1961

OLDSMOBILE

88 • S-88 • 98

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SERVICE MANUAL

1961 OLDSMOBILE SERVICE MANUAL

USE OF INDEX

Arrangement of sections is shown by the index on the right side of this page. Black tabs on the first page of each section register opposite the section indexes when edge of the manual is turned as shown in illustration. A more detailed table of contents precedes each section.

FOREWORD

This manual is compiled to provide service procedures, adjustments and specifications for the 1961 Oldsmobiles. An understanding of the material contained herein and in supplementary Dealer Technical Information Bulletins, issued when necessary, will assist service personnel in properly maintaining the quality to which Oldsmobile cars are built.

PRICE: TWO DOLLARS

To aid in locating revisions in the Service Manual, a gray background is used to identify portions of the text which describe new procedures, changes in procedure and specification changes.

SERVICE DEPARTMENT

OLDSMOBILE DIVISION

GENERAL MOTORS CORPORATION

LANSING, MICHIGAN

SPECIFICATIONS ARE LISTED AT END OF EACH SECTION

GENERAL INFORMATION

CONTENTS OF SECTION 1

1961 MODEL IDENTIFICATION

A four digit number, called the car series and body style designation number, identifies any car as to series and style. Reading from left to right, the digits represent the following:

First and second digits: Series designation.
Third and fourth digits: Body Style.

Example: The number 3211 identifies a car as a 88, 2 door sedan. Note that "32" identifies the car as a 88 and that "11" represents a 2 door sedan.

1961 MODEL DESIGNATION

Series	Body Style	Designation Series Style
88	2 Door Sedan	3211
	Fiesta Sedan	3235
	Holiday Coupe	3237
	Holiday Sedan	3239
	Fiesta Sedan (3 Seat)	3245
	Convertible Coupe	3267
	4 Door Sedan	3269
Super 88	Fiesta Sedan	3535
	Holiday Coupe	3537
	Holiday Sedan	3539
	Fiesta Sedan (3 Seat)	3545
	Convertible Coupe	3567
	4 Door Sedan	3569
98	4 Door Sedan (6 Window)	3819
	Holiday Sedan (6 Window)	3829
	Holiday Coupe	3837
	Holiday Sedan (4 Window)	3839
	Convertible Coupe	3867

BODY AND STYLE NUMBERS

The body and style numbers are stamped on a plate which is located under the hood below the left windshield wiper transmission. (Fig. 1-1) The plate shows:

1. Year and Style Number of Body
2. Body Number
3. Trim Number
4. Paint Number (Color Specification Number)

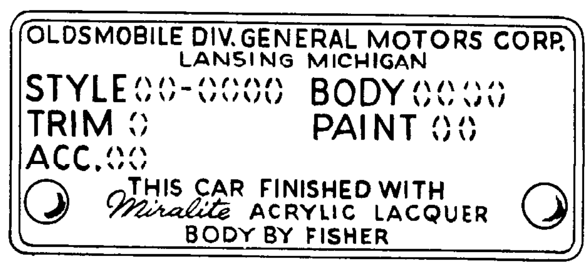


Fig. 1-1 Body and Style Number Plate

All Fisher Body numbers are prefixed by letters indicating the plant at which the body was assembled.

LA - Lansing	BC - South Gate
BA - Doraville	BW - Wilmington
BK - Kansas City	BT - Arlington
BL - Linden	

Fiesta sedan bodies are made by the Ionia Manufacturing Division of the Mitchell-Bentley Corporation. The plates are similar to the Fisher Body plate as shown in Fig. 1-1.

NOTE: WHEN WRITING SERVICE ORDERS, PREPARING A.F.A.'s OR CORRESPONDENCE, IT IS VERY IMPORTANT THAT ALL LETTERS AND NUMBERS BE INCLUDED FOR CORRECT BODY IDENTIFICATION.

VEHICLE IDENTIFICATION NUMBER PLATE

The 1961 vehicle identification number plate is located on the left front door hinge pillar and

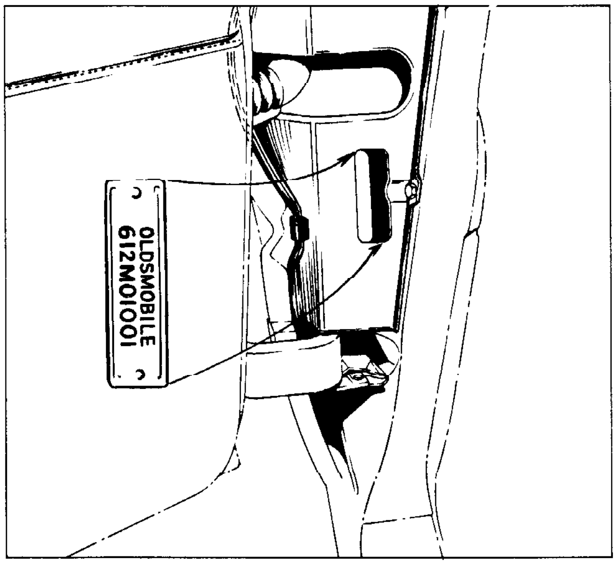


Fig. 1-2 Vehicle Identification Number Plate

is visible through a hole in the hinge pillar cover as illustrated in Fig. 1-2. Each identification number is prefixed by three numbers and a letter. The first two numbers (61) indicate the year 1961. The third number designates the series.

2 - 88 (32 Series)
5 - Super 88 (35 Series)
8 - 98 (38 Series)

The letter in the identification number indicates the assembly plant at which the car was built. "M" indicates a Lansing-built car. "A" an Atlanta-built car, etc. (See STARTING VEHICLE IDENTIFICATION NUMBER CHART.)

NOTE: ALWAYS SHOW COMPLETE ENGINE UNIT AND VEHICLE IDENTIFICATION NUMBER IN REPORTS AND CORRESPONDENCE.

ENGINE UNIT NUMBER (For Manufacture and Service Use)

The engine unit number is stamped on the left cylinder head. (Fig. 1-3) For engine usage refer to the ENGINE IDENTIFICATION CHART.

ENGINE IDENTIFICATION

	Engine Unit Number							
Series	Prefix (Code Letter)	Starting Unit No.	Suffix (Code Letter)	Engine Color	Carburetor Type	Piston Type	Head Gasket Thickness	Compression Ratio
88	F	001001	--	Green	2 Bbl.	Dished	.025"	8.5:1
88 (H.C. Opt.)	G	001001	H	Green	2 Bbl.	Flat	.025"	10.00:1
88 (H.C. Opt.)	G	001001	--	Red	4 Bbl.	Flat	.025"	10.00:1
88 (Export)	F	001001	E	Green	2 Bbl.	Dished	.040"	8.3:1
S88 & 98	G	001001	--	Red	4 Bbl.	Flat	.025"	10.00:1
S88 & 98 (Export)	G	001001	E	Red	4 Bbl.	Dished	.040"	8.3:1

STARTING VEHICLE IDENTIFICATION NUMBERS FOR 1961

Built At:	88 (32 Series)	Super 88 (35 Series)	98 (38 Series)
Lansing, Michigan	612M01001	615M01001	618M01001
Atlanta, Georgia	612A01001	615A01001	618A01001
Kansas City, Kansas	612K01001	615K01001	618K01001
Linden, New Jersey	612L01001	615L01001	618L01001
South Gate, California	612C01001	615C01001	618C01001
Wilmington, Delaware	612W01001	615W01001	618W01001
Arlington, Texas	612T01001	615T01001	618T01001

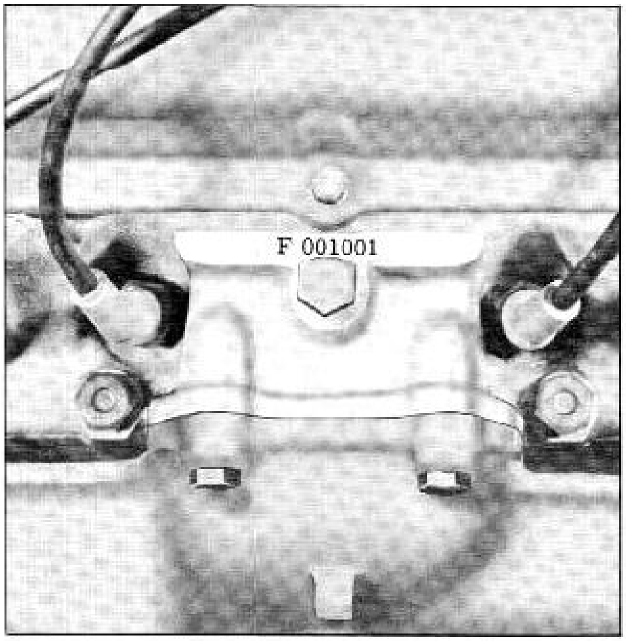


Fig. 1-3 Engine Unit Number Location

TRANSMISSION SERIAL NUMBER

The Hydra-Matic serial number plate is riveted to the left side of the transmission case. (Fig. 1-4) A prefix of OA61-1001 on a light green plate identifies the transmission as being used with a 4 Bbl. carburetor engine and a prefix of O61-1001 on a bright yellow plate identifies the transmission as one used with a 2 Bbl. carburetor engine.

NOTE: ALWAYS INCLUDE THE TRANSMISSION SERIAL NUMBER IN CORRESPONDENCE CONCERNING HYDRA-MATIC TRANSMISSIONS.

88 SERIES -	IDENTIFIED BY PREFIX "0" ON A YELLOW PLATE
S88 & 98 SERIES -	IDENTIFIED BY PREFIX "0A" ON A LIGHT GREEN PLATE

Fig. 1-4 Transmission Serial Number Plate

Syncro-Mesh transmissions do not have a serial number.

PUSHING CAR TO START ENGINE

Hydra-Matic

As a result of Hydra-Matic transmission design, the engine cannot be started by pushing the car.

Syncro-Mesh

To start the engine by pushing the car, move the gearshift lever to either second or high gear, disengage the clutch and turn on ignition switch. When the vehicle reaches a speed of 10 m.p.h., engage the clutch.

TOWING PRECAUTIONS

Always place a wooden 4" x 4" adjacent to the bumper back bars and frame cross member and a rubber mat or other suitable protector between the bumper and the tow chains or cables to prevent distortion and/or marring of the bumpers. For front end lift, place the chains or cables around the ends of the frame side rails at both sides. All models can be towed without disconnecting the propeller shaft except in the case of transmission or propeller shaft failures, the propeller shaft must be disconnected from the differential and wired to the exhaust pipe or the car must be towed with the rear wheels off the ground. If the propeller shaft is disconnected and the "U" joint bearing retaining strap is broken, wrap tape around the bearing caps to prevent loss. When towing with rear wheels off the ground, the steering wheel must be centered and held in position by a steering wheel holding clamp or by tying it to the window division channel. Tire to ground clearance should not exceed 6 inches while towing the car and SPEED SHOULD NOT EXCEED 30 M.P.H.

HOISTING THE CAR

When supporting car on a floor jack or floor stands, the car should be supported at the suspension points only. Under no condition should the car be supported at the extreme ends of frame or at the center of a frame side rail.

When using a frame contact hoist the car should be lifted at the torque boxes (where front and rear frame sections join the frame side rails).

The car should not be lifted at the front or rear bumper with anything other than the bumper jack provided with the car.

GENERAL SPECIFICATIONS

	88	Super 88	98
Wheelbase			
All Except Fiestas	122.9"	122.9"	125.9"
Fiestas	121.85"	121.85"	--
Overall Length	212"	212"	218"
Overall Width	77.2"	77.2"	77.2"
Overall Height	55.6"*	55.6"*	55.6"
Tread Width, Front and Rear	61"	61"	61"
Engine Displacement	394.1 Cu. In.	394.1 Cu. In.	394.1 Cu. In.
Compression Ratio	8.5 to 1**	10.00 to 1	10.00 to 1

* With 5 passenger load - 8.00 x 14 tires
** High Compression Option - 10.00 to 1

CAPACITIES

ITEM	CAPACITY
Differential	5 Pts.
Engine Crankcase Only, Drain and Refill	4 Qts.
Engine Crankcase, Drain and Refill and Filter Change	5 Qts.
Cooling System	
With Air Conditioning (Less Heater)	21 Qts.
Without Air Conditioning (Less Heater)	19-1/4 Qts.
For Heater, Add	1 Qt.
Gasoline Tank	20 Gal.
Syncro-Mesh Transmission	2-1/2 Pts.
Hydra-Matic Transmission	
Without Removing Oil Pan	5-1/2 Qts.
With Oil Pan Removal	6-1/2 Qts.
After Complete Overhaul	9 Qts.
Power Steering	
Complete System	1-3/4 Qts.
Pump Only	1 Qt.

LUBRICATION

CONTENTS OF SECTION 2

OLDSMOBILE GUARDIAN MAINTENANCE SCHEDULE

MAINTENANCE SERVICE	MILEAGE IN THOUSANDS																			
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
Body and Chassis Lubrication	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Change Engine Oil and Clean Inlet Breather Cap	As Required - Refer to Page 2-5																			
Replace Oil Filter			•			•			•			•			•			•		
Clean and Oil non Disposable Type Air Cleaner (Service Oftener under Dusty Driving Conditions)			•			•			•			•			•			•		
Change Element in Disposable Type Air Cleaner (Service Oftener under Dusty Driving Conditions)								•								•				
Change Hydra-Matic Fluid													•							
Hydra-Matic Band Adjustment													•							
Repack Universal Joints (Service Oftener In Warm Climates or Under High Temp. Operating Conditions)										•										
Rotate Tires		•		•		•		•		•		•		•		•		•		•
Brake Adjustment	As Necessary - Refer to Page 7-2																			
Repack Front Wheel Bearings					•					•					•					•
Lubricate Slip Yoke				•				•				•				•				•
Spark Plugs - Clean and Gap					•					•					•					•
Distributor - Adjust Points & Set Timing					•					•					•					•
Carburetor - Adjust Idle Speed & Mixture					•					•					•					•
Clean Battery Cables and Terminals	Every 10,000 Miles or Once Each Year																			
Service Air Conditioning	Refer to Page 14-7																			
Liquid Glaze	As Necessary																			
Clean Crankcase Ventilation Inlet Breather	At Every Oil Change																			
Clean Crankcase Ventilation Check Valve					•					•					•					•

Fig. 2-1 Oldsmobile Guardian Maintenance Schedule

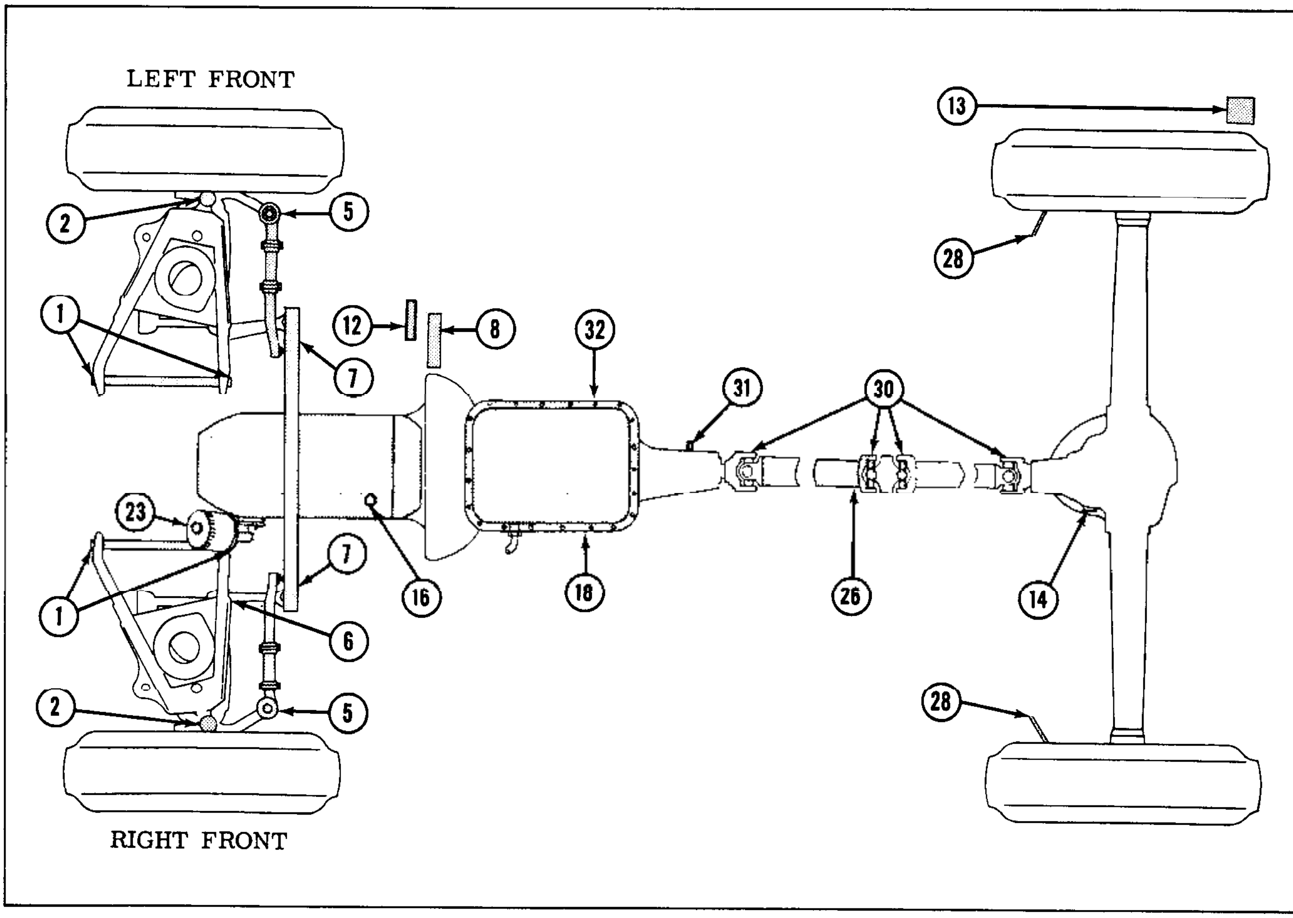


Fig. 2-2 Lubrication Points

EVERY 2,000 MILES

CHASSIS

1. Lower control arm pivot shafts . . . 4 points
2. Lower control arm ball joints . . . . 2 points
3. Upper control arm pivot shafts . . . . 4 points
4. Upper control arm ball joints . . . . 2 points
5. Tie rod ends . . . . 2 points
6. Steering idler arm bushing . . . . . . 1 point
7. Relay rod . . . . 2 points
8. Clutch equalizer . . . . 1 point
9. Generator oil cups . . . . . SAE 20 engine oil
10. Throttle and transmission linkage pivot points . . . . . SAE 20 engine oil
11. Parking brake linkage . . . SAE 20 engine oil
12. Syncro-Mesh clutch linkage (including felt washers at end of the clutch equalizer) . . . SAE 20 engine oil
13. Gas tank filler door hinge . SAE 20 engine oil

BODY LUBRICATION—CHECK—LUBRICATE AS REQUIRED

(Wipe Off Old Lubricant)

Door lock striker teeth-Light coat of stick type lubricant.

Rotary lock-Drop or two of SAE 20 oil on lock pivot. Light coat of stick type lubricant on surface of lock housing.

Door hinge and hold open assembly-Thin film of lubriplate on friction surfaces. A drop of oil on all pivot points.

Door jamb switch-Thin film of lubriplate 630 AAW or equivalent to end of plunger.

Hood hinges-SAE 20 oil at pivot points.

Hood latch-Thin film of lubriplate on friction surface. A drop of oil on all pivot points.

Rear compartment lid-Apply lubriplate 630 AAW to bolt at striker contact area.

Rear compartment lid hinges and torque rods-Apply lubriplate 630 AAW to hinges and torque rods at friction points. Apply lithium soap grease to torque rod silencer.

Weatherstrips, door bottom drain hole sealing strip, and door and hood bumpers-Thin film of Dow Corning 4X weatherstrip grease.

Seat adjuster-Thin film of lubriplate 630 AAW on seat tracks.

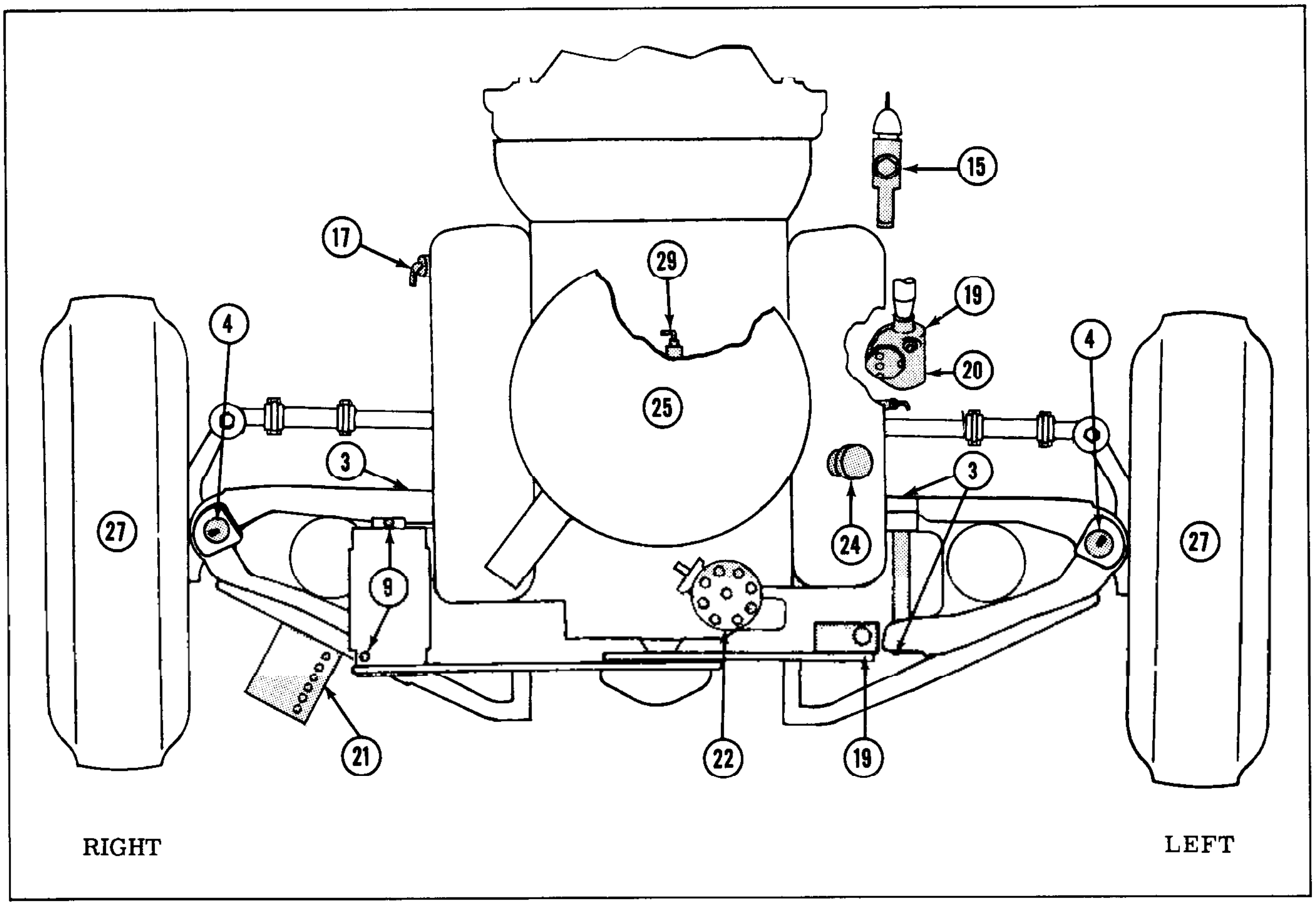


Fig. 2-3 Lubrication Points

CHECK FLUID LEVEL—ADD IF NECESSARY

14. Differential . . . . Special lubricant Part No. 531536. (Small amounts of SAE 90 Multi-Purpose Gear Lubricant may be used to replenish differential.)
15. Brake master cylinder . . . GM Brake Fluid No. 11.
16. Engine oil. . . . . MS or DG oil of proper viscosity.
17. Hydra-Matic . . . . GM Hydra-Matic fluid.
18. Syncro-Mesh . . . . Syncro-Mesh Transmission Lubricant. Part No. 582840.
19. Steering gear and pump (Power) . . . . GM Hydra-Matic fluid.
20. Steering gear (Manual) . . . SAE 80 Multi-Purpose Gear Lubricant.
21. Battery . . . . Distilled water.

EVERY 6,000 MILES

16. Engine oil* -- Drain and refill with MS or DG oil of proper viscosity whenever oil filter is replaced. Refer to Change Interval Chart, Page 2-5.
22. Distributor -- Apply a film of Delco-Remy Cam and Ball Bearing Lubricant to the breaker cam.
23. Oil filter* -- Replace oil filter.
24. Crankcase inlet breather* -- Wash in solvent and re-oil with engine oil.
25. Air cleaner (non-disposable type)* - Wash in kerosene and re-oil with SAE 20 engine oil.

NOTE: The heavy duty disposable type air cleaner should be replaced every 16,000 miles. However in dusty areas it may require more frequent replacement.

*Severe driving conditions may necessitate more frequent attention.

EVERY 8,000 MILES

26. Slip yoke -- Lubricate with Seal Lubricant (Part No. 567196) until lubricant appears at slip yoke nut at rear of front propeller shaft.

EVERY 10,000 MILES

21. Battery -- Clean top of battery and cable terminals, apply a thin film of petrolatum to battery post and clamps.

27. Front wheel bearings -- Clean and pack with a sodium soap, fine fiber grease such as Marfax Heavy Duty Number 1.

28. Parking brake cables -- Lubricate with brake cable lubricant (Lithium soap grease).

29. Positive crankcase ventilator -- Clean check valve and line.

EVERY 16,000 MILES

25. Replace disposable air cleaner.

EVERY 20,000 MILES

30. Universal joints -- Disassemble, clean and repack with a sodium soap, fine fiber grease such as Marfax Heavy Duty Number 2.

EVERY 26,000 MILES

17. Hydra-Matic -- Drain and refill with GM Hydra-Matic fluid.

31. Speedometer cable -- Lubricate lower 2/3 with AC speedometer grease.

32. Adjust Hydra-Matic transmission band.

STEERING LINKAGE AND SUSPENSION

The front suspension and the steering linkage should be thoroughly lubricated with chassis lubricant at 2,000 mile intervals.

The rear suspension does not require lubrication.

DIFFERENTIAL

Periodic or seasonal changes are not recommended. The lubricant level should be checked at 2,000 mile intervals and if necessary, add lubricant to bring it up to the filler plug level. Small additions of SAE 90 Multi-Purpose Gear Lubricant may be used.

CAUTION: Always clean dirt or foreign materials from around plug opening before removing filler plug.

Capacity of the differential is approximately 2 pints.

BRAKES

The fluid level in the master cylinder should be checked every 2,000 miles. If necessary to add fluid, use GM Brake Fluid No. 11. Standard brake fluid level must be maintained at 1/2" below the master cylinder filler cap.

CAUTION: Extreme care must be exercised to prevent entry of dirt into the master cylinder.

At time of brake overhaul, all rust should be cleaned from brake shoes, the inner surfaces of the brake backing plates, and all metal contact points at the brake shoe assembly. A film of four parts (volume) of Synthetic Oil Seal Lubricant (Part No. 567196) and one part (volume) of powdered graphite should be applied to the surfaces against which the shoes operate or adjacent brake parts contact. Care must be exercised to prevent any lubricant from getting on the braking surfaces of shoes or drums.

ENGINE CRANKCASE OIL

The TYPE of engine oil used will effect operation, wear, and combustion chamber deposits; the oil VISCOSITY will affect oil economy and ease of starting. It is, therefore, important that the recommendations made in this section regarding TYPE, VISCOSITY and OIL CHANGE INTERVAL be followed.

Type of Oil

ML - Not Recommended

This oil is designed for light service in engines not critically affected by sludge and varnish deposits.

MM - Not Recommended

This oil has additives to reduce sludge, varnish, and acids, but not in sufficient quantities to be recommended for use in the Oldsmobile engine.

MS and DG - Recommended

These oils are recommended for use in Oldsmobile engines as they have sufficient additives to minimize formation of sludge, varnish, and acids under normal driving conditions. These additives also give extreme pressure protection which prevents scuffing wear encountered under some types of driving conditions.

DS

This oil is specially compounded for use in diesel engines under severe operating conditions, and is not generally available. It can be used satisfactorily in Oldsmobile engines, but is not required. It contains a larger quantity of additives than the MS or DG oils.

Brands of Oil

In selecting a brand of engine oil, it is advisable to consider the reputation of the refiner and distributor, as they are responsible for the quality of the product and their reputation is the car owner's best indication of quality. To obtain maximum performance and satisfaction from the engine, it is important to use only crankcase oils that have been proven, in service, to be satisfactory in minimizing wear as well as sludge, varnish, and acidic deposits.

Even though designated "For Service MS" or "For Service DG", some commercial crankcase oils form the type of combustion chamber deposits that increase the tendency for detonation and pre-ignition; also, some are deficient in anti-wear characteristics and may contribute to rapid wear of engine' parts, such as camshaft, valve lifters, rocker arms, and piston rings.

Under adverse operating conditions where a greater concentration of additives is required, a High Detergency Concentrate which has been thoroughly tested and recommended is available under General Motors Part No. 582099.

The use of proprietary compounds, such as "break-in" oils, "tune-up" compounds, "tonics", "friction reducing" compounds, etc., are specifically not recommended.

Oil Viscosity

SAE viscosity numbers specify viscosity only and should not be confused with "Type of Oil". The lower viscosity of "thinner" oils, such as, SAE 5W, or SAE 10W are designed for use during cold weather to provide fast starting and instant lubrication. The higher viscosity or "thicker" oils, such as, SAE 20 or SAE 20W are designed for use during warm or hot weather to provide adequate lubrication under higher operating temperatures.

Several oil companies now market multiple viscosity oils, such as, SAE 5W-20, SAE 10W-20, SAE 10W-30, etc., which are designed to combine the fast starting and instant lubrication characteristics of the lower SAE number with the warm weather operating characteristics of the higher SAE number.

The proper oil viscosity to use depends upon the range in atmospheric temperatures that will be encountered during the period the oil remains in the crankcase. More than normal oil consumption will be encountered during warm or hot weather, particularly under high speed driving conditions, if the oil viscosity is too low. The following chart will serve as a guide to the proper oil viscosity to use under various atmospheric temperature conditions. It is not necessary to change oil for the unseasonably cold or warm days encountered during the fall or spring season.

Anticipated Lowest Atmospheric Temperature	Recommended SAE Viscosity Number When Single Viscosity Oils Are Used	Recommended SAE Viscosity Range When Multi/Viscosity Oils Are Used
32°F	SAE 20 or SAE 20W	SAE 10W-30 or SAE-10W-20
0°F	SAE 10W	SAE 10W-30 or SAE 10W-20
Below 0°F	SAE 5W	SAE 5W-20

NOTE: The SAE viscosity number should be plainly marked on the oil containers.

SAE 5W oils are not recommended for sustained high speed driving during warm weather. For sustained high speed driving when the prevailing daylight temperature is above 90°F, SAE 30 may be used.

SAE 5W and SAE 5W-20 oils are particularly advantegous during extremely low temperatures because the easy starting and quick flow characteristics of these oils greatly reduce the drain on the battery in cold weather.

Oil Change Interval

The crankcase of the engine was filled at the factory with MS or DG oil. If it is necessary to add oil before the first drain period, use oil of type and viscosity recommended in the preceding paragraphs on "Type of Oil" and "Viscosity". Break-in oils are entirely unnecessary and their use is not recommended.

When changing oil, drain the crankcase after the engine has reached normal operating temperature to insure complete removal of the old oil. Oil pan drain plug torque is 30-35 ft. lbs.

The initial oil change and subsequent changes should be made in accordance with the following recommendations:

Prevailing Daylight Temperature	Change Interval
Above 32° F.	*Every 3,000 miles or every 3 months, whichever occurs first.
Below 32° F.	*Every 3,000 miles or every 2 months, whichever occurs first.

* NOTE: If the car has been driven in a dust or sand storm, the engine oil should be changed as soon as possible. When the car is operated on dirt roads or under dusty conditions, it may be necessary to change the oil more frequently than indicated in the above recommended intervals which were predicted on paved road driving conditions.

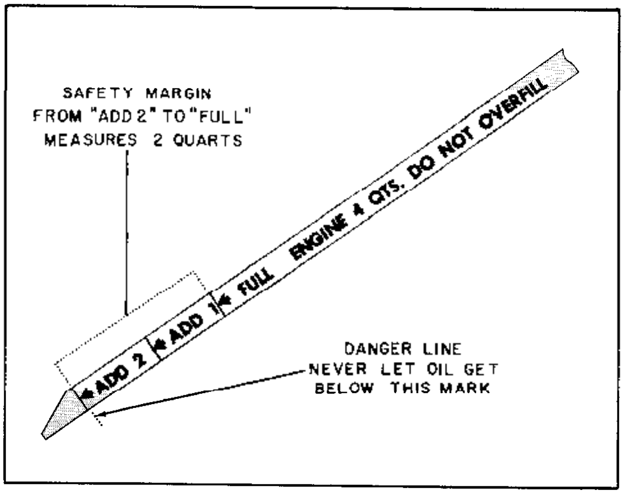


Fig. 2-4 Engine Oil Dipstick

Crankcase Capacity

Oil change only, 4 quarts.

Oil change and filter element change, 5 quarts.

Oil Level

The engine oil dipstick located on the left side of the engine, is marked "Full", "Add 1", and "Add 2". The oil level should be maintained in the safety margin, neither going above the "Full" line nor under the "Add 2" line. The oil level should be checked when refueling. (Fig. 2-4)

HYDRA-MATIC TRANSMISSION

GM Hydra-Matic Fluid

This all-season fluid, designed for year-round operation, is available through authorized dealers.

Fluid for the Hydra-Matic unit is also available through most independent oil companies. Only fluid with the following identification on the container should be used: brand name, including the words ". . . . . Fluid Type "A", plus "AQ-ATF-number-A".

Checking Hydra-Matic Fluid Level

Fluid level should be checked every 2,000 miles. Check must be made with the engine idling and the selector lever in the park position. FLUID LEVEL MUST BE MAINTAINED AT THE FULL MARK (transmission warm).

CAUTION: Do not fill above full mark as this will cause foaming and will result in improper operation.

Draining Hydra-Matic Transmission

The Hydra-Matic fluid should be changed every 26,000 miles.

To drain the Hydra-Matic transmission oil:

1. Remove drain plug from transmission oil pan permitting fluid to drain, then replace the plug.
2. Raise hood and remove dipstick.
3. First add 3-1/2 quarts of HM fluid to the transmission.
4. With the selector lever in park position and the car on a level surface, start engine. With engine running, add fluid to bring level to "FULL" mark on the dipstick.

NOTE: Approximately 4 quarts of oil are required to fill the Hydra-Matic transmission after the transmission has been drained. Approximately 5 quarts will be required to fill the transmission if the oil pan has been removed and drained at the same time that the fluid is changed. AFTER FLUID HAS BEEN ADDED THE TRANSMISSION IS WARM, LEVEL SHOULD BE CHECKED TO MAKE SURE THAT IT IS AT THE "FULL" MARK ON THE OIL LEVEL DIPSTICK. Approximately 7 quarts are required after an overhaul.

BAND ADJUSTMENT

To adjust the band, remove the oil pan, loosen band adjusting screw lock nut and tighten screw to 100 inch lbs. Back screw off 2-1/4 turns and tighten lock nut. Install pan and add necessary oil.

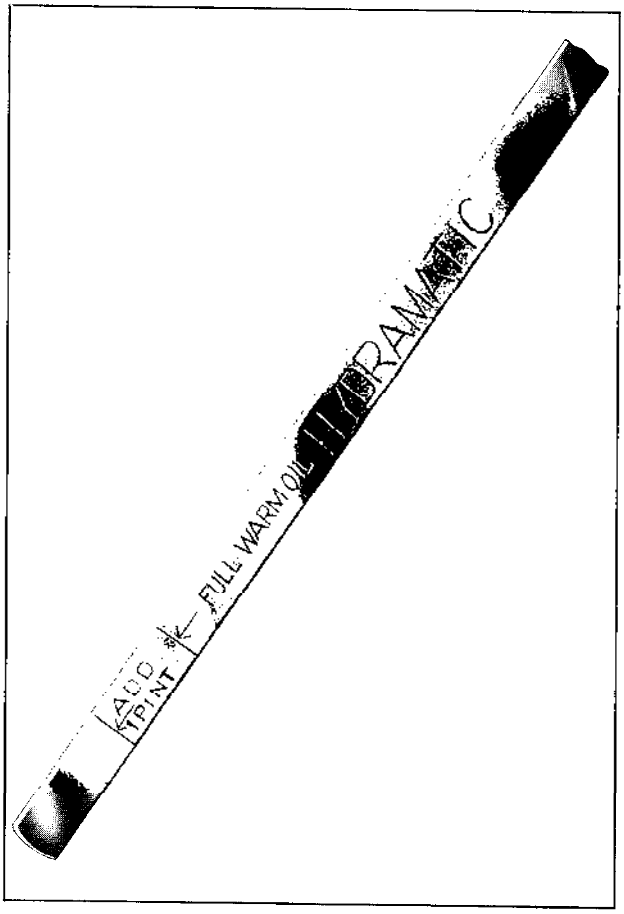


Fig. 2-5 Hydramatic Transmission Oil Level Dipstick

SYNCRO-MESH TRANSMISSION

Remove the filler plug from the transmission case and fill to the level of the opening with Syncro-Mesh Transmission Lubricant, Part No. 582840. The lubricant level should be checked every 2,000 miles and if found low, the transmission should be checked for leaks, and the source of the leak corrected. Periodic or seasonal change of lubricant is not recommended:

CAUTION: Always clean dirt or foreign material from around plug before removing.

Capacity of the unit overhauled is 2 pints.

POWER STEERING GEAR AND PUMP

Check every 2,000 miles and maintain oil level at "FULL" mark. Oil must be warm when checking oil level. Use Hydra-Matic Transmission Fluid. Power steering gear lubrication is accomplished by the oil supplied to the gear by power steering pump. Pump must be at maximum full mark.

MANUAL STEERING GEAR

Check steering gear lubricant level every 2,000 miles. The necessity for frequent addition of lubricant indicates leakage and the source of leakage must be found and corrected. Use SAE 80 Multi-Purpose Gear Lubricant. Regular or seasonal changes are unnecessary.

NOTE: THE FRONT WHEELS SHOULD BE TURNED TO THE EXTREME RIGHT TO ALLOW GREASE TO ENTER THE GEAR FREELY.

BATTERY

Check battery liquid level every 2,000 miles or once a month (more often in hot weather). Level should reach the bottom of the vent well.

CAUTION: DO NOT OVERFILL.

Service battery and terminals every 10,000 miles or once a year. Check tightness of battery hold-down bolts. To properly clean battery:

1. Make sure vent plugs are closed tight.
2. Brush battery with a diluted ammonia or soda and rinse with clear water. Apply a thin coating of petrolatum to terminals and clamps.

DISTRIBUTOR

The breaker cam should be lubricated with a thin film of Delco-Remy Cam and Ball Bearing Lubricant every 6,000 miles or whenever the contact assembly is replaced. No other lubrication is required. The movable breaker plate is lubricated by oil from the upper main shaft bushing.

GENERATOR

Hinge cap oilers are provided at both the commutator and drive ends. Every 2,000 miles the oilers should be filled to the cap with SAE 20 oil.

If the oil reserve in the commutator end frame becomes completely exhausted through failure to lubricate at regular intervals, it will require more than a simple filling to restore the reserve. In such case, oil cup should be filled three times consecutively, allowing time between fillings for the oil to soak down.

THROTTLE AND TRANSMISSION LINKAGE

Every 2,000 miles, remove road film from lubrication points, then apply engine oil to all friction and bearing surfaces on transmission control linkage and throttle linkage.

PARKING BRAKE LINKAGE

All the moving parts of the parking brake linkage should be lubricated with engine oil every 2,000 miles.

PARKING BRAKE CABLES

The parking brake cables leading to the rear wheels operate inside metal conduits through a portion of their length. Normal use of this type of cable will assist in keeping them in operating condition without periodic maintenance.

CLUTCH LINKAGE

Every 2,000 miles remove road film from lubrication points, then apply engine oil to all friction and bearing surfaces on the clutch linkage. The clutch equalizer should be lubricated with chassis lube.

FUEL FILTER

The fuel filter is located in front of the right cylinder head. The bowl and element should be cleaned when necessary. If the element cannot be cleaned satisfactorily, it should be replaced.

OIL FILTER

A full flow oil filter, provided as optional equipment on all models, filters 100% of the oil delivered by the oil pump. For this reason the interval of change is very important. The oil filter should be replaced every 6,000 miles. Operating conditions may require more frequent replacement.

The oil filter can be removed as follows:

1. Loosen filter with a wrench, then remove and discard filter.

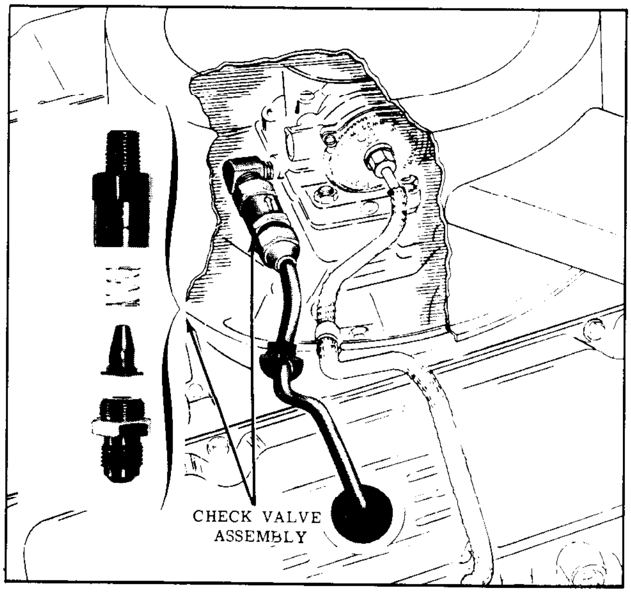


Fig. 2-6 Positive Crankcase Ventilator

2. Clean out filter body casting.
3. With new seal seated on face of new filter, install filter carefully, then torque 15-17 ft. lbs.

CRANKCASE BREATHER

At each engine oil change the crankcase inlet breather cap should be washed in solvent and re-oiled with SAE 20 oil. Operating conditions may require more frequent service.

POSITIVE CRANKCASE VENTILATOR

The positive crankcase ventilator check valve should be cleaned every 10,000 miles. (Fig. 2-6)

AIR CLEANER

Non-Disposable Type

The air cleaner element should be serviced every 6,000 miles. Operating conditions may require more frequent service.

The air cleaner should be serviced as follows:

1. Remove the filter element.
2. Wash accumulated dirt from the filter element by plunging it up and down several times in clean kerosene and wring dry.
3. Oil filter element with SAE 20 oil wring out excess oil and install.

Heavy Duty Disposable Element Type

The air cleaner incorporates a disposable air filter element. The outside surface of the element is covered with a coarse material for primary filtering of large particles. The inner surface is a less porous material for filtering fine particles. Soft plastic flanges are used as self contained gaskets which seal the air cleaner body and cover. Therefore, all air must pass through the filter element.

The air filter element should be replaced every 16,000 miles under normal driving conditions, or under dusty driving conditions more frequently as required. Do not attempt to service the element.

The filter element should be replaced as follows:

1. Remove air cleaner assembly to prevent dirt from falling into carburetor.
2. Remove filter element from air cleaner.
3. Clean dust and dirt from metal surfaces of air cleaner body and install new filter element.
4. Install air cleaner assembly on car.

SLIP YOKE

The slip yoke should be lubricated every 8,000 miles with Special Seal Lubricant (Part No. 567196) until lubricant appears at the rear of the front propeller shafts. A grease fitting plug is provided for lubrication of the slip yoke.

UNIVERSAL JOINTS

The needle bearings in the universal joints of the propeller shafts are prepacked with lubricant at the time of their manufacture; no attention need be given these bearings so far as lubrication is concerned for 20,000 miles.

When removing the propeller shaft, mark the shaft so it may be replaced in all places in the same position as when removed.

To lubricate, proceed as follows:

For Service of universal joints, refer to PROPELLER SHAFT Section 6.

1. If the propeller shafts were separated, thoroughly clean the slip yoke and lubricate with Special Lubricant (Part No. 567196).

FRONT WHEEL BEARINGS

Front wheel bearings should be lubricated every 10,000 miles with a sodium soap, fine fiber grease such as Marfax Heavy Duty Number 2. Long fibrous greases should be avoided because they throw out of bearings.

Pack the bearing assemblies full, but do not put grease in hub as excessive grease increases the chance of leakage into the brakes and prevents proper heat dissipation of the hub and drum assembly.

When it is found necessary to remove the front wheel bearings for cleaning, the bearings should be washed in clean gasoline (not light oil) and must be thoroughly dried before new grease is applied. If the bearings are washed in light oil, the grease will not adhere to the bearings and the bearings will run dry.

The adjustment of front wheel bearings should be made as follows:

1. Tighten adjusting nut 10-15 ft. lbs. to insure that all parts are properly seated and threads are free.
2. Back off nut 1/6 to 1/4 turn and install cotter pin.

SPEEDOMETER CABLE

The speedometer cable is lubricated at the time of assembly and should not require further lubrication, under normal conditions, for 26,000 miles. When a new speedometer cable is installed, it should be lubricated. To lubricate, all old grease must first be removed from the cable casing and then a coating of AC Speedometer cable grease should be applied to the lower two-thirds of the cable only. This will properly lubricate the upper one-third of the casing, giving an even coating of lubricant the full length of the flexible cable, without danger of excess grease working up into the speedometer head.

Special care should be exercised that foreign material, etc. is not permitted to get into cable housing.

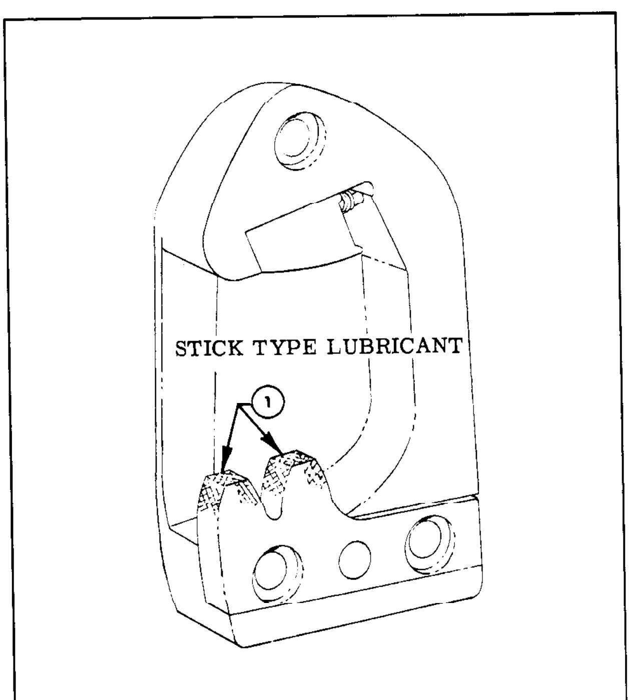


Fig. 2-7 Door Lock Striker

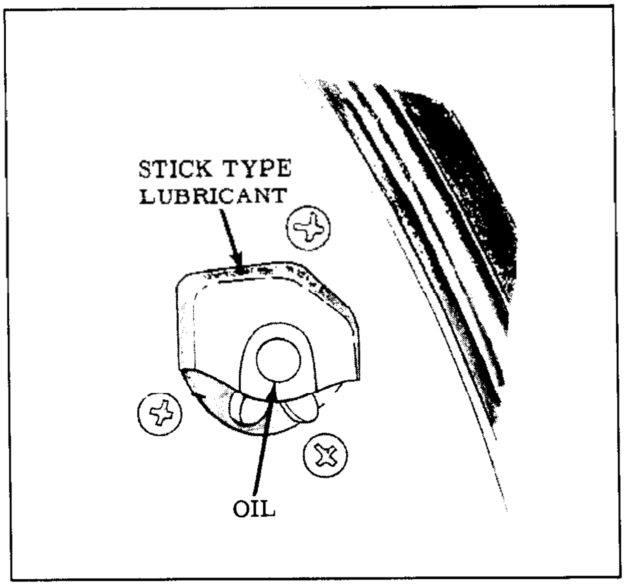


Fig. 2-8 Door Lock

BODY LUBRICATION

HOOD HINGES

SAE 20 oil should be used to lubricate the hood hinges, care being taken not to allow the oil to drop on fenders or other exposed painted surfaces.

HOOD LATCH

Lubricate the latch pilot bolts and latch locking plates with a thin film of lubriplate. Use a light oil for pivot points.

DOOR LOCK STRIKER

Wipe off dirt and apply a thin coat of stick type lubricant to top surface of lock bolt striker teeth (Fig. 2-7) After lubrication, close door several times and remove excess lubricant along the side edge of teeth.

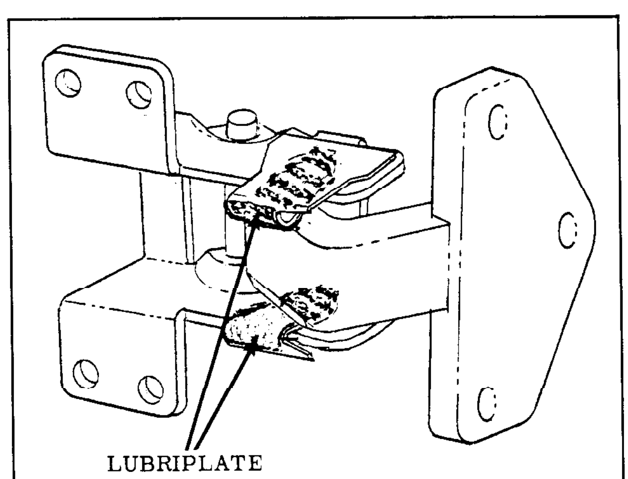


Fig. 2-9 Front Door Hinge and Hold Open Assembly

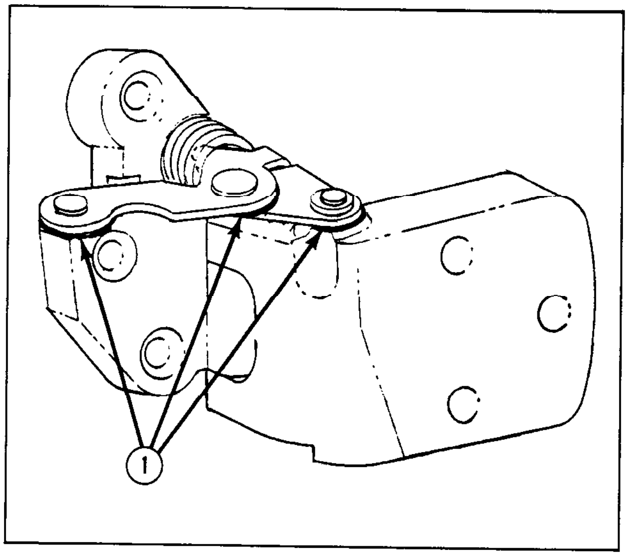


Fig. 2-10 Rear Door Hinge

DOOR LOCKS

Wipe off dirt and apply a thin coat of stick type lubricant on surface of lock housing. (Fig. 2-8)

Place a drop or two of SAE 20 oil on the rotary lock pivot.

DOOR HINGE AND HOLD OPEN ASSEMBLY

Wipe off dirt and apply a light coat of lubriplate 630 AAW or its equivalent at points indicated by number 1. (Fig. 2-9)

Place a drop of oil on hinge pins. Wipe off excess lubricant.

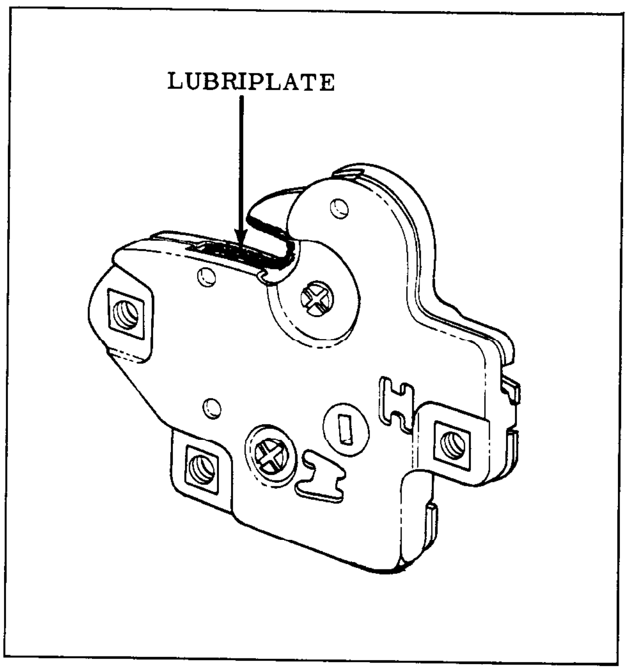


Fig. 2-11 Rear Compartment Lid Lock Bolt

REAR COMPARTMENT LID AND BACK DOOR LOCKS

On rear compartment lid locks, apply a thin film of Lubriplate 630 AAW or its equivalent. (Fig. 2-11)

On back door locks, apply a thin film of Lubriplate 630 AAW or its equivalent to the bolt at the striker contact areas.

DOOR AND REAR COMPARTMENT LOCK CYLINDERS

A small quantity of lock lubricant occasionally applied to the lock cylinders will prevent sticking.

REAR COMPARTMENT LID HINGES AND TORQUE RODS

Apply Lubriplate 630 AAW or equivalent to hinge and torque rods at friction points. Apply a thin coat of Lithium Soap Grease to torque rod silencer at area contacted by torque rod.

WEATHERSTRIP AND DOOR BUMPERS

A thin film of silicone lubricant should be used on all weatherstrips, door bumpers, hood and lacings to prevent squeaking.

FRONT SEAT ADJUSTER MECHANISM

A thin film of Lubriplate 630 AAW or its equivalent should be applied to the seat tracks as needed or during repairs.

GLOVE COMPARTMENT DOOR HINGE

Wipe off dirt and apply a sparing amount of dripless oil to the hinge frictional points. Operate door and wipe off excess lubricant.

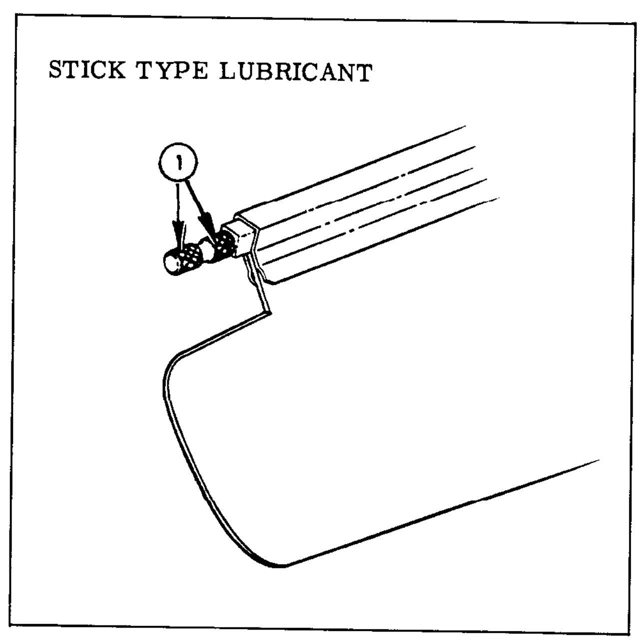


Fig. 2-12 Sunshade Rod

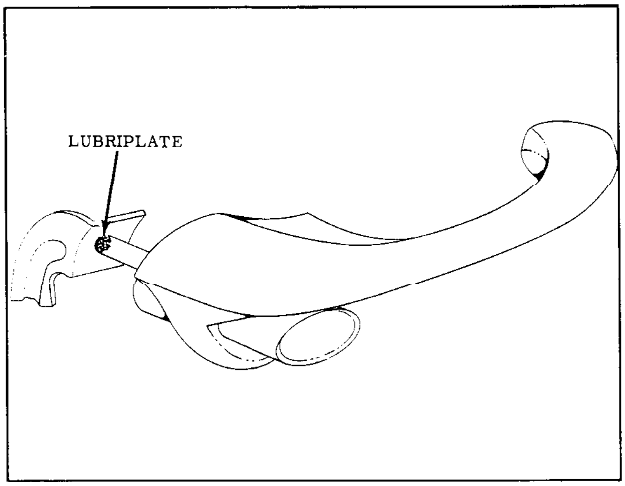


Fig. 2-13 Door Outside Handle

GAS TANK FILLER DOOR HINGE

Remove accumulated dirt away from spring.

Apply a few drops of dripless oil to frictional points of door hinge. Work door several times and wipe off excess lubricant.

SPARE TIRE COVER HINGE ASSEMBLY (35 Styles)

Wipe off dirt and apply a few drops of dripless oil to frictional areas. Work cover several times and wipe off excess lubricant.

SUNSHADE ROD

Remove sunshade from support and apply a thin film of stick type lubricant to end of sunshade rod. (Fig. 2-12)

THE FOLLOWING PARTS SHOULD BE LUBRICATED WHEN ACCESS TO PARTS IS AVAILABLE:

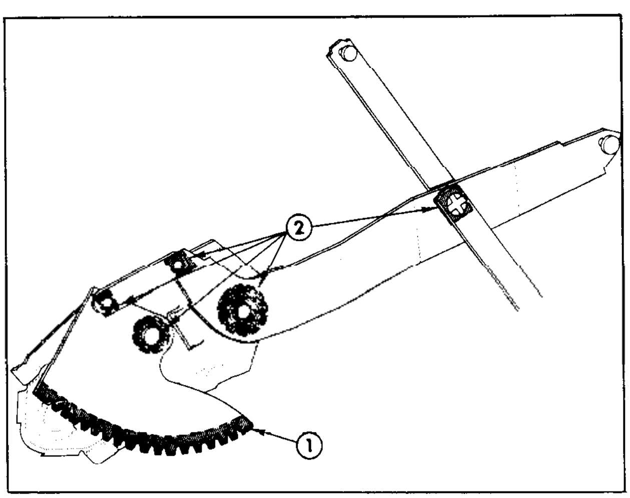


Fig. 2-14 Door Window Regulator

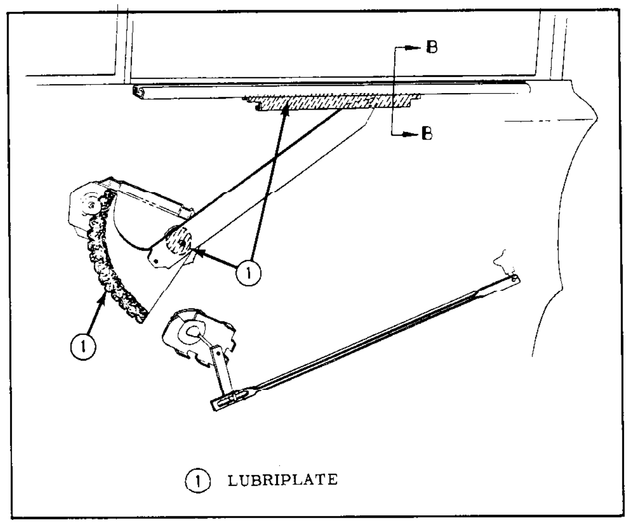


Fig. 2-15 Front Door Window Regulator Cams

DOOR LOCK OUTSIDE HANDLE

Apply a light coat of No. 630 AAW Lubriplate or equivalent to surface of lock cylinder shaft contacting bell crank. (Fig. 2-13)

DOOR WINDOW REGULATOR

Apply a coat of No. 630 AAW Lubriplate or equivalent to areas indicated by the numbers 1 and 2. (Fig. 2-14) Lubrication of front door window regulator is typical of lubrication of rear door regulators.

DOOR WINDOW CAMS

Apply a coat of No. 630 AAW Lubriplate or equivalent to channel portions of cams. (Fig.2-15)

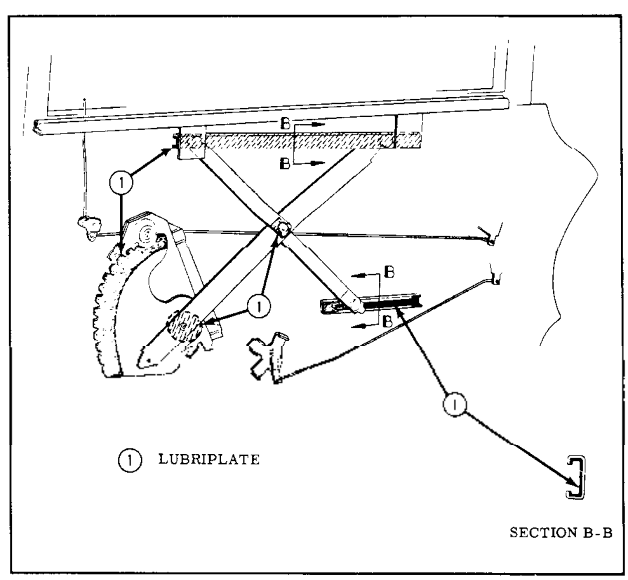


Fig. 2-16 Rear Door Window Regulator Cams

DOOR LOCK PARTS

Lubricate moving parts of door lock with No. 630 AAW Lubriplate or equivalent.

DOOR LOCKING MECHANISM

Apply No. 630 AAW Lubriplate or equivalent to pivot points at ends of all connecting rods.

BACK DOOR HINGES AND TORQUE RODS (35 Styles)

Wipe off dirt and apply dripless oil to frictional points; work door several times and wipe off excess lubricant.

HYDRA-MATIC

CONTENTS OF SECTION 3

PERIODIC MAINTENANCE

The fluid level should be checked every 2,000 miles and should be changed at 26,000 mile intervals. The fluid level should be checked with the selector lever in "Park" position, the engine running at idle speed and the car on a level surface. The level indicator and filler tube are located under the hood at the right rear corner of the engine.

Approximately 5-1/2 quarts of oil are required to fill the Hydra-Matic transmission after the transmission has been drained. Approximately 6-1/2 quarts will be required to fill the transmission if the oil pan has been removed and drained at the same time that the fluid is changed. Approximately 9 quarts are required after an overhaul.

When changing the transmission oil, add 5 quarts, start the engine, and add oil to bring fluid level to the "Full" mark on the dipstick.

Fluid only with the following identification on the container should be used: brand name, including the words ".... Fluid Type A, plus the mark "AQ-ATF" - number and a letter "A" embossed on the top of the can as follows: "AQ-ATF - number - A".

GENERAL INFORMATION

Two variations of the Hydra-Matic are used to tailor the transmission to the type of carburetion used. The type "O" transmission is used with the two barrel carburetor, and the OA type transmission is used with the engines equipped with a four barrel carburetor.

OPERATING PRINCIPLES

Two planetary units are used to obtain neutral, three forward speeds and reverse. A parking pawl locks the output shaft to the case for a positive lock park position. A flywheel and damper are used to transmit power from the engine to the transmission.

A fluid coupling is used to provide additional torque multiplication for first and reverse gears and to lock members of the two planetary gear sets together to provide third speed (direct drive). A multiple disc clutch is used to lock the drive

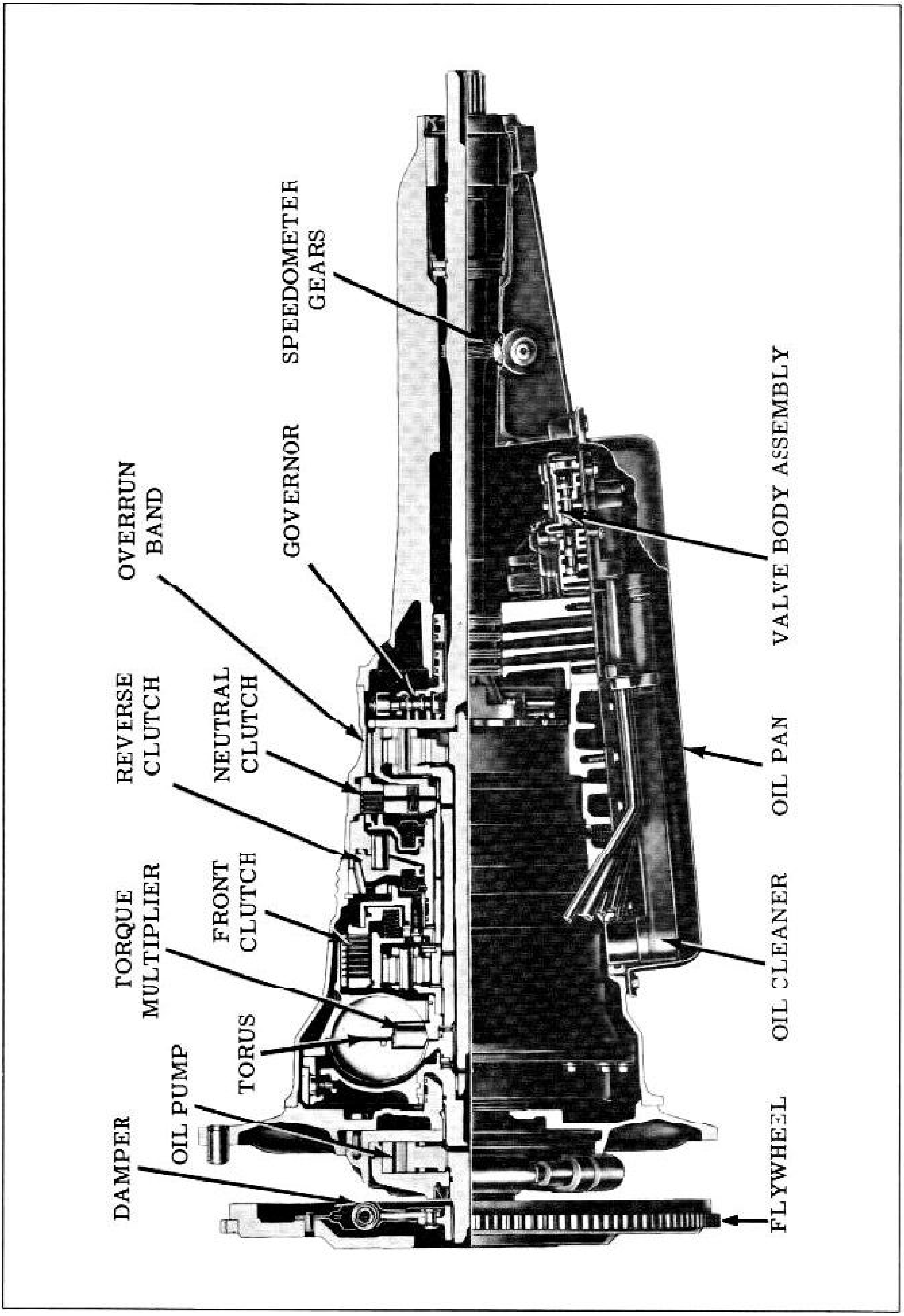


Figure 3-1 Hydra-Matic

torus and front unit internal gear together to provide reduction in the front unit for second speed. This clutch is also used with the fluid coupling to lock the front and rear units together to provide third speed (direct drive).

A sprag clutch is used to lock one member of the front or rear unit to the case to provide reduction for first and second speeds.

TRANSMISSION OPERATION

OPERATION IN DRIVE RANGE

The transmission offers three selective drive ranges, "D", "S" and "L". In "D" range, the transmission starts in first and shifts automatically to second and third speed.

With the selector lever in "S" range, the transmission will shift to Second and remain in Second until approximately 70 to 82 M.P.H., regardless of throttle opening. This provides additional acceleration for long hills or traffic driving, as well as engine braking power when descending long grades. When car speed reaches approximately 70 to 82 M.P.H. the transmission automatically upshifts to Third. If the car speed decreases to approximately 65 to 78 M.P.H., the transmission will automatically downshift to Second speed.

With the selector lever in "L" range, the transmission will remain in First regardless of throttle opening or car speed. "L" range is designed for engine braking when descending steep grades. It may also be used to hold the car in First speed for maximum pulling power.

PART THROTTLE DOWNSHIFT— THIRD TO SECOND

A part throttle downshift can be made any time the transmission is in Third and the car speed is below approximately 35 M.P.H. Since this downshift will occur at part throttle opening, the advantage of Second speed power is obtained without a wide open throttle. This feature is desirable in traffic conditions where a wide open throttle would be unnecessary.

FORCED DOWNSHIFTS (Detent)

In "D" range the transmission can be downshifted from Third to Second, and from Second to First within set speed ranges. In "S" range a Second to First forced downshift can be made within a set speed range. A warning "feel" on the accelerator pedal makes it possible for the driver to obtain full throttle performance with or without downshift, as desired.

CLOSED THROTTLE DOWNSHIFTS

DRIVE RANGE

When the transmission is in Third speed "Drive" range and the driver takes his foot off the accelerator and stops the car, the transmission will automatically downshift from Third to Second speed at approximately 13 mph and downshift from Second to First speed at approximately 11 mph. Since the downshift speeds are so close together, it may be difficult to determine which shift is taking place and the downshift may feel like a Third to First speed downshift.

SUPER RANGE

When the transmission is in Third speed "Super Range" (over 75 mph) and the driver takes his foot off the accelerator and stops the car, the transmission will automatically downshift from Third to Second speed at approximately 75 mph and downshift from Second to First speed at approximately 10 mph.

LOW RANGE

If the car is being driven in "Low" range, the transmission will not upshift to Second speed, therefore no downshift can occur.

If the car is being driven in "Super" range and the driver moves the selector lever to "Low" range and takes his foot off the accelerator, the transmission will automatically downshift from Second to First speed at approximately 35 mph.

If the car is being driven in "Drive" range (above 75 mph) and the driver moves the selector lever to "Low" range and takes his foot off the accelerator, the transmission will automatically downshift from Third to Second speed at approximately 70 mph and from Second to First speed at approximately 35 mph.

REVERSE

Reverse is accomplished through use of a friction clutch applied by oil pressure and designed for ease in "rocking" the car. A reverse blocker piston prevents movement of the selector lever to the "Reverse" position above 10 mph.

PARKING

The Hydra-Matic indicator has a "Park" (P) position which is desirable for parking and starting the car when on an incline. The engine can also be started with the selector lever in the "Neutral" (N) position.

With the selector lever in "Park" position, a parking pawl engages with lugs on the output shaft flange and locks the output shaft to the transmission case. A detent in the steering column prevents accidental movement of the selector lever to the "Park" position.

STALL TESTING

Under NO condition should the transmission be "stall tested" because the excessive heat developed will damage the unit.

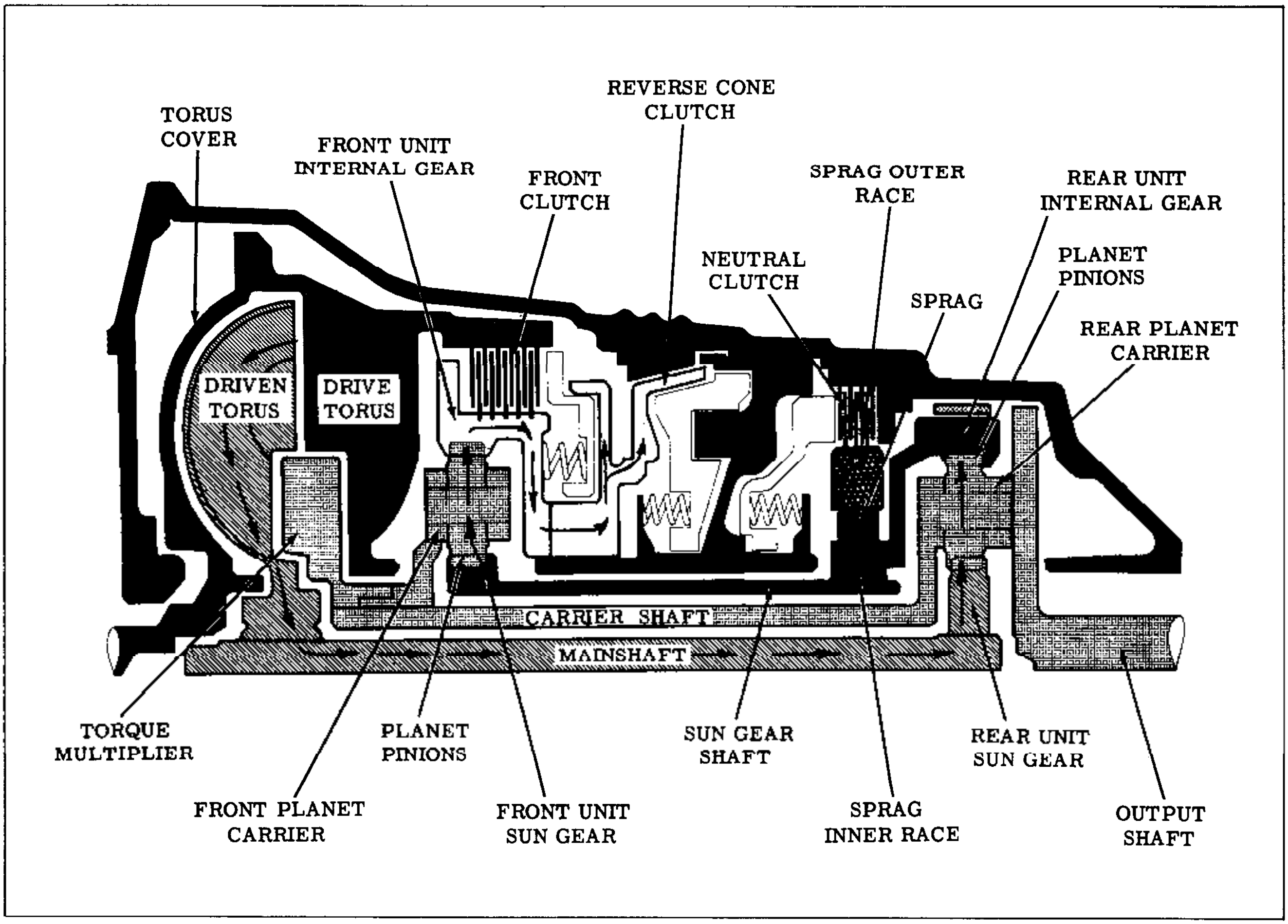


Figure 3-2 Neutral

NEUTRAL—ENGINE RUNNING

FLUID COUPLING—FILLED

FRONT CLUTCH—RELEASED

REVERSE CLUTCH—RELEASED

NEUTRAL CLUTCH—RELEASED

SPRAG—INEFFECTIVE

Power from the engine is mechanically transmitted to the torus cover and to the drive torus member. The drive torus then directs the oil against the driven torus causing it to turn the main shaft and rear unit sun gear clockwise.

In neutral the neutral clutch is released thus preventing the sprag assembly from holding the rear unit internal gear against turning counter-clockwise. Therefore, as the rear unit sun gear turns clockwise, the rear unit pinions turn counter-clockwise driving the rear internal gear counter-clockwise.

The front unit sun gear is mechanically connected to the rear internal gear and is also turning counter-clockwise, this causes the front unit planet pinions to rotate clockwise on their pins. The clockwise motion of the front unit pinions drive the front internal gear clockwise.

Because both the rear unit internal gear and the front unit internal gear are spinning freely, there is no transfer of torque from the front or rear units to the planet pinion carriers or output shaft.

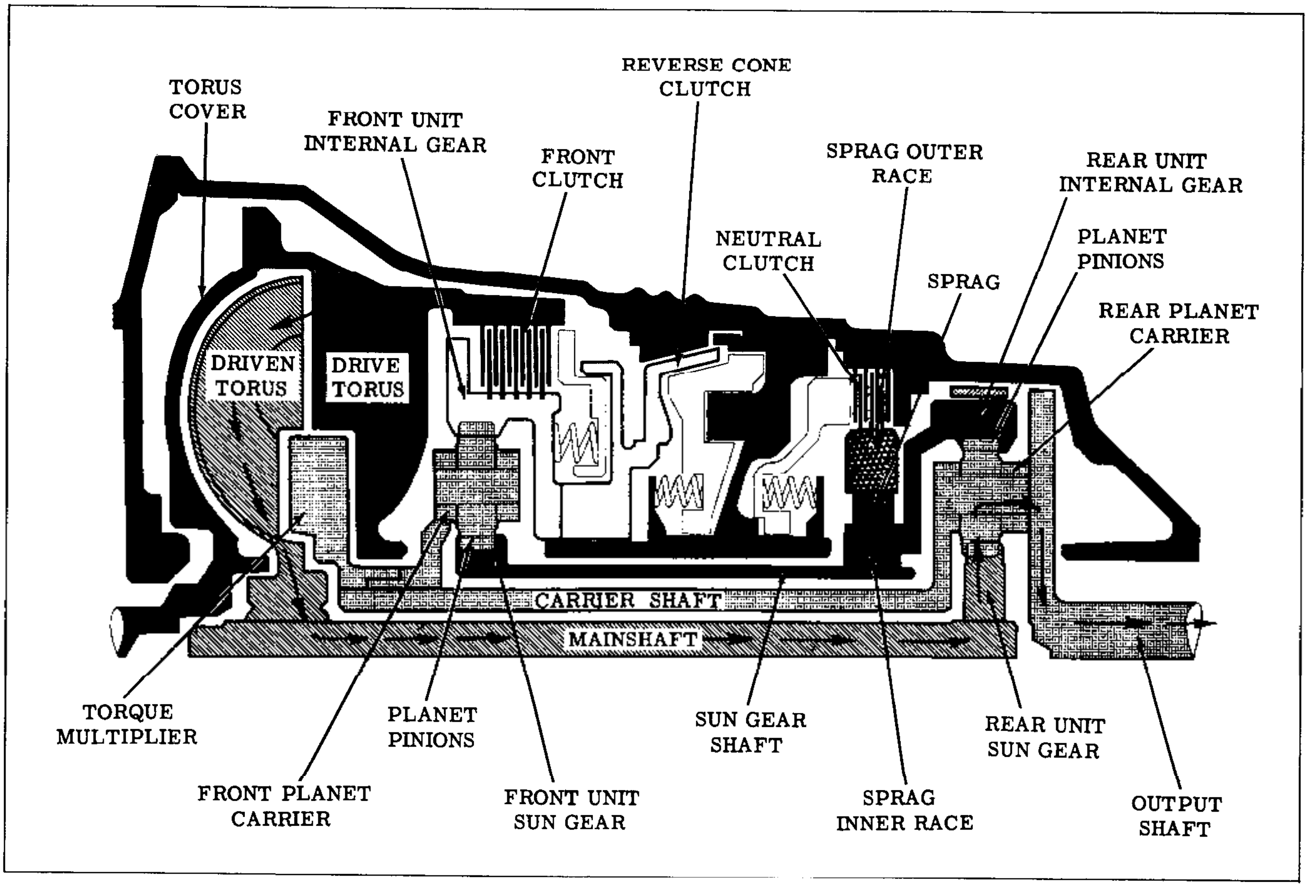


Figure 3-3 First Speed

FIRST SPEED RATIO 3.56:1

FLUID COUPLING—FILLED

FRONT CLUTCH—RELEASED

REVERSE CLUTCH—RELEASED

NEUTRAL CLUTCH—APPLIED

SPRAG—EFFECTIVE

Power from the engine is mechanically transmitted to the torus cover and to the drive torus member. Torque is then transmitted through oil to the driven torus member. Oil from the driven torus is then directed against the torque multiplier which redirects the force of the oil back to the drive torus in such a way as to assist the engine in turning the drive torus. Torque through the coupling is then applied to the mainshaft and rear unit sun gear.

The neutral clutch is applied locking the sprag outer race to the case, which in turn holds the rear unit internal gear stationary. Torque through the rear sun gear then attempts to drive the pinions and internal gear counter-clockwise, however, with the internal gear held stationary, the output shaft through the pinions is compelled to rotate clockwise within the internal gear at a reduced speed.

As the rear carrier and output shaft rotate clockwise at reduced speed the front carrier, which is connected to the rear carrier, also rotates clockwise at a reduced speed. With the sprag assembly holding the front unit sun gear stationary, the carrier and pinions rotate the front unit internal gear at approximately one-half engine speed.

The reduction in first speed is due to the 2.97 rear unit gear reduction, times the 1.3 coupling torque multiplication, less the .3 engine torque acting on the output shaft through the torque multiplier.

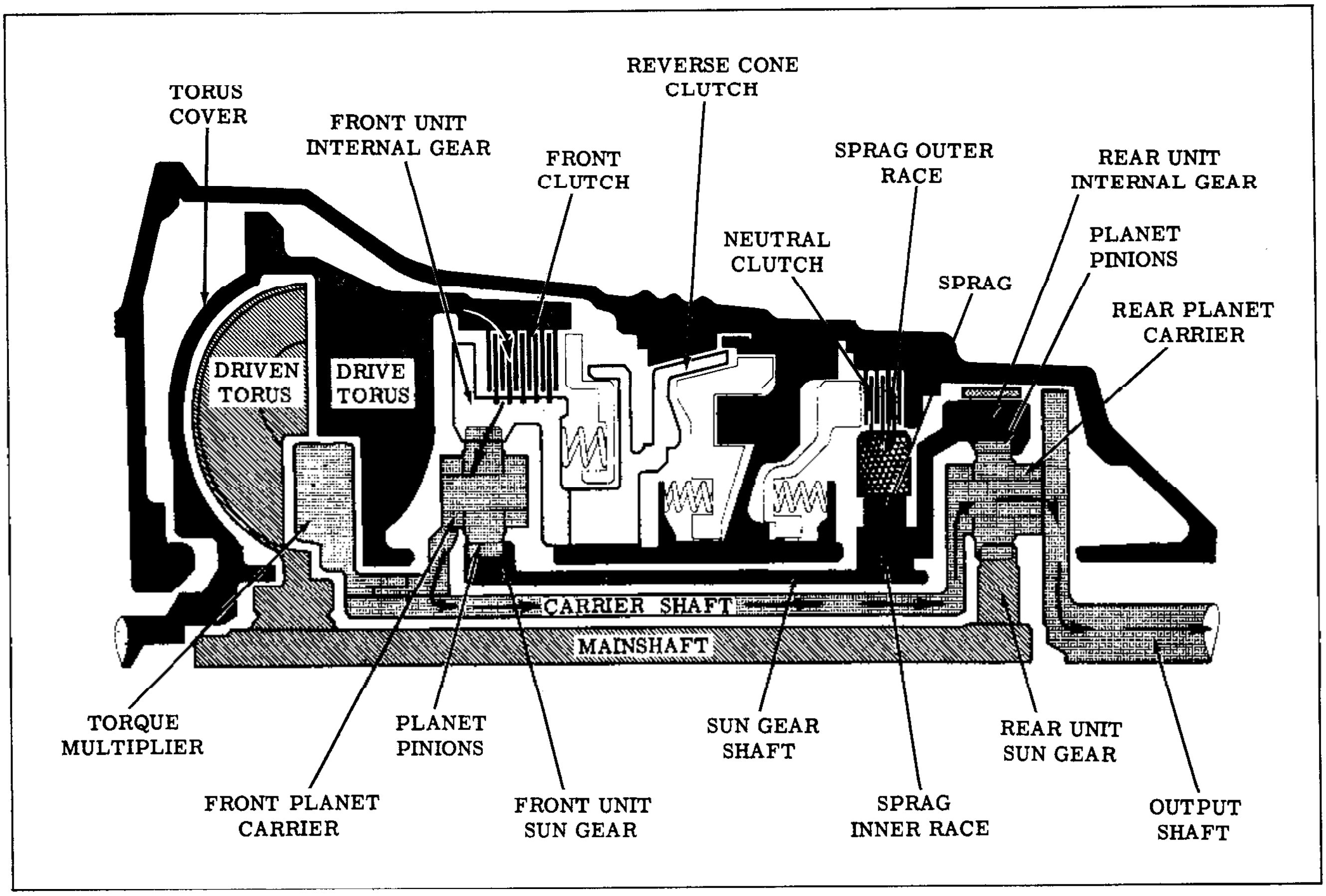


Figure 3-4 Second Speed

SECOND SPEED RATIO 1.56:1

FLUID COUPLING—EMPTY

FRONT CLUTCH—APPLIED

REVERSE CLUTCH—RELEASED

NEUTRAL CLUTCH—APPLIED

SPRAG—EFFECTIVE

Power from the engine is mechanically transmitted to the torus cover and to the drive torus member. The front clutch is applied and the coupling is empty so engine torque is mechanically applied to the front unit internal gear.

The front unit sun gear shaft is splined to the sprag inner race and with the neutral clutch applied, the sprag prevents the sun gear from turning counter-clockwise. Engine torque at the front internal gear is then applied to the pinions, and because the sun gear cannot rotate, the planet pinions and carrier are compelled to revolve clockwise around the front unit sun gear in reduction. Torque is then transmitted by the front planet carrier to the rear unit carrier and shaft assembly and to the output shaft.

As the output shaft and rear unit carrier turns clockwise in reduction, the pinions will drive the rear unit sun gear and driven torus in a clockwise direction faster than engine speed. Because the coupling is empty no power is transmitted through the torus members and all torque multiplication in second speed is due to the 1.56:1 front unit gear ratio.

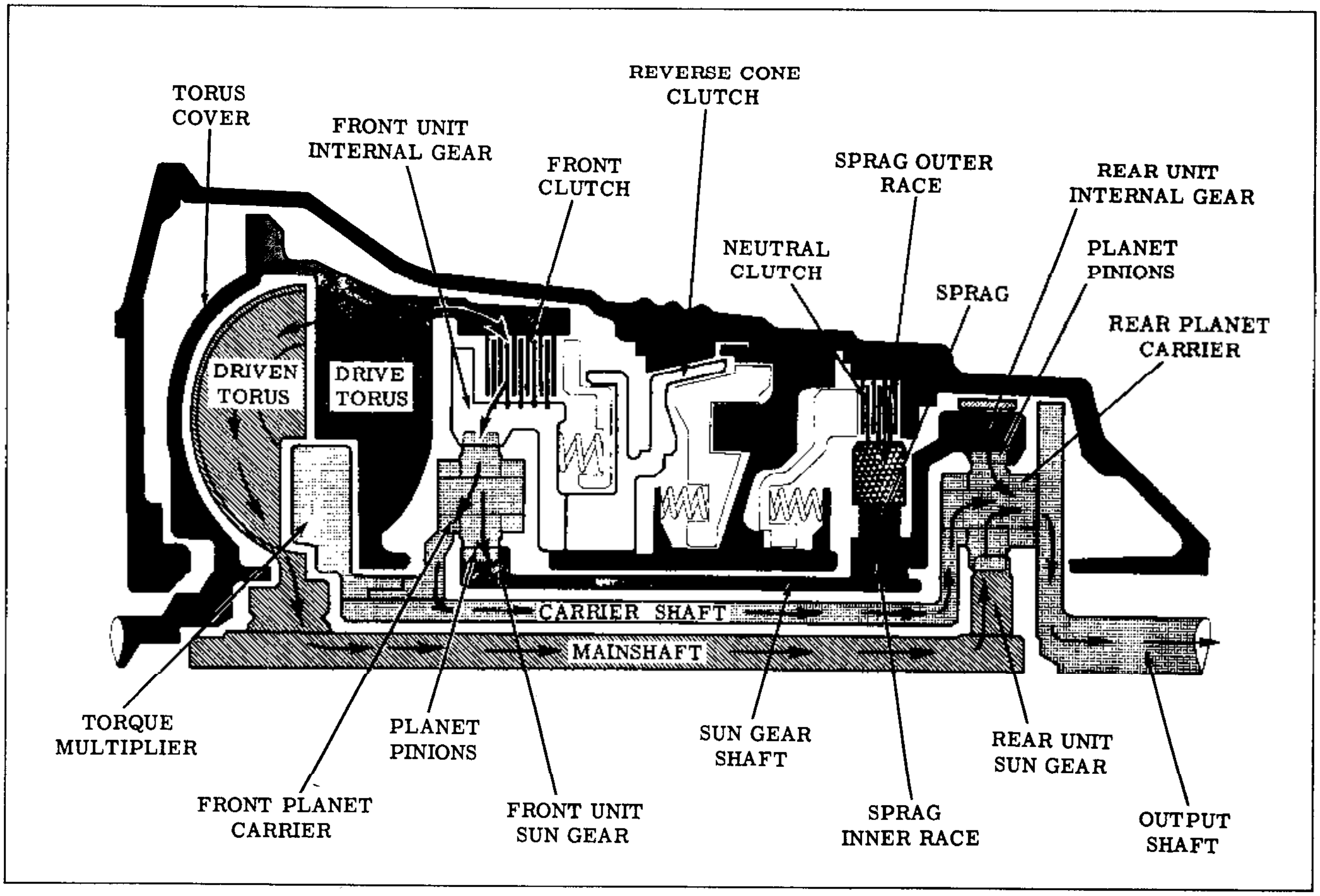


Figure 3-5 Third Speed

THIRD SPEED RATIO 1:1

FLUID COUPLING—FILLED

FRONT CLUTCH—APPLIED

REVERSE CLUTCH—RELEASED

NEUTRAL CLUTCH—APPLIED

SPRAG—INEFFECTIVE (OVERRUN)

Power from the engine, mechanically transmitted to the torus cover, is applied through the front clutch to the front unit internal gear. The front internal gear then, through the pinions, TENDS to turn the front sun gear against the sprag. This would cause the front carrier to run clockwise in reduction. The rear carrier then must also attempt to revolve clockwise in reduction. With the rear carrier rotating clockwise in reduction, and the rear internal gear TENDING to be stationary against the sprag, the rear unit pinions attempt to rotate counter-clockwise on their pins, thus driving the rear unit sun gear and driven torus clockwise faster than engine speed.

However, because the coupling is filled, the driven torus and rear unit sun gear can not revolve faster than the drive torus which turns at engine speed. Therefore, the rear sun gear speed is slowed down to approximately engine speed. In so doing, the rear unit pinions are slowed down in their rotation on the pinion pins. The carrier and pinions then change the direction of load against the internal gear causing it to overrun the sprag and revolve with the carrier and sun gear at the same speed. Because the output shaft and carriers are connected to the torque multiplier in the coupling, the torque multiplier is also turning the same speed as the drive and driven torus so that it has no effect in third speed.

Both planet carriers and the output shaft are connected, the front sun gear and rear internal gear are connected, and the front internal gear and rear unit sun gear are turning at approximately the same speed, thus the entire train must revolve as a unit in direct drive.

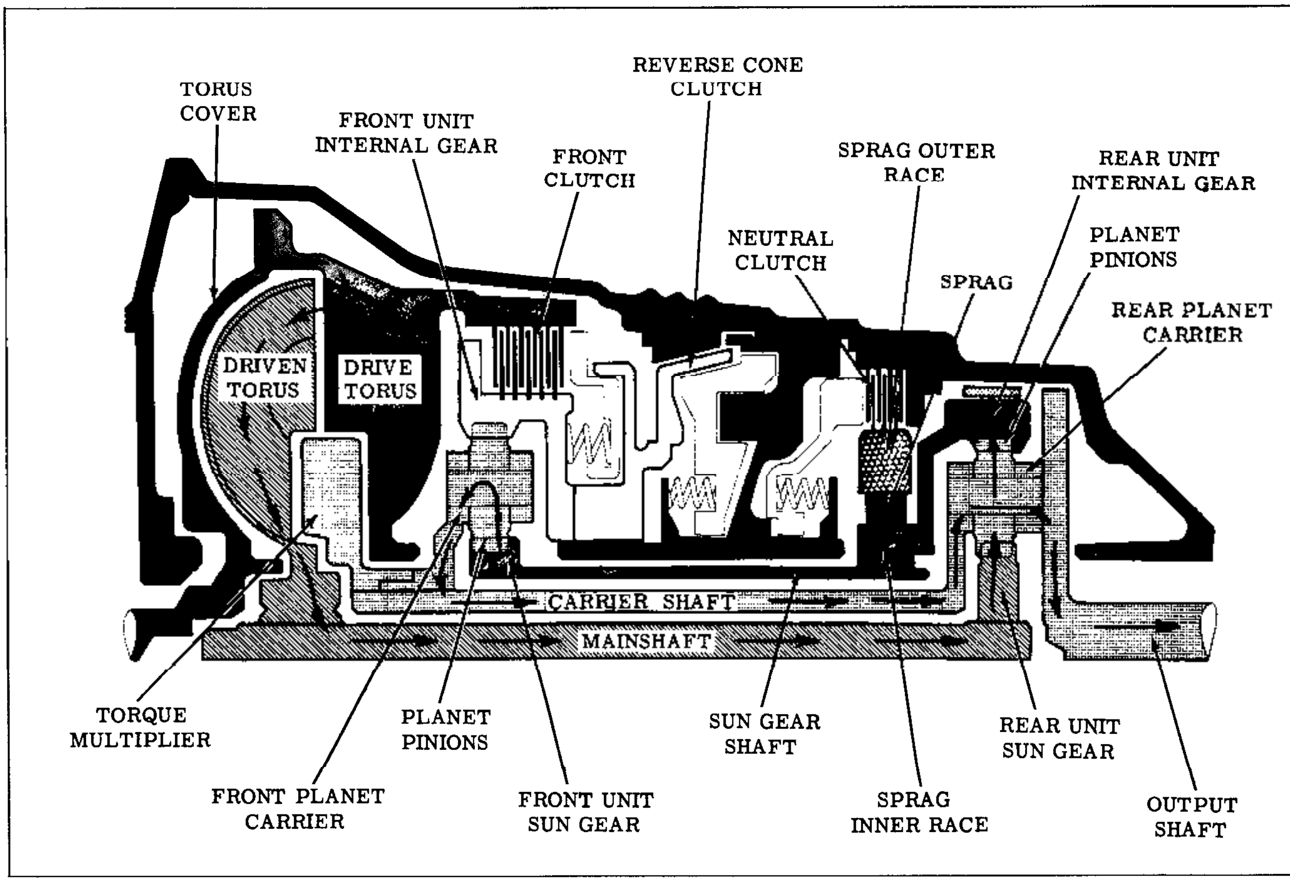


Figure 3-6 Reverse

REVERSE RATIO 3.53:1

FLUID COUPLING—FILLED

FRONT CLUTCH—RELEASED

REVERSE CONE—APPLIED

NEUTRAL CLUTCH—RELEASED

SPRAG—INEFFECTIVE

Power from the engine is mechanically transmitted to the torus cover and to the drive torus member. Torque is then transmitted through oil to the driven torus member. Oil from the driven torus is then directed against the torque multiplier which redirects the force of the oil back to the drive torus in such a way as to assist the engine in turning the drive torus. Torque through the coupling is then applied to the mainshaft and rear unit sun gear.

The rear unit sun gear then drives the rear unit pinions as idlers which in turn drive the rear unit internal gear in a counter-clockwise direction. (The neutral clutch is released so that the sprag cannot hold the internal gear).

Because the rear unit internal gear is turning counter-clockwise, the front unit sun gear is turning counter-clockwise. The reverse cone is holding the front unit internal gear stationary so that the front unit pinions and planet carriers are compelled to walk around the front internal gear in counter-clockwise direction in reduction. The output shaft is connected to the front and rear unit carrier so the output shaft turns counter-clockwise or in reverse at a reduction.

The effect of the force of the oil in the coupling is such that the torque multiplier is imparting an additional .3 times engine torque to the carrier and output shaft in the reverse direction.

The total reduction in reverse is due to the 1.3 coupling torque ratio times the 2.49 gear ratio plus the .3 engine torque acting on the torque multiplier which results in a 3.53:1 reduction at the output shaft in the reverse direction.

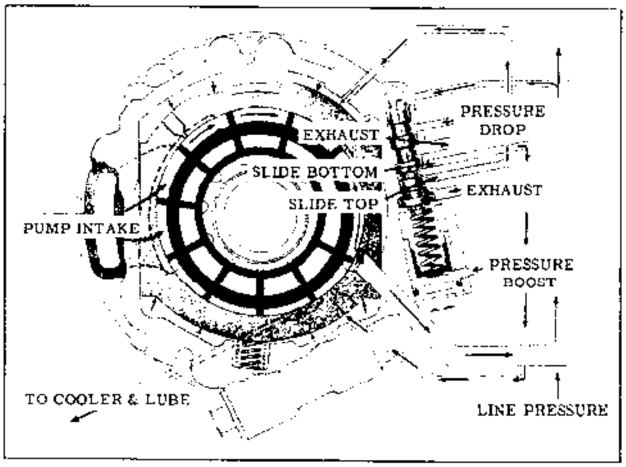


Figure 3-7 Pressure Regulator Valve and Pump

VALVES AND THEIR FUNCTION

PRESSURE REGULATOR VALVE

Controls line pressure by regulating the output of the pump. This valve is constructed with two areas where pressures can be applied to overcome regulator spring force which in turn either increases or decreases the line pressure.

THROTTLE VALVE

The throttle valve regulates to obtain a pressure proportional to carburetor opening by the throttle valve spring and T.V. plunger which is operated mechanically by the throttle linkage. The T.V. pressure decreases when the oil temperature goes below approximately 75°F. This is accomplished by a bimetal thermostatic element which contacts the throttle valve at temperatures less than 75°F, and opposes the force of the regulator spring.

GOVERNOR

The governor contains two valves, of different weight, which rotate with the output shaft permitting each valve to produce a different pressure proportional to the vehicle speed. G-1 pressure operates at low speeds and G-2 pressure at the higher speeds. (Fig. 3-8)

MANUAL VALVE

The manual valve distributes pressures to place the transmission in either neutral, drive range, super range, low range, or reverse. It is controlled mechanically, through linkage, by the selector lever on the steering column.

1-2 SHIFT VALVE

The 1-2 shift valve provides for the 1-2 and 2-1 shifts and is actuated by T.V. and G-1 governor pressures.

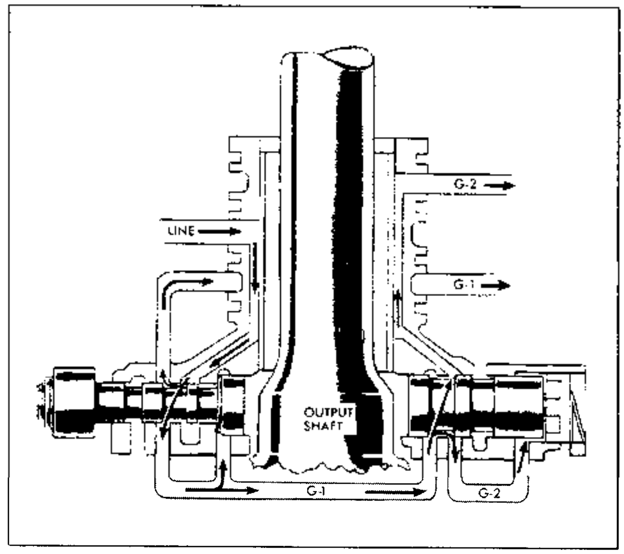


Figure 3-8 Governor Assembly

2-3 SHIFT VALVE

The 2-3 shift valve provides the 2-3 and 3-2 shifts and is actuated by T.V. and both G-1 and G-2 governor pressures.

COUPLING FEED LIMIT VALVE

This valve is located in the pump body and provides a direct feed to the coupling from the pump in neutral, first gear and reverse. It is controlled by coupling signal pressure but opens only when coupling signal pressure is greater than 70 psi.

COUPLING EXHAUST VALVES

The coupling exhaust valves are located in the torus cover assembly and they seal the coupling exhaust ports whenever coupling signal pressure is directed to close them.

COUPLING TIMING VALVE

The coupling timing valve controls the exhaust and fill of the coupling. It is controlled by front clutch pressure on the 1-2 shift and delays the exhaust of the coupling until clutch capacity is sufficient to carry the torque. On a 2-3 shift it is controlled by 1st and 3rd pressure and shifts immediately after the 2-3 shift valve.

PRESSURE BOOST VALVE

The pressure boost valve controls the flow of oil to the line boost area of the pressure regulator valve. It is shifted by front clutch pressure and is timed to move after the clutch has assumed the torque.

PRESSURE DROP VALVE

The pressure drop valve controls the flow of oil to the line drop area of the pressure regulator valve. It provides a varying pressure inversely proportional to T.V. pressure which results in a modulated line pressure.

2-1 DOWNSHIFT VALVE

The 2-1 downshift valve regulates the exhaust of the front clutch on throttle 2-1 downshifts. It is designed to gradually release the clutch while the coupling is being filled to prevent a sudden increase in engine RPM.

FRONT CLUTCH EXHAUST VALVE

The front clutch exhaust valve controls the release of the front clutch during a throttle 2-1 downshift. It provides a wide open clutch exhaust when coupling pressure is sufficient.

TV PLUNGER

The TV plunger provides the part throttle 3-2 and the detent 3-2 and 2-1 shifts, and also provides accelerator pedal assist. It is operated mechanically by the T.V. linkage.

REVERSE BLOCKER VALVE

The reverse blocker valve prevents a shift into reverse at speeds above 10 mph. It is controlled by G-1 pressure and provides a mechanical stop for the manual linkage.

2-1 CUTOFF VALVE

The 2-1 cutoff valve is controlled by T.V. pressure and shifts at about 28 psi. It provides an immediate exhaust of front clutch oil on closed throttle 2-1 downshifts and provides a source for 2-3 boost pressure on light 2-3 upshifts.

2-3 BOOST VALVE

The 2-3 boost valve provides 2-3 boost pressure on light throttle 2-3 upshifts to momentarily increase pump pressure until the coupling reaches sufficient pressure.

NEUTRAL CLUTCH VALVE

The neutral clutch valve regulates neutral clutch apply oil to satisfy various throttle opening conditions. This results in a slow neutral clutch fill with a light throttle and a quick fill for a heavy throttle, insuring a smooth but firm clutch application under all conditions.

OIL COOLER CONTROL VALVE (Fig. 3-9)

The control valve is located in the case cover behind the oil pump and controls the flow of oil to the oil cooler. The bimetal valve remains closed at temperatures below 200° heat and prevents oil from entering the oil cooler. When the oil temperature reaches 200° the valve opens and permits oil to circulate through the oil cooler to maintain an ideal operating temperature.

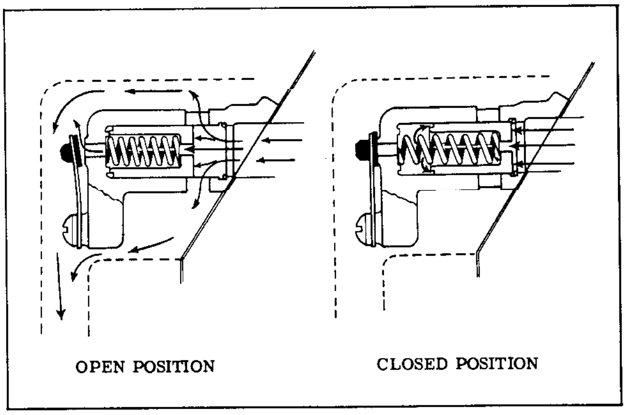


Figure 3-9 Oil Cooler Control Valve

OVERRUN BAND AND SERVO

The overrun band and servo are used to obtain engine braking when coasting in first or second speed with the selector lever in super or low range position. To prevent the transmission from overrunning, the overrun band assembly is applied to the rear unit internal gear thus holding the rear internal and front unit sun gears stationary for the desired braking.

An overrun band servo is used to apply and release the overrun band.

FIRST STAGE

Band apply pressure acts against the servo piston moving the piston, servo springs, retainer and piston pin against the release spring to start the application of the band. When the band has been applied to the rear internal gear it begins to offer resistance to the travel of the piston pin.

SECOND STAGE

As band apply pressure continues to build up under the piston, the piston begins to travel up on the piston pin against the force of the servo springs. The piston then moves away from the washer which allows a small portion of the band apply pressure to bleed to exhaust through the bleed hole in the piston. Overrun band apply pressure under the piston then continues to build up at a slower rate and causes a greater force to be applied to the band. (Fig. 3-10)

THIRD STAGE

When the piston travels up far enough to contact the servo spring retainer, the bleed hole is sealed off again. This allows the band apply pressure to build up quickly again and causes the piston to apply its full force directly against the servo spring retainer and piston pin to give the final full apply force.

The design of the servo is such as to provide for a smooth gradual apply of the band under all driving conditions and oil pressures.

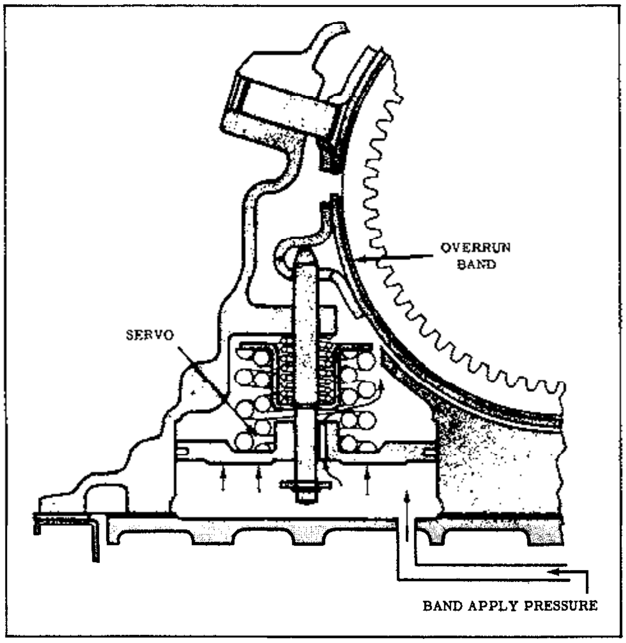


Figure 3-10 Overrun Band and Servo

COMPENSATOR VALVES (Fig. 3-11)

The compensator valves are regulated by T.V. pressure and supply compensator pressure to control the front clutch accumulator.

FRONT CLUTCH ACCUMULATOR (Fig. 3-11)

The front clutch accumulator is a cushioning and timing device which enables the front clutch to apply smoothly under all throttle and torque conditions.

When the front clutch is engaging, front clutch apply oil is also directed to the front clutch accumulator. Front clutch oil compresses the pistons against spring pressure, causing the accumulator to absorb an amount of clutch apply oil. During the initial application of the front clutch piston, a comparatively small quantity of clutch apply oil is diverted to the accumulator. When the clutch piston is in its apply position, the accumulator pistons move against spring pressure and the amount of oil absorbed by the accumulator will increase, thereby decreasing the flow to the front clutch. Since the pistons moving against their springs meet increasing resistance to their motion, the oil pressure applying the front clutch increases gradually to provide a smooth application.

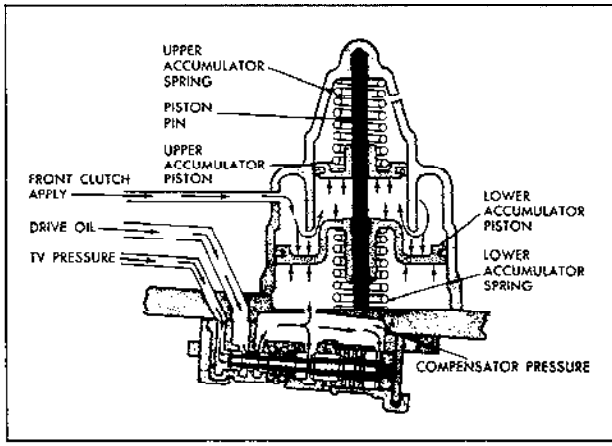


Figure 3-11 Compensator and Accumulator

When the pistons reach the ends of their strokes, the front clutch pressure rises to main line pressure to insure positive and complete engagement following the shift.

NEUTRAL (ENGINE RUNNING)

COUPLING—FILLED	REVERSE CONE—OFF	SPRAG—INEFFECTIVE
FRONT CLUTCH—OFF	NEUTRAL CLUTCH—OFF	OVERRUN BAND—OFF

Whenever the engine is running, line pressure is always directed to the:

1. Pressure Regulator
2. Pressure Relief Valve
3. Coupling Feed Limit Valve
4. Throttle Valve
5. Coupling Timing Valve
6. Manual Valve
7. 2-3 Shift Valve
8. Governor Assembly
9. Pressure Boost Valve

BASIC CONTROL

Line pressure through the coupling timing valve is directed into the signal passage. Signal oil closes the coupling exhaust valves and opens the coupling feed limit valve to provide coupling feed oil. Line pressure through the orifice at the coupling timing valve provides an additional source of coupling feed oil to fill the coupling. The neutral clutch is released, therefore the sprag is ineffective.

PRESSURE CONTROL

The pressure relief valve provides for the exhaust of excessive main line pressures at approximately 240 psi. This condition may occur only in the event of a malfunction in the pump or pressure regulator.

Line pressure to the throttle valve is regulated to a variable pressure called T.V. pressure. The throttle valve, which regulates T.V. pressure, is controlled by the T.V. spring and throttle plunger through adjustable linkage from the carburetor throttle. As the throttle is opened, the linkage depresses the throttle plunger to increase the force of the T.V. spring, thus causing the throttle valve to regulate T.V. pressure to a higher value. T.V. pressure is designed to vary in proportion to throttle opening and is used throughout the system to activate or control different valves at various times in relation to throttle opening.

Line pressure through the pressure boost valve enters two passages to become pressure boost and pressure drop signal oil. Pressure boost oil is directed against the boost plug in the pressure regulator to give an increase in line pressure. Pressure drop signal pressure is routed to the pressure drop valve where T.V. pressure acting on the end of the pressure drop valve regulates pressure drop signal oil to a variable decreasing pressure which in turn is applied against the second land of the pressure regulator valve.

At closed throttle, line drop pressure is maximum thus causing the greatest drop in line pressure; at full throttle, line drop pressure is regulated to exhaust resulting in high line pressure. Line pressure is controlled to vary with throttle opening from 132 to 180 psi.

Line pressure directed to the governor will be regulated to become two variable governor pressures; G-1 and G-2.

NOTE: In transmissions built prior to Serial Nos. 0-61-21372 and OA-61-32538 a pressure boost plug and spring is used to position the pressure boost valve so that the pressure boost passage is shut off from line pressure which results in a line pressure of 74 to 105 psi.

SUMMARY

The coupling is filled and the neutral clutch is released, thereby causing the transmission to be in neutral.

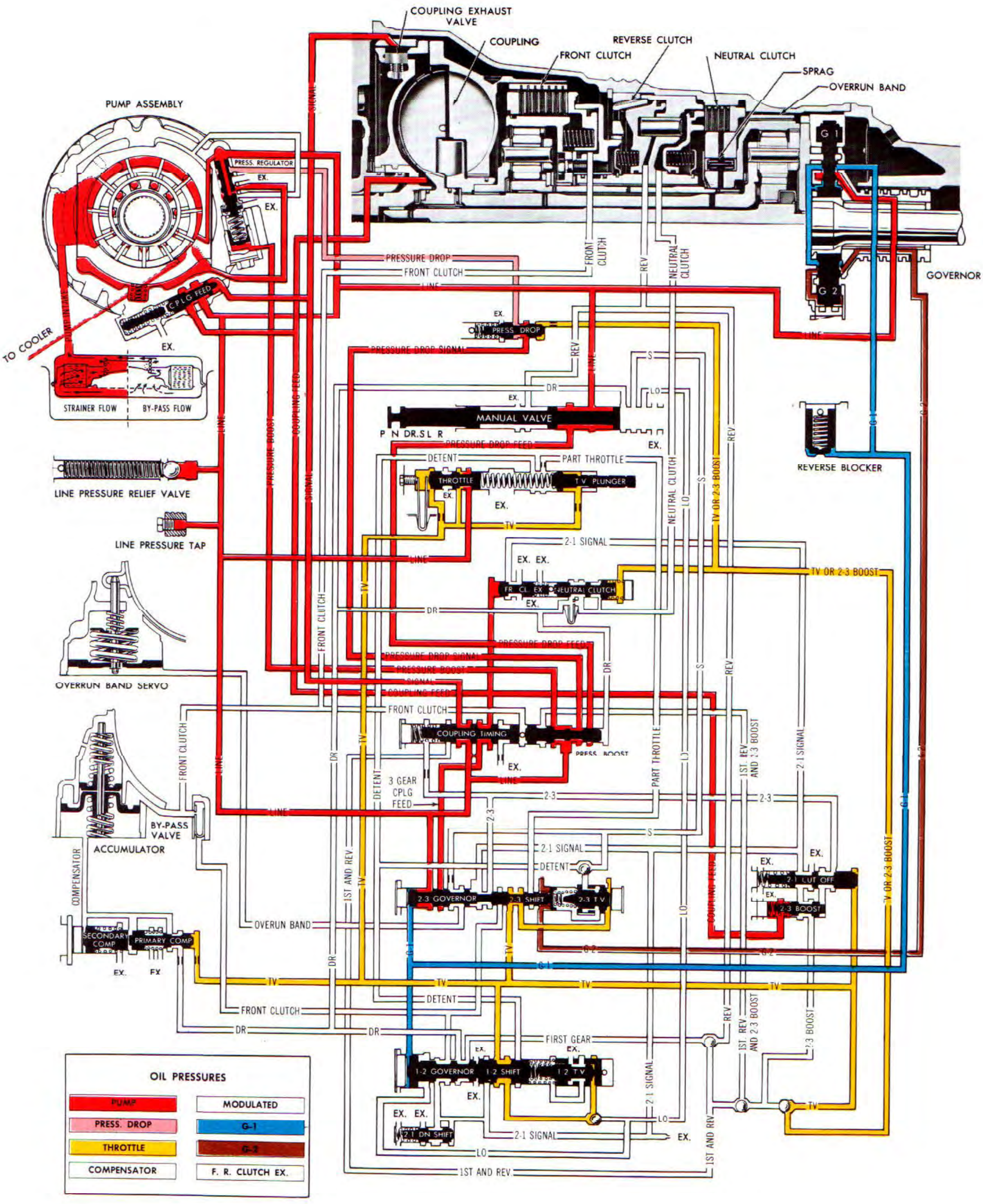


Figure 3-12 Neutral (Engine Running)

DRIVE RANGE (FIRST SPEED)

COUPLING—FILLED	**REVERSE CONE—OFF**	**SPRAG—EFFECTIVE**
FRONT CLUTCH—OFF	**NEUTRAL CLUTCH—ON**	**OVERRUN BAND—OFF**

When the selector lever is moved to the drive position, the manual valve is repositioned to allow line pressure to enter the drive oil circuit. Drive oil then flows to the following:

1. Neutral Clutch Valve
2. 1-2 Governor Valve
3. Pressure Boost Valve
4. Primary Compensator Valve

BASIC CONTROL

Drive oil to the neutral clutch valve is directed into the neutral clutch apply passage. The neutral clutch valve senses a balance between neutral clutch apply pressure and T.V. plus spring pressure to regulate the flow of neutral clutch apply pressure to insure a smooth but firm clutch application under all throttle conditions. As the neutral clutch applies, the sprag becomes effective for first speed.

PRESSURE CONTROL

Line pressure will vary from 132 to 180 psi depending on the amount of T.V. pressure or throttle opening.

TIMING CONTROL

Drive oil and T.V. pressure are directed to the primary compensator valve. Drive oil flowing through compensator valves will become regulated to a pressure called compensator. Increasing T.V. pressure (which increases with throttle opening) will cause compensator to regulate to an increasing value. Compensator pressure is then designed to vary with throttle opening but in such a way as to be proportional to engine torque. Compensator pressure is directed to the accumulator for use during the 1-2 shift.

FAIL SAFE FEATURES

To provide a safety feature, drive oil to the 1-2 shift valve is routed into the first speed passage past two ball-check valves to the pressure boost valve. If for any reason the line boost valve has remained in the neutral or second speed position, first speed oil will flow past the pressure boost valve to become line boost oil which is necessary in first speed.

First speed oil flowing past one ball-check is resting on the coupling timing valve. Again, if for any reason the coupling timing valve should remain in the second speed position, first speed oil will flow past the valve to become coupling signal oil. This insures that the coupling can be filled in first speed regardless of the position of the new coupling timing valve.

SUMMARY

The coupling is filled, the neutral clutch is applied and the sprag is effective, placing the transmission in first.

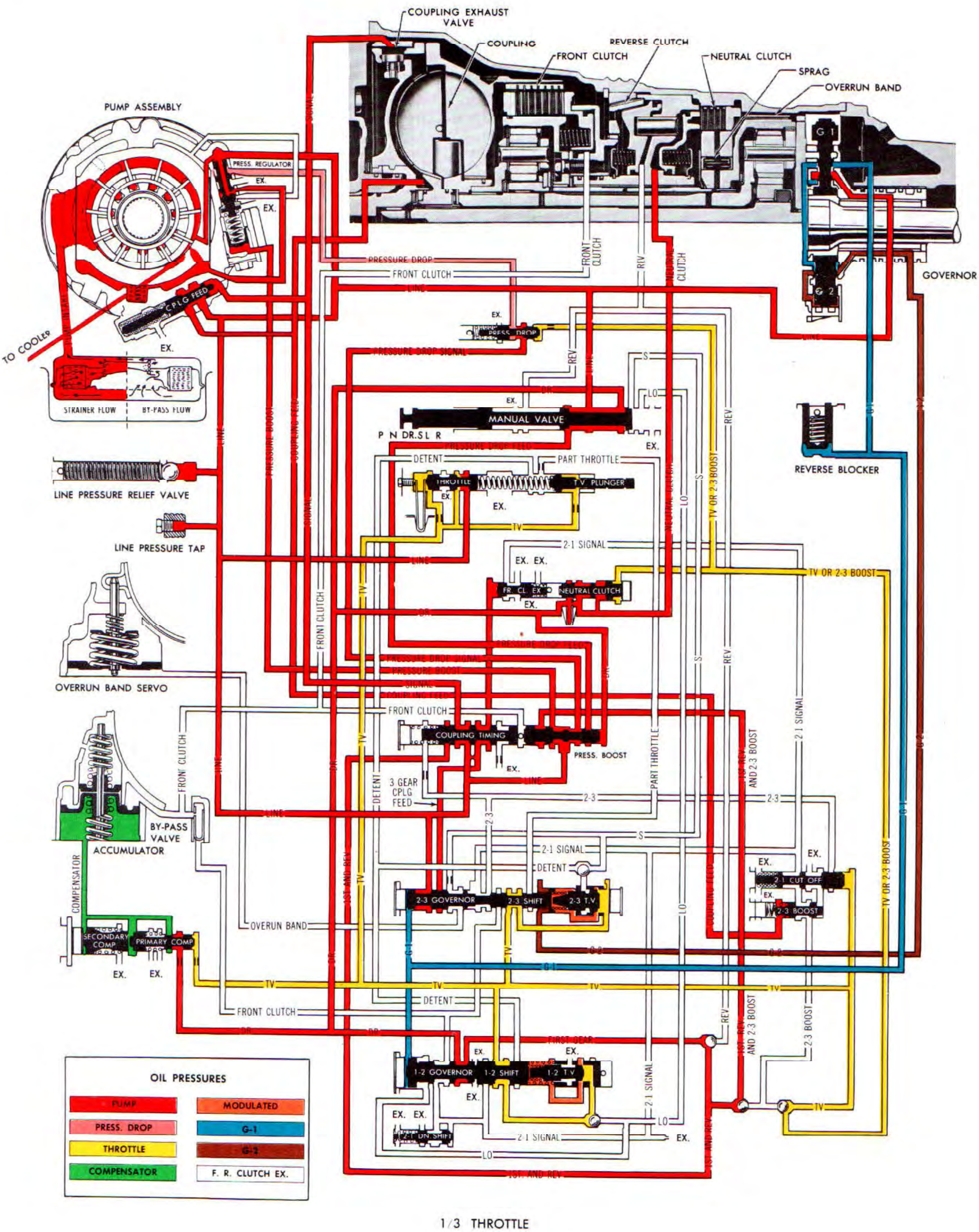


Figure 3-13 Drive Range (First Speed)

DRIVE RANGE (SECOND SPEED)

COUPLING—EMPTY	REVERSE CONE—OFF	SPRAG—EFFECTIVE
CLUTCH—ON	NEUTRAL CLUTCH—ON	OVERRUN BAND—OFF

As vehicle speed and G-1 pressure increases, the force of G-1 acting on the 1-2 governor valve will overcome the force of the 1-2 shift valve spring, 1-2 T.V. spring, and modulated T.V. pressure. This causes the 1-2 shift valve to open, which allows drive oil to enter the front clutch passage. Simultaneously, T.V. pressure to the 1-2 regulator valve is cut off at the 1-2 shift valve, and first speed oil is exhausted through the 1-2 shift valve.

BASIC CONTROL

Front clutch oil from the 1-2 shift valve then is directed to the following places:

1. 2-3 shift valve for later use and, after passing an orificed one way check valve to the:
2. Front Clutch
3. Front Clutch Accumulator
4. Coupling Timing Valve
5. Pressure Boost Valve

Front clutch oil applies the clutch and moves the coupling timing valve against the spring cutting off line pressure to the signal passage. As signal pressure is cut off, the coupling exhaust valves open, thus allowing the coupling to empty and the coupling feed limit valve to close, cutting off coupling feed pressure to the coupling.

PRESSURE CONTROL

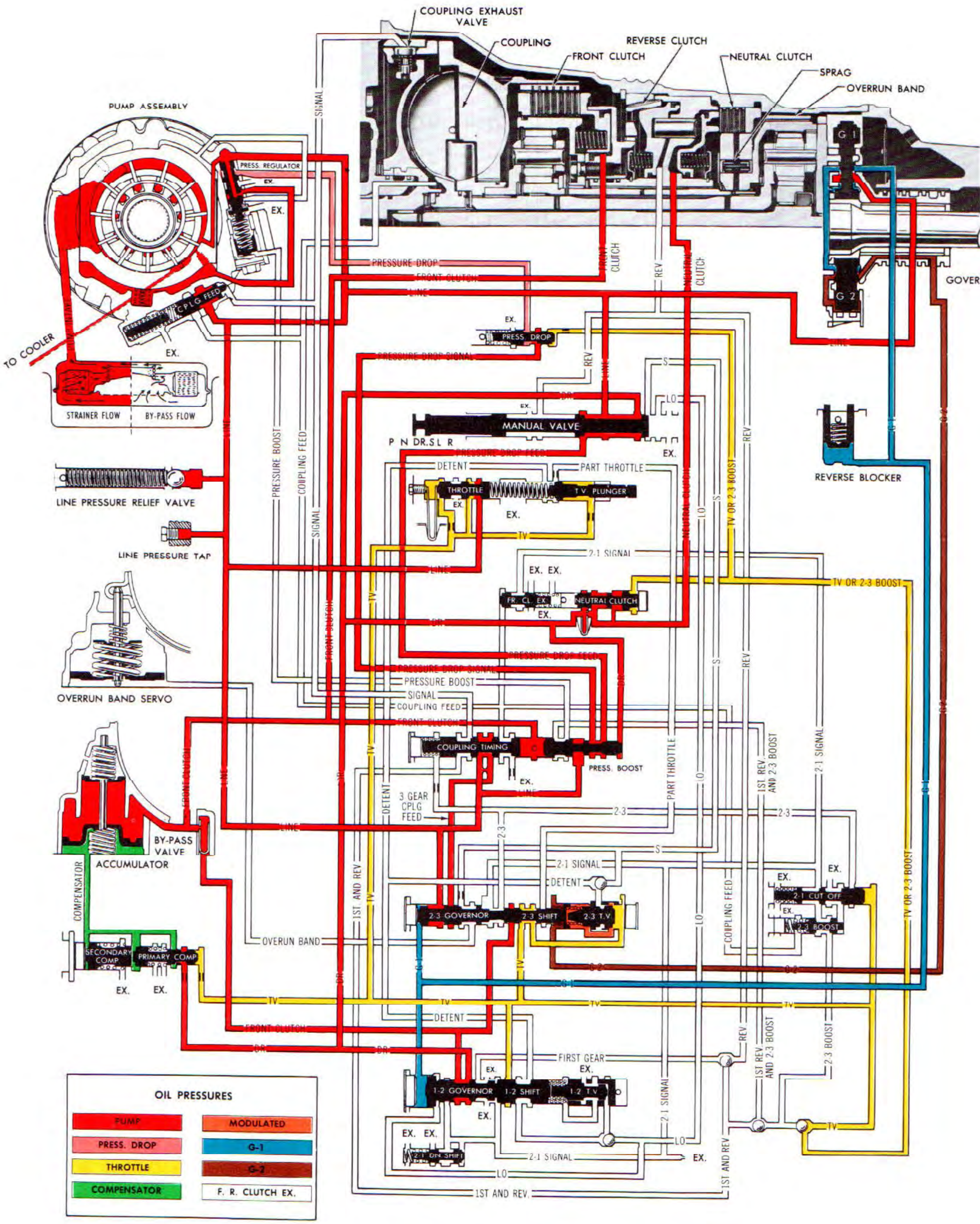
Front clutch oil to the line boost valve overcomes drive oil at the opposite end, thus moving the valve to cut off line pressure from entering the pressure boost passage and pressure drop signal passage. Because line drop feed is now directed through the pressure boost valve into the pressure drop signal passage, line pressure will drop to a variable value of 74 to 105 psi. Front clutch oil is used on the pressure boost valve since it is a signal oil which notifies the pressure boost valve that the oil pressure in the clutch itself is sufficiently high to allow the clutch to carry second speed torque. Also, if the line pressure were not kept in a boosted condition temporarily, the neutral clutch would not have sufficient pressure to prevent its slipping before the transmission had completed the shift to second speed.

TIMING CONTROL

Front clutch oil is directed to the accumulator to provide a cushion for clutch apply pressure. Compensator pressure is also fed to the accumulator to control the amount of cushioning the accumulator will provide according to throttle opening. At light throttle, compensator pressure is low, thus allowing the accumulator to absorb a greater amount of clutch oil for greater cushioning. At heavy throttle, compensator assists the lower accumulator spring in acting against clutch pressure to give a firmer but smooth clutch application. Front clutch oil acting on the coupling timing valve times the movement of the valve and the resulting exhaust of the coupling to coincide with the application of the front clutch.

SUMMARY

The front clutch is applied and the coupling is empty, shifting the transmission into second speed.



1/3 THROTTLE

Figure 3-14 Drive Range (Second Speed)

DRIVE RANGE (THIRD SPEED)

COUPLING—FILLED	REVERSE CONE—OFF	SPRAG—OVERRUN
FRONT CLUTCH—ON	NEUTRAL CLUTCH—ON	OVERRUN BAND—OFF

As vehicle speed increases, G-1 and G-2 pressure and the 2-3 shift valve spring acting on the 2-3 shift valve train will overcome the force of the T.V. regulator spring and modulated pressure on the 2-3 shift valve. The shift valve will then open allowing front clutch pressure and line pressure to enter the 2-3 and 3rd speed coupling fill passage. T.V. pressure is now cut off from entering the shift T.V. passage.

BASIC CONTROL

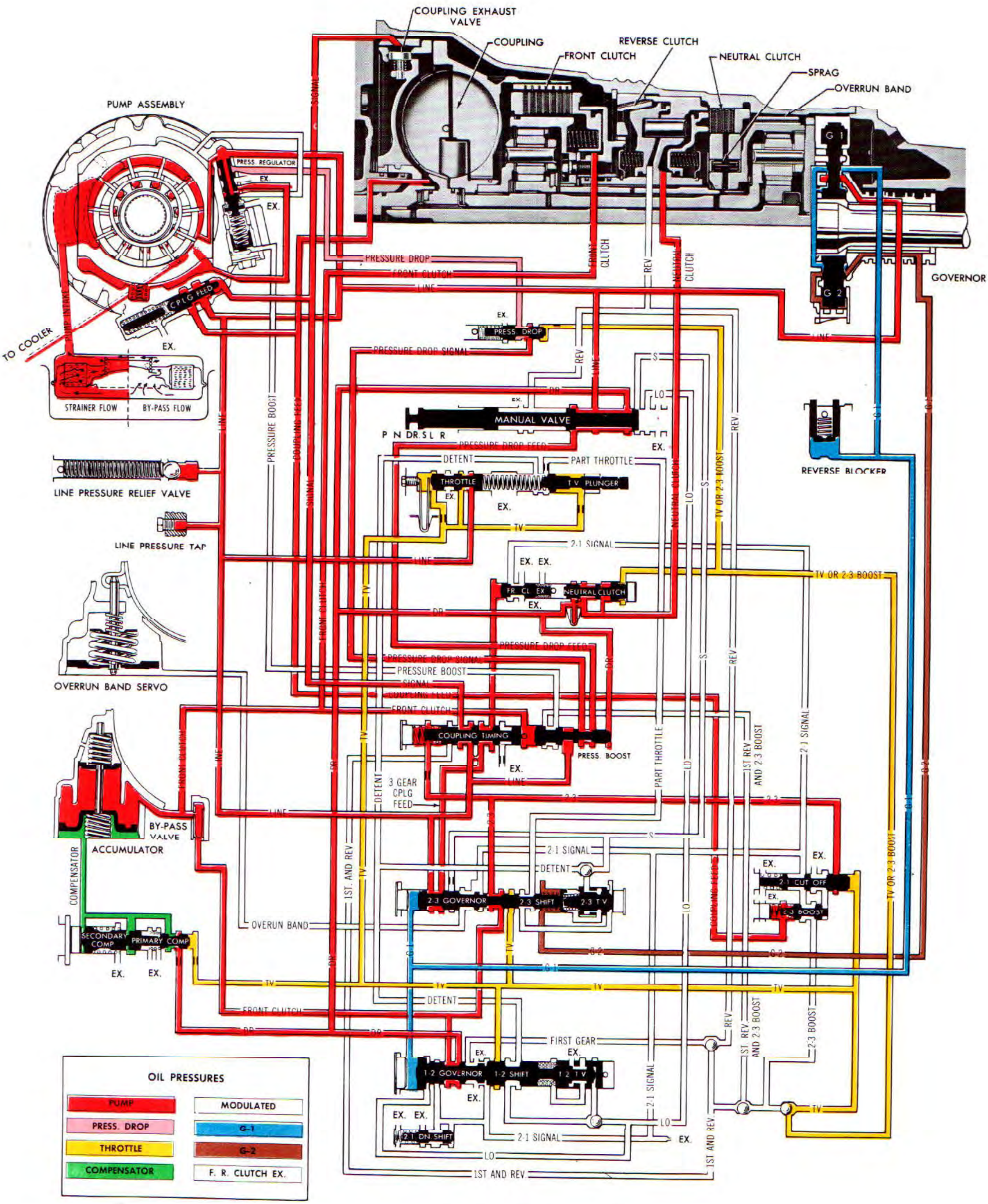
2-3 oil then repositions the coupling timing valve to allow signal pressure to close the coupling exhaust valves and open the coupling feed limit valve to provide coupling fill. Under some throttle conditions signal pressure may not be great enough to open the coupling feed limit valve. In this case all coupling feed pressure comes from the coupling timing valve. Third speed coupling feed pressure flows to the coupling timing valve where it provides an additional source for coupling feed pressure.

PRESSURE CONTROL

Under most driving conditions line pressure is not changed between second and third speed; however, below approximately 28 psi T.V. pressure, the 2-1 cutoff valve opens against T.V. pressure to allow 2-3 pressure to enter the 2-3 transfer passage. This will cause a temporary boost in line pressure as described under DRIVE RANGE-LIGHT THROTTLE 2-3 UPSHIFT.

SUMMARY

The front clutch remains applied and the coupling is filled so the transmission is in third speed.



MEDIUM THROTTLE

Figure 3-15 Drive Range (Third Speed)

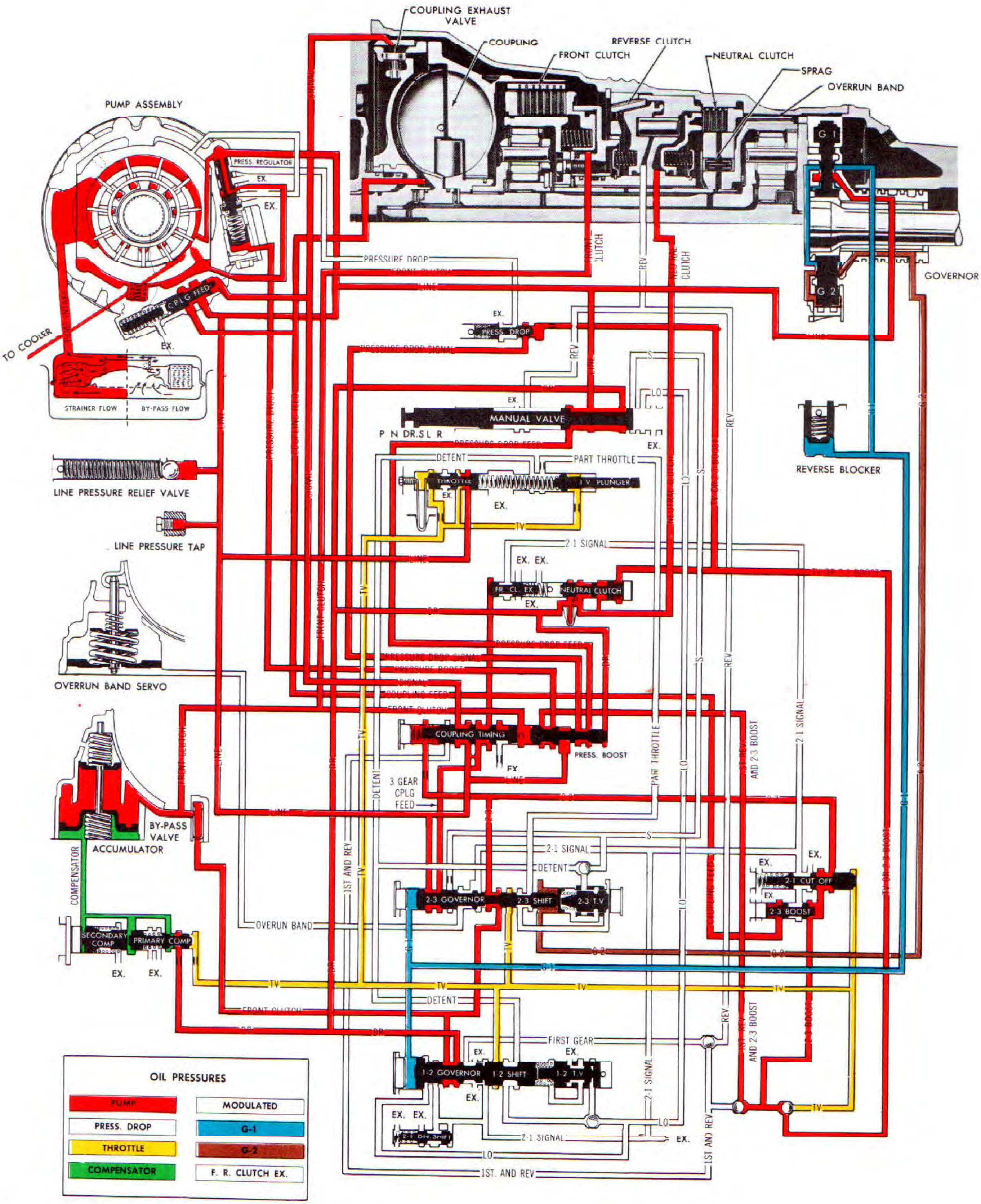
DRIVE RANGE—LIGHT THROTTLE 2-3 UPSHIFT

BASIC CONTROL

The basic control on light throttle 2-3 upshifts is the same as a basic 2-3 upshift.

PRESSURE CONTROL

When a 2-3 upshift is made at throttle positions giving less than approximately 28 psi T.V. pressure the 2-1 cut off valve is positioned against T.V. pressure by the spring. This allows 2-3 oil to flow past the 2-1 cut off valve, thus opening the 2-3 boost valve against the spring. This allows 2-3 oil to flow into the 2-3 boost passage and in turn past a ball check valve to the pressure drop valve. This closes the pressure drop valve cutting off pressure drop. Simultaneously, 2-3 boost oil flows past another ball check into the 1st, Reverse and 2-3 boost passage where it supplies an alternate source for pressure boost. Line pressure is then raised to a sufficient value to provide a fast coupling feed. As the coupling fills and reaches operating pressure, coupling feed pressure acts on the end of the 2-3 boost valve to cut off the source of boost pressure. With 2-3 boost cut off, T.V. pressure is again directed through the ball check valve to control the pressure drop valve. Line pressure will then drop to its normal third speed value of 74-105 psi.



(VALVES SHOWN PRIOR TO COUPLING REACHING FULL CHARGE PRESSURE)

Figure 3-16 Drive Range - Light Throttle 2-3 Up Shift

DRIVE RANGE—3-2 PART THROTTLE DOWNSHIFT

COUPLING—EXHAUSTING

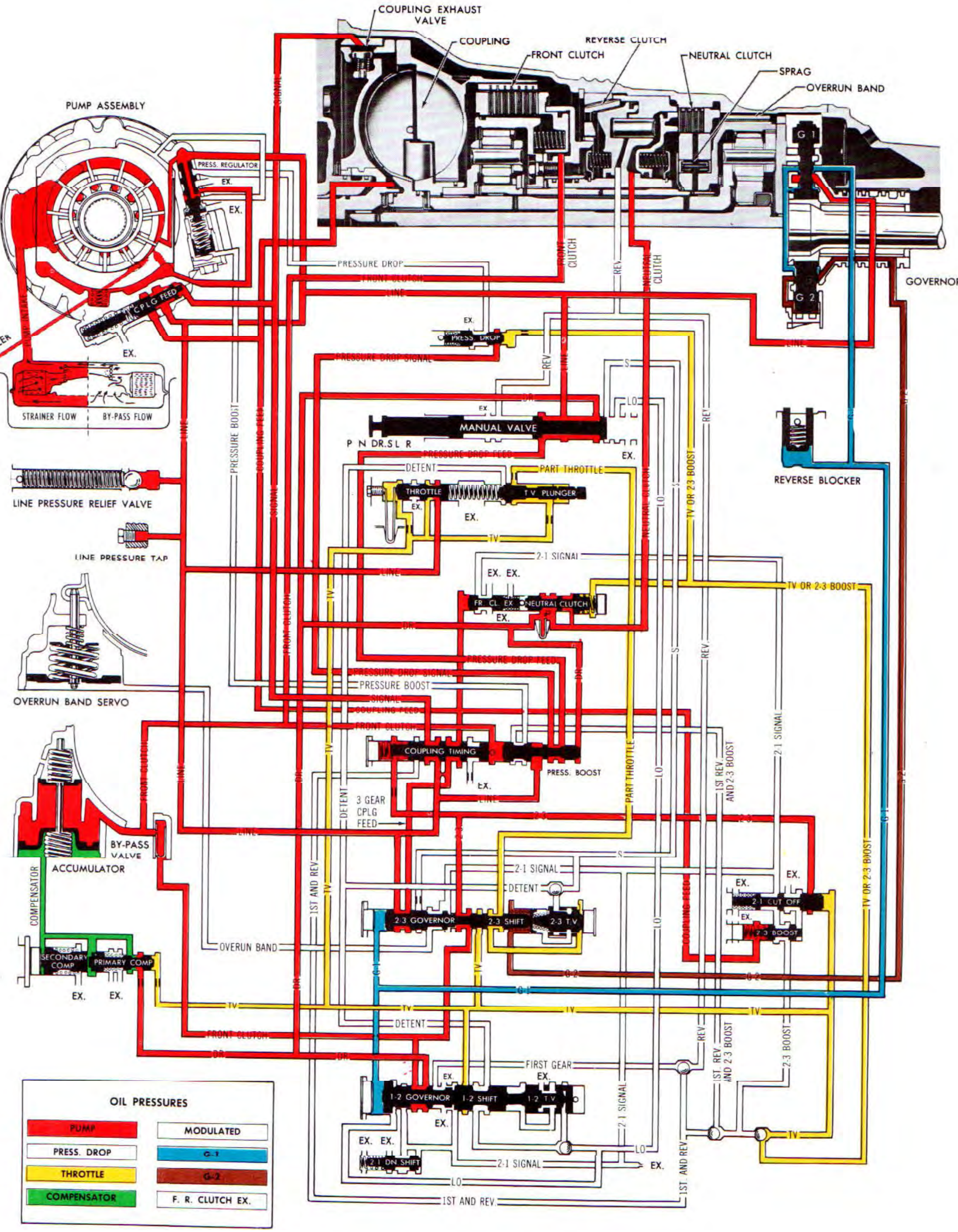
At vehicle speeds below approximately 35 mph a 3-2 downshift can be obtained by depressing the accelerator a given amount. When the accelerator is depressed sufficiently, T.V. pressure acting behind the T.V. plunger is allowed to enter the part throttle T.V. passage. Because the 2-3 shift valve is open, part throttle T.V. pressure enters the passage and acts against the large end of the 2-3 T.V. regulator valve which causes the 2-3 shift valve to close.

BASIC CONTROL

As the 2-3 shift valve closes, 2-3 oil and 3rd speed coupling fill oil from the 2-3 shift valve are cut off, thereby causing the coupling to exhaust, shifting the transmission back into second speed.

PRESSURE CONTROL

The pressure remains the same as in third speed.



(VALVES IN THIRD SPEED PRIOR TO DOWNSHIFT)

Figure 3-17 Drive Range - 3-2 Part Throttle Downshift

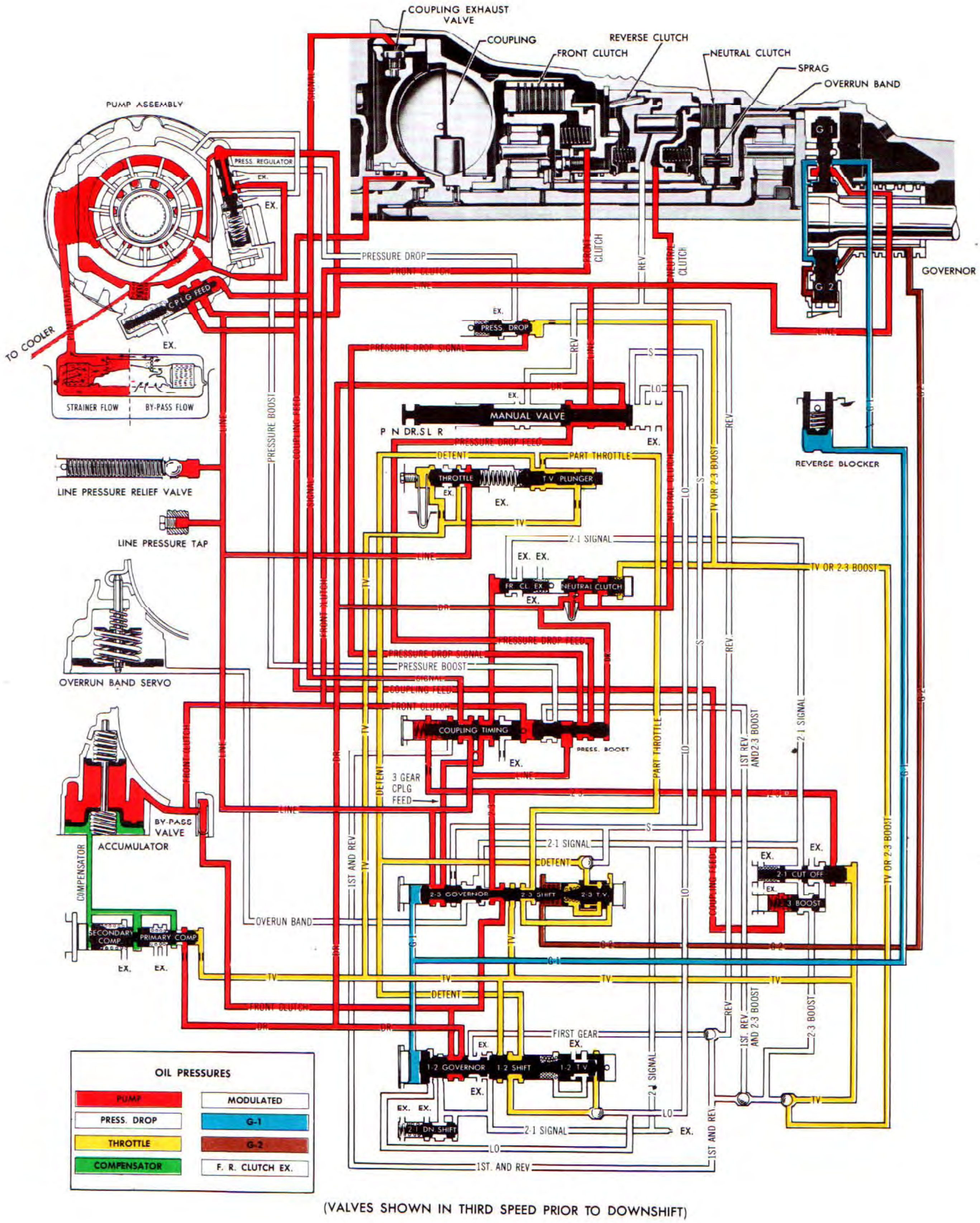
DRIVE RANGE—3-2 DETENT DOWNSHIFT

COUPLING—EXHAUSTING

While operating in third speed at speeds below approximately 65 mph, a forced or detent 3-2 downshift is available. This is accomplished by depressing the accelerator fully past the noticeable stop at full throttle.

As this is done, the T.V. plunger is fully depressed exposing the detent passage to T.V. pressure. Detent pressure which flows past the ball-check is directed against the large land of the 2-3 shift valve.

The force, due to pressure detent will overcome the force of G-1 and G-2 pressure and one spring acting in the opposite direction, thereby causing the 2-3 shift valve to close. The transmission will then shift into second speed.



(VALVES SHOWN IN THIRD SPEED PRIOR TO DOWNSHIFT)

Figure 3-18 Drive Range - 3-2 Detent Downshift

DRIVE RANGE—2-1 DETENT DOWNSHIFT

COUPLING—FILLING

FRONT CLUTCH—EXHAUSTING

At vehicle speeds below approximately 22 mph in second speed, a forced or detent 2-1 downshift can be obtained by depressing the accelerator fully past the detent. This causes the T.V. plunger to open the detent passage to T.V. pressure. Detent pressure then enters the 1-2 shift T.V. passage to act against the 1-2 T.V. valve. This causes the 1-2 shift valve to close against the force of G-1 pressure.

BASIC CONTROL

As the 1-2 shift valve closes, drive oil to the front clutch is cut off and all front clutch pressure in the front clutch and accumulator is compelled to exhaust the 2-1 signal passage. The spring and 2-1 signal pressure repositions the coupling timing valve to provide coupling signal pressure and coupling feed pressure.

PRESSURE CONTROL

Drive oil acting on the pressure boost valve repositions the valve against exhausting front clutch oil to provide both boost pressure and line drop signal with line pressure at 132 to 180 psi.

TIMING CONTROL

During a heavy throttle 2-1 downshift, the release of the clutch must be timed to coincide with the filling of the coupling. To accomplish this timing, exhausting front clutch oil or 2-1 signal oil is used as follows:

1. It flows through the closed 2-3 shift valve into the 2-3 passage to rapidly reposition the coupling timing valve for coupling fill.
2. It flows to the 2-1 cut off valve where a rapid exhaust is obtained at light throttles only, but no effect is obtained at heavy throttle 2-1 shifts.
3. It regulates to exhaust through the 2-1 downshift valve to a valve that will hold the front clutch torque in second speed but not in first speed. This feature permits the front clutch to handle the transmission torque in second speed until such time that first speed torque is predominate.
4. It rests against the front clutch exhaust valve until such time that coupling pressure attains a sufficient value to handle torque capacity in first speed. Coupling pressure then opens the front clutch exhaust valve to exhaust all remaining 2-1 signal or front clutch oil.

FAIL SAFE FEATURES

Drive oil flows past the closed 1-2 shift valve into a passage that supplies an auxiliary feed to the coupling timing valve. This oil provides an additional feed for signal oil in the event that the coupling timing valve should hang up in the closed position or is slow to move to the open position.

Drive oil into the first speed passage also flows through the ball-check valves and supplies a source for line boost pressure to rapidly fill the coupling prior to the time that the line boost valve has had a chance to be repositioned in the first speed position.

DRIVE RANGE—2-1 LIGHT THROTTLE DOWNSHIFT

(Illustration Shows First Speed Just After The Downshift)

During a light or closed throttle 2-1 downshift, as the 1-2 shift valve closes, drive oil to the front clutch passage is cut off; however, all front clutch pressure in the system is exhausted into the 2-1 signal passage. Because T.V. pressure is slight with light throttle, the 2-1 cut off valve is open to exhaust the 2-1 signal oil. This allows an immediate exhaust or front clutch oil.

Drive oil which formerly applied the front clutch when the 1-2 shift valve was open is now directed into the first gear passage which flows through the ball-check valves and supplies a source for pressure boost pressure to rapidly fill the coupling prior to the time that the pressure boost valve has had a change to be repositioned in the first speed position.

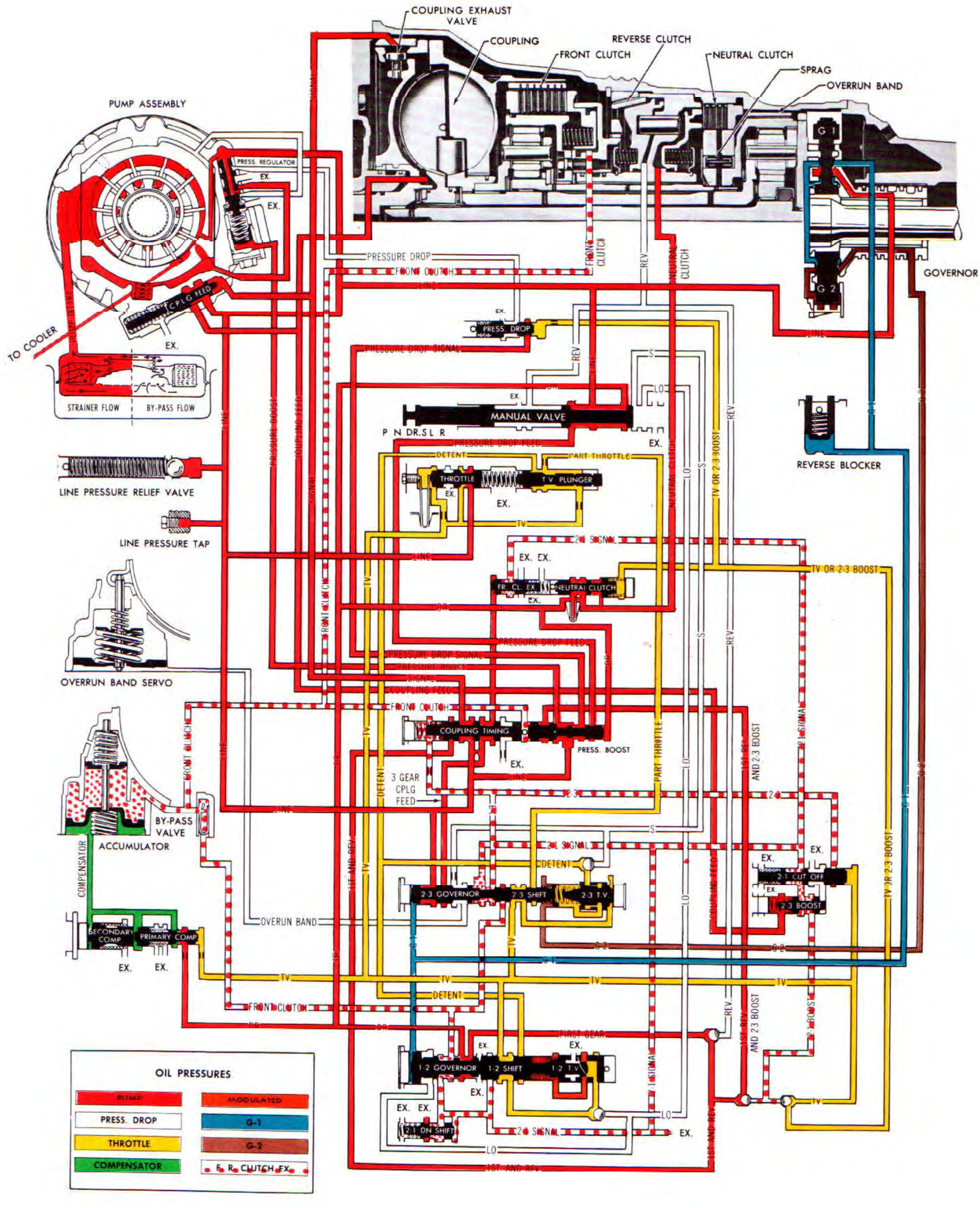


Figure 3-19 Drive Range - 2-1 Downshift

"S" RANGE—SECOND SPEED

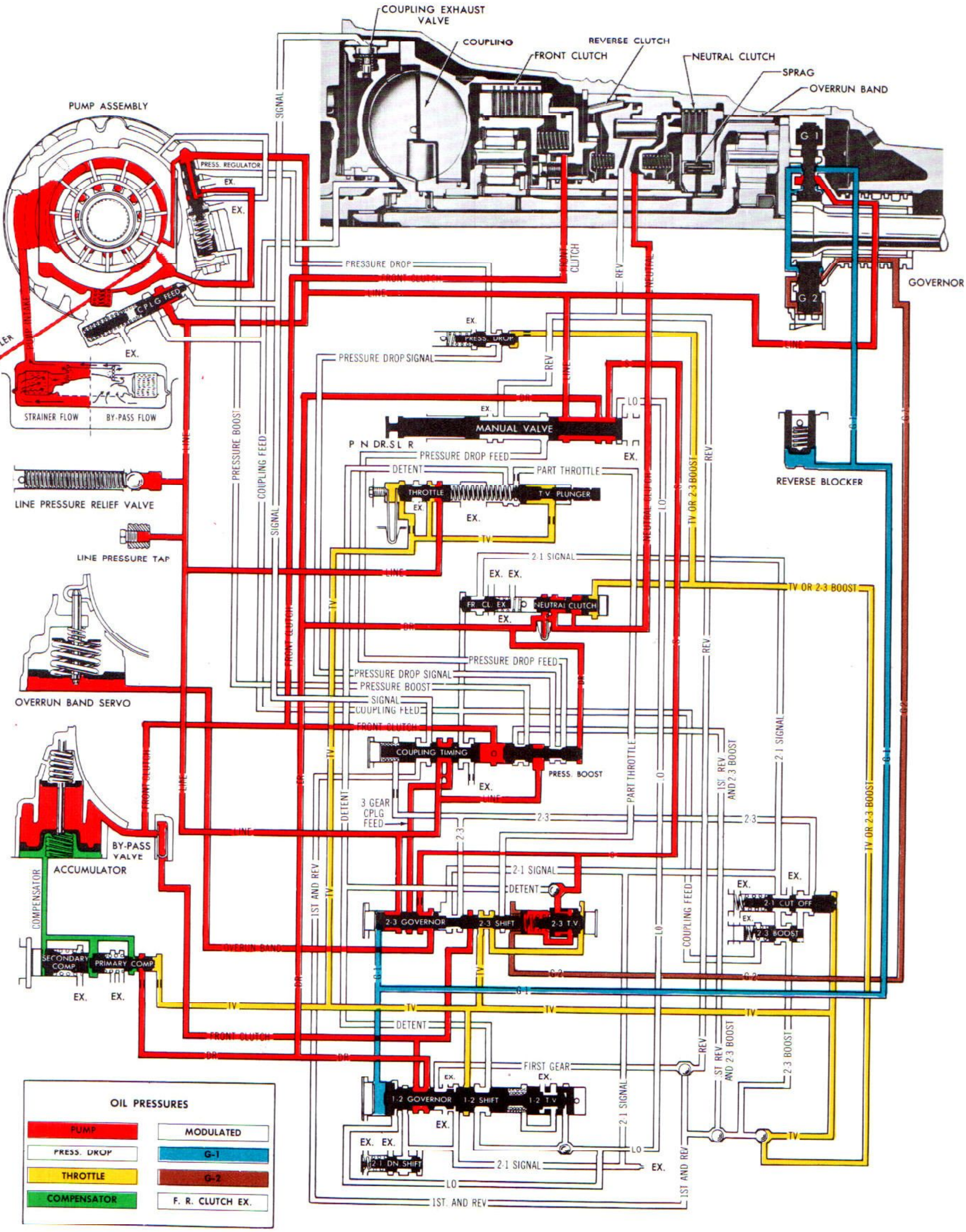
COUPLING—EMPTY **REVERSE CONE—OFF** **SPRAG—EFFECTIVE**

FRONT CLUTCH—APPLIED **NEUTRAL CLUTCH—APPLIED** **OVERRUN BAND—ON**

Oil flow in "S" range second speed is primarily identical to that in drive range second speed, with the following exceptions:

1. Oil Pressure
   When the manual valve is in the "S" position the line drop feed passage is cut off. This stops the source of line drop pressure so that line pressure is constant at approximately 105 psi regardless of throttle opening.
2. "S" Range Pressure
   "S" range pressure from the manual valve performs two functions. First, it is directed through the ball-check against the large end of the 2-3 shift valve to prevent a 2-3 shift from normally occurring in "S" range.* Secondly, it is directed through the 2-3 shift valve to apply the overrun servo and band for engine braking in second speed.

*As a safety feature, it is possible to obtain a 2-3 upshift in "S" range but only above the speed at which the normal drive range through detent 2-3 upshift occurs.



LIGHT THROTTLE

Figure 3-20 "S" Range - Second Speed

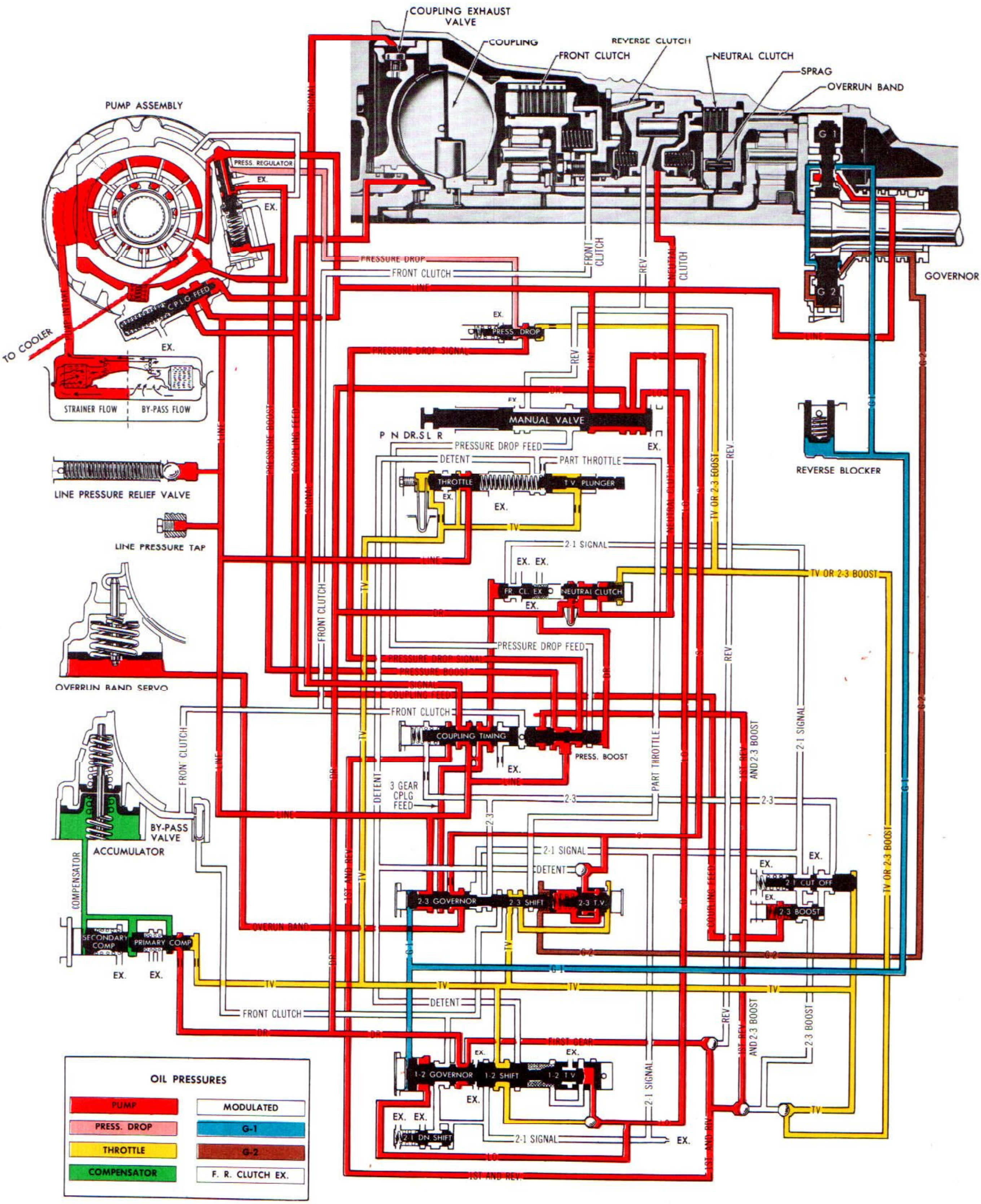
LOW RANGE—FIRST SPEED

When the selector lever is placed in the "L" position, the Manual Valve is moved to uncover an additional source of pressure, "L" range oil.

"L" range oil is directed to two locations:

1. Against the large end of the 1-2 governor valve to work against the force of G-1 pressure.
2. Through the ball-check valve, past the 1-2 T.V. regulator valve to act against the 1-2 shift valve to further assist in keeping the 1-2 shift valve closed against G-1 pressure.

The primary purpose of "L" range oil is to provide a definite means of preventing a 1-2 upshift from occurring in the "L" range position.



LIGHT THROTTLE

Figure 3-21 Low Range - First Speed

REVERSE

COUPLING—FILLED	**REVERSE CONE—ON**	**SPRAG—INEFFECTIVE**
FRONT CLUTCH—OFF	**NEUTRAL CLUTCH—OFF**	**OVERRUN BAND—OFF**

When the selector lever is moved to the "R" position, the manual valve is repositioned to exhaust Drive, "S" Range and "L" Range oil. Reverse oil pressure from the manual valve is allowed to enter the control system.

BASIC CONTROL

Reverse pressure applies the reverse cone.

Line pressure, through the coupling timing valve enters the signal passage to close the coupling exhaust valves and open the coupling feed limit valve for coupling fill.

PRESSURE CONTROL

Pressure control in reverse is identical to that obtained in neutral. Line pressure will vary from 132-180 psi depending on T.V. pressure.

FAIL SAFE FEATURES

Reverse pressure is also directed through a ball-check valve, to the coupling timing valve, to feed the coupling signal passage if the coupling timing valve should remain in the second speed position.

Line drop feed from the manual valve and reserve pressure through the ball-check valves are directed to the pressure boost valve to provide a secondary source for pressure drop and pressure boost if for any reason the pressure boost valve had remained in the second gear position.

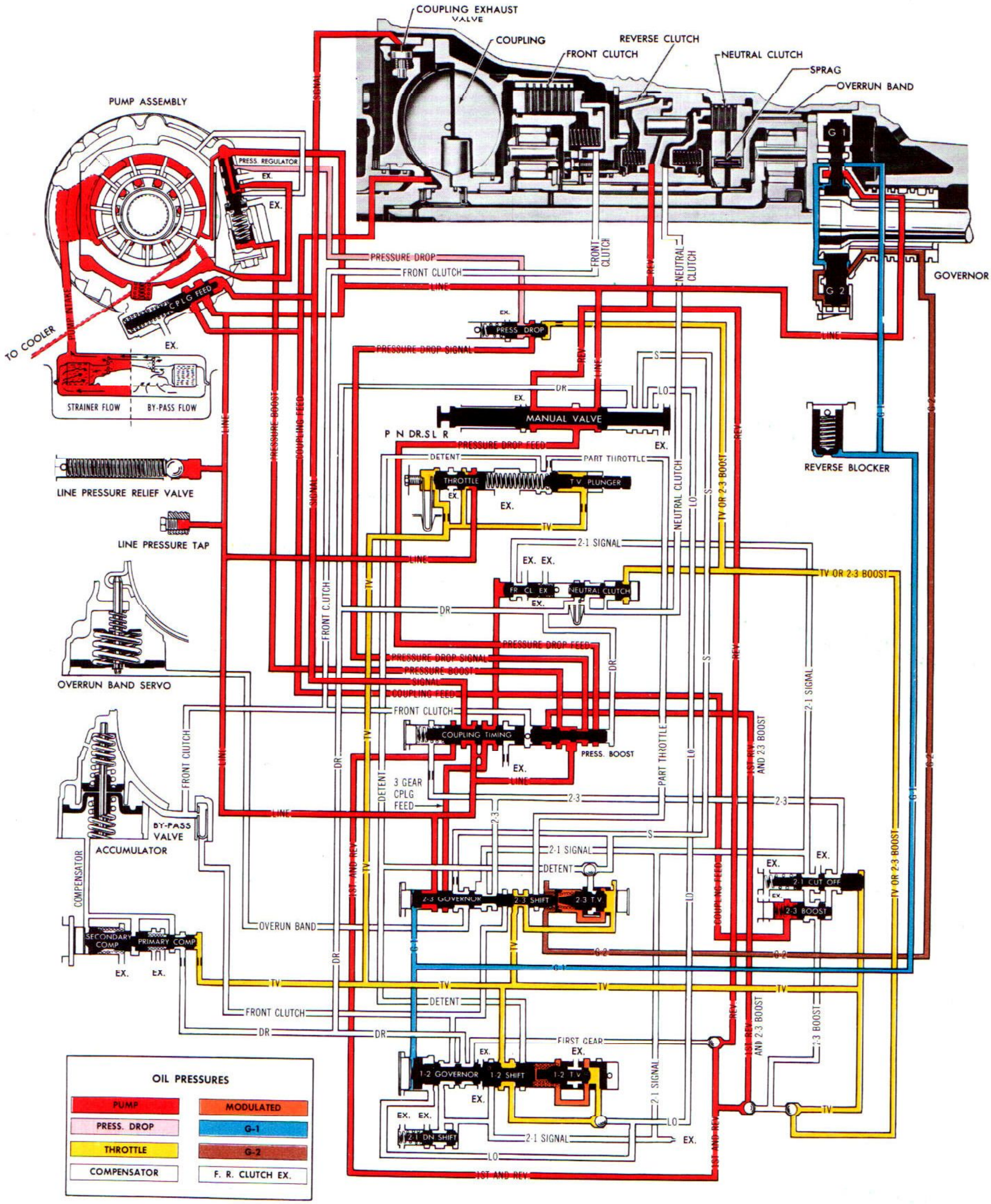


Figure 3-22 Reverse

OPERATIONS NOT REQUIRING REMOVAL OF TRANSMISSION

Some of the parts and/or units can be removed from the transmission without removing the transmission assembly from the car. The procedures for such operations are not specifically outlined; however, the basic procedure and specifications as outlined under DISASSEMBLY OF THE TRANSMISSION and ASSEMBLY OF THE TRANSMISSION will apply.

UNITS OR PARTS THAT CAN BE READILY REMOVED FROM THE TRANSMISSION ARE:

Oil Pan and Gasket
Outside T.V. and Manual Levers
Manual Shaft Seal
T.V. Shaft Seal
Rear Bearing Retainer Seal
Speedometer Driven Gear

UNITS OR PARTS THAT CAN BE REMOVED AFTER OIL PAN REMOVAL ARE:

Compensator Valve Body
Oil Cleaner
Control Valve Body
Accumulator and Servo
Case to Case Support Seals

UNITS THAT CAN BE REMOVED AFTER REAR BEARING RETAINER REMOVAL ARE:

Speedometer Drive Gear
Governor
Output Shaft
Rear Thrust Bearing and Races
Bushing Assembly
Parking Linkage (Also Requires Oil Pan Removal)

NOTE: To remove the rear bearing retainer it is necessary to remove the propeller shaft and also lower the rear of the transmission assembly to provide accessibility to the attaching bolts and provide floor pan clearance.

CAUTION: To prevent damage to the rear bearing, the output shaft must be removed and the governor placed on the output shaft before driving the speedometer drive gear onto the output shaft.

PARTS THAT CAN BE REMOVED AFTER LOWER HOUSING REMOVAL ARE:

Pipe Assembly (Also Requires Oil Pan Removal)
Coupling Feed Limit Valve
Pressure Regulator Valve

REMOVING THE HYDRA-MATIC TRANSMISSION

1. Disconnect transmission vent pipe from rear of right hand exhaust manifold.
2. Raise car (on hoist), remove oil filler pipe from transmission and drain fluid.
3. Disconnect speedometer cable and manual and throttle levers from transmission.
4. Remove propeller shaft assembly.
5. Install engine support bar. (Fig. 3-23)
6. Support transmission with unit-lift and an adapter that will accommodate the transmission.
7. Raise engine enough to relieve weight from rear engine mounts. Remove engine mount to cross member attaching bolts.
8. Remove cross member to frame attaching bolts and cross member.
9. Lower unit-lift until it is free of transmission oil pan.
10. Lower engine (using support bar adjusting screws), NOT TO EXCEED 1-1/2 INCHES, to permit removal of the upper transmission to flywheel housing bolts.
11. Disconnect oil cooler lines from fittings. Cap lines immediately.
12. Pry vent pipe from top of transmission case.
13. Raise unit-lift until it supports transmission and remove remaining transmission to flywheel housing bolts.
14. Move transmission rearward approximately 1-1/2" to disengage input shaft from damper hub.
15. Lower transmission from car.

INSTALLING THE HYDRA-MATIC TRANSMISSION

To install, reverse the above procedure and include the following:

Lubricate input shaft splines with a thin film of wheel bearing grease.

After transmission is installed, add 5 quarts of Hydra-Matic fluid. Set parking brake, start engine and allow oil to reach operating temperature, then add enough fluid to bring level to the "Full" mark on the dipstick.

NOTE: Transmission capacity: approximately 6-1/2 quarts (for oil change, pan removed). Approximately 9 quarts (after complete overhaul).

Adjust throttle and manual control linkage. (See MINOR SERVICE ADJUSTMENTS)

NOTE: If the pressure regulator valve spring was replaced, it will be necessary to check line

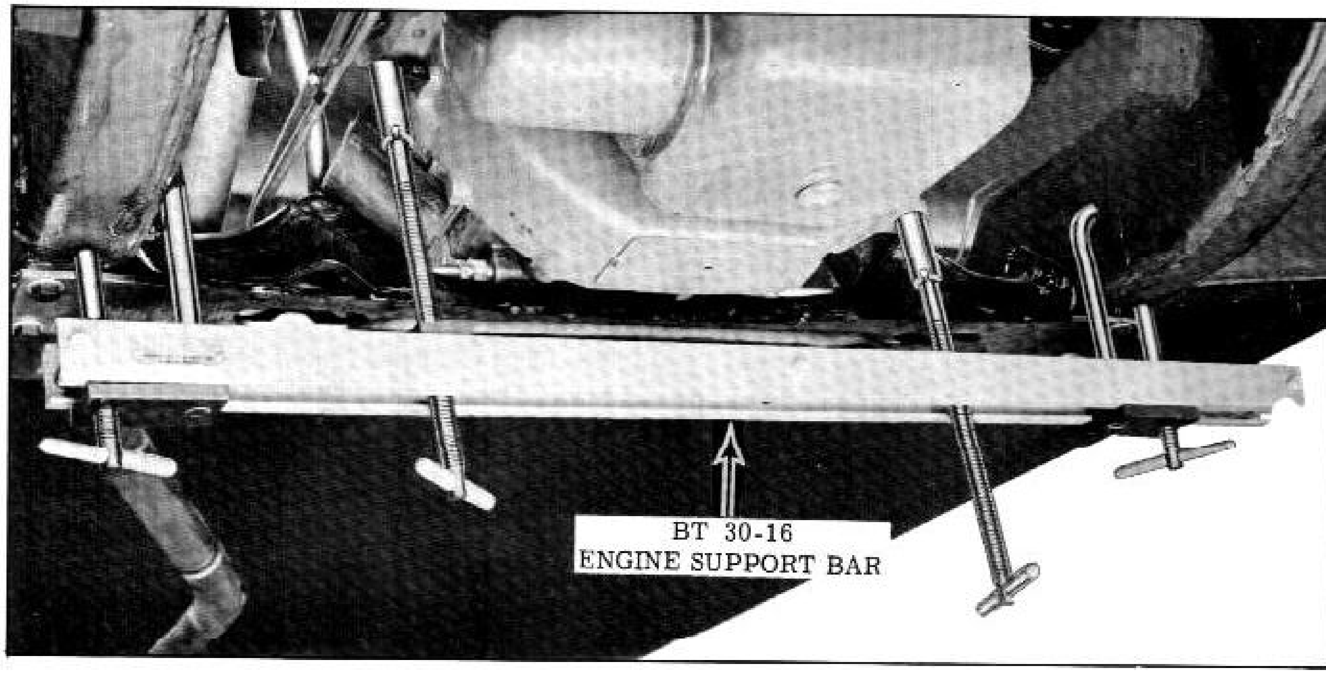


Fig. 3-23 Engine Support Bar

pressure. Pressure should be checked with shift selector in "N" or "P", engine running on fast idle and T.V. lever disconnected and held first rearward against its stop, which will give minimum T.V. pressure, and then forward to its stop, which will give maximum T.V. pressure. The correct line pressure for transmissions built prior to Serial Numbers 0-61-21372 and OA-61-32538 are: 69-79 psi with minimum T.V. pressure and 98 to 112 psi with maximum T.V. pressure. Transmissions built after above Serial Numbers should have 124-129 psi with minimum T.V. pressure and 176-184 psi with maximum T.V. pressure. If line pressures are not within above limits, it will be necessary to install a new booster plug. Booster plugs can be identified as follows:

A. Lowest pump pressure = "V" groove on end of booster plug.

B. Medium pump pressure = "Bead" on end of booster plug.

C. Highest pump pressure - End of booster plug is plain.

GENERAL SERVICE PRECAUTIONS

To aid the mechanic when servicing the transmission, it is recommended that upon disassembly of a unit, all parts should be cleaned and inspected as outlined under CLEANING AND INSPECTION, then the unit should be reassembled before disassembly of other units to avoid confusion and interchanging of parts.

1. Before disassembly of the unit, thoroughly clean the exterior.
2. Disassembly and reassembly of the unit and the sub-assemblies must be made on a clean work bench. As in repairing any hydraulically operated unit, cleanliness is of the utmost importance; therefore, the bench, tools, and parts must be kept clean at all times.
3. Before installing cap screws into aluminum parts, ALWAYS DIP SCREWS INTO HYDRA-MATIC OIL to prevent cap screws from galling the aluminum threads and also to prevent the screws from seizing.
4. Always use a torque wrench when installing cap screws into aluminum parts to prevent the possibility of stripping the threads.
5. If taped threads in aluminum parts are stripped or damaged, the part can be made serviceable by the use of Heli-Coils.
6. Seal protecting tools must be used when assembling the units to prevent damage to the seals. The slightest flaw in the sealing surface of the seal can cause an oil leak.
7. The aluminum castings and the valve parts are very susceptible to nicks, burrs, etc., and care should be exercised while handling them.
8. The internal snap rings should be expanded and the external snap rings compressed if they are to be reused. This will insure proper seating when installed. DO NOT REUSE TRU-ARC SNAP RINGS.
9. Replace all "O" rings, gaskets and oil seals that are removed.
10. During assembly of each unit, all internal

parts must be lubricated with Hydra-Matic oil.

11. The rear unit steel clutch plates must be installed in an un-nested position. Follow procedure.

12. The Fluid coupling is a balanced unit and if either the drive torus or torus cover are damaged, both units will have to be replaced as a matched assembly.

13. Always assemble the output shaft to the rear planet carrier in the same relative position.

PARTS CLEANING AND INSPECTION

After complete disassembly of a unit, all metal parts should be washed in a clean solvent and dried with compressed air. All oil passages should be blown out and checked to make sure that they are not obstructed. The small passages, such as in the front pump slide, should be checked with tag wire. All parts should be inspected to determine which parts are to be replaced.

The various inspections of parts are as follows:

1. Inspect linkage and pivot points for excessive wear.
2. Bearing and thrust surfaces of all parts should be checked for excessive wear and scoring.
3. Check for broken seal rings, damaged ring lands and damaged threads.
4. Inspect seals and "O" rings.
5. Mating surfaces of castings and end plates should be checked for burrs and irregularities. If a good seal is not apparent, burrs and irregularities may be removed by lapping the surface with crocus cloth. The crocus cloth should be held on a flat surface, such as a piece of plate glass.
6. Castings should be checked for cracks and sand holes.
7. Gear teeth should be checked for chipping, scoring, and excessive wear.
8. Valves should be free of burrs and the shoulders of the valves must be square. Any burrs or irregularities may be removed by honing. Valves should be free to slide in their respective bores.
9. Inspect composition clutch plates for damaged surfaces and loose facings. If flakes of facing material can be removed with the thumbnail, the plates should be replaced, however, composition plate discoloration is not an indication of failure.
10. Inspect steel clutch plates for scored surfaces.
11. Inspect springs for distortion or collapsed coils. Slight wear (bright spots) on the sides of the springs is permissible.
12. When inspecting bushings, fit the mating part into the bushing and observe the amount of looseness. Bushing clearance is excessive if more than .008 of an inch exists when checked with a wire feeler gauge.
13. If the transmission shows evidence that foreign material has circulated throughout the transmission or if the oil cleaner is dirty, the oil cleaner should be discarded and a new one installed upon assembly of the transmission.

TRANSMISSION DISASSEMBLY

CONTROL VALVE BODY, ACCUMULATOR AND SERVO REMOVAL

1. Attach transmission Holding Fixture J-8763 to transmission case.
2. Place transmission and Holding Fixture into Bench Adaptor J-6115-A, then rotate transmission so that oil pan is up. (Fig. 3-24)
3. Remove oil pan and gasket.
4. Remove oil cleaner attaching bolt and oil cleaner. (Fig. 3-25)
5. Inspect and if necessary, remove the oil cleaner to case seal ring with a small screw driver.
6. Pry T.V. shaft seal from side of rear bearing retainer. (Fig. 3-26)
7. Remove 5 control valve assembly attaching bolts and carefully remove control valve assembly from the pipe assembly and rear bearing retainer. (Fig. 3-26) DO NOT DROP THE MANUAL VALVE.

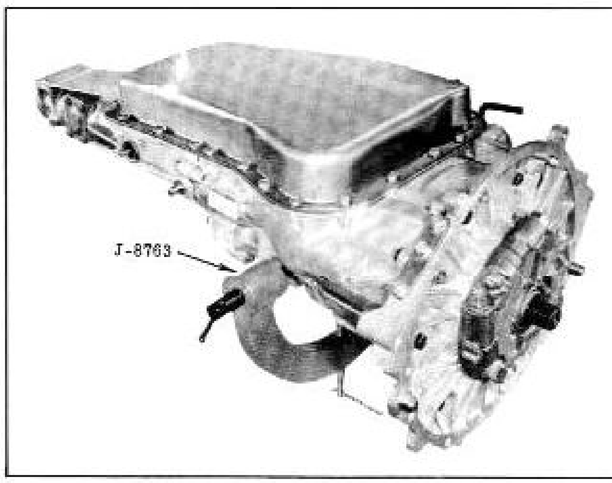


Figure 3-24 Transmission Holding Fixture

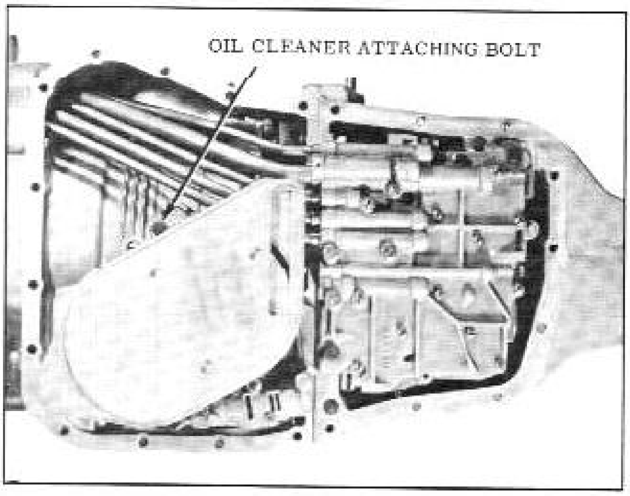


Figure 3-25 Oil Cleaner

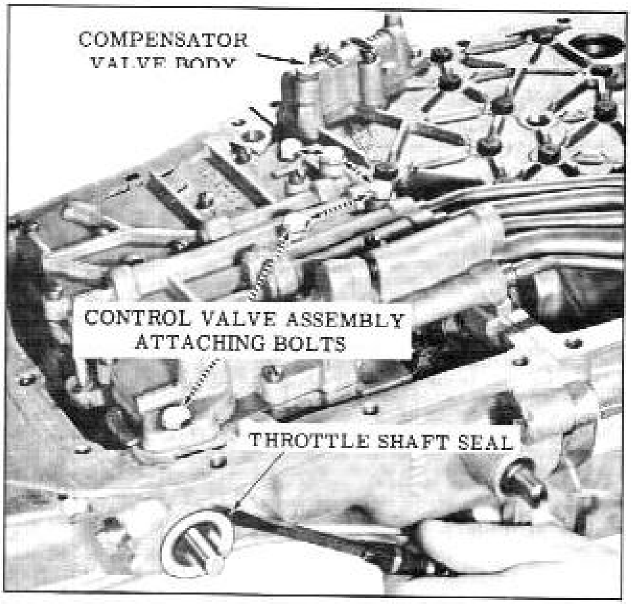


Figure 3-26 Valve Bodies and Seal

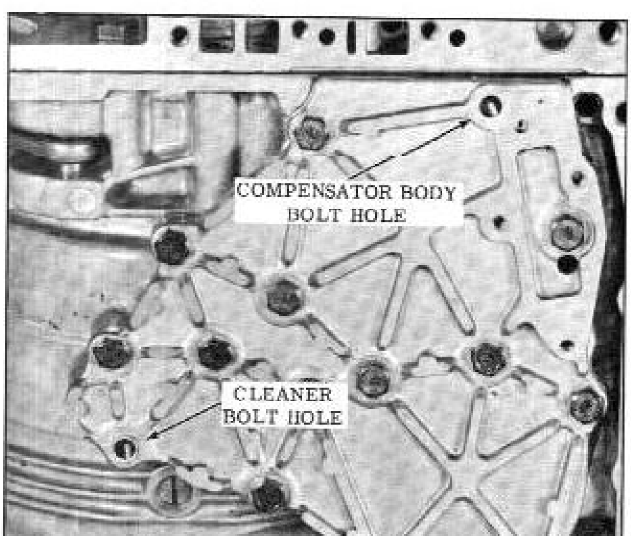


Figure 3-27 Accumulator and Servo Cover

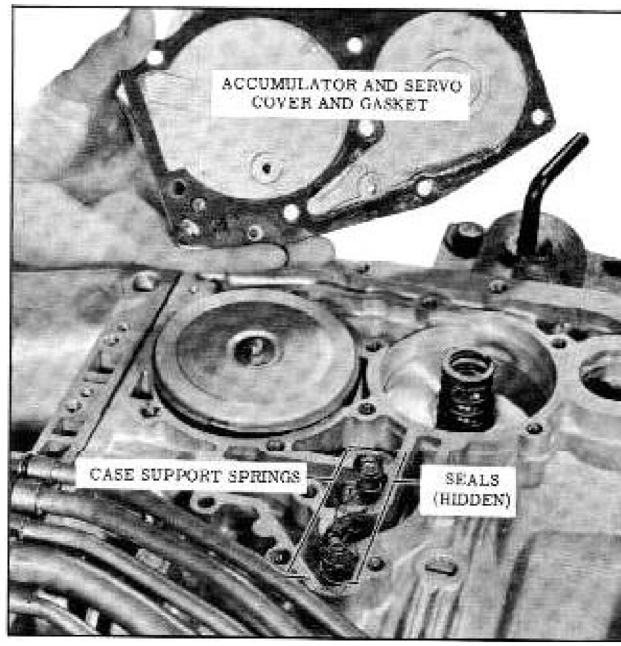


Figure 3-28 Case Support Springs and Seals

8. Remove manual valve from control valve assembly.

9. Remove the compensator valve body assembly from the servo and accumulator cover by removing 1 bolt and 3 screws. (Fig. 3-26)

10. Remove the servo and accumulator cover and gasket by removing the 12 remaining cover bolts. (Fig. 3-27) Cover is under spring tension.

11. Remove the 3 case support springs and seals. (Seals may remain in transmission case). (Fig. 3-28)

12. Remove the servo piston assembly and the

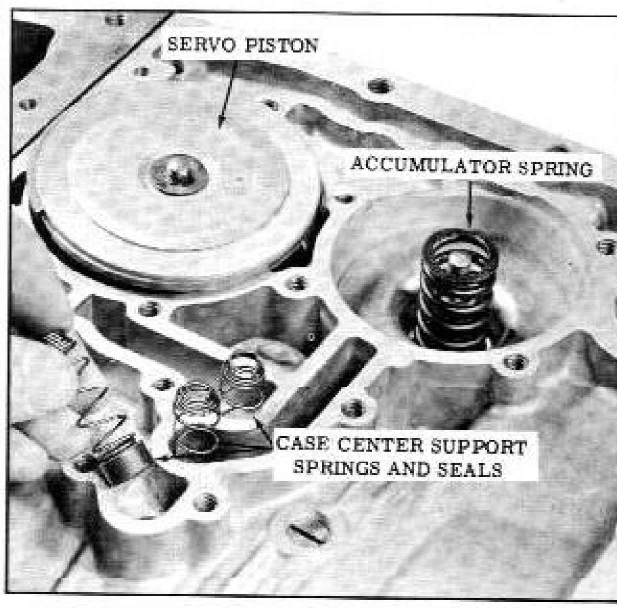


Figure 3-29 Accumulator and Servo

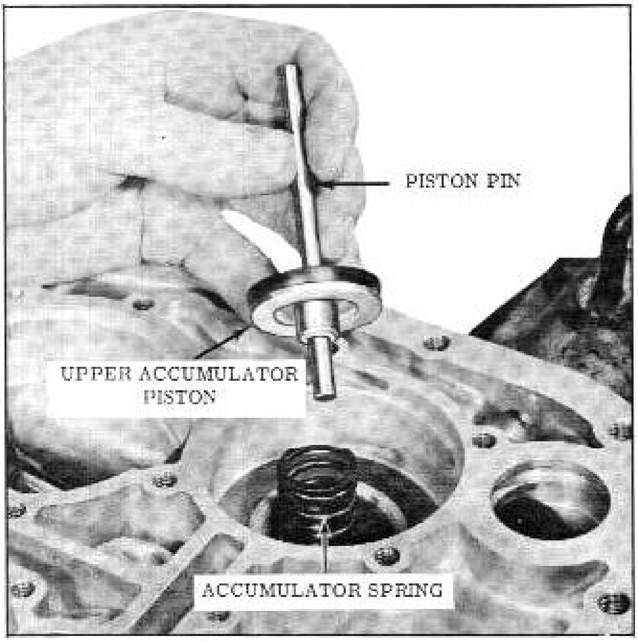


Figure 3-30 Accumulator Removal

servo release spring from bore in case. (Fig. 3-29)

13. Remove the lower accumulator spring and piston. (Fig. 3-29)
14. Remove the accumulator piston pin, then using the stem of the accumulator pin as a tool, remove the upper accumulator piston. (Fig. 3-30)
15. Remove the upper accumulator spring.
16. Remove the ring and seal from the lower and upper accumulator pistons.
17. Remove the pipe assembly attaching bolt, washer and seal from front of case cover and withdraw the pipe assembly and seals from transmission. Multiple seals may have remained in transmission. (Fig. 3-31)

If transmission is not to be disassembled further, refer to Page 3-58 for servicing of the valve body or Page 3-54 for servicing of the accumulator and servo.

FRONT UNIT END PLAY CHECK

If transmission is to be completely disassembled, measure front unit end play as follows:

1. Remove one case cover to case attaching bolt.
2. Install Tool J-6126 into transmission case. (Fig. 3-32)
3. Assemble Neutral Clutch Retainer J-6135 on the input shaft.
4. Clamp dial indicator on bolt from Tool J-6126 and index indicator with end of Tool J-6135 in line with lock screw on tool.
5. Position a screw driver through case, BEHIND OUTPUT SHAFT FLANGE and gently pry forward on output shaft to position units forward.
6. At the same time move Tool J-6135 and record end play. (Fig. 3-32)
7. End play should be .005" to .020". Record end play.
8. Remove the tools.

REAR BEARING RETAINER, SPEEDOMETER DRIVE GEAR, AND GOVERNOR REMOVAL

1. If rear seal replacement is necessary, drive seal from rear bearing retainer using a chisel.

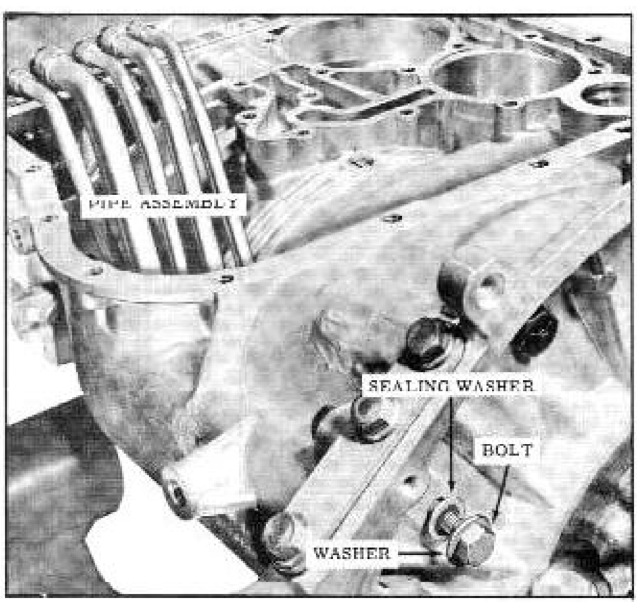


Figure 3-31 Pipe Assembly Removal

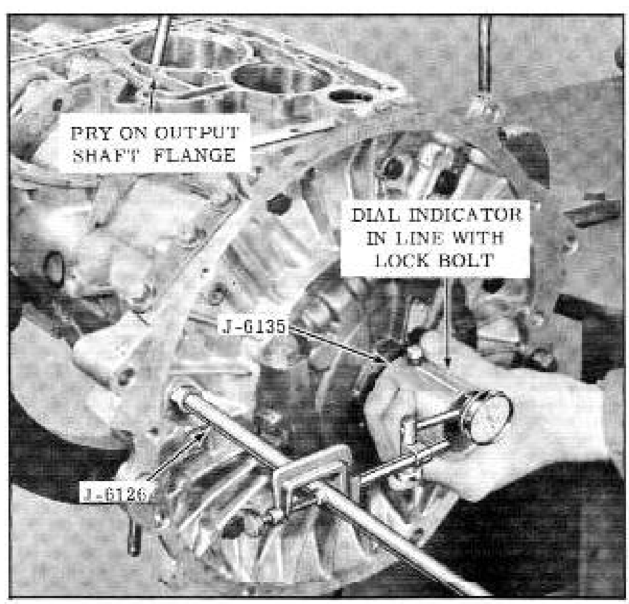


Figure 3-32 Checking End Play

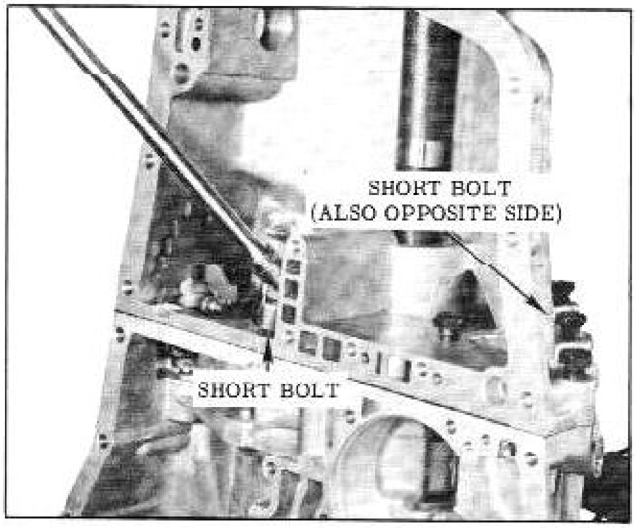


Figure 3-33 Rear Bearing Retainer Bolts

2. Remove the rear bearing retainer cover and gasket by removing the 4 attaching bolts.

3. Rotate the transmission so that the output shaft is up, then remove the rear bearing retainer to case attaching bolts (6 on out side and 2 on inside of rear bearing retainer.) (Fig. 3-33)

4. Reaching through access hole in rear bearing retainer, cut and remove "O" ring from output shaft, unseat the rear output shaft snap ring using Tool J-8872 and move snap ring upward over output shaft "O" ring groove. (Fig. 3-34)

5. Carefully, remove the rear bearing retainer and gasket from output shaft.

CAUTION: Care should be exercised to prevent manual shaft retainer from falling out of front face of rear bearing retainer. In lifting retainer over output shaft, use care to prevent the retainer sleeve from striking the speedometer drive gear.

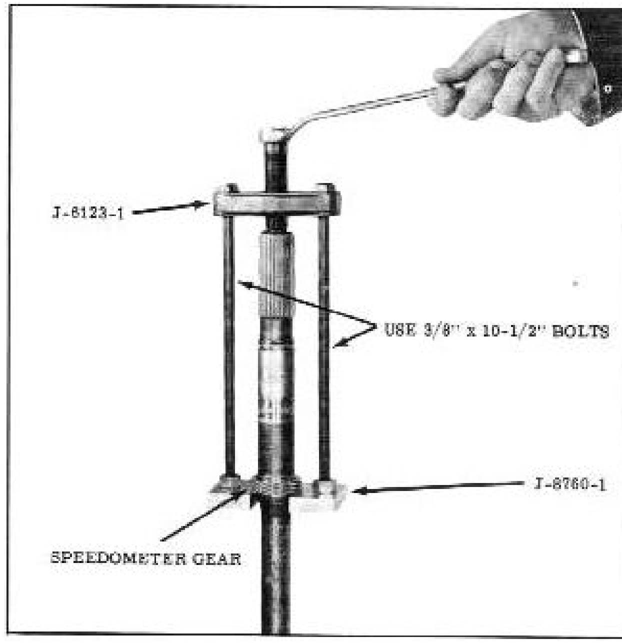


Figure 3-35 Removing Speedometer Drive Gear

6. Remove the dislodged snap ring from rear bearing retainer.

7. Remove the remaining snap ring from the output shaft using Tool J 8872.

8. Engage parking pawl, then using Speedo Gear Puller J-6123-1 and 2 machine bolts 3/8 x 10-1/2 USS, remove the speedometer drive gear from the output shaft. (Fig. 3-35)

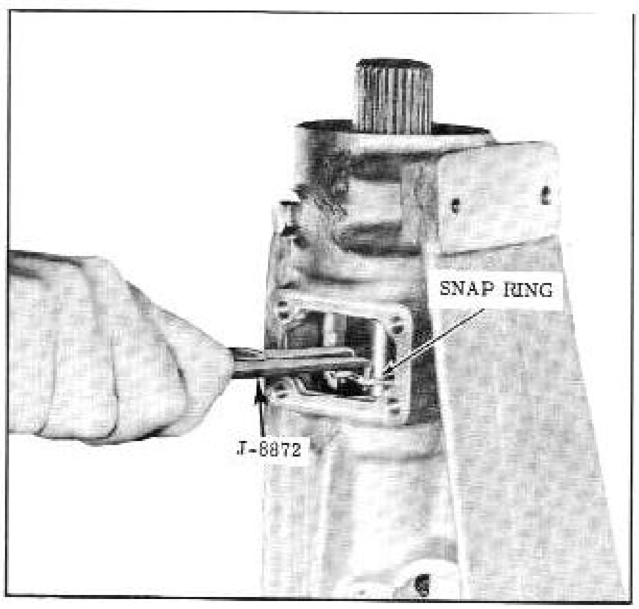


Figure 3-34 Unseating Snap Ring

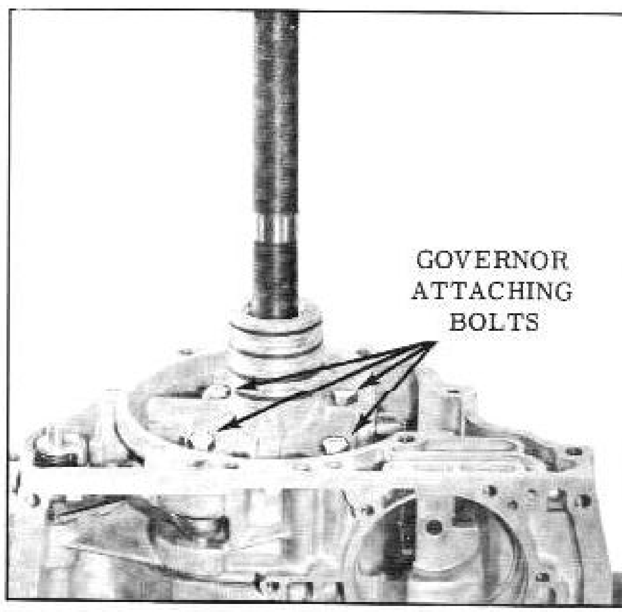


Figure 3-36 Governor Removal

9. Remove the 4 governor attaching bolts, governor assembly and gasket from output shaft. (Fig. 3-36)

10. If alignment marks are not visible, mark one dowel pin and nearest tooth on the output shaft flange for ease in re-assembling.

    CAUTION: Do not punch or scratch ground surface on output shaft flange for marking.

11. Remove the output shaft assembly from transmission by lifting straight up.

    If transmission is not to be disassembled further, refer to Page 3-50 for servicing of the governor or Page 3-53 for servicing of the rear bearing retainer.

CASE COVER AND FRONT PUMP REMOVAL

1. Rotate the transmission so that the case cover and pump are up.

2. If necessary, remove and discard the pump seal by crimping seal as shown in Fig. 3-37 and withdrawing seal with needle nose pliers.

    NOTE: If transmission is NOT to be disassembled, install seal as follows:

    a. Place Seal Protector J-8828 over input shaft.

    b. Apply seal lubricant Part No. 567196 to the sealing lip of a new seal.

    c. Apply a film of P.O.B. No. 3 sealer, Part No. 557622 to the outer diameter of the seal.

    d. Install seal using Tool J-8761. (Fig. 3-38)

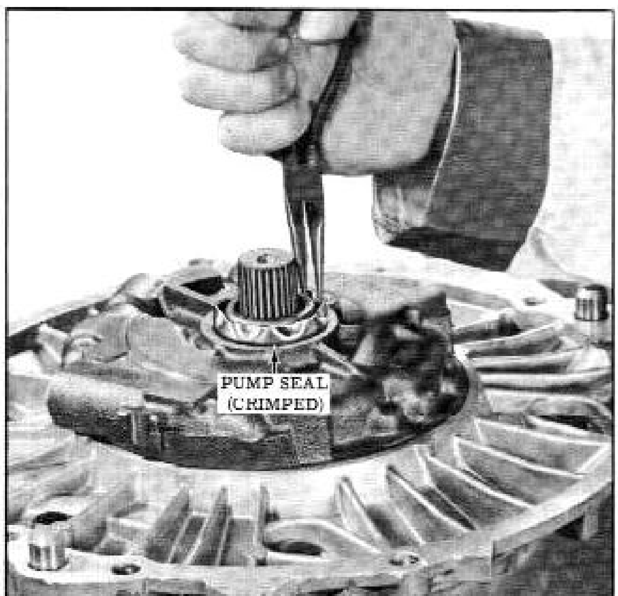


Figure 3-37 Removing Oil Pump Seal

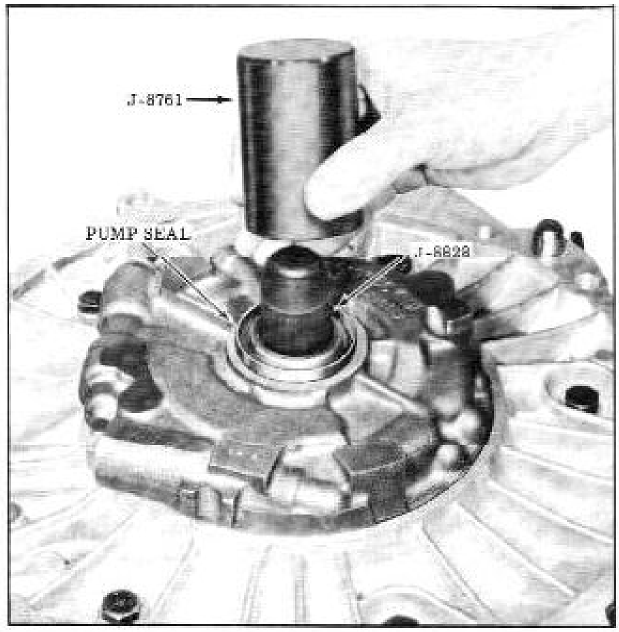


Figure 3-38 Installing Pump Oil Seal

3. Remove 6 large and 3 small case cover to case attaching bolts.

    NOTE: Two of the small bolts are attached from the case side of the case cover.

4. Install Seal Protector J-8828 over input shaft, if pump seal was not removed.

5. Remove case cover and pump assembly by lifting straight up. Slight tapping with plastic hammer may be necessary.

6. Remove case cover to case gasket and discard.

7. Remove bearing race if it remained on the torus cover.

If transmission is not to be disassembled further, refer to Page 3-45 for servicing of the case cover or Page 3-46 for servicing of the oil pump.

TORUS REMOVAL

1. Install a box end wrench as a holding tool, using a large case cover attaching bolt. (Fig. 3-39)

2. Completely loosen 12 torus cover attaching bolts and remove the holding wrench.

3. Remove torus cover from torus assembly by lifting input shaft straight up.

4. Remove and DISCARD torus cover to drive torus gasket.

5. Remove race, thrust bearing, and race from either torus cover or torus member. Parts may have remained with either unit. (Fig. 3-40)

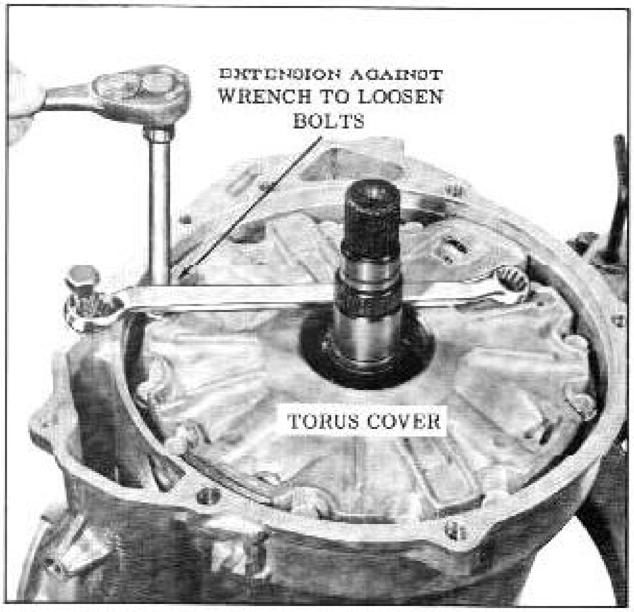


Figure 3-39 Removing Torus Cover Bolts

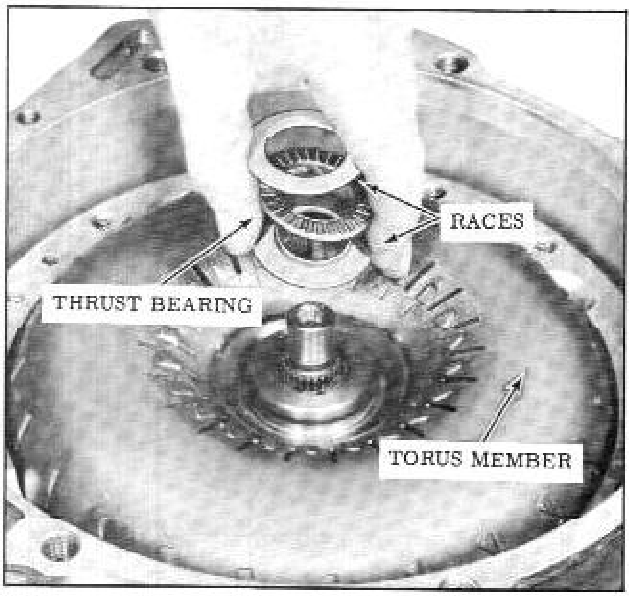


Figure 3-40 Removing Bearing and Races

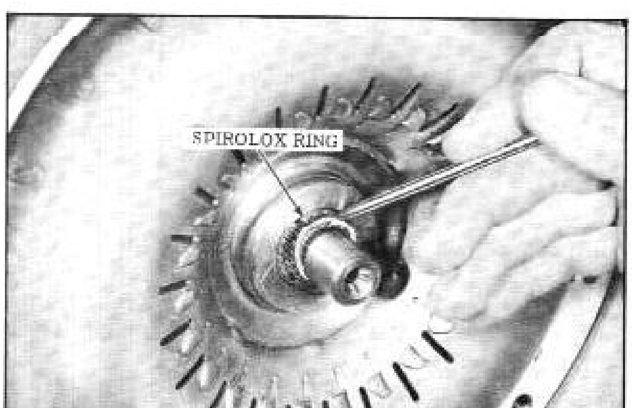


Figure 3-41 Removing Spirolox Ring

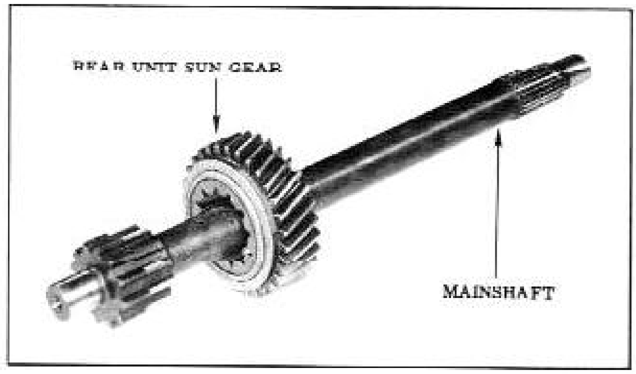


Figure 3-42 Sun Gear Removal

6. Rotate transmission to horizontal position with bottom up.
7. From the front of the transmission remove the driven torus member to main shaft Spirolox ring, with a small pointed tool. (Fig. 3-41)
8. Push main shaft through driven torus member and remove driven torus member.
9. Remove race, thrust bearing and race from drive torus member.

   NOTE: Some of these parts may have been removed with the driven torus member.
10. Remove the mainshaft and sun gear from the rear of the transmission.
11. Remove the bearing and race from the rear carrier.

    NOTE: These parts may have remained with the main shaft.
12. Remove sun gear from main shaft. (Fig. 3-42)
13. From the front of the transmission, remove the drive torus member and torque multiplier as a unit. (Fig. 3-43)

Figure 3-43 Drive Torus and Torque Multiplier

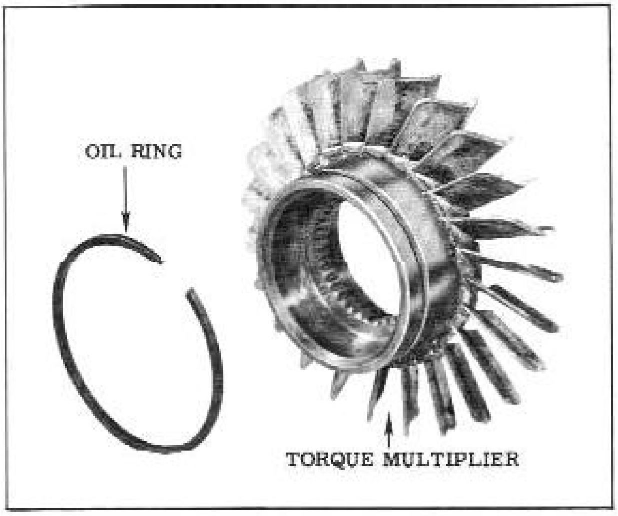


Figure 3-44 Torque Multiplier Oil Ring

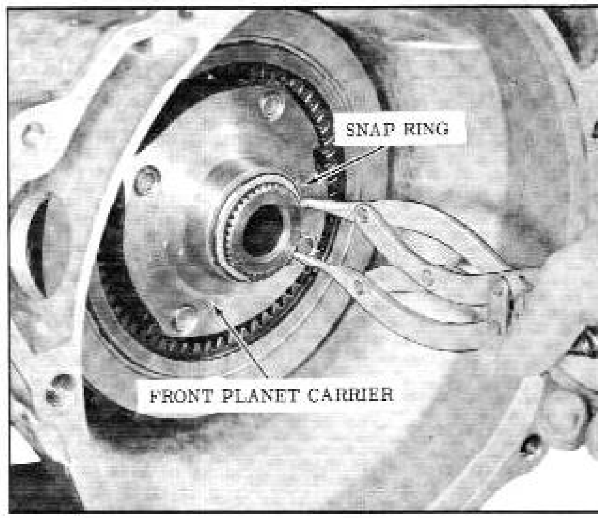


Figure 3-46 Removing Snap Ring

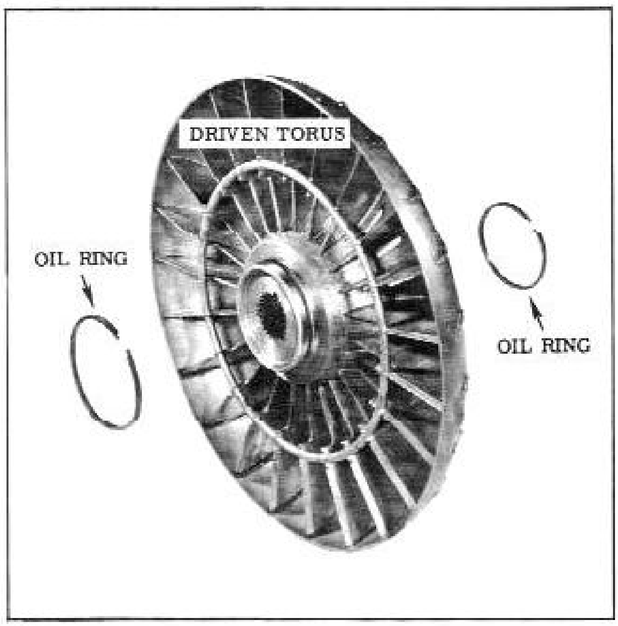


Figure 3-45 Driven Torus Oil Rings

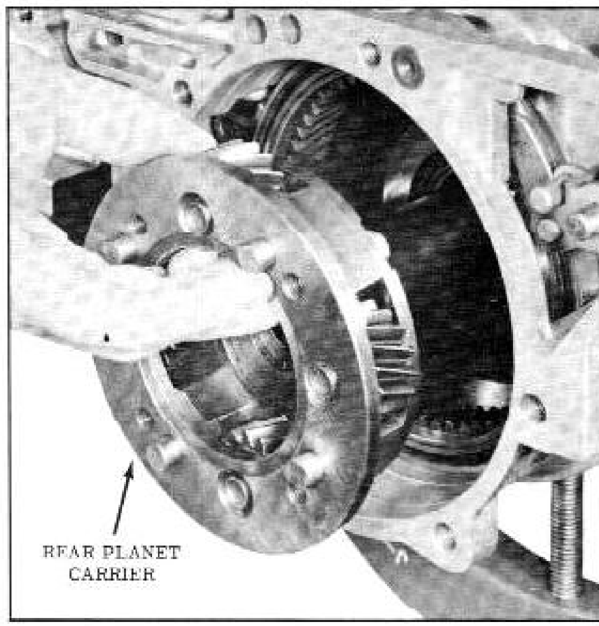


Figure 3-47 Removing Rear Carrier

14. Remove the torque multiplier by pushing from rear of the drive torus member.

15. If necessary, remove oil rings from driven torus member and torque multiplier (three rings). (Fig. 3-44 and 3-45)

If transmission is not to be disassembled further, refer to Page 3-51 for servicing of the torus cover.

FRONT AND REAR UNITS REMOVAL

1. Remove front carrier to carrier shaft snap ring. (Fig. 3-46)
2. Remove the front unit carrier assembly.
3. Remove race, thrust bearing and race.

NOTE: Some of these parts may have remained with the carrier.

4. Remove the rear carrier and shaft assembly from the rear of the transmission. (Fig. 3-47)
5. Remove the thrust bearing and race from the rear unit carrier assembly. (Fig. 3-48)

NOTE: These parts may have remained with the rear unit internal gear.

6. From the rear of the transmission, remove the rear internal gear to front sun gear shaft snap ring. (Fig. 3-49)
7. Make certain parking pawl is disengaged, then remove the rear unit internal gear and sprag assembly. (Fig. 3-50)

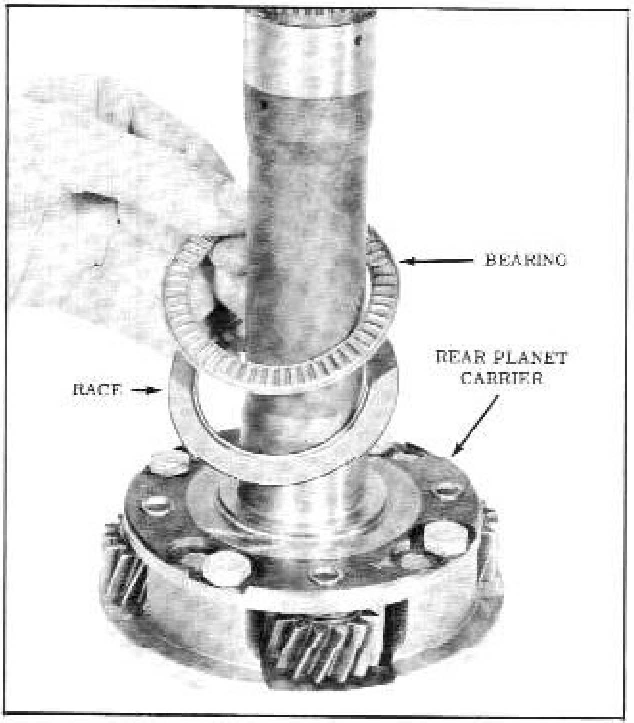


Figure 3-48 Thrust Bearing and Races

Figure 3-49 Removing Internal Gear Snap Ring

8. Rotate the transmission 90° so that the front of transmission is up.

   CAUTION: Transmission parts are loose and will drop out if transmission is not rotated as described.

9. Remove the front unit sun gear assembly, race, thrust bearing and race. (Fig. 3-51)

10. Remove the front unit gear and clutch assembly from the front of transmission.

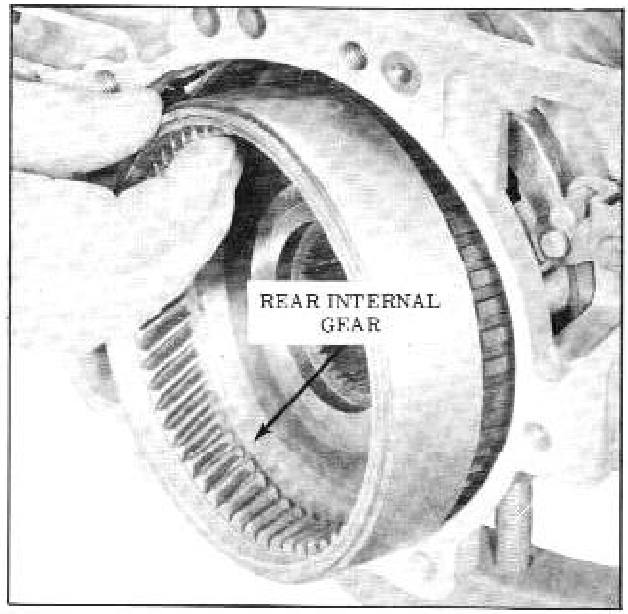


Figure 3-50 Removing Internal Gear

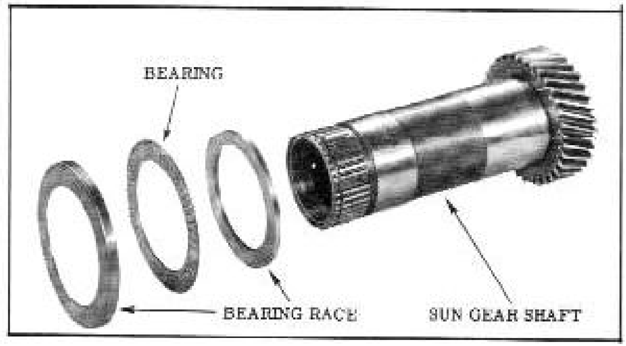


Figure 3-51 Bearing and Races

1. Remove the bronze thrust washer from the front unit clutch drum. (Fig. 3-52)

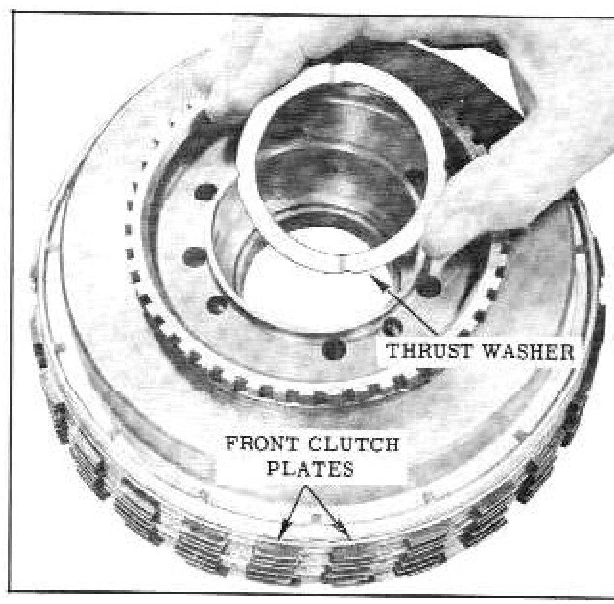


Figure 3-52 Front Clutch

Figure 3-53 Removing Reverse Cone

NOTE: The bronze thrust washer may have remained on the case support.

12. Remove the reverse stationary cone to case snap ring.
13. Using Reverse Cone Puller, J-8768, remove the reverse cone and reverse stationary cone. Position tool under lugs of reverse cone and pull upward. (Fig. 3-53)

    A slide hammer (J-6125) can be used as illustrated.
14. Remove the reverse stationary cone key from case.
15. Remove the reverse and neutral piston and case support assembly.

    NOTE: If assembly is tight in case, loosen both holding fixture screws slightly and gently tap case support with soft hammer from rear.
16. Remove the neutral clutch drum key from the transmission case. (Fig. 3-54)

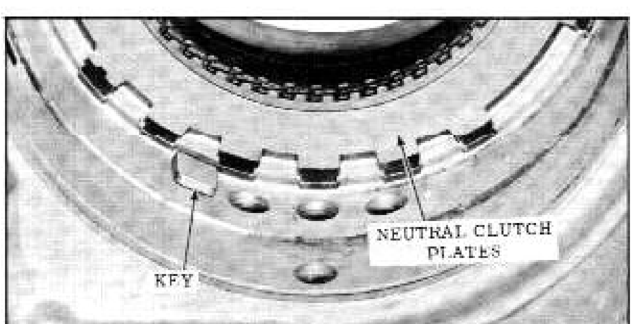


Figure 3-54 Neutral Clutch Key and Plates

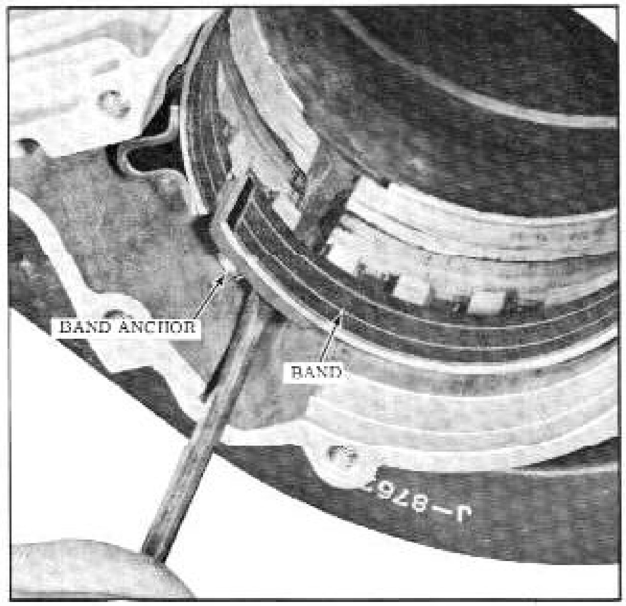


Figure 3-55 Removing Overrun Band

17. Remove the neutral clutch plates (4 drive composition and 4 driven steel) and clutch backing plate from transmission case. (Fig. 3-54)
18. Rotate the transmission so that the rear of the case is up.
19. Unhook the band from the anchor and lift upwards to remove. (Fig. 3-55)

If transmission is not to be disassembled further, refer to Page 3-48 for servicing of the reverse and neutral clutch, Page 3-55 for servicing of the front clutch, or Page 3-57 for servicing of the rear internal gear and sprag.

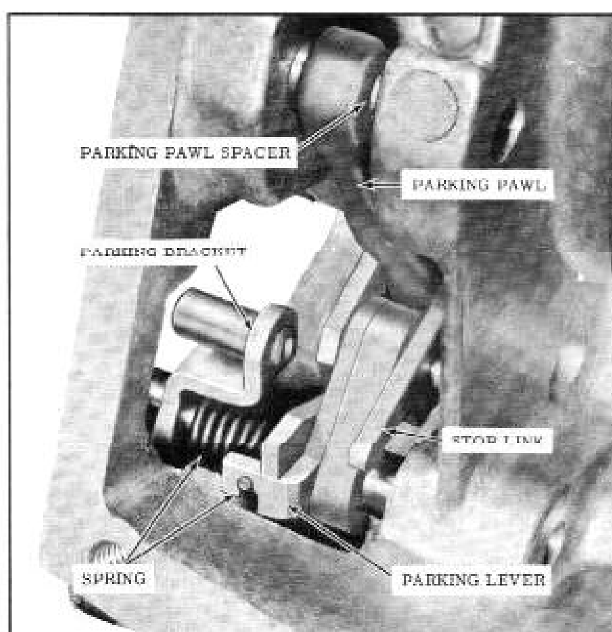


Figure 3-56 Spring and Lever Assembly

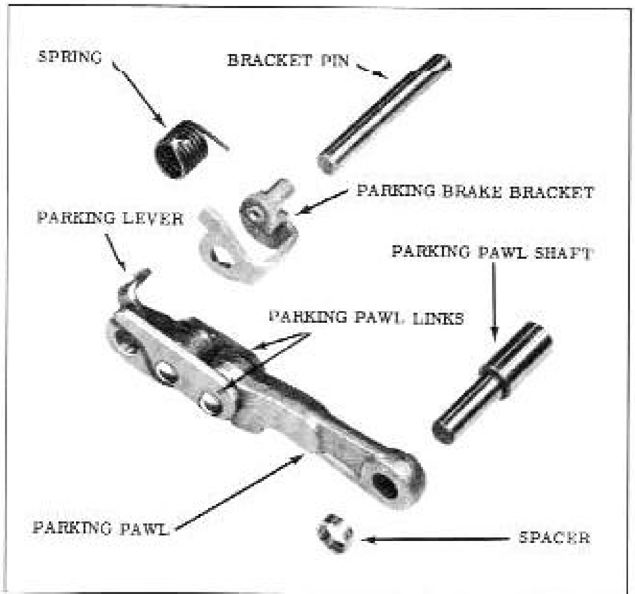


Fig. 3-57 Parking Pawl Assembly

PARKING PAWL LINKAGE REMOVAL

If necessary, remove the parking pawl linkage as follows:

1. While holding parking brake link stop against parking bracket pin, unhook spring from parking lever assembly. (Fig. 3-56 and Fig. 3-57)
2. Remove parking bracket and spring.
3. Remove parking bracket pin.
4. Remove parking pawl shaft and spacer. Spacer might drop from case.
5. Remove parking pawl, link and lever assembly.

DISASSEMBLY AND ASSEMBLY OF INDIVIDUAL UNITS

CAUTION: Before installing cap screws into aluminum parts, the screws should be dipped into Hydra Matic oil to prevent galling and/or seizing of threads.

CASE COVER DISASSEMBLY

1. Loosen 6 case cover to pump attaching bolts approximately 4 turns.
2. Support cover so that pump is off bench and gently tap loosened bolts to disengage pump from case cover. (Fig. 3-58)
3. Remove 6 bolts from case cover.
4. Remove 2 lock type oil rings from case cover.

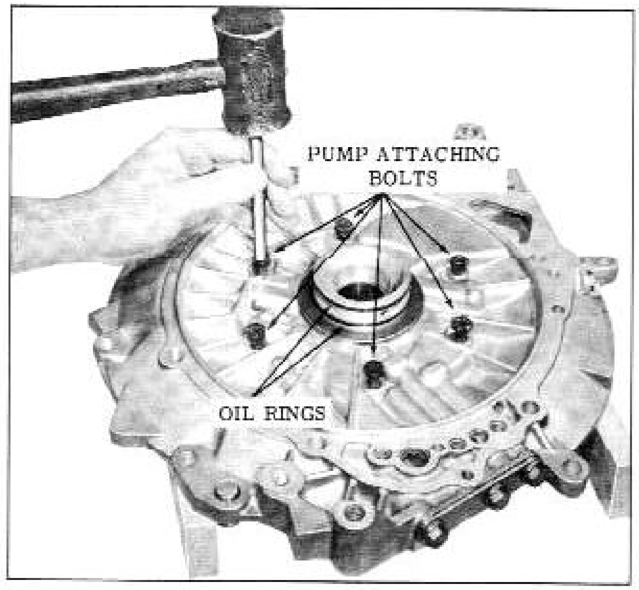


Fig. 3-58 Removing Oil Pump

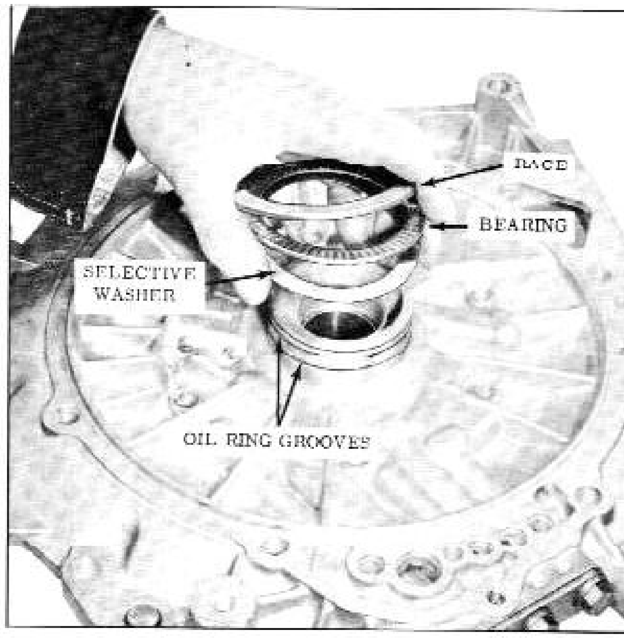


Fig. 3-59 Removing Race, Bearing and Washer

5. Remove race, thrust bearing, race and selective washer(s) from case cover. (Fig. 3-59)
6. Remove cooler control valve assembly and gasket. (Fig. 3-60) DO NOT DISASSEMBLE COOLER CONTROL VALVE ASSEMBLY.
7. Remove 3 case cover bolts, plate and gasket and the remaining bolt and seal in the case cover, if necessary for cleaning passages. (Fig. 3-58)

ASSEMBLY OF CASE COVER

1. If removed, install case cover plate and gasket with 3 attaching bolts and seal washers. Torque 18 to 20 ft. lbs. (Fig. 3-61)

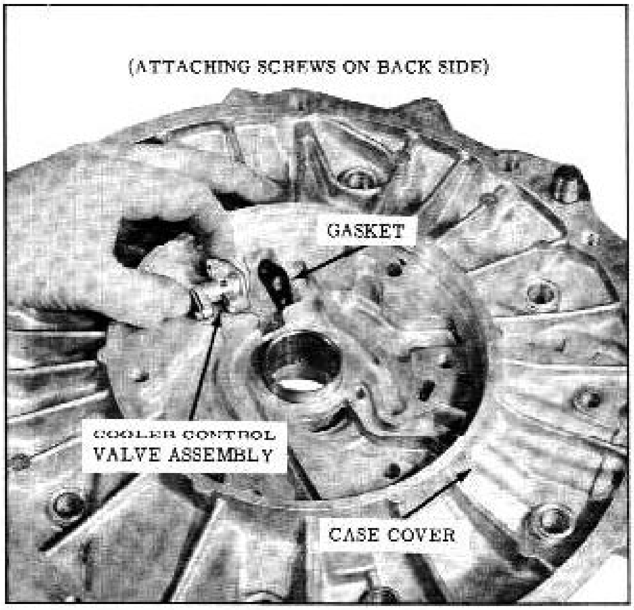


Fig. 3-60 Removing Cooler Control Valve

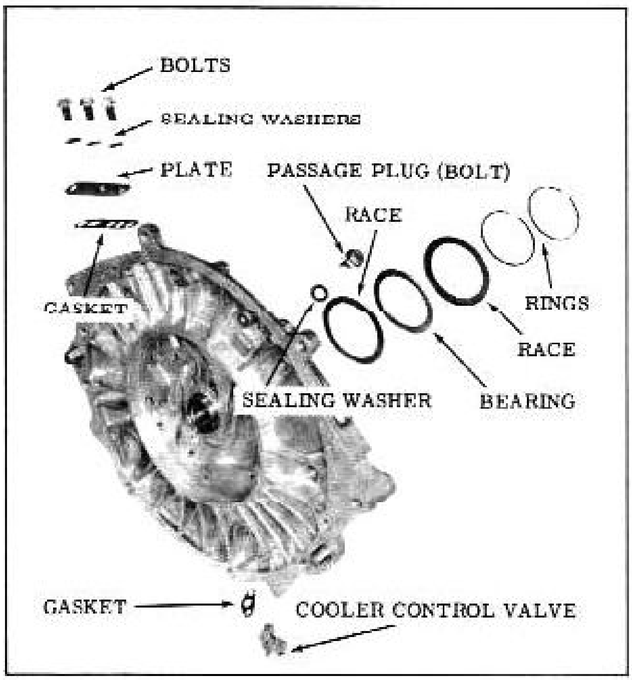


Fig. 3-61 Case Cover Assembly

2. If removed, install bolt and seal washer in case cover. Torque 18 to 20 ft. lbs.
3. Install selective washer(s) over tower of case cover.

   NOTE: If end-play was incorrect during disassembly, check thickness of old washer, then refer to selective washer chart and install new thrust washer.

4. Install race, thrust bearing and cupped race (cup side down) and retain with petrolatum.
5. Install 2 lock type oil rings on tower.
6. Attach cooler control valve assembly and gasket with 2 attaching screws. Torque 2.5 to 3.5 ft. lbs.

SELECTIVE THRUST WASHER CHART

PART NO.	THICKNESS	COLOR IDENT.
8620697	.027" - .029"	Bright & Notched
8620698	.036" - .038"	Copper
8620699	.045" - .047"	Black
8620700	.054" - .056"	Bright

PUMP DISASSEMBLY (Fig. 3-62)

1. Inspect and remove "O" ring from pump, if condition indicates replacement is necessary.
2. Remove the pump cover to body attaching screw.
3. Remove the pump cover from the pump and roll pin. Do not pry to remove. Rotating the cover will aid removal.
4. Remove the top vane ring, rotor, 11 vanes and bottom vane ring.
5. Remove the pump slide by compressing slide against priming springs and lift up on opposite end.
6. Remove the inner and outer priming springs.
7. Remove the coupling feed limit plug and "O" ring. (Fig. 3-63)
8. From the same bore remove the coupling limit spring, guide pin and valve.
9. Remove the pressure regulator plug assembly and "O" ring. (Fig. 3-63)
10. Remove the booster plug from the pressure regulator plug.
11. Remove the booster plug stop sleeve from pump.
12. Remove the pressure regulator valve spring and valve.
13. If necessary, remove rubber cushion from pressure regulator valve.

PUMP ASSEMBLY (Fig. 3-62)

1. Install new cushion on pressure regulator

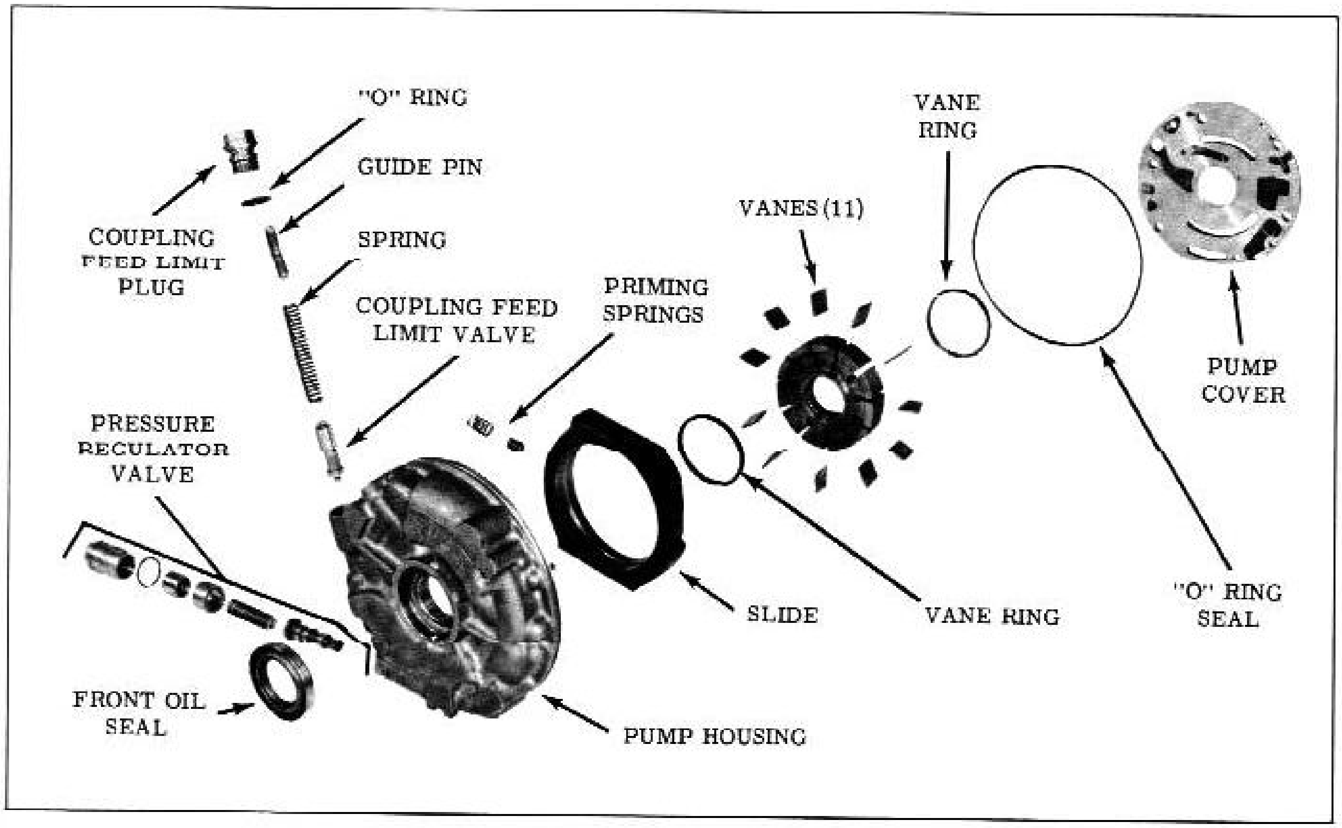


Fig. 3-62 Oil Pump Assembly

valve if previously removed, and install pressure regulator spring on valve.

NOTE: If a new pressure regulator spring is installed, it will be necessary to check line pressure after transmission is installed. If line pressure is incorrect, it will be necessary to install a selective booster plug. This information is included in the transmission installation procedure.

2. Install pressure regulator valve and spring in bore of pump.

3. Install pressure regulator booster plug stop

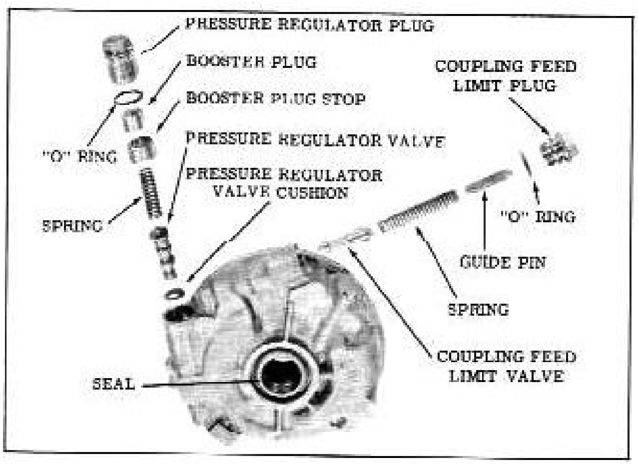


Fig. 3-63 Limit Valve and Pressure Regulator

into pump, over the spring.

4. Install new "O" ring on pressure regulator plug, if condition warrants.

5. Install booster plug into pressure regulator plug, cup side out.

6. Install plug assembly into pump. Torque 15 to 20 ft. lbs.

7. Install coupling limit valve, spring and pin into pump.

8. Install new "O" ring on coupling feed limit valve plug, if condition warrants.

9. Install coupling feed limit valve plug into pump. Torque 15 to 20 ft. lbs.

10. Install inner and outer pump priming springs into bottom cavity of pump.

11. Assemble slide into pump body by compressing slide against priming springs at lower end until slide can be fully installed into pump. (Fig. 3-64)

12. Install bottom vane ring into pump cavity.

13. Install pump rotor (hub side down) in pump pocket over vane ring.

14. Install 11 vanes into rotor. (Fig. 3-65)

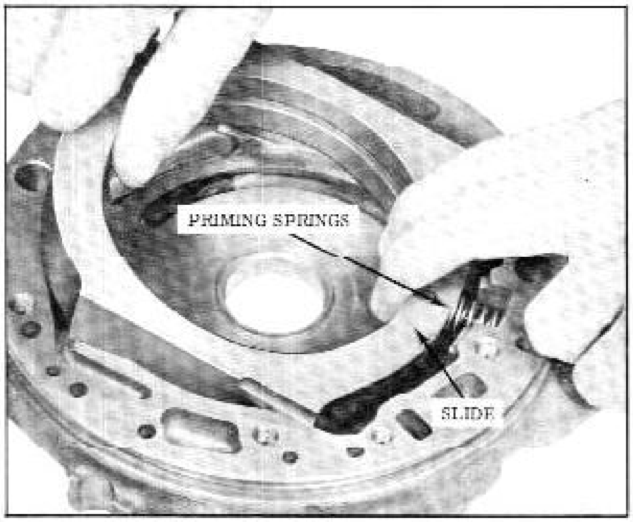


Fig. 3-64 Installing Pump Slide

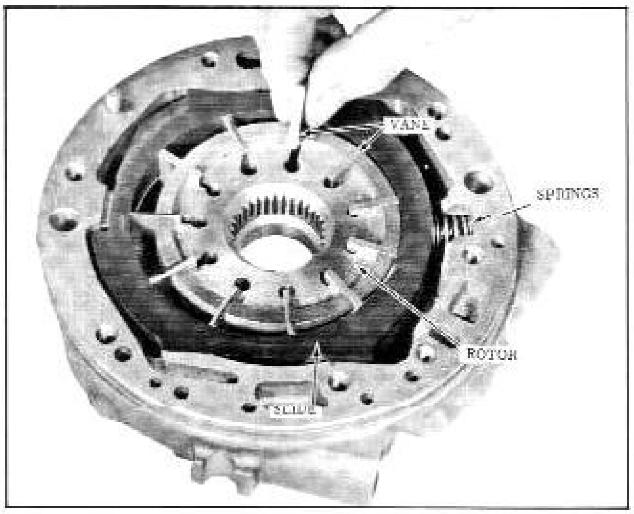


Fig. 3-65 Installing Pump Vanes

NOTE: Install the vanes so that the ring wear pattern on the edge of the vane is against the guide ring.

Fig. 3-66 Installing Pump Cover

15. Install top vane ring on rotor.
16. Install pump cover over roll pin, center cover and torque screw 6 to 8 ft. lbs. (Fig. 3-66)
17. Install "O" ring on pump, if removed.
18. If front seal was removed, install a NEW one as follows:
    a. Apply seal lubricant Part No. 567196 to the sealing lip of a new seal.
    b. Apply a light coat of P.O.B. No. 3 Sealer (Part No. 557622) to the outer diameter of the seal.
    c. Position seal into pump and install seal with Tool J-8761.

ASSEMBLY OF PUMP ASSEMBLY TO CASE COVER

1. Position the case cover on the pump, aligning the bolt holes.
2. Install 6 case cover to pump attaching bolts, draw the bolts up evenly to properly seat the "O" ring seal in the case cover. Torque 15 to 18 ft. lbs.

If other units are not to be serviced, refer to Page 3-68.

REVERSE AND NEUTRAL CLUTCH DISASSEMBLY

1. Remove 2 oil rings from hub of case support. (Fig. 3-67)
2. Using Tools J-8765, J-6129, and J-4670-C,

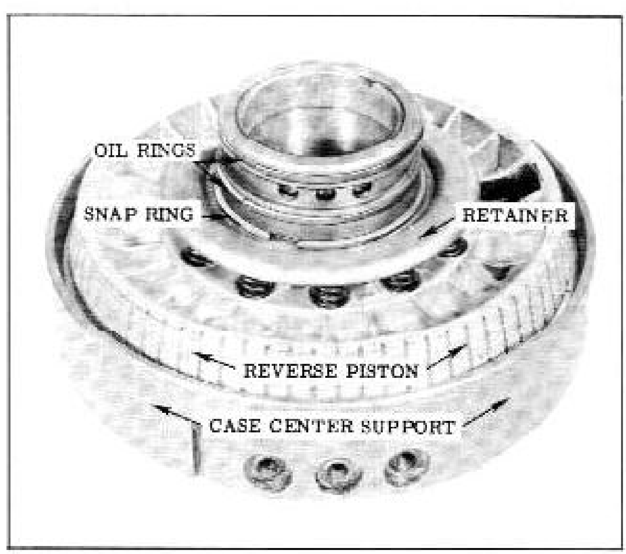


Fig. 3-67 Case Support and Reverse Piston

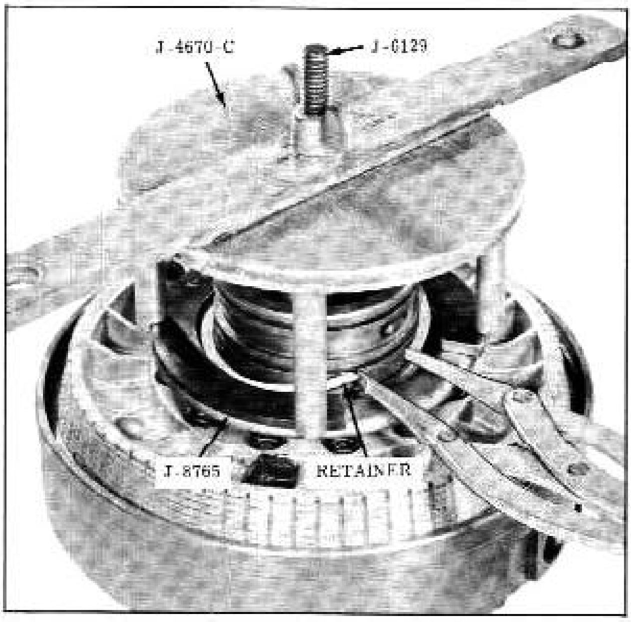


Fig. 3-68 Removing Reverse Release Spring Retainer

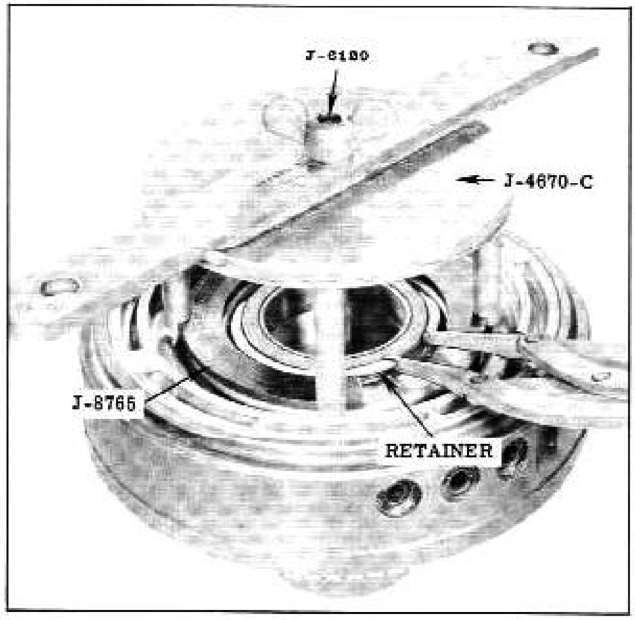


Fig. 3-69 Removing Neutral Clutch Retainer

remove reverse release spring retainer snap ring. (Fig. 3-68)

3. Remove tools from the reverse and neutral clutch assembly.

4. Remove the reverse release spring retainer and 12 release springs.

5. Remove reverse clutch piston. It may be necessary to tap housing to permit removal.

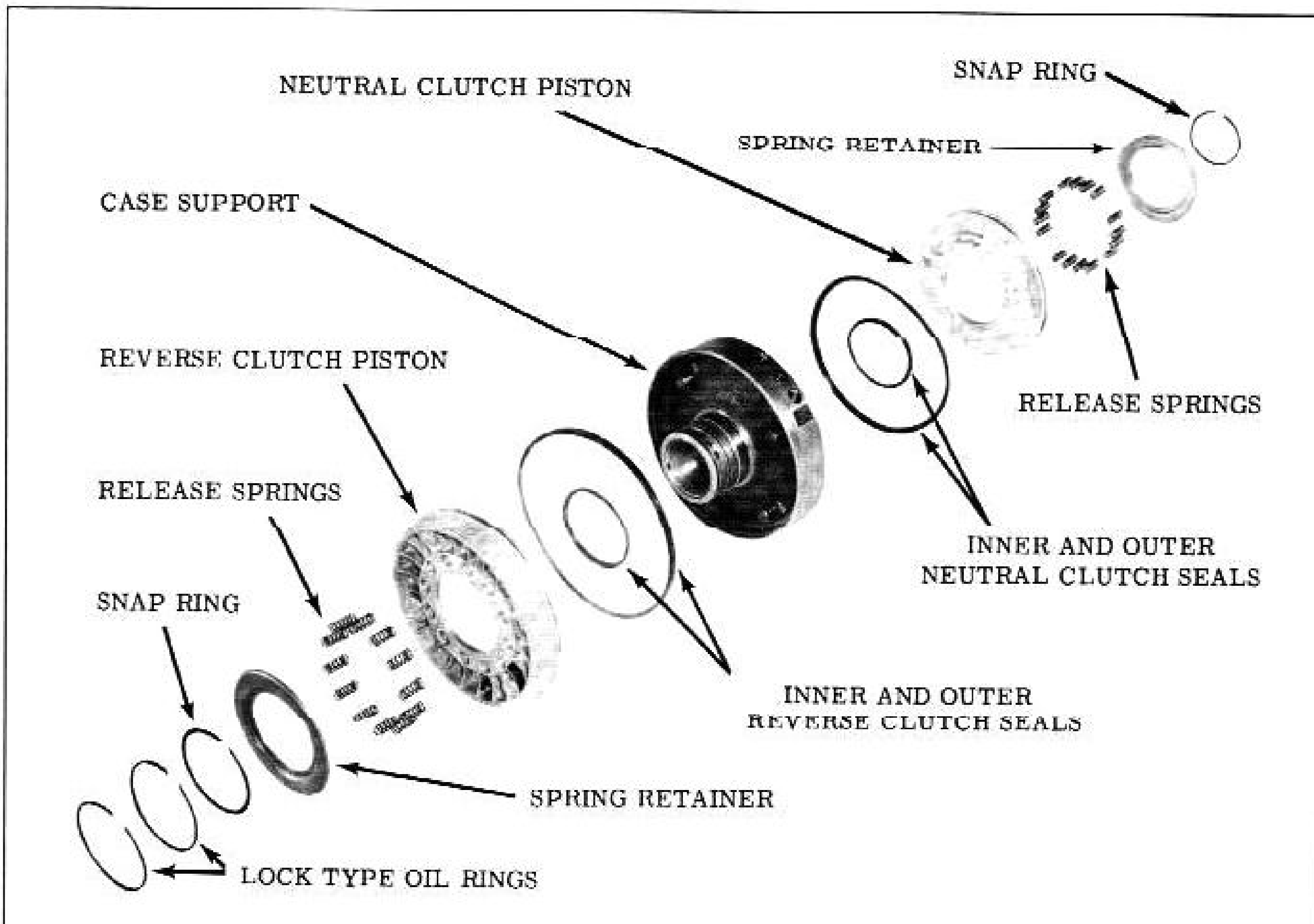


Fig. 3-70 Reverse and Neutral Clutch Assembly

6. Remove inner and outer reverse piston seal rings and discard.

7. Using Tools J-8765, J-6129, and J-4670-C, remove neutral clutch release spring retainer snap ring. (Fig. 3-69) Remove tools.

8. Remove neutral clutch release spring retainer and 16 neutral clutch release springs. Do not mix springs with reverse release springs. (Neutral clutch springs are longer).

9. Remove neutral clutch piston. It may be necessary to tap housing.

10. Remove inner and outer neutral clutch seal rings and discard.

ASSEMBLY OF REVERSE AND NEUTRAL CLUTCH (Fig. 3-70)

1. Install new inner and outer neutral clutch seals. Lip of seals should face the neutral clutch housing.

2. Install Inner Seal Protector J-8766 over neutral clutch hub. (Fig. 3-71)

3. Install neutral clutch piston so that spring pockets are not over web in case support. Use small blade screw driver to depress lip of seal into case support. Remove seal protector.

4. Install 16 release springs into spring pocket of neutral clutch piston and place spring retainer over spring. (Neutral clutch springs are longer than reverse piston springs.)

5. Using Tools J-8765, J-6129, and J-4670-C,

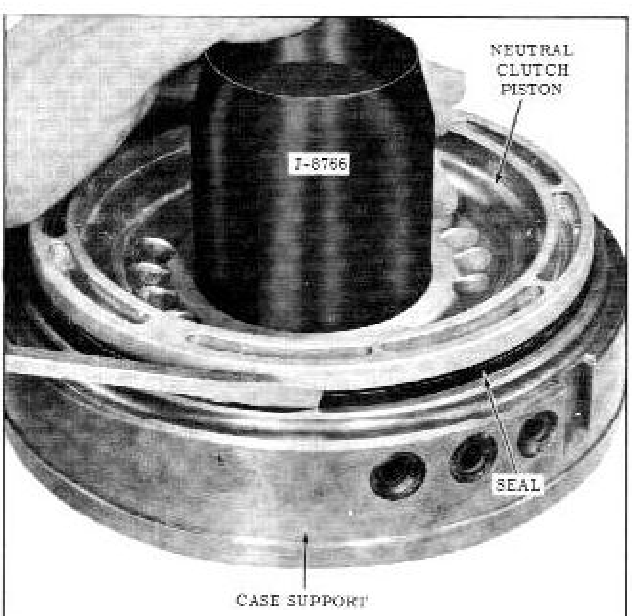


Fig. 3-71 Installing Neutral Clutch Piston

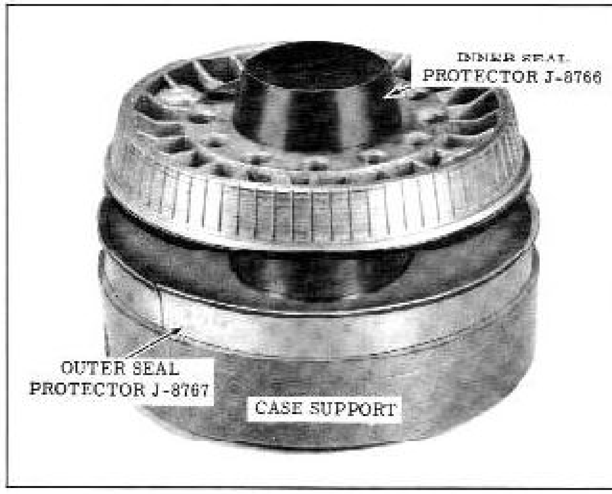


Fig. 3-72 Installing Reverse Piston

compress neutral clutch release springs and install retainer snap ring. (Fig. 3-69) Remove tools.

6. Install Inner Seal Protector Tool J-8766 over reverse piston hub and install Reverse Outer Seal Protector Tool J-8767 into case support. (Fig. 3-72)

7. Install new inner and outer reverse piston seals on reverse piston, lip of seals facing dowel pins.

8. Install reverse piston, aligning piston to index with dowel pins, then remove tools.

9. Install 12 reverse piston release springs into spring pockets.

10. Install reverse piston spring retainer.

11. Using Tools J-8765, J-6129 and J-4670-C, compress release springs. (Fig. 3-68)

12. Install reverse piston spring retainer snap ring and remove tools.

13. Check all springs for proper position in pockets.

14. Install 2 lock type oil rings on hub of case support.

If other units are not to be serviced, refer to Page 3-64.

GOVERNOR DISASSEMBLY

1. Compress tang of G-2 plug retainer and remove. (Fig. 3-73)

2. Remove G-2 plug and G-2 valve.

3. Inspect and remove if necessary, 4 governor lock type oil rings from governor tower.

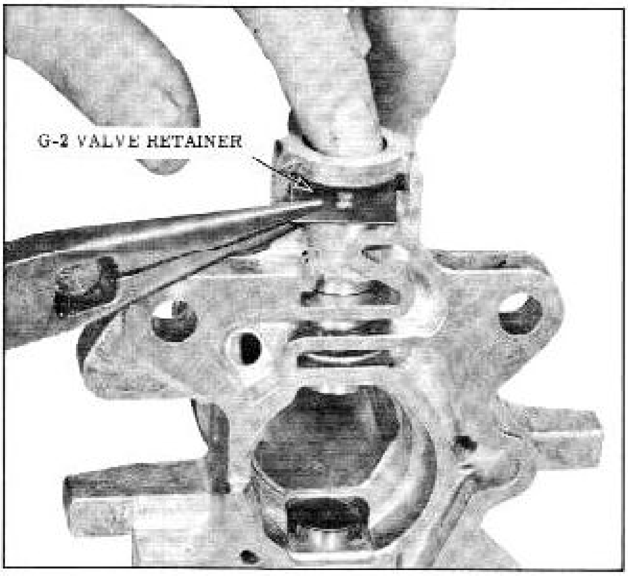


Fig. 3-73 Removing Retainer

ASSEMBLY OF GOVERNOR (Fig. 3-74)

1. If removed, install 4 lock type governor oil rings on governor tower.
2. Install G-2 valve (small land first) into governor.
3. Install G-2 plug with the flat side out.
4. Install G-2 plug retainer with tang side out.

If other units are not to be serviced, refer to Page 3-67.

DISASSEMBLY OF TORUS COVER (Fig. 3-75)

1. Inspect and remove if necessary, 2 hook type oil rings from input shaft.
2. Install Exhaust Valve Retaining Tool J-6122-1.
3. Remove torus exhaust valve cover screw with Tool J-8874. An impact wrench will aid removal.

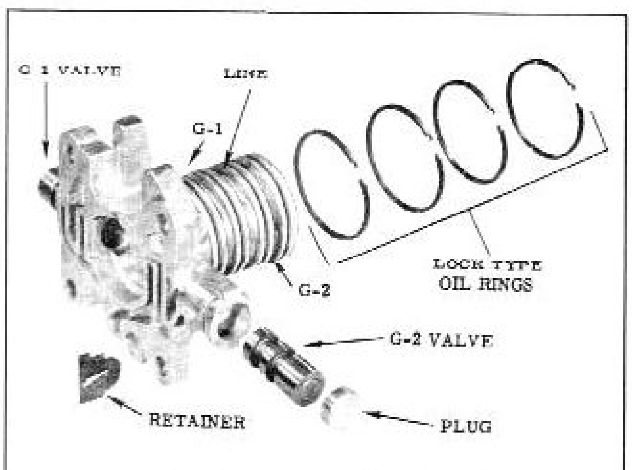


Fig. 3-74 Governor Assembly

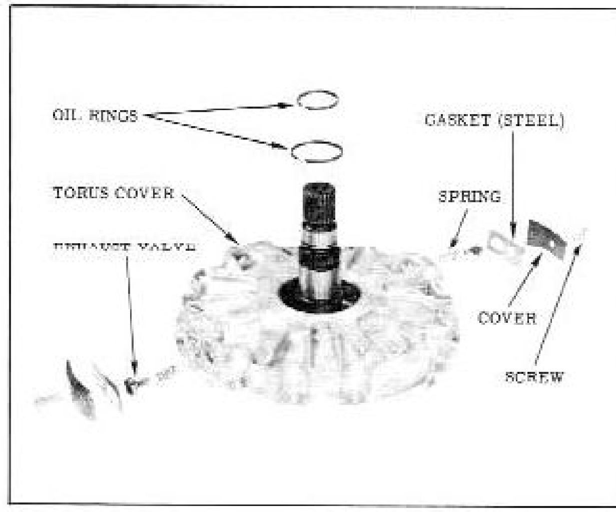


Fig. 3-75 Torus Cover Assembly

4. Remove exhaust valve cover, steel gasket, valve and spring. Discard the gasket.
5. Repeat operation for second exhaust valve.

ASSEMBLY OF TORUS COVER (Fig. 3-75)

1. Install exhaust valve spring and valve.
2. Install Exhaust Valve Retaining Tool J-6122-1. (Fig. 3-76)
3. Install torus cover exhaust valve gasket and cover. Torque the retaining screw 20 to 25 ft. lbs. using Tool J-8874. (Fig. 3-76)
4. Repeat operation for second exhaust valve.
5. Install 2 lock type oil rings on input shaft, if they were removed.

If other units are not to be serviced, refer to Page 3-68.

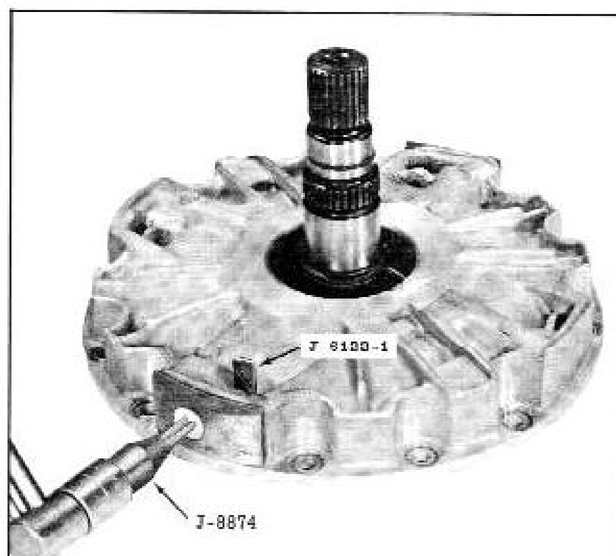


Fig. 3-76 Installing Exhaust Valve Cover

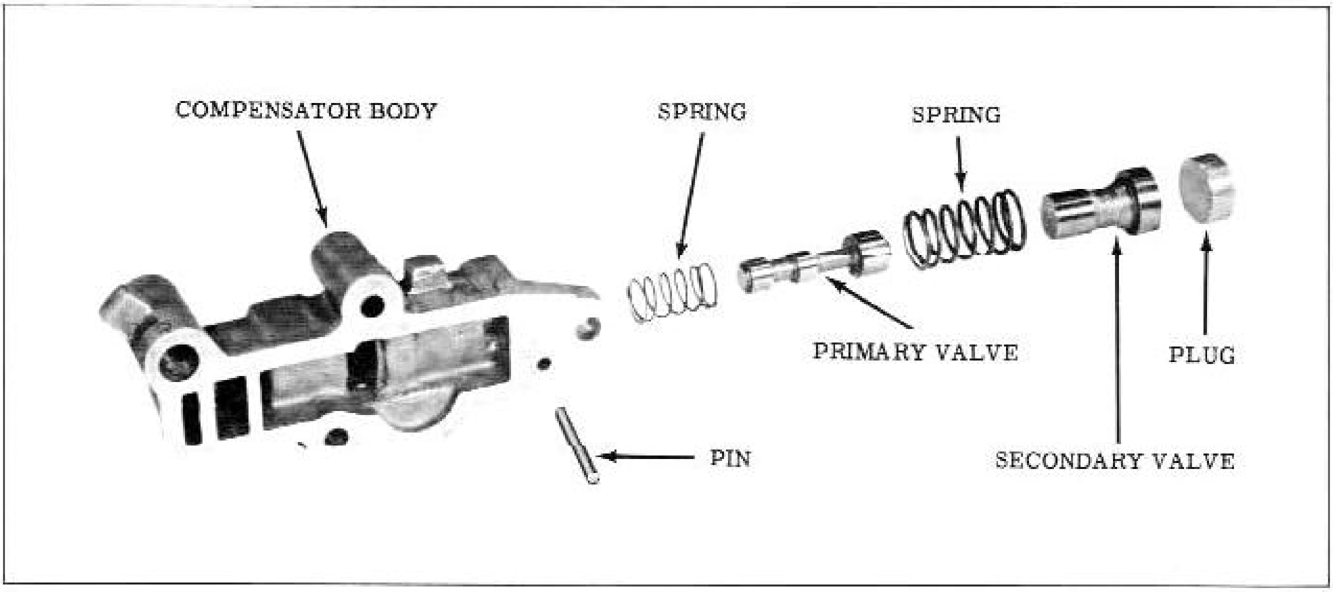


Fig. 3-77 Compensator Valve Assembly

DISSASSEMBLY OF COMPENSATOR VALVE BODY (Fig. 3-77)

1. Compress compensator plug and remove retaining pin and plug.
2. Remove secondary compensator valve and spring.
3. Remove primary compensator valve and spring.

ASSEMBLY OF COMPENSATOR VALVE BODY (Fig. 3-77)

1. Install primary compensator spring on primary compensator valve.
2. Install primary compensator spring and valve (small end first into body).
3. Install secondary compensator spring on secondary compensator valve.
4. Install the secondary spring and valve into compensator body (spring end first).
5. Install compensator plug, compress and install retaining pin.

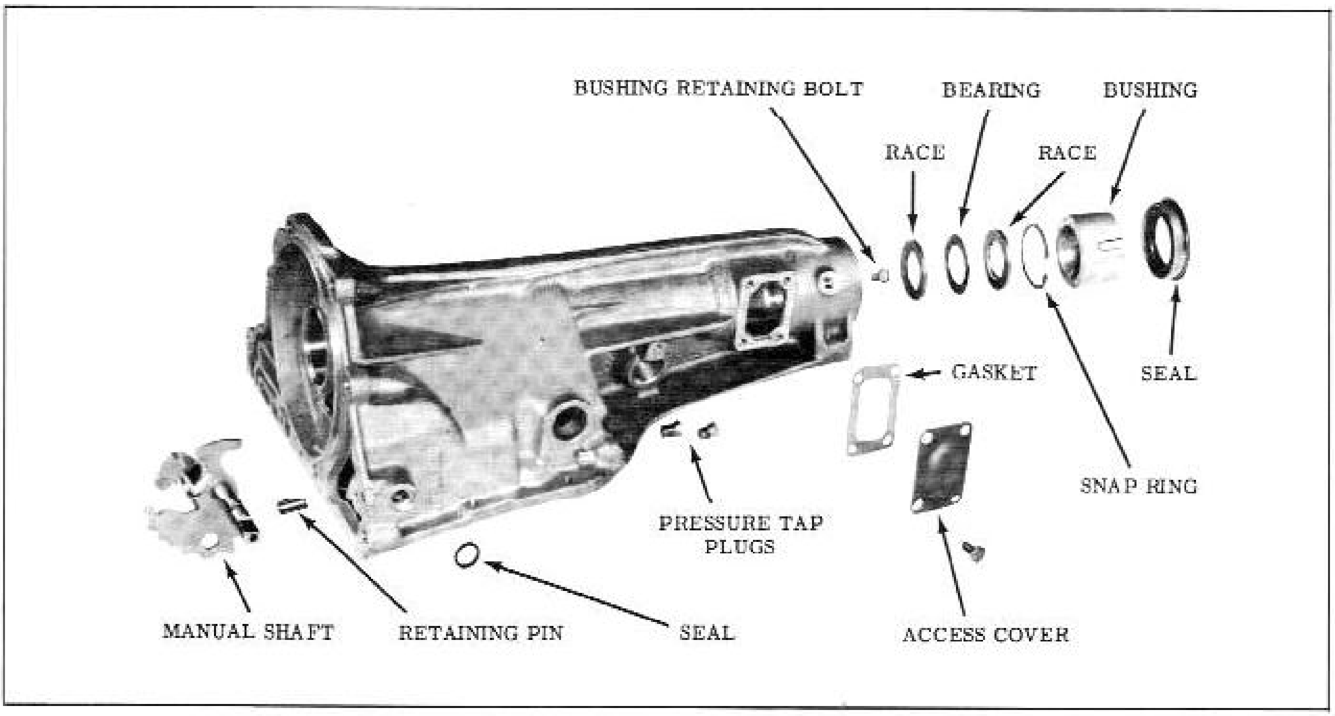


Fig. 3-78 Rear Bearing Retainer Assembly

If other units are not to be serviced, refer to Page 3-71, Step 14.

DISASSEMBLY AND ASSEMBLY OF REAR BEARING RETAINER (Fig. 3-78)

DISASSEMBLY

1. Using Tool J-8873 remove the rear bearing race to rear bearing retainer snap ring through access hole in retainer.
2. Remove rear race, bearing and front race.
3. Remove inside manual lever and shaft assembly by removing manual shaft retaining pin from case side of retainer.
4. Rotate lever and shaft assembly to remove from rear bearing retainer.
5. If necessary, remove manual shaft seal from bore in retainer.
6. If it is necessary to replace the bushing and sleeve assembly, the rear seal must be removed, then:
   a. Remove the rear bearing retainer bushing and sleeve assembly retaining bolt.
   b. Drive the bushing and sleeve assembly from the rear bearing retainer with a drift.
7. If necessary to replace the speedometer driven gear assembly or the "O" ring seal, remove the cap screw and retainer, and withdraw the assembly.

CLEAN AND INSPECT REAR BEARING RETAINER (Fig. 3-79)

ASSEMBLY OF REAR BEARING RETAINER (Fig. 3-78)

1. If removed, install the bushing and sleeve

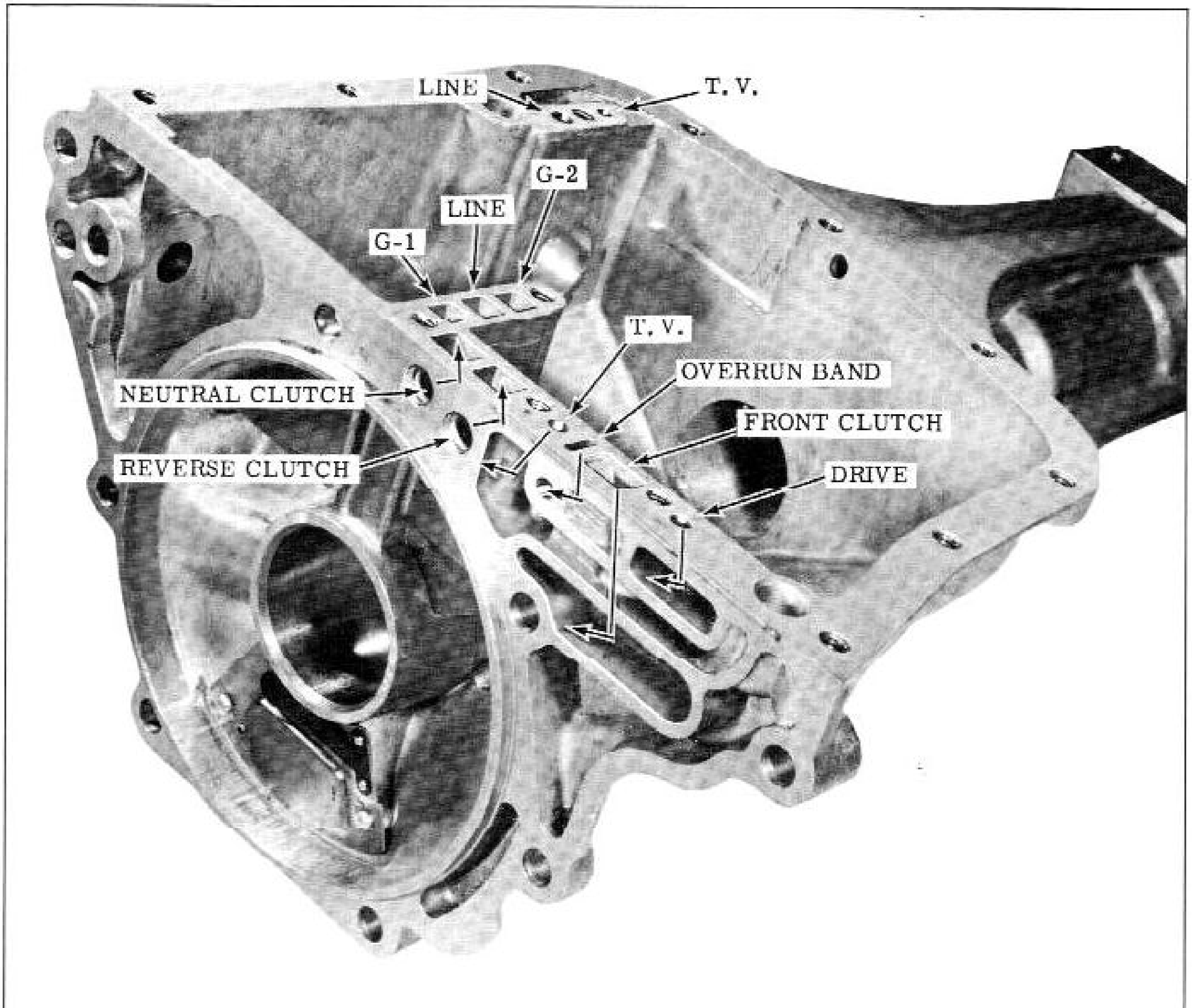


Fig. 3-79 Rear Bearing Retainer Passages

assembly in end of rear bearing retainer with chamfered end first, aligning short slot in bushing with locking screw hole in rear bearing retainer with a drift.

2. If rear seal was removed, coat sealing lip of new seal with lubricant Part No. 567196, coat the outer diameter of seal with P.O.B. No. 3 Sealer and install seal using Tool J-5154.

3. Install bushing lock screw and torque 12 to 15 ft. lbs.

4. Install race, thrust bearing and race into rear bearing retainer through access hole.

5. Install snap ring through access hole of retainer, concave side towards rear (identification side away from race) and align ear of snap ring with top slot in retainer.

6. Install inside detent lever and shaft assembly into rear bearing retainer.

7. Install manual shaft retainer into hole in retainer, align key with annular groove in shaft and retain with petrolatum.

8. If removed, install new manual shaft seal (grooved side toward retainer). (Fig. 3-80)

9. If removed, install a new "O" ring seal on the speedometer driven gear body then install the assembly, retainer and cap screw.

If other units are not to be serviced, refer to Page 3-67.

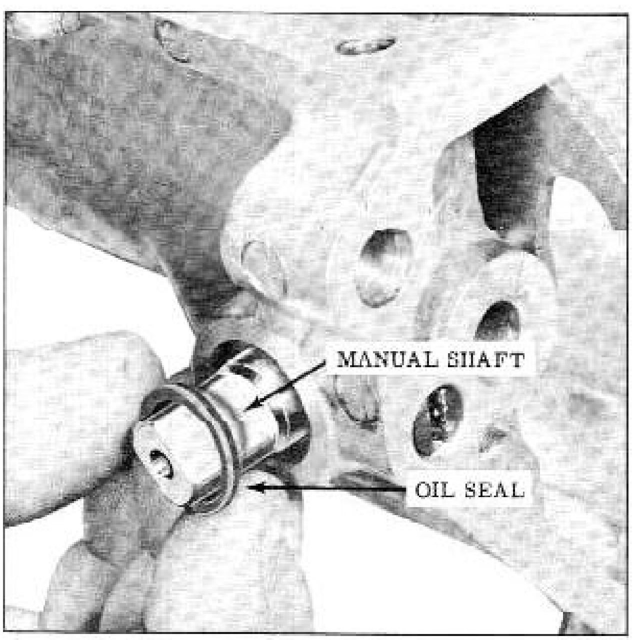


Fig. 3-80 Installing Oil Seal

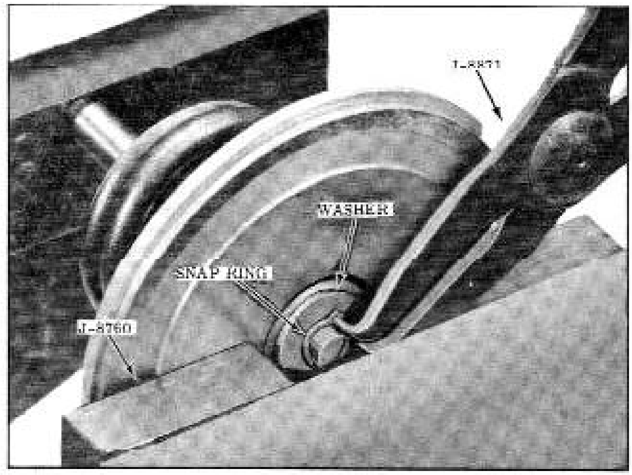


Fig. 3-81 Servo Disassembly

ACCUMULATOR PISTONS AND SERVO PISTON ASSEMBLIES

DISASSEMBLY

1. Position Speedometer Gear Puller Adapter J-8760 against the servo piston and place the piston assembly and spacer between the jaws of a bench vise. (Fig. 3-81)

2. Tighten the vise sufficiently to remove the snap ring.

3. Remove the servo piston to piston pin snap ring and washer.

4. Carefully, remove piston assembly from the vise.

5. Remove the servo piston, springs and retainer.

6. Remove and discard the lip seal from the upper accumulator piston.

7. If necessary, remove piston rings.

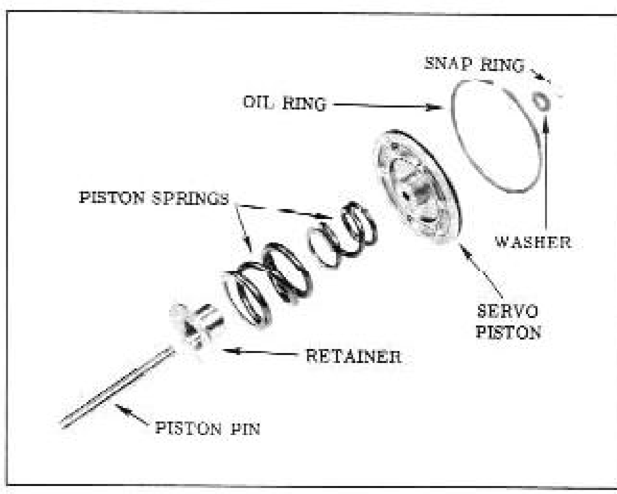


Fig. 3-82 Servo Assembly

ASSEMBLY (Fig. 3-82)

1. Install a new piston seal on the upper accumulator piston, lip facing flat side of piston.

2. Install the spring retainer, spring and servo piston over the servo piston pin.

3. Place the assembled servo components with Speedometer Gear Puller Adapter J-8760 against the servo piston into a vise and carefully compress the assembly to allow the flat washer and snap ring to be installed.

4. Install the washer and snap ring.

5. Remove the servo piston assembly and tools from the vise.

6. If removed, install piston rings.

If other units are not to be serviced, refer to Page 3-70.

FRONT CLUTCH (Fig. 3-84)

DISASSEMBLY

1. Remove the bronze thrust washer from the front clutch assembly if it is not removed.

2. Insert 2 studs, (Tool J-3387-2) into dowel holes on back side of front clutch assembly.

3. Install front clutch assembly with studs into vise so that studs are retained by the vise jaws. (Fig. 3-83)

4. Remove 4 front internal gear to front clutch housing attaching bolts.

5. Remove assembly from vise, place on bench with internal gear up and gently tap dowel pins with a punch to remove front internal gear from front clutch housing.

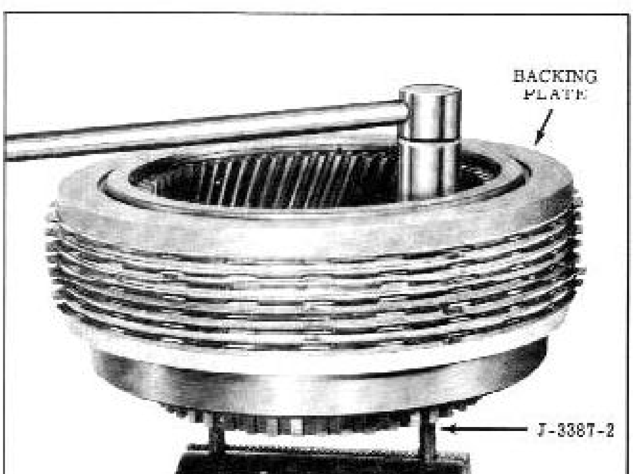


Fig. 3-83 Front Clutch Disassembly

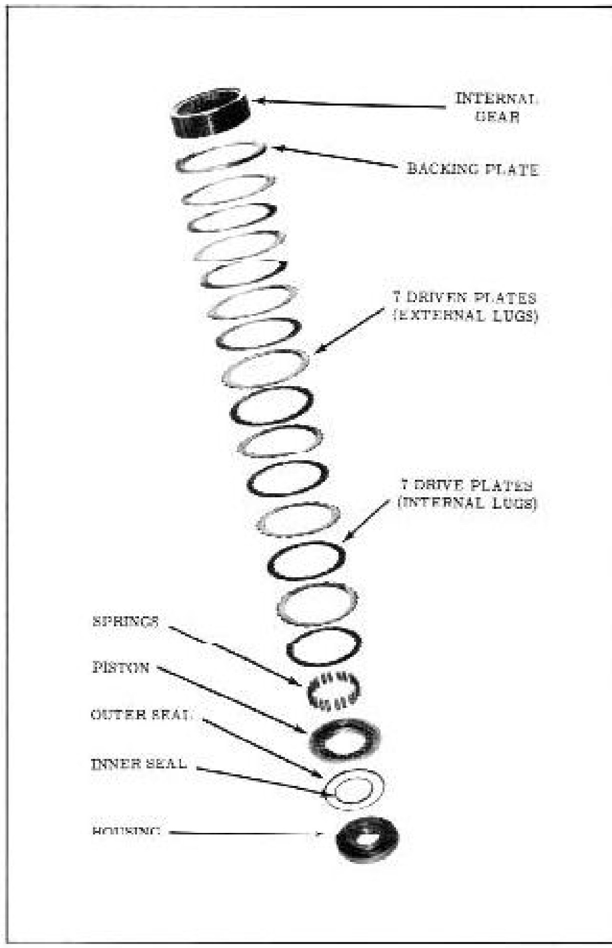


Fig. 3-84 Front Clutch Assembly

6. Remove front internal gear and clutch backing plate.

7. Remove 7 drive and 7 driven front unit clutch plates.

8. Remove 20 front clutch release springs.

9. Remove front clutch piston from front clutch housing.

10. Remove front clutch piston outer seal from piston, remove clutch inner piston seal from clutch housing and discard seals.

ASSEMBLY

1. Install new inner piston seal on front clutch housing with lip of seal facing down.

2. Install new outer piston seal on clutch piston with lip facing away from spring pockets.

3. Install clutch housing over clutch piston, carefully rotating assembly while depressing lip of piston seal with a small screw driver.

4. Install piston release springs (20) into spring pockets in piston.

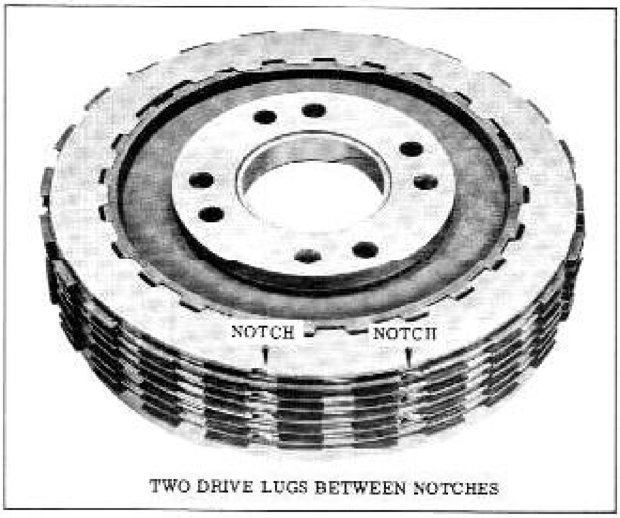


Fig. 3-85 Clutch Plate Alignment

5. Install front clutch backing plate on front internal gear with undercut facing flange on internal gear.

6. Lubricate clutch plates and install 7 composition drive and 7 steel driven clutch plates alternately over the front internal gear starting with a composition clutch plate.

   NOTE: The steel clutch plates must be assembled in an un-nested position as follows: (Fig. 3-85)

   a. Place a composition plate and the first steel plate over the internal gear noticing the location of the slight half moon notch in the edge of the steel plate.

   b. Install another composition plate and then the second steel plate so that the half moon notch is located 2 drive lugs on the internal gear away from the notch in the first steel plate.

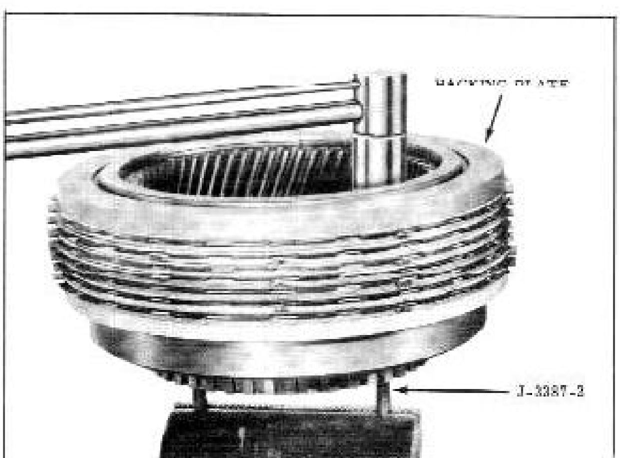


Fig. 3-86 Assembly of Front Clutch

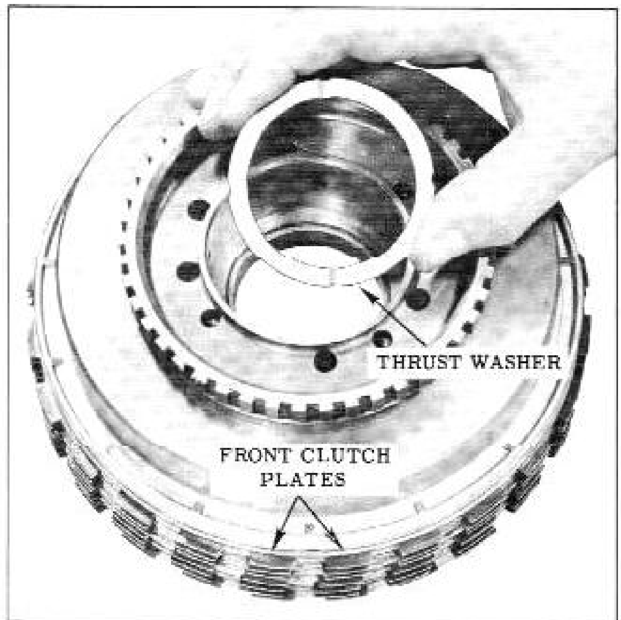


Fig. 3-87 Installing Thrust Washer

   c. Continue to alternately install the composition and steel plates so that the notches in the odd numbered steel plates are one above the other and the notches in the even numbered steel plates are one above each other.

7. Position front unit internal gear with plates on clutch release springs, aligning dowels.

8. Loosely install the internal gear front clutch bolts.

9. Insert Tool J-3387-2 into dowel holes in back side of front clutch assembly, then install front clutch assembly with studs into vise so studs are retained by vise jaws. (Fig. 3-86)

10. Tighten bolts snugly and check bottom steel clutch plate for freedom after tightening bolts. Torque the four front unit internal gear to front clutch housing bolts 22 to 27 ft. lbs.

    NOTE: Alternately tighten bolts to properly seat front internal gear on dowels.

11. Install bronze thrust washer into recessed I.D. of front clutch housing bore using petroleum to retain. (Fig. 3-87)

    CAUTION: If new clutch plates were installed, check to see if clutch plates can be moved by the drive lugs. A moderate preloading of clutch plates is satisfactory, however, if drive plates cannot be rotated, it will be necessary to replace the clutch piston.

If other units are not to be serviced, refer to Page 3-64, Step 14.

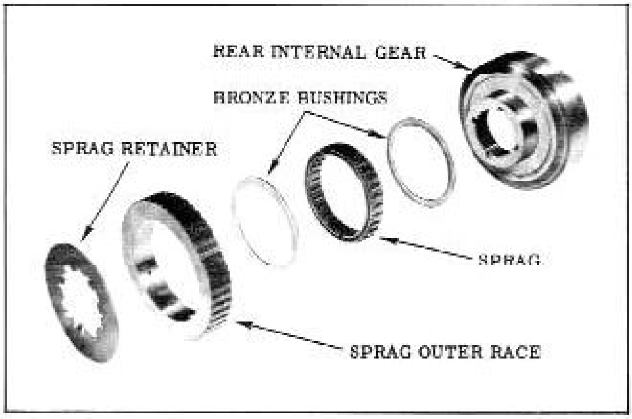


Fig. 3-88 Sprag Assembly

REAR INTERNAL GEAR AND SPRAG (Fig. 3-88)

DISASSEMBLY

1. Remove sprag retainer.
2. Remove sprag outer race from sprag assembly and rear internal gear.
3. Remove the sprag and bushing assembly (2 bronze bushings) from internal gear.

ASSEMBLY

1. Place one bronze bushing over inner race of internal gear with cup side facing up.
2. Place sprag assembly into the sprag outer race.
3. With shoulder side of sprag up, start sprag and outer race over internal gear hub. (Fig. 3-89)

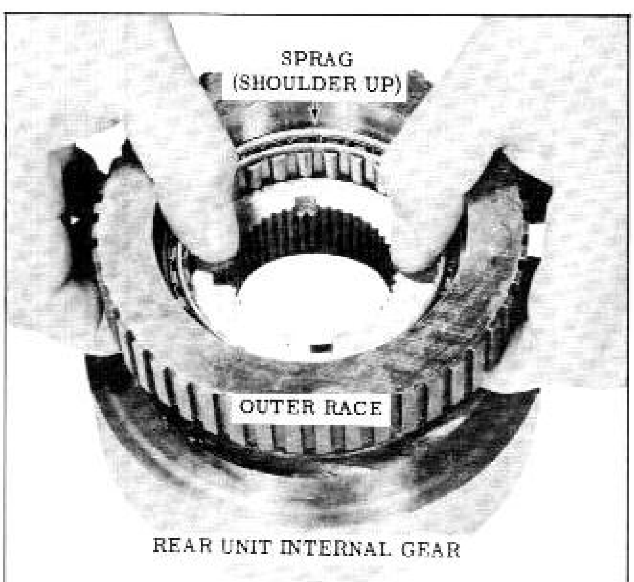


Fig. 3-89 Installing Sprag

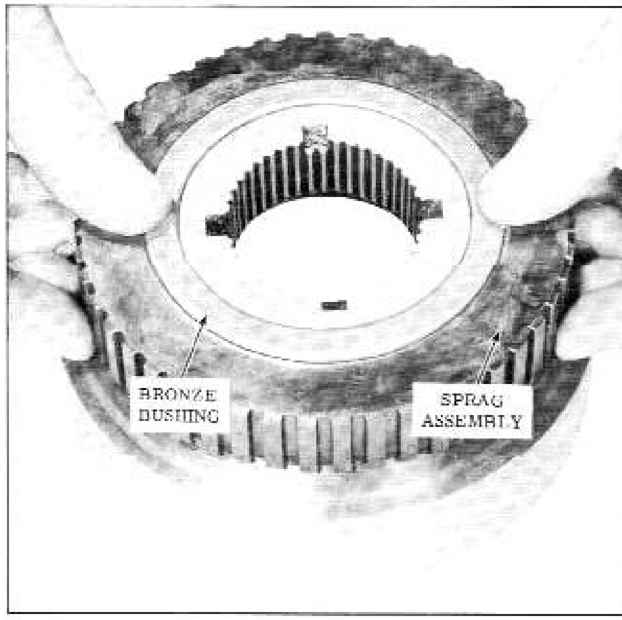


Fig. 3-90 Installing Bushing

4. Press sprag and outer race down against internal gear.
5. Install second bronze bushing, cup side down, against sprag assembly. (Fig. 3-90)
6. Apply petrolatum on sprag retainer and install sprag retainer on internal gear aligning tangs with the internal gear slots. (Fig. 3-91)

NOTE: Check to make certain sprag assembly is properly installed by rotating outer race counter-clockwise. Outer race should not turn clockwise.

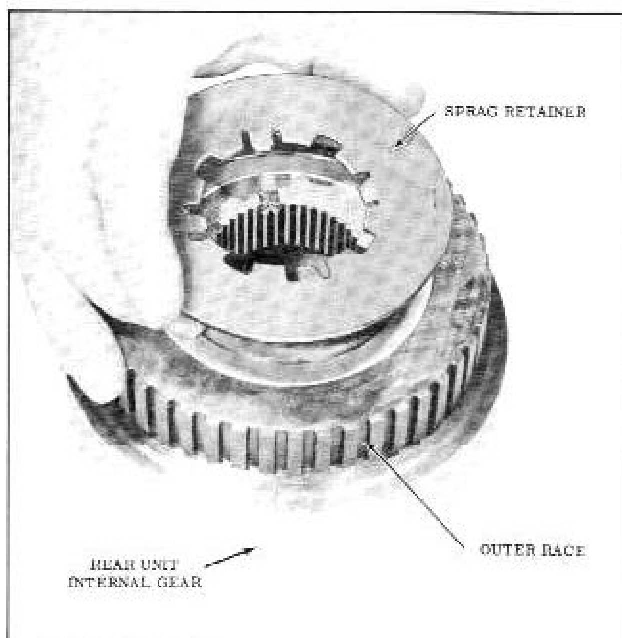


Fig. 3-91 Installing Sprag Retainer

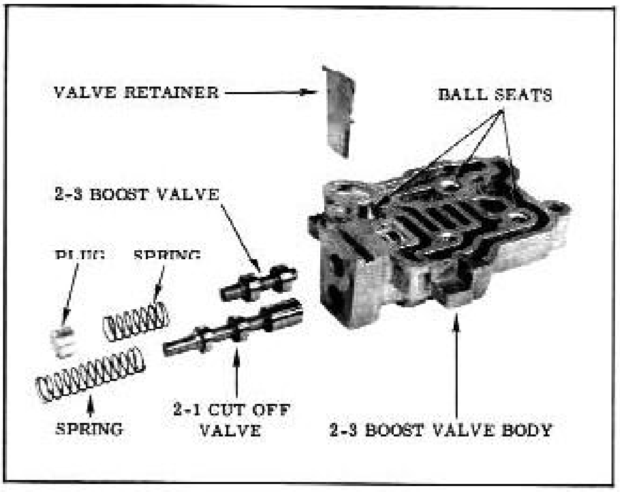


Fig. 3-92 2-3 Boost Valve Body Assembly

If other units are not to be serviced, refer to Page 3-64, Step 12.

DISASSEMBLY OF 2-3 BOOST BODY (Fig. 3-92)

1. Remove the 2-3 boost body assembly by removing 4 attaching screws. (One screw is located on channel plate side of body).

   CAUTION: The 2-3 boost body contains 3 loose check balls.

2. Remove the 3 check balls and spacer plate from the 2-3 boost body.

3. Remove the retainer from the 2-3 boost body. Retainer is under spring pressure.

4. Remove the 2-1 cut off valve spring, 2-1 cut off valve, 2-3 boost plug, 2-3 boost spring and the 2-3 boost valve.

ASSEMBLY OF 2-3 BOOST BODY (Fig. 3-92)

1. Install the 2-3 boost valve, long stem out, spring and plug in the bore of the boost body nearest the cored face.

2. Compress the 2-3 boost plug against spring tension and partly install the 2-3 boost body retainer.

3. Install the 2-1 cut off valve, stem out, and spring in remaining bore of boost body.

4. Compress the 2-1 cut off valve spring and slide 2-3 boost body retainer over spring.

   NOTE: Leave spacer plate and check balls loose at this time.

If other units are not to be serviced, refer to Page 3-62, Step 5.

DISASSEMBLY AND ASSEMBLY OF CONTROL VALVE ASSEMBLY (Fig. 3-93)

1. Remove channel body from valve body assembly by removing 2 attaching screws from the valve body side and 13 screws from the channel body side.

2. Remove neutral clutch by-pass valve and the front clutch by-pass valve from channel body. (Fig. 3-94)

3. Turn channel body over to casting side and remove retaining pin and pressure relief spring. (Fig. 3-94)

   NOTE: Pin is under extreme pressure.

4. Remove pressure relief ball, if necessary.

   NOTE: Assemble loose parts into channel body after inspection. (Fig. 3-94)

   a. Assemble pressure relief ball, spring and retaining pin into channel body.

   b. Install neutral clutch by-pass valve and front clutch by-pass valve into channel body.

5. Place separator plate on channel body and check alignment of by-pass valves.

6. Remove 2 check balls and the T.V. thermostatic element. (Fig. 3-95)

7. Remove T.V. plunger guide retainer located in cored passage near T.V. adjusting screw. Position control valve assembly with the cored side up and the T.V. lever positioned on the top right hand side. (Fig. 3-95)

8. Remove multiple valve plug retainer located in lower left hand corner.

   NOTE: Plugs are under spring tension.

9. Remove the 2-1 downshift spring and valve from the lowest bore.

10. Remove the valve bore plug, by threading a valve body attaching screw into plug, and slide plug out from the adjacent bore.

    NOTE: The valve bore plug is a non-operating retaining plug used in valve bores. They are all threaded and should be removed and installed with a valve body attaching screw.

11. Remove the 1-2 governor valve from the same bore.

12. Remove the valve bore plug and the 2-3 governor valve from the adjacent bore.

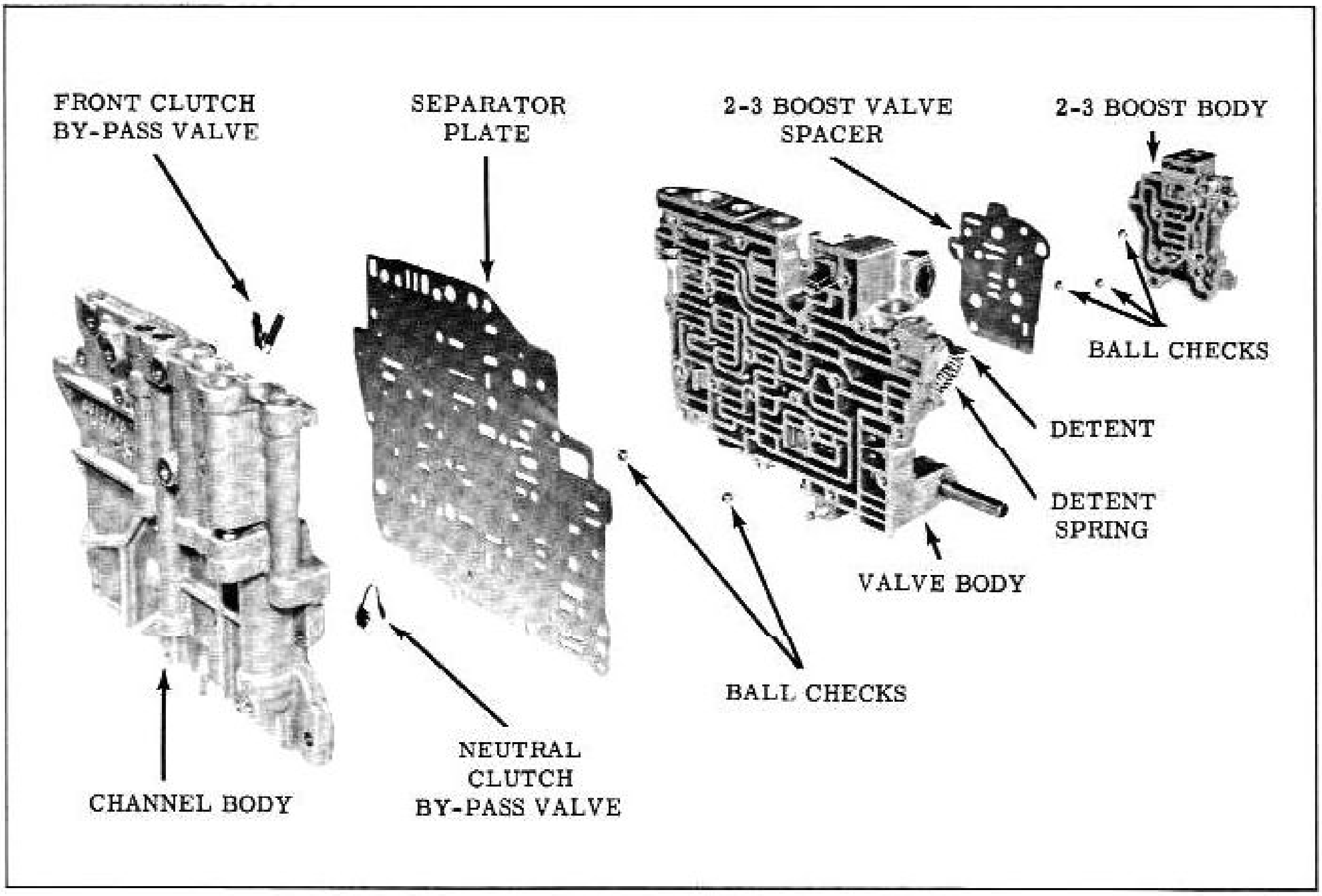


Fig. 3-93 Control Valve Body Assembly

13. Remove the valve bore plug, coupling timing valve spring and valve from the next adjacent bore.
14. Remove the pressure boost valve retaining pin from the same bore on the cored side of the valve body.
15. Remove the pressure boost valve from the same bore. (Fig. 3-96)
16. On the opposite side of the valve body, start with the lower bore and remove the retaining pin.
17. Remove the 1-2 T.V. bushing and valve from the same bore.
18. Remove the 1-2 T.V. and shift valve spring, then remove the 1-2 shift valve from the same bore.
19. Remove the valve bore plug retainer and plug, while holding finger over plug as plug is under spring pressure, from the adjacent bore.
20. Remove the 2-3 T.V. valve, spring and bushing from the same bore.
21. Remove the 2-3 shift valve and spring from the same bore.
22. Remove the retaining pin and valve bore plug from the fourth bore.
23. Remove the neutral clutch valve spring and neutral clutch valve.
24. Remove the front clutch exhaust valve retaining pin from the same bore on the cored side of valve body. Compress spring with a small screw driver to remove pin.

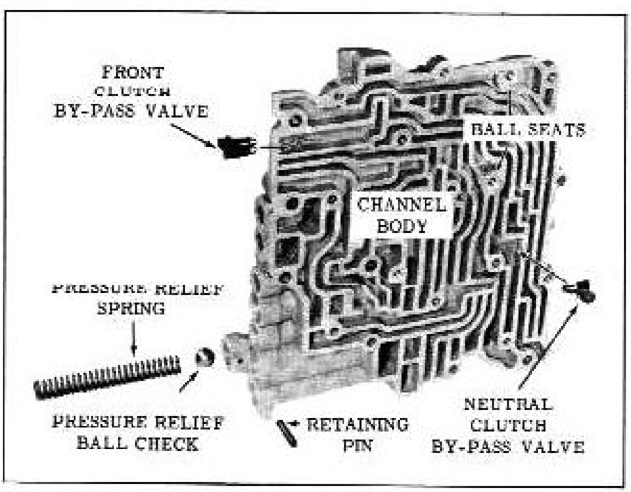


Fig. 3-94 Channel Body

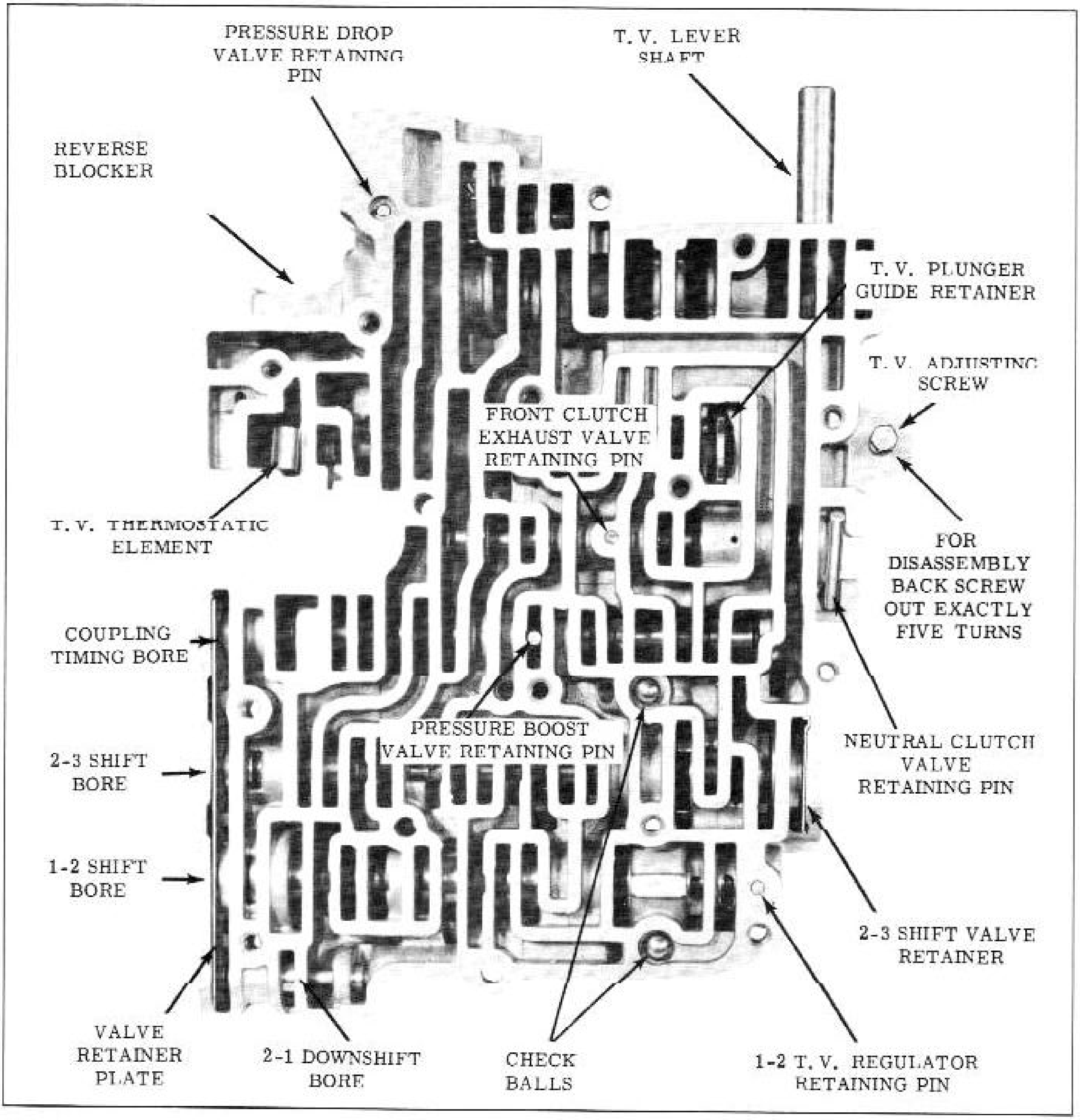


Fig. 3-95 Valve Body Assembly

25. Remove the front clutch exhaust valve spring and valve.

26. Remove the pressure drop retaining pin, spring and valve from the last bore on the opposite side of the control valve assembly.

27. Loosen T.V. adjustment screw EXACTLY 5 TURNS. (Fig. 3-95)

28. Turn the valve body over and remove the throttle lever by removing the outside "C" ring and washer, positioning the shaft so that the lever will clear the T.V. adjustment screw, then remove the washer.

29. Remove T.V. plunger and sleeve, then remove the T.V. spring and valve.

30. If necessary, remove the reverse blocker piston retaining pin spring and reverse blocker piston.

31. Remove detent spring.

NOTE: Do not remove detent lever unless replacement is necessary.

32. If necessary to remove detent lever, use a small punch to tap detent retainer pin through

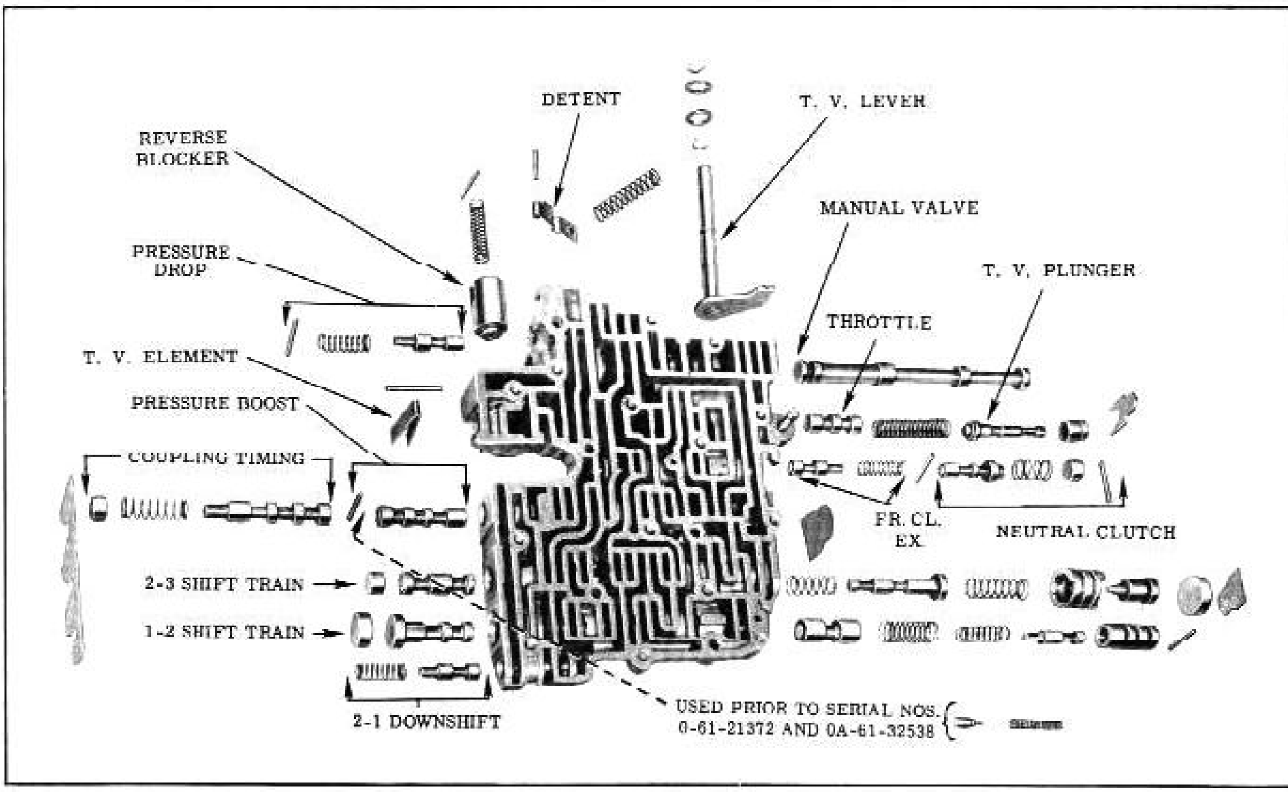


Fig. 3-96 Valve Assemblies

lever. Remove detent lever and pin.

33. Clean and inspect all parts.

ASSEMBLY—CONTROL VALVE ASSEMBLY (Fig. 3-96)

NOTE: All attaching screws are to be torqued 2.5 to 3.5 ft. lbs. and all attaching bolts are to be torqued 6 to 8 ft. lbs.

1. If previously removed, install manual detent by positioning manual detent in valve body and installing retaining pin.
2. Install detent spring into manual detent.
3. If removed, install the reverse blocker piston, spring and pin.
4. Install the pressure drop valve, stem end of valve last, then install spring and retaining pin in the top bore adjacent to the detent spring.
5. Install the T.V. valve (round end first), spring, plunger and sleeve into the T.V. bore adjacent to the manual valve bore.
6. Place washer against "C" ring on T.V. lever shaft.
7. Install T.V. lever shaft through hole in valve body so that the T.V. lever will index between the T.V. plunger and throttle adjusting screw.
8. Install washer and "C" ring securing lever assembly to valve body.
9. Turn T.V. adjusting screw back to original position, EXACTLY 5 TURNS. (Fig. 3-95)
10. Install the T.V. plunger guide retainer through cored side of valve body into annular groove in T.V. plunger guide.
11. Install the front clutch exhaust valve (land end first) and front clutch exhaust valve spring in the bore adjacent to the T.V. bore.
12. Install short retaining pin through cored side of valve body while compressing the front clutch exhaust valve spring.
13. Install the neutral clutch valve (land end first) and spring in the same bore.
14. Compress the neutral clutch valve spring and install valve bore plug (threaded end out) and retaining pin.
15. Place the 2-3 shift valve spring on the 2-3 shift valve.
16. In the next open bore install the 2-3 shift valve and spring.
17. Install the 2-3 T.V. spring into spring pocket of 2-3 shift valve.

18. Install the 2-3 T.V. valve into the 2-3 regulator bushing so that valve will completely enter bore of bushing.

19. Install the 2-3 T.V. valve and bushing into the 2-3 bore. (Small end of T.V. valve first.)

20. Install the 2-3 valve bore plug and retainer.

21. Install the 1-2 shift valve in the bore adjacent to the 2-3 shift valve.

22. Install the 1-2 T.V. and shift valve springs in the same bore.

23. Install the 1-2 T.V. valve into the bushing, stem end out.

24. Install the 1-2 T.V. valve and bushing into the 1-2 bore, stem end first.

25. Compress the bushing and install short retaining pin from the cored side of the valve body.

26. In the bore adjacent to the "U" shaped "cut-out" install the pressure boost valve, using brass rod to guide valve into bore, (long land first). (Fig. 3-96)

27. Install coupling timing valve (land end first) into the same bore.

28. Install coupling timing valve spring over stem end of coupling timing valve.

29. Install valve bore plug in valve body compressing and partially installing multiple plug retainer. Install retainer in such a manner that only one corner of the plug is retained. This will permit the installation of the remaining valves. (Fig. 3-97)

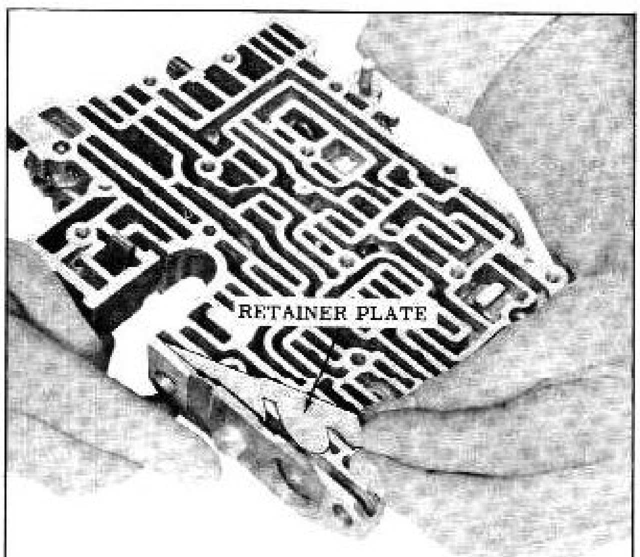


Fig. 3-97 Installing Retainer Plate

30. Install the 2-3 governor valve into the adjacent 2-3 bore (flat end first).

31. Install the 2-3 valve bore plug against the 2-3 governor valve, compressing plug against spring tension into the bore and position the retainer so that edge of plug is secure.

32. Install the 1-2 governor valve into the adjacent 1-2 shift valve bore.

33. Install the bore plug in the 1-2 bore, compressing the valve against spring pressure and position multiple retainer.

34. Install the 2-1 downshift valve (land end first) into the remaining bore.

35. Place 2-1 downshift spring over 2-1 downshift valve, compressing spring and secure with multiple retainer.

36. Install the T.V. element (open end down) in cavity behind throttle valve.

FINAL ASSEMBLY OF THE COMPLETE CONTROL VALVE ASSEMBLY (Fig. 3-98)

1. Install 2 ball-check valves into pockets on cored side of valve body.

2. Position separator plate over cored side of control valve body.

3. Position channel body on valve body and attach with 13 screws, leave loose for final adjustment.

4. Turn control valve assembly over and install one large and two small ball-check valves into pockets.

5. Place 2-3 boost body to valve separator on valve body.

6. Place 2-3 boost body on separator plate and install 3 attaching screws. (Do not tighten screws at this time).

7. Install 2 screws, valve body to channel body.

8. Turn valve assembly over and install the 2-3 boost body to control valve body long attaching screw.

9. Tighten 19 control valve body assembly attaching screws. Torque 2.5 to 3.5 ft. lbs.

CLEAN AND INSPECT TRANSMISSION CASE (Fig. 3-99)

ASSEMBLY OF INDIVIDUAL UNITS INTO TRANSMISSION CASE

CAUTION: Before installing cap screws into aluminum parts, the screws should be dipped into

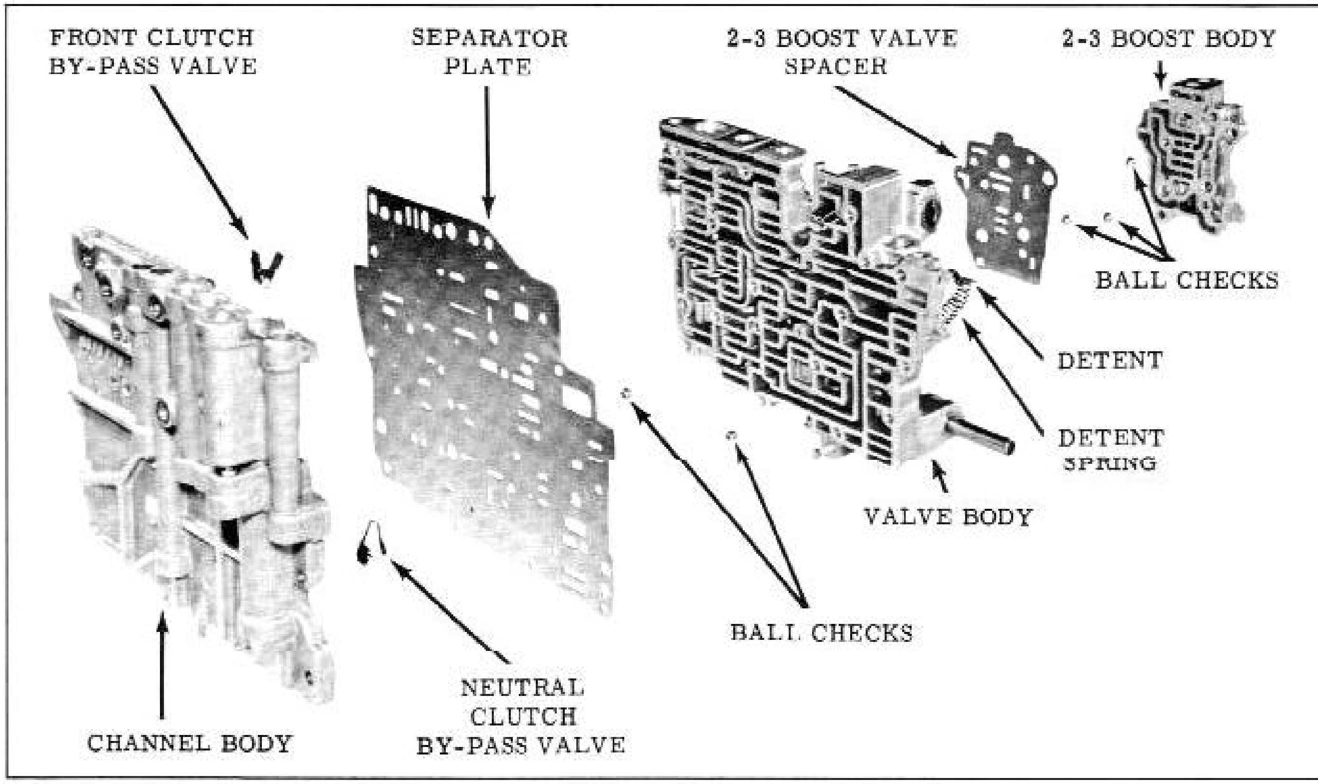


Fig. 3-98 Control Valve Body Assembly

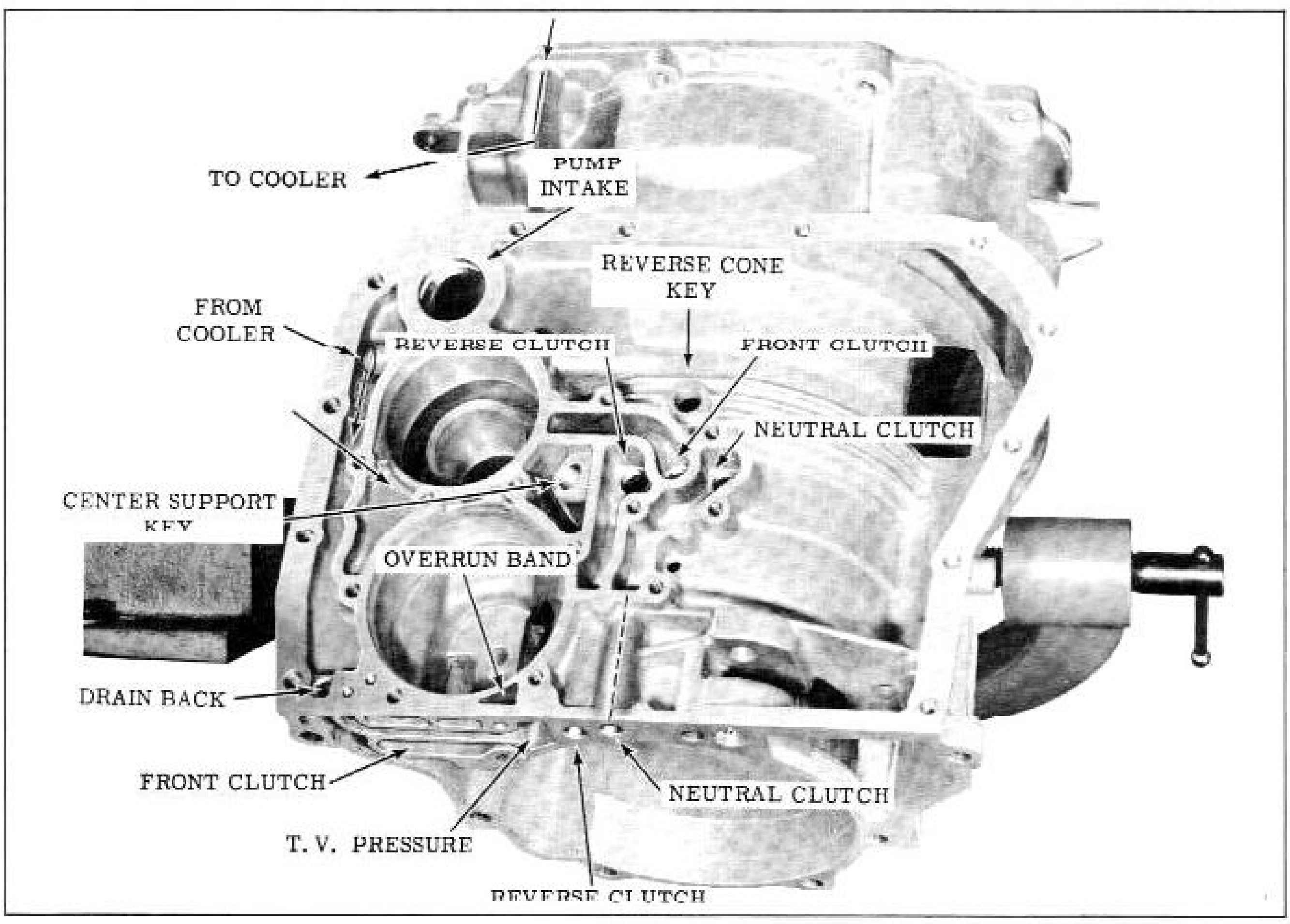


Fig. 3-99 Case Passages

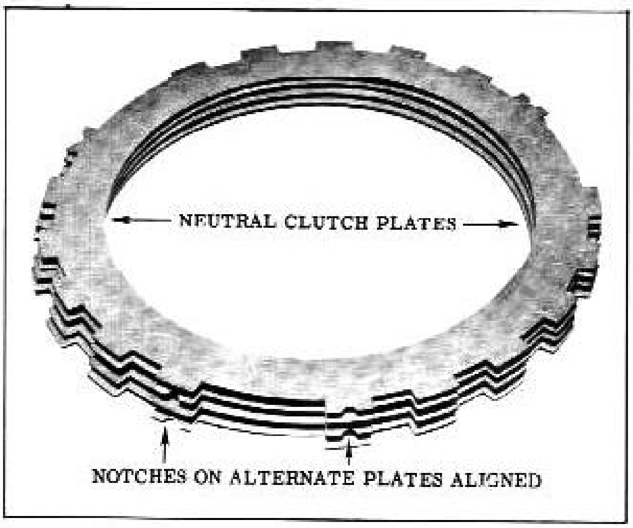


Fig. 3-100 Clutch Plate Alignment

Hydra-Matic oil to prevent galling and/or seizing of threads.

FRONT AND REAR UNITS

1. Place transmission case in holding fixture with the front end up.

2. Install neutral clutch backing plate into case (flat side up).

3. Install 4 neutral clutch drive and driven clutch plates as follows:

   a. Position every other steel plate so that the notched lug is on the opposite side of the wide space. The steel plates must be installed one above the other in this arrangement to properly un-nest the clutch pack. (Fig. 3-100)

   b. Install the composition drive and steel driven clutch plates alternately starting with a composition clutch plate and be certain that the steel plates are stacked as previously arranged.

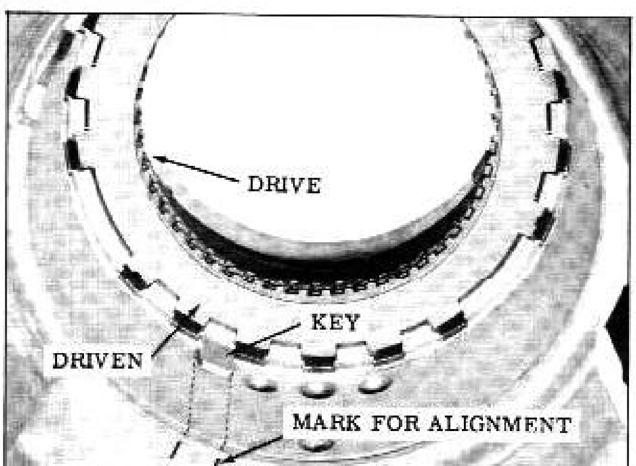


Fig. 3-101 Alignment Marks

4. Install long case support key, (chamfered side up).

5. Mark the case to indicate one side of the key to assist in alignment for installation of case support. (Fig. 3-101)

6. Install neutral and reverse clutch assembly into case, aligning case support key into keyway. Taping may be required.

7. Install reverse stationary cone key into case (rounded side up). (Fig. 3-102)

8. Install reverse cone (steel) into case over reverse piston.

9. Install reverse stationary cone (plastic), aligning reverse stationary cone key with keyway in cone, lightly tap into place, if required.

10. Install large reverse cone snap ring into snap ring groove in case. (Fig. 3-103)

11. Reposition transmission, rear end up, and install overrun band over anchor in case.

12. Install rear unit internal gear and sprag assembly into case, aligning neutral clutch plates with sprag outer race.

    NOTE: Be sure sprag retainer bottoms against case support to insure engagement of all plates.

13. Reposition transmission (bottom side up).

14. Install front clutch assembly into front of transmission.

    NOTE: Be sure bronze washer is positioned in counter bore of front unit clutch drum.

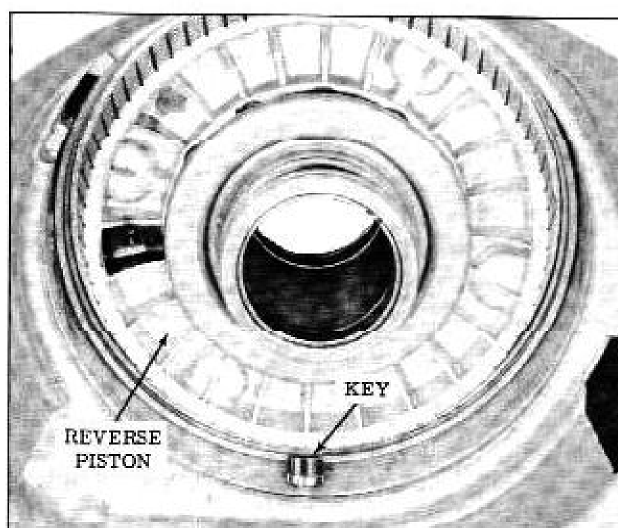


Fig. 3-102 Stationary Cone Key

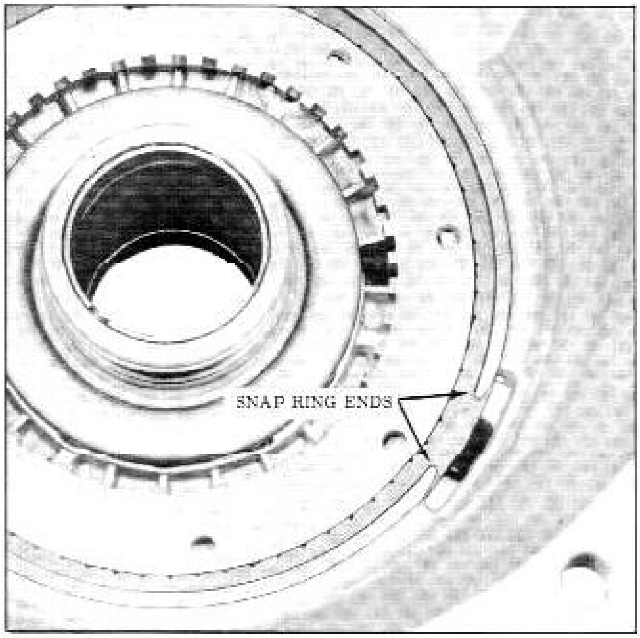


Fig. 3-103 Snap Ring Location

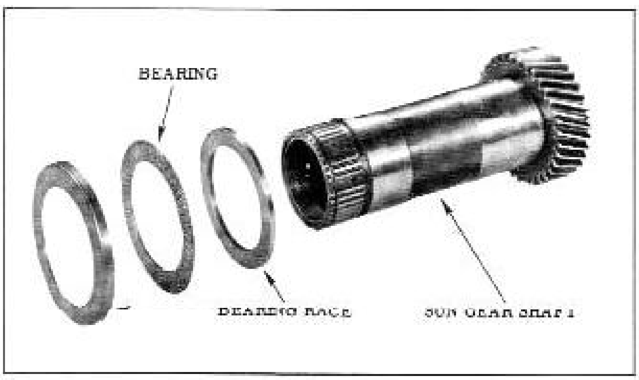


Fig. 3-104 Bearing and Races

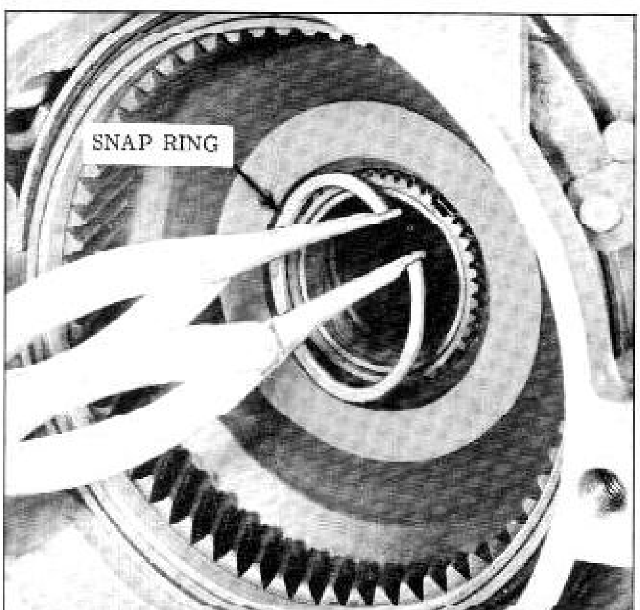


Fig. 3-105 Installing Internal Gear Snap Ring

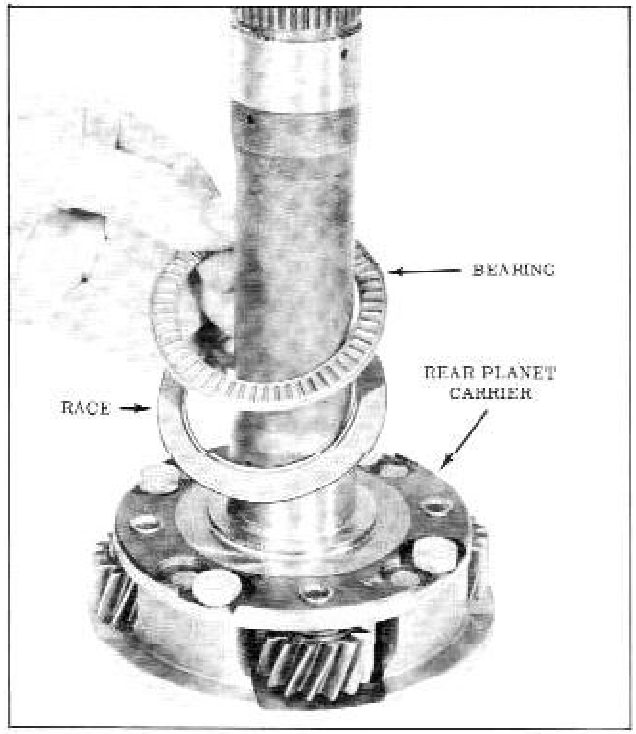


Fig. 3-106 Thrust Bearing and Races

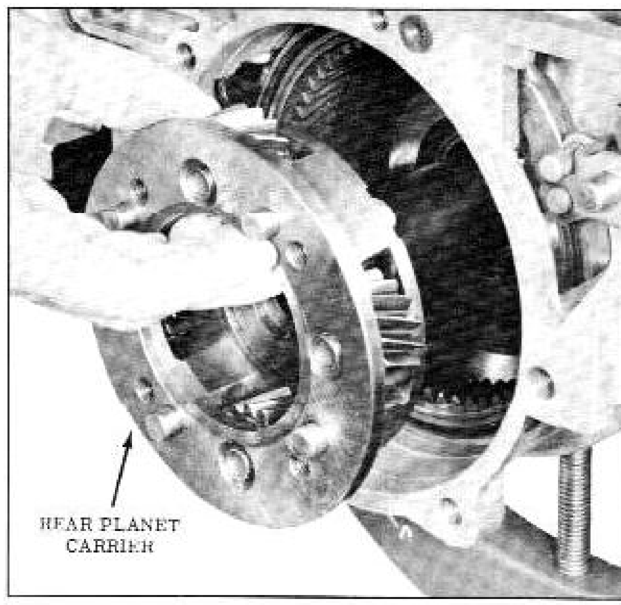


Fig. 3-107 Installing Rear Carrier

15. Install thick bearing race, thrust bearing and the thin cupped bearing race on front sun gear and shaft assembly. (Fig. 3-104)

16. Install front sun gear and shaft assembly through case support, aligning splines of sun gear shaft with rear internal gear and cut-away splines with sprag retainer.

    CAUTION: Be sure to hold rear unit internal gear forward during this operation.

17. Install rear unit internal gear snap ring (Fig. 3-105) on front sun gear shaft.

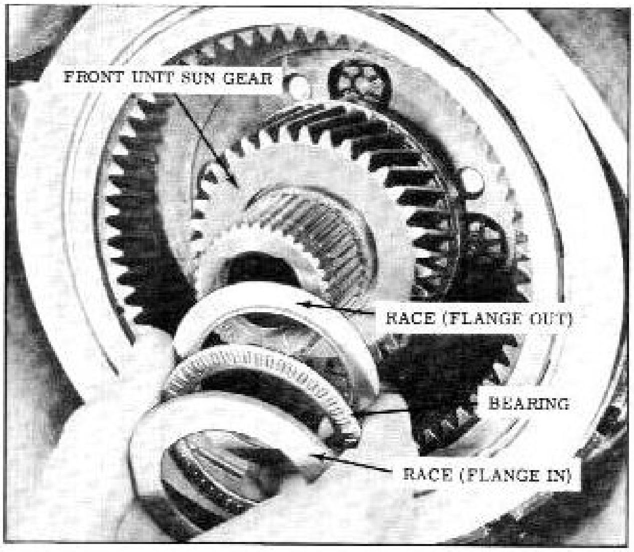


Fig. 3-108 Installing Bearing and Races

18. Install bearing race (inner flange out) and bearing on rear planet carrier. Retain with petrolatum. (Fig. 3-106)

19. Install rear planet carrier through front unit sun gear shaft from rear of transmission. (Fig. 3-107)

20. Install thrust bearing and races as shown and retain with petrolatum. (Fig. 3-108)

21. Holding the rear planet carrier forward, install front unit carrier.

22. Install front unit carrier to rear planet carrier shaft snap ring while holding rear carrier forward. (Fig. 3-109)

23. Reposition transmission (rear end up).

24. Install rear unit sun gear to rear carrier bearing race into rear carrier with flange up, retain with petrolatum.

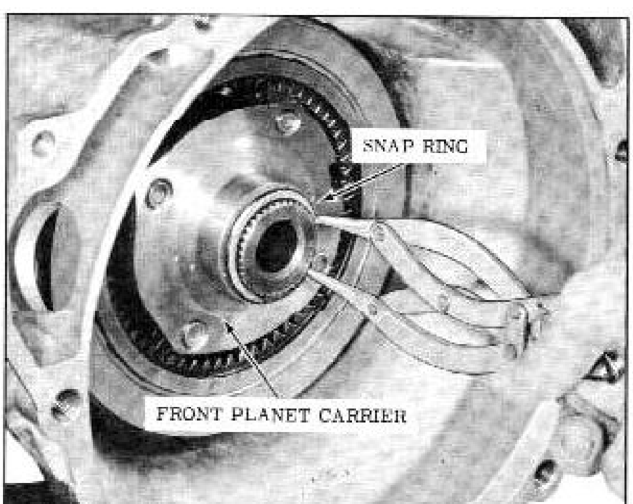


Fig. 3-109 Installing Snap Ring

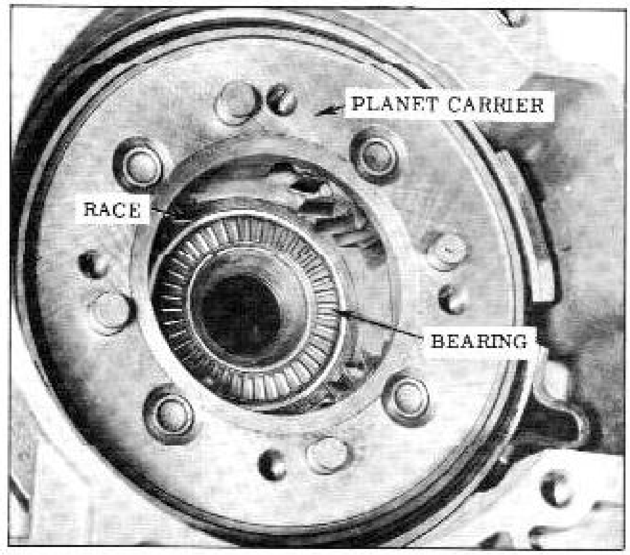


Fig. 3-110 Installing Thrust Bearing

25. Install rear unit sun gear to rear carrier thrust bearing into bearing race. (Fig. 3-110)

26. Assemble rear unit sun gear to mainshaft, if removed, and install through rear carrier. (Fig. 3-111)

PARKING PAWL LINKAGE (Fig. 3-112)

1. Install parking pawl spacer into transmission case.

2. Position parking pawl and linkage assembly against spacer with tooth of parking pawl facing toward center of case and install parking pawl pin.

3. Install parking bracket shaft through linkage and into case.

4. Install parking brake spring into parking bracket, with hook end of spring facing opposite to free end of dowel pin and with straight leg of spring in narrow slot between sides of bracket, and install over bracket shaft with dowel pin facing up.

5. Hook spring on parking lever, holding stop against pin. (Fig. 3-112)

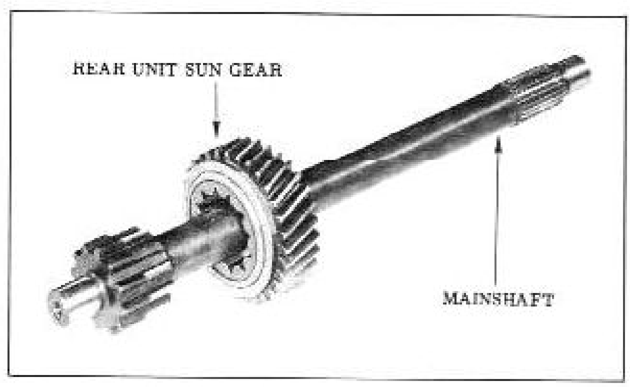


Fig. 3-111 Installing Sun Gear

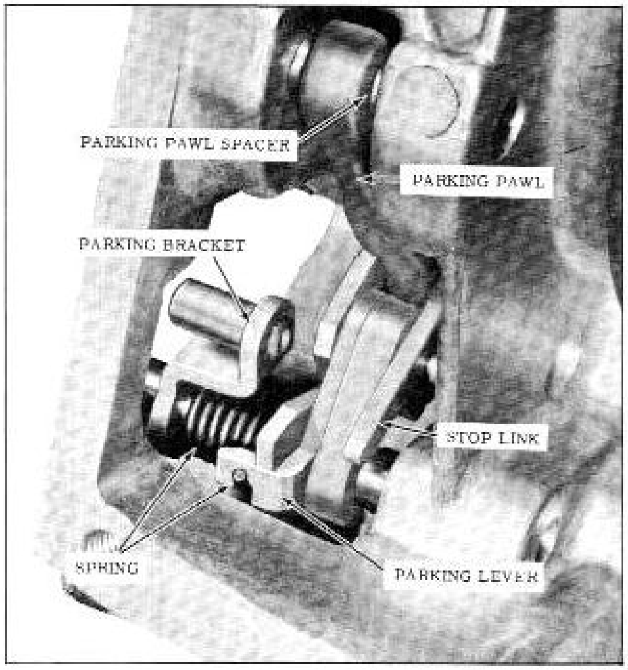


Fig. 3-112 Parking Pawl Assembly

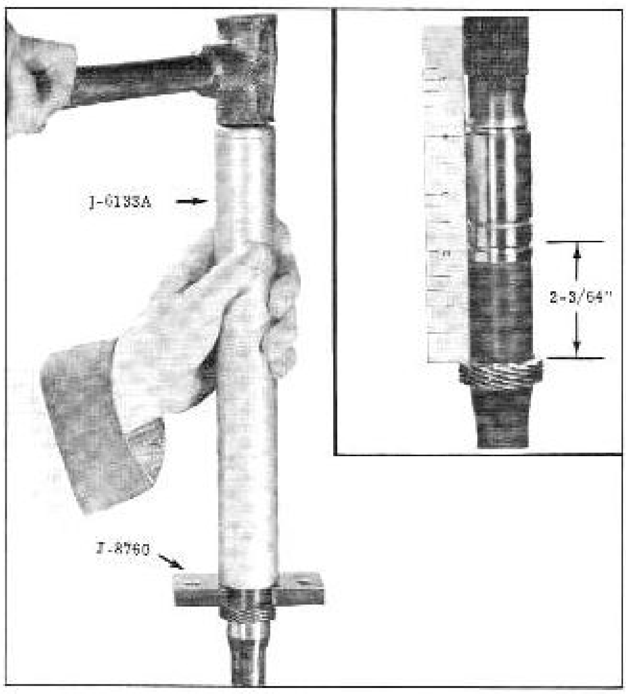


Fig. 3-113 Installing Speedometer Drive Gear

6. Move parking pawl to disengaged position.

OUTPUT SHAFT, GOVERNOR AND REAR BEARING RETAINER

1. Place governor gasket and governor assembly on output shaft.
2. Install speedo drive gear using Tool J-6133-A and J-8760-1. Gear must be installed 2-3/64" from nearest snap ring groove. (Fig. 3-113)

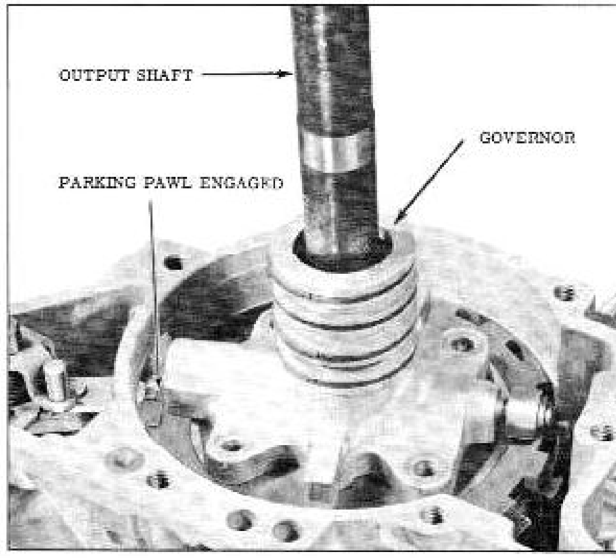


Fig. 3-114 Installing Governor

3. Install snap ring in output shaft groove (nearest to speedometer drive gear).
4. Install output shaft to rear carrier assembly using alignment marks.
5. Engage parking pawl. (Fig. 3-114)
6. Install 4 governor attaching bolts. Torque 19 to 24 ft. lbs.
7. Install rear bearing retainer gasket on rear bearing retainer and retain with petrolatum.
8. Start rear bearing retainer down over output shaft and install rear output shaft snap ring through access hole and over end of output shaft while retainer is being carefully lowered over governor assembly. (Fig. 3-115)
9. Carefully align parking linkage pin and manual

Fig. 3-115 Installing Snap Ring

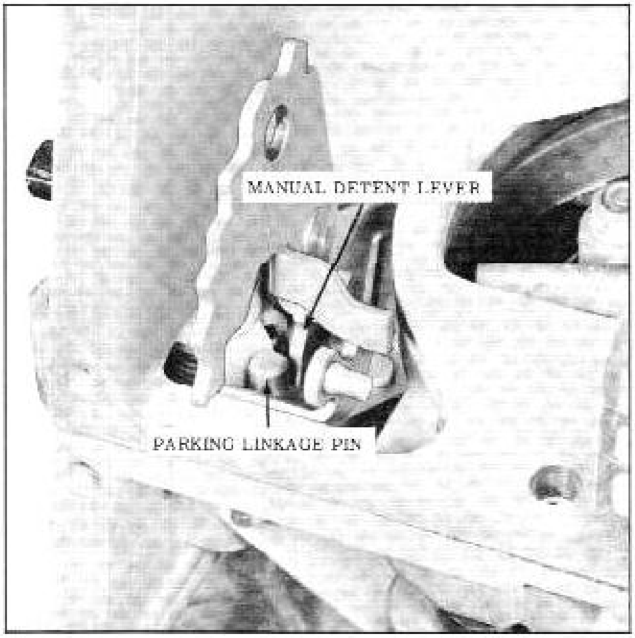


Fig. 3-116 Aligning Parking Linkage

detent lever as rear bearing retainer is aligned with dowel pin and case. (Fig. 3-116)

10. Install 8 rear bearing retainer to case attaching bolts as shown in Fig. 3-117. Torque all bolts 20 to 25 ft. lbs.
11. Using Tool J-6133-A, seat rear bearing snap ring. It may be necessary to move output shaft rearward to locate snap ring, by repositioning transmission to horizontal position and pushing on front unit carrier.
12. Install "O" ring seal over output shaft and into groove.
13. If rear seal was removed, lubricate sealing lip of new seal with Lubricant Part No. 567196 and apply a light coat of P.O.B. No. 3 Sealer (Part No. 557622) to the outer diameter of the seal, then install seal, using Tool J-5154.

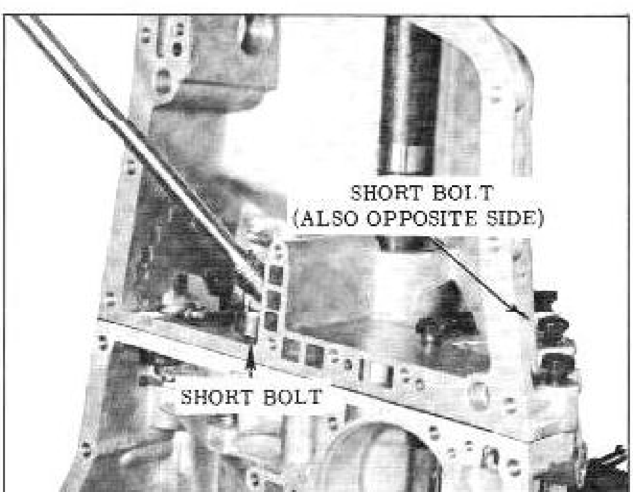


Fig. 3-117 Rear Bearing Retainer Attaching Bolts

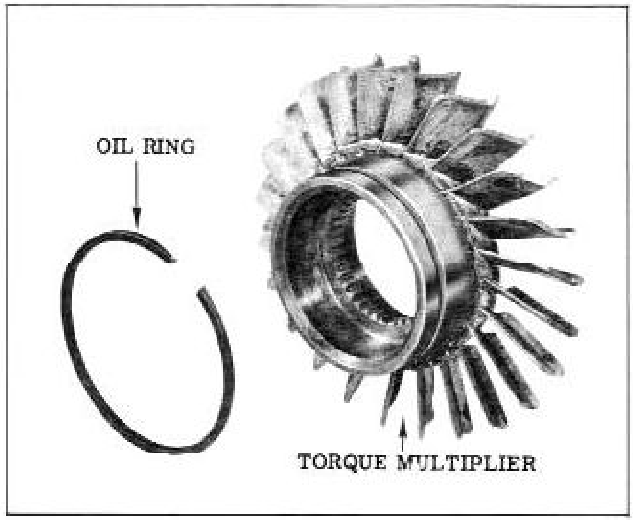


Fig. 3-118 Torque Multiplier Oil Ring

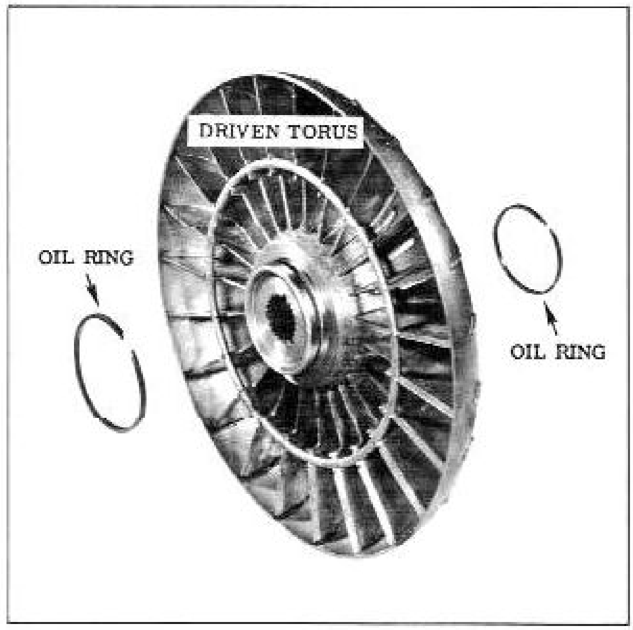


Fig. 3-119 Driven Torus Oil Rings

14. Install rear bearing retainer cover plate and gasket with 4 attaching bolts. Torque 6 to 8 ft. lbs.
15. Reposition transmission (front end up).

TORUS MEMBERS, PUMP AND CASE COVER

1. Install front unit drive torus, aligning front unit clutch plates with drive torus. Look through vent port in case to make sure that all clutch plates are engaged.
2. Install lock type oil ring on torque multiplier hub, if removed. (Fig. 3-118)
3. Install lock type oil ring on front and rear hubs of driven torus member, if removed. (Fig. 3-119)

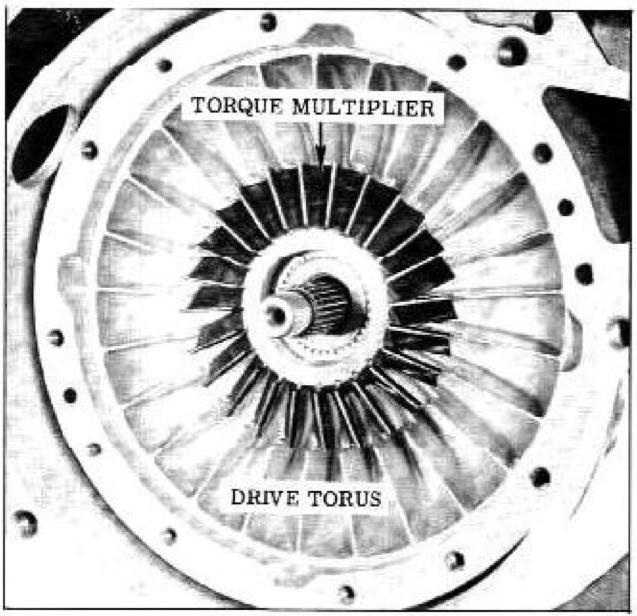


Fig. 3-120 Torque Multiplier Installation

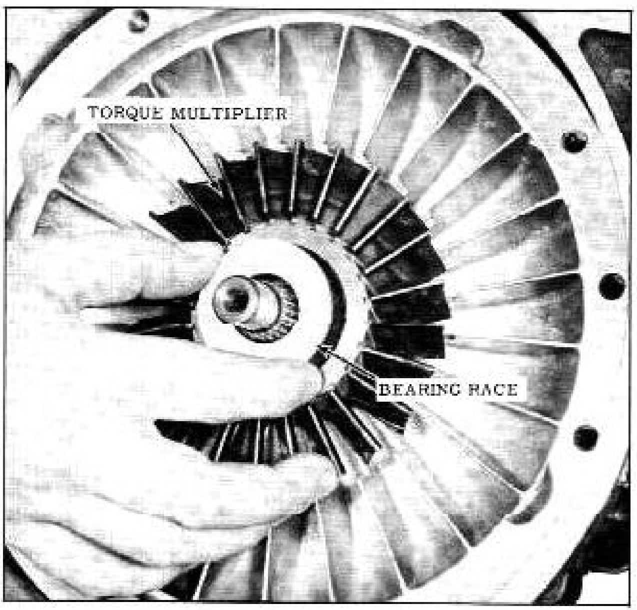


Fig. 3-121 Installing Bearing Race

4. Install torque multiplier into drive torus aligning splines and position torque multiplier so that the I.D. of the hub of the torque multiplier is flush with the planet carrier shaft. (Fig. 3-120) A light tap with a plastic hammer may be required.

5. Install driven torus to torque multiplier rear bearing race into torque multiplier. (Fig. 3-121)

6. Install flanged race into driven forus (flange side up). (Fig. 3-122)

7. Install bearing into flanged race and retain with petrolatum.

8. Install driven torus member over main shaft,

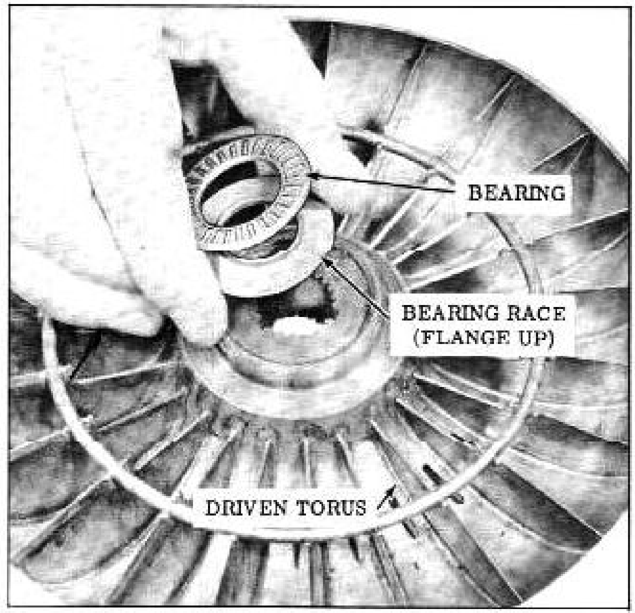


Fig. 3-122 Installing Race and Bearing

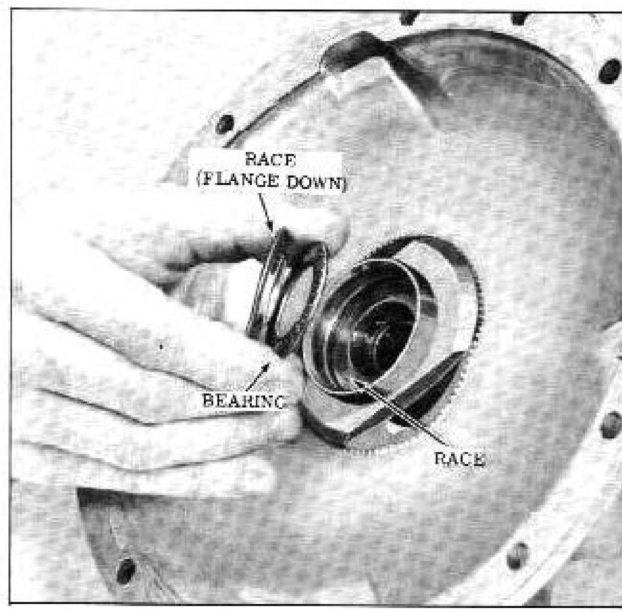


Fig. 3-123 Installing Bearing and Races

pull up on main shaft while repositioning transmission (pan side up).

9. Hold main shaft forward while installing driven torus to main shaft retaining ring.

10. Reposition transmission (front end up).

11. Install NEW drive torus to torus cover metal gasket on drive torus. Retain with petrolatum.

12. Install flat bearing race into torus cover.

13. Install bearing into flanged race, coat with petrolatum and install into torus cover with flanged side down. (Fig. 3-123)

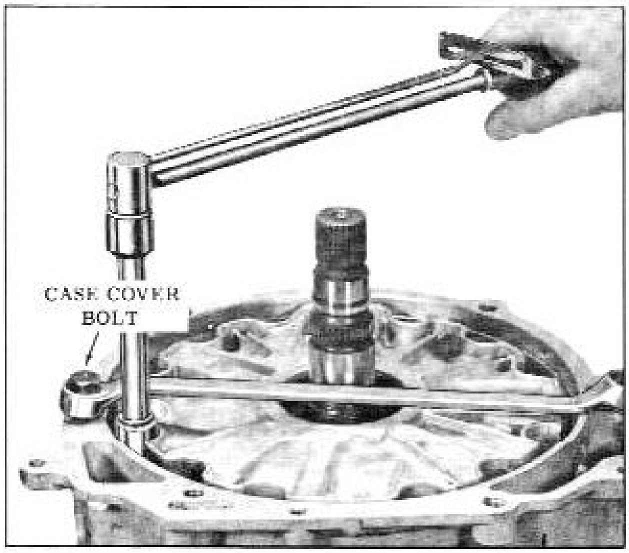


Fig. 3-124 Torus Cover Installation

14. Coat new gasket with petrolatum and install on torus cover.

15. Install torus cover to the drive torus member, aligning dowel pins.

16. Install box end wrench on case, as a holding tool, and install 12 torus cover to drive torus attaching bolts, cross tightening the bolts. Torque 17 to 20 ft. lbs. (Fig. 3-124)

17. Remove box end wrench.

18. Install new gasket, coated with Sealer Part No. 557622, on case cover.

19. Install Seal Protector Tool J-8828 over input shaft. (Fig. 3-125)

20. Install case cover and pump assembly on transmission case.

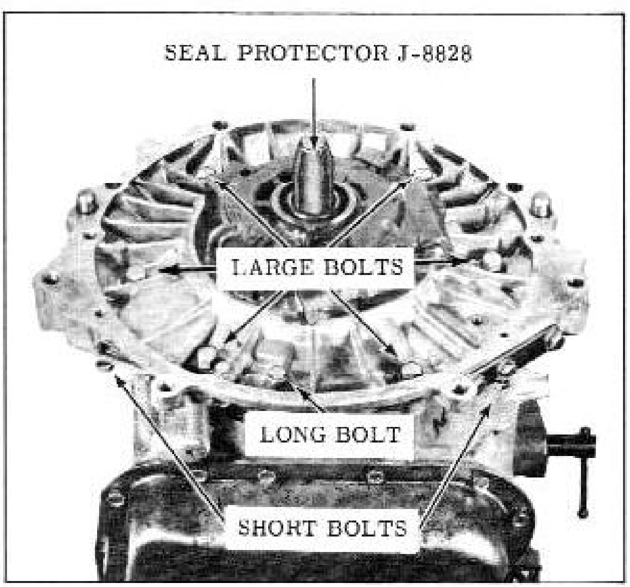


Fig. 125 Seal Protector and Bolt Location

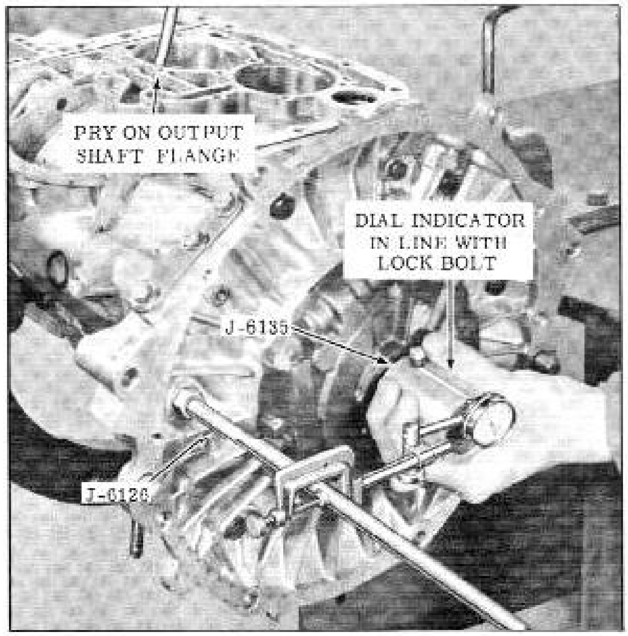


Fig. 3-126 Checking End Play

21. Install six large case cover to case attaching bolts and torque 30 to 35 ft. lbs. Install the three small attaching bolts as shown in Fig. 3-125 and torque 15 to 18 ft. lbs. Remove seal protector.

FRONT UNIT END PLAY CHECK

1. Remove one case cover to case attaching bolt.
2. Install Tool Bolt J-6126 into transmission case.
3. Assemble Neutral Clutch Retainer Tool J-6135 on the input shaft of the torus cover.
4. Clamp dial indicator on Tool J-6126 and index indicator with end of Tool J-6135 in line with the lock screw.
5. Position a screw driver through case, BEHIND THE FLANGE ON THE OUTPUT SHAFT and gently pry forward on output shaft to position units forward.
6. At the same time move tool handle and record end play. (Fig. 3-126)
7. End play should be .005" to .020". If end play is incorrect, refer to selective shim washer chart and install new selective shim washer(s). (Page 3-46)
8. Remove tools and reinstall case cover to case attaching bolt. Torque bolt 30 to 35 ft. lbs.
9. Rotate transmission (pan side up).

ACCUMULATOR, SERVO AND VALVE BODY

1. Install accumulator pin into case. (Fig. 3-127)

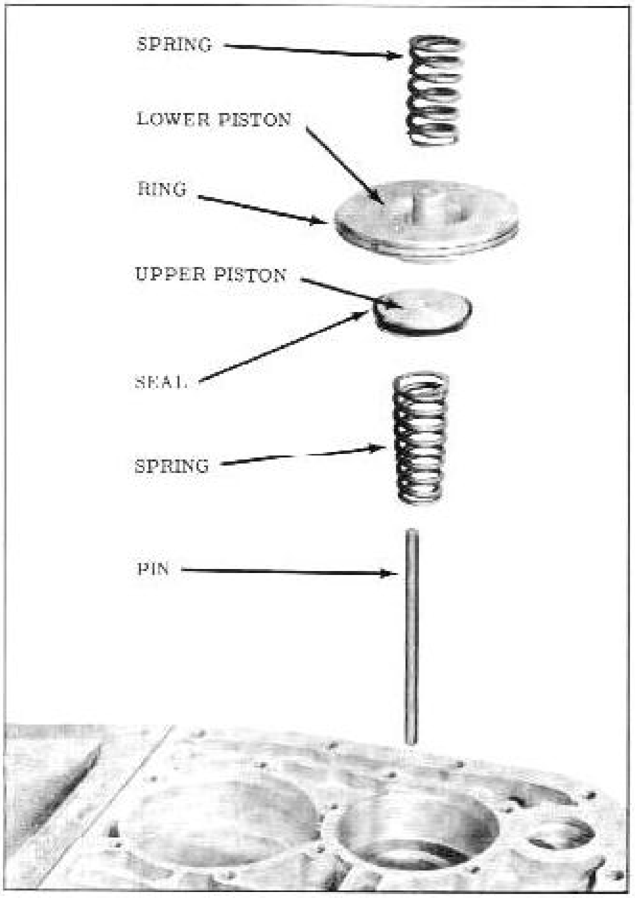


Fig. 3-127 Accumulator Installation

2. Install upper accumulator spring (tapered end down).
3. Install NEW small accumulator piston seal with lip of seal facing flat side of piston.
4. Install small accumulator piston with lip of seal facing up.

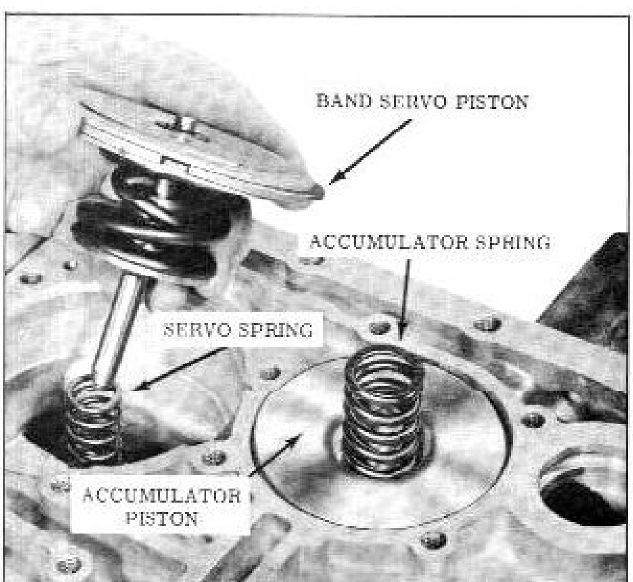


Fig. 3-128 Servo Installation

5. Install large accumulator piston ring on piston, if removed.
6. Install large accumulator piston over pin with spring pocket up.
7. Install short accumulator spring into spring pocket.
8. Install servo release spring into case bore. (Fig. 3-128)
9. Install servo piston assembly into case (stem down).
10. Install 3 case support to case seals and springs (seals down). (Fig. 3-129)
11. Install servo and accumulator gasket, coated with petrolatum, on servo and accumulator cover.

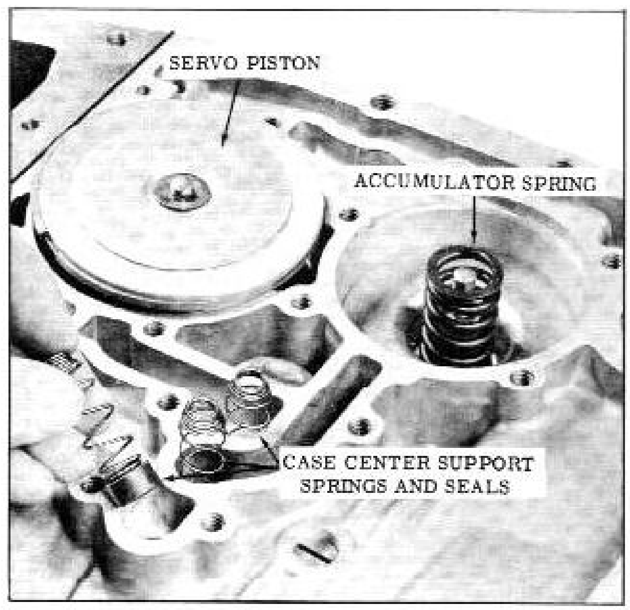


Fig. 3-129 Installing Seals and Springs

12. Install servo and accumulator cover. Use 4 bolts through center of cover to locate the cover and align case support to case seals and accumulator seal ring. After cover is lined up, depress cover and tighten bolts. Torque 6 to 8 ft. lbs.
13. Install 8 servo and accumulator cover bolts. Leave the remaining bolts out. (Fig. 3-130) Torque 6 to 8 ft. lbs.
14. Install compensator body assembly on accumulator cover using 3 screws and 1 bolt. (Fig. 3-131) Torque screws 2.5 to 3.5 ft. lbs. and torque bolt 6 to 8 ft. lbs.
15. Install a case to oil cleaner pipe "O" ring in case bore, if removed.
16. Install oil cleaner with pipe in case bore and

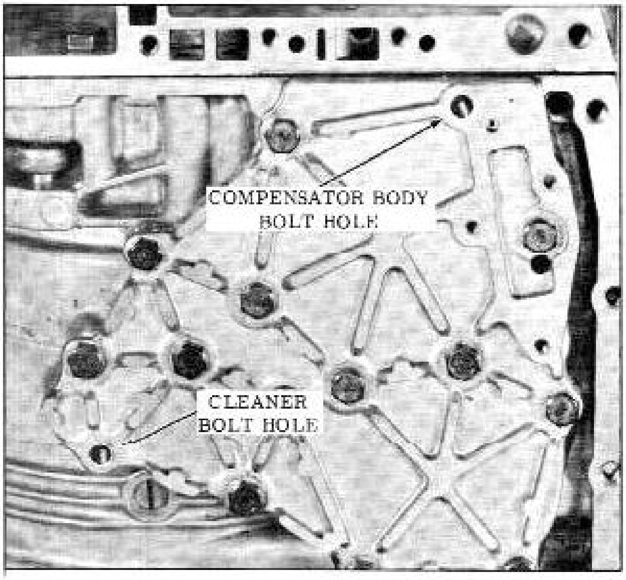


Fig. 3-130 Accumulator Cover Bolt Location

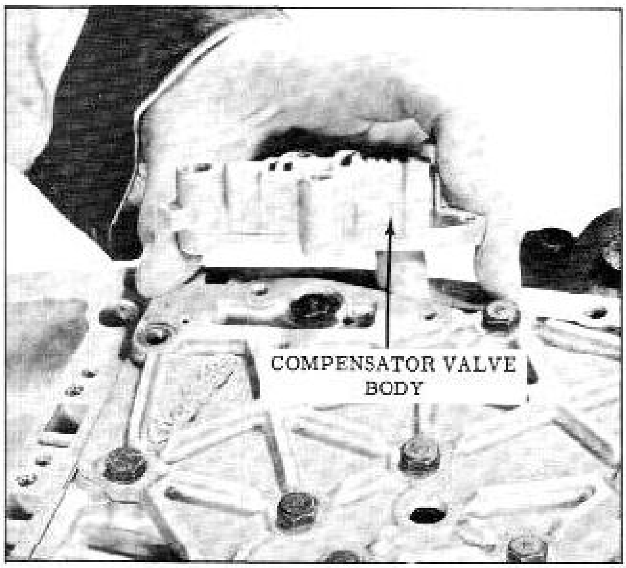


Fig. 3-131 Installing Compensator Body

secure oil cleaner with one remaining cover attaching bolt. Torque 6 to 8 ft. lbs.

17. Install seals on pipe assembly, if removed.

18. Install pipe assembly into case through opening in case. (Fig. 3-132)

19. Install seal and washer, if removed, on pipe assembly attaching bolt, and install bolt to pipe assembly from front side of case cover. Torque 10 to 12 ft. lbs.

20. Install manual valve in valve body.

21. Apply petrolatum to valve body pipe ports and install valve body assembly by guiding T.V. shaft through opening in rear bearing retainer and positioning manual valve on pick up pin. Position pipe assembly to index with pipe ports in valve body and move forward to seat pipe

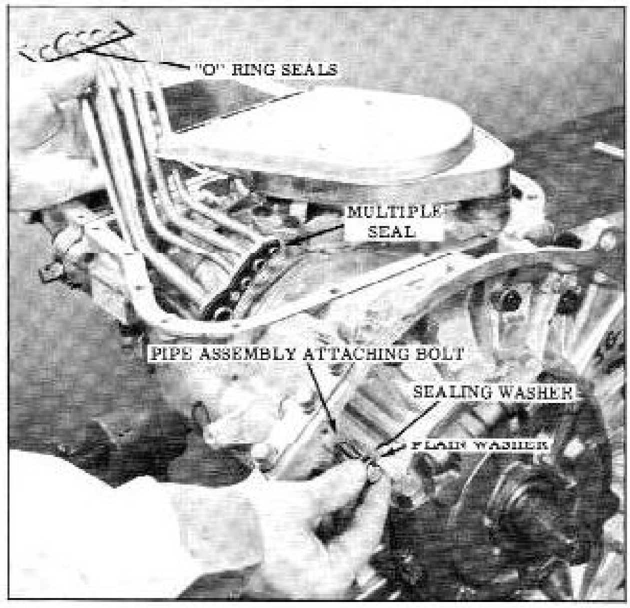


Fig. 3-132 Installing Pipe Assembly

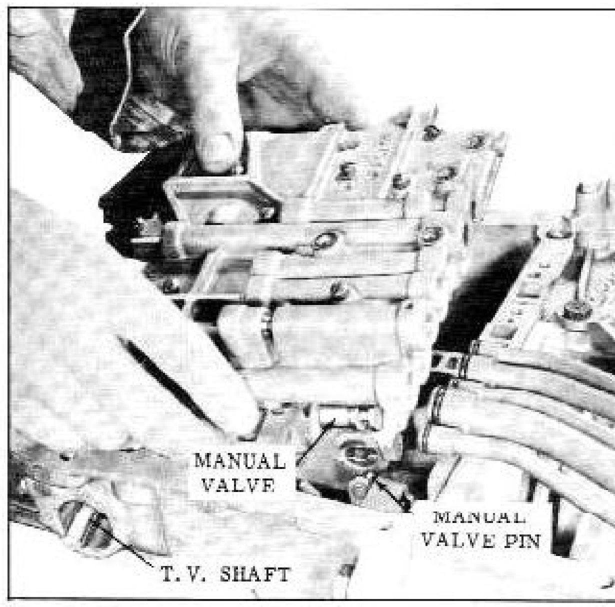


Fig. 3-133 Installing Valve Body

seals. (Fig. 3-133) Install 5 valve body attaching bolts. Torque 6 to 8 ft. lbs.

22. Install throttle shaft seal over T.V. shaft into case.

23. Install new oil pan gasket on transmission.

24. Install oil pan on transmission using 21 attaching screws. Torque 12 to 15 ft. lbs.

SERVICING THE OIL COOLER

The oil cooler is located in the lower tank of the radiator and its purpose is to cool the oil in the event excessive temperature tends to develop.

In a major transmission failure, where particles of metal have been carried with the oil throughout the units of the transmission, it will be necessary to flush out the oil cooler and connecting lines. The oil cooler is a sealed container providing a passage for oil to flow from the inlet to the outlet. Clean solvent can be flushed through the cooler with air pressure. (An engine desludge gun may be used.) The cooler should be back-flushed first through the return line to remove all foreign material possible. Then flush through the inlet line and finish by flushing through the return line. Clean remaining solvent from cooler with compressed air applied to the return line and flush with Hydra-Matic oil.

MINOR SERVICE ADJUSTMENTS

THROTTLE LINKAGE ADJUSTMENTS (Fig. 3-134)

1. ADJUST T.V. LEVER AT SIDE OF TRANSMISSION

a. Raise car and remove clip and lower T.V. relay rod from T.V. lever "A" at side of transmission. (Fig. 3-135)

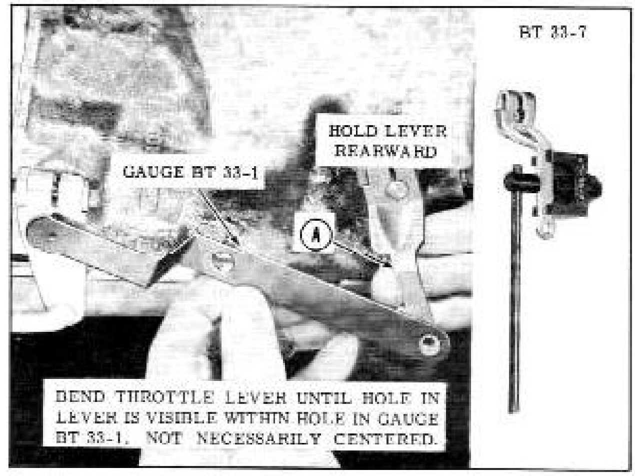


Fig. 3-135 Checking T.V. Lever Adjustment

b. Place short end of T.V. lever Gauge BT-33-1 into manual lever shaft. While holding T.V. lever at the end of its rearward travel, the T.V. lever hole should be visible within the hole in the gauge. (Fig. 3-135)

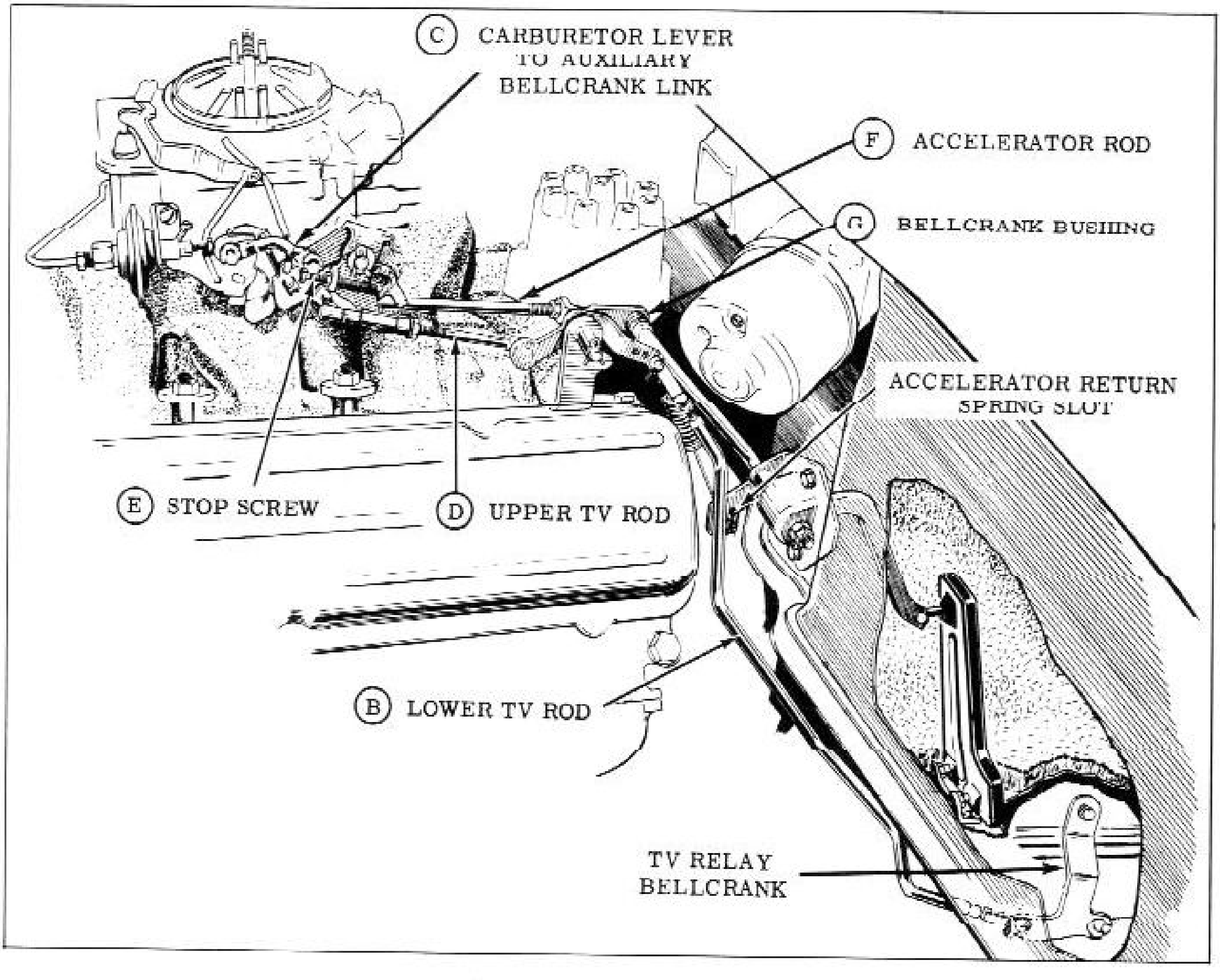


Fig. 3-134 Throttle Linkage Adjustments

c. If T.V. lever hole is not completely visible within the gauge hole, bend lever with Tool BT-33-7 and recheck adjustment. Install T.V. rod and clip.

d. Lower car.

THE FOLLOWING LINKAGE ADJUSTMENT STEPS MUST BE MADE WITH THE CARBURETOR THROTTLE VALVES IN THE CLOSED BORE POSITION.

(Step 2) LOWER T.V. ROD ADJUSTMENT

(Step 3) CARBURETOR LEVER TO AUXILIARY BELLCRANK LINK ADJUSTMENT

(Step 4) UPPER T.V. ROD ADJUSTMENT

To completely close throttle valves, start engine, remove air cleaner and block intermediate choke lever at climatic control housing to release fast idle cam. Install throttle return check holding Tool J-6342-01 to hold plunger away from throttle lever. Turn off ignition switch and BACK OUT SLOW IDLE ADJUSTING SCREW UNTIL CARBURETOR THROTTLE VALVES ARE COMPLETELY CLOSED. In a true closed bore position, clearance will be present at the end of the fast idle screw, slow idle screw, and the throttle return check plunger.

2. ADJUST LOWER T.V. ROD (B, Fig. 3-134)

a. Loosen jam nut on lower T.V. rod "B" and remove both rods from T.V. bellcrank. Upper T.V. rod has socket and ball stud connections which snap on and off.

b. With T.V. bellcrank and transmission lower T.V. rod "B" held against their rearward stops, adjust lower T.V. rod clevis so that the pin will enter freely into holes in clevis and T.V. bellcrank. (Fig. 3-136)

c. Install cotter pin and tighten jam nut on lower T.V. rod "B".

3. ADJUST CARBURETOR LEVER TO AUXILIARY BELLCRANK LINK (C, Fig. 3-134)

a. Measure clearance as shown in Fig. 3-137 (four barrel) or Fig. 3-138 (two barrel) with feeler gauge. To obtain proper clearance of .020" to .040" remove link "C" and bend. Reinstall link and recheck clearance. Link can be installed up or down.

4. ADJUST UPPER T.V. ROD (D, Fig. 3-134)

a. Adjust, by rotating rod until bellcrank is

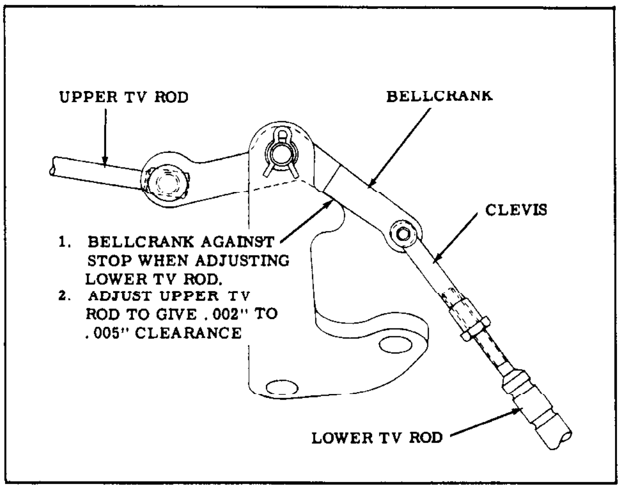


Fig. 3-136 Adjusting T.V. Rods

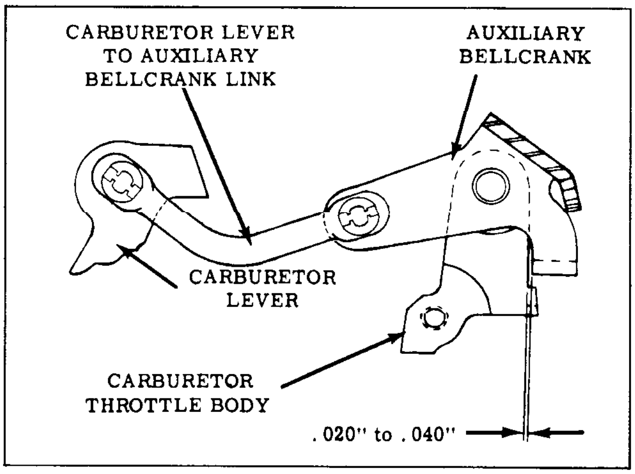


Fig. 3-137 Checking Carburetor Link (4 Bbl.)

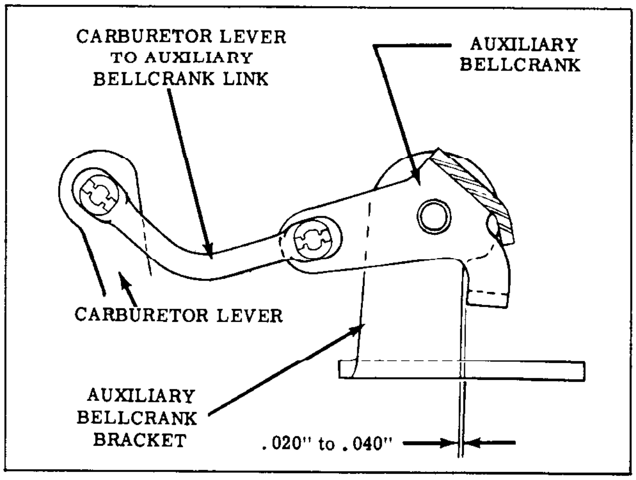


Fig. 3-138 Checking Carburetor Link (2 Bbl.)

.002" to .005" off its stop with the throttle valves closed. (Fig. 3-136) Do not apply pressure on linkage while making this adjustment.

b. Tighten jam nut.

5. IDLE SPEED ADJUSTMENT

a. Remove block holding choke valve open, start engine and allow it to reach normal operating temperature.

b. With throttle return check Holding Fixture J-6342-01 in place, set slow idle speed according to the following chart and instructions.

SLOW IDLE SPEED	
SELECTOR LEVER	R.P.M.
Drive	500
Factory Installed Air Conditioning - Air Conditioning turned "OFF". Idle Compensator held closed. Dealer Installed Air Conditioning (Without Idle Compensator) - Air Conditioning turned "ON".	

NOTE: When setting idle speed make sure the idle compensator is closed by holding it down with a pencil or other suitable tool. If the idle speed increases when the air cleaner is installed, do not reduce idle speed setting since the idle compensator is open. If idle speed decreases, readjust to correct rpm.

THE FOLLOWING ADJUSTMENTS MUST BE MADE WITH THE CHOKE COMPLETELY OFF, FAST IDLE OFF, AND THE CARBURETOR THROTTLE VALVES IN THE SLOW IDLE POSITION.

(Step 6) THROTTLE STOP SCREW ADJUSTMENT

(Step 7) ACCELERATOR PEDAL HEIGHT

6. ADJUST THROTTLE DOWNSHIFT STOP SCREW (E, Fig. 3-134)

a. Loosen jam nut and back out stop screw several turns. Push rearward on accelerator pedal lever until throttle valves are wide open, then hold in wide open position with left hand on carburetor throttle lever. Rotate T.V. bellcrank counterclockwise with right hand to the point of maximum transmission lever travel. This point is a matter of feel - do not bend or stretch linkage beyond this point.

b. With linkage held in this position, adjust stop screw "E" to just touch the tang on the downshift lever.

c. Allow the throttle valves to return to a

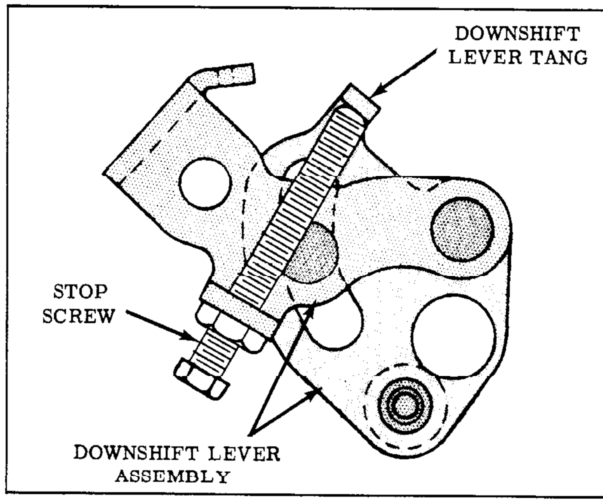


Fig. 3-139 Throttle Downshift Stop Screw Adjustment

closed position, then turn stop screw in 1-1/2 to 2 turns and tighten jam nut. (Fig. 3-139)

7. ADJUST ACCELERATOR PEDAL ALIGNMENT AND HEIGHT

a. Disconnect accelerator pedal bellcrank link from pedal and check alignment. If pedal and link are misaligned, bend the left ball stud up or down as required.

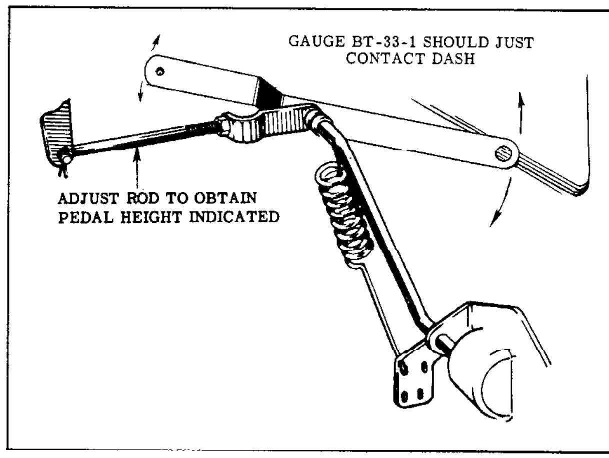


Fig. 3-140 Accelerator Pedal Height Adjustment

b. Adjust accelerator rod "F" to position accelerator rod to bellcrank bushing "G" so that Gauge BT-33-1 just touches dash. (Fig. 3-140)

c. Lubricate linkage pivot points with light engine oil.

MANUAL LEVER ADJUSTMENT

The following adjustment provides proper clearance between the neutral detent in the transmission and the stop for the manual shift lever in the upper steering column mast jacket.

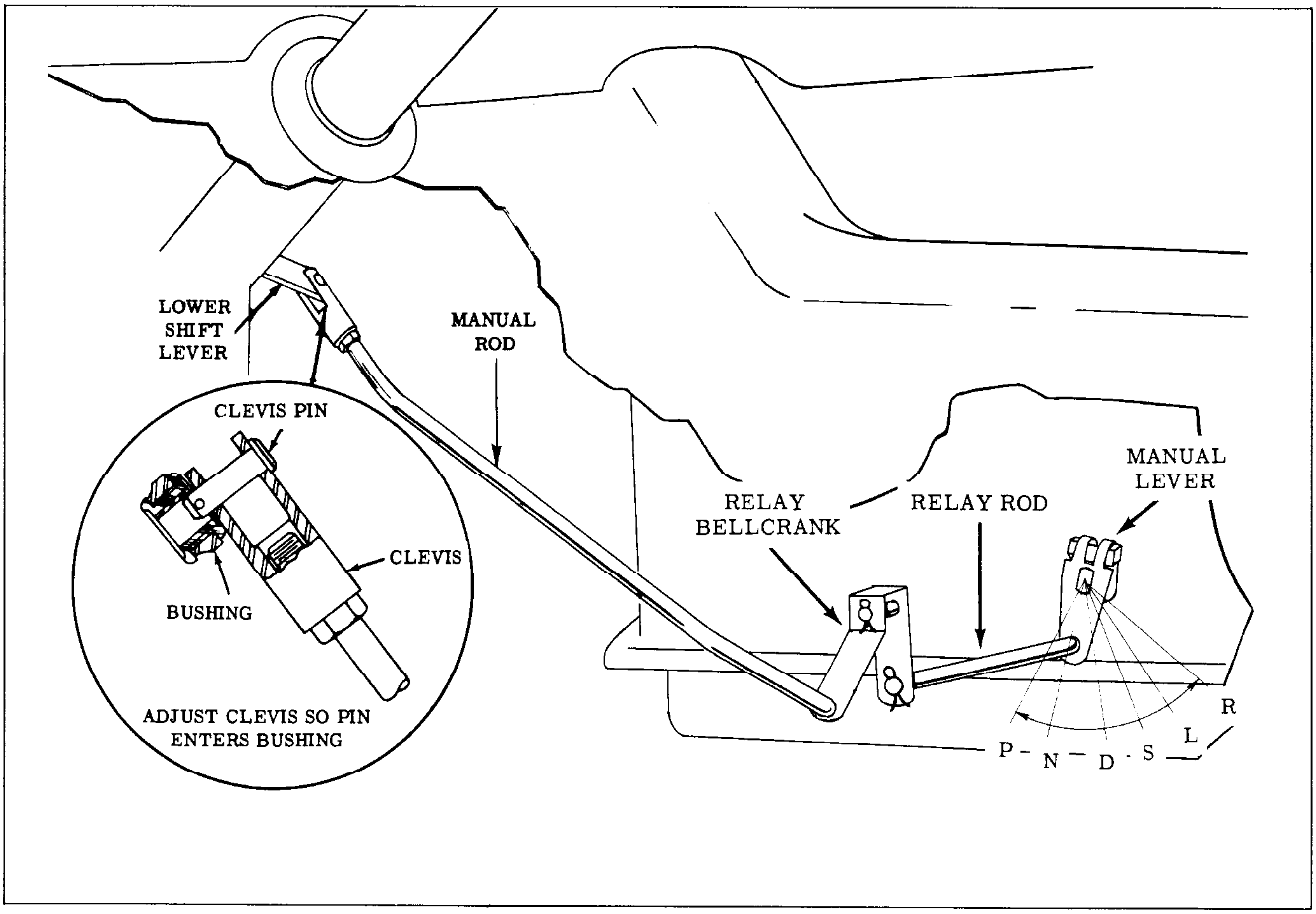


Fig. 3-141 Manual Lever Adjustment

1. Set transmission manual lever in neutral detent position.
2. Disconnect manual rod from lower shift lever.
3. Hold lower shift lever upward so selector lever is positioned against stop in upper steering column. Do not raise lever.
4. Adjust manual rod end so pin will enter approximately 1/8" into lower shift lever bushing with selector lever against stop. (Fig. 3-141)
5. Lengthen clevis 2-1/2 turns.
6. Connect manual rod to lower shift lever and tighten clevis lock nut.

DIAGNOSIS

This information is an aid to and not a substitute for a good basic understanding of the Principles of Operation. It is of utmost importance to observe and perform all preliminary steps outlined in this Diagnosis Guide. Make certain that all "on the car repairs" possibilities have been exhausted before the transmission is removed from the car.

Prior to attempting to correct any assumed malfunctions of the transmission, always check and test as follows:

CHECK OIL LEVEL

Always check the oil level before road testing. Erratic shifting or other malfunctions can in some cases be traced to improper oil level.

ROAD TEST

For a proper diagnosis, a thorough knowledge of the operation of the transmission is essential. Where possible, a test route should be established to include some hilly section to test for open throttle downshifts, a level section for testing upshift points and a quiet section for testing for noise.

Check all upshifts and downshifts for smoothness of operation in drive range. Also check transmission in low and "S" range and reverse.

NOTE: There are only two upshifts in drive range (1st to 2nd and 2nd to 3rd).

While road testing, the transmission oil pressure gauge should be connected and the pressures checked as follows:

Check in "S" Range with steady road load at approximately 25 mph. Reading should be between 98.6 and 111.4 psi. (Transmission in 2nd speed)

CAUTION: Do not stall test transmission under any conditions.

LOW OIL PRESSURE

POSSIBLE CAUSES:

1. Oil Level - Low
2. Boost Plug - Wrong - Stuck
3. Pressure Regulator Valve
4. Strainer and "O" Ring
5. Manual Valve - Misaligned
6. Foaming or Cavitation
7. Control Valve Assembly - Stuck Valve(s)
8. Internal Leak
9. Front Pump - Slide - Low Output

HIGH OIL PRESSURE

POSSIBLE CAUSES:

1. Pressure Regulator Valve - Stuck
2. Boost Plug - Wrong - Stuck
3. Manual Valve - Misaligned With Quadrant
4. Control Valve Assembly - Stuck Valve
5. Front Pump - Slide - High Output

Always be certain the engine is operating at peak performance. The engine and transmission are designed to operate as an integral power unit. Failure of the engine to deliver peak power can result in improper shift characteristics and apparent transmission malfunction.

EXTERNAL LINKAGE

The importance of proper linkage adjustment cannot be over emphasized. Improper linkage adjustment can cause rough erratic shifting, missing shifts, or the inability to select one or more of the ranges.

OIL LEAKS

Before attempting to correct an oil leak, the actual source of the leak must be determined. In many cases the source of the leak can be deceiving due to "wind flow" around the engine and transmission. If any doubt exists as to the source of the leak there are two ways to determine it.

RED DYE

The addition of red dye to the transmission oil will indicate if the leak is from the transmission.

BLACK LIGHT

The use of a "Black Light", Tool No. J-6640, to identify the oil from the leak is also suitable. Comparing the oil from the leak to that on the engine or transmission dipstick when viewed by black light will determine the source of the leak.

POSSIBLE POINTS OF OIL LEAKS

1. TRANSMISSION OIL PAN
   a. Improperly installed or damaged gasket.
   b. Attaching bolts not correctly torqued.
   c. Filler pipe flange weld or stripped threads.
   d. Filler pipe.
   e. Oil pan not flat.
   f. Rear bearing retainer and/or case not positioned correctly at oil pan.
2. REAR BEARING RETAINER
   a. Rear seal not installed properly or damaged.
   b. Gasket (rear bearing retainer to case) damaged or improperly installed.
   c. Rear bearing retainer to case attaching bolts not correctly torqued.
   d. Speedo gear housing not tight.
   e. Main line pressure plug not tight.
   f. T.V. line pressure plug not tight.
   g. Inner T.V. lever seal.
   h. Cover plate gasket improperly installed or defective.
   i. Cover plate screws not correctly torqued.
3. COOLER CONNECTIONS
   a. Adapter not correctly torqued.
   b. Adapter defective.
4. CASE COVER ASSEMBLY LEAKS
   a. Gasket - Case to Case Cover improperly installed.
   b. Bolts - Improperly torqued.

c. Washer Seals - Damaged.

d. Plate or Gasket - Defective.

5. FRONT END LEAKS
   a. Pump "O" ring cut or improperly installed.
   b. Front seal.
   c. Case to case cover gasket.
   d. Case cracked or porus.
   e. Cut or improperly installed "O" ring - coupling feed limit valve, (oil pump).
   f. Cut or improperly installed "O" ring - pressure regulator assembly.
   g. Breather pipe.
   h. Manual shaft seal - defective or improperly installed.

NO DRIVE IN DRIVE RANGE

POSSIBLE CAUSES:

1. Low Oil Level
2. Linkage, Manual
3. Control Valve Assembly
4. Internal Leak
5. Low Oil Pressure
6. Neutral Clutch
7. Sprag Assembly - Or Race
8. Coupling
9. Passage Restricted
10. Reverse Cone Engaged

FIRST SPEED ONLY

POSSIBLE CAUSES:

1. Governor
2. Control Valve Assembly
3. Clutch

DRIVE IN SECOND AND THIRD ONLY

POSSIBLE CAUSE:

1. Control Valve Assembly

DRIVE IN FIRST AND THIRD ONLY

(MIGHT BE REPORTED AS 1-2 SLIP)

POSSIBLE CAUSES:

1. Control Valve Assembly
2. Coupling

DRIVE IN FIRST AND SECOND ONLY

POSSIBLE CAUSES:

1. Governor (G-2)
2. Control Valve Assembly

DRIVE IN NEUTRAL

POSSIBLE CAUSES:

1. Linkage, Manual
2. Neutral Clutch

NO REVERSE

POSSIBLE CAUSES:

1. Linkage, Manual
2. Low Pressure
3. Reverse Cone Clutch
4. Restricted Passage
5. Neutral Clutch

DRIVE IN "S" OR LOW RANGE ONLY

POSSIBLE CAUSES:

1. Sprag Assembly
2. Neutral Clutch

ROUGH 1-2 SHIFT

POSSIBLE CAUSES:

1. T.V. Linkage
2. Control Valve Assembly
3. Accumulator
4. Compensator Body Assembly
5. 1-2 Oil Passage
6. Coupling
7. Front Clutch

ERRATIC SHIFTS

POSSIBLE CAUSES:

1. Governor Assembly
2. Control Valve Assembly

SLIPPING ALL RANGES

POSSIBLE CAUSES:

1. Low oil level
2. Low oil pressure

SLIPPING — 1-2 SHIFT

(CAN BE REPORTED AS 1-3 ONLY)

POSSIBLE CAUSES:

1. T.V. Linkage
2. Low Oil Pressure
3. Control Valve Assembly
4. Compensator Body Assembly
5. Accumulator
6. 1-2 Oil Passages
7. Front Clutch

SLIPPING — 2-3

POSSIBLE CAUSES:

1. Control Valve Assembly
2. Coupling
3. Linkage Adjustment

NO ENGINE BRAKING IN "S" OR LOW RANGE

POSSIBLE CAUSES:

1. Overrun Servo
2. Overrun Band

NO PART THROTTLE OR DETENT DOWNSHIFTS

POSSIBLE CAUSES

1. T.V. Linkage
2. Accelerator Travel
3. Control Valve Assembly
4. Governor

SELECTOR LEVER WILL NOT GO INTO REVERSE

POSSIBLE CAUSES:

1. Manual Linkage
2. Reverse Blocker Valve
3. Governor

SELECTOR LEVER WILL NOT GO INTO PARK

POSSIBLE CAUSES:

1. Parking Linkage
2. Manual Linkage

FORWARD DRIVE IN REVERSE

POSSIBLE CAUSES:

1. Manual Linkage
2. Neutral Clutch

REVERSE DRIVE IN NEUTRAL

POSSIBLE CAUSE:

1. Reverse Cone Clutch

HIGH UPSHIFTS

POSSIBLE CAUSES:

1. Upper T.V. Rod Too Long or Lower T.V. Rod Too Short.
2. T.V. Lever
3. T.V. Pressure
4. Control Valve Assembly
5. Governor
6. Governor Oil Passages

UPSHIFTS LOW

POSSIBLE CAUSES:

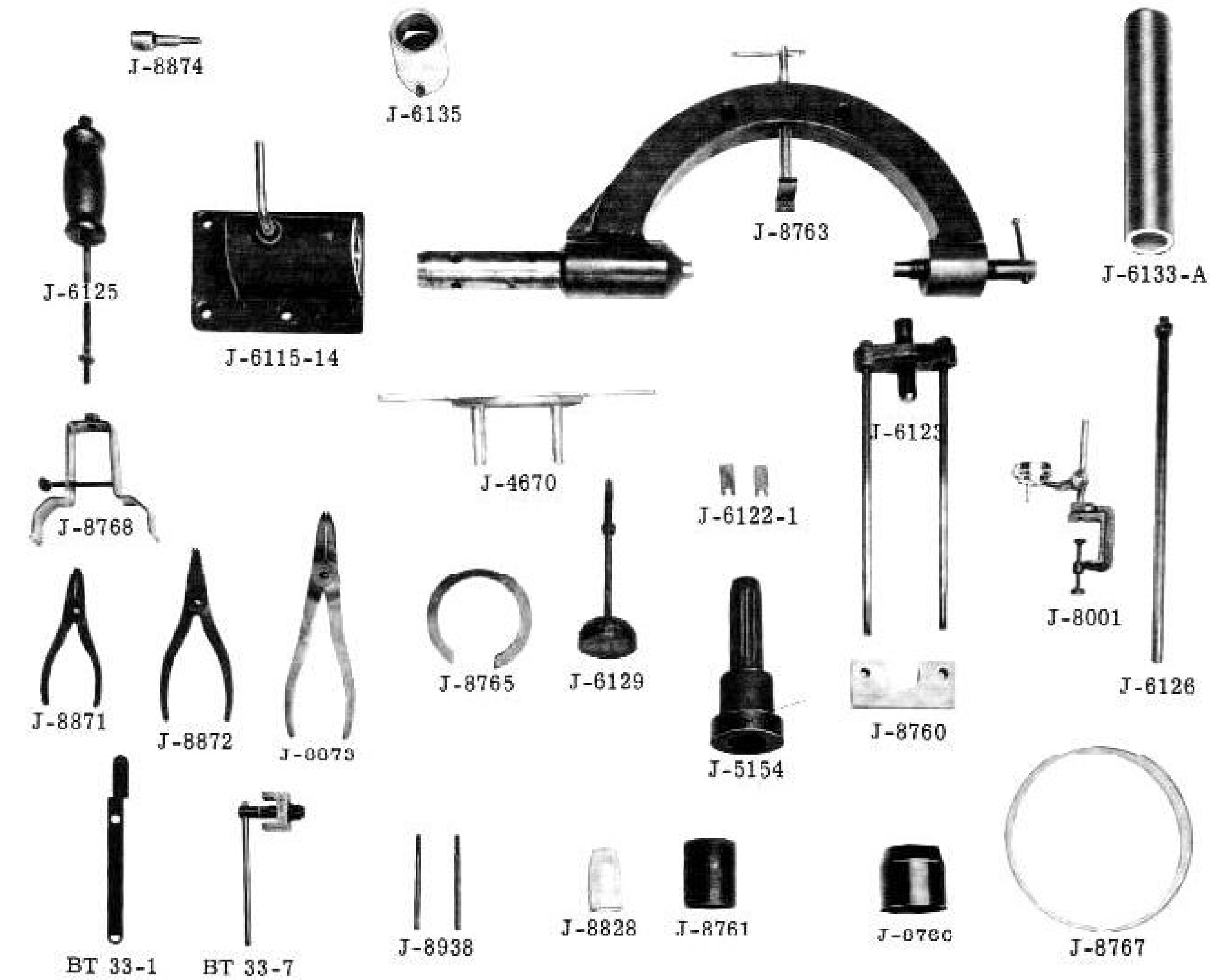
1. Upper T.V. Rod Too Short or Lower T.V. Rod Too Long.
2. Control Valve Assembly
3. Governor
4. T.V. Lever
5. Governor Passages
6. T.V. Pressure

NOISE DIAGNOSIS

CONDITION	CAUSE
1. All Ranges - More pronounced with Hot oil - 1st gear approximately 1000 to 1200 R.P.M. (Moan)	1. Oil Pump
2. 2-1 - 2-3 Shift (Whine)	2. Oil Pump
3. 2nd & Reverse Gear Noise Low R.P.M. (Only)	3. Front Unit Gear Set
4. 1st-2nd, Reverse & Neutral Gear Noise - High R.P.M. Predominant noise in 2nd during 2-3 shift.	4. Rear Unit Gear Set
5. 2-3 shift noise with Hot Oil and Low R.P.M.	5. (Coupling Fill) Pump Whine
6. Noise In All Except 2nd	6. Coupling
7. Buzzing Noise	7. T.V. Valves, Governor or Pressure Regulator Valve
8. Rattle - Light Load - 3rd	8. Damper

TORQUE SPECIFICATIONS

LOCATION	TORQUE (Ft. Lbs.)
Valve Bodies	
Channel Plate to 2-3 Boost Body	2.5 to 3.5
Channel Plate to Valve Body	2.5 to 3.5
Valve Body to Channel Plate	2.5 to 3.5
2-3 Boost Body to Valve Body	2.5 to 3.5
Compensator Body to Servo & Accumulator Cover	2.5 to 3.5
Valve Body to Case	6 to 8
Compensator Valve Body to Case	6 to 8
Rear Bearing Retainer	
Rear Bearing Retainer Cover to Retainer	6 to 8
Rear Bearing Retainer to Bushing Sleeve	12 to 15
Rear Bearing Retainer to Case	20 to 25
Pump and Case Cover	
Oil Cooler Control Valve to Case Cover	2.5 to 3.5
Pump Cover to Pump Body	6 to 8
Case Cover to Case (5/16-18)	15 to 18
Case Cover to Case (7/16-14)	30 to 35
Case Cover to Pump	15 to 18
Case Cover to Pipe	10 to 12
Plate to Case Cover	18 to 20
Torus Feed Limit Valve Plug	15 to 20
Pressure Regulator Plug	15 to 20
Front and Rear Units	
Front Internal Gear to Clutch Housing	22 to 27
Rear Planet Shaft to Carrier	19 to 23
(Governor) Output Shaft to Carrier	19 to 23
Torus Exhaust Valve Cover to Torus Cover	24 to 29
Torus Cover to Drive Torus	17 to 20
Oil Pan to Case	12 to 15
Servo and Accumulator Cover to Case	6 to 8
Case Cover to Engine and Lower Flywheel Housing	50 to 55



BT 33-1	Transmission T. V. Lever Gauge	J-8761	Oil Pump Seal Installer (Transmission)
BT 33-7	T. V. Lever Bending Tool	J-8763	Holding Fixture
J-4670	Clutch Spring Compressor	J-8765	Reverse & Neutral Clutch Retainer Adapter
J-5154	Rear Oil Seal Installer	J-8766	Reverse & Neutral Clutch Inner Seal Protector
J-6115-14	Holding Fixture Bench Adapter	J-8767	Reverse Clutch Outer Seal Protector
J-6122-01	Coupling Valve Retainers	J-8768	Reverse Cone Puller
J-6123	Speedo, Gear Remover	J-8828	Oil Pump Seal Protector
J-6125	Slide Hammers	J-8871	No. 22 - 90 Degree Truarc Plier External
J-6126	Dial Indicator Support	J-8872	No. 24 - 90 Degree Truarc Plier External
J-6129	Clutch Spring Compressor	J-8873	No. 25 - 90 Degree Truarc Plier Internal
J-6133-A	Rear Bearing and Speedometer Gear Installing Tool	J-8874	F-30 Clutch Head 3/8 Drive Bit
J-6135	Neutral Clutch Retainer (Output Shaft End Play Adapter)	J-8938	(J-3387-2) Internal Gear & Clutch Housing Assembly (Holding Studs)
J-8001	Dial Indicator Set		
J-8760	Speedometer Gear Remover Adapter Set		

Fig. 3-142 Hydra-Matic Tools

STEERING

CONTENTS OF SECTION 4

STEERING LINKAGE (Fig. 4-1)

PERIODIC MAINTENANCE

The steering linkage does not require periodic lubrication as it is lubricated for life at the time of manufacture.

GENERAL INFORMATION

The only steering linkage adjustment is at the

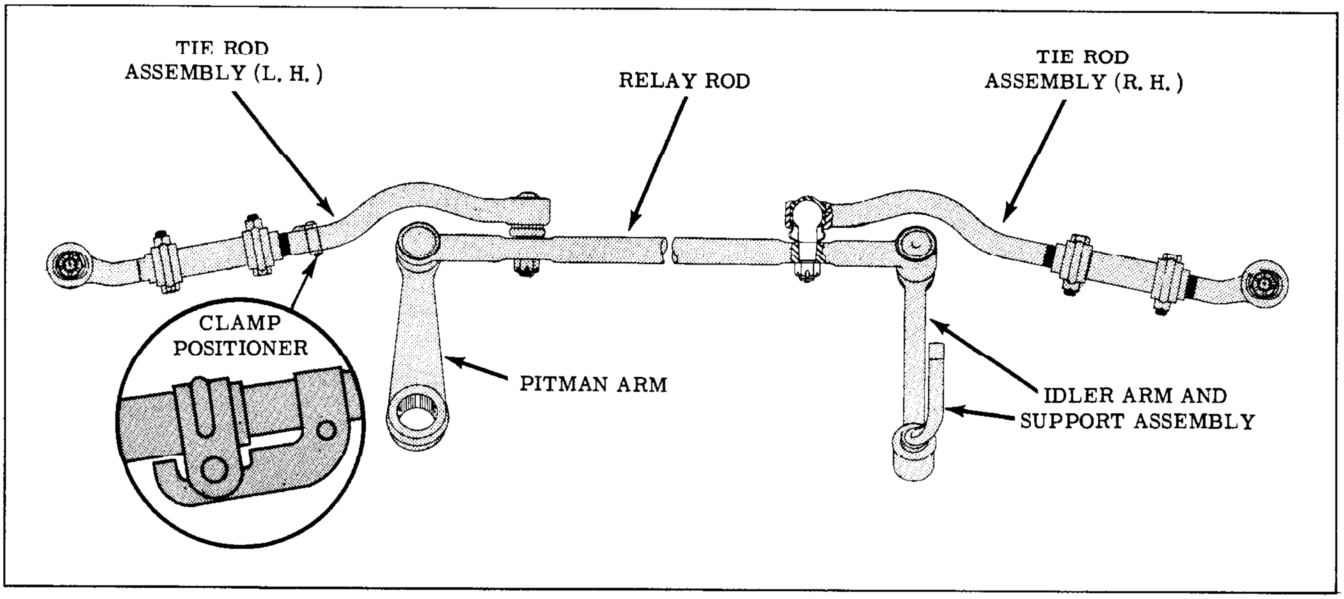


Fig. 4-1 Steering Linkage

tie rod sleeves for the setting of steering wheel spoke alignment and front wheel toe-in. Improperly adjusted steering linkage can cause tire wear, and improper steering wheel alignment can cause excessive play and car wander while driving in the straight ahead position. Worn steering linkage can cause excessive play, kickback, front wheel shimmy, car wander, and road shock. If worn linkage joints are suspected, they should be checked for wear and worn parts should be replaced. Linkage joints are worn if free travel within the joints can be detected while operating the steering mechanism.

CAUTION: Two types of steering linkage are used in production. The Saginaw linkage can be identified by the plastic bearing in the end of each linkage joint and the Thompson linkage can be identified by a metal bearing cover plate. Under no condition should the Saginaw or Thompson linkage individual parts be interchanged on a linkage assembly.

REPLACEMENT OF STEERING LINKAGE PARTS

PITMAN ARM

To disconnect the pitman arm from the pitman shaft use Tool J-5504-B or a similar puller. Upon assembly, install the pitman arm with the front wheels in the straight ahead position and with the steering wheel at the center of its travel. Torque pitman shaft nut 90 to 120 ft. lbs.

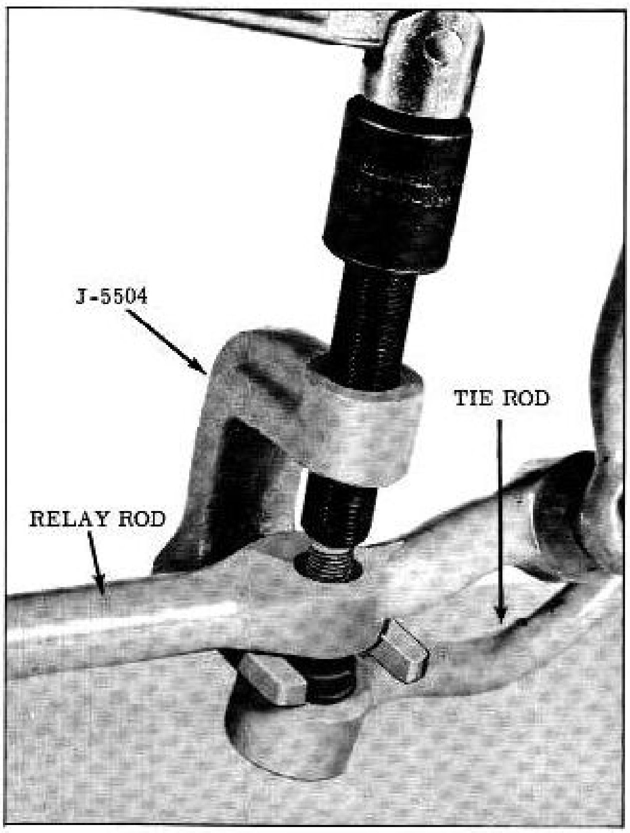


Fig. 4-2 Disconnecting Linkage Joint

LINKAGE JOINTS

IMPORTANT: When disconnecting a linkage joint, no attempt should be made to disengage the joint by driving a wedge between the joint and the attached part. Exercise care so as not to damage the rubber sealing boots as they are not replaceable.

Tie rod joints should be disconnected from the relay rod, after removing the attaching nut, by using Tool J-5504-B (Fig. 4-2). To disconnect the outer end of a tie rod, remove the tie rod to plain arm attaching nut, then tap the END of the PLAIN ARM with a hammer to free the tie rod from the plain arm. Upon reassembly, the linkage joint nuts should be tightened 50 to 60 ft. lbs. To remove the pitman arm or idler arm from the relay rod, the steering linkage should be removed from the car. After removing the nut, the relay rod can be clamped in a vise or supported so that the joint can be driven out of the relay rod.

IDLER ARM AND SUPPORT ASSEMBLY

The idler arm and support is serviced as an assembly and no adjustments are required. When installing the support to the frame bracket, torque the bolts 25 to 35 ft. lbs.

TIE RODS

Whenever the tie rod end is assembled to the tie rod and prior to assembling the tie rod end to the plain arm, make certain that an equal number of tie rod and tie rod end threads are exposed at each end of the tie rod sleeve.

LINKAGE ADJUSTMENT

Toe-in and steering wheel spoke alignment is

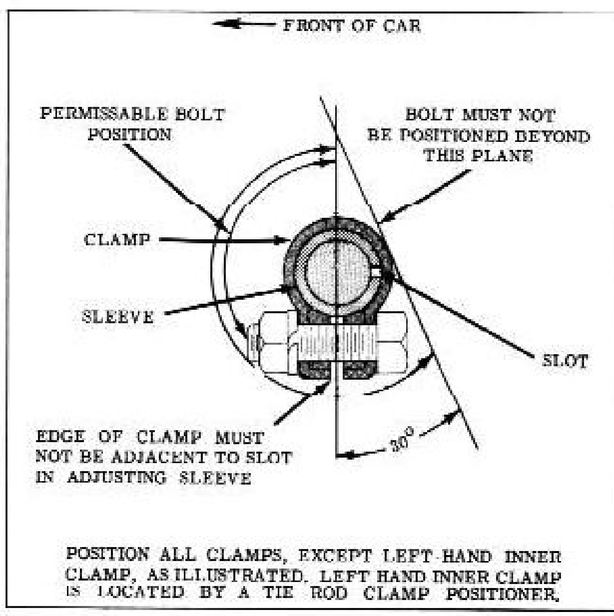


Fig. 4-3 Tie Rod Clamp Positioning

obtained by turning the adjusting sleeves on the tie rods which in turn lengthen or shorten the tie rod assemblies. Refer to WHEEL ALIGNMENT. After adjusting toe-in, make certain that the sleeve clamps are positioned as shown in Fig. 4-3.

MANUAL STEERING

PERIODIC MAINTENANCE

Check lubricant level in gear every 2,000 miles. Use SAE 80 Multi-Purpose gear lubricant to replenish.

GENERAL DESCRIPTION (Fig. 4-4)

The manual steering gear is the recirculating ball nut type. The worm and the ball nut have mating spiral grooves in which two sets of 25 balls each circulate to provide a low friction drive between the worm and nut (Fig. 4-4).

Each set of balls operate in their own circuit. When the steering wheel is turned to the left, the ball nut is moved downward by the balls which roll between the worm and nut. As the balls reach the outer surface of the nut, they enter the return guides which direct them across and down into the ball nut where they enter the circuit again. When a right turn is made, the ball nut moves upward and the balls circulate in the reverse direction.

The teeth on the ball nut and the pitman shaft sector, are so designed that a "high point" or tighter fit exists between the ball nut and the sector teeth when the front wheels are in the straight ahead position. The teeth on the ball nut and pitman shaft are tapered so that proper lash may be obtained by moving the pitman shaft closer to or away from the ball nut teeth by means of an adjusting screw which extends through the side cover. The head of the adjusting screw and a selectively fitted shim controls the end play of the pitman shaft.

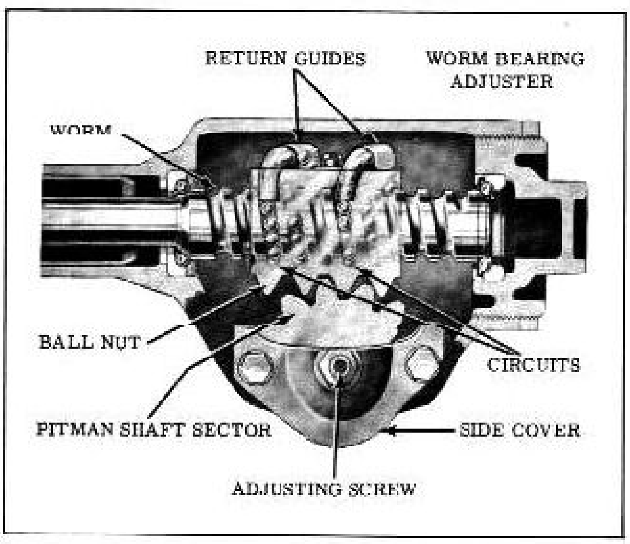


Fig. 4-4 Manual Steering Gear

The worm bearing adjuster controls the worm bearing preload.

ADJUSTMENTS (ON CAR)

Before any adjustments are made to the steering gear in an attempt to correct such conditions as shimmy, hard or loose steering, or road shock, careful check should be made to determine that front end alignment, shock absorbers, wheel balance, and tire pressure are correct.

There are two adjustments on the manual steering gear:

a. WORM BEARING PRELOAD ADJUSTMENT

b. OVER-CENTER ADJUSTMENT

IMPORTANT: The worm bearing preload adjustment must be checked and corrected if necessary before the over-center adjustment is made. Failure to follow the proper sequence may result in damage to the steering gear.

WORM BEARING PRE-LOAD ADJUSTMENT

1. Disconnect the pitman arm from pitman shaft using Tool J-5504-B or a similar puller.
2. Loosen pitman shaft adjusting screw lock nut and loosen adjusting screw a few turns (Fig. 4-7).
3. With spring scale Tool J-544 at the rim of the steering wheel, measure the pull which is required to keep the wheel in motion at about 30° off straight ahead position. (Fig. 4-5).

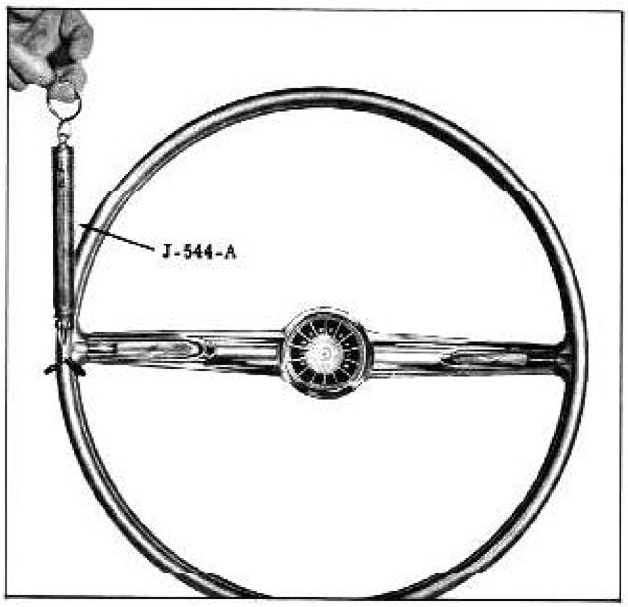


Fig. 4-5 Checking Worm Bearing Preload

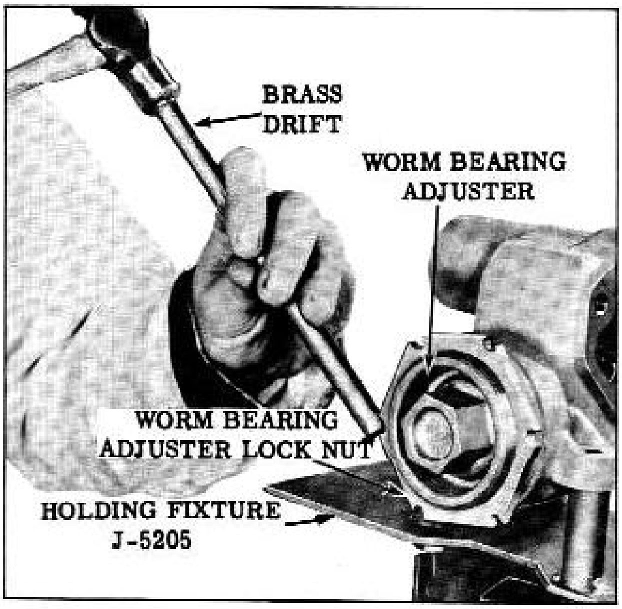


Fig. 4-6 Loosening Lock Nut

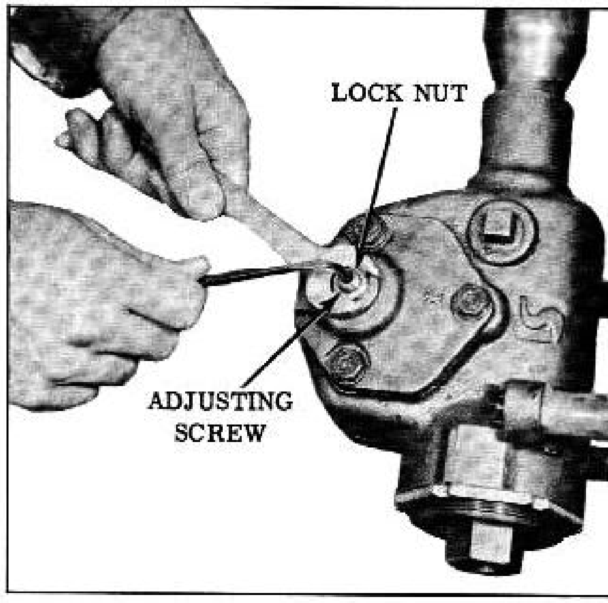


Fig. 4-7 Over-Center Adjustment

4. The pull required should be between 1/2 and 7/8 pounds. If it is not, it will be necessary to loosen the worm bearing adjuster lock nut with a brass drift (Fig. 4-6) and turn the worm bearing adjuster the required amount to bring the spring pull within limits.

5. When adjustment is correct, retighten lock nut and recheck preload.

OVER-CENTER ADJUSTMENT

6. After making the worm bearing adjustment, the pitman shaft adjusting screw should be tightened until a pull of 1-1/2 to 2 pounds at the steering wheel rim is required to turn the wheel through the center range. (Approximately 2-7/8 turns from either end of travel on car or 3-1/8 turns for bench adjustment.) (Fig. 4-7) Tighten the lock nut and recheck the over-center adjustment.

7. After adjustments have been made, assemble pitman arm to pitman shaft with front wheels and steering wheel in the straight ahead position so that splines will align properly. Torque pitman shaft nut (90 to 120 ft. lbs.)

GEAR ASSEMBLY REMOVE AND INSTALL

1. Remove steering wheel assembly, upper bearing spring and seat.

2. Remove mast jacket grommet retainer screws and remove mast jacket cover plate from toe pan.

3. Disconnect horn wire and turn signal wire, and neutral safety switch and back-up lamp wires on cars so equipped, from the switches on the mast jacket and horn wire connector.

4. Remove cap from upper mast jacket bracket and disconnect upper clamp.

5. Disconnect shift linkage and battery cable sleeve from lower end of mast jacket.

6. Loosen lower clamp and remove mast jacket from gear and worm shaft.

7. Remove the pitman shaft nut. Then using Tool J-5504-B or a similar puller, disengage the pitman arm from the pitman shaft.

8. Remove steering gear to frame mounting bolts.

9. Remove gear assembly by pulling it out from under the car.

To install, apply wheel bearing grease to the gear mounting pads to prevent squeaks between the housing and frame, then reverse the removal procedure.

IMPORTANT: Tighten upper mast jacket clamp before tightening steering gear to frame bolts. Torque steering gear to frame bolts 60 to 80 ft. lbs. Torque pitman shaft nut 90 to 120 ft. lbs.

DISASSEMBLY OF GEAR

1. Mount gear on Holding Fixture J-5205.

2. Loosen the pitman shaft adjusting screw lock nut.

3. Rotate worm shaft 3-1/8 turns from end of

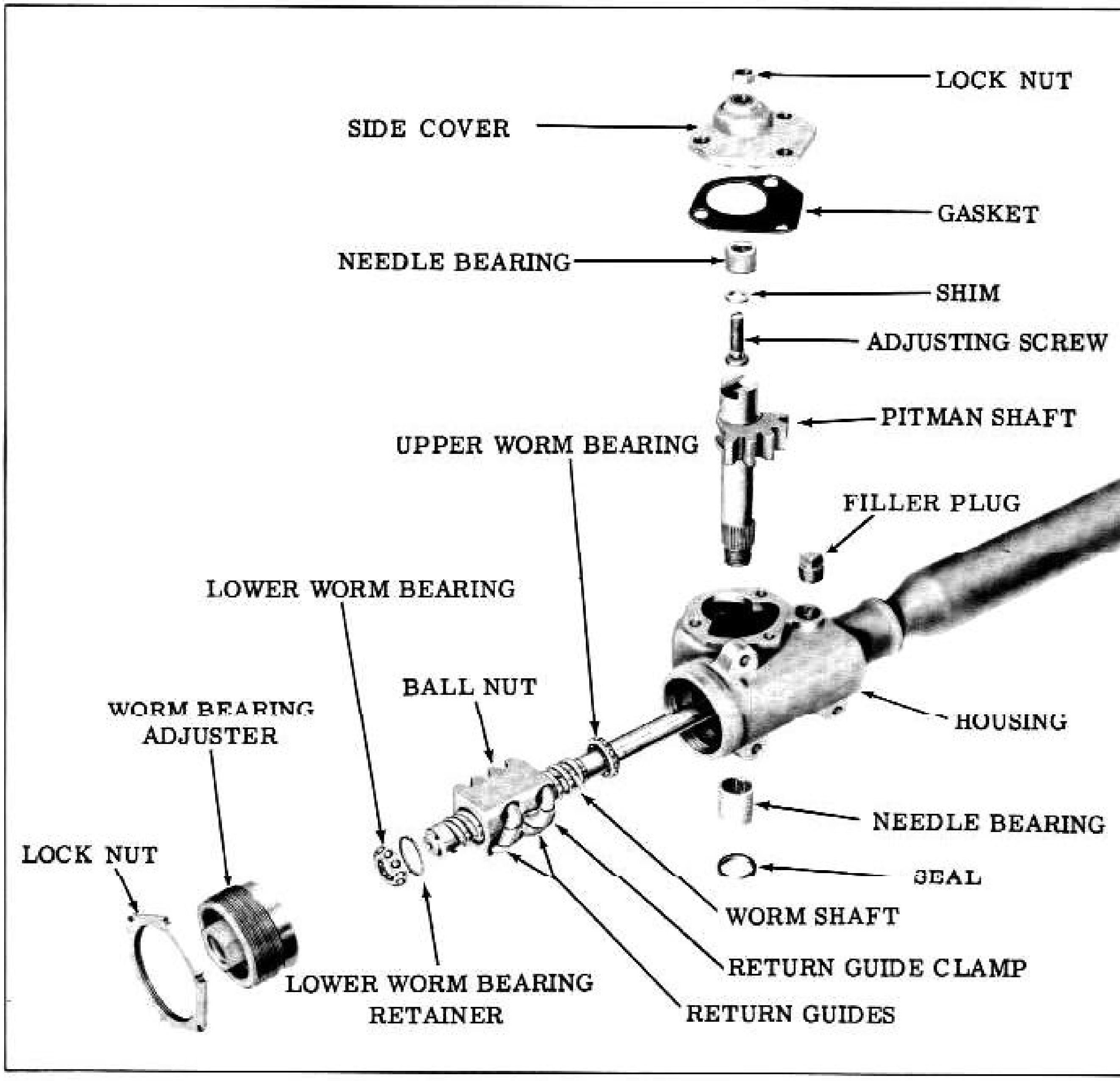


Fig. 4-8 Steering Gear Nomenclature

travel, then remove side cover and pitman shaft from steering gear housing.

4. Loosen worm bearing adjuster lock nut with a brass drift, then remove lock nut and adjuster assembly from gear housing.
5. Remove worm shaft assembly (with ball nut) out through bottom of housing. Slide rubber grommet and upper worm bearing off steering shaft.

SERVICING OF INDIVIDUAL UNITS

PITMAN SHAFT AND SIDE COVER

Disassembly

1. Remove pitman shaft adjusting screw lock nut.
2. Thread, adjusting screw through pitman shaft cover, then remove cover and gasket.
3. If needle bearing is to be replaced, remove bearing from side cover using Tool J-5190 as follows:
   a. Loosen the forcing screw of Tool J-5190 so the expander jaws can be fully retracted.
   b. Place Tool J-5190 through needle bearing in side cover.
   c. Thread a 7/16" x 20 bolt in the adjusting screw hole in the side cover until Tool J-5190 is raised up just enough for the knurled section to clear the bearing.
   d. Turn the forcing screw in to expand jaws and remove the bearing (Fig. 4-9).

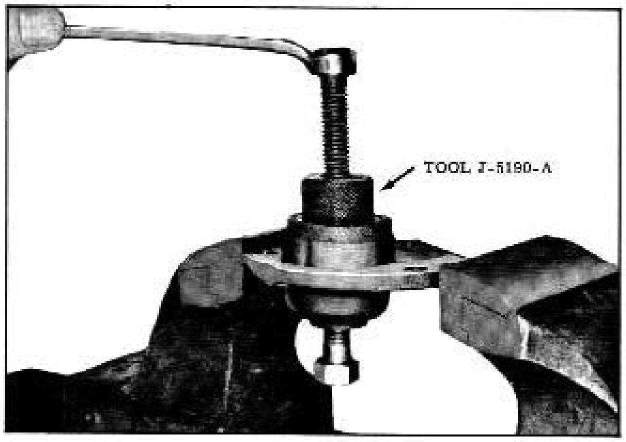


Fig. 4-9 Removing Needle Bearing

4. Wash all parts in clean solvent and dry with compressed air. Inspect parts.

Assembly

1. If needle bearing was removed, position new bearing on side cover with manufacturer's identification facing out, and drive needle bearing flush with surface of casting bore using Tool J-7030-1 and driver handle J-8092. (Fig. 4-10) Pack bearing with SAE 80 Multi-Purpose Gear Lubricant.

2. Check the end clearance of the adjusting screw in the slot of the pitman shaft. (Fig. 4-11) The screw should rotate freely but not have more than .002" clearance. If clearance exceeds .002", select the proper shim to bring the clearance to specification. (Shim thicknesses are .063", .065", .067", and .069")

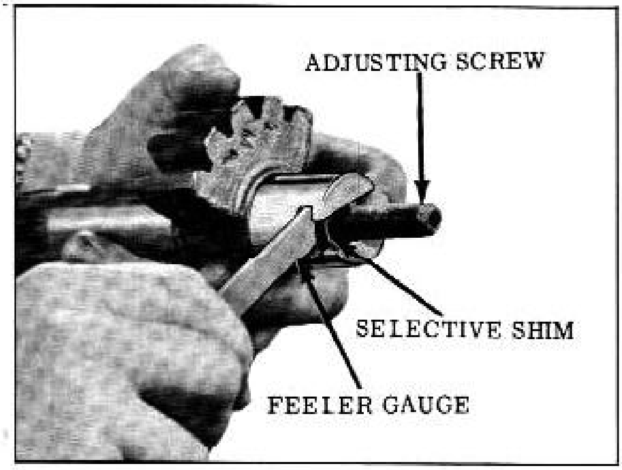


Fig. 4-11 Checking End Clearance

3. Assemble the pitman shaft and adjusting screw (with proper shim) to side cover. Thread the adjusting screw through the side cover until the side cover bottoms on the pitman shaft.

4. Install lock nut but do not tighten.

HOUSING

Disassembly

1. If pitman shaft seal ONLY is to be replaced, use a small chisel to collapse the seal so it can be lifted from the housing (Fig. 4-12)

2. If pitman shaft needle bearing is to be replaced, use Tool J-7030-1 with Driver Handle J-8092 to drive bearing and seal fromhousing. (Fig. 4-13)

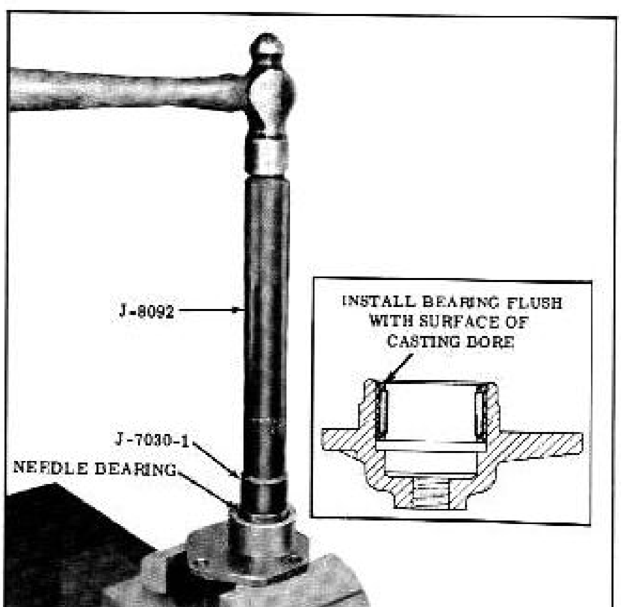


Fig. 4-10 Installing Needle Bearing

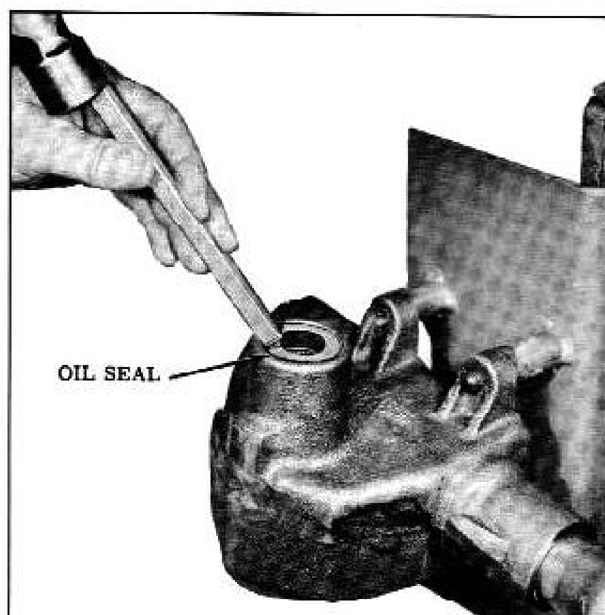


Fig. 4-12 Removing Pitman Shaft Seal

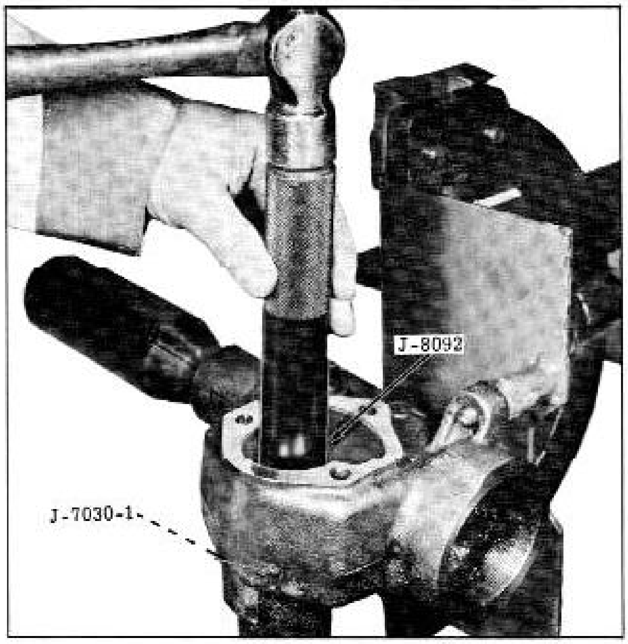


Fig. 4-13 Removing Needle Bearing

3. Wash housing in clean solvent and dry with compressed air.

Assembly

1. If pitman shaft needle bearing was removed, install Ring J-7030-2 over J-7030-1 and place stamped end of new bearing (manufacturer's name) over end of Tool J-7030-1, then drive bearing into housing until Ring J-7030-2 bottoms in bore. (Fig. 4-14) Pack bearing with SAE 80 Multi-Purpose Gear Lubricant.

2. Place a new seal into housing with lip of seal facing inward. Drive seal in the housing until it bottoms against shoulder or counterbore,

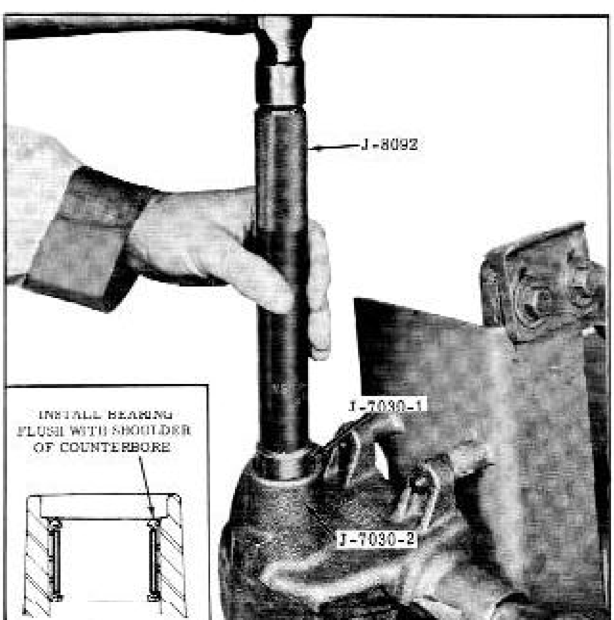


Fig. 4-14 Installing Pitman Shaft Bearing

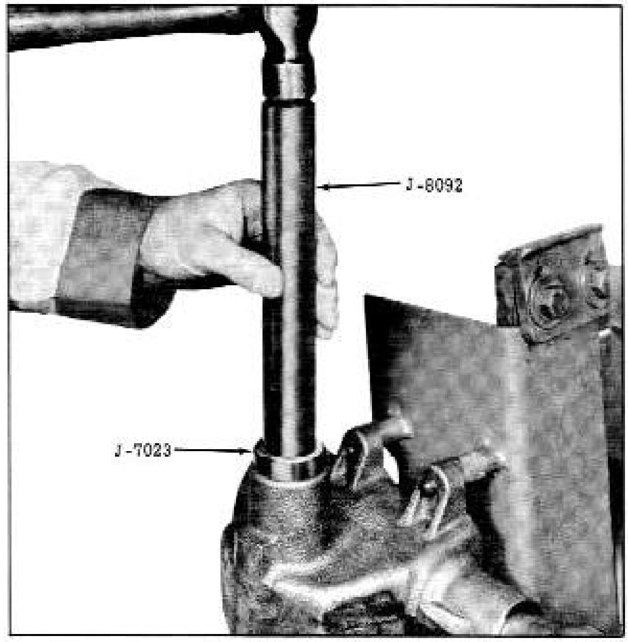


Fig. 4-15 Installing Pitman Shaft Seal

using Tool J-7023. (Fig. 4-15) Coat lip of seal with seal lubricant, Part No. 567196.

WORM BEARING ADJUSTER

Disassemble

1. Pry lower worm bearing retainer from adjuster, then remove lower worm bearing.

2. Wash all parts in clean solvent and dry with compressed air. Inspect parts for wear.

Assemble

1. Pack lower worm bearing with SAE 80 Multi-Purpose Gear Lubricant, then place bearing on race and install retainer.

BALL NUT

Remove

1. Remove ball return guide clamp and guides from ball nut.

2. Rotate worm until all balls have dropped out of the nut, then remove nut from worm.

3. Wash all parts in clean solvent and dry with compressed air. Inspect parts for wear.

Install

1. Slide ball nut over worm. (Fig. 4-16)

2. With ball nut teeth facing downward, install 20 balls into EACH CIRCUIT.

3. Place 5 balls into EACH RETURN GUIDE and

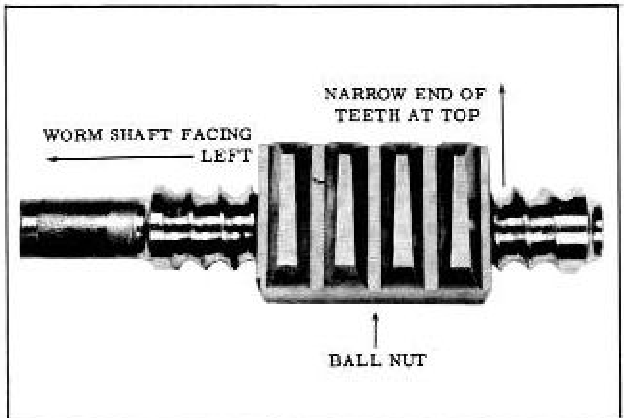


Fig. 4-16 Positioning Ball Nut

retain with SAE 80 Multi-Purpose Gear Lubricant.

4. Install return guides and guide clamp onto ball nut.

ASSEMBLY OF STEERING GEAR

1. Pack the upper worm bearing with SAE 80 Multi-Purpose Gear Lubricant, then slide upper worm bearing over worm shaft and position bearing against worm. Install grommet. Slide worm shaft, bearing and ball nut assembly into gear housing.
2. Install worm bearing adjuster into gear housing. Adjuster should be installed just tight enough to hold worm bearing in place. Final adjustment will be made later.
3. Install pitman shaft and side cover assembly and gasket, with sector and ball nut teeth centered as shown in Fig. 4-17. Torque side cover bolts 20 to 22 ft. lbs.
4. Fill steering gear with SAE 80 Multi-Purpose Gear Lubricant.

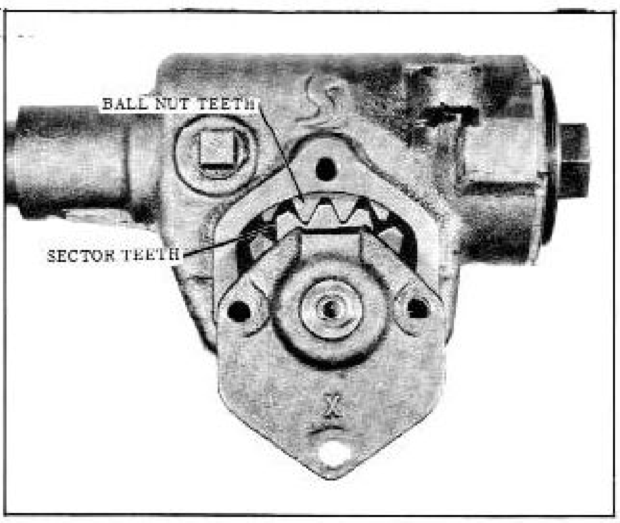


Fig. 4-17 Sector and Ball Nut Centered

5. Steering gear should be bench adjusted before it is assembled in car as follows:
   a. Place steering wheel on shaft.
   b. Turn steering gear from one extreme to the other to make certain there are no unusual binds.

      NOTE: Never allow ball nut to strike the ends of the ball races when reaching its extreme position due to the possibility of damaging ball guides.

   c. Adjust worm bearing preload and overcenter adjustment as outlined under ADJUSTMENTS (ON CAR) following steps 3 thru 6.
6. Remove steering wheel from shaft.
7. Remove gear from Holding Fixture.

POWER STEERING

PUMP

PERIODIC MAINTENANCE

Every 2,000 miles, check and maintain oil level at the oil level mark on the reservoir neck. OIL MUST BE WARM WHEN CHECKING OIL LEVEL. Use Hydra-Matic transmission fluid.

GENERAL DESCRIPTION

The component parts of the power steering pump are encased in the reservoir so that only the pump housing face and hub are exposed. The reservoir has a filler neck and cap which simplifies checking and adding oil.

OPERATION (Fig. 4-18)

Oil is supplied from the reservoir to the pumping chambers (composed of the cam ring, rotor, thrust plate and pressure plate) through passage A. Oil discharged from the pumping chamber is discharged to cavity B. From the cavity B, oil passes through orifice C into the outlet passage and on through the flexible lines to the steering gear. Part of the oil in cavity B passes through openings D in the pressure plate to act on the inner edge of the ten vanes and assist centrifugal force in keeping the vanes out against the cam ring. The thrust plate has four blind cavities directly opposite these four openings in the pressure plate to prevent side thrust on the vanes.

When pump output exceeds the calibration of orifice C, a back pressure builds up behind the flow control valve at E which overcomes spring force and opens the valve to allow oil to return

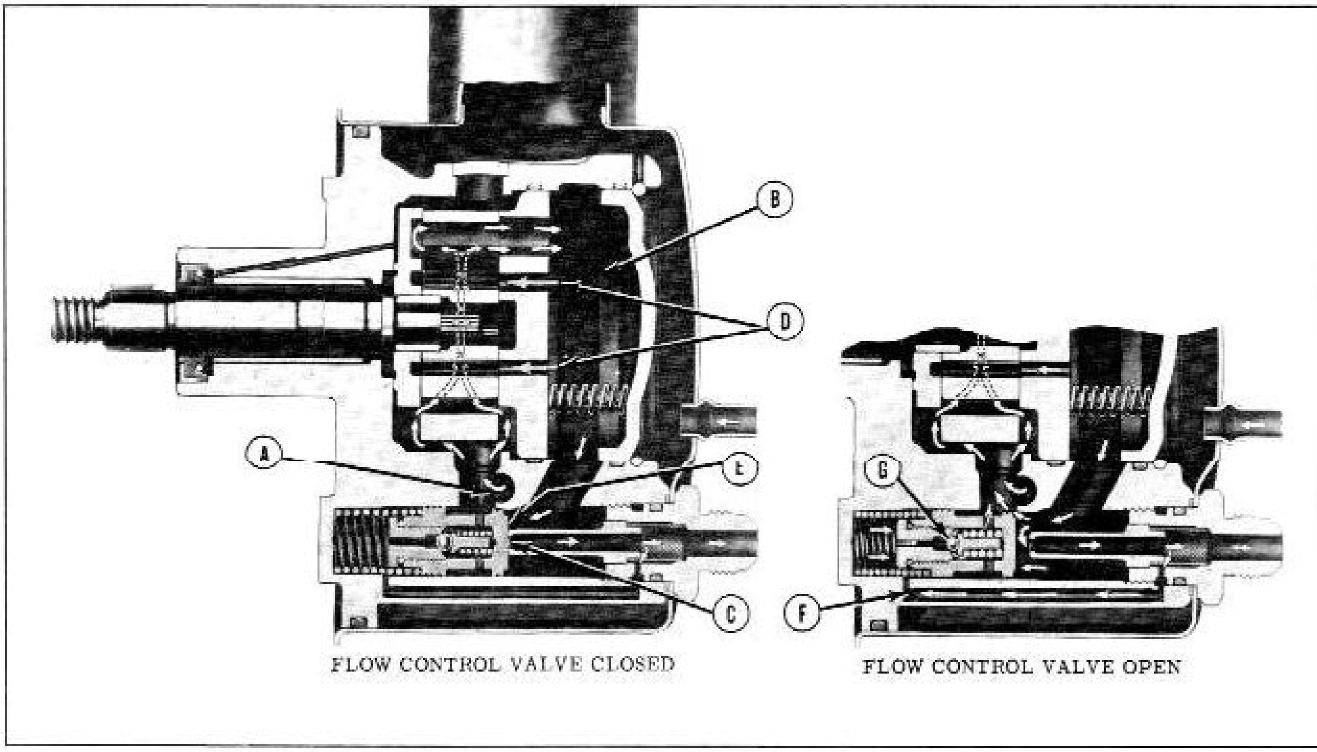


Fig. 4-18 Oil Flow at Low Speed

to the intake side of the pump and to the reservoir. (Inset, Fig. 4-18) Flow control is desirable to reduce power consumption which would otherwise result if the pump were allowed to circulate oil through the steering gear with no regulation when driving at high speed.

When steering conditions demand high pressure for power assist, the pump builds up sufficient pressure on the steering gear rack-piston to turn the pitman shaft. This pressure is also being exerted on the front end of the flow control valve through passage F. When extremely high pressure is built up in the steering gear (such as when holding the steering linkage against its stop) the pressure relief ball G is forced from its seat. Oil flowing past the ball, plus the normal internal leakage at the outer edge of the flow control valve, reduces the pressure on the forward side of the flow control valve. The flow control valve then opens, allowing oil to return to the intake side of the pump and to the reservoir.

When making a partial turn at low speed, the pressure requirements are normally well below maximum pressure, so the pressure relief ball will be closed. Also the pump output is less than system requirements so the flow control valve is closed.

MINOR SERVICE OPERATIONS

PUMP BELT ADJUSTMENT

Checking

The pump belt adjustment can be checked without disturbing the pump. To check, position Gauge 33-70 on pump belt as shown in Fig. 4-19. If the pointers on sleeve of tool do not index with the groove in tool plunger, the belt should be adjusted as follows:

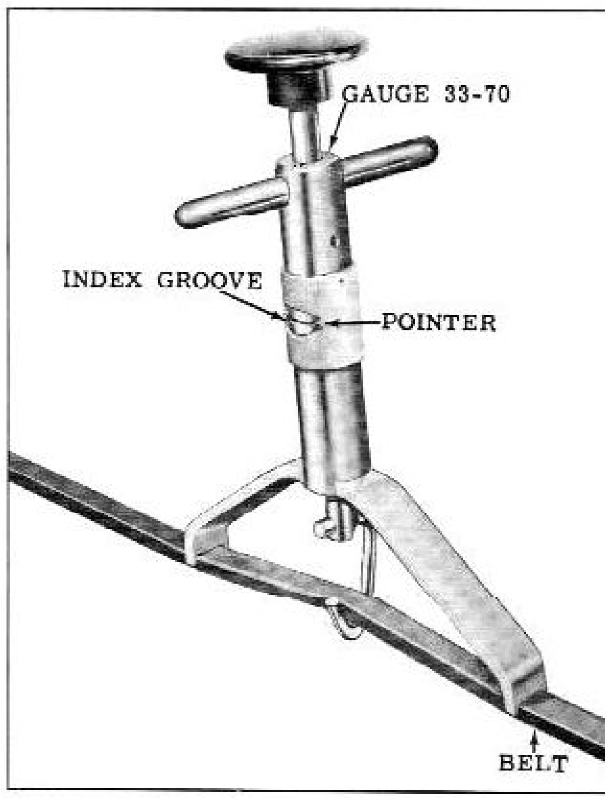


Fig. 4-19 Checking Pump Belt Adjustment

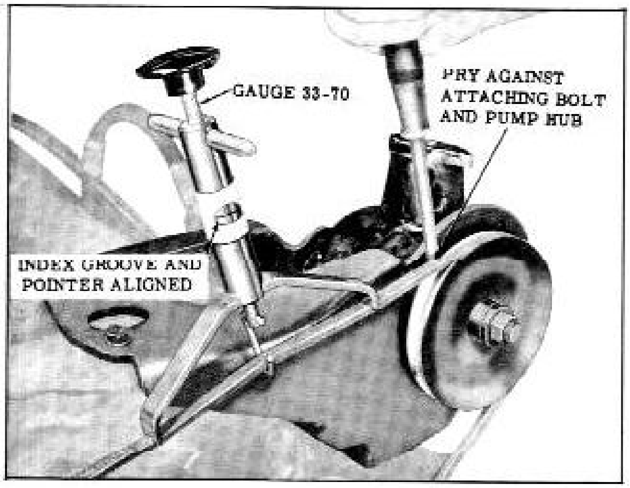


Fig. 4-20 Adjusting Pump Belt

Adjustment

With Gauge 33-70 positioned on pump belt, loosen the pump attaching bolts and adjust the belt tension by moving the pump away from engine until pointers on gauge 33-70 index with groove in gauge plunger. (Fig. 4-20) Tighten attaching bolts 20 to 28 ft. lbs. and recheck adjustment.

SERVICING OF THE FLOW CONTROL VALVE (WTHOUT REMOVING PUMP ASSEMBLY FROM CAR)

1. Disconnect high pressure hose from pump union and drain oil.
2. Remove union and withdraw flow control valve and spring with a magnet.
3. For disassembly and assembly of flow control valve refer to step 13 under PUMP DISASSEMBLY and step 1 under PUMP ASSEMBLY.
4. To install reverse the above procedure and

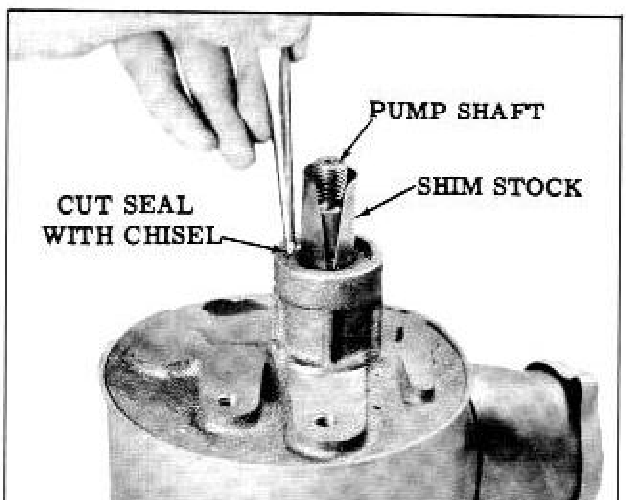


Fig. 4-21 Cutting Seal

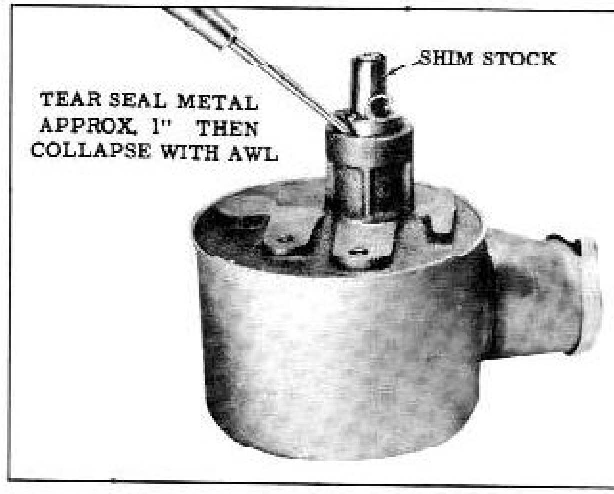


Fig. 4-22 Removing Seal

install a new "O" ring seal on the union.

PUMP SHAFT OIL SEAL REPLACEMENT (WITHOUT DISASSEMBLING PUMP)

The pump shaft oil seal can be replaced without disassembling the pump from the car as follows:

1. With the pump pulley removed, bend a piece of .005" shim stock (approximately 2-1/2" long) into a cylindrical shape, then push the shim stock past seal until it bottoms in pump body. (Fig. 4-21)

   NOTE: The use of Seal Protector Tool J-7132-1 will aid in pushing shim stock into pump body. The use of shim stock around the drive shaft will prevent damage to the machined surfaces of the shaft when removing seal.

2. Cut metal body of seal with a small chisel as shown in Fig. 4-21.
3. Tear metal body approximately 1" with diagonals. Force an awl between the pump body and the O.D. of seal to collapse the seal, then pry seal from pump body. (Fig. 4-22) Remove shim stock.
4. Apply Special Seal Lubricant (Part No. 567196) to the sealing lip of a new seal, then install seal over Seal Protector Tool J-7132-1 with metal side of seal against tool.
5. Slide Tool J-7132-1 (with seal) over drive shaft, then using Tool J-7132-2, drive seal into pump body. (Fig. 4-23)
6. Remove tools.

PUMP REMOVAL AND INSTALLATION (Fig. 4-24)

1. Disconnect the hoses from the pump and se-

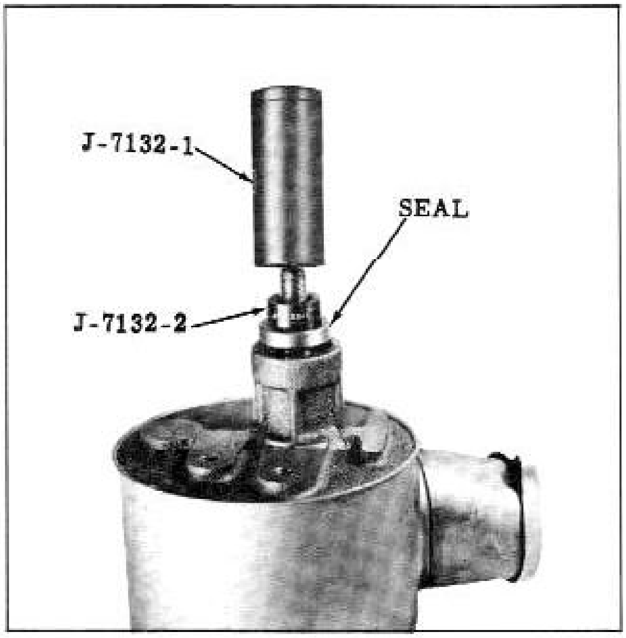


Fig. 4-23 Installing Seal

cure end of hoses above fluid level. Cap pump fittings.

2. Remove the pump pulley attaching nut.

3. Remove the rear bracket by removing the 3 bracket attaching nuts and the bracket to intake manifold bolt.

4. Loosen the pump to front bracket attaching bolts and remove the belt and pulley. DO NOT HAMMER PULLEY OFF SHAFT.

5. Remove the 2 pump to front bracket attaching bolts and remove pump.

To install, reverse the removal procedure. Tighten the rear bracket attaching nuts 20 to 40 ft. lbs., rear bracket to intake manifold bolt and pump to front bracket bolts 20 to 28 ft. lbs. and the pulley attaching nut 35 to 45 ft. lbs. Fill reservoir

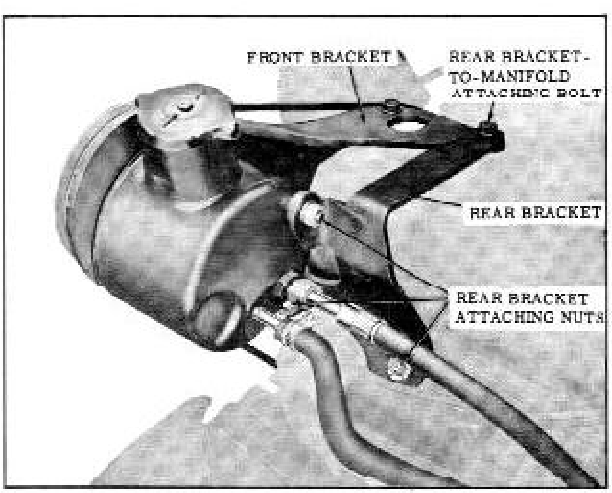


Fig. 4-24 Pump Mounting

with Hydra-Matic fluid, then bleed pump by turning pulley counter-clockwise until air bubbles cease to appear. Refill reservoir to proper fluid level, if necessary. Adjust pump belt as outlined under PUMP BELT ADJUSTMENT.

PUMP DISASSEMBLY (Fig. 4-26)

1. Clean the exterior of the pump and drain the reservoir. Lightly clamp the pump body in a vise so that the rear of the reservoir is facing up.

2. Remove the rear mounting stud and then remove the "O" ring seal. Discard the seal.

3. Remove the union. Remove "O" ring seal from union and discard.

4. Remove the reservoir by rocking it while pulling upward. Remove pump body from vise.

5. Remove the "O" ring, flow control valve assembly and spring from the bore in the pump body.

6. Rotate the end cover retainer ring so that one end of the ring is over the hole in the side of body, then force end of ring from its groove and remove ring. (Fig. 4-25)

7. Remove end cover from pump body. If cover is cocked in pump body, tap plate with a soft hammer to free up.

8. Remove the two pressure plate springs from the dowel pins.

9. Remove the drive shaft key, then place the pump on a bench with the drive shaft up. Tap

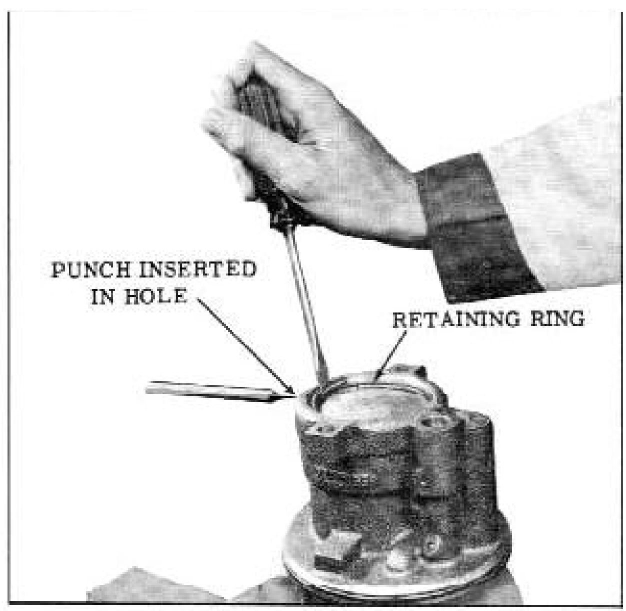


Fig. 4-25 Removing End Cover Retaining Ring

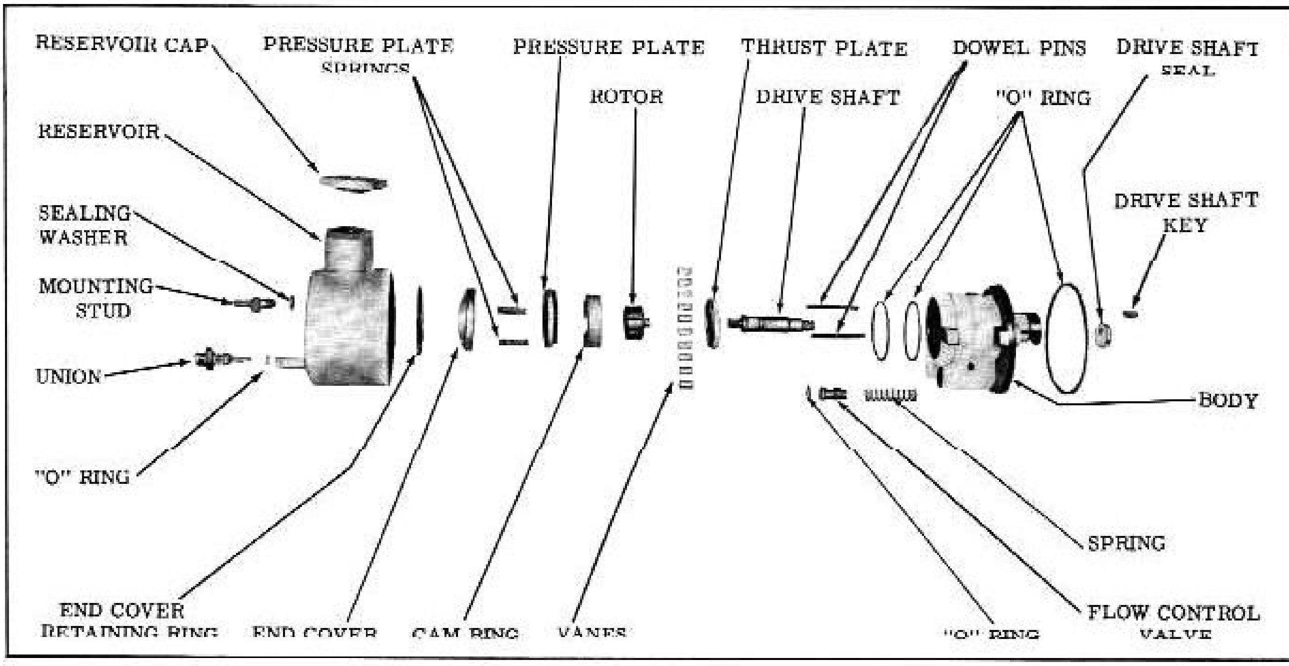


Fig. 4-26 Power Steering Pump

end of shaft with a soft hammer until it is free.

10. Lift the pump body off the shaft, then remove the drive shaft, thrust plate, dowel pins, cam ring, rotor, vanes and pressure plate.

11. Remove 2 inside and 1 outside "O" rings from the pump body.

12. Pry the drive shaft oil seal from the pump body with a screw driver.

13. If necessary to disassemble the flow control valve, proceed as follows:

    a. Clamp the valve in a brass jawed vise.

    b. Remove the hex head plug and shims. (Fig. 4-27) Note the number of shim(s) on the plug so the same number of shim(s) can be reinstalled during assembly.

    c. Remove the pressure relief ball, guide and spring from the flow control valve.

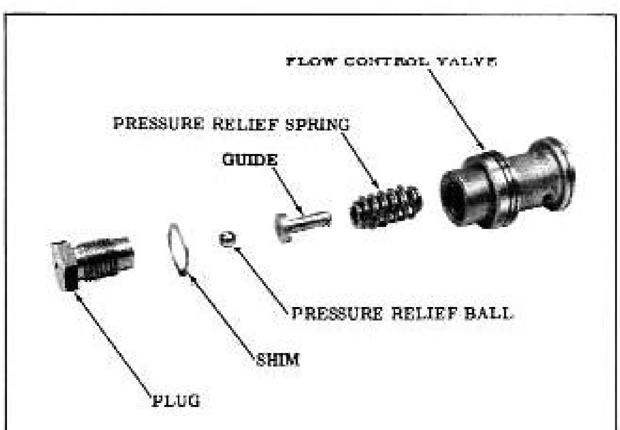


Fig. 4-27 Flow Control Valve

CLEANING AND INSPECTION

1. Wash all parts in clean solvent, blow out all passages with compressed air and air dry.

2. Inspect the drive shaft for wear and see that the seal area of the shaft is smooth and free of nicks.

3. Check the fit of the vanes in the rotor slots. They must slide freely but snugly in the slots. Tightness may be relieved by thorough cleaning or by removal of irregularities with a fine stone. Replace the rotor and/or vanes if excessive looseness exists between the rotor and vanes.

4. Inspect the flat surfaces on the thrust plate and pressure plates for scoring or irregular wear. Light scores can be smoothed by light lapping, after which all lapping compound must be thoroughly removed.

5. Inspect all ground surfaces of the cam ring for roughness or irregular wear. Light scores on the flat surfaces may be smoothed by lapping. Normal wear or scuff marks on the inner surface do not affect pump operation or cause excessive noise; however, if the wear consists of chatter marks or gouges, both the cam ring and vanes should be replaced.

6. Inspect the ground surfaces of the flow control valve and remove any slight irregularities with a fine stone. Install the flow control valve spring on the valve, insert the spring end of the valve in the pump body and check the fit of the valve by pushing it down into its operating position.

7. Check the end cover for nicks on the surface which contacts the "O" ring. Remove small nicks with a fine stone. Replace the cover if it is badly nicked or distorted.

8. Inspect the pump body bushing. If the bushing is scored or badly worn, replace the pump body and bushing as an assembly.

9. Inspect the reservoir for cracks, broken welds, or distortion. If any of these conditions are present, replace the reservoir.

PUMP ASSEMBLY

1. If the flow control valve was disassembled, assemble as shown in Fig. 4-27. Use the same number of shims removed, as altering shim thickness will change relief pressure. Tighten the plug to approximately 4 ft. lbs.

2. Apply Special Seal Lubricant (Part No. 567196) to the sealing lips of a new drive shaft seal and drive the seal into the pump body using Tool J-7132-2. (Fig. 4-28) Remove tool.

3. Place Seal Protector J-7586 over the threaded end of the shaft, then install the shaft in the pump body. (Fig. 4-29) Remove protector.

4. Lightly clamp body in a vise, cavity up.

5. Coat a new pressure plate to pump body "O" ring with petrolatum and install in the lower groove in the pump body.

NOTE: This "O" ring is slightly smaller in diameter than the end cover "O" ring.

6. Coat the end cover to pump body "O" ring with petrolatum and install in the upper "O" ring groove.

7. Install the two dowel pins in the holes at the bottom of the pump body cavity.

8. Install the thrust plate over the dowel pins with the oil ports up.

NOTE: One of the dowel pin holes is slightly elongated in both the thrust plate and cam ring. These holes should be at the same dowel pin to minimize the possibility of pump noise. (Fig. 4-30)

9. Install the cam ring with the small holes over the dowel pins SO THAT THE ARROW ON

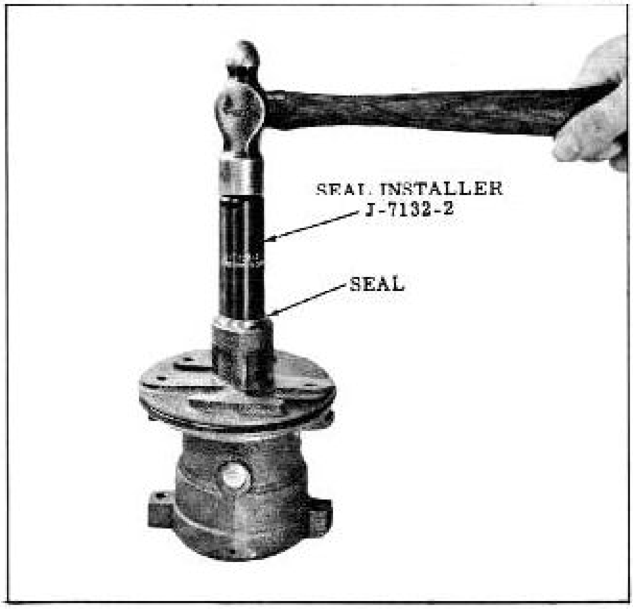


Fig. 4-28 Installing Seal

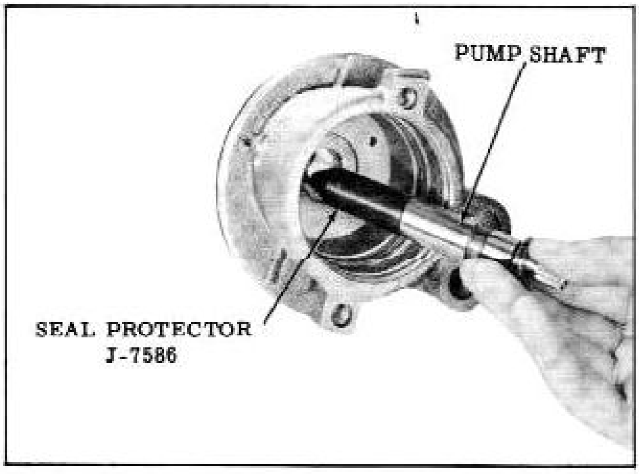


Fig. 4-29 Installing Pump Shaft

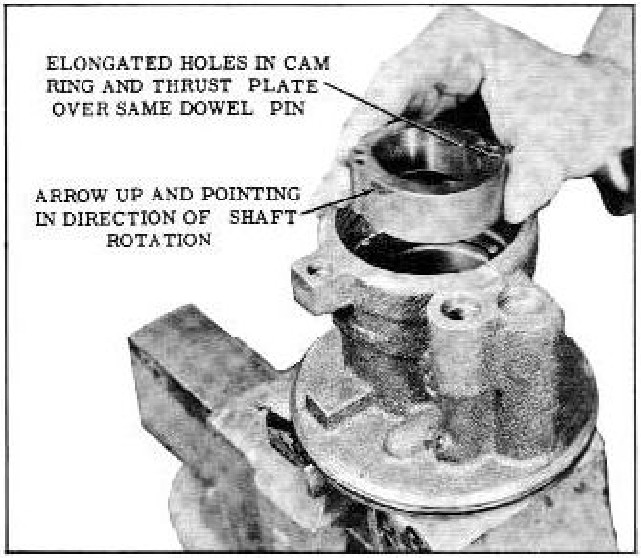


Fig. 4-30 Installing Cam Ring

THE OUTER SURFACE IS NEAR THE TOP OF THE CAM RING. (Fig. 4-30)

10. Install the rotor with the alignment sleeve down.

11. Install the vanes in the rotor slots with the radius edge of vanes outward.

12. Apply petrolatum to the outer circumference of the pressure plate, then, with the oil ports down toward the rotor, install the pressure plate over the dowel pins through the two smallest notches in the pressure plate until the pressure plate seats against the cam ring.

13. Install the two springs over the dowel pins.

14. Install the end cover and retaining ring as follows:

   a. Apply petrolatum to the outer circumference of the end cover and position the cover into the pump body.

   b. Install Differential Side Bearing Puller (J-8107), along with a 1/2" drive socket to press the end cover down beyond the retaining ring groove. (Fig. 4-31)

   c. Install the retaining ring in the pump body and remove the puller and socket.

15. Install flow control valve spring, flow control valve (hex head plug end down), and "O" ring seal into pump body bore.

16. Apply petrolatum to the reservoir to the pump body "O" ring, then install the "O" ring on the pump body.

17. Place the reservoir over the pump body, align the holes, and push the reservoir down over the "O" ring.

18. Install the "O" ring seal on the short end of the mounting stud, then install the stud and tighten 25 to 35 ft. lbs.

19. Install the "O" ring on the union, (groove next to hex head) then install union and tighten 15 to 20 ft. lbs.

20. Install the drive shaft key while supporting the shaft on the opposite side.

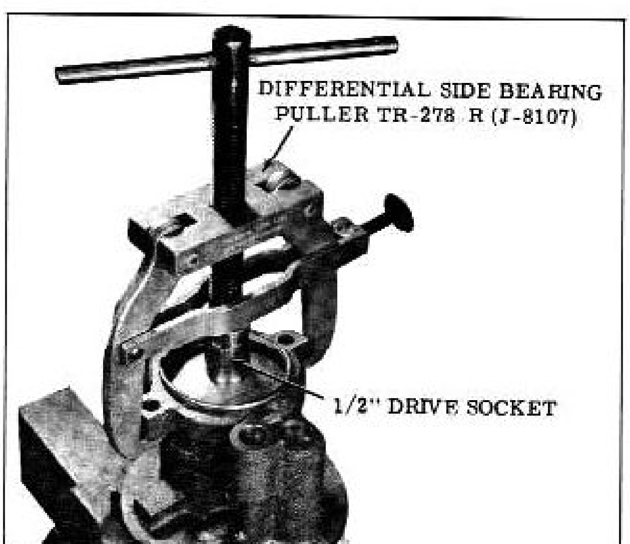


Fig. 4-31 Installing End Cover

POWER STEERING GEAR

GENERAL DESCRIPTION (Fig. 4-32)

The rotary valve type power steering gear is compactly designed with the steering shaft, control valve, worm, rack piston and power cylinder all in line. All oil passages are internal within the gear thereby minimizing the chances of external oil leaks.

The response of the steering gear to turning of the steering wheel is designed so that only a small amount of movement of the steering wheel is required to actuate the control valve for power assist. This fast response gives the driver greater control of the car and reduces the amount of correction needed to control the car, but the driver's feel of the road is still maintained.

The outer race for the recirculating balls in the steering gear is an integral part of the rack-piston rather than being a separate ball nut.

The steering gear satisfies two conditions which are: neutral (for straight ahead driving), and power assist (for turning). When effort is not being applied at the steering wheel, the spool valve and valve body automatically center themselves resulting in a neutral condition with all passages open so only a low neutralizing oil pressure exists.

Power assist is obtained by a delay in the radial movement of the valve body in relation to the radial movement of the spool valve and is accomplished as follows:

Effort applied at the steering wheel is transferred through the steering shaft, flexible coupling to the lower shaft. The spool valve (pinned to the lower shaft) turns with the lower shaft. The upper end of the torsion bar (pinned to the lower shaft) also turns at the same rate as the lower shaft. The lower end of the torsion bar is pinned to the cap which in turn, is connected to the worm by 2 lugs. The worm resists turning due to the resistance of the front wheels, therefore, the valve body which is connected to the cap also remains stationary. With the worm and valve body held stationary and the lower shaft and spool valve turning

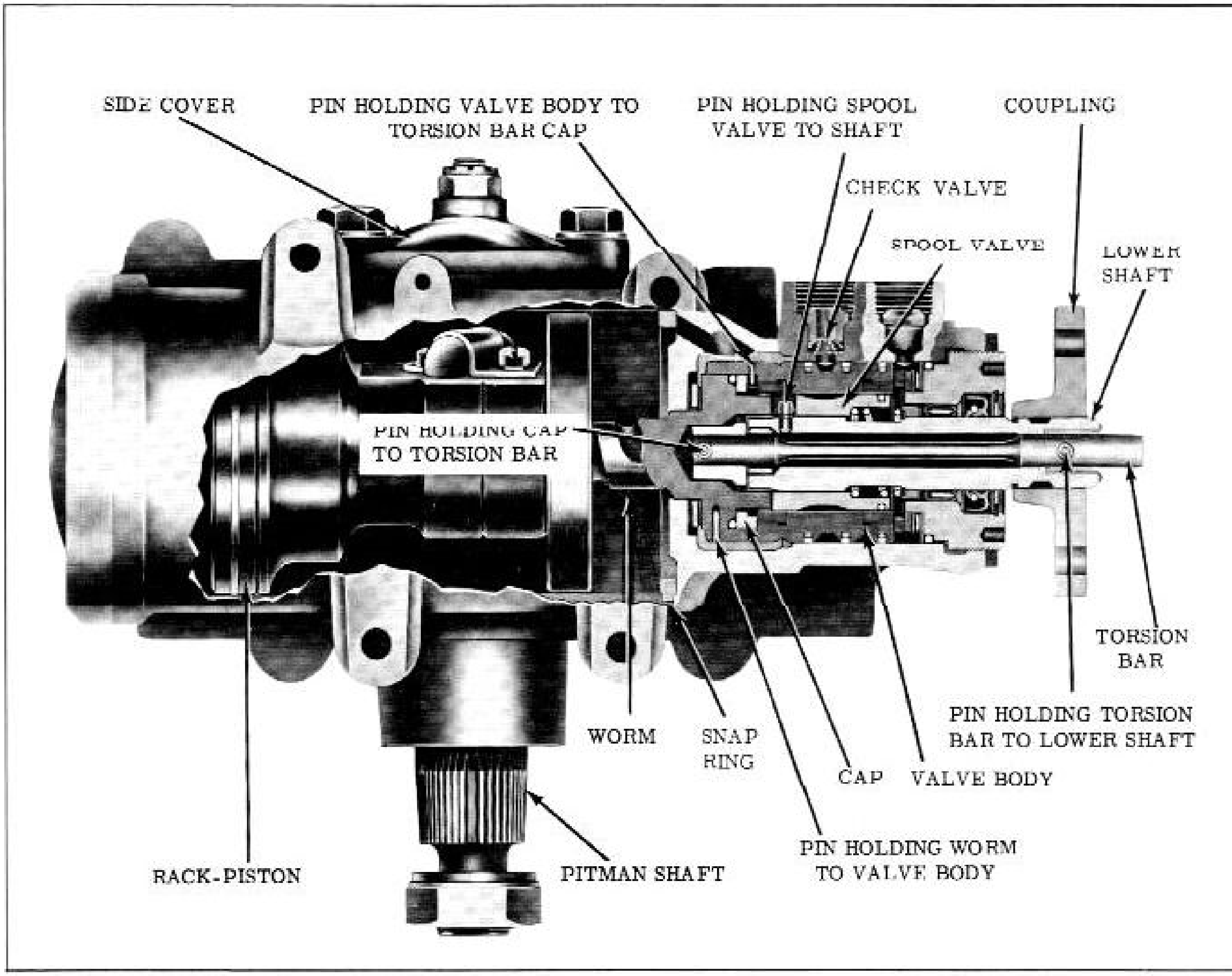


Fig. 4-32 Power Steering Gear

a slight amount, the torsion bar will twist to allow the slots in the spool valve to align with the passages in the valve body to direct oil for power assist.

OPERATION

NEUTRAL (STRAIGHT AHEAD POSITION) (Fig. 4-33)

When turning effort is not being applied at the steering wheel, the slots in the spool valve are positioned so that oil entering the valve body from the housing pressure port passes through the slots in the spool valve to the oil return port in the housing. The chambers at both ends of the rack-piston and around the pitman shaft are always full of oil, which acts as a cushion to absorb road shock so that they are not transferred to the driver. In addition, this oil lubricates all the internal components of the gear.

RIGHT TURN (Fig. 4-34)

When the steering wheel is turned to the right, the worm resists being turned because of the resistance offered by the front wheels. The valve body also resists turning because it is pinned to the worm. Driver force exerted at the steering wheel turns the lower shaft and spool valve a slight amount which twists the torsion bar between the worm and the spool valve. This slight amount of turning of the spool valve is sufficient to position the slots in the valve body and spool valve for power assist.

The right turn slots in the spool valve are closed off from the return (wide) slots in the valve body and opened more to the pressure (narrow) slots in the valve body. The left turn slots in the spool valve are closed off from the pressure slots in the valve body and opened more to the return slots in the valve body.

Pressure immediately begins to build up against the lower end of the rack-piston, forcing it upward to apply turning effort to the pitman shaft. The oil in the chamber at the upper end of the rack-piston is then forced out through the valve body and spool valve through the oil return port to the pump reservoir.

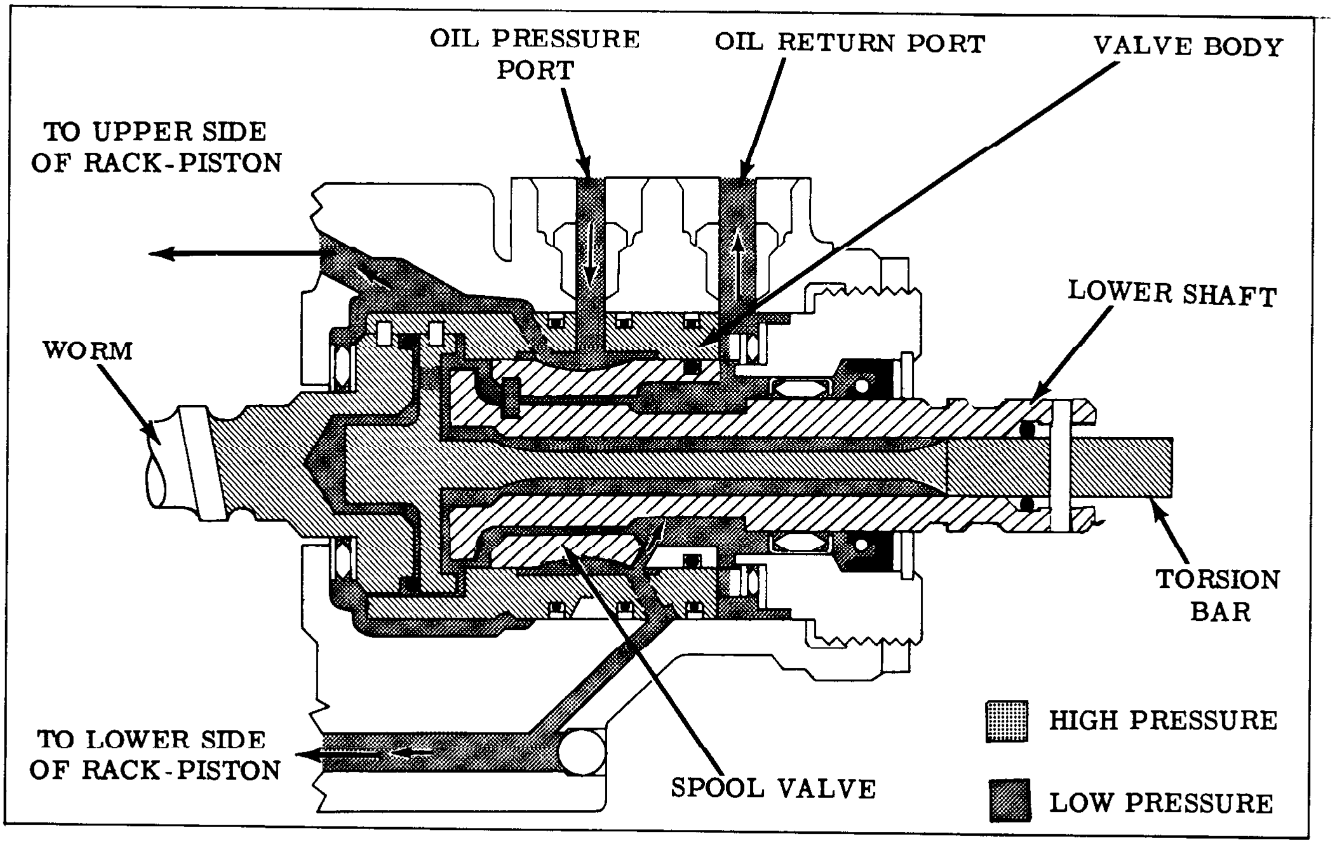


Fig. 4-33 Neutral Position

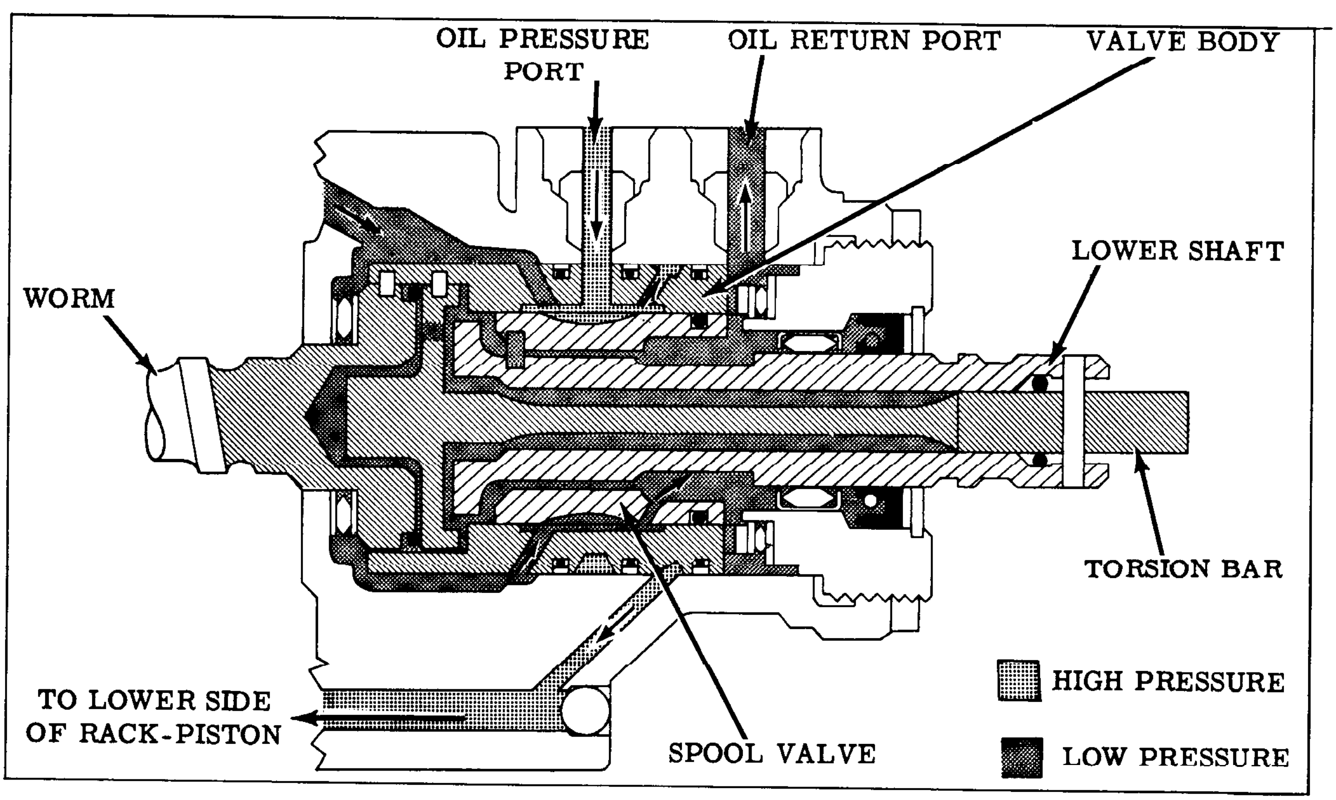


Fig. 4-34 Right Turn Position

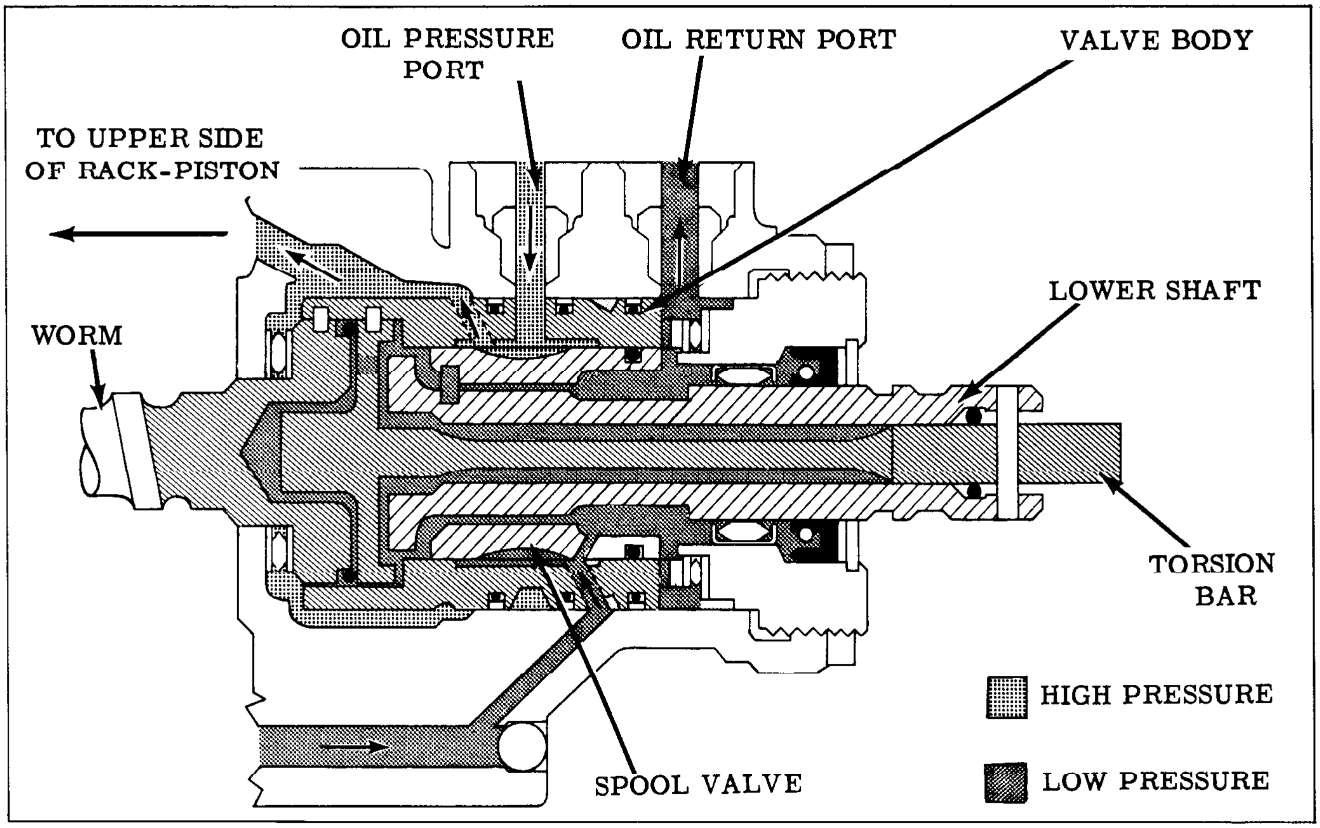


Fig. 4-35 Left Turn Position

The instant the driver stops applying turning effort to the steering wheel, the spool valve is forced back into its neutral position by the torsion bar. Oil pressure on the lower end of the rack-piston then decreases so that pressure is again equal on both sides of the rack-piston, and the front wheels return to the straight ahead position, when the car is moving.

Under normal driving conditions, oil pressure does not exceed 200 p.s.i. except when turning corners where it does not ordinarily exceed 600 p.s.i. Oil pressure when parking ranges from 1,200 to 1,300 p.s.i. depending upon road conditions and weight of the car. The steering effort during normal driving, ranges from 1 to 2 lbs. and during parking from 2 to 3-1/2 lbs. again depending upon road conditions.

A check valve located under the high pressure connector seat (Fig. 4-32) hydraulically dampens the shock transmitted to the steering gear when driving on washboard roads.

LEFT TURN (Fig. 4-35)

When the steering wheel is turned to the left, the relationship between the spool valve slots and valve body slots is again changed through twisting of the torsion bar. Pressure immediately builds up against the upper end of the rack-piston, forcing it downward to apply turning effort to the pitman shaft. The oil in the chamber at the lower end of the rack-piston is forced out through the valve body and spool valve to the pump reservoir.

ADJUSTMENT (ON CAR)

OVER-CENTER ADJUSTMENT

The over-center adjustment is the only power steering gear adjustment which can be made on the car; however, in order to make this adjustment, it is also necessary to check the combined ball and thrust bearing preload.

1. Remove the pitman shaft nut, then disconnect the pitman arm from the pitman shaft using Puller J-5504-B or a similar puller.

2. Loosen the pitman shaft adjusting screw lock nut and thread the adjusting screw out to the limit of its travel through the pitman shaft side cover.

3. Disconnect the horn wire at the relay, then remove the horn button or ornament from the steering wheel.

4. Count the number of turns of the steering wheel through its full travel to locate the steering wheel at its center of travel.

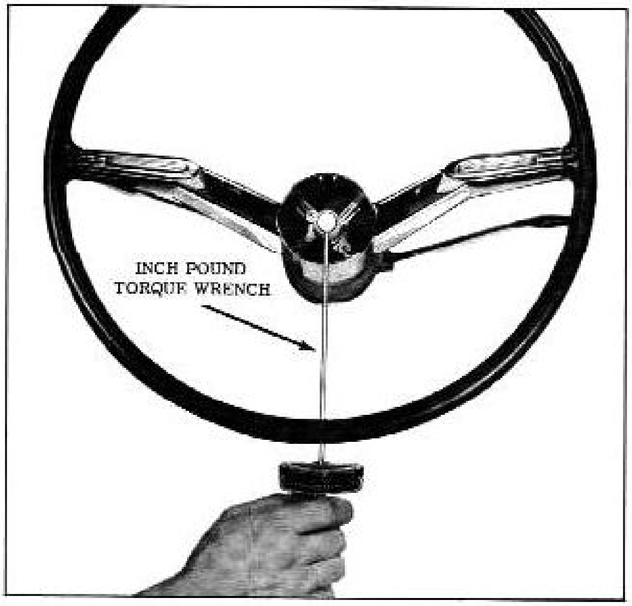


Fig. 4-36 Checking Preload

5. Check the combined ball and thrust bearing preload with an inch-pound torque wrench on the steering shaft nut by rotating through the center of travel. (Fig. 4-36) Note the highest reading.
6. Tighten the pitman shaft adjusting screw until the torque wrench reads 4 to 8 in. lbs. higher than the previous reading on the steering shaft. The total over-center preload should not exceed 16 in. lbs.
7. While holding the pitman shaft adjusting screw, tighten the lock nut and recheck the adjustment.
8. Install the horn button or ornament and connect the horn wire. Connect the pitman arm to the pitman shaft. Torque pitman shaft nut 90 to 120 ft. lbs.

POWER STEERING GEAR REMOVAL AND INSTALLATION

1. Remove the two steering flange attaching nuts and lock washers. Remove ground wire from flange attaching bolt. (Fig. 4-37)
2. Disconnect the hoses from the pump and cap the pump and hose fittings.
3. Hoist the car.
4. Remove the pitman shaft nut, then disconnect the pitman arm from the pitman shaft using Puller J-5504-B or a similar puller.
5. Remove the three bolts attaching the gear to the frame side rail, then remove the gear with the hoses attached.

Before installing the steering gear, apply a sodium soap fine fiber grease to the gear mount-

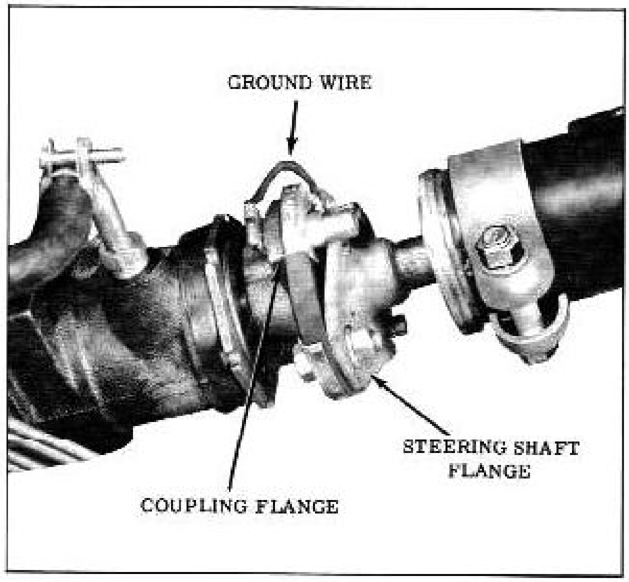


Fig. 4-37 Coupling Assembly

ing pads to prevent squeaks between the gear housing and the frame. Make sure the alignment pin on the gear housing enters the hole provided in the frame side rail. Before tightening the steering gear to frame bolts, shift the steering gear as necessary to place it in the same plane as the steering shaft so that the flexible coupling is not distorted. Tighten the steering gear to frame bolts 60 to 80 ft. lbs. and the pitman shaft nut 90 to 120 ft. lbs.

After the hoses are connected to the pump, add Hydra-Matic oil as necessary to bring the fluid level to the full mark. With the engine running, turn the steering wheel through its full travel two or three times to bleed air from the system. Recheck the oil level and add oil if necessary.

STEERING GEAR DISASSEMBLY

NOTE: In many cases, complete disassembly

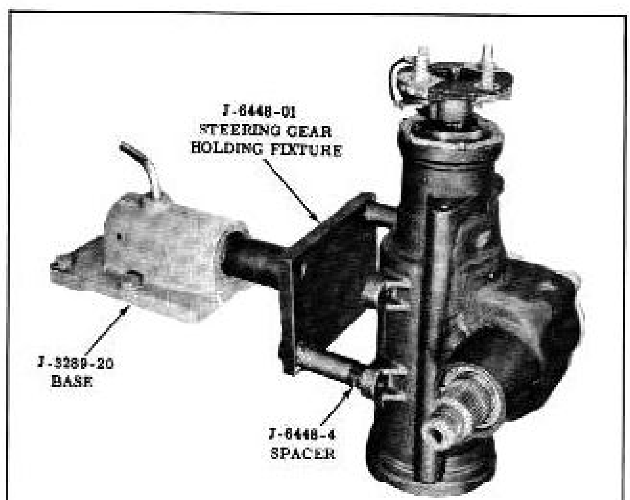


Fig. 4-38 Holding Fixture J-6448-01

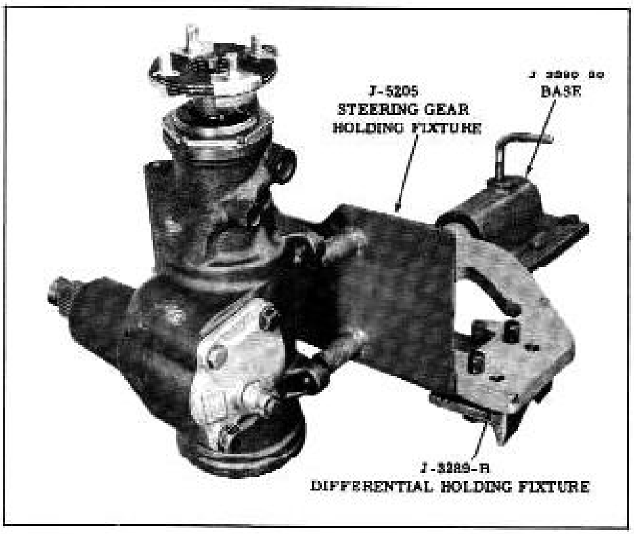


Fig. 4-39 Holding Fixture J-5205

of the gear will not be necessary since most of the component parts can be removed without complete disassembly of the gear. The procedure for such operations are not specifically outlined; however, the following basic procedure and specifications will apply.

To facilitate servicing of the gear, the gear should be mounted in Holding Fixture J 6118 01 (Fig. 4-38) or Holding Fixture J-5205. Holding Fixture J-5205 is designed to be used with Modified Differential Holding Fixture J-3289-B. (Fig. 4-39)

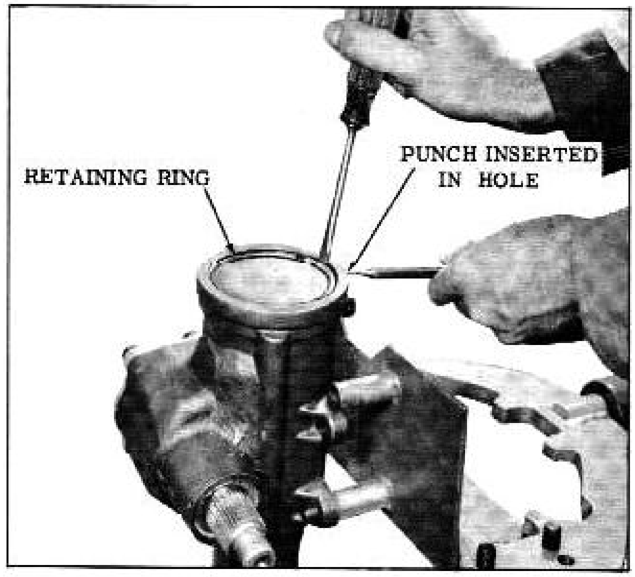


Fig. 4-40 Removing End Cover Ring

1. Rotate end cover retainer ring so that one end of the ring is over hole in side of housing then force end of ring from its groove and remove ring. (Fig. 4-40)
2. Turn coupling flange counterclockwise until rack-piston just forces end cover out of housing otherwise the worm may thread out of the rack-piston and the balls will fall out of their circuit. Remove cover and discard "O" ring.

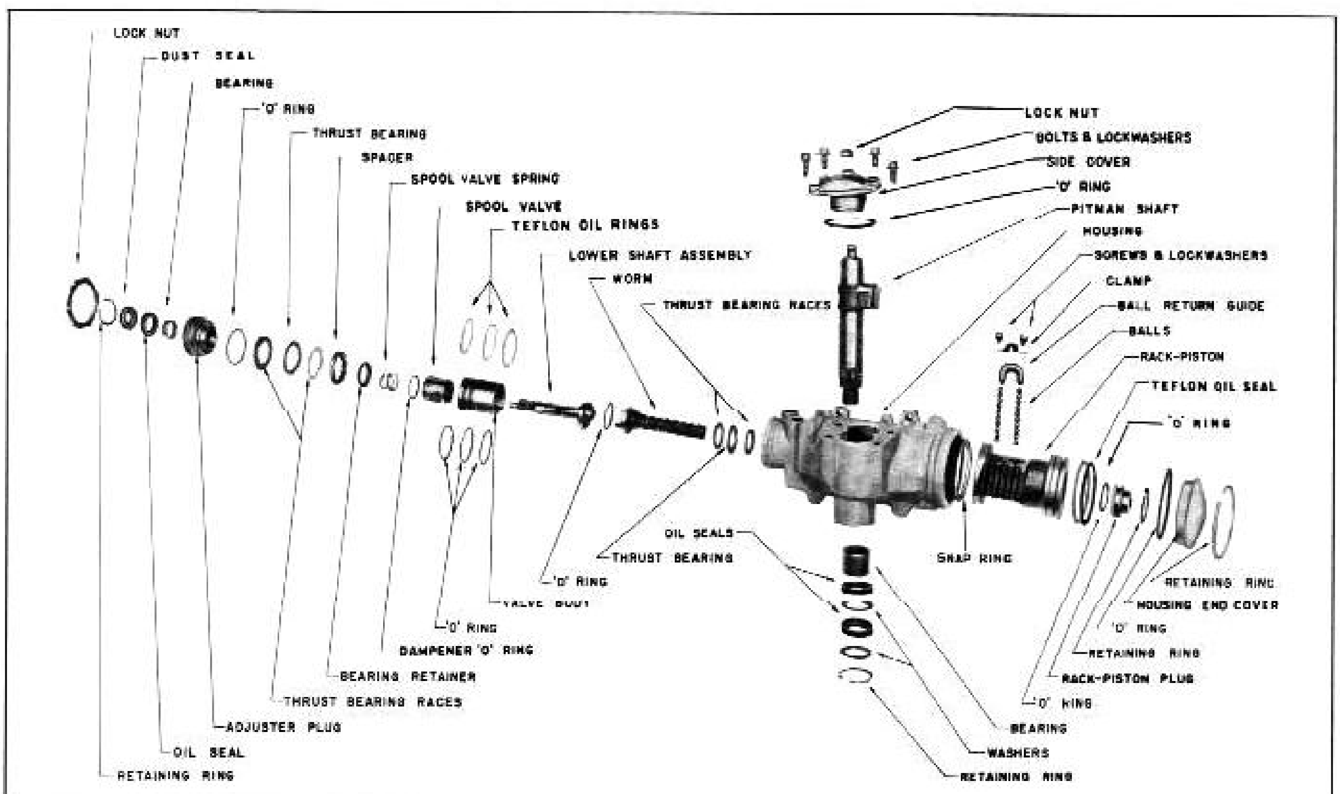


Fig. 4-41 Power Steering Gear

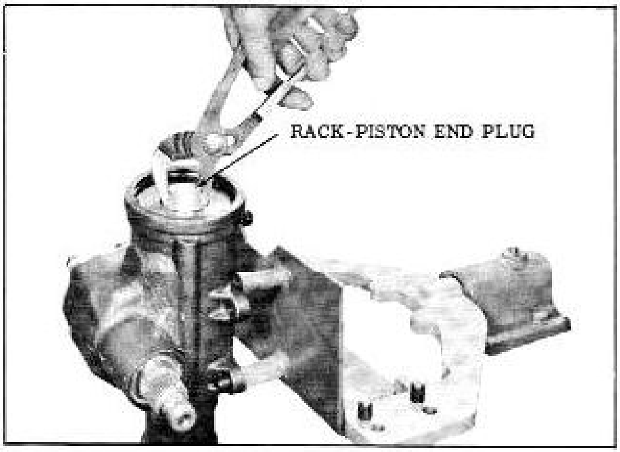


Fig. 4-42 Removing Rack-Piston Plug

3. Remove the rack-piston plug retaining ring using internal pliers, then pull the plug from rack-piston as shown in Fig. 4-42. Remove "O" ring from plug and discard.

4. Remove the pitman shaft and side cover as follows:

   a. Loosen the over-center adjusting screw lock nut and remove the 4 side cover attaching cap screws and 3 lock washers.

   b. Rotate side cover until the rack-piston and pitman shaft teeth are visible, then turn the coupling flange until the pitman shaft teeth are centered in the housing opening. Tap pitman shaft with a soft hammer and remove the pitman shaft and side cover from the housing. Remove the side cover "O" ring and discard.

5. Remove the rack-piston as follows:

   a. Insert Ball Retainer Tool J-7539 into the rack-piston bore with pilot of tool seated in the end of the worm. (Fig. 4-43) Turn coupling flange counterclockwise while holding tool tightly against worm. The rack-piston will be forced onto the tool.

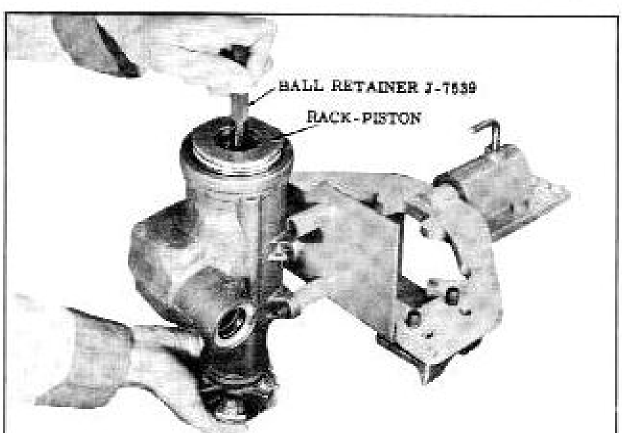


Fig. 4-43 Removing Rack-Piston

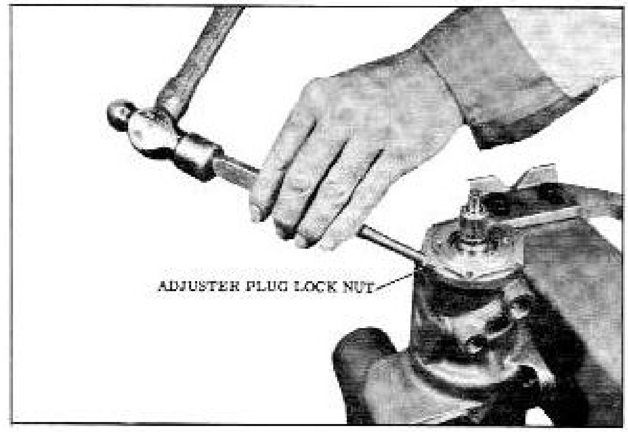


Fig. 4-44 Loosening Lock Nut

   b. Remove the rack-piston with Ball Retainer Tool J-7539 from gear housing.

6. Remove the adjuster plug as follows:

   a. Remove flange attaching bolt and flange.

   b. Loosen the adjuster plug lock nut with punch. (Fig. 4-44)

   c. Remove adjuster plug assembly with Spanner Wrench J-7624. (Fig. 4-45) Remove and discard the plug "O" ring.

7. Grasp the lower shaft and pull the valve and shaft assembly from the housing bore. Separate worm and shaft and remove the lower shaft cap "O" ring and discard.

8. If the worm or lower thrust bearing and race(s) remained in the gear housing, remove at this time.

SERVICING INDIVIDUAL UNITS

ADJUSTER PLUG ASSEMBLY (Fig. 4-46)

Disassembly

1. Remove the thrust bearing retainer by prying

Fig. 4-45 Removing Adjuster Plug

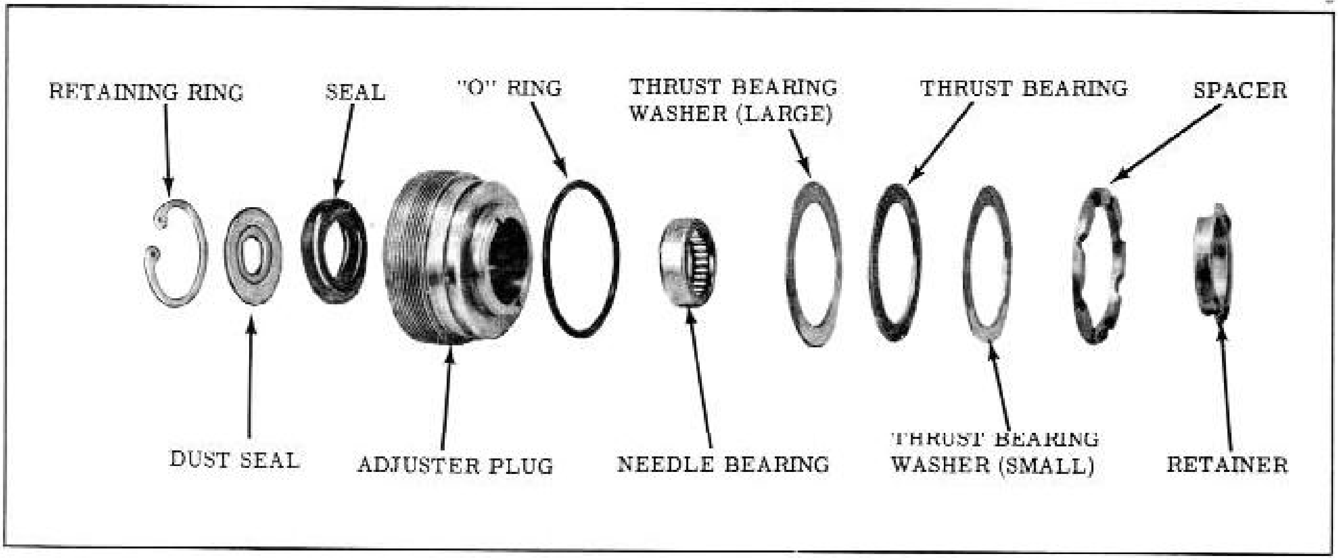


Fig. 4-46 Adjuster Plug Assembly

at the two raised areas with an awl or small screw driver, remove the thrust bearing spacer, thrust bearing and washers.

2. If the seal ONLY is to be replaced and not the bearing, remove the retaining ring with internal pliers, then remove the dust seal. Pry the seal from the bore of the adjuster plug. Discard seal.

3. If the needle bearing is to be replaced, remove the retaining ring using internal pliers, then drive the dust seal, seal and bearing from the adjuster plug with Tool J-5254. (Fig. 4-47) Discard seal and bearing.

CLEANING AND INSPECTION

1. Wash all parts in clean solvent and dry parts with compressed air.

2. Inspect thrust bearing spacer for wear or cracks. Replace if damaged.

3. Inspect thrust bearing rollers and washers for wear, pitting or scores. If any of these conditions exists, replace the bearing and washers.

Assembly

1. If the needle bearing was removed, place new needle bearing over Tool J-5254 with the manufacturer's identification against the tool and drive or press bearing until it is flush with the surface of the seal bore. (Fig. 4-48)

2. If seal was removed, temporarily install the adjuster plug in the gear housing and place dust seal and a new oil seal on Tool J-5254 (lip of seal away from tool). Lubricate seal with Hydra-Matic oil and drive or press seal into adjuster plug just far enough to provide clearance for the retaining ring. (Fig. 4-49) Tool J-5254 must be free of burrs that could scratch the seal.

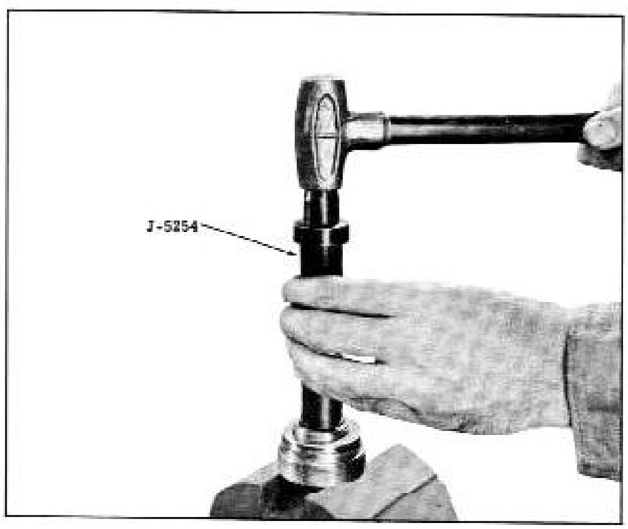


Fig. 4-47 Seal and Bearing Removal

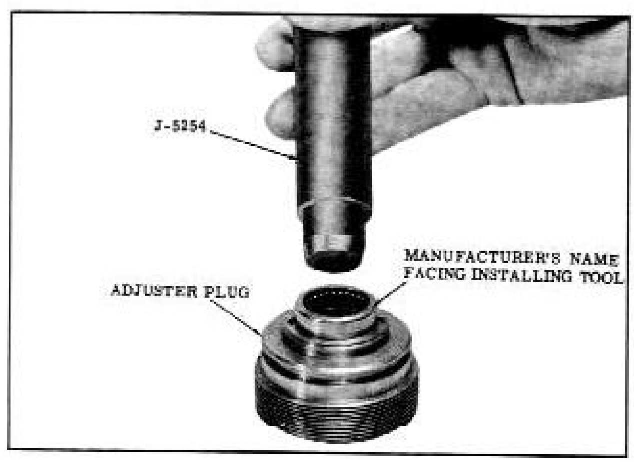


Fig. 4-48 Installing Bearing

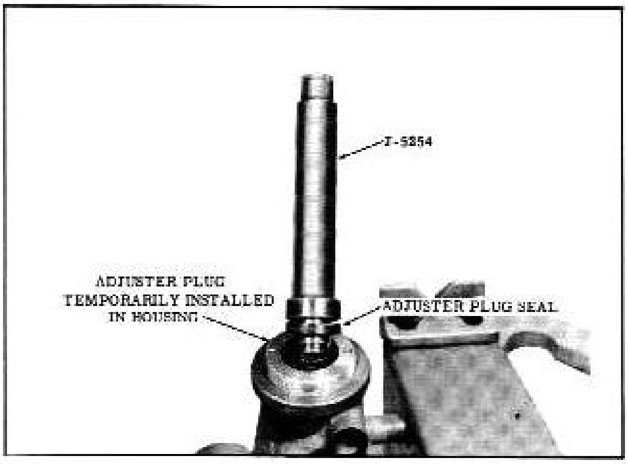


Fig. 4-49 Installing Seal

3. Install retaining ring with internal pliers, then remove the adjuster plug from the housing.
4. Lubricate the thrust bearing assembly with Hydra-Matic oil. Place the large thrust bearing washer on the adjuster plug hub then install the upper thrust bearing, small bearing washer and spacer (grooves of spacer away from bearing washer).
5. Install a new bearing retainer on the adjuster plug by carefully tapping on the flat surface of the retainer. (Fig. 4-50)

   NOTE: The projections must not extend beyond the spacer when the retainer is seated. The spacer must be free to rotate.

VALVE AND LOWER SHAFT ASSEMBLY (Fig. 4-51)

Disassembly

1. Remove the spool valve spring by carefully prying top coil out of groove in the lower shaft, then slide the spring from the shaft.

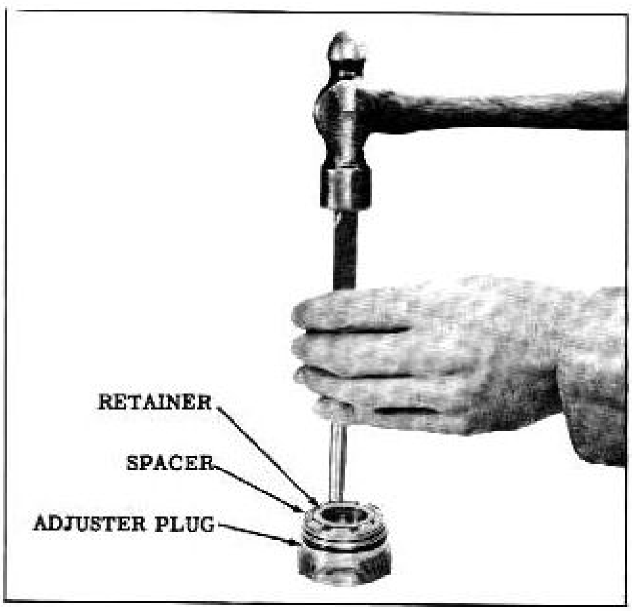


Fig. 4-50 Installing Bearing Retainer

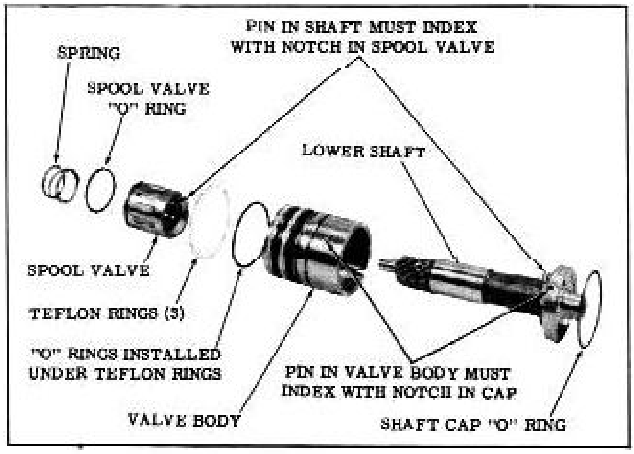


Fig. 4-51 Valve and Lower Shaft Assembly

2. To remove the lower shaft assembly from the valve body, proceed as follows:
   a. While holding the assembly (lower shaft down), lightly tap the lower shaft against the bench until the shaft cap is free from the valve body. (Fig. 4-52) The spool valve should be held in the valve body while tapping the shaft.
   b. Carefully remove the lower shaft assembly so as not to cock the spool valve in the valve body.
3. Push the spool valve out of the flush end of the valve body until the dampener "O" ring is exposed, then carefully pull the spool from the valve body while rotating the valve. (Fig. 4-53) If the spool valve becomes cocked, reverse the withdrawal procedure, then again attempt to remove the valve.

   IMPORTANT: Do not attempt to force the

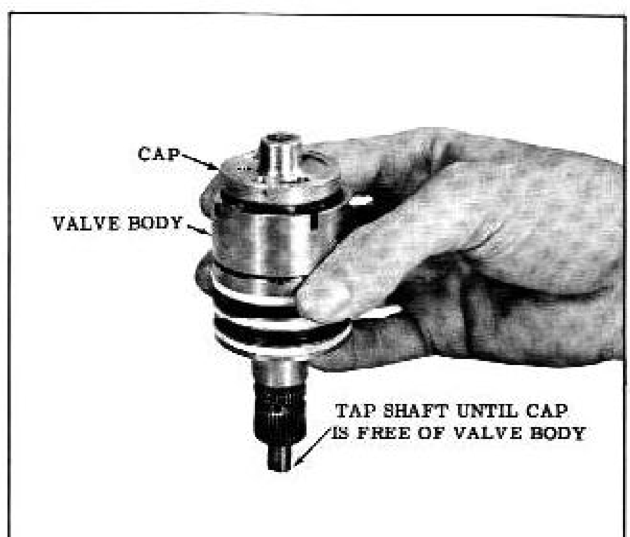


Fig. 4-52 Freeing Shaft Cap

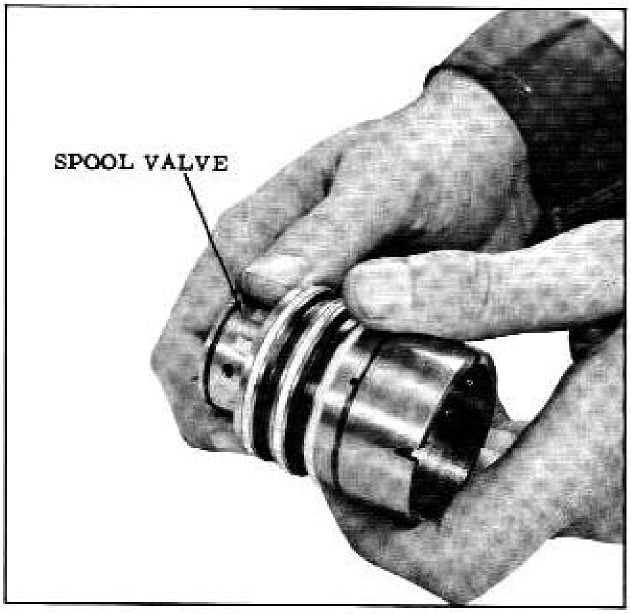


Fig. 4-53 Removing Spool Valve

spool valve in or out of the valve body. If the spool is cocked in the valve body, straighten the spool by tapping with a plastic or rawhide mallet, then push the spool back into the body and repeat the removal procedure.

4. Remove the dampener "O" ring from the spool valve and discard.

5. If the teflon oil rings are to be replaced, cut the 3 teflon oil rings and "O" rings from the valve body and discard.

Cleaning and Inspection

1. Wash all parts in clean solvent and blow out all oil holes with compressed air.

2. If the drive pin in the lower shaft or valve body is cracked, excessively worn or broken, replace the complete valve and shaft assembly.

3. If there is evidence of leakage between the torsion bar and the lower shaft, or scores, nicks, or burrs on the ground surface of the lower shaft that cannot be cleaned up with crocus cloth, the entire valve and shaft assembly must be replaced.

4. Check the O.D. of the spool valve and the I.D. of the valve body for nicks, burrs, or bad wear spots. If the irregularities cannot be cleaned up by the use of crocus cloth, the complete valve and shaft assembly will have to be replaced.

5. If the small notch in the skirt of the valve body is excessively worn, the complete valve and shaft assembly will have to be replaced.

6. Lubricate the spool valve with Hydra-Matic fluid and check the fit of the spool valve in the valve body (with the spool valve dampener "O" ring removed). If the valve does not rotate freely without binding, the complete valve and shaft assembly will have to be replaced.

7. Check the overall length of the spool valve spring. The spring should be approximately 3/4". If it is less than 11/16", replace the spring.

ASSEMBLY (Fig. 4-54)

1. Install the 3 valve body "O" rings in the oil ring grooves and lubricate with Hydra-Matic oil.

2. Lubricate the 3 teflon oil rings with petrolatum and install in grooves over "O" rings.

   NOTE: The oil rings may appear to be distorted, but the heat of the oil during operation of the gear will straighten them out.

3. Assemble the lower shaft assembly in the valve body so the notch in the lower shaft cap engages with the pin in the valve body. (Fig. 4-54) If necessary, tap the shaft cap with a plastic hammer until cap is seated in the valve body.

4. Install the spool valve as follows:

   a. Lubricate the spool valve dampener "O" ring with petrolatum and install over spool valve.

   b. Lubricate the spool valve with Hydra-Matic oil and slide the valve over the lower shaft (notch in spool towards the valve body). Rotate the spool valve while pushing the valve into the valve body until the notch in the spool engages the pin in the lower shaft.

   c. Carefully crowd the dampener "O" ring

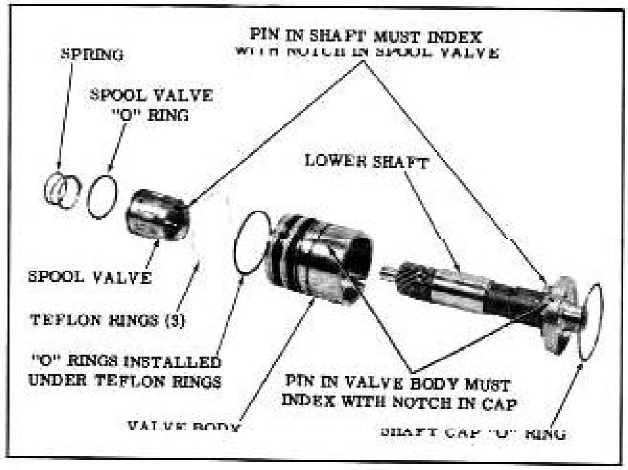


Fig. 4-54 Valve and Lower Shaft Assembly

into its groove until the spool valve can be pushed all the way in the valve body. The spool valve is properly seated when it is flush with the top of valve body.

NOTE: Exercise extreme caution during this operation so the "O" ring will not be cut.

5. Slide the valve spring over the lower shaft and down into the spool valve until the top coil of the spring is in the shaft groove.

PITMAN SHAFT AND SIDE COVER (Fig. 4-55)

Disassembly

Remove the lock nut and side cover from the adjusting screw. Do not attempt to disassemble pitman shaft. Discard lock nut.

NOTE: The power steering gear is equipped with a self-adjusting type of pitman shaft which automatically keeps the over-center adjustment within specifications for a limited mileage (up to approximately 10,000 miles), regardless of the wear of the rack-piston and related parts. This is accomplished by the use of a wear washer and a heavy spring in the pitman shaft assembly. The wear washer is calibrated to wear at the same rate as the other components of the gear.

In cases where gear chucking or "clunk" cannot be corrected by performing the over-center adjustment (See POWER STEERING GEAR ADJUSTMENT-ON CAR), the trouble may be due to excessive wear in the pitman shaft or a broken spring in the pitman shaft.

To check the pitman shaft for excessive wear or a broken spring:

1. With the side cover removed from the pitman shaft, clamp the shaft in a vise and thread two 7/16" S.A.E. nuts on the adjusting screw. Tighten nuts so they are locked on the shaft.

2. Using a 5/8" socket and an inch-pound torque wrench, measure the torque required to turn the adjusting screw. (Fig. 4-56) Torque reading should be 1 to 15 inch lbs.

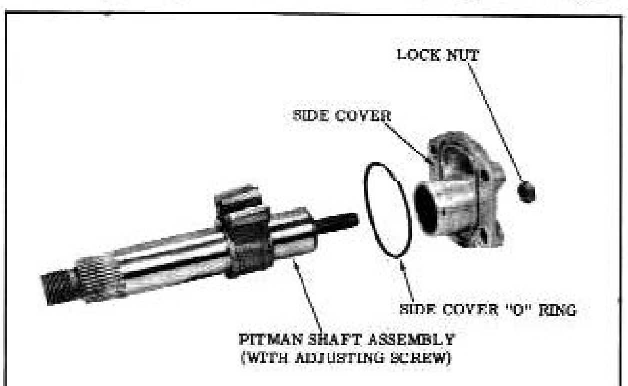


Fig. 4-55 Pitman Shaft and Side Cover

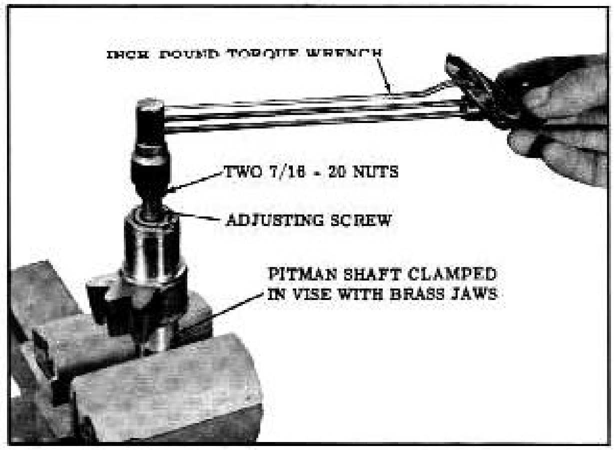


Fig. 4-56 Checking Adjusting Screw Torque

3. If the reading is not within this range, the complete pitman shaft assembly must be replaced. DO NOT ATTEMPT TO CORRECT READING BY DISASSEMBLING THE PITMAN SHAFT.

4. Remove the torque wrench and the two 7/16" nuts from the adjusting screw.

Cleaning and Inspection

1. Wash all parts in clean solvent and dry parts with compressed air.

2. Check pitman shaft bearing surface in the side cover for scoring. If badly worn or scored, replace the side cover.

3. Check the sealing and bearing surfaces of the pitman shaft for roughness, nicks, etc. If minor irregularities in surface cannot be cleaned by use of crocus cloth, replace the pitman shaft.

4. Replace pitman shaft assembly if teeth are damaged or if the bearing surfaces are pitted or scored.

Assembly

Thread the side cover onto the pitman shaft adjusting screw until it bottoms. Install, but do not tighten, a new adjusting screw lock nut.

RACK-PISTON

Disassembly

1. Check the ball preload as follows:

   a. Lightly clamp the rack-piston assembly in a brass jawed vise with Tool J-7539 still in place.

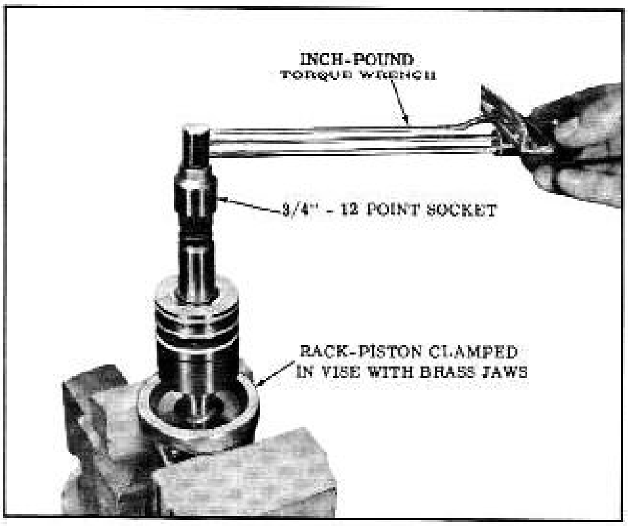


Fig. 4-57 Checking Preload

b. Thread worm into rack-piston while holding Tool J-7539 tightly against worm so the balls will not fall out of the rack-piston. When the worm is in place, remove Tool J-7539.

c. Clamp rack-piston (flanged end of worm up) in vise, then install the valve and lower shaft assembly so that the small notch in the valve body engages the drive pin in the worm. Locate the over-center position of the worm by slowly turning the worm and noting the area where the turning effort is highest. DO NOT THREAD THE WORM OUT TOO FAR SINCE THIS MAY CAUSE SOME OF THE BALLS TO DROP OUT OF THE RACK-PISTON.

d. Using a torque wrench and a 3/4" 12 point socket, check the preload while rotating the torque wrench in a 120° arc. The reading should be 1/16 to 5 in. lbs. (Fig. 4-57)

e. If the preload is not within limits, a new set of balls must be installed upon re-assembly. Note the ball size stamped on the rack-piston and install the next size larger balls to increase the preload or the next size smaller balls to decrease the preload, black balls need not be replaced unless they are defective. A change of one ball size will change the preload approximately 1 in. lb.

NOTE: If a number is not apparent, the ball size is number 7.

f. Remove the torque wrench and valve and shaft assembly.

2. Thread the worm out of the rack-piston, remove ball return guide clamp, guide valves and balls.

3. If necessary to replace the teflon oil seal and "O" ring remove at this time.

Cleaning and Inspection

1. Wash all parts in clean solvent and dry with compressed air.

2. Inspect the worm and rack-piston grooves and all the balls for scoring. If either the worm or rack-piston needs replacing, both must be replaced as a matched assembly.

3. Inspect ball return guide halves, making sure that the ends where the balls enter and leave the guides are not damaged.

4. Inspect lower thrust bearing and washers for scores or excessive wear. If any of these conditions are found, replace the thrust bearing and washers.

5. Inspect rack-piston teeth for scores or excessive wear. Inspect the external ground surfaces for wear, scoring or burrs.

6. Inspect the rack-piston stop ring (inside of housing) and replace if damaged.

Assembly

1. If the teflon oil seal and "O" ring were removed, install a new "O" ring and seal, lubricated with Hydra-Matic oil, in the groove of the rack-piston.

2. Slide the worm all the way into the rack-piston. It is not necessary to have the thrust bearing assembly on the worm at this time.

3. Turn the worm until the worm groove is aligned with the lower ball return guide hole. (Fig. 4-58)

4. Lubricate the balls with Hydra-Matic oil, then feed 16 balls into the rack-piston while slowly rotating the worm counterclockwise.

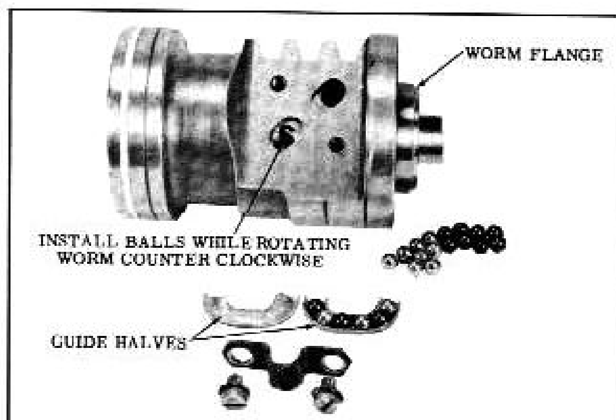


Fig. 4-58 Installing Balls

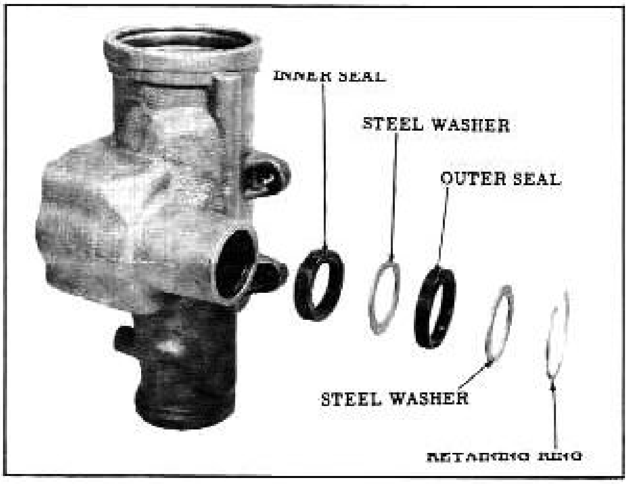


Fig. 4-59 Pitman Shaft Seals

IMPORTANT: The black balls are .0005" smaller than the silver balls. The black and silver balls must be installed alternately into the rack-piston and return guide.

5. Alternately install 6 balls into the return guide and retain with petrolatum. Install the return guide assembly onto the rack-piston. Install the return guide clamp and tighten the 2 clamp screws 8 to 12 ft. lbs.

6. Check the ball preload if it was necessary to install a new set of balls to correct the preload. Refer to RACK-PISTON - DISASSEMBLY (Step 1).

7. Insert Bearing Retainer Tool J-7539 into the rack-piston, then while holding tool tightly against end of worm, thread worm out of the rack-piston.

PITMAN SHAFT NEEDLE BEARING AND SEALS (Fig. 4-59)

Remove

1. If pitman shaft seals ONLY are to be replaced, remove the seal retaining ring and outer steel washer, then pry out the outer seal. Remove the inner steel washer, then drive out the inner seal.

2. If pitman shaft needle bearing replacement is necessary, remove the seal retaining ring, outer steel washer, then drive needle bearing, seals and inner washer out with Tool J-6278-1. (Fig. 4-60)

Install

1. If the pitman shaft needle bearing was removed, place Adaptor J-6278-2 over Tool J-6278-1; slide the new needle bearing on the tool with the manufacturer's identification against the adaptor and drive the bearing into

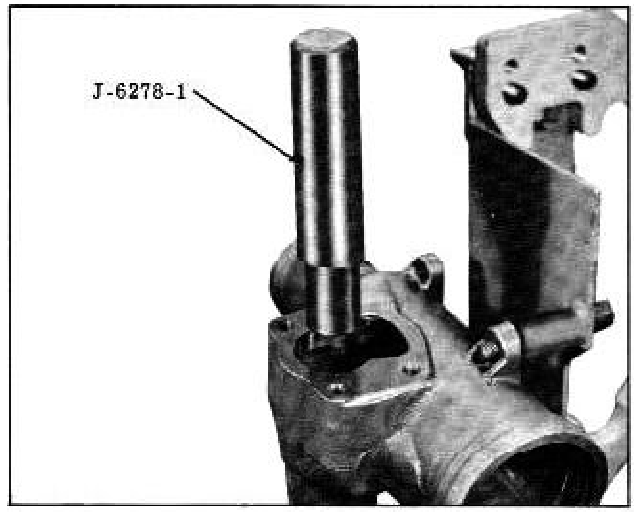


Fig. 4-60 Needle Bearing and Seal Removal

the housing until adaptor bottoms in housing. (Fig. 4-61)

2. Coat the lips of the oil seals with special lubricant (Part No. 567196).

3. Install the pitman shaft oil seals as follows:

   a. Place Adaptor J-6278-2 over Tool J-6278-1; then install the outer seal, inner steel washer, and inner seal with the lips of the seals facing away from the adaptor.

   b. Drive the seals into the housing until the top of Adapter J-6278-2 is flush with the housing. (Fig. 4-62)

   c. Remove the tool and adaptor, then install the outer steel washer and seal retaining ring. The retaining ring will not seat in the groove at this time.

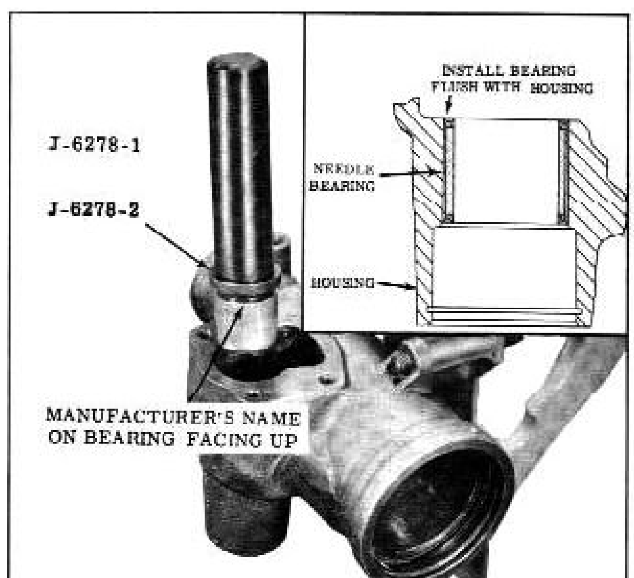


Fig. 4-61 Installing Needle Bearing

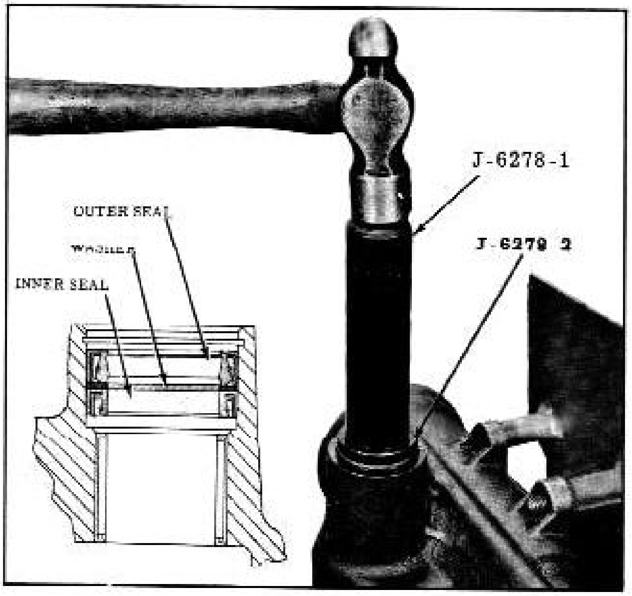


Fig. 4-62 Installing Oil Seals

d. Reinsert Tool J-6278-1 with Adaptor J-6278-2 and continue driving the seals until the retaining ring seats in its groove (Inset, Fig. 4-62), then remove the tool and adaptor.

HOSE CONNECTORS

Removal

If the hose connections were leaking at the connector seats in the housing remove one or both connector seats as follows:

1. Thread a nut and place a washer on a 5/16" - 18 tap.
2. If the connector seat is being removed from an assembled gear, coat the end of the tap with petrolatum to prevent chips from entering the passage while tapping the seat.
3. With the steering gear in a vertical position, thread the tap into the connector seat.

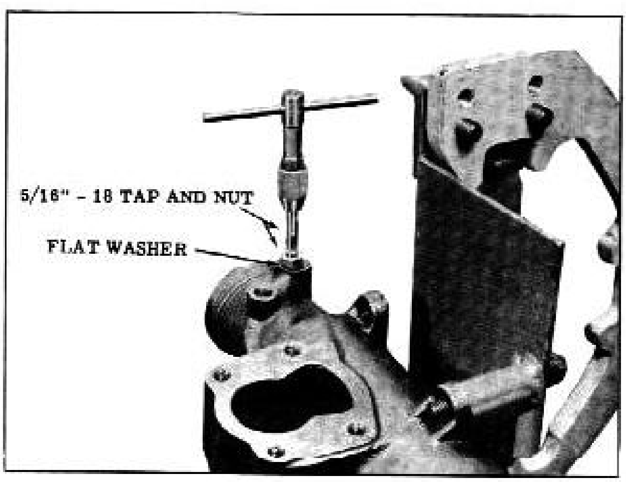


Fig. 4-63 Removing Connector Seat

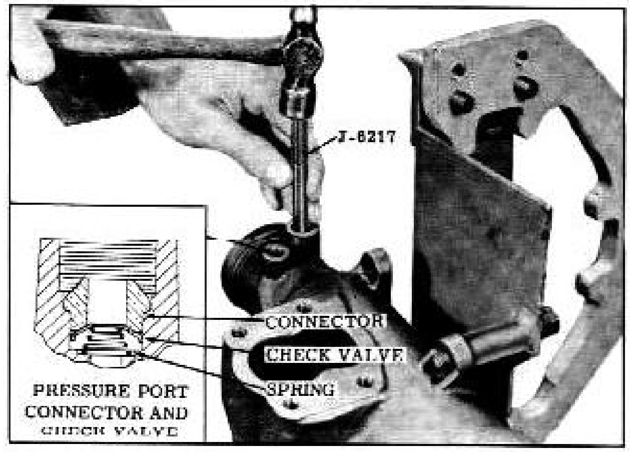


Fig. 4-64 Installing Connector Seat

more than 3 turns. (Fig. 4-63)

4. Tighten the nut to remove the seat.

NOTE: A check valve and spring is located below the high pressure connector seat and can be replaced when seat is removed.

Install

To install a new connector seat, use Tool J-6217 to seat it in the housing. (Fig. 4-64)

STEERING GEAR ASSEMBLY

1. Install the worm as follows:
   a. Lubricate the worm, lower thrust bearing and the two thrust washers with Hydra-Matic oil, then install one thrust washer, the bearing, and the other thrust washer over the end of the worm.
   b. With the valve bore end of gear housing down, insert the worm and thrust bearing assembly into the housing. While holding the worm in place, turn the gear housing so the valve bore end of the housing is up.
2. Install the valve and lower shaft assembly as follows:
   a. Lubricate the valve body teflon rings and a new lower shaft cap "O" ring with petrolatum. Install the lower shaft cap "O" ring in the valve body so it is seated against the lower shaft cap. Align the NARROW NOTCH in the valve body with the pin in the worm, then install the valve and shaft assembly in the gear housing. (Fig. 4-65) Apply pressure to the VALVE BODY when installing. If pressure is applied to the lower shaft during installation, the shaft may be forced out of the valve body.

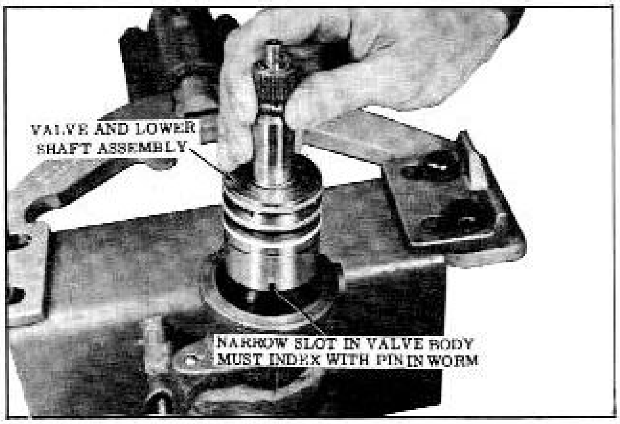


Fig. 4-65 Installing Valve and Lower Shaft Assembly

IMPORTANT: The valve body is properly seated when the oil return hole in the housing is entirely uncovered. (Fig. 4-66)

3. Lubricate a new adjuster plug "O" ring with petrolatum and install in groove on adjuster plug. Place Seal Protector J-6222 over lower shaft, then install the adjuster plug assembly in the housing until it seats against the valve body. (Fig. 4-67) Remove Seal Protector. Do not adjust the thrust bearing preload at this time.

4. Install the rack-piston as follows:

   a. Lubricate the rack-piston teflon seal with petrolatum.

   b. With the rack-piston bore of the housing facing up, position Seal Compressor J-7576 against the shoulder in the housing.

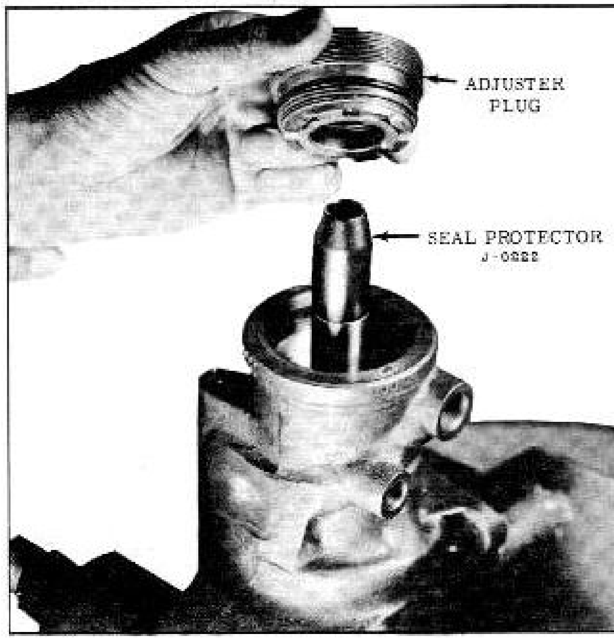


Fig. 4-67 Installing Adjuster Plug

   c. With Ball Retainer J-7539 in place in the rack-piston, push the rack-piston into the housing until Tool J-7539 contacts the worm. (Fig. 4-68)

   d. Turn the lower shaft clockwise with a 3/4" twelve point socket or box end wrench to thread the rack-piston onto the worm while holding Tool J-7539 against the end of the worm.

   e. When the rack-piston is completely threaded on the worm, remove Ball Retainer J-7539 and Seal Compressor J-7576.

5. Install a new "O" ring on the rack-piston

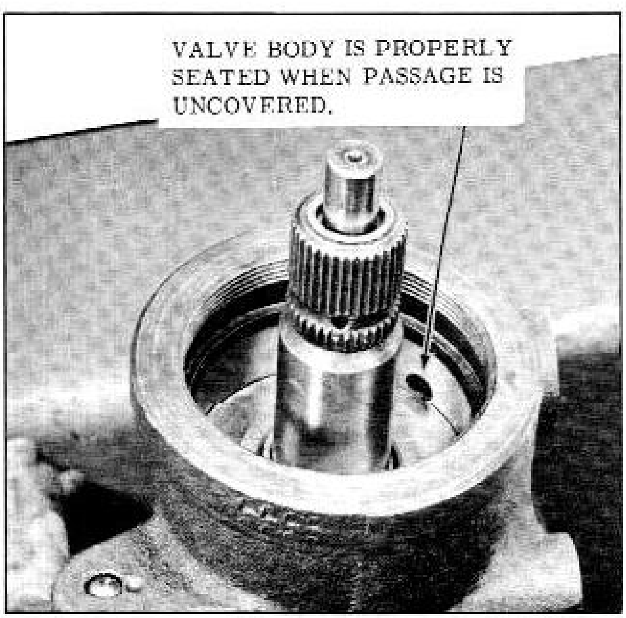


Fig. 4-66 Valve Body Properly Seated

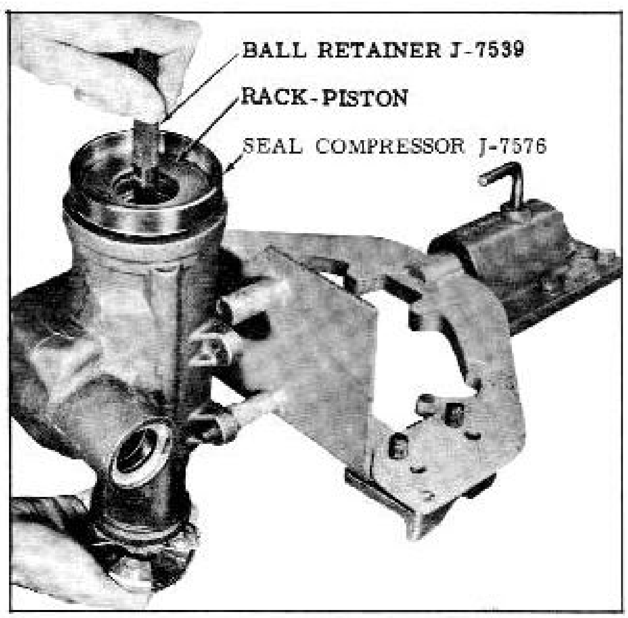


Fig. 4-68 Installing Rack-Piston

plug and lubricate it with petrolatum, then tap the plug in the rack-piston with a soft hammer.

6. Install the rack-piston plug retaining ring in the bore of the rack-piston using internal pliers.

7. Install a new housing end cover "O" ring and lubricate it with petrolatum, then install the end cover and retaining ring.

8. Install the pitman shaft and side cover as follows:

   a. Install a new "O" ring in the pitman shaft side cover and retain with petrolatum.

   b. Turn the lower shaft until the rack-piston teeth are centered in the pitman shaft opening, then install the pitman shaft and side cover so that the center tooth of the pitman shaft engages the center groove of the rack-piston.

   c. Install the 4 side cover bolts and 3 lock washers and tighten 25 to 30 ft. lbs. Refer to Fig. 4-69 for washer location.

9. Adjust the thrust bearing preload as follows:

   a. Turn the adjuster plug clockwise with Spanner Wrench J-7624 until it is tight, then loosen it 1/8 turn.

   b. Turn the lower shaft all the way clockwise, then turn it counter-clockwise 1/2 turn.

   c. Install an inch-pound torque wrench with a 3/4" 12 point socket on the lower shaft splines. (Fig. 4-69)

   d. Rotate the torque wrench in a 45° arc and note the highest reading.

   e. Tighten the adjuster plug with Spanner Wrench J-7624 until the torque wrench reads 1 to 3 in. lbs. higher than the initial load reading.

   f. Install the adjuster plug lock nut and tighten with Spanner Wrench J-972-A.

   g. Recheck the adjustment to be sure it is still only 1 to 3 in. lbs. higher than the initial load reading. If the adjustment changed when tightening the lock nut, re-adjust the adjuster plug.

10. Adjust the over-center preload as follows:

   a. Make sure the over-center adjusting screw is backed all the way out.

   b. Install an inch-pound torque wrench with a 3/4" 12 point socket on the lower shaft splines.

   c. Rotate the lower shaft from one stop to the other to count the number of turns and locate the center of travel, then check the combined ball and thrust bearing preload by rotating the torque wrench through the center of travel. (Fig. 4-70) Note the highest reading.

   d. Tighten the pitman shaft adjusting screw until the torque wrench reads 4 to 8 in. lbs. higher than the previous reading. The total reading should not exceed 16 in. lbs.

   e. While holding the adjusting screw, tighten the lock nut and recheck the adjustment.

11. Position the coupling flange onto the lower shaft, then install the flange attaching bolt and lock washer. Position the flange so that there is 3/4" between the adjuster lock nut and the coupling to steering flange bolt heads. Tighten the coupling flange attaching bolt 20 to 25 ft. lbs.

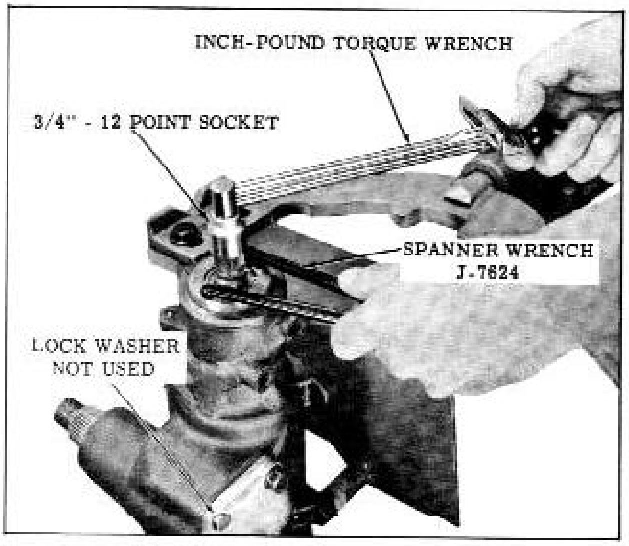


Fig. 4-69 Adjusting Thrust Bearing Preload

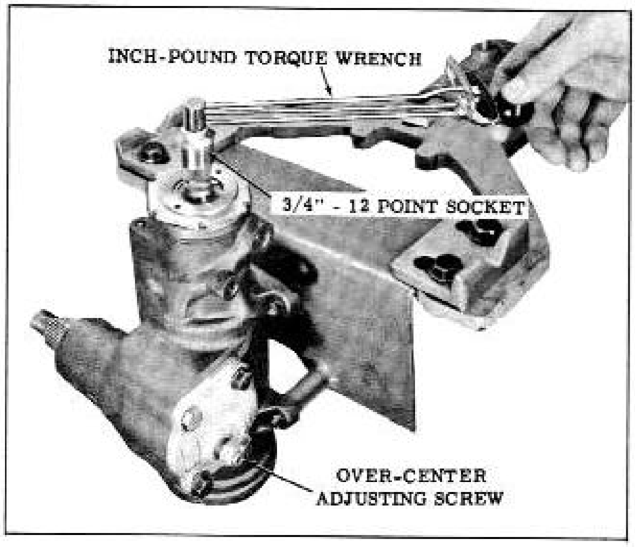


Fig. 4-70 Checking Over-Center Preload

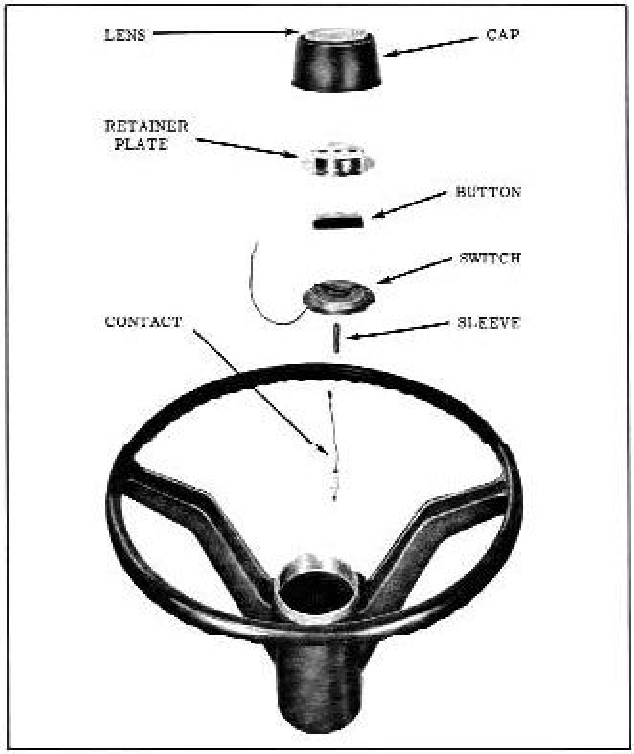


Fig. 4-71 Standard Steering Wheel

STEERING WHEEL AND HORN CONTACT (Fig. 4-71 and 4-72)

STEERING WHEEL

Remove

1. Disconnect the horn wire from the wiring harness.

2. Standard wheel - Remove cap to steering wheel attaching screw, pull cap from wheel, then disconnect horn switch wire from the contact assembly lead.

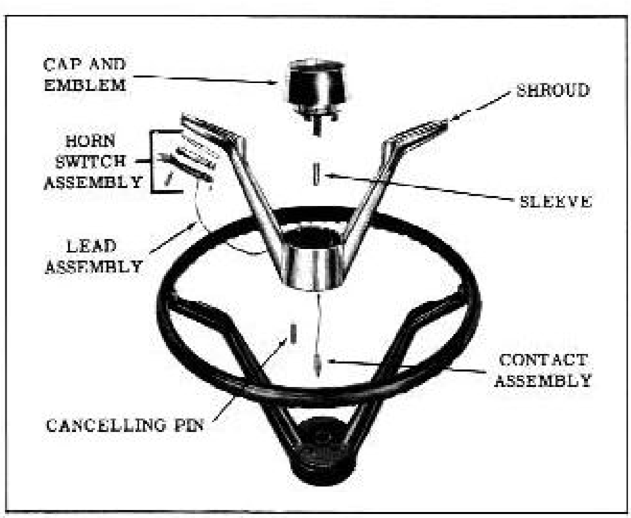


Fig. 4-72 Deluxe Steering Wheel

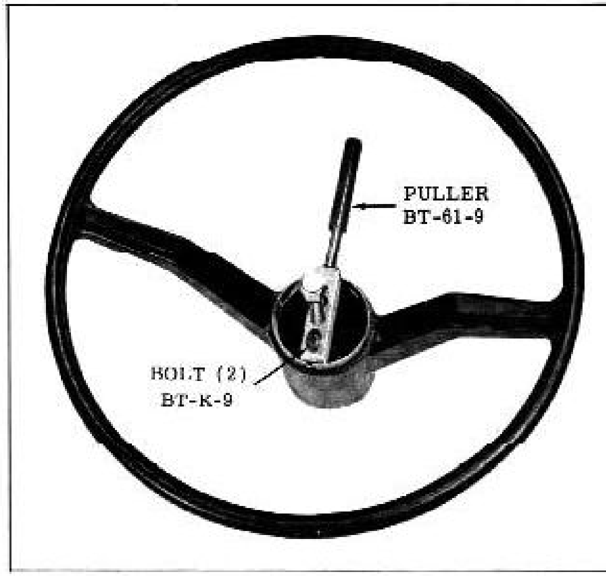


Fig. 4-73 Steering Wheel Removal

3. Deluxe wheel - Carefully pry the cap and emblem assembly from the shroud.

4. Remove the steering wheel attaching nut and washer, then using a puller such as BT-61-9, remove the steering wheel from the steering shaft. (Fig. 4-73) Remove puller from steering wheel.

Install

1. With the marks on the steering wheel and steering shaft aligned, install the wheel, flat washer and nut.

   NOTE: When mark on steering wheel hub and steering shaft are lined up, wheel spokes should be horizontal as car is driven straight ahead.

   If this is not the case, it will be necessary to adjust the tie rod ends until steering wheel assumes its proper position. When a new steering gear is installed, it may be necessary to adjust steering wheel spoke alignment even though spoke alignment had been correct for the old gear.

2. Torque the nut 25 ft. lbs. and stake to steering shaft. On standard steering wheels, connect horn switch wire to the contact assembly lead and install cap. On deluxe steering wheels, install cap and emblem assembly.

3. Connect horn wire to wiring harness.

HORN CONTACT ASSEMBLY REPLACEMENT

1. Remove the steering wheel.

2. Deluxe steering wheels - Disconnect the horn switch wires from the contact assembly lead,

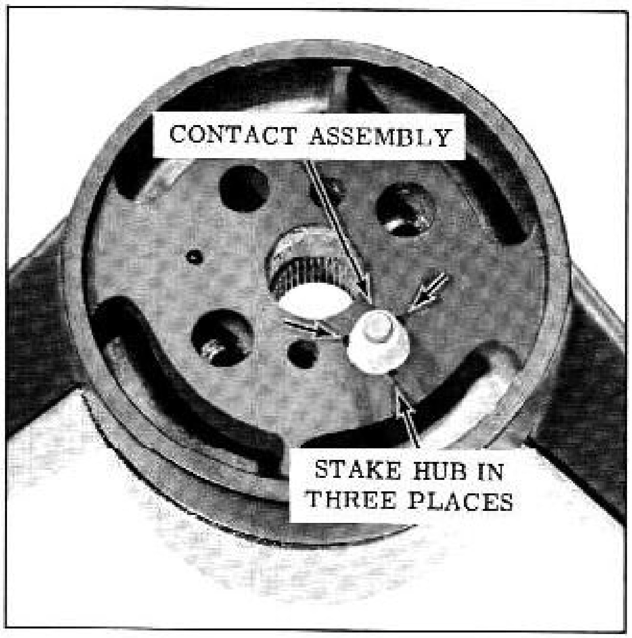


Fig. 4-74 Installing Horn Contact

then remove the 4 shroud attaching screws and shroud.

3. Remove the staking from the wheel hub and pull the contact assembly from the steering wheel.

To install, place contact assembly in steering wheel and stake hub in three places (Fig. 4-74) to retain the contact assembly, then reverse the removal procedure.

HORN SWITCH ASSEMBLY REPLACEMENT

The horn switch is retained to the cap (standard steering wheel) or to the shroud (deluxe steering wheel) by screws. (Figs. 4-71 and 4-72)

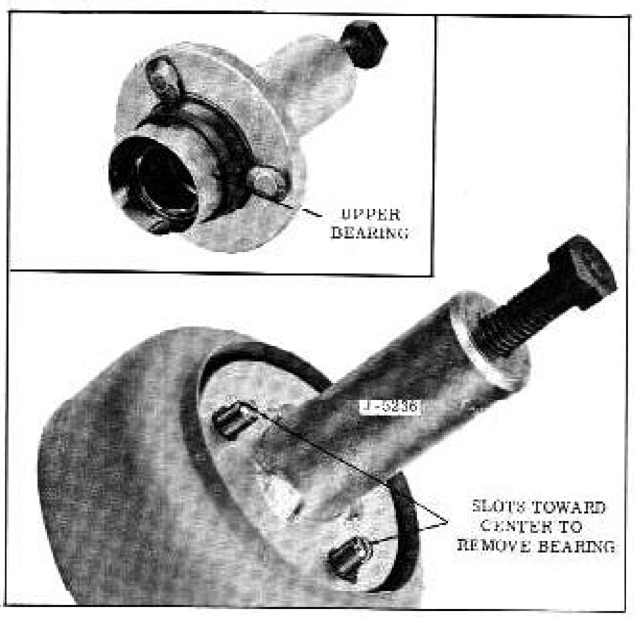


Fig. 4-75 Upper Bearing Removal

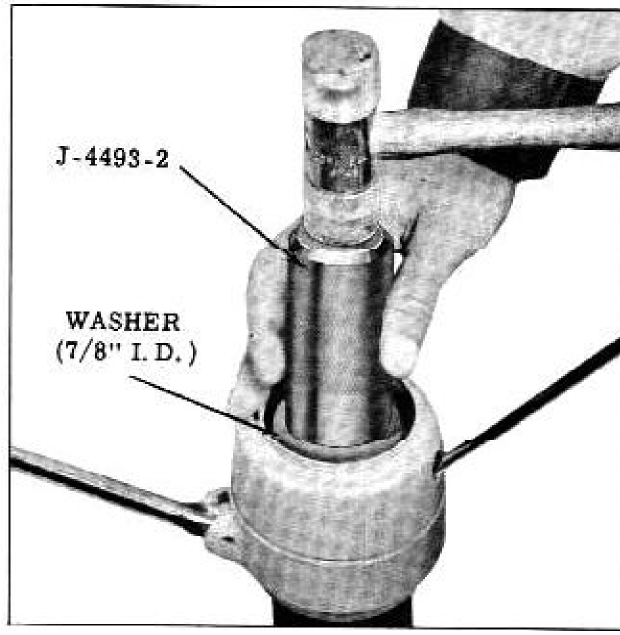


Fig. 4-76 Installing Upper Bearing

To remove the horn switch from the standard wheel, the cap must be removed. To remove the horn switch from the deluxe steering wheel, the steering wheel and the shroud must be removed.

UPPER BEARING REPLACEMENT

1. Remove steering wheel.
2. Disconnect horn wire from chassis wiring harness.
3. Remove upper bearing from retainer using Tool J-5236. (Fig. 4-75)

To install reverse above procedure. Use Tool J-4493-2 and a standard washer having a 7/8" inside diameter to install new bearing. (Fig. 4-76)

TURN SIGNAL ACTUATOR ASSEMBLY REMOVE AND INSTALL (Fig. 4-77)

1. Remove the steering wheel assembly and the turn signal lever.

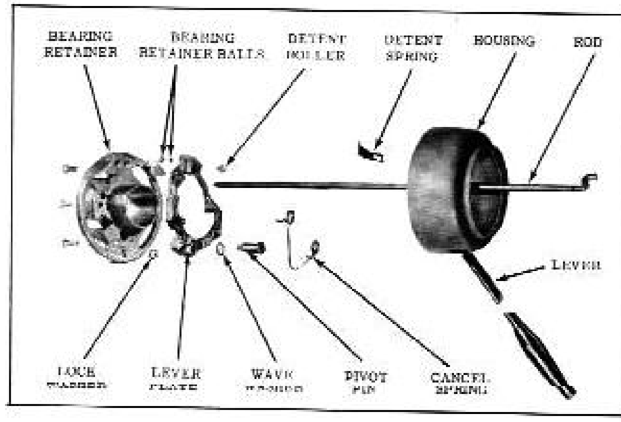


Fig. 4-77 Turn Signal Actuator Assembly

2. Insert a screw driver with a round shank through the turn signal lever hole in the housing and pull or pry the housing from the bearing retainer.

3. Remove the cancel spring and pivot pin with wave washer from the lever plate.

4. Depress the detent spring to disengage it from the upper bearing retainer, then separate the lever plate, detent spring, detent roller and detent balls from the upper bearing retainer. (Fig. 4-77)

5. To install, reverse the above procedure and lubricate all frictional areas with a thin coat of Lithium Soap Grease. Press the housing over the upper bearing retainer so that it just snaps over the rim of the bearing retainer flange.

STEERING COLUMN

REMOVE AND INSTALL

1. Disconnect rod from lower shift lever.

2. On cars equipped with Syncro-Mesh, disconnect rod from cross shift lever. (Fig. 4-78)

3. From under instrument panel disconnect the horn wire from chassis wiring harness and the turn signal wires from turn signal switch on mast jacket.

4. Disconnect the wires from the Hydra-Matic combination neutral safety and back-up switch or the wires from the Syncro-Mesh back-up light switch on the mast jacket.

5. Remove cap from upper mast jacket bracket, then remove the H-M indicator needle from the shifter tube. (Fig. 4-79)

6. Remove steering wheel, spring and retainer.

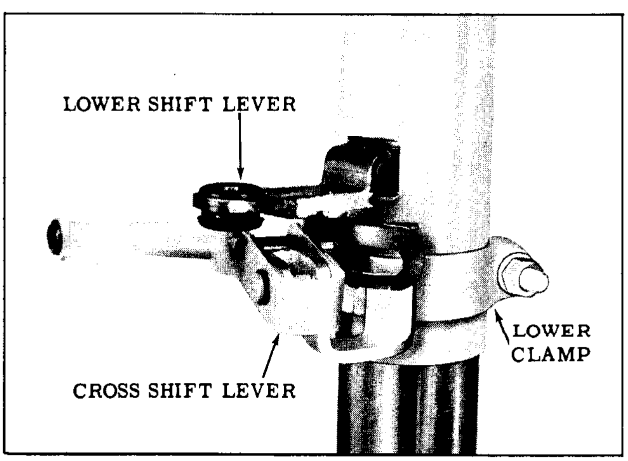


Fig. 4-78 Synchro-Mesh Shift Levers

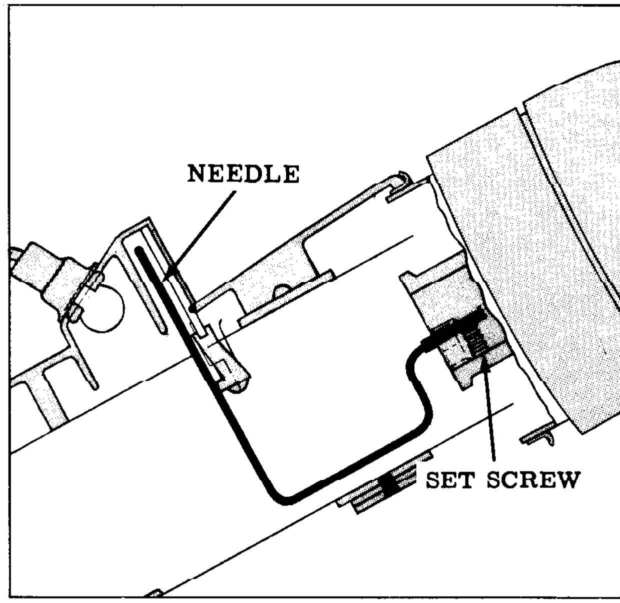


Fig. 4-79 Hydra-Matic Indicator Needle

7. Disconnect mast jacket grommet and retainer from floor pan.

8. Remove mast jacket cover plate.

9. Disconnect positive battery cable sleeve from mast jacket lower clamp.

10. Remove clamp from mast jacket bracket.

11. If equipped with standard steering, loosen lower clamp.

12. Slide mast jacket off steering shaft.

To install steering column assembly, reverse the removal procedure.

NOTE: Before tightening the upper and lower clamps, position the steering column assembly (manual steering) or lower bearing (power steering), to provide 1/8" to 3/16" clearance between the steering wheel and turn signal actuator housing.

Adjust turn signal switch. (See SECTION 13)

On Hydra-Matic equipped cars, check and adjust neutral safety switch. (See Section 13) Align the H-M indicator needle. (See Section 15)

DISASSEMBLE AND ASSEMBLE (Fig. 4-80 and 4-81)

1. Remove turn signal switch from side of mast jacket. Remove the switch pin and spring from the turn signal rod.

2. Remove the Hydra-Matic combination neutral safety and back-up light switch or the Syncro-Mesh back-up light switch from the mast jacket. Remove the switch lever from the shift tube.

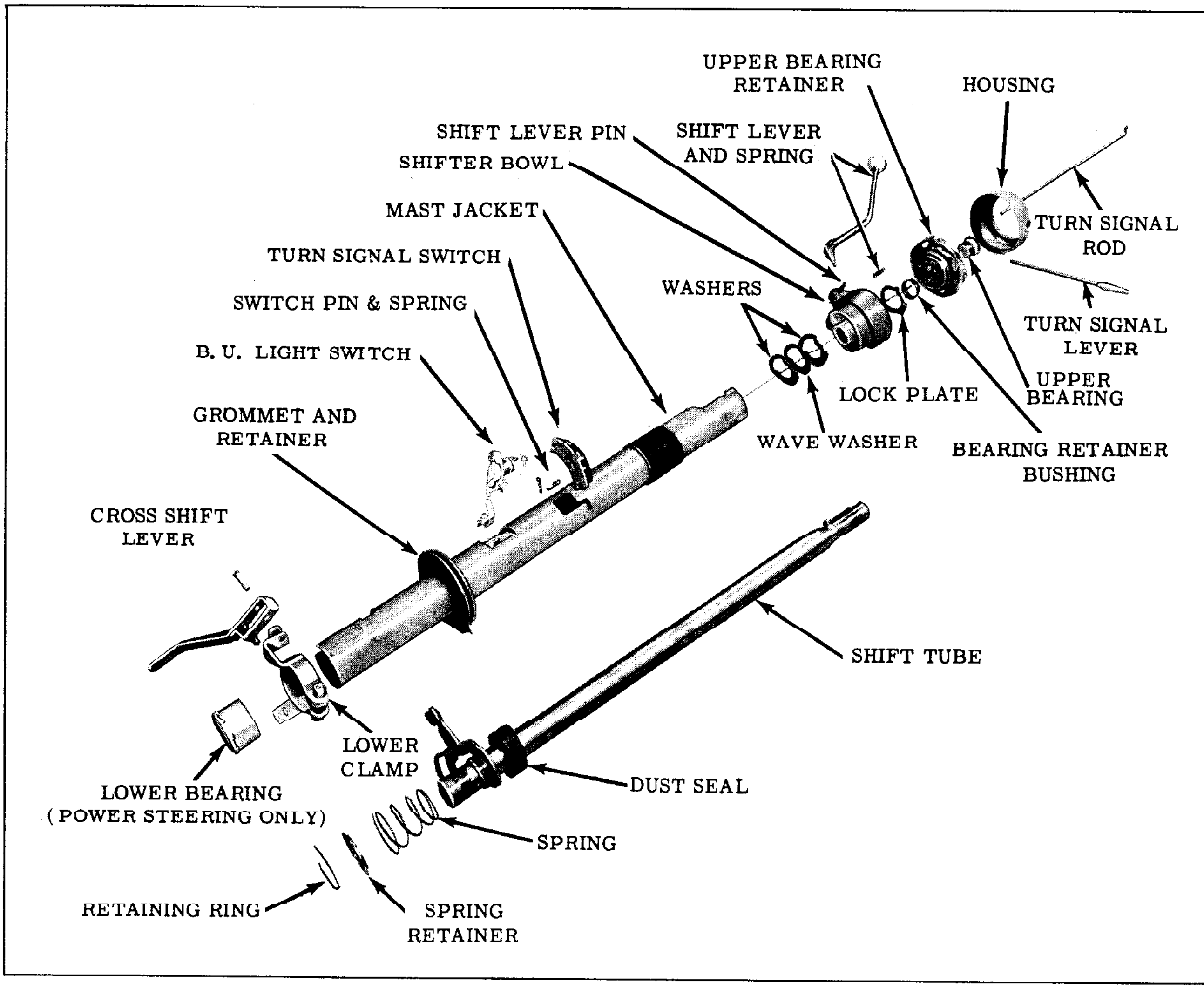


Fig. 4-80 Steering Column (Synchro-Mesh)

3. Pry out the upper bearing from the bearing retainer, then remove the upper bearing and horn wire.

4. On Hydra-Matic models, remove the shift tube retainer ring and washer from inside the upper bearing retainer.

5. Remove the 3 upper bearing retainer screws, then remove the upper bearing retainer and turn signal actuator assembly.

   NOTE: If necessary, the shift stop plate (Hydra-Matic models) or the bearing retainer bushing (Syncro-Mesh models) can be removed from the upper bearing retainer at this time.

6. Rotate the lock plate clockwise, then remove the plate. On Hydra-Matic models, remove thrust washers and wave washer from shift tube.

7. On Syncro-Mesh models, support shifter bowl, and drive shift lever pin from bowl. Remove shift lever and spring from bowl. Remove anti-rattle from the shift lever.

8. Pull shifter bowl, from shift tube. On Syncro-Mesh models, remove thrust washers and wave washers from shift tube.

9. On Hydra-Matic models, support shifter bowl, and drive shift lever pin from bowl. Remove shift lever and spring from bowl. Remove anti-rattle from shift lever.

10. If car is equipped with power steering, loosen lower clamp and remove lower bearing retainer assembly.

11. Remove lower clamp.

12. On Syncro-Mesh models, remove retaining ring, spring retainer, spring, and shift tube from lower end of mast jacket.

13. On Hydra-Matic models, remove anti-rattle spring and shift tube from lower end of mast jacket.

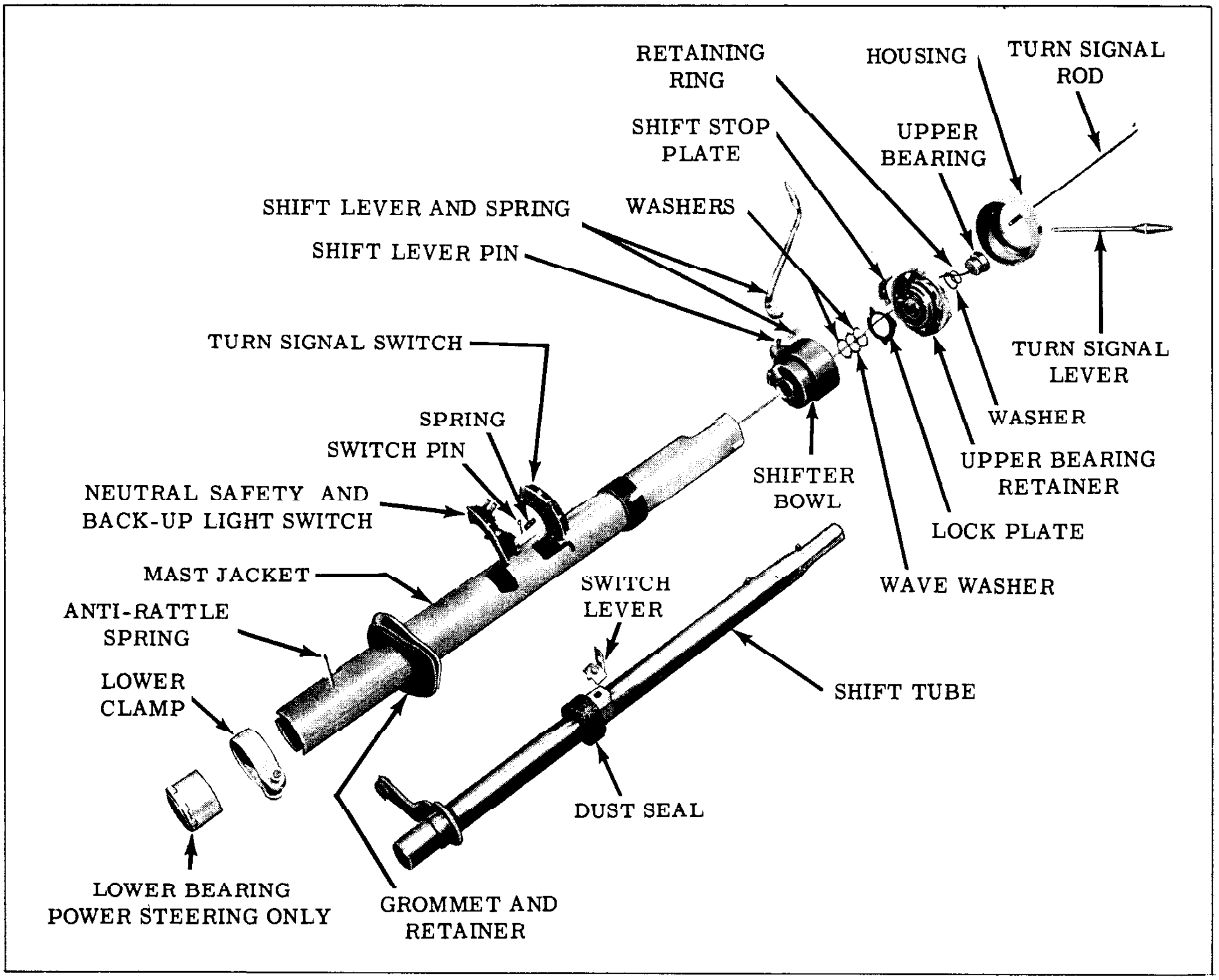


Fig. 4-81 Steering Column (Hydra-Matic)

NOTE: The lower bearing should not be disassembled.

To reassemble mast jacket, reverse the removal procedure. Apply a thin coat of Lithium Soap Grease to all frictional parts. Install upper bearing using Tool J-4493-2 and a standard washer having a 7/8" inside diameter. (Fig. 4-76)

DIAGNOSIS OF MANUAL AND POWER STEERING

NOTE: Items identified by (M.S.) apply to manual steering only and items identified by (P.S.) apply to power steering only. All items not identified by (M.S.) or (P.S.) apply to both units.

HARD STEERING WHILE DRIVING OR POOR RETURN OF STEERING TO CENTER

CAUSE	CORRECTION
1. Tight steering shaft bearings.	1. Replace bearings.
2. Lower coupling flange rubbing against adjuster plug (P.S.)	2. Loosen bolt and reposition for clearance.
3. Steering wheel rubbing against turn signal collar.	3. Adjust mast jacket endwise.
4. Tires not properly inflated.	4. Inflate to specifications.
5. Steering linkage tie-rod joints misaligned.	5. Loosen tie-rod sleeve and center ball joint.
6. Steering gear misaligned.	6. Align at frame.
7. Tight over-center adjustment.	7. Adjust in car to specifications.
8. Thrust bearing adjustment too tight.	8. Adjust to specifications.
9. Ball preload too tight. (P.S.)	9. Remove gear and change ball size as required.
10. Sticky spool valve. (P.S.)	10. Remove and clean valve or replace valve assembly.
11. Sticking pump flow control valve.	11. Remove valve and clean.

CAR LEANS TO ONE SIDE OR THE OTHER

CAUSE	CORRECTION
1. Front end misaligned.	1. Adjust to specification.
2. Worn or damaged valve and shaft assembly. (P.S.) NOTE: If this is the cause, steering effort will be very light in direction of lead and heavy in opposite direction.	2. Replace valve and shaft assembly.

MOMENTARY INCREASE IN EFFORT WHEN TURNING WHEEL FAST TO THE RIGHT OR LEFT. (P.S.)

CAUSE	CORRECTION
1. Low oil level in pump.	1. Check oil level in pump reservoir.
2. Pump belt slipping.	2. Tighten or replace belt.
3. Excessive internal leakage.	3. Replace rack-piston teflon seal and "O" ring, rack-piston end plug seal, and/or replace valve.

DIAGNOSIS OF MANUAL AND POWER STEERING (Continued)

EXTERNAL OIL LEAKS
(WIPE GEAR THOROUGHLY AND MAKE SURE SOURCE OF LEAKAGE IS DETERMINED)

CAUSE	CORRECTION
1. Loose hose connections. (P.S.)	1. Tighten.
2. Damaged hose. (P.S.)	2. Replace.
3. Side cover "O" ring seal. (P.S.)	3. Replace seal.
4. Pitman shaft seals.	4. Replace seals.
5. Housing end cover "O" ring seal. (P.S.)	5. Replace seal.
6. Adjuster plug seals. (P.S.)	6. Replace seals.
7. Torsion bar seal. (P.S.)	7. Replace valve and shaft assembly.

GEAR NOISE (RATTLE CREAK OR CHUCKING)

CAUSE	CORRECTION
1. Loose over-center adjustment. NOTE: A slight rattle may occur on turns because of the increased lash off the "high point". This is normal and the lash must not be reduced below the specified limits to eliminate this slight rattle.	1. Adjust to specification.
2. Gear loose on frame.	2. Check gear to frame mounting bolts. Tighten bolts to specification.
3. Lack of lubricant at gear contact points.	3. Lubricate gear box to frame contact points.

GEAR NOISE ("HISSING" SOUND) (P.S.)

CAUSE	CORRECTION
There is some noise in all power steering systems. One of the most common is a "hissing" sound most evident at standstill parking. There is no relationship between the noise and performance of the gear. "Hiss" may be expected when steering wheel is at end of travel or when slowly turning at standstill.	Do not replace valve and shaft assembly unless "hiss" is extremely objectionable. Slight "hissing" is satisfactory and in no way effects steering. A replacement valve and shaft assembly may also exhibit slight noise and is not always a cure for the objection. Check clearance around safety drive bolts in flexible coupling. Be sure steering shaft and gear are aligned so the flexible coupling rotates in a flat plane and is not distorted as shaft rotates. Any metal to metal contact through the flexible coupling will transmit the valve "hiss" into the car.

DIAGNOSIS OF MANUAL AND POWER STEERING (Continued)

EXCESSIVE WHEEL KICK-BACK OR LOOSE STEERING

CAUSE	CORRECTION
1. Lash in steering linkage.	1. Replace parts affected.
2. Air in system. (P.S.)	2. Add oil to pump reservoir.
3. Excessive lash between pitman shaft and rack-piston.	3. Make over-center adjustment.
4. Loose thrust bearing adjustment.	4. Adjust to specification.
5. Ball and worm preload incorrect. (P.S.)	5. Remove rack-piston and worm, and change balls to obtain specified preload.

STEERING WHEEL SURGES OR JERKS WHEN TURNING WITH ENGINE RUNNING, ESPECIALLY DURING PARKING. (P.S.)

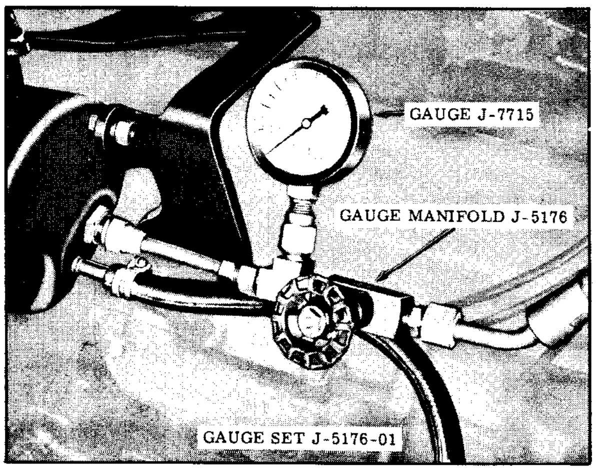
CAUSE	CORRECTION
1. Loose pump belt.	1. Adjust to specification.

HARD STEERING WHEN PARKING

CAUSE	CORRECTION
1. Loose pump belt. (P.S.)	1. Adjust to specification.
2. Low oil level in reservoir. (P.S.)	2. Fill to proper level. If excessively low, check all lines and joints for evidence of external leakage.
3. Lack of lubrication in ball joints.	3. Add lubricant.
4. Tires not properly inflated.	4. Inflate to recommended pressure.
5. Insufficient oil pressure. (P.S.)	5. If all of the above checks do not reveal the cause of hard steering, make the following tests of oil pressure. a. Disconnect the pressure line at pump, then install gauge set J-5176-01. (Fig. 4-82) b. With engine at slow idle and gauge valve open, note the oil pressure on the gauge while turning steering wheel from one extreme position to the other. Expecially note the maximum pressure which can be built up with the wheel held in either right or left extreme position. CAUTION: Do not hold wheel in extreme position for an extended period of time because it will drastically increase the oil temperature and will cause undue wear on the pump.

DIAGNOSIS OF MANUAL AND POWER STEERING (Continued)

HARD STEERING WHEN PARKING (Continued)

CAUSE	CORRECTION
 Fig. 4-82 Oil Pressure Gauge	c. With oil temperature between 150°F. and 170°F. (measured with a thermometer in the reservoir) oil pressure should not be less than 1,100 p.s.i. for satisfactory power steering operation. (Fig. 4-82) d. If the maximum oil pressure is less than 1,100 p.s.i., it indicates trouble in the pump, hoses, steering gear, or a combination of these parts. To eliminate the hoses and gear, close the gauge valve and quickly test pressure of the pump only with the engine at slow idle, then open the valve to avoid increasing oil temperature. e. Comparing the maximum pressure obtained in these two tests will indicate source of trouble as follows: (1) First test (step b) pressure low, and second test (step d) pressure normal - indicates faulty hoses or steering gear. (2) First test (step b) and second test (step d) pressure equally low - indicates faulty oil pump.
6. Low oil pressure due to restriction in hose. (P.S.)	6. Clean or replace as required.
7. Low oil pressure due to steering gear. (P.S.)	7. Remove steering gear for disassembly.
a. Pressure loss in cylinder due to worn rack-piston seal, damaged "O" ring or scored housing bore.	a. Inspect rack-piston seal and "O" ring and housing bore.
b. Leakage at valve rings, valve body to worm seal, rack-piston end plug seal.	b. Replace rings and seals.
c. Loose fit of spool in valve body or leaky valve body.	c. Replace valve and shaft assembly.

VALVE "SQUAWK" WHEN TURNING OR WHEN RECOVERING FROM A TURN. (P.S.)

CAUSE	CORRECTION
1. Cut or worn dampener "O" ring on spool valve.	1. Replace dampener ring.
2. Loose or worn valve.	2. Replace valve and shaft assembly.

DIAGNOSIS OF MANUAL AND POWER STEERING (Continued)

NO EFFORT REQUIRED TO TURN. (P.S.)

CAUSE	CORRECTION
1. Broken torsion bar.	1. Replace valve and shaft assembly.

PUMP NOISE

CAUSE	CORRECTION
1. Loose belt.	1. Tighten belt.
2. Hose(s) touching other parts of car.	2. Adjust hose position.
3. Low Oil Level.	3. Fill reservoir.
4. Air in the oil.	4. Check oil level.
5. Excessive back pressure caused by hoses or steering gear.	5. Locate restriction and correct.
6. Scored pressure plate.	6. Lap away light scoring. Replace heavily scored part.
7. Vanes not installed properly.	7. Install properly.
8. Vanes sticking in rotor slots.	8. Free up by removing burrs or dirt.
9. Extreme wear of pump ring.	9. Replace part.
10. Face of thrust plate scored.	10. Lap away light scoring. Replace heavily scored part.
11. Scored rotor.	11. Lap away light scoring. Replace heavily scored part.

INOPERATIVE, POOR, OR NO ASSIST: (PUMP ASSEMBLY)

CAUSE	CORRECTION
1. Loose drive belt.	1. Tighten belt.
2. Low oil level.	2. Fill reservoir.
3. Air in the oil.	3. Add oil to pump reservoir.
4. Flow control valve stuck.	4. Remove burrs or dirt.
5. Vanes sticking in rotor slots.	5. Free up by removing burrs or dirt.
6. Faulty flow control valve assembly.	6. Clean and free up parts. Replace part(s) as necessary.

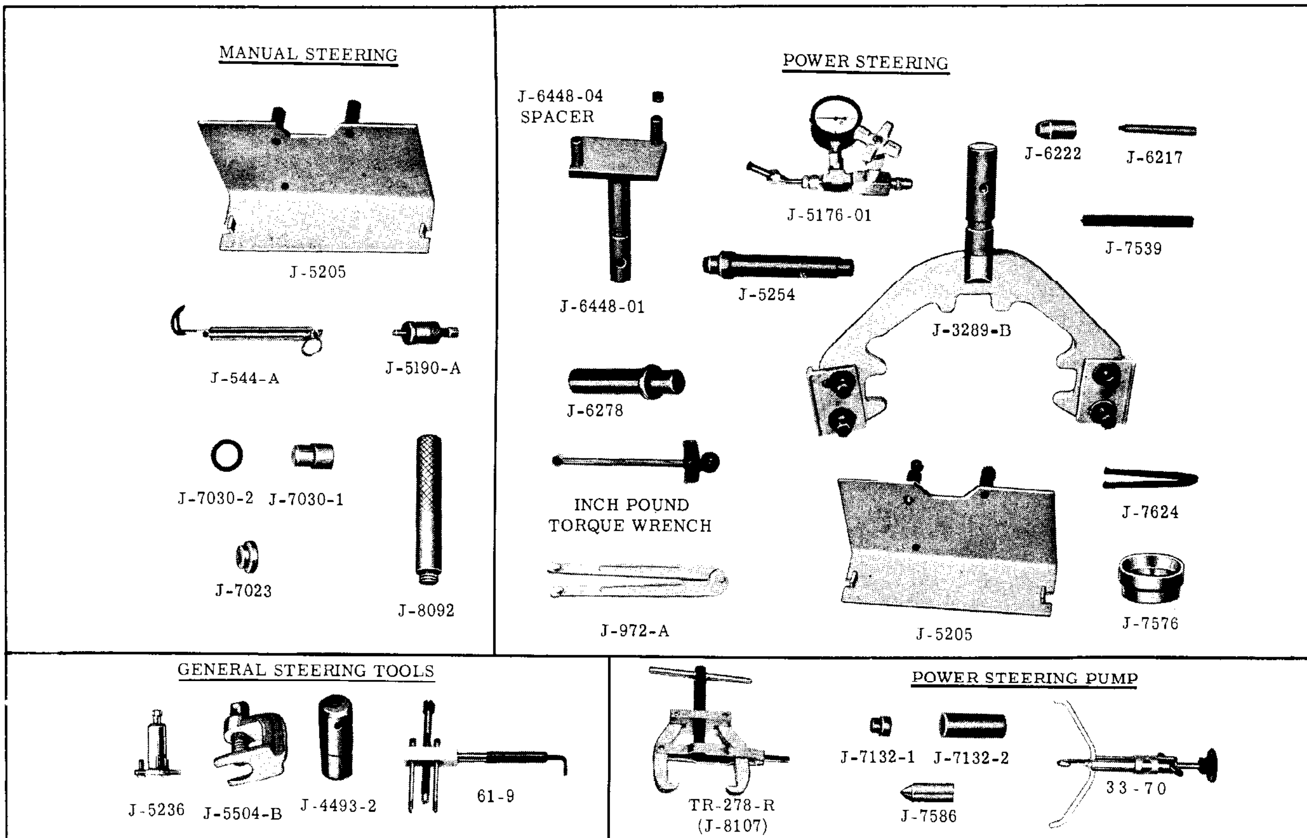
TORQUE SPECIFICATIONS

NOTE: Specified torque is for installation of parts only. Checking of torque during inspection may be 15% below the specifications.

APPLICATION	FT. LBS.
STEERING LINKAGE	
1. Idler Arm Support to Frame Bolt	25 to 35
2. Tie Rod Clamp Bolts	20 to 25
3. Tie Rod to Plain Arm and Relay Rod Nuts	50 to 60
4. Steering Wheel Nut	25 Min. and Stake
MANUAL STEERING GEAR	
7. Gear to Frame Bolts	60 to 80
8. Pitman Shaft Nut	90 to 120
9. Side Cover Bolts	20 to 22
POWER STEERING PUMP	
10. Pulley Nut	35 to 45
11. Pump Bracket to Cylinder Head	20 to 40
12. Pump Bracket to Intake Manifold and to Pump	20 to 28
13. Pump Mounting Stud	25 to 35
14. Union	25 to 35
15. Flow Control Valve Plug	4
POWER STEERING GEAR	
16. Gear to Frame Bolts	60 to 80
17. High Pressure Line Fitting (At Gear)	20 to 30
18. Oil Return Line Fitting (At Gear)	20 to 30
19. Pitman Shaft Adjusting Screw Lock Nut	25 to 35
20. Side Cover Bolts	30 to 35
21. Adjuster Plug Lock Nut	50 (Approx.)
22. Coupling Flange Bolt	20 to 25
23. Return Guide Clamp Screws	8 to 10

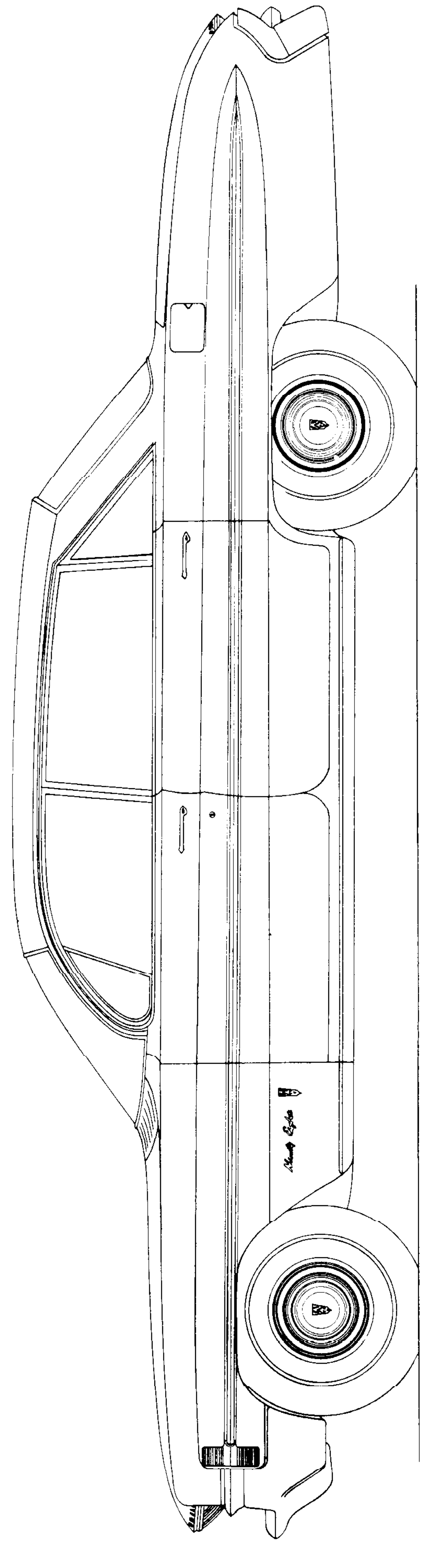
GENERAL SPECIFICATIONS

MANUAL STEERING	
RATIO	24 to 1
LUBRICANT	SAE 80 Multi-Purpose Gear Lubricant
ADJUSTMENTS	
1. Worm Bearing Preload	1/2 to 7/8 lbs.
2. Over-Center Adjustment	1-1/2 to 2 lbs.
3. Pitman Shaft Adjusting Screw End Clearance	.002" Max.
POWER STEERING	
RATIO	17.5 to 1
LUBRICATION	
4. Lubricant	G.M. Hydra-Matic Fluid
5. Capacity - Complete System	1-3/4 Qts.
6. Capacity - Pump Only	1 Qt.
ADJUSTMENTS	
8. Ball Preload	1/2 to 5 in. lbs.
9. Thrust Bearing Preload	1 to 3 in. lbs. in excess of initial load
10. Over-Center Adjustment	4 to 8 in. lbs. in excess of combined ball and thrust bearing preload



61-9	Steering Wheel Puller
TR-278-R (J-8107)	Differential Side Bearing Puller (Used for Pump End Cover Installation)
J-544-A	Spring Scale
J-3289-B	Differential Holding Fixture (Used for Mounting Gear Holding Fixture J-5405)
33-70	Belt Tensioning Gauge
J-5176-01	Pressure Testing Manifold (Used with Gauge J-7715)
J-5190-A	1955 Power Steering Gear End Casting Bearing Puller (Used for Side Cover Needle Bearing Puller)
J-5254	End Cover Seal and Needle Bearing Installer (Used for Removing and Installing Adjuster Plug Oil Seal and Needle Bearing)
J-5205	Steering Gear Holding Fixture
J-5504-B	Pitman Arm Puller
J-6217	Hose Connector Installer
J-6222	End Cover Seal Protector (Used for Installing Adjuster Plug)
J-6278	Pitman Shaft Bearing Remover and Installer
J-6278-2	Adaptor (Used with J-6278 for Installing Pitman Shaft Seals and Bearing)
J-6448-01	Power Steering Gear Holding Fixture
J-6448-04	Spacer (Used with J-6448-01)
J-7023	Pitman Shaft Seal Installer
J-7030-1	Side Cover Needle Bearing Installer and Shaft Remover and Installer
J-7030-2	Used with J-7030-1 for Installing Pitman Shaft Needle Bearing
J-7132-1	Seal Protector
J-7132-2	Seal Installer
J-7539	Ball Retainer
J-7576	Rack-Piston Teflon Ring Compressor
J-7586	Pump Oil Seal Protector
J-7624	Spanner Wrench (Used for Removing and Installing Adjuster Plug. Also used for Adjusting Thrust Bearing Preload)
J-7715	Pressure Testing Gauge (Used with Gauge Manifold J-5176)
J-8092	Drive Handle
J-972-A	Differential Adjusting Nut Wrench (Used for Tightening Adjuster Plug Lock Nut)

Fig. 4-83 Manual and Power Steering Tools



98 FOUR DOOR SEDAN
(SIX WINDOW)
3819

SUSPENSION

CONTENTS OF SECTION 5

FRONT SUSPENSION

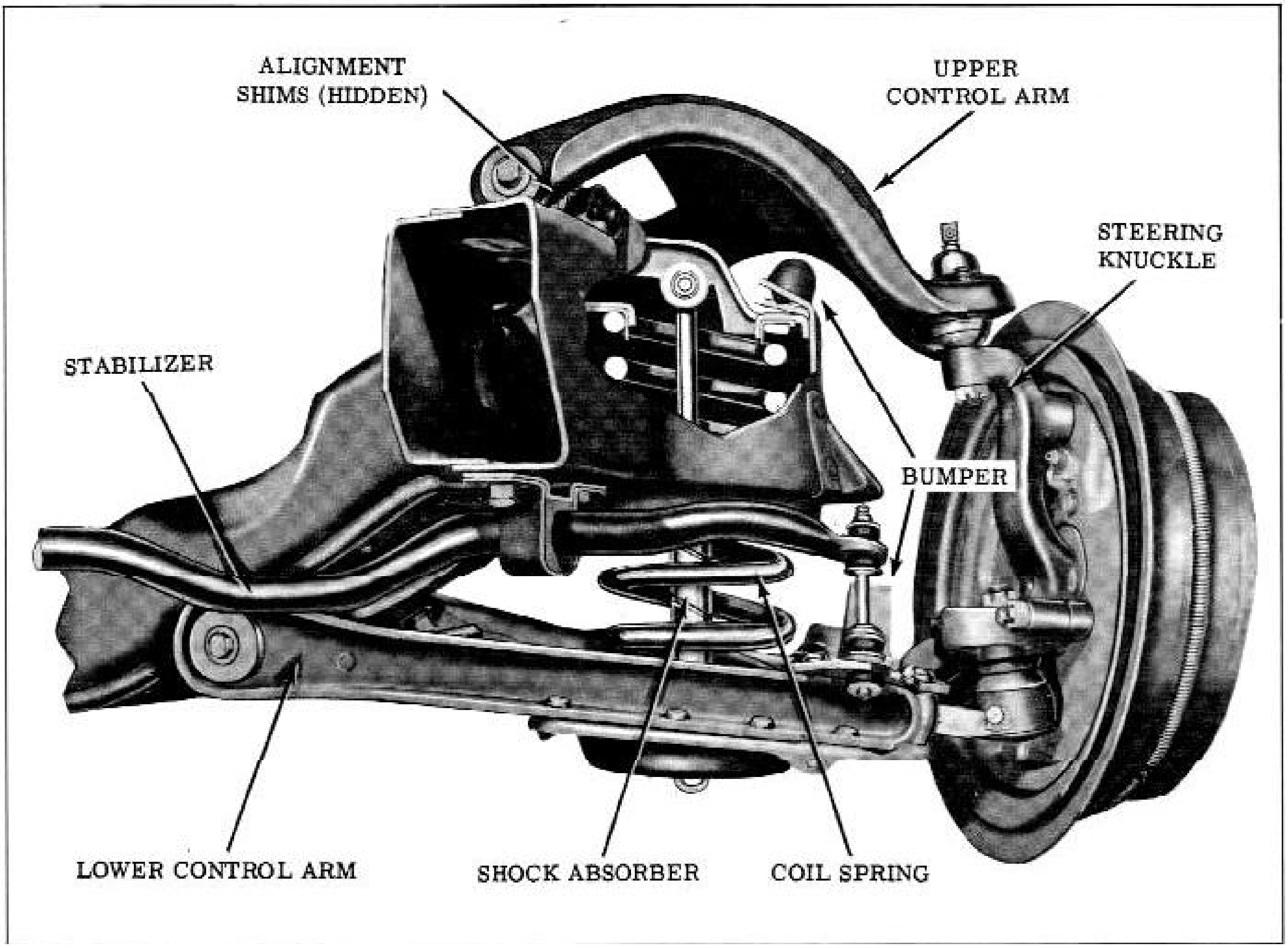


Fig. 5-1 Front Suspension

PERIODIC MAINTENANCE

Upper and lower control arm ball joints should be lubricated every 2,000 miles with chassis lubricant. Front wheel bearings should be cleaned and repacked with a sodium soap fine fiber grease every 10,000 miles. The stabilizer, shock absorbers, control arm pivot shaft bushings and rear support arm bushings should NOT be lubricated.

GENERAL DESCRIPTION (Fig. 5-1)

The Oldsmobile Pivot Poise Suspension utilizes ball joints, riveted to the upper and lower control arms and bolted to the steering knuckle. The inner ends of the control arms are supported by non replaceable bushings. The bushings are bolted to the pivot shafts and the pivot shafts are bolted to the frame. Caster and camber adjustments are made by placing shims between the upper pivot shafts and the frame.

The upper end of the coil spring seats on an insulator in the frame, and the lower end rests on a seat in the lower control arm.

The direct acting type, double action shock absorbers are mounted inside the coil springs. The upper end of the shock absorber is attached to the frame, and the lower end is attached to the spring seat in the lower control arm.

Rubber bumpers mounted on the frame cushion the upper control arms extreme downward movement and rubber bumpers on the lower control arms cushion their extreme upward movement.

WHEEL BEARING ADJUSTMENT (Fig. 5-2)

The proper functioning of the front suspension cannot be maintained unless the front wheel bearings are correctly adjusted. Cones must be a slip fit on the spindle and the inside diameter of cones should be lubricated to insure that the cones

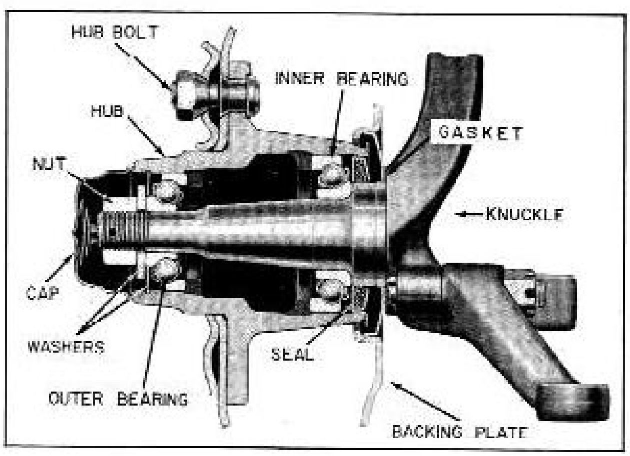


Fig. 5-2 Steering Knuckle and Hub Assembly

will creep. Spindle nut must be a free-running fit on threads.

The adjustment of front wheel bearings should be made as follows:

1. Tighten adjusting nut with a torque wrench to approximately 17 ft. lbs. to insure that all parts are properly seated and threads are free.

2. Back off nut and retighten to 4 ft. lbs.

3. If cotter pin hole in spindle and slot in nut line up, insert cotter pin; otherwise, back off adjusting nut to nearest line up of slot and hole and insert cotter pin.

HUB AND DRUM ASSEMBLY

REMOVE (WHEEL REMOVED)

1. Remove grease cap from hub.

2. Remove cotter pin, nut and washer from spindle.

3. Carefully pull hub and drum assembly from spindle.

   NOTE: It may be necessary to back off the brake shoe adjustment before the hub and drum can be removed.

DISASSEMBLY

1. Remove washer retaining the ball and separator assembly in the hub.

2. Remove the outer bearing inner race and the ball and separator assembly from hub.

3. Pry seal from hub, then remove inner bearing inner race and ball and separator assembly from hub.

4. If necessary to remove outer races, insert a brass drift into hub, indexing end of drift with notches in hub behind bearing outer race, and tap with a hammer.

CLEANING AND INSPECTION

NOTE: For inspection of front drums, refer to BRAKE DRUMS, Section 7.

1. Wash all parts in clean solvent with the exception of the ball and separator assemblies and races and air dry. Ball and separator assemblies should be washed in gasoline.

2. Check bearings for cracked separators and worn or pitted balls.

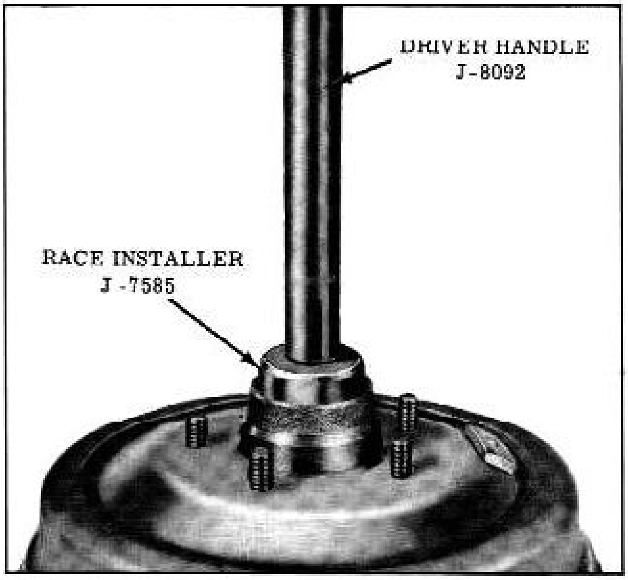


Fig. 5-3 Installing Outer Bearing Race

3. Check bearing races for cracks, scores or a brinelled condition.

ASSEMBLY

1. If the outer races were removed, drive or press the races into the hub as shown in Fig. 5-3 and 5-4.

INSTALL

1. Lubricate the bores of the inner races and fully pack the ball and separator assemblies with a sodium soap, fine fiber grease such as Marfax Heavy Duty No. 2.

2. Install inner bearing ball and separator assembly into outer race, then install inner bearing inner race.

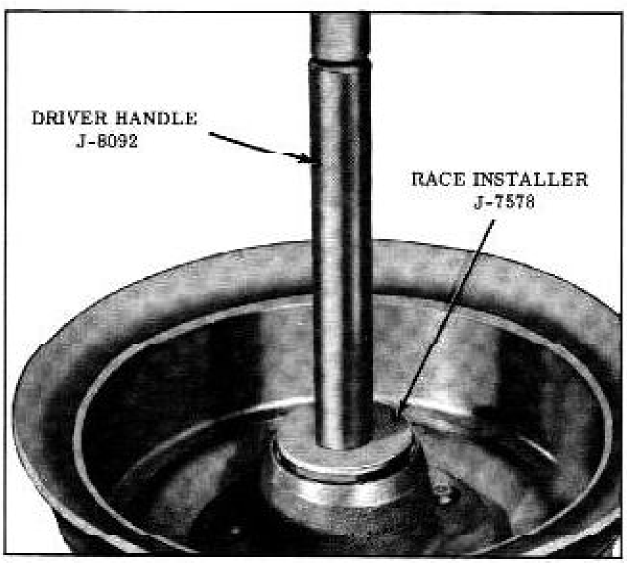


Fig. 5-4 Installing Inner Bearing Outer Race

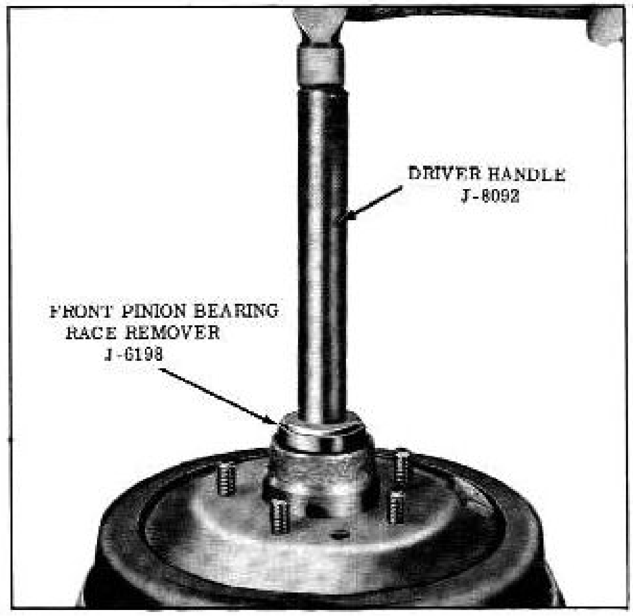


Fig. 5-5 Installing Outer Bearing Retainer Washer

3. Carefully tap seal into hub.

4. Install outer bearing ball and separator into hub. Position washer, which retains ball and separator in the hub, over bearing, and install with Tool J-6198. (Fig. 5-5)

5. Clean any traces of grease from brake lining and drum with fine sandpaper, then position hub and drum assembly over spindle.

6. Install outer bearing inner race over spindle, then install the washer and spindle nut. Draw spindle nut up snug and adjust bearing as outlined under WHEEL BEARING ADJUSTMENT.

7. Adjust brake shoes if necessary.

HUB BOLT REPLACEMENT

The following procedure should be followed whenever it is necessary to install a new hub bolt into the hub and drum assembly.

1. With the hub and drum assembly removed, drill a 5/8" hole 1/4" deep into the head of the hub bolt.

2. Support hub and drum assembly and drive or press hub bolt out through the front of the hub and drum assembly.

3. Press a new hub bolt into the hub.

4. While supporting hub bolt, peen hub bolt into the countersunk area of drum with the use of Peening Tool J-554-18 until the drum is secure to the hub. (Fig. 5-6)

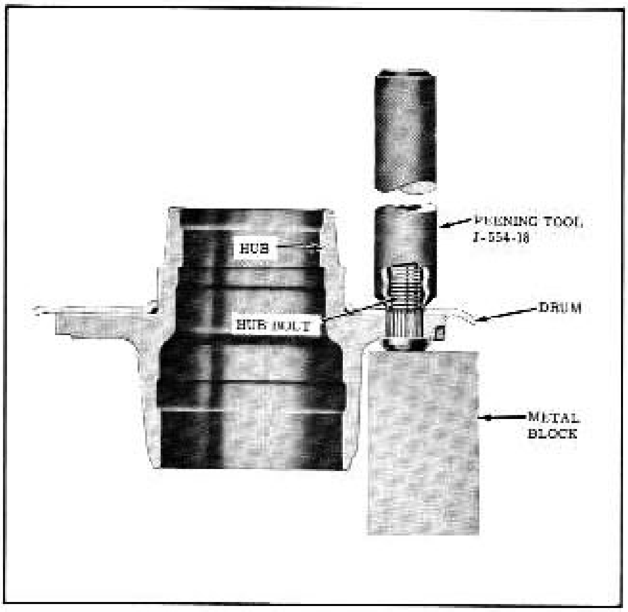


Fig. 5-6 Peening Hub Bolt

FRONT SHOCK ABSORBERS

A slight amount of fluid may bleed by the rod seal in cold weather and deposit a light film on the upper area of the shock absorber. This condition will not impair operation and should be considered normal. A shock absorber should never be checked horizontally or with the rod extension down.

For a complaint of a noisy or defective shock absorber, first check the mounting torque. If mounting is satisfactory, disconnect the lower mountings and pump the shock absorbers by hand in a vertical position. Compare both shock absorbers. If both shocks respond the same, it is unlikely that a defective shock absorber exists.

THUMPING NOISE

A thumping noise usually occurs when a shock absorber is changing its direction of stroke.

1. The shock absorber should be pumped with a rapid change of stroke. If lag is felt when changing stroke, this unit will be noisy.
2. Completely extend the shock absorber and pull hard. If spring tension is felt, this shock absorber will be noisy and should be replaced.

SQUEAKY OR REED TYPE NOISE

1. Hand pump the shock absorber at different rates of speed. If noise is heard that changes from a deep grunt to a high-pitched squeak, the shock absorber needs replacement.

   NOTE: A squealing noise could be attributed to seals. This is particularly true if the shock has been inoperative for a period of time. This noise will disappear after a few strokes of the shock absorber and is not a cause for rejection.

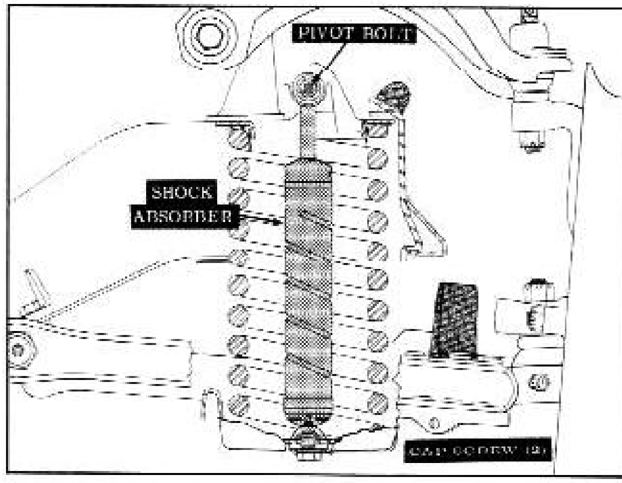


Fig. 5-7 Shock Absorber Mounting

REMOVE AND INSTALL (Fig. 5-7)

1. Remove upper pivot bolt from the shock absorber.
2. Remove the two cap screws and lock washers attaching shock absorber to lower control arm and remove shock absorber.

To install shock absorber, reverse sequence of operations. Torque the pivot bolt nut 65 to 75 ft. lbs. and the cap screws 15 to 25 ft. lbs.

STABILIZER

REMOVE AND INSTALL (Fig. 5-8)

1. Disconnect each side of stabilizer linkage by removing nut from link bolt; pull bolt from linkage, and remove retainers, grommets, and spacer.

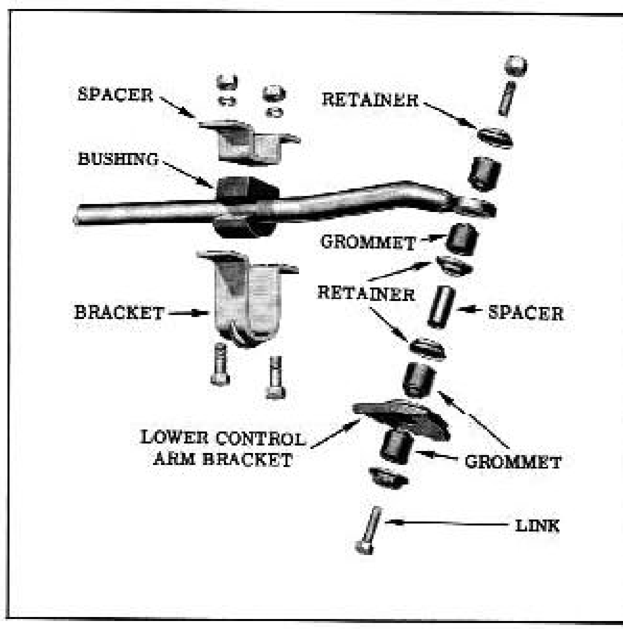


Fig. 5-8 Stabilizer Bar and Linkage

2. Remove bracket to frame bolts and remove stabilizer bar, rubber bushings, and brackets.
3. To replace, reverse sequence of operations. The rubber bushings should be positioned squarely in the brackets with the opening in the bushings facing the front of car. Torque stabilizer link nut 8 to 12 ft. lbs. and bracket bolts 25 to 45 ft. lbs.

IMPORTANT: Never lubricate stabilizer bar rubber bushings as they are dependent upon a bonding of the rubber to the bar for proper stabilizer action.

UPPER CONTROL ARM ASSEMBLY

REMOVAL

1. Raise front of car and support lower control arm with floor stands.

   NOTE: Since the weight of the car is used to relieve spring tension on the upper control arm, the floor stands must be positioned between the spring seats and ball joints of the lower control arms for maximum leverage.

2. Remove wheel, then loosen the upper ball joint from the steering knuckle as follows:
   a. Remove the cotter pin from the upper ball joint stud and clean threads of stud.
   b. Loosen the upper ball joint nut and install Tool J-8806 as shown in Fig. 5-9.

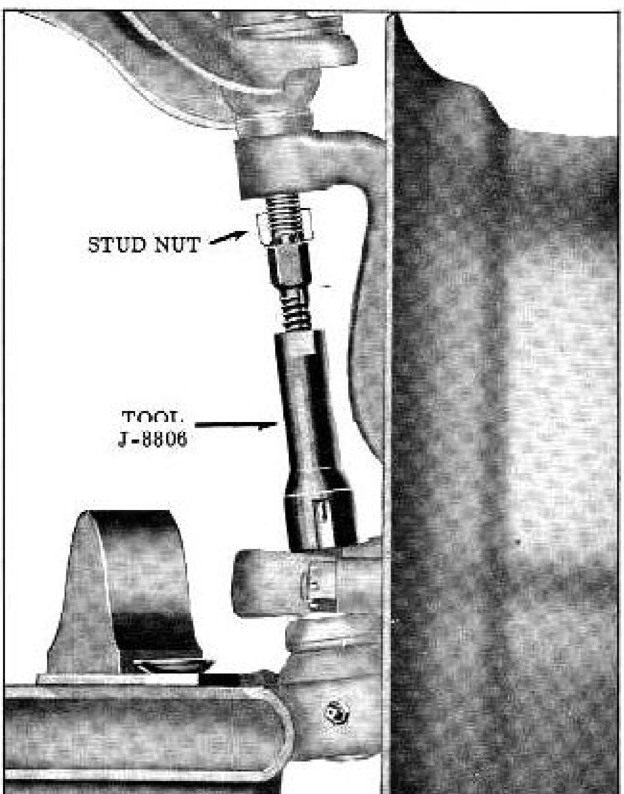


Fig. 5-9 Loosening Upper Ball Joint

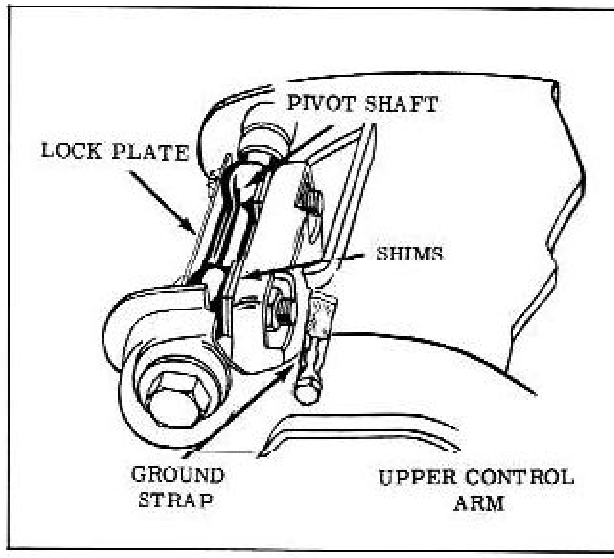


Fig. 5-10 Upper Control Arm Mounting

   c. Apply pressure on stud by expanding the tool until the stud breaks loose.
   d. Remove Tool J-8806 and upper ball joint nut, then pull stud free from knuckle.

4. Disconnect ground strap from control arm. Support the hub and drum to prevent weight of the assembly from damaging the brake hose.
5. Using a 7/8" deep flex socket with a long extension, remove the pivot shaft to frame attaching nuts from under the fender. (Fig. 5-10) Remove wheel alignment shims, control arm and pivot shaft assembly from car.

   NOTE: Keep shims grouped so that they may be reinstalled in their original position.

INSTALL

1. Position pivot shaft on the frame, then install pivot shaft attaching bolts, lock plate and nuts with the original alignment shims installed between the pivot shaft and frame on their respective bolts. Torque nuts 85 to 110 ft. lbs.
2. Remove the temporary support from the hub and drum, then connect ball joint to steering knuckle. Torque nut 40 ft. lbs. (minimum) and install cotter pin. Tighten nut further, if necessary to install cotter pin. Attach ground strap to control arm. (Fig. 5-10)
3. Install wheel, then check wheel alignment and adjust if necessary.

LOWER CONTROL ARM BALL JOINT REPLACEMENT (ON CAR)

IMPORTANT: If worn ball joint is suspected, check by attempting to chuck the top and bottom

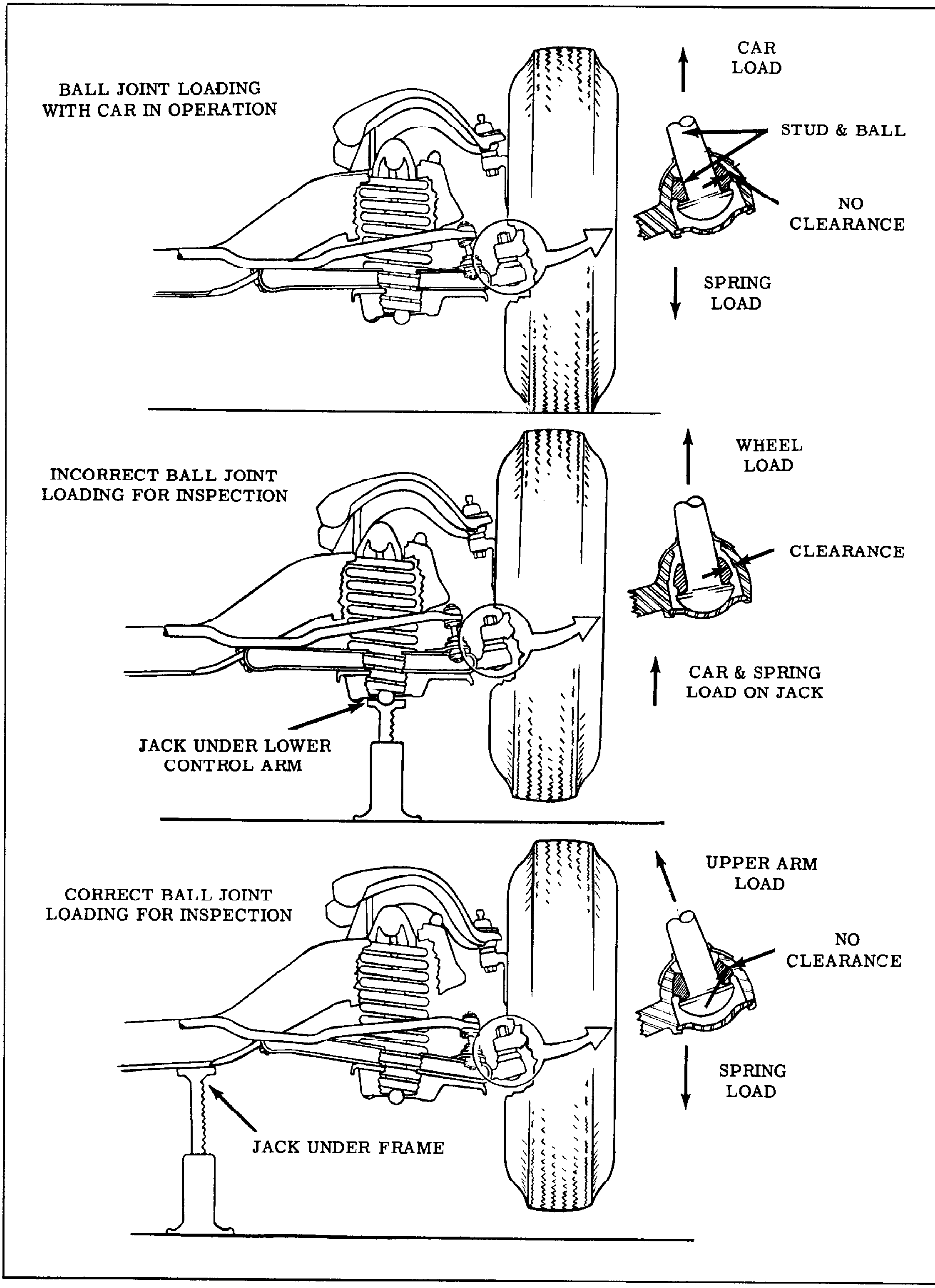


Fig. 5-11 Checking Lower Control Arm Ball Joint

of wheel in and out WITH THE WEIGHT OF THE CAR SUPPORTED BY THE FRAME (NOT THE LOWER CONTROL ARM). If the ball joint is loose, under this condition, it should be replaced. UNDER ANY OTHER CONDITION THE LOWER BALL JOINT MAY APPEAR TO BE WORN REGARDLESS OF ITS ACTUAL CONDITION. (Fig. 5-11)

1. Raise front of car, support outboard end of lower control arm with floor stand and remove wheel assembly.
2. Disconnect lower ball joint from steering knuckle using Tool J-8806.
3. Block steering knuckle, backing plate and hub and drum assembly away from the lower control arm to obtain accessibility.

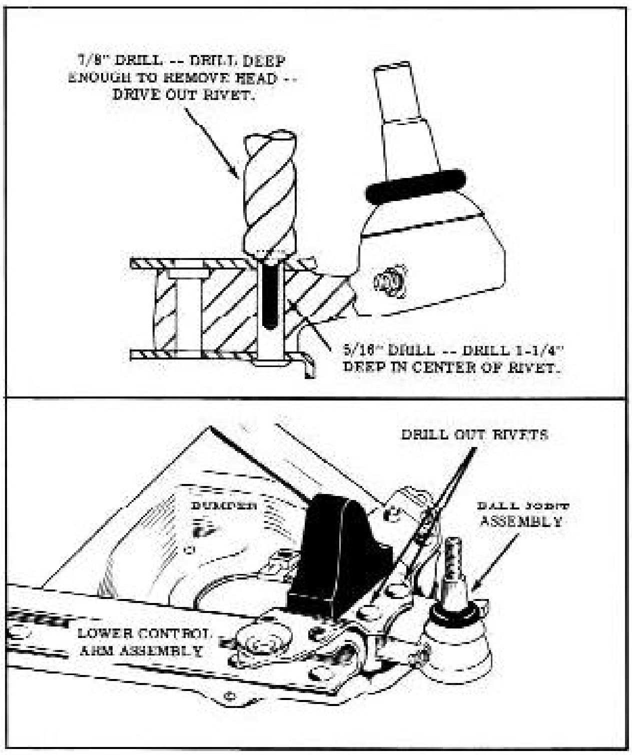


Fig. 5-12 Ball Joint Replacement

4. Follow instructions included in parts package for replacement of new ball joint. (Fig. 5-12)

NOTE: If the rivets cannot be driven out, then the bottom rivet heads must also be drilled out. Use extreme caution not to elongate holes in the lower control arm when drilling rivets.

LOWER CONTROL ARM ASSEMBLY AND/OR COIL SPRING

REMOVE

1. Raise front of car and support frame with floor stands.
2. Remove wheel assembly.
3. Disconnect stabilizer link from lower control arm.
4. Remove shock absorber.
5. Position a floor jack under lower control arm between the spring seat and ball joint. Raise floor jack until it supports lower control arm.
6. Disconnect the lower control arm ball joint from the steering knuckle as follows:

   a. Remove the cotter pin from the lower ball

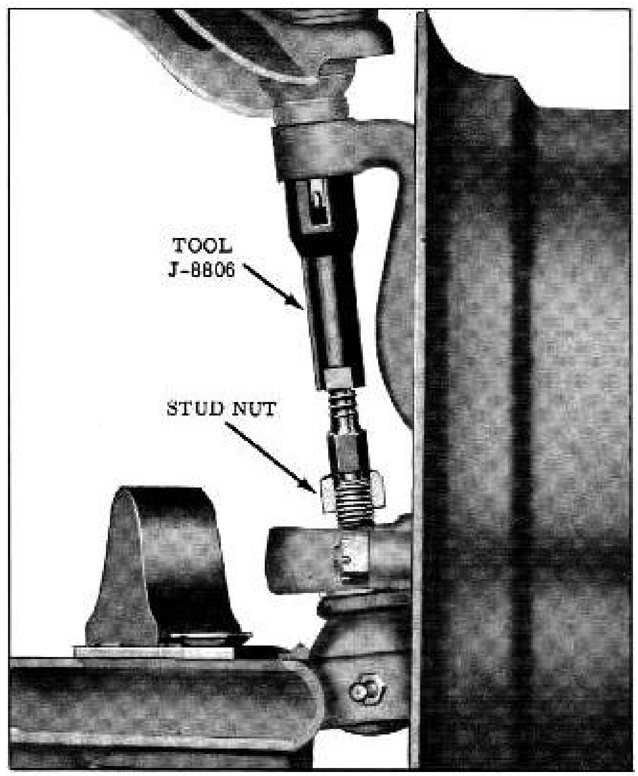


Fig. 5-13 Loosening Lower Ball Joint

   b. Loosen the lower ball joint nut, then install Ball Joint Removing Tool J-8806 as shown in Fig. 13.

   c. Apply pressure on stud by expanding the tool until the stud breaks loose from the steering knuckle.

   d. Remove Tool J-8806 and ball joint nut.

7. Slowly lower floor jack until spring is fully extended and remove spring.

IMPORTANT: The left and right coil springs on cars without air conditioning should not be interchanged. The coil spring part number is stamped on the outer side of the end coil.

8. If necessary to remove lower control arm, remove pivot shaft to cross member attaching bolts.

INSTALL

1. If the lower control arm was removed, connect control arm pivot shaft to frame cross member. Torque pivot shaft nuts 75 to 95 ft. lbs.
2. Tape spring insulator to the top of spring in at least 6 places.

   IMPORTANT: The top of the spring may be identified by a flat coil which will allow the insulator to seat squarely on the top coil.

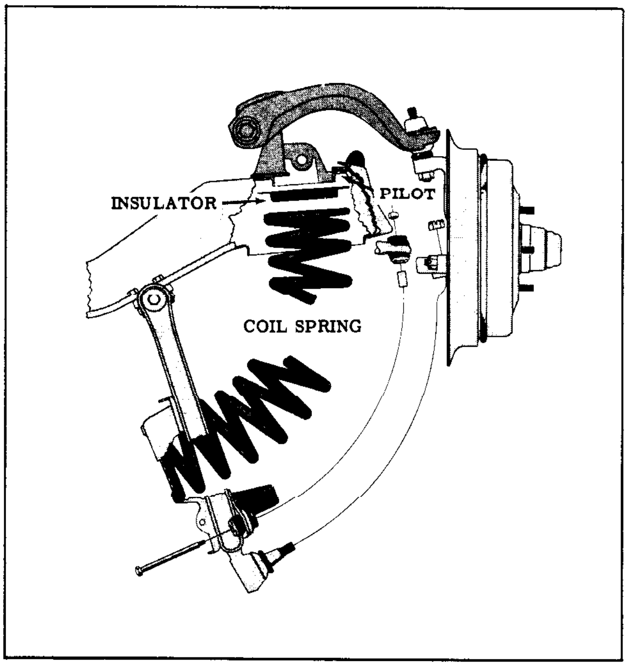


Fig. 5-14 Coil Spring Positioning

3. While holding spring and insulator against pilot in frame cross member, tilt spring so it will pilot in lower control arm. (Fig. 5-14). Rotate spring so the end of the bottom coil will index with edge of hole in control arm spring seat. The coil should not cover any portion of the hole.
4. Position floor jack between spring seat and ball joint. Chain the upper control arm to the base of the jack.
5. Raise control arm until the ball joint is tight in steering knuckle. Install ball joint nut and tighten to 40 ft. lbs. (minimum) and install cotter pin. Tighten nut further, if necessary, to install cotter pin.

   NOTE: A screwdriver slot is provided in the lower ball joint stud as a means of preventing the stud from turning when tightening the ball joint nut.
6. Install shock absorber.
7. Connect stabilizer link to lower control arm.
8. Install wheel and lower car.
9. Torque control arm shaft bushing bolts 50 to 60 ft. lbs. with weight of car on wheels.

STEERING KNUCKLE

REMOVE

1. Raise front of car and support lower control arms with floor stands.

   NOTE: Since the weight of the car is used to relieve the spring tension from the knuckle, the floor stands must be positioned between the spring seats and ball joints of the lower control arms for maximum leverage.
2. Remove front wheel and hub and drum assembly.
3. Remove backing plate without disconnecting brake hose. Leave plain arm connected to tie rod end.

   NOTE: Support the backing plate assembly out of way to avoid any strain on brake hose.
4. Disconnect the control arm ball joints from the steering knuckle as outlined under Control Arm Removal. (Fig. 5-9 and 5-13)
5. Remove steering knuckle from car.

INSTALL

1. Connect the upper and lower ball joints to the steering knuckle.
2. Torque stud nuts 40 ft. lbs. (minimum) and install cotter pins. Tighten further, if necessary, to install cotter pin.
3. Install a new backing plate to steering knuckle gasket on the steering knuckle.

   NOTE: A screwdriver slot is provided in the lower ball joint stud as a means of preventing the stud from turning when tightening ball joint nut.
4. Install backing plate and plain arm to steering knuckle. Torque backing plate anchor bolt 85 to 110 ft. lbs. and bend lock plate against bolt head.

   Torque plain arm to steering knuckle to backing plate nuts 80 to 130 ft. lbs.
5. Install wheel and hub and drum assembly. Adjust wheel bearings.
6. Lower car.

7. Check camber, caster and toe-in and adjust if necessary.

WHEEL ALIGNMENT

Front wheel alignment is the mechanics of adjusting all the interrelated factors affecting the running and steering of the front wheels of the automobile. Incorrect alignment of front wheels will result in hard steering and abnormal tire wear.

The front wheel alignment factors are:

1. CASTER (Fig. 5-15)
2. CAMBER (Fig. 5-16)
3. TOE-IN (Fig. 5-17)
4. TOE-OUT (STEERING GEOMETRY) (Fig. 5-18)

Before any attempt is made to check or correct Caster, Camber, Toe-In or Toe-Out, the following preliminary checks and necessary corrections should be made on those parts which influence the steering of the car:

1. Inflate tires to recommended pressure.
2. Check front wheel bearings and steering gear for proper adjustments.
3. Check front wheel and tire assemblies for radial and lateral runout.
4. Grasp front bumper in center and raise and lower front end several times to allow frame to come to its normal level. Check for erratic shock absorber action.

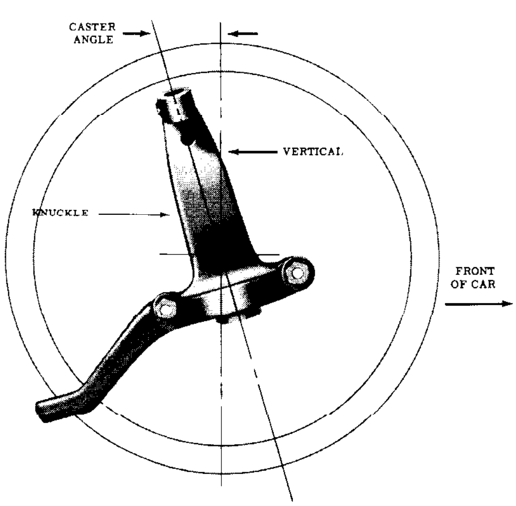


Fig. 5-15 Front Wheel Caster

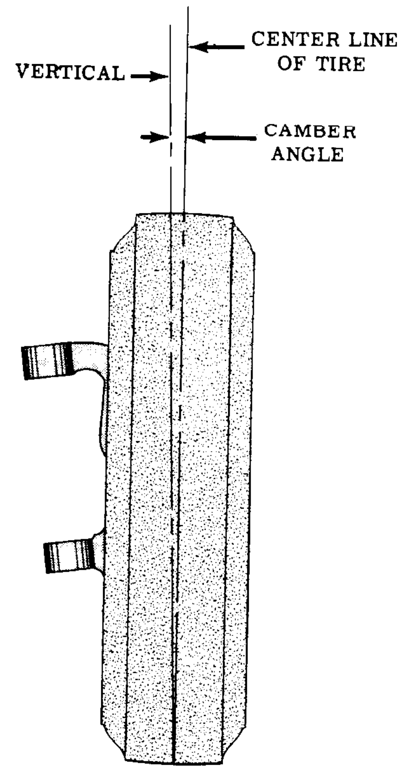


Fig. 5-16 Front Wheel Camber

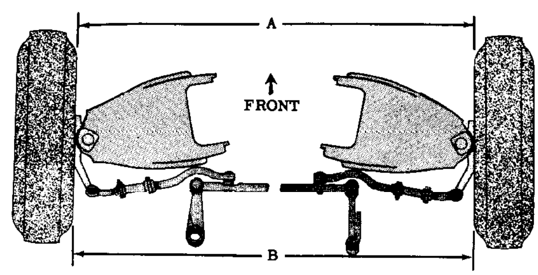


Fig. 5-17 Front Wheel Toe-In

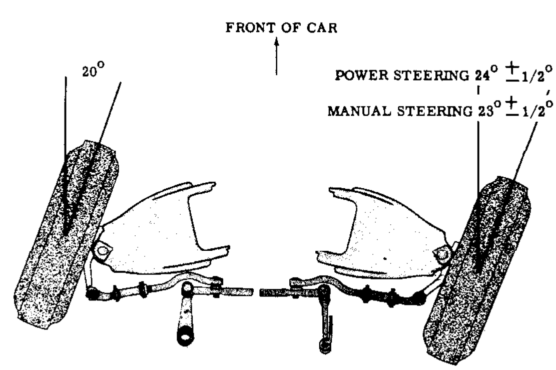


Fig. 5-18 Front Wheel Toe-Out

The method of checking alignment will vary depending on the type of equipment being used. The instructions furnished by the manufacturer of the equipment should be followed.

NOTE: Check front wheel alignment without passengers or load in or on car and with car doors closed as the addition of load or shifting of weight will result in incorrect alignment. Camber angle of the right and left wheel should be within $1/2^{\circ}$ of each other for best handling characteristics.

CASTER AND CAMBER ADJUSTMENT (Caster 0° to 1° –) (Camber ¼° – to ½° +)

Camber and Caster are adjusted by shims placed between the upper pivot shafts and the frame. (Fig. 5-19) Both caster and camber adjustments can be made at the same time after the wheel alignment checks have been completed.

In order to remove or install shims, do not remove weight from the front wheels. Loosen the pivot shaft to frame bolts using a 7/8" deep flex socket and a long extension.

NOTE: Loosen the top and rear fasteners on the fender filler plate aprons to gain access to the pivot shaft bolts.

Refer to the shim chart to determine the amount of shims necessary to correct the adjustment. After the correct number of shims have been installed, torque the pivot shaft mounting nuts 85 to 110 ft. lbs. and recheck caster and camber.

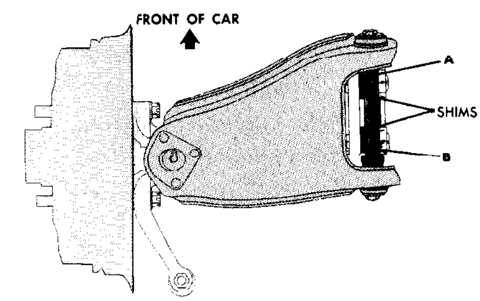
Shim Thickness	One shim added to or subtracted from BOTH BOLTS will change CAMBER	One shim added to or subtracted from FRONT BOLT ONLY will change CASTER
.020	$1/8^{\circ}$	$3/8^{\circ}$
.060	$3/8^{\circ}$	$1\text{-}1/8^{\circ}$
.120	$3/4^{\circ}$	$2\text{-}1/4^{\circ}$

TOE-IN ADJUSTMENT (0" to 1/16") Fig. 5-17)

1. Loosen the clamp bolts at each end of the steering tie rod adjustable sleeves.

2. With steering wheel set in straight ahead position, turn tie rod adjusting sleeves to obtain the proper toe-in adjustment.

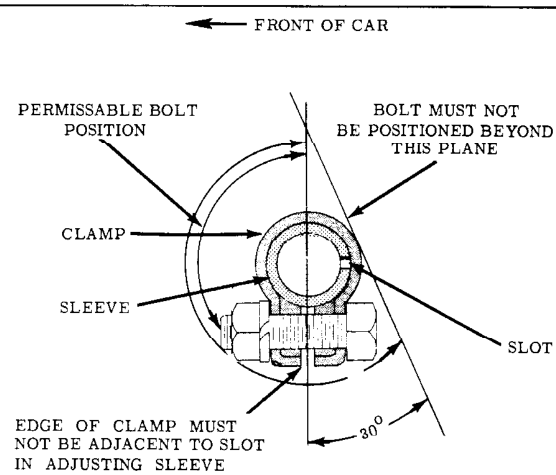
3. When adjustment has been completed according to the recommended specification, and tie rod and ball studs are riding squarely in their seats. Position inner clamps as shown in Fig. 5-20.



TO DECREASE POSITIVE CASTER:	ADD SHIM AT A
TO INCREASE POSITIVE CASTER:	REMOVE SHIM AT A
*TO INCREASE CAMBER:	REMOVE SHIMS AT BOTH A AND B
*TO DECREASE CAMBER:	ADD SHIMS AT BOTH A AND B

*NOTE: BY ADDING OR SUBTRACTING AN EQUAL AMOUNT OF SHIMS FROM A AND B, CAMBER WILL CHANGE WITHOUT AFFECTING CASTER ADJUSTMENT

Fig. 5-19 Caster and Camber Adjustments



POSITION ALL CLAMPS, EXCEPT LEFT HAND INNER CLAMP, AS ILLUSTRATED. LEFT HAND INNER CLAMP IS LOCATED BY A TIE ROD CLAMP POSITIONER.

Fig. 5-20 Tie Rod Clamp Positions

TOE-OUT (STEERING GEOMETRY) Fig. 5-18)

Toe-out is the mechanics of keeping the front wheels in proper relative alignment as the wheels are turned right or left. When turning, the wheels go into a toe-out position, (further apart at the front of the tire than they are at the back). This condition increases with the increase of the turn.

To check, turn wheels to right until left wheel has been turned 20° from straight ahead position. Right wheel setting should be $23^{\circ} \pm 1/2^{\circ}$ without power steering and $24^{\circ} \pm 1/2^{\circ}$ with power steering on all models. Then follow same procedure with wheels turned to left. Errors found are usually due to bent plain arms or incorrect caster, camber or toe-in. If error is due to bent plain arm, replacement with new arm should be made. When replacements of this kind are made, it is important that other front end parts are checked and front wheels realigned.

FRONT SUSPENSION DIAGNOSIS

WHEEL BEARING NOISE

Wheel bearing noise may be confused with rear axle noise; however, front wheel bearing noise does not change when comparing "pull" and "coast". A bad bearing will cause a knock or click approximately every two revolutions of wheel since the bearing rollers do not travel at the same speed as the wheel. To determine which wheel bearing is noisy, hoist the car and spin each wheel while listening at the hub cap.

HARD STEERING

Cause:

1. Low or uneven tire pressure.
2. Steering gear adjusted too tight.
3. Insufficient or incorrect steering gear lubricant used.
4. Improper caster.
5. Upper or lower control arms bent.
6. Frame bent or broken.
7. Steering knuckle bent.

EXCESSIVE PLAY OR LOOSENESS IN STEERING SYSTEM

Cause:

1. Steering gear adjusted too loosely or worn linkage.
2. Control arm ball joints worn.
3. Front wheel bearings worn or incorrectly adjusted.
4. Loose front stabilizer link or worn bushings.

ERRATIC STEERING ON APPLICATION OF BRAKE

Cause:

1. Low or uneven tire pressure.
2. Incorrect or uneven caster.
3. Steering knuckle bent.
4. Loose steering linkage or suspension.
5. Dirt or grease on brake lining.

FRONT WHEEL SHIMMY

Cause:

1. Uneven tire pressure.
2. Steering linkage worn.
3. Front wheel bearings worn or incorrectly adjusted.
4. Shock absorbers worn or inoperative.
5. Control arm ball joints worn.
6. Toe-in incorrect.
7. Incorrect or uneven caster.
8. Steering knuckle bent.
9. Wheels, tires, or brake drums out of balance.
10. Excessive runout of wheels or tires.

CAR PULLS TO ONE SIDE

Cause:

1. Low or uneven tire pressure.
2. Rear wheels not tracking with front wheels.
3. Shock absorbers worn or inoperative.
4. Toe-in incorrect.
5. Incorrect or uneven caster or camber.
6. Frame or frame member bent or broken.

WORN TIRE TREAD EDGES

Cause:

1. Improper front end alignment.
2. High speed driving on curves.
3. Steering knuckle bent.
4. Steering plain arm bent.
5. Low tire pressure.

SCUFFED TIRES

Cause:

1. Tires improperly inflated.
2. Wheels or tires out of true.

3. Control arm ball joints worn.
4. Toe-in incorrect.
5. Uneven caster.
6. Incorrect toe-out on turns.
7. Steering gear incorrectly adjusted.
8. Eccentric or bulged tires.

FRONT OR REAR WHEEL TRAMP

Cause:

1. Wheels, tires, or brake drums out of balance.
2. Shock absorbers worn or inoperative.
3. Loose or worn front wheel bearings.

CAR WANDERS

Cause:

1. Low or uneven tire pressure.
2. Steering gear adjusted to loosely or worn linkage.

REAR SUSPENSION

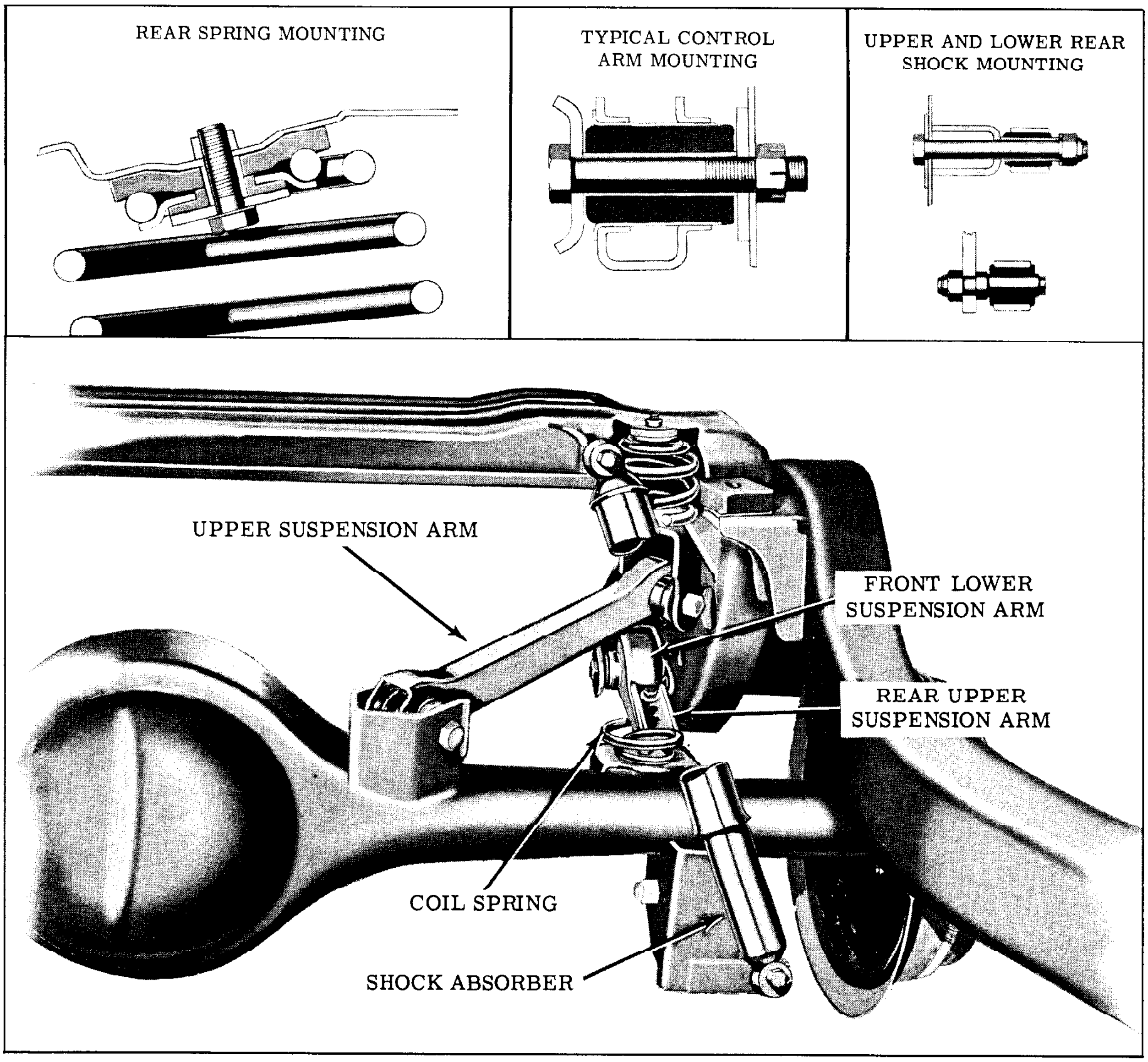


Fig. 5-21 Rear Suspension

REAR SHOCK ABSORBER

A slight amount of fluid may bleed by the rod seal in cold weather and deposit a light film on the upper area of the shock absorber. This condition will not impair operation and should be considered normal. A shock absorber should never be checked horizontally or with the rod extension down.

For a complaint of a defective or noisy shock absorber, first check the mounting torque. If mounting is satisfactory, disconnect the lower mountings and pump the shock absorber by hand in a vertical position. Compare both shock absorbers. If both shocks respond the same, it is unlikely that a defective shock absorber exists.

THUMPING NOISE

A thumping noise usually occurs when a shock absorber is changing its direction of stroke.

1. The shock absorber should be pumped with a rapid change of stroke. If lag is felt when changing stroke, this unit will be noisy.
2. Completely extend the shock absorber and pull hard. If spring tension is felt, this shock absorber will be noisy and should be replaced.

SQUEAKY OR REED TYPE NOISE

1. Hand pump the shock absorber at different rates of speed. If noise is heard that changes from a deep grunt to a high-pitched squeak, the shock absorber needs replacement.

   NOTE: A squealing noise could be attributed to seals. This is particularly true if the shock has been inoperative for a period of time. This noise will disappear after a few strokes of the shock absorber and is not a cause for rejection.

REMOVE AND INSTALL (Fig. 5-21)

1. Remove shock absorber lower mounting nut at axle housing lower suspension arm bracket.
2. Remove shock absorber upper pivot bolt from frame and remove shock absorber.

To install, loose-assemble shock absorber at both ends, then torque lower stud nut 30 to 46 ft. lbs. and the upper bolt and nut 75 to 95 ft. lbs.

REAR SUSPENSION ARMS (Fig. 5-21)

The rear axle housing is attached to the frame by 4 suspension arms. The lower arms are adjustable for length and control the differential nose angle. When removing and installing suspension arms, the frame and axle housing BOTH should be supported by floor stands or other suitable means. When installing a new lower arm, the same corresponding holes should be aligned as on the original arm. The upper arm and the lower arm front section must be installed with the open side of the channel facing downward. The lower arms are stamped "FRONT" and "REAR" for proper suspension installation.

CAUTION: Whenever a suspension arm is installed, torque the attaching bolts 65 to 75 ft. lbs. WITH THE CAR RESTING AT NORMAL CARRYING HEIGHT.

REAR SPRINGS

REMOVE AND INSTALL (Fig. 5-21)

1. Hoist rear of car and disconnect shock absorbers from rear axle housing.
2. Loosen parking brake cable clamps at frame and loosen suspension arms at frame and axle.
3. Support frame to relieve weight from springs.
4. Remove the upper and lower spring mounting bolts, washers, insulators and clamps.
5. Remove the coil spring and the two remaining insulators.

To install, reverse removal procedure. Tape upper insulator to coil springs without obstructing the bolt hole, to aid installation. Before tightening bolts, make sure that clamp stop is against end of coil spring. Torque upper and lower spring attaching bolts 45 to 65 ft. lbs.

NOTE: The use of Tool BT-6102 will align the spring with the lower mounting pad and hold the spring in a compressed position when installed on the forward side of the spring, spanning three coils.

CAUTION: Do not connect shock absorbers or tighten arm assembly bolts until the weight of the car is resting on the rear springs.

AXLE SHAFT, BEARING AND OIL SEAL (Fig. 5-22)

AXLE SHAFT—REMOVE

1. Remove wheel.

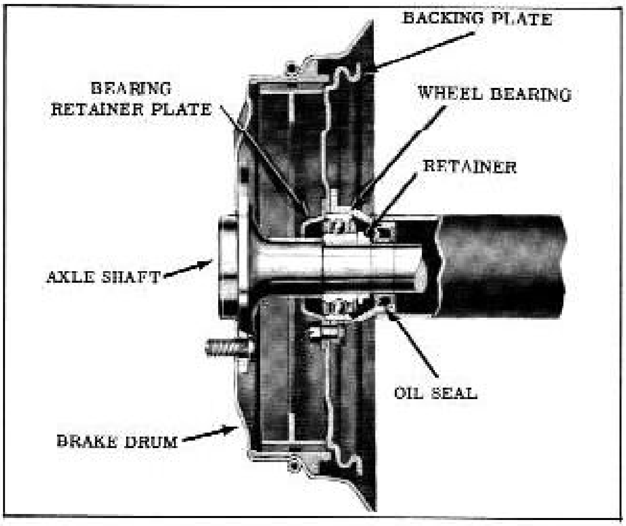


Fig. 5-22 Axle Shaft and Related Parts

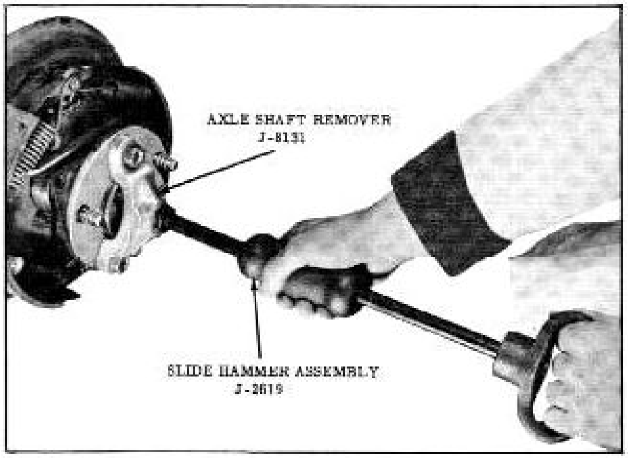


Fig. 5-23 Removing Axle Shaft

NOTE: Wheel nuts on left side of car have left hand threads.

2. Remove the two Tinnerman nuts from wheel studs which hold the brake drum in place and remove the drum.

NOTE: If Tinnerman nuts are removed by turning off threads, they can be reused, however, if nuts are damaged in any way they should be replaced.

3. Remove nuts from the four bolts attaching brake backing plate to axle housing.

4. Pull axle shaft bearing retainer plate away from backing plate, taking care not to dislodge backing plate as brake line may be damaged.

5. Pull axle shaft and bearing assembly from housing. Use Tool J-942-1 and Slide Hammer J-2619 if bearing is a tight press fit in the axle housing. (Fig. 5-23)

NOTE: Extreme care must be exercised to prevent the axle shafts from dragging on oil seal. Bearings should then be covered by a clean cloth to prevent dirt getting into bearings.

6. Replace one backing plate attaching nut to hold plate in position.

BEARING REMOVAL

The sealed rear wheel bearings are built with .012" to .015" end-play between balls and races and should not be rejected unless end-play is greater than .020" or definite roughness between ball and race can be felt when bearing is rotated by hand. The bearing should be checked for end-play and roughness before it is removed from the axle shaft because if bearing has been removed from the axle shaft it cannot be used again.

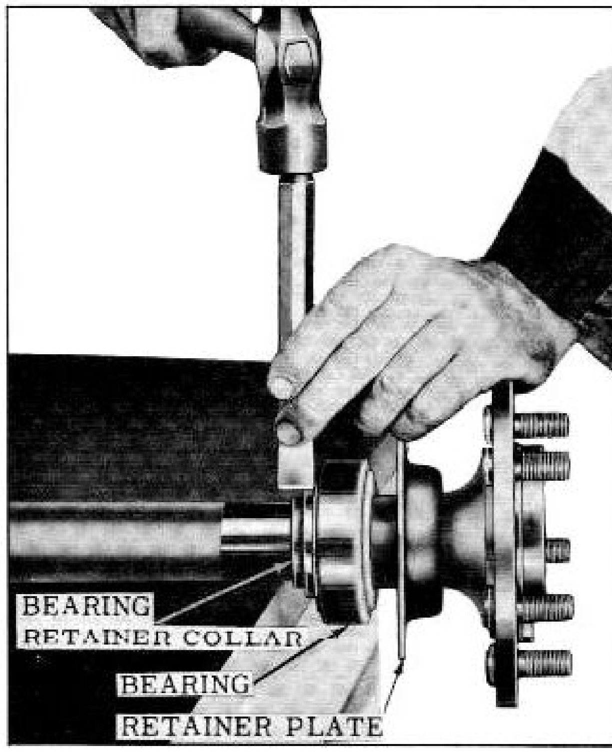


Fig. 5-24 Removing Bearing Retainer

NOTE: Tipping of either race can cause a large error in end-play reading.

1. With axle shaft removed, remove bearing retainer collar after splitting with cold chisel as shown in Fig. 5-24. Do not damage axle shaft.

2. Engaging outer race of bearing with Tool J-947-2, used in conjunction with J-947-1, press off bearing in arbor press, (Fig. 5-25). Remove bearing only when a new bearing is to be installed. (Tool J-947-2 is used during removal to prevent breakage of the bearing outer race which could result in personal injury.)

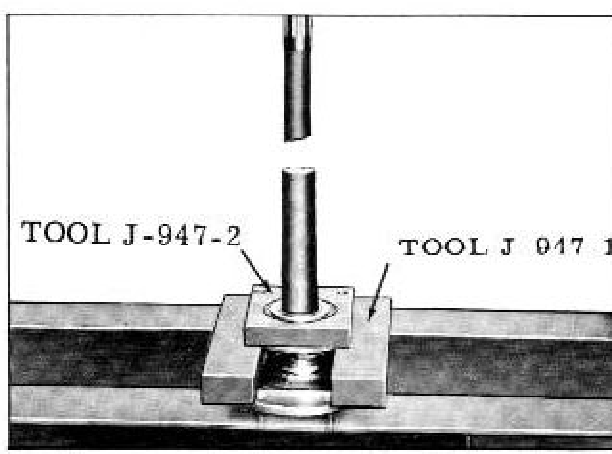


Fig. 5-25 Removing Axle Shaft Bearing

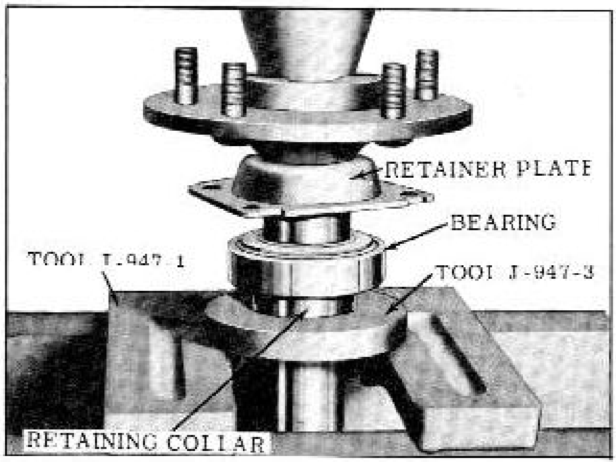


Fig. 5-26 Installing Axle Shaft Bearing Retainer

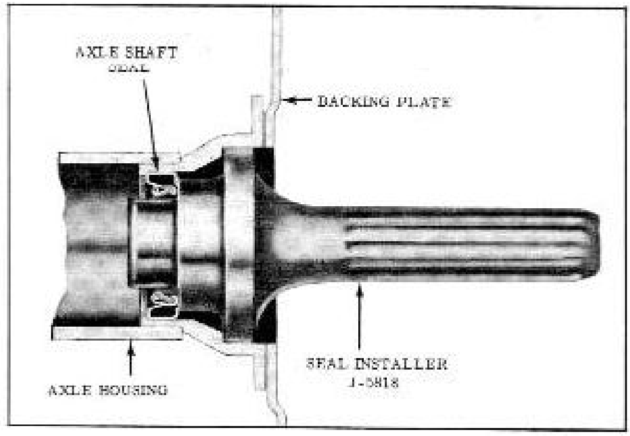


Fig. 5-27 Installing Rear Oil Seal

AXLE SHAFT FLANGE BOLT—REMOVE AND INSTALL

The axle shaft flange bolts can be removed by pressing bolts from axle flange. To install, press new bolts into flange using care not to damage threads. Support bolt head and peen bolt with Peening Tool J-554-18.

BEARING—INSTALL

1. Using Tool J-947-3 in conjunction with plate J-947-1, press bearing over axle shaft being sure that pressure is applied to inner race of bearing. After bearing has been pressed firmly against axle shaft shoulder, press new bearing retainer collar over axle shaft until it is firmly seated against bearing. (Fig. 5-26) Do not damage shaft oil seal surface.

AXLE SHAFT—INSTALL

Before installing axle shafts examine oil seals. The oil seals have feather edges which form a tight seal around the axle shafts. If these feather edges are damaged in any way, the oil seals must be replaced.

Examine the surface of the shaft on which the seal wipes to make sure that it is smooth and free from tool marks. If necessary, dress down shaft with crocus cloth.

If roughness or excessive play is detected in wheel bearings they should be replaced.

Axle shafts are serviced with wheel studs pressed into the flange of the shaft. The threads of these studs are left hand for the left hand side of the car and right hand for the right hand side of the car, thereby making the right and left hand shaft assemblies different for service.

1. Remove temporary nut holding backing plate to axle housing.
2. Clean inner surface of backing plate and place new gasket over backing plate mounting studs. Clean gasket side of retainer plate.
3. Slide axle shaft and bearing assembly into place. EXTREME CARE MUST BE EXERCISED WHEN SLIDING THE AXLE SHAFT THROUGH THE OIL SEAL TO AVOID DAMAGING THE SEAL.
4. Place retainer plate over backing plate mounting studs and install self-locking nuts. Torque 55 to 60 ft. lbs.
5. Replace brake drum and wheel assembly.

OIL SEAL (AXLE SHAFT REMOVED)

Remove

1. Insert splined end of axle shaft into seal.
2. With splined end of axle shaft contacting upper I.D. of seal, press down on axle shaft until seal is removed from axle housing.

Install

1. Apply P.O.B. No. 2 sealer to O.D. of seal.
2. Position seal into axle housing. Drive seal into housing with Tool J-5818 until seal is fully seated. (Fig. 5-27)

AXLE HOUSING

ALIGNMENT

If rear tire wear indicates that the axle housing may be bent, the alignment can be checked as follows:

1. Back the car squarely onto an alignment machine.

2. Compensate for wheel run-out the same as for checking front wheel toe-in.

3. Check camber readings which should be 1/4° negative to 1/2° positive.

4. Check the amount of toe-out, which should be 1/16" to 3/16".

   NOTE: Due to the fact that the car is backed onto an alignment machine, the actual toe-out will be read on the scale as toe-in. However, if the toe-out is checked with a tram gauge, disregard the aforementioned.

5. If a tram gauge is used for checking toe-out, it will still be necessary to perform steps 1 and 2 in order to check camber.

The necessary straightening operations may be performed using frame straightening equipment without removing the axle housing from the car. This procedure will allow checks during the straightening operation to determine when the housing is within the prescribed limits.

WHEELS AND TIRES

CHECKING TIRES FOR LEAKS

With wheel assembly removed, inflate tire to recommended pressure, then submerge wheel assembly in a water tank or run water over tire to locate leak. Mark location of leak with a crayon.

DISMOUNTING TIRES

1. With wheel assembly removed, remove valve cap and core to deflate tires.

2. Use commercial type bead breaker to loosen tire sealing beads from rim.

   CAUTION: DO NOT use tire irons for breaking beads from rim as this may damage beads.

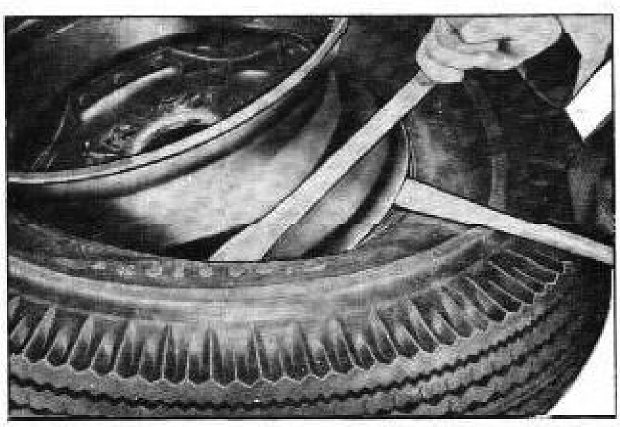


Fig. 5-28 Removing Tire

3. After beads have been loosened, remove the outside bead from the rim with two tire irons.

4. Turn the tire over and again use tire irons, one between the rim and bead to pry the rim out, the other to pry outward between the tire bead and rim as shown in Fig. 5-28.

REPAIRING TIRES

There are several methods of repairing tubeless tires. Oldsmobile recommends only two methods for repairing punctures not exceeding 3/16" in diameter.

a. The Hot Patch Method:

   This method uses a patch which requires heat (either self-contained or electrically applied) to vulcanize the patch to the tire.

b. The Self-Vulcanizing Method:

   In this method, no heat is required because the vulcanizing action is chemically performed.

Hot Patch Repair Method

1. Clean out the injury with hand rasp furnished with the tire repair kit.

2. Using sealing gun, fill puncture from the outside of the tire as shown in Fig. 5-29.

3. Thoroughly clean inside of tire around injury with methyl chloroform. Allow the cleaned area to dry.

4. Roughen area around injury with hand buffer or wire brush.

5. Spread an even coating of rubber cement over the puncture, slightly larger than the patch area, and allow it to dry for 5 minutes.

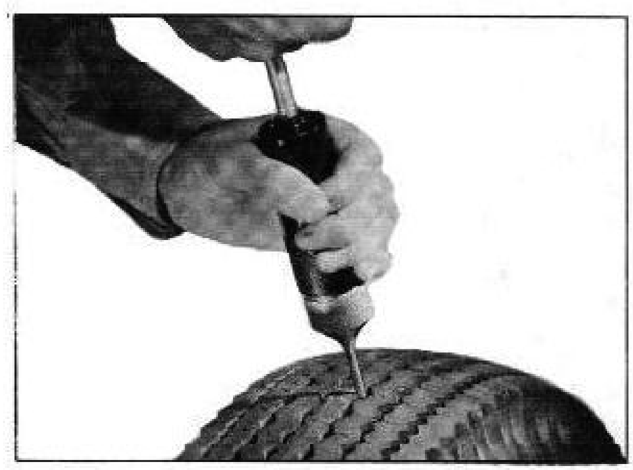


Fig. 5-29 Using Sealer Gun

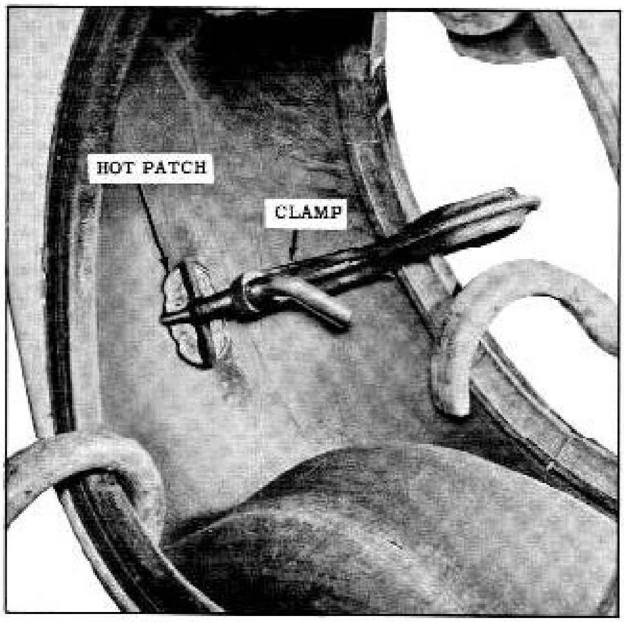


Fig. 5-30 Hot Patch Application

6. Remove protective tape from patch on patches containing own source of heat. Prepare patch material for igniting by loosening material with point of a knife.

7. Carefully center patch over injury and hold in place using special clamp. Tighten clamp maximum finger tight. (Fig. 5-30)

8. Apply heat to patch. Allow to cool 15 minutes.

9. If self-contained heat patch was used, carefully remove metal cup and blow out any ashes remaining in tire.

Self-Vulcanizing Method

(Firestone Tubeless Tire Repair Kit No. 3-K-164)

NOTE: This method should be used only for tires WITHOUT soft puncture-sealing material on the inside surface of the tire. The following procedure should be followed in using the kit.

1. Clean out the injury with the awl to remove puncturing object and foreign material.

2. Thoroughly clean the inside of the tire around the injury with methyl chloroform. Allow to dry.

3. Fill the injury with Filler Rubber (supplied in kit) using the awl as follows:

   a. Clean awl needle and dip in Self-Vulcanizing Fluid. From inside of tire, force needle through tire until point extends beyond tread.

   b. Remove detachable handle from awl needle.

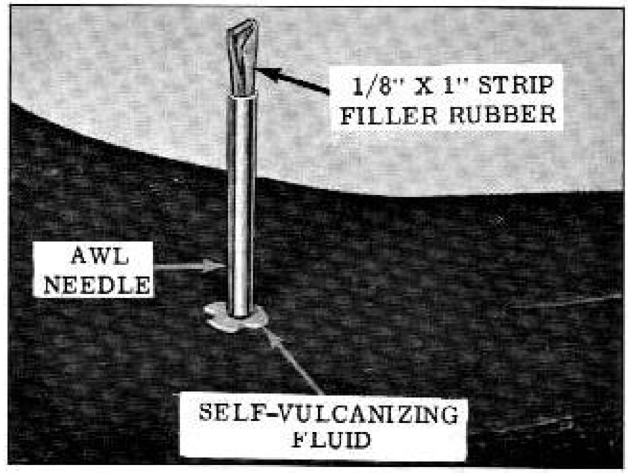


Fig. 5-31 Sealing Injury With Filler Rubber

   Cut 1/8" x 1" strip of Filler Rubber, remove protective cover and insert into hole of awl needle with end of rubber strip extending beyond the needle. (Fig. 5-31)

   c. Pull needle through tire with pliers. Filler Rubber will remain in the puncture. Cut off excess rubber flush with inside of tire.

   The injury may also be filled from the outside or inside of the tire with a sealant gun. Hold gun tip firmly against puncture and force sealant until it comes through the other side of the tire.

4. Thoroughly roughen area around puncture, slightly larger than patch, with wire brush included in kit. Remove all traces of lubricant, foreign material, etc. Do not use additional solvent after buffing.

5. Apply an even coating of Self-Vulcanizing Fluid over buffed area. IMPORTANT: Allow to dry 5 minutes until no longer tacky.

6. Remove foil backing from patch. Place over injury and iron down firmly, expecially the edges, with roller tool included in kit. To prevent buckling and insure a good seal, roll patch from the center toward the outer edges. (Fig. 5-32) Vulcanization is completed chemically. The repaired tire can be placed back in service immediately.

VALVE REMOVAL AND REPLACEMENT (Tire Removed)

To remove a rubber "snap-in" valve from rim, force a small screwdriver blade between valve and edge of hole. Then, while prying on valve to start groove out of edge of hole, push the valve back through the rim.

IMPORTANT: To insure against air leaking around the valve, always use a new valve once a valve is removed from the rim.

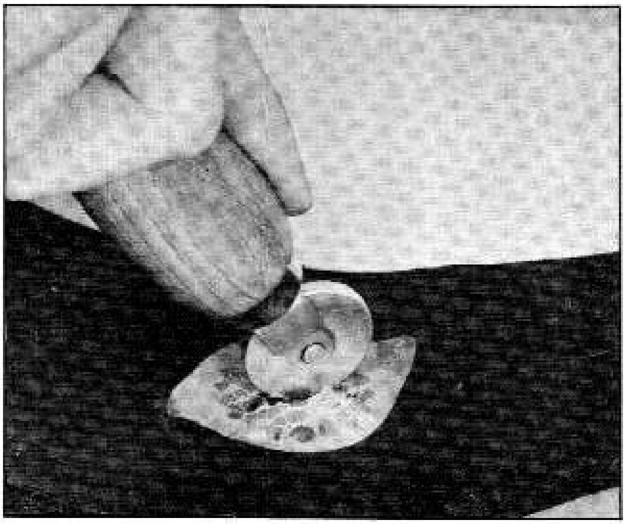


Fig. 5-32 Rolling Patch

The one piece "snap in" type rubber valve is installed as follows:

1. Clean all particles of foreign matter from around the area and the edges of the valve hole in the rim with steel wool.
2. Lubricate the outside of the valve with water or a very light film of tire lubricating soap such as GM-2251 or Ru-Glyde.

   IMPORTANT: DO NOT USE GREASE OR DRY SOAP AS IT WILL DETERIORATE THE RUBBER.

3. Insert the "snap-in" type rubber valve through the hole in rim as far as it will go, then pull the valve through the hole with a tire valve fishing tool until the valve snaps into position. (Fig. 5-33)

   NOTE: Do not attempt to drive the valve into position with a hammer or pull the valve with pliers as damage to the valve may result.

MOUNTING TIRES

Tire mounting machines or tire irons can be

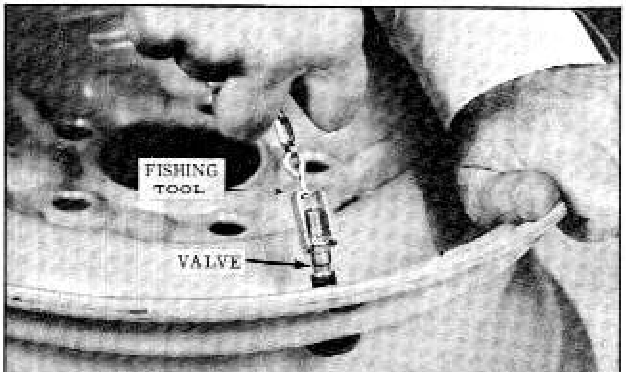


Fig. 5-33 Installing Valve

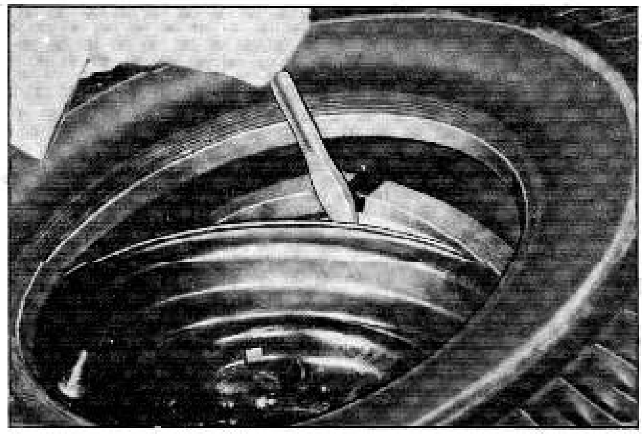


Fig. 5-34 Mounting Tire

used, however, extreme care must be exercised to prevent injury to the sealing bead and circumferential bead when forcing tire over rim.

1. If a new tire is to be mounted, remove the cardboard spacer.
2. Apply a light film of tire lubricating soap GM-2251 or Ru-Glyde to sealing beads of tire.

   NOTE: DO NOT use excessive lubricant as this may lead to rim slippage and subsequent breakage of air seal.

3. Carefully mount inner bead in usual manner. If tire irons are used, take small "bites" around rim being careful not to injure the tire bead. (Fig. 5-34)

   CAUTION: DO NOT use a hammer, as damage to bead will result.

4. Install outer bead in the same manner.

   Fig. 5-35 illustrates a tire mounting band slipped around the outside of the tire to compress center of tire tread to force bead out against the rim seat. A sash cord winched

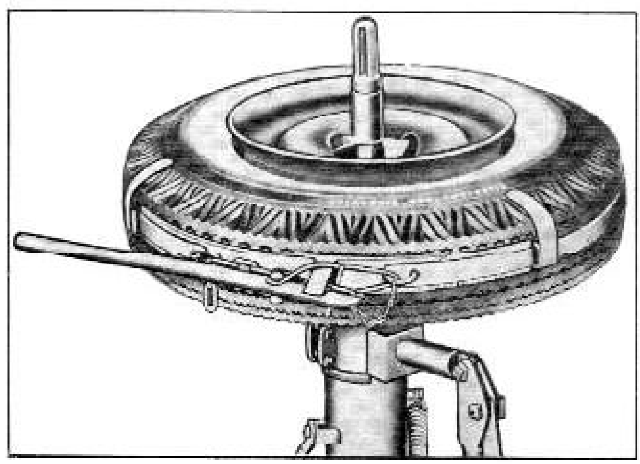


Fig. 5-35 Tire Mounting Band

around a jack handle will serve the same purpose.

5. While holding the tire in upright position, press against the outside of the wheel. This will start the outside bead onto the bead seat.

6. Next, lean the tire so the weight of the wheel will help seat the inside bead.

7. Give a few quick "shots" of air to seat the tire beads on the bead seats.

CAUTION: KEEP HANDS AWAY FROM TIRE BEAD RIM DURING THIS OPERATION.

8. Inflate tire to 40 pounds.

9. Check to be sure that the bead positioning rib (outer ring of tire) is visible evenly just above the rim flange all the way around tire, both sides.

10. Deflate to recommended air pressure.

TIRE INFLATION

Maintenance of the correct inflation pressure is one of the most important elements in tire care.

For recommended tire pressure (tires cold) refer to chart.

TIRE INFLATION

SERIES	Front p.s.i.	Rear p.s.i.
88-S88 (8.00 x 14 Tires)	24	22*
88-S88 (8.50 x 14 Tires)	22	22*
98	22**	22

*24 Fiestas
**24 If equipped with 8.50 x 14 tires and Air Conditioning

Too great a tire pressure is detrimental, but not so much as under inflation. Higher inflation pressure than recommended will cause:

1. A harder riding car.
2. A tire more susceptible to various types of bruises.
3. Tire chatter, resulting in uneven wear.
4. Excessive wear at the center of the tire tread.

Even when a tire is properly inflated, it is flat where it contacts the road so that the car at all times is in effect being pushed up hill. This condition is exaggerated on an under-inflated tire.

Inflation pressures lower than recommended will result in:

1. Higher gasoline consumption.
2. Rapid and uneven wear on the edges of the tire tread.
3. A tire more susceptible to rim bruises and various types of rupture.
4. Increased cord fatigue or broken tire cords.
5. Hard steering.
6. High tire temperatures.
7. Car roll on sharp curves.
8. Tire squeal on curves.

TIRE NOISE

Complaints of axle noise are more frequently caused by tires than by differential gears, bearings, etc.

Tire noise is frequently diagnosed as axle noise. The process of determining whether the noise is caused by tires is relatively simple. Tire noise is relative directly to the speed of the car and the road surface. Tests made for drive, float, and coast noise as used for differential testing will have little or no effect on noise level if tires are the cause.

VARIOUS TYPES OF TIRE WEAR

Under Inflation Wear

Under inflation results in abnormal wear of the tread shoulder, caused by the tires rolling on the shoulders with a wiping action. (Fig. 5-36)

In addition, under-inflated tires are subjected to continual flexing, causing high internal temperatures and cracking of the sidewall.

Over Inflation Wear

Over inflation causes the center section of the tread to receive excessive driving and braking, therefore, the center section is worn more than the shoulders. (Fig. 5-37) An over inflated tire is subject to breaks in the fabric from severe impacts and is more easily cut or punctured.

Toe-in or Toe-out Wear

Excessive toe-in or toe-out has the effect of dragging the tires sideways down the road, which results in feathering the raised portions of the tread.

Improper toe-in is indicated by feather edges on the inner side of the tread. (Fig. 5-38) Toe-out is indicated by the feather edges on the outer side of the tread.

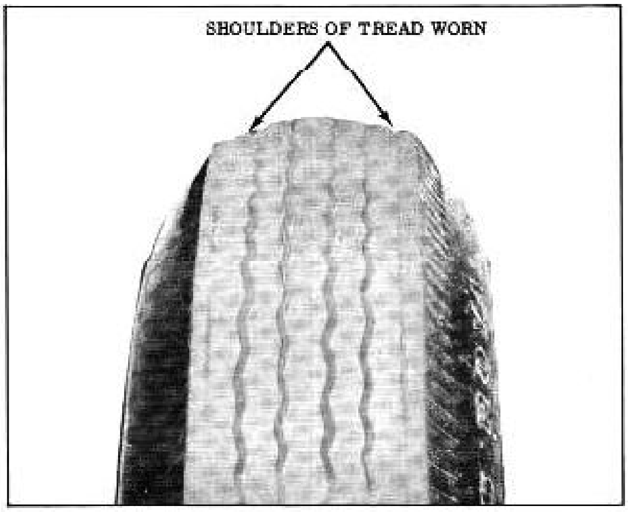


Fig. 5-36 Under Inflation Wear

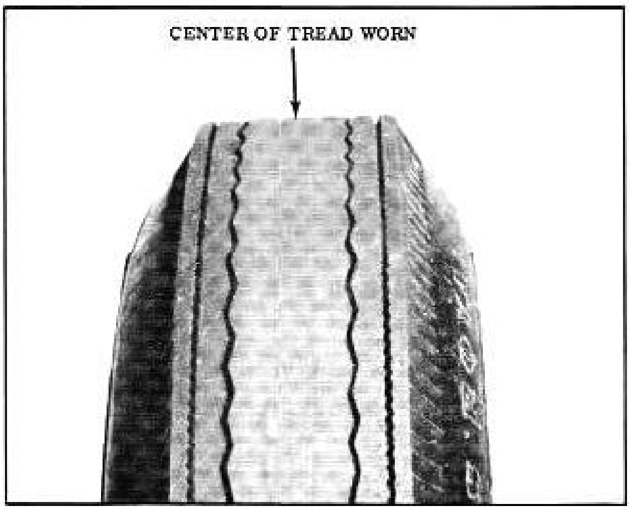


Fig. 5-37 Over Inflation Wear

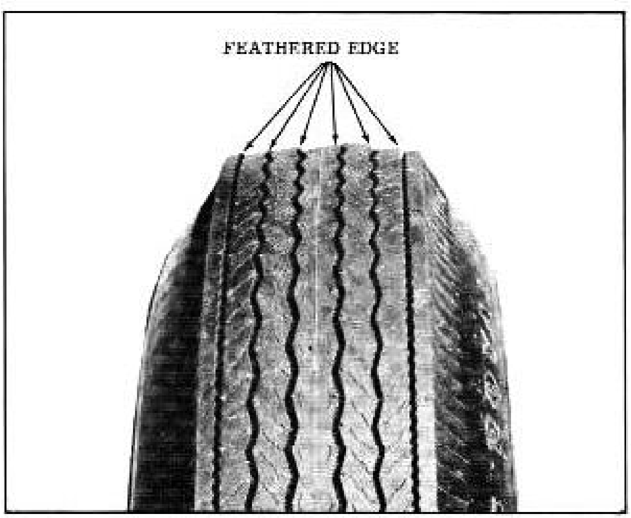


Fig. 5-38 Toe-In Wear

Camber Wear

Excessive positive camber will cause wear on the outer side of the tread. (Fig. 5-39) Excessive

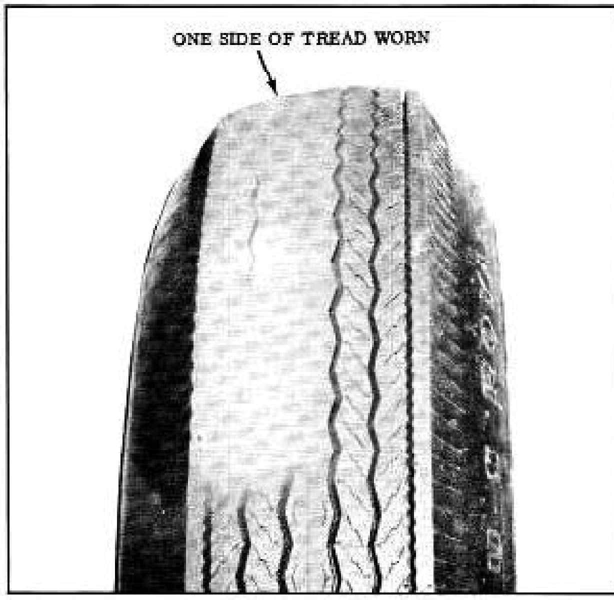


Fig. 5-39 Camber Wear

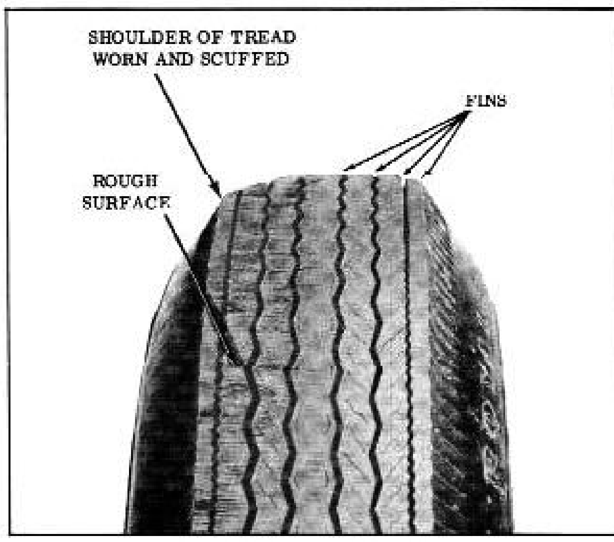


Fig. 5-40 Cornering Wear

negative camber will cause wear on the inner side of the tread. Camber wear may also be evident if the car is driven continually on highly crowned roads.

Wear Due to Driver Habits

Owner driving habits may cause cornering wear, rear tire inside wear, and front tire heel and toe wear even though all wheel alignment factors are within specifications and tires are properly inflated.

Cornering wear, caused by high speeds on turns, is identified by the rounded shoulders of the tire and small rough abrasions and fins raised by cornering friction against the road. (Fig. 5-40)

Rear tire inside wear is caused by rapid acceleration which causes the axle to bend slightly in a horizontal plane to toe-in the rear tires. This

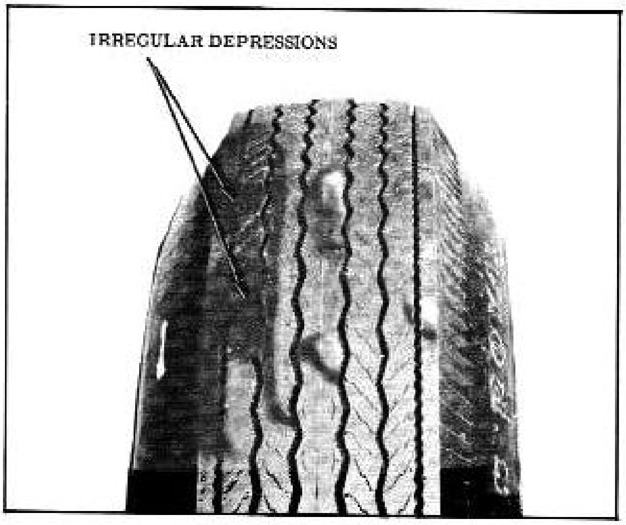


Fig. 5-41 Wear Due To Mechanical Conditions

results in excessive wear on the inner shoulders of the rear tires and is similar in appearance as camber wear. (Fig. 5-39)

Wear Due to Mechanical Conditions

Loose parts of the front suspension system such as worn ball joints, mountings of the upper and lower control arms, inoperative shock absorbers and unbalanced wheels and tires, will cause flat spots, cups, gouges and wavy wear. (Fig. 5-41)

TIRE ROTATION

In order to obtain maximum tire tread life and keep the spare tire from deteriorating due to lack of use, tires should be rotated at 4,000 mile intervals as shown in (Fig. 5-42)

TIRE AND WHEEL RUNOUT

Wheel and tire assemblies may be checked for runout with a dial indicator at points shown in Fig. 5-43. Runout should not exceed the following limits:

Tire Runout:	Radial	.100"
	Lateral	.125"
Wheel Runout:	Radial	.050"
	Lateral	.060"

NOTE: Tire runout should be checked as soon as possible after car has been driven to avoid false readings due to the tendency of tires to take a temporary "set" after standing for a few hours.

WHEEL AND TIRE BALANCE

Wheel, tire, and brake drum balance must be

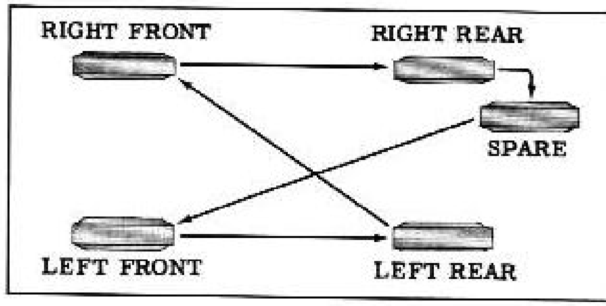


Fig. 5-42 Tire Rotation

maintained within certain limits; otherwise, wheel tramp and high speed shimmy will result.

Front wheel "tramp" and front wheel "shimmy" are two entirely different conditions. Front wheel "tramp", which usually occurs at high speed, is a wheel "hop" caused from an unbalanced condition of wheels, loose linkage in the front end, or improperly operating shock absorbers.

"Shimmy" may occur at the lower speeds and is a wobbly condition of the front wheels caused from an unbalanced condition, loose front end linkage, loose steering gear parts, or faulty steering gear adjustment. "Tramp" and "shimmy" will be felt in the whole car, however, "shimmy" can also be felt at the steering wheel. "Shimmy" is a front wheel condition entirely, whereas it is possible to have "tramp" in front or rear wheels.

Due to the irregularities in tread wear caused by sudden brake application, misalignment, low inflation pressure, or tire repair, etc., a wheel and tire assembly may lose its original balance. Consequently, if front end instability develops, the tire and wheel assembly should be checked for static and dynamic balance.

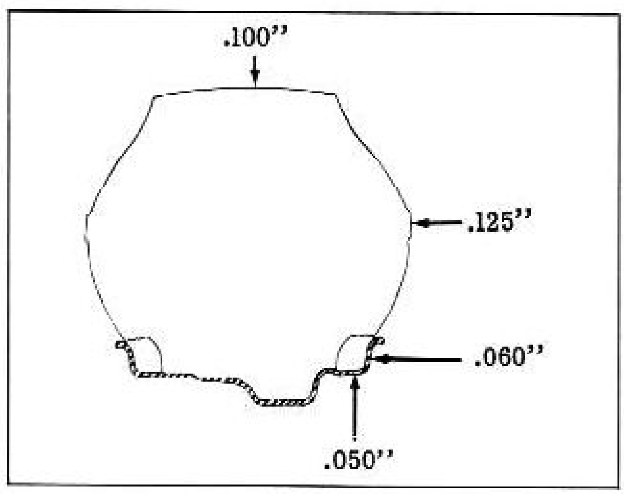


Fig. 5-43 Runout Specifications

SPECIFICATIONS

FRONT SUSPENSION

1. CASTER ANGLE (DEGREES)	0^{o} to 1^{o}-
2. CAMBER (DEGREES)*	$1/4^{o}$- to $1/2^{o}$+
3. TOE-IN	0" to 1/16"
4. TOE-OUT ON TURNS	
MANUAL STEERING	20^{o}=23^{o} $\pm$ $1/2^{o}$
POWER STEERING	20^{o}=24^{o} $\pm$ $1/2^{o}$
5. BALL JOINT INCLINATION	11^{o}
6. TREAD	61"
7. CARRYING HEIGHT	11-3/8" to 12-1/16"

*Maximum Camber variation between either side of the car should not exceed $1/2^{o}$.

REAR SUSPENSION

1. REAR AXLE	
a. Tread	61"
b. Road Clearance at Differential	7.05"
c. Allowable Out-of-True of Housing on the Vertical (At Rear Wheel)	$1/4^{o}$ neg. to $1/2^{o}$ pos. camber
d. Allowable Out-of-True of Housing on the Horizontal (At Rear Wheel)	1/16" to 3/16" Toe-Out
2. CARRYING HEIGHT	
a. All Except Fiestas	5-13/16" to 6-9/16"
b. Fiestas	5-3/8" to 6-1/8"

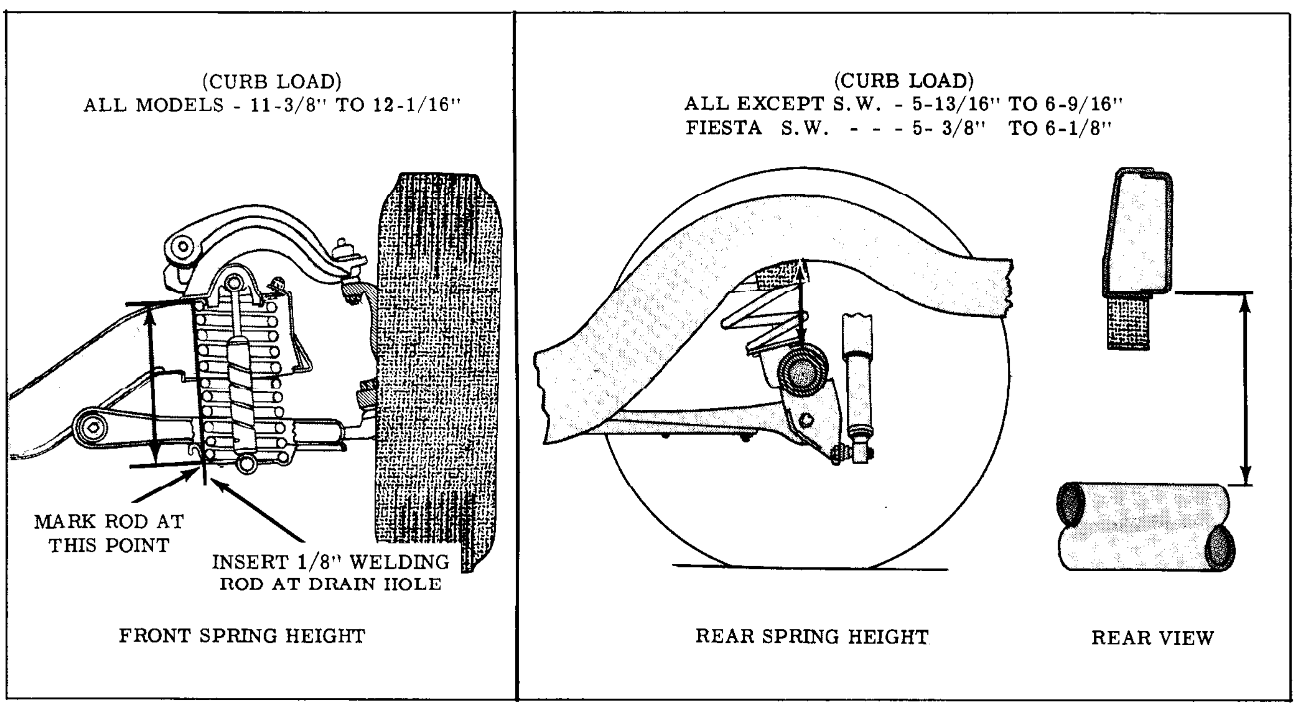


Fig. 5-44 Spring Carrying Heights

WHEELS AND TIRES

1. WHEEL BASE

   a. 88 & S88 . . . . 122.9"
   b. 98 . . . . 125.9"

2. WHEELS

   a. Rim Diameter . . . . 14"
   b. Rim Width . . . . 6"
   c. Radial Runout* . . . . .050" Max.
   d. Lateral Runout* . . . . .060" Max.

3. TIRES

   a. Radial Runout* . . . . .100" Max.
   b. Lateral Runout* . . . . .125" Max.

*Total Indicator Reading

TIRE SIZES

Series	Standard	Optional (U.S. Only)
88 & S88 Without Factory Installed Air Conditioning	8:00 x 14	8:50 x 14
88 & S88 With Factory Installed Air Conditioning	8:50 x 14	---
98 Without Factory Installed Air Conditioning	8:50 x 14	9:00 x 14
98 With Factory Installed Air Conditioning	9:00 x 14	---

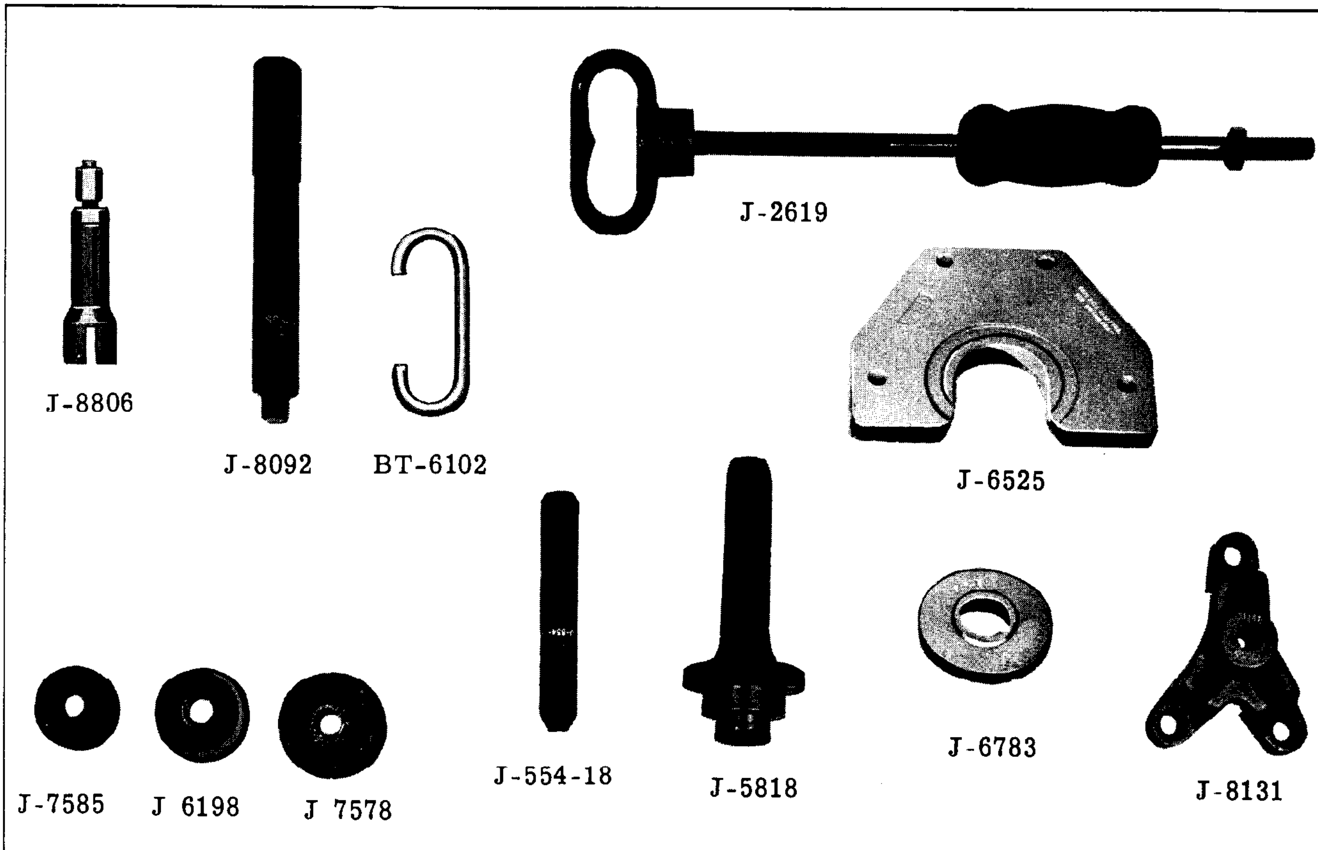
TORQUE TIGHTNESS CHART

NOTE: Specified torque is for installation of parts only. Checking of torque during inspection may be 15% below the specifications.

APPLICATION	Ft. Lbs.
FRONT SUSPENSION	
Stabilizer	
Stabilizer Link Nut	13 to 17
Stabilizer Bar Bracket to Frame Bolt & Nut	25 to 45
Shock Absorber	
Shock Absorber Upper Pivot Bolt & Nut	65 to 75
Shock Absorber to Control Arm Bolts	15 to 25
Control Arms	
Upper Control Arm Pivot Shaft to Frame Bolts & Nuts	85 to 110
Lower Control Arm Pivot Shaft to Frame Bolts & Nuts	75 to 95
Upper Arm to Pivot Shaft Bolt	35 to 45
Lower Arm to Pivot Shaft Bolt	50 to 60
Ball Joints	
Ball Joints to Steering Knuckle Nuts	40 Min.

TORQUE TIGHTNESS CHART (Cont'd.)

APPLICATION	Ft. Lbs.
Steering Knuckle	
Backing Plate to Steering Knuckle (Anchor Bolt)	85 to 110
Plain Arm to Steering Knuckle to Backing Plate Bolts (1/2")	80 to 130
Wheel Bearing Adjustment Nut	(Refer to Wheel Bearing Adj.)
REAR SUSPENSION	
Shock Absorber	
Upper Pivot Bolt & Nut	75 to 95
Lower Stud Nut	30 to 46
Suspension Arms	
Pivot Bolts & Nuts	65 to 75
Lower Arm Front & Rear Section Bolts & Nuts	45 to 60
Rear Spring	
Upper & Lower Bolt	45 to 65
Backing Plate	
Backing Plate Attaching Bolts	45 to 60
MISCELLANEOUS	
Wheel Nuts	70 to 85



J-554-18 Hub Bolt Peening Tool

J-2619 Slide Hammer Assembly (Used to Remove Axle Shafts)

J-5818 Axle Shaft Oil Seal Installer

J-6198 Front Pinion Bearing Cup Installer (Used to Install Outer Bearing Inner Race Retainer)

J-6525 (J-947-1 and J-947-2) Axle Shaft Bearing Remover

J-6783 (J-947-3) Axle Shaft Bearing Retainer Installer

J-7578 Front Wheel Bearing Inner Race Installer

J-7585 Front Wheel Bearing Outer Race Installer

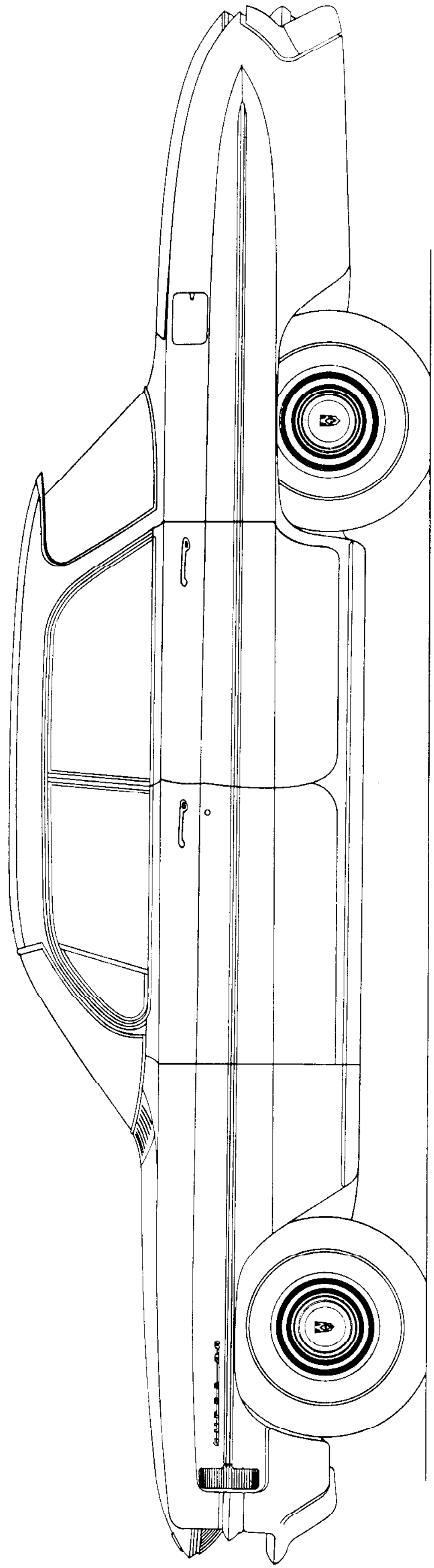
J-8092 Driver Handle (Used with J-6198, J-7578 and J-7585)

J-8131 (J-942-1) Axle Shaft Remover

J-8806 Ball Joint Remover

BT-6102 Rear Spring Installer

Fig. 5-45 Suspension Tools



SUPER 88 FOUR DOOR SEDAN
3569

PROPELLER SHAFT AND DIFFERENTIAL

CONTENTS OF SECTION 6

PROPELLER SHAFT

PERIODIC MAINTENANCE

The Hydra-Matic propeller shaft slip yoke is provided with a grease fitting and should be lubricated every 8,000 miles with Special Lubricant (Part No. 567196) until the lubricant appears at the slip yoke vent hole.

The Syncro-Mesh propeller shaft slip yoke does not require periodic maintenance as it is lubricated by the transmission lubricant.

Universal joints should be lubricated every 20,000 miles. To lubricate, the joint must be completely disassembled and cleaned. Lubricate each needle bearing assembly and fill the reservoir in each bearing journal of the spider with a sodium soap, fine fiber grease such as Marfax No. 2.

DESCRIPTION (Fig. 6-1)

The propeller shaft assembly consists of the shaft, a slip yoke and two universal joints. The rear yoke shaft is bonded in rubber to the inside of the propeller shaft tube and cannot be removed for service. The front of the propeller shaft attaches to the transmission main shaft with a slip

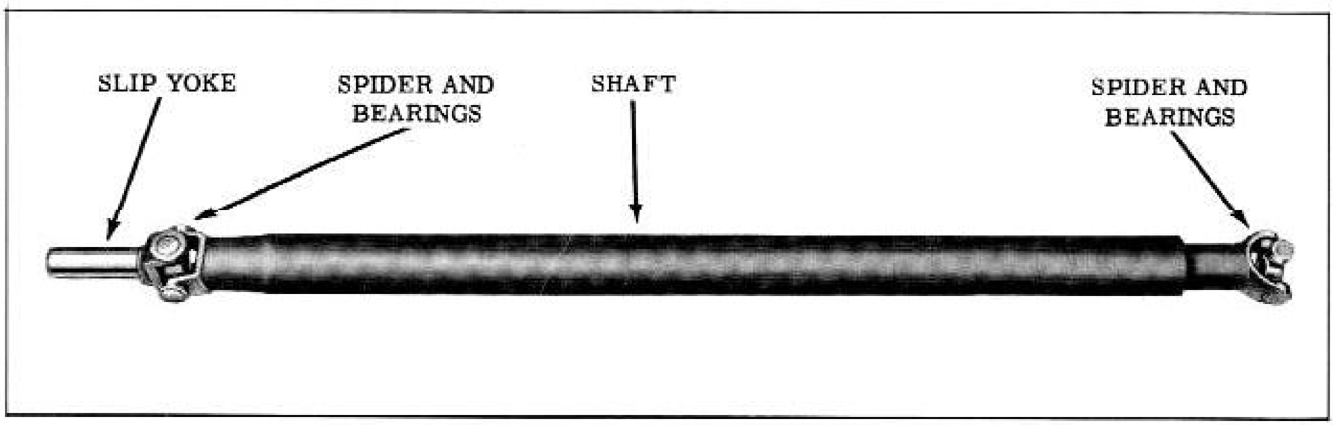


Fig. 6-1 Propeller Shaft Assembly

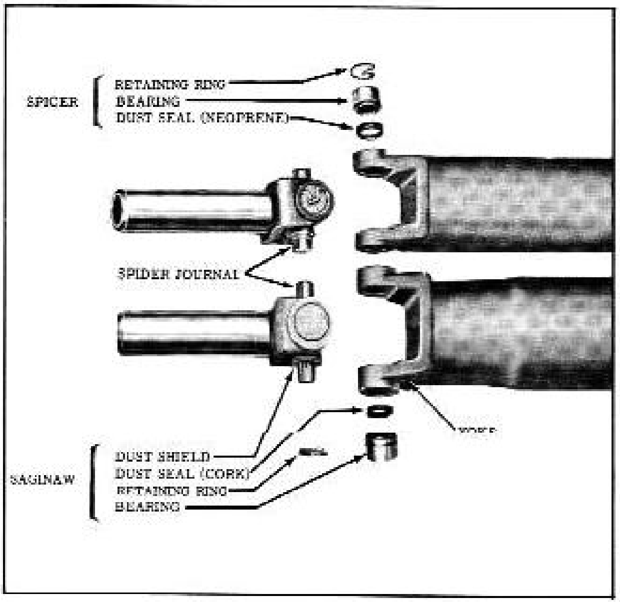


Fig. 6-2 Universal Joints

yoke and the rear of the shaft attaches to the differential companion flange.

Oldsmobile uses both Saginaw and Spicer propeller shaft assemblies. Saginaw assemblies can be identified by the "C" shaped universal joint bearing retaining rings, located on the bearings adjacent to the inner sides of the yoke. Spicer assemblies use "D" shaped universal joint bearing retaining rings which fit into the outer edge of the yoke. (Fig. 6-2)

The propeller shaft assembly is a balanced unit and should be kept free of under coating or other material which could upset the balance.

REMOVE AND INSTALL

1. Straighten lock tangs away from the four "U" bolt nuts and remove the "U" bolts from the differential companion flange.
2. If the companion flange "U" joint bearings are not retained with a metal retaining strap, use a piece of wire or tape to hold bearings on their spider journals.
3. Lower the rear of the shaft and slide rearward.

To install, apply one ounce of Seal Lubricant, Part No. 567196, to the splines of the slip yoke (Hydra-Matic only). Using new companion flange "U" bolt locks, torque "U" bolt nuts 14 to 18 ft. lbs. then bend the lock tangs against the nuts.

UNIVERSAL JOINT BEARINGS—REMOVE (Fig. 6-2)

(Saginaw Type)

1. With propeller shaft removed from the car, remove all bearing retaining rings.

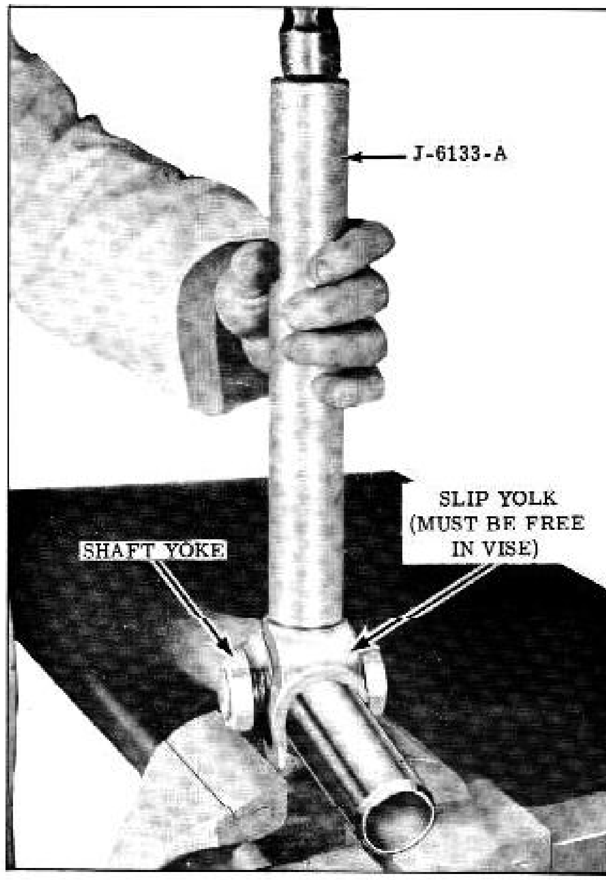


Fig. 6-3 Partial Bearing Removal (Saginaw)

NOTE: Mark both yoke and shaft so that the units may be reassembled in their original position in order to maintain the original balance.

2. Position the slip yoke end of propeller shaft on a vise so that the shaft yoke rests on top of the vise jaws. The slip yoke must be free to move vertically between jaws of vise.
3. Apply force on yoke around bearing. (Fig. 6-3) This will drive the slip yoke down causing spider to force bearing partially out of the yoke.
4. Clamp the partially exposed bearing in a brass jawed vise, then tap yoke until bearing is removed. (Fig. 6-4) Remove bearing from vise.

NOTE: The use of Tool J-4174 will facilitate removal of bearings. (Inset, Fig. 6-4)

5. To remove opposite bearing, repeat Steps 2, 3 and 4.
6. Remove slip yoke from spider.
7. Clamp shaft yoke in vise.

NOTE: Do not clamp the propeller shaft tube in a vise.

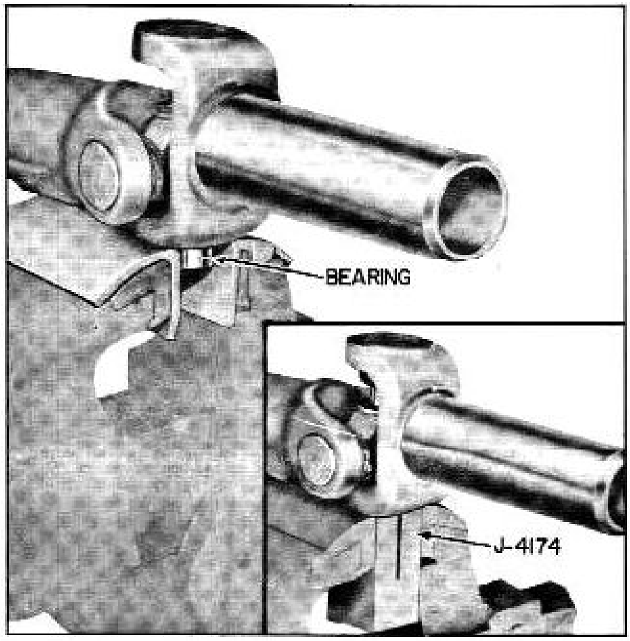


Fig. 6-4 Bearing Removal (Saginaw)

8. Drive on spider until bearing is partially forced out of yoke. (Fig. 6-5)

9. Clamp partially exposed bearing in a brass jawed vise and tap on yoke until bearing is removed.

10. To remove opposite bearing, repeat Steps 7, 8 and 9.

11. Remove spider from shaft yoke.

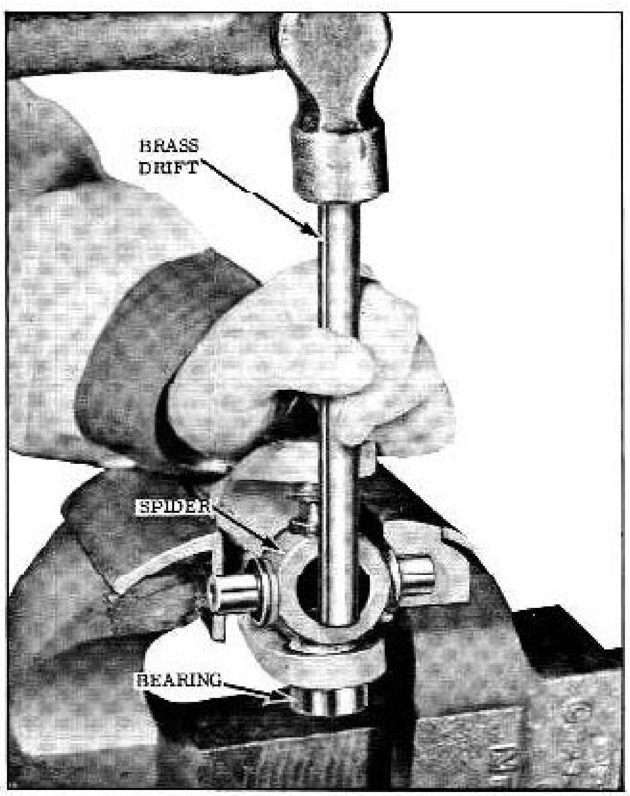


Fig. 6-5 Partial Bearing Removal (Saginaw)

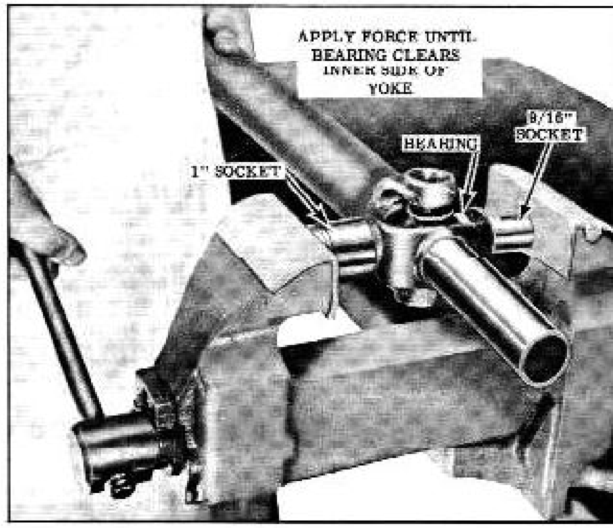


Fig. 6-6 Pressing Bearing From Yoke (Spicer)

12. Remove rear spider and bearings.

(Spicer Type)

1. With propeller shaft removed, remove all retaining rings that retain bearings in the yoke.

   NOTE: Mark slip yoke and shaft yoke, so that the units may be reassembled in their original position to maintain original balance.

2. Press the bearings from the yoke as shown in Fig. 6-6. Continue pressing until bearing which is pushed by the 9/16" socket clears inner side of yoke.

3. Remove propeller shaft and sockets from vise.

4. If exposed bearing on the outer side of yoke is still tight, clamp bearing in a brass jawed vise and tap yoke until bearing is free.

5. Remove slip yoke from spider. Remove bearing from spider journal.

6. To remove bearings from shaft yoke, repeat Step 2.

7. Clamp exposed bearing in a brass jawed vise and tap yoke until bearing is free.

8. Remove spider from shaft yoke.

9. Remove spider and bearings from rear yoke.

CLEANING AND INSPECTION

1. Wash all parts thoroughly in cleaning solvent.

   NOTE: Bearings and spiders should be washed in clean gasoline, not light oil. If bearings are washed in light oil, the grease will not adhere to the bearings and the bearings will run dry.

2. Inspect dust seals and shields for damage. Replace if necessary. Cork seals should be flexible. If brittle or hard, replace seals.

3. Inspect roller bearing surfaces of spider journals, inner bearing surfaces of outer races and rollers for wear, scores, flat spots, or any other visible damage.

UNIVERSAL JOINT BEARINGS—INSTALL

(Saginaw and Spicer)

1. Lubricate each needle bearing assembly and fill the reservoir in each spider journal with a sodium soap, fine fiber grease such as Marfax Heavy Duty No. 2.

2. Press cork dust seal into recess of Saginaw bearings. Install neoprene dust seals on Spicer bearings.

3. If new dust shields are to be installed on Saginaw spiders, install at this time.

4. Position a spider journal in a shaft yoke.

5. Press a bearing into one side of yoke until retaining ring can be installed. (Fig. 6-7)

   NOTE: On Spicer units the bearing must be recessed into the yoke so that the retaining ring can be installed. The bearing can be recessed with a 9/16" socket and vise. (Inset, Fig. 6-7)

6. Install retaining ring. Retaining rings on Saginaw units must be installed with the gap toward the yoke.

7. Repeat Steps 5 and 6 on opposite bearing. As the bearing is installed, align spider journal with the bearing.

8. To install the slip yoke, position the yoke over the spider journal with scribe marks aligned and repeat Steps 5, 6 and 7.

9. Position bearings which attach to a companion flange, onto the spider journals and retain with wire or tape.

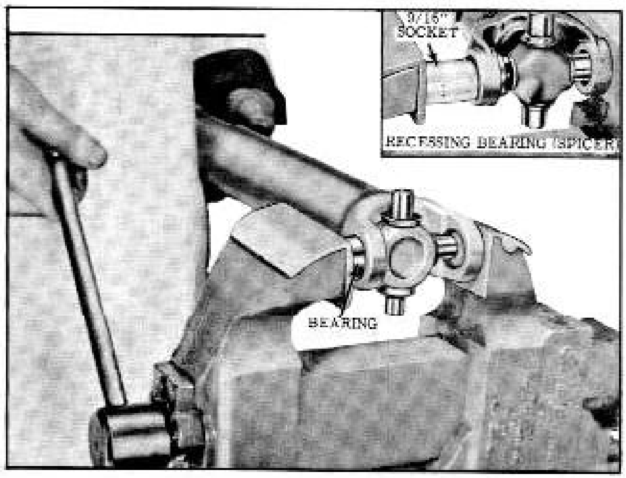


Fig. 6-7 Installing Bearings

DIFFERENTIAL

PERIODIC MAINTENANCE

Periodic or seasonal lubricant changes are not recommended. The lubricant level should be checked at 2,000 mile intervals and, if necessary, add Special Lubricant (Part No. 531536). Small amounts of S.A.E. 90 Multi-Purpose Gear Lubricant may be used to bring the fluid up to the filler plug level.

IMPORTANT: If, for any reason, ALL of the lubricant must be replaced, it is essential that only Special Lubricant (Part No. 531536) be used. Use of other than the above mentioned type of lubricant may result in noise under certain conditions and may cause chatter in the Anti-Spin Differential. If the wrong type of lubricant is used it will require draining the differential and installing the recommended lubricant (Part No. 531536). It may be necessary to drive Anti-Spin equipped cars for a short distance to allow the new lubricant to cover the plates before the chatter will disappear.

Capacity of the differential is approximately 5 pints.

MINOR SERVICE OPERATIONS

PINION OIL SEAL REPLACEMENT

1. Disconnect propeller shaft from differential companion flange and support shaft up in body tunnel by wiring propeller shaft to the exhaust pipe. If "U" joint bearings are not retained by a retainer strap, use a piece of wire to hold bearings on their spider journals.
2. Mark the position of the companion flange, pinion shaft and nut so that they can be reinstalled in the same position.
3. Remove companion flange nut, using Tool J-6544 to hold flange. (Fig. 6-8) Remove washer.
4. Remove companion flange using puller J-6295-01. (Fig. 6-9)

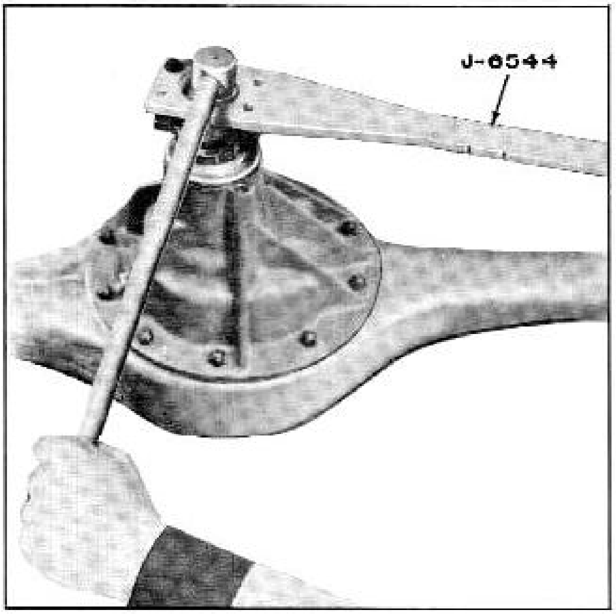


Fig. 6-8 Removing Companion Flange Nut

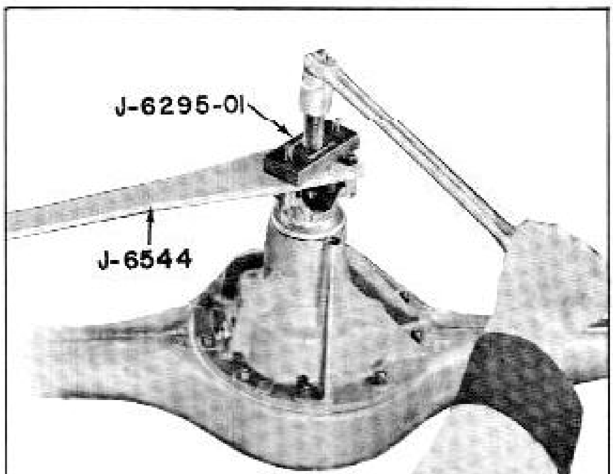


Fig. 6-9 Removing Companion Flange

5. Remove oil seal by driving it out of carrier with a blunt chisel.

6. Examine surface of companion flange for tool marks, nicks, or damaged surface. If damaged, replace flange as per instructions under COMPANION FLANGE REPLACEMENT.

7. Examine carrier bore and remove any burrs that might cause leaks around the O.D. of the seal.

8. Coat outside diameter of new seal sparingly with Permatex No. 2 and install seal using driver J-5395-01 to properly locate seal in carrier. (Fig. 6-10)

9. Apply Special Seal Lubricant (Part No. 567196) to the O.D. of the companion flange and sealing lip of new seal.

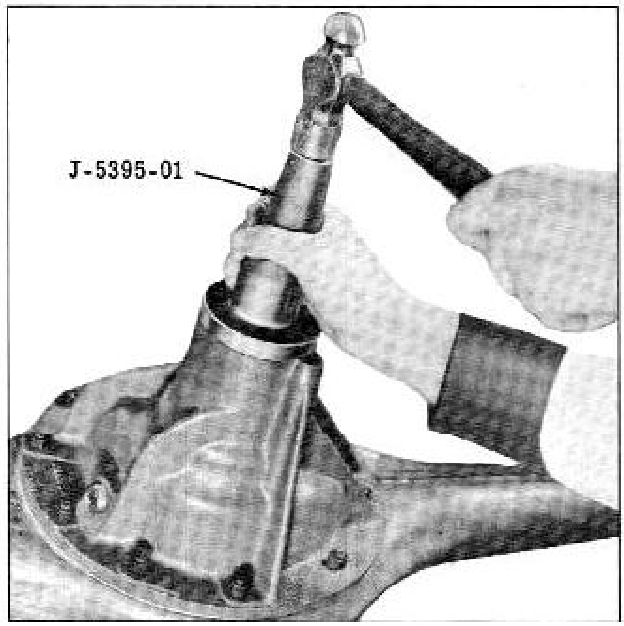


Fig. 6-10 Installing Pinion Oil Seal

10. Install companion flange and tighten nut to the same position as marked in step 2, while holding companion flange with Tool J-6544. Tighten nut 1/16" beyond alignment marks.

COMPANION FLANGE REPLACEMENT

1. Remove both rear wheels and brake drums.

2. Remove both axle shafts BEING CAREFUL NOT TO DRAG THE AXLE SHAFTS ACROSS THE SEALS.

3. Disconnect rear universal joint and support propeller shaft by tying propeller shaft to exhaust pipe. If "U" joint bearings are not retained by a retainer strap, use a piece of wire to hold bearings on their spider journals.

4. Remove companion flange nut using Holding Tool J-6544 to hold flange. (Fig. 6-8)

5. Remove washer and then remove companion flange using puller J-6295-01. (Fig. 6-9)

6. Apply Special Seal Lubricant (Part No. 567196) to the O.D. of the new companion flange, then install companion flange, washer and companion flange nut finger tight.

7. While holding companion flange with Tool J-6544, tighten the nut a little at a time and turn drive pinion several revolutions after each tightening to seat the rollers. Check the pre-load of bearings each time with an inch pound torque wrench or with Spring Scale J-544-A until pre-load is 10 to 15 inch pounds. (See CARRIER DISASSEMBLY, step 1)

NOTE: The bearing pre-load should never exceed 25 inch pounds if the differential has been in use.

Fig. 6-11 Removing Cup Plug

8. Connect rear universal joint to differential companion flange.

9. Install axle shafts carefully to avoid dragging shafts across seals. Torque 55 to 60 ft. lbs.

10. Install drums and wheels.

OIL GALLEY PLUG REPLACEMENT

1. Remove companion flange. (See COMPANION FLANGE REPLACEMENT, steps 1 thru 5)

2. Center punch and drill hole in plug to receive sheet metal screw.

3. Remove plug as shown in Fig. 6-11.

4. Clean metal particles from oil galley.

5. Coat O.D. of a new plug with Permatex No. 3, then drive plug into oil drain galley until it is FLUSH with carrier. (Fig. 6-12)

6. Install companion flange (see COMPANION FLANGE REPLACEMENT, steps 6 thru 10).

DIFFERENTIAL—REMOVE

1. Remove the axle shafts.

2. Clean the differential carrier and the axle housing around carrier to prevent dirt from entering the housing or falling on the gears.

3. Remove the companion flange "U" bolts. If "U" joint bearings are not retained by a retainer strap, use a piece of wire or a rubber band to hold "U" joint bearings on the spider. Support the propeller shaft by tying it to the exhaust pipe.

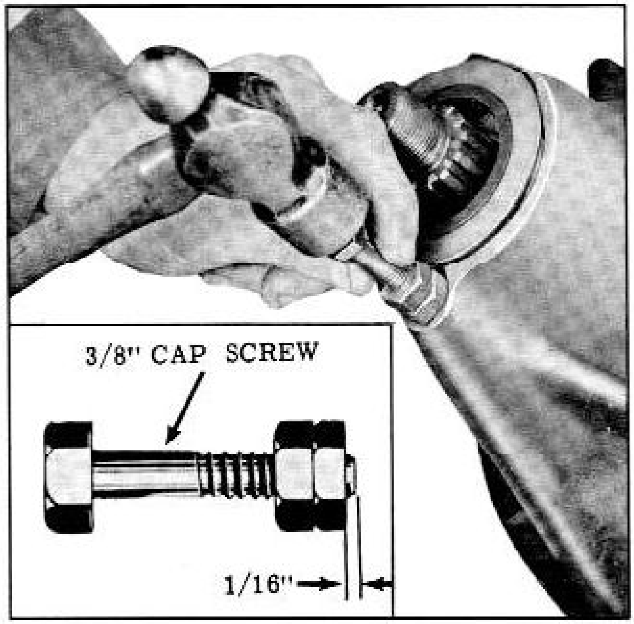


Fig. 6-12 Installing Cup Plug

4. Drain the oil by removing nuts from carrier mounting studs and moving carrier away from axle housing.

   CAUTION: Do not clean the differential until it has been disassembled. This will avoid washing dirt into the bearings.

DIFFERENTIAL—INSTALL

IMPORTANT: Differential gears that have failed or bearings that are damaged by chipping are certain to leave particles of metal in the housing. These particles must be thoroughly cleaned from the housing before installing the carrier to prevent repeat failure.

Bearings that are not chipped, but are loose (lapped-in) are an indication of dust, grit, or dirt in the oil that caused the bearings to wear. This too must be thoroughly cleaned from the housing before installing the differential to prevent excessive bearing wear.

To assure that the housing is clean, thoroughly wash the interior of the housing with clean solvent. Loosen any particles that may be lodged by tapping the housing its entire length, then wipe the inside of housing dry to remove all particles.

1. Clean the gasket surface on housing and install a new gasket.

2. Align the differential with the housing and carefully install the differential over the mounting studs. Install nuts on studs and tighten evenly.

3. Torque nuts 50 to 60 ft. lbs.

4. Install axle shafts. Torque 55 to 60 ft. lbs.

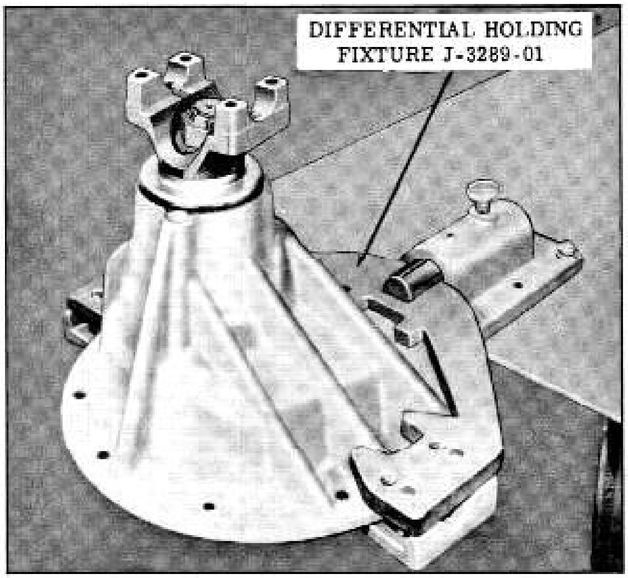


Fig. 6-13 Holding Fixture

5. Install brake drums and wheels. Connect propeller shaft to differential companion flange.

6. With car level, fill the rear axle housing to filler plug level with Special Lubricant (Part No. 531536).

CAUTION: If new gears and/or bearings are installed, the owner should be advised NOT TO DRIVE CAR OVER 50 MILES PER HOUR OR USE FULL THROTTLE FOR THE FIRST 50 MILES. This will permit proper "break-in" of the gears and bearings.

DIFFERENTIAL—DISASSEMBLY

Careful inspection of the differential while disassembling the unit will assist in determining the cause of axle noise, as in many instances improper bearing pre-load and/or ring gear to pinion backlash are the basic causes of the noise.

1. Mount differential in Holding Fixture J-3289-01. (Fig. 6-13)

2. If original pinion gear and ring gear are to be reinstalled, install dial indicator set KMO-30 as shown in Fig. 6-14. Measure backlash at two points (180° apart). The lowest reading should be within .005" to .009".

3. Mark the right side bearing adjusting nut, bearing cap, and carrier with two punch marks as shown in Fig. 6-15, also mark the left side in the same manner using one punch mark. These marks will serve for location and adjusting purposes when rebuilding differential with the original gear set.

4. Remove bearing cap lock screws and locks.

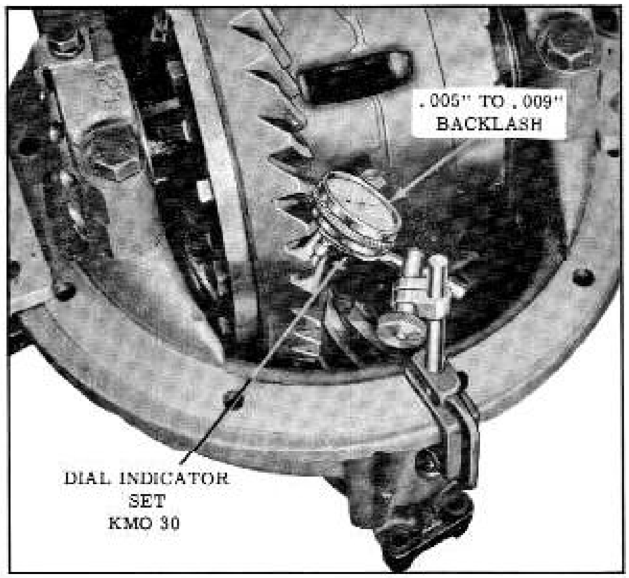


Fig. 6-14 Measuring Backlash

5. To determine if the side bearing pre-load is correct:

   a. Loosen each bearing cap attaching bolt (1/4 to 1/2 turn) just enough to turn adjusting nut. (Tap lightly on bearing cap to assure freeness of nut in threads.)

   b. Back off the right hand adjusting nut (one opposite ring gear) with Tool J-972-A and watch the outer race of the bearing.

   NOTE: If the side bearing pre-load is correct, the outside bearing race should start to turn the instant the adjusting nut is loosened. It should continue to turn until the adjusting nut is loosened 2 to 3 notches. Count and record the notches between the

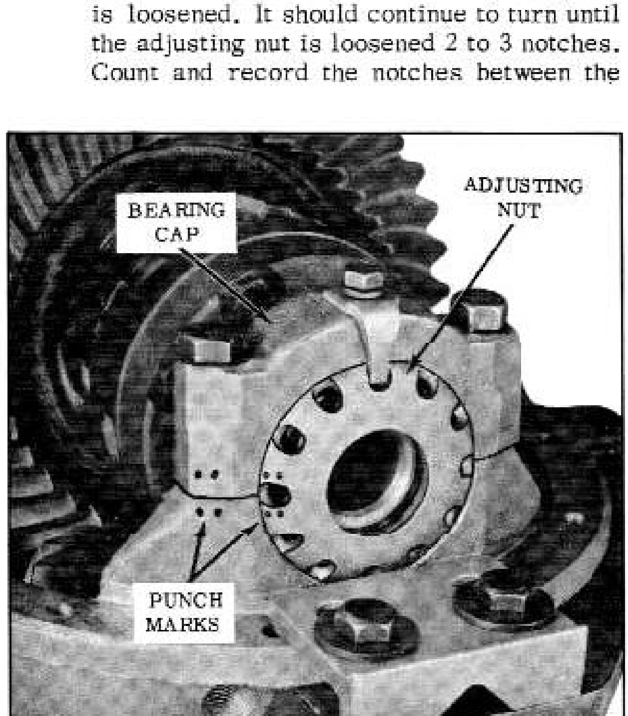


Fig. 6-15 Adjusting Nut Markings

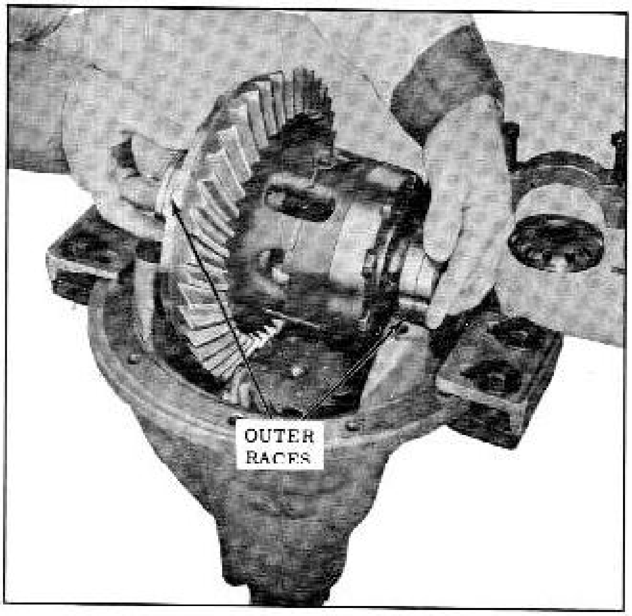


Fig. 6-16 Removing Differential Case (Anti-Spin Shown)

punch marks on the nut and those on the carrier where bearing race stopped turning.

6. Remove the bearing cap bolts, bearing cap, and adjusting nuts.

7. Lift the differential case from the carrier while holding the side bearing outer races against rollers. (Fig. 6-16) Remove bearing outer races.

IMPORTANT: DO NOT DROP OR MIX THE DIFFERENTIAL SIDE BEARING OUTER RACES AS THEY MUST BE ASSEMBLED TO THE SAME BEARING FROM WHICH THEY

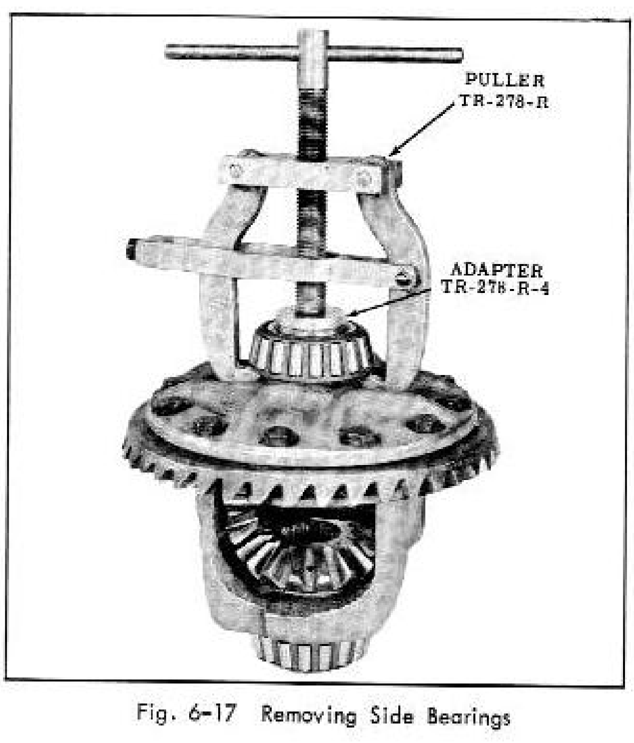


Fig. 6-17 Removing Side Bearings

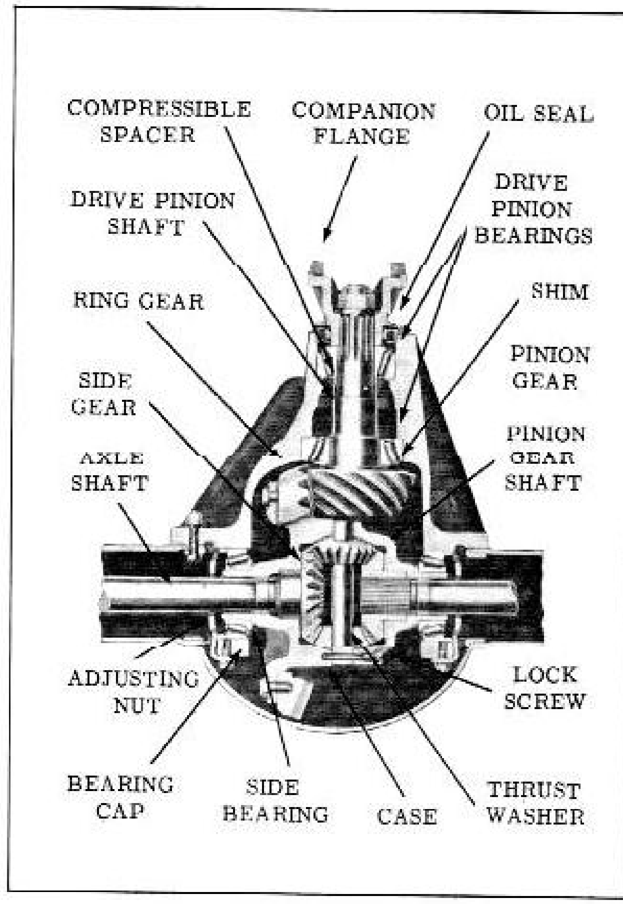


Fig. 6-18 Differential Assembly (Standard)

CASE—DISASSEMBLY
(Conventional Differential Only)

1. If side bearings are to be removed, use Differential Side Bearing Remover TR-278-R and Adapter TR-278-R-4 as shown in Fig. 6-17. Be sure ends of puller are placed in recess in differential case.

2. If the ring gear or differential case is to be replaced, remove ring gear from case.

3. Remove lock screw and pinion gear shaft, then remove the pinion gears, side gears and thrust washers from case.

CARRIER—DISASSEMBLY

1. Check pinion bearing pre-load with an inch-pound torque wrench as shown in Fig. 6-19. Pre-load should be within 10 to 15 in. lbs. for old bearings, 24 to 32 in. lbs. for new bearings.

If an inch pound torque wrench is not available, Spring Scale J-544-A may be used by hooking to Companion Flange Holding Tool J-6544 at a point 10 inches from pinion shaft center, as shown in Fig. 6-20. The reading in pounds, multiplied by 10 will give inch-pounds.

Thus 3 pounds on the scale will indicate 30 in.

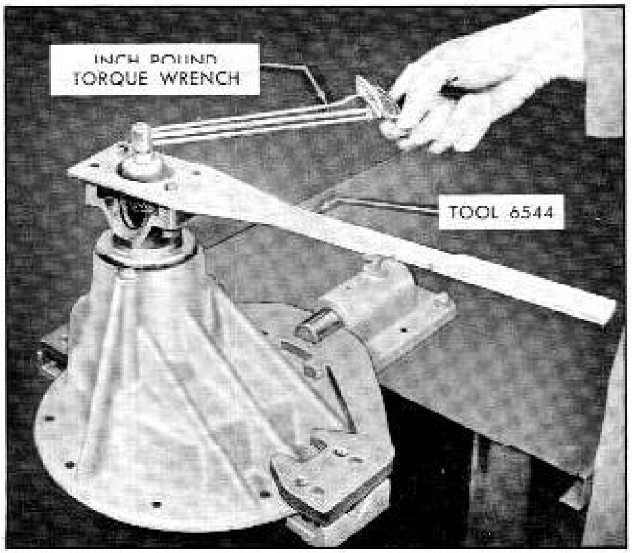


Fig. 6-19 Measuring Bearing Preload With Torque Wrench

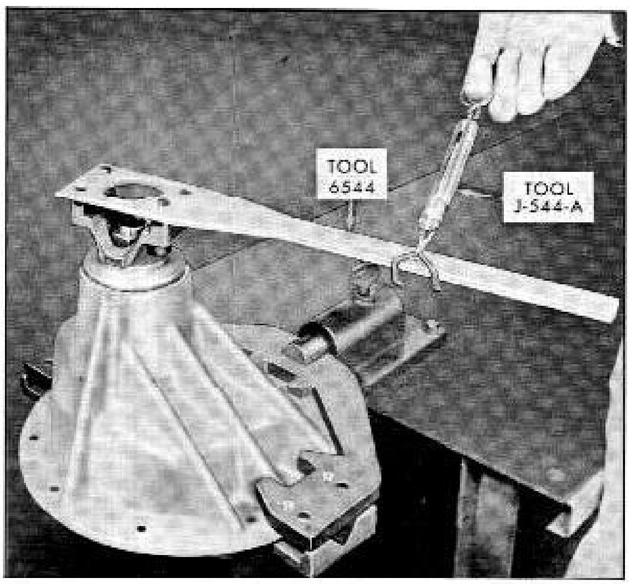


Fig. 6-20 Measuring Bearing Preload With Spring Scale

lbs. The reading BETWEEN POUND GRADUATIONS must be read in TENTHS rather than ounces. Example: 2 lbs., 8 oz., is read 2.5 lbs., which equals 25 in. lbs.

2. Turn the assembly to a horizontal position as shown in Fig. 6-21, then, using Tool J-6544 to hold companion flange, remove the companion flange nut using a 1-1/4" socket.

3. Remove washer.

CAUTION: To avoid possibility of dropping the drive pinion assembly, leave the carrier in a horizontal position until the pinion assembly is removed.

4. Using companion flange puller J-6295-01 and holding Tool J-6544, remove companion flange. (Fig. 6-22)

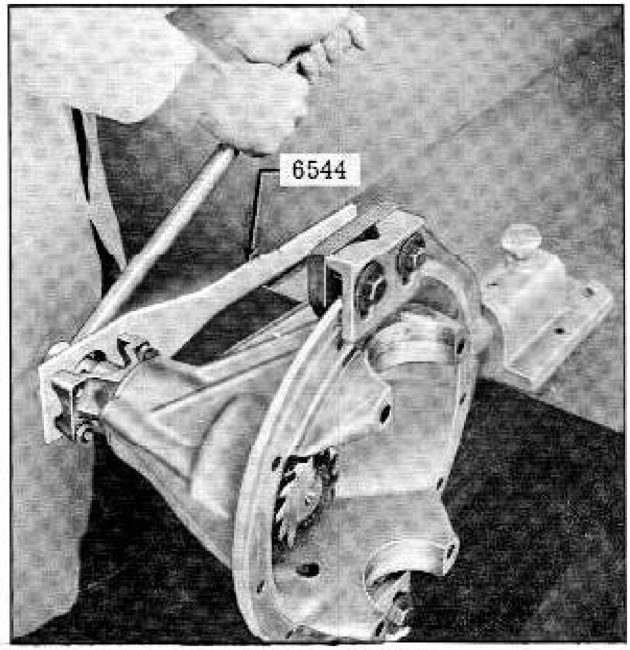


Fig. 6-21 Removing Companion Flange Nut

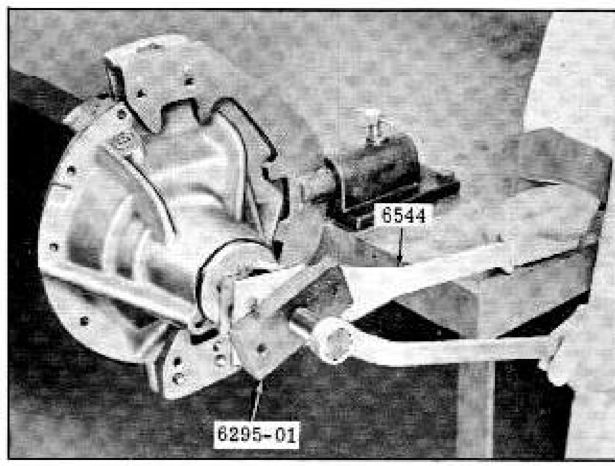


Fig. 6-22 Removing Companion Flange

5. Remove the drive pinion, rear bearing, and spacer by one of the following methods:

   a. Remove the drive pinion by hand if it has a sliding fit in front bearing.

   b. If the drive pinion has a light press fit in the front bearing, lightly tap the pinion free with a composition hammer.

   c. If drive pinion has a tight press fit in front bearing, remove with an arbor press.

NOTE: In some cases, a shim washer .037" to .045" thick will be found between the compressible spacer and inner race of the front drive pinion bearing. This shim is used in production to salvage the compressible spacer should the recommended pre-load be exceeded.

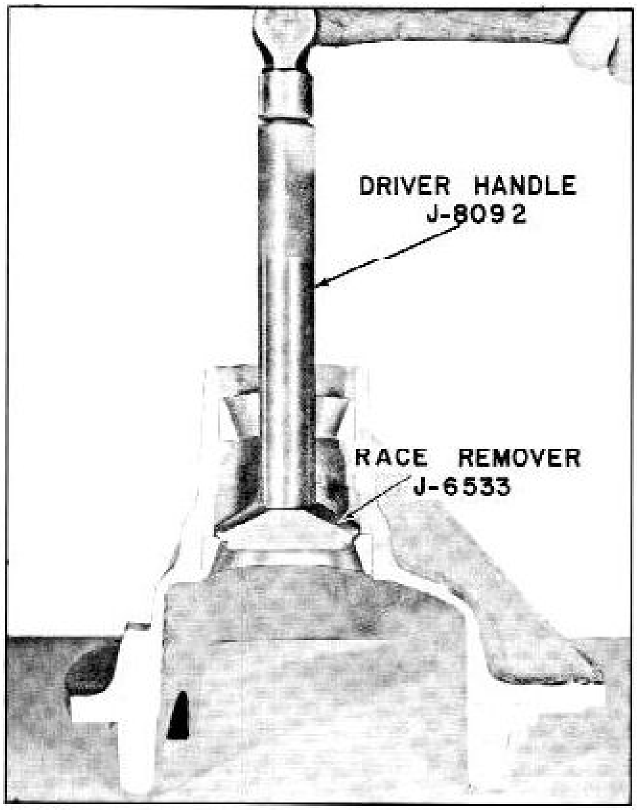


Fig. 6-23 Removing Rear Bearing Outer Race

It can be used in the same manner, and its use will be covered later. No more than 1 shim is to be used.

6. Remove the oil seal by driving it out of the carrier with a blunt chisel.

7. Remove the front inner race and roller assembly.

8. Press rear bearing outer race from carrier using Tool J 6533. (Fig. 6-23)

9. Press the front bearing outer race from carrier using Tool J-6198. (Fig. 6-24)

10. If the rear pinion bearing or shims are to be replaced, use Tool J-6531 placed in an arbor press as shown in Fig. 6-25 to press the rear bearing inner race and roller assembly off the pinion shaft.

    NOTE: The shims between the pinion bearing and the pinion gear are the selective shims used to locate the drive pinion gear with the ring gear.

CLEANING AND INSPECTION

1. Clean all differential bearings thoroughly in clean solvent (do not use a brush). Examine bearings visually and by feel. All bearings should feel smooth when oiled and rotated while applying as much hand pressure as possible.

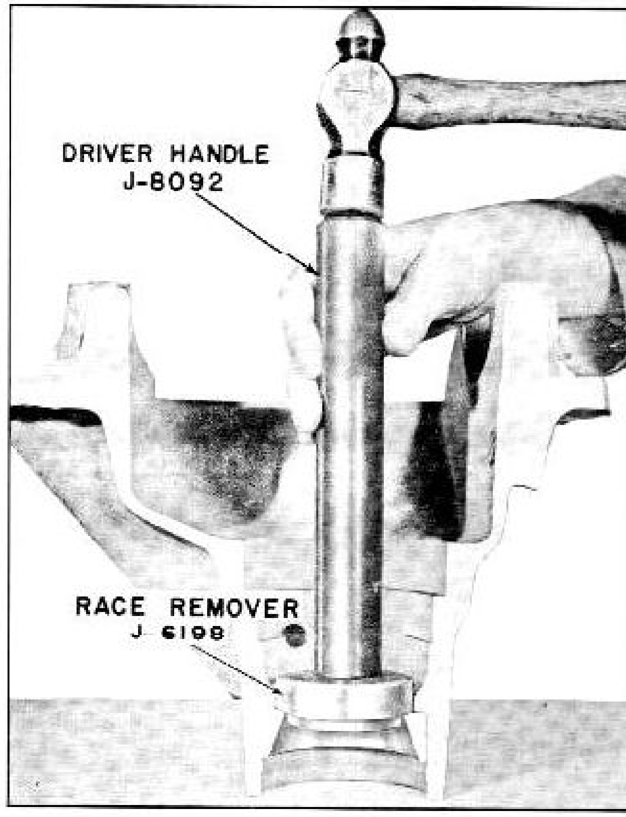


Fig. 6-24 Removing Front Bearing Outer Race

NOTE: Minute scratches and pits that appear on rollers and races at low mileage are due to the initial pre-load, and bearings having these marks should not be rejected.

2. Examine sealing surface of companion flange for nicks, burrs, or rough tool marks which would cause damage to seal and result in an oil leak. Replace if damaged.

3. Examine carrier bore and remove any burrs that might cause leaks around the O.D. of the seal.

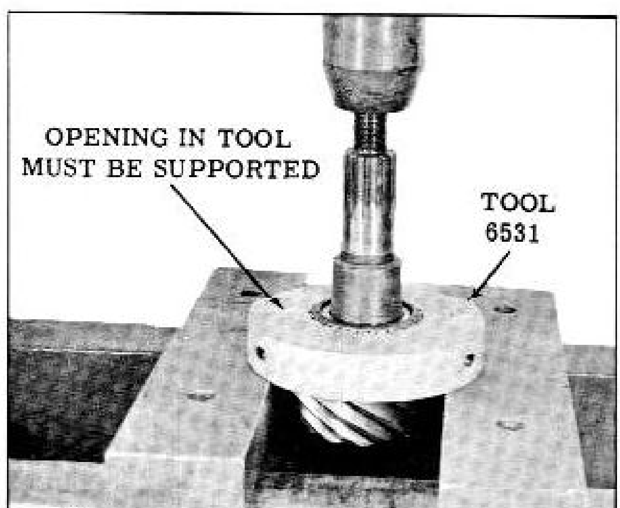


Fig. 6-25 Removing Rear Bearing

4. Examine the differential ring gear and drive pinion teeth for nicks, burrs and scoring. Any of these conditions will require replacement of the gear set.
5. Inspect the differential pinion gear shaft for unusual wear; also, the pinion and side gears and thrust washers.
6. Check the press fit of the side bearing inner race on the differential case hub by prying against the shoulder at the puller recess in the case. Side bearings must be a tight press fit on the hub.
7. Remove oil galley plug at front of carrier, clean passage, and install new plug as outlined under OIL GALLEY PLUG REPLACEMENT.
8. Diagnosis of a differential failure such as: chipped bearings, loose (lapped-in) bearings, chipped gears, etc., is a warning that some foreign material is present; therefore, the axle housing must be cleaned.

DIFFERENTIAL—ASSEMBLY

DIFFERENTIAL CASE ASSEMBLY (Conventional Differential Only)

1. If the ring gear was removed, position the gear on the case flange and install the attaching bolts. Tighten the attaching bolts evenly and alternately across the diameter in progressive stages. Torque 55 to 65 ft. lbs.
2. If side bearings were removed, install as shown in Fig. 6-26.

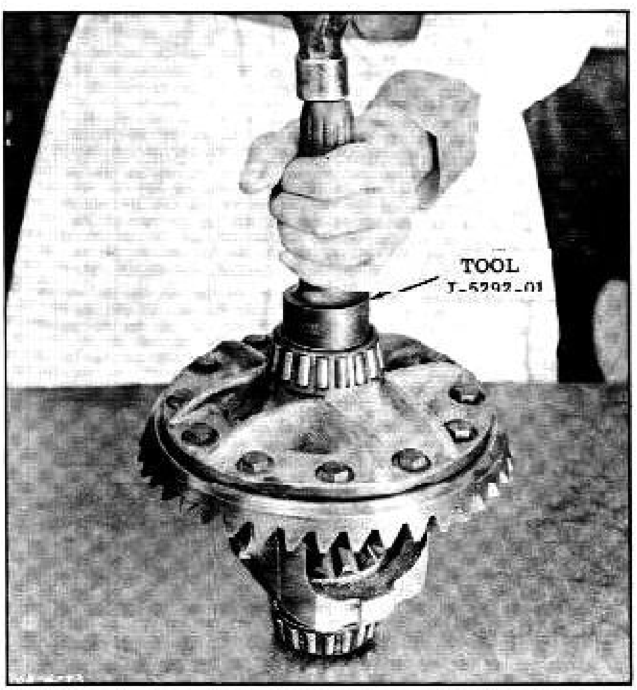


Fig. 6-26 Installing Side Bearings

3. Lubricate the side gears, pinion gears and thrust washers.
4. Place the side gear thrust washers over gear hubs and install side gears in case.
5. While holding the upper side gear up into its bore, position one pinion gear (without a washer) between side gears and rotate gears until pinion gear is directly opposite from loading opening in case.
6. Place the other pinion gear in position between side gears so that the pinion gear shaft holes are in line.
7. Rotate the pinion gears in position to assure pinion gear shaft holes in gears are lined up with shaft holes in case. If not, pinion will require repositioning in side gear teeth.
8. With gears properly meshed, rotate assembly just enough to permit working the pinion thrust washers into position between gears and case.
9. Install the pinion gear shaft and lock it in place with lock screw and lock washer.

CARRIER—ASSEMBLY

Marking on Differential Carrier and Pinion

Before installing the drive pinion, the correct number of shims to locate the drive pinion properly must be determined from markings on the

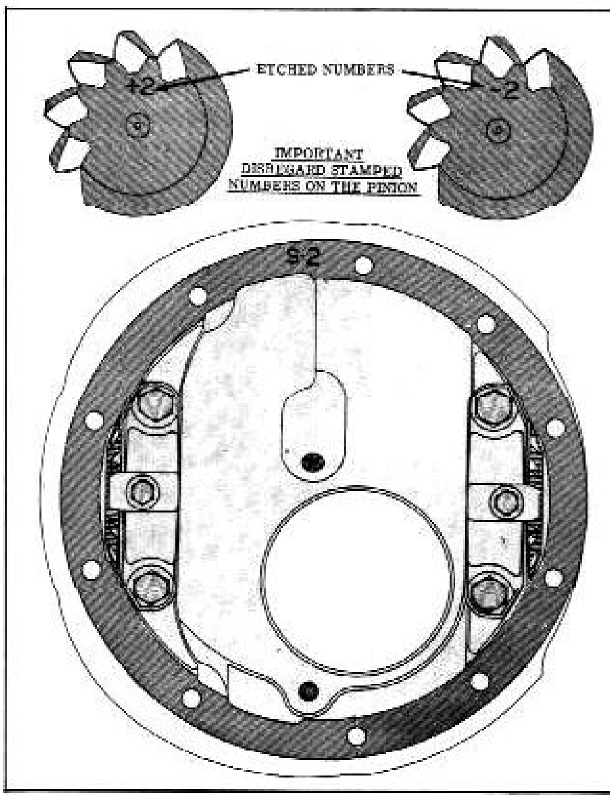


Fig. 6-27 Pinion and Carrier Markings

differential carrier and end of pinion gear. Drive pinions ground to zero specifications are not marked as they are considered "0".

The differential carrier is marked on the face of the flange. (Fig. 6-27) "D" means "deep" and "S" means "shallow" depth of carrier bore to the shoulder for the rear pinion bearing. The digit following the letter designates the number of thousandths "deep" or "shallow".

If shims are required to correct an error in pinion machining, a number will be ETCHED on the end of the drive pinion indicating in thousandth of an inch the correction required to position pinion in carrier. Examples: +2 requires .002" added shim thickness and -2 requires .002" less shim thickness. (Fig. 6-27) Disregard numbers which are STAMPED on end of pinion. They are for manufacturing control and DO NOT REFER TO SHIMS.

CAUTION: Always use the shim chart to correctly position the pinion when rebuilding a differential using new gears, pinion bearings or carrier. (Fig. 6-28)

How To Use The Shim Chart

Read the markings STAMPED on the carrier and ETCHED on drive pinion (Fig. 6-27) and then refer to the "SHIM CHART". (Fig. 6-28)

In the column "Carrier Marking" read to the right to the "Pinion Marking" vertical column. The intersection of these columns show the correct total shim thickness for this particular carrier and pinion.

Notice on the chart, the shim requirement for a carrier marked "O" together with an unmarked pinion is .016". This means that any "Plus" or "Minus" markings or "Shallow" or "Deep" markings, represent the variation in shim thickness from the starting point of .016".

Example: Carrier which is marked "D-1" with a pinion not marked requires total shim thickness of .017". Use shim thickness chart to identify (by notches) thickness of shims. If necessary, measure shims with a micrometer.

NOTE: Due to the tolerances of the bearings used in production, the shim thickness as found in differentials with original bearings may vary slightly from the service shim chart. However, always use the shim chart when installing new bearings, as service bearings are within the standard height range.

If new bearings are not installed when a new pinion or carrier is installed, any variation from the chart must be taken into consideration when determining the new shim requirements.

Example: If a differential with original bearings had an unmarked pinion and a carrier marked "O", the shim requirements according to the shim chart would be .016". If only .013" shim thickness was found in the differential, then obviously the bearing accounted for the .003" variation. This variation will have to be taken into consideration when installing a new pinion or carrier.

When to Use a New Compressible Spacer

A washer with the old compressible spacer or a new compressible spacer should be used under the following conditions:

SERVICE SHIM SELECTION CHART		
PART NO.	THICKNESS	IDENTIFICATION NOTCHES
524014	.004	NONE
524015	.005	1 NOTCH
524016	.006	2 NOTCHES
524017	.007	NONE
524020	.010	NONE
531711	.013	1 NOTCH
531712	.014	2 NOTCHES
531713	.015	NONE
531714	.016	1 NOTCH
531715	.017	2 NOTCHES

CARRIER MARKING	PINION MARKING								
MARK	-4	-3	-2	-1	0	+1	+2	+3	+4
S-5	.007	.008	.009	.010	.011	.012	.013	.014	.015
S-4	.008	.009	.010	.011	.012	.013	.014	.015	.016
S-3	.009	.010	.011	.012	.013	.014	.015	.016	.017
S-2	.010	.011	.012	.013	.014	.015	.016	.017	.018
S-1	.011	.012	.013	.014	.015	.016	.017	.018	.019
O	.012	.013	.014	.015	.016	.017	.018	.019	.020
D-1	.013	.014	.015	.016	.017	.018	.019	.020	.021
D-2	.014	.015	.016	.017	.018	.019	.020	.021	.022
D-3	.015	.016	.017	.018	.019	.020	.021	.022	.023
D-4	.016	.017	.018	.019	.020	.021	.022	.023	.024
D-5	.017	.018	.019	.020	.021	.022	.023	.024	.025

Fig. 6-28 Pinion Shim Chart

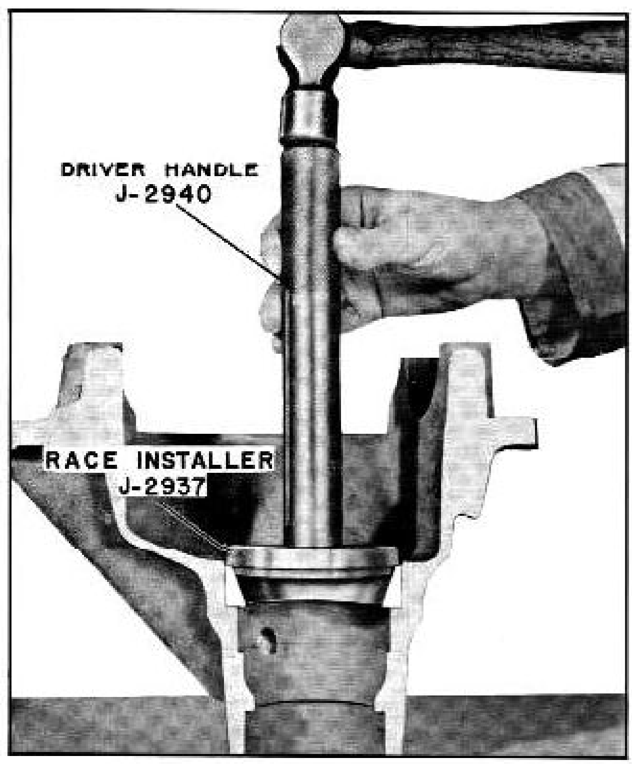


Fig. 6-29 Installing Rear Bearing Outer Race

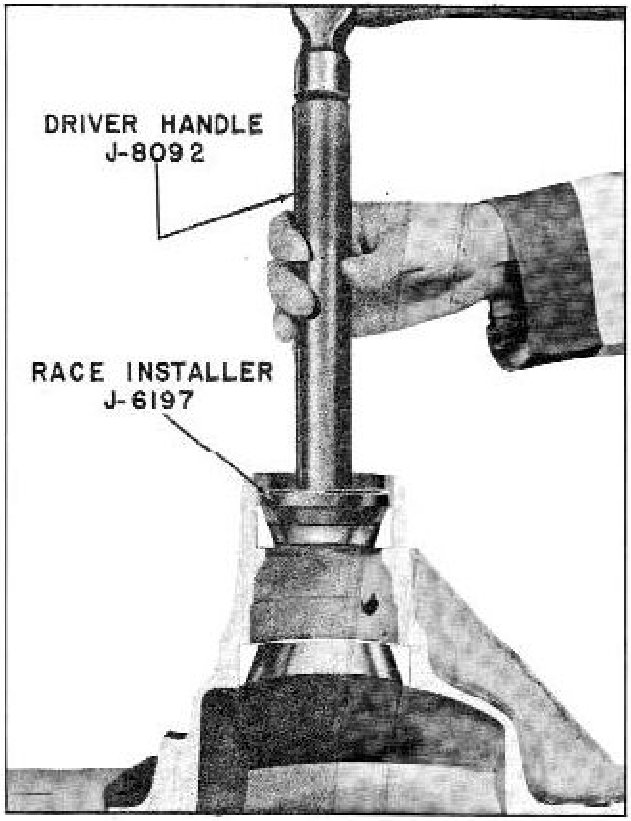


Fig. 6-30 Installing Front Bearing Outer Race

a. When a new drive pinion gear and/or pinion bearings or carrier is installed.

b. When the required pre-load has been exceeded during the adjustment.

NOTE: If a washer was found between the spacer and outer pinion bearing assembly, the washer should be discarded and a new compressible spacer used.

1. Press outer race of rear pinion bearing firmly in place against shoulder in the carrier. (Fig. 6-29)

2. Press outer race of front pinion bearing firmly against shoulder in carrier. (Fig. 6-30)

3. Install correct number of pinion adjusting shims against shoulder of drive pinion shaft.

4. Lubricate the rear bearing roller assembly, then press the rear bearing inner race and roller assembly firmly in place against the shims on pinion shaft. (Fig. 6-31)

5. Place the compressible spacer over the drive pinion shaft (with the large diameter against drive pinion shaft shoulder). Install washer if original spacer is reused.

6. Place the drive pinion assembly into position in the carrier. Lubricate the front bearing roller assembly and slide over the pinion

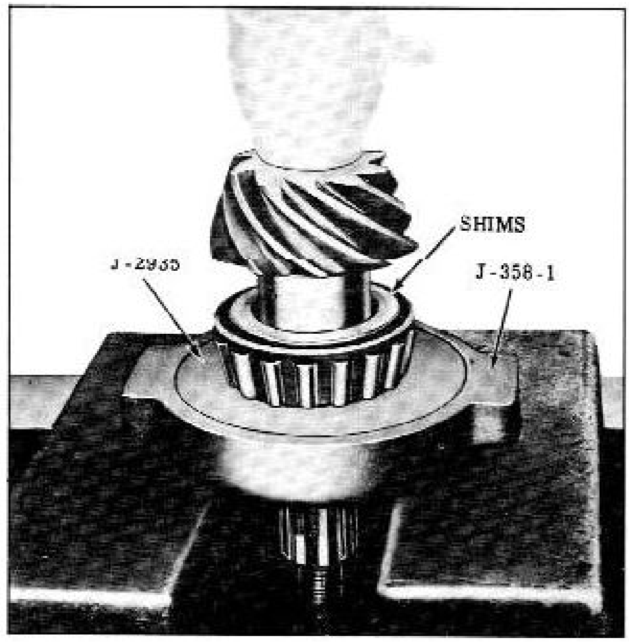


Fig. 6-31 Installing Bearing on Pinion Shaft

shaft. Install front bearing inner race.

NOTE: If the drive pinion shaft is a press fit in the front bearing, install the roller and race using Tool J-6133-A to press or drive the assembly onto the pinion shaft while supporting pinion gear. (Fig. 6-32)

7. Coat the outer diameter of a new pinion oil seal with Permatex No. 2 (use sparingly).

8. Just start the seal into carrier by tapping lightly and then finish driving the seal in place with Pinion Seal Installer J-5395-01. (Fig. 6-33)

9. Apply a coating of Special Lubricant (Part

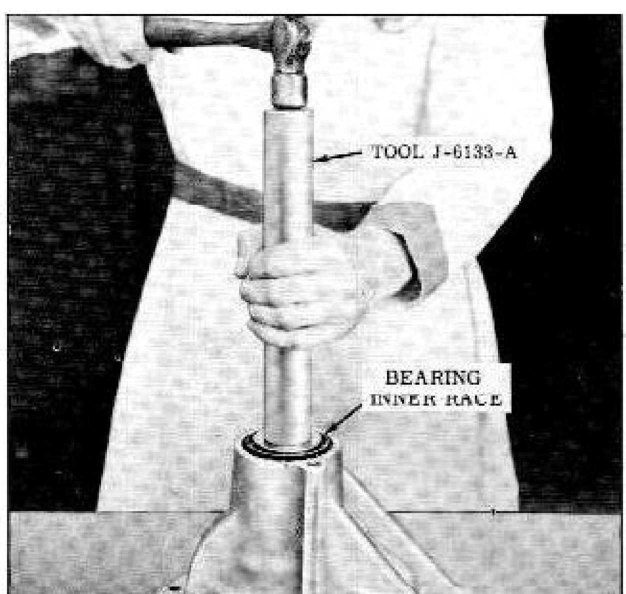


Fig. 6-32 Installing Front Pinion Bearing Inner Race

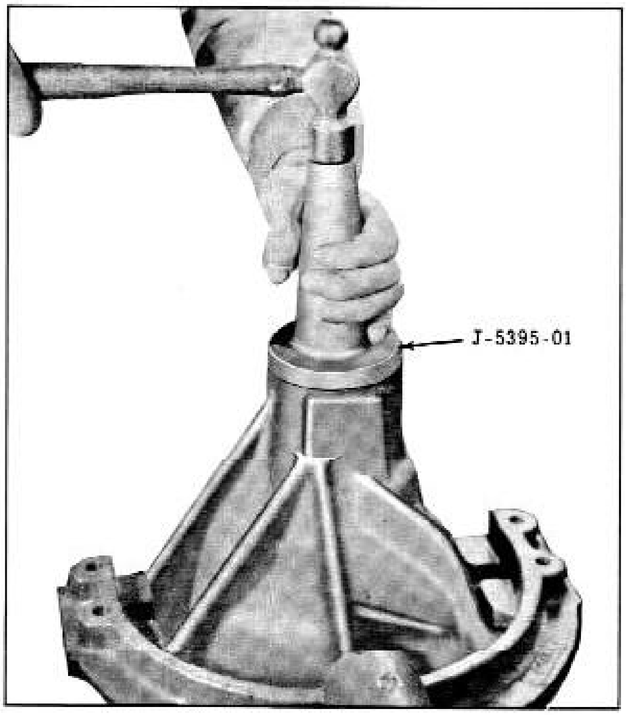


Fig. 6-33 Installing Pinion Oil Seal

No. 567196) to the O.D. of the companion flange and the sealing lip of the new seal.

10. While supporting the drive pinion shaft, tap the companion flange onto the drive pinion shaft.
11. Oil the flat washer and threads of drive pinion shaft and then install the washer and nut but do not tighten.
12. Adjust pinion bearing pre-load.

Adjusting Pinion Bearing Pre-Load

CAUTION: Extreme care must be used in tightening companion flange nut to pre-load pinion bearings correctly. Incorrect pre-load may result in bearing failure. Never back off nut to secure proper pre-load if specified pre-load has been exceeded. If specified maximum pre-load is exceeded, it will be necessary to use a washer, or use a new compressible spacer.

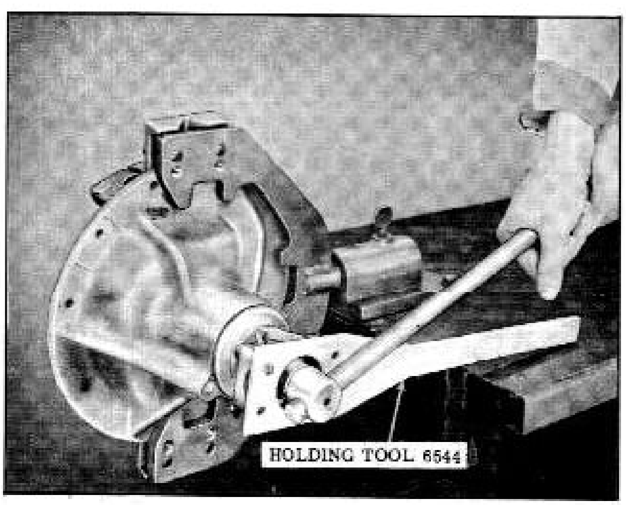


Fig. 6-34 Tightening Companion Flange Nut

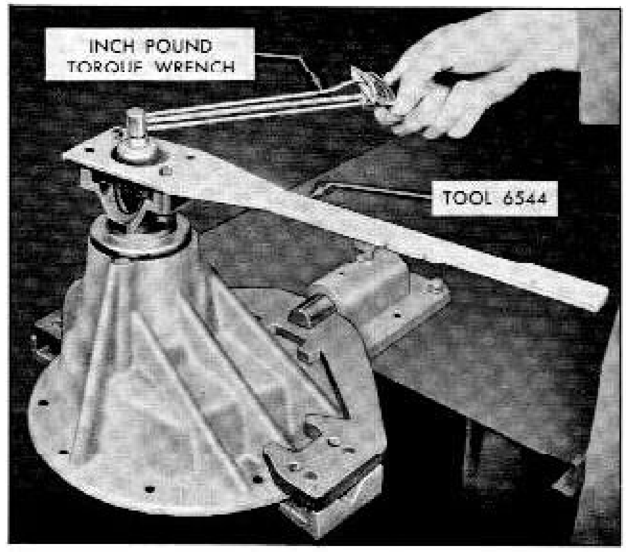


Fig. 6-35 Measuring Bearing Preload With Torque Wrench

Position carrier assembly as shown in Fig. 6-34 and tighten companion flange nut using Flange Holding Tool J-6544 and a heavy duty socket until all end play in drive pinion assembly is removed. Continue to tighten nut carefully, not more than 1/6 turn at a time, then turn drive pinion shaft several revolutions to seat rollers and check bearing pre-load with an inch-pound torque wrench (Fig. 6-35) or spring scale J-544-A. (Fig. 6-36)

NOTE: If spring scale J-544-A is used to check pre-load, it should be hooked to companion flange holding Tool J-6544 at a point 10 inches from drive shaft center. (Fig. 6-36) Readings in pounds times 10 will give inch-pounds. Readings between

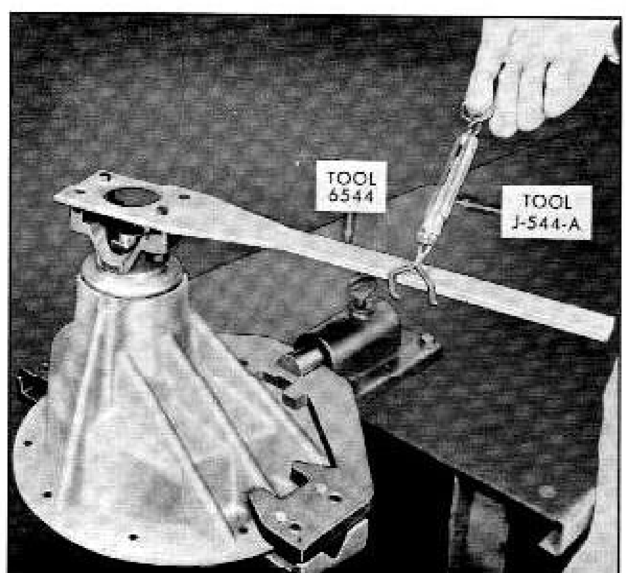


Fig. 6-36 Measuring Bearing Preload With Spring Scale

pound graduations must be read in tenths rather than in ounces; for example: 2 lbs. 8 oz., is read 2.5 lbs. times 10 = 25 inch-pounds.

Repeat tightening and checking until pre-load is 24 to 32 inch-pounds for new bearings, or 10 to 15 inch-pounds for old bearings.

DIFFERENTIAL CASE—INSTALL

1. Lubricate the side bearings, side gears and pinion gears.
2. Hold the differential side bearing outer races in position over the side bearings and carefully lower the differential case and ring gear assembly into carrier pedestal, engaging the ring gear with the drive pinion gear teeth.
3. Move the assembly toward the pinion until the lash between the ring gear and pinion is taken up.
4. Place the adjusting nuts (right and left) in position squarely against the bearing outer races and into the threads of carrier pedestal.

   NOTE: Rotate the adjusting nuts back and forth a few times by hand to be sure they are free and correctly positioned in threads. Leave the nuts snug against the bearings.

5. Install the bearing caps as marked.

   CAUTION: Make sure the adjusting nuts are properly seated, threads not crossed, and pedestal caps not interchanged.

6. Install the cap screws (no washers are used) and draw them down only sufficiently to lightly hold the caps in place. This can be done by drawing them down snugly and then loosening them approximately 1/4 to 1/2 turn.
7. Adjust backlash and side bearing pre-load.

Adjusting Backlash and Side Bearing Pre-Load

NOTE: Whenever new parts, such as gear sets, bearings, etc., are installed, the markings on the carrier and adjusting nuts (indicating the original position of gears and side bearing pre-load) should be disregarded. Whenever original parts are installed, the markings can be used to reset the adjustments providing the original settings were correct.

With bearing caps tightened just snug, proceed as follows:

1. Using Tool J-972-A, back off the right hand adjusting nut (one opposite ring gear) approximately three turns (just enough so lash between ring gear and pinion can be removed).

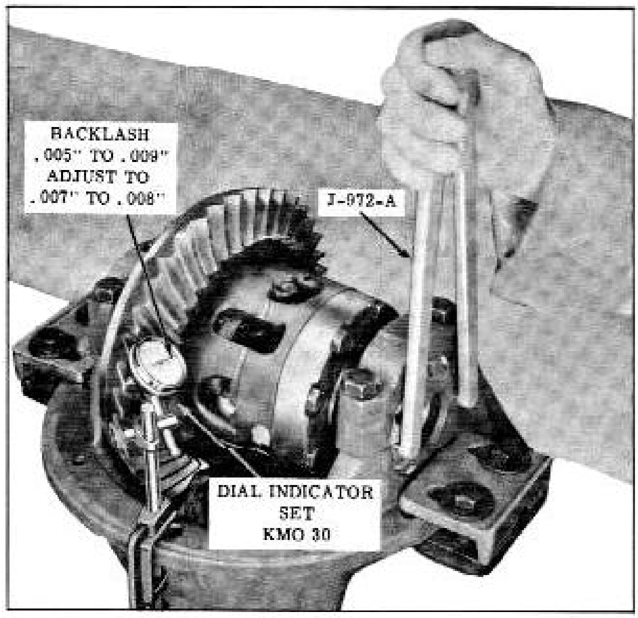


Fig. 6-37 Adjusting Backlash (Anti-Spin Shown)

2. Tighten the left hand adjusting nut to move ring gear into mesh with pinion until all lash is removed, then back off adjusting nut three notches.

   NOTE: This is only a starting point and may need to be readjusted depending on the backlash present after making the following adjustments.

3. Tighten the right hand adjusting nut while watching the outer race of bearing. When the bearing race starts to turn along with the adjusting nut, indicating pre-load on bearing, tighten two additional notches. Tighten adjusting nut to align closest notch in nut with cap screw hole in bearing cap. Do not loosen nut to align notch with hole in bearing cap.
4. Tighten bearing cap bolts 65 to 85 ft. lbs.
5. Clamp dial indicator to differential carrier and check backlash between ring gear and drive pinion, using Dial Indicator Set KMO-30. (Fig. 6-37) If the same ring gear and pinion were installed, the backlash should be adjusted according to markings on the bearing caps and adjusting nuts providing the differential was not disassembled to correct a noise complaint.

   NOTE: If backlash is not within .005" to .009", it will be necessary to adjust backlash .007" to .008". To do this, and at the same time retain the two notches pre-load on the side bearing, proceed as follows:

6. Loosen bearing cap bolts slightly, then move both adjusting nuts in the same direction one notch at a time until correct backlash is obtained. For example, if left nut is backed off

one notch, right nut must be tightened one notch.

NOTE: To increase backlash, move ring gear away from drive pinion gear. To decrease backlash move ring gear toward drive pinion gear.

Be sure bearing cap bolts are tightened 65 to 85 ft. lbs. each time backlash is checked.

7. After side bearing pre-load is correct, install bearing cap locks and lock bolts.

ANTI-SPIN DIFFERENTIAL CASE

NOTE: Service procedures and specifications for the Anti-Spin Differential are the same as the conventional differential except for the Anti-Spin case assembly unless otherwise specified.

GENERAL DESCRIPTION

The conventional differential divides the driving force equally to both rear wheels. The driving force is limited by the wheel which has the least amount of traction; therefore, if one wheel is on snow or mud, the wheel will spin and the driving force is lost.

The Anti-Spin Differential (optional on all series) through the use of gears and clutches directs the driving force to the wheel with the best traction thus improving the ability of the car to pull out of mud or snow.

Anti-Spin Differentials can be identified by the anti-spin lubrication tag attached by a carrier to axle housing nut and also by the letter "L" on the axle ratio pad. (Fig. 6-52)

CAUTION: ON CARS EQUIPPED WITH ANTI-SPIN DIFFERENTIALS, DO NOT RUN ENGINE

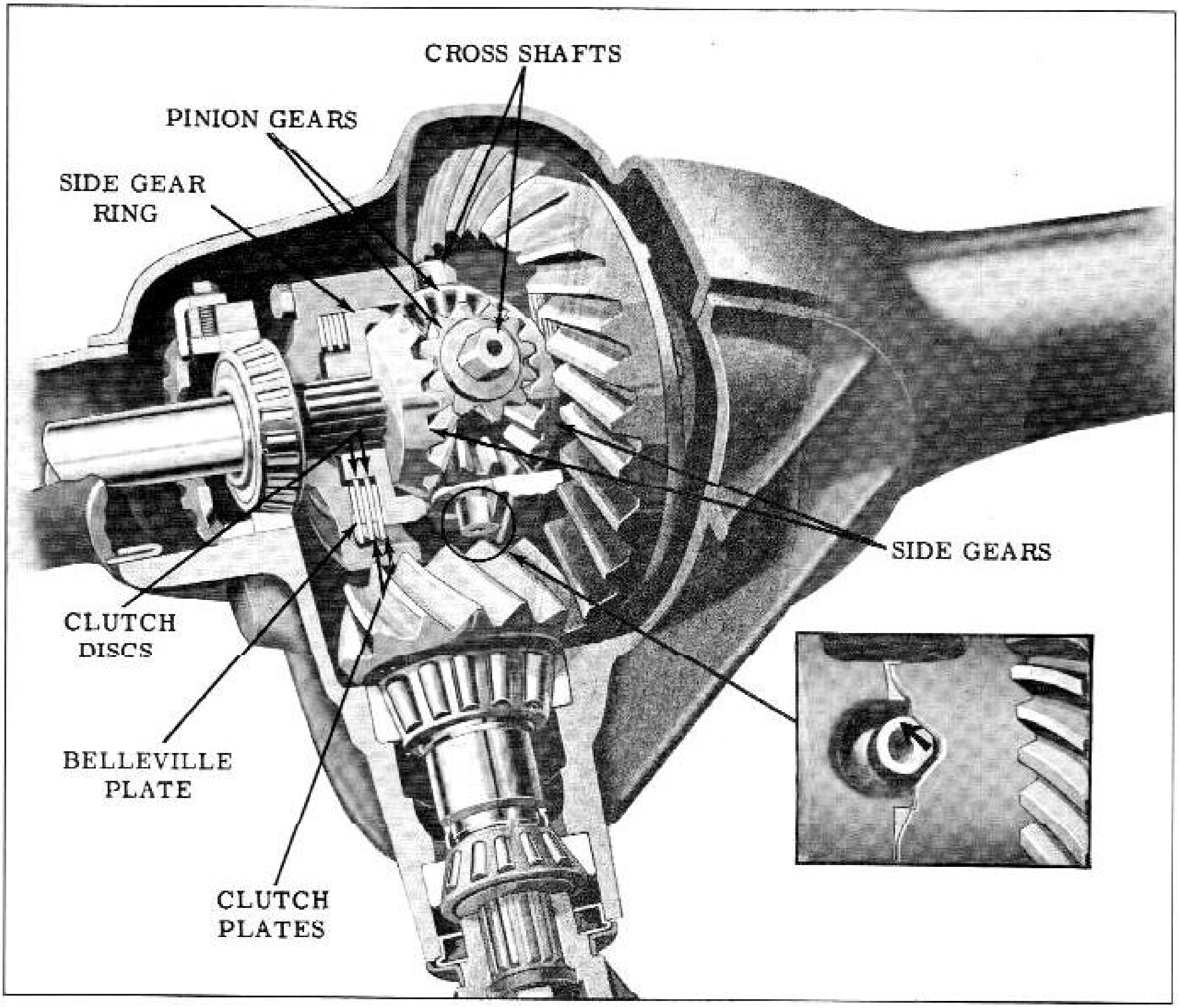


Fig. 6-38 Anti-Spin Differential

WITH ONE REAR WHEEL OFF THE GROUND AND TRANSMISSION IN GEAR.

OPERATION (Fig. 6-38)

The Anti-Spin Differential transmits torque from the drive pinion gear to the ring gear and to the case and cross shafts in the same manner as the conventional differential. In addition, the Anti-Spin Differential incorporates the use of clutches which tend to lock the axle shafts to the case or, in effect, to each other.

The mechanism that actuates the clutches consists of 4 pinion gears positioned in the case on 2 cross shafts which are at right angles to each other. Both ends of the shafts have 2 flat surfaces which mate with ramps in the differential case and case cover.

When driving force is applied at the differential case, the cross shafts, pinion gears and side gears (splined to the axle shafts) begin to rotate as an assembly in the same direction as the case. Although traction at the rear wheels may not be equal, their resistance to turning forces the cross shafts to slide up the ramps in the differential case and case cover (see inset Fig. 6-38), pushing the cross shafts apart. As the cross shafts move away from each other, the pinion gears on each cross shaft bear against the side gear rings (splined to the axle shaft and the clutch plates) to apply the clutches, which are preloaded by Belleville plates, and to lock the axle shafts to the case. Thus, both rear wheels turn at an equal speed and driving force is not lost by the wheel with poor traction.

When turning a corner, the action is essentially that of a conventional differential.

ANTI-SPIN CONVERSION INFORMATION

The case assembly (less ring gear and side bearings) is available for converting a conventional differential to Anti-Spin. The ring gear and side bearings of the conventional differential, if in good condition, can be used with the Anti-Spin case assembly.

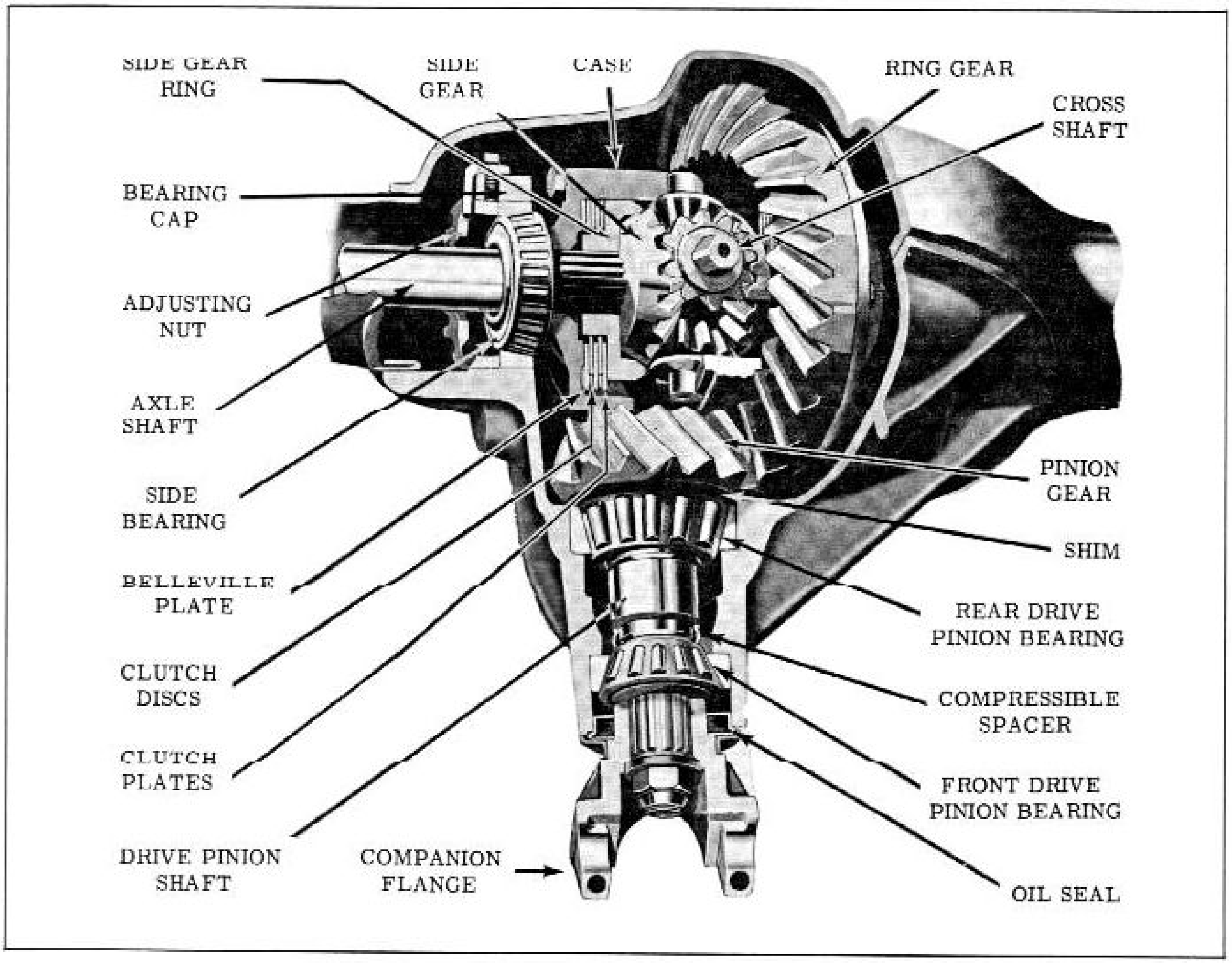


Fig. 6-39 Differential Assembly (Anti-Spin)

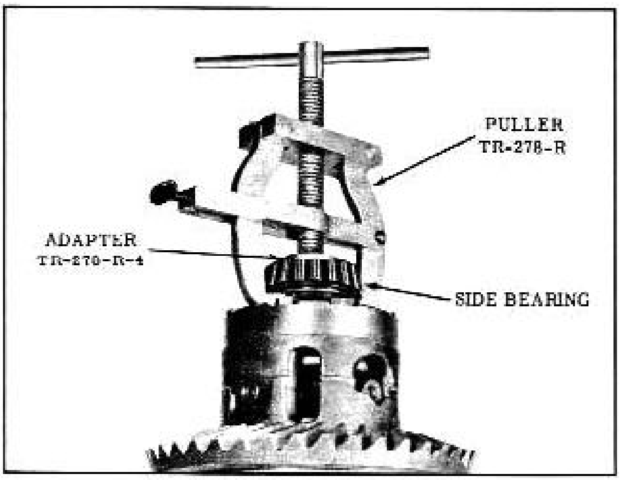


Fig. 6-40 Removing Side Bearing

CASE DISASSEMBLY (Fig. 6-41)

1. If side bearings are to be removed, use Differential Side Bearing Remover TR-278-R and Adapter TR-278-R-4 as shown in Fig. 6-40. Be sure ends of puller are placed in recess in differential case or case cover.

2. If the ring gear or differential case is to be replaced, remove ring gear from case.

3. Clamp the case assembly in a BRASS JAWED VISE by the ring gear or case flange. (Fig. 6-42)

4. Mark differential case and case cover with a center punch to provide alignment when assembling. (Fig. 6-42) If the cross shafts are to be reused, observe ends of shafts and case for daubs of paint identifying location. If they are not marked, it will be necessary to mark one end of each shaft as well as the case.

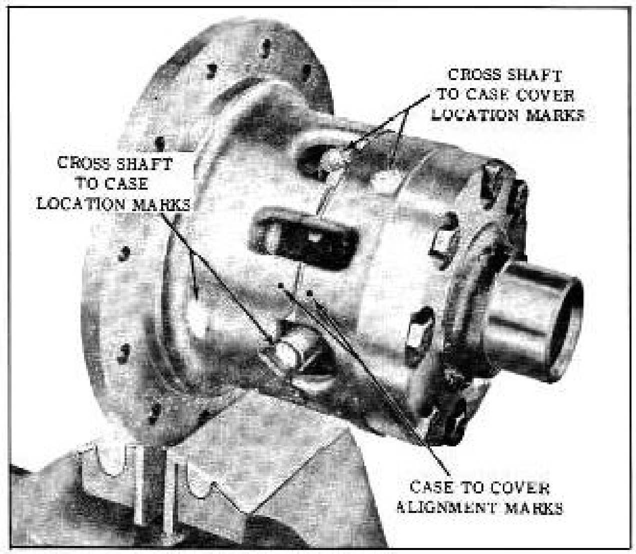


Fig. 6-42 Alignment Marks

5. Loosen the differential case to case cover attaching bolts, then place assembly on bench and remove bolts.

6. Lift the differential case cover from differential case. Clutch discs, plates and side gear ring may remain in differential case or may remain in cover.

   NOTE: Keep all parts removed from each case half together so they can be reinstalled in their original position.

7. Remove side gear ring, 2 clutch discs, 2 clutch plates and Belleville plate from case cover.

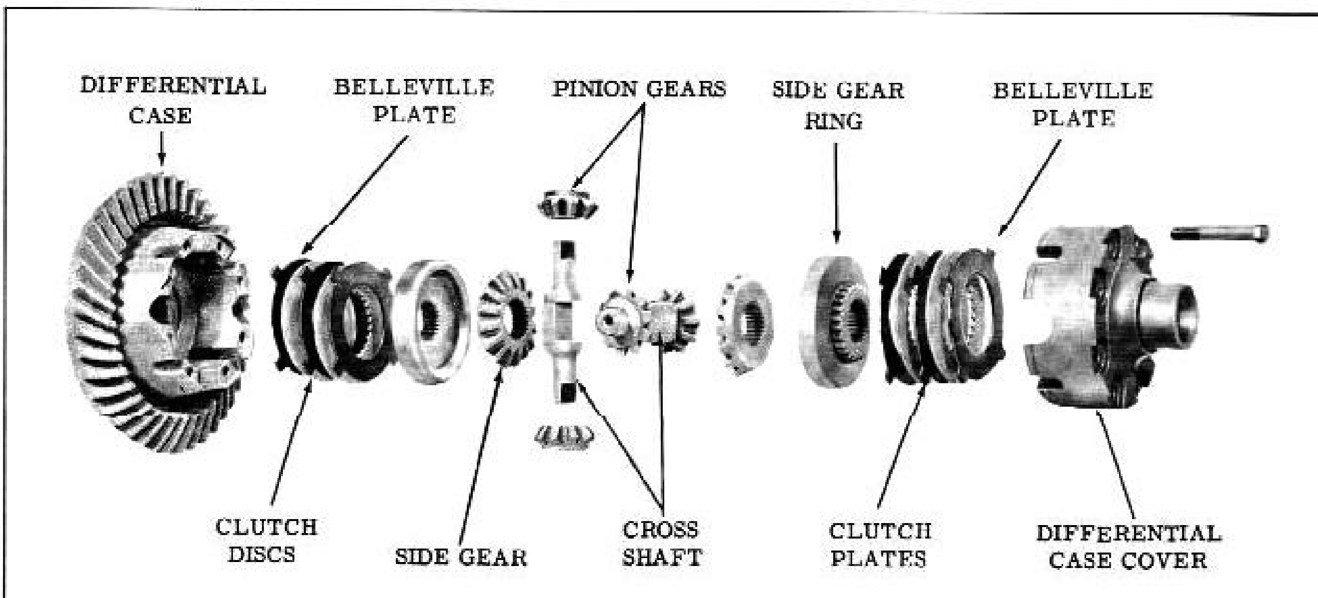


Fig. 6-41 Differential Case (Anti-Spin)

8. Remove side gear and cross shafts with pinions.

9. Remove side gear, side gear ring, 2 clutch discs, 2 clutch plates and Belleville plates from case.

CLEANING AND INSPECTION OF CASE

1. Clean side bearings thoroughly in clean solvent (do not use a brush). Examine bearings visually and by feel. Bearings should feel smooth when oiled and rotated while applying as much hand pressure as possible.

   NOTE: Minute scratches and pits that appear on rollers and races at low mileage are due to the initial pre-load, and bearings having these marks should not be rejected.

2. Examine the ring gear and drive pinion teeth for nicks, burrs, or scoring. Any of these conditions will require replacement of the gear set.

3. Inspect cross shafts, pinion and side gears. Replace if parts are excessively scored, pitted or worn.

4. Check the press fit of the side bearing inner race on the differential case. Side bearings must be a tight press fit on the hub.

5. Inspect clutch discs and plates for scored, worn, cracked or a distorted condition. If any of these conditions exist, new clutch discs and plates must be installed.

6. Inspect side gear rings and differential case halves for scoring. Replace damaged parts.

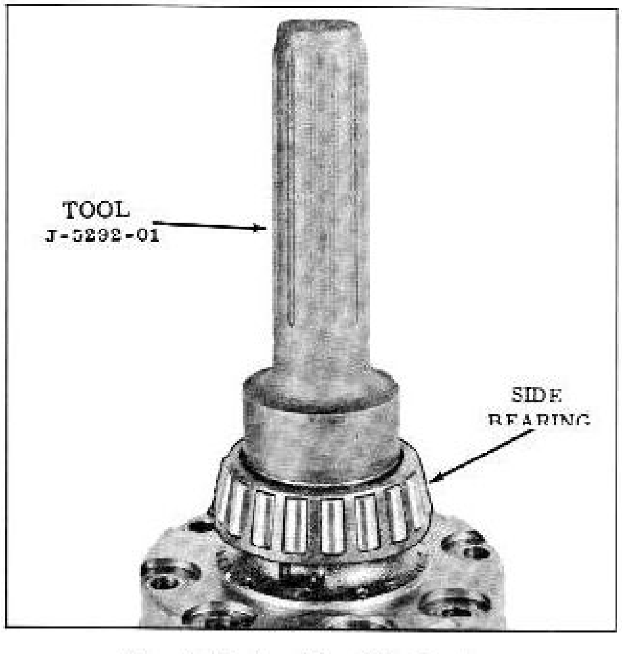


Fig. 6-43 Installing Side Bearing

DIFFERENTIAL CASE—ASSEMBLY

1. If the ring gear was removed, position the gear on the case flange and install the attaching bolts. Tighten the attaching bolts evenly and alternately across the diameter in progressive stages. Torque 55 to 65 ft. lbs.

2. If side bearings were removed, lubricate the bearings and install on case and case cover hubs as shown in Fig. 6-43.

3. Place the differential case on bench with opening up.

4. Oil clutch plates and discs with Special Lubricant (Part No. 531536). Install the Belleville plate in the differential case with the dished side of plate facing away from the case. Align external lugs on the plate with notches in the case.

5. Install a clutch plate (with external lugs) onto side gear ring, then install a clutch disc (splined) onto the side gear ring.

6. Install a clutch plate on clutch disc and align lugs with plate previously installed on side gear ring, then install a clutch disc (splined).

7. Hold flange half of the differential case on its side and install side gear ring and clutch plate assembly into case with lugs aligned with notches.

   NOTE: Make sure that the side gear ring is seated in its bore.

8. Install side gear (teeth up) in side gear ring.

9. Install two pinion gears on one cross shaft and

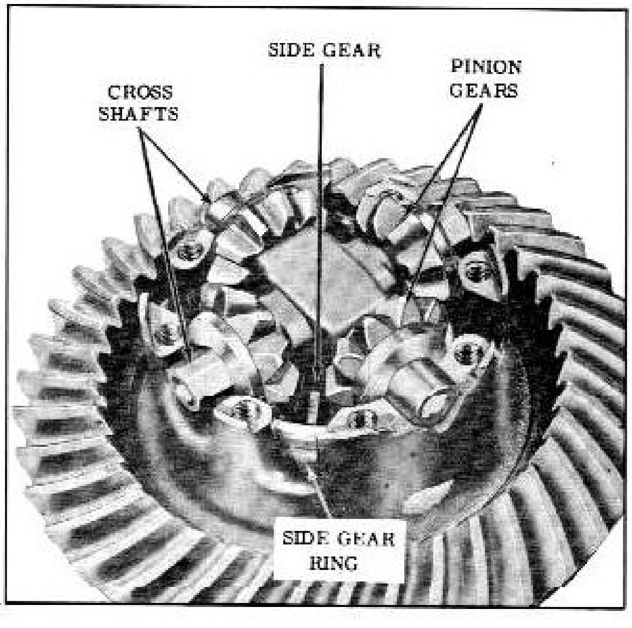


Fig. 6-44 Cross Shaft Installation

install the assembly into its original position in the case (notch in shaft up) with ends of cross shaft in largest openings in the case. (Fig. 6-44)

10. Install two pinion gears on the other cross shaft and install the assembly into its original position in the case (notch in shaft down) with ends of shaft in the ramps.
11. Install side gear onto pinion gears.
12. Place side gear ring onto side gear. Oil clutch plates and discs with Special Lubricant (Part No. 531536) as they are alternately installed on side gear ring, starting with a clutch plate and finishing with the Belleville plate. Belleville plate must be installed with the dished side facing the clutch disc. (Fig. 6-45)

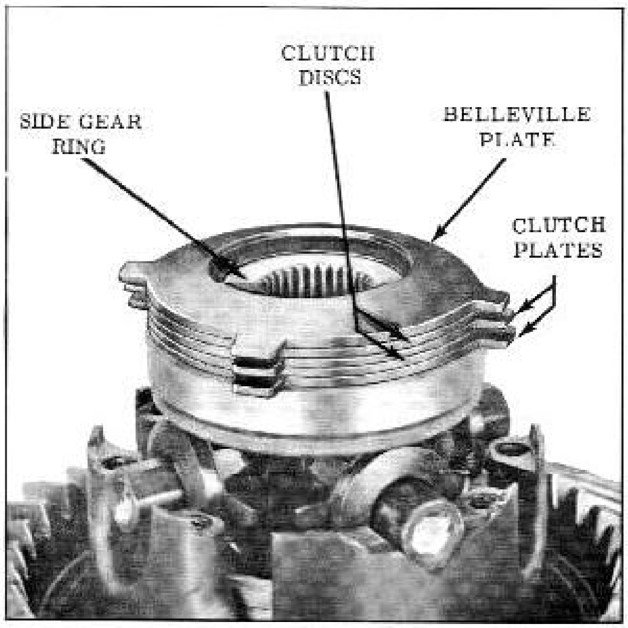


Fig. 6-45 Clutch Plate Installation

13. Align clutch plate lugs so they are in line with clutch plate lugs in case.
14. Place case cover over clutch assembly, engaging with clutch plate lugs and with punch marks on case aligned.
15. Install the eight cover to case attaching bolts, THEN INSTALL THE AXLE SHAFTS TO ALIGN THE SPLINES OF THE SIDE GEARS AND THE SIDE GEAR RINGS. With axle shafts installed tighten the cover to case attaching bolts evenly, then torque 35 to 45 ft. lbs. Remove axle shafts from case assembly.

DIAGNOSIS

ANTI SPIN OPERATION

If an anti-spin differential is suspected of not providing positive traction to the non-slipping wheel, the condition can be checked as follows:

1. Place the transmission in neutral.
2. Raise one wheel off the floor and place a block in the front and rear of the opposite wheel.
3. Remove hub cap or wheel disc and apply a torque wrench as shown in Fig. 6-46.
4. Disregard breakaway torque and observe only the torque required to continuously turn the wheel smoothly.

If the torque reading is less than 40 ft. lbs., the unit should be disassembled and the case assembly should be repaired as necessary.

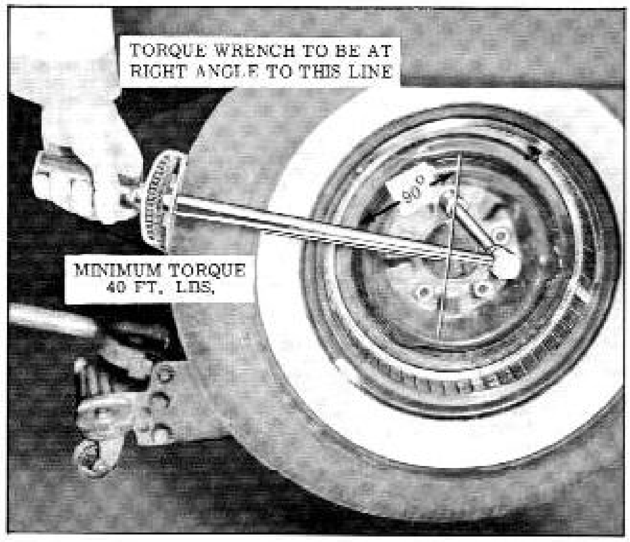


Fig. 6-46 Checking Anti-Spin

DIFFERENTIAL NOISE

When a differential assembly is suspected of being noisy, a thorough road test should be made to make sure that the noise is not being caused by tires, road surface, wheel bearings, engine, transmission, muffler, body or propeller shaft.

TIRE NOISE

Different types of road surfaces will affect tire noise but will not affect rear axle noise. For road testing, select a level tarvia or asphalt road, as this type road surface practically eliminates tire noise. For test purposes only, inflating all tires to approximately 50 lbs. pressure will materially alter noise caused by tires, but will not affect noise caused by the rear axle. Rear axle noise usually ceases when coasting with transmission in neutral at speeds under 30 m.p.h., however, tire noise continues with lower tone as car speed is reduced. Rear axle noise always changes when comparing "pull" and "coast", but tire noise remains about the same.

WHEEL BEARING NOISE

Wheel bearing noise may be confused with differential noise; however, a rough rear wheel bearing produces a vibration or growl which continues with car coasting with transmission in neutral. A bad bearing may cause a knock or click approximately every two revolutions of the wheel since the bearing rollers do not travel at the same speed as the rear axle shaft. To determine which front wheel bearing is noisy, hoist the car and spin each wheel while listening at the hub cap. To determine which rear wheel bearing is noisy, hoist car and start engine. With transmission in gear, use a piece of rubber hose or stethoscope BT-37 at the axle housing to locate the noise.

ENGINE AND TRANSMISSION NOISE

Note speed at which noise occurs, and with car standing and transmission in neutral, accelerate the engine to approximate speed where noise was noticed. If a similar noise is produced with the car standing, it cannot be due to the rear axle.

DIFFERENTIAL SIDE AND PINION GEAR NOISE

Differential side gears and pinions seldom cause noise because their movements is negligible on straight ahead driving.

RING GEAR AND PINION GEAR NOISE

These generally show up as drive noise, coast noise, or float noise. Drive noise is most pronounced on constant acceleration through the speed range. Coast noise is most pronounced when the car is allowed to coast through the speed range while in gear. Float noise is the most pronounced while holding the car speed constant at various speeds. Drive, coast, and float noises will be very rough and irregular if the differential side bearings or drive pinion bearings are rough, worn, or loose.

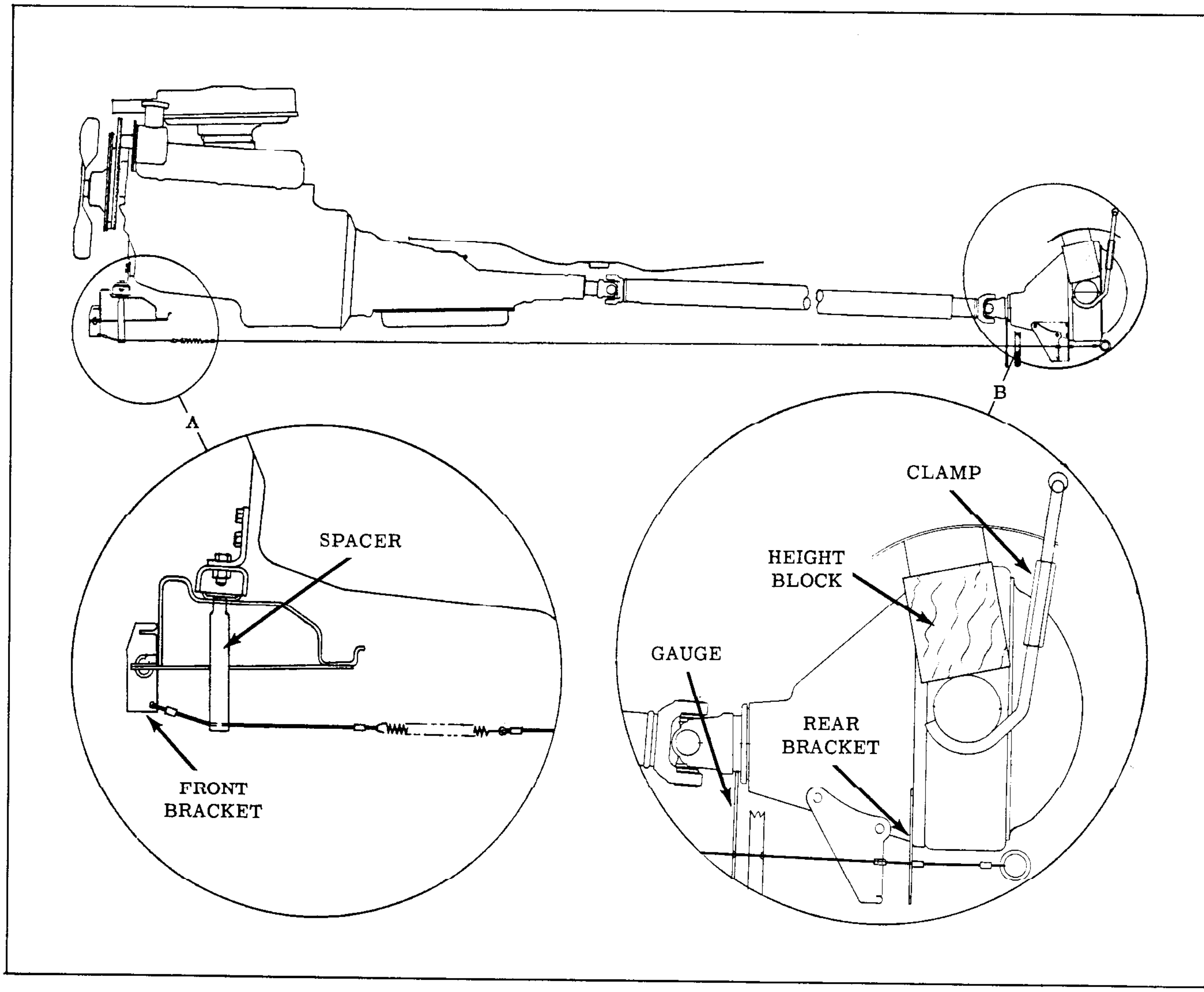


Fig. 6-47 Checking Differential Nose Angle

DRIVE PINION BEARING AND SIDE BEARING NOISE

Rough or brinnelled bearings produce a continuous whine starting at a relatively low speed. The noise is most noticeable with a light pull between 18 to 25 miles per hour.

DIFFERENTIAL CLUTCH CHATTER (Anti-Spin Only)

Improper lubricant can cause the clutch plates to grab and release intermittently resulting in chatter when the car is turning a corner slowly. Special Lubricant (Part No. 531536) MUST be used for initial fill of the differential, small amounts of S.A.E. 90 Multi-Purpose Gear Lubricant can be added to bring the lubricant up to filler plug level.

DRIVE LINE VIBRATION

Drive line vibration can be caused by propeller shaft out of balance, worn or bad "U" joints and bearings, or differential alignment. To correct the differential nose angle the following procedure should be used.

CHECKING AND ADJUSTING DIFFERTNTIAL NOSE ANGLE (USING TOOL BT-30-1 AND BT-30-2) (FIG. 6-47)

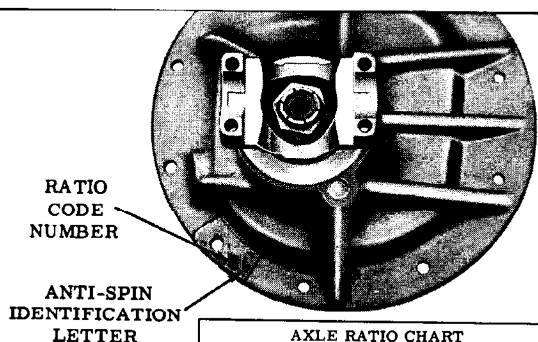
1. Connect cable at front frame cross member. (Fig. 6-47, Inset "A")
2. Install rear bracket on the two lower right studs on differential carrier. (Fig. 6-47, Inset "B")
3. Hook cable in upper hole on rear bracket, then install spacer between cable and bottom of front engine mount.
4. Install wooden blocks between rear axle housing and rubber bumpers. Refer to directions on blocks. Install hold down clamps around axle housing (the lower hook end should point toward front of car). Install upper hook into the 3/4" hole in frame immediately above axle housing. (Fig. 6-47 inset "B") Adjust turn buckles on clamps until wooden blocks fit snugly between axle housing and rubber bumpers.

   It may be necessary to lift up on the car to install the wooden blocks.
5. Position gauge as shown and check differential nose angle alignment.

   If the wire is not within limits of the gauge notch, the differential nose angle can be corrected by lengthening or shortening the lower suspension arms.

AXLE AND SPEEDOMETER RATIOS

Series	Trans.	Body Style	Axle Ratio Code (Fig. 6-48)	Tire Size	Speedometer Gear Identification No. (Fig. 6-49) Drive	Driven
32 & 35	S-M	ALL	8 Std.	8.00 x 14 Std.	8	20
32 & 35	S-M	ALL	8 Std.	8.50 x 14 Over	8	19
32 & 35	S-M	ALL	8 Air Conditioning	8.50 x 14 Std.	8	19
32	H-M	11,37,39,67,69	7 Std.	8.00 x 14 Std.	13	27
32	H-M	11,37,39,67,69	7 Std.	8.50 x 14 Over	13	27
32	H-M	11,37,39,67,69	2 Plains	8.00 x 14 Std.	13	26
32	H-M	11,37,39,67,69	2 Plains	8.50 x 14 Over	13	26
32	H-M	11,37,39,67,69	7 Plains - Air Cond.	8.50 x 14 Std.	13	27
32	H-M	35,45	7 Plains	8.00 x 14 Std.	13	27
32	H-M	35,45	7 Plains	8.50 x 14 Over	13	27
32	H-M	35,45	7 Plains - Air Cond.	8.50 x 14 Std.	13	27
32	H-M	11,37,39,67,69	0 Air Conditioning	8.50 x 14 Std.	13	28
32	H-M	11,37,39,67,69	0 Mountain	8.00 x 14 Std.	13	29
32	H-M	11,37,39,67,69	0 Mountain	8.50 x 14 Over	13	28
32	H-M	11,37,39,67,69	0 Premium Fuel Opt.	8.00 x 14 Std.	13	29
32	H-M	11,37,39,67,69	0 Premium Fuel Opt.	8.50 x 14 Over	13	28
32	H-M	11,37,39,67,69	0 Police Option	8.00 x 14 Std.	13	29
32	H-M	11,37,39,67,69	0 Heavy Duty Option	8.00 x 14 Std.	13	29
32	H-M	ALL	9 Export Option Mt.	8.00 x 14 Std.	13	31
32	H-M	ALL	9 Export Option Mt.	8.50 x 14 Over	13	30
32	H-M	35,45	0 Std.	8.00 x 14 Std.	13	29
32	H-M	35,45	0 Std.	8.50 x 14 Over	13	28
32	H-M	35,45	0 Air Conditioning	8.50 x 14 Std.	13	28
35	H-M	ALL	0 Std.	8.00 x 14 Std.	13	29
35	H-M	ALL	0 Std.	8.50 x 14 Over	13	28
35	H-M	ALL	0 Air Conditioning	8.50 x 14 Std.	13	28
35	H-M	ALL	7 Plains	8.00 x 14 Std.	13	27
35	H-M	ALL	7 Plains	8.50 x 14 Over	13	27
35	H-M	ALL	7 Plains - Air Cond.	8.50 x 14 Std.	13	27
38	H-M	ALL	9 Std.	8.50 x 14 Std.	13	30
38	H-M	ALL	9 Std.	9.00 x 14 Over	13	29
38	H-M	ALL	9 Air Conditioning	9.00 x 14 Std.	13	29
38	H-M	ALL	7 Plains	8.50 x 14 Std.	13	27
38	H-M	ALL	7 Plains	9.00 x 14 Over	13	26
38	H-M	ALL	7 Plains - Air Cond.	9.00 x 14 Std.	13	26



AXLE RATIO CHART

CODE	RATIO
2	43:16 (2.69:1)
7	43:15 (2.87:1)
8	41:12 (3.42:1)
9	42:13 (3.23:1)
0	40:13 (3.08:1)

Fig. 6-48 Axle Ratio Code

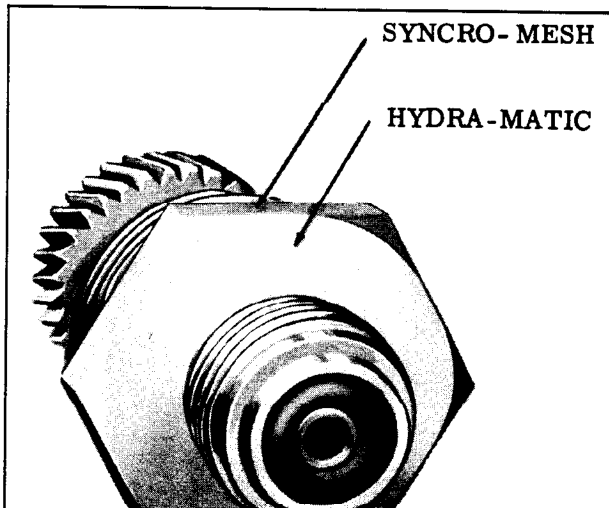


Fig. 6-49 Speedometer Driven Gear Identification

SPECIFICATIONS

PROPELLER SHAFT

1. Length (From Center Line of Front U-Joint to Center Line of Rear U-Joint)
   - a. 88 and S88 Series . . . . 55-13/16"
   - b. 98 Series . . . . 58-13/16"

DIFFERENTIAL

LUBRICATION

1. Capacity . . . . 5 Pts. (Approx.)
2. Drain and Refill . . . . Special Lubricant Part No. 531536
3. Replenish . . . . Special Lubricant Part No. 531536 or S.A.E. 90 Multi-Purpose Gear Lubricant

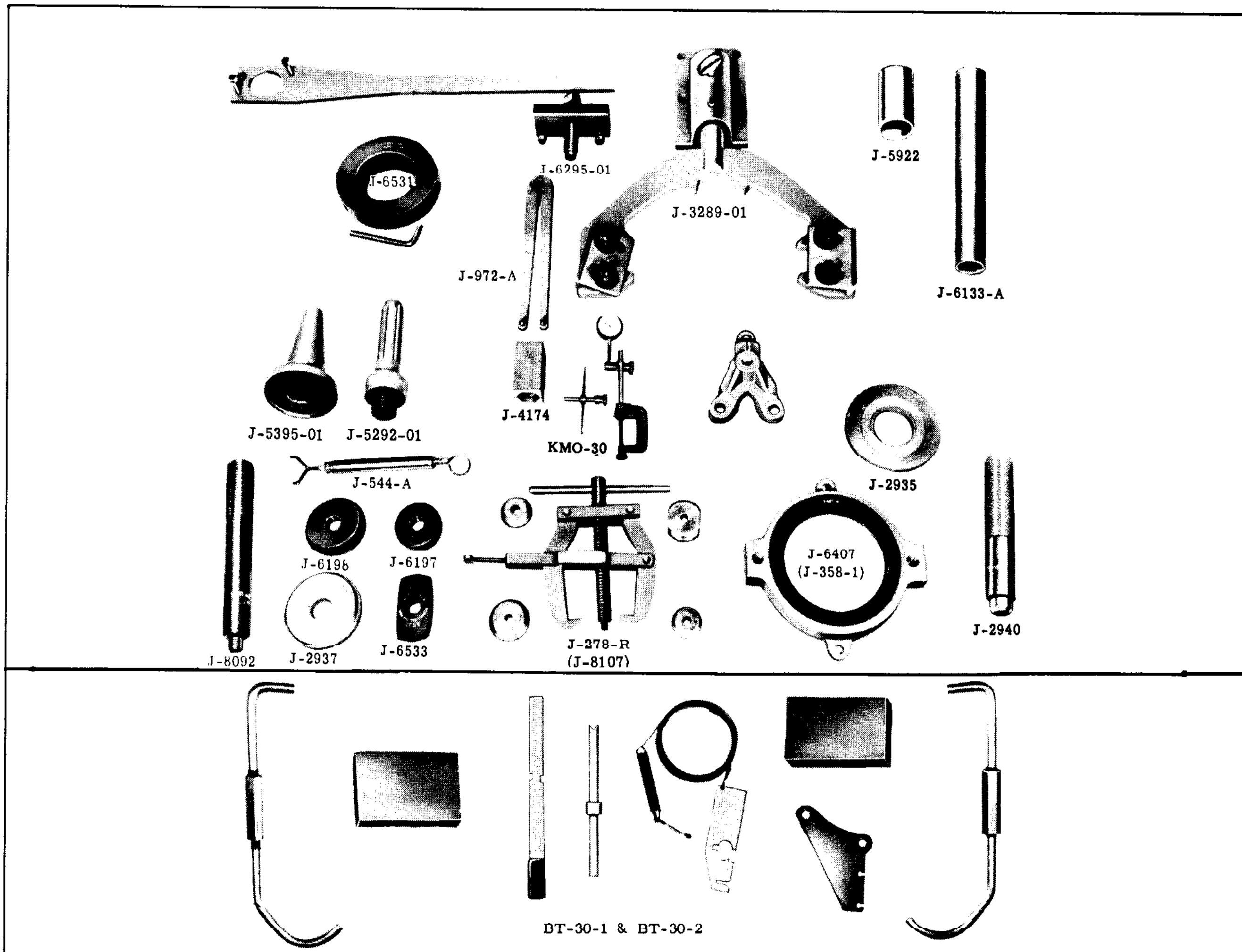
ADJUSTMENTS

4. Backlash (.005" to .009") . . . . Adjust to .007" to .008"
5. Drive Pinion Bearing Pre-Load
   - a. New Bearings . . . . 24 to 32 in. lbs.
   - b. Old Bearings . . . . 10 to 15 in. lbs.
6. Side Bearing Pre-Load . . . . 2 to 3 notches

TORQUE SPECIFICATIONS

NOTE: Specified torque is for installation of parts only. Checking torque during inspection may be 15% below specified minimum.

APPLICATION	FT. LBS.
PROPELLER SHAFT	
Companion Flange "U" Bolts	14 to 18
DIFFERENTIAL	
Carrier to Axle Housing Nuts	50 to 60
Bearing Cap Bolts	65 to 85
Ring Gear Cap Screws	55 to 65
Cover to Case Cap Screws	35 to 45



BT-30-1 & BT-30-2 Differential Nose Angle Check

KMO-30 Dial Indicator Set

TR-278-R (J-8107) Differential Side Bearing Puller

J-544-A Spring Scale

J-942-1 (J-8131) Axle Shaft Puller Adapter

J-972-A Differential Adjusting Nut Wrench

J-2935 Rear Pinion Bearing Outer Race Press Plate

J-2937 Rear Pinion Bearing Outer Race Installer

J-2940 Driver Handle

J-3289-01 Differential Holding Fixture

J-4174 "U" Joint Bearing Remover

J-5292-01 Differential Side Bearing Installer

J-5395-01 Pinion Seal Installer

J-5922 Air Conditioning Compressor Oil Seal Installer (Used for Installing Prop. Shaft Center Bearing)

J-6133-A H. M. Rear Oil Pump Bearing & Speedometer Gear Installer (Used for Front Pinion Inner Race Installer)

J-6197 Front Pinion Bearing Outer Race Installer

J-6198 Front Pinion Bearing Outer Race Remover

J-6295-01 Companion Flange Puller

J-6407 (J-358-1) Press Plate Holder

J-6525 (J-947-2) Axle Shaft Bearing Remover and Installer

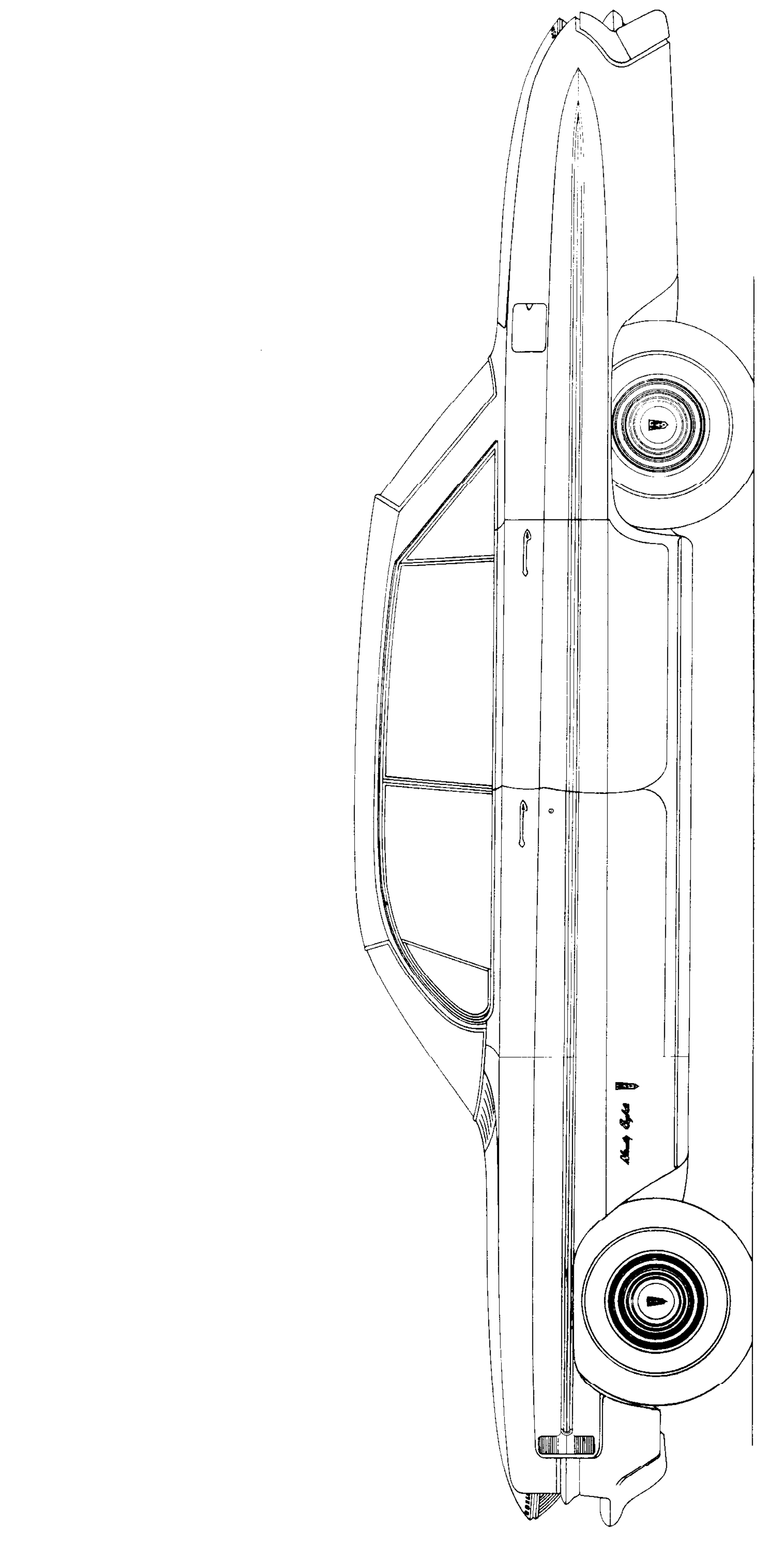
J-6531 Rear Pinion Bearing Remover

J-6533 Rear Pinion Bearing Outer Race Remover

J-6544 Companion Flange Holding Tool

J-8092 Driver Handle

Fig. 6-50 Propeller Shaft and Differential Tools



98 HOLIDAY SEDAN
(SIX WINDOW)
3829

BRAKES

CONTENTS OF SECTION 7

PERIODIC MAINTENANCE (Standard Brakes)

NOTE: For periodic maintenance of power brake equipped cars, refer to POWER BRAKES.

Each time the car is in the service department, the brake pedal movement should be observed. Brake shoes should be adjusted whenever the brake pedal travel from the released to the fully applied position exceeds 4" on standard brakes.

Each time the chassis is lubricated, check level of brake fluid in reservoir. Fluid level should be 1/2" below the bottom of the master cylinder fill opening. Replenish as necessary with G.M. Brake Fluid No. 11. Also, brake hoses and lines should be inspected for signs of chafing, deterioration and other damage.

DESCRIPTION

The braking system consists of hydraulically operated service brakes that apply the brake shoes simultaneously at all four wheels, and a mechanically operated parking brake that applies the brake shoes at the rear wheels only.

SERVICE BRAKE

When the service brake pedal is depressed, the piston in the master cylinder forces fluid under pressure to a wheel cylinder at each wheel, which in turn push the brake shoes against the brake drum. As the shoes contact the drum, the friction between the shoes and the rotating drum moves the primary shoe downward against the adjusting screw which acts as a link to transmit the force of the primary shoe to the lower end of the secondary shoe. With the upper end of the secondary shoe being held by the stationary anchor pin, the secondary shoe is "wedged" against the drum. This "wedging" action, due to frictional force, imparts the self energizing action to the braking effort and thereby decreases the effort required by the driver to stop the car.

PARKING BRAKE

The parking brake applies the rear brakes through cable and linkage by means of a foot operated parking brake pedal mounted below the instrument panel. The parking brake is released by a pull handle.

PARKING BRAKE LIGHT SWITCH

The parking brake light switch is bolted to the pedal mounting bracket and is actuated by a striker on the pedal. For adjustment procedure, refer to ELECTRICAL SECTION.

STOPLIGHT SWITCH

The stoplight switch is bolted to the brake pedal bracket and is actuated by an adjustable contact screw mounted on the brake pedal arm. For adjustment procedure, refer to ELECTRICAL SECTION.

ADJUSTMENTS

BRAKE SHOE ADJUSTMENT (Standard and Power Brakes)

A brake pedal adjustment should be made whenever the brake pedal travel from the released to the fully applied position exceeds 1-3/4" on power brakes and 4" on standard brakes.

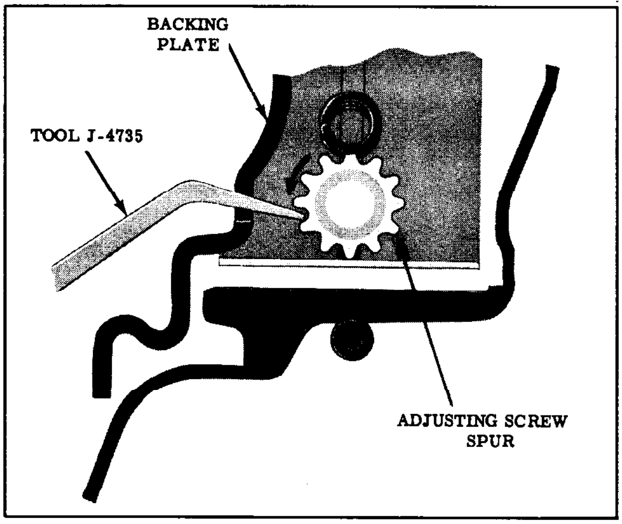


Fig. 7-1 Expanding Brake Shoes

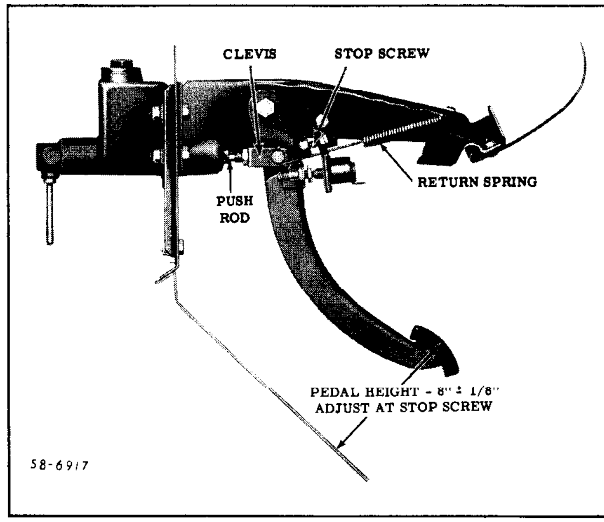


Fig. 7-2 Brake Pedal Adjustment

1. On cars equipped with standard brakes, check brake pedal free travel as outlined under BRAKE PEDAL ADJUSTMENTS.

2. Fully release parking brake, then hoist car.

3. Remove adjusting screw hole cover from backing plate. Expand brake shoes by turning adjusting screw using Tool J-4735 (Fig. 7-1) until heavy resistance is felt on brake drum while rotating wheel, then turn adjusting screw in opposite direction approximately sixteen notches.

   NOTE: If it is necessary to take up adjusting screw more than 50 notches, or car mileage indicates linings may be worn to rivets, the linings should be inspected and replaced, if necessary. (See SHOES AND LININGS).

4. Install the adjusting screw hole cover.

5. Repeat steps 2 and 3 for remaining wheels.

6. Fill master cylinder to 1/2" below the bottom of the master cylinder fill opening with G.M. Brake Fluid No. 11.

BRAKE PEDAL ADJUSTMENTS (Standard Brakes) (Fig. 7-2)

An incorrectly adjusted brake pedal can hold the master cylinder piston from fully returning to its released position, which will result in brake drag or lock-up. The brake pedal free travel should be checked after a brake shoe adjustment has been made.

1. Remove the pedal return spring and the master cylinder push rod clevis pin.

2. Turn back floor mat and check pedal height (from floor pan to top of pedal pad). If dimension is not 8" ± 1/8", loosen lock nut and adjust stop screw. (Fig. 7-2) Tighten lock nut and recheck adjustment.

3. To adjust master cylinder push rod, lightly push the master cylinder push rod until it contacts the hydraulic piston.

4. Turn push rod until clevis pin can be freely installed into the brake pedal, then shorten push rod one turn for proper free play.

5. Tighten lock nut and connect push rod to brake pedal.

   NOTE: Whenever the brake pedal height has been changed, the stop light switch adjustment should be checked and adjusted if necessary. (See ELECTRICAL SECTION)

PARKING BRAKE ADJUSTMENT (Fig. 7-3)

1. Release parking brake.

2. Adjust brake shoes if the service brake pedal travel from the released to the fully applied position exceeds 1-3/4" on power brakes and 4" on standard brakes. (See BRAKE SHOE ADJUSTMENT)

3. Adjust rear cables by first tightening equalizer adjusting nut until a heavy resistance is felt at rear wheels, then loosen equalizer adjusting nut 10 full turns and tighten lock nut. (Fig. 7-3)

MINOR SERVICE OPERATIONS

BRAKE PEDAL AND BRACKET (Standard Brakes)

The brake pedal is suspended from a mounting bracket under the instrument panel. Nylon bushings between the pivot bolt and the pedal eliminates

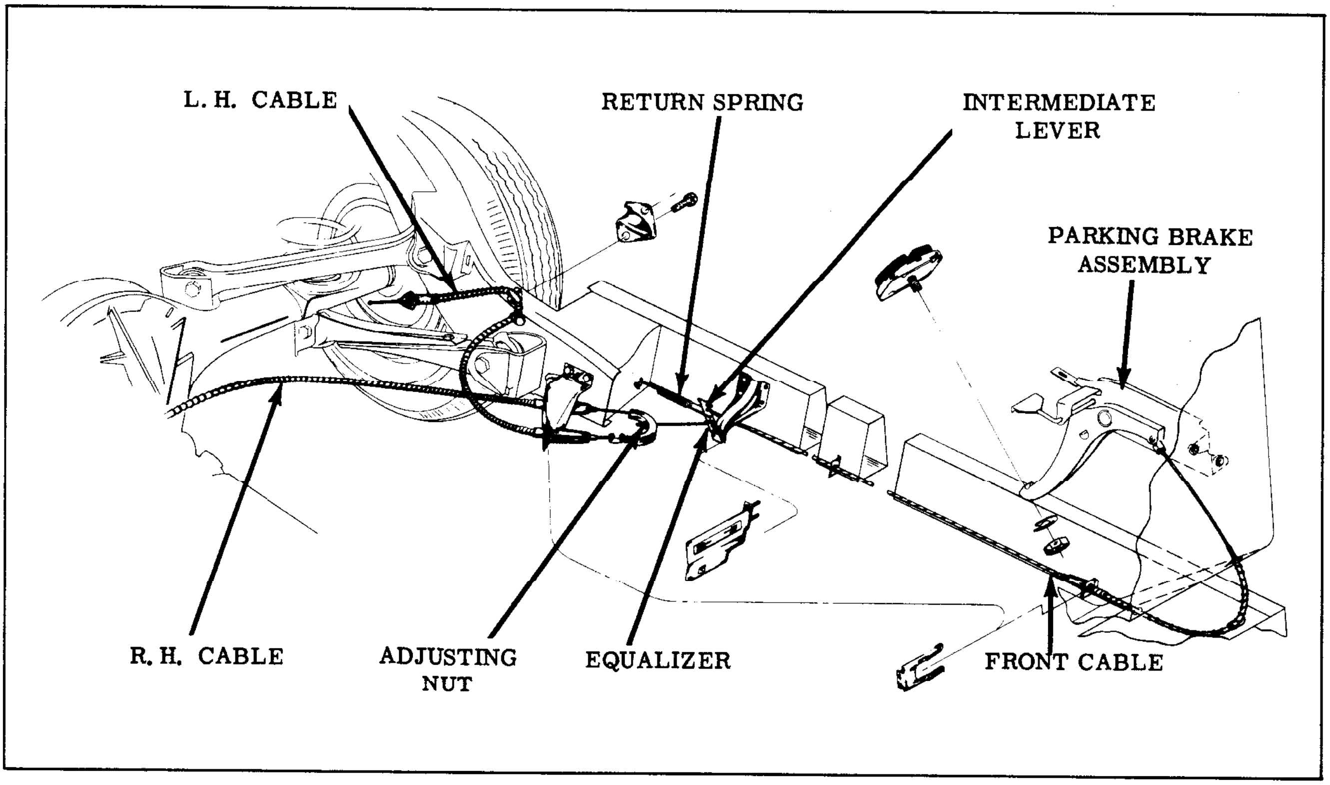


Fig. 7-3 Parking Brake Linkage

periodic lubrication. The pedal is connected to the master cylinder push rod by a clevis.

BRAKE PEDAL—REMOVE AND INSTALL (Fig. 7-4)

1. Remove the stop light switch. Disconnect the pedal return spring.
2. On Syncro-Mesh equipped cars, install a 1/4" gauge pin in the gauge pin hole in the frame. Remove the L.H. pivot bolt nut and flat washer, then loosen the pivot bolt until it is free of the R.H. nut (welded to the bracket).

   The brake pedal can now be removed without removing the clutch pedal by pulling the pivot bolt to the left until it clears the brake pedal.

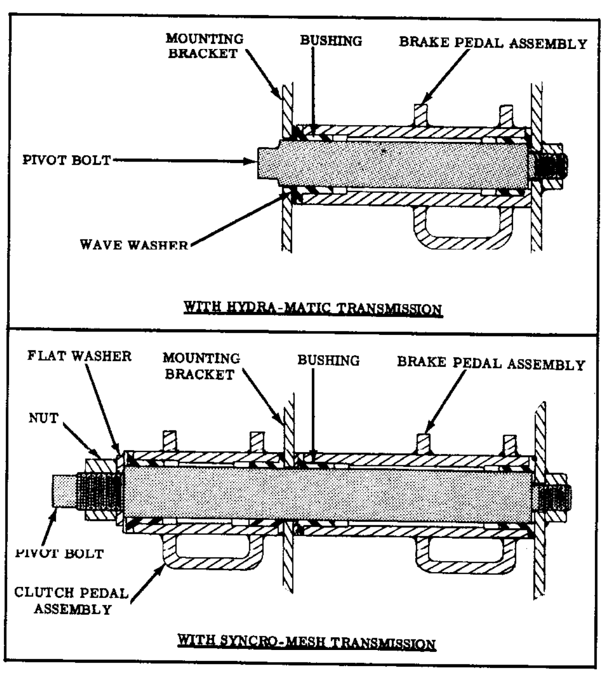


Fig. 7-4 Pivot Bolt and Pedal Assembly

3. On Hydra-Matic equipped cars, loosen the pivot bolt until it is free of the right hand nut (welded to the bracket), then remove the pivot bolt and brake pedal.

   To install, lubricate nylon bushings with Lubriplate and reverse the procedure. Torque pivot bolt or nut 10 to 18 ft. lbs. Adjust brake pedal as outlined under BRAKE PEDAL ADJUSTMENTS (Standard Brakes).

HYDRAULIC SYSTEM

BLEEDING OF LINES

Whenever a line is disconnected from any wheel, it is necessary that the wheel cylinder be bled. If the hydraulic line is disconnected from the master cylinder or the brake pedal has a spongy feeling, each wheel cylinder must be bled to expel air from the system.

NOTE: Power brakes can be bled in the same manner as a standard brake system. If pressure bleeding equipment is not available, DO NOT use the vacuum assist. With the engine shut off the vacuum reserve should be depleted by applying the brakes several times before starting the bleeding procedure.

The system can be bled manually or by using pressure bleeding equipment.

To bleed the system, the following procedure is recommended:

The correct sequence for bleeding is left front, right front, left rear, right rear.

1. If brakes are to be bled manually, fill the brake reservoir with G.M. Brake Fluid No. 11 and KEEP AT LEAST ONE-HALF FULL OF FLUID DURING THE BLEEDING OPERATION.

2. If brakes are to be bled with pressure equipment, connect the tank to the brake reservoir and raise the pressure in the brake system to 20 to 30 p.s.i.

3. Attach Bleeder Tube J-7779-2 to bleeder valve. (Fig. 7-5) THE TUBE MUST HANG SUBMERGED IN A CLEAN CONTAINER PARTIALLY FILLED WITH G.M. BRAKE FLUID NO. 11 DURING THE BLEEDING OPERATION.

4. Unscrew bleeder valve three quarters of a turn with a wrench such as J-7779-1 and watch flow of fluid from bleeder tube. When all air bubbles ceased to appear and fluid is clear, close bleeder valve.

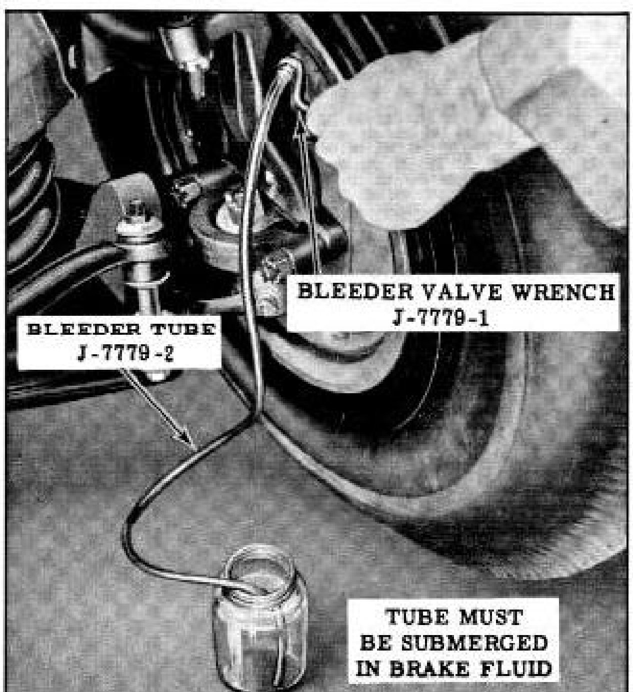


Fig. 7-5 Bleeding Brakes

NOTE: If brakes are bled without the aid of pressure equipment, the brake pedal must be operated during this operation to force the fluid from the bleeder hose. To do this, open the bleeder valve, fully depress the brake pedal, then slowly release pedal until it is in the fully released position. Continue operating pedal until liquid, containing no air bubbles, emerges from bleeder tube. Close bleeder valve.

5. Remove bleeder tube.

6. Repeat steps on the remaining wheel cylinders if the entire system is to be bled.

7. If the brakes were bled manually, check fluid in reservoir and replenish if necessary, after the bleeding operation has been completed.

FLUSHING HYDRAULIC SYSTEM

Whenever mineral oil has been introduced into the hydraulic system, the entire system should be thoroughly flushed with Declene Flushing Fluid and all rubber parts must be replaced. The Declene Flushing Fluid is introduced into the master cylinder reservoir and expelled at each wheel cylinder in the same manner as the bleeding operation (See BLEEDING OF LINES).

When flushing is completed, bleed the hydraulic system with G.M. Brake Fluid No. 11 as outlined under BLEEDING OF LINES until all flushing fluid and air is expelled from the lines.

MASTER CYLINDER

STANDARD AND POWER

The standard brake master cylinder can be removed without disconnecting the push rod and clevis. The hydraulic master cylinder, on cars equipped with power brakes, can be removed and

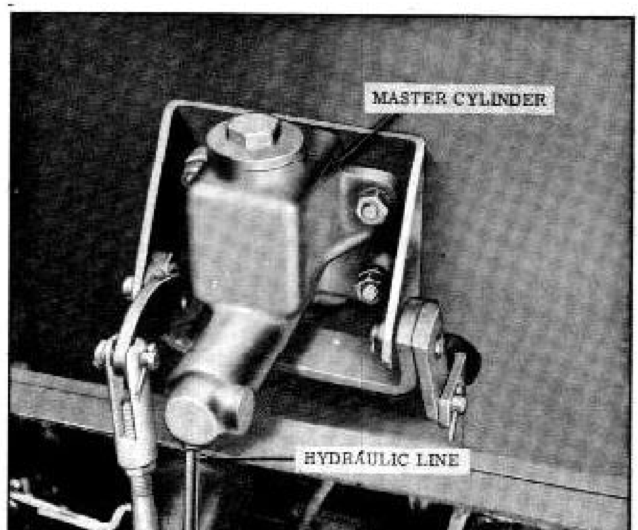


Fig. 7-6 Master Cylinder Attachment (Standard Brake)

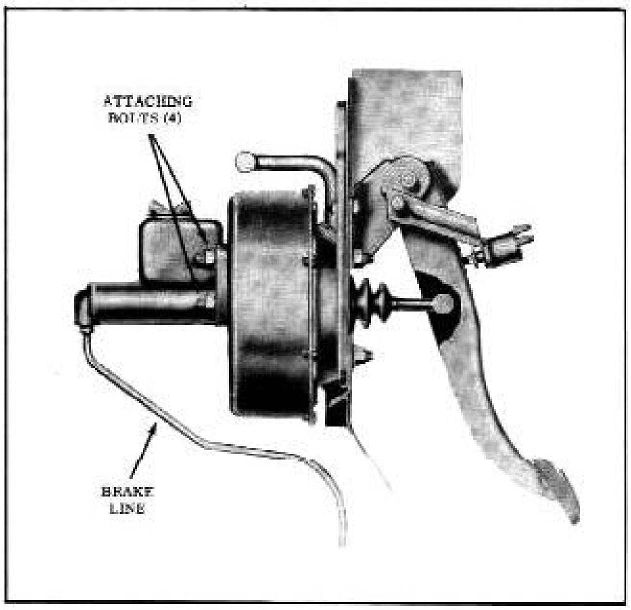


Fig. 7-7 Master Cylinder Attachment (Power Brake)

serviced without removing the vacuum cylinder from the car. Power brake units can be identified by the bronze Moraine vacuum cylinder and the black Bendix vacuum cylinder.

REMOVE (Fig. 7-6, 7-7)

1. Be sure area around master cylinder is clean, then disconnect the hydraulic line at the master cylinder. Plug or tape end of line to prevent entrance of dirt.
2. If car is equipped with standard transmission, install gauge pin in holes provided in the frame side rail, to hold clutch linkage in position, then disconnect clutch linkage from clutch pedal bellcrank and remove bellcrank.
3. Remove master cylinder by removing the four attaching nuts. On Moraine power brake units remove and record the number of any shims found between the master and vacuum cylinders.

   NOTE: On Moraine power brake units, the master cylinder piston will remain attached to the vacuum unit. If piston is to be serviced, the vacuum section must be removed and disassembled. (REFER TO MORAINE POWER BRAKE - DISASSEMBLY)

4. Drain master cylinder.

INSTALL

1. To install the standard brake master cylinder:
   a. Lubricate push rod with a light film of brake fluid to facilitate positioning of rubber boot on push rod after master cylinder is installed.
   b. Position master cylinder against cowl, push boot onto push rod and guide push rod into master cylinder piston cavity.
   c. Install the attaching nuts and lock washers. Torque nuts 20 to 28 ft. lbs.
   d. From inside car, pull boot along push rod toward clevis until boot is fully extended. Check brake pedal as outlined under BRAKE PEDAL ADJUSTMENTS (Standard Brake).
2. To install the power brake master cylinder:
   a. Position a new master cylinder to vacuum cylinder "O" ring on flange of master cylinder. Lubricate "O" ring with a light film of clean brake fluid.
   b. Moraine power brake - Apply a light film of brake fluid on the secondary seals. Install shims, that were removed on master cylinder removal, over the mounting studs and check hydraulic piston height as outlined under HYDRAULIC PISTON HEIGHT ADJUSTMENT. Position master cylinder so that master cylinder piston enters bore of master cylinder. Use care so that secondary seals are not damaged.
   c. Bendix power brake - Position master cylinder so that push rod enters cavity in master cylinder piston.

      NOTE: If a new push rod was installed, adjust push rod as outlined under PUSH ROD ADJUSTMENT.

   d. Install master cylinder attaching nuts and lock washers. Torque 15 to 20 ft. lbs.
3. Install hydraulic line to master cylinder.
4. Fill master cylinder reservoir with G.M. Brake Fluid No. 11 and bleed all wheel cylinders as outlined under BLEEDING OF LINES.

DISASSEMBLY (Figs. 7-8, 7-9 and 7-10)

1. Standard brake - Remove boot from master cylinder.
2. Standard and Bendix power brake master cylinders - Remove the piston retaining ring from the bore of the master cylinder and remove piston.
3. Remove the primary cup, spring and residual check valve from bore of master cylinder.
4. Pry the rubber valve seat washer from cylinder bore.
5. Moraine and Bendix power brake - Remove master cylinder to vacuum cylinder "O" ring.

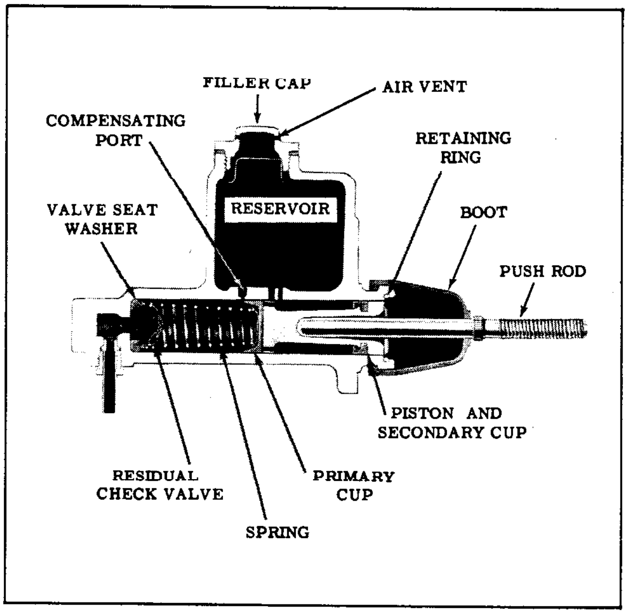


Fig. 7-8 Master Cylinder (Standard Brake)

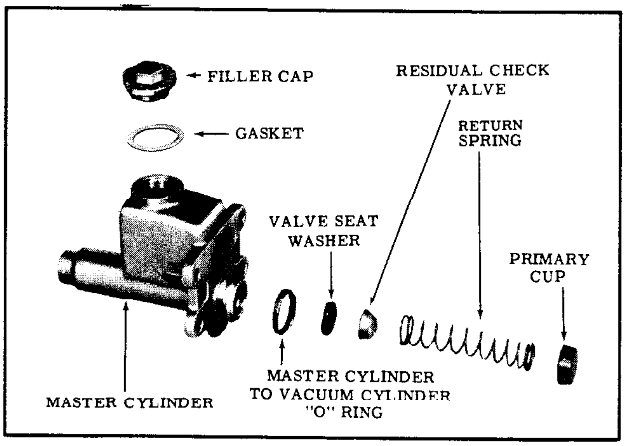


Fig. 7-9 Master Cylinder (Moraine Power Brake)

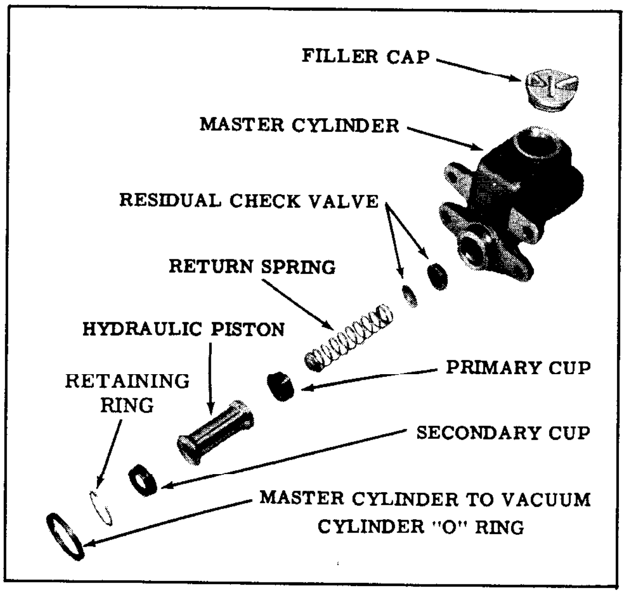


Fig. 7-10 Master Cylinder (Bendix Power Brake)

6. Moraine power brake - Remove the two secondary seals from the master cylinder piston.

CLEANING AND INSPECTION

1. Wash all parts in Declene Flushing Fluid and blow out all passages with compressed air. Be sure compensating port is open.
2. Inspect cups, residual check valve, valve seat washer and Moraine power brake secondary seals for a swelling or distorted condition. Replace if damaged. If such a condition exists, the entire system should be flushed (See FLUSHING HYDRAULIC SYSTEM) and all rubber parts in the wheel cylinders should be inspected and replaced if damaged.
3. Inspect the master cylinder bore for scores, rust, pits or etches. If any of these conditions exist, the complete master cylinder must be serviced as an assembly.

   CAUTION: Do not attempt to hone the master cylinder bore as a means of salvaging the cylinder assembly. Reconditioning of the bore leaves the walls sufficiently rough to cause premature failure of the rubber cups. It also enlarges the bore to the extent that the standard size piston will no longer fit properly. Oversize pistons and cups are not available.

4. Moraine power brake - Inspect master cylinder piston (attached to vacuum cylinder) for scores or nicks. If any of these conditions are found, the vacuum unit must be removed from the car and the piston replaced. (Refer to MORAINE POWER BRAKE - DISASSEMBLY)

ASSEMBLY (Figs. 7-8, 7-9 and 7-10)

1. Lubricate master cylinder bore and all rubber parts with G.M. Brake Fluid No. 11.
2. Install check valve rubber washer against the shoulder inside the master cylinder bore.
3. Install large end of spring over residual check valve, then install the assembly into the bore (check valve end first).
4. Install primary cup over end of spring (dished side toward spring).
5. Standard and Bendix power brake - Install piston into bore and while compressing spring, install retaining ring.
6. Moraine power brake - Install the two secondary seals on the master cylinder piston with the seal lips facing away from the vacuum cylinder.

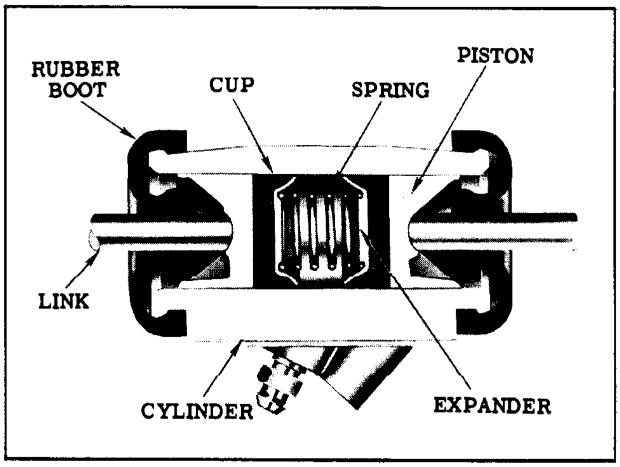


Fig. 7-11 Wheel Cylinder

7. Standard Brake - Install boot over lip of master cylinder casting.

8. Bendix and Moraine power brake - Install the master cylinder to vacuum cylinder "O" ring on the flange of the master cylinder.

WHEEL CYLINDERS (Fig. 7-11)

REMOVE

1. Remove brake drums and shoes as outlined under DRUM AND BRAKE ASSEMBLIES, REMOVE.

2. Front wheel cylinder:
   a. Remove brake line from brake hose.
   b. Remove the brake hose retainer clip at the frame bracket.
   c. Remove brake hose from wheel cylinder.

3. Rear wheel cylinder - Remove the brake line from the wheel cylinder.

4. Remove the wheel cylinder to backing plate attaching bolts and remove wheel cylinder.

To install, reverse the removal procedure torque wheel cylinder to backing plate bolts 10 to 18 ft. lbs. and bleed the lines. (See BLEEDING OF LINES)

DISASSEMBLY

1. Remove links and rubber boots.

2. Remove pistons, cups, expanders and spring from wheel cylinder bore.

CLEANING AND INSPECTION

1. Wash all parts in Declene Flushing Fluid and blow out all passages with compressed air.

2. Inspect cups for a swelling or distorted condition, replace if damaged. If a swelling condition exists, the entire hydraulic system should be flushed (See FLUSHING HYDRAULIC SYSTEM) and all the rubber parts in the hydraulic system should be inspected and replaced if damaged.

3. Inspect the wheel cylinder bore for scores, rust, pits or etches. If any such conditions exist, the complete wheel cylinder will have to be replaced as an assembly.

   CAUTION: Do not attempt to recondition a wheel cylinder bore as a means of salvaging the cylinder. Reconditioning of the bore leaves the walls sufficiently rough to cause premature failure of the rubber cups. It also enlarges the bore to the extent that the standard size pistons will no longer fit properly. Oversize pistons and cups are not available.

ASSEMBLY

Lubricate the bore of the wheel cylinder and all rubber parts with G.M. Brake Fluid No. 11 and assemble as shown in Fig. 7-11.

DRUMS AND BRAKE ASSEMBLIES

INSPECTION

Whenever brake drums are removed, they should be inspected for scores, deep grooves, cracks and out of round.

Cracked drums must be replaced, however, cracks running circumferentially at the back corner of drum where the cast iron blends into the steel portion of the drum are of no consequence and drums should not be replaced.

NOTE: Grooves extending around the entire braking surface of the brake drum are permissible providing the edges of the grooves that contact the shoes are smooth.

Drum out of round can be measured with a dial indicator and extension rod. Out of round measurements exceeding .010" (total indicator reading) require turning or replacement of drum.

TURNING DRUMS

If irregularities in the braking surface of the drum cannot be removed with emery cloth or out of round exceeds .010" (total indicator reading), the drum should be turned to .060" greater than the original inside diameter; that is, after being turned the diameter should be 11.060". Oversize brake linings must be used with turned drums.

REPLACING DRUMS

Whenever new drums are to be installed, the braking surface of the drum must be thoroughly cleaned with methyl chloroform to remove the rust proof coating.

BRAKE LINE

When replacing a damaged brake line, the damaged section should be cut out and repaired with steel brake tubing, listed under Group 8.964 in the Chassis Parts Book. Flare connections must be a double lap. Follow Flaring Tool Manufacturer's instructions for proper flaring of the double lap flare.

FRONT BACKING PLATE

Remove

1. Hoist car.
2. Remove the hub and drum assembly and the inner bearing inner race from the steering knuckle.
3. Remove the primary and secondary shoe return springs and the spring holder.
4. Remove the brake hold down springs.
5. Spread shoes to clear wheel cylinder links, then remove primary and secondary shoes as an assembly.
6. Loosen lock tab from anchor pin, then remove the anchor pin bolt.
7. Remove the brake hose from the brake line.
8. Remove the brake hose retainer clip at the frame bracket.
9. Remove the wheel cylinder to backing plate attaching bolts and remove wheel cylinder and brake hose.
10. Remove the plain arm to steering knuckle to backing plate bolts and nuts, then remove backing plate.

Install

1. Position the backing plate onto the steering knuckle.
2. Install the two plain arm to steering knuckle to backing plate bolts and nuts. Torque nuts 80 to 130 ft. lbs.
3. Install the wheel cylinder. Torque nuts 8 to 12 ft. lbs. Connect brake hose to brake line. Tighten brake line fittings 8 to 12 ft. lbs.
4. Install the brake hose retainer clip.
5. Position a new lock tab over the anchor pin bolt, then install the anchor pin bolt.
6. Align the slot in the lock tab with the boss on the wheel cylinder. Torque anchor pin bolt 55 to 80 ft. lbs. Bend lock tab down until it contacts the anchor pin bolt head.
7. Position the brake shoes onto the backing plate. Spread brake shoes and insert into the wheel cylinder links.
8. Install the brake hold down springs.
9. Position the brake return spring holder over the anchor pin, then install return springs.
10. Install the hub and drum assembly, and adjust wheel bearings.
11. Adjust brakes, fill master cylinder and bleed wheel cylinder. Refer to BLEEDING OF LINES.

REAR BACKING PLATE

Remove

1. Hoist car, remove wheel and brake drum.
2. Remove the brake line from the wheel cylinder.
3. Remove the brake return springs and guide.
4. Remove the brake shoe hold down springs and the parking brake lever strut and spring, then disconnect the parking brake cable from the operating lever.
5. Spread shoes to clear wheel cylinder links, then remove the brake shoes as an assembly.
6. Disconnect the parking brake cable from the backing plate.
7. Remove the axle assembly. (Refer to AXLE SHAFT - REMOVE, Page 5-12.)
8. Remove backing plate.
9. Remove wheel cylinder.

Install

1. Install wheel cylinder on backing plate. Torque attaching bolts 8 to 12 ft. lbs.
2. Position backing plate on axle housing and install the axle shaft. (Refer to AXLE SHAFT - INSTALL, Page 5-14.) Install the parking brake cable onto the brake drum.
3. Spread brake shoes and install on backing plate so that the brake shoes enter the wheel cylinder links. Install the parking brake strut and spring.

4. Position guide over anchor pin, then install brake return springs and brake hold down springs.

5. Install brake line on wheel cylinder.

6. Install brake drum and wheel.

7. Fill master cylinder, bleed and adjust brakes.

BRAKE ASSEMBLIES

If linings are worn nearly flush with rivets, new linings should be installed.

When brake lining replacement is necessary, it is recommended that all the linings be replaced. In some cases where there is extremely low mileage on the brake lining, it is permissible to replace the lining on one wheel when brake fluid or other foreign material has caused premature damage to the lining.

REMOVE (Fig. 7-12)

1. Hoist car.

2. Remove parking brake cable equalizer, then disconnect cables from equalizer.

3. Remove rear brake drums and front hub and drum assemblies.

4. Remove primary and secondary shoe return springs.

5. Remove brake shoe hold-down caps, springs and pins.

6. Spread shoes to clear wheel cylinder links. On rear brake assemblies, remove parking brake operating lever, strut and spring, then disconnect parking brake cable from operating lever.

7. Remove shoes, then remove secondary to primary shoe spring and adjusting screw.

8. On rear brake assemblies, remove parking brake lever from secondary shoe.

CLEANING AND INSPECTION

1. Inspect linings for wear. If linings are worn nearly flush with rivets, new linings should be installed.

2. Loosen wheel cylinder boot and inspect wheel cylinders for brake fluid leakage. If leak exists, remove wheel cylinder for service or replacement. (See WHEEL CYLINDERS)

3. Clean inner surfaces of brake backing plates and all contacting points.

4. Clean exposed portions of parking brake cables.

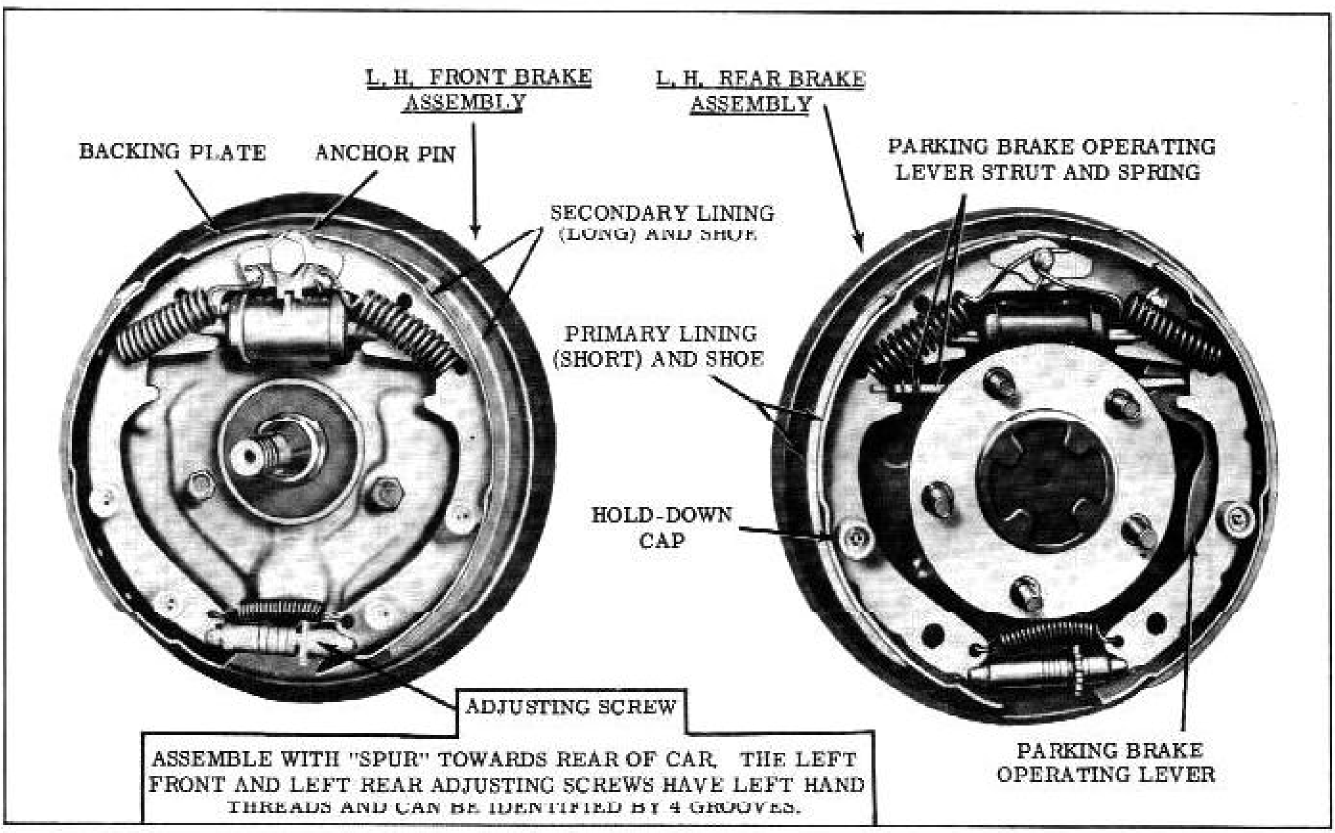


Fig. 7-12 Brake Details

INSTALLATION (Fig. 7-12)

1. The adjusting screw threads, backing plate ledges, and all other contacting points should be lubricated with a compound mixture containing 4 parts (volume) of Special Seal Lubricant Part No. 567196 and 1 part (volume) of powdered graphite.

2. Pull parking brake cables forward and rearward through conduits, lubricate freely with Lithum Soap Grease, and return cable to normal position. Remove any excess lubricant.

3. Tighten all brake backing plate mounting bolts as follows:

   Plain arm to steering knuckle to front backing plate - 80 to 130 ft. lbs., anchor pin to steering knuckle - 55 to 80 ft. lbs., rear backing plate to axle housing nuts - 45 to 60 ft. lbs.

4. On rear brake assemblies, install the parking brake lever to the secondary shoe.

5. Assemble the primary to secondary shoe spring to the shoes, and install the adjusting screws.

   IMPORTANT: THE LEFT FRONT AND REAR ADJUSTING SCREWS HAVE LEFT HAND THREADS AND CAN BE IDENTIFIED BY 4 GROOVES. ALL ADJUSTING SCREWS MUST BE INSTALLED WITH THE "SPUR" END OF THE SCREW TOWARD THE REAR OF THE CAR.

6. On rear brake assemblies, assemble the parking brake cable to the parking brake lever.

7. Assemble shoe assembly to backing plate. Be sure wheel cylinder links are properly positioned in shoe notches. On rear brake assemblies, install the parking brake strut and spring.

8. Install the brake shoe hold-down pins, springs and caps.

9. Install the primary and secondary shoe return springs.

10. Install rear brake drums and front wheel hubs and drum assembly, being sure adjusting screws are backed off sufficiently.

11. Connect parking brake equalizer.

12. Adjust front wheel bearings. (See WHEEL BEARING ADJUSTMENT, Section 5)

13. Adjust brake shoes as described under BRAKE SHOE ADJUSTMENT.

14. Adjust parking brake cables as outlined under PARKING BRAKE ADJUSTMENT.

15. Fill master cylinder. Fluid level should be within 1/2" below the bottom of the master cylinder fill cap.

POWER BRAKES

PERIODIC MAINTENANCE

Each time the car is in the service department, the brake pedal height should be observed. Brakes should be adjusted whenever the brake pedal travel from the released to the fully applied position exceeds 1-3/4", engine running. (See BRAKE SHOE ADJUSTMENT)

Each time the chassis is lubricated, check level of brake fluid in reservoir. Fluid level should be 1/2" below the bottom of the master cylinder fill opening. Replenish as necessary with G.M. Brake Fluid No. 11. Also, brake hoses and lines should be inspected for signs of chafing, deterioration and other damage.

DESCRIPTION

Oldsmobile uses Bendix and Moraine power brake units. The Bendix unit can be identified by the black colored vacuum cylinder and the end plate to vacuum cylinder attaching screws. Moraine units can be identified by the bronze colored vacuum cylinder and the slot and tang vacuum cylinder to end plate attachment. Internally the Bendix and Moraine vacuum units differ in construction, but both units are designed to seal off the vacuum from the units when the brake pedal is in the released position. The hydraulic master cylinder on the Bendix and Moraine units are similar in construction-and-service to the standard brake master cylinder. For removal and service of the power brake master cylinder refer to MASTER CYLINDER.

The power brake unit combined with a vacuum check valve, traps manifold vacuum in the reser-

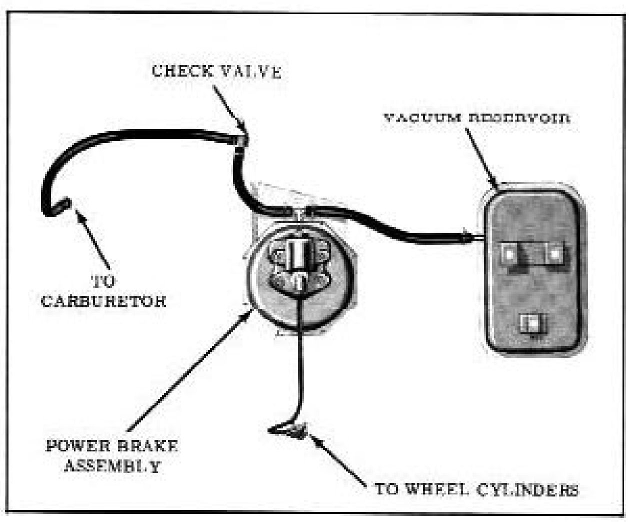


Fig. 7-13 Power Brake Layout

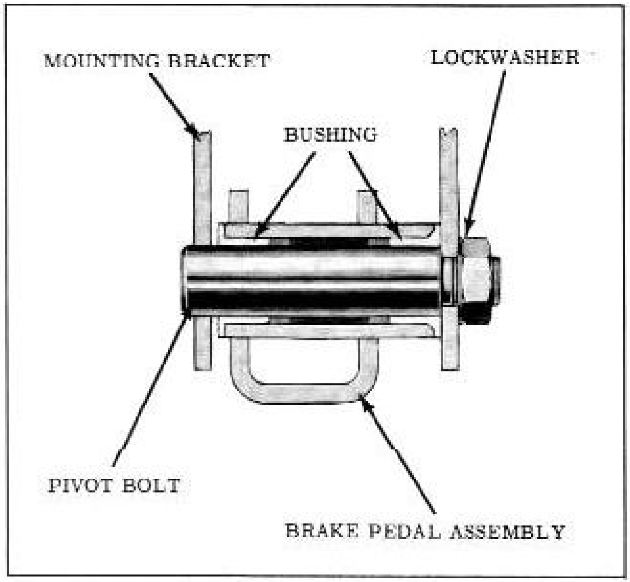


Fig. 7-14 Brake Pedal and Pivot Bolt

voir at the highest manifold vacuum available, making possible three or four normal brake applications after the engine has been shut off for several hours or more. If the engine should stall, several applications of the brakes can still be made with vacuum assist. After the vacuum supply is exhausted brake applications can still be made, however, more effort is required due to the lack of vacuum assist.

MINOR SERVICE OPERATIONS

BRAKE PEDAL

Remove and Install (Fig. 7-14)

1. Disconnect the power brake operating rod and the stop light wiring.
2. Remove the pivot bolt nut, lock washer, flat washer, then remove the pivot bolt and brake pedal.

   To install, lubricate nylon bushings with Lubriplate and reverse the above procedure. Torque pivot bolt nut 10 to 18 ft. lbs. Adjust stop light switch as outlined in the ELECTRICAL SECTION.

VACUUM RESERVE TANK

The vacuum reserve tank is located under the left front fender on the fender filler plate. No service is required other than replacement for leakage. To remove the vacuum reserve tank, remove the L.H. hood hinge assembly. Fender filler plate to reserve tank bolt torque is 8 to 10 ft. lbs.

POWER BRAKE UNIT

Remove and Install (Fig. 7-15)

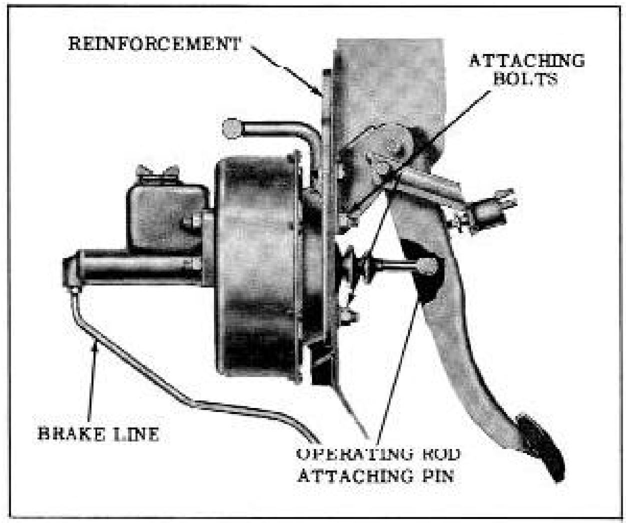


Fig. 7-15 Power Brake Attachment

1. Disconnect hydraulic line. Plug or tape line to prevent dirt from entering the hydraulic system.
2. Disconnect vacuum lines from the vacuum cylinder.
3. Disconnect the operating rod from the power brake pedal.
4. Remove the four vacuum cylinder unit to cowl attaching nuts.
5. To install reverse removal procedure. Torque the vacuum cylinder to cowl bolts 8 to 16 ft. lbs. Fill master cylinder with G.M. Brake Fluid No. 11 and bleed entire system. (See BLEEDING OF LINES)

   NOTE: After unit is installed on the car, the engine must be started and vacuum allowed to build up before any brake applications are made.

MORAINE POWER BRAKE

PRINCIPLES OF OPERATION

Released Position (Fig. 7-16)

In the released position, both sides of the vacuum piston (16) are open to atmospheric pressure. This allows the vacuum piston to be held in the released position by the vacuum piston return spring (3). This is accomplished as follows:

Vacuum is shut off within the piston since the floating valve (7) is held on its seat (18) by the combination reaction and floating valve spring (17). The air valve (9) and the operating rod (10) are held in the released position by the air valve return spring (14) which opens the atmospheric port (8). Atmospheric pressure, after passing

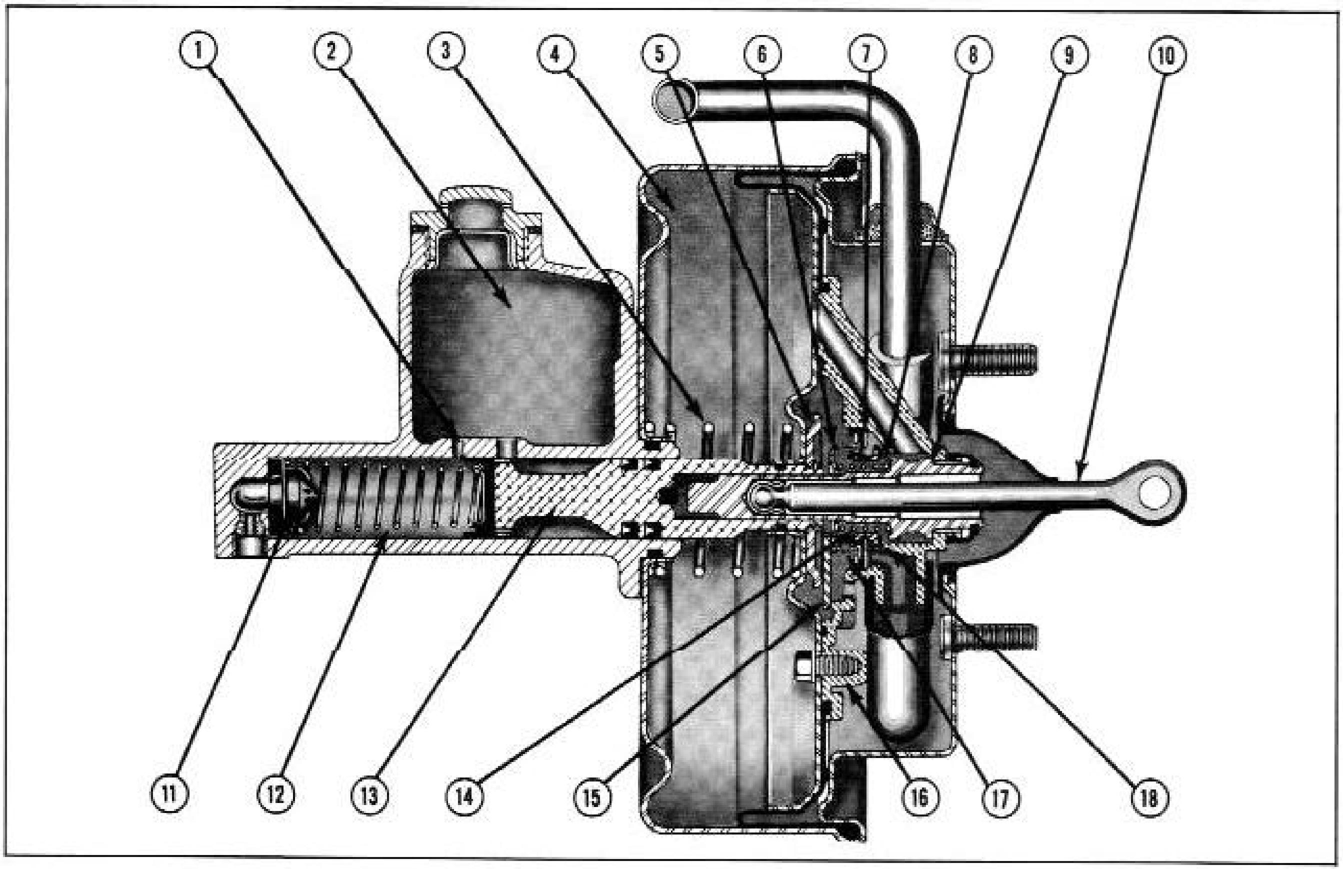


Fig. 7-16 Released Position

through the power brake air filter, enters the vacuum cylinder at the rear side of the vacuum piston. It then passes through the open atmospheric port (8) where it enters the forward side (4) of the vacuum piston. Atmospheric pressure is now equal on both sides of the vacuum piston, allowing the piston return spring to hold the vacuum piston in the released position.

The combination reaction and floating valve return spring (17) holds the air valve reaction plate (6) against the three reaction levers (15). This forces the master cylinder piston reaction plate (5) against its stop and the three reaction levers against their pivot points on the vacuum piston. Initial movement of the operating rod and air valve does not move the reaction mechanism.

The master cylinder piston (13) being attached to the vacuum piston assembly is also held in the released position by the vacuum piston return spring. In the released position the compensating port (1) is open and fluid can flow in either direction between the hydraulic cylinder (12) and the fluid reservoir (2). A slight pressure is maintained in the lines by the residual check valve (11).

Applying Position (Fig. 7-17)

As the brakes are applied, the operating rod (10) and air valve (9) move forward in the vacuum piston (16) to close the atmospheric port (8). Further movement allows the air valve to unseat the floating valve (7) and open the vacuum port (18). Vacuum can now communicate through the vacuum piston to the forward side of the vacuum piston (4). With vacuum on the forward side and atmospheric pressure on the rear of the vacuum piston, a force is developed which moves the vacuum piston and the hydraulic piston (13) in the apply direction.

The initial movement of the hydraulic piston in the apply direction closes the compensating port (1), sealing off the fluid reservoir (2) from the hydraulic cylinder (12). Further movement of the hydraulic piston in the apply direction increases pressure in the master cylinder, forcing fluid past the residual check valve (11) through the lines and into the wheel cylinders to apply the brakes.

As the pressure in the hydraulic cylinder increases, the force on the end of the hydraulic piston causes the hydraulic piston reaction plate (5) to move away from its stop and press against the reaction levers (15). The levers in turn pivot and press against the air valve reaction plate (6). This action moves the air valve and operating rod slightly to allow the floating valve (7) to close the vacuum port (18). The force on the hydraulic piston is transferred back through the air valve and operating rod to give the driver brake "feel".

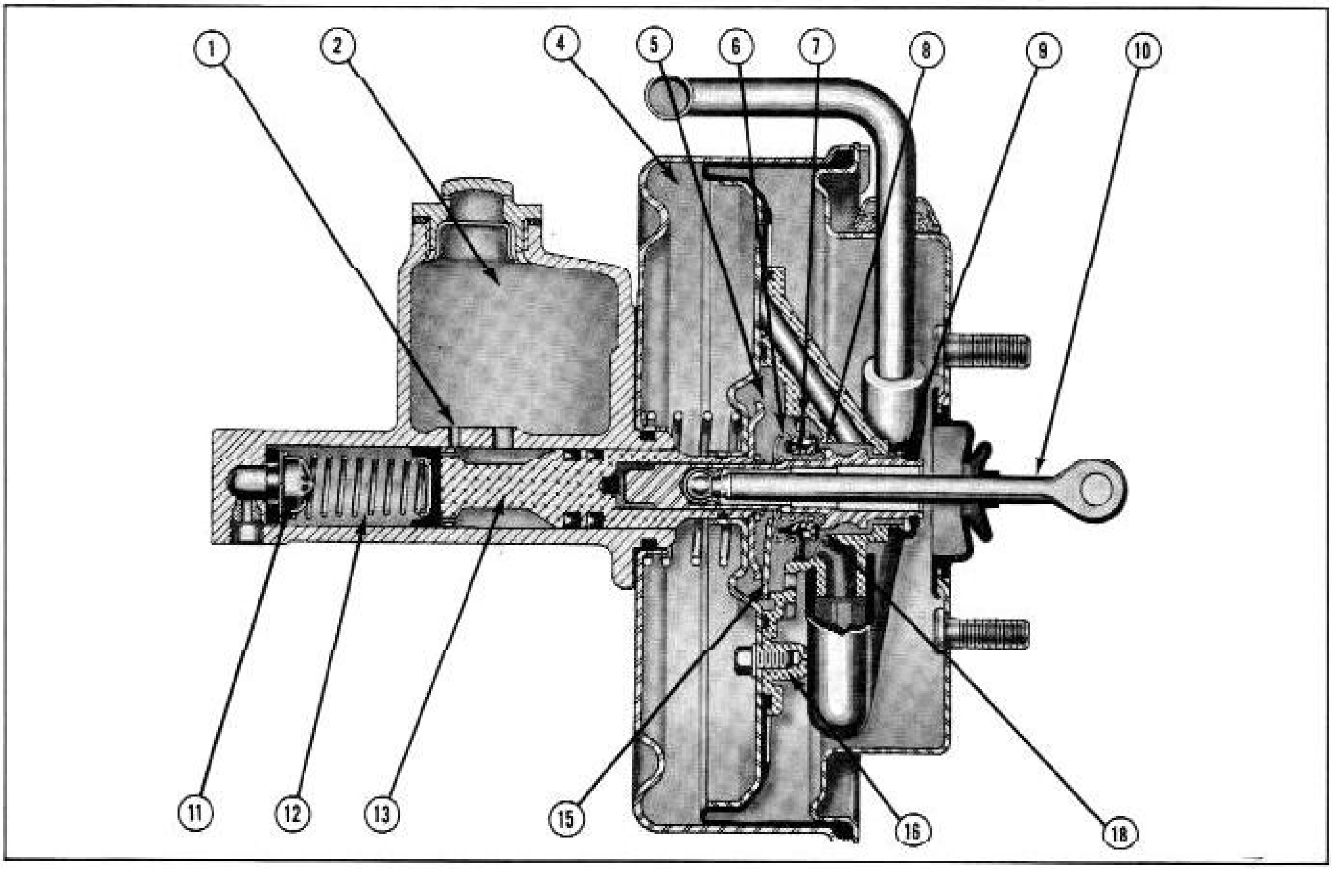


Fig. 7-17 Applied Position

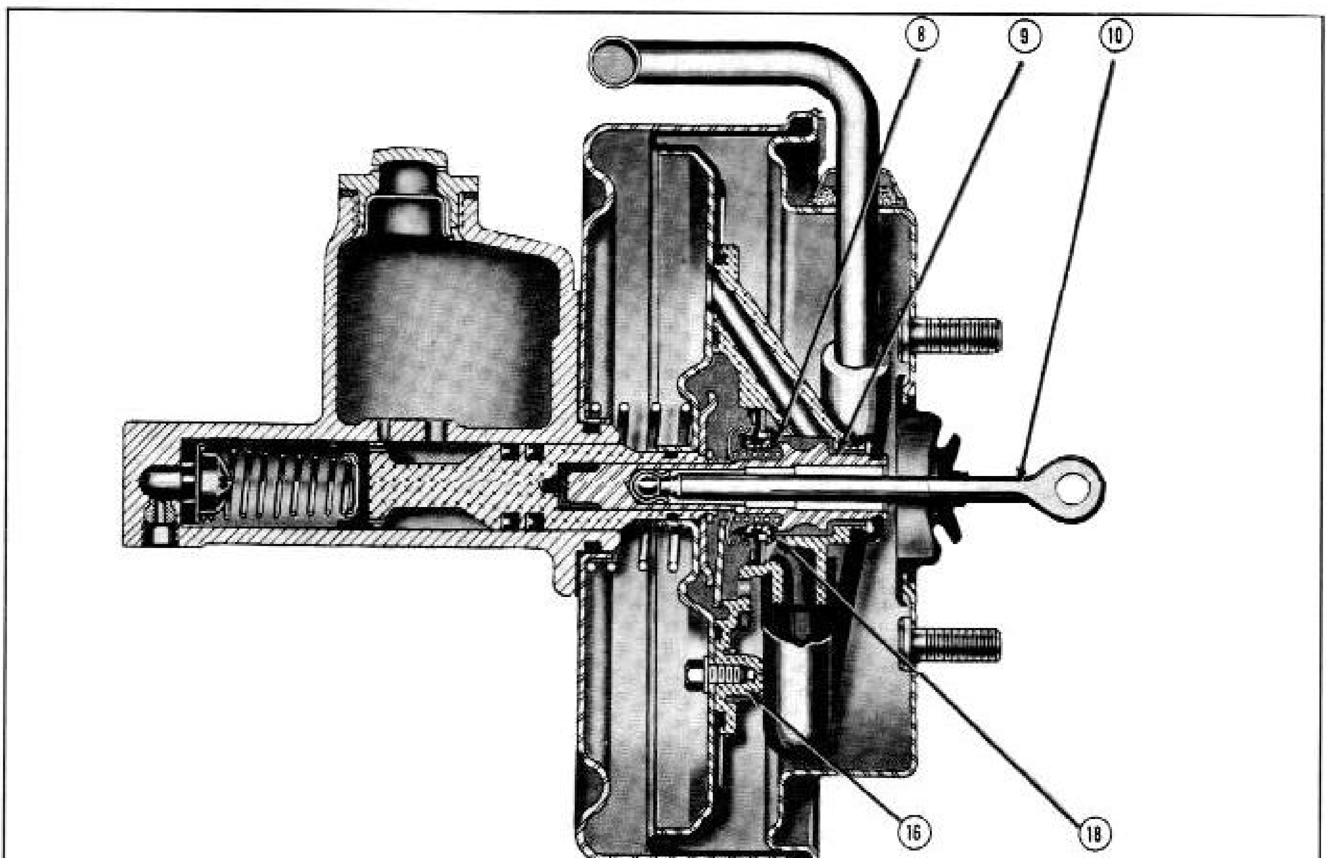


Fig. 7-18 Hold Position

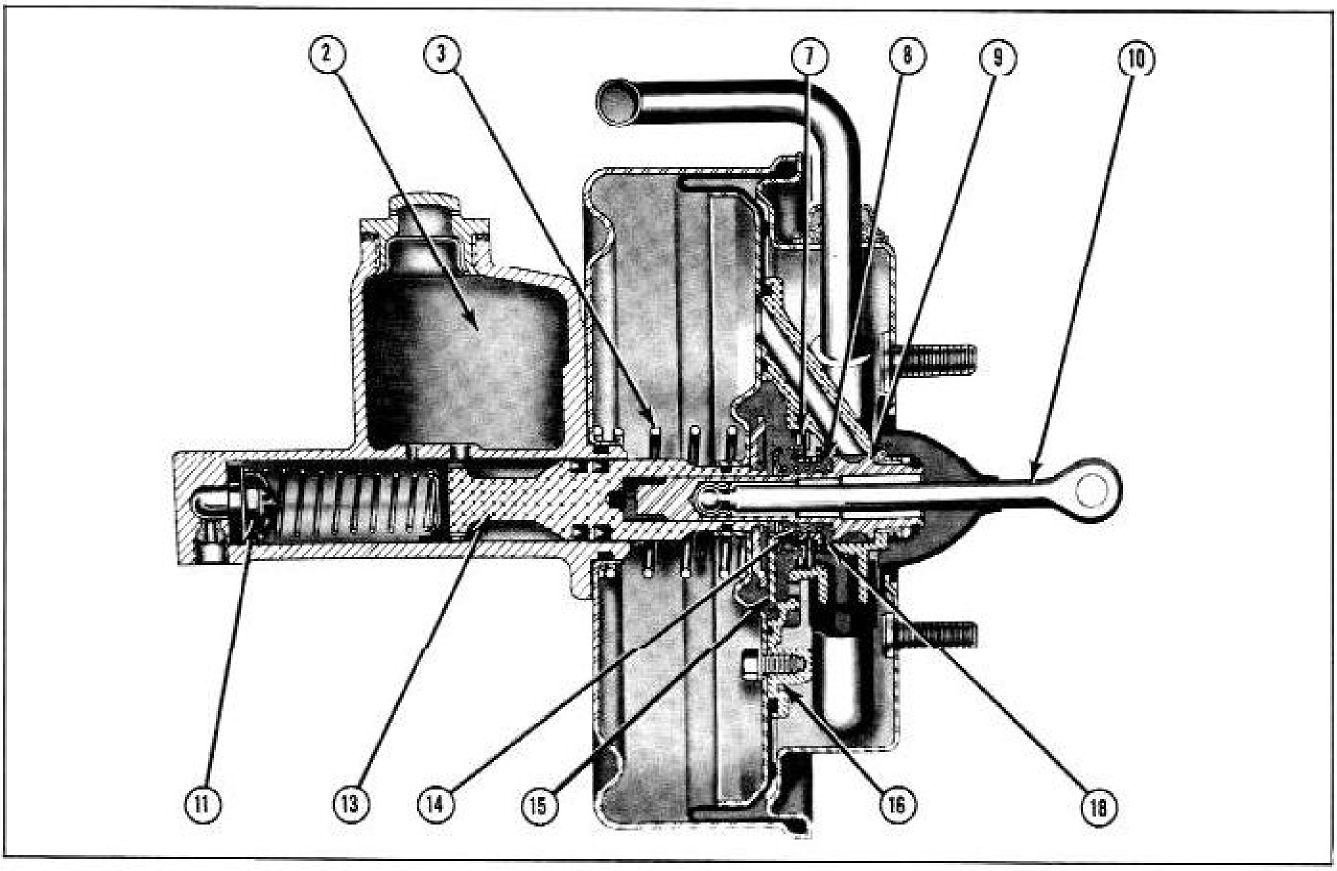


Fig. 7-19 Releasing

HOLDING (Fig. 7-18)

When the desired brake pedal force has been reached, the driver stops increasing the brake pedal force, which in turn holds the push rod (10) and air valve (9) stationary. The vacuum piston (16) will continue to move forward until the vacuum port (18) is closed. At this point the atmospheric port (8) is also closed and no further movement of the vacuum piston (16) takes place until the force on the brake pedal is either decreased or increased.

RELEASING (Fig. 7-19)

As the force on the brake pedal is released, the combination reaction and air valve return spring (14) and the reaction levers (15) force the air valve (9) and operating rod (10) away from the floating valve (7), allowing the floating valve to seat on the vacuum piston (16). This closes the vacuum port (18) and allows the atmospheric port (8) to open. Both sides of the vacuum piston are now open to atmospheric pressure and the vacuum piston return spring (3) forces the vacuum piston (16) together with the hydraulic piston (13) into the released position. Brake fluid, under pressure, in the lines now flows back through the residual check valve (11) and into the master cylinder reservoir (2).

DISASSEMBLY OF MORAINE POWER BRAKE (Fig. 7-20)

NOTE: Use extreme care to keep mineral oil or grease from coming in contact with hydraulic parts.

1. Clean the outside of the power brake unit. Remove filler cap then empty brake fluid from master cylinder reservoir.

2. Clamp master cylinder in a vise, with the operating rod up.

3. Using two wrenches, rotate end plate counterclockwise to separate end plate from vacuum cylinder. (Fig. 7-21) If end plate cannot be readily loosened, tap the lugs lightly with a punch and hammer.

   NOTE: Four pieces of heater hose slipped over the four attaching studs will protect the stud threads.

4. Remove end plate and vacuum piston assembly from the vacuum cylinder.

5. Remove boot from the operating rod. Pull end plate away from vacuum piston, disconnect vacuum hose from vacuum inlet and remove end plate.

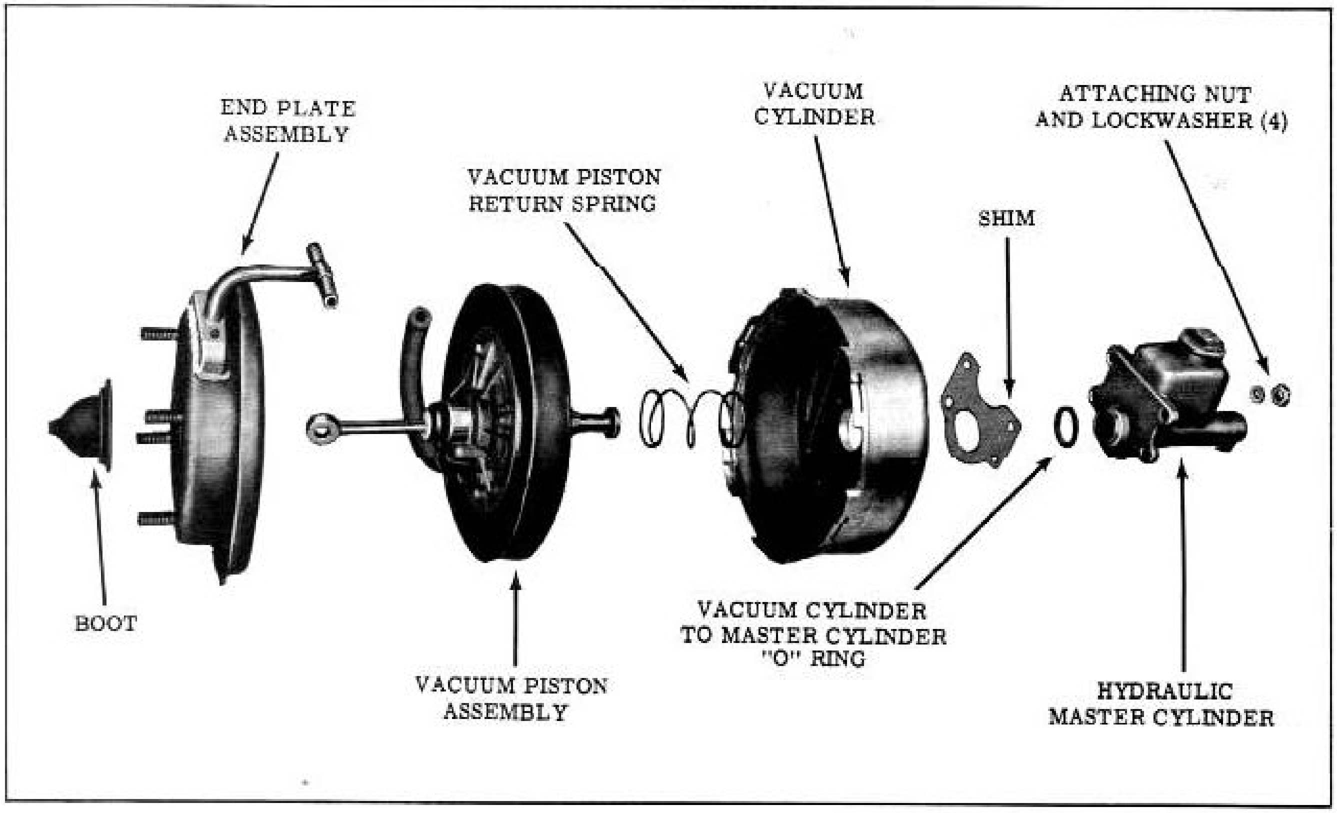


Fig. 7-20 Moraine Power Brake

6. Remove the two vacuum inlet attaching screws, vacuum inlet and air filter from end plate.

7. Remove the vacuum piston return spring from vacuum cylinder.

8. Remove the master cylinder to vacuum cylinder attaching nuts and remove vacuum cylinder.

9. Remove and note the number of shims (if any) located between the master cylinder and the vacuum cylinder. The same number of shims must be installed on reassembly.

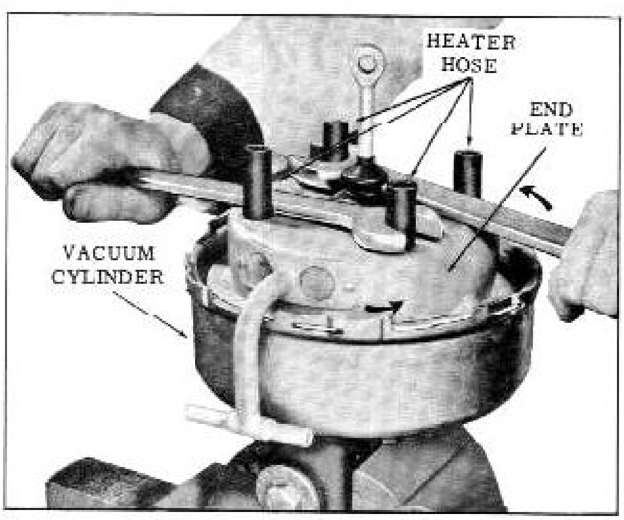


Fig. 7-21 Removing Vacuum Cylinder End Plate

DISASSEMBLY OF VACUUM PISTON (Fig. 7-22)

1. Remove support plate and diaphragm from power piston assembly by removing the four attaching screws and lock washers. Separate diaphragm from support plate. (Fig. 7-23)

2. Remove the square cut "O" ring, three reaction levers, valve reaction plate, floating valve return spring and air valve return spring from vacuum piston.

3. Remove the boot from the air valve and vacuum piston, then pull the air valve and operating rod from floating valve side of vacuum piston. Remove floating valve assembly from air valve.

4. Remove vacuum hose from vacuum piston using Hose Clamp Pliers J-8404.

5. Disassemble the floating valve. (Fig. 7-24)

   NOTE: The diaphragm retainer plate may have remained in the vacuum piston.

6. Remove retaining ring that secures the master cylinder piston to the support plate and separate the reaction plate, master cylinder piston, and support plate.

7. Remove "O" ring and two secondary seals from O.D. and the rubber bumper from I.D. of master cylinder piston.

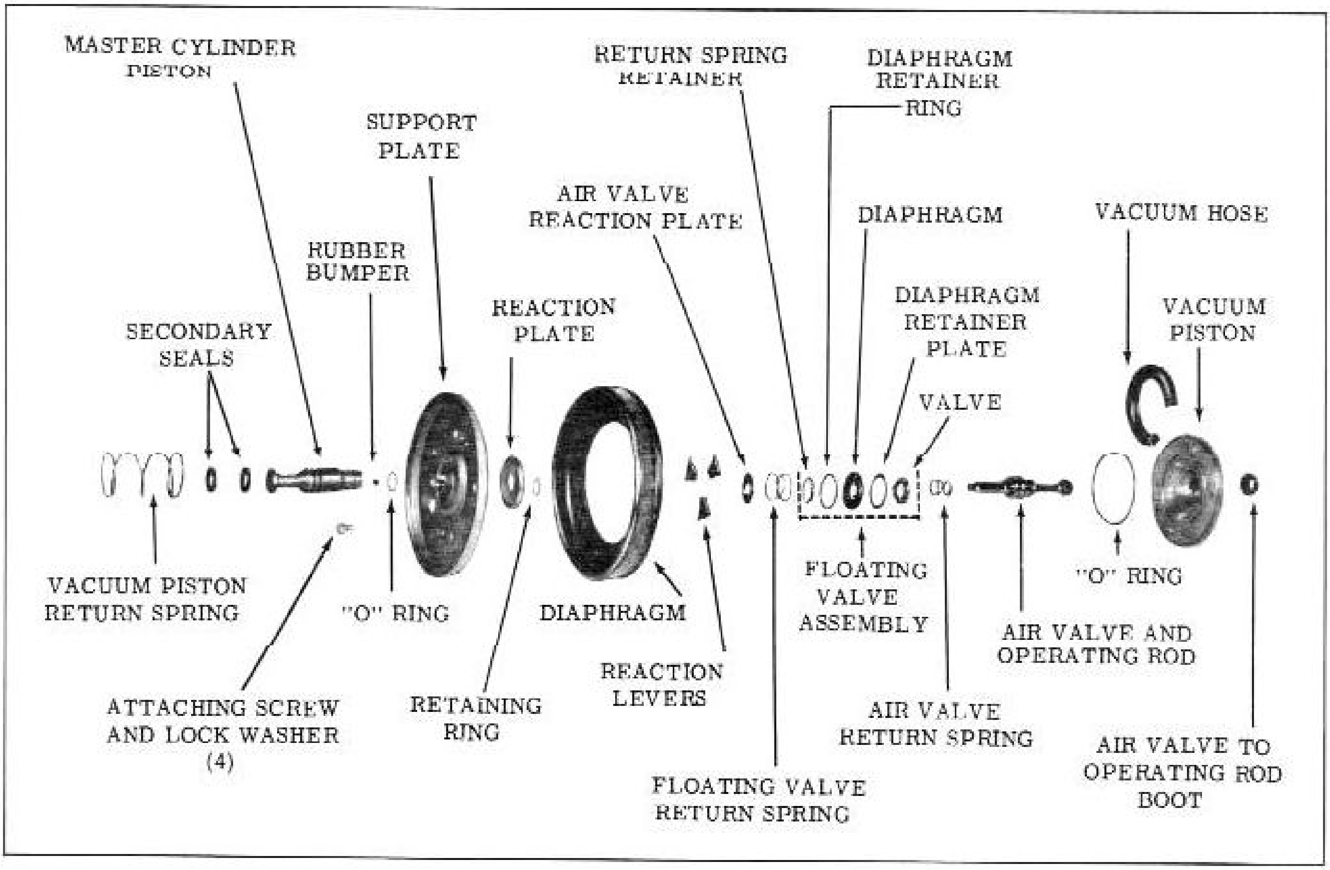


Fig. 7-22 Vacuum Piston Assembly

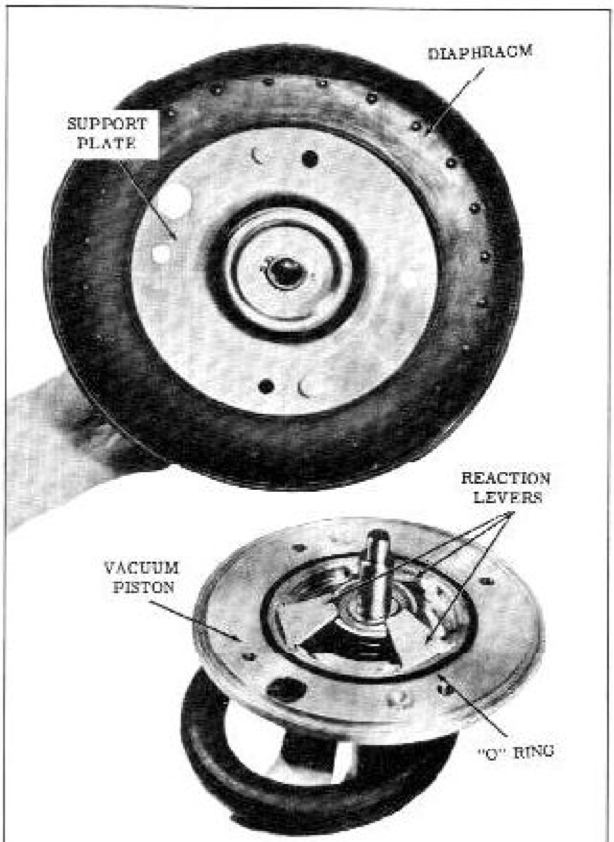


Fig. 7-23 Removing Support Plate From Piston

CLEANING AND INSPECTION

1. Thoroughly wash all parts in Declene or alcohol, blow out all passages and air dry. Place parts on clean paper.
2. Inspect vacuum cylinder for scoring, pitting, dents or nicks. Small imperfections may be smoothed out with fine crocus cloth. Replace if damaged.
3. Inspect vacuum piston diaphragm for deterioration or abrasions. Replace if damaged.

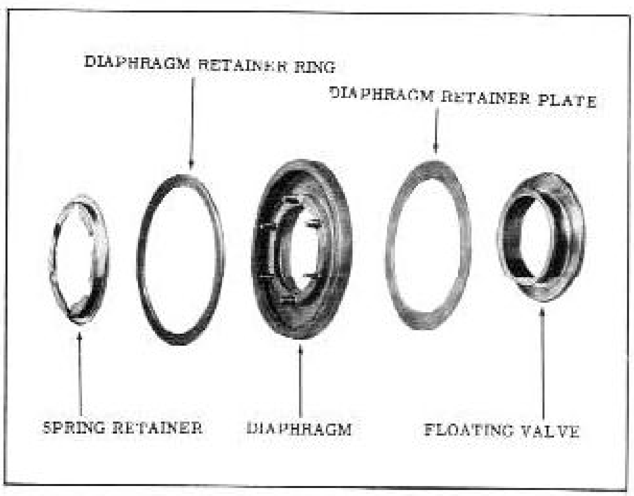


Fig. 7-24 Floating Valve Assembly

4. Inspect air valve for scratches, nicks, distortion or corrosion. Check seat for smoothness. Valve should have a free sliding fit when inserted in the vacuum piston bore. Replace if worn or damaged.

5. Check floating valve assembly for distortion of metal parts and deterioration or abrasions of rubber parts. Replace if worn or damaged.

6. Check vacuum piston for cracks, distortion, damaged reaction lever seats or rough and uneven floating valve seat. Be sure all openings and passages are clean.

7. Check reaction levers for distortion. The levers may be straightened with a mallet if not too badly distorted.

8. Replace air filter element if filled with dirt or damaged.

9. Examine master cylinder piston for nicks, scores and corrosion. Holes in end of piston must be open. If scored, nicked or corroded, replace piston.

ASSEMBLY OF MORAINE POWER BRAKE

For assembly of master cylinder refer to MASTER CYLINDER - ASSEMBLY.

VACUUM PISTON (Fig. 7-22)

1. Position small rubber bumper in counterbore of master cylinder piston. Depress bumper until bumper is seated in recess.

2. Coat two new secondary seals with brake fluid and position in grooves on master cylinder piston with lips of seals facing the master cylinder end of the piston.

3. Coat a new "O" ring with brake fluid and position into second groove from counterbored end of master cylinder piston. Insert piston into the flange side of diaphragm support plate.

4. Position reaction plate, with raised rim away from support plate, over piston and install retainer ring.

5. Assemble the floating valve as follows: (Fig. 7-24)

   a. Position the diaphragm retainer plate over the floating valve.

   b. Assemble the diaphragm over the flange of the floating valve.

   c. Insert the diaphragm retaining ring under the lip of the diaphragm.

   d. Press the valve spring retainer over the hub of floating valve and the inner lip of the diaphragm.

6. Insert operating rod and air valve into vacuum piston.

7. Apply a light film of Versilube (supplied with parts package) or Special Lubricant (Part No. 567196) to the outside diameter of the floating valve diaphragm. Install floating valve over air valve so that the rubber face of the floating valve rests on the seat in the vacuum piston.

   NOTE: Check that diaphragm is not distorted while floating valve is being pressed into position.

8. Install the vacuum piston to support plate "O" ring in groove on vacuum piston. (Fig. 7-25)

9. Position the air valve return spring over the air valve so that the spring rests on the air valve.

10. Position the floating valve return spring over the air valve so that the spring rests on the flange of the spring retainer.

11. Place the air valve reaction plate over the air valve so that the flanged side of reaction plate rests on the floating valve return spring.

12. Coat both sides of the reaction levers with Versilube or Special Lubricant (Part No.

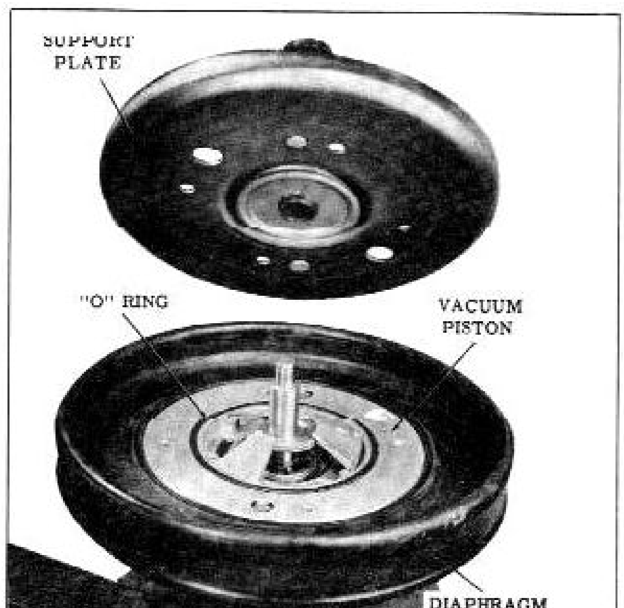


Fig. 7-25 Piston and Support Plate

567196) and position levers in their slots in the vacuum piston.

13. Place diaphragm on the vacuum piston so that the inner bead of diaphragm is positioned in outer groove of vacuum piston. (Fig. 7-25)

    NOTE: Do not lubricate vacuum piston diaphragm. Diaphragm should be coated sparingly with talcum powder.

14. Position support plate into the vacuum piston diaphragm and align the two dimples on the support plate with the depressions in the vacuum piston.

15. Depress the support plate, being careful that the reaction levers and the diaphragm maintain their positions. Install the four screws and torque 5 to 7 ft. lbs.

16. Invert the vacuum piston assembly and install the air valve boot so that the large diameter lip of boot is in the groove of the vacuum piston and the small diameter lip in the groove of the air valve.

17. Position vacuum hose on vacuum piston and retain with hose clamp. Ends of hose clamp must be parallel with the face of the vacuum piston.

ASSEMBLY OF POWER BRAKE UNIT

1. If master cylinder was not overhauled, position a new master cylinder to vacuum cylinder "O" ring on the flange of the master cylinder. Coat "O" ring with a light film of Special Lubricant (Part No. 567196).

2. Place vacuum cylinder on bench with studs up. Install over studs the same number of shims as were removed on disassembly. Check hydraulic piston height as outlined under HYDRAULIC PISTON HEIGHT ADJUSTMENT.

3. Clamp the master cylinder reservoir in a vise and torque master cylinder to vacuum cylinder bolts 15 to 20 ft. lbs.

4. Install the vacuum piston return spring over hub of the vacuum cylinder.

5. Install the vacuum inlet and air filter on the end plate with the "T" facing away from the mounting studs. Torque 15 to 20 inch lbs.

6. Position end plate over vacuum piston operating rod and install the vacuum hose on the vacuum inlet. Seat the end plate against the diaphragm and support plate.

7. Pull the skirt of the diaphragm over the end plate until the bead of the diaphragm seats against the end plate flange.

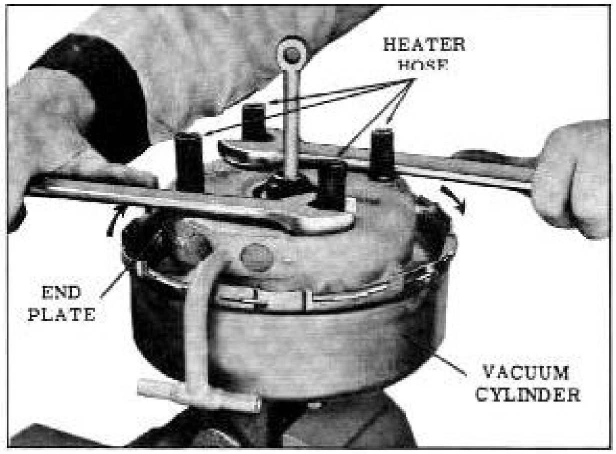


Fig. 7-26 Installing End Plate

8. Place the vacuum piston assembly in the vacuum cylinder with the vacuum inlet tube in line with the master cylinder reservoir filler cap. Guide the master cylinder piston through the return spring into the master cylinder bore.

9. Depress and rotate end plate clockwise until end plate is locked to vacuum cylinder. (Fig. 7-26)

10. Position boot over operating rod and insert the lip of the boot through the hole in the end plate.

11. Remove hoses from mounting studs and install filler cap.

HYDRAULIC PISTON HEIGHT ADJUSTMENT

This adjustment is necessary to allow the primary cup, in the master cylinder, to return past the compensating port when the brake is in the released position. This prevents hydraulic lock-up in the brake system.

The dimension is 1.833" minimum to 1.844" maximum. It is measured with Gauge J-8531 from the end of the hydraulic piston to the master cylinder mounting surface on the vacuum cylinder.

The adjustment is accomplished by adding or removing shims between the master cylinder and the vacuum cylinder as determined by Gauge J-8531 in the following steps:

1. Separate the master cylinder from the vacuum cylinder.

2. Place the gauge over the hydraulic piston with the legs of the gauge toward the mounting surface next to the studs on either side of the piston. (Fig. 7-27)

3. Add or remove .010" thick shims until the gauge just contacts the end of the piston. If more than five shims are required for correct adjustment, recheck assembly of vacuum piston.

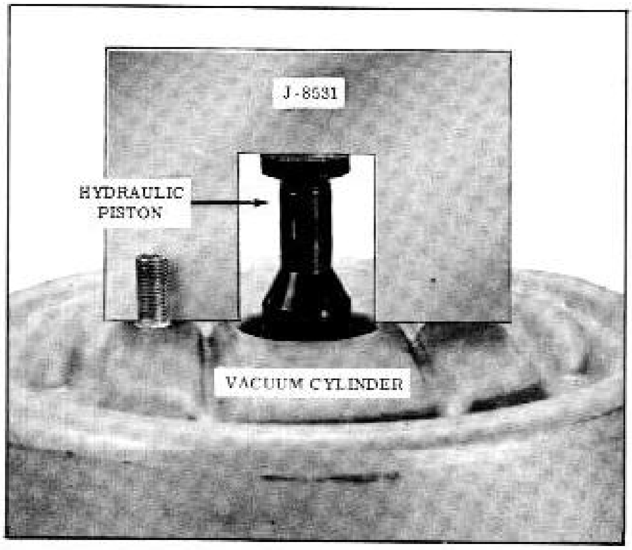


Fig. 7-27 Checking Hydraulic Piston Height

NOTE: It is desirable that there be clearance at the piston rather than at the mounting surface if equal contact cannot be obtained at all three points.

4. Reassemble master cylinder to vacuum cylinder.

BENDIX POWER BRAKE

PRINCIPLES OF OPERATION

Released Position (Fig. 7-28)

In the released position both sides of the vacuum piston (5) are open to atmospheric pressure. This allows the vacuum piston to be held in the released position by the vacuum piston return spring (6). This is accomplished as follows:

The operating rod (1) and air valve (2) are held in the released position by the air valve return spring (3). This allows the floating valve return spring (4) to seat the floating valve (12), shutting off vacuum to the vacuum piston. With the air valve in the released position the atmospheric port (10) is open. Atmospheric pressure, after passing through the air cleaner, enters the vacuum cylinder at the rear of the vacuum piston. It then passes through the vacuum piston to the air valve where it enters the forward side of the vacuum piston. Atmospheric pressure is now equal on both sides of the vacuum piston, allowing the piston return spring to hold the vacuum piston in the released position.

With the vacuum piston in the released position, the hydraulic piston (15) is moved to the released

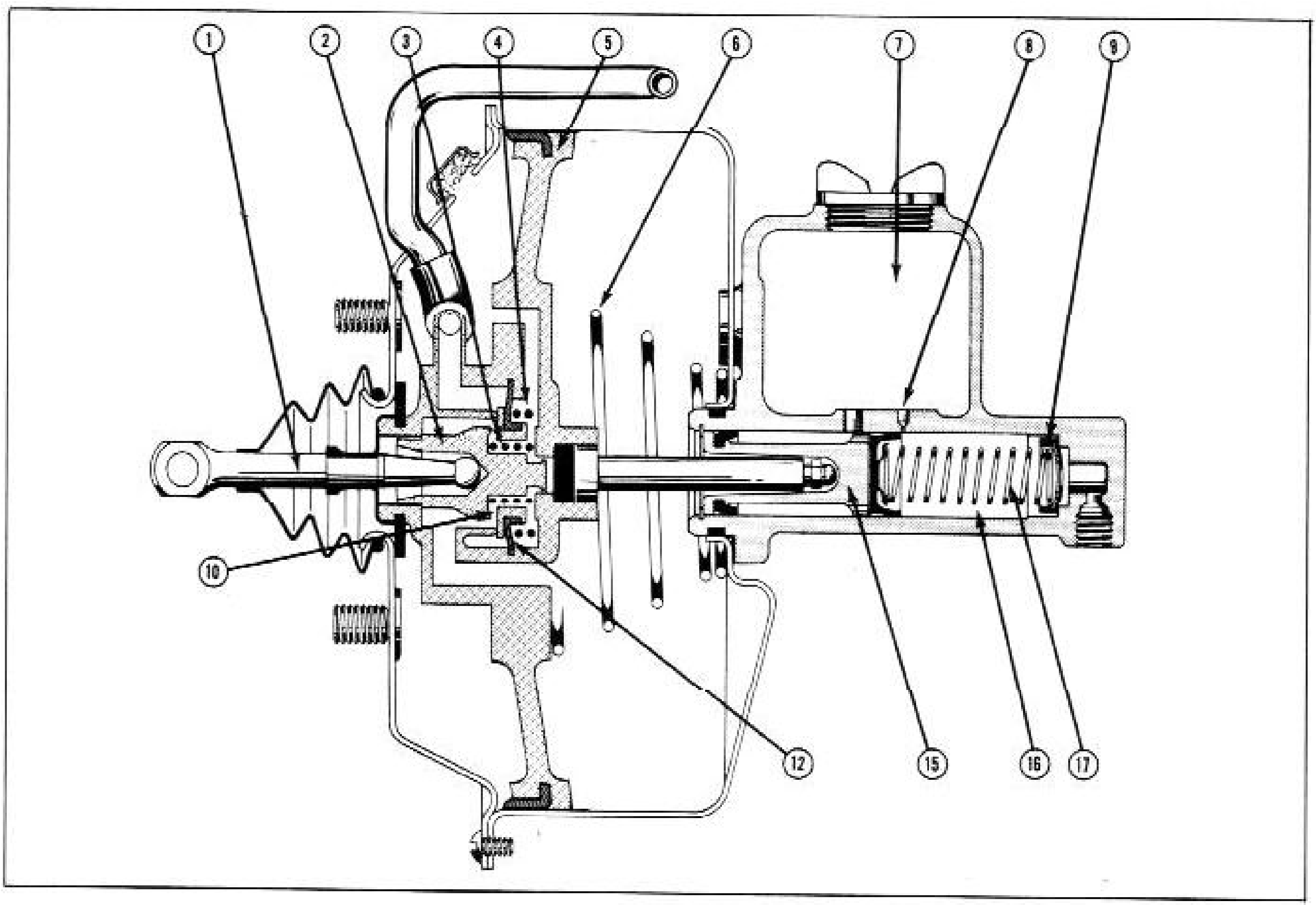


Fig. 7-28 Released Position

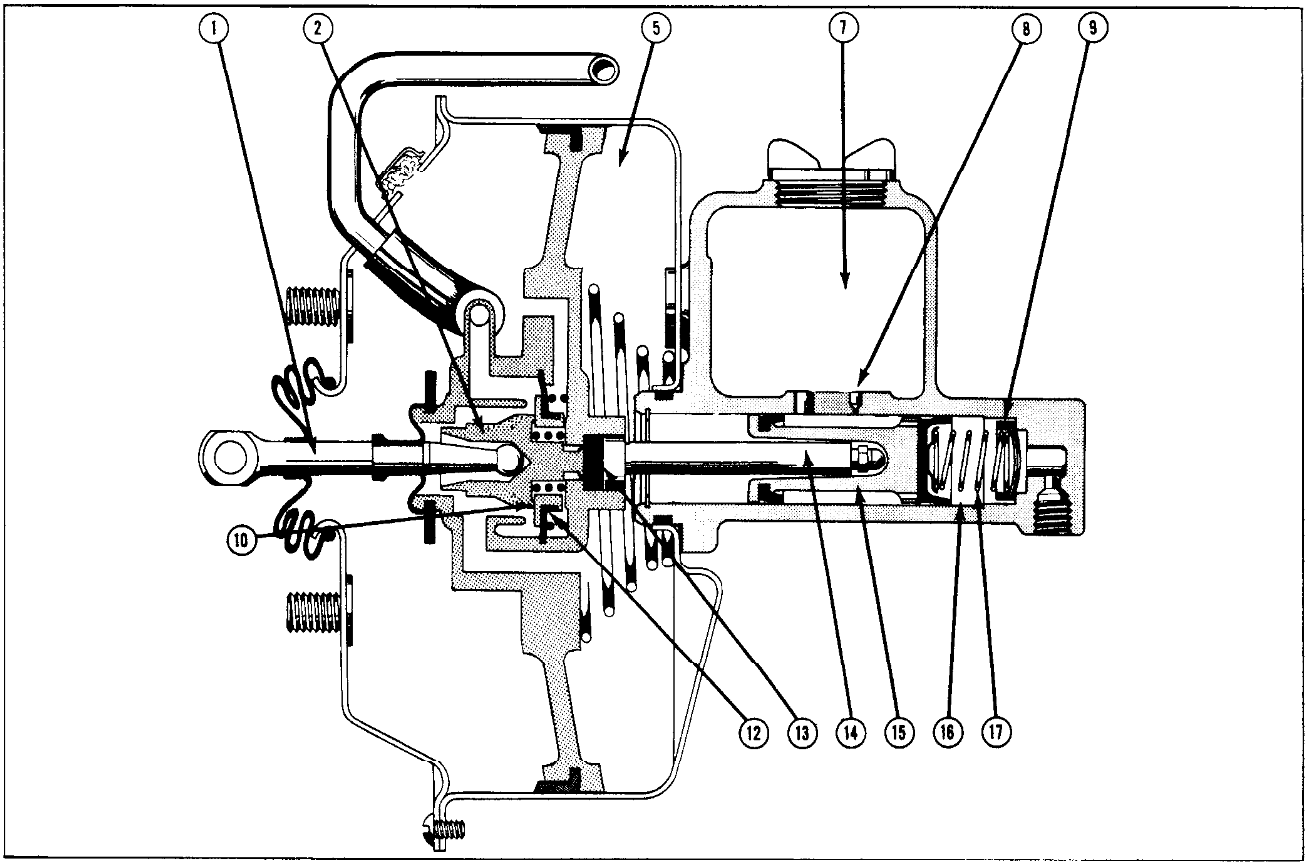


Fig. 7-29 Applied Position

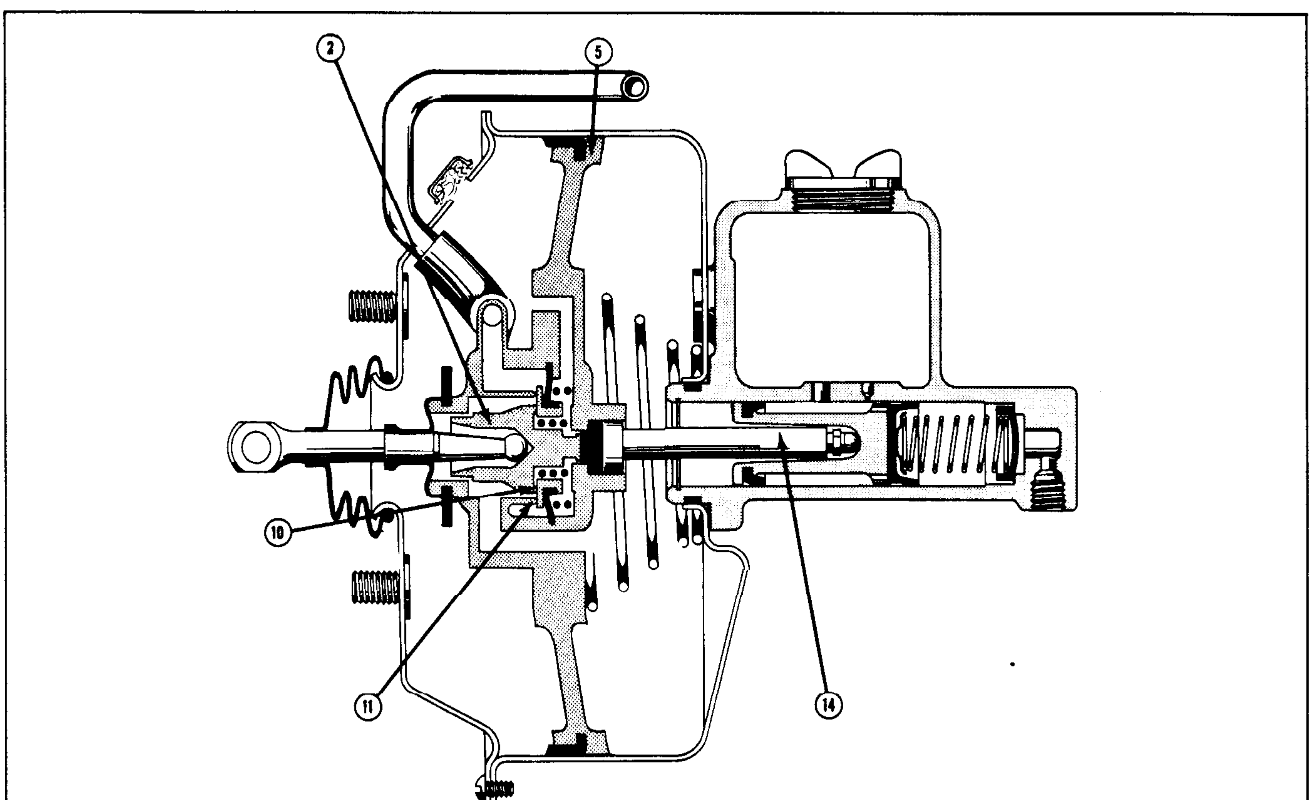


Fig. 7-30 Holding Position

position by the hydraulic piston return spring (17). The compensating port (8) in the master cylinder is open and fluid can flow in either direction between the hydraulic cylinder (16) and the fluid reservoir (7). A slight pressure is maintained in the lines by the residual check valve (9).

Applying Position (Fig. 7-29)

As the brakes are applied, the operating rod (1) and air valve (2) move forward in the vacuum piston (5) to close the atmospheric port (10). Further movement in the applied direction allows the air valve to unseat the floating valve (12) and open the vacuum port (11). Vacuum can now communicate through the vacuum piston to the forward side of the vacuum piston. With vacuum at the forward side and atmospheric pressure at the rear of the vacuum piston, a force is developed which moves the vacuum piston (5), push rod (14) and the hydraulic piston (15) in the apply direction.

The initial movement of the hydraulic piston in the apply direction closes the compensating port (8), sealing off the fluid reservoir (7) from the hydraulic cylinder (16). Further movement of the hydraulic piston in the apply direction increases pressure in the master cylinder, forcing fluid past the residual check valve (9), through the lines and into the wheel cylinders to apply the brakes.

As fluid pressure increases in the master cylinder, a reaction force is transmitted through the push rod (14) to the reaction disc (13) to apply a pressure on the air valve. This reaction force moves the air valve slightly rearward in relation to the vacuum piston to close off the vacuum port (11). The reaction force is in proportion to the fluid pressure in the hydraulic system and balances the force exerted on the operating rod, providing the driver with brake "feel".

Holding Position (Fig. 7-30)

When the desired brake application has been reached, the driver stops increasing the brake pedal force, which in turn holds the push rod (14) and air valve (2) stationary. The vacuum piston (5) will continue to move forward until the vacuum port (11) is closed. At this point the atmospheric port (10) is also closed and no further movement of the vacuum piston takes place until the force on the brake pedal is either decreased or increased.

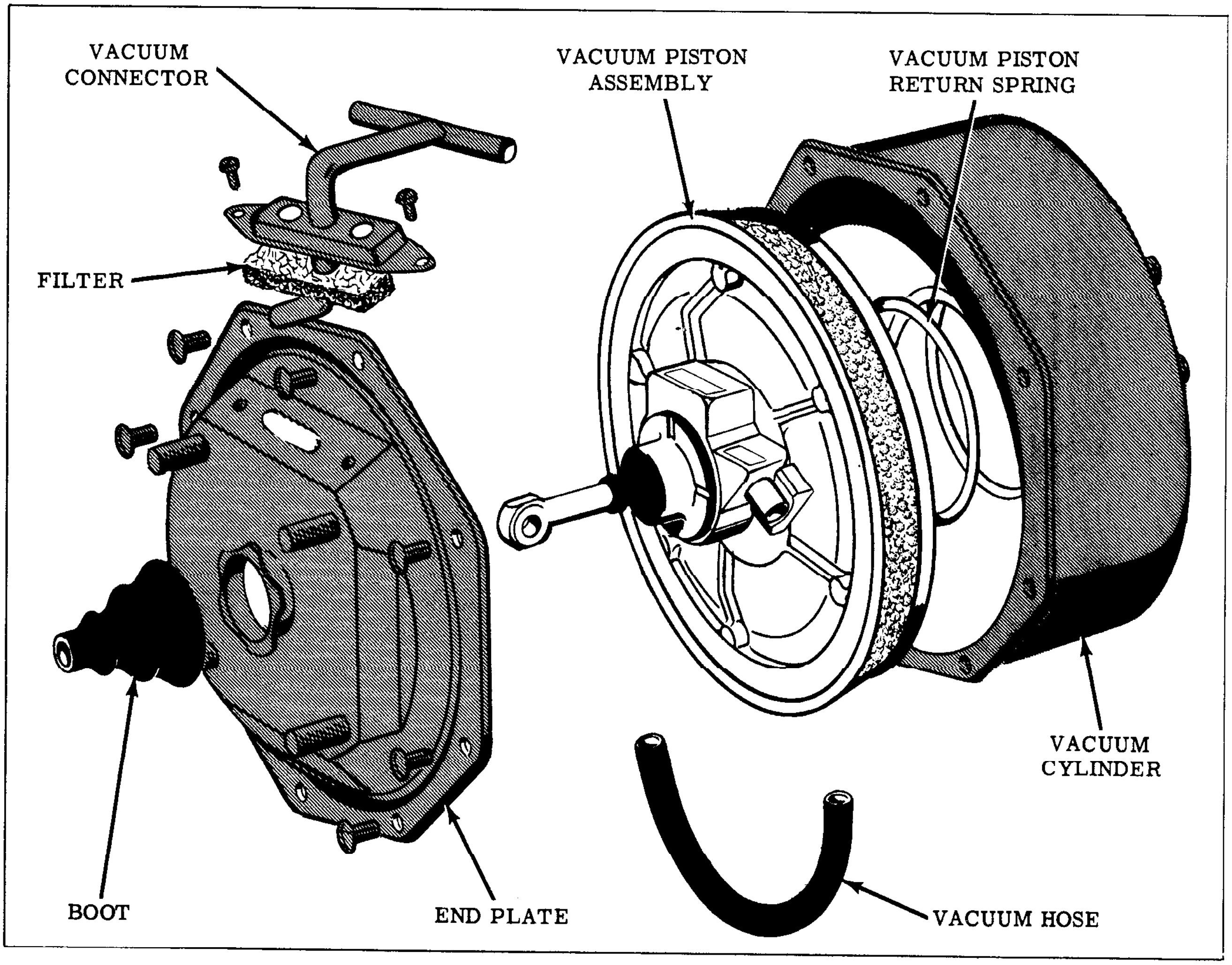


Fig. 7-31 Bendix Power Brake

DISASSEMBLY OF BENDIX POWER BRAKE (Fig. 7-31)

NOTE: Use extreme care to keep mineral oil or grease from coming in contact with hydraulic parts.

1. Clean the outside of the power brake unit. Remove filler cap then empty brake fluid from master cylinder reservoir.

2. Clamp master cylinder in a vise with the operating rod up.

3. Scribe a line across the end plate and the vacuum cylinder. Loosen the end plate attaching screws, depress end plate and remove the screws.

4. Scribe a mark on the face of the piston to correspond with the mark on the end plate. Remove end plate and vacuum piston assembly from the vacuum cylinder.

   NOTE: When removing end plate and vacuum piston assembly, use care so that the hydraulic cylinder piston push rod does not drop out of the vacuum piston.

5. Remove boot from the operating rod. Pull end plate away from the vacuum piston, disconnect vacuum hose from the vacuum inlet and remove end plate.

6. Remove the vacuum inlet attaching screws, vacuum inlet and air filter from end plate.

7. Remove piston return spring.

8. Remove the master cylinder to vacuum cylinder attaching nuts and remove vacuum cylinder.

DISASSEMBLY OF VACUUM PISTON (Fig. 7-32)

1. Remove the push rod seal and the vacuum hose from the vacuum piston.

2. Remove wick and expander from around the rear piston plate.

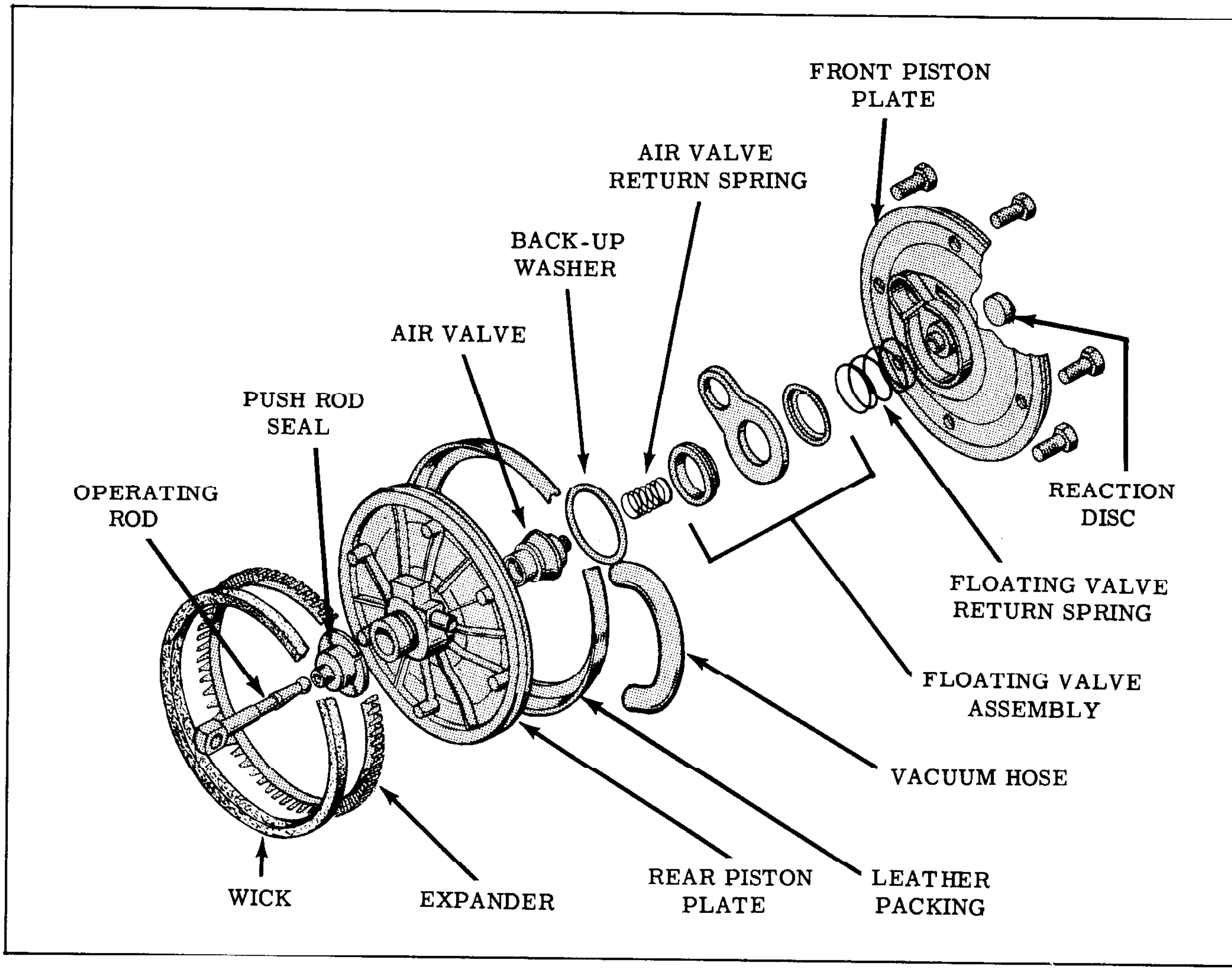


Fig. 7-32 Vacuum Piston Assembly

3. Invert vacuum piston, remove the six piston plate attaching screws and separate the front plate from the rear piston plate.

4. Remove the air valve return spring, floating valve, floating valve return spring, the diaphragm back-up plate and the leather packing from the rear piston plate.

5. If necessary, disassemble the floating valve.

6. Remove the rubber reaction disc from the front piston plate. NOTE: It may be necessary to use a small rod having a smooth flat end to push the reaction disc out of the piston.

7. Remove the operating rod and air valve from the rear piston plate.

8. To replace either the operating rod or the air valve, hold assembly with air valve down and inject alcohol into the cavity around the operating rod to lubricate the rubber lock in the air valve. The valve can then be pried off.

CLEANING AND INSPECTION

1. Thoroughly wash all metal parts in cleaner. Use ONLY alcohol or Declene on plastic or rubber parts. Blow out all passages and air dry. Place parts on clean paper.

2. Inspect vacuum cylinder for scoring, pitting, dents or nicks. Small imperfections may be smoothed out with fine crocus cloth. Replace if damaged.

3. Inspect air valve for scratches, nicks, or breakage. Check seat for smoothness and flatness. Valve should have a free sliding fit when inserted in the vacuum piston bore. Replace valve if damaged.

4. Check floating valve for distortion of metal parts and deterioration or abrasions of rubber parts. Replace if worn or damaged.

5. Check front and rear vacuum piston plates for cracks or rough or uneven floating valve seat. Be sure all openings and passages are clean.

6. Check all rubber and leather parts. Replace if damaged.

7. Check all springs and expanders for distortion. Replace as necessary.

8. Replace air filter element if dirty.

NOTE: When overhauling a unit, use all the parts furnished with the parts kit. Discard all old rubber parts.

ASSEMBLY OF BENDIX POWER BRAKE

For assembly of master cylinder refer to MASTER CYLINDER - ASSEMBLY.

VACUUM PISTON (Fig. 7-32)

1. If the operating rod and air valve were separated, dip the air valve in alcohol and assemble to the ball end of the operating rod. Make certain air valve is locked to the operating rod.

2. Install the rubber reaction disc into the front piston plate.

3. If the floating valve was disassembled, assemble as shown in Fig. 7-33.

4. Insert the operating rod into the rear piston plate.

5. Place the rear piston plate in a vise, operating rod down, then install leather packing on piston plate with lip down.

6. Install the diaphragm back-up washer into the rear piston plate, then position the floating valve into the piston plate on top of the back-up washer, spring seat up.

7. Install the air valve return spring over the air valve and install the floating valve return spring on the floating valve return spring seat.

8. Position and align the front piston plate over the rear piston plate and loosely install the six attaching screws. (Fig. 7-33)

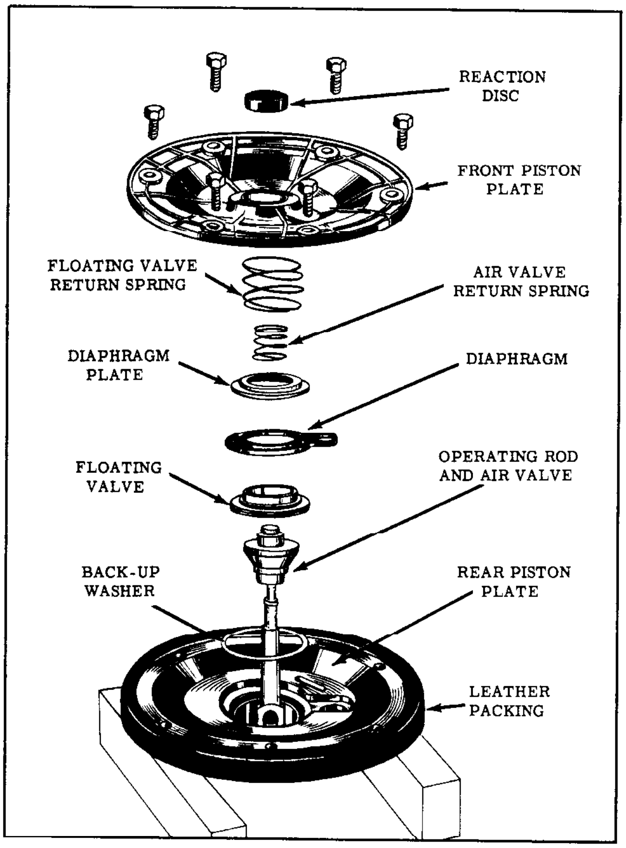


Fig. 7-33 Assembly of Vacuum Piston

9. Position vacuum piston on a bench with the operating rod up.

10. Place wick inside of expander, saturate wick with shock absorber fluid, then install wick and expander against leather packing with fingers of expander facing up.

11. Tighten the front to rear piston plate attaching screws 4 to 6 ft. lbs.

12. Install the push rod seal onto the vacuum piston.

13. Apply 3M Super Weatherstrip adhesive to the inside of the vacuum hose and install hose to vacuum piston with the hose lying parallel to the piston.

ASSEMBLY OF POWER BRAKE UNIT (Fig. 7-34)

1. Install the vacuum inlet and air filter on the end plate, with the "T" facing away from the mounting studs.

2. Position the end plate over the operating rod and push the vacuum hose approximately 5/8" on the vacuum inlet.

3. Clamp end plate and vacuum piston in a vise with the operating rod down.

4. Install the vacuum piston return spring over the push rod with the small end up.

5. Apply a thin film of shock absorber fluid to the inside of the vacuum cylinder and position vacuum cylinder over the vacuum piston. Align the mark on the vacuum cylinder with the alignment mark on the end plate, depress vacuum cylinder and install the end plate to vacuum cylinder attaching screws.

6. Position the boot over the operating rod and install boot on end plate.

7. Check the push rod adjustment as outlined under PUSH ROD ADJUSTMENT.

8. If master cylinder was not disassembled, install a new master cylinder to vacuum cylinder "O" ring on the flange of the master

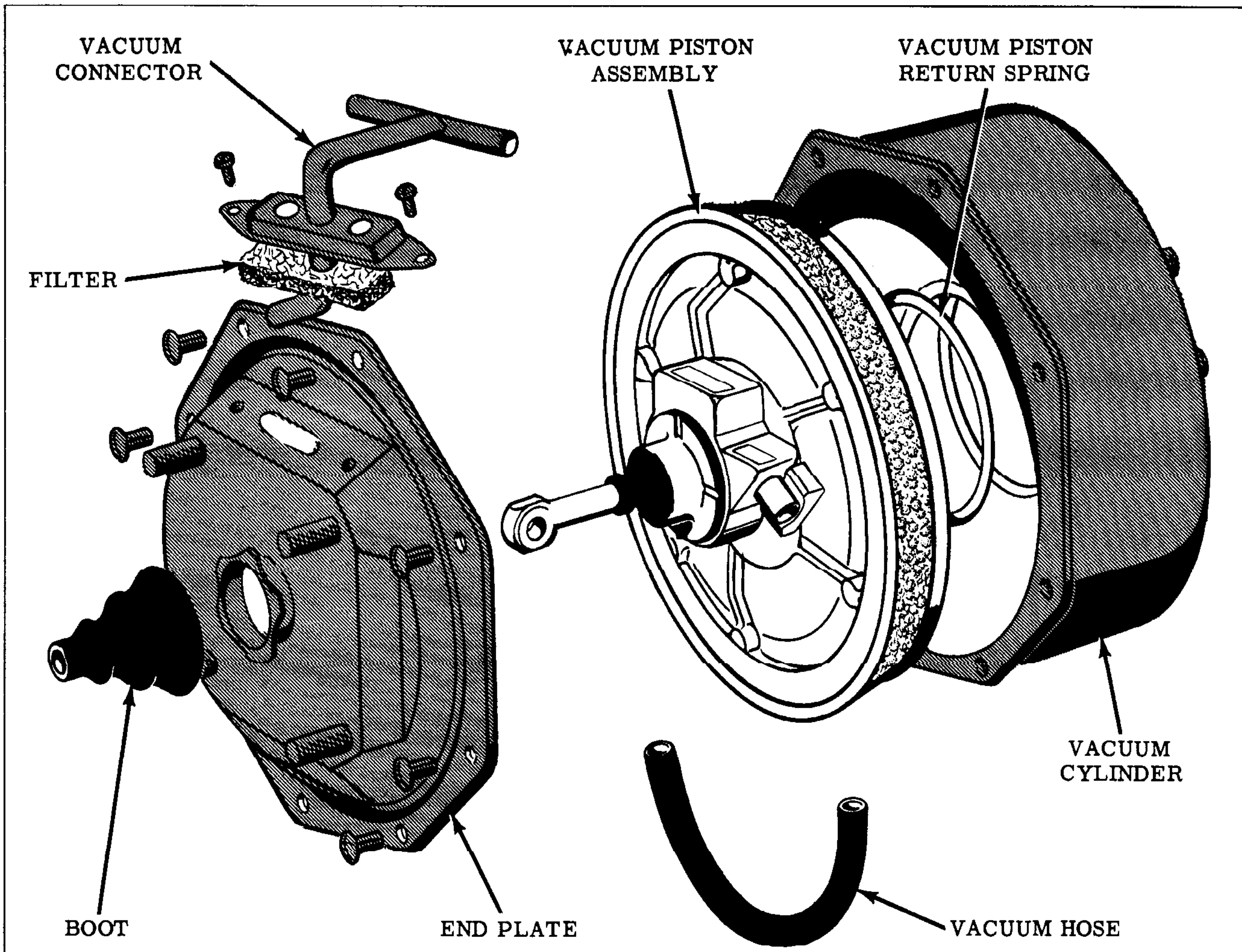


Fig. 7-34 Assembly of Brake Unit

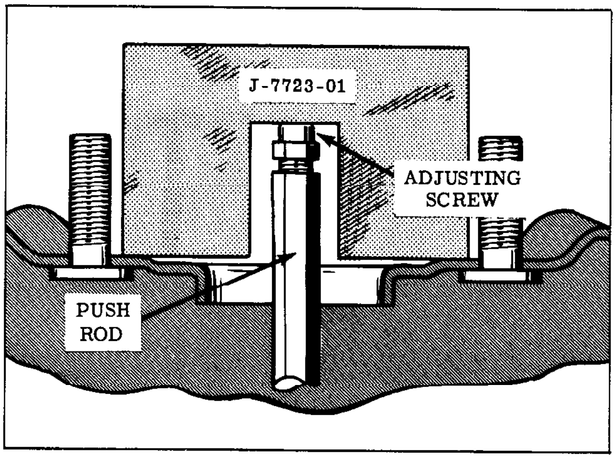


Fig. 7-35 Push Rod Adjustment

cylinder. Coat "O" ring with a light film of Dow Corning 4X Compound and install master cylinder onto vacuum cylinder. Torque attaching nuts 15 to 20 ft. lbs.

PUSH ROD ADJUSTMENT (Fig. 7-35)

The push rod incorporates a self locking adjusting screw to provide a means of maintaining correct relationship between the vacuum piston and the master cylinder piston. The relationship between the pistons is important because the compensating port must be open when the vacuum piston is in the released position.

Under normal service conditions the push rod does not require any attention provided that the adjustment has not been changed and the push rod remains in the original vacuum unit.

When a new push rod is used or the push rod is transferred to another unit, the push rod adjustment must be checked as follows:

a. With the vacuum unit assembled, position Gauge J-7723-01 over the push rod with the legs of Gauge resting on the vacuum cylinder. The push rod adjusting screw should just touch the Gauge.

b. If necessary to adjust, rotate the adjusting screw until the adjusting screw just touches the gauge.

POWER BRAKE TESTING

Any time a power brake unit has been removed or a new unit installed on a car, vacuum and hydraulic leakage tests as well as operational tests should be made to determine whether the unit is operating properly.

NOTE: The power brake hydraulic and vacuum systems can be checked for leakage or operational tests without the aid of special testing equipment. Such tests, however, will only indicate that the power brake system is leaking. To isolate the leak without unnecessary removal of parts, Tester BT-500 should be used. Use of Tester BT-500 can also pin point malfunctions which would not be apparent if the tester was not used. For procedures pertaining to the use of Tester BT-500 refer to TESTING WITH BT-500.

TESTING WITHOUT BT-500

Road test the brakes by making a brake application at about 20 m.p.h. to determine if the vehicle stops evenly and quickly. If the pedal has a spongy feel when applying the brakes, air is present in the hydraulic system. Bleed the system at each wheel cylinder.

With the engine stopped and the transmission in neutral, apply the brake several times to exhaust all vacuum in the system. Depress the brake pedal, hold foot pressure on the pedal and start the engine. If the vacuum system is operating, the pedal will tend to fall away under foot pressure, and less pressure will be required to hold the pedal in the applied position. If no action is felt, the vacuum system is not functioning.

Stop the engine and again exhaust all vacuum in the system. Without starting the engine, depress the brake pedal and hold foot pressure on the pedal. If the pedal gradually falls away under foot pressure, the hydraulic system is leaking.

If the brake pedal travel from the released to the fully applied position exceeds 1-3/4" the brake shoes require readjustment or relining.

TESTING WITH BT-500

VACUUM SYSTEM CHECKS (ON CAR)

The power brake vacuum system, including the power brake unit, the vacuum check valve, the reserve tank and the connecting hoses, can be checked on the car for leaks with the system at rest, using Tester BT-500. By following the procedures, the leak can be isolated so that unnecessary removal of any of the power brake system units is eliminated.

Before proceeding with the tests, inspect all power brake system vacuum hoses and tighten all connections.

A. Testing Vacuum System (Complete)

1. Connect tester hoses as shown in Fig. 7-36 Inset A.
2. Start the engine and set it on slow idle.
3. Open the vacuum gauge valve. Tap the gauge to stabilize the reading. The vacuum gauge should read 19" to 21".

4. Shut off the engine and set the timer at 15 seconds. There should be no drop in vacuum during this period. If there is a drop in vacuum, a leak exists. To isolate the leak, proceed with Test B.

B. Testing Vacuum System (Less Vacuum Reservoir)

1. Connect tester hose as shown in Fig. 7-36, Inset B.

2. Start the engine and set it on slow idle.

3. With vacuum gauge valve open, tap the gauge to stabilize the reading. The vacuum gauge should read 19" to 21".

4. Shut off the engine and set the timer at 15 seconds. There should be no drop in vacuum during this period. If there is no drop in vacuum, the leak is at the reserve tank. If there is a drop in vacuum, the check valve or the power brake unit is leaking. To determine which of these two units is at fault, proceed with Test C.

C. Testing Vacuum System (Less Power Brake Unit)

1. Connect test hoses as shown in Fig. 7-36, Inset C.

2. Start the engine and set it on slow idle.

3. With the vacuum gauge valve open, tap the gauge to stabilize the reading. The vacuum gauge should read 19" to 21".

4. Shut off the engine and set the timer at 15 seconds. There should be no drop in vacuum during this period.

   a. If there is a drop in vacuum, the leak is in the check valve.

   b. If there is no drop in vacuum during this

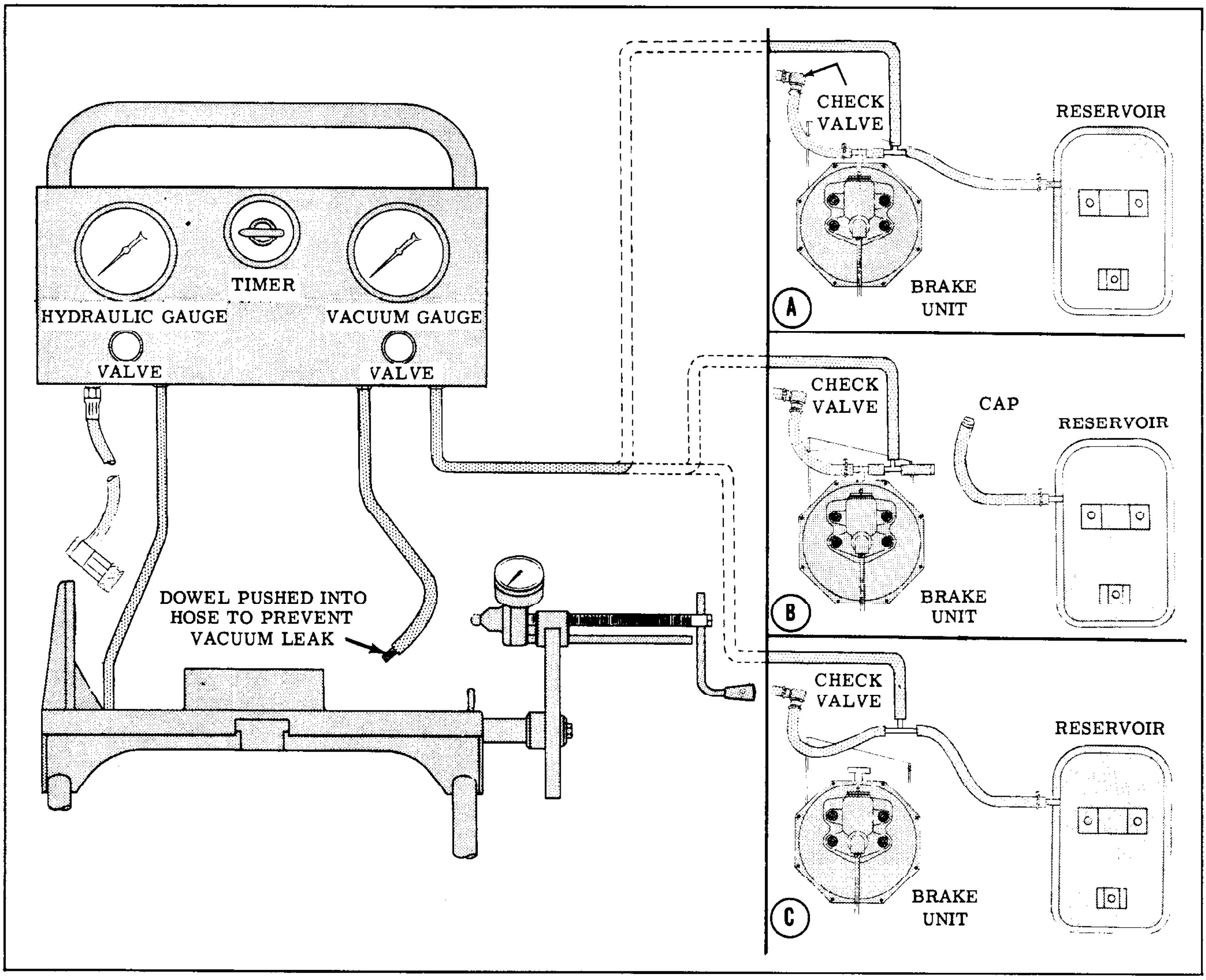


Fig. 7-36 Hose Connections (Testing on Car)

period, the power brake unit is leaking since the rest of the system has proven to be satisfactory.

5. Disconnect the tester hoses from the car.

POWER BRAKE UNIT TESTING PROCEDURE (ON TEST STAND)

When a power brake unit is removed from a car because of a vacuum leak at rest, or for any other vacuum or hydraulic malfunction, install the unit on the test stand and make the following tests.

These tests can be used for diagnosis and for comparison with the test results obtained after making the necessary corrections in the power brake unit.

Preparation for Testing

1. Install the power brake unit on the modified test stand.
2. Make sure the operating rod load gauge bracket is properly adjusted so that the operating rod gauge is aligned with the power brake unit operating rod.
3. Fill the master cylinder with G.M. Brake Fluid No. 11.
4. Connect tester hoses as shown in Fig. 7-37.
5. Start the engine and set it on slow idle.
6. Open the tester hydraulic gauge valve and vacuum gauge valve. Bleed the master cylinder by operating the power brake operating rod by hand until air bubbles have disappeared from the hydraulic hose.
7. Close the hydraulic gauge valve. Vacuum and hydraulic checks can now be made.

A. Vacuum Check at Rest

This check is made to determine whether there is a vacuum leak with the unit in the released position.

1. With tester hoses connected as shown in Fig. 7-38, open the vacuum gauge valve. With the engine on slow idle, the gauge, should read 19" to 21".
2. Close the vacuum gauge valve, tap the gauge to stabilize the reading and set the timer at 15 seconds. There should be no drop in vacuum during this period. If there is a drop in vacuum, a leak exists at one or more of the following points:

   a. Internal vacuum hose.

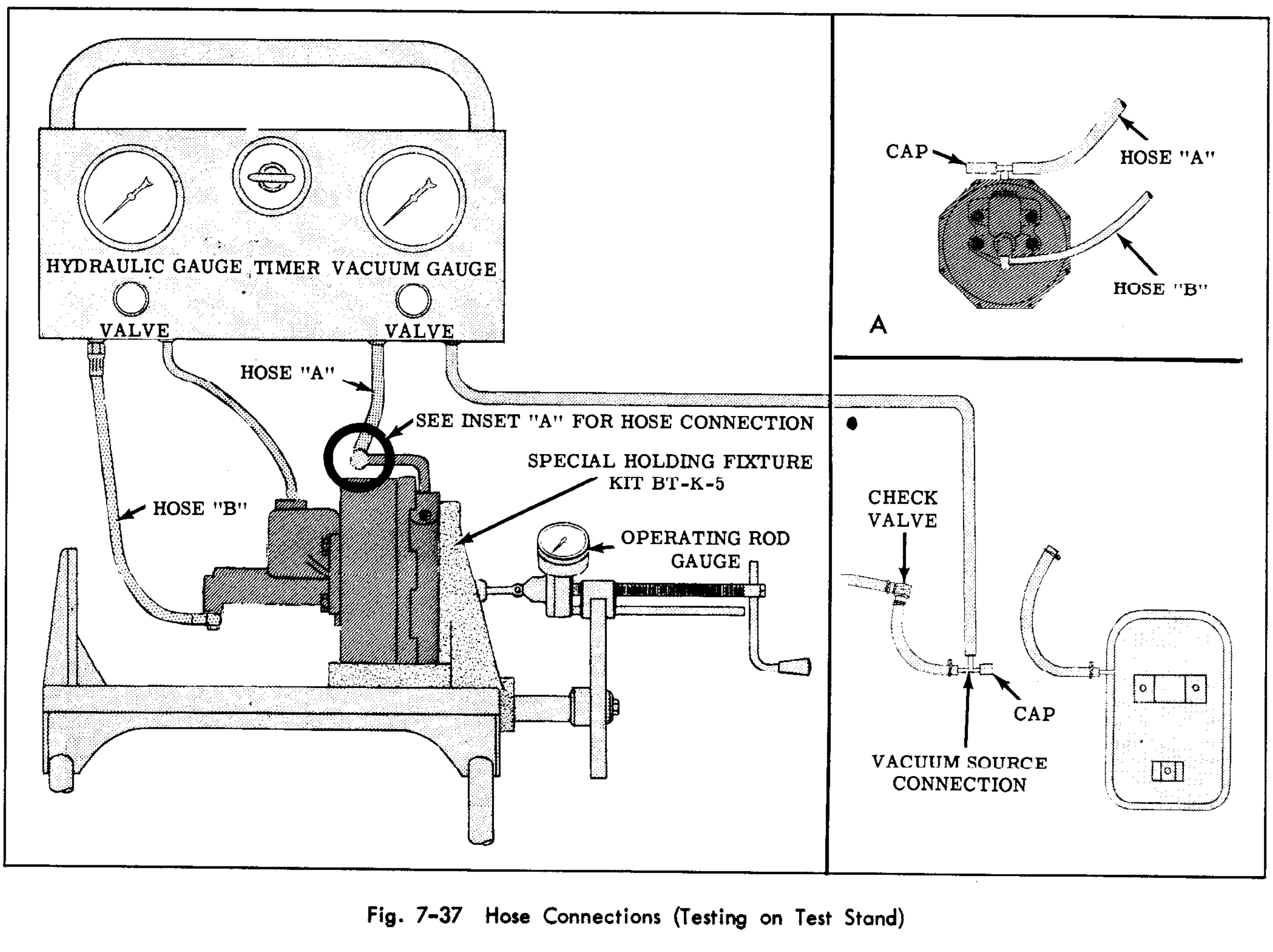


Fig. 7-37 Hose Connections (Testing on Test Stand)

b. Floating valve seat.

c. Floating valve diaphragm.

B. Vacuum Check Under Load

This check is made to test the condition of all vacuum seals, many of which cannot be tested with the unit in the released position.

1. With tester hoses connected as shown in Fig. 7-37, open the tester vacuum gauge valve. With the engine running at slow idle, the gauge should read 19" to 21".

2. Apply a 120 lb. load to the power brake operating rod by turning the crank until the operating rod gauge reads approximately 120 lbs., cycling it several times between 120 lbs. and 140 lbs., then bring it down to 120 lbs. This procedure prevents a drop in load due to normal resistance in the unit.

3. Close the vacuum gauge valve and set the timer at 30 seconds. If the drop in vacuum is greater than 1-1/2" there is a leak at one or more of the following points.

MORAINE

a. Vacuum diaphragm.

b. Floating valve.

c. Master cylinder to vacuum cylinder "O" ring.

d. Master cylinder piston to support plate "O" ring.

e. Support plate to vacuum piston "O" ring.

f. Leak around master cylinder attaching bolts.

g. Floating valve diaphragm.

h. Secondary seals.

i. Air valve boot.

BENDIX

a. Leather packing.

b. Floating valve

c. Master cylinder to vacuum cylinder "O" ring.

d. Floating valve diaphragm.

e. Internal hose.

f. Leak around master cylinder attaching bolts.

g. Secondary cup.

C. Hydraulic Check

This check is made to determine whether there is an internal or external leak in the hydraulic system and is made without vacuum assist.

1. With tester hoses connected as shown in Fig. 7-37, close the vacuum gauge valve and operate the brake operating rod until vacuum gauge drops to zero.

2. Apply a 100 lb. load to the power brake operating rod by turning the crank until the operating rod gauge reads approximately 100 lbs., cycling it several times between 100 lbs. and 120 lbs., then bringing it down to 100 lbs. This procedure prevents a drop in load due to normal resistance in the unit.

3. Set the timer at 30 seconds and watch the operating rod gauge. There should be no drop in gauge reading during this period. If the operating rod gauge reading drops, it indicates an internal or external leak in the hydraulic system.

   a. An external leak could be at the hydraulic line connections. Make a visual inspection at this point.

   b. An external leak could also be due to a faulty secondary cup, (Bendix) or secondary seals (Moraine).

   c. An internal leak would be at the primary cup in the master cylinder (Moraine or Bendix).

D. Performance Check

Three checks are made to determine whether the hydraulic pressure is within specified limits for a given amount of force on the power brake operating rod.

With the tester hoses connected as shown in Fig. 7-37, the test is made with the engine running at slow idle, the vacuum gauge valve open and the hydraulic gauge valve closed. The vacuum gauge should read 19" to 21".

Check No. 1 (Fig. 7-37)

Apply a 40 lb. load to the operating rod. Be sure to stabilize the load gauge by cycling it several times between 40 lbs. and 60 lbs. before adjusting it to 40 lbs. The hydraulic pressure gauge should now read between 200 and 250 p.s.i.

Check No. 2

Apply an 80 lb. load to the operating rod. Be sure to stabilize the load gauge by cycling it several times between 80 lbs. and 100 lbs. before adjusting it to 80 lbs. The hydraulic pressure gauge should now read between 450 and 500 p.s.i.

Check No. 3

Apply a 100 lb. load to the operating rod. Be sure to stabilize the load gauge by cycling it several times between 100 lbs. and 120 lbs. before adjusting it to 100 lbs. The hydraulic pressure gauge should now read between 575 and 625 p.s.i.

If the power brake unit fails one or more parts of the performance test, the trouble may be due to air in the hydraulic system, caused by improper bleeding, or to a mechanical condition causing excessive resistance to movement of the vacuum piston and hydraulic plunger.

E. Residual Check Valve Check

1. Hook up gauge as shown in Fig. 7-38.
2. Apply a 50 lb. load to the operating rod. Release the load completely then reapply the 50 lb. load. This allows the fluid to enter the gauge line.
3. Release the load on the operating rod and observe the reading on the gauge.
4. Reading should be 5 to 16 lbs. and hold steady for 30 seconds. If gauge reading drops, check all connections and repeat steps 2 and 3. If gauge reading still drops,

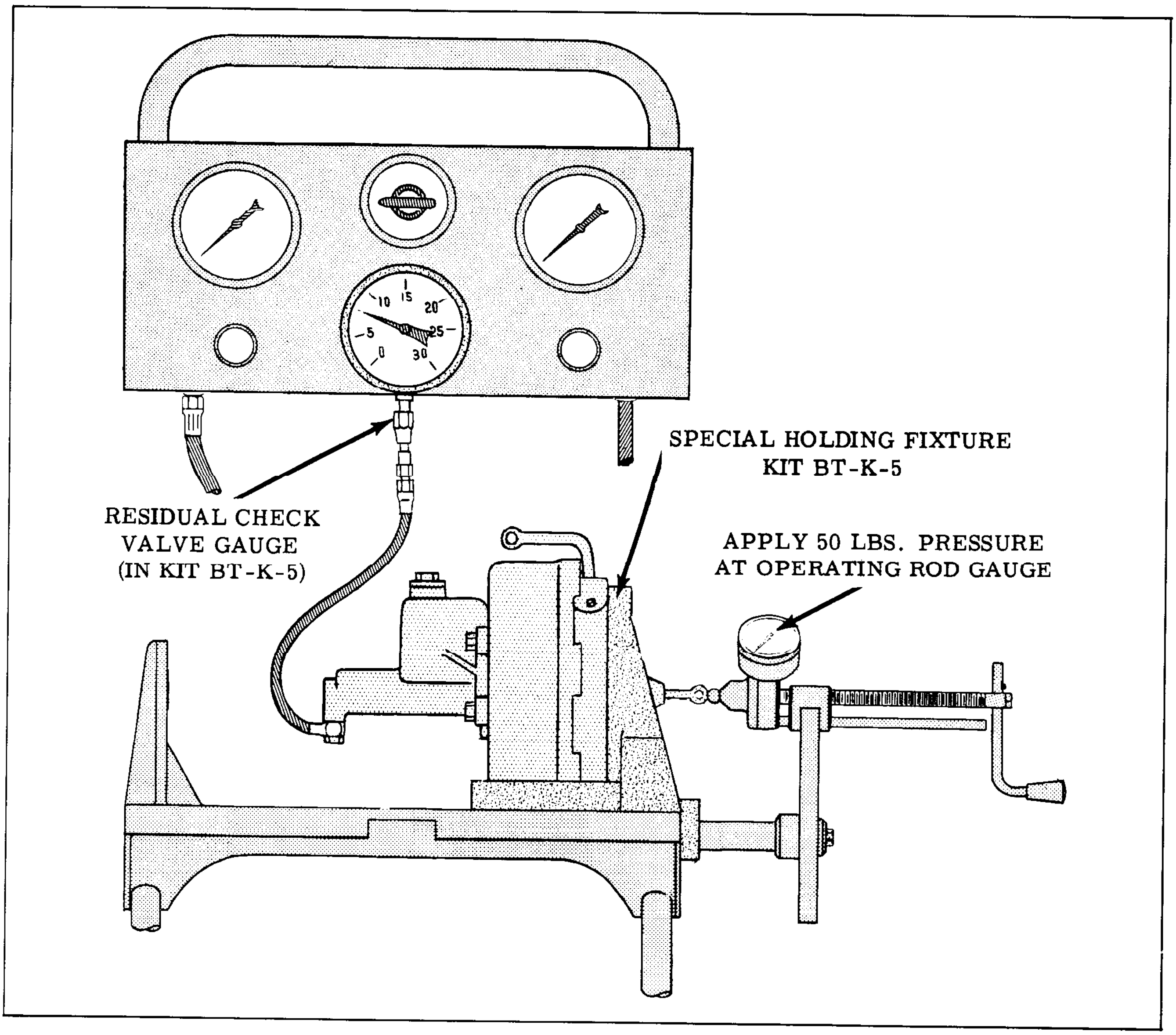


Fig. 7-38 Checking Residual Check Valve

the residual check valve is leaking and must be replaced. (See MASTER CYLINDER DISASSEMBLY).

5. If gauge reading is steady but below 5 lbs., the spring in the master cylinder is weak.

BRAKE DIAGNOSIS

The following diagnosis applies to both power brakes and standard brakes unless otherwise specified.

1. Hard Pedal Feel May Be Caused By:

A. Power brake vacuum failure due to:

(1) Faulty vacuum check valve.

(2) Collapsed vacuum hose.

(3) Plugged or loose vacuum hose or fittings.

(4) Leaking vacuum reserve tank.

B. Bound up pedal mechanism.

C. Glazed linings.

D. Grease on brake drum or linings.

E. Power brake unit trouble due to:

(1) Internal vacuum hose loose or restricted.

(2) Vacuum leak in vacuum piston assembly or past the leather packing (Bendix) or vacuum diaphragm (Moraine).

(3) Leak at vacuum cylinder to master cylinder "O" ring.

(4) Restricted air filter cleaner.

(5) Malfunctioning air valve.

(6) Leaking past floating valve or air valve.

2. "Grabby" or Severe Brakes Caused By:

A. Grease or brake fluid on linings.

B. Scored drums.

C. Burned linings.

D. Power brake unit trouble due to:

(1) Sticking air valve.
(2) Master cylinder piston binding on air valve. (Moraine)
(3) Binding master cylinder piston.

3. Pedal Goes to Floor (or almost to floor) Caused By:

A. Brakes require adjustment.

B. Air in hydraulic system.

C. Hydraulic leak in line or at wheel cylinders.

D. Low fluid level in master cylinder reservoir.

E. Leak at primary cup.

F. Sand hole or crack in master cylinder.

4. Brake Lock Up Caused By:

A. Restricted compensator port.

B. Incorrect hydraulic piston height (Moraine).

C. Incorrect push rod adjustment (Bendix).

D. Incorrect pedal free travel (Standard).

GENERAL SPECIFICATIONS

BRAKE ASSEMBLIES AND DRUMS

1. BRAKING AREA . . . . . 191.7 sq. in.
2. RATIO (Percentage of Braking Effect)
   a. Front Brakes 56%
   b. Rear Brakes 44%
3. DRUMS
   a. Inside Diameter . . . . . 11"
   b. Out of Round (Total Indicator Reading) . . . . . .010" (Max.)
4. LININGS
   a. Length - Primary Shoes . . . . . 9-3/8"
   b. Length - Secondary Shoes . . . . . 12-1/32"
   c. Width - Front Brake . . . . . 2-1/2"
   d. Width - Rear Brake . . . . . 2"
   e. Thickness . . . . . 7/32"

HYDRAULIC SYSTEM

1. FLUID TYPE . . . . . G.M. No. 11
2. FLUID LEVEL
   a. Standard and Power Brakes . . . . . . 1/2" Below Bottom of Master Cylinder Fill Opening
3. MASTER CYLINDER BORE . . . . . 1"
4. WHEEL CYLINDER BORE
   a. Front . . . . . 1-1/8"
   b. Rear . . . . . 1"

ADJUSTMENTS

1. BRAKE SHOE (Standard and Power). . . . . . Tighten adjusting screw until heavy resistance is felt on brake drum, then back off approximately 16 notches.
2. PEDAL HEIGHT - Standard Brake (from floor pan to pedal pad). . . . . . 8" ± 1/8"
3. FREE TRAVEL - Standard Brakes . . . . . . Refer to Brake Pedal Adjustments
4. MINIMUM PEDAL TO FLOOR CLEARANCE BEFORE ADJUSTMENT IS REQUIRED (with brakes applied)
   a. Standard . . . . . 4"
   b. Power . . . . . 1-3/4"
5. PARKING BRAKE (Adjust with parking brakes released)
   a. Equalizer . . . . . . Tighten equalizer adjusting nut until heavy drag is felt at rear wheels, then loosen nut 10 turns.

TORQUE SPECIFICATIONS

NOTE: Specified torque is for installation of parts only. Checking of torque during inspection may be 15% below the specified.

Application	Ft. Lbs.
General	
1. Brake Line Fittings	8 to 12
2. Anchor Pin To Steering Knuckle Bolt	55 to 80
3. Plain Arm to Steering Knuckle to Backing Plate Bolts & Nuts	80 to 130
4. Rear Brake Backing Plate to Axle Housing Nuts	45 to 60
5. Wheel Cylinder to Backing Plate Cap Screws	10 to 18
6. Wheel Nuts	70 to 85
Parking Brake	
7. Brake Lever Assembly to Dash Cap Bolts	8 Max.
8. Brake Lever Assembly to Instrument Panel Cap Screws	8 Max.
9. Brake Rod End to Intermediate Lever Cap Screw	10 to 18
Standard Brakes	
10. Pedal Mounting Bracket to Instrument Panel Cap Screws	8 Max.
11. Pedal Mounting Bracket and Master Cylinder Bolts to Dash	20 to 28
12. Pedal Pivot Bolt Nut (Syncro-Mesh)	10 to 18
13. Master Cylinder Filler Cap	10 to 20
Power Brakes	
14. Master Cylinder Filler Cap (Moraine)	10 to 20
15. Master Cylinder Filler Cap (Bendix)	Finger Tight
16. Master Cylinder to Vacuum Cylinder	15 to 20
17. Vacuum Cylinder to Dash	8 to 16
18. Support Plate to Vacuum Piston (Moraine)	5 to 7
19. Front to Rear Piston Plate (Bendix)	4 to 6

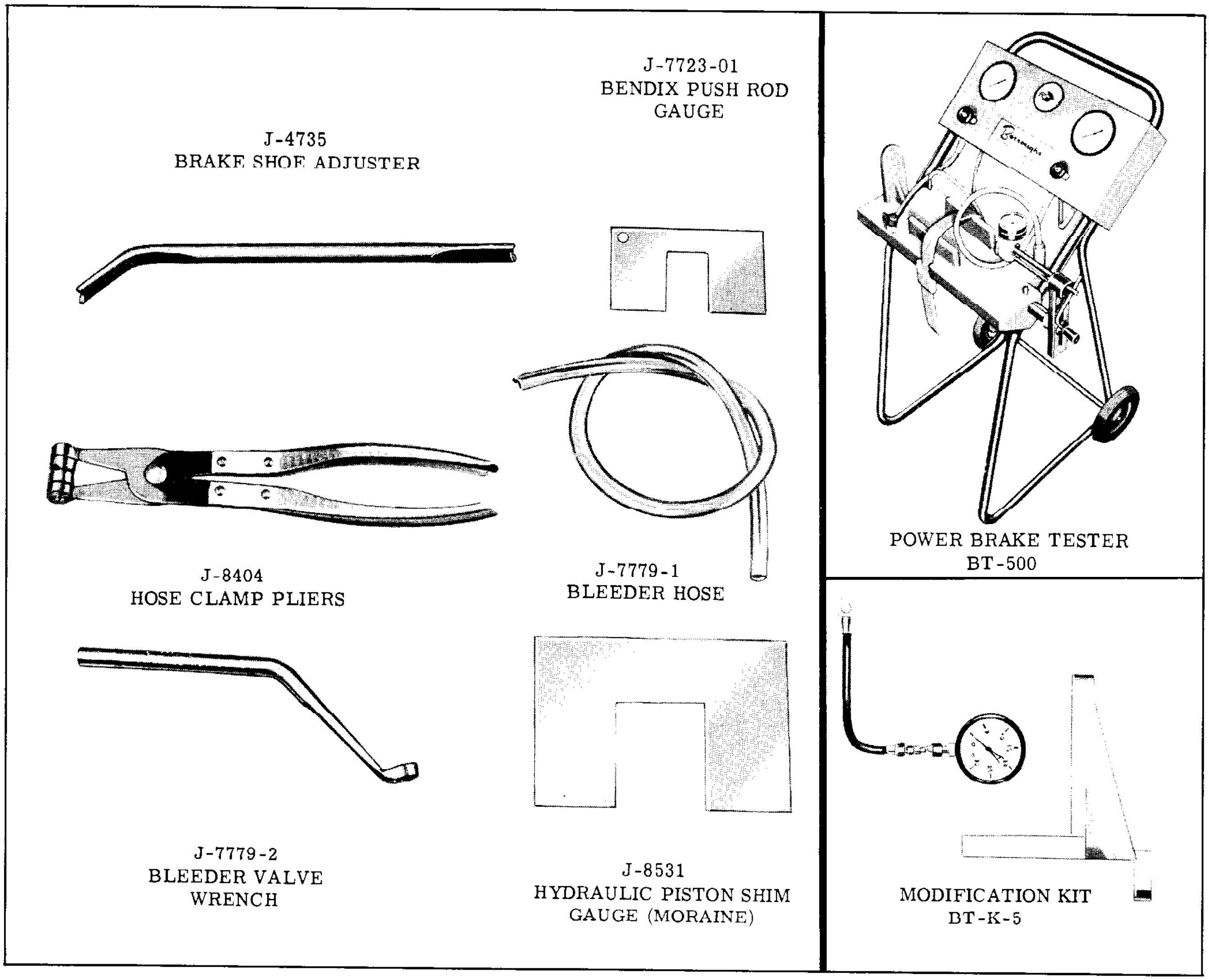
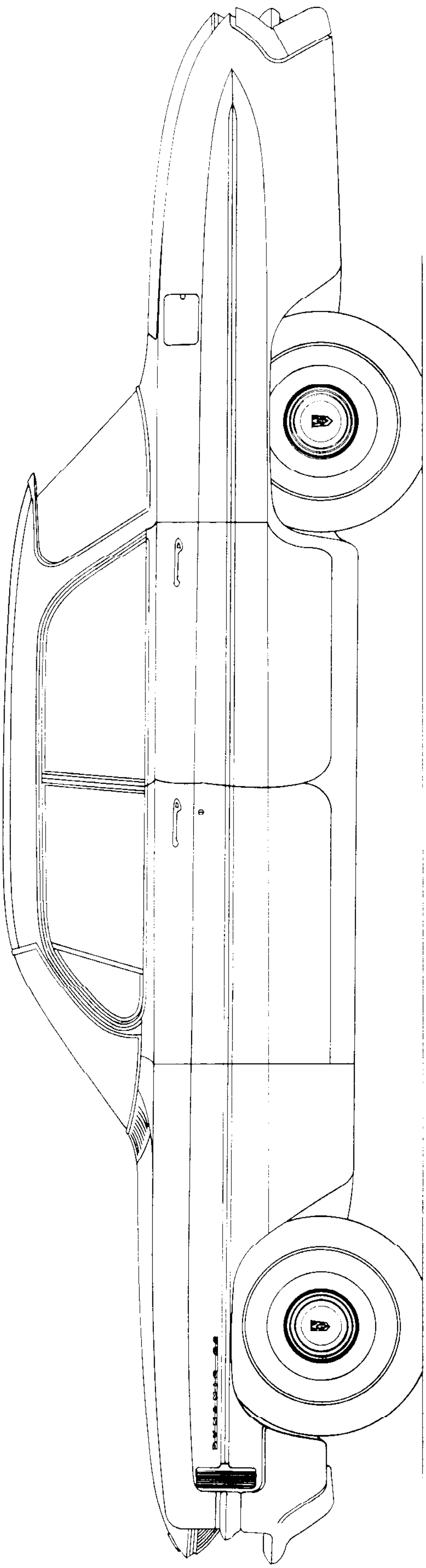


Fig. 7-39 Brake Tools



88 FOUR DOOR SEDAN
3269

ENGINE

CONTENTS OF SECTION 8

PERIODIC MAINTENANCE

For periodic engine lubrication and maintenance refer to LUBRICATION - SECTION 2.

Remove dirt and foreign materials from radiator cooling fins with compressed air when necessary. If equipped with air conditioning, also remove dirt and foreign material from condenser cooling fins.

The cooling system requires the following periodic maintenance:

Spring - Drain system completely, refill with water and add 16 ozs. of cooling system inhibitor, Part No. 989498.

Fall* - Drain system completely, add anti-freeze as required.

*In areas where temperatures do not require anti-freeze, drain in the spring and add cooling system inhibitor, Part No. 989498.

GENERAL DESCRIPTION

Engines used in the 88, S88 and 98 Series have a 4-1/8" bore, 3-11/16" stroke and a displacement of 394.1 cubic inches.

The 88 Series engine uses a dished type piston which provides a compression ratio of 8.5:1. This engine is designed to use regular fuel.

The S88 and 98 Series engine uses a flat top piston which provides a compression ratio of 10:1. This engine is designed to use premium fuel.

The 10:1 compression ratio engine is also available as an option in the 88 Series.

MANIFOLDS

The intake manifold for both banks of cylinders is of one casting, while each bank has a separate exhaust manifold.

Preheating of the gasoline mixture is obtained by the exhaust gas passage thru the intake manifold, which directly connects the two exhaust manifolds, forcing the hot exhaust gases to circulate around the choke heat tube when the heat control valve is closed or partially closed. (Fig. 8-1)

Cast integral with the intake manifold at the front is a passage which returns the water from the cylinder heads to the water outlet and the radiator core.

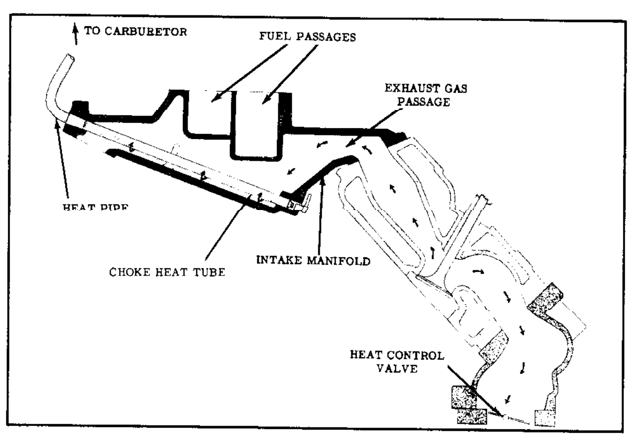


Fig. 8-1 Exhaust Flow (Heat Control Closed)

An elbow is incorporated on the lower end of the choke heat tube to prevent water from being drawn up the heat tube and into the carburetor. (Fig. 8-1) The elbow must be installed with the tube end up.

INTAKE MANIFOLD AND/OR GASKET

Remove

1. Drain radiator, then disconnect upper radiator hose from water outlet.
2. Remove air cleaner.
3. Disconnect spark plug wires.
4. Disconnect throttle linkage.
5. Remove fuel and vacuum lines that interfere with manifold removal.
6. Disconnect primary wiring from coil, and remove ignition wires from resistor.
7. If equipped with power steering, disconnect power steering pump and bracket as an assembly.
8. If equipped with air conditioning, disconnect generator, then remove attaching bolts and tip compressor and bracket rearward to obtain clearance for manifold removal.
9. Remove intake manifold with coil and carburetor attached.
10. Clean cylinder head and manifold machined surfaces.

Install

1. Reverse sequence of removal operations, using new graphite coated metal gaskets between the head and intake manifold. Apply Permatex No. 3 sealer or equivalent around gasket water holes.
2. Dip threads of intake manifold bolts in C.P. No. 9 sealer (Nat. Machine Prod. Co.). Install manifold bolts and nuts and torque 22 to 34 ft-lbs. in sequence as shown in Fig. 8-2.
3. If equipped with power steering or air conditioning, adjust belt tension. (See Belt Adjustments, Sections 4 and 14)
4. After installation of manifold is completed, adjust throttle linkage. (For Hydra-Matic equipped cars, refer to Section 3; for Syncro-Mesh equipped cars, refer to Section 11.)

MANIFOLD HEAT CONTROL VALVE (Fig. 8-3)

The manifold heat control valve assembly is mounted on the left exhaust manifold. This automatically controlled valve regulates the amount of heat by-passed through the intake manifold so that a sufficient amount of heat is transferred to insure a uniform vaporization of the intake mixture under all operating conditions.

The offset valve, counterweight, and thermostat are calibrated to give proper intake manifold heat under all driving conditions.

The manifold heat control valve must be in proper operating condition to insure good performance and economy. A heat valve that does not close causes poor warm-up and rich carburetion. A heat valve that does not open will cause unsatisfactory operation during normal engine temperature operation, especially in hot weather. The thermostatic spring is designed to close the valve

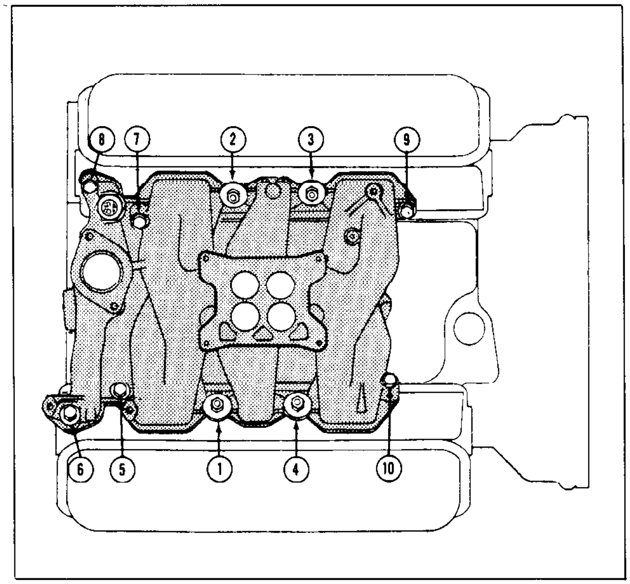


Fig. 8-2 Intake Manifold Torque Sequence

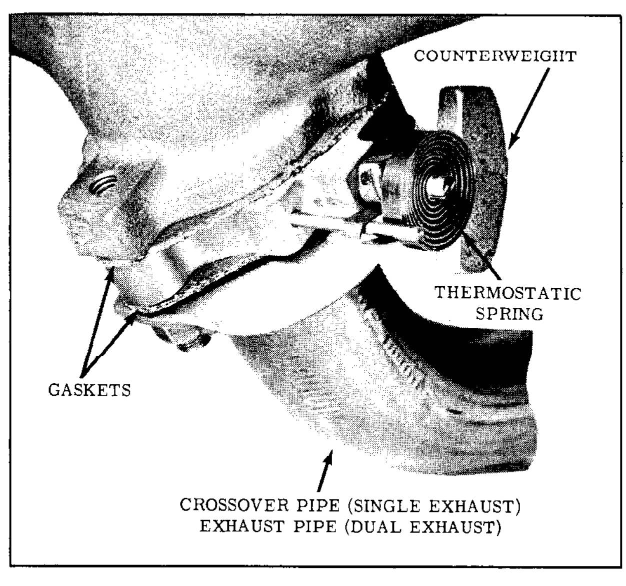


Fig. 8-3 Manifold Heat Control Valve

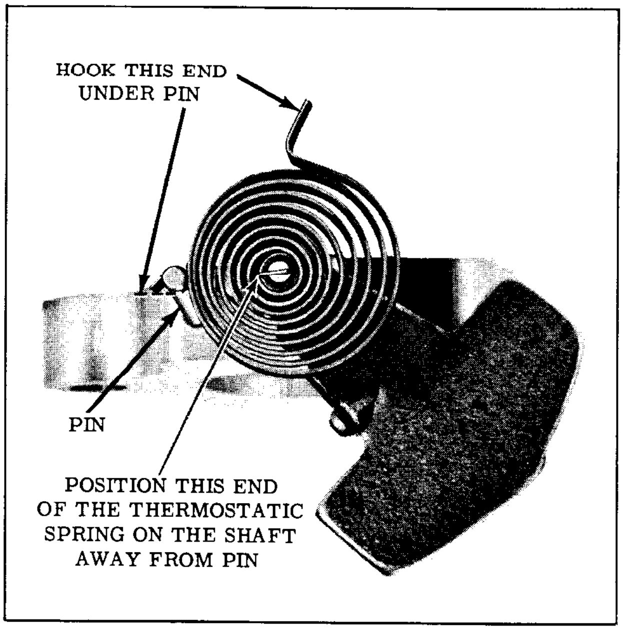


Fig. 8-4 Spring Installation

as the engine cools. As the spring warms and the engine speed increases, the counterweight and exhaust gas pressure opens the valve.

INSPECTION

With a cool exhaust manifold, start the engine and flash the throttle quickly. The heat control valve should open and return to the closed position. The valve opens when the weight rotates downward. If the valve does not operate and the counterweight shaft is free, it indicates that either the valve is loose on the shaft or the shaft is broken. If the shaft is tight, it may be freed-up by rotating the counterweight.

CAUTION: Never oil the heat control valve shaft bearing surfaces as carbon may form and "freeze" the shaft.

A rattling or "buzzing" noise indicates that the shaft bushings are worn. If the manifold heat control valve is noisy or inoperative, the assembly should be repaired or replaced.

The manifold heat control valve must be assembled as shown in Fig. 8-4.

Remove and Install

The manifold heat control valve can be removed by disconnecting the crossover pipe to exhaust manifold attaching nuts (on cars with the single exhaust system) or by disconnecting the L.H. exhaust pipe to manifold (on cars with the dual exhaust system).

NOTE: Always use new gaskets and "Seez-Pruf" nuts when replacing the heat control valve. Torque exhaust or crossover pipe to manifold nuts 25 to 35 ft. lbs.

EXHAUST MANIFOLD

Remove

1. Disconnect exhaust pipe or pipes.
2. L.H. Manifold: Remove manifold heat control valve.
3. Raise front of engine as outlined under RAISING FRONT OF ENGINE.
4. L.H. Manifold: Loosen power steering hoses at the steering gear and rotate hose and pipe to gain accessibility. Tighten fittings to prevent oil loss.
5. Remove manifold to head attaching nuts and bolts and remove manifold.
6. Clean manifold and cylinder head machined surfaces.

Install

1. Apply Dixon No. 3 Graphite Grease (Part No. 581823) to the sealing surfaces of the exhaust manifold center and end port flanges.

   NOTE: Gaskets are not used between the cylinder head and the exhaust manifold.

2. Position the exhaust manifold onto the head.
3. If manifold studs show signs of coolant leakage, remove the studs and apply C.P. No. 9 Sealer to the stud threads.
4. Apply C.P. No. 9 Sealer to the attaching bolts and fasten the manifold to the head. Torque bolts and nuts 19 to 25 ft. lbs.
5. Reverse Steps 1 thru 4 of the exhaust manifold removal procedure.

HEAD AND VALVE MECHANISM

ROCKER ARM SHAFT ASSEMBLY

Remove

1. R.H. rocker arm shaft: Disconnect crankcase ventilator or hose and remove from rocker arm cover.
2. Remove rocker arm cover. If equipped with air conditioning, remove compressor and generator bracket attaching bolts and tip compressor rearward to remove R.H. rocker arm

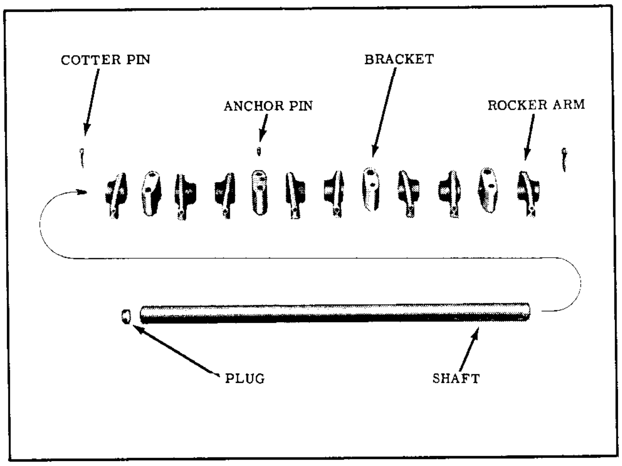


Fig. 8-5 Rocker Arm Assembly

cover. If equipped with power steering, remove pump mounting bracket attaching bolts and move assembly to one side to gain access to L.H. rocker arm cover.

3. Remove rocker arm bracket bolts.

4. Remove rocker arm shaft assembly.

Disassemble

1. Remove cotter pins from ends of rocker shaft.

2. Remove brackets and rocker arms from shaft. (Fig. 8-5)

   NOTE: One bracket is attached to the shaft by an anchor pin. (Fig. 8-6) It is not necessary to remove this bracket unless either the bracket, shaft, or pin has to be replaced. If necessary to remove, insert a drift through the oil passage in the bracket and drive out pin.

   If necessary to remove rocker shaft plug, punch hole in plug, then pry plug from end of shaft.

Assemble

1. If shaft, pin, or pinned bracket was removed, install a new pin. Drive pin flush with bracket. (Rocker arm shaft oil ports must face down)

2. If rocker shaft plug was removed, position a new plug in end of shaft, and install plug until outer shoulder is 9/32" into end of shaft.

3. Lubricate all frictional surfaces of the rocker arms, brackets and shaft, then assemble rocker arm shaft assembly as shown in Fig. 8-5.

Install

1. Position rocker arm shaft assembly on cylinder head and reverse removal procedure.

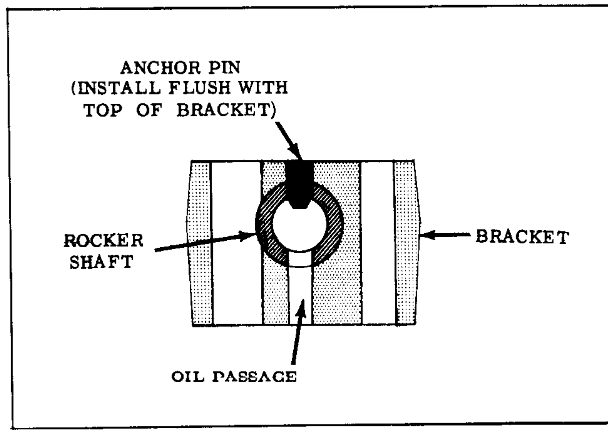


Fig. 8-6 Bracket and Anchor Pin

2. Align assembly and tighten bolts evenly.

3. Torque large bolts 60 to 80 ft. lbs., small bolts 14 to 22 ft. lbs.

VALVE SPRING

Remove and Install (On Car)

To replace a worn or broken valve spring without removing the cylinder head, proceed as follows:

1. Remove the rocker arm shaft assembly.

2. Remove spark plug and install Air Hose Adapter BT-72-1B. Connect an air hose to the adapter to hold the valve on its seat.

3. Install valve compressor on cylinder head as shown in Fig. 8-8. Compress valve spring until valve keys are accessible, then remove

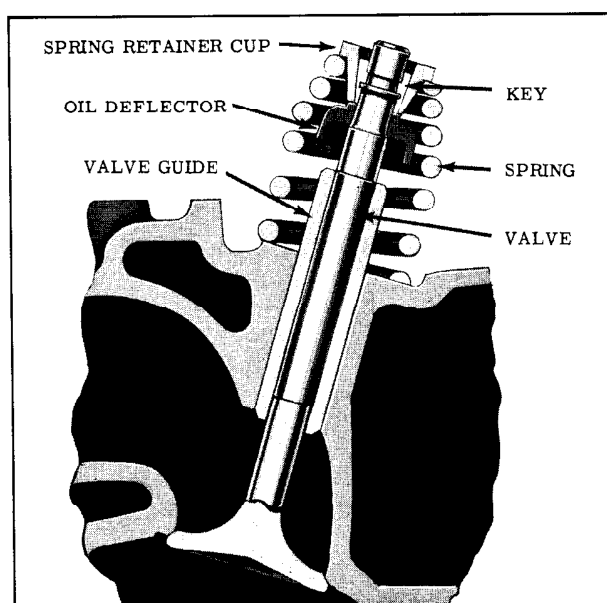


Fig. 8-7 Valve Assembly

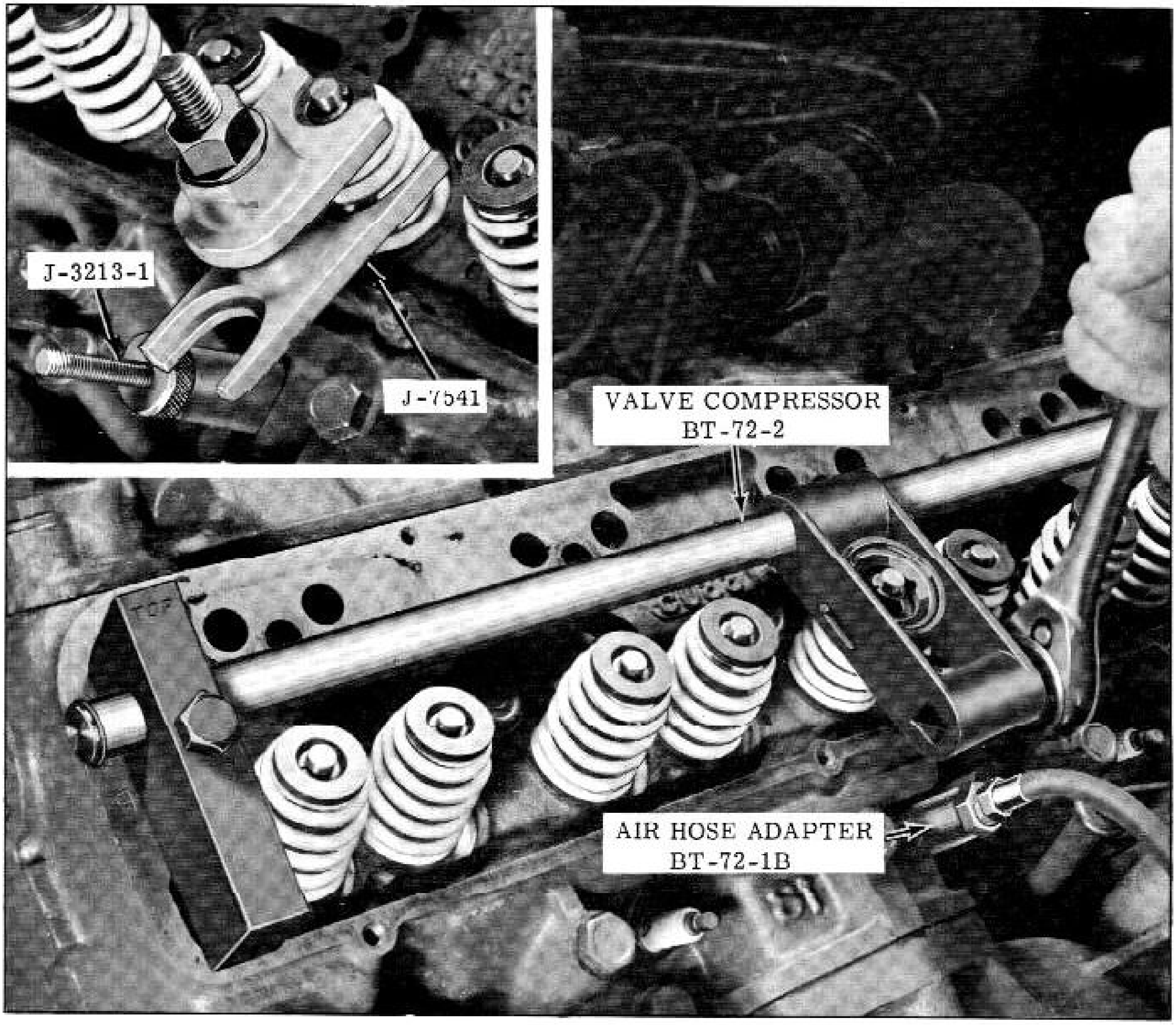


Fig. 8-8 Compressing Valve Springs

keys, spring retainer cup and spring. (Fig. 8-7)

To install valve spring, reverse the removal procedure.

CYLINDER HEAD AND/OR GASKET

Remove

1. Drain radiator and cylinder block.
2. Remove intake manifold.
3. Remove generator.
4. Disconnect exhaust pipes.
5. R.H. head: Disconnect crankcase ventilator tube or hose from R.H. rocker arm cover.
6. Remove rocker arm cover. If equipped with air conditioning, remove compressor and generator bracket attaching bolts and tip compressor rearward to remove R.H. rocker arm cover. If equipped with power steering, remove pump mounting bracket attaching bolts and move assembly to one side to gain access to L.H. rocker arm cover.
7. Remove rocker arm shaft assembly. Disconnect ground strap from rear of cylinder head.
8. Remove push rods. Keep rods grouped so they can be installed in their original location.
9. Remove cylinder head bolts then remove cylinder head with exhaust manifold attached.

Disassembly

1. Remove spark plugs.
2. Remove exhaust manifold.

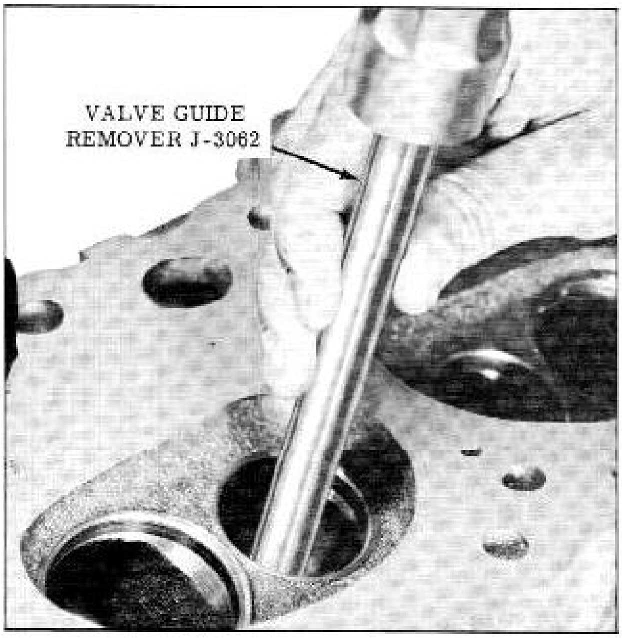


Fig. 8-9 Removing Valve Guide

3. Remove valve keys by compressing valve spring with a tool such as BT-72-2 or OTC-CF-11.
4. Remove valve spring retainer cups and springs. (Fig. 8-7) Keep all parts grouped so they can be installed on their original valves.
5. Remove oil deflectors from valve stems.
6. Invert heads and remove valves. Keep valves separated so they can be installed in their original location.
7. If necessary to remove valve guides, support head on wood blocks then drive out with Valve Guide Remover Tool J-3062 (Fig. 8-9)

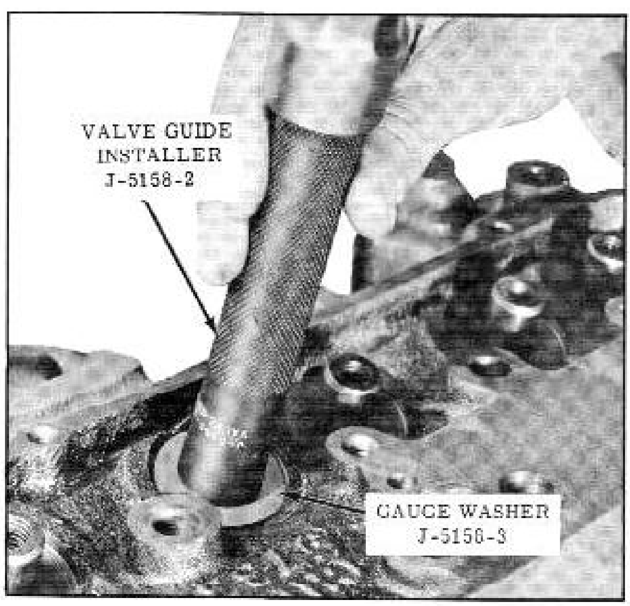


Fig. 8-10 Installing Valve Guide

To install valve guides, proceed as follows:

Lay Gauge Washer J-5158-3 on the valve spring seat. Install guide into cylinder head (with grooved end of guide up) by driving on Tool J-5158-2 until the tool seats against the gauge washer. (Fig. 8-10) This will allow the valve guides to extend 25/32" above the face of the valve spring seat.

When reconditioning valves and valve seats, only precision equipment should be used and the recommendations of the equipment manufacturer should be followed. Clean carbon from heads and also from valve guides. Whenever valves are ground or new valves and guides are installed, the valve seats must be reconditioned. Cutters (45°) are required for reseating, and a snug fitting solid pilot of the correct size should be used. New guides, if required, should be in place at the time seats are cut. Service guides are Parco-Lubrited and finished to size, and should NOT be reamed. Oversize guides (.010" O.D.) can be identified by a groove on the O.D. of the guide.

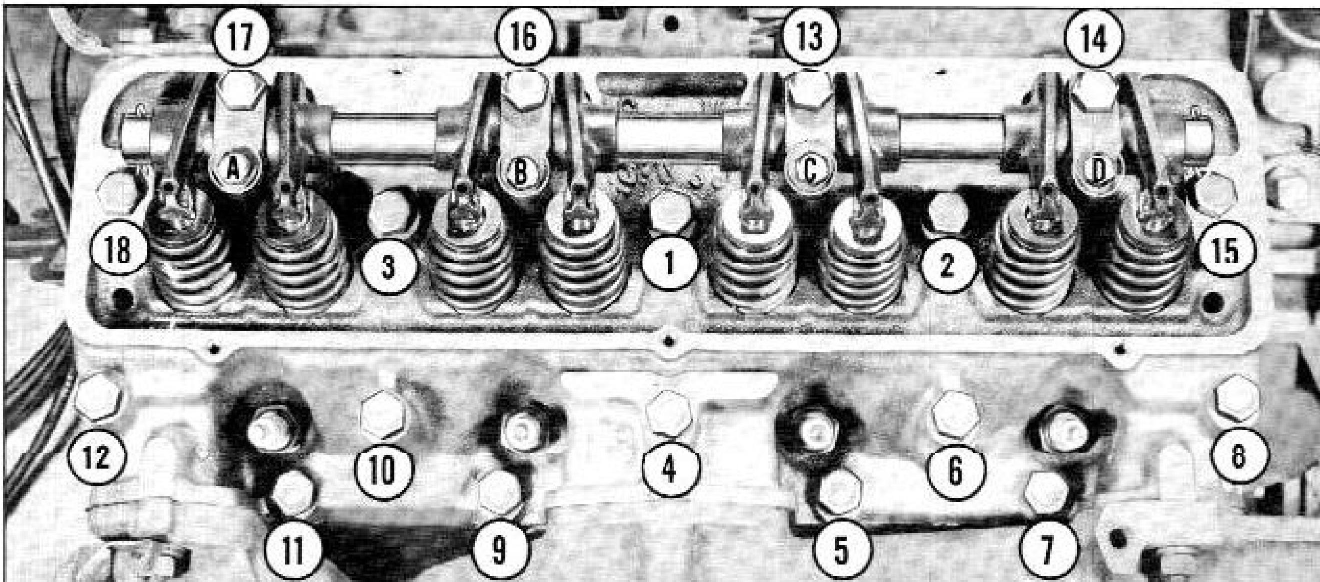
IMPORTANT: To assure satisfactory service, it is necessary that valve seat width be maintained within specifications. (Intake and exhaust seat width should be .037" to .075"). A 15° cutter should be used to narrow the seat as necessary.

Assemble

1. Install valves in their respective guides.
2. Install new oil deflectors over valve stem. Force deflectors down as far as possible on valve stem. The deflectors will correctly position themselves when the engine is started.
3. Position valve springs over valve stems.
4. Install valve lock retainer cups, then compress springs with a tool such as BT-72-2 or OTC-CF-11.
5. Install valve stem keys.
6. Check valve springs and keys to be sure they are properly seated.
7. Before assembling the exhaust manifold to the head, apply Dixon No. 3 Graphite Grease to the sealing surfaces of the exhaust manifold center and end port flanges.

NOTE: Gaskets are not used between the cylinder head and exhaust manifold.

If the manifold attaching studs show signs of coolant leakage, remove studs and apply C.P. No. 9 sealer to the stud threads, then reinstall studs.



A. TIGHTEN ALL BOLTS SNUG.

B. TIGHTEN NUMBERED BOLTS IN SEQUENCE SHOWN 50 TO 60 FT. LBS.

C. TIGHTEN LETTERED BOLTS 14 TO 22 FT. LBS.

D. RETIGHTEN NUMBERED BOLTS IN SEQUENCE SHOWN 60 TO 80 FT. LBS.

E. RETIGHTEN LETTERED BOLTS 14 TO 22 FT. LBS.

Fig. 8-11 Head Bolt Torque Sequence

Apply C.P. No. 9 sealer to the cap screws and assemble the manifold to the head. Torque the cap screws and nuts 19 to 25 ft. lbs.

8. Set spark plug gap to .030" and reinstall plugs. Torque 18 to 34 ft. lbs.

Install

1. Install cylinder head guide studs J-3455 in cylinder head bolt holes at each end of block.
2. Apply a coat of P.O.B. No. 3 Gasket Sealer to both sides of a new head gasket and position gasket over guide studs.
3. Place cylinder head in position. Apply C.P. No. 9 Sealer to head bolts. Install the center and lower row of attaching bolts finger tight, after removing guide studs.
4. Install push rods and rocker arm shaft assembly making sure that the push rods are properly seated in the rocker arms and valve lifters.
5. Tighten rocker arm shaft bracket and cylinder head attaching bolts in sequence as shown in Fig. 8-11.
6. Connect ground strap to rear of cylinder head.
7. Cement new gasket to rocker arm cover, then install cover.
8. R.H. head: Install crankcase ventilator tube or hose on R.H. rocker arm cover.
9. Connect exhaust pipes to exhaust manifold using new gaskets.
10. Install generator, and polarize after wires are connected. (See Installation of Generator in ELECTRICAL SECTION).
11. Adjust generator belt as outlined in ELECTRICAL SECTION.
12. Apply C.P. No. 9 sealer to the attaching bolts and install intake manifold. Torque nuts and bolts 22 to 34 ft. lbs.
13. Fill radiator.
14. After engine reaches operating temperature, finish filling radiator until coolant level is 1/4" below filler neck.

VALVE LIFTERS

Operation (Fig. 8-12)

Oil is supplied to the lifter through a hole in the side of the lifter body which indexes with a groove and hole in the lifter plunger.

When the lifter begins to ride up the cam lobe, the ball check is held against its seat in the plunger by the ball check spring which traps the

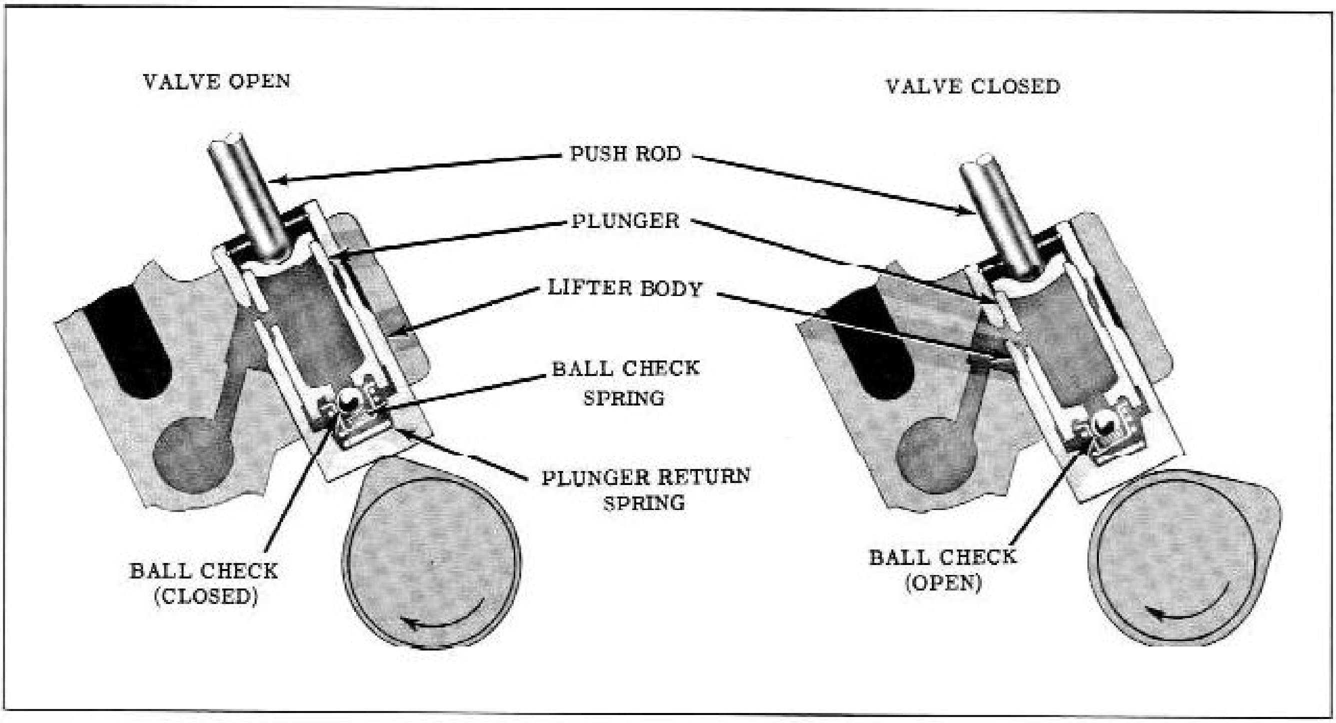


Fig. 8-12 Lifter Action on Camshaft

oil in the base of the lifter body below the plunger. The plunger and lifter body then raise as a unit, pushing up the push rod to open the valve. The force of the valve spring which is exerted on the plunger through the rocker arm and push rod causes a slight amount of leakage between the plunger and lifter body. This "leak down" allows a slow escape of trapped oil in the base of the lifter body. As the lifter rides down the other side of the cam lobe and reaches the base circle or "valve closed" position, the plunger spring quickly moves the plunger back (up) to its original position. This movement causes the ball check to open against the ball spring and oil from within the plunger is drawn into the base of the lifter. This restores the lifter to zero lash.

Valve Lifter Sizes

Valve lifters may be one of three sizes: Standard, .001", or .010" oversize. It is important when replacing valve lifter assemblies that the proper size lifter be ordered. An identification numeral is etched on all lifter bodies except standard. The cylinder block is marked 1 or 10, for lifter size, on the rail under the engine top cover. No mark indicates standard size lifter.

Remove and Install

IMPORTANT: Valve lifters and push rods should be kept in order so they can be reinstalled in their original position in the cylinder block.

1. Remove intake manifold, engine top cover, rocker arm covers and rocker arm shaft assemblies.
2. Remove push rods.
3. On varnished lifters, apply "D-Carb" solution to lifter body. Allow 5 minutes for solution to remove varnish.
4. Remove valve lifters. The use of Tool 23-15 will aid in removal of varnished lifters. (Fig. 8-13)

Reverse removal procedure for installation. Check lifters for free movement in the bore and to see that there is no perceptible side play.

Disassemble

1. Remove retainer spring with Tool BT-31 or a small screw driver.

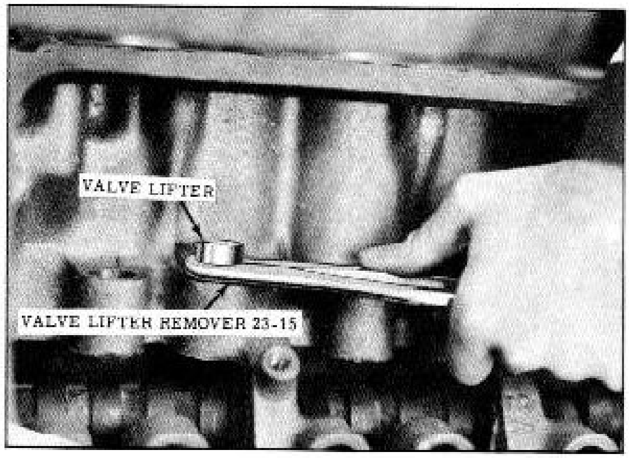


Fig. 8-13 Removing Lifter

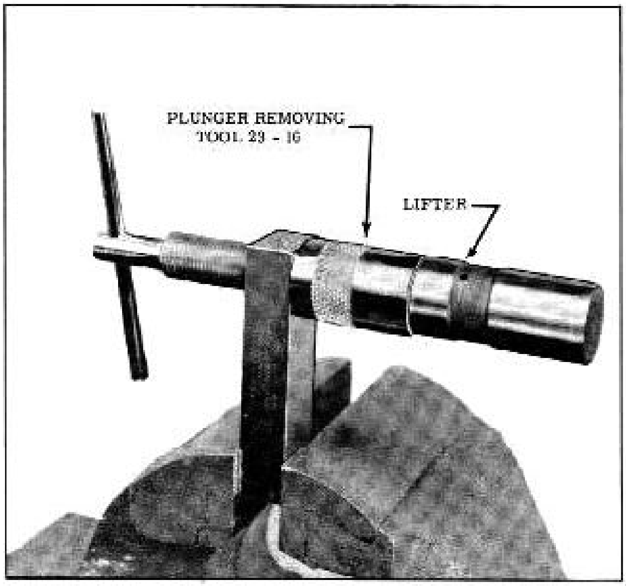


Fig. 8-14 Removing Plunger

2. Remove push rod seat.

3. Remove plunger and plunger spring. If plunger is stuck tight, allow lifter to soak in "D - Carb" solvent for approximately five minutes, then remove plunger. Tool 23-16 may be used if plunger does not fall out. (Fig. 8-14)

CAUTION: "D-Carb" should be used in a well ventilated room. Avoid contact with skin and prolonged breathing of fumes.

4. Remove ball check retainer from plunger, then remove ball and spring.

Clean and Inspect

After lifters are disassembled, all parts should be cleaned in clean solvent, using cleaning brush J-5099. A small particle of foreign material under the ball check valve will cause malfunctioning of the lifter. Close inspection should be made for nicks, burrs, or scoring of parts. Balls, ball check retainers, springs, push rod seats, and snap rings are interchangeable and can be replaced individually. The body and plunger are selectively fitted at the factory for proper leak-down rate and must not be interchanged or replaced individually. If either the body or plunger is defective, replace with a new lifter assembly.

IMPORTANT: DO NOT CONDEMN VALVE LIFTERS THAT HAVE A SLIGHT GAP OR SHOW EVIDENCE OF LEAKAGE WHERE THE LIFTER FOOT IS WELDED TO THE LIFTER BODY (FIG. 8-15) UNLESS THE LEAK-DOWN RATE IS NOT WITHIN SPECIFICATIONS. (SEE VALVE LIFTER LEAK-DOWN)

NOTE: Whenever lifters are removed, always check the lifter foot for wear as follows:

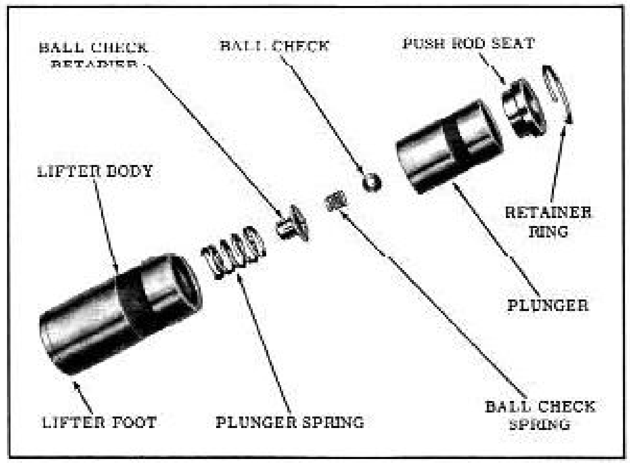


Fig. 8-15 Hydraulic Valve Lifter

1. Place a straight edge across the lifter foot.

   NOTE: Lifter foot must be clean and dry.

2. While holding the lifter at eye level, check for light between the straight edge and lifter foot.

3. If light indicates a flat or concave surface of the lifter foot, the lifter should be replaced and the camshaft inspected for wear. Wear at the CENTER of the cam base circle is NORMAL. (Fig. 8-16) The camshaft should be replaced ONLY when wear is present across FULL WIDTH of cam base circle.

Assemble and Valve Lifter Leak-Down Test

IMPORTANT: Lifters must be assembled while submerged under Hydraulic Lifter Test Fluid BT-59 and leak-down tested before placing into service.

1. Install Adapter 105-2 in reservoir of Tester BT-60, then fill reservoir with Hydraulic Lifter Test Fluid BT-59, 1/2" below top of reservoir.

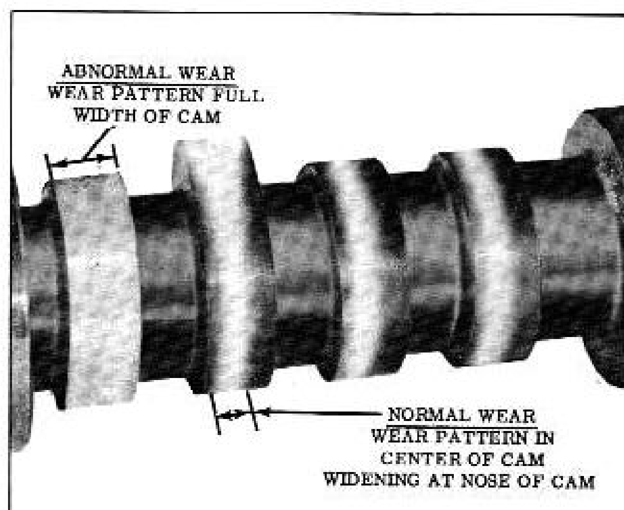


Fig. 8-16 Camshaft Wear Patterns

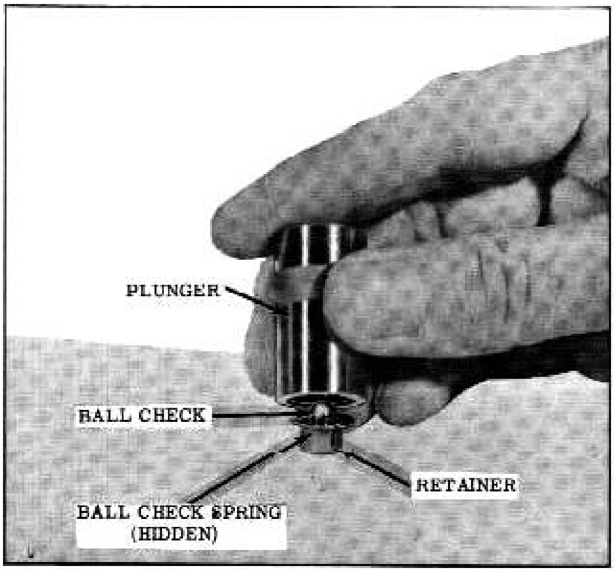


Fig. 8-17 Assembling Retainer in Plunger

2. Assemble ball check, spring and retainer into plunger. (Fig. 8-17) Make sure retainer flange is pressed tight against bottom of recess in plunger.

3. Install plunger spring over ball check retainer.

4. Hold plunger with spring up and insert into lifter body. Hold plunger vertical to prevent cocking spring.

5. Place assembly into the tester cup then position push rod seat onto plunger.

6. Position the 1/4" steel test ball on the push rod seat. Lower tester ram until it contacts the steel ball.

7. Allow ram to move downward by its own weight until air bubbles disappear.

8. Raise ram, then allow to lower as in step 7. Repeat this procedure several times or until all air is expelled from lifter.

   CAUTION: DO NOT ATTEMPT TO EXPELL AIR FROM LIFTER BY PUMPING RAM.

9. After all air is expelled, allow ram to bleed down lifter until retaining ring groove is exposed.

10. Install retaining ring.

11. Adjust ram screw so that it contacts the steel ball in the push rod seat when the pointer is at the start line.

12. Raise arm, then start test by resting ram on steel ball. Rotate reservoir one revolution every 2 seconds and time the indicator from

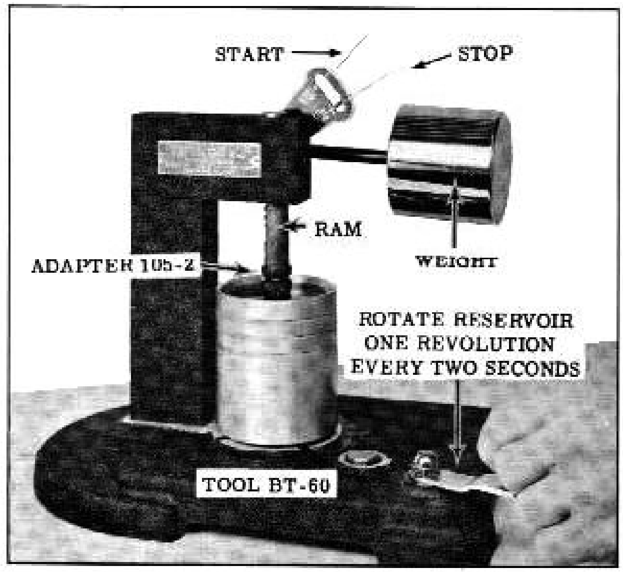


Fig. 8-18 Testing Lifter

the start to the stop line. (Fig. 8-18) Allowable tolerance for leak-down rate is 12 to 90 seconds (for used lifters) and 20 to 90 seconds (for new lifters).

13. If leak-down tolerance is within specifications, the lifter can be placed in service without removing test fluid.

VALVE LIFTER DIAGNOSIS

1. Momentarily Noisy When Car is Started:

This condition is normal. Oil drains from the lifters which are holding the valves open when the engine is not running. It will take a few seconds for the lifter to fill after the engine is started.

2. Intermittently Noisy on Idle Only, Disappearing When Engine Speed is Increased:

Intermittent clicking is an indication of a flat or pitted ball. It may also be caused by dirt.

Correction: Clean lifter and inspect the ball. If ball is defective, replace ball.

3. Noisy at Slow Idle or With Hot Oil, Quiet With Cold Oil or as Engine Speed is Increased:

Insert a .015" feeler gauge between the rocker arm and valve stem. If noise momentarily disappears and then reappears after a few seconds with the feeler still inserted, it is an indication that the lifter "leak-down" rate is too fast.

Correction: The lifter must be serviced.

4. Noisy at High Car Speeds and Quiet at Low Speeds:

a. High oil level - Oil level above the "Full" mark allows crankshaft counterweights to churn the oil into foam. When foam is pumped into the lifters, they will become noisy since a solid column of oil is required for proper operation.

Correction: Drain oil until proper level is obtained. See LUBRICATION SECTION.

b. Low oil level - Oil level below the "Add 2" mark allows the pump to pump air at high speeds which results in noisy lifters.

Correction: Fill until proper oil level is obtained. See LUBRICATION SECTION.

5. Noisy at Idle Becoming Louder as Engine Speed is Increased to 1500 R.P.M.:

a. This noise is not connected with lifter malfunction. It becomes most noticeable in the car at 10 to 15 mph "Lo" range, or 30 to 35 mph "S" range, and is best described as a "hashy" sound. At slow idle, it may be entirely gone or appear as a light ticking noise in one or more valves. It is caused by one or more of the following:

(1) Badly worn or scuffed valve tip and rocker arm pad.

(2) Excessive valve stem to guide clearance.

(3) Excessive valve seat runout.

(4) Off square valve spring.

(5) Off square rocker arm pad.

(6) Excessive valve face runout.

Diagnosis:

Remove rocker arm covers and while listening with a length of heater hose or Stethoscope BT-37, locate noisy valves by increasing engine speed slightly above idle, about 1000 r.p.m. With gloved hand, push sideways on valve spring. Noise will change, either becoming louder or disappearing completely. Some noise will be present in all valve locations. It is necessary to determine which are actually responsible for the customer complaint:

Correction:

a. Occasionally this noise can be eliminated by rotating the valve spring and valve. Crank engine until noisy valve is off its

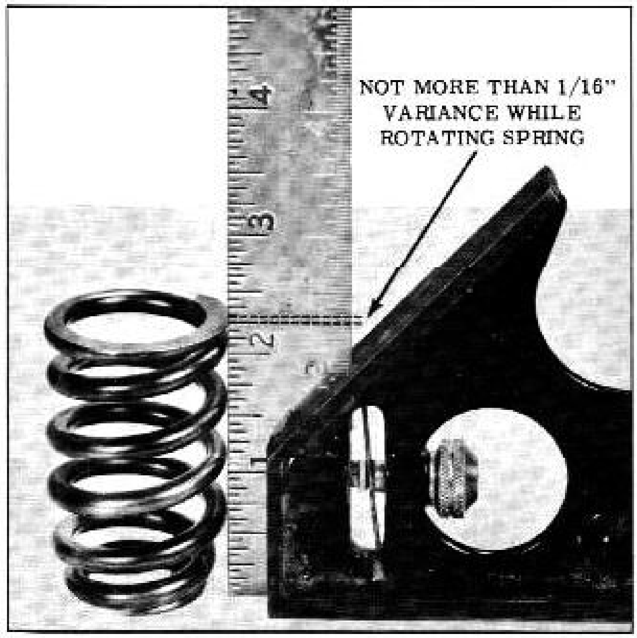


Fig. 8-19 Checking Valve Spring for Distortion

seat. Rotate spring 90°. This will also rotate valve. Repeat until valve becomes quiet. If correction is obtained, check for an off square valve spring. If spring is off square more than 1/16" in free position, replace spring. (Fig. 8-19)

b. Observe rocker arm pad for excessive wear or excessive off square. Replace as required. (Fig. 8-20)

c. If correction is not obtained, remove cylinder head and check for excessive valve stem to guide clearance. Correct as required.

Check valve seat runout. Repair as required by cutting seat. Reface valve and

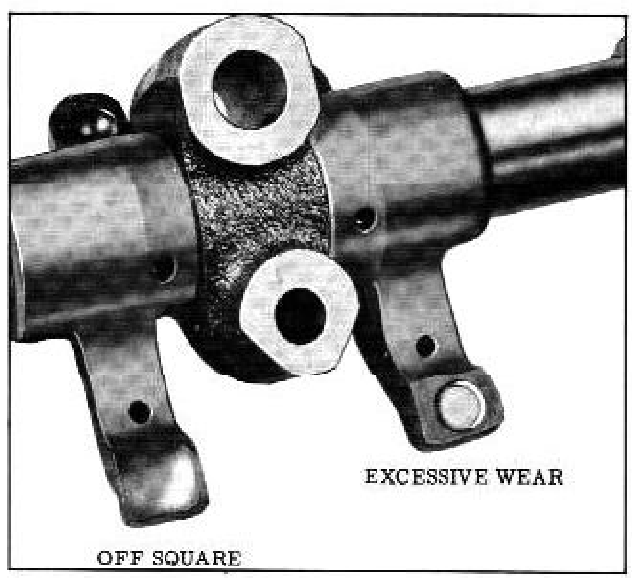


Fig. 8-20 Rocker Arm Wear Patterns

lap valve to seat lightly.

CAUTION: Heavy lapping which results in a groove in the valve face can cause early burning.

6. Valves Noisy Regardless of Engine Speed:

Correction: This condition can be caused by any of the following factors:

a. With transmission in neutral and parking brake on, run the engine at a high speed. If a foreign particle in the lifter is restricting proper operation, this method sometimes proves successful in dislodging the particle. If this method does not quiet the lifter, strike the rocker arm above the push rod with a mallet while the engine is idling. This method of correction has proven successful for dislodging a foreign particle which is preventing the ball from seating properly.

b. Check for valve lash by turning engine so the piston in that cylinder is on T.D.C. of firing stroke. If valve lash is present, the push rod can be freely moved up and down a certain amount with rocker arm held against valve.

Valve lash indicates one of the following:

(1) Worn push rod.

(2) Worn rocker arm.

(3) Lifter plunger stuck in down position due to dirt or varnish.

(4) Defective lifter.

CHECKING OF THE ABOVE FOUR ITEMS:

Remove the rocker arm shaft assembly then proceed as follows:

1. Observe upper end of push rod. Excessive wear of the spherical surface indicates one of the following conditions:

   (a) Improper hardness of the push rod. The rod must be replaced.

   (b) Improper lubrication to the push rod. The push rod and rocker arm must be replaced. The oiling system to the push rod should be checked.

2. If push rod appears in good condition and has been properly lubricated, replace rocker arm and recheck valve lash.

3. & 4. If valve lash exists and push rod and rocker arm are satisfactory, trouble is in lifter. Lifter should be rebuilt, or replaced if necessary.

RAISING FRONT OF ENGINE

When removing the exhaust manifold, oil pan, front cover or the engine front mount, the front of the engine must be raised to provide clearance. This is accomplished as follows:

1. Remove the engine front mount to front cross member attaching nuts. On cars equipped with air conditioning, disconnect the fan ring.

2. Remove the threaded bolt of Tool J-8568 from the support plate. Feed the support plate through the large opening in the underside of the front cross member. Align the hole in the support plate with the center hole in the front cross member.

   NOTE: Attach a chain 18 to 24 inches long to Tool J-8568 to aid in positioning the Tool in and out of the front cross member. (Inset, Fig. 8-21)

3. Insert the threaded bolt into the support plate. Rotate the threaded bolt until it contacts the engine front mount. (Fig. 8-21). Raise engine until proper clearance is obtained.

   NOTE: When raising engine, do not allow rear of engine or engine components to contact the cowl.

4. When removing the engine front cover or the engine front mount, raise the engine to the desired height then insert wood blocks between the exhaust manifolds and the front cross member. Lower engine until the engine is supported by the wood blocks. The threaded bolt can now be lowered away from the engine front mount.

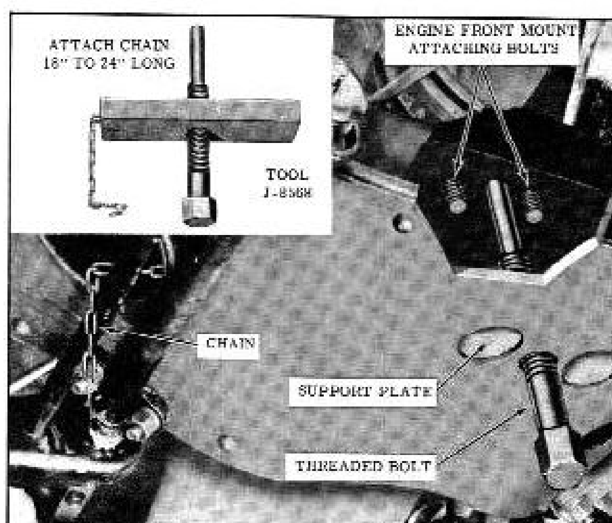


Fig. 8-21 Raising Front Of Engine

After the service operations have been performed, lower the engine. Remove the threaded bolt from the support plate then pull the plate out of the cross member. Install the fan ring (if so equipped) and the engine mount nuts. Torque nuts 45 to 50 ft. lbs.

OIL PAN AND PUMP

OIL PAN

Remove

1. Position No. 1 piston on bottom of stroke. This moves the No. 1 and No. 2 crankshaft counterweights out of the way to aid in pan removal and installation.
2. Disconnect battery cable.
3. On cars equipped with single exhaust systems, remove the exhaust crossover pipe.
4. Disconnect idler arm support from frame.
5. Remove attaching bolts, and position starter away from engine.
6. Remove the 2 engine front mount attaching nuts. Raise engine with Tool J-8568. (Refer to RAISING FRONT OF ENGINE.)
7. Drain oil from pan, then remove pan.

   NOTE: Holes are provided in the frame cross member for access to the front oil pan bolts.
8. Clean oil pan. Use Methyl Chloroform to clean old sealer from pan.

Install

1. Apply P.O.B. No. 3 sealer to the bottom side of new fiber gaskets and install gaskets on pan.
2. Install new front and rear synthetic rubber seals on oil pan. Apply a light coat of P.O.B. No. 3 sealer to exposed surfaces of seals, to insure that seals do not hang up on the front main bearing cap and rear main bearing sealing surfaces during oil pan installation.
3. To install oil pan reverse removal procedure making sure that all seals are in position before pan is tightened.
4. Torque oil pan bolts evenly 10 to 18 ft. lbs.
5. Lower engine. (Refer to RAISING FRONT OF ENGINE).

OIL PUMP

Remove and Install

1. Remove oil pan. (Refer to OIL PAN - Remove)
2. Remove the 2 oil pump to rear main bearing cap attaching screws, then remove pump and drive shaft extension.

To install, insert the drive shaft extension through the opening in the block until the shaft

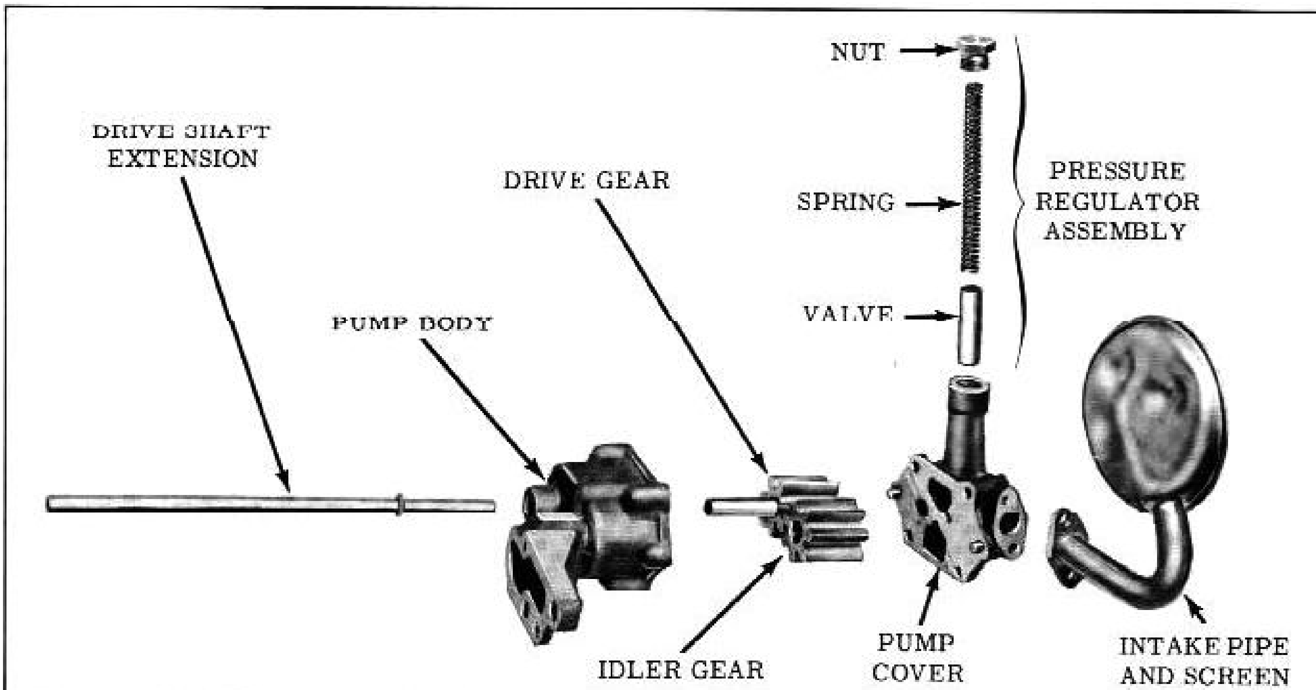


Fig. 8-22 Oil Pump Assembly

mates into the distributor drive gear. Position pump onto the rear main bearing cap, torque the attaching bolts 22 to 26 ft. lbs. Install oil pan. (Refer to OIL PAN - Install)

OIL PUMP—DISASSEMBLE (Fig. 8-22)

1. Remove the oil pump drive shaft extension.

   NOTE: Do not attempt to remove the special washers from the drive shaft extension. The drive shaft extension and special washers must be serviced as an assembly.

2. Remove the intake pipe and screen.
3. Remove the pressure regulator nut, spring and valve.
4. Remove the 4 oil pump cover attaching screws and remove the oil pump cover.
5. Remove the drive gear and idler gear from the pump body.

CLEANING AND INSPECTION

1. Wash all parts in clean solvent and blow out passages with compressed air.
2. Inspect all moving parts for scoring. Small imperfections can be cleaned up with a fine hone.
3. Check pressure relief valve clearance in bore. Clearance should be .0025" to .005". Too much clearance can affect oil pressure at idle. (The oil pressure warning light on the instrument panel is calibrated to light when oil pressure is less than 3 lbs.)
4. Check end clearance of gears. End clearance of gears should be .0025" to .008".

ASSEMBLY

1. Install the drive gear into the pump with the hex I.D. of the drive shaft toward the oil pump mounting pad.
2. Install the idler gear and the oil pump cover. Tighten the cover screws 5 to 8 ft. lbs.
3. Position the pressure regulator valve into the pump cover, closed end first, then install spring and nut. Tighten nut 35 to 40 ft. lbs.
4. Install the intake pipe and screen with screen facing away from the pump mounting pad. Tighten screws 4 to 7 ft. lbs.

   IMPORTANT: When assembling the drive shaft extension to the drive shaft, the END OF THE EXTENSION NEAREST THE SPECIAL WASHERS MUST BE INSERTED INTO THE DRIVE SHAFT.

CONNECTING ROD AND PISTON ASSEMBLY

Two types of pistons are used. Pistons used in the regular fuel engine are a dished type while the pistons used in the premium fuel engine are flat.

ROD AND PISTON ASSEMBLY—REMOVE

1. Remove cylinder head or heads.
2. Remove oil pan.

   IMPORTANT: If more than one piston and rod assembly is to be removed, the corresponding cylinder number should be stamped on the machined surfaces of the connecting rod and cap (on side opposite spit hole) for identification when reinstalling. If the pistons are to be removed from the connecting rod, mark but DO NOT STAMP cylinder number on piston.

   CAUTION: To prevent damage to the rods, the stamping operation must be performed while the connecting rods are still attached to the crankshaft.

3. Remove the ridge at the top of the cylinder bore before attempting to remove the piston and rod assembly.
4. After removing bearing caps and bearings, place guide Tool BT-22 over the threads of

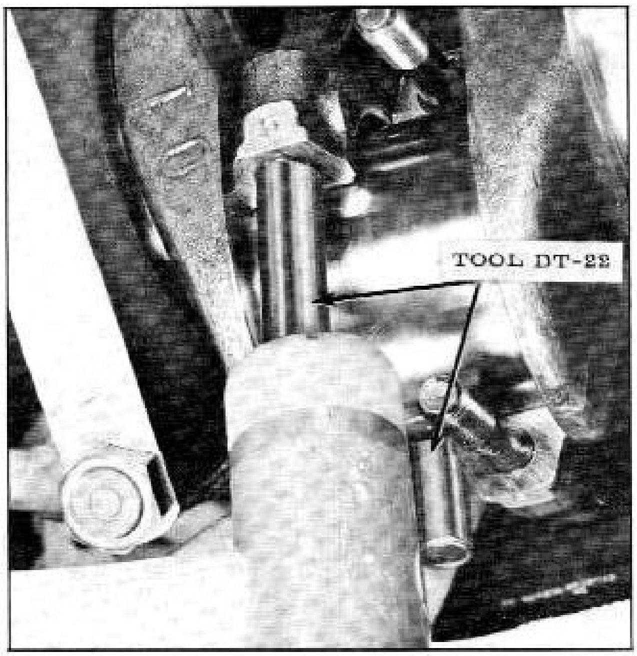


Fig. 8-23 Connecting Rod Removal

connecting rod bolts to prevent damaging the bearing journals, then tap rod and piston assembly through the top of the cylinder bore. (Fig. 8-23) Pistons should only be removed from the top of the cylinder block.

CYLINDER BORE

Cylinder bore size can be measured with inside micrometers. Maximum allowable taper of the cylinder bore is .010".

Reconditioned cylinder bores should be held to not more than .001" out of round and .001" taper (larger at the bottom).

It is important that reconditioned cylinder bores be thoroughly washed with a large brush and a soap and water solution to remove all traces of abrasive material to eliminate rapid wear.

CLEANING PISTON

Clean the pistons by scraping carbon off the top of the piston and immerse the pistons in a solvent. Deposits in the ring grooves can be removed by using a broken piston ring or a suitable groove cleaning tool.

MEASURING PISTON (Fig. 8-24)

When measuring piston for size or taper, measurement must be made on skirt 90° from piston pin hole (with the piston pin removed).

When measuring taper, the largest reading must be at the bottom of the skirt. Allowable taper is .000" to .001".

NOTE: On some cars oversize pistons may be found. These pistons will be either .005" or .010" oversize.

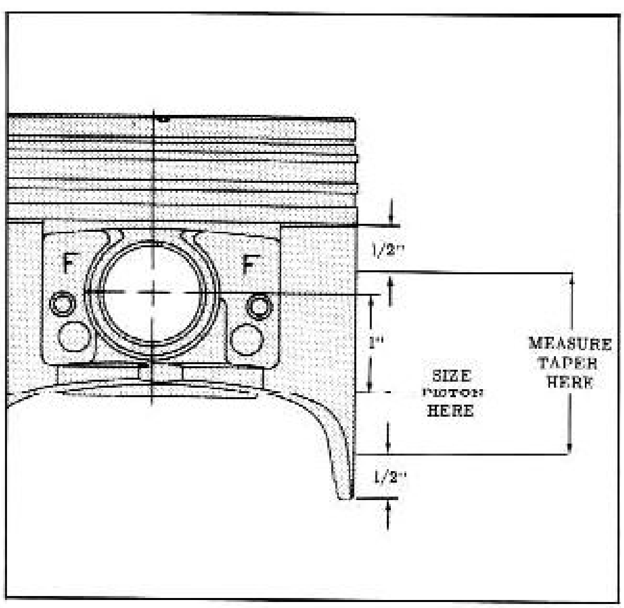


Fig. 8-24 Measuring Piston

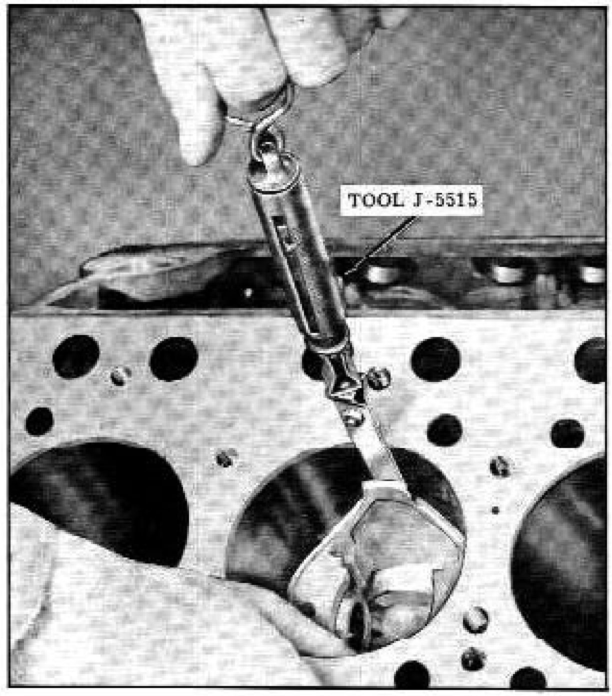


Fig. 8-25 Fitting Piston to Cylinder

FITTING PISTON

NOTE: The piston and cylinder bore must be free of oil and at the same temperature.

1. Place a 1/2" x 12" x .0015" ribbon attached to scale J-5515 against the upper side of the bore, at 90° to the normal piston pin location. (Fig. 8-25)

2. Insert piston (with pin and rings removed) into bore with head downward.

3. While holding the piston in the center of its normal travel, slowly pull the scale in a straight line and note the reading on the scale. The reading should be 3 to 12 pounds.

Each piston should be fitted to its individual cylinder and marked for that cylinder.

PISTON PIN

Piston pins are available in three sizes: Standard, .001", and .003" oversize. Honing of the piston pin hole for installation of oversize pins is the most satisfactory method of sizing.

The correct piston pin fit in the piston and in the connecting rod is .0003" to .0005" loose. If the pin to piston clearance is to the high limit (.0005"), the pin can be inserted in the piston with very little hand pressure. The pin will fall through the piston by its own weight. If the pin to piston clearance is to the low limit, .0003", very little hand pressure will be required to insert the pin into the piston. The pin will not slide through the piston by its own weight. It is important that both the pin and piston pin hole be clean and free of oil when checking pin fit, and that the piston pin hole is not more than .0005" out of round.

Whenever the replacement of a piston pin is necessary, the size pin required should be determined by trying standard, .001" or .003" oversize pins.

CONNECTING ROD BUSHINGS

In rod bushing replacement, the bronze bushing after having been pressed into the rod should be burnished and then finished to size with a hone.

The fit of the piston pin in the connecting rod bushing should be .0003" to .0005" loose.

CHECKING CONNECTING ROD

After the connecting rods and pistons are separated, the rods should be checked for alignment. If a rod is twisted or bent, a new rod must be installed. NO ATTEMPT SHOULD BE MADE TO STRAIGHTEN CONNECTING RODS.

ROD AND PISTON—ASSEMBLY

Lubricate piston pin hole and piston pin to facilitate installation of pin, then position connecting rod with its respective piston as shown in Fig. 8-26. Install piston pin and pin retainers.

RINGS

The pistons have three rings (two compression rings and one oil ring). Production rings are supplied from two sources and are of similar design. On both types of rings the outside diameter of the top compression ring is chrome plated, the second compression ring is of the step type and has a black finish. Both types of oil rings consist of 2 rails and an expander.

To determine which make of production rings

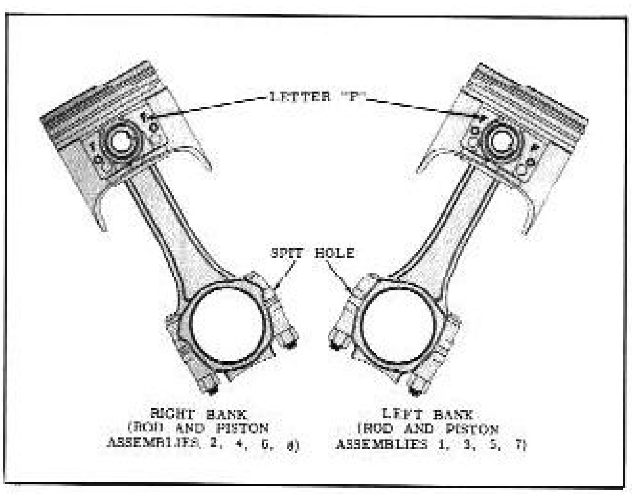


Fig. 8-26 Assembly of Rod to Piston

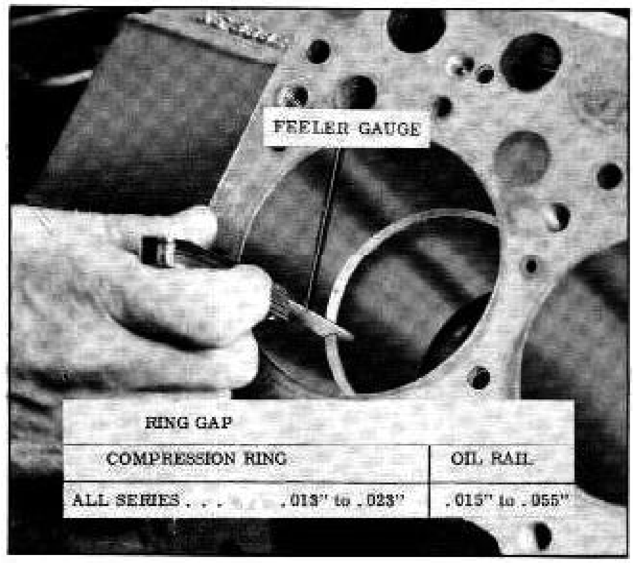


Fig. 8-27 Checking Ring Gap

were installed in the engine, the following identification may be observed: Sealed Power compression rings have a "dimple" and/or T marked on the top of the rings. Perfect Circle compression rings have the word "TOP" marked on the top of the rings.

RING TOLERANCES

When installing new rings, ring gap and side clearance should be checked as follows:

Piston Ring and Rail Gap

Each ring and rail gap must be measured with the ring or rail positioned squarely and at the bottom of the ring-travel area of the bore. (Fig. 8-27)

If the gap measurement is not within the specifications shown in Fig. 8-27, file the ends of rings and rails until the minimum gap is obtained. Ends of rings and rails must be filed square.

Side Clearance

Each ring must be checked for side clearance (see chart) in its respective piston groove by inserting a feeler gauge between the ring and its upper land. (Fig. 8-28) The piston grooves must be cleaned before checking ring for side clearance.

NOTE: To check oil ring side clearance, the oil rings must be installed on the piston.

ALLOWABLE SIDE CLEARANCE

Oil Rings	.0005" to .007"
Compression Rings	.001" to .004"

RING INSTALLATION

IMPORTANT: For service ring specifications

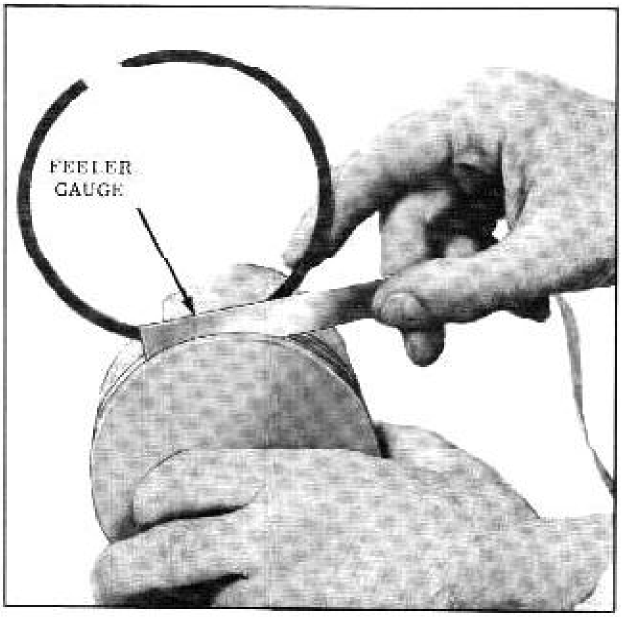


Fig. 8-28 Checking Side Clearance

and detailed installation instructions, refer to the instructions furnished with the parts package.

ROD AND PISTON ASSEMBLY—INSTALL

When installing piston and connecting rod assemblies, Connecting Rod Bolt Guide Tool BT-22 should be placed over the connecting rod bolt threads to protect the crankshaft bearing surfaces.

Apply SAE No. 20 oil to rings and piston, then install the rod and piston assemblies in their respective bores so the notch, cast in the top of each piston will be toward the front of the engine after installation.

NOTE: The piston can be installed in the piston bore without danger of breaking the piston rings if Tool J-8037 or a similar ring compressing tool is used. (Fig. 8-29)

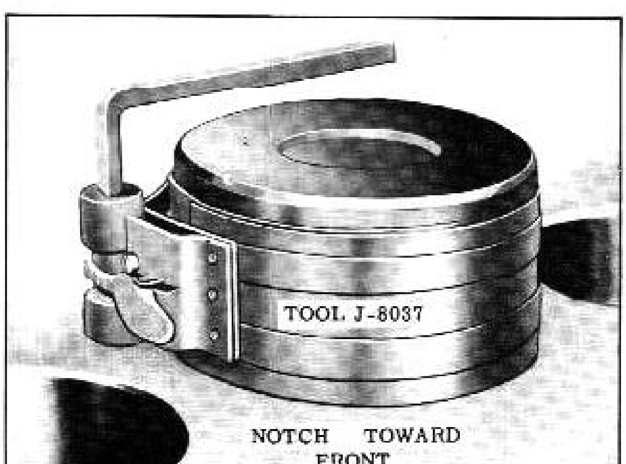


Fig. 8-29 Installing Piston Assembly

Install connecting rod caps with bearing index notches in rod and cap on same side.

The connecting rod cap attaching nuts should only be tightened enough to keep each rod in position until all piston and rod assemblies have been installed. This will facilitate installation of the remaining piston assemblies.

The clearance between the adjacent rods on each crankpin should be from .002" to .011" when checked with a feeler gauge.

Torque rod bearing cap nuts 38 to 48 ft. lbs.

CONNECTING ROD BEARINGS—REPLACE

The removable steel backed aluminum insert type connecting rod bearing shells are assembled with a slight projection above the rod and cap faces to insure a positive contact. Adjustment for wear, such as installing shims behind the shells should NEVER be practiced. WORN BEARINGS MUST BE REPLACED.

Connecting rod bearings can be replaced without removing the rod and piston assembly from the engine.

1. Remove oil pan.
2. With connecting rod journal at approximately bottom center, remove both bearing caps.

   NOTE: Before removing bearing caps, stamp cylinder number on machined surfaces of connecting rod and cap for identification when reinstalling.

3. Inspect journals for roughness and wear. Slight roughness may be removed with a fine grit polishing cloth saturated with engine oil. Burrs may be removed with a fine oil stone. If the journals are scored or ridged, the crankshaft must be replaced or reground.
4. The connecting rod journals can be checked for out-of-round with the use of a 2" to 3" micrometer. Maximum out-of-round must not exceed .0015".
5. Clean oil from journal, bearing cap connecting rod and outer and inner surface of bearing inserts.
6. Place a piece of "Plastigauge" in the center of lower bearing shell.
7. Reinstall bearing cap and torque 38 to 48 ft. lbs.
8. Remove bearing cap and determine bearing clearances by comparing the width of the flattened "Plastigauge" at its widest point with the graduation on the "Plastigauge" container. The number within the graduation on

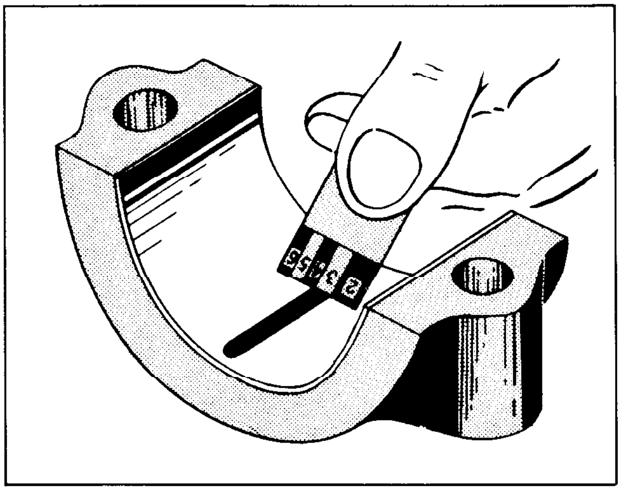


Fig. 8-30 Checking Bearing Clearance

the envelope indicates the clearance in thousandths of an inch. (Fig. 8-30) If this clearance is greater than .0035", replace the bearing and recheck clearance with "Plastigauge".

NOTE: Lubricate bearing with SAE 20 oil before installation. Repeat steps 2 thru 8 on remaining connecting rod bearings.

All rods must be connected to their journals when rotating the crankshaft.

MAIN BEARINGS

Main bearing clearance must not exceed .0035" on No. 1, 2, 3, and 4 bearings and .0045" for No. 5 bearing. The .0035" and .0045" clearances are permissable only if the engine is disassembled for other than a bearing noise condition. If bearings are noisy or if a visual inspection indicates defective bearings, new bearings must be installed within the specifications outlined under MAIN BEARINGS - REPLACE.

Bearings which fall within the .0035" and .0045" specifications should not be rejected if the bearings show a normal wear pattern or slight radial grooves.

CHECKING BEARING CLEARANCES

1. Remove bearing cap and wipe oil from crankshaft journal and outer and inner surfaces of bearing shell.

   NOTE: To prevent the possibility of raising the metal around the dowel hole in the rear main bearing cap, insert Slide Hammer J-6125 in oil pump mounting screw hole to remove the cap.

2. Place a piece of "Plastigauge" in the center of bearing.

3. Use a floor jack or other means to hold crankshaft against upper bearing shell. This is necessary to obtain accurate clearance readings when using "Plastigauge".

4. Reinstall bearing cap and bearing. Torque 90 to 120 ft. lbs. (Rear bearing cap to be torqued 130 to 160 ft. lbs.)

5. Remove bearing cap and determine bearing clearance by comparing the width of the flattened "Plastigauge" at its widest point with the graduation on the "Plastigauge" container. The number within the graduation on the envelope indicates the clearance in thousandths of an inch. (Fig. 8-30) If this clearance is greater than .0035" for No. 1, 2, 3 or 4 bearings and .0045" for No. 5 bearing, REPLACE BOTH BEARING SHELLS AS A SET. Recheck clearance after replacing shells. (Refer to MAIN BEARINGS - REPLACE).

MAIN BEARINGS—REPLACE

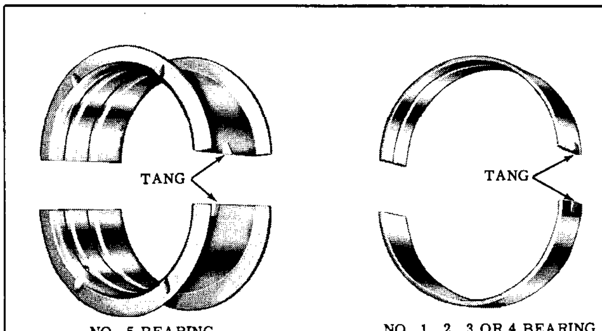
Main bearing clearances not within specifications (.0005" to .0021" for No. 1 and 2 bearings, .0008" to .0024" for No. 3 and 4 bearings and .0020" to .0034" for No. 5 bearing), must be corrected by the use of selective upper and lower shells. (Refer to Fig. 8-31 for selective sizes.) UNDER NO CIRCUMSTANCES should the use of shims behind the shells; to compensate for wear, be attempted.

IMPORTANT: THE UPPER AND LOWER SHELLS MUST BE INSTALLED IN PAIRS.

To install main bearing shells, proceed as follows:

1. Remove bearing cap and remove lower shell.

2. Insert a flattened cotter pin in the oil passage hole in the crankshaft, then rotate the crankshaft in the direction opposite to cranking



IDENTIFICATION (ON SHELL TANG)		THICKNESS
NO. 1 THRU 4	NO. 5	
NONE	NONE	STANDARD
B	A	.0005" UNDERSIZE
C	B	.0010" UNDERSIZE
E	C	.0015" UNDERSIZE

Fig. 8-31 Main Bearing Sizes

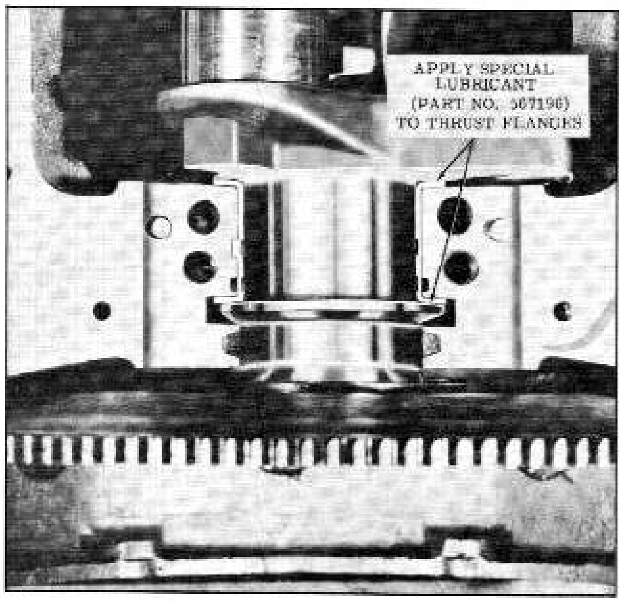


Fig 8-32 Rear Main Bearing

rotation. The cotter pin will contact the upper shell and force it out.

3. The main bearing journals should be checked for roughness and wear. Slight roughness may be removed with a fine grit polishing cloth saturated with engine oil. Burrs may be removed with a fine oil stone. If the journals are scored or ridged, the crankshaft must be replaced or reground.

   NOTE: The journals can be measured for out-of-round with the crankshaft installed by using a crankshaft caliper and inside mircometer. The upper bearing shell must be removed when measuring the crankshaft journals. Maximum out-of-round of the crankshaft journals must not exceed .0015".

4. Clean crankshaft journals and bearing caps thoroughly before installing new main bearings.

5. No. 5 bearing - apply Special Lubricant (Part No. 567196) to the thrust flanges of bearing shells. (Fig. 8-32)

6. Place new upper shell on crankshaft journal with locating tang in correct position and rotate shaft to turn it into place using cotter pin as during removal.

7. Place new lower shell in bearing cap.

8. No. 5 bearing - install new asbestos oil seal in the rear main bearing cap. (See REAR MAIN BEARING OIL SEAL - REPLACE)

9. Install bearing caps. Torque No. 1 thru 4 bearing caps 90 to 120 ft. lbs. and No. 5 bearing cap 130 to 160 ft. lbs.

REAR MAIN OIL SEALS—REPLACE

Rear Main Oil Seal

The rear main bearing is sealed against oil leaks by a special asbestos covered wiper seal. Special care must be exercised when installing this seal.

Whenever the crankshaft is removed, a new seal coated with graphite grease should be installed in the engine block. Whenever the No. 5 bearing cap is removed, a new seal should be installed in the bearing cap. The seal, to be properly installed, should be crowded into the groove in the bearing cap and block by hand, then driven tightly into the groove by tapping Tool 23-18 with a hammer. (Fig. 8-33)

NOTE: To check if seal is fully seated in the bearing cap, slide Tool 23-18 away from the seal. With Tool 23-18 fully seated in the bearing cap, slide tool against the seal. If under cut area of tool slides over the seal, the seal is fully seated. If tool butts against the seal the seal must be driven further into the seal groove.

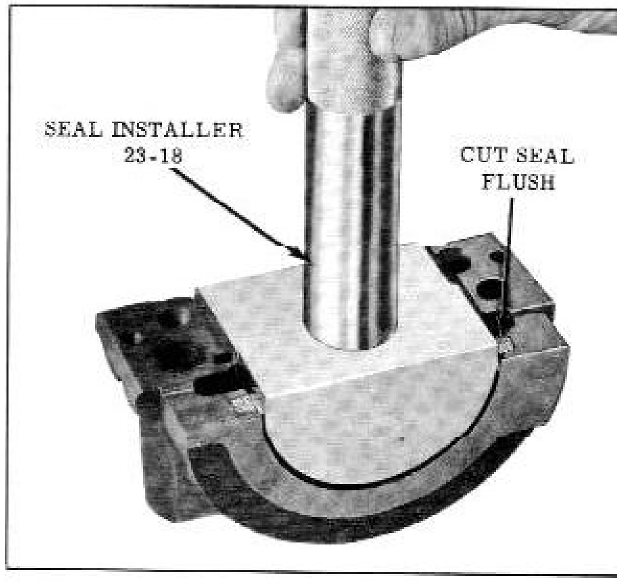


Fig. 8-33 Installing Oil Seal

After the seal has been seated in the bearing cap and while the tool is still resting in the bearing cap, the seal should be cut flush with the parting line between upper and lower bearing. The ends of the seal must be cut clean so no frayed ends will be clamped between the block and cap, and the seal must entirely fill the groove.

Cork Seals

After the rear main bearing cap has been installed, DuPont Cement No. 5402 or equivalent should be wiped in grooves in block on both sides of bearing cap and the two cork seals pressed into place in the grooves. (Fig. 8-34)

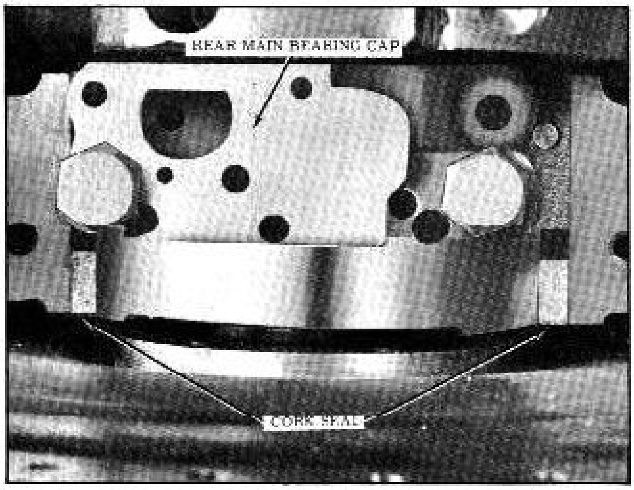


Fig. 8-34 Rear Main Bearing Cork Seals

CRANKSHAFT PULLEY—REMOVE

1. Remove belt(s) from crankshaft pulley.
2. Remove crankshaft pulley bolt and washer.
3. Pull pulley from crankshaft.

When installing crankshaft pulley, apply P.O.B. No. 3 sealer to inside diameter of pulley and to crankshaft key to prevent possible oil leakage. Coat outside area of crankshaft pulley, which enters seal, with Special Seal Lubricant (Part No. 567196). Torque crankshaft pulley bolt 100 ft. lbs. (minimum).

CRANKSHAFT FRONT OIL SEAL

Remove (Fig. 8-35)

The crankshaft front oil seal can be removed without removing the radiator or crankshaft pulley key as follows:

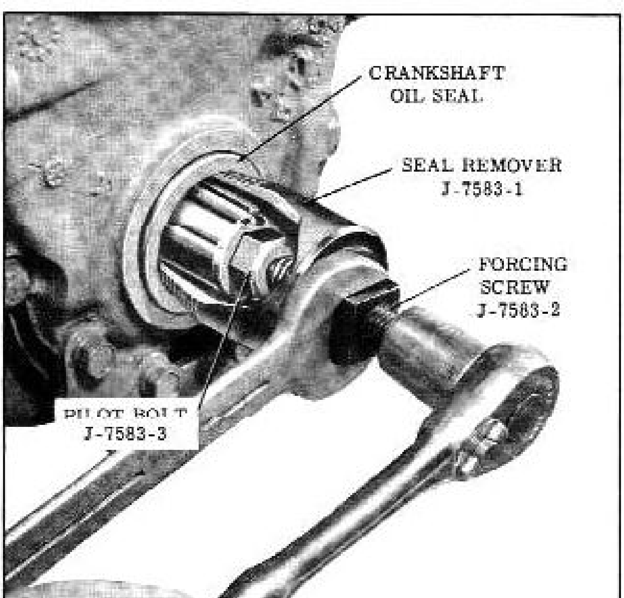


Fig. 8-35 Removing Crankshaft Front Oil Seal

1. Remove crankshaft pulley and thread Pilot Bolt J-7583-3 into end of crankshaft.
2. Thread Tool J-7583-1 into oil seal, then tighten forcing screw J-7583-2 until seal is removed from front cover.
3. Remove oil seal from Tool J-7581-1 and Pilot Bolt J-7583-3 from crankshaft.

Install (Fig. 8-36)

Two types of front oil seals are used. One type of seal is 1/2" thick, the other type is 3/4" thick. Both seals can be installed with Seal Installer J-7584-1, however, Adapter Ring J-7584-2 must be used with the 3/4" seal.

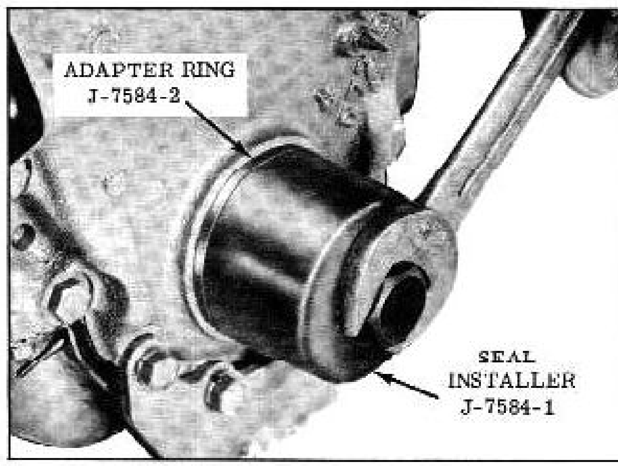


Fig. 8-36 Installing Crankshaft Front Oil Seal

1. Coat outer diameter of a new seal with P.O.B. No. 3 Sealer. Lubricate lips of seal with Special Seal Lubricant (Part No. 567196).
2. Position seal into engine front cover.
3. If a 3/4" thick seal is to be used, Adapter Ring J-7584-2 must be positioned between Seal Installer J-7584-1 and the seal.
4. Position Seal Installer J-7584-1 over seal and thread Forcing Screw J-7584-3 into crankshaft until Seal Installer contacts engine cover.
5. Remove Seal Installer and ring if used.
6. Install crankshaft pulley and belts. Torque pulley bolt 100 ft. lbs. minimum. Tighten belts to gauge line on Tool 33-70.

FRONT COVER—REMOVE AND INSTALL

1. Drain cooling system.

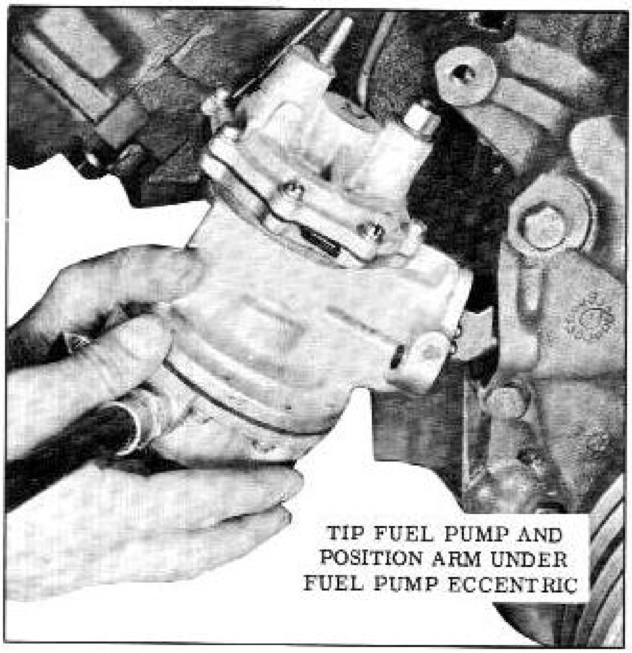


Fig. 8-37 Fuel Pump Installation

2. Disconnect lower radiator hose and heater hose from front cover.
3. Disconnect generator link at generator.
4. Raise front of engine as outlined under RAISING FRONT OF ENGINE.
5. Remove oil pan.
6. Remove fan blades and pulley.
7. Remove crankshaft pulley.
8. Remove distributor cap. Install a jumper wire and crank engine until distributor rotor points toward the cowl, then remove fuel pump assembly.
9. Remove front cover attaching bolts and front cover assembly.

To install, reverse sequence of operations. Tighten belts to gauge line on Tool 33-70.

NOTE: Always install a new front oil seal. Fuel pump rocker arm pad should be coated with Special Seal Lubricant (Part No. 567196). Install fuel pump as shown in Fig. 8-37.

The front cover attaching bolts should be dipped in P.O.B. No. 3 Sealer. Torque 24 to 40 ft. lbs. One side of the fuel and vacuum pump gasket should be coated with a gasket cement such as P.O.B. No. 4.

TIMING CHAIN AND GEARS (WITH FRONT COVER REMOVED)

Whenever the timing gears or chain are to be removed, remove the fuel pump eccentric, then pull the camshaft gear from the shaft. The timing chain can now be removed. To remove the crankshaft gear, tap gear off shaft or if the gear is a tight fit, use a universal puller.

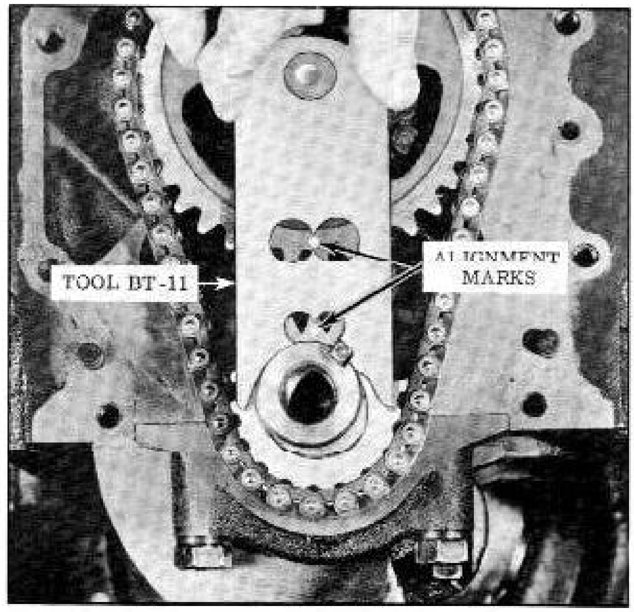


Fig. 8-38 Timing Camshaft

On reassembly, apply P.O.B. No. 3 Sealer to crankshaft key, then install the gears and timing chain so the correct valve timing is obtained. Alignment marks on timing chain gears must index with pointers on Gauge BT-11. (Fig. 8-38) Install fuel pump eccentric with the cupped side out and torque attaching cap screws 14 to 22 ft. lbs. Lubricate end of camshaft plunger with Special Lubricant (Part No. 567196).

EXTERNAL METHOD OF CHECKING VALVE TIMING

1. Remove L.H. valve cover.

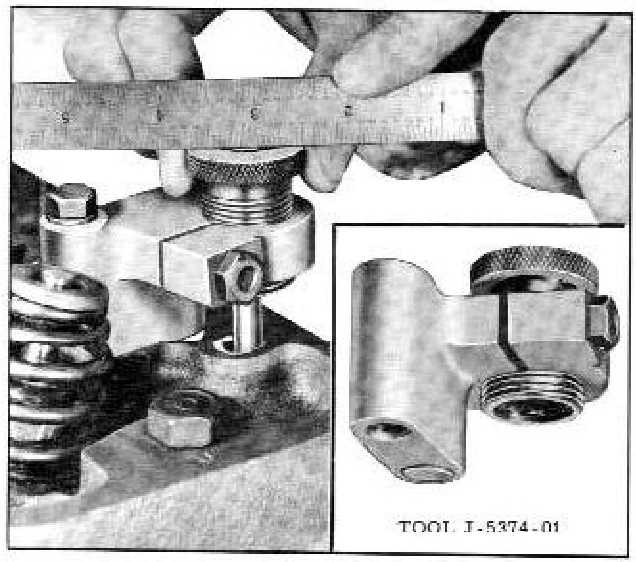


Fig. 8-39 External Method of Checking Valve Timing

2. Install jumper wire and crank engine until timing pointer on engine front cover indexes with the 0^{o} mark on the harmonic balancer. If both valves of No. 1 cylinder are closed the piston will be on top dead center of the firing stroke. If valves are not closed, crank engine one complete revolution to put piston on top dead center of firing stroke.

3. Remove rocker shaft assembly on the left hand cylinder head.

4. Install Tool J-5374-01 in place of rear rocker shaft bracket with step plunger over No. 7 cylinder exhaust push rod (rearmost push rod).

5. Screw main body of gauge down so the step plunger contacts the push rod and the small diameter of the step plunger is flush with the

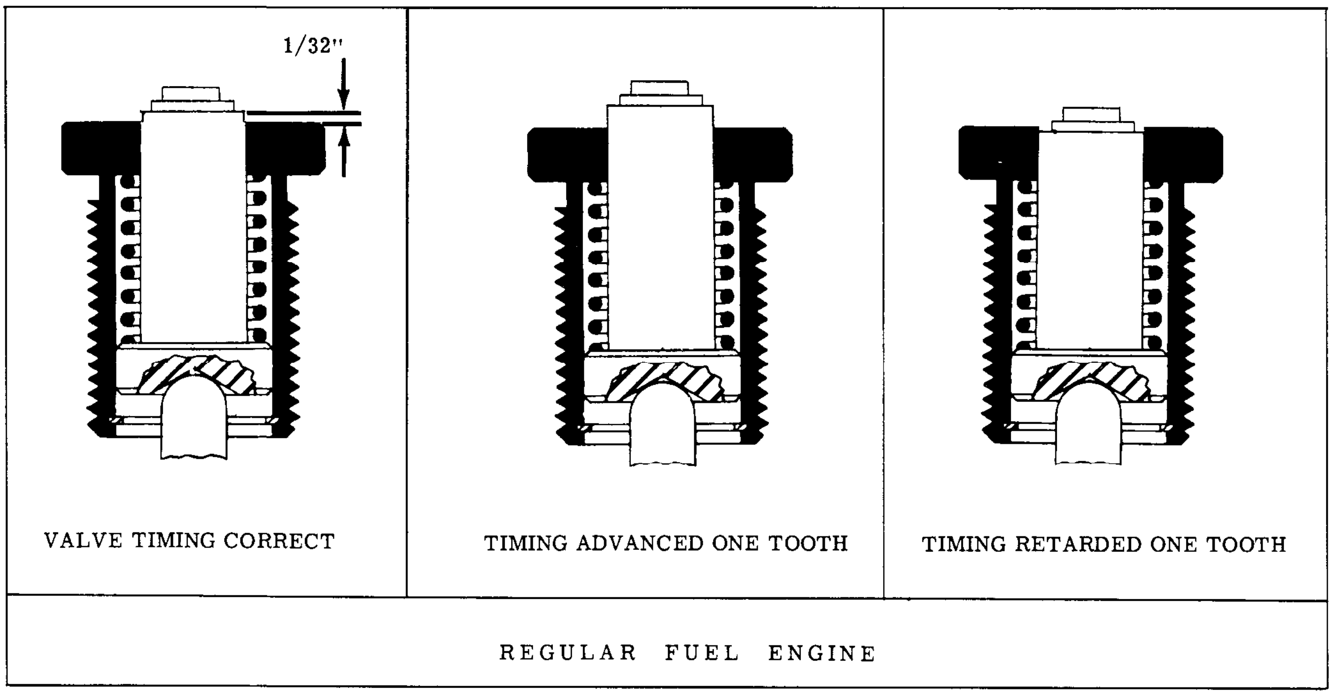


Fig. 8-40 Engine Valve Timing

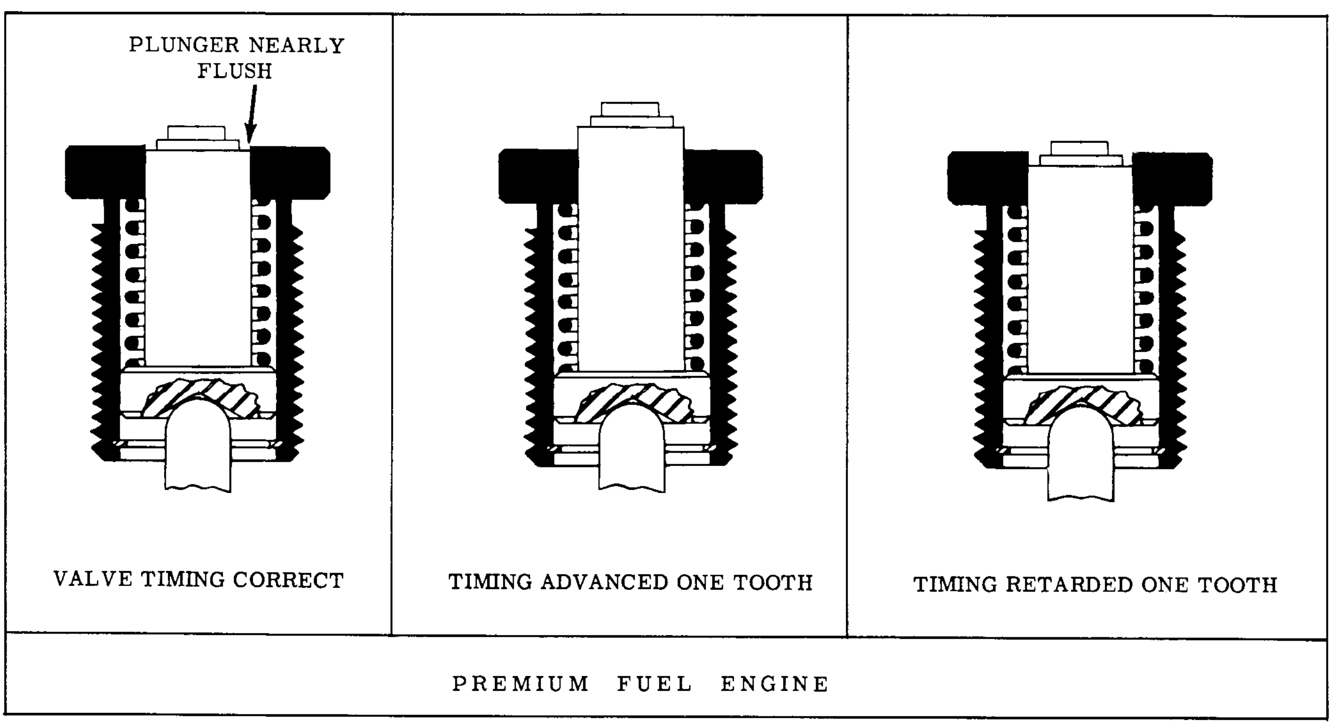


Fig. 8-41 Engine Valve Timing

top of the main body as shown in Fig. 8-39. Tighten clamp bolt.

6. Crank the engine ONE complete revolution so that No. 1 cylinder is again on top dead center (beginning of intake stroke). Refer to Fig. 8-40 or 8-41 for interpretation of the valve timing.

CAMSHAFT AND CAMSHAFT BEARINGS

The camshaft used on the regular fuel engine differs from the camshaft used on the premium fuel engine and can be identified by the step on the thrust flange. (Fig. 8-42)

CAMSHAFT

Remove and Install

1. Drain cooling system.
2. Remove oil cooler lines and radiator hoses.
3. If equipped with air conditioning, remove condenser. Disconnect fan ring.
4. Remove radiator upper support and radiator.
5. Remove air cleaner.
6. Remove rocker arm covers then remove the rocker arm shaft assemblies and push rods.
7. Disconnect fuel and vacuum lines, then remove intake manifold.
8. Remove distributor.
9. Remove engine top cover and valve lifters.

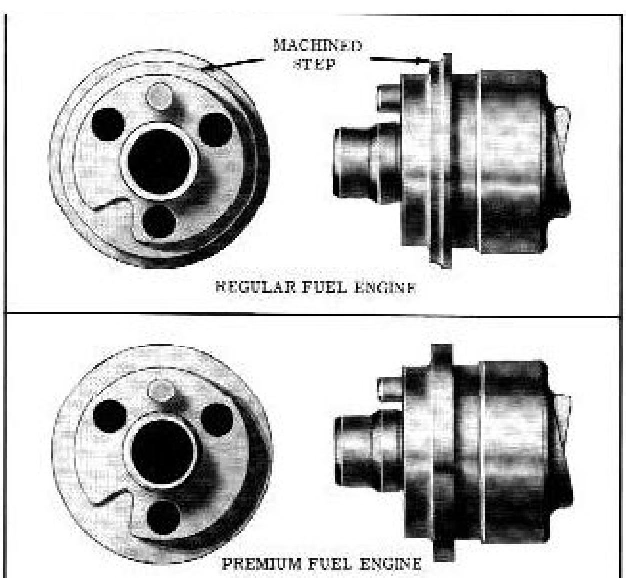


Fig. 8-42 Camshaft Identification

10. Raise engine then remove oil pan.
11. Remove crankshaft pulley, fuel pump and engine front cover.
12. Remove camshaft plunger assembly, fuel pump eccentric, camshaft sprocket and timing chain.
13. Remove camshaft by CAREFULLY sliding it out from the front of the engine.

Before installing the camshaft, it is important that the camshaft be lubricated liberally with engine oil mixed with G.M. Concentrate, Part No. 582099. To install the camshaft, reverse the removal procedure.

CAMSHAFT BEARINGS

Whenever it is necessary to replace a camshaft bearing ALL THE BEARINGS must be replaced. Service replacement bearings do not require line reaming.

Remove—(Camshaft Removed)

1. Assemble tools as shown in Fig. 8-43 (Inset "A") and remove No. 1 camshaft bearing by driving it rearward. Remove old bearing from J-4476-27 and repeat procedure on No. 2 bearing.
2. Assemble tools as shown in Fig. 8-43 (Inset "B") and remove No. 3 bearing. Remove old bearing from J-4476-27 and repeat procedure on No. 4 bearing.
3. To remove No. 5 bearing proceed as follows:
   a. Assemble tools as shown in Fig. 8-44.
   b. Insert tool into block with the fingers of remover J-4476-9 behind No. 5 camshaft bearing. Spread fingers of remover by tightening the set screw.

      CAUTION: Use care to prevent dislodging the plug in the rear of the block.

   c. Turn handle J-4476-20 clockwise until No. 5 bearing is removed.
   d. Remove bearing from Remover J-4476-9 and remove Tool set-up from engine.

Install

Camshaft bearings must be installed with the outside chamfer toward the rear of the engine. Position bearing with parting line at top center to assure alignment of the bearing oil holes with the oil passages in the block.

CAUTION: Be sure the camshaft bearings are installed exactly as outlined in the installation

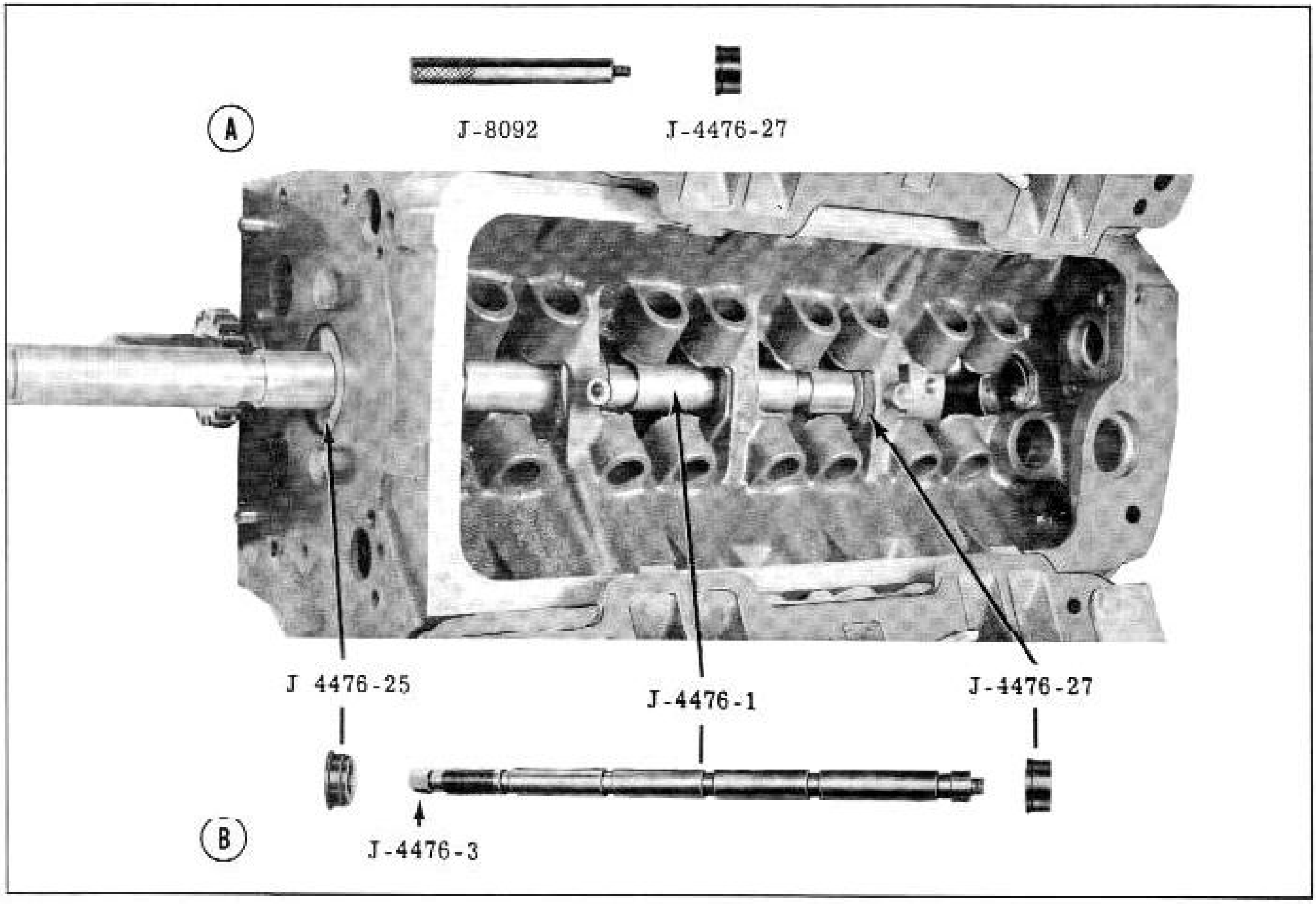


Fig. 8-43 Removing No. 4 Camshaft Bearing (Typical of 1, 2, and 3)

procedure, as the bearings must be positioned in proper relationship to the camshaft bearing surfaces. If a bearing is installed too far forward or rearward in the web of the block, it is possible for the camshaft to wear a groove into the bearing and restrict the oil passage through the cam bearings.

After a bearing is installed, check alignment of the oil hole in the bearing and the oil hole in the block with a 1/8" rod.

1. To install No. 5 camshaft bearing proceed as follows:
   a. Assemble tools as shown in Fig. 8-45 and insert into engine block so that Installer J-4476-27 is past the No. 4 bearing opening.
   b. Position a new bearing on Installer J-4476-27, and insert tool and bearing in No. 5 bearing opening.
   c. Drive bearing into the bearing opening until Horseshoe Spacer J-4476-26 contacts Tool J-4476-25. This will correctly position the No. 5 bearing laterally.

      CAUTION: Be sure spacer J-4476-26 remains in place during bearing installation. If spacer should become mispositioned, it is possible to drive out the plug in the rear of the cylinder block. If the plug is loosened, the flywheel must be removed in order to install a new plug.
   d. Remove Installer from No. 5 bearing and check oil hole alignment.
2. After the No. 5 bearing is in place, install the No. 4 bearing as follows:
   a. Assemble tools as shown in Fig. 8-46.
   b. Position a new bearing on Installer J-4476-27 and drive bearing until Tools J-4476-29 and J-4476-26 are driven tight against J-4476-25. This will correctly position the bearing laterally.
   c. Remove Installer from bearing and check upper and lower oil hole alignment.
   d. Repeat steps b. and c. on No. 3, then No. 2 bearing.

      NOTE: When installing No. 2 bearing, Pilot J-4476-28 is not used. After bearing is installed, check upper and lower oil hole alignment.
3. To install No. 1 bearing proceed as follows:

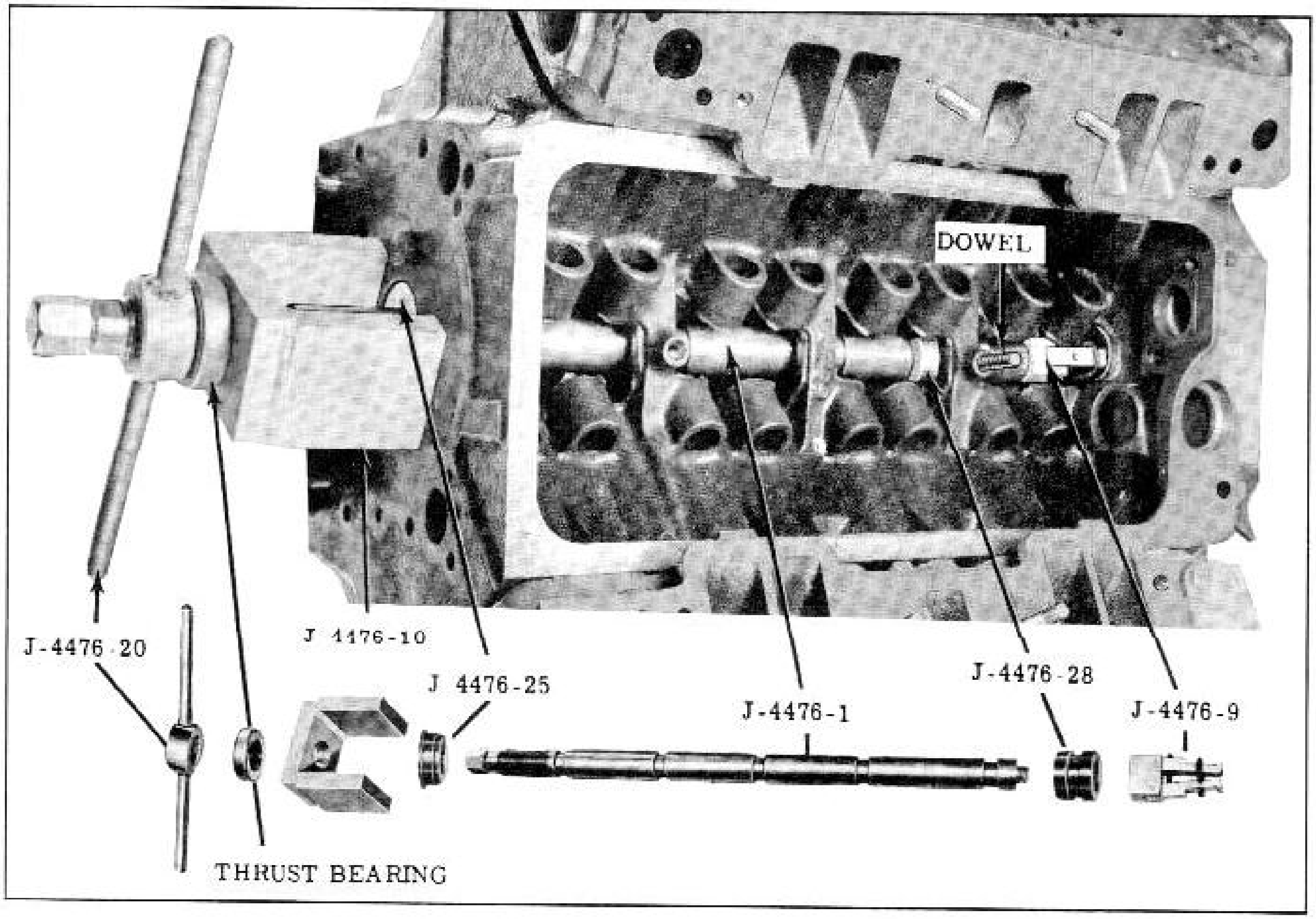


Fig. 8-44 Removing No. 5 Camshaft Bearing

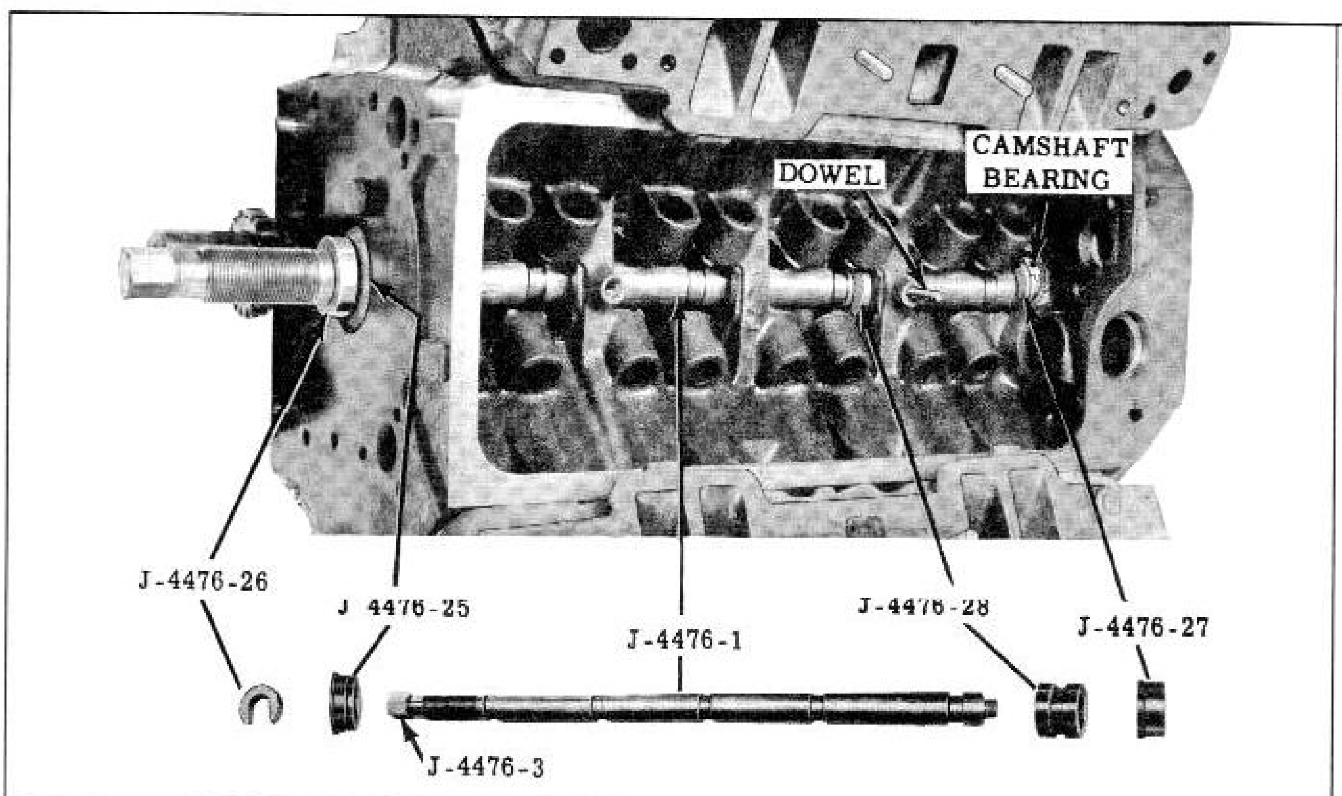


Fig. 8-45 Installing No. 5 Camshaft Bearing

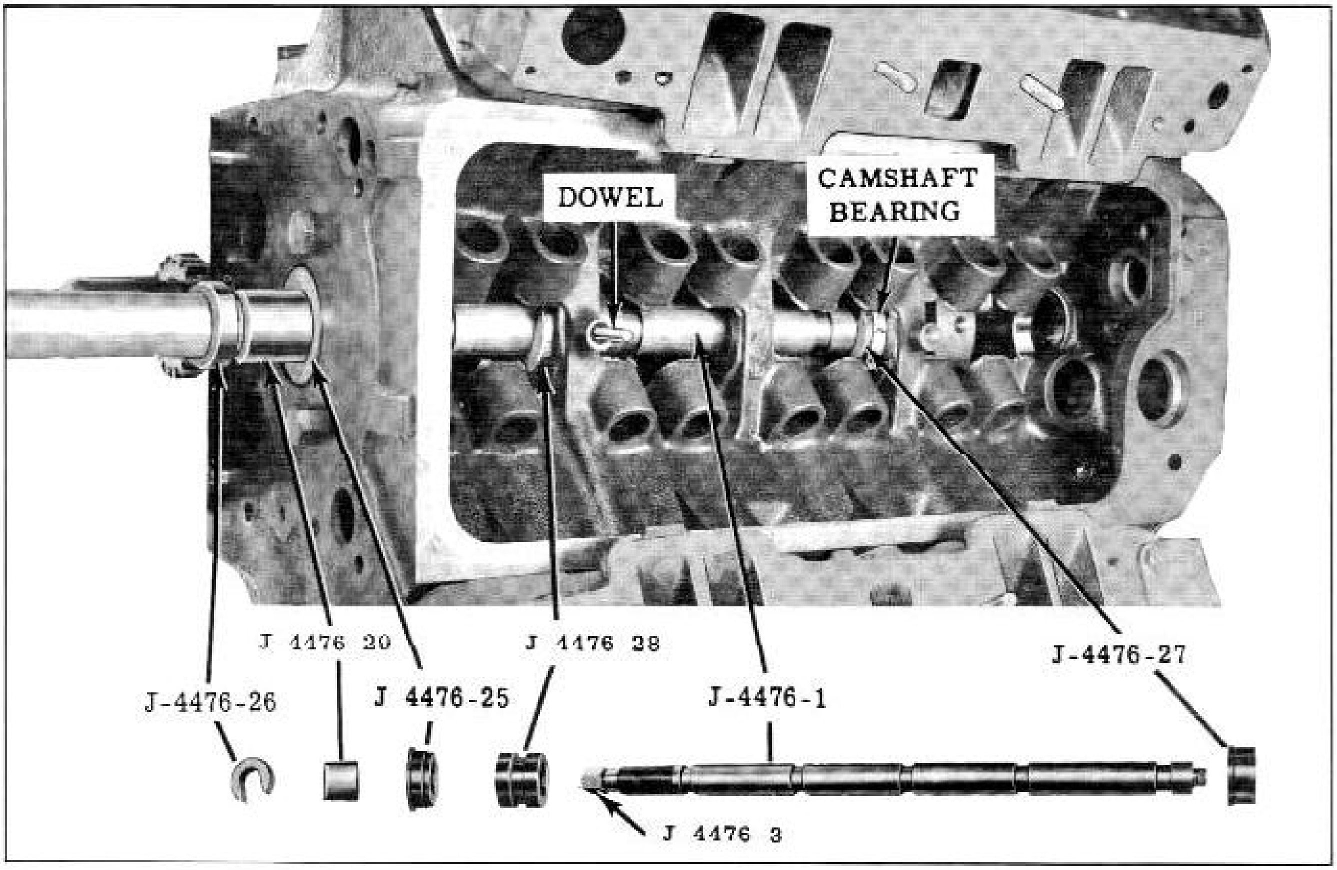


Fig. 8-46 Installing No. 4 Camshaft Bearing (Typical of 3 and 2)

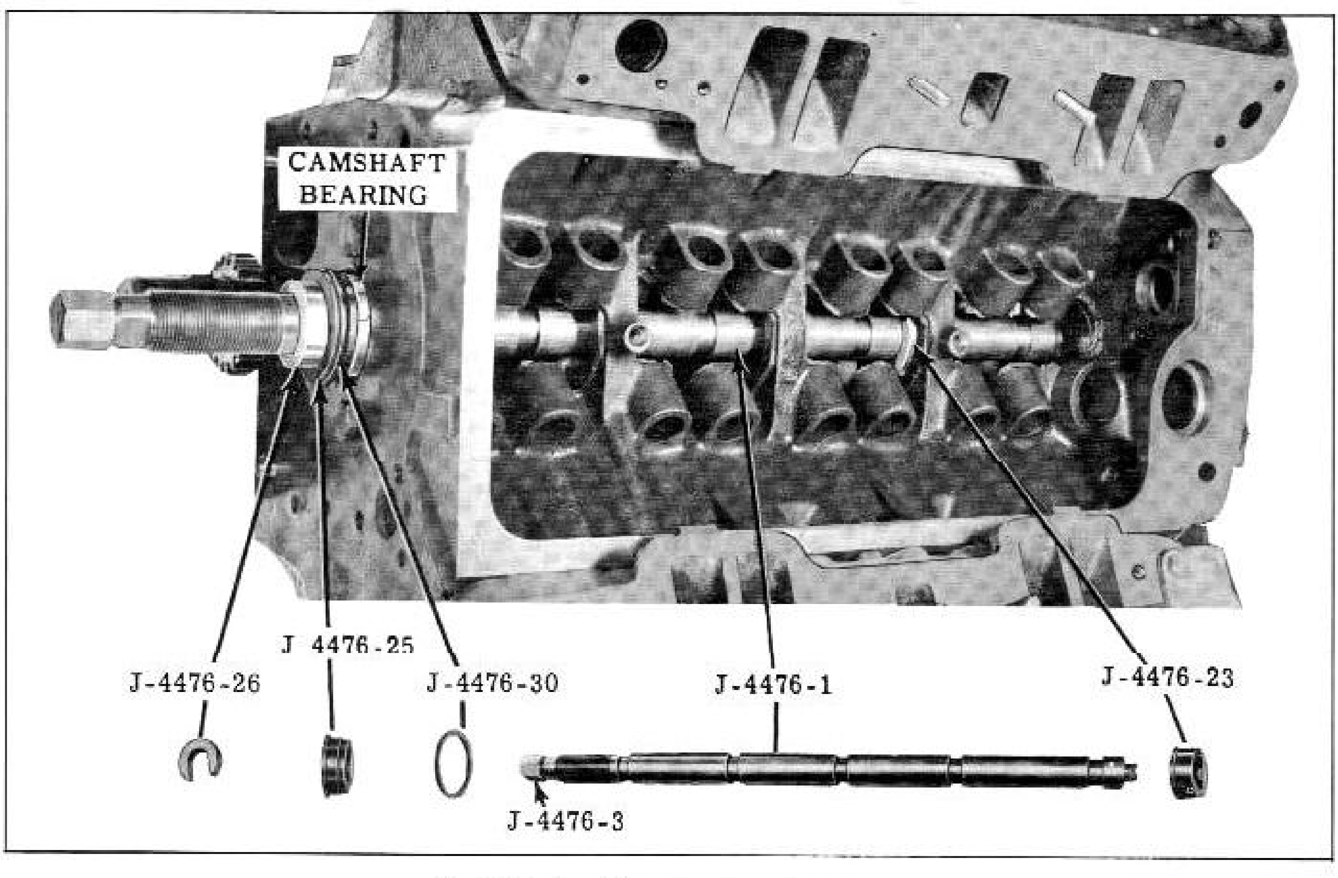


Fig. 8-47 Installing No. 1 Camshaft Bearing

a. Assemble tools as shown in Fig. 8-47.

b. Install Pilot J-4476-23 in No. 4 camshaft bearing.

c. Install a new bearing on Installer J-4476-25 and drive bearing until tool J-4476-30 and J-4476-26 are driven tight against Tool J-4476-25. This will correctly position No. 1 bearing, laterally. Check oil hole alignment.

LOWER FLYWHEEL HOUSING ALIGNMENT

(CLUTCH HOUSING REMOVED)

Lower flywheel housing alignment is rarely required; however, if a new lower housing is used, alignment should be checked.

Misalignment is evident as a "step" between the engine block and the lower housing resulting from the location of the housing too far forward or rearward on the block. (Fig. 8-48) This condition can be corrected by elongating the dowel holes so as to allow the lower housing to move to the rear or to the front as required.

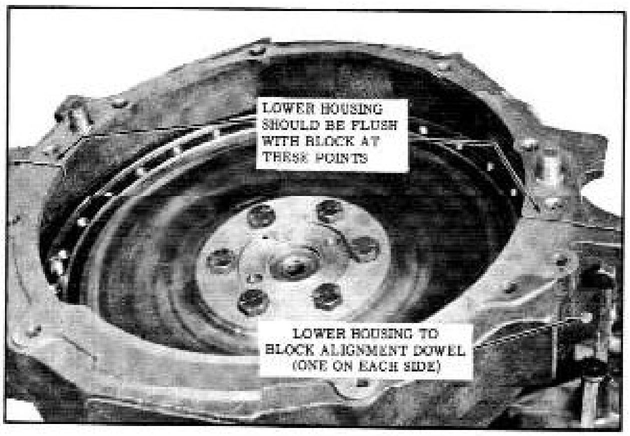


Fig. 8-48 Checking Lower Housing Alignment

NOTE: Do not remove dowel pins or enlarge dowel pin holes with an oversize drill, as correct sidewise location of lower housing must be maintained for proper engagement of starter pinion and ring gear.

CRANKSHAFT PILOT BEARING (SYNCRO-MESH)

On Syncro-Mesh equipped cars a Durex pilot bearing is located in a bore in the rear end of the crankshaft and is held in place by a sheet metal retainer pressed in the crankshaft.

When removing the pilot bearing, pry out the bearing retainer with a screwdriver, then remove the bearing with Pilot Bearing Puller J-1448-1. (Fig. 8-49) All old lubricant in the the reservoir

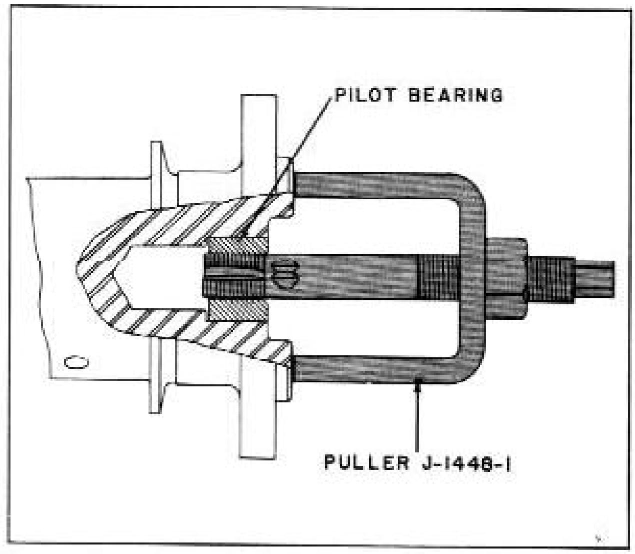


Fig. 8-49 Pilot Bearing Removal

hind the bearing should be removed.

Install the new bearing using Tool J-4530-1 (Fig. 8-50) Apply a light coat of P.O.B. No. 3 Sealer to rim of retainer then install retainer as shown in Fig. 8-51. Add 1/4 ounce (level tablespoonful) of front wheel bearing grease to the reservoir.

DAMPER PLATE

Remove and Install

1. Remove Hydra-Matic transmission.

2. Remove the six damper plate to flywheel attaching cap screws and remove damper. (Fig. 8-52)

To install, position damper with hub of damper toward the crankshaft and reverse the removal procedure. Torque the damper to crankshaft attaching cap screws 55 to 65 ft. lbs.

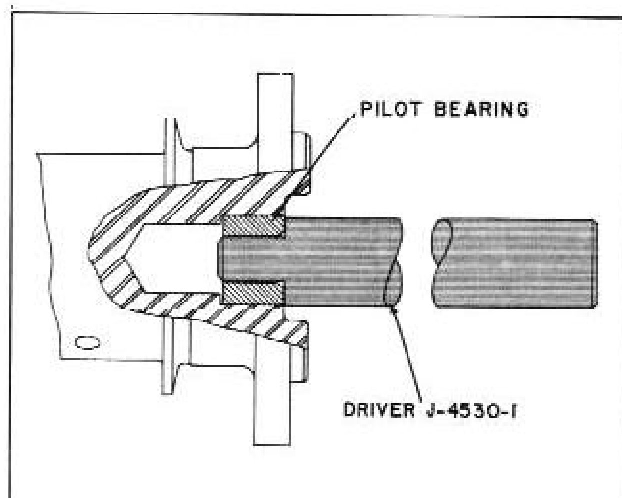


Fig. 8-50 Pilot Bearing Installation

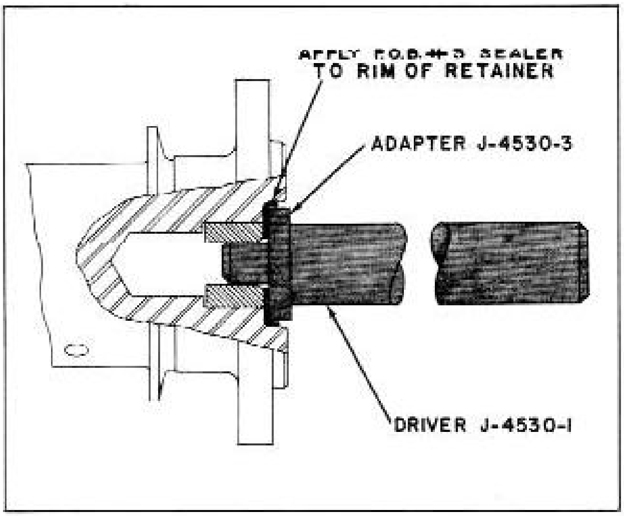


Fig. 8-51 Pilot Bearing Retainer Installation

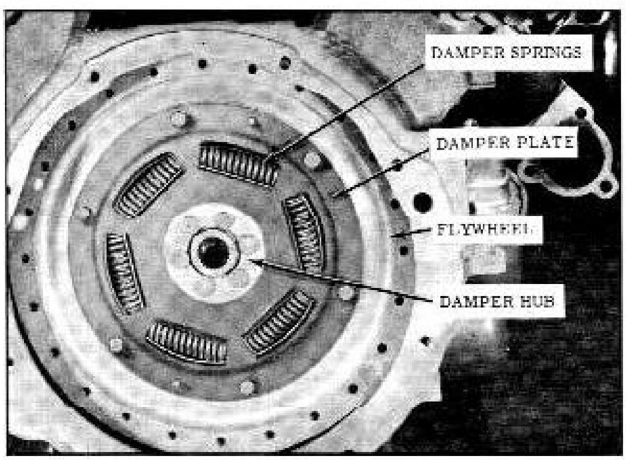


Fig. 8-52 Damper Assembly

FLYWHEEL

Remove

1. Remove transmission, starting motor and lower flywheel housing.

2. On Syncro-Mesh transmission equipped cars, remove the clutch assembly.

3. On Hydra-Matic equipped cars, remove the damper plate assembly.

4. Remove the six flywheel to crankshaft attaching cap screws and remove the flywheel.

Balancing

All flywheels, original and service replacement, are balanced individually. This is accomplished by inserting and staking a balancing pin or pins, if necessary, into the holes provided along the outer circumference of the flywheel. THESE STAKED BALANCE PINS ARE NOT TO BE REMOVED. After the flywheel is attached to the crankshaft, the engine and flywheel are again balanced as an assembly and, if necessary, additional balancing pins are installed in the flywheel. These pins are not staked.

When installing a service replacement flywheel it is essential that the flywheel be balanced with the engine. If there are no unstaked balance pins in the original flywheel, the new flywheel may be installed on the crankshaft as is. If UNSTAKED balance pins are found on the original flywheel, proceed as follows:

1. Position the original flywheel over the new flywheel and align the flywheel to crankshaft attaching bolt holes.

2. Mark the position of the unstaked balancing pins on new flywheel.

3. Transfer the balancing pins from the original flywheel to the new flywheel in the holes marked in Step 2. NOTE: If an unstaked pin cannot be installed in the exact position as the original due to the presence of a staked pin, insert the pin into an adjacent hole on either side of the staked pin.

Install

To install the flywheel, position the flywheel onto the crankshaft. Align the attaching bolt holes of the flywheel and crankshaft and install the attaching bolts. Torque the bolts 85 to 95 ft. lbs.

ENGINE MOUNTS

FRONT (Fig. 8-53)

To remove the front engine mount proceed as follows:

1. Raise front of engine. (Refer to RAISING FRONT OF ENGINE.)

2. Loosen the mount to bracket nuts and remove mount.

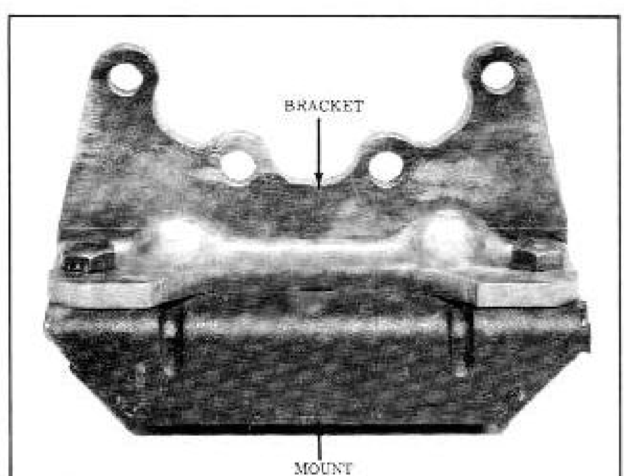


Fig. 8-53 Front Engine Mount

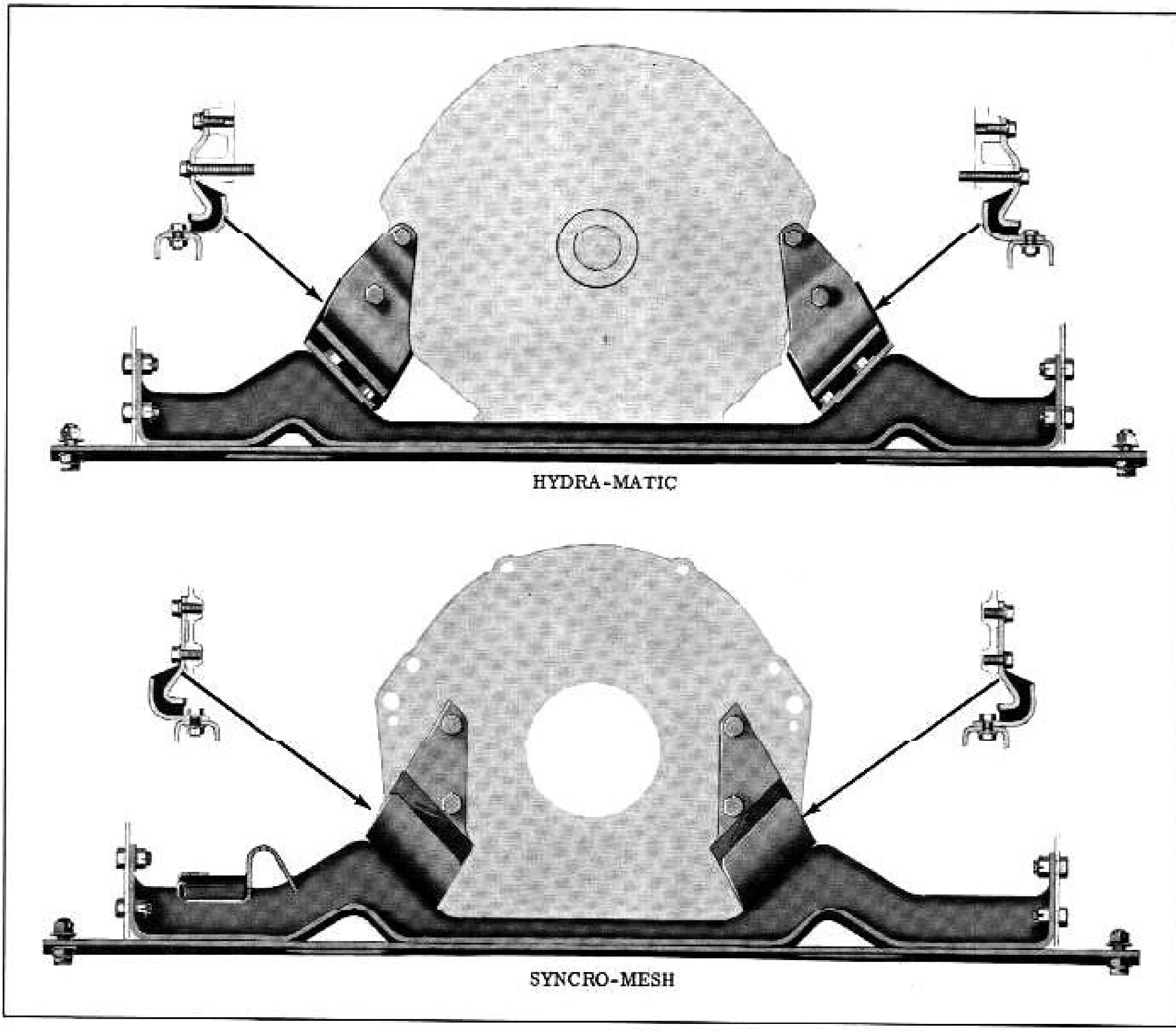


Fig. 8-54 Rear Engine Mounts

3. To install engine front mount, reverse removal procedure.

NOTE: When installing an engine front mount, the engine bracket to mount attaching nuts should first be installed finger tight and then alternately tightened down one turn at a time. DO NOT TIGHTEN ONE SIDE INDEPENDENTLY OF THE OTHER. This is extremely important since the lower portion of the assembly would not seat evenly in the upper portion. The front mount must be properly positioned and tightened; otherwise, the mounting will bind and the engine will feel rough, particularly at idle. Tighten mount nuts 35 to 50 ft. lbs.

REAR (Fig. 8-54)

Remove

To remove a rear mount, proceed as follows:

1. Position the Engine Support BT-30-16 as shown in Fig. 8-55.

2. Remove the rear mount to cross member attaching bolts.

3. Raise engine slightly, until mount can be removed.

4. Remove the mount to flywheel housing attaching bolts and remove mount.

Install

1. Position the mount on the flywheel housing and install the attaching bolts. Torque mount to flywheel housing attaching bolts 50 to 60 ft. lbs.

2. Lower engine until full weight of engine is on the mounts and install the mount to cross member attaching bolts. Torque bolts 40 to 56 ft. lbs. Remove Tool BT-30-16.

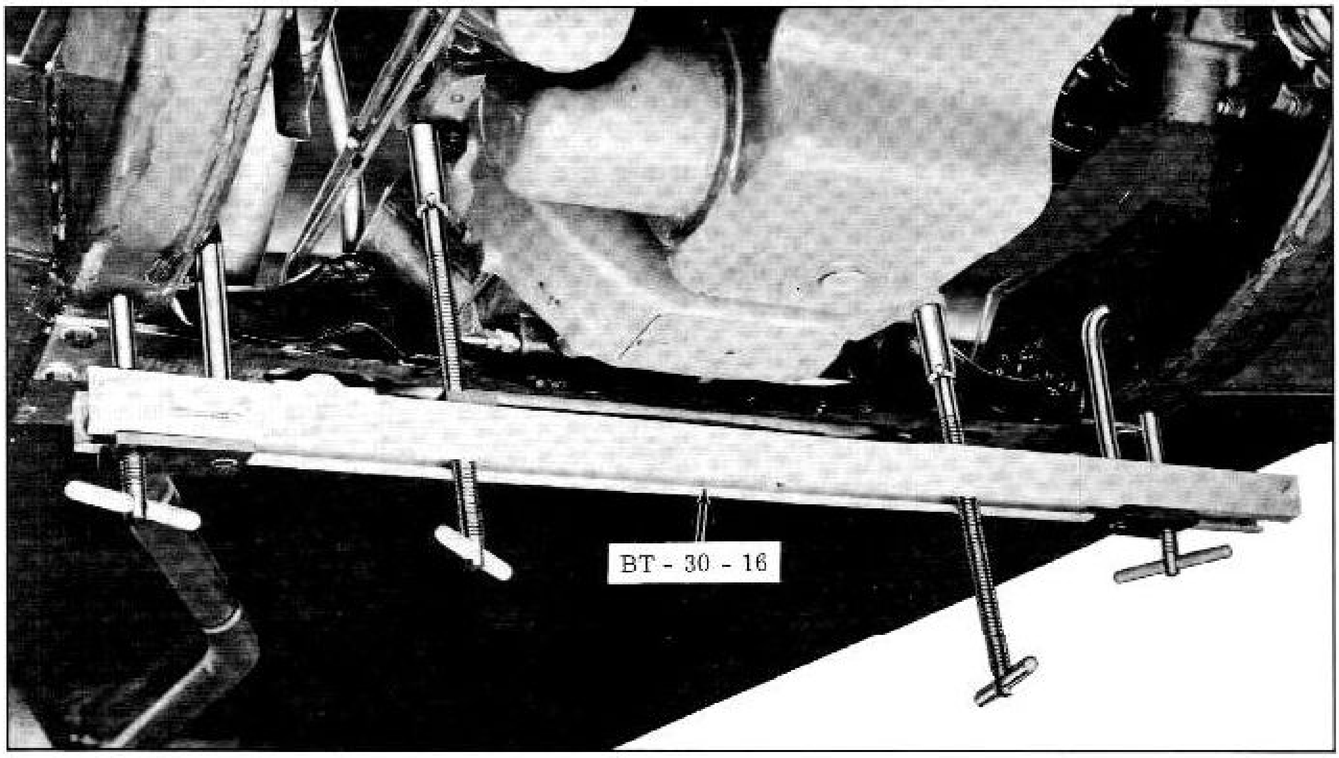


Fig. 8-55 Engine Support Bar

COOLING SYSTEM (Fig. 8-56)

GENERAL DESCRIPTION

The engine cooling system is of the pressure type employing a 15 lb. pressure radiator cap. The water pump is a centrifugal type, and circulation is controlled by a thermostat located under the water outlet in the intake manifold. Full length water jackets allow the engine coolant to completely surround all cylinders.

OPERATION

The water pump discharges water through the front engine cover into both banks of the block. The water then flows through the full length water jackets in the block, up into the two cylinder heads through the heads and then flows from the front of each cylinder head through the intake manifold water passage to the water outlet and finally to the radiator.

When the thermostat is closed, all the water flows through the two internal by-passes to the inlet side of the water pump and back to the engine block.

No water distributor tube is used in the block since the size and location of the water distributor holes in the cylinder block and heads are designed for uniform coolant distribution.

The 15 pound pressure radiator cap raises the boiling point of the water to approximately 248°F.

CAUTION: When removing the radiator cap, turn the cap counterclockwise to the point where pressure is released. After all the pressure has been released, the cap can then be SAFELY removed.

PERIODIC MAINTENANCE

Protection of the cooling system can best be accomplished through the use of Inhibitor, Part No. G.M. 989498.

All new Oldsmobiles have an inhibitor added to the cooling system at the time of initial fill. This inhibiting compound is non-foaming and non-corrosive.

It is not necessary to add inhibitors to cars that have standard anti-freeze products containing proper corrosion preventing inhibitors.

The cooling system requires the following periodic maintenance:

Spring - Drain system completely, refill with water and add 16 ozs. of cooling system inhibitor, Part No. 989498.

Fall* - Drain system completely, add anti-freeze as required.

*In areas where temperatures do not require anti-freeze drain in the spring and add cooling system inhibitor, Part No. 989498.

DRAIN AND REFILL

Before draining the cooling system, inspect the system and perform any necessary service to

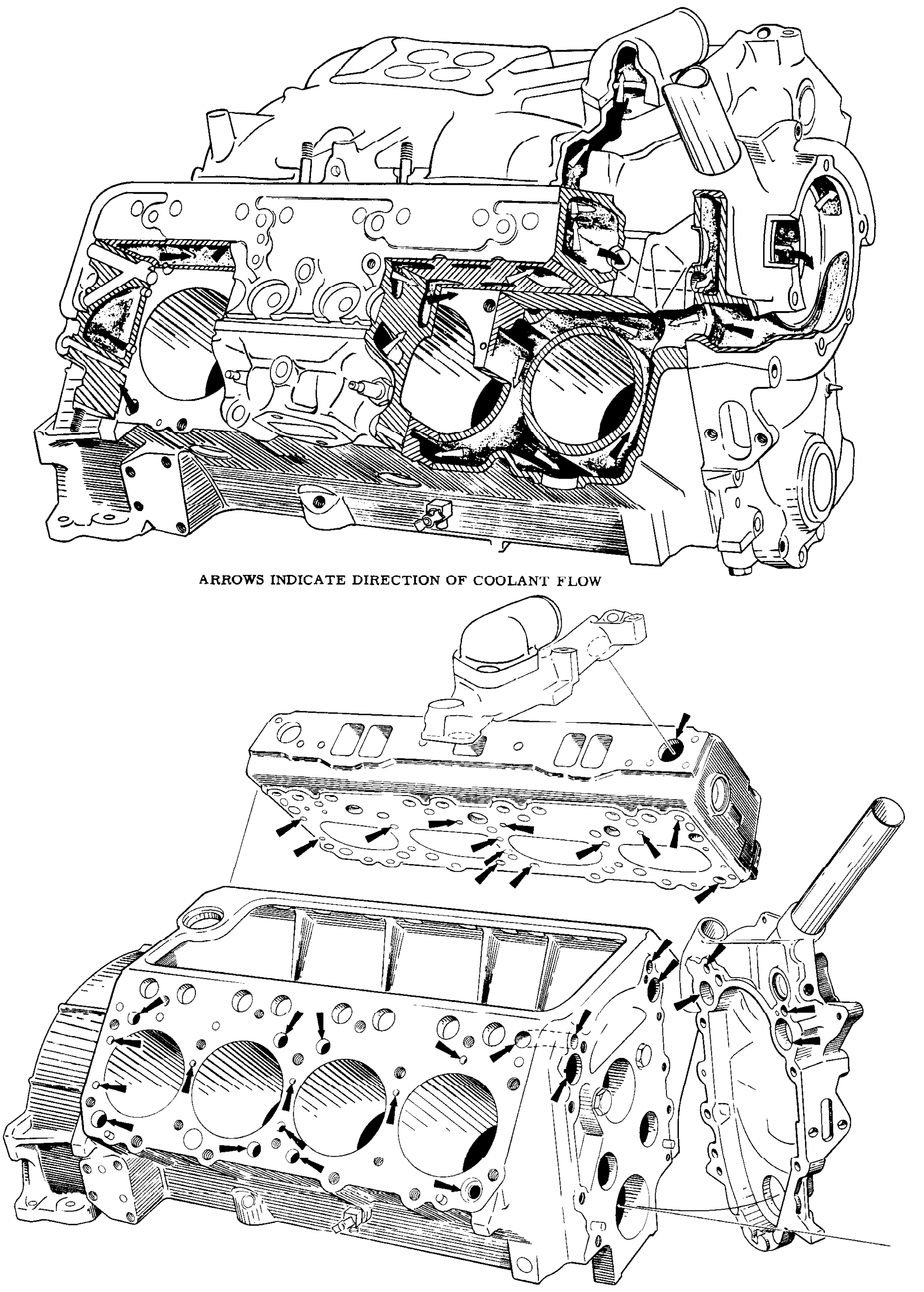


Fig. 8-56 Engine Coolant Flow and Passages

insure that it is clean, leak-tight and in proper working order.

1. Completely drain the system by opening drain valves at radiator lower tank and on each side of engine block.

   NOTE: If coolant drains out rusty, or if rust deposits are seen in the radiator, the cooling system should be flushed.

2. Determine the amount of anti-freeze to be used and mix with approximately 2 gallons of water.

3. Start engine and immediately pour the mixture of anti-freeze and water into the radiator with the engine idling and finish filling with water until level covers radiator core.

4. Run the engine until it reaches driving temperature, covering the radiator if necessary in order to open the thermostat and establish complete circulation through the system before driving the car or exposing it to freezing temperature. Finish filling with water to 1/4" below top of radiator filler neck after the engine has reached operating temperature.

FAN CLUTCH

A thermostatically controlled fan is used on air conditioned cars. When the radiator discharge air does not require use of the engine cooling fan, the clutch will disengage the fan. When the fan is required for engine cooling, the clutch engages the fan, however, the fan operates at a slower speed than conventional engine fans, reducing noise level.

The fan clutch engages when the radiator discharge air at the clutch thermostatic coil reaches 135° to 145°F. Engagement of the clutch and fan

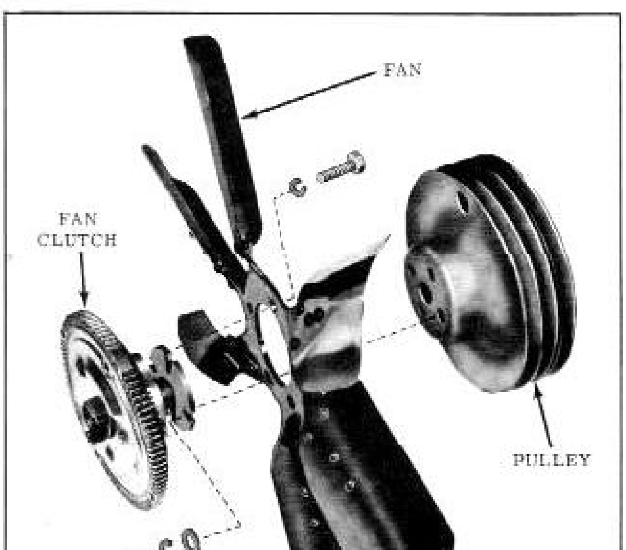


Fig. 8-57 Fan and Clutch Assembly

allows the fan to rotate at a speed of 2100 to 2300 rpm. When the radiator discharge air at the clutch thermostatic coil reaches a minimum of 125°F, the clutch is disengaged with a minimum fan speed of approximately 800 rpm.

The thermostatically controlled fan clutch is serviced only as an assembly.

Remove and Install

1. Remove the four fan and clutch to pulley attaching bolts. (Fig. 8-57)

2. Disconnect the fan ring.

3. Remove fan and clutch assembly from car.

4. Remove the four fan to clutch attaching nuts, then separate fan and clutch.

5. To install, reverse the removal procedure. Torque attaching bolts and nuts 10 to 15 ft. lbs.

FAN AND PULLEY—REMOVE AND INSTALL

The fan blades and pulley can be removed without disturbing the water pump or radiator.

NOTE: If belt tension on pulley is not released, the fan can be removed without disturbing the pulley by removing four attaching bolts. When the first two bolts are removed, replace with aligning studs. The tension of the belt will keep the pulley in position.

To remove the fan and pulley as an assembly proceed as follows:

1. Loosen generator and link adjusting bolt.

2. Remove four fan and pulley attaching bolts.

3. Remove fan and pulley.

Reverse the removal procedure for installing fan and pulley and adjust belt(s) to proper tension.

For power steering pump belt adjustment, see STEERING SECTION. For generator belt adjustment, see ELECTRICAL SECTION. For Compressor belt adjustment, see AIR CONDITIONING SECTION.

RADIATOR—REMOVE AND INSTALL (Fig. 8-58)

1. Drain complete cooling system.

2. Disconnect upper and lower radiator hoses.

   NOTE: If car is equipped with Hydra-Matic transmission, disconnect and cap oil cooler lines.

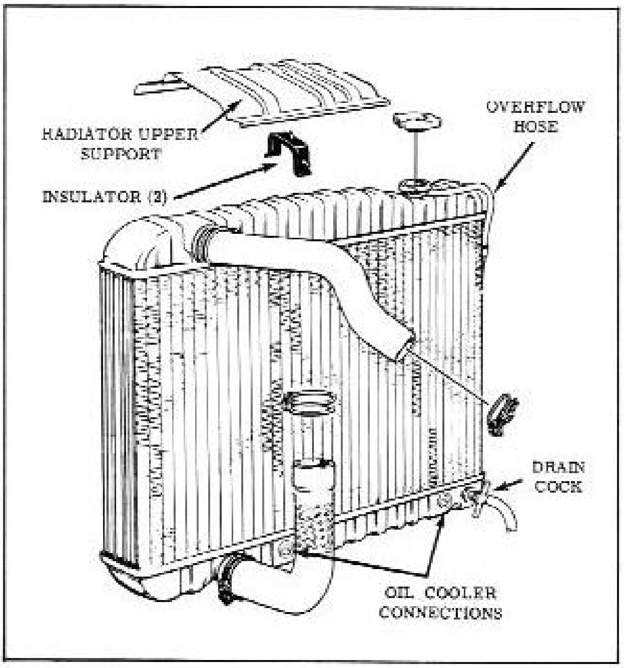


Fig. 8-58 Radiator and Attaching Parts

3. Remove the radiator upper support.
4. If car is equipped with air conditioning, remove the fan ring attaching screws and position fan ring away from radiator.
5. Position fan blades to clear radiator lower outlet and remove radiator.

To install radiator, reverse sequence of operations and refill to 1/4" below top of radiator filler neck. (At normal operating temperature.) Check Hydra-Matic fluid level.

WATER PUMP (Fig. 8-59)

Remove

1. Drain cooling system.
2. Loosen pulley belts, then remove fan, spacer and pulley from pump hub.
3. Remove six water pump attaching bolts (four pump housing to front engine cover attaching bolts and two pump housing to block attaching bolts).
4. Remove water pump.

Disassembly

1. Remove bearing retainer wire from front of housing.
2. Support outside surface of pump housing in arbor press and press shaft through impeller and housing, pressing on impeller end of shaft toward front of housing. (Fig. 8-60)
3. Remove seal assembly from rear of housing

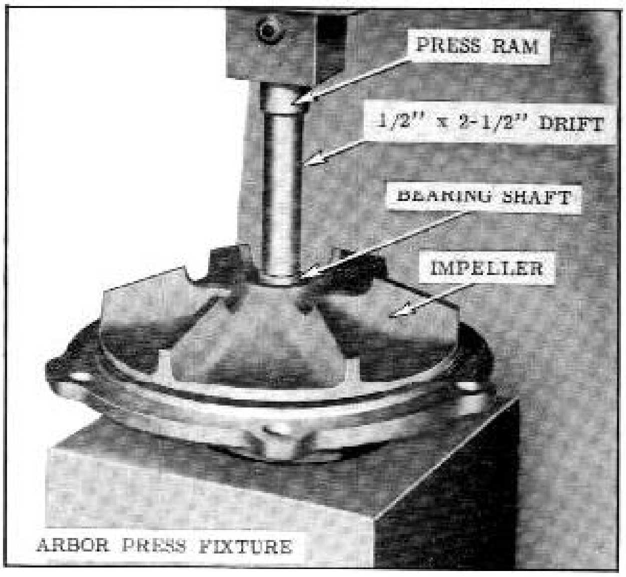


Fig. 8-60 Removing Impeller from Shaft

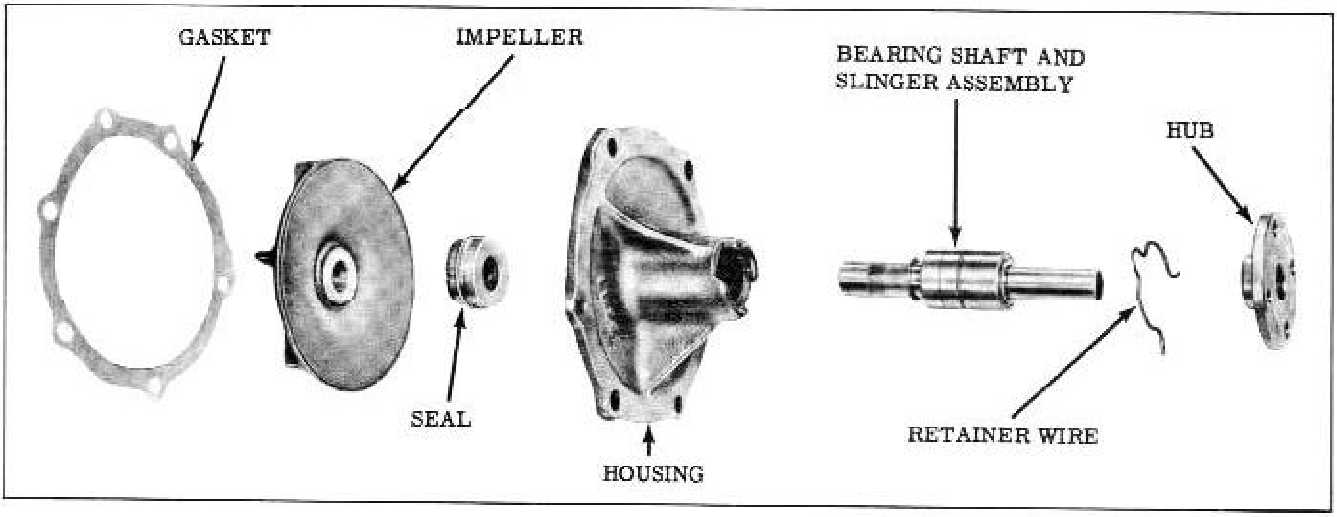


Fig. 8-59 Water Pump Assembly

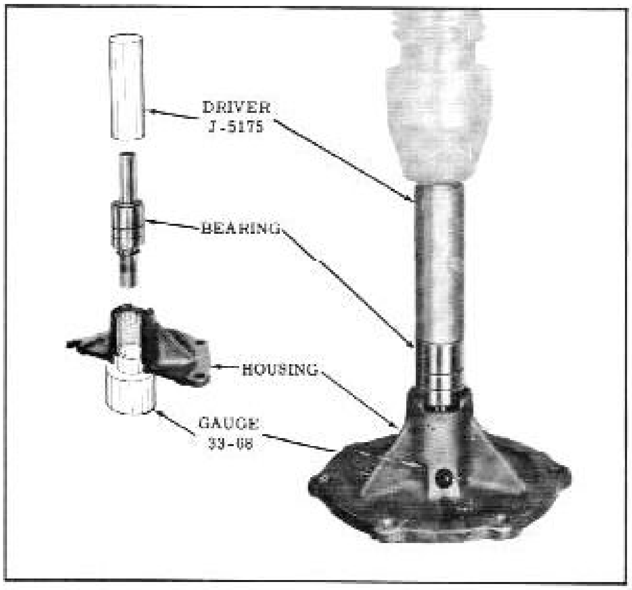


Fig. 8-61 Installing Bearing

by driving against inside face of seal with a drift.

4. Support hub and press shaft through hub to remove.
5. Clean all sealer material from pump housing and seal seat.

Assembly

1. Place Bearing Installation Gauge 33-68 in pump housing, then press bearing assembly into pump housing as shown in Fig. 8-61 until bearing bottoms on gauge.
2. Install bearing retainer wire.
3. Install a new hub with Tool BT-16 as shown in Fig. 8-62.

   NOTE: Assembly must be supported on bearing shaft.

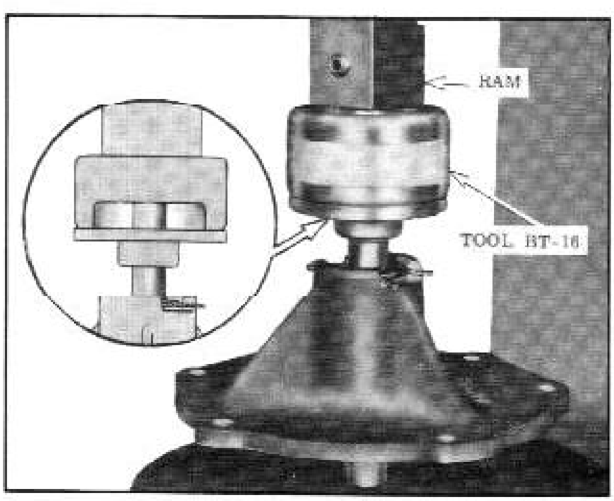


Fig. 8-62 Installing Fan Hub

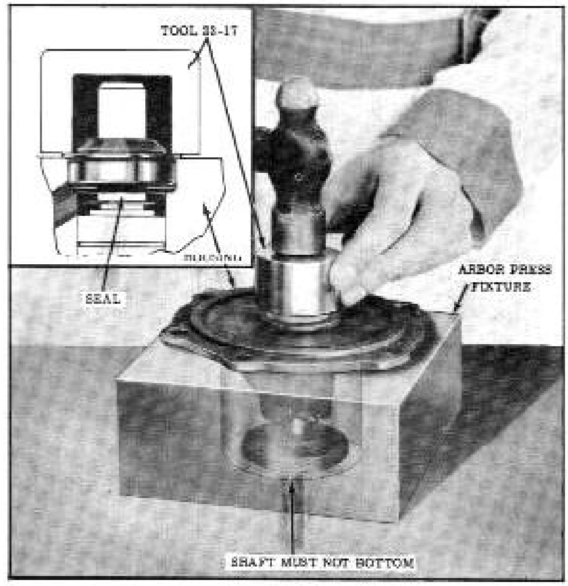


Fig. 8-63 Installing Seal

4. Coat the outer seating diameter of a new seal with C.P. No. 9 Sealer and install seal using Tool 23-17 as shown in Fig. 8-63.
5. Before assembling the impeller to the bearing shaft, foreign particles should be removed from the water pump seal face mating surface of the impeller.
6. Using Tool BT-15 to support impeller, press bearing shaft through impeller until bottom edges of vanes are 13/16" from machined face at edge of housing. (Fig. 8-64)

Install

1. Apply a thin coat of gasket cement to the pump housing to retain the gasket, then position the gasket on the housing.
2. Install the pump assembly in the front cover. Torque 5/16" bolt 14 to 22 ft. lbs. and 7/16" bolts 24 to 40 ft. lbs.

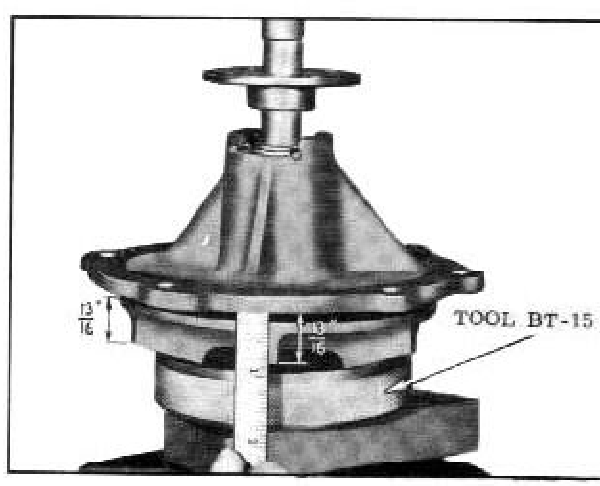


Fig. 8-64 Installing Impeller

3. Install fan pulley, spacer and fan. Torque fan to hub bolts 10 to 15 ft. lbs.

4. Install pulley belt(s) and adjust belt tension as outlined in STEERING, ELECTRICAL, OR AIR CONDITIONING SECTION.

5. Fill cooling system until coolant covers radiator core. After engine reaches operating temperature, fill radiator to 1/4" below filler neck.

FUEL SYSTEM

GAS TANK AND GAUGE

The gas tank has a capacity of 20 gallons. The gas tank filler is located in the left rear quarter panel. Venting of the fuel tank is provided for at the top of the tank, and in the filler tube cap.

The tank gauge unit has a Saran fuel filter on the end of the suction pipe which prevents entry of dirt or water into the fuel line. The filter is a push fit on the end of the pipe and should be pressed on approximately 1-11/16" so that the pipe bottoms on the shoulder inside the filter. For repair and diagnosis of fuel gauge, refer to ELECTRICAL SECTION.

DRAINING GAS TANK

1. With the car on a hoist, gas tank cap removed, disconnect the neoprene hose from the fuel line at the frame side rail. This connection is located just ahead of the right rear torque box.

2. Insert approximately a 3 foot piece of tubing into the neoprene hose. Insert open end of tubing into a container.

3. The tank can now be drained through gravity flow.

Remove and Install

1. Drain tank.

2. Disconnect gas hose from fuel line at right side of tank. On cars equipped with a fuel return line, remove the fuel return hose from return line at right side of gas tank.

3. Disconnect the fuel gauge wires. Remove the two tank strap attaching bolts and lower tank.

To install, reverse the removal procedure. Torque the strap attaching nuts 10 ft. lbs. maximum.

NOTE: A fuel return from the fuel filter to the gas tank is incorporated on air conditioned and 2 barrel carburetor equipped cars to prevent excessive fuel pressure build-up in the line between the fuel pump and the carburetor.

CAUTION: If a car is to be stored for any appreciable length of time, the gasoline should be drained from the complete fuel system - including carburetor, fuel pump, all fuel lines, and fuel tank in order to prevent gum formations and resultant improper engine performance.

FUEL FILTER

No attempt should be made to clean a dirty filter element. Whenever a dirty filter is encountered the element should be replaced. Always install a new bowl gasket after the bowl is removed.

FUEL AND VACUUM PUMP (Fig. 8-65)

Two types of fuel pumps are used. Cars without deluxe heater or air conditioning use a fuel pump without a vacuum booster. Cars that are equipped with a deluxe heater and/or air conditioning use a fuel pump with a vacuum booster. Cars equipped with a 2 barrel carburetor or cars equipped with air conditioning use a fuel filter which incorporates a fuel return line. The fuel return line, from the filter to the gas tank, aids in maintaining a constant fuel pressure at the carburetor under varying conditions.

FUEL SECTION

The fuel pump draws gasoline from the tank and supplies it to the carburetor in sufficient quantity to meet engine requirements at any speed or load.

The fuel pump rocker arm is held in constant engagement with the eccentric on the camshaft by the rocker arm spring. As the outer end of the rocker arm moves down, the fuel link pulls the fuel diaphragm up. The enlargement of the fuel chamber draws fuel from the tank through the inlet valve and into the fuel chamber.

The pump delivers fuel to the carburetor only when the pressure in the outlet line is less than the pressure maintained by the diaphragm spring. When the carburetor float needle valve opens, the spring expands and moves the diaphragm down to force fuel past the outlet valve to the carburetor. When the carburetor float needle valve closes (on cars without a fuel return line) the pump builds up pressure in the fuel chamber until the diaphragm spring is again compressed. The diaphragm then remains stationary until more fuel is required by the carburetor.

A pulsator is used to insure a solid charge of fuel to the carburetor.

VACUUM SECTION

The vacuum section (of fuel pumps so equipped)

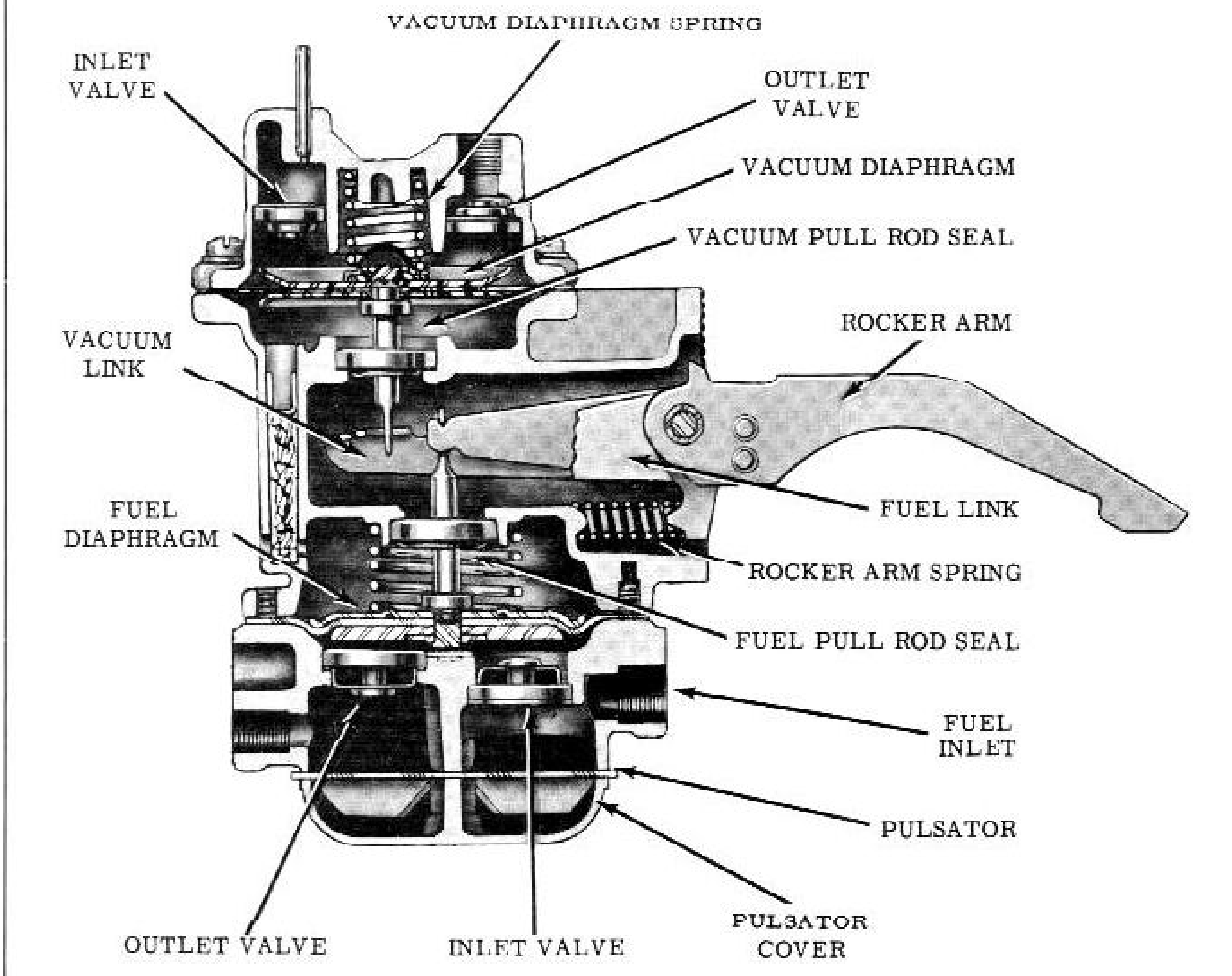


Fig. 8-65 Fuel and Vacuum Pump

acts as a booster when engine manifold vacuum is insufficient to operate the air conditioning, or heater controls.

This section is a single acting pump since air is displaced on the downward movement of the diaphragm and is controlled by the inlet and outlet valves. The lower side of the diaphragm is open to atmospheric pressure through an inlet and exhaust passage in the pump body.

As the rocker arm is moved down by pressure from the high point of the eccentric, it bears against the vacuum link which is also pivoted on the rocker arm pin bushing. The long end of the link is hooked to the diaphragm so the rocker arm movement results in upward motion of the vacuum diaphragm. The diaphragm movement compresses the diaphragm spring and exhausts air from the upper chamber to the intake manifold.

As the rotating eccentric permits the rocker arm to move away from contact with the link, the compressed diaphragm spring is free to move the diaphragm down, enlarging the upper chamber and drawing air from the vacuum controlled units. This diaphragm stroke exhausts air from the lower chamber, through the filtered passago in the pump body to atmosphere.

When vacuum is not required for the heater or air conditioning controls or whenever engine vacuum is sufficient to operate the controls, vacuum holds the diaphragm near the center of its stroke so that very little diaphragm movement occurs.

FUEL PUMP INSPECTION AND TEST (ON CAR)

When testing fuel pump for volume flow, the volume must be checked first at the outlet side of the fuel filter and then at the inlet side of the fuel filter.

As filtered foreign material builds up within the filter, fuel flow restriction increases, resulting in a decrease of volume flow at the filter outlet. When the restriction becomes excessively high, volume flow to the carburetor can drop below engine requirements although the fuel pump is still capable of meeting volume specifications. This makes it necessary to check volume flow at both the inlet and outlet side of the fuel filter to determine if the fuel pump or filter is out of specification.

1. Be sure there is gasoline in the tank.

2. Check for loose line connections. A leak at the pressure side of the system (line from pump to carburetor) will be indicated by dripping fuel. A leak in the suction side of the system (line from gas tank to pump) will not be apparent except in its effect of reducing volume of fuel on the pressure side of the system. Tighten loose line connections. Tighten fuel pump diaphragm flange screws.

3. Look for bends or kinks in lines which will reduce fuel flow.

4. Test fuel flow as follows:

   a. Disconnect fuel line at the carburetor.

   b. Ground primary terminal of distributor with jumper lead so that engine can be cranked without firing.

   c. Place suitable container at end of fuel line and crank engine a few revolutions.

      NOTE: If little or no gasoline flows from open end of line, then the fuel line or filter is clogged or the pump is inoperative. Before removing pump, disconnect fuel lines at fuel pump and at gas tank and blow through them with an air hose to make sure they are clear. Reconnect fuel lines to pump and gas tank, then retest fuel flow while cranking engine.

5. Even if fuel flows in good volume from line at carburetor, it is advisable to make certain that pump is operating within limits.

   a. Attach a low reading pressure gauge to upper end of pump to carburetor line.

   b. Run engine at approximately 1800 r.p.m. (using gasoline in carburetor bowl) and note reading on pressure gauge.

   c. If pump is operating properly, the pressure will be 5 to 6 pounds and will remain constant. If pressure is too low or too high or varies materially at different speeds, the pump should be removed for repair or replacement.

VACUUM SECTION INSPECTION AND TEST (ON CAR)

1. Make certain that all vacuum connections are in place and are air tight. Replace cracked or deteriorated hose.

2. The vacuum pump may be tested by attaching a vacuum gauge to the inlet port (port connected to heater or air conditioning controls) with outlet pipe to manifold disconnected.

   CAUTION: Always make vacuum pump test with manifold line disconnected.

With engine operating at 1200 r.p.m. the gauge should show 8 inches of vacuum (minimum). Less than the above specified minimum indicates a malfunctioning vacuum pump.

PUMP ASSEMBLY

Remove and Install

1. Install a jumper wire and crank engine until the distributor rotor points toward the cowl.

2. Disconnect fuel and vacuum lines from pump.

   NOTE: Do not disconnect flex line at the pump. Disconnect flex line at fuel pipe.

3. Remove the pump to front engine cover attaching bolts and remove pump.

When installing pump, the pump arm operating pad should be coated with Special Lubricant (Part No. 567196). The gasket should be cemented in place to aid installation. Torque pump to cover bolts 34 to 40 ft. lbs.

Attach rubber flex line to fuel line.

Fuel Section—Disassembly

NOTE: Before proceeding with the following operation, clean the outside of the unit. DO NOT SUBMERGE PUMP IN COMMERCIAL TYPE DEGREASER OR USE STEAM.

1. Clamp pump in vise by one ear of mounting flange with fuel side up.

2. Remove screws attaching pulsator cover and diaphragm to fuel pump, then remove pulsator cover and diaphragm.

3. Mark edges of fuel cover and body diaphragm flange so the parts can be reassembled in the same relative position.

4. Remove fuel cover screws and lock washers. Tap cover lightly to separate it from body if cover sticks.

5. Remove pump from vise. While holding pump with vacuum side up, push on diaphragm then tilt up on side opposite rocker arm to disengage pull rod from fuel link. Remove diaphragm and spring. (Fig. 8-66)

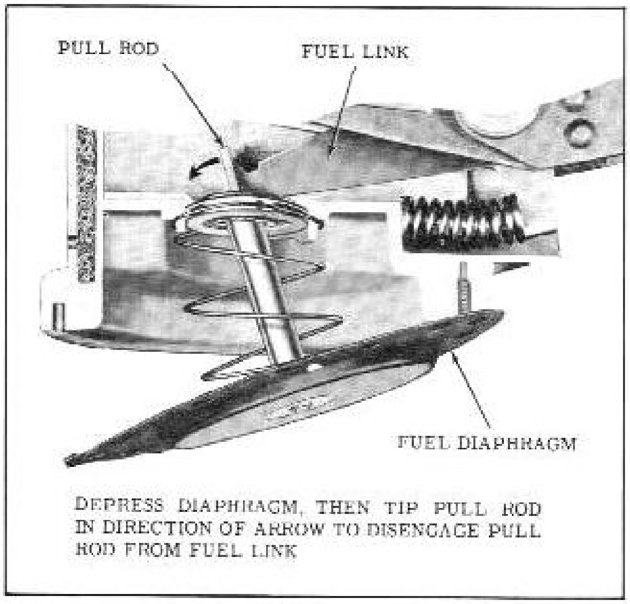


Fig. 8-66 Removing Fuel Diaphragm

6. If valves are to be replaced, remove the staking then remove the inlet and outlet valves and gaskets from the fuel cover. (Fig. 8-67)

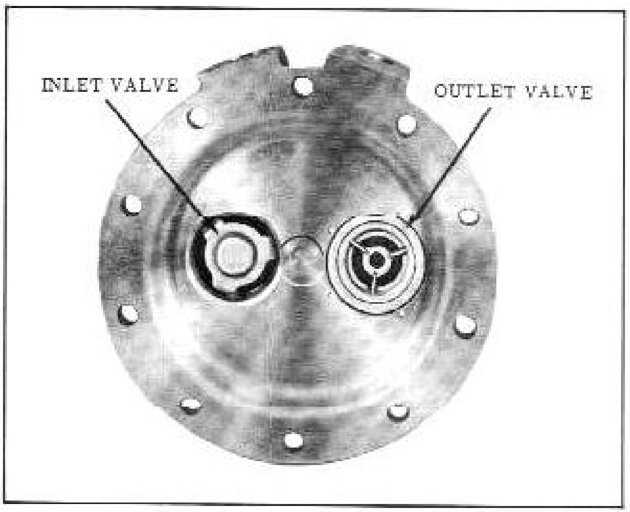


Fig. 8-67 Fuel Inlet and Outlet Valves

7. Remove pull rod seal by pulling out seal retainer and seal. (Fig. 8-68)

   NOTE: The pull rod seal should be replaced whenever the fuel pump is disassembled.

Vacuum Section—Disassembly

1. Clamp pump in vise, with vacuum side up.
2. Scribe a mark on the vacuum cover and pump body, then remove vacuum cover attaching screws.
3. Remove cover spring and spring seat.

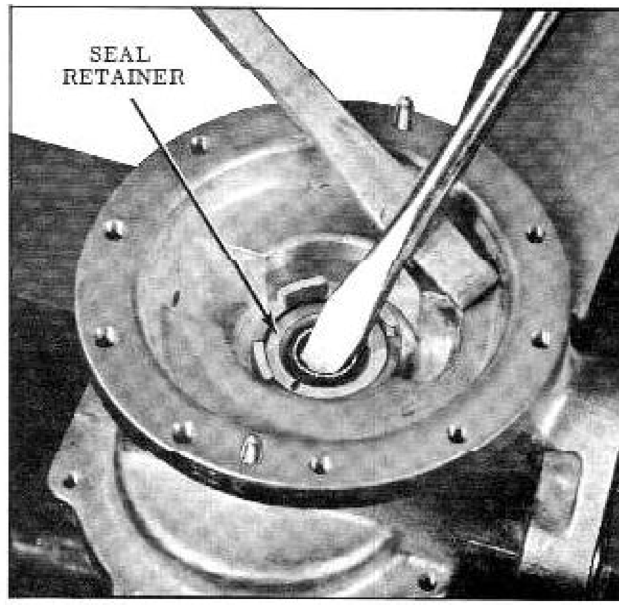


Fig. 8-68 Removing Fuel Pull Rod Seal and Retainer

4. Remove vacuum diaphragm by turning diaphragm 1/4 turn and pulling straight out. (Fig. 8-69)

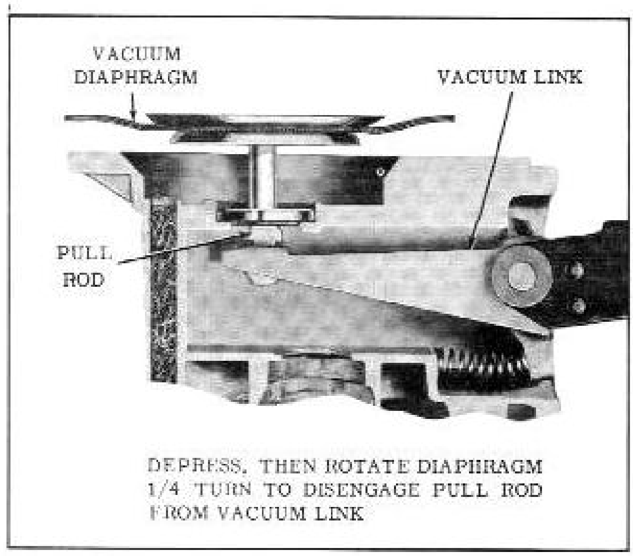


Fig. 8-69 Pull Rod and Vacuum Link

5. If valves are to be replaced, remove the staking, then remove the inlet and outlet valves and gaskets from the vacuum cover. (Fig. 8-70)
6. Remove pull rod seal by prying out seal retainer and seal. (Fig. 8-71)

   NOTE: The pull rod seal should be replaced whenever the vacuum pump is disassembled.

Cleaning and Inspection

1. Clean and rinse all metal parts in solvent. Blow out all passages with air hose.

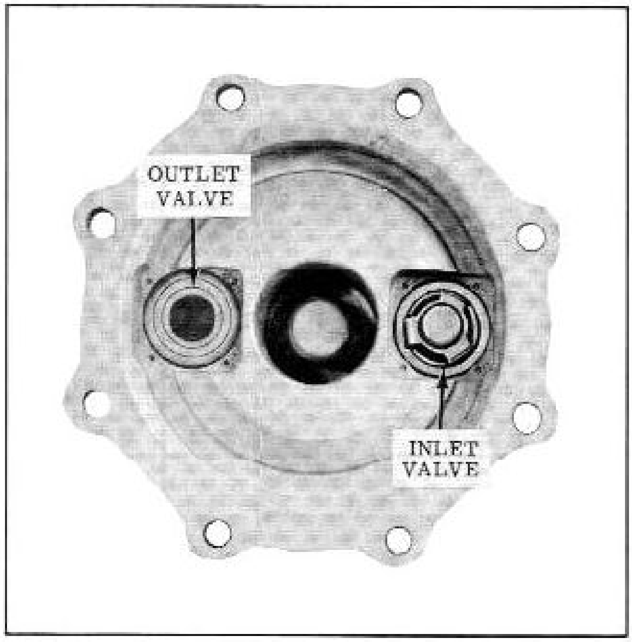


Fig. 8-70 Vacuum Valves

2. Inspect pump body, fuel cover, and vacuum cover for cracks, breakage, and distorted flanges. Examine all screw holes for stripped or crossed threads. Replacement of pump assembly is advisable if one or more of the following conditions are found:

   a. Body or cover castings warped or damaged.

   b. Rocker arm worn at cam pad.

   c. Rocker arm bushing worn.

   d. Links worn excessively.

   NOTE: If flange facings are warped .010" or less, they can be trued up on a piece of plate glass with No. 400 grit sandpaper.

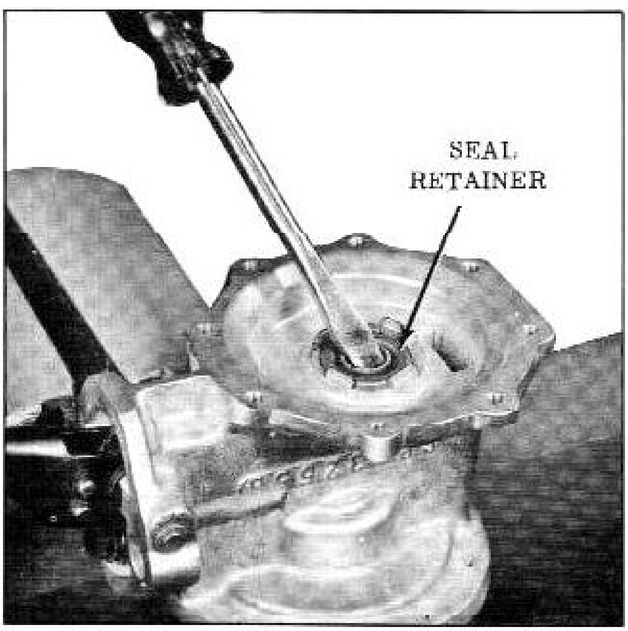


Fig. 8-71 Removing Pull Rod and Seal Retainer

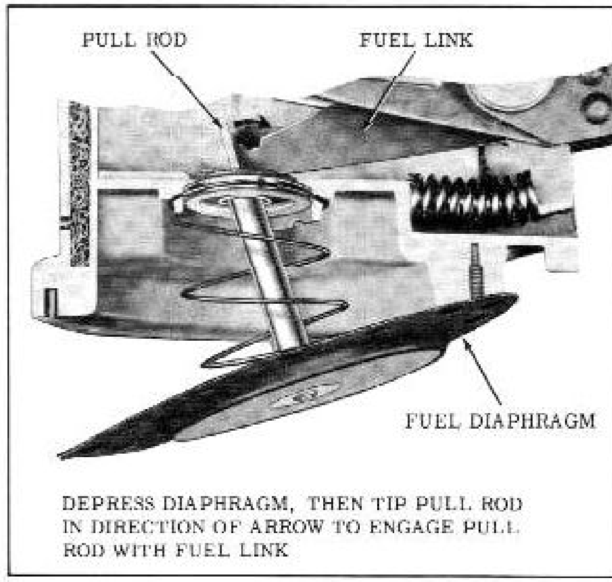


Fig. 8-72 Engaging Pull Rod With Fuel Link

Fuel Section—Assembly

NOTE: Always assemble the fuel section of the pump before the vacuum section.

1. Install a new pull rod seal and retainer using a tube or socket which rests on the outer shoulder of the retainer.

2. Position spring into the pump body, insert the diaphragm through the pull rod seal.

3. While holding the pump with vacuum side up, tilt diaphragm up on side opposite rocker arm until pull rod engages fuel link. (Fig. 8-72)

4. Place valve gaskets in recesses provided in fuel cover. Place valve assemblies on top of gaskets. Inlet valve must have spring cage facing out of cover, and the outlet valve must have the spring cage facing into cover. Stake valves in place. (Fig. 8-67)

5. Lift rocker arm until the diaphragm is flat across the body flange and install fuel cover on body, making sure that file marks on cover and body are aligned. While holding diaphragm flat, install cover screws and lock washers loosely until screws just engage lock washers.

   NOTE: Diaphragm must be flexed by several full strokes of rocker arm before tightening cover screws, or pump pressure will be incorrect and diaphragm may be damaged.

6. Tighten the cover screws alternately and securely.

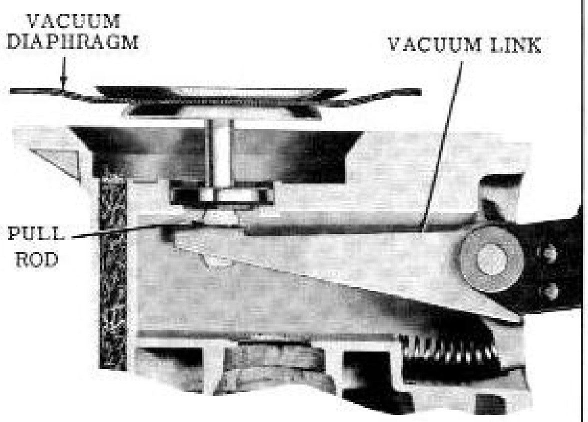


Fig. 8-73 Installing Fuel Diaphragm

7. Position pulsator diaphragm on fuel cover, then install pulsator cover and secure with attaching screws.

Vacuum Section—Assembly

1. If valves were removed, place paper gaskets in recesses provided for valves in the vacuum cover. Place valve assemblies on top of gaskets. (Fig. 8-70)
2. Secure valve assemblies by staking.
3. Clamp pump in vise by one ear of mounting flange with vacuum side of pump up.
4. Install a new pull rod seal and a retainer using a tube or socket which rests on the outer shoulder of the retainer.
5. Hold vacuum diaphragm so that flat of pull rod is parallel with rocker arm and gently insert pull rod down through seal.
6. Rotate diaphragm 1/4 turn until pull rod engages vacuum link. (Fig. 8-73)
7. Place spring seat over the end of diaphragm, and place the spring on the seat, then place vacuum cover over the spring.
8. With the scribe marks aligned, insert screws with lock washers, then tighten evenly until screws just engage lock washers. Be sure that screws pass through holes in fabric of diaphragm without damage to material.
9. Flex diaphragm several times, then tighten all screws.

EXHAUST SYSTEM

The single exhaust system (standard on all models) consists of a crossover pipe, exhaust pipes, resonator and muffler.

The dual exhaust system, optional on all Hydra-Matic equipped cars, (except 35 and 45 styles) consists of exhaust pipes, resonators and mufflers. (Fig. 8-74)

MUFFLER AND RESONATOR

The muffler is a reverse flow type, having an asbestos and steel outer shell.

Resonators are used to aid the mufflers in silencing exhaust pulsations.

Mufflers and resonators have drain holes to expel condensation. These drain holes should be checked when the car is lubricated and opened if necessary.

When installing components of the exhaust system, observe the following:

1. To insure gas tight connections:
   a. Always use new gaskets.
   b. Apply Vibradamp No. 253 or equivalent to the outside diameter of the pipes where they join the muffler or resonator, and at exhaust pipe joints.
   c. When tightening exhaust pipe flange, tap the flanges with a hammer to insure the proper seating of the flanges and gaskets.
2. Before tightening any part of the exhaust system, align the exhaust system pipes to provide adequate clearance between the body and frame.

   NOTE: ALLOW ENGINE TO REACH OPERATING TEMPERATURE BEFORE TORQUING ATTACHING NUTS.

LOCATING ENGINE OIL LEAKS

In cases where the engine oil leaks cannot be located visually, the use of DuPont Oil Red or "Blacklight" should be used.

To use Oil Red, drain one quart (minimum) of oil from the engine, then mix 1 tablespoon of the Oil Red and the oil that was drained. Pour this mixture into the crankcase. Start engine and inspect for trace of colored oil. Oil Red is harmless to the engine.

Blacklight should be used when it cannot be determined whether the oil leak originates from the engine or the transmission. To use the Blacklight method, remove engine and transmission dipsticks to compare with a sample of oil from the location of the leak. By viewing the oil on the dipsticks with a sample under Blacklight, it can be determined which unit is leaking.

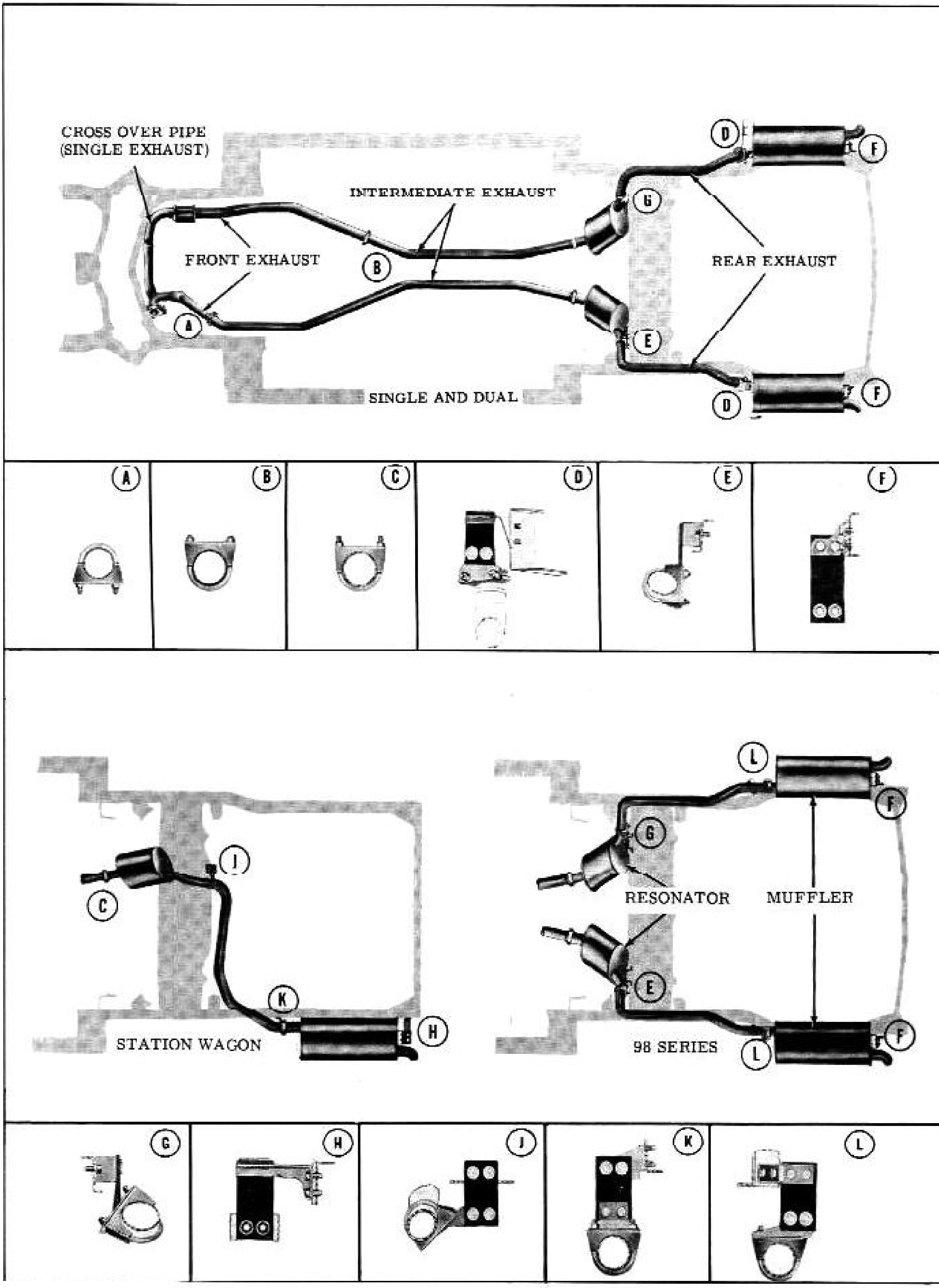


Fig. 8-74 Exhaust System

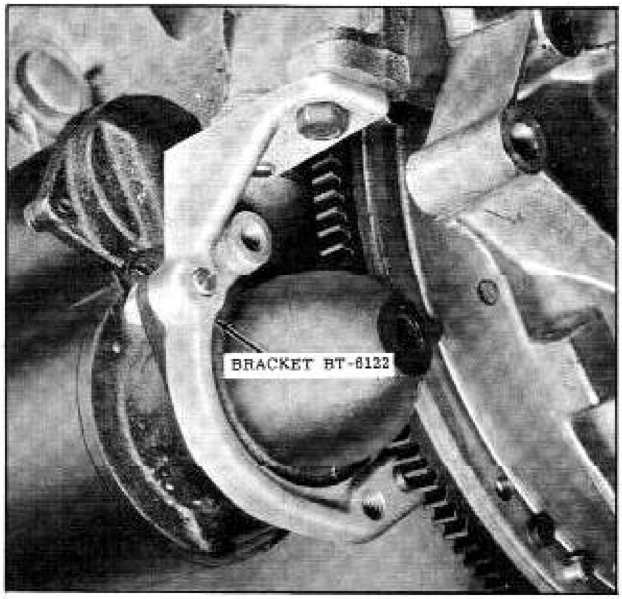


Fig. 8-75 Starter Bracket Installation

NOTE: When an oil leak is suspected in the immediate flywheel area, remove the lower flywheel housing and install starter bracket BT-6122 as shown in Fig. 8-75. This will allow the engine to be started with lower housing removed.

The Blacklight method can also be used to pin point leaks after the suspected area has been wiped clean of oil and the engine runs long enough to show up a leak. The oil will glow when viewed with Blacklight.

GENERAL SPECIFICATIONS

Subject and Remarks

1. CYLINDER BLOCK
   - a. Engine Type . . . . . 90° V-Type
   - b. Number of Cylinders 8
   - c. Bore and Stroke . . . . . 4.125" x 3.6875"
   - d. Piston Displacement . . . . . 394.1 cu. in.
   - e. Compression Ratio
     - Regular Fuel 8.5:1
     - Premium Fuel 10.0:1
   - f. Firing Order 1-8-7-3-6-5-4-2
   - g. Cylinder Identification
     - Left Bank (Front to Rear) 1-3-5-7
     - Right Bank (Front to Rear) 2-4-6-8

2. CRANKSHAFT
   - a. Diameter - Main Bearing Journal
     - All . . . . . 2.9990" to 3.000"
   - b. Width - Main Bearing Journal, Including Fillets
     - No. 1 . . . . . 1.090"
     - Nos. 2, 3 and 4 . . . . . 1.000"
     - No. 5 . . . . . 1.880"
   - c. Diameter - Connecting Rod Bearing Journal . . . . . 2.4992" to 2.5002"
   - d. Width - Connecting Rod Bearing, Including Fillets . . . . . 1.877" to 1.880"
   - e. Length - Overall Crankshaft . . . . . 26.066"
   - f. Diameter - Of Oil Holes in Crankshaft . . . . . .201" to .209"
   - g. Number of counterweights 6
   - h. Clearance - Crankshaft End Thrust . . . . . .004" to .008"

3. CRANKSHAFT SPROCKETS
   - a. Width . . . . . .520" to .530"
   - b. Pitch . . . . . .500"
   - c. Number of Teeth 18

4. FLYWHEEL
   - a. No. of Teeth on Starter Gear 176
   - b. No. of Teeth on Starter Pinion 9

5. MAIN BEARINGS
   - a. Clearance - Crankshaft Vertical
     - Nos. 1 and 2 . . . . . .0005"
     - Nos. 3 and 4 . . . . . .0008" to .0024"
   - b. No. 5 . . . . . .0020" to .0034"
   - c. Width - Bearing Shaft
     - Nos. 1, 2, 3 and 4 . . . . . .818"
     - No. 5. . . . . . 1.875"

6. PISTONS
   - a. Length Overall . . . . . 4.050"
   - b. Length from Top of Piston to Pin Center . . . . . 1.770" to 1.773"
   - c. Clearance (At Thrust Surface) Selective . . . . . .0075" to .00125"
   - d. Diameter - Nominal Outside . . . . . 4.125"
   - e. Weight - Less Pins and Rings . . . . . 27.761 oz.

GENERAL SPECIFICATIONS—Continued

Subject and Remarks

7. PISTON PINS	
a. Diameter (Selective)	.9807" to .9803"
b. Length Overall	3.126"
c. Diametrical Clearance (Selective) Plain Boss	.0003" to .0005" Loose
8. PISTON RINGS	
a. Number Compression Rings	2
b. Width, Compression Ring Top	.0775" to .0780"
c. Width, Compression Ring, Bottom	.0925" to .0935"
d. Gap Clearance Compression Rings	.013" to .023"
e. Clearance in Groove, Compression Rings	.001" to .004"
f. Number, Oil Rings	1
g. Width, Oil Ring Assembly	
Perfect Circle	.1831" to .1889"
Sealed Power	.1840" to .1890"
h. Gap Clearance, Oil Ring	.015" to .055"
i. Clearance - Oil Ring to Piston Groove	.0005" to .007"
9. CONNECTING RODS	
a. Length - Center to Center	6.996" to 7.000"
b. Diameter - Connecting Rod Bore	2.6245" to 2.6250"
c. Diameter - Pin Bore	.9807" to .9811"
d. Clearance - Crankshaft (Vertical)	.0005" to .0026"
e. Clearance - Crankshaft (Horizontal)	.0013" to .0034"
f. Clearance - Pin to Rod	.0003" to .0005" Loose
g. Clearance - End to Crankshaft	.002" to .011"
10. CAMSHAFT	
a. Bearing Journal Diameters	
All	1.9977" to 1.9985"
b. Width (Including Chamfers)	
Nos. 1 and 5	.781"
Nos. 2, 3 and 4	.699"
c. Journal Clearance in Bushing	.0010" to .0033"
d. Diameter - Reamed Bushing	
All	1.9995" to 2.001"
e. Length - Bushing	
All	.688"
f. End Thrust	Block and Spring Loaded Plunger
11. CAMSHAFT SPROCKET	
a. Width	.520" to .530"
b. Pitch	.500"
c. Number of Teeth	36
12. TIMING CHAIN	
a. Width	27/32"
b. Length	24"
c. Number of Links	48
d. Pitch	.500"
13. VALVES - INTAKE	
a. Diameter - Head	1.870" to 1.880"
b. Diameter - Stem	.3427" to .3432"

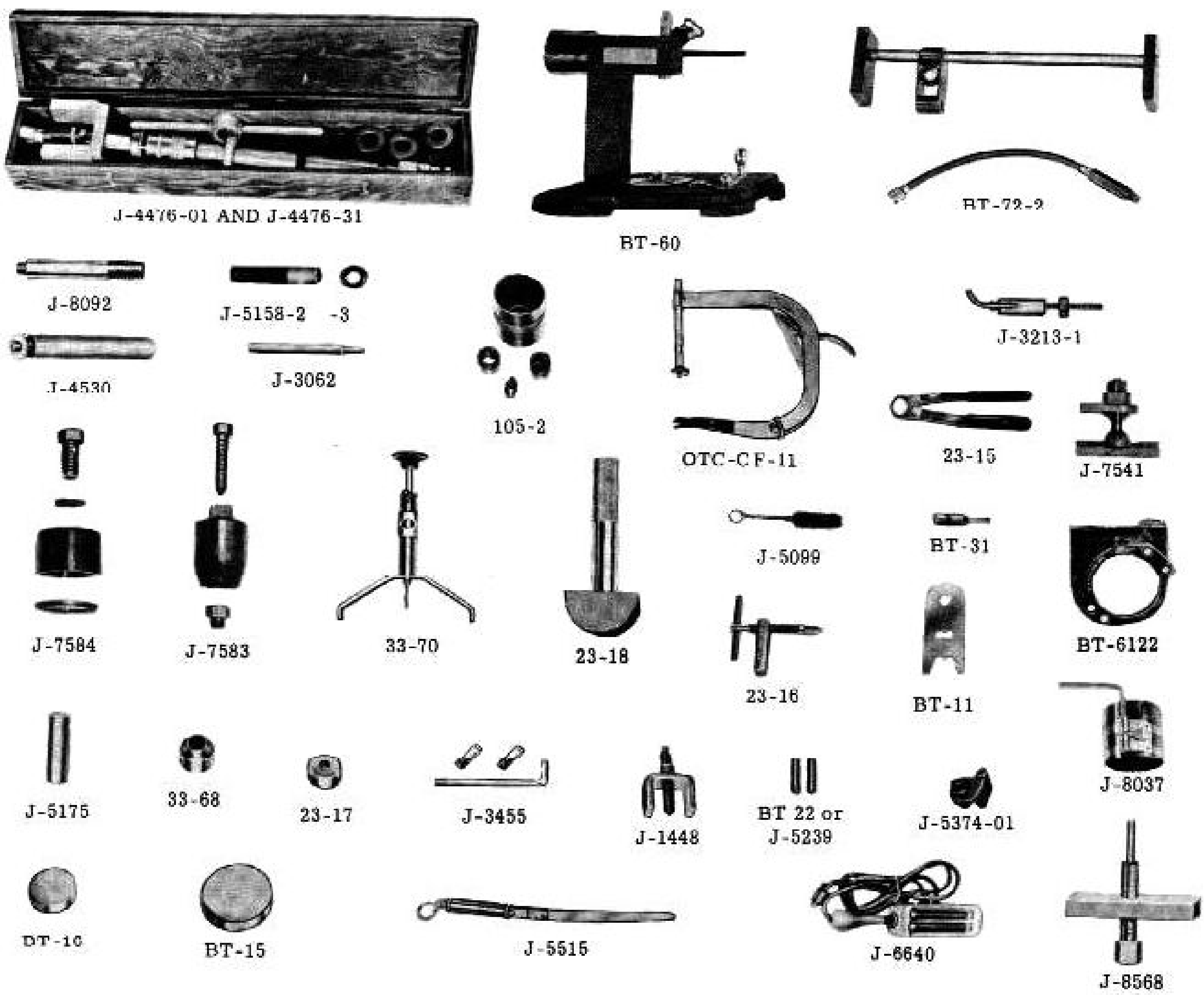
GENERAL SPECIFICATIONS—Continued

Subject and Remarks	
13. VALVES - INTAKE - (Continued)	
c. Angle - Valve Seat	45°
d. Width - Valve Seat	.037" to .075"
e. Lift - Premium Fuel	.427"
Regular Fuel	.427"
f. Clearance in Guide	.0011" to .0025"
g. Lash	Hydraulic
14. VALVES - EXHAUST	
a. Diameter - Head	1.557" to 1.567"
b. Diameter - Stem	.3940" to .3945"
c. Angle - Valve Seat	45°
d. Width - Valve Seat	.037" to .075"
e. Lift	.435"
f. Clearance in Guide	.0015" to .0030"
g. Lash	Hydraulic
15. VALVE SPRINGS	
a. Number of coils	6.40 to 6.60
b. Length - Free	2.25"
c. Diameter - Wire	.190" to .194"
d. Diameter - Inside Top	.760"
e. Diameter - Outside Bottom	1.472" to 1.496"
f. Pressure and Length	
Valve Open	175 to 189 lbs. @ 1.437"
g. Valve Closed	85 to 95 lbs. @ 1.837"
16. VALVE LIFTERS	
a. Diameter - Body	
Standard	.9210" to .9215"
.001" Oversize	.9220" to .9225"
.010" Oversize	.9310" to .9315"
b. Length - Overall	2.125"
c. Clearance in Boss Selective	.0005" to .0020"
17. VALVE GUIDES	
a. Height from top of Head	.787"
b. Diameter - Inside Intake	.3442" to .3452"
c. Diameter - Inside Exhaust	.3960" to .3970"
d. Length - Overall	2.390"
18. LUBRICATION SYSTEM	
a. Capacity - Engine	
Crankcase Only, Drain and Refill	4 Qts.
Drain and Refill with Filter Change	5 Qts.
b. Oil Pump	
Clearance - Pressure Relief Valve in Bore	.0025" to .005"
Clearance - End Gears	.0025" to .008"
Width - Pump Gears	1-1/2"
19. COOLING SYSTEM	
a. Radiator - Make	Harrison
b. Capacity	19-1/4 Qts.
For Heater, Add	1 Qt.
For Air Conditioning, Add	1-3/4 Qts.
c. Pressure Cap	15 Lb.
d. Thermostat	170°

TORQUE SPECIFICATIONS

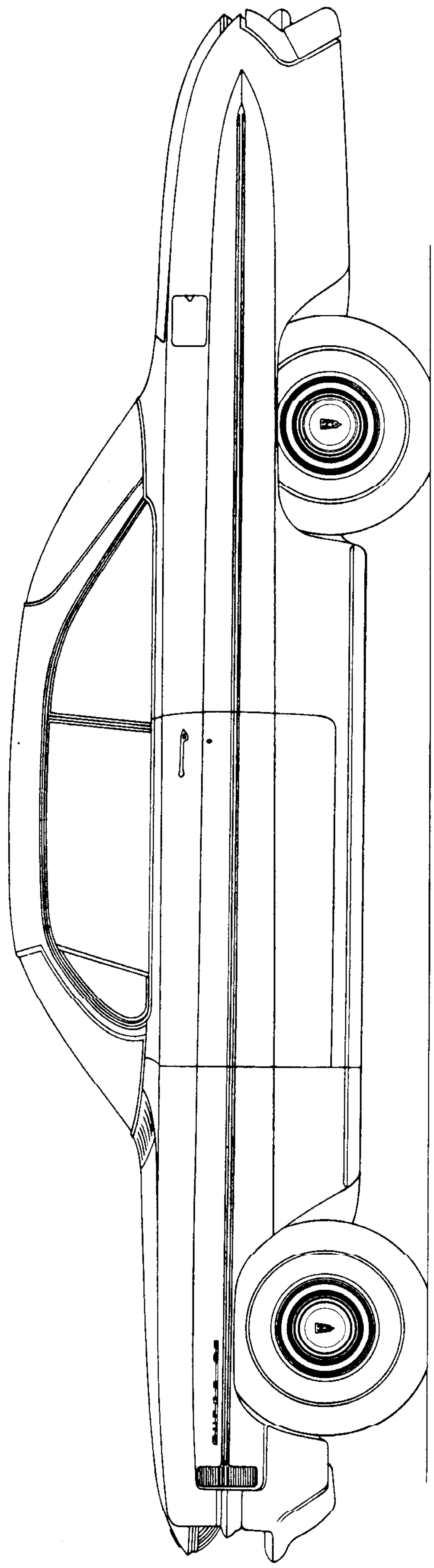
NOTE: Specified torque is for installation of parts only. Checking of torque during inspection may be 15% below the specified minimum.

Application	Ft. Lbs.
CRANKSHAFT AND CONNECTING RODS	
Connecting Rod Bearing Cap Bolts	38 to 48
Crankshaft Bearing Cap Bolts (Nos. 1, 2, 3 & 4)	90 to 120
Crankshaft Bearing Cap Bolts (Rear)	130 to 160
Crankshaft Pulley Bolt	100 Min.
ENGINE MOUNTS	
Front Mount Bracket to Front Cover Bolts	28 to 38
Front Mount to Bracket Nuts	35 to 50
Front Mount to Frame Nuts	45 to 50
Rear Mount to Flywheel Housing Bolts	50 to 60
Rear Mount to Cross Member	40 to 56
HEAD AND VALVE MECHANISM	
Rocker Arm Cover Bolts	4 to 7
Cylinder Head to Block Bolts	60 to 80
Rocker Shaft Bracket to Head	14 to 22
Spark Plugs	18 to 34
FLYWHEEL AND DAMPER PLATE	
Flywheel to Crankshaft Bolts	85 to 95
Clutch Pressure Plate to Flywheel Bolts	14 to 17
Damper Plate to Flywheel Bolts	55 to 65
FLYWHEEL AND CLUTCH HOUSING	
Flywheel Lower Housing Cover Bolts	4 to 7
Flywheel Lower Housing to Block Bolts	50 to 55
Flywheel Cover Housing to Block and Flywheel Housing	50 to 55
Clutch Housing to Block and Flywheel Housing Bolts	50 to 55
FRONT COVER AND WATER PUMP	
Cover to Block Bolts (3/8")	24 to 40
Cover to Block Bolts (7/16")	24 to 40
Water Pump to Front Cover	14 to 22
Water Outlet to Manifold	22 to 26
FUEL AND VACUUM PUMP	
Pump to Front Cover Bolts	35 to 40
Fuel Pump Eccentric	14 to 22
MANIFOLD	
Intake Manifold to Head Bolts	22 to 34
Exhaust Manifold to Head Bolts and Nuts	19 to 25
OIL PAN, PUMP AND FILTER	
Oil Pan Bolts	10 to 18
Oil Pan Drain Plug	35 to 45
Pump to Bearing Cap	22 to 26
Pump Relief Valve Plug	35 to 40
Pump Cover Bolts	5 to 8
Pump Screen Bolts	4 to 7
Filter Assembly to Cylinder Block Bolts	28 to 38
Filter Housing	10 to 20



BT-11	Timing Gauge
BT-15	Water Pump Impeller Installer
BT-16	Fan Hub Installer
BT-22	Connecting Rod Bolt Guide
BT-31	Valve Lifter Lock Spring Tool
BT-60	Hydraulic Valve Lifter Tester
BT-72-2	Valve Spring Compressor Set
23-15	Valve Lifter Remover
23-16	Valve Lifter Plunger Remover
23-17	Water Pump Seal Installer
23-18	Rear Main Bearing Seal Installer
BT-6122	Starting Motor Bracket
33-68	Water Pump Bearing Installing Gauge
33-70	Belt Tension Gauge
105-2	Adapter (Used with Hydraulic Valve Lifter Tester)
J-1448	Crankshaft Pilot Bearing Remover
J-3062	Valve Guide Remover
J-3213-1	Valve Holding Tool
J-3455	Cylinder Head Guide Studs
J-4476-01 & J-4476-31	Camshaft Bearing Remover and Installer
J-4530	Crankshaft Pilot Bearing Installer
J-5099	Valve Lifter Cleaning Brush
J-5158-2 & 3	Valve Guide Remover and Installer
J-5175	Water Pump Bearing Driver
J-5374-01	External Valve Timing Checking Gauge
J-5515	Spring Scale (Used for Fitting Piston)
J-6640	Black Light (Used for Checking Oil Leaks)
J-7541	Valve Spring Compressor
J-7583	Front Cover Crankshaft Oil Seal Remover
J-7584	Front Cover Crankshaft Oil Seal Installer
J-8037	Piston Ring Compressor
J-8092	Driver Handle - Used with J-4476-01 and J-4476-31
J-8568	Engine Jack
OTC-CF-11	Valve Spring Compressor

Fig. 8-76 Engine Tools



SUPER 88 HOLIDAY COUPE
3537

CARBURETION

CONTENTS OF SECTION

ROCHESTER CARBURETOR
MODEL 4GC

THEORY OF OPERATION

FLOAT SYSTEM (Fig. 8-101)

The Rochester 4GC carburetor employs two sets of twin floats to maintain correct fuel level in both float bowls under all conditions of operation.

Fuel enters the carburetor on the primary side. Some of this fuel passes through a channel in the air horn and enters the inlet passage on the secondary side at (9). As the fuel level on the primary side drops, the floats (5) drop, moving the inlet needle (12) off its seat (14). The fuel pump forces fuel through the filter screen (2) into the inlet passage (3), thru the small filter screen (4), and then into the float bowl. As the fuel level in the bowl rises, the floats rise and close off the inlet needle.

A coil spring located on the power piston stem, acts as an assist in closing the inlet needle on its seat by exerting pressure on a tang located at the center of the float arms.

The only time the vacuum assist spring applies pressure to the tang on the float lever is during carburetor idle and part throttle operation. This is when the power piston is in the full up position. During heavy acceleration and power system operation, the power piston drops and releases all pressure applied to the floats to hold them closed. This allows maximum float drop and full fuel flow to eliminate the possibility of dry jets and engine cut-out.

As fuel is drawn from the bowl on the secondary side, the float action is similar to that on the primary side. As the floats (7) drop, the fuel pump forces fuel through the fuel inlet (1) and the filter screen (2). Fuel then passes through the fuel channel in the air horn, the small filter screen (9), and secondary needle seat (10) and into the fuel bowl. When the fuel level rises, the floats (7) rise and when the proper fuel level is reached in the carburetor bowl, the inlet needle closes, shutting off all fuel flow. A float balance spring (11) installed between the float hanger posts applies pressure on the float tang at the rear of the float arm to assist in closing the needle seat.

Both float systems are provided with float needle pull-clips (8 and 13), which pull the inlet needles from their seats by a drop in fuel level in the float bowls. This is to prevent the possibility of gum deposits causing a sticking condition.

Both sides of the carburetor are individually and internally vented by the channels shown at (6). These vents transmit the air pressure from beneath the air cleaner to the fuel in the float bowl. The amount of fuel metered by the carburetor is dependent upon the pressure in the float bowl. By locating the vents below the air cleaner, or internally, the carburetor automatically compensates

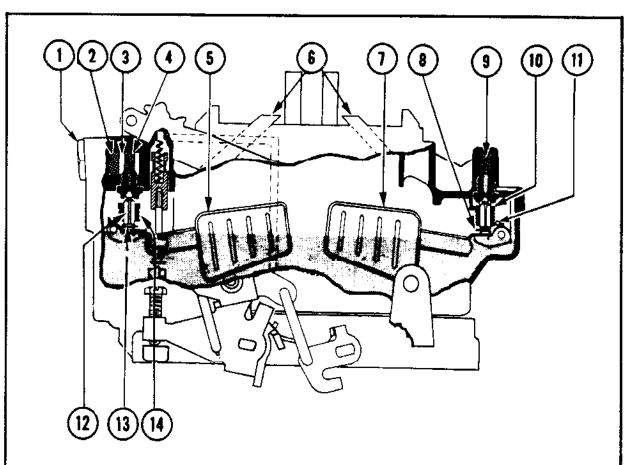


Fig. 8-101 Float System

for air cleaner restriction, since the same pressure causing air to flow will also be causing fuel to flow.

A cored passage in the float bowl, slightly above the normal fuel level, links the primary and secondary float bowls together. In this way, any abnormal rise in level on one side will be absorbed by the other and will not seriously disrupt the operation of the engine.

IDLE SYSTEM (Fig. 8-102)

At small throttle openings (1) vacuum created by the main venturi is not sufficient to cause fuel to flow. Therefore, an additional system has been provided to furnish the proper mixture ratios required throughout the low speed range.

An adjustable idle system on the primary side of the carburetor supplies the fuel required for normal curb idle, off idle and low speed range. The idle fuel is drawn from the float bowl through the main metering jets (3) into the main well, passing through the calibrated idle tube restrictions (4) and idle tubes. Air joins this fuel at the calibrated idle tube restrictions at (5). The fuel/air mixture then passes through a calibrated restriction (9). More air is added at the secondary idle air bleeds (10) and passes down through the lower idle air bleeds (11) and secondary idle discharge holes (12). The resultant mixture is then discharged into the throttle bore from the idle needle holes (2).

As the throttle valves (1) are opened from the curb idle position, air entering the secondary idle discharge holes (12) gradually diminishes. When these holes become exposed to manifold vacuum they then become fuel discharge holes to meet the increased demand of the engine.

Further opening of the throttle valves increases the air velocity through the carburetor sufficiently to cause the air to strike the end of the extended lower idle air bleed (11), creating a lower pressure within the bleed tube. As a result, fuel begins to discharge from this bleed tube and continues to do so throughout the part throttle and wide open throttle ranges, supplementing the nozzle delivery.

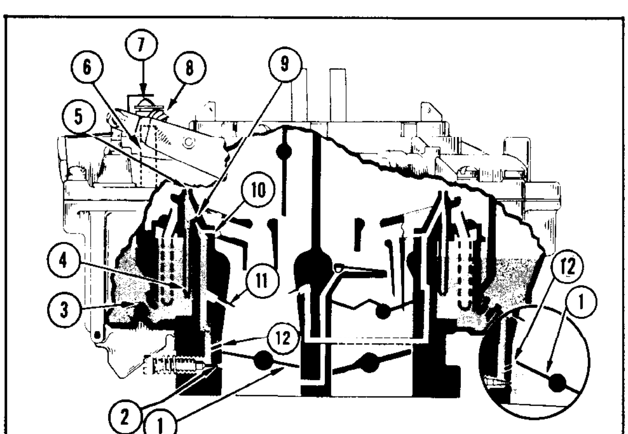


Fig. 8-102 Idle System

To adjust the idle mixture, a tapered needle (2) is used to vary the opening of the discharge hole. When the needle is turned in, the area is decreased and the idle mixture becomes leaner.

In order to minimize difficult hot weather starting or rough idling due to fuel vapor formation in the carburetor bowl, the model 4GC carburetor incorporates an external vent which operates when the throttle valves are in the idle position. The external idle vent (6) is located in the center of the carburetor air horn on the primary side of the carburetor. It consists of an actuating tang (8) integral with the pump lever which operates a rubber valve (7) mounted over the vent hole. This rubber vent is attached to a spring.

When the throttle valves are closed, the actuating tang contacts the spring arm to which the rubber vent valve is attached and holds it open. This permits vapors from the float bowl to vent to the atmosphere. As the throttle valves are opened, the spring arm closes the vent valve returning the carburetor to an internal balance.

Carburetors, on cars equipped with factory installed air conditioning, incorporate an idle compensator to prevent stalling under prolonged "hot idle" conditions. (Fig. 8-103) The idle compensator consists of a bi-metal strip, a valve and a mounting bracket. It is mounted between the venturi on the secondary side. The valve seats on a hole drilled into the center throttle body attaching bolt hole leading to the underside of the primary throttle valves.

When under hood temperatures rise to a predetermined value, the bi-metal strip lifts the valve off its seat. This allows additional idle air to enter below the throttle valves, offsetting the enrichening effects of the high temperatures. When underhood temperatures are lowered, the valve closes and the idle operation returns to normal.

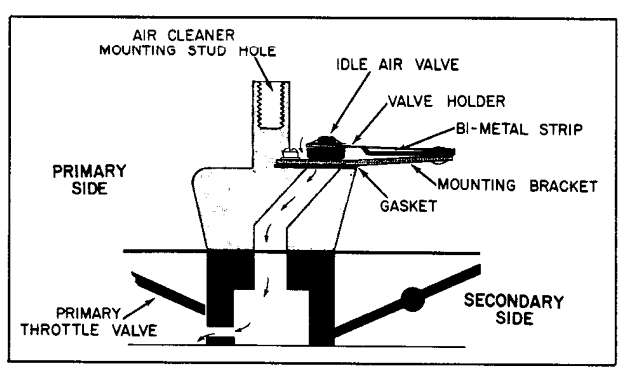


Fig. 8-103 Idle Compensator

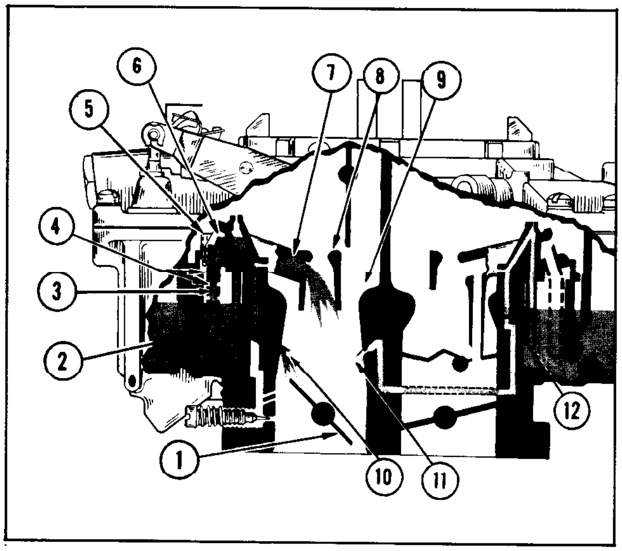


Fig. 8-104 Part Throttle System

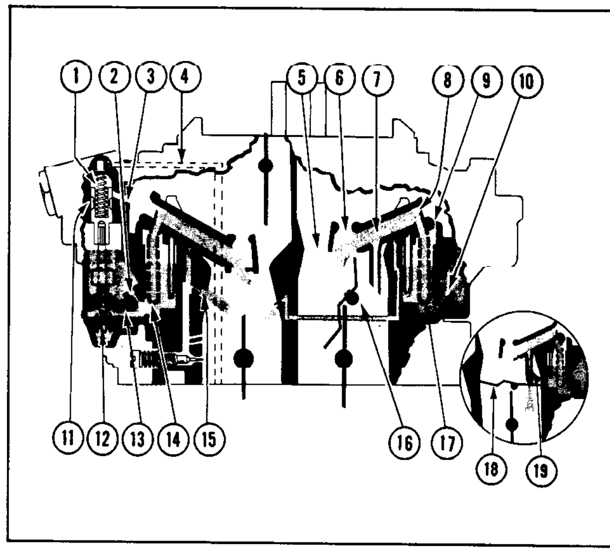


Fig. 8-105 Power System

PART THROTTLE SYSTEM (Fig. 8-104)

As the throttle valves are opened to a greater degree and more air is drawn through the carburetor, it is necessary to provide means, other than the idle system, for supplying additional fuel to meet the engine requirements. The primary side of the carburetor meets the increased demand for fuel in the following manner:

At a point of sufficient throttle opening, manifold vacuum, multiplied several times in the primary (9) and secondary venturi (8), is transmitted to the tip of the main well tubes or main discharge nozzles (6). This vacuum draws fuel from the float bowl through the calibrated main metering jets (2) and into the main well tubes (3). After passing through the main well tubes (3) air joins the mixture at the main well bleeds (4). The mixture then passes from the tip of the nozzle (6) through the mixture passage (7), to the secondary venturi (8), and into the intake manifold.

As the throttle opening is progressively increased and more fuel is drawn through the main well tubes, the fuel level in the main well drops. The calibrated holes (4) in the main well tubes are proportionately exposed to the air in the upper well area. When this occurs, they become air bleeds mixing progressively more air with the fuel passing through the main well tubes. Although the nozzle suction is increased by increasing the throttle opening, the fuel mixture to the engine remains constant throughout the part throttle range.

As throttle opening increases, the lower idle air bleeds become part throttle feed nozzles in the main bore below the primary venturi (9). Discharge nozzles (11) are located in the venturi wall on the primary side, and are fed by the idle tubes (12) in the secondary cluster. These nozzles provide an additional source of fuel to maintain a constant mixture ratio at wide primary throttle openings. The tubes act as nozzles and supplement the fuel discharge of the main system to fill the gap between late part throttle and pre-power system operation. Fuel is discharged from these nozzles at throttle openings which correspond to a steady speed of approximately 70 to 90 m.p.h. No fuel is discharged until the primary throttles are opened sufficiently to allow air flow to create a low pressure area at the tube. Fuel then flows throughout the remainder of the part and wide-open throttle range. The secondary throttle valves of the carburetor do not open until the primary linkage engages the secondary throttle shaft. They then open fully during the final few degrees of primary throttle travel. The secondary side, therefore, supplies fuel through a portion of the part throttle range and through the power range.

POWER SYSTEM (Fig. 8-105)

To achieve the proper mixtures required when more power is desirable or sustained high speed driving is to be maintained, the carburetor employs the use of a vacuum-operated power piston (11) in the air horn and a power valve (12) in the float bowl.

The power system is located on the primary side of the carburetor. The power piston vacuum channel (4) is exposed to manifold vacuum beneath the throttle valves. The vacuum in this channel varies directly with manifold vacuum. In the idling and part throttle ranges, the manifold vacuum is normally quite high. This vacuum is sufficient to hold the power piston (11) in its extreme up position. However, as the throttle valves are progressively opened, the vacuum drops.

When the vacuum drops below approximately 9" hg., the calibrated spring (1) beneath the power piston forces the piston down. This situation occurs at very high driving speeds or on rapid accelerations. When the piston drops, it unseats the spring loaded power valve (12). This permits additional fuel to flow from the float bowl through the calibrated power restriction (13) and into the main wells. The additional fuel supplements fuel already flowing through the main metering jets (2) and main well tubes (14), (on the primary side) making the mixture being delivered to the manifold considerably richer than normal part throttle mixtures.

This power mixture continues to be supplied as long as the manifold vacuum remains below approximately 9" hg. When the manifold vacuum again increases sufficiently, the force of the power piston spring (1) is overcome and the piston is drawn up, returning the carburetor to the economical part throttle mixtures. It will be noted that the power piston cavity in the carburetor air horn is connected to the main air flow passage by a vacuum break hole (3). This hole prevents the vacuum, acting on the piston, from also acting on the top of the fuel in the float bowl. Any leakage of air past the upper grooves of the piston will be compensated for by this vacuum break hole and will not affect carburetor calibration.

It is also in this range that the secondary side of the carburetor provides additional air and fuel to the engine for increased power. For high speed operation, beyond the part throttle range, the throttle linkage engages the secondary throttle valves and opens them completely in the remaining few degrees of primary throttle travel. Manifold vacuum acting on the secondary side of the carburetor is multiplied at the primary (5) and secondary (6) venturi, drawing fuel from the float bowl through the calibrated main metering jets (10) into the main wells. This fuel then passes through the main well tubes (17) and is bled in a manner similar to that described previously in the operation of the primary main well air bleeds.

This mixture is bled further at the main well bleeds (9)and is then drawn to the tips of the main well tubes (8). It then passes through the mixture passage (7) to the secondary venturi (6) and is discharged into the intake manifold.

The lower idle air bleeds (15) also supply fuel throughout the power range in a manner similar to that described under the part throttle system operation.

The auxiliary valves (16) provide a means for controlling secondary bore opening according to air velocity at wide open throttle. High velocity allows good metering and also holds the valves open, so that the secondary metering system can supply fuel-air mixture.

Low velocity, in turn, reduces metering efficiency. When this condition occurs, the spring tension overcomes the velocity and closes the valves. Air which was going through four bores, now passes through only two; the velocity is twice as high and good metering control is extended over a wider range of low speed, wide-open-throttle operation.

During the period when the secondary throttle valves are open and air flow is not high enough in the secondary bores to open the auxiliary valves, additional fuel is needed for the air which bypasses around the auxiliary valves. The additional fuel is supplied by tubes (19) which extend from the mixture channel in the venturi cluster arm to the low pressure point below the closed auxiliary valves (18).

When the air flow is high enough to open the auxiliary valves, the down tubes (19) no longer feed fuel because the low pressure point is now in the small venturi. With this feature, the correct fuel/air mixture can be supplied at any point during secondary throttle valve operation.

PUMP SYSTEM (Fig. 8-106)

When the throttle is opened rapidly, the air flow and manifold vacuum change almost instantaneously, while the heavier fuel tends to lag behind, causing a momentary leanness. The accelerator pump provides the fuel necessary for smooth operation during rapid acceleration. Since the throttle valves on the secondary side of the carburetor remain fully closed throughout part throttle operation, it is necessary to have only one accelerator pump located on the primary side of the carburetor.

A double spring pump plunger is used on the carburetor. The rates of compression of the top spring (7) and the bottom spring (4) are calibrated to insure a smooth sustained charge of fuel for acceleration. On the pump intake or up-stroke of the plunger, fuel from the float bowl passes through the pump filter screen (2), unseating the aluminum inlet ball (3), and filling the pump well. The accelerator pump is connected through the pump shaft and lever assembly, and pump rod to the throttle lever.

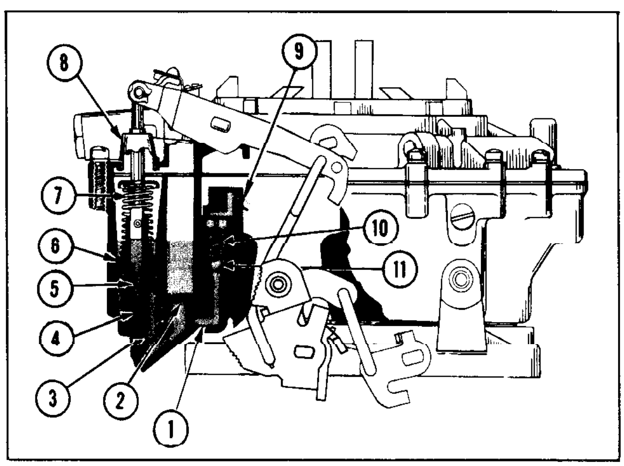


Fig. 8-106 Pump System

Upon acceleration or down stroke of the pump plunger, the force of fuel in the pump well seats the inlet ball (3). The fuel is then forced through the discharge channel (1), unseating the pump outlet ball (11), and then discharges through the pump jets (9) into the air stream. At the end of the discharge, the outlet ball is returned to its seat by the spring (10), which prevents air being drawn back into the fuel channel during the intake stroke.

The pump plunger head is vented to minimize the effect of fuel percolation in the pump well. This is accomplished by the design of a ball check and seat in the plunger head (5). Any build-up of fuel vapors in the pump well will rise, by-pass the ball and vent into the float bowl. This insures a solid charge of fuel beneath the plunger head for rapid acceleration. Without this feature, any vapor pressure build-up would evacuate the charge of fuel in the pump system, causing poor initial acceleration as well as difficult hot weather starting.

The carburetor also makes use of a pump plunger shaft dust boot (8) which serves the dual purpose of preventing dirt and foreign material from entering the fuel bowl through the shaft opening on the top of the air horn and also provides the proper seal necessary to maintain internal balance.

A two hole pump lever is used to provide an option for use in high altitude or high temperature areas. Normal pump rod installation is in the inner hole of the lever. The inner hole provides an increase of fuel during the first 15° of pump travel. Total pump capacity remains the same regardless of which hole is used. The outer hole is provided to correct a pump stumble (rich pump) which may be encountered on light tip-in at high altitude or temperature. Pump rod position should never be changed on cars operated in moderate or cold climates and not in warm climates or high altitudes unless owner complaints of a stumble on acceleration are received.

CHOKE SYSTEM (Fig. 8-107)

The choke system permits the fast idle speed to be regulated independently of the choke valve. The system is fully automatic to insure proper starting and driving when the engine is cold, with the added advantage of a shorter choking period while maintaining fast idle speeds adequate for fast warm-up. It also allows easier re-starting on a partially warm engine.

Choking of the carburetor is necessary only on the primary side because the secondary throttle valves are locked in the closed position whenever the choke valve is even partially closed. This is accomplished by a secondary throttle shaft lockout lever, located on the choke housing side of the throttle body, and a slot on the fast idle cam. Whenever the choke valve is closed, the lockout lever prevents opening of the secondary throttle valves. When the choke valve is wide open, the fast idle cam drops down so that the lockout lever clears the cam, permitting the secondary throttle valves to open.

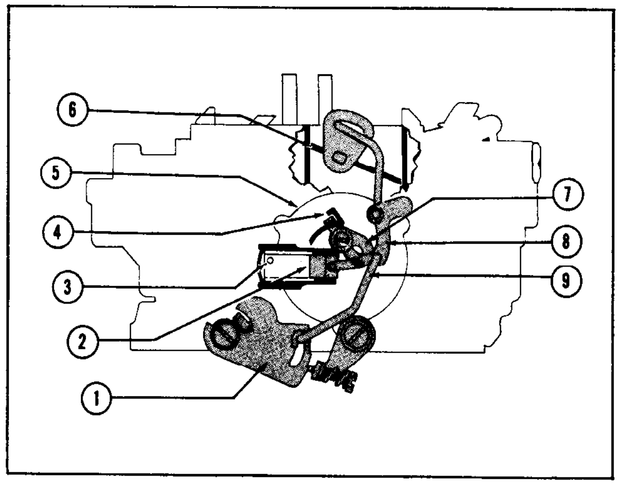


Fig. 8-107 Choke System

The choke system is composed of a thermostatic coil (4), vacuum piston (2), offset choke valve (6), and fast idle cam (1). Operation is controlled by a combination of intake manifold vacuum, the offset choke valve, atmospheric temperature and exhaust manifold heat.

When the engine is cold, the thermostatic coil is calibrated to hold the choke valve closed. As the engine is started, air velocity against the offset choke valve causes the choke valve to open against the torque of the thermostatic coil (4). Intake manifold vacuum is applied to the vacuum piston (2) through the vacuum channel (3) which also tends to open the choke valve. The choke valve is not balanced between the torque of the thermostatic coil against vacuum pull upon the choke piston and air velocity against the offset choke valve, causing a regulated air flow into the carburetor providing a richer mixture during the warm-up period.

During warm-up, the vacuum piston modifies choke action to compensate for varying engine loads or acceleration. Any acceleration or increased load, decreases the vacuum applied on the choke piston. This allows the thermostatic coil to momentarily decrease choke valve opening providing the engine with a richer mixture for acceleration.

As the engine warms up, hot air from the exhaust manifold is drawn into the thermostatic coil housing (5). The hot air raises the temperature and causes the coil to slowly relax its tension allowing the choke valve to move gradually to the full open position.

To prevent stalling during the warm-up period it is necessary to run the engine at a slightly higher idle speed. This is accomplished by the fast idle screw which rests on the steps of the fast idle cam located next to the choke housing opposite the main throttle levers.

The fast idle cam is linked to the choke lever (7) by the fast idle cam rod (9) and the intermediate lever (8). This makes the movement of the fast idle cam directly related to the movement of the coil, allowing the choke valve to open sooner while maintaining increased idle r.p.m. until the choke coil is completely released.

While the automatic choke is in operation, the driver may wish to advance the throttle to the wide open position. Since this would decrease pull upon the vacuum piston (2), thereby closing the choke valve, it is necessary to provide increased carburetor air flow by opening the choke valve mechanically. To accomplish this, a tang on the fast idle cam is made to contact the throttle lever at wide open throttle position so as to sufficiently open the choke valve. This is also called a choke unloader and also serves to dechoke a flooded carburetor during starting operation whenever the engine is cranked with the accelerator held fully depressed.

REMOVE AND INSTALL

1. Remove air cleaner.
2. Remove cotter key, which retains bellcrank, and retainer from bellcrank rod and remove bellcrank and rod as an assembly.
3. Disconnect fuel line from front of carburetor.
4. Disconnect choke pipe from choke cover.
5. Disconnect vacuum lines.
6. Remove four throttle body to intake manifold nuts and remove carburetor.
7. If equipped with positive crankcase ventilation inspect and clean the vacuum plate as necessary.

To install reverse removal procedure and make adjustments outlined under Adjustments (On Car). Torque carburetor to intake manifold nuts 11 to 14 ft. lbs.

CARBURETOR DISASSEMBLY

DISASSEMBLY OF AIR HORN (Fig. 8-108)

1. Mount the carburetor on Holding Fixture J-5923-B, or 30-14.
2. Remove the fuel inlet fitting and gasket, then remove the filter screen from the air horn.
3. Remove idle vent valve screw, shield and valve.
4. Remove the retainer from the upper end of the pump rod and disengage rod.

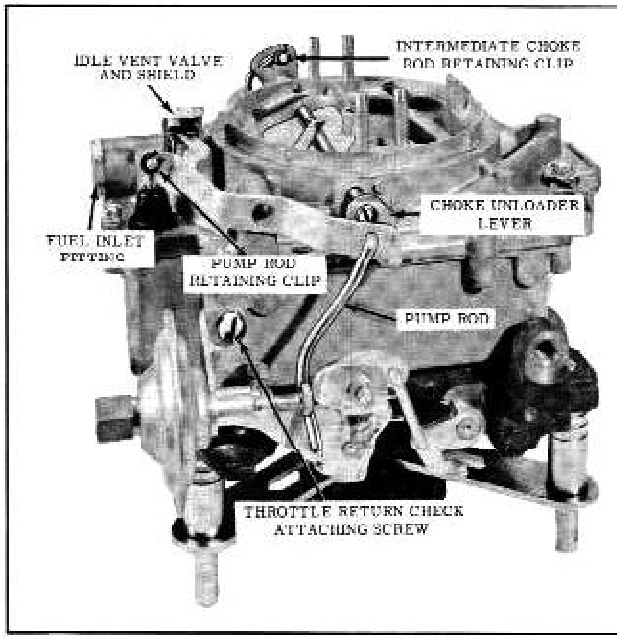


Fig. 8-108 4GC Carburetor

5. Remove the retainer from pump plunger shaft and unhook the shaft from pump arm.
6. Remove the retainer from the intermediate choke rod and unhook rod from choke lever.
7. If the choke shaft is to be removed:
   a. Remove the small screw holding the choke unloader lever to the choke shaft, then remove the lever.
   b. Remove the two small brass choke valve retaining screws and discard. Remove the choke valve and the choke shaft.
8. Remove the 13 air horn attaching screws, one screw is recessed in the top of the air horn.
9. Carefully lift the air horn until the float assemblies are clear of the carburetor body.
10. Remove the hinge pin from the primary float assembly, then slide the float and needle away from the power piston stem. (Fig. 8-109)
11. Remove primary float needle seat and gasket, using Tool BT-52. Remove the small filter screen from the needle seat bore.

    NOTE: The float needle and seat are matched and must be installed as an assembly.

12. Remove the hinge pin, float assembly, needle seat gasket and filter screen from the secondary side of the air horn. Do not remove the float balance spring unless it is distorted and needs replacement.
13. Remove the air horn gasket.

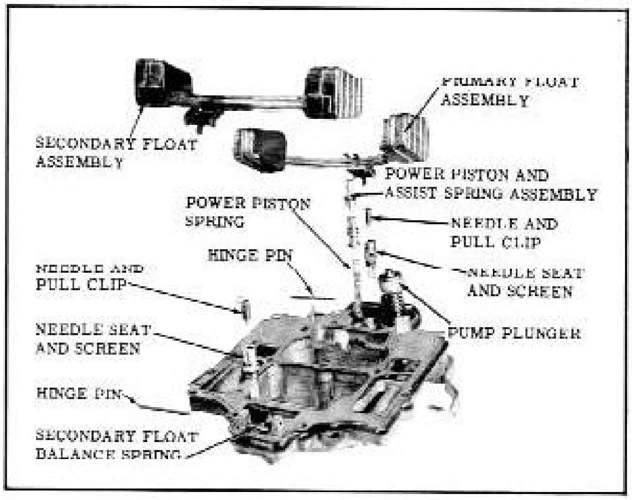


Fig. 8-109 Air Horn Assembly

14. Remove burrs around power piston bore due to staking and remove the power piston assembly by depressing the stem and allowing it to snap back into position. Remove the spring under the piston.

15. Remove the pump plunger assembly by sliding the shaft through the rubber seal. Remove the rubber seal from the top side of the air horn casting.

DISASSEMBLY OF FLOAT BOWL

1. Remove the fast idle cam attaching screw. (Fig. 8-110)

2. Remove the three choke cover attaching screws and retainers, then remove the choke cover, gasket and baffle from the choke housing.

3. Remove the choke piston lever attaching screw, then remove the lever link and piston assembly from the choke housing.

4. Remove the two choke housing attaching screws,

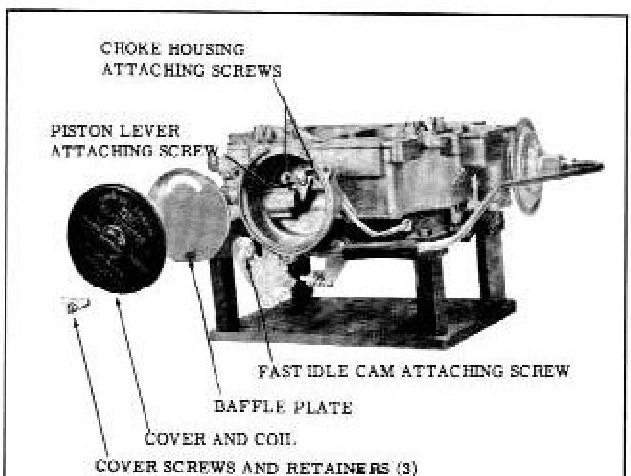


Fig. 8-110 Choke Assembly and Fast Idle Cam

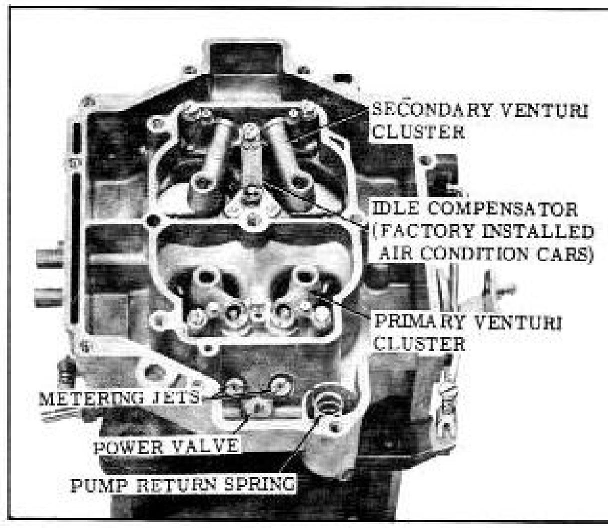


Fig. 8-111 Float Bowl Assembly

then remove the choke housing and linkage from the carburetor body.

5. Remove the intermediate choke lever and shaft with linkage from the choke housing, then remove choke housing gasket.

6. Remove the throttle return check by removing the attaching screw, and the rubber tee from the vacuum fitting on the throttle body.

7. Remove the three attaching screws and lock washers from the venturi cluster on the primary side, then remove the cluster and gasket. (Fig. 8-111)

8. Remove the three attaching screws and lock-washers from the venturi cluster on the secondary side, then remove the cluster and gasket.

9. If equipped with idle compensator, remove attaching screws then remove the idle compensator and gasket.

10. Remove both metering jets from the primary (pump) side of the carburetor body.

11. Remove the power valve and gasket.

12. Remove both metering jets from the secondary side of the carburetor. Keep them in a separate group.

13. Remove the pump return spring from the pump well, then invert the carburetor body to remove the aluminum pump inlet ball from the well.

14. Remove the small "T" shaped pump discharge spring guide with needle nose pliers, then remove the small spring and steel ball. (Fig. 8-112)

15. If it is necessary to clean or replace the small screen next to the pump plunger bore, remove the retainer ring and screen.

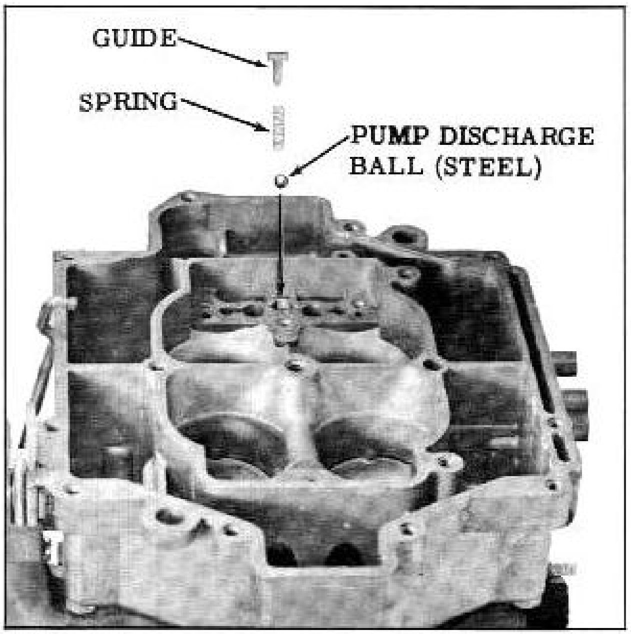


Fig. 8-112 Pump Discharge Spring Guide

16. Invert the carburetor body and remove the four throttle flange attaching screws. Remove the throttle flange and gasket. (Fig. 8-113)

17. Remove the secondary auxiliary throttle valve assembly from the carburetor body.

DISASSEMBLY OF THE THROTTLE BODY

NOTE: No attempt should be made to remove the throttle valve or shaft from the throttle flange as it may be impossible to reassemble the throttle valves correctly in relation to the vacuum advance and idle discharge orifices.

The idle mixture needle screws may be removed for cleaning or replacement. Also the slow and fast idle speed screws can be removed if necessary.

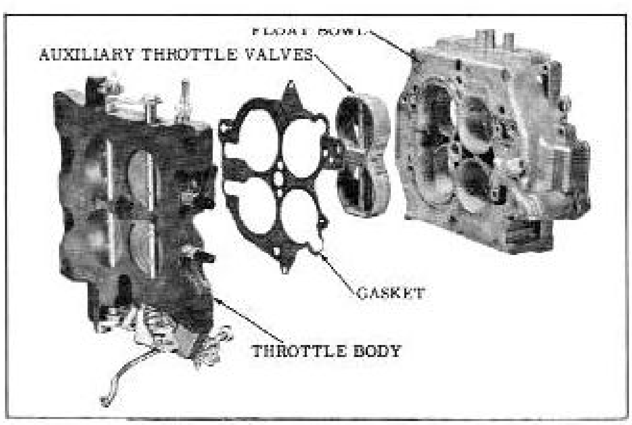


Fig. 8-113 Throttle Body and Auxiliary Throttle Valves

CLEANING OF PARTS

The carburetor should not be cleaned in any solution other than a cold immersion type cleaner.

1. Thoroughly clean carburetor castings and metal parts in carburetor cleaning solvent.

   CAUTION: The choke coil, housing, and pump plunger should not be immersed in solvent. Clean pump in clean gasoline only.

2. Blow all passages in casting dry with compressed air. DO NOT PASS DRILLS THROUGH JETS OR PASSAGES.
3. Clean filter screens of dirt or lint. If the filter screens are distorted or plugged they should be replaced.

INSPECTION OF PARTS

1. Check floats for dents or excessive wear at hinge pin holes.
2. Shake floats to check for leaks.
3. Examine float needle and seat. If grooved, replace with a factory matched float needle, seat, and gasket assembly.
4. Inspect the idle mixture adjusting needles for burrs or ridges.
5. Inspect the upper and lower surfaces of the carburetor body to see that the small sealing beads are not damaged. Damaged beading may result in air or fuel leaks at that point.
6. Inspect holes in pump rocker arm, fast idle cam, and throttle shaft lever. If holes are worn excessively or out of round to the extent of improper operation of the carburetor, worn parts should be replaced.
7. Inspect the steps on the fast idle cam for excessive wear. If excessive wear is noted, cam should be replaced to assure proper engine operation during the warm-up and choking periods.
8. Inspect the pump plunger leather for cracks or creases. If the pump plunger leather is damaged, replace the pump plunger as a complete assembly.
9. Inspect the throttle flange assembly. Make sure the idle passages and vacuum channels are clean.
10. Inspect filter screens. If screens are distorted or plugged, they should be replaced.

As mentioned during the disassembly of the carburetor, there is a very close tolerance fit of the throttle valves in the throttle body. Also the idle discharge orifices are drilled in relation to a properly fitting valve. Therefore, if the throttle valves, levers or shafts are worn excessively or damaged, a complete throttle body assembly is required.

CARBURETOR ASSEMBLY

ASSEMBLY OF THE THROTTLE BODY

1. Install the idle mixture needles and springs finger tight. Back out the needles 1-1/2 turns as a preliminary idle adjustment.
2. If removed, install the slow and fast idle screws in the throttle levers.

ASSEMBLY OF THE FLOAT BOWL

1. With the carburetor body in the inverted position, install the auxiliary throttle valve assembly so that the calibrated spring operating pin is down. (Fig. 8-113)
2. Position the throttle body gasket on the float bowl so that all holes are properly aligned.
3. Place the throttle body on the float bowl and install the four attaching screws. Tighten the center screw 9 to 10 ft. lbs. and the outer screws 3 to 4 ft. lbs.
4. Place the float bowl upright on the holding stand.
5. Install the pump outlet steel ball, spring, and "T" shaped guide in the center hole of primary venturi cluster mounting surface in float bowl. (Fig. 8-114)
6. Install the power valve and gasket, and the two primary main metering jets. (Fig. 8-115)

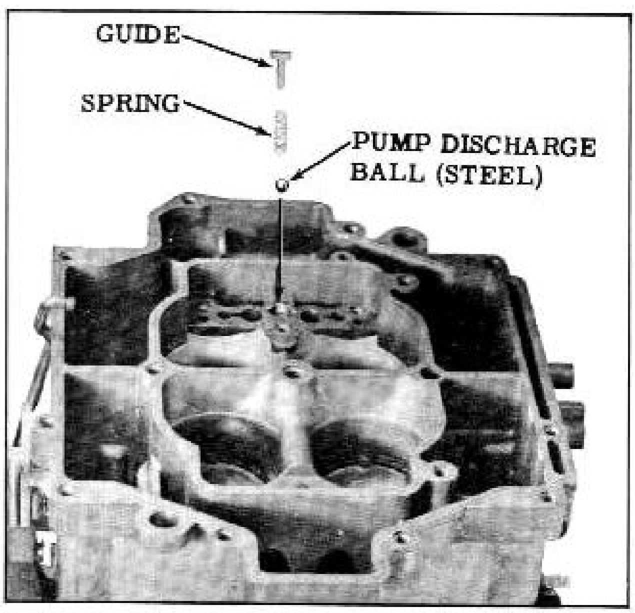


Fig. 8-114 Pump Discharge Spring Guide

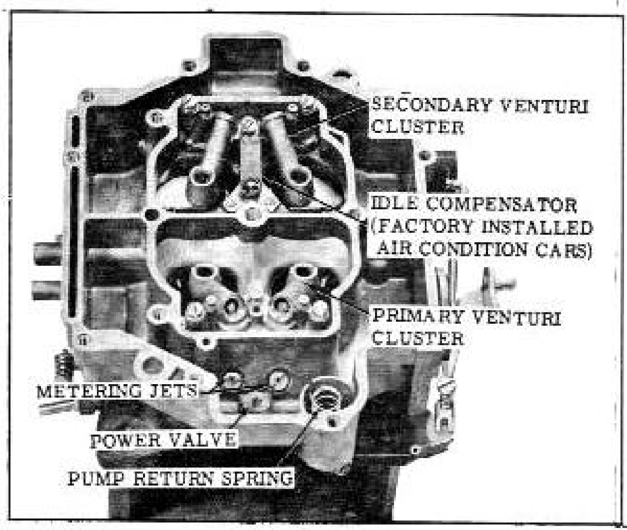


Fig. 8-115 Float Bowl Assembly

7. Install the two secondary main metering jets.
8. If equipped with idle compensator, install compensator and gasket and retain with 2 screws. Make sure the compensator is seated firmly in the passage and tighten screws securely.
9. Install the secondary venturi cluster and gasket and retain with three attaching screws and washers.

   NOTE: The secondary cluster does not have pump discharge nozzles.

10. Install primary venturi cluster and gasket and retain with three attaching screws and lockwashers.
11. Install the pump inlet aluminum ball and the pump return spring in the pump plunger well. Be sure the spring is seated over the ball.
12. Install the pump inlet screen and retainer if removed.

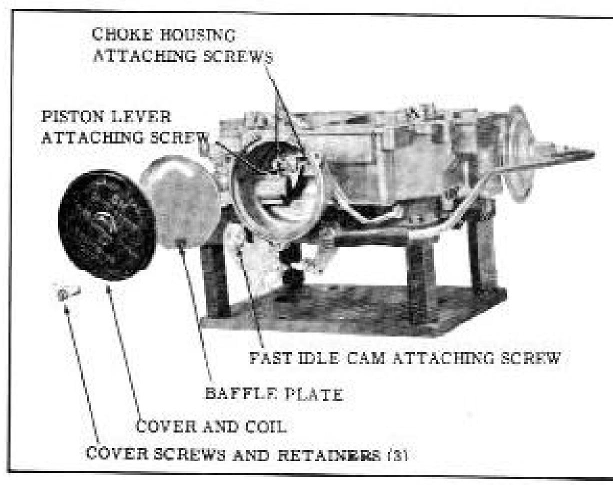


Fig. 8-116 Choke Assembly and Fast Idle Cam

13. Install the choke housing gasket, intermediate choke lever and shaft with linkage, in the choke housing. (Fig. 8-116)
14. Install the choke housing on the float bowl and retain with two attaching screws. Be sure the intermediate choke shaft lever is extending downward between the two attaching screw bosses.
15. Install the choke lever, link, and piston assembly and attach lever to the intermediate choke shaft.

    NOTE: The choke piston pin hole in the piston should be pointing inward.

16. Install fast idle cam with attaching screw.

ASSEMBLY OF THE AIR HORN (Fig. 8-117)

1. Install the power piston spring in the bore, then install the power piston in the air horn and stake the casting very lightly to hold the piston in place.
2. Install the pump plunger rubber seal in the air horn by inserting the small end through from the bottom. The lips of the seal must be seated on both sides of the cover.
3. Insert the pump plunger shaft through the rubber seal.
4. Position the gasket on the air horn.
5. Install both float needle seats and gaskets, with filter screens attached using Tool BT-52.
6. Install secondary float assembly on the air horn, retaining in place with hinge pin. Make sure tang on rear of the float arms is over the balance spring.
7. Install primary float assembly with the center of the float arms on the power piston shaft under the vacuum assist spring retainer.

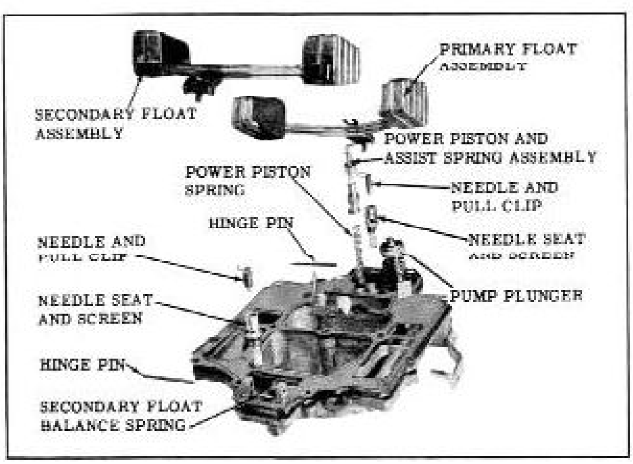


Fig. 8-117 Air Horn Assembly

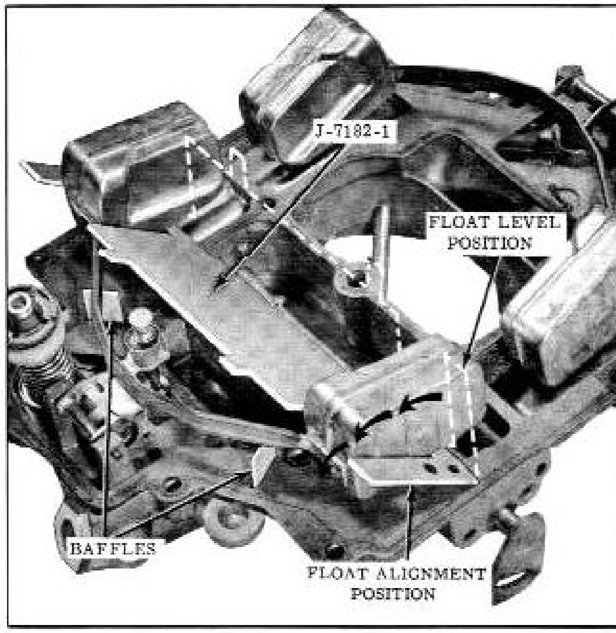


Fig. 8-118 Checking Primary Float Level and Alignment

8. Make float adjustments as outlined under float adjustments.

FLOAT ADJUSTMENTS

FLOAT LEVEL AND ALIGNMENT—PRIMARY SIDE

When checking the primary float level, be sure that the float arms do not rest on the baffles. A minimum of .030" must be maintained between the float arms and the baffles. If the minimum clearance does not exist after the float adjustments are made, it will be necessary to file the float arms.

NOTE: Do not file the baffles.

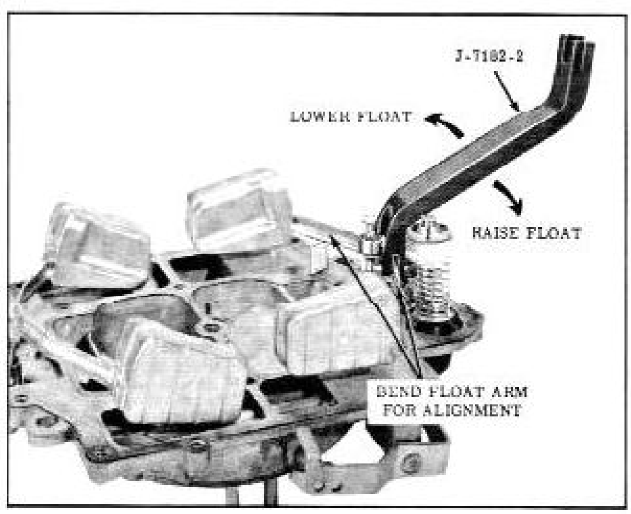


Fig. 8-119 Adjusting Float Level (Primary Shown)

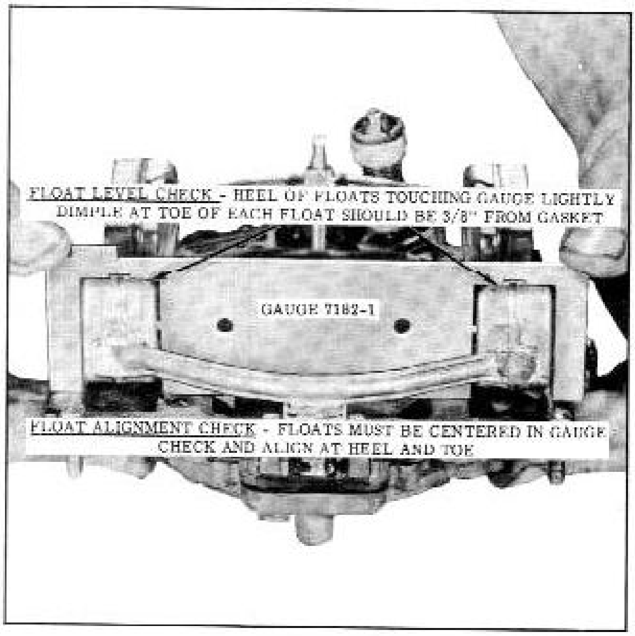


Fig. 8-120 Checking Secondary Float Level and Alignment

1. With gasket in place and the air horn inverted, position gauge J-7182-1 under the primary float as shown in Fig. 8-118.
2. With the gauge held vertical, the lower surfaces of each float pontoon should just touch the gauge. The lower surface of each pontoon should be parallel with the air horn.
3. If necessary to adjust, bend the float arm as indicated in Fig. 8-119.
4. To check float alignment rotate gauge as indicated in Fig. 8-118. Float pontoon should be centered in the gauge cutout.
5. If adjustment is necessary, bend the float arms horizontally as required. After bending float arms, recheck the float level.

FLOAT LEVEL AND ALIGNMENT SECONDARY SIDE

1. With the gasket in place and the air horn inverted, position gauge as shown in Fig. 8-120.
2. The highest point of the float pontoons at the heel should just touch the gauge.
3. If necessary to adjust, bend the float arms at the center with Tool J-7182-2.
4. Measure distance from the dimple on the side of each pontoon to the air horn gasket. Distance should be 3/8".
5. If an adjustment is necessary, bend each float arm as required, then recheck float level.
6. To check for float alignment, position gauge J-7182-1 over the floats. With the gauge centered on the air horn, the float pontoons should be centered in the gauge.
7. If an adjustment is necessary, bend the float arm to center the pontoon in the gauge. Recheck the float level.

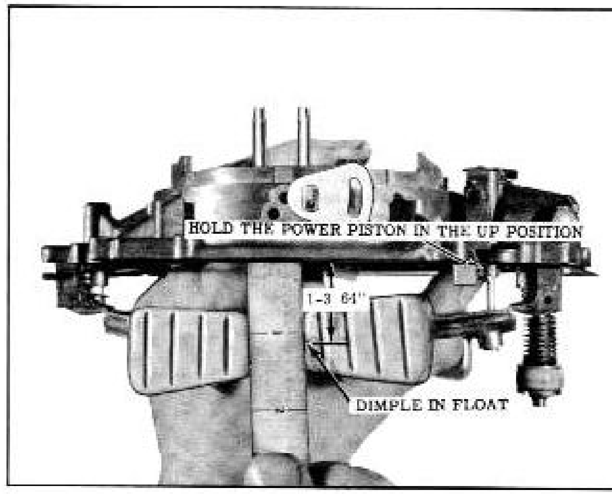


Fig. 8-121 Checking Vacuum Assist Spring Adjustment

VACUUM ASSIST SPRING ADJUSTMENT

1. Position the air horn as shown in Fig. 8-121, with the power piston retained in the up position.
2. Bounce the floats lightly and measure the distance from the gasket to the dimple on the side of the primary float.
3. If an adjustment is necessary, bend the tang under the vacuum assist spring and retainer as indicated in Fig. 8-122.

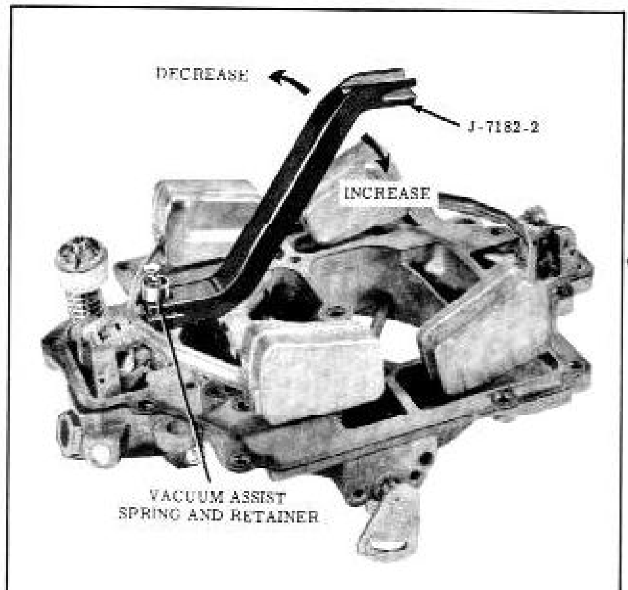


Fig. 8-122 Adjusting Vacuum Assist Spring

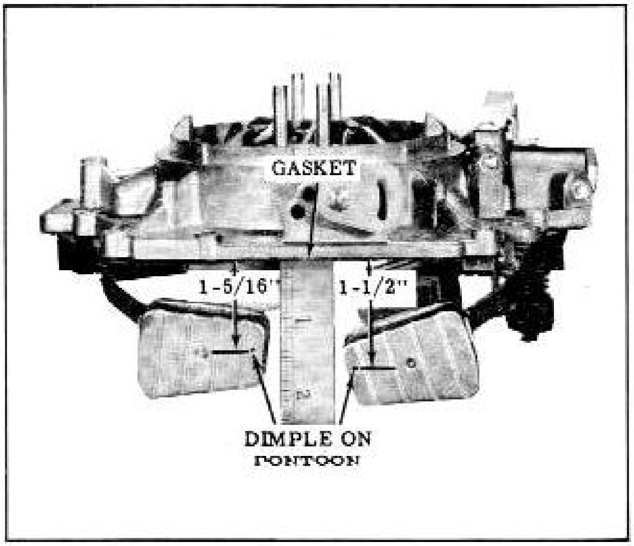


Fig. 8-123 Checking Primary and Secondary Float Drop

FLOAT DROP ADJUSTMENT— PRIMARY AND SECONDARY

1. Position the air horn as shown in Fig. 8-123. Do not hold the power piston for this adjustment.
2. Bounce the floats lightly and measure the distance from the air horn gasket to the center of the dimple on the secondary and primary float pontoons. Distance on the secondary should be 1-5/16". Distance on the primary should be 1-1/2".
3. If an adjustment is necessary, bend the tang at the rear of the float arms toward the needle and seat to decrease the setting, away from the needle and seat to increase the setting.

COMPLETION OF CARBURETOR ASSEMBLY

1. Carefully guide the air horn assembly on the carburetor body so that the pump plunger, power valve stem, and floats will not be damaged.
2. Align the holes in the air horn, gasket and body and just start the 13 air horn attaching screws.
3. Tighten evenly and securely the inner attaching screws (including the screw through the inner wall), then tighten the remaining outside attaching screws in the same manner.
4. If choke shaft was removed, install the choke shaft in the air horn by inserting it in the hole from the same side as the choke.
   a. Slide the choke valve through the shaft so that the letters "RP" on the valve are facing up when the valve is closed.
   b. Install two new small choke valve-to-shaft attaching screws. Close the choke valve to align choke in air horn, then tighten screws.
5. Install the rubber idle vent valve and shield on top of the air horn. Make sure valve seats properly on air horn.
6. Insert upper end of the pump rod through the inner hole in the pump lever by lifting up on the lever, then install the retainer. Insert pump plunger shaft in pump lever and install retainer.
7. Install the fuel inlet screen, gasket and fitting in the air horn.
8. Install the choke unloader lever on the choke shaft.
9. Install the intermediate choke rod into the choke lever.
10. Adjust intermediate choke rod and choke coil as outlined under ADJUSTMENTS (ON OR OFF THE CAR).
11. Install the rubber tee on the vacuum fitting in the throttle body.
12. Adjust fast idle cam rod, secondary lockout, secondary throttle lockout, pump rod, and unloader as outlined under ADJUSTMENT (ON OR OFF CAR).

ADJUSTMENTS (On or Off the Car)

INTERMEDIATE CHOKE ROD AND CHOKE COIL ADJUSTMENT

The choke vacuum piston must be properly positioned with respect to the vacuum slots in the choke housing bore to provide proper choke pull off action.

1. With the choke cover and baffle removed position the fast idle screw on the high step of the fast idle cam. Raise the intermediate choke lever to its full up position then push lightly on the end of choke piston to remove all lash in the linkage, check to see if the choke piston is flush to 1/32" out of the choke piston bore. (Fig. 8-124)
2. Bend the intermediate choke rod if necessary to correctly position choke piston.
3. Position baffle in choke housing, then install cover gasket, cover and coil assembly, and three screws and retainers.
4. Rotate cover counterclockwise until coil picks up tang on piston linkage. Continue rotating

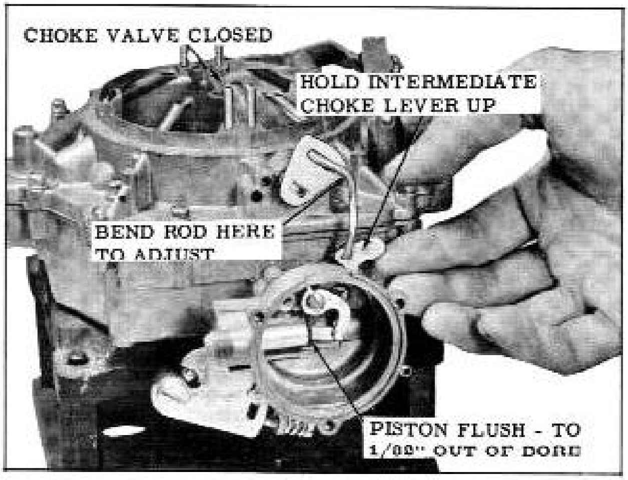


Fig. 8-124 Intermediate Choke Rod Adjustment

cover until scribe line on cover is on index. (Fig. 8-125)

5. Tighten the three cover attaching screws.

FAST IDLE CAM ROD ADJUSTMENT

In addition to the intermediate choke rod and choke coil adjustment, it is necessary to adjust the fast idle cam rod to the cam. This insures proper positioning of the fast idle cam when the choke coil is in operation.

1. Turn in the fast idle screw until it just contacts the middle step of the fast idle cam.
2. With the shoulder of the highest step of the fast idle cam held against the fast idle screw, hold the intermediate choke lever in the extreme up position. The intermediate choke rod and the fast idle cam rod must be at the upper limit of travel in the slot to remove all travel, check the clearance between the top edge of the choke valve and the dividing wall of the air horn. Check clearance with small end of gauge BT-68. Clearance should be .053". (Fig. 8-126)
3. If necessary to adjust, bend the fast idle cam rod (lower rod).

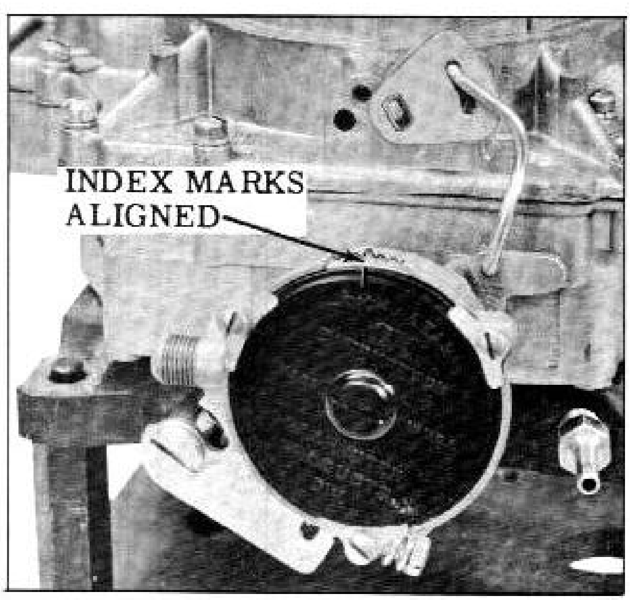


Fig. 8-125 Choke Coil Setting

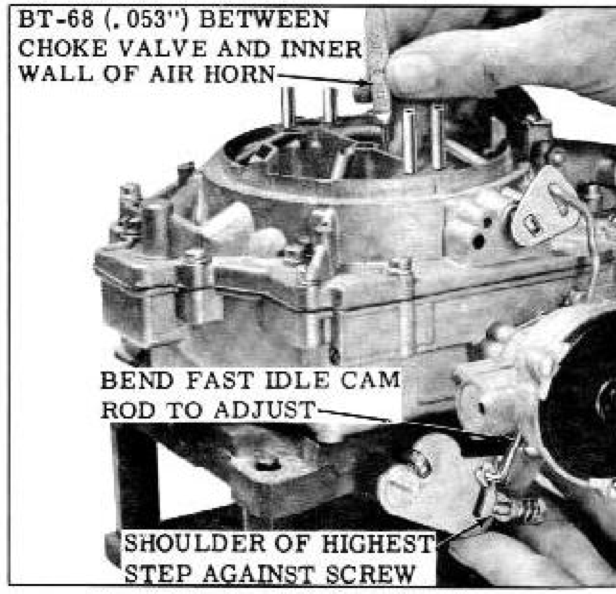


Fig. 8-126 Fast Idle Cam Rod Adjustment

SECONDARY THROTTLE LOCK-OUT ADJUSTMENT

The secondary throttle lock-out prevents opening of the secondary throttle valves until the engine has reached normal operating temperature. Insufficient clearance at the lock point will allow the fast idle cam to strike the tang and prevent the choke from closing.

1. Measure the clearance between the lock-out tang and the top edge of the slot in the fast idle cam. The clearance should be .015" ± .005". (Fig. 8-127)

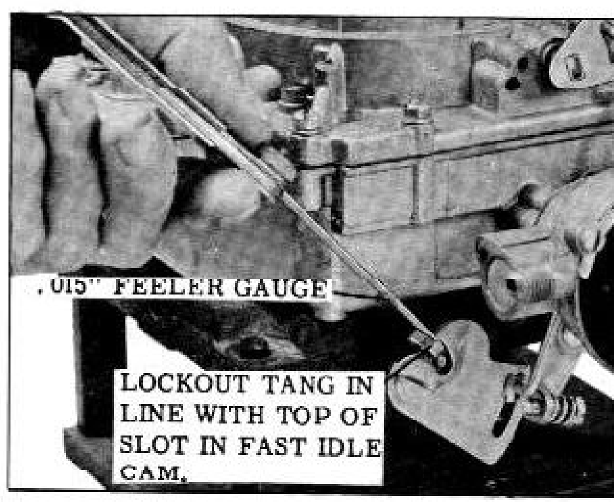


Fig. 8-127 Secondary Throttle Lock-Out Adjustment

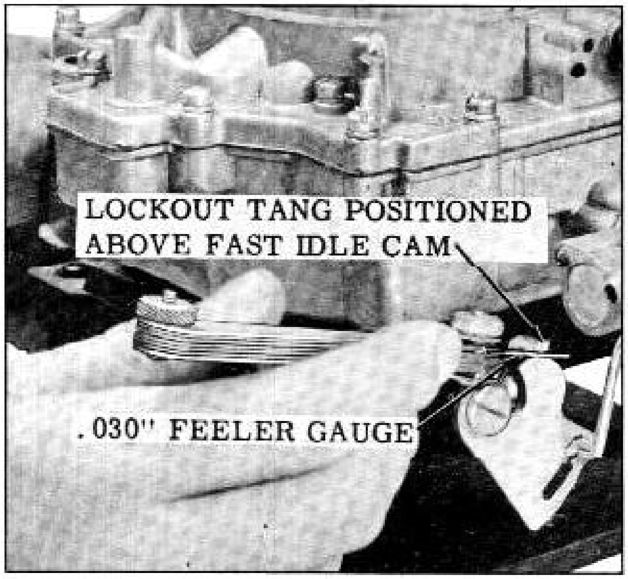


Fig. 8-128 Secondary Throttle Contour Clearance Adjustment

2. If adjustment is necessary, bend the tang sideways using Tool BT-18 until the proper clearance is obtained.

SECONDARY THROTTLE CONTOUR CLEARANCE ADJUSTMENT

The secondary throttle contour clearance adjustment, which is performed after the lock-out adjustment, actually times the unlocking of the secondary throttle valve in relation to engine temperature.

1. Hold the choke valve in the wide open position so that the secondary lock-out tang is positioned over the fast idle cam, then measure the clearance between the tang and the fast idle cam. The clearance should be .030" ± .010". (Fig. 8-128)
2. If adjustment is necessary, allow the choke to close so that the tang is again in the slot of the fast idle cam, then use Tool BT-91 to bend the tang straight up or down as required for proper clearance.

PUMP ROD ADJUSTMENT

1. While holding the throttle valves closed, idle speed screw backed out, measure the distance from the top of the air horn casting to the bottom edge of the pump plunger shaft. It should be 1-1/64". (Fig. 8-129)
2. If adjustment is necessary, bend the pump rod using Tool BT-18.
3. Operate the pump rod several times to be sure the movement is free.

UNLOADER ADJUSTMENT

If the engine "loads up" or becomes flooded when cold starting, it is necessary to mechanically open the choke valve a small amount to admit more air and facilitate starting. This is accomplished when the tang on the pump lever contacts a tang on the choke shaft at wide-open throttle.

1. Be sure the pump rod adjustment is correct.
2. While holding the throttle lever in the wide open position (with carburetor off car), or with accelerator pedal completely depressed (with carburetor on car), check the clearance between the top edge of the choke valve and the dividing wall. The correct clearance is .115" and can be checked with gauge BT-90. (Fig. 8-130)
3. If necessary, bend the small tang on the pump lever with Tool BT-91 to obtain the correct dimension.

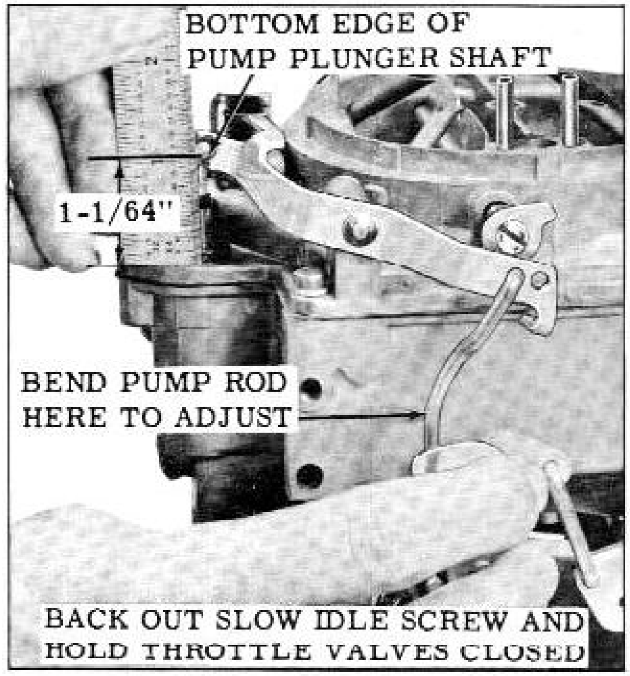


Fig. 8-129 Pump Rod Adjustment

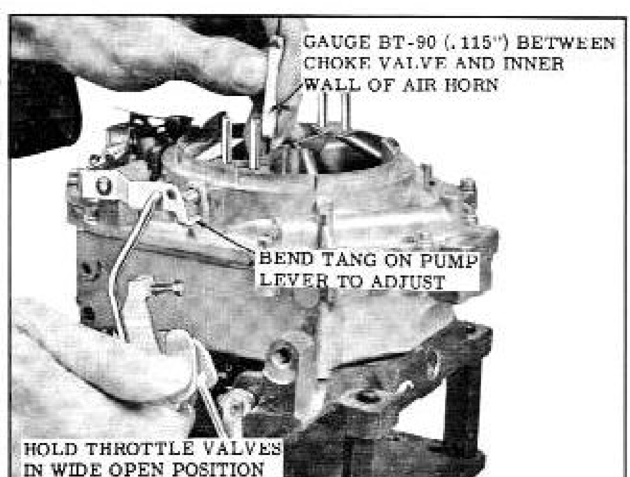


Fig. 8-130 Unloader Adjustment

IMPORTANT: If the unloader adjustment was made off the car, it will be necessary to recheck the adjustment with the accelerator pedal completely depressed after the carburetor is installed.

SECONDARY ACTUATING LEVER ADJUSTMENT

1. Install the throttle return check on the carburetor with holding fixture J-6342-01 in place.
2. Back out the fast idle adjusting screw until the throttle valves are fully closed. Be sure the fast idle screw is not resting against the fast idle cam.
3. Remove slack from linkage and insert a feeler gauge between the actuating lever and the primary lever. (Fig. 8-131).
4. Clearance should be between .005" and .025".
5. To adjust, open the throttle valves and bend the actuating tang with Bending Tool BT-18.

ADJUSTMENTS (ON CAR)

There are four adjustments that must be made with the carburetor mounted on the engine. They are: Slow Idle Adjustment, Fast Idle Adjustment, Throttle Return Check Adjustment and Atmospheric Idle Vent Adjustment.

SLOW IDLE ADJUSTMENT

(Air Cleaner Removed)

Engine must be at operating temperature and throttle return check Holding Fixture J-6342-01 in place when making the slow idle speed adjustment.

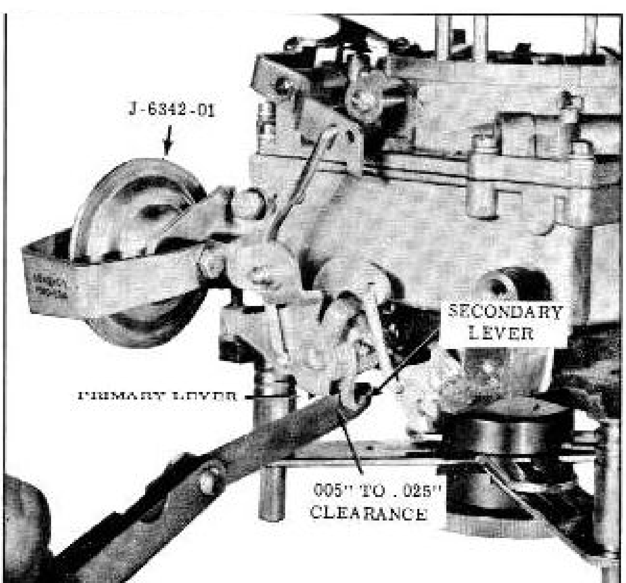


Fig. 8-131 Secondary Actuating Lever Adjustment

SLOW IDLE SPEED

TRANSMISSION	GEAR	R.P.M.
Hydra-Matic	Drive	500
Syncro-Mesh	Neutral	550
Factory Installed Air Conditioning - Air Conditioning turned "OFF", Idle Compensator held closed. Dealer Installed Air Conditioning (Without Idle Compensator) - Air Conditioning turned "ON".		

After the idle r.p.m. is stabilized, turn in or out each idle adjusting needle screw until the smoothest possible idle is obtained. This normally is accompanied by a higher manifold vacuum reading and/or an increase of idle r.p.m. Then, turn out (rich) each needle 1/4 turn, at which time both the idle vacuum and r.p.m. will drop off slightly. This adjustment will prove to be correct for all normal requirements.

NOTE: Idle speed and mixture should be re-checked with air cleaner installed.

When setting the idle speed and mixture on cars with an idle compensator (factory installed air conditioning only) make sure the idle compensator stays closed by holding it down. If the idle speed increases when the air cleaner is installed, do not reduce the idle speed setting since the idle compensator is open. If the speed decreases, re-adjust idle to correct r.p.m.

FAST IDLE ADJUSTMENT

When the engine is cold and the choke valve is partially closed, it is necessary that the engine r.p.m. at idle be higher than normal to prevent stalling. This adjustment, if correct, will assure proper engine r.p.m. during the warm-up period.

1. Open throttle valves and rotate the fast idle cam so that the fast idle screw is resting on the high step of the cam.
2. With the engine running at operating temperature, transmission selector lever in neutral and the parking brake applied, adjust the fast idle screw to obtain an engine speed of 1600 r.p.m.

NOTE: Any time the fast idle is changed it will be necessary to adjust the throttle return check.

THROTTLE RETURN CHECK ADJUSTMENT

The throttle return check is designed to open the throttle valves to increase engine speed when engine vacuum drops if the engine loads up and starts to stall. It also acts to retard throttle closing when the driver suddenly takes his foot off the accelerator pedal.

The vacuum to the throttle return check has an air bleed above the throttle valves to give faster response to the return check on decelleration.

1. Be sure the fast idle adjustment has been made, then shut off the engine.
2. Rotate the fast idle cam so that the fast idle screw rests on top of the highest step of the fast idle cam.
3. Measure the clearance between the contact screw and the contact on the throttle lever. The clearance should be .020".
4. If adjustment is necessary, adjust the contact screw using two wrenches.

NOTE: Any time the fast idle is changed, it will be necessary to readjust the throttle return check. For throttle linkage adjustments refer to the Hydra-Matic Section (3) or Syncro-Mesh Section (11).

ATMOSPHERIC IDLE VENT ADJUSTMENT

The atmospheric idle vent is designed to vent any vapor formed in the float bowl during slow idle operation. It is opened by a tang on the pump lever whenever the throttle valves are in the slow idle position.

1. Rotate fast idle cam until the fast idle screw is resting on the highest step of the fast idle cam. (1600 r.p.m.) The idle vent valve should just be closed.
2. If necessary to adjust, bend the idle vent tang on the pump lever, using Tool BT-69.
3. Run the engine on slow idle. The idle vent must be open.

ROCHESTER CARBURETOR MODEL 2GC

THEORY OF OPERATION

FLOAT SYSTEM (Fig. 8-132)

The float system controls the level of fuel in the carburetor bowl. Fuel enters the carburetor through the inlet strainer then passes thru the needle and seat strainer (1) then thru the needle and seat (2), then into the carburetor bowl. The flow continues until the rising liquid level raises the float (8) to a position where the needle valve (3) is closed. The fuel level can be regulated by setting the float to close the valve when the proper level is reached.

The float tang (4) prevents the float from traveling too far downward. A float needle pull clip (5) connecting the float arm to the needle valve keeps the needle from sticking closed in the seat.

The float bowl is internally vented (6) to eliminate any possible change in fuel/air mixture due to air cleaner restriction.

An external idle vent valve (7) located on top of the float bowl, vents the bowl to atmosphere during idle operation. Any fuel vapors which may form in the float bowl during idle will be vented to the atmosphere. The idle vent closes after the throttle valve has moved from the idle position and returns the carburetor to an internal balance.

IDLE SYSTEM (Fig. 8-133)

The idle system consists of the idle tubes (5), idle passages (3), idle air bleeds (1), idle adjustment needles (7) and idle discharge holes (6).

In the curb idle speed position, the throttle valve (9), is slightly open, allowing a small amount of air to pass between the wall of the carburetor bore and the edges of the throttle valve.

The idle needle hole (8) is in the high vacuum area below the throttle valves while the fuel bowl is vented to atmospheric pressure.

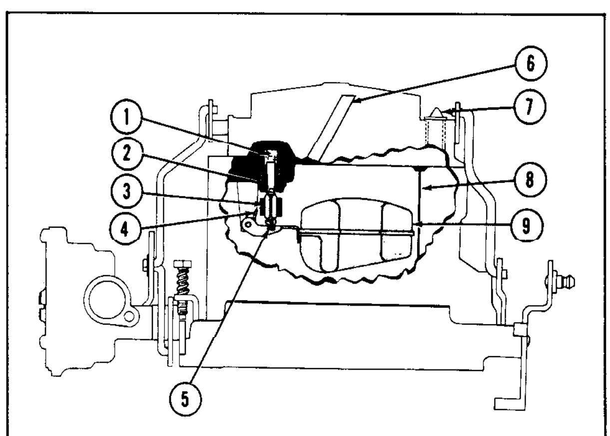


Fig. 8-132 Float System

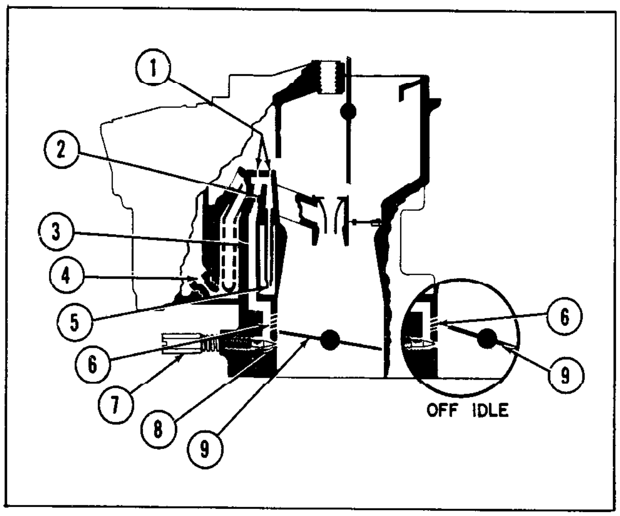


Fig. 8-133 Idle System

The fuel is drawn from the bowl through the main metering jets (4) into the main well. The fuel is metered by the idle fuel metering orifice at the lower tip of the idle tube (5) and travels up the idle tube. When the fuel reaches the top of the idle tube, it is mixed with air through two idle air bleed holes (1) and the mixture moves through the horizontal idle passage through a restriction (2) and down the vertical idle passage to the four idle discharge holes (6) located just above the throttle valves where more air is added to the mixture. The mixture then passes through the idle needle holes (8) and into the bore of the carburetor.

In addition to this mixture of fuel and air, air enters the bore of the carburetor through the slightly opened throttle valve. For smooth operation, the air from the bore and the air-fuel mixture from the idle needle hole must combine to form the correct final mixture for curb idle engine speed.

The position of the idle adjusting needle (7) regulates the amount of air-fuel mixture admitted to the carburetor bore. Except for this variable at the idle adjustment needle, the idle system is specifically calibrated for low engine speeds.

As the throttle valves are opened, a pressure differential change occurs. Opening of the valve progressively exposes the idle discharge holes (6) to manifold vacuum and the air flow, with the result that they deliver additional air-fuel mixture for off-idle engine requirements.

On factory installed air conditioned cars, an idle compensator is used as an additional aid to prevent stalling during prolonged hot idle. The compensator mounted between the large venturi, consists of a bi-metal strip which, when heated, opens a valve allowing additional idle air to enter the system. (Fig. 8-134)

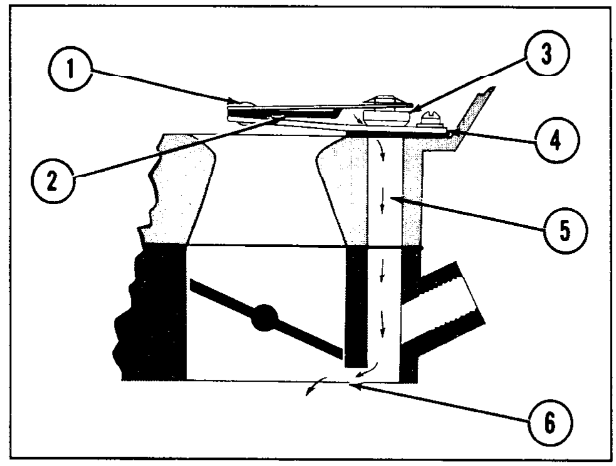


Fig. 8-134 Idle Compensator

IDLE COMPENSATOR

The idle compensator (1) consists of a bi-metal strip (2), a valve (3), and a mounting bracket (4). It is mounted between the large venturi at the rear. The valve seats on a hole which is connected by an air passage (5) to a point below the throttle valves (6).

In operation, when idling hot for long periods, the bi-metallic strip will expand upward, forcing the valve off its seat. This allows additional idle air to enter below the throttle valves, offsetting the enrichening effects of high engine temperatures.

When under-hood temperature decreases, the valve closes and idle operation returns to normal.

PART THROTTLE SYSTEM (Fig. 8-135)

As the throttle valves are opened to a greater degree and more air is drawn through the carburetor, it is necessary to provide means, other than the idle system, for supplying additional fuel to meet engine requirements.

Further opening of the throttle valve (7) increases the speed of the air stream passing through

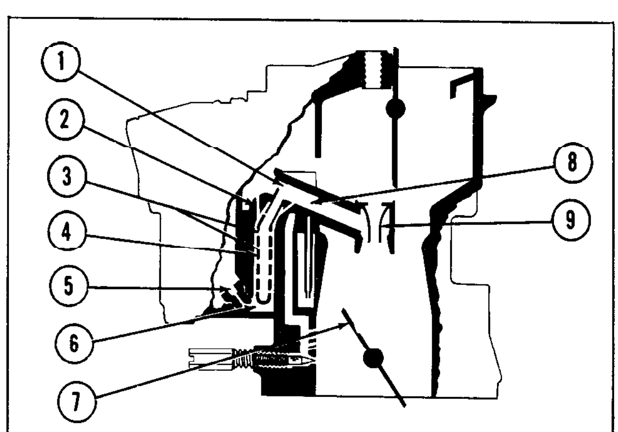


Fig. 8-135 Part Throttle Operation

the venturi, thus lowering the pressure (raising the vacuum) in the small venturi area (9) of the carburetor bore. At the same time, the edge of the throttle valve is moved away from the wall of the bore, gradually reducing the vacuum and reducing the mixture at the idle discharge holes.

Since the low pressure point is now in the small venturi area, fuel and air-fuel mixture will be forced from the fuel bowl through the main metering system to the venturi as follows:

The fuel passes through the main metering jets (5) into the main well (6) where it raises in the main well tube (4). Air entering through the main well air bleeds (3) in the cluster is mixed with fuel through the vents (2) in the main well tube. The mixture continues up the main well tube through the nozzle (1) where more air is added. The mixture flows through the high speed passage (8) to the small venturi (9) where it mixes with additional air and moves on to the bore of the carburetor, through the intake manifold, and into the cylinders as a final mixture for part throttle operation.

As throttle opening is increased and more fuel is drawn through the main well tubes, the fuel level in the main well drops. More holes in the main well tubes are then exposed to the air in the upper well area and become air bleeds. This maintains the proper air/fuel mixture to the engine throughout the part throttle range.

Permanent jets and air bleeds calibrate the main metering system for efficient part throttle operation.

POWER SYSTEM (Fig. 8-136)

The power system provides additional fuel for heavy load and high speed engine requirements.

A spring loaded power piston (2) controlled by vacuum (1) regulates the power valve to supply additional fuel according to speed and load.

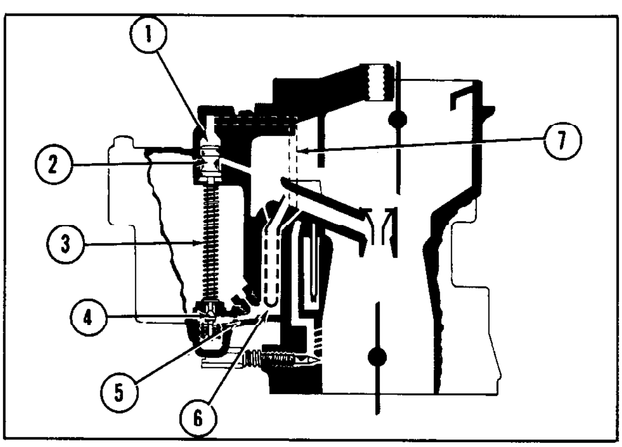


Fig. 8-136 Power System

The power piston vacuum channel is open to manifold vacuum (7) beneath the throttle valves. This allows the vacuum in the channel to raise and fall with engine manifold vacuum.

During idle and part throttle operation, the vacuum in the channel is normally high enough to hold the power piston in the fully raised position against the tension of the power valve spring. As the manifold vacuum drops with engine load the calibrated spring (3) forces the piston (2) down against the power valve (4). The power valve is opened and allows additional fuel to flow through the calibrated power restrictions (5) into the main wells (6).

The power valve (4) allows a gradual increase in fuel flow as the power valve is fully opened to permit a maximum calibrated fuel flow from the power system.

As the load decreases, manifold vacuum increases. The increasing vacuum pull on the piston (2) gradually overcomes the spring tension of the power valve spring and the power piston returns to its original raised position; then the valve (4) is fully closed.

PUMP SYSTEM (Fig. 8-137)

Extra fuel for smooth, quick acceleration is supplied by a double-spring pump plunger. The combination of the top and bottom springs are calibrated to move the plunger in such a manner that a smooth sustained charge of fuel is delivered for acceleration.

The fuel passes from the bowl through the pump screen to remove any dirt, then is drawn past the ball check (3) into the pump well on the intake or upstroke of the plunger. When the plunger is pushed down for acceleration, the force of the stroke seats the ball check (3) to prevent flow to the fuel bowl and the fuel is forced up the pump discharge passage (6).

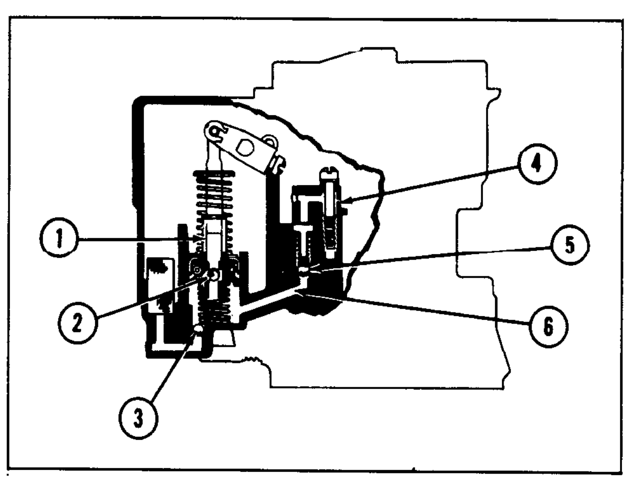


Fig. 8-137 Pump System

The pressure of the fuel lifts the pump outlet ball check (5) from its seat and the fuel passes on through the pump jets (4) in the cluster where it is sprayed into the venturi and delivered to the engine.

The pump plunger head embodies a ball check and seat, designed to eliminate fuel percolation problems in the pump system. When the engine is idling or not operating, excessive fuel vapor in the pump well will rise through the plunger head and by-pass the ball (2), then circulate into the fuel bowl, which is vented to the atmosphere.

Without this feature, vapor pressure in the pump system might force fuel through the pump passage and into the engine, causing hard starting when hot because of excess fuel in the manifold or poor initial acceleration due to lack of the proper amount of fuel in the pump system.

CHOKE SYSTEM (Fig. 8-138)

For cold engine operation, a rich mixture at the carburetor is required so that a combustible mixture enters the manifold system to be drawn into the cylinders after considerable condensation of the fuel vapor on the cold engine parts. The function of the choke system is to subject all fuel outlets in the bore of the carburetor to high vacuum, while restricting the intake of air.

The choke system includes a thermostatic coil

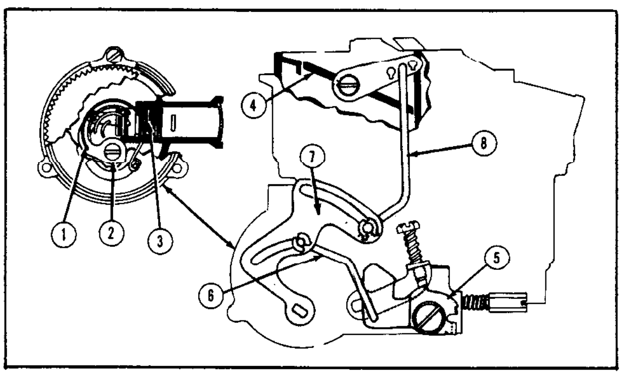


Fig. 8-138 Choke System

(1), housing (2), choke piston lever (3), choke valve (4), fast idle cam (5) and linkage (6), (7) and (8).

The choke is controlled by a combination of intake manifold vacuum, air velocity against the offset choke valve, atmospheric temperature, and induced heat from the exhaust manifold system.

When the engine is cold, the bi-metal thermostatic coil (1) expands and closes the choke valve. As soon as the engine is started, two forces within the carburetor start the de-choking operation:

A. Engine manifold vacuum exerts a pulling action on the choke piston (3) through a vacuum passage.

B. Fresh air is heated in the heat tube, passes through the choke tube, begins to warm the thermostatic coil (1), and gradually opens the choke valve.

A three hole upper choke lever is used which will allow a finer choke piston adjustment in all temperatures and climatic conditions in the field.

With the lever in the outer hole, the choke valve will open less for a given throttle opening resulting in richer mixtures under loads of accelerations. By moving the lever into the center, or inboard hole, the choke valve will open progressively more resulting in leaner mixtures. Normal position of the intermediate choke rod is in the center hole.

During engine warm-up, a faster idle to prevent engine stalling is accomplished by a fast idle cam (5) connected by linkage (6) directly to the choke coil (1) rather than by position of the choke valve (4). This allows the choke valve to open faster, while maintaining engine r.p.m.

If the engine becomes flooded during the starting period, the choke valve can be partially opened manually to allow increased air flow through the carburetor. This is accomplished by depressing the accelerator pedal to the floor. The unloader projection on the throttle lever contacts the unloader on the float bowl, which in turn moves the unloader rod and upper unloader lever to partially open the choke valve.

CARBURETOR REMOVE AND INSTALL

1. Remove air cleaner.
2. Remove retaining clip from bellcrank rod and remove rod from carburetor.
3. Disconnect fuel line from front of carburetor.
4. Disconnect choke pipe from choke cover.
5. Disconnect vacuum lines.
6. Remove four throttle body to intake manifold nuts.
7. Remove carburetor.

To install reverse removal procedure and make adjustments outlined under ADJUSTMENTS (ON THE CAR).

Torque carburetor to intake manifold nuts 11 to 14 ft. lbs.

CARBURETOR DISASSEMBLY

AIR HORN

1. Mount carburetor on Holding Fixture BT-30-14 or J-5923-B. (Fig. 8-139)
2. Remove fuel inlet fitting and gasket, then remove the filter screen.
3. Remove the idle vent valve retaining screw, shield and vent.

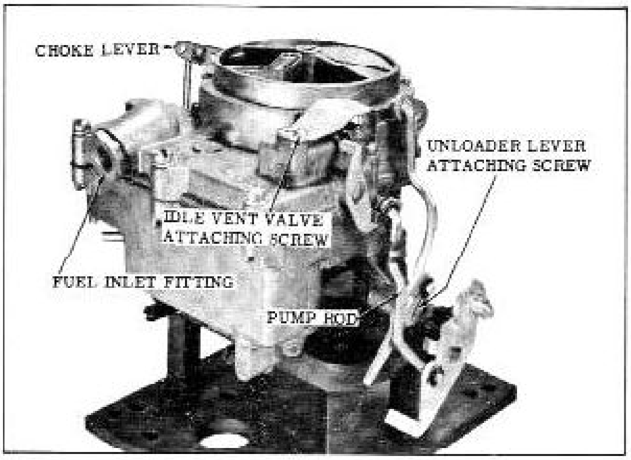


Fig. 8-139 2GC Carburetor

4. Remove screw in the end of the choke shaft and remove the intermediate choke rod and lever.
5. Unhook spring clip from the upper end of the pump rod at the pump lever and disconnect the upper end of the pump rod.
6. Remove the choke unloader lever attaching screw from the float bowl.
7. Remove the eight air horn attaching screws, then lift the air horn straight up to remove.
8. Invert the air horn and place on a flat surface, then remove the float hinge pin, float and needle assembly. (Fig. 8-140)
9. Remove the float needle and seat and gasket using Tool BT-52, then remove fuel filter from the needle seat bore.
10. Remove the power piston by depressing piston stem and allowing it to snap free.
11. Remove the retainer from the pump plunger shaft and remove pump plunger.
12. If the pump lever and shaft or inner arm is to be replaced, loosen the set screw on the inner arm.

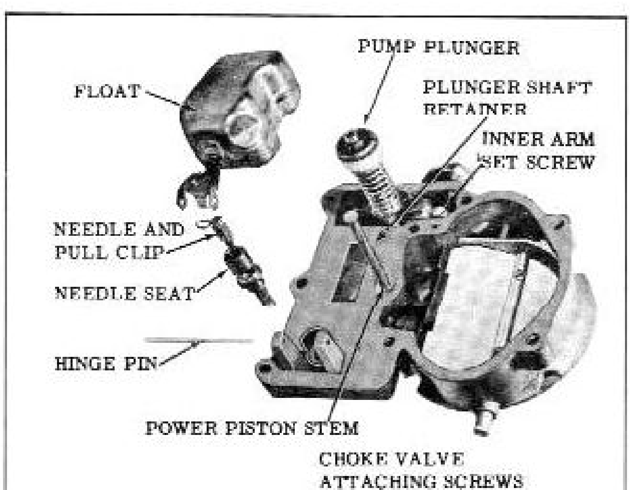


Fig. 8-140 Air Horn Assembly

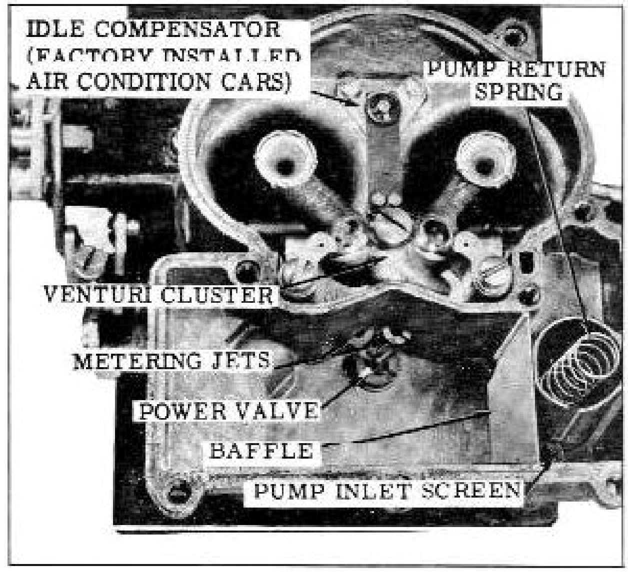


Fig. 8-141 Float Bowl Assembly

13. Remove the air horn gasket.
14. If the choke valve or shaft is to be replaced remove the two choke valve attaching screws, then remove the choke valve and choke shaft from air horn.

FLOAT BOWL (Fig. 8-141)

1. Remove baffle, pump inlet filter screen and pump plunger return spring, then remove aluminum ball check from bottom of pump well.
2. Remove main metering jets and power valve.
3. If equipped with an idle compensator, factory installed air conditioned cars only, remove attaching screws and remove idle compensator and gasket.
4. Remove venturi cluster attaching screws and remove cluster and gasket.

   NOTE: The cluster center screw is larger and has a gasket since it is located in the pump discharge passage.

5. Using a pair of needle nosed pliers, remove the pump discharge spring guide, then remove the spring and steel ball. (Fig. 8-142)
6. Invert float bowl and remove the three throttle body attaching screws, then remove the throttle body and gasket.

THROTTLE BODY AND CHOKE LINKAGE (Fig. 8-143)

1. Remove the fast idle cam attaching screw.
2. Remove the three choke cover attaching screws and retainers, then remove the cover and gasket.

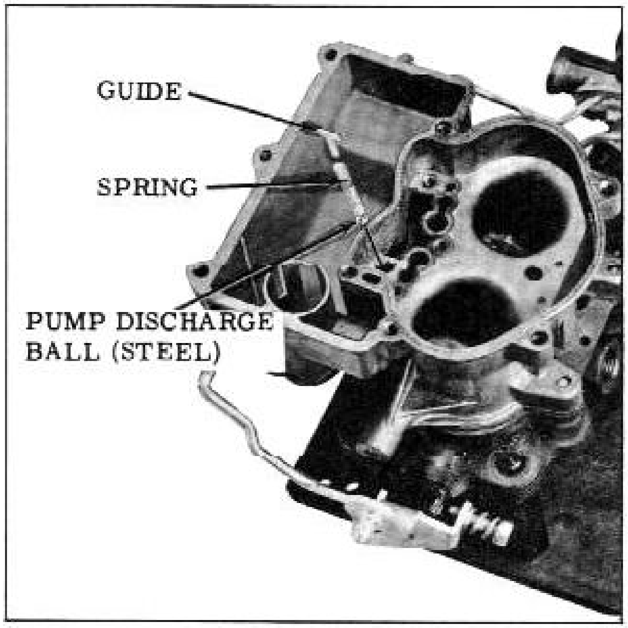


Fig. 8-142 Pump Discharge Guide

3. Remove baffle plate from choke housing.
4. Remove the choke piston attaching screw, then remove piston link and lever assembly. The piston can be removed from the link by removing the piston pin.
5. Remove the two choke housing attaching screws, then remove the choke housing with linkage and gasket.
6. Remove the choke housing gasket, then remove the choke lever and shaft with linkage from the choke housing.
7. The idle mixture needle screws may be removed for cleaning or replacement. The slow and fast idle speed screw and spring and the fast idle lever can also be removed and replaced.

   NOTE: No attempt should be made to remove the throttle valves or shaft as it may be impossible to assemble the throttle valve correctly in relation to the idle discharge orifices.

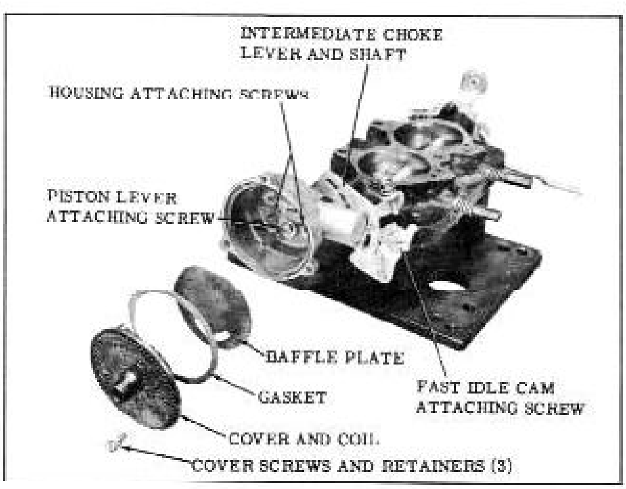


Fig. 8-143 Throttle Body and Choke Linkage

CLEANING OF PARTS

The carburetor should not be cleaned in any solution other than a cold immersion type cleaner.

1. Thoroughly clean carburetor castings and metal parts in carburetor solvent.

   CAUTION: The choke coil, housing and pump plunger should not be immersed in solvent. Clean pump in clean gasoline only.

2. Clean and dry all passages in castings with compressed air. Do not pass drills through jets or passages.
3. Clean filter screens of dirt or lint. If filter screens are distorted or plugged, they should be replaced.

INSPECTION OF PARTS

1. Check floats for dents or excessive wear at hinge pin holes.
2. Shake floats to check for leaks.
3. Examine float needle and seat. If grooved, replace with a new matched float needle, seat and gasket assembly.
4. Inspect the idle mixture adjusting needles for burrs or ridges. Replace if necessary.
5. Inspect the upper and lower surfaces of the float bowl to see that the small sealing beads are not damaged. Damaged beading may result in air or fuel leaks at that point.
6. Inspect holes in pump rocker arm, fast idle cam and throttle shaft lever. If holes are worn excessively or out of round to the extent of improper operation of the carburetor, the worn parts should be replaced.
7. Inspect the steps on the fast idle cam for excessive wear. If worn, replace cam to assure proper engine operation during the warm-up and choking periods.
8. Inspect the pump plunger leather for cracks or creases. If the pump leather is damaged, replace the pump plunger as an assembly.
9. Inspect the throttle body to make sure idle passages and vacuum channels are open.

CARBURETOR ASSEMBLY

THROTTLE BODY ASSEMBLY (Fig. 8-143)

1. If removed, install the slow idle speed screw and spring.
2. If removed, install the fast idle lever on the end of the throttle shaft with attaching screw. Install the fast idle speed screw and spring in the lever.

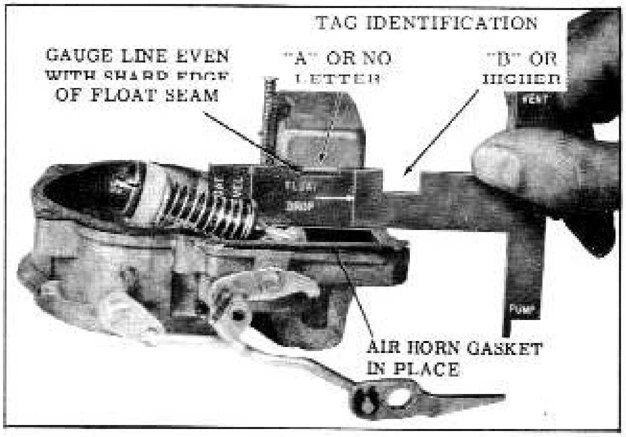


Fig. 8-144 Float Level Adjustment

3. If removed, install the idle mixture needles and springs in the throttle body. Tighten finger tight, then back out 1-1/2 turns as a preliminary idle adjustment.

4. Install the intermediate choke lever and shaft, with linkage attached, in the choke housing. The lever should extend upward between the attaching screw bosses.

5. Install the choke housing gasket, then position the choke housing on the throttle body and install the two attaching screws.

6. If removed, install the choke piston on the link so that the piston pin hole is facing outward.

7. Install the choke piston lever and link assembly in the choke housing, then install the attaching screw.

8. Position the fast idle cam on the throttle body and install attaching screw.

9. Place a new gasket on the bottom of the float bowl with holes aligned, then position the throttle body on the gasket and install the three attaching screws. Tighten screws evenly and securely.

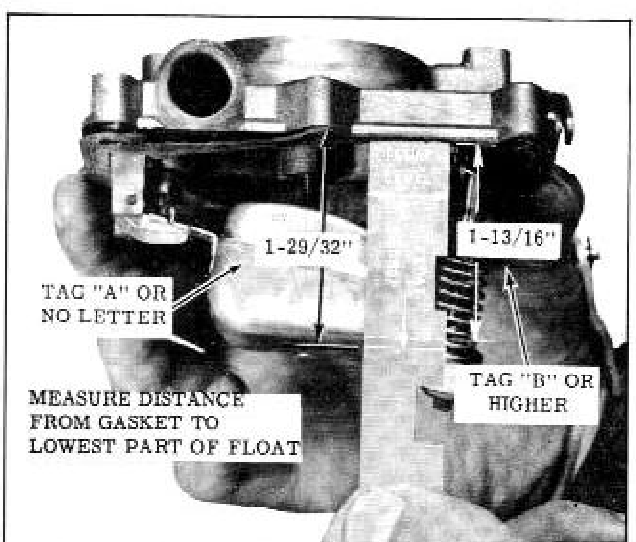


Fig. 8-145 - Float Drop Adjustment

FLOAT BOWL ASSEMBLY

1. Install the pump discharge (steel) ball, spring and guide in the passage in the venturi cluster mounting surface. (Fig. 8-142)

2. Install the venturi cluster, gasket, and attaching screws. Screw with gasket must be inserted in center hole.

3. If equipped with idle compensator, install compensator and gasket between the two large venturi, using two self-tapping screws. Do not over-tighten.

4. Install the main metering jets and power valve.

5. Install the pump inlet (aluminum) ball and the pump return spring in the pump well. Install the pump inlet screen and the baffle in the float bowl.

AIR HORN ASSEMBLY

1. If removed, install the choke shaft in the air horn, by inserting it from the throttle lever side, then install the choke valve in the shaft with the letters "RP" facing upward.

   a. Install the choke valve screws. Center the choke valve before tightening screws, then stake screws lightly.

2. If removed, position the pump inner lever in the air horn, install the pump lever and shaft and tighten retaining screw.

   NOTE: Lubricate shaft with "Lubriplate" or light grease.

3. Install the pump plunger shaft in the pump lever so that the end is pointing inward, then install the retainer.

4. Position the float needle seat gasket and small filter screen on the seat. Install seat in air horn with BT-52.

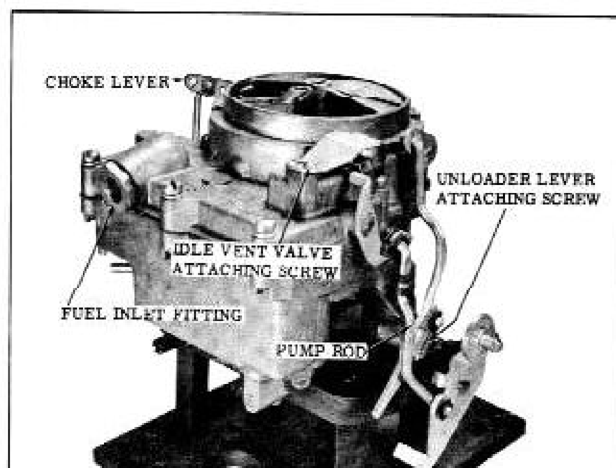


Fig. 8-146 Carburetor Assembly

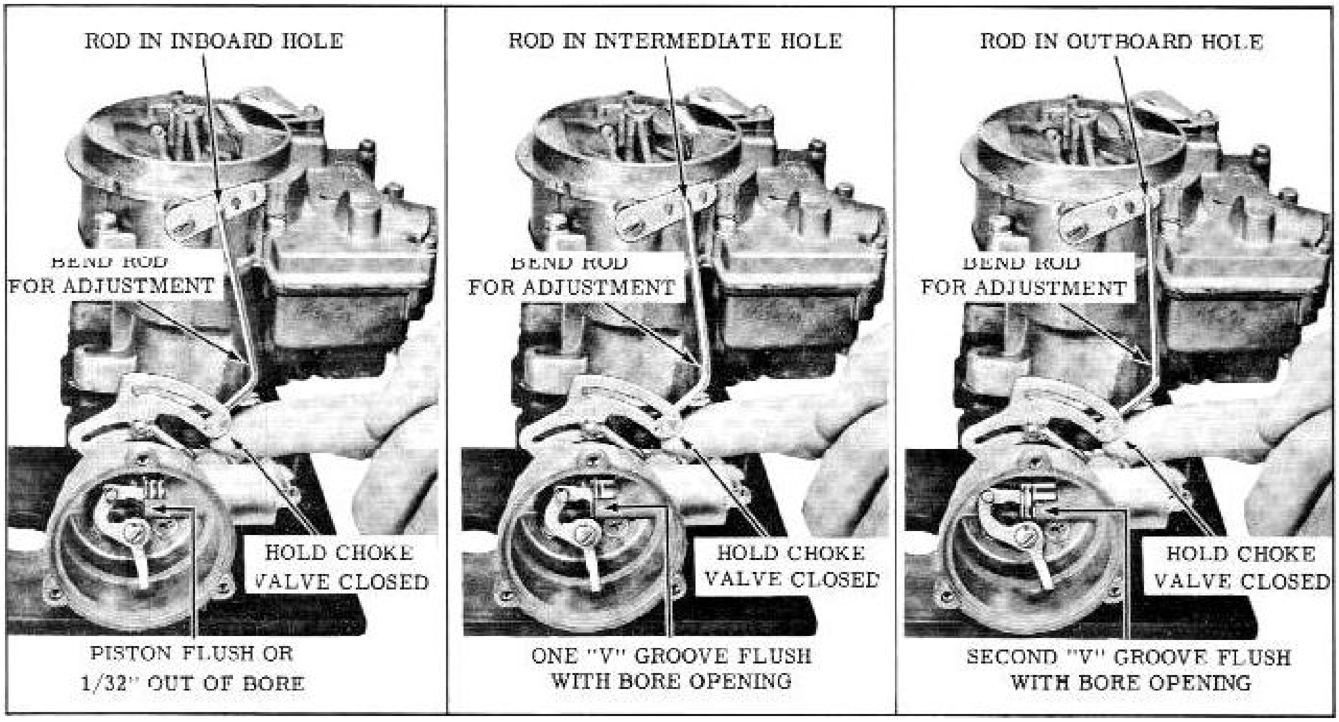


Fig. 8-147 Intermediate Choke Adjustment

5. Install the power piston and lightly stake the casting. Make sure piston travels freely.
6. Install the air horn gasket, float and needle assembly and float hinge pin.

FLOAT LEVEL ADJUSTMENT

1. Make sure the float is properly aligned on the air horn. If it is necessary to bend the float arm for alignment purposes, recheck the float level setting. (Fig. 8-144)

FLOAT DROP ADJUSTMENT (Fig. 8-145)

1. If necessary to adjust, bend the float tang which contacts the needle seat. Bend the tang toward the seat to decrease float drop and away from the seat to increase the drop.

COMPLETION OF CARBURETOR ASSEMBLY (FIG. 8-146)

1. Install the air horn on the float bowl while guiding accelerator pump in place. Install and tighten the eight air horn screws evenly and securely.
2. Insert the choke unloader rod in the unloader lever on the choke shaft, then install the unloader lever on the float bowl.
3. Position the upper end of the pump rod on the pump lever and retain with spring clip.
4. Position idle vent valve and shield on air horn and retain with attaching screw.
5. Install the fuel inlet filter screen with the closed end inward, then install the inlet fitting and gasket.
6. Install the choke lever, with intermediate shaft rod attached, on the choke shaft and retain with screw.
7. Install rubber tee on the vacuum fitting in the throttle body.
8. Adjust fast idle cam rod, pump rod, and unloader as outlined under ADJUSTMENTS (ON OR OFF CAR).

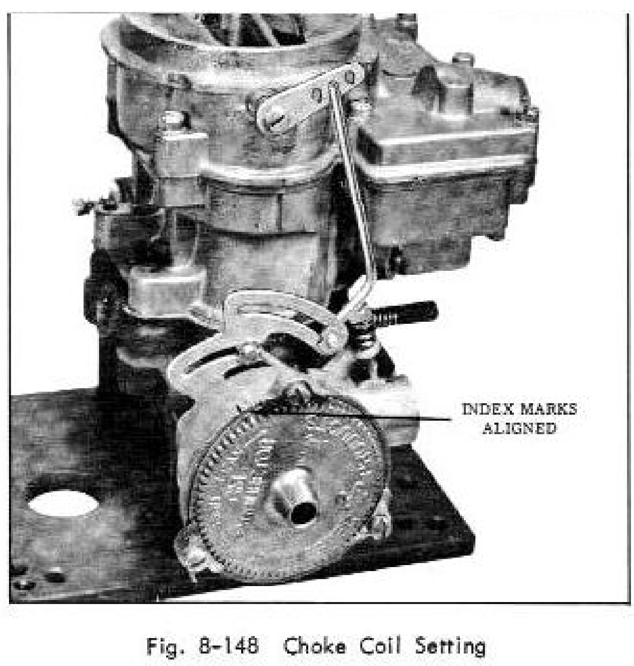


Fig. 8-148 Choke Coil Setting

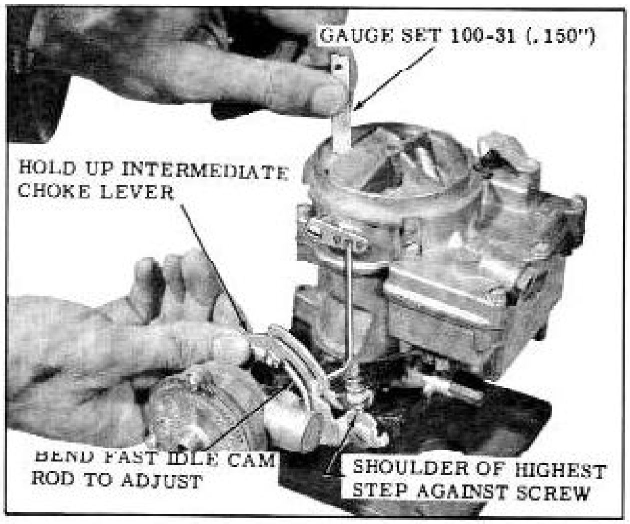


Fig. 8-149 Fast Idle Cam Rod Adjustment

ADJUSTMENTS (On or Off the Car)

INTERMEDIATE CHOKE ROD AND CHOKE COIL ADJUSTMENT

1. Adjust the intermediate choke rod as outlined in Fig. 8-147.
2. After choke rod adjustment is made, position the baffle plate, coil cover and gasket and the three screws with retainers in the choke housing. Do not tighten screws.
3. Rotate the choke cover counterclockwise until the coil picks up the choke shaft tang, and the mark on the choke cover is on index. (Fig. 8-148)
4. Tighten the three cover screws evenly and securely.

FAST IDLE CAM ROD ADJUSTMENT

1. Turn in fast idle speed screw until it just contacts the second step of the fast idle cam.

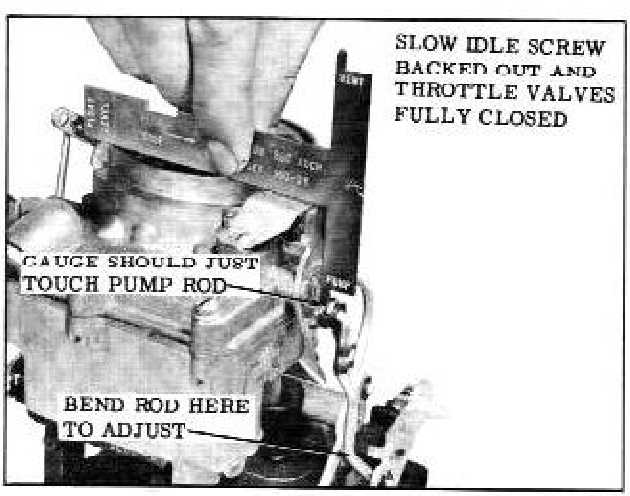


Fig. 8-150 Pump Rod Adjustment

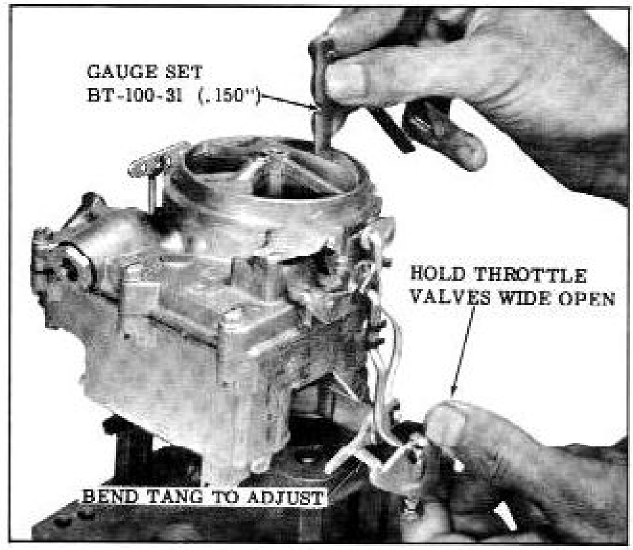


Fig. 8-151 Unloader Adjustment

2. While holding up on the intermediate choke lever so that the shoulder of the highest step of the fast idle cam is against the fast idle speed screw. Check the clearance between top edge of the choke valve and the air horn at the rear edge, using Gauge Set 100-31 (.150"). Make sure the intermediate choke rod is at the bottom of its slot in the intermediate lever. (Fig. 8-149)
3. If necessary to adjust, bend the fast idle cam rod.

PUMP ROD ADJUSTMENT

1. Using Gauge Set 100-31 (1-7/16") check the distance from the top of the air cleaner mounting ring to the top of the pump rod. The leg of the gauge marked "Pump" should just touch the top of the pump rod. (Fig. 8-150)
2. If necessary to adjust, bend the pump rod in the location shown.

UNLOADER ADJUSTMENT

1. With throttle valves held wide open, check clearance between the top edge of the choke valve and the air horn. (Fig. 8-151)
2. If necessary to adjust, bend the tang on the throttle lever which contacts the unloader lever.

NOTE: If the unloader adjustment is made with the carburetor off the car, recheck the adjustment after the carburetor is installed while the accelerator pedal is completely depressed.

ADJUSTMENTS (ON CAR)

There are three adjustments that must be made with the carburtor mounted on the engine. They are: Slow Idle, Fast Idle and Throttle Return Check.

SLOW IDLE SPEED

TRANSMISSION	GEAR	R.P.M.
Hydra-Matic	Drive	500
Syncro-Mesh	Neutral	550
Factory Installed Air Conditioning - Air Conditioning turned "OFF", Idle Compensator held closed. Dealer Installed Air Conditioning (Without Idle Compensator) - Air Conditioning turned turned "ON".		

SLOW IDLE ADJUSTMENT

With the engine at normal operating temperature, throttle return check Holding Fixture J-6342-01 in place, and air cleaner removed, adjust slow idle as outlined in chart. Tool BT-1501 can be used to turn adjusting screws.

After the idle r.p.m. is stabilized, turn in or out each idle adjusting screw until the smoothest possible idle is obtained. This is normally accompanied by a higher manifold vacuum reading and/or an increase in idle r.p.m. Then turn out each needle 1/4 turn, at which time both vacuum and idle r.p.m. will drop off slightly.

NOTE: It may be necessary to readjust idle speed and mixture after air cleaner is installed on car.

When setting idle speed and mixture on carburetors with an idle compensator (factory installed air conditioning only) make sure the idle compensator is closed by holding it down. If the idle speed increases when the air cleaner is installed, do not reduce idle speed setting since the idle compensator is open. If idle speed decreases, readjust to correct r.p.m.

FAST IDLE ADJUSTMENT

The fast idle adjustment can be made as follows:

1. Rotate fast idle cam, so that the fast idle screw is resting on the high step of the cam.
2. With engine running at operating temperature and transmission in neutral, adjust the fast idle screw to obtain an engine speed of 1900 r.p.m.

   NOTE: Set fast idle at 2200 r.p.m. in sub-zero temperatures.

   Any time the fast idle is changed it will be necessary to adjust the throttle return check.

THROTTLE RETURN CHECK ADJUSTMENT

The throttle return check adjustment can be made as follows:

1. Be sure fast idle adjustment has been made, then shut off engine.
2. Rotate fast idle cam so that the fast idle screw rests on top of the highest step of the fast idle cam.
3. Measure clearance between the contact screw and the throttle lever contact. Clearance should be .050".
4. If adjustment is necessary, adjust the contact screw using two wrenches.

   NOTE: Any time the fast idle is changed it will be necessary to readjust the throttle return check. For throttle linkage adjustment, refer to the Hydra-Matic Section (3) or Syncro-Mesh Section (11).

ATMOSPHERIC IDLE VENT ADJUSTMENT

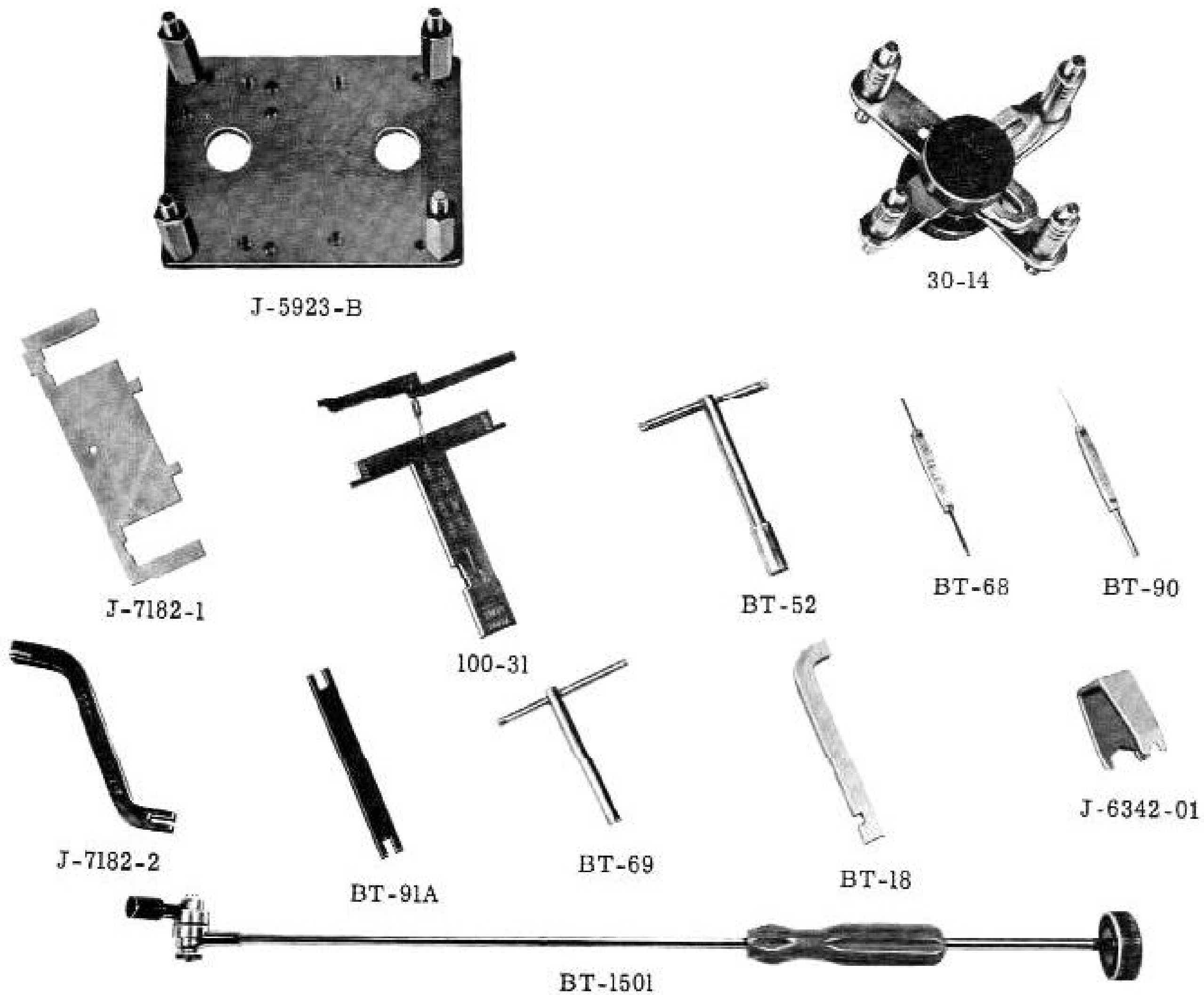
The atmospheric idle vent is designed to vent any vapor formed in the float bowl during slow idle operation. It is opened by a tang on the pump lever whenever the throttle valves are in the slow idle position.

1. Rotate fast idle cam until the fast idle screw is resting on the highest step of the fast idle cam. (1900 r.p.m.) The idle vent valve should just be closed.
2. If necessary to adjust, bend the idle vent tang on the pump lever, using Tool BT-69.
3. Run the engine on slow idle. The idle vent must be open.

SPECIFICATIONS

Carb.	Float Level			Float Drop		Assist Spring	Choke Rod	Choke Coil	Fast Idle Cam Rod	Lock-Out	Sec. Throt. Clearance	Pump Rod	Unloader	Sec. Act. Lever	Slow Idle	Fast Idle	Return Check	Idle Vent
	Prim.	Sec. Toe	Sec. Heel	Prim.	Sec.													
2-GC	11/16" 1/2"	-	-	1-29/32" 1-13/16"	-	-	Flush To 1/32" Out	Index	.150"	-	-	1-7/16"	.150"	-	500 & 550	1900 & 2200	.050"	Just Closed at 1900
4-GC	9/32"	3/8"	1-3/8"	1-1/2"	1-5/16"	1-3/64"	Flush To 1/32" Out	Index	.053"	.015"	.030"	1-1/64"	.115"	.005" To .025"	500 & 550	1600	.020"	Just Closed at 1600

* For detailed information as to adjustment procedures for the above specifications refer to their respective sections.



BT-18	- Bending Tool - Pump Rod.	30-14	- Universal Carburetor Holding Fixture
BT-52	- Needle Seat Remover and Installer.	100-31	- Tool Set for 2GC Adjustments.
BT-68	- Fast Idle Cam Rod Checking Gauge. (.053")	J-5923-B	- Carburetor Holding Stand
BT-69	- Bending Tool - Idle Vent.	J-6342-01	- Throttle Return Check Holding Tool
BT-90	- Unloader Checking Gauge (.115")	J-7182-1	- Float Level and Alignment Gauge 4GC
BT-91A	- Bending Tool - Tang of the Fast Idle Cam	J-7182-2	- Bending Tool - Float And Vacuum Assist Tang 4GC
BT-1501	- Idle Adjusting Tool		

Fig. 8-152 Carburetor Tools

ENGINE TUNE-UP

CONTENTS OF SECTION 9

ENGINE TUNE-UP

To maintain the most satisfactory engine performance, it is recommended that the following items be performed every 10,000 miles: Service the spark plugs and ignition points, check the timing, idle mixture, slow and fast idle speed.

SPARK PLUGS

1. Remove foreign material from around the spark plug holes and remove the spark plugs.
2. Clean exterior of plugs and inspect for cracked insulators or excessively burned electrodes.
3. Clean all serviceable plugs with an abrasive type cleaner. File center electrode flat. (Fig. 9-1) Do not file center electrode on new plugs.
4. Adjust spark plug gaps to .030" using a round feeler gauge.
5. Install plugs using new gaskets and torque 18 to 34 ft. lbs.

DISTRIBUTOR CONTACT POINTS

1. Remove air cleaner, distributor cap and rotor. Check distributor cap for cracks.
2. Inspect points, check for excessive burning or pitting. Replace if necessary.
3. Remove scale from points with a fine cut contact point file. Do not attempt to remove all roughness.
4. Apply a film of Delco-Remy cam and ball bearing lubricant or equivalent to the breaker cam.
5. Install distributor rotor and cap.

DWELL ANGLE

1. Connect one lead of dwell meter to the primary distributor lead terminal and the other lead to ground.
2. With engine running at idle speed, insert Dwell Adjusting Tool J-6296 or BT-1501 through distributor window into the head of the adjusting screw. (Fig. 9-2) Adjust dwell angle to 30°.

IGNITION TIMING

The ignition timing marks are located on the

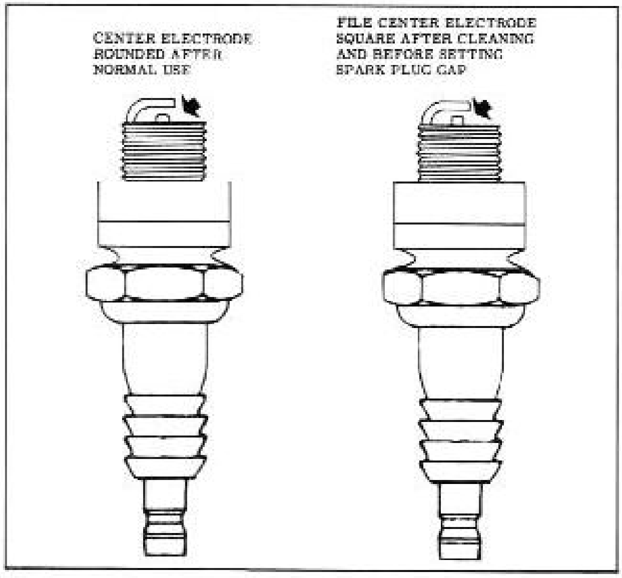


Fig. 9-1 Filing Center Electrode

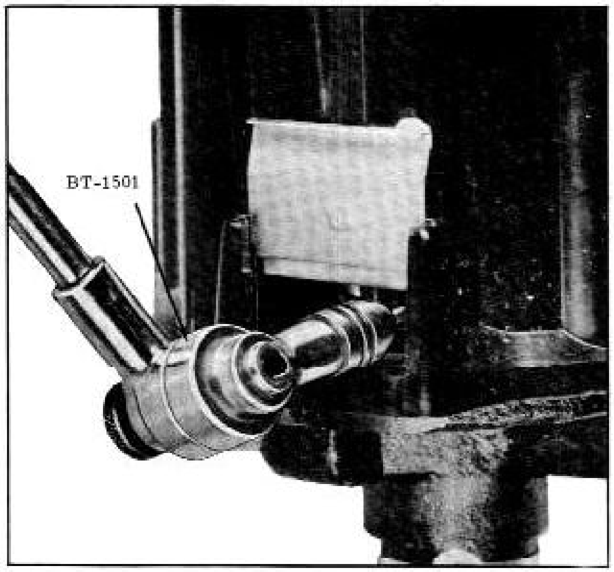


Fig. 9-2 Adjusting Dwell Angle

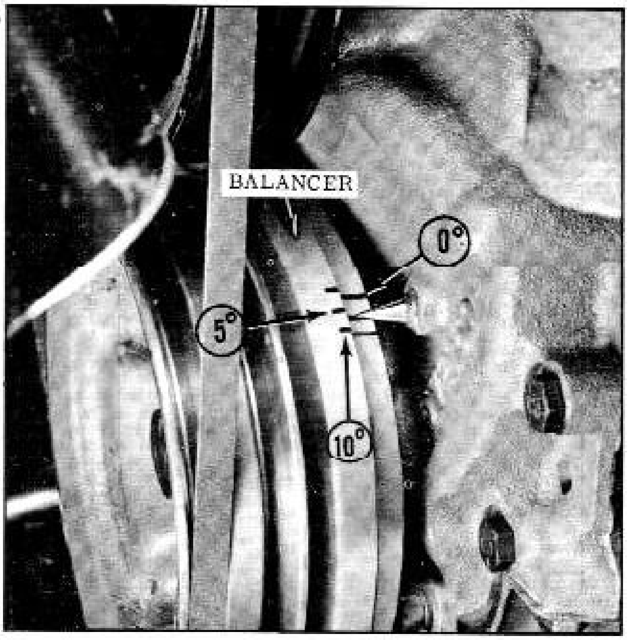


Fig. 9-3 Timing Marks

rim of the crankshaft balancer, consisting of three saw slots representing top dead center, 5° and 10° before top dead center. (Fig. 9-3)

To adjust ignition timing proceed as follows:

1. Disconnect distributor vacuum line at carburetor and cover fitting with tape.
2. Adjust engine speed to 850 R.P.M.
3. With the use of a timing light set timing to 5° before top dead center on regular fuel engines and 7-1/2° on premium fuel engines. To adjust the ignition timing loosen the distributor clamp bolt and rotate the distributor.

   NOTE: If a tuned engine detonates with this setting, the cause is low octane fuel or carbon build-up in the combustion chamber. If these factors are not corrected, the timing should be retarded 2-1/2° from the specified settings. In areas that have an extra high octane, the timing may be advanced beyond the specified setting providing spark knock is not encountered.
4. Tighten the distributor clamp bolt to 12 ft. lbs. Recheck timing to make sure distributor was not moved during tightening of bolt.
5. Remove tape and connect distributor vacuum advance line.

SLOW IDLE ADJUSTMENT

With the engine at normal operating temperature, Throttle Return Check Holding Fixture J-6342 in place, and air cleaner removed, adjust slow idle as outlined in chart. Tool BT-1501 can be used to turn idle mixture adjusting screws.

SLOW IDLE SPEEDS		
TRANSMISSION	GEAR	R.P.M.
Hydra-Matic	Dr.	500
Syncro-Mesh	N	550

Air Conditioning
With Idle Compensator - Air Conditioning "OFF" - Idle Compensator Held Closed.
Without Idle Compensator - Air Conditioning "ON".

After the idle R.P.M. is stabilized turn in or out each idle adjusting screw until the smoothest possible idle is obtained. This is normally accompanied by a higher manifold vacuum reading and/or an increase in idle R.P.M. Then turn out each needle 1/4 turn, at which time both vacuum and idle R.P.M. will drop off slightly.

NOTE: It may be necessary to readjust idle speed and mixture after air cleaner is installed on car.

When setting idle speed and mixture on carburetors with an idle compensator (factory installed air conditioning only) make sure the idle compensator is closed by holding it down with a pencil or other suitable tool. If the idle speed increases when the air cleaner is installed, do not reduce idle speed setting since the idle compensator is open. If idle speed decreases, readjust to correct R.P.M.

FAST IDLE ADJUSTMENT

1. Rotate fast idle cam so that the fast idle screw is resting on the high step of the cam.
2. With engine running at normal operating temperature and transmission in neutral, adjust fast idle screw to obtain an engine speed of 1600 R.P.M., with 4GC, and 1900 R.P.M. with 2GC carburetor.

ROAD TEST

Road test car thoroughly. Check engine performance at HIGH SPEED, LOW SPEED and IDLE. After road test is complete inspect engine for oil and coolant leaks.

If car does not perform properly after the plugs and points have been serviced and the timing, idle mixture, slow and fast idle speed have been checked and adjusted, additional possible causes are as follows:

IGNITION SYSTEM

1. High resistance in spark plug cables (Refer to MILLIAMP TEST - ELECTRICAL SECTION).
2. Loose or faulty primary ignition wiring or connections.
3. High resistance in ignition system (Refer to ELECTRICAL SECTION).
4. Distributor mechanical advance mechanism binding or sticking.
5. Distributor vacuum advance unit leaking vacuum.

FUEL SYSTEM

1. Carburetor float level adjusted too LOW or too HIGH or leak at float needle seat.
2. Dirt and/or corrosion in carburetor fuel or air passages.
3. Low capacity fuel pump. (See ENGINE SECTION).
4. Punctured vacuum diaphragm in fuel pump assembly.
5. Plugged fuel filter.
6. Water in fuel filter bowl.

Careful examination of the carburetor and fuel system should reveal defects if present. Always be ACCURATE with the carburetor adjustments.

VALVE SYSTEM

1. Sticking valve due to carbon and/or varnish deposits.
2. Broken or weak valve springs.
3. Warped, cracked or burned valve.
4. Valve not seating correctly.
5. Faulty hydraulic valve lifter.
6. Bent push rod, push rod worn excessively or push rod seat worn in rocker arm.
7. Incorrect valve timing.

COMPRESSION TEST

To determine if the valves or pistons are at fault, a test should be made to determine the cylinder compression pressure. When checking cylinder compression, the throttle and choke should be open, all spark plugs removed, and the battery at or near full charge. The lowest reading cylinder should not be less than 80% of the highest, and no cylinder reading should be less than 100 pounds.

NORMAL	- Compression builds up quickly and evenly to specified compression on each cylinder.
PISTON RINGS	- Compression low on first stroke tends to build up on following strokes but does not reach normal. Improves considerably with addition of oil.
VALVES	- Low on first stroke does not tend to build up on following strokes. Does not improve much with addition of oil.

MISCELLANEOUS CAUSES

1. Restricted exhaust system.
2. Pre-ignition, due to carbon deposits in the combustion chamber.
3. Poor ground connection between engine and frame or body.
4. Malfunctioning manifold heat control valve. (Refer to ENGINE SECTION)

DIAGNOSIS

CONDITION	POSSIBLE CAUSES
Hard Starting	Fuel System, Timing, Distributor, Battery, Starter, Ignition Coil, Wiring
Rough Idle	Carburetion - Spark Plugs, Engine Valves, Leaking Intake Manifold
Stalls On Idle	Idle Speed, Fuel Mixture, Choke, Intake Manifold Leak

DIAGNOSIS (Cont'd.)

CONDITION	POSSIBLE CAUSES
Poor Acceleration	Timing, Fuel System, Compression
Cuts Out On Acceleration	Carburetion, Ignition System
Miss On Acceleration	Spark Plugs, Points, Carburetor, Wiring, Condenser
Steady Low Top Speed	Fuel Lines, Fuel Filter, Fuel Pump, Gas Tank Vent, Timing, Distributor, Air Filter, Low Compression, Exhaust System Clogged, Lifters
Surges on Steady Throttle	Fuel Line, Fuel Filter, Gas Tank Vent, Fuel Pump, Carburetion
High Speed Miss	Spark Plugs, Ignition Points, Fuel System, Valve Mechanism, Ignition Coil, Wiring
Valve Noise	Incorrect Oil Level In Crankcase, Lifters Dirty, Worn Rocker Arms, Worn Lifters, Oil To Rocker Arms Restricted

GENERAL SPECIFICATIONS

SLOW IDLE SPEEDS		
TRANSMISSION	GEAR	R.P.M.
Hydra-Matic	Dr.	500
Syncro-Mesh	N	550
Air Conditioning: With Idle Compensator - Air Conditioning "OFF" - Idle Compensator Held Closed. Without Idle Compensator - Air Conditioning "ON".		

FAST IDLE
- 2 Barrel Carburetor . . . . 1900 R.P.M.
- 4 Barrel Carburetor . . . . 1600 R.P.M.

CHOKE SETTING . . . . Index

DISTRIBUTOR
- a. Cam Angle Range . . . . 28° to 32° (Adjust to 30°)
- b. Contact Point Opening . . . . .016"
- c. Contact Arm Spring Tension . . . . 19 to 23 oz.
- d. Condenser Capacity . . . . 18 to 23 Mfd.
- e. Vacuum Advance per inch of Vacuum
  - 8" to 10" . . . . Start
  - 19" to 21" . . . . 10° to 12°
- f. Mechanical Advance per Distributor r.p.m.
  - 400 . . . . 0° to 2°
  - 975 . . . . 6.5° to 8.5°
  - 2200 . . . . 11° to 13°

GENERAL SPECIFICATIONS (Cont'd.)

IGNITION TIMING

Normal Setting (Regular Fuel Engine)	5° B.T.D.C.
Normal Setting (Premium Fuel Engine)	$7\text{-}1/2^{\circ}$ B.T.D.C.
With Low Octane or Carbon Build-Up (Retard From Normal Setting)	$2\text{-}1/2^{\circ}$

SPARK PLUGS

Air Gap	.030"

HEAT RANGE

Regular Fuel Engine	A.C. 45
Premium Fuel Engine	A.C. 44
Export	A.C. 46

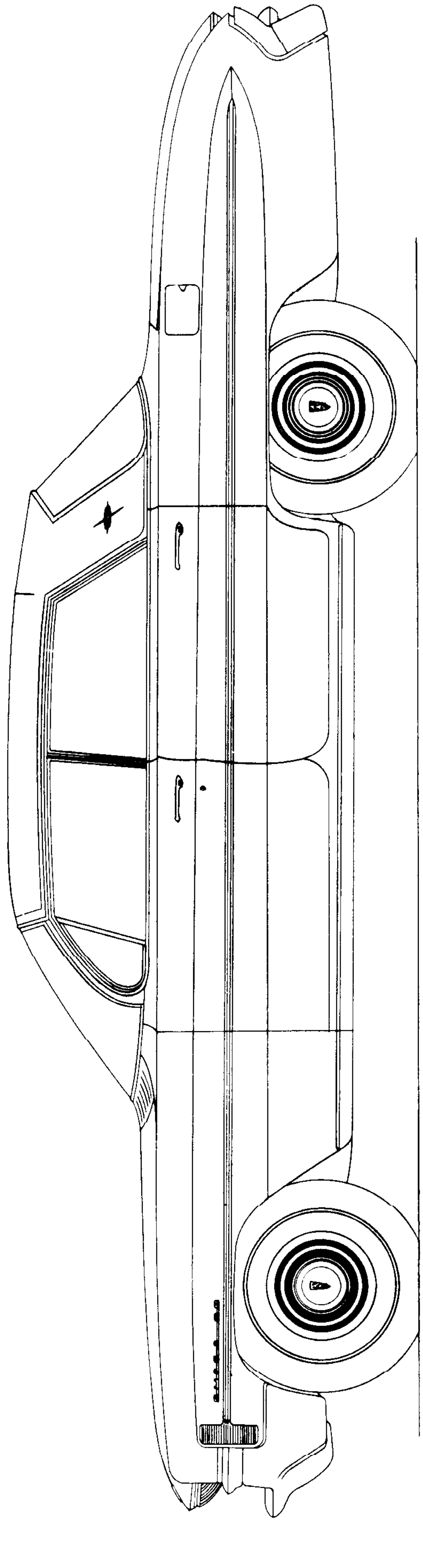
COMPRESSION TEST	*Minimum 100 lbs.

*Lowest cylinder not less than 80% of highest cylinder.

TORQUE SPECIFICATIONS

NOTE: Specified torque is for installation of parts only. Checking of torque during inspection may be 15% below the specification.

APPLICATION	Ft. Lbs.
1. Battery Hold-Down Nut	1.5 to 2.5
2. Connector Strap to Starting Motor Bolt	6 to 8
3. Distributor Clamp to Cylinder Block Bolt	11 to 14
4. Generator Bracket to Exhaust Manifold Bolts	22 to 26
5. Generator to Bracket Bolts and Nuts	14 to 17
6. Ignition Coil to Intake Manifold Stud Nuts	9 to 11
7. Spark Plugs	18 to 34
8. Starter Motor to Flywheel Lower Housing Nut and Bolt	45 to 50
9. Battery Cable to Starter Motor Nut	10 to 12
10. Junction Block Nut	8 to 10
11. Starter Terminals (Solenoid)	1.50 to 1.75
12. Ignition Coil Terminal Nuts	2 to 3
13. Generator Terminal Nuts	2 to 3
14. Intake Manifold to Head Bolts	22 to 34
15. Exhaust Manifold to Head Bolts and Nuts	19 to 25



SUPER 88 HOLIDAY SEDAN
3539

CLUTCH

CONTENTS OF SECTION 10

PERIODIC MAINTENANCE

The clutch linkage should be lubricated with SAE 20 Engine Oil every 2000 miles. The clutch pedal free travel should also be checked at this time.

Every 20,000 miles the clutch release bearing should be lubricated sparingly with a sodium soap fine fiber grease such as Marfax Heavy Duty No. 2.

GENERAL DESCRIPTION (Fig. 10-1)

The single plate, dry disc clutch is mounted with a free sliding fit on the splines of the Syncro-Mesh Transmission mainshaft. Engagement of the clutch is accomplished by a spring loaded pressure plate.

When the clutch pedal is depressed, the clutch release yoke moves the release bearing forward on the transmission bearing retainer sleeve until the bearing moves the inner end of the release levers. The release levers pivot at yokes (attached to the cover plate) and overcome the pressure spring force to move the pressure plate rearward to disengage the driven plate.

When the clutch pedal is released, the pressure springs compress the driven plate between the pressure plate and the flywheel to engage the clutch. The engagement of the clutch is cushioned by springs mounted between the facing discs of the clutch plate. As the speed of the engine increases, the weighted outer ends of the release levers, through centrifugal force, add to the spring force exerted on the driven plate, thereby in-

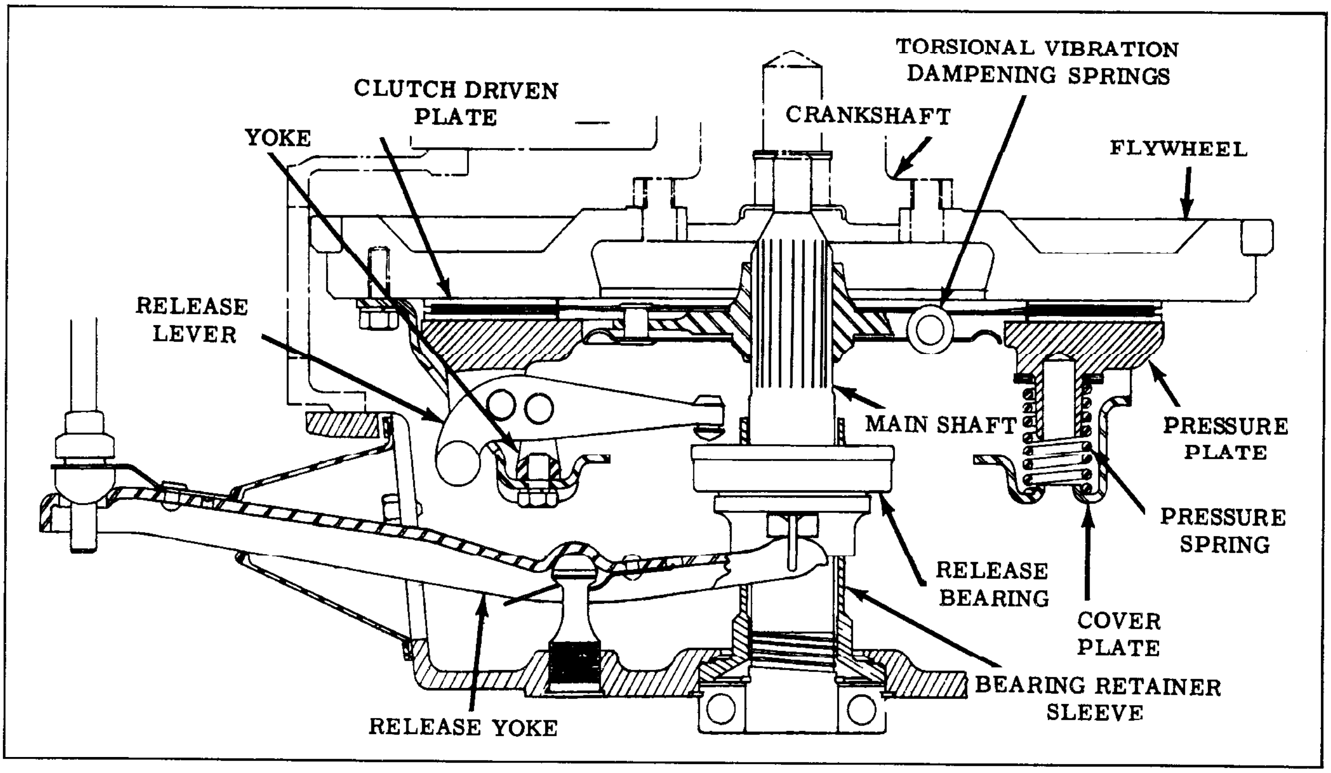


Fig. 10-1 Clutch Assembly

creasing clutch pressure and increasing the clutch torque capacity.

Torsional vibrations from the engine are prevented from being transmitted to the transmission by coil springs mounted in the hub of the driven plate. Balance is obtained by means of narrow sheet metal strips crimped around the webs of the driven disc. Grinding of the edges should not be attempted as a means of balancing.

CLUTCH LINKAGE (Fig. 10-2)

The clutch linkage consists of the clutch pedal, pedal to bellcrank pedal rod, pedal bellcrank to clutch release bellcrank rod and the clutch release bellcrank to release yoke rod.

MINOR SERVICE OPERATIONS

CLUTCH PEDAL

REMOVE AND INSTALL

1. Install 1/4" gauge pin in frame. (Fig. 10-2)
2. Remove cotter pin, clevis pin and spring washer from clutch pedal to pedal bellcrank rod.
3. Remove nut, washer and spring washer from clutch pedal pivot shaft.
4. Slide clutch pedal from pivot shaft and disconnect clutch pedal rod from pedal.

To install, lubricate nylon bushings and pedal rod ball socket with special lubricant (Part No. 567196) and reverse removal procedure. Torque pivot shaft nut 10 to 18 ft. lbs.

ADJUSTMENTS

CLUTCH LINKAGE (Fig. 10-2)

1. Install a 1/4" gauge pin (a piece of steel rod), in the gauge pin holes provided in the frame side rail.
2. Remove cotter pin, clevis pin and spring washer from clevis at upper end of rod "A".

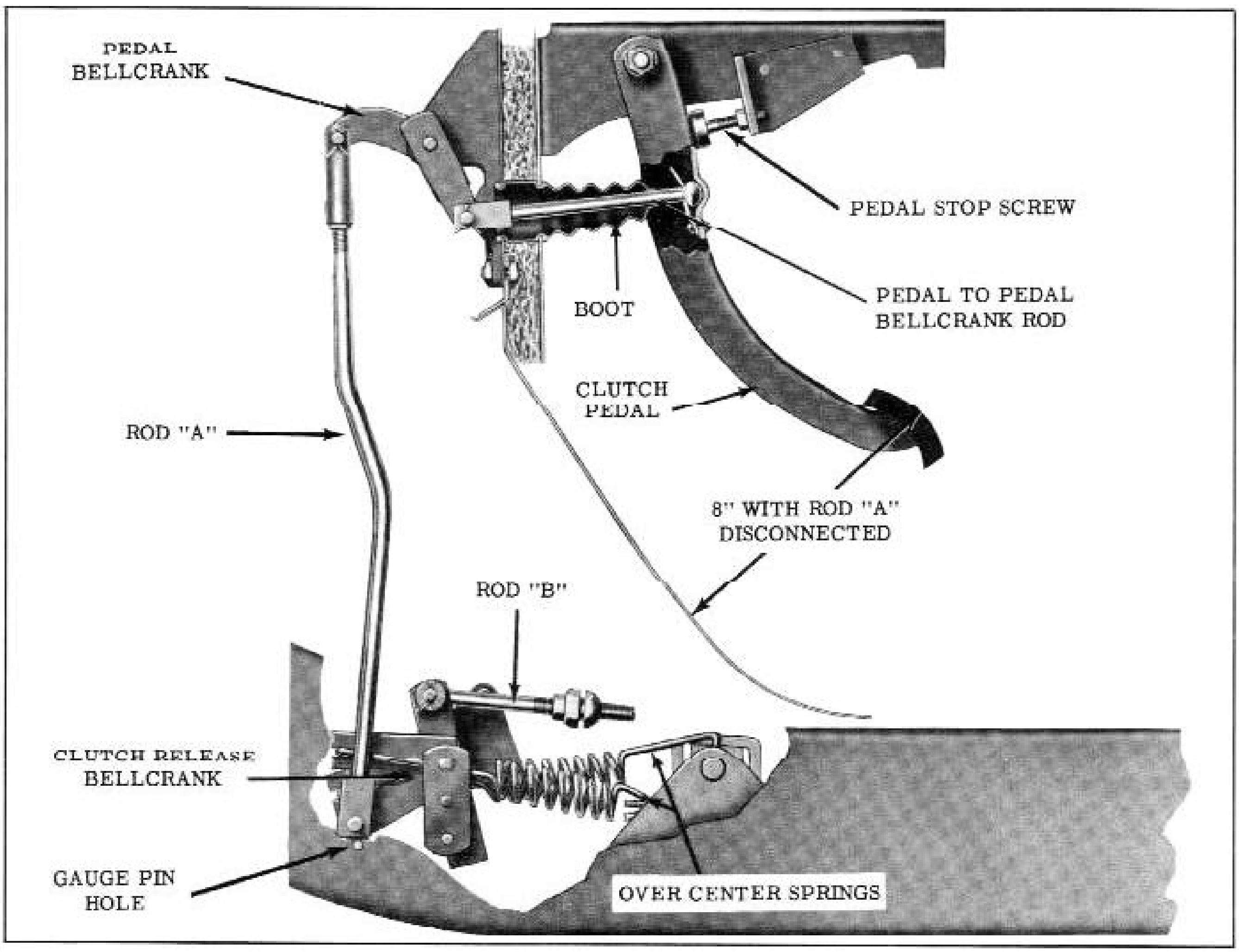


Fig. 10-2 Clutch Linkage

The over center springs will hold bottom of rod against the gauge pin.

3. Loosen lock nut and adjusting nut on rod "B" until rod is free of tension.

4. Turn back floor mat and adjust pedal stop screw until the top of the pedal pad on the clutch pedal is 8" from the floor pan.

   NOTE: After linkage is connected, pedal height should be 8-1/4" with spring load applied.

5. Adjust upper clevis on rod "A" until the gauge pin is free in frame hole, after rod "A" is connected to the pedal bellcrank. Install clevis pin, spring washer and cotter pin in clevis. Tighten rod lock nut to clevis.

6. Adjust rod "B" until 1" to 1-1/4" free pedal travel is obtained. Tighten lock nut.

7. Remove gauge pin from frame.

CLUTCH—REMOVE AND INSTALL

(Transmission Removed)

1. Remove transmission bearing retainer sleeve.

2. Remove the right and left lower flywheel housing bolts.

3. Disconnect adjustable rod at yoke.

4. Support rear of engine using Engine Support Tool 30-16. Remove the engine rear mount bolts at the clutch housing, then remove frame cross member.

5. Remove remaining bolts securing clutch housing to flywheel housing and remove clutch housing and release yoke.

6. Mark flywheel and clutch cover for correct positioning at reassembly.

7. Alternately loosen the 6 clutch cover to flywheel attaching bolts one or two turns at a time so as not to distort the cover, then remove clutch assembly.

To install, reverse sequence of operations. Seal the area between the bearing retainer sleeve and the clutch housing as shown in Fig. 10-3. Use an old transmission drive gear to align clutch disc while tightening clutch to flywheel. Repack reservoir behind the crankshaft pilot bearing with 1/4 ounce (level tablespoonful) of front wheel bearing grease. Lubricate bearing surface of release levers with front wheel bearing grease. Adjust transmission and clutch linkage. Lubricate clutch

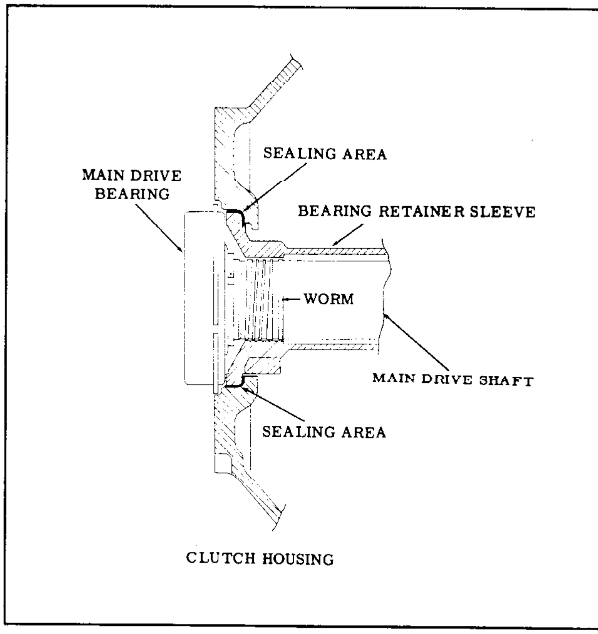


Fig. 10-3 Sleeve Installation

release bearing as outlined under PERIODIC MAINTENANCE.

INSPECTION

1. Inspect the clutch driven plate for broken or distorted torsion springs, worn, loose or oily facings and damaged splines which could cause binding. If any of these conditions exist, install a new clutch plate assembly.

2. Inspect the pressure plate and cover assembly for scores or cracks. If the pressure plate springs have been overheated, the paint will be burned off or they will show a pronounced blue color indicating the temper has been drawn. If any defects are found, the pressure plate and cover must be replaced as an assembly.

ADJUSTMENT OF CLUTCH RELEASE LEVERS

1. Before adjustment of clutch release levers is attempted, levers must be worked several times to center the bearings.

2. Place Gauge J-1048 on a flywheel in the position normally occupied by the driven plate.

3. Mount pressure plate assembly to flywheel, alternately tightening attaching screws one or two turns at a time so as not to distort pressure plate assembly cover.

4. Lay a short straight edge across the center boss of the gauge as a guide for positioning release levers. (Fig. 10-4)

5. The level of bearing surfaces on all lever adjusting screws should be from .000" to .062" below the level of the gauge center boss, and

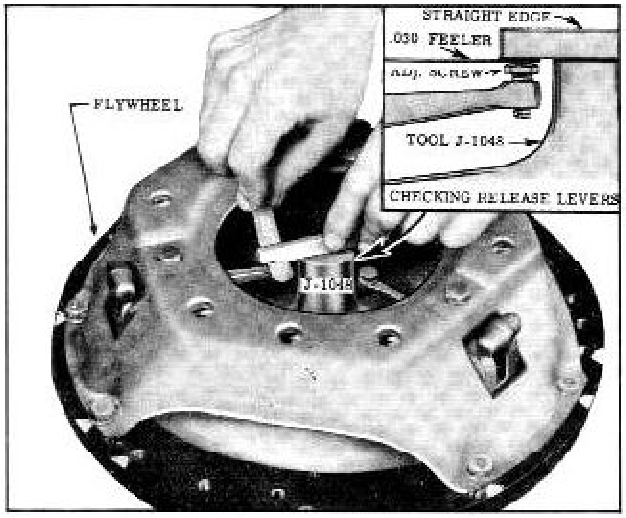


Fig. 10-4 Checking Release Levers

each lever should lie within .015" of the other two levers.

6. If the levers are not more than .025" out of plane, adjustment can be made by lightly tapping the release yoke mounting screw heads, using an 8 ounce hammer, in order to bend the pressure plate cover a small amount until all levers are in the same plane within .015".

If the levers are more than .031" out of plane or do not lie within .000" to .062" below the center boss, it will be necessary to adjust the release lever screws as follows:

a. Using a standard hack-saw blade, remove the original stakes from the required release lever adjusting screws.

b. Adjust screw (or screws) until all levers are within .015" of each other and lie not more than .062" below the level of the gauge center boss.

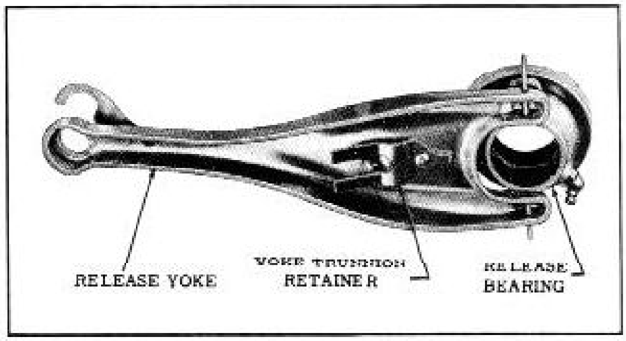


Fig. 10-5 Clutch Yoke Assembly

c. With head of screw resting on a solid block, use a blunt chisel to restake the screws to the lever.

d. Recheck release lever adjustment as outlined in steps 1 through 5.

RELEASE YOKE, REMOVE AND INSTALL (Fig. 10-5)

To remove the clutch release yoke, proceed as follows:

1. Remove transmission and bearing retainer sleeve.

2. Disconnect adjusting rod from yoke.

3. Remove the clutch housing.

4. Snap yoke off ball stud by pushing in on end of yoke, then remove yoke.

To install, reverse sequence of removal operations. Lubricate clutch release bearing as outlined in the Lubrication Section. Lubricate clutch release yoke trunnion with Special Lubricant (Part No. 567196). Check and adjust clutch linkage. (Refer to Clutch Linkage Adjustment)

CLUTCH SPECIFICATIONS

1. CLEARANCE
   Hub and Splines on Clutch Shaft . . . . .00175" to .005"

2. DISC FACINGS

   a. Area - Total Square Inches 56.5
   b. Diameter - Inside . . . . 7"
   c. Diameter - Outside . . . . 11"
   d. Number Used 2
   e. Thickness . . . . .136"

3. DRIVEN DISC ASSEMBLY

   a. Number Used 1
   b. Overall Thickness (Clutch Engaged) . . . . .315"

4. PEDAL FREE TRAVEL . . . . 1" to 1-1/4"

5. PEDAL HEIGHT . . . . 8-1/4"

6. PRESSURE SPRINGS

   a. Number Used 9
   b. Compression Pressure - lbs. . . . . 175 at 1-9/16"
      1. Color . . . . Orange

7. RELEASE BEARING

   a. Thickness . . . . .665"
   b. Type . . . . Ball

TORQUE SPECIFICATIONS

NOTE: Specified torque is for installation of parts only. Checking of torque during inspection may be 15% below the specified minimum.

Application	Ft. Lbs.
Clutch to Flywheel Bolts	14 to 17
Clutch Release Ball Stud	35 to 40
Clutch Housing to Block Bolts	50 to 55
Rear Engine Mount to Clutch Housing Bolts	45 to 60
Frame Cross Member Bolts	45 to 65
Frame Cross Member to Rear Engine Mount	45 to 60

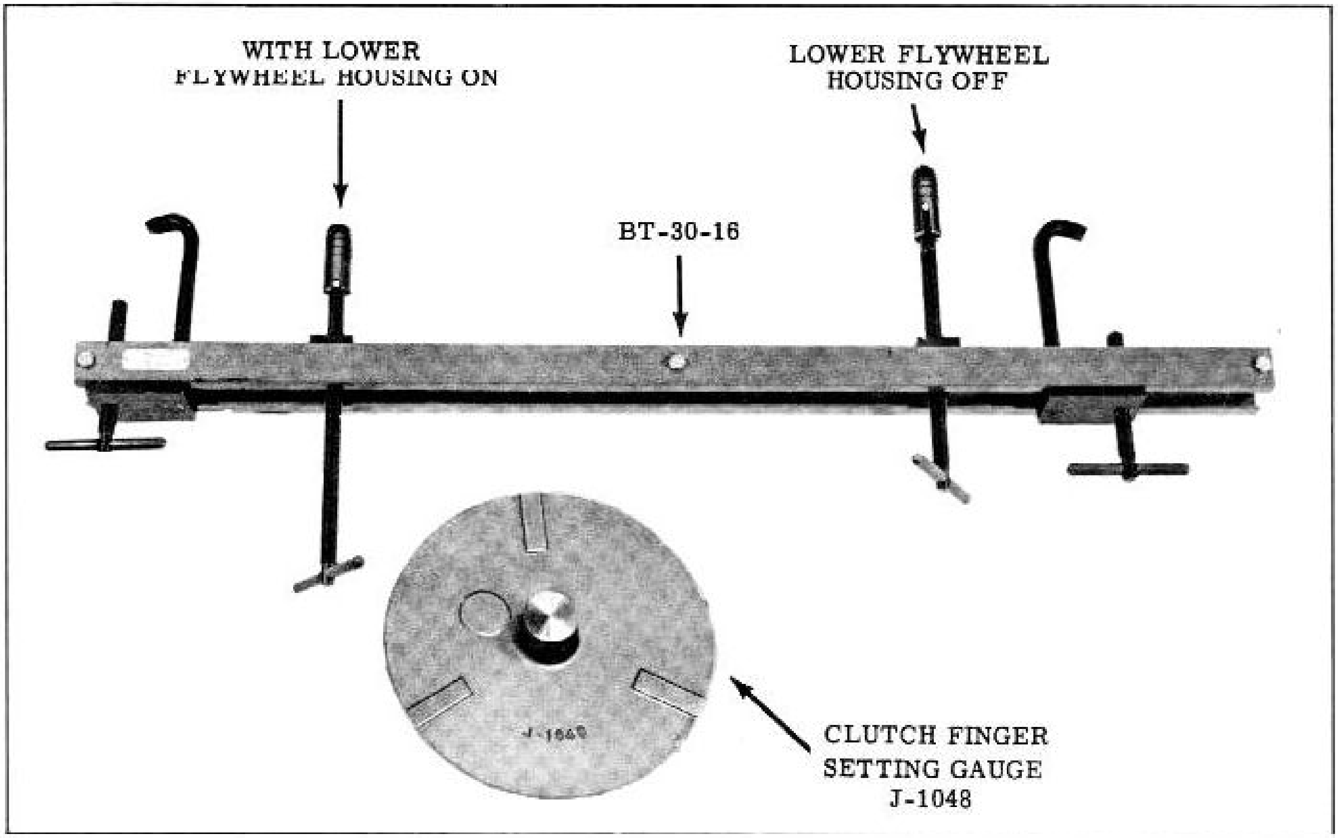


Fig. 10-6 Clutch Tools

SYNCRO-MESH

CONTENTS OF SECTION 11

PERIODIC MAINTENANCE

The lubricant level should be checked every 2,000 miles and if found to be below the filler plug level add SAE 80 Multi-Purpose Gear Lubricant. Periodic or seasonal change of lubricant is not recommended.

ADJUSTMENT OF SHIFT RODS

The Syncro-Mesh transmission requires two linkage adjustments to properly position the hand shift lever with respect to the steering wheel.

Shift Lever Adjustment (Fig. 11-1)

1. Set the transmission outer shift lever "A" in the second gear position (Lever "A" forward, lever "C" rearward).
2. Disconnect the shift rod from the steering column lower shift lever at clevis "B".
3. Hold the steering column lower shift lever upward against its stop in the mast jacket.
4. Install clevis pin through lower shift lever from the bottom side, then adjust clevis so it slides over pin freely (Inset Fig. 11-1). Then shorten shift rod by turning clevis five and one-half turns.
5. Install the clevis pin and cotter pin, then tighten the clevis lock nut.

Cross Shift Linkage Adjustment

1. Disconnect the cross shift rod from the steering column cross shift lever "E".
2. With the transmission selector lever "C" rearward against its stop, adjust clevis "D" so that the clevis pin will easily enter the hole in lever "E" while holding the cross shift lever rearward to take up the lash. Then remove the clevis pin and lengthen the rod by five full turns of the clevis. This should bring the hand shift knob to within 4-7/16" ± 1/4"

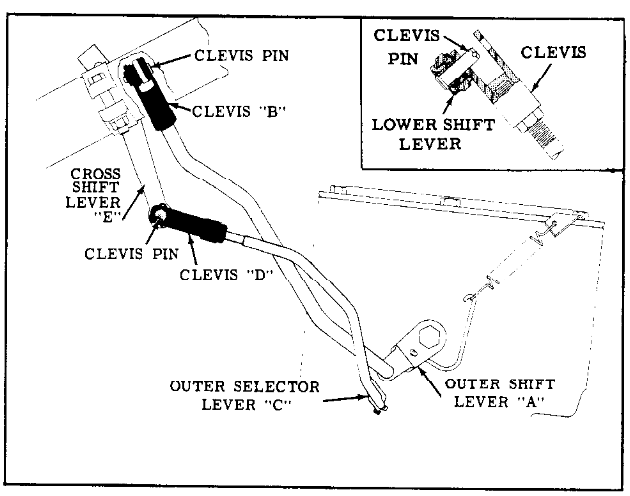


Fig. 11-1 Shift Lever Adjustment

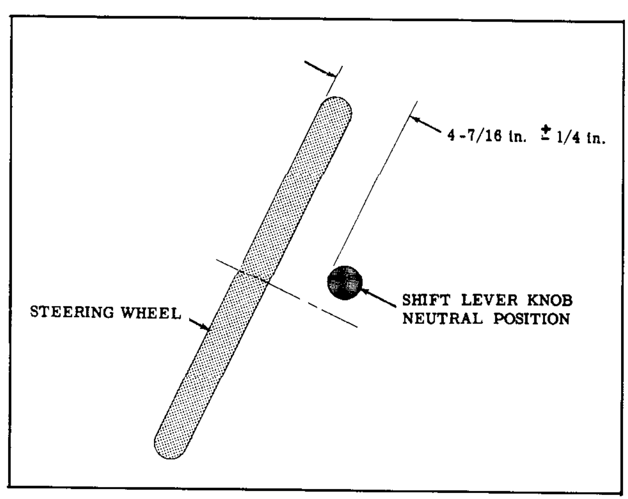


Fig. 11-2 Position of Shift Lever

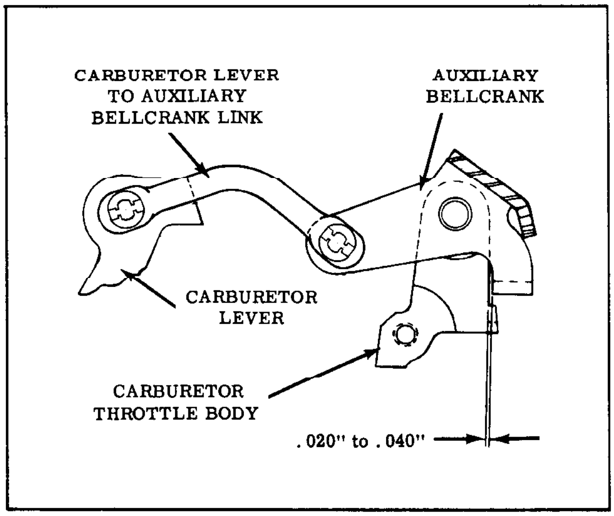


Fig. 11-3 Carburetor Lever to Auxiliary Bellcrank Adjustment (4 Barrel)

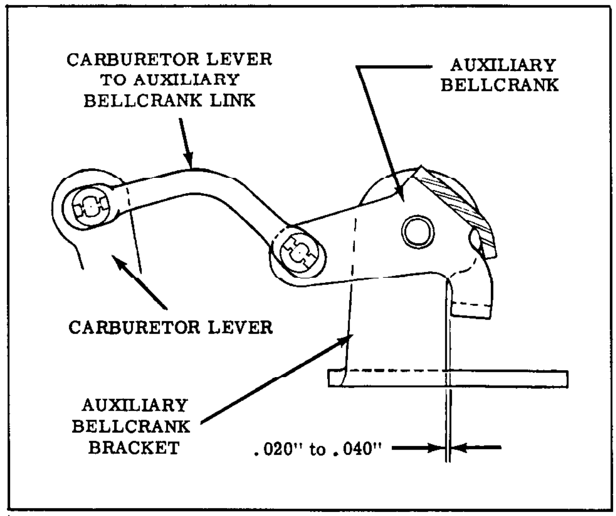


Fig. 11-4 Carburetor Lever to Auxiliary Bellcrank Adjustment (2 Barrel)

of the front face of the steering wheel. (Fig. 11-2)

3. Install the clevis pin and cotter pin, then tighten the clevis lock nut.

THROTTLE CONTROL ADJUSTMENT (Fig. 11-3)

The throttle control adjustment must be made with the choke open and the throttle valves completely closed.

NOTE: Due to the split choke design, make sure fast idle cam is not touching fast idle adjusting screw.

1. Place transmission in neutral.

2. Remove air cleaner.

3. Adjust throttle lever to auxiliary bellcrank link as follows:

   a. 4GC - With the use of a feeler or wire gauge, measure distance between machined surface of carburetor throttle body and the auxiliary bellcrank gauging tang. Clearance should be .020" to .040". If adjustment is necessary, remove auxiliary bellcrank link and bend as required. Install link and recheck clearance. (Fig. 11-3)

   b. 2GC - Repeat Step "a" with the exception that the clearance is measured between the auxiliary bellcrank bracket, bolted to the manifold, and the auxiliary bellcrank. (Fig. 11-4)

4. Adjust throttle rod to obtain the correct accelerator pedal height as indicated in Fig. 11-5.

5. Adjust slow idle as outlined in the TUNE-UP SECTION, Page 9-2.

REAR BEARING RETAINER OIL SEAL

REMOVE AND INSTALL (With Propeller Shaft Removed)

1. Remove oil seal by prying seal from bearing retainer.

2. Coat outside diameter of new seal sparingly with Permatex No. 2. Apply Special Seal Lubricant (Part No. 567196) to the sealing lip of seal.

3. Drive seal into the rear bearing retainer using Seal Installing Tool J-5154 until seal is fully seated. (Fig. 11-6)

TRANSMISSION REMOVE AND INSTALL

1. Drain transmission and disconnect control rods and the speedometer cable at the transmission.

2. Remove the propeller shaft.

3. Remove the 4 transmission to clutch housing attaching bolts and slide the transmission rearward until the main drive shaft clears the clutch housing. Lower the transmission.

To install the transmission, apply a light film of lubriplate to the pilot and the first 1" of splines on the main shaft. Reverse the removal sequence and torque the transmission to clutch housing bolts 60 to 70 ft. lbs. Install propeller

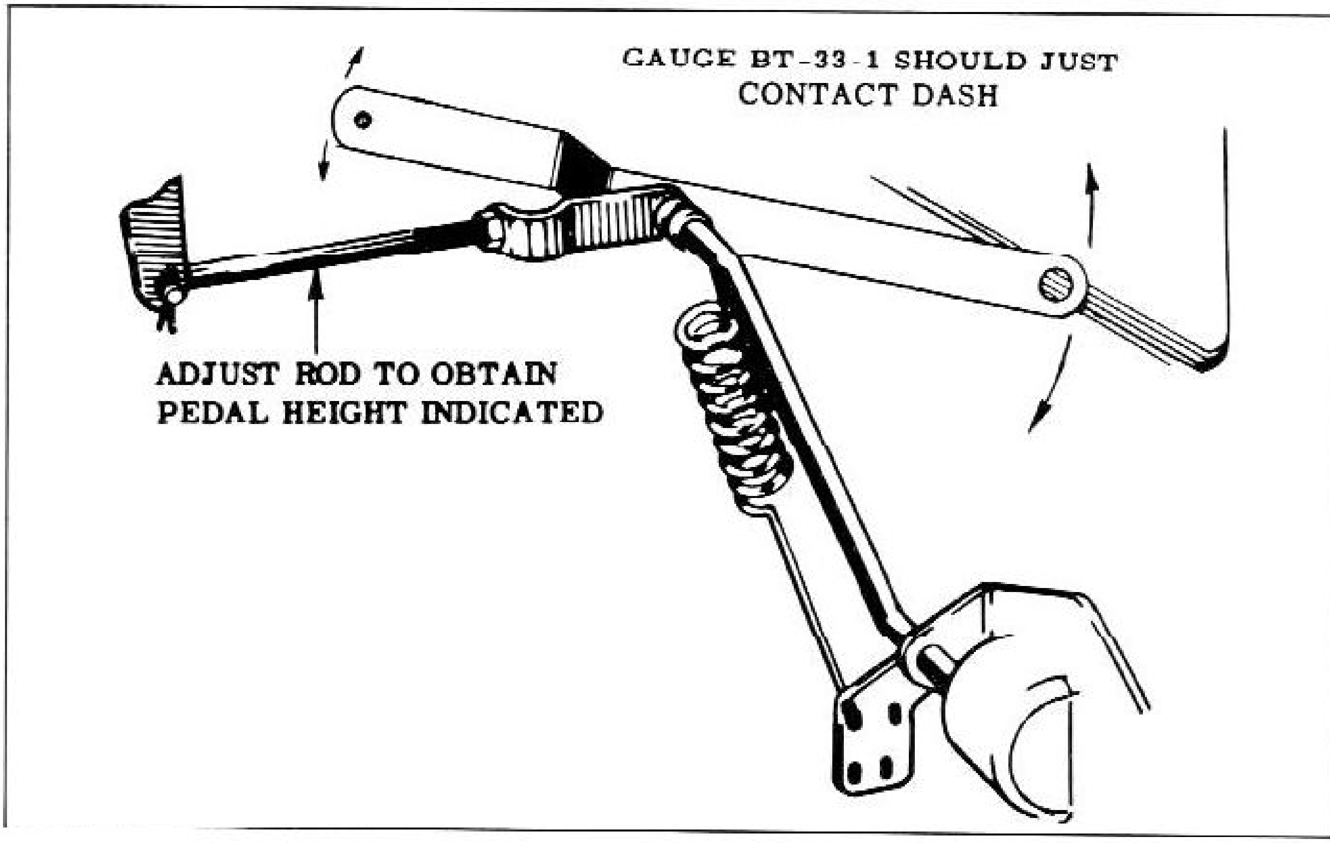


Fig. 11-5 Accelerator Pedal Adjustment

shaft and torque universal joints to differential companion flange 14 to 18 ft. lbs. Through the speedometer driven gear hole fill the rear bearing retainer with 1/2 pint of SAE 80 Multi-Purpose Gear Lubricant. (This will eliminate any chance of the rear bearing retainer bushing running dry until enough oil passes through the main shaft bearing to fill the rear bearing retainer.) Install the speedometer driven gear and torque 6 to 8 ft. lbs. Fill the transmission to the level of the filler plug hole with SAE 80 Multi-Purpose Lubricant, approximately 2-pints additional.

TRANSMISSION DISASSEMBLY

(TRANSMISSION REMOVED)

1. Clean the exterior of the transmission thoroughly.
2. Remove the return spring, spring extension, spring clip, cover, and cover gasket. (Fig. 11-7)

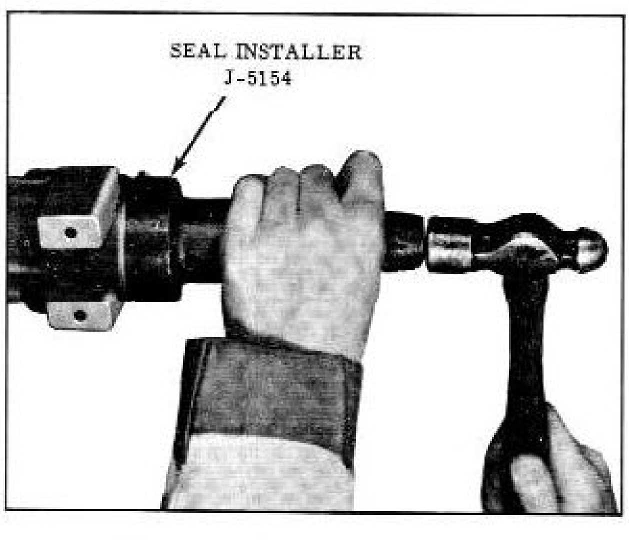


Fig. 11-6 Installing Rear Bearing Retainer Oil Seal

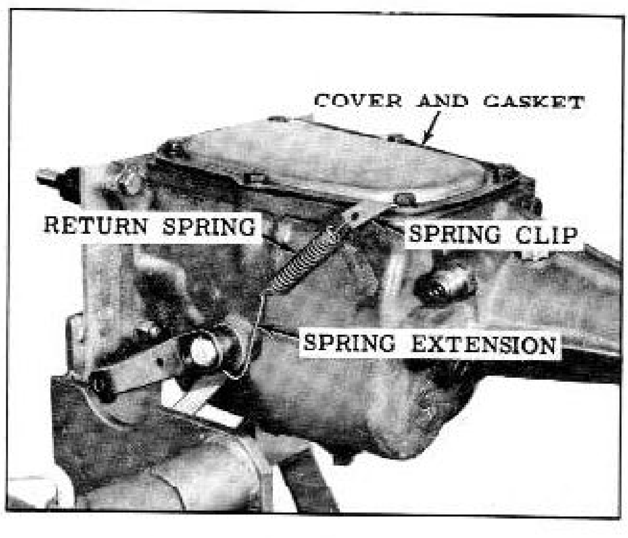


Fig. 11-7 Return Spring Assembly

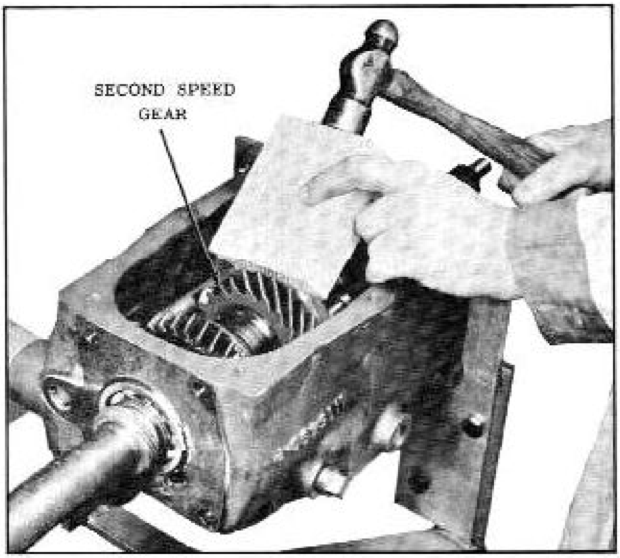


Fig. 11-8 Freeing Rear Bearing From Case

3. Remove speedometer driven gear.

4. Remove rear bearing retainer and gasket.

5. Remove the set screws from two shifter yokes. (Fig. 11-13)

6. Pull the mainshaft rearward until the rear bearing clears the case.

   NOTE: If fit between bearing and transmission case is tight, it may be necessary to tap the second speed gear as shown in Fig. 11-8.

7. Remove the synchronizing clutch from the main shaft. (Fig. 11-9)

   NOTE: If necessary to service only the main drive shaft, main drive gear, or main drive shaft bearing, the assembly can be removed at this point in the disassembly. (Refer to Step 20)

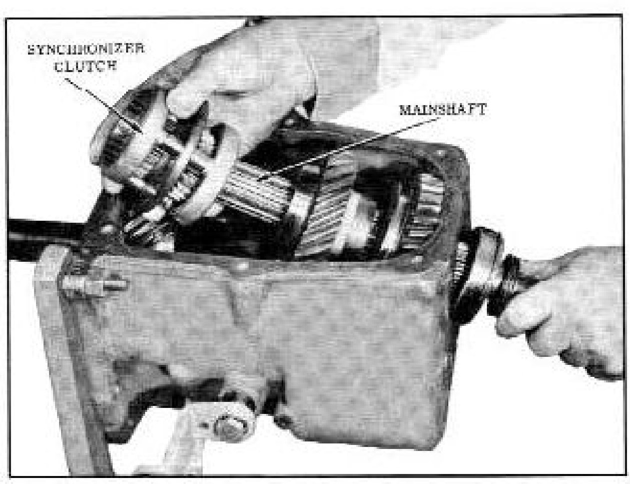


Fig. 11-9 Removing Synchronizing Clutch

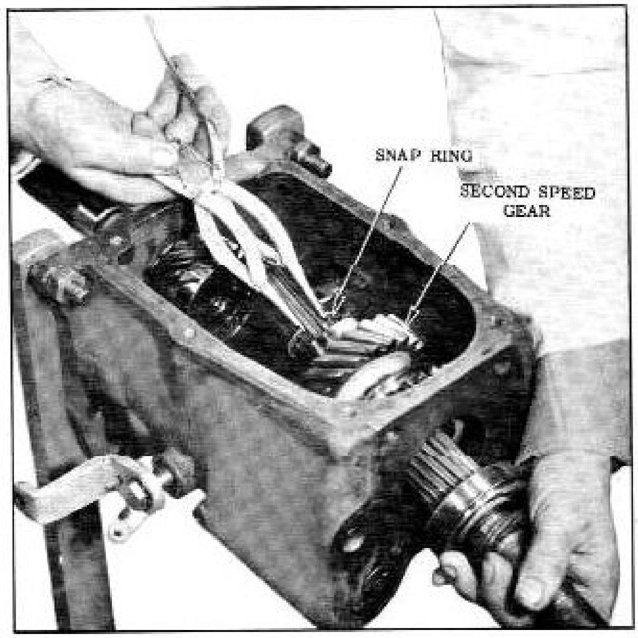


Fig. 11-10 Removing Second Speed Gear Snap Ring

8. Remove the snap ring holding the second speed gear on the main shaft. (Fig. 11-10)

9. Remove the keyed thrust washer, the second speed gear, and the rear thrust washer from the main shaft. (Fig. 11-11)

10. Remove the low and reverse gear retaining ring and slide the gear off the main shaft. (Fig. 11-12)

11. Pull the main shaft from the rear of the case.

12. Loosen the outer shift lever bolt. Position the lever so that the inner shift levers are vertical and remove the outer shift lever. (Fig. 11-12)

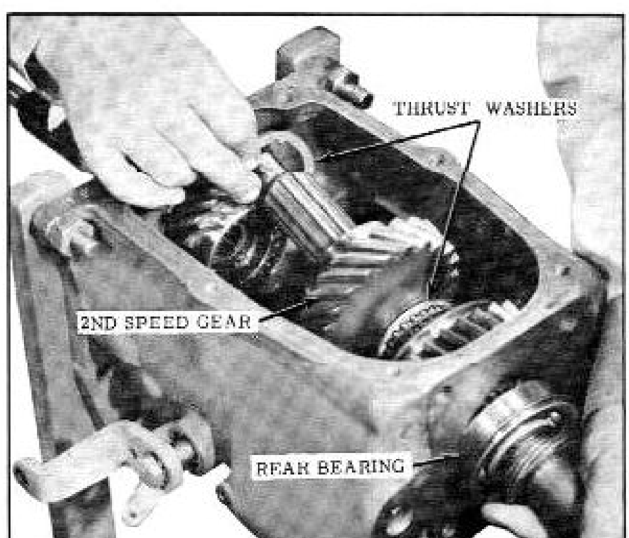


Fig. 11-11 Removing Second Speed Gear

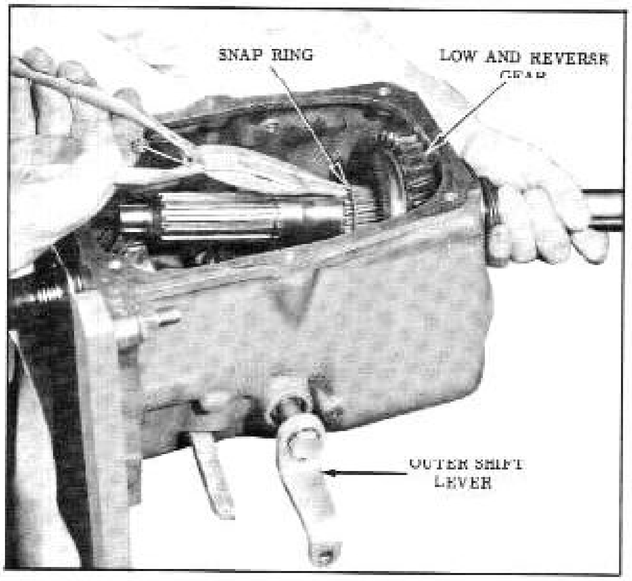


Fig. 11-12 Low and Reverse Gear Snap Ring

13. Remove the set screws from the inner shift levers. (Fig. 11-13)

14. Pull selector shaft away from the second and third speed shifter shaft and remove the interlock retainer. (Fig. 11-14)

15. Drive the selector shaft out through the right side of the case. The welch plug will be driven out by the shaft. Do not allow levers of interlock to drop into the case.

NOTE: The selector shaft can be removed from the left side of the case, however, damage to the selector shaft seal will result.

16. Push or tap the 1st and reverse shifter shaft out through the rear of the case, taking care to prevent the poppet ball and spring from

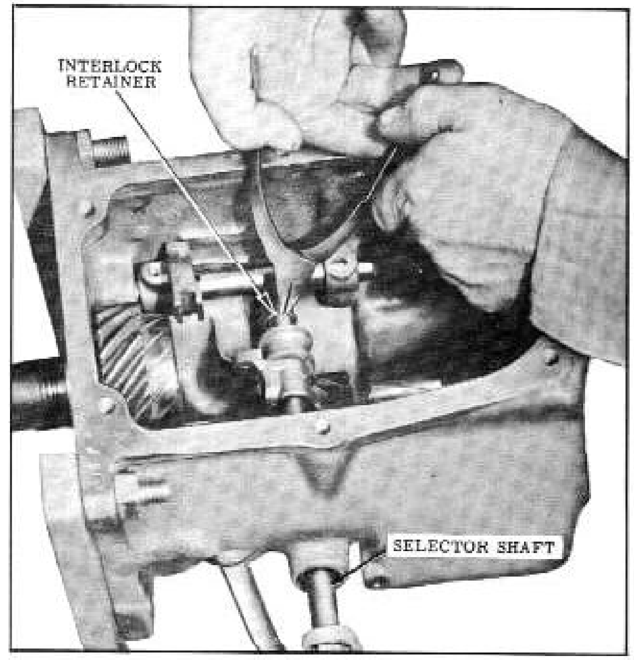


Fig. 11-14 Removing Interlock Retainer

flying out. Remove the first and reverse shifter yoke, ball and spring.

17. Push or tap the second and third shifter shaft out through the front of the transmission case, taking care to prevent the poppet ball and spring from flying out. Remove the second and third shifter yoke, ball and spring.

18. Remove the first and reverse interlock pin from the case near the selector shaft seal. (Fig. 11-15)

19. Drive the counter gear shaft lock pin into the shaft. (Fig. 11-16).

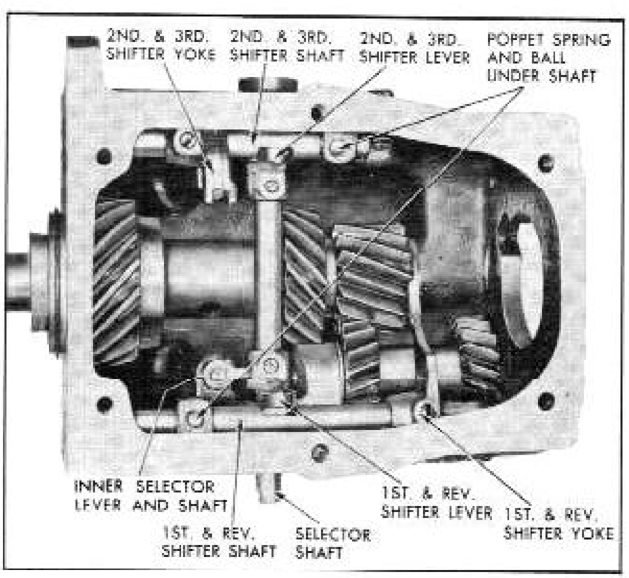


Fig. 11-13 Shift Mechanism

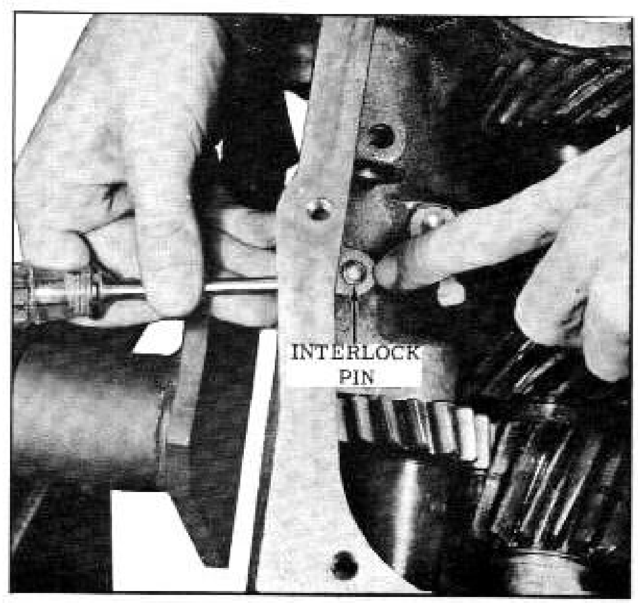


Fig. 11-15 Removing First and Reverse Interlock Pin

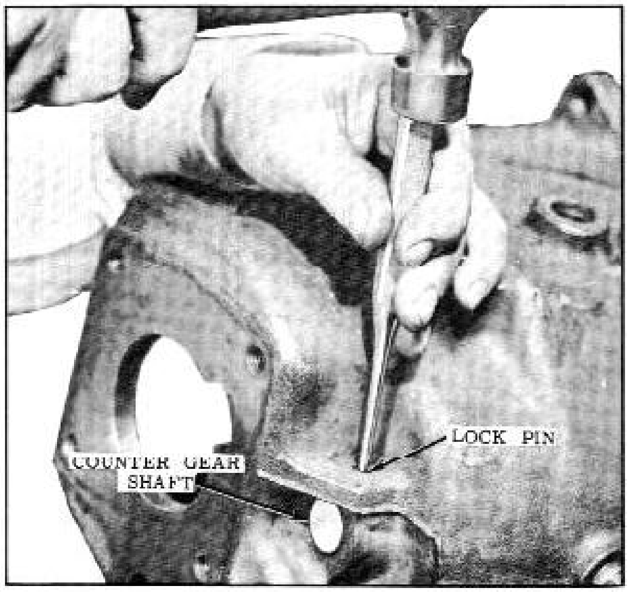


Fig. 11-16 Driving Lock Pin Into Shaft

20. Remove the retaining ring from the main drive gear bearing outer race and tap the drive gear and bearing assembly toward the rear of the case. Remove the main drive gear assembly from the case.

21. Drive the counter gear shaft out through the rear end of the case using Bearing Loader Tool J-1001-A and a brass hammer. Make sure that the bearing loader tool follows the shaft closely so that the counter gear bearings and thrust washers will be held in place. (Fig. 11-17)

22. Remove the counter gear assembly from the case.

23. Remove the transmission outer selector lever nut, lock washer and lever, then remove the inner selector shaft and lever assembly.

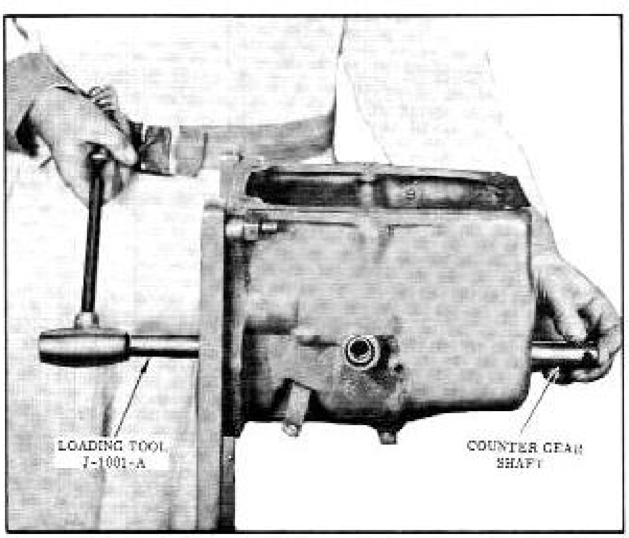


Fig. 11-17 Removing Counter Gear Shaft

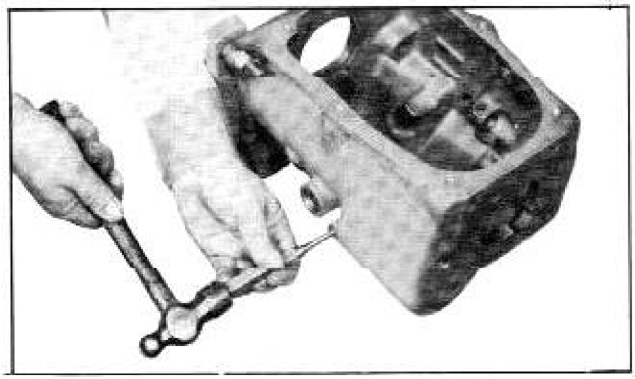


Fig. 11-18 Driving Lock Pin Into Idler Shaft

24. Drive the reverse idler gear shaft lock pin into the shaft. (Fig. 11-18)

25. Drive the reverse idler gear shaft out the rear of the case.

    NOTE: A 1/2" x 8" brass drift should be used to remove the shaft by driving on the idler gear shaft through the counter gear shaft boss in front of case.

26. Remove the reverse idler gear shaft, gear, and thrust washer from the case. (Fig. 11-19)

27. Remove lock pin from reverse idler gear shaft.

CLEANING AND INSPECTION

1. Wash all bearings thoroughly in clean solvent, then air dry. Lubricate bearings with light engine oil and check for roughness.

2. Wash the transmission case thoroughly inside and out with cleaning solvent. Inspect case for cracks, burrs on the front or rear faces of case and for rough or damaged bearing or shaft bores.

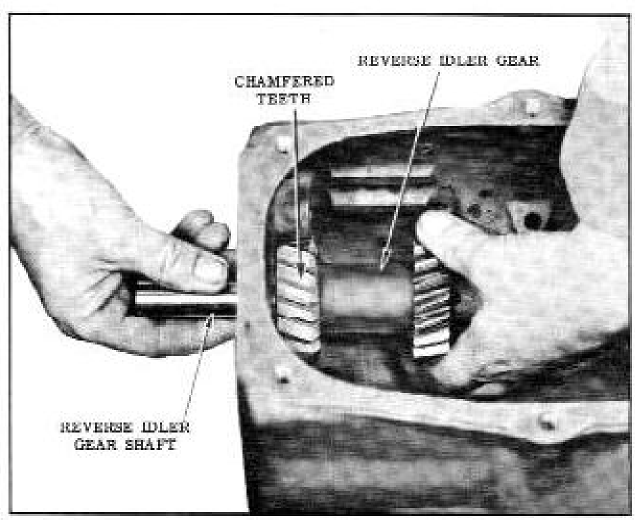


Fig. 11-19 Removing Reverse Idler Gear Shaft

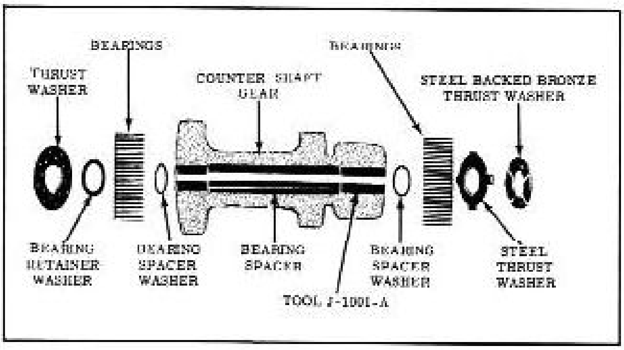


Fig. 11-20 Counter Gear Assembly

3. Wash the rear bearing retainer thoroughly inside and out with cleaning solvent. Inspect retainer for cracks, roughness or scored face or bearing bore.

4. Inspect all gears for excessive wear, chips or cracks. Replace gears as necessary.

5. Inspect main shaft and main drive gear splines for nicks or excessive wear.

6. Inspect companion flange for SCARS, NICKS or excessive wear on the bearing or sealing surfaces. Any of these conditions requires replacement of the flange.

SERVICING INDIVIDUAL UNITS

Counter Gear Assembly (Fig. 11-20)

If the counter gear bearings or gear requires replacement, the bearings, retaining washer, thrust washers, and bearing spacer must be removed from the counter gear. Assemble the parts as follows:

1. Install the bearing spacer and the bearing spacer washers on Bearing Loader Tool J-1001-A, then insert the tool into the counter gear.
2. Install 26 needle bearings in each end of the gear around the bearing loader tool. Position the first bearing under the loader tool so that the tool is centered in the bore of the gear.

3. Install the bearing retainer washer and large perforated thrust washer on the loader tool at the large end of the counter gear. Use petrolatum to retain the washers in place.

4. Install the steel thrust washer on the loader tool at the small end of the counter gear, indexing the 4 tangs with the 4 slots in gear. Then install the bronze and steel thrust washer on the tool. Retain with petrolatum.

   NOTE: Steel side of washer must be toward case.

5. Leave the Bearing Loader Tool J-1001-A in place until the counter gear is installed in the case.

Main Drive Gear

If necessary, the main drive gear ball bearing or roller bearings may be replaced.

1. Remove the retaining ring and washer holding the main drive gear bearing to the main drive gear. (Fig. 11-21)

2. Remove the bearing by jarring the shaft on a block of wood.

3. Pry the wire lock ring from the bore of the main drive gear, then remove retaining washer and 14 needle bearings.

4. To assemble, hold the shaft in the vertical

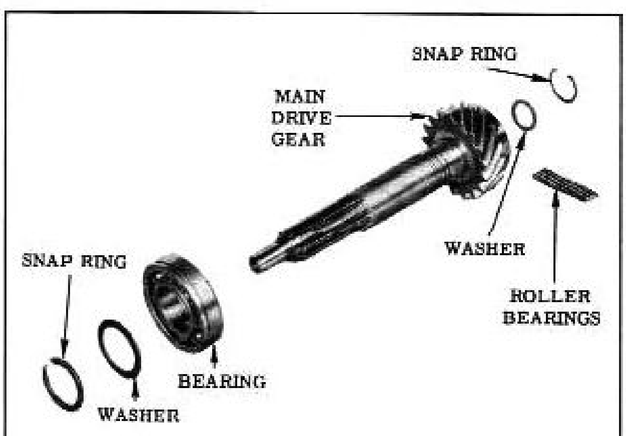


Fig. 11-21 Main Drive Gear Assembly

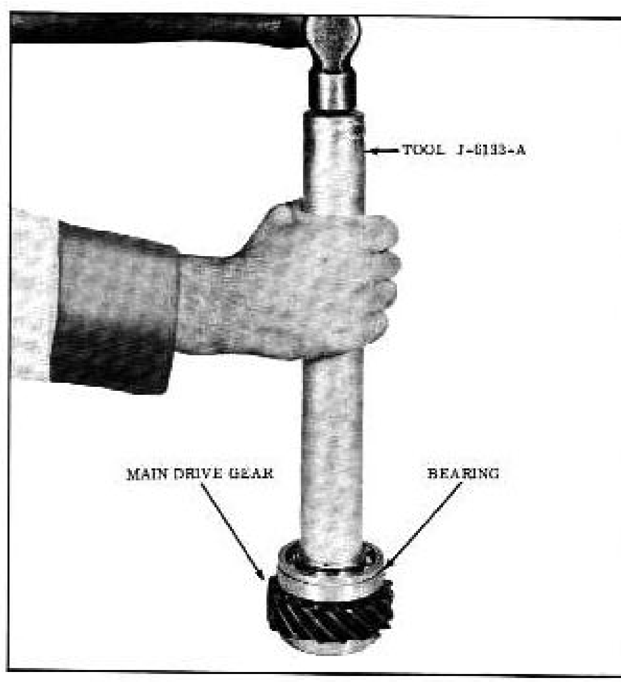


Fig. 11-22 Installing Bearing

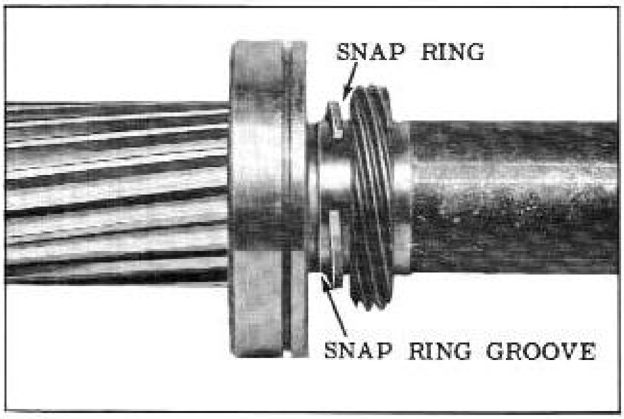


Fig. 11-23 Snap Ring Position Prior to Disassembly of Main Shaft

position and install the needle bearings in the bore of the gear, using petrolatum if necessary to retain the bearings. Install the retaining washer and lock ring.

5. Install the main drive gear bearing on the shaft, shielded side toward gear with Tool J-6133-A. (Fig. 11-22)

6. Install the washer, dished side TOWARD the bearing, then install the retaining ring on the shaft against the washer.

Main Shaft

The speedometer drive gear and rear bearing can be removed from the main shaft as follows.

1. Bend the speedometer gear spacer and remove from the shaft. Discard spacer.

2. Remove the retaining ring from the groove and slide along the shaft toward the speedometer drive gear. (Fig. 11-23)

3. Place the first and reverse gear on the main shaft first and reverse splines with the flat side of the gear toward the bearing. Using the first and reverse gear as a slide hammer, remove the speedometer drive gear, retaining ring and bearing from the shaft. (Fig. 11-24)

4. To assemble the parts, install the bearing on the main shaft with the shielded side toward the shoulder of the first and reverse splines on the main shaft and seat the bearing against the first and reverse gear splines on the main shaft. (Fig. 11-25)

5. Install the retaining ring against the inner race of the bearing and install a new speedometer gear spacer.

6. Drive the speedometer drive gear on the main shaft against the spacer.

Rear Bearing Retainer

The only item serviced in the rear bearing retainer is the seal. If the seal requires replacement, pry seal out and install a new one as follows:

1. Apply a coating of Special Seal Lubricant (Part No. 567196) to the sealing lip of the seal.

2. Apply a light coat of Gasoila or Permatex No. 3 to the outer diameter of the seal.

3. Install the seal into the rear bearing retainer

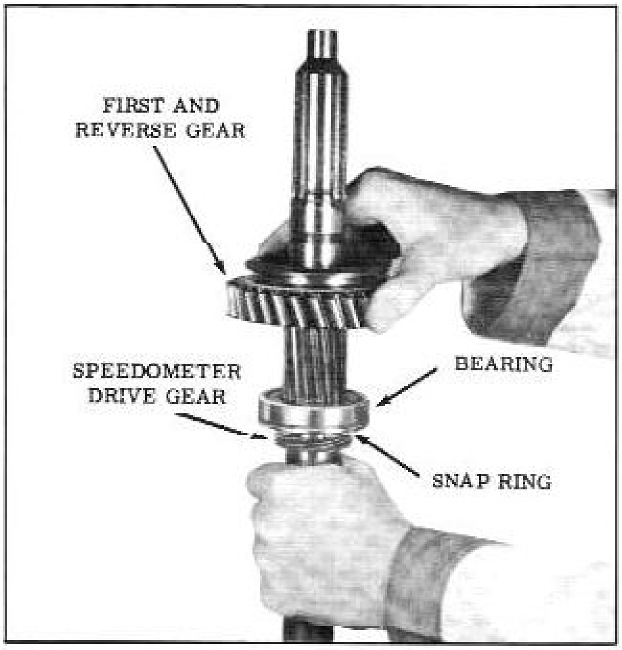


Fig. 11-24 Removing Bearing and Gear

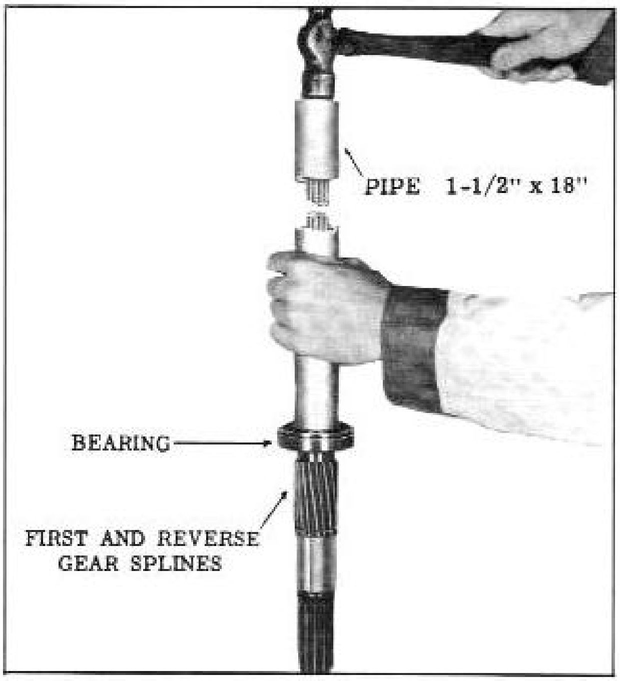


Fig. 11-25 Installing Rear Bearing

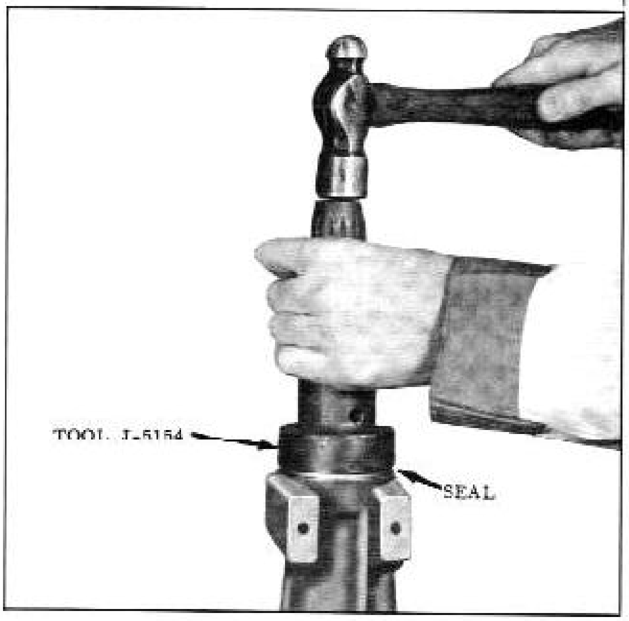


Fig. 11-26 Installing Rear Bearing Retainer Oil Seal

using Seal Installing Tool J-5154. (Fig. 11-26)

Synchronizing Clutch

The synchronizing clutch detent springs are serviced separately and replacement, if necessary, can be accomplished by prying each spring loose from the gear and pushing it out of the groove. (Fig. 11-27) New springs can be installed by pushing them into position in the grooves.

Selector Shaft Seal

The selector shaft seal can be removed and replaced if necessary. Pry out the old seal from the case. Coat the sealing lip of the seal with Lubriplate, coat the outer diameter of the seal with a non-hardening sealer, such as Permatex No. 2, and install the seal in the case using a tool such as a socket to drive the seal until it bottoms in the case.

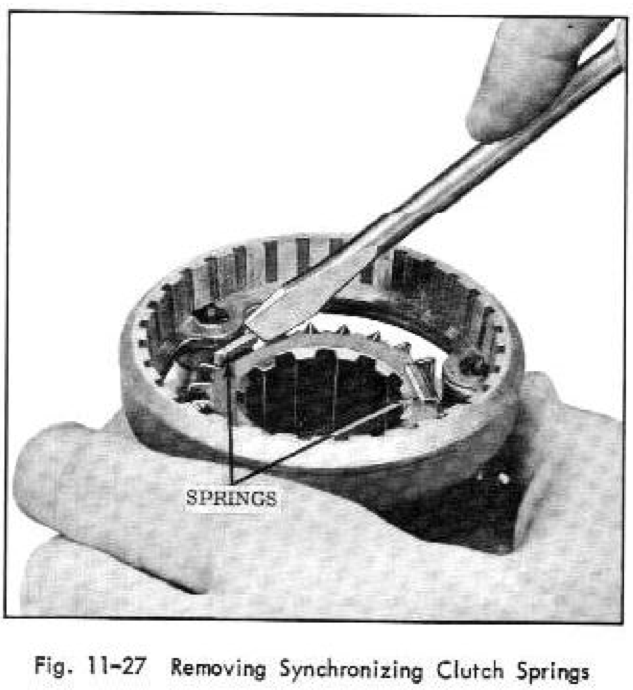


Fig. 11-27 Removing Synchronizing Clutch Springs

Reverse Idler Gear Bushings

The reverse idler gear bushings can be replaced if necessary. However, the new bushings must be line reamed after they are installed. Drive out the old bushings, then install the new ones until they are positioned just beyond the chamfer in the gear. New reverse idler gears contain bushings which have already been machined to size.

ASSEMBLY OF TRANSMISSION

1. Install the reverse idler gear as follows:

   a. Position the reverse idler gear and bronze thrust washers into the case (chamfered teeth to the rear of the case), then install the idler gear shaft (slotted end out) until the front of the shaft picks up the front thrust washer and just starts into the inner support in the case. (Fig. 11-28)

   b. Coat the protruding end (slotted) of the shaft with a non-hardening sealer such as Permatex No. 2.

   c. Make sure the lock pin hole in the shaft is in line with the lock pin hole in the case. The slot in the end of the idler gear shaft is for this purpose. Finish driving the shaft into the case using a brass drift and a hammer.

   d. Coat a new lock pin with a non hardening

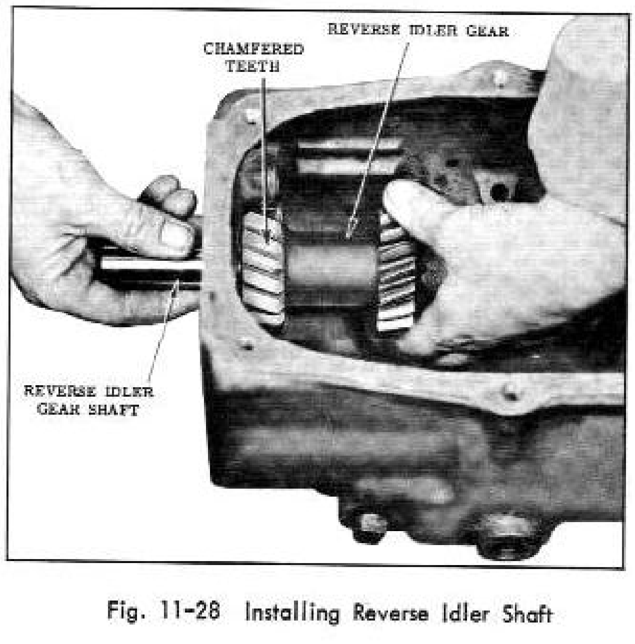


Fig. 11-28 Installing Reverse Idler Shaft

sealer such as Permatex No. 2. Drive the lock pin 1'' below the surface of the boss on the case.

2. Install the counter gear as follows:

   a. Position the counter gear assembly into the case, with the large bronze thrust washer toward the front of the case.

   b. Align the counter gear assembly with the counter gear shaft holes in the case. The tang of the combination steel and bronze thrust washer must index with the case. Install the counter gear shaft, small end first, from the rear of the case until the front end of the shaft just enters the bore in the front wall of the case. Make sure that the shaft closely follows the bearing loader Tool J-1001-A so that the bearings and thrust washers are held in place.

   c. Line up the lock pin hole in the shaft with the lock pin hole in the case, then coat the protruding end of the shaft with a non-hardening sealer such as Permatex No. 2. Finish driving the shaft into the case using a brass drift and a hammer.

   d. Coat a new lock pin with Permatex No. 2 and drive pin flush with case.

3. Install the spring washer, flat washer, and the oil seal on the inner selector shaft in that order, with the crowned side of the spring washer against the flat washer. (Fig. 11-29)

4. Apply Lubriplate to the inner selector shaft, insert the shaft in the transmission case, then install the outer selector lever, washer, and nut so that the bend of the lever is down.

5. Install the main drive gear shaft into front of case. Install bearing retainer ring.

6. Install a new welch plug coated with Permatex No. 2 or its equivalent, in the side of the case opposite the selector shaft seal. The welch

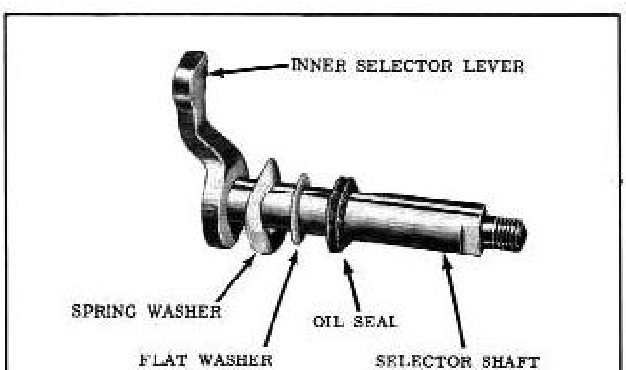


Fig. 11-29 Inner Selector Lever and Shaft

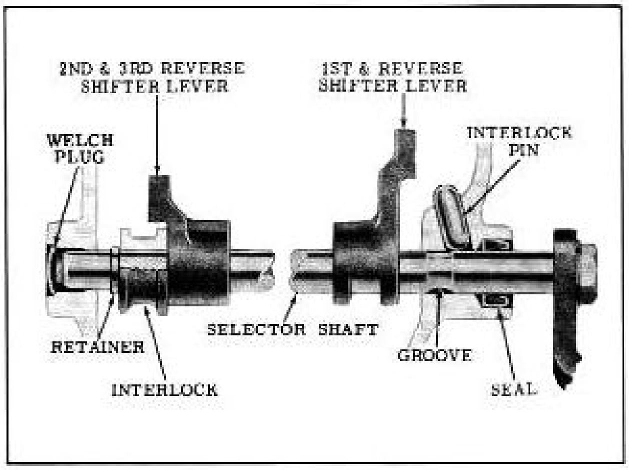


Fig. 11-30 Selector Shaft and Related Parts

plug is seated when it bottoms in the bore in the case.

7. Install the selector shaft and shifter levers as follows: (Fig. 11-30)

   a. Coat the sealing lip of the seal with Lubriplate, then insert the selector shaft through the seal until it just protrudes inside the case.

   b. Engage the first and reverse shifter lever with the inner selector lever in the case, then depress the inner selector lever while sliding the selector shaft through the first and reverse shifter lever.

      NOTE: The flat ground surface of the shifter lever must face left side of case.

   c. Install the second and third shifter lever on the selector shaft, installing the flat ground surface of the lever toward the right side of case. Place the second and third speed interlock on the selector shaft. Install a new interlock retainer on the shaft. Do not install set screws at this time.

      NOTE: The retainer can be installed and clinched with a pair of needle nose pliers.

8. Install the selector shaft interlock pin in the case. Move selector shaft until the interlock pin engages groove in selector shaft. (Fig. 11-30)

9. Install the spring and poppet ball for the first and reverse shifter shaft in the case, then install the shifter shaft from the rear of the case with the grooved end rearward and place the first and reverse shifter yoke on the shaft with the set screw hole facing up. Use a punch to depress the poppet ball and spring when installing the shaft. Do not install the set screw at this time.

10. Install the spring and poppet ball for the second and third speed shifter shaft in the case. Move selector shaft so that the second and third interlock will be directly under the second and third shifter shaft. Install the shaft from the front of the case with 3 notched detents rearward and place the second and third shifter yoke on the shaft with the set screw hole facing up. Do not install the set screw at this time.

11. Position first and reverse and the second and third shifter shafts so that the notch in each shaft is directly above the selector shaft.

    NOTE: This is the neutral position.

12. Install NEW set screws in the shifter levers and tighten with a screwdriver socket and torque 15 to 20 ft. lbs. Stake set screws to prevent loosening.

13. Install the outer shift lever, lock washer and bolt on the selector shaft.

14. Insert the main shaft through the bore in the rear of the transmission case, then slide the first and reverse gear on the shaft with flat side of the gear rearward. Install the first and reverse gear (thin) retaining ring in groove in spline.

15. Line up the small wire spacer ring in the ring groove in the main shaft with the machined thrust washer keyway groove on the second speed gear bearing surface. (Fig. 11-31)

    NOTE: There are two grooves machined the full length of the second speed gear bearing surface of the main shaft. The shallow angle groove is for lubrication purposes only

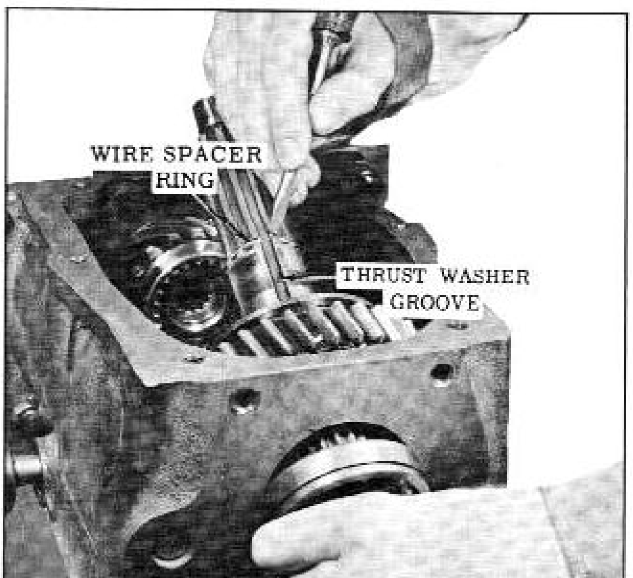


Fig. 11-31 Lining Up Wire Spacer Ring

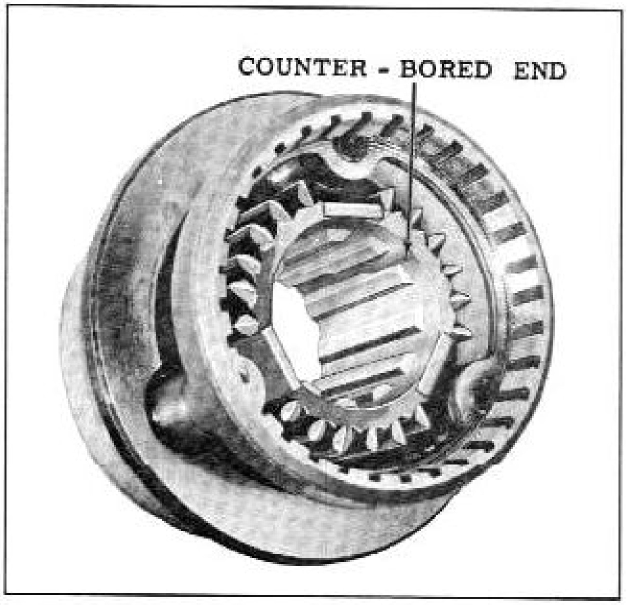


Fig. 11-32 Synchronizing Drum

and should not be obstructed. The deep groove, similar to a spline, is designed to receive the tangs of the two second speed gear thrust washers.

16. Install the second speed gear inner thrust washer, indexing the tang with the proper groove on the main shaft.

17. Place the second speed gear on the main shaft with the cone clutch surface facing forward, install outer thrust washer and retain with a NEW retaining ring.

18. Install the synchronizing drum on the main shaft with the counter-bored end of the gear toward the second speed gear. (Fig. 11-32) Engage the synchronizing drum with the second and third speed shifter yoke and index the first and reverse shifter yoke, then tap the main shaft forward until it pilots in the main drive gear and the rear bearing pilots in the case.

19. Install the rear bearing retaining ring.

20. Install NEW set screws in the shifter yokes and tighten 15 to 20 ft. lbs. Stake set screws to prevent loosening.

    NOTE: These screws are deformed at the slotted end to provide a self-locking feature to prevent screws from loosening. This feature is lost if the screws are used a second time.

21. Coat the rear bearing retainer bushing with SAE 80 Multi-Purpose Gear Lubricant, then position a new rear bearing retainer gasket and the rear bearing retainer on the transmission case.

22. Apply Permatex No. 2 on the rear bearing

retainer screws. Install the screws and tighten 28 to 33 ft. lbs.

23. Coat the sealing lip of the rear bearing retainer oil seal with Special Lubricant (Part No. 567196). Coat the outer diameter of the seal with Gasoila or Permatex No. 3.

24. Install the seal into the rear bearing retainer using Seal Installing Tool J-5154.

25. Position a new top cover gasket on the transmission case and install the top cover, spring clip, attaching screws and lock washers. Torque screws 10 to 12 ft. lbs.

26. Install the toggle spring and spring extension between the spring clip and the outer shift lever.

To install the transmission, apply a light film of Lubriplate to the pilot and the first 1" of splines on the main shaft. Reverse the removal sequence and torque the transmission to clutch housing bolts 60 to 70 ft. lbs. Install propeller shaft and torque universal joints to differential companion flange 14 to 18 ft. lbs. Through the speedometer driven gear hole fill the rear bearing retainer with 1/2 pint of SAE 80 Multi-Purpose Gear Lubricant. (This will eliminate any chance of the rear bearing retainer bushing running dry until enough oil passes through the main shaft bearing to fill the rear bearing retainer.) Install the speedometer driven gear and torque 6 to 8 ft. lbs. Fill the transmission to the level of the filler plug hole with SAE 80 Multi-Purpose Lubricant (approximately 2 pints additional).

CLUTCH HOUSING ALIGNMENT

(WITH TRANSMISSION AND CLUTCH ASSEMBLY REMOVED)

If any of the following conditions arise, a misaligned flywheel housing is indicated.

1. Excessive gear noise.
2. Transmission jumps out of third gear.
3. Early bearing failure.

FACE RUNOUT (Fig. 11-33)

NOTE: It is not necessary to have the lower flywheel housing in place when checking face and radial runout.

1. Install Pilot Mounting Strap J-5248-1 on flywheel.

2. Install Pilot Shaft J-8989-9 to mounting strap.

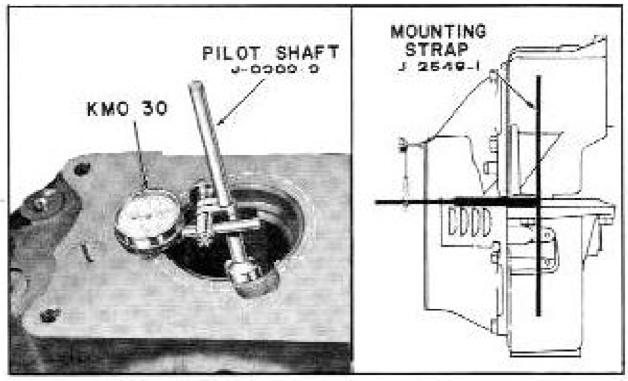


Fig. 11-33 Checking Face Runout

Mount Dial Indicator KMO-30 (with a large contact button) on the shaft.

3. Tap crankshaft to the rear of the engine.

4. Bring the indicator into contact with the face of the housing with approximately .015" compression. The point of contact should be 2-1/4" from the center of the crankshaft.

5. Rotate the flywheel through 360° (Tool J-972-A may be used to rotate flywheel) and note the indicator reading. If the total indicator reading exceeds .003", shim as necessary between the housing and the engine block.

RADIAL RUNOUT (Fig. 11-34)

1. Assemble Dial Indicator KMO-30 so that the lever rides in the bore of the housing with approximately .015" compression.

2. Position the indicator at (A) and set the dial at zero. Rotate the flywheel until indicator is at (B) and note indicator reading. Indicator reading at (B) must not be more than .004" on either side of the initial reading, indicating that the center of housing bore is within .002" on either side of crankshaft.

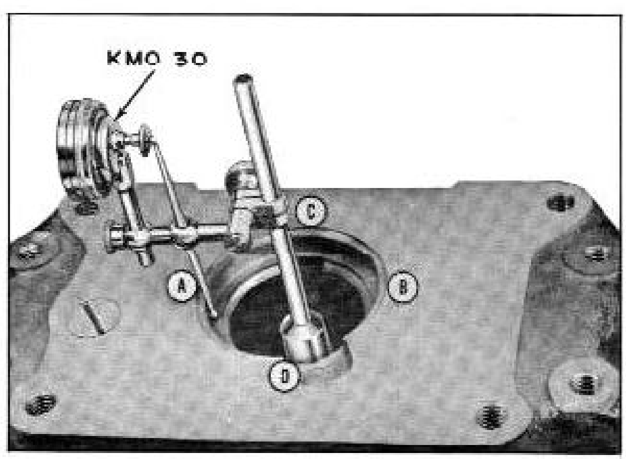


Fig. 11-34 Checking Radial Runout

3. Position the indicator lever at the top of the bore (C) with the dial set at .000". Rotate the flywheel until the indicator is at (D). Reading must be between .000" to + .008", indicating the center of housing bore is .000" to .004" below center of crankshaft.

4. If readings are not within specifications, it will be necessary to remove the clutch housing and the dowel pins.

   NOTE: Saw off the dowel pins close to the block before driving pins through; otherwise, the pins will strike the flywheel before clearing the dowel pin holes.

5. Install the clutch housing and recheck radial runout as outlined under steps 1 through 3. If dial indicator readings are not within specifications, loosen the clutch housing to block cap screws slightly, then shift the housing to bring within limits. After aligning housing again tighten housing attaching bolts and recheck radial runout.

6. Using Reamer J-4832-3 (roughing reamer) and Ratchet Wrench J-808-6, ream the two engine blocks to clutch housing dowel pin holes. Then finish ream using Reamer J-4832-4 and install oversize dowel pins, Part No. 557754 (large chamfer end out).

   NOTE: The above reamers must be shortened to 4" overall length in order to perform this operation with engine in the car.

7. Clean all cuttings from housing.

8. Remove dial indicator set-up.

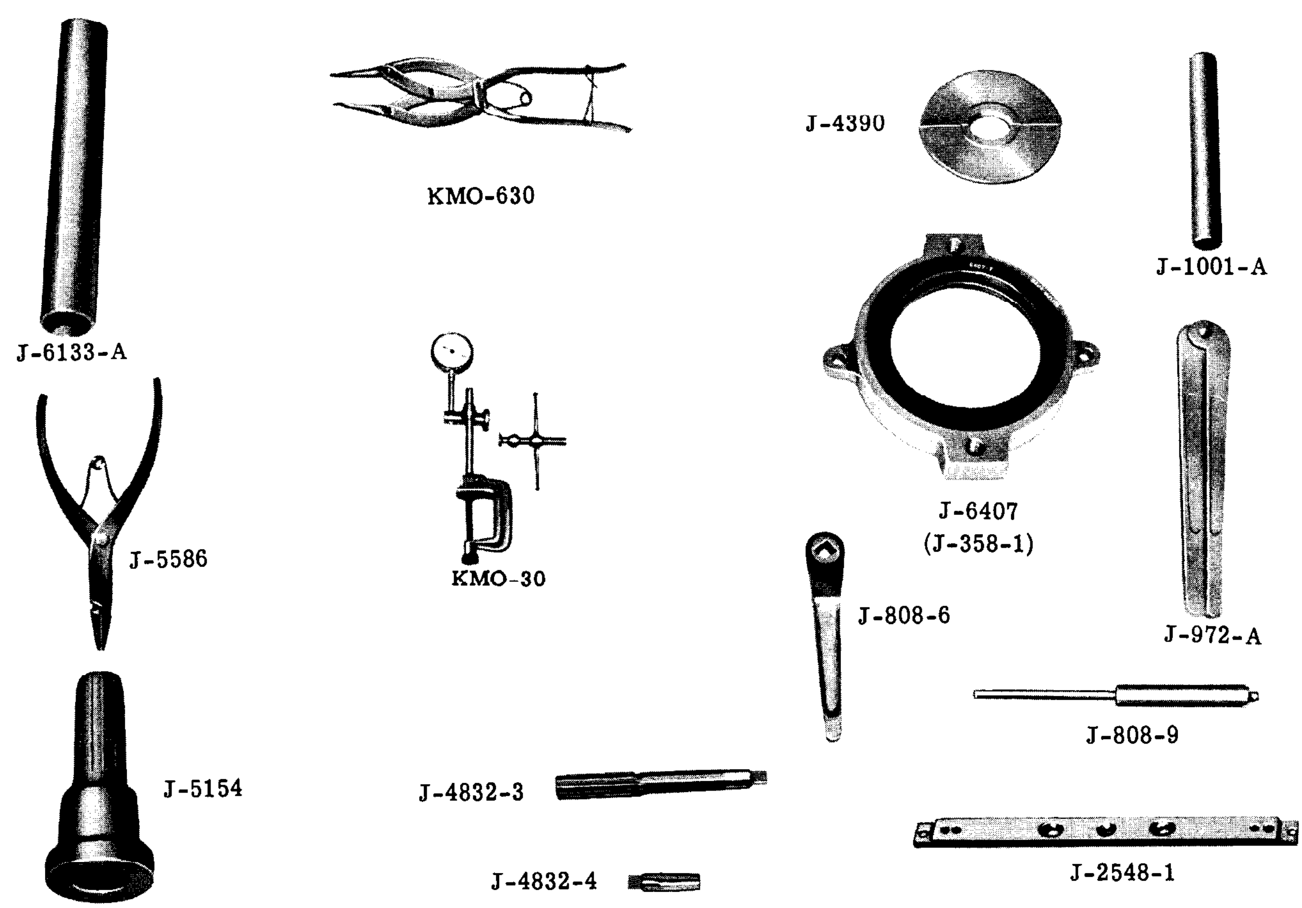
SYNCRO-MESH TRANSMISSION SPECIFICATIONS

CAPACITY	2-1/2 Pts.
GEAR RATIOS	
1st	2.15:1
2nd	1.37:1
3rd	Direct
Rev	2.28:1

TORQUE SPECIFICATIONS

NOTE: Specified torque is for installation of parts only. Checking of torque during inspection may be 15% below the specified minimum.

Application	Ft. Lbs.
Transmission to Clutch Housing Bolts	60 to 70
Cover Bolts	10 to 12
Rear Bearing Retainer Bolts	28 to 33
Speedometer Driven Gear	6 to 8
Shifter Lever and Yoke Set Screws	15 to 20



KMO-30	Dial Indicator Set
KMO-630	Snap Ring Pliers
J-808-6	Ratchet Handle
J-808-9	Pilot Shaft
J-972-A	Differential Adjusting Nut Wrench (Used to Turn Flywheel)
J-1001-A	Needle Bearing Loader
J-2548-1	Flywheel Housing Alignment Tool Set
J-4390	Speedometer Gear Remover and Installer (Used as Mainshaft Bearing Installer)
J-4832-3	Roughing Reamer
J-4332-4	Finish Reamer
J-5154	Rear Bearing Retainer Seal Driver
J-5586	Snap Ring Pliers
J-6133-A	H. M. Rear Oil Pump Bearing and Speedometer Gear Installer
J-6407 (J-358-1)	Press Plate Holder

Fig. 11-35 Synchro-Mesh Tools

FRAME AND BUMPERS

CONTENTS OF SECTION 12

FRAMES

When supporting car on a floor jack or floor stands, the car should be supported at the suspension points only. Under no conditions should the car be supported at the extreme ends of frame or at the center of a frame side rail.

When using a frame contact hoist the car should be lifted at the torque boxes (where the front and rear frame sections join the frame side rails).

CHECKING FRAME ALIGNMENT

The diagram shown in Fig. 12-1 can be used to check the alignment of a car frame that has been distorted.

The reference points indicated in the illustration are to be checked with a tram gauge. The dimensions between the various reference points will show where straightening operations are necessary.

NOTE: Corresponding measurements must be equal within 1/4".

1. Measure A-A. If not equal, rear end of frame is misaligned.

2. Measure B-B. If not equal, center portion of frame is misaligned.

STRAIGHTENING FRAME

3. Measure C-C. If not equal, then front suspension cross member is misaligned.

STRAIGHTENING FRAME

In case of collision, frame members can often be satisfactorily straightened to the required limits. However, the front suspension cross member is made to unusually close limits necessary for proper front wheel alignment; therefore, straightening of this unit may not be successful.

It is possible that the ordinary straightening methods will suffice for minor damage to the front suspension cross member; however, in case of serious damage or fracture, the entire front suspension cross member must be replaced. Before the member is replaced, it is essential that the frame alignment be checked, and corrected if necessary.

Whenever possible, frame members should be securely fastened with hot rivets. In case riveting equipment is not available, finished bolts snugly fitted in reamed holes may be used. The nuts should be securely tightened and lock washers used, care being taken that washers do not spread. (Cold driven rivets are not recommended unless

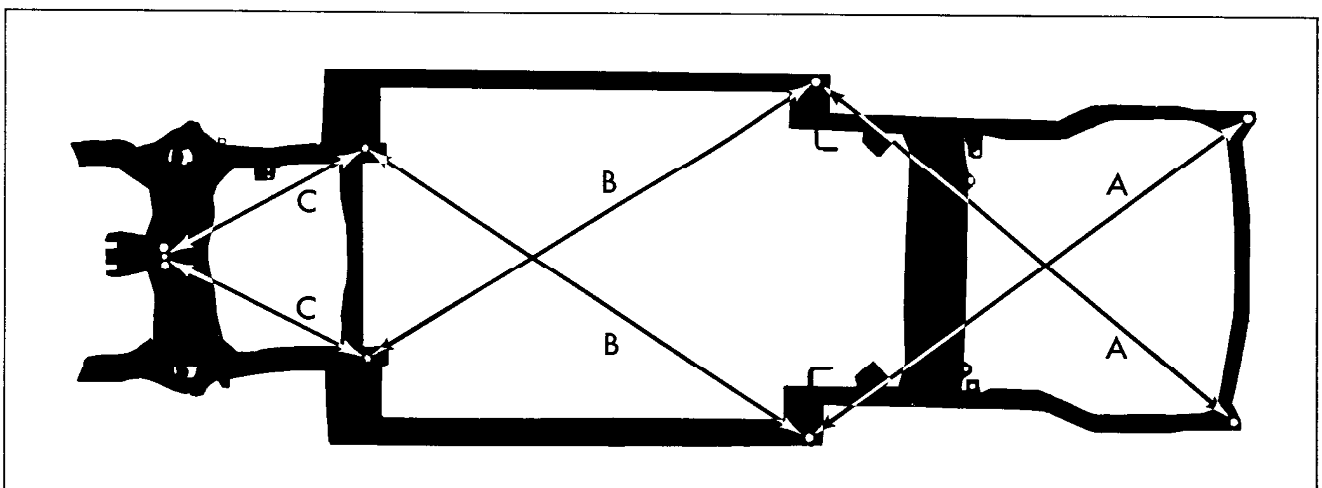


Fig. 12-1 Frame Alignment Diagram

the heavy power press equipment necessary to make secure fastening is available.)

After frame members are riveted or bolted securely, all welded joints and areas that were cut to permit removal of a frame member should be welded.

When the frame repair is completed and inspected, the various parts of the suspension may be assembled.

BUMPER ALIGNMENT

Vertical, horizontal, fore and aft alignment of the front and rear bumper assemblies is provided for through the use of elongated holes in the bumper to back bar and back bar to frame.

NOTE: The front bumper back bar to frame bolts are serrated. To make fore and aft adjustments, the nuts must be loosened and the bolt tapped until serrations are clear of frame and back bar. Then position bumper and tighten nuts.

To align bumpers, loosen bumper attaching bolts and shift bumper to desired position. Make sure that bumpers are horizontal and clearance between bumper and fenders is even on both sides. Torque bolts as indicated under Torque Specifications.

BUMPER TORQUE SPECIFICATIONS

NOTE: Specified torque is for installation of parts only. Checking of torque during inspection may be 15% below the specified minimum.

Application	Ft. Lbs.
FRONT BUMPER	
Upper and Lower Molding to Primary Bar	1 to 1-1/2
Outer Extensions to Primary Bar	22 to 28
License Support to Bumper	8 Max.
Support Bracket to Back Bar	100 Min.
Back Bar to Frame	100 Min.
Outer Extension Braces	22 to 28
Bumper Wing to Fender	22 to 28
REAR BUMPER	
Inner Guard to Primary Bars	35 to 45
Outer Guard to Primary Bars	22 to 28
Upper Primary Bar to Lower Primary Bars	22 to 28
Back-up Light to Bumper or Ornament	6 Max.
Bumper to Back Bar	100 Min.
Back Bar to Frame	100 Min.
Step to Bumper (45 Style)	22 to 28
Frame to Inner Support Bracket	18 to 24
Center Support to Frame and Inner Support	30 to 40

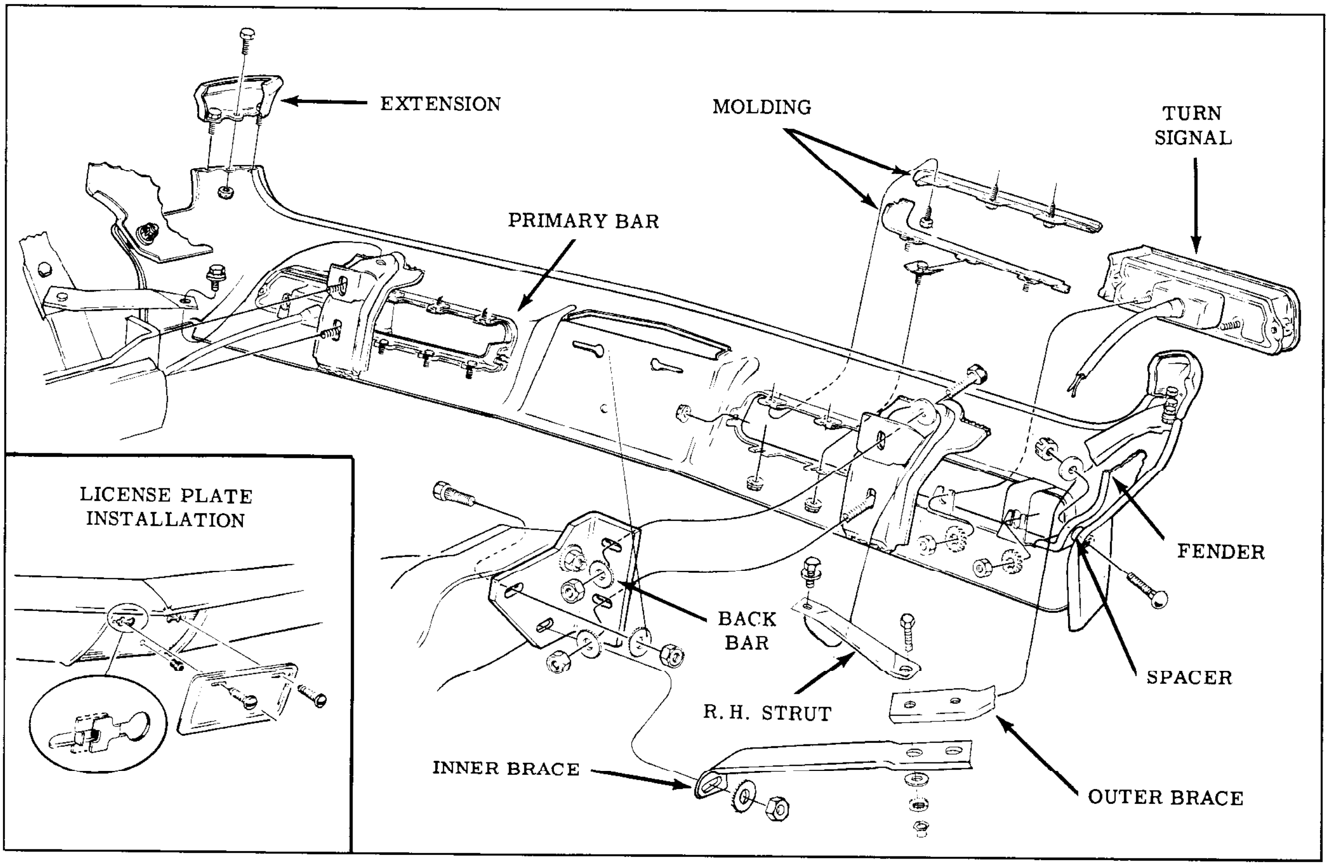


Fig. 12-2 Front Bumper Assembly

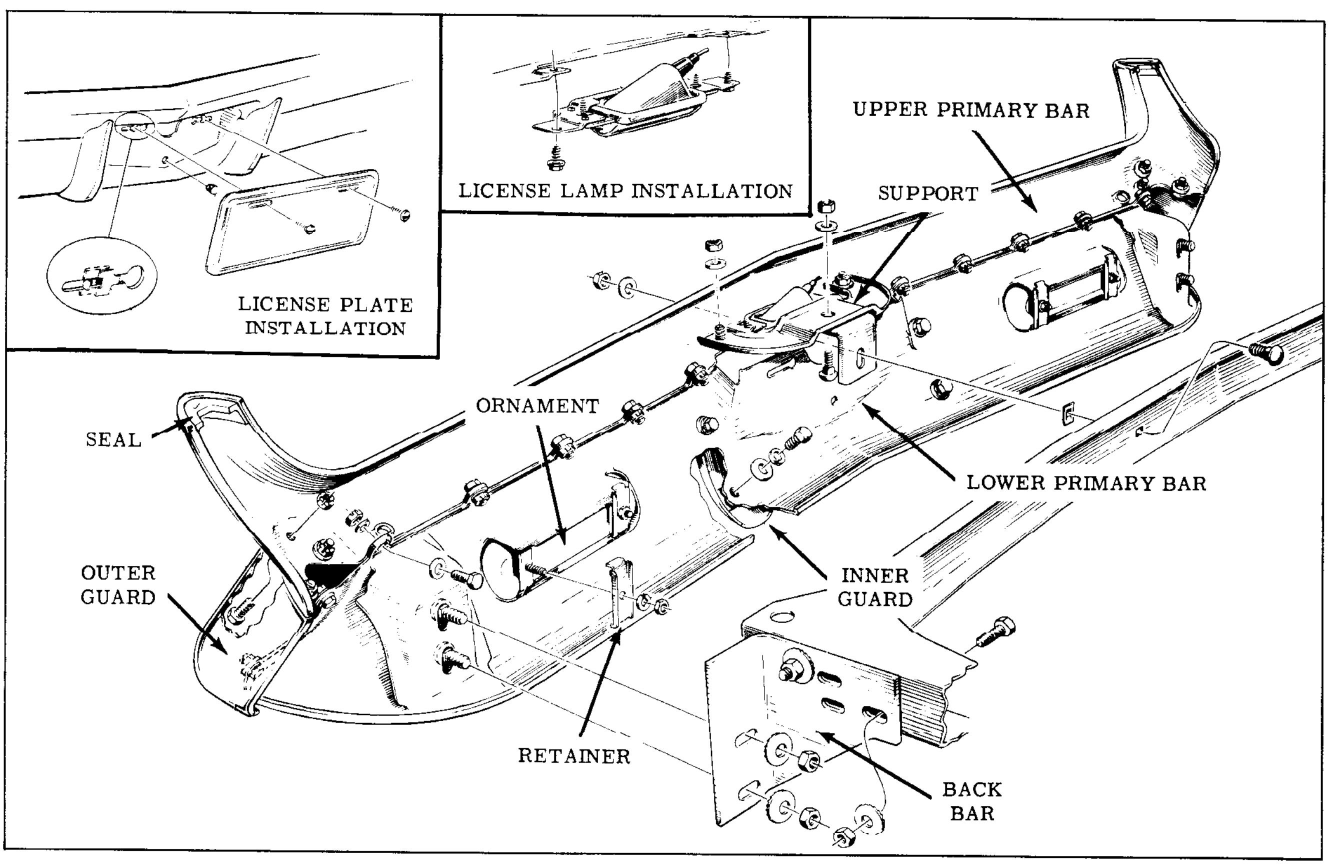


Fig. 12-3 Rear Bumper Assembly (All Except Fiesta)

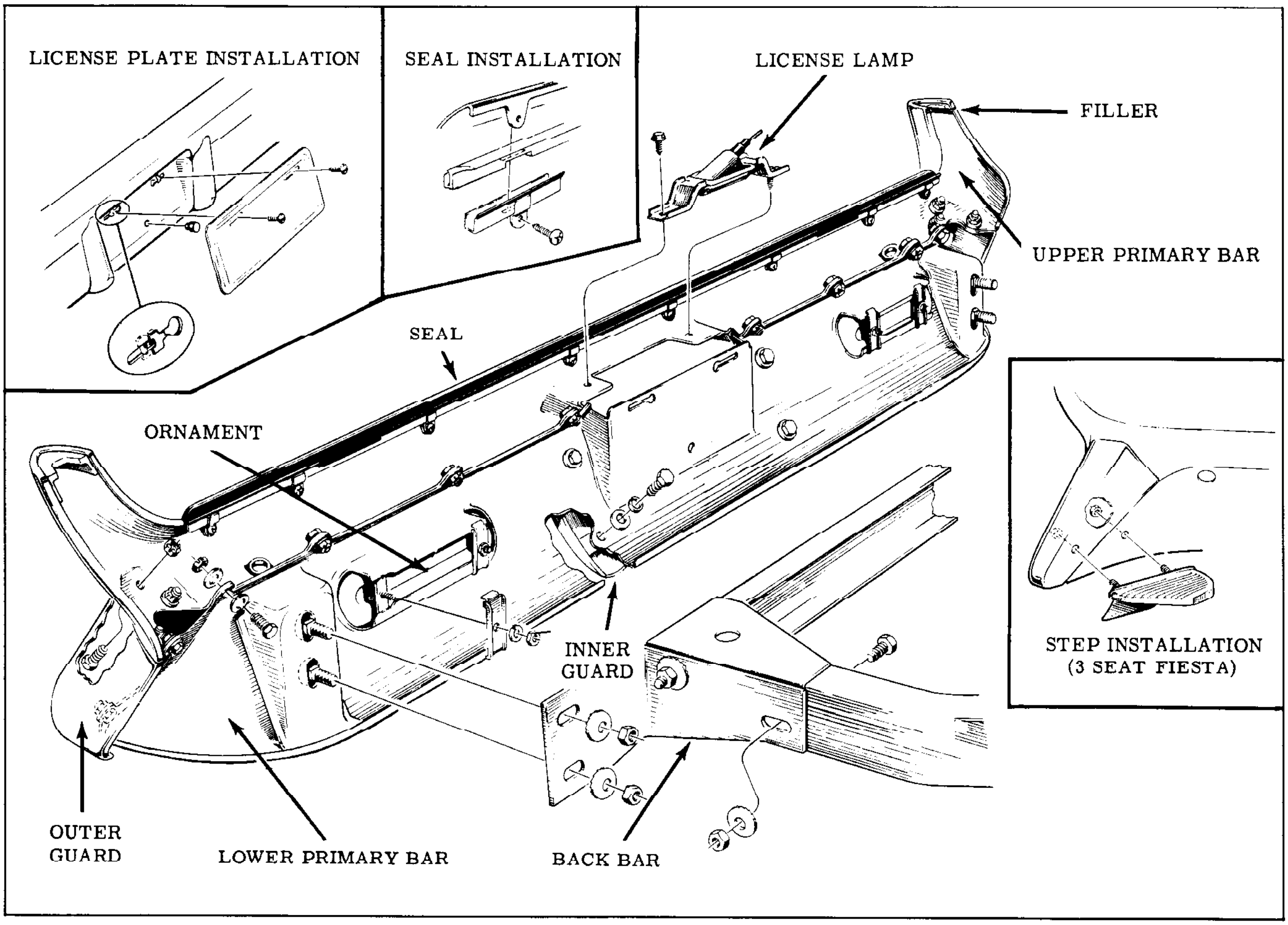


Fig. 12-4 Rear Bumper Assembly (Fiesta)

ELECTRICAL

CONTENTS OF SECTION 13

PERIODIC MAINTENANCE

BATTERY

1. Check battery liquid level every 2,000 miles or once a month (more often in hot weather). Level should reach the bottom of the vent well.

   CAUTION: DO NOT OVERFILL.

2. Clean top of battery and terminals every 4,000 miles and check tightness of battery hold-down bolt. To properly clean battery:

   a. Make sure vent plugs are closed tight.

   b. Brush battery with a diluted ammonia or soda solution. When the solution stops foaming, rinse with clear water.

3. Clean battery cable clamps with diluted ammonia or soda and rinse with clear water. Apply a thin coating of petrolatum to terminals and clamps before installing clamps.

GENERATOR

1. Add 8 to 10 drops of light engine oil (on both 35 and 40 ampere generators) at each lubrication period.

2. Inspect the commutator and brushes for wear and cleanness (observe through end frame). If commutator is dirty, clean with number 00 sand paper, brush seating stone, or seating paste while engine is running. DO NOT USE EMERY CLOTH.

3. If brushes are worn to less than half their original length, replace them as outlined under SERVICING OF UNITS IN THE CHARGING CIRCUIT.

4. Check generator belt tightness and adjust if necessary.

   a. Place belt tension tool 33-70 on generator belt.

   b. Loosen generator adjusting link bolt.

   c. Tighten generator belt until the line on the gauge is even with the pointers as shown in Fig. 13-8.

   d. Tighten generator adjusting link bolt.

DISTRIBUTOR

The hinge cap oiler should be filled with light engine oil at each vehicle lubrication period. When replacing contact point assembly, apply a small amount of Delco-Remy Cam and Ball Bearing Lubricant or equivalent to the breaker cam. No other lubrication is required.

In addition to lubrication, the distributor requires periodic inspection of the cap, rotor, wiring, breaker points, and timing.

WIRING SYSTEM (Fig. 13-1)

A combination junction and fuse block is

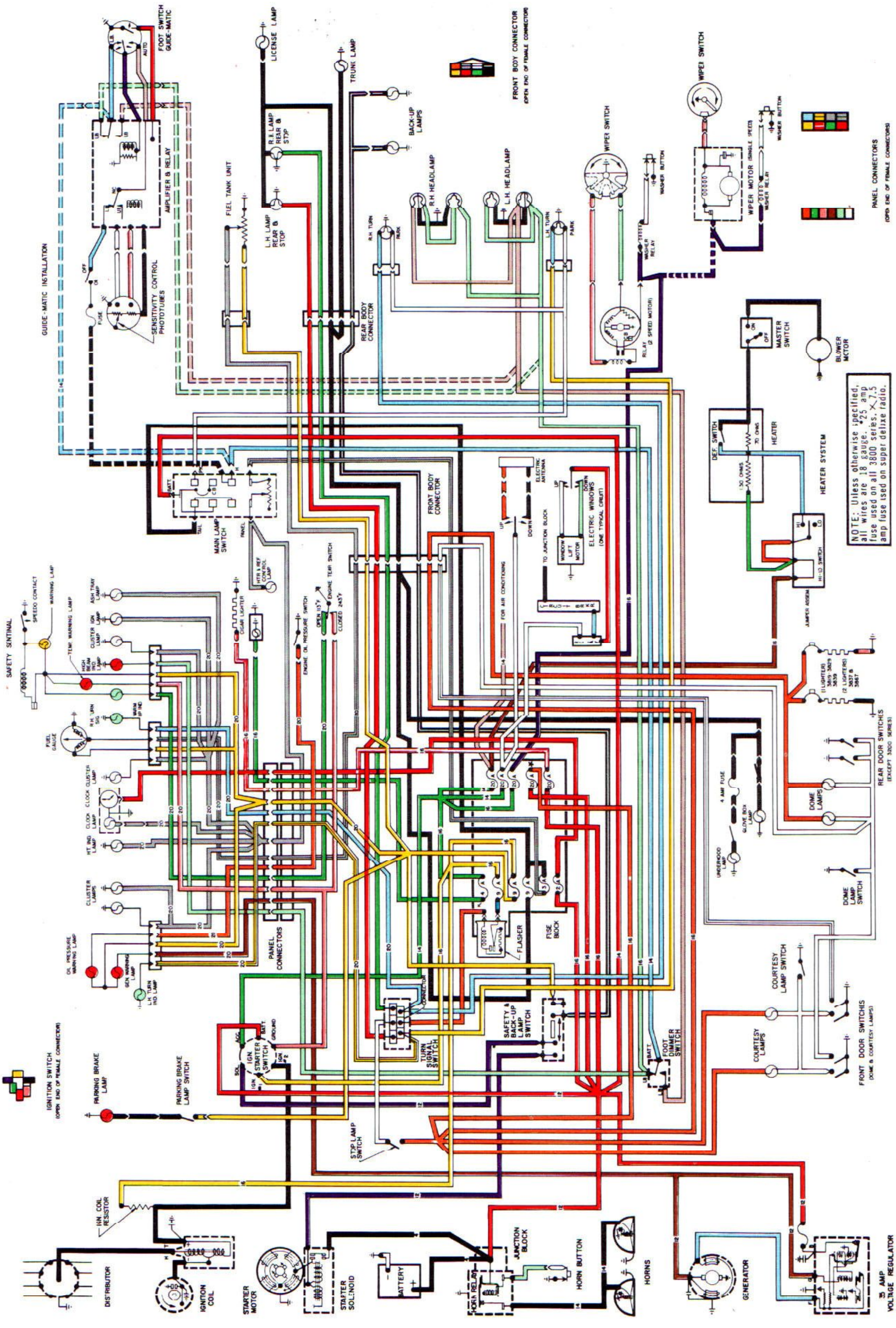


Fig. 13-1 Wiring Diagram

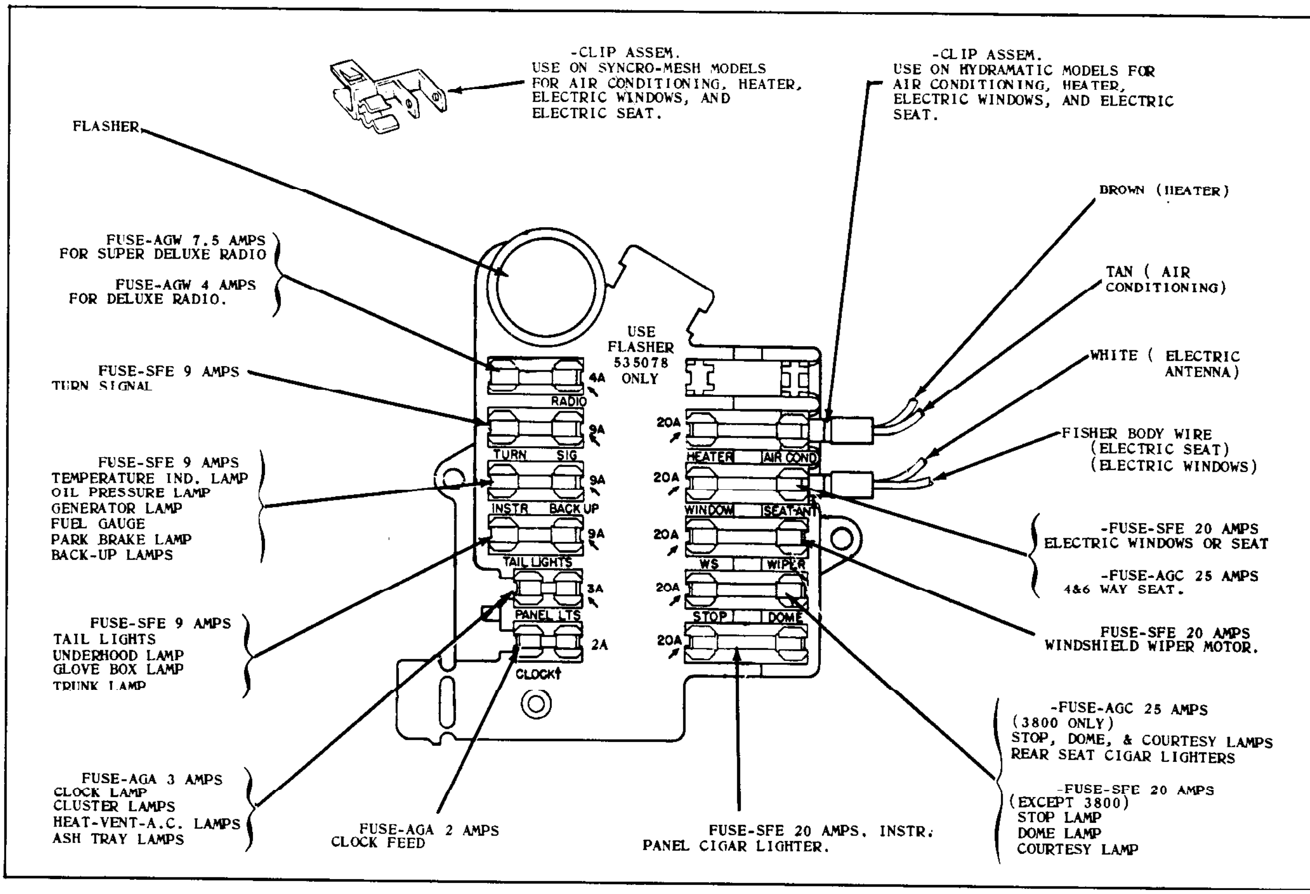


Fig. 13-2 Fuse Block

mounted on the dash under the instrument panel and is color coded to correspond to the wiring color code. Each wire from the fuse panel is also color coded to simplify servicing. The turn signal flasher is mounted on the fuse block.

All electrical units in the instrument panel are connected to chassis wiring by multiple contact plugs, which are keyed to prevent improper assembly. There is no service other than replacement of the printed circuit panels. Body wiring is likewise connected to chassis wiring by a multiple contact plug which is located under the left side of the instrument panel.

IMPORTANT: Whenever it is necessary to disconnect the body wiring plug or whenever any electrical tests or repairs are made in the wiring harness, the wires to the fuel gauge unit in the gas tank must be disconnected to prevent damage to the tank unit resistance coil.

FUSE HOLDER REPLACEMENT

The fuse holders can be removed from the fuse block after the block has been disconnected from the cowl, by compressing the small tangs on both sides of the holder while applying pressure to the holder. A tool to compress the tangs can be made with a cotter pin.

CHARGING CIRCUIT

The charging circuit consists of the battery, generator, regulator, and generator warning light. Cars without factory installed air conditioning have a 35 ampere generator and regulator. Cars

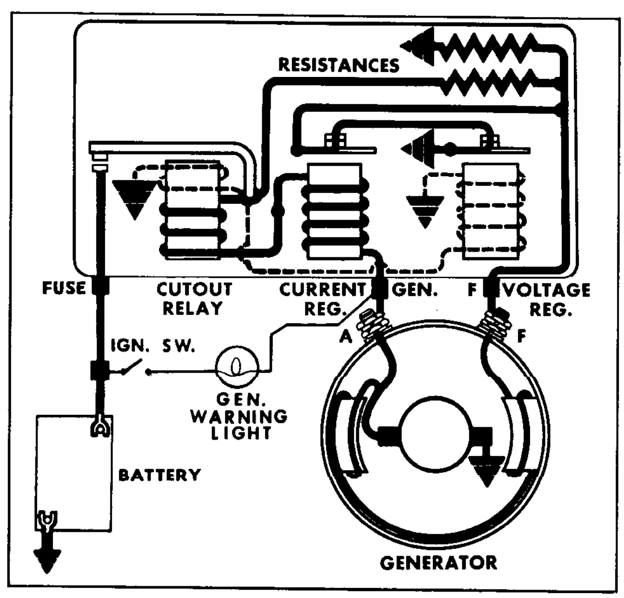


Fig. 13-3 Charging Circuit (35 Ampere)

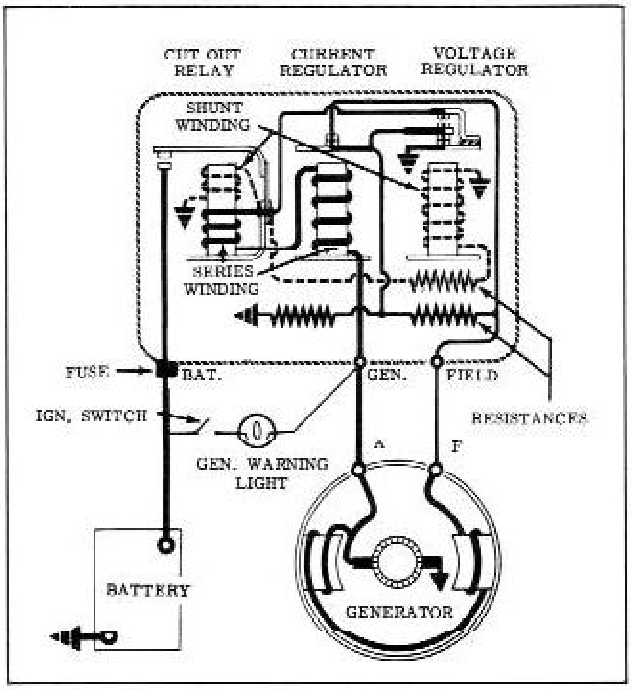


Fig. 13-4 Charging Circuit (40 Ampere)

with factory installed air conditioning have a 40 ampere generator and regulator. The simplified wiring diagrams shown in Figs. 13-3 and 13-4 illustrate the charging circuits.

BATTERY

The Delco battery used on 88 Series engines, designed for regular fuel, is a 12 volt, 62 ampere hour unit containing 9 plates per cell. The battery used on engines designed for premium fuel is a 12 volt, 70 ampere-hour unit containing 11 plates per cell. Both batteries are assembled in a hard rubber container with rubber separators, and are fitted with the "visual level fill" cell covers.

CAUTION: HYDROGEN GAS IS PRODUCED BY THE BATTERY. A FLAME OR A SPARK NEAR THE BATTERY MAY CAUSE AN EXPLOSION.

BATTERY LIQUID IS HIGHLY ACIDIC. AVOID SPILLING ON CLOTHING OR OTHER FABRICS.

GENERATOR

The standard generator is a 12 volt, 35 ampere, shunt field unit. Cars with factory installed air conditioning are equipped with a 12 volt 40 ampere generator. The output of the generator is limited by the generator regulator. The brushes are not manually adjustable. They are held against the generator commutator by reaction type holders provided with springs. Generator structure and nomenclature are shown in Figs. 13-5 and Fig. 13-6.

GENERATOR REGULATOR

The standard regulator is a Delco-Remy 12 volt 35 ampere unit containing a cutout relay, voltage regulator, and current regulator. (Fig. 13-7) Cars with factory installed air conditioning are equipped with a 12 volt, 40 ampere generator regulator. The checks and adjustments for the 40

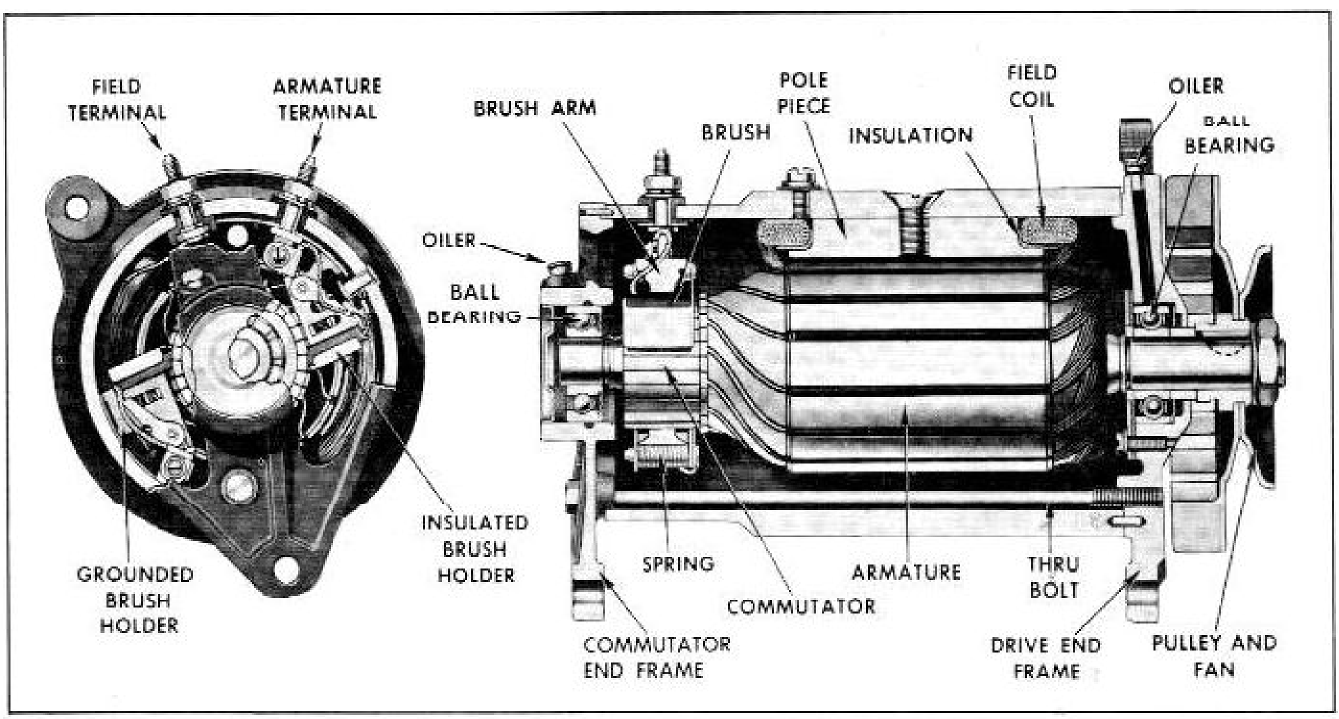


Fig. 13-5 Generator Details (35 Ampere)

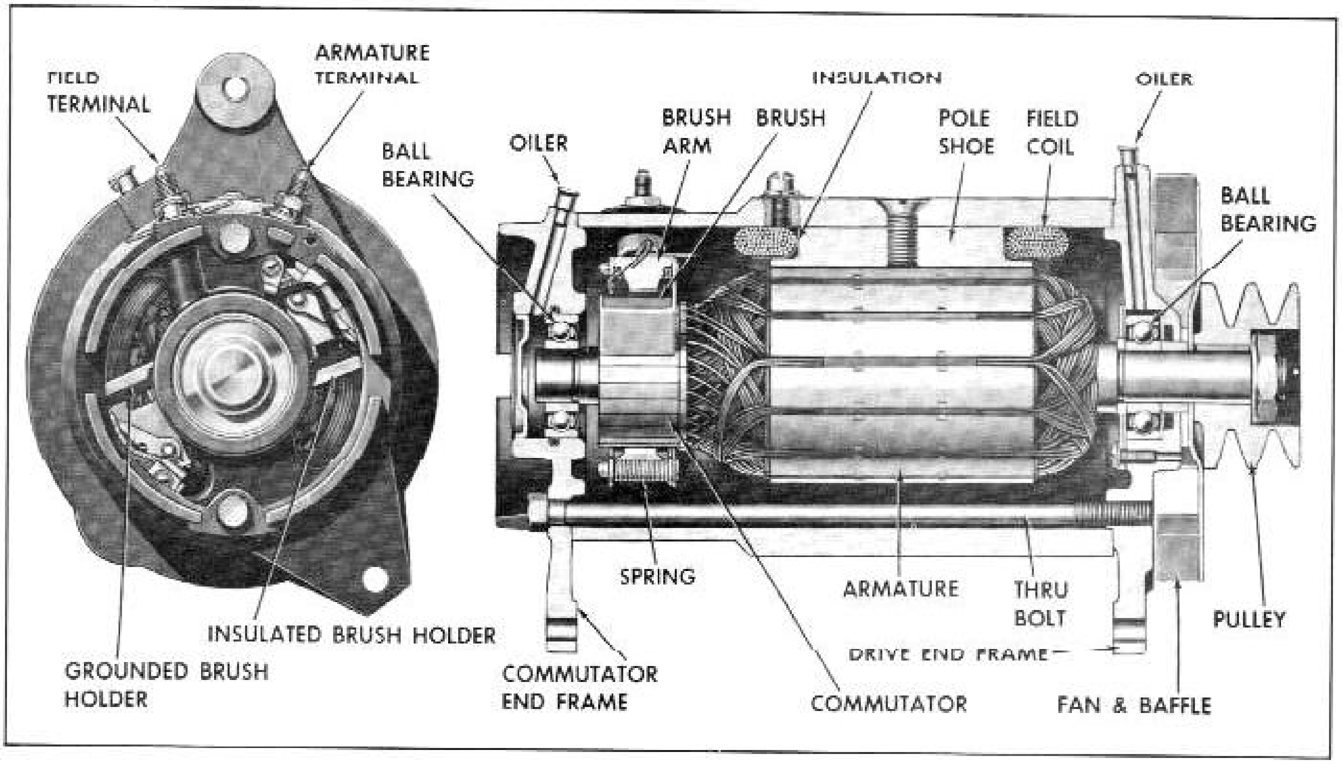


Fig. 13-6 Generator Details (40 Ampere)

ampere unit are the same as those on the 35 ampere unit with the exception of the voltage regulator checks and adjustments, and testing the charging circuit for voltage drop.

NOTE: A special fuse assembly is attached to the "BAT" terminal of both regulators. This fuse protects the generator armature if the cutout relay points are stuck in the closed position. Check this fuse for continuity if a rundown battery is encountered.

Cutout Relay

The cutout relay closes and opens the charging

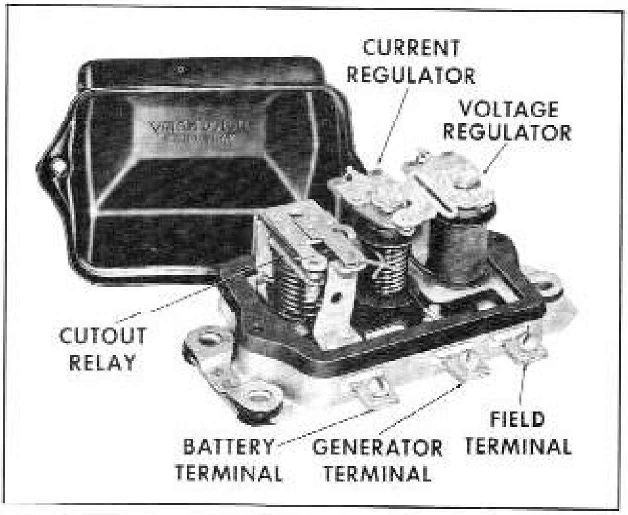


Fig. 13-7 Regulator (35 Ampere)

circuit between the generator and the battery. When the generator voltage reaches the value for which the cutout relay is adjusted, the contact points close, allowing the current to flow from the generator toward the battery. When the generator voltage falls below the battery voltage, the points open to prevent the battery from discharging through the generator when the engine is idling or stopped.

Voltage Regulator

The voltage regulator limits the voltage of the electrical system to a safe maximum. The contacts of the voltage regulator oscillate at a high speed, opening and closing the points. This action intermittently introduces resistance into the generator field circuit, thereby reducing voltage.

The 40 ampere voltage regulator for air conditioned cars has a double set of contacts to regulate voltage. The lower set of contacts limits generator voltage at low speeds. Vibration of the lower contacts intermittently inserts a resistance in the generator field circuit. This resistance is satisfactory at low speeds; however, when the speed is increased, the lower set of points can no longer control the voltage and the armature closes the upper contacts. A vibrating action takes place on the upper set of contacts to regulate generator voltage at high speed.

Current Regulator

The current regulator prevents overheating of the generator armature by limiting generator output. When generator output reaches the value for which the current regulator is set, the points open, inserting a resistance into the generator field circuit. This causes the generator output and the field voltage to decrease, allowing the contact points to close. This cycle occurs many times each second, thereby limiting generator output to a safe maximum.

Generator Warning Light

The red generator warning light, located in the instrument panel, should light when the ignition key is turned on and the engine is stopped. If not, either the bulb is burned out, the generator has an open circuit, or the instrument lamp fuse is blown.

When the generator voltage output becomes greater than the battery voltage, the red light should go out. This does not, however, indicate whether the battery is being charged or the regulator is functioning properly. This should be checked with an A.V.R. unit if trouble is experienced with the charging system.

A blown voltage regulator fuse will give a false generator warning light indication at low engine speeds. The red indicator light will go on when the ignition switch is turned on and go off as the engine is started. However, as engine r.p.m. is increased to highway speeds, the red indicator light will go on again. A blown fuse will also cause

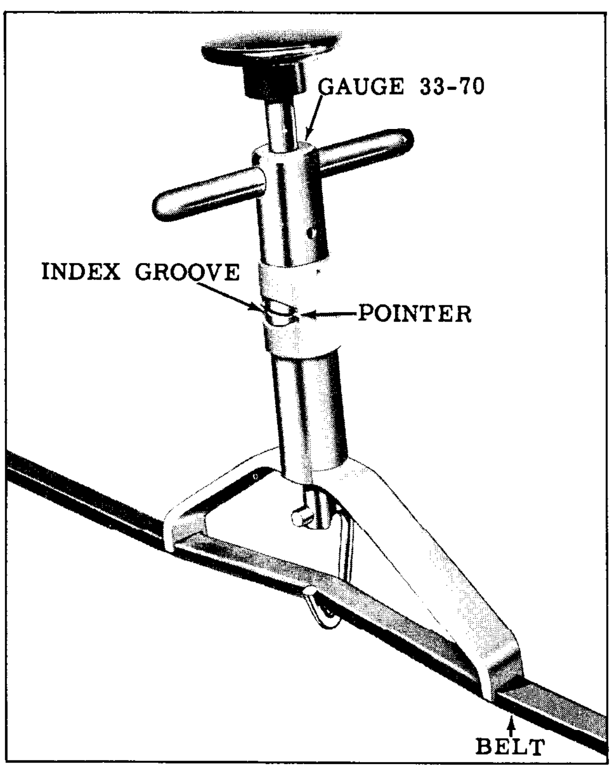


Fig. 13-8 Checking Belt Tension

the generator commutator to glaze after low mileage and leave a dark deposit on the commutator preventing normal current flow. This dark deposit can be removed with a brush seating paste or stone.

CHECKS AND ADJUSTMENTS OF THE CHARGING SYSTEM ON THE CAR

WIRING

35 AMPERE REGULATOR

To check for excessive voltage drops caused by loose connections, burned or broken wires or other high resistances, proceed as follows:

IMPORTANT: THIS TEST IS NOT TO BE PERFORMED ON CARS WITH 40 AMPERE REGULATORS AS GROUNDING OF THE "F" TERMINAL WILL BURN THE UPPER SET OF POINTS OF THE REGULATOR.

1. Ground the "F" terminal of the regulator.
2. Connect an ammeter in series between the positive battery cable and the "BAT" terminal of the regulator. (Fig. 13-9)
3. Turn off all accessories and operate the generator at a speed sufficient to produce a charging rate of 20 amperes.
4. Measure the voltage drops at V1, V2, and V3 as shown in Fig. 13-9. V1 plus V2 should not exceed 0.5 volt. V3 should not exceed 0.3 volt. Excessive readings indicate high resistance in the areas checked.
5. Remove the ground jumper from the "F" terminal of the generator and turn on all lights

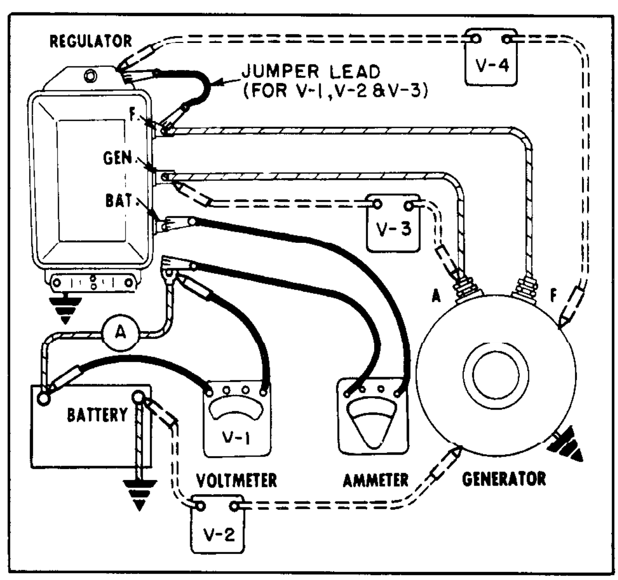


Fig. 13-9 Testing Voltage Drop (35 Ampere)

and accessories. Measure the voltage drop V4 as shown in Fig. 13-9. If this reading is more than 0.1 volt, excessive resistance is indicated in this portion of the circuit and can be due to a poor ground at the regulator or at the engine ground strap.

6. If excessive resistance is indicated in any part of the circuit, clean and tighten all connections and check the wires and replace as necessary.

40 AMPERE REGULATOR

1. DO NOT GROUND "F" terminal of regulator.
2. Disconnect the field lead from the regulator "F" terminal, connect Variable Resistance J-7099 between this lead and ground of the regulator. Turn variable resistance to the "open" position.
3. Turn off all accessories.
4. Adjust engine speed to 1,600 r.p.m.
5. Adjust the Variable Resistance J-7099 until the ammeter indicates exactly 20 amperes. DO NOT ALLOW VOLTAGE TO EXCEED 16 VOLTS. It may be necessary to turn on the lights and accessories to obtain the 20 ampere load.
6. Measure the voltage drop at V-1 as shown in Fig. 13-10, then subtract the reading at the ammeter from the V-1 reading to give the actual drop of the wiring in this part of the charging circuit. Reading should not exceed 0.6 volts.
7. Measure the voltage drop at V-2 as shown in Fig. 13-10. If this reading is more than 0.2 volts, excessive resistance is indicated in this portion of the circuit and can be due to a poor ground at the regulator or at the engine ground strap.

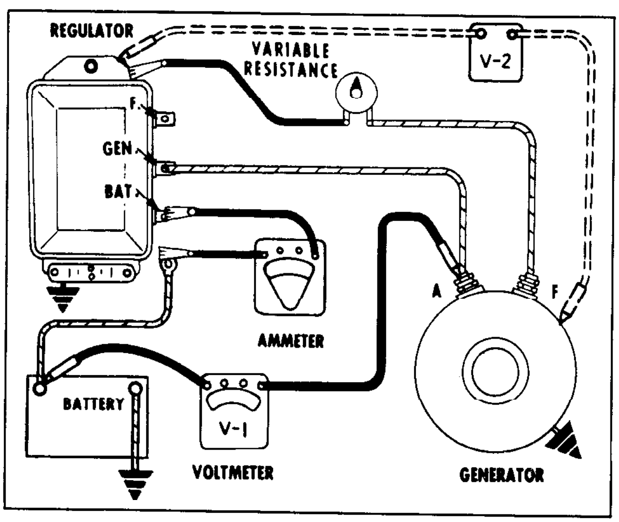


Fig. 13-10 Testing Voltage Drop (40 Ampere)

BATTERY

STATE OF CHARGE

A hydrometer test will indicate the state of charge of a battery unless water has recently been added to the battery or the battery has been recently fast charged. A good hydrometer reading does not necessarily indicate that the battery will perform its normal functions. (See LIGHT LOAD TEST in SERVICING OF UNITS IN THE CHARGING CIRCUIT)

Specific gravity of the electrolyte varies .004 units for every 10^{o} difference between the temperature of the electrolyte and 80^{o}F. The hydrometer reading must be corrected to 80^{o}F.

Examples:

a.	Hydrometer gravity reading	1.235
	Electrolyte temperature 110^{o}F	
	Correction (4x3)	+.012
	Corrected gravity reading	1.247
b.	Hydrometer gravity reading	1.250
	Electrolyte temperature 0^{o}F	
	Correction (4x8)	-.032
	Corrected gravity reading	1.218

A battery with a corrected specific gravity reading 1.215 is half charged. A battery with a specific gravity reading of 1.270 ± .010 at 80^{o}F is fully charged.

If the corrected specific gravity of the electrolyte is less than 1.215 or varies more than .025 between cells, the battery should be removed for a slow charge and a light load test.

REGULATOR

Before attempting regulator adjustments, the regulator must be at normal operating temperature. Allow a cold engine to run approximately 15 minutes before making any voltage adjustments. On cars which have been driven into the service area, and are at normal operating temperature, the voltage adjustments can be made immediately. After the voltage adjustments have been made, turn on all lights and accessories and run engine at fast idle for an additional 25 minutes. The additional 25 minute interval is required in order that the current regulator is allowed to stabilize before making any current regulator adjustments. If the current regulator is not allowed to stabilize, the current regulator setting may be as high as 6 amperes off the specified settings.

NOTE: To prevent the engine from overheating, it may be necessary, in some areas, to place fans in front of the radiator to assist in engine cooling.

Before making voltage adjustments on the 35 and 40 Amp. Regulators and current adjustments on the 40 Amp. Regulator, position a good quality (graduations directly on glass) mercury type glass thermometer within 1/4" of the regulator cover. This measures the ambient (surrounding) temperature of the regulator. After the ambient temperature is known, the correct regulator settings can be made in relation to the temperature.

The electrical checks should be made in the following order:

Voltage Regulator Setting

Cutout Relay Closing Voltage

Current Regulator Setting

REGULATOR ADJUSTMENTS
35 AMPERE REGULATOR

Voltage Regulator Setting

1. Connect a variable resistance (25 watt capacity) and an ammeter into the charging circuit at "BAT" terminal of regulator as in Fig. 13-11.

2. Connect the positive lead of a voltmeter to the regulator "BAT" terminal, negative lead of voltmeter to ground.

3. Position a thermometer on the regulator so that the bulb is within a 1/4" of the regulator cover.

4. Start engine and adjust variable resistance to obtain a current flow of not more than 10 amperes. Operate the engine at 1,600 to 1,900 r.p.m. for 15 minutes. Regulator cover must be in place.

5. Cycle the generator by stopping the engine and restarting it.

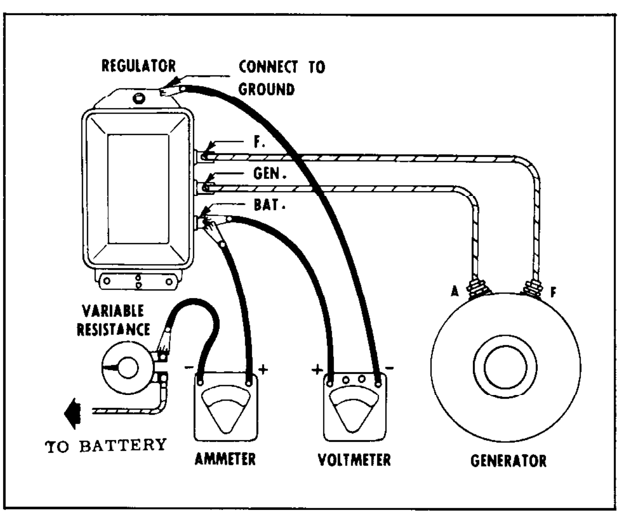


Fig. 13-11 Checking Voltage Setting (35 Ampere)

REGULATOR AMBIENT TEMPERATURE	VOLTAGE LOW		VOLTAGE HIGH
165° F	13.1	—	13.9
145° F	13.5	—	14.3
125° F	13.8	—	14.7
105° F	14.0	—	14.9
85° F	14.2	—	15.2
65° F	14.4	—	15.4
45° F	14.5	—	15.6

← NORMAL SPECIFICATION RANGE →

■ INDICATES PUBLISHED SPECIFICATIONS

Fig. 13-12 Voltage Correction Factors (35 Ampere)

6. Run engine at 1,600 to 1,900 r.p.m. and record the voltage reading. Voltage reading should be within the Normal Specification Range as indicated by the regulator ambient temperature. (Fig. 13-12)

7. If voltage does not fall within the Normal Specification Range, adjust the voltage until it is midway between the high and low of the Normal Specification Range as indicated by the regulator ambient temperature. (Fig. 13-12)

8. To adjust the voltage setting, remove the thermometer and regulator cover and turn the adjusting screw. (Fig. 13-13) Increase spring tension to raise the setting; decrease

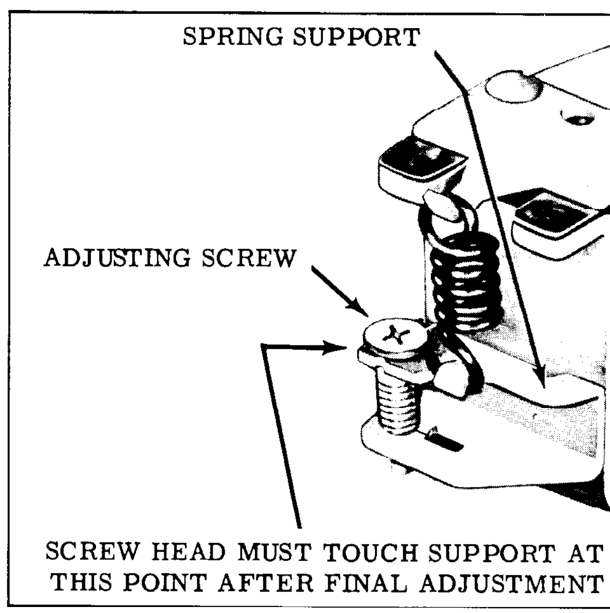


Fig. 13-13 Adjusting Voltage Setting

spring tension to lower the setting. Before taking the reading after each adjustment, replace the regulator cover as quickly as possible and cycle the generator. (The engine should be stopped while removing and installing the regulator cover to reduce the possibility of causing a short.)

CAUTION: Final adjustment should always be made by increasing spring tension to assure contact between the screw head and spring support. Sometimes the spring support does not follow the screw head as spring tension is decreased, and it will be necessary to bend the spring support up to insure contact between the spring support and screw head before final adjustment is completed.

CUTOUT RELAY CLOSING VOLTAGE SETTING

1. Connect the positive lead of a voltmeter on the regulator "GEN" terminal and the negative lead to ground. (Fig. 13-14)

2. Remove the field wire from the "F" terminal of the regulator. Connect Variable Resistance J-7099 in series with the field circuit. Turn in the resistance.

3. Operate the engine at 1,600 to 1,900 r.p.m., then decrease the resistance and note the voltage reading on the voltmeter at which the relay closes. Closing voltage should be 11.8 to 13.5 volts.

   Slowly increase the resistance; the contact points should again open.

4. If voltage is not within specifications, adjust the closing voltage to 12.8 volts by turning the adjusting screw clockwise to increase the setting or counterclockwise to decrease the setting. (Fig. 13-15)

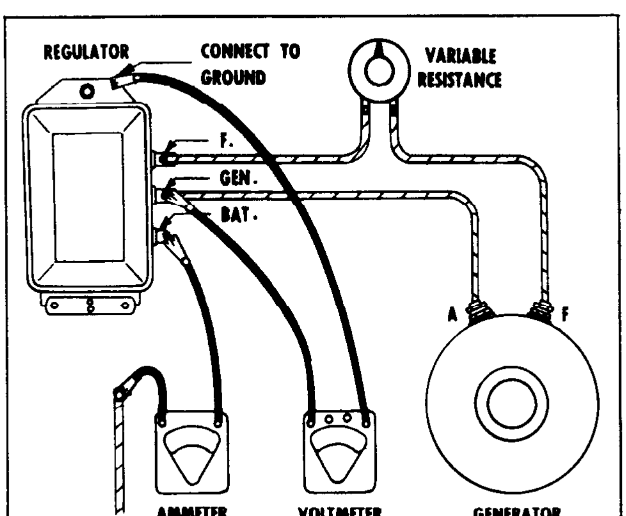


Fig. 13-14 Checking Cutout Relay Closing Voltage

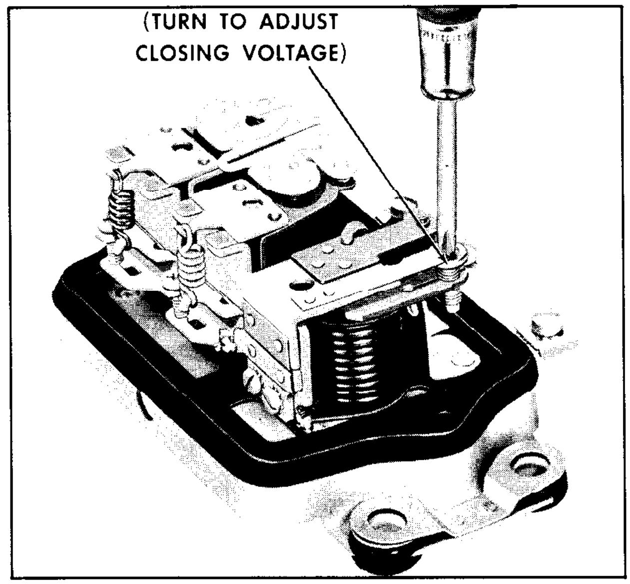


Fig. 13-15 Adjusting Cutout Relay Closing Voltage (35 Ampere Regulator Shown)

CURRENT REGULATOR SETTING

1. Connect an ammeter into the circuit as shown in Fig. 13-16.
2. Turn on all lights and accessories or connect a load across the battery to reduce the system voltage to 12.5 to 13 volts.
3. Position a thermometer on the regulator so that the bulb is a 1/4" away from the regulator cover.
4. Operate the generator at an engine speed of 1,600 to 1,900 r.p.m. for at least 25 minutes to establish operating temperature and stabilize the regulator.
5. Cycle the generator by either of the following methods.

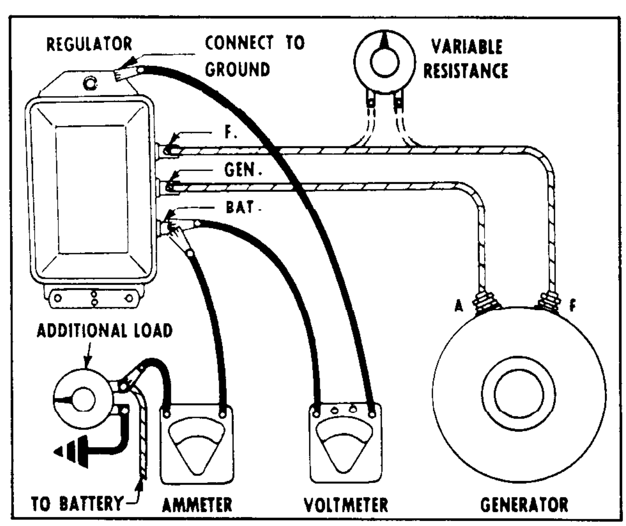


Fig. 13-16 Checking Current Regulator Setting

REGULATOR AMBIENT TEMPERATURE	CURRENT
65°	35.0 to 40.0
85°	34.0 to 38.5
105°	32.5 to 37.0
125°	31.0 to 35.5
145°	29.5 to 33.5

Fig. 13-17 Current Ambient Temperature Factors (35 Ampere Regulator)

Method A - Stop the engine; restart, and bring engine back to 1,600 or 1,900 r.p.m. and record the current setting. Refer to Fig. 13-17 for proper setting of the 35 ampere regulator, as indicated by the regulator ambient temperature.

Method B - Connect Variable Resistor J-7099 into the field circuit as in Fig. 13-17. Move the voltmeter lead from "BAT" to "GEN" terminal of regulator. With the generator operating at 1,600 to 1,900 r.p.m., slowly increase (turn in) the resistance of the variable resistor until generator voltage is reduced below 4 volts. Move voltmeter lead back to "BAT" terminal of regulator. Decrease (turn out) all of the resistance of the variable resistor. Note current setting. Refer to Fig. 13-17 for proper setting of the 35 ampere regulator, as indicated by the regulator ambient temperature.

6. Adjust current regulator to 35 amperes in the same manner as that used for adjusting voltage regulator settings.

REGULATOR ADJUSTMENTS
40 AMPERE REGULATOR

Voltage Regulator Setting

CAUTION: NEVER GROUND THE FIELD TERMINAL OF THE GENERATOR OR IN THE REGULATOR WHILE THE ENGINE IS RUNNING. BURNING OF THE UPPER SET OF REGULATOR POINTS WILL RESULT.

1. To properly check the voltage regulator, the battery must be fully charged or a 1/4 ohm fixed resistor should be connected in series with the battery between the battery terminal on the regulator and the battery wire. (Fig. 13-18) This will limit current flow to the battery to less than 10 amps.

2. Connect a voltmeter from battery terminal on regulator to ground.

3. Connect Variable Resistance J-7099 in series with the field circuit, between the generator field wire and the generator field terminal on the regulator.

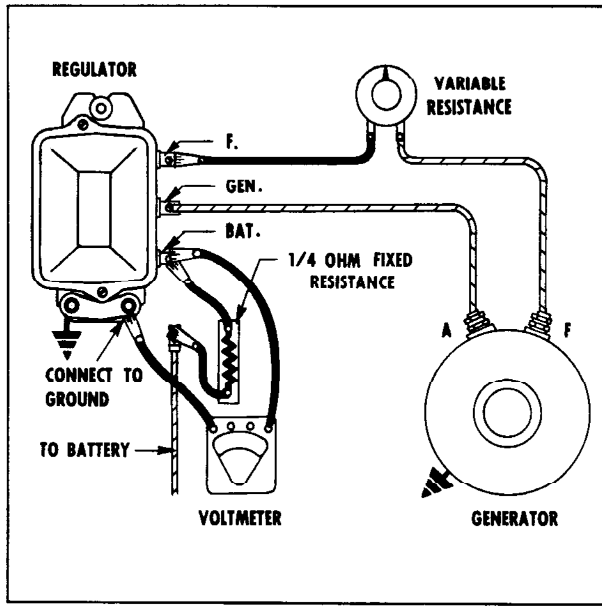


Fig. 13-18 Checking Voltage Setting (40 Ampere)

4. With the regulator cover removed, reduce (turn out) the variable resistance and operate the engine at a speed sufficient to operate the regulator on the upper points.

5. Install the regulator cover. Position a thermometer on the regulator with the bulb a 1/4" away from the cover. Allow the engine to run at 1,600 to 1,900 r.p.m. to bring the regulator up to operating temperature.

6. Remove the regulator cover and cycle the generator by turning the variable resistance to the open position momentarily, then slowly decrease variable resistance (turn all the way out). Regulator should again be operating on the upper set of contacts. Record voltage reading. Voltage reading should be within

REGULATOR AMBIENT TEMPERATURE	VOLTAGE LOW		HIGH
205° F	13.3	—	14.1
185° F	13.4	—	14.2
165° F	13.5	—	14.4
145° F	13.7	—	14.5
125° F	13.8	—	14.6
105° F	14.0	—	14.8
85° F	14.1	—	14.9
	← NORMAL SPECIFICATION RANGE →		

Fig. 13-19 Voltage Correction Factors (40 Ampere)

the Normal Specification Range as indicated by the regulator ambient temperature. (Fig. 13-19)

7. Increase variable resistance (turn in) slowly until the voltage regulator is operating on the lower set of contacts. Voltmeter reading should now be .1 to .3 volts lower than it was for the upper set of contacts.

   NOTE: If the voltmeter reading for the lower set of points is not within .1 to .3 volts lower than the reading for the upper set of points, proceed with steps 8 and 9, then adjust the regulator air gap as outlined under VOLTAGE REGULATOR AIR GAP ADJUSTMENT (See SERVICING OF UNITS IN THE CHARGING CIRCUIT) and recheck the voltage settings of both sets of contacts.

8. If voltage does not fall within the Normal Specification Range, adjust the voltage until it is midway between the high and low of the Normal Specification Range as indicated by the regulator ambient temperature. (Fig. 13-19) After an adjustment is made, repeat step 6.

9. To increase the voltage of the upper contact, turn the adjusting screw clockwise. (Fig. 13-20) To decrease, turn it counterclockwise. Final setting must always be made while increasing spring tension. Spring support must be in contact with adjusting screw head.

10. If the adjusting screw is turned in beyond range, the spring support may not return when the screw is backed out. It would then be necessary to back the screw out until there is sufficient clearance and bend the spring support up to contact the screw head.

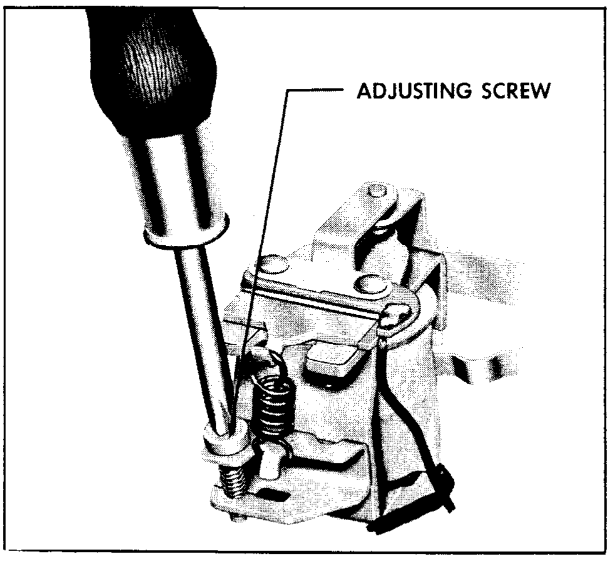


Fig. 13-20 Adjusting Upper Contact

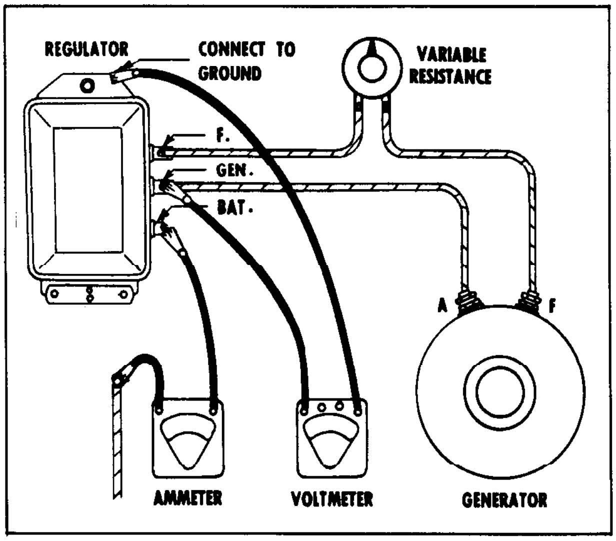


Fig. 13-21 Checking Cutout Relay Closing Voltage

CUTOUT RELAY CLOSING VOLTAGE

1. Connect a voltmeter between the regulator "GEN" terminal and ground. (Fig. 13-21)

2. Connect Variable Resistance J-7099 in series with the field circuit. Turn in the resistance.

3. Operate the engine at 1,600 to 1,900 r.p.m., then decrease the resistance and note the voltage at which the relay closes. Closing voltage should be 11.8 to 13.0 volts.

   Make sure relay opens when the resistance is again increased.

4. Adjust the closing voltage to 12.8 volts by turning the adjusting screw clockwise to increase the setting or counterclockwise to decrease the setting. (Fig. 13-22)

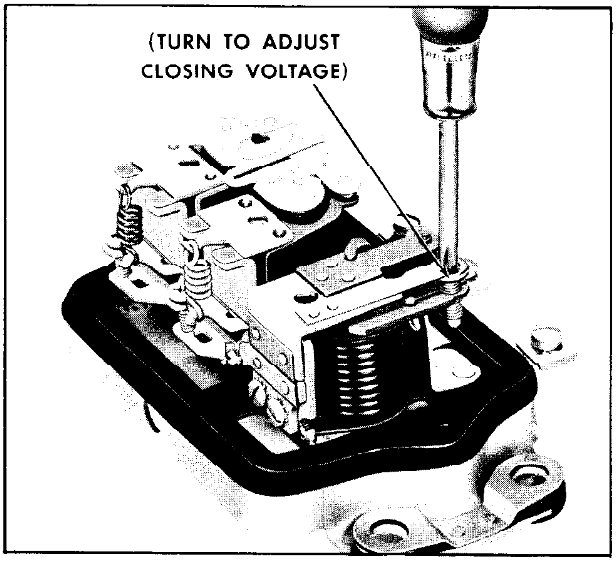


Fig. 13-22 Adjusting Cutout Relay Closing Voltage (35 Ampere Shown)

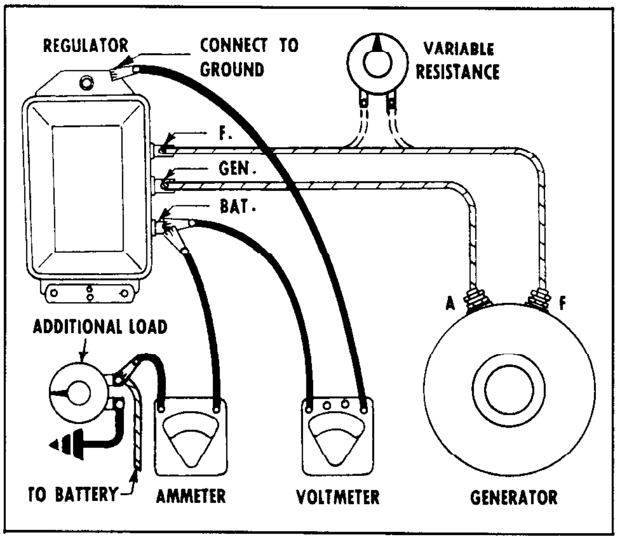


Fig. 13-23 Checking Current Regulator Setting

CURRENT REGULATOR SETTING

The temperature compensation of the 40 ampere regulator is extremely sensitive. Care must be exercised with regard to temperature to assure proper regulator adjustment.

The purpose of the temperature compensation is to decrease the current regulator setting automatically as underhood temperatures increase.

This protects the generator from overheating and prevents premature generator failure. If the temperature is not taken into consideration, the regulator can be improperly adjusted which will result in a damaged generator armature or a discharged battery.

1. Connect an ammeter into the circuit as shown in Fig. 13-23.

2. Turn on all lights and accessories or connect a load across the battery to reduce the system voltage to 12.5 to 13 volts.

3. Position a thermometer on the regulator so that the bulb is a 1/4" away from the regulator cover.

4. Operate the generator at an engine speed of 1,600 to 1,900 r.p.m. for at least 25 minutes to establish operating temperature and stabilize the regulator.

5. Cycle the generator by either of the following methods:

   Method A - Stop the engine; restart, and bring engine back to 1,600 r.p.m. and record the current setting. Refer to Fig. 13-24 for proper setting of the 40 Ampere Regulator, as indicated by the regulator ambient temperature.

REGULATOR AMBIENT TEMPERATURE	CURRENT
85°	43.0 to 51.5
105°	40.5 to 48.0
125°	38.0 to 45.0
145°	35.0 to 42.0
165°	32.5 to 38.5
185°	30.0 to 36.0
205°	27.5 to 34.5

Fig. 13-24 Current Ambient Factors (40 Ampere)

   Method B - Connect Variable Resistor J-7099 into the field circuit as in Fig. 13-23. Move the voltmeter lead from "BAT" to "GEN" terminal of regulator. With the generator operating at 1,600 to 1,900 r.p.m., slowly increase (turn in) the resistance of the variable resistor until generator voltage is reduced below 4 volts. Move voltmeter lead back to "BAT" terminal of regulator. Decrease (turn out) all of the resistance of the variable resistor. Refer to Fig. 13-24 for proper setting of the 40 Ampere Regulator, as indicated by the regulator ambient temperature.

6. Adjust current regulator to 40 amperes in the same manner as that used for adjusting voltage regulator settings.

CHECK FOR OXIDIZED REGULATOR POINTS

Abnormal fluctuation of the voltmeter or ammeter pointer while testing the voltage or current regulator indicates an oxidized condition of regulator contact points. This condition may cause a high resistance in the generator field circuit and reduced generator output. Test for oxidized contact points as follows:

(35 Ampere Regulator)

1. Turn on the headlights.

2. Operate the generator at speed which will produce a charge rate of 5 amperes.

3. Ground the "F" terminal of the regulator.

4. If generator output increases more than 2 amperes, oxidized regulator contact points are indicated and the regulator should be removed from the car and the contact points should be cleaned as outlined under SERVICING OF UNITS IN THE CHARGING CIRCUIT.

(40 Ampere Regulator)

1. With engine stopped, disconnect battery lead from regulator terminal marked "BAT". Connect ammeter red lead to "BAT" terminal and ammeter black lead to battery lead.

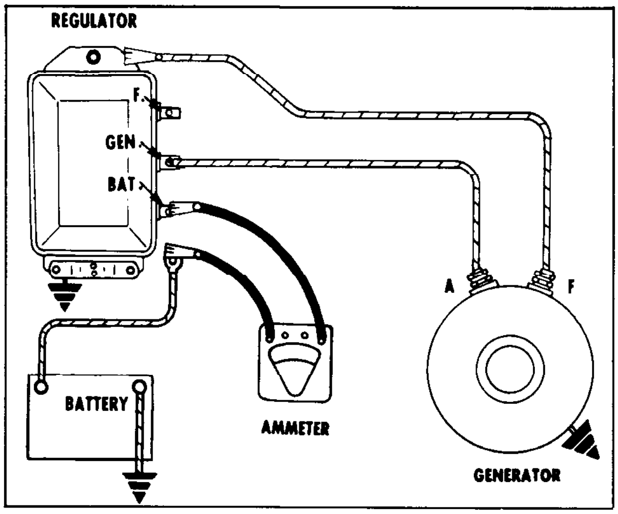


Fig. 13-25 Checking for Oxidized Points (40 Ampere)

2. Turn on headlights. Start engine and adjust speed until test ammeter reads exactly 5 amperes.
3. Disconnect field lead from regulator "F" terminal and ground it on regulator base. Fig. 13-25. If ammeter reading increases more than 2 amperes, oxidized contact points are indicated. Regulator should be removed and contact points cleaned before proceeding to any other regulator tests.

CAUTION: Never use a jumper to ground the generator or regulator field terminal when these units are connected and operating together, as this would burn the contacts of the voltage regulator.

SERVICING OF UNITS IN THE CHARGING CIRCUIT

BATTERY

Removal and Installation (Fig. 13-26)

1. Disconnect battery cables and remove wiring harness from clip on tie bar extension.
2. Remove the three tie bar extension attaching bolts and remove extension.
3. Remove the battery retainer nut and washer, then remove the battery.

To install, reverse the removal procedure.

IN-THE-CAR BATTERY TEST AND CHARGING

INSPECTION

Check outside of battery for damage or signs of serious abuse such as broken case or covers.

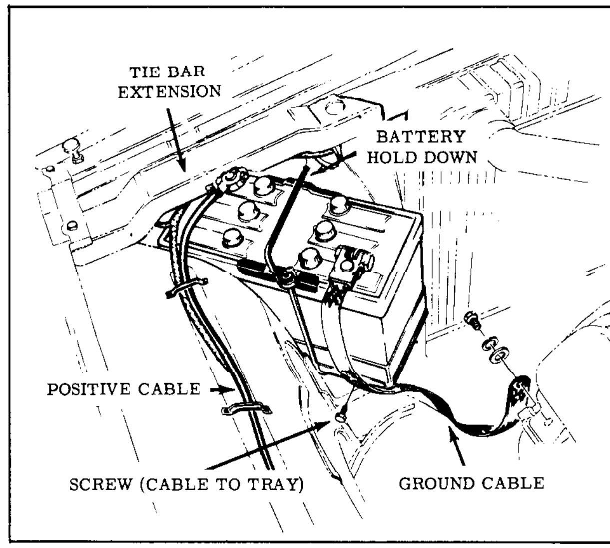


Fig. 13-26 Battery Mounting

Check inside of battery by removing the vent caps and inspecting for signs of abuse such as electrolyte level too low to see, or bad or unusual odors.

If battery shows signs of serious damage or abuse, it should be replaced. If not, make light load test.

LIGHT LOAD TEST

1. Place load on battery by holding starter switch "ON" for 3 seconds. It makes no difference whether starter turns engine or not. However, if engine starts, turn off ignition immediately.
2. Turn on headlights (Low beam) for 1 minute. With lights still "ON" read individual cell voltages of battery with voltmeter (.01 volt division). Compare readings with the following:

A. Uniform Readings

If all cells read 1.95 volts or more and the difference between the highest and lowest cell is less than .05 volts, battery is good. If any cell reads less than 1.95 volts, battery should be fully recharged for good performance. See CHARGING AFTER LIGHT LOAD TEST.

B. Non-uniform Readings

If all cells read 1.95 volts or more and there is a difference of .05 volts or more between the highest and lowest cell, the battery should be replaced.

C. Low Readings

If all cells read less than 1.95 volts, battery is too low to test properly. FAILURE OF THE METER TO REGISTER ON ALL CELLS DOES NOT INDICATE A DEFECTIVE BATTERY. Boost charge battery and repeat Light Load Test. (See BOOST CHARGING FOR LIGHT LOAD TEST.) If battery is found to be good after boosting, it should be fully recharged for good performance.

If none of the cells come up to 1.95 volts after the first boost charge, the battery should be given a second boost. Batteries which do not come up after second boost charge should be replaced.

NOTE: If any battery found to be good by the Light Load Test does not perform satisfactorily in subsequent service, it should again be tested by the Light Load Test and if it still tests "good", it should be removed from the car and tested as outlined under SLOW CHARGING.

BOOST CHARGING FOR LIGHT LOAD TEST

1. Boost 12-volt batteries at 50 amperes for 20 minutes (50 x 20 = 1000 ampere minutes). If charger will not give this rate, charge for an equal number of ampere minutes at best rate available. For purposes of light load test do not boost battery more than the amount indicated.

CHARGING AFTER LIGHT LOAD TEST

1. For best performance, a good battery should be fully charged before being returned to service.

2. If batteries are to be fully charged by means of a quick charger, the charge rate must be "tapered" (reduced to a safe limit) when the electrolyte temperature reaches 125°F. or when gassing becomes excessive. Failure to do so may harm the battery.

Slow Charging

Batteries removed from the car for charging should be charged continuously at a low rate. Batteries may be safely slow-charged at a rate in amperes equal to 7% of the battery's ampere-hour capacity. Ex: 7% of 62 A.H. = 4.3 amperes or 7% of 70 A.H. = 4.9 amperes. This is called the "Normal" charge rate. The battery is fully charged when specific gravity readings taken at hourly intervals show no increase during three consecutive readings. Although the slow-charge method is recommended for charging all batteries, discharged batteries in otherwise good condition, may be given a "boost" with a fast charger if time does not permit complete slow-charging. When using a fast charger, it must be remembered that the battery is only receiving a partial charge and that the battery electrolyte temperature must not be allowed to exceed 125°F. If the battery heats excessively, quick charging must be discontinued.

Batteries removed from the car for further checking, in order to determine whether or not the unit should be replaced, should first be brought to a fully-charged condition by slow-charging. Badly sulfated batteries may require a continuous slow-charge for 48 hours or more before a rise in gravity reading occurs. If the specific gravity reading of any cell fails to reach 1.215 (corrected to 80°F.) or if there is a variation of more than 25 points between cells after thorough slow charging, replace the battery.

GENERATOR

Disassembly (Fig. 13-27)

1. Mount generator in a vise, being careful not to damage generator frame.

2. Remove the two through bolts, then pull commutator end frame from rear of field frame. Remove brushes.

3. If necessary to remove the commutator end frame bearing, use hooked shaped piece of welding rod to pull bearing from frame. Remove "O" ring from bore of frame and discard.

4. Remove armature and drive end frame assembly from front of field frame.

5. Mount armature assembly in a vise, then remove pulley nut and lockwasher. Remove pulley and fan from armature shaft.

6. Remove key from keyway. Slide long spacer from armature shaft.

7. Slide drive end frame and short spacer from shaft.

8. If necessary to remove the drive end bearing from the frame, remove the three bearing retainer plate attaching screws, then remove plate, gasket, bearing, felt washer retainer and felt washer.

9. If necessary to remove field coils, proceed as follows:

   a. Remove field and armature terminal nuts, then push terminal studs through frame.

   b. Remove two large screws and remove pole shoes and field coils from generator frame.

Cleaning and Inspection

1. Check brush holders for bends or deformities which might prevent proper functioning. Check brush spring tension (28 ounces) as shown in Fig. 13-28.

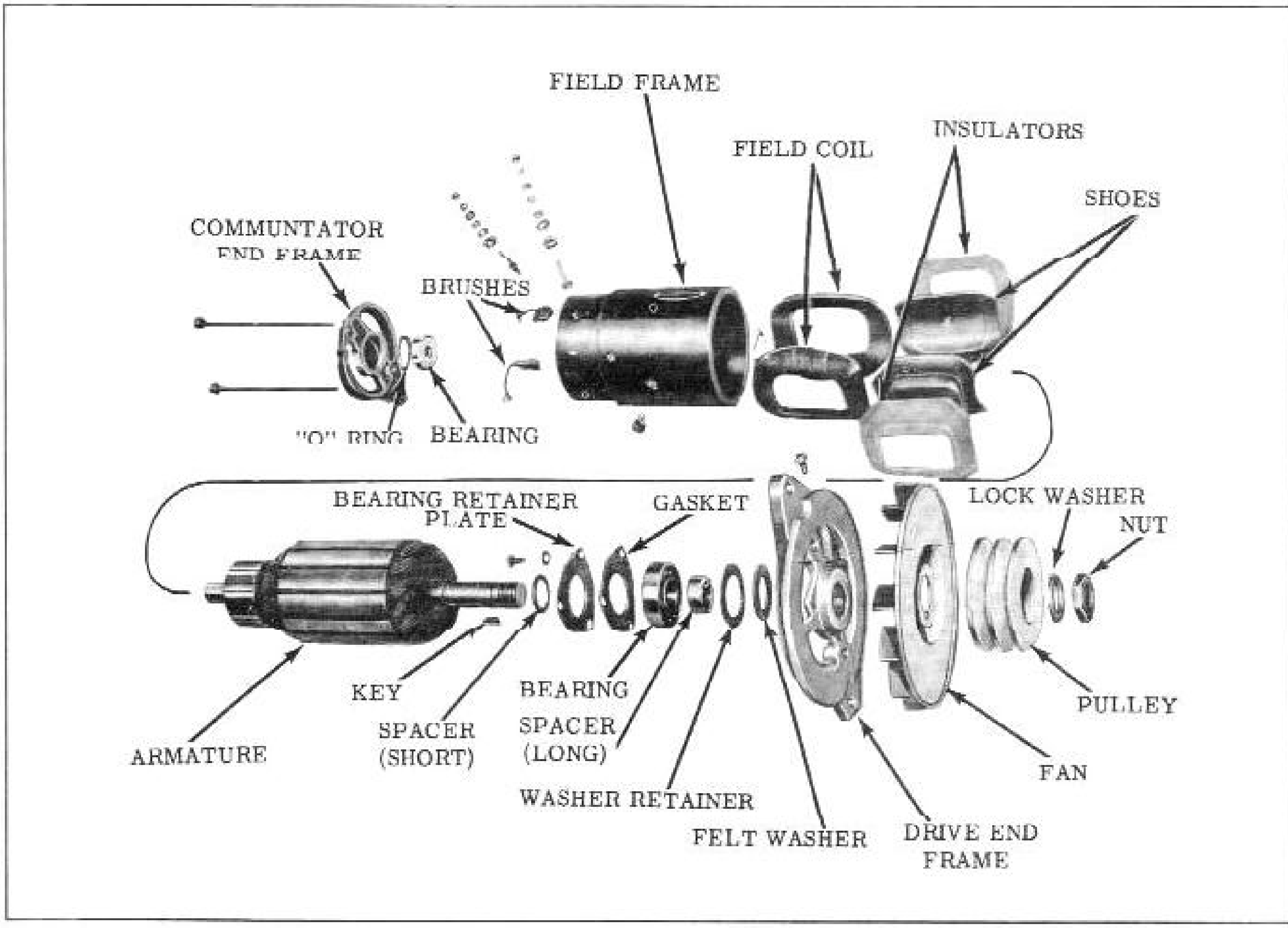


Fig. 13-27 Generator Details

2. Wash all metal parts except armature and fields in cleaning solvent. Degreasing solvents will damage the insulation in fields and armature.

3. Inspect ball bearing for roughness, scored races, and deformed balls.

4. Inspect armature commutator for roughness. Rough commutators should be turned down and undercut. Check solder connections where armature wires connect to commutator bars.

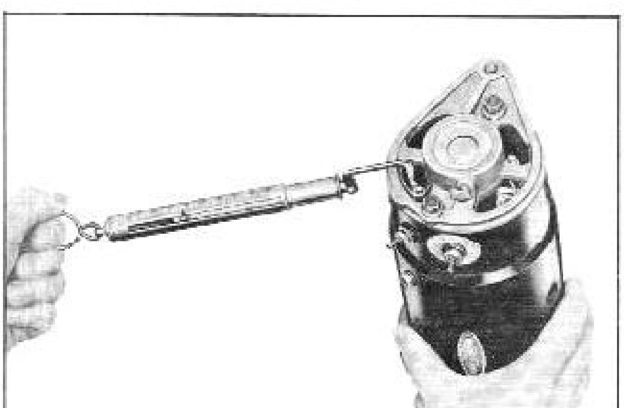


Fig. 13-28 Checking Brush Tension

5. Place armature on growler and check for shorts by rotating armature with hack saw blade over core. (Fig. 13-29) If saw blade vibrates, armature is shorted. If cleaning

Fig. 13-29 Checking Armature for Short

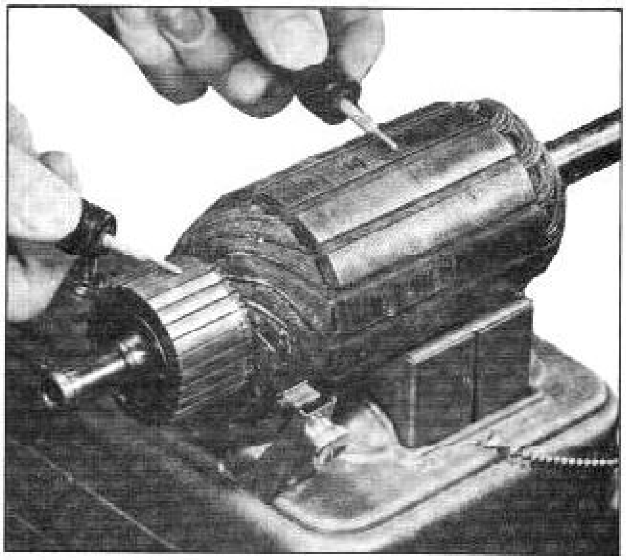


Fig. 13-30 Checking Armature for Ground

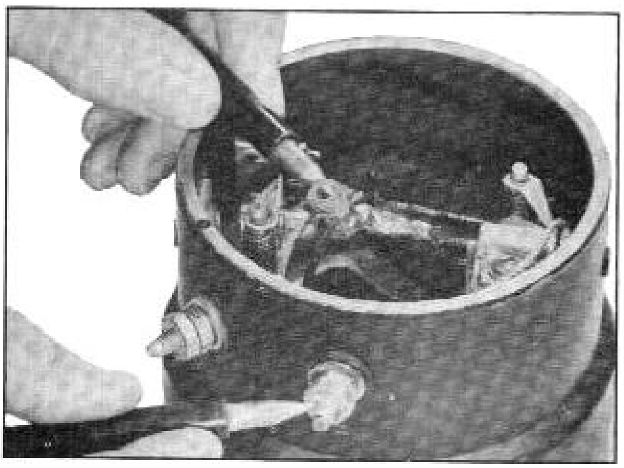


Fig. 13-31 Checking Field Coils for Open Circuit

Fig. 13-32 Checking Field Coils for Ground

commutator bars does not correct the vibration, replace the armature.

6. Place one lead of 110 volt test lamp on the armature core and the other lead on each commutator bar. (Fig. 13-30) If lamp lights, armature is grounded and must be replaced.

7. Place one lead of the 110 volt test lamp on field terminal and the other lead on the armature terminal. (Fig. 13-31) If lamp does not light, check for loose connections. If no loose connections are found, field coils are open. Replace coils.

8. Ground one lead of test lamp on frame and place other lead on field terminal. (Be sure free end of field wire is not touching frame and field terminal insulation is not broken.) (Fig. 13-32) If lamp lights, field coils are grounded. If ground in coils cannot be located and repaired, replace coils.

9. Place one lead of test lamp on generator positive (output) lead and the other lead on generator frame. Make sure loose end of terminal lead is not touching frame. (Fig. 13-33) If lamp lights, positive terminal insulation through frame is defective and must be replaced.

10. Place one lead of test lamp on the positive (insulated) brush holder and the other lead on frame. (Fig. 13-34) If lamp lights, brush holder is grounded due to defective insulation at the frame.

11. Check armature for open circuit by making a bar-to-bar check on the commutator.

Generator Repair

Loose Electrical Connections - When an open soldered connection is found during inspection, it

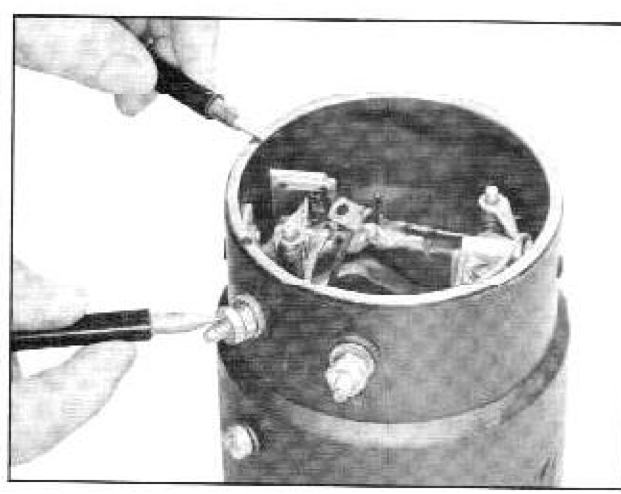


Fig. 13-33 Checking Positive Terminal for Ground

Fig. 13-34 Check Brush Holder for Ground

may be resoldered provided rosin flux is used for soldering.

CAUTION: ACID FLUX MUST NEVER BE USED ON ELECTRICAL CONNECTIONS.

Turning Commutator - When inspection shows commutator roughness, it should be cleaned as follows:

1. Turn down commutator in a lathe until it is thoroughly cleaned.

2. Undercut insulation between commutator bars 1/32". This undercut must be the full width of insulation and flat at the bottom; a triangular groove will not be satisfactory.

3. Sand the commutator lightly with No. 00 sandpaper to remove any slight burrs left from undercutting. The slots should be cleaned out carefully to remove any dirt and copper dust.

4. Recheck armature on growler for short circuits.

Assembly

1. If field coils were removed:

   a. Install pole shoes in field coils and install this assembly in field frame, being sure field terminal lead is near the hole in frame for lead terminal stud.

   b. Install two screws which hold pole pieces and field coils to frame.

   c. Install field terminal stud through insulator in generator frame.

   d. Install armature lead and terminal stud through insulator in generator frame.

2. Install short spacer on armature shaft.

3. If drive end bearing was removed from the frame, install as follows:

   a. Install felt washer and felt washer retainer into bore of frame.

   NOTE: Install retainer with dished side away from felt washer.

   b. Pack bearing with Delco-Remy Cam and Ball Bearing Lubricant or equivalent, then install bearing in drive end frame. Install bearing retainer plate and gasket on drive end frame and tighten the three screws.

4. Slide the drive end frame assembly on armature shaft and install long spacer.

5. Install key into keyway of shaft, then place armature shaft into vise.

6. Slide fan and pulley over shaft, then install pulley lock washer and nut. Torque nut 70 ft. lbs. Remove armature and drive end-frame assembly from vise.

7. If the commutator end frame bearing was removed, install as follows:

   a. Coat new "O" ring with S.A.E. 20 oil and install in bore of commutator end frame.

   b. Pack bearing with Delco-Remy Cam and Ball Bearing Lubricant or equivalent. Install bearing in frame (with sealed side of bearing facing outward).

8. Install brushes in brush holders.

9. Install armature and drive-end-frame assembly in generator frame.

10. Align field frame dowel pin with hole in drive end frame.

11. Inspect brushes to see that they are seated correctly; then install commutator end frame on field frame, aligning dowel pin with hole. Install and tighten two through-bolts.

Installation of Generator

1. After the generator has been assembled, position the generator on the engine and install the generator attaching bolts, but do not tighten.

2. Install generator and fan belt.

3. Adjust belt tension with tool 33-70.

4. Torque generator attaching bolts 14 to 17 ft. lbs.

5. Connect positive generator lead and field lead to terminals on generator frame.

IMPORTANT: On radio equipped cars, connect the radio by-pass condenser to generator output (a) terminal.

6. Polarize the generator by momentarily connecting a jumper wire between the "BAT" and "GEN" terminals on regulator.

7. Start engine. If brushes squeak, seat them by placing brush seating paste on the commutator. The soft abrasive material of the paste will be carried under the brushes and wear the brush faces to the commutator contour in a few seconds.

REGULATOR

Although electrical adjustments are made with the regulator on the car as outlined under CHECKS AND ADJUSTMENTS ON THE CAR, it is necessary to remove the regulator for cleaning contact points and adjusting air gaps on the three regulator units.

Contact Points

Inspect contact points for pits and oxidation. Replace points if badly burned. To clean the contact points, remove the upper contact bracket.

The large flat contact point, located on the 35 ampere voltage regulator armature and the upper contact support on the current regulator, always develops a slight cavity and should be cleaned of oxides by using a riffler file. (Fig. 13-35)

CAUTION: DO NOT FILE CONTACT POINTS EXCESSIVELY. NEVER USE SANDPAPER OR EMERY CLOTH. DO NOT FILE VOLTAGE REGULATOR POINTS ON THE 40 AMPERE UNIT.

If it is necessary to replace the upper contact points of the regulator, reassemble the regulator as shown in Fig. 13-36 (40 Ampere Regulator).

Cutout Relay Gap and Point Opening Adjustment (35 and 40 Ampere Regulator)

1. Place fingers on armature directly above core and move armature down until points just close. Measure air gap between armature and center of core (.020"). Check to see that points close simultaneously. To adjust air gap, loosen two screws at back of relay and raise or lower armature as required. (Fig. 13-37)

2. Check point opening and adjust to .020" by bending upper armature stop. (Fig. 13-38)

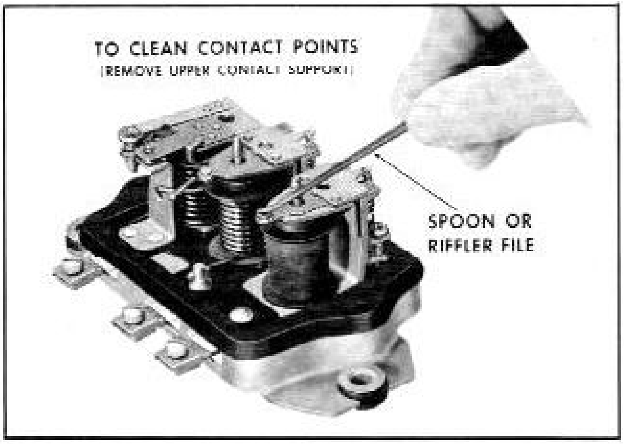


Fig. 13-35 Cleaning Contact Points

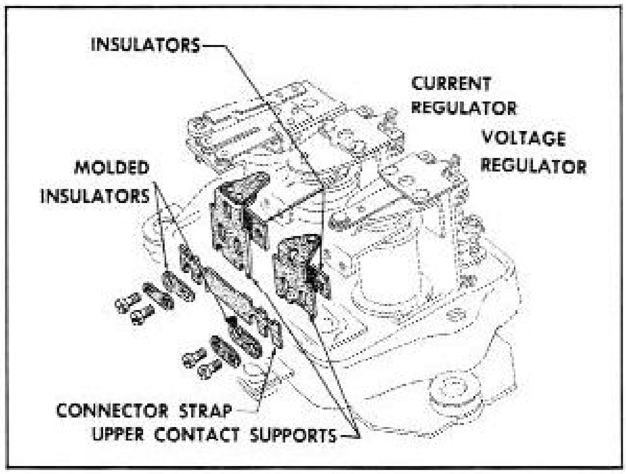


Fig. 13-36 Contact Support Brackets (40 Ampere)

Voltage Regulator Air Gap Adjustment (35 Ampere Regulator)

Push armature down to core and release it until contact points just touch and then measure air

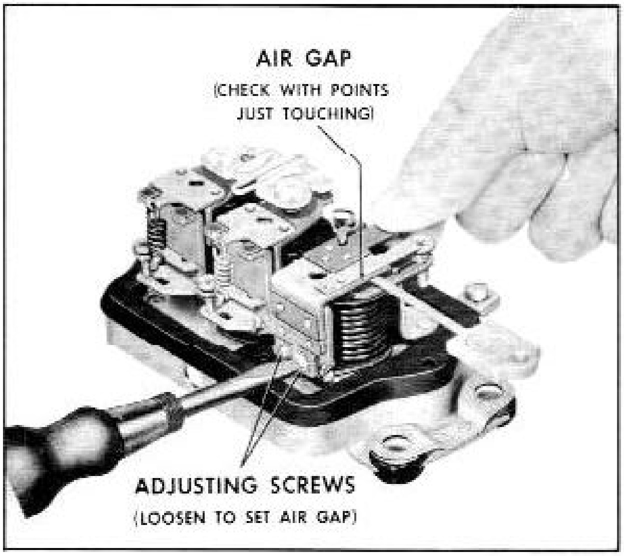


Fig. 13-37 Adjusting Cutout Relay Air Gap

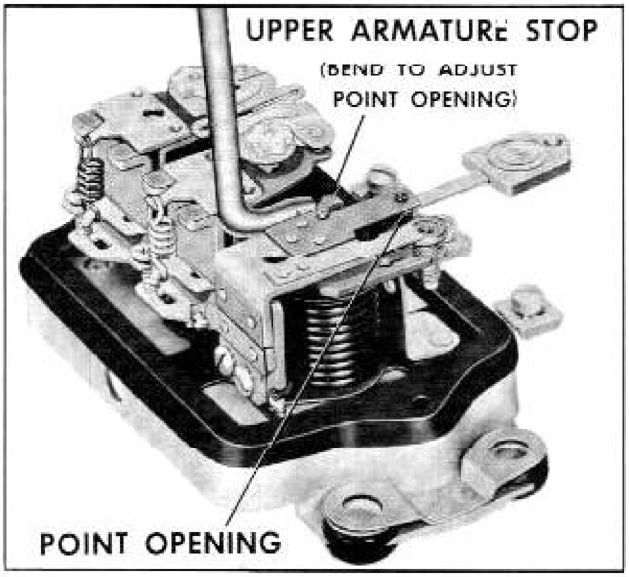


Fig. 13-38 Adjusting Cutout Relay Point Opening

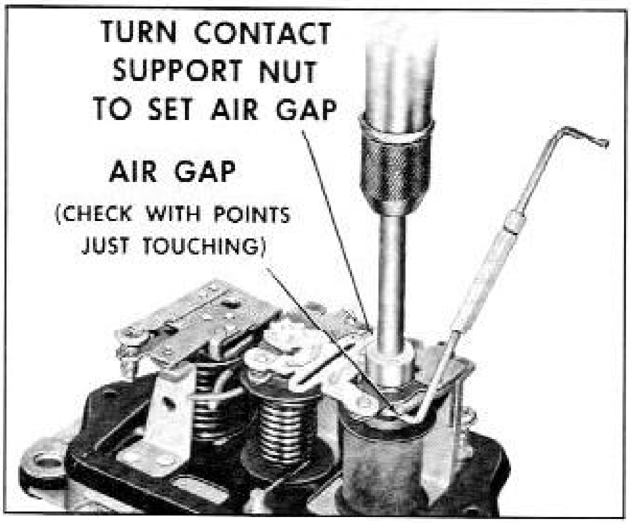


Fig. 13-39 Adjusting Voltage Regulator Air Gap (35 Amp.)

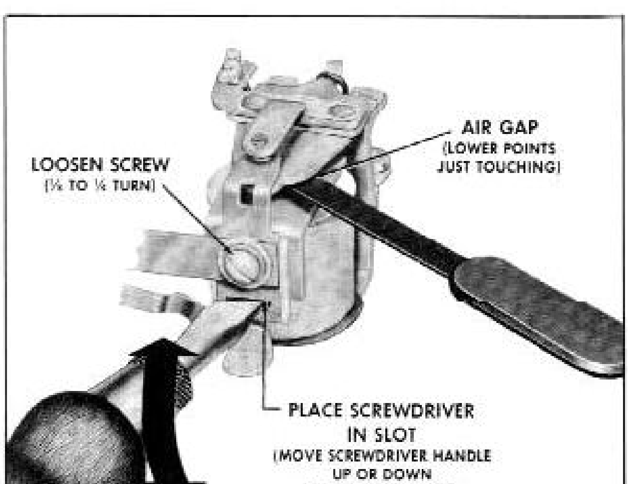


Fig. 13-40 Adjusting Voltage Regulator Air Gap (40 Amp.)

gap between armature and center of core. Air gap should be .075". Adjust gap by loosening contact mounting screws and raising or lowering contact brackets as required. (Fig. 13-39) Check to see that points are lined up and tighten screws after adjustment.

Voltage Regulator Air Gap Adjustment (40 Ampere Regulator)

The difference in voltage between the upper and lower contacts (.1 to .3 volts lower than upper contacts) can be increased by slightly increasing the air gap between the armature and center of the core. The difference can be decreased by slightly decreasing the air gap. (Fig. 13-40) Standard air gap is .067".

After the air gap adjustment is made it will be necessary to recheck the voltage setting of both sets of contacts as outlined under VOLTAGE REGULATOR SETTING (40 AMPERE REGULATOR). (See CHECKS AND ADJUSTMENTS OF THE CHARGING SYSTEM ON THE CAR)

Upper Contact Point Opening (40 Ampere Regulator)

1. With lower contacts just touching, measure the point opening between upper set of contacts (.016").
2. Adjust by bending the upper contact arm on the armature assembly. (Fig. 13-41)

Current Regulator Air Gap Adjustment

Check and adjust current regulator air gap for both the 35 ampere and 40 ampere regulators in exactly the same manner as the 35 ampere voltage regulator. Air gap should be .075".

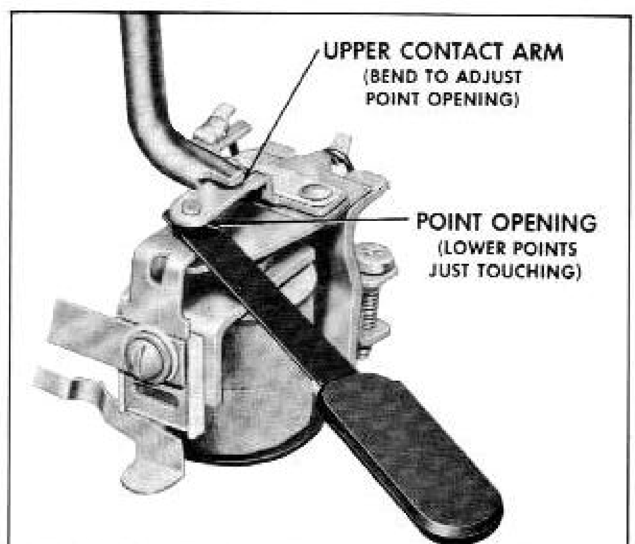


Fig. 13-41 Adjusting Voltage Regulator Point Opening (40 Amp.)

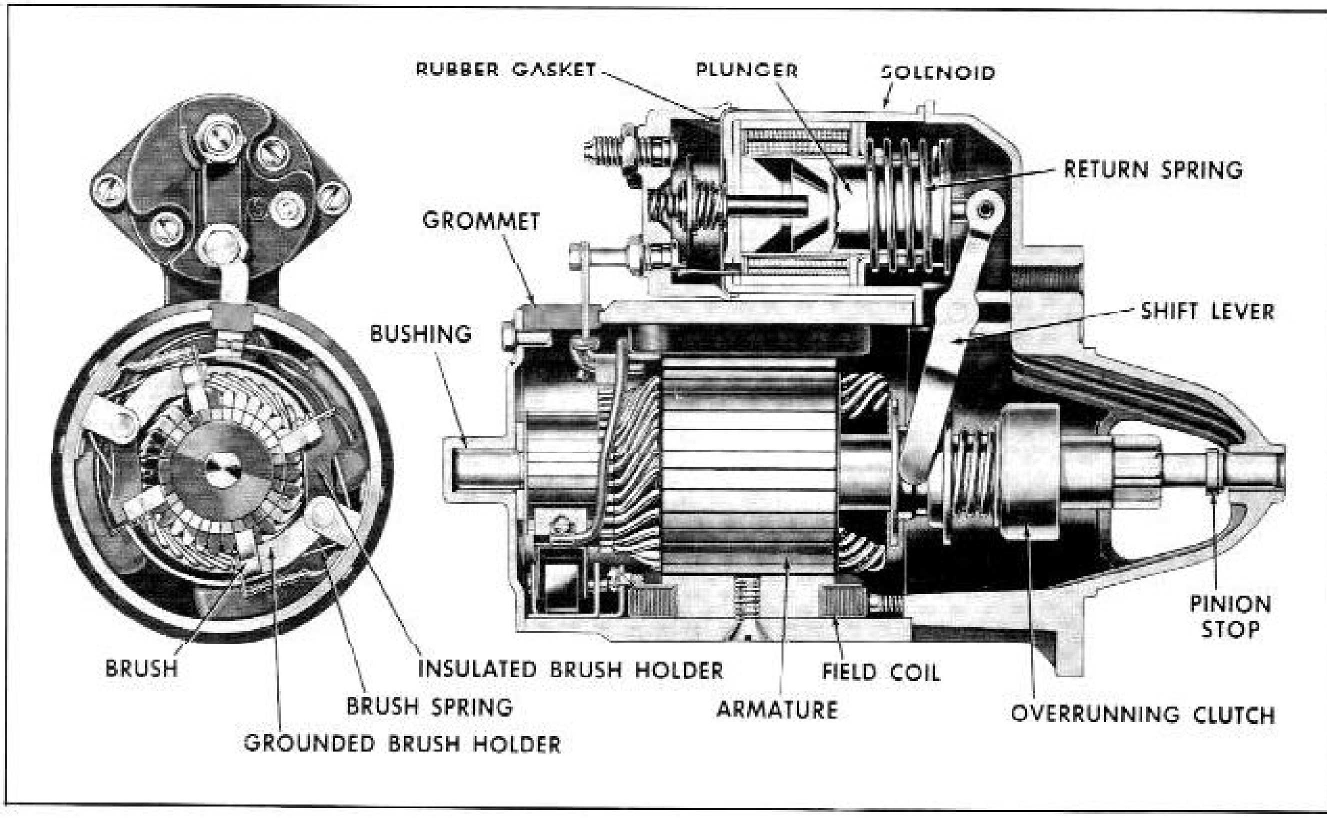


Fig. 13-42 Starter Motor Details

Installation of Regulator

1. With rubber gasket in place on regulator base and cover installed, install regulator and tighten mounting screws.

   CAUTION: DO NOT tighten the mounting screws excessively as this will destroy the cushioning effect of rubber grommets in the mounting.

2. Attach "BAT", "GEN", and "FIELD" leads to regulator and polarize generator by momentarily connecting a jumper wire to the "BAT" and "GEN" terminals on the regulator before starting the engine.

3. Check and adjust the electrical settings of the regulator on the car as outlined under CHECKS AND ADJUSTMENTS ON THE CAR.

STARTING CIRCUIT

STARTING MOTOR ASSEMBLY (Fig. 13-42)

The Delco-Remy Starting Motor is a 12-volt extruded frame type unit, having four poles and a compound field. The starting motor used with regular fuel engines (Fig. 13-43) has three field coils connected in series from the field terminal to the insulated brushes, and one shunt coil connected from the field terminal to ground.

The starting motor used with premium Fuel Engines (Fig. 13-44) has heavier armature and field windings, and has two field coils in series with the armature circuit and in parallel to each other. The other two field coils are in parallel with each other and are connected from the field terminal to ground.

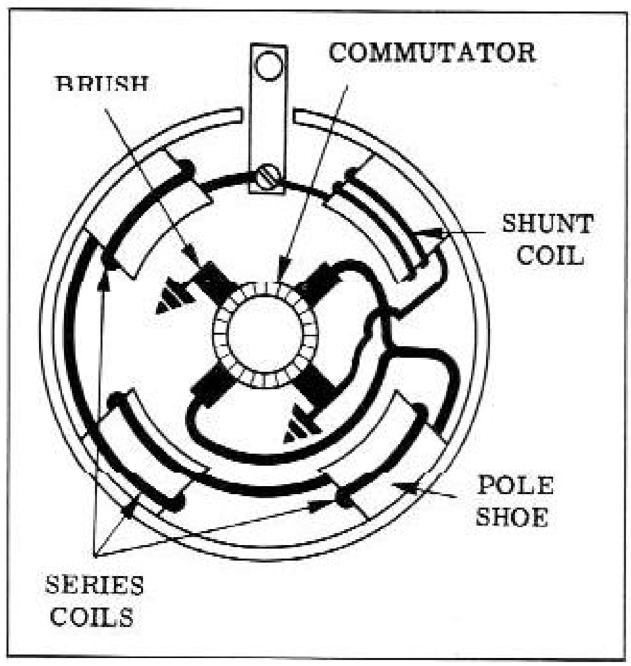


Fig. 13-43 Starter Field Windings (Regular Fuel Engine)

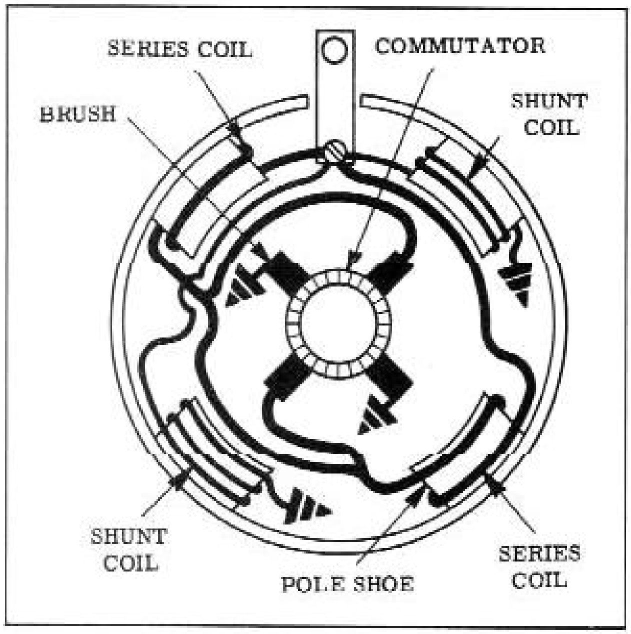


Fig. 13-44 Starter Field Windings (Premium Fuel Engine)

The armature rotates in bushings at both ends. An overrunning clutch drive is used to engage the cranking motor pinion with the flywheel. The overrunning action of the clutch protects the cranking motor armature from excessive speed when the engine starts.

A solenoid switch, integral with the solenoid assembly, operates the overrunning clutch drive by means of a linkage to the shift lever. When the ignition switch is turned to the starting position, the solenoid is energized, moving the cranking motor pinion into mesh with the flywheel. The solenoid switch contacts are then closed so that battery current is delivered to the cranking motor.

The armature shaft and clutch have spiral splines which prevent full cranking power until the clutch pinion is fully engaged in the flywheel ring gear. An assist spring (regular fuel engine only) between the armature winding and the collar of the clutch drive aids the solenoid in overcoming the return spring force in the initial movement of the clutch. A pinion stop, consisting of a snap ring retainer and thrust collar assembled on the armature shaft takes all the end thrust.

Removal

1. Disconnect positive battery cable at junction block and disconnect the solenoid switch wire (purple) from the chassis wiring harness.
2. Hoist car.
3. If equipped with dual exhaust, disconnect exhaust pipe at manifold.
4. Disconnect starting motor from lower flywheel housing and remove motor while sliding battery cable loom through sleeve.

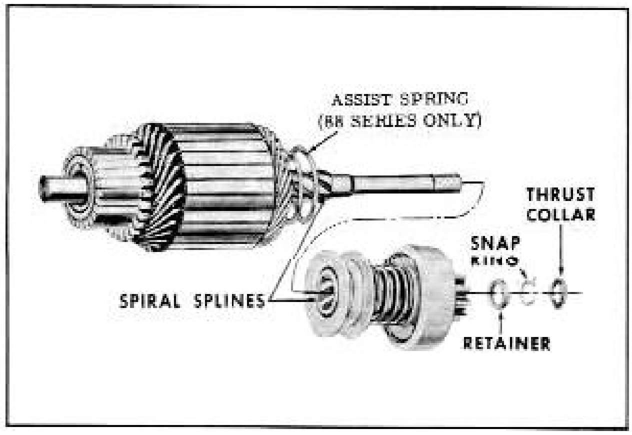


Fig. 13-45 Overrunning Clutch

Disassembly

1. Disconnect the field coil connector from the motor solenoid terminal.
2. Remove thru-bolts, then remove commutator end frame and leather washer.
3. Remove field frame assembly, armature, and clutch assembly from drive gear housing.
4. If necessary to remove overrunning clutch from armature shaft proceed as follows:
   a. Remove thrust collar from armature shaft. (Fig. 13-45)
   b. Slide a standard half-inch pipe coupling or other metal cylinder of suitable size (an old pinion can be used if available) over shaft against retainer to be used as a driving tool. (Fig. 13-46) With armature shaft supported on wood block, tap end of driving tool until retainer clears snap ring.
   c. Remove snap ring from groove in shaft using pliers or other suitable tool. If the

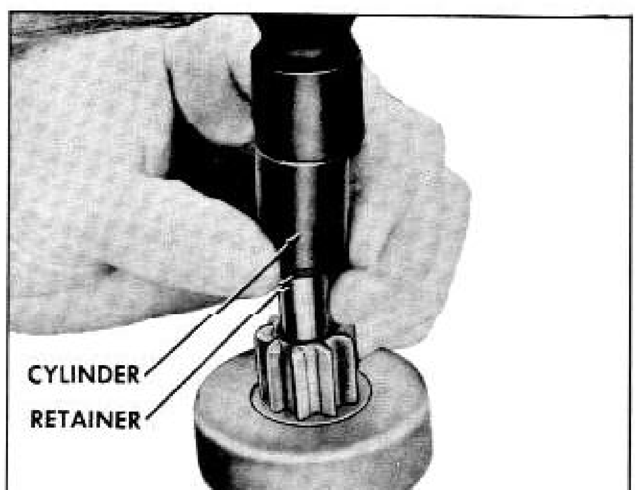


Fig. 13-46 Removing Pinion Retainer

snap ring is distorted during removal it will be necessary to use a new one upon reassembly.

d. Remove retainer, clutch assembly, and assist spring from armature shaft.

5. If necessary to replace brush holding parts, proceed as follows:

a. Remove screws attaching leads and brushes to the holders.

b. Press down on the flat spring so that center of spring clears the retaining slot. Slide off the brush spring and two brush holders as an assembly.

c. Reassemble and install new brushes if necessary.

6. If necessary to remove solenoid assembly or shift lever, proceed as follows:

a. Remove solenoid to drive gear housing attaching screws, then remove solenoid assembly.

b. To remove shift lever and-or plunger, remove shift lever pivot bolt.

c. Disassemble shift lever from plunger.

Cleaning, Inspection and Tests

1. Clean all starting motor parts, but DO NOT USE GREASE DISSOLVING SOLVENTS FOR CLEANING THE OVERRUNNING CLUTCH, ARMATURE, AND FIELD COILS, since such a solvent would dissolve the grease packed in the clutch mechanism and would damage armature and field coil insulation.

2. Test overrunning clutch action. The pinion should turn freely in the overrunning direction. Check pinion teeth to see that they have not been chipped, cracked, or excessively worn. Replace assembly if necessary.

3. Check brush holders to see that they are not deformed or bent, but will properly hold brushes against the commutator.

4. Check fit of armature shaft in bushing of drive housing. Shaft should fit snugly in the bushing. If the bushing is worn, it should be replaced.

5. Inspect armature commutator. If commutator is rough or out-of-round, it should be turned down and the mica undercut 1/32". Inspect the points where the armature conductors join the commutator bars to make sure they have a good connection. A burned commutator bar is usually evidence of a poor connection.

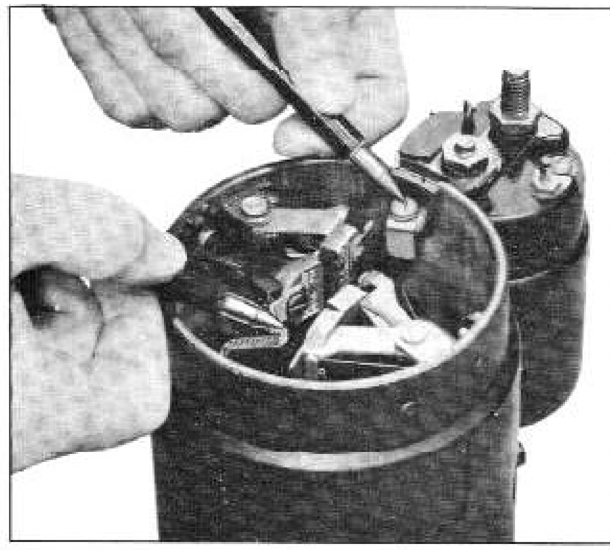


Fig. 13-47 Checking Field Coil for Open

6. If test equipment is available:

a. Check the armature for short circuits by placing on growler and holding hack saw blade over armature core while armature is rotated. If saw blade vibrates, armature is shorted. Recheck after cleaning between the commutator bars. If saw blade still vibrates, replace the armature.

b. Using a 110-volt test lamp place one lead on the armature shaft and the other on the commutator. If the lamp lights, the armature is grounded and must be replaced.

c. On starting motors used with regular fuel engines, using a 110-volt test lamp, place one lead on the connector bar the other lead on one of the insulated brush terminals. (Fig. 13-47) If the lamp does not light the series coils are open and will require repair or replacement.

Fig. 13-48 Checking Field Coil for Ground

d. On starting motors used with premium fuel engines, disconnect the field wires from connector bar. Using a 110-volt test lamp, place one lead on terminal of one series coil and the other lead on one of the insulated brushes. If the lamp does not light, the coil has an open circuit. Test other series coil in the same manner.

e. Using a 110-volt test lamp, place one lead on the connector bar and the other on the field frame. (Fig. 13-48) Disconnect all shunt coil grounds before this check is made. If the lamp lights, the field coils are grounded and the defective coils will require repair or replacement.

f. Using a 110-volt test lamp, place one lead on each end of one shunt coil. (Fig. 13-49) If the lamp does not light, the shunt coil is open and will require replacement. On starting motors used with premium fuel engines, test the other shunt coil in the same manner.

g. Check the current draw of the solenoid winding. (See SOLENOID CURRENT CHECK)

Assembly

1. If the solenoid assembly or shift lever was removed, proceed as follows:

   a. Assemble shift lever and plunger.

   b. Position shift lever and plunger assembly in drive gear housing and install lever pivot bolt.

   c. Install solenoid assembly to drive gear housing.

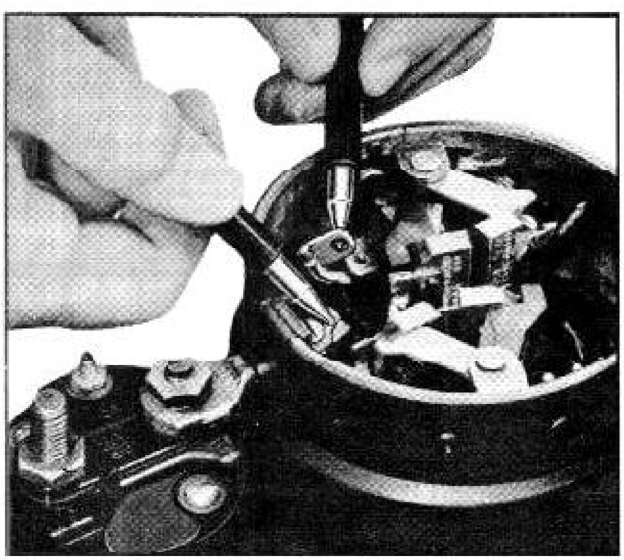


Fig. 13-49 Checking Shunt Coil for Open

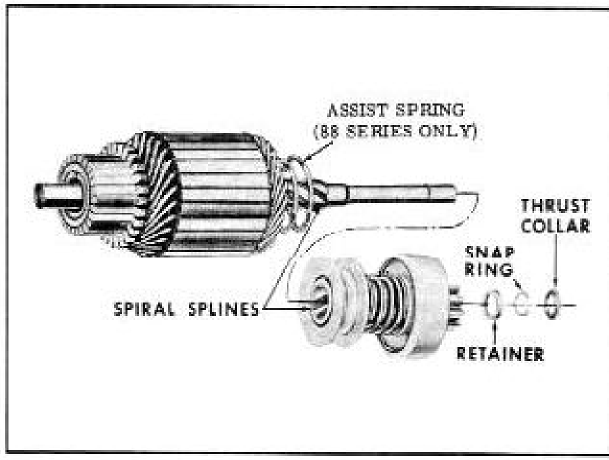


Fig. 13-50 Overrunning Clutch

2. If the overrunning clutch was removed from the armature shaft, assemble as follows:

   a. Lubricate drive end of armature shaft with SAE No. 10 oil, then install assist spring against armature.

   b. Slide clutch assembly onto armature shaft with pinion away from armature. (Fig. 13-50)

   c. Slide retainer onto shaft with cupped surface facing away from clutch assembly.

   d. Install snap ring into groove on armature shaft.

   e. Assemble thrust collar onto shaft with shoulder next to snap ring.

   f. Position retainer and thrust collar next to snap ring. Using two pliers, grip retainer and thrust collar and squeeze until snap ring is forced into retainer and is held securely in groove in armature shaft. (Fig. 13-51)

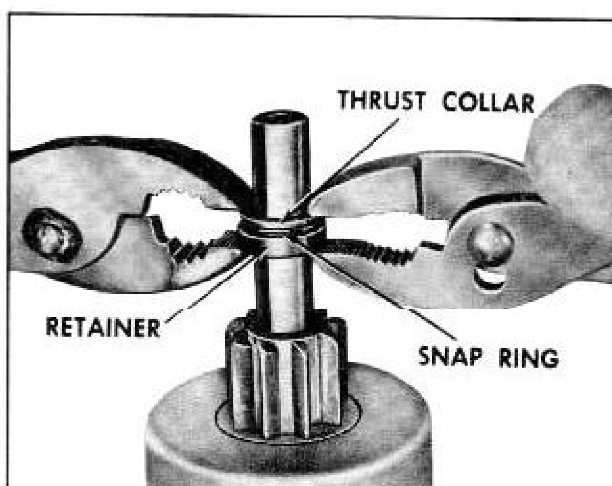


Fig. 13-51 Installing Retainer and Snap Ring

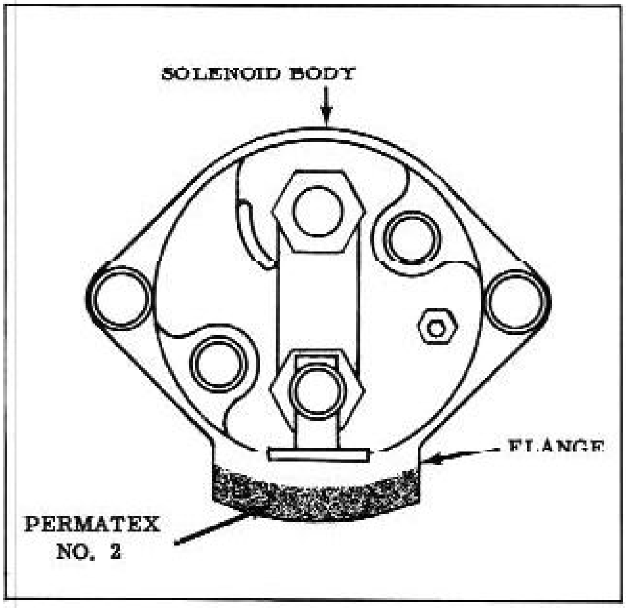


Fig. 13-52 Sealing Solenoid Housing

3. Lubricate drive gear housing bushing with 4 or 5 drops of light engine oil.

4. With thrust collar in place against snap ring and retainer, slide armature and clutch assembly into drive gear housing and engage clutch with shift lever yoke.

5. Apply Permatex No. 2 on solenoid flange as shown in Fig. 13-52.

6. Positon field frame against drive gear housing using care to prevent damage to brushes.

7. Lubricate commutator end frame bushing with 4 or 5 drops of light engine oil.

8. Install leather washer on armature shaft and slide end frame onto shaft, then install and tighten thru bolts.

9. Connect the field coil connector to the motor solenoid terminal.

10. Check pinion clearance as outlined under PINION CLEARANCE.

Pinion Clearance

Whenever the cranking motor has been disassembled or the solenoid has been replaced, it is necessary to check the pinion clearance. Pinion clearance must be correct to prevent the buttons on the shift lever yoke from rubbing on the clutch collar during cranking.

To check, connect a voltage source of approximately 6 volts between the solenoid switch terminal and ground.

CAUTION: If a 6 volt battery is not available, a 12 volt battery may be used PROVIDING ONLY

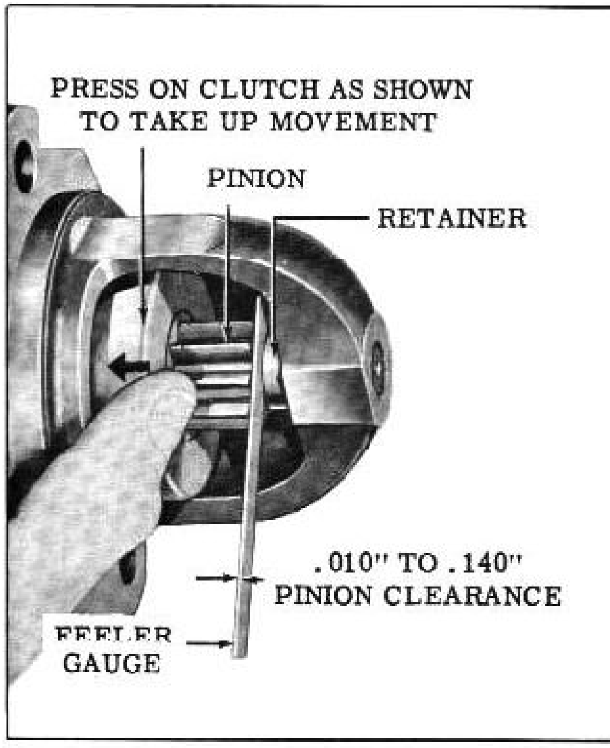


Fig. 13-53 Checking Pinion Clearance

THREE CELLS ARE CONNECTED IN SERIES. TO PREVENT MOTORING, CONNECT A HEAVY JUMPER LEAD FROM THE SOLENOID MOTOR TERMINAL TO GROUND.

Energize the solenoid to shift the clutch, push the pinion back as far as possible to take up any movement, and check the clearance with a feeler gauge. (Fig. 13-53) The clearance should be .010" to .140".

Means for adjusting pinion clearance is not provided on the starter motor. If the clearance does not fall within limits, check for improper installation and replace all worn parts.

Solenoid Current Draw (Fig. 13-54)

If solenoid is not removed from starting motor, the connector strap must be removed from the terminal on the solenoid before making these tests. Complete tests in a minimum of time to prevent overheating of the solenoid.

To check hold-in winding, connect an ammeter and a variable resistance in series with a 12 volt battery and the "switch" terminal on the solenoid. Connect a voltmeter to the "switch" terminal and to ground. Adjust the voltage to 10 volts and note the ammeter reading. It should be 10.5 to 12.5 amperes for starting motors used with regular fuel engines and 15.5 to 17.5 amperes for starting motors used with premium fuel engines.

To check both windings, connect the ammeter, variable resistance and voltmeter as for previous test. Ground the solenoid "motor" terminal. Adjust the voltage to 10 volts and note the ammeter

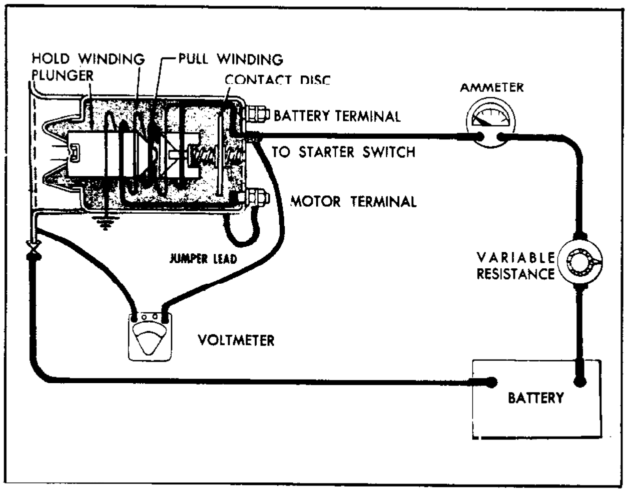


Fig. 13-54 Checking Solenoid Windings

reading. It should be 42 to 49 amperes for starting motors used with regular fuel engines and 47 to 54 amperes for starting motors used with premium fuel engines.

Current draw readings that are over specifications indicate shorted turns or ground in the windings of the solenoid, and the solenoid should be replaced. Current draw readings that are under specifications indicate excessive resistance. Check connections, then replace solenoid if necessary.

NEUTRAL SAFETY SWITCH

A neutral safety switch mounted on the mast jacket, is employed as a safety factor on Hydra-Matic models. The switch prevents starting of the engine with the transmission in gear. The engine may be started with the selector lever in neutral or park position.

Checking

1. Apply hand brake firmly.
2. Put shift lever into "D" range and turn ignition switch to "Start".
3. While holding ignition switch on "Start", slowly move shift lever toward "N" position until engine cranks and starts.
4. Without moving the shift lever after engine starts, depress accelerator pedal slightly to determine whether or not transmission is in gear. If neutral safety switch is properly adjusted, transmission will not be in gear.

NOTE: If equipped with back-up lights, the lights should operate with the ignition on and the selector lever in reverse.

Adjustment

To adjust the neutral safety switch, loosen the switch attaching screws on the mast jacket. With the selector lever in the Neutral position, position the switch so that a .090" pin can be inserted through the hole in the switch arm and into the hole in the face of the switch. Tighten the switch attaching screws and remove the pin. Recheck adjustment.

CHECKING STARTING CIRCUIT RESISTANCE

Whenever the starter motor turns over slowly or not at all, or the solenoid fails to engage the starter with the flywheel, excessive resistance of the starter circuit may be the cause.

The following checks for excessive resistance can be performed with the starter motor on the car.

1. Test battery and charge if necessary.

   CAUTION: To prevent the engine from firing during the following checks, ground the distributor primary lead.

2. Measure the voltage drop (V1) during cranking between the positive battery post and the "BATTERY" terminal of the solenoid. (Fig. 13-55)
3. Measure the voltage drop (V2) during cranking between the "BATTERY" terminal of the solenoid and the "MOTOR" terminal of the solenoid.
4. Measure the voltage drop (V3), during cranking between the negative battery post and the starter motor frame.

If the voltage drop for any one of the above three checks exceeds 0.2 volt, excessive resistance is indicated in that portion of the starting circuit being checked. Locate and eliminate the cause for any excessive voltage drop in these circuits in order to obtain maximum efficiency of the starting system.

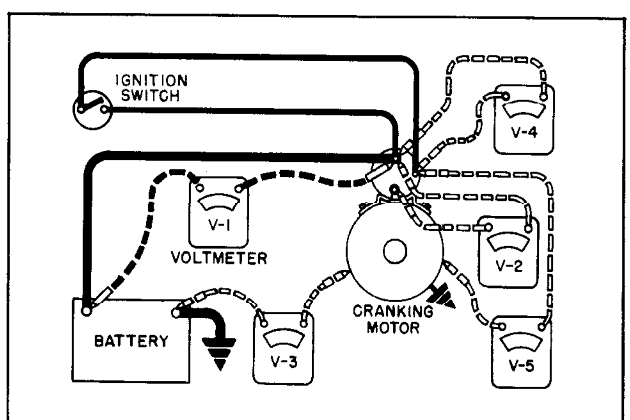


Fig. 13-55 Checking Starting Circuit Resistance

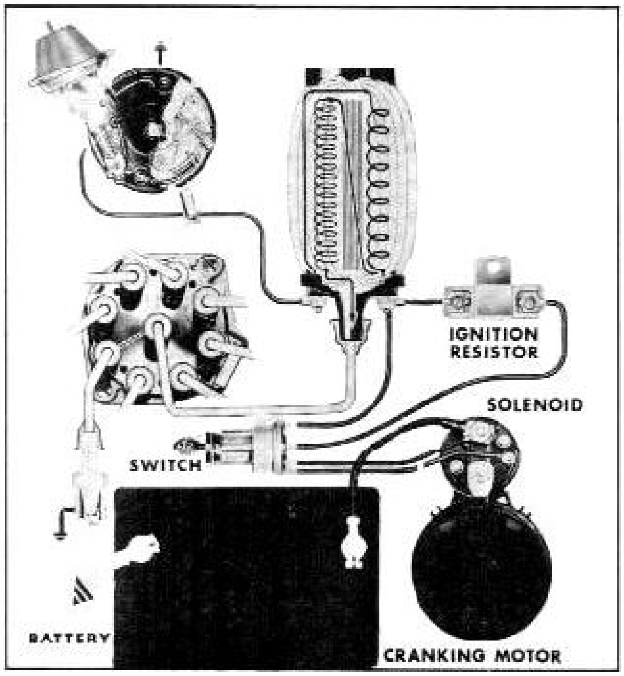


Fig. 13-56 Ignition System

If the solenoid fails to pull in, the trouble may be due to excessive voltage drop in the solenoid circuit. To check for this condition, measure the voltage drop (V4) during cranking, between the "BATTERY" terminal of the solenoid and the "SWITCH" terminal of the solenoid. If the voltage drop exceeds 2.5 volts, the resistance is excessive in the solenoid circuit.

If the voltage drop does not exceed 2.5 volts and the solenoid does not pull in, measure the voltage (V5) available at the "SWITCH" terminal of the solenoid. The solenoid should pull in with 8.0 volts at temperatures up to 200°F. If not, remove the starter motor and test the solenoid as outlined under SOLENOID CHECK.

IGNITION CIRCUIT (Fig. 13-56)

The ignition circuit includes the distributor, ignition coil, ignition resistor, ignition switch, spark plugs, and battery. For servicing of the battery see CHARGING CIRCUIT.

DISTRIBUTOR (Fig. 13-57)

Description

The distributor cap has a window for adjusting point opening (dwell angle) while the cap is mounted and the engine is running. The contact point set is replaced as one complete assembly. The service replacement contact set has the BREAKER LEVER SPRING TENSION and POINT ALIGNMENT pre-adjusted. Only the POINT OPENING requires adjusting after replacement.

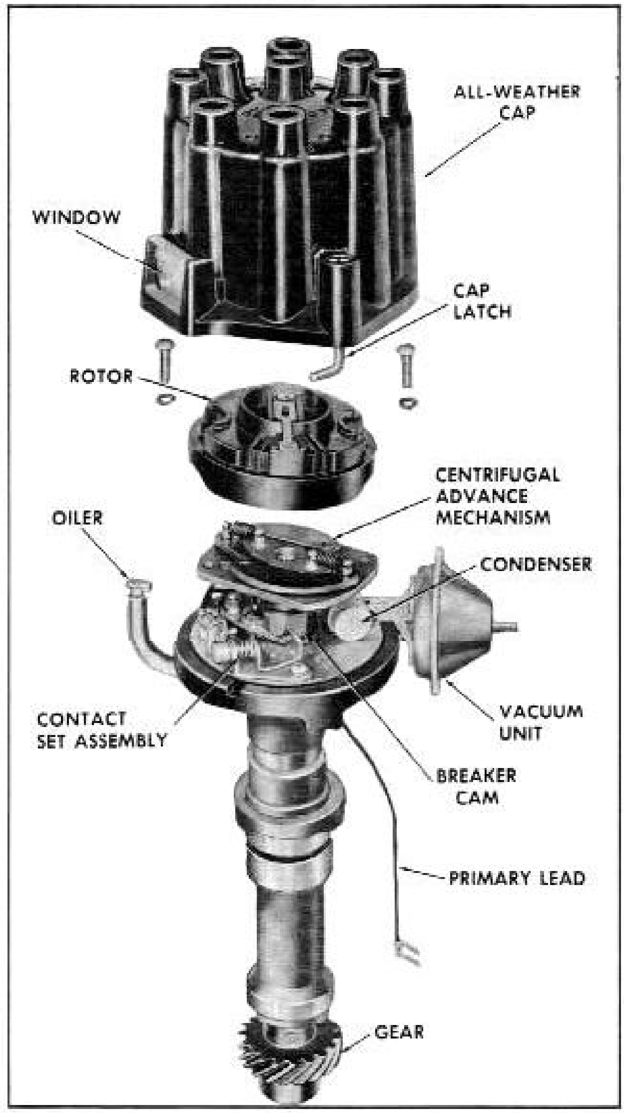


Fig. 13-57 Distributor

Under part throttle operation the intake manifold vacuum is sufficient to actuate the vacuum control diaphragm, thus advancing the spark and increasing fuel economy. During fast acceleration or when the engine is pulling heavily, the vacuum is not sufficient to actuate the diaphragm; therefore, the movable breaker plate is held so that the ignition timing is retarded.

The centrifugal advance mechanism consists of a cam actuated by two centrifugal weights controlled by springs. As the speed of the distributor shaft increases with engine speed, the centrifugal advance weights move outward which advances the cam, causing the contact points to open earlier, thus advancing the spark.

Adjustment of Distributor Dwell Angle (On Car)

1. Remove the distributor cap and inspect contact points; clean if necessary. Install cap.

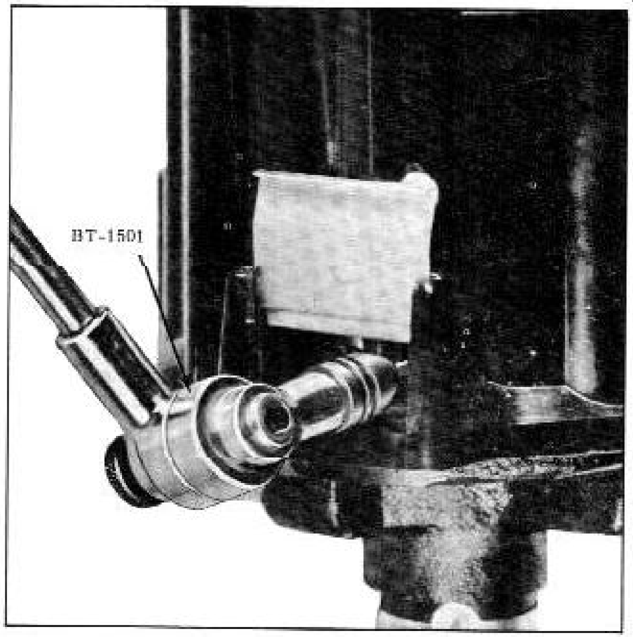


Fig. 13-58 Adjusting Dwell Angle

2. Connect a dwell meter to the primary distributor lead terminal on the coil and a suitable ground.

3. Raise window on side of distributor cap.

4. With the engine running at idle speed, insert Dwell Adjusting Tool BT-1501 into the head of the adjusting screw as shown in Fig. 13-58 and adjust dwell angle to 30°.

   NOTE: If the dwell angle reading is erratic, check the primary circuit points and condenser.

The dwell angle variation should not exceed 3° at engine speeds between idle and 1750 r.p.m. Excessive variation indicates distributor wear.

Removal

1. Disconnect the distributor primary wire from coil.

2. Remove distributor cap as shown in Fig. 13-59.

   NOTE: If necessary to remove secondary wires from cap, mark position on cap tower for lead to No. 1 cylinder. This will aid in reinstallation of leads. (Fig. 13-60)

3. Remove vacuum hose line from vacuum advance unit.

4. Remove distributor clamp screw and hold-down clamp.

5. Note position of rotor, then pull distributor up until rotor just stops turning counterclockwise and again note position of rotor.

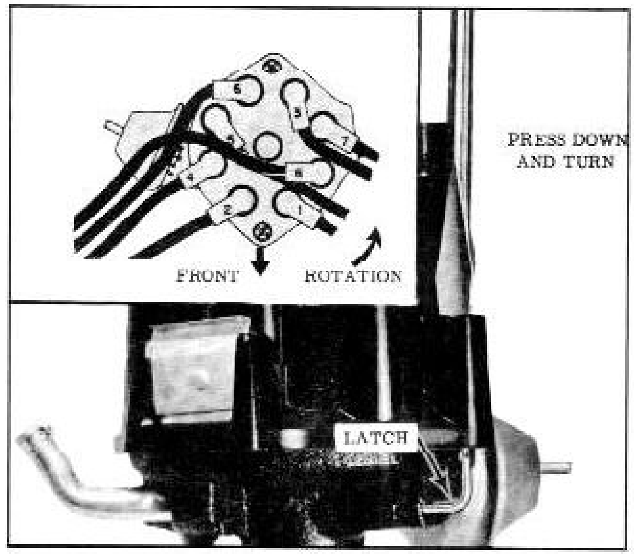


Fig. 13-59 Removing Distributor Cap

To install, reverse removal procedure.

IMPORTANT: To insure correct timing of the distributor, the distributor must BE INSTALLED with the rotor correctly positioned as noted in step 5.

If the engine has been turned after the distributor was removed, it will be necessary to install a jumper wire and crank engine until timing pointer on engine front cover indexes with 0° saw slot on the harmonic balancer. If both valves of the No. 1 cylinder are closed, the piston will be on top dead center of the firing stroke and the distributor can be installed with the rotor pointing to the No. 1 spark plug terminal in the distributor cap. If not, crank engine one complete revolution, then install distributor.

Tests (Distributor Removed from Car)

With the distributor removed from the vehicle, place the distributor in a distributor testing machine. When mounting distributor in tester first secure the gear in the drive mechanism, then push distributor housing down toward the gear to

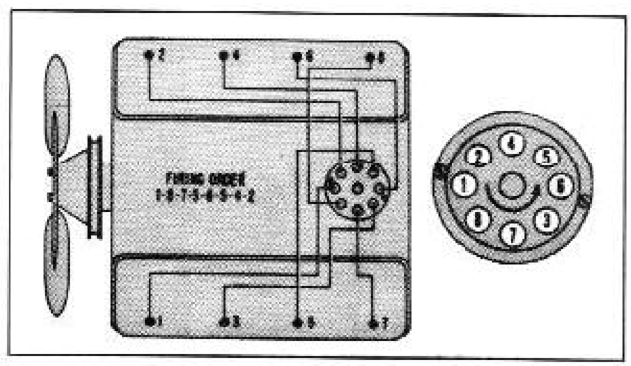


Fig. 13-60 Spark Plug Wiring

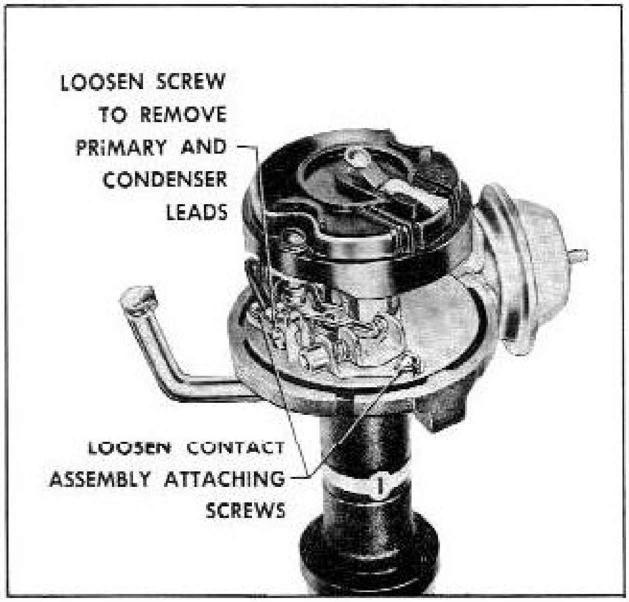


Fig. 13-61 Removing Contact Point Set

take up end play between the gear and housing, and finally secure the housing in the tester. Test the distributor for variation of spark, correct centrifugal and vacuum advance (See SPECIFICATIONS), and condition of contact points. This test will give valuable information on the distributor condition and indicates parts replacement which may be necessary.

Replacing Distributor Contact Set

1. Remove distributor and condenser lead and primary lead from the contact set terminal by loosening the attaching screw.

2. Loosen the two attaching screws which hold the base of contact set, turn and lift out the assembly. (Fig. 13-61)

3. Upon reassembly make sure that hole "A" in the contact set is centered over the dowel on the distributor plate and install the primary leads as shown in Fig. 13-62. Leads must be properly located to eliminate lead interference between cap, weight base, and breaker advance plate.

4. Apply a film of Delco-Remy Cam and Ball Bearing Lubricant, or equivalent, to the breaker cam.

Adjusting Distributor Dwell Angle

1. With distributor mounted in distributor testing machine, connect the dwell meter to the distributor primary lead.

2. Turn the adjusting screw to set the dwell angle at 30^{o}.

If a distributor tester is not available, the dwell angle may be adjusted as follows:

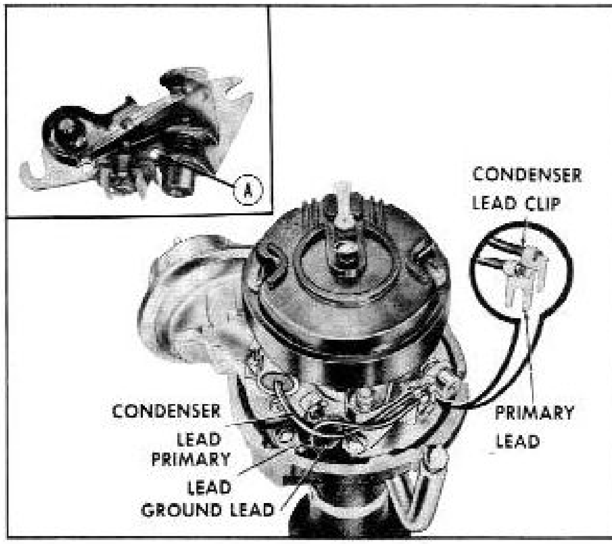


Fig. 13-62 Installing Contact Point Set

1. Mount distributor in a vise.

2. Connect a testing lamp between the primary lead and ground.

3. Rotate the shaft until one of the breaker cam lobes is under the center of the rubbing block on the moveable point.

4. Turn the adjusting screw clockwise until the lamp lights, then give the wrench one-half turn in the opposite direction.

When distributor has been installed in car, point opening must be reset by connecting a dwell meter to the primary distributor lead terminal on the coil and a suitable ground. The dwell angle must be set at 30^{o} with the engine running at idle speed.

Rotor

The rotor is retained by two screws and is provided with round and square lugs which engage with the mechanical advance plate so that the rotor may be installed in only one position. (Fig. 13-63)

Mechanical Advance

The mechanical advance weights and springs are accessible by removing the rotor. The mechanical advance plate is assembled to the breaker cam. In order to remove the breaker cam and advance plate, follow the procedure for DISTRIBUTOR-DISASSEMBLY AND ASSEMBLY.

VACUUM ADVANCE UNIT

Removal

1. Remove the two vacuum advance attaching screws. (Fig. 13-64)

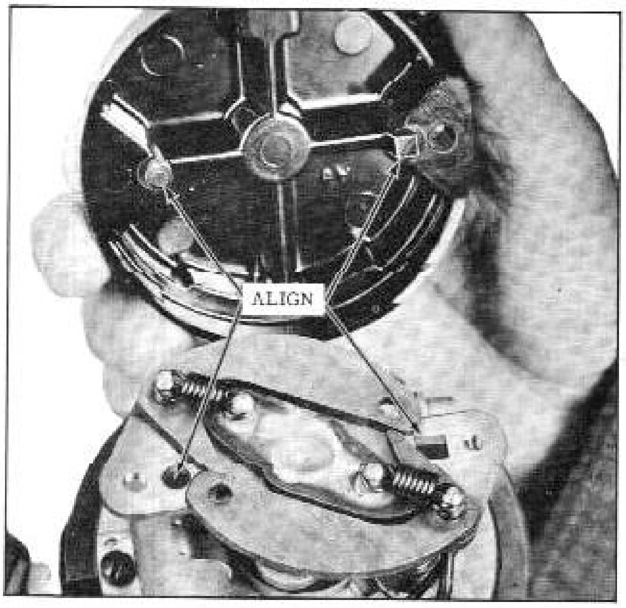


Fig. 13-63 Rotor Installation

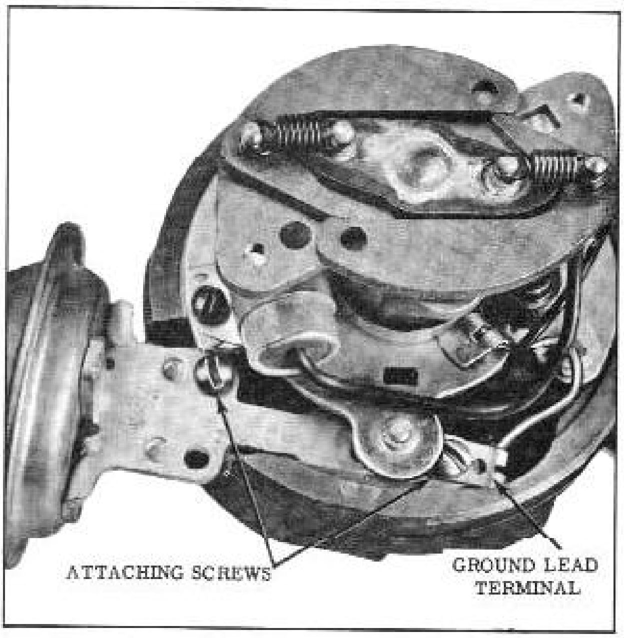


Fig. 13-64 Vacuum Advance Unit

2. Turn the breaker plate clockwise and push the rod end of the vacuum advance down so that it will disengage and clear the breaker plate. Remove vacuum advance unit.

Installation

1. Position the rubber sleeve over the rod end of the vacuum advance.

2. Insert the rod end of the unit between the housing and the breaker plate.

3. Turn the breaker plate clockwise so that the rod end can be inserted into the hole in the breaker plate.

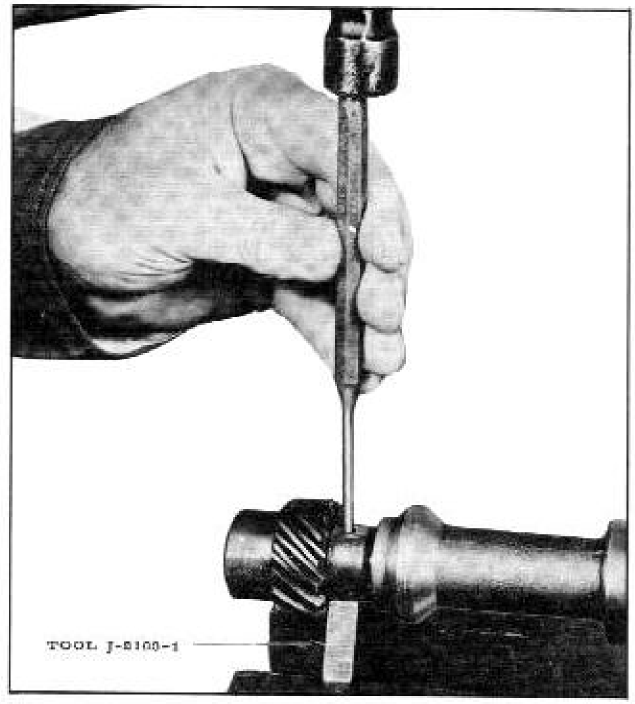


Fig. 13-65 Removing Drive Gear Pin

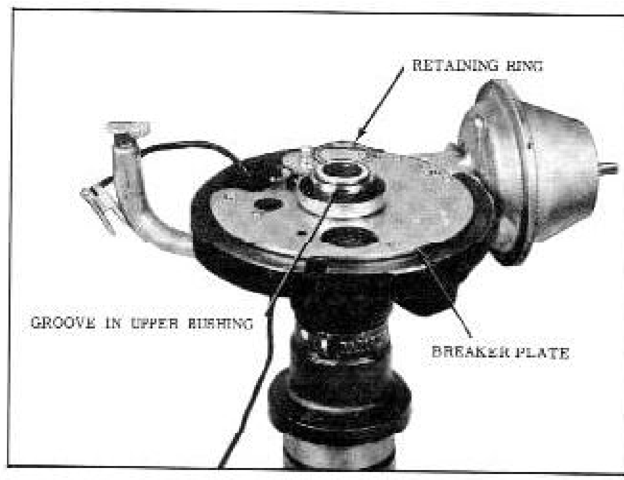


Fig. 13-66 Breaker Plate

4. Install the attaching screws with the ground lead terminal under the inner mounting screw. (Fig. 13-64)

DISTRIBUTOR

Disassembly

1. Mark distributor shaft and gear so that they may be reassembled in the same position.

2. File the staking from the drive gear pin and drive out the pin. (Fig. 13-65)

3. Pull the distributor assembly from the gear and pull the distributor shaft and breaker cam from the housing.

4. Remove the retaining ring from the upper bushing and lift the breaker plate and felt wick from the bushing. (Fig. 13-66)

5. Remove the two retaining screws and the vacuum advance.

Assembly

1. Install the vacuum advance with the ground lead terminal under the inner mounting screw. (Fig. 13-64)

2. Place the felt wick on the upper bushing, then place the breaker plate over the upper bushing and vacuum advance link.

3. Install the retaining ring on the upper bushing.

4. Slide the distributor shaft through housing bushings.

5. Push the distributor shaft into the driven gear with the holes aligned.

6. Install and stake a new pin. Exercise care while staking to prevent damaging the gear.

7. Lubricate distributor as outlined under PERIODIC MAINTENANCE and check and adjust dwell angle, vacuum advance, and mechanical advance. Refer to ELECTRICAL SPECIFICATIONS (Distributor).

IGNITION COIL AND IGNITION RESISTOR

The external resistor, connected in series with the primary circuit between the battery and coil, limits the primary current at low speeds and allows the coil to operate at maximum efficiency at road speeds. The resistor is by-passed during cranking, thereby connecting the ignition coil directly to the battery. This makes full battery voltage available at the coil and keeps ignition voltage as high as possible during cranking. The by-passing of the resistor during cranking is accomplished within the ignition switch.

IGNITION AND STARTING SWITCH

The ignition and starting switch is key-operated to close the ignition primary circuit and to energize the solenoid for cranking. The ignition key must be turned to the extreme clockwise position to energize the starter solenoid. Spring tension returns the key to the normal ignition position when it is released.

Accessories may be used when the engine is not running if the ignition key is turned counter-clockwise.

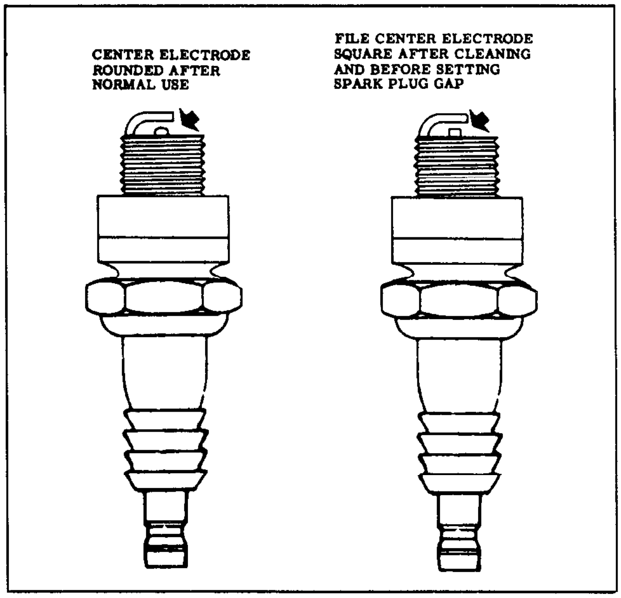


Fig. 13-67 Filing Center Electrodes

SPARK PLUGS

Type 44 spark plugs are used on all engines using premium fuel. Type 45 spark plugs are used on all engines using regular fuel. Export engines use a type 46 spark plug. All spark plugs have 14mm threads and 13/16" hex body.

The proper gap setting is .030". Satisfactory results can be assured only when genuine AC plugs of the type recommended are used.

Whenever spark plugs are removed from the car and cleaned, the following precautionary steps should be followed:

1. The center electrode should be filed flat before the gap setting is made. (Fig. 13-67)

   NOTE: Do not file electrodes when setting gap on new plugs.

2. Any traces of paint or dirt should be cleaned from the spark plug porcelain.

3. All plugs should be checked for cracks in the porcelain. These cracks are not always visible because they may be hidden by the steel body. Use a spark plug tester to test plugs. If the spark plug porcelain is cracked a new spark plug must be installed.

IGNITION SYSTEM DIAGNOSIS

If the engine does not run, the ignition system may be at fault if:

1. There is no spark during cranking when a spark plug wire is held 1/4" from the engine.

IGNITION SYSTEM CHECK CHART

Step No.	Operation	Specification	Possible Trouble
1	Check all connections in Primary and Secondary circuit		
2	Remove secondary lead from distributor cap. Hold 1/4 inch from engine while cranking and observe if spark occurs.		IF SPARK OCCURS: Distributor cap Rotor Spark plug wiring
3	Check Voltage V1 while cranking	1 volt Max.	Open circuit from battery side of coil to IGN, on ignition switch Ignition switch not closing ignition circuit in start position Ground in circuit from coil terminal to IGN, on ignition switch Ground in coil
4	Check Voltage V2 ignition switch "On", points open	Normal Battery	Low battery Points not open Ground in circuit from coil to distributor Ground in distributor Ground in coil Ground in circuit from coil to ignition switch or to resistor
5	Check Voltage V2 ignition switch "On", points closed	5 to 7 Volts	IF UNDER 5 VOLTS: Loose connection from resistor through ignition switch circuit to battery Loose connection between resistor and coil Resistor is open or has too much resistance IF OVER 7 VOLTS: Loose connection between coil and distributor Resistor out of circuit due to shorted or incorrect wiring Resistor has too little resistance Coil primary is open
6	Check Voltage V3 ignition switch "On", points closed	0.2 Volt Max.	Contacts not closed Loose connection in distributor Distributor not grounded to engine Faulty contacts
7	Check Voltage V4 ignition switch "On", points closed	0.7 Volt Max.	Loose connection from resistor through ignition switch circuit to battery
8	If these checks fail to find cause of trouble - remove distributor, coil and resistor from engine and check to specifications. Also check wiring harness.		

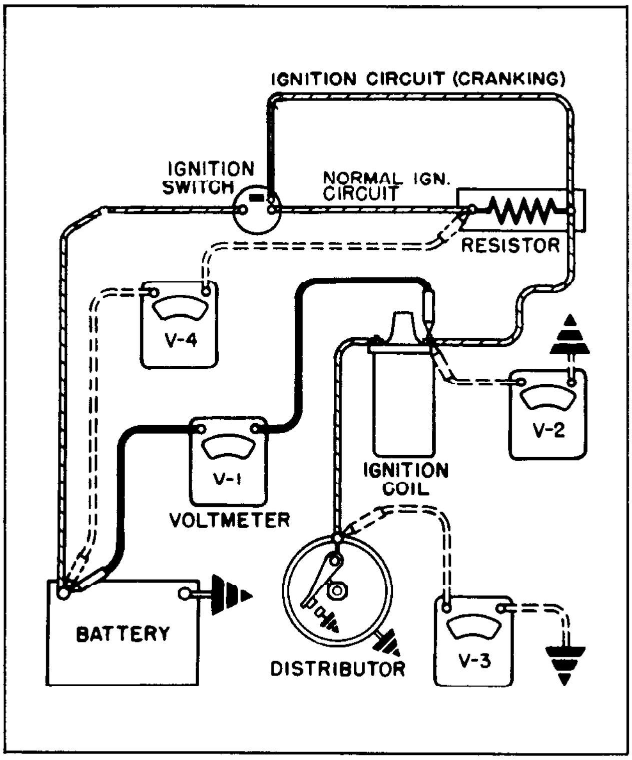


Fig. 13-68 Ignition System Tests

2. The engine starts but immediately stops when the ignition switch is released from the "START" position.

If the above checks indicate that the ignition system is at fault, the following checks may be made to help locate the difficulty, or locating trouble in the ignition system if the car runs, but not satisfactorily. (Fig. 13-68 and IGNITION SYSTEM CHECK CHART) All checks are to be made with the lights and accessories off and in the sequence shown.

MILLIAMP TEST

The milliamp test will indicate the presence of faulty ignition cables, cracked distributor cap, or burned rotor.

NOTE: When making a milliamp test, use the indicated reading values as furnished by the testing equipment manufacturers.

1. Connect tachometer, start engine, and set engine speed according to the directions on the test equipment.

2. Set meter knob to secondary efficiency position.

3. Ground positive lead.

4. Check each spark plug lead by connecting the positive lead of the meter directly to the cable. A variation of 5 graduations between plugs is allowable.

5. A low reading indicates high resistance in the circuit. If a low reading is encountered, disconnect the cable from the spark plug and check the reading again. If the reading increases, the spark plug is partially shorted.

6. A low reading with the cable disconnected from the spark plug indicates:

   a. Poor connection on either end of the cable.

   b. Burned or corroded connector inside the distributor cap.

   c. Damaged or broken cable.

   Clean and inspect the distributor cap terminals on both ends. Check cable insulation for cracks, pinholes, or an oil-soaked condition. DO NOT attempt to shorten, rework, or repair cables.

   NOTE: If the milliamp reading is still unsatisfactory, carefully check the distributor cap and rotor for leakage or cracks. Test the coil, condenser, and primary circuit, including starter solenoid connections, ignition switch and terminals, as well as the coil and distributor terminals.

7. A low reading on all cables indicates:

   a. Burned or broken rotor.

   b. Faulty distributor cable.

   c. Weak coil.

   d. Cables not tight in distributor cap.

   e. Excessively burned rotor or distributor cap terminal electrodes.

   f. Spring button not contacting carbon brush in distributor cap.

   g. Incorrect breaker point tension. (19 to 23 oz.)

HORNS

QUICK CHECKS FOR HORN TROUBLE

When horn trouble is encountered, the difficulty may be in the horn relay, wiring, or the horn itself. Quick checks to determine cause for trouble may be made as follows:

1. Ground the "S" terminal of the horn relay.

   a. If the horn operates satisfactorily, the trouble is in the horn contact or the wiring.

   b. Connect a jumper wire between the "H" terminal of the horn relay and the battery. If horn now operates satisfactorily, the trouble is in the horn relay. (See HORN RELAY CHECKS AND ADJUSTMENTS)

c. If the above checks indicate that the horn wiring and relay are not defective, connect a voltmeter to the "H" terminal and ground. As the horn control circuit is closed, note the reading on the voltmeter. The horn should blow at any voltage above 7.0 volts, however, it may be weak or have poor tone at any voltage below 11.25 volts. If the voltmeter shows no reading, the wiring between the horn relay and horn is open or the horn is not grounded. If reading is less than 7.0 volts, the fault is high resistance in the wiring or a faulty horn.

After previous checks have been made, and it is established that the horn is at fault, the trouble may be that the contacts are held open by a foreign particle. To dislodge the particle, energize the horn and tap the horn lightly. If this is the trouble, the horn will start to blow and resume normal operation.

HORN CURRENT ADJUSTMENT

Connect an ammeter and a voltmeter as shown in Fig. 13-69. With horn operating, the current draw should be 8.0 to 10.0 amperes at 11.5 volts. To change the current adjustment, turn the adjusting screw on the horn clockwise to increase and counterclockwise to decrease the setting.

If horn fails to operate properly after the above adjustments have been made, the horn should be replaced.

HORN RELAY CHECKS AND ADJUSTMENTS

Closing Voltage

1. Disconnect positive battery cable from "B" terminal of horn relay.

2. Connect a variable resistance of at least 10 ohms in series between battery cable and "B" terminal. (Fig. 13-70)

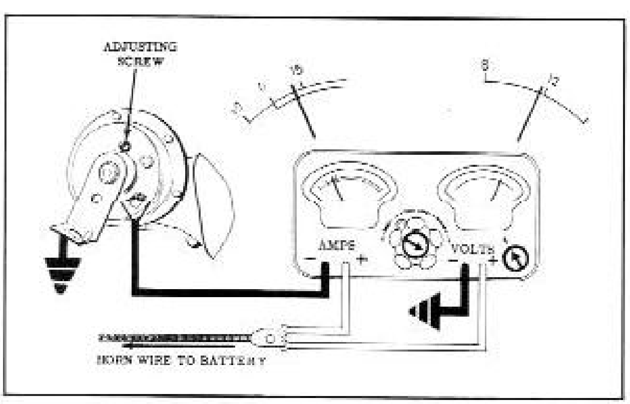


Fig. 13-69 Checking Current Draw

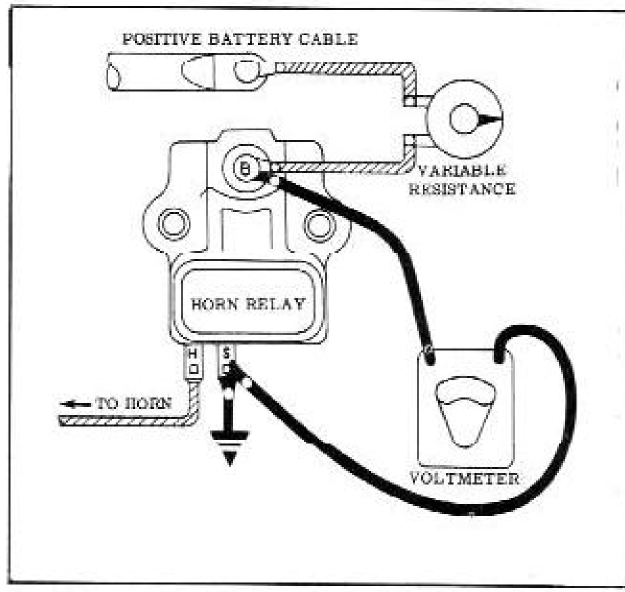


Fig. 13-70 Checking Horn Relay Closing Voltage

3. Connect a voltmeter across the "S" terminal and the "B" terminal of the horn relay. Ground the "S" terminal.

4. Slowly decrease the resistance until horn relay points close. Closing voltage should be 1.50 to 9.5 volts. If voltage is outside this range, adjust to 6.5 volts by bending armature spring post down to increase the voltage or up to decrease the voltage. (Fig. 13-71)

Air Gap

NOTE: The closing voltage adjustment must be correct before making the following check.

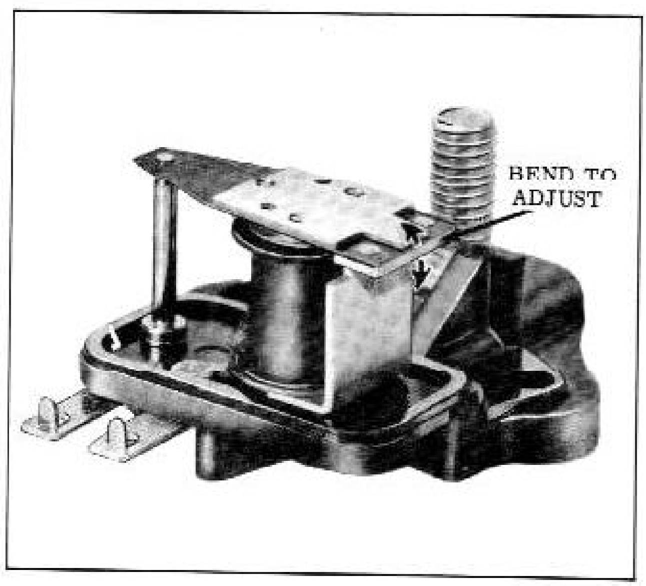


Fig. 13-71 Adjusting Horn Relay Closing Voltage

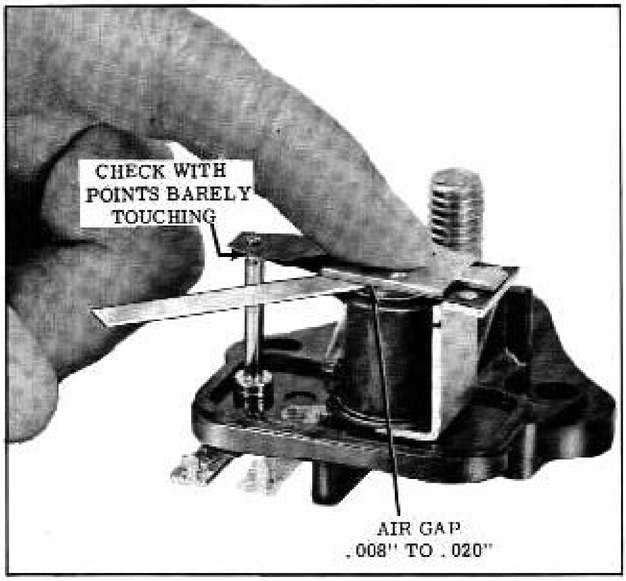


Fig. 13-72 Checking Horn Relay Air Gap

With the positive battery cable disconnected, check the air gap with the points barely touching. (Fig. 13-72) Air gap should be .008" to .020". No adjustment is provided.

Point Opening

NOTE: The closing voltage adjustment must be correct before making the following check.

With the positive battery cable disconnected, check the point opening. (Fig. 13-73) Point opening should be .020" (minimum). No adjustment is provided.

TURN SIGNAL

The turn signal circuit consists of the switch,

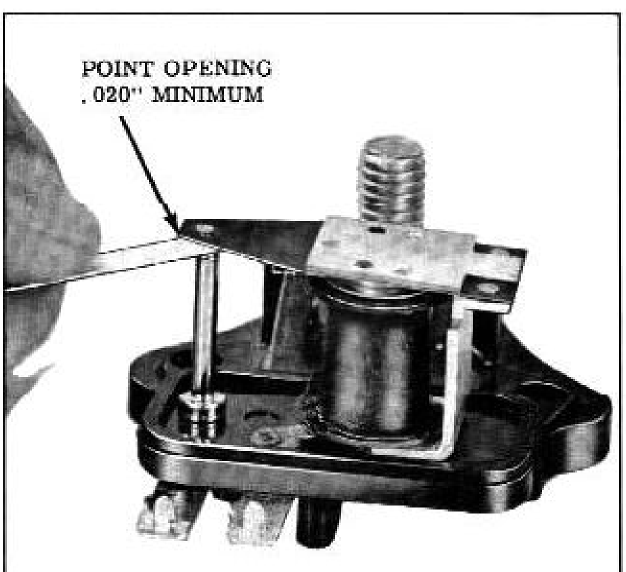


Fig. 13-73 Checking Horn Relay Point Opening

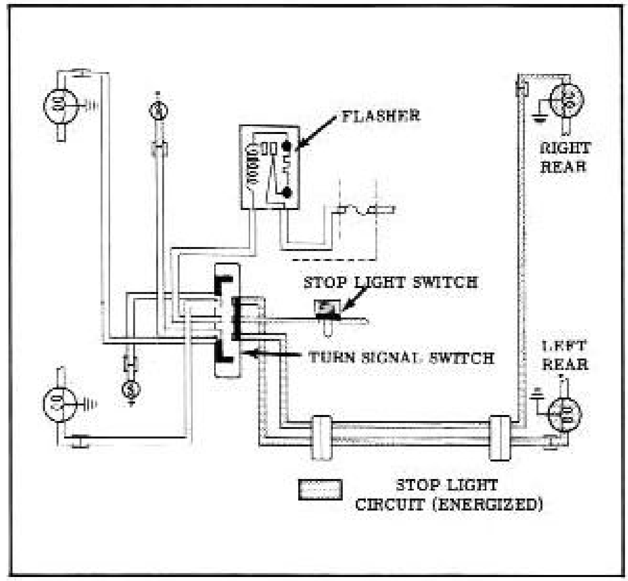


Fig. 13-74 Turn Signal Circuit (Off Position)

flasher, two pilot lamps in the instrument panel, the stop lamp filaments in the rear lamps, and the turn signal filaments in the parking lamps. (Fig. 13-74)

The turn signal switch is mounted on the steering column mast jacket just above the Hydra-Matic neutral safety switch and actuated by a rod extending down the mast jacket from the turn signal actuator assembly.

See SECTION 4 for servicing of turn signal switch.

TURN SIGNAL DIAGNOSIS (Fig. 13-75 and 13-76)

The turn signal wiring diagrams indicate the stop light circuit and the turn signal circuit energized at the same time in order to show how the stop light circuit is changed to a turn signal circuit when the turn signal switch is actuated.

1. PILOT LAMP FLASHES DIMLY FASTER THAN NORMAL
   A. Right turn - right rear or right front turn signal filaments burned out, light bulb base not grounded or an open in the front or rear turn signal circuit.
   B. Left turn - left rear or left front turn signal filaments burned out, light bulb base not grounded or an open in the front or rear turn signal circuit.
2. ONE PILOT LIGHT INOPERATIVE
   A. Pilot light filament burned out.
   B. Poor connection or a defective printed circuit at pilot light cluster.

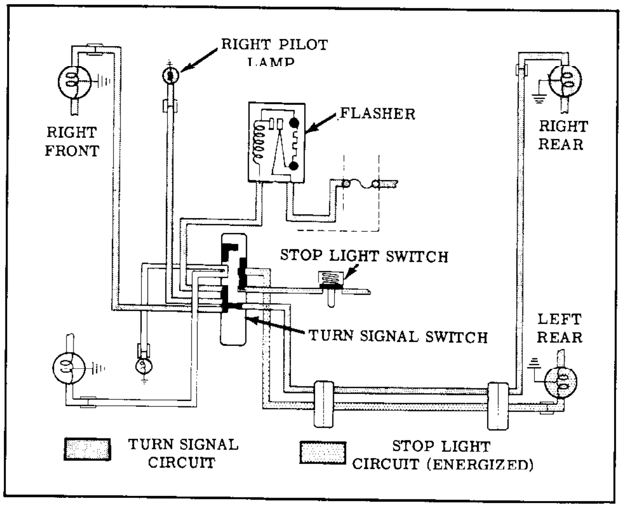


Fig. 13-75 Turn Signal Circuit (Right Turn Position)

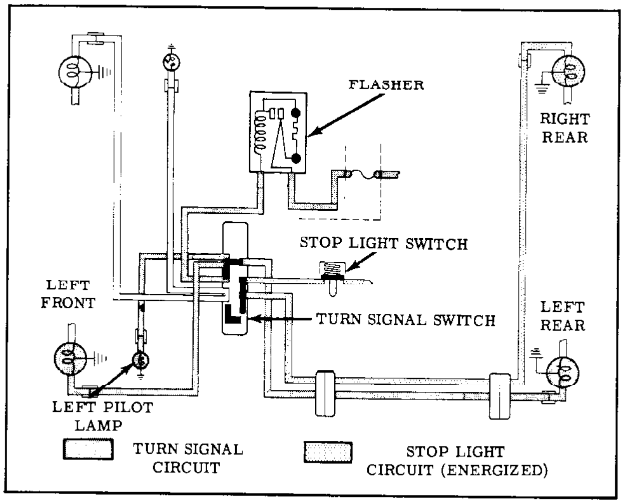


Fig. 13-76 Turn Signal Circuit (Left Turn Position)

3. ALL TURN SIGNAL LIGHTS INOPERATIVE

A. Fuse blown (If new fuse burns out, check for short circuit).

B. Flasher inoperative.

C. Defective turn signal switch.

D. Open circuit in the dark blue wire from fuse block to flasher or in the orange wire from flasher to turn signal switch.

SWITCH ADJUSTMENT

To adjust the turn signal switch, loosen the switch attaching screws, and with the lever in the neutral position, shift the switch until two .090" pins can be inserted into the holes in the face of the switch. (Fig. 13-77)

TEMPERATURE INDICATOR

The engine temperature indicator lights are controlled by a thermal switch in the right front of the intake manifold.

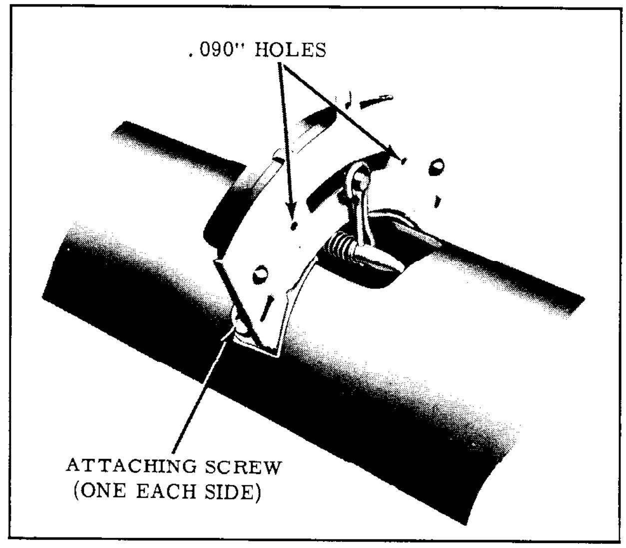


Fig. 13-77 Adjusting Turn Signal Switch

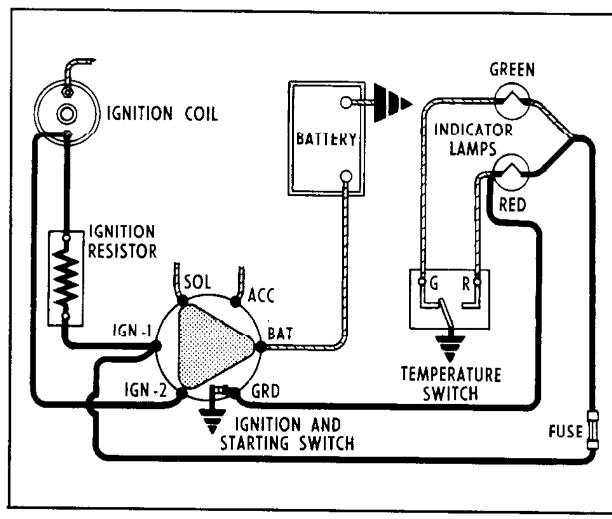


Fig. 13-78 Temperature Indicator Circuit

When the ignition switch is turned to the "START" position, A TEST CIRCUIT IS CLOSED TO INDICATE WHETHER THE RED LIGHT IS FUNCTIONING PROPERLY. (Fig. 13-78) When the engine is started cold, the green light comes on to indicate that the engine has not reached normal operating temperature (113°F ± 2°F). When the engine reaches normal temperature, the green light will be turned off by the thermal switch.

If the engine cooling system is not functioning properly, the thermal switch will close the circuit to the red light when the engine temperature reaches 243°F ± 2°F. The thermal switch does not require servicing. If it is defective, it should be replaced.

OIL PRESSURE INDICATOR

The engine oil pressure indicator light is

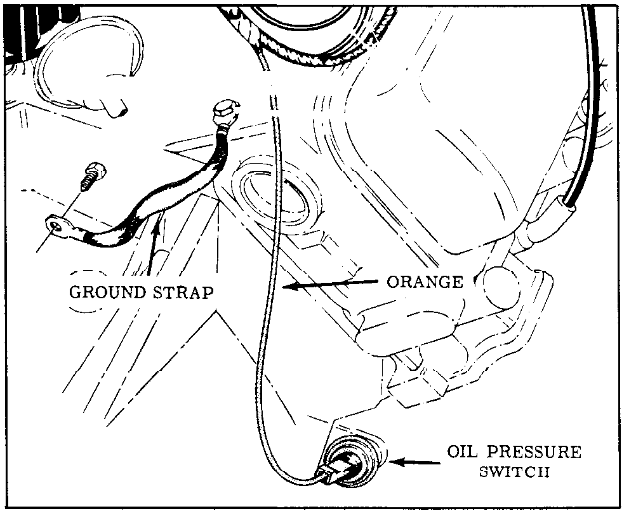


Fig. 13-79 Oil Pressure Switch

controlled by a pressure operated switch located in the oil filter pad. (Fig. 13-79) When the engine is running, the light operates only when the oil pressure is not satisfactory. This light should come on when the ignition is turned on and the engine is not running.

FUEL GAUGE

The instrument panel fuel gauge has a balanced pointer. When the ignition key is turned off, the pointer may come to rest at any position on the dial.

The gasoline fuel gauge circuit consists of an electrical indicator in the instrument panel and a float-controlled rheostat in the tank.

CHECKING GAS GAUGE

To isolate the cause of an inoperative gas gauge the following procedure should be followed:

1. Disconnect the gas gauge wires from the tank unit at the tank.

2. Obtain a known good tank unit from stock and connect to the gas gauge wiring, observing correct color code. Ground the test unit to the body.

3. With engine running at fast idle, observe operation of instrument panel gas gauge while moving the float arm on tank gauge test unit through its travel from empty to full.

4. If instrument panel gas gauge reads correctly with test unit, trouble is caused by:

   A. No ground from tank to body.

   To check for improper ground from tank to body, remove the temporary ground wire from the car body and attach it to the tank, then repeat Step 3. If the instrument panel gas gauge does not read correctly, the cause is an improper ground. To correct, attach a permanent ground wire from the gas tank to the body. The ground wire can be fastened beneath one of the gauge attaching screws.

   B. Defective tank unit.

   If the instrument panel gas gauge reads correctly in Step 4A, the trouble is a defective tank unit. To correct, remove the tank unit and check for a bent or sticking float arm or a non-buoyant float. If gauge cannot be repaired, the gauge should be replaced.

5. If instrument panel gauge did not operate during test in Step 4, trouble is caused by:

   A. Defective instrument panel gauge.

   To check instrument panel gauge, obtain an instrument panel gauge printed circuit case and a known good instrument panel gas gauge from stock. Assemble parts as shown in Fig. 13-105. Remove connector from instrument panel gas gauge and install on test gauge. With instrument panel test unit grounded, repeat Steps 2 and 3. If test gauge reads correctly, the trouble is a defective instrument panel gauge or printed circuit. Remove the gauge assembly from the instrument panel and inspect the printed circuit. If printed circuit is not defective, replace the instrument panel gas gauge.

   B. Defective Wiring

   If the instrument panel gas gauge does not read correctly in Step 5A, the trouble is due to an open circuit in the wiring since a short circuit would blow the 9 amp fuse in the instrument and back-up lamp circuit and be evidenced by failures in other instrument panel units.

   Open circuits are usually the result of poor or open connections at the wiring connectors. While the connections may be intact, the small amount of current required will not complete the circuit if the terminals are corroded.

   To find the location of the various wiring connectors, refer to Fig. 13-80. As each connector is checked, separate the two halves of the connector, clean the male connector and reconnect two or three times to insure continuity. Make sure each connector is fully seated.

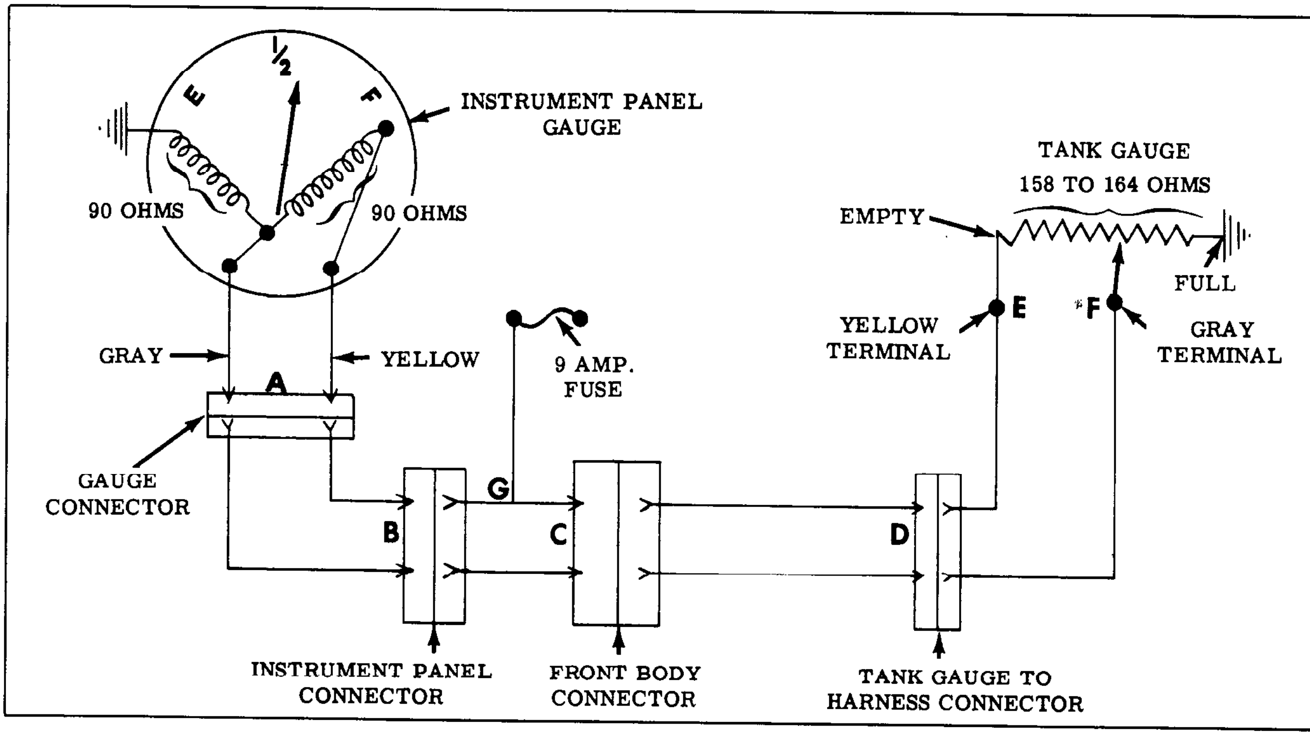


Fig. 13-80 Gas Gauge Wiring Circuit

GAS GAUGE DIAGNOSIS

COMPLAINT	CAUSE	CORRECTION
Pointer remains on 1/2 regardless of float position.	Poor connection of terminals in Gray wire. "Break" in Gray wire.	Check connectors at "A", "B", "C", "D" OR "F". Check for continuity in Gray wire between connectors.
Pointer moves from above 1/2 to F regardless of float position.	Poor connection of terminals in Yellow wire. "Break" in Yellow wire.	Check connectors at "C", "D", "E", or "G". Check for continuity in Yellow wire between connectors.
Pointer moves from below 1/2 to E regardless of float position.	Tank gauge unit not grounded to car.	Check for proper ground. If in doubt, install positive ground wire.
Pointer remains on full regardless of float position. (Pointer may move slowly toward either stop when test float is set at empty position.)	Instrument panel gauge not grounded.	Check for ground between instrument panel gauge and instrument panel.
Pointer does not move when ignition switch is turned on.	No current to gauge.	Check yellow wire connections. Check 9 amp fuse in instrument and back-up lamp circuit. Check instrument panel gauge printed circuit.
Pointer remains on E regardless of float position. (Pointer may move slowly toward either stop when test float is set at full position.)	Poor connection at gauge.	Check yellow wire connections at "A", "B" or "G".
Pointer is erratic	Intermittent open in wiring or tank unit burned out.	Refer to Gas Gauge Checking.

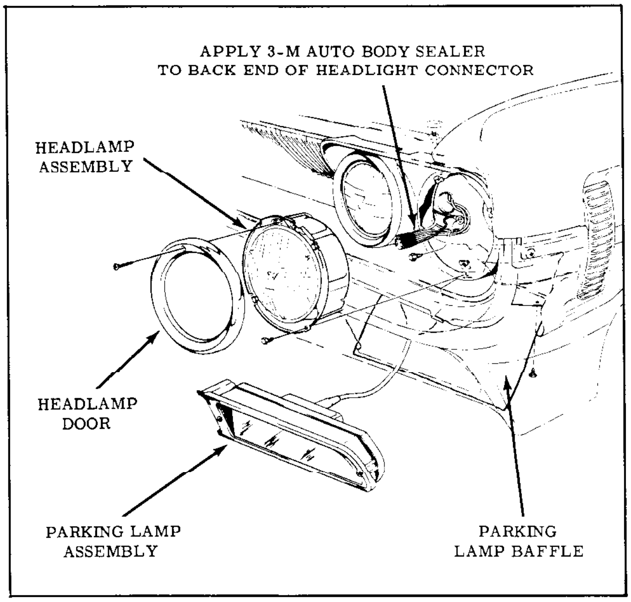


Fig. 13-81 Headlamps and Parking Lamp

HEADLIGHTS

The dual headlight system consists of four headlights paired horizontally. Each pair of lights consists of a sealed beam unit (inner unit with No. 1 embossed on the lens) with one filament which provides an upper beam only, and a sealed beam unit (outer unit, with No. 2 embossed on the lens) with 2 filaments which provides both an upper and lower beam. The sub-body is also identified.

Since the No. 2 headlight lens is designed to provide maximum illumination on lower beam and the upper beam filament is not at the focal point of the No. 2 light, the major portion of the upper beam illumination is supplied by the No. 1 unit. Thus, the upper beam is supplied by all four headlights.

When the lower beam is desired, the No. 1 lights are turned off, the upper filament of the No. 2 lights are turned off and the lower filaments of the No. 2 lights are turned on.

SEALED BEAM UNIT REMOVE AND INSTALL (Fig. 13-81)

1. Remove headlight rim.
2. Disengage the coil spring from the retaining ring, then pull the assembly out of the body and disconnect plug from rear of sealed beam unit.
3. Remove the 2 retaining ring attaching screws, then remove retaining ring and sealed beam unit and sub body.

To install unit, reverse the removal procedure.

NOTE: The locating bosses on the back of the sealed beam units are designed so that the No. 1 and No. 2 units are not interchangeable.

HEADLIGHT AIMING

Aimers J-6663 meet the SAE specifications for mechanical headlight aimers.

1. Before proceeding with headlight aiming the following items should be performed:
   a. Locate car on a known level surface or recalibrate aimers for a selected unlevel area. (Refer to AIMING AREA)
   b. Check and equalize tires to recommended pressures.
   c. Car should not be loaded with passengers or have excess weight in rear compartment.
   d. Rock car sideways to stabilize springs.
   e. Turn on headlights, replace any units burned out.
2. Remove all the headlight rims.
3. Mount Aimers J-6663 on either the two outer or two inner headlights so that the cross arm of each aimer is horizontal and pointing inward.

   IMPORTANT: Guide points on sealed beam unit must contact inner ring of aimer.
4. Fasten string to R.H. aimer. Rotate aimers until string just clears "F" and "G". (Fig. 13-82)
5. Horizontal Aim
   a. Loosen horizontal adjusting screw "A" of R.H. headlight and tighten until string is positioned directly over the center line of the aiming dial and point "G".
   b. Repeat adjustment on horizontal screw "A" of L.H. headlight until string is positioned directly over center line of the aiming dial at point "F".
   c. Recheck points "F" and "G" and readjust if necessary.
6. Vertical Aim
   a. Loosen knob "O" on both aimers and move slide until numeral "2" appears in DOWN view window. Tighten knobs. (Fig. 13-83)
   b. Loosen vertical adjusting screws "B" and tighten until bubbles are centered in level.

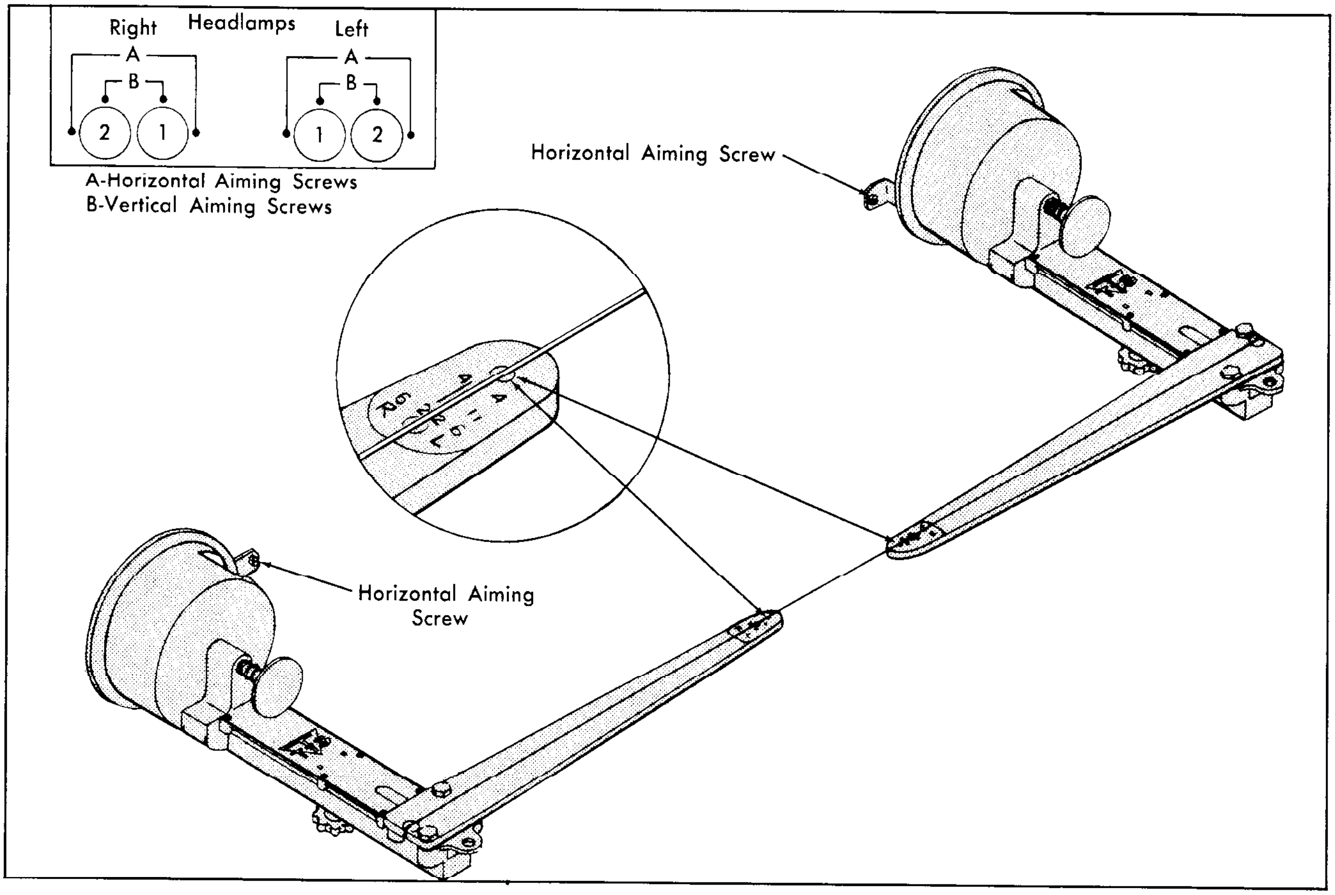


Fig. 13-82 Horizontal Aim

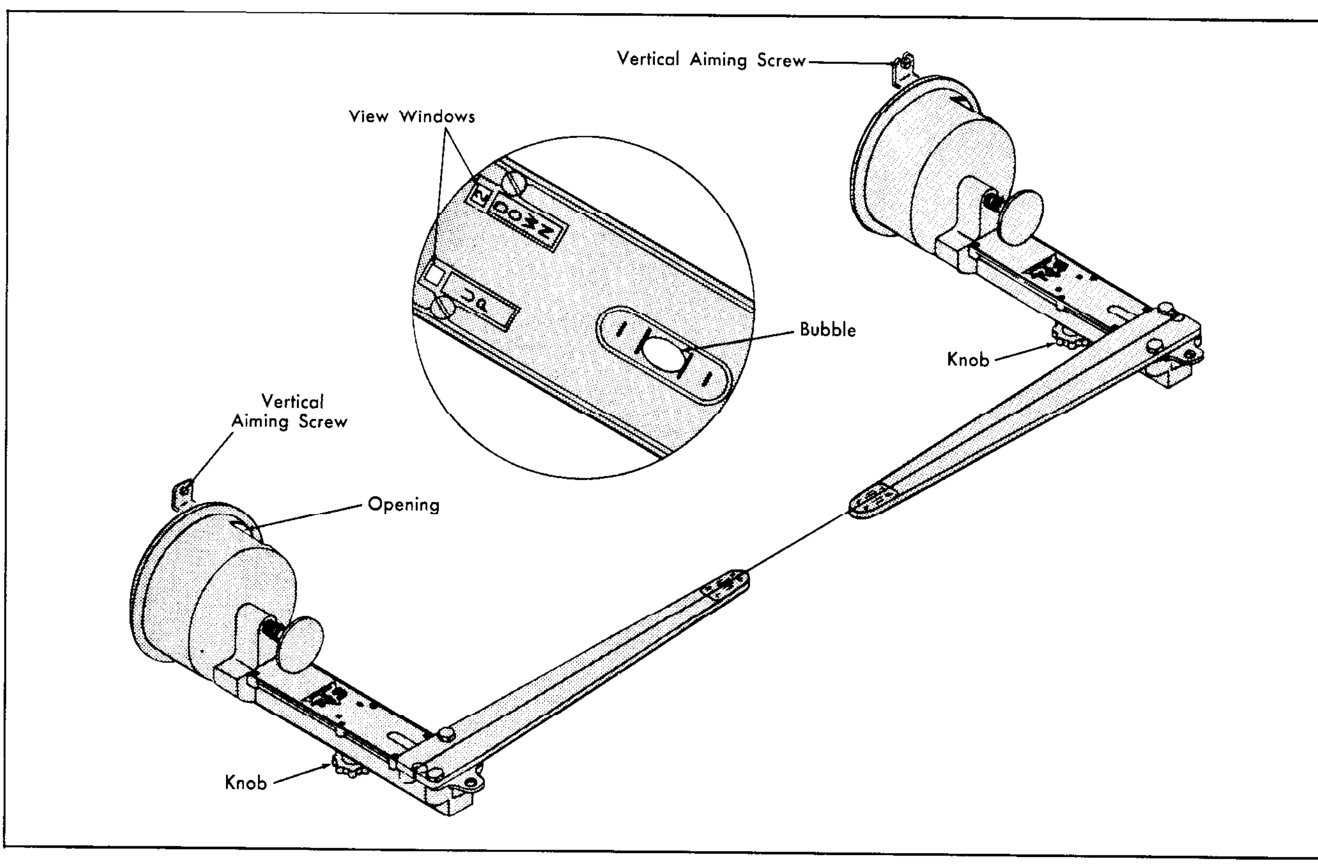


Fig. 13-83 Vertical Aim

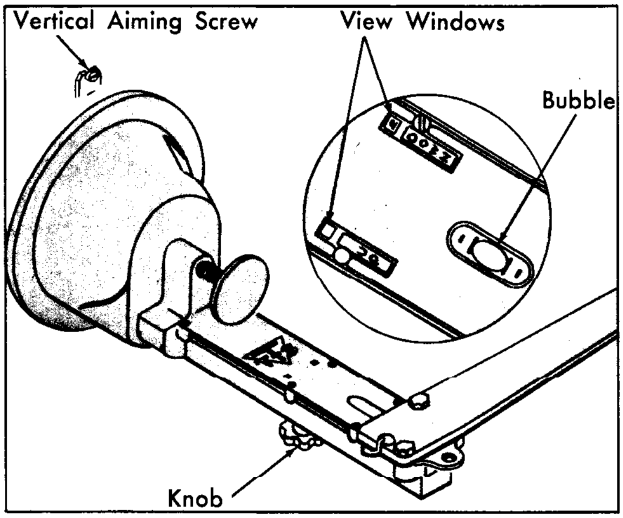


Fig. 13-84 Vertical Alignment

c. Recheck string at points "F" and "G" and readjust horizontal aim if necessary.

7. Remove aimers and repeat steps 3 through 6 on other set of headlight units.

8. After headlight aiming is completed, install the headlight rims.

AIMING AREA

In order to obtain accurate headlight aim, the car must be either located on a known level surface, or the Aimers J-6663 must be calibrated to compensate for an unlevel surface.

Select an area which appears to be level. Drive car into that area and install aimers on either the two outer or the two inner lights so that both cross arms point toward the center of the car. Loosen knob on bottom of aimer and move slider until numeral 2 appears in "Down" view window. (Fig. 13-84) Turn headlight vertical aiming screws to center the level bubbles. Mark the wheel po-

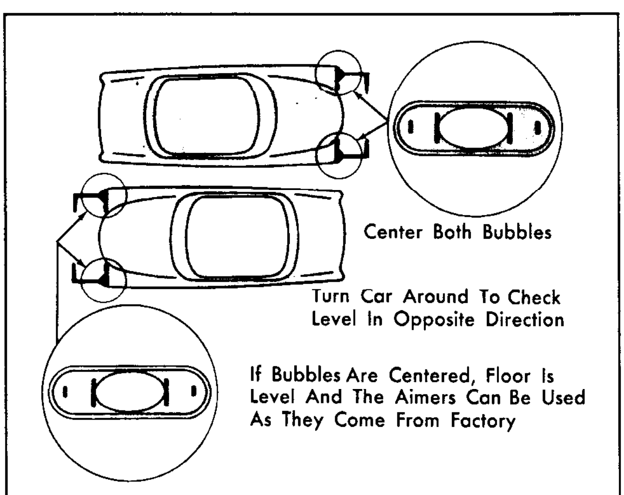


Fig. 13-85 Selection of Aiming Area

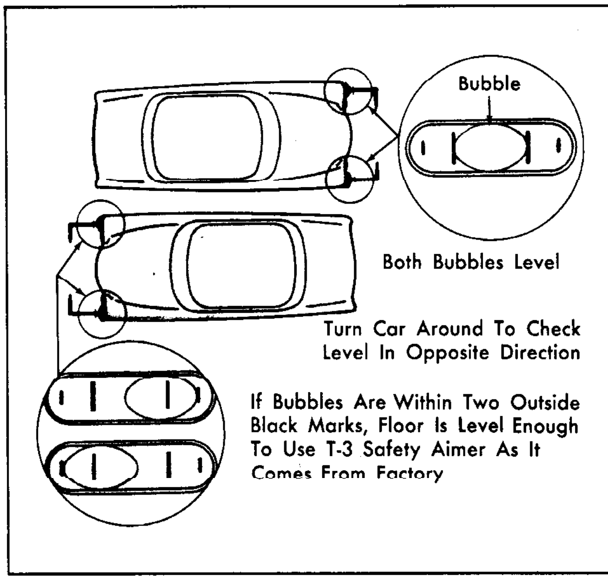


Fig. 13-86 Floor Level Limits

sitions on the floor, then turn car end for end making sure that all four wheels are positioned within the marks located on the floor. If the bubbles are still centered, (Fig. 13-85) the aiming area is level and the Aimers J-6663 can be used without further adjustments with the car in this area and position.

If the bubbles are not centered after turning car end for end, (Fig. 13-86) the aimers must be re-calibrated as follows:

1. Loosen knob on bottom of aimer and move slider until bubble is centered. Record numeral that now appears in the view window.

2. Move slider to a position half-way between the recorded number in step 1 and the numeral 2 in the "Down" view window.

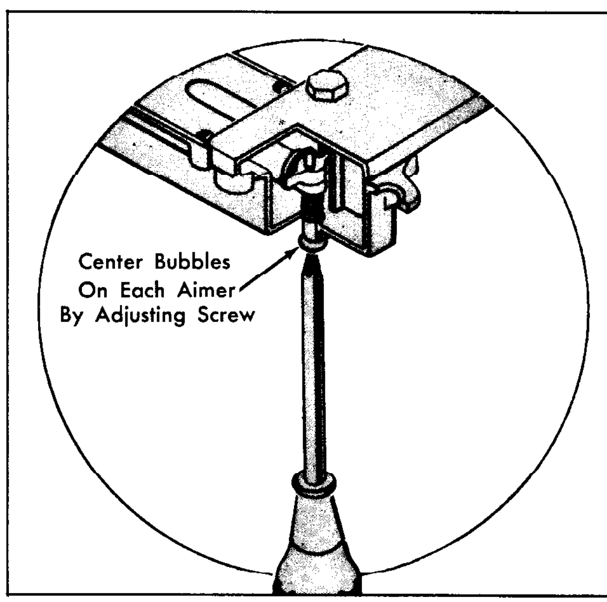


Fig. 13-87 Adjusting Aimer

3. Without moving the car, recalibrate aimers by turning the adjusting screw until bubble is centered. (Fig. 13-87)

The aimer is now calibrated for this specific area. Tire locations should be permanently marked so that all future headlight adjustments are performed with the car facing in the same direction and tires located in the same position.

AIMING FIXTURE

An easily constructed checking fixture can be made to correct aimer alignment according to original manufacturers specifications, after the aimers have been dropped or damaged. Since the manufacturers calibration is required in making this fixture, care must be taken to use only an aimer that is known to be properly aligned.

1. Mount a 10" x 10" square of 3/4" plywood in a vertical position on a wall.
2. Install three 1/2" No. 6 pan head wood screws on the board as shown in Fig. 13-88. The screw heads should be approximately 1/4" from board.
3. Place the aimer against the screws with the horizontal arm parallel to the floor and the numeral 2 in the "Down" view window. Be certain the screw heads provide adequate clearance between the flange of the aimer and the board.

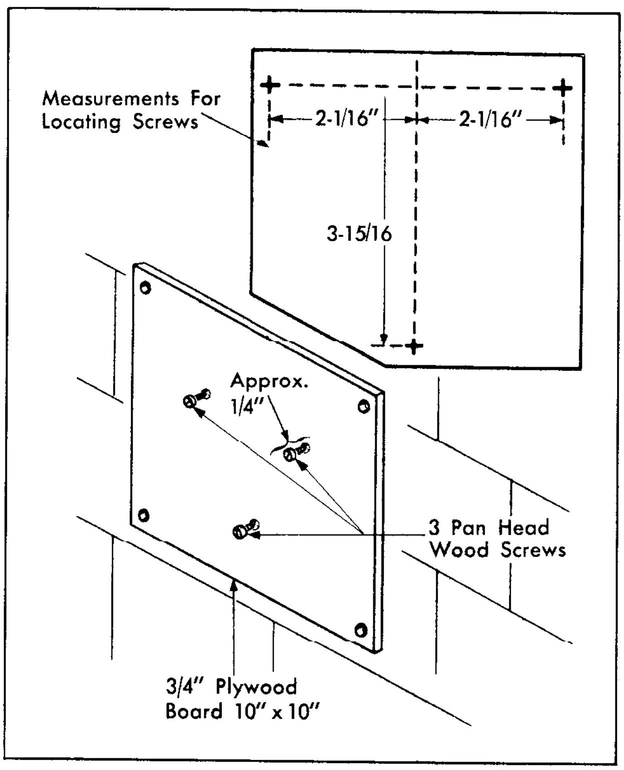


Fig. 13-88 Aiming Fixture

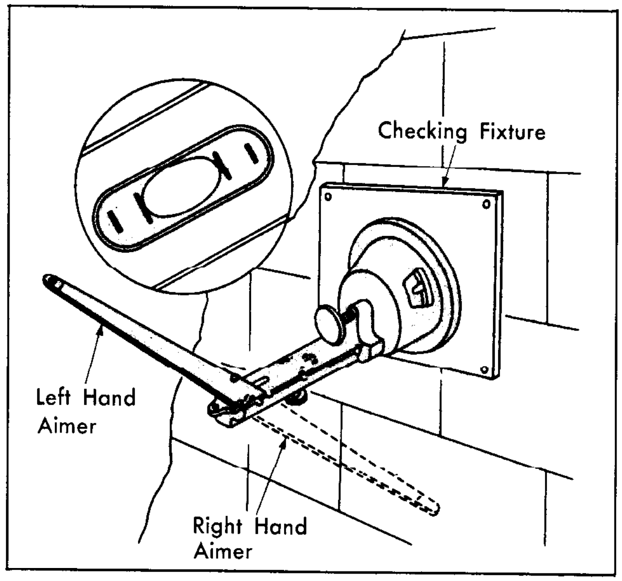


Fig. 13-89 Checking Vertical Calibration

4. Adjust the three screws until the bubble in the aimer is centered. Screws should be left in this position.
5. After the checking fixture has been constructed and adjusted as outlined above, any aimer can be quickly and easily checked periodically and especially if it should be dropped or damaged in any way.

AIMER CALIBRATION

When an aimer has been dropped or damaged, the alignment should be checked as follows:

1. With the numeral 2 in the "Down" window of the aimer, hold the aimer retaining ring against the three screws in the checking fixture and with the horizontal arm parallel to the floor as shown in Fig. 13-89. If the bubble is centered, the aimer is vertically calibrated.
2. If the bubble is not centered, adjust the screw on the bottom of the aimer, Fig. 13-87, until the bubble is centered. The aimer is now calibrated vertically.
3. The horizontal check of the aimer is made by placing the aimer on the board as in the vertical check, except that the horizontal arm is pointing toward the floor as shown in Fig. 13-90. With a small weight or plumb bob on one end of a three-foot string, connect the opposite end of the string to the slot in the aimer arm. The string should fall as shown, inset, Fig. 13-90. If it falls outside the tolerances shown, the aimer should be replaced.

TAIL LIGHT

The tail light bulb is a double element bulb which

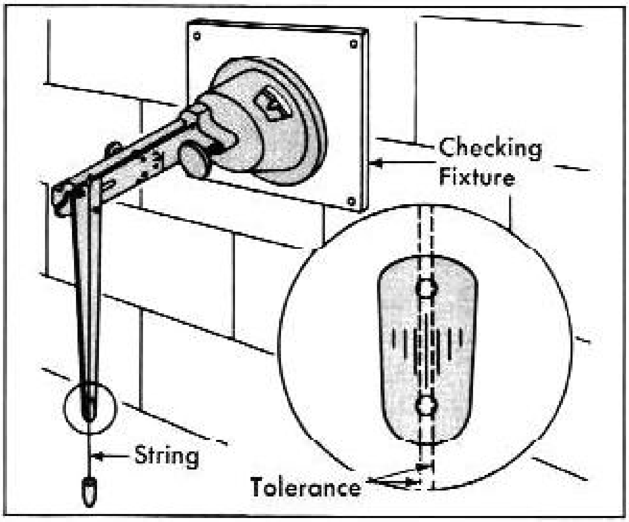


Fig. 13-90 Checking Horizontal Calibration

acts as a stop light, tail light and turn signal light.

The tail light bulb on all models, except station wagons can be replaced from within the rear compartment by removing the socket from the tail light housing. When installing the socket, align the tang of the socket with the slot in the housing and push until socket snaps into place.

The tail light bulb on station wagons can be replaced by removing the tail light lens.

STOP LIGHT SWITCH (Figs. 13-91 and 13-92)

The stop light switch must be checked whenever brake pedal height has been changed. Adjustment is made with an adjustable contact screw on the pedal arm. To obtain proper operation of the stop lights, adjust the screw as follows:

1. With brake pedal in the fully released position, turn adjusting screw until stop lights just go "off"; then unscrew adjusting screw three turns.
2. Check stop light switch operation by applying and releasing the brake, making certain that stop lights go "off" when brake pedal is in fully released position.

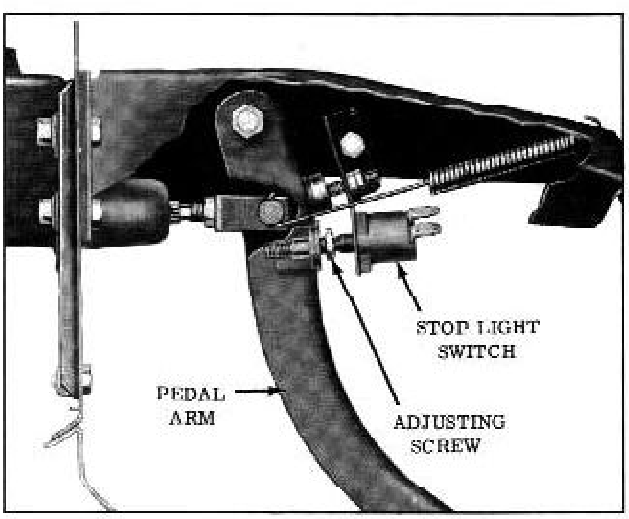


Fig. 13-91 Stop Light Switch (Standard Brakes)

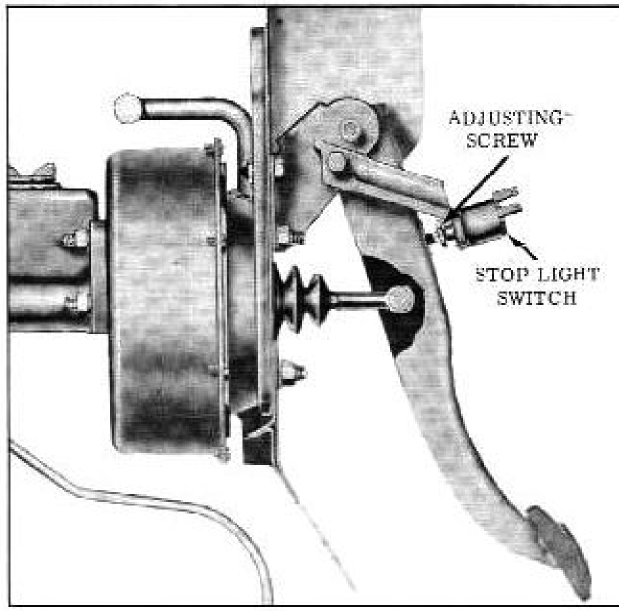


Fig. 13-92 Stop Light Switch (Power Brakes)

BACK-UP LIGHT SWITCH (Fig. 13-93)

On cars equipped with Hydra-Matic, the back-up light switch is incorporated with the neutral safety switch. (See STARTING CIRCUIT, Neutral Safety Switch, for adjustment.) On cars equipped with Syncro-Mesh transmission, the back-up lamp switch is mounted on the steering column.

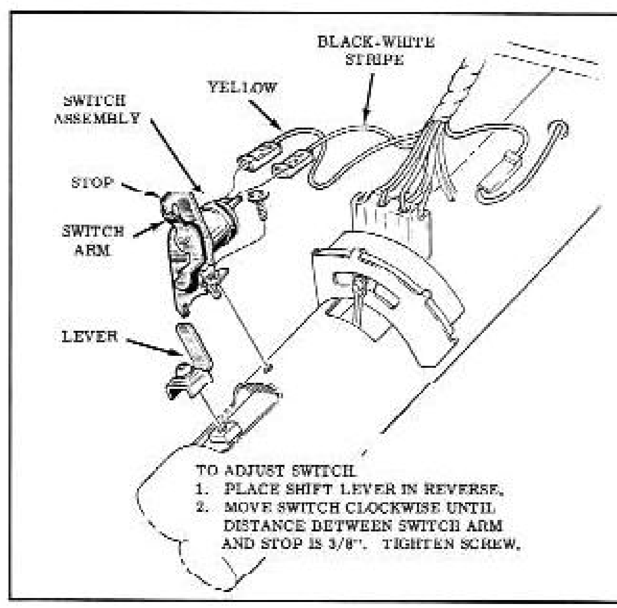


Fig. 13-93 Back-Up Light Switch (Syncro-Mesh)

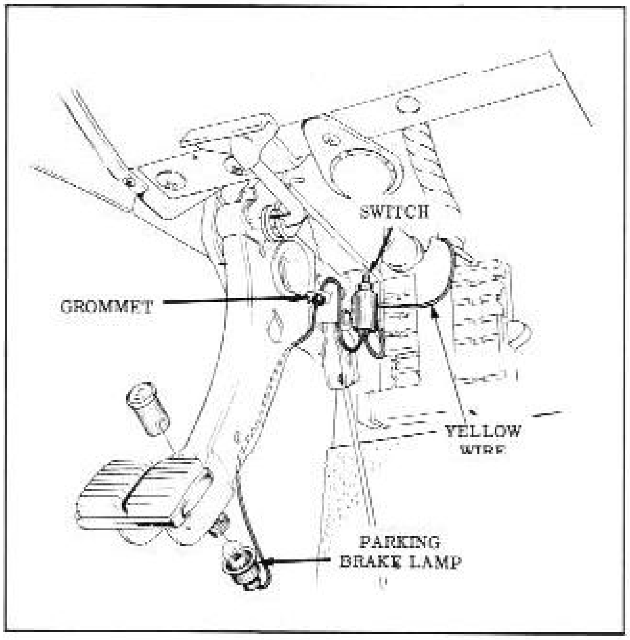


Fig. 13-94 Parking Brake Light Switch

To adjust switch, place shift lever in reverse. Loosen attaching screw and move switch clockwise until distance between switch arm and stop is 3/8". Tighten attaching screw.

PARKING BRAKE LIGHT SWITCH (Fig. 13-94)

The parking brake switch is mounted on the parking brake mounting bracket and is actuated by a striker on the pedal arm.

To adjust, fully release the parking brake, then with the ignition switch on, loosen the switch attaching screw and slide the switch fore or aft until the light just goes off. Tighten the screw and recheck the adjustment.

HEADLIGHT SWITCH (Fig. 13-95)

The headlight switch controls the headlights, parking lights, tail lights, and instrument panel lights. These circuits are protected by a circuit breaker incorporated in the headlight switch. In addition, the tail lights and instrument panel lights are protected by fuses located in the fuse block. The brightness of the instrument panel lights is adjustable by means of a rheostat built into the headlight switch. Turning the knob of the switch operates the rheostat.

The light switch used on cars with Guide-Matic has a separate ON-OFF switch for Guide-Matic actuation, and also incorporates a 9 amp fuse to protect the circuit.

HEADLIGHT CIRCUIT BREAKER

The normal lighting load is not sufficient to

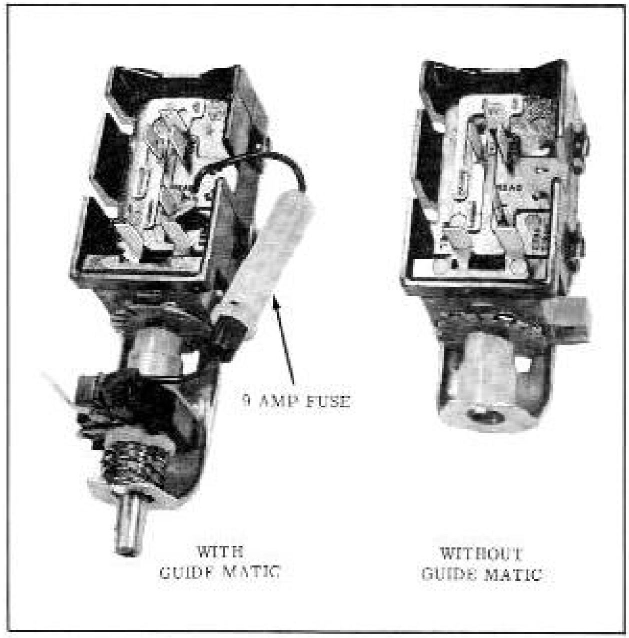


Fig. 13-95 Headlight Switch

cause the circuit breaker (located on the headlight switch) to open. If a short occurs, the circuit breaker will cause the lights to flicker. This flickering will continue until the cause of the short is corrected. The circuit breaker is not adjustable.

DIMMER SWITCH

The foot dimmer switch is used to select high or low beam of the headlights as desired. Cars equipped with Guide-Matic have a combination override and dimmer switch. The override position of the switch is obtained by depressing the switch half-way, and is used to signal oncoming cars by switching momentarily to upper beam. The headlights return to automatic operation when the switch is released. The foot dimmer switch must be in the upper beam position before the Guide-Matic will operate.

GUIDE-MATIC POWER HEADLIGHT CONTROL

The Guide-Matic Power Headlight Control consists of: the phototube, amplifier unit, and a combination override and foot dimmer switch. (Fig. 13-96)

The phototube unit picks up light from an approaching car and operates the amplifier unit.

The amplifier unit supplies voltage to the phototube unit and operates the power relay in response to a signal from the phototube unit. It is mounted on the left front door hinge pillar behind the cowl trim pad.

The power relay is an integral part of the amplifier unit and switches the headlamps between high and low beam. The power relay also operates when the "Guide-Matic" switch is off.

The phototube unit has a sensitivity control knob which enables the driver to adjust the sensitivity for conditions such as heavy snow or fog. The knob has a "FAR" and "NEAR" at the extreme ends of the adjustment range and a detent position midway in the range for the normal setting. Adjustment toward the "FAR" (clockwise) position increases the sensitivity for driving during foggy weather conditions when light penetration from oncoming cars is poor. Adjustment toward the "NEAR" position (counterclockwise) decreases the sensitivity for driving during heavy snowstorms or similar conditions when there is abnormal light reflections.

The Courtesy Salute section of the "Guide-Matic" which switched the headlights from upper to lower beam in two-step action is not available in 1961.

REMOVAL AND INSTALLATION

NOTE: If diagnosis indicates that the phototube unit must be removed for repair by an authorized warranty repair dealer, the amplifier unit should also be removed and sent with the phototube unit. If the amplifier unit must be removed for repair, the phototube unit need not be sent with it if diagnosis indicated it was operating satisfactorily.

Phototube Unit

1. Remove the left cowl trim pad and disconnect the phototube unit harness plug from the amplifier. (Fig. 13-96)

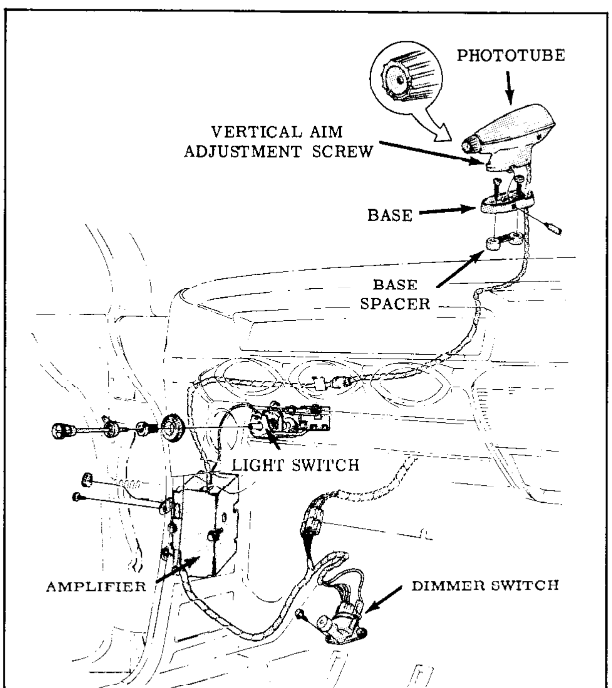


Fig. 13-96 Guide-Matic Layout

2. Remove the Phillips head pivot pin from the right side of the phototube unit base, then lift the unit off the mounting plate and remove the phototube unit and wiring.

To install, reverse the above procedure, check vertical and horizontal aim, and the Dim and Hold sensitivity adjustment. (See ADJUSTMENTS AND TESTS)

Amplifier Unit

1. Disconnect the light blue wire connector from the "Guide-Matic" "OFF-ON" switch terminal on the headlight switch. (Fig. 13-96)

2. Remove the left cowl trim pad and disconnect the phototube unit harness plug from the amplifier. Remove door hinge pillar cover.

3. Disconnect dimmer switch harness from the dimmer switch and headlight harness from main wiring harness.

4. Remove the amplifier attaching screws at the door pillar, then remove the amplifier.

To install, reverse the removal procedure. After installing the amplifier unit, check the Dim and Hold sensitivity adjustment. (See ADJUSTMENTS AND TESTS)

ADJUSTMENTS AND TESTS

"GUIDE-MATIC" TESTING EQUIPMENT

Level J-8465-20 and a test lamp, are required for the aiming and sensitivity adjustments, and must be used in conjunction with the AE-2 Tester. The test lamp and adapter are identified by tool number J-8662.

VERTICAL AIMING ADJUSTMENT

1. Phototube unit aiming should be done with the car unloaded, trunk empty except for spare tire, gas tank at least half full, and with correct tire pressure.

2. Position car on a level floor. Floor must be level within 1/4" fore and aft of car.

3. Rock car gently sideways to equalize springs.

4. Set the level J-8465-20 on top of phototube unit as shown in Fig. 13-97.

   NOTE: The three points on aiming device must be resting on top of phototube unit and the aiming device must be touching front of phototube unit.

5. Observe number stamped on driver control knob (Fig. 13-97) Adjust aiming dial until corresponding number is under pointer.

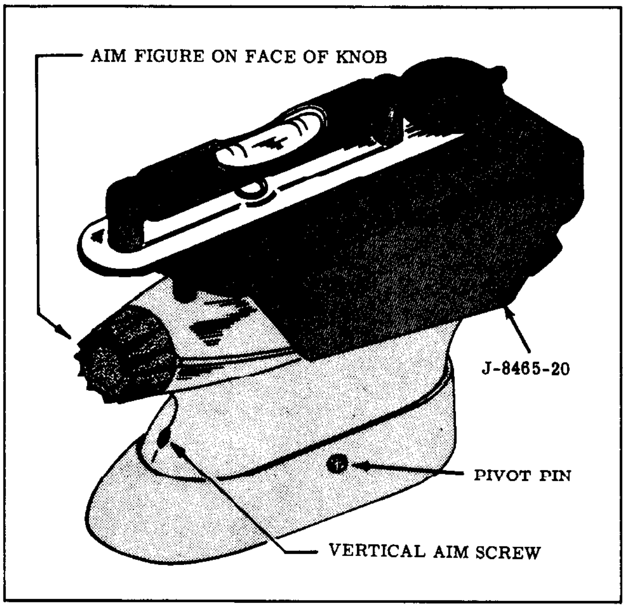


Fig. 13-97 Level Installation

6. Adjust vertical aim screw until bubble is centered in level.

NOTE: If the phototube unit is aimed too low, back reflections from the headlights of the car, on which the "Guide-Matic" is installed, will hold its own headlights on the lower beam. Also, the phototube unit must be aimed as low as possible to provide the maximum tolerance for car loading.

HORIZONTAL AIMING ADJUSTMENT (Fig. 13-98)

NOTE: If the phototube unit has been removed for service, it must be aimed parallel to the centerline of the car after the installation is made.

1. Place two pieces of tape or chalk marks 8-13/16" apart on a wall or screen at hood level height.

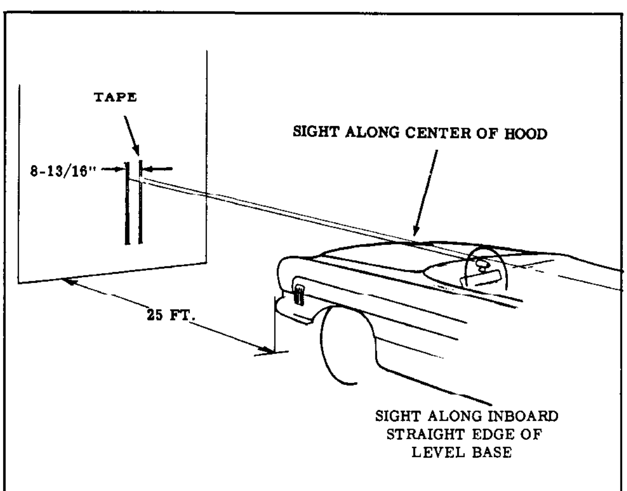


Fig. 13-98 Horizontal Aim

2. Line up the center of the hood with the right hand tape or chalk mark. The car must be positioned perpendicular to and 25 feet from the wall or screen.

3. With level J-8465-20 installed on phototube unit, sight along inboard straight edge of level base to the left hand tape or chalk mark.

   NOTE: If the unit is aimed more than 4 inches to the right or left of the left hand tape, horizontal aim must be readjusted by removing phototube base and elongating forward screw hole as necessary to aim phototube.

HOLD SENSITIVITY TEST

1. Place tester head against front of phototube unit and position bail into place over sensitivity control knob. Plug tester head into modified AE-2 tester. (Fig. 13-99)

   NOTE: Cover phototube unit with a black cloth while testing and adjusting sensitivity. If car has been in the sun immediately prior to checking, allow it to cool in a covered area before checking.

2. Turn on headlights, and with Guide-Matic switch "On", WAIT AT LEAST FIVE MINUTES for amplifier to stabilize. Set standard foot dimmer switch to "Automatic" position. Upper beam will then be on.

   IMPORTANT: SENSITIVITY CONTROL ON PHOTOTUBE UNIT MUST BE IN CENTER (DETENT) POSITION WHILE TESTING AND ADJUSTING HOLD SENSITIVITY.

3. Turn Zero Corrector on face of tester until meter pointer is on zero set line. (Fig. 13-100)

4. Turn Intensity Rheostat of tester counterclockwise.

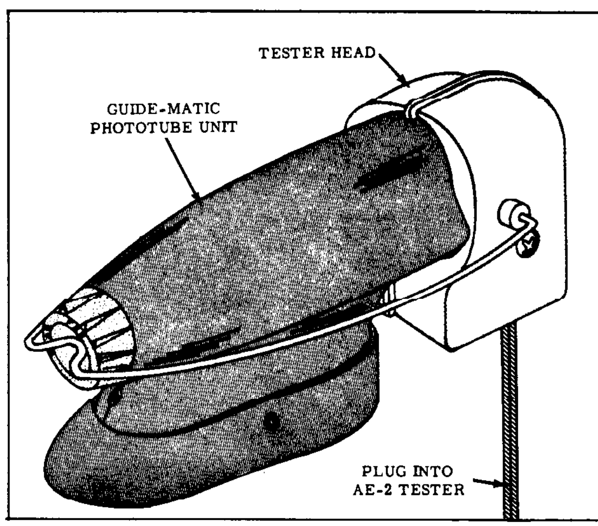


Fig. 13-99 Installing Tester Head

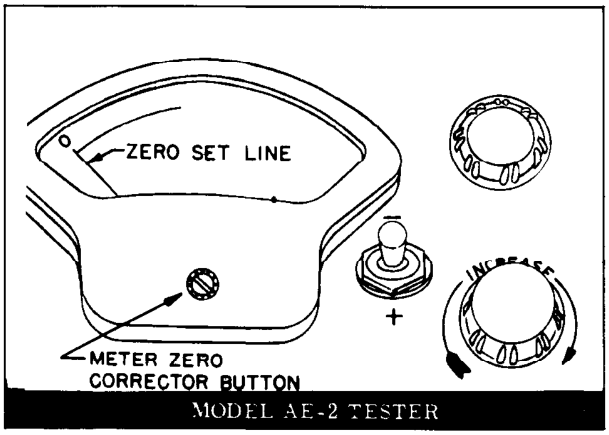


Fig. 13-100 Setting Zero Corrector

5. Insert tester connector of Model AE-2 tester into cigar lighter receptacle.

6. Operate engine at fast idle while making sensitivity tests and adjustments.

7. Turn Tester Selector Switch to "Dim" position. Be sure to use proper "Dim" position for clear or tinted windshield.

8. Turn Intensity Rheostat all the way clockwise to turn headlights on lower beam.

   NOTE: If lights do not switch to lower beam, the Dim control in the amplifier must be turned completely clockwise and then re-adjusted after Hold adjustment is correct.

9. Turn tester Selector to "Hold" position.

10. Slowly turn Intensity Rheostat counterclockwise just to point where headlamps switch to upper beam. The meter pointer should now read in the Hold Sensitivity Adjustment Bar on the meter scale. (Fig. 13-101)

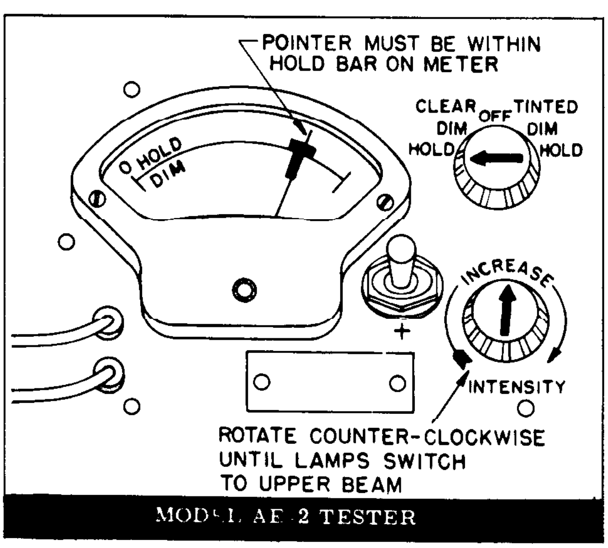


Fig. 13-101 Hold Sensitivity Test

If Hold Sensitivity is not properly adjusted, proceed with HOLD SENSITIVITY ADJUSTMENT.

HOLD SENSITIVITY ADJUSTMENT

The Hold and Dim adjusting controls are located in the amplifier unit and can be adjusted with a screwdriver after removing the cover plate and plug from the door hinge pillar. THE DIM SENSITIVITY ADJUSTMENT MUST NOT BE MADE UNTIL AFTER THE HOLD SENSITIVITY IS CORRECTLY ADJUSTED.

1. Turn "Hold" control clockwise to end of adjustment.

2. Rotate Intensity Rheostat all the way clockwise.

3. Turn Selector switch momentarily to "Dim" position to switch lights to lower beam, then switch back to "Hold" position.

   NOTE: If lights do not switch to lower beam, the amplifier dim control must be turned completely clockwise and then re-adjusted after hold adjustment is correct.

4. Adjust tester Intensity Rheostat until meter pointer is at center of Hold Sensitivity bar. (Fig. 13-101)

5. Turn the Hold control counterclockwise SLOWLY just to the point where headlights switch to upper beam.

6. Rotate tester Intensity Rheostat clockwise to end of travel, then turn Selector Switch momentarily to "Dim" position and back to "Hold". (Headlights should now be on lower beam.)

7. Recheck Hold adjustment by turning Intensity Rheostat SLOWLY counterclockwise just to point where headlights switch to upper beam. Meter pointer should now read in the "Hold" adjustment green bar if adjustment is correct. If not, repeat procedure starting with Step 1.

DIM SENSITIVITY TEST

IMPORTANT: SENSITIVITY KNOB ON PHOTO-TUBE UNIT MUST BE IN CENTER (DETENT) POSITION WHILE TESTING AND ADJUSTING DIM SENSITIVITY.

1. Rotate tester Intensity Rheostat completely counterclockwise. (Fig. 13-102)

2. Turn Selector Switch momentarily to "Hold" position, then back to "Dim" position. Headlights should now be on upper beam.

3. Turn Intensity Rheostat SLOWLY clockwise

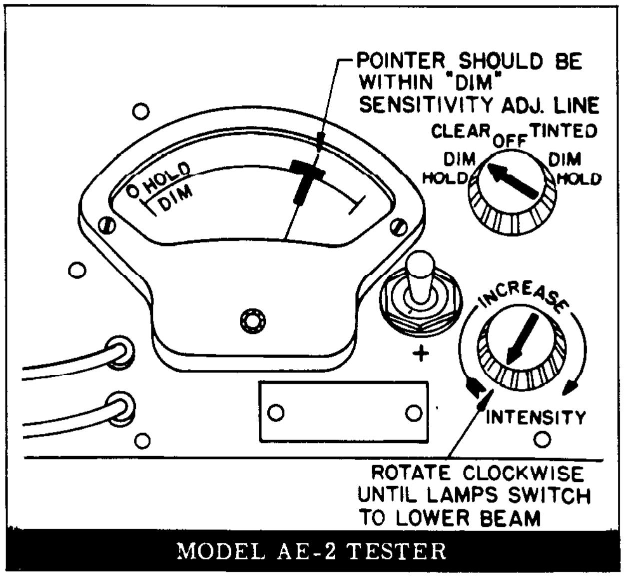


Fig. 13-102 Dim Sensitivity Test

stopping at the exact point where the headlights switch to lower beam. Meter pointer should read within the Dim Sensitivity Adjustment Line.

If Dim Sensitivity is not properly adjusted, proceed with DIM SENSITIVITY ADJUSTMENT.

DIM SENSITIVITY ADJUSTMENT

NOTE: DIM SENSITIVITY SHOULD NOT BE ADJUSTED UNTIL AFTER "HOLD" SENSITIVITY IS PROPERLY ADJUSTED.

1. Rotate Dim control completely counterclockwise.
2. Momentarily turn tester "Off", then back to "Dim" position. Headlights should now be on upper beam.
3. Adjust Intensity Rheostat until meter pointer is at the Dim Sensitivity Adjustment Line.
4. SLOWLY rotate Dim control clockwise just to point where headlights switch to lower beam. DO NOT GO BEYOND THIS SETTING.
5. Turn tester Intensity Rheostat completely counterclockwise, then momentarily turn tester to "Hold" and back to "Dim" to place headlights on upper beam.
6. Rotate tester Intensity Rheostat SLOWLY clockwise just to point where headlights switch to lower beam. Meter will read within Dim Sensitivity Line if adjustment is correct. If not, repeat Steps 1 thru 6.
7. Turn off headlights and remove tester. Replace plug in door hinge pillar and install cover plate.

"GUIDE-MATIC" DIAGNOSIS

IMPORTANT: Check 9 amp fuse in fuse holder on headlight switch if "Guide-Matic" is inoperative.

LIGHTS STAY ON LOW BEAM

1. With the headlight switch "On" and the Guide-Matic switch "Off", operate the dimmer switch to see if lights can be switched from low to upper beam.

   a. If lights go to upper beam when dimmer switch is operated with Guide-Matic switch off, power relay in amplifier and dimmer switch are functioning. Leave dimmer switch in upper beam (automatic) position, then proceed with Step 2.

   b. If the lights stay on low beam, the dimmer switch, power relay (in amplifier) or wiring at these units is at fault.

      (1) Remove dimmer switch and disconnect dimmer switch harness. Disconnect amplifier harness from car wiring harness. Place car wiring harness onto dimmer switch. Operate dimmer switch.

      (2) If headlights switch from upper to lower beam, trouble is in amplifier unit. Remove amplifier unit for repair by an authorized warranty repair station.

      (3) If not, trouble is in dimmer switch harness or connectors.

2. With headlight switch and Guide-Matic switch "On", wait at least a minute for the amplifier to warm up, then cover the phototube unit with a dark cloth.

   a. If lights go to upper beam, system is operating but requires adjustment.

   b. If the lights stay on low beam, position the amplifier "Hold" control in approximately the center of its travel to eliminate the possibility of complete misadjustment locking the headlights on low beam. If the headlights still stay on low beam when the phototube unit is again covered, the amplifier or phototube unit is defective. Proceed with Step 1.

      (1) Remove the L.H. cowl trim pad, then disconnect the phototube unit harness plug from the amplifier.

         (a) If the lights go to upper beam, the phototube unit is at fault. Remove the cover and substitute the phototube and pre-amplifier tube assembly with a known good tube assembly.

(Remove attaching screw and unsolder wire from cap of tube.) If the condition still exists, remove the phototube unit and amplifier unit for testing and repair by an authorized warranty repair dealer.

(b) If the lights stay on low beam, the amplifier unit is at fault. Substitute known good tubes. If the condition still exists, remove the amplifier unit only for repair by an authorized warranty repair dealer.

LIGHTS STAY ON UPPER BEAM

1. With the headlight switch on and Guide-Matic switch "Off", operate the dimmer switch to determine if lights can be switched from upper beam to low beam.

   a. If lights go to low beam, power relay (in amplifier) and dimmer switch are functioning. Leave the dimmer switch in upper beam (automatic) position, then proceed with Step 2.

   b. If lights stay on upper beam, the dimmer switch, power relay (in amplifier) or wiring at these units is at fault.

      (1) Check 9 amp fuse in holder at headlight switch.

      (2) Remove dimmer switch and disconnect dimmer switch harness. Disconnect amplifier harness from car wiring harness. Place car wiring harness onto dimmer switch. Operate dimmer switch.

      (3) If headlights change from upper to lower beam, trouble is in amplifier unit. Remove amplifier unit for repair by an authorized warranty repair station.

      (4) If not, trouble is in dimmer switch harness or connectors.

2. With headlight switch and Guide-Matic switch "On", wait at least a minute for the amplifier to warm up, then remove the phototube unit control knob, "C" ring, cover screws and cover. Ground the white wire terminal in phototube unit.

   a. If the lights go to lower beam, trouble is in the phototube unit. Substitute the phototube and pre-amplifier tube assembly with a known good tube assembly. (Remove attaching screw and unsolder wire from switch.) If condition still exists, remove the phototube unit and amplifier for testing and repair by an authorized warranty repair station.

   b. If the lights stay on upper beam when the white wire terminal in the phototube unit is grounded, the amplifier unit or dimmer switch is at fault.

      (1) Remove red wire from dimmer switch, if headlights go to low beam, the dimmer switch is at fault.

      (2) If headlights remain on upper beam, disconnect dimmer switch harness and amplifier harness. Connect car harness to dimmer switch. If headlights change from upper beam to lower beam, trouble is in the amplifier. Substitute known good tubes. If condition still exists, remove amplifier unit for testing and repair by an authorized warranty repair station.

SPEEDOMETER HEAD ASSEMBLY (Fig. 13-103)

The speedometer head assembly consists of the speedometer head, safety sentinel (optional equipment) and the "HOT", "COLD" and "HIGH BEAM" indicators.

All electrical connections are made through a printed circuit, eliminating external wiring at each electrical component. The printed circuit is connected to the main wiring harness by a plug-in type connector.

The temperature indicators use colored lights to indicate engine temperatures.

PRINTED CIRCUIT REPLACEMENT (Fig. 13-104)

1. Remove speedometer head assembly. (Refer to INSTRUMENT PANEL AND RADIO SECTION.)
2. Remove the printed circuit attaching screws.
3. If equipped with safety sentinel, disconnect safety sentinel actuating wire from printed circuit.
4. Remove printed circuit.

SPEEDOMETER HEAD— REMOVE AND INSTALL

1. Remove speedometer head assembly.
2. If equipped with safety sentinel, remove the safety sentinel control knob.
3. Remove the case to bezel attaching screws.
4. Remove the speedometer head to case attaching screws and remove speedometer head from housing.

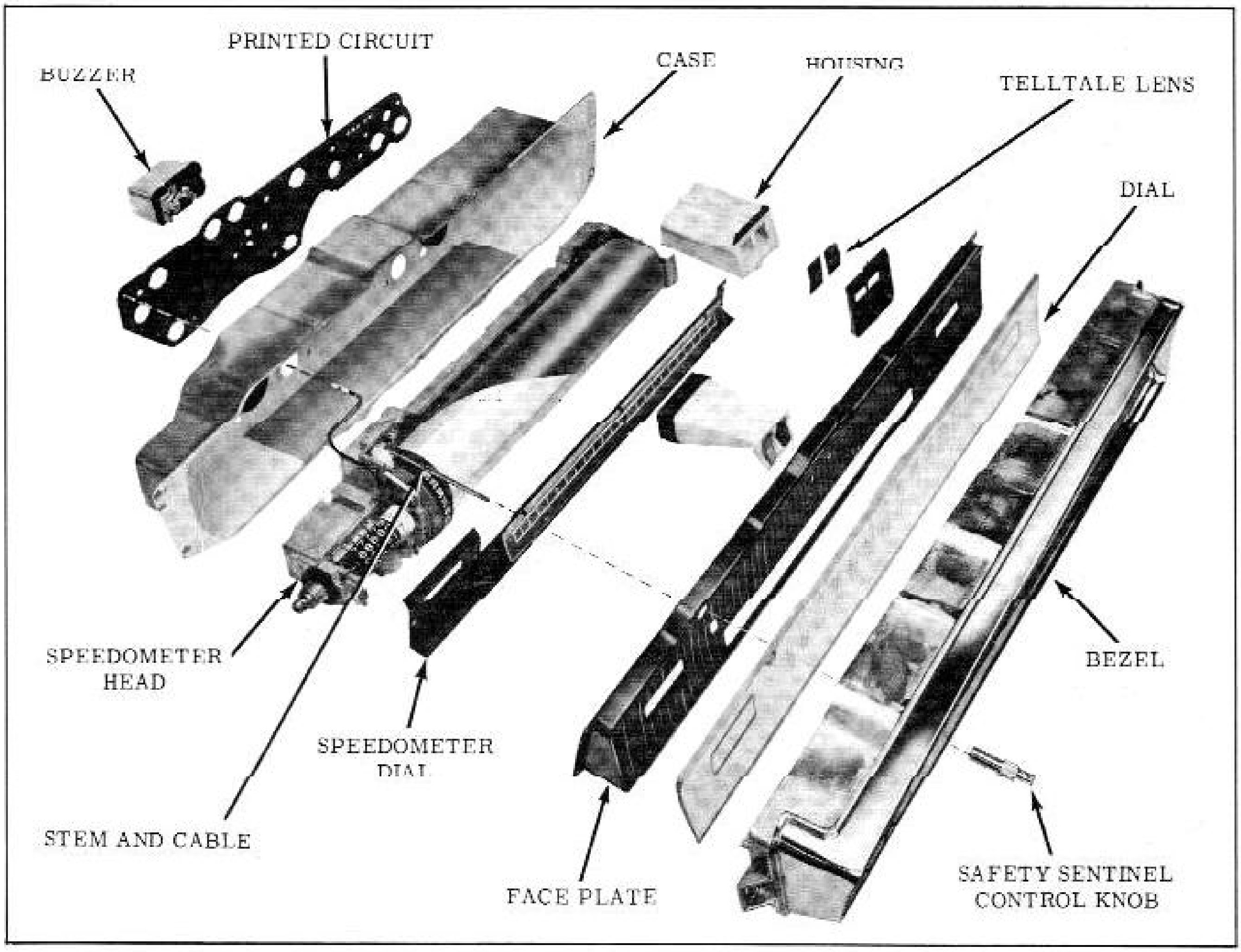


Fig. 13-103 Speedometer Head Assembly

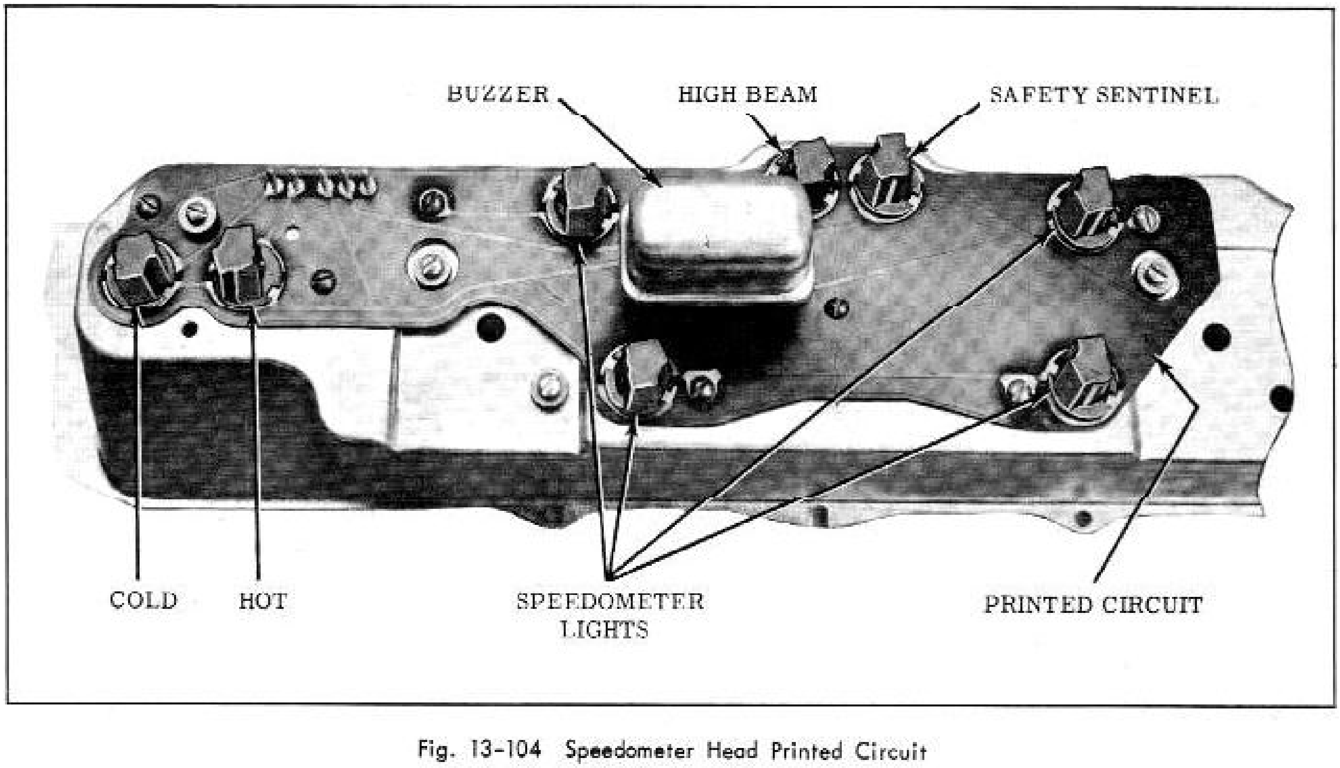


Fig. 13-104 Speedometer Head Printed Circuit

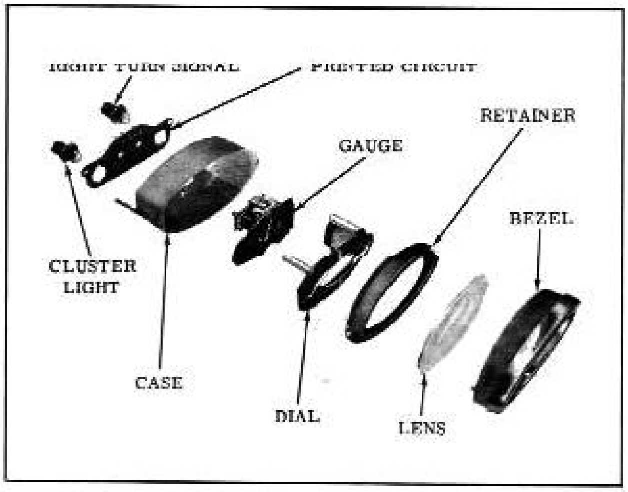


Fig. 13-105 Fuel Gauge Assembly

NOTE: If equipped with safety sentinel, remove the actuating wire from the printed circuit.

To install, reverse the removal procedure.

FUEL GAUGE PRINTED CIRCUIT—R&R
Fig. 13-105 (Assembly Removed)

1. Remove light sockets.
2. Remove the protective caps, nuts and washers from the fuel gauge.
3. Remove the printed circuit to fuel gauge assembly attaching screws and remove printed circuit.
4. To install, reverse the procedure.

FUEL GAUGE—R&R
(Assembly Removed)

1. Remove the case to fuel gauge bezel retaining screws and remove bezel, glass and retainer.
2. Remove the face plate to case attaching screws and remove face plate.
3. Remove the protective caps, nuts and washers from fuel gauge and remove gauge from case.

To install, reverse the removal procedure.

GENERATOR—OIL—LEFT TURN SIGNAL CLUSTER (Fig. 13-106)

Remove and Install

1. Remove wiring harness connector plug from printed circuit.
2. Remove the nuts securing cluster assembly to instrument panel and remove cluster from front of instrument panel.

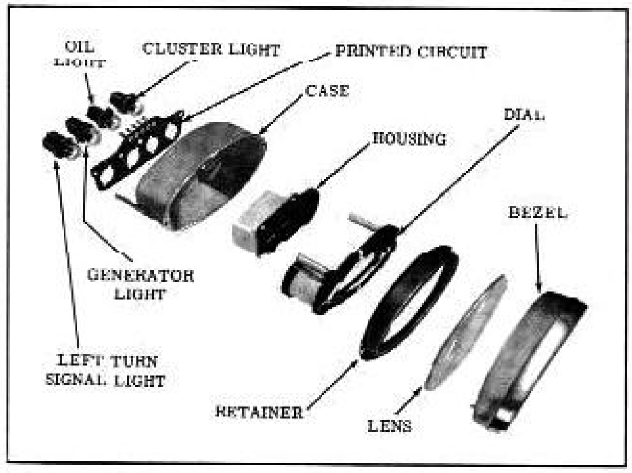


Fig. 13-106 Generator, Oil and Turn Signal Indicator Cluster

To install, reverse removal procedure.

PRINTED CIRCUIT—R&R
(Cluster Removed)

1. Remove the light sockets.
2. Remove the printed circuit to case attaching screws and remove printed circuit.

To install, reverse removal procedure.

SAFETY SENTINEL
(Fig. 13-107)

A speed warning device (Safety Sentinel), is available as factory installed optional equipment. A knob on the instrument panel can be turned by

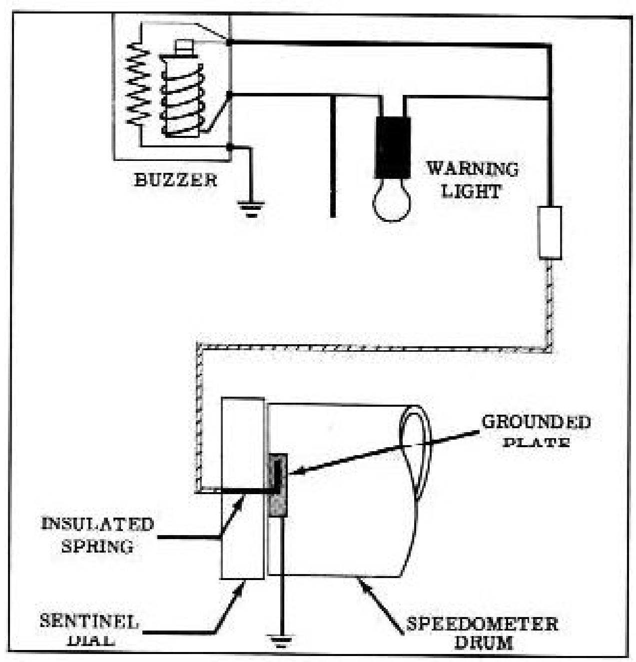


Fig. 13-107 Safety Sentinel Circuit

the driver to adjust the sentinel dial in the cluster face to any desired speed setting between 20 and 110 m.p.h. When car speed is equal to, or exceeds the setting on the sentinel dial, a warning light and buzzer warn the driver that he is exceeding his desired speed.

The circuit is completed when the grounded plate on the speedometer drum rotates into position to contact the insulated spring on the sentinel dial, thereby completing the circuit to operate the buzzer and warning light.

When the car speed is increased to 18 m.p.h. (approximately) above the sentinel setting, the grounded plate on the speedometer drum will continue to rotate until the grounded plate passes the insulated spring to open the circuit.

CHECKING THE SAFETY SENTINEL

1. Check the 9 ampere fuse in the fuse block. The parking brake lamp, back up lamps, temperature, generator, oil pressure warning lamps, and fuel gauge are also on this fuse.

2. Raise the car so that the rear wheels are off the floor.

3. Adjust the Safety Sentinel to 30 m.p.h. and start the engine.

4. Accelerate to 32 m.p.h. The buzzer and light should operate.

5. If the buzzer operates and the light does not, remove the bulb from the rear of the speedometer head assembly and install a new one.

6. If the light comes on and the buzzer does not sound, remove the buzzer and replace with one known to be working.

7. If the buzzer and light do not operate, but other panel units in the same circuit operate, check Safety Sentinel circuit connection to the printed circuit. If connection is good, remove the speedometer head for repair by an authorized warranty repair dealer.

ELECTRICAL CIRCUIT DIAGNOSIS PROCEDURE

CAUTION: The gasoline tank gauge unit can be partially or completely damaged by a momentary surge of 12 volt current across the resistance coil in the tank gauge. To prevent damaging the tank unit resistance coil, it is recommended that the tank wires be disconnected before any electrical tests or repairs are made in the wiring harness. The above precaution should also be exercised whenever the chassis to body wiring connector plug has to be disconnected.

Failures in a circuit are usually caused by short or open circuits. Open circuits are usually caused by breaks in the wiring, faulty connections or mechanical failure in a component such as a switch or circuit breaker. Short circuits are usually caused by wires from different components of the circuit contacting one another or by a wire or component grounding to the metal of the body due to a screw driven through the wire, insulation cut through by sharp metal edge, etc.

If a failure is encountered in one of the body circuits, the circuit diagrams should be thoroughly reviewed to become familiar with the circuit before performing an intensive checking procedure to determine the cause and location of the failure. The body circuit diagrams are located in the BODY SECTION. The following information may aid in locating and correcting a failure in the body wiring electrical system.

1. If a major portion of the electrical circuit becomes inoperative simultaneously, the failure may be due to improper connections between the front and rear harness, or between the front harness and the chassis wiring connector.

2. If only one of the circuits is inoperative, the failure is due to an open circuit or short in the affected circuit. Short circuits usually result in blown fuses or in the case of power equipment circuits, in the circuit breaker opening the circuit. If the fuse is not blown and the circuit affected is a lamp circuit, check the bulb before proceeding with any checking procedures.

3. The dome lamp and courtesy lamp circuits are designed so that the switches are in the "ground" side of the circuit. If a condition is encountered where the lamps remain "on" even though the jamb or courtesy lamp switches are not actuated, the failure is probably due to defective switches, or to the wire leading to the switches being grounded to the metal body.

TESTING WITH BT 11-20

If the preliminary checks have not located the cause of failure, Tester BT 11-20 can be used to isolate the defective circuit without unnecessary removal of trim or hardware. (Fig. 13-124)

TESTING FOR SHORT CIRCUIT

CAUTION: If the turn signal fuse is blown, remove the flasher and install a jumper wire in its place before connecting test leads. Do not use BT 11-20 in the clock, radio or fuel gauge circuits.

1. Move detector switch to TEST.

2. Remove blown fuse and connect a test lead to each fuse clip. Move detector switch to SHORT.

3. Turn on all switches in the blown fuse circuit.

4. Observe each unit or light in shorted circuit. Units or lights that operate momentarily (when tester light is out) are not shorted.

5. Position meter over the shorted circuit, at the fuse block, with the base of the meter or arrows directly above the wiring. The meter needle will deflect AWAY from the direction of the short each time the tester completes the circuit. Note the amount of needle deflection.

6. Move meter progressively from the fuse block toward the unit that is not operating. The location of the short will be indicated by a reduction in needle deflection. If the needle ceases to deflect, the short circuit has been passed, the wrong circuit has been followed or the meter is not above the circuit.

7. After the short is located and repaired, remove the test leads and replace the fuse.

WINDSHIELD WIPER

Two types of electric windshield wipers are used. Usage and identification is as follows:

88 Series - The standard wiper motor used with this series is a single speed motor operating wipers with a tandem wiping action. This unit is identified by the rectangular shaped motor housing.

A two speed wiper motor is available as an option on the 88 Series, also operating the tandem wipers. This unit is identified by a daub of white paint on the end of the motor case.

S88 and 98 Series - The wiper consists of a two speed wiper motor operating wipers which overlap. This unit does not have any markings on the motor case.

An integral type windshield washer pump (standard on 98 Series) is available as optional equipment with any wiper motor.

CONTROLS (Fig. 13-108)

Two types of wiper controls are used and consist of electrical switches that start and stop the wiper motor. The controls consist of a knob for actuating the wiper motor and a push button for operating the windshield washer pump if the car is so equipped. When the push button is depressed to actuate the washer pump, the wipers are also actuated. Manual operation of the wiper speed knob is required to turn the wipers off.

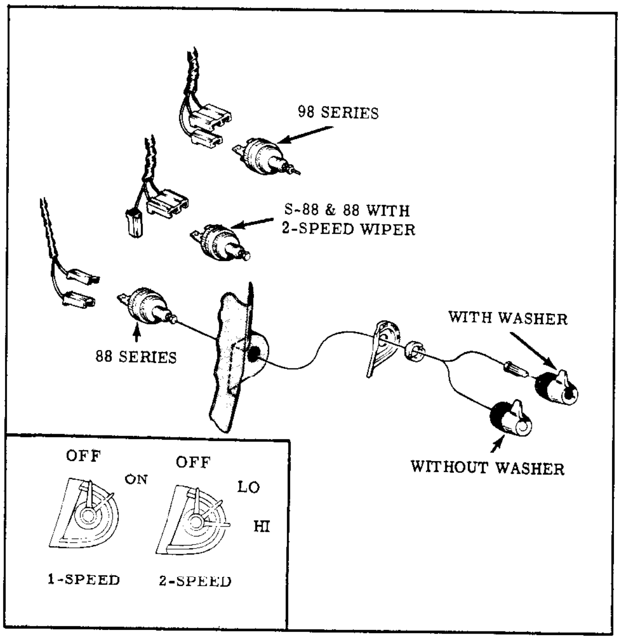


Fig. 13-108 Windshield Wiper Controls

TRANSMISSION—REPLACEMENT (Fig. 13-109)

1. Remove cowl vent grille. (Refer to SECTION 16)

2. Detach transmission drive linkage from wiper motor assembly.

   NOTE: Hold crank arm on the overlap two speed motor with a wrench when removing or tightening the linkage to crank nut.

3. Remove 3 transmission attaching screws and remove transmission.

4. Remove transmission and linkage arms from cowl.

To install, reverse removal procedure. Lubricate as outlined in LUBRICATION SECTION.

WIPER MOTOR—REPLACEMENT (Fig. 13-109)

1. Make certain wiper motor is in parked position.

2. Remove cowl vent grille. (Refer to SECTION 16)

3. Remove screw securing ground strap to cowl, and disconnect electrical connector(s) from motor. If equipped with windshield washers, remove washer hoses.

4. Detach transmission drive linkage from wiper motor.

   NOTE: Hold crank arm on the overlap two

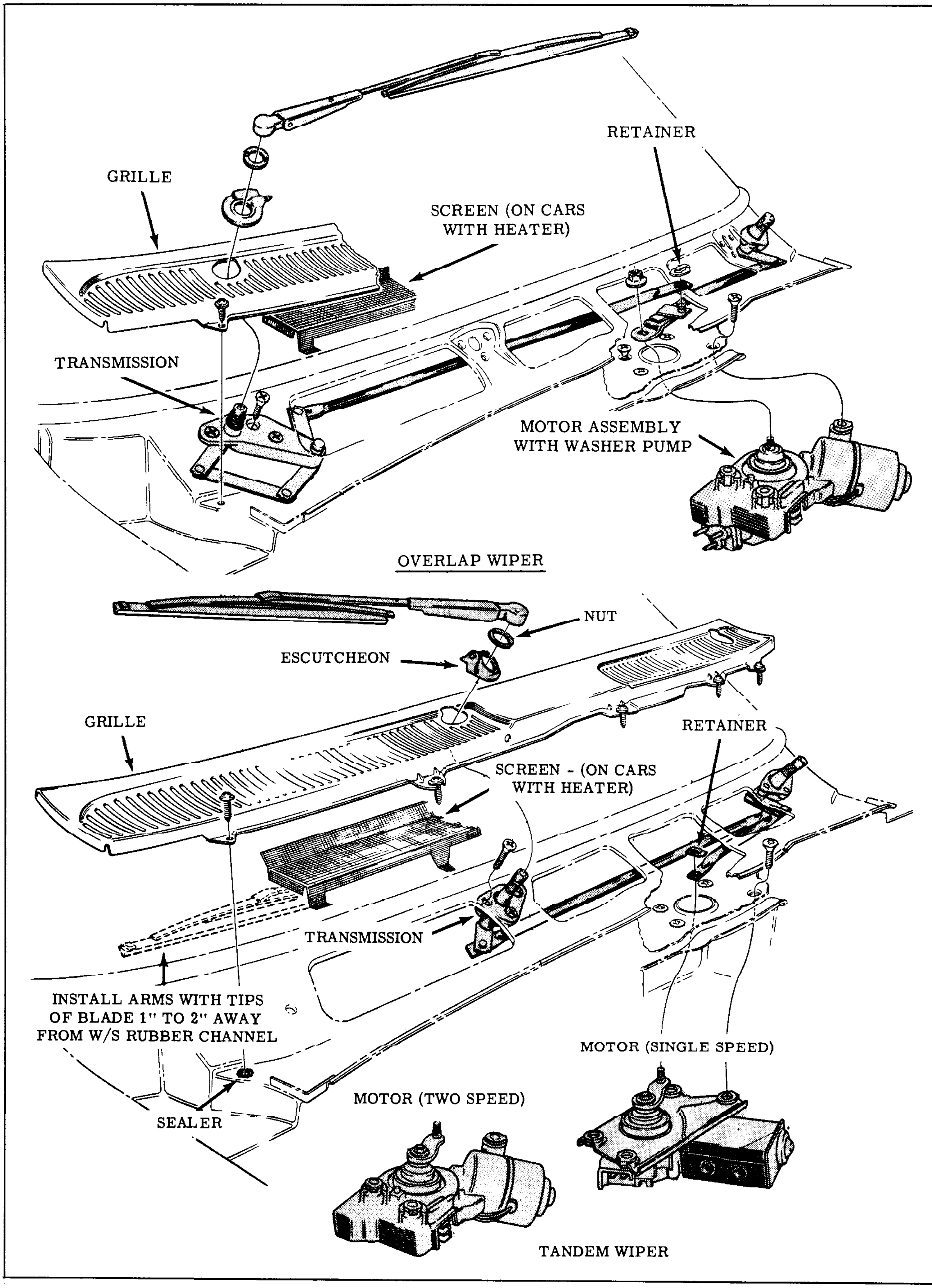


Fig. 13-109 Windshield Wiper Assemblies

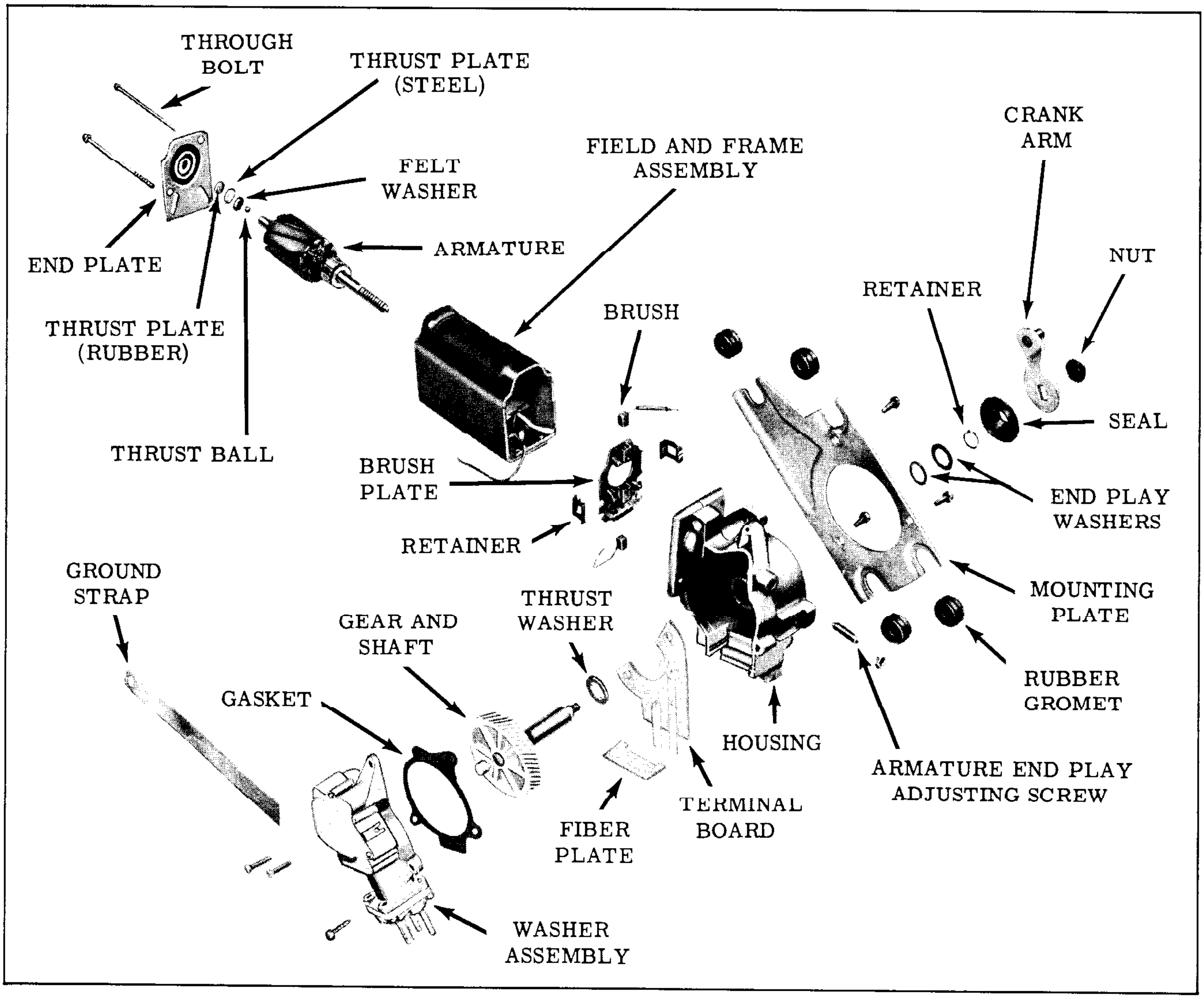


Fig. 13-110 Wiper and Washer Assembly (Single Speed)

speed motor with a wrench when removing or tightening the linkage to crank nut.

5. Remove wiper motor attaching screws and lock washers, and carefully lower motor assembly from cowl.

To install, reverse the removal procedure.

SINGLE SPEED WIPER MOTOR (Fig. 13-110)

The one speed Delco wiper consists of a rectangular shaped shunt type 12 volt motor attached to a gear box containing a gear and shaft assembly and parking switch. The worm on the motor armature drives the gear and shaft assembly. A crank arm, attached externally to the gear and shaft assembly, drives the two wiper transmissions through connecting link arms with a tandem action.

An automatic reset type circuit breaker, located internally on the motor brush plate, protects the motor windings from overheating.

A washer pump, (optional equipment mounts on the gear housing section of the wiper and is driven by the wiper motor.

WIPER MOTOR

Disassembly

If only the motor armature is to be removed,

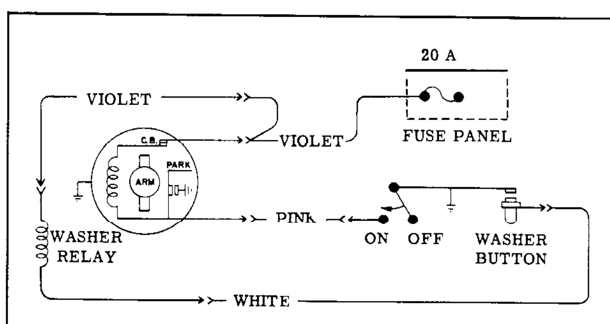


Fig. 13-111 Wiring Diagram (Single Speed)

it will not be necessary to completely disassemble the motor and gear box assembly. However, if brushes, frame and field, brush plate, or terminal board are to be removed, complete disassembly of the motor and gear box assembly will be necessary.

1. Remove the two through bolts.
2. Remove end plate assembly.
3. Thread armature worm shaft counterclockwise from gear box.

Assembly

1. Pull the field and frame assembly away from gear box housing to gain access to the brush plate.
2. Pull brush plate from field and frame assembly by prying retainers from the frame.
3. Unload the brush springs, using a small wire hook, by pulling the brush end of spring up out of the slot of brush holder and hooking the end of spring on the edge of the spring holder.
4. Load brushes into the brush holders.
5. Insert armature into field and frame assembly and guide worm end of shaft through brush plate and bushing in gear box housing.
6. Thread armature worm shaft clockwise, into gear box to engage worm with gear.
7. With brushes and brush plate positioned on armature commutator replace the end of the brush spring in the brush holder slot to load brushes.
8. Using a screwdriver to seat retainers, reposition the brush plate in the frame and position frame on gear box housing.
9. Be sure worm shaft is threaded in until it seats against the end of the armature end play adjusting screw.
10. Install end plate assembly, being sure the thrust ball is lubricated and in place in the end of armature shaft.
11. Install two through bolts.
12. Adjust the armature end play with either of the following two methods:
    a. Stand motor on end with motor running. Loosen lock nut and turn end play adjusting screw out 1/4 turn. Turn screw in until a light pressure is felt between the armature and the screw. Tighten lock nut.
    b. With motor running and an ammeter connected, loosen lock nut and turn adjusting screw out until a minimum current reading is obtained. Tighten adjusting screw until current reading increases 0.1 ampere. Tighten lock nut.

GEAR BOX

Disassembly

The gear box may be disassembled independently of the motor unit.

1. Mark crank arm and end of shaft for assembly purposes, then remove crank arm retaining nut, crank arm and seal cap.
2. Remove the retaining ring and end play washers.
3. Remove the gear box cover or washer pump (if equipped), and the gear and shaft. Separate thrust washer from shaft.
4. If terminal board is to be removed, unsolder the leads then remove the two attaching screws. Note the color code of the leads so they can be installed in their original position.
5. Clean and check all parts for wear and replace as necessary.

Assembly

1. If the terminal board was removed, solder the leads in their original position and install the terminal board.
2. Position the thrust washer over the gear shaft and insert gear and shaft into the motor housing.
3. Install a tablespoonful of lubricant (such as Shell Alvania No. 2) around the worm drive gear.
4. Install the fiber block, gasket and gear box cover or washer pump.

   NOTE: When installing washer pump, align cam slot with drive pin. (Fig. 13-117)
5. Install the end play washers and retaining ring. End play must not exceed .003".
6. Install the seal cap, making sure inner lip fits over housing extension.
7. With index marks aligned, position crank arm over the shaft and install the retaining nut.

DIAGNOSIS (One Speed Wiper Motor)

1. WIPERS WILL NOT OPERATE
    a. Fuse blown.

b. Open circuit in purple or pink wire.

c. Wiper control switch defective.

(1) To test purple and pink wires and wiper control switch, disconnect harness from motor and connect test lamp across terminals in connector.

(2) Turn ignition switch to "accessory" position and turn wiper control switch on. If test lamp lights, the wires and switches are good, it indicates a defective motor or a bind in the linkage.

d. Disconnect linkage from motor and attach jumper wires to motor terminals to determine whether motor or linkage is inoperative.

e. Motor defective.

(1) Open or short in circuit breaker, field windings, brushes, or armature.

(2) Shaft bushings seized.

2. WIPERS CONTINUE TO OPERATE WITH WIPER CONTROL SWITCH "OFF".

a. Defective switch (internally grounded).

b. Pink wire shorted to ground.

c. Defective park switch in gear box housing (grounded).

d. Grounded circuit in motor between brush and ground terminal.

3. WIPERS STOP WHEN WIPER CONTROL SWITCH IS TURNED OFF - DO NOT RETURN TO PARK POSITION.

a. Park switch defective.

TWO SPEED WIPER MOTOR (Fig. 13-112)

The 2 speed wiper motor consists of a compound 12 Volt DC motor and a gear box section containing the gear mechanism and relay control. The motor armature has a worm shaft which drives the main gear assembly and related parts. The two wiper transmission link arms attach to an external crank arm which is attached to the main drive gear assembly. During normal operation, the crank arm rotates continuously through 360°. Oscillation is accomplished at the wiper transmissions.

Two relay controls, consisting of a relay coil,

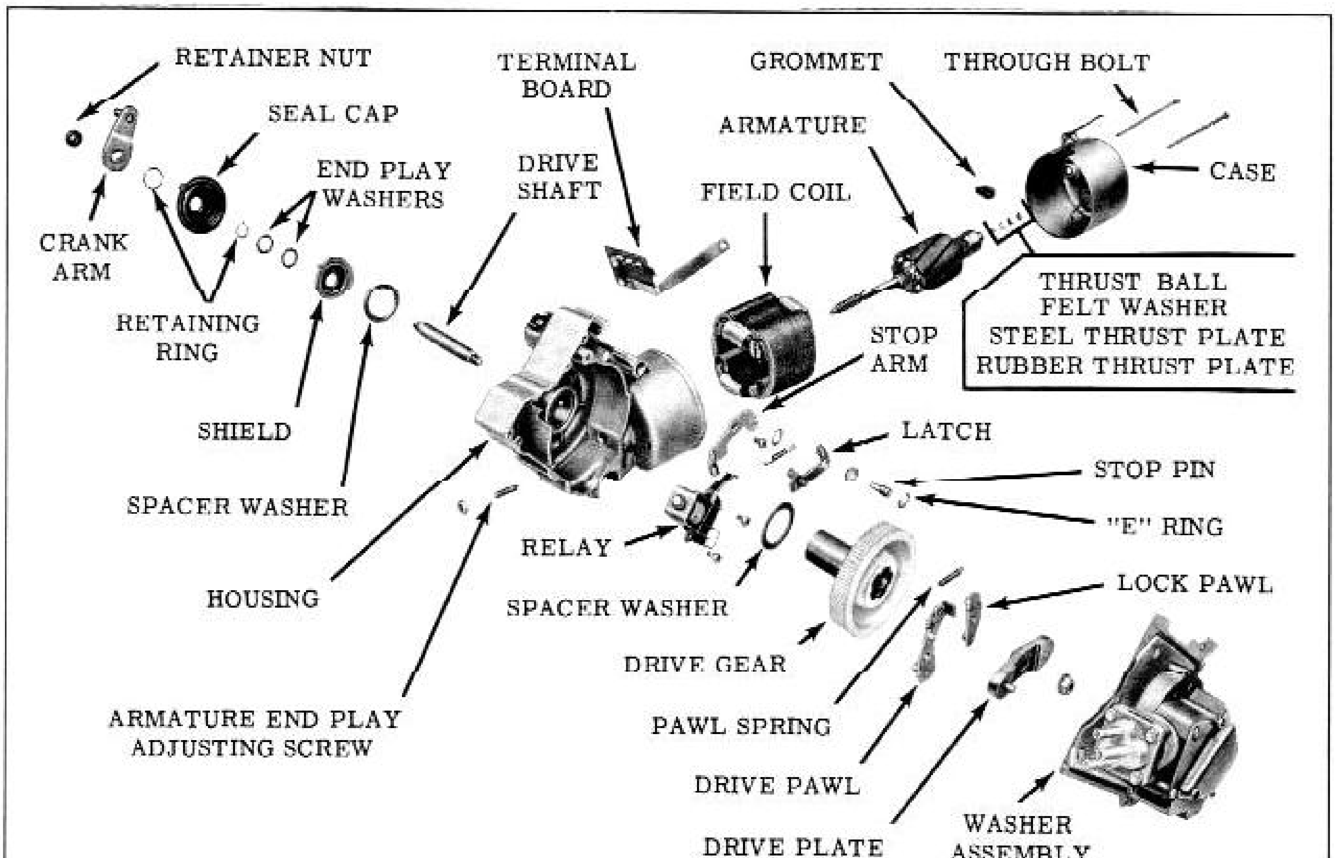


Fig. 13-112 Wiper and Washer Assembly (Two Speed)

relay armature and switch assembly are located in the gear housing and controls the starting and stopping of the wiper through a latching mechanism.

A washer pump mounts on the gear housing section of the wiper and is driven by the wiper motor.

MOTOR CASE AND/OR ARMATURE

Remove

1. Remove the two through bolts and the armature end play adjusting screw and lock nut.
2. Tap the brush end of the motor case with a mallet to free it from the gear housing, then insert a brass drift into the armature end play adjusting screw opening in the gear housing to push the armature and motor case from the housing.
3. Remove the armature from the motor case.

   NOTE: The steel thrust ball is retained in the commutator end of the armature shaft by grease. The ball can be removed by dissolving the grease with solvent.

4. Remove the felt washer, thrust disc and rubber disc from the bore of the armature bearing in the motor case.

Assembly

1. Install the rubber disc, steel thrust disc, and felt washer into the bore of the armature bearing.
2. Install brush springs and brushes in holder. Retain brushes in holders with a brush retainer as shown in Fig. 13-113.

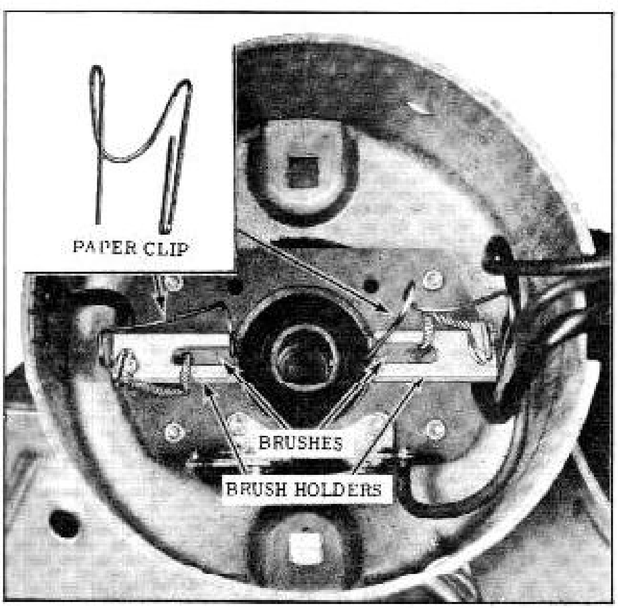


Fig. 13-113 Retaining Brushes

3. Lubricate the steel thrust ball, the bearing and worm surface of the armature shaft with Delco-Remy Cam and Ball Bearing Lubricant.
4. Install the armature in the motor case, then remove the brush retainers.
5. While holding the armature in the motor case, start the armature shaft through the bearing in the gear housing. Guide motor wire grommet into notch in motor case.
6. Rotate motor case until the through bolt holes in the case are aligned with those in the gear housing, then install the 2 through bolts and tighten.
7. Install the armature end play adjusting screw.
8. Adjust the armature end play with either of the following two methods:

   a. Stand motor on end with motor running. Loosen lock nut and turn end play adjusting screw out 1/4 turn. Turn screw in until a light pressure is felt between the armature and the screw. Tighten lock nut.

   b. With motor running and an ammeter connected, loosen lock nut and turn adjusting screw out until a minimum current reading is obtained. Tighten adjusting screw until current reading increases 0.1 ampere. Tighten lock nut.

FIELD COIL

Remove (Armature Removed)

1. Scribe an alignment mark on the field coil and housing for reference when installing new field coil. This mark can be transferred to the new coil for proper installation in housing.

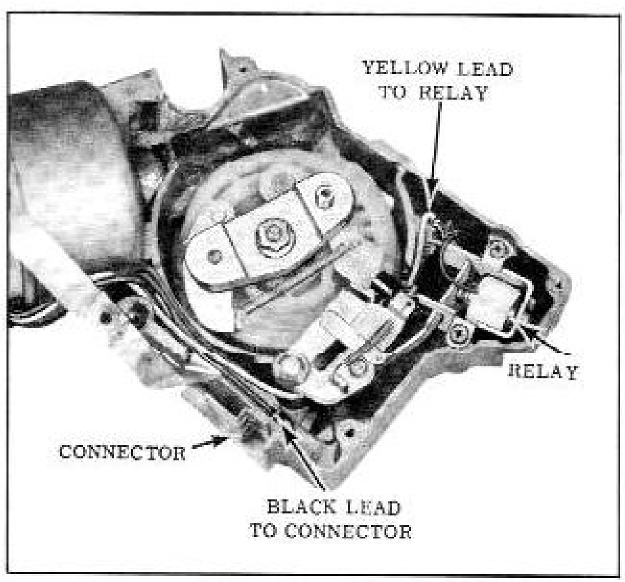


Fig. 13-114 Wiper Motor Leads

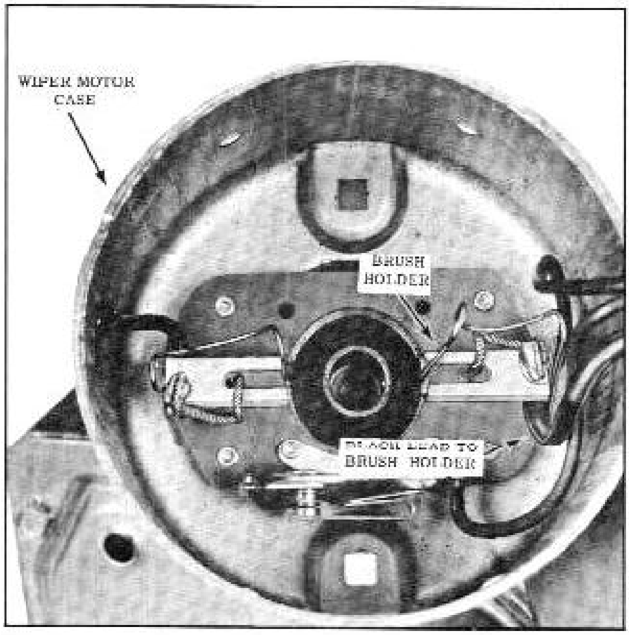


Fig. 13-115 Field Coil Connections in Case

2. Remove wiper gear cover or washer.

3. Remove two relay attaching screws, remove relay and unsolder yellow wire at relay connection. (Fig. 13-114)

4. Slide connector block from housing and unsolder black wire from connection. (Fig. 13-114)

5. Unsolder black solid wire from brush holder in case as shown in Fig. 13-115.

6. Remove field coil with Tool J-7844 as shown in Fig. 13-116.

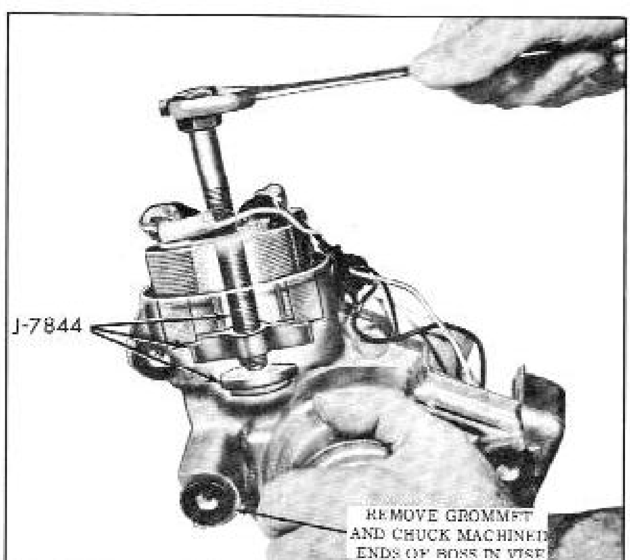


Fig. 13-116 Removing Field Coil

Install

1. Position a new field coil in the housing in proper alignment.

2. Temporarily install the through bolts to act as guides while installing the field coil.

3. Using a small brass drift, tap the field coil lightly and evenly into housing. Use caution not to damage field wiring.

   NOTE: If field coil requires excessive force to install, remove and file outer diameter of field laminations at point of interference.

4. Route yellow wire to relay control assembly and solder to relay terminal.

5. Solder black wire to connector block terminal.

6. Thread black solid wire thru hole in brush holder. Loop end of black wire over armature brush wire and solder both wires to brush holder.

GEAR BOX

The gear box is divided into two areas; the relay control and latching mechanism and the drive gear mechanism.

RELAY CONTROL AND LATCHING MECHANISM

Disassembly

NOTE: Before unsoldering any wires, mark the color code of the wires to their respective terminals.

1. Remove the four screws which secure the gear box cover or washer pump assembly to the gear box.

2. Disconnect coil spring, remove "E" ring and lift the latch and follower assembly off the pivot pin.

3. Remove the stop assembly retaining screw. This will permit the stop assembly to be moved as necessary to allow clearance for removing the relay control assembly.

4. Remove the two screws that secure the relay control assembly.

5. Lift the relay control assembly out of the gear box and unsolder leads as required.

6. If terminal board is to be replaced, it can be removed at this time.

Assembly

Solder existing green and yellow wiper leads to relay control switch and solder the relay coil lead to the wiper unit terminal board and reverse disassembly procedure.

DRIVE GEAR MECHANISM

Disassembly

1. Mark the crank arm, drive shaft and the motor housing then remove the crank arm retaining nut.

   NOTE: The alignment marks are necessary in order to assemble the parts in their original location. If the parts are not installed in their original location, the wiper blades will be mispositioned in the "Park" position.

2. Remove crank arm, snap ring, and rubber seal.

3. Remove the retaining ring, end play washers, and spacer washer.

4. Repeat step 1 through 3 under "Relay Control and Latch Mechanism Disassembly".

5. Remove gear mechanism from the gear box and slide spacer washer off the gear assembly eccentric shaft.

6. Slide the drive plate and shaft assembly out of the gear assembly, remove the lock and drive pawls, and remove the coil spring.

7. Remove the stop assembly pivot pin and the stop assembly.

   NOTE: It may be necessary to use vise grip pliers to remove the stop assembly pivot pin. A new pivot pin is included in the stop assembly parts package.

8. Clean and inspect all parts, replace as necessary.

Assembly

1. Position stop assembly and pivot pin into the housing. Tap lightly with a brass drift to seat the pivot pin.

2. Assemble lock and drive pawls to the shaft and drive plate assembly.

3. Install the assembled parts in the gear and eccentric shaft.

4. Hold the gear and drive plate assembly in this relative position until installed in housing since no retainer is used and accidental disassembly can easily occur.

5. Connect the coil tension spring between the lock and drive pawls.

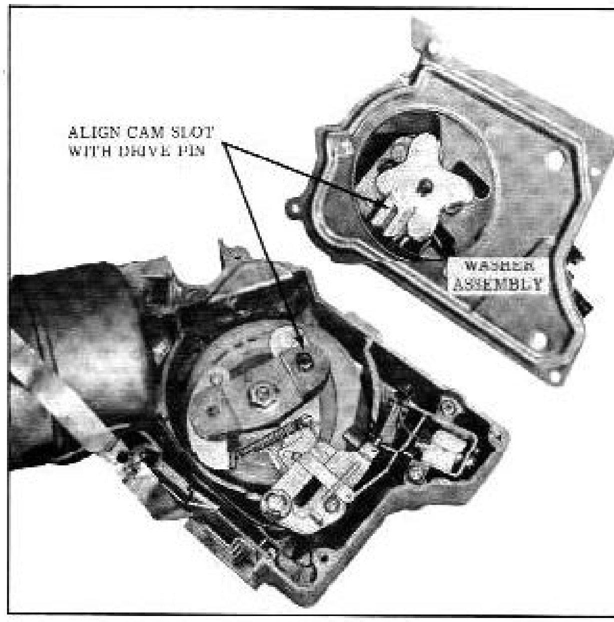


Fig. 13-117 Washer Installation

6. Install spacer washer on the eccentric shaft of the gear.

7. Install gear mechanism in the housing.

8. Reassemble parts removed in Steps 1 through 4 under drive gear disassembly. Install a tablespoonful of lubricant (such as Shell Alvania No. 2) around the worm drive gear. Be sure the rubber seal is fully seated on the housing.

   NOTE: When installing washer pump, align cam slot with drive pin. (Fig. 13-117)

DIAGNOSIS TWO SPEED WIPER MOTOR

WIPER INOPERATIVE (On Car)

1. Check for blown fuse. If a new fuse blows, check for mechanical "lock-up" or short in circuit. If equipped with washer, check purple wire from wiper terminal board to washer connection for a short.

2. Connect a jumper wire from the wiper motor to ground. If the wiper motor will operate with ignition switch in "accessory" position and wiper control switch in low or high speed position, a defective wiper ground strap or connection is indicated.

3. With the ignition in the "accessory" or "on" position, check for 12 volts at the center terminal of wiper terminal board (purple wire connected). If there is no voltage at this point, but there is voltage at the fuse clips, the purple wire from the fuse block to the wiper connector is open.

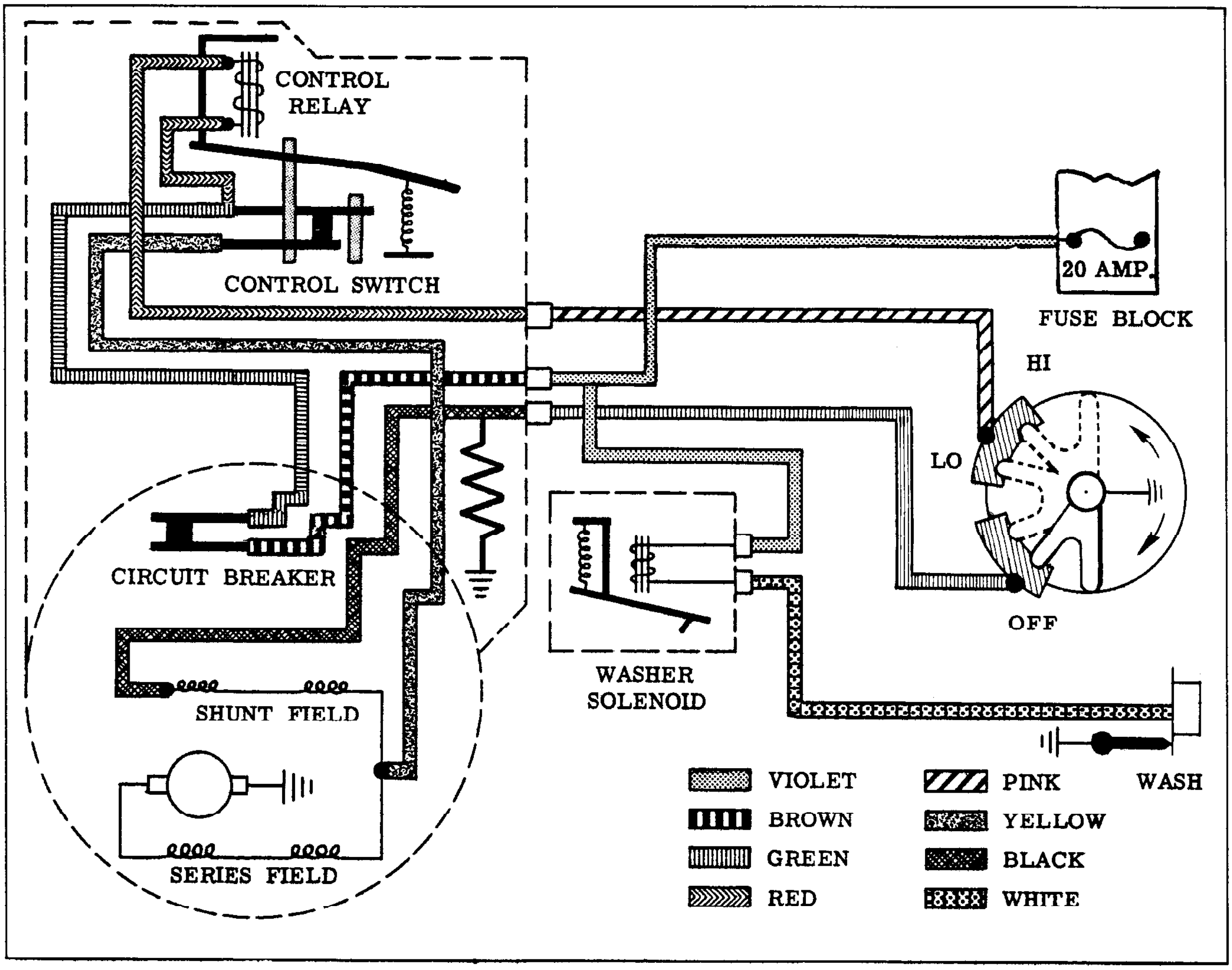


Fig. 13-118 Wiring Diagram (Two Speed Wiper)

4. To determine if the wiper control switch or wiper is inoperative, disconnect wires at the wiper terminal board and operate the wiper motor independently of the wiper control switch as follows:

   a. Connect a 12 volt supply to the center terminal (purple) of the wiper terminal board and connect a jumper wire from the control relay terminal (pink) of the wiper terminal board to ground. The wiper should operate at high speed.

   b. With the wires connected as in step a, check the low speed operation by connecting another jumper wire from the shunt field terminal (light green) of the wiper terminal board to ground.

   c. If the wiper operates when making either test a or b, it indicates that the wires from the motor to the wiper control switch, the wiper control switch, or the connectors are at fault.

5. If the wipers fail to operate after making tests a, b, and c, disconnect the transmission link arm from the motor. If the wiper motor will operate with the transmissions disconnected, the trouble is in the transmission(s). If wiper fails to operate, remove the wiper motor for checking off the car.

WIPER INOPERATIVE (Off Car)

1. Remove gear box cover or washer pump assembly. Visually inspect for loose connections or burned wires at terminal connector board and relay control switch.

2. Visually inspect latch arm, spring and relay control switch tabs for damage or binding.

3. Connect 12 volts (+) to center terminal on terminal board and the negative (-) terminal to motor housing, also connect the wiper ground strap to motor housing. Connect a jumper wire from the red wire on terminal board to the motor housing. With these wires connected, control relay coil should be energized. If coil does not energize, it indicates

an open in the brown wire circuit breaker, green wire, control relay, or red wire. If the control relay energizes and its armature pulls in but the motor does not operate, make the following checks with a test light.

a. Connect test light between the yellow wire on the relay control switch and ground. If test light does not light, relay control switch is defective.

b. If test light does light, trouble is in the yellow wire to the field coils, field coils, or armature.

WIPERS WILL NOT PARK—JUMPS IN AND OUT OF PARK POSITION

1. Remove wiper motor from car.

2. Remove gear box cover or washer pump from wiper housing.

3. Check for binding or broken parts at:

   a. Drive pawl lever.

   b. Relay control switch tabs.

   c. Stop tab on drive pawl and spring.

   d. Check the relay control switch points as follows:

      (1) If the drive pawl is in the park position, disconnect the drive pawl spring and move the stop tab away from the relay control switch tab.

      (2) Connect 12 volts (+) to the red wire on the terminal board. Connect the negative lead to one side of test light. Connect other side of test light to yellow wire. Switch should be closed and test light should be on.

      (3) Push the insulated tab (one not connected to relay armature), if the test light does not go out, the switch is defective.

MOTOR CONTINUES TO OPERATE WITH WIPER CONTROL SWITCH OFF

1. Check for mechanical bind or broken parts at the control relay armature, latch arm, and drive pawl.

2. Check for grounded red wire from relay to terminal board.

Motor Checks

For the Motor Checks, disassemble the motor but leave the field assembly in the housing.

1. Check armature to detect an open or short circuit.

2. Inspect the case and brush assembly for the following items.

   a. Worn brushes.

   b. Brushes binding in their respective holders.

   c. Defective brush springs.

   d. Loose solder joints.

   e. Dirty or defective circuit breaker contacts.

Field Checks

1. Disconnect yellow lead from relay control switch and connect an ohmmeter between the yellow lead and the brush holder to which the internal field lead connects. No reading indicates an open series field.

   Connect the ohmmeter between the yellow lead and the terminal to which the black motor lead attaches. No reading indicates an open shunt field.

2. Disconnect yellow lead from relay control switch. Be sure steel case and brass ground strap are not touching the housing. Check between the yellow lead and field lamina with an ohmmeter or 110 volt test lamp. If continuity exists, it indicates a grounded field.

WINDSHIELD WASHER PUMP

The windshield washer pump consists of a relay, pump assembly, valve assembly and related parts assembled in a casting which attaches directly to the wiper gear box.

OPERATION

WASHER OFF (Fig.13-119)

When the wiper is operated, the rotor cam is always turning with the wiper gear. As the rotor cam rotates it actuates a spring loaded lever (1) and pin (4) assembly to which a ratchet pawl (2) is attached.

The lever arm pin extends into the slot (5) of a spring loaded plunger arm (6). The spring loaded plunger arm which is attached to the pumping bellows (9), is held in a retracted position (spring compressed) by an eccentric (7) on the ratchet wheel (8) when the pump is idling.

While the pumping mechanism is idling the lever arm pin can move freely back and forth in the plunger arm slot and no pumping action occurs.

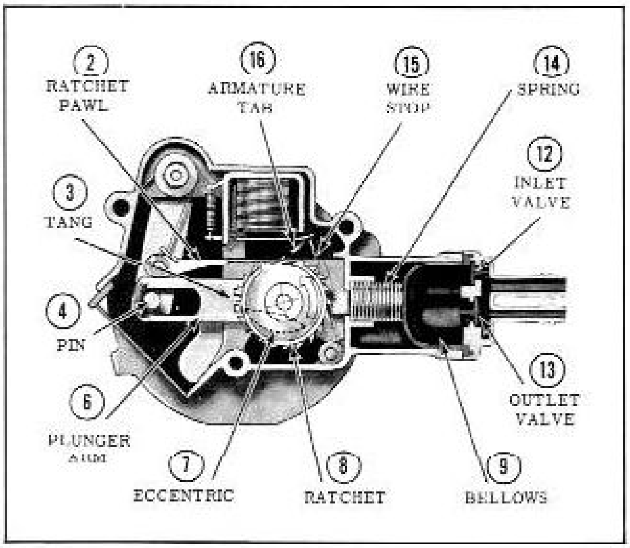


Fig. 13-119 Washer In Off Position

The ratchet pawl, which extends through an opening in the relay armature (10), is prevented from rotating the ratchet wheel by the relay armature.

WIPER ON (Fig. 13-120)

When the washer button on the instrument panel is depressed, the circuit to the washer pump relay coil (11) is closed to ground. The relay is held in the energized position by a wire stop (15).The ratchet pawl (2), which previously was moving freely back and forth through the armature opening now drops out of the opening and engages the ratchet wheel (8).

As the ratchet wheel is rotated the eccentric (7) moves away from the plunger arm tang (3) releasing the plunger arm (6) for pumping action.

The plunger arm being spring loaded, now moves toward the bellows (9) and collapses the bellows forcing the water in the bellows out through the outlet valves (13) to the nozzles (exhaust stroke).

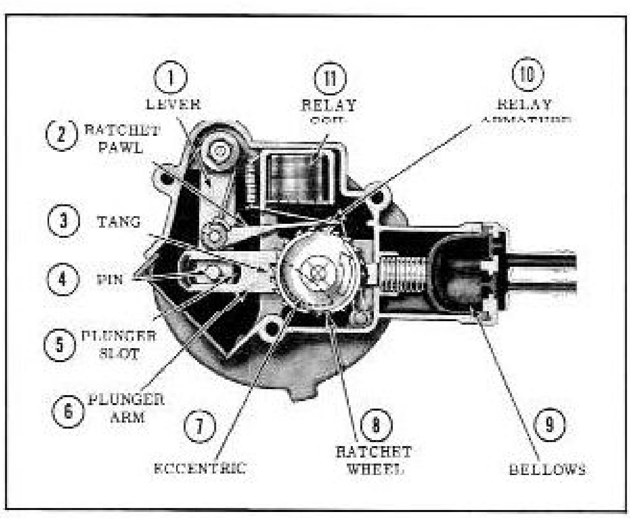


Fig. 13-120 Washer In On Position

At the same time the edge of the plunger arm slot moves up tight against the lever arm pin (4). As the rotor cam is turned, each of the four lobes actuate the lever arm which in turn pulls the plunger arm back compressing the spring (14). While the plunger arm is being pulled back (suction stroke) water is drawn in through the inlet valve (12). As the high point of each lobe is passed, the plunger arm spring pulls the plunger arm toward the bellows. This collapses the bellows and forces water out through the outlet valve (exhaust stroke).

For each revolution of the wiper gear and/or rotor cam there are four pumping strokes. For each pumping stroke the ratchet wheel is actuated or turned one tooth by the ratchet pawl. As the ratchet wheel turns, the eccentric pushes the wire stop out of the way of the relay armature. This allows the armature to partially drop so that the armature tab (16) rests against the edge of the ratchet wheel. After the ratchet wheel has been rotated about 12 teeth the ratchet wheel eccentric starts to interfere with the plunger arm tang (3), resulting in shorter pumping strokes.

When the ratchet wheel has been turned through 360° or 21 teeth, two simultaneous functions occur as the wash cycle is completed:

A. The relay armature tab drops into the ratchet wheel slot allowing the ratchet pawl to enter the armature opening preventing further ratchet wheel rotation.

B. The ratchet wheel eccentric moves into a position which holds the plunger arm in a retracted position preventing further pumping action.

DISASSEMBLY AND ASSEMBLY

Relay Terminal Board Assembly (Fig. 13-121)

1. Remove relay terminal board cover.
2. Slide spring clip off relay mounting stud.
3. Rotate nylon rotor cam to free ratchet pawl from relay armature and lift out relay terminal board.
4. Save terminal insulator for reassembly.
5. To reinstall relay assembly, hold relay armature against the coil pole and position the coil mounting stud in the casting slot.
6. Reinstall spring clip on mounting stud.
7. Assemble insulator over terminal and position terminal board in slot.
8. Manually rotate washer pump nylon cam

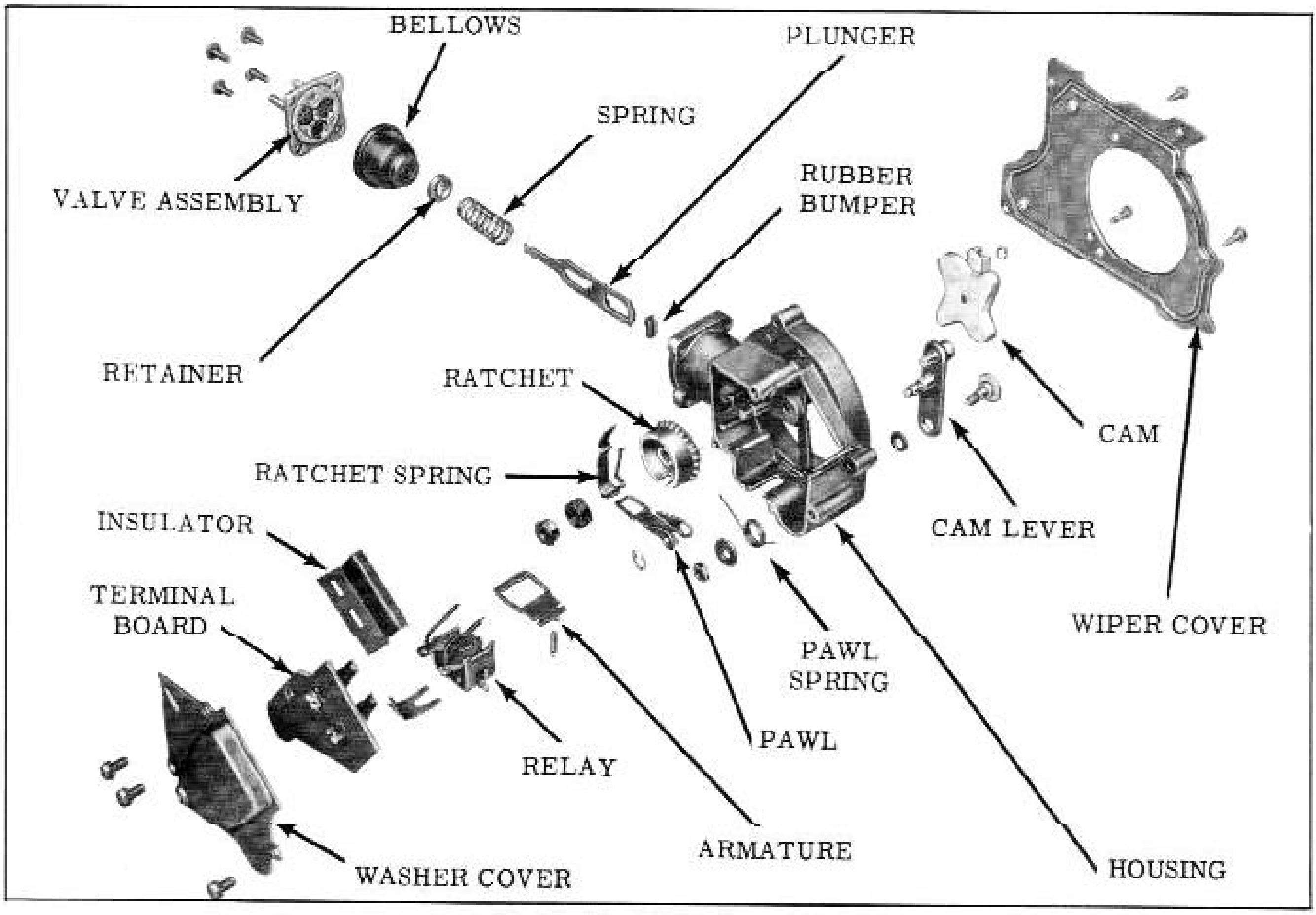


Fig. 13-121 Washer Assembly

through a cycle (ratchet rotated 21 teeth) to check if pump is operating correctly as explained under pump operation.

Valve Assembly

1. Remove the four screws that secure the valve assembly to the housing and gently pry the bellows lip out of the valve body.

To install valve assembly, reverse the procedure.

Bellows

1. Remove valve assembly.

2. If pump is in idling position, release it as follows: Push relay armature toward relay coil so that wire stop spring engages it; then manually rotate nylon rotor cam until pumping action can be felt. The bellows should now extend partially out of the housing.

3. Place an obstruction (small block of wood) between cam lever arm and housing. (Fig. 13-122)

4. Push in against bottom of bellows and turn bellows approximately 90°. This will release bellows from pumping arm. To install, reverse the procedure.

WASHER DIAGNOSIS (ON CAR)

Washer Pump Inoperative

1. Inspect all washer hoses and hose connections; inspect screen at end of jar cover tube for being plugged and for adequate supply of liquid in jar.

2. Start wiper motor first then push washer

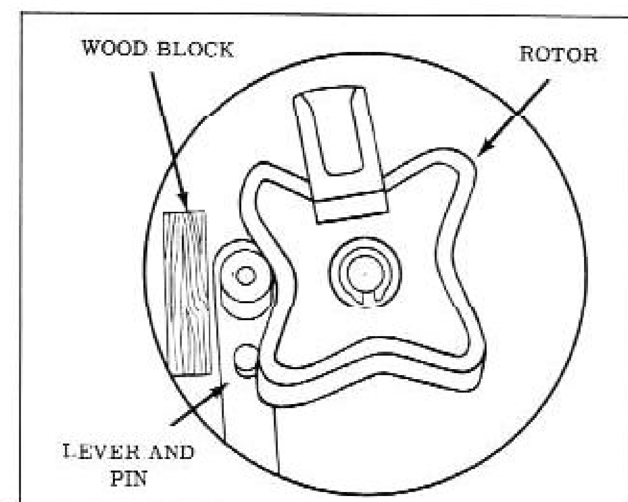


Fig. 13-122 Removing Bellows

button and listen for "click" as washer relay pulls in. If no "click" is heard, check power supply (12V) at washer pump wiring connector. No voltage indicates defective car wiring.

3. If correct voltage reading was obtained in Step 2, start wiper first then connect 12 volt supply to one of washer terminals and ground the other. If washer relay "click" is heard, a defective instrument panel switch is indicated.
4. If washer relay click is not heard in Step 3, a defective washer pump relay coil is indicated.
5. If relay click is heard in Step 3, and pump still does not pump water, a defective valve assembly is indicated. (Note: Listen for soft clicking as washer pump ratchet wheel is rotated through a cycle).

Washer Pump Will Not Shut Off When Wiper is "On"

1. Disconnect wiring from washer pump. If pump shuts off, trouble is located in the wiring or switch.
2. If pump fails to shut off in Step 1, remove pump assembly from car for further checking (See WASHER DIAGNOSIS-OFF CAR).

WASHER DIAGNOSIS - OFF CAR

1. Connect 12 volt supply to one of washer terminals and ground the other. Manually rotate the rotor cam and observe if relay armature pulls in. Failure of relay to pull in indicates an open relay coil or poor solder connections.
2. If relay pulled in in Step 1, manually rotate the rotor cam (CCW looking at rotor) through a complete cycle (Ratchet wheel rotated 360° or 21 teeth) carefully observing if performance matches that as explained under washer operation. Binds or any other type of malfunction can usually be located in this manner.

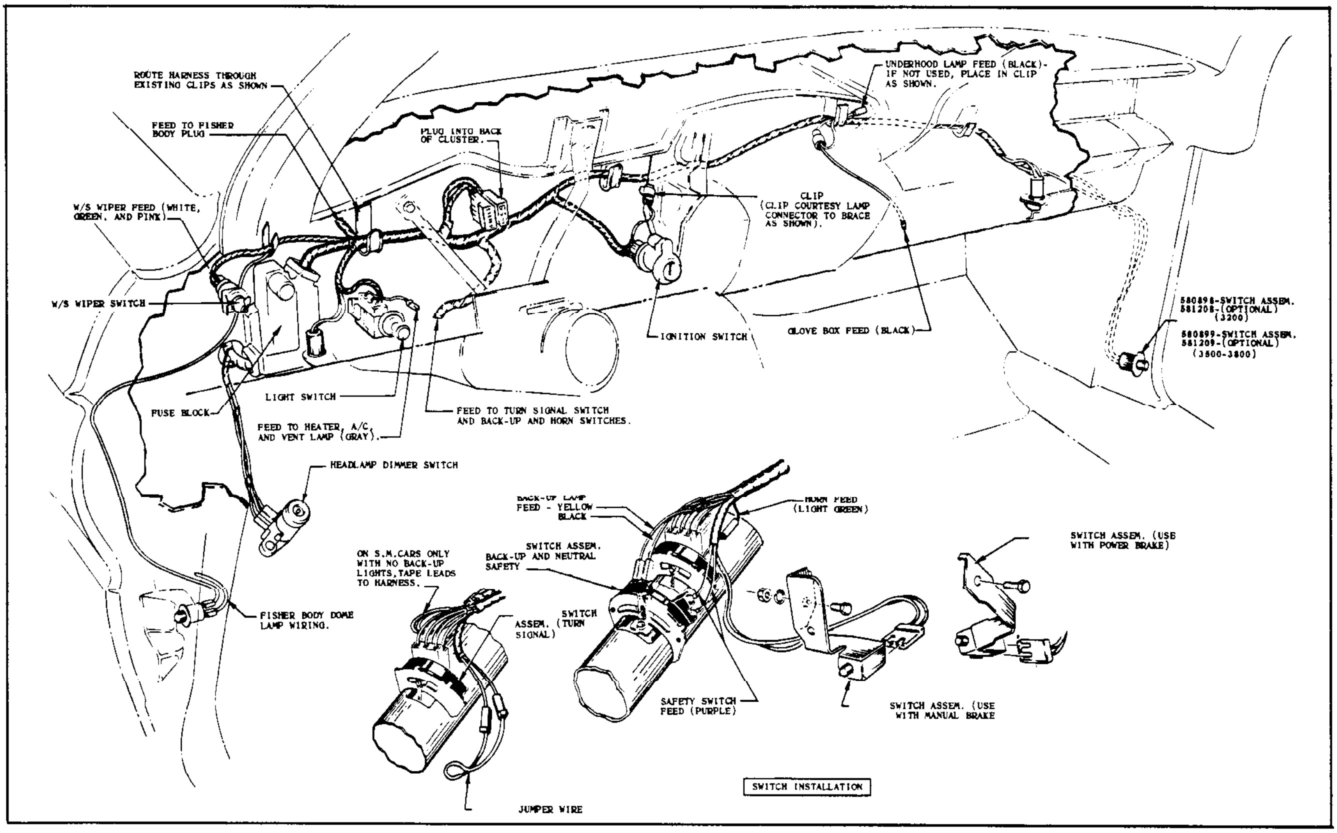


Fig. 13-123 Instrument Panel Wiring

TORQUE SPECIFICATIONS

NOTE: Specified torque is for installation of parts only. Checking of torque during inspection may be 15% below the specifications.

APPLICATION	Ft. Lbs.
1. Battery Hold-Down Nut	1.5 to 2.5
2. Connector Strap to Starting Motor Bolt	6 to 8
3. Distributor Clamp to Cylinder Block Bolt	11 to 14
4. Generator Bracket to Exhaust Manifold Bolts	22 to 26
5. Generator to Bracket Bolts & Nuts	14 to 17
6. Ignition Coil to Intake Manifold Stud Nuts	9 to 11
7. Spark Plugs	18 to 34
8. Starter Motor to Flywheel Lower Housing Nut & Bolt	45 to 50
9. Battery Cable to Starter Motor Nut	10 to 12
10. Junction Block Nut	8 to 10
11. Starter Terminals (Solenoid)	1.50 to 1.75
12. Ignition Coil Terminal Nuts	1 to 1.50
13. Generator Terminal Nuts	2 to 4

GENERAL SPECIFICATIONS

DISTRIBUTOR TEST SPECIFICATIONS

Distr. No.	Rotor Rot.	Spring Tension	Vacuum Advance		Mechanical Advance			
1110968	L.H.	19 to 23 oz.	8" to 10"	19" to 21"	Distr. r.p.m.	400	975	2200
	(Counter-clockwise)		Start	10° to 12°	Degrees	0° to 2°	6.5° to 8.5°	11° to 13°

STARTING MOTOR

a. Make . . . . . Delco-Remy
b. Brush Spring Tension . . . . . 35 oz. min.
c. No. of Brushes Used 4
d. No. of Fields 4
e. No. of Teeth on Starter Pinion 9
f. No. of Teeth on Flywheel 176
g. Ratio Between Starter Pinion and Ring Gear . . . . . 19.5 to 1
h. Rotation, Viewed from Drive End . . . . . Clockwise
i. Pinion Clearance . . . . . .010" to .140"
j. Free Speed (Model 1107665): 3600 to 5100 r.p.m. at 10.6 volts, 65 to 100 amps.
k. Free Speed (Model 1107776): 3900 to 5400 r.p.m. at 10.6 volts, 80 to 120 amps.

SOLENOID SWITCH

a. Current Consumption (Model 1119798) Both Windings at 10 Volts @80°F. 42 to 49 Amps.
b. Current Consumption (Model 1114257) Both Windings at 10 Volts @80°F. 47 to 54 Amps.
c. Current Consumption (Model 1119798) Hold-In Winding at 10 Volts @80°F. 10.5 to 12.5 Amps.
d. Current Consumption (Model 1114257) Hold-In Winding at 10 Volts @80°F. 15.5 to 17.5 Amps.

GENERATOR

a. Charging Rate Cold - at 14.0 Volts, 2520 r.p.m. (Model 1102217) . . . . . 35 Amps.
b. Charging Rate Cold - at 14.0 Volts, 2600 r.p.m. (Model 1102187) . . . . . 40 Amps.
c. Charging Rate Hot . . . . . (Controlled by Current Regulator)
d. Field Current Draw at 12 Volts, 80°F (Model 1102217) . . . . . 1.62 to 1.82 Amps.
e. Field Current Draw at 12 Volts, 80°F (Model 1102187) . . . . . 2.66 to 2.86 Amps.
f. Brush Spring Tension . . . . . 28 oz.

GENERAL SPECIFICATIONS (Cont'd)

GENERATOR REGULATOR

Cut Out Relay

a. Air Gap . . . . .020"
b. Point Opening . . . . .020"
c. Closing Voltage (Model 1119253) . . . . 11.8 to 13.5 Volts (Adjust to 12.8 Volts)
d. Closing Voltage (Model 1119600) . . . . 11.8 to 13.0 Volts (Adjust to 12.8 Volts)

Voltage Regulator

e. Air Gap (Model 1119253) . . . . .075"
f. Air Gap (Model 1119600) . . . . .067"
g. Upper Contact Opening (Model 1119600) . . . . .016"
h. Voltage Setting (Model 1119253) . . . . Refer to Fig. 13-12
i. Voltage Setting (Model 1119600) . . . . Refer to Fig. 13-19
j. Lower Contact Setting (Model 1119600) . . .1 to .3 Volts Lower Than Upper Contacts

Current Regulator

k. Air Gap . . . . .075"
l. Current Setting (Model 1119253) . . . . Refer to Fig. 13-17
m. Current Setting (Model 1119600) . . . . Refer to Fig. 13-24

NOTE: Operating temperature shall be assumed to exist after not less than 25 minutes of continuous operation with a charge rate of 1 to 10 amperes.

BATTERY—12 VOLT

Regular Fuel Engine

a. Make . . . . Delco-Remy
b. Model 3KMR62
c. Plates . . . . 9 Per Cell
d. Capacity at 20 Hr. Rate . . . . 62 Ampere Hour
e. Specific Gravity for fully Charged Battery . . . . 1.270 ± .010 at 80°F.

Premium Fuel Engine

a. Make . . . . Delco-Remy
b. Model 3KRM70
c. Plates . . . . 11 Per Cell
d. Capacity at 20 Hr. Rate . . . . 70 Ampere Hour
e. Specific Gravity for fully Charged Battery . . . . 1.270 ± .010 at 80°F.

COIL

a. Primary Resistance . . . . 1.28 to 1.42 Ohms
b. Secondary Resistance . . . . 7200 to 9500 Ohms

RESISTOR, IGNITION COIL

a. Resistance 80°F . . . . 1.75 to 1.85 Ohms

DISTRIBUTOR

a. Cam Angle Range . . . . 28° to 32° (Adjust to 30°)
b. Contact Point Opening . . . . .016"
c. Contact Arm Spring Tension . . . . 19 to 23 oz.
d. Condenser Capacity . . . . .18 to .23 Mfd.

SPARK PLUGS

a. Make . . . . AC
b. Type:
   - Regular Fuel Engine 45
   - Premium Fuel Engine 44
   - Export Engine 46

c. Thread . . . . Metric 14MM
d. Body . . . . 13/16" hex.
e. Spark Gap . . . . .030"

GENERAL SPECIFICATIONS (Cont'd)

HORNS
a. Current Draw at 12 Volts . . . . . 7 to 11 Amps.

HORN RELAY
a. Point Opening . . . . . .020" min.
b. Closing Voltage . . . . . 1.5 to 9.5 Volts (Adjust to 6.5 Volts)
c. Air Gap - Points Closed . . . . . .008" to .020"

TURN SIGNAL FLASHER
a. Flashes per Minute (non-adjustable) . . . . . 70 to 90

GAS GAUGE—TANK UNIT
a. Resistance . . . . . "Y" Terminal to Grd. 158 to 164 Ohms

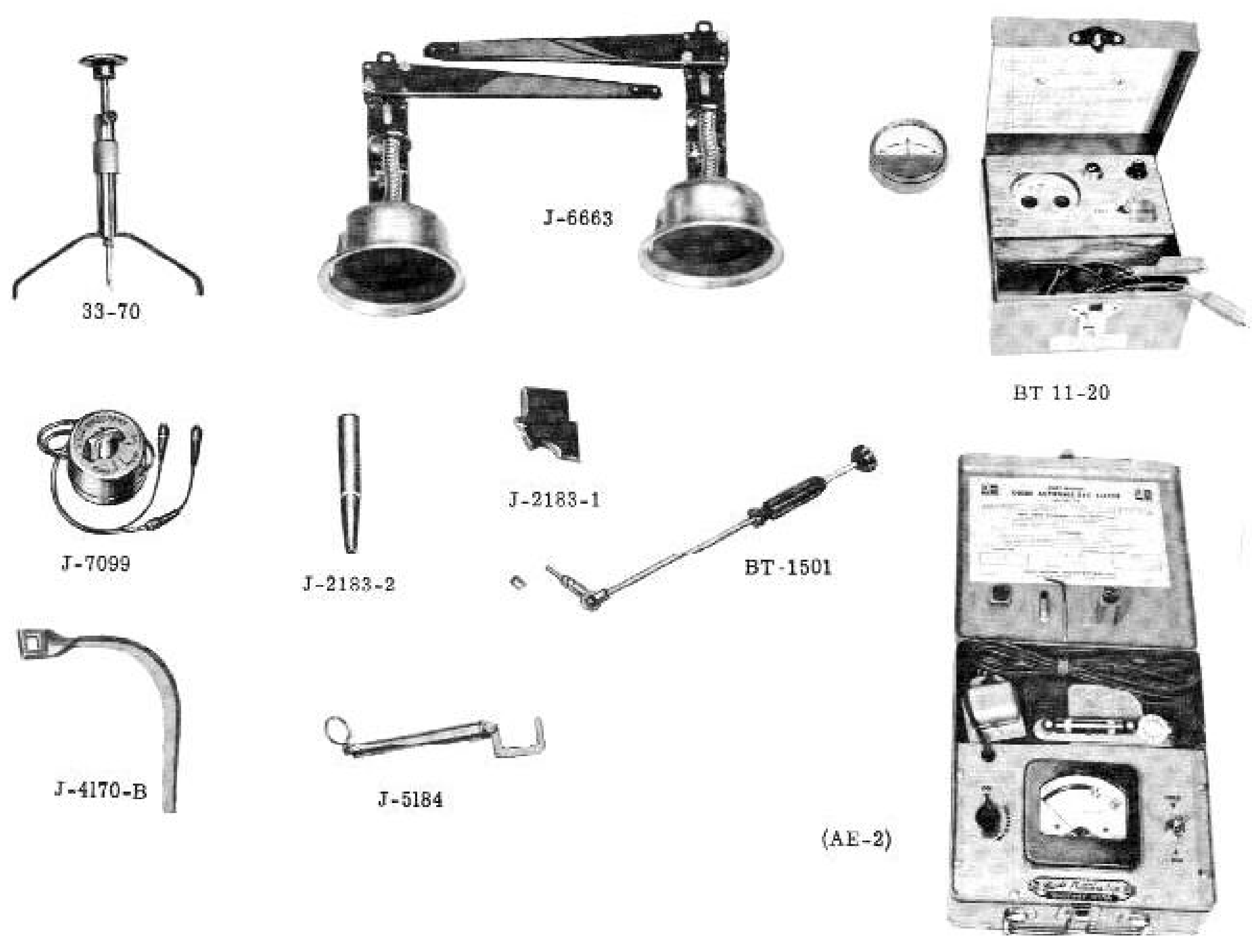
GAS GAUGE—INSTRUMENT PANEL UNIT
a. Resistance . . . . . Each Coil 90 Ohms

FUSE SPECIFICATIONS AND LOCATION

APPLICATION	FUSE TYPE AND AMPERES	FUSE LOCATION
Electric Clock	AGA 2	Located in Fuse Block For exact location Refer to Fig. 13-2
Courtesy Lights Dome Lights Stop Lights Rear Seat Lighter	SFE 20 Except on 3800 Series which have AGC 25	
Temperature Indicator Light Parking Brake Light Fuel Gauge Oil Pressure Warning Light Generator Warning Light Back-Up Light Turn Signal Glove Compartment Light Underhood Light Tail Lights Rear Compartment Light	SFE 9	
Cigar Lighter (Instrument Panel)	SFE 20	
Radio - Deluxe	AGW 4	
Radio - Super Deluxe	AGW 7.5	
Heater and/or Air Conditioning Electric Windshield Wipers	SFE 20	
Electric Antenna Electric Windows or Seat	SFE 20 with 2 way seat AGC 25 with 4 or 6 way seat	
Instrument Cluster Light Ash Tray Light Clock Light Heater, Ventilation & Air Conditioning Lights	AGA 3	
Generator Armature and Wire	575532	On "Bat" Terminal of Regulator
Headlights	Circuit Breaker	On Headlight Switch
Electric Seat, Window and/or Convertible Top Motor	Circuit Breaker	L.H. Side of Cowl (in engine compartment)
Guide-Matic Headlight Control	SFE 9	On Headlight Swtich

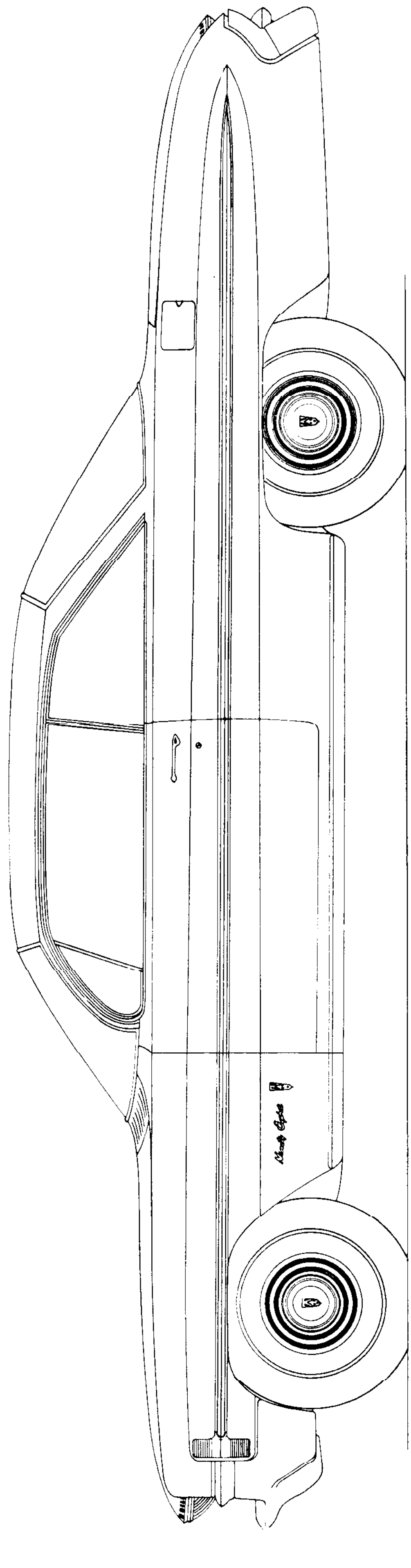
LIGHT BULB NUMBERS

Headlamps (inner) (#1) (Upper beam only)	4001
Headlamps (outer) (#2) (lower & Upper beam)	4002
Stop Lights and Tail Lights Parking Lights and Turn Signal Front	1034
Dome Light	1004
Dome & Reading Light	94-1F
Arm Rest Light	68
Courtesy Light Side Roof Light	90
Shift Indicator Light Ignition Switch Safety Sentinel Light Ash Tray Light High Beam Indicator	53
Heater Control Light Odometer Light Glove Compartment Light Parking Brake Warning Light Oil Pressure Warning Light Fuel Gauge Generator Warning Light Temperature Indicator Light Turn Signal Indicator Lights Electric Clock	57
Underhood Light Rear Compartment Light	89
Back-Up Lights	1073
Radio Dial Light	1893



BT 11-20	Short Detector
BT 33-70	Belt Tensioner Gauge
BT 1501	Distributor Dwell Angle Adjusting Tool
J-2183-1-2	Drive Flange and Oil Pump Gear Anvil (Used for Removing Distributor Driven Gear Pin)
J-4170-B	Generator Belt Adjusting Tool (Used in Conjunction with Torque Wrench J-1264)
J-5184	Electrical Tension Checking Scale
J-6663	Headlight Aimers
J-7099	25 Ohm Variable Resistance
AE-2	Autronic Eye Tester (Modification Kit J-8662 Required)

Fig. 13-124 Tools



98 HOLIDAY COUPE
3837

AIR CONDITIONING

CONTENTS OF SECTION 14

PERIODIC MAINTENANCE

Remove road accumulation from condenser every 2,000 miles or as necessary.

The refrigerant and oil should be checked at least twice a year. Use Frigidaire 1000 Viscosity Oil.

Check and adjust compressor belt tension at the beginning of the cooling season.

The system should be operated for at least five minutes each month.

GENERAL DESCRIPTION

The Air Conditioning system provides refrigerated and dehumidified air to cool the car interior. The system uses both outside and recirculated air.

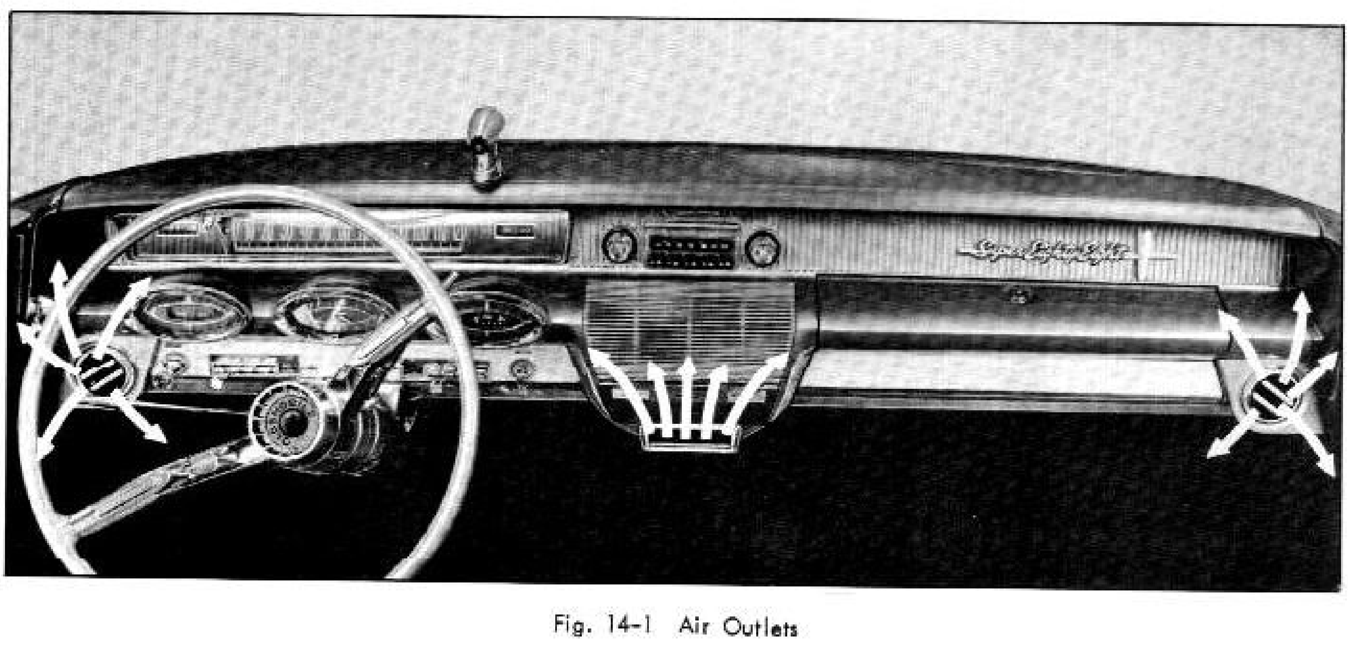


Fig. 14-1 Air Outlets

The temperature of the air entering the passenger compartment is regulated by a single control. Outside air is directed through the evaporator and discharged into the passenger compartment for normal ventilation. For normal cooling, 100% outside air passes through the evaporator core. For maximum cooling, at low speeds, approximately 75% recirculated air and 25% outside air is directed through the evaporator core.

Air Outlets (Fig. 14-1)

Adjustable air outlets are located on either side and under the instrument panel. The left and right hand air outlets may be adjusted to direct the air as desired. The center outlet can be controlled to direct or shut off the air. For maximum cooling the center outlet should be wide open. Floor cooling is provided by discharging air directly to the floor from fixed openings in the air manifold located under the instrument panel.

The air condition control assembly is mounted in the instrument panel. A three speed blower switch is located in the control assembly. (Fig. 14-2)

FAST COOL DOWN

To rapidly cool a car which has been standing for a period of time in the sun, open the center outlet, depress "NORMAL" button, slide temperature lever to the extreme right position and turn blower speed switch on "HI". Open car windows just long enough to expel hot air. After car has cooled, adjust temperature control lever position to suit individual comfort. Air flow can be directed by adjusting the side and center outlets. The recommended position of these outlets, for best over-all front and rear seat cooling, is when the outlets are adjusted to direct the air flow along the inside roof line.

DRIVING CONDITIONS

For normal driving conditions, the driver may adjust the temperature of cool air by moving the control lever to suit individual comfort. Selection of blower speeds should be regulated according to the amount of air forced into the passenger compartment by the forward motion of the car.

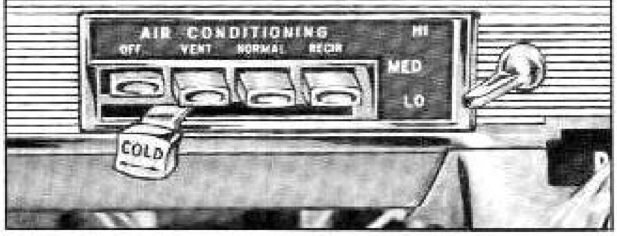


Fig. 14-2 Controls

When driving in heavy traffic, it may be desirable to set the blower speed switch on "HI". At higher car speeds, air will be forced by the forward motion of the car into the passenger compartment in greater volume, lessening the speed requirements of the blower motor. It then may be desirable to set the blower speed switch on "MED" or "LO".

SERIAL NUMBER

The serial number plate is attached to the top side of the compressor and includes the Serial Number and Model Number.

IMPORTANT: ALWAYS INCLUDE BOTH SERIAL NO. AND MODEL NO. ON REPORTS.

OPERATION OF SYSTEM (Fig. 14-3 and 14-4)

CONTROLS (Fig. 14-2)

The air conditioning control assembly is mounted in the instrument panel to the left of the steering column. To obtain ventilation without refrigeration, depress the "VENT" button. Air now enters the driving compartment through the left hand cowl outlet valve. With the temperature control lever moved to the right, and the "NORMAL" or "RECIRCULATE" button depressed, the compressor clutch engages the compressor. Movement of the control lever from left to right increases the degree of cooling within the car. The blower speed switch is located to the right of the control buttons. Three speeds, "HI", "LO" and "MED" are available for forced refrigerated ventilation.

COMPRESSOR

The refrigeration system uses an axial type compressor. It is a reciprocating compressor having five cylinders, with intake and discharge valve reeds for each cylinder. These valve reeds cause the compressor to have a definite separation between the discharge (high) side and the intake (low) side. Oil is picked up by the refrigerant in the compressor and is pumped through the refrigeration system. An oil test fitting is on the lower side of the compressor. The solenoid-operated clutch pulley permits the compressor to run only when refrigeration is desired. The only items to be serviced are the clutch pulley assembly, solenoid, compressor shaft seal and oil pump.

COMPRESSOR PRESSURE RELIEF VALVE

The compressor is equipped with a pressure relief valve which is placed in the system as a safety factor. Under certain conditions, the refrigerant on the high side may exceed a safe operating pressure. To prevent damage, the valve is designed to open automatically at approximately 430 p.s.i. Any condition that causes this valve to open should be corrected, and the refrigerant oil and refrigerant should be replenished as necessary.

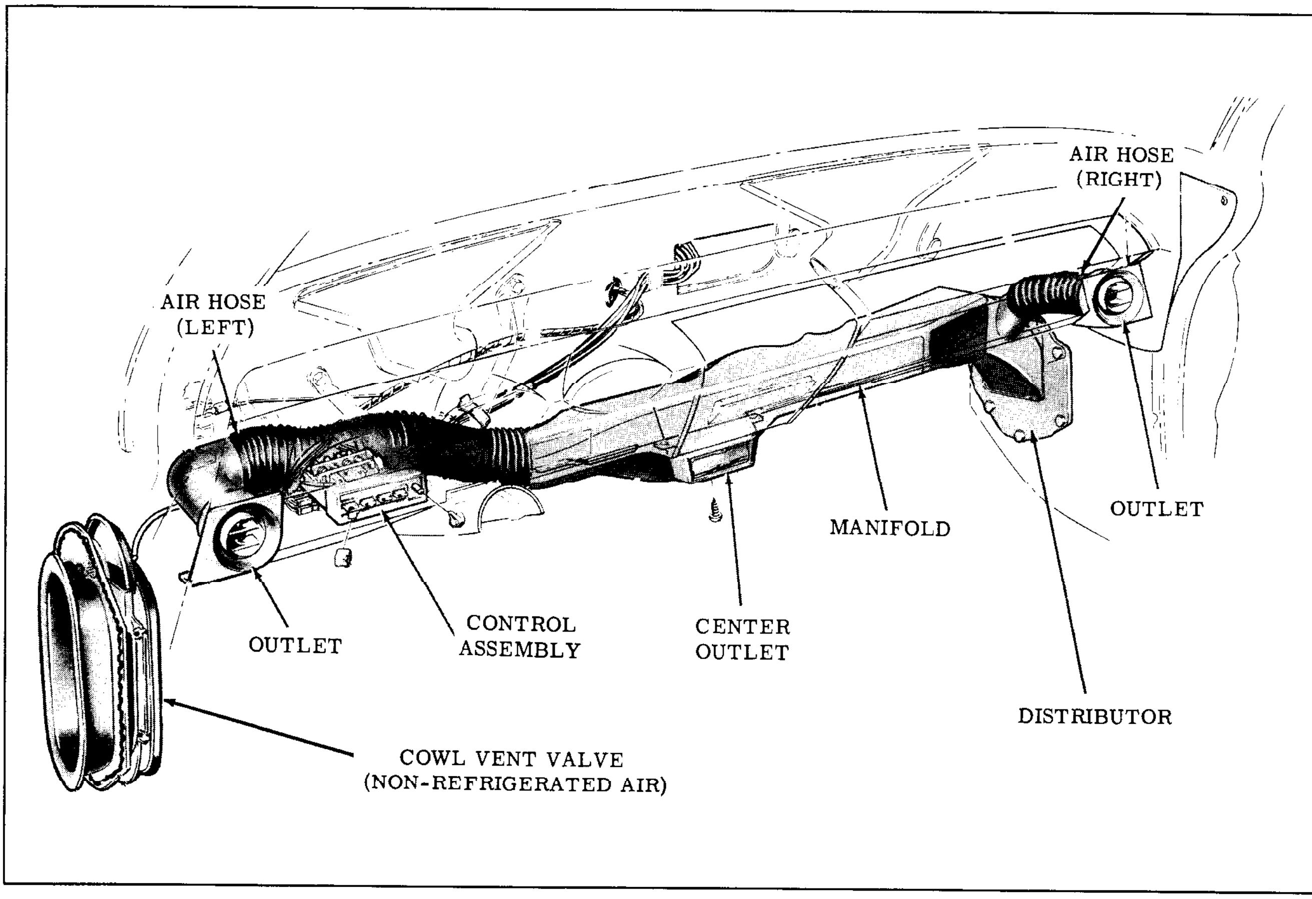


Fig. 14-3 Location of Air Outlets & Controls

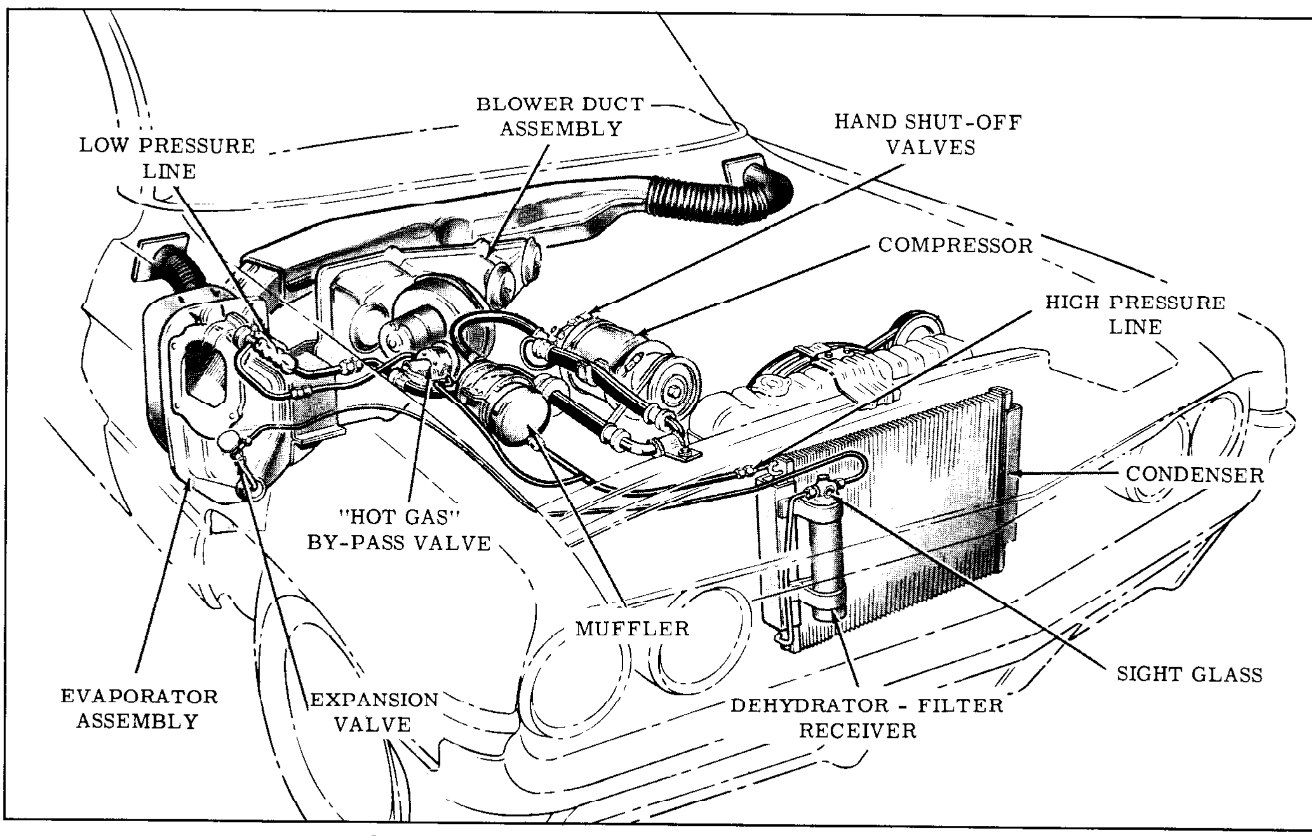


Fig. 14-4 Refrigerant System Unit Location

COMPRESSOR HIGH AND LOW PRESSURE VALVES (HAND SHUT-OFF)

The compressor inlet and outlet lines attach to shut-off valves on the outside of the compressor. These valves are necessary to permit pressure checks and servicing of the refrigerant system.

The compressor high and low pressure valves are two way valves. When the valve stems are turned completely counterclockwise, the passage to the compressor is connected to the refrigerant line, but sealed from the gauge fitting. (Fig. 14-5) This is the normal operating position.

When the valve stems are turned completely clockwise, the passages to the refrigerant lines are sealed, and the passages to the gauge fittings are opened. In this position, the evaporator and condenser are shut off from the compressor and the compressor can be removed or serviced.

CAUTION: NEVER OPERATE THE COMPRESSOR WITH THE HIGH PRESSURE VALVE CLOSED (FULLY CLOCKWISE).

When the valve stems are opened slightly from the counterclockwise position, both the passages to the gauge fittings and to the compressor are open. This permits pressure gauge readings while operating the system.

NOTE: The high pressure valve is the upper valve; the low pressure valve is the lower one.

The valves are serviced as an assembly and are sealed at the compressor by means of two "O" rings.

MUFFLER

A muffler in the high pressure side of the system reduces compressor noises and high pressure line vibrations. The muffler tank absorbs the surges from the compressor in a manner similar to the action of a hydraulic accumulator. No repairs are to be made on the muffler. If it is defective, it should be replaced. Always install the muffler with the outlet side down.

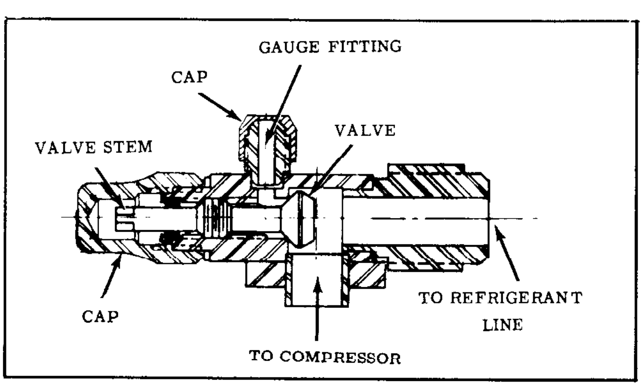


Fig. 14-5 Compressor Valve

CONDENSER

The aluminum condenser assembly is made up of coils which carry the refrigerant, and cooling fins which provide rapid transfer of heat. The condenser is located in front of the engine cooling system radiator so that it receives a high volume of air from the movement of the car and from the engine fan. The air passing through the condenser cools the high pressure refrigerant vapor, causing it to condense into a liquid.

SIGHT GLASS

The sight glass (at the top of the dehydrator-filter-receiver) is provided to aid in diagnosis, by permitting the refrigerant to be observed. The appearance of a steady flow of bubbles or foam, after the compressor has run long enough to stabilize, indicates a shortage of refrigerant.

The sight glass can be serviced without removing the dehydrator-filter-receiver assembly. After removal of the retaining screw the sight glass can be lifted out with caulking compound and the "O" ring can be removed with a wire hook.

CAUTION: When performing this operation the system should not be left open longer than absolutely necessary as the dehydrator will absorb an excess of moisture. Refer to SERVICING OF THE REFRIGERANT SYSTEM.

DEHYDRATOR-FILTER-RECEIVER ASSEMBLY

The functions of this unit are to absorb moisture and foreign material that may be present in the system after assembly, and to insure a solid charge of liquid refrigerant in the line feeding the expansion valve, providing the system is properly charged. This unit is not serviceable, and should be replaced when there has been a leak in the low pressure side of the system which permitted air and moisture to be drawn into the system.

EXPANSION VALVE (Fig. 14-6)

The expansion valve, mounted outside the evaporator housing, controls the flow of refrigerant into the evaporator. It is adjusted so that the temperature of the refrigerant at the evaporator outlet must be 6°F. higher than the temperature of the refrigerant at the inlet before more refrigerant is allowed to enter the evaporator. A capillary tube filled with carbon dioxide provides the temperature regulation of the expansion valve. The capillary tube is fastened to the low pressure refrigerant line coming out of the evaporator so that it communicates the temperature of the refrigerant at this point to the expansion valve. If the temperature differential between the inlet and outlet decreases below 6°F., the expansion valve will

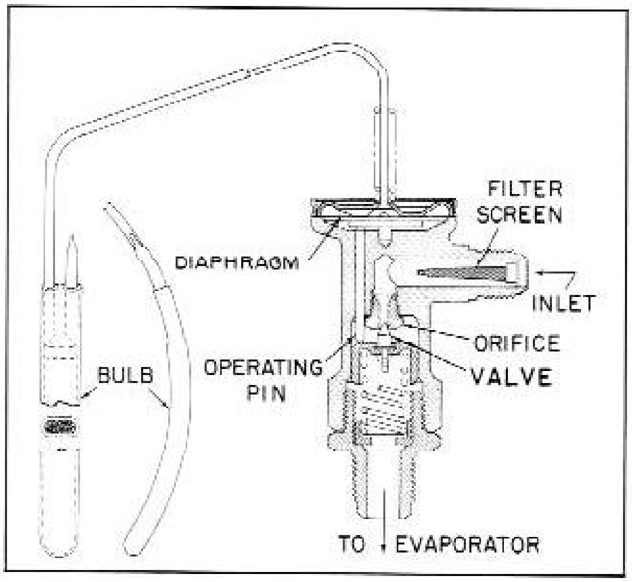


Fig. 14-6 Expansion Valve

automatically reduce the amount of refrigerant entering the evaporator. If the temperature differential increases above 6°F., the expansion valve will automatically allow more refrigerant to enter the evaporator, increasing the cooling. The only service operations to be performed on the expansion valve are the cleaning and/or replacement of the inlet filter screen.

NOTE: It is very important that the expansion valve capillary tube bulb be tightly clamped to the low pressure refrigerant line coming out of the evaporator for proper operation. Both the low pressure line and capillary tube should be clean at the points of contact.

EVAPORATOR

The evaporator assembly is attached to the right side of the cowl, under the fender.

The evaporator is a device which cools and dehumidifies the air before it enters the car. High pressure liquid refrigerant flows through the expansion valve into the low pressure area of the evaporator. This regulated flow of refrigerant boils immediately. Heat from the evaporator core surface is lost to the boiling and vaporizing refrigerant, which is cooler than the core, thereby cooling the core. The heat in the air passing through the evaporator core loses its heat to the cooler surface of the core, thereby cooling the air. As the process of heat loss from the air to the evaporator core surface is taking place, any moisture (humidity) in the air condenses on the outside surface of the evaporator core and is drained off as water.

"HOT GAS" BY-PASS VALVE (Fig. 14-7)

The by-pass valve performs two functions in the refrigeration circuit. First, it acts as a temperature control and secondly it limits the evaporator minimum pressure to prevent "freeze-up" of the evaporator coils. The valve serves as a temperature control being linked directly to the air conditioning temperature lever by a cable. The by-pass valve is opened more when the temperature lever on the air conditioning control is in the extreme left position. In this position it maintains high evaporator pressure. The farther to the right the temperature lever is positioned, the lower the evaporator pressure will become. The by-pass control cable adjustment is of extreme importance to insure proper operation in all temperature lever positions.

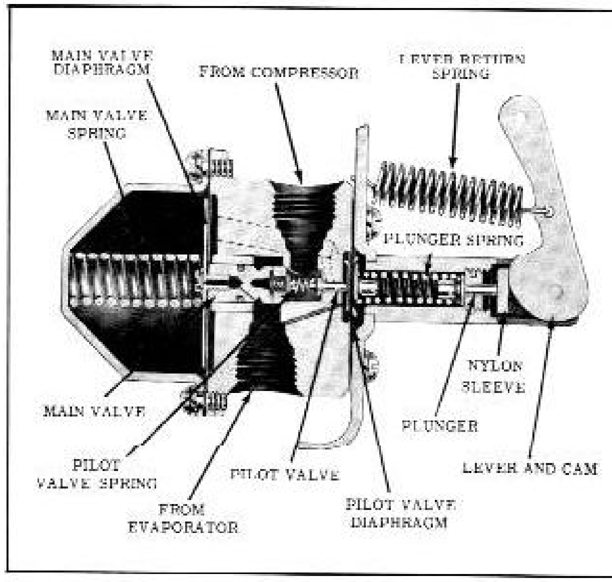


Fig. 14-7 "Hot Gas" By-Pass Valve

When the temperature lever is moved fully to the right, the by-pass valve is set to maintain low evaporator pressure (29.5 p.s.i.) which results in maximum cooling ability of the evaporator and consequently maximum cooling of the discharge air. The evaporator minimum pressure is limited by automatically injecting "Hot Refrigerant Gas" into the low pressure line from the evaporator core. This action takes place when the evaporator pressure tends to drop below 29.5 p.s.i.

REFRIGERATION CIRCUIT (Fig. 14-8)

Heat laden, low pressure vapor refrigerant is drawn into the compressor and pumped from the compressor through the muffler to the condenser under high pressure. The vapor is heated as a result of the compression process. As it passes through the condenser, the high pressure-high temperature vapor is cooled, which causes the vapor to condense into liquid. The liquid refrigerant passes from the condenser into the dehydrator-filter-receiver which acts as a reservoir. The liquid in the receiver is still under high pressure.

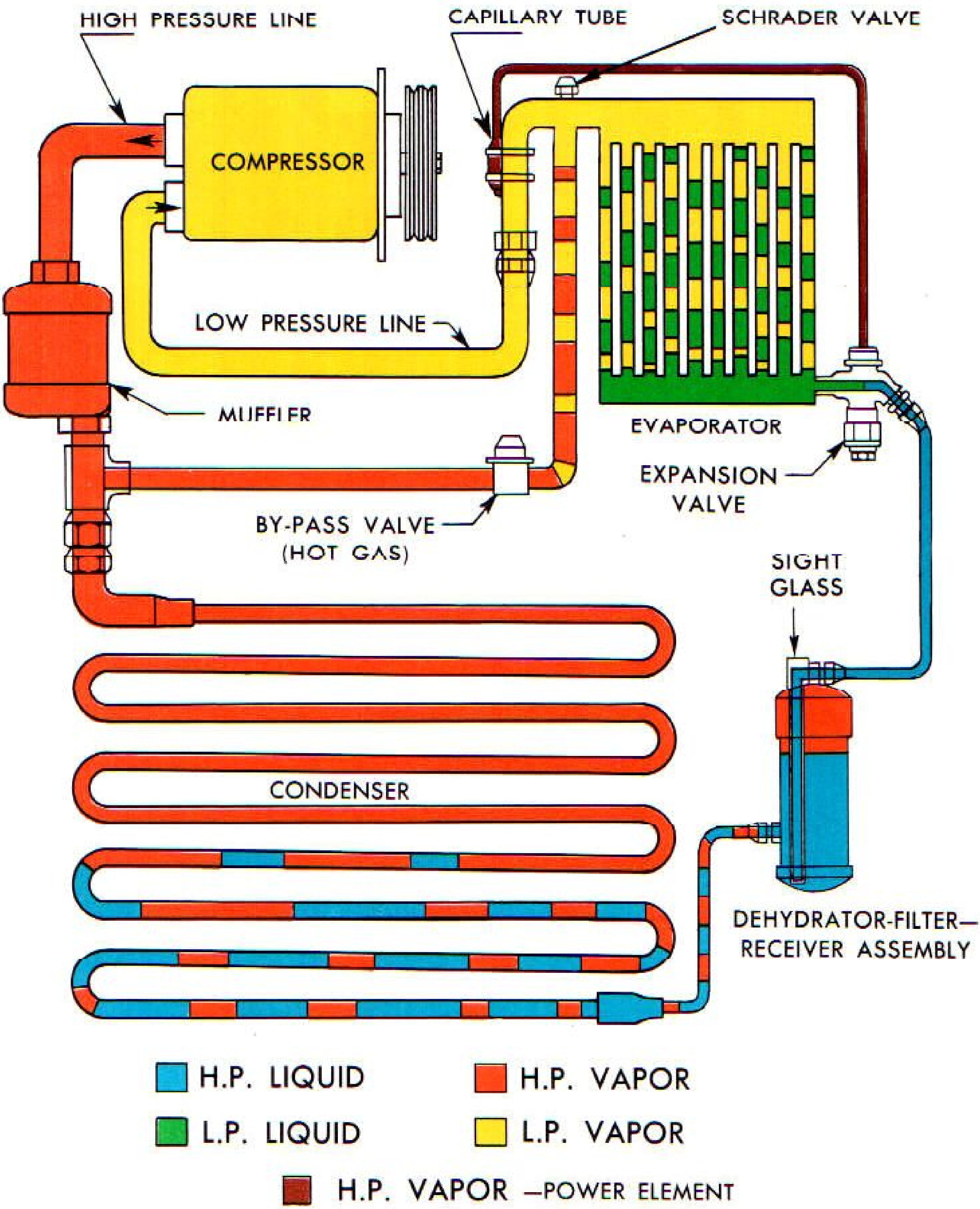


Fig. 14-8 Refrigeration Circuit

Liquid refrigerant from the receiver now passes on to the expansion valve. The expansion valve meters refrigerant into the evaporator core. When the pressure in the evaporator is reduced, the liquid refrigerant immediately begins to boil at low temperature as it enters the evaporator. As the refrigerant passes through the evaporator, it continues to boil, absorbing heat from (and thereby cooling) the air passing through the evaporator core. By the time the refrigerant leaves the evaporator, it has completely vaporized and has warmed approximately 6°F.

Refrigerant returns from the evaporator through the low pressure line to the compressor. When the evaporator pressure drops below 29.5 p.s.i. the by-pass valve partially opens to permit "Hot Gas" from the compressor to enter the suction line from the evaporator core to prevent freezing of the core. It is this same action that regulates the amount of cooling when the temperature lever on the instrument panel is moved to the left. By-pass valve action maintains higher evaporator pressures and warmer discharge air.

On a cold day, the system will by-pass almost constantly. As the ambient (atmospheric) temperature becomes higher, the by-pass system will work less and less.

PRECAUTIONS IN HANDLING REFRIGERANT 12

Do Not Leave Refrigerant Drum Uncapped

All refrigerant drums have a metal screw cap. This cap protects the valve and safety plug from damage; therefore, the protective cap should always be replaced when the drum is not in use.

Do Not Subject Drum to High Temperature

The drum should not be exposed to the radiant heat of the sun, for the resulting increase in pressure may cause the safety plug on the drum to burst.

The refrigerant drum should never be subjected to excessive temperature when charging a system. The drum should be heated for charging purposes by placing in 125°F. water. Never heat above 125°F. or use a blow torch, radiator, or stove to heat the drum.

Do Not Weld or Steam Clean On or Near the System

Welding or steam cleaning of, or near, any of the refrigerant lines or components of the refrigerant system can build up dangerous pressures in the system.

Do Not Fill the Drum Completely

When filling a small drum from a larger one, aways allow space above the liquid for expansion. If the drum were completely filled and the temperature increased, tremendous hydraulic force would develop.

Do Not Discharge Vapor Into Area Having Exposed Flame

Large quantities of refrigerant 12 should not be discharged into a closed room. The refrigerant may displace the oxygen in the air. Also, heavy concentrations of refrigerant 12 in contact with a live flame, such as a gas heater, or drawn into the intake of a running engine will produce a poisonous gas. This gas will also tarnish all bright metal surfaces.

Do Not Expose Eyes to Refrigerant

One of the most important precautions is protection of the eyes when handling refrigerant. Any liquid refrigerant which may accidentally escape is approximately 21.7°F. below zero. If any refrigerant comes in contact with the eyes, serious injury could result. Always wear goggles to protect the eyes when handling refrigerant.

If refrigerant should come in contact with the eyes:

1. DO NOT rub the eye. Splash the eyes with cold water to gradually get the temperature above the freezing point.
2. Apply a protective film of an antiseptic oil over the eye ball to reduce the possibility of infection.
3. Consult a doctor or an eye specialist immediately.

Should liquid refrigerant come in contact with the skin, the injury should be treated the same as though the skin has been frostbitten or frozen.

MAINTAINING CHEMICAL STABILITY IN THE REFRIGERATION SYSTEM

The efficient operation of the air conditioning refrigeration system is dependent on the pressure-temperature relationship of pure refrigerant. As long as the system contains only pure refrigerant (plus a certain amount of compressor oil which mixes with the refrigerant), it is considered to be chemically stable.

When the foreign materials, such as dirt, air, or moisture, are allowed to get into the system, they will effect chemical stability, resulting in acids or sludge which could cause the expansion valve to freeze up, and change the pressure-temperature relationship of the refrigerant. Thus, the system will no longer operate at the proper pressures and temperatures, and the efficiency will decrease and parts deteriorate.

The following general practices should be observed to insure chemical stability in the system:

Keep Lines Sealed

When disconnecting refrigerant lines, the lines should be at, near or above surrounding room temperature to prevent formation of condensation inside the lines. The lines should also be immediately capped to prevent entrance of dirt or foreign material.

Keep Tools Clean

Tools should be kept clean and dry. This includes the gauge set and replacement parts. Keep gauge lines plugged.

Use Clean Dry Oil Container

When adding oil to compressor, the container should be exceptionally clean and dry due to the fact that refrigeration oil is as moisture-free as possible; therefore, it will quickly absorb any moisture with which it comes in contact.

Keep Oil Container Capped

The oil container should not be opened until ready for use and should be capped immediately after use to reduce the possibility of the oil absorbing moisture.

Do Not Keep System Open Longer Than Five Minutes

PRECAUTION IN HANDLING LINES

All line connections use "O" rings for sealing. Replacement lines must be checked to see if they are completely sealed and dehydrated. Refrigerant lines must be free of kinks which would restrict the flow of refrigerant and cause noise.

Insulated clamps are used to reduce vibration and it is important to reinstall all the clamps when a line is replaced. Tightening connections is very important and the proper size wrenches should be used. The opposing fitting should always be held with a wrench to prevent distortion of connecting lines or components. This is especially important in tightening a hose connection as twisting a hose stiffens it and permits it to transmit more vibration. ALWAYS USE TWO WRENCHES WHEN TIGHTENING OR LOOSENING LINE FITTINGS. "O" rings should be coated with refrigeration oil and installed on the line before the line is inserted into the fitting, to insure proper sealing. Torque "O" ring fittings 30 to 35 ft. lbs.

When disconnecting any fitting in the refrigeration system, proceed very cautiously regardless of gauge readings. Open very slowly, keeping face and hands away so that no injury can occur if there happens to be liquid refrigerant in the line. If pressure is noticed when fitting is loosened, allow it to bleed off very slowly.

CAUTION: ALWAYS WEAR SAFETY GOGGLES WHEN OPENING REFRIGERANT LINES.

In the event any line is opened to atmosphere, it should be IMMEDIATELY capped to prevent entrance of moisture and dirt.

SPECIAL EQUIPMENT

REFRIGERATION GAUGE SET (Fig. 14-9)

The gauge set is used when purging, evacuating, charging, or diagnosing trouble in the system. The low pressure gauge is graduated into pounds of pressure from 0 to 100 and in the opposite direction in inches of vacuum from 0 to 30. The high pressure gauge is graduated from 0 to 300 pounds pressure. The center connection is common to both and is for the purpose of attaching a line for adding refrigerant or evacuating the system. When this connection is not required, it should be capped with a flare nut and cap.

The hand shut-off valves close each opening to the connector and to each other. They DO NOT open or close off pressure to the gauges.

LEAK DETECTOR (TORCH)

The leak detector (torch) is used to locate a leak in any part of the refrigerant system. To operate, the detector is ignited and the sampling tube is held close to all possible points of leakage (fittings, connections, etc.). If the flame changes color, particularly green, brilliant blue, or purple, refrigerant is being drawn into the sample tube, indicating a leak.

CAUTION: DO NOT BREATHE THE FUMES THAT ARE PRODUCED BY THE LEAK DETECTOR AS THEY ARE POISONOUS.

CAUTION: The valve should never be closed

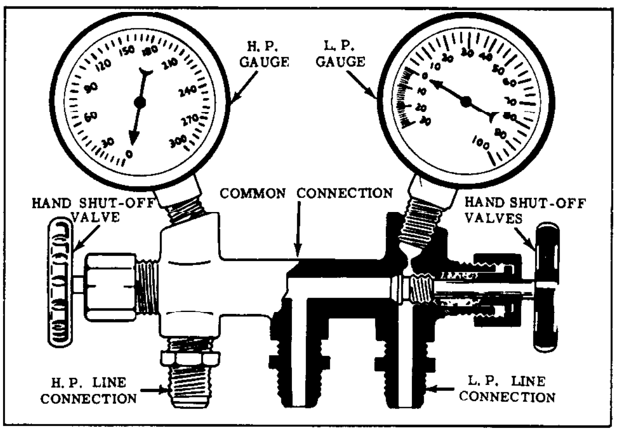


Fig. 14-9 Gauge Set

tightly when the needle is hot because the needle will "freeze" when the burner cools and the valve seat will be damaged.

For confined areas, such as sections of the evaporator and condenser, the alcohol torch or a Bernz-O-Matic torch is the only method which can be used.

LEAK DETECTOR (LIQUID)

There are a number of fittings and places throughout the air conditioning unit where leak detector solution (Part No. 564255) may be used to pinpoint leaks.

Apply the solution to the suspected area with a swab that is attached to the bottle cap. Bubbles will form within seconds if there is a large leak.

VACUUM PUMP

The vacuum pump is recommended as a service tool. If a leaking system has been operated in a discharged condition, the receiver-dehydrator-filter assembly should be replaced and a vacuum pump should be used to thoroughly evacuate the system.

SERVICING OF INDIVIDUAL UNITS (NOT IN REFRIGERANT SYSTEM)

The following services and repairs concern parts of the air conditioning system which can be serviced without opening the refrigerant system.

COMPRESSOR BELT ADJUSTMENT

Tool 33-70 is used to check the compressor belt tension. (Fig. 14-10)

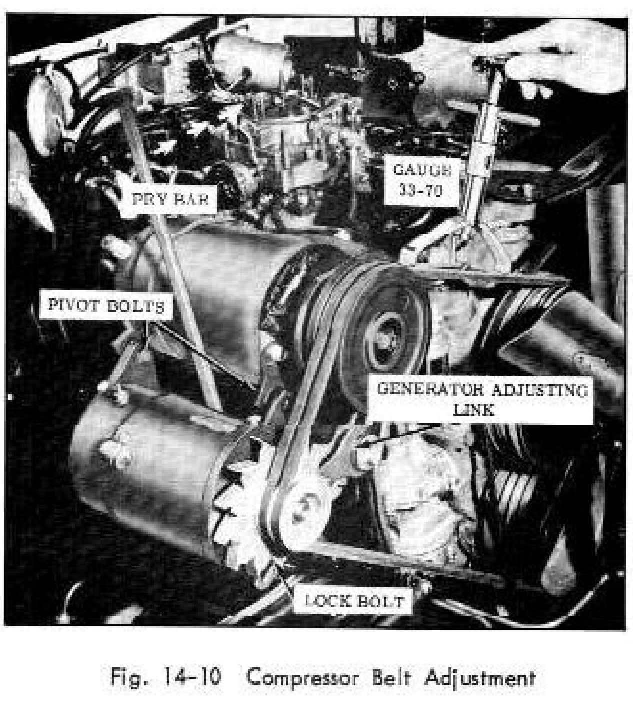


Fig. 14-10 Compressor Belt Adjustment

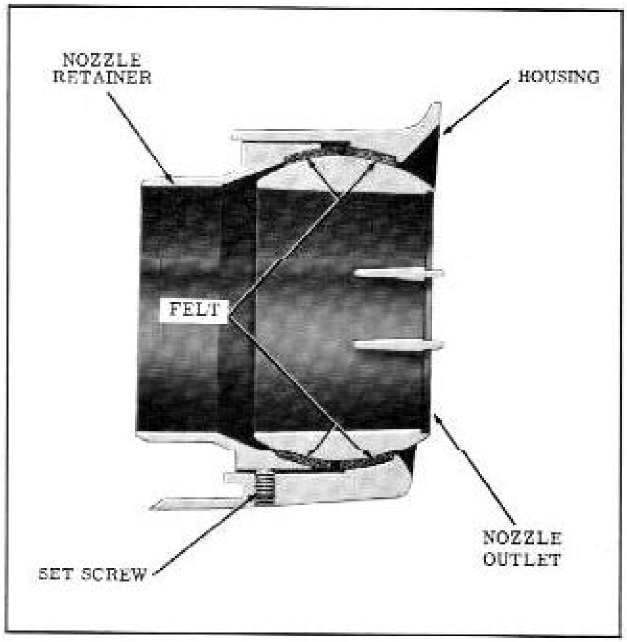


Fig. 14-11 Air Outlet Adjustment

If belts require adjustment:

1. Loosen the generator bracket bolts and link.
2. Pivot the generator until the pointers on Tool 33-70 are even with line on tool plunger.
3. Tighten the generator bracket bolts and adjusting link.
4. Check the other belt if it is outside the gauge limits, replace both belts as a matched set.

AIR OUTLETS

Adjustment (Fig. 4-11)

Nozzles should be free to rotate but tight enough

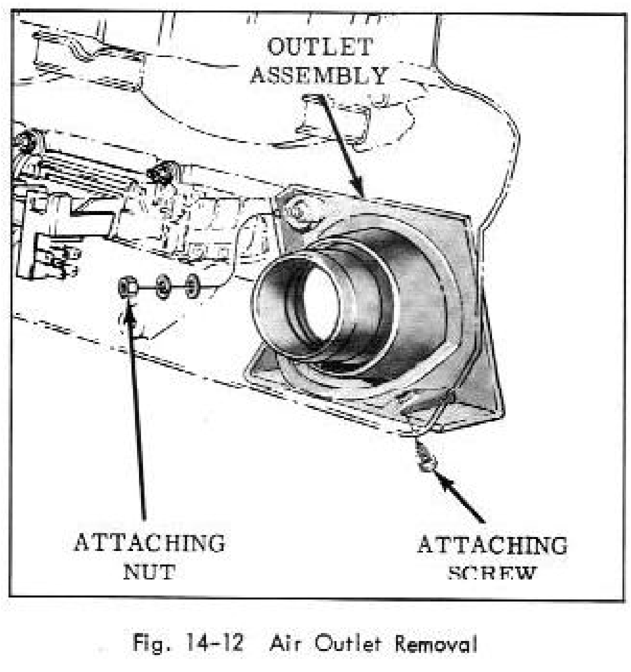


Fig. 14-12 Air Outlet Removal

to remain in a set position. If the tension is insufficient:

1. Loosen set screw at bottom through opening in housing.
2. From behind instrument panel, push in retainer to tighten or pull out to loosen ball adjustment.
3. Tighten set screw.

Removal (Fig. 14-12)

1. Remove side panel.
2. Slide hose off nozzle retainer.
3. Remove nut and screw at bottom of housing, then remove outlet assembly.

COMPRESSOR CLUTCH SWITCH

Adjustment (Fig. 14-13)

The compressor clutch switch is actuated by the sliding lever in the control assembly. The switch should close when the lever is moved 1/4" from the extreme left position. If necessary to adjust, bend the switch bracket.

CONTROL ASSEMBLY

Remove and Install (Fig. 14-14)

1. Remove the two control to cluster nuts at top of control behind instrument panel.
2. Remove control assembly from instrument panel, then remove by-pass valve cable.

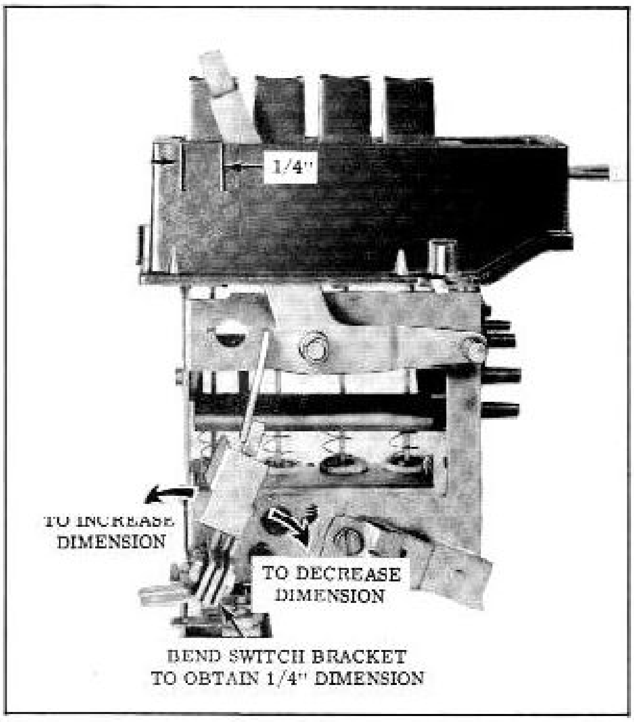


Fig. 14-13 Clutch Solenoid Switch Adjustment

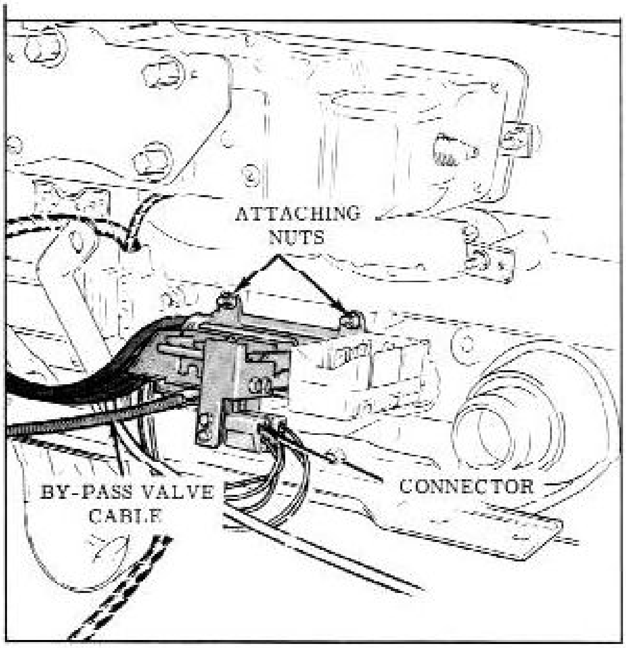


Fig. 14-14 Control Assembly Removal

3. Remove vacuum hoses, wires and light socket from control assembly.
4. To install, reverse removal procedure. Refer to Fig. 14-10, Fig. 14-11 and Fig. 14-12 for proper installation of hoses.

"HOT GAS" BY-PASS VALVE CABLE ADJUSTMENT (Fig. 14-15)

1. Check to insure cable is not kinked and operates freely, then disconnect return spring.
2. Place the lever in the extreme right position.
3. Disconnect the cable from the lever and loosen

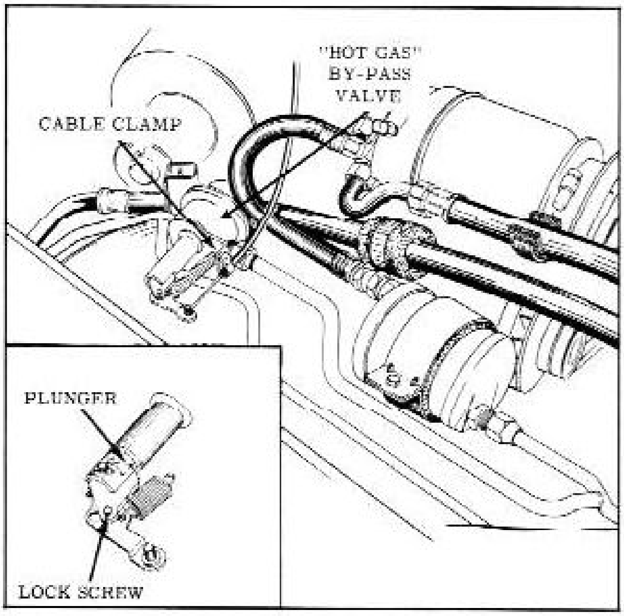


Fig. 14-15 By-Pass Valve Cable Adjustment

the cable clamp on the by-pass valve bracket.

4. Loosen the lock screw on the lever assembly.

5. With the lever against stop, position the cam so that it just touches the nylon plunger. Tighten the lock screw in this position.

6. With the by-pass lever held against its stop, install the control wire coil over the lever pin and tighten the cable clamp. Install return spring.

7. Move the control to the left and back to the extreme right position. There should now be 1/16" spring-back of the lever. Again check to make sure that the cam is just touching the nylon plunger and lever on "Hot Gas" valve is against the stop.

BLOWER MOTOR

The blower motor assembly is mounted on the blower duct at the right side of the cowl in the engine compartment. To remove the motor and blower, remove the 5 motor to case attaching screws, and the low pressure hose clamp from the fender tie bar. Disconnect the motor lead at the connector and remove the motor ground wire screw at the by-pass valve bracket. Bend the low pressure hose down at the housing and remove the blower motor assembly.

BLOWER DUCT ASSEMBLY

Removal and Installation (Fig. 14-16)

1. Disconnect battery ground cable.
2. Remove air cleaner.
3. Remove vacuum hoses from three diaphragms on duct, and disconnect wiring at resistor.
4. Disconnect motor lead at connector and remove motor ground wire screw at by-pass valve bracket.
5. Remove low pressure hose clamp.
6. If equipped with heater, disconnect heater hoses at heater core. Wire the upper hose above coolant level. Drain coolant from heater core in a small container.
7. Remove wires and windshield washer hoses from clips at top of duct.
8. Remove right front wheel and fender filler access plate.
9. Disconnect heater core and case from cowl.
10. Remove six screws from evaporator to blower connecting duct, then remove top section of connecting duct.
11. Remove nuts and screws holding duct assembly to cowl, then remove duct assembly.
12. Remove the lower section of connecting duct from blower duct assembly.

When installing, reverse removal procedure. Be sure rubber gasket is in place on cowl, and reseal connecting duct.

DIAPHRAGM ADJUSTMENTS (Blower Duct Assembly Removed)

The three vacuum diaphragms mounted on the blower duct are pre-set prior to assembly and no

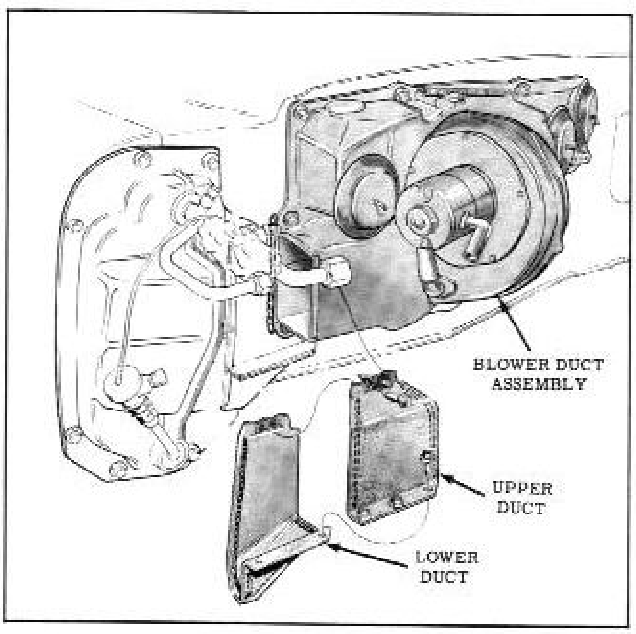


Fig. 14-16 Blower Duct Assembly

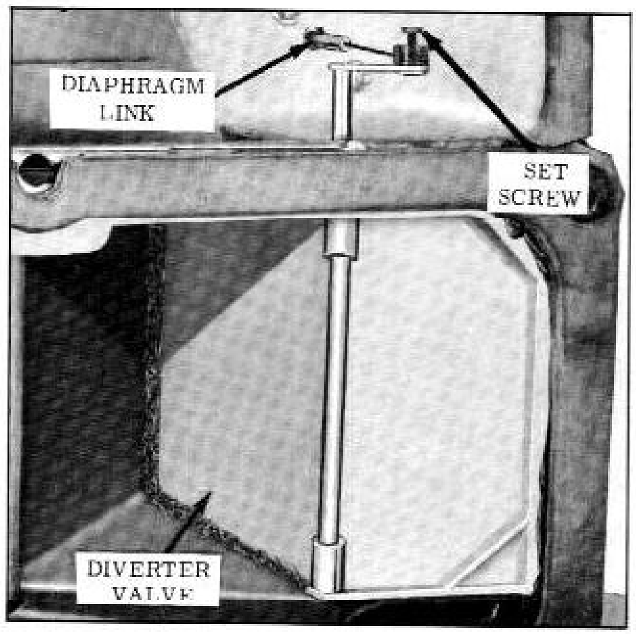


Fig. 14-17 Diverter Valve Adjustment

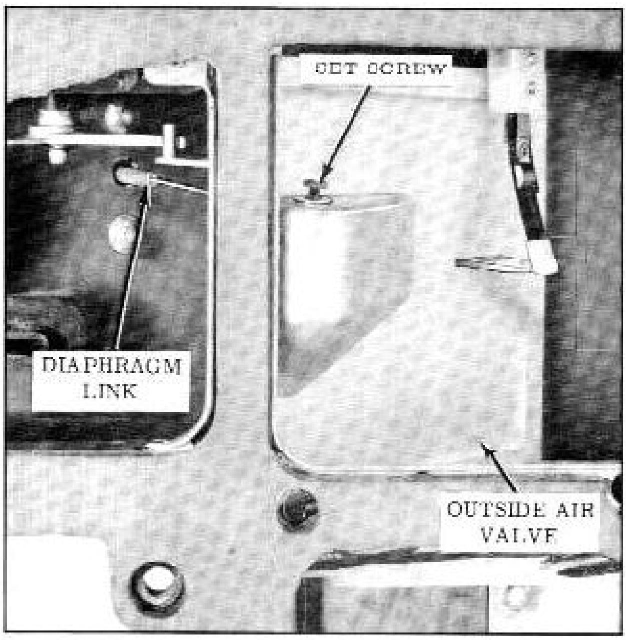


Fig. 14-18 Outside Air Valve Adjustment

adjustment is possible until the blower duct assembly is removed.

No adjustment is provided for the "ON-OFF" switch in the blower duct. The switch is actuated by a boss on the outside air valve when the valve opens approximately 1/2".

Diverter Valve (Fig. 14-17)

With the diverter valve held closed by spring tension, loosen set screw and pull diverter valve diaphragm link out until it is not quite fully extended, then tighten set screw.

Outside Air Valve (Fig. 14-18)

With the outside air valve closed by spring tension, loosen the set screw and pull outside air valve diaphragm link out until it is not quite fully extended, then tighten set screw.

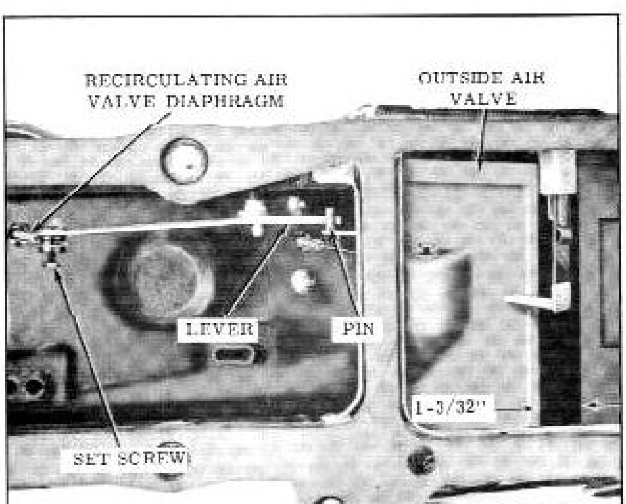


Fig. 14-19 Recirculating Air Valve Adjustment

Recirculating Air Valve (Fig. 14-19)

With set screw loosened, position outside air valve open 1-3/32" from edge of door opening. A wood block 1-3/32" wide can be used as a gauge for this dimension. Push recirculating diaphragm link all the way in and tighten set screw. With outside air valve open 1-3/32" and the diaphragm link pushed all the way into the diaphragm, the lever should just contact the pin.

CLUTCH AND PULLEY ASSEMBLY

Clutch Adjustment (Fig. 14-20)

1. Energize clutch coil by disconnecting coil wire at connector on compressor, then connect a jumper wire from known "hot" source to coil wire.

2. With feeler gauge, J-9228 check air gap between rotor plate and coil housing. This air gap should be .025" to .035". If the air gap is not within these specifications, it will be necessary to remove the rotor plate and add or subtract shims. These shims come in seven thicknesses: .010", .012", .015", .018", .020" .022", .025", and by proper selection of these shims, .005" vibration in air gap can be obtained.

Pulley and Rotor Plate Removal (Fig. 14-21)

1. Energize compressor clutch coil long enough to permit removal of the compressor shaft nut after straightening lock tangs.

   NOTE: Energize clutch coil by disconnecting coil wire at connector on compressor, then connect a jumper wire from known "hot" source to coil wire. Remove nut and lock

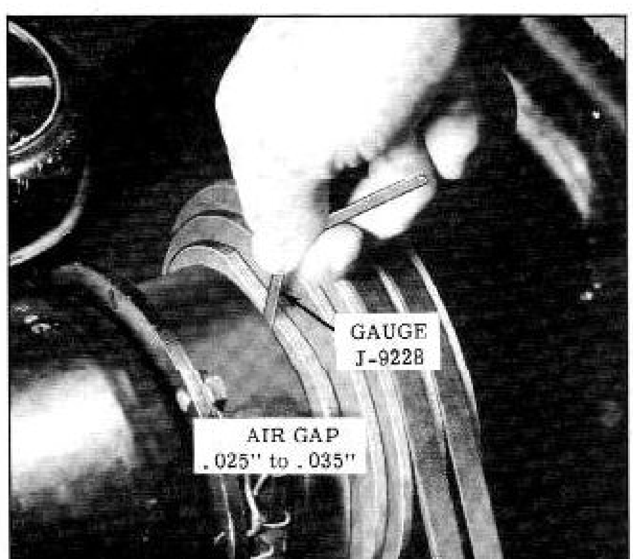


Fig. 14-20 Checking Rotor Plate Air Gap

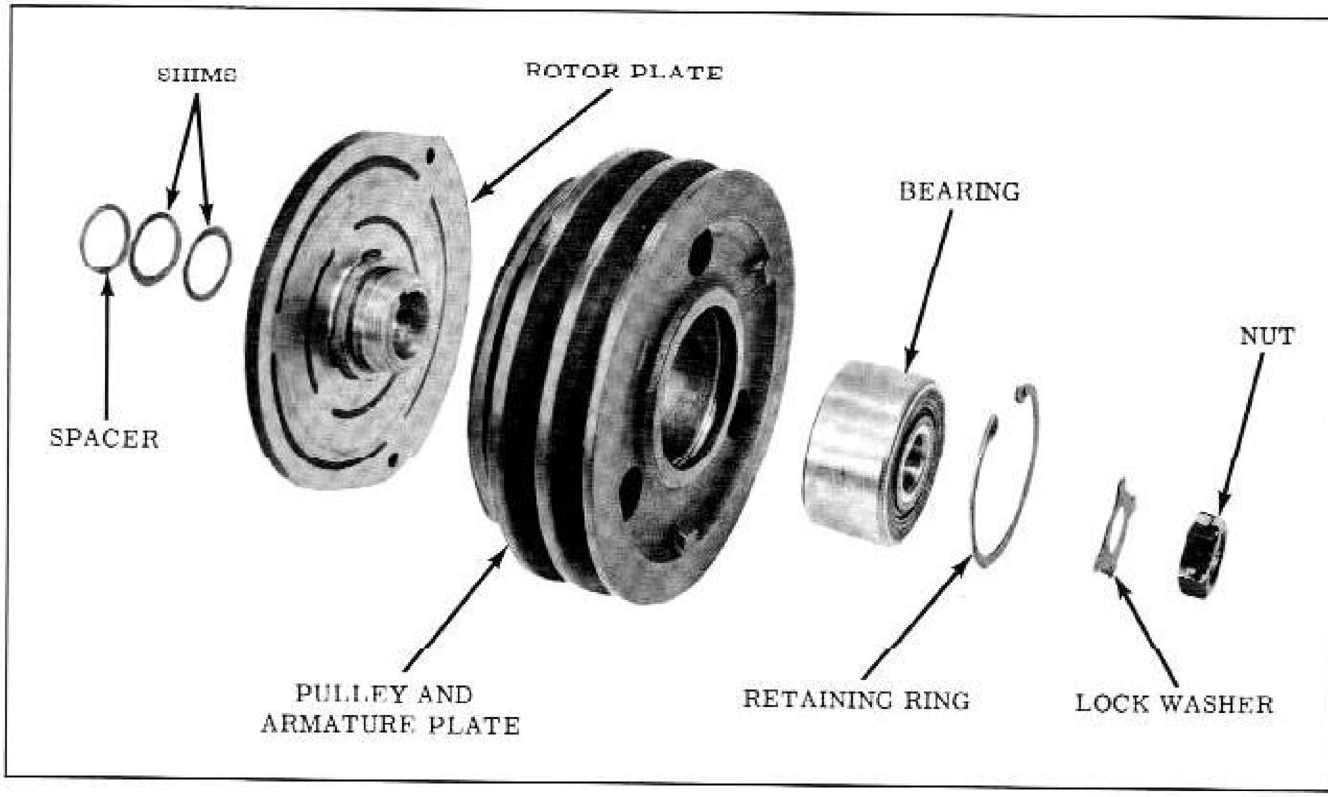


Fig. 14-21 Pulley and Clutch Assembly

washer from the compressor shaft.

2. Remove pulley belts, then using Tool J-8433, remove pulley. (Fig. 14-22)
3. Thread Tool J-6322 onto hub of rotor plate. While holding the tool with a wrench, tighten the tool bolt to remove rotor plate. (Fig. 14-23) Remove Tool J-6322 from the rotor hub.
4. If selective shims or spacer are to be removed, remove the Woodruff key.
5. Inspect pulley and armature plate for cracks or broken drive springs. Inspect rotor plate for cracks. Do not replace clutch plates for a scoring condition. (Fig. 14-24)

Pulley and Rotor Plate Installation

1. With spacer, shims, and Woodruff key installed, position rotor plate on compressor shaft. (Threaded hub portion of plate facing away from compressor.)
2. If Tool J-6323 is to be used, place Spacer

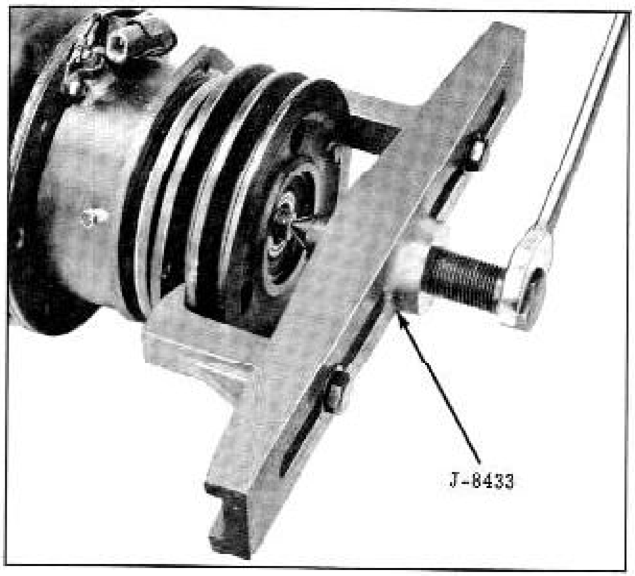


Fig. 14-22 Pulley Removal

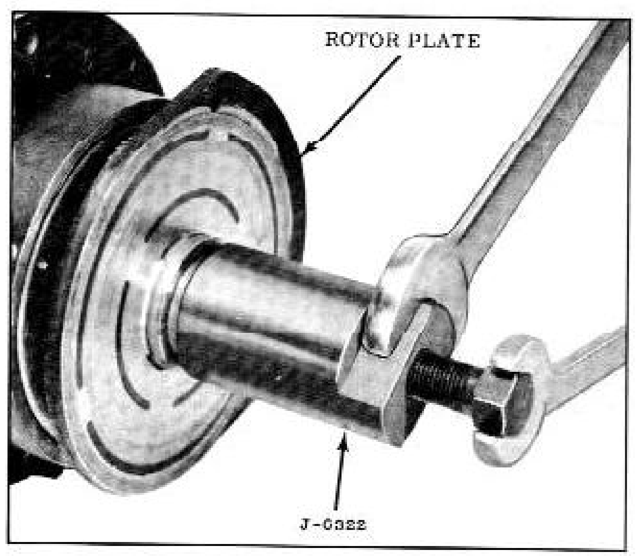


Fig. 14-23 Rotor Plate Removal

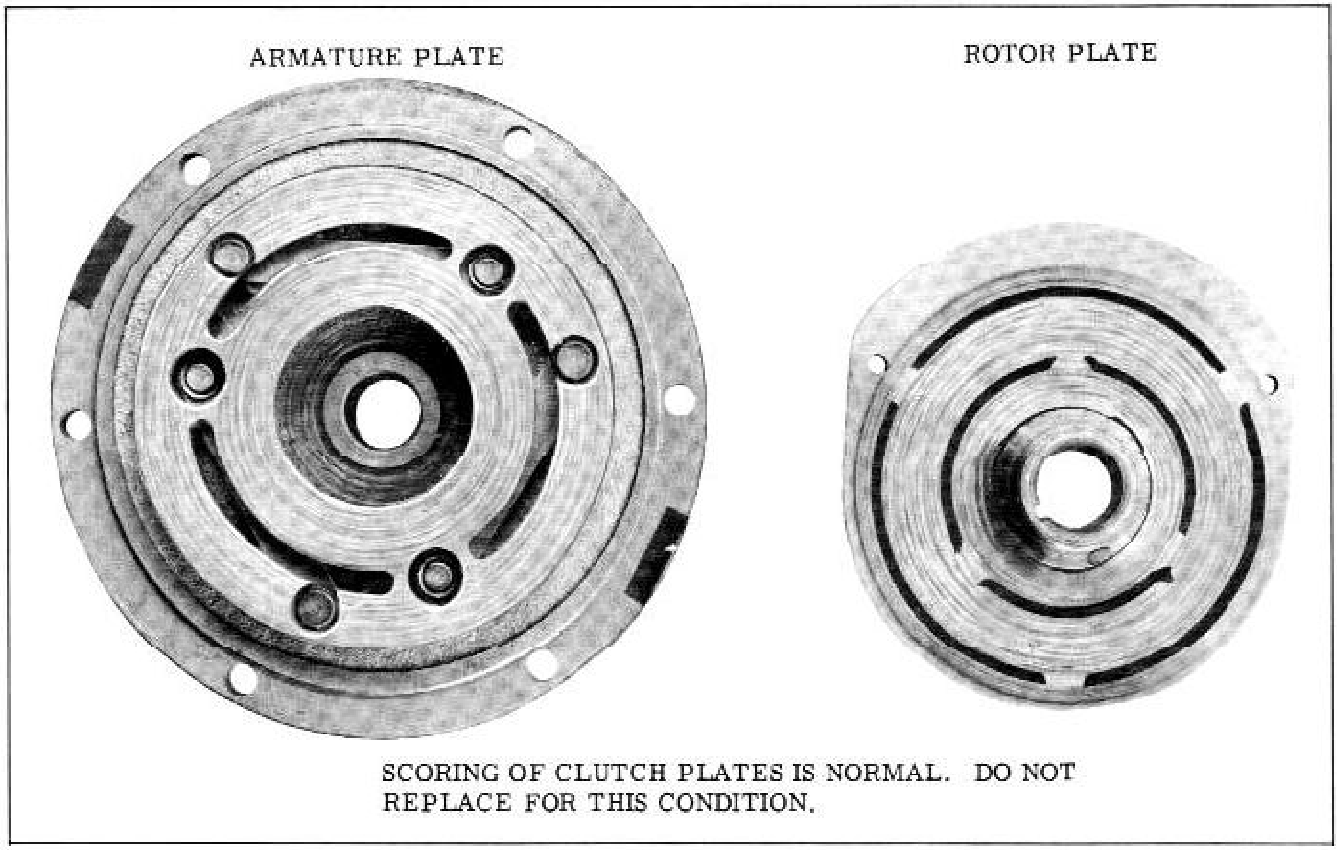


Fig. 14-24 Normal Clutch Plate Wear

J-6323-5 on the compressor shaft with the chamfered side facing the clutch assembly.

3. Thread the bolt of Tool J-6323 or J-8446, without spacer, onto the compressor shaft, and while holding the bolt, turn the nut counter-clockwise until the rotor plate seats against the spacer and shims. (Fig. 14-25) Remove the tool(s).

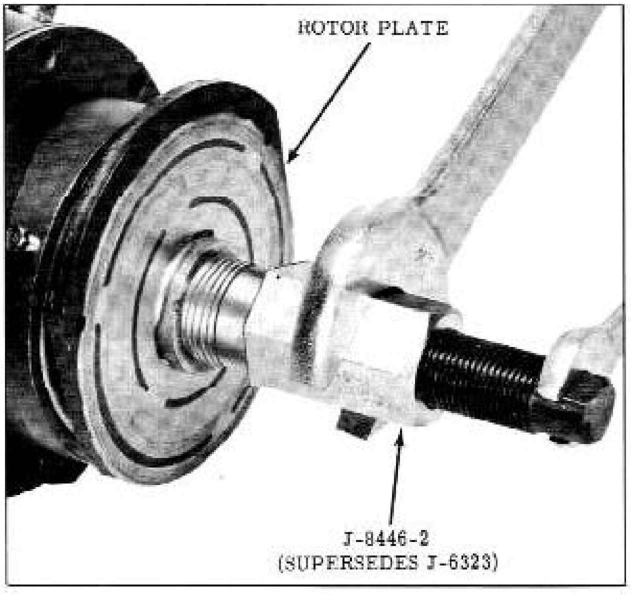


Fig. 14-25 Installing Rotor Plate

4. Check rotor plate air gap. The air gap must be .025" to .035". (Fig. 14-20)

5. Start pulley on compressor shaft, then place Spacer J-6323-3 over the tool bolt with the chamfered side away from the tool if using Tool J-6323. Thread bolt of Tool J-6323 or J-8446 without spacer, onto compressor shaft. While holding the tool bolt, turn the tool nut counterclockwise to press the pulley onto the compressor shaft. (Fig. 14-26) Remove tool(s).

6. Install lock washer and nut on compressor shaft. (Do not torque at this time.)

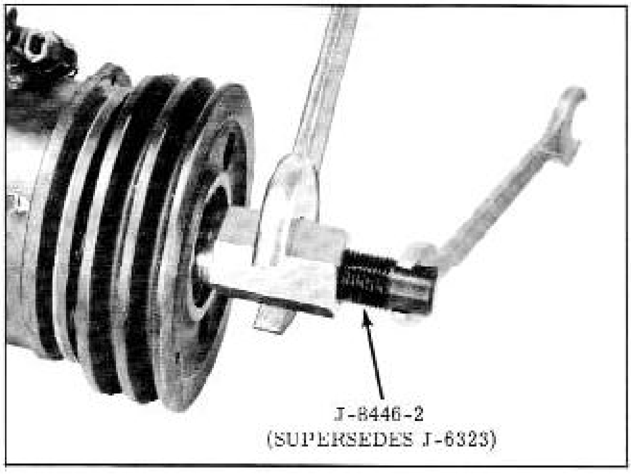


Fig. 14-26 Installing Pulley

7. Install and adjust compressor belts using Tool 33-70.

8. With the clutch coil energized, torque the compressor shaft nut 5 to 7 ft. lbs. Bend lock washer tangs against nut.

PULLEY BEARING

Removal

1. Remove pulley.
2. Remove bearing retainer ring from groove in pulley cavity using No. 3 Tru-Arc Pliers.
3. Remove bearing from pulley hub.

NOTE: If pulley hub shows evidence of wear due to outer race of bearing rotating in hub, replace pulley.

Installation

1. Install new bearing into pulley by pressing on outer race of bearing.

2. Install retainer ring (chamfer out), then install pulley.

CLUTCH ACTUATING COIL (Fig. 14-27)

Removal

1. Remove the pulley and the rotor plate.
2. Remove the coil retainer and insulator.
3. Disconnect the lead-in wire and remove the lead-in terminal, ground wire screws, and the coil wire retaining clamp from the compressor flange.
4. Remove the coil and insulator from coil housing, taking care not to damage the coil.
5. Inspect insulator and "O" ring, replace if damaged.

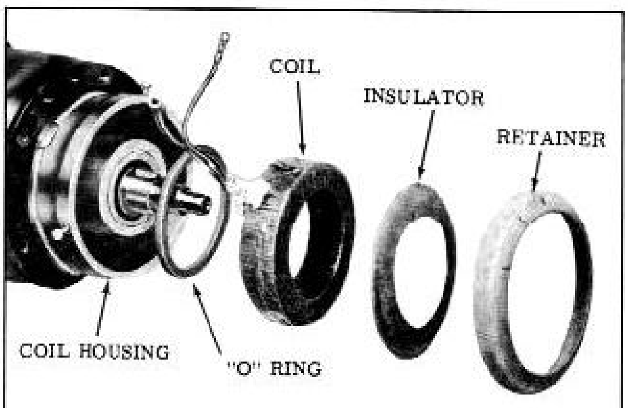


Fig. 14-27 Clutch Coil Assembly

Installation

1. Tape the "O" ring to the inner side of coil.
2. Route coil leads through opening in coil housing and install coil.
3. Install retaining clamp, connect ground wire, and connect positive leads to the connector. Attach connector bracket to compressor flange.
4. Install paper insulator with the dished side toward the coil.
5. Install coil retainer over coil insulator with dished side toward coil and press firmly in place while installing the 3 retainer screws.
6. Install the rotor plate on the compressor shaft. (Fig. 14-25)
7. Check the air gap between the clutch and the housing. Air gap must be .025" to .035".
8. Install the pulley. (Fig. 14-26)
9. Install compressor belts and adjust tension using Tool 33-70.
10. Energize clutch coil and torque compressor shaft nut 5 to 7 ft. lbs. Bend lock washer tangs against nut.

SERVICING OF THE REFRIGERANT SYSTEM

In removing and replacing any part of the refrigerant system except the compressor, the following operations must be performed.

1. Purge the system by releasing the refrigerant to atmosphere.
2. Remove and replace the defective part.
3. Evacuate the system of air and moisture.
4. Charge the system with refrigerant 12.

PURGING THE SYSTEM

1. With the engine stopped, remove protective caps from compressor high and low pressure hand shut off valves. (Fig. 14-28)
2. Make sure both valves are turned fully counterclockwise; this is to assure that gauge outlets are closed.
3. Remove caps from both gauge outlets on compressor.
4. Crack open (turn clockwise) high and low pressure hand shut-off valves on compressor

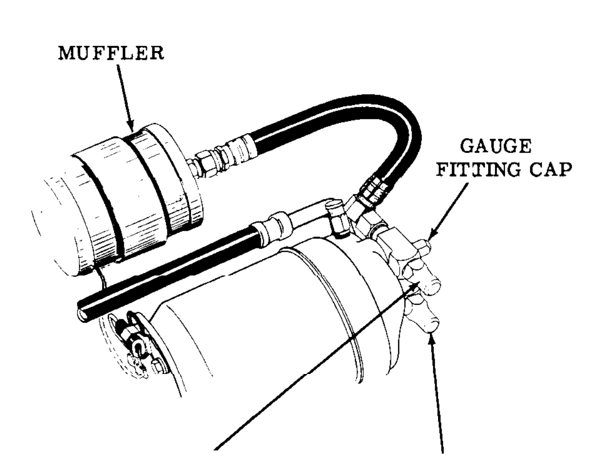


Fig. 14-28 Shut-Off Valves

and allow refrigerant to escape from the system.

CAUTION: Do not open valves beyond cracking point or compressor oil may be discharged with the refrigerant.

The complete system has now been purged of refrigerant and any part in the refrigeration system can be replaced.

EVACUATING THE SYSTEM WITHOUT USING VACUUM PUMP (VACUUM PUMP RECOMMENDED)

1. Have gauge set and refrigerant drum connected as shown in Fig. 14-29.

2. Turn compressor high pressure hand shut-off valve fully clockwise. Turn compressor low pressure hand shut-off valve fully counterclockwise, then two turns clockwise. Replace end caps and tighten.

   CAUTION: Leave compressor high pressure gauge outlet cap off.

3. Close high pressure gauge valve and open low pressure gauge valve.

4. Set refrigeration temperature control lever fully to the right, start engine and allow to run at slow idle to obtain a vacuum of 28" for 5 minutes.

   NOTE: Position a container to receive any oil discharge from the high pressure gauge outlet so that an equivalent amount of new oil can be added.

5. While engine is running, install cap on compressor high pressure gauge outlet.

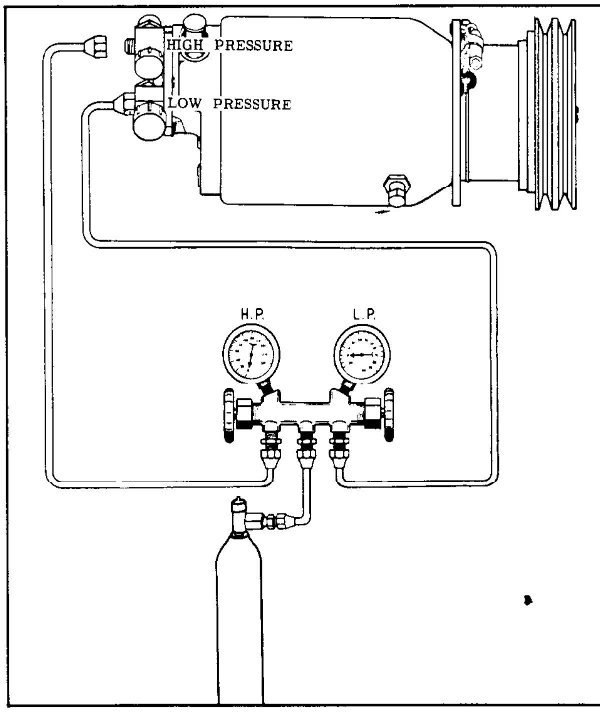


Fig. 14-29 Evacuating the System

6. Stop engine and observe if 28" vacuum will hold for 3 minutes.

7. Open valve on refrigerant drum and allow system to charge up to drum pressure; then close valve on refrigerant drum.

8. Again purge the system through the compressor high pressure gauge outlet, by removing gauge outlet cap. After system is purged, start the engine. Allow to run at slow idle to obtain a vacuum of 28" for 5 minutes.

9. While engine is running, install cap on compressor high pressure gauge outlet, then stop the engine.

   NOTE: This second evacuation is to eliminate any air or moisture that might have remained in the system.

10. Place refrigerant drum on scales and weigh accurately. This is to determine amount of refrigerant used to bring the system up to drum pressure and to complete the full charge of refrigerant. Set drum in a pail of water at not more than 125°F. if desired. (If pail of water is used, weigh it with refrigerant drum.)

11. Open valve on refrigerant drum to charge system to drum pressure.

12. Turn compressor high pressure hand shut-off valve fully counterclockwise and remove gauge outlet cap.

13. Crack open compressor high pressure hand

shut-off valve to purge outlet, crack open high pressure gauge to valve to purge hose, and connect hose to compressor while purging.

14. Turn compressor high pressure hand shut-off valve clockwise two turns, then close high pressure gauge valve.

The system is now ready for charging.

CHARGING THE SYSTEM

After the system is evacuated, leave the gauge set and refrigerant drum connected for the charging process. Also make sure the high pressure gauge valve is closed, the low pressure gauge valve is open, and the valve on the refrigerant drum is closed; then proceed as follows:

1. Open valve on refrigerant drum to allow refrigerant to enter the system. Start the engine and operate at fast idle with the temperature control fully to the right and the "NORMAL" button depressed. Close low pressure valve in gauge set at frequent intervals to be certain pressure in the low side is always maintained above 5 p.s.i.

2. When 5 lbs. 3 ozs. of refrigerant has entered the system, close the refrigerant drum valve and the low pressure gauge valve.

3. Turn both compressor hand shut-off valves fully counterclockwise, remove the gauge set, and replace caps on hand shut-off valves and gauge fittings.

4. After the system is charged a performance check should be made. Observe particularly for excessive head pressures.

BY-PASS VALVE

NOTE: When leak testing, be sure the cover attaching screws and the mounting bracket attaching screws are tight. Also, a small leak at the By-Pass Valve adjusting screw is normal after the lever has been moved, and will not require a new parts kit installation.

Disassembly (Fig. 14-30)

1. Remove valve assembly from car for bench disassembly of unit.

2. With unit on bench, remove counter balance springs, retainer, pin, lever, and moulded spacer from mounting bracket.

3. Using Tool J-6389, remove the adjusting screw from mounting bracket.

4. Remove plunger, shim washers, and adjusting spring from mounting bracket.

5. Mark both mounting bracket and valve body with a scribed line or center punch to assure same reassembly of units.

6. Remove the four attaching screws and lock washers, mounting bracket, back-up plate, and pilot diaphragms.

7. Remove six cover attaching screws. (Use caution, cover is under spring tension.)

8. Remove cover, main valve spring, main valve and diaphragm assembly, pilot valve spring

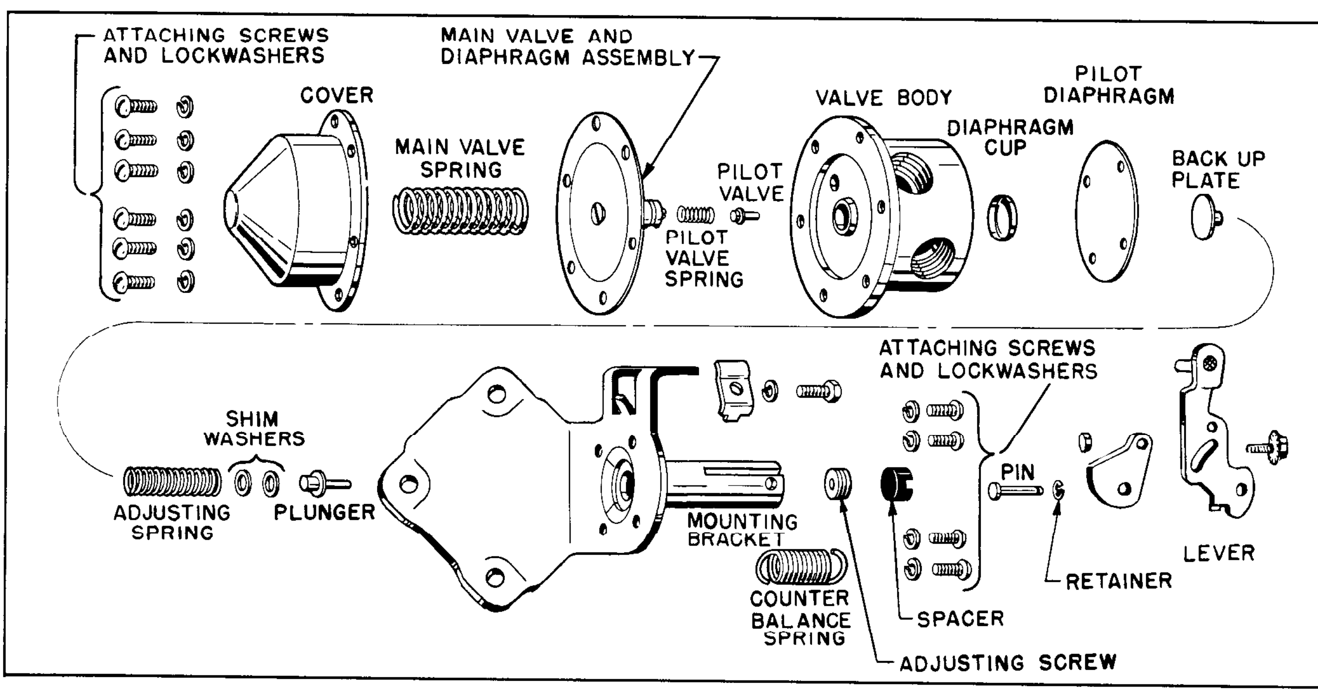


Fig. 14-30 By-Pass Valve Assembly

and pilot valve.

9. Thoroughly clean valve body with cleaning solvent and blow out all passages with dry air.

Assembly (Fig. 14-30)

1. Apply compressor oil to valve end of main valve and diaphragm assembly. Be sure "O" ring seal on main valve is lubricated.

2. Place new pilot valve spring in hollow end of Tool J-6389 and then place the new nylon pilot valve into end of spring. Hold valve body with flange facing down and insert pilot valve and spring into valve body bore. Be sure nylon tip is extending out of hole in valve body.

   Install main valve and diaphragm assembly into bore. Be sure screw head on main valve enters pilot valve spring. This can be determined by viewing through line connection opening in valve body.

3. Place main valve spring on top of main valve diaphragm and the cover over the main valve spring.

4. Align holes in main diaphragm, valve body and cover and install six attaching screws and lock washers, tighten evenly.

5. Place diaphragm cup, with flange toward main valve body, over end of nylon pilot valve stem that protrudes from valve body.

6. Place new pilot diaphragm over diaphragm cup and align the four holes in diaphragm with screw holes in valve body.

7. Place back-up plate next to pilot diaphragm, then place mounting bracket into position by matching up alignment marks and attach with the four screws and lock washers.

8. Place shim washers over the large diameter of the plunger and place adjusting spring next to the shim washers. Insert this assembly into the threaded cavity of the mounting bracket.

9. Install adjusting screw into threaded cavity in mounting bracket.

   NOTE: Before installing lever and counter balance spring, the valve requires adjustment with the by-pass valve mounted on the car.

10. Install valve, then evacuate and charge the refrigerant system.

11. Adjust by-pass valve as outlined under BY-PASS VALVE ADJUSTMENT.

   NOTE: If the adjusting screw travels out of range before the proper adjustment, it will be necessary to remove or add shim washers as necessary.

12. Adjust the cable as outlined under BY-PASS VALVE CABLE ADJUSTMENT.

BY-PASS VALVE ADJUSTMENT (Fig. 14-31)

The "Hot Gas" by-pass valve is adjusted to regulate evaporator pressure so that it will not fall below 29 to 30 p.s.i. If it controls below 29 p.s.i., the evaporator will "ice-up" and refrigeration capacity will be reduced. If the valve controls higher than this pressure an undesirable loss of refrigeration will occur and will be especially noticeable in extremely hot weather. This is because for each pound in pressure higher than 30 p.s.i., the discharge air temperature will be raised one degree. The controlling pressure of the valve can be checked and adjusted as follows:

1. Remove Schrader valve fitting cap at low pressure line near evaporator.

2. Install Adaptor J-5420 on the low pressure gauge hose, and connect the adapter to the Schrader valve fitting on the evaporator.

3. Purge the gauge and hose by opening low pressure gauge valve for a few seconds.

4. Start engine and allow to run at 2000 R.P.M. Move temperature control lever to the extreme right position, turn blower speed on "LOW" and depress "RECIRCULATION" button.

5. Place paper in front of condenser to obtain a head pressure of 200 p.s.i.

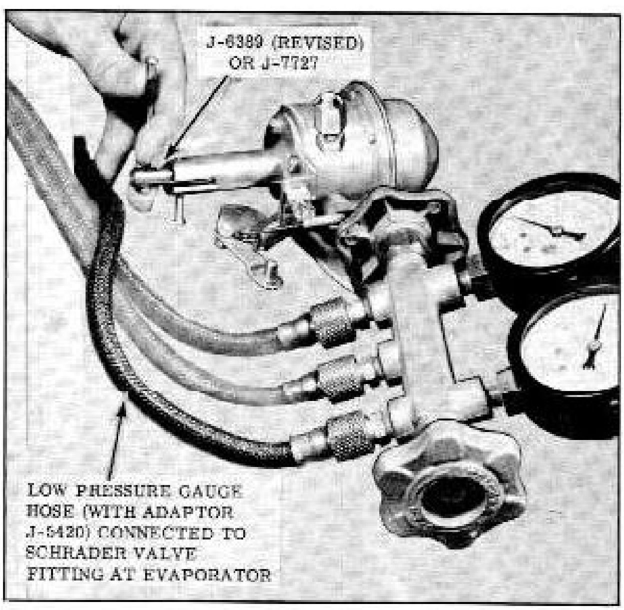


Fig. 14-31 By-Pass Valve Adjustment

6. Observe pressure gauge and adjust valve only if pressure is not 29 to 30 p.s.i.

   NOTE: If necessary to adjust the valve pressure setting, the control cable and the lever and cam will have to be disconnected from the by-pass valve in order to insert Tool J-7727 into the valve. (Fig. 14-31) After the valve pressure has been adjusted to 29.5 p.s.i., the control cable adjustment will have to be made. (Refer to BY-PASS CONTROL CABLE ADJUSTMENT.)

7. Turn adjusting screw clockwise to increase pressure; counterclockwise to decrease pressure.

8. Turn engine off, remove gauge hose from Schrader valve fitting.

9. Install Schrader valve fitting cap.

EVAPORATOR ASSEMBLY

NOTE: The expansion valve can be replaced without removing the evaporator assembly by following the instruction sheet in the expansion valve parts package.

Removal

1. Purge the system as outlined under PURGING THE SYSTEM.
2. Remove fender plate access hole cover and anti-squeak.
3. Disconnect high pressure line at expansion valve, and low pressure lines near evaporator. Tape fittings to prevent entrance of dirt and moisture.

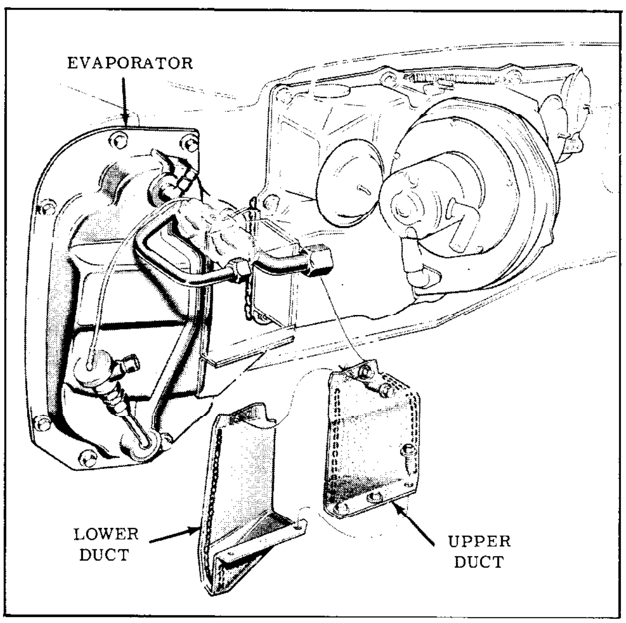


Fig. 14-32 Evaporator Assembly

4. Remove six screws from evaporator to blower connecting duct, then remove upper section of duct. (Fig. 14-32)
5. Loosen two screws on inside of lower section of connecting duct, then slide from blower duct.
6. Remove evaporator attaching screws and remove evaporator through access hole.

Disassembly

1. On bench, remove expansion valve from evaporator by loosening the line fitting and removing the capillary bulb clamps.
2. Remove evaporator housing bolts, nuts and washers, then remove evaporator from housing.

To assemble, reverse disassembly procedure.

Installation

1. With rubber gasket cemented to evaporator housing, position the evaporator assembly in cowl opening and install attaching screws.
2. Install lower section of connecting duct in blower duct. Then install the two screws on inside of duct.
3. Place upper section of connecting duct in position, then install attaching screws.
4. Remove caps and tape from lines, oil the fittings with Frigidaire 1000 oil, then connect the lines to the evaporator pipes.
5. Install the filler plate cover, bracket and anti-squeak.
6. Evacuate the system as outlined under EVACUATING THE SYSTEM.
7. Charge the system as outlined under CHARGING THE SYSTEM.
8. Leak test all line fittings that were disconnected. Refer to LEAK DETECTOR.

COMPRESSOR SEAL AND OIL PUMP

Removal (Fig. 14-33)

1. Remove caps from compressor high and low pressure hand shut-off valves.
2. Turn both compressor hand shut-off valves fully clockwise to close the system and open compressor gauge outlets.
3. Crack open compressor high pressure gauge outlet cap and allow refrigerant to purge until

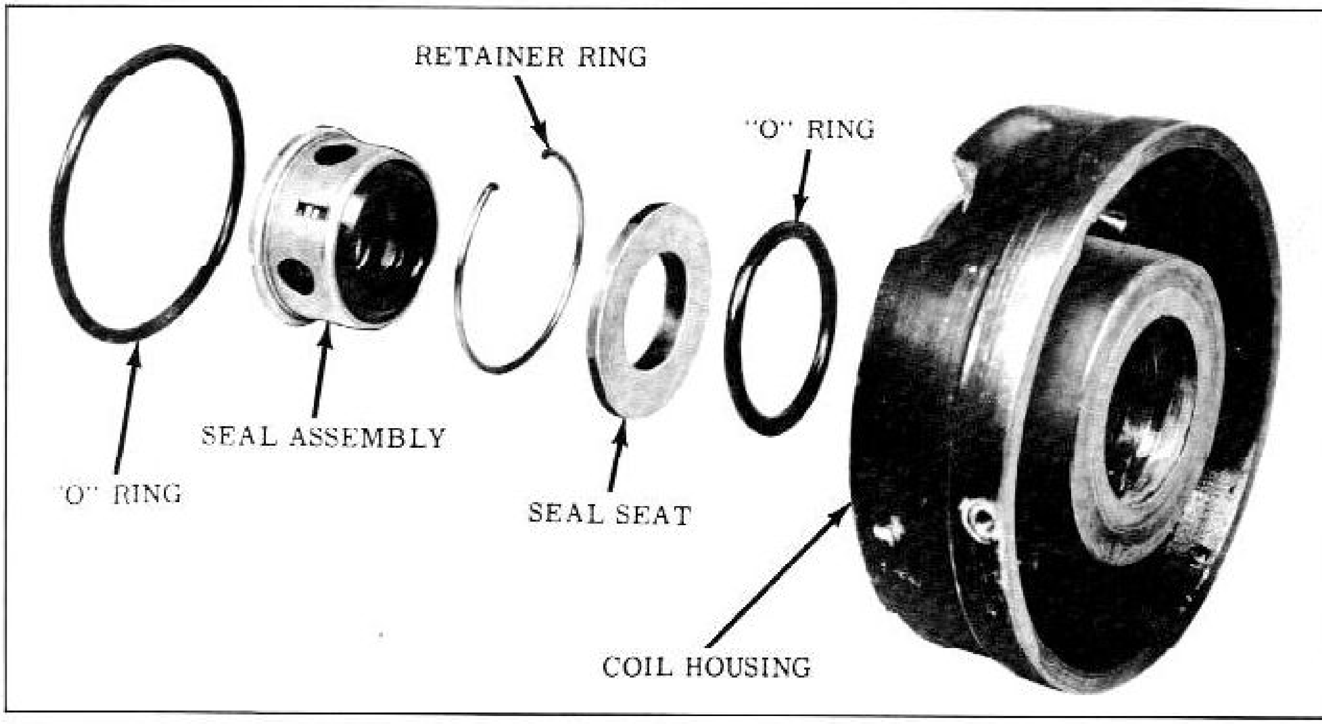


Fig. 14-33 Compressor Seal Assembly

"hiss" is no longer heard.

4. Remove clutch coil. Refer to PULLEY AND CLUTCH REMOVAL, AND COIL REMOVAL. Remove Woodruff key and shims.

5. Remove the 6 screws and pull the coil housing from the compressor.

   NOTE: To aid in removal of screws, a No. 3 Phillips head socket should be used. Tapping socket head lightly before applying torque to screws will also aid in their removal.

6. Remove seal assembly.

7. From the compressor side of the coil housing, remove the snap ring, seal seat, and "O" ring.

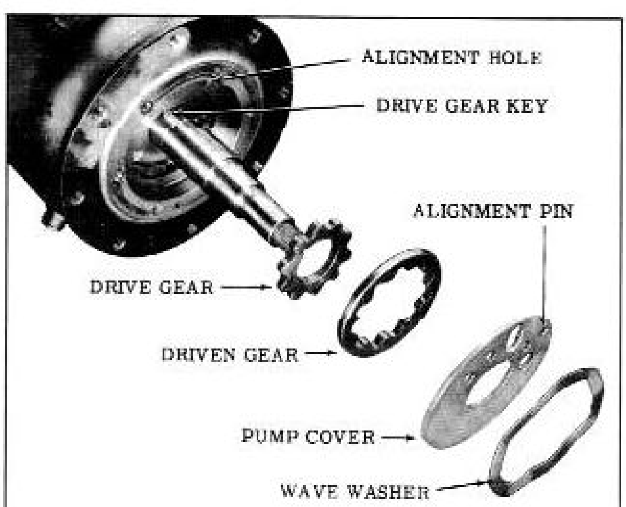


Fig. 14-34 Oil Pump Assembly

8. Remove the large "O" ring from the coil housing flange.

9. Remove oil pump plate and gears for inspection (Fig. 14-34).

Cleaning and Inspection of Parts

Thoroughly clean the seal cavity and shaft with wiping tissues furnished in the seal package. DO NOT touch or mar the contacting face of the new seal or seal seat with hands or tools since this may damage the seal. All seals and "O" rings must be replaced with new parts. Inspect oil pump gears for scoring and excessive wear. Replace gears if damaged.

Installation (Fig. 14-33)

1. Lubricate pump gears with Frigidaire 1000 oil and install as shown in Fig. 14-34.

2. Flush the coil housing seal cavity with Frigidaire Oil No. 1000.

3. Install wave washer in recess of compressor flange.

4. Install Tool J-6320 on the compressor shaft with the tapered end toward the front of the shaft. Align the seal drive pin and rotate the retaining ring to contact the pin to hold it in place.

5. Coat the entire seal assembly with Frigidaire

Oil and install the seal assembly, making sure the drive pin engages the keyway in the seal. (Fig. 14-35)

6. Install the "O" ring into the seal cavity of the coil housing.

7. Coat the seal seat with Frigidaire Oil and place into seal cavity with small diameter out so that it will face the compressor.

   CAUTION: Do not touch sealing surface.

8. Install seal seat retaining ring into seal cavity, being extremely careful not to mar sealing surface.

9. Install the large coil housing "O" ring and coat with Frigidaire Oil.

10. With Tool J-6320 in place on compressor shaft, install the coil housing with the wire opening positioned between the tapped holes for ground wire and hold-down clamp.

11. Start the 6 coil housing screws and tighten evenly to 15 ft. lbs. torque. Remove Tool J-6320 from compressor shaft.

12. Install coil, rotor plate and pulley. (Refer to COIL INSTALLATION, CLUTCH ASSEMBLY AND PULLEY INSTALLATION)

13. Connect gauge set as shown in Fig. 14-36. Be sure the compressor hand shut-off valve caps are installed after the gauge set is connected.

14. Remove cap from compressor high pressure gauge outlet, close high pressure gauge valve, and open low pressure gauge valve.

15. Start engine and allow to run at slow idle. Move temperature control lever fully to the right. Position a container to receive any oil discharged from the high pressure gauge outlet so that an equivalent amount of new oil can be added.

16. Allow engine to run until 28" of vacuum has been maintained for 5 minutes.

17. While engine is running, install cap on compressor high pressure gauge outlet and stop engine. Observe if 28" vacuum will hold for 3 minutes.

   NOTE: If vacuum does not hold, charge system with drum pressure and check for leaks.

18. Open valve on refrigerant drum and allow compressor to come up to drum pressure, then close valve.

19. Purge the compressor again through the high pressure gauge outlet, then remove the cap from the gauge outlet and start the engine. Allow to run at idle until 28" of vacuum has been maintained for 5 minutes, then install cap on compressor high pressure gauge outlet and stop the engine.

20. Open valve on refrigerant drum to charge compressor, then momentarily crack open the compressor high pressure gauge outlet cap to purge the air remaining in the high pressure side of the compressor.

21. Remove the compressor high pressure hand

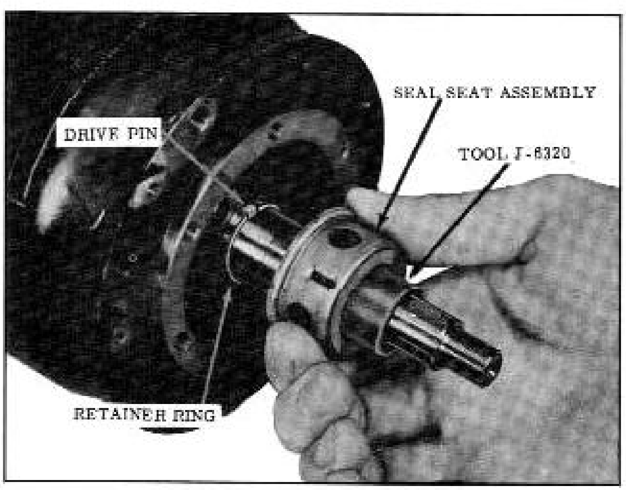


Fig. 14-35 Installing Seal

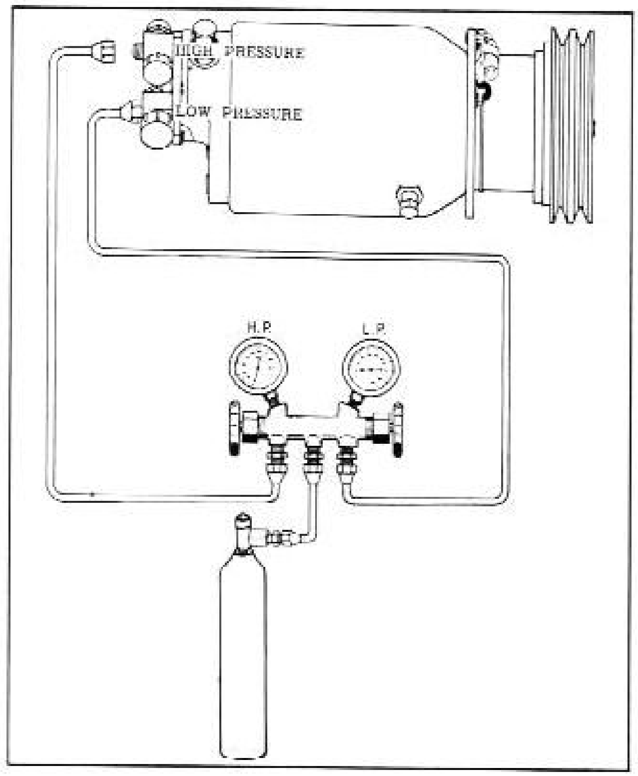


Fig. 14-36 Evacuating the System

shut-off valve cap, then turn valve fully counterclockwise, and remove the cap from the high pressure gauge outlet.

22. Crack open compressor high pressure hand shut-off valve to allow refrigerant to purge slowly from gauge outlet; then crack open high pressure gauge hose and connect hose to gauge outlet and tighten.

23. Close valves on refrigerant drum and high pressure gauge.

24. Turn compressor high pressure hand shut-off valve two turns clockwise. Turn compressor low pressure hand shut-off valve fully counterclockwise, then two turns clockwise.

25. Check the system as outlined under ADDING REFRIGERANT - PARTIAL CHARGE. If it is necessary to add refrigerant, omit steps 1 through 7 of the procedure for adding refrigerant, since the gauge set on refrigerant drum is already connected.

MALFUNCTIONING COMPRESSOR

A new compressor does not have the clutch actuating coil parts, the pulley clutch parts, or the hand shut-off valve assembly. A service shipping plate is bolted over two "O" rings to seal the valve port openings. The two "O" rings under the shipping plate should be transferred to the old assembly and two new "O" rings used when installing the compressor on the car. A new compressor is charged with 13 ounces of Frigidaire 1000 Viscosity Oil, and a mixture of refrigerant 12 and nitrogen under approximately 5 p.s.i. pressure. Envelopes attached to the compressor contain enough shims to insure a sufficient number of shims for the compressor clutch adjustment.

Removal

1. Remove protective caps from compressor high and low pressure hand shut-off valves.

2. Turn both compressor hand shut-off valves two turns clockwise to open the compressor gauge outlets.

3. Crack open compressor high pressure gauge outlet cap and allow refrigerant to purge from system until "hiss" is no longer heard; then turn both hand shut-off valves fully clockwise.

4. Disconnect clutch coil wire at compressor connector, then connect a jumper wire from a known "hot" source to the coil wire. Loosen the pulley nut, then disconnect jumper wire.

5. Remove the pulley nut and locking washer.

6. Remove the belts from the compressor pulley.

7. Remove the bolt holding the hand shut-off valve assembly to the compressor, then remove the assembly from the compressor.

8. Remove the compressor-to-support bolts, then remove the compressor assembly.

9. Remove the pulley, rotor plate and coil. (Refer to PULLEY AND ROTOR PLATE REMOVAL AND COIL REMOVAL.)

Installation

1. Position the new compressor on the support plates, then install and tighten the compressor-to-support plate bolts to 15 ft. lbs. torque.

2. Remove the protective covering from the shaft of the new compressor.

3. Install coil, rotor plate and pulley. (Refer to COIL INSTALLATION, AND ROTOR PLATE AND PULLEY INSTALLATION.)

4. Connect a jumper wire from a known "hot" source to the clutch coil wire.

5. Check clearance between rotor plate and coil housing. If clearance is not between .025" and .035", it will be necessary to add or subtract shims. (Shim thickness .010", .012", .015", .018", .020", .022" and .025".)

6. Remove jumper wire and install coil wire in connector.

7. Remove the shipping plate from the rear of the compressor and the two "O" rings from the valve port openings, and install two new "O" rings.

8. Install the hand shut-off valve assembly on the compressor, then install the mounting bolt and tighten to 15 ft. lbs. torque.

9. Install belts and adjust tension using Tool 33-70.

10. Install a charging line to the compressor high pressure gauge outlet and to a drum of refrigerant 12.

11. Disconnect the liquid line from the dehydrator-filter-receiver assembly on the inlet side, and cap the dehydrator-filter-receiver immediately.

12. Turn the high pressure hand shut-off valve fully counterclockwise, then turn it back two turns clockwise.

13. Open the refrigerant drum valve and turn the drum upside down to allow liquid refrigerant to flush through the condenser and out the

line. Use approximately 2 lbs. of refrigerant for this operation.

14. Close the drum valve and connect the dehydrator-filter-receiver assembly.

15. Remove the expansion valve screen and clean or replace as necessary.

16. Remove the charging line from the compressor high pressure gauge outlet, install the gauge set, and evacuate the entire system as outlined under EVACUATING THE SYSTEM.

17. Recharge the system as outlined under CHARGING THE SYSTEM WITH REFRIGERANT - COMPLETE CHARGE.

ADDING REFRIGERANT—PARTIAL CHARGE

The proper charge of refrigerant to insure a clear sight glass under operating conditions at various ambient temperatures is 5 lbs. 3 ozs. Since less than 5 lbs. 3 oz. will result in a clear sight glass under some load conditions, it is necessary to consider load effects when checking and adding refrigerant to the system. The load can be varied by changing the blower speed as listed in the following chart. Be sure to operate the system for at least 5 minutes before checking sight glass.

Ambient Temp. (Outside of Car)	Blower Switch Position	Temperature Control Setting	Push Button Setting	Engine R. P. M.
70° - 80°	High	Fully To Right	"Normal"	1600
80° - 90°	Medium	Fully To Right	"Normal"	1600
90° or above	Low	Fully To Right	"Normal"	1600

If the system is low on refrigerant, proceed as follows:

1. Turn off the ignition.

2. Remove both compressor hand shut-off valve protective caps and make sure both valves are turned fully counterclockwise.

3. Remove both compressor gauge outlet fitting caps and install the gauge hoses on the fittings. (Fig. 14-37)

4. Make sure both gauge valves are closed, then turn both compressor hand shut-off valves two turns clockwise.

5. Crack open both gauge valves to purge the gauge hoses through the center hose, and crack open the valve on the refrigerant drum or the "Fits-All" Valve on a 15 oz. refrigerant can. While refrigerant is escaping from

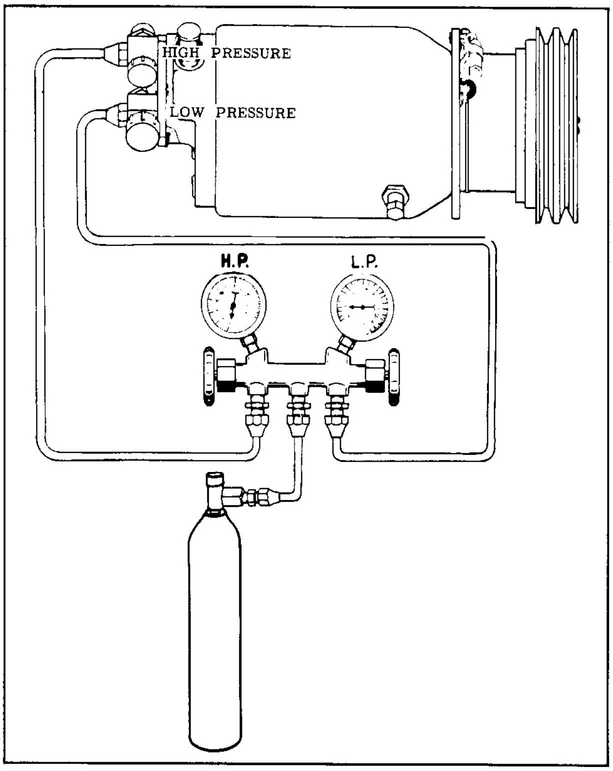


Fig. 14-37 Adding Refrigerent (Partial Charge)

the center hose of the gauge set and the valve fitting on the refrigerant container, connect the center hose to the refrigerant container.

6. Close the refrigerant container valve and both gauge valves.

7. Start the engine and set at 1600 R.P.M. Make sure the temperature control lever is fully to the right, the "NORMAL" button is depressed, and the blower switch is set according to the preceding chart.

8. Open valve on refrigerant container and the low pressure gauge valve to allow refrigerant to enter the system. When sight glass clears, close refrigerant container valve.

9. Wait two minutes, then check the sight glass. If vapor is still visible, open the refrigerant container valve and again allow refrigerant to enter the system. Add 1/4 lb. of refrigerant after sight glass clears.

10. Shut off engine, turn both compressor hand shut-off valves fully counterclockwise, remove gauge set, and install all protective caps.

CHECKING OIL LEVEL

If a refrigerant leak is found which indicates some loss of oil by the presence of oil around the leak, or if it is necessary to determine whether or not the compressor has a sufficient amount of oil, the following procedure should be used:

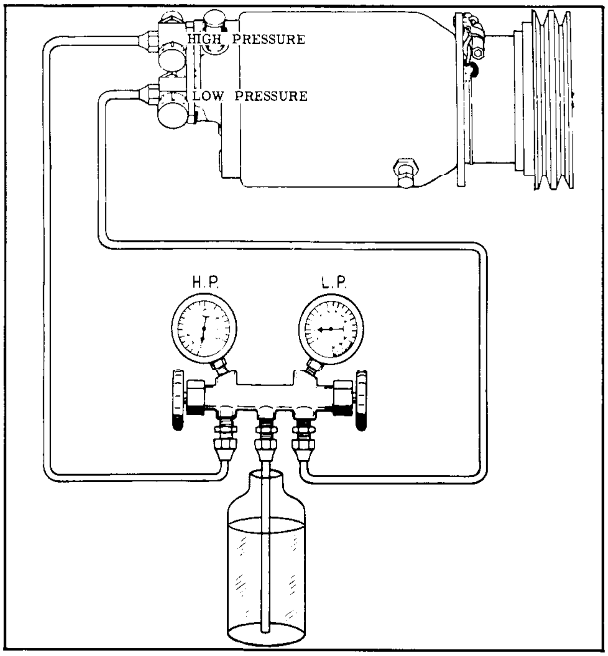


Fig. 14-38 Adding Oil

1. Start engine and operate at 1600 R.P.M. with temperature control lever fully to the right and "NORMAL" button depressed for 5 minutes, then stop the engine.

2. Slowly open the oil test valve on the compressor and allow the first surge of oil and refrigerant to escape against a clean cloth. The refrigerant will evaporate, while the oil will saturate the cloth.

   NOTE: The first surge of oil may be only the amount of oil standing in the fitting. The valve should be held in the open position just long enough to be certain the oil level is at least to the top of the fitting.

3. If oil continues to escape with the refrigerant vapor, the oil level in the compressor is satisfactory.

4. If oil does not continue to escape from the test valve, the oil is below the minimum level.

ADDING OIL (Fig. 14-38)

1. Remove protective caps from compressor high and low pressure hand shut-off valves and make sure valves are turned fully counterclockwise.

2. Remove plug from high pressure gauge outlet and connect high pressure gauge hose to compressor high pressure fitting.

3. Install plug in center hose on gauge set.

4. Turn compressor high pressure hand shut-off valve two turns clockwise and replace protective cap.

5. Crack open the high pressure valve on the gauge manifold.

6. Crack open the low pressure valve on the gauge manifold to purge air from gauge set. While vapor is still escaping from the low pressure gauge line, connect to low pressure fitting on the compressor hand shut-off valve.

7. Close the high and low pressure valves on the gauge set.

8. Turn the compressor low pressure hand shut-off valve fully clockwise.

9. Remove center hose on gauge set and install oil charging line.

   NOTE: Make certain oil line is clean. (Use a 1/4" x 10" copper tube with fitting to connect to center connection on gauge set.)

10. Crack open the high pressure valve on the gauge set to purge air from the oil charging line.

11. While vapor is still escaping from the oil charging line, uncap the oil bottle (Frigidaire 1000 Viscosity) and insert the oil line to the bottom of the oil bottle and allow vapor to slowly bubble through the oil.

12. Close high pressure valve on gauge set. Allow time for escaped vapor to dissipate. Leak test all connections that were made during repair.

13. Position the gauge set and oil charging line, while still inserted to the bottom of the oil bottle so that it will not be disturbed during the following procedure.

14. Move temperature control lever to extreme right position, depress "NORMAL" button, and start engine and allow to run at slow idle until approximately 10" vacuum is obtained.

15. Stop the engine and observe the low pressure gauge to see if the vacuum will hold. There should not be any fast change of gauge reading.

16. Open the low pressure valve on the gauge set and allow 2 ounces of oil to be drawn from the bottle.

17. Close the low pressure valve on the gauge set. Remove the oil charging line from the bottle and replace cap on bottle. Remove the oil charging line from the gauge set and install a cap on the center connection.

18. Open the high pressure valve on the gauge set.

19. Open the low pressure valve on the gauge set slowly to allow the high side pressure to force the oil remaining in the gauge set and low pressure gauge line into the compressor.

20. Close high and low pressure valves on the gauge set and then turn compressor low pressure valve fully counterclockwise and replace protective cap.

21. Start engine and operate at 1600 R.P.M. with temperature control lever fully to the right and "NORMAL" button depressed for 5 minutes, then stop engine.

22. Again open oil test valve and allow first surge of oil to escape against a clean cloth. If oil continues to escape the oil level is satisfactory. If oil does not come out after first surge, add another 2 ounces at a time, following previous procedure, until test indicates a sufficient amount has been added.

23. Remove end cap from high pressure hand shut-off valve on compressor and turn valve fully counterclockwise and replace end cap.

24. Remove gauge lines and replace caps on gauge lines and on compressor valves.

CHECKING AND ADDING OIL AFTER MAJOR LOSS

The compressor was originally charged with 13 ounces of Frigidaire 1000 Viscosity Oil. During normal operation, because of an affinity of refrigerant 12 for oil, a certain amount of oil will circulate throughout the system along with the liquid and vapor. To determine if the compressor has sufficient oil, an oil test valve has been placed on the underside of the compressor body. If any major loss of oil has occurred, such as a severe compressor seal leak, line breakage, damaged condenser, etc., proceed as follows after making the necessary repairs.

1. Remove belts and coil electrical lead (black wire).

2. Remove protective caps from compressor hand shut-off valves and turn valves fully clockwise. Remove low and high pressure hand shut-off valves from compressor by removing center bolt.

3. Disconnect generator and remove compressor-to-support mounting bolts.

4. Transfer compressor to bench and loosen the oil drain screw.

5. Allow all of the oil to drain from the compressor into a clean container; this is to determine the amount and condition of oil.

NOTE: If the examination of the oil shows any foreign material; sludge, water, etc., flush the system as outlined under INSTALLING A NEW COMPRESSOR.

6. If the condition of the oil indicates that the compressor is free of any contamination, position the compressor so that the oil test valve flange is on the top side and pour from a graduated bottle, 9 ounces of NEW Frigidaire 1000 Viscosity Oil into the compressor.

7. Tighten the oil drain screw.

8. Install compressor and generator on the engine and connect electrical lead to coil.

9. Using new "O" rings, install compressor hand shut-off valves; then torque bolt to 15 ft. lbs.

10. Install belts and adjust tension using Tool 33-70.

11. Evacuate the system to remove air and moisture; then charge the system with refrigerant.

12. Check oil level as outlined under CHECKING OIL LEVEL.

DIAGNOSIS AND SPECIFICATIONS

AIR CONDITIONING ROAD TEST

This test does not serve as a basis for diagnosis, but only as a guide to determine if the discharge air temperature is standard. If the discharge air temperature is not standard, make the performance test to locate the cause of the malfunction.

Drive the car at 20 m.p.h. with the temperature control lever fully to the right, "NORMAL"

Temperature (Outside) °F.	Relative Humidity %	Discharge Air Temperature (R.H. Nozzle) °F.
70	50	41
	60	41
	90	43
80	50	43
	60	44
	90	48
90	40	43
	50	46
	60	50
100	20	45
	40	53
	50	57

push button depressed, blower speed switch on "HI" and a thermometer in the right air discharge nozzle. Make sure the windows and doors are tightly closed, since this can affect the velocity and the temperature of the discharge air. After taking the temperature reading, perform this test while traveling in the opposite direction to cancel any wind effect. Also, the relative humidity must be determined for this test since it will have an effect on the discharge air temperature.

PERFORMANCE TEST

The Performance Test should be made with the car doors and windows closed, the temperature control lever fully to the right, "NORMAL" button depressed, blower speed switch on "HI", an auxiliary fan in front of the radiator, and the car hood down as far as possible. Since the gauge hoses prevent the hood from being completely closed, cover the complete hood-to-cowl opening to prevent engine heat from entering the evaporator.

1. Remove access hole cover plate from right fender filler plate.

2. Remove Schrader valve fitting cap at evaporator.

3. Install Adapter J-5420 on the low pressure gauge hose, and connect the adapter to the Schrader valve fitting on evaporator, then momentarily open low pressure gauge valve to purge gauge hose.

4. Remove the compressor high pressure gauge outlet cap and install high pressure gauge hose.

5. Make sure high pressure gauge valve is closed, then turn compressor high pressure and shut-off valve two turns clockwise. Momentarily open high pressure gauge to purge the gauge and hose.

6. In Neutral, adjust engine speed to maintain 34 p.s.i. at the low pressure gauge until stabilization is achieved.

7. After temperature and humidity have been determined, compare test results with the Performance Chart.

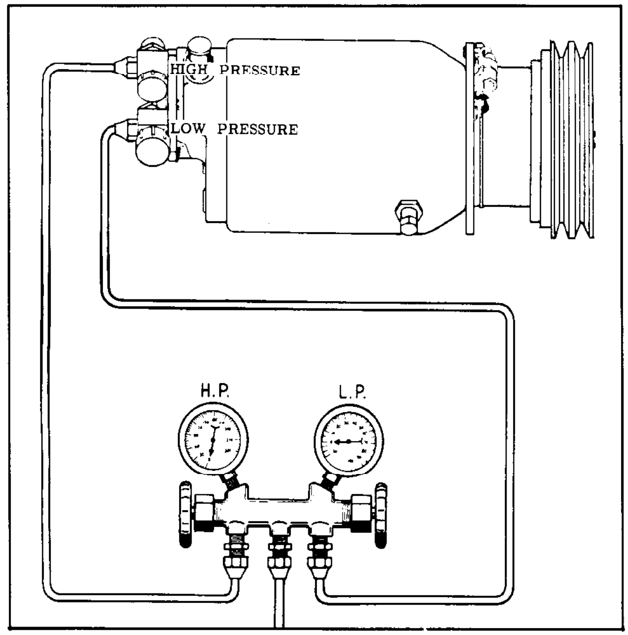


Fig. 14-39 Gauge Connections for Pressure Test

8. To obtain low pressure reading at compressor, proceed as follows:
   a. Connect tachometer and record engine R.P.M. with low pressure gauge still reading at 34 p.s.i. as outlined previously.
   b. Disconnect low pressure gauge at evaporator.
   c. Remove the compressor low pressure gauge outlet cap and install the low pressure gauge hose. (Fig. 14-39)
   d. Make sure the low pressure gauge valve is closed. Then turn the compressor low pressure hand shut-off valve two turns clockwise. Momentarily open low pressure gauge valve to purge the gauge hose.
   e. Check tachometer to make sure engine R.P.M. has not changed. Then compare readings with Performance Chart.

9. When test is completed, turn high and low pressure hand shut-off valves fully counterclockwise. Disconnect gauge hoses, and install protective caps.

10. Install Schrader valve fitting cap.

11. Install access hole cover plate.

DIAGNOSIS OF PERFORMANCE TEST RESULTS

CONDITION AND CAUSE	CORRECTION
ENGINE RPM TOO HIGH	
A. Defective or improperly adjusted "hot gas" by-pass valve.	A. Adjust or replace as necessary.

DIAGNOSIS OF PERFORMANCE TEST RESULTS (Cont'd.)

CONDITION AND CAUSE	CORRECTION
B. Restriction in low pressure line.	B. Remove, inspect, and clean or replace.
C. Loose compressor drive belts.	C. Adjust as outlined.
D. Defective clutch or coil.	D. Check or replace as necessary.
E. Defective expansion valve.	E. Replace as necessary.
F. Expansion valve capillary tube not tight to evaporator.	F. Check clamp for tightness.
G. Clutch slipping.	G. Refer to CLUTCH SLIPPAGE.
HIGH PRESSURE SIDE OF SYSTEM TOO HIGH (With High Engine Speed)	
A. Engine overheated.	A. Check engine cooling system.
B. Restricted air flow through condenser.	B. Remove foreign material from engine radiator and condenser.
C. Air in system or overcharge of refrigerant.	C. Momentarily purge system on high pressure side with engine not running; then, operate system and re-check pressure. Repeat as necessary. Check sight glass with system under load.
D. Restriction in condenser, dehydrator-filter-receiver assembly, or any high pressure line.	D. Remove parts, inspect for restricted passage, and clean or replace.
E. Too much oil in compressor.	E. Drain oil and add correct amount.
ENGINE RPM TOO LOW	
A. Insufficient refrigerant.	A. Add refrigerant as outlined.
B. Restricted air passage.	B. Check air flow.
NOZZLE DISCHARGE AIR TOO WARM (With Other Readings OK)	
A. Air hoses not properly connected.	A. Inspect air hoses and manifolds.
B. Defective or mispositioned evaporator drain hoses.	B. Replace or align as necessary.
C. Poor Seal - Evaporator to cowl.	C. Correct sealing.
CLUTCH SLIPPAGE	
A. Incorrect clutch air gap.	A. Place correct number of shims at the REAR of the rotor plate assembly. (See CLUTCH ADJUSTMENT.)

DIAGNOSIS OF PERFORMANCE TEST RESULTS (Cont'd.)

CONDITION AND CAUSE	CORRECTION
B. Head pressure too high.	B. Purge system until bubbles appear in sight glass and then add one pound of refrigerant.
C. Pulley wobbles.	C. Check and replace, if necessary, the pulley bearing. If pulley has been worn by bearing, replace pulley.
VELOCITY OF AIR AT DISCHARGE NOZZLES TOO LOW	
A. Restricted evaporator core in evaporator assembly.	A. Wash evaporator core. Remove air distributor from cowl trim pad and spray water through evaporator with hose.
B. Restricted air hoses.	B. Inspect and replace if necessary.
C. Defective blower motor.	C. Check and replace if necessary.
D. Defective switches.	D. Check and replace if necessary.
E. Poor wiring connection (Low voltage at blower.)	E. Correct wiring.
FROSTING OF EVAPORATOR LOW PRESSURE OUTLET LINE	
A. Defective expansion valve.	A. Replace valve.
B. Defective or improperly adjusted "hot gas" by-pass valve.	B. Adjust or repair valve as necessary.
SWEATING OF AIR DISCHARGE NOZZLES	
A. Heater valve not completely closed or leaking.	A. Check air valve for proper closing.
B. Air leak at cowl or floor pan.	B. Properly seal all holes in cowl and floor pan.
WATER BLOWING OUT AIR DISCHARGE NOZZLE	
A. Plugged or kinked evaporator drain hose.	A. Clean or align as necessary.
INOPERATIVE CONTROLS	
A. Inadequate vacuum.	A. Check vacuum. All controls should move with 10" Hg. Check hoses.

PRESSURE—TEMPERATURE RELATIONSHIP OF REFRIGERANT-12

Temp. °F	Pressure	Temp. °F	Pressure	Temp. °F	Pressure	Temp. °F	Pressure	Temp. °F	Pressure
-8	5.4	22	22.4	52	49.0	82	87.0	112	140.1
-6	6.3	24	23.9	54	51.0	84	90.1	114	144.2
-4	7.2	26	25.4	56	53.0	86	93.2	116	148.4

PRESSURE—TEMPERATURE RELATIONSHIP OF REFRIGERANT-12 (Cont'd.)

Temp. °F	Pressure	Temp. °F	Pressure	Temp. °F	Pressure	Temp. °F	Pressure	Temp. °F	Pressure
-2	8.2	28	27.0	58	55.4	88	96.4	118	153.0
0	9.2	30	28.5	60	58.0	90	99.6	120	157.1
2	10.2	32	30.1	62	60.0	92	103.0	122	161.5
4	11.3	34	32.0	64	62.5	94	106.3	124	166.1
6	12.3	36	33.4	66	65.0	96	110.0	126	171.0
8	13.5	38	35.2	68	67.5	98	113.3	128	175.4
10	14.6	40	37.0	70	70.0	100	117.0	130	180.2
12	15.9	42	39.0	72	73.0	102	121.0	132	185.1
14	17.1	44	41.0	74	75.5	104	124.0	134	190.1
16	18.4	46	43.0	76	78.3	106	128.1	136	195.2
18	19.7	48	45.0	78	81.1	108	132.1	138	200.3
20	21.0	50	47.0	80	84.1	110	136.0	140	205.5

PERFORMANCE CHART

*Cowl Inlet		Evaporator Pressure	Engine	Discharge Air R.H. Nozzle	**Pressure
Humidity	Temp.	(At Schrader Valve)	(RPM Range)	Temp. ± 1°F.	High (Discharge) ± 5 lbs.
20	100	34	520-550	40	215
	110	34	880-930	41	265
	90	34	520-600	41	180
30	100	34	700-760	43	235
	110	34	1300-1500	44	287
	80	34	520-605	41	153
	90	34	615-785	44	196
40	100	34	1080-1180	46	254
	110	34	1810-2000	48	314
	70	34	520-600	41	112
	80	34	520-600	43	162
50	90	34	805-850	47	212
	100	34	1460-1560	49	274
	110	34	2300-2500	52	335
	70	34	520-530	41	117
	80	34	600-670	44	172
60	90	34	920-1020	48	228
	100	34	1825-1995	52	293
	70	34	520-550	46	121
70	80	34	700-750	46	182
	90	34	1200-1280	51	244
	100	34	2190-2390	55	313
	70	34	520-600	42	123
80	80	34	750-850	47	191
	90	34	1450-1550	53	260
	100	34	2660-2860	58	333
	70	34	600-700	43	125
90	80	34	830-930	49	200
	90	34	1840-1940	55	275

*Atmospheric Temperature and Relative Humidity to be taken at Cowl Inlet.
**The Low Pressure (Suction) reading should be 1 to 2 lbs. lower than Evaporator Pressure.

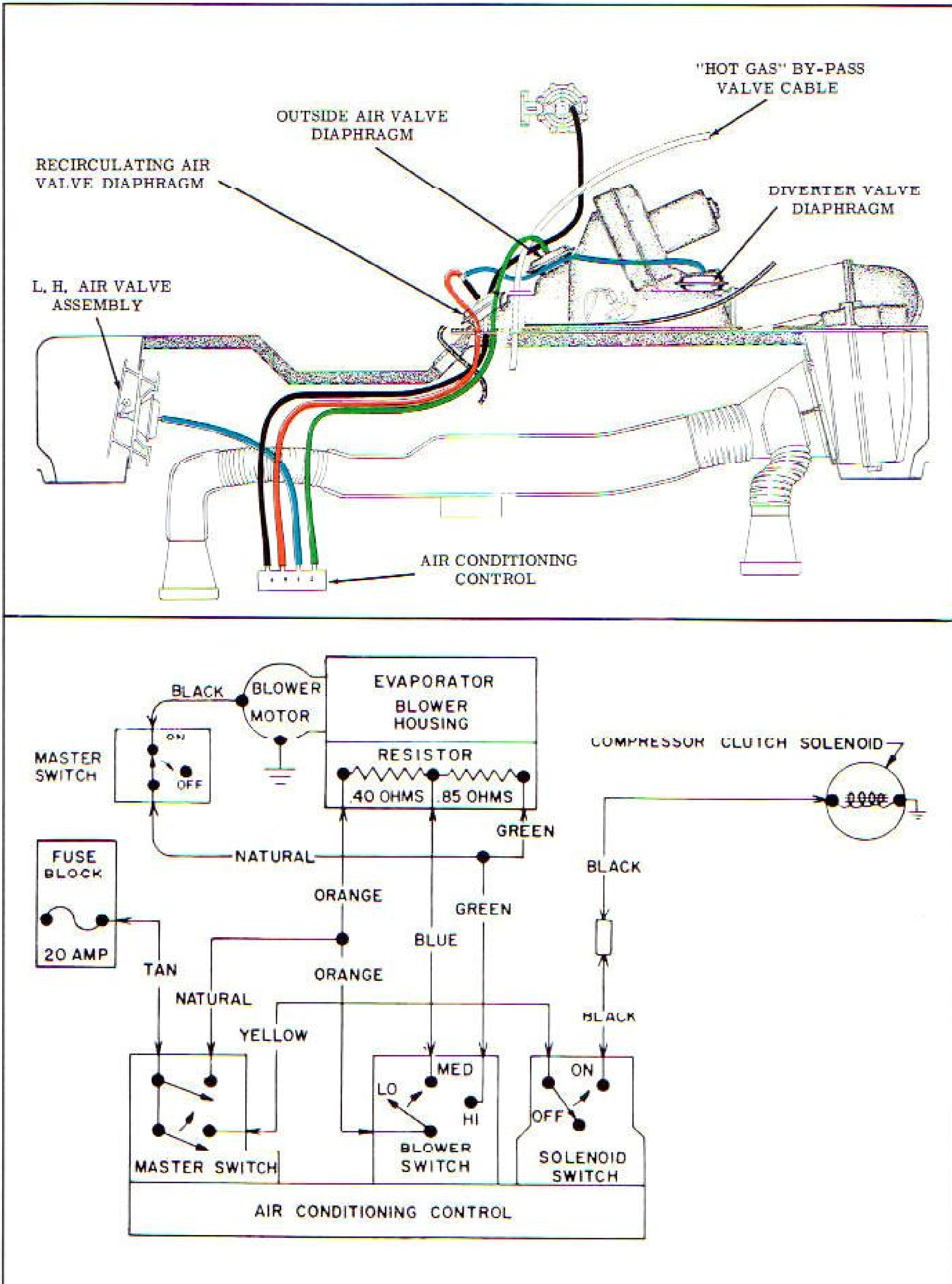


Fig. 14-40 Air Conditioning Without Heater

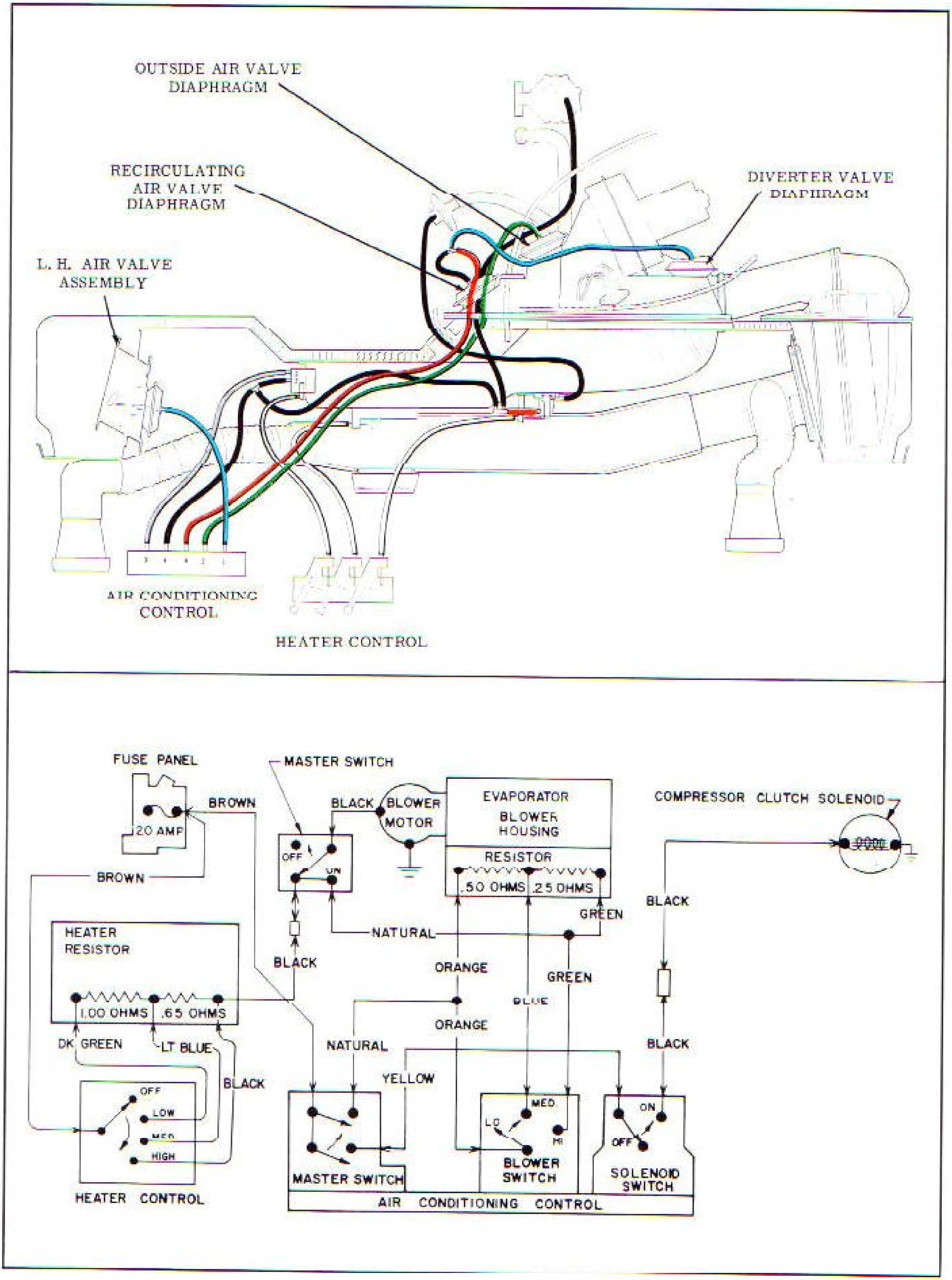
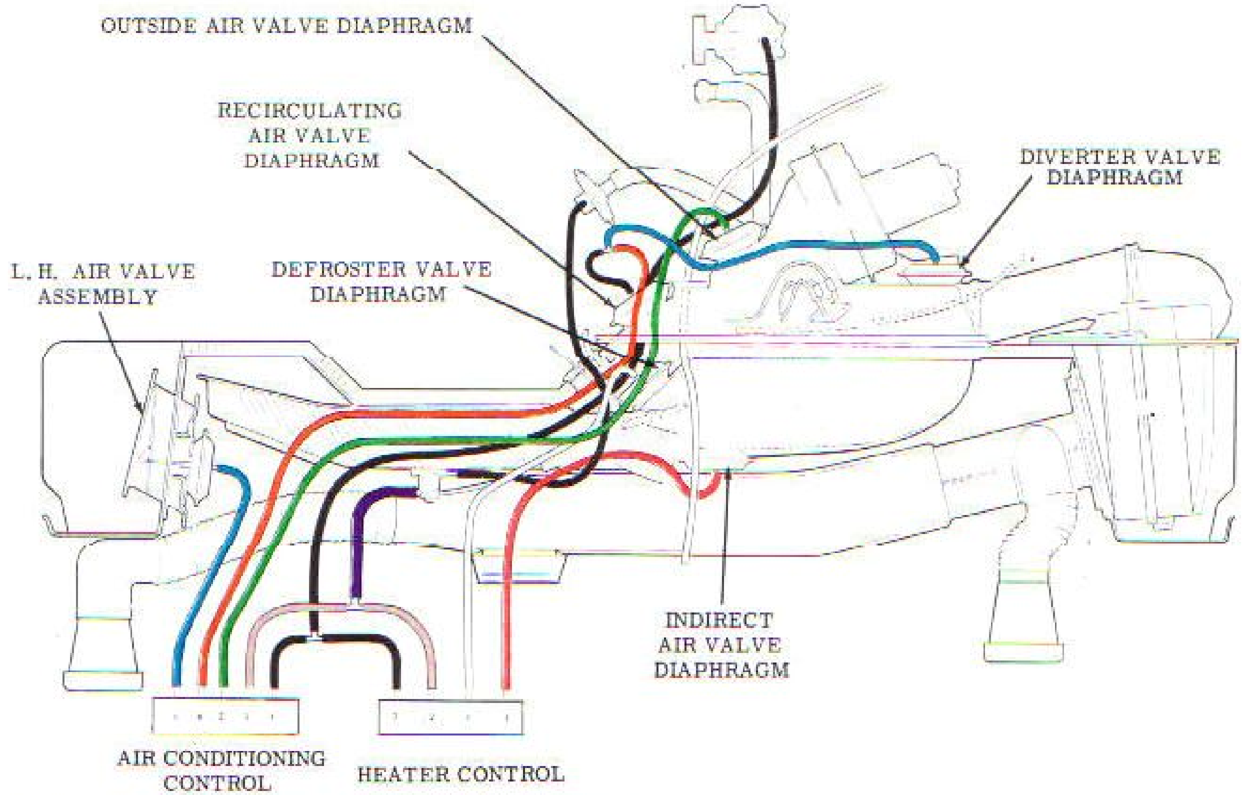


Fig. 14-41 Air Conditioning With Standard Heater



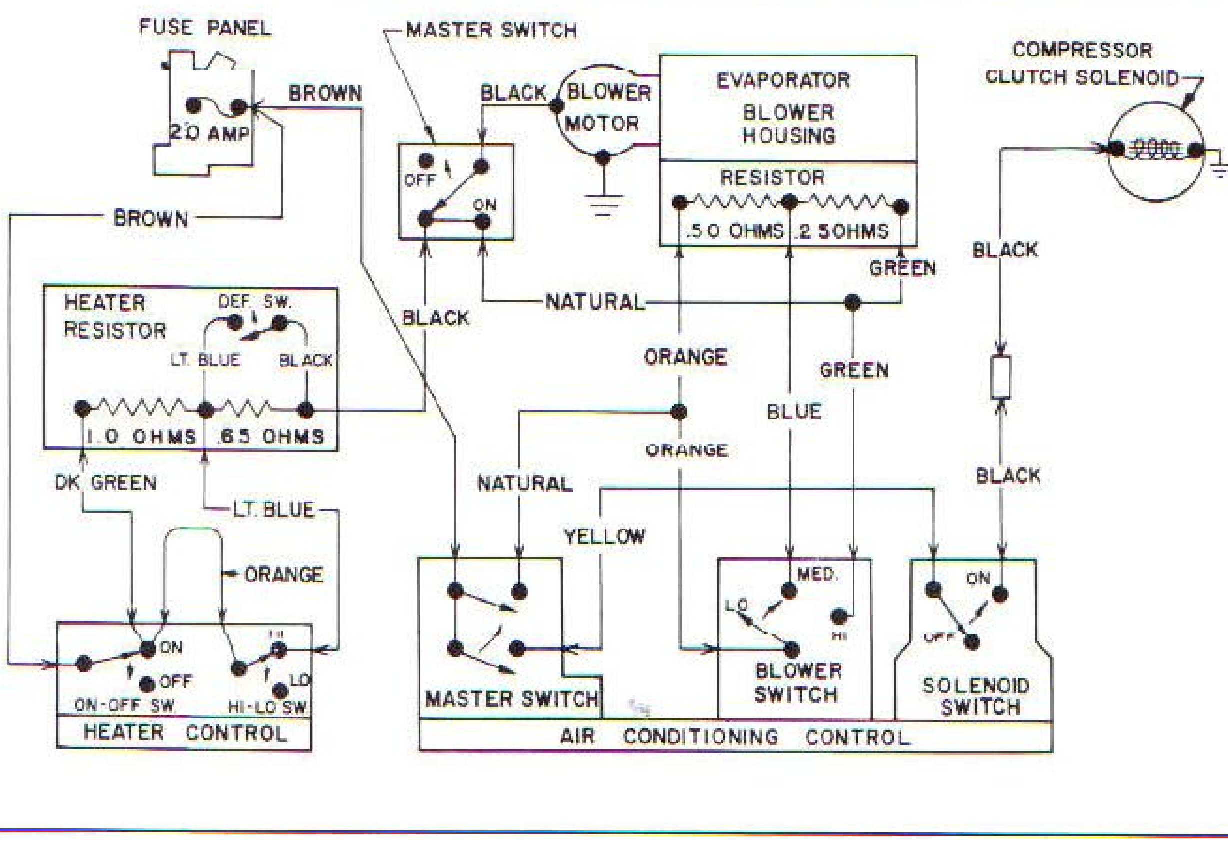


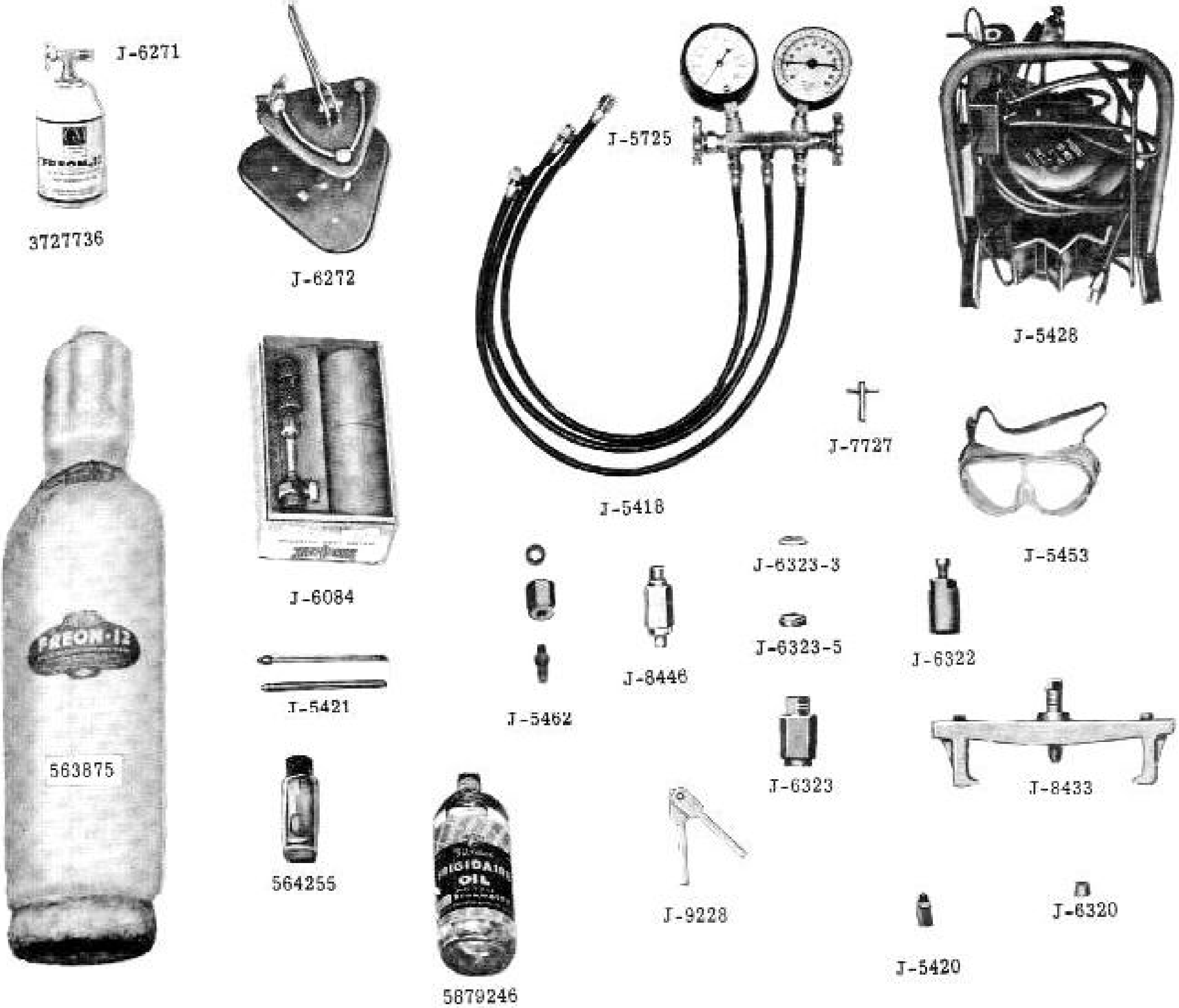
Fig. 14-42 Air Conditioning With Deluxe Heater

GENERAL SPECIFICATIONS

Engine Idle Speed	(Refer to Engine Tune-Up and/or Carburetion Section)
Cooling System Capacity	
With Air Conditioning (Less Heater)	21 qts.
Without Air Conditioning (Less Heater)	19-1/4 qts.
For Heater (Add)	1 qt.
Fuse (at Fuse block)	SFE 20 Amps.
Amount of Refrigerant-12 in System:	5 Lbs. 3 Oz.
Total Amount of Oil in Refrigerant System	13 Fluid Oz.
Type of Oil	Frigidaire 1000 Viscosity

TORQUE SPECIFICATIONS

	Ft. Lbs.
Compressor Bracket to Intake Manifold	22 to 26
Compressor Bracket to Cylinder Head	55 to 65
Compressor Support to Compressor	15
Compressor Support to Bracket	35 to 50
High and Low Pressure Valve Assembly to Compressor	15
Pulley to Compressor Shaft	5 to 7
Coil and Seal Housing to Compressor	15
"Hot-Gas" By-Pass Valve Fitting	25 to 30
"O" Ring Line Connections	30 to 35



J-5418	Gauge Charging Line	J-6323-3	Adaptor (Used in Conjunction with J-6323 for Clutch and Pulley Installation)
J-5420	Gauge Adapter	J-6323-5	Adapter (Used in Conjunction with J-6323 for Clutch Plate and Pulley Installation)
J-5421	Pocket Thermometer	J-7727	(J-6389 Modified) "Hot Gas" By-Pass Valve Adjusting Tool
J-5428	Vacuum Pump	J-8433	Compressor Pulley Puller
J-5453	Goggles	J-8446	Compressor Clutch Plate and Pulley Installer
J-5462	Refrigerant Drum Hook-Up Set	J-9228	Non-Magnetic Feeler Gauge
J-5725	Gauge Manifold Test Unit	563875	25 lbs. Refrigerant 12
J-6084	Leak Detector Kit	564255	Leak Detector 4 oz.
J-6271	Fits-All Valve	3727736	15 oz. Refrigerant 12
J-6272	#3 Multi-Opener	5879246	Lubricating Oil
J-6320	Compressor Seal Protector		
J-6322	Compressor Clutch Plate Puller		
J-6323	Compressor Clutch Plate and Pulley Installer		

Fig. 14-43 Air Conditioning Tools

INSTRUMENT PANEL AND RADIO

CONTENTS OF SECTION 15

INSTRUMENT PANEL

The lower instrument panel section is a removable panel and is retained by bolts and sheet metal screws. (Fig. 15-1) All instruments and units can be removed without removing the lower instrument panel section.

REMOVE AND INSTALL

1. Remove side garnish moldings and side panels.
2. Disconnect power steering column assembly or disconnect standard steering column and loosen gear at frame to provide clearance for instrument panel removal.

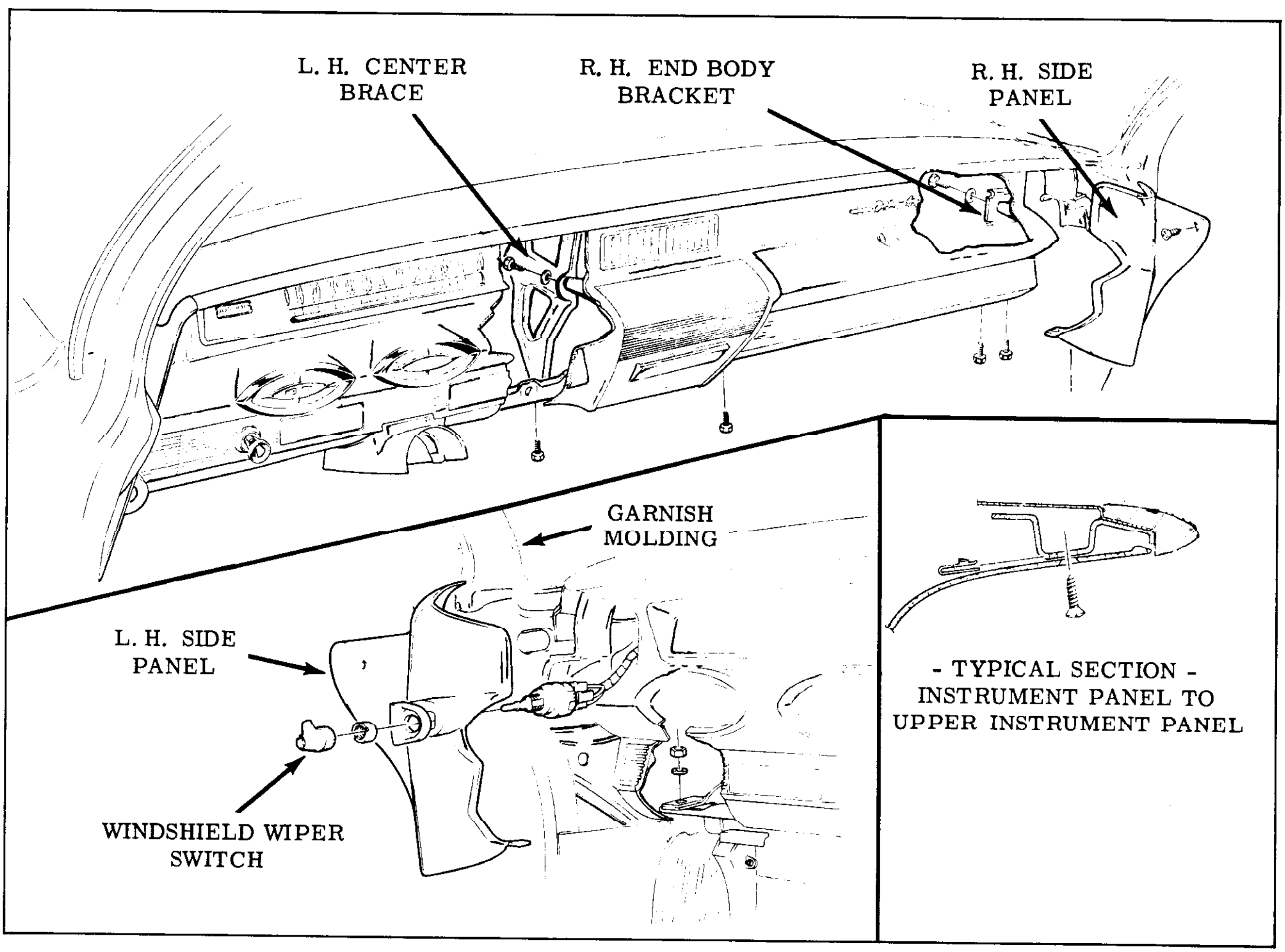


Fig. 15-1 Instrument Panel

3. The following wiring and/or controls must be disconnected:
   a. Heater, ventilator and/or air conditioning controls.
   b. Wiring from printed circuits.
   c. Radio, rear seat speaker and antenna leads.
   d. Power top, courtesy light and power antenna switch leads.
   e. Hoses from vacuum deck lid release control.
   f. Cigar lighter lead.
4. Remove instrument panel attaching screws. (Fig. 15-1)
5. With aid of a helper, lower panel and remove assembly from car.
6. To install the lower panel assembly reverse the removal procedure.

INSTRUMENTS

The instruments are of the printed circuit type and all of the electrical instruments and lights are connected to the wiring harness by connector plugs located behind the instrument panel.

All the instruments are electrically operated, except the speedometer and Hydra-Matic indicator which are mechanically operated. A speed warning device (Safety Sentinel) is offered as optional equipment on all models. A knob on the instrument cluster allows the driver to pre-set his desired speed. When this speed is reached a light goes on and a buzzer sounds.

The generator, temperature, and oil pressure indicators use colored lights to warn the driver of conditions other than normal when the engine is operating at speeds above idle or is at normal operating temperature.

The light sockets used in the instruments can be removed by turning the socket 1/8 of a turn counterclockwise.

NOTE: For servicing of instrument panel components, refer to ELECTRICAL SECTION.

FUEL GAUGE, CLOCK OR GENERATOR AND OIL PRESSURE WARNING LIGHT ASSEMBLIES

To remove an assembly, disconnect the wiring connector, remove two nuts and washers and withdraw the assembly from the front of the instrument panel. (Fig. 15-2)

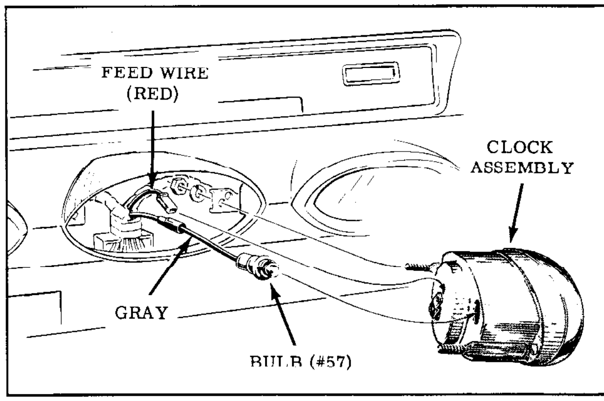


Fig. 15-2 Clock Assembly

NOTE: The clock incorporates a self-regulating feature. When the hand setting knob is pulled out to set the hands, an automatic regulating device is placed in operation. Setting the hands ahead or back will cause the device to regulate the clock to run either faster or slower, determined by the degree of time setting change.

SPEEDOMETER HEAD ASSEMBLY

Removal and Installation

1. Disconnect the parking brake assembly from the instrument panel and loosen it at the cowl. Disconnect the L.H. instrument panel brace, headlamp switch and the ventilation or air conditioning control assembly from the instrument panel.
2. Remove light sockets, wiring harness and safety sentinel buzzer from speedometer head assembly.
3. Remove the 2 speedometer head assembly mounting nuts and rotate the top of the assembly downward. (Fig. 15-3) DO NOT DAMAGE PRINTED CIRCUIT.
4. Disconnect the speedometer cable and withdraw the assembly from the left side of the steering column from under the instrument panel.
5. To install, reverse the removal procedure.

SPEEDOMETER CABLE ASSEMBLY

Removal and Installation

1. Remove the left side panel. (Refer to SIDE PANELS)
2. Reach between the end of the instrument panel and the front door hinge pillar and disconnect the speedometer cable.
3. Remove the left air outlet grille and cowl trim panel.
4. Disconnect cable from transmission.
5. Remove cable from car. (Refer to Fig. 15-4 for routing and cable clip locations)

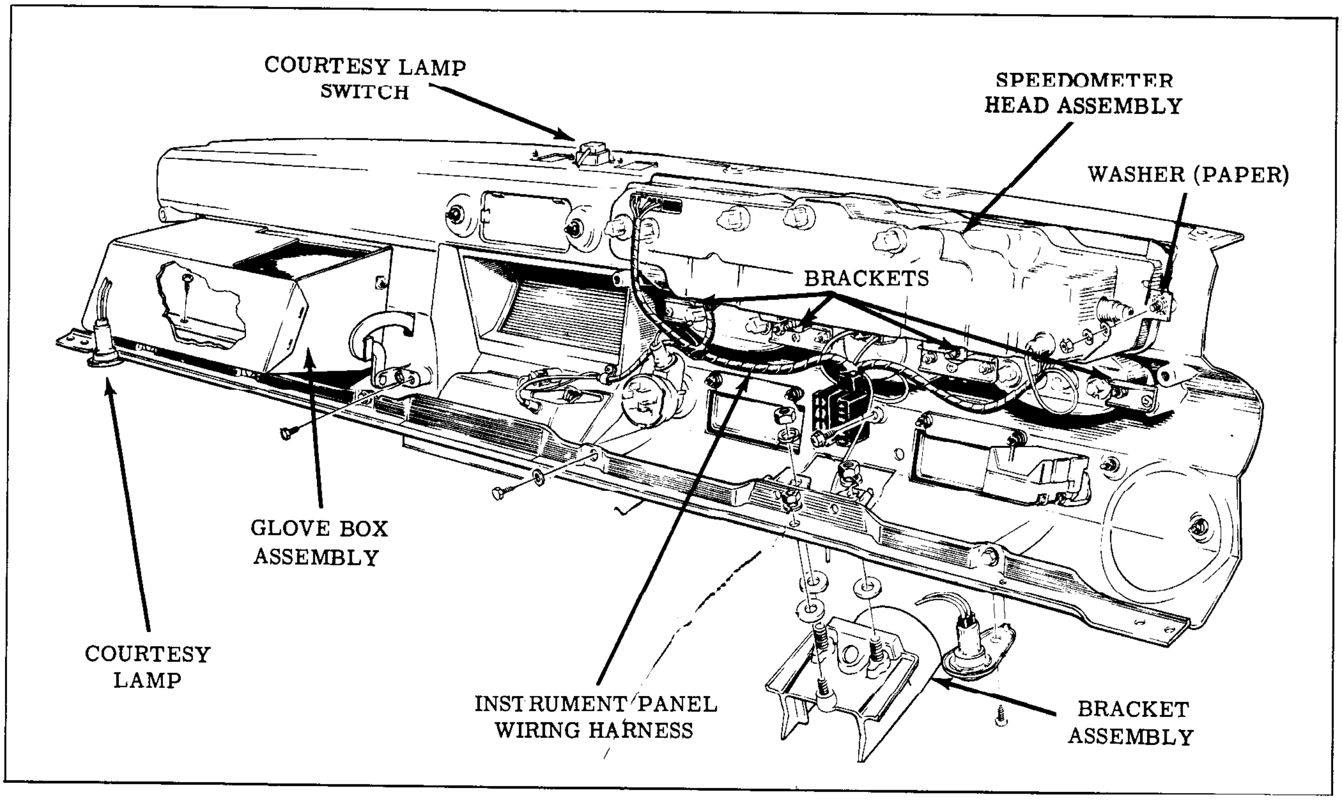


Fig. 15-3 Speedometer Head Assembly

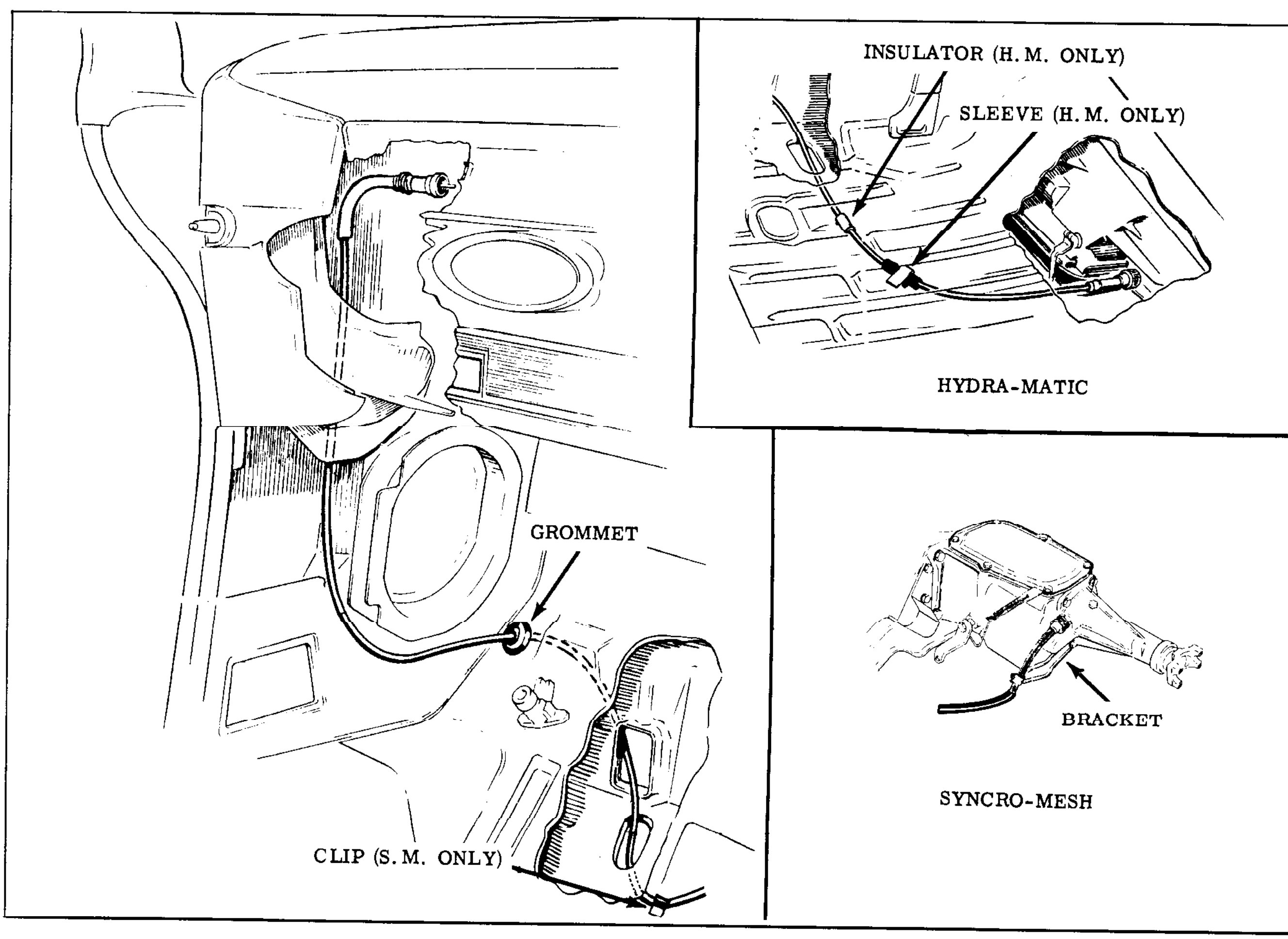


Fig. 15-4 Speedometer Cable Routing

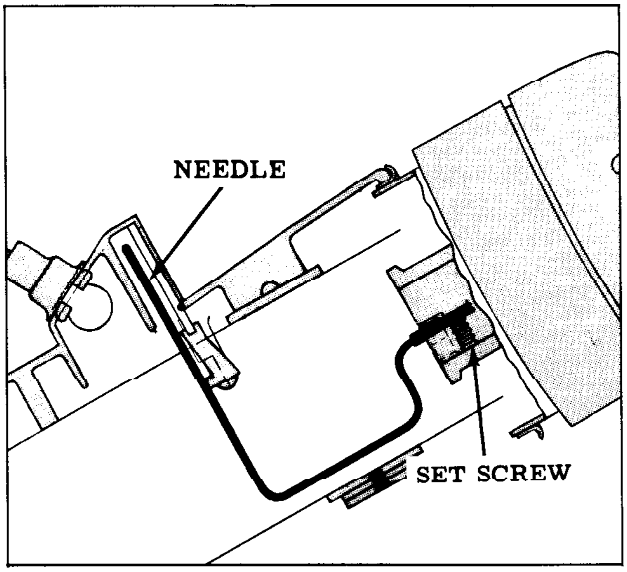


Fig. 15-5 Hydra-Matic Indicator Needle

6. To install, reverse the removal procedure.

HYDRA-MATIC INDICATOR NEEDLE

Remove and Install (Fig. 15-5)

To remove the H-M indicator needle, remove steering column cap from steering column bracket, loosen the set screws on the shifter tube, then carefully remove the needle. To install, reverse the removal procedure, using extreme care to prevent damage to the needle. Move selector lever through entire range to check for needle interference.

ADJUST

With the steering column cap removed from the steering column bracket, move the selector lever to "Neutral" position. Align H-M needle with "N", tighten the set screw, then move selector lever through entire range to check needle alignment with remaining selector positions. Readjust needle if necessary.

INSTRUMENT PANEL MOLDINGS (Fig. 15-6)

RADIO AND CLOCK HOLE COVERS

The radio and clock hole covers can be removed by removing the attaching nuts and washers accessible from the rear of the instrument panel.

CONTROL PANEL MOLDING

Remove and Install

1. Disconnect the light switch, ignition switch, and heater and air conditioning outlet and controls, if so equipped, from the instrument panel.

2. Loosen the left end molding. If equipped with air conditioning, remove side panel and air conditioning outlet.

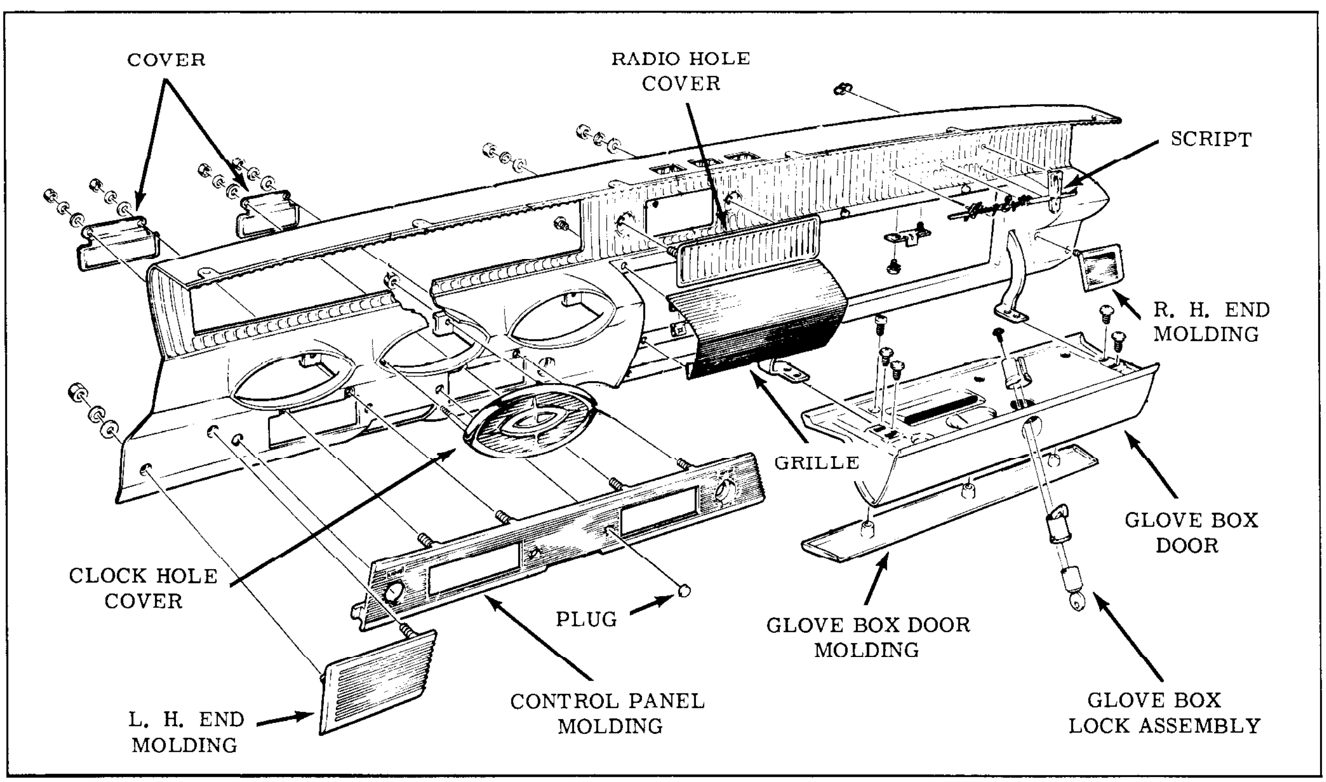


Fig. 15-6 Instrument Panel Moldings

3. Remove the molding attaching nuts and molding.

4. To install, reverse removal procedure.

GLOVE BOX DOOR MOLDING

Remove and Install

1. Remove the molding attaching nuts and the molding.

2. To install, reverse the procedure.

L.H. OR R.H. END MOLDINGS

The end moldings are retained by two nuts and washers. In order to remove an end molding it is necessary to remove a side panel and a side garnish molding.

SIDE PANELS

In order to remove a side panel it is necessary to remove the windshield side garnish molding. The side panels are retained by two sheet metal screws. To remove the left side panel it is necessary to disconnect the wiring connector from the wiper control after the panel has been disengaged from the hinge pillar and instrument panel.

SAFETY PADS OR COVER
(See Body SECTION)

GLOVE BOX
(See BODY SECTION)

ASH TRAYS

Ash tray light sockets are a push-fit in their panel housings which are mounted above the ash tray housing on the instrument panel.

STEERING COLUMN BRACKET

The steering column bracket is fastened to the instrument panel by 3 studs, washers, and nuts. Anti-squeak gaskets are used between the steering column bracket and the instrument panel.

IMPORTANT: H-M indicator needle must be removed before removing bracket. (See HYDRA-MATIC INDICATOR NEEDLE.)

INSTRUMENT PANEL SCRIPT

The script can be removed after removing the glove box. (Fig. 15-6)

COURTESY LIGHTS

The instrument panel courtesy light socket assembly is of the snap-in type, installed from under the instrument panel. The courtesy lights are attached to the instrument panel lower brace by one screw and are located by a tang.

PARKING BRAKE LIGHT

The parking brake light is mounted on the parking brake pedal. To remove, push in on the back of the unit to compress spring, and turn the socket clockwise 1/8 turn.

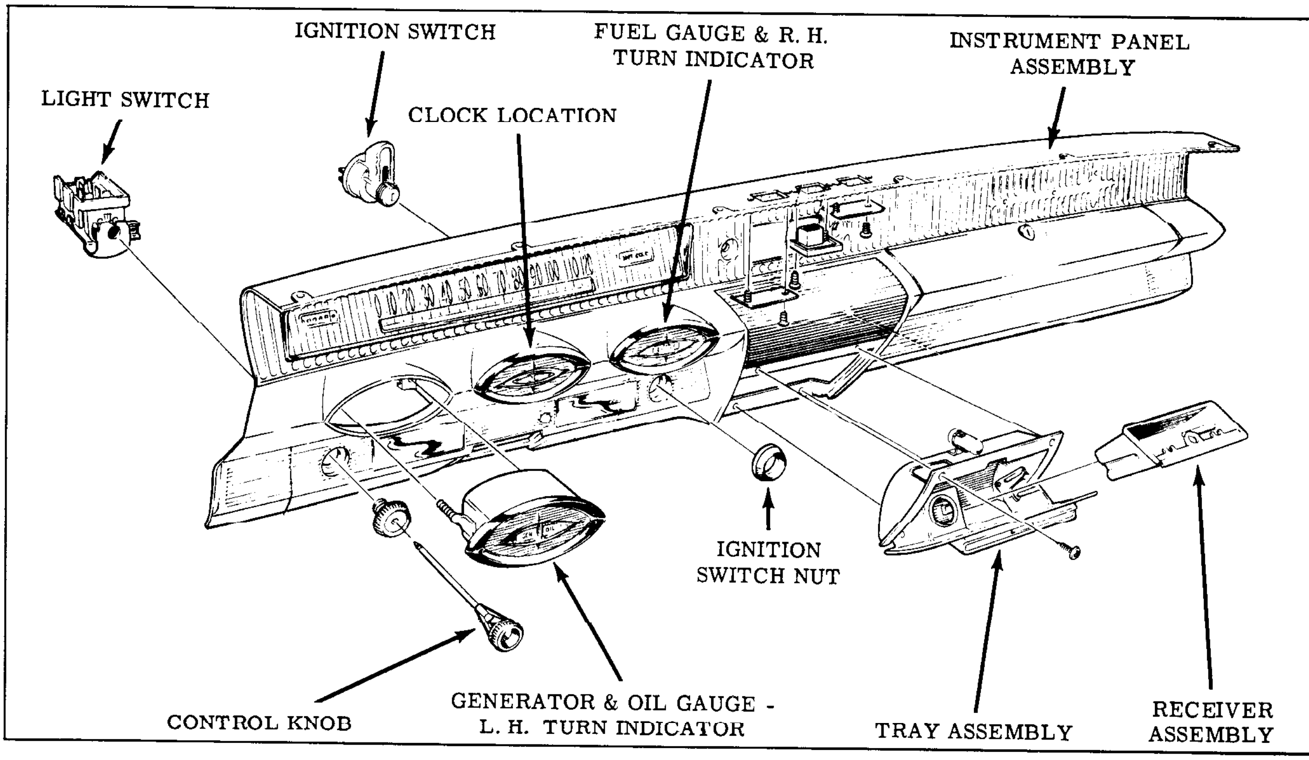


Fig. 15-7 Instrument Panel Switches

HEADLIGHT SWITCH (Fig. 15-7)

The brightness of the instrument panel lights is controlled through a variable resistor unit by turning the light switch knob right or left.

On cars equipped with Guide-Matic the light switch incorporates a switch, located between the pull knob and escutcheon, which permits the selection of automatic or manual headlight control.

To Remove Headlight Switch:

1. Disconnect wiring connector from the light switch.
2. Remove knob and rod by first pulling knob out to "Headlight" position, then depress button on bottom of switch assembly and pull rod out.
3. If car is equipped with Guide-Matic, loosen Guide-Matic switch knob set screw and remove switch knob.
4. Remove escutcheon with an Allen wrench.
5. Remove headlight switch from rear of instrument panel.

To install, reverse removal procedure.

IGNITION STARTER SWITCH (Fig. 15-7)

To remove Switch Assembly:

1. Remove light socket.
2. Remove escutcheon from instrument panel, then remove switch assembly from underside of instrument panel.

   NOTE: A tool to remove escutcheon can be made from 16 gauge metal 4" long and 1" wide.

3. Disconnect wiring connector from back of ignition switch.

   NOTE: The ignition switch wiring connector is locked to the back of the ignition switch by means of a special terminal tang which fits in a terminal hole. The connector plastic insulation has a slot in it to gain access to the tang. To remove the connector, insert a small punch or awl through the slot to depress the terminal tang and disengage it from the terminal, then pull the connector from the ignition switch. The tang automatically engages the terminal when the connector is reinstalled. (Fig. 15-8)

To Remove Lock Cylinder:

1. Remove escutcheon.

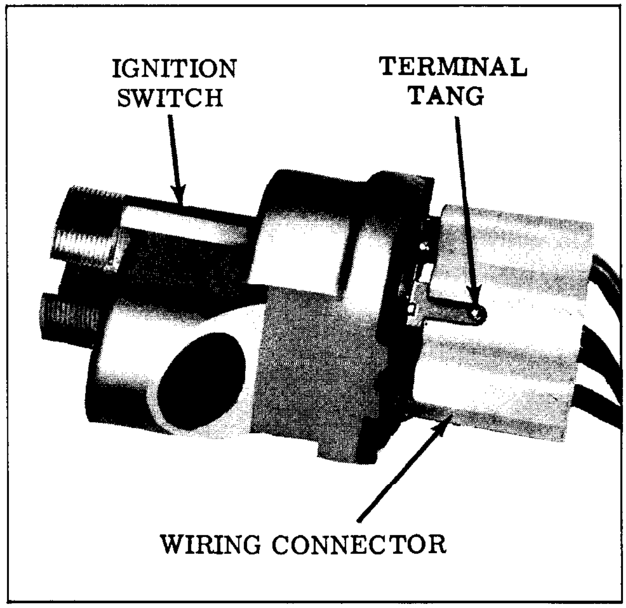


Fig. 15-8 Ignition Switch Connector

2. Insert key and turn to the left.
3. Push a wire in hole in face of lock cylinder.
4. Turn cylinder to extreme left and withdraw cylinder.

CIGAR LIGHTER

To Remove Lighter Assembly:

1. Disconnect wire and terminal from ash tray housing.
2. Unscrew the retainer from the lighter body assembly and remove lighter body.

VENTILATION AND HEATING CONTROLS

(See VENTILATING AND HEATING SECTION)

WINDSHIELD WIPER CONTROL

To remove the wiper control it is necessary to remove the left side panel. The control is attached as shown in Fig. 15-1.

RADIO

DELUXE—SUPER DELUXE (Figs. 15-9 and 15-10)

The radio consists of the receiver unit and the speaker unit. The serial number plate on the deluxe and super deluxe radio is located on the bottom of the receiver chassis.

On cars equipped with a rear seat speaker, a variable type control located behind the manual tuning knob modulates both the front and rear speakers simultaneously. (Fig. 15-9) As the control is turned counterclockwise, the volume of

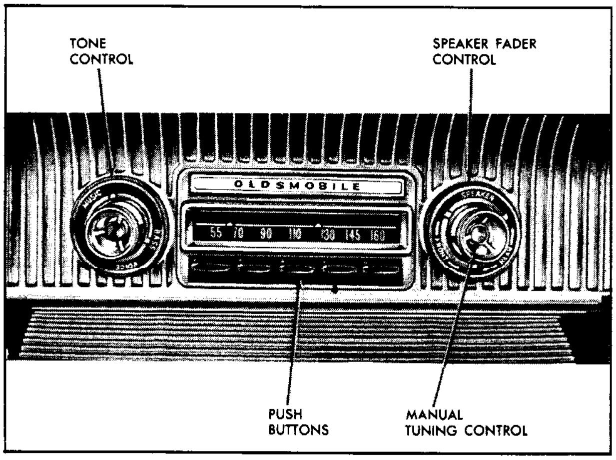


Fig. 15-9 Deluxe Radio

the front speaker increases while the volume of the rear speaker decreases. As the control is turned clockwise the volume of the front speaker diminishes while the volume of the rear speaker increases. After the desired speaker modulation is obtained, the volume of both speakers can be regulated by the volume control knob.

Both the Deluxe and Super Deluxe models have 5 push buttons for touch tuning, which mechanically tunes the radio to pre-selected stations, and a control knob for manual selection of stations.

In addition to push button tuning, the Super Deluxe model features automatic tuning. Depressing the foot selector switch or the center push bar rejects any station previously selected and automatically selects and tunes the next available station.

The sensitivity of the automatic tuning mechanism can be increased or decreased by the sliding lever located under the bar. The lever has three positions. When the lever is to the left, only the stronger or local stations will be received. The sensitivity can be increased by moving the lever to the middle or extreme right position.

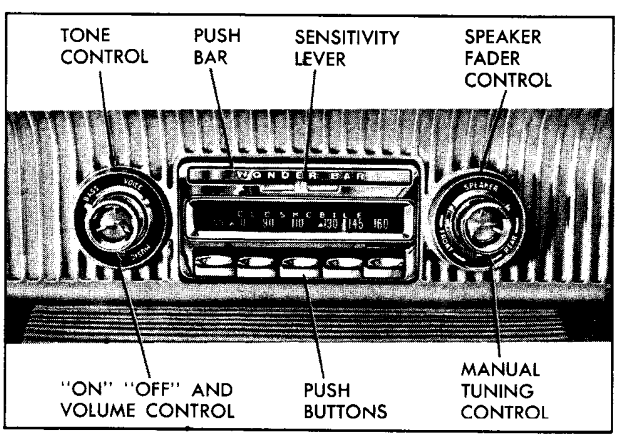


Fig. 15-10 Super Deluxe Radio

Push Button Adjustment

Adjustment of the mechanical push button tuning system on the Deluxe and Super Deluxe models is the same.

1. Allow the receiver to warm up for a few minutes.
2. Select a push button for the desired station. Pull the button slightly to the left and then out as far as it will go.
3. Tune in the desired station manually.
4. Push the selected button to its maximum IN position. This is the locking operation.
5. Proceed in the same manner for the remaining stations.
6. After all the buttons have been adjusted, recheck the settings. Push each button, then see if the station can be tuned in more accurately manually. If so, repeat step 2 and reset the station manually.

Receiver Removal (Deluxe or Super Deluxe)

1. Disconnect radio lead (green) from wiring harness. (Fig. 15-11)
2. On cars equipped with rear seat speaker, disconnect speaker lead.
3. Disconnect antenna lead-in from receiver, through opening in top of glove box.
4. On Super Deluxe radios, disconnect foot selector plug-in connector from right side of receiver.
5. Remove radio control knobs and nuts from front of instrument panel.
6. Disconnect receiver bracket from receiver side support while supporting receiver to prevent it from falling. Remove the receiver.

To install receiver, reverse the removal procedure.

FOOT SELECTOR SWITCH—REMOVAL (Super Deluxe Radio)

1. Fold floor mat to expose foot switch and remove attaching screws.
2. Remove foot switch wiring lead from clips along upper side of dash, then remove plug-in connector from right side of radio receiver.

To install switch, reverse the removal procedure.

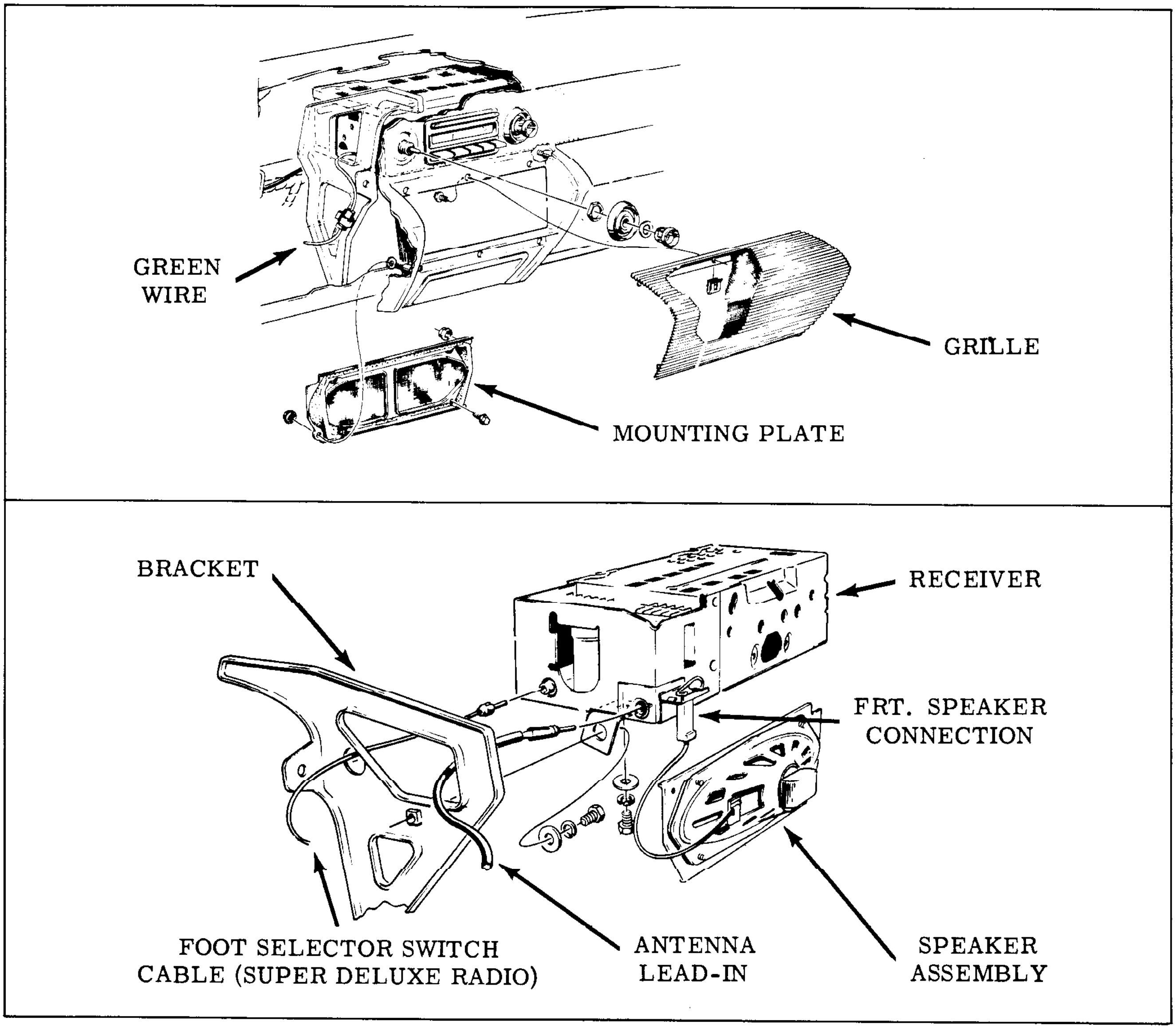


Fig. 15-11 Radio and Speaker Removal

RADIO SPEAKERS

FRONT SPEAKER REMOVAL

To remove the front speaker, disconnect the speaker lead and remove the speaker to instrument panel nuts. (Fig. 15-11)

To install, reverse removal procedure.

REAR SEAT SPEAKER REMOVAL
All Styles (Except Fiestas and Convertibles)

The rear seat speaker is mounted under the parcel shelf, and is accessible through the rear compartment. To remove speaker:

1. Disconnect lead from terminal.

2. Remove four mounting nuts, lock washers, and flat washers, while supporting speaker to prevent it from dropping. (Fig. 15-12)

To install, reverse removal procedure, being careful to avoid damaging the speaker cone while aligning the speaker assembly over the mounting screws.

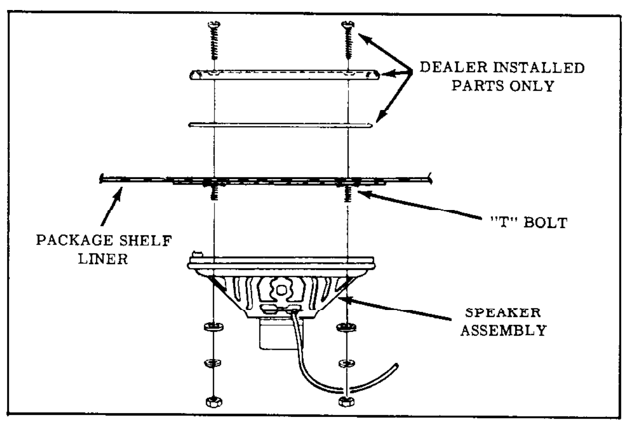


Fig. 15-12 Rear Seat Speaker (All Except 35, 45 & 67 Styles)

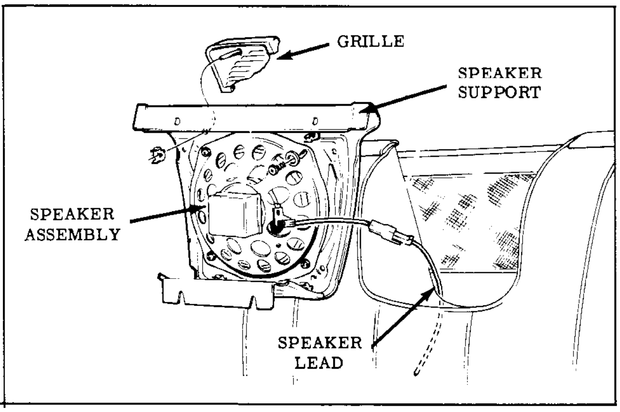


Fig. 15-13 Rear Seat Speaker (67 Styles)

Convertibles

The rear seat speaker on convertibles is mounted on the rear seat back. To remove speaker, proceed as follows:

1. Remove rear seat cushion.
2. Remove the upper two body to seat back attaching screws, accessible from the rear compartment.
3. Remove the two lower seat back attaching screws and tip seat back forward.

   NOTE: Place protective covering on floor panel to prevent soiling of seat back.

4. Remove four speaker assembly to seat back attaching screws.
5. Disconnect lead wire from speaker. Remove the four speaker attaching screws and remove speaker. (Fig. 15-13)
6. If speaker grille is to be replaced, it can be removed by removing the four self threading attaching nuts.
7. To install, reverse removal procedure.

Fiestas

The rear speaker on Fiestas is mounted on the rear quarter trim panel on the left side of the car. To remove the speaker proceed as follows:

1. Remove rear quarter trim panel.

   CAUTION: Speaker ground wire is attached to inner quarter panel. Do not break the ground wire.

2. Disconnect speaker ground wire from the inner quarter panel.
3. Remove speaker assembly from the quarter panel. (Fig. 15-14)

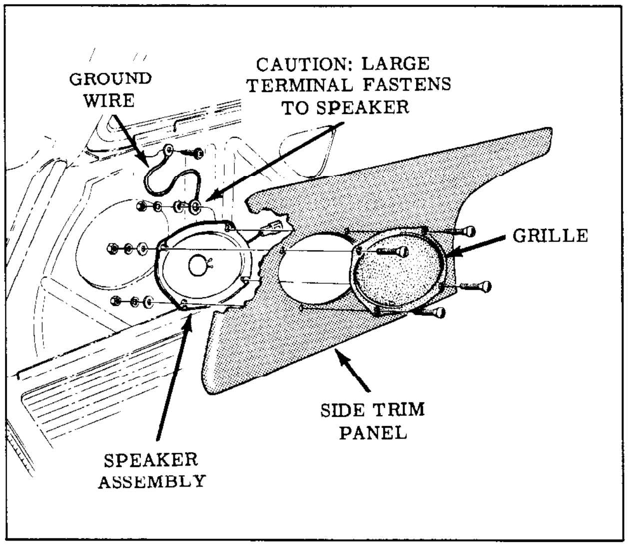


Fig. 15-14 Rear Seat Speaker (35 & 45 Styles)

4. To install, reverse the removal procedure. To replace the speaker lead, refer to Fig. 15-15.

ANTENNA

TRIMMER ADJUSTMENT

1. With the antenna fully extended, turn the radio on.
2. Turn the volume control full on and tune the receiver to a weak station between 600 and 1000 K.C. on the dial.
3. With a small screwdriver, adjust the antenna trimmer located on the bottom of the receiver.

MANUAL ANTENNA

Removal and Installation

1. Reach through the access hole in the top of the glove box and withdraw the antenna lead from the radio chassis.
2. Remove the right air outlet grille and cowl trim panel.
3. Refer to Fig. 15-16 and remove antenna assembly.
4. To install, reverse the removal procedure.

ELECTRA ANTENNA (All Except Fiestas) (Fig. 15-17)

Removal and Installation

1. Pull back trim panel and floor covering from antenna mounting area in rear compartment.
2. Disconnect connector plug, ground lead and unscrew lead-in nut from antenna tube.

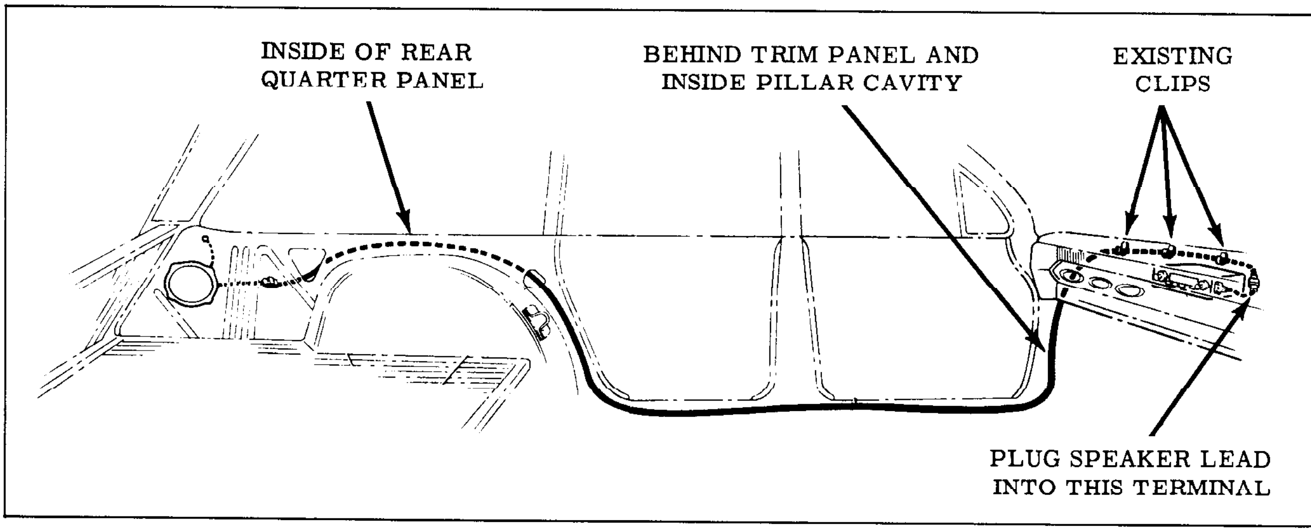


Fig. 15-15 Rear Seat Speaker Lead (35 & 45 Styles)

3. Remove cap nut from antenna on top of right rear quarter panel using Tool J-9215.

4. Remove bracket to floor pan screws, cover, and remove antenna.

5. To install, reverse removal procedure. Align antenna mast to perpendicular before tightening bracket screws.

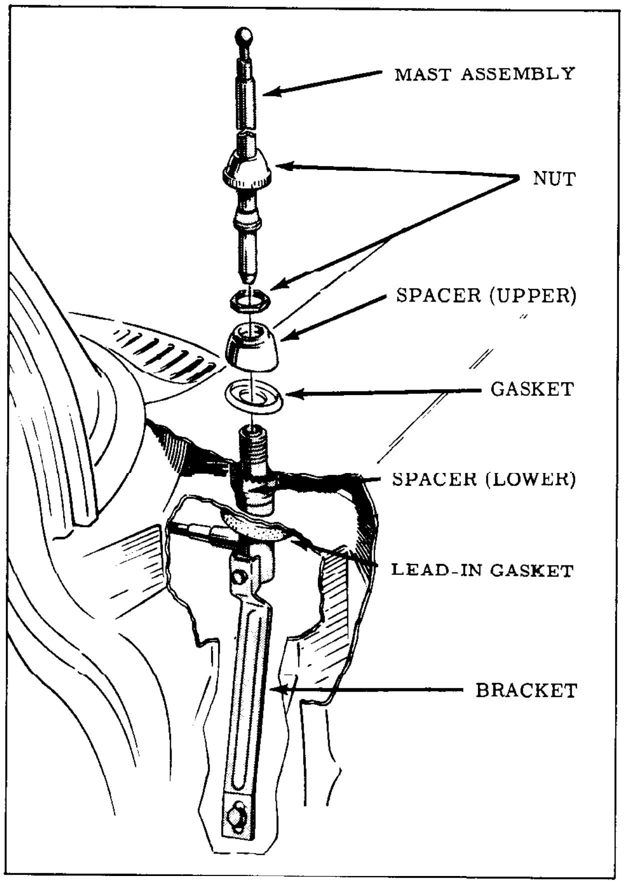


Fig. 15-16 Manual Antenna Installation

NOTE: For lead-in cable and wiring harness removal refer to Fig. 15-18 for routing and clip location. An access hole in the top of the glove box is provided for disconnecting and connecting the lead-in.

ELECTRIC ANTENNA (Fiestas)

Antenna, Removal and Installation (Fig.15-19)

1. Lower antenna mast if possible and remove nut at fender mounting with Tool J-9215.

2. Remove the left rear garnish moldings and rear left rear quarter trim panel.

3. From inside the rear quarter inner panel disconnect the connector plug, ground strap and the lead-in.

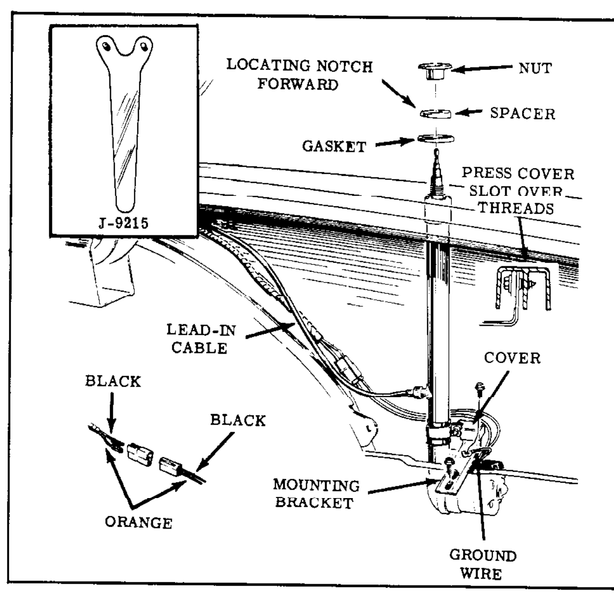


Fig. 15-17 Power Antenna Installation (Except 35 & 45 Styles)

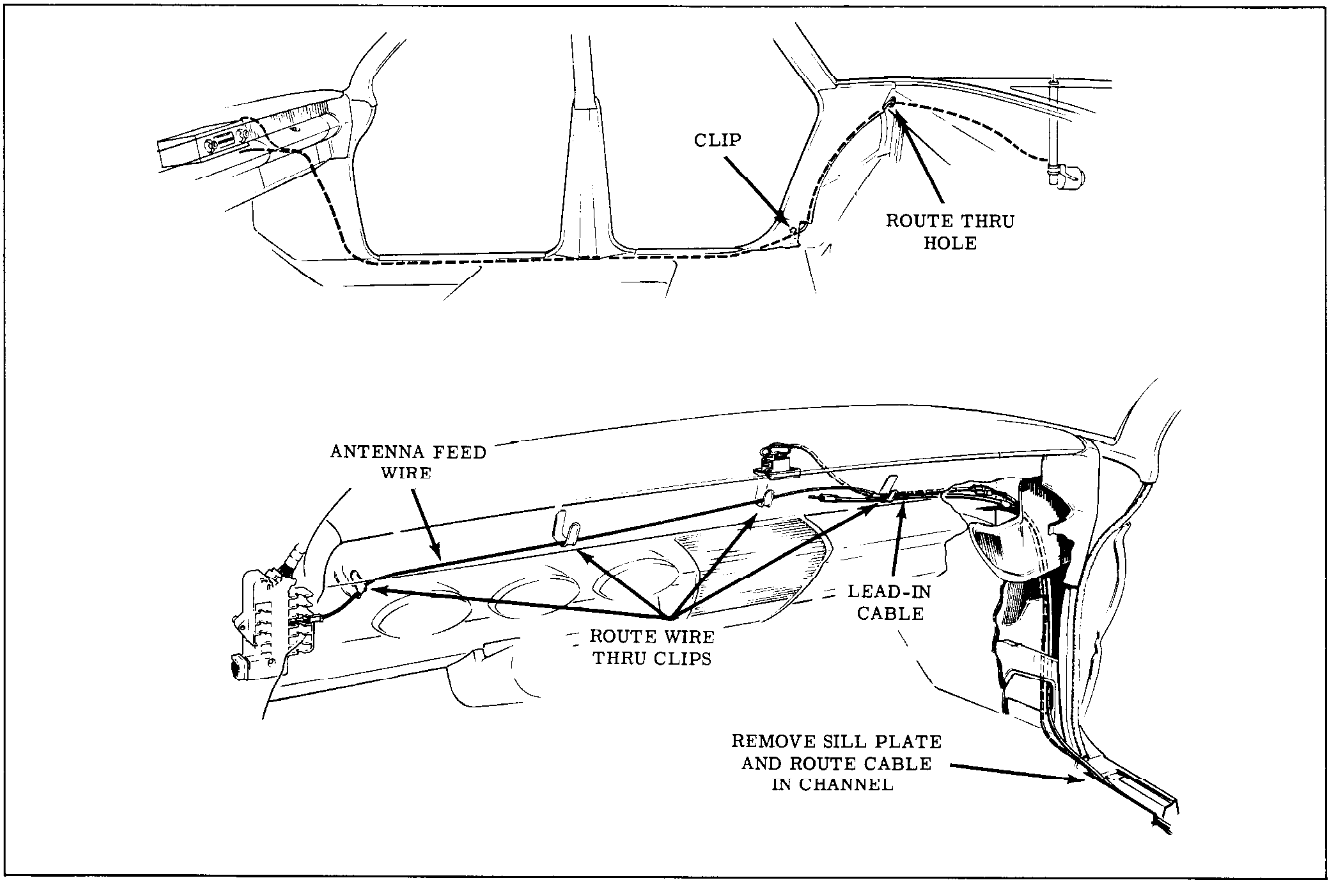


Fig. 15-18 Power Antenna Lead-In (Except 35 & 45 Styles)

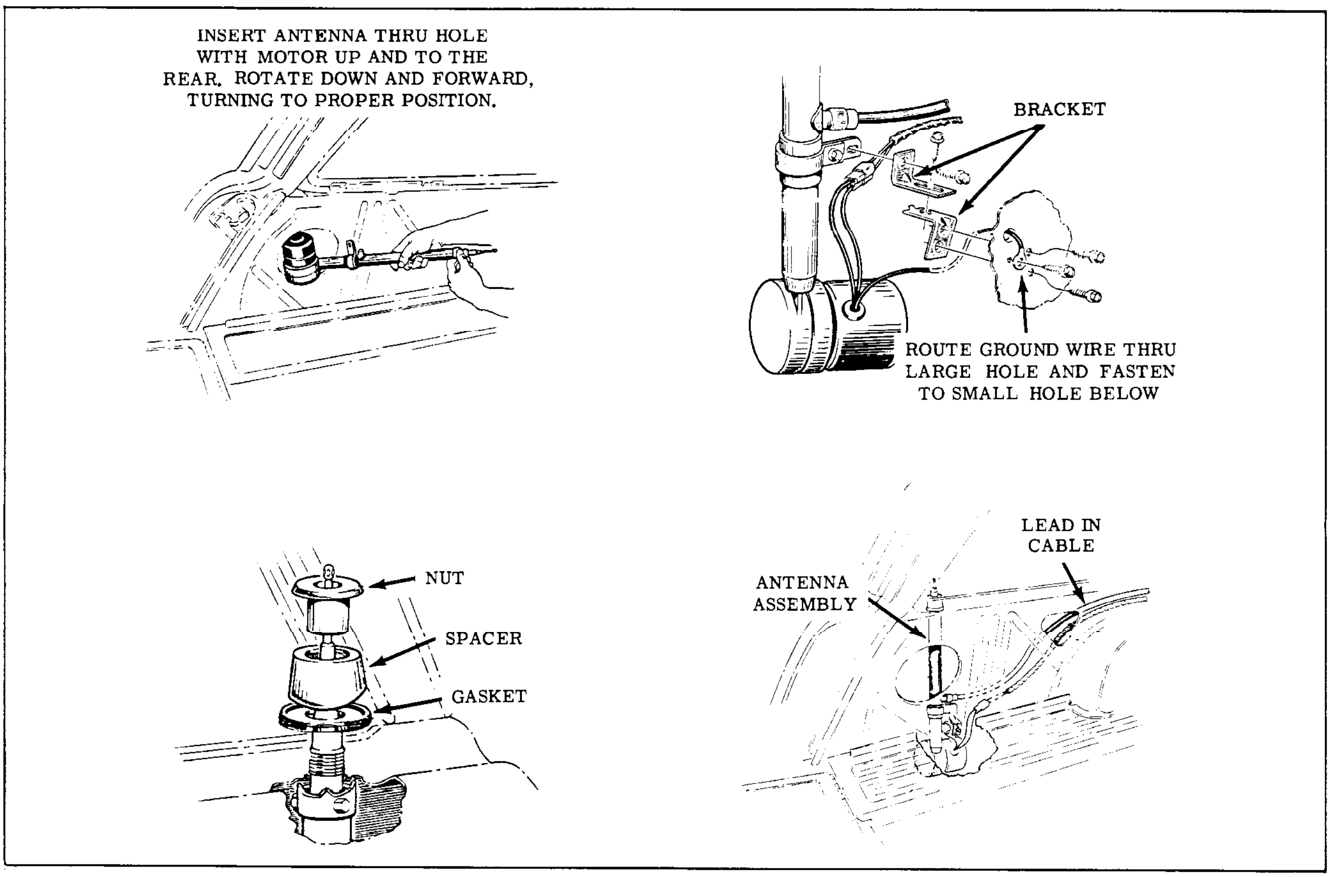


Fig. 15-19 Power Antenna Installation (35 & 45 Styles)

4. Remove antenna bracket screws from inner panel and withdraw the antenna assembly.

5. To install, reverse the removal procedure. In and out, and forward and rearward mast alignment is provided by elongated mounting bracket holes.

Lead In, Removal and Installation

1. Remove left rear quarter trim panels and door sill plates.

2. Fold back floor mats and remove body wiring shield.

3. Remove cowl trim panel and remove antenna lead-in.

   NOTE: A hole is provided in the top of the glove box which permits lead-in removal from the radio chassis without removing the glove box.

4. To install, reverse the removal procedure and route and retain the lead-in as shown in Fig. 15-20.

ELECTRIC ANTENNA

Disassembly (Fig. 15-21)

The following parts are serviceable: Drive Assembly, Mast Assembly and Support Tube Assembly. To service any of these parts proceed as follows:

1. Remove the two connector to support tube screws and remove connector.

2. Unsolder hook-up wire at pin and remove pin and insulator assembly.

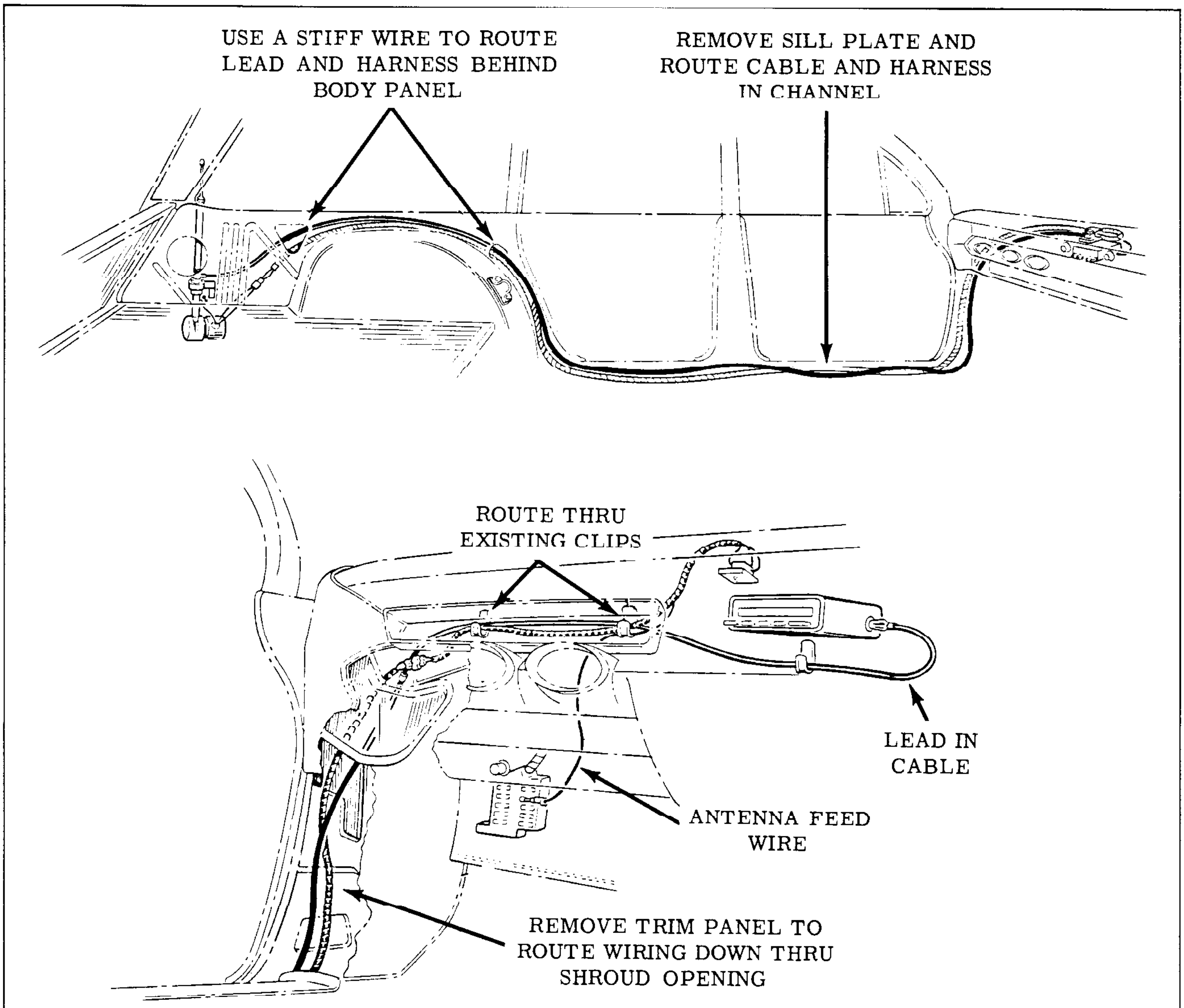


Fig. 15-20 Power Antenna Lead-In (35 & 45 Styles)

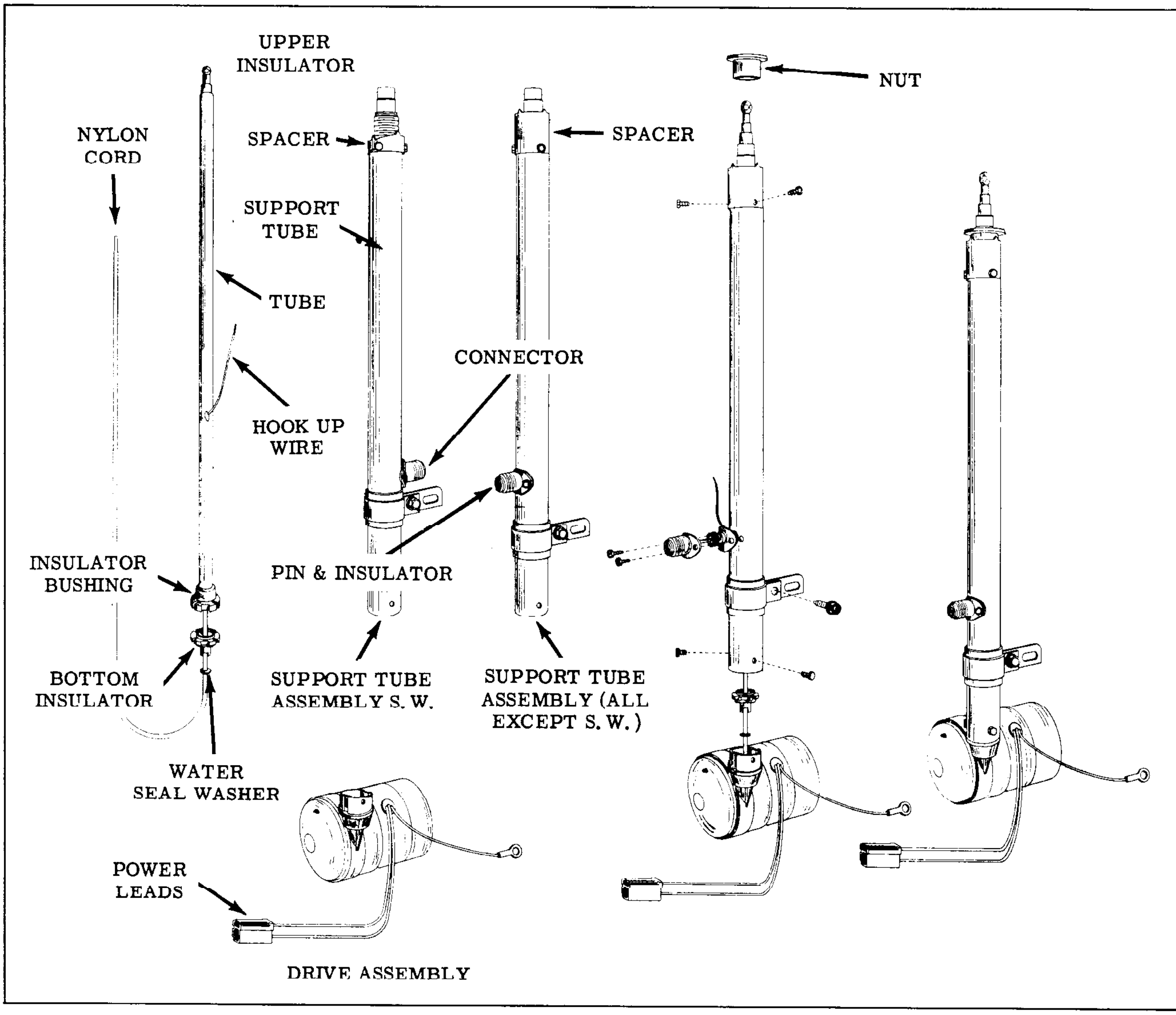


Fig. 15-21 Power Antenna Assembly

NOTE: Do not overheat pin by slow soldering as the pin insulator will be destroyed.

3. Remove the three support tube to drive assembly screws.

4. While applying a back and forth rotary motion, pull until support tube is removed from antenna.

   NOTE: Do not remove upper insulator from support tube.

5. If the drive assembly or mast assembly is to be replaced, proceed as follows:

   a. While applying a rocking motion, pull on mast until insulator bushing is removed from the drive assembly tubular fitting.

   b. Energize motor until entire length of nylon cord is expelled from drive assembly. To prevent a kink or bend in nylon cord, keep it taut by pulling on mast.

   NOTE: If motor is inoperative, it will be necessary to manually remove the nylon cord from the drive assembly as follows:

   c. Place the assembly in a vise so that the normal plane of the nylon cord is parallel with the floor.

   d. Pull on nylon cord until it is completely expelled from the drive assembly.

   CAUTION: No attempt should be made to disassemble antenna further than Step 5-d.

Assembly

1. Thread nylon cord through bottom insulator, (small diameter end down) and water seal washer.

2. Energize motor and feed nylon cord into drive assembly. Do not allow nylon cord to bend or kink.

NOTE: Push water seal washer and bottom insulator all the way down into tubular fitting (make sure that keyways in bottom insulator are rotated to key position) before nylon cord completely disappears into drive assembly.

3. Push mast assembly into tubular fitting making sure that the upper edge of the insulator bushing is below the center of the 3 support tube to drive assembly screw holes.

4. Install support tube over mast assembly, making sure hook-up wire is extended through proper hole in support tube. Line up 3 holes in support tube and install the 3 screws.

5. Solder hook-up wire to pin and insulator assembly being careful not to overheat by slow soldering.

6. Install connector over pin and insulator assembly and install 2 screws.

Diagnosis

If antenna fails to operate properly, check the following possible sources of trouble.

1. Excessive tightening of cap nut on fender will result in excessive operating noise in the car.

2. A stalled or slowly operating mast may be caused by bent or dirty mast sections. If dirty, wipe with oily cloth.

3. See that fuse is not burned out.

4. See that ground wire is tight.

5. To determine whether fault is in the antenna or in the control circuit, disconnect the leads coming from antenna. Connect a jumper wire to the positive battery terminal and touch jumper wire to each of the terminals of the wires coming from the drive assembly. If antenna does not operate, the fault is in the antenna drive assembly. If antenna does operate, the fault is in the control circuit.

6. If trouble is in the control circuit:

   a. Examine electrical connections at switch, making sure they are securely connected.

   b. Check wiring at switch with lamp or motor.

If antenna lead-in is suspected of being bad, check radio operation using an antenna lead-in known to be good.

NOTE: If excessive static is encountered, check suppressors and static eliminators for proper installation. (Fig. 15-22)

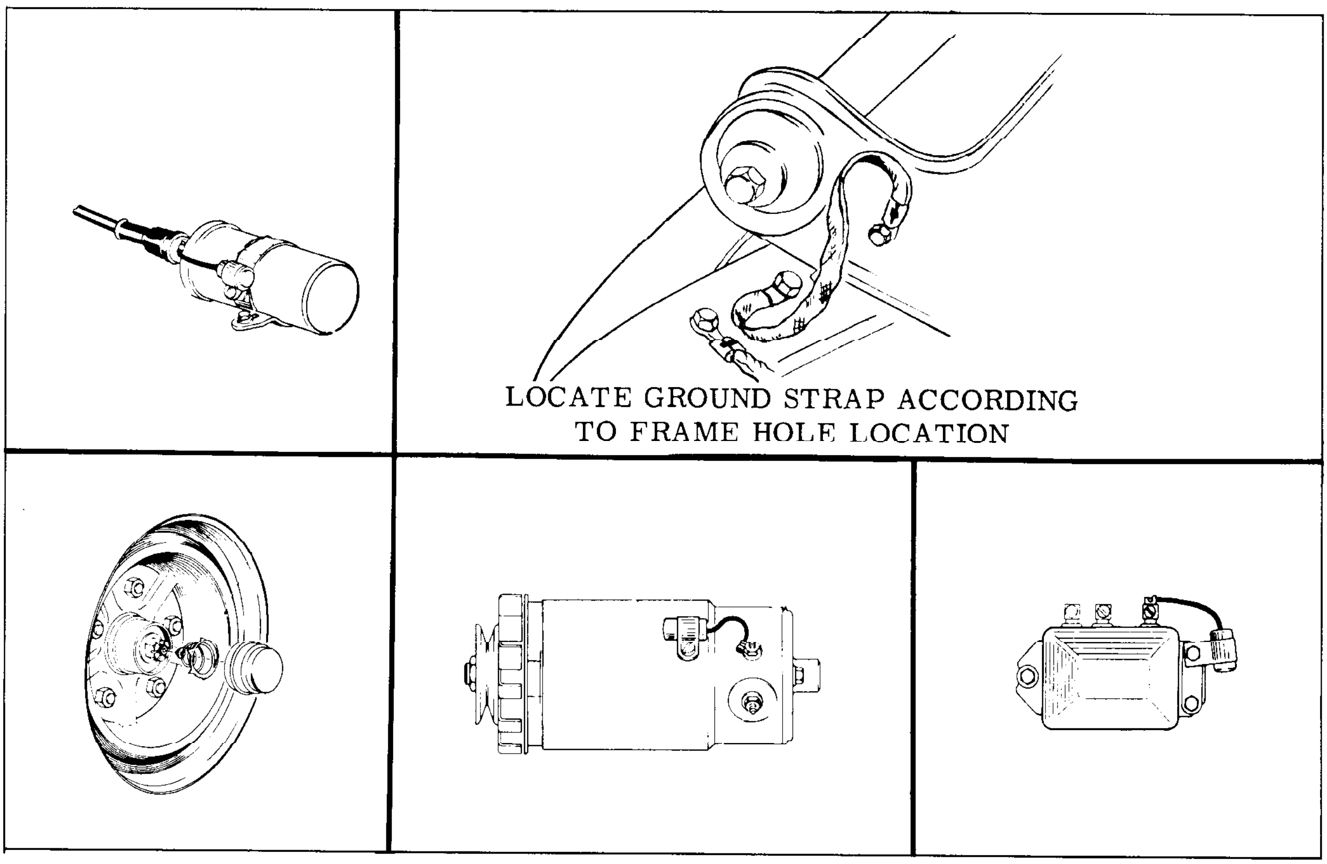


Fig. 15-22 Static Eliminators and Suppressors

CHASSIS SHEET METAL
VENTILATION AND HEATING

CONTENTS OF SECTION 16

CHASSIS SHEET METAL

HOOD AND HINGES

HOOD HINGE ADJUSTMENT

The hood hinge adjustment provides lateral and vertical alignment of the rear edge of the hood in relation to the cowl vent grille.

1. Raise hood and loosen hinge bracket to cowl bolts and the hinge bracket to fender bolt on each side of car. (Fig. 16-1) For fore or aft adjustment, loosen hood hinge to hood bolts.

2. Shift hood until clearances shown in Fig. 16-2 are obtained.

3. Tighten bolts and recheck alignment.

PILOT BOLT ADJUSTMENT

After aligning the hood hinges, the hood pilot bolts and rubber bumpers, located on the fender tie bar, should be adjusted. The pilot bolts position the hood as it is lowered. Vertical adjustment can be made by loosening the pilot bolt lock nuts and adjusting the threaded pilot bolts up or down for proper engagement with the latch assemblies. Lateral adjustment can be made by loosening the lock nuts on the pilot bolts and moving the

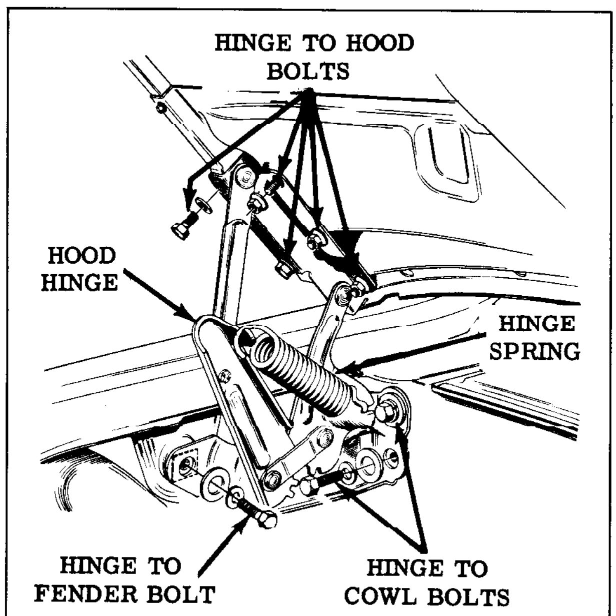


Fig. 16-1 Hood Hinge Assembly

Fig. 16-2 Sheet Metal Clearances

pilots right or left until front hood to fender clearances are 1/8" maximum. (Fig. 16-3)

The rubber bumpers must be adjusted for alignment of the forward edge of the hood with the forward edge of the fenders. Vertical adjustment can be made by loosening the lock nuts on the rubber bumpers and turning bumpers either up or down.

HOOD ASSEMBLY REMOVE AND INSTALL

1. Raise hood and install protective coverings over cowl and fender areas to prevent damage to paint and moldings when removing or installing hood.

Fig. 16-3 Hood to Fender Clearances

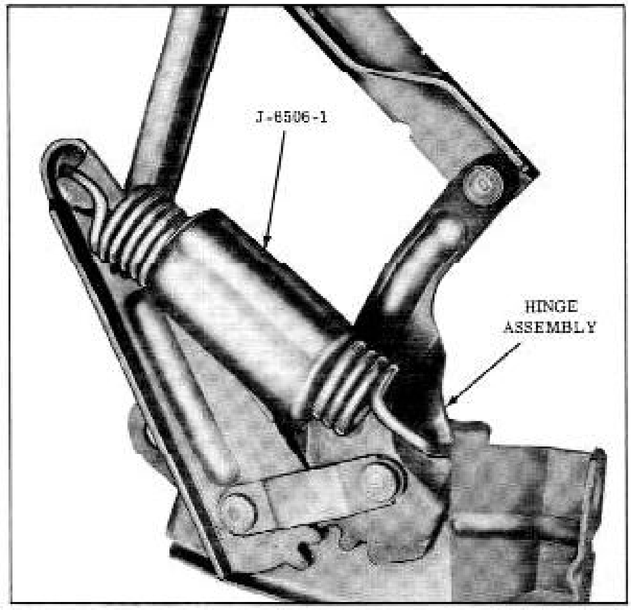


Fig. 16-4 Hinge Spring Tool in Position

2. Disconnect underhood lamp wire.

3. Remove the two mounting bolts on each side of hood. (Fig. 16-1).

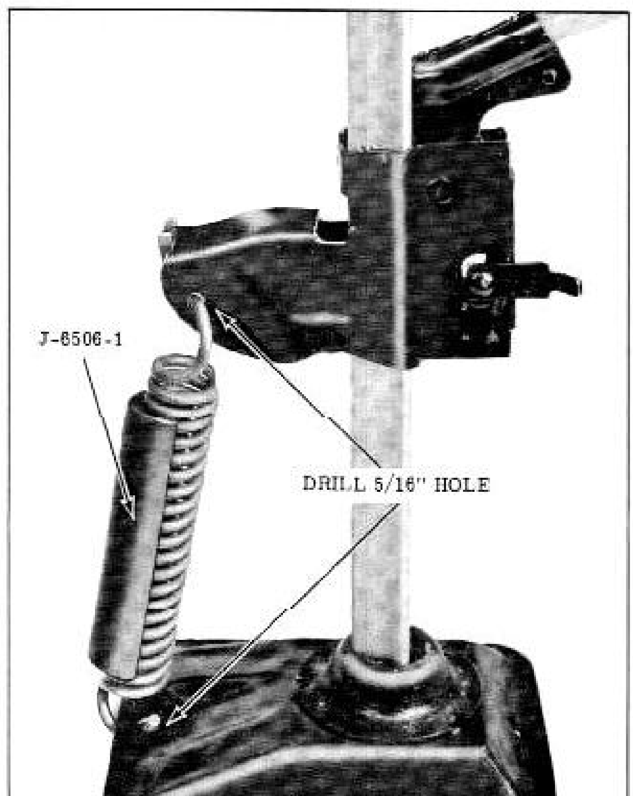


Fig. 16-5 Installing Hinge Spring

4. While supporting hood, remove the three mounting stud nuts on each side of hood.

5. Remove hood assembly.

To install, reverse removal procedure and check hood alignment.

If necessary to install a new insulator, apply cement to within 2 inches of outer edges of insulator and install with smooth side exposed.

NOTE: The mounting stud holes in the hood hinge bracket are enlarged to provide a slight fore and aft adjustment of the hood panel.

HOOD HINGE SPRING REMOVE AND INSTALL

To remove the spring from the hood hinge, raise hood to expand spring and place Tool J-6506-1 over the spring.

Lower hood until spring can be removed. (Fig. 16-4) When installing new spring, a suitable expander must be used to stretch the spring, then Tool J-6506-1 can be placed over the spring. (Fig. 16-5) Position spring (with tool in place) on hinge.

Lower hood slightly to expand spring, then remove Tool J-6506-1.

HOOD HINGE REMOVE AND INSTALL (With Spring Removed)

1. Mark the hinge outline on the cowl to facilitate alignment on installation.

2. While supporting hood, remove the hinge bracket to hood bolts and nuts, then remove the two hinge bracket to cowl and the hinge bracket to fender bolt.

3. Remove hinge assembly.

To install, apply auto body caulking compound around the hinge bracket to cowl bolts and reverse removal procedure. Align hood after hinge is installed.

HOOD EMBLEM AND LETTERS

Hood Emblem (88 and S88 Series)

The hood emblem is attached by self-threading nuts which are accessible from the underside of the hood. Install the nuts using Tool J-7158.

Hood Letters (98 Series)

The hood letters are attached to the hood by nuts which are accessible from the underside of the hood.

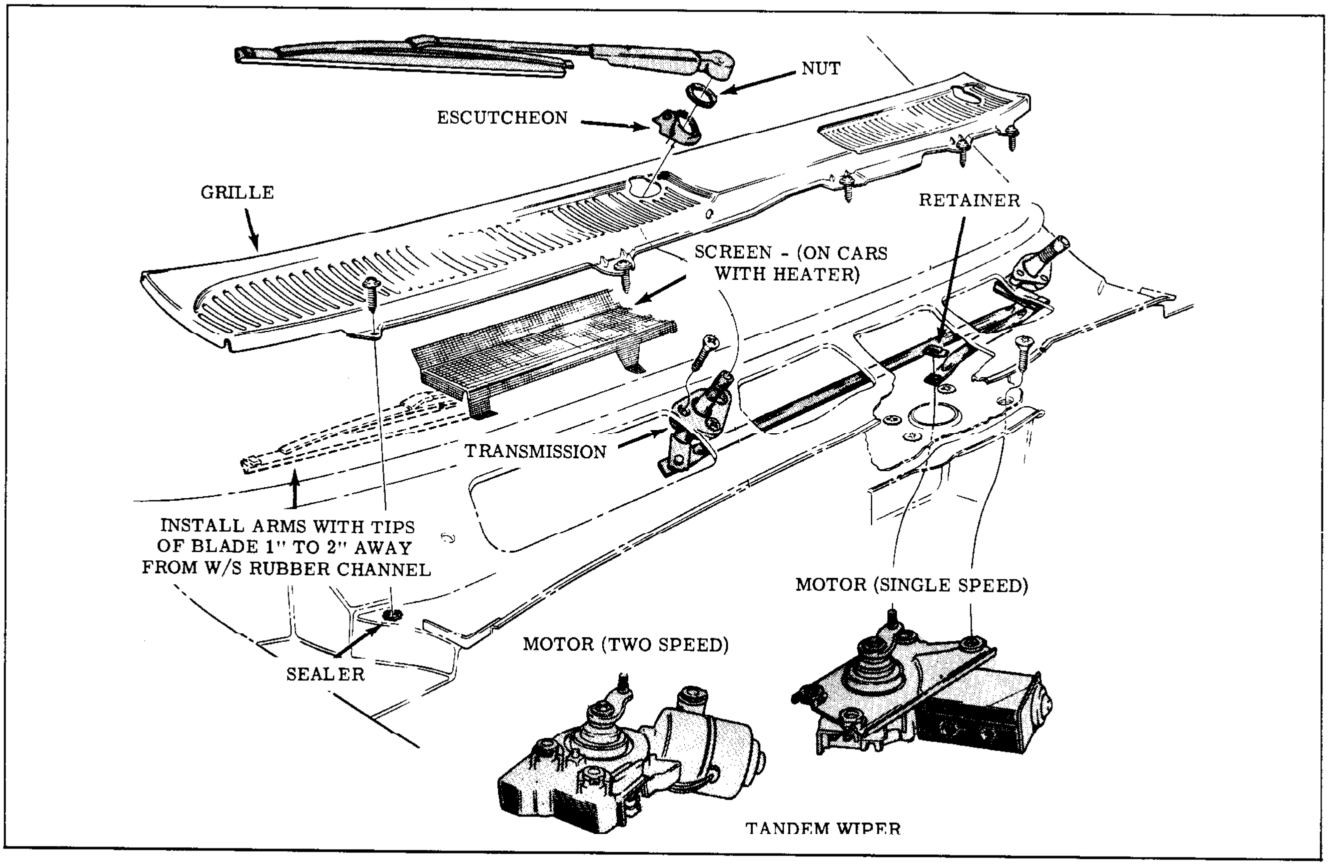


Fig. 16-6 Cowl Vent Grille

COWL VENT GRILLE

REMOVE AND INSTALL (Fig. 16-6)

1. Remove windshield wiper arms.
2. With the use of Tool J-6592-02, remove wiper transmission to escutcheon nut and escutcheon.
3. Raise hood and remove six cowl vent grille to cowl screws.
4. Remove cowl vent grille.

To install, apply a medium-bodied sealer around vent grille attaching screw holes and vent grille tab slots in cowl, then carefully slide grille rearward to engage rear edge of grille between windshield lower reveal moldings and molding attaching clips and reverse removal procedure.

FENDER

REMOVAL (Fig. 16-7)

Before removing and installing a fender, painted areas and moldings adjacent to the fender should be covered for protection against scratches. When installing a fender, it is important that all anti-squeaks and seals be reinstalled. If the anti-squeaks and seals are damaged, they should be replaced.

FENDER ALIGNMENT

The holes in the fenders are enlarged to permit adjustment. When making installation, fender should first be placed firmly into position, and before replacing any bolts, make sure the rear edge of the fender matches the contour of the door. (This adjustment is made by positioning fender in or out at upper and lower attachment by using shims as required.) After this contour adjustment, install and tighten all fender bolts just

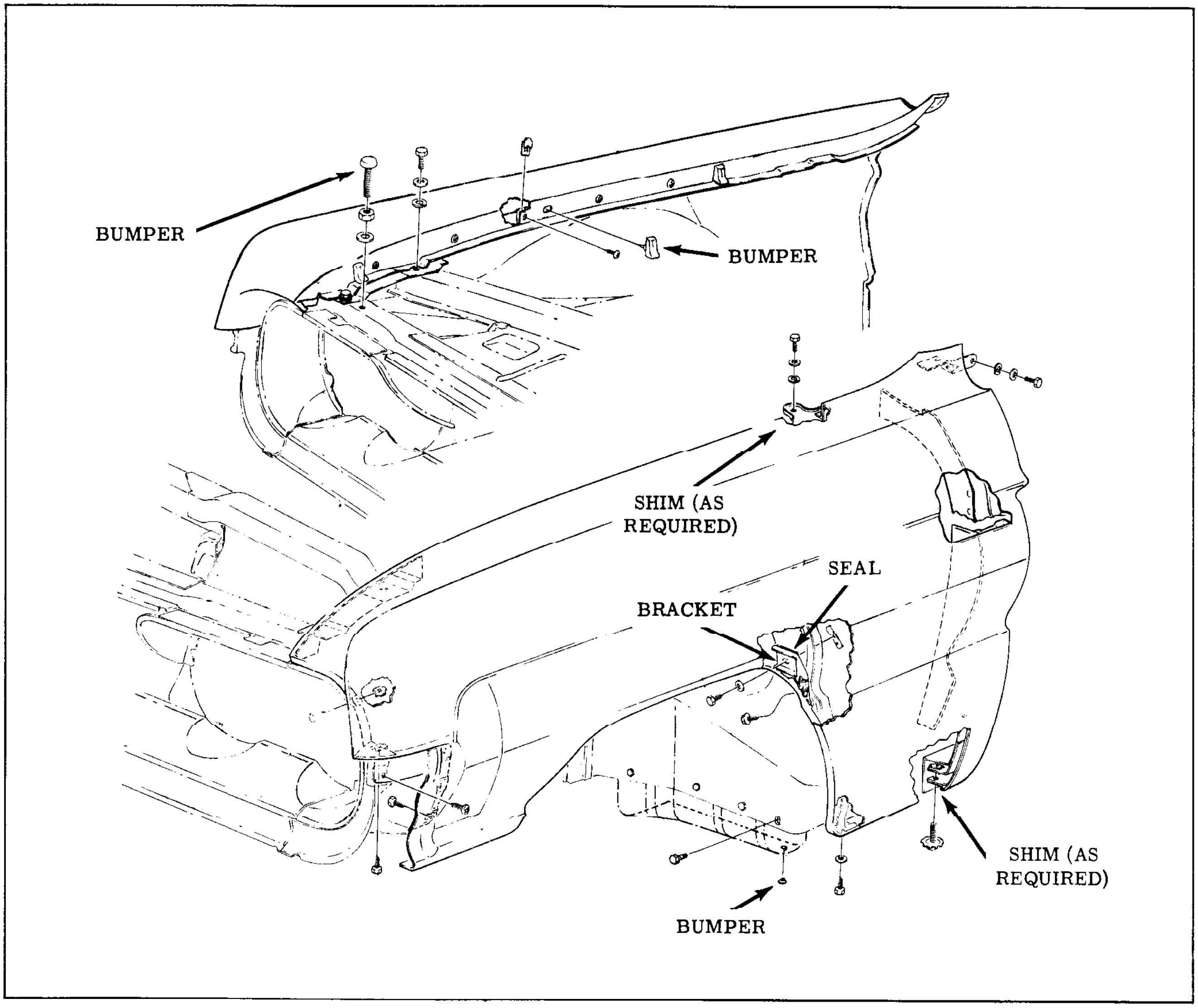


Fig. 16-7 Fender Attachments

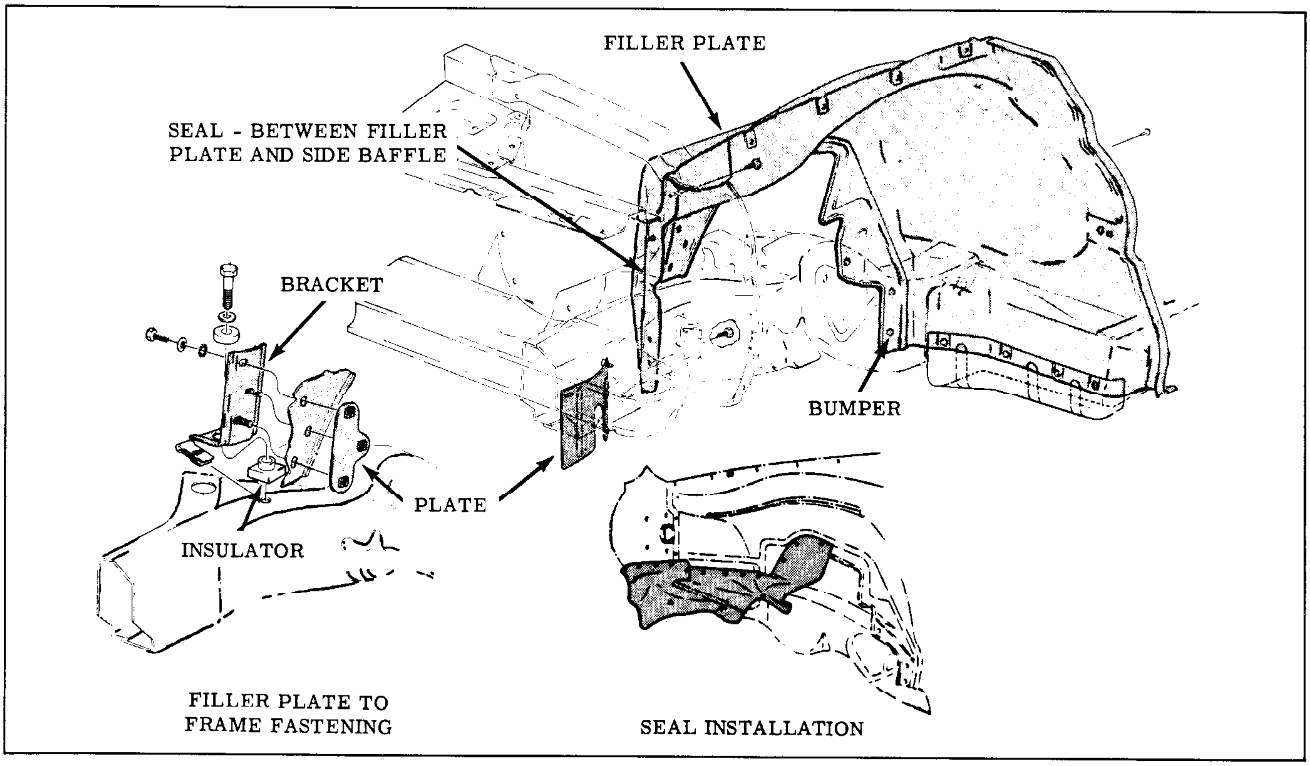


Fig. 16-8 Filler Plate and Baffle Attachment

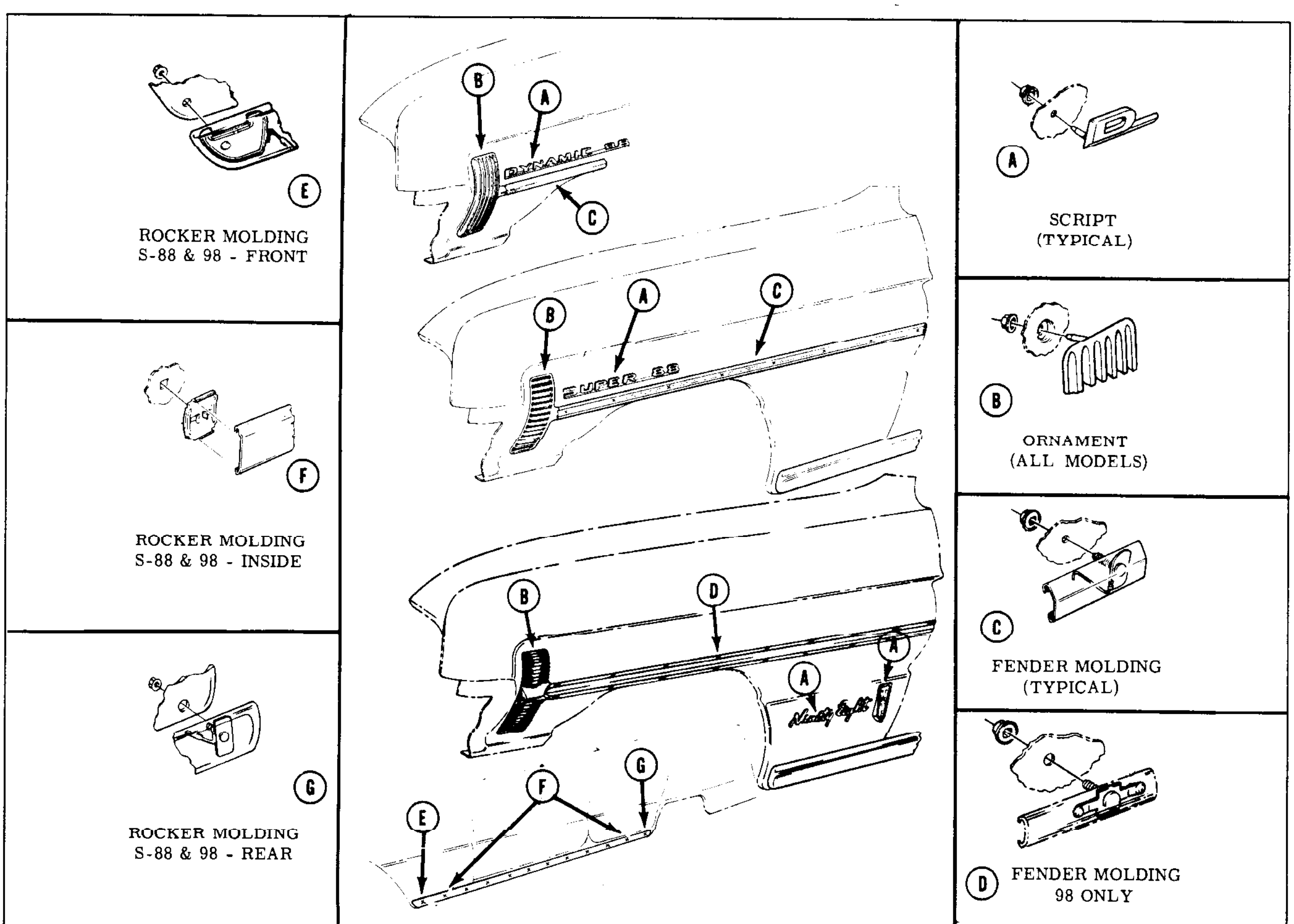


Fig. 16-9 Moldings

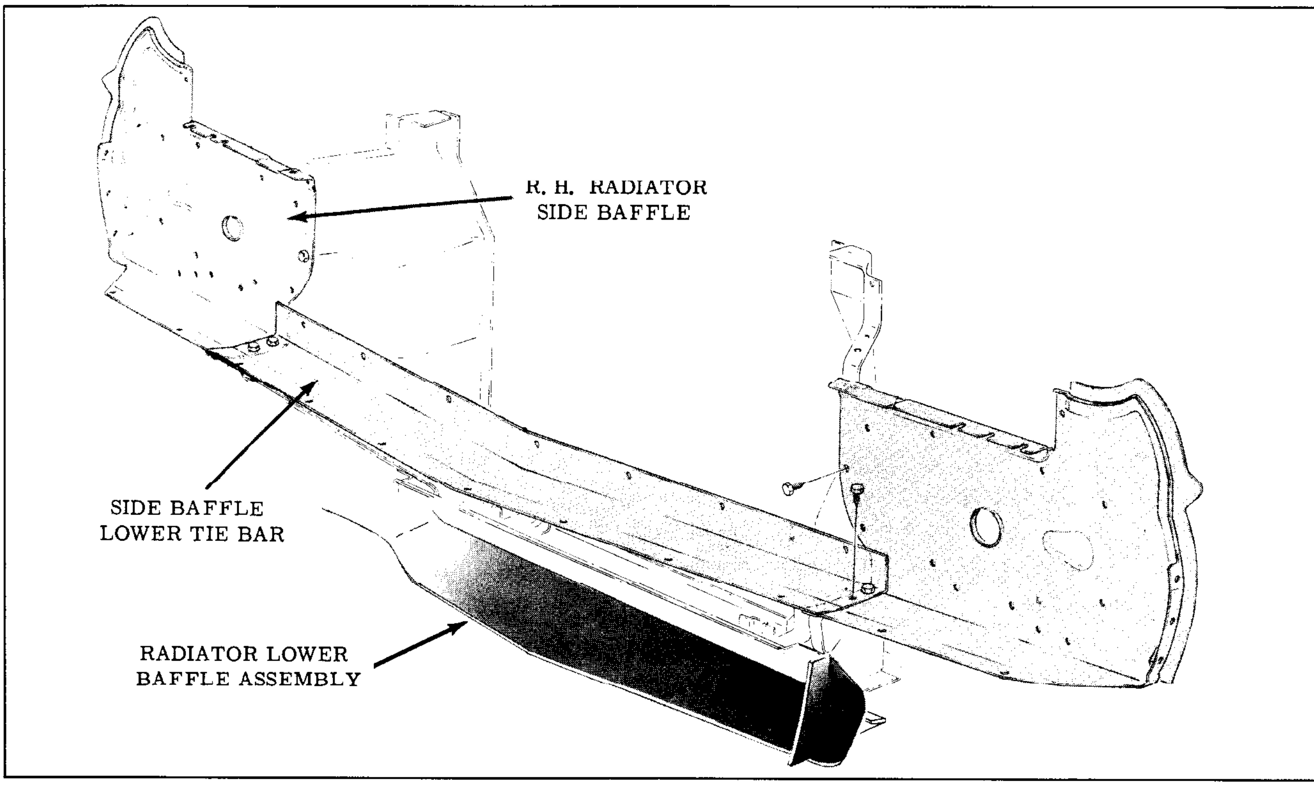


Fig. 16-10 Radiator Baffles

enough to permit shifting as required. After fender is properly positioned tighten all attaching screws and bolts.

FILLER PLATE AND BAFFLE ASSEMBLY (Fig. 16-8)

All necessary wiring and parts should be disconnected or removed before removing the filler plate. It is important that all seals and anti-squeaks be checked and replaced, if necessary, before installing.

When removing a fender, the baffle assembly (Fig. 16-8), unless damaged, should be left attached to the fender filler plate. If the baffle has been damaged and a new fender and baffle plate is to be installed, alignment of mounting holes is made easier by attaching the baffle to the filler

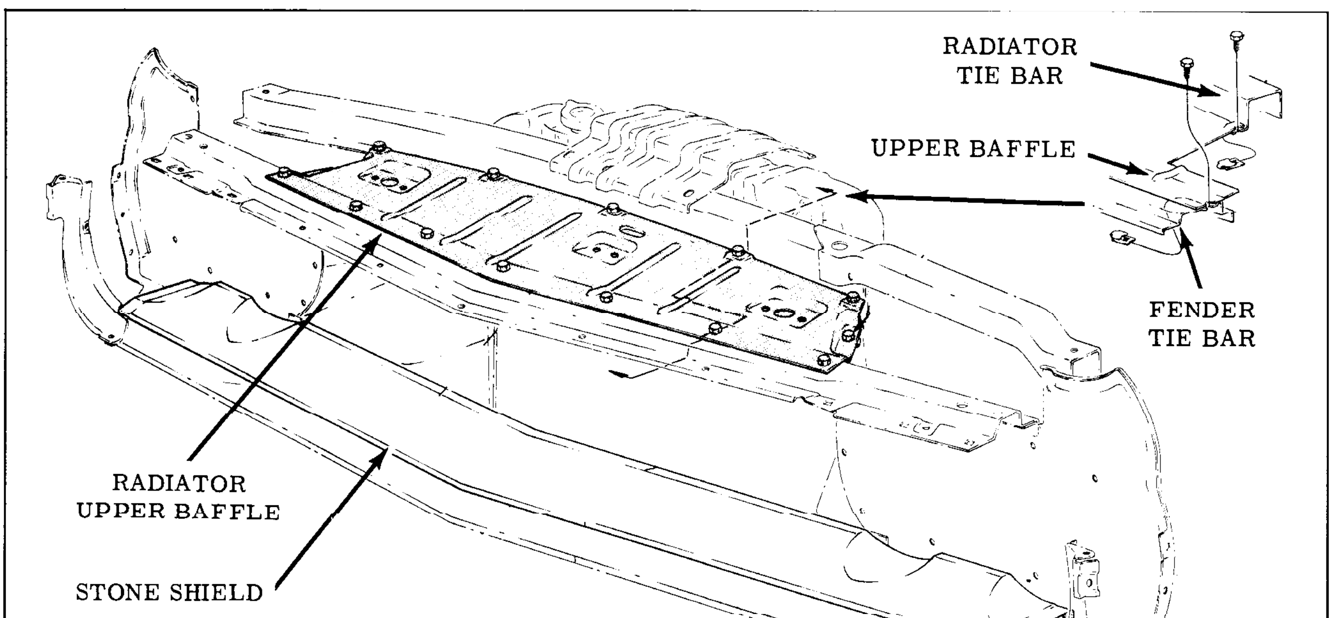


Fig. 16-11 Radiator Upper Baffle

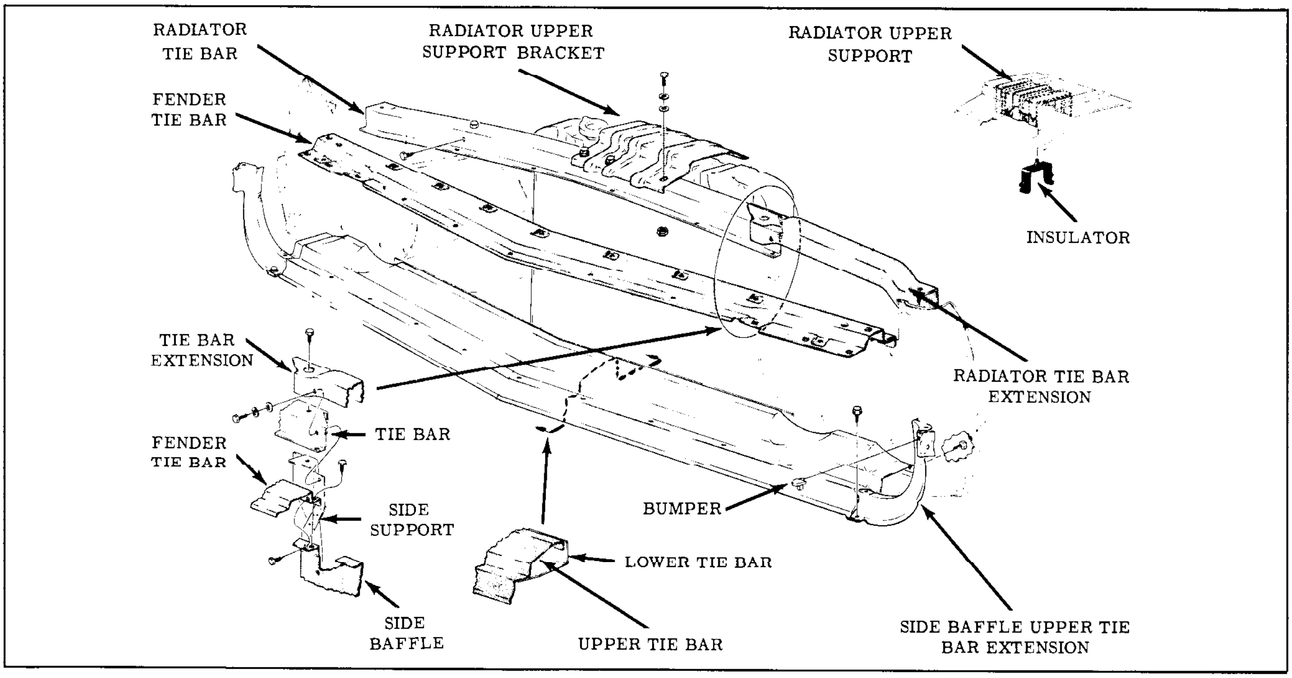


Fig. 16-12 Radiator Upper Insulator

plate first. After the fender has been installed, the baffle plate can be bolted to the fender.

Fender Side Molding (Fig. 16-9)

The fender side molding is retained by nuts. To remove, it is necessary to loosen the fender at the cowl, disconnect it at the lower bracket then move outward to reach the rear attaching nuts.

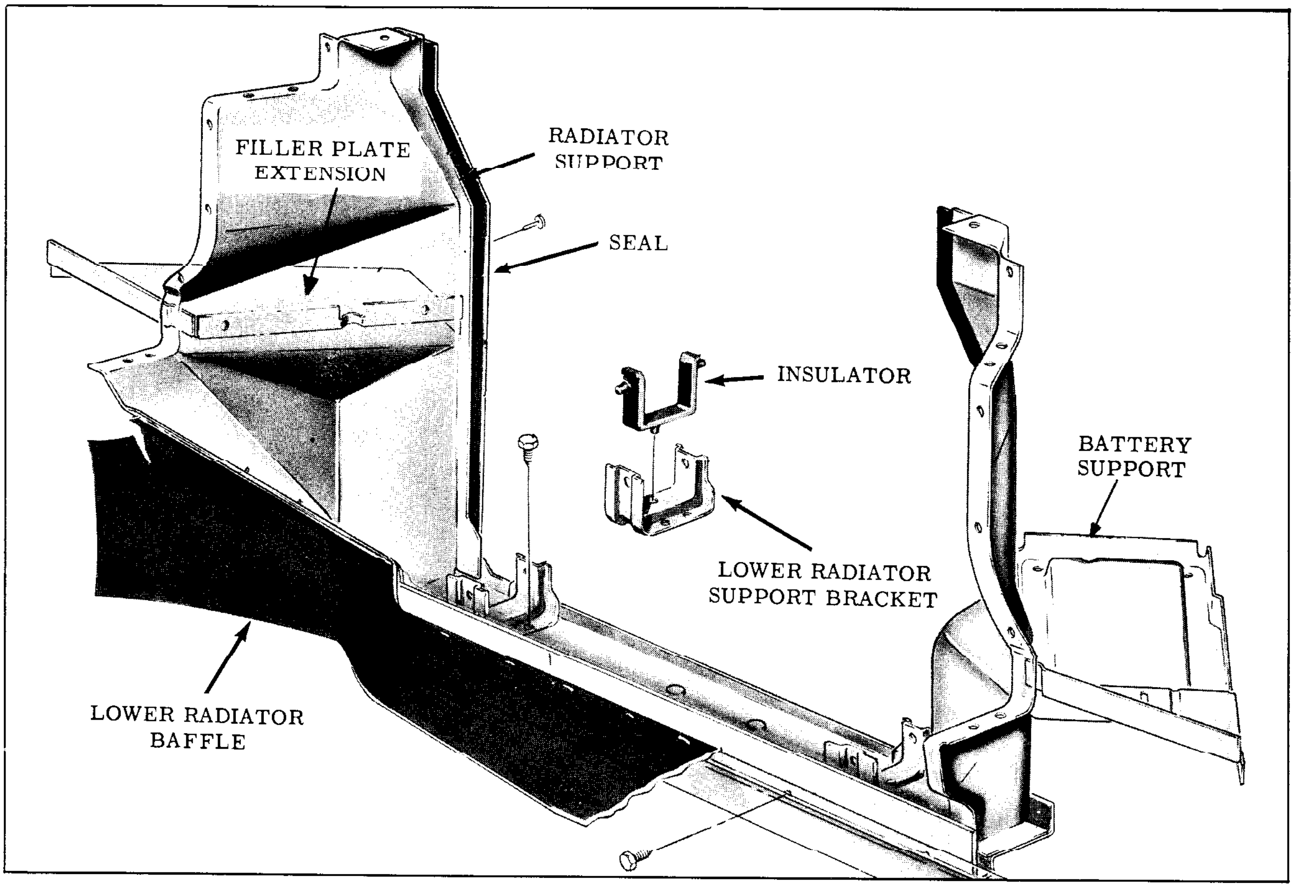


Fig. 16-13 Radiator Lower Insulator

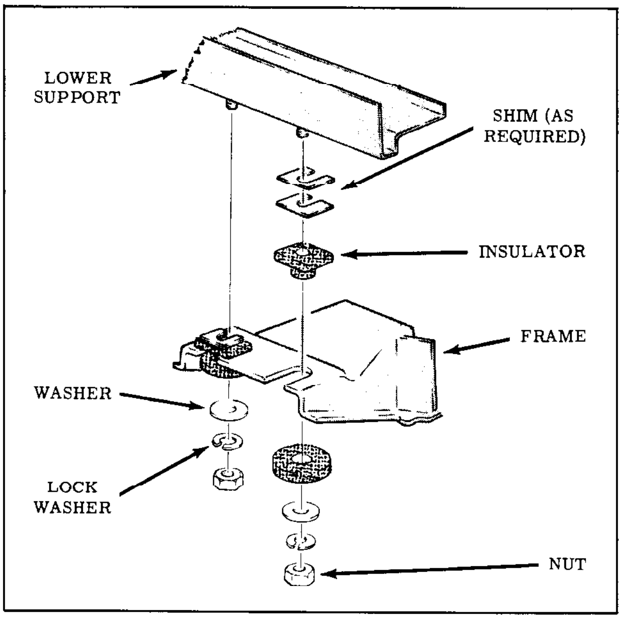


Fig. 16-14 Lower Support Mounting

Ornament (Fig. 16-9)

Each ornament is attached to the fender by nuts which are accessible under the fender.

Script and Emblem (Fig. 16-9)

The script and emblem are retained by nuts

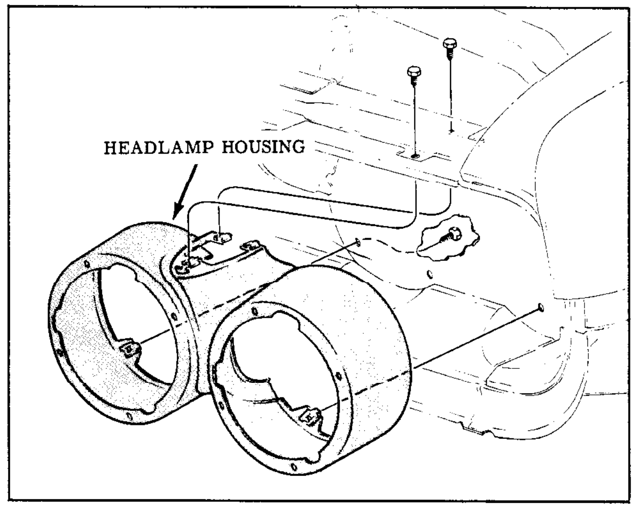


Fig. 16-15 Headlamp Housing

which are accessible under the fender. On the 98 models it is necessary to disconnect the rear of the fender to gain access.

RADIATOR SUPPORT BAFFLES

The radiator supports and baffles can be removed by removing all attaching screws. (Figs. 16-10 and 16-11) Before installing, check and replace, if necessary, the radiator support bracket insulators.

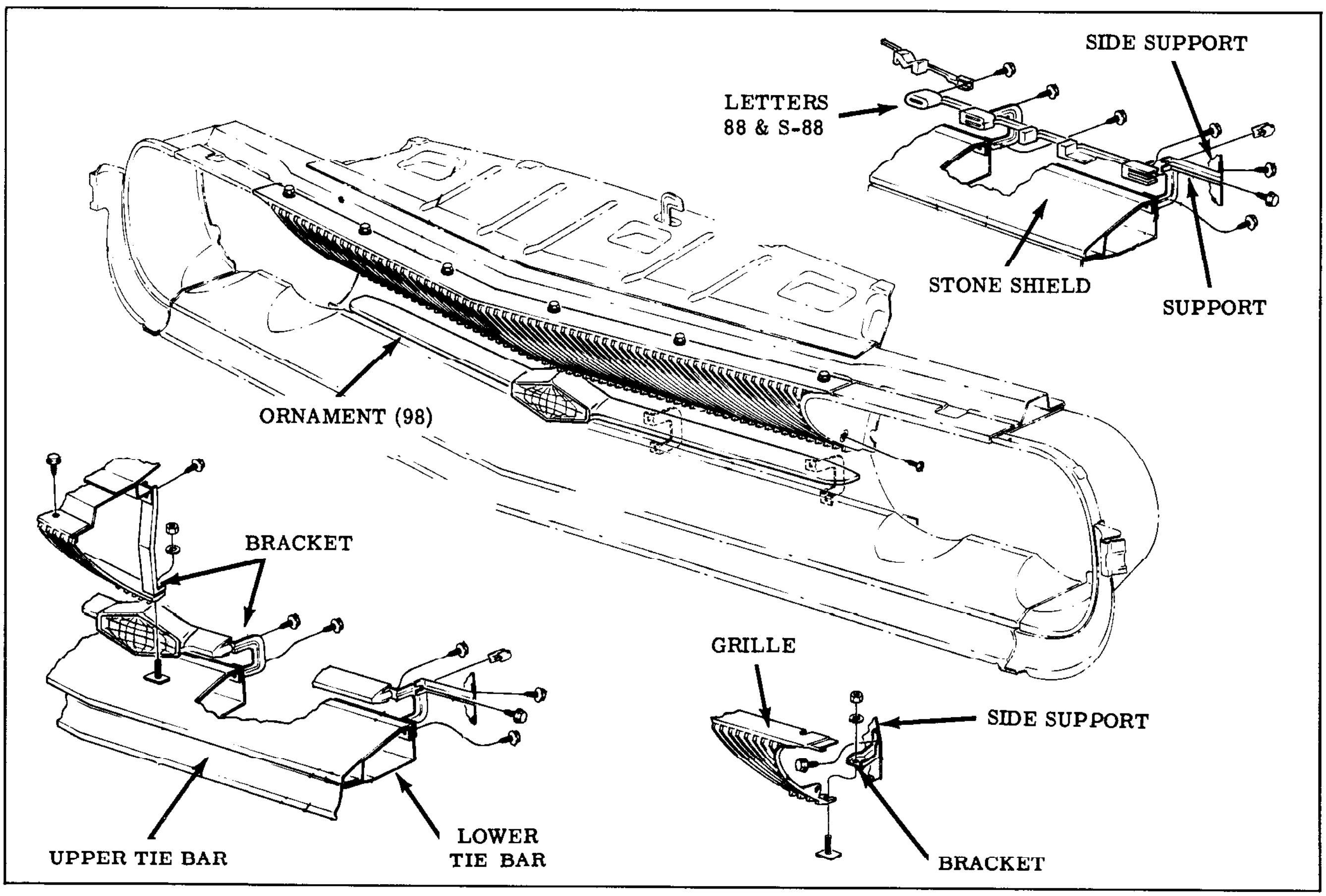


Fig. 16-16 Grille

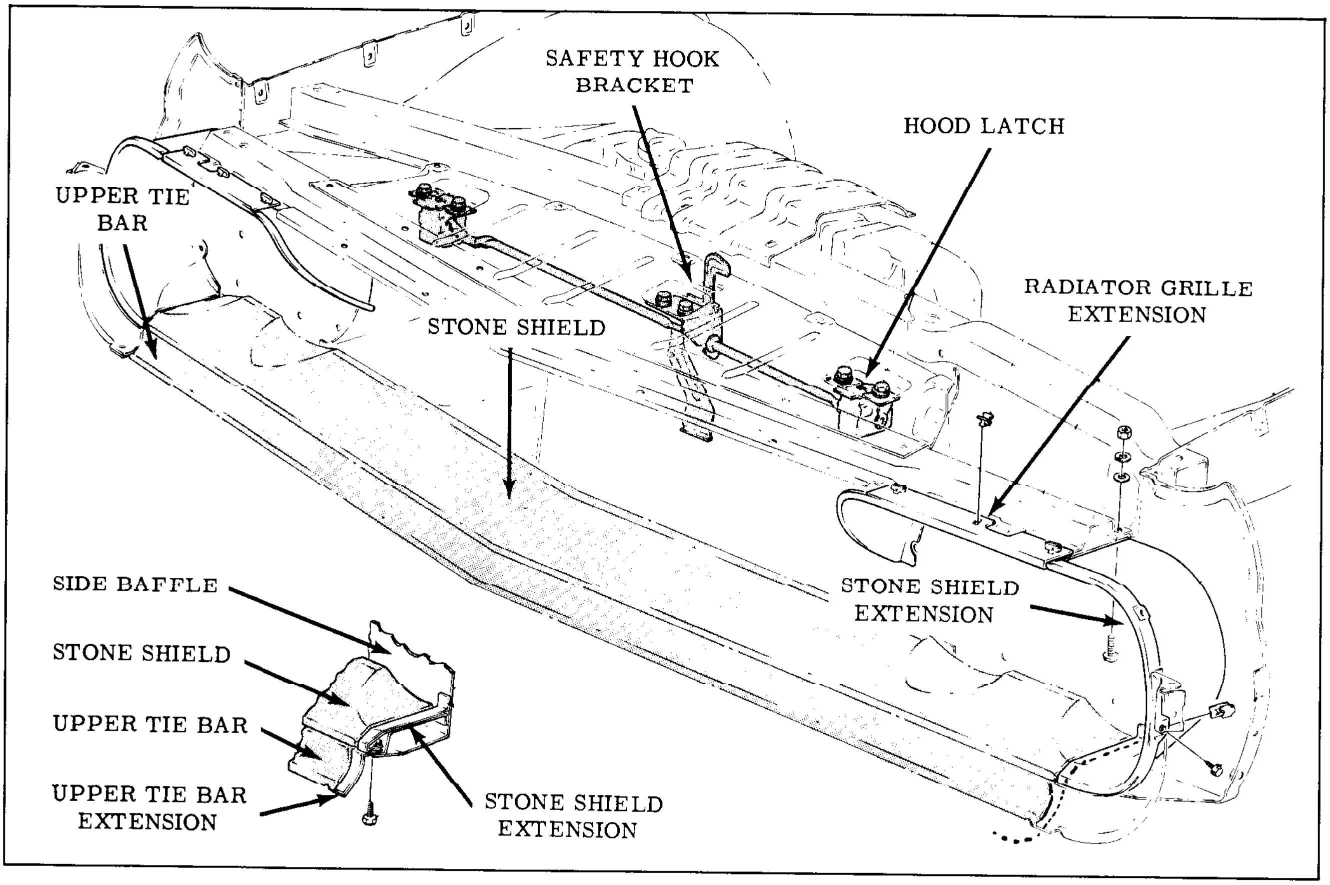


Fig. 16-17 Grille Extensions

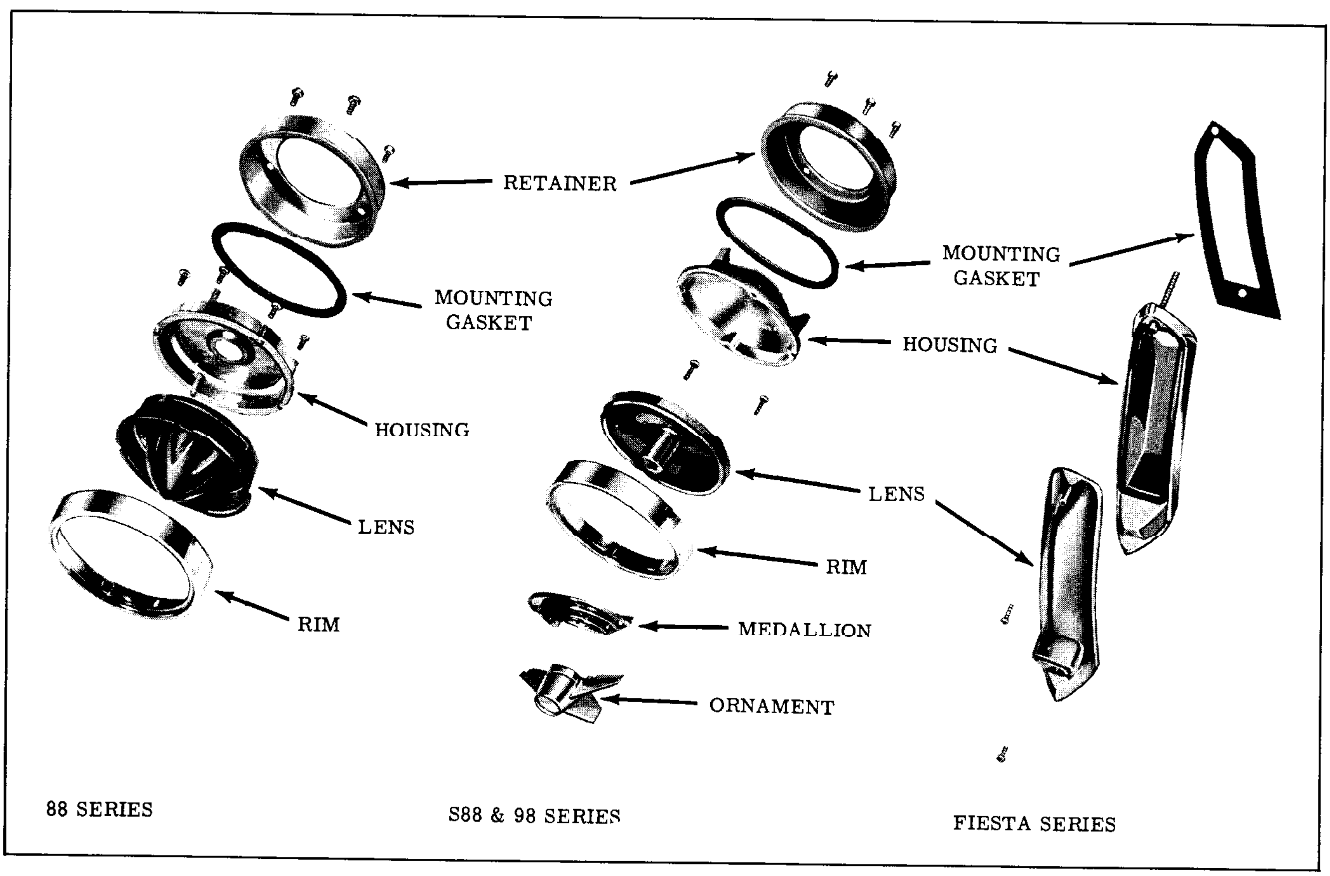


Fig. 16-18 Tail Lamp Assemblies

Radiator insulators and support brackets must be properly installed as shown in Figs. 16-12 and 16-13.

The radiator lower support to frame shims and insulators must be installed as shown in Fig. 16-14.

GRILLE ASSEMBLY

HEADLAMP HOUSINGS (Fig. 16-15)

The headlamp housings are retained by self tapping sheet metal screws. To remove housing it is not necessary to remove the headlamp assemblies.

To install, reverse removal procedure. Check headlamp aim and adjust if necessary.

GRILLE (Figs. 16-16 and 16-17)

The grille is single piece construction held in place by bolts thru the fender tie bar and three support brackets.

GRILLE EXTENSIONS

The grille extensions are retained by clips and screws which are easily accessible. The grille can be removed by removing the clips and screws.

GRILLE LETTERS (88 and S88)

The grille letters are two piece construction held together at the center by one bolt. The letters fasten to four front support brackets and a bracket at each end.

ORNAMENT (98 Only)

The ornament is a single piece construction and fastened by screws through four support brackets.

TAIL LAMP ASSEMBLY (Fig. 16-18)

The tail lamp assemblies on all models except station wagons are accessible from within the truck compartment. On station wagons it is necessary to remove the quarter trim panel.

Upon installation, the tang on the lamp assembly must index with the slot in the rear end panel.

VENTILATING AND HEATING

DELUXE HEATER

GENERAL DESCRIPTION

Air enters the ventilating and heating system at the cowl vent grille, travels through the plenum chamber and into the cowl air chamber. Air can now be directed into the passenger compartment by opening the right and left side cowl valves or by opening the heater inlet valve. The valves are opened by vacuum operated diaphragms, actuated by push buttons, and closed by spring force.

The ventilation control push buttons are located on the instrument panel on the left side of the steering column bracket, and the heater control push buttons are located on the right side of the steering column bracket. The heater control also contains the blower speed switch and the temperature control slide lever.

The blower motor is started whenever the heater inlet air valve is opened. Movement of the inlet valve operates a master "ON", "OFF" switch which controls operation of the blower motor.

The water control valve assembly consists of a water valve located on the rear of the right cylinder head, and a thermostat located inside the heater case in the passenger compartment. A temperature control slide lever on the heater control panel is connected to a lever on the thermostat by a cable. Moving the slide lever to the right allows vacuum to pass through the thermostat and open the water valve which is opened and closed by an integral diaphragm. The thermostat will regulate the amount of water flowing through the water valve through changes in temperature in the heater case or by movement of the sliding lever.

Cars without heaters are equipped with a hand operated cowl outlet valve for left side ventilation. (Fig. 16-19)

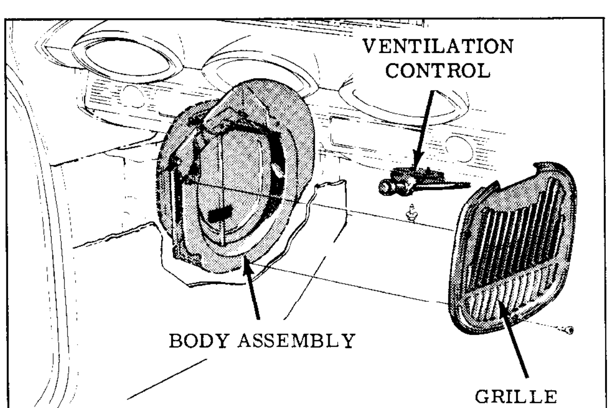


Fig. 16-19 L.H. Ventilation Control

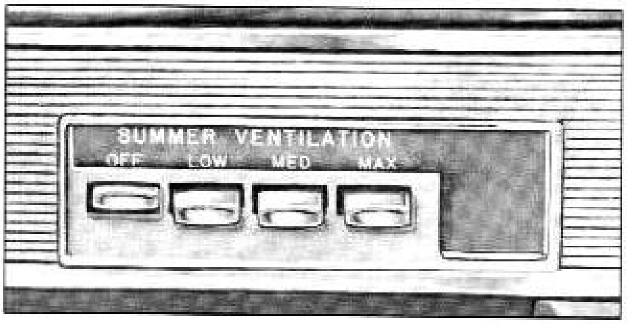


Fig. 16-20 Ventilation Controls

VENTILATION SYSTEM (Fig. 16-20)

For ventilation the "OFF" button on the heater must be depressed. When the "LOW" button on the ventilation control is depressed the heater inlet valve is opened and the blower motor is started. Since the cowl outlet valves are closed, air flows through the heater core into the heater case and out the heater louvers into the passenger compartment. Rate of air flow can be controlled by the blower speed switch on the heater control.

When the "MEDIUM" button is depressed the left hand cowl outlet valve opens in addition to the heater air inlet valve and air flows into the car through both the heater and the left hand cowl ventilator valve.

When the "MAXIMUM" button is depressed, the heater inlet valve is closed, shutting off the blower motor, and the right and left cowl outlet valves are opened. Air now flows from the cowl air chamber directly into the passenger compartment.

HEATING SYSTEM (Fig. 16-21)

For heating, the "OFF" button on the ventilation control panel must be depressed and the temperature control lever moved to the right, depending on amount of heat desired.

Depressing the "DIRECT" button on the heating control opens the heater inlet air valve which starts the blower motor. The water valve is opened and air is now heated as it passes through the heater core and into the passenger compartment through the louvers located on the right and left side of heater case. The louvers are in the fully open position.

When the "INDIRECT" button is depressed, air flow is the same as when the "DIRECT" button is depressed with the exception that a vacuum operated diaphragm closes the louvers part way and heated air is directed along the sides of the passenger compartment.

Depressing the "DEFROST" button operates a vacuum operated diaphragm which closes the louvers completely and also closes the defroster switch increasing blower motor speed. With the louvers closed and blower motor speed increased, the defroster control valve automatically opens and air flows into the right and left defroster nozzles, diverting the air flow onto the windshield.

Rate of air flow on "DIRECT", "INDIRECT" and "DEFROST" can be controlled by the blower speed switch.

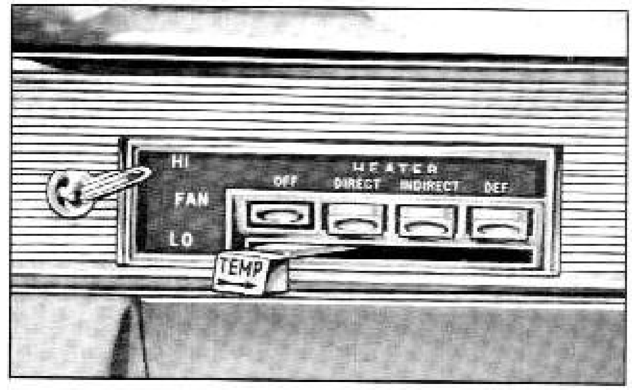


Fig. 16-21 Heater Controls

ADJUSTMENTS

TEMPERATURE CONTROL

With the THERMOSTAT lever on the heater distributor in the closed position (fully to the right), the temperature control lever at the instrument panel should be 1/8" from the left end of the slot in the control assembly on the instrument panel. To adjust, proceed as follows:

1. Check to insure that the cable is not kinked and operates freely.
2. Loosen the control cable clamp at the thermostat.
3. Move the THERMOSTAT lever to the closed position (fully to the right). Position the cable conduit until the temperature control lever is 1/8" from the left end of the slot in the control assembly on the instrument panel. (Fig. 16-22)

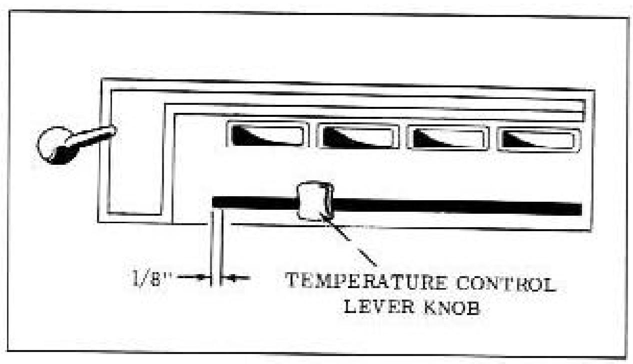


Fig. 16-22 Temperature Control Adjustment

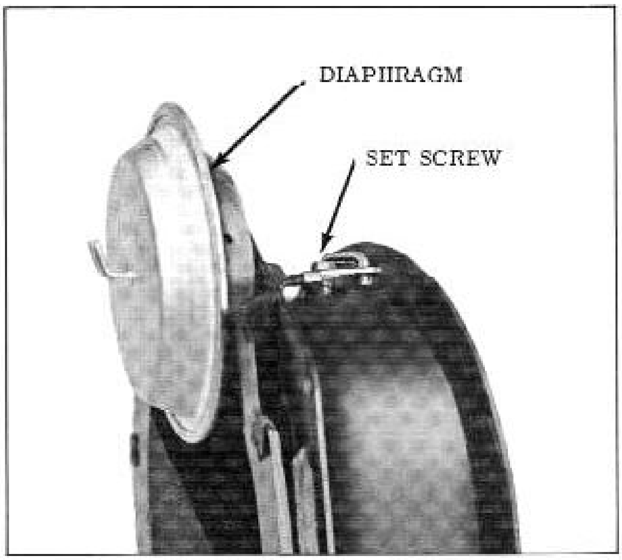


Fig. 16-23 Cowl Outlet Diaphragm Adjustment

4. Tighten the control cable clamp.

COWL OUTLET DIAPHRAGM

Adjustment of the cowl outlet valve and diaphragm linkage is provided at the diaphragm. (Fig. 16-23)

1. With cowl vent valve body removed, L.H. diaphragm installed, loosen set screw.
2. Pull diaphragm lever to its extreme stop, then push back 1/16".
3. While holding valve closed, tighten set screw.

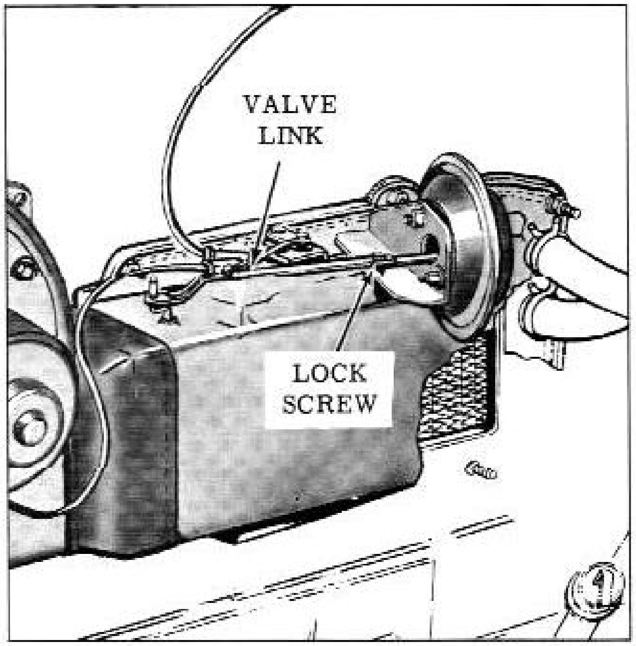


Fig. 16-24 Heater Inlet Diaphragm Adjustment

HEATER INLET DIAPHRAGM (Fig. 16-24)

To adjust the heater inlet valve linkage, loosen valve link to diaphragm lever lock screw. Pull diaphragm lever to its extreme stop, then push back 1/16". Tighten lock screw with valve in closed position.

COWL VENT VALVE BODY

Remove and Install (Fig. 16-25)

1. Remove cowl vent grille and trim pad.

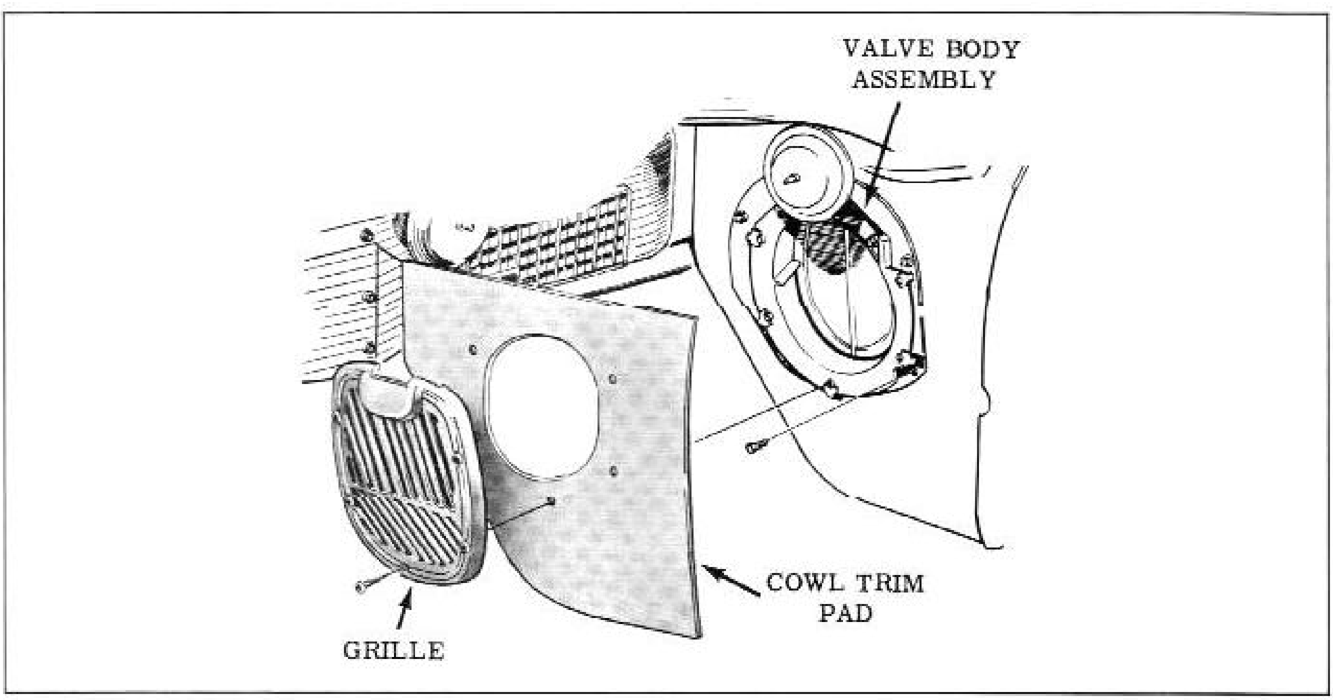


Fig. 16-25 Cowl Vent Valve Body

2. Disconnect vacuum line from diaphragm.

3. Remove valve body assembly to cowl attaching screws and remove valve body.

On installation, apply a 3/8" bead of caulking compound between the valve body and cowl, make sure water seal tape is installed over actuating wire rod hole in valve body, then reverse removal procedure.

HEATER BLOWER ASSEMBLY

Remove and Install (Fig. 16-26)

1. Scribe hood hinge location on right side of hood and cowl.

2. Remove hood hinge spring.

3. While firmly supporting hood, remove the right hood hinge from cowl and hood.

4. Disconnect heater motor wiring.

5. Remove the 5 blower motor attaching screws.

6. Remove fan from motor shaft.

7. Remove blower motor.

To install, reverse removal procedure and align hood.

HEATER CASE AND CORE

Remove and Install

1. Remove glove box.

2. Disconnect wiring, vacuum lines, and defroster hoses from heater case.

3. Remove the 9 case to cowl attaching screws and remove heater case.

4. To remove heater core, proceed as follows:

   a. Drain radiator.

   b. Disconnect water hoses from heater core and vacuum line from heater inlet valve diaphragm.

   c. Remove the six heater inlet to cowl attaching nuts and washers and remove heater inlet assembly. (Fig. 16-26)

   d. Remove heater core from inside the passenger compartment.

To install reverse the removal procedure. Apply sealer as indicated in Fig. 16-26.

VENTILATION AND HEATING CONTROLS

Remove and Install (Fig. 16-27)

1. Disconnect all vacuum lines and wiring.

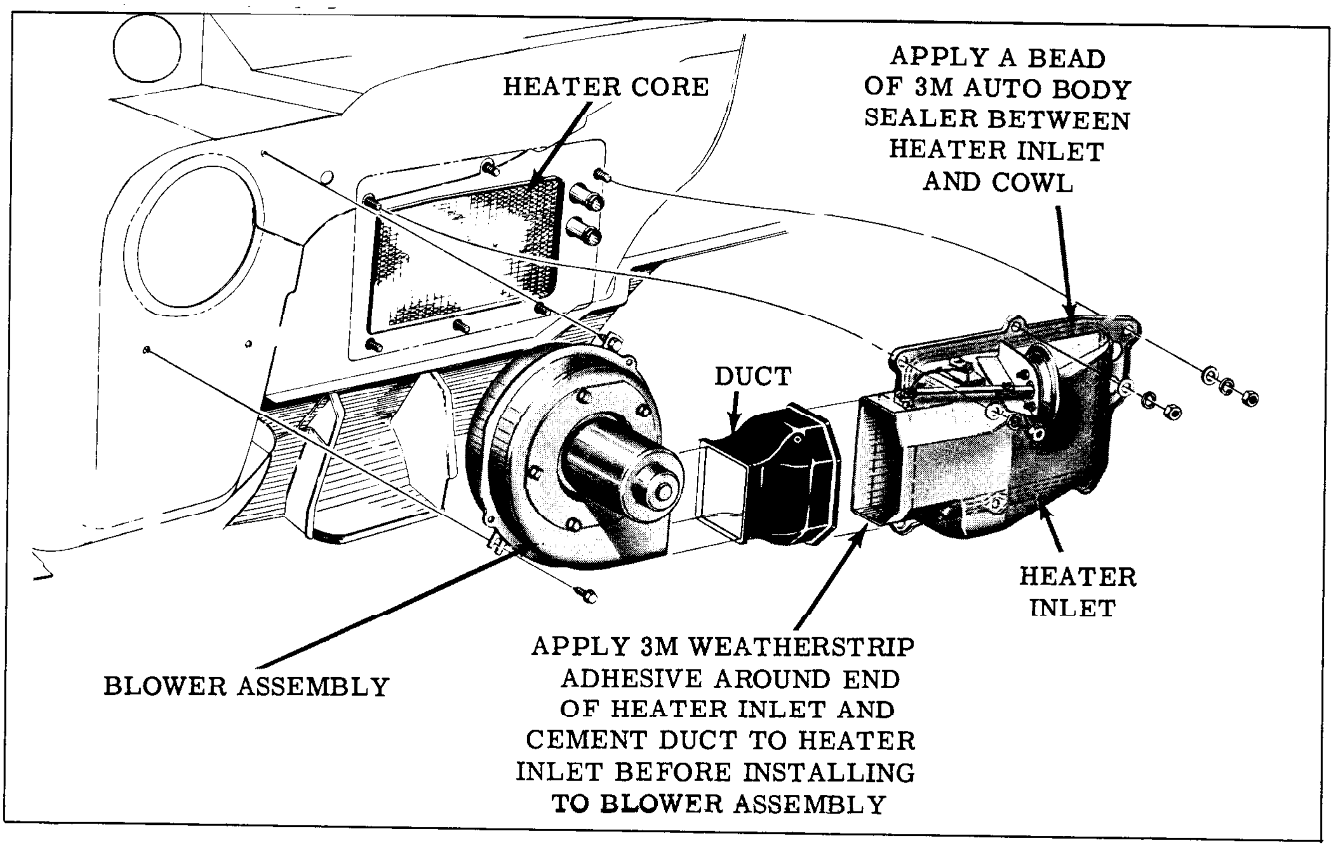


Fig. 16-26 Heater Inlet and Blower Assembly

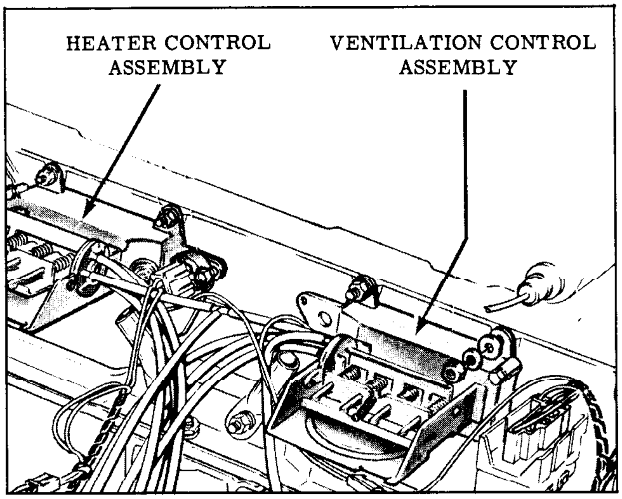


Fig. 16-27 Ventilation and Heating Controls

2. Remove blower speed control lever and temperature control slide lever knob. (Heater only)
3. Remove brace attaching screws from the instrument panel.
4. Remove two attaching nuts on each control, and remove control from the rear of instrument panel.

To install, reverse removal procedure. Refer to schematic diagrams (Fig. 16-29) and (Fig. 16-30) for proper installation of hoses. Wiring and hoses must be properly routed and clipped so that they do not drape in front of heater outlet as it will affect air flow and heater performance.

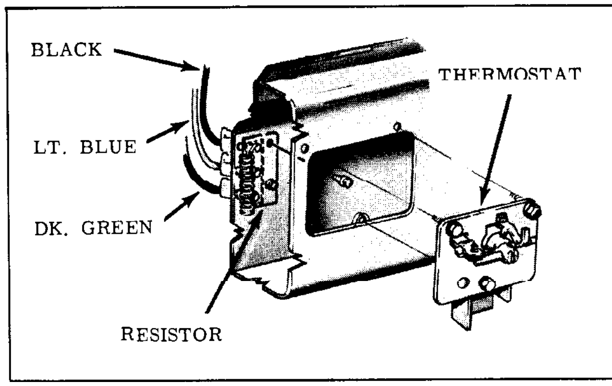


Fig. 16-28 Heater Thermostat and Resistor

HEATER THERMOSTAT AND RESISTOR

Remove and Install (Fig. 16-28)

The heater thermostat attaches to the heater case with 3 sheet metal screws. To remove, disconnect vaccum hose and temperature control cable from thermostat and remove attaching screws.

The heater resistor is mounted inside the heater case with two sheet metal screws, accessible after the heater thermostat is removed. To remove, disconnect wiring and remove attaching screws.

To install heater thermostat and resistor, reverse removal procedure.

VACUUM CONTROL CHART

CONTROLS		DIAPHRAGM OPERATED					
Heater	Ventilation	L.H. Cowl Vent Valve	R.H. Cowl Vent Valve	Heater Inlet Valve	Water Valve	Defroster Valve	Indirect Air Valve
Off	Off						
Direct	Off			X	*X		
Indirect	Off			X	*X		X
Defrost	Off			X	*X	X	
Off	Low			X			
Off	Medium	X		X			
Off	Maximum	X	X				

*With temperature control moved to extreme RIGHT position.

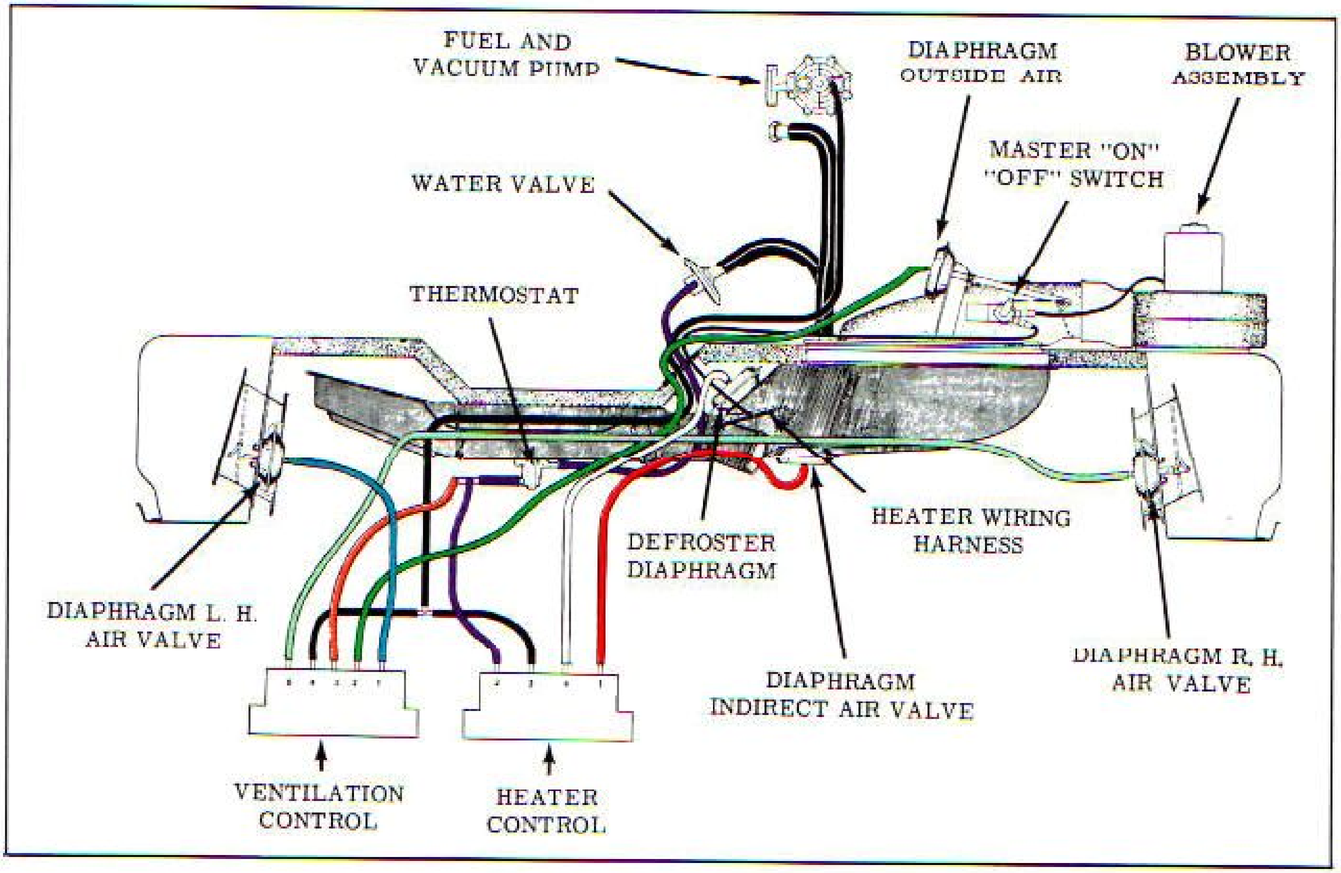


Fig. 16-29 Schematic Diagram (Deluxe Heater)

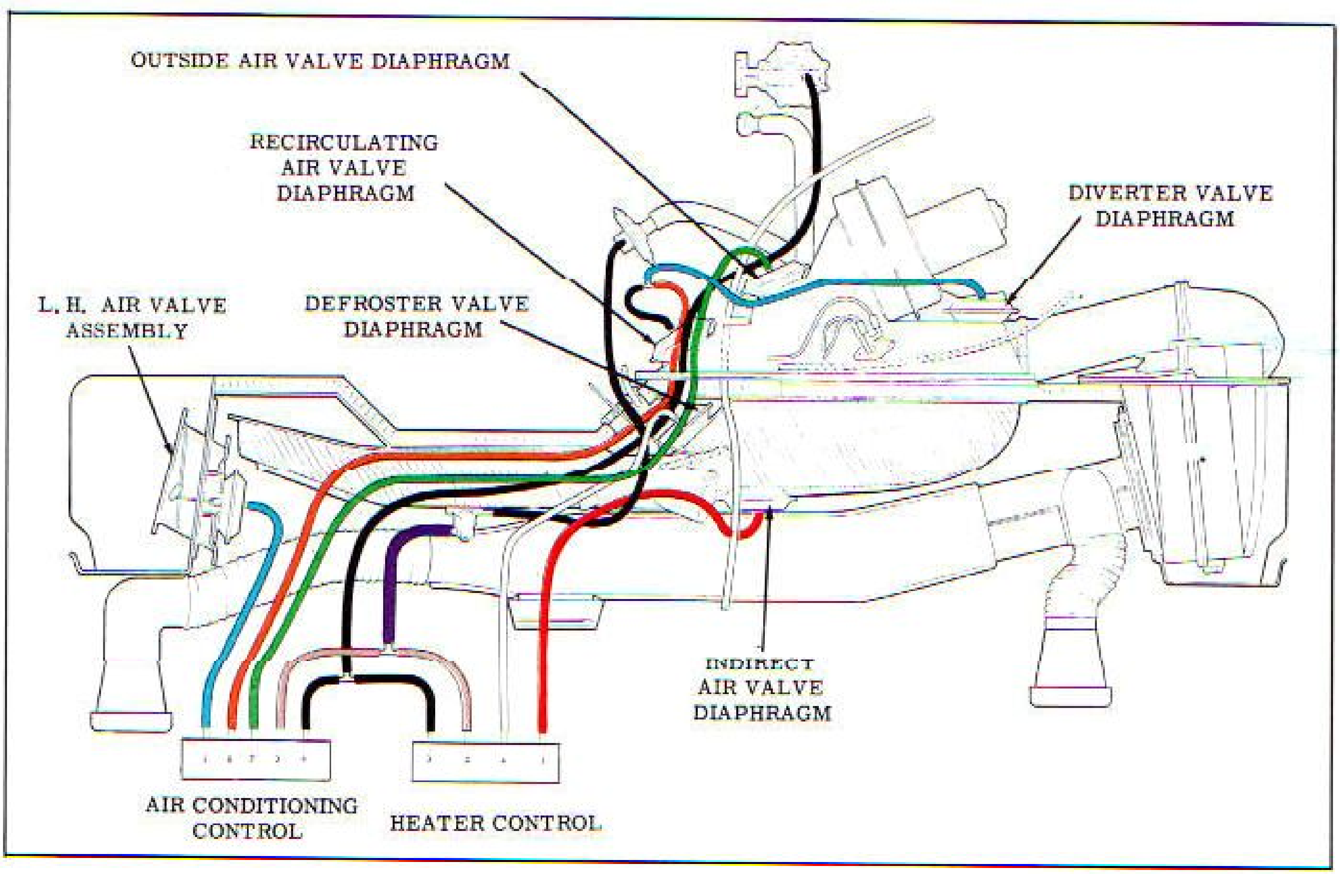


Fig. 16-30 Schematic Diagram (Deluxe Heater with Air Conditioning)

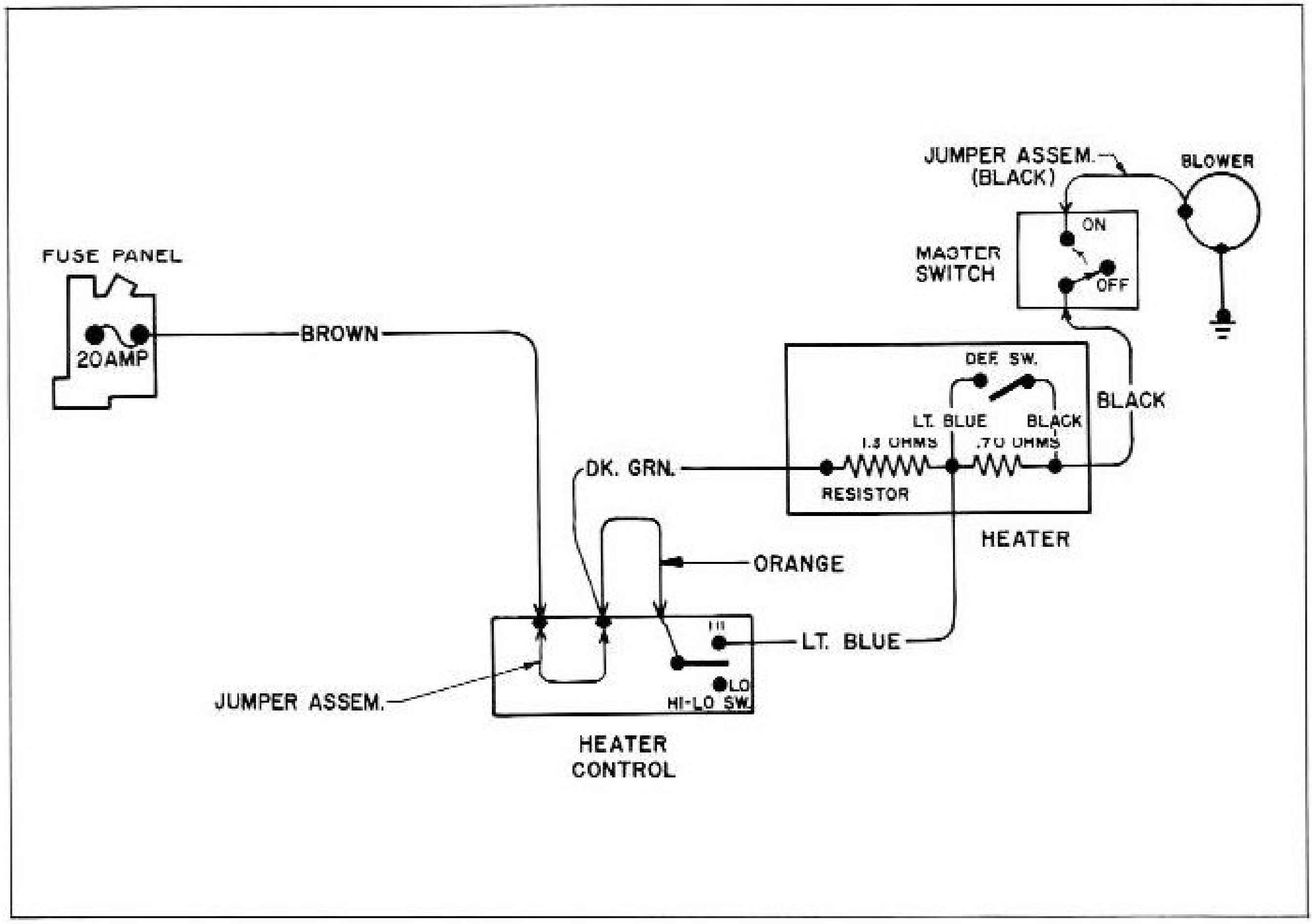


Fig. 16-31 Wiring Diagram (Deluxe Heater)

VENTILATING AND HEATING SYSTEM

STANDARD HEATER

GENERAL DESCRIPTION

The body ventilating system incorporates the use of an air intake grille located at the top of the cowl. The air entering through the intake grille is directed through a duct to the right and left sides of the cowl, through an outlet assembly to the passenger compartment. The flow of air into the passenger compartment is controlled by adjustable doors in the outlet assemblies.

Water carried into the left and right ducts flows out a drain hole located at the bottom of each duct.

STANDARD HEATER

VENTILATION SYSTEM (Fig. 16-32)

For ventilation in the body of cars equipped with a Standard Heater, the controls are located at the left side of the steering column.

The upper lever, when moved to the right will open the left cowl air outlet door. The lower lever will open the right cowl air outlet door.

For air to come through these outlets, the car must be moving forward. The amount of air coming into the body can be controlled by the control levers. With the levers in the extreme right position, outlet doors will be fully opened.

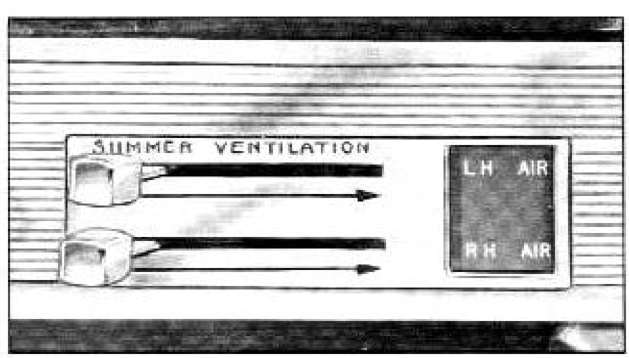


Fig. 16-32 Ventilation Controls

HEATING SYSTEM (Fig. 16-33)

For heating, the heater blower switch must be rotated downward from the "OFF" position toward the "HI" position. The temperature control lever marked "HEAT" must be pushed to the right depending on the amount of heat required, as this lever regulates the temperature thermostat.

NOTE: Thermostat is vacuum controlled. Cars equipped with air conditioning use a vacuum type fuel pump. Cars without air conditioning use a vacuum tank mounted on the cowl and are equipped with single action pump.

For service procedure of thermostat, see DE-LUXE HEATER.

The "AIR" control bar must also be moved to the right which will open the door in the air inlet assembly on the cowl.

The blower switch is a 3 speed switch. The first mark under the "OFF" position is low, the second, medium and "HI" is maximum speed.

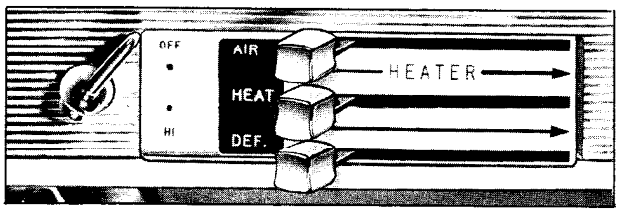


Fig. 16-33 Heater Controls

ADJUSTMENTS

Cable adjustments should be made at the control assembly first.

1. Be sure cable housing is flush with rear edge of clamp on control. (Fig. 16-39)
2. Move lever 1/8" from left end of slot. (Fig. 16-22)

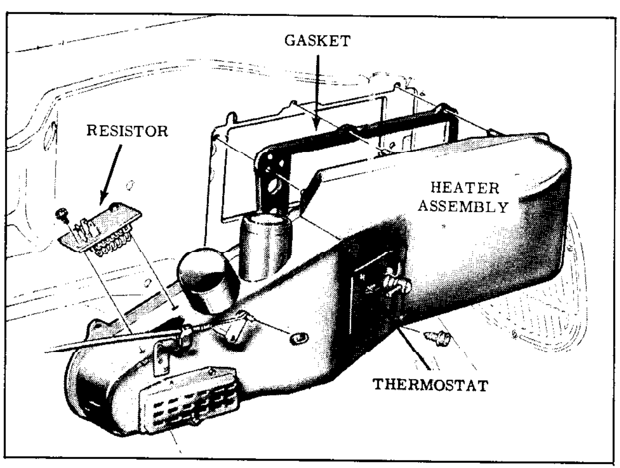


Fig. 16-34 Heater Case and Core

3. Loosen clamp at opposite end of cable.
4. Place part to be adjusted in closed position, properly position cable in clamp and tighten.

NOTE: When cables are properly adjusted, control levers will not touch either end of slot.

HEATER CASE AND CORE (Fig. 16-34)

Remove and Install

1. Remove glove box.
2. Disconnect wiring, heater control cables, defroster hoses and vacuum line from thermostat.
3. Remove thermostat assembly from case.
4. Remove the heater case to cowl attaching screws.

If the heater core is to be removed, proceed as follows:

a. Drain radiator.

b. Disconnect water hoses from heater core.

c. Remove the 6 heater inlet to cowl attaching nuts and washers Fig. 16-35 and remove heater core attaching screws, from inside passenger compartment.

To install reverse above procedure.

NOTE: When installing heater case, heater outlets should be clear of all hoses, wiring, bowden cables etc. so that air flow direction will not be adversely affected. The hoses, etc. should be clipped in place out of the way of the heater opening.

HEATER THERMOSTAT AND RESISTOR (Fig. 16-34)

Remove and Install

The heater thermostat is attached to the heater case by three metal screws. To remove, disconnect vacuum lines, control cables and remove screws. The heater resistor is mounted on the top of the heater case at the left side. It is held in position by two screws. To remove, disconnect wires, remove screws and lift resistor upward.

To install reverse removal procedure.

VENTILATING AND HEATING CONTROLS
Remove and Install (Fig. 16-36)

Disconnect control cables and wiring. Remove control attaching nuts from in back of instrument panel and remove control from rear.

To install reverse removal procedure. For schematic diagrams showing position of wiring, hoses, and cables see Fig. 16-37 thru 16-40.

To install reverse removal procedure.

AIR OUTLET (Fig. 16-25)

Remove and Install

This is done in the same manner as the deluxe heater outlet. The standard heater however, will not have the vacuum diaphragm.

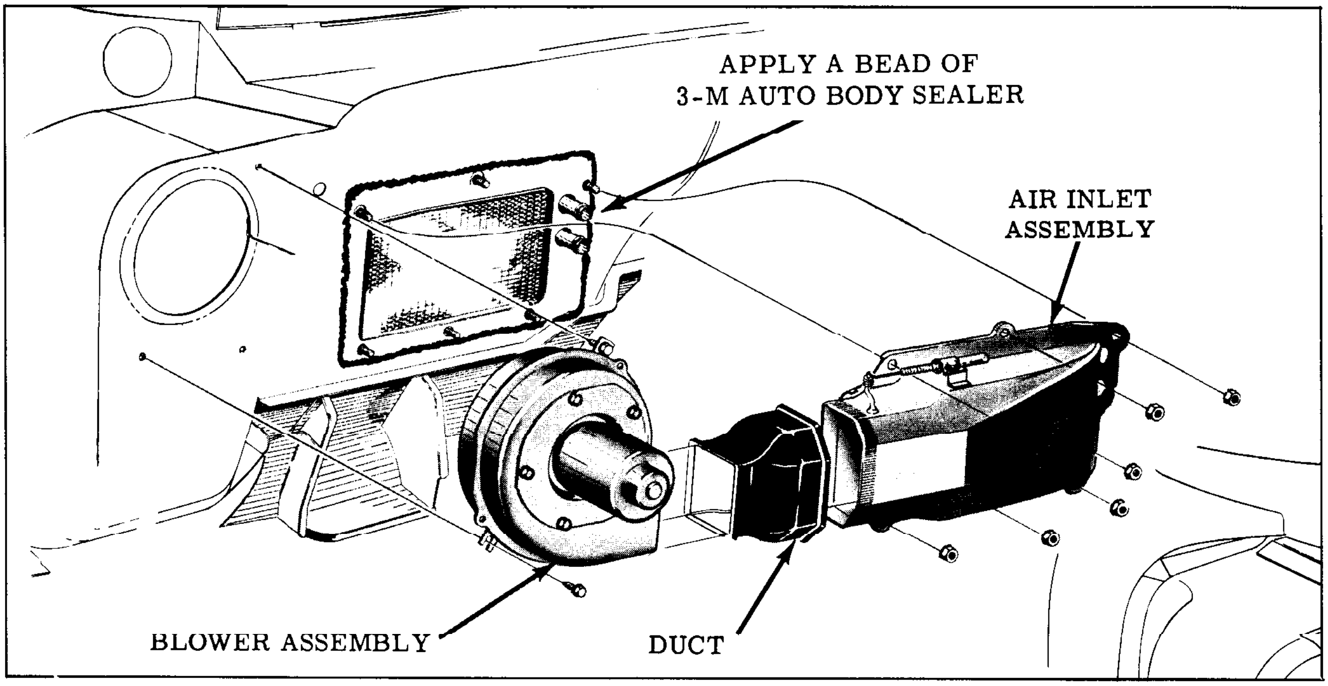


Fig. 16-35 Heater Inlet

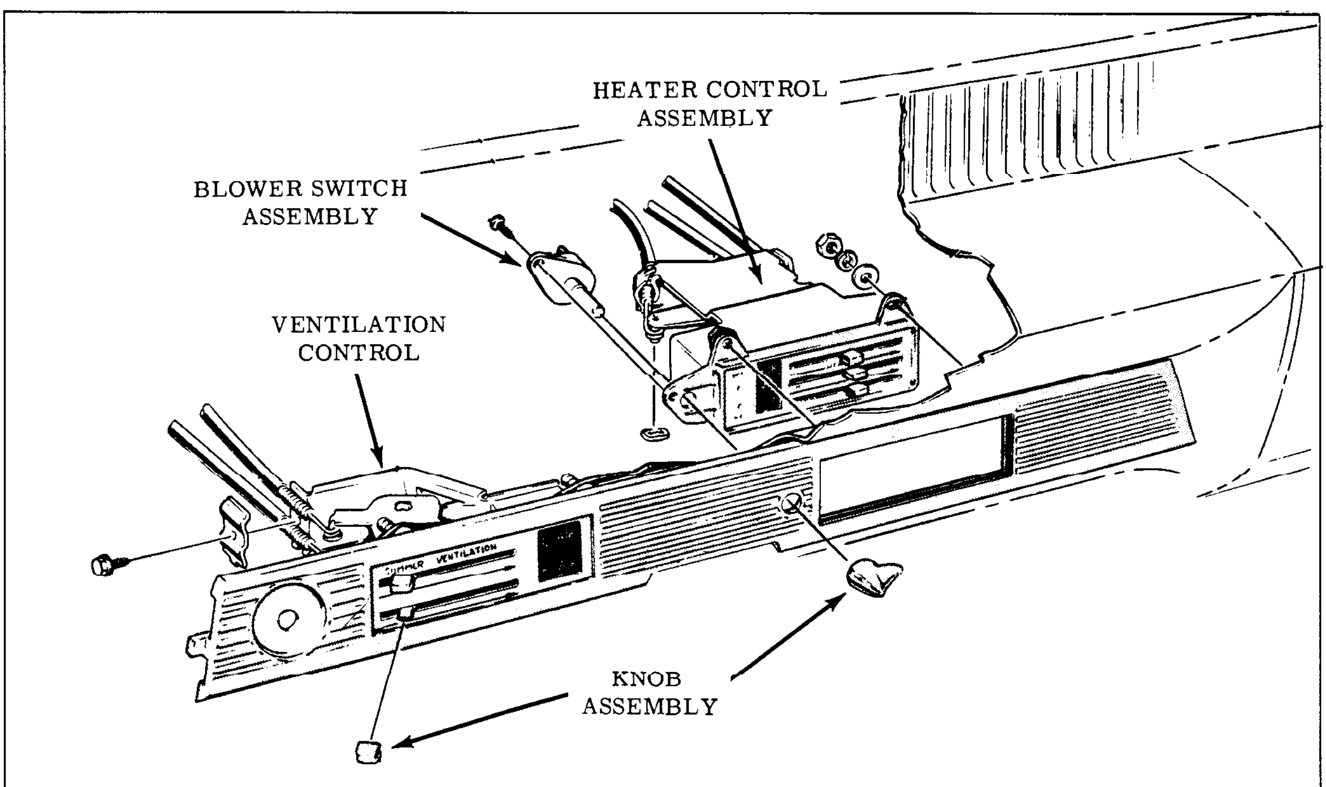


Fig. 16-36 Heating and Ventilation Controls

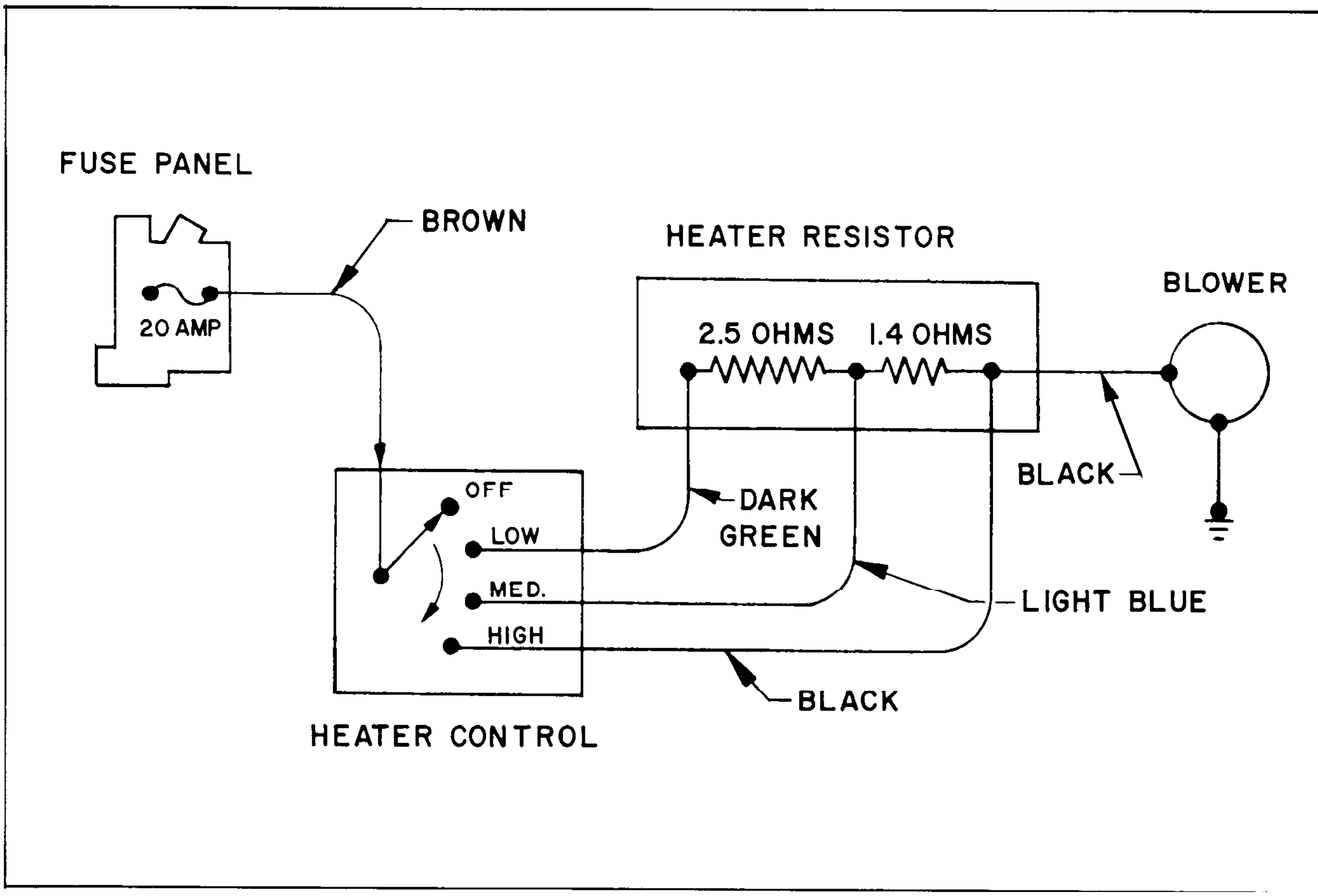


Fig. 16-37 Wiring Diagram (Standard Heater)

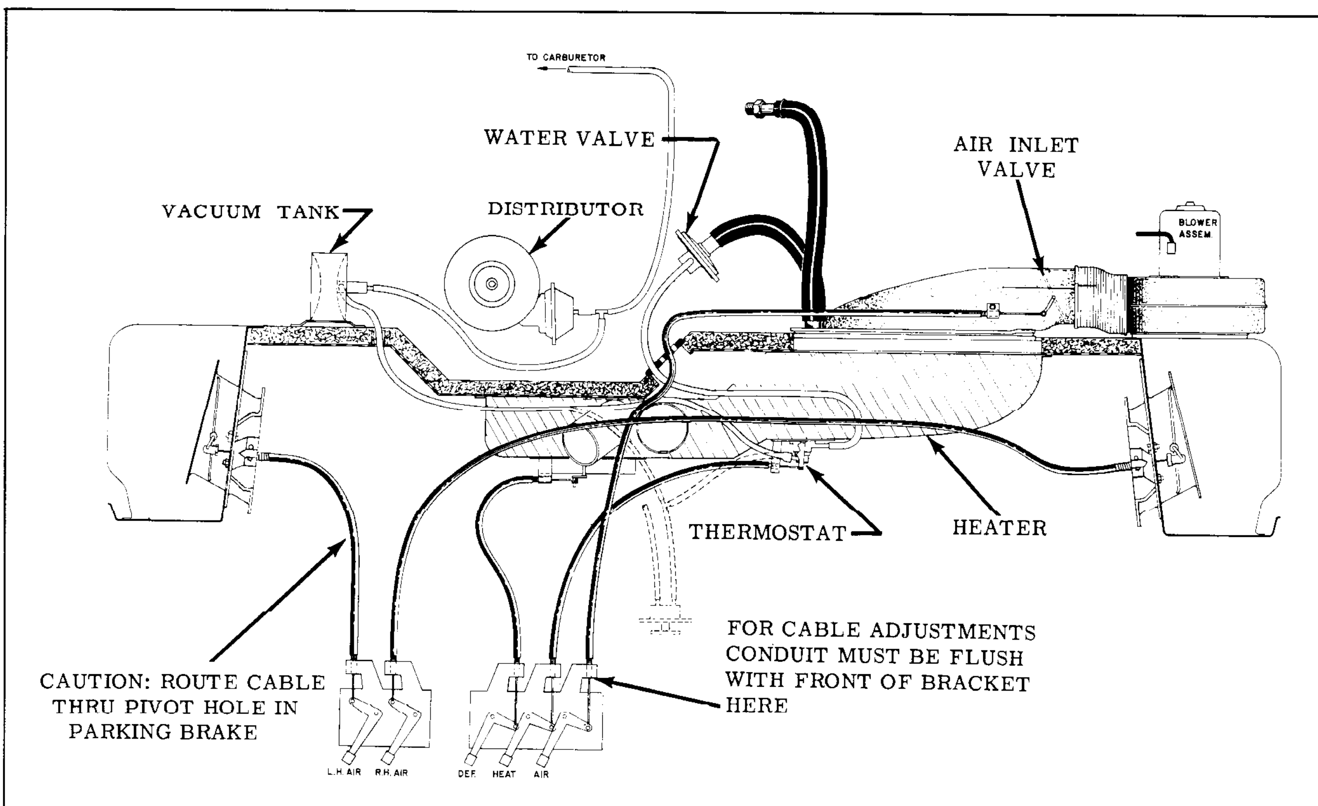


Fig. 16-38 Schematic Diagram Standard Heater

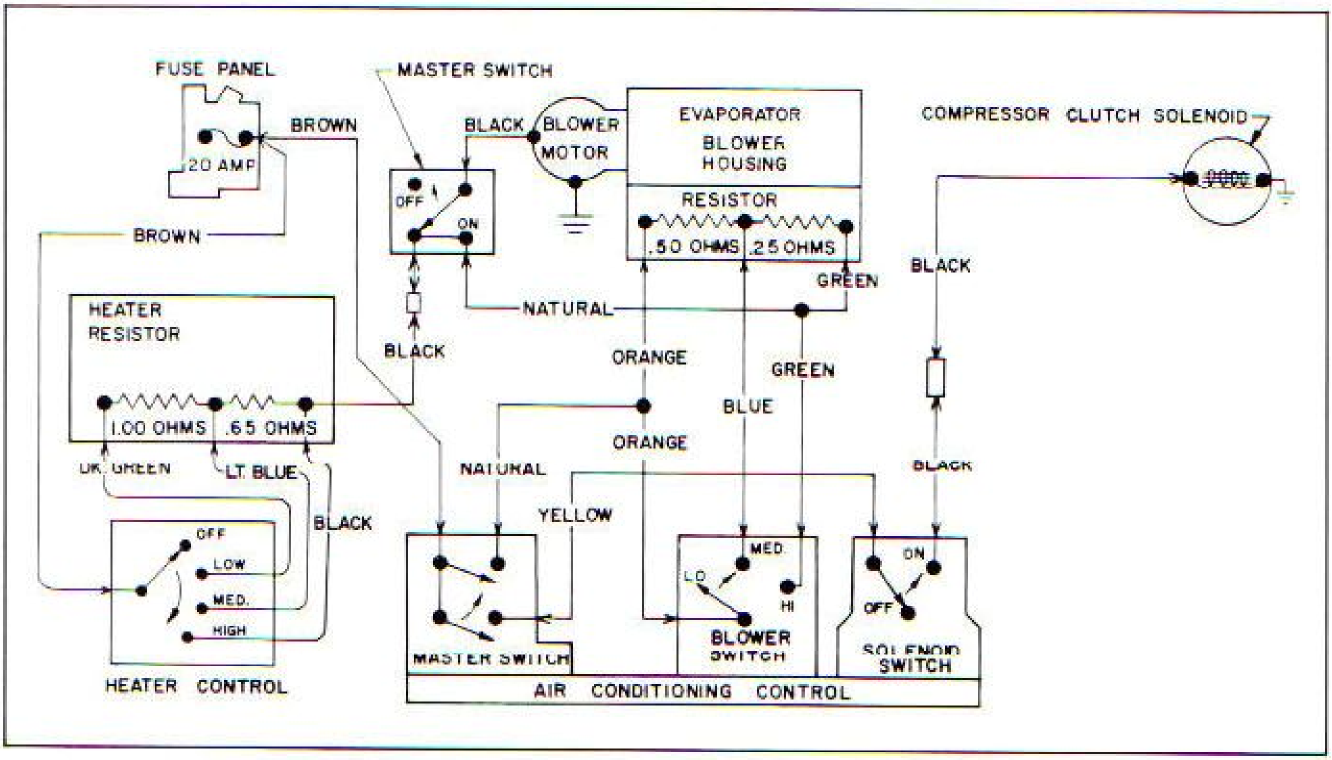


Fig. 16-39 Schematic Wiring Diagram (Standard Heater with Air Conditioning)

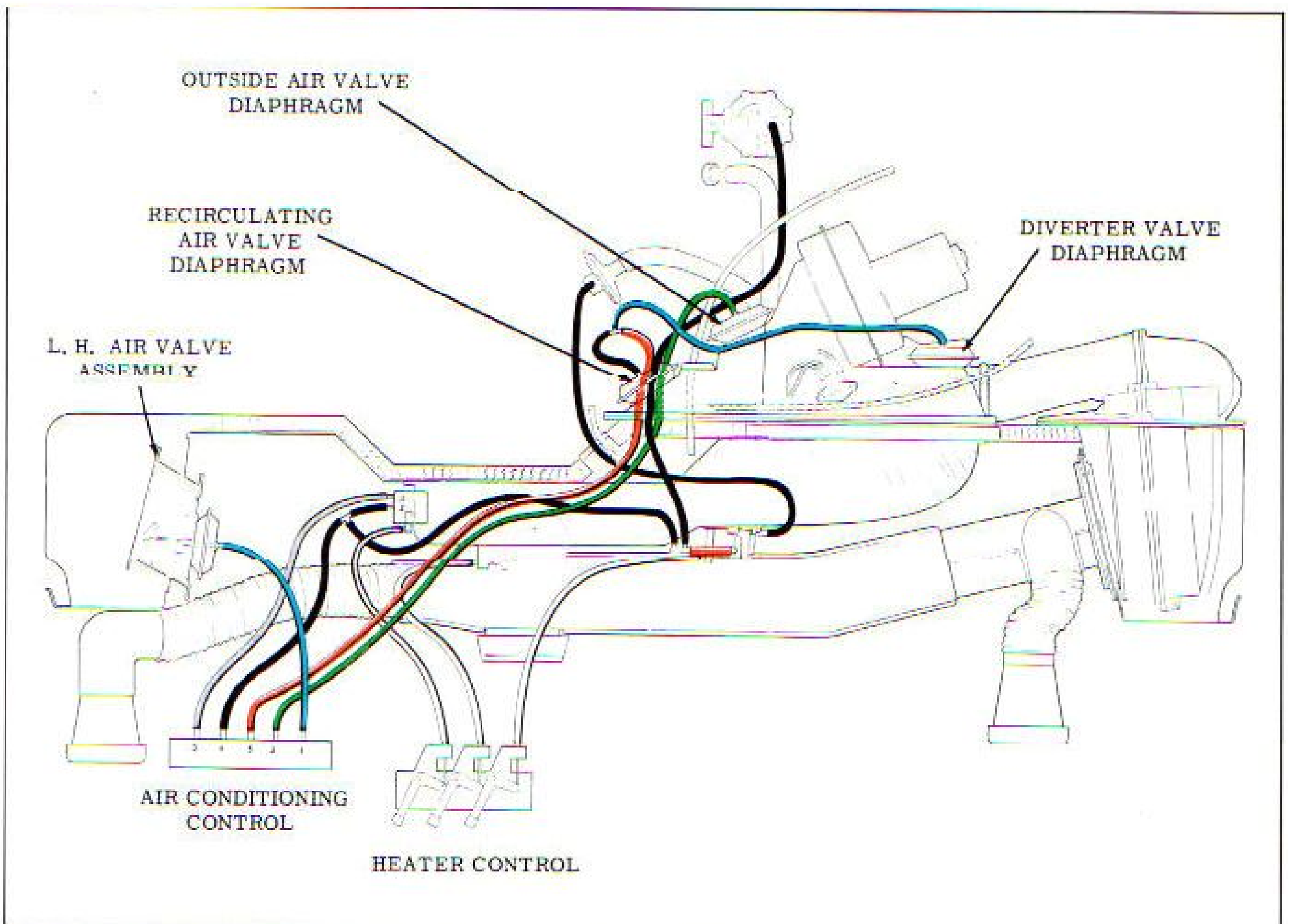


Fig. 16-40 Schematic Diagram (Standard Heater with Air Conditioning)

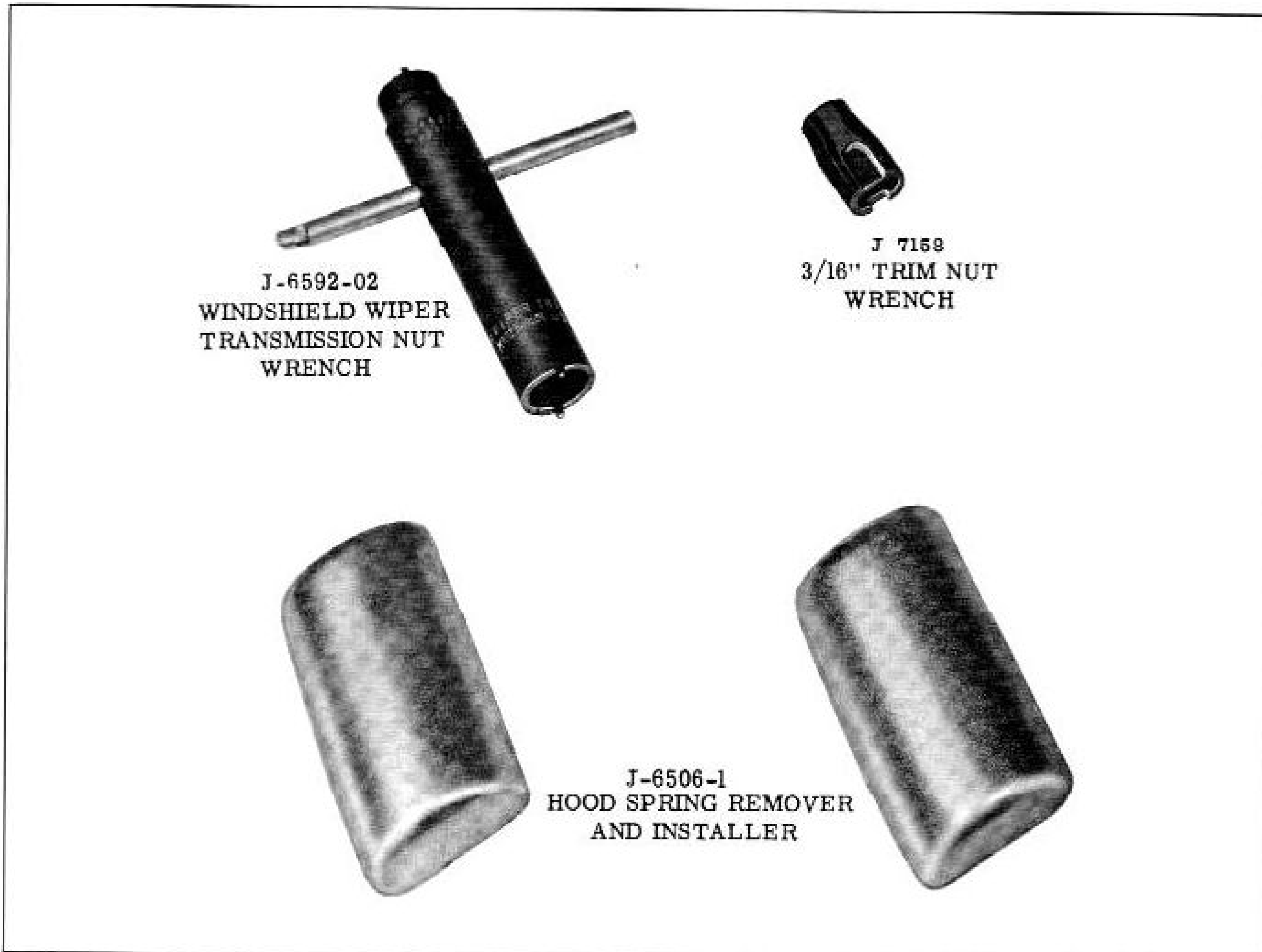
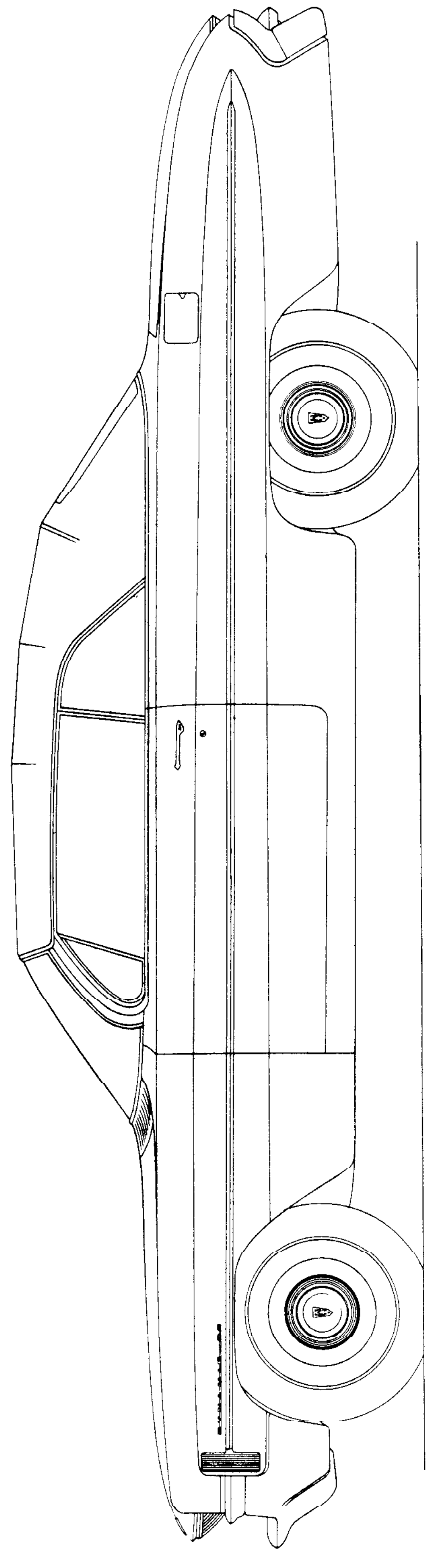


Fig. 16-41 Tools



88 CONVERTIBLE COUPE
3267

BODY

CONTENTS OF SECTION 17

WINDSHIELD ASSEMBLY

WINDSHIELD GARNISH MOLDINGS

The windshield garnish moldings consist of an upper right and left, side right and left and lower right and left moldings.

The upper and side moldings are installed after the lower moldings. All moldings are secured by screws.

Removal and Installation (Figs. 17-1 and 17-2)

1. Place protective covering over front seat and instrument panel.

2. Remove moldings in following order: side, lower and upper moldings.

   NOTE: On "67" styles remove windshield pillar weatherstrip retainers and side reveal moldings prior to removal of side garnish moldings. Remove sunshade supports prior to removal of upper garnish moldings.

3. To install, reverse removal procedure.

REAR VIEW MIRROR SUPPORT

Removal and Installation

1. Remove one side of upper windshield garnish molding.

2. Remove support attaching screws and slide to one side and remove.

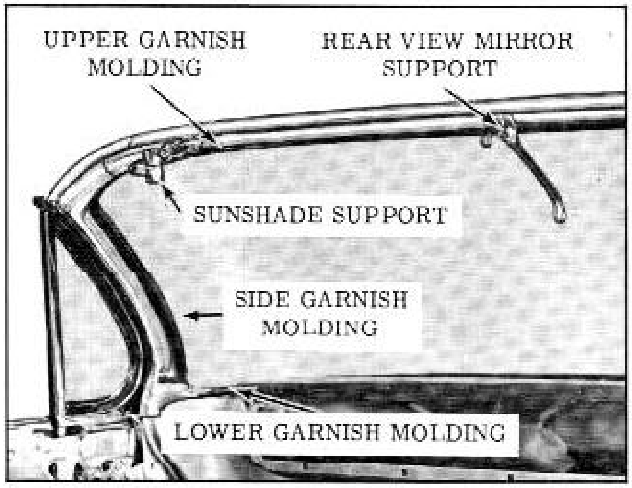


Fig. 17-1 Windshield Garnish Moldings

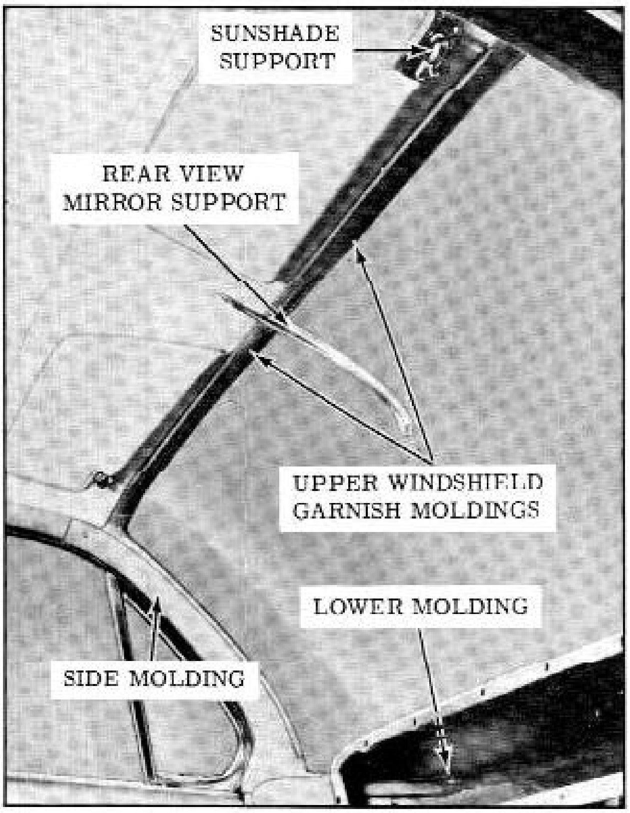


Fig. 17-2 Windshield Garnish Moldings

3. To install, reverse removal procedure. (Figs. 17-1 and 17-2)

SUNSHADE SUPPORT

Removal and Installation

1. Remove attaching screws and support.

   NOTE: On "67" styles raise top before removing support.

2. To install, reverse removal procedure.

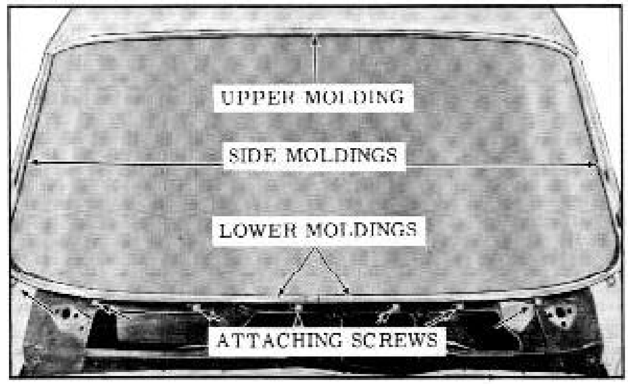


Fig. 17-3 Windshield Reveal Moldings

WINDSHIELD REVEAL MOLDINGS

The windshield reveal moldings consist of a one piece upper, right and left side and right and left lower moldings. On all styles except "67" and 3239 and 3539 styles, the upper and side moldings are secured to the opening by clips. The side moldings on the "39" styles are secured to the windshield pillar and side roof rails by screws, which are hidden by the side roof rail and windshield weatherstrip retainer. On "67" styles the upper reveal molding is secured to the upper windshield frame by screws at each end and studs and nuts in the center. The side moldings on "67" styles are secured to the windshield pillars by screws. The lower moldings on all styles are secured by screws through the molding clips into the shroud upper assembly. (Fig. 17-3)

Removal

1. Place protective covering over hood and front fenders.
2. Remove windshield wiper arms, escutcheon nuts and escutcheons.
3. Remove air intake grille attaching screws. (Fig. 17-4)
4. Lift up grille and slide forward to remove.

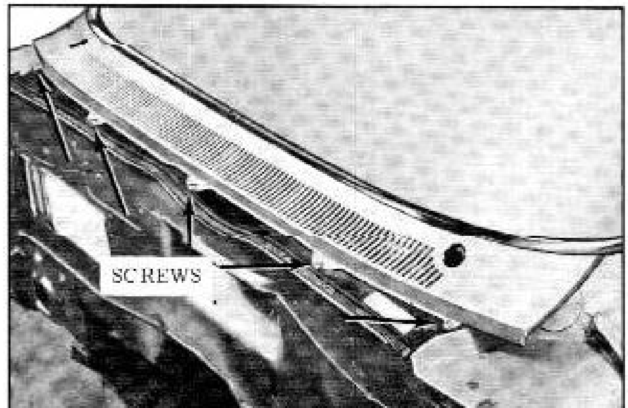


Fig. 17-4 Air Intake Grille

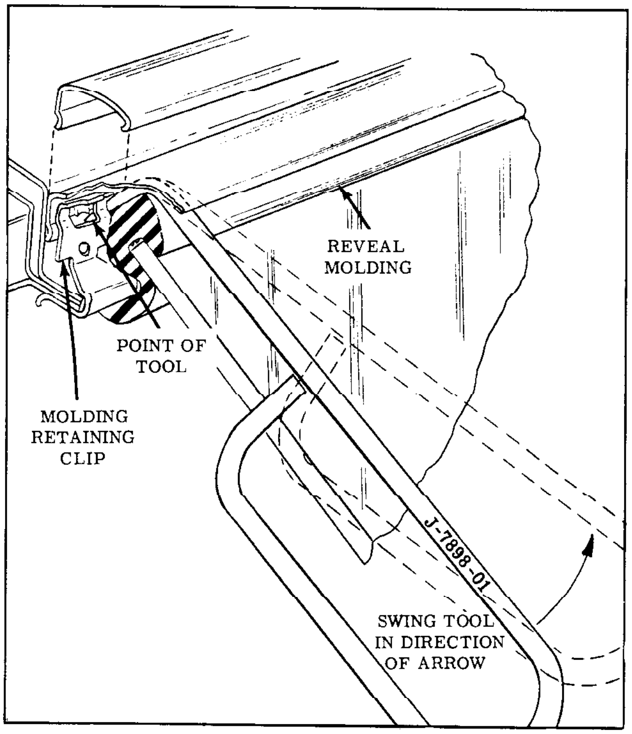


Fig. 17-5 Removing Reveal Molding

CAUTION: Care should be exercised to make certain grille does not chip paint from adjacent panels.

5. Remove lower reveal molding attaching screws (Fig. 17-3) and remove the molding.

6. On all styles except "67" styles, Tool J-7898-01 may be used to remove the side and upper reveal moldings. When using Reveal Molding Removing Tool J-7898-01, carefully lift up upper end of reveal molding sufficiently to engage point of tool between molding and molding clip as indicated in Fig. 17-5. Swing tool slightly as indicated in illustration, to disengage prongs of clip from molding and lift molding free of clip. Repeat this operation at each molding clip.

NOTE: In some instances a flat-bladed tool such as a putty knife may be used to pry the moldings from the opening. Care should be exercised when removing moldings to eliminate any damage to the moldings or body paint.

7. On all 3239 and 3539 styles the side reveal moldings are secured by screws at the pillar and roof rail and it is necessary to loosen the roof rail and windshield pillar weatherstrip to gain access to the screws. Remove screws and carefully remove the molding from the opening. On "67" styles, the side moldings are secured by screws only. Raise top, loosen windshield pillar weatherstrip retainer, remove attaching screws and molding.

8. On all styles except "67" styles, carefully remove the upper reveal molding with Tool J-7898-01 or a flat-bladed tool as required. On "67" styles, remove screws at outer ends of molding then remove upper garnish molding to gain access to stud nuts. Remove nuts and molding.

Installation

Make certain there is sufficient sealer in cavity between windshield rubber channel and body. If sealer is required, apply medium-bodied sealer.

1. Upper Reveal Moldings: On all styles except "67" styles, snap upper reveal molding in place. On "67" styles, seal attaching studs and holes and install molding.

2. Side Reveal Molding: On "39" and "67" styles, seal attaching screw holes and install moldings.

3. On "39" and "67" styles, seal side roof rail and windshield pillar weatherstrips and retainers and install.

4. Install lower reveal molding and previously removed hardware parts.

WINDSHIELD GLASS

Removal

1. Place protective covering over front seat and instrument panel.

2. Place protective covering over hood and front fenders.

3. Remove garnish moldings.

4. Remove windshield wiper arms escutcheon nuts and escutcheons.

5. Remove air intake grille.

6. Remove windshield reveal moldings.

NOTE: If glass is broken or cracked, mark centerline of glass and body, so alignment of glass to body opening may be checked to locate cause of glass break (glass off center or strain break).

7. On inside of body loosen lip of rubber channel from pinchweld flange along top and sides of windshield as follows: With palm of hand, apply pressure to glass near edge and using a blunt putty knife carefully assist rubber channel over pinchweld flange. (Fig. 17-6)

8. After windshield channel is free from pinchweld flange, with aid of helper, carefully lift windshield assembly from opening and place on a protected bench.

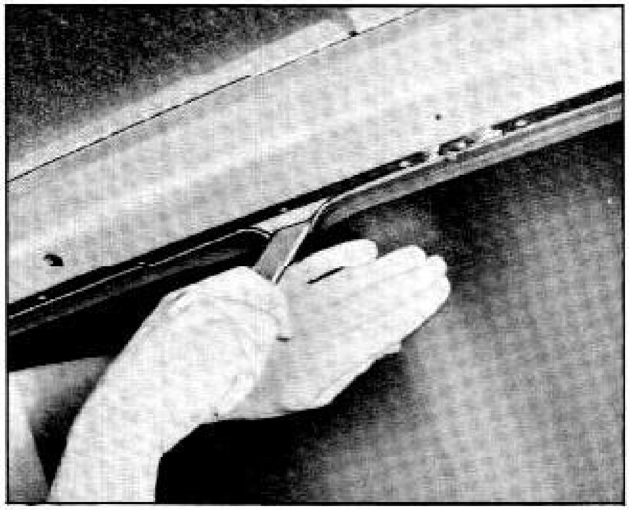


Fig. 17-6 Windshield Glass Removal

CHECKING BODY WINDSHIELD OPENING

It is important that the body windshield opening be checked thoroughly before installation of a replacement windshield glass. The following procedure outlines the method which should be used to check the windshield opening.

1. Remove the windshield from body.
2. Check windshield rubber channel for any irregularities.
3. Clean off old sealer around windshield opening and check entire body opening flange for any irregularities.
4. Install 5 windshield checking blocks to pinchweld flange. (Fig. 17-7) Position one block over lower pinchweld flange on each side of body 12" inboard from the lower corner of windshield opening. Position one block over upper pinchweld flange midway between center block and each outboard block on lower retaining flange.
5. With aid of helper, carefully position replacement glass on blocks in windshield opening.

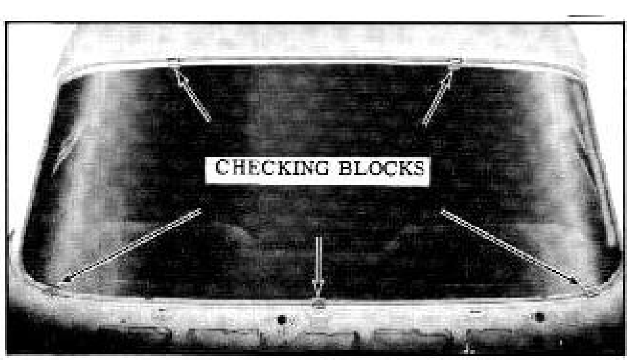


Fig. 17-7 Windshield Opening Check

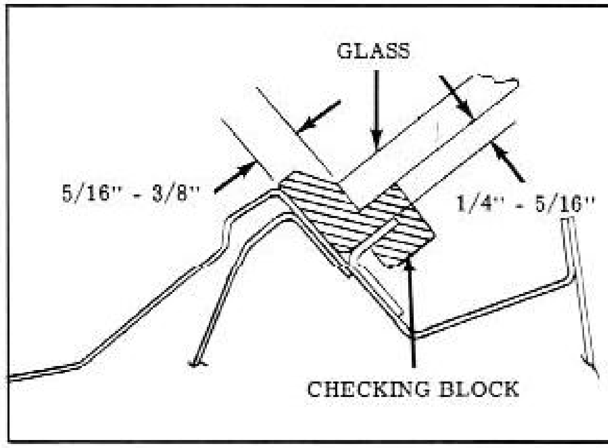


Fig. 17-8 Windshield Check Dimensions

CAUTION: Care should be exercised to make certain glass does not strike body metal during installation. Edge chips can lead to future breaks.

6. With windshield supported and centered in the body opening by checking blocks, check relationship of glass to body opening around entire perimeter of glass. Fig. 17-8 shows a typical section taken through the glass channel and body opening. Check glass to body relationship as follows:
   a. The inside surface of glass should be uniform distance from pinchweld flange. The dimension should be 1/4" to 5/16".
   b. The outer edge of glass should be a uniform distance from body metal, measured in plane of the glass. This dimension should be 5/16" to 3/8".
7. Mark any sections of body to be re-formed, remove glass and re-form opening as required.
8. Recheck windshield opening as outlined above. Then mark the center line on the glass and body so that glass can be accurately centered in the opening when installed.

Installation

1. Clean out old sealer in glass cavity of windshield rubber channel and around base of rubber channel.
2. Install rubber channel to glass.
3. Install a strong cord in pinchweld cavity of rubber channel completely around windshield. Tie ends of cord and tape to inside surface of glass at bottom center of glass. (Fig. 17-9)
4. Apply a ribbon of medium-bodied sealer completely around base of rubber channel. (View "1", Fig. 17-10)

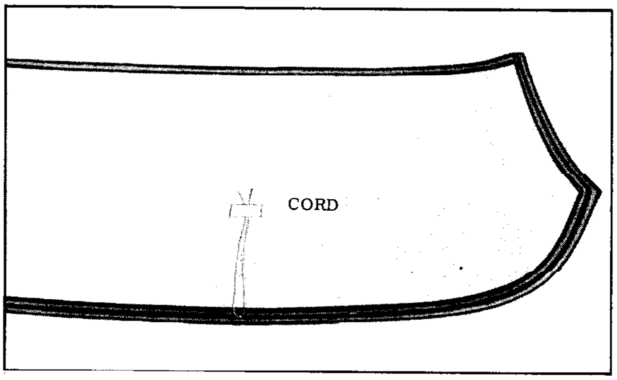


Fig. 17-9 Cord Installation

5. Inspect condition of each molding clip, install new clips where necessary, make certain clips are properly sealed to pinchweld and body on all except "67" styles. (View "2" Fig. 17-10)

6. Apply a bead of medium-bodied sealer approximately 1/4" in diameter to corner of windshield opening rabbet and around each side of windshield opening as shown. (View "3" Fig. 17-10)

7. With aid of helper, carefully position and center windshield assembly in windshield opening.

   CAUTION: Do not position by tapping or hammering glass at any time.

8. When the glass and channel are properly positioned in the opening, slowly pull both ends of cord starting at lower center of windshield, to seat lip of rubber channel over pinchweld flange. Cord should be pulled first across bottom of windshield, then up each side and finally across top of windshield.

9. Using a pressure type applicator, seal inner and outer lips of rubber channel to glass with weatherstrip adhesive. (View "4" Fig. 17-10) Seals are to extend completely around rubber channel.

10. Clean off excess sealer from windshield glass.

11. On outside of windshield apply medium-bodied sealer between windshield rubber channel and opening across top and sides. (View "5" Fig. 17-10)

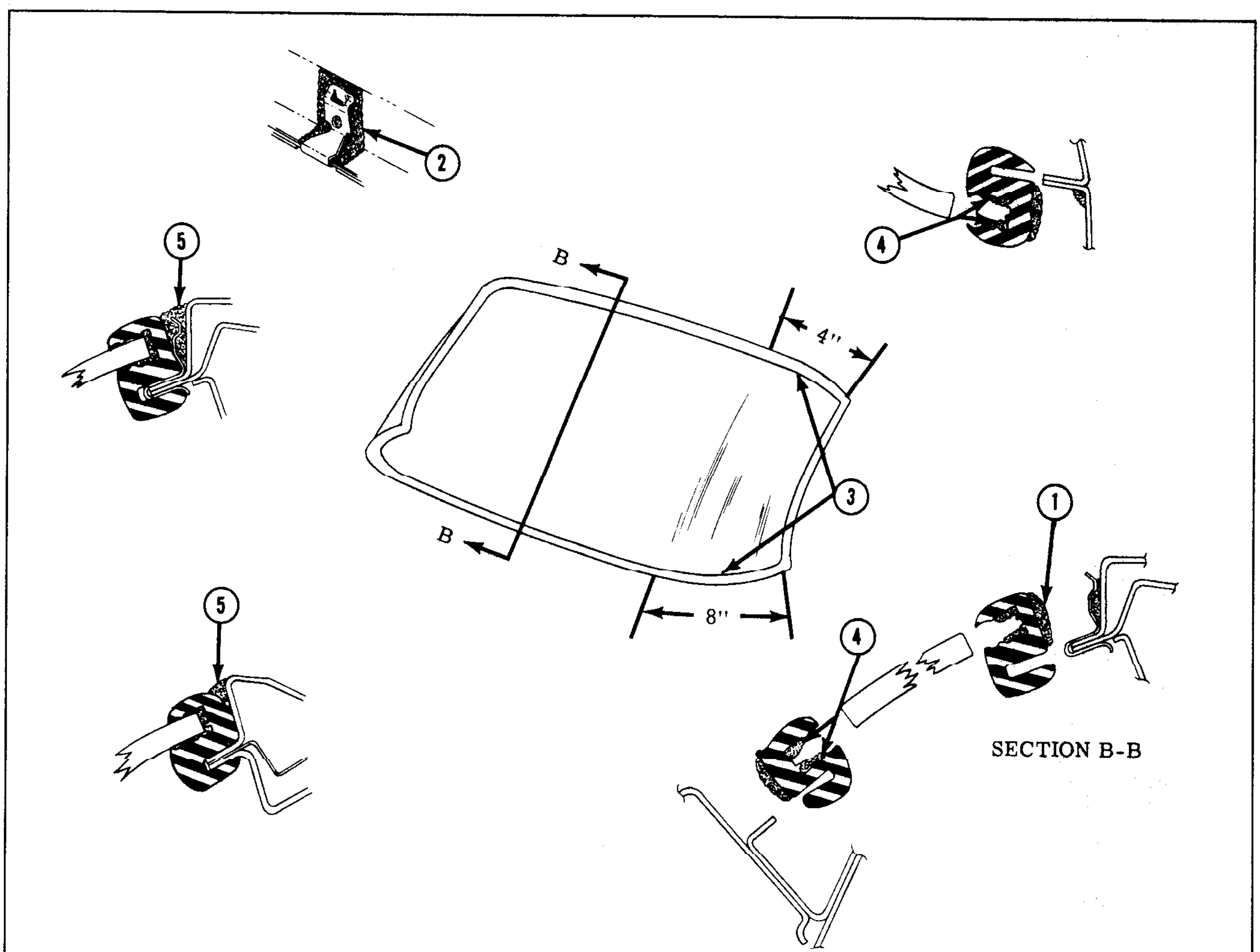


Fig. 17-10 Windshield Sealing

12. Reinstall all previously removed parts and remove protective coverings.

WINDSHIELD GLASS REPLACEMENT (ONLY WHEN CHECKING OF OPENING IS NOT REQUIRED)

Removal

1. Place protective covering over front seat and instrument panel.
2. Place protective covering over hood and front fenders.
3. Remove upper and side garnish moldings and mirror support. On "67" styles remove sunshade supports.
4. Remove upper and side reveal moldings.
5. Remove windshield wiper arms.
6. On inside of body loosen lip of rubber channel from pinchweld flange along top and sides of windshield as follows: With palm of hand, apply pressure to glass near edge (Fig. 17-6), at same time use a blunt putty knife or other suitable tool and carefully assist rubber channel over pinchweld flange across top and sides only.
7. Tilt glass forward sufficiently to remove glass from channel and remove glass.

   NOTE: Do not remove lower portion of rubber channel from pinchweld or break seal between rubber channel and lower pinchweld.

Installation

1. Clean out cavity of windshield rubber channel of all old sealer, etc.
2. Apply a mild soap solution to cavity and outer lip of rubber channel.
3. Place windshield glass in rubber channel.
4. Working from inside the body with a screwdriver or other suitable tool, work the inner lip of the windshield channel over the pinchweld flange, up each side and across the top.

   CAUTION: Do not attempt to position glass by tapping or hammering at any time.

5. Using a pressure type applicator, seal inner and outer lips of rubber channel to glass with weatherstrip adhesive. (View 4, Fig. 17-10) Seals are to extend completely around rubber channel.
6. On outside of windshield apply medium-bodied sealer between windshield rubber channel and opening across top and sides. (View 5, Fig. 17-10)
7. Clean off excess sealer.
8. Reinstall all previously removed parts and remove protective coverings.

INSTRUMENT PANEL COMPARTMENT

DOOR

Removal and Installation

1. Mark location of compartment door hinges on door inner panel and hinges.
2. Remove attaching screws from door inner panel and remove door.
3. To install, reverse removal procedure and align as necessary.

Adjustments

1. To position compartment door up or down or right or left in its opening, loosen hinge(s) at door inner panel and shift door to desired position.
2. The compartment door lock striker may be adjusted by loosening attaching screws and moving striker to desired position.

DOOR KNOB ASSEMBLY

Removal and Installation

1. Open compartment door, remove screw from retainer and remove assembly.
2. To install, reverse removal procedure.

COMPARTMENT BOX

Removal and Installation

1. Open compartment door, remove compartment attaching screws and remove compartment box.
2. To install, reverse removal procedure.

INSTRUMENT PANEL COVER (35 AND 38 SERIES)

The instrument panel cover assembly is secured to the upper instrument panel by cement around the front and end areas and by studs and nuts at the rear.

Removal

1. Remove lower instrument panel assembly and lower and side garnish moldings.
2. From underside of instrument panel at rear, remove cover attaching nuts (View "1" Fig. 17-11) and with a putty knife or other suitable tool, carefully loosen cemented area and remove cover assembly. Remove or loosen necessary chassis items.

   CAUTION: Do not bend or buckle cover.

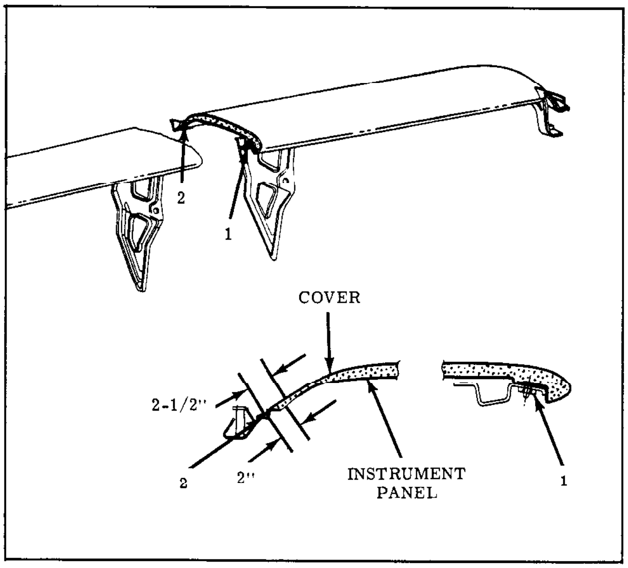


Fig. 17-11 Panel Cover Installation (S88 and 98)

Installation

1. Clean off cementing surfaces of instrument panel and instrument panel cover.

2. Apply a thin coat of neoprene type adhesive to the instrument panel. (Fig. 17-11) Apply a 2" wide strip of adhesive to the front edge and ends of the upper instrument panel.

3. Apply a heavy coat of adhesive 2-1/2" wide to the instrument panel cover. (View "2" Fig. 17-11)

4. Immediately following application of adhesive carefully position cover to instrument panel making certain cover attaching studs at the rear line-up with holes in the instrument panel. Then, firmly and evenly press cemented surfaces to instrument panel removing any wrinkles.

   CAUTION: This adhesive is fast drying; therefore, perform this operation quickly while adhesive is still wet.

5. Install all previously removed parts.

INSTRUMENT PANEL COVER (32 SERIES)

The instrument panel cover is secured to the instrument panel by studs and nuts. (Fig. 17-12)

Removal and Installation

1. Remove lower instrument panel assembly.
2. From underside of instrument panel remove attaching stud nuts and remove cover.

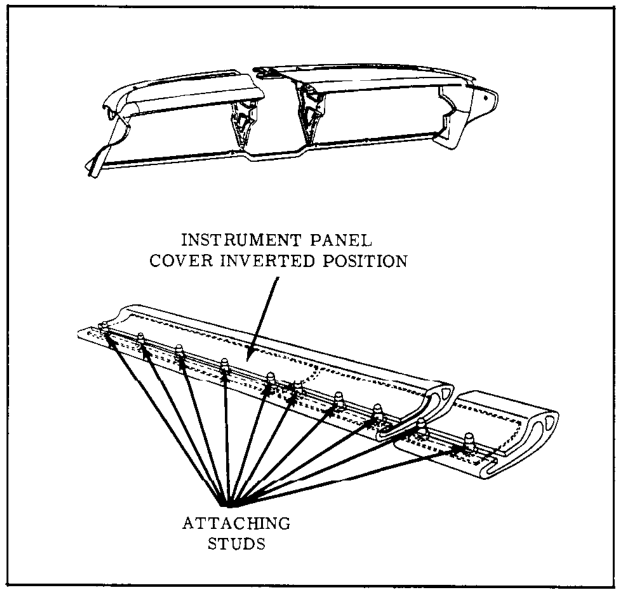


Fig. 17-12 Panel Cover Installation (88)

NOTE: Loosen or remove necessary chassis items.

3. To install, reverse removal procedure.

DOORS AND CENTER PILLAR

FRONT AND REAR DOORS

The entire door section has been divided into the following parts:

Service operations which are the same or similar for both front and rear doors.

Service operations for front doors only.

Service operations for rear doors only.

FRONT AND REAR DOOR WEATHERSTRIP ASSEMBLY ("29", "37", "39" and "67" Styles)

The door weatherstrip is a one-piece mechanically retained type. On all styles, the weatherstrip is retained by an attaching hole sealing plug. This feature eliminates the need for sealing the weatherstrip clips along the door bottom facing. Service procedures for front and rear door weatherstrips are similar and both weatherstrips are covered herein.

Removal

1. Remove snap fasteners securing front and rear ends of weatherstrip at belt line.

2. Insert top of Weatherstrip Inserting Tool J-5757 at clip locations and carefully snap clips from retaining holes.

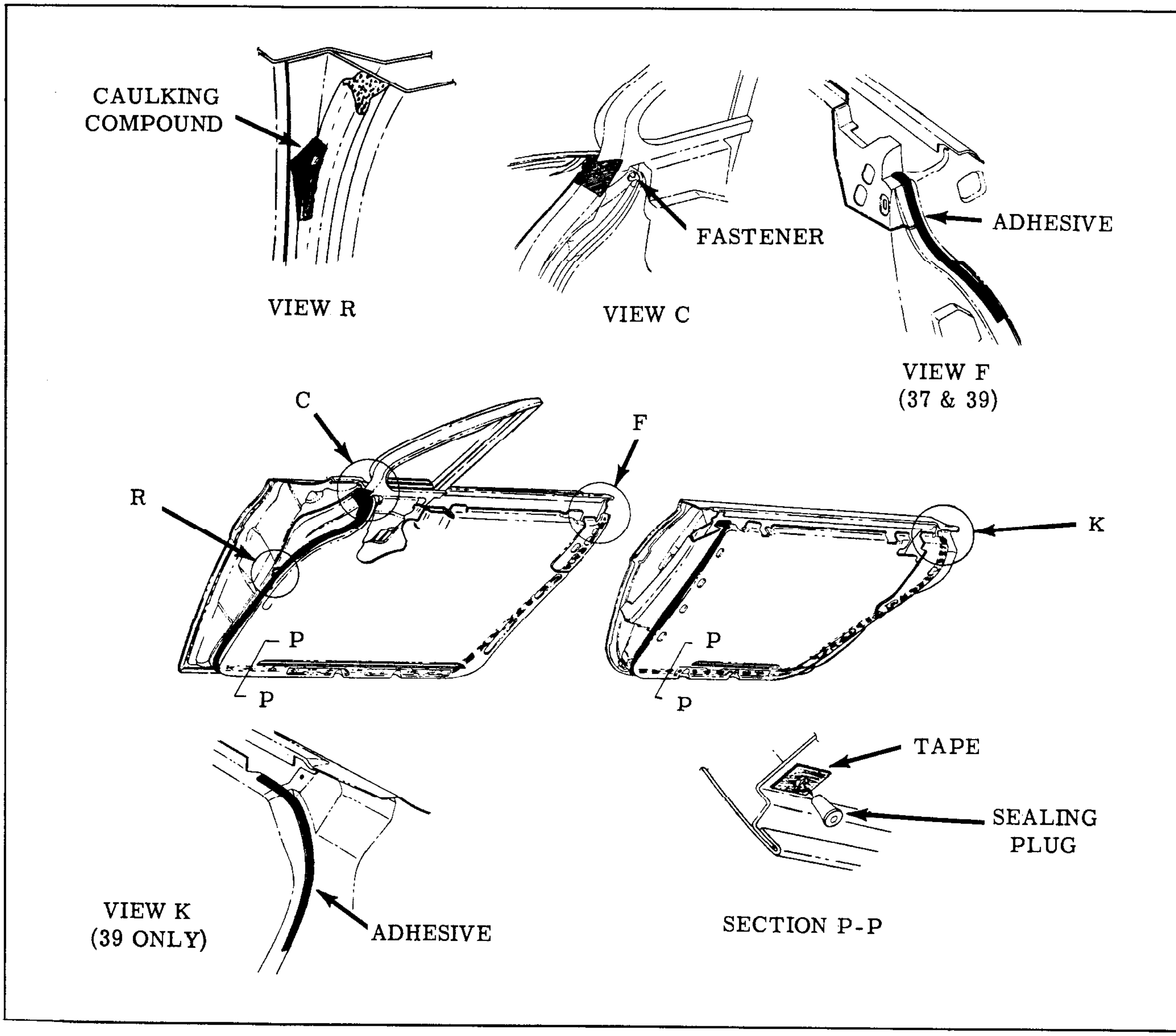


Fig. 17-13 Door Weatherstrip (Typical of "29", "37", "39" and 67 Styles)

3. At upper rear portion of front door weatherstrip on "37" and "67" styles and upper rear portion of rear door weatherstrip on "29" and "39" styles, carefully break cement bond securing weatherstrip to door inner panel. (Fig. 17-13, Views "F" and "K")

NOTE: If necessary, a putty knife can be used to help break the cement bond.

Installation

1. Check weatherstrip clips for proper contour and reform, if necessary, using Clip Reforming Tool J-5984. (Fig. 17-14)

2. Check all attaching hole sealing plugs. If sealing plugs are loose and will not remain engaged in door inner panel, install a 1/2" x 1" piece of cloth backed waterproof body tape over sealing plug retaining hole. (Section "P-P", Fig. 17-13) Make two 5/16" slits in tape to form an "X". Install plug and check for a snug fit. If plug is still loose, repeat above operation by installing a second piece of tape over existing repair. This procedure may also be used to repair waterleaks which may develop at sealing plug locations.

3. If new weatherstrip is being installed, clean old cement from door to insure a clean cementing surface. Then apply cement to areas indicated below.

   a. Apply a bead of weatherstrip adhesive 9" long to lock pillar facing of front door at belt area on "37" and "67" styles (View "F").

   b. Apply a bead of weatherstrip adhesive 9" long to lock pillar facing of rear doors at belt area on "29" and "39" styles (View "K").

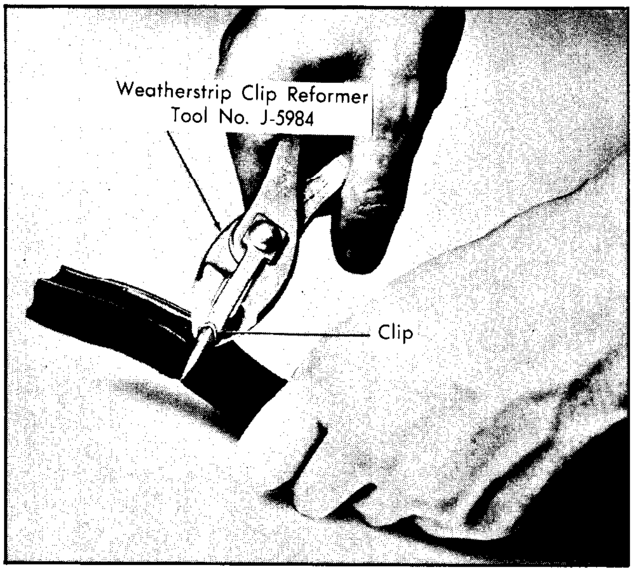


Fig. 17-14 Reforming Weatherstrip Clip

4. Install clips to door by placing notched end of Weatherstrip Inserting Tool J-5757 in loop of clip and pushing clip into attaching hole sealing plug. Repeat operation along both sides and bottom of door.

   NOTE: DO NOT DISTORT CLIPS OR UNSATISFACTORY WEATHERSTRIP RETENTION WILL RESULT.

5. At front corner of rear door (at belt), apply weatherstrip cement to facing of formed end of weatherstrip and corresponding surface of door inner panel and cement weatherstrip in place. Replace forward snap fastener only. (Fig. 17-15)

6. Clean off all excess weatherstrip adhesive. Install stud fasteners.

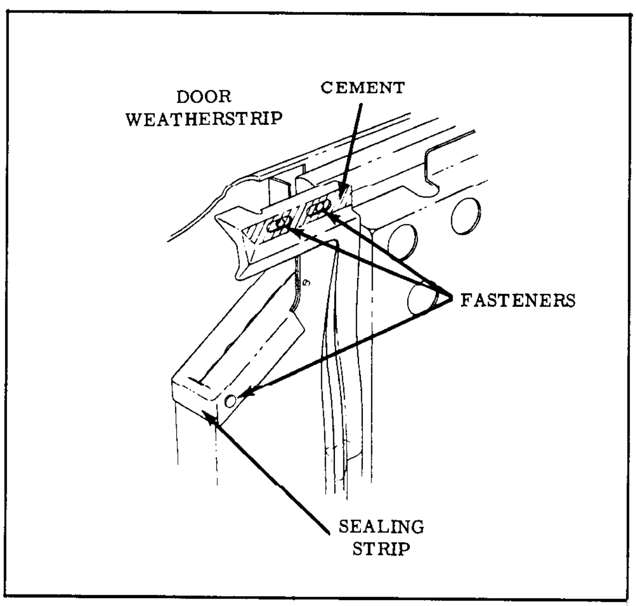


Fig. 17-15 Rear Door Hinge Pillar Sealing Strip (at Belt)

7. On front doors, midway down from top of weatherstrip, fill area between weatherstrip and door inner panel with body caulking compound. (View "R", Fig. 17-13)

FRONT AND REAR DOOR WEATHERSTRIPS ("11", "19", "35", "45" and "69" Styles)

Removal

1. Insert tip of Weatherstrip Inserting Tool J-5757 at clip locations and carefully snap clips from retaining holes.

2. On front doors, carefully break cement bond securing weatherstrip to door lock pillar facing. On rear doors, carefully break cement bond securing weatherstrip to door hinge pillar and lock pillar facings. (Fig. 17-16 Views "B", "D" and "G") Then remove weatherstrip from door.

Installation

1. Check weatherstrip clips for proper contour and reform, if necessary, using Clip Reforming Tool J-5984. (Fig. 17-14)

2. Check all attaching hole sealing plugs. If sealing plugs are loose and will not remain engaged in door inner panel, install a 1/2" x 1" piece of cloth backed waterproof body tape over sealing plug retaining hole. (Section "P-P", Fig. 17-16) Make two 5/16" slits in tape to form an "X". Install plug and check for a snug fit. If plug is still loose, repeat above operation by installing a second piece of tape over existing repair. This procedure may also be used to repair waterleaks which may develop at sealing plug locations.

3. If new weatherstrip is being installed, clean old cement off door to insure a clean cementing surface. Then apply cement to following locations:

   a. Apply a bead of weatherstrip adhesive 9" long to hinge pillar and lock pillar facings of front door at belt area. (Views "B" and "D")

   b. Apply bead of weatherstrip adhesive 9" long to lock pillar facing of rear door at belt area. (View "G").

4. Position front door weatherstrip so that preformed section is at upper rear corner of door. Position rear door weatherstrip so that molded section is at upper front corner of door.

5. Install clips to door by placing notched end of Inserting Tool J-5757 in loop of clip and

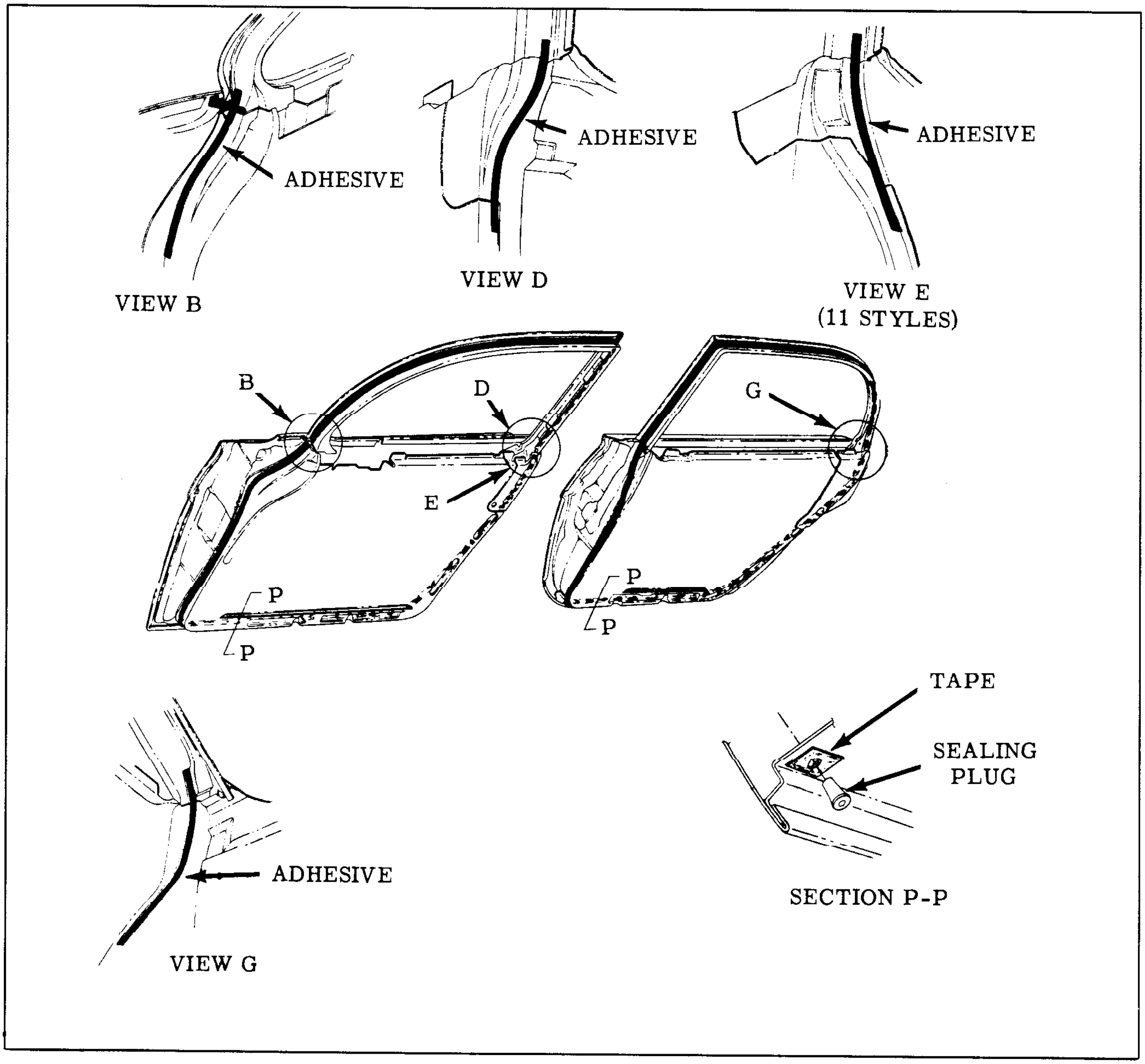


Fig. 17-16 Door Weatherstrip (Typical of "11", "19", "35", "45" and "69" Styles)

pushing clip into attaching hole sealing plug.

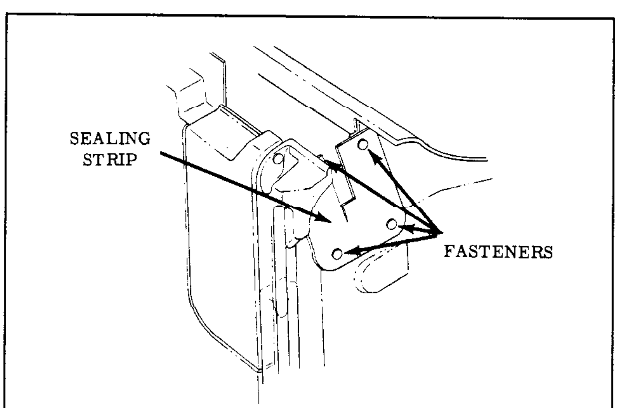


Fig. 17-17 Front Door Lock Sealing Strip (at Belt)

NOTE: DO NOT DISTORT CLIPS OR UNSATISFACTORY WEATHERSTRIP RETENTION WILL RESULT.

6. Clean off all excess weatherstrip adhesive.

FRONT DOOR LOCK PILLAR SEALING STRIP (AT BELT) ("29" and "39" Styles)

Removal and Installation

1. Remove snap fasteners securing sealing strip to lock pillar facing of front door and remove strip. (Fig. 17-17)

2. To install, reverse removal procedure.

REAR DOOR HINGE PILLAR SEALING STRIP (AT BELT) ("29" and "39" Styles)

Removal and Installation

1. Remove snap fasteners securing sealing strip to hinge pillar facing of rear door and remove strip. (Fig. 17-15)

2. To install, reverse removal procedure.

FRONT AND REAR DOOR LOCK STRIKERS

Removal and Installation

1. With pencil, mark position of striker on body pillar.

2. Remove 3 door lock striker attaching screws and remove striker and adjusting plates from pillar.

3. To install, seal all striker plate attaching screw clearance holes with body caulking compound.

4. Apply 1/8" bead of body caulking compound around entire back surface of striker plate. No skips must exist in caulking compound; then place striker and adjusting plates within marks on pillar and install striker plate attaching screws.

   IMPORTANT: Whenever a door has been removed and installed, or realigned, the door SHOULD NOT be closed completely until visual check is made to determine if lock extension will engage in striker notch. Where required, door lock striker emergency spacers should be installed so that door can be closed and an accurate check made to determine emergency spacer requirements.

5. Clean off all excess caulking compound.

Adjustments

1. To adjust striker up or down or in or out, loosen striker plate attaching screws and shift striker and adjusting plates as required, then tighten screws.

DIMENSIONAL SPECIFICATIONS FOR USE OF DOOR LOCK STRIKER EMERGENCY SPACERS

1. Door(s) should be properly aligned before checking door spacer requirements.

2. To determine if door lock striker emergency spacers are required, apply modeling clay or body caulking compound in door lock striker notch where lock extension engages and then close door to form measureable impression in clay or caulking compound. (Fig. 17-18)

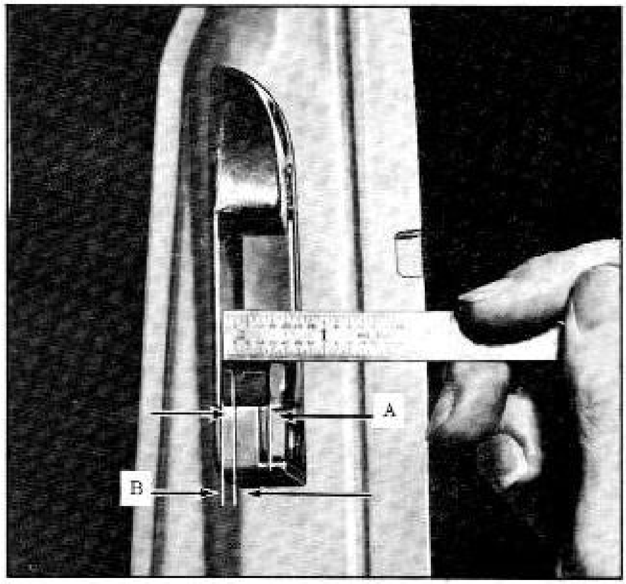


Fig. 17-18 Door Lock Striker Engagement Check

When dimension "A" from rear face of striker teeth to rear edge of depression in clay is less than 11/32", install emergency spacers and proper length striker attaching screws as indicated.

Dimension "A"	No. of Spacers Required	Spacer Thickness	Striker Attaching Screws*
11/32" to 9/32"	1	1/16"	Original
9/32" to 7/32"	1	1/8"	Emergency (1/8" longer)
7/32" to 5/32"	1 - (1/16" Spacer) 1 - (1/8" Spacer)	3/16"	Emergency (1/8" longer)
5/32" to 3/32"	2 - (1/8" Spacer)	1/4"	Emergency (1/4" longer)

NOTE: Dimension "B" in the illustration should never be less than 1/8".

*Zinc or cadmium-plated flat-head cross recess screw with countersunk washer.

FRONT AND REAR DOOR BOTTOM DRAIN HOLE SEALING STRIPS

The door bottom drain hole sealing strip is attached to the door inner panel over the drain holes by a snap-on fastener at each end of the strip.

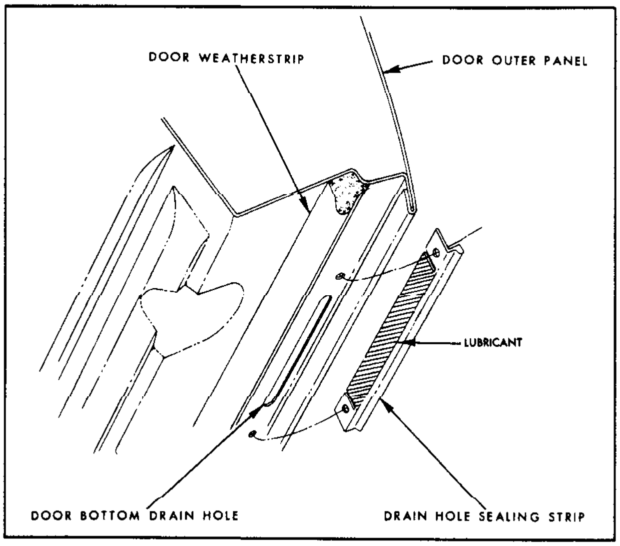


Fig. 17-19 Door Drain Hole Sealing

To prevent strip from adhering to door inner panel and blocking drain hole, apply a sparing amount of silicone rubber lubricant on the center section of sealing strip. (Fig. 17-19)

DOOR LOCK SPRING CLIP(S)

A spring clip is used on the door lock levers to secure the remote control connecting rod and inside locking rod connecting link to the door levers. A slot in the spring clip provides for disengagement of the clip, thereby facilitating detachment of the connecting link from the lock lever.

To disengage the spring clip, use a screwdriver or other suitable tool to slide the clip out of engagement. (Fig. 17-20)

FRONT AND REAR DOOR WATER DEFLECTORS

A waterproof paper deflector is used to seal the door inner panel and prevent entry of water into the body. The polyethylene (black) side of the deflector is placed against the inner panel. The deflector fits into a retaining slot at the bottom of the door inner panel and deflects the water to the bottom of the door and out the bottom drain

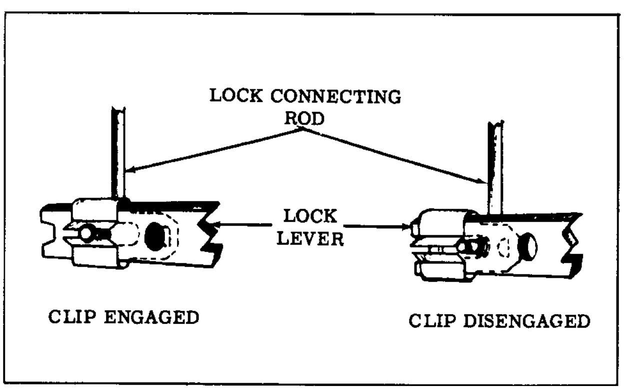


Fig. 17-20 Door Lock Spring Clip

holes. The deflector is further secured by a string loaded sealing material along both front and rear edges and by the application of waterproof sealing tape at front and rear lower corners. Whenever work is performed on front or rear doors where the paper water deflector has been disturbed, the deflector must be properly sealed and taped to the inner panel to prevent serious waterleaks. It is important that the specified material and recommended removal and installation or replacement procedures be used. Body caulking compound is recommended if additional sealing material is required.

When access to the inner panel is required, the deflector may be completely or partially detached from the inner panel. If the existing water deflector is damaged so that it will not properly seal the door, replacement of the deflector is required.

The following procedure covers complete removal and installation of the water deflector. If only partial removal of the deflector is required, perform only those steps which are necessary to expose the required area of the door inner panel.

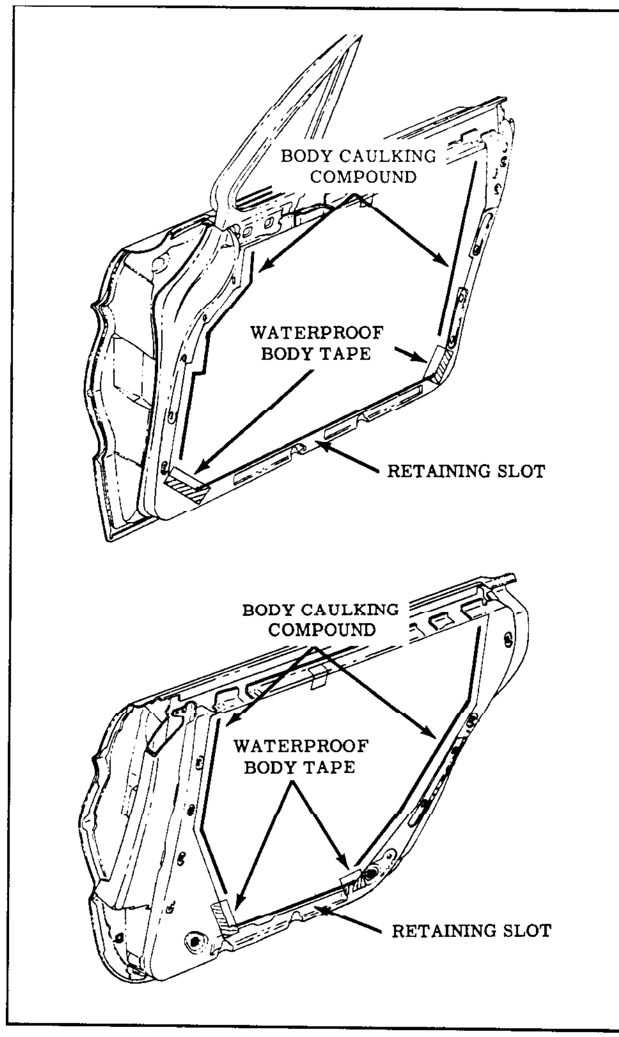


Fig. 17-21 Front and Rear Door Water Deflector Sealing

Removal

1. Remove door trim assembly.

2. Remove strips of waterproof body tape securing lower corners of water deflector. (Fig. 17-21)

3. Carefully break cement bond securing upper corners of water deflector to door inner panel. Then while holding string, located within sealer, against water deflector, carefully disengage edges of deflector from door. Exercise care so as not to tear water deflector.

   NOTE: If necessary, a putty knife can be used to help break cement bond.

4. Disengage lower edge of water deflector from retaining slot in door inner panel and remove water deflector.

Installation

1. Inspect water deflector and, where necessary, repair any tears or holes with waterproof body tape applied to both sides of deflector. In addition, if bond between polyethylene and deflector paper has been torn, cut or damaged, apply waterproof body tape to both sides of deflector over damaged area to prevent water from wicking on uncoated side of deflector paper.

2. If new water deflector is to be installed, use old water deflector as a template, trim new deflector to proper size and cut holes for door inside hardware. If old sealer does not effect a satisfactory seal, clean off old cement from door inner panel and apply a continuous bead of door caulking compound (approximately 3/16" diameter) to door inner panel along line contacted by front and rear edges of water deflector. (Fig. 17-21)

3. If necessary, seal all arm rest screw attaching holes with body caulking compound.

4. Position water deflector to door inner panel with polyethylene coated side (black) of deflector against inner panel. Insert lower edge of deflector in retaining slot. Then firmly roll or press sealed areas to obtain a good bond between deflector and door inner panel.

5. Seal lower corners of deflector with 2" or 2-1/2" waterproof body sealing tape. (Fig. 17-21)

6. Clean off all excess cement or caulking compound and install previously removed door trim and inside hardware.

FRONT AND REAR DOOR ARM REST ASSEMBLY

Removal and Installation

1. Remove screws securing arm rest and remove arm rest.

2. To install, reverse removal procedure.

FRONT AND REAR DOOR INSIDE REMOTE CONTROL HANDLE (All 3500 and 3800 Series Except 69 Style)

Removal and Installation

1. Remove door arm rest assembly.

2. Remove screw securing remote control handle to regulator spindle and remove handle.

3. To install, reverse removal procedure.

   NOTE: Install handle at same angle as handle on opposite door.

FRONT AND REAR DOOR TRIM ASSEMBLY

Removal and Installation

1. Remove door inside handles, locking rod knob and arm rest assembly.

2. Remove screws securing trim assembly to door inner panel.

3. With a clean rubber mallet tap trim assembly along front and rear edges to free trim assembly retaining nails in slots.

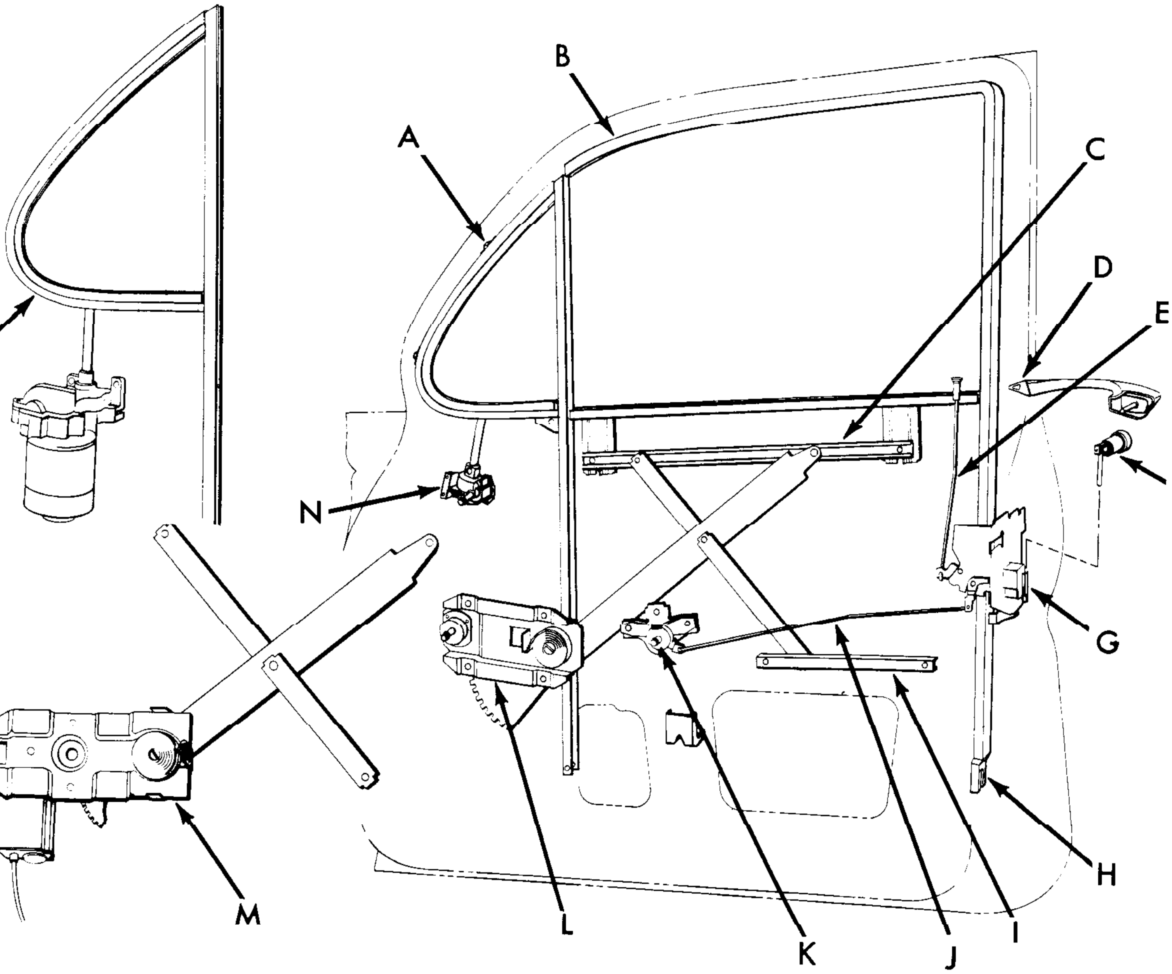
4. Place Tool J-6335 between water deflector and door trim assembly at lower edge of trim assembly. Working upward, carefully loosen front and rear edges of door trim assembly from door inner panel.

   NOTE: Exercise extreme care so as not to disturb water deflector.

5. Lift trim assembly upwards and carefully disengage trim from top of door inner panel; then remove trim assembly from door.

   NOTE: On styles equipped with electric window regulators and/or electric ventilators, after trim assembly is disengaged from top of door inner panel, disconnect switch terminal block(s) from switch assembly(s).

6. To install, reverse removal procedure. Broken retaining nails should be replaced with repair tabs, which are available as service parts.



A. FRONT DOOR VENTILATOR ASSEMBLY
B. FRONT DOOR WINDOW ASSEMBLY
C. FRONT DOOR WINDOW LOWER SASH CHANNEL CAM
D. FRONT DOOR OUTSIDE HANDLE ASSEMBLY
E. FRONT DOOR INSIDE LOCKING TO LOCK ROD ASSEMBLY
F. FRONT DOOR LOCK CYLINDER ASSEMBLY
G. FRONT DOOR LOCK ASSEMBLY
H. FRONT DOOR WINDOW GLASS RUN CHANNEL ASSEMBLY
I. FRONT DOOR INNER PANEL CAM ASSEMBLY
J. FRONT DOOR LOCK REMOTE CONTROL TO LOCK ROD ASSEMBLY
K. FRONT DOOR LOCK REMOTE CONTROL ASSEMBLY
L. FRONT DOOR WINDOW REGULATOR ASSEMBLY - MANUAL
M. FRONT DOOR WINDOW ELECTRIC REGULATOR AND MOTOR ASSEMBLY
N. FRONT DOOR VENTILATOR REGULATOR ASSEMBLY - MANUAL
O. FRONT DOOR ELECTRIC VENTILATOR AND MOTOR ASSEMBLY

Fig. 17-22 Front Door (Typical of Sedan and Fiesta)

FRONT AND REAR DOOR WINDOW LOWER SASH CHANNEL AND FILLER ("11", "19" and "69" Styles)

The outboard section of the door window lower sash channel filler is designed to raise the door window glass run channel outer strip assembly in position to effect a proper weatherseal. Replacement of either or both the lower sash channel and filler can be accomplished as a bench operation as follows:

Installation

1. Widen lower sash channel 1/16" along entire length. This can best be accomplished by forcing a flat piece of steel (approximately 5/16" wide) through full length of channel cavity.

2. Install rubber filler on glass.

3. Apply a film of rubber lubricant (soap and water solution), along entire sash channel contacting surface of rubber filler.

4. With a rubber mallet, pound lower sash channel onto rubber filler and glass.

   CAUTION: Care should be exercised to make certain glass does not strike body metal during installation procedure as edge chips can cause tempered plate glass to shatter. DO NOT attempt to grind glass.

FRONT DOORS ("11", "19", "35", "45" and "69" Styles)

Fig. 17-22 is typical of sedan and station wagon style front doors with the trim assembly and inner panel water deflector removed. This illustration identifies the component parts of the front door assembly, their relationship and various attaching points.

("29", "37" and "39" Styles)

Fig. 17-23 is typical of the Holiday coupe and sedan style front doors with the trim assembly and inner panel water deflector removed. This illustration identifies the component parts of the front door assembly, their relationship and various attaching points.

FRONT DOOR ASSEMBLY AND HINGES

The front door hinges are the swing-out type with an integral door check on the upper hinge assembly and a two position hold open on lower hinge assembly. The hinges are attached to the front door body hinge pillar and to the door assembly with bolts and anchor plates. The door and hinges can be removed as an assembly from the body hinge pillar or the door can be removed from the hinge straps.

Removal

1. Place protective covering over front fender at door opening to protect paint finish.

2. If door and hinges are to be removed from body hinge pillar, it will be necessary to remove hinge pillar cover. (Fig. 17-24) Additional access may be obtained at lower hinge by loosening front fender lower rear attaching bolt.

3. Mark hinge locations on door or hinge pillar depending on method of removal being used.

4. On bodies equipped with electrically powered window regulators and/or ventilators, proceed as follows:

   a. Remove door trim assembly and detach inner panel water deflector sufficiently to gain access to wire connector(s) at motor(s).

   b. Detach wire harness from inner panel as required and disconnect motor(s) from harness at connector(s).

   c. Remove electric conduit from door and remove wire harness from between door panels through opening in door hinge pillar.

5. With door properly supported, remove bolts securing upper and lower hinges to front body hinge pillar or door hinge pillar. Then with aid of helper remove door assembly from body. (Fig. 17-25)

Installation

1. As an anti-squeak precaution, before installing door, coat attaching surface of hinge with heavy-bodied sealer. (Fig. 17-26)

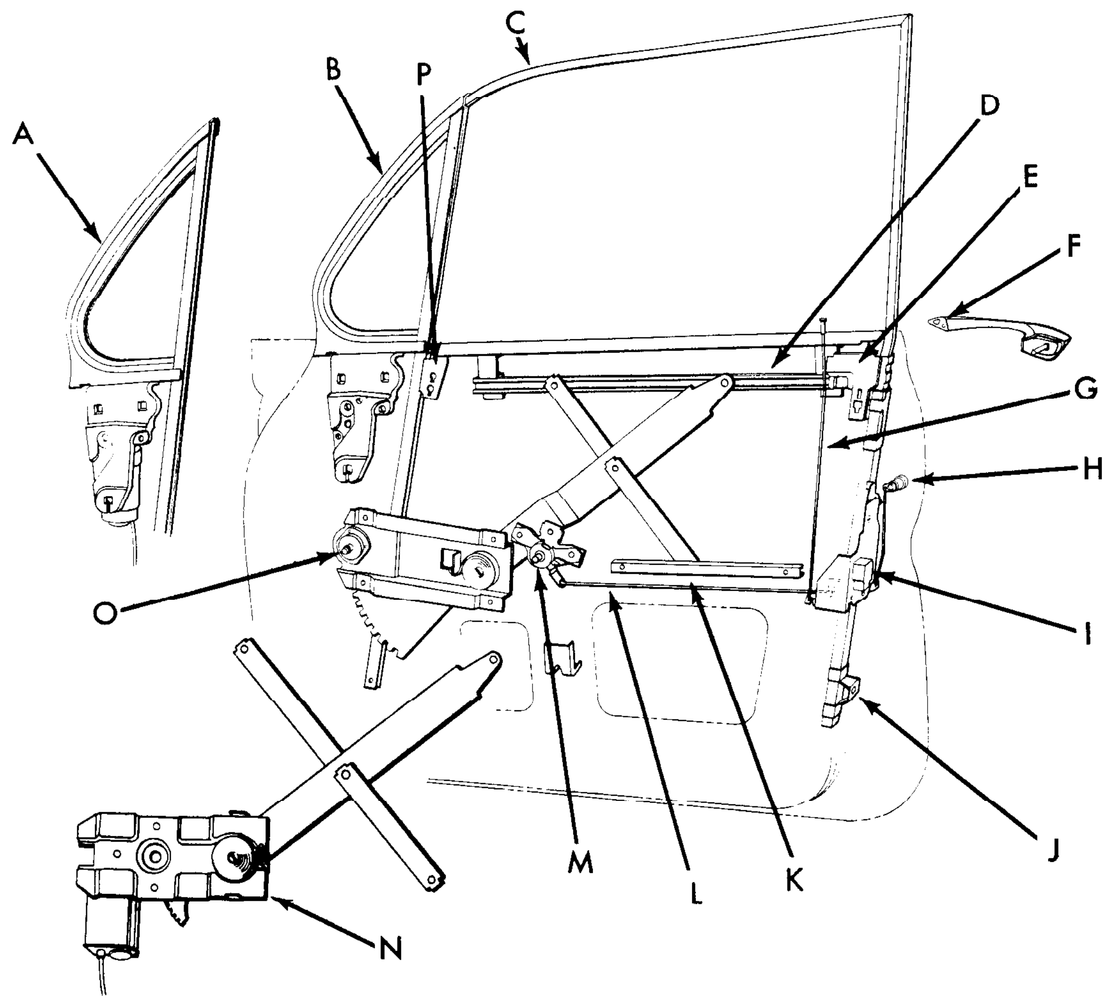
2. With aid of helper, reinstall door to body opening, align hinges within marks and tighten bolts. Check door for proper alignment.

3. On bodies equipped with electrically-operated window regulator and/or ventilator, proceed as follows:

   a. Install wire harness in between door panels and reinstall harness to door inner panel. Connect regulator motor and/or ventilator motor.

   b. Install conduit to door inner panel. Check operation of electric window and/or ventilator assembly.

   c. Where required, seal door inner panel



A. FRONT DOOR ELECTRIC VENTILATOR AND MOTOR ASSEMBLY

B. FRONT DOOR VENTILATOR ASSEMBLY - MANUAL

C. FRONT DOOR WINDOW ASSEMBLY

D. FRONT DOOR WINDOW LOWER SASH CHANNEL CAM

E. FRONT DOOR WINDOW REAR STOP ASSEMBLY

F. FRONT DOOR OUTSIDE HANDLE ASSEMBLY

G. FRONT DOOR INSIDE LOCKING TO LOCK ROD

H. FRONT DOOR LOCK CYLINDER ASSEMBLY

I. FRONT DOOR LOCK ASSEMBLY

J. FRONT DOOR WINDOW GLASS RUN CHANNEL ASSEMBLY

K. FRONT DOOR INNER PANEL CAM ASSEMBLY

L. FRONT DOOR LOCK REMOTE CONTROL TO LOCK ROD ASSEMBLY

M. FRONT DOOR LOCK REMOTE CONTROL ASSEMBLY

N. FRONT DOOR WINDOW ELECTRIC REGULATOR AND MOTOR ASSEMBLY

O. FRONT DOOR WINDOW REGULATOR ASSEMBLY - MANUAL

P. FRONT DOOR WINDOW FRONT STOP ASSEMBLY

Fig. 17-23 Front Door (Typical of Holiday Coupe and Sedan Styles)

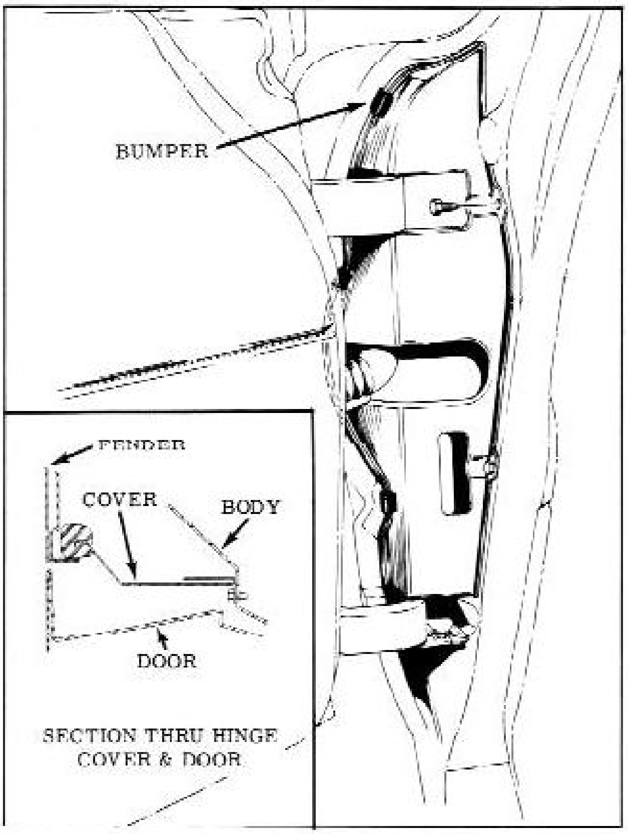


Fig. 17-24 Front Door Hinge Cover

water deflector as specified in DOOR INNER PANEL WATER DEFLECTOR and reinstall previously removed parts.

4. For lubrication information see LUBRICATION SECTION.

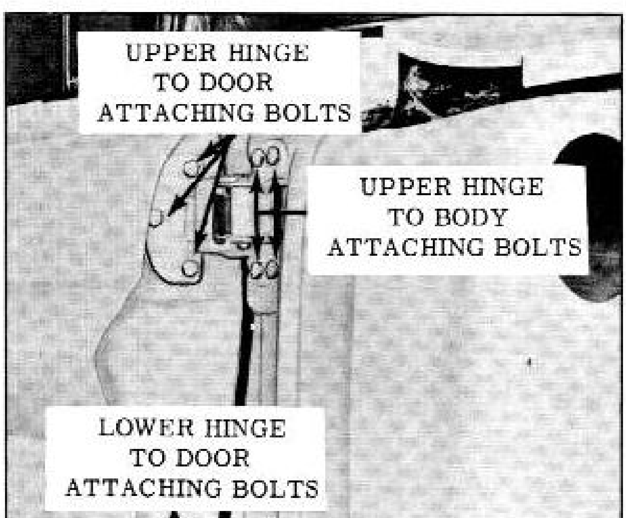


Fig. 17-25 Front Door Hinge Attachment

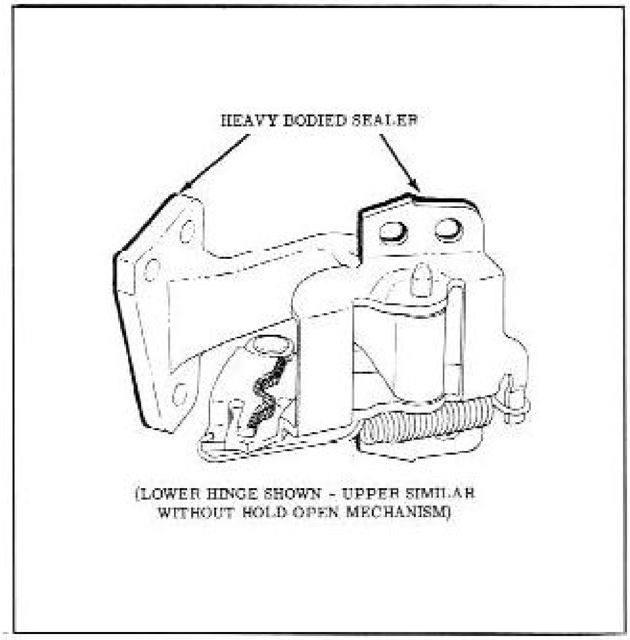


Fig. 17-26 Door Hinge Anti-Squeak

Adjustments

In and out or up and down adjustments are provided at door hinge pillar. Fore and aft adjustments are provided at front body hinge pillar.

NOTE: After performing any door adjustments on "29", "37", "39", and "67" styles, the front door ventilator and window should be checked for proper alignment with the side roof rail weatherstrip and adjusted, where required. In addition, the door lock extension-to-striker engagement should be checked, and if necessary, adjusted as described under DOOR LOCK STRIKER ADJUSTMENTS.

1. For in and out or up and down adjustments, loosen hinge to door pillar attaching bolts. (Fig. 17-25) Adjust door as required and tighten bolts.

   NOTE: When performing in and out adjustments, adjust one hinge at a time so as not to lose up and down adjustment.

2. To adjust door fore or aft, remove hinge pillar cover, then loosen hinge to body pillar attaching bolts. (Fig. 17-25) Adjust door as required and tighten bolts.

FRONT DOOR OUTSIDE HANDLE ASSEMBLY

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector sufficiently to expose large inner panel access hole.

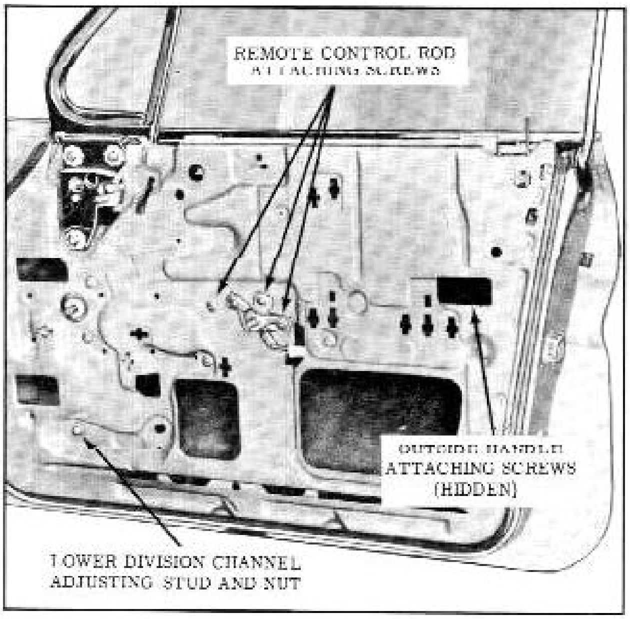


Fig. 17-27 Door Hardware Locations

2. Through access hole, remove screws securing outside handle to door outer panel and remove handle and gaskets. (Fig. 17-27)

3. To install, reverse removal procedure.

Disassembly and Assembly

1. Remove door outside handle assembly.
2. Depress retainer slightly and turn retainer one quarter turn. Remove retainer, spring and push button and shaft from handle. (Fig. 17-28)
3. To install, reverse disassembly procedure.

FRONT DOOR LOCK CYLINDER ASSEMBLY

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector sufficiently to expose large access hole.

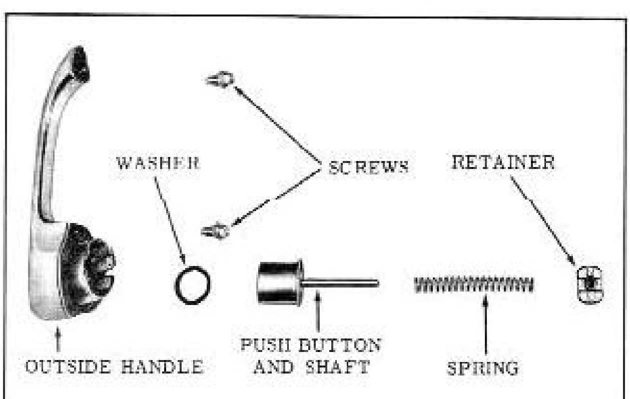


Fig. 17-28 Front Door Outside Handle Assembly

2. Through access hole, with a screwdriver or other suitable tool, disengage door lock cylinder to lock connecting rod from door lock. (See DOOR LOCK SPRING CLIP.)

3. On all except "39" styles, slide lock cylinder retaining clip forward from door lock pillar facing sufficiently to permit removal of lock cylinder with attached connecting rod from door. On "39" styles, disengage spring clip from inside of door.

   NOTE: Door lock cylinder connecting rod may be removed from lock cylinder as a bench operation or prior to removing cylinder.

4. To install, reverse removal procedure. Check operation of lock cylinder and lock prior to installing inner panel water deflector.

Disassembly and Assembly

1. Remove lock cylinder assembly from door.
2. Remove pawl retaining clip, pawl and lock cylinder retaining clip. (Fig. 17-29)
3. To assemble, reverse disassembly procedure.

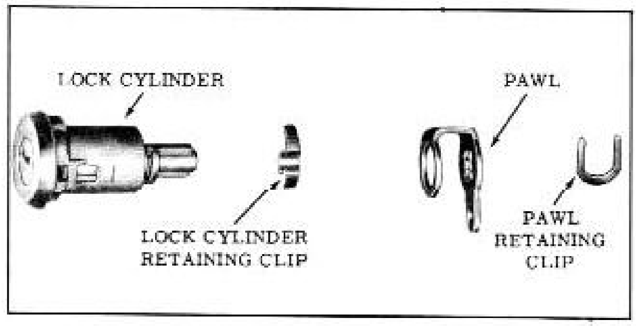


Fig. 17-29 Door Lock Cylinder Assembly

NOTE: The lock cylinder housing scalp used in production is usually damaged when removed and must be replaced by a new scalp which is available as a service part. The service lock cylinder housing scalp is secured by tabs.

DOOR INNER PANEL CAM ASSEMBLY

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector.

2. Remove screws securing door inner panel cam assembly, then disengage cam from window regulator balance arm and remove from door. (Fig. 17-27)

3. To install, reverse removal procedure. Prior to installation, lubricate entire length of cam with 630 AAW Lubriplate or equivalent.

Adjustments

1. To correct a condition where the glass is cocked in the glass run channels, loosen inner panel cam attaching screws, adjust either end of cam up or down as required and tighten screws.

FRONT DOOR LOCK ASSEMBLY

All locks are the rotary bolt type lock with the safety interlock feature. With the safety interlock feature it is important that the lock extension and housing engages properly in the door lock striker and that, where necessary, striker emergency spacers of the proper thickness are used to obtain proper engagement.

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector.
2. Through access hole, disengage spring clips securing lock cylinder connecting rod, remote control connecting rod and inside locking rod to lock and disengage rods from lock. (See DOOR LOCK SPRING CLIPS.)
3. On "29", "37", "39" and "67" styles remove door window rear glass run channel lower attaching screw and loosen upper attaching screws on lock pillar facing of door and at top of door inner panel to permit removal of lock. On "11", "19", "35", "45" and "69" styles from inside door, remove rear glass run channel lower attaching nut or screw and pull channel forward.
4. Remove door lock attaching screws from lock pillar facing of door and remove lock assembly from door. (Fig. 17-30)

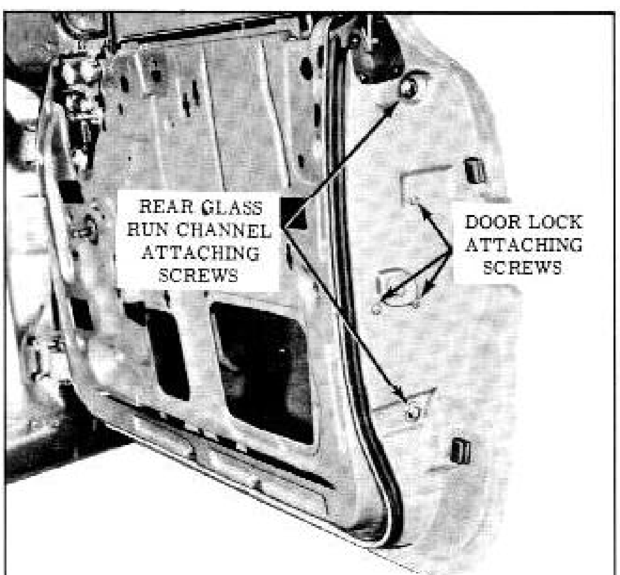


Fig. 17-30 Door Lock and Run Channel

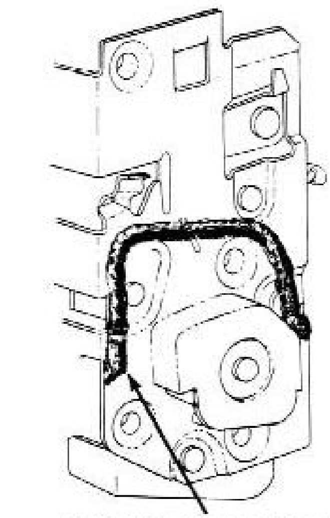


Fig. 17-31 Front Door Lock Assembly

5. To install, reverse removal procedure. Prior to installation of lock assembly on "11", "37", and "67" styles, apply a ribbon of medium-bodied sealer (approximately 1/4" in diameter) across face of lock frame. Check for proper operation, and where loosened, adjust glass run channel for proper alignment prior to installing inner panel water deflector. (Fig. 17-31)

FRONT DOOR REMOTE CONTROL ASSEMBLY AND CONNECTING ROD

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector.
2. Remove remote control attaching screws and disengage remote control from connecting rod. (Fig. 17-27)
3. To remove remote control connecting rod, carefully disengage spring clip securing rod to lock and remove rod from lock. Disengage rod from spring clip on door inner panel where necessary, and remove rod.
4. To install, reverse removal procedure. Check door lock and remote control assemblies for proper operation prior to installing inner panel water deflector.

FRONT DOOR VENTILATOR REGULATOR MANUAL AND ELECTRIC

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water

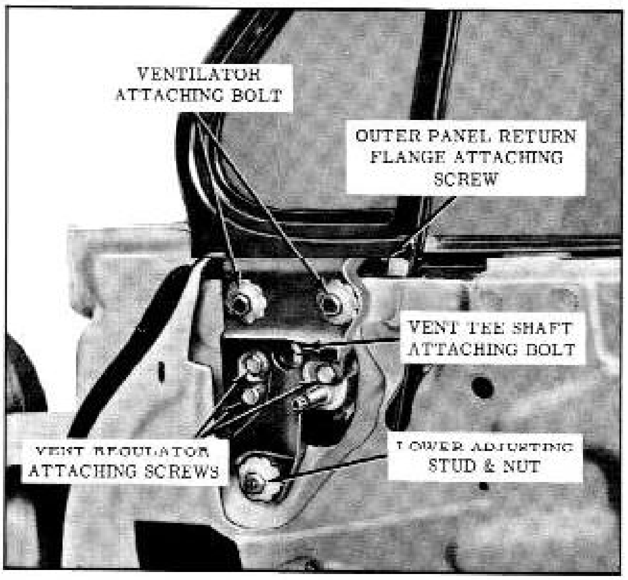


Fig. 17-32 Front Door Ventilator

deflector sufficiently to gain access to regulator attaching screws.

2. On styles equipped with electric ventilator regulators, disconnect regulator motor wires at connector.
3. Remove ventilator tee shaft attaching bolt and ventilator regulator attaching screws. (Fig. 17-32)
4. Disengage ventilator regulator shaft from ventilator tee shaft and remove regulator and motor assembly from door through access hole.
5. To install, reverse removal procedure. Check operation of ventilator assembly prior to installing inner panel water deflector.

Adjustments

1. Excessive "play" (flutter) of ventilator at pivot shaft when ventilator is in open position, can be corrected by tightening ventilator tee shaft to regulator shaft attaching bolt. (Fig. 17-32)

   NOTE: Bolt should be tightened carefully to avoid stripping threads in regulator spiral gear shaft.

FRONT DOOR VENTILATOR ASSEMBLY MANUAL AND ELECTRIC

1. Remove door trim assembly and detach inner panel water deflector.
2. Lower door window. Remove ventilator to door outer panel return flange attaching screw. (Fig. 17-33)
3. At front of ventilator assembly, break cement bond securing front door hinge pillar sealing strip (at belt) to ventilator assembly.

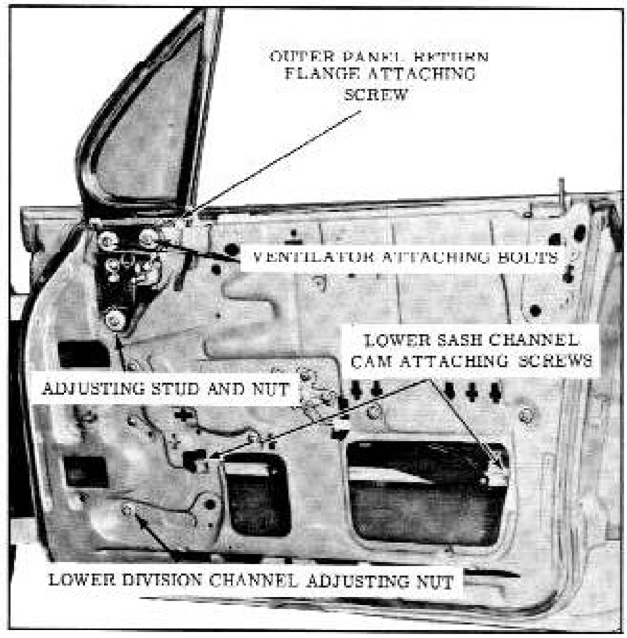


Fig. 17-33 Window and Ventilator Attachment

4. Remove ventilator division channel lower adjusting stud and nut. (Fig. 17-33)
5. On styles with power ventilators, remove the regulator and motor assembly. Styles equipped with manual ventilators, the ventilator can be removed with the regulator attached.
6. Loosen ventilator frame adjusting stud nut and remove ventilator attaching bolts, (Fig. 17-33) then carefully lift ventilator assembly upward and rearward and remove from door.
7. To install, reverse removal procedure. Prior to installation of ventilator assembly, apply a bead of body caulking compound to door outer panel return flange along area contacted by ventilator assembly. Adjust ventilator assembly as described under FRONT DOOR VENTILATOR ADJUSTMENTS.

FRONT DOOR VENTILATOR ADJUSTMENTS ("29", "37", "39" and "67" Styles)

The front door ventilator assembly can be adjusted up or down and in or out at the top for alignment in the door opening and proper weatherstrip contact in the ventilator area. The lower portion of the ventilator division channel can be adjusted in or out and fore and aft for alignment with the door window glass. The ventilator assembly can also be adjusted fore or aft for alignment with the body windshield pillar.

To adjust the ventilator assembly, proceed as follows:

1. Remove door trim assembly and detach inner panel water deflector.
2. Remove ventilator frame to outer panel attaching screw. (Fig. 17-33)

3. Loosen ventilator division channel adjusting stud nut and ventilator frame adjusting stud nut.

4. Loosen ventilator frame attaching bolts.

5. To adjust upper portion of ventilator in or out, turn ventilator frame adjusting stud and ventilator division channel adjusting stud in or out as required, then tighten stud nuts, attaching bolts and install ventilator to outer panel return flange attaching screw.

6. To adjust ventilator assembly up or down or fore or aft, position entire ventilator assembly, as required, then tighten all attaching bolts, stud nuts and ventilator to outer panel return flange attaching screw. Check door window for proper alignment and where required, adjust window as described under FRONT DOOR WINDOW ADJUSTMENT.

   NOTE: In some cases, it may be necessary to relocate ventilator to outer panel attaching screw.

7. Seal water deflector to door inner panel and install door trim and inside hardware.

FRONT DOOR VENTILATOR ASSEMBLY ("11", "19", "35", "45" and "69" Styles)

Removal and Installation

1. Remove door trim assembly and detach inner panel water deflector.

2. Remove ventilator regulator assembly.

3. Lower door window. Remove ventilator to door outer panel return flange attaching screw. (Fig. 17-34)

4. Remove ventilator division channel lower adjusting stud and nut. (Fig. 17-34)

5. Remove ventilator upper attaching screws along window frame.

6. Lower ventilator assembly sufficiently to tilt assembly inward; then lift ventilator assembly upward and remove from door.

7. To install, reverse removal procedure.

FRONT DOOR VENTILATOR ADJUSTMENTS ("11", "19", "35", "45" and "69" Styles)

To adjust ventilator division channel in or out or fore or aft, remove door trim assembly and detach inner panel water deflector sufficiently to loosen division channel lower adjusting stud nut. Adjust stud in or out as required or position channel fore or aft as required; then tighten stud nut.

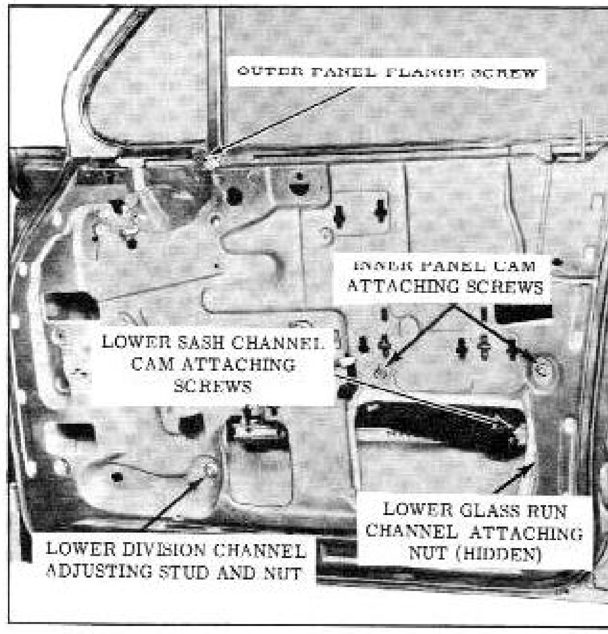


Fig. 17-34 Front Door Glass (Sedans)

FRONT DOOR WINDOW ASSEMBLY MANUAL AND ELECTRIC ("29", "37", "39" and "67" Styles)

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector.

2. Through holes in inner panel, remove screw securing window assembly front and rear stops to lower window sash channel. Then

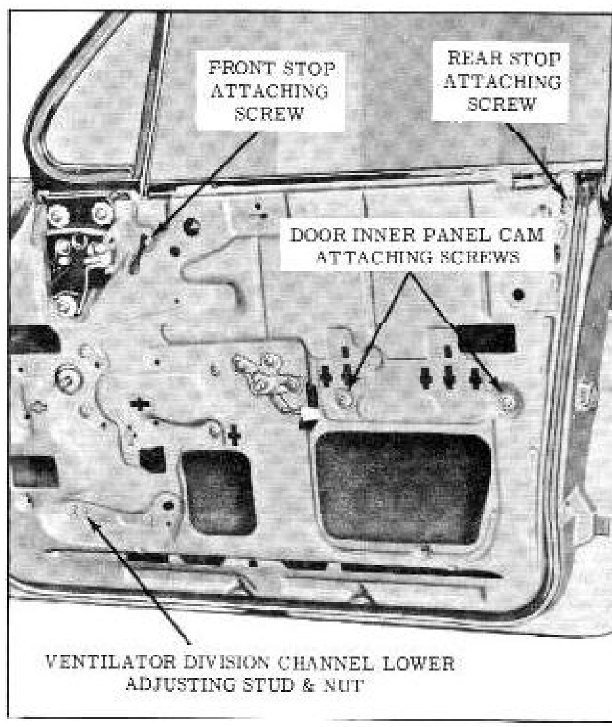


Fig. 17-35 Front Door Glass (Holidays)

lower window slightly and remove stops. (Fig. 17-35)

3. Lower door window to expose window lower sash channel cam attaching screws. On styles equipped with electric window regulators, disconnect wiring harness feed wires from regulator motor at connector.
4. Remove window lower sash channel cam attaching screws and disengage cam from window sash channel. Lift window assembly upward and remove from door. (Fig. 17-33)

   CAUTION: DO NOT OPERATE REGULATOR MOTOR after window assembly is disengaged from regulator. Operation of motor with load removed may damage unit.

5. To install, reverse removal procedure. Before installing window lower sash channel cam, lubricate entire length of cam with 630 AAW Lubriplate or equivalent. Check window for proper operation prior to installing inner panel water deflector.

FRONT DOOR WINDOW ADJUSTMENTS MANUAL AND ELECTRIC ("29", "37", "39" and "67" Styles)

The door window glass may be adjusted to provide proper contact with the side roof rail weatherstrip. Adjustments have also been provided to relieve a binding door glass due to misalignment of the glass run channels. To perform the following adjustments, remove door trim assembly and detach inner panel water deflector, where necessary, to gain access to hardware attaching points; then proceed as follows:

1. To correct a condition where glass is "cocked" in glass run channels, loosen inner panel cam attaching screws, adjust cam up or down as required and retighten screws. (Fig. 17-35)
2. To adjust upper front portion of window assembly in or out for proper contact with side roof rail weatherstrip, adjust ventilator assembly in or out as described under FRONT DOOR VENTILATOR ADJUSTMENTS.
3. To adjust lower portion of ventilator division channel for alignment with window assembly, lower door window and loosen ventilator division channel adjusting stud nut. Turn adjusting stud in or out or position lower end of channel fore or aft, as required; then, retighten adjusting stud nut. (Fig. 17-35)
4. To adjust upper rear of window assembly in or out for proper contact with side roof rail weatherstrip, or to adjust rear of window assembly in or out at belt line, loosen rear glass run channel attaching screws at lock pillar facing of door and screw at top of door inner panel. Position channel in or out as required and tighten screws. (Fig. 17-30)

   NOTE: Adjustments 2, 3 and 4 must be co-ordinated to provide a properly operating front door window.

5. To adjust limit of "up" travel of window assembly for proper contact with side roof rail weatherstrip, raise door window and through inner panel access holes loosen door window front and rear stop assembly attaching screws. Adjust stops up or down as required, then tighten attaching screws. (Fig. 17-35)

FRONT DOOR WINDOW ASSEMBLY MANUAL AND ELECTRIC ("11", "19", "35", "45" and "69" Styles)

Removal and Installation

1. Lower door window. Remove door trim assembly and detach inner panel water deflector.
2. Remove door ventilator assembly as previously described under FRONT DOOR VENTILATOR - REMOVAL AND INSTALLATION.
3. On styles equipped with electric window regulators, disconnect wiring harness feed wires from regulator motor at connector.

   CAUTION: DO NOT OPERATE REGULATOR MOTOR after window assembly is disengaged from regulator. Operation of motor with load removed may damage unit.

4. Remove screws securing window lower sash channel cam to window assembly and carefully disengage cam from window lower sash channel. (Fig. 17-34)
5. Rotate rear edge of window assembly upward and remove window assembly from between inner and outer panels.
6. To install, reverse removal procedure. Check window for proper operation before installing inner panel water deflector. Prior to installation, lubricate entire length of lower sash channel cam with 630 AAW Lubriplate or equivalent.

FRONT DOOR WINDOW ADJUSTMENTS MANUAL AND ELECTRIC ("11", "19", "35", "45" and "69" Styles)

1. To correct a condition where glass is "cocked" in glass run channels, loosen inner panel cam attaching screws, adjust cam up or down as required and tighten screws. (Fig. 17-34)
2. To adjust lower portion of ventilator division channel for proper alignment with door window assembly, lower door window and loosen ventilator adjusting stud nut. Turn adjusting

stud in or out or position lower end of channel fore or aft as required; then tighten adjusting stud nut. (Fig. 17-27)

3. To adjust lower portion of window glass run channel in or out for proper alignment with door window, raise door window. From inside door, loosen glass run channel lower attaching nut or screw, adjust channel as required and tighten nut or screw. (Fig. 17-34)

DOOR WINDOW GLASS RUN CHANNEL ASSEMBLY ("29", "37", "39" and "69" Styles)

Removal and Installation

1. Remove door window assembly.
2. Remove 2 screws securing channel to lock pillar facing of door and screw at upper flange of door inner panel. Then remove channel assembly through large access hole. (Fig. 17-30)
3. To install, reverse removal procedure. Check window for proper alignment before installing door trim.

FRONT DOOR WINDOW REGULATOR ASSEMBLY

1. Remove door trim assembly and detach inner panel water deflector.
2. Remove ventilator division channel lower adjusting stud and nut. (Fig. 17-36)
3. On styles equipped with manual window regulators, lower window. Remove window lower sash channel cam attaching screws and disengage sash channel cam from window lower sash channel; then raise window and prop in full up position. Disengage sash channel cam from window regulator arm rollers.
4. On "29", "37", "39" and "67" styles equipped with electrical window regulators, remove door ventilator assembly and door window, remove screws securing window lower sash channel cam to window sash channel, disengage cam from window sash channel and remove cam. On remaining styles prop window in up position.
5. On styles equipped with electric window regulators, disconnect wire harness feed wires from regulator motor at connector.

   CAUTION: DO NOT OPERATE REGULATOR MOTOR after window assembly is disengaged from regulator. Operation of motor with load removed may damage unit.

6. Remove window regulator attaching screws.

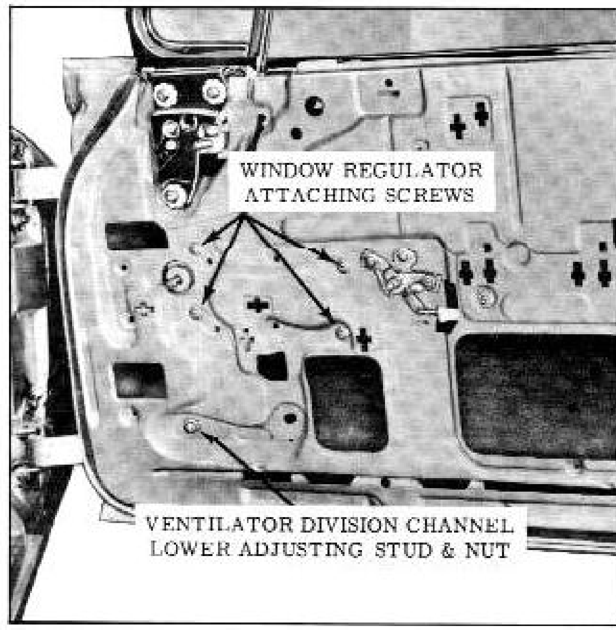


Fig. 17-36 Window Regulator Attachment

Disengage regulator balance arm from inner panel cam and carefully remove regulator assembly from door.

NOTE: On some styles only one end of inner panel cam is open sufficiently to permit removal of regulator arm roller.

7. To install, reverse removal procedure. Check window for proper operation prior to installing inner panel water deflector.

FRONT DOOR WINDOW REGULATOR ELECTRIC MOTOR ASSEMBLY

The electric motor assembly which powers the window regulator on electrically operated windows, is a twelve volt, reversible direction motor with a built-in circuit breaker and a self-locking gear drive. The motor is secured to the regulator assembly by screws.

Removal and Installation

1. Remove front door electric window regulator assembly from door as previously described and clamp it in a vise. (Fig. 17-37)

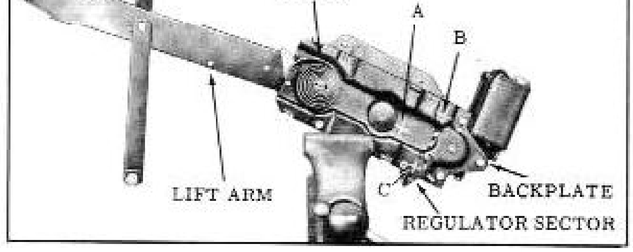


Fig. 17-37 Regulator and Motor Assembly (Electric)

NOTE: The position of regulator assembly in vise will vary with type of regulator and position of lift arm.

CAUTION: BE SURE TO PERFORM STEPS 2 AND 3 BEFORE ATTEMPTING TO REMOVE MOTOR FROM REGULATOR. The regulator lift arm, which is under tension from the counter-balance spring, can cause serious injury if motor assembly is removed without locking the sector in position with a nut and bolt.

2. Drill a 1/4" hole THROUGH BACK PLATE AND SECTOR at location indicated at either A, B or C, depending on position of lift arm.

   NOTE: Do not drill into motor housing, part of which is indicated by dotted line. In addition, locate hole a sufficient distance from edge of sector to insure proper retention of the sector.

3. Insert 3/16" bolt through hole in back plate and sector and install nut to bolt. Do not tighten nut.

4. Remove motor attaching bolts and remove motor assembly from regulator. (Fig. 17-37)

   NOTE: Clean off steel chips from regulator sector and motor pinion gear.

5. To install, reverse removal procedure. If difficulty is encountered when trying to line up motor attaching holes, the regulator lift arm may be moved up or down manually so that motor pinion gear will mesh with teeth on regulator sector and regulator attaching holes will line up.

   NOTE: Be sure to remove temporary nut and bolt from regulator before installing it in door.

DOOR WINDOW LOWER SASH CHANNEL CAM

Removal and Installation

1. Remove door trim assembly and detach inner panel water deflector.

2. Lower door window to expose lower sash channel cam attaching screws and remove screws. (Fig. 17-33)

3. Disengage cam from window lower sash channel and prop window in up position.

4. Disengage cam from window regulator, lift and balance arm rollers and remove from door.

5. To install, reverse removal procedure. Prior to installation, lubricate entire length of lower sash channel cam with 630 AAW Lubriplate or equivalent.

DOOR WINDOW GLASS RUN CHANNEL OUTER STRIP ASSEMBLY (All 3200 Series)

Removal and Installation

1. Lower door window and remove door trim assembly.

2. On all except "37" and "67" styles, detach inner panel water deflector; then disengage window from lower sash channel cam and carefully lower window to bottom of door.

3. Remove screws securing each end of strip assembly; then press down on strip assembly at clip locations to disengage attaching clips from return flange of door outer panel. Remove strip assembly.

4. To install, reverse removal procedure.

FRONT DOOR WINDOW GLASS RUN CHANNEL ASSEMBLY ("11", "19", "35", "45" and "69" Styles)

Removal and Installation

1. Lower door window. Remove door trim assembly and detach inner panel water deflector.

2. Remove front door ventilator assembly and slide window forward slightly to expose lock pillar portion of glass run channel.

   NOTE: Exercise care so that exposed front edge of glass does not come in contact with body metal.

3. Through inner panel access hole loosen nut or screw securing lower end of glass run channel. (Fig. 17-34)

4. Squeeze glass run channel together along upper and lock pillar sections of window frame and pull or carefully pry channel assembly from window frame. Remove channel assembly from door.

5. To install, reverse removal procedure.

CENTER PILLAR

CENTER PILLAR FINISHING CAP (All "29" and "39" Styles)

Removal and Installation

1. Remove 2 screws from top of cap and remove cap from center pillar.

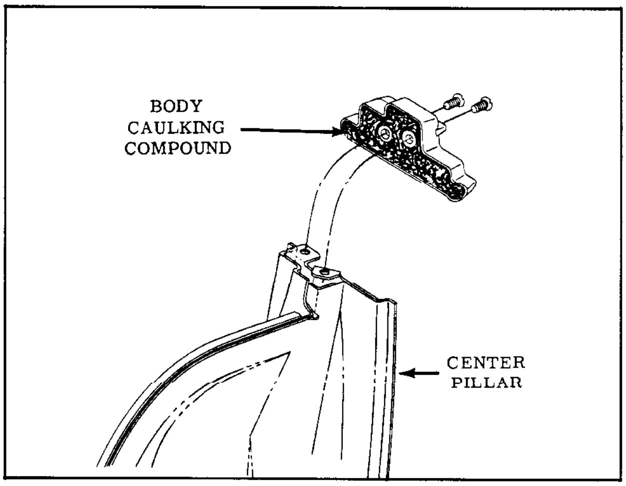


Fig. 17-38 Center Pillar Finishing Cap Sealing

2. To install, apply a bead of body caulking compound to underside of cap; then, position cap on center pillar and install attaching screws. (Fig. 17-38)

CENTER PILLAR TRIM
(All "29" and "39" Styles)

Removal and Installation

1. Remove center pillar finishing cap.
2. Carefully slide center pillar trim upward to disengage trim from pinchweld flanges and remove from body.
3. To install, reverse removal procedure.

REAR DOORS

"35", "45" and "69" Styles

Fig. 17-39 is typical of sedan and Fiesta style rear doors with the trim pad and inner panel water deflector removed. This illustration identifies the component parts of the rear door assembly, their relationship and various attaching points.

"39" Styles

Fig. 17-40 is typical of Holiday 4-window sedan style rear doors with the trim assembly and inner panel water deflector removed. This illustration identifies the component parts of the rear door assembly, their relationship and various attaching points.

"29" Styles

Fig. 17-41 is typical of Holiday 6-window sedan style rear door with the trim assembly and inner panel water deflector removed. This illustration identifies the component parts of the rear door assembly, their relationship and various attaching points.

REAR DOOR ASSEMBLY AND HINGES

The rear door hinges are attached to the center pillar with 2 butt-type hinges. The hinges are secured to the center pillar and door hinge pillar by screws and anchor plates. The lower hinge incorporates an integral door check and hold open.

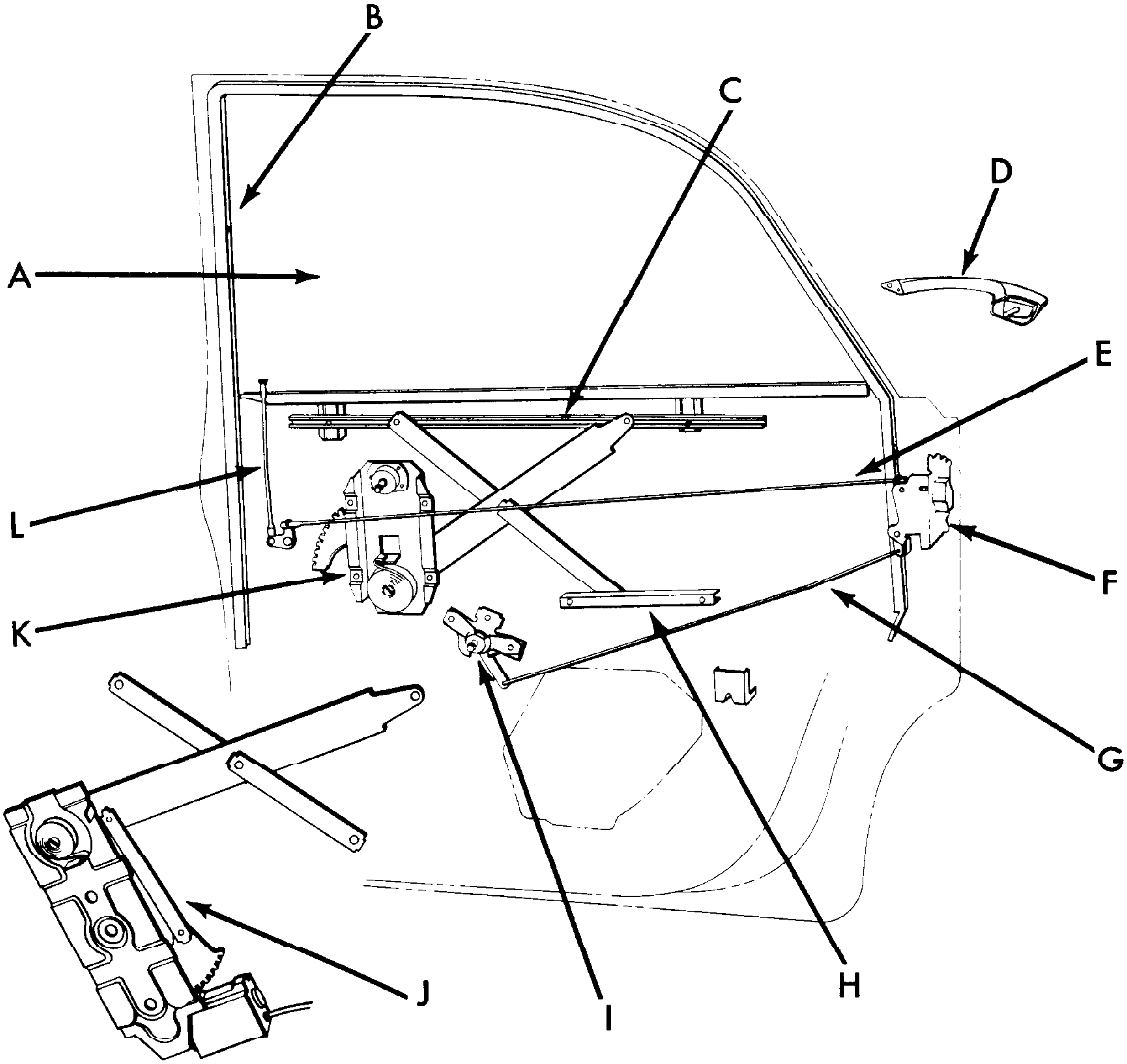
Removal

The door and hinges can be removed as an assembly from the center pillar or the door can be removed from the hinge straps.

1. On "29" and "39" styles, lower door window.
2. Clean off excess sealer around each hinge strap and mark location on door hinge pillar or center pillar, depending on method of removal being used.
3. On bodies equipped with electrically powered window regulators, proceed as follows:
   a. Remove door trim assembly and detach inner panel water deflector sufficiently to gain access to wire connector at motor.
   b. Detach wire harness from door inner panel as required and disconnect regulator motor from harness at connector.
   c. Remove electrical conduit from door and remove wire harness from between door panels through opening in door hinge pillar.
4. With door properly supported, remove 3 upper and 3 lower hinge attaching screws at door hinge pillar or center pillar depending on method of removal. (Figs. 17-42 and 17-43)
5. With aid of helper remove door from body.

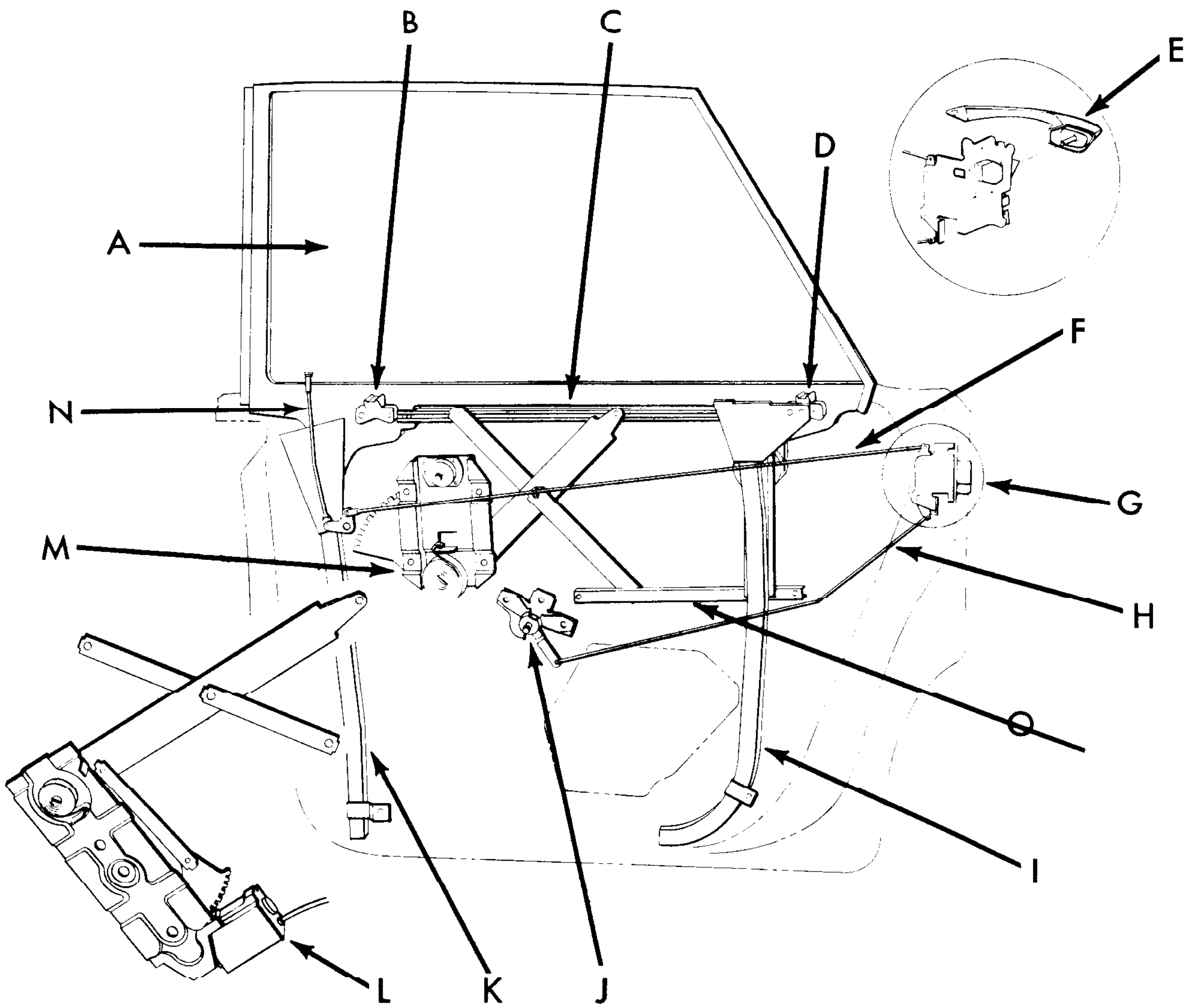
Installation

1. With scraper and mineral spirits clean off any old sealing compound at hinge attaching areas. This operation should be performed carefully to avoid possibility of soiling adjacent trim material.
2. Apply a coat of heavy-bodied sealer to attaching surfaces of hinge straps or corresponding surfaces of door or body. (Fig. 17-44)
3. With helper, lift door into position. Install screws loosely, then align strap within marks on pillar and tighten bolts. Check door for alignment.
4. On doors with electrically-operated windows, proceed as follows:
   a. Install wiring harness inside of door. Connect regulator motor, then install wiring harness to inner panel.



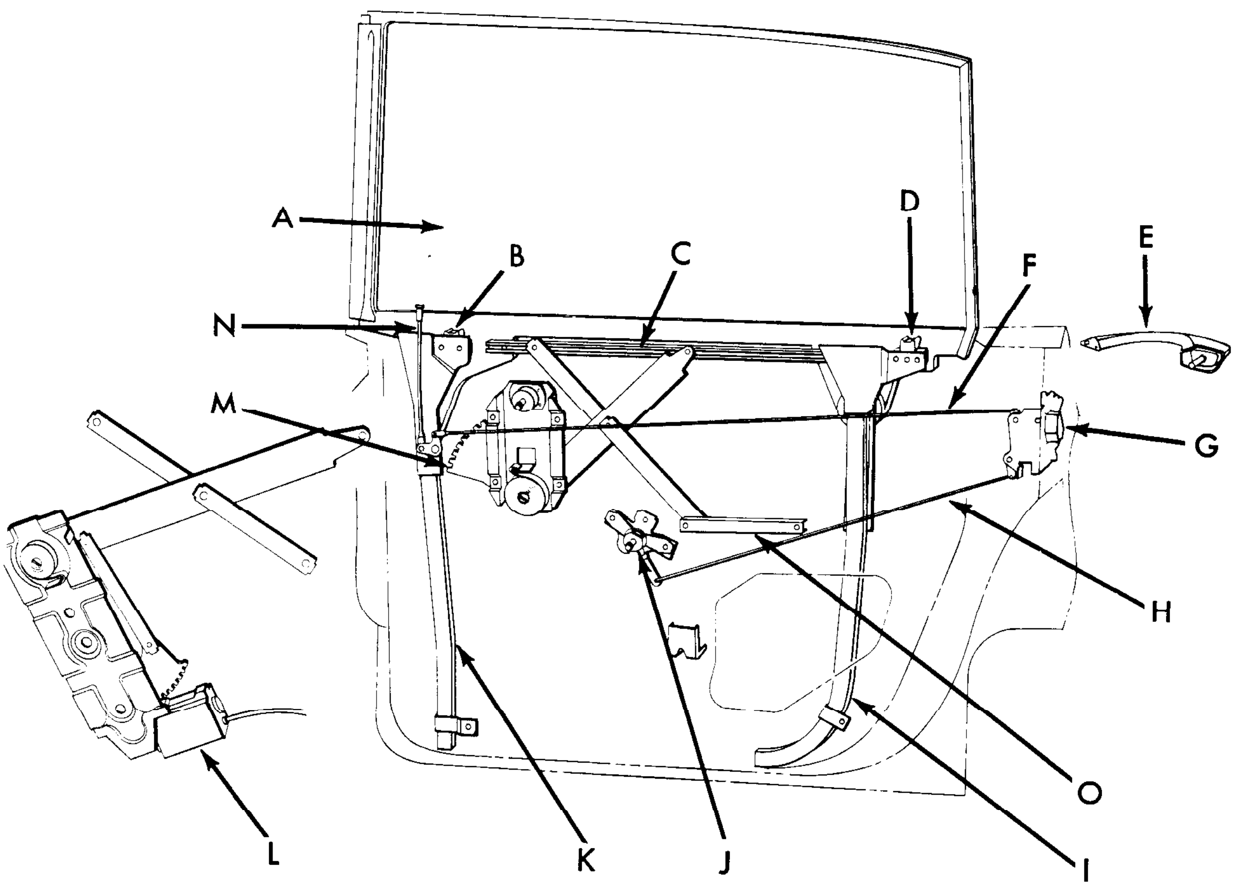
A. REAR DOOR WINDOW ASSEMBLY
B. REAR DOOR WINDOW GLASS RUN CHANNEL ASSEMBLY
C. REAR DOOR WINDOW LOWER SASH CHANNEL CAM
D. REAR DOOR OUTSIDE HANDLE ASSEMBLY
E. REAR DOOR INSIDE LOCKING TO LOCK ROD ASSEMBLY
F. REAR DOOR LOCK ASSEMBLY
G. REAR DOOR LOCK REMOTE CONTROL TO LOCK ROD ASSEMBLY
H. REAR DOOR INNER PANEL CAM ASSEMBLY
I. REAR DOOR LOCK REMOTE CONTROL ASSEMBLY
J. REAR DOOR WINDOW ELECTRIC REGULATOR AND MOTOR ASSEMBLY
K. REAR DOOR WINDOW REGULATOR ASSEMBLY
L. REAR DOOR INSIDE LOCKING ROD

Fig. 17-39 Typical Sedan and Fiesta Rear Door



A. REAR DOOR WINDOW ASSEMBLY
B. REAR DOOR WINDOW FRONT FEMALE WEDGE PLATE
C. REAR DOOR WINDOW LOWER SASH CHANNEL CAM
D. REAR DOOR WINDOW REAR FEMALE WEDGE PLATE
E. REAR DOOR OUTSIDE HANDLE ASSEMBLY
F. REAR DOOR LOCK TO LOCKING LEVER ROD
G. REAR DOOR LOCK ASSEMBLY
H. REAR DOOR LOCK REMOTE CONTROL TO LOCK ROD ASSEMBLY
I. REAR DOOR WINDOW REAR GUIDE CAM ASSEMBLY
J. REAR DOOR LOCK REMOTE CONTROL ASSEMBLY
K. REAR DOOR WINDOW GUIDE FRONT CAM ASSEMBLY
L. REAR DOOR WINDOW ELECTRIC REGULATOR AND MOTOR ASSEMBLY
M. REAR DOOR WINDOW REGULATOR ASSEMBLY - MANUAL
N. REAR DOOR INSIDE LOCKING ROD
O. REAR DOOR WINDOW INNER PANEL CAM ASSEMBLY

Fig. 17-40 Typical Holiday Rear Door (4-Window Sedan)



A. REAR DOOR WINDOW ASSEMBLY
B. REAR DOOR WINDOW FRONT FEMALE WEDGE PLATE
C. REAR DOOR WINDOW LOWER SASH CHANNEL CAM
D. REAR DOOR WINDOW REAR FEMALE WEDGE PLATE
E. REAR DOOR OUTSIDE HANDLE ASSEMBLY
F. REAR DOOR LOCK TO LOCKING LEVER ROD
G. REAR DOOR LOCK ASSEMBLY
H. REAR DOOR LOCK REMOTE CONTROL TO LOCK ROD ASSEMBLY
I. REAR DOOR WINDOW REAR GUIDE CAM ASSEMBLY
J. REAR DOOR LOCK REMOTE CONTROL ASSEMBLY
K. REAR DOOR WINDOW GUIDE FRONT CAM ASSEMBLY
L. REAR DOOR WINDOW ELECTRIC REGULATOR AND MOTOR ASSEMBLY
M. REAR DOOR WINDOW REGULATOR ASSEMBLY - MANUAL
N. REAR DOOR INSIDE LOCKING ROD
O. REAR DOOR WINDOW INNER PANEL CAM ASSEMBLY

Fig. 17-41 Typical Holiday Rear Door (6-Window)

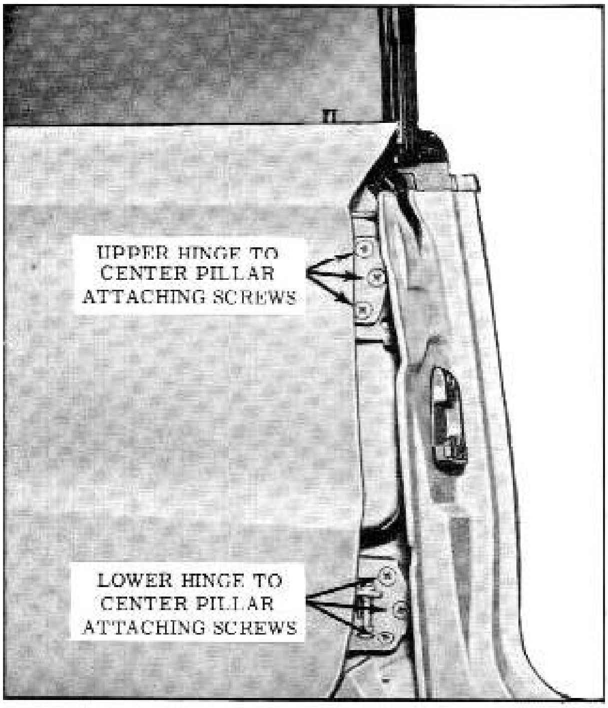


Fig. 17-42 Rear Door to Pillar Attachment

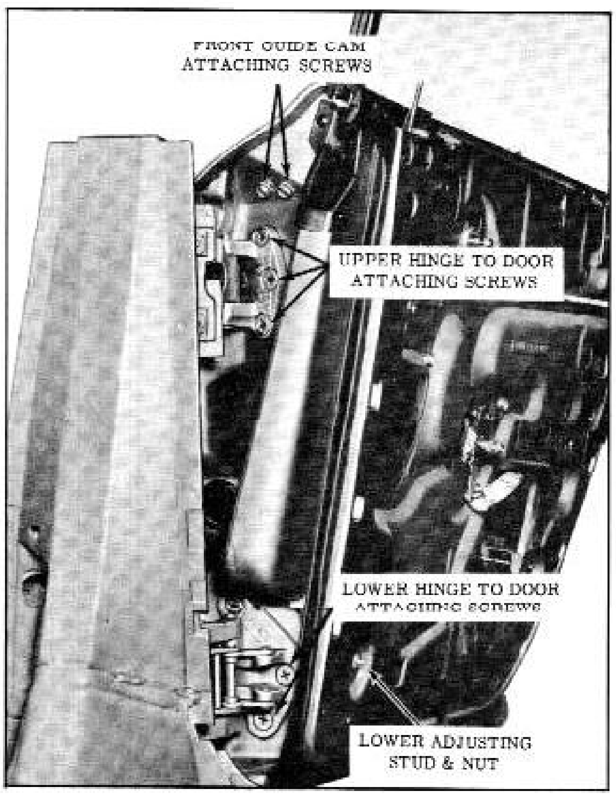


Fig. 17-43 Rear Door Hinge Attachment

b. Install conduit to door hinge pillar. Check operation of electric window assembly.

5. Where required, seal door inner panel water deflector as specified in DOOR INNER PANEL WATER DEFLECTOR and reinstall all previously removed parts.

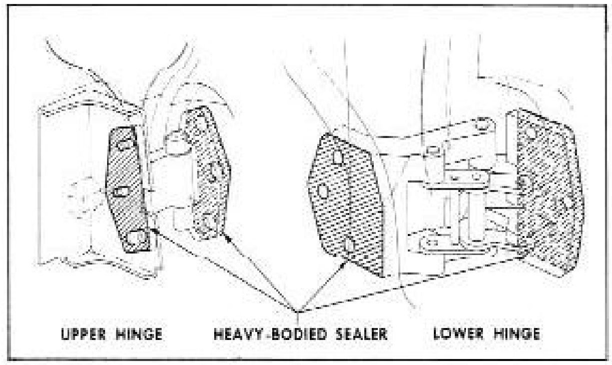


Fig. 17-44 Rear Door Hinge Anti-Squeak Sealing

6. For lubrication information see LUBRICATION SECTION.

Adjustments

In and out or up and down adjustments are provided at door hinge pillar. Fore and aft and a slight up and down adjustment are provided at center pillar. When checking the door for alignment, remove door lock striker from body pillar to allow door to hang free on its hinges.

NOTE: After performing any adjustments, the rear door window on "29" and "39" styles should be checked for proper alignment with side roof rail weatherstrip. In addition, door lock extension-to-striker engagement should be checked and adjusted if necessary.

1. For in and out or up and down adjustment, loosen hinge to door pillar attaching screws. (Fig. 17-43) Adjust door as required and tighten screws.

   NOTE: When performing in and out or fore and aft adjustments, adjust one hinge at a time so that "up and down" adjustment is maintained.

2. To adjust door fore or aft, loosen hinge to center pillar attaching screws. (Fig. 17-42) Adjust door fore or aft as required and tighten screws and bolts.

   CAUTION: Use only the recommended procedures for adjusting rear doors. The upper hinge is constructed of die cast aluminum which will break under strain of bending in an attempt to short-cut adjustments.

REAR DOOR OUTSIDE HANDLE

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector sufficiently to gain access to door outside handle attaching screws. (Fig. 17-45)

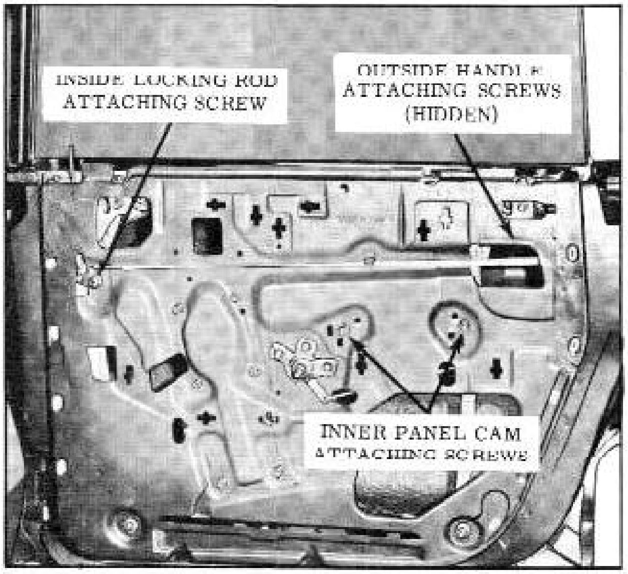


Fig. 17-45 Rear Door ("39" Style)

2. Through access hole remove handle attaching screws, then remove handle and gaskets from door outer panel.

3. To install, reverse removal procedure. Make certain front and rear gaskets are installed between handle and door outer panel. Check all operations of door lock before installing door inner panel water deflector.

Disassembly and Assembly

1. Remove door outside handle.

2. Depress retainer sufficiently to turn retainer one-quarter turn. Remove retainer, spring, push button and shaft and sealing ring from handle. (Fig. 17-28)

3. To assemble, reverse disassembly procedure.

REAR DOOR LOCK ASSEMBLY

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector.

2. On "35", "45" and "69" styles, through large access hole, remove screw securing lower end of glass run channel at door lock pillar and raise end of channel to expose lock assembly. (Fig. 17-46)

3. Through access hole disengage spring clips and detach inside lock connecting rod and remote control connecting rod from lock assembly. (See DOOR LOCK SPRING CLIPS.)

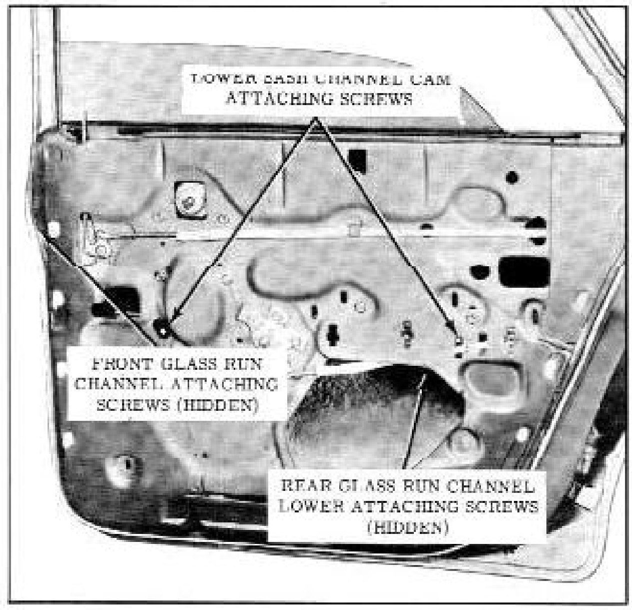


Fig. 17-46 Rear Door Assembly ("35", "45" & "69" Styles)

4. At lock pillar facing, remove door lock attaching screws and remove lock assembly through access hole. (Fig. 17-47)

5. To install door lock, reverse removal procedure. Check all operations of door lock before installing door trim and inside hardware.

REAR DOOR INNER PANEL CAM

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector sufficiently to expose inner panel cam attaching screws. (Fig. 17-45)

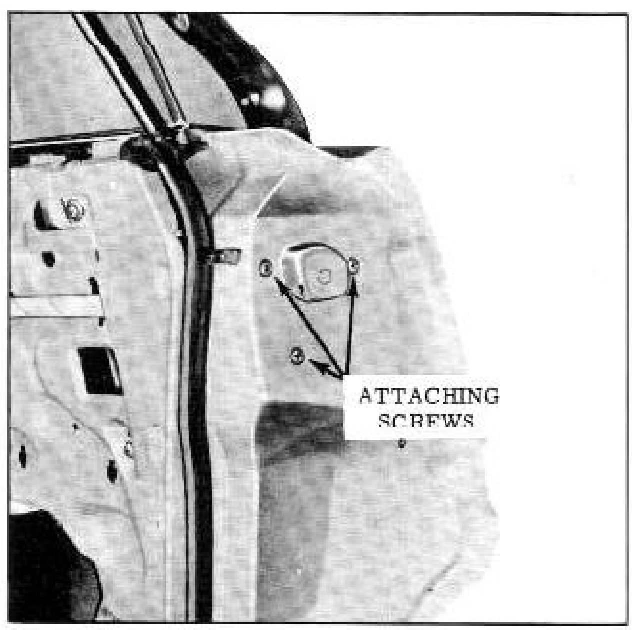


Fig. 17-47 Rear Door Lock Assembly

2. Remove cam attaching screws; then disengage cam from window regulator arm roller and remove from door.

3. To install, reverse removal procedure. Prior to installation of inner panel cam, lubricate entire length of cam with 630 AAW Lubriplate or equivalent.

Adjustments

1. To correct a condition where the window glass is cocked in glass run channels, loosen door inner panel cam attaching screws, adjust cam as required, and tighten screws. (Fig. 17-45)

REAR DOOR LOCK TO LOCKING LEVER ROD

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector sufficiently to expose lock rod assembly and gain access to rear door lock assembly.

2. Remove inside locking rod knob from rod.

3. On "35", "45" and "69" styles, through large access hole, remove screw securing lower end of glass run channel at door lock pillar to gain access to spring clip securing rod to lock. (Fig. 17-46)

4. Through access hole, disengage spring clip securing inside locking rod assembly to door lock and disengage rod from lock. (See DOOR LOCK SPRING CLIP.)

5. Disengage rod from spring clip on door inner panel. Then remove inside locking rod assembly attaching screw, spring washer and washer cup and remove assembly from door. (Fig. 17-45)

6. To install, reverse removal procedure. Check operation of inside locking rod assembly prior to installing water deflector.

REAR DOOR LOCK REMOTE CONTROL AND CONNECTING LINK ASSEMBLY

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector sufficiently to gain access to remote control attaching screws and door lock assembly.

2. Remove remote control attaching screws and remove remote control from connecting rod. (Fig. 17-48)

3. On "35", "45" and "69" styles, through

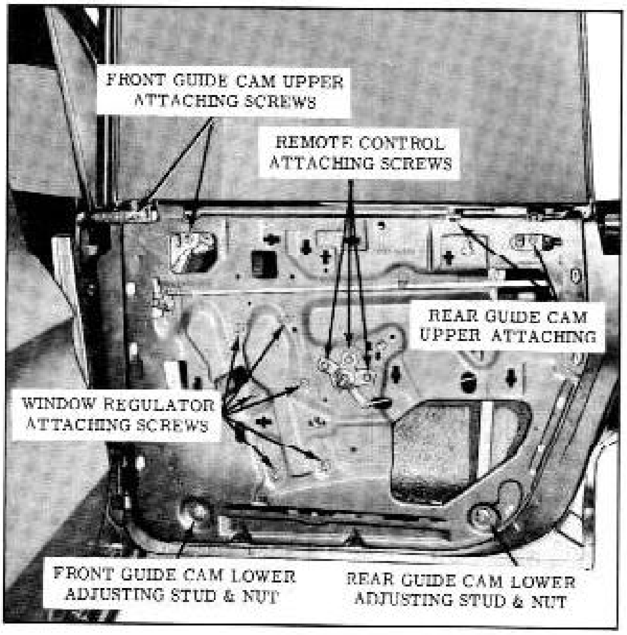


Fig. 17-48 Rear Door Assembly ("39" Style)

large access hole, remove glass run channel lower attaching screw at lock pillar to gain access to spring clip securing rod to lock. (Fig. 17-46)

4. Through access hole, disengage remote control connecting rod spring clip and disengage rod from lock. Remove rod from door.

5. To install remote control and connecting rod, reverse removal procedure. Position remote control rearward sufficiently to take up slack in linkage so that all clearances are taken out of linkage in a rearward position. Check all operations of door lock before installing door inner panel water deflector.

REAR DOOR WINDOW REGULATOR ASSEMBLY MANUAL AND ELECTRIC

Removal and Installation

1. Lower door window. Remove door trim assembly and detach inner panel water deflector.

2. Remove door window lower sash channel cam. Carefully raise window and prop in up position.

3. On styles equipped with electric window regulators, disconnect wiring harness feed wires from regulator motor at connector. In addition, on 3819-29 and 39 styles, loosen rear guide cam upper attaching screws and remove lower adjusting stud and nut to permit removal of electric window regulator.

CAUTION: DO NOT OPERATE REGULATOR MOTOR after window assembly is disengaged from regulator. Operation of motor with load removed may damage unit.

4. Remove regulator attaching screws, disengage balance arm from inner panel cam and remove regulator assembly through access hole. (Fig. 17-48)
5. To install, reverse removal procedure. Check operation of window before installing inner panel water deflector.

NOTE: To remove electric motor from regulator assembly, see WINDOW REGULATOR ELECTRIC MOTOR ASSEMBLY.

REAR DOOR WINDOW GLASS RUN CHANNEL OUTER STRIP ASSEMBLY (3239-35-45 and 69, 3539-35-45 and 69 Styles)

On styles having rear door reveal moldings, the strip assembly is part of the reveal molding assembly.

Removal and Installation

1. Remove door trim assembly and detach inner panel water deflector.
2. Disengage window lower sash channel cam from window lower sash channel and carefully lower glass to bottom of door.
3. Remove screws securing assembly. Then press down on assembly to disengage clips and remove assembly.
4. To install, reverse removal procedure.

REAR DOOR AND/OR REAR QUARTER WINDOW REGULATOR ELECTRIC MOTOR ASSEMBLY

The electric motor assembly which powers the window regulator on electrically-operated windows is a 12-volt reversible motor with a built-in type circuit breaker and a self-locking gear drive. The motor is attached to the regulator assembly with bolts.

Removal and Installation

1. Remove electric window regulator assembly from door and/or rear quarter and clamp securely in vise. (Fig. 17-49)

NOTE: The position of the regulator clamped in the vise will vary with type of regulator and position of lift arm.

CAUTION: BE SURE TO PERFORM STEPS 2 AND 3 BEFORE ATTEMPTING TO REMOVE MOTOR FROM REGULATOR. The regulator lift arm, which is under tension from the counter-balance spring, can cause serious injury if the motor is removed without locking the sector in position.

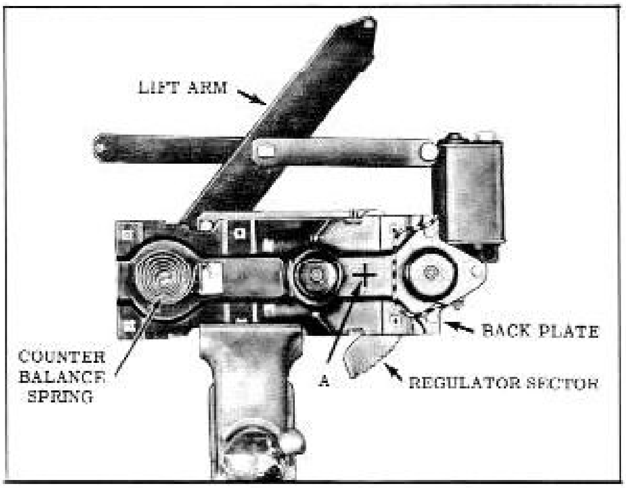


Fig. 17-49 Rear Door Window Regulator Assembly

2. Drill a 1/4" hole THROUGH SECTOR AND BACK PLATE within area indicated by "A". (Fig. 17-49)

NOTE: Locate hole a sufficient distance from edge of sector to insure proper retention of the sector.

3. Insert a 3/16" bolt through hole in back plate and sector and install nut to bolt. (Do not tighten nut)
4. Remove motor attaching bolts and remove motor assembly from regulator. (Fig. 17-49)

NOTE: Clean off steel chips from regulator sector and motor pinion gear after drilling operation.

5. To install, reverse removal procedure. If difficulty is encountered when trying to line up motor assembly attaching hole, the regulator lift arm may be moved up or down manually so that motor pinion gear will mesh with teeth on regulator sector, and regulator attaching holes will line up.

NOTE: Be sure to remove temporary nut and bolt from regulator before installing it into door or rear quarter.

REAR DOOR WINDOW GLASS RUN CHANNEL ASSEMBLIES ("19", "35", "45" and "69" Styles)

Rear Door Window Front Door Glass Run Channel

Removal and Installation

1. Remove door trim assembly and detach inner panel water deflector. Then disengage lower sash channel cam from window sash channel. On "35", "45" and "69" styles remove door window assembly and on "19" styles carefully lower window assembly to bottom of door.

2. Remove front glass run channel lower attaching screws from hinge pillar facing of door inner panel. (Fig. 17-46)

3. Carefully disengage glass run channel attaching clips along front of door window frame. Pull glass run channel inboard and upward and remove channel from between inner and outer panel.

   CAUTION: After glass run channel has been removed, front edge of door glass is left exposed and unprotected. Care should be exercised so that glass does not strike window frame at any point as glass may be damaged.

4. To install, reverse removal procedure. Check operation of rear door window and, where required, adjust glass run channel for proper operation of window assembly.

Rear Door Window Rear Glass Run Channel

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector sufficiently to gain access to rear glass run channel lower attaching screw and remove screw. (Fig. 17-46)

2. Remove front glass run channel. On "19" styles carefully slide window assembly forward to permit removal of rear glass run channel.

   CAUTION: Exercise care so that exposed front edge of glass does not become damaged by contacting window frame.

3. Carefully disengage glass run channel attaching clips along top and lock pillar portion of window frame. Then pull rear door glass run channel inboard and upward and remove channel from between inner and outer panels.

4. To install, reverse removal procedure. Check operation of rear door window and, where required, adjust glass run channel for proper window operation.

REAR DOOR WINDOW GLASS RUN CHANNEL ADJUSTMENTS ("19", "35", "45" and "69" Styles)

1. To adjust either glass run channel in or out or up or down, loosen channel attaching screw(s), adjust channel as required and tighten screws. After any adjustments, check window for proper operation.

   NOTE: Adjustment of both channels must be coordinated to provide proper operation of the rear door window assembly.

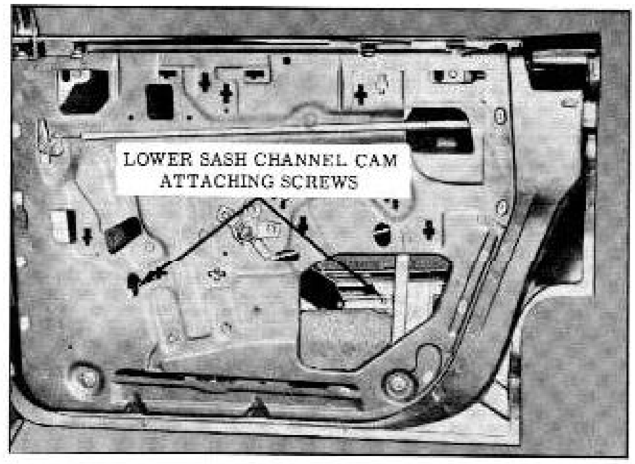


Fig. 17-50 Rear Door Lower Sash Channel Cam Attachment

REAR DOOR WINDOW LOWER SASH CHANNEL CAM

Removal and Installation

1. Remove door trim assembly and detach inner panel water deflector.

2. Lower door window sufficiently to gain access to lower sash channel cam attaching screws through access holes in door inner panel and remove screws. (Fig. 17-50)

3. While supporting window by hand, carefully disengage cam from window lower sash channel and rollers on window regulator arms and remove from door. Carefully lower door window.

4. To install, reverse removal procedure. Prior to installation, lubricate entire length of sash channel cam with 630 AAW Lubriplate or equivalent. Check operation of window assembly prior to installing inner panel water deflector.

REAR DOOR WINDOW ASSEMBLY ("19", "35", "45" and "69" Styles)

Removal and Installation

1. Lower door window. Remove door trim assembly and detach inner panel water deflector.

2. Remove rear door window front glass run channel.

3. Remove lower sash channel cam attaching screws and disengage cam from sash channel. (Fig. 17-51)

   NOTE: On styles equipped with electric window regulators, disconnect wiring harness electrical feed plug from regulator motor at connector.

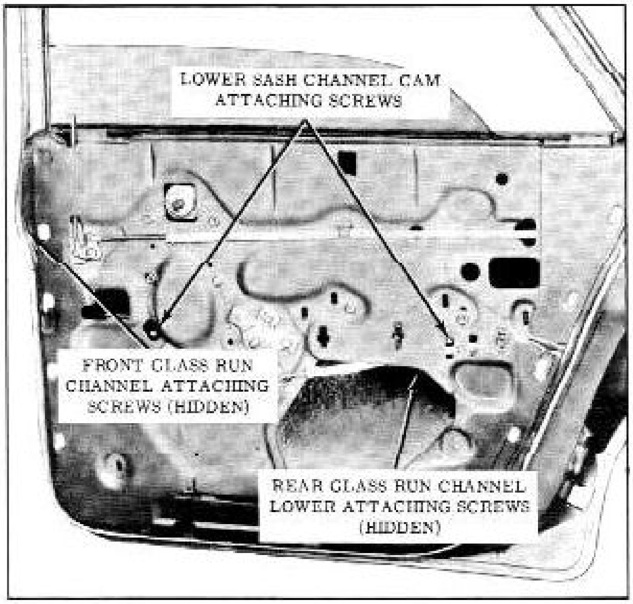


Fig. 17-51 Rear Door Assembly ("35", "45 and 69 " Styles)

CAUTION: DO NOT OPERATE REGULATOR MOTOR after window assembly is disengaged from regulator. Operation of motor with load removed may damage unit.

4. On "19" styles carefully rotate rear edge of window assembly upward and remove window assembly from door. On "35", "45" and "69" styles rotate rear edge of window assembly downward to remove assembly from door.

5. To install, reverse removal procedure. Prior to installation of window lower sash channel cam, lubricate entire length of cam with 630 AAW Lubriplate or equivalent.

   Check operation of window assembly and, where required, adjust window as described under REAR DOOR WINDOW GLASS RUN CHANNEL ASSEMBLIES AND REAR DOOR INNER PANEL CAM.

REAR DOOR WINDOW GUIDE FRONT CAM ASSEMBLY ("29" and "39" Styles)

The window guide front cam assembly incorporates an attaching support bracket at the upper end of the guide cam which is attached to the door hinge pillar facing by 2 screws. The front cam can be removed without removing this attaching bracket.

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector.
2. Through inner panel access hole remove front guide cam upper attaching screw(s) and front guide cam lower adjusting stud and nut. (Fig. 17-48)
3. Carefully disengage guide cam from window lower sash channel roller and remove guide cam through access hole.
4. To install, reverse removal procedure. Prior to installation, lubricate entire length of guide cam with 630 AAW Lubriplate or equivalent. Reseal front guide cam lower adjusting stud and nut with body caulking compound.
5. Check operation of window assembly and, where required, adjust window as described under REAR DOOR WINDOW ADJUSTMENTS.

REAR DOOR WINDOW GUIDE FRONT CAM SUPPORT (3239 and 3539 Styles)

Removal and Installation

1. Remove door trim assembly and detach inner panel water deflector.
2. Raise door window. Through inner panel access hole remove front guide cam upper attaching screw. (Fig. 17-48)
3. At door hinge pillar facing, remove 2 screws securing guide cam support and remove support through access hole. (Fig. 17-52)
4. To install, reverse removal procedure. Check operation of window assembly and, where required, adjust window as described under REAR DOOR WINDOW ADJUSTMENTS.

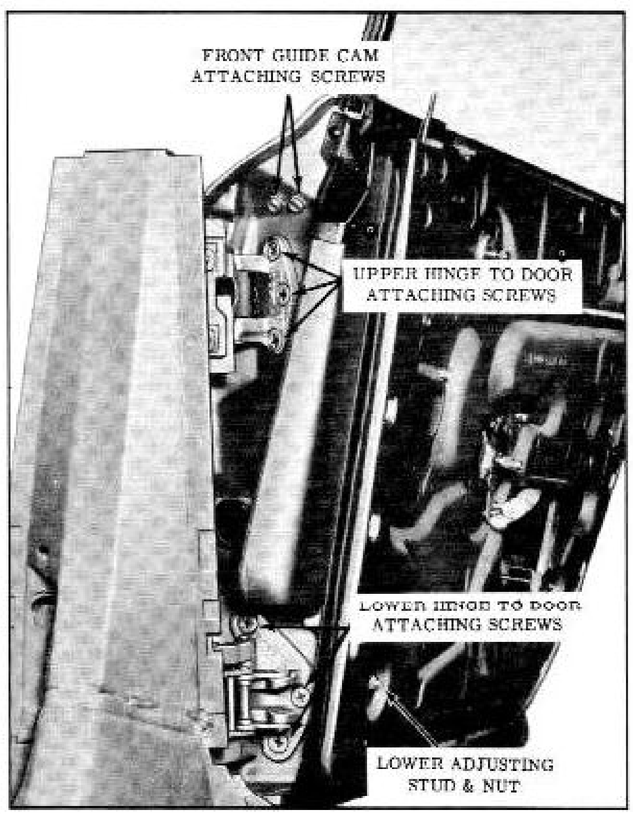


Fig. 17-52 Rear Door Hinge Attachment

REAR DOOR WINDOW GUIDE
REAR CAM ASSEMBLY
("29" and "39" Styles)

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector.

2. Remove rear cam upper attaching screws and lower adjusting stud and nut. (Fig. 17-48)

3. Carefully disengage cam from roller on window guide assembly and remove rear cam through large access hole.

4. To install, reverse removal procedure. Prior to installation lubricate entire length of cam with 630 AAW Lubriplate or equivalent. If exposed, seal cam lower adjusting stud and nut with body caulking compound.

5. Check operation of window assembly and, where required, adjust window as described under REAR DOOR WINDOW ADJUSTMENTS.

REAR DOOR WINDOW ASSEMBLY— MANUAL AND ELECTRIC
("29" and "39" Styles)

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector.

2. Through access holes in door inner panel remove screws securing rear door window front and rear male wedge plates to window lower sash channel and remove wedge plates. (Fig. 17-53)

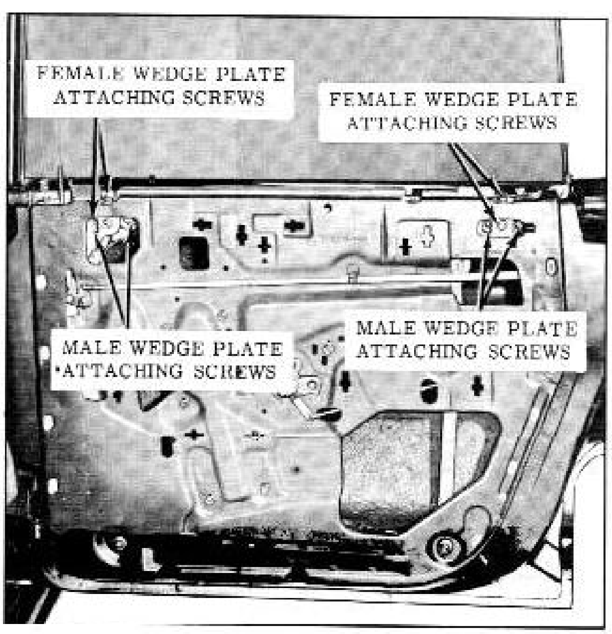


Fig. 17-53 Rear Door Assembly ("39" Style)

3. Lower door window and remove lower sash channel cam attaching screws. (Fig. 17-50)

   NOTE: On styles equipped with electric window regulators, disconnect wiring harness electrical feed plug from regulator motor at connector.

   CAUTION: DO NOT OPERATE REGULATOR MOTOR after window assembly is disengaged from regulator. Operation of motor with load removed may damage unit.

4. Carefully raise door window and remove from door.

5. To install, reverse removal procedure. Check window for proper alignment and, where necessary, align window as described under REAR DOOR WINDOW ADJUSTMENTS. Prior to installation of window lower sash channel cam, lubricate entire length of cam with 630 AAW Lubriplate or equivalent. Also lubricate lower sash channel rollers and pivot area of rear door window rear guide.

REAR DOOR WINDOW ADJUSTMENTS— MANUAL AND ELECTRIC
("29" and "39" Styles)

IMPORTANT: The rear door assembly should be properly aligned in the body opening before adjusting the rear door window.

Adjustments have been provided to insure proper contact of the rear door window with the side roof rail weatherstrip and with the door glass run outer strip assembly; also, for proper contact of the rear door window front frame weatherstrip with the front door window frame. Unless otherwise specified, the following window adjustments are for both manually and electrically-operated windows.

NOTE: To perform the following rear door window adjustments, remove door trim assembly and detach inner panel water deflector.

1. Up and down adjustment of door window assembly:

   a. Through inner panel access holes, loosen screws securing front and rear male wedge plates to window lower sash channel.

   b. Reposition window assembly as required, adjust front and rear male wedge plates up or down as required; then tighten wedge plate attaching screws. Check operation of window assembly.

      NOTE: The front or rear of window assembly may be adjusted up or down by adjusting either front or rear male wedge plate as required. In cases of major adjustment, however, both wedge plates should be adjusted.

2. Fore or aft adjustment of rear door window assembly:

   a. Loosen lower adjusting stud nut on both front rear guide cams. (Fig. 17-53)

   b. Loosen screw(s) securing upper end of front and rear guide cams, position window fore or aft as required, then tighten screw(s) and lower stud nut on each cam.

   c. Check window for proper operation and, if necessary, readjust rear door window front and/or rear male wedge plates fore or aft to insure proper contact with female wedge plates on door inner panel.

   d. On styles where lower adjusting stud and nut are not covered by water deflector, seal stud and nut with body caulking compound.

   NOTE: The in and out adjustment of the rear door window assembly can be obtained by adjusting the front and rear guide cams in or out as required. It is desirable, however, to adjust only one guide cam at a time in order to maintain the fore and aft adjustment of the window assembly.

3. To adjust front of window assembly in or out on 3200 and 3500 Series, proceed as follows:

   a. With window in full up position, loosen front guide cam adjusting stud nut. (Fig. 17-48)

   b. Loosen front female wedge plate attaching screw. (Fig. 17-48)

   c. Loosen 2 front guide cam support attaching screws on door hinge pillar facing. (Fig. 17-52)

   d. Position front of window assembly in or out as required and adjust front female wedge plate accordingly; then tighten wedge plate attaching screw.

   e. Adjust front guide cam lower adjusting stud in or out as required and tighten nut. Tighten front guide cam support attaching screws on door hinge pillar facing.

   f. Reseal lower adjusting stud and nut with body caulking compound.

4. To adjust front of window assembly on 3800 Series, and rear of window assembly on all styles, proceed as follows:

   a. With window in full up position, loosen guide cam lower adjusting stud nut and screws securing female wedge plate and guide cam to top of door inner panel. (Fig. 17-53)

   b. Position window assembly in or out as required; then tighten screws.

   c. Adjust lower adjusting stud in or out as required and tighten stud nut. Check window for proper operation.

   NOTE: On styles where lower adjusting stud and nut are not covered by water deflector, seal stud and nut with body caulking compound.

5. In or out adjustment of top of rear window frame:

   a. With window in full up position, loosen front guide cam support attaching screws on door hinge pillar facing or guide cam attaching screws on top of door inner panel, and rear guide cam upper attaching screws.

   b. Loosen front and rear guide cam lower adjusting stud nuts.

   c. Adjust studs in or out as required then tighten stud nuts.

   d. Tighten screws securing upper end of guide cam and check window for proper operation. Reseal all guide cam lower adjusting stud(s) and nut(s) not covered by water deflector with body caulking compound.

REAR DOOR HINGE PILLAR SEALING STRIP (AT BELT) ("29" and "39" Styles)

Removal and Installation

1. Remove fasteners securing sealing strip and remove strip.

2. To install, reverse removal procedure.

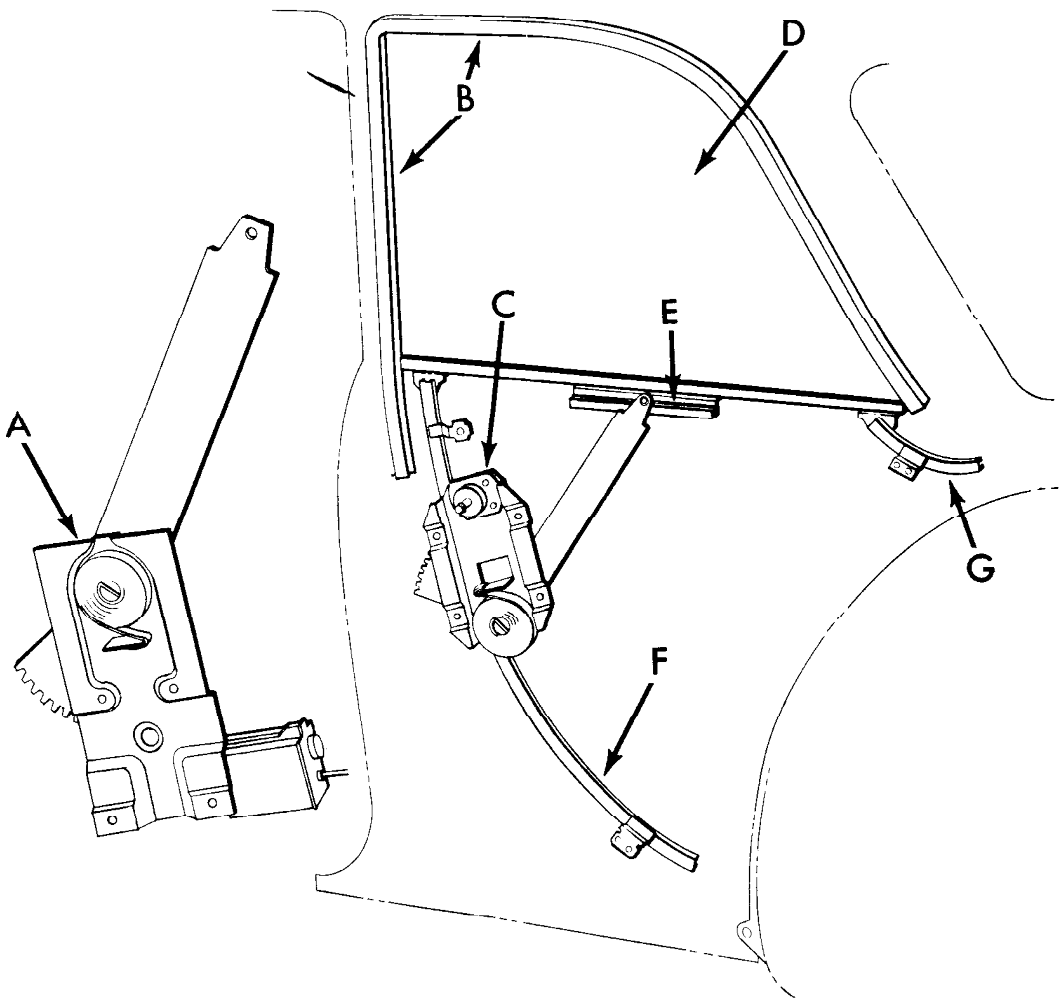
REAR QUARTER

TRIM AND HARDWARE

The rear quarter section is divided according to body styles as follows:

"11" Style Bodies
"37" Style Bodies
"19" and "29" Style Bodies
"67" Style Bodies

Fig. 17-54, Fig. 17-55 and Fig. 17-56 are phantom views which identify and show the relationship of major component parts of the rear quarter section of "11", "37" and "67" styles.



A. REAR QUARTER WINDOW ELECTRIC MOTOR AND REGULATOR ASSEMBLY
B. REAR QUARTER WINDOW GLASS RUN CHANNEL
C. REAR QUARTER WINDOW REGULATOR ASSEMBLY - MANUAL
D. REAR QUARTER WINDOW ASSEMBLY
E. REAR QUARTER WINDOW LOWER SASH CHANNEL CAM
F. REAR QUARTER WINDOW FRONT GUIDE ASSEMBLY
G. REAR QUARTER WINDOW REAR GUIDE ASSEMBLY

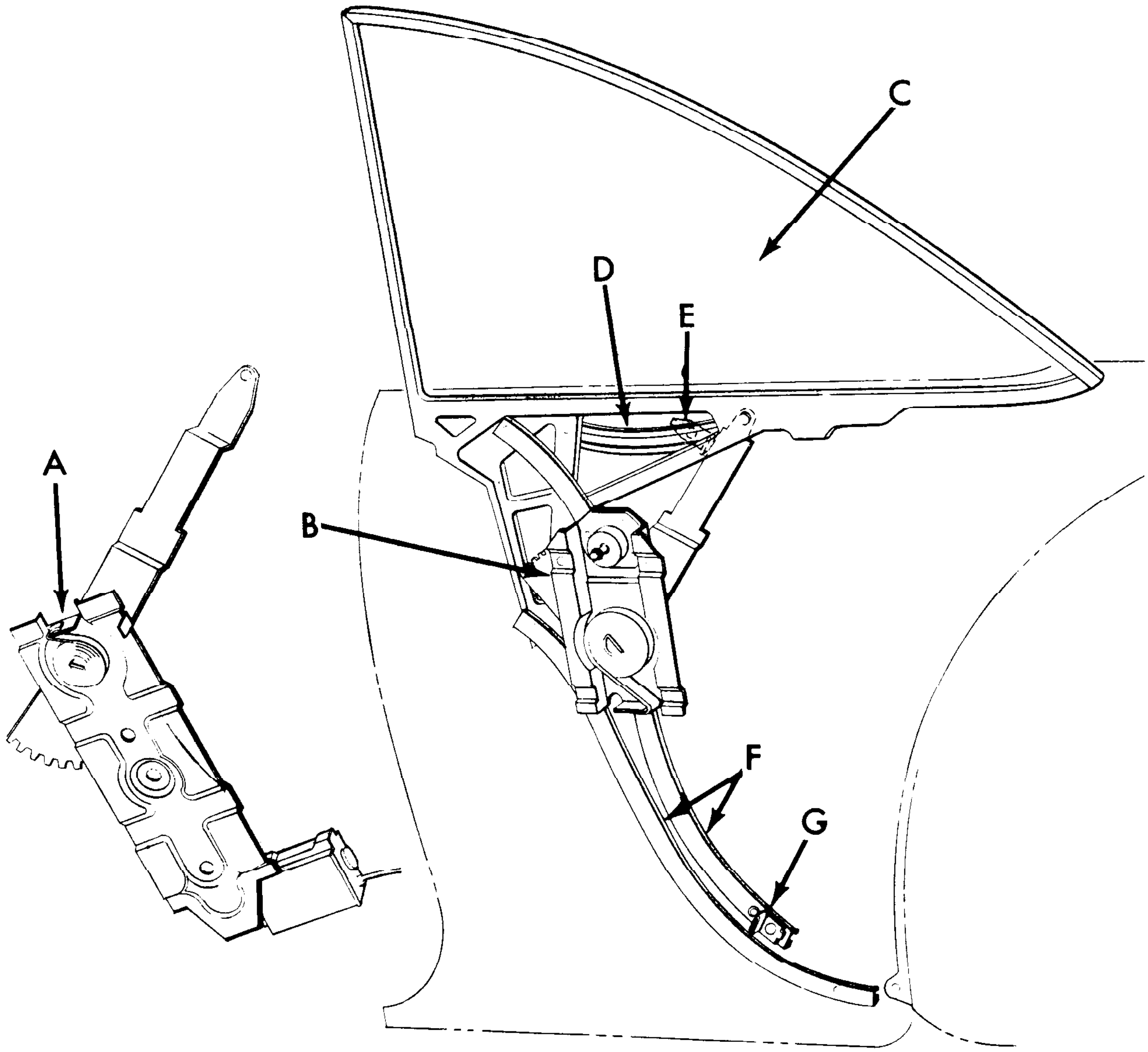
Fig. 17-54 Rear Quarter Window ("11" Styles)

TRIM ASSEMBLY (3211 Style)

Removal and Installation

1. Remove rear seat cushion and seat back assemblies.
2. Remove rear quarter garnish molding and rear quarter arm rest assembly. On styles with manually operated windows, remove window regulator handle.
3. Using Trim Panel Removing Tool J-6335, carefully pry rear quarter trim assembly retaining nails from tacking strip; then lift trim assembly upwards to disengage from retainers at top of rear quarter inner panel and remove assembly from quarter panel.

   NOTE: On styles with electrically-operated windows, disengage trim assembly from retainers at top of inner panel; then disconnect window switch junction block from switch and remove trim assembly.
4. To install rear quarter trim assembly, reverse removal procedure.



A. REAR QUARTER WINDOW ELECTRIC MOTOR AND REGULATOR ASSEMBLY

B. REAR QUARTER WINDOW REGULATOR ASSEMBLY - MANUAL

C. REAR QUARTER WINDOW ASSEMBLY

D. REAR QUARTER WINDOW LOWER SASH CHANNEL CAM

E. REAR QUARTER WINDOW REGULATOR LIFT ARM STOP

F. REAR QUARTER WINDOW FRONT GUIDE ASSEMBLY

G. REAR QUARTER WINDOW LOWER STOP

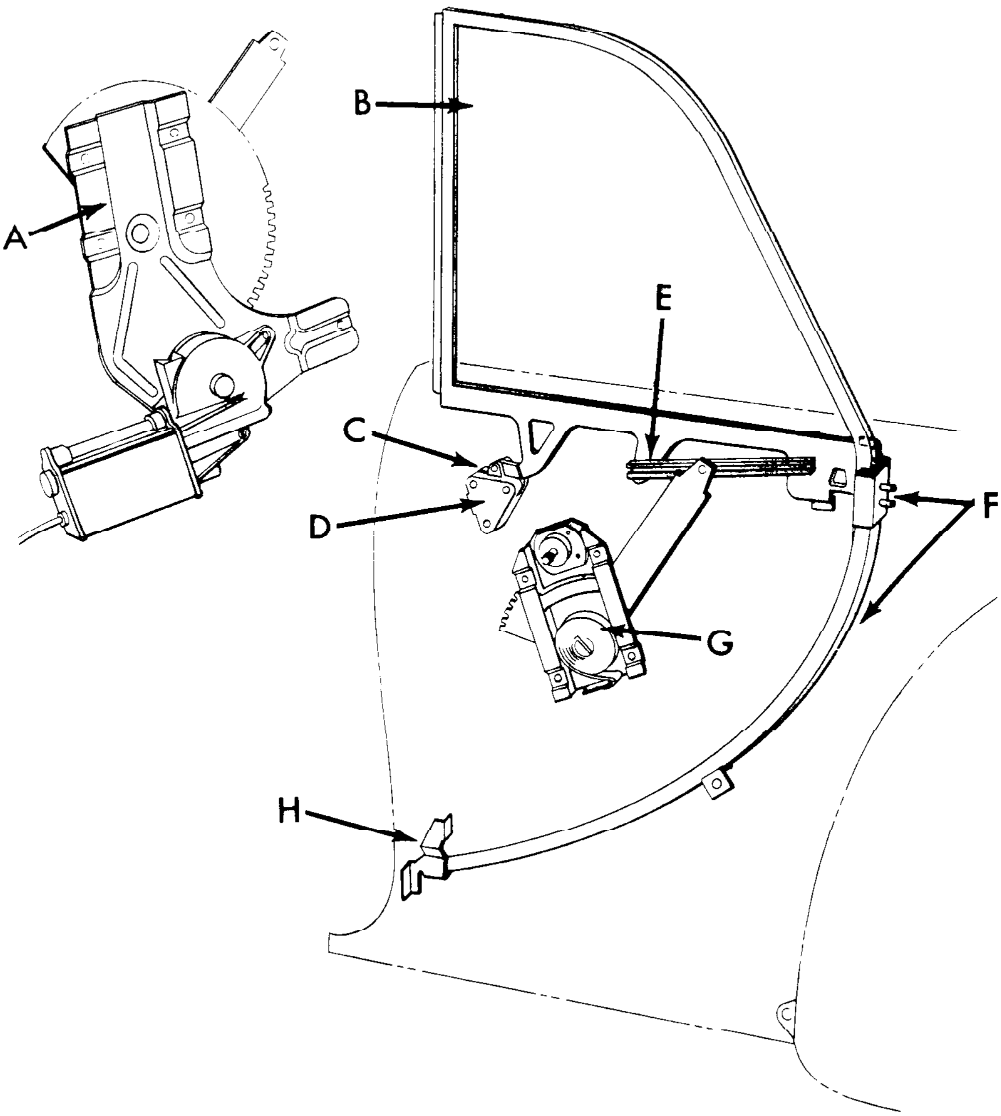
Fig. 17-55 Rear Quarter Window ("37" Styles)

WINDOW GLASS RUN CHANNEL (3211 Style)

Removal and Installation

1. Lower rear quarter window. Remove rear quarter window garnish molding and rear quarter trim assembly.

2. Remove rear quarter window glass run channel attaching screw. (Fig. 17-57) Carefully remove glass run channel from retainers in



A. REAR QUARTER WINDOW ELECTRIC MOTOR AND REGULATOR ASSEMBLY
B. REAR QUARTER WINDOW ASSEMBLY
C. REAR QUARTER WINDOW HINGE BOLT
D. REAR QUARTER WINDOW HINGE ADJUSTING PLATE
E. REAR QUARTER WINDOW LOWER SASH CHANNEL CAM
F. REAR QUARTER WINDOW GUIDE ASSEMBLY - INCLUDES WINDOW UPPER STOP
G. REAR QUARTER WINDOW REGULATOR - MANUAL
H. REAR QUARTER WINDOW LOWER STOP

Fig. 17-56 Rear Quarter Window ("67" Styles)

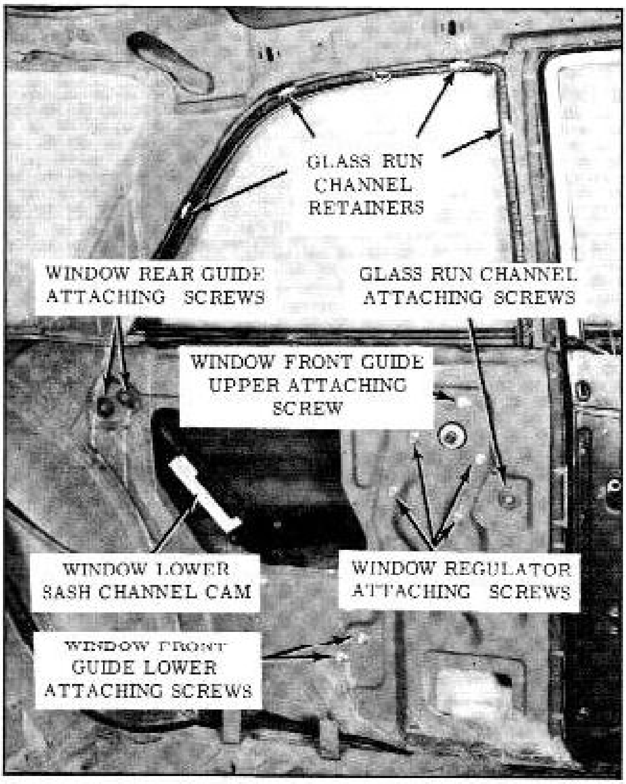


Fig. 17-57 Rear Quarter Hardware ("11" Styles)

rear quarter pillar and side roof rail.

3. To install glass run channel, reverse removal procedure.

QUARTER WINDOW (3211 Style)

Removal and Installation

1. Lower rear quarter window. Remove rear quarter window garnish molding. Remove rear quarter arm rest and quarter trim assembly.

2. Remove access hole cover from inner panel. Loosen window front guide upper attaching screw. Remove window rear guide attaching screws and remove guide. (Fig. 17-57)

3. Lift rear quarter window assembly upward and rearward and disengage window cam from regulator arm roller. Tilt window inward, disengage window from front guide and remove window from between rear quarter panels.

4. To install rear quarter window assembly, reverse removal procedure. Prior to installing the window lower sash channel cam, lubricate channel of cam with Lubriplate or its equivalent along length of channel.

5. Adjust rear quarter window for proper alignment and operation as described under REAR QUARTER WINDOW ADJUSTMENTS (3211 Style).

6. Seal large access hole cover and front guide upper attaching screw as specified under REAR QUARTER INNER PANEL SEALING (3211 Style).

WINDOW ADJUSTMENT (3211 Style)

To adjust rear quarter window fore or aft, loosen front guide attaching screw. (Fig. 17-57) Adjust window and guide fore or aft as required and tighten attaching screws.

WINDOW GLASS RUN OUTER SEALING STRIP (3211 Style)

Removal and Installation

1. Remove rear quarter trim assembly.

2. Remove screws securing sealing strip to return flange of rear quarter outer panel and remove sealing strip.

3. To install rear quarter window glass run outer sealing strip, reverse removal procedure.

WINDOW FRONT GUIDE ASSEMBLY (3211 Style)

Removal and Installation

1. Remove rear quarter trim assembly.

2. Remove access hole cover from inner panel.

3. Remove front guide upper and lower attaching screws. (Fig. 17-57) Disengage guide from roller on window lower sash channel; move front guide assembly rearward between panels sufficiently to allow upper end of guide to be started out through large access hole, then remove guide assembly.

4. To install front guide assembly, reverse removal procedure. Prior to installing guide, lubricate channel of guide with Lubriplate or its equivalent along entire length of channel.

5. Adjust rear quarter guide for proper window alignment and operation as described under REAR QUARTER WINDOW ADJUSTMENTS (3211 Style).

6. Seal inner panel hole cover and front guide attaching screws as specified under REAR quarter inner panel sealing.

WINDOW REAR GUIDE ASSEMBLY (3211 Style)

Removal and Installation

1. Remove rear quarter trim assembly.

2. Remove large access hole cover from inner panel.

3. Remove rear guide attaching screws. (Fig. 17-57)

4. Disengage rear guide from roller on window lower sash channel and remove rear guide from body.

5. To install rear guide assembly, reverse removal procedure. Prior to installation of guide, lubricate channel of guide with Lubriplate or its equivalent. Seal inner panel access hole cover and rear guide attaching screws as specified under REAR QUARTER INNER PANEL SEALING.

WINDOW REGULATOR ASSEMBLY—MANUAL AND ELECTRIC (3211 Style)

Removal and Installation

1. Lower rear quarter window and remove rear quarter trim assembly.

2. Remove access hole cover from inner panel. Remove front guide upper attaching screw and glass run channel attaching screw. (Fig. 17-57)

3. On styles equipped with electric window regulators, disconnect feed wire plug from electric motor.

   CAUTION: DO NOT OPERATE REGULATOR MOTOR after the window assembly is disengaged from the regulator of after the regulator assembly is removed from the body. Operation of the motor with the load removed may damage the unit.

4. Remove window regulator attaching screws. (Fig. 17-57) Disengage regulator arm roller from window lower sash channel cam and remove regulator assembly through large access hole.

   NOTE: The procedure for removing the electric motor from the rear quarter window regulator is described and illustrated under REAR DOOR AND/OR REAR QUARTER WINDOW REGULATOR ELECTRIC MOTOR ASSEMBLY in the DOOR SECTION.

5. To install window regulator assembly, reverse removal procedure. Prior to installing regulator, lubricate regulator and window guide cams as outlined in LUBRICATION SECTION.

6. Seal access hole cover and any screws which have been disturbed as specified under REAR QUARTER INNER PANEL WATER DEFLECTOR.

7. Adjust window front guide as specified under REAR QUARTER WINDOW ADJUSTMENTS (3211 Style).

8. Check operation of window prior to installing rear quarter trim and inside hardware.

REAR QUARTER ARM REST ASSEMBLY ("37" Styles)

Removal and Installation

1. Remove rear seat cushion and seat back and filler panel.

2. Remove attaching screws at front and rear of arm rest.

3. On styles equipped with electrically-operated windows and/or rear quarter cigar lighter, carefully detach arm rest from rear quarter inner panel sufficiently to disconnect window switch junction block and/or cigar lighter wires.

4. Remove arm rest assembly from rear quarter panel.

5. To install arm rest assembly, reverse removal procedure.

6. Where present, check operation of power operated rear quarter window and/or rear quarter cigar lighter.

TRIM ASSEMBLY ("37" Styles)

Removal and Installation

1. Remove rear seat cushion and seat back assemblies and back window side garnish molding.

2. Remove rear quarter arm rest assembly.

3. On styles with manually-operated windows, remove window regulator handle and antifriction washer.

4. Remove three screws securing rear quarter panel filler to quarter panel and remove filler.

5. Using TRIM PANEL REMOVING TOOL J-6335, carefully pry trim assembly retaining nails from tacking strip; then lift trim assembly upward to disengage from retainers at top of rear quarter inner panel and remove assembly from body.

6. To install rear quarter trim assembly, reverse removal procedure.

   NOTE: If any retaining nails are broken off, they can be replaced with door trim assembly nailing strip replacement tabs which are available as a service part.

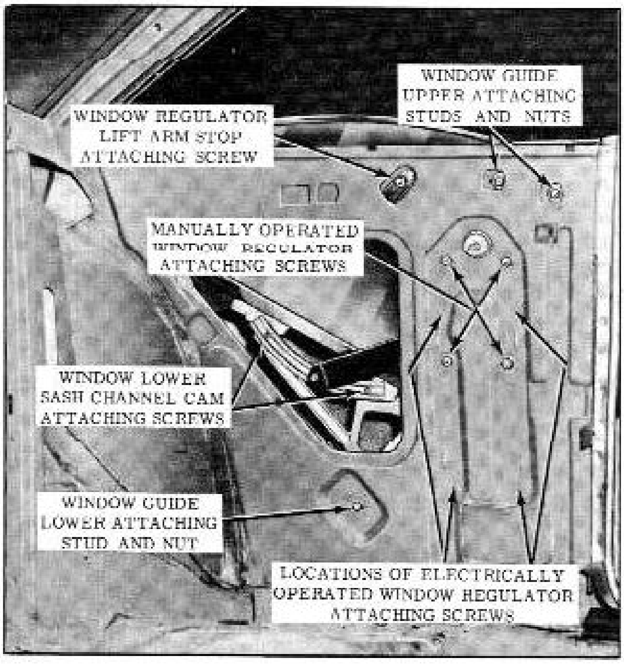


Fig. 17-58 Rear Quarter Hardware

WINDOW ASSEMBLY—MANUAL OR ELECTRIC ("37" Styles)

Removal and Installation

1. Remove rear seat cushion and back assemblies and rear quarter arm rest and trim assemblies.

2. Remove rear quarter window sealing strip assembly from side roof rail and remove rear quarter inner panel large access hole cover.

3. On styles equipped with electric window regulators, disconnect feed wire connector from electric motor.

   CAUTION: DO NOT OPERATE REGULATOR MOTOR after the window assembly is disengaged from the regulator. Operation of the motor with the load removed may damage the unit.

4. With the rear quarter window in the down position remove the lower sash channel cam attaching screws. (Fig. 17-58)

5. Detach cam from roller on regulator arm and remove cam.

6. Loosen rear quarter window front guide attaching screws. (Fig. 17-58)

7. Lift rear quarter window upward and disengage rollers on window lower sash channel frame from channels of rear quarter window front guide assembly, then remove window from between inner and outer panels.

8. To install rear quarter window assembly, reverse removal procedure. Prior to installation of the window lower sash channel cam, lubricate channels of cam and guide with Lubriplate or its equivalent along entire length of channels.

9. Adjust rear quarter window for proper alignment and operation as described under REAR QUARTER WINDOW ADJUSTMENTS ("37" Styles). Seal all rear quarter hardware attachments which have been disturbed and inner panel access hole cover as specified under REAR QUARTER INNER PANEL SEALING ("37" Styles).

WINDOW ADJUSTMENTS ("37" Styles)

1. Remove rear seat cushion and seat back assemblies.

2. Remove rear quarter arm rest and trim assemblies.

3. To adjust the window fore or aft, loosen the front guide attaching stud nuts. (Fig. 17-58) Move the window and guides fore or aft as required; then tighten the front guide attaching stud nuts.

4. To adjust the rear quarter window in or out, loosen the window front guide upper attaching stud nuts. (Fig. 17-58) Adjust the studs in or out as required; then tighten stud nuts.

5. To limit the forward and upward travel of the rear quarter window, adjust the regulator lift arm stop as required. (Fig. 17-58)

6. To limit the down travel of the rear quarter window, remove the inner panel large access hole cover, loosen the lower stop assembly attaching bolt (located at the lower end of the window front guide cam) and adjust stop up or down as required.

7. After performing window adjustments, seal hardware attaching screws which have been disturbed, as specified under REAR QUARTER INNER PANEL SEALING ("37" Styles).

WINDOW REGULATOR ASSEMBLY—MANUAL AND ELECTRIC ("37" Styles)

Removal and Installation

1. Lower rear quarter window. Remove seat cushion and back assemblies and rear quarter arm rest and trim assemblies.

2. Remove rear quarter inner panel large access hole cover.

3. On styles equipped with electric window regulators, disconnect feed wire plug from electric motor.

   CAUTION: DO NOT OPERATE REGULATOR MOTOR after the window assembly is disengaged from the regulator or after the regulator assembly is removed from the body. Operation of the motor with the load removed may damage the unit.

4. Remove window lower sash channel cam attaching screws. (Fig. 17-58) Detach cam from roller on regulator lift arm and remove cam.

5. Prop window in up position.

6. Remove front guide upper and lower attaching stud nuts. (Fig. 17-58) Disengage guide cams from rollers on window lower sash channel frame; then remove guide from between quarter panels.

7. Remove rear quarter window regulator attaching screws and remove regulator assembly through large access hole.

   NOTE: The procedure for removing the electric motor from the rear quarter window regulator is described and illustrated under REAR DOOR AND/OR REAR QUARTER WINDOW REGULATOR ELECTRIC MOTOR ASSEMBLY in the DOOR SECTION.

8. To install the rear quarter window regulator assembly, reverse removal procedure. Seal window regulator attaching points as specified under REAR QUARTER INNER PANEL SEALING ("37" Styles).

WINDOW REGULATOR ELECTRIC MOTOR ASSEMBLY ("37" Styles)

Removal and Installation

See REAR DOOR AND/OR REAR QUARTER WINDOW REGULATOR ELECTRIC MOTOR ASSEMBLY in the DOOR SECTION.

WINDOW FRONT GUIDE ASSEMBLY ("37" Styles)

Removal and Installation

1. Remove rear seat cushion and seat back. Remove rear quarter arm rest and trim assemblies. Remove rear quarter inner panel large access hole cover.

2. With window in up position remove the window front guide upper and lower attaching stud nuts. (Fig. 17-58)

3. Maneuver guide assembly between rear quarter panels so that upper end of guide can be started out of large access hole; then remove guide assembly.

4. To install rear quarter window front guide assembly, reverse removal procedure. Prior to installation of the front guide assembly, lubricate channels of guide with Lubriplate or its equivalent along full length of channels.

5. Adjust front guide assembly for proper window alignment and operation as described under REAR QUARTER WINDOW ADJUSTMENTS ("37" Styles).

6. Seal front guide attaching screws as specified under REAR QUARTER INNER PANEL SEALING ("37" Styles).

WINDOW GLASS RUN OUTER SEALING STRIP ("37" Styles)

Removal and Installation

1. Remove rear seat cushion and back assemblies. Remove rear quarter arm rest and trim assemblies.

2. Remove rear quarter inner panel large access hole cover. Loosen window lower stop attaching screw located on lower end of window front guide assembly; then operate window to the extreme low position.

3. Remove sealing strip attaching screws and remove sealing strip from body.

4. To install rear quarter window glass run outer sealing strip, reverse removal procedure.

WINDOW SEALING STRIP (AT ROOF RAIL) ("37" Styles)

Removal and Installation

1. Lower rear quarter window and remove back window side garnish molding.

2. Remove screws securing sealing strip assembly to roof rail; then carefully remove sealing strip from roof rail.

3. To install, first apply a continuous bead of medium-bodied sealer (approximately 1/8" in diameter) to the side roof rail along a line just outside the sealing strip attaching screw holes. Apply a second continuous bead of medium-bodied sealer along a line just inside sealing strip attaching screw holes.

4. To install reverse removal procedure.

REAR QUARTER LOWER TRIM ASSEMBLY ("39" and "69" Styles)

Removal and Installation

1. Remove rear seat cushion and seat back and back window side garnish molding.
2. Using Trim Panel Removing Tool J-6335 carefully pry trim assembly retaining nails from tacking strip; then lift trim assembly upward to disengage from retainers at top of rear quarter inner panel and remove trim from quarter panel.
3. To install rear quarter trim assembly, reverse removal procedure.

REAR QUARTER LOWER TRIM ASSEMBLY ("19", "29", "39" and "69" Styles)

Removal and Installation

1. Remove rear seat cushion and seat back.
2. Remove back window side garnish molding and side roof rail rear finishing molding. On "19" and "29" Styles remove rear quarter window front garnish molding. Remove screw securing metal trim support.
3. Using Tool J-6335 carefully pry trim assembly retaining nails from tacking strip; then lift trim assembly upward to disengage from retainers at top of rear quarter inner panel and remove assembly from quarter panel.
4. To install rear quarter trim assembly, reverse removal procedure.

REAR QUARTER UPPER TRIM ASSEMBLY ("39" Styles)

Removal and Installation

1. Remove rear seat cushion and seat back, and remove rear quarter lower trim assembly.
2. Carefully break cement bond securing trim foundation to quarter panel; then remove trim assembly from quarter panel.
3. To install, first apply trim cement to contacting surfaces of trim foundation and quarter panel; then position trim to quarter panel and press or roll cemented areas to assure a good cement bond. Install rear quarter lower trim assembly and rear seat cushion and back.

REAR QUARTER UPPER TRIM ASSEMBLY ("19" and "29" Styles)

Removal and Installation

1. Remove back window side garnish molding and side roof rail rear finishing molding.
2. Carefully break cement bond securing trim foundation to quarter panel; then remove trim assembly from quarter panel.
3. To install, first apply trim cement to contacting surfaces of trim foundation and quarter panel; then position trim to quarter panel and press or roll cemented areas to assure a good cement bond. Install back window side garnish molding and side roof rail rear finishing molding.

QUARTER WINDOW ("19" and "29" Styles)

Removal and Installation

1. Remove rear seat cushion and seat back. Remove back window side garnish molding and rear quarter window front garnish molding. Remove rear quarter trim assembly.
2. On "19" styles, remove screws securing glass rubber channel retainer along bottom of window and retainer at front of window. On "29" Style, remove screws securing three glass rubber channel retainers at bottom of window and retainer at top of window.
3. Using a suitable tool, carefully break sealer bond between rubber channel and body opening.
4. Carefully push rear quarter glass and rubber channel assembly inward and remove assembly from opening.

   NOTE: The rear quarter window rubber channel may be removed from the glass as a bench operation.

5. To install, reverse removal procedure. Prior to installing quarter window glass and rubber channel, clean off old sealer from rubber channel and body opening to insure a smooth sealing surface. Apply a ribbon of medium-bodied sealer in corner of rear quarter side outer panel rabbet completely around window opening. (View "1", Fig. 17-59) After glass and rubber channel have been installed, apply a bead of weatherstrip cement between outer surface of the glass and rubber channel completely around the window and rubber channel. (View "2", Fig. 17-59) Clean off all excess sealer and cement.

FOLDING TOP COMPARTMENT SIDE TRIM PANEL ASSEMBLY ("67" Styles)

Removal and Installation

1. Remove rear seat cushion and seat back.

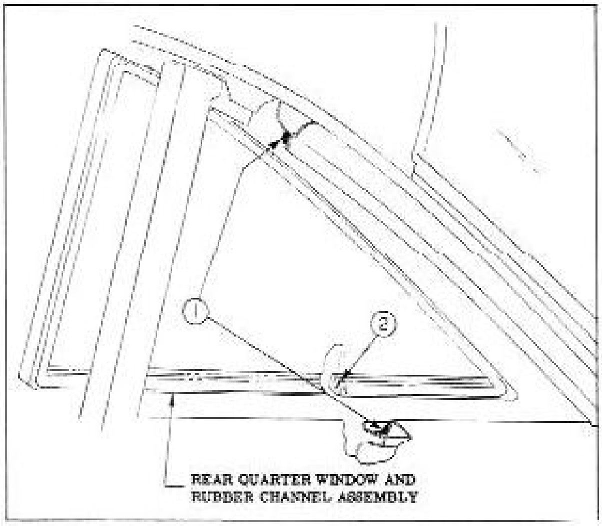


Fig. 17-59 Sealing Rear Quarter Window and Outer Panel Rabbet

2. Remove attaching screws securing front and rear of side trim panel.
3. Raise trim panel and move it inboard.
4. Disconnect electrical leads, where present, and remove side trim panel.
5. To install folding top compartment side trim panel, reverse removal procedure.

REAR QUARTER TRIM ASSEMBLY ("67" Styles)

Removal and Installation

1. Remove folding top compartment side trim panel.
2. On styles with manually-operated windows, remove window regulator handle and anti-friction washer.
3. Using Tool J-6335 carefully pry trim assembly retaining nails from tacking strips, then lift assembly upward to disengage from retainers at top of rear quarter inner panel and remove assembly from body.
4. To install rear quarter trim assembly, reverse removal procedure.

   NOTE: If any retaining nails are broken off, they can be replaced with door trim assembly nailing strip replacement tabs which are available as a service part.

QUARTER WINDOW ASSEMBLY— MANUAL OR ELECTRIC ("67" Styles)

Removal and Installation

1. Lower folding top and operate rear quarter window to a half down position. Remove rear seat cushion and seat back.

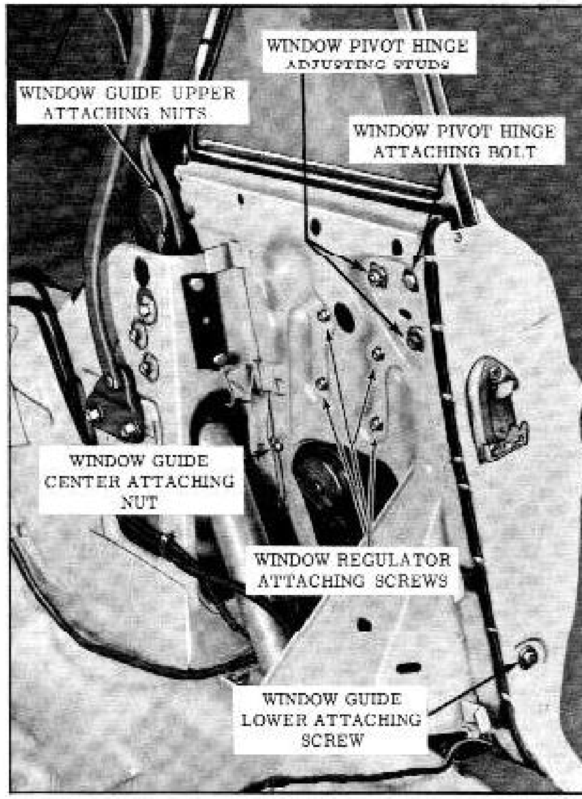


Fig. 17-60 Rear Quarter Hardware ("67" Styles)

2. Remove folding top compartment side trim panel and rear quarter trim assembly.
3. On styles equipped with electric window regulators, remove access hole cover and disconnect the wiring harness electrical feed plug from the regulator motor.

   CAUTION: DO NOT OPERATE REGULATOR MOTOR after window is disengaged from regulator. Operation of motor with load removed may damage the unit.

4. Remove window pivot bolt. (Fig. 17-60)
5. Disengage window male hinge from female hinge plate.
6. Raise window to disconnect window lower sash channel cam from roller on window regulator lift arm and remove window.
7. To install rear quarter window assembly, reverse removal procedure. Prior to installation, lubricate pivot hinge and window lower sash channel cam with Lubriplate or its equivalent.
8. Adjust rear quarter window for proper alignment and operation, as described under REAR QUARTER WINDOW ADJUSTMENTS ("67"

Styles). Seal window pivot bolt and inner panel access hole cover as specified under REAR QUARTER INNER PANEL SEALING ("67" Styles).

QUARTER WINDOW ADJUSTMENTS ("67" Styles)

1. To adjust the limit of the rear quarter window up travel, loosen the window guide upper attaching screws. (Fig. 17-60) Adjust upper stop to desired position and tighten guide attaching screws.

2. To adjust the rear quarter window up or down or fore or aft; or to adjust the top or the rear of the window in or out, the folding top compartment side trim panel and rear quarter trim assembly must be removed to gain access to the pivot bolt and adjusting studs.

   a. Up or down or fore or aft window adjustment: Loosen pivot bolt and both adjusting stud nuts. (Fig. 17-60) Position window as required; then tighten pivot bolt and stud nuts.

   b. In or out adjustment of top of window: Loosen lower adjusting stud nuts and slightly loosen rear stud nut. Adjust lower stud in or out, as required, then tighten both stud nuts. (Fig. 17-60)

   c. In or out adjustment of rear of window: Loosen pivot hinge rear adjusting stud nut and loosen slightly the lower adjusting stud nut. Loosen window guide upper attaching nuts and center stud nut. (Fig. 17-60) Adjust rear adjusting stud in or out, as required, then tighten both stud nuts. Adjust window guide for proper alignment with window and tighten upper attaching nuts and center stud nut.

   NOTE: After performing any rear quarter window adjustment, seal all attaching screws which have been disturbed as specified under REAR QUARTER INNER PANEL SEALING ("67" Styles).

QUARTER WINDOW REGULATOR— MANUAL OR ELECTRIC ("67" Styles)

Removal and Installation

1. Remove rear seat cushion and back, folding top compartment side trim panel and rear quarter trim assembly.

2. Remove rear quarter inner panel access hole cover.

3. Operate window to full up position and prop in up position.

4. On styles equipped with electric window regulators, disconnect feed wire plug from electric motor.

   CAUTION: DO NOT OPERATE REGULATOR MOTOR after the regulator assembly is disengaged from the window assembly or after it is removed from the body. Operation of the motor with the load removed may damage the unit.

5. Remove regulator attaching screws. (Fig. 17-60) Disengage regulator lift arm roller from window lower sash channel cam and remove regulator assembly through access hole.

6. To install window regulator assembly, reverse removal procedure.

7. Lubricate regulator sector, window cams and pivot hinge as specified in the LUBRICATION SECTION.

8. Seal regulator attaching screws and inner panel access hole cover as specified under REAR QUARTER INNER PANEL SEALING ("67" Styles).

QUARTER WINDOW REGULATOR ELECTRIC MOTOR ASSEMBLY ("67" Styles)

The procedure for removing the electric motor from the rear quarter window regulator assembly is similar to the procedure described under REAR DOOR AND/OR REAR QUARTER WINDOW REGULATOR ELECTRIC MOTOR ASSEMBLY.

QUARTER WINDOW GUIDE ("67" Styles)

Removal and Installation

1. Remove rear seat cushion and seat back. Remove folding top compartment side trim panel, and rear quarter trim assembly.

2. Remove inner panel access hole cover and rear quarter window assembly. On styles equipped with electric window regulators, remove window regulator assembly.

3. Remove window guide upper and center attaching nuts and lower attaching screw. (Fig. 17-60) Disengage window guide from behind window frame and remove guide through large access hole.

4. To install rear quarter window guide, reverse removal procedure. Adjust window guide for proper window alignment and operation as described under REAR QUARTER WINDOW ADJUSTMENTS ("67" Styles).

5. Seal window guide attaching screws, access hole plug at lock pillar and inner panel access hole cover as specified under REAR QUARTER INNER PANEL SEALING ("67" Styles).

QUARTER WINDOW GLASS RUN OUTER SEALING STRIP ("67" Styles)

Removal and Installation

1. Remove rear quarter window assembly.
2. Remove screws securing sealing strip to outer panel and remove strip.
3. To install rear quarter window glass run outer sealing strip, reverse removal procedure.

QUARTER INNER PANEL SEALING ("11", "37" and "67" Styles)

Whenever the rear quarter inner panel seals have been disturbed, the area must be resealed before the rear quarter trim is reinstalled. Following are the rear quarter inner panel openings and hardware attaching locations which must be sealed to prevent water leakage and possible trim damage.

NOTE: When body caulking compound is used, work compound firmly to metal surfaces and feather edges out to obtain good adhesion.

QUARTER INNER PANEL SEALING

(For "11" Styles Refer to Fig. 17-61)
(For "37" Styles Refer to Fig. 17-62)
(For "67" Styles Refer to Fig. 17-63)

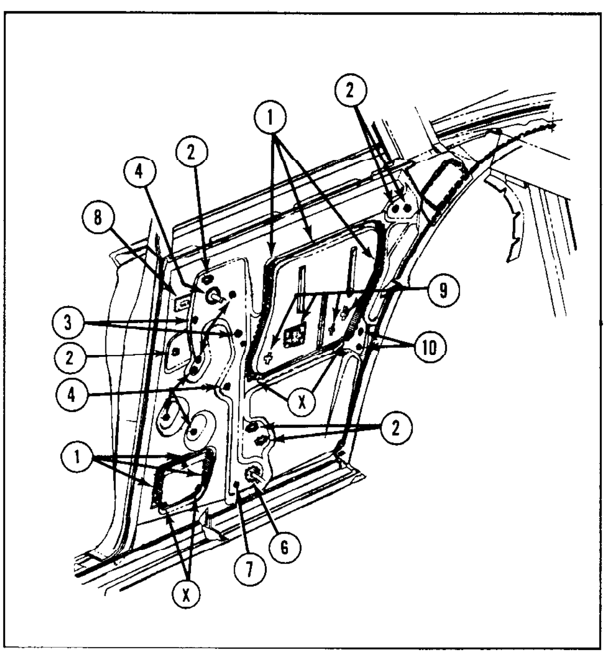


Fig. 17-61 Inner Quarter Panel Sealing ("11" Styles)

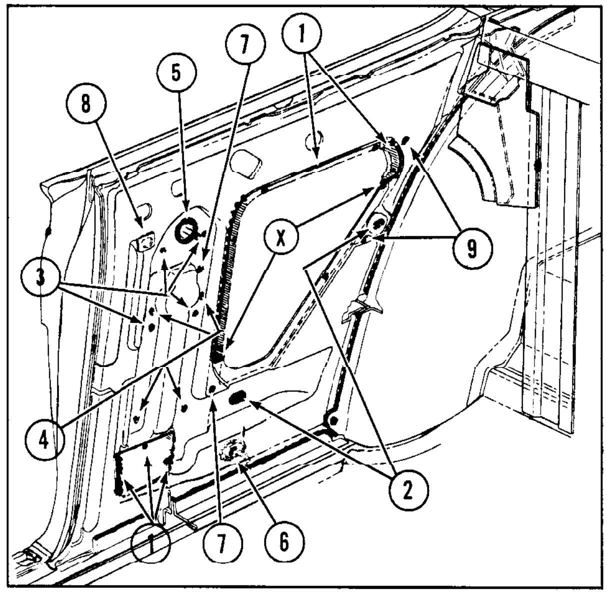


Fig. 17-62 Inner Quarter Panel Sealing ("37" Styles)

(1) LARGE AND SMALL ACCESS HOLE COVERS

1. Prior to installation of access hole cover, apply a continuous bead of body caulking compound (approximately 1/8 inch diameter) across top and down sides of quarter inner panel along flange contacted by cover.
2. After installation of cover, apply body caulking compound at lower corners of cover, at locations "X", to seal openings where cover flange transition to inside of quarter panel occurs.

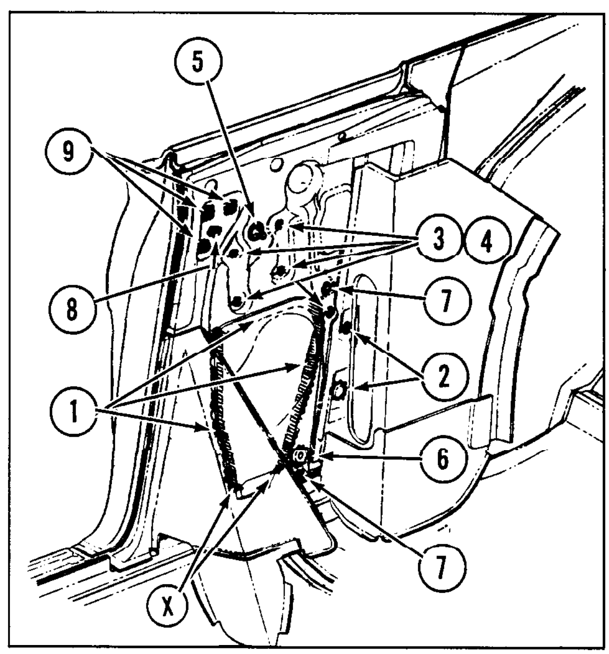


Fig. 17-63 Inner Quarter Panel Sealing ("67" Styles)

(2) WINDOW GUIDE ATTACHING SCREWS

1. Apply body caulking compound over window guide attaching screws and holes. Firmly press caulking compound to assure a good bond and watertight seal.
2. On "67" Styles apply weatherstrip adhesive (black) around the window guide attaching hole plug to effect a seal between inner panel and plug.

(3) MANUAL WINDOW REGULATOR ATTACHING SCREWS

1. Apply weatherstrip adhesive (black) over attaching screws.

(4) ELECTRIC WINDOW REGULATOR ATTACHING SCREWS

1. Apply weatherstrip adhesive (black) over attaching screws.

(5) WINDOW REGULATOR SPINDLE HOLE SEALING WASHER

1. Apply weatherstrip adhesive over exposed surface of washer to seal pores of sponge rubber and joint between inner panel and washer.
2. On "67" Styles with electrically operated windows apply weatherstrip adhesive (black) around the manual regulator spindle hole; then apply waterproof body tape over spindle hole.

(6) WIRE HARNESS AND GROMMET HOLE (STYLES WITH ELECTRICALLY OPERATED WINDOWS)

1. Apply weatherstrip adhesive (black) around the grommet and wire to effect a seal between wire and grommet and between grommet and inner panel.

(7) WIRE HARNESS CLIP HOLE (STYLES WITH ELECTRICALLY OPERATED WINDOWS)

1. Apply weatherstrip adhesive over hole.

(8) GAUGE SLOT

1. Apply waterproof body tape over slot.

(9) ARM REST ANCHOR NUT (3211 STYLE ONLY)

1. Apply body caulking compound over anchor nut and hole to effect a seal around anchor nut, hole and attaching screw when arm rest is installed.

(9) ARM REST ANCHOR NUT HOLE (3211 STYLE ONLY)

1. Where anchor nuts are not used, apply waterproof body tape over hole.
2. Press tape firmly to effect a good bond.

(10) WINDOW STOP ATTACHING SCREWS (3211 STYLE WITH ELECTRICALLY OPERATED WINDOWS)

1. Apply weatherstrip adhesive (black) over stop attaching screws.

(9) SEAT BACK TO QUARTER PANEL FILLER PANEL ATTACHING SCREW HOLES ("37" STYLES ONLY)

1. Apply weatherstrip adhesive (black) over filler panel attaching holes.

(9) WINDOW HINGE ATTACHING SCREWS ("67" STYLES ONLY)

1. Apply body caulking compound over hinge attaching screws.
2. Press compound firmly to assure a good bond and watertight seal.

HEADLINING

HEADLINING ASSEMBLY ALL 3537-39 and 3837-39 Styles (Fig. 17-64)

The headlining assembly consists of vinyl sponge sections cemented to foundation boards. On 3537-39 and 3837 Styles, four sections are used while on 3839 Styles, five sections are used.

The headlining sections are secured in place by retainers. Plastic moldings are snapped over the retainers and cover the retainers and edge of the headlining sections. Where necessary, the headlining sections may be removed individually.

Removal (One or More Sections)

1. Place protective coverings over seat cushions and backs.
2. Remove side roof rail moldings. If removing front section of headlining, remove windshield upper garnish molding (View "D"), sunshade support assemblies and rear view mirror support. If removing rear section, remove back window garnish moldings. On 3539 Styles remove rear quarter trim assembly to gain access to headlining attaching tabs at side roof rail area. If center sections are being removed, remove dome lamp and/or side roof rail lamps and coat hooks, if present.
3. With a flat-bladed tool, carefully pry one end of plastic molding (View "A") from retainer and remove plastic moldings from both retainers securing section of headlining being removed.
4. Carefully bend down tabs securing "39" Style headlining section to side roof rails. (View "E")

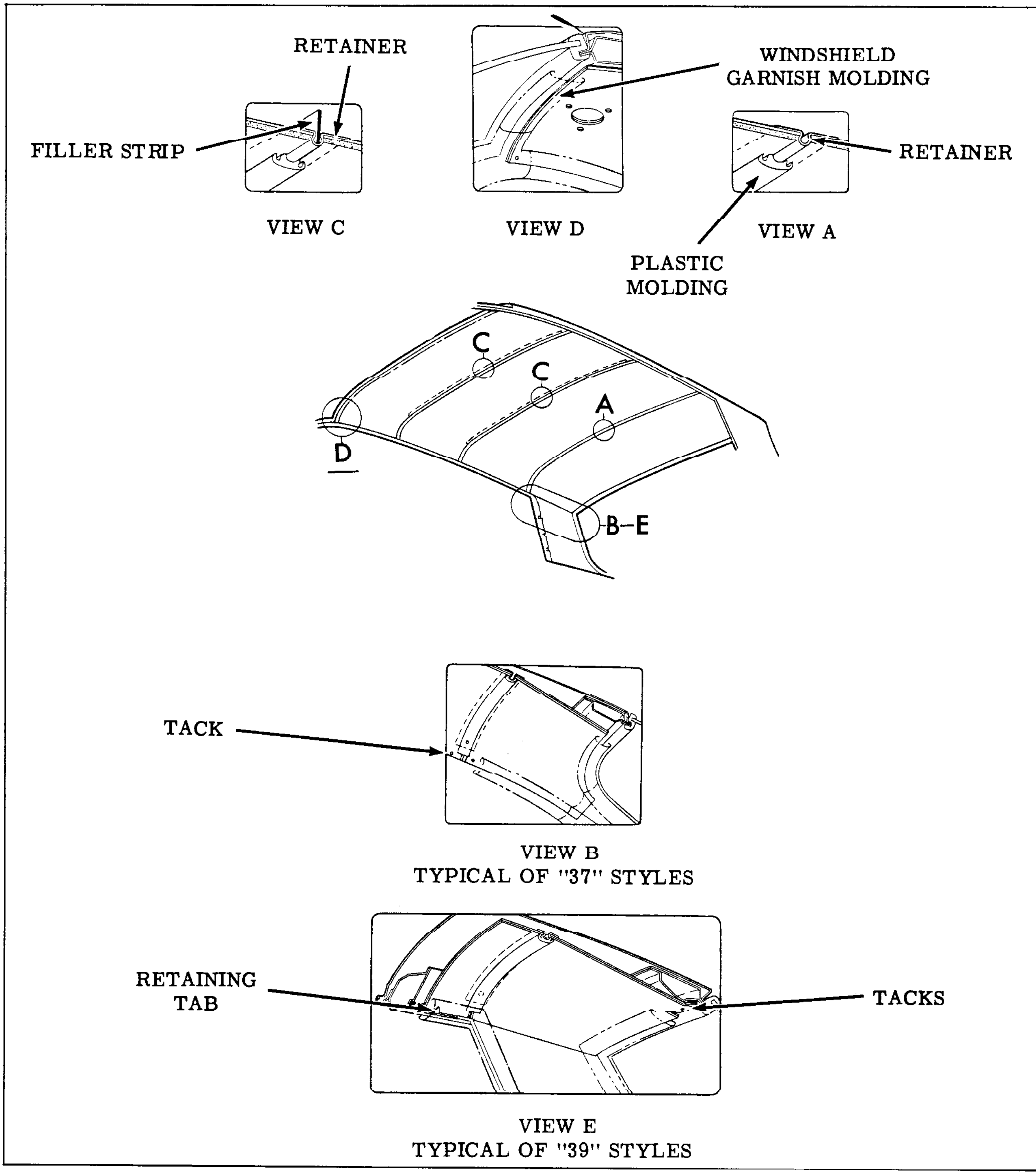


Fig. 17-64 Headlining Assembly ("37" and "39" Styles)

5. With a flat-bladed tool, carefully pry one edge of headlining section from retainer and remove from body.

6. If removing headlining section at back window, remove tacks securing section to side roof rails and at back window opening and remove headlining section from body.

7. To remove headlining retainers, remove attaching screws at side roof rails and remove retainers. Filler strips, (View "C") are installed in retainers.

Installation

1. If retainers were removed, make certain that filler strip shown in View "C" is installed in each retainer prior to installing retainer.

2. Install headlining sections by positioning one edge in retainer and centering section in relation to other sections and side roof rails, then carefully snap remaining edge in other retainer. Bend side roof rail tabs over headlining section. Snap plastic molding over retainers.
3. If installing rear section of headlining on a "39" Style, position forward edge of section in retainer. Center and align section in relation to side roof rails, other sections, and back window opening and stay tack section in place. Recheck alignment; then starting at center of back window area, permanently tack section to tacking tab strips at back window opening, 2 tacks each tab.
4. If installing front section of headlining on all styles or rear section on "37" Styles, position appropriate edge in retainer. Center section in relation to other sections and side roof rails; then install section to side roof rails over tab retainers.

   NOTE: Forward edge of front section and rearward edge of rear section is secured in place by windshield or back window garnish moldings.
5. Install all previously removed hardware and remove protective coverings.

HEADLINING ASSEMBLY (All except 3235-45, 3535-37-45 and 3837-39 Styles)

The headlining assembly is formed to the roof contour by concealed listing wires. Both ends of each listing wire are installed into holes in listing wire clips which are secured to the side roof inner rail. The wires and listing pockets are secured to the roof bows on some styles by bend-over metal tabs. The headlining is secured at the windshield by cement and tacks or staples and along the side roof rail by tacks, staples or a pronged retainer. A pronged retainer is used where side roof rail finishing moldings are not used. The rear end of the headlining is secured at the back window by a foundation board which is supported above the back window opening by metal retaining tabs or by cement and tacks or staples. In addition, the rear listing wire on all "69" Styles is secured to the center of the back window inner panel support by a metal retaining tab.

CAUTION: CLEAN HANDS ARE ESSENTIAL WHEN WORKING WITH HEADLINING MATERIAL.

Removal

1. Place protective coverings over seat cushions and backs.
2. Prior to removing headlining, remove following hardware and trim assemblies if present.
   a. Windshield side and upper garnish moldings.
   b. Rear view mirror support.
   c. Sunshade supports.
   d. Dome or side roof rail lamps.
   e. Coat hooks.
   f. Rear quarter upper garnish moldings. (2 door styles)
   g. Side roof rail moldings.
   h. Back window garnish moldings.
   i. Back window upper and side garnish moldings.
   j. Center pillar finishing moldings.
   k. Rear quarter trim, where necessary.
3. Carefully remove tacks or staples securing headlining at windshield opening, along side roof rails on bodies equipped with side roof rail finishing moldings, at rear quarter windows and at back window opening. Then carefully detach cemented edges of headlining.
4. On styles where headlining is secured to side roof rails by retainers, use Headlining Inserting Tool J-2772 or similar wide-bladed tool and carefully disengage headlining from retainer tabs. (View "A", Fig. 17-65)
5. Working from front to rear of body, disengage headlining listing wires from side roof rails, gathering or folding headlining with listing wires on outside to keep headlining clean. Bend down metal tabs at bows on bodies using tabs to support listing wire. (View "B", Fig. 17-65 and 17-66)
6. Disengage headlining on Styles using foundation board from metal tabs or retainers at back window and remove headlining assembly from body. (View "D", Fig. 17-65)

   IMPORTANT: Note into which hole the ends of the listing wires are installed to insure proper installation. (View "A", Fig. 17-65 and 17-66)
7. If necessary, listing wires may be removed from pockets.

Installation

1. Install listing wires into headlining listing pockets and lift entire headlining assembly into body.
2. Center and align rearward end of headlining

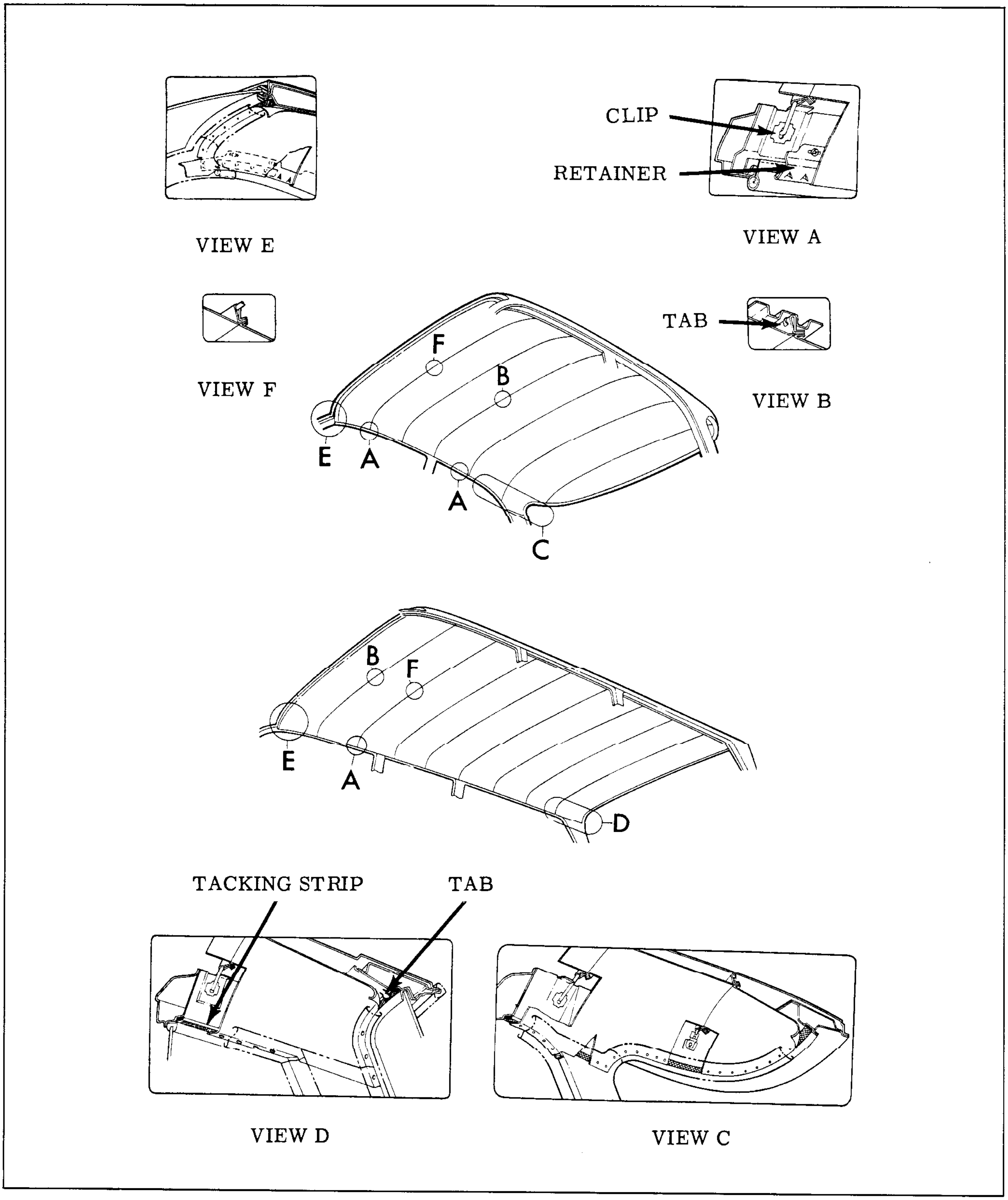


Fig. 17-65 Headlining Assembly

and engage foundation board where used under metal retainer or metal tabs above back window. (View "D", Fig. 17-65) Then working forward, install ends of listing wires into listing wire holes along side roof rail.

NOTE: Make certain listing wires are installed in correct hole in clips to insure proper contour of headlining. (View "A", Figs. 17-65 and 17-66)

3. Install balance of listing wires into proper holes in listing wire clips. (View "A", Figs. 17-65 and 17-66) Install listing wire where

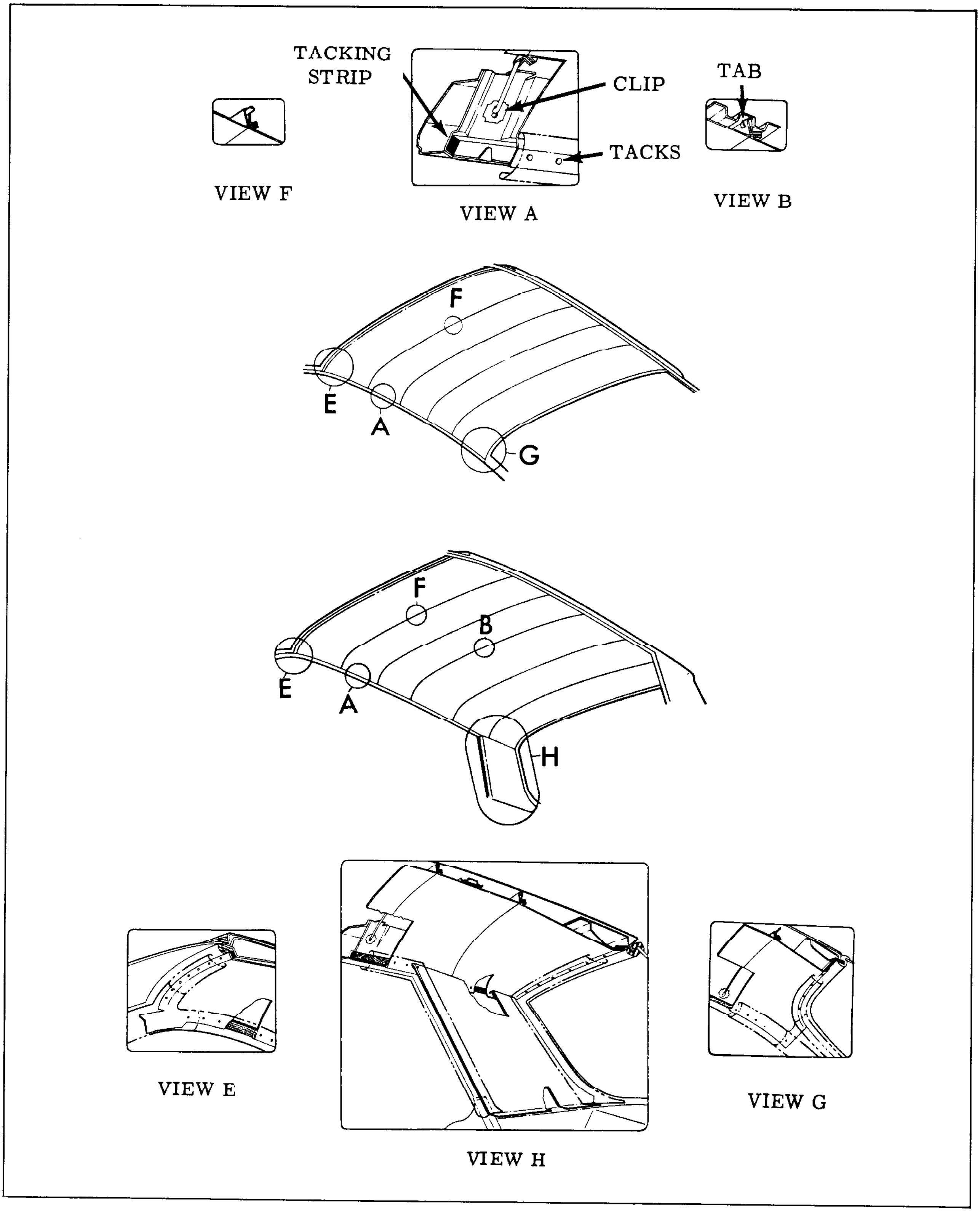


Fig. 17-66 Headlining Assembly

necessary to roof bow metal retaining tabs, center headlining and bend over retaining tabs.

4. Center and align headlining in relation to windshield opening, back window opening, coat hooks and sunshade support locations. Then apply trim cement to headlining tacking surfaces at windshield and back window opening. (Views "C", "D" and "E", Fig. 17-65 and Views "E", "G" and "H", Fig. 17-66) Stretch

and stay tack headlining to windshield and back window openings and along side roof rails if tacks are used.

5. Remove all "fullness" and "draws" from headlining material and permanently tack headlining to tacking strips. (View "A", Fig. 17-66)

   NOTE: On those styles where side roof rail moldings are not used, use Headlining Inserter Tool J-2772 or similar wide-bladed tool and carefully tuck edges of headlining under metal retainer tabs along both side roof rails. (View "A", Fig. 17-65)

6. Install all previously removed hardware and trim assemblies and remove protective coverings.

SEATS

REPOSITIONING FRONT SEAT ASSEMBLY (ALL FULL WIDTH SEATS)

Raising Front Seat Height

A service parts package is available consisting of 4 shims and 8 bolts which can be installed at each of the seat adjuster to floor pan mounting areas.

Repositioning Front Seat Assembly One Inch Forward

1. Remove front seat adjuster-to-floor pan attaching bolts as described in FRONT SEAT ASSEMBLY WITH ATTACHED SEAT ADJUSTERS - REMOVAL AND INSTALLATION procedure.
2. Move seat assembly to one side to gain access to floor pan area below one adjuster.
3. Drill a 3/8 inch diameter hole through the floor pan at guide dimple located one inch forward of each original adjuster attaching hole.
4. Repeat Steps 2 and 3 at other end of seat assembly.
5. Seal original seat adjuster attaching bolt holes with body caulking compound.
6. Position seat assembly over drilled holes, install original adjuster attaching bolts and secure in position with 5/16 inch lock washers and 5/16 x 24 hexagon nuts from underneath floor pan.
7. Check seat operation and install previously removed parts.

Repositioning Front Seat Assembly One Inch Rearward

1. Remove front seat adjuster-to-floor pan attaching bolts as described in FRONT SEAT ASSEMBLY WITH ATTACHED SEAT ADJUSTERS - REMOVAL AND INSTALLATION procedure.
2. Prop up each adjuster pedestal and drill out pilot hole to 3/8 inch diameter. (Pilot holes are located in upper surface of pedestal base plate and are one inch forward of original attaching bolt holes.)
3. Reposition seat assembly one inch rearward so that new drilled holes are above weld nuts in floor pan.
4. Install original seat adjuster-to-floor pan attaching bolts.
5. Check seat operation and install previously removed parts.

FRONT SEAT ASSEMBLY MANUALLY OPERATED (All Styles except 3837-39 and 67 Styles)

Manually operated front seat adjusters provide fore and aft movement of the seat. When the knob at the left of the seat is pulled up, the seat adjusters unlock, permitting a horizontal travel of the seat. When the seat is in the desired position, the knob is released and the seat is locked.

Removal and Installation (With Attached Seat Adjusters)

1. Turn back floor covering and remove four seat adjuster-to-floor pan bolts from each adjuster.
2. With the aid of a helper, remove seat assembly from body.
3. To install, reverse removal procedure.

FRONT SEAT ADJUSTER (MANUAL)

Removal and Installation

1. Remove seat assembly with attached seat adjusters from body and place upside down on a clean protected surface.
2. When removing left adjuster, it is necessary to remove the seat adjuster control knob.
3. Squeeze hooked end of seat adjuster locking wire together and slide retaining spring back over hump in locking wire, remove wire from retainer on seat bottom frame and disengage locking wire from seat adjuster.
4. Remove adjuster-to-seat bottom frame front

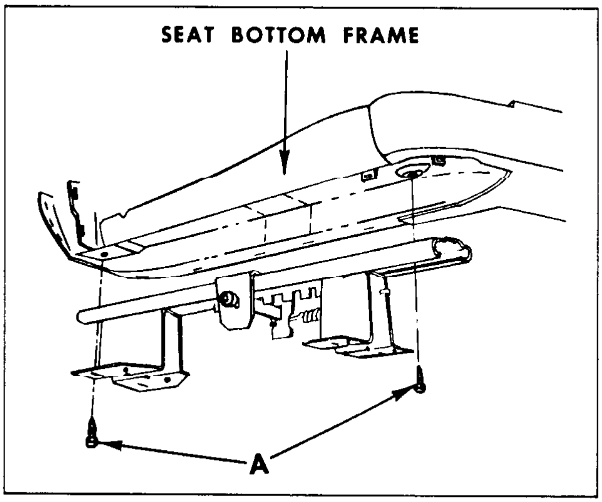


Fig. 17-67 Manually Operated Seat Adjuster

and rear attaching bolts and remove seat adjuster from seat assembly. (Fig. 17-67)

5. To install, reverse removal procedure.

6. Check operation of seat assembly. If right adjuster does not lock or unlock satisfactorily when control handle on left adjuster is operated, remove locking wire retainer from hole in seat bottom frame, and adjust retainer by selecting another hole to obtain proper tension in locking wire.

FRONT SEAT ASSEMBLY (TWO-WAY ELECTRIC) (3837-39 and 67 Styles)

The electrically operated two-way front seat assembly can be moved forward or rearward by means of a manually operated seat control switch mounted in the left seat side panel.

Removal and Installation (With Attached Adjusters)

1. Under front of seat disconnect seat control switch wire harness from feed wire harness and detach control switch harness from clip on floor pan.

2. Turn back floor covering and remove four seat adjuster-to-floor pan attaching bolts from each adjuster. This will also disconnect ground wire.

3. Remove seat assembly with attached adjusters from body.

4. To install, reverse removal procedure. Make sure ground wire is installed under seat adjuster attaching bolt.

   IMPORTANT: When installing seat assembly in body, seat adjusters should be parallel and "in phase" with each other. In the event the adjusters are "out of phase", (that is one adjuster reaches its full forward or rearward travel before the other adjuster), proceed as follows: Apply power source and actuate until left seat adjuster reaches full forward or rearward travel. Disconnect power drive cable at left side of actuator motor and actuate right adjuster until it reaches the corresponding full forward or full rearward position. Connect left adjuster power drive cable and check seat operation to full limits of fore and aft travel.

FRONT SEAT ADJUSTER (TWO-WAY ELECTRIC) (3837-39 and 67 Styles)

Removal and Installation

1. Remove front seat assembly with attached adjusters and place upside down on a clean protected surface. See FRONT SEAT ASSEMBLY (TWO-WAY ELECTRIC) Removal and Installation With Attached Adjusters.

2. Detach power drive cable from gear nut of adjuster to be removed. (Fig. 17-68)

3. Remove seat adjuster-to-seat bottom frame front and rear attaching bolts. (Fig. 17-68)

4. Remove adjuster from assembly.

5. To install, reverse removal procedure.

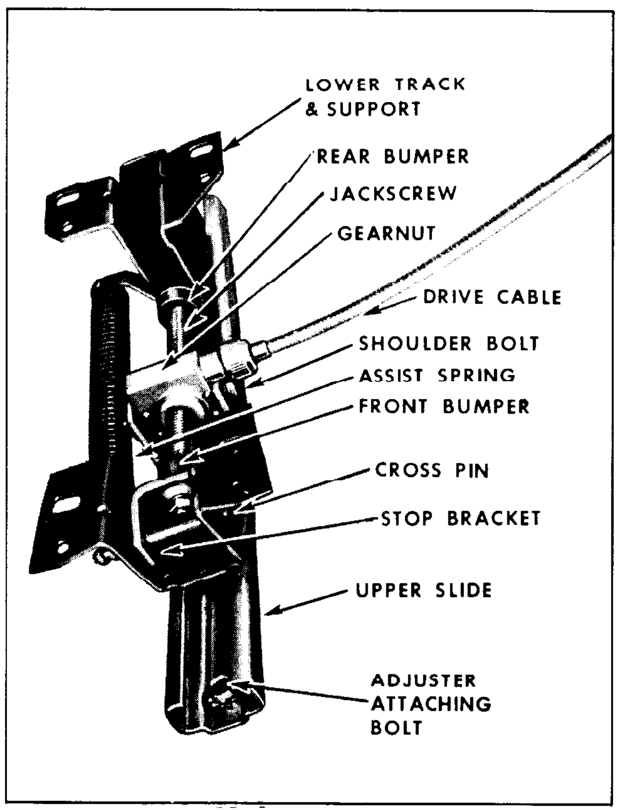


Fig. 17-68 Two-Way Seat Adjuster

FRONT SEAT ADJUSTER GEAR NUT AND JACKSCREW ASSEMBLY (TWO-WAY ELECTRIC (3837-39 and 67 Styles)

Removal and Installation

1. Remove front seat assembly with attached adjusters and place upside down on a clean, protected surface. See FRONT SEAT ASSEMBLY (TWO-WAY ELECTRIC) Removal and Installation With Attached Adjusters.

2. Detach power drive cable from gear nut and jackscrew assembly to be removed.

3. Using a "clutch" type screwdriver, remove two shoulder bolts securing gear nut to upper slide portion of seat adjuster assembly. (Fig. 17-68)

4. Remove retainer that secures stop bracket crosspin to adjuster front pedestal and remove crosspin. (Fig. 17-68)

5. Remove gear nut and jackscrew assembly from seat adjuster assembly.

6. When installing new gear nut only, remove cotter pin, washers and rubber bumper from rear end of jackscrew and remove gear nut from jackscrew.

7. When installing new jackscrew only, remove nut, washers, rubber bumper and stop bracket with inserted rubber grommet from front end of jackscrew, as well as gear nut and washers, rubber bumper and cotter pin from rear end of jackscrew.

8. To install, reverse removal procedure.

FRONT SEAT ADJUSTER PLASTIC SHOES (TWO-WAY ELECTRIC) (3837-39 and 67 Styles)

Removal and Installation

1. Remove front seat adjuster to be serviced from front seat assembly. (See FRONT SEAT ADJUSTER (TWO-WAY ELECTRIC) Removal and Installation.

2. Using a "clutch" type screwdriver, remove two shoulder bolts securing gear nut to upper slide portion of seat adjuster assembly. (Fig. 17-68)

3. Slide lower track and support base portion of seat adjuster, with attached jackscrew and gear nut, forward until it disengages from upper slide assembly. The four plastic shoes may now be disengaged from the positioning slots on the lower track.

4. To install, reverse removal procedure making sure that groove in plastic shoe slips onto the lower track with the thinner section of the shoe protruding above the surface of the track.

FRONT SEAT ADJUSTER ACTUATOR MOTOR (TWO-WAY ELECTRIC) (3837-39 and 67 Styles)

Removal and Installation

1. Remove front seat assembly.

2. Disconnect both power drive cables from actuator motor.

3. Remove two bolts that secure actuator motor support bracket to weld nuts at front of seat bottom frame and remove actuator motor with attached support bracket from seat assembly.

4. When installing new motor, disconnect motor-to-support bracket jumper ground wire from motor and transfer support bracket with inserted rubber grommets and attached jumper ground wire from old motor to new actuator motor.

5. To install, reverse removal procedure and check seat operation to extreme limit of fore and aft travel.

FRONT SEAT ASSEMBLY (FOUR-WAY ELECTRIC)

The seat adjuster motor, which is energized by a single button control switch, operates both the horizontal and vertical movement of the seat adjusters through a solenoid actuated transmission assembly. The transmission assembly incorporates one solenoid which controls the horizontal movement of the seat and a second solenoid which controls the vertical movement of the seat. When either solenoid is energized, the solenoid plunger engages the clutch shaft dog with the driving gear dog; the driving gear dog turns the clutch shaft which in turn operates both seat adjusters by means of the flexible cables.

Removal and Installation

1. Under front of seat, disconnect seat control switch wire harness from feed wire harness and detach control switch harness from clip on floor pan.

2. Turn back floor carpeting, remove both seat adjuster track covers and remove four seat adjuster-to-floor pan attaching bolts from each adjuster. Remove carpet retainers at front of seat adjusters.

3. With aid of a helper, remove seat assembly

with attached adjusters and actuator assembly from body.

4. To install seat assembly, reverse removal procedure. Make sure ground wire is securely attached at right seat adjuster and under seat adjuster-to-floor pan attaching bolt.

   IMPORTANT: When installing seat assembly in body, seat adjusters should be parallel and "in phase" with each other. In the event the adjusters are "out of phase" (that is, one adjuster reaches its maximum horizontal or vertical travel in a given direction before the other adjuster) proceed as follows:

   a. For horizontal travel, operate seat control switch until one adjuster reaches full forward position. Detach horizontal drive cable from adjuster which has reached full forward position. Operate seat forward until other adjuster reaches full forward position; then, connect horizontal drive cable and check horizontal travel of seat.

   b. For vertical travel, operate seat control switch until one adjuster reaches the fully raised position. Disconnect vertical drive cable from adjuster which has reached the fully raised position. Operate seat upward until other adjuster has reached the fully raised position; then, connect the vertical drive cable and check vertical travel of seat.

FRONT SEAT ADJUSTER ASSEMBLY (FOUR-WAY ELECTRIC)

Removal and Installation

1. Operate seat assembly to fully raised and forward position.

2. Remove front seat assembly from body with attached adjusters, motor and transmission and place upside down on a clean protected surface.

3. Detach the two power drive cables from adjuster to be removed.

4. Remove adjuster-to-seat bottom frame front and rear attaching bolts and remove adjuster from seat assembly.

5. To install seat adjuster assembly, reverse removal procedure. Black cable attaches to horizontal actuator and yellow cable attaches to vertical gear nut.

   NOTE: Check operation of seat adjusters and make sure adjusters are "in phase". See Step 4 under FRONT SEAT ASSEMBLY - Removal and Installation.

FRONT SEAT ADJUSTER VERTICAL JACKSCREW, GEAR NUT AND SPRING (FOUR-WAY ELECTRIC)

Removal and Installation

1. Operate seat assembly to fully raised position and remove seat assembly from body.

2. Remove seat adjuster from side on which jackscrew is to be removed.

3. Using a clutch type screwdriver, remove shoulder screws securing linkages to vertical gear nut. (Fig. 17-69)

4. Using a drift punch, carefully drive out jackscrew pin. (Fig. 17-69)

5. Move jackscrew, gear nut and spring assembly sufficiently rearward to disengage front of jackscrew from adjuster frame; then, raise front of jackscrew and move assembly forward sufficiently to remove assembly from seat adjuster.

   NOTE: It may be necessary to manually raise or lower the upper portion of adjuster to gain clearance for removal of jackscrew, gear nut and spring assembly.

6. To remove gear nut and spring from jackscrew, actuate or turn gear nut off jackscrew.

7. To install, reverse removal procedure.

FRONT SEAT ADJUSTER HORIZONTAL ACTUATOR OR UPPER AND LOWER CHANNELS (FOUR-WAY ELECTRIC)

Removal and Installation

1. Remove front seat adjuster.

2. Remove screws securing horizontal actuator and remove actuator from seat adjuster. (Fig. 17-69)

3. Slide seat adjuster lower channel from upper channel and, if required, remove plastic shoes from lower channel track.

4. To install, reverse removal procedure. If lower channel has been removed from upper channel, make sure all four plastic shoes are installed on lower track. Apply "Lubriplate" to track portion of upper channel and to teeth on lower channel. When installing horizontal actuator, adjust actuator so that drive gear is fully engaged with teeth on lower channel. When horizontal actuator attaching screws are tightened, there should be no free motion between upper and lower channels.

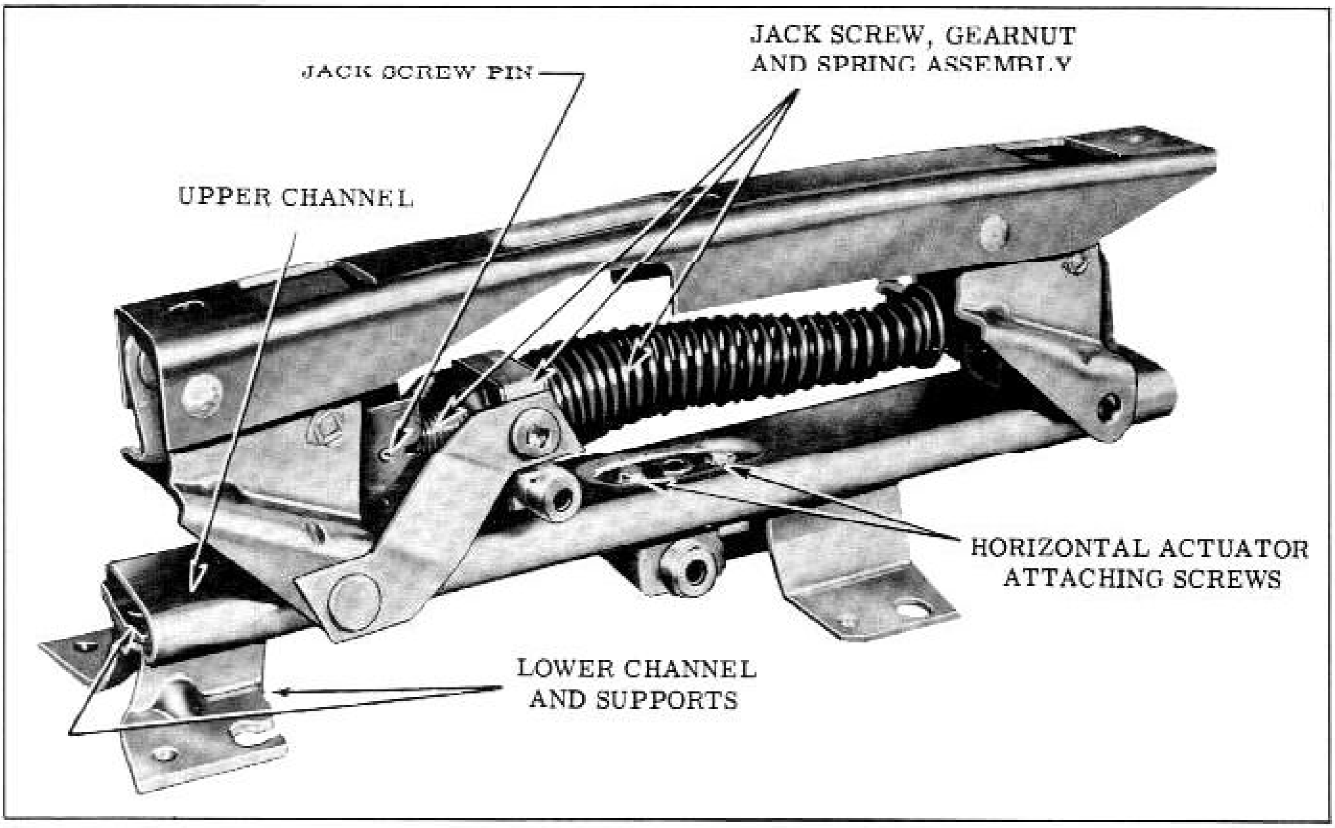


Fig. 17-69 Four-Way Seat Adjuster

FRONT SEAT ADJUSTER ELECTRIC MOTOR OR DRIVE CABLE (FOUR-WAY ELECTRIC)

Removal and Installation

1. Remove front seat assembly.
2. Remove motor support-to-seat frame attaching bolts.
3. Move motor assembly towards left side of seat sufficiently to disengage motor drive cable; then, remove motor from support assembly. Motor drive cable may be removed, if required.
4. To install, reverse removal procedure making sure motor drive cable is properly engaged at both motor and transmission.

FRONT SEAT ADJUSTER HORIZONTAL AND VERTICAL CABLES (FOUR-WAY ELECTRIC)

Removal and Installation

1. Remove front seat assembly from body with attached adjusters, motor and transmission, and place upside down on a clean protected surface.
2. Detach both horizontal and vertical cables from seat adjuster.
3. Remove screws securing horizontal and vertical cable and plate on side of transmission from which cables are being removed and remove cables from seat assembly. (Fig. 17-70)
4. To remove one cable from end plate for service replacement, place end plate in a vise and with a suitable tool, remove knock-out plug located adjacent to cable hole. This will allow cable to be removed from end plate and a new service replacement cable installed.
5. To install horizontal and vertical cables, reverse removal procedure.

FRONT SEAT ADJUSTER TRANSMISSION (FOUR-WAY ELECTRIC)

Removal and Installation

1. Remove front seat assembly from body with attached adjusters, motor and transmission and place upside down on a clean protected surface.
2. Disconnect wire harness connector from transmission. (Fig. 17-70)
3. Remove screws securing horizontal and vertical cable end plate on both sides of transmission and detach cables from transmission.

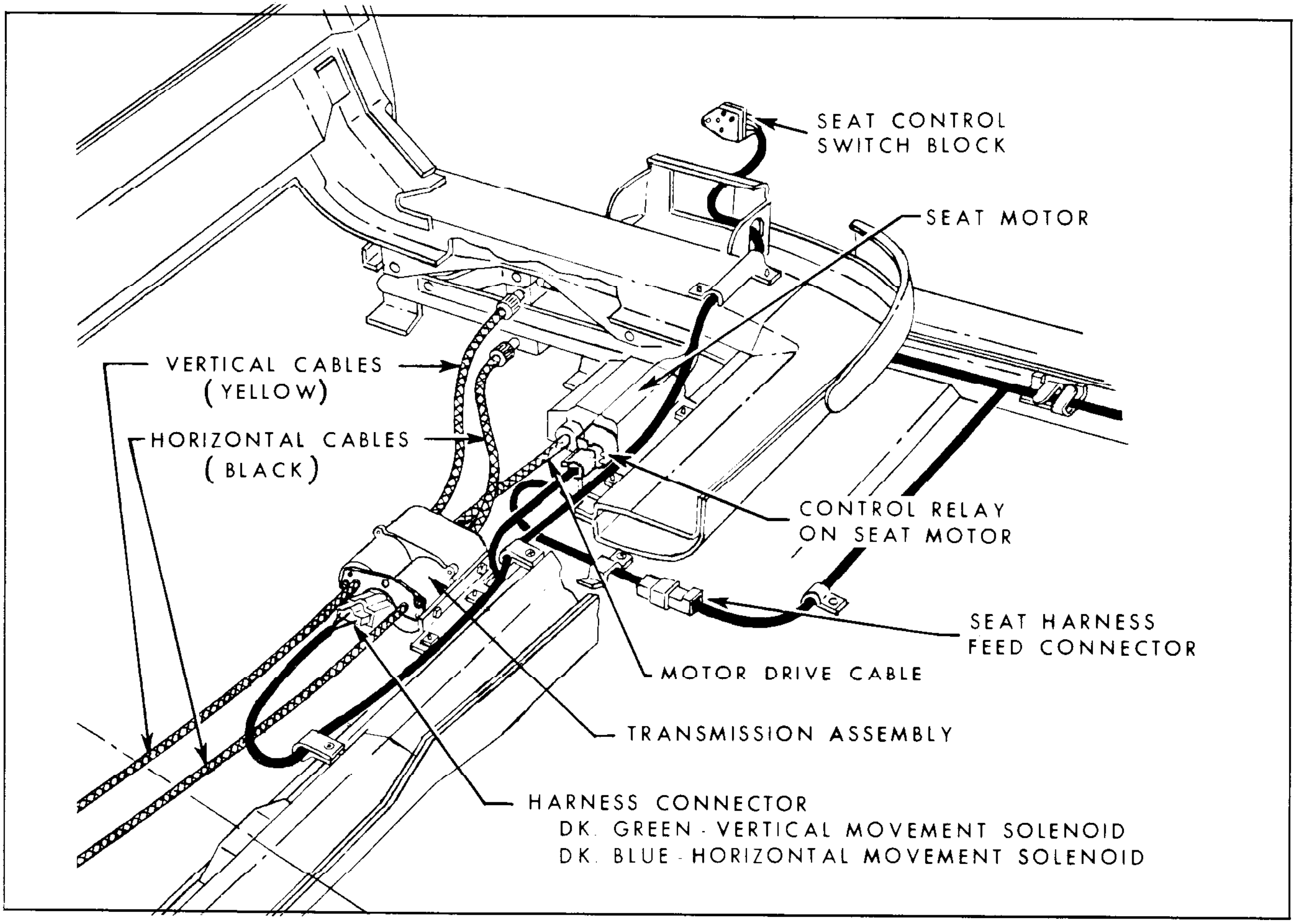


Fig. 17-70 Four Way Seat Assembly

4. Remove transmission to support attaching bolts; then disengage transmission from motor drive cable and remove transmission from seat assembly. (Fig. 17-70)

5. To install, reverse removal procedure.

Disassembly and Assembly

1. Remove front seat adjuster transmission from seat assembly.

2. Remove screw securing ground strap to solenoid housing and screws securing transmission support to gear and solenoid housing. (Fig. 17-71)

3. Remove screws securing gear and solenoid housing together; then carefully separate housings and remove component parts of transmission assembly. (Fig. 17-71)

4. To assemble transmission assembly, reverse removal procedure.

IMPORTANT: Prior to or during installation, lubricate frictional surfaces of driving gear thrust washer, clutch and gears, dog washers, clutch shaft and solenoid plungers with Lubriplate.

FRONT SEAT ASSEMBLY (SIX-WAY ELECTRIC)

The electrically-operated six-way front seat assembly can be moved forward, rearward, upward, downward or tilted by means of a manually-operated seat control switch. The large center control knob controls movement of the entire seat assembly horizontally or vertically. The smaller forward control knob controls the vertical movements of the front of the seat assembly causing the seat assembly to tilt. In the same manner, the rear control knob controls vertical movement of the rear of the seat assembly. This seat adjuster operating mechanism incorporates a transmission assembly which includes three solenoids and six drive cables leading to the seat adjusters. Solenoid No. 1 controls the vertical movement of the rear edge of the seat. (Fig. 17-72) Solenoid No. 2 controls the horizontal movement of the seat. Solenoid No. 3 controls the vertical movement of the front edge of the seat. In addition to the six seat adjuster drive cables at the transmission assembly, a motor drive cable is installed from the motor to the transmission assembly. (Fig. 17-72) When one of the control switch buttons is actuated, the motor and one of the solenoids are energized simultaneously. The solenoid plunger engages the large gears with a driving gear. The

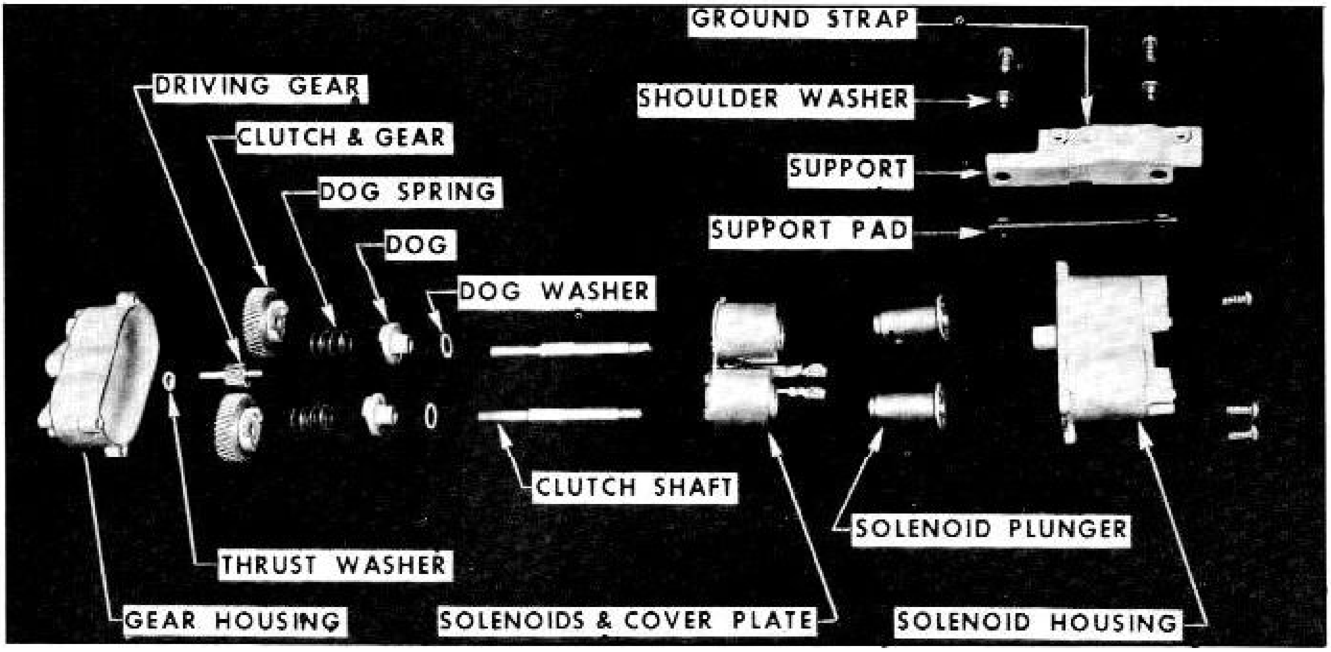


Fig. 17-71 Four-Way Seat Transmission

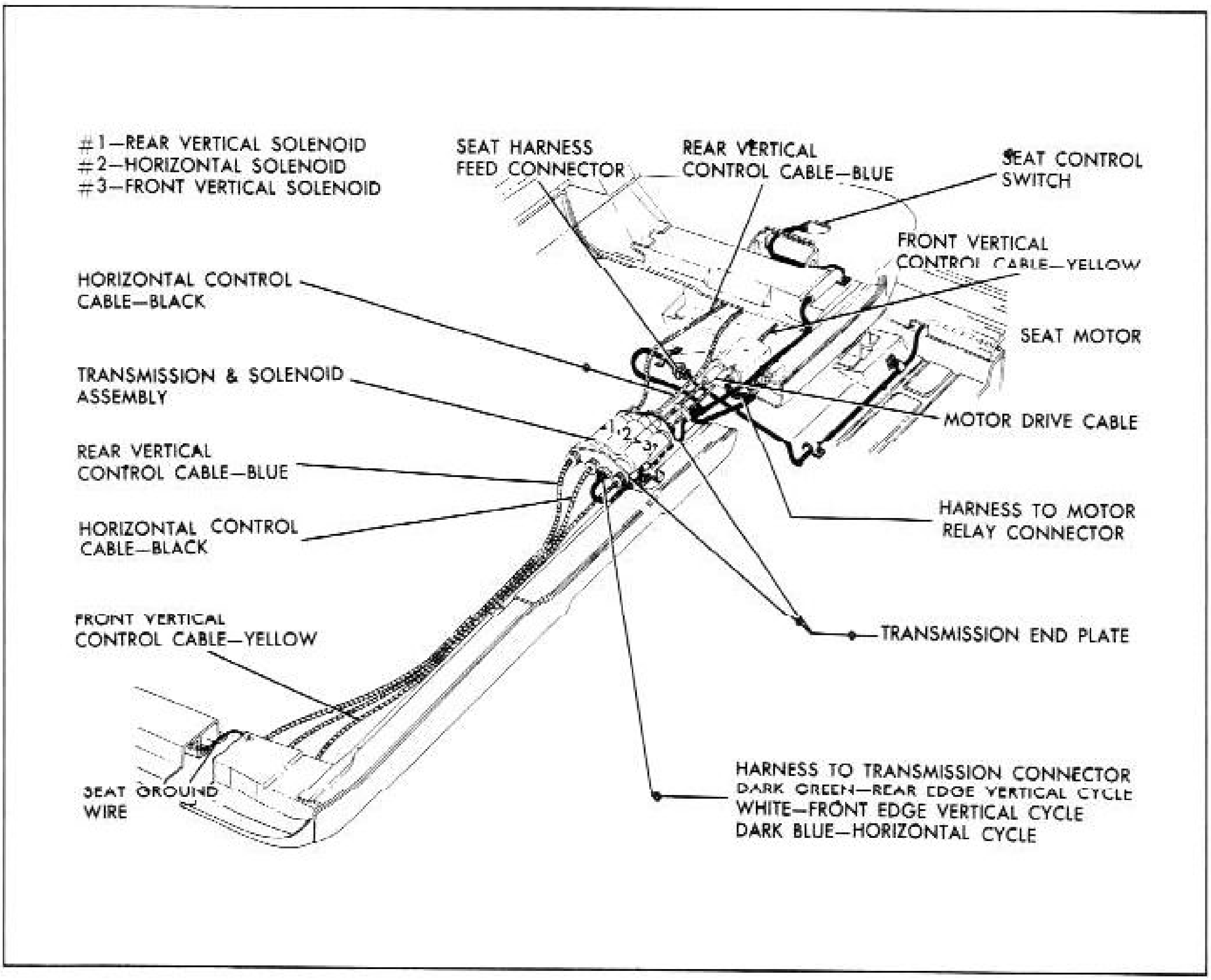


Fig. 17-72 Six-Way Seat Installation

driving gear rotates the large gears which rotates the drive cables and operates both adjusters. When the switch contacts are opened, a spring returns the solenoid plunger to its original position, disengaging the large gears from the driving gear.

Removal and Installation

1. Under front of seat, disconnect seat wire harness from feed wire harness and detach control switch harness from clip on floor pan.

2. Turn back floor carpeting, remove both seat adjuster track covers and remove four seat adjuster-to-floor pan attaching bolts from each adjuster. Remove carpet retainers at front of seat adjusters.

3. With aid of a helper, remove seat assembly with attached adjusters, motor and transmission assembly from body.

4. To install seat assembly, reverse removal procedure. Make sure ground wire is securely attached at right seat adjuster and under seat adjuster-to-floor pan attaching bolt.

FRONT SEAT ADJUSTER ASSEMBLY (SIX-WAY ELECTRIC)

Removal and Installation

1. Remove front seat assembly from body with attached adjusters, motor and transmission, and place upside down on a clean protected surface.

2. Detach the three power drive cables from adjuster to be removed. (Fig. 17-72)

3. Remove adjuster-to-seat bottom frame front and rear attaching bolts and remove adjuster from seat assembly.

4. To install seat adjuster assembly, reverse removal procedure. Black cable attaches to horizontal actuator; yellow cable to front vertical gear nut and blue cable to rear vertical gear nut.

   IMPORTANT: When installing seat assembly in body, seat adjusters should be parallel and "in phase" with each other. In the event the adjusters are "out of phase" (That is, one adjuster reaches its maximum horizontal or vertical travel in a given direction before the other adjuster), proceed as follows:

   a. For horizontal travel, operate seat control switch until one adjuster reaches full forward position. Detach horizontal drive cable from adjuster which has reached full forward position. Operate seat forward until other adjuster reaches full forward position; then, connect horizontal drive cable and check horizontal travel of seat.

   b. For front and rear vertical travel, operate seat control switch until one adjuster reaches fully raised position. Disconnect vertical drive cable from adjuster which has reached the full up position. Operate seat upward until other adjuster has reached the full up position; then, connect the vertical drive cable and check vertical travel of seat.

FRONT SEAT ADJUSTER VERTICAL JACKSCREW, GEAR NUTS AND SPRING (SIX-WAY ELECTRIC)

Removal and Installation

1. Remove seat assembly from body.

2. Remove seat adjuster from side on which jackscrew is to be removed.

3. Using clutch-type screwdriver or other suitable tool, remove shoulder screws securing linkages to vertical gear nuts. (Fig. 17-73)

4. Insert a No. 1 crosshead screwdriver or other suitable tool into drive cable slot in rear vertical gear nut and actuate rear vertical gear nut forward sufficiently to release compression of counterbalance spring.

   NOTE: In some cases it may be necessary to actuate the front vertical gear nut forward to provide sufficient room for the rear vertical gear nut forward adjustment to release spring tension.

5. Remove jackscrew front and rear attaching nuts. (Fig. 17-74) Lift front end of jackscrew sufficiently to disengage from support; then disengage rear end of jackscrew from support and remove jackscrew, gear nuts and spring assembly from adjuster. Spring and spring silencer may now be removed from jackscrew. (Fig. 17-74)

6. To remove vertical gear nuts, turn or actuate gear nuts off jackscrew.

7. To install, reverse removal procedure making sure jackscrew is installed with unthreaded shoulder at rear of adjuster and gear nuts installed as shown in Fig. 17-73. Rear vertical gear nut, which has the larger diameter cable attachment, should be installed to the rear; front vertical gear nut, which has the smaller diameter cable attachment should be installed at the front. Both vertical gear nuts should have cable attachment at bottom and facing inside of adjuster. (Fig. 17-73)

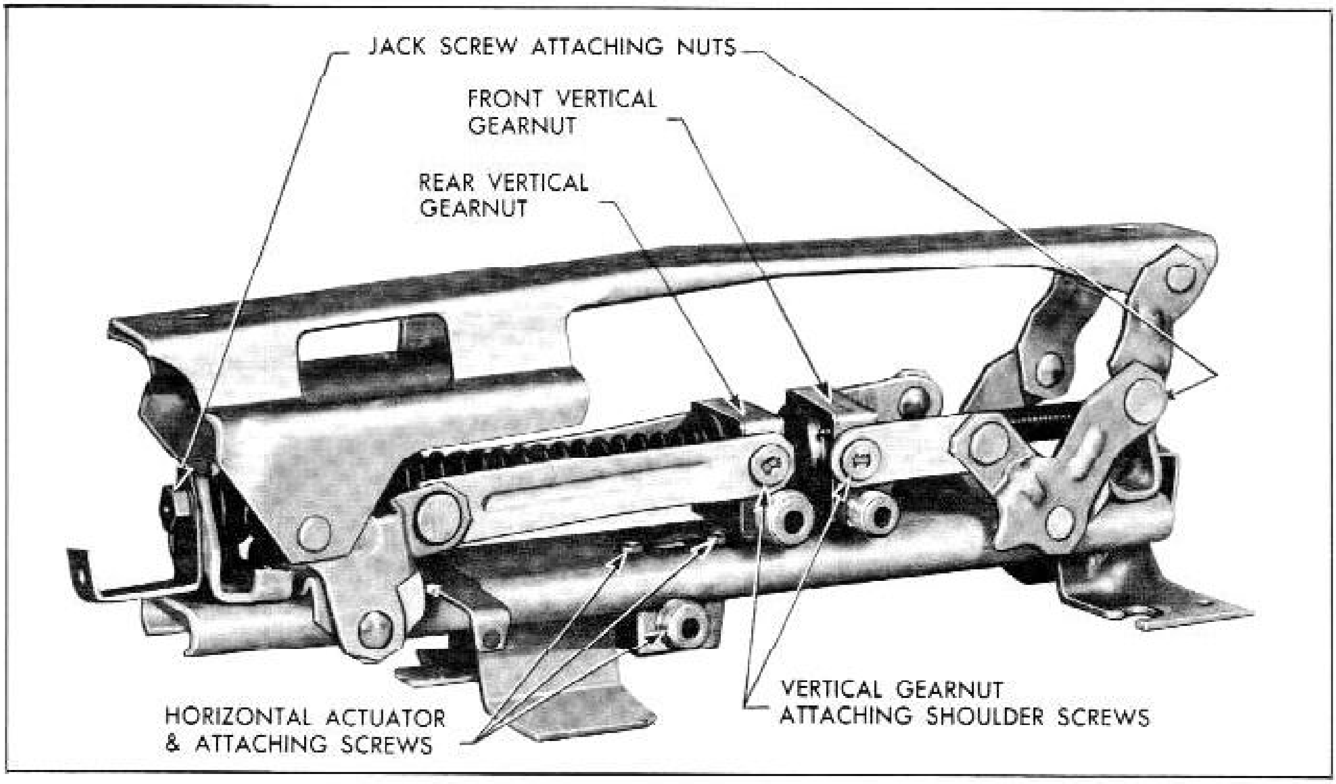


Fig. 17-73 Six-Way Seat Adjuster

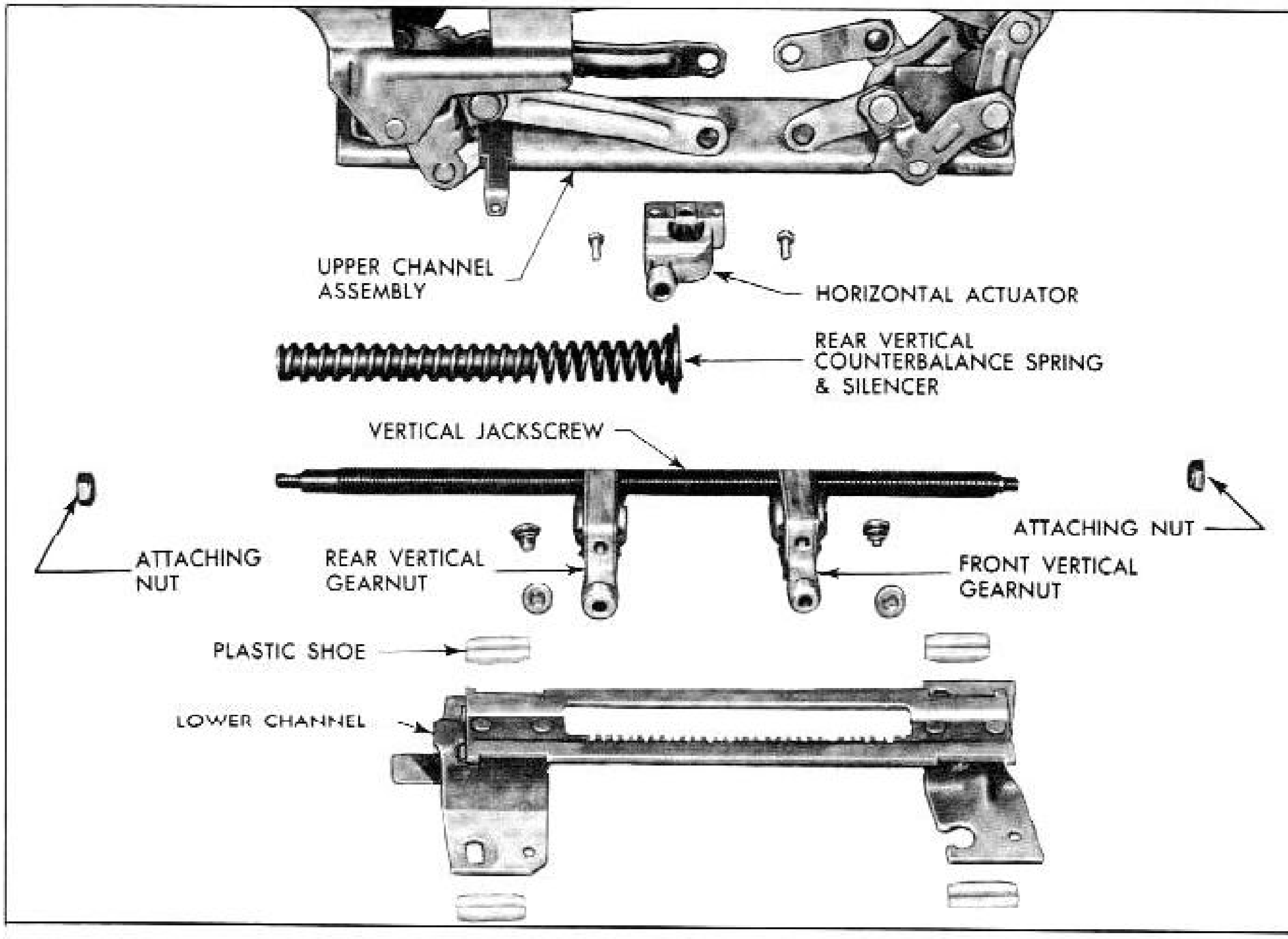


Fig. 17-74 Six-Way Seat Adjuster Assembly

FRONT SEAT ADJUSTER HORIZONTAL ACTUATOR OR UPPER AND LOWER CHANNELS (SIX-WAY ELECTRIC)

Removal and Installation

1. Remove front seat adjuster.

2. Remove screws securing horizontal actuator (Fig. 17-73) and remove actuator from seat adjuster.

3. Slide seat adjuster lower channel from upper channel and, if required, remove plastic shoes from lower channel track. (Fig. 17-74)

4. To install, reverse removal procedure. If lower channel has been removed from upper channel, make sure all four plastic shoes are installed on lower track. Apply "Lubriplate" or equivalent to track portion of upper channel and to teeth on lower channel. When installing horizontal actuator, adjust actuator so that drive gear is fully engaged with teeth on lower channel. When horizontal actuator screws are tightened, there should be no free motion between upper and lower channels.

FRONT SEAT ADJUSTER ELECTRIC MOTOR OR DRIVE CABLE (SIX-WAY ELECTRIC)

Removal and Installation

1. Remove front seat assembly as previously described.

2. Remove motor support-to-seat frame attaching bolts.

3. Move motor assembly towards left side of seat sufficiently to disengage motor drive cable; then, remove motor from support assembly. Motor drive cable may be removed, if required, by removing cable end plate from transmission.

4. To install, reverse removal procedure making sure motor drive cable is properly engaged at both motor and transmission.

FRONT SEAT ADJUSTER HORIZONTAL AND VERTICAL DRIVE CABLES (SIX-WAY ELECTRIC)

Removal and Installation

1. Remove front seat assembly from body with attached adjusters, motor and transmission and place upside down on a clean protected surface.

2. Detach both horizontal and vertical cables from seat adjuster.

3. Remove screws securing horizontal and vertical cable end plate on side of transmission from which cables are being removed and remove cables from seat assembly; then disengage cables from end plate.

4. To install horizontal and vertical cables, reverse removal procedure. Make sure cables are installed to correct gear nuts. (Fig. 17-72)

FRONT SEAT ADJUSTER TRANSMISSION (SIX-WAY ELECTRIC)

Removal and Installation

1. Remove front seat assembly from body with attached adjusters, motor and transmission, and place upside down on a clean protected surface.

2. Disconnect wire harness connector from transmission. (Fig. 17-72)

3. Remove screws securing horizontal and vertical cable end plate on both sides of transmission and detach cables from transmission.

4. Remove transmission to support attaching bolts; then disengage transmission from motor drive cable and remove transmission from seat assembly.

5. To install, reverse removal procedure.

Disassembly and Assembly

1. Remove front seat adjuster transmission from seat assembly.

2. Remove screw securing ground strap to solenoid housing and screws securing transmission support to gear and solenoid housings.

3. Remove screws securing gear housing to the solenoid housing; then, carefully separate housings and remove component parts of transmission assembly. (Fig. 17-75)

4. To assemble transmission, reverse removal procedure. (Fig. 17-75)

   IMPORTANT: Prior to or during installation, lubricate frictional surfaces of driving gear, thrust washer, large gears, dog washers, gear shaft and solenoid plungers with "Lubriplate" or equivalent.

BACK WINDOW REVEAL MOLDINGS

Back windows are secured in the body opening by conventional rubber channels. All styles have back window reveal moldings which must be removed to remove the back window and rubber channel assembly.

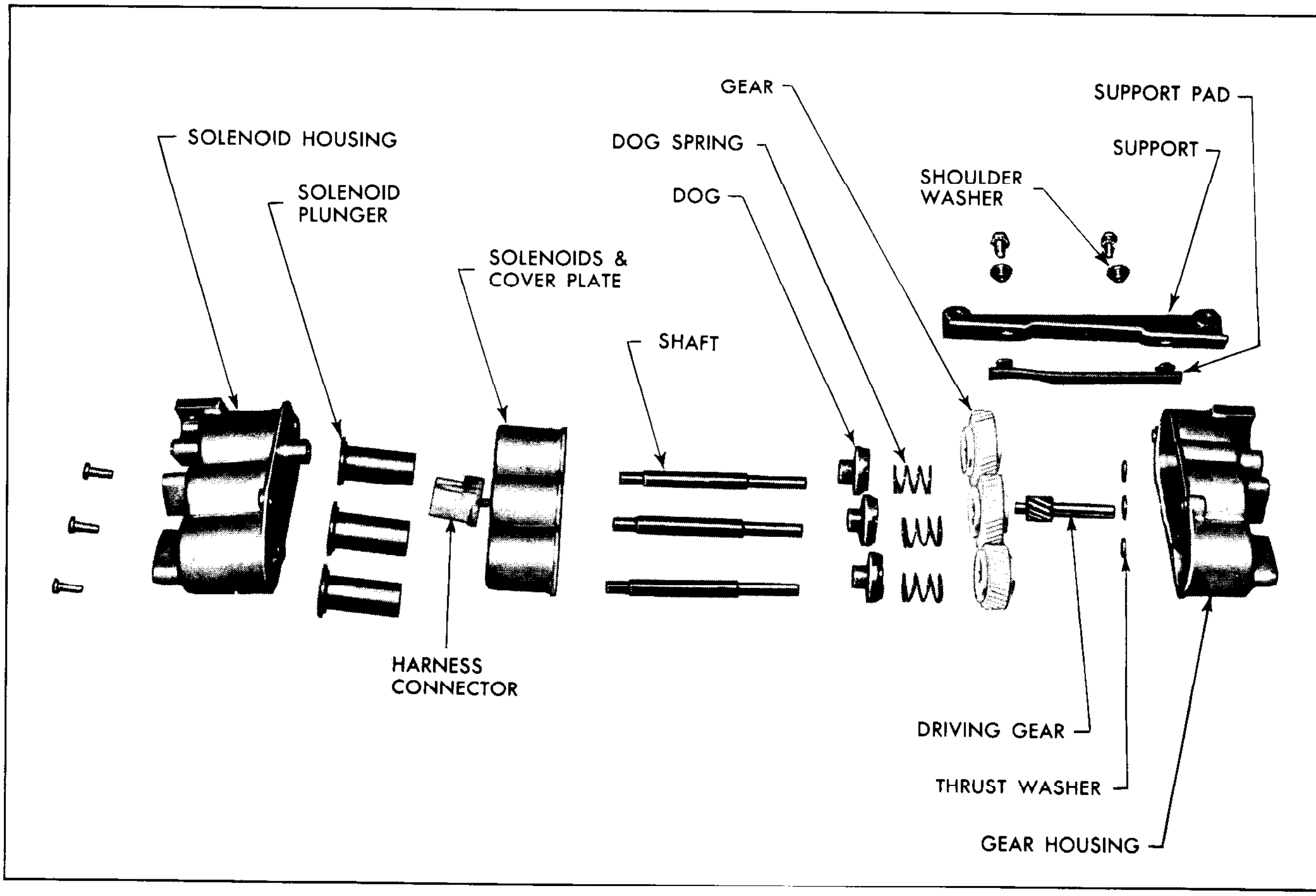


Fig. 17-75 Six Way Seat Transmission Assembly

BACK WINDOW LOWER REVEAL MOLDING (3211 and 3269 Styles)

The back window lower reveal molding is equipped with an "L" shaped retaining flange which is secured in an "L" shaped cavity in the back window rubber channel. To remove the reveal molding it is necessary to first remove the back window and rubber channel assembly; then, remove the molding from the rubber channel.

To install, reverse removal procedure.

BACK WINDOW REVEAL MOLDINGS

Back window reveal moldings are secured to the body by a combination of two or more of the following type attachments:

A. Reveal Molding Retaining Clip

B. Reveal Molding Retaining Clip and Screw

C. Reveal Molding Bolt and Clip

D. Reveal Molding Retaining Clip and Molding Clip

E. Reveal Molding Attaching Screw

F. Reveal Molding Clip (At Roof Pinchweld Flange)

The locations where these attachments are used are indicated on the illustrations for the various body styles. Also shown in the illustrations are sectional views of the attachments used.

REVEAL MOLDING RETAINING CLIPS

NOTE: The reveal molding retaining clip attachment is used at various locations marked "A" on all body styles to secure the back window reveal moldings. Wherever this clip is called out in the procedure for removing the back window reveal moldings, refer to the following procedure covering disengagement and engagement of reveal moldings from reveal molding retaining clip.

DISENGAGEMENT AND ENGAGEMENT OF REVEAL MOLDING FROM RETAINING CLIP

Reveal molding retaining clips are snapped over the back window pinchweld or retaining flange and secure the reveal molding by means of barbed prongs.

1. To disengage the reveal molding from the clip requires the use of Reveal Molding Removal Tool J-7898-01.

2. Insert end of tool between back window rubber channel and reveal molding.

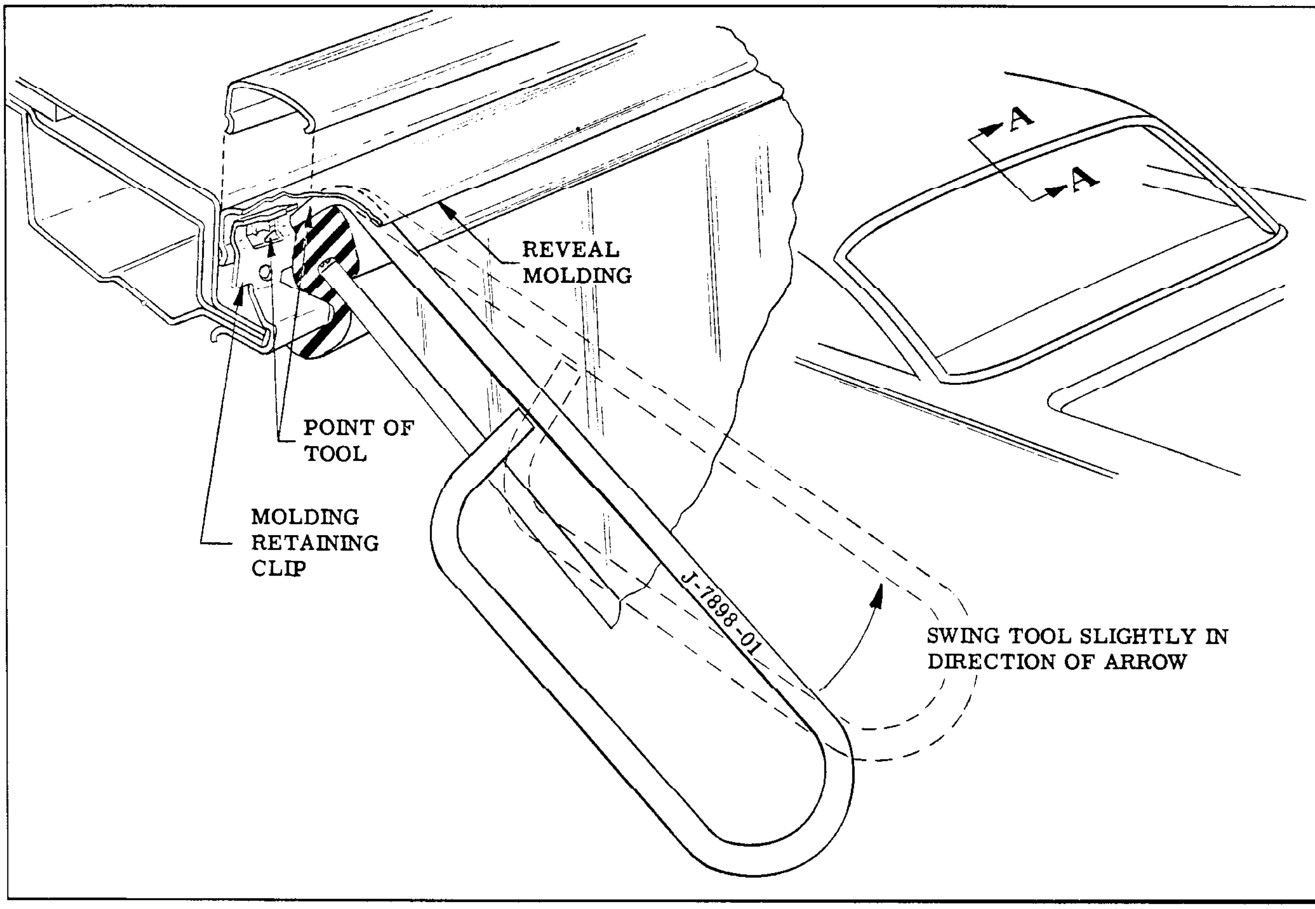


Fig. 17-76 Removing Back Window Upper Reveal Molding

3. Engage point of tool between retaining clip and molding, then swing tool slightly to disengage prongs of clip from molding and lift molding free of clip. (Fig. 17-76)

   IMPORTANT: Do not lift excessively on molding. If clip is disengaged, molding will lift free of clip easily. If clip is not disengaged, any excessive pull on molding will cause prongs of clip to bite harder on molding; thereby making it more difficult to disengage clip from molding. If difficulty is being experienced in disengaging clip, push molding at clip location to relieve pressure of clip prongs on molding while using tool to disengage clip.

   NOTE: An occasional application of a silicone lubricant on end of tool will facilitate inserting tool between reveal molding and rubber channel and sliding tool to engage with clip.

4. To install molding(s), position molding so that flange of molding is between body metal and clip; then carefully push molding at retaining clip locations until molding is properly secured by retaining clips.

SIDE REVEAL MOLDING
("11" and "69" Styles)

Carefully pull back outer lip of back window rubber channel and remove molding attaching screws at locations "B" and remove molding. To install, reverse removal procedure. (Fig. 17-77)

LOWER SIDE REVEAL MOLDING
(3569 Styles)

Removal and Installation (Fig. 17-77)

1. From inside body under inner lip of back window rubber channel, remove nut securing molding bolt and clip assembly at location "C".
2. From outside of body disengage molding from rear retaining clip "A".
3. Slide molding rearward sufficiently to disengage from front retaining clip and remove molding.
4. To install, position molding to body and engage molding with retaining clips; then, install bolt and clip nut.

LOWER CENTER REVEAL MOLDING
(3569 Styles)

Removal and Installation (Fig. 17-77)

1. Remove lower side reveal molding from one side of body.

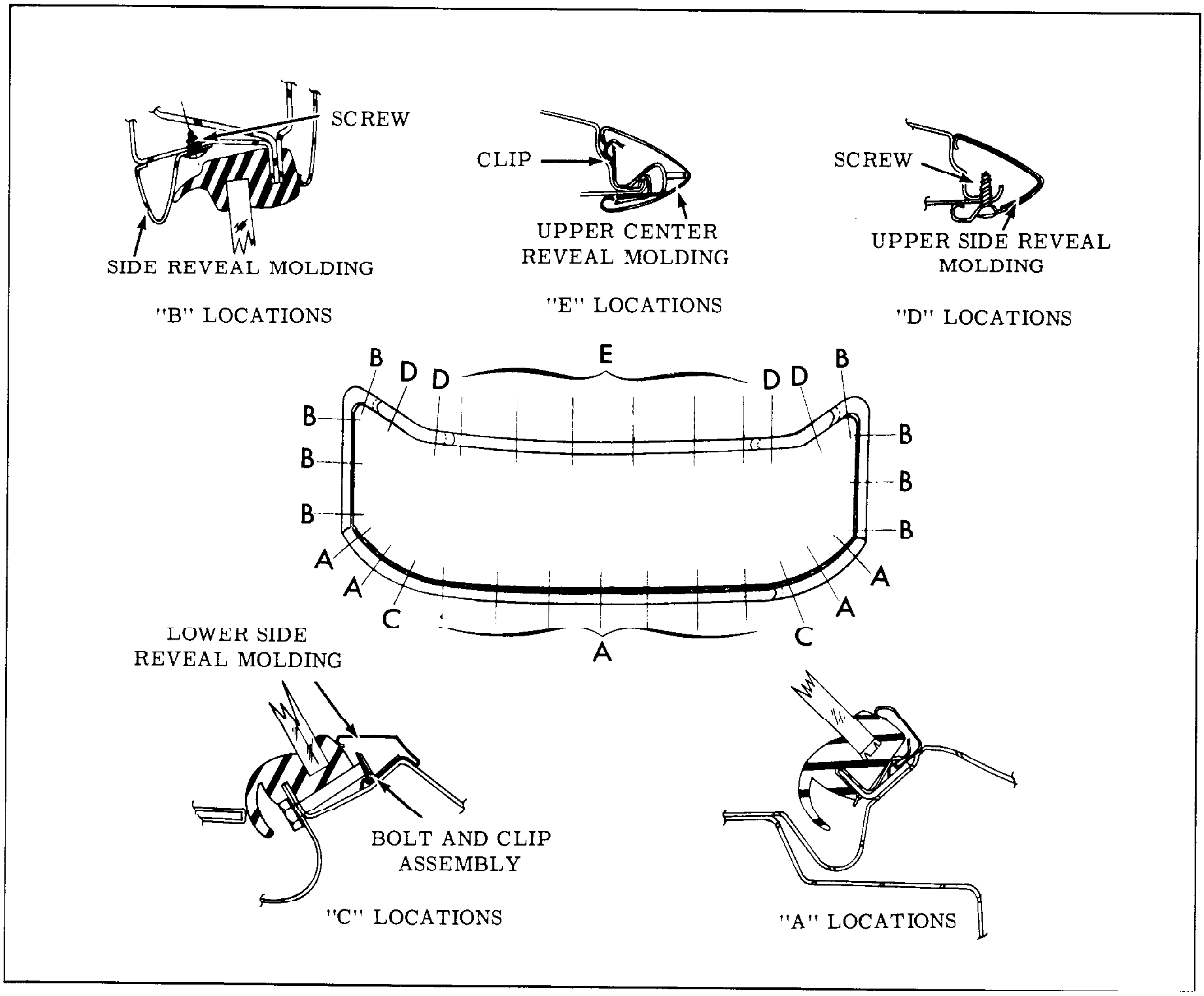


Fig. 17-77 Back Window Reveal Moldings ("69" Styles)

2. Disengage molding from retaining clips at locations "A".
3. Slide molding from under lower side molding and remove from body.
4. To install, reverse removal procedure.

UPPER SIDE REVEAL MOLDING ("11" and "69" Styles)

Removal and Installation (Fig. 17-77)

1. From bottom of molding remove screws at location "D"; then, slide molding from beneath side reveal molding and remove molding.
2. To install, reverse removal procedure.

UPPER CENTER REVEAL MOLDING ("11" and "69" Styles)

Removal and Installation (Fig. 17-77)

1. Place a double thickness of masking tape on roof panel adjacent to center reveal molding to protect painted surface.
2. Remove upper side reveal molding from one side of body.
3. Using a flat bladed tool carefully pry upper edge of molding at clip locations "E" sufficiently to disengage molding from clips.
4. Slide molding from under upper side reveal molding and remove from body.
5. To install, reverse removal procedure. Check molding clips for damage and, where necessary, replace clips.

UPPER REVEAL MOLDINGS (3237 and 3537 Styles)

Removal and Installation (Fig. 17-78)

1. Starting at lower end of molding disengage molding from the first four or five retaining

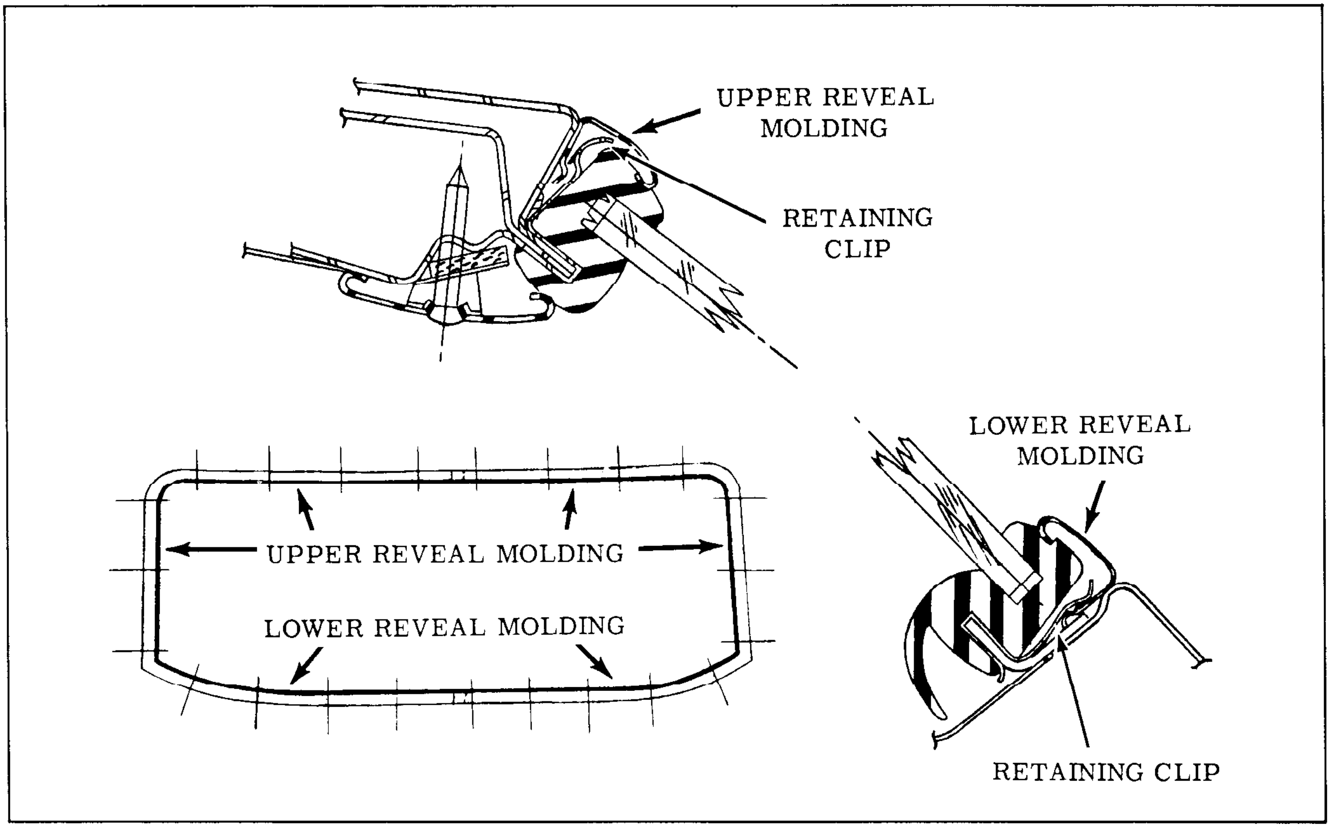


Fig. 17-78 Back Window Reveal Moldings ("37" Styles)

clips "A"; then slide molding off remaining clips by pulling molding towards side of body.

2. To install, first position molding, then engage molding with retaining clips.

LOWER REVEAL MOLDINGS (3237 and 3537 Styles)

Removal and Installation (Fig. 17-78)

1. Disengage lower end of upper reveal molding from first two retaining clips "A".
2. Starting at outer end of lower reveal molding, disengage molding from the first retaining clip "A".

   IMPORTANT: Do not use excessive force (prying) to disengage molding from this clip as it may result in damage or breakage of the clip. This clip in addition to being secured by the back window retaining flange may be secured by a screw into the back window opening and, therefore, will not flex as much as clips without the screw.

3. Disengage molding from the next retaining clip "A"; then slide molding off remaining clips by pulling molding towards side of body.
4. To install, first position molding then engage molding with retaining clips.

SIDE REVEAL MOLDING (3239 Styles)

Removal and Installation (Fig. 17-79)

1. Remove back window side garnish molding.
2. From inside body under inner lip of back window rubber channel, remove nuts from molding bolt and clip assemblies at locations "B".
3. From outside body disengage retaining clips at locations "A" and remove molding from body.
4. To install, reverse removal procedure.

LOWER REVEAL MOLDING (3239 Styles)

Removal and Installation (Fig. 17-79)

1. From inside body under inner lip of back window rubber channel, remove nut from both right and left side reveal molding lower bolt and clip assemblies "B".
2. From outside body disengage both right and left side reveal moldings from retaining clips "A".
3. Pull both right and left side reveal moldings

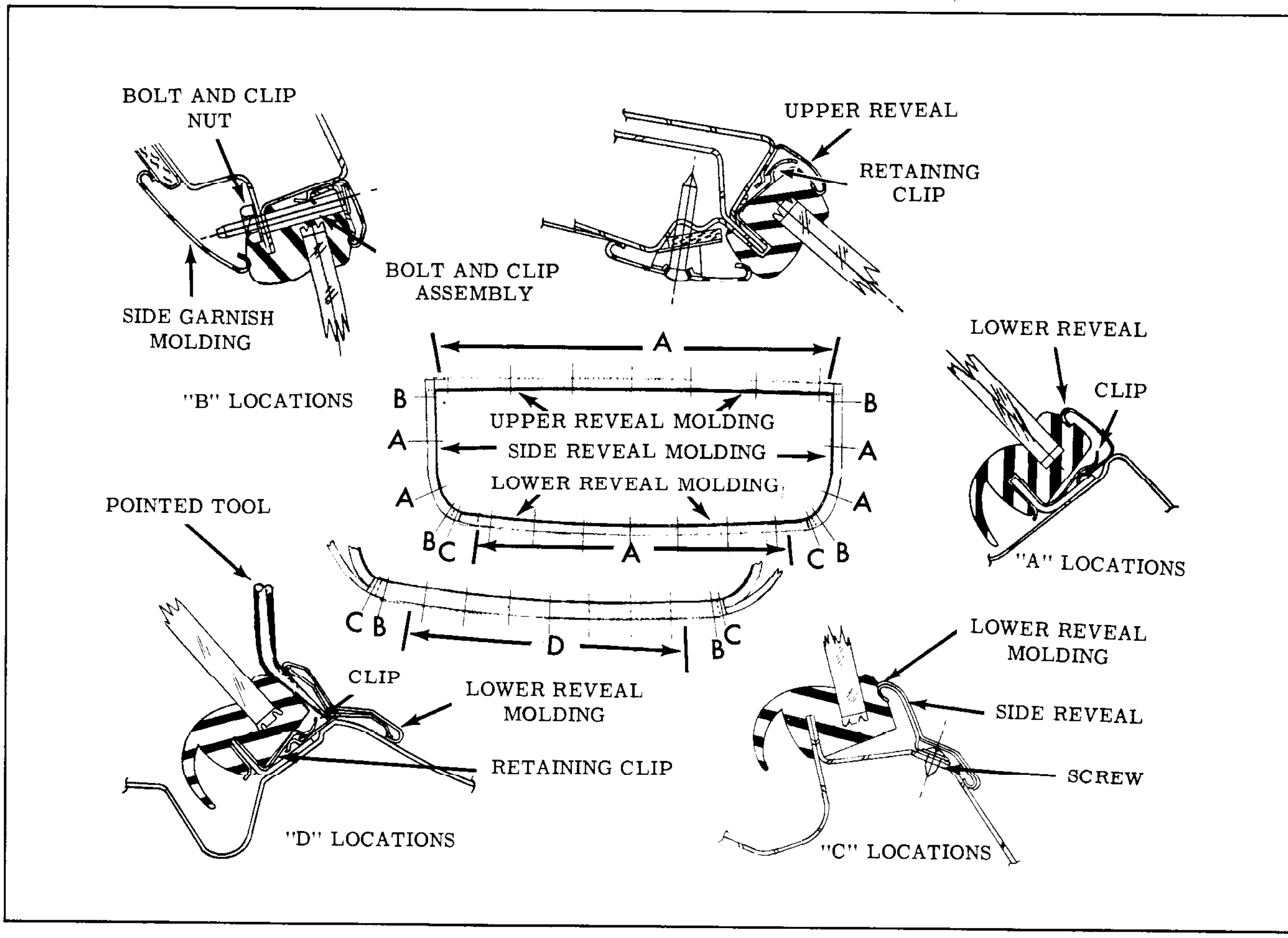


Fig. 17-79 Back Window Reveal Moldings (3239 and 3539 Styles)

away from body sufficiently to remove lower reveal molding attaching screws at location "C".

4. Disengage molding from retaining clips "A" and remove molding from body.

5. To install, reverse removal procedure.

UPPER REVEAL MOLDING (3239 and 3539 Styles)

Removal and Installation (Fig. 17-79)

1. Remove both right and left back window side garnish moldings.

2. From inside of body under inner lip of back window rubber channel, remove nut from both the right and left side reveal molding upper bolt and clip assemblies.

3. From outside body disengage both right and left side reveal moldings from upper retaining clips "A".

4. Pull side reveal moldings away from rubber channel sufficiently to disengage upper reveal molding retaining clips at locations "A"; then remove upper reveal molding from body.

5. To install, reverse removal procedure.

LOWER REVEAL MOLDING (3539 Style)

Removal and Installation (Fig. 17-79)

1. From inside body under inner lip of back window rubber channel, remove nuts from lower reveal molding bolt and clip assemblies at location "B".

2. Using Tool J-7898-01 or other similar pointed tool, insert point of tool between molding and rubber channel and engage point of tool with molding clip, as indicated in View "D".

3. Push or pull molding clip with tool until clip has moved out of engagement with molding retaining clip on body.

4. Perform this operation at each of the molding clip locations "D" and remove molding from body.

5. To install, first slide molding clips in molding

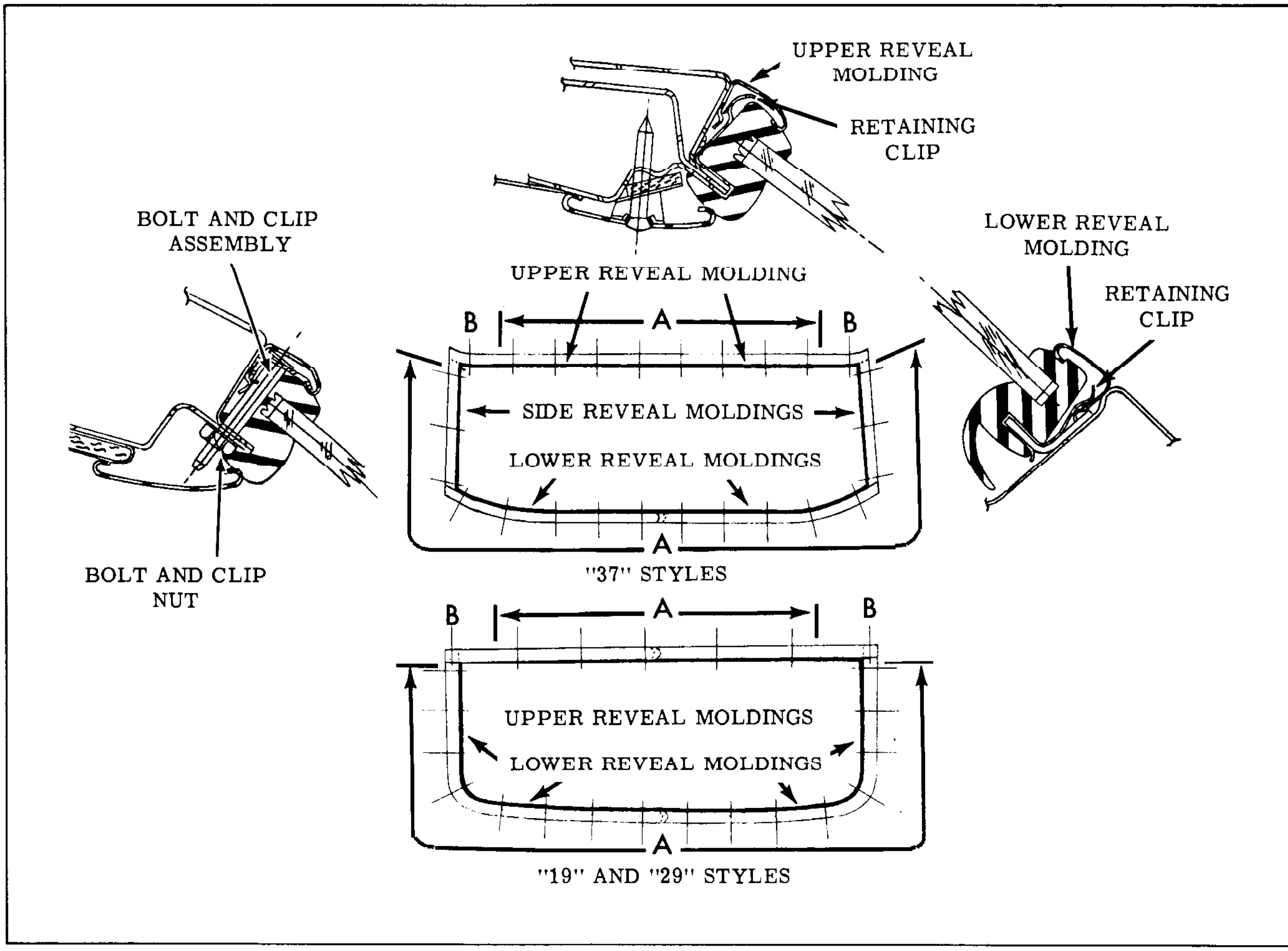


Fig. 17-80 Back Window Reveal Molding (3837 Style)

so they will be in position to engage with retaining clips on body. Then position molding to body and engage clips.

SIDE REVEAL MOLDING (3539 Style)

Removal and Installation (Fig. 17-79)

1. From inside body under inner lip of back window rubber channel, remove nut from bolt and clip assembly at upper end of side reveal molding (location "B") and outer end of lower reveal molding at location "C".

2. Using Tool J-7898-01 or other similar pointed tool, disengage the first two molding clips "D" as follows: Insert point of tool between molding and rubber channel and engage point of tool with molding clip as indicated in View "D", then push or pull molding clip with tool until clip has moved out of engagement with molding retaining clip on body.

3. Remove screw securing lower end of side reveal molding at location "C".

4. Disengage side reveal molding from retaining clips "A" and remove molding from body.

5. To install, reverse removal procedure.

UPPER REVEAL MOLDING (3837 Style)

Removal and Installation (Fig. 17-80)

1. Remove back window upper garnish moldings.

2. From inside body under lip of back window rubber channel assembly, remove nut securing molding bolt and clip assembly at both ends of molding (locations "B").

3. Disengage molding from three or four retaining clips "A"; then slide molding off remaining clips by pulling molding towards side of body.

4. To install, first position molding, then engage molding with retaining clips and install nuts on molding bolt and clip assemblies.

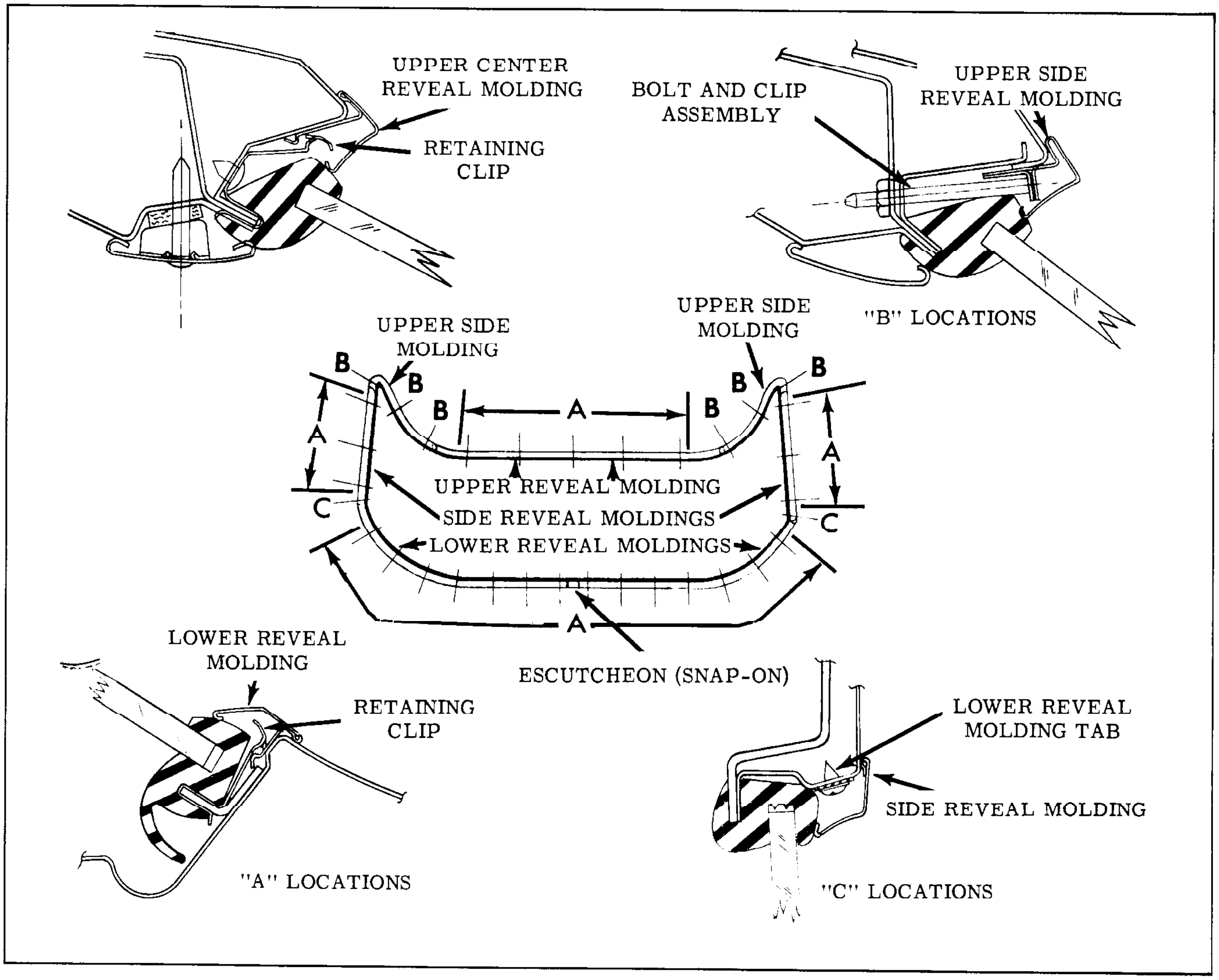


Fig. 17-81 Back Window Reveal Molding (3839 Style)

SIDE REVEAL MOLDING (3837 Style)

Removal and Installation (Fig. 17-80)

1. Remove back window upper garnish molding and corner escutcheon.
2. From inside body under lip of back window rubber channel assembly, remove nut securing upper reveal molding bolt and clip assembly at location "B" on side of body from which side reveal molding is being removed.
3. Disengage side reveal molding clips at locations "A"; then slide molding from under upper reveal molding and remove from body.
4. To install, reverse removal procedure.

LOWER REVEAL MOLDINGS (3837 Style)

Removal and Installation (Fig. 17-80)

1. Disengage lower end of side reveal molding from clips "A".
2. Disengage the outer end of the lower reveal molding from the first two or three clips "A"; then slide lower reveal molding off remaining clips "A" by pulling molding towards side of body.
3. To install, first position molding; then engage molding with retaining clips.

UPPER SIDE REVEAL MOLDING (3839 Style)

Removal and Installation (Fig. 17-80)

1. Remove back window upper garnish molding and corner escutcheon.
2. From inside body under lip of back window rubber channel assembly remove nuts from molding bolt and clip assemblies at locations "B".
3. From outside of body carefully remove molding with attached bolt and clip assemblies from body.

4. To install, first apply body caulking compound around base of bolt and clip assemblies; then reverse removal procedure.

UPPER CENTER REVEAL MOLDING (3839 Style)

Removal and Installation (Fig. 17-81)

1. Remove one upper side reveal molding (either right or left).
2. Slide upper center reveal molding off retaining clips "A" by pulling molding towards side of body.
3. To install, first position molding; then engage molding with retaining clips.

SIDE REVEAL MOLDING (3839 Style)

Removal and Installation (Fig. 17-81)

1. Remove upper side reveal molding. Disengage side reveal molding from upper clip "A"; then slide molding off remaining clips "A" by pulling molding upwards.
2. To install, first position molding; then engage molding with retaining clips.

LOWER REVEAL MOLDINGS (3839 Style)

Removal and Installation (Fig. 17-81)

1. Remove upper side reveal molding.
2. Disengage side reveal molding from upper clip "A"; then pull molding upward sufficiently to remove screw securing tab on lower reveal molding at location "C".
3. Disengage outer end of lower reveal molding from the first 3 clips "A".

   IMPORTANT: Do not use excessive force (prying) to disengage molding from these clips as it may result in damage or breakage of the clip. These clips in addition to being secured by the back window retaining flange are secured by a screw into the back window opening and, therefore, will not flex as much as clips without the screw.

4. Slide molding off remaining clips "A" by pulling molding towards side of body. Center escutcheon is a snap-on type.
5. To install, first position molding; then, engage molding with retaining clips.
6. Install screw securing tab at location "C".
7. Slide side reveal molding downward into position and engage molding with upper clip "A".
8. Install upper side reveal molding.

UPPER REVEAL MOLDING (3819-29 Styles)

Removal and Installation (Fig. 17-80)

1. Remove back window upper garnish molding.
2. From inside body under inner lip of back window rubber channel remove nut from upper reveal molding bolt and clip assembly at location "B".
3. Slide upper reveal molding off retaining clips "A" by pulling molding towards side of body.
4. To install, first position molding; then engage molding with retaining clips "A".
5. Install nut securing molding clip and bolt assembly.

LOWER REVEAL MOLDING (3819-29 Styles)

Removal and Installation (Fig. 17-80)

1. Remove back window upper garnish molding.
2. From inside body under inner lip of back window rubber channel remove nut from upper reveal molding bolt and clip assembly at location "B".
3. Disengage lower reveal molding from the retaining clips "A" along the side of the back window; then, slide molding off the remaining retaining clips "A".
4. To install, first position molding; then, engage molding with retaining clips.

BACK WINDOW

BACK WINDOW ASSEMBLY ("19", "29" and "37" Styles)

Removal

1. Place protective coverings over rear seat cushion and back, over parcel shelf trim and over painted surfaces around back window.
2. Remove back window garnish moldings. Remove back window sunshade and support, where present.
3. Remove back window reveal moldings.
4. From inside body carefully break seal between lip of rubber channel and pinchweld flange completely around back window.

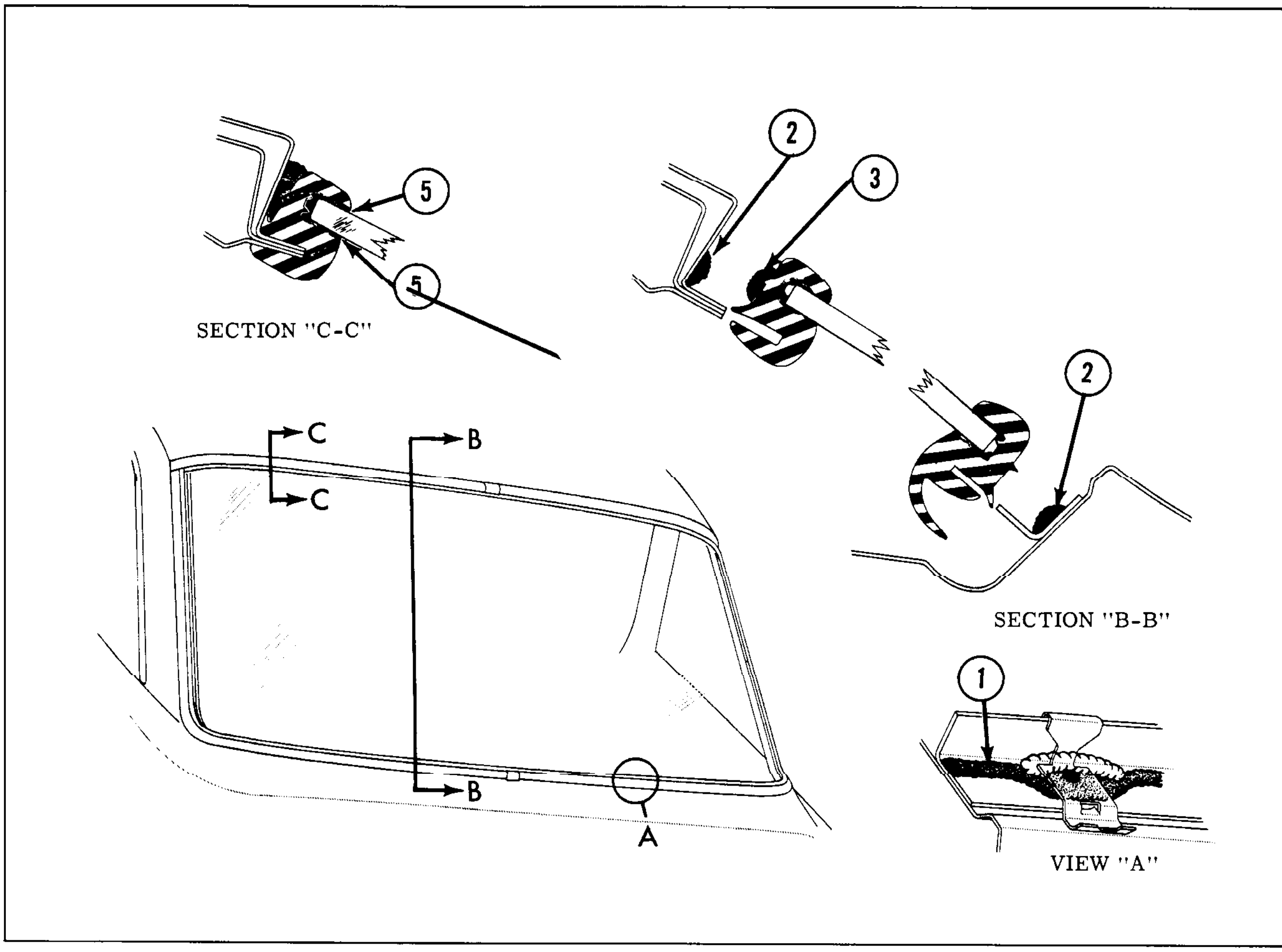


Fig. 17-82 Back Window Sealing (3819-29 and 37 Styles)

5. Carefully push back window and rubber channel assembly outward until lip of rubber channel is disengaged from body pinchweld flange.

6. With aid of a helper, lift complete assembly from body opening and place on a protected surface. Remove rubber channel from glass.

Installation

IMPORTANT: Care should be exercised to make certain glass does not strike body metal during installation as edge chips can cause tempered plate glass to shatter. DO NOT attempt to grind glass.

1. Clean original sealer from back window body opening and rubber channel and install rubber channel to glass.

   IMPORTANT: Before installing back window glass, check the back window body opening and pinchweld flange for any irregularities and correct, where necessary.

2. Check installation of reveal molding clips at pinchweld and retaining flanges and replace clips, where necessary. If replacing clips, apply medium-bodied sealer to opening rabbet, prior to installing clips. ("1", View "A", Fig. 17-82)

3. Apply a continuous ribbon of medium-bodied sealer (approximately 1/2" wide by 1/4" thick) on wall of rabbet, completely around opening. ("2", Section "B-B", Fig. 17-82)

4. Insert a strong cord into pinchweld cavity of rubber channel; tie ends together at bottom center and tape to inside surface of glass.

5. Apply a continuous ribbon of medium-bodied sealer (approximately 1/2" wide by 1/4" thick) to base of rubber channel across top and down sides at opening. ("3", Section "B-B", Fig. 17-82)

6. With aid of a helper, position back window assembly into body opening. While helper is applying hand pressure to outside surface of glass, use a hooked tool to pull inner lip of rubber channel over retaining flange along bottom of opening.

7. With aid of helper applying hand pressure to

outside surface of glass, pull cords in rubber channel and, where necessary, use a hooked tool to seat lip of rubber channel over body flanges across bottom, up sides and across top of window opening.

IMPORTANT: If, during the string pulling operation, the rubber lip is not seating properly over the body flange, check for location(s) where the rubber channel is tight against the body flange preventing forward movement of the glass and channel assembly into the opening. Using a hooked tool, seat the rubber lip over the body flange at any tight location(s) before proceeding with the cord pulling sequence.

8. Using a pressure type applicator, apply sufficient medium-bodied sealer to completely fill wedge shaped opening between rubber channel and body across top and down sides of rubber channel. ("4", Section "C-C", Fig. 17-82)
9. Using a pressure type applicator (pistol type oiler) apply weatherstrip adhesive (black) between rubber channel and glass on inside and outside of glass around entire perimeter of glass. ("5", Section "C-C", Fig. 17-82) Application of adhesive should be continuous with no skips.
10. Install back window moldings as described under BACK WINDOW REVEAL MOLDINGS.
11. Clean off excess sealer and cement; install previously removed parts and remove protective coverings.

BACK WINDOW ASSEMBLY ("11" and "69" Styles)

Removal

1. Remove rear seat cushion and back, and both right and left quarter trim assemblies. Place protective coverings over parcel shelf trim and over painted surfaces around back window.
2. Remove back window garnish moldings. Remove back window lower side and lower center reveal moldings on all styles except 3211-69.
3. From inside body carefully break seal between lip of rubber channel and pinchweld flange completely around back window.
4. Carefully push back window and rubber channel assembly outward until lip of rubber channel is disengaged from body pinchweld flange.
5. With aid of a helper, lift complete assembly from body opening and place on a protected surface. On 3211-69 styles, remove lower reveal molding from rubber channel. Remove rubber channel from glass.

Installation

IMPORTANT: Care should be exercised to make certain glass does not strike body metal during installation as edge chips can cause tempered plate glass to shatter. DO NOT attempt to grind glass.

1. Clean original sealer from back window body opening and rubber channel and install rubber channel to glass. On 3211-69 styles install lower reveal molding in cavity of rubber channel.

   IMPORTANT: Before installing back window glass, check the back window body opening pinchweld flange for any irregularities and correct where necessary.

2. Check installation of lower reveal molding clips at pinchweld and retaining flanges and replace clips, where necessary. If replacing clips, apply medium-bodied sealer to opening rabbet prior to installing clips. ("1", View "A", Fig. 17-83)
3. Apply a continuous ribbon of medium-bodied sealer (approximately 1/2" wide by 1/4" thick) on wall of rabbet completely around opening. ("2", Section "B-B", Fig. 17-83)
4. Insert a strong cord in pinchweld cavity of rubber channel; tie ends together at bottom center and tape to inside of glass.
5. Apply a continuous ribbon of medium-bodied sealer (approximately 1/2" wide by 1/4" thick) to base of rubber channel across top and down sides of rubber channel. ("3", Section "B-B", Fig. 17-83)
6. With aid of a helper, position back window assembly into body opening. While helper is applying hand pressure to outside surface of glass, use a hooked tool or other suitable tool to pull inner lip of rubber channel over retaining flange along bottom of opening.
7. With aid of helper applying hand pressure to outside surface of glass, pull cords in rubber channel and, where necessary, use a hooked tool to seat lip of rubber channel over body flanges at sides, across bottom and across top of window opening.

   IMPORTANT: If, during the string pulling operation, the rubber lip is not seating properly over the body flange, check for location(s) where the rubber channel is tight against the body flange preventing forward movement of the glass and channel assembly into the opening. Using a hooked tool, seat the rubber lip over the body flange at any tight location(s) before proceeding with the cord pulling sequence.

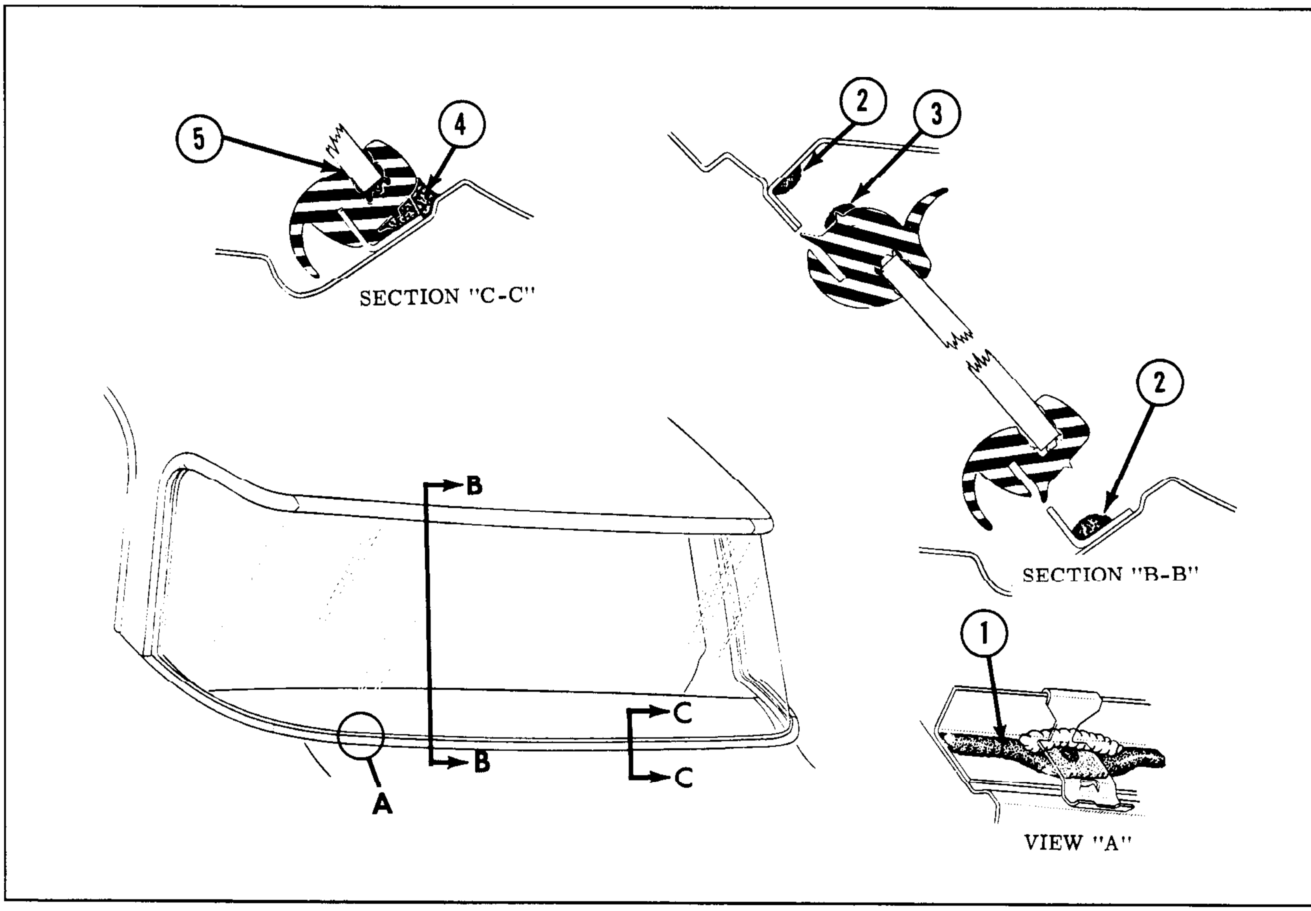


Fig. 17-83 Back Window Sealing (All 11, and 69 Styles)

8. Using a pressure type applicator, apply sufficient medium-bodied sealer to completely fill the wedge shaped opening between rubber channel and body across bottom of channel. ("4", Section "C-C", Fig. 17-83)
9. Using a pressure type applicator (pistol type oiler) apply weatherstrip adhesive (black) between rubber channel and glass on inside and outside of glass around entire perimeter of glass. ("5", Section "C-C", Fig. 17-83) Application of adhesive should be continuous with no skips.
10. Install back window lower reveal moldings as described under BACK WINDOW REVEAL MOLDINGS.
11. Clean off excess sealer and adhesive; install previously removed parts and remove protective coverings.

BACK WINDOW ASSEMBLY (3239 and 3539 Styles)

Removal

1. Place protective coverings over rear seat cushion and back, over parcel shelf trim and over painted surfaces around back window.
2. Remove back window garnish moldings.
3. Remove back window upper reveal moldings.
4. From inside body carefully break seal between lip of rubber channel and pinchweld flange completely around back window.
5. With aid of a helper, carefully push upper portion of glass outward; then lift glass upward and remove from body. Place glass on a protected surface.
6. Remove back window rubber channel from body opening.
7. Remove back window side and lower reveal moldings.

Installation

IMPORTANT: Care should be exercised to make certain glass does not strike body metal during installation as edge chips can cause tempered plate glass to shatter. DO NOT attempt to grind glass.

1. Clean original sealer from back window body opening and rubber channel and install rubber channel to glass.

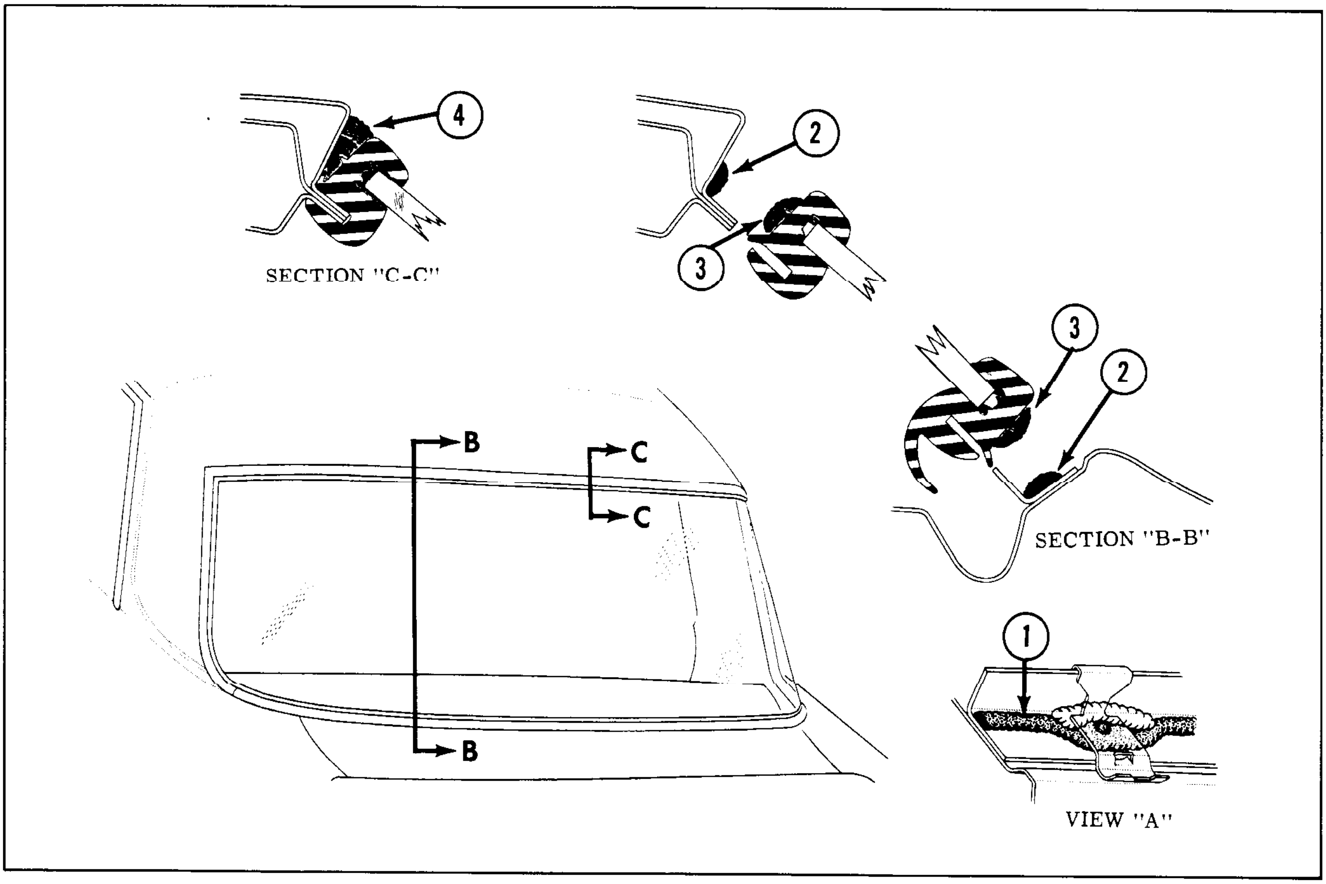


Fig. 17-84 Back Window Sealing (3239 and 3539)

IMPORTANT: Before installing back window glass, check the back window body opening and pinchweld flange for any irregularities and correct, where necessary.

2. Check installation of reveal molding clips at pinchweld and retaining flanges and replace clips, where necessary. If replacing clips, apply medium-bodied sealer to opening rabbet, prior to installing clips. ("1", View "A", Fig. 17-84)

3. Apply a continuous ribbon of medium-bodied sealer (approximately 1/2" wide by 1/4" thick) on wall of rabbet completely around opening. ("2", Section "B-B", Fig. 17-84)

4. Insert a strong cord into pinchweld cavity of rubber channel; tie ends together at bottom center and tape to inside surface of glass.

5. Apply a continuous ribbon of medium-bodied sealer (approximately 1/2" wide by 1/4" thick), completely around base of rubber channel. ("3", Section "B-B", Fig. 17-84)

6. With aid of a helper, position back window assembly into body opening. While helper is applying hand pressure to outside surface of glass, use a hooked tool to pull inner lip of rubber channel over retaining flange along bottom of opening.

7. With aid of helper applying hand pressure to outside surface of glass, pull cords in rubber channel and, where necessary, use a hooked tool to seat lip of rubber channel over body flanges at sides, across bottom and across top of window opening.

IMPORTANT: If, during the string pulling operation, the rubber lip is not seating properly over the body flange, check for location(s) where the rubber channel is tight against the body flange preventing forward movement of the glass and channel assembly into the opening. Using a hooked tool, seat the rubber lip over the body flange at any tight location(s) before proceeding with the cord pulling sequence.

8. Using a pressure type applicator, apply sufficient medium-bodied sealer to completely fill the wedge shaped opening between rubber channel and body across top of channel. ("4", Section "C-C", Fig. 17-84)

9. Using a pressure type applicator, apply weatherstrip adhesive (black) between rubber channel and glass on inside and outside of glass

around entire perimeter of glass. ("5", Section "C-C", Fig. 17-83) Application of adhesive should be continuous with no skips.

10. Install back window reveal moldings as described under BACK WINDOW REVEAL MOLDINGS.
11. Clean off excess sealer and adhesive; install previously removed parts and remove protective coverings.

BACK WINDOW ASSEMBLY (3839 Style)

Removal

1. Remove rear seat cushion and back assemblies, and rear quarter trim assemblies. Place protective coverings over parcel shelf trim and over painted surfaces around back window.
2. Remove back window garnish moldings.
3. Remove all back window reveal moldings. See BACK WINDOW REVEAL MOLDINGS ("39" Styles).
4. From inside body, carefully break seal between lip of rubber channel and pinchweld flange around perimeter of glass.
5. Carefully push lower edge of window and rubber channel assembly rearward until lip of rubber channel is disengaged from retaining flange; then push upper edge until disengaged from pinchweld flange.
6. With aid of helper, lift complete assembly from body opening and place on a protected surface.

CHECKING BACK WINDOW BODY OPENING

Due to the size and contour of the wrap-around back window it is important that the back window body opening be checked before the installation of a replacement glass. The following procedure outlines the method which may be used to check the back window body opening.

1. Clean off original sealer from back window body opening.
2. Check body pinchweld flange for any irregularities and correct, where necessary.
3. Install Windshield Check Blocks J-8942 over pinchweld flange at locations shown in Fig. 17-85.
4. With aid of a helper, carefully position replacement glass in back window opening.

   CAUTION: Care should be exercised to make certain glass does not strike body metal during checking procedure or installation procedure as edge chips can cause tempered plate glass to shatter. DO NOT attempt to grind glass.

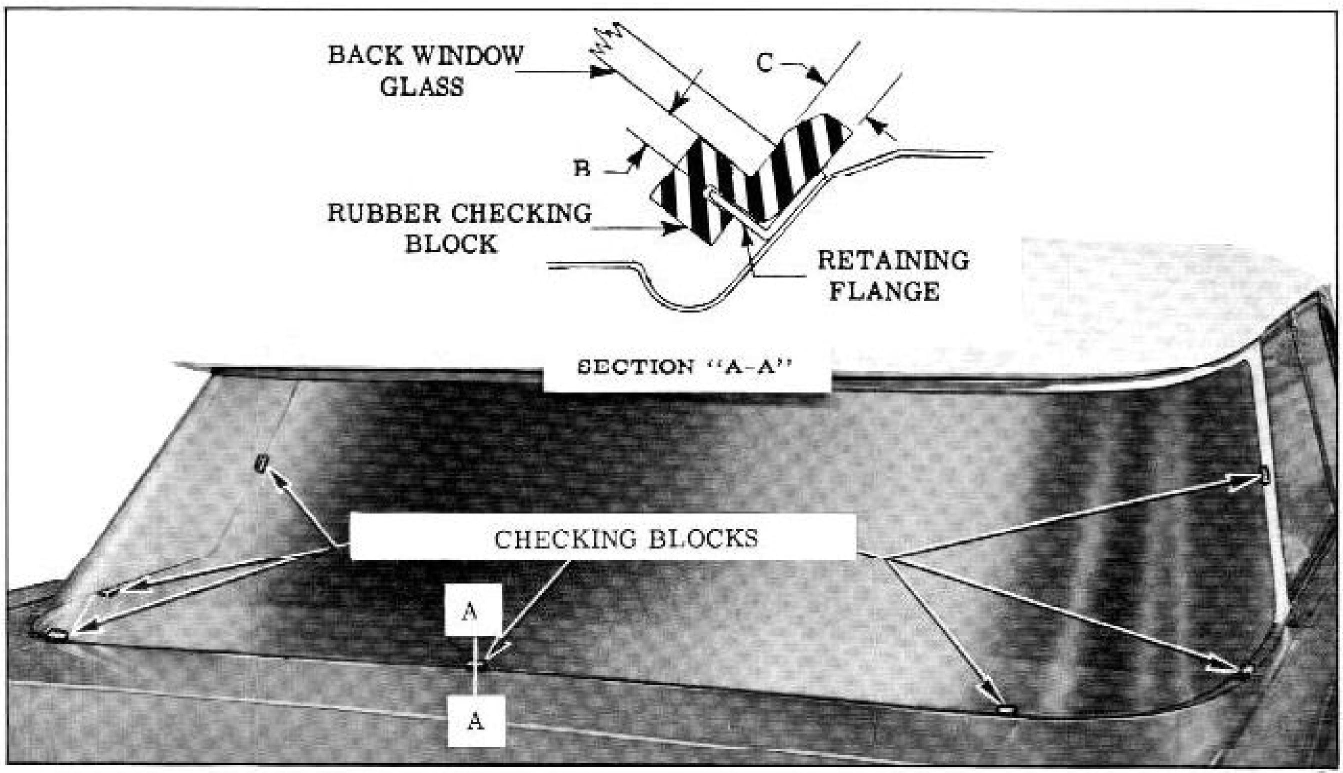


Fig. 17-85 Checking Back Window Opening (3839)

5. With back window glass supported and centered in the opening by checking blocks, check relationship of glass to body opening around entire perimeter of glass. The distance between the inside surface of the glass and the pinchweld flange, indicated at "B" in Section "A-A", and between the outer edge of the glass and body metal, indicated at "C" in Section "A-A", should be uniform along the bottom and at the sides of the glass and body opening. (Fig. 17-85) Any irregularities should be marked and re-formed. The distance between the outer edge of the glass and body metal, indicated at "C" in Section "A-A", increases at the upper corners and along the top of the opening.
6. Mark any sections of body to be re-formed; remove glass from opening and re-form opening as required.
7. Recheck back window opening again as outlined above. MARK CENTER OF GLASS AND BODY OPENING so that the glass can be accurately centered in the opening when installing.

Installation

1. Clean original sealer from back window body opening and rubber channel. Check back window body opening and pinchweld flange for any irregularities and correct, where necessary.
2. Check installation of reveal molding clips at pinchweld and retaining flanges and replace clips, where necessary. If replacing clips, apply medium-bodied sealer to opening rabbet, prior to installing clips. ("1", View "A", Fig. 17-86)

   IMPORTANT: If installing a new back window glass, check glass and body opening as described under CHECKING BACK WINDOW BODY OPENING ("39" Styles).

3. Apply a continuous ribbon (approximately 1/4" thick) of medium-bodied sealer to wall of back window rabbet completely around opening. ("2", Section "B-B", Fig. 17-86)
4. Install rubber channel to glass. Insert a strong cord into pinchweld cavity of rubber channel from lower corner of one side around top of lower corner of opposite side; then insert another cord from upper corner of one side around bottom to upper corner of opposite side. (Fig. 17-87) Tape ends of cords to inside surface of glass.

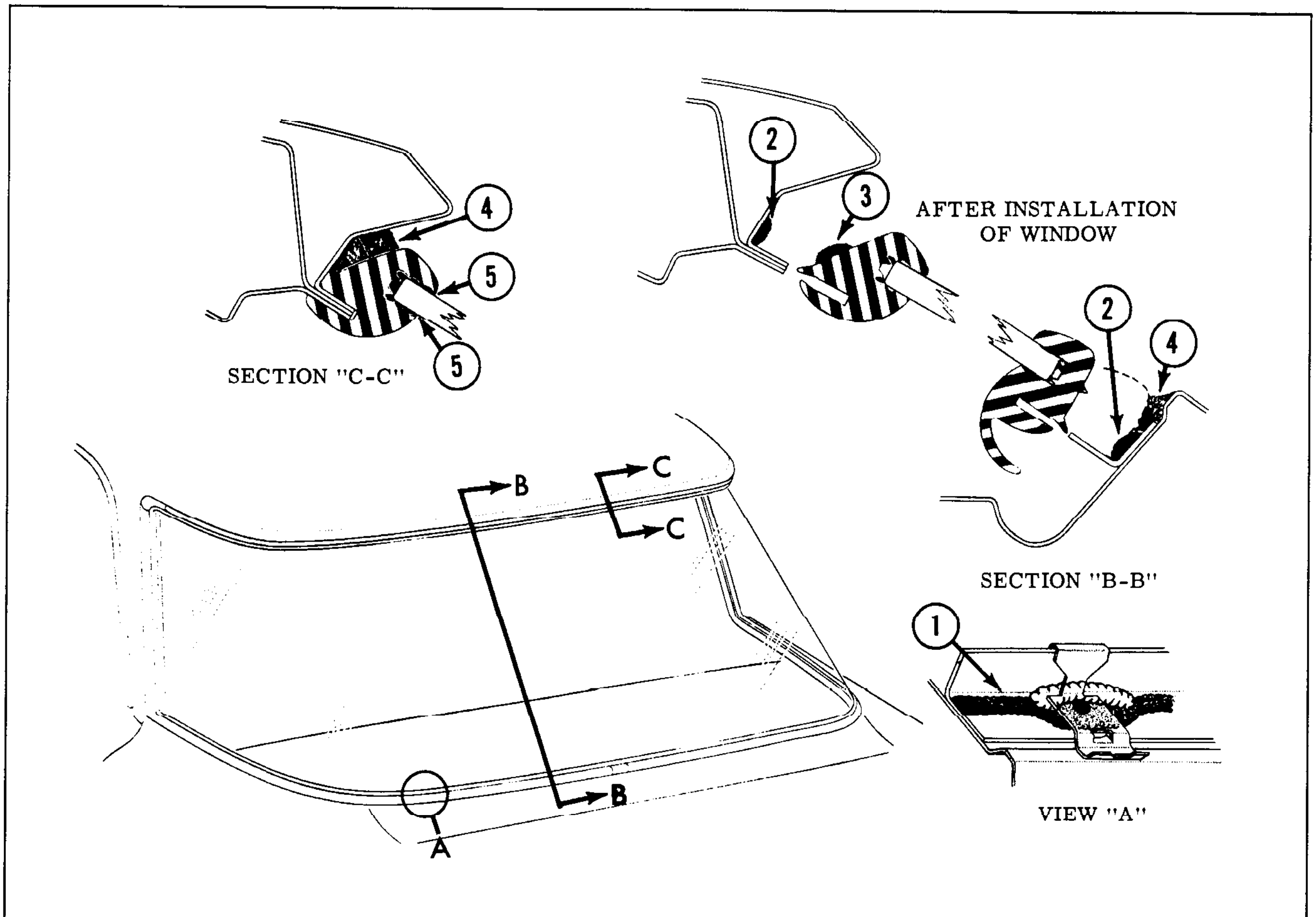


Fig. 17-86 Back Window Sealing (3839)

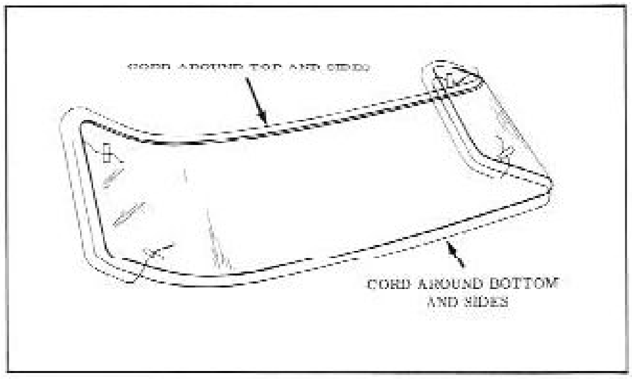


Fig. 17-87 Back Window Cord Installation

5. Apply a continuous ribbon of medium-bodied sealer (approximately 1/2" wide by 1/4" thick) to base of rubber channel across top and down sides of rubber channel. ("3", Section "B-B", Fig. 17-86)

6. Apply a 2" wide film of rubber lubricant (soap and water solution) just outboard of pinchweld flange completely around lower portion of back window opening.

7. With aid of a helper, position glass and rubber channel assembly into body opening snug to outside of pinchweld flange and center glass and channel according to center marks.

8. While a helper is applying hand pressure to outside surface of glass, use a hooked tool to pull inner lip of rubber channel over retaining flange along bottom of opening.

9. With aid of a helper, applying hand pressure to outside surface of glass, pull cords in rubber channel and, where necessary, use a hooked tool to seat lip of rubber channel over body flanges at sides first; then across top and ending up across the bottom.

   IMPORTANT: If, during the string pulling operation, particularly when starting at the sides, the rubber lip is not seating properly over the body flange, check for location(s) where the rubber channel is tight against the body flange preventing forward movement of the glass and channel assembly into the opening. Using a hooked tool, seat the rubber lip over the body flange at any tight location(s) before proceeding with the cord pulling sequence.

10. Using a pressure type applicator, apply sufficient medium-bodied sealer to completely fill wedge shaped opening between rubber channel and body completely around rubber channel. ("4". Section "B-B" and "C-C", Fig. 17-86)

11. Using a pressure type applicator, apply weatherstrip adhesive (black) between rubber channel and glass on inside and outside of glass around entire perimeter of glass ("5", Section "C-C", Fig. 17-86) Application of adhesive should be continuous with no skips.

12. Install back window reveal moldings as described under BACK WINDOW REVEAL MOLDINGS (3839 Style).

13. Clean off all excess sealer and cement; install previously removed parts and remove protective coverings.

REAR COMPARTMENT

The rear compartment lid employs 2 torsion rods between the hinge assemblies as a counterbalance and hold open for the lid. Notches are provided at the hinge assemblies for rod adjustment. The rear compartment lid lock employs the use of a side action snap-bolt mechanism. The end of the lock assembly enters the striker when the lid is closed and acts as a guide. A single section cement-on type weatherstrip is used on all styles and is cemented to the rear compartment and gutter assembly.

REAR COMPARTMENT LID

Removal and Installation

1. Open lid and place protective covering along edges of rear compartment opening to prevent damage to painted surface.

2. Disengage wire harness from clips on hinge and rear compartment lid inner panel and remove wire harness from lid where necessary.

3. Mark location of hinge straps on lid inner panel.

4. With aid of helper remove lid attaching bolts "A" and remove lid. (Fig. 17-88)

5. To install rear compartment lid, reverse removal procedure. Align lid with scribe marks before tightening hinge attaching bolts.

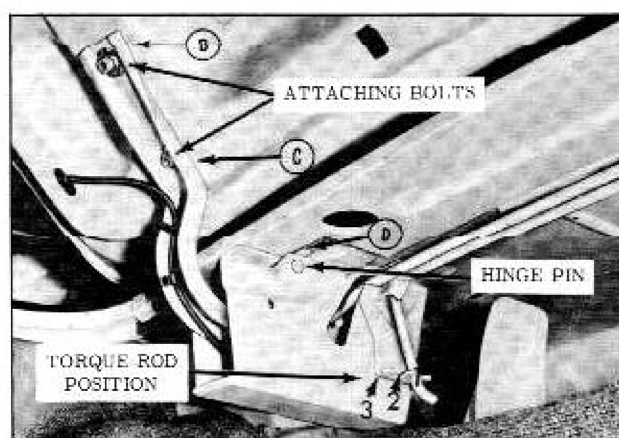


Fig. 17-88 Rear Compartment Hinge and Torque Rod

REAR COMPARTMENT LID ADJUSTMENTS

1. To adjust compartment lid forward or rearward, or from side to side in body opening, loosen both hinge strap attaching bolts and adjust lid as required; then tighten bolts.

2. To adjust compartment lid at hinge area up or down, install shims between lid inner panel and hinge straps as follows:

   a. To raise front edge of lid at hinge area, place shim between lid inner panel and forward portion of one or both hinge straps at "C". (Fig. 17-88)

   b. To lower front edge of lid at hinge area, place shim between lid inner panel and rearward portion of one or both hinge straps at "B". (Fig. 17-88)

3. To check lid lock bolt engagement with striker, see REAR COMPARTMENT LID LOCK STRIKER ENGAGEMENT CHECK.

REAR COMPARTMENT LID HINGE

Removal

1. Place protective covering over body around upper portion of rear compartment opening and provide support for lid on side where hinge is to be removed.

2. Remove rear compartment side trim foundation at hinge area if necessary. If left hinge is being removed, disengage wire harness from clip on left hinge.

3. Mark location of hinge strap on lid inner panel and remove bolts securing hinge strap to lid.

4. With a suitable tool disengage torque rod from notched retainer on inboard face of opposite hinge box "E". (Fig. 17-88)

   NOTE: Mark retainer notch before removing torque rod to insure that rod is installed in same position.

5. Disengage opposite end of torque rod from movable portion of hinge strap and remove rod.

6. Bend up hinge pin retaining tab on inboard face of hinge box "D"; remove hinge pin and then remove hinge from box. (Fig. 17-88)

Installation

1. Position hinge in hinge box and install hinge pin. Bend over retaining tab to secure hinge pin.

2. Position hinge strap within scribe marks on lid inner panel and install attaching bolts.

3. Install "U" shaped end of torque rod to hinge box making certain outer end of rod is engaged in hole in outboard face of hinge box.

4. Engage torque rod to lower movable portion of hinge and engage other end of rod to correct retaining notch in inboard face of opposite hinge box.

5. Check alignment of rear compartment lid and make any necessary adjustments.

6. Replace wire harness if left hinge was removed.

7. Replace all previously removed trim.

REAR COMPARTMENT TORQUE ROD ADJUSTMENT

The amount of effort required to open and close the rear compartment lid is determined by the position of the torque rods in the notches on the inboard face of the hinge boxes. If the torque rod is located in position 1, the amount of effort required to open the lid is the greatest and the amount of effort required to close the lid is the least. If the torque rod is located in position 3, the amount of effort to open the lid is the least and the amount of effort to close the lid is the greatest. ("E", Fig. 17-88)

NOTE: It is not necessary to adjust the left and right hand torque rods at the same time or to the same final position (notch).

REAR COMPARTMENT LID LOCK CYLINDER

The rear compartment lid lock cylinder is secured to the rear end outer panel by a metal retainer.

Removal and Installation

1. Open rear compartment lid.

2. Remove lock cylinder retainer and remove lock cylinder assembly. (Fig. 17-89)

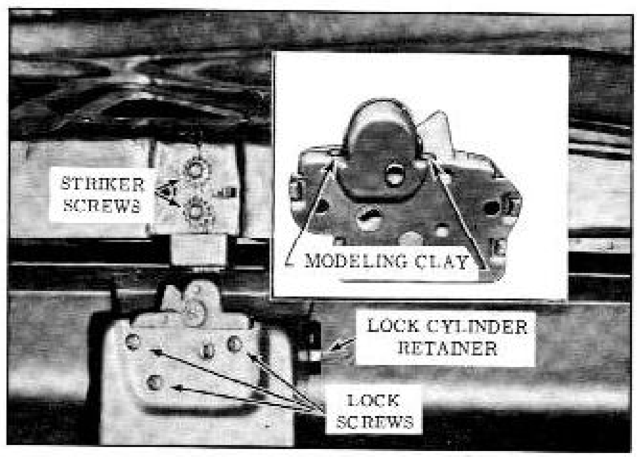


Fig. 17-89 Rear Compartment Lid Lock and Striker

3. To install, reverse removal procedure, making certain lock cylinder gasket seals to the rear end outer panel. Check for proper operation.

REAR COMPARTMENT LID LOCK

Removal and Installation

1. Open rear compartment lid.
2. Remove lock cylinder retainer and remove cylinder assembly. (Fig. 17-89)
3. Remove lock attaching screws and lock assembly. (Fig. 17-89)
4. To install, reverse removal procedure and check for proper operation of lock and lock cylinder.

REAR COMPARTMENT LID LOCK STRIKER

Removal and Installation

1. Open rear compartment lid.
2. Mark location of striker on lid inner panel.
3. Remove attaching screws and striker.
4. To install, position striker within scribed marks, install attaching screws, check for proper operation and tighten attaching screws.

REAR COMPARTMENT LID LOCK STRIKER ENGAGEMENT CHECK

IMPORTANT: Since the rear compartment lock frame acts as a guide when entering the striker, make sure rear compartment lid is properly positioned in body opening before performing striker engagement check. To check for proper engagement of rear compartment lid lock bolt with striker, use the following procedure.

1. Insert a small quantity of modeling clay on frame of lock at both sides of the lock bolt as shown in inset of Fig. 17-89. Close lid with moderate force.
2. Open lid and check amount of engagement of striker with lock frame as indicated by the compression of the clay. The striker bar impressions in the clay should be even on both sides of the lock frame. Where required, loosen striker attaching screws; adjust striker sideways or up or down to obtain proper engagement; then tighten screws.

REAR COMPARTMENT WEATHERSTRIP

Removal

1. Separate butt ends of weatherstrip at rear of compartment opening.
2. Using a flat-bladed tool, carefully disengage weatherstrip from its cement bond in gutter around entire perimeter of rear compartment and remove weatherstrip.

Installation

1. Clean out gutter around entire rear compartment opening to provide a clean cementing surface.
2. Apply (brush) a continuous coat of neoprene type weatherstrip cement along the lower and outer surfaces of the rear compartment gutter as indicated at "1" in Fig. 17-90 around full length of gutter.
3. Using a flat-bladed tool such as a putty knife or headlining inserting tool, insert weatherstrip into gutter starting with one end of weatherstrip at rear center of gutter and working completely around gutter.
4. When installing new weatherstrip, trim end of weatherstrip to form a butt joint at rear center of opening. Brush weatherstrip adhesive on both ends of weatherstrip and secure ends together to form a butt joint.
5. Using a pressure type applicator, apply neoprene type weatherstrip cement between weatherstrip and outer surface of gutter as indicated at "2" completely around gutter to assure a watertight seal. (Fig. 17-90)
6. Roll or press weatherstrip to aid in obtaining a good cement bond and proper retention of the weatherstrip. Allow sufficient time for cement to set before closing rear compartment lid.

EXTERIOR MOLDINGS

The exterior moldings are secured to the body by any one or a combination of the following: attaching screws, attaching nuts, snap retention on body parts, bathtub type snap-on clips of steel or plastic construction, friction type snap-in clips, bolts and clip assemblies, and molding integral attaching studs. Fig. 17-91 illustrates the typical

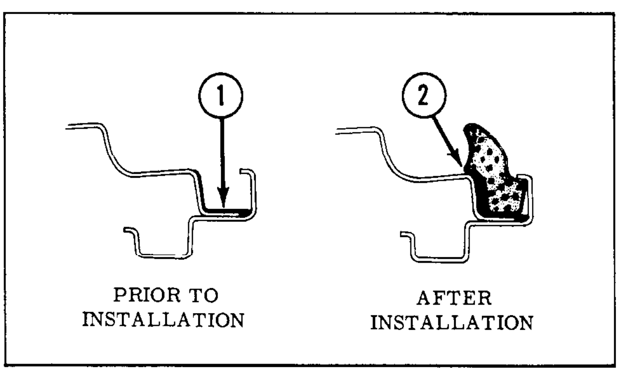


Fig. 17-90 Rear Compartment Weatherstrip Installation

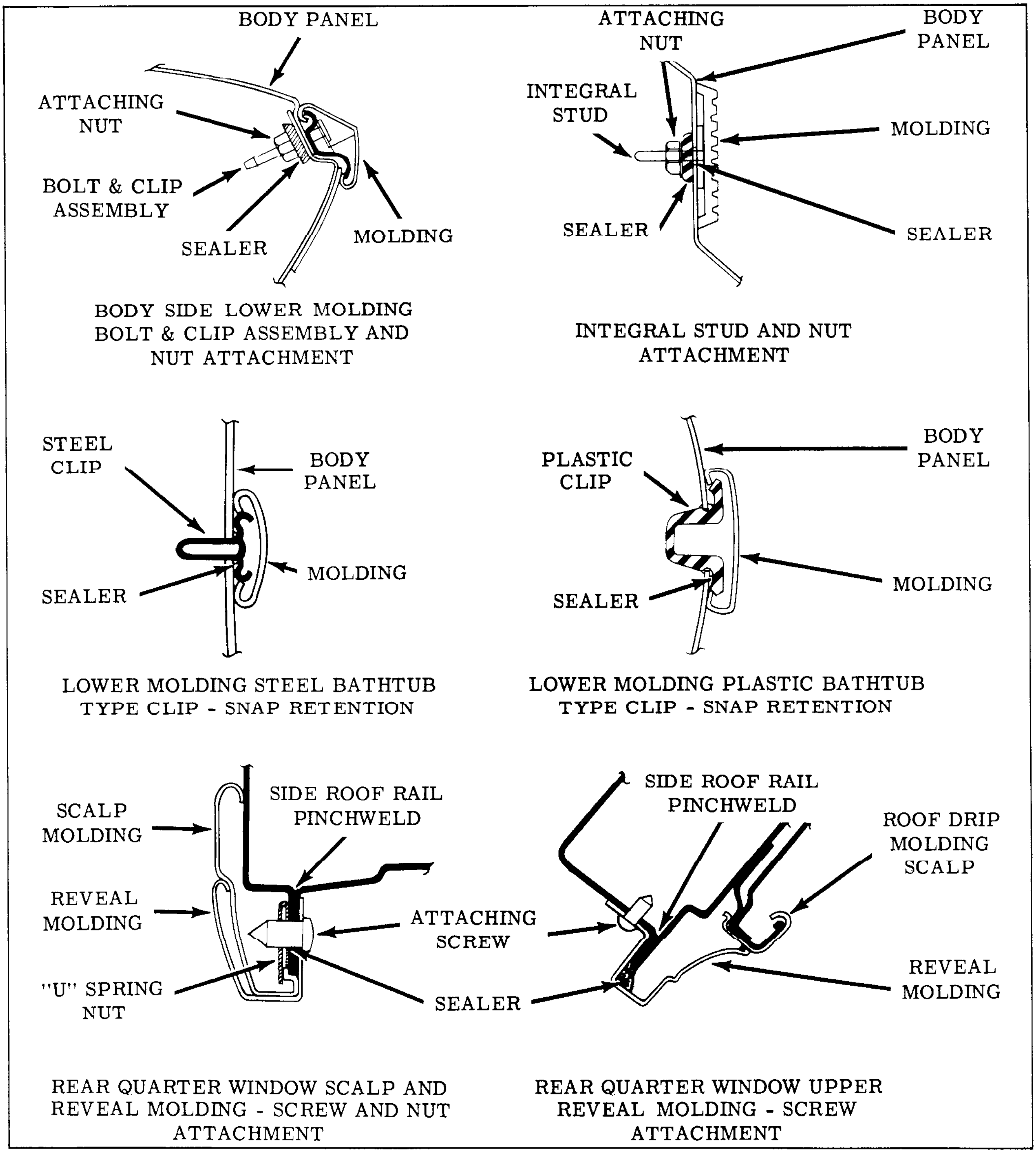


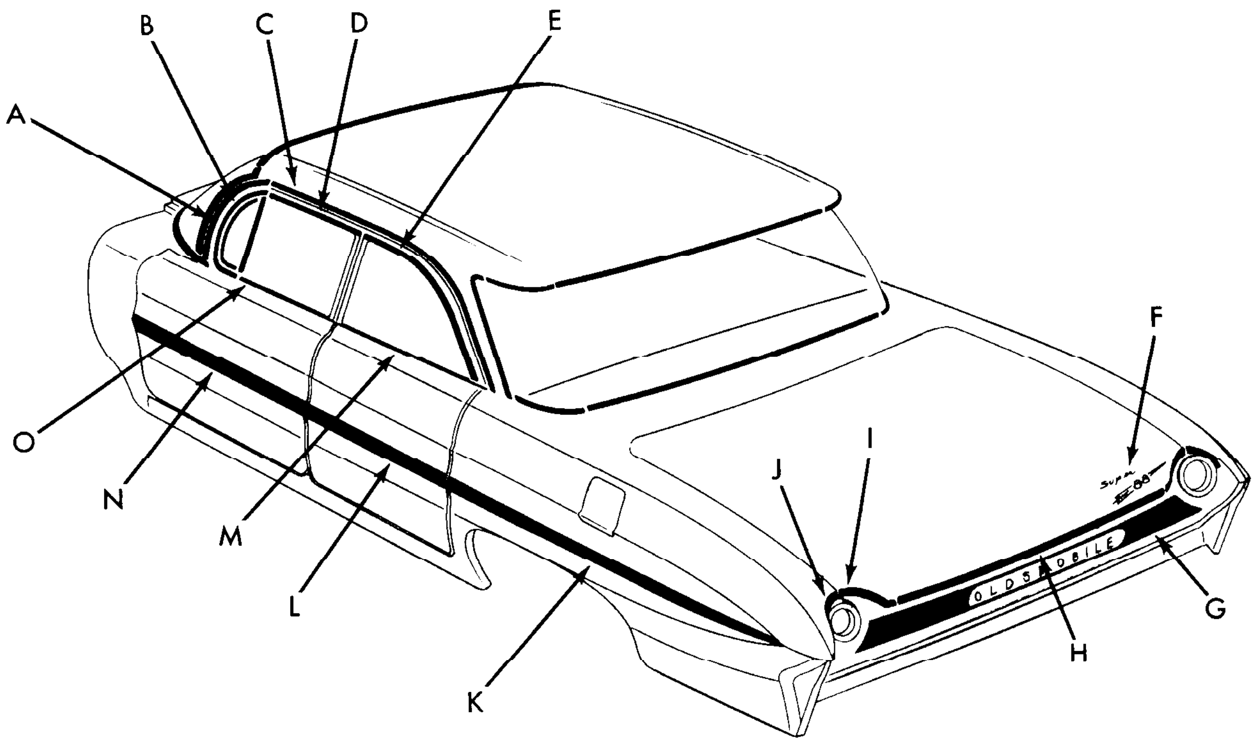
Fig. 17-91 Typical Molding Installation

methods used in attaching moldings to the body.

CAUTION: During removal and installation of body exterior moldings, certain precautions should be exercised. Adjacent paint finishes should be protected to avoid refinishing. Proper tools and methods should be employed to guard against molding damage, particularly if the part is to be reused. Whenever a sealing operation is disturbed, appropriate sealing materials and methods should be used to provide the required watertight seal. Every screw, nut or clip that secures a molding to a body outer panel, including the attaching hole, requires a specialized type of sealing operation. Medium bodied sealer or body caulking compound is effective in sealing moldings.

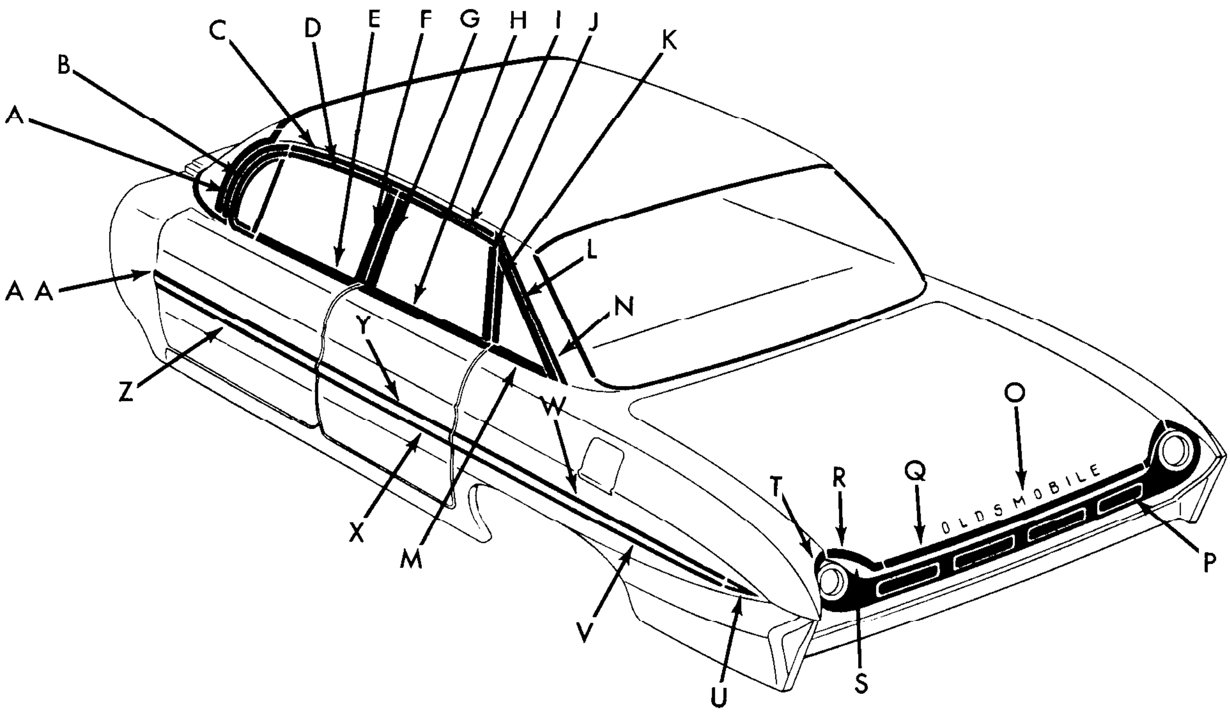
The exterior moldings are identified in Figs. 17-92, 17-93, 17-94 and 17-95.

NOTE: Bathtub type clips, of steel or plastic construction, can be removed by cutting them



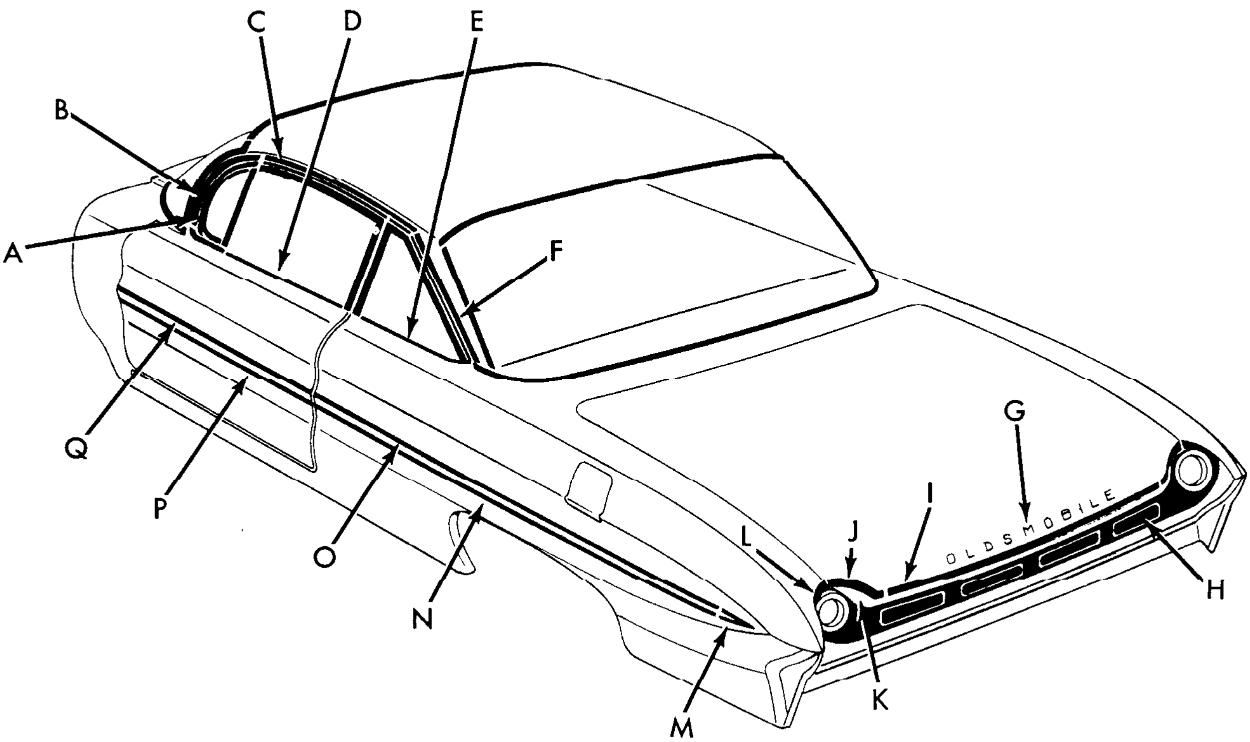
A WINDSHIELD PILLAR DRIP MOLDING SCALP
B FRONT DOOR WINDOW FRAME FRONT VERTICAL SCALP MOLDING
C ROOF DRIP MOLDING SCALP
D FRONT DOOR WINDOW FRAME UPPER SCALP MOLDING
E REAR DOOR WINDOW FRAME UPPER SCALP MOLDING
F REAR COMPARTMENT LID "SUPER" AND "88" NAME PLATES
G REAR END PANEL MOLDING
H REAR COMPARTMENT LID OUTER PANEL PEAK CENTER MOLDING
I REAR COMPARTMENT LID OUTER PANEL PEAK SIDE MOLDING
J REAR OF REAR FENDER PEAK MOLDING
K REAR FENDER LOWER MOLDING
L REAR DOOR OUTER PANEL LOWER MOLDING
M REAR DOOR WINDOW REVEAL MOLDING
N FRONT DOOR OUTER PANEL LOWER MOLDING
O FRONT DOOR WINDOW REVEAL MOLDING

Fig. 17-92 Exterior Moldings (Typical of 69 Styles)



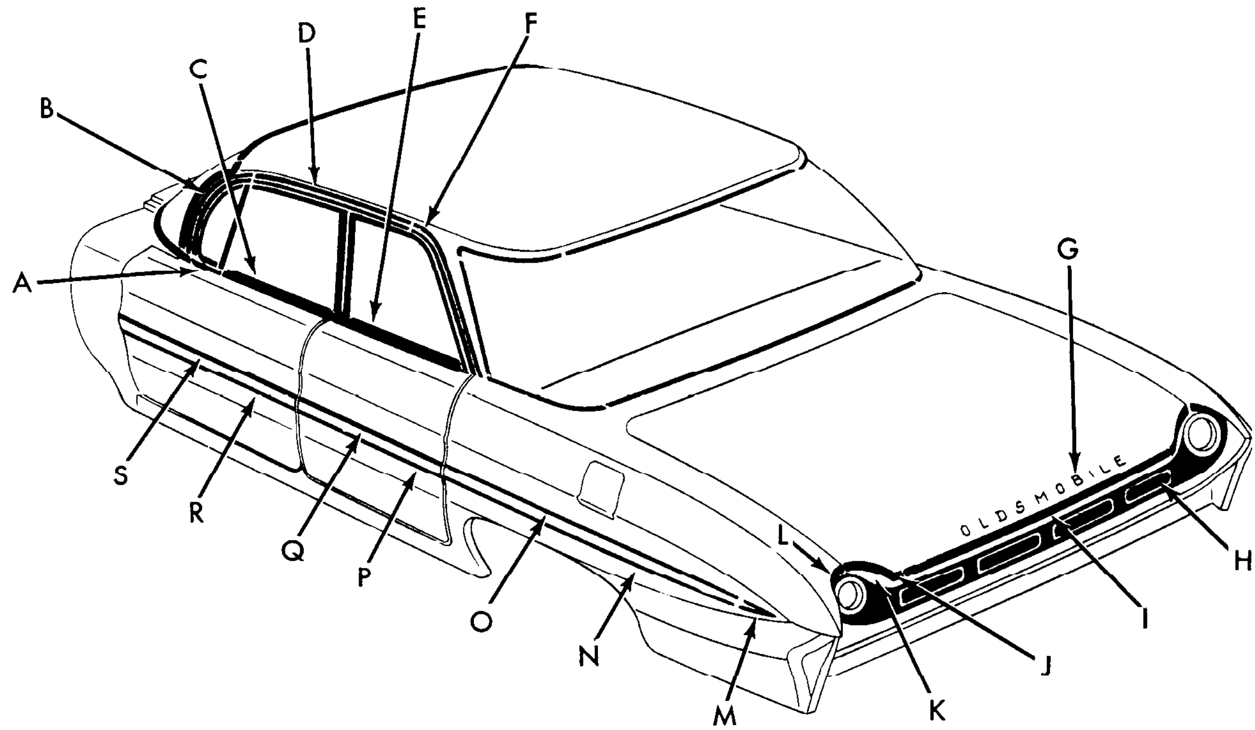
A WINDSHIELD PILLAR DRIP MOLDING SCALP
B FRONT DOOR WINDOW FRAME FRONT VERTICAL SCALP MOLDING
C ROOF DRIP MOLDING FRONT SCALP
D FRONT DOOR WINDOW FRAME UPPER SCALP MOLDING
E FRONT DOOR WINDOW REVEAL MOLDING
F FRONT DOOR WINDOW FRAME REAR VERTICAL SCALP MOLDING
G REAR DOOR WINDOW FRAME FRONT VERTICAL SCALP MOLDING
H REAR DOOR WINDOW REVEAL MOLDING
I REAR DOOR WINDOW FRAME UPPER SCALP MOLDING
J REAR DOOR WINDOW FRAME REAR VERTICAL SCALP MOLDING
K REAR QUARTER WINDOW FRONT REVEAL MOLDING
L REAR QUARTER WINDOW UPPER REVEAL MOLDING
M REAR QUARTER WINDOW LOWER REVEAL MOLDING
N ROOF DRIP MOLDING REAR SCALP
O REAR COMPARTMENT LID "OLDSMOBILE" NAME PLATE
P REAR END PANEL MOLDING
Q REAR COMPARTMENT LID OUTER PANEL PEAK CENTER MOLDING
R REAR COMPARTMENT LID OUTER PANEL PEAK SIDE MOLDING
S REAR COMPARTMENT LID OUTER PANEL LOWER MOLDING
T REAR OF REAR FENDER PEAK MOLDING
U REAR FENDER UPPER AND LOWER MOLDING ESCUTCHEON
V REAR FENDER LOWER MOLDING
W REAR FENDER UPPER MOLDING
X REAR DOOR OUTER PANEL LOWER MOLDING
Y REAR DOOR OUTER PANEL UPPER MOLDING
Z FRONT DOOR OUTER PANEL LOWER MOLDING
AA FRONT DOOR OUTER PANEL UPPER MOLDING

Fig. 17-93 Exterior Moldings (Typical of 19 & 29 Styles)



A DOOR WINDOW REVEAL MOLDING (AT VENT)
B WINDSHIELD PILLAR DRIP MOLDING SCALP
C ROOF DRIP MOLDING FRONT SCALP
D DOOR WINDOW REVEAL MOLDING
E REAR QUARTER WINDOW REVEAL MOLDING
F ROOF DRIP MOLDING REAR SCALP
G REAR COMPARTMENT LID "OLDSMOBILE" NAME PLATE
H REAR END PANEL MOLDING
I REAR COMPARTMENT LID OUTER PANEL PEAK CENTER MOLDING
J REAR COMPARTMENT LID OUTER PANEL PEAK SIDE MOLDING
K REAR COMPARTMENT LID OUTER PANEL LOWER MOLDING
L REAR OF REAR FENDER PEAK MOLDING
M REAR FENDER UPPER AND LOWER MOLDING ESCUTCHEON
N REAR FENDER LOWER MOLDING
O REAR FENDER UPPER MOLDING
P DOOR OUTER PANEL LOWER MOLDING
Q DOOR OUTER PANEL UPPER MOLDING

Fig. 17-94 Exterior Moldings (Typical of 37 Styles) 3837 Shown



A FRONT DOOR WINDOW REVEAL MOLDING (AT VENT)
B WINDSHIELD PILLAR DRIP MOLDING SCALP
C FRONT DOOR WINDOW REVEAL MOLDING
D ROOF DRIP MOLDING FRONT SCALP
E REAR DOOR WINDOW REVEAL MOLDING
F ROOF DRIP MOLDING REAR SCALP
G REAR COMPARTMENT LID "OLDSMOBILE" NAME PLATE
H REAR END PANEL MOLDING
I REAR COMPARTMENT LID OUTER PANEL PEAK CENTER MOLDING
J REAR COMPARTMENT LID OUTER PANEL PEAK SIDE MOLDING
K REAR COMPARTMENT LID OUTER PANEL LOWER MOLDING
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M REAR FENDER UPPER AND LOWER MOLDING ESCUTCHEON
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R FRONT DOOR OUTER PANEL LOWER MOLDING
S FRONT DOOR OUTER PANEL UPPER MOLDING

Fig. 17-95 Exterior Moldings (Typical of 39 Styles)

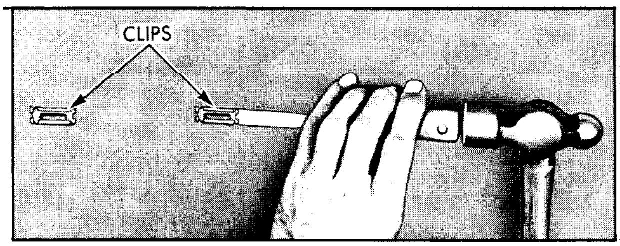


Fig. 17-96 Removing Clip

part way through or all of the way through from the outer panel with a sharp, flat-bladed tool. (Fig. 17-96) In some cases it may be necessary to cut the clip from each end to remove it. "Narrow" and "wide" bathtub type clips, of steel construction, are used to retain exterior moldings to the body at certain locations, particularly below the belt line. Fig. 17-97 shows Clip Installing Tool J-7160 which is required to install the "wide" bathtub type steel clips and Fig. 17-98 shows Tool J-8954 which is required to install the "narrow" bathtub type steel clips.

WINDSHIELD PILLAR DRIP MOLDING SCALP

The scalp is secured to the drip molding by snap retention. On "37", "39" and "29" styles, the scalp is overlapped by the windshield pillar weatherstrip installation.

Removal

1. On "37", "39" and "29" styles, remove the windshield pillar weatherstrip and retainer.
2. Use a pointed hook tool, starting at the lower end under the drip molding and unsnap the scalp from the drip molding.

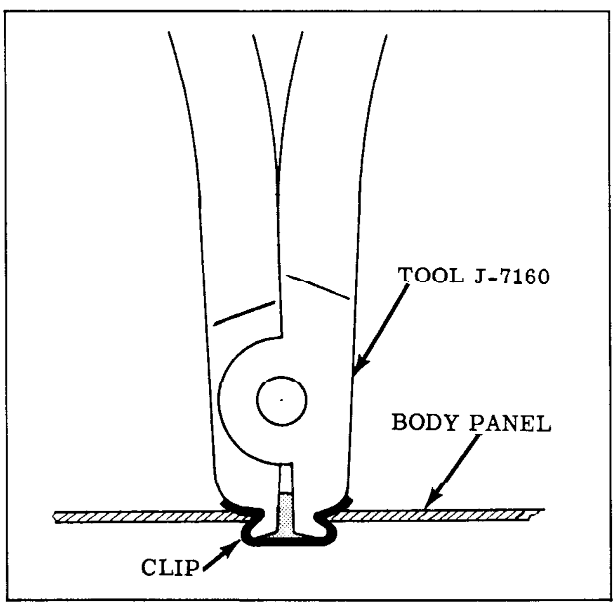


Fig. 17-97 Installing Clip

Installation

1. Position the scalp over the upper lip of the windshield pillar drip molding and over the roof drip molding scalp.
2. Snap the lower rolled edge of the scalp under the drip molding.
3. On "37", "39" and "29" styles, complete the installation of the windshield pillar weatherstrip.

WINDSHIELD PILLAR TO ROOF DRIP MOLDING ESCUTCHEON (All 3211-35-37-45 and 69 Styles)

The escutcheon is painted body color and is secured to both drip moldings by snap retention. The escutcheon is used only on styles that do not include the special order bright finish scalp moldings. On "37" styles the windshield pillar weatherstrip retainer overlaps the escutcheon.

Removal

1. On "37" styles remove the windshield pillar weatherstrip retainer.
2. Use a pointed hook tool to unsnap the escutcheon by carefully prying outwardly under the drip moldings.

Installation

1. Position the escutcheon over the upper lip of the windshield pillar and roof drip moldings.
2. Snap the lower rolled edge of the escutcheon under the drip moldings.

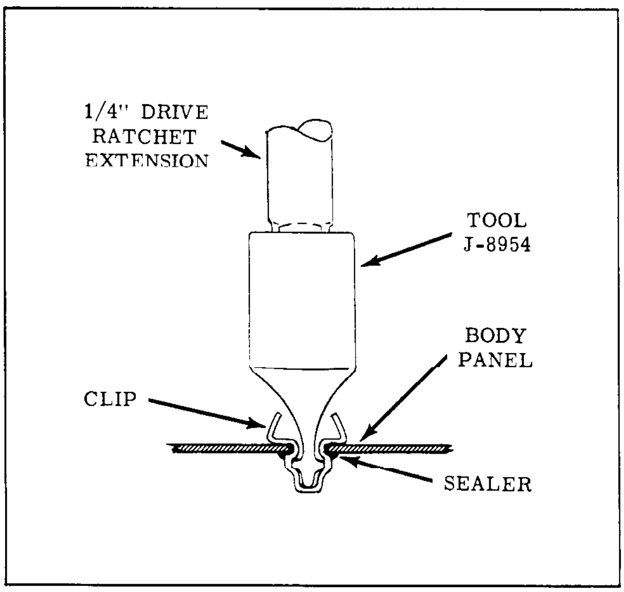


Fig. 17-98 Installing "Bathtub" Type Clip

3. Fit the escutcheon to the drip molding and touch up as required.
4. Complete the installation of the windshield pillar weatherstrip.

ROOF DRIP MOLDING SCALP (3535-37-45-69 and 3839 Styles)

The scalp, of one-piece construction, is secured to the drip molding by snap retention. At the front the scalp is overlapped by the windshield pillar drip molding scalp. On "37" styles, the scalp is overlapped by the side roof rail weatherstrip and reveal molding over the doors and by the rear quarter window sealing strip at the rear. On "39" styles the scalp is overlapped by the side roof rail weatherstrip.

Removal

1. Remove the windshield pillar drip molding scalp.
2. On "37" styles, remove the side roof rail weatherstrip retainer and reveal molding and the rear quarter window sealing strip.
3. On "39" styles, remove the side roof rail weatherstrip and retainer.
4. With a pointed hook tool, unsnap the scalp from the drip molding.
5. Start the removal on the underside of the drip molding at either end.

Installation

1. Position the scalp over the upper lip of the drip molding and snap the lower rolled edge of the scalp under the drip molding.
2. Seal and install the previously removed parts.

ROOF DRIP MOLDING FRONT SCALP AND ROOF DRIP MOLDING REAR SCALP (3819-29 and 37 Styles)

A front and a rear scalp are secured to the drip molding by snap retention. The front scalp is overlapped at the front by the windshield pillar drip molding scalp. On "29" styles the scalp is overlapped by the side roof rail weatherstrip and by the rear quarter window upper reveal molding. On "37" styles the scalp is overlapped by the side roof rail weatherstrip and rear quarter window sealing strip.

Removal

1. Remove the windshield pillar drip molding scalp.
2. On "29" styles, remove the side roof rail weatherstrip and retainers. On "37" styles, remove the side roof rail weatherstrip retainer and the quarter window sealing strip.
4. To remove the rear scalp, detach only the required length of the front scalp.
5. To remove either scalp, use a pointed hook tool and unsnap the scalp from the drip molding. Start the removal on the underside of the drip molding at either end.

Installation

1. Position the scalp over the upper lip of the drip molding and snap the lower rolled edge of the scalp under the drip molding.
2. Install the rear scalp before the front scalp.
3. Seal and install the previously removed parts.

ROOF DRIP MOLDING FRONT SCALP, ROOF DRIP MOLDING REAR SCALP AND ROOF DRIP MOLDING SCALP ESCUTCHEON (3239 and 3539 Styles)

The scalps of three-piece construction consist of a front scalp, a rear scalp and a scalp escutcheon which are secured to the drip molding by snap retention. The scalp installation is overlapped by the windshield side reveal molding at the front and by corresponding sections of the side roof rail weatherstrip retainer and reveal moldings.

Removal

1. To remove the front scalp, remove the windshield side reveal molding and the side roof rail weatherstrip retainer and reveal molding.
2. To remove the rear scalp, remove the rear body lock pillar weatherstrip retainer and reveal molding.
3. After preliminary removal operations, remove the scalp escutcheon by unsnapping it from the drip molding.
4. To remove either scalp, use pointed hook tool and unsnap the scalp from the drip molding. Start the removal on the underside of the drip molding at either end.

Installation

1. To install either scalp, position the scalp over the upper lip of the drip molding and snap the lower rolled edge of the scalp under the drip molding.
2. Position the escutcheon and snap it into place.
3. Install the previously removed parts.

ROOF EXTENSION PANEL EMBLEM (3239 and 3539 Styles)

The emblem is secured to the roof extension panel by two integral attaching studs and sealed attaching nuts.

Removal

1. Remove the rear quarter upper trim assembly.
2. Remove the attaching nuts and the emblem.

Installation

1. Apply body caulking compound to the attaching studs and nuts.
2. Position the emblem to the body and install the attaching nuts to effect a watertight seal.
3. Install the previously removed parts.

FRONT DOOR WINDOW REVEAL MOLDING (AT VENT) (3211-35-45-69 Optional, 3237-39-67, 3535-37-39-45-67 and 3829-37-39-67 Styles)

The molding is secured to the return flange of the door by two attaching screws. The molding is overlapped by the door ventilator at the return flange.

Removal

1. Remove the door trim assembly.
2. Remove the attaching screws which are readily accessible on each side of the door ventilator.
3. Loosen the ventilator to door upper attaching screws and remove the molding.

Installation

1. Position the molding to the door, align the attaching holes and install the attaching screws.
2. Tighten the door ventilator to door upper attaching screws and install the door trim assembly.

FRONT DOOR WINDOW FRAME UPPER SCALP MOLDING (3819 Style)

The upper scalp molding is secured to the window frame by snap retention and by a metal tab at the rear. The upper scalp molding is overlapped at the front by the front vertical scalp molding.

Removal

1. Unbend the metal tab at the rear.
2. With a flat-bladed hook tool, unsnap the scalp molding from the window frame by starting at the rear and by working outwardly from the window opening.
3. Before unsnapping the front of the molding, slide it rearwardly to clear the front vertical scalp molding. Use care not to damage any door parts during this operation.

Installation

1. Apply body caulking compound (1/8" x 1/4" x 1/4") at six inch intervals in the middle of the inner side of the molding.
2. Position the molding to the outside edge of the window frame, engage the front end of the molding, and slide it under the rear edge of the vertical scalp molding.
3. With the molding aligned at the upper rear corner, snap the molding on the window frame and secure the metal tab at the rear.

FRONT DOOR WINDOW FRAME UPPER SCALP MOLDING (3211-35-45-69 Optional, and 3535-45-69 Styles)

The molding is secured to the window frame by snap retention and by a metal tab at the rear. The upper snap molding is overlapped at the front by the front vertical scalp molding.

Removal

1. Detach the door upper glass run channel.
2. Remove the door ventilator upper attaching screws.
3. Move the door ventilator slightly rearward and partially detach the rear of the front vertical scalp molding for clearance purposes.
4. Unbend the metal tab at the rear of the upper scalp molding.
5. With a flat-bladed hook tool, unsnap the upper scalp molding from the window frame by starting at the rear and by working toward the center of the window opening.
6. Before unsnapping the front of the molding, slide it rearwardly to clear the front vertical scalp molding.

   CAUTION: Use care not to damage any door parts during this operation.

Installation

1. Position the molding to the inside edge of the window frame, engage the front end of the molding, and slide it under the rear edge of the front vertical scalp molding.

2. With the molding aligned at the upper rear corner, snap the molding onto the window frame and secure the metal tab at the rear.

3. Complete the installation of the front vertical scalp molding, the door ventilator and the door upper glass run channel.

FRONT DOOR WINDOW FRAME FRONT VERTICAL SCALP MOLDING— (3211-35-45-69 Optional, 3535-45-69 and 3819 Styles)

The front vertical scalp molding is secured to the window frame by snap retention and by a metal tab which is retained by a screw behind the door ventilator.

Removal

1. Remove the door ventilator. Remove the lower end attaching screw and unbend the metal tab.

2. With a flat-bladed hook tool, unsnap the scalp molding from the window frame by working outwardly from the window opening.

Installation

1. Apply body caulking compound (1/8" x 1/4" x 1/4") at six inch intervals in the middle of the inner side of the molding.

2. Position the molding to the outside edge of the window frame and to the window lower reveal line and snap it into place.

3. Bend the molding tab at the lower end to the return flange of the door, drill the attaching hole as required on a replacement molding and install the attaching screw.

4. Install the door ventilator and the previously removed parts.

FRONT DOOR WINDOW FRAME REAR VERTICAL SCALP MOLDING (3819 Style)

The rear vertical scalp molding is secured to the door window frame by snap retention. The molding is overlapped at the top by the upper scalp molding and at the bottom by the reveal molding.

Removal

1. Remove the upper scalp molding.

2. With a flat-bladed hook tool, unsnap the scalp molding from the window frame by working outwardly from the window opening.

3. Before unsnapping the molding at the bottom, slide it upward to clear the reveal molding.

Installation

1. Apply body caulking compound (1/8" x 1/4" x 1/4") at six inch intervals in the middle of the inner side of the molding.

2. Position the molding to the outside edge of the window frame and to the window lower reveal line and snap it into place.

3. Engage the vertical scalp molding on the window frame at the bottom and slide it under the reveal molding before securing the balance of the molding.

REVEAL MOLDINGS

Front Door Window Reveal Molding (3535-37-39-45-67-69, 3819-29-37-39-67 and Optional on 3211-35-37-39-45-67-69 Styles)

Rear Door Window Reveal Molding (3535-39-45-69, 3819-29-39 and Optional on 3239-35-39-45-69 Styles)

The molding is secured to the return flange of the door by screws. The molding is installed before the door window installation.

Removal

1. On "29", "35", "39", "45" and "69" style rear doors, remove the door window. On all other styles, front and rear doors, disengage the window lower attachment and lower the window below the reveal molding attaching screws.

2. Remove the attaching screws and the molding.

Installation

1. Position the molding to the door and install the attaching screws.

2. On all styles, complete the door window installation, seal the water deflector, and install the previously removed parts.

FRONT DOOR OUTER PANEL LOWER MOLDING (All 3200 and 3500 Styles)

The molding is secured to the door by a screw at the front and rear hemming flanges and by bathtub type snap-on clips.

Removal

1. Remove the front and rear hemming flange screw.

2. With a flat-bladed tool, unsnap the molding from each retaining clip.

Installation

1. Replace damaged clips and seal the replacement clips as required.
2. Position the molding to the door and over the retaining clips and snap it into place.
3. Seal and install the end attaching screws.

FRONT DOOR OUTER PANEL UPPER MOLDING AND FRONT DOOR OUTER PANEL LOWER MOLDING (All 3800 Styles)

The molding is secured to the door by a screw at the front and rear hemming flanges and by bathtub type snap-on clips.

Removal

1. Remove the front and rear hemming flange screw.
2. With a flat-bladed tool, carefully unsnap the molding from each retaining clip.

Installation

1. Replace damaged clips and seal the replacement clips as required.
2. Position the molding to the door and over the retaining clips and snap it into place.
3. Seal and install the end attaching screws.

REAR DOOR WINDOW FRAME UPPER SCALP MOLDING (3535-45-69 and Optional on 3235-45-69 Styles)

The upper scalp molding is secured to the window frame by snap retention and by a metal tab at the front end of the molding.

Removal

1. Detach the door upper and lock pillar glass run channel from the door.
2. Unbend the metal tab at the front of the molding.
3. Use a flat-bladed hook tool to unsnap the upper scalp molding from the window frame by working toward the center of the window opening.

Installation

1. Position the molding to the inside edge of the window frame and to the upper corner and snap it into place.
2. Secure the front metal tab.
3. Complete the installation of the door upper and lock pillar glass run channel.

REAR DOOR WINDOW FRAME UPPER SCALP MOLDING (3819 Style)

The upper scalp molding is secured to the window frame by snap retention and by a metal tab at the rear.

Removal

1. Unbend the metal tab at the end of the molding.
2. Use a flat-bladed hook tool to unsnap the upper scalp molding from the window frame by working outwardly from the window opening.

Installation

1. Apply body caulking compound (1/8" x 1/4" x 1/4") at six inch intervals in the middle of the inner side of the molding.
2. Position the molding to the outside edge of the window frame and to the upper corners and snap it into place.
3. Secure the rear metal tab.

REAR DOOR WINDOW FRAME FRONT VERTICAL SCALP MOLDING AND REAR DOOR WINDOW FRAME REAR VERTICAL SCALP MOLDINGS (3819 Style)

The vertical scalp molding is secured to the window frame by snap retention. The molding is overlapped at the top by the upper scalp molding and at the bottom by the reveal molding.

Removal

1. Remove the upper scalp molding. With a flat-bladed hook tool, unsnap the molding from the window frame by working outwardly from the window opening.
2. Before unsnapping the lower end of the molding, slide it upward to clear the reveal molding.

Installation

1. Apply body caulking compound (1/8" x 1/4" x 1/4") at six inch intervals in the middle of the inner side of the molding.
2. Position the molding to the outside edge of the window frame.
3. Engage the lower end of the molding on the window frame and slide it under the reveal molding.
4. Snap the balance of the molding on the window frame.
5. Install the upper scalp molding.

REAR DOOR OUTER PANEL LOWER MOLDING (3235-39-45-69 and 3535-39-45-69 Styles)

The molding is secured to the door by a clip-bolt and nut at the front hemming flange, by a screw at the rear hemming flange and by bathtub type snap-on clips.

Removal

1. Remove the front attaching nut and the rear attaching screw.
2. With a flat-bladed tool, unsnap the molding from each retaining clip.

Installation

1. Replace any damaged clips as required.
2. Position the molding over the retaining clips and snap it into place.
3. Seal and install the front attaching nut and the rear attaching screw.

REAR DOOR OUTER PANEL UPPER MOLDING AND REAR DOOR OUTER PANEL LOWER MOLDING (3819-29-39 Styles)

The molding is secured to the door by a clip-bolt and nut at the front hemming flange, by a screw at the rear hemming flange and by bathtub type snap-on clips.

Removal

1. Remove the front attaching nut and the rear attaching screw.
2. With a flat-bladed tool, unsnap the molding from each retaining clip.

Installation

1. Replace damaged clips and seal the replacement clips as required.
2. Position the molding over the retaining clips and snap it into place.
3. Seal and install the front attaching nut and the rear attaching screw.

REAR QUARTER WINDOW FRONT REVEAL MOLDING (3211 Style)

The molding is secured to the rear body lock pillar by three clips and attaching screws. The molding is overlapped by the upper scalp molding.

Removal

1. Remove the rear quarter window upper scalp molding.
2. Remove the molding attaching screws and the molding.

Installation

1. Apply body caulking compound to the attaching holes in the lock pillar.
2. Position the molding to the lock pillar, align the clip holes with the attaching holes in the body and install the attaching screws.
3. Install the upper scalp molding and the previously removed parts.

REAR QUARTER WINDOW UPPER SCALP MOLDING (3211 Style)

The molding, of painted finish, is secured to the roof rail pinchweld flange with attaching screws and "U" spring nuts.

Removal

1. Remove the rear quarter window glass run channel and garnish molding.
2. Remove the attaching screws and the molding.

Installation

1. Apply body caulking compound to the attaching holes in the roof rail pinchweld flange.
2. Assemble "U" spring nuts to the molding flange at the slot locations.
3. Position the molding to the front reveal molding, align the "U" spring nuts with the body attaching holes and install the attaching screws.
4. Install the previously removed parts.

REAR QUARTER WINDOW LOWER REVEAL MOLDING (Optional On 3211 Style)

The molding is secured to the rear quarter panel return flange with screws.

Removal

1. Remove the rear quarter window, remove the attaching screws and remove the molding.
2. Use care not to damage the front reveal molding during the removal of the lower reveal molding.

Installation

1. Apply a ribbon of medium-bodied sealer (1/4" diameter) along the entire length of the inboard upper corner of the molding.
2. Protect the bottom of the front reveal molding

and position the lower reveal molding to the quarter panel.

3. Install the attaching screws and the previously removed parts.

REAR QUARTER WINDOW UPPER REVEAL MOLDING (Optional on 3211 Style)

The molding is secured to the side roof rail pinchweld flange and to the rear body lock pillar facing with attaching screws. The molding is overlapped by the lower reveal molding.

Removal

1. Remove the lower reveal molding.
2. Remove the upper reveal molding attaching screws and the molding.

Installation

1. Position the molding over the previously installed scalp molding and butt the front of the molding against the lock pillar facing.
2. Seal and install the front attaching screw.
3. Align and seal the remaining holes and install the attaching screws. The attaching screws pass through the molding slots, through the holes in the pinchweld, and secure in the scalp holding "U" spring nuts.
4. Install the previously removed parts.

REAR QUARTER WINDOW UPPER REVEAL MOLDING (3829 Style)

The molding is secured to the side roof rail by screws. The attaching screws are overlapped by the rear quarter window installation.

Removal

1. Remove the rear quarter window.
2. Remove the attaching screws and the molding.

Installation

1. Apply a ribbon of medium-bodied sealer (1/4" diameter) along the entire length of the lower inner surface of the molding which contacts the pinchweld.
2. Position the molding over the side roof rail pinchweld overlapping the ends of the front and lower reveal moldings.
3. Install the attaching screws.
4. Seal and install the rear quarter window.

REAR QUARTER WINDOW FRONT REVEAL MOLDING (3829 Style)

The molding is secured to the rear body lock pillar rear facing with screws. The molding is overlapped by the upper and lower reveal moldings.

Removal

1. Remove the rear quarter window upper and lower reveal moldings.
2. Remove the attaching screws and the molding.

Installation

1. Apply a ribbon of medium-bodied sealer (1/4" diameter) along the entire length of the deepest rear channel section of the molding. Also seal the attaching holes on the lock pillar.
2. Position the molding to the lock pillar and install the attaching screws.
3. Seal and install the previously removed parts.

REAR QUARTER WINDOW FRONT REVEAL MOLDING (3819 Style)

The molding is secured to the rear body lock pillar rear flange by "U" spring nuts and screws. The molding is overlapped by the upper and lower reveal moldings.

Removal

1. Remove the rear quarter window upper and lower reveal moldings.
2. Remove the attaching screws and the molding.

Installation

1. Apply medium-bodied sealer around the attaching holes on the body lock pillar rear flange.
2. Assemble the molding attaching nuts to the molding flange at the slot locations.
3. Position the molding to the rear body lock pillar.
4. Align and seal the attaching holes and nuts and install the attaching screws.
5. Seal and install the previously removed parts.

REAR QUARTER WINDOW LOWER REVEAL MOLDING (3819 and 3829 Styles)

The molding is secured to the rear quarter return flange by screws. The molding is overlapped at the rear by the upper reveal molding.

Removal

1. Remove the upper reveal molding.
2. Remove the attaching screws and the molding.

   CAUTION: Exercise care not to damage the front reveal molding.

Installation

1. Apply ribbon of medium-bodied sealer (1/4" diameter) along the entire length of the inboard upper corner of the molding.
2. Protect the bottom of the front reveal molding and position the lower reveal molding to the quarter panel.
3. Install the attaching screws and the previously removed parts.

REAR QUARTER WINDOW REVEAL MOLDING (3537-67, 3837-67 and Optional 3237-67 Styles)

The molding is secured to the rear quarter panel return flange by screws.

Removal

1. Remove the rear quarter window.
2. Remove the attaching screws and the molding.

Installation

1. Position the molding along the rear quarter panel return flange.
2. Install the attaching screws and the previously removed parts.

REAR QUARTER BELT REVEAL MOLDING (3539, Optional 3239 Styles)

The molding is secured to the body by two screws at the front, and by two snap-in clips which are previously installed in the molding. At the rear, the molding is overlapped by the back window lower reveal molding which is secured to the back window lower pinchweld by a bolt and clip assembly.

Removal

1. Remove the front attaching screws and the bolt and clip assembly attaching nut.
2. With a flat-bladed tool, unsnap the molding clips from the body. Slide the molding downwardly and forwardly to remove it.

Installation

1. Replace the damaged clips as required.
2. Seal the molding clips and the attaching holes with body caulking compound to effect a watertight seal.
3. Position the molding to the body and snap the clips into place.
4. Install the front attaching screws and the rear attaching nut.

REAR QUARTER PINCHWELD FINISHING MOLDING (3267, 3567, and 3867 Styles)

The moldings are secured to the quarter pinchweld with snap-on clips which are previously installed on the pinchweld around the rear and side sections and with a screw at each forward end. The right molding overlaps the left molding.

Removal

1. Remove the front attaching screws at the rear quarter windows.
2. Detach the front end of the folding top compartment bag from the rear seat back.
3. Remove the attaching screws from the three back curtain trim retainers and pull them away from the body pinchweld.
4. With a wood block and hammer or with a flat-bladed tool, carefully disengage the moldings from the clips.
5. To remove the left molding, detach only a short section of the overlapping right molding.

Installation

1. Clean and seal the pinchweld flange.
2. Apply waterproof tape over the pinchweld flange to seal it completely.
3. Replace the damaged clips as required.
4. Position and locate the left molding to the body and snap it into place.
5. Install the right molding.
6. Install the previously removed parts.

REAR FENDER LOWER MOLDING (3537-39-67 and 69 Styles)

The molding is secured to the fender by snap-in type clips which are previously installed in the molding along the front and by bolt and clip assemblies along the rear.

Removal

1. Loosen or remove the rear compartment side trim as required.

2. Remove the rear attaching nuts.
3. With a flat-bladed tool, unsnap the molding and the clips from the fender.

Installation

1. Replace damaged clips and seal the replacement clips as required.
2. Apply body caulking compound to the attaching holes, to the clip bolts and to the attaching nuts.
3. Position the molding to the fender, align the retaining clips and snap the molding and clips into place.
4. Install the attaching nuts to effect a watertight seal.
5. Complete the rear compartment trim installation.

REAR FENDER LOWER MOLDING (3211-37-39-67 and 69 Styles)

The molding is secured to the fender by bathtub type snap-on clips along the forward area and by sealed bolt and clip assemblies at the rear.

Removal

1. Loosen or remove the rear compartment side trim as required.
2. Remove the rear attaching nuts which are accessible in the rear compartment.
3. With a flat-bladed tool, unsnap the molding at each clip location.

Installation

1. Replace damaged clips and seal the replacement clips as required.
2. Apply body caulking compound to the rear clip bolts and attaching nuts.
3. Position the molding to the fender and over the retaining clips and snap it into place.
4. Install the rear attaching nuts to effect a watertight seal.
5. Complete the rear compartment trim installation.

REAR FENDER UPPER MOLDING, REAR FENDER LOWER MOLDING AND REAR FENDER UPPER AND LOWER MOLDING ESCUTCHEON (All 3800 Styles)

The moldings are secured to the fender by bathtub type snap-on clips and by an escutcheon which is retained by a bolt and clip assembly and nut.

Removal

1. To remove either molding, remove or loosen the rear compartment side trim as required.
2. Remove the rear attaching nut and the escutcheon.
3. With a flat-bladed tool carefully unsnap the molding from each retaining clip.

Installation

1. To install either molding, replace damaged clips and seal the replacement clips as required.
2. Apply body caulking compound to the escutcheon attaching stud and nut.
3. Position the molding flange over the retaining clips and snap it into place.
4. Position the escutcheon to the fender and moldings and install the attaching nut to effect a watertight seal.
5. Install the rear compartment side trim.

REAR OR REAR FENDER PEAK MOLDING

The molding is secured to the rear fender by bolt and clip assemblies and sealed attaching nuts.

Removal

1. Remove the attaching nuts.

Installation

1. Replace damaged clips as required.
2. Apply body caulking compound to the clip bolt and nut.
3. Position the molding to the fender and align the end of the molding flush with the rear compartment lid opening.
4. Install the attaching nuts to effect a watertight seal.

REAR COMPARTMENT LID OUTER PANEL PEAK SIDE MOLDINGS

Each molding is secured to the lid by a clip and screw at the outboard end and by a bolt and clip assembly and nut at the inboard end of the molding.

Removal

1. Remove the attaching screw and nut.

Installation

1. Replace damaged clips in the molding as required.
2. Apply body caulking compound to the clip-bolt, attaching nut and attaching screw.
3. Position the molding over the peak center molding and to the edge of the lid.
4. Install the attaching nut and screw to effect a watertight seal.

REAR COMPARTMENT LID OUTER PANEL PEAK CENTER MOLDING

The molding is secured to the lid by bolt and clip assemblies and attaching nuts. The molding is overlapped at the outer ends by the peak side moldings.

Removal

1. Remove the peak side moldings.
2. Remove the attaching nuts and remove the molding.

Installation

1. Replace damaged clips in the molding as required.
2. Apply body caulking compound to the clip-bolts and attaching nuts.
3. Position the molding to the lid and install the attaching nuts to effect a watertight seal.
4. Seal and install the peak side moldings.

REAR COMPARTMENT LID OUTER PANEL LOWER MOLDING (All 3800 Styles)

The molding is secured to the lid by screws along the top and bottom of the molding. The upper attaching screws are overlapped by the rear compartment lid peak center and side moldings.

Removal

1. Remove the peak center and side moldings.
2. Remove the upper and lower attaching screws and remove the molding.

Installation

1. Apply body caulking compound around the perimeter of the attaching holes in the lid and to the attaching screws.
2. Position the molding to the lid and install the attaching screws to effect a watertight seal.
3. Install the peak center and side moldings.

REAR COMPARTMENT LID "OLDSMOBILE" NAME PLATE (All 3800 Styles)

The name plate is comprised of individual letters each of which is secured to the lid outer panel by an integral attaching stud and a sealing attaching nut.

Removal

1. To remove the name plate letters, remove the attaching nuts through the inner panel access cutouts.

Installation

1. Apply body caulking compound to each name plate letter attaching stud and nut.
2. Position each letter to the lid outer panel and install the attaching nut to effect a watertight seal.

REAR COMPARTMENT LID "88" AND "S88" NAME PLATE (All 3200 and 3500 Series Except 35 and 45 Styles)

The name plates are secured to the lid outer panel by integral attaching studs and sealed attaching nuts.

Removal

1. Remove the attaching nuts through the inner panel access cutouts.

Installation

1. Apply body caulking compound to the attaching studs and nuts.
2. Position the name plates to the lid outer panel and install the attaching nuts to effect a watertight seal.

REAR END PANEL MOLDING (All 3200 and 3500 Series Except 35 and 45 Styles)

The molding is secured to the rear end panel by bolt and clip assemblies and attaching nuts.

Removal

1. Remove the attaching nuts.

Installation

1. Apply body caulking compound to the clip bolts and attaching nuts.
2. Position the molding to the rear end panel and install the attaching nuts to effect a watertight seal.

REAR END PANEL MOLDING (All 3800 Styles)

The molding, of one-piece construction, is secured to the rear end panel by screws along the top and bottom of the molding. The molding attachments are overlapped by the tail lamps and bumper.

Removal

1. Remove the tail lamps.
2. Detach the bumper as required for access to the lower attaching screws.
3. Remove the attaching screws along the top and bottom of the molding and remove the molding.

Installation

1. Position the molding to the rear end panel.
2. Apply body caulking compound to the attaching holes and screws.
3. Install the screws to effect a watertight seal.
4. Seal and install the tail lamps. Complete the bumper installation.

SIDE ROOF RAIL WEATHERSTRIP ("29", "37" and "39" Styles)

The side roof rail weatherstrip assembly is a one-piece type which is secured to the front body hinge pillar with a snap fastener. The remainder of the weatherstrip is secured to the side roof rail by a weatherstrip retainer and reveal molding.

Removal

1. Remove snap fastener securing weatherstrip at front body hinge pillar.
2. Carefully disengage inner lip of weatherstrip from retainer. Using a flat-bladed tool, carefully break cement bond between weatherstrip and side roof rail weatherstrip retainer and reveal molding.
3. On "39" styles, loosen weatherstrip retainer rear attaching screw; then slide weatherstrip downward and rearward to disengage clip from under retainer.
4. Remove weatherstrip assembly from body.

Installation

1. Clean off old cement from side roof rail weatherstrip and weatherstrip retainer to insure a clean cementing surface.
2. Apply a continuous bead (approximately 3/16" diameter) of medium-bodied sealer along entire outboard surface of weatherstrip retainer and reveal molding (Section "A-A", Fig. 17-99).
3. On "37" styles, apply weatherstrip cement to rear end of weatherstrip and cement it to front end of rear quarter window sealing strip.
4. On "29" styles, apply weatherstrip cement to rear end of weatherstrip and cement it to upper portion of rear body lock pillar.
5. On "39" styles, slide rear end of weatherstrip upward until weatherstrip retaining clip is engaged behind weatherstrip retainer.
6. On all styles, start at rear end of weatherstrip and carefully engage inboard edge of weatherstrip into weatherstrip retainer. Using a flat-bladed tool, install outboard edge of weatherstrip into weatherstrip retainer.
7. On "39" styles, tighten weatherstrip retainer rear attaching screw.
8. On all styles, install snap fastener at front body hinge pillar.
9. Clean off all excess weatherstrip cement.
10. With doors and windows closed, front and/or rear door window upper frames should make an even continuous contact with the side roof rail weatherstrip. If necessary, adjust weatherstrip and/or ventilator or front or rear door windows to obtain proper weatherstrip contact.

SIDE ROOF RAIL WEATHERSTRIP ADJUSTMENTS

The attaching holes in the side roof rail weatherstrip retainer are elongated allowing "in and out" adjustment of the side roof rail weatherstrip; however, the amount of adjustment is small and is not intended to correct improper ventilator or door window alignment. It is NOT necessary to remove the weatherstrip to adjust the retainer. Weatherstrip retainer attaching screw access holes are provided in the weatherstrip assembly. (Fig. 17-99)

IMPORTANT: Before attempting to adjust the side roof rail weatherstrip, first check that the ventilator and front and rear door windows are properly aligned and where necessary, adjust for proper alignment as directed under ADJUSTMENT OF THE VENTILATOR AND/OR FRONT OR REAR DOOR WINDOW.

1. To adjust side roof rail weatherstrip "in or out" first determine and mark retainer at area or areas to be adjusted.
2. Loosen retainer attaching screws slightly in

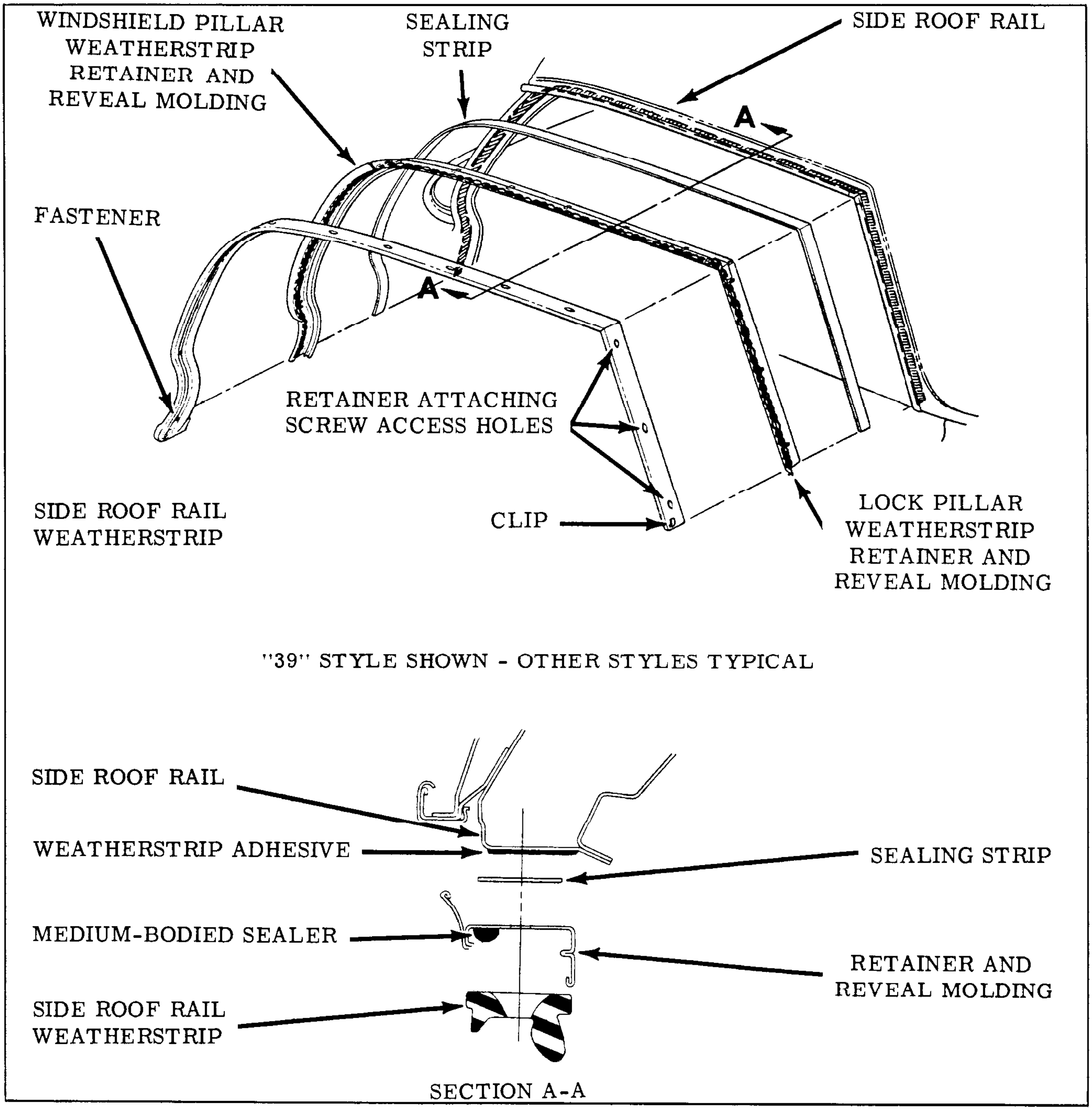


Fig. 17-99 Side Roof Rail Weatherstrip

area to be adjusted; then, adjust retainer "in or out" as required.

3. Tighten retainer attaching screws.

FOLDING TOP

OPERATION OF FOLDING TOP

The convertible coupe incorporates a hydro-lectric system to raise and lower the folding top. After the top has been unlatched and raised above the windshield by hand, it can be lowered or raised, respectively, by actuating a power control switch located on the instrument panel. Hydraulic fluid from an electrically driven pump is forced through tubing to double-acting, piston-type cylinders located at each rear quarter section of the car. Pressurized fluid entering the top of the hydraulic lift cylinder forces the pistons down--thus lowering the top. Pressurized fluid entering the bottom of the hydraulic lift cylinders forces the piston upward--thus raising the top.

TOP BOOT

The top boot is attached to the body with concealed "floating-type" snap fasteners along the side and rear edges and a "slide-in" retainer along the front edge. (Fig. 17-100) When the folding top is raised, either of the following two methods may be used for storing the boot.

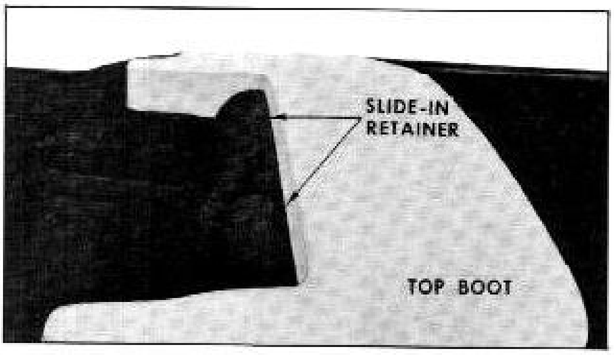


Fig. 17-100 Top Boot Assembly

1. The boot may be stored in its protective case in rear compartment of car.
2. The boot may be left attached to the slide retainer and folded behind rear seat back.

The top compartment, behind the rear seat back, must be used only for storage of the top boot when it is attached to the slide retainer on the seat back. The storage of such items as golf clubs, luggage and miscellaneous objects in the compartment not only interferes with proper operation of the top, but may damage the top or the plastic rear window.

TO LOWER THE TOP

1. Stop the car. If top boot has been stored in its retainer behind rear seat, turn boot over seat back and fold ends. (Fig. 17-101) It is not necessary to lower rear window or rear quarter windows before lowering top.
2. Turn down both sun visors; then rotate each locking handle rearward then upward until it is disengaged from striker on windshield header. (Fig. 17-102)
3. Raise front of top to disengage front roof rail from windshield header. (Fig. 17-103)
4. Actuate power top control switch until front top rail is approximately two feet from full down position.

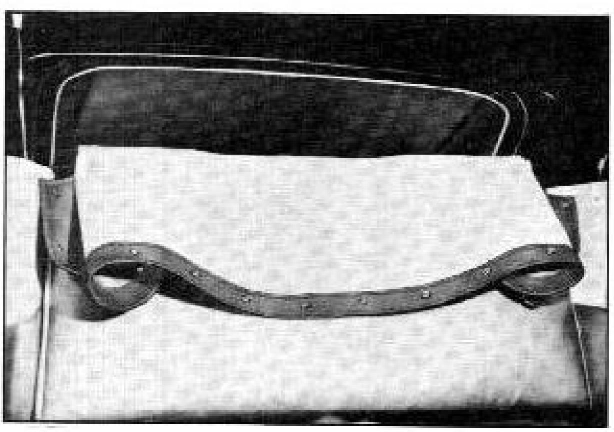


Fig. 17-101 Folding Top Boot

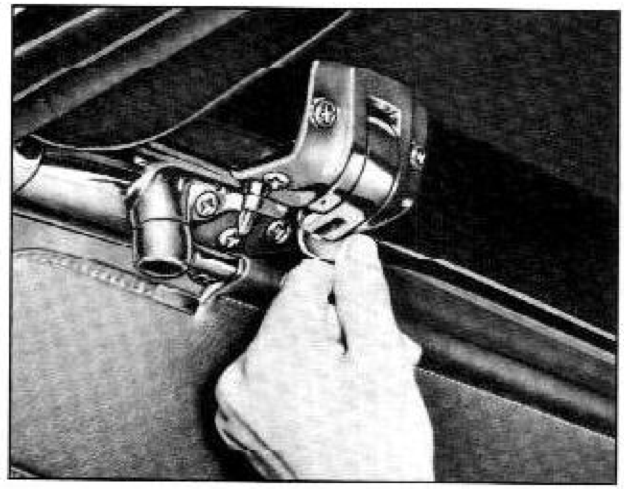


Fig. 17-102 Unlocking Top From Header

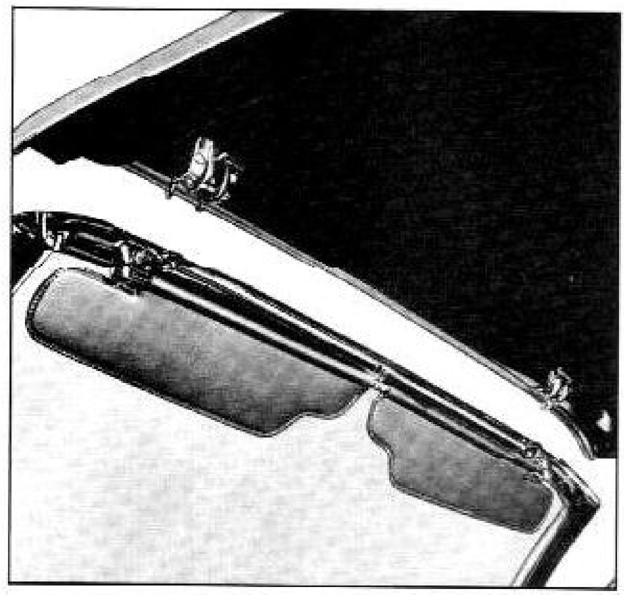


Fig. 17-103 Disengaging Top From Header

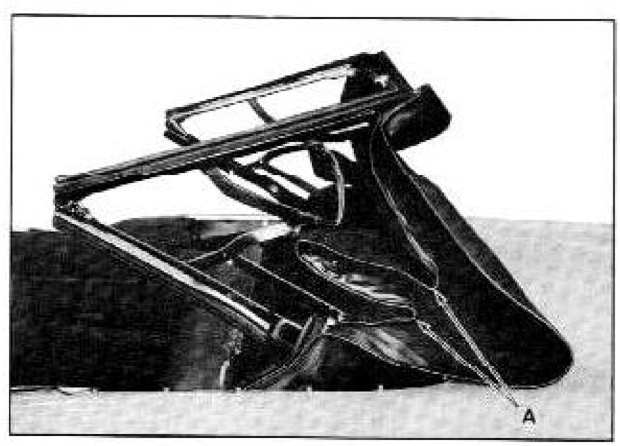


Fig. 17-104 Padding Pulled From Between Arms

5. On right and left side of body, pull top material and padding "A" from between operating arms of top. (Fig. 17-104)

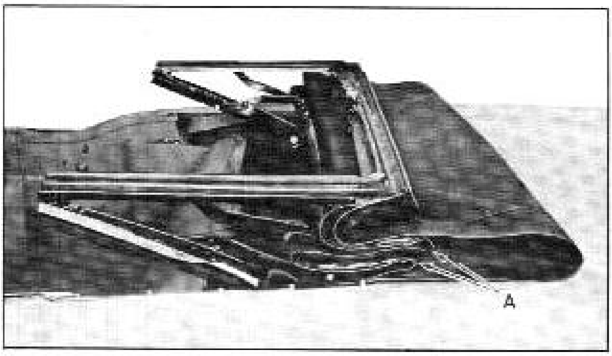


Fig. 17-105 Padding Tucked into Compartment

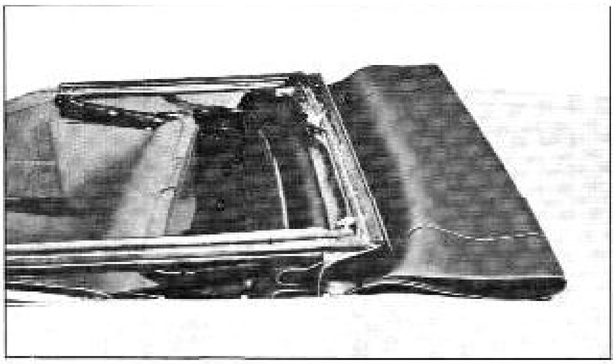


Fig. 17-106 Top Folded

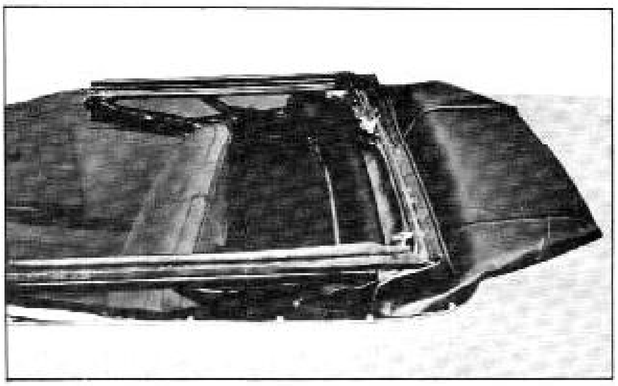


Fig. 17-107 Corners Folded

6. Operate top control switch until top is approximately six (6) inches from full down position. Tuck corners of padding "A" into top compartment to insure proper fit of top boot. (Fig. 17-105)

7. Operate top control switch until top is in fully lowered position. Smooth out top material on body panel and fold over corners of top material. (Fig. 17-106)

8. Place material over folding top. (Fig. 17-107)

TOP BOOT INSTALLATION

1. Slide front edge of boot into retainer "A" along seat back. (Fig. 17-108) Center boot for proper engagement of snap fasteners.

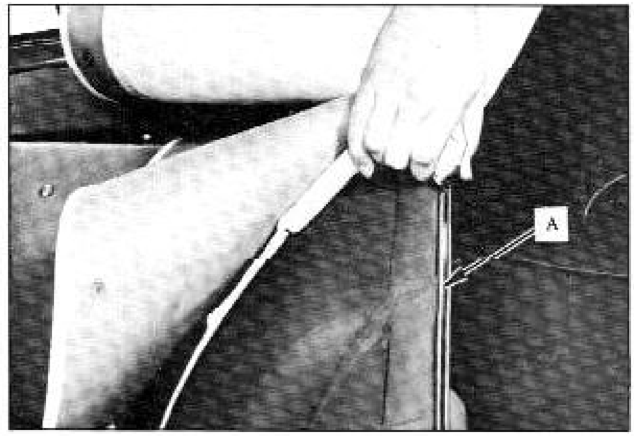


Fig. 17-108 Sliding Boot into Retainer

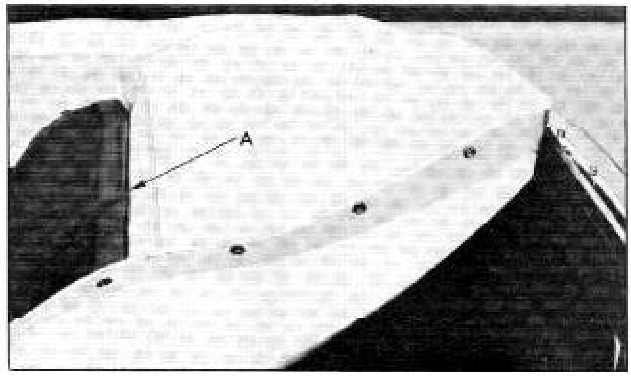


Fig. 17-109 Boot Partially Installed

2. Place top boot in position over folded top and engage several boot fasteners to studs along rear molding. Then adjust boot to remove wrinkles by sliding forward edge of boot to right or left in retainer. (Fig. 17-109)

3. Engage remaining boot fasteners to studs on molding and rear quarter trim. (Fig. 17-100)

TO RAISE THE TOP

1. Stop the car. Disengage all top boot snap fasteners from studs, turn boot over seat back and fold ends of boot toward center. If thoroughly dry, top boot may be removed from retainer, folded and placed in protective case. Smooth out top material on body panel.

2. Turn down sun visors and operate power top control switch until top is fully raised.

3. After top is raised, guide studs on front roof rail into striker holes; then engage each folding top locking handle with striker on windshield header. (Fig. 17-110)

4. Rotate each handle downward THEN FORWARD until fully engaged with striker on windshield header. Turn up sun visors.

NOTE: BE SURE TOP IS SECURELY LOCKED TO WINDSHIELD HEADER BEFORE DRIVING CAR.

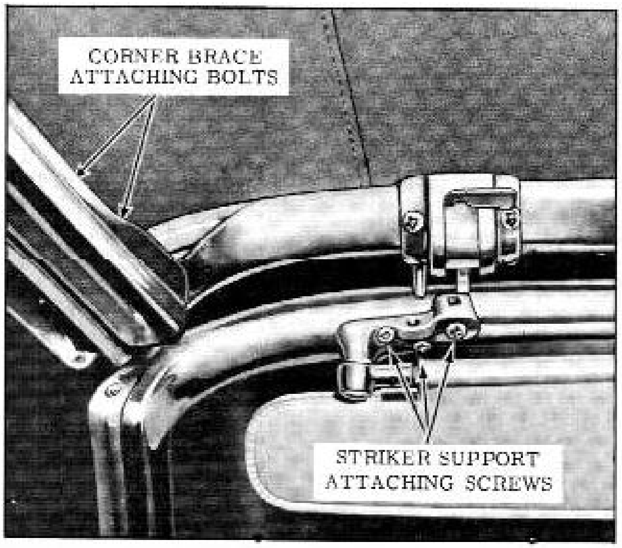


Fig. 17-110 Engaging Roof Header with Striker

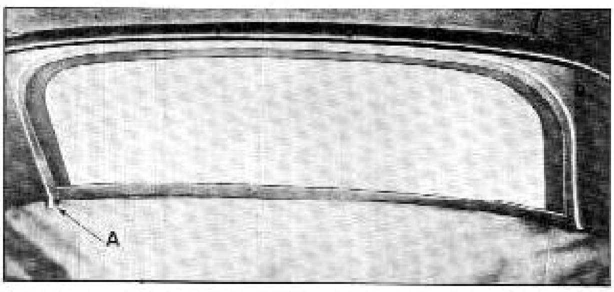


Fig. 17-111 Lowering Window

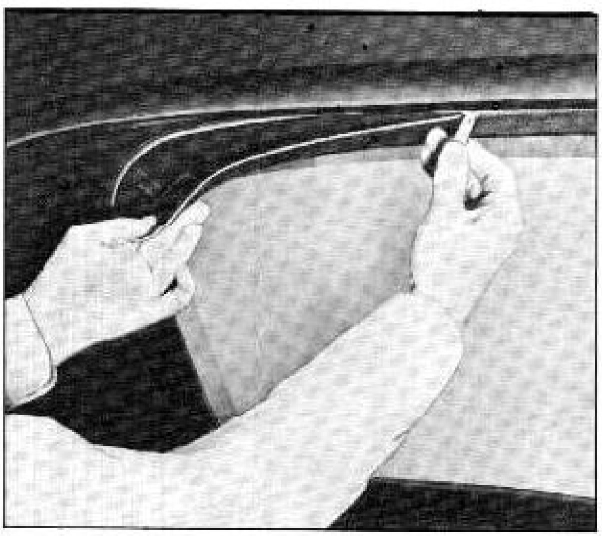


Fig. 17-112 Closing Rear Window

TO LOWER REAR WINDOW

Slide zipper fastener "A" upward, across top and down opposite side. (Fig. 17-111) Then carefully lower window into top compartment.

TO RAISE REAR WINDOW

1. Hold window in its approximate closed position; then slide zipper along sides and top of window. (Fig. 17-112)

   NOTE: In some cases, rear window zipper can be operated much easier if top is released at windshield header to relieve tension on zipper.

2. On outside of car after window has been raised, tuck top flaps into valance along right and left side of window opening. (Fig. 17-113)

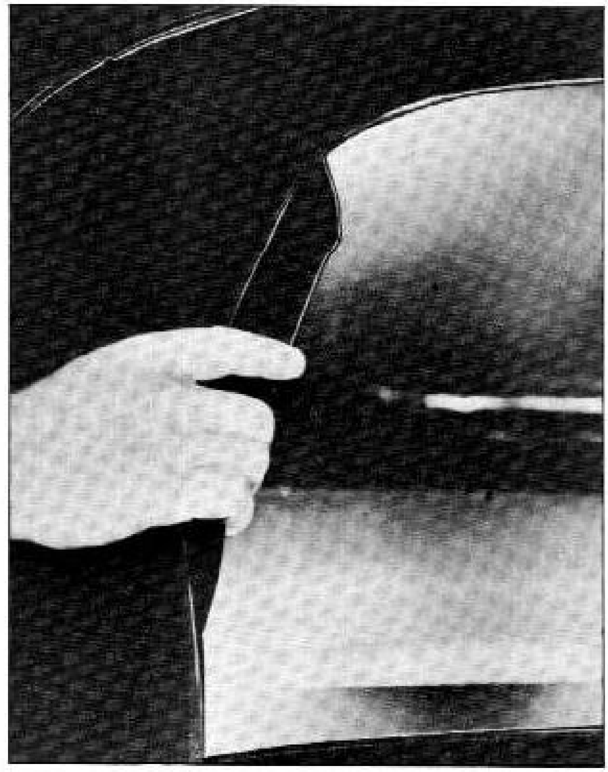


Fig. 17-113 Tuck in Flaps

GENERAL INFORMATION

1. As a safety precaution, DO NOT OPERATE TOP UP OR DOWN WHILE CAR IS IN MOTION. After raising top, make sure it is securely locked to the windshield header before starting car.
2. Do not obstruct the mechanical operation of top.
3. Do not place miscellaneous objects such as golf clubs, luggage, etc., in the folding top compartment.
4. To prevent water stains, mildew or possible shrinkage of top material, do not keep top folded for a long period of time if it is damp or water-soaked.
5. Do not paste advertising stickers, gummed labels or masking tape on the plastic rear

window. The adhesive used on such items is difficult to remove and may be injurious to the plastic composition of the window.

6. Allow plastic rear window and top material to become warm and pliable before attempting to operate top in temperatures below 50°F.

7. After raising the rear window. be sure to engage the top flaps into the valance along the sides of the rear window opening. This operation is performed from outside the car.

8. In some cases, the rear window can be lowered and raised much easier if the top is raised slightly above the windshield header to relieve the tension of the back curtain zipper.

CARE OF REAR WINDOW

The back curtain in the convertible coupe is provided with a large pliable plastic window. Due to the texture of the plastic window, it is susceptible to scratches and abrasions; therefore, when cleaning the window, follow the steps outlined below:

1. To remove superficial dust, do not use a dry cloth. Use a SOFT COTTON CLOTH MOISTENED WITH WATER and wipe crosswise of the window.

2. To wash the rear window, use cold or tepid (not hot) water and a mild neutral soap suds. After the washing, rinse with clear water and wipe with a slightly moistened clean soft cloth.

   CAUTION: Never use solvents such as alcohol or volatile cleaning agents on the plastic window. These liquids may have a deteriorating effect on the plastic and, if spilled, may spot the painted finish on the body panels.

3. When removing frost, snow or ice from the plastic window, DO NOT USE A SCRAPER. In an emergency, warm water may be used. Use care that the warm water does not contact the glass windows or windshield.

CLEANING THE TOP

The top should be washed frequently with neutral soap suds, lukewarm water and a brush with soft bristles. Rinse top with sufficient quantities of clear water to remove all traces of soap.

If the top requires additional cleaning after using soap and water, a mild foaming cleanser can be used. Rinse the whole top with water, then apply a mild foaming type cleanser on an area of approximately two square feet. Scrub area with a small soft bristle hand brush, adding water as necessary until the cleanser foams to a soapy consistency. Remove the first accumulated soilage with a cloth or sponge before it can be ground into the top material. Apply additional cleanser to the area and scrub until the top is clean. Care must be exercised to keep the cleanser from running onto body finish as it may cause streaks if allowed to run down and dry. After the entire top has been cleaned, rinse the top generously with clean water to remove all traces of cleanser. If desired, the top can be supported from the underside during the scrubbing operations.

After cleaning always be sure the top is thoroughly dry before it is lowered. Lowering the top while it is still wet or damp may cause mildew and unsightly wrinkles.

Do not use volatile cleaners or household bleaching agents on the top material.

SIDE ROOF RAIL WEATHERSTRIPS

The sealing along each folding top side roof rail is accomplished by a front, center and rear section of weatherstrip. These weatherstrips are attached to the side roof rails with nuts on the three integral studs of each weatherstrip section. In addition, both ends of the side roof rail front weatherstrip and the forward ends of the center and rear side roof rail weatherstrips are secured to the side roof rail with screws. Two additional screws are used to secure the preformed forward section of the side roof rail front weatherstrip to the front roof rail. An additional screw is used to secure the folding top compartment side panel weatherstrip portion of the rear side roof rail weatherstrip to the rear quarter inner panel.

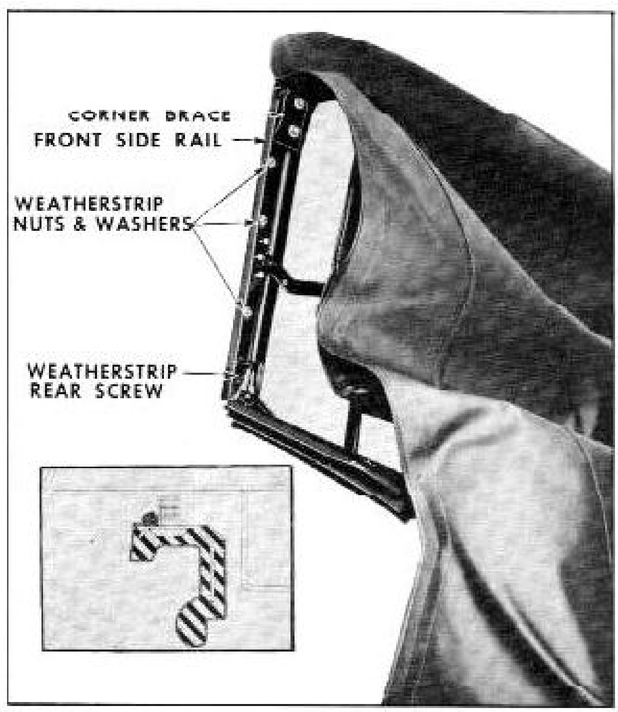


Fig. 17-114 Side Roof Rail Weatherstrip

The procedure below outlines the removal and installation of all 3 sections of weatherstrip. Each section may be removed and installed separately.

Removal

1. Lower top halfway.
2. Remove weatherstrip attaching screw(s) at end(s) of each section of weatherstrip.
3. Remove two screws at preformed forward end of side roof rail front weatherstrip. Remove two screws securing end of front roof rail weatherstrip retainer. With a flat-bladed tool, carefully break cement bond between front roof rail rear weatherstrip and side roof rail front weatherstrip at butt joint.
4. Remove weatherstrip attaching nuts and washers and remove weatherstrips. (Fig. 17-114)

Installation

1. Clean off cement from front and side roof rails to insure clean cementing surfaces.
2. Apply ribbon of body caulking compound along entire length of attaching surface on each side roof rail weatherstrip section just outboard of integral studs and reverse removal procedure. (Fig. 17-114)
3. Apply weatherstrip cement to adjoining surfaces of side roof rail front weatherstrip and front roof rail rear weatherstrip. Install side roof rail weatherstrip to form butt joint with front roof rail rear weatherstrip. Reinstall front roof rail weatherstrip retainer screws. Clean off excess cement and sealer.
4. Install two screws securing preformed forward end of side roof rail front weatherstrip to front roof rail.
5. At rear of side roof rail rear weatherstrip secure weatherstrip to quarter inner panel with screw and washer assembly.

Adjustment

1. The side roof rail weatherstrip sections may be adjusted inboard or outboard. To adjust, remove attaching screws, loosen attaching nuts and position as desired. Tighten nuts and reinstall attaching screws. If necessary, drill new holes (1/8") for attaching screws.

   NOTE: The side roof rail weatherstrip front section may also be adjusted fore or aft.

2. The side roof rail weatherstrips may also be adjusted downward. To perform this adjustment, loosen weatherstrip as required and insert a tapered waterproof cardboard shim between weatherstrip and side roof rail, tighten weatherstrip attaching nuts and reinstall attaching screws.

FRONT ROOF RAIL WEATHERSTRIP

Two weatherstrips of different types are used along the front roof rail. The front weatherstrip is a trim covered 3/8" diameter round rubber which is tacked to the front roof rail trim stick. The rear weatherstrip is a door weatherstrip type section and is secured to the front roof rail by weatherstrip cement and by the rear edge of a two-piece metal retainer. (Fig. 17-115)

Removal and Installation

To remove either weatherstrip, lower folding top and remove two-piece metal retainer; remove tacks securing front weatherstrip or break cement bond securing rear weatherstrip. To install weatherstrip, reverse removal procedure. When installing rear weatherstrip, follow cementing instructions outlined for front door weatherstrip.

FOLDING TOP ADJUSTMENTS

The folding top linkage consists of three sections of right and left side roof rails and a front roof rail connected by bolts, hinges, and a series of connecting links and bows. The top linkage is attached to the body at the rear quarter area by a male hinge bolted to an adjustable support. The front roof rail is locked at the windshield header by two hook type locks which are an integral part of the two locking handles.

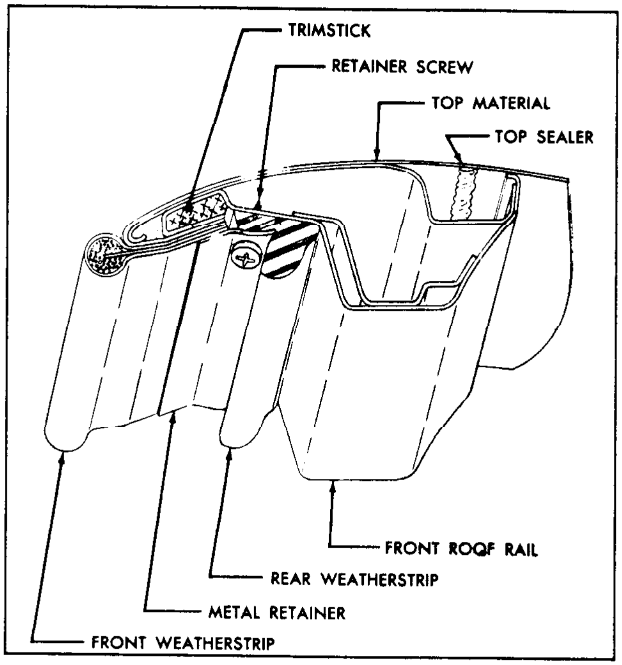


Fig. 17-115 Sealing Front Roof Rail

To correct some top variations, only a single adjustment is required; other top variations require a combination of adjustments. In conjunction with adjustment of the folding top, it may be necessary to adjust the door, door glass, rear quarter glass, trim sticks or side roof rail weatherstrips.

ADJUSTMENT OF TOP AT FRONT ROOF RAIL CORNER BRACE

If the top, when in a raised position, is too far forward or does not move forward enough to allow the guide studs on the front roof rail to enter holes in the striker assemblies, proceed as follows:

1. Unlatch top and raise it above windshield header. Remove side roof rail weatherstrip front attaching screws.
2. Loosen corner brace attaching bolts (Fig. 17-116) and adjust front roof rail fore or aft as required. Repeat on opposite side if necessary.

   NOTE: This adjustment is limited. If additional adjustment is required, it can be made at the folding top male hinge.

3. When front roof rail corner brace is properly adjusted, tighten attaching bolts and reinstall side roof rail front weatherstrip attaching screws. Check forward section of weatherstrip and reseal if necessary.

ADJUSTMENT OF TOP AT SUNSHADE AND STRIKER SUPPORT ASSEMBLY

If a difficult locking action, caused by misalignment of the sunshade and striker support assembly, is encountered at the front roof rail or if a closer fit of the front roof rail to windshield header is desired, proceed as follows:

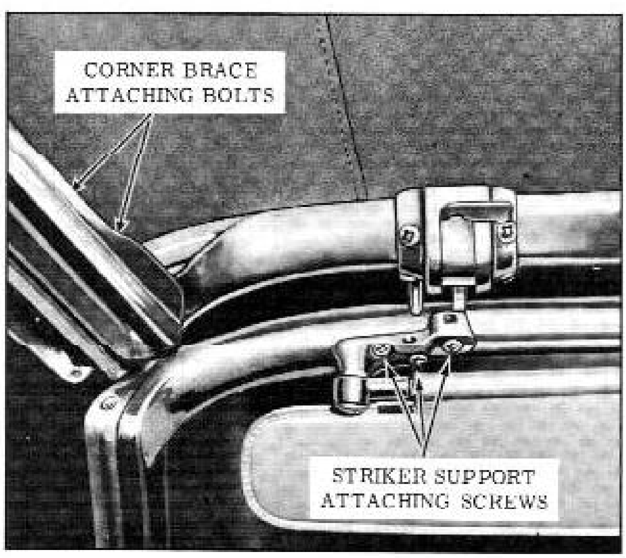


Fig. 17-116 Front Roof Rail Adjustment

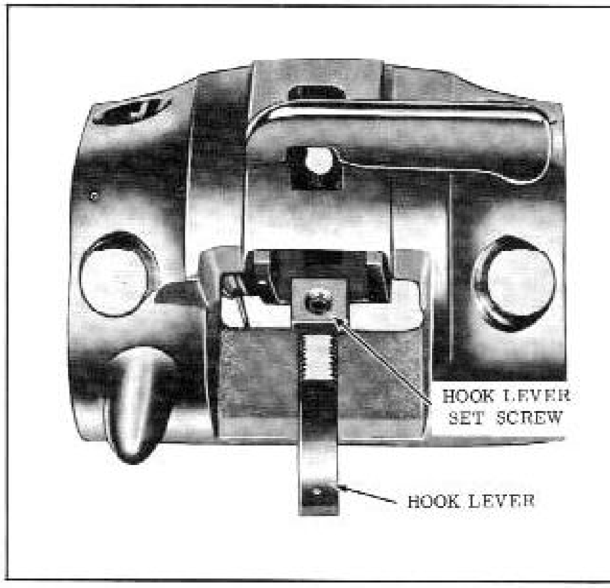


Fig. 17-117 Front Roof Rail Lock Assembly

1. Unlatch top and raise it above windshield header.
2. Loosen striker support attaching screws and adjust striker as required (Fig. 17-117) then tighten attaching screws.

If after adjusting the striker support, the locking action of top is still unsatisfactory, the hook lever on the front roof rail lock assembly may be adjusted as follows:

1. Loosen hook lever set screw. (Fig. 17-117)
2. Turn hook lever clockwise to tighten locking action of top, counterclockwise to reduce locking action of top.
3. After desired locking action has been obtained, tighten hook lever set screw.

ADJUSTMENT OF TOP CONTROL LINK ADJUSTING PLATE

1. With top in up position, if joint between front and center side roof rail is too high or too low, proceed as follows:

   a. Remove folding top compartment side trim panel and loosen two bolts securing control link adjusting plate sufficiently to permit adjustment of plate. (Fig. 17-118)

   b. Without changing fore and aft location of adjusting plate, adjust side roof rail up or down allowing adjusting plate to move up or down over serrations on support as required; then tighten bolts.

2. If top assembly does not stack properly when top is in down position, proceed as follows:

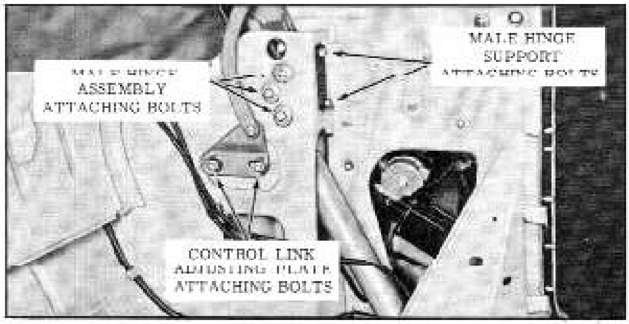


Fig. 17-118 Folding Top Adjustments

a. Loosen bolts securing control link adjusting plate sufficiently to permit adjustment of plate.

b. Without changing the up or down location of adjusting plate, move adjusting plate forward or rearward (horizontally) over serrations as required to obtain desired height; then tighten bolts.

ADJUSTMENT OF TOP AT MALE HINGE SUPPORT

Prior to making any adjustment of top linkage at male hinge, loosen two bolts securing folding top rear quarter trim stick to rear quarter panel. This will prevent any possible damage to top when it is raised after adjustment. After making an adjustment at male hinge, check folding top at rear quarter area for proper fit and, if necessary, adjust trim stick assembly.

1. If there is an excessive opening between side roof rail rear weatherstrip and rear of rear quarter window, or if front roof rail is too far forward or rearward, proceed as follows:

   a. Loosen male hinge assembly attaching bolts. (Fig. 17-118)

   b. Move hinge fore or aft as required to obtain proper alignment between side roof rail rear weatherstrip and rear quarter window; then tighten bolts.

   c. Lock front roof rail to windshield, (where required, adjust front roof rail corner brace), and check fit of top material at rear quarter trim stick area. If necessary, adjust trim stick; then tighten trim stick attaching bolts.

2. If side roof rail is too high or too low at rear quarter window area, proceed as follows:

   a. Scribe locating mark on top of male hinge and male hinge support to maintain proper fore and aft relation of the two parts.

   b. Loosen male hinge assembly attaching bolts and male hinge support front attaching bolts. (Fig. 17-118)

   c. Without changing fore and aft location of male hinge, adjust hinge support up or down as required to obtain proper alignment between side roof rails and rear quarter windows.

   d. Tighten hinge support front attaching bolts, then while maintaining proper alignment of scribe marks on top of hinge, tighten hinge assembly attaching bolts. (Fig. 17-118)

   e. Check fit of top material at rear quarter trim area and, if necessary, adjust trim stick. If adjustment is not necessary, tighten trim stick attaching bolts.

FOLDING TOP TRIM

COMPLETE ASSEMBLY

The top trim is one continuous piece of material. The materials which are required for performing convertible top sealing operations are a neoprene type weatherstrip adhesive for cementing vinyl surfaces and convertible top sealer, Part No. 1098737 for sealing the cloth inner lining of the top material.

Removal

1. Place protective covers on all exposed panels which may be contacted during procedure.
2. Remove following trim and hardware items:

   a. Rear seat cushion and back.

   CAUTION: Disconnect rear seat speaker wire if present.

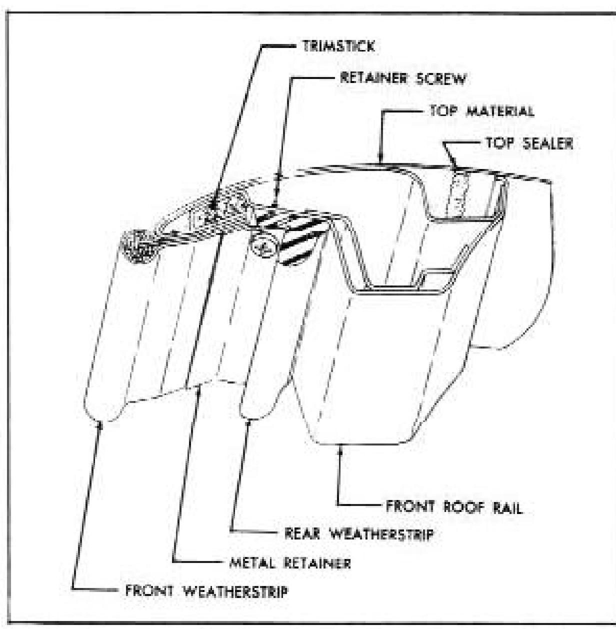


Fig. 17-119 Front Roof Rail Sealing

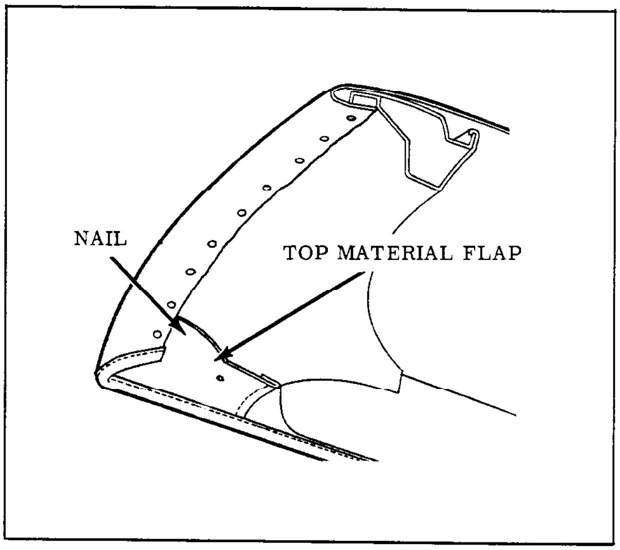


Fig. 17-120 Top Material Attachment To Roof Rail

b. Folding top compartment side trim panel assemblies.

c. Side roof rail rear weatherstrips; then loosen folding top quarter flaps from rail.

3. At front of body, raise front roof rail, remove retainers and front weatherstrips and detach top material from front roof rail. (Fig. 17-119)

4. Loosen front end of each side roof rail front weatherstrip sufficiently to detach top material flaps which are nailed and cemented to rails. (Fig. 17-120)

5. Detach folding top compartment bag from rear seat back panel, exposing rear quarter and rear trim stick attaching bolts. Forward end of top compartment bag may be tied or wired to center roof bow to provide ready access to attaching bolts. (Fig. 17-121)

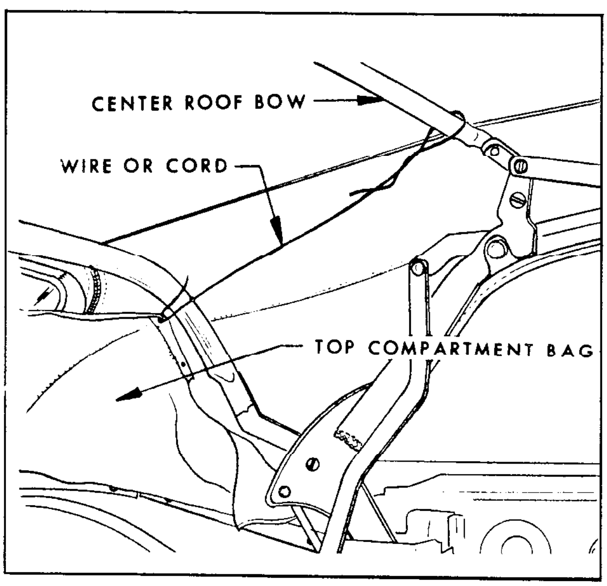


Fig. 17-121 Top Compartment Bag Held in Position

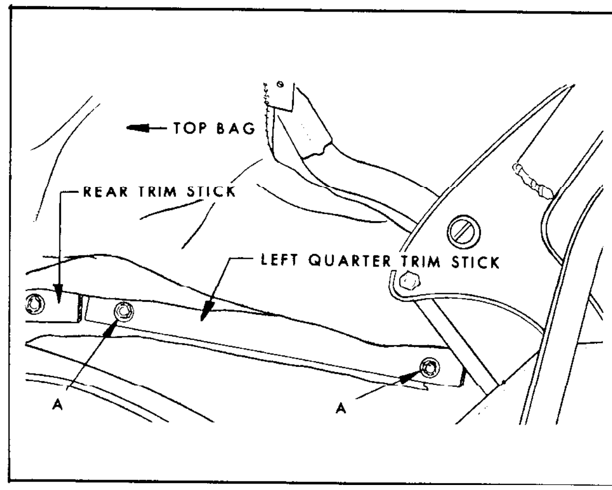


Fig. 17-122 Trim Stick Removal

6. At each rear quarter area remove attaching bolts and washers securing rear quarter trim stick assembly to rear quarter inner panel. (Fig. 17-122)

7. Remove rear trim stick attaching bolts; then lift trim assembly with attached quarter and rear trim sticks on top of rear compartment front panel.

8. To establish the relationship of the old top material to its position on rear trim stick, cut selvage end of top material off flush with lower edge of trim stick.

   CAUTION: When cutting top material, be careful not to cut selvage edge of back curtain lower panel.

9. Using a pencil, mark both ends of rear and rear quarter trim sticks on vinyl surface of top material. Reference marks for trim sticks should be transferred to new top material when Step 30 of installation procedure is performed.

10. Remove screw securing escutcheon clip at each end of wire-on binding on rear bow. Remove wire-on binding from rear bow. Detach top

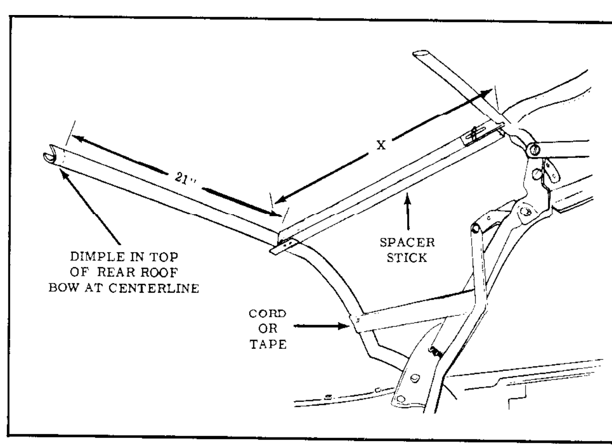


Fig. 17-123 Spacer Stick Installation

material from rear roof bow and from trim sticks, then remove top cover assembly.

11. Lock top to windshield header. Install radius end of each adjustable spacer stick to fit against center roof bow. Install opposite end of spacer stick so that metal plate fits under rear roof bow. (Fig. 17-123) Spacer sticks should be installed along inboard edge of side stay pad or approximately 21" outboard from centerline dimple of rear roof bow. (Fig. 17-123) While exerting rearward pressure on rear bow to draw side stay pads taut, extend spacer sticks until they fit snug between center bow and rear roof bow, then tighten wing nuts.

NOTE: Spacer sticks may be made as shown in Fig. 17-124.

12. Temporarily tie or tape rear bow to rear side roof rails. (Fig. 17-123) Detach side stay pads and back curtain with integral quarter stay pads from rear bow.

13. Remove rear trim stick with attached back curtain assembly and top compartment bag from body and place on clean surface. Measure and record dimension "Z" between lower surface of rear trim stick and upper edge of back curtain lower valance. (Fig. 17-125) Back curtain assembly may now be detached from rear trim stick.

14. Remove side stay pads. Stay pads are attached

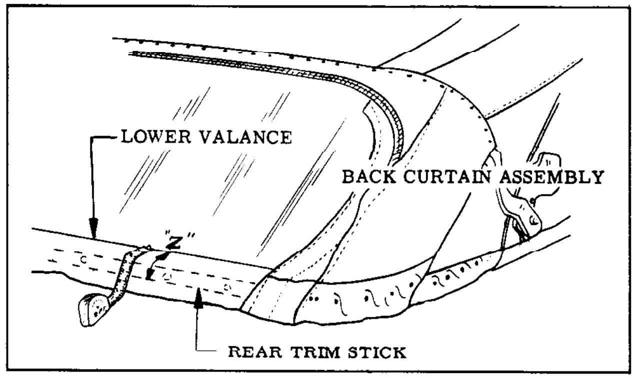
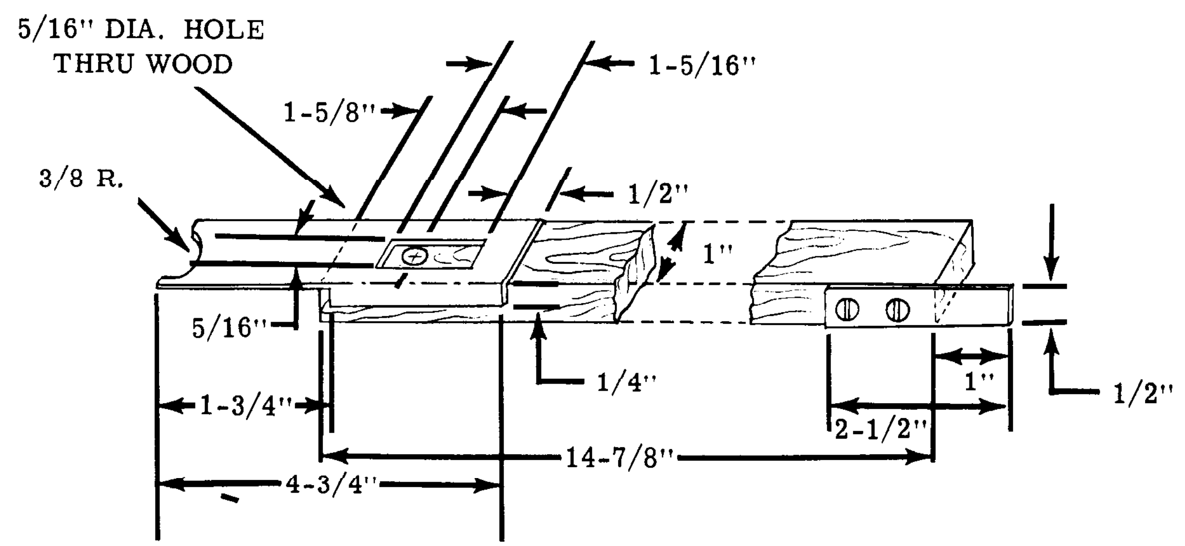


Fig. 17-125 Check Trim Stick to Lower Valance Dimension

to front roof rail and front and rear bows with tacks; to center bow with screws.

Installation

1. If new top is being installed but it was impossible to perform step 11 of removal procedure, preset spacer sticks to shortest length and install between center and rear roof bow. (Fig. 17-123) Adjust sticks so that dimension "X" (measured along spacer stick from front upper rolled edge of rear roof bow to center of center bow) is approximately 16-1/4". Tie or tape rear bow to rear side roof rails.



MATERIAL PER STICK: WOOD - 1/2" x 1" x 14-7/8"
STEEL - 1/32" x 1/2" x 2-1/2"
STEEL - 1/32" x 1-1/2" x 4-3/4"
2 SCREWS #6 x 1/2"
BOLT 1/4" x 20" x 1"
WINGNUT 1/4" x 20"
2 WASHERS 1/4" I.D.

Fig. 17-124 Spacer Stick Details

2. In all cases, dimension "X", previously described, must be between 16" and 16-1/2" and equal on both sides. This dimension may be changed slightly within tolerances to correspond with new top after tryout.

3. Tack side stay pads to rear roof bow. Stay tack pads to front roof rail and front bow. (Fig. 17-126) Install stay pad wadding using an approved trim cement.

4. Trim selvage end of side stay pads just forward of rear rolled edge of rear roof bow. (Fig. 17-127)

5. Distance from center of center bow to rolled forward upper edge of rear roof bow is 16-1/4" (± 1/4"). Readjust spacer sticks and side roof rail pads as required if rear bow does not come within this position range. (Fig. 17-127)

6. Place back curtain window assembly on clean covered work bench with exterior (vinyl) surface of back window valance facing upward. (Large pliable back window must be handled carefully to avoid possible damage due to scratches, abrasions, etc.) Using hand oiler, apply bead of neoprene-type weatherstrip adhesive to both stitches which secure back window to zipper and back curtain water deflector. (Fig. 17-128)

7. Apply neoprene-type weatherstrip adhesive to stitches which secure back curtain water deflector along outboard edge of deflector. (Fig. 17-129)

8. After sealer has dried, turn back window assembly over with exterior (vinyl) surface of

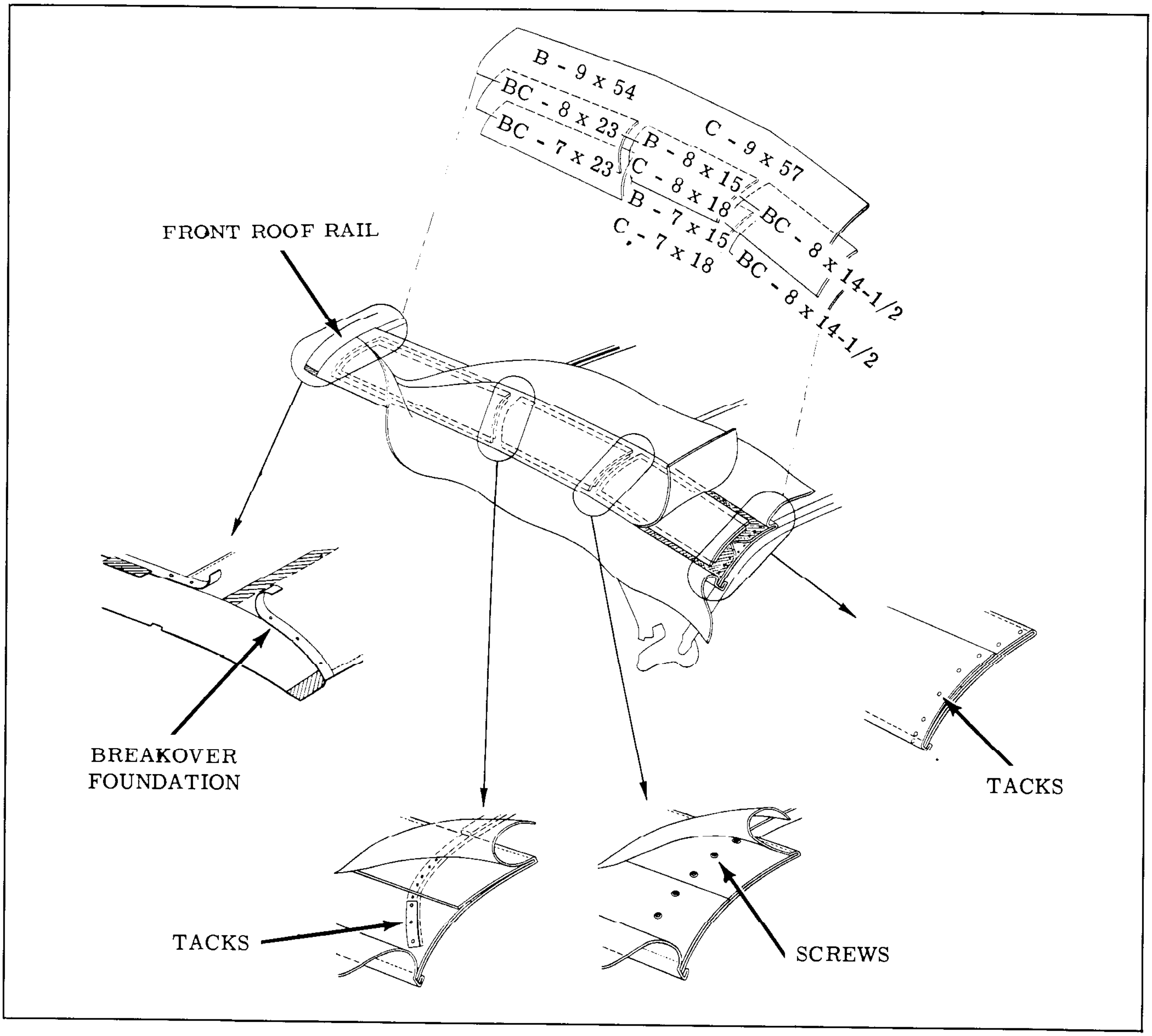


Fig. 17-126 Tacking Stay Pads

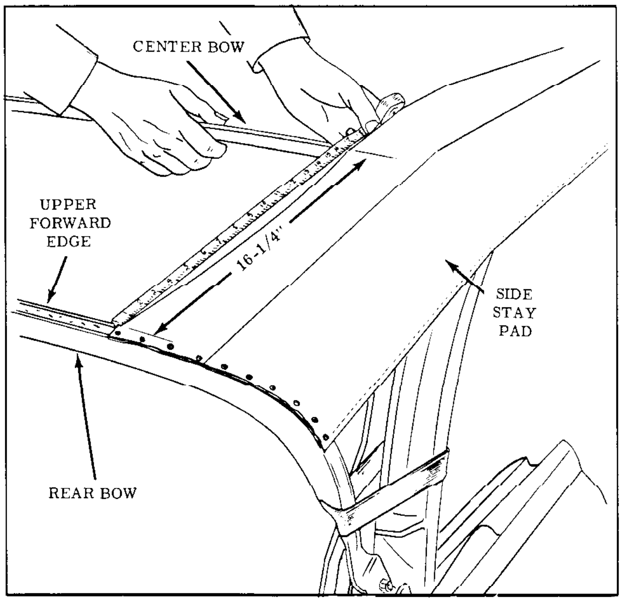


Fig. 17-127 Position of Rear Bow

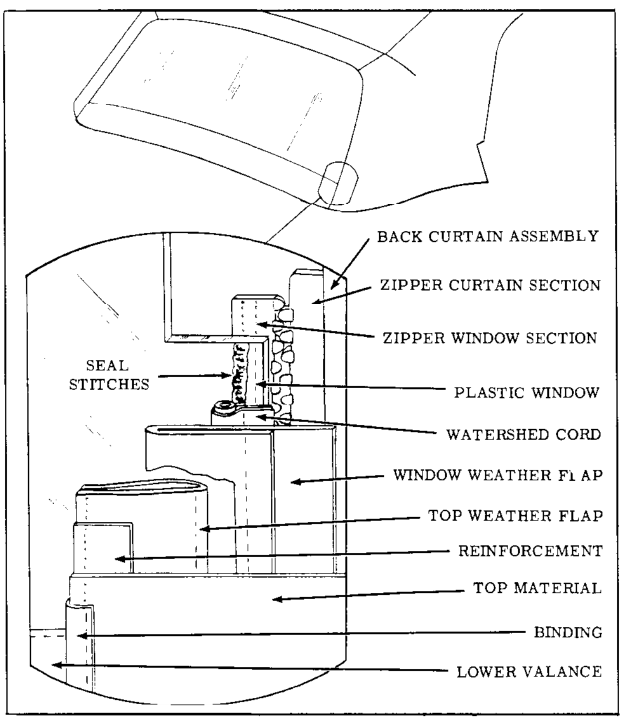


Fig. 17-128 Back Curtain Sealing

back window valance facing down. Apply bead of convertible top sealer along lower edge of back window curtain inner layer in area which will be tacked to rear trim stick. (Fig. 17-130)

9. Check back curtain stay pad watershed for proper installation to rear trim stick. (Fig. 17-131) A new watershed may be made from a vinyl coated material. Place vinyl coated side of material against trim stick, then tack material in position. Bottom portion of watershed is wrapped upward and around lower edge of back stay pad inner flap. The stay

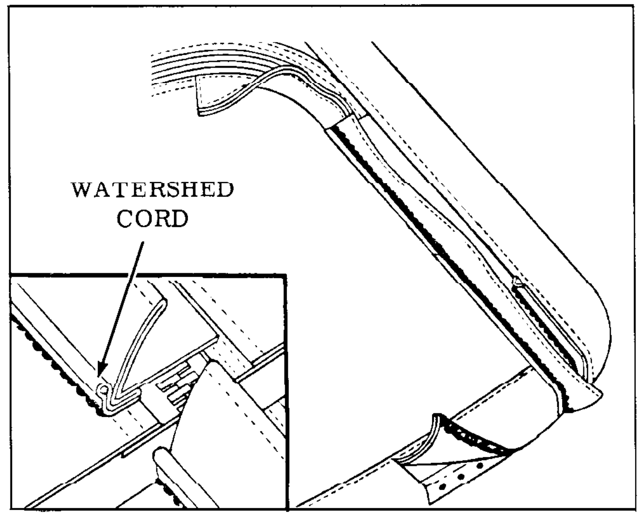


Fig. 17-129 Back Curtain Watershed Cord

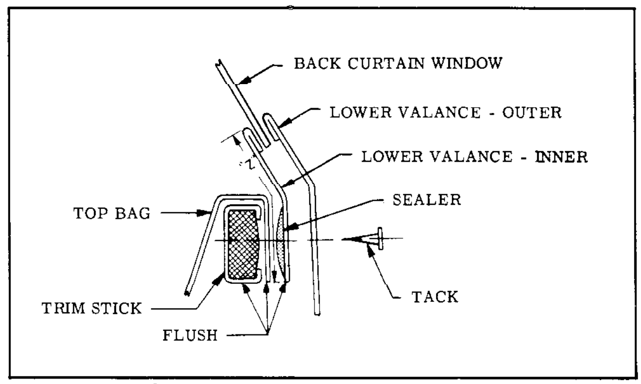


Fig. 17-130 Curtain Attachment to Trimstick

pad outer layer (coated fabric) is then tacked to the trim stick. The watershed is designed to protect lower edge of stay pad from wicking water.

10. Center and position back curtain assembly to

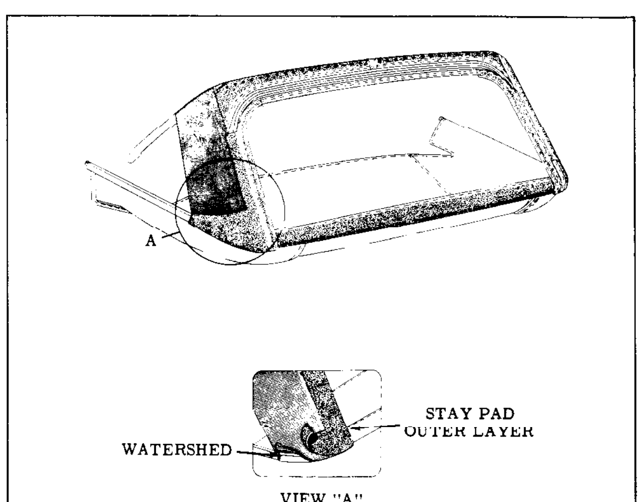


Fig. 17-131 Back Curtain Stay Pad Watershed

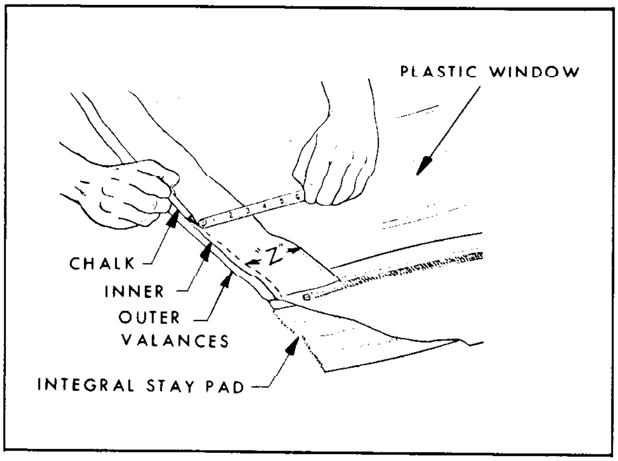


Fig. 17-132 Marking Inner Trim Material

rear trim stick over attached top compartment bag. Distance between lower surface of trim stick and upper edge of back curtain lower valance inner layer should correspond to dimension "Z" of old back curtain. (See step 13 of removal procedure.) Dimension should not exceed 3 inches in area below back curtain window (between offset located at right and left radii of rear trim stick). (Fig. 17-132) This dimension can be readily maintained during tacking operations by first placing chalk mark on cloth lining surface of valance inner layer or marking vinyl surface of top material along lower edge of trim stick.

NOTE: New back curtain and top material should extend 1/2" below lower edge of trim sticks. (Fig. 17-144)

11. Tack curtain assembly to rear trim stick. (Fig. 17-133) Tacks should be placed close to each side of every bolt hole in trim stick. Then pierce or punch back curtain assembly for each trim stick bolt. See Fig. 17-130 for tacking of back curtain lower valances at body centerline.

NOTE: Do not install tacks within 1/2" of back curtain watershed cord. (Fig. 17-134 illustrates watershed cord and exterior back curtain sealing).

12. Tack lower inner layer of back curtain stay pads over watershed to rear trim stick using chalk lines on pads as reference guide lines to establish proper contours. (Fig. 17-135) Trim edges of stay pad inner layer.

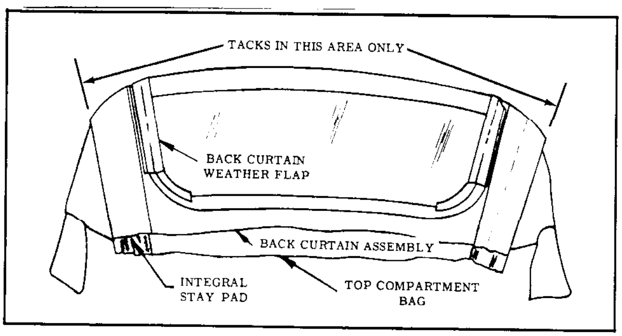


Fig. 17-133 Tacking Back Curtain

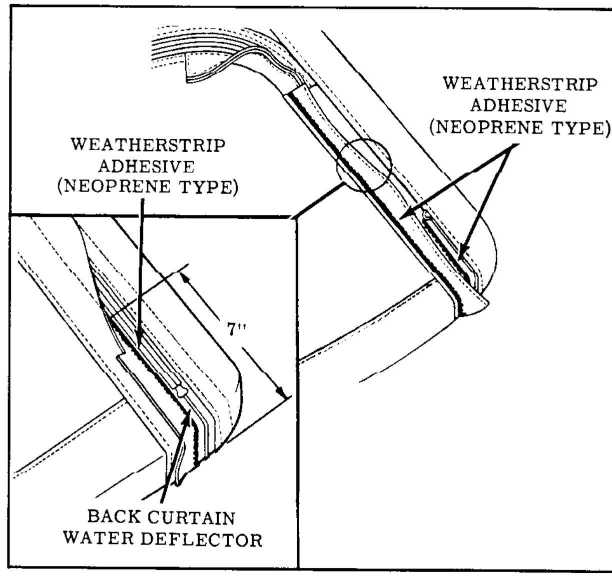


Fig. 17-134 Back Curtain Sealing

13. Wrap bottom portion of watershed upward around lower edge of stay pad inner flap. (Fig. 17-131); then tack stay pad outer layer (coated fabric) over watershed.

14. Inspect rubber trim stick fillers cemented to body below pinchweld. (Fig. 17-136) Re-cement if necessary.

15. Install rear trim stick with attached back curtain assembly into body.

NOTE: Make sure that all trim stick bolts are driven completely in to represent finished condition.

16. Secure back curtain assembly with one tack to rear bow to prevent damage to plastic sheet. (Fig. 17-137)

17. Working from body center progressively outboard to right and left sides, tack back curtain upper valance and upper ends of integral

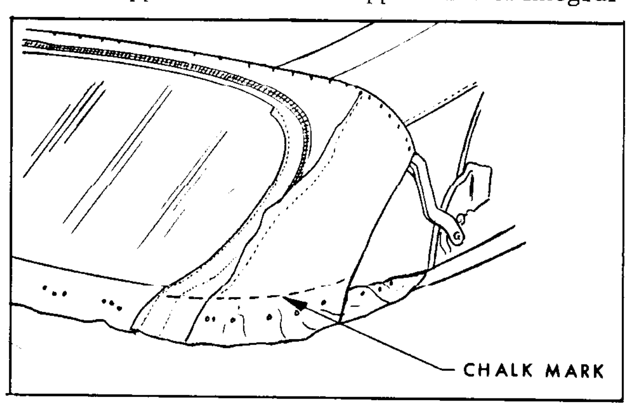


Fig. 17-135 Tacking Back Curtain Stay Pads

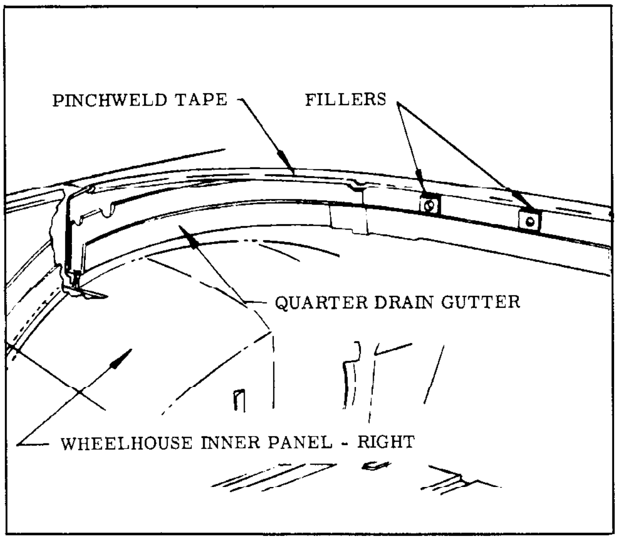


Fig. 17-136 Checking Trim Stick Fillers

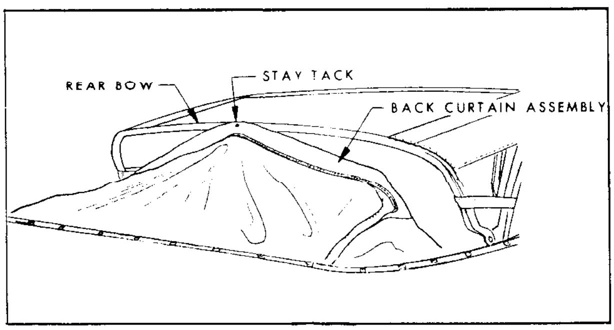


Fig. 17-137 Stay Tacking Back Curtain

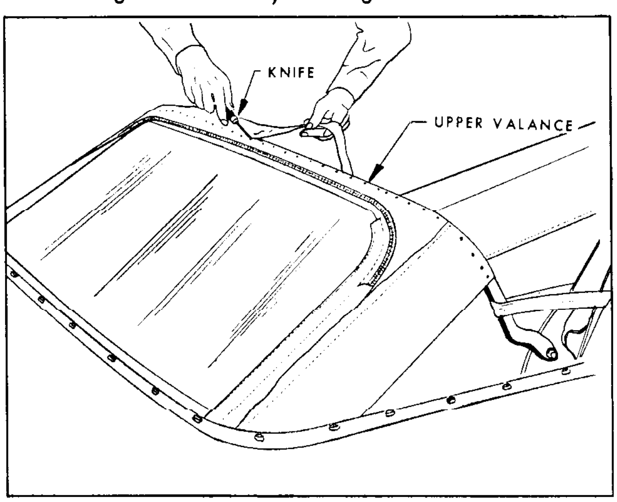


Fig. 17-138 Triming Upper Valance

stay pads to rear bow. Make sure all fullness has been drawn from curtain before trimming off excess at rear bow. (Fig. 17-138)

CAUTION: Trim forward edges of back curtain and pads just rearward of front rolled edge of rear roof bow. Do not cut front side stay pads.

18. Check contour of back curtain assembly and stay pads at rear roof bow and at pinchweld molding.

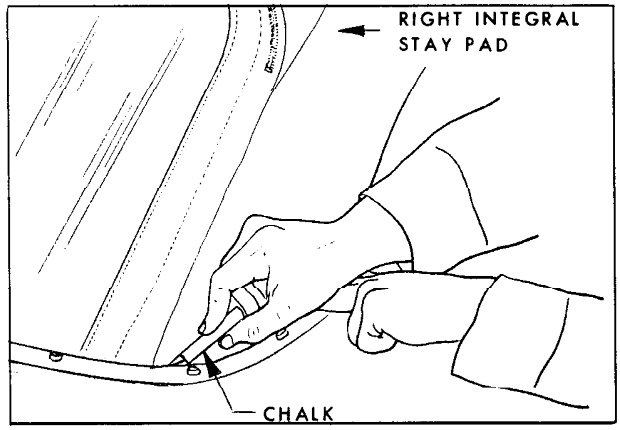


Fig. 17-139 Marking Quarter Stay Pads

19. Where required, place reference chalk mark on outer surface of back curtain or quarter stay pads along pinchweld finishing molding. Readjust back curtain assembly and/or stay pads as required. (Fig. 17-139)

20. Where required, adjust side stay pads; then tack side stay pads to front roof rail and front bow. Attach side stay pads to center bow with screws. Trim selvage end of side stay pads at front roof rail. Install stay pad covering material in conventional manner using an approved trim cement.

21. Lay out new top material on clean protected surface with outer layer of material exposed.

22. Using a pencil, mark top material (mark should be approximately 1/2" in length) at deck seam 4-1/4" from edge of top material upper valance binding. (Fig. 17-140)

23. Fold new top material in half so that inner lining of top material is exposed. (Fig. 17-141) Install a 6" piece of tape on inner surface at centerline fold of new top material. (Fig. 17-141) Using a pencil, mark the approximate

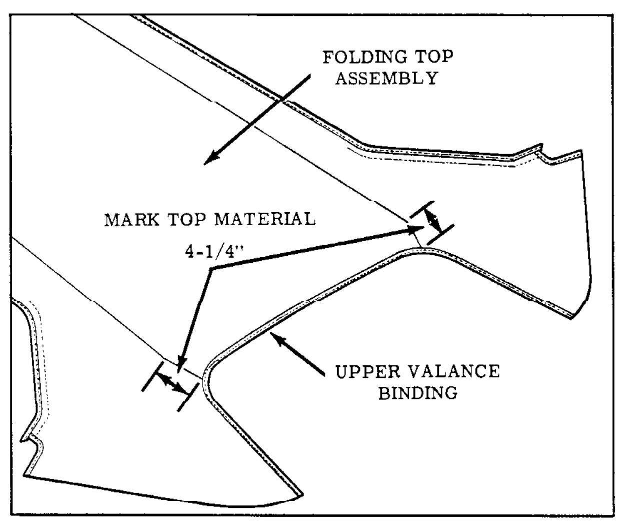


Fig. 17-140 Marking Top Material

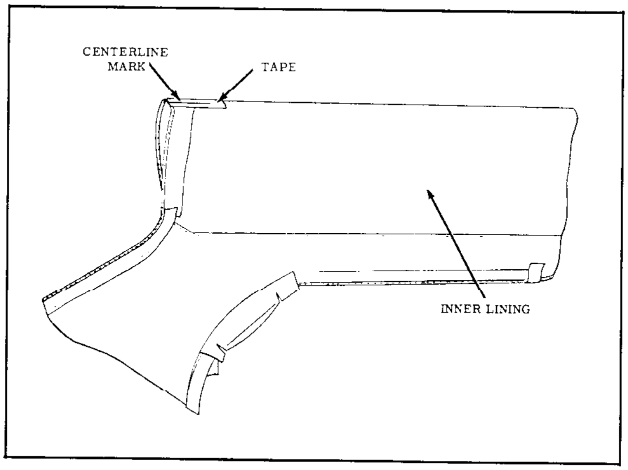


Fig. 17-141 Centerline of Top Material

centerline of new top material along entire length of tape.

IMPORTANT: Be sure mark will be visible inside of body after new top is installed on convertible top framework.

24. Along forward surface of rear roof bow install a 1" piece of tape at centerline dimple of rear roof bow. Using a pencil, mark centerline of rear bow on tape. (Fig. 17-142)

25. Remove rear bow spacer sticks and positioning tape or cord.

26. Remove rear trim stick.

27. Check position of rear roof bow in relation to new folding top trim assembly by placing new top trim over folding top framework. With quarter flaps properly folded over rear side roof rails (edge of rails should match stitch lines of quarter flaps), marks on deck seam should be in center of rear roof bow.

NOTE: The deck seam mark will vary slightly (± 1/4") depending upon position of rear roof bow. Also check centerline mark on inner lining of top material. Mark should correspond to centerline mark on rear roof bow.

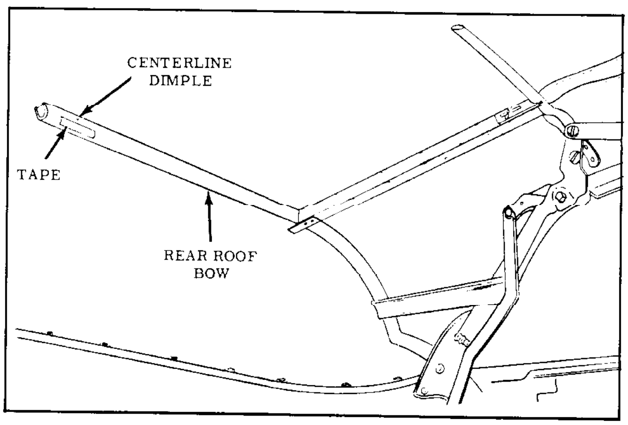


Fig. 17-142 Centerline of Rear Roof Bow

28. Remove top trim material.

29. Apply bead of convertible top sealer to inner lining of top material along front roof rail. Sealer bead should be roughly parallel with forward edge of top material and located so that sealer will be completely concealed by front roof rail when top is installed. (Fig. 17-119)

30. Carefully lay removed top, which was marked at lower edge of trim stick prior to removal, over new top. Align old top with new top. Using a pencil, mark vinyl surface of new top using marked edge of old top as guide. Also mark edges of trim sticks on vinyl surface of new top material. (See Steps 8 and 9 of removal procedure.)

31. Position top trim on framework and center assembly both fore and aft and side to side. Positively locate top by engaging weatherflaps at back curtain.

32. Check position of top trim at rear roof bow and at side roof rear rails. With quarter flaps properly folded over rear side roof rails (edge of rails should match stitch lines of quarter flaps), marks on deck seam should be in center of rear roof bow.

NOTE: The deck seam mark will vary slightly (± 1/4") depending upon position of rear roof bow. Also check centerline mark on inner lining of top material. Mark should correspond to centerline mark on rear roof bow. (Fig. 17-142)

33. Using neoprene-type weatherstrip adhesive, fasten rear quarter flaps to side roof rear rails. Make sure that seam breaks at forward edge of side roof rear rail.

NOTE: Material may have to be stretched from side to side to insure proper fit of top material flaps to side roof rear rails and to remove wrinkles from top material along rear roof bow.

34. Cut or pierce flaps for side roof rear rail

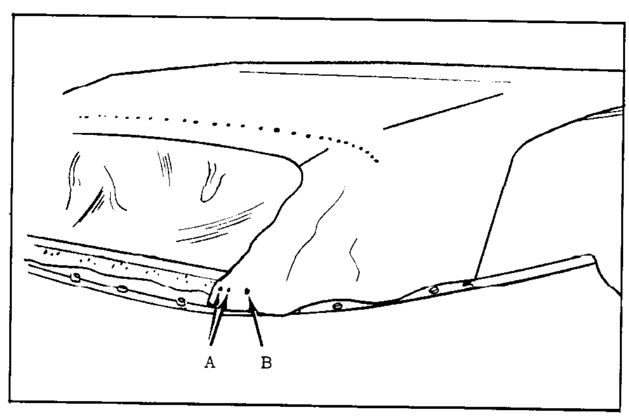


Fig. 17-143 Tack Top Material

weatherstrip attaching bolts. Install side roof rear rail weatherstrip to help maintain position of quarter flaps while adhesive is drying.

35. Using previously marked lines (ends of trim stick) as locating reference, tack top material to rear and rear quarter trim sticks. "A" in Fig. 17-143 shows top material installed to rear trim stick at base of each weatherflap.

    IMPORTANT: Do not install tacks within 1/2" of back curtain watershed cord. (Fig. 17-134)

36. Cut or punch hole in top material for each trim stick attaching bolt.

37. Install top material into body. Make sure rear and rear quarter trim stick attaching bolts are completely driven in to represent finished condition.

38. Check fit of top material. Rear quarter trim sticks may be adjusted downward to remove minor wrinkles in top material in rear quarter area.

39. Where required, re-mark top material; then make necessary adjustments to top material by repositioning rear quarter trim sticks and/or by retacking top material to rear and/or rear quarter trim sticks.

    NOTE: In extreme cases, adjustment of top material at rear or rear quarter trim sticks may have to be performed several times before desired fit of top material is obtained.

40. Remove trim sticks with attached top material from top compartment well. Back curtain and top material should extend 1/2" below trim sticks. (Fig. 17-144) Trim material as required. Apply convertible top sealer onto all

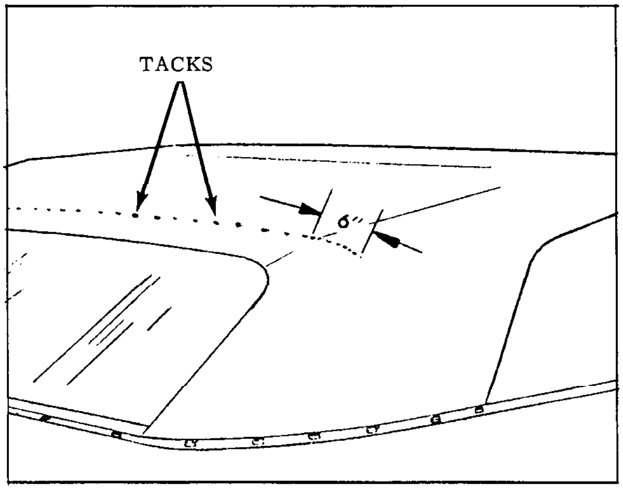


Fig. 17-145 Tack Location

trimmed edges, around each tack head and around each trim stick attaching bolt hole.

CAUTION: All painted surfaces adjacent to belt finishing molding should be adequately covered to prevent possible sealer damage.

41. Install trim sticks with attached top material into top compartment well and tighten side and rear trim stick attaching bolts.

42. Re-check side roof rail flaps. Make sure mark at deck seams is in center of rear bow. Also recheck centerline mark on inner surface of top material at rear bow.

43. Where required, remove side roof rail rear weatherstrips. Readjust top material at side roof rails and reinstall weatherstrips.

44. While pulling top material slightly rearward, stay tack top material along rear roof bow.

    IMPORTANT: Tacks must be installed along a straight line in center of rear bow.

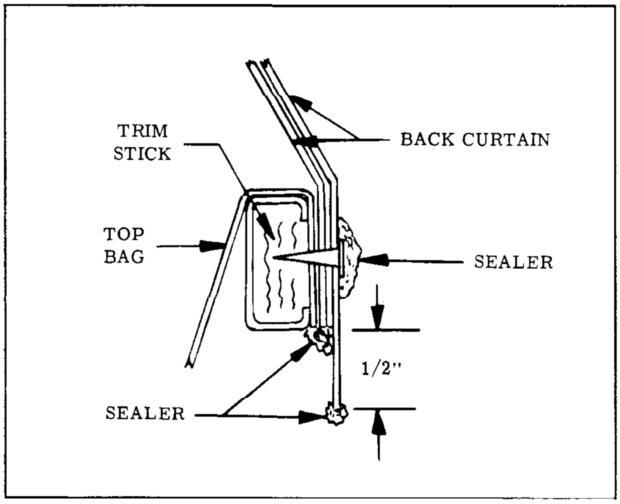


Fig. 17-144 Sealing at Trim Stick

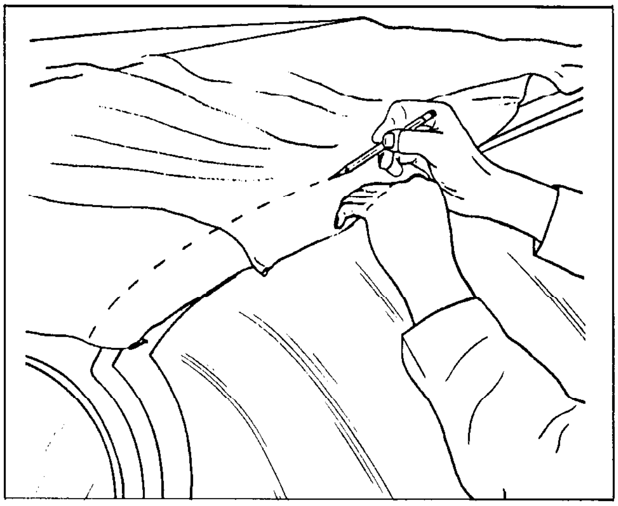


Fig. 17-146 Marking Top Material

(Fig. 17-145) Tacks outboard of deck seams should be restricted to distance not to exceed six inches, which is length wire-on binding extends past seam. (Fig. 17-145)

45. Unlock top from windshield header, apply neoprene-type weatherstrip adhesive to front flaps and to corresponding areas on side roof front rails. Fasten flaps to side roof front rails. (Fig. 17-120) Lock top to windshield header.
46. At front roof rail, pull top trim material forward to desired tension. While maintaining tension on top trim, place a pencil mark on outer surface of trim material along forward edge of front roof rail. (Fig. 17-146)
47. Unlock top from windshield header and apply neoprene-type weatherstrip adhesive to tacking area of front roof rail. Pull top trim material slightly forward so that pencil marks are forward of front edge of front roof rail. Fasten top trim to cemented area and stay tack trim to rail. (Fig. 17-147)
48. Lock top to windshield header. Check appearance of top trim as well as operation and locking action of top. If additional tension is desired in top trim, unlock top from header and reposition top trim so that pencil marks are further forward. Stay tack and recheck top appearance.
49. Complete tacking of top trim to front roof rail and trim off excess material.
50. Permanently tack top material to rear roof bow. Apply bead of neoprene-type weatherstrip adhesive around each tack head, and into two holes pierced into top material for wire-on binding clip escutcheons.
51. When completed, folding top should be free from wrinkles and draws. Install all previously removed trim and hardware and clean any soil from top material, back curtain or pads.

FOLDING TOP ASSEMBLY

Removal

1. Remove folding top trim assembly as described in steps 1 through 10 of "Removal of Folding Top Trim Assembly".

Installation

1. Prior to installation of new top trim material, check contour of back curtain and side stay pad assemblies. Where required, adjust back curtain and/or side stay pads as required.
2. Install new folding top trim assembly as described in steps 21 through 24 and 26 through 51 of "Installation of Folding Top Trim Assembly".

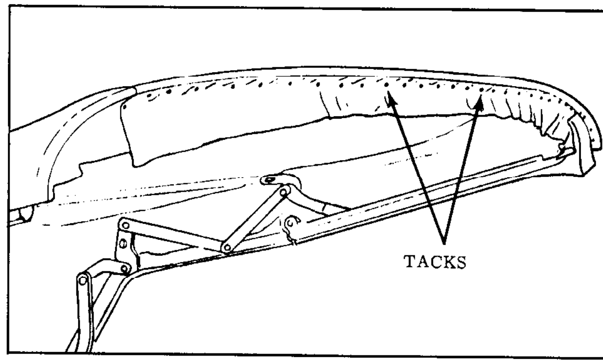


Fig. 17-147 Tacking Trim to Rail

BACK CURTAIN ASSEMBLY

Removal

1. Detach top compartment bag from seat back panel and remove all trim stick attaching bolts.
2. Remove wire-on binding and escutcheons.
3. Detach folding top trim from rear roof bow and from rear trim stick. Remove side roof rail rear weatherstrips and detach top trim from side roof rails.
4. Carefully slide top trim forward exposing tacked edge of rear curtain assembly.
5. Working at one side stay pad area, detach outboard tacks that secure side stay pad to quarter stay pad section of back curtain assembly and to rear roof bow. Detach outboard tacks that secure quarter stay pad section to rear roof bow. Turn quarter stay pad section back and stay-tack side stay pad to rear roof bow.
6. Remove inboard tacks of above components; turn balance of the quarter stay pad section back and permanently tack side stay pad to rear roof bow.
7. Repeat steps 5 and 6 on other side and detach balance of back curtain assembly from rear roof bow.
8. Detach back curtain assembly from large trim stick and remove from car.

Installation

1. Install spacers sticks as described in steps 1 and 2 of "Installation of Folding Top Trim" procedure.
2. Seal and install back curtain assembly as described in steps 6 through 19 of "Installation of Folding Top Trim" procedure.

NOTE: Extra care in positioning new curtain at same location on trim stick as old curtain and aligning of trim stick attaching bolt holes in top material with holes in trim stick will allow reinstallation of top material to its original position with a minimum of refitting.

HYDRO-LECTRIC SYSTEM

The hydraulic unit which is used in the Convertible bodies, consists of a 12-volt reversible type motor, a rotor-type pump, two hydraulic lift cylinders and an upper and lower hydraulic hose assembly. The unit is installed in the body directly behind rear seat back. (Fig. 17-148)

MOTOR AND PUMP ASSEMBLY (Fig. 17-149)

Removal

1. Operate folding top to full "up" position.
2. Disconnect battery cable.
3. Place protective covering over rear seat cushion and back.
4. Working inside body, detach front edge of folding top compartment bag from rear seat back panel.
5. Working on inside of body over rear seat back, remove pump and motor shield attaching screws and remove shield.
6. Remove clips "A" and "B", Fig. 17-148, securing wire harness and hydraulic hose to rear seat back panel.
7. Disconnect motor leads from wire harness and ground attaching screw "C", Fig. 17-148.
8. To facilitate removal, apply a rubber lubricant to pump attaching grommets "D", then carefully disengage grommets from floor pan.
9. Place absorbent rags below hose connections and end of reservoir.

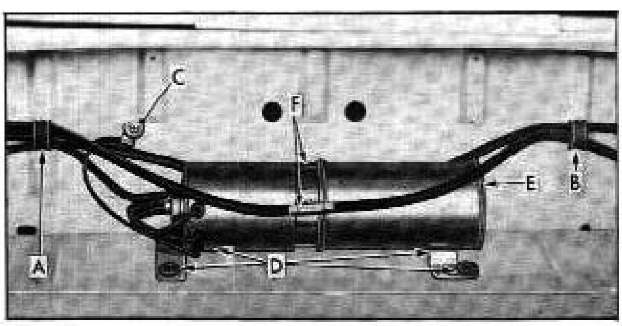


Fig. 17-148 Hydro-Lectric Motor and Pump Assembly

10. With a screwdriver, vent reservoir by removing filler plug indicated at "E", Fig. 17-148, then reinstall plug.

    NOTE: Venting reservoir is necessary in this "sealed-in" unit to equalize air pressure in reservoir to that of the atmosphere. This operation prevents the possibility of hydraulic fluid being forced under pressure from disconnected lines and causing damage to trim or body finish.

11. Disconnect hydraulic lines at "F", Fig. 17-148 and cap open fittings to prevent leakage of fluid. Use a cloth to absorb any leaking fluid, then remove unit from rear compartment.

Installation

1. If a replacement unit is being installed, fill reservoir unit with G.M. Hydraulic Brake Fluid Super No. 11. See Checking Fluid in Reservoir for proper fluid level.
2. Connect hydraulic hoses, engage attaching grommets in panel and connect wiring.
3. Remove reservoir filler plug and place absorbent rags under filler opening.

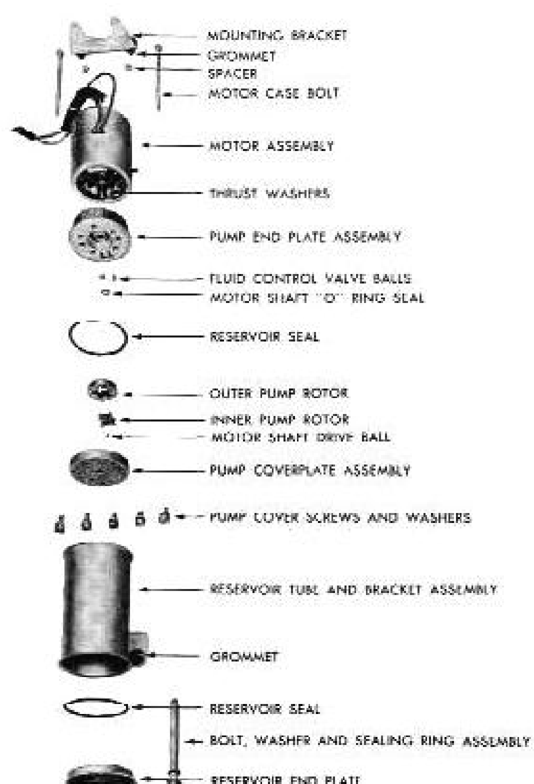


Fig. 17-149 Hydro-Lectric Motor and Pump Exploded

4. Connect battery and operate top through its up and down cycle with filler plug removed from reservoir.

5. Check connections for leaks and check fluid level in reservoir.

6. Install previously removed parts.

RESERVOIR TUBE

Disassembly From Motor and Pump Assembly

1. Remove motor and pump assembly from body.
2. Scribe a line across pump end plate, reservoir tube and reservoir tube end plate (Fig. 17-150) to insure correct assembly of parts.
3. With a screwdriver, remove reservoir filler plug. Note sealing ring around plug.
4. Drain fluid from reservoir into a clean container.
5. Remove bolt from end of assembly and remove reservoir end plate and tube. Note sealing rings around bolt, reservoir end plate, and between end of reservoir tube and pump assembly.

Assembly To Motor and Pump Assembly

1. Position sealing ring on pump and assemble reservoir tube to pump according to scribe marks.

   NOTE: Bracket assembly on tube should be located at outer end when tube is assembled to pump.

2. Position sealing ring on tube end plate and place end plate on reservoir tube, lining up scribe marks. Install and tighten attaching bolt.

3. Place unit in horizontal position and fill with fluid until level of fluid is even with bottom of filler plug hole.

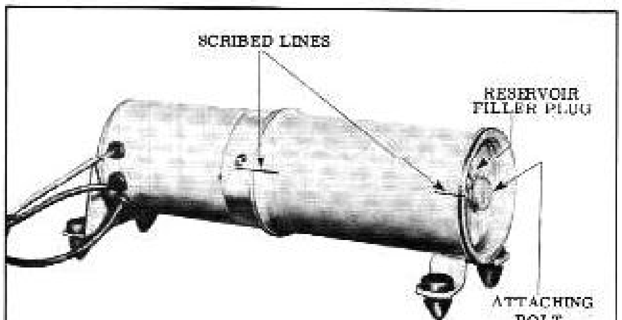


Fig. 17-150 Alignment Marks

4. Make sure that sealing ring is on filler plug before installing filler plug.

OPERATION OF FOLDING TOP

When the control switch is actuated to the "up" position, the battery feed wire is connected to the red motor lead and the motor and pump assembly operate to force the hydraulic fluid through the hoses to the lower ends of the double-acting cylinders. The fluid forces the piston rods in the cylinders upward, thus raising the top. The fluid in the top of the cylinders returns to the pump for recirculation to the bottom of the cylinders. When the control switch knob is actuated to the "down" position, the feed wire is connected to the dark green motor lead and the motor and pump assembly operate in a reversed direction to force the hydraulic fluid through the hoses to the top of the cylinders. The fluid forces the piston rods in the cylinders downward, thus lowering the top. The fluid in the bottom of the cylinders returns to the pump for recirculation to the top of the cylinders.

OPERATION OF PUMP ASSEMBLY

The pump assembly is designed to deliver a maximum pressure of 240 p.s.i. to 280 p.s.i. The operation of the pump assembly when raising the top is as follows:

1. Raising the Top: When the red motor lead is energized the motor drive shaft turns the rotors clockwise as indicated by the large arrow in Fig. 17-151. The action of the pump rotors forces the fluid under pressure to the bottom of each cylinder forcing the piston upward. This action causes the fluid above the piston in each cylinder to be forced into the pump, which recirculates the fluid to the bottom of the cylinders. The additional fluid required to fill the cylinder due to piston rod displacement is drawn from the reservoir.
2. Lowering the Top: When the green motor lead is energized the motor drive shaft turns the rotors counterclockwise as indicated by the large arrow in Fig. 17-151. The action of the pump rotors forces the fluid under pressure to the top of each cylinder. This action causes the fluid below the piston in each cylinder to be forced into the pump which recirculates the fluid to the top of each cylinder. The surplus hydraulic fluid due to piston rod displacement flows into the reservoir.

FLUID CONTROL VALVE

The fluid control valve consists of a rocker arm installed in the pump cover plate, and two steel balls. Fig. 17-152 shows the top surface of the pump cover plate. The dotted lines indicate the cavities on the bottom side of the cover plate. The cavities are designed to permit fluid flow between pump rotors and the reservoir.

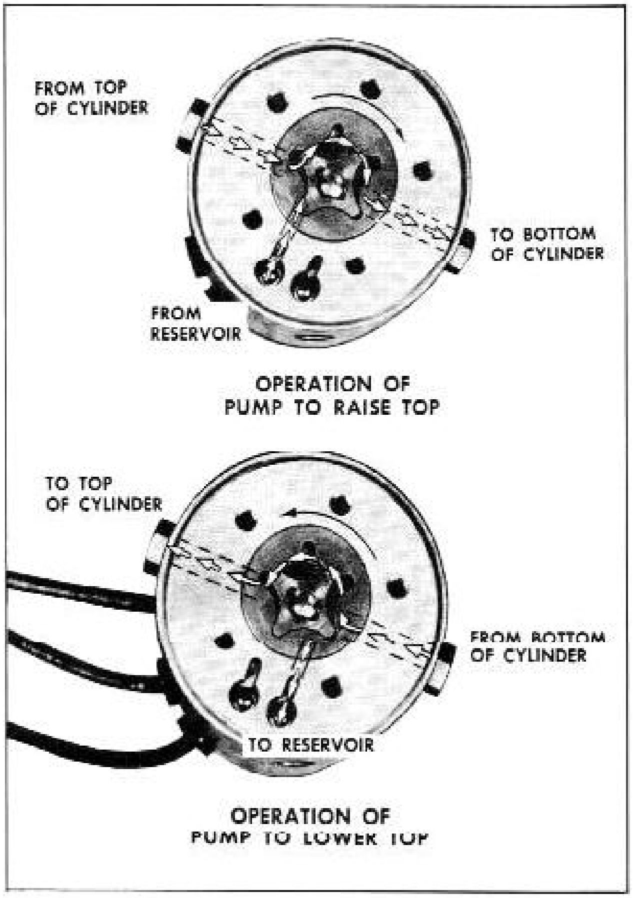


Fig. 17-151 Pump Operation

Figs. 17-153 and 17-154 illustrate the operation of the fluid control valve.

MECHANICAL CHECKING PROCEDURE

If there is a failure in the Hydro-Lectric system and the cause is not evident, the mechanical operation of the top should first be checked. If the folding top assembly appears to have a binding action, disconnect the top lift cylinder piston rods from the top linkage and then manually raise and lower the top. The top should travel through its up and down cycle without any evidence of a binding action. If a binding action is noted when the top is

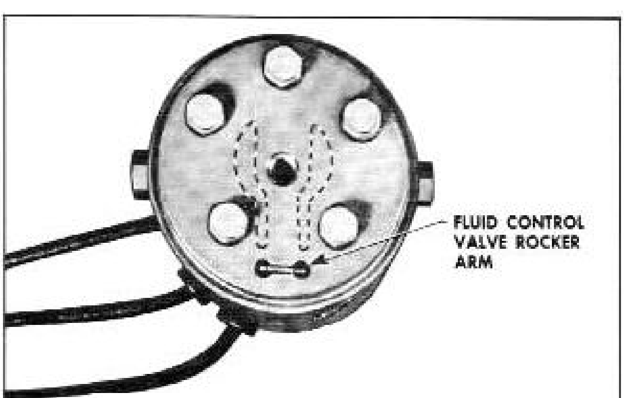


Fig. 17-152 Pump Cover Plate

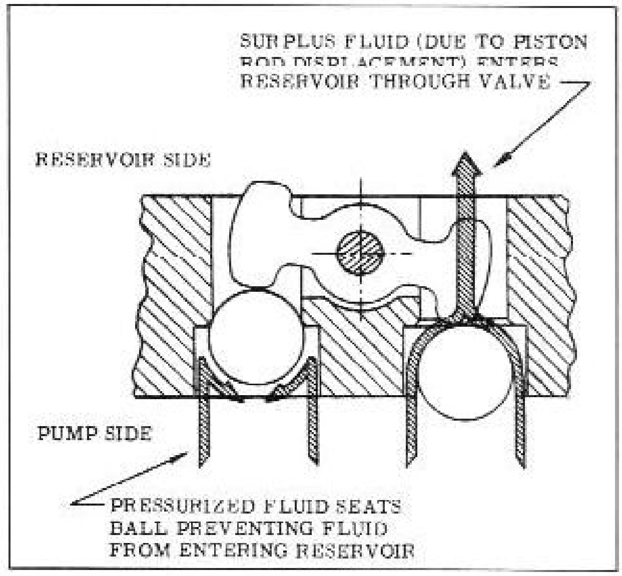


Fig. 17-153 Fluid Control Valve (Top Lowered)

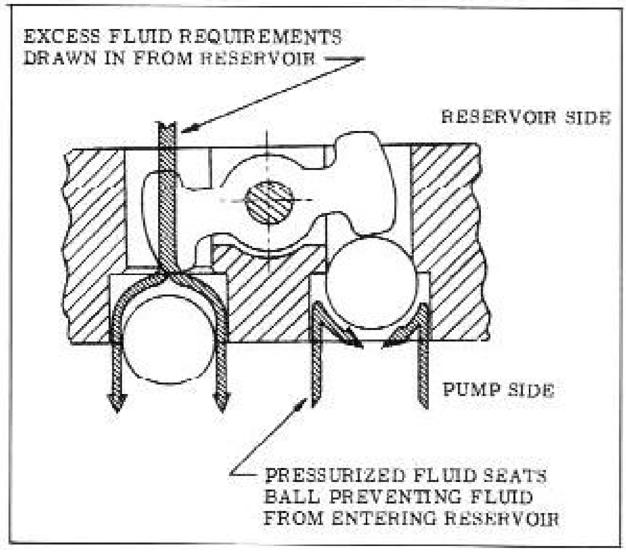


Fig. 17-154 Fluid Control Valve (Top Raised)

being locked at the header, check the alignment of the door windows, ventilators and rear quarter windows with relation to the side roof rail weatherstrips. Make all necessary adjustments for correct top alignment. If a failure continues to exist after a check for mechanical failure has been completed, the Hydro-Lectric system should then be checked for electrical or hydraulic failures.

ELECTRICAL CHECKING PROCEDURE

If a failure in the Hydro-Lectric system continues to exist after the mechanical operation has been checked the electrical system should then be checked. A failure in the electrical system may be caused by a low battery, breaks in wiring, faulty connections, mechanical failure of an electrical component, or wires or components shorting to one another or to body metal. Before beginning checking procedures, check battery according to recommended procedure.

Checking for Current at Folding Top Control Switch

1. Disengage terminal block from rear of switch.
2. Connect light tester to central feed terminal of switch terminal block.
3. Ground light tester ground lead to body metal.
4. If light tester does not light there is an open or short circuit between power source and switch.

Checking the Folding Top Control Switch

If there is current at the feed wire terminal of the terminal block, operation of switch can be checked as follows:

1. Place a No. 12 jumper wire on switch terminal block between center terminal (feed) and one of two motor wire terminals. If motor operates with jumper wire but did not operate with switch, switch is defective.
2. Connect jumper wire between center terminal (feed) and other motor wire terminal on switch terminal block. If motor operates with jumper wire, but did not operate with switch, switch is defective.

Checking Switch to Motor Lead Wires

If switch is found to be operating properly, the switch to motor lead wires can be checked as follows: (Fig. 17-155)

1. Disconnect green switch-to-motor wire from motor lead in rear compartment.
2. Connect a light tester to green switch-to-motor wire terminal.
3. Ground light tester ground lead to body metal.
4. Actuate switch to "down" position. If tester does not light, there is an open or short circuit in wire.
5. Disconnect red switch-to-motor lead from motor.
6. Connect light tester to red switch-to-motor wire terminal.
7. Actuate switch control knob to "up" position. If tester does not light, there is an open or short circuit in wire.

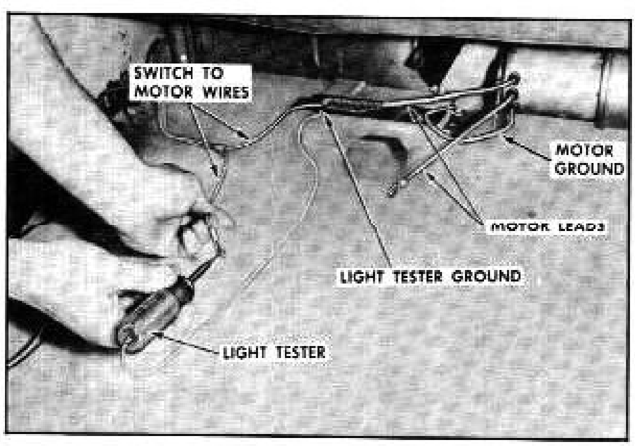


Fig. 17-155 Checking Motor Wiring

Checking the Motor Unit

If a light tester indicates current at the motor-lead terminals of the switch-to-motor wires, but motor unit does not operate from switch, a final check of the motor unit can be made as follows:

1. Check connection of motor ground wire to body metal. ("C", Fig. 17-148)
2. Connect a No. 12 jumper wire from battery positive pole to motor lead terminal that connects to green switch-to-motor wire. The motor should operate to lower top.
3. Connect jumper wire to motor lead terminal that connects to red switch-to-motor wire. The motor should operate to raise top.
4. If motor fails to operate on either or both of these checks, it should be repaired or replaced.
5. If motor operates with jumper wire but will not operate from switch-to-motor wires, the trouble may be caused by reduced current resulting from damaged wiring or poor connections.

HYDRAULIC CHECKING PROCEDURE

Failures in the hydraulic system can be caused by lack of hydraulic fluid, leaks in hydraulic system, obstructions or kinks in hydraulic hoses or faulty operation of a cylinder or pump. A pressure gauge can be used to check the pressure of the pump. See Checking Pressure at Pump.

Checking Hydraulic Fluid Level in Reservoir

1. Operate top to raised position.
2. Remove pump and motor shield.
3. Place absorbent rags below reservoir at filler plug.
4. Remove filler plug. Fluid level should be at lower edge of filler plug hole.
5. If fluid is low, add G.M. Hydraulic Brake Fluid Super No. 11 to bring to specified level.

6. Reinstall filler plug and pump and motor shield.

Checking Operation of Lift Cylinders

1. Remove rear seat cushion and folding top compartment side panel assemblies.

2. Operate folding top control switch and observe lift cylinders during "up" and "down" cycles for these conditions:

   a. If movement of cylinder is not coordinated, or sluggish when the motor is actuated, check hydraulic hoses from motor and pump to cylinder for kinks.

   b. If one cylinder rod moves slower than the other, cylinder having slower moving rod is defective and should be replaced.

   c. If both cylinder rods move slowly or do not move at all, check the pressure of the pump.

   NOTE: To insure proper operation of the lift cylinders, the top lift cylinder rods should be cleaned and lubricated at least twice a year. To perform these operations, raise top to "up" position and wipe exposed portion of each top lift cylinder piston rod with a cloth dampened with brake fluid to remove any oxidation and/or accumulated grime. With another clean cloth apply a light film of brake fluid to the piston rods to act as a lubricant.

   CAUTION: Exercise care so that brake fluid does not come in contact with any painted or trimmed parts of the body.

Checking Pressure at Pump

1. Remove motor and pump assembly from rear compartment.

2. Install plug in one port, and pressure gauge in port to be checked. (Fig. 17-156)

3. Actuate motor with applied voltage of 9.5 to 11.0 volts. Pressure gauge should show a pressure between 240 p.s.i. and 280 p.s.i.

4. Check pressure in other port.

   NOTE: A difference in pressure readings may exist between the pressure port for top of cylinders and pressure port for bottom of cylinders. This condition is acceptable if both readings are within the limit of 240 p.s.i. and 280 p.s.i.

5. If the pressure is not within specified limits, unit is defective and should be repaired or replaced, as required.

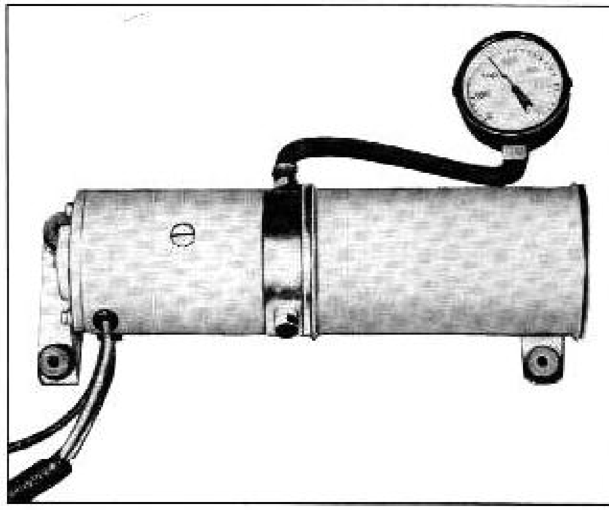


Fig. 17-156 Checking Pump Pressure

REMOVAL OF FOLDING TOP LIFT CYLINDER

1. Remove rear seat cushion and seat back.
2. Remove folding top compartment side trim panel assembly.
3. With top in raised position, remove attaching nut, bolt, bushing and washer from upper end of cylinder.
4. Remove cotter pin, spacers and clevis pin securing lower end of cylinder to lift cylinder lower support.
5. Move cylinder to gain access to lower hydraulic hose connection.
6. Disconnect and cap hydraulic connections on cylinder and on each hose; remove cylinder.

   CAUTION: Before disconnecting hydraulic connections, place suitable wiping rags under connections to absorb any drippage of hydraulic fluid. Also, disconnect battery cable to prevent accidental operation of motor and pump while hydraulic hoses are disconnected.

7. To install cylinder, reverse removal procedure with following exceptions: To aid in connection of cylinder piston rod to folding top linkage, use power to raise piston rod to extended position. Operate top down and up several times, then check and correct level of hydraulic fluid in reservoir.

ELECTRICAL

HORIZONTAL SEATS

The seat adjusters are actuated by a 12 volt series wound motor located near the center of the seat bottom frame and energized by a control switch installed in the left seat side panel. (Fig. 17-157)

POSSIBLE CONDITIONS AND CORRECTIONS

The Seat Motor Does Not Operate in Either The Forward or Rearward Direction

Causes:

1. Open or short circuit in wiring harness.
2. Inoperative motor.

Corrections:

1. Connect one light tester lead to feed terminal of switch block and ground other tester lead to body metal. If tester does not light, there is an open or short circuit between switch and power source.
2. Check operation of seat control switch with jumper wire.
3. Check circuit from control switch to motor for short or open circuit and check ground wire attachment at adjuster.
4. Check operation of motor with No. 12 gauge jumper wire. Connect one end of jumper wire to power source and the other end to one of the seat motor terminals. Motor should operate. Perform same check at the other motor terminal. If motor does not operate, repair or replace motor as required.

The Seat Motor Operates In Only One Direction

Causes:

1. Defective switch.
2. Open or short circuit in motor feed wires.
3. Defective seat motor.

Corrections:

1. Check operation of seat control switch with jumper wire.
2. Check circuit from control switch to motor for short or open circuit.
3. Check operation of motor with No. 12 gauge jumper wire. Connect one end of jumper wire to power source and the other end to one of the seat motor terminals. Motor should operate. Perform same check at the other motor terminal. If motor does not operate, repair or replace motor as required.

FOUR-WAY SEAT

The seat adjusters are actuated by a 12 volt, reversible series wound motor with a built-in circuit breaker. The motor is installed at the left side of the seat assembly. (Fig. 17-158) The seat motor is energized by a toggle-type control switch installed in the left seat side panel.

The seat adjuster operating mechanism incorporates a transmission assembly which includes two solenoids and four drive cables leading to the seat adjusters. One solenoid controls the vertical movement of the seat while the other solenoid controls the horizontal movement of the seat. In addition to the four seat adjuster drive cables at

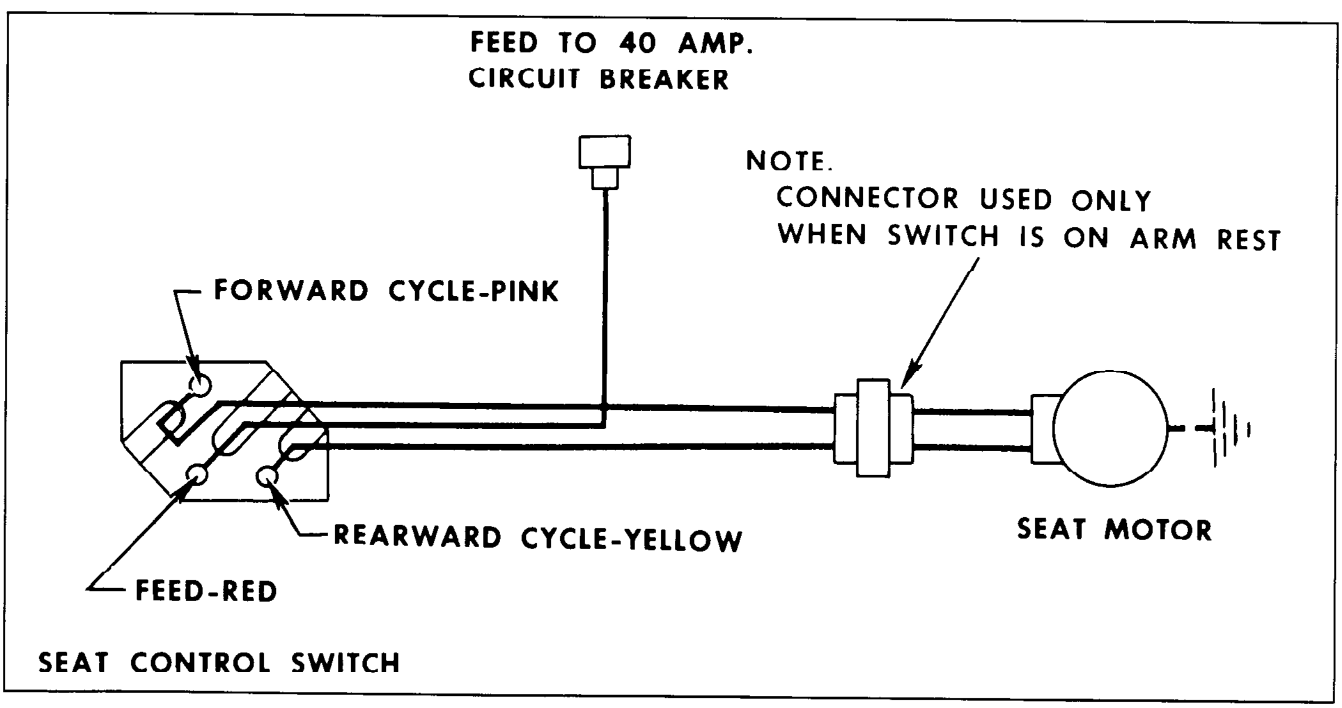


Fig. 17-157 2-Way Seat Circuit Diagram

the transmission assembly, a main drive cable is installed from the motor to the transmission assembly. When the control switch is actuated, the motor and one of the solenoids are energized simultaneously. Then the solenoid plunger engages the clutch shaft dog with the driving gear dog. The driving gear rotates the clutch shaft which rotates the drive cables and operates both adjusters. When the adjusters reach their limit of travel, the drive cables stop their rotating action due to the "slip clutch" design incorporated in the clutch and gear assembly. When the switch contacts are opened, a return spring returns the solenoid plunger to its original position, disengaging the clutch shaft dog from the driving gear dog.

CHECKING PROCEDURE (4-WAY SEAT)

Checking for Current at Circuit Breaker

1. Connect one light tester lead to battery side of circuit breaker located at left front of dash and ground other lead. If tester does not light, there is no current at battery side of circuit breaker.
2. To check circuit breaker, disconnect switch feed wire from breaker, and with a light tester check for current at switch side of circuit breaker. If tester does not light, there is no current flowing through circuit breaker.

Checking the Relay Assembly

1. With light tester, check for current at circuit breaker side of relay. If tester does not light there is a short or open circuit between circuit breaker and relay assembly.
2. Turn ignition switch on and with a light tester check for current at seat control switch side of relay. If tester does not light, the relay is defective or there is a short or open circuit between ignition switch and relay assembly.

Checking for Current at Seat Control Switch

1. Connect one light tester lead to feed terminal of switch block and ground other light tester lead to body metal. (Fig. 17-159)
2. If tester does not light, there is no current at switch block. Failure is caused by an open or short circuit between switch block and power source.

Checking the Seat Control Switch

In the following operations which specify the seat control switch to be actuated, a switch that has been checked for proper operation may be connected to the switch block. If a switch is not available, a 3-way jumper wire can be made to perform the switch function. The method of making

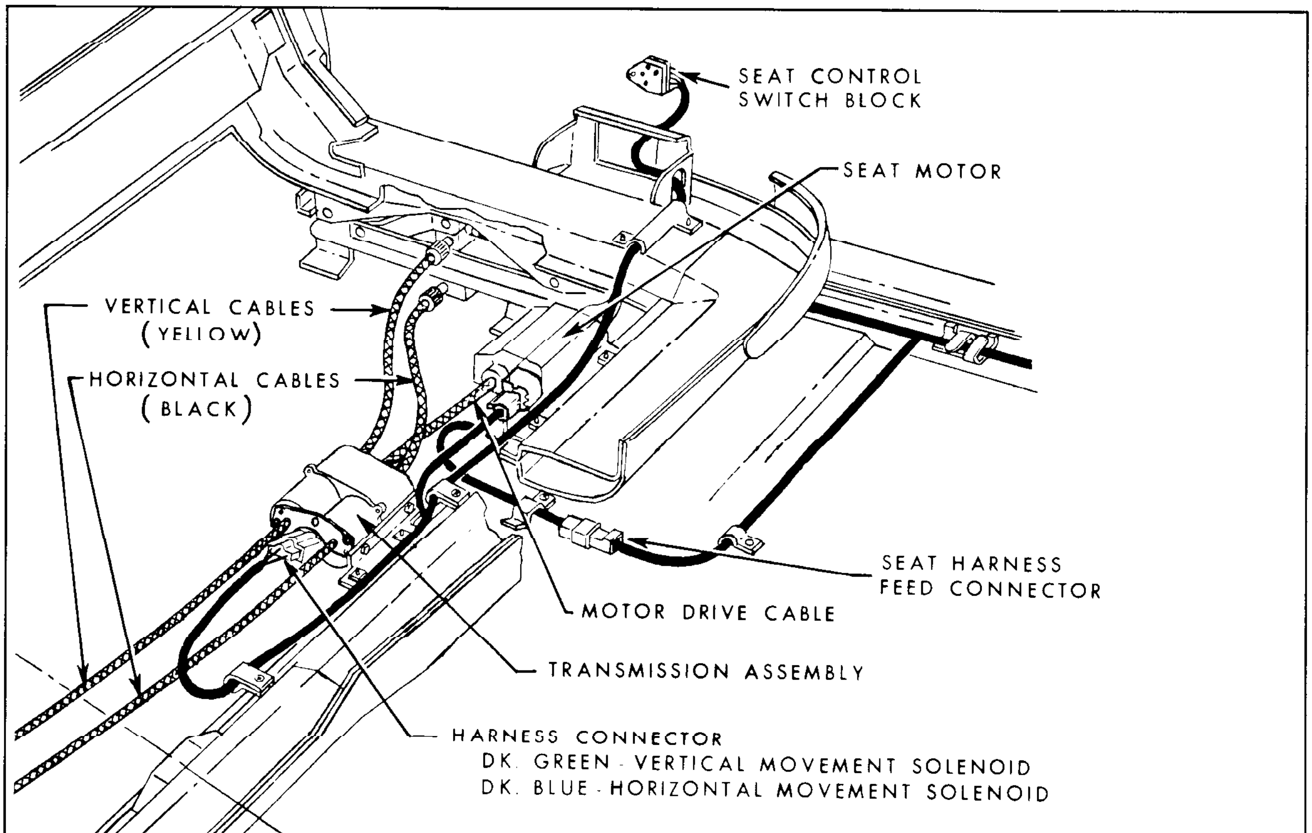


Fig. 17-158 4-Way Seat Wiring Installation the jumper wire and the switch locations to be connected, to obtain a specific movement of the seat, are shown in Fig. 17-159. If a jumper wire is used, number the locations on the switch block as indicated in the illustration.

NOTE: To make jumper wire, refer to Inset in Fig. 17-159.

1. Obtain switch or jumper wire and connect to switch block.

2. Operate switch if used. If adjusters operate with new switch or jumper wire but did not operate with original switch, the original switch is defective.

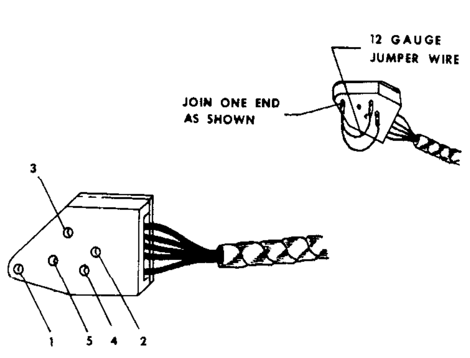
   IMPORTANT: To obtain a seat movement using a 3-way jumper wire at the switch block, the switch feed location, one of the motor field wire locations and one of the solenoid locations have to be connected simultaneously.

The switch locations to be connected to obtain a specific seat movement are outlined as follows:

1. To raise seat, place jumper wire in locations 1, 2 and 5.
2. To lower seat, place jumper wire in locations 1, 4 and 5.
3. To operate seat forward, place jumper wire in locations 1, 3 and 4.
4. To operate seat rearward, place jumper wire in locations 1, 2 and 3.

Checking the Wires Between Switch and Motor

1. Disconnect motor field feed wires from motor assembly.



LOCATION	WIRE COLOR	FUNCTION
1	WHITE	SWITCH FEED
2	YELLOW	FIELD FEED-REARWARD & UP CYCLE
3	DARK BLUE	SOLENOID-HORIZONTAL MOVEMENT
4	PINK	FIELD FEED-FORWARD & DOWN CYCLE
5	DARK GREEN	SOLENOID-VERTICAL MOVEMENT

Fig. 17-159 4-Way Seat Switch Control Block

2. Connect one light tester lead to field feed connector and ground other light tester lead to body metal, then actuate switch. If tester does not light, there is a short or open circuit between switch block and motor feed connector. Check the remaining motor field wire in the same manner.

Checking the Motor Assembly

1. Disconnect motor field feed wires from motor.

2. Connect one end of a No. 12 gauge jumper wire to battery positive pole and other end to one of the motor field feed wires.

3. If motor does not operate, motor is defective. Check the remaining motor field wire in the same manner.

Checking Wires Between Switch and Solenoids

1. Disconnect harness connector from transmission assembly.

2. Connect one light tester lead to one terminal of power feed and ground other light tester lead to body metal.

3. Operate switch to wire being tested. If tester does not light, there is no current at end of harness wire. Failure is caused by an open or short circuit between end of wire and switch.

4. Check other wire in same manner.

   NOTE: One wire in connector is a blank. Check wiring diagram for colors of wires actually used.

Checking the Solenoid

1. Check solenoid ground strip attachment for proper ground.

2. Connect one end of a No. 12 gauge jumper wire to the battery positive pole and the other end of the lead to the solenoid being checked.

   CAUTION: To prevent damaging the solenoid, do not energize solenoid for more than one minute.

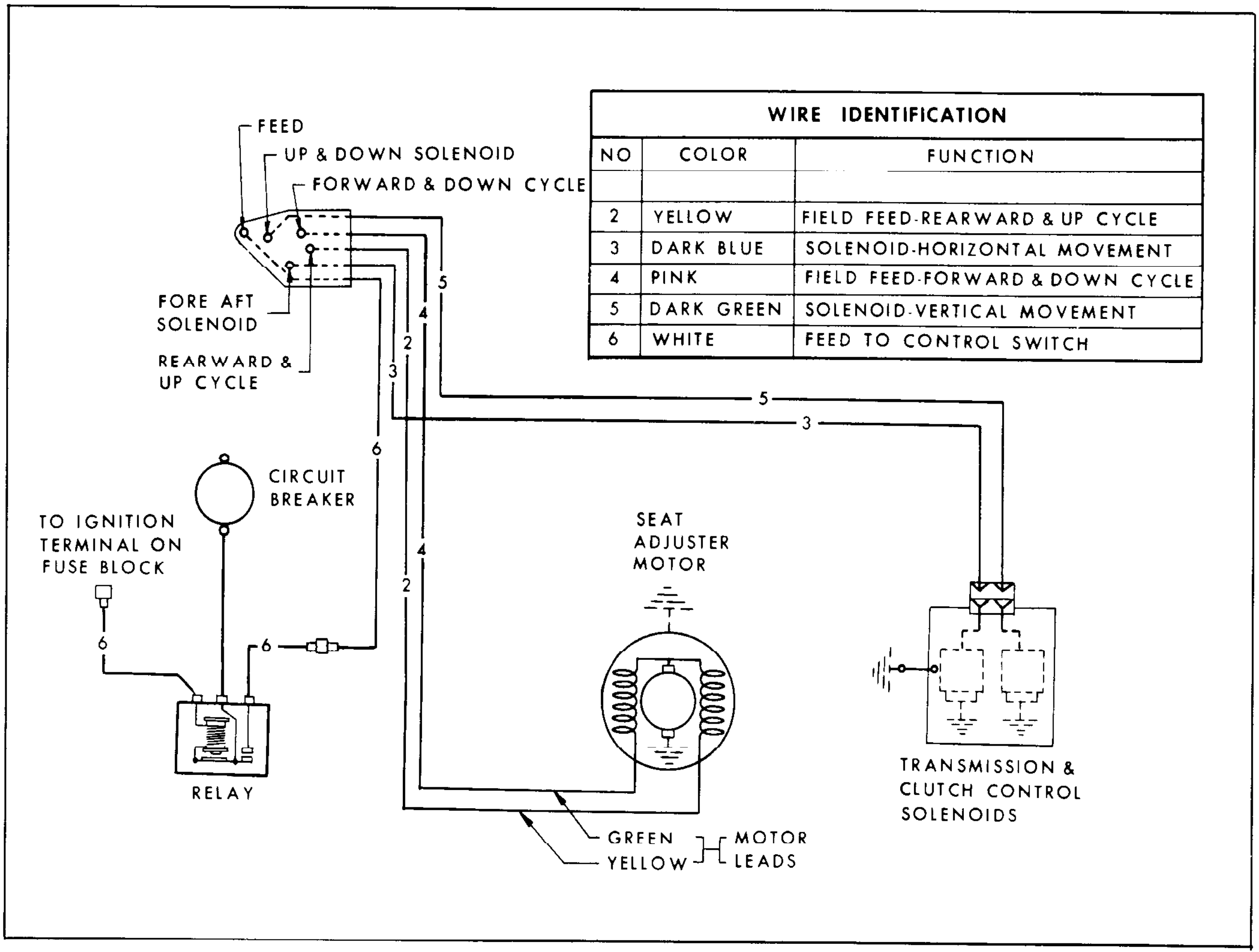
3. Operate switch to actuate adjuster motor and solenoid being checked.

4. If adjusters do not operate and there is no mechanical failure of the adjusters, the solenoid is defective.

   NOTE: If solenoid is functioning properly, a "click" may be heard when solenoid plunger operates.

TYPICAL ELECTRICAL FAILURES OF FOUR-WAY POWER SEATS

CONDITION	CAUSE	CORRECTION
Seat adjuster motor does not operate.	Short or open circuit between power source or switch and motor.	Check circuit from power source and switch to motor to locate failure. Check ignition switch circuit through relay.
	Defective motor.	Check motor. If defective, repair or replace as required.
Seat adjuster motor operates in both directions but seat adjusters are not actuated.	Short or open circuit between switch and affected solenoid.	Check circuit from switch to solenoid to locate failure.
	Defective solenoid.	Check solenoid. If defective, repair or replace as required.
Seat adjuster motor operates in one direction only, seat moves down and forward, but does not move up and rearward.	Short or open circuit between one of the motor field wires and seat control switch.	Check circuit between affected motor field wire and seat switch.
	Defective field coil in motor.	Check motor. If defective, repair or replace as required.



WIRE IDENTIFICATION

NO	COLOR	FUNCTION
2	YELLOW	FIELD FEED-REARWARD & UP CYCLE
3	DARK BLUE	SOLENOID-HORIZONTAL MOVEMENT
4	PINK	FIELD FEED-FORWARD & DOWN CYCLE
5	DARK GREEN	SOLENOID-VERTICAL MOVEMENT
6	WHITE	FEED TO CONTROL SWITCH

Fig. 17-160 4-Way Seat Circuit Diagram

SIX-WAY SEAT

The seat adjusters are actuated by a 12 volt motor installed at the left side of the seat assembly. (Fig. 17-161) The motor is energized by a 3 button-type control switch located in the left seat side panel.

The electrical portion of the seat operates as follows: (Fig. 17-162) When one of the control switch buttons is actuated, current flows to the transmission solenoid which controls the desired seat movement. The energizing of the solenoid coil results in the solenoid plunger action engaging the gear mechanism to rotate the control cable. The same switch action which energized the solenoid produces a current flow through the motor control relay to one of the motor field coils. The current flow through the relay closes the contacts between the relay power source and the armature motor lead wire, and results in the operation of the seat motor.

CIRCUIT CHECKING PROCEDURES

It may be necessary to use only one or all of the procedures outlined to locate an electrical failure in the circuit. If the location of the failure is evident, follow only the steps required to check the affected wire or component. If the location of the failure is not evident, follow the procedure as outlined. Before performing any extensive check procedures, check the seat adjuster drive cables for proper attachment. In addition, refer to the circuit diagrams.

Checking Feed Circuit Continuity at Circuit Breaker

1. Connect one light tester lead to battery side of circuit breaker and ground other lead. Circuit breaker is located in front of the dash panel. If tester does not light, there is an open or short circuit in feed circuit to breaker.

2. To check circuit breaker, disconnect the output feed wire (the wire opposite the power source feed to the breaker) from the breaker and with light tester check terminal from which wire was disconnected. If tester does not light, circuit breaker is inoperative.

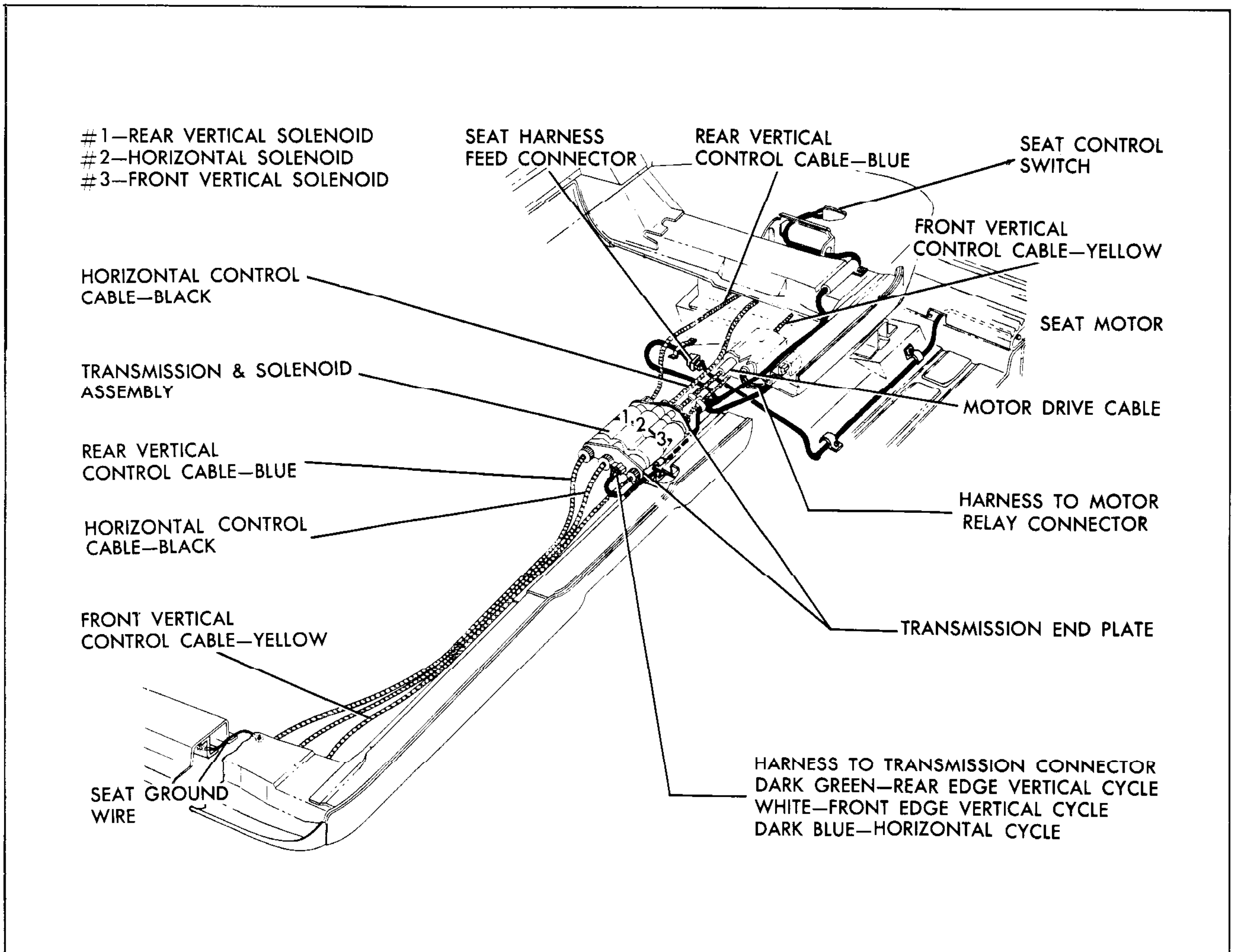


Fig. 17-161 Six-Way Seat Installation

Checking Relay Assembly (On Dash)

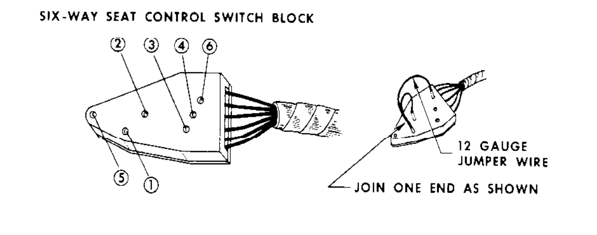
1. With light tester, check relay feed (dark blue wire terminal). If tester does not light, there is an open or short circuit between relay and circuit breaker.

2. Turn ignition switch on and with light tester check output terminal of relay (red wire terminal). If tester does not light, the relay is inoperative or there is a short or open circuit between ignition switch (white wire) and relay assembly. (Check fuse at dash panel.)

Checking Feed Circuit Continuity at Seat Control Switch

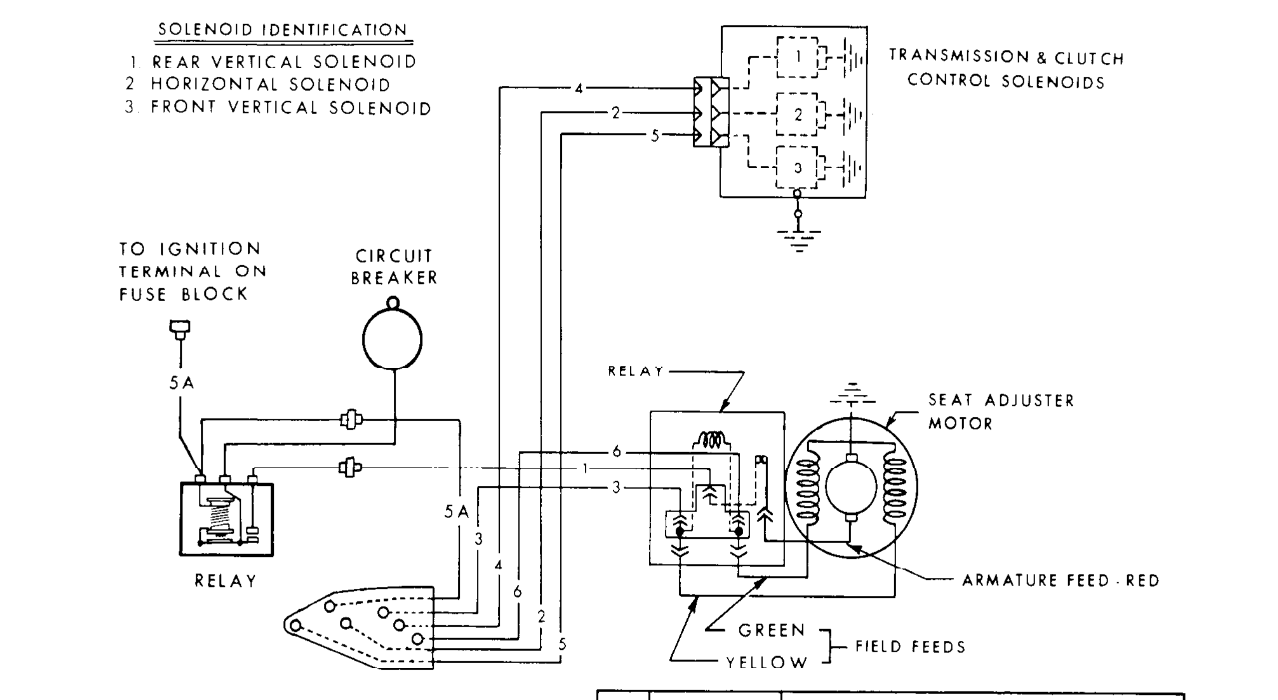
1. Connect one light tester lead to feed terminal of switch block and ground other test lead to body metal. (Fig. 17-163)

2. If tester does not light, there is an open or short circuit between switch and power source. The seat circuit incorporates 2 major feed circuits from the relay which is actuated by the ignition switch. The circuit from the ignition switch to the relay is protected by a 25 amp. fuse located at the fuse block. When the ignition switch is turned "On", current flows through the fuse to the white wire terminal on the relay and to the seat control



LOCATION	WIRE COLOR	FUNCTION
1	WHITE	SWITCH FEED
2	DARK BLUE	SOLENOID-HORIZONTAL MOVEMENT
3	PINK	FIELD FEED-REARWARD & DOWN CYCLE
4	DARK GREEN	SOLENOID REAR EDGE VERTICAL CYCLE
5	ORANGE	SOLENOID-FRONT EDGE VERTICAL- CYCLE
6	YELLOW	FIELD FEED-FORWARD & UP CYCLE

Fig. 17-163 Six-Way Seat Control Switch Block



No.	COLOR	FUNCTION
1	RED	FEED
2	DARK BLUE	SOLENOID - HORIZONTAL MOVEMENT
3	PINK	FIELD FEED - REARWARD & DOWNWARD
4	DARK GREEN	SOLENOID - REAR EDGE VERTICAL
5	ORANGE	SOLENOID - FRONT EDGE VERTICAL
5A	WHITE	FEED TO CONTROL SWITCH
6	YELLOW	FIELD FEED - FORWARD & UPWARD

Fig. 17-162 Six-Way Seat Circuit Diagram

switch. Simultaneously, the energizing of the relay results in the contacts within the relay closing and providing current to the seat motor armature terminal on the relay. (Fig. 17-162)

Checking Feed Circuit Continuity at Relay on Seat Motor

1. Disengage 3-wire connector body from the seat motor relay terminal.
2. Insert one light tester lead into the relay power feed (red wire) connector slot on the harness, and ground the other light tester lead.
3. If tester does not light, there is no current at end of feed wire. Failure is caused by an open or short in feed circuit. The current for this circuit is controlled by the ignition switch and relay at the dash. The ignition switch must be turned "On" for current to be present at this terminal.

   NOTE: In the following operations which specify the seat control switch to be actuated, a switch that has been checked for proper operation may be connected to the switch block. If a switch is not available, a 3-way jumper wire can be made to perform the switch function. The jumper wire and the switch locations to be connected to obtain a specific movement of the seat are shown in Fig. 17-163. If a jumper wire is used, number the locations on the switch block as indicated in the illustration. Details outlining the making, and use of the jumper wire follow the checking procedures.

Checking the Seat Control Switch

1. Obtain switch or jumper wire and connect to switch block.
2. Operate switch. If adjusters operate with new switch or jumper wire, but did not operate with original switch, the original switch is defective.
3. Check all six movements of seat adjuster.

Checking Wires Between Control Switch and Motor Relay

1. Disengage 3-wire harness connector from relay at motor.
2. Insert one light tester lead into the motor field connector slot on harness and ground the other lead.
3. Actuate seat switch to energize field wire being tested.
4. If tester does not light, there is no current at end of wire. Failure is caused by an open or short circuit between end of wire and switch. Check other motor field wire in the same manner.

Check the Relay Assembly

1. Disconnect 3 motor leads from relay assembly. These are the wires leading from the motor to the relay.
2. Connect one end of a jumper wire to one of the motor field feed studs on the relay and ground the other end of the jumper wire.
3. Connect one end of light tester to motor armature feed stud on relay and ground other light tester lead.
4. With a jumper wire, energize the field stud which is not grounded. If tester does not light, the relay is defective.

Check the Motor Assembly

1. Disconnect the motor armature feed lead and one of the motor field feeds from the relay assembly.
2. With a jumper wire, energize the armature feed and one of the field feeds.
3. If motor does not operate, it is defective. Check the other motor field feed in the same manner.

Checking the Wire Between the Solenoid and Switch

1. Disengage harness connector from transmission.
2. Connect one light tester lead to end of harness wire being tested and ground other lead.
3. Operate switch to energize wire being tested. If tester does not light, there is no current at end of wire. Failure is caused by an open or short circuit between end of wire and switch.

Checking the Solenoid

1. Check solenoid ground strap attachment for proper ground.
2. Energize solenoid being checked with jumper wire.

   NOTE: If solenoid is functioning, a "click" should be heard when solenoid plunger operates "in" and "out".

   CAUTION: To prevent damaging the solenoid, do not energize solenoid for more than one minute.
3. With solenoid energized, actuate seat control switch to energize adjuster motor.
4. If adjusters do not operate, and there is no mechanical failure in the seat unit, the solenoid is defective.

Checking Seat Switch

To make jumper wire, obtain 2 pieces of No. 12 gauge wire, each 4-1/2'' long. Join one end of each wire as shown in Fig. 17-163. The joined end can be inserted in the feed location in the switch block; one of the remaining ends can be inserted into one of the field locations in the switch block; the other end can be inserted into one of the solenoid locations.

IMPORTANT: To obtain a seat movement using a 3-way jumper wire at the switch block, the switch feed location, one of the motor field wire locations and one of the solenoid locations must be connected.

1. To raise front edge of seat, place jumper in locations 1, 6 and 5. (Fig. 17-163)
2. To lower front edge of seat, place jumper in locations 1, 3 and 5.
3. To raise rear edge of seat, place jumper in locations 1, 6 and 4.
4. To lower rear edge of seat; place jumper in locations 1, 3 and 4.
5. To move seat forward, place jumper in locations 1, 6 and 2.
6. To move seat rearward, place jumper in locations 1, 3 and 2.

TYPICAL ELECTRICAL FAILURES OF SIX-WAY SEAT CIRCUITS

Seat Adjuster Motor Does Not Operate

Causes:

1. Short or open circuit between power source or switch and motor.
2. Defective motor.

Corrections:

1. Check circuit from power source and switch to motor to locate failure.
2. Check ignition switch circuit through relay at left dash.
3. Check motor. If defective, repair or replace as required.

Seat Adjuster Motor Operates, But Seat Adjusters Are Not Actuated

Or

Seat Adjuster Motor Operates, Front Edge of Seat Moves Up and Down and Seat Moves Forward and Rearward The Rear Edge of Seat Cannot be Operated

Causes:

1. Short or open circuit between switch and affected solenoid.
2. Defective solenoid.

Corrections:

1. Check circuit from switch to solenoid to locate failure.
2. Check solenoid. If defective, repair or replace as required.

Seat Adjuster Motor Operates And Seat Adjusters Move Front and Rear Edge Of Seat Up and Forward, But Will Not Move The Seat Down or Rearward

Or

Seat Adjuster Motor Operates and Seat Adjusters Move Front and Rear Of Seat Down and Rearward, But Will Not Move The Seat Up And Forward

Causes:

1. Short or open circuit between one of the motor field wires and seat control switch.
2. Defective field coil in motor.

Corrections:

1. Check circuit between affected motor field wire and seat switch.
2. Check motor. If defective, repair or replace as required.

POWER WINDOW AND VENTILATOR CIRCUITS

POWER OPERATED WINDOWS

The wiring harness for the electrically operated windows consists of 3 major sections:

FRONT CROSS-OVER HARNESS

This harness is installed beneath the instrument panel and completes the circuit from the right door to the left door windows. The front harness also includes the wiring for the front door windows. (Fig. 17-164) The multiple connector located at the center of the front harness is used only for manufacturing purposes and is not intended to be disengaged in service.

REAR DOOR OR REAR QUARTER WINDOW HARNESS

A separate harness controls the operation of the right and left rear door or quarter windows. The right and left harnesses are connected to the front cross-over harness beneath the outer ends of the instrument panel. (Fig. 17-165)

The power windows are operated by a rectangular shaped 12 volt series wound motor with an internal circuit breaker and a self-locking rubber coupled gear drive. The harness to window motor connector is designed with a locking embossment to insure a positive connection. When disengaging the harness connector from the motor, it is necessary to depress the thumb release. When installing the harness, the thumb release must be held depressed until the embossment on the female connector is locked in the hole of the motor connector.

The power window electrical circuit is protected by a 40 ampere circuit breaker installed in front of the left side of the dash. In addition, a relay is used in the circuit and is installed in front of the left side of the dash panel. The relay prevents the operation of the power windows until the ignition switch is turned "on".

POWER WINDOW CIRCUIT CHECKING PROCEDURES

Failures in a circuit are usually caused by short circuits or open circuits. Open circuits are usually caused by breaks in the wiring, faulty connections or mechanical failure in a component such as a switch or circuit breaker. Short circuits are usually caused by wires from different components of the circuit contacting one another

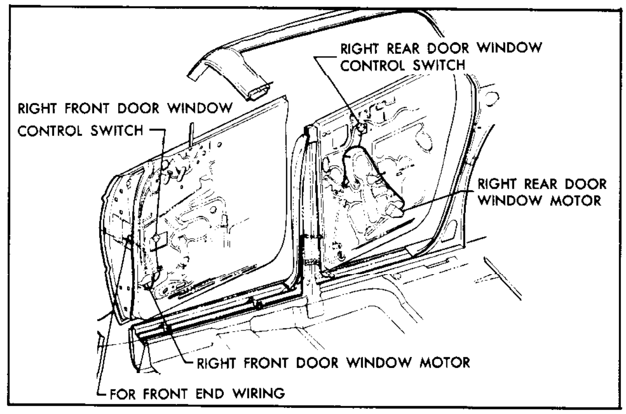


Fig. 17-165 Power Window Wiring at Doors

or by a wire or component grounding to the metal of the body due to a screw driven through the wire or insulation cut through by sharp metal edge.

It may be necessary to use only one or all of the procedures outlined to locate an electrical failure in the circuit. If the location of the failure is evident, follow only the steps required to check the affected wire or component. If the location of the failure is not evident follow the procedure as outlined. Be sure to check the harness connectors beneath the outer ends of the instrument panel for proper engagement.

Checking Feed Circuit Continuity at Circuit Breaker

1. Connect one light tester lead to battery side

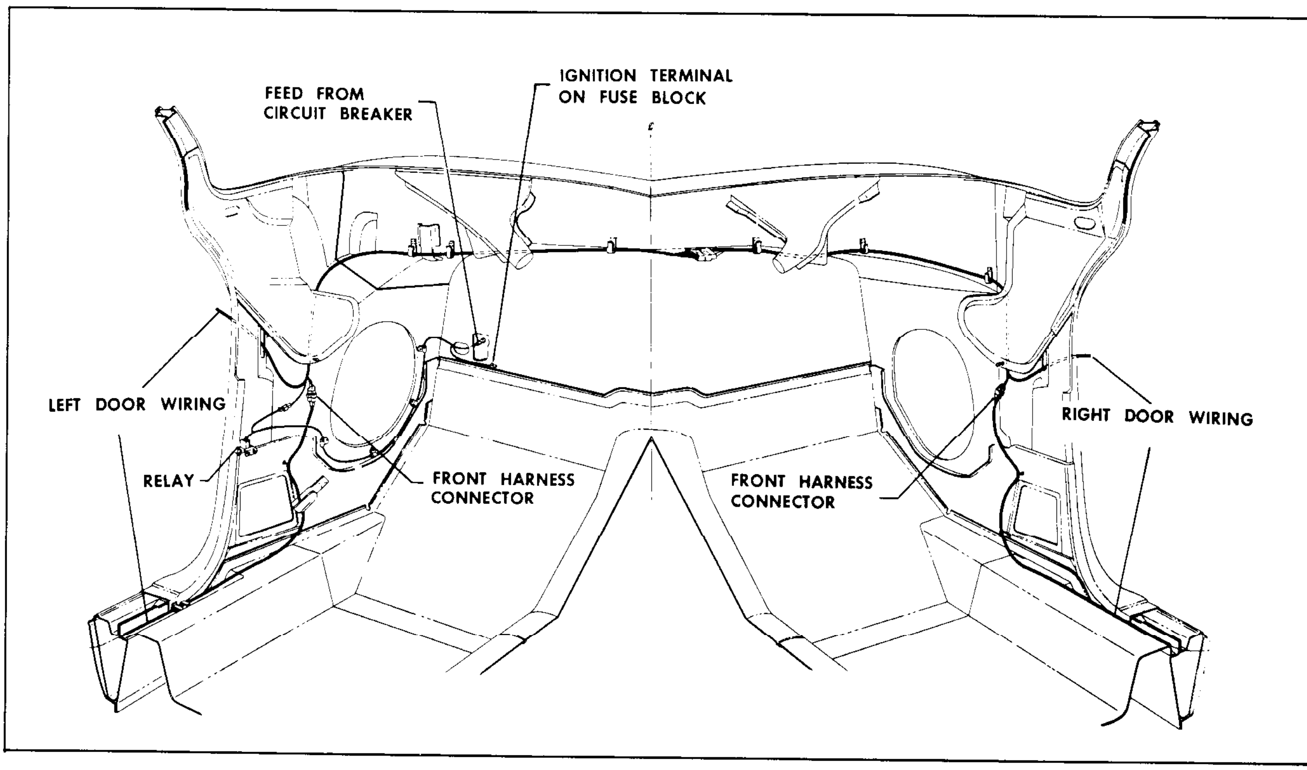


Fig. 17-164 Power Window Wiring at Instrument Panel

of circuit breaker and ground other lead. Circuit breaker is located in front of the dash panel. If tester does not light, there is an open or short circuit in feed circuit to breaker.

2. To check circuit breaker, disconnect the output feed wire (the wire opposite the power source feed to the breaker) from the breaker and with light tester check terminal from which wire was disconnected. If tester does not light, circuit breaker is inoperative.

Checking Relay Assembly

1. With light tester, check relay feed (dark blue wire terminal). If tester does not light, there is an open or short circuit between relay and circuit breaker.

2. Turn ignition switch on and with light tester check output terminal of relay (red wire terminal). If tester does not light, the relay is inoperative or there is a short or open circuit between ignition switch (white wire) and relay assembly. (Check fuse at dash panel.)

Checking Feed Circuit Continuity at Window Control Switch

1. Connect one light tester lead to feed terminal of switch block and ground other tester lead to body metal. (Fig. 17-166)

2. If tester does not light, there is an open or short circuit between switch and power source.

Checking Window Control Switch

1. Insert one end of a No. 12 gauge jumper wire to the switch feed terminal and the other end to one of the motor lead terminals in the switch block. Repeat this check on the remaining motor lead terminal. (Fig. 17-167)

2. If the motor operates with the jumper wire, but does not operate with the switch, the switch is defective.

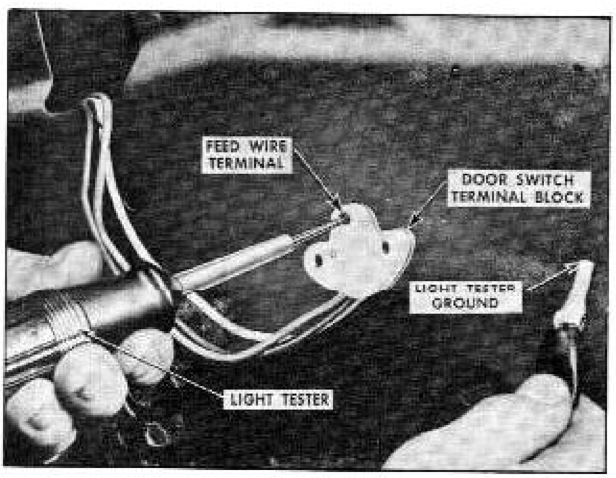


Fig. 17-166 Checking For Current at Window Control Switch

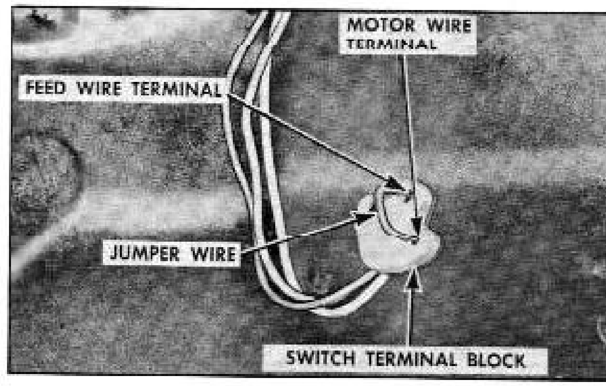


Fig. 17-167 Checking Window Control Switch

Checking Wires Between Door Window Switch and Door Window Motor

1. Disengage harness connector from window motor connector. The thumb release on the harness connector must be depressed before it can be disengaged from the motor.

2. Insert one end of a No. 12 gauge jumper wire to the switch feed terminal and the other end to one of the motor lead terminals in the switch block. (Fig. 17-167)

3. With light tester check for current at terminal being checked. If tester does not light, there is an open or short circuit in the harness between the control switch and motor connector. (Fig. 17-168)

Checking Door Window Motor

1. Check window regulator and channels for possible mechanical bind of window.

2. Check attachment of window motor to inner panel to insure an effective ground.

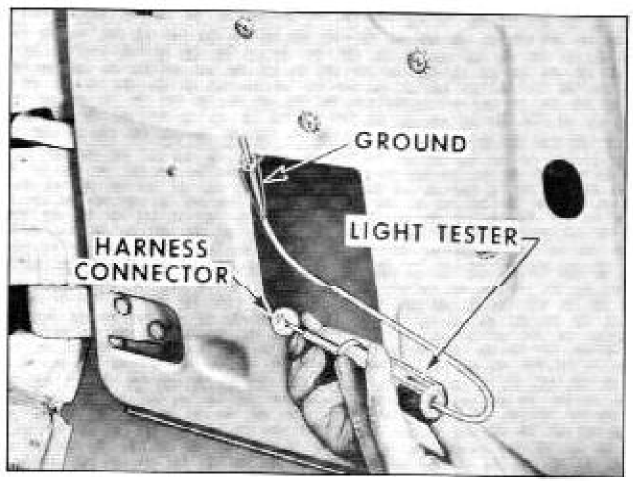


Fig. 17-168 Checking Wiring Between Switch and Door Window Motor

3. Connect one end of a No. 12 gauge jumper wire to the power source and the other end to one of the terminals on the window motor.

4. If the motor fails to operate with a jumper wire, the motor is defective and should be repaired or replaced as required. Check the other motor lead in the same manner.

POWER OPERATED VENTILATORS

The power ventilators are operated by a rectangular shaped 12 volt series wound motor with an internal circuit breaker. The ventilator harness is routed from the right to the left door beneath the instrument panel. (Fig. 17-169)

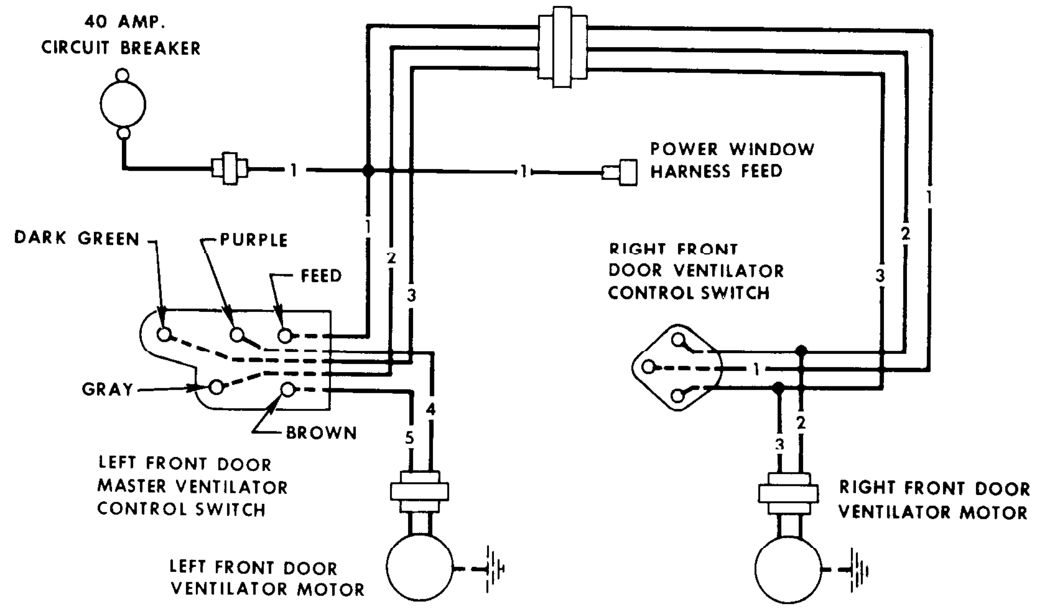
The power ventilator circuit is very similar to the power window circuit. The diagnosis outlined for the power windows may also be used in locating and correcting failures in the power ventilator circuit.

Typical Failures of Power Window

The following typical failures and corrections have been listed as an aid for eliminating electrical failures in the power window electrical circuit. It should be noted that multiple failures in the circuit may lead to a combination of conditions, each of which must be checked separately. (Fig. 17-170)

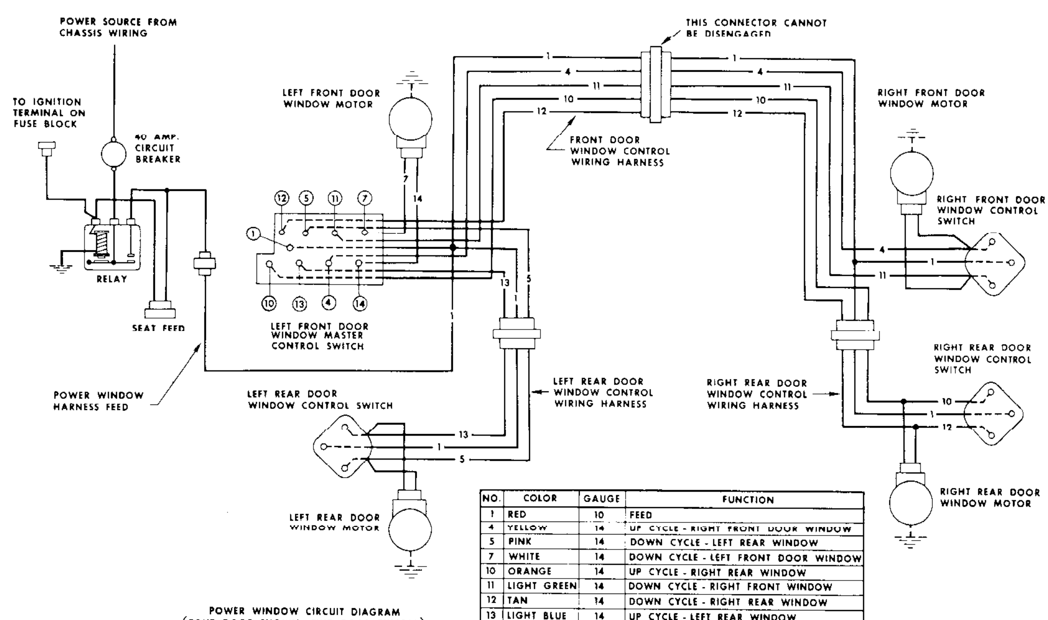
TYPICAL FAILURES OF POWER WINDOWS

CONDITION	CAUSE	CORRECTION
None of the windows will operate.	Short or open circuit in power feed circuit.	Check circuit breaker operation. Check relay operation. Check feed connector to power harness beneath instrument panel. Check the feed circuit wires for possible short or open circuit.
Right rear door window does not operate from master control switch on left front door or from control switches on right rear door. Left door window operates.	Short or open circuit between right rear door harness and power window front harness.	Check harness connectors beneath outer ends of instrument panel for proper installation. Check wires in power window front harness for possible short or open circuit.
	Short or open circuit in affected window control switch or window motor circuit.	Check operation of rear door window control switch. Check circuit from window control switch to window motor for short or open circuit.
	Possible mechanical failure or bind in window channels.	Check window regulator and channels for possible mechanical failure or bind.
	Defective window motor.	Check operation of motor.
Right door windows will operate from left door master control switch but will not operate from right door control switches. Left door windows operate.	Open or short circuit in front harness feed wire circuit.	Follow up feed wire in front harness for possible short or open circuit.



NO.	COLOR	FUNCTION
1	RED	FEED
2	GRAY	CLOSE CYCLE-RIGHT FRONT DOOR VENTILATOR
3	DARK GREEN	OPEN CYCLE-RIGHT FRONT DOOR VENTILATOR
4	PURPLE	OPEN CYCLE-LEFT FRONT DOOR VENTILATOR
5	BROWN	CLOSE CYCLE-LEFT FRONT DOOR VENTILATOR

Fig. 17-169 Power Ventilator Circuit



NO.	COLOR	GAUGE	FUNCTION
1	RED	10	FEED
4	YELLOW	14	UP CYCLE - RIGHT FRONT DOOR WINDOW
5	PINK	14	DOWN CYCLE - LEFT REAR WINDOW
7	WHITE	14	DOWN CYCLE - LEFT FRONT DOOR WINDOW
10	ORANGE	14	UP CYCLE - RIGHT REAR WINDOW
11	LIGHT GREEN	14	DOWN CYCLE - RIGHT FRONT WINDOW
12	TAN	14	DOWN CYCLE - RIGHT REAR WINDOW
13	LIGHT BLUE	14	UP CYCLE - LEFT REAR WINDOW
14	BLACK	14	UP CYCLE - LEFT FRONT WINDOW

Fig. 17-170 Power Window Circuit

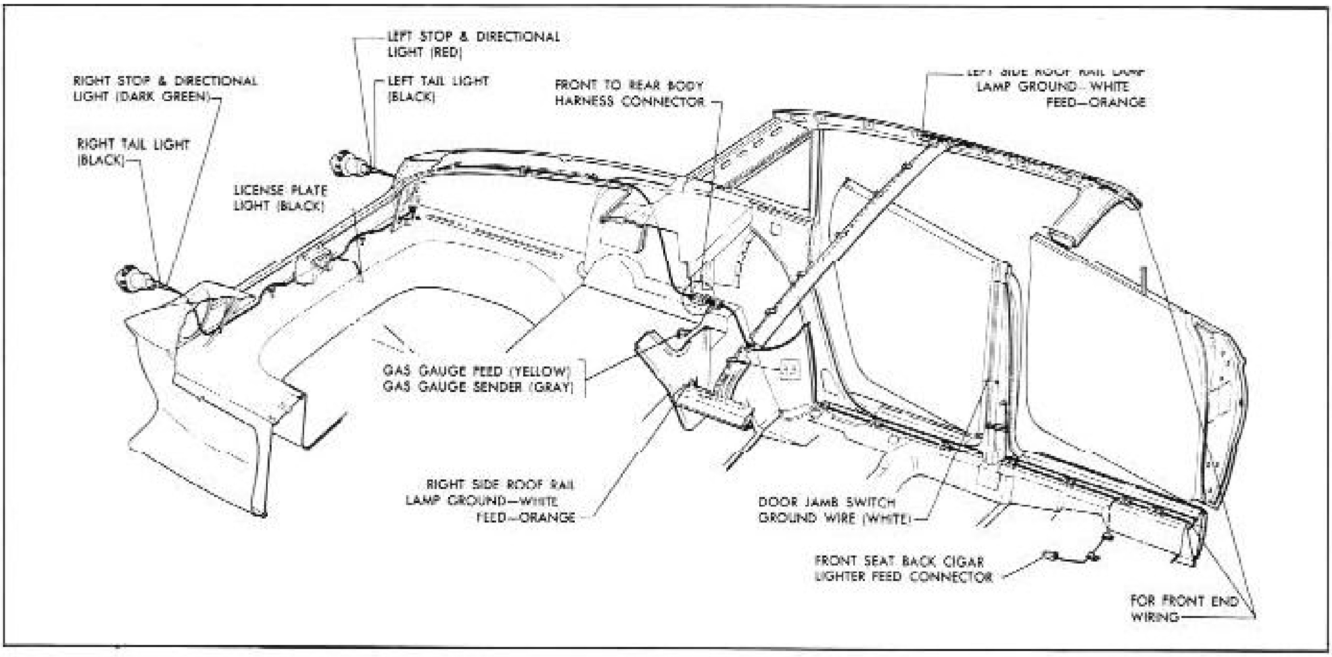


Fig. 17-171 Body Wiring (3829 Style Shown)

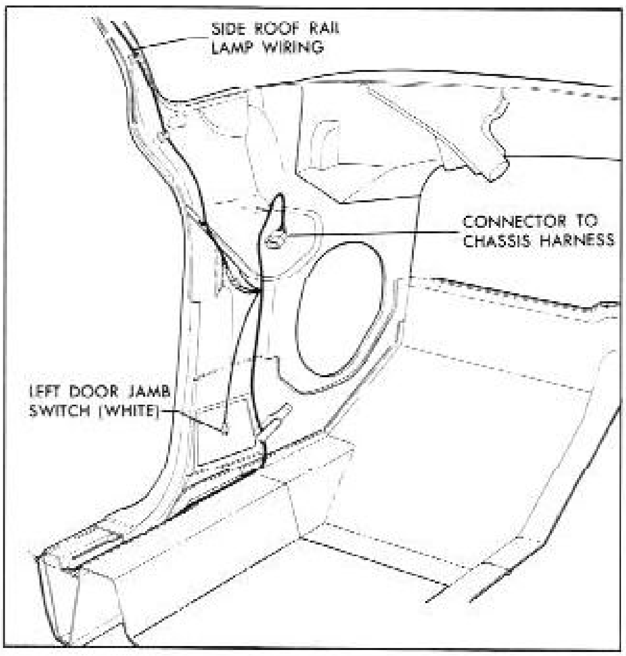


Fig. 17-172 Front Body Wiring (3829 Shown)

FIESTA

GENERAL DESCRIPTION

The fiesta has a manually or electrically operated tail gate window. To provide for maximum cargo space, the second seat back(s) can be folded forward to obtain additional floor area.

A special option is available on 2 seat styles, which includes a vertically mounted spare tire, in the right rear quarter panel, and a lock on the

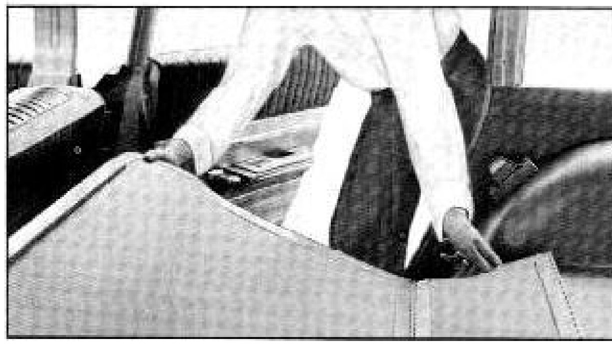


Fig. 17-173 Folding Rear Seat Back Rest

rear floor section. This option provides additional storage area, with security.

On 3 seat styles, the back of the 3rd seat folds rearward into the floor. To raise the seat back, it is necessary to lift up on the floor panel while raising the seat back. (Fig. 17-173) On 3 seat styles the 3rd seat back lifts from the floor. (Fig. 17-174) The windshield, instrument panel front

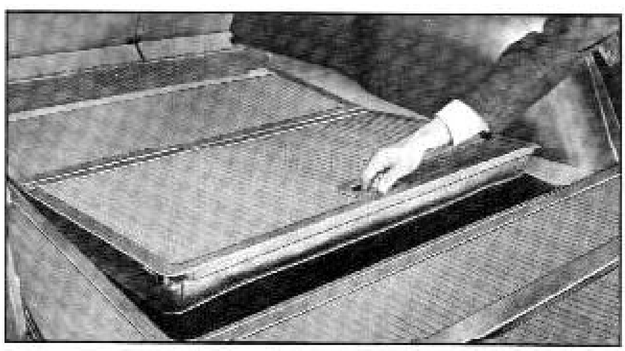


Fig. 17-174 Folding Third Seat (45 Styles)

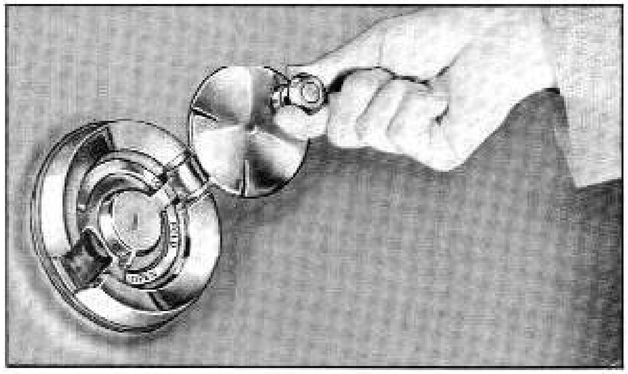


Fig. 17-175 Manual Window Control

seat and front and rear doors, are the same as used on sedans. For servicing of these items refer to their respective procedures in the BODY SECTION.

OPERATION OF TAIL GATE WINDOW

Manual Rear Window Control

To open the tail gate it is FIRST NECESSARY TO LOWER THE REAR WINDOW. This is accomplished by pulling out the window control knob, placing the indicator on OPEN and turning the handle counterclockwise until the window is COMPLETELY DOWN. (Fig. 17-175) A mechanical safety device prevents the tail gate from being opened until the window is down completely. When lowering is completed, turn the indicator to FOLD. This places the control knob in "free wheeling" so it may be rotated to locate in the recess at the bottom of the control assembly when folded back into position.

When the window is completely down, the tail gate is opened by grasping the latch, located top center on the inner panel of the tail gate, and pulling up and to the rear.

NOTE: The handle CANNOT BE RECESSED unless the cap cylinder is rotated from open to either fold or lock positon.

To raise the window, pull out control knob, place indicator in OPEN position and turn knob clockwise. When the window is completely closed, turn the indicator to FOLD and replace control knob in closed position. (Fig. 17-176)

Fig. 17-176 Manual Control Handle Latch

To lock the tail gate, lift the control handle, insert the door and ignition key and turn the indicator counterclockwise to LOCK. Remove key and replace control handle in closed position.

ELECTRIC REAR WINDOW CONTROL (Fig. 17-177)

The window is lowered from the outside by inserting the door and ignition key in the tail gate and turning counterclockwise. Turning the key clockwise raises the window. The rear window may also be raised and lowered from the driver's compartment with the control located in the center

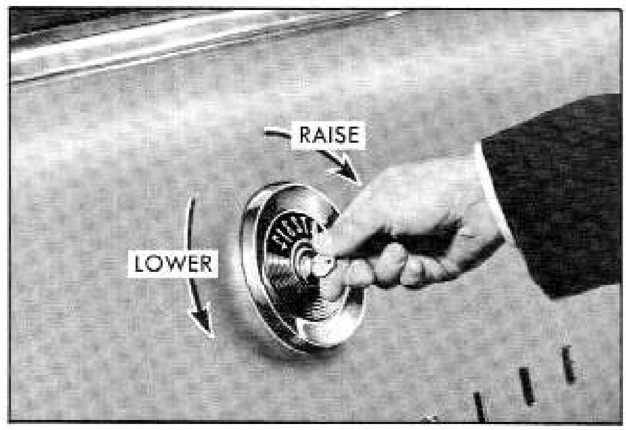


Fig. 17-177 Electric Window Control

of the instrument panel above the radio. This switch operates only when the ignition is ON or in ACCESSORY position, whereas the switch on the tail gate operates independently of the ignition.

NOTE: Electric rear window switch located on left rear side panel of 3 seat models, operates only when ignition switch is in "on" or "accessory" position.

As in the case of the manual control, the window must be completely down before the tail gate can be opened. When the tail gate is open, a switch automatically prevents the window from being raised.

IMPORTANT: Tail gate must be fully engaged in strikers to operate electric rear window. The nylon plunger located in the L.H. striker must be depressed by the tail gate lock case and this can only be accomplished when the tail gate is fully closed in the striker. If window does not operate, open gate, depress and hold nylon plunger (Fig. 17-179) and operate switches. If window operates while holding plunger fully compressed, this indicates the striker switch and tail gate lock case are not meeting properly. Adjust striker so that component parts mate. If window still does not

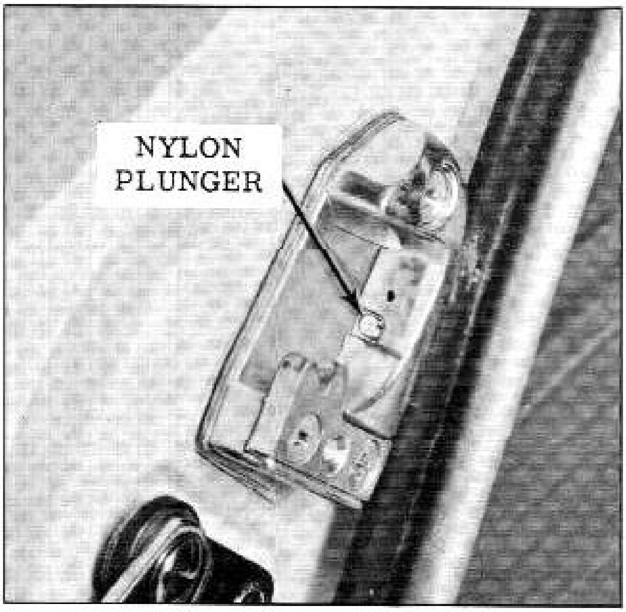


Fig. 17-178 Tail Gate Striker Switch

operate check wire connections for possible short or open circuit.

To Operate Window With Tail Gate Open

When service requires that the glass be raised and lowered with the tail gate open, the manually operated window can be cranked up or down. On the electrically operated window, it will be necessary to depress the switch plunger which is located in the left tail gate striker plate (Figs. 17-178 and 17-179) and then operate window switch.

CAUTION: Tail gate glass must be fully down before closing the tail gate.

SPARE TIRE

TWO SEAT STYLES (Fig. 17-180)

The spare tire and tire changing equipment are located under a hinged section of the rear floor. To gain access, lift the section using the finger hole provided. The section may be held open by swinging out the end of the support bar (located under rear side of the floor panel of the opened section) and placing it in the retaining hole which is in the left side.

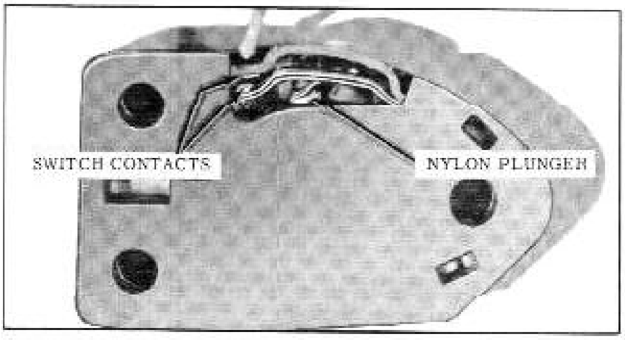


Fig. 17-179 Striker

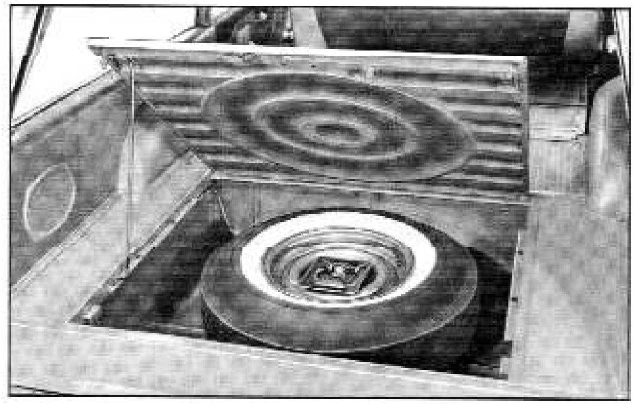


Fig. 17-180 Spare Tire Location (35 Styles)

SPECIAL OPTION AND THREE SEAT STYLES (Fig. 17-181)

On special option and 3 seat styles the spare tire is mounted in a compartment in the R.H. quarter panel.

To remove tire it is necessary to remove the tire cover, then lift up rear edge of auxiliary floor and pull rearward.

REAR SEAT ASSEMBLY

The rear seat cushion can be removed in the same manner as on conventional styles. The seat back trim assembly can be removed by first removing the rear seat cushion, then removing the trim to back panel attaching screws. The rear seat back floor pivot brackets can be removed by disconnecting the links and removing the bracket to floor pan bolts.

Rear Seat Back Panel, Auxiliary Floor and Hinge Assembly

Removal and Installation

1. Remove the rear seat cushion.
2. Remove the hinge to auxiliary floor panel attaching screws.

Fig. 17-181 Spare Tire Location (Special Option & 45 Styles)

3. Remove retainers and disengage links from the floor pivot brackets.
4. Remove the seat back panel, auxiliary floor and hinge assembly.

To install reverse the removal procedure.

THIRD SEAT ASSEMBLY ("45" STYLE)

The seat cushion of this seat can be removed by lifting up on rear edge of cushion (rear of car) approximately 2 inches then pulling toward rear of car. It is important that cushion be lifted vertically first due to type of clamp holding cushion in position.

Fold back rest toward down position approximately half way. Lift auxiliary floor away from back rest and unhook the two springs from the auxiliary floor.

Place back rest to up position and remove 4 bracket to floor attaching bolts and remove assembly.

TAIL GATE

REMOVE AND INSTALL

1. Lower window, open tail gate.
2. Remove the tail gate inner panel cover.
3. Disconnect water deflector around tail gate hinge.
4. If equipped with electric window lift:
   a. Disconnect water deflector and remove R.H. large access hole cover.
   b. Raise window, disconnect the wiring harness from the motor and tail gate and remove harness from the bottom of the tail gate.
5. Fully open tail gate and support in this position.
6. Remove tail gate support arms.
7. Remove the 3 hinge to tail gate attaching bolts from each hinge. Scribe around bolt holes for hinge location.
8. On manual operated windows, raise window approximately 6".
9. Position the tail gate in the near closed position, to relax the torque rods, then with aid of a helper lift tail gate from hinges.
10. To install, reverse the procedure, align the tail gate and reseal water deflector. Apply body caulking compound around hinge where it enters the tail gate. (Fig. 17-182)

ADJUSTMENTS

The in and out and sidewise adjustment is provided at the body hinge and up and down adjustment is provided at the hinge on the tail gate. In and out adjustments at the top of the tail gate are provided at the lock strikers, which are adjusted the same as a door lock striker.

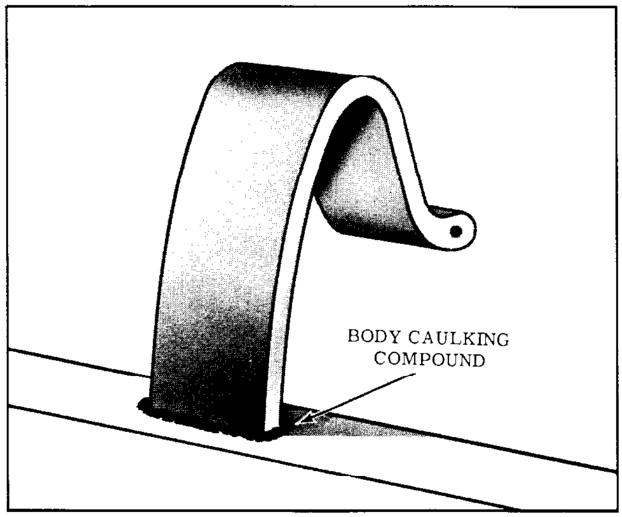


Fig. 17-182 Hinge Sealing

TORQUE RODS (Tail Gate)

REMOVE AND INSTALL (Fig. 17-183)

1. Remove tail gate. (Refer to TAIL GATE - REMOVE AND INSTALL)
2. Block follow board securely in "Up" position.
3. Remove one bolt securing each torque rod to the stationary hinge. Pull torque rod out of stationary hinge.
4. Position moveable hinge in open position. Remove the two Phillips head screws from each hinge and remove torque rods.

To assemble reverse the removal procedure.

Install torque rods as shown in Fig. 17-183.

FOLLOW BOARD TORQUE RODS

REMOVE AND INSTALL (Fig. 17-184)

1. Place follow board in down position.
2. Remove two outer screws in follow board. This will disconnect rods from follow board.
3. Lift up follow board.
4. Loosen torque rod clamp in center of body.

To install reverse removal procedure. The outer torque rod clamps can be attached to follow board when in the down position by reaching under the follow board and holding a clamp to the follow board and by inserting screw.

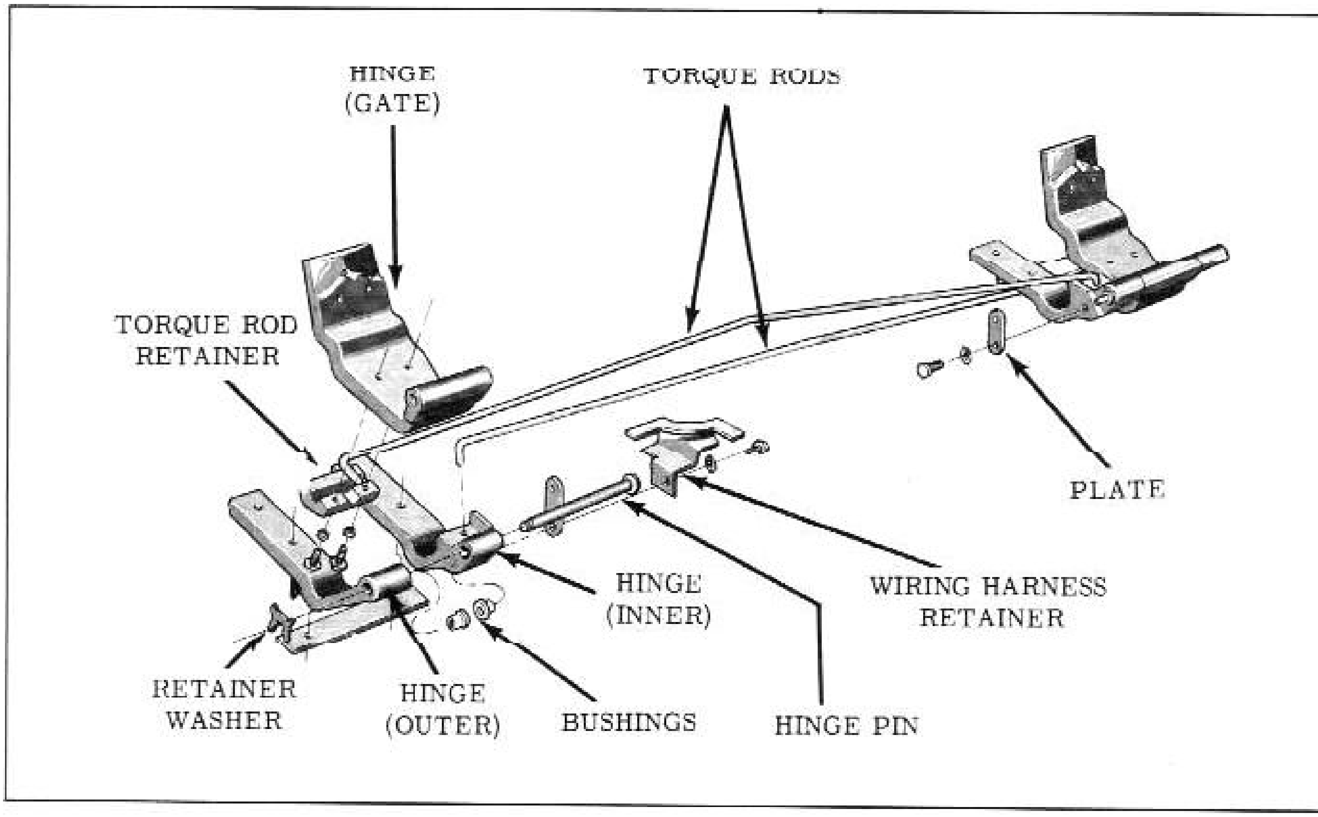


Fig. 17-183 Tail Gate Torque Rods

HINGE REPLACEMENT (Fig. 17-183)

Either half of the tail gate hinge can be removed independently of the other.

1. Remove the tail gate assembly. (Refer to TAIL GATE - REMOVE AND INSTALL.)
2. Disconnect torque rods from hinge to be removed.
3. Disconnect bumper to obtain clearance for hinge removal.
4. Scribe hinge location on body, to aid in alignment upon installation.
5. Remove hinge assembly.
6. If only half of the hinge assembly is to be replaced, remove the hinge pin retainer and hinge pin.
7. To install, reverse the removal procedure. Apply heavy-bodied sealer to the attaching surfaces of hinge straps or corresponding surfaces of the body and tail gate.

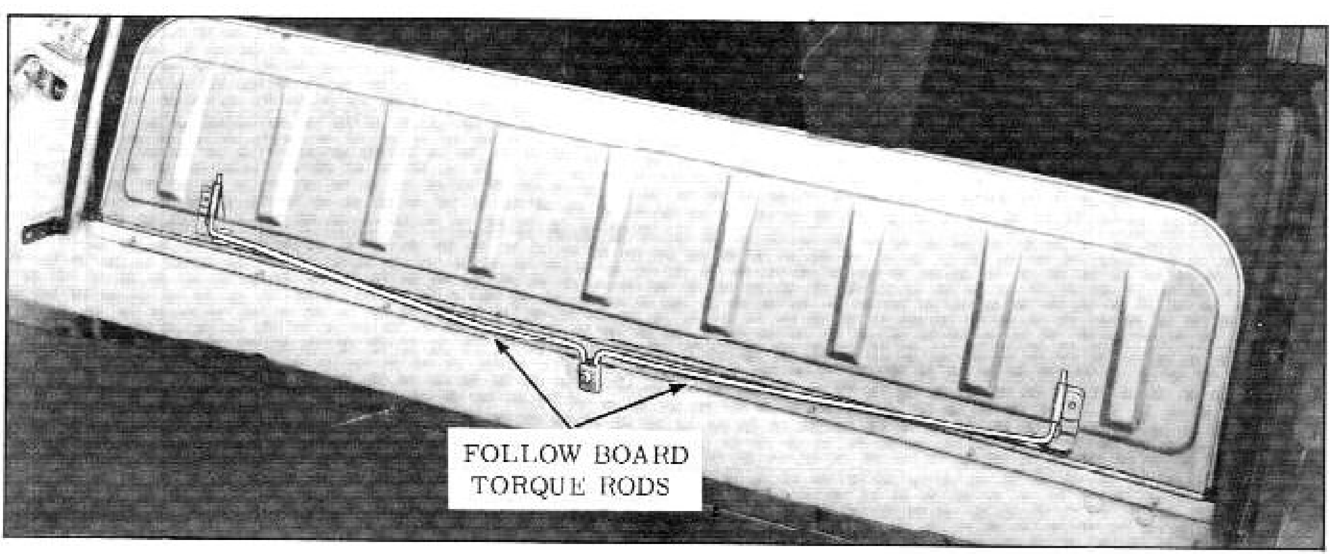


Fig. 17-184 Follow Board Torque Rods

WEATHERSTRIP

A mechanically retained weatherstrip is provided on each side of the tail gate and a weatherstrip is also attached to the body rear end panel.

Remove

1. Remove weatherstrip upper attaching screw and loosen run channel upper attaching bolt sufficiently to detach weatherstrip tab.
2. With a flat bladed tool, carefully break cement bond between panel and weatherstrip.
3. Insert tip of Tool J-5757 at clip locations and snap clips from retaining holes and remove weatherstrip.

Install

1. Clean off old cement.
2. Check weatherstrip clips for proper contour, and reform, if necessary with Clip Reforming Tool J-5984. (Fig. 17-185)
3. Apply a bead of 3M Super Weatherstrip Adhesive to sealing areas and install weatherstrip with Inserting Tool J-5757 by inserting tool in loop of clip and pushing clip into retaining hole. Repeat operation along both sides of tail gate. Install weatherstrip upper attaching screw and bolt.

HEADLINER

REMOVE AND INSTALL

The headliner consists of 5 sections of perforated hardboard, retained by plastic retainer finishing moldings. The plastic retainer finishing moldings snap onto retainers, which are attached to the roof top crossbows. Side aluminum retainers (used on 88 to retain outer edges of headliner over front and rear door area) are retained by screws to the side roof inner rail. To remove the front headliner section, the windshield upper garnish moldings, rear view mirror support, sun visors and side roof rail molding (S88) must be removed. To remove the rear section, the roof top header garnish molding must be removed.

1. Remove side roof rail molding, if present.
2. With a screw driver or suitable tool, pry one end of the plastic retainer finishing molding loose from its retainer. Then "peel" the plastic retainer finishing molding from its retainer. (Fig. 17-186)

   NOTE: Two retainer finishing moldings must be removed to remove any one panel, with the exception of the front and rear panels.
3. Slide headliner section back sufficiently to clear finishing molding retainer, then lift sides out of side retainers and remove section.
4. To install, reverse removal procedure.

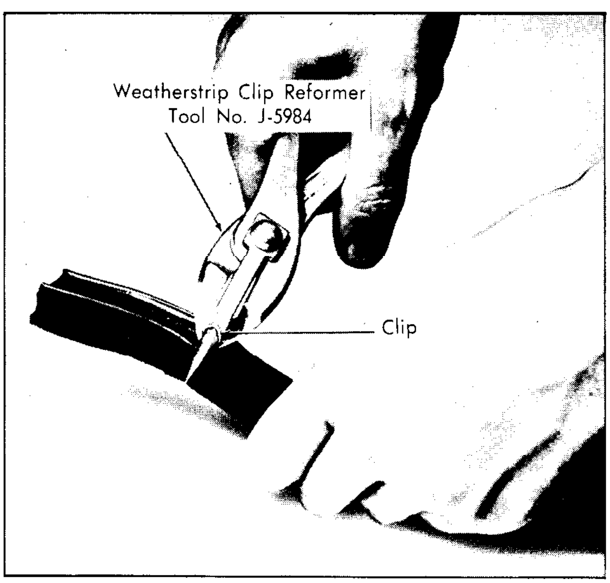


Fig. 17-185 Reforming Clip

QUARTER TRIM PANELS

The quarter trim panels are retained by exposed sheet metal screws and retainer finishing moldings at the lower edge. The rear quarter trim panels on either side of the body have to be removed to install tail lamp assemblies.

NOTE: Bulbs can be replaced by removing the lens.

FLOOR AND TAIL GATE VINOLEUM

VINOLEUM FLOOR

The auxiliary flooring is composed of individual

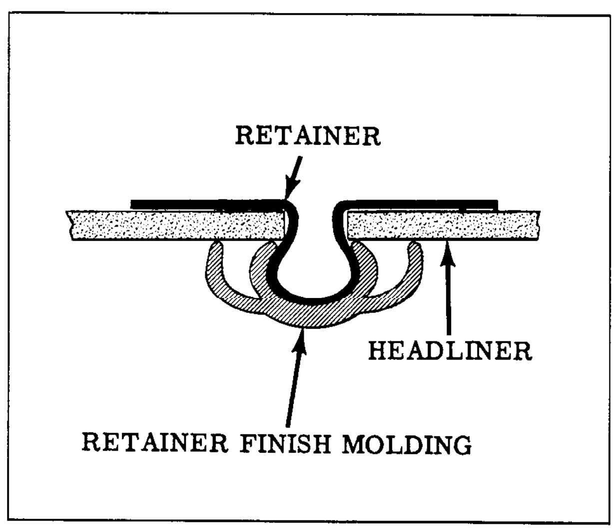


Fig. 17-186 Headliner & Retainer

pressed panels with Vinoleum covering. Any panel covering can be removed with a putty knife or suitable tool, working the cemented cover loose from the panel. Install new flooring with waterproof Vinoleum Adhesive.

TAIL GATE VINOLEUM

1. Fold back follow board, remove lower molding and skid strips.
2. With a putty knife or suitable tool, pry the vinoleum from the tail gate panel.
3. To install, clean panel thoroughly and install new vinoleum cover. Coat the back side of the covering as well as the panel with waterproof Vinoleum adhesive. Allow it to become tacky, then position the covering and press-roll onto panel.
4. Install the lower molding and skid strips.

REAR QUARTER WINDOW ASSEMBLY

Removal

1. Remove rear quarter window garnish moldings.
2. Remove the rear quarter trim panels.
3. Remove screws securing retainers at top, front and bottom of window assembly.
4. Using a suitable tool, carefully break seal bond between rubber channel and body opening, then have helper carefully push glass and rubber channel inboard and remove assembly from opening.

   NOTE: Rubber channel may be removed from glass as a bench operation.

Installation

1. Clean off old sealer from rubber channel and body opening to insure a smooth sealing surface.
2. Check drain hose for any obstructions and clean out, if necessary.
3. Apply a ribbon of medium-bodied sealer in corner of rear quarter reveal moldings completely around window opening.
4. Install quarter window assembly and install retainers and clips.
5. Using a plews oiler or any other suitable applicator, apply a bead of a neoprene base weatherstrip cement between glass and outer wall of rubber channel completely around window. Clean off excess sealer.
6. Replace all previously removed parts and remove protective coverings.

NAME PLATE LETTERS AND MOLDINGS (Fig. 17-187)

NAME PLATE

The name plate is attached to the tail gate by special self threading nuts and sealer assemblies. To remove the name plate it is necessary to remove the tail gate inner panel cover, disconnect the water deflector and remove the right hand access hole cover.

To install, reverse the removal procedure and reseal water deflector.

LETTERS

The tail gate letters are attached with push-on type retainers. To remove, it is necessary to remove the tail gate inner panel cover, disconnect water deflector and remove the access hole covers. After the letters are installed, apply body caulking compound around the letter studs, reverse the removal procedure and reseal water deflector.

QUARTER WINDOW REVEAL MOLDING

The quarter window reveal moldings, upper, lower and rear, can be removed after the quarter window and rubber channel are removed.

QUARTER WINDOW SCALP

The quarter window scalp moldings, front, upper and rear, can be removed after the quarter window and rubber channel are removed.

REAR FENDER MOLDING

The rear fender molding is attached by three nuts at the rear and five snap-in clips at the front. The molding attaching nuts are accessible by removing the rear quarter trim pad or upright spare tire, on cars so equipped.

ROOF DRIP MOLDING

The roof drip moldings are attached by snapping the molding over the roof drip rail.

BODY OPENING REAR PINCHWELD FINISHING MOLDINGS—UPPER AND SIDE

The body opening pinchweld finishing moldings are retained by snapping the moldings over retaining clips.

TAIL GATE WINDOW REVEAL— UPPER, LOWER AND SIDE MOLDINGS

The tail gate window upper moldings, right and left, are secured to the body by attaching screws. The left reveal molding overlaps the right reveal molding at the center and the attachment is secured with a screw. Both upper reveal moldings are overlapped at the outer ends by the side reveal moldings.

To remove the moldings, remove the tail gate window upper glass run channels and the side reveal moldings. Remove the upper reveal molding attaching screws and remove the moldings. The moldings may be removed individually. Removal of either reveal molding individually requires detachment of the opposite side upper glass run channel at the center.

To install the moldings, apply a continuous ribbon of medium-bodied sealer (1/4" diameter) to the center of the inner surface of each molding and along the entire length of the molding. Position and install the right molding before the left molding. Seat and install the glass run channels and the side reveal moldings.

The tail gate window lower reveal molding is attached with screws which are accessible after the tail gate window is removed.

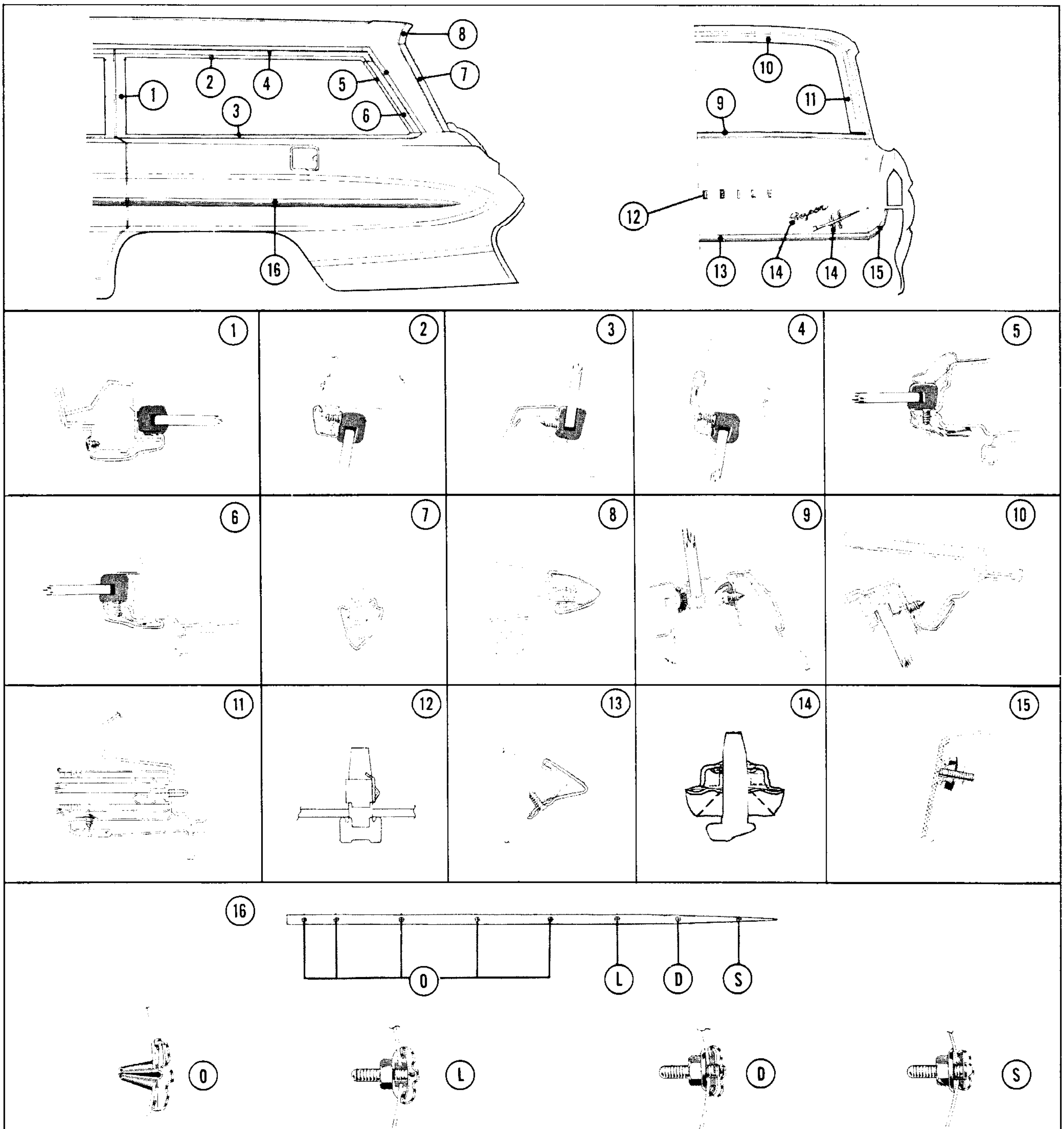


Fig. 17-187 Exterior Molding Attachment

The tail gate window side moldings, right and left, are secured to the body by a slide-on attachment and by screws.

To remove the moldings, remove the rear body opening garnish moldings and panels and the tail gate window upper glass run channels. Remove the attaching screws and slide the moldings downward and inward from the body. When removing either molding individually, detach the opposite upper glass run channel at the center.

To install the moldings, apply a continuous ribbon of medium-bodied sealer to fill the cavity formed by the attaching surfaces of each molding. Position the moldings to the body and to the upper reveal moldings and install the attaching screws. Seal and install the upper glass run channels. Install the previously removed parts.

TAIL GATE LOWER FINISHING MOLDING

The tail gate lower finishing molding is attached to the tail gate with self tapping screws, accessible after removing the rear bumper.

REAR QUARTER FINISHING MOLDING

The rear quarter finishing molding is attached with a screw and nut. The nut is accessible after removing the rear quarter trim pad or upright spare tire.

TAIL GATE WINDOW ASSEMBLY (MANUAL OR ELECTRIC) (Fig. 17-188)

Removal

1. Remove the tail gate window garnish molding.
2. Carefully operate window fully outward until the window lower sash channel right and left cam attaching bolts are accessible.

   NOTE: If cam attaching bolts are not accessible, bend the sheet metal until bolts are accessible. (Fig. 17-189)

3. Remove window lower sash channel right and left cam attaching bolts. Disengage cams from window lower sash channel; then carefully remove window assembly.

   CAUTION: DO NOT OPERATE REGULATOR MOTOR after the window assembly is disengaged from the regulator or removed from the tail gate. Operation of the motor with the load removed may damage the unit and make it inoperative.

4. To install tail gate window assembly, reverse removal procedure. Prior to installing window lower sash channel cams, lubricate channel portion of cam with "Lubriplate" or its equivalent.

TAIL GATE WINDOW ADJUSTMENTS

1. To adjust the tail gate window forward or rearward for proper alignment with the window glass run channel (on body), and/or to eliminate a binding condition of the window in the tail gate glass run side channels, loosen the tail gate glass run side channel(s) lower attaching bolt at tail gate lock pillar; move lower end of channel forward or rearward, as required, and tighten lower attaching bolt.

   NOTE: The vertical portion of the tail gate window glass upper run channels are adjustable forward or rearward for proper alignment with the tail gate glass.

2. To correct a condition where the glass is "cocked" in the glass run channels, loosen window regulator attaching screws, rotate regulator assembly clockwise or counterclockwise, as required, to eliminate "cocked" condition. (Fig. 17 190)

TAIL GATE WINDOW REGULATOR ASSEMBLY (MANUAL OR ELECTRIC)

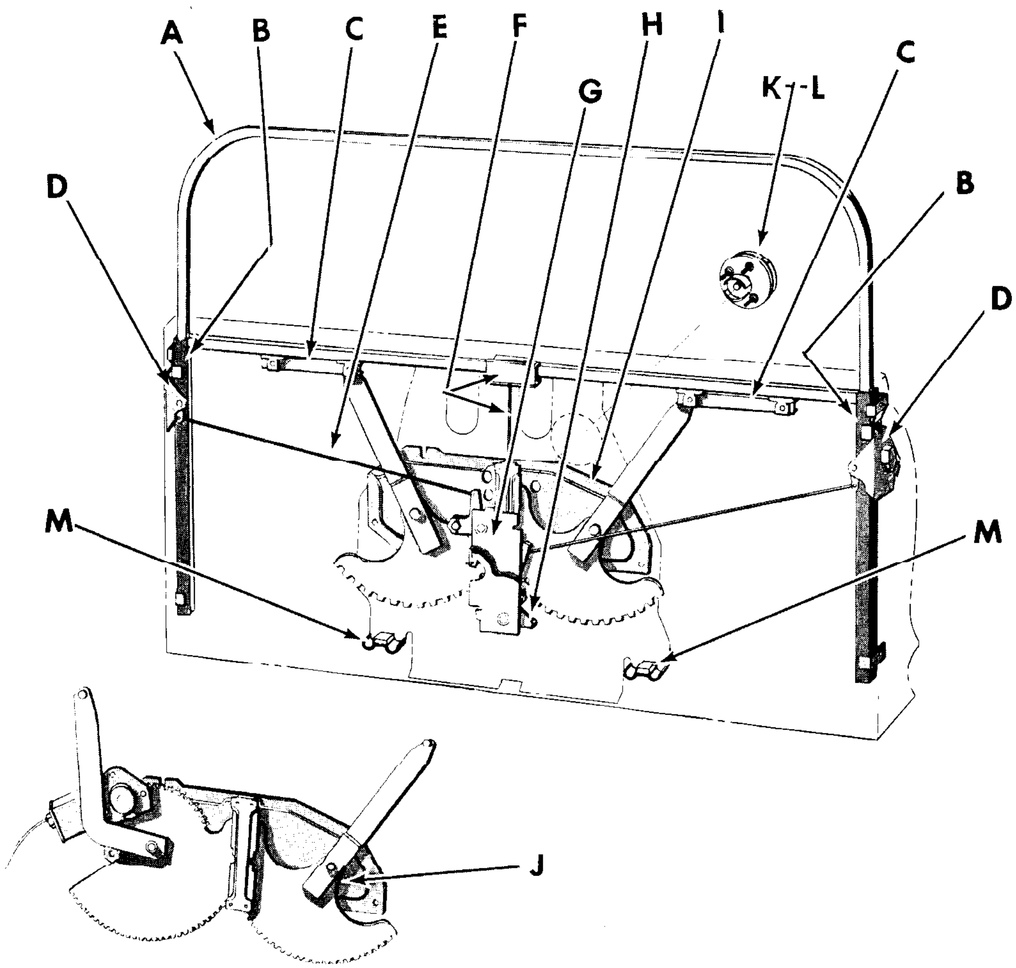
Removal and Installation

1. Remove tail gate window assembly, as described under TAIL GATE WINDOW ASSEMBLY - Removal and Installation.
2. Remove the inner panel cover lower retainer, inner panel cover and skid strips.
3. Detach tail gate lock remote control right connecting rod from remote control.
4. On styles equipped with electrically operated tail gate window, disconnect tail gate harness connector from motor.

   CAUTION: DO NOT OPERATE REGULATOR MOTOR after window assembly is disengaged from the regulator or after the regulator is removed from the tail gate. Operation of the motor with the load removed may damage the unit and make it inoperative.

5. Remove regulator attaching screws. (Fig. 17-190) Remove regulator assembly through access hole.

   NOTE: To remove electric motor from regulator assembly see TAIL GATE WINDOW REGULATOR ELECTRIC MOTOR ASSEMBLY - Removal and Installation.



A. Tail Gate Window Assembly

B. Tail Gate Window Glass Side Run Channel Assembly - Right and Left

C. Tail Gate Window Lower Sash Channel Cam - Right and Left

D. Tail Gate Lock Assembly - Right and Left

E. Tail Gate Lock Remote Control Connecting Rod - Right and Left

F. Tail Gate Lock Remote Control Inside Handle Assembly - Includes Push Rod

G. Tail Gate Lock Remote Control Assembly

H. Tail Gate Lock Remote Control Locking Lever - Actuated By Window

I. Tail Gate Window Regulator Assembly - Manual

J. Tail Gate Window Regulator Assembly - Electric

K. Tail Gate Window Regulator Outside Handle Assembly

L. Tail Gate Window Regulator Outside Lock Cylinder Switch and Escutcheon Assembly

M. Tail Gate Window Rubber Bumber Stops

Fig. 17-188 Tail Gate Assembly

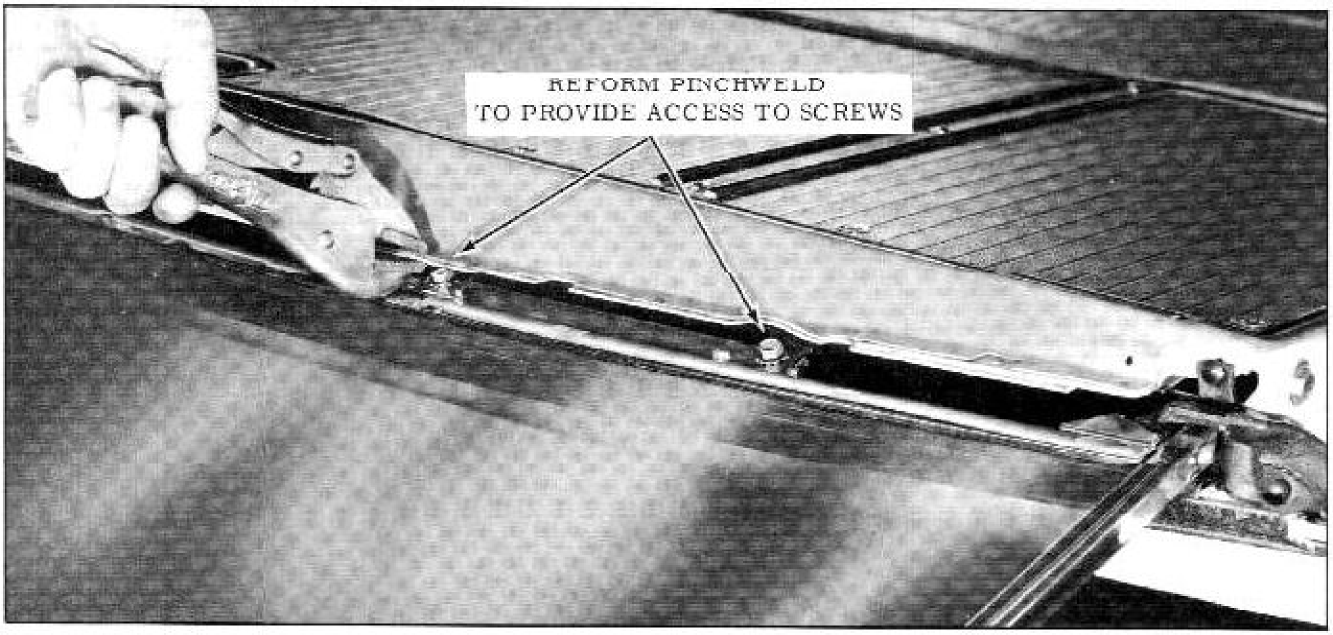


Fig. 17-189 Tail Gate Window Removal

6. To install tail gate window regulator assembly, reverse removal procedure. Prior to installing regulator, lubricate the teeth on the regulator sectors with "Lubriplate".

   Prior to resealing tail gate inner panel water deflector, check operation of window and tail gate locking mechanism. Where necessary, adjust tail gate window, tail gate lock strikers or tail gate lock remote control for proper operation.

TAIL GATE WINDOW REGULATOR ELECTRIC MOTOR ASSEMBLY

Removal and Installation

1. Remove tail gate window regulator and electric motor assembly as described under TAIL GATE WINDOW REGULATOR ASSEMBLY - Removal and Installation.
2. Place regulator assembly in a vise as shown in Fig. 17-191.

   CAUTION: BE SURE to perform steps 3 and 4 before attempting to remove the motor from the regulator. The regulator lift arms which are under tension from the counterbalance spring can cause serious injury if the motor is removed without locking the sectors in position.
3. Drill a 1/4" hole through regulator backplate and main sector within area indicated by dotted lines. (Fig. 17-191)

   NOTE: Do not locate hole less than 1/2" away from edge of backplate, sector or holes in backplate and sector. Do not use holes in

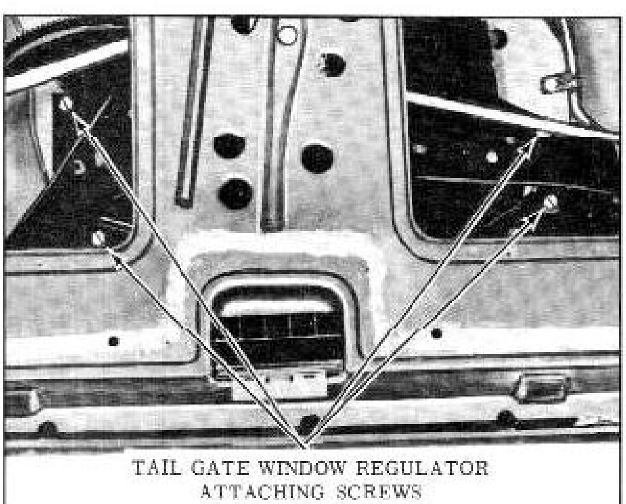


Fig. 17-190 Regulator Removal

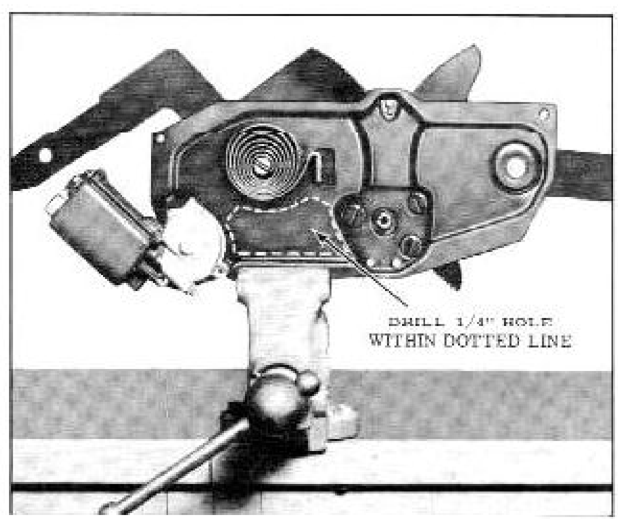


Fig. 17-191 Regulator Motor Removal

backplate or sector as they are too large and locking bolt can slip out.

4. Insert a 3/16" bolt through hole in backplate and sector and install nut to bolt. (Do not tighten nut.)
5. Remove 3 motor attaching bolts, and remove motor assembly from regulator.

   NOTE: Clean off steel chips from the regulator sectors and motor pinion gear after drilling operation.

6. To install regulator electric motor assembly, reverse removal procedure.

   NOTE: Be sure to remove nut and bolt locking sector after motor is installed.

TAIL GATE WINDOW REGULATOR OUTSIDE HANDLE ASSEMBLY (Manually Operated)

Removal and Installation

1. Remove inner cover panel lower molding and inner cover panel.
2. Detach tail gate inner panel water deflector sufficiently to gain access to access holes, shown at "A". (Fig. 17-192)
3. Carefully raise window until holes in window regulator are aligned with inner panel access holes "A".

   CAUTION: Support portion of window assembly extending out of tail gate.

4. Through access holes, remove tail gate handle attaching nuts and remove handle assembly and gasket from tail gate. To disassemble tail gate handle assembly, see TAIL GATE HANDLE ASSEMBLY - Disassembly and Assembly.
5. To install tail gate handle assembly, reverse removal procedure. Make sure sealing gasket is installed between tail gate outer panel and handle escutcheon and make sure handle clutch is properly engaged with window regulator clutch. Check operation of window prior to resealing water deflector. Reseal tail gate inner panel water deflector as specified under TAIL GATE INNER PANEL WATER DEFLECTOR.

Fig. 17-192 Outside Handle Removal

TAIL GATE WINDOW LOCK CYLINDER ASSEMBLY

Removal and Installation

1. Using an awl or suitable punch, carefully punch through webbed hole in face of lock cylinder cap (selector lever).
2. With key in lock cylinder and selector lever in "Lock" position insert a piece of wire (paper clip) in hole on face of lock cylinder cap and depress plunger with wire sufficiently to allow key and selector lever to be turned counterclockwise approximately 1/8 turn; then, remove lock cylinder and cap assembly.
3. To install lock cylinder and cap assembly, reverse removal procedure. Prior to installation, lubricate frictional surfaces of lock cylinder and cap parts with "Lubriplate" or its equivalent.

TAIL GATE WINDOW HANDLE ASSEMBLY

Disassembly and Assembly (Fig. 17-193)

1. Remove window regulator handle assembly.
2. Using an awl, remove clutch spring retainer; then remove clutch washer and spring washer, and remove clutch and lock cylinder assembly from unit. (Fig. 17-193)
3. Using snap ring pliers or other suitable tool, remove housing spring retainer; then remove housing washer and spring washer, and remove back plate from handle and knob housing.

   NOTE: Plastic shoes can be removed from handle and knob housing by carefully prying shoes from housing. (Fig. 17-193)

4. If replacing handle and knob assembly, remove screws securing handle and knob retainers; then disengage handle and knob including handle pin from housing.
5. To install handle assembly, reverse removal procedure. Prior to installation, lubricate frictional surfaces of part with "Lubriplate".

TAIL GATE WINDOW LOCK CYLINDER AND CASE ASSEMBLY

Disassembly and Assembly

1. Remove window regulator handle assembly.

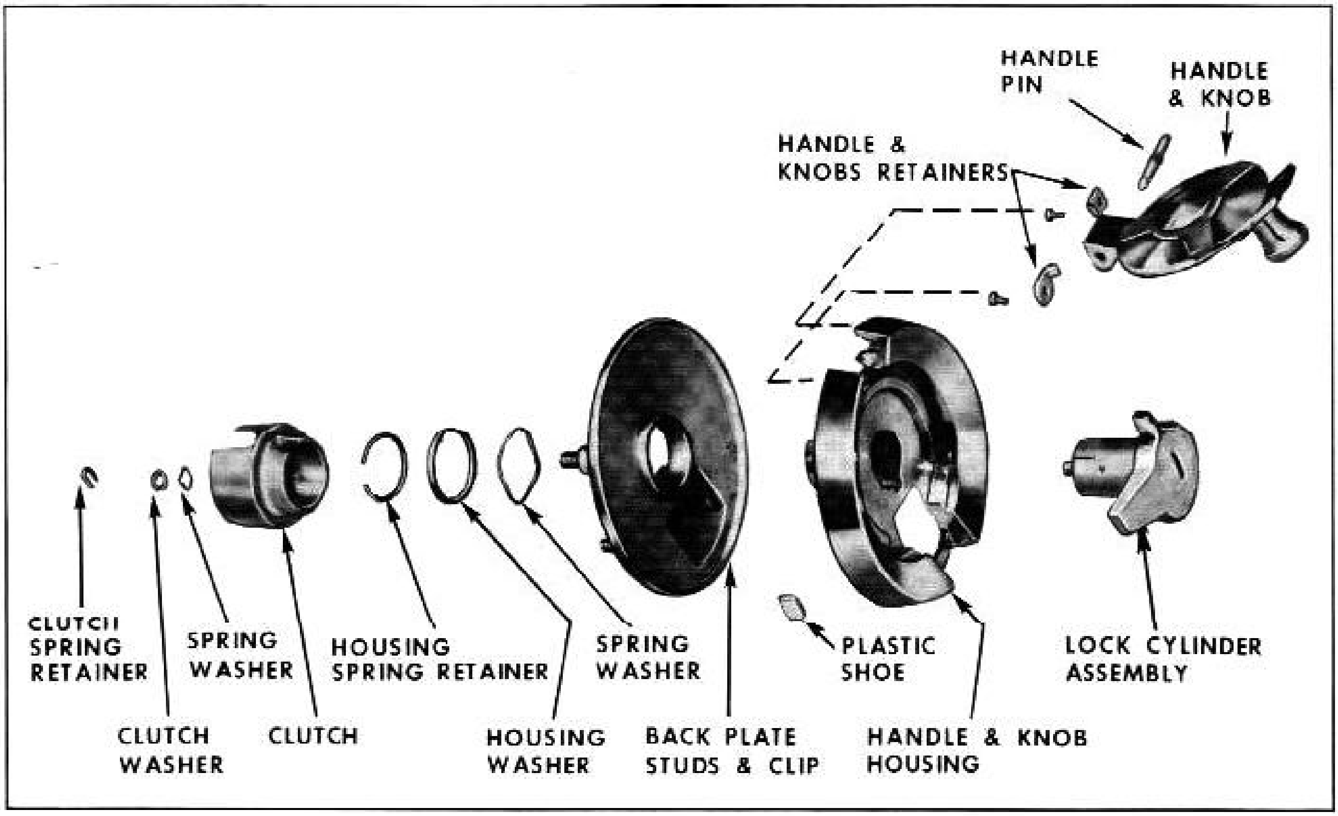


Fig. 17-193 Window Regulator Outside Handle Assembly

2. Using an awl, remove clutch spring retainer; then remove clutch washer and spring washer, and remove clutch and lock cylinder assembly from unit. (Fig. 17-193)

3. Insert a piece of wire (paper clip) in hole on face of lock cylinder cap. While holding lock cylinder case, depress plunger with wire sufficiently to allow key and selector lever to be turned counterclockwise approximately 1/8 turn; then, remove lock cylinder and cap assembly and detent spring from handle assembly. (Fig. 17-194)

   NOTE: When removing lock cylinder and cap assembly from case, place finger over locking pawl to prevent pawl and spring from popping out. (Fig. 17-194)

4. Remove locking pawl and pawl spring from lock cylinder case.

5. To install lock cylinder and case assembly, reverse removal procedure. Prior to installation, lubricate frictional surfaces of parts with "Lubriplate".

TAIL GATE ELECTRIC WINDOW LOCK CYLINDER SWITCH AND ESCUTCHEON ASSEMBLY

Removal and Installation (Fig. 17-195)

1. Remove inner cover panel lower molding and inner cover panel.

2. Detach tail gate inner panel water deflector sufficiently to gain access to access holes "A" for removal of assembly attaching nuts. (Fig. 17-192)

3. Carefully operate window upward until holes in window regulator assembly are aligned with inner panel access holes.

   CAUTION: Support portion of window extending out of tail gate.

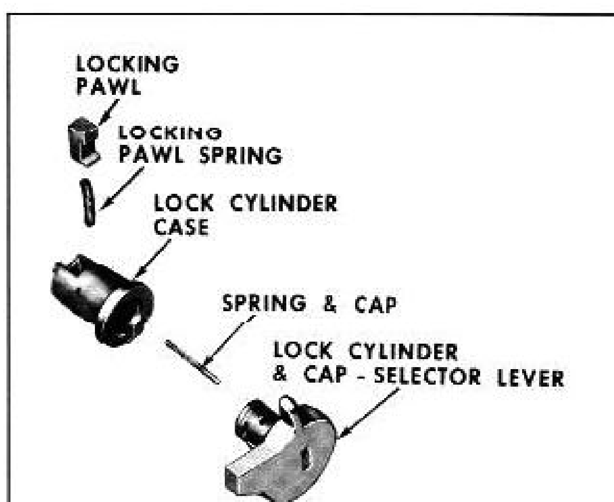


Fig. 17-194 Lock Cylinder and Case

4. Remove lock cylinder, switch and escutcheon assembly attaching nuts. Detach assembly from tail gate outer panel sufficiently to disconnect junction block from switch; then, remove assembly and gasket from tail gate.

   To disassemble electric window lock cylinder, switch and escutcheon assembly see ELECTRIC WINDOW LOCK CYLINDER, SWITCH AND ESCUTCHEON ASSEMBLY - Disassembly and Assembly.

TAIL GATE ELECTRIC WINDOW LOCK CYLINDER SWITCH AND ASSEMBLY

Removal and Installation

1. Remove tail gate electric window lock cylinder, switch and escutcheon assembly.
2. Disengage lock cylinder and switch retainer and remove lock cylinder and switch assembly from escutcheon. (Fig. 17-195)
3. To install lock cylinder and switch assembly, reverse removal procedure.

Disassembly and Assembly

1. Using a pointed tool inserted through holes in lock cylinder case, depress tab of switch clips and remove clips. (Fig. 17-195)
2. Carefully pull switch and switch cam from lock cylinder case. (Fig. 17-195)
3. Bend out crimped flange of lock cylinder case cap sufficiently to remove cap; then remove lock cylinder cap and springs.

   NOTE: The crimped flange on lock cylinder case caps necessitates damaging cap during removal from lock cylinder case; however, service replacement caps are available which have 4 bend over tabs for installation.

4. To assemble lock cylinder and switch assembly, reverse removal procedure. Prior to installation, lubricate frictional surfaces of lock cylinder and switch parts with "Lubriplate" or its equivalent. Install a new service replacement lock cylinder case cap.

TAIL GATE LOCK ASSEMBLY (RIGHT OR LEFT)

Removal and Installation

1. Remove tail gate window assembly and inner panel cover and disconnect water deflector.
2. Remove tail gate window glass run side channel attaching screws and remove channel from side of tail gate from which lock is being removed. (Fig. 17-196 and 17-198)

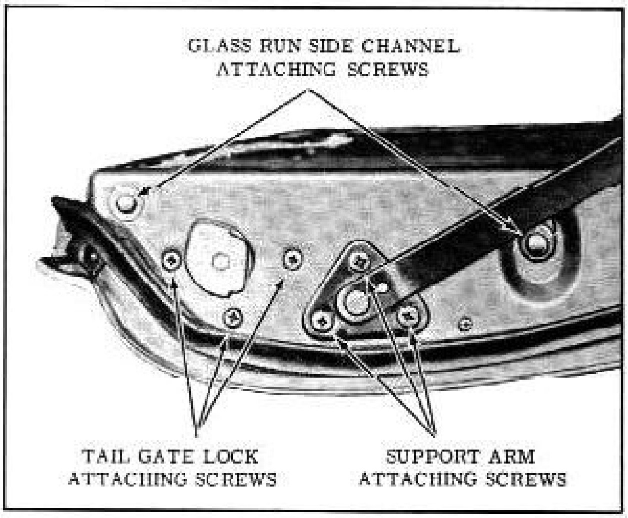


Fig. 17-196 Tail Gate Lock and Support Arms

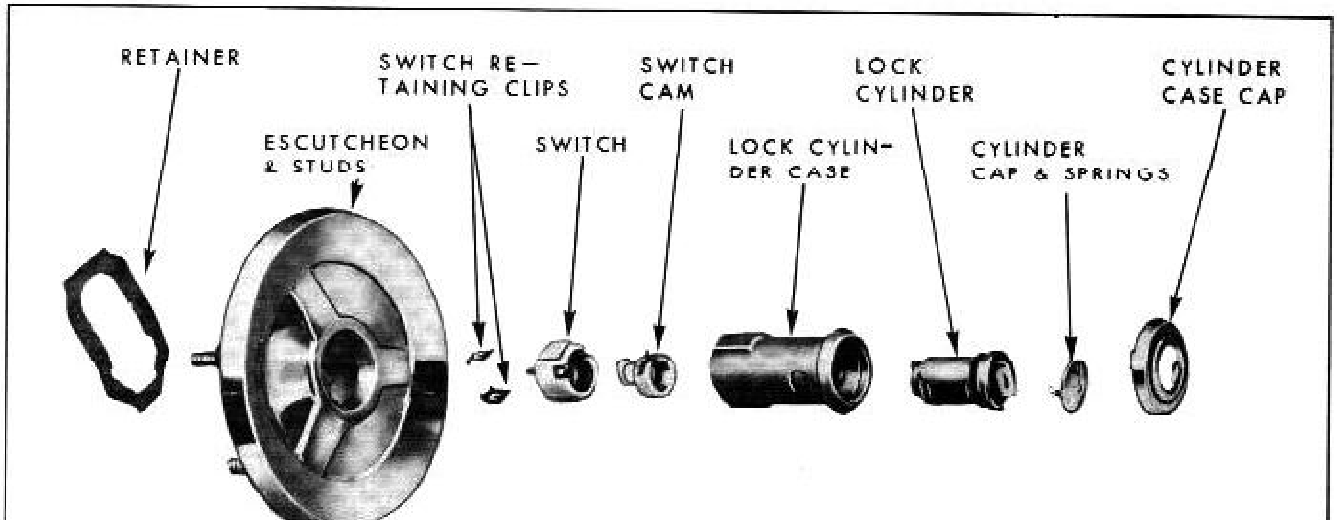


Fig. 17-195 Electric Lock Cylinder and Switch

3. Disengage spring clip and detach lock remote control connecting rod from lock remote control. (Fig. 17-198)
4. Remove tail gate lock attaching screws and remove tail gate lock with attached connecting rod. (Fig. 17-198) Detach connecting rod from lock.
5. To install tail gate lock assembly, reverse removal procedure. Prior to installing lock assembly into tail gate, apply a bead of body caulking compound to lock frame along joint of lock bolt housing, as indicated at "1". (Fig. 17-197)

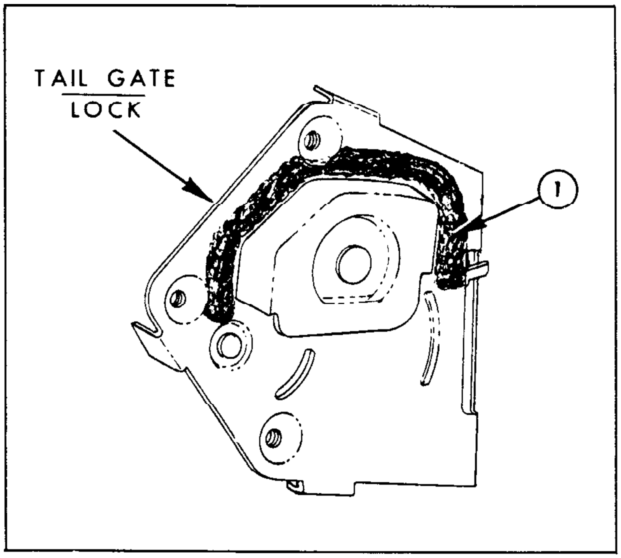


Fig. 17-197 Tail Gate Lock Sealing

When attaching connecting rod to lock bellcrank lever, make sure bellcrank lever is in position shown in Fig, 17-198. When installing connecting rod to remote control, gently pull connecting rod towards remote control lever to seat bellcrank lever at lock; turn remote control lever adjusting screw until hole in lever is aligned with end of connecting rod; then install connecting rod to lever. (Fig. 17-196)

NOTE: Check clips at ends of remote control levers for proper retention of connecting rods and replace, if necessary.

Prior to resealing water deflector, check operation of tail gate locking mechanism.

TAIL GATE LOCK REMOTE CONTROL INSIDE HANDLE ASSEMBLY

Removal and Installation (Fig. 17-199)

1. Remove tail gate belt finishing molding and tail gate inner cover panel. Detach inner water deflector sufficiently to gain access to inner panel.
2. Loosen tail gate lock remote control attaching screws and move remote control towards bottom of tail gate sufficiently to disengage end of handle push rod from hole in remote control lever. (Fig. 17-199)

   NOTE: In some instances it may be necessary to reach into tail gate and actuate remote control lever to disengage push rod from lever.
3. Remove handle attaching screws located under handle and remove handle assembly (includes push rod) from tail gate.
4. To install tail gate lock remote control inside handle assembly, reverse removal procedure. Lubricate frictional points of inside handle assembly with "Lubriplate".

   NOTE: To engage end of handle push rod into hole in remote control lever, it may be necessary to raise window to gain access to lever. Adjust remote control upward until tabs on handle push rod just contact remote control lever.

Prior to resealing tail gate inner panel water deflector check operation,of tail gate locking mechanism and, where necessary, adjust door lock strikers or remote control for proper operation.

TAIL GATE LOCK REMOTE CONTROL ASSEMBLY

Removal

1. Remove tail gate window assembly and inner panel cover and disconnect water deflector.
2. Disengage clips securing lock connecting rods to remote control and detach connecting rods from remote control. (Fig. 17-199)
3. Remove tail gate lock remote control attaching screws. Disengage remote control from inside handle push rod and remove remote control from tail gate.

Installation

1. Engage inside handle push rod into hole in remote control lever; then loosely install remote control attaching screws.
2. Adjust remote control assembly up or down until tabs on push rod just contact remote control lever and tighten remote control attaching screws.

   IMPORTANT: If installing a new remote control assembly, remove cotter key at "A" in Fig. 17-199, after adjustment, to free locking lever.
3. Gently pull lock connecting rod towards remote control lever to seat bellcrank lever at

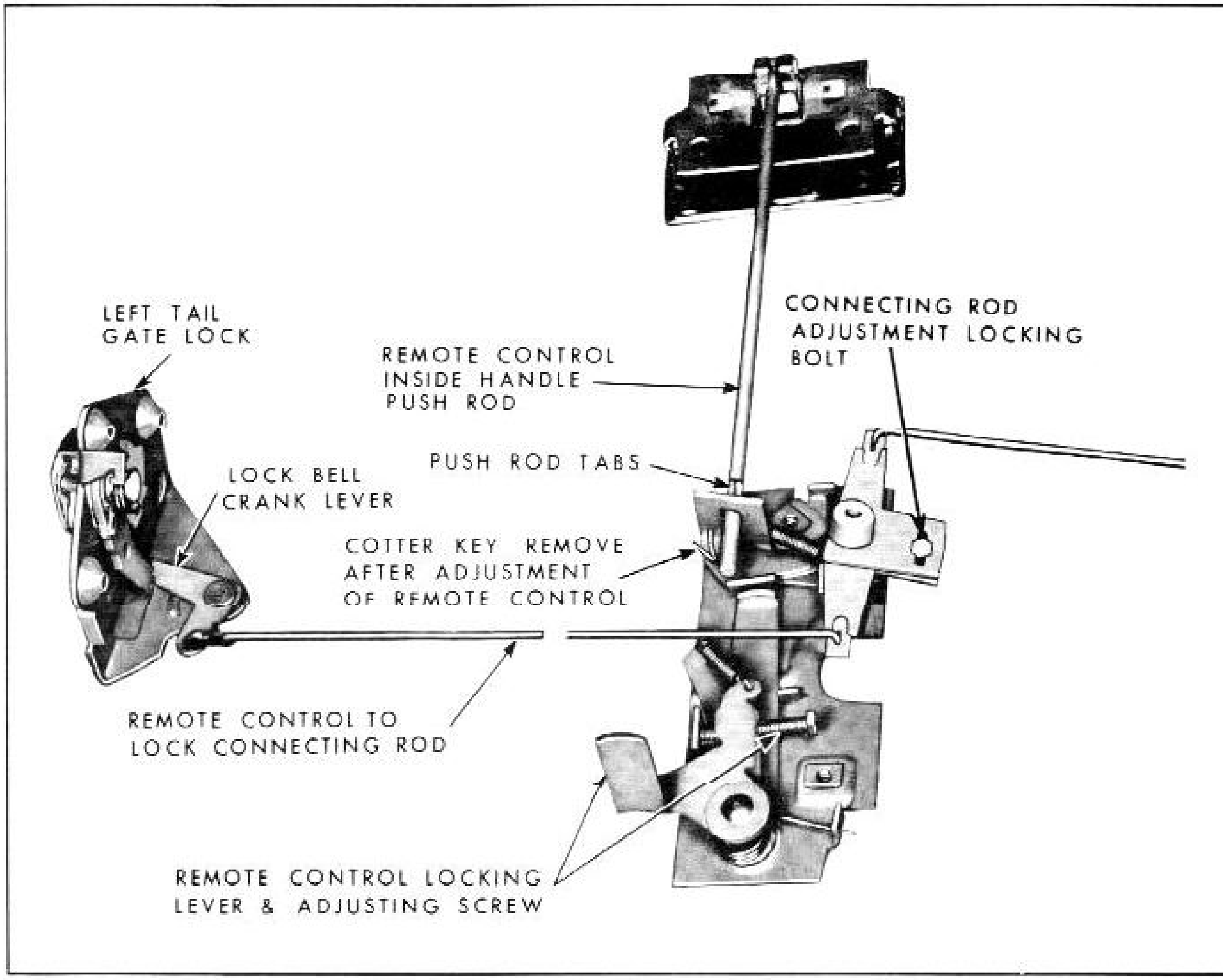


Fig. 17-198 Tail Gate Lock Remote Control

lock; turn remote control lever adjusting screw until hole in lever is aligned with end of connecting rod. (Fig. 17-199) Install connecting rod to lever.

NOTE: Check clips at ends of remote control levers for proper retention of connecting rods and replace, if necessary.

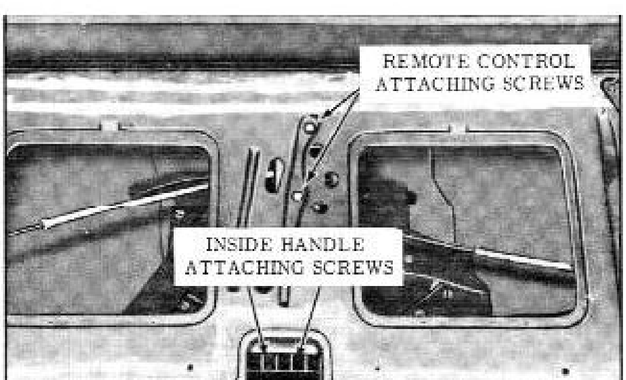


Fig. 17-199 Remote Control Removal

4. Check operation of tail gate locking mechanism. To open tail gate when window assembly is removed, depress tail gate lock remote control locking lever through access hole and at the same time operate the tail gate remote control inside handle. (Fig. 17-199)
5. Install tail gate window assembly, as described under TAIL GATE WINDOW ASSEMBLY - Installation.
6. Lower window just below the tail gate window side reveal moldings then adjust remote control locking lever adjusting screw so that lever is just contacting window sash channel frame. Check operation of remote control inside handle. Handle should remain locked until window upper sash channel frame is below tail gate side reveal moldings.
7. Seal water deflector and install previously removed parts.

TAIL GATE INNER PANEL WATER DEFLECTOR

A waterproof paper tail gate inner panel water deflector is cemented to the tail gate inner panel and deflects water into the bottom of the tail gate where it can drain out the bottom drain holes. The bottom of the water deflector is cemented to the inner panel in a manner that will deflect water towards designated access holes where the water can readily enter into the bottom of the tail gate.

IT IS IMPORTANT THAT WHENEVER ANY WORK IS PERFORMED ON THE TAIL GATE WHERE THE WATER DEFLECTOR HAS BEEN DISTURBED, THE DEFLECTOR MUST BE PROPERLY SEALED TO THE TAIL GATE INNER PANEL.

Partial Detachment

1. Remove tail gate inner cover panel lower molding and inner cover panel.
2. Carefully disengage deflector along top and sides inside cemented edge of deflector. (Fig. 17-200)

   NOTE: DO NOT TEAR WATER DEFLECTOR.

3. Roll deflector back to gain access to tail gate inner panel.

Resealing Procedure

1. To reseal water deflector, first inspect water deflector for any tears or holes and, where necessary, repair any tears or holes with waterproof body tape applied to both sides of deflector.
2. Apply body caulking as shown in Fig. 17-200, properly position water deflector and press firmly to obtain a good bond and seal.
3. Install previously removed cover panel.

WATER DEFLECTOR REPLACEMENT

Removal

1. Remove tail gate inner cover panel lower retainer and inner cover panel.
2. Break cement bond securing edges of water deflector to door inner panel and remove water deflector from tail gate.

Installation

1. Using old water deflector as template, trim new deflector to proper size.
2. Apply a bead of body caulking compound (approximately 3/16" diameter) to tail gate inner panel as indicated in Fig. 17-200.

   IMPORTANT: The body caulking compound should be applied along the lower portion of the tail gate exactly as shown in illustration to assure proper drainage of water through inner panel access holes into bottom of tail gate.

3. Position water deflector to tail gate inner panel with polyethylene coated side of deflector against inner panel. Firmly press or roll sealed areas to obtain a good bond between deflector and tail gate inner panel.
4. Clean off all excess caulking compound; then install previously removed tail gate inner cover panel.

BODY MOUNTS

To minimize vibration and noise, the body mounts must be properly torqued. Body mounts which are not tightened sufficiently will cause body "chucking" and damage to the insulators. If body mounts are tightened excessively, the cushioning effect of the insulators is impaired resulting in squeaks and body "drumming". Body mount bolts and studs must be torqued 35 to 45 ft. lbs.

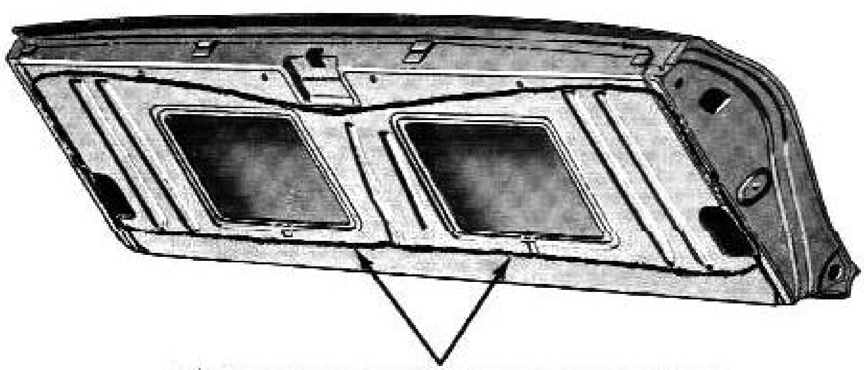


Fig. 17-200 Water Deflector Sealing

1961 PAINT SERVICE NUMBERS
EXTERIOR COLORS

Comb. Code	Color Name	R.M. Stock No.	DuPont Stock No.
A	Ebony Black	A-946	88-L
B	Twilight Mist	A-1398	4153-L
C	Provincial White	A-1199	4024-L
D	Platinum Mist	A-1203	4023-L
F	Azure Mist	A-1396	4143-L
H	Glacier Blue	A-1399	4150-L
J	Tropic Mist	A-1394	4142-L
K	Alpine Green	A-1391	4148-L
L	Garnet Mist	A-1221 R	4034-LH
N	Cordovan Mist	A-1218	4035-L
P	Turquoise Mist	A-1395	4141-L
Q	Aqua	A-1392	4149-L
R	Sandalwood	A-1133	2964-L
S	Autumn Mist	A-1401 R	4154-L
T	Fawn Mist	A-1397	4146-L

INSTRUMENT PANEL AND INTERIOR LACQUER COLORS

Color	DuPont		Rinshed-Mason Stock No.
	Stock No.	Formula No.	
Light Gray		93361	61 O 11
Medium Green		94297-H	61 O 31
Medium Blue		94235	61 O 23
Medium Fawn		94171	61 O 82
Medium Turquoise		94299	61 O 24
Medium Red	4066-H	---	60 C 61 R

GLOSS AND FLAT*

Color	DuPont Stock No.	Rinshed-Mason Stock No.	
Dark Gray	95040	61 O 12	*To derive flat paint from gloss paint add R-M Universal Flattening Concentrate Code No. 850 or DuPont No. 4528 Flattening Concentrate to gloss paint.
Dark Green	94298	61 O 32	
Dark Blue	94294	61 O 25	
Dark Fawn	95039	61 O 83	
Dark Turquoise	94350	61 O 26	
Dark Red	94498	61 O 52	

BODY SEALING AND CEMENT APPLICATION

GENERAL APPLICATION	TYPE MATERIAL	EXAMPLE OR EQUIVALENT
Rubber to Metal Sealer	Weatherstrip Adhesive (Black)	3-M Weatherstrip Adhesive
Rubber to Rubber Sealer	Weatherstrip Adhesive (Black)	3-M Weatherstrip Adhesive
Rubber to Metal Cement	Weatherstrip Adhesive (Neoprene Type)	3-M Weatherstrip Adhesive (Neoprene Type)
Plastic to Metal Cement	Weatherstrip Adhesive (Neoprene Type)	3-M Weatherstrip Adhesive (Neoprene Type)
Fabric to Metal Cement	Trim Adhesive	3-M Trim Adhesive
Carpet to Metal Cement	Trim Adhesive	3-M Trim Adhesive
Sealing Tapes	Waterproof Body Type	Black Tirro Automotive Tape Arno Black Waterproof Tape

SPECIFIC APPLICATION	TYPE MATERIAL	EXAMPLE OR EQUIVALENT
Windshield and Rear Window Glass to Rubber Channels	Weatherstrip Adhesive (Black)	3-M Weatherstrip Adhesive
Windshield and Rear Window Glass Channels to Body Sheet Metal	Medium Bodied Sealer	3-M Auto Body Sealer 3-M Body Caulking
Exterior Moldings to Body Metal	Body Caulking Compound (Neutral)	3-M Body Caulking (Black)
Exterior Moldings to Rubber	Body Caulking Compound (Black)	3-M Body Caulking
Screws or Bolts, etc. From Exterior Into the Interior of Body, etc.	Body Caulking Compound (Neutral)	3-M Body Caulking
Screws or Bolts, etc. From Interior to the Exterior of Body, etc.	Body Caulking Compound (Neutral)	3-M Body Caulking
Exterior Metal to Metal Sealer (Pinchwelds, Joints, etc.)	Body Caulking Compound (Neutral)	3-M Body Caulking
Interior Metal to Metal Sealer (Pinchwelds, Joints, etc.)	Body Caulking Compound Medium Bodied Sealer	3-M Auto Body Sealer
Large Opening Sealer or Compound	Waterproof Tape Cemented with Weatherstrip Adhesive (Neoprene)	Weatherstrip Adhesive (Neoprene)
	Body Caulking Compound Waterproof Body Tape	Black Tirro Automotive Tape Arno Black Waterproof Tape
Convertible Top Sealer	(Part No. 1098737)	(Nitrile Type)

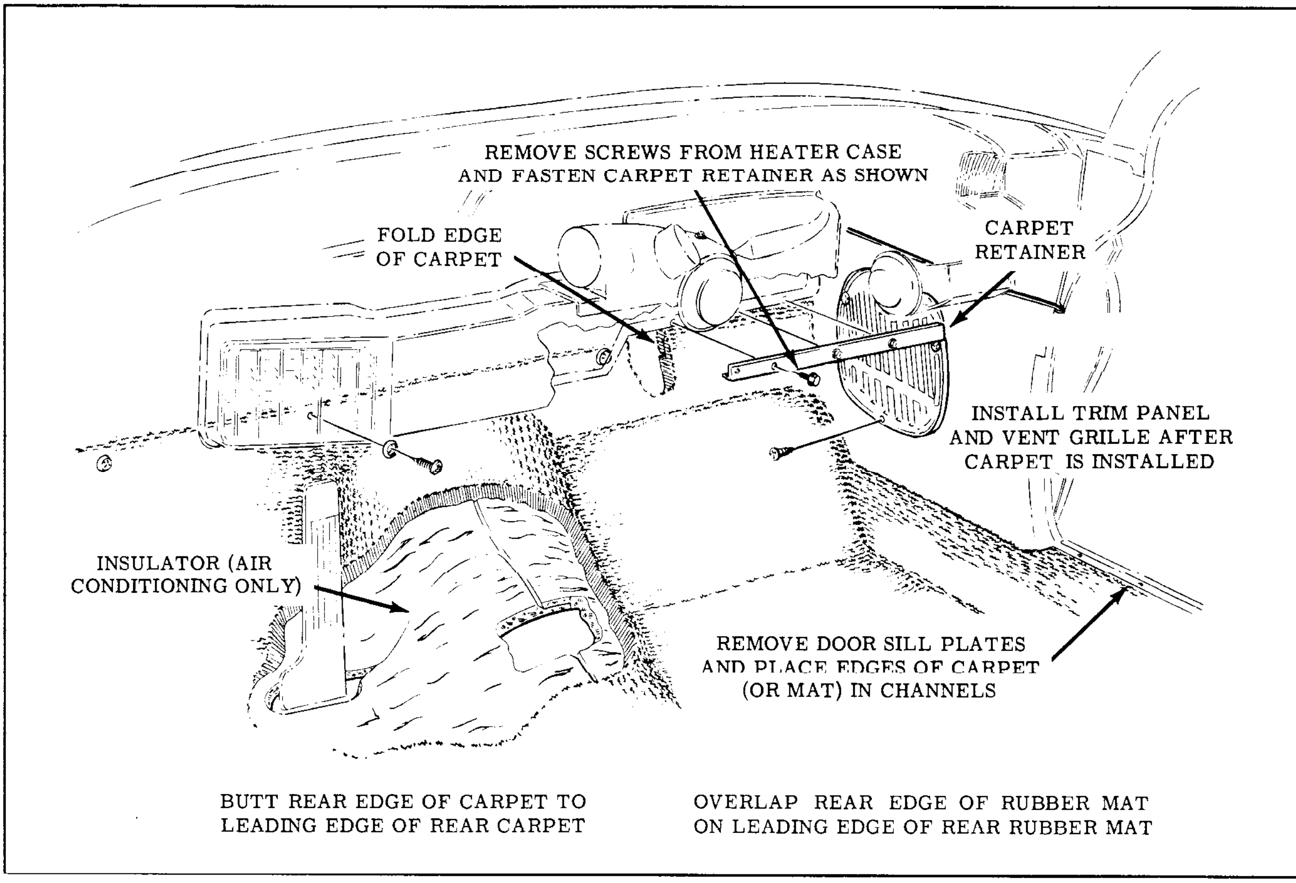


Fig. 17-201 Front Floor Mat Installation

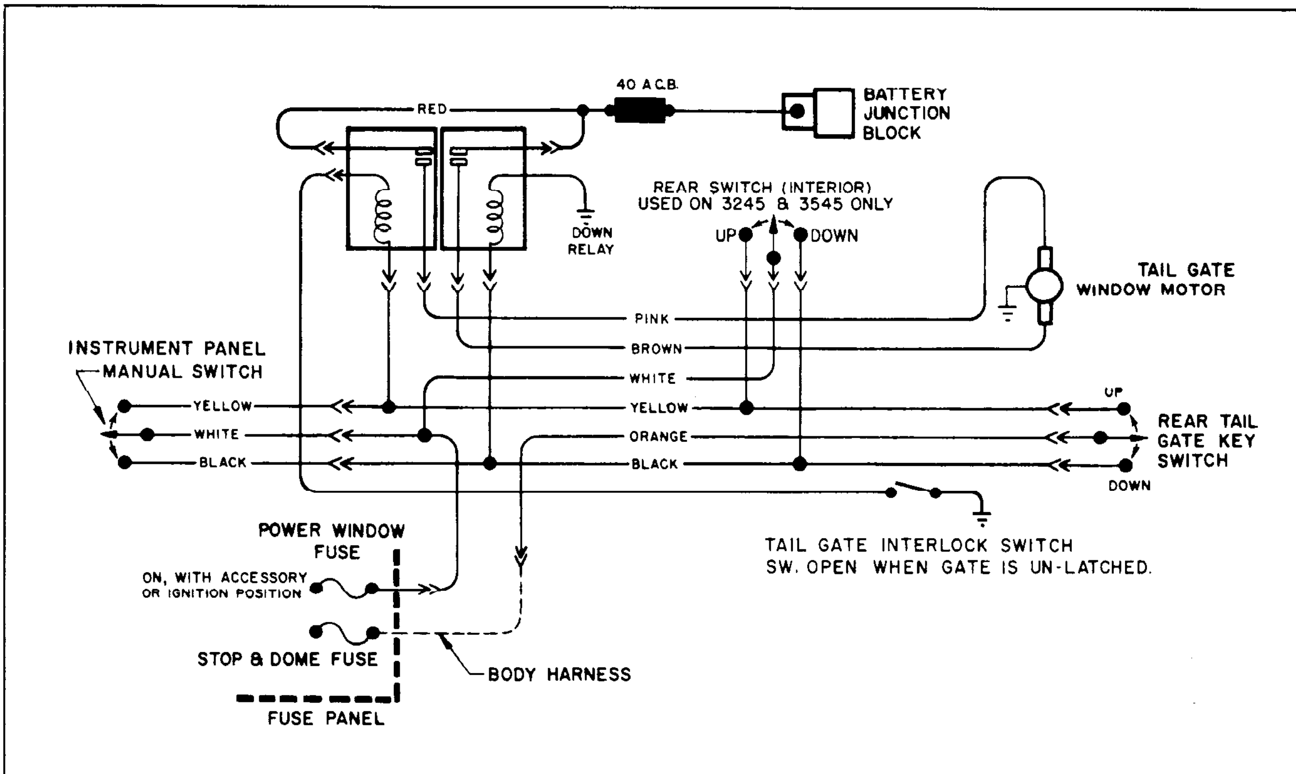


Fig. 17-202 Tail Gate Wiring Diagram

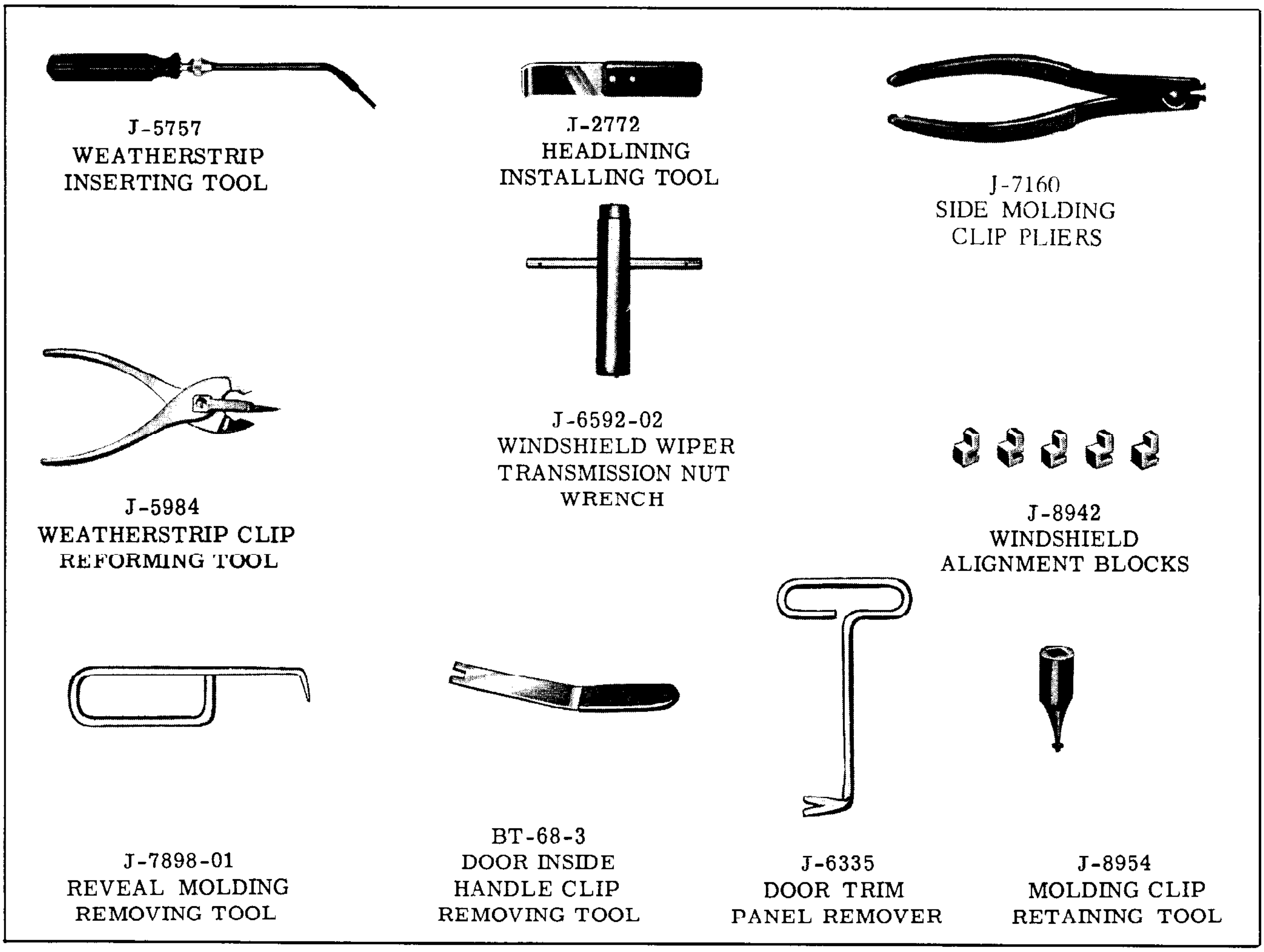


Fig. 17-203 Trim and Hardware Tools