

# REBEL BREAKS RANKS

*Restricted to economy engines for years, Rambler has finally gone on the attack with some real horsepower to bolster its other outstanding features.*

By RAY BROCK

In keeping with HRM's policy of trying to give our readers a true report on Detroit's "super-stocks" or "performance models" as they are sometimes called, we selected the American Motors Corporation's new Rambler Rebel for our guinea pig this month. There is only one model available in the Rebel series and it is easily distinguished from other Rambler cars. The body style is four-door hardtop sedan with Silver-Gray exterior paint and a full-length gold-anodized aluminum trim piece along the side of the car. The thing that really makes it differ from the other Ramblers, though, doesn't show from the outside but is readily apparent either by lifting the hood or by tickling the throttle. The big difference is in the power department.

The engine is a 327 cubic inch V8 with 255 horsepower that was developed by American Motors and used with a smaller 250-inch displacement in the 1956 Hudson Hornet and Nash Statesman cars. An SAE report prepared by American Motors engineers upon completion of their new V8 in 1956 gave four objectives that were closely followed in the development of this engine. First: it was to be flexible enough in design to be readily adaptable to future displacement requirements, compression ratios or other necessary revisions. Second: the engine was to be easily installed in present as well as future bodies and also to be readily accessible for service in these bodies. This meant that external measurements should be kept at a minimum. Third: the engine was to use the latest and most economical manufacturing processes. Fourth: the engine was to be of the lowest possible weight without sacrificing durability.

The first objective was quickly proven when the original 250 cubic inch displacement was raised to 327 and the 8.0 compression ratio was raised to 9.5 in the 1957 version of the engine. The engine was flexible and an extra 1/2-inch bore was easily taken care of by a slight core change in the block. The second objective, size, was also met. To meet future styling demands, the engine had to be low and for installation ease it

had to be of minimum length and width. The short, 3 1/4-inch stroke was chosen to permit low height and a minimum width. This objective was also met as can be seen by a 25 5/8 inch width across the widest portion of the complete engine, the exhaust manifolds. Height is also very nominal, 14 7/16 inches from the crankshaft centerline to the carburetor flange on the intake manifold. From the crank to the bottom of the pan is approximately 9 inches. Length from the bell housing face on the block to the center of the fan pulley is 27 3/4 inches. A third objective, manufacturing, was met to AM's satisfaction and the fourth objective, weight, was also well taken care of. The weight of the 327-inch Rebel engine is just a few pounds over the 600 mark, complete with standard accessories and clutch but less transmission. The 327-inch displacement of the new V8 comes from

a four-inch bore and a 3 1/4-inch stroke.

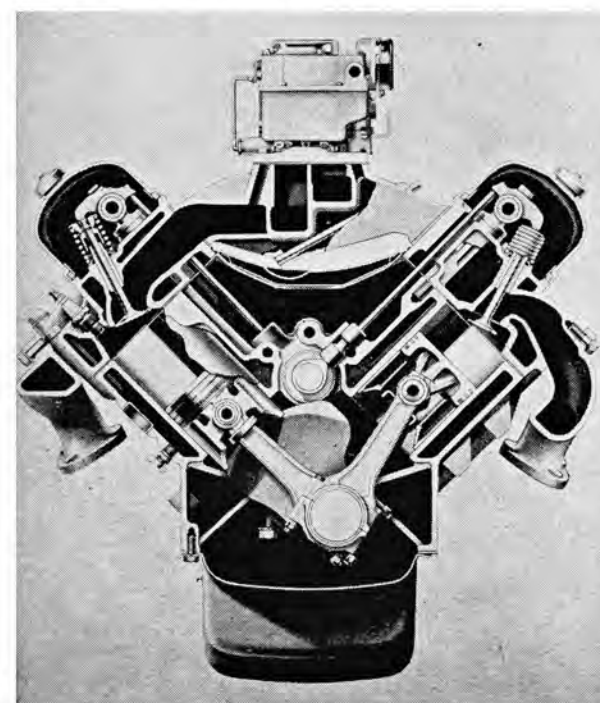
Pistons are aluminum alloy, steel insert, Autothermic type with slipped skirts. The slipper skirt is shaped to match closely the cam turned counterweights on the crankshaft when at bottom center. This permitted a shorter rod and allowed the shortest possible cylinder block heights which in turn meant an engine with minimum height for a given stroke. Three rings are used on the pistons with the top compression ring and the two rails of the three-piece oil ring chrome plated on the wear face for maximum life.

The crankshaft is a steel forging with five main bearings, six counterweights and a finished weight of 62.8 pounds. As mentioned previously, the counterweights are cam turned and are also chamfered next to the throw to match the piston slipper contour. An interesting feature of the 2 1/2-inch crankshaft main bearings

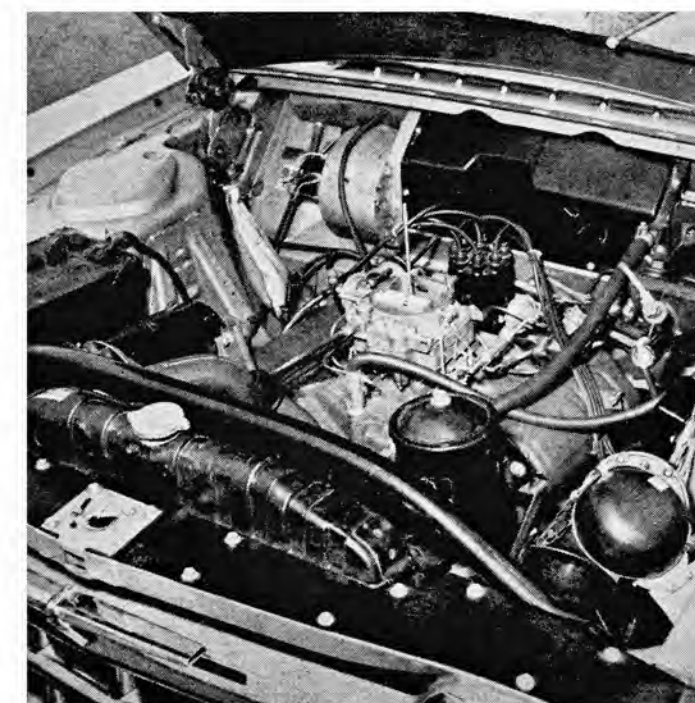
is that inserts for all five mains are the same size and width with the exception of the front bearing which is flanged for crank thrust. Unless forewarned, a mechanic taking one of these engines apart for the first time is liable to think that somebody goofed at the factory because the rear main journal is about twice as wide as the first four journals, yet the rear insert width is the same as bearings 2, 3 and 4. The inserts are designed this way to simplify assembly and also to keep bearing cost down.

While on the bottom end of the engine we might make mention of the oil pump which is actually an integral part of the rear bearing main cap. This close-coupled arrangement between pump and main cap was designed so that the pump would be high, as close to the crankshaft centerline as possible, thereby permitting the oil pan sump to be moved fore or aft

*Well designed V8 used in the Rebel has deep block for added support to the mains, 327 cubic inches, a 4-inch bore and 3 1/4-inch stroke. Rated power is 255; torque, 345 lbs./ft.*



*View of engine compartment minus carburetor air cleaner discloses a compact but neat arrangement. Extras included power steering, power brakes but not air conditioning. Note front coil spring well.*





*Tech Ed Ray Brock at 6'2" is much taller than the compact six-passenger Rebel V8.*

## REBEL BREAKS RANKS continued

as steering linkage placement on future models might require. This feature should also make adaptation into earlier chassis simple since the pan can be altered for steering clearance much more so than can other V8 engine pans. Oil routing from the positive displacement gear pump is to the main oil gallery above the cam bearings, into a groove machined in each

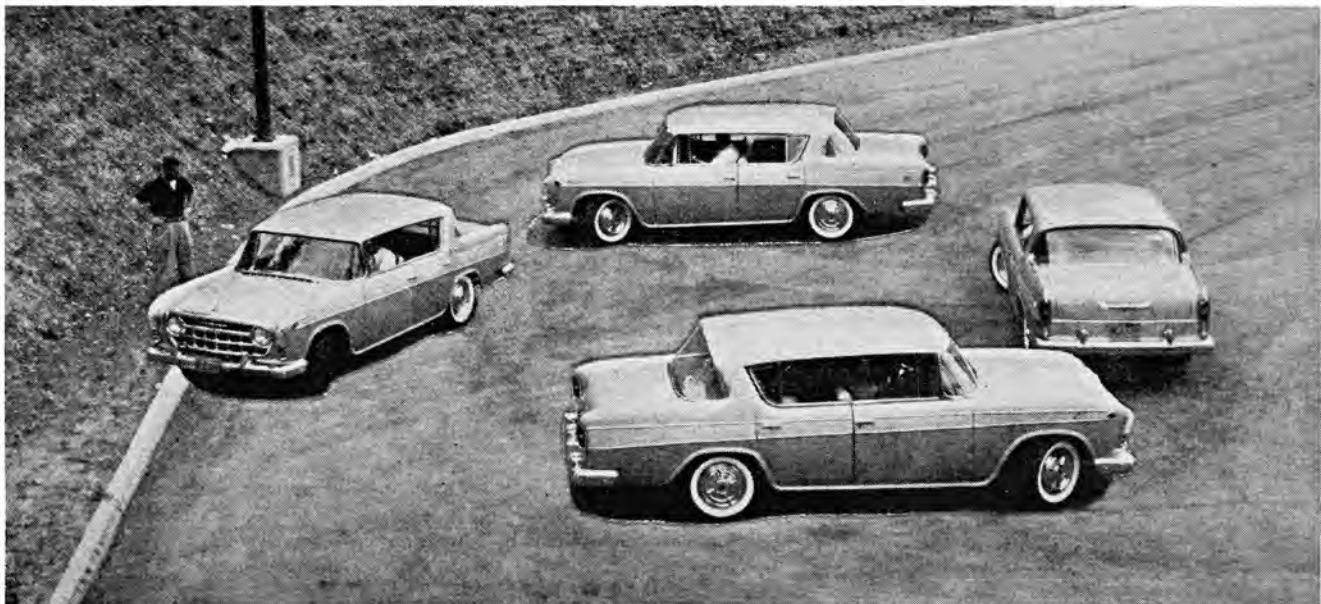
cam bearing web, down to the main bearings and then through the crank to the rod journals. Two more galleries feed the tappets and then pass the oil through rocker arm supports into hollow rocker shafts and to the rocker arms.

The rods are steel forgings with a 6.375-inch length between centers. The pin bore is a press fit for a steel piston

pin .9305 inches in diameter. On the crankshaft end, the rod is bored for steel backed micro-babbitt inserts that clamp to the 2¼-inch rod journals.

The cylinder heads are interchangeable and feature a kidney-shaped, wedge-type, cast chamber which AM believes to offer advantages not found in other chambers. Intake ports are individual and the ex-

*To illustrate small turning circle of the Rebel, 37½ feet, car is shown at four points.*





Unit construction of Rambler body and frame has nearly 9,000 welds which make the one-piece unit rattle-free. Mounting wells for the wide spaced front coil springs are stampings in fender panelling.



The Rebel is an agile car in city traffic and a cinch to maneuver into a parking place. Only the most violent cornering reveals the car has 58 percent of its weight up front.

haust ports are individual for the end cylinders but use a Siamese port for the center cylinders of each bank. Port design is such that cross-sectional area of the ports is greater than the area of the valve opening. A gradual tapering of port area to the valve is designed to increase gas velocity at the intake valve and create a 'ram' effect which will, in turn, increase engine torque. A gradual enlargement of the exhaust port as gases move from the exhaust valve to the manifold was designed to minimize back pressure and give more efficient scavenging. Large area cast iron exhaust manifolds carry the burned gases to a dual exhaust system with straight-through type mufflers. More about these mufflers later. An interesting feature on the head-to-exhaust manifold matching is that gaskets are not used, merely a ground surface on each which permits leakproof fits.

Valve sizes are 1.787 inches for the intake and 1.406 inches for the exhaust. Using today's standards, these valves are

not too big but judging from the head design, there is plenty of room for valve size increase and AM will undoubtedly do just that when they feel the time is ripe. Both intake and exhaust valves use the same single spring with 85-91 pounds pressure closed and 150-160 pounds open. Lifters are mechanical on the Rebel engine with clearances of .012 intake and .014 exhaust (hot) used. Adjustments are made at the rocker arms which have a 1.5 to 1 ratio. Cam timing is very mild on the Rebel engine with 244 degrees of duration on both the intake and exhaust valves, intake opening 12° 30' before top center, exhaust closing 10° 30' after top center and only .375 inches lift at the valve. Between increasing valve size and cam timing, a large jump in performance should be expected from this engine.

Carburetion for the 255 horsepower Rebel engine was originally scheduled for the Carter four-barrel carburetor with an optional Bendix fuel injection system and a horsepower increase to 288. The

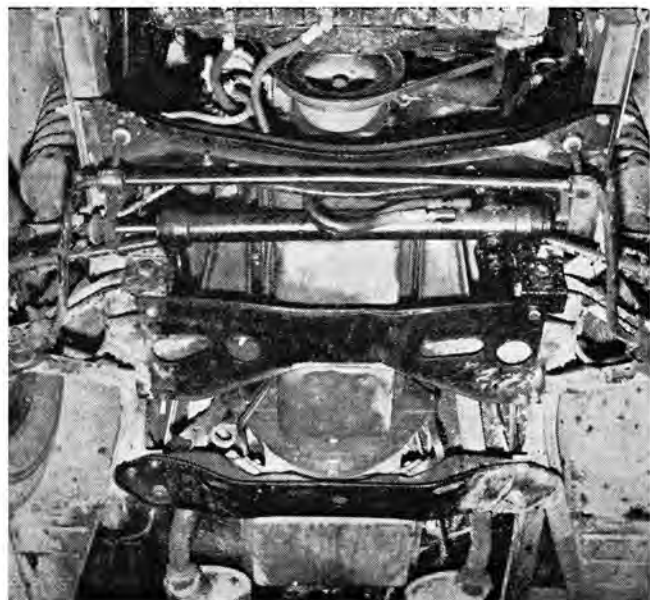
Bendix "Electrojector" is as implied by the name, an electronically controlled fuel injection system which uses transistors and other electronic devices to sense engine requirements and to feed the proper amount of fuel to the individual ports at the proper time. At some point between planning and production, a few flaws were evidently discovered so the optional "Electrojector" was withdrawn from the Rebel until the trouble is solved. The Carter WCBF four-barrel carburetor is therefore used on all Rebels.

The Rebel electrical system is 12 volt and the ignition is supplied by the new ('56) Delco-Remy distributor with external point adjustment that permits setting the dwell angle with the engine running. Spark plugs recommended are either Auto-Lite AL-7 or Champion H-10.

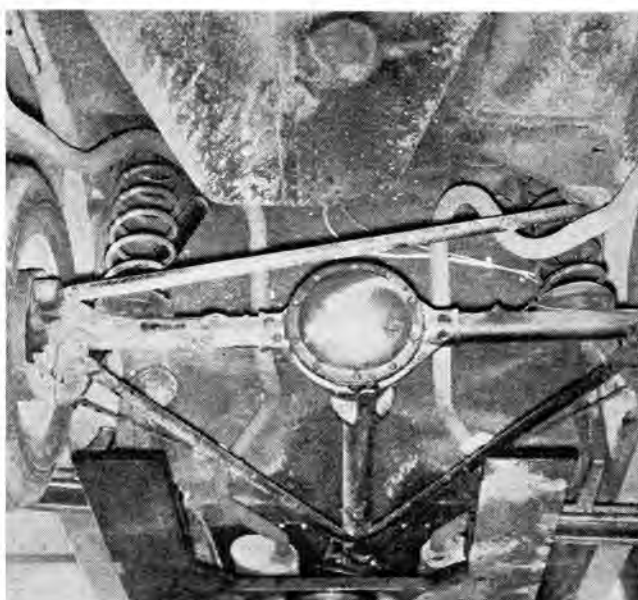
In the transmission department two types are available, the standard shift with overdrive or the "Flashaway" Hydra-Matic. For the stick shift transmis-

(Continued on page 62)

Monroe link booster power steering unit gives driver an assist without eliminating "feel" of the road. Note wide set coils.



Torque tube rear end uses coil spring suspension and long anti-sway bar to stabilize car. Shocks are Gabriel Adjustomatic.



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## REBEL BREAKS RANKS

continued from page 19

sion, a Borg & Beck 10-inch pressure plate and disc are used. Gear ratios in the standard transmission are 2.57 to 1 in low, 1.55 in second, direct in high and 3.49 in reverse. The overdrive unit reduces engine rpm at a given speed by .70 and the standard rear end ratio for the overdrive model is 4.10 to 1.

The "Flashaway" Hydra-Matic, with which our test car was equipped, is made by the Detroit Gear Division of General Motors and is basically the same as the Olds "Jetaway" or Pontiac's "Strato-Flight." Gear ratios for the "Flashaway" are 3.97 to 1 in first, 2.55 in second, 1.55 in third and direct in fourth. Reverse ratio is 4.31 and the standard rear end ratio with this transmission is 3.15 to 1.

The drive line on the Rebel is torque tube with steady braces from the fore part of the tube to brackets located near the backing plate for added lateral strength. The rear end is of the Hypoid type and has a cast steel center section with steel tube axle housings welded to the center piece. Rear axle suspension is by coil springs with a long anti-sway bar from a bracket on the left axle tube to another on the right side of the body-frame single unit. Shock absorbers for the Rebel are Gabriel Adjustomatics with three settings; soft, medium and firm, which can be adjusted by taking loose the bottom part of the shock, then collapsing the shock to engage an adjustment device. Arrows on the lower portion of the shock align with either of the three settings when the shock is twisted to get the desired setting after which the shock is extended again until it can be connected to the axle.

We discovered while adjusting shock settings during our test that the shocks are the only limiting factors to the rear axle drop when the wheels are off the ground. We used a frame-lift grease rack when making the adjustment and were a bit surprised when we pulled the shock from the stud to have the rear wheel drop down and the suspension coil spring to fall out on the floor. Limit straps around the axle or other positive means of keeping the rear axle attached to the car would give a more comforting feeling if you make a habit of driving across railroad crossings which get the rear wheels off the ground. A broken shock absorber end would let the spring fall out with perhaps disastrous results.

The front suspension is also coil spring with the AM "deep coil" feature used that mounts the spring directly between the spindle support and a coil pad in the body-frame unit. Unequal length A-arms are used in the conventional manner to maintain proper distance between front wheels throughout all travel. A stabilizer bar is bushed in rubber directly to the

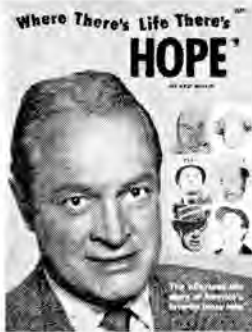
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lower A-arms of each front wheel with short links to support the bar from the frame. Gabriel Adjustomatic tubular shock absorbers are also used on the front wheels and are direct acting between the lower A-arm and the frame. Soft, medium and firm adjustments are at the driver's disposal.

A Gemmer worm and roller steering gear is standard for the Rebel with a 20:1 ratio in the gear and an overall ratio of 23:1 due to steering linkage. Four and one-half turns of the wheel are required to go from lock-to-lock. An optional item is the Monroe linkage-booster type power steering with which our test car was equipped. This power booster unit is used with the same worm and roller type gear but reduces the overall ratio to 17.2:1 and lock-to-lock turns of the wheel to 3 and one-half turns. The link type power steering such as this is an assistance unit only and does not remove the "feel" of the road from the driver so is an easy steering with which to become accustomed.

When we originally looked at the brake specifications on the Rebel, we had not yet driven the car and were willing to bet that Rambler had gone too far when they put the 255 horsepower engine in this chassis. The spec sheet described the brakes as Wagner "CFR," compound servo action type with a nine-inch drum and 150.24 square inches of effective lining area. Mention was also made that special flanged brake drums were used for increased heat dissipation. We received a pleasant surprise when we got behind the wheel of the Rebel because we discovered that in spite of only a nine-inch drum, the Rebel brakes were the best we've tried in quite some time and in spite of appearance the Rebel is not a light car. The weight was 3570 pounds but the brakes handled the car as though it were much lighter. Our test car had the Bendix vacuum booster power assist which perhaps encourages extra abuse of brakes due to the lighter required pedal pressure but, even after we made repeated sudden stops from above 60 mph, there was plenty of reserve and absolutely no pull to either side.

A look under the car reveals that probably the reasons for the Rebel's superior brakes are the flanged drums and 15-inch wheels. The wide flange on the drum not only provides extra drum surface to dissipate the heat to the air but also provides extra strength at the open end of the drum to prevent warpage that destroys lining contact. The 15-inch wheels enter into the picture also because they do not crowd the drum as do the 14-inch wheels on many of the '57 cars. There is plenty of room between the wheel and drum for air circulation and fast cooling. The tire sizes are 6.70 x 15 tubeless with Nylon tires as standard.

Body and frame are of integral construction.  
(Continued next page)



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struction on all American Motors cars. This perhaps puts them a step ahead of the other manufacturers in this department because rumor has it that the single-unit construction will soon be used by many of the others. There are approximately 9,000 welds in the Rebel body-frame which AM claims eliminates squeaks and rattles. On this count, we agree completely. The car was silent over all types of roads. After running the car through an automatic car wash with high pressure water spray, we also failed to discover any leaks around doors or windows which is very commendable in view of this being a four-door hardtop. Body height is 58.4 inches and outside width is just under six feet.

Although thought of as a small car with a wheelbase of 108 inches and 58-inch tread both front and rear, interior room is equal to or better than the bigger cars including seat width which is a healthy five feet both front and rear. The short wheelbase gives the Rebel a much smaller turning circle than any of its competition, 37 feet 5 inches.

In the ride department, the Rebel gives the passengers a very comfortable ride except when the shocks are set on "soft." For the HRM staff, this was too bouncy and the car seemed to "wander" from lane to lane on smooth roads and with no side wind. A "medium" setting solved this problem very quickly although an even better combination seemed to be medium settings on the rear shocks and firm on the front shocks. Recommended tire pressure of 24 pounds (cold) was raised to 28 (cold) and added even more stability but increased road shock with the "firm" front shock setting.

We mentioned earlier that the Rebel was fairly heavy for a so-called small car, 3570 pounds. Of this weight, 2085 pounds or 58.4 per cent is concentrated on the front wheels and 1485 pounds or 41.6 per cent on the rear wheels. With this weight distribution, we expected the car to "push" the front end on corners and that is just exactly what happened. The Rebel did not lean as much as we expected but on tight cornering, even with 28 pounds in the tires, the driver could feel the outside front tire "squash" badly as the car understeered in a very pronounced manner. With full power on the rear wheels in this type of driving, the rear wheels did not start to slide until the car was almost too far through the corner at which time they let loose suddenly requiring the driver to grab a lot of steering wheel in a hurry to keep from spinning to the inside of the curve. The "quick" 17.2:1 steering proved quite handy at this point because a "slower" steering would never have permitted recovery in time. In spite of the Rebel's handy steering ratio, we recommend that you not try to road race your Rebel because if you do, sooner or later the rear wheels are going to beat the front

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wheels around that one tempting corner.

While we had the Rebel placed at our disposal by the Southern California American Motors zone office, we made the rounds of several speed shops in the Los Angeles area seeking interesting bits of information and met repeated requests for a trial ride from performance-minded people. We obliged whenever possible and were quite impressed by comments we received on the Rebel. All thought that the acceleration was very good, 9.4 seconds to a true 60 mph with our Hydra-Matic (3.15 rear end) equipped test car. The same car with standard transmission and a 4.10 rear end is reliably reported to better 8 seconds flat. Our guest critics were also impressed by the workmanship on the car. The Rebel is not a cheap car in price or quality. Body work, interior material and trim, paint, door fit, etc., were all excellent.

The one thing that was a bit bothersome (this is purely a personal gripe, of course), was the muffler noise. They are called straight through but actually are probably a three-pass type muffler with some of the baffles left out for less back pressure. The result is that the gases from the exhaust head pipe ping against a baffle someplace inside the muffler and even though you know better, you'd swear that there was an exhaust leak. A pair of genuine straight through mufflers with fiberglass packing would provide a much more pleasant tone.

Standing 1/4-mile acceleration was accomplished in 17 seconds flat with a speed of 84 mph at the end of the quarter but before you start saying that you can top its time, remember that the standard gear ratio is 3.15:1. A 3.54 ratio available in the other Rambler series cars would make a world of difference although the Rebel is really impressive just as it is. It is quite a car and a trial run in one might surprise you.



Front coil springs mount directly above spindle supports. Note wide cooling flange on brake drum which provides excellent stopping despite small nine-inch brakes.

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