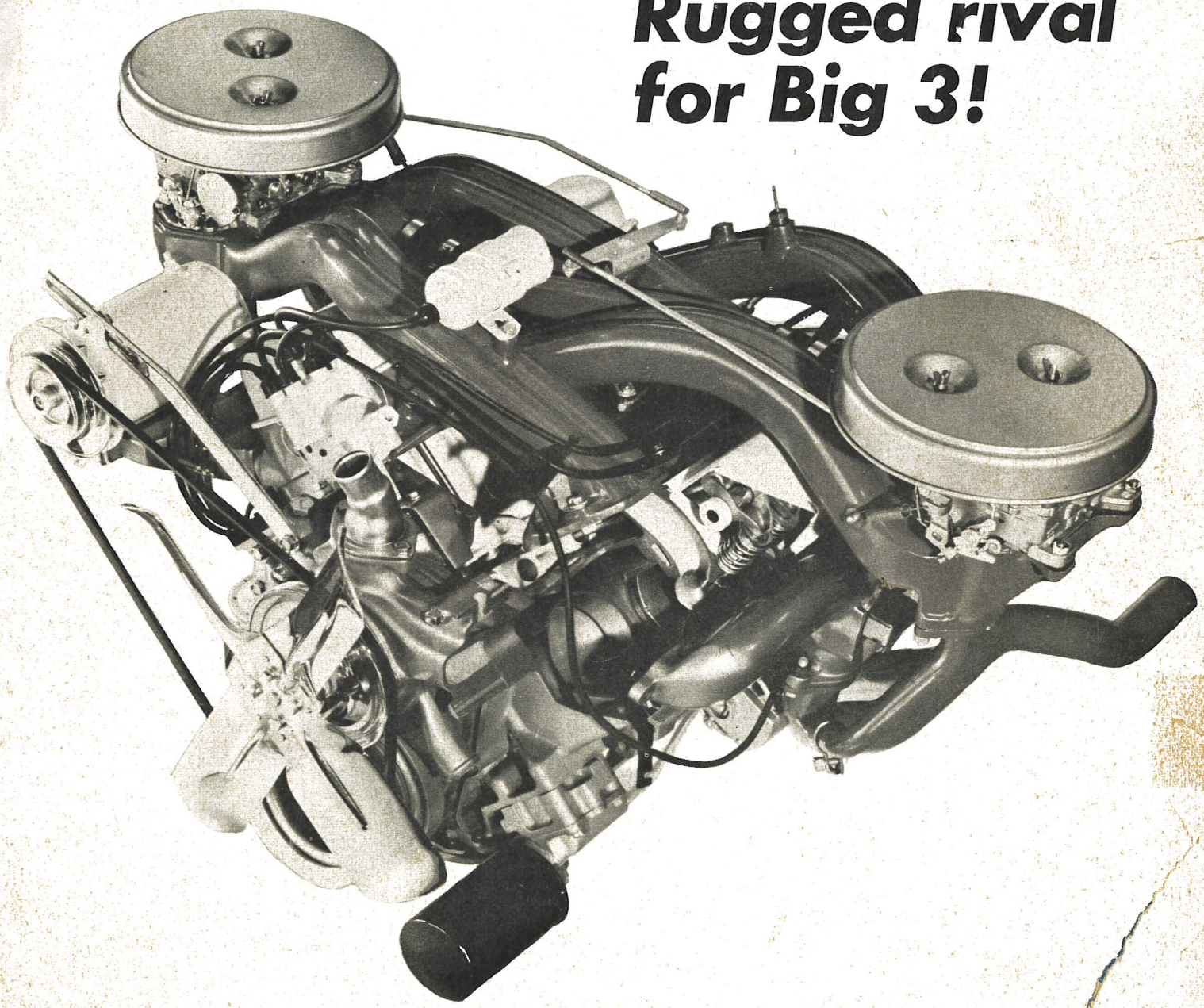
NOVEMBER 1959 35c

Motor Trend

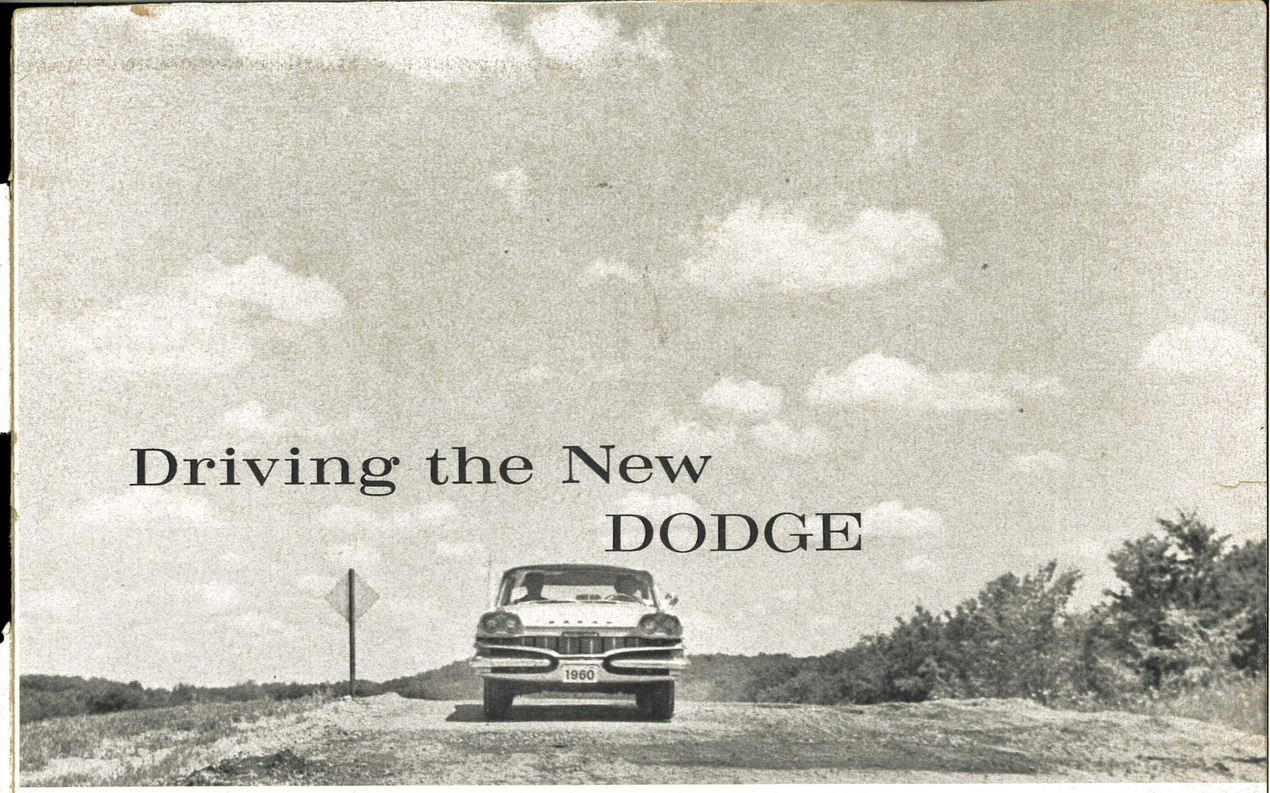
"THE AUTOMOTIVE TESTING MAGAZINE"

Dodge's DART Rugged rival for Big 3!



REPRINTED FROM NOVEMBER 1959 MOTOR TREND MAGAZINE

Driving the New DODGE



THE MOST IMPRESSIVE SENSATION we got while driving the various Chrysler Corp. cars at the Chrysler Proving Grounds earlier this year was that of comfort—coupled with a feeling of strength and security. The Chrysler family seems to be quite a choice selection of finely engineered cars. In particular, the new Dart by Dodge represents a noteworthy achievement in today's automobile industry. (See page 44 for a separate story on this car.) For safety, good handling and pleasing (if not greatly changed) appearance, it would seem that today's buyer should carefully consider the '60 Chrysler family before making his final selection. What each of them has to offer in particular is covered on these pages, while features common to all are covered separately (see page 40) and the two interesting engine developments are on pages 42 and 45.

DODGE

The Dodge for the new year is made in 11 models in two series—the Matador and Polara—both powered by V8 engines using overhead valves. The Matador displaces 361 cu. ins. with a bore and stroke of 4.12 x 3.38 ins., and the Polara measures 383 cu. ins. with the same stroke but a bore of 4.25 ins. The D-500 package, with premium fuel recommended, is optional. Both the Matador and Polara have two-door hardtops, four-door sedans and four-door hardtops, six- and nine-passenger station wagons. The Polara will also have a convertible.

Styling themes on both Dodge and the Dart are subdued, with an interior nearly all-new. Seats have been redesigned to permit increased height, leg- and knee room, and more natural sitting positions as a result of the lowered floor pans in the unit-constructed bodies. Front and rear seat accessibility has been improved by means of new straightened and relocated pillars, and new door hinges permit doors to be opened wider.

The actual redesigning began with the use of two-dimensional plastic figures, representing the average human form. In stature and curvature, these figures represent, according to Dodge engineers, 95 per cent of all people who ride in cars today. These "human prototypes" were used primarily as general comfort references. Into a cushioned "seat buck" engineers placed an "A-point" machine representing the head and torso of a 175-pound human. From this was determined head clearance from the roof, seat distance from floor pedals, cushion angles and seat contours.

Upon final construction after tests with the plastic apparatus, 60 Dodge staff employees of all ages, heights, widths and weights rode in the seats under varying road conditions to test design comfort. Changes were tabulated and incorporated into final seat design.

Overall, the 1960 Dodge Matador nine-passenger wagon we drove, with its standard 361-cu.-in. engine, displayed very good handling characteristics for its size. Lacking the bullishness of the more lively and heavier Chrysler cars, and responding a bit more slowly than the lighter Plymouth, the Dodge should have an appeal to motorists who prefer an in-between strata in their automobile selection.

NEW YORK EDITOR STEVE DA COSTA EXAMINES 4-DOOR HARDTOP AND 6-PASSENGER STATION WAGON, TWO OF FIVE NEW DART MODELS.

Driving the New DART

OUR INTRODUCTION TO THE NEWEST CAR in the Chrysler line came at the time of the first press showing for magazine writers at the Chrysler Proving Grounds in Detroit. It was indicated that while the car placed at our disposal had been driven several thousands of miles around the country by company employees, it had been stripped of all identifying marks and made to look as camouflaged as possible. What we saw was a bright and shiny, new full-sized car with hardly a speck of dust or dirt to be found on its hide.

The model was the Seneca, the body style was a two-door hardtop, the powerplant was the engine with a new slant (see page 42). From all appearances, and from the several hours I spent driving the car over test roads, the introduction of a new full-size car of the quality of the Dart is justified. It has to be, for it not only competes with the Plymouth, but with the Ford and Chevy as well.

IN NORMAL OPERATION AND BEYOND, where speeds indicated around the 100 mph figure, it's as pleasant and comfortable riding a car as the best higher-priced models. Steering ratio has been well thought out and is facile, with good recovery. Brakes operate swiftly and surely, and acceleration prowess of the relatively small engine with appropriate gearing in "drive" range is fresh and sprightly.

On washboard road strips the steering wheel could be released with no noticeable straying, giving a good recommendation to the car's suspension and balance. In "round-robin" driving, in which the wheel is held hard to one side and increased throttle pressure is applied, the speedometer reached close to 35 mph before the discomfort of aggravated lean was recorded. Numerous simulated braking emergency tests were applied during the morning's ride, and while wheels and drums were hot to the touch the resistance to brake fade was clearly evident.

Seating in both driver and passenger spaces is at all times comfortable and roomy, and with windows rolled up the overall quietness provides for normal and clearly audible conversation even at high speeds. Instruments are fully visible and easy to read.

THERE ARE FIVE NEW MODELS in the Dart Series: Seneca, available with the new six or the standard V8 engine; the Pioneer, which has the same engine options; and the Phoenix, in which one of two V8 engines is used. The Seneca is offered in a club sedan, a four-door sedan, and a six-passenger station wagon. Pioneer models are a club sedan, two-door hardtop, a four-door sedan and both six- and nine-passenger wagons. The Phoenix has a two-door hardtop, a four-door sedan and four-door hardtop, plus a convertible. Basic bodies are on a 118-in. wheelbase, with wagons 122 ins.

Major optional equipment accessories (except the "Power Team" engine and transmissions) include air conditioning, padded instrument panel, power brakes and steering, six-way power seat (except in the Seneca), power windows (except in the Seneca), roof luggage rack on wagons, Solex shaded glass, swivel seating (except in the Seneca), and vacuum operated positive door locks.

ENGINE CHOICES FOR THE DART should make this car perform for you any way you'd like: economically, moderately hot, or as a real screamer. First of all, the new inclined six will be the standard choice in the two lower lines. Then, there's the ohv V8 of 318-cu.-in. displacement. Finally, there's the potent 383-cu.-in. D-500 V8.

The straight six of 225 cu. ins. uses one single-barrel carburetor, 8.5 to 1 compression and can be had with either the manual three-speed transmission or the new TorqueFlite automatic especially designed for the engine.

The smaller V8 uses a two-barrel carburetor as standard, along with 9 to 1 compression and is teamed with a manual three-speed gearbox, the two-speed, pushbutton PowerFlite, or the three-speed, pushbutton TorqueFlite automatic transmission. A four-barrel carb is optional.

For the hot engine enthusiast, the D-500 engine package is available, but only on the top-line Phoenix models. In such installations, the 383-cu.-in. engine is equipped with 10 to 1 compression ratio heads, twin four-barrel carburetors with ram induction, special camshaft and valve springs, dual point distributor and dual exhausts. The TorqueFlite transmission is standard, though it is different from the standard three-speed automatic in that it has higher shift points. Standard rear axle ratio is 3.31, while 2.93 is optional.

We see quite a future for the competitive Dart. —Steve DaCosta

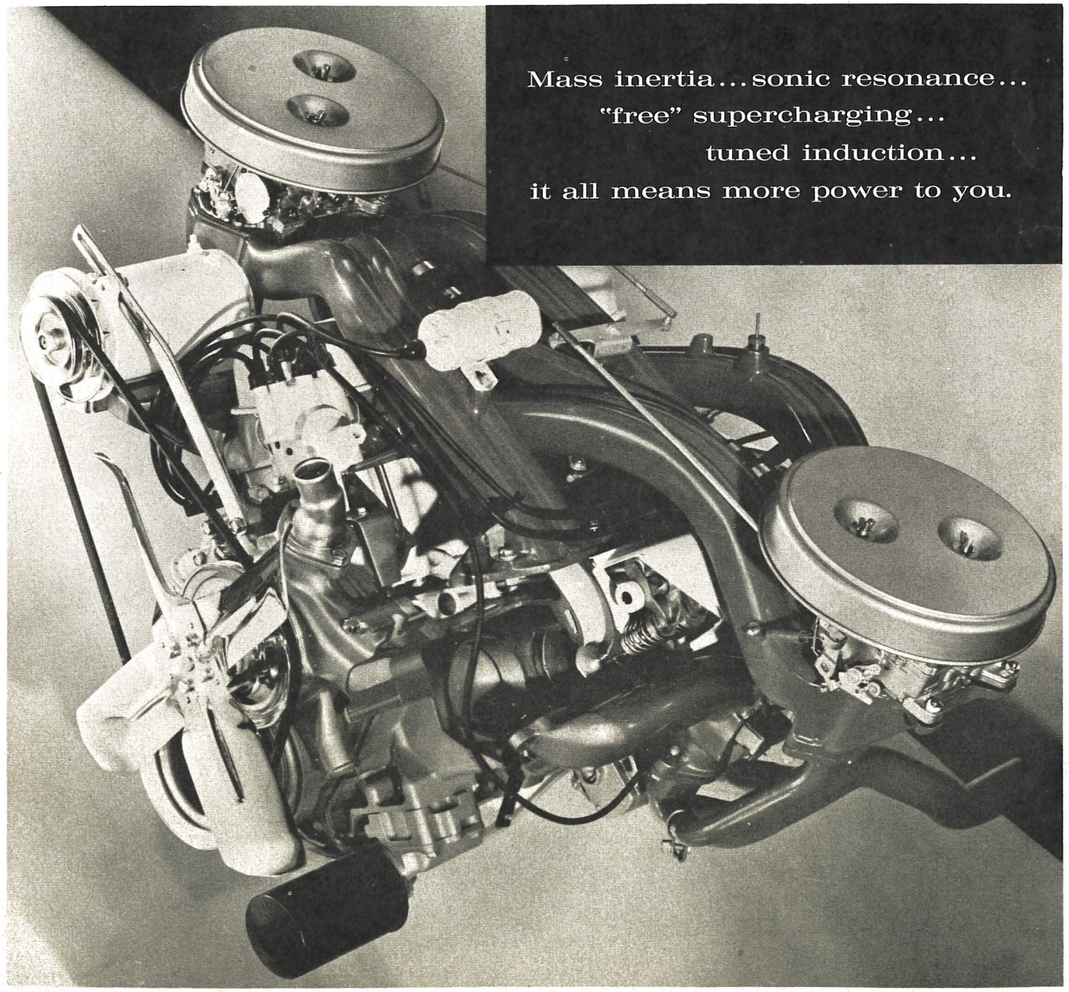
Ramming the Mixture!

by Charles Nerpel Technical Editor

THE SAME TYPE OF SONIC BOOM that rattles windows over a wide area every time a jet plane dives earthward is occurring thousands of times a minute inside the intake manifold of an automobile engine. A wave of compressed air, rushing to replace a vacuum wave caused by the intake stroke of the piston, not only gets up to pretty good velocity, but is reluctant to stop. Like the sonic boom which has the power to push hard enough to rattle and often break windows, it has the power to ram an appreciable increase of air/fuel mixture into the engine combustion chamber—provided the door/valve is open to receive it.

Contrary to the layman's opinion, there is not a steady flow of air inside the intake manifold, but a pulsation like rapidly huffing and puffing your breath. Naturally, this pulsation varies according to the engine speed because it is caused by the suction stroke of each piston. When several of these pistons are hooked up to or supplied by one manifold with short branches of varying length to each intake port, there is a lot of confused air/fuel mixture bouncing around. This does not necessarily mix it any better or distribute it more uniformly to the final destination, the combustion chamber. One of the big factors causing this disturbance is the bounce, or inertia, of the moving mixture.

Builders and tuners of competition engines have been aware of this intake manifold confusion for many years and solved it by individual intake pipes and multiple carburetion. They also realized that there was a relationship between tube length and engine output, both on the intake and the exhaust side of the engine. Many tuners, especially motorcyclists, turned to exhaust tuning because it was more practical with the space



Ramming the Mixture!

continued

limitations they have. Exhaust tuning is also easier to experiment with by the use of trombone-type sliding extensions. Even so, we have seen some motorcycles set up for lakes and drag racing that had long intake tubes running rearward with the carburetors *beyond the rear wheel hub.* This was effective, but it was bulky and required many hours of playing with various lengths while actually running against time clocks.

The history of such ram induction is long and its worth is well known in racing circles, but practical application is the main issue, and it took a Detroit manufacturer to apply it to a passenger car engine. During the so-called horsepower race, domestic automobile manufacturers developed engine modifications for passenger cars that not so long ago were regarded as real hop-up items. Cam contours gave more valve overlap at the expense of some economy but provided more torque; higher compression increased horsepower but required high-quality fuel; bigger multi-throat carburetors fed more fuel into engines that demanded more because of better breathing and increased cylinder capacity. So what was next? Bigger bore, higher compression, wilder cams, specially treated fuels? After all, there is a limit to what can be done to an engine for the average user who runs it cold, lugs down to chugging rpm, regards normal maintenance as some sort of plague, drives 100 mph and completely disregards maximum rpm limits.

Obviously, "something for nothing" could solve power problems, and if we discount the untold amounts spent for research and development, this is what the Chrysler Corp. did. Sounds like the magic words, "perpetual motion," but it is not quite that. Since 1952 Chrysler has been experimenting with the ram effect on engine induction systems. They knew that they could calculate basic effective intake lengths for various rpm's, and the ram tube could be either before the carburetor or between it and the intake port. They also knew that the final test of power increase could best be achieved by the trial-and-error method of using telescoping tubes and an engine dynamometer. This type of tuning had always been used for more output on the top end, but pleasure car engines required not more speed, but more power in the passing ranges, or the 1800 to 3600 rpm region.

Continued testing proved out an optimum 30-in. length for each tube (a separate one for each port), and though each tube was in effect a miniature organ pipe tuned to the same frequency, there was no reason why the engine had to look like a pipe organ. By an ingenious core casting, Chrysler engineers arranged the intake tubes for the left cylinder bank so that they curve over the top of the engine and are fed by a four-barrel carburetor low and outboard of the right valve cover. The right bank is similarly supplied by a left-mounted carburetor, the ram tubes intermeshing as they cross in their curved paths over the top of the block. They are of rectangular section with rounded corners with inside dimensions of 1⅞ by 1⅛ ins.

Chrysler's new ram-inducted engine will be an option on the Plymouth, Dodge, Dart, DeSoto and the yet-to-be-announced Chrysler 300-F—where the 413-cu.-in. engines with dual four-barrel ram-tuned intake manifolds show almost 10 per cent more torque in the medium speed ranges than the same engine with single four-barrel carburetor and standard manifolding.

Chrysler engineers found that by reversing the normal method of carburetor and ram tube placement they could eliminate the pulsations in the power curve they got with their previous experimental engines. With the tubes extending *from* the carburetors at the engine, they got a torque increase at various rpm's from about 2400 on up to 4500. But, they wanted a *steady* power increase all along the torque curve. The placement of the carburetors at the *ends* of the tubes, along with the proper length for the tubes, gave them exactly what they wanted.

There were a couple of extra bonuses, besides.

With the carburetors mounted to the side of the engine they can be kept cooler while the engine is running and will also pick up less conducted heat from the hot engine while the car is parked. They are also easier to service. Then, while engine compartments have had a reasonable amount of length and width to accommodate the rather short-but-wide V8's, the centrally-located air cleaner had to be scaled down wafer-thin to clear modern low hood lines. The extra inches gained by lower side location of the carburetors and their air filters will be a boon to the stylists who now can drop that hood line even further on future designs.

This is the first domestic production use of ram tuning with carburetors and it offers a substantial power increase with low cost, no moving parts, and no adjustments to maintain. Besides, it is the first step to a whole new phase of increasing engine output and efficiency, not only on existing "big" engines but on the smaller ones that are sure to follow on the heels of Detroit's compact car program.

Looking into the future, the inertia of the exhaust wave is just as effective as that of the intake surge and can be used to scavenge combustion chambers in the same sort of exhaust supercharging, thereby increasing the effectiveness of the ram-tuned intake. Exhaust tuning is not compatible with the present day mufflers but could work well with a "Maxim"-type silencer.

Who knows, with the rapidly increasing knowledge of sonic and supersonic impulses, we may some day figure out a way to completely silence exhaust with counter-reacting sound waves. Remember, if we do, it all started with ram tuning.

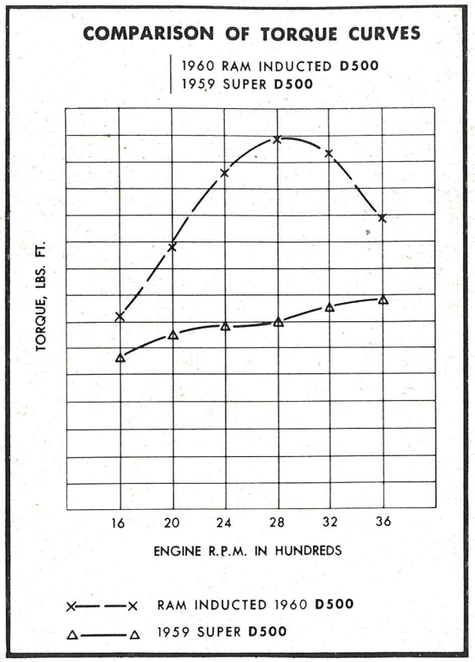
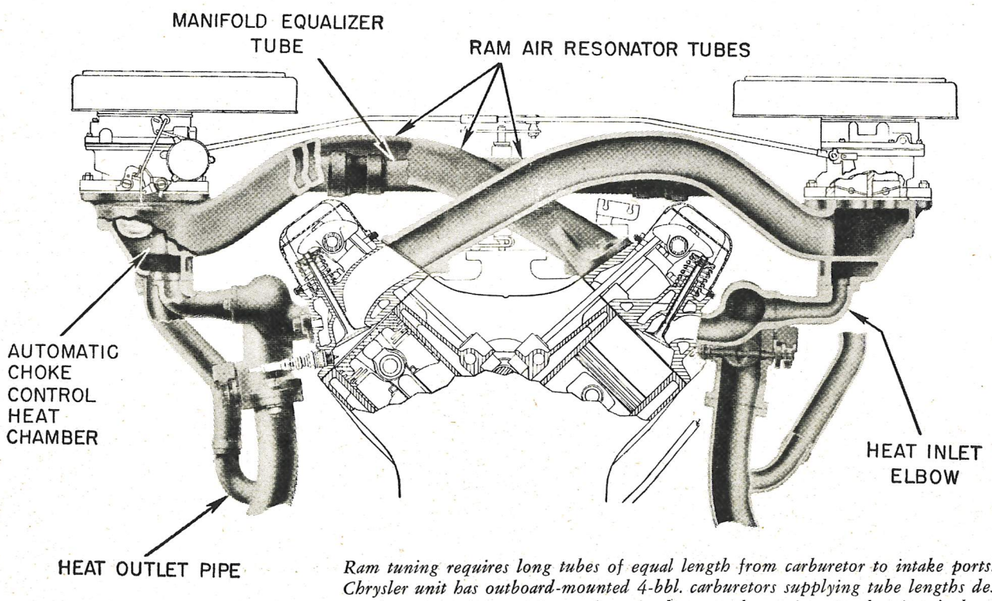


Chart shows torque increase in passing speed ranges with ram tuned induction manifold. Intake tubes have lengths calculated to take advantage of the air/fuel inertia pulses arriving at intake valve as it opens.



Ram tuning requires long tubes of equal length from carburetor to intake ports. New Chrysler unit has outboard-mounted 4-bbl. carburetors supplying tube lengths designed to give power increase in passing speed ranges by sonic supercharging fuel mixture.

WHAT IT'S LIKE TO DRIVE THE RAM-TUNED DODGE

THE FIRST TIME we were behind the wheel of a car with ram induction was in a standard-looking '59 Dodge four-door hardtop. From outside appearances it looked like any other Dodge—but there the similarity ended!

With George Gibson, Dodge Chief Engineer, driving first we left the Chrysler Corp. Engineering buildings behind and drove out onto the streets of Detroit. He was going to show us what it was like, but in the space of a couple of blocks turned to us and said, "Here, you take over. I don't have to *show* you. You can see better for yourself."

At first, trying not to pick up a ticket for over-exuberance on city streets, there was no noticeable difference. A few blocks later we turned onto an expressway. Using the approach ramp we had to accelerate to move out into traffic—and that's where we noticed the first difference; it wasn't as if a supercharger had cut in, but it certainly felt like someone had poured the coals into it. And this was even without full benefit of the kickdown of the three-speed automatic transmission.

We were traveling about 35 mph at the time and before we were able to look down at the speedometer it was nudging close to the 65-mph limit that's imposed in the state of Michigan. We slowed down to about 40 mph, then seeing a clear spot ahead, stomped the throttle to the floor. The proportionate torque increase from 2000 to 2800 rpm with ram induction is about double that of the '59 D-500 system; it would not be right to say that the acceleration increases at this same rate, but it does go up—and fast. Again we had to quickly back off to keep the ever-alert Detroit police from crawling up our back.

This time we had used the second gear kickdown; the throaty sound of the air/fuel mixture roaring down the 30-in. tubes into the combustion chambers magnified the feeling of acceleration. Though you definitely get pushed back in your seat when it first takes hold, the acceleration is much smoother than most other forms of advanced carburetion.

In comparing acceleration of a ram-inducted Dodge to the Super D-500 Dodge of '59, you would find that the 0-60 mph times would be *about* the same; it's from about 50 mph on up that ram induction really comes into its own. That's the way it was designed, too—to take advantage of the torque in mid-ranges so that cars with this system are much-better-than-average highway cruisers. They *could* be set up so that they'd set the dragstrips afire, but this was not the purpose for which it was designed.

Cruising around on expressways and city streets failed to unearth any unusual characteristics or faults. The Dodge continued to scorch the pavement (it "tweaked" rubber in the upshift from second to third) every time we floorboarded the throttle.

What it will do over a longer period of time is something we can tell you about in an upcoming road test of a Dart with ram induction. We'll be driving this car from Detroit to Los Angeles and so will be able to give you the facts on acceleration in all speed ranges, fuel economy and other general performance. Watch for it in an early issue.

—*The Editors*

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MOTOR TREND, the nation's top-selling automotive testing magazine, sets the pace for consumer buying. From station wagon owners to sports car enthusiasts, Motor Trend, with its vast audience of young automotive-minded men continues to exert a strong influence on the buying habits of countless thousands each year.

In this period of great changes in Detroit, Motor Trend has led the field in automotive reporting, keeping the public abreast of new models through honest up-to-the-minute comparison tests.

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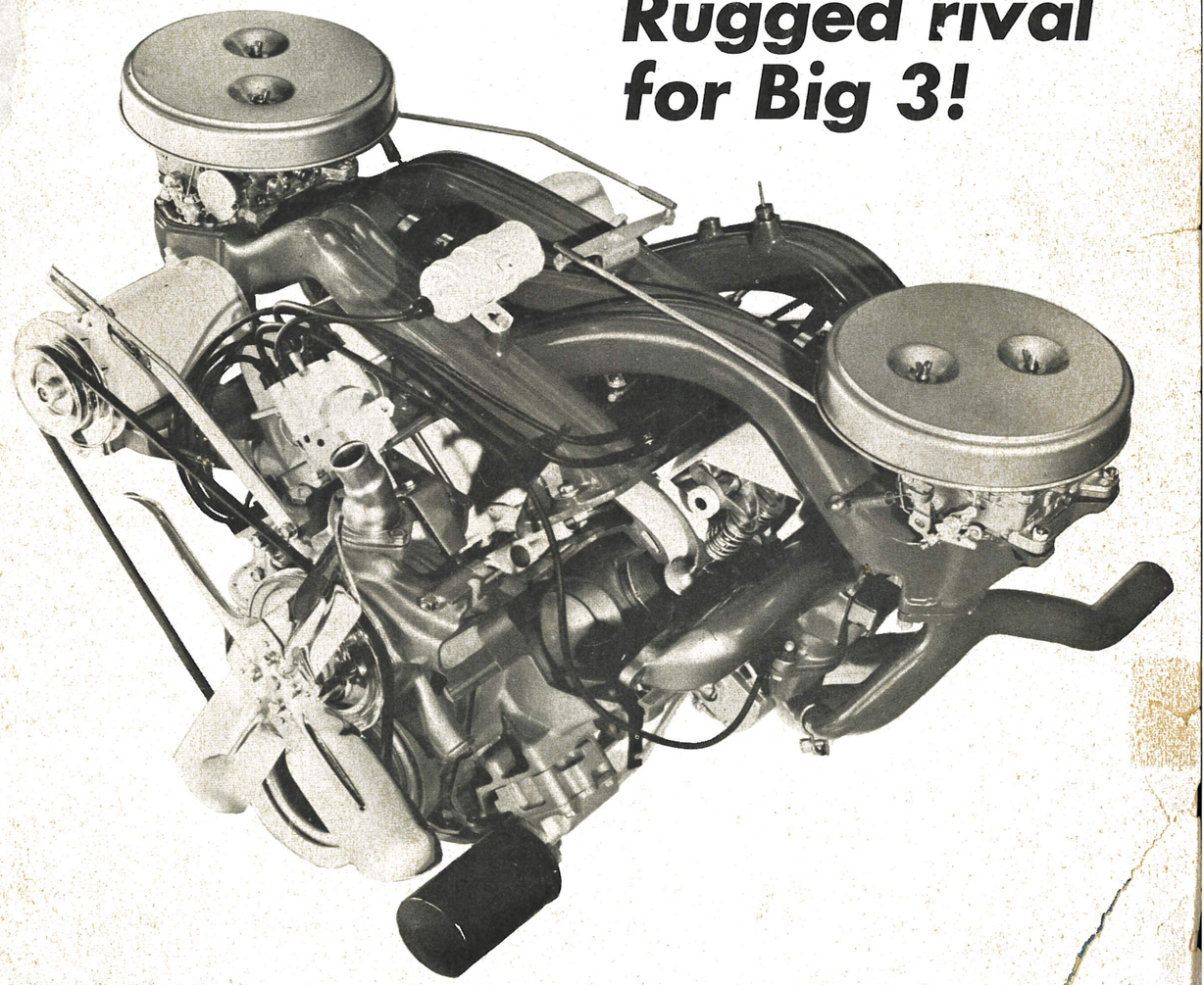

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