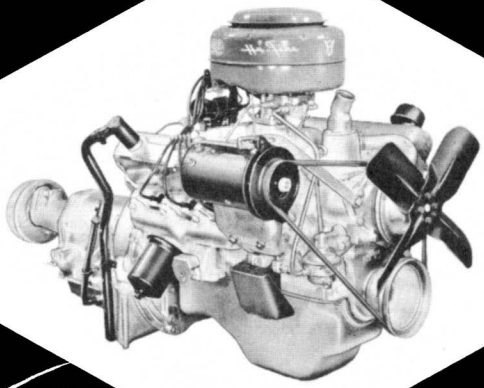
THE NEW PLYMOUTH V-8 ENGINE

SERVICE REFERENCE BOOK SESSION NO. 100



Prepared by

CHRYSLER CORPORATION

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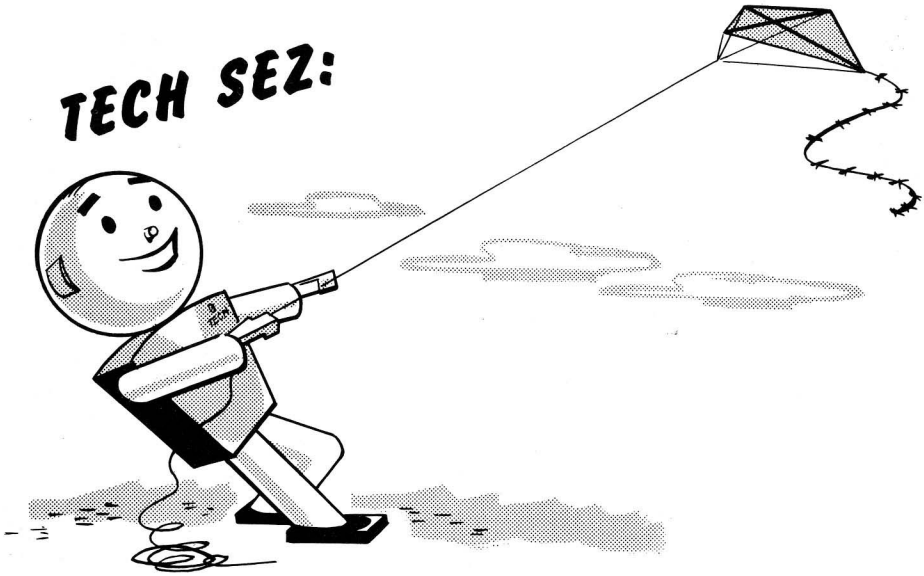


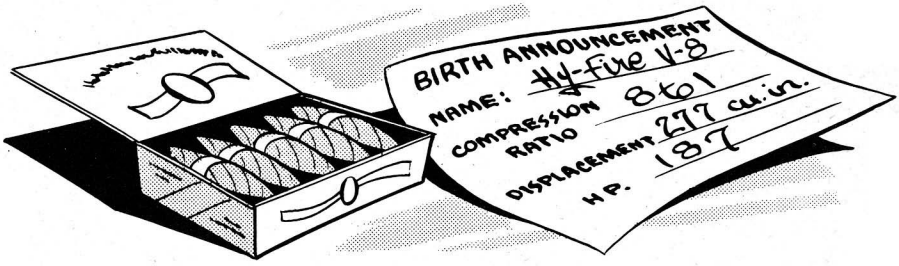
"PLYMOUTH PROVIDES A NEW HIGH IN POWER!"

With the new, 277 cubic-inch Hy-Fire V-8 engine, Plymouth provides a *new high* in power. Owners of cars so equipped will be counting on you technicians to keep this powerhouse operating at peak efficiency.

And that's where this reference book will help! It's packed with authoritative facts on the new features, servicing suggestions, and other tips you'll find useful when this engine comes in for attention.

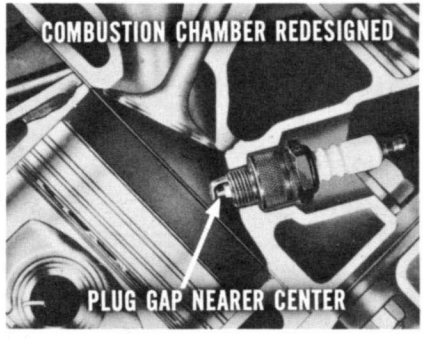
Here's your road map to this handy service information!

NEW ENGINE FEATURES IN GENERAL

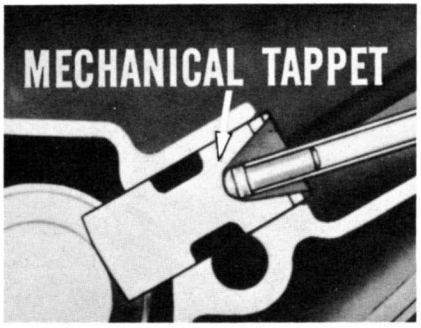


Combustion Chamber. More than any other part of a car, the engine sets the keynote in all-around performance. The new Plymouth Hy-Fire V-8 engine, with a higher compression ratio of 8 to 1 . . . a greater displacement of 277 cubic inches, and 187 hp., sets a pace in performance that's really impressive. Your appreciation of this power plant grows as you get acquainted with its many new features.

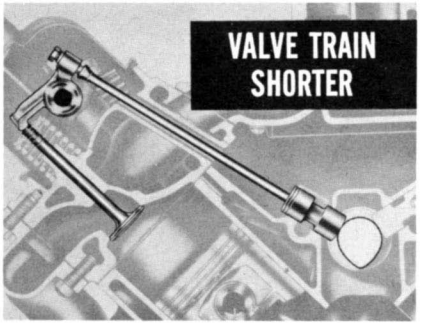
For example, the combustion chamber has been redesigned to eliminate surface pockets. The spark plug electrodes are nearer to the chamber center, also. As a result, the air-fuel mixture flows more smoothly through the chamber. In addition, the mixture is burned more evenly and completely. All of this redesign adds up to a much more efficient combustion chamber.



Valves. Valves are larger, too. This, along with other design features, contributes to better engine breathing and longer valve life. Outstanding among the new engine features is the use of mechanical tappets. This over-all engine design lends itself nicely to the use of mechanical tappets.



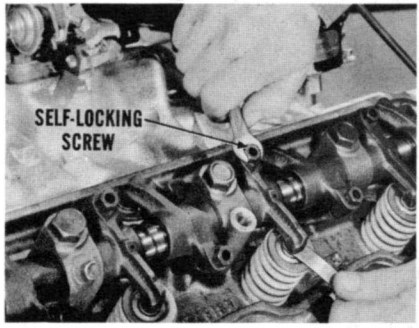
As you probably know, the trend lately has been toward the use of hydraulic tappets. That's because most valve trains on recent engines have been rather long. A lot of expansion, due to heat, has been involved.



But on the new Plymouth engine, the valve train is 3″ to 4″ *shorter* in length. Valve stems and push rods are shorter. Besides that, there's a different size block, and an entirely new valve-train geometry.

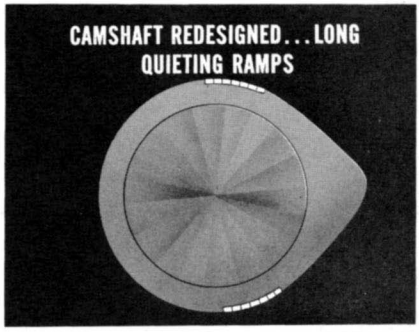
What does that mean? Well, there's far less change in valve lash due to valve-train expansion. So mechanical tappets can be used very satisfactorily. The automatic adjusting feature of hydraulic tappets, therefore, isn't required in order to control tappet clearance.

You should always set mechanical tappet clearances with the engine hot and running. All you have to do is check the clearance at the valve stem with a feeler gauge. Adjust the clearance by turning the self-locking screw in the push rod end of each valve rocker arm.



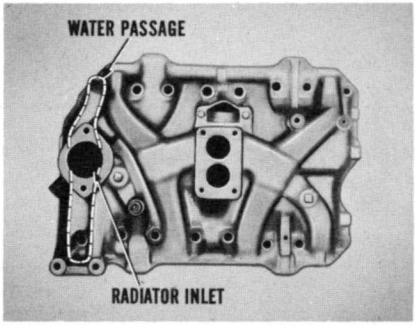
Camshaft. Another improvement shows up in the camshaft design.

Cams are provided with quieting ramps long enough so valve noise is reduced to a minimum. What has been accomplished, then, is a smooth, quiet-running engine with intake valves set at .008″ clearance . . . and exhaust valves set at .018″ clearance.



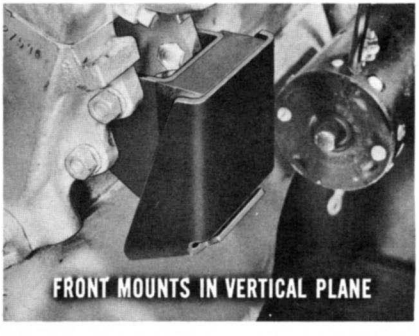
Cooling. Engine cooling, on this engine, has also been improved. There are full-length water jackets that completely surround each cylinder. The block is longer for more space between the bores. That also means better cooling.

Intake Manifold. There's a new intake manifold, too. It has a water passage at the front, leading to the radiator inlet. In conjunction with the manifold is a new automatic choke. This choke is located in a pocket in the exhaust crossover passage of the intake manifold.

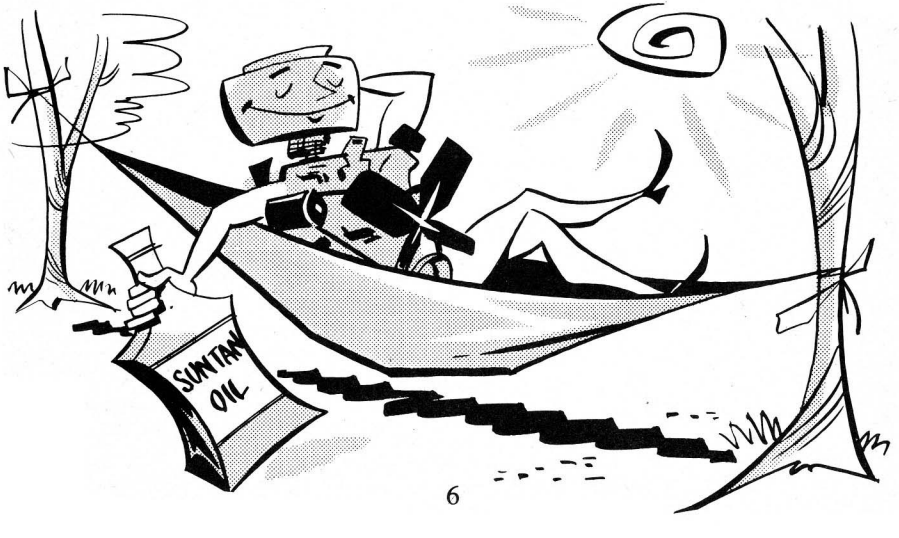


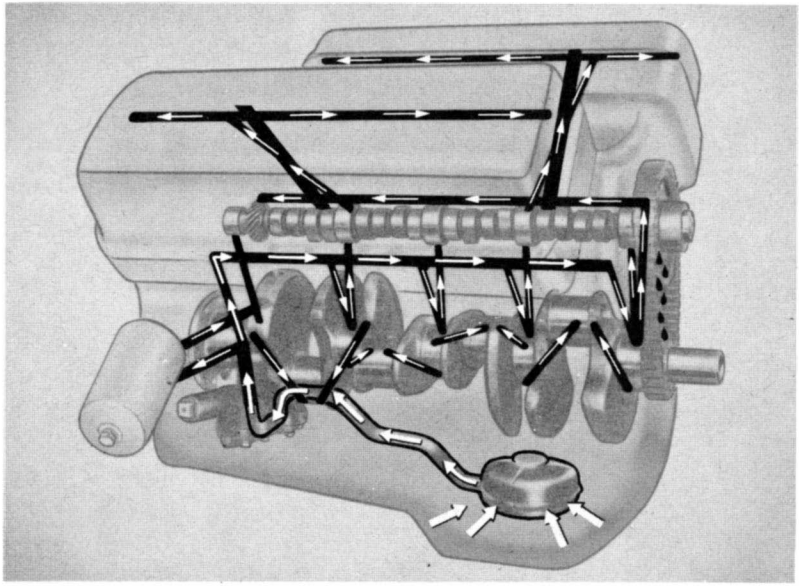
Other new features are the spark plugs, lubrication system, and the crankcase ventilation system. Even the engine mounts are new and of a distinctly different type.

Engine Mounts. You'll notice that there are two mounts at the front, and one at the rear of the engine. The new mountings, consisting of rubber bonded between two metal plates, are mounted on the frame at the front in a vertical plane. Engine vibration forces act through the rubber in a direction parallel to the plates—in other words, in *shear*. In fact, they're called "shear-type" mountings. They're especially good at damping out engine low-speed vibration effects. They isolate from the frame and body the rocking motion induced in the engine by torque impulses, particularly while the engine is idling.

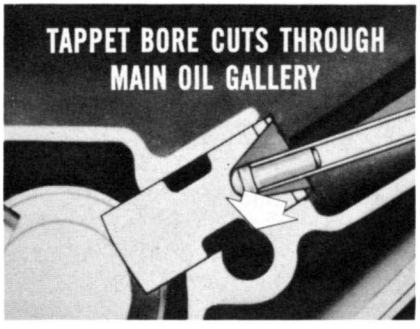


ENGINE LUBRICATION SYSTEM DETAILS

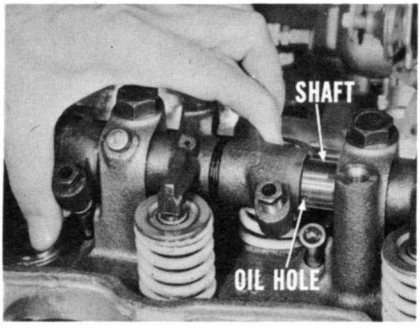




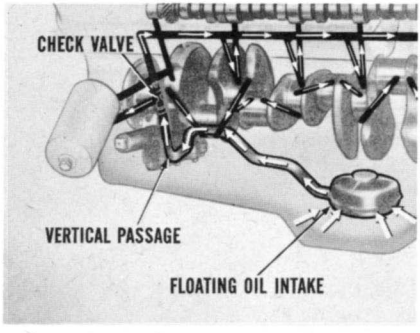
Improvements in engine lubrication are always made to protect engine life and to better the performance when possible. In the case of the mechanical tappets on this new engine, ample lubrication is provided. The tappet bore in the cylinder block actually cuts through the main oil gallery. Because of this intersection, the tappets get a constant oil bath during operation.



Rocker arms get their share of oil, too. The arms are mounted on a shaft supported in struts that are integral with the cylinder head.

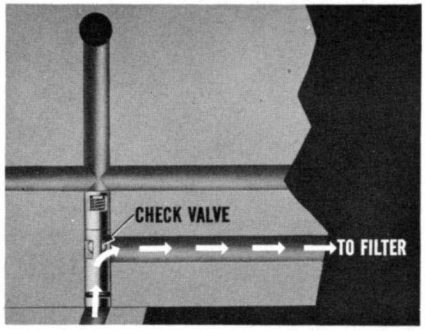


Oil is forced through the rocker arm shaft and through a small hole in the shaft to the clearance between the shaft and rocker arm. Oil that squeezes out at that point drains back to the crankcase through return holes drilled in the bottom corners of each cylinder head.

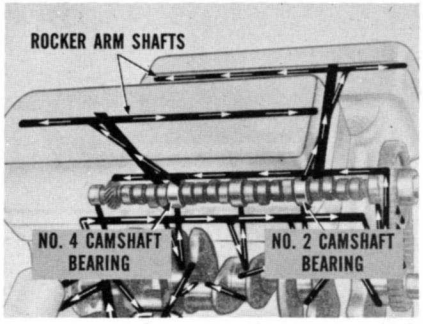


But suppose we trace the oil flow from the time the oil leaves the crankcase. For example, once the oil is drawn into the floating oil intake, it goes into a vertical passage in the block. A ball check valve at this point acts as an oil-flow traffic officer.

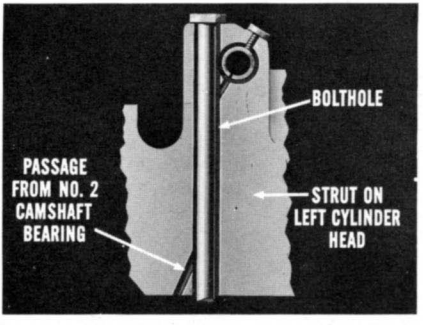
Oil pressure opens the ball check valve. This, in turn, admits oil to a horizontal passage leading to a full-flow oil filter. Oil is forced through the filter, and back through another horizontal passage that leads to the main oil gallery. From there, oil goes to each main and camshaft bearing.

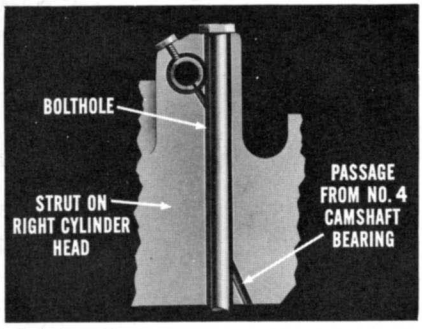


From the #2 and #4 camshaft bearings, oil passages lead to the cylinder heads, and up to the rocker arm shafts.



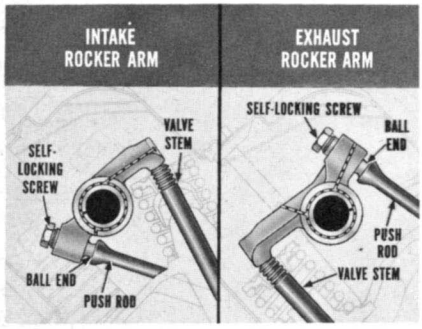
Oil comes up a passage from the #2 camshaft bearing, for instance. This passage indexes with a cylinder head bolthole. The oil flows around the bolt shank and out a hole going through to the rocker arm shaft bracket on the *left* cylinder head. This rocker arm shaft bracket is the second one from the front.





Oil from the #4 camshaft bearing also goes up the same kind of passage. This passage indexes with a cylinder head bolthole on the *right* cylinder head. The bolthole, in this case, is the one going through the rocker arm shaft bracket which is the second bracket from the rear of the engine.

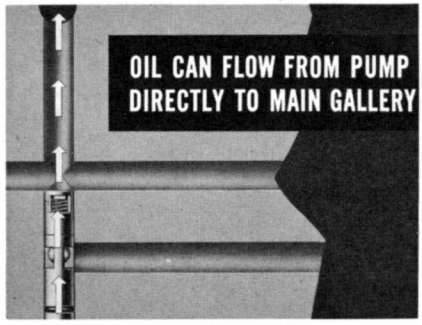
After lubricating the rocker arm bores, some of the oil is forced through drilled passages in the rocker arms for two other important lubricating jobs.



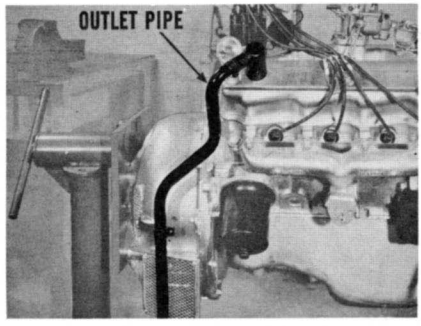
Oil lubricates the ball end of the self-locking screw that fits into the push rod. It also lubricates the valve stem from another passage in the arm. Incidentally, intake and exhaust valve rocker arms are drilled differently to perform both of these two lubricating jobs.

Ball Check Valves. In case you're wondering about that ball check valve and what it does, keep in mind that it really works as a combination check and bypass valve. The check valve, in a vertical passage in the block, admits oil to a horizontal passage. It also acts as a *check* to retain oil in the passages, filter, and gallery when the engine isn't running.

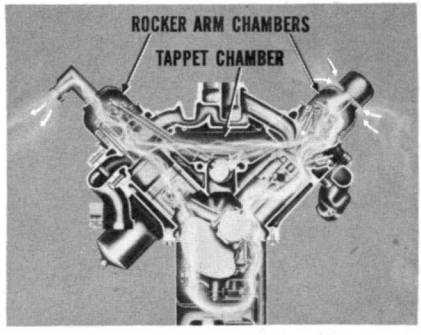
Just above the check valve is the by-pass valve. If the oil filter ever gets plugged, oil pressure lifts a disc in the by-pass valve to let the oil through. With the by-pass open, oil can flow from the pump directly to the main gallery without going through the filter. This insures lubrication for the engine if an owner ever forgets to replace the filter. Every 5,000 miles is the normal interval for filter replacement. However, in dusty areas, or under unusual driving conditions, it may be necessary to replace the filter more frequently.



The New Crankcase Ventilation System. Another protective feature on this new engine is an improved crankcase ventilation system. Inlet and outlet pipes, for instance, have different locations. Here's how the system works. Forward motion of the car creates suction around the outlet pipe extending downward from the rear of the right bank rocker arm cover.

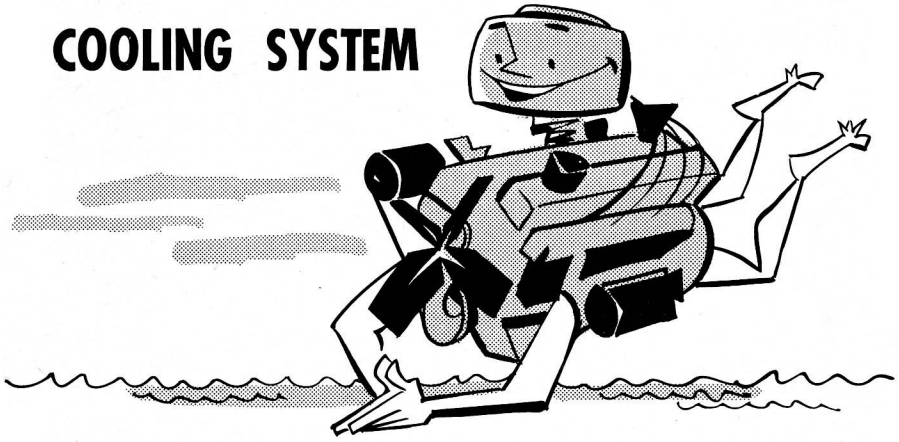


This, naturally, draws air and crankcase vapors out of the engine through the draft created by fresh air entering the crankcase combination oil filler cap and air filter. This inlet is at the forward end of the left cylinder bank rocker arm cover.

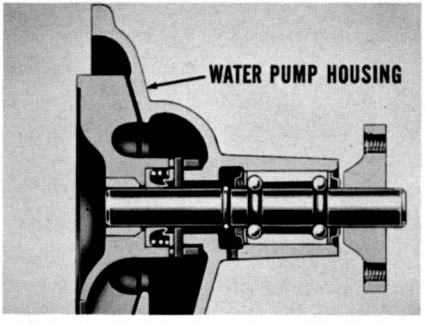


The valve rocker arm chambers and the valve tappet chamber are also ventilated along with the crankcase. So, more of the engine gets ventilated and the entire system keeps engine oil free from contamination caused by condensation and combustion fumes.

COOLING SYSTEM

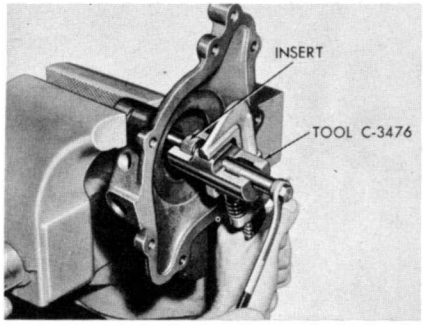


Water Pump Housing Is New. The water pump housing on this engine is a part of the timing chain case cover. The cover, therefore, is actually the water pump housing. If you ever remove the housing, always coat the attaching screws with a good sealer that is not soluble in water. That's because these screws extend into the water passage. Two studs are used, in addition to the screws. It will seldom be necessary to remove these studs. However, if it should be necessary, be sure to seal the threads when installing the studs in the block.



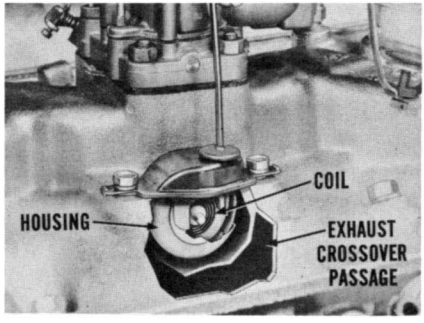
By the way, the impeller in that water pump is made of plastic. If, for any reason, you find it necessary to replace this impeller, here's

how to do the job. First, break the plastic impeller away from the insert. Next, use a special puller (C-3476) to remove the impeller insert. Install the new impeller so that the end of the shaft and impeller insert are flush.

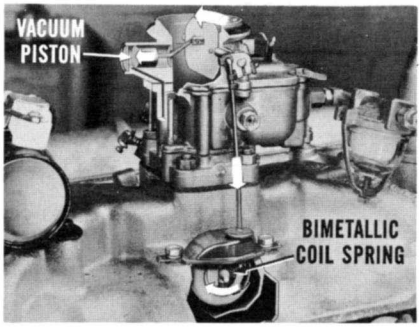


AUTOMATIC CHOKE AND MANIFOLD HEAT CONTROL VALVE

Automatic Choke. You'll remember the new location of the automatic choke—in a well in the exhaust crossover passage of the intake manifold. A rod connects the coil with the choke valve operating lever. A bimetallic coil spring holds the choke valve closed. A vacuum-operated piston in the carburetor tries to open the valve.



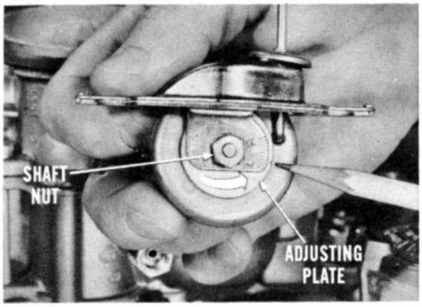
As the bimetallic coil spring heats up, it unwinds and allows the choke valve to open. The vacuum-operated piston, connected to the choke valve, opens the valve. The vacuum passage to the piston, you'll notice, is in the carburetor body. Being there, it uses fil-



tered air from the carburetor air horn. Failure, due to dirt in the piston passage, is practically eliminated.

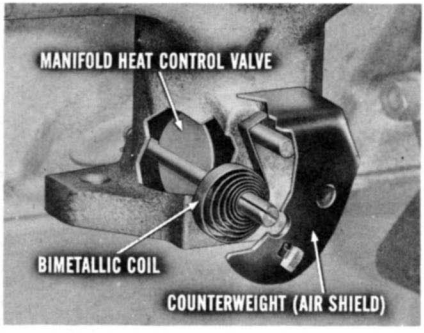
Locating the choke coil in the exhaust crossover passage of the intake manifold ties it in better with actual engine operating temperatures. The bimetallic coil reacts more directly to true engine heat. In other words, it virtually eliminates overchoking and underchoking —two main causes of engine stalling and faltering.

Adjusting the choke is easy. While you may never have to make this adjustment, here's how simply it's done. First, loosen the holddown bolts and remove the choke from its pocket in the manifold. Next, loosen the shaft nut. Then, turn the adjusting plate toward "lean," or "rich." You'll find "L" and "R" stamped on the cover.



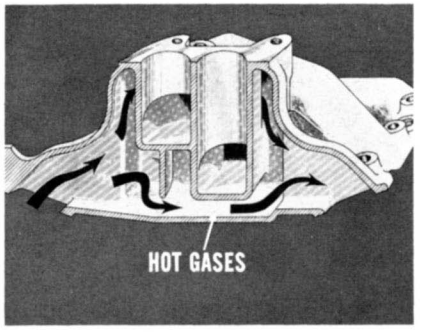
Ordinarily, you can tell if the choke's working by just moving the choke rod up and down. It should work freely, without any binding or interference.

Manifold Heat Control Valve. When checking the choke, be sure the manifold heat control valve moves freely, also. It is now located in the right exhaust manifold. A stuck heat control valve will affect the operation of the choke coil, and result in poor choke operation. In short, the manifold heat control valve has a direct effect on the operation of the choke valve. If you suspect the automatic choke of operating improperly,



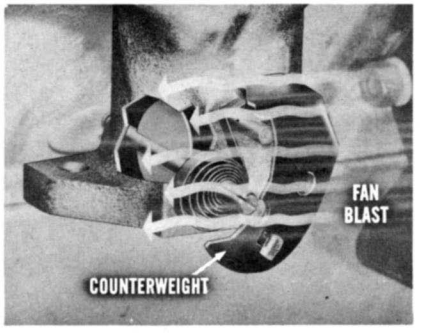
be sure the manifold heat control valve is doing its job before you adjust the tension of the choke bimetallic coil.

As you know, the manifold heat control valve functions during the engine warm-up period. When the engine is cold, the heat valve is closed. This directs hot gases through the exhaust crossover passage and applies heat to the carburetor hot spot. That helps vaporize the fuel mixture for smooth engine idle and faster warm-up



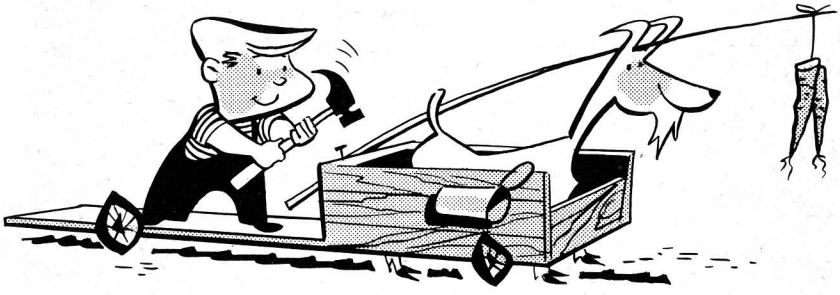
Now, after warm-up, and also during cold operation acceleration or high-speed driving, the heat valve opens. This cuts down exhaust gas flow to the hot spot. Consequently, you get better breathing and greater power output at higher speeds.

The counterweight on the heat control valve shaft also serves as an air shield to protect the bimetallic coil from the cold-air blast from the fan. So the heat valve doesn't stay closed too long. Heat control valve operation, therefore, is keyed in better with actual engine temperature. This provides the proper warm-up, a reduction in back-pressure after warm-up, and contributes to engine operating efficiency.

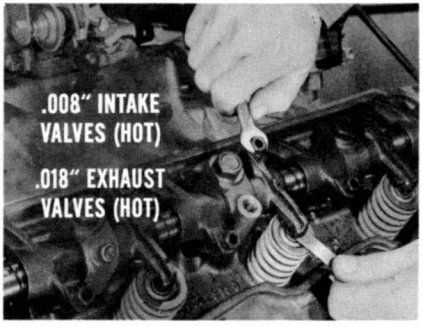


ENGINE ADJUSTMENTS

Nobody needs to tell you that as long as everything is adjusted to specifications, the owner of a car equipped with the new Plymouth engine will enjoy better combustion, more power, and greater economy.



Tappet Clearance Specifications. By way of reminder, the tappet clearances on this new Hy-Fire V-8, 227 cubic-inch engine are .008″ on the intake valves, and .018″ on the exhaust valves.

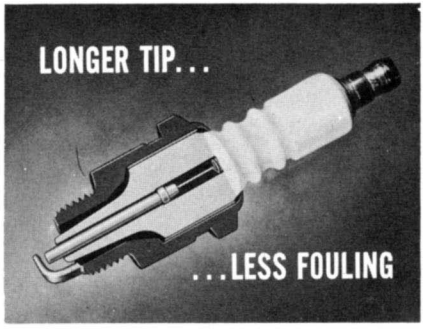


This is a *hot setting*. Check these clearances while the engine is idling at normal operating temperature.

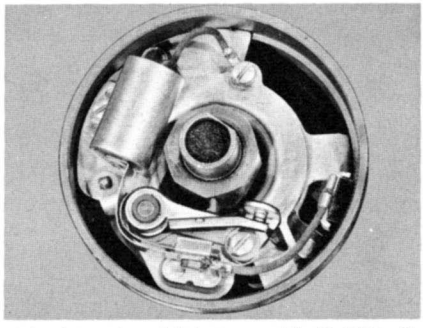
Setting Valve Clearance Cold. Sometimes it is necessary to set valve clearances cold, as a preliminary setting. To set valve clearance when the engine's cold, set intake valves .009″ (to get .008″ when hot). Set the exhaust valves .025″ (to get the .018″ specified for hot setting).

Spark Plugs. Spark plugs used in this engine have a porcelain tip that's been extended. This puts the electrodes closer to the center of the combustion chamber for smoother and more complete burning of the mixture. Since the longer porcelain tip means more distance

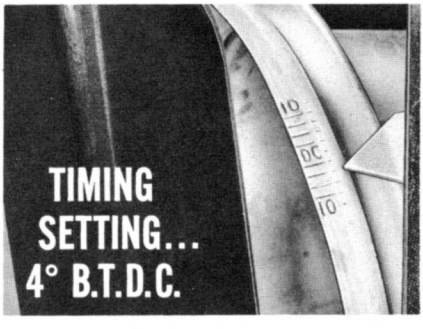
between the tip and case, there's less chance of the plug shorting out from deposits building up. So there's less fouling, along with more efficient operation over a wider heat range. To get full benefit from these plugs, be sure they're adjusted to a gap of .035″. Use a round wire gauge, and don't bump the electrodes during installation, or you'll change that .035″ setting.



The distributor on this engine uses a single set of contact points. Remember to set these points at a clearance of .018″.



Setting Ignition Timing. Ignition timing should be set 4° B.T.D.C. on engines equipped with the two-barrel carburetor. If a slight ping is heard during a hard acceleration around 15 m.p.h. in direct drive, *and timing is set within the allowable range,* it is an indication that you are getting the maximum power from that grade of fuel. If the four-barrel carburetor is used, set ignition timing at *Top Dead Center.*

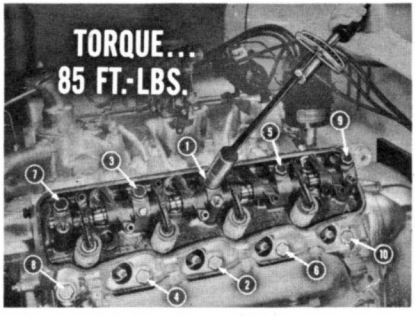


If an owner prefers using premium fuel in a two-barrel carburetor engine, however, you can advance the timing. *But don't advance it more than 8° before top dead center!* This engine is designed to give standard performance on regular fuel.

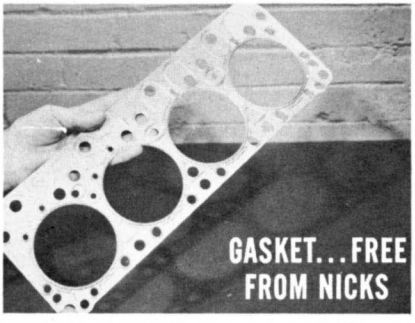
This allowance will take care of variations in fuel quality in different areas. As you know, fuel varies somewhat in octane rating in various localities. Altitude and other climatic conditions also call for compromise in timing. In general, stick to 4° B.T.D.C. for two-barrel carburetor jobs, and Top Center for four-barrel jobs, as that setting will take care of normal driving under most conditions.

Premium fuel is recommended for use in engines equipped with the four-barrel carburetor. Timing should be set at Top Center, and *never advanced from that setting!*

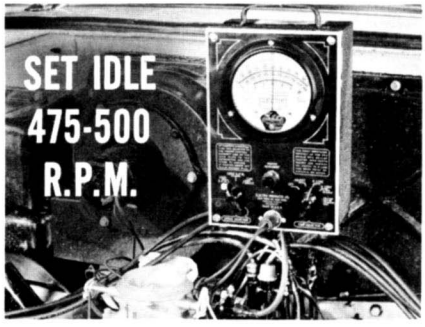
Tightening Cylinder Head. One important thing to keep in mind is that the cylinder heads must be properly tightened. If they are not, water leaks might show up. So torque the center bolt of the inner row first to 85 foot-pounds. Then, tighten the center bolt of the outer row. Alternate from the inner to the outer rows, working out to the ends. Remember . . . the *sequence* of tightening is very important!



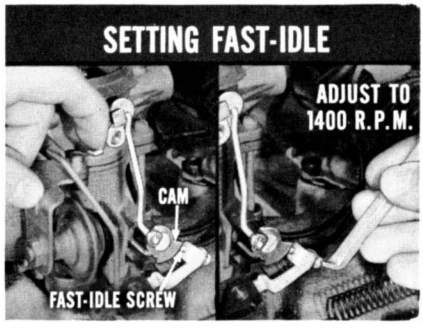
Installing a New Gasket. Now, if you ever have to install a new gasket, be sure it's free from nicks—especially that bossed line that carries around the entire gasket. Also, see that the block edges are clean and free from burrs. To reinstall the head, use a two-step tightening sequence. First, snug down the bolts to about 40 foot-pounds in proper sequence. Then, go back and tighten the bolts in order to 85 foot-pounds. With the new steel gasket, a third check on cylinder head bolt torque after the engine has warmed up won't be necessary.



Adjusting the Carburetor. You adjust the carburetor as you have on previous engines. Set idle at 475 to 500 r.p.m. with the engine at normal temperature, and the transmission in neutral.

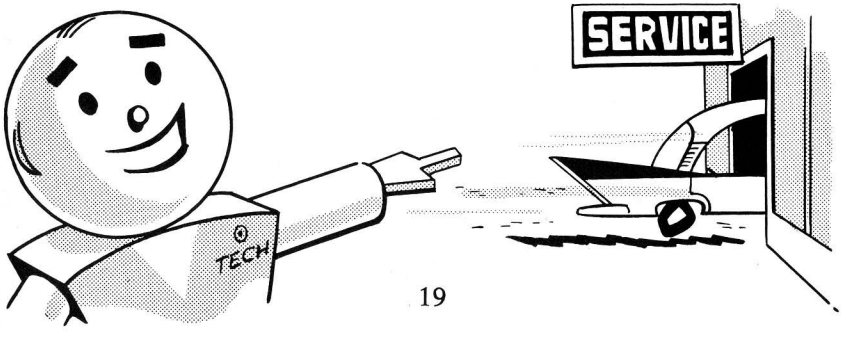


Setting fast-idle is really simple. With the choke open, move the cam so the high point is under the fast-idle screw. Adjust the screw to give you 1400 r.p.m.



A FINAL WORD . . .

When you and all of our technicians know how to handle the new engine features, it's bound to make your work a lot easier. Usually, whatever you can do *easier,* you're bound to do *better.* Better work, of course, is *important.* That's what brings in the service customers!



RECORD YOUR ANSWERS TO THESE QUESTIONS ON QUESTIONNAIRE NO. 100

In the 277 cubic-inch V-8 engine, the intake valves should be set at .008″ and exhaust valves at .018″.	RIGHT	1	WRONG
The check valve works as a combination check and by-pass valve to insure lubrication of the engine at all times.	RIGHT	2	WRONG
The carburetor automatic choke for the new V-8 Plymouth engine is located on the side of the carburetor.	RIGHT	3	WRONG
When checking the choke, always be sure the manifold heat control valve moves freely because it ties in closely to proper choke operation.	RIGHT	4	WRONG
It's important to check tappet clearance every time the car comes in for an engine tune-up.	RIGHT	5	WRONG
Ignition timing for two-barrel and four-barrel carburetor equipped engines should be set 4° B.T.D.C.	RIGHT	6	WRONG
Specified torque on the cylinder head bolts is 70 foot-pounds.	RIGHT	7	WRONG
To set fast-idle, be sure the choke valve is wide open. Then move the fast-idle cam so the high point is under the fast-idle screw and turn the screw to give you 1400 r.p.m.	RIGHT	8	WRONG
When setting valve clearances cold, set intake valves at .009 in. and exhaust valves at .025 in.	RIGHT	9	WRONG
The 277 cu. in. engine can be identified by the oil filler located in the left rocker arm cover.	RIGHT	10	WRONG

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