CAR CRAFT

The SHOW-HOW Magazine

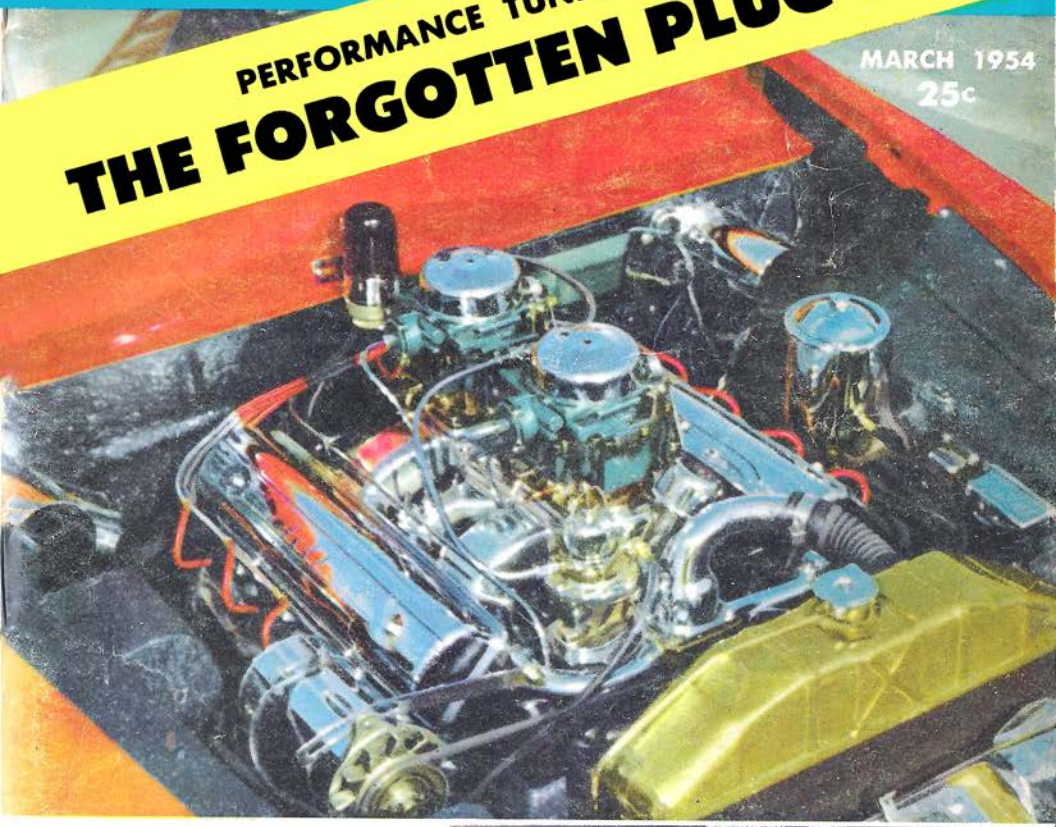
CUSTOM CARS • HOT RODS

PERFORMANCE TUNING:

THE FORGOTTEN PLUG

Page 38

MARCH 1954
25c



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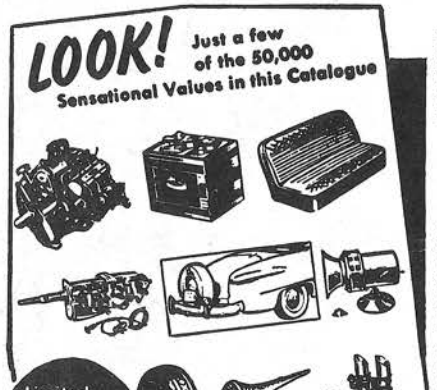
NOW! YOU SAVE UP TO 50% on AUTO PARTS, ACCESSORIES

EVERYTHING you need for your car—50,000 items including thousands of HARD-TO-GET PARTS *plus* many unusual accessories offered for the FIRST TIME—all at wholesale prices!



Take advantage of this big opportunity to get *everything* you need for your car—even many hard-to-find parts and accessories you can't buy in stores! You can get them at wholesale prices—save up to 50%. You'll find these 50,000 thrilling bargains described and illustrated in a giant new wholesale catalogue, jam-packed with exciting values.

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New, used, rebuilt parts and accessories for all makes, years, models of all autos, trucks and taxis.

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Just off the Press

124 illustrated pages, jammed with 50,000 automotive items at wholesale prices. For limited time only it can be yours for just 25c—which will be credited on your first $5.00 order. It's like getting this valuable bargain packed catalogue FREE! Send today for YOURS.

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Please rush me your giant catalogue that describes 50,000 automotive items I can get at wholesale prices. I enclose 25c to cover part of cost—which I understand will be credited to me on my first $5.00 order. Also send me FREE GIFT.

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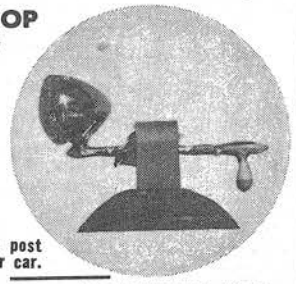
Discount special of the month

FAMOUS DUAL TEARDROP SPOTLIGHT

$15.95 each

DUAL KIT . . . 29.95

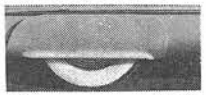
Seal beam teardrop, heavy chrome! Door or post mount. State make, year & body style of your car.



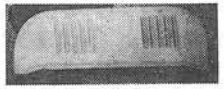
FLARE SKIRTS

$8.45 pr.

Ford	36-54
Consul-Zephyr	All
Merc	39-54
Chev	36-54
Olds (exc. 98)	35-54
Pont	35-54
Buick	35-41, 50-53
Willys	52-54
Stude	35-52
Ply	35-54
Dodge	35-52
DeSoto	35-54
Chry	35-54



Italian Louvered Flare Skirts $14.95



Skirts are all steel with concealed rubber liner. The easily installed skirts are primed for paint.

"Ding Dong" BERMUDA BELL

An unusual accessory—chrome finish, pleasant two tone signal. Easily installed under car floor by driver's seat. Fits all model cars. (Regular 5.95)..... **3.75**

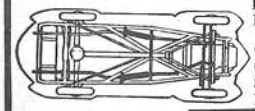
CUSTOM GRILLE BAR

$15.95

49-52 Ford
49-50 Merc
53 Ford.....$6.45

Specify make & year. Triple chrome heavy steel.

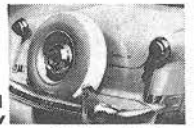
V-8 Dual Exhaust Sets



Ford 35-53
Merc 39-53 **$21.95**

Olds 49-53
Cad 50-51, Dodge 53, Stude 51-53, Linc 49-51, Ford Pick-Up 39-53 **26.95**

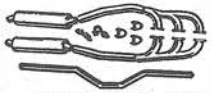
GENUINE CONTINENTAL KIT



$43.45
49-54 Ford
49-54 Chev

Kit includes sturdy tire mount, lock mechanism, tire cover, bumper extension, stone deflector, chrome hub cap and misc. hardware. Kits available for all cars.

Exhaust HEADER SETS



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FORD, MERC, CHEV. (Except Conv. & Power Gl.) 37-54 **$35.95**

AVAILABLE FOR MOST ALL CARS!

Sets include headers, header extension, mufflers, tail pipe, clamps and brackets.

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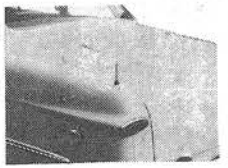
3 section beautifully chromed hide-away aerial and long aerial lead wire for custom REAR mounting.

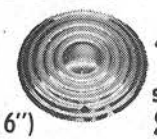
AERIAL with 108" Wire.....$7.45
AERIAL with 180" Wire..... 8.95
DUAL KIT (2 Aerials) 180" Wire.....$12.50



WHEEL DISCS

$14.95

Set of 4 (15" or 16")



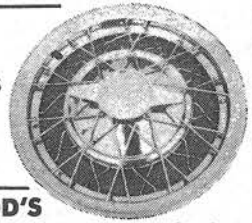
Triple chrome, heavy gauge metal. DURABLE, finished to a high lustre.

Wire WHEEL DISC

SET OF 4 WITH LOCKS

$45.95 15 in.

(Regular price, $99.50)



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CAR CRAFT

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CONTENTS

DEPARTMENTS

FEATURES

COVER

Norman Rector's '49 Fordillac is a car that was built both for show and for go. The beautiful sectioned Tudor is capable of running the pants off of most custom iron. For details see pages 18-23. Ektachrome by Rick.

BRIEF AND TO THE POINT:

270 Words from the Editor

WITH this issue we bring you the real meat on the Fordomatic conversion, how to modify what Chuck Eddy calls the "crazy mixed-up pump" and all that goes with it. We cannot point out too strongly that these modifications should be made *only* by a qualified Fordomatic service man. The cost of the man's services is far less than the cost of replacing the transmission or some of the parts which could very easily get botched.

Those of you who are Honker fans will miss him this month. Seems the lad just plain got combat fatigue from fighting with a pushbutton door on a car with a dead battery. Dick Day got a glimpse of him as he wandered off, ostensibly on a vacation. The poignant scene that Dick caught can be seen at the bottom of this page.

One of the very best articles on tuning that we've ever seen is Racer Brown's story on spark plugs which starts on page 38. This is *must* reading for anyone desiring any kind of performance out of any kind of a car, souped, sport, racing or stock. This is one bit that should be read and reread by anyone with any pretensions of being a tuneup man or by anyone desirous of saving a buck.

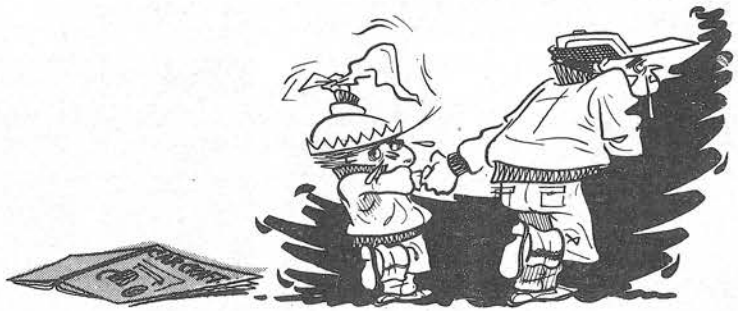
If you really want to know how to knock poundage off a car check out on pages 32 to 37. This is the story of how Ernie McAfee, a very sharp lad indeed, took 400 pounds out of a car that was considered to be something near the ultimate in lightness *before* he started.

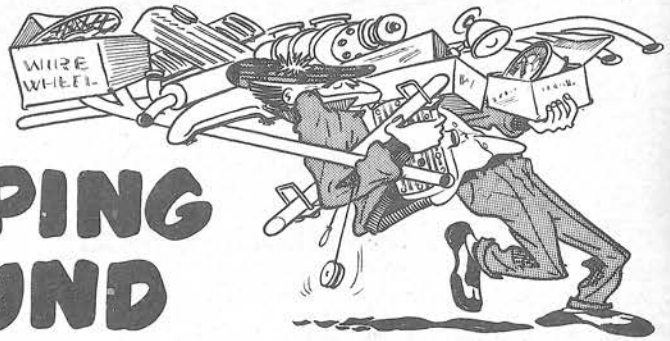
THINGS TO COME

WE'LL depart from our usual course of promises to make a few predictions. We're rather fond of shoving our somewhat red neck out anyway.

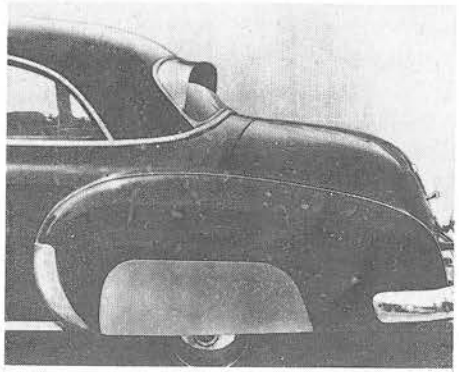
First up is the new Ford engine family. These are mills with a great potentiality, but somehow we regret the passing of the V8 flat-top. The old engine was a piece of equipment on which you could operate with the skill of a shovel wielder and still come up with more horses. The new one, we predict, will be a whole lot tougher to operate on. You won't be able to just sit down and start whacking away at it. For one thing, the crankshaft is made of nodular iron so it can't be metal sprayed for more stroke. Even if it could, the only engine you can stroke in the whole new V8 family is the Merc. The can case in the Ford won't allow enough of an increase to permit it. A whole new set of theories based on short stroke will have to be made.

Another prediction: Those desiring a longer ride than is provided ordinarily can look to the somewhat neglected sport of road racing this season. For those who prefer to run against the clock there are hill climbs. By hill climbs we don't mean straight slant shooting but a timed ride up a twisting uphill course. One thing is sure, in a test of this nature you really find out where your suspension system is lacking.





SHOPPING AROUND



SUNSHADE

WINDSHIELD sun visors have proved their worth in sunny areas, particularly on cars with a great deal of rake in the windshield. With the widespread use of large-area rear windows in modern cars the same protection is called for to protect the rear seat from sun-ray damage. At this particular time of year it could be remembered that snow and freezing rain can also collect and block the window completely. The need has been filled by a California company with a new visor to fit most modern cars. Fabricated of highly polished stainless steel, the visors have the appearance of chrome and are easier to keep up. Or, if it is desired, they can be sanded, primed and painted. Price is $4.95 at automotive parts dealers or from Hilton Mfg. Co., Dept. C, 210A West 7th St., Los Angeles, Calif.

GRINDER

The new Mall Aerial Grinder, available in three grinder sizes, is a new workhorse for industrial workbench or production in the welding shop, foundry, or auto body shop. The aluminum alloy housing cuts non-operative weight to a minimum. Ball bearings are used throughout the tool. Commutator and switch are fully enclosed to keep out dust and shop grit. The 6 x 1 inch wheel has a ⅝" hole, spindle speed of 3730 rpm free; the 5 x 1 inch wheel has ½" hole, spindle speed of 4430 rpm; the 4 x 1 inch wheel has ½" hole, spindle speed of 5560 rpm. The Mall Aerial Grinder weighs 12 pounds. Dimensions are: length, 22"; width, 4.75"; height, 4.5". The large size model is for heavy duty jobs. The two other sizes are available for work in smaller spaces and for occasions where a higher grinding speed is desirable. Mall Tool Company, 7725 S. Chicago Ave., Chicago 19, Ill.

LETTERS

OMATIC

Dear Sir:

I recently purchased a '49 Merc convert with a standard transmission. I have decided to replace this trans. with Merc-O-Matic.

Could you give me some idea what changes I would have to make and also your opinion of this move?

Sincerely,
Bruce A. Ormond
Norfolk, Va.

See page 14—Ed.

RACE CARS

Dear Sir:

I enjoy your magazine a great deal; especially the various articles about racing.

The only gripe that I feel I have coming is that this sport is not getting the coverage that it deserves.

How about a little more on stock cars and midgets?

Sincerely,
Bud Francis
Oklahoma City, Okla.

The boys have been taking a well-deserved rest and as soon as they get going again we'll have more on the dirt track barreling. —Ed.

JUNKER?

Dear Sirs:

Have read your magazine for quite some time now, and find it both informative and interesting.

After reading about fellows making cars of this, that and the other, I thought I would tell you about my "junk yard special." Just so you'd know what a good junker is: Body '33 Chev coupe; engine '48 Cad; drive shaft ½ Cad, ½ Pontiac; rear end Pontiac; front end ½ Pontiac, ½ Chev.; column shift '48 Merc; throttle linkage Harley-Davidson; hubs Pontiac; hydraulic suspended brake system '50 Ford; instrument panel ½ Cad, ½ Chev.; shock absorbers Stude; carburetor make unknown, horn exhaust whistle from a fire engine.

The funny part about it, the damn thing runs! Averages 18 to 20 miles per gallon of gas!

If this isn't a junker please send definition of one.

Sincerely,
Thomas B. Forbes
West Cape May, N.J.

If that's the way you want it, Tom, it's OK with us.—Ed.

AND AGAIN

Dear Sir:

Like you say, everyone to his own taste, but what I have to say about reader Van Korben's opinion is unprintable. I would rather see a clean custom or a sleek sports job any day than a stock model of any kind.

I think you have a fine magazine. I have every copy since you started publication. Keep them coming!

Sincerely,
Charles A. Leftwich
Fort Scott, Kansas

GM STYLING

Dear Sirs:

I have just been reading your January issue of Car Craft and just thought I would inform you that in your story on the cover car you made a slight error.

In the story it says that, "the taillights on the custom Merc are '52 Buick taillights," but if you'll take another look I'm sure you'll agree that they are '49 Buick taillights.

I think your magazine has a lot of interesting articles, especially "Torch Tips."

At the place where I work, a few of the guys took a vote on the name of your magazine, and it was a unanimous vote that we preferred the name HONK to that of CAR CRAFT.

With torch in hand,
Don Nengas
Salt Lake City, Utah

Dick Day has been sentenced to 30 days in the wilds of Detroit to count wirewheel hub caps and ponder on the vagaries of GM styling.—Ed.

HYBRID HYDROS

Dear Sir:

Your magazine sure did help me out when I built my '35 Ford up from nothing.

Your magazine is tops with me and all the boys aboard.

But, I ran into a little trouble with another car I bought.—I have a '48 Pontiac convert Hydramatic, and I have a '50 Pontiac engine and a '50 Olds 88 engine.

I would appreciate any information I could get on the installation of both of these engines in my '48 Pontiac.

Thank you very much, keep your CAR CRAFT coming.

Sincerely,
Ray L. Foster
U.S.S. Latimer

You would probably be better off if you traded your '48 Hydramatic unit in on a late model dual range unit built to fit the Olds engine. As far as we can determine, the castings for the Olds 88 and the Pontiac are not interchangeable.—Ed.

JAGUAR TRANSMISSION

Dear Sir:

I enjoy your magazine very much. I would like to see more stories on '39 or '40 Fords if you can get them.

I have a '39 Ford and I would like to ask you if it would be possible for me to put a Jaguar transmission in it, and approximately how much would this cost?

There are a few guys who are trying to get a club started here so we can race our cars. Any information would help us.

Thanks,
Donald Wade
Rockdale, Texas

The National Hot Rod Association, 5959 Hollywood Blvd., Hollywood 28, California, should be able to help you start a club. The Jaguar transmission is a good one, but it is extremely heavy. Adaptation problems are few—merely making a motor plate to align the bell housing of the Ford to that of the gearbox. The rear mount of the Jag box would also have to be adapted to the X frame of your Ford. However, unless you plan a competition car, this gearbox is not practical for your particular installation unless the rear end gear ratio is raised to 3.54 to 1. The whole procedure seems rather expensive for the results you would get.

SWING FOR SPORT

Dear Sirs:

Congratulations on your very complete article about Joe Goss' unique Drag wagon. It's a pleasure to read about something other than engines.

One or two questions: Would it be possible to make up such a rear end having a true differential action? If so, how to go about it? I am interested in individual rear suspension for a contemplated sports car, but would like to have a differential.

Also, Goss uses forward mounted spindle arms and tie rod. Was this necessary or merely for lowering purposes?

Thanks for any help you can give me,

Dick Kelley
Pasadena, California

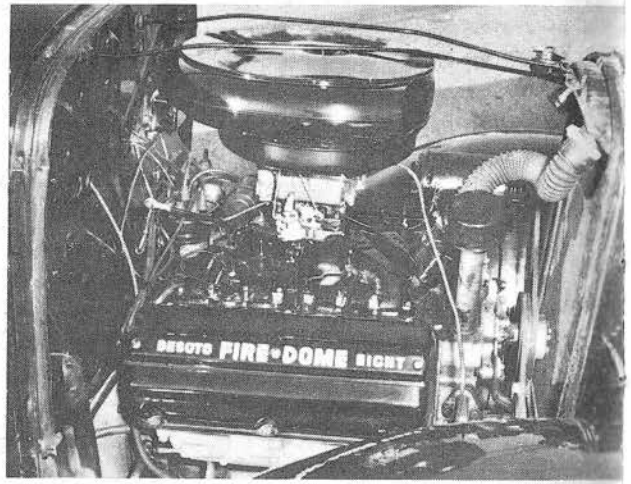
Since Joe used the regular differential cage in the center section, it would appear that a regular differential could be employed, using standard spiders. The method would be to use the Ford axles cut and splined to form stub axles in place of the spool and single solid stub which Joe employed. Although Joe used ball bearings, there is no real reason why the standard Timken roller bearings will not suffice. The forward mounted spindle arms are merely Joe's version of a method of lowering. The device is recommended only for straightaway competition cars.—Ed.

(*Continued on page 66*)

DE SOTO DEUCE

it's Mom's car now!

Photos by Tom Medley



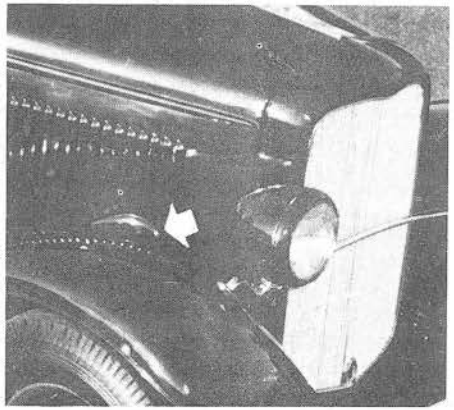
HARRISON Haggard for some time, now, has been a definite fixture at just about any kind of racing event you can name in the California scene. Right now, he's counting cadences for Uncle Sam instead of counting rpms for C-T Automotive, for whom he was a general helper and top-notch pit crewman until his neighbors put the arm on him for two years of his time.

As long as we've known him, we didn't know what Harrison was using to drive around when not at races. Then, one day he dropped by with a feline look in his eye and seemingly chewing on a mouthful of canary feathers. Outside was one of the most sanitary looking Deuce roadsters we had seen. The little bear was almost stock in appearance, the only give-away being a pair of hefty 7.20-15 tires on the rear.

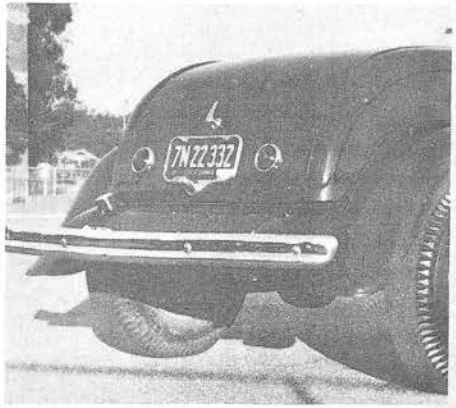
Harrison admitted to owning the car for a considerable space of time. He also owned up to the fact that it wasn't just the car that he wanted us to see but rather what was under the hood. We lifted the hood and thereunder lay a spanking new DeSoto Fire-Dome V8.

The most surprising thing about it was the neat way it nestled inside the close quarters of the '32 engine compartment. Harrison was most definite about the fact that he had to cut nothing at all to get the chunky mill into the space. The only special parts needed were a Junkin adaptor plate and a set of fabricated motor mounts bolted to the '32 rails. Everything went into place as if it had been designed to fit. The only chopping necessary was the need to make a small bubble in each hood side to accommodate the wide DeSoto heads.

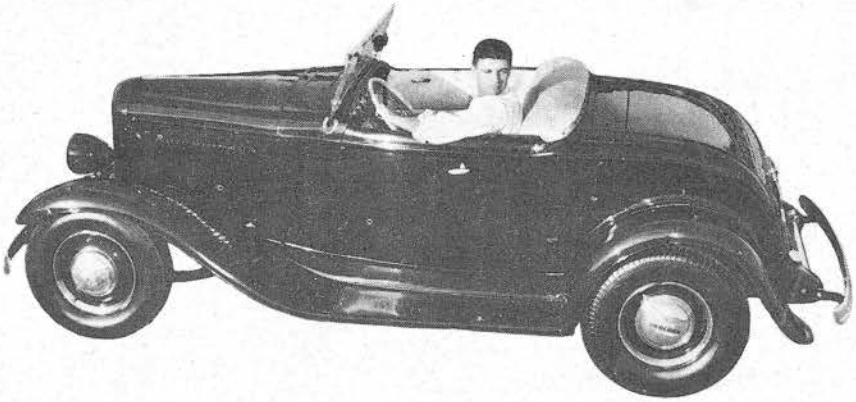
In driving, the car felt as if it had a big-bore Merc except that it was much smoother and lacked the blast effect of the full house. For a general purpose street machine it was ideal. So ideal, in fact, that when we asked who was going to take care of the car we were told: "Oh, Mom will keep it, she loves the thing—uses it for shopping!" Drag it out, Mom!



• *Width of engine caused only need for body changes; blisters (arrow) met need.*

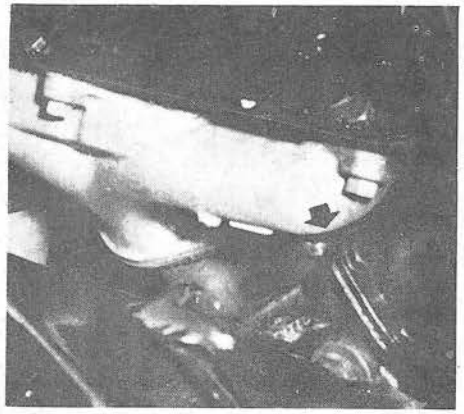


• *Rear deck is completely stock except for Pontiac taillights and late bumper.*



• *Only clue to power in Haggard's roadster is seen in large 7.00-16 rear tires.*

• *Engine is stock except for four-throat carburetor mounted on Weiand adapter.*



• *Left exhaust manifold just clears the steering gear oil filler plug (arrow).*

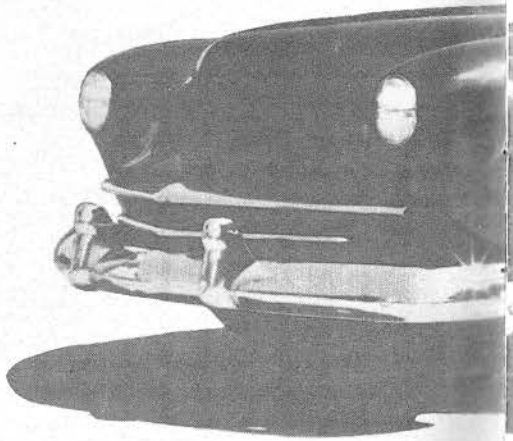
• *Front motor mount was the only item that had to be fabricated by Haggard.*

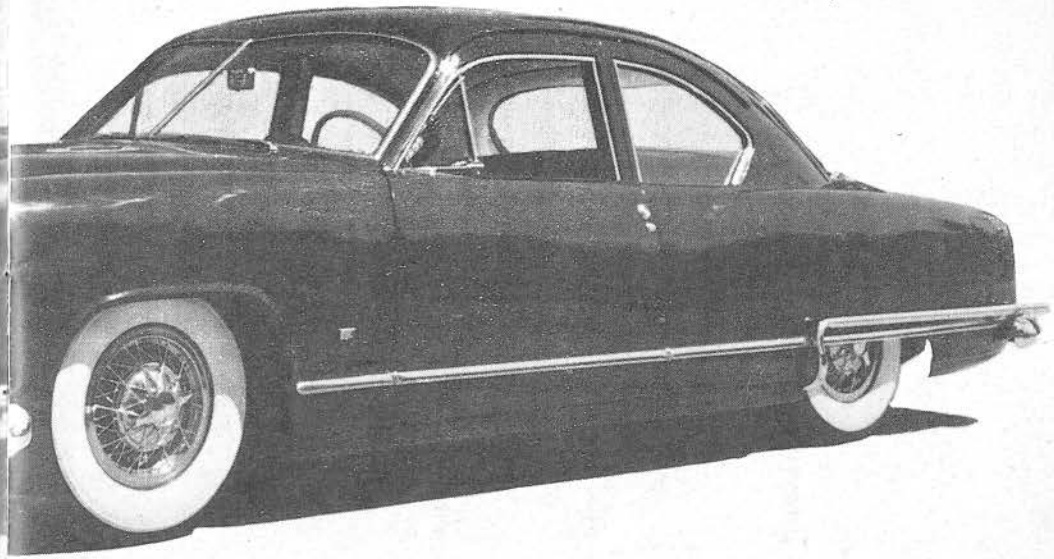
KAISER . . . A NEW BREED FOR THE BODY SHOP TORCH

WHY the Kaiser automobile hasn't found more prominence in the customizing field could be termed a sixty-four dollar question. It's definitely not because of body styling, because straight from the show room floor, the Kaiser possesses lines that surpass many restyled custom cars on the road today.

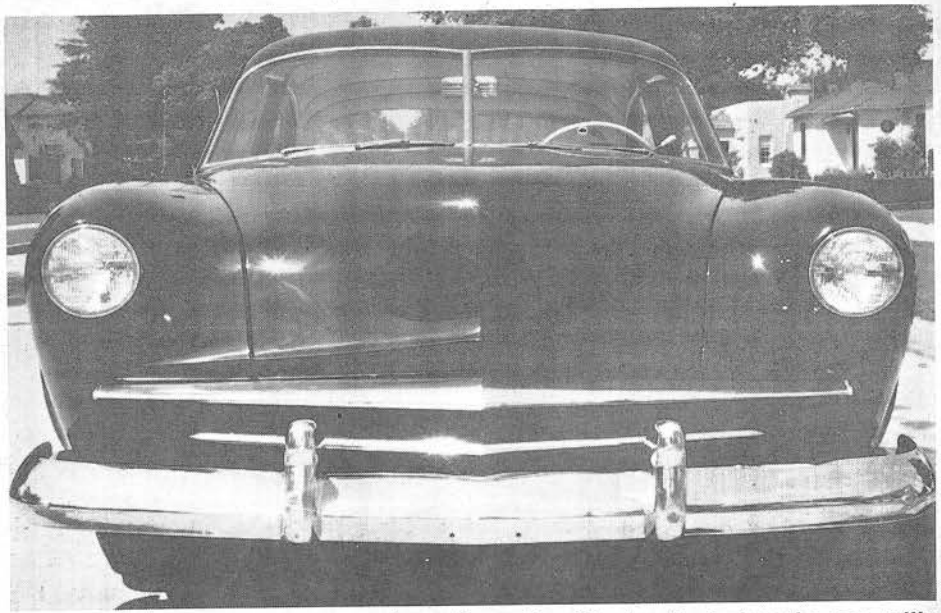
When Dave Chavis, of South Gate, California, tired of customizing Fords, Chevys, etc., he purchased this '51 Kaiser for a different approach to his favorite hobby. He kept his innovations on a conservative basis, not disturbing the original lines, but merely removing and adding components that sharpened the car's exterior and interior features.

When the Kaiser was completed Dave found that by doing several of the minor revisions in his own backyard, although taking a few months of his spare time, had saved his bank book considerably and netted two results. One, a fine appearing custom for a minimum amount of money and, two, a custom of which there are only about four on the entire West Coast.



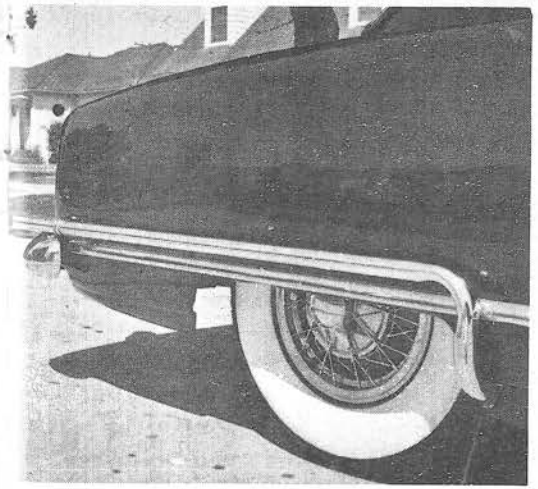


• *Dave did such jobs as nosing and decking and minor grille work in his own backyard, but turned the car over to George Cerny's Body Shop in Compton, Calif., for the frenching of headlights, removal of parking lights and a black paint job. A radical lowering job of five inches, both front and rear, nestles Kaiser close to ground.*

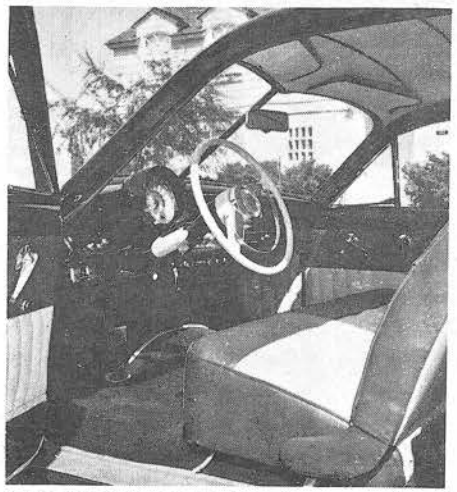


• *The front end appearance was changed considerably by shortening the top grille bar to its present position, which originally wrapped around the front fenders. Door handles were removed and replaced with push-button latches from a '47 Lincoln.*

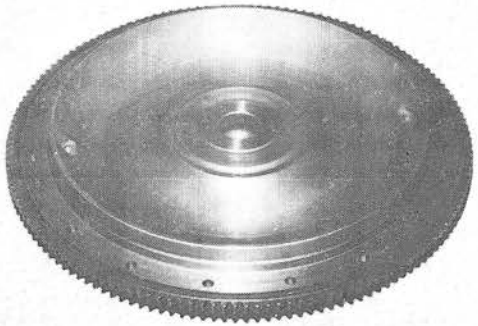
Photos by Felix Zelenka

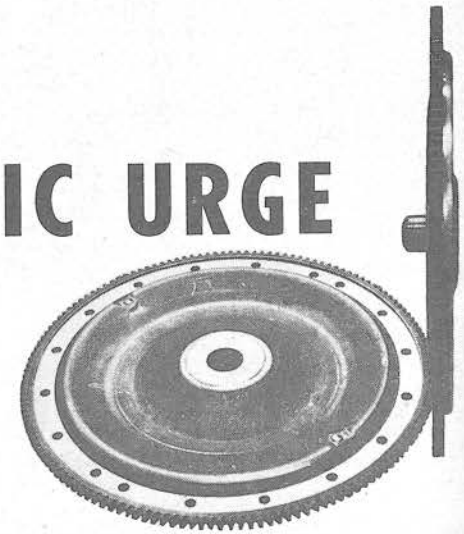


• *Special exhaust system with tips escaping from lower body panels and contouring rear fenders was built by Advance.*



• *Color tones of the interior are red and black. The stock upholstery on top of dash has been removed and dash repainted.*





• *Early style cast steel converter cover (left) should be replaced with late model, V8 pressed steel unit (below) for best acceleration potential and weight saving.*

AUTOMATIC URGE

MODIFYING YOUR FORDOMATIC

In the first once-over we attempted to convey some whys and wherefores of Fordomatic and Mercomatic designs. Now we'll get our hands oily and tell how desirable transmission modifications may be accomplished. Without giving dire warnings, we must advise the reader in search of performance that internal changes are a job for a certified Fordomatic or Mercomatic specialist. Though most specialists may know little of these suggested changes, they should be able to accomplish them satisfactorily with the aid of this guide to "automatic urge."

You will probably be charged somewhere in the neighborhood of $40 for the full treatment, with a descending scale, if your desires are modest. As few independent garages are equipped or trained to cope with these automatics, you had better have a heart-to-heart talk with the Service Manager of the Ford or Mercury dealership where you normally trade. Ask to see his Automatic Service Bench and Special Tools; and if you are not favorably impressed, go elsewhere. Also, ask to see the mechanic's certificate, either Fordomatic or Mercomatic. As one major requirement for satisfactory automatic work is the ability to maintain scrupulous cleanliness, see what provisions have been made to fulfill this requirement while working on your "mass of precision parts."

Now let's get to work! First, we'll talk about Mechanical and Hydraulic modifications to the Converter, Transmission and to the Control System, and finally, desirable instruments to use with your automatic. Generally speaking, any mechanical changes will require a complete disassembly of both converter and gearbox. However, if you're going this far, hydraulic changes can be incorporated at the same time.

CONVERTER MODIFICATIONS

First unit to receive our attention will be the converter. There have been converter changes incorporated in Ford production since July, 1952, which eliminate any leakage problem at the front cover and converter parting line. The late converters in either 6 cylinder or 8 cylinder versions are easily recognized because they have 18 cover bolts instead of 34, which the earlier series carried. Fewer bolts do the same job by using an "O" ring-cover seal in place of the thin gasket previously employed. Chief virtue of the late type is its ability to seal more tightly at high RPM.

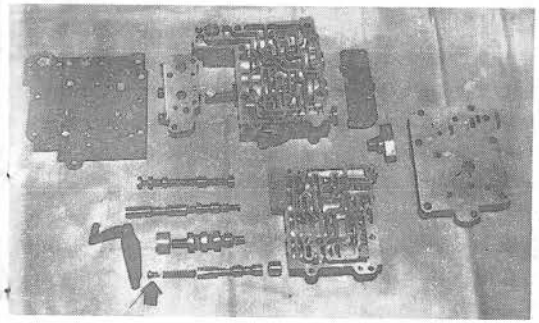
The "O" ring is forced outward into the sealing chamber by the centrifugal force of the oil. As this force approaches 800 pounds per square inch at 4000 RPM, the reader may understand the desirability of operating an automatic below 5000 RPM. By all means, Nuvolari, "red line" your tach at 6000 RPM!

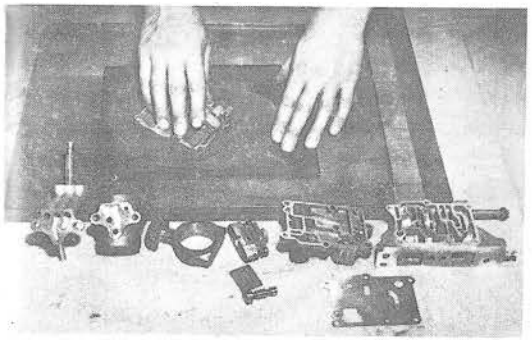
Properly installed flat gaskets should not lose oil under these extreme RPM conditions, but they are more difficult to render completely leak-proof. It might be well not to attempt performance increases of 50% and above with anything but the later automatics having serial numbers starting with 5 and above. This is mentioned because the later units incorporate other desirable features, which will contribute to the success of the modifications.

Six-cylinder converters are equipped with *cast* front covers, contrasted with lighter *pressed* covers on the 8-cylinder model. As the whole converter serves as a flywheel, it is possible that the 25 pound "monster" cover was intended to satisfy the theoretical requirements of the six-cylinder engine's idling characteristics. However, your writer has found that the 12½ pound pressed cover of the eight cylinder will improve initial acceleration in the six-cylinder installation without impairing normal idle smoothness. Chief precaution to be taken at this point is to install six 3/16" flat washers *between* the flex plate and front cover together with six, long, bronze-washed cover-bolts. The washers will compensate for the reduced thickness of the *pressed* cover. The remaining twelve cover bolts from the original assembly (bronze-washed) should be replaced by twelve, shorter, oxide-coated eight cylinder bolts.

After converter assembly, check internal end clearance by flattening on one end a soft copper wire 6 inches long and bending it into a half-inch right angle hook. This "feeler" is inserted through the converter hub and between the last stator thrust washer and the hub thrust face with the complete converter assembly resting front cover down. By successively flattening and "miking" our impromptu feeler, we can determine whether the end clearance of the internal parts approaches the desirable .010-.020 inch figure. Don't fret if yours isn't this snug, as long as it isn't over .050 of an

(*Continued on next page*)





• *Arrow points to "speed secret," 8-32 -8 screw placed in outer end of modulator spring to produce added tension. Breakdown shows valve-body assembly.*

• *All mating surfaces should be lapped with #320 wet-or-dry paper to prevent leakage. Left to right are oil distributor, distributor sleeve, governor counterweight, governor body and valve, regulator cover, separator plate and body.*

by Chuck Eddy

Photos by Eric Rickman

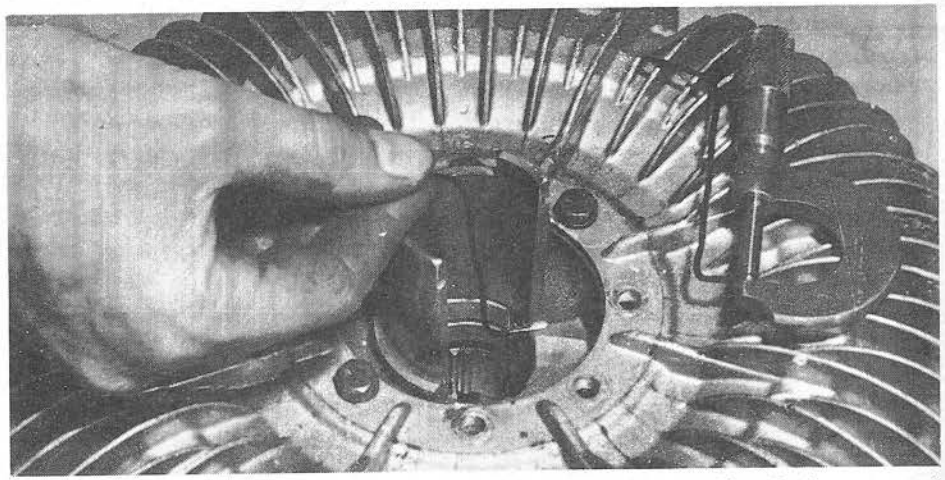
inch. If over .050, you had better try a new cover, yours is distorted! Before you button-up the converter cover bolts, you might put two pieces of putty or chromate paste between the turbine and impeller blades, 180 degrees apart, just to check whether these parts *could* touch. Your putty should squeeze to about .050 of an inch. Too much more would indicate excessive clearance, which might impair torque characteristics of the converter. Both of these clearances just mentioned can be reduced to the desirable minimum by increasing the thickness of the turbine thrust washer (Part No. 7962) which rests against the front cover, but in no case should its *total* thickness exceed .085 of an inch. Thickness may be increased by "sweating on" the necessary thickness of brass shim stock, cut to same diameter doughnut as the thrust washer. Inspection of the stator one-way clutch assembly for wear on the "sprags" and stator bearings should be carefully done, as reaction on stator parts is increased if we put some more fire under the hood.

INSIDE THE TRANSMISSION

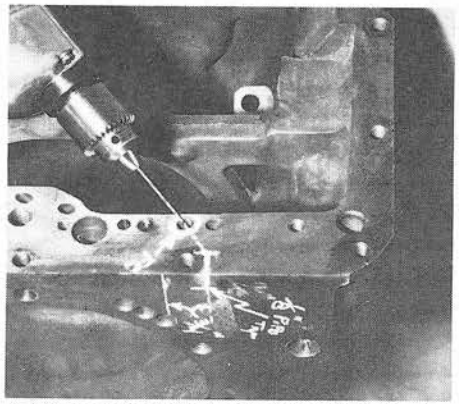
Aft of the converter, our concern will be with clearances and smoothness of all bearing surfaces, and pressure-tight mating surfaces. Specified end clearance of the transmission is .010-.029 of an inch; controlled by a selective thrust washer, #77067, available in four graduated thicknesses, suffixes A, B, C, D. As torque reaction within the transmission produces end thrust against eight different thrust washers, it is most desirable to reduce "slack" by building the clearance as close to the low limit of .010 as possible. This low limit will in no sense increase internal friction as this is entirely dependent upon thrust loadings.

To a mechanic familiar with engine clearances, Fordomatic journal clearances may seem sloppy, about .002 per inch of journal diameter. But remember that thrust inside the gearbox is steady and not reciprocating, as, for instance, in a connecting rod bearing. In the light of this fact, journal smoothness is more important to bearing life than mere diameter. #320 wet or dry abrasive paper, torn in ¾-inch wide strips, may be used to smooth journals, using a "shoe-shine" action. Final polish should be done with *crocus* cloth, obtainable at most paint and hardware stores. This polishing should be necessary only on transmissions with number prefixes 1, 2, 3, or 4, as later model parts are production micro-finished.

Along the primary sun gear shaft lie six small iron seal rings and behind on the output shaft, lie four larger rings. In each case, these rings are held by the bores in which they seal and the two shafts revolve within



• *Internal end clearance of converter assembly is checked by making feeler gauge of soft wire, miked to .010-.020", and slipping it between hub face and stator washer.*



• *For gauge outlet, drill for ⅛ inch pipe tap 7/16" below case edge and ¾" from edge of marked pressure hole. 1/16" connecting hole is drilled as shown.*

• *Front band servo is checked by air pressure at apply hole. Piston should snap smartly into engage position. Upon release, it should return sharply.*

them. Consequently, the bores should be first carefully checked for smoothness, then new rings should be trial fitted within them, exactly as piston rings are fitted to cylinder bores. Clearance at the ring gaps should be about .001-.002 of an inch and should not exceed .005. Care at this point will assure minimum leakage for clutch applications and improve timing of shafts. If any of the three bores in which these rings seal are scratched, they may be smoothed with a piston pin hone or master cylinder hone. Shaft grooves should have smooth *sides* so that rings do not bind when installed and held compressed with fingers. As the moving seal actually occurs between the side of the ring and side of the groove, these surfaces are important.

Next points of attack are the front and rear servos. As the front servo applies each time a shift to intermediate occurs, it is busy indeed. Servo seal "O" rings are subject to more rapid wear and somewhat jerky action if the surfaces against which they move are not flawless. The desired finish may be rapidly produced with a small piece of #320 wet or dry abrasive paper held in the servo bore, while revolving the part with the outer hand. Actual clearances between servo pistons and cylinder walls are not too important as long as no binding or scraping occurs.

As the front servo piston is guided by its stem, a trial assembly of the three major parts, without "O" rings, will indicate if any eccentric condition exists to produce interference. If rubbing between these parts occurs, substitute new parts, *one at a time*, to determine which is at fault.

The rear servo is not critical as long as the piston can be inserted freely into its cylinder with a slight "cock" angle. As this piston must follow the arc of the rocker lever, its edge is rounded to prevent any "cocking" over its full range of movement. This radiused edge should be dressed free of any galling and the servo cylinder should likewise be polished.

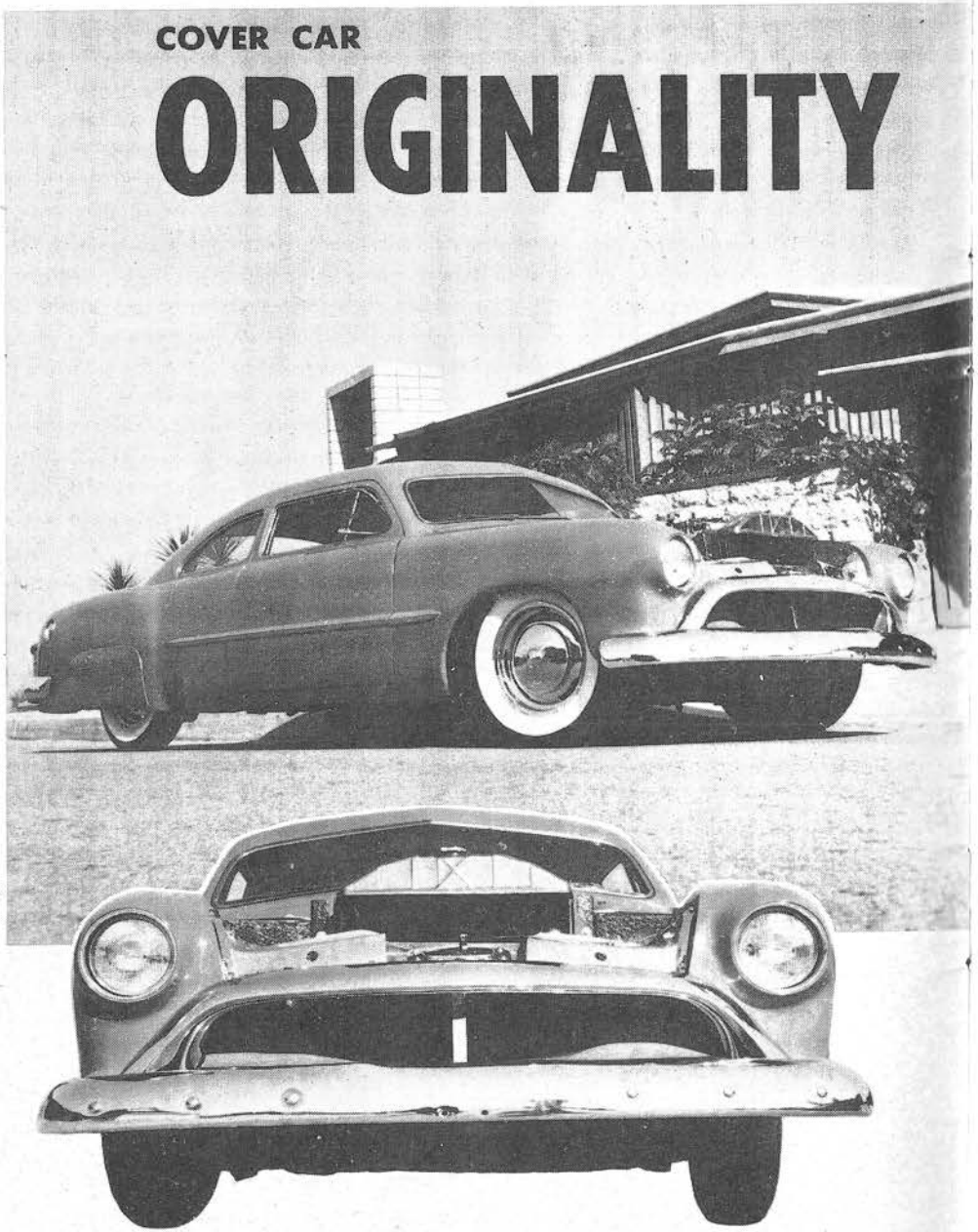
Both servos have springs which function to return the pistons when no hydraulic pressure is applied. As neither return spring is very strong, binding of the "O" rings may slow down servo release under conditions when bands involved should release quickly. When servos are reassembled, with new "O" rings as necessary, they should be liberally lubricated with automatic transmission fluid. To check for proper operation, simply hold an air nozzle tightly against the "apply" hole and open the air valve. The servo should apply "smartly" and release with a single, smooth movement as pressure is *cut off*, with the nozzle still held firmly against the apply hole, to meter the air release.

Front and rear clutches are the next point of attention. The same important factors of refinement should be observed as with the

(*Continued on page 58*)

COVER CAR

ORIGINALITY



• *By sectioning the body and chopping the top of the '49 Ford, Rector has achieved beautiful low, sleek lines and a much wider appearance. Top lip bar of grille is from '50 Olds and also accentuates width. Front wheel openings have been enlarged, allowing for turning radius. Side trim is from '49 Buick; wheels are chrome plated.*

IN ORANGE

Photos by Bob D'Olivo

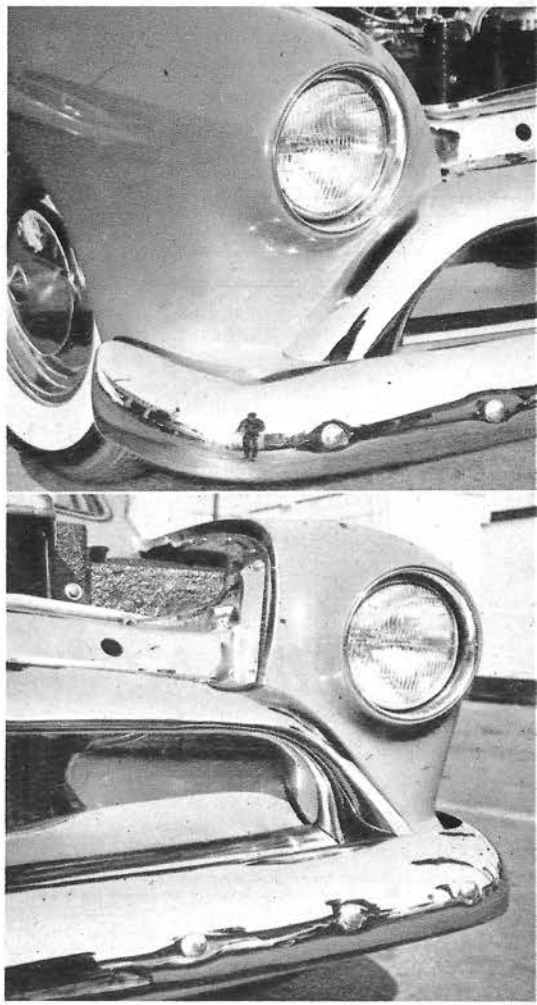
IT was a situation that could face anybody. Norman Rector had, slightly over a year ago, purchased himself a '49 Ford Six tudor at what, for that time, was a fairly reasonable price. The car was used for several months in Norman's body shop business primarily for chasing parts, hiking costumers' cars and general running around. Then came the day when Norman decided new equipment was a good idea. He put the Six up for sale.

No takers, at least not for any kind of a reasonable price. It seemed that nobody wanted a flathead six. Offers, such as there were, approached the ridiculous. So the car just sat. It got to the point where Norm couldn't stand the sight of the beast. There were two choices — burn the thing or change it. He took the latter course, applying the torch in his spare time. The car began to take shape as an ordinary sort of conservative custom.

However, with the approach of Motorama, Rector decided to go whole hog on the car. First in the order of doing was a drastic revision of the power plant. A '50 Cadillac engine was procured and given the four-inch bore treatment. Compression was boosted to 9.5 to 1 through the use of high-dome four-inch pistons. Twin four-throat carburetion in the form of a Weiand manifold was added. The whole works was chromed and buffed and then stuffed into the car along with a Hydramatic transmission.

The body got a radical four-and-a-half-inch section job and the top was chopped to the tune of three-and-three-quarter inches. Further lowering in the amount of three-and-a-half inches was done on the chassis by removing one coil on each front spring and placing three-and-a-half-inch blocks over the rear springs. Total drop in overall height was just one quarter inch under a *full foot!* Try that on your seven-foot brother-in-law.

(Continued on Page 21)



• *Clearly shown is how '50 Oldsmobile grille lip bar was fitted to Ford's grille opening. Small chrome strip running across lower part of opening and bumper is stock item. Headlights have been tunneled and then frenched.*

• *Exterior of the semi-race Cad is equally as beautiful as the restyled body. The firewall and inner fender panels are sprayed with dum-dum and painted a dark blue, making an elaborate contrast against the chrome goodies on the mill and the orange body paint. The hood is being rebuilt to clear the carburetors and is not completed as yet. Note windshield was butt-jointed and sealed with plastic.*

ORIGINALITY IN ORANGE continued

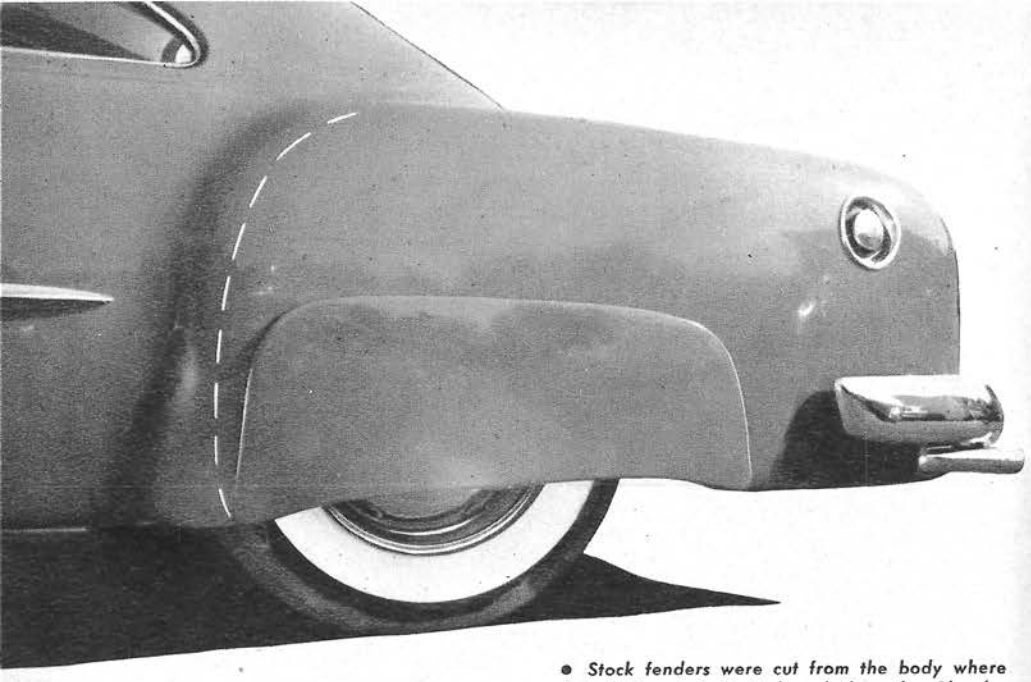
After this came the external goodie treatment. The stock rear fenders were bobbed just aft of the rear windows. In their place went a pair of '51 Chrysler fenders which were faired into the sides and deck. The wheel openings in the front fenders were radiused two and a half inches to allow for wheel turning. Ford fender skirts cover the openings in the Chrysler fenders at the rear.

The front end was given an Olds grille which blends in with the stock bumper. The rear bumper was taken from a '53 Ford. This unit was split and a flat metal plate added for extra length and to hold the license plate. The rear gravel shield was pared down to allow the bumper to ride close to the body.

Then came the interior. On this, Norman went all-out. The entire interior is upholstered in orange and white plastic with orange and gray rugs. Designed and executed by Jack MacNeill of Gaylord's Custom Shop, the brilliance of the color scheme is matched by the workmanship on the material. A '51 Chrysler instrument panel was faired into the '49 Ford dash, giving an instrument location directly in front of the driver. When the windshield was cut, the center strip was removed and the joint filled with clear plastic, giving

(Continued on Next Page)

• *Adapting '51 Chrysler rear fenders added 6-ins. more overall width. Rear bumper is from front of '53 Ford which has section removed from the center and replaced with flat plate, making neat license mounting and also was needed for extra width. '53 Ford Ranch Wagon bumper guards are installed and taillights are '51 Chrysler. Body seams have been filled-in and deck lid shaved.*

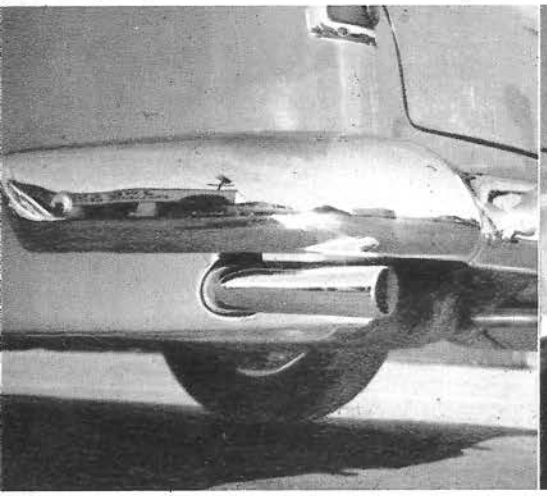


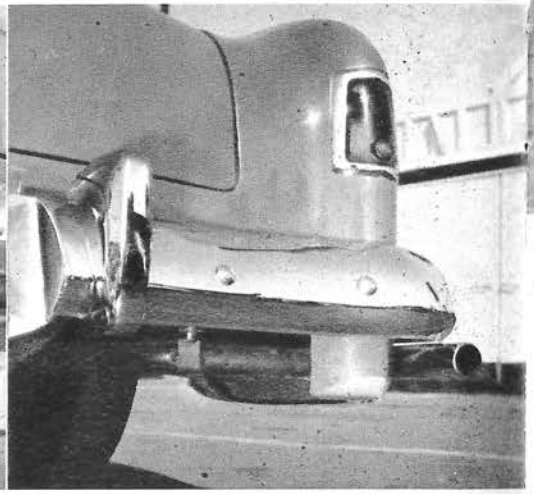
ORIGINALITY IN ORANGE continued

a unique effect similar to that of a modern, butt-jointed window. The outside of the car was given a 21-coat lacquer job in red-orange to match the color of the upholstery.

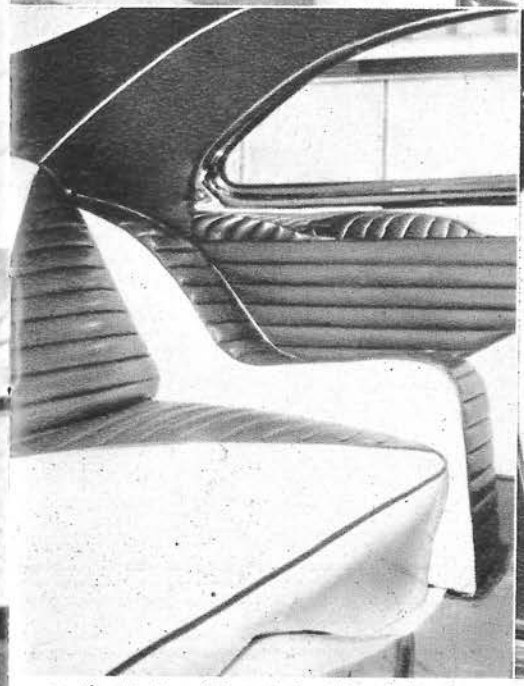
The car, eye-searing as it may be, is not just for show. This one really motates, showing a performance that would do credit to many street hot rods. From a piece of junkyard bait, Norman has built himself quite a hunk of machinery, indeed. Best offer to date: five times the best offer for the Ford Six.

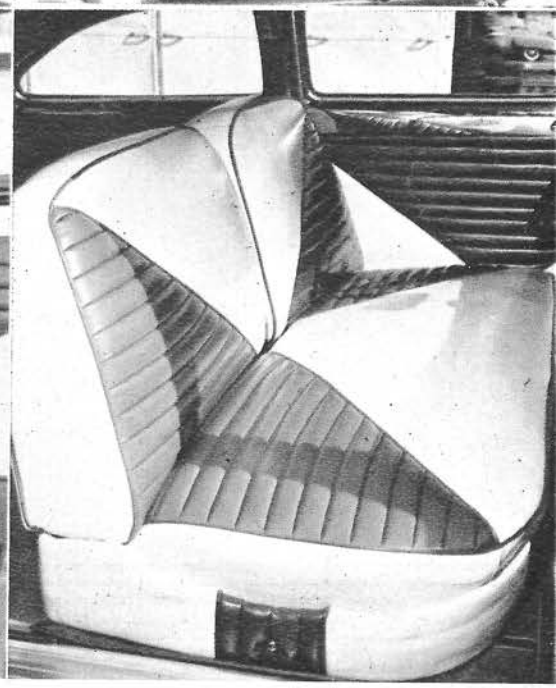
• Stock fenders were cut from the body where dotted line is indicated and then the Chrysler fenders adapted approximately two inches forward of it. Note how the fender skirt has been contoured to the lower edge of the fender. Chrome gas filler spout is stock '51 Chrysler.





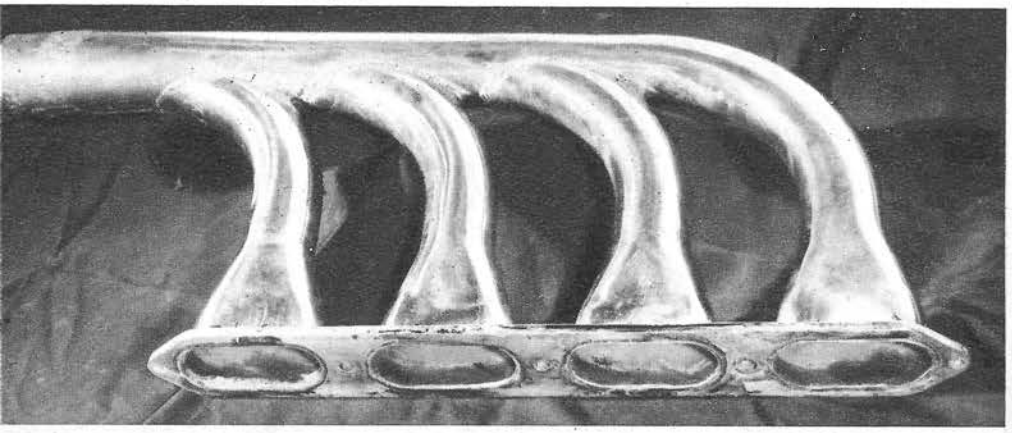
• Exhaust tips have been routed through the lower edge of the rear fenders by means of a small S-bend. Chrysler fenders added 2 ins. length to car. In picture at right, center section of bumper modification is shown. Note that bumper's gravel shield was narrowed allowing bumper to fit close to body.





• The interior of Rector's jewel has had a large amount of constructional modification as well as the radical upholstery. A '51 Chrysler instrument panel is installed in the stock dash. The backs of the front seats were cut down 4 inches. The lower frame was also removed and the seat mounted rigidly to the floor. The back seat was reconstructed from plywood paneling, rubberized horsehair and foam rubber. Color tones of the radical interior are orange and white with gray floor rugs and kickboards.

CRAFT REPORT :



BUILDING HEADERS BY HAND

RESULTS achieved through the use of exhaust headers on racing and sports competition cars give definite and conclusive proof of their value and necessity in obtaining top performance and maximum horsepower from any car. Dynamometer tests have shown that headers are a definite *must* if top performance from a smooth running engine is wanted and required.

By eliminating the constricting, twisting curves and rough and narrow passages found in many cast iron production manifolds, and helping in the elimination of power robbing back pressure, headers help to increase horsepower, provide higher top speeds, faster acceleration, better gas mileage and longer engine life. They also help keep the engine cool in some cases through more rapid exodus of hot exhaust gases.

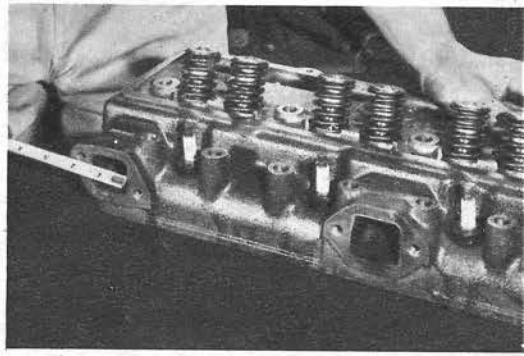
In this "Show-How" series of photos you will see how an expert master craftsman with 28 years of header building experience makes a custom set of Cadillac headers. The same methods can be applied to any other make of car.

Rudy Capranica of Arcadia, California, in charge of the metal shaping and header departments of the Frank Kurtis racing and sports car manufacturing shops in Los Angeles, each year is the craftsman who creates the custom headers used on a great majority of the Indianapolis Speedway and other top notch racing cars.

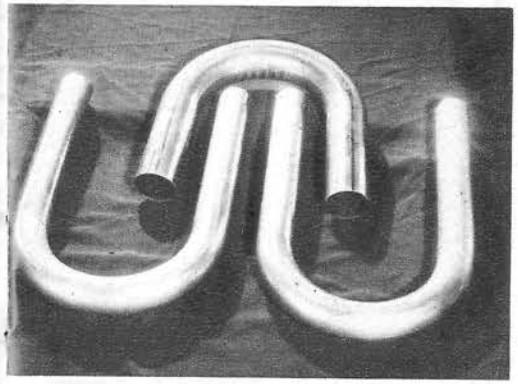
Rudy made his first header for a Model "T" over 28 years ago and later while working as a custom metal mechanic at the Don Lee Cadillac shop in Los Angeles, started making headers for Frontenac racers then running at the Ascot Speedway in Hollywood. We were fortunate in obtaining the expert advice of such a craftsman for use in this series.

Text and Photos by Lester Nehamkin

• *Custom made mandrils and hammers of tool steel are necessary to withstand both heat and pounding. Although all of the units shown here are not needed to make any one set of headers, uses are found for all of them in a large speed shop.*



• *Rudy Capranica measures the diameter of valve port openings and the distance between them in a Cadillac head to determine the proper size of pipe to use in fabricating the header. It is advisable to use as large an opening or diameter as possible to permit rapid exit of gases.*



• *Measurements have determined the amount of mild steel tubing needed to make the header. Three 180 degree bends were purchased. Properly cut, three pieces will supply all the material needed.*

• *The length of the main or number-one lead is measured off on a 180 degree bend of purchased tubing. This lead should be the longest distance or radius AWAY from the block as hood room will allow. The longer the distance the cooler the main header line will remain and also this long distance will help increase the draft or suction thus aiding in the rapid scavenging of exhaust.*

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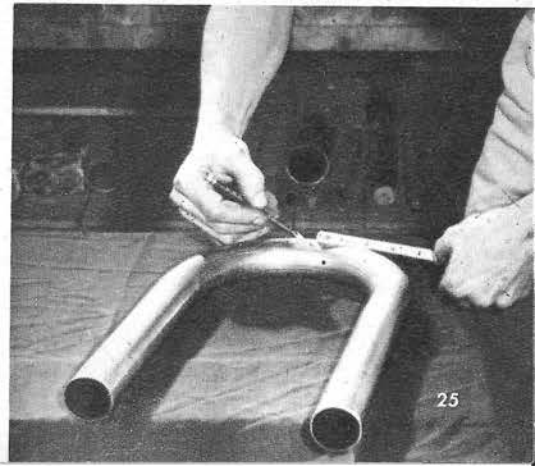
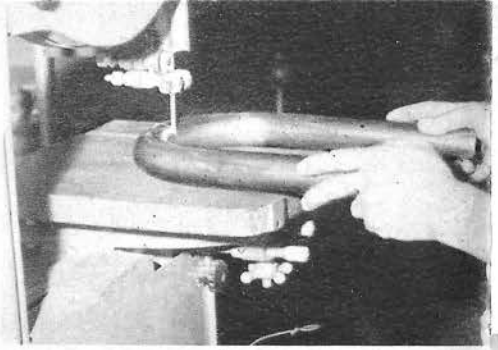
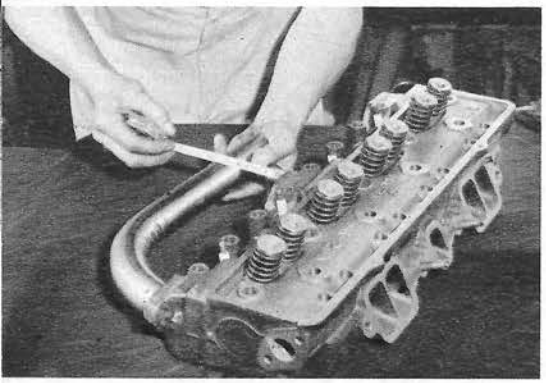


HEADERS continued

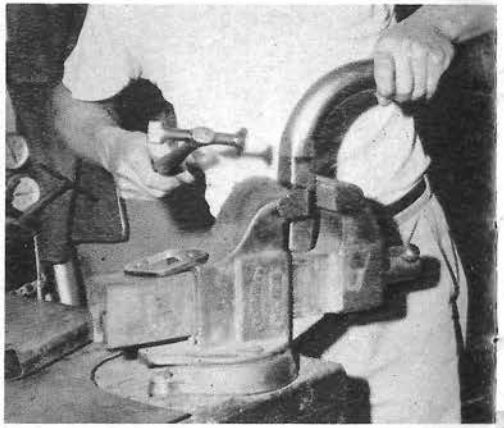
• *The measured actual length of 180 degree tubing is cut on a band saw. A hacksaw will accomplish the same operation in a small shop.*

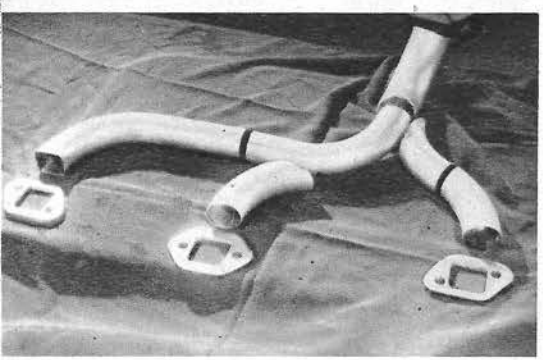




• *Re-checking distance of main lead from exhaust ports in block and establishing location of center port opening in header's main line must be done at this time to establish the cut-off point which is generally made just ahead of the center outlet tube.*

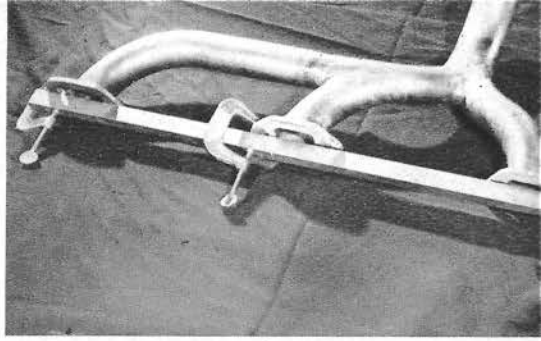
• *Squaring off lead over a mandril to fit shape of manifold flange — this is done both hot and cold. Heat is applied when maximum measurements such as a change from original diameter, size or shape of opening is required.*

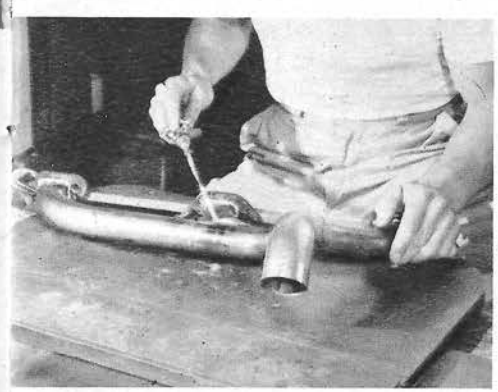




• *Final lay-out of header assembly just before welding process. Note that center outlet (or Siamese port on a Cadillac) has been located away from the cut-off seam and that the number one lead on the left has been squared to fit the custom made flange. Other leads will be squared off before welding begins. Flanges have been fabricated from ¼-inch cold rolled mild steel to prevent work hardening and cracking from high heat encountered at their location.*

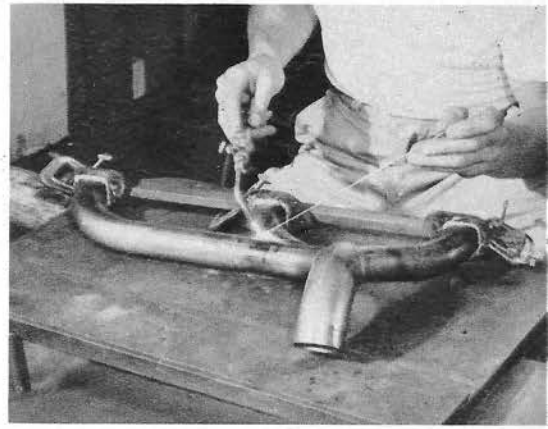
• *A "C" clamp jig bar arrangement is used on the manifold to hold flanges in the proper attitude in relation to their relative positions on the exhaust port openings.*

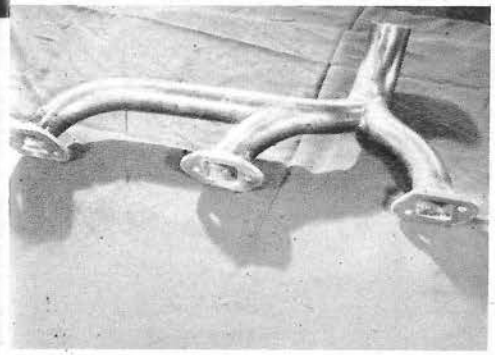




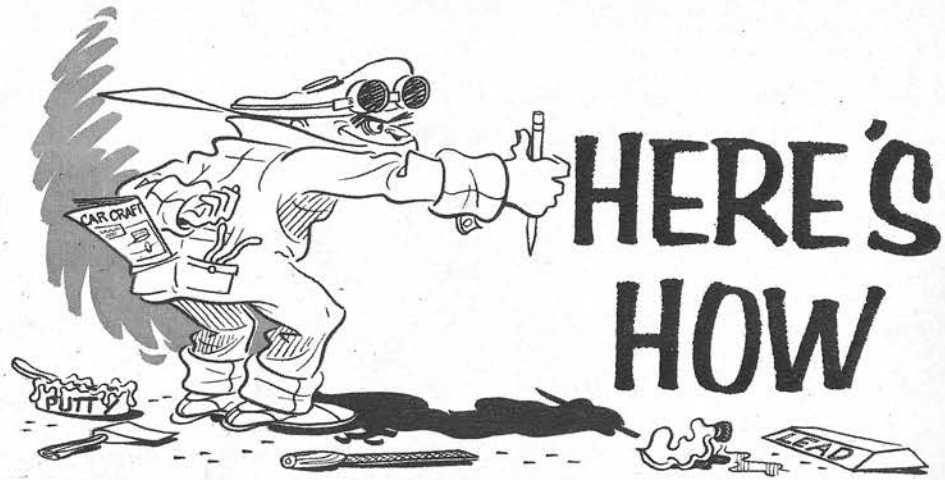
• *Mating surfaces are heated with an acetylene torch after tacking and before welding them together to help close up the gap.*

• *The center lead is welded into the header. Mild steel welding rod and an acetylene torch is used. The center outlet into the main header has previously been cut. This can be done either by filing or with a narrow-bladed bandsaw.*





• *Here is the finished product. Functional, smooth flowing lines are a distinctive feature of this custom made header, promoting streamlined flow of exhaust gas from the engine.*



HERE'S HOW

BODY SECTIONING PART I

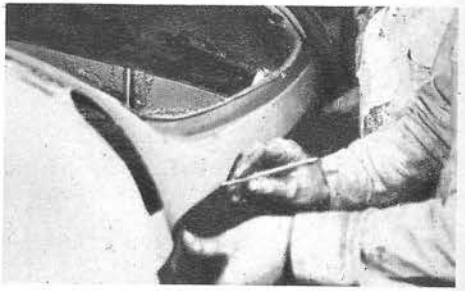
By Dana Mooring — Photos by Bob Behme

SECTIONING is one of the customizer's most effective methods of getting that long and racy look. It's not a difficult operation, but it does require careful workmanship.

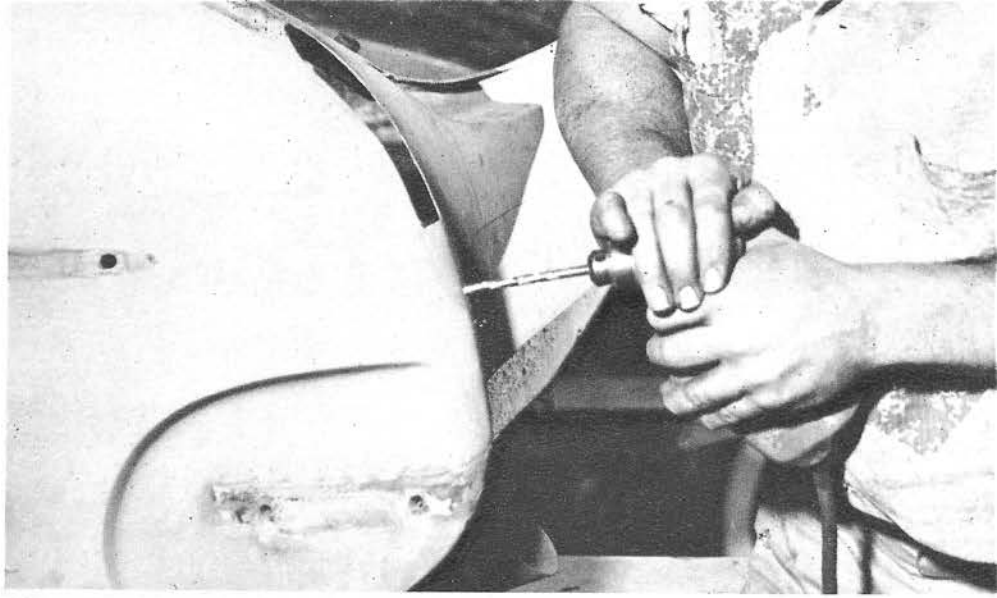
Before you actually begin cutting a section out of your car, however, there are a couple of things to first decide; namely, how wide the cut and where. The make of the car will, for the most part, determine how much to section. If your car has wide body panels compared to, say, the '51 Olds 88 shown here, then more can be cut. To retain harmony between the body and the top, though, go easy on the "how much." The idea behind sectioning is to get away from that "box-on-wheels" look. If you section too much then you'll have a "box-top" on wheels. Up to seven and eight inches *can* be cut from most cars without damage. But, if you're in doubt, photograph your car, have enlargements made, get a pair of scissors and see for yourself, "how much to cut."

"Where to cut" is determined by the contour of the body panels. To keep the stock contour and have the parts join without overlapping, the two edges of the section removed must be equidistant from the tangent points. These tangent points are plotted by dropping a plumb line (where possible) along the side of the car, then bringing the line slowly in until it touches the body. The point which is the outermost part of the contour bulge. Say you were going to section a one-inch strip from a football; to get the two sections to match after cutting you'd cut a half-inch from each half. But don't expect the tangent points on your car to form as even a ring as on a football; they won't. These tangent points are plotted regularly at one-foot intervals.

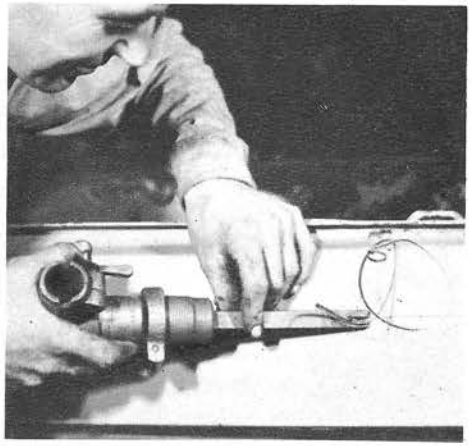
Careful plotting of the tangent points is important — if you want a smooth seam after joining. Careful workmanship is necessary to get the seam to stay that way. Follow our step-by-step sectioning of Jack Stewart's '51 Olds 88 by the Burbank Valley Custom Shop, and you'll see — there's no mystery to sectioning.



1. After determining how much to cut and where, the next step is to begin marking off the section. Using an aluminum strip the width of the section as a gauge makes this operation go faster. Everything that could conceivably interfere with sectioning should be removed at this time.



2. Although other methods of cutting can be employed, the air cutter gives the most even edge. To allow the air-powered cutter to get a bite, drill a ¼ inch hole at the beginning of each cut.



3. Make certain the cutter follows the scribed line. If the tangent points were marked and plotted accurately the panels will match precisely after dropping the body.

4. The trunk post is sectioned at the base since that line is a tangent. It is sectioned separately by chiseling the bottom free. Top line of the post section is cut with a torch.

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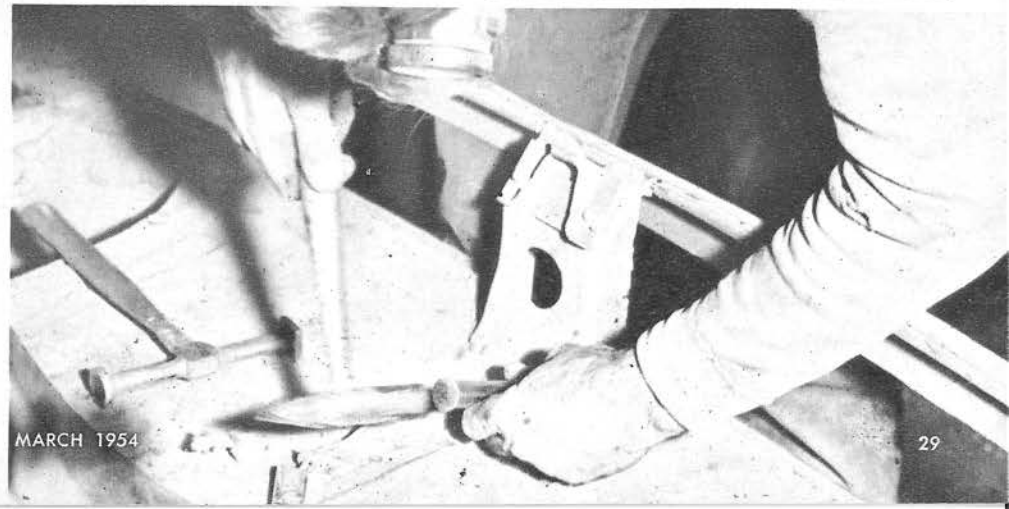
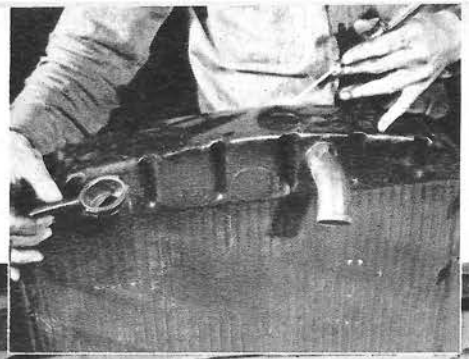
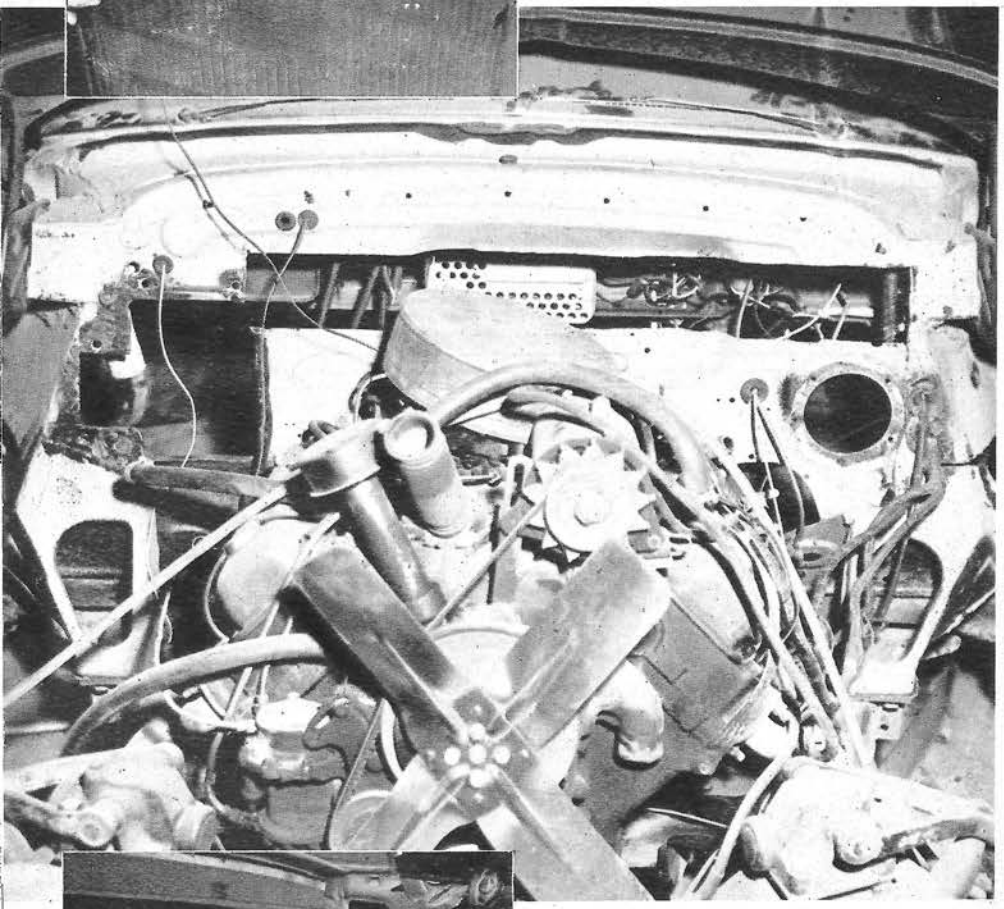
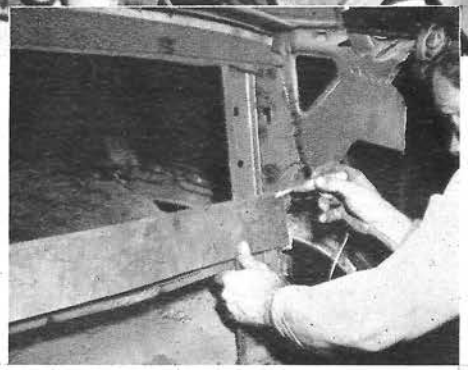




TORCH TIPS continued

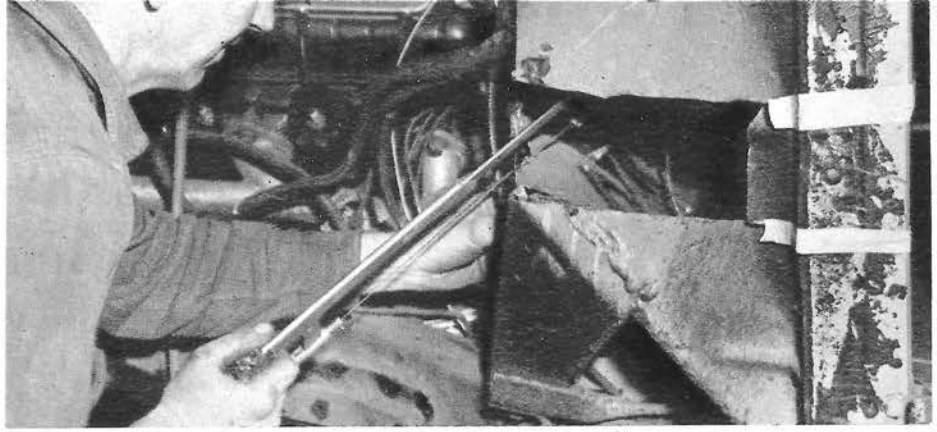
5. Instead of making the radiator shorter, it should be dropped from its stock position at the base and the inlet spout position changed to the side.





6. To permit the fire-wall to be marked and sectioned, the hood and radiator should be removed. Position of section from fire-wall is governed not by tangent points as elsewhere but by where the least amount of cable replacement will be necessary.

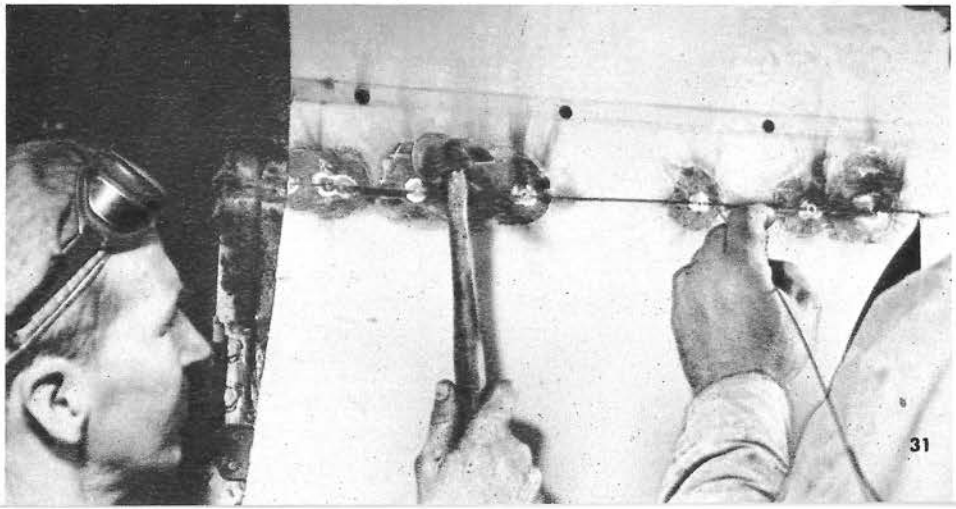
7. Uprights should be marked with the same gauge used in marking the body panels. This will reduce the chance for error in measuring.



8. It will be necessary to use a hacksaw in cutting many places. Uprights should be taped or tacked after cutting and before dropping to prevent any misalignment.

9. Be certain to thoroughly check all points before dropping. Errors in marking or cutting can be more easily rectified at this stage. Since the rear fender is to be remodeled, the sectioning goes only to the center of the rear fender. For sectioning alone, the section strip would have continued to the rear of the fender. To allow for a horizontal shift in the tangent point, a vertical slice is measured as illustrated in the forward portion of the rear fender.

10. When the body is finally ready to drop, get assistance in lowering. Once dropped, the uprights should be tack welded immediately, and then the unjoined seams to prevent movement. After tack welding all the seams, they are then ready to be spot welded in areas about two feet apart. Slight misalignments should be hammered flush before welding.

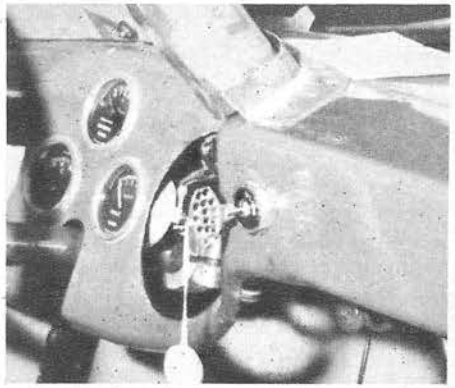


HOLEY TERROR

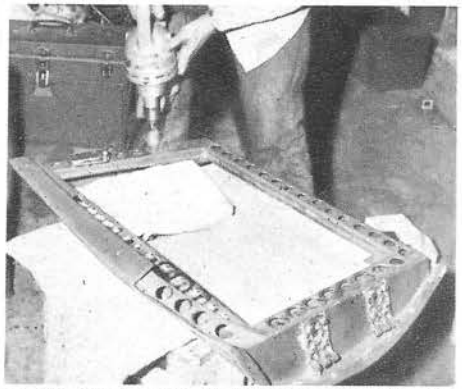
the car and driver that went on a diet

By John Christy

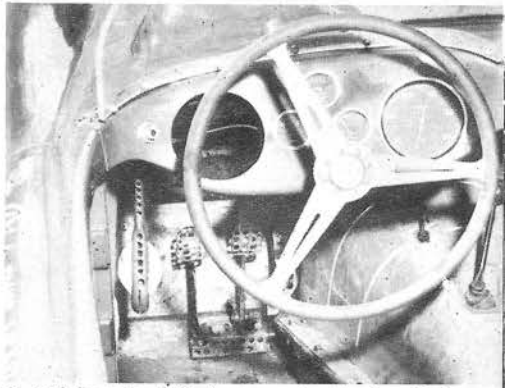
• *Entire valve train was lightened in process of souping. Here Ernie tulips a valve on lathe.*



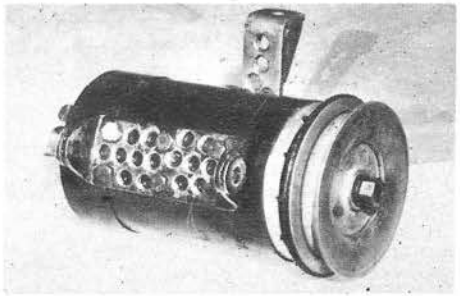
• *It may have been a gag, but even the ignition key came in for the hole treatment.*



• *The door, even though aluminum like the rest of the body, got a thorough going-over.*

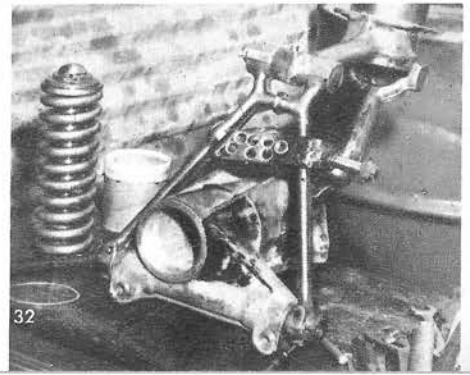


• *Pedals were drilled as was handbrake. Cork rimmed steering wheel replaces stock item.*



• *Generator from MG TD was seven lbs. lighter than stock unit, a good point to remember.*

• *Unique suspension, completely self contained, is same design for both front and rear ends.*



Photos by Les Nehamkin

WHEN the '53 Pan American road race rolled around one thing was certain — Ernie McAfee was going to be in it even if all he had for wheels was a set of roller skates.

Ernie is a veteran hot rodder and automotive engineer who. in the 30's, held the streamliner record at the dry lakes with a speed of 137 mph, for that time a fabulous figure. Since that time Ernie has opened a sports car emporium specializing in the hairier breeds of Italian equipment.

In the '52 Carrera the man rode as copiloto to Jack McAfee (no relation) in Tony Paravano's Ferrari coupe, winding up right behind the Mercedes team. Thus, Ernie is no stranger to the Carrera; but this year he was determined to drive. "But what?" was the question.

The competition was getting rougher in the unlimited division than a lone operator, even with a sponsor, could hope to cope with. This let out the Ferrari. It wouldn't have done Ernie's business any good to use a stocker. This left him in the small sports, or under 97 cubic-inch class. He had just picked up a franchise to sell the Siata, a small but rapid and roadable Italian car equipped with a 122 cubic inch souped up Fiat V8 engine.

Ernie got out his scratch pad and pencil and came up with a set of figures which would reduce the Siata mill down to the 1600 cc limit of the small sports class. Then he wrote the factory to see if they would equip one of their super-light competition coupes with the engine he had planned. However, time ran short before the negotiations came to a head, forcing him to take a 208-S roadster out of stock.

With an entry deadline staring them in the face, the crew went to work with a vengeance. The procedure was to take the stock mill and give it a warming over. First the engine was stripped and given a complete going over, then a factory full-house cam with 60 degrees overlap was added. This gave the car 98 bhp at the rear wheels as opposed to the 78 horses pulled by the stocker.

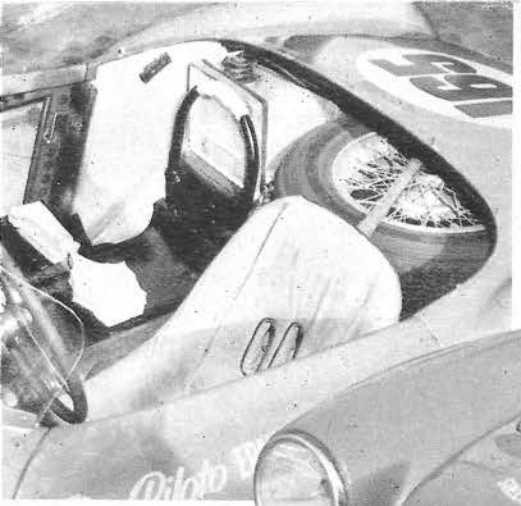
The reason for souping the engine before reducing the size becomes clear when it is realized that the effects of a given operation will be in nearly direct proportion to the size of the engine. What Ernie was trying to achieve was horsepower in the small engine equal to that of the large stocker in its original form. The reduction in power created by the reduction in size was known and the intention was to get an increase greater than the loss suffered.

The Siata engine is a peculiar sort of beast; the block is aluminum, the barrels being wet, steel sleeves in banks of four set at an angle of 70 degrees apart. The crankshaft is a 180 degree job with a difference. The fact that the cylinder banks set 70 degrees rather than 90 means that the crankpins must also be offset. Since each bank is 10 degrees, so must each crankpin be offset 10 degrees. The firing order necessitated by this arrangement gives the car the sound of a fast four-barrel or even a 12 instead of the typical V8 beat. It screams instead of roaring.

The reduction process was simple in theory but not so easy in practice. New sleeves were machined from Meehanite, a tough steel alloy, reducing the bore size eight millimeters from 72 mm to 64 mm. The stroke was left stock at 61.3 mm. Why the metric measure? It's easier to figure in decimals when you're playing that close. Simple, eh Guiseppe?

Special pistons were cast to fit the new holes. Only one of the difficulties was that

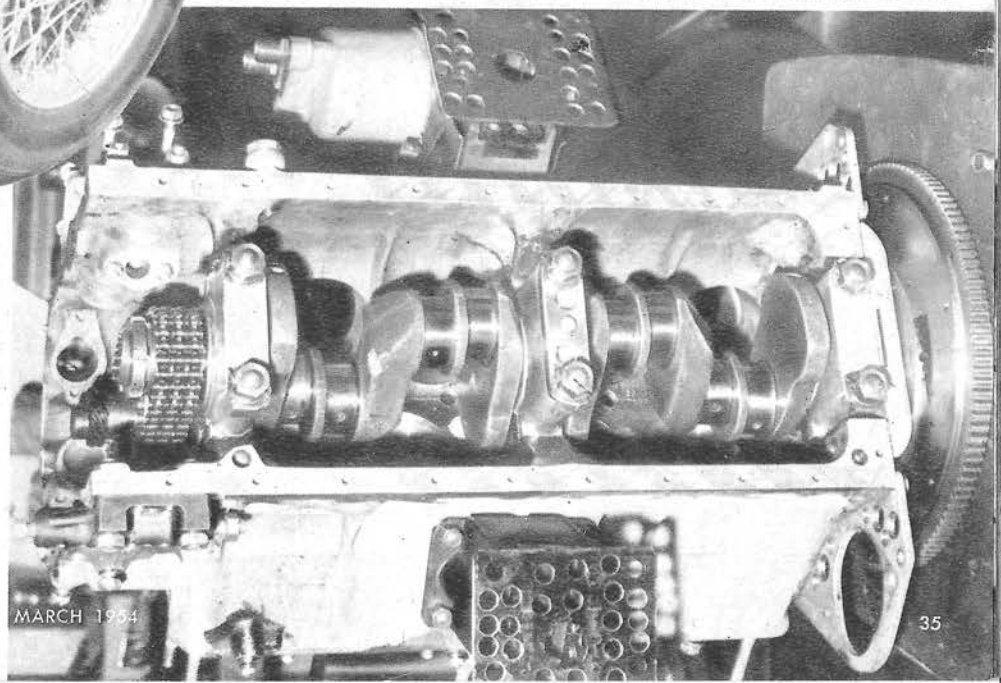
(Continued on Next Page)



• *Cockpit was completely stripped. Skeleton seat was used to mount second spare tire and wheel.*

• *All buttoned up, ready for running. Ernie and car were lighter by a total of 400 lbs.*

• *Underside view of engine shows offset crankpins on 180° crank. Note drilled-out mounts.*



HOLEY TERROR

continued

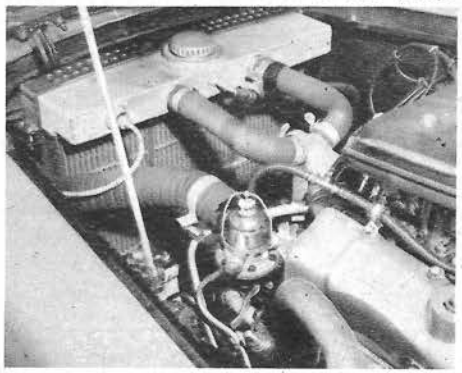
new wristpins had to be made for the drastic reduction. The engine had to be run up on the test stand and torn down twice before everything was satisfactory. Valves, which were already cut to 30 degrees, were refaced and tuliped for lightness.

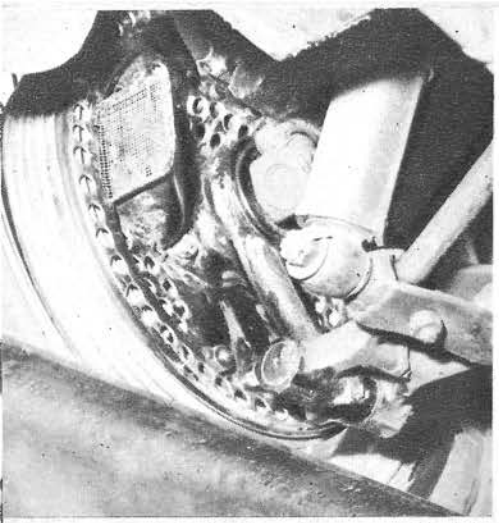
Lightness! That word was the guiding light of the whole (pun intended) operation. The first thing Ernie did was to remove every bit of excess trim, including the door handles.

This was just the start. The man went wild with drill and hole saw. Every non-stressed piece of steel or alloy on the car was punched like a drunkard's driving license. Braces, en-

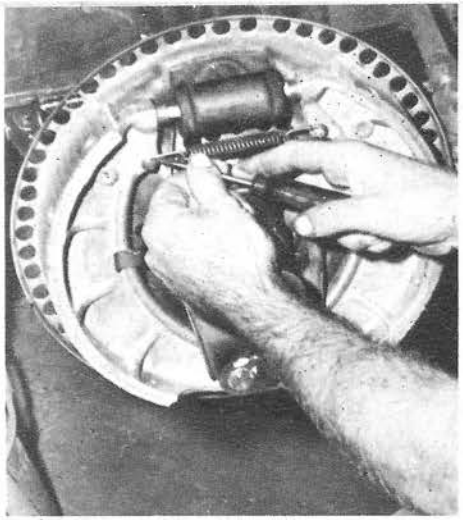
(Continued on Page 36)

• *Use of aluminum radiator saves 30 lbs. in weight. Note use of air duct to fuel pump.*





• *Weight of the backing plates was reduced by half through liberal use of the hole-shooter.*



• *Hefty, eleven-inch brakes on Siata have more actual area than those on Lincoln, Cadillac.*

HOLEY TERROR

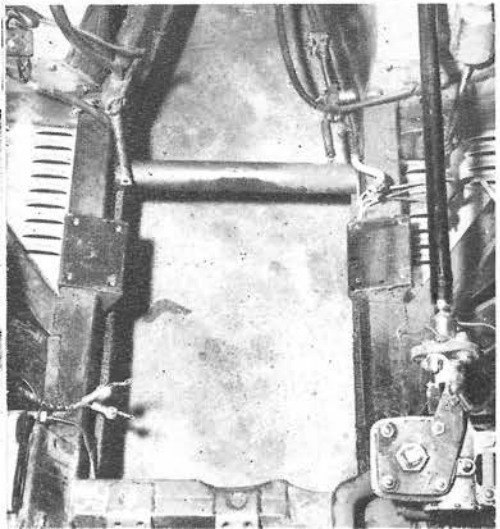
continued

gine mounts, pedals, brackets, framing, braces, knock-off wheel-caps and brakes all came under the busy hole-shooter.

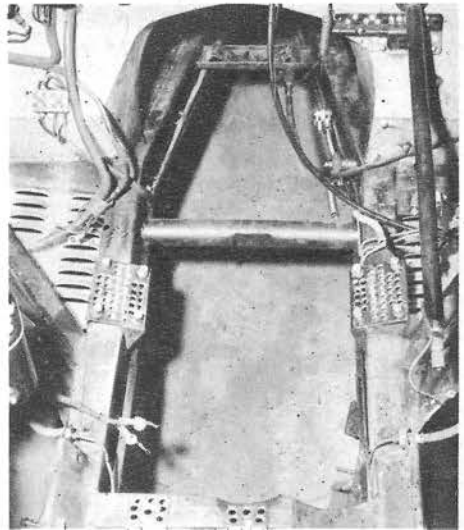
Even the ignition key got the works. The thing looked as if it had been on the preferred list of a moths' convention. The wind howled through the cockpit like a pack of coyotes under a winter moon.

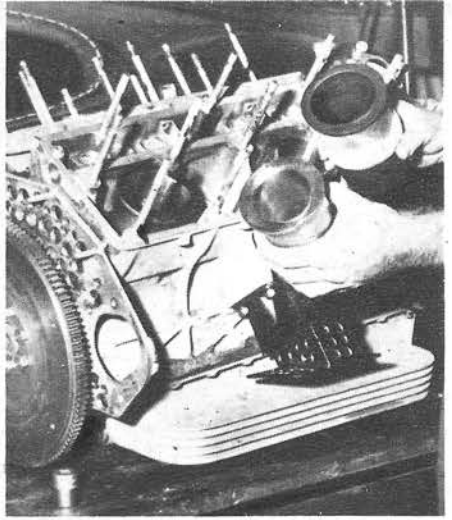
What couldn't be drilled or dispensed with was replaced by lighter material. The radiator weight was reduced almost 30 lbs. by replacing the original brass cooler with a special aluminum goodie that was and is Ernie's pride and joy. The fuel tank was jerked out bodily and replaced with a hand-built aluminum tank. The floorboards were taken up, the shallow underpan sufficing for underside protection. The stock steering wheel, light though it was, was replaced with a featherweight item with a cork rim and magnesium spokes. Since the international regulations call for complete road equipment, the generator couldn't be tossed out completely. However, seven pounds were saved by replacing the stock item with a generator from an MG TD, the bracket for which was liberally sprinkled with holes.

• *Engine compartment in Siata before "Operation Swiss Cheese" was begun by McAfee.*



• *After the drillers got through every non-stressed brace and bracket had been punched.*





• *New sleeve reduced bore size by eight millimeters, had to be fly-cut to clear valves.*

• *New pistons were cast to Ernie's own design with high crowns giving 8.2/1 compression.*

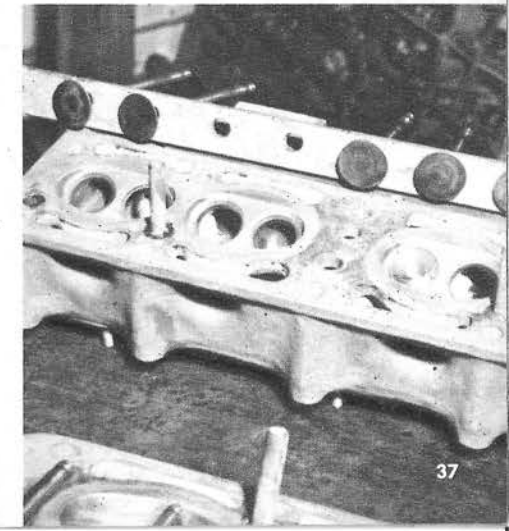
Also tossed out was the stock passenger's seat. This was replaced by a skeleton tube device that would have crippled a human passenger but the second spare tire rode co-pilot for the trip. The stock transmission was removed and replaced with a five-speed unit also made by Siata.

With all this lightening and hole-shooting one might think that strength and durability would suffer. Nothing could be further from the truth. Ernie had worked his way up to fifth place on the tortuous and rough first leg. On the second leg he had briefly ridden first and had been passed by the winning Porsche on a straight stretch. Hitting another series of curves, he was pulling for the Porsche again when he went into a blind dog-leg a little too hot. Going wide with everything dragging but his feet, he slammed into a cement marker post at better than 60 mph, uprooting the post and carrying it over a 20-foot bluff. The only thing that suffered was the steering and front cross-member. The radiator wasn't even punctured! "We're coming back next year," says Ernie; "might have to drill a few more holes, though."

This from a man who, after giving his car the reducing treatment to the tune of 400 pounds, went on a diet and took off 20 himself.

• *Special, large-capacity aluminum fuel tank was fabricated to replace the stock steel one.*

• *Combustion chamber design is a modified wedge. Valves were left small to clear bore.*



performance tuning:

THE FORGOTTEN PLUG

Illustrations by Don Fell

Text and Photos by W. G. Brown

LET'S consider one of the most essential parts of an engine, one that plays a vital role in obtaining and maintaining good engine performance: the lowly spark plug. This little item is despised, cursed at, overworked, underrated, neglected, and in general, completely misunderstood by most car owners. Buried as it is in the cylinder head, it is almost forgotten and it's no wonder that an engine won't start promptly, refuses to idle smoothly and misfires at high speeds.

But, as in so many cases, the blame really rests on the car owner or serviceman who made a bad choice in spark plug heat range or type and who refuses to own up to his mistake by failing to properly care for them.

Spark plugs normally work under conditions approaching the impossible. First, during the intake stroke, the plug is chilled by the incoming charge of fuel/air mixture. Next, as the fuel/air mixture is compressed during the compression stroke, the spark plug is required to pass an electrical spark between its electrodes at the worst possible time, which is when the pressure and temperature due to compression is near its maximum. The spark ignites the combustible fuel/air mixture, causing a tremendous increase of cylinder temperature and pressure and exposing the valves, pistons, spark plugs and combustion chamber surfaces to a searing flame. Then, as the piston descends on the power stroke, the temperatures and pressures within the cylinder decrease. Finally during the exhaust stroke, the plug is subjected to a blast of hot exhaust gases trying to find their way to the exhaust port.

Such are the widely varying conditions in a cylinder during one operational cycle. In these diverse circumstances, the plug is expected to fire unfailingly at the required instant. It is not expected to become fouled with oil that passes the intake valve guides and piston rings, or carbon that attaches itself to the combustion chamber surfaces. Neither is it expected to burn the electrodes, thus widening the specified electrode gap, nor is it xpected to leak compression. A spark plug is expected to perform its task under all extremes of engine speed and load and do so for untold thousands of miles while it is dirty both inside and out. In two words: it can't.

The first step toward dependable and long lasting spark plug operation, with consequent improvement of engine performance, is the selection of a spark plug of the correct heat range. The term "heat range" refers to the ability of a spark plug to conduct heat away from the firing end. To help clear up a confusing issue, a "hot" or "cold" plug has no measurable effect on the combustion temperature in the cylinder. This temperature remains essentially the same regardless of the heat range of spark plug used, provided there is no detonation or pre-ignition encountered. A "cold" plug transfers the heat of combustion from the plug electrodes and porcelain insulator to the cylinder head and surrounding water jacket much more rapidly and effectively than a "hot" plug, which retains more heat within itself between firing impulses.

The factory recommended spark plug for a stock engine was selected because it is the plug that is least likely to cause trouble during average use. By "average" is meant driving to and from the supermarket, idling in traffic and general light load, low and medium engine rpm conditions. In other words, the spark plug installed at the factory is more than likely on the "hot" side, which makes it less prone to the effects of oiling, which often occurs in a new engine.

Unfortunately, there is no hard and fast rule by which the correct heat range of spark plug may be chosen for a specific engine. The design of the combustion chamber and the valve arrangement dictates to some extent whether a hot or cold plug should be used. Generally, for most stock engines, a hotter plug is required for overhead valve engines

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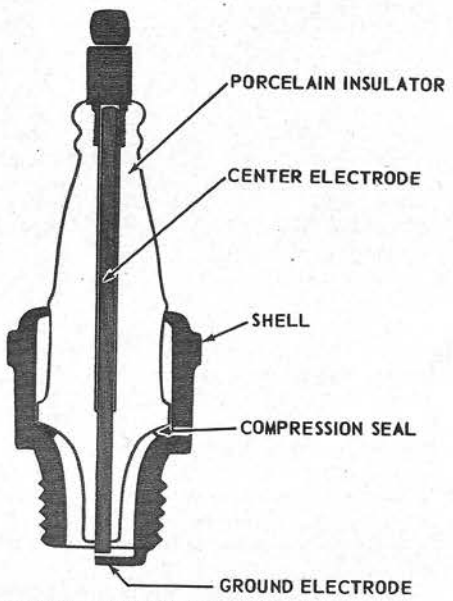
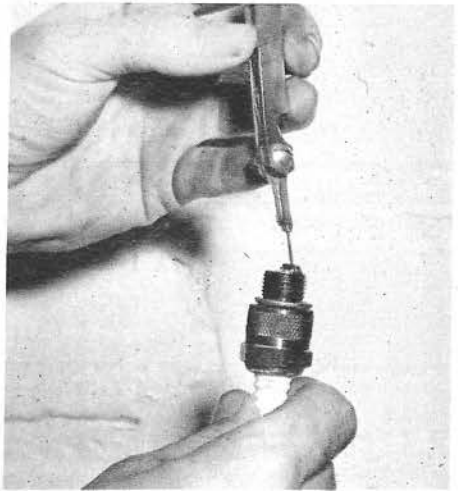


• *Section of typical spark plug shows components. Compression seal is the sensitive spot.*

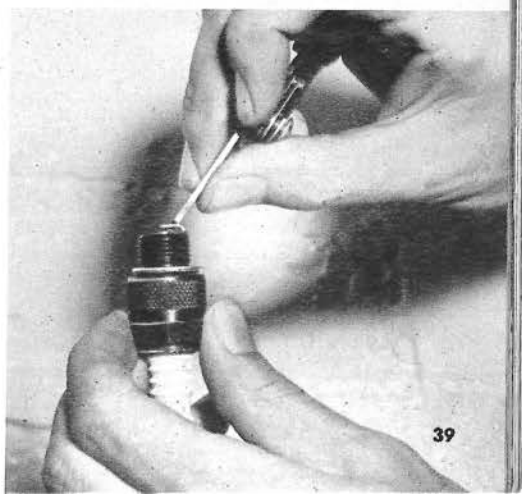
• *After plug is removed from engine, the threads should be thoroughly cleaned with a wire brush.*

• *Plug should then be washed with brush and lacquer thinner or similar degreasing compound.*

• *Electrode gap must be measured with a round wire spark plug gapping tool, as shown here.*



• *Electrode gap is adjusted to specifications by bending only the ground electrode wire.*



• *Carbon deposits are easily removed by sand blasting in cleaner. Sand must be blown out with air.*

THE FORGOTTEN PLUG

continued

that for "L" head engines, but if the engine is modified, in any way affecting compression ratio or valve timing, or both, even this slim guide is of no value.

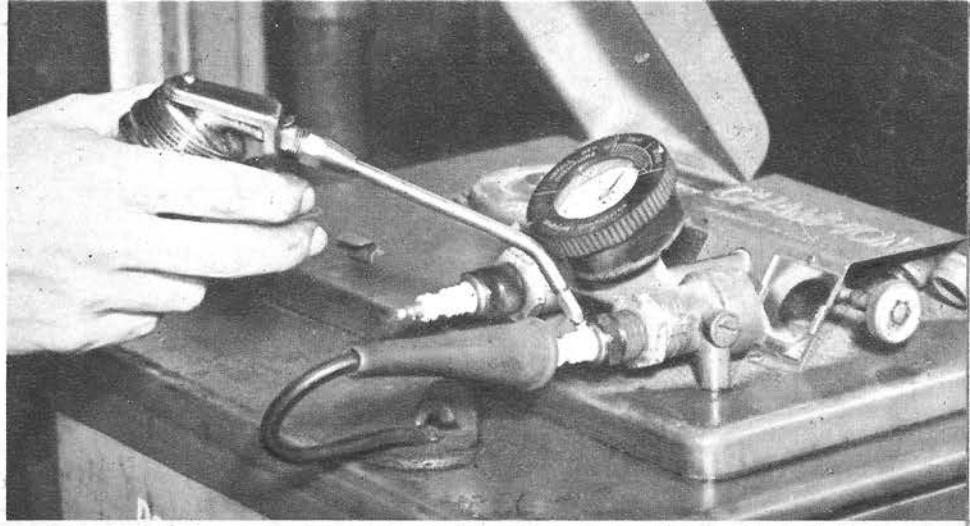
Each single step in heat range, either hotter or colder, is equal to approximately a 50 degree Fahrenheit differential in heat transfer qualities in the normal range of passenger car spark plugs. Towards the extremes of hot and cold, this differential becomes less. From this it can be seen that each step would have a very definite effect on the spark plug operating characteristics. The numbering system used by the major spark plug manufacturers offers a clue to a plug's heat range. For normal passenger car plugs, the higher the number, the hotter the plug. In some special types, such as for racing and foreign engines, this practice is reversed.

Before we attempt to describe how to choose the correct spark plug, we must make the assumption that the engine in question is in reasonably good shape. The compression pressures of all cylinders must be consistent within limits, which reflects the condition of the piston rings and valves, and carbon formations in the combustion chamber should be at a minimum. The fuel/air mixture must be correct in all speed ranges. Whether the engine is completely stock, modified in some way or used strictly for competition is relatively unimportant. The fuel to be used is also relatively unimportant because the process of finding the correct plug is the same for any engine.

In many cases, driving habits and the type of driving most frequently encountered will govern the selection of the proper plug. For sustained high speed runs on the highway, a colder plug by one or two steps will be necessary than with an identical engine being used in city traffic the majority of the time. For modified engines, especially those that have higher compression ratios, multiple carburetion, altered valve timing and are bored and stroked, very possibly two sets of plugs will be needed; the hotter set for normal city driving and the colder set for use on the highway. For engines with moderate increases in compression ratio and other modifications, perhaps the best starting point would be one plug colder than that recommended by the factory. When special cylinder heads or other equipment is used, the manufacturers of the special items, or other reliable sources, should be consulted.

The most common fault in choosing a spark plug arises from the fact that the plug is usually too cold for the particular application. The prevalent belief seems to be that the colder the plug, without fouling or oiling, the better. The exact opposite is true; the hotter the plug without burning, the better the starting, warm-up, idling, slow speed operation and fuel economy.

If the heat range of a spark plug is correct, it usually takes about 100 miles of city driving for the plug to "color." The porcelain insulator will turn a rusty brown to light tan color at around the 100 mile mark. Highly



• *Plug is checked for compression leaks by applying air pressure and a few drops of oil to seal.*

leaded fuels will cause a white to yellowish powder to form on the ground electrode and end of the plug shell; however, these deposits will have no bearing on the color of the porcelain during the first few hundred miles of driving. If, after the first 100 miles or so, the porcelain apears to be snow white, then the plug is too hot and will eventually burn under a sustained heavy load. If a plug is too cold, the porcelain and shell will appear to be black and sooty. The plugs must be given time to color, no knowledge can be gained by changing plugs every few miles without first giving them a chance. The plugs in a competition engine should color in less time because they are usually a little colder than is absolutely necessary. For long straightaway competition, the plugs should begin to color after a couple of runs, while on shorter courses, such as drag strips, possibly six to eight runs will have to be made before any sign of coloring can be detected on the porcelain. Actually, the process of finding a spark plug of the correct heat range is a matter of experimentation. In order to make the best selection, it is very likely that several sets of plugs of varying heat range will have to be tried, but the plugs should be run in the engine long enough to make certain that the final choice is a good one, unless of course, detonation or pre-ignition is encountered.

A plug that is too hot can be the source of very serious trouble to an engine. If the porcelain refuses to color and eventually takes on a burned, glassy appearance, the plug is too hot. In extreme cases, the porcelain will actually blister and the plug electrodes will turn yellow, then blue before they melt completely. A plug that reacts like this is probably causing detonation, and in later stages, will cause pre-ignition, both of which are very destructive to any engine.

Not only must a spark plug of the correct heat range be chosen but the plug must be of the correct thread length or "reach." Most automotive spark plugs are made in one of four standard reach lengths: 3/8, 7/16, 1/2 or 3/4 of an inch and the length of the spark plug threads in the cylinder head determines the proper reach to use. In modified or competition engines, the proper reach is especially important. If the reach is too short, the exposed threads in the cylinder head could very easily become overheated, causing detonation and pre-ignition. If the reach is too long, the exposed threads on the spark plug could cause the same results, as well as interference between the spark and the valves or piston.

When the proper plug is found for use with gasoline in a modified engine, in all probability the same plug will operate satisfactorily when straight alcohol is used for fuel. If a fuel additive, such as nitromethane, is used for competition purposes, the normal plug should no longer be used. In most engines, the use of such an additive in quantities of from 15 to 50%, will require a plug that is five to eight plugs colder. This is only an approximation and it should be noted that plug steps instead of heat range steps are specified, because the spark plug numbering systems used leave several gaps for which no plugs are made. The reason for such a radical

(Continued on Next Page)

• *Correct tightening of plug in head cannot be overemphasized. Torque wrench gives accurate results.*

THE FORGOTTEN PLUG

continued

step becomes clear when it is realized that nitromethane and other additives contain oxygen and when the additional oxygen is liberated within the engine, the combustion pressures and temperatures are increased by as much as 75 to 100%. The inability of the engine to convert the extra heat into usable horsepower results in a greatly increased heat flow to the engine cooling water. To a great extent, the degree of efficiency with which the additional oxygen is utilized by the engine in increased power, is dependent upon the efficiency of the combustion chamber design. About all that can be done to an existing combustion chamber when this type of fuel additive is used, is to make absolutely certain that there are no sharp edges, rough surfaces or projections in the combustion chamber. These fuel additives are extremely sensitive to temperature and pressure changes and any "hot spots"; projections or sharp edges that retain the heat of combustion over to the following power stroke, could, and sometimes do, cause the fuel/air mixture to detonate or pre-ignite during the compression stroke. A spark plug could be classified as a hot spot if the plug type is too hot. Let me repeat: if there are any exposed threads either on the spark plug or in the cylinder head, these too, could very easily cause detonation. And with this type of fuel additive, prolonged detonation is the forerunner of a ruined engine. Consequently, a very cold plug, and one of the correct reach, must be used when nitromethane or similar additives are mixed with the normal fuel, to eliminate the plug from becoming a cause of detonation or pre-ignition.

Spark plugs in normal everyday use are subjected to the same type of carbon and lead deposits as other combustion chamber surfaces. Carbon deposits do not always hamper the plug's operating efficiency unless the deposits are unusually heavy. Lead oxide deposits, on the other hand, can and do cause spark plug misfiring which is usually quite difficult to trace down. This arises from the use of modern, leaded gasolines and becomes evident after about 300 miles or more of slow speed city driving, after which the car is taken for a fast run on the highway. Misfiring will occur at high speeds under heavy load and is frequently blamed on a faulty ignition distributor. When this happens, the plugs should be very closely examined. If they look good when viewed with the naked eye, they should be carefully inspected with a powerful magnifying glass. Very tiny hair lines on the porcelain insulator will indicate the path taken by the electrical current when the plug misfires, although the lead oxide deposits themselves may not be visible. The oxide formation is easily removed from the offending plug by sandblasting in a spark plug cleaner, which brings up another point of discussion.

Sandblasting spark plugs is definitely recommended at least every 2000 to 3000 miles. A plug of the correct heat range will operate satisfactorily for many thousands of miles as long as it is kept clean both inside and out and the proper electrode gap is maintained. Sandblasting plugs seems to be a controversial issue for some unknown reason, but sandblasting does not injure a plug, but actually increases its life if done at reasonable intervals. There have been cases where the same set of plugs have been used for as long as two years in racing engines when they have been cleaned thoroughly and often. As a matter of fact, new plugs are more apt to give trouble than used plugs because faulty plugs do occasionaly escape undetected from the factory.

Before the plugs are sandblasted, it is recommended that any oil or dirt be washed from the inside and outside surfaces of the plug with lacquer thinner, carbon tetrachloride or other degreasing solutions. The plugs must then be thoroughly dried and the outside surfaces wiped clean of any film that may remain. When sandblasting plugs, it is most important that the blast of sand be applied only long enough to remove any deposits on the plug surfaces. Usually this takes two to three seconds. It is equally important to be sure that no particles of sand remain between

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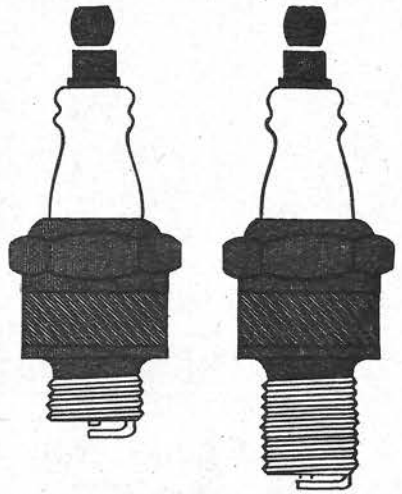
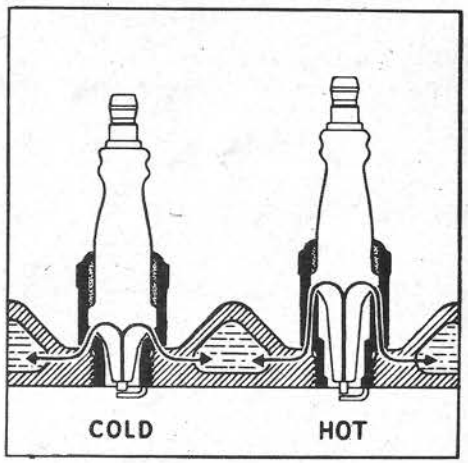
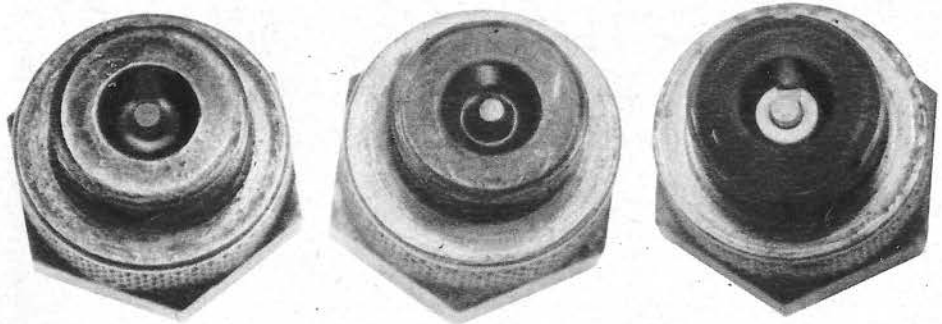


• *Correct thread length or "reach" is important too. Short reach, left, compared to long reach.*



• *Diagram shows comparison of flow of heat through a "cold" plug, left, and a "hot" plug.*



• *Normal plug, left, with good "color," as compared to oiled plug at center, and "fried" plug, right.*

TORCH TIPS

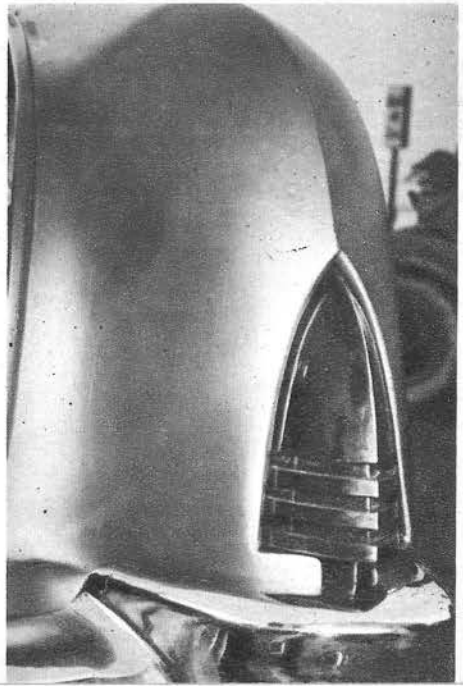
restyling merc taillights

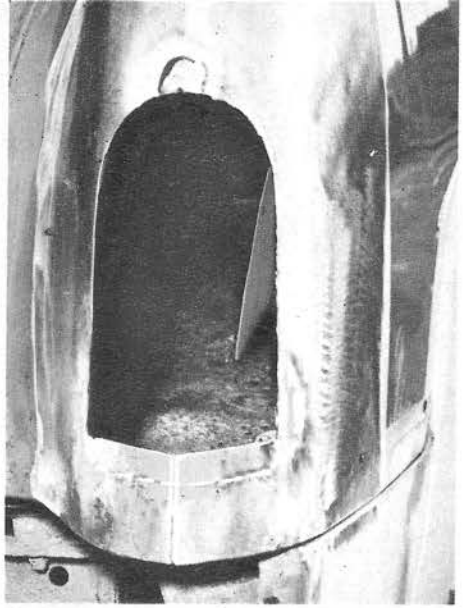
By Dick Day
Photos by Tom Medley

TAILLIGHT restyling is a custom procedure with unlimited possibilities. The job can be treated in a conservative manner like frenching-in or redesigning the stock lights on your car. or by selecting another automobile manufacturer's product to install. To the average beginner, who wishes to install another type, the selection might pose a slight problem, but considering the many varieties of shapes and contours, it should remain relatively simple. The basic thought is to keep the selection within the contours of the fender.

In the case of Roy Gamache's '51 Merc, Norman Rector who operates his own body shop in Los Angeles, selected '53 Lincoln Capri taillight lenses to install. The conversion results were great and the rear section took on a completely different appearance.

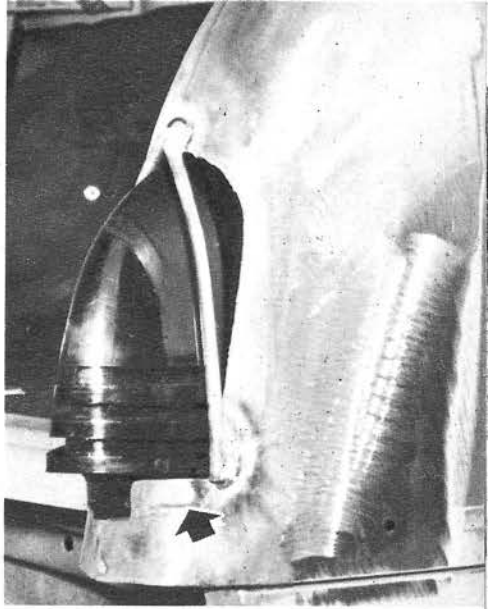
Like all Torch Tip articles. this innovation is not confined to this particular make. Basically the installation was built completely around the Merc's stock taillight opening, as can easily be done with other cars.





1. First remove stock taillights and bumper. With an electric grinder equipped with a 24 grit close coat disc, grind paint down to the bare metal approximately 8 inches back from the opening. At the bottom of opening where dotted line is indicated, enlarge the opening by cutting metal away approximately one inch.

2. Build a small T-perch (arrow) about an inch in height and place inside opening as shown. On top of the perch, insert the '53 Capri lens from the inside of the fender until lens touches the opening at three points. (Small arrows)



3. After determining the position of the lens, braze two pieces of ⅜-inch copper tubing, one to each side, contouring upper part of lens. At the bottom weld two small pieces of 18 gauge sheet metal to each side. (Arrow)

4. Complete lens framework should be as pictured. Drill a ¼-inch hole in T-perch and braze it in position inside fender floor. Hole in perch is for bolting lens unit in upon completion.

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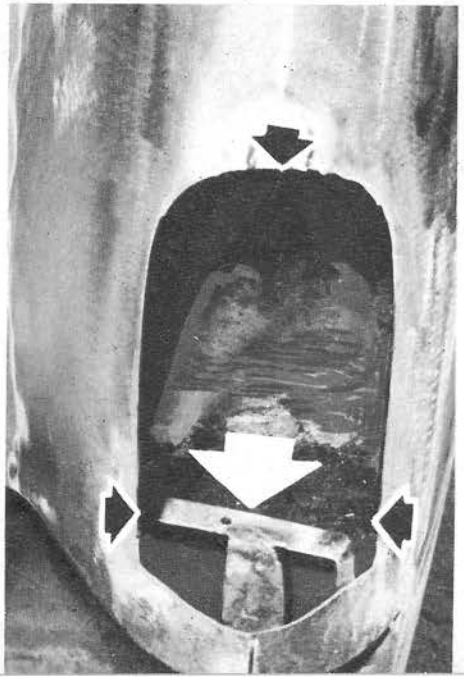
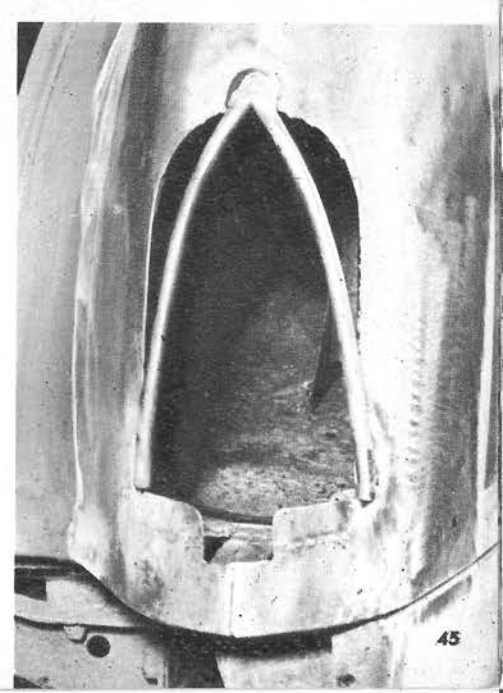
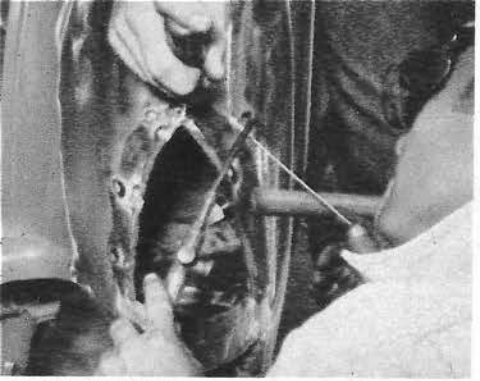
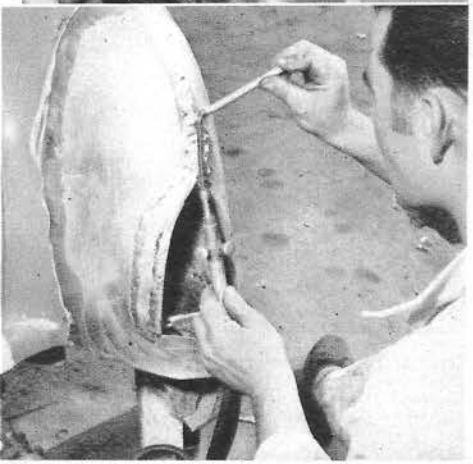


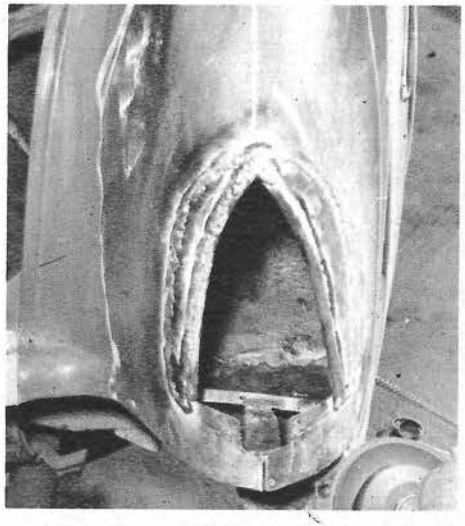




TORCH TIPS continued

5. Fill gap between tubing and fender with 18 gauge sheet metal. Spot braze at 1-inch intervals and then braze solid bead. Warpage can be held at a minimum by cooling area with wet rag as you progress. Warped and low areas may be worked out with a picking block and hammer. Refit lens once again for correct alignment.



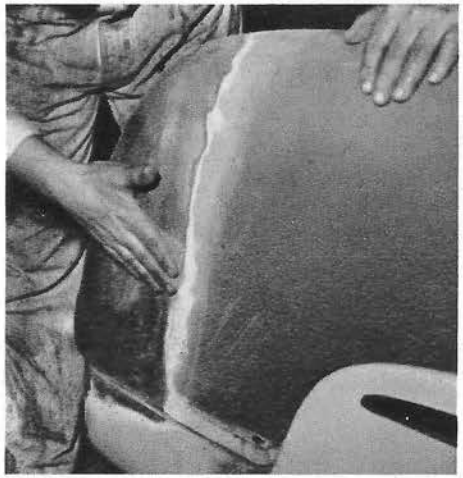


6. Using a 36 grit close coat disc, grind smooth all brazed and welded seams. Next, clean all seams thoroughly with a rotary wire brush.

7. Apply tinning compound with a pad of steel wool while using an open flame to heat the immediate working area. Tin back from the taillight opening approximately 6 to 8 inches. When the area has been completely tinned with the pad, wipe with a clean cloth, still applying heat as you go. This allows tinning compound to be worked out smooth, cooking any oxidation.

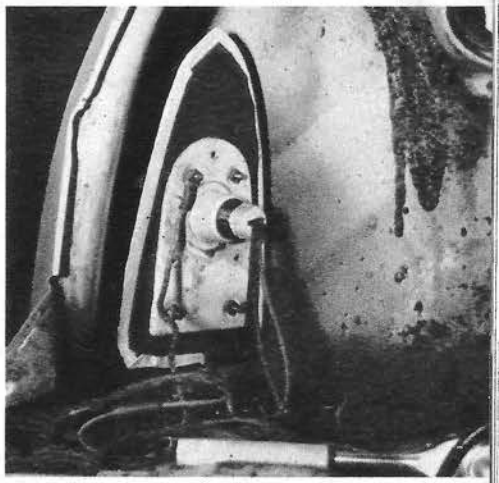
8. Starting at the ridge of the fender apply stick body lead with the torch. After each stick has been applied, smooth the lead to the contours of the fender and low brazed area with wooden paddle while applying heat with torch. Dip paddle in melted beeswax to prevent lead from sticking to it. Work down from the top, one side at a time, making sure each patch of lead is securely fused together.

9. After leading is completed, wash area with lacquer thinner, removing all beeswax. Entire area is now worked smooth with a vixen file. For best results to keep file from clogging and working out low areas, file from at least two directions as you progress. Clean up taillight opening with a small three cornered file.



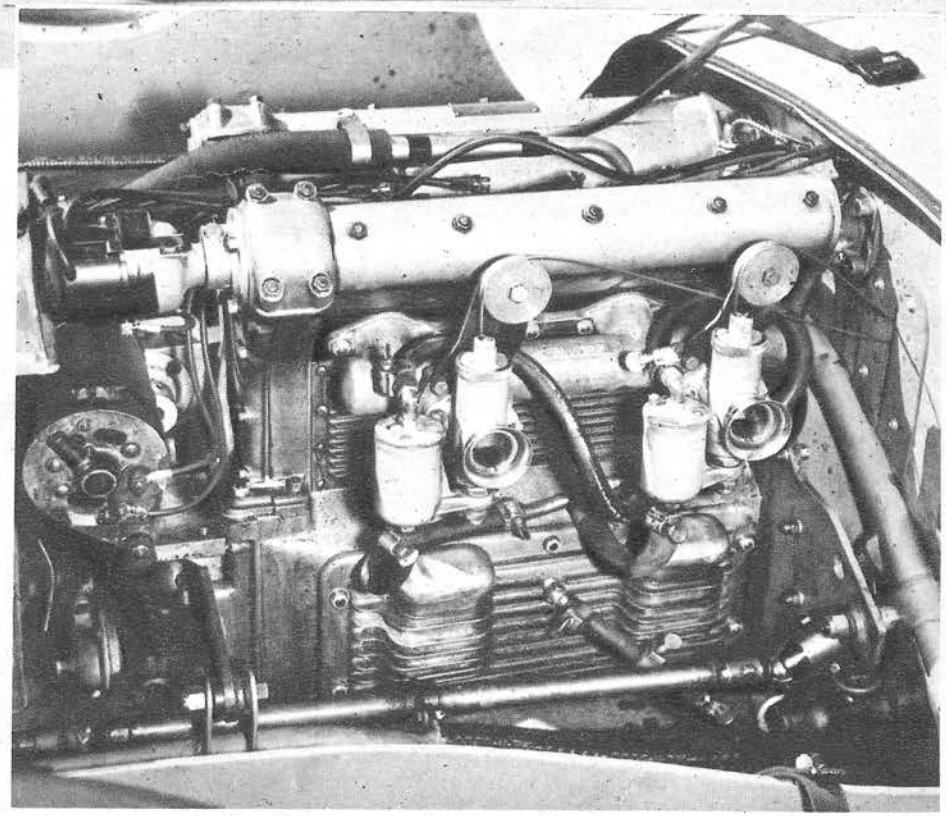
10. Once lead is smooth and fender contour is correct, hand sand with 80 grit paper (dry).

11. With area sanded thoroughly, apply metal prep and wipe dry with clean cloth. Surface is now ready for primer to be applied. Several coats may be needed to cover file marks, etc.; however, let each coat dry before re-spraying again for assured adhesion. First primer coat is block-sanded with 280 grit paper (wet). Second primer coat is sanded with 360 grit (wet). Surface should now be ready for finish paint.

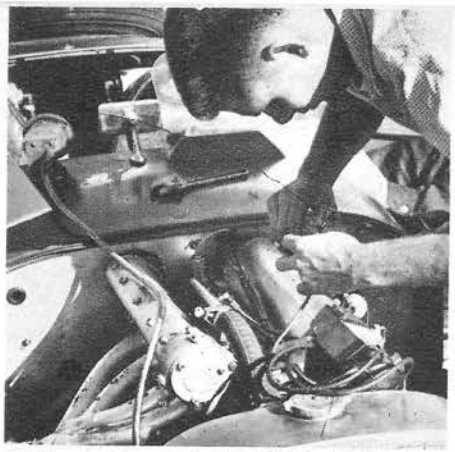


12. To finish the job bolt the Lincoln lens unit to the small T-perch from inside the fender.

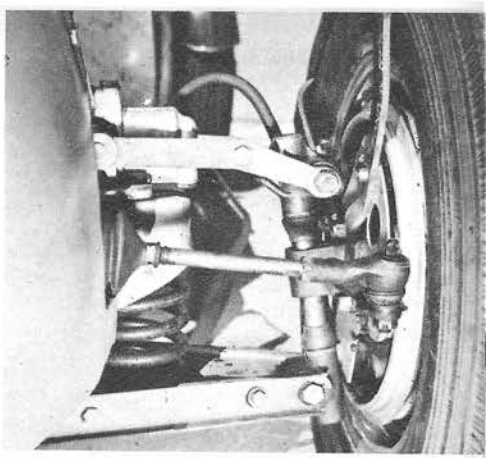
OFFY-POWERED ROAD RUNNER...



• 91 cu. in. Meyer-Drake Offy incorporates changes in carburetion, ignition and cams. Jugs are Amals.



• Pit crewman adjusts ticklish Amal motorcycle carb, soon to be exchanged for Carter.



• Front suspension layout is MG TD adapted to fit tubes. Steering is rack and pinion.

..just a dream child

Photos by Bob D'Oliva and W. G. Brown

YOU might say that George Beavis, late of Australia, had a little experience in racing. Since 1928 to be exact. After a lengthy period as factory representative for Norton Motorcycles, George came to this country in the 30's and started stuffing his foot through the firewall of a midget.

The man admits a fondness for small rapid machinery. He never went to the larger cars although he did quite well for himself in the doodlebugs. World War II killed off midgets for the duration and George had to content himself with bench racing until after VJ day.

After the war, Beavis had a brief fling at the midgets again and then decided to see what he could do with road racing which was just starting up on the West Coast. After going through a succession of MGs, he decided that there just plain weren't enough suds in the MG mill. Rounding himself up a 91 cubic inch Meyer-Drake engine, he set to work

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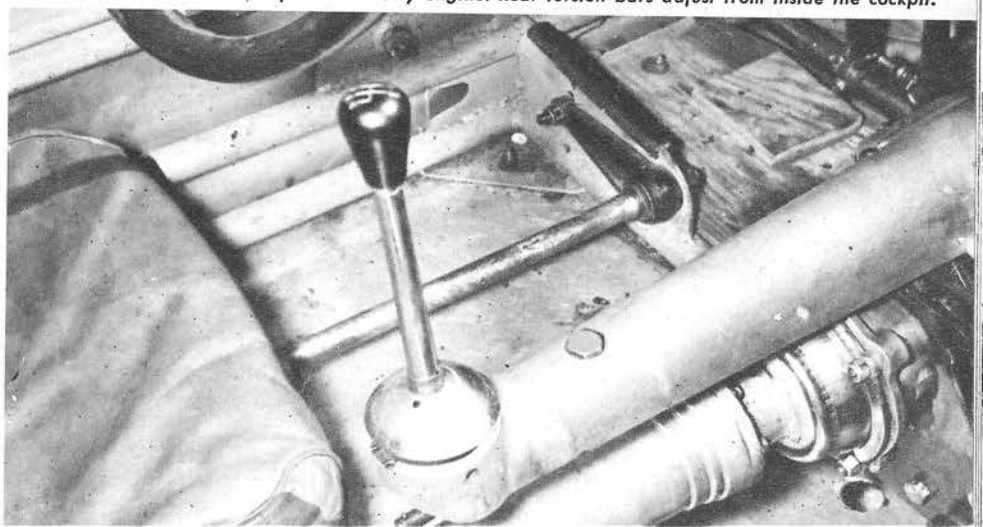
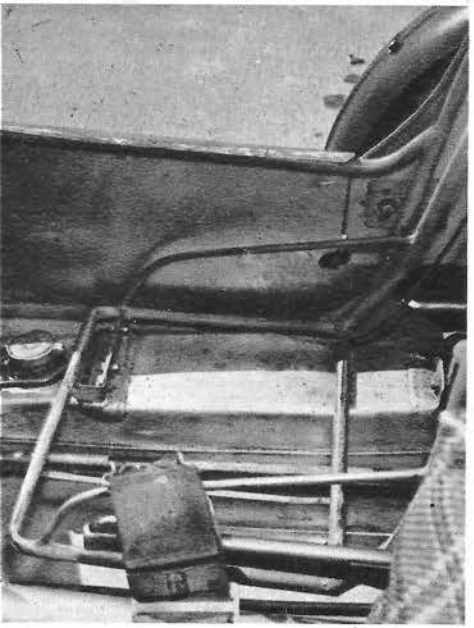
• Transmission is MG TC adapted to fit Offy engine. Rear torsion bars adjust from inside the cockpit.



• *Seats are tube skeletons. Rear end is Pat Warren riding between MG TD axle housings.*

• *Dry sump oil tank is placed beneath passsenger seat. Note small, light frame tubing.*



JUST A DREAM CHILD continued

modifying it to fit his MGTD. In this he had the help of the entire Meyer-Drake crew, who admit to using George for a guinea pig in their plans for developing sports car engines. It was a hard job. As originally designed. the "Offy" is meant to keep wound up tight with only a small spread in the horsepower curve. This meant that the cams had to be changed to produce a lower but longer curve.

Ignition, also, had to be changed. Originally ignition was by magneto mounted on a plate at the front of the block. This spot was now taken up by the generator. The solution was to mount a battery ignition using four coils, four breakers and four condensers on the cam cover a-la Ferrari.

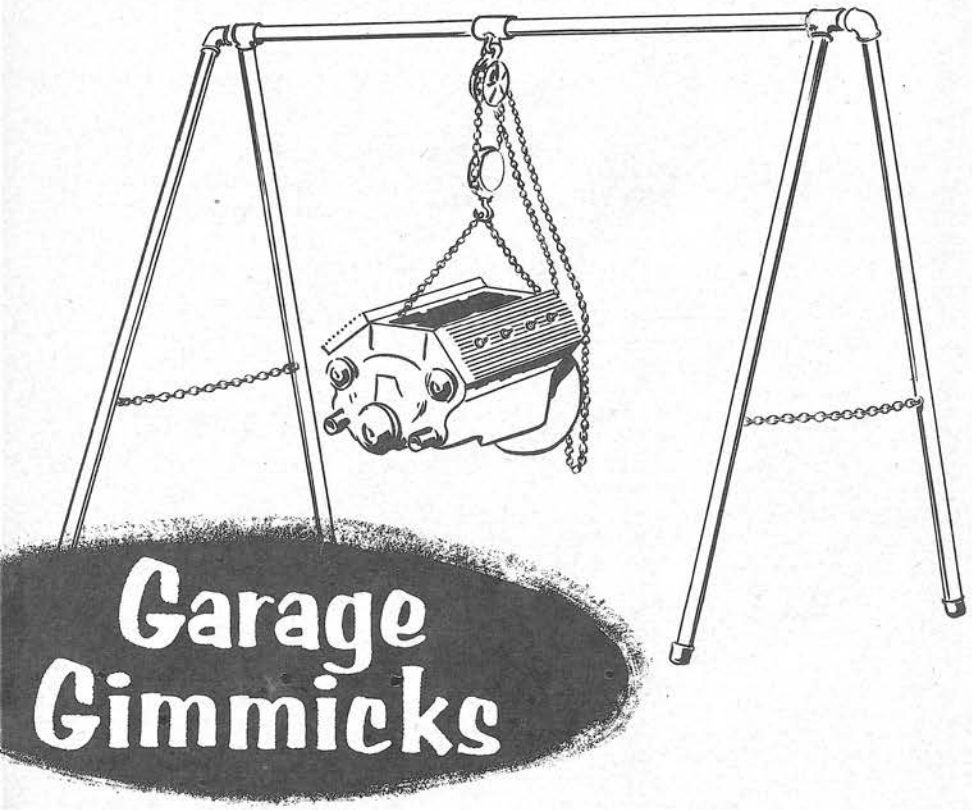
In its present shape the engine delivers 112 bhp over a fairly wide range of rpm and has been cranked up to 8300 rpm on the Meyer-Drake dyno.

Finding the TD a little heavy for all-out racing, George took the car apart and built up a special job with tube rails and a rolled aluminum skin. The TD front suspension was grafted onto the tube rail rig and a special rear end was made up using the TD axle shafts. The center section is a Pat Warren quick-change unit and the housings were specially made by Beavis. The rear end set-up was hung on Morris Minor torsion bars in the best midget tradition. Steering is by TD rack and pinion.

An MGTC transmission was adapted to the Offy engine by means of a special adapter that the Meyer-Drake people thought good enough to schedule for production on their forthcoming powerplant package.

For brakes, George adapted '50 DeSoto two-leading-shoe drums and backing plates to TD Mark II Borrani hubs, giving fabulous braking characteristics to the light car.

Although still in an experimental stage, the car shows promise of terrific potentialities. Even at this stage the racer has blinding acceleration coupled with excellent handling and stopping power, being able to bore deep into a corner before slowing down and blasting out with same screaming ability of the Offy midgets. It should prove a potent threat to such foreign equipment as the Osca and to such hefty hybrids as Ken Miles' MG. George modestly calls it "just a dream child." We should have such dreams.



Garage Gimmicks

CHAIN HOIST STAND

• Chain hoist stand is easily put together from pipe and plumber's fittings as shown here. Length of legs and top bar can be varied slightly without altering the entire design of the rig.

PERHAPS the biggest problem of using the chain hoist is that of where to mount the thing. In some home garages the problem is solved through the use of a sturdy beam set endwise over four or five rafters. In others a beam can be placed crosswise between the side stringers.

However, in many modern home garages, particularly in prefabricated construction, there are not enough rafters to bear the load of hoist and load to be lifted. In many cases the stringers are concealed.

The only alternative is to build some kind of stand to which the hoist can be attached and which will bear the load safely. This can be done in any one of a number of ways and from a variety of materials. One of the best we've seen, however, is a portable rig that can be used anywhere, either in the garage or outside.

By John Christy

This one was used at Bonneville by a team of hot rodders who wanted to run in several classes and so had to change engines on the salt. The very simplicity of the rig intrigued us, since it could be taken down in a matter of minutes and stowed in the back of a pickup truck. It could also be folded flat for storage.

The materials can be found in any plumbing supply house. All that's needed is some 40 feet of three-inch O.D. pipe, six inches of 3 or 3½ I.D. pipe, two three-inch elbows and two three-inch "T" fittings. Four three-inch caps can also be used but are not absolutely necessary.

As can be seen in the plans, the pipe is cut into four eight-foot lengths for legs and one five-foot length for the cross piece. This last measurement can be changed slightly to accommodate a wider car but should not be too long since stiffness will be affected.

The five-foot length of pipe is threaded on each end to fit into one arm of each "T" fitting. A short length of pipe, approximately ten inches in length, is then threaded over its entire length. This is then cut in half and each half threaded into the opposite arm of each "T" fitting from the cross piece. Over each end of the short lengths is placed an elbow.

Next the remaining pipe is cut into four eight-foot lengths. These are each threaded to fit the "T" fittings and the elbows as shown in the plan drawings to form the legs of the stand. To prevent spreading, a chain is passed between the legs on each end of the stand. This can be attached either by welding or by use of a ¼-inch ring bolt passed through each leg. The collar shown in the plans is not absolutely necessary since the hoist can be slung on a short length of chain wrapped around the cross piece. However, the use of the collar will make a finished job of the rig.

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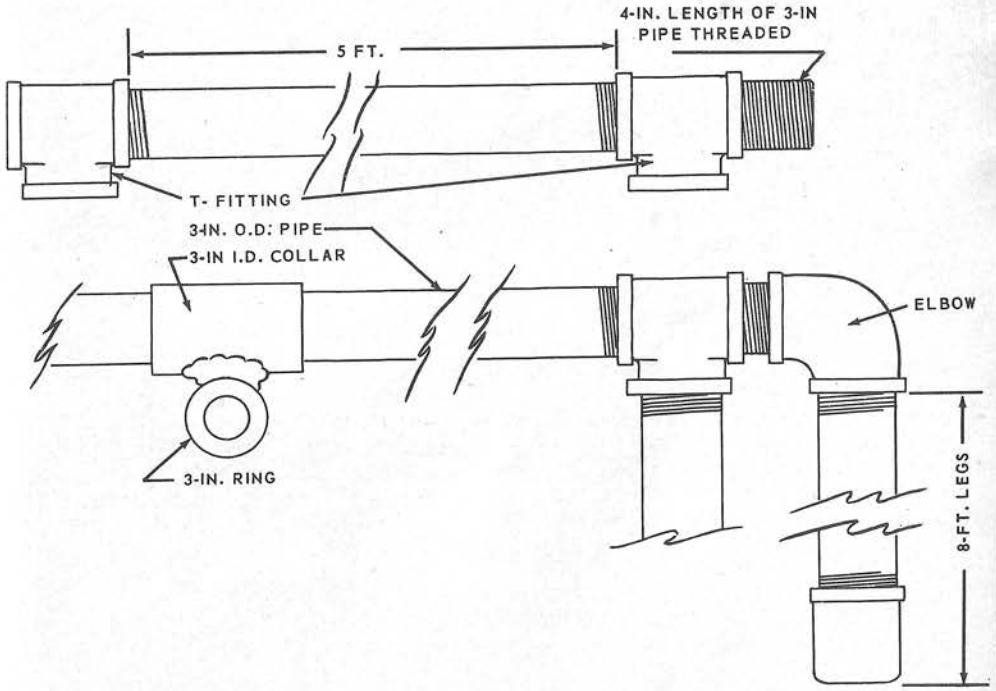


Garage Gimmicks

continued

RATCHET SPRING SPREADER

THERE are several ways to spread an automobile spring for removal or installation. Some methods involve the use of several jacks, a piece of pipe and many curses. Others involve using excess weight on the car and a piece of bar or pipe or even a plank to hold the spring open. Most of these catch-as-catch-can methods involve the danger of a smashed hand.

About the only sure way of spreading a leaf spring is through the use of a tool called, strangely enough, a spring spreader. This is almost always a bar over which is placed a length of tubing. Both bar and tubing are wedge shaped to fit between the eye and the surface of the spring. Some device, usually a large nut riding in threads along the length of the bar, is used to force the pipe and bar apart, spreading the spring.

Here is a simpler way, one that will make use of one of those omnipresent but frustrating bumper jacks with which manufacturers see fit to equip their automobiles. Since most people go out and purchase a more sturdy jack, the stock item usually is consigned to cluttering up the garage or luggage compartment.

The only other materials needed are about 36 inches of two-inch I.D. pipe and a large hammer. A grindstone or large file will also come in handy.

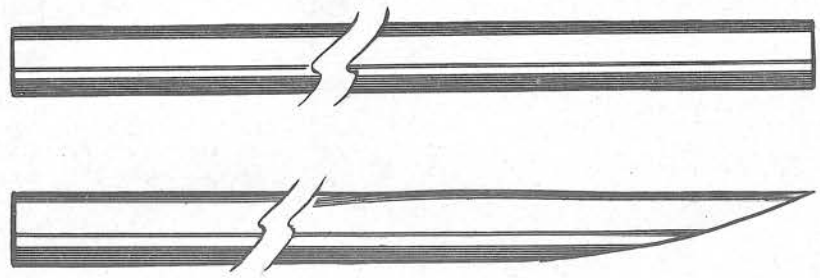
First, remove the lifting device from the bar of the jack and saw or grind off the hook that normally is used to catch the bumper. Then take the bar and flatten the BOTTOM end into the form of a wedge, using a torch to apply heat. Let cool slowly and then grind the wedge to a finished form.

Then take the pipe and heat one end to an orange heat. Pound the heated end flat, being careful not to flatten the pipe too far back. Allow to cool slowly and then grind to a finished shape. The wedge formed should be slightly lopsided as shown in the drawings rather than a symmetrical wedge.

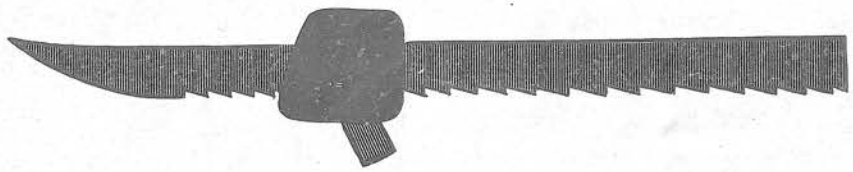
After these operations, slip the ratchet lifting device over the jack bar. Follow this with the pipe. Now all you have to do is to place the assembly inside the curve of the spring and fit the wedged ends snugly between the eye and the surface of the main leaf. Two or three pumps on the jack handle will spread the spring without strain and without a lot of wrench work on your part. To release the spring, flip the jack release down and pump the handle a couple of times. The spring will come back to its original tension without snapping.

It might be wise to add a note in conclusion that this type of spreader will not work on springs with reverse-rolled eyes or on springs which have been torched. If you are an all-out lowering fan, resign yourself to bruised knuckles.

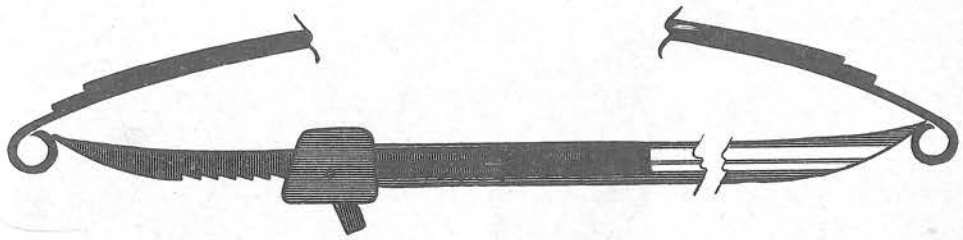
Illustrations by Don Fell



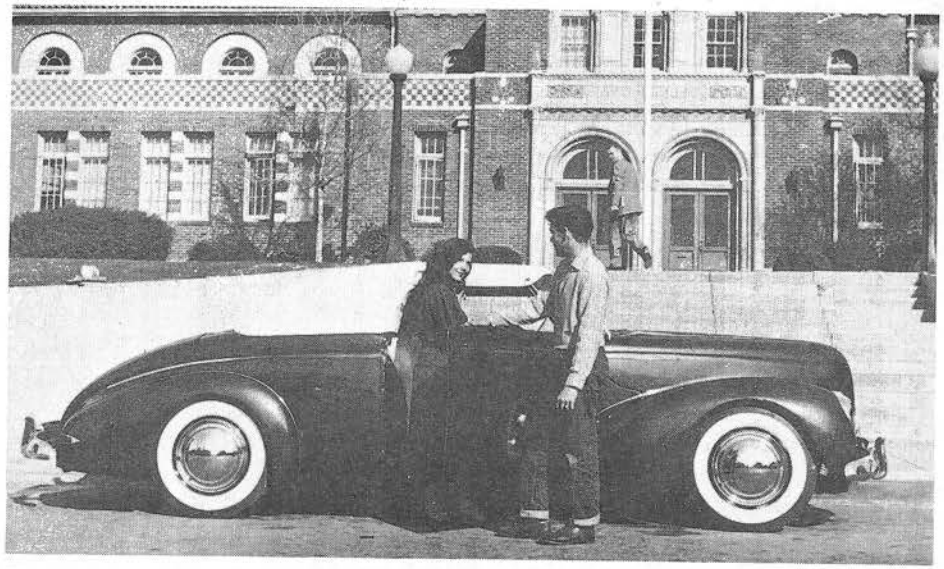
• *From two-inch I.D. pipe make hollow end of spreader by beveling and grinding.*

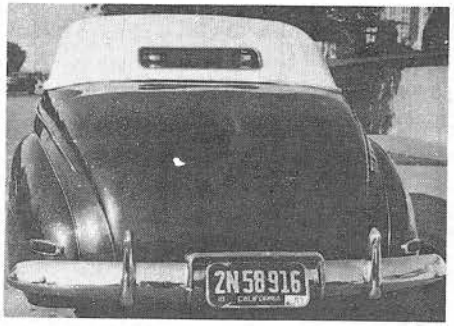


• *Ratchet shaft of bumper jack is beveled to chisel point at bottom end. The lifting hook on the jack carrier is then removed. For use with longitudinal springs bevel shaft on SIDE. For use with transverse springs, bevel as shown in this diagram.*



• *Pipe is slipped over the shaft as shown here. Operation of the jack will spread spring. Curves and ratchets are shown exaggerated for emphasis in explanation.*

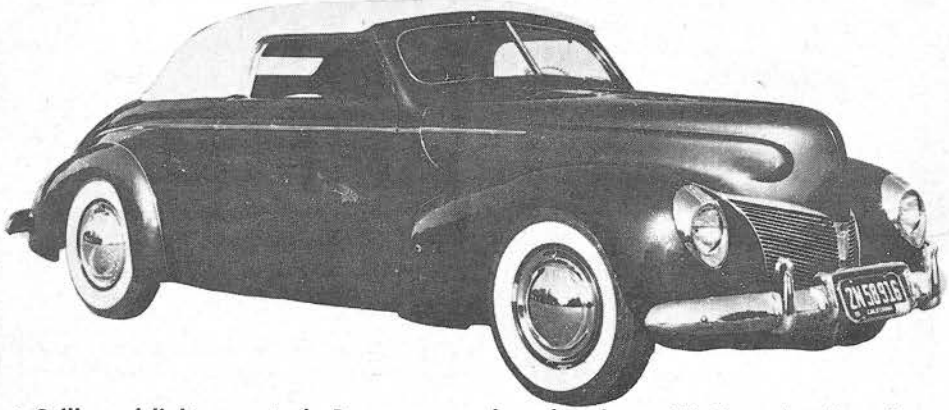




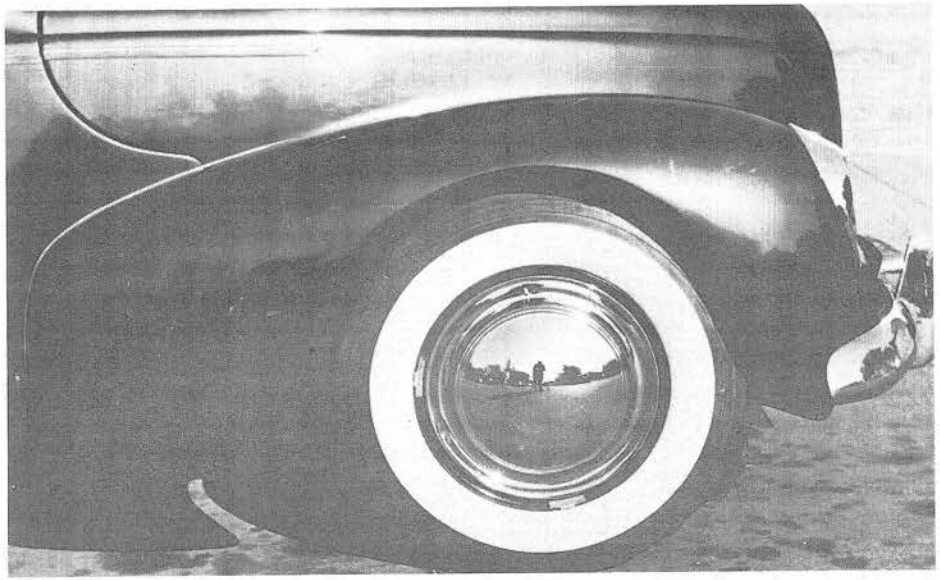
• *Turtledeck has been smoothed. Taillights are '41 Studebaker set sideways.*

DATE BAIT

Text and Photos by Bob Behme



• *Grille and lights are stock. Bumpers, guards and arch are '48 Chevrolet throughout.*



• *Both front and rear fenders have been radiused for wheel clearance and appearance.*

BACHELORS, especially young ones, have a funny way of judging a car. They rate them by their popularity with the opposite sex. If droves of females fawn over the car, demanding rides and favors, the job is really a hot one, no matter how cool the owner may play it.

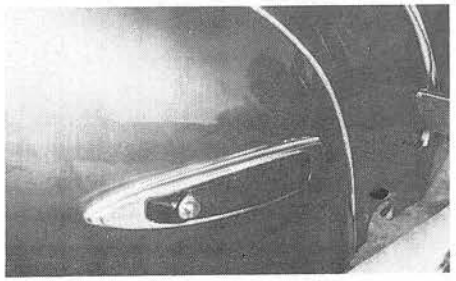
Stockers are notorious duds in this department. It takes a real custom to pile up the points. In Burbank, California, where the cars are thicker than the smog, one car has been getting more than its share of female admiration.

The car is Glen Hooker's channeled '39 Merc convertible which was the subject of a two-part how-to-do-it in recent issues of CAR CRAFT. Hooker completed his project with the help of two uncles, Neil Emory and Clayton Jensen of Valley Custom. The day the dark golden bronze lacquer was dry Glen brought his car to school. It made an immediate and big hit. Females by the score flocked around the vehicle and Glen's steady, pretty "Tommy" Neilsen, not a bad custom herself, had a hard time separating Glen and his car from the throng.

Though Tommy found it difficult to see the reasons for the car's popularity, Glen was well pleased with the response of Burbank's female contingent.

"The hours we spent," Glen murmured, "are about to pay off."

Whether they were or not, Tommy managed to get the first ride.



• *Fender seams are welted in chrome. Note how Stude lights follow fender line.*

• *Glen's steady, Tommy Neilsen, received the very first ride despite competition.*

AUTOMATIC URGE

(*Continued from page 17*)

servos. Large seals on both clutch pistons are not "O" rings, but square-edged seals. Their efficiency depends upon the sharpness of these edges, plus sufficient thickness to cause them to protrude about 1/10 of their thickness out of the seal groove. This is called "pull down" and actually produces the necessary compression of the seal rubber to assure proper sealing. Again, the bores of the cylinders in which these pistons operate should be smoothed as necessary with #320 paper and "crocus" cloth. Trial fits of both clutch pistons into their bores, *without seal rings,* will detect any binding. If any interference exists which cannot be eliminated easily by abrasive paper, replace the part which is causing the binding. As the front clutch remains applied in all forward speeds, cushioning of its initial application is not too critical. This is produced by a small restriction in the apply hole in its hub. This prevents roughness and "times" its initial apply.

As the front clutch is more remotely located from its pressure source (the regulator body) than any other mechanism, it is subject to slippage if seals and mating surfaces along the route are leaking badly. Consequently, if prolonged but gradual slippage does occur, the stack of steel and bronze-faced plates comprising the clutch may decrease in total thickness, without failing. This forces the Belleville spring washer (Part #77565) to flex more than it should to compress the stack. Some cases of fatigue failure of this Belleville washer, improperly attributed to insufficient "beef," have been caused by just such front clutch wear. Accordingly, it is not felt necessary to machine the housing to accommodate two of these spring washers, as was done by Barney Navarro, "My Fordomatic Takes a Beating!" Rather, we feel that elimination of the causes of gradual slippage, such as internal leakage, will insure the long life which was designed into the unit. Of course, higher apply pressures are a necessary part of the final solution, of which we will tell more later. *Hub seals* in these clutches are "O" rings similar to the servo seals. When installed in the hub grooves, they should protrude noticeably and exert some drag when the piston is installed over them. *Piston bores* in contact with these "O" rings should be polished. Sharp edges on the hub at the "O" rings groove will tend to chew at the aluminum piston bore, so radius these slightly if Henry forgot to do so.

All later model transmissions have a modified rear clutch release spring and seat. These reduce any cocking tendencies and assure more positive clutch release. These are designated 1P77515B for the spring and 1P77516B for the spring seat. These parts should be installed without fail on any overhaul.

Most of the preceding suggestions have involved both mechanical and hydraulic modifications, but we will now cover a few which are purely hydraulic. As internal passages which carry pressures around 160 PSI could not be satisfactorily gasketed, almost without exception, metal to metal fits are employed. Efficiency of these joints is due purely to their flatness, plus specification torques on the bolts which join them. The torques may not be improved upon, but production mating fits oftentimes leave much to be desired. The solution lies in careful hand lapping against #280 or #320 wet or dry paper placed on a near-flat surface. As a surface plate is seldom available, use two pieces of scrap *windshield* glass, placed on the flattest bench top in the shop. A piece of five-ply plywood will furnish excellent support for the glass sheets. The abrasive paper will neatly adhere to the glass if it is dipped into solvent before positioning. Wet lapping is much more rapid than dry and prevents "loading" of the abrasive. A "figure 8" or circular motion, with light pressure, should be employed. A "trace lap" of a few light strokes will enable you to determine how much additional lapping will be necessary. Lap only enough to produce a continuous surface around pressurized cavities, don't remove any more stock than is absolutely necessary!

Starting from the front of the transmission, the following surfaces should be checked by "trace lapping" and fitting with Prussian Blue:

1. Regulator body—two die-cast halves lapped flat and separator plate checked. Lap small flapper check valve.

2. Regulator body to transmission case joint, with finishing grade valve compound. Use regulator body as a "lap."

3. Valve body, all mating surfaces. This should include four small steel cover plates and ten parting lines of the valve body lapped on glass. Also mate the rear pump check valve and seat in the main body.

4. Valve body separator plate to transmission case parting line. As this surface is slightly recessed below the case oil pan surface, the separator plate should be "mate lapped" to it, with finishing compound, while the valve body is disassembled.

5. Governor (77131) and counterweight mating surfaces.

6. Oil distributor (77881) and distributor sleeve (77882) mating surfaces.

7. Rear oil pump cover (77860) lapped flat, housing (77850) mating surface minimum lap to produce flat surface. Clean all parts, reassemble pump, check for free rotation of gears. If too tight, lap *binding gear* as necessary.

8. Lap rear face of front pump stator support (surface of front pump which rests against case).

9. Lap front face of rear clutch piston (77514) surface which contains cavities. This is to improve valve action which steel plate must accomplish as it is compressed against the piston face. (One cavity contains a bleed hole.)

10. Check cheek of rear servo at rear mating surface. As servo is fed through a "V" shaped passage drilled in the case, both surfaces around this passage should be flat.

At this point, it should be obvious to the interested reader that the transmission tolerates a certain amount of internal leakage. If this leakage does not rob clutches or bands of sufficient pressure to produce slippage or destroy the "timing" of shifts, it will never be harmful. As this amount is very difficult to determine on inspection, the safest course is to eliminate leakage wherever it *could* occur. The above list covers most of these possibilities.

Caution!

In any case where valve finishing abrasive compound has been used to mate lap parts, these parts should be thoroughly washed with soap or detergent and *hot* water. Blow parts dry and coat with transmission fluid to prevent rust. If parts have been smoothed on wet or dry paper, cleaning solvent will remove the abrasive.

CONTROL SYSTEM MODIFICATIONS

As this clever system is designed to "sense" driving conditions, we can easily modify its response by changing the balance values of certain valves. As more pressure is desired to prevent clutch and band slippage, the first obvious modification would be to increase the tension of 1P77463-A, the control pressure regulator spring. This has been done by spacer washers or substitution of the truck spring, PAD-77463, which is shorter but stiffer than the passenger car spring. This procedure is *definitely not* recommended by your writer, as it produces unnecessarily rough initial clutch and band applications. "Initial" applications are those which occur when the shift lever is moved from Neutral to any of the three gear positions—Lo, Drive, or Reverse. Roughness of initial apply is not only objectionable but unnecessary. Control pressure under these conditions of "no throttle pressure" should be 60-80 PSI in passenger car and 76-96 in the truck. As no load exists on the transmission under these conditions, these pressures are adequate. However, when maximum engine torque is being transmitted, control pressures must rise to prevent slippage. Therefore, this *pressure rise* is a most important factor.

As the transmission must withstand maximum stress in Lo and Reverse, pressures in these ranges are higher than in Drive. If we can fool the control system into thinking it is in Lo while in Drive range, we will obtain a desirable 20 psi increase in maximum pressures and also a more rapid pressure rise. As the valve which determines the upper limits to which control pressure will rise is the *modulator valve*, a simple modification to this valve will be our first modification. To increase modulator spring tension, remove the *front plate* or *throttle stop*. Directly under the end opposite the "dog leg" of the plate will be found the Modulator Spring. It must be installed exactly this way. An ordinary #8-32 *round head* screw, about 3/8 inch long, inserted into the modulator spring will serve as the necessary spacer.

(*Continued on page 64*)

THE FORGOTTEN PLUG

(*Continued from page 43*)

the center electrode and the porcelain insulator, or between the porcelain and the outer shell. Sand lodged in the plug may be easily removed by a blast of compressed air or with a very fine wire, taking care not to chip or crack the porcelain. If the sand is not removed, it can and eventually will cause shorting of the plug with consequent misfiring.

As in choosing a spark plug of the correct heat range, there is no hard and fast rule regarding the proper spark plug electrode gap to use in a specific engine. Generally, it is necessary to hit upon a happy medium that will give good performance in all speed ranges. Extremes in spark plug electrode gaps have a very pronounced effect on engine performance. So we find that the correct electrode gap is again a matter of compromise and experimentation. With the modern stock and modified engines using increasingly high compression ratios, it is good practice to reduce the electrode gap somewhat, because the higher the compression ratio, the more resistance there is for the spark to jump the gap, due to increased pressures in the cylinders. In an extreme case with a very high compression ratio and a very wide electrode gap, it may be found, while the engine is under load, that the ignition system will refuse to send a spark across the gap, which results in misfiring and causes the spark to jump elsewhere in the ignition system where the resistance is less than it is in the cylinders. However, a comparatively wide gap will result in better starting, idling, low speed operation and fuel economy, but high-speed performance will suffer. Conversely, a narrow gap will give good high speed performance, but not without a loss of low speed efficiency. As a general rule, the electrode gap should never be reduced any more than absolutely necessary to obtain good performance in all speed ranges. For example, the recommended electrode gap for late model stock Fords and Mercurys is .032 of an inch, but in modified engines, performance will be good with a gap of .022 of an inch. The same engine will perform even better with a gap of .025 of an inch.

The electrode gap should be checked on all new or used plugs before installing them in an engine. The gap must be checked with a gap setting tool, consisting of varying diameters of round piano wire. This method is much preferred to using a flat feeler gauge. If the gap needs correcting on a new normal passenger car type plug with the ground electrode on the end, the ground electrode only should be bent to conform to the desired gap. No attempt should ever be made to bend the center electrode because, invariably, the porce lain insulator will crack or chip, thus ruining the plug. Old or used plugs, in which the ground and center electrodes have been eroded, should be filed with a small flat file until the surfaces are flat and bright. The ground electrode should then be bent to conform to the specified gap as described above.

The colder types of spark plugs, specifically those made for foreign and racing engines, are constructed with a side ground electrode, in which the ground electrode wire is pressed into a hole drilled at right angles to the threads. Adjustments to the electrode gap of plugs constructed in this manner must be made by the use of a special tool, available from the spark plug manufacturer. The electrode gap of this type of racing plug is generally specified to be between .015 and .018 of an inch, depending upon the engine and the type of ignition. Usually, the narrower gap is specified for magneto ignition systems. The gap should also be measured with the abovementioned type of piano wire gap setting tool.

Before a set of plugs is installed in an engine, it is essential that the area immediately surrounding the threaded spark plug hole in the cylinder head be thoroughly cleaned. Any paint, dirt, grease or other foreign matter must be scraped off or washed with solvent until the bare metal is exposed. Any foreign matter between the spark plug gasket and the cylinder head will retard the flow of heat from the plug to the engine cooling water, causing the plug to run and appear as though it were too hot. Care must be taken to prevent the loosened foreign matter from falling into the spark plug hole. The spark plug threads in the cylinder head should be cleaned with the proper size bottoming tap and blown out with compressed air.

When a new or used spark plug is installed in an engine, a new spark plug gasket must be used for best results. Spark plug gaskets are usually of "French" type construction, consisting of a ring of asbestos that is encircled with a formed copper cover. The smooth side of the gasket must be placed against the spark plug with the seamed side against the cylinder head. If the gasket is inadvertently turned over, there will result about a five degree Fahrenheit lowering of heat transfer qualities. In other words, a reversed gasket will result in a hotter running plug by from 1/10 to 1/8 of one heat range. For the sake of consistent coloring between plugs, which indicates whether the plug is of the correct heat range or not, new gaskets should be installed as specified or else a false color "reading" could easily be made.

There is one more item that has a very important bearing on maintaining the proper heat transfer qualities of a spark plug. This is the matter of tightening the plug in the cylinder head. The tightening force, or torque, is measured in foot pounds and by the experience gained from spark plug manufacturers through the years, very definite torque values have been established for spark plugs of all thread sizes in cylinder heads of both cast iron and aluminum. The following chart shows the recommended torque values in foot pounds for the most frequently used thread size of spark plugs:

THREAD SIZE	CAST IRON HEAD	ALUM. HEAD COLD	ALUM. HEAD HOT
10 mm.	14	11	7
14 mm.	30	27	23
18 mm.	34	32	28

If a torque wrench is not available, the spark plugs should first be screwed into the cylinder head until they are finger tight, then tightened with a deep socket wrench of the correct size as follows:

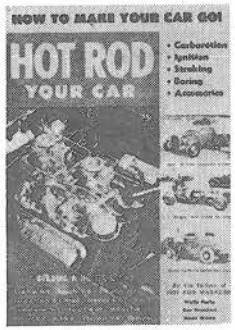
THREAD SIZE	CAST IRON HEAD	ALUM. HEAD COLD	ALUM. HEAD HOT
10 mm.	1 turn	7/8 turn	3/4 turn
14 mm.	3/4 turn	3/4 turn	5/8 turn
18 mm.	3/4 turn	3/4 turn	1/2 turn

From this it can be seen that spark plugs, as small and insignificant as they may seem, require frequent and intelligent servicing. Properly selected, installed and cared for, a set of spark plugs will give long service.

LIL' BEEP

By Dick Day

√ Check List for Car-Minded Men



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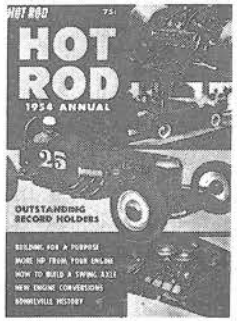

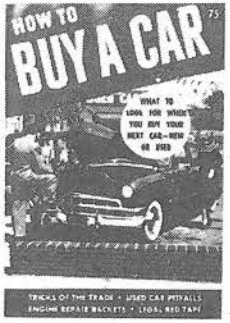

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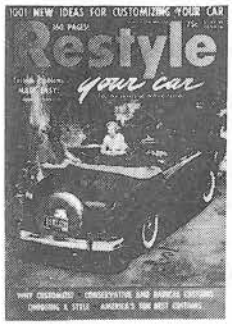

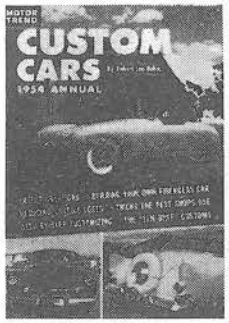

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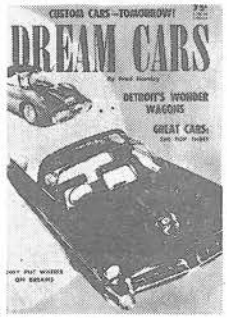

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AUTOMATIC URGE

(*Continued from page 59*)

Also suitable would be a filister head screw of the same dimensions. Additional spring pressure forces the modulator to assume nearly the same position it does in Lo and Reverse and obtains the correspondingly high maximum pressures of those ranges in *Drive* position.

One suggestion, however, may save time. Before any transmission disassembly whatever, a pressure test should be made to determine if pressures and *pressure rise* in Drive, Lo and Reverse ranges are *normal.* Appropriate correction should be made at that time, otherwise no evaluation of actual results will be possible after these suggested modifications have been made.

If you intend to use your passenger car to tow trailers of over one ton gross weight, we suggest the installation of a truck pressure regulator body and control pressure spring. As the truck regulator body routes converter return flow out through the ⅛ inch pipe passage on the front right side of the case, this flow must continue through a truck oil cooler and back to the sump. Failure to provide this return would cause excessive back pressure in the converter and resultant damage. The normal passenger car regulator body returns converter exhaust directly to the sump through a hole in its cover.

Momentarily forsaking hydraulic modifications, it would be wise to point out that the most efficient means of enabling your automatic to pull heavier loads is to substitute higher numerical ratios in the rear axle. As torque obtained in this manner is far more economical than forcing the converter to multiply torque, it also results in less converter heating and would consequently make the installation of the cooler superfluous. Gears available of higher numerical ratio are as follows: Passenger car—3.31, 3.54, 3.73 (1951), 3.9, 4.10; Wagon series or F-100—3.54, 3.92, 4.09, 4.27. Another desirable modification concerns the speed at which Lo gear will finally come in when slowing down in "Lo" range. Normally, the transmission will obtain *Intermediate* if the selector is moved from Drive to Lo above the 21-27 mph range. As many object to the intensity of the shift to *Lo gear* as the car slows

(*Continued on page 66*)

AUTOMATIC URGE

(*Continued from page 64*)

through this range, it may be desirable to lower the range of the shift. This is accomplished by cutting approximately 1/16 inch or 1½ turns off the end of the Low inhibitor valve spring. Until you find out how much to remove, better go easy or the drop-down speed will occur so low that the braking effect of Lo gear will be of less use. No other departures from standard specifications are desirable or recommended. In fact, when a Fordomatic or Mercomatic is "tight" very little damage can be inflicted upon the unit with considerable abuse.

LETTERS

(*Continued from page 9*)

HORSES AND MONEY

Dear Sir:

I am a regular reader of your CAR CRAFT magazine, which is the "most" as far as I'm concerned.

I'm seeking some information and think you are very well qualified to give it to me!

I have a '53 Mercury Monterey and am very interested in making it "go."

Would you please advise me on how I could soup it up, yet not go broke doing it.

Thank you,
Richard Carroll
c/o FPO San Francisco, Calif.

P.S.—Keep up the good magazine!

Your problem is much the same as that confronting all of us, Dick, that of pouring on the soup without winding up in debtor's prison. About the best thing that we can recommend is the use of the standard bolt-on equipment made by any one of several reliable manufacturers, many of whom advertise in CAR CRAFT. *For results produced by this equipment see the February issue in in which the lead story details the tests conducted on this type of speed equipment.*
—Ed.

STOP PEEKING

Dear Sir:

Please pardon my peeking at Lizzie's private area (December—page 16), but I thought I saw a Ruxtell axle and perhaps a gear shift lever in the picture on page 17.

Emery M. Howe
Pasadena 10, Calif.

Lizzie does have a Ruxtell axle.—Ed.

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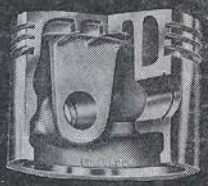

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