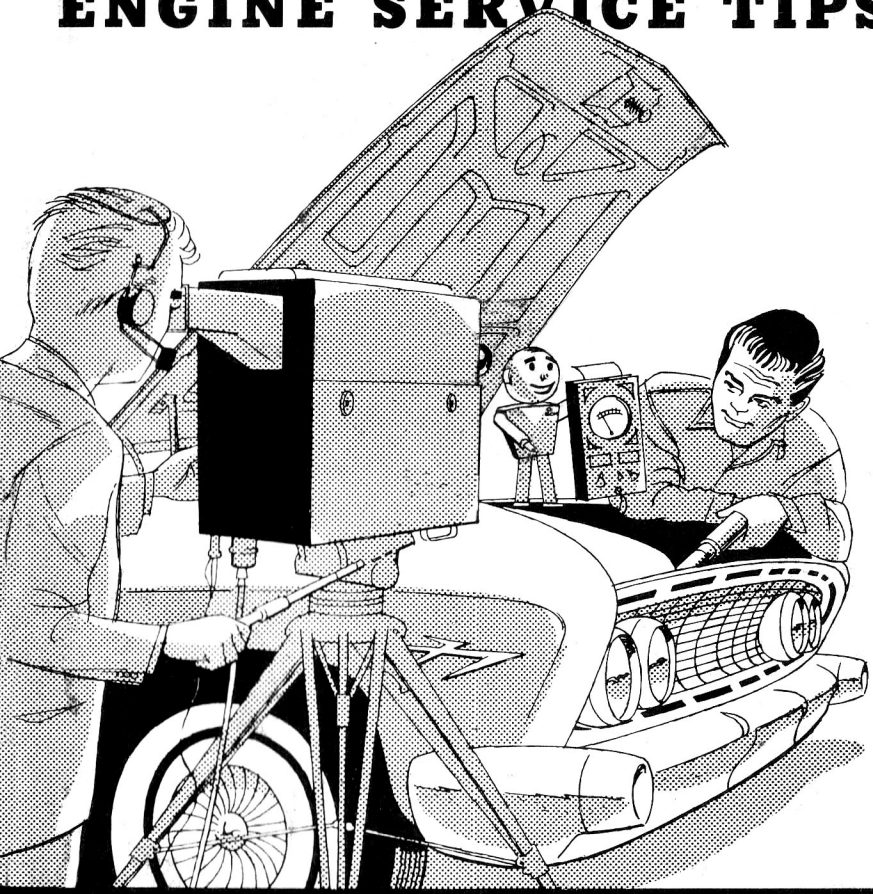
SERVICE REFERENCE BOOK

of the MASTER TECHNICIANS SERVICE CONFERENCE

session no. 158

ENGINE SERVICE TIPS



Prepared by CHRYSLER CORPORATION

PLYMOUTH, DODGE, CHRYSLER-IMPERIAL DIVISIONS

TECH SEZ:

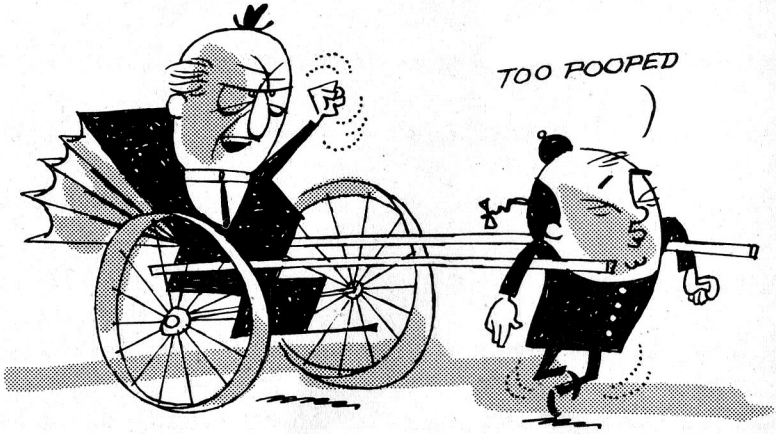
"Engines are worth caring for..."

How well a car's engine performs is a matter of daily concern to every driver. When it runs efficiently—and quietly—the owner is usually satisfied with the entire car. But when engine operation is erratic, or when it makes a strange noise, most owners come apart at the seams.

That's quite natural, of course. And, that's where your ability to diagnose engine conditions accurately, and correct them effectively, can put you in solid with your service customers.

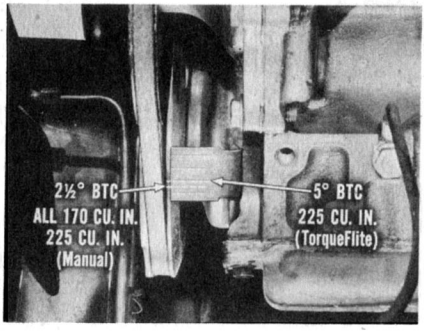
To help you do that, this reference book provides field-tested answers that eliminate guesswork and needless loss when you are called upon to correct certain engine conditions. It tells you what to do, and how and when to do it, to get the best engine performance. Here's how this useful information is arranged for your convenience:

DIAGNOSIS OF UNUSUAL CONDITIONS



Detonation

Upon receiving a report of detonation, or loss of power, road-test the car first to verify the exact condition. Also, find out which grade of fuel the owner normally uses. Detonation, remember, is usually caused by low-octane fuel or incorrect ignition timing. It can also be caused by using spark plugs of the incorrect heat range, localized hot spots or engine overheating caused by some obstruction in the cooling system.



Ignition timing is set at 2½° BTC on all 170-cubic-inch engines (Valiant and Lancer), and on the 225-cubic-inch engines used with manual transmissions. Set ignition timing at 5° BTC on the 225-cubic-inch engine used with the TorqueFlite automatic transmissions.

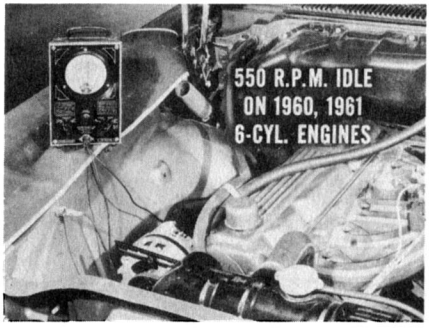
After setting ignition timing with a timing light, test the car on the road to see that it is delivering the best engine performance for the fuel being used. If it was necessary to change the timing from the basic specification during the road test, to eliminate detonation or to improve performance, determine the final setting by testing it with a timing light after returning to the shop.

Don't *retard* timing more than 5° from the specified setting. On the other hand, see that timing is never *advanced* more than 5° from the specified setting. Too much advance can cause pre-ignition, burned pistons, or other serious damage.

NOTE: Always remember to disconnect the vacuum advance line at the vacuum unit when setting ignition timing, so there will be no movement of the advance plate in the distributor. Tape the end of the line to plug it.

Idle Speed

The engine should be run long enough to be sure it has reached normal operating temperature. The choke valve should then be wide open. Using a reliable tachometer, set engine idle speed at 550 r.p.m. with the transmission in neutral. This 550 r.p.m. curb idle is recommended on all 1960 and 1961 six-cylinder engines to provide better engine idle performance.

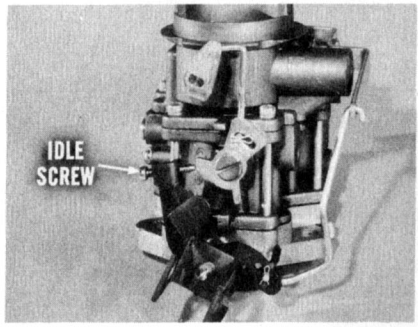


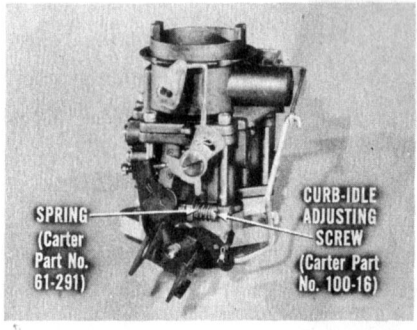
The final idle fuel-air mixture adjustment should then be made for smooth engine idle.

NOTE: When setting idle speed of engines equipped with an alternator, the bright lights should be turned on. This will impose a load on the engine comparable to that normally imposed by the heater, radio and other accessories.

Fast-Idle Adjustment—Early 1960 Models

Adjusting fast idle and curb idle on early 1960 model six-cylinder engines is occasionally a problem. That's because the carburetor has only one screw for setting both the fast and curb idle. With this setup, fast idle may be too fast when curb idle is okay. And, when fast idle is okay, the curb idle may be too slow and cause a rough idle or stalling.



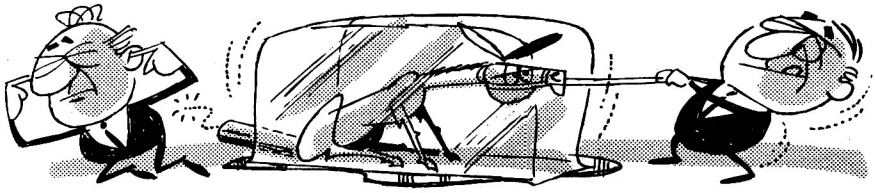


In a case of this kind, install a curb-idle adjusting screw (Carter Part No. 100-16) and spring (Carter Part No. 61-291) in the tapped hole provided. This will permit accurate curb-idle setting independently of fast-idle setting, and result in improved engine performance.

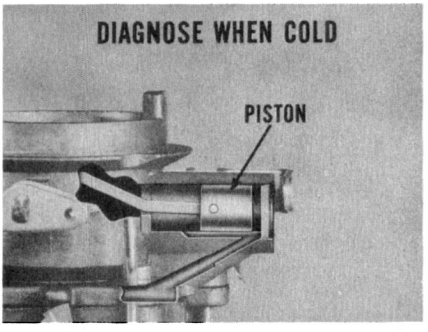
Cold Starting

Occasionally, there are reports of poor cold starting. This might be caused by improper choke valve action due to gum deposits which cause the choke vacuum unloader piston to stick. It can occur on all carburetor models, including 1960, which have the vacuum piston cylinder as an integral part of the air horn.

Since the piston sticking takes place when the engine is cold,



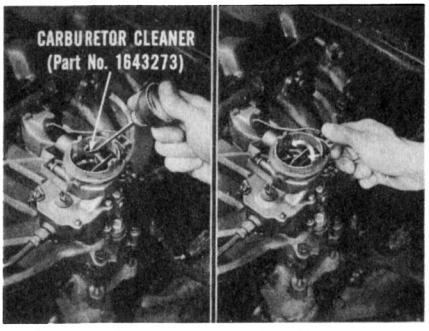
diagnosis can be made only at that time. When the engine's at normal operating temperature, the gum deposits liquefy and allow movement of the piston. However, upon cooling, the gum solidifies to act as an adhesive between the piston and cylinder.



This adhesion, in most cases, is not strong. You can free the piston with a slight pressure, but the sticking will re-occur with each cooling cycle.

Certain fuels and fuel additives contribute to this gum formation. In addition, low-speed and stop-and-go driving during cold weather aggravate the condition.

As a good preventive maintenance practice whenever the air cleaner is removed for service, squirt a few drops of carburetor cleaner (Part No. 1643273) into the vacuum piston chamber, while the engine is idling. Move the choke valve back and forth to help the cleaner flush the deposits from the piston and bore.

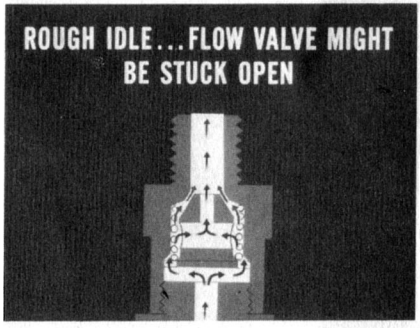


NOTE: Do not use oil-base cleaners, or a solvent with graphite or other additives which would leave a film.

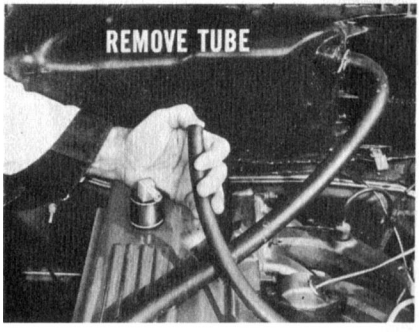
As gum deposits accumulate throughout the carburetor, a complete cleaning will be needed—especially at the choke shaft bearings. On every major job, remove the welch plug from the end of the cylinder, and remove the piston and link assembly. Dip the piston in cleaning solvent and insert the piston into its cylinder. Work the piston in the cylinder to help dissolve deposits. Clean the cylinder with compressed air or a clean cloth, and dry the piston.

Reinstall the piston assembly, connect it to the choke valve and install a new welch plug, Carter Carburetor Part No. 47-30 (5/8" diameter), or Stromberg Carburetor Part No. 388116 (3/4" diameter) in the end of the cylinder. Inspect the choke system for freedom of operation and proper adjustment.

Rough Idle—Closed Crankcase Ventilation System Engines



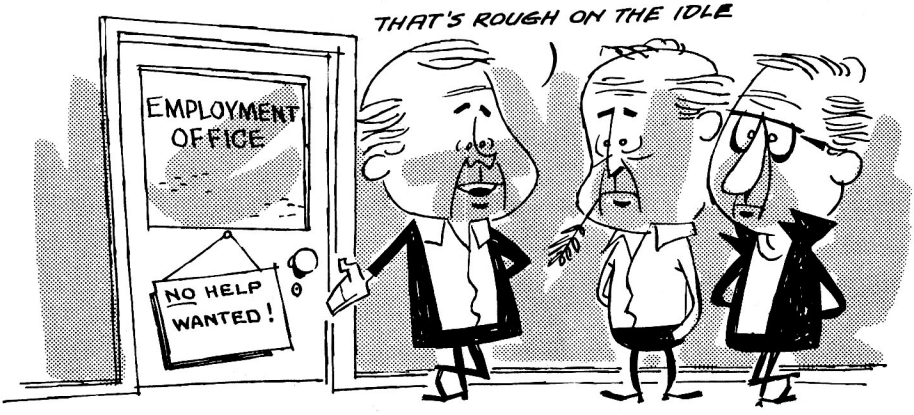
On an engine equipped with the closed crankcase ventilation system, engine idle will be rough and the engine will have a tendency to stall if the flow valve sticks in its open position. This would let excess air bleed in at idle, and lean out the fuel mixture.



A quick test for a sticking flow valve is to remove the flexible connecting hose from the flow valve and hold your thumb over the end of the hose. If engine idle smooths out, the flow valve is probably dirty and needs cleaning.

The flow valve should be serviced regularly, of course. This is particularly important on cars that are operated under short-trip driving conditions during cold weather.

If the flow valve happens to be clean, test for other causes of rough idle and stalling. In short, inspect for vacuum line leaks, a loose intake manifold, or valve lash that just might be too tight.

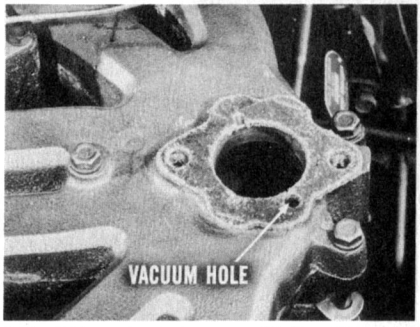


NOTE: All V-8 engines equipped with 4-barrel carburetors and the high-performance camshaft, and fitted with closed crankcase ventilation, require a flow valve with a lower spring rate. That's because engine vacuum at idle is lower on these engines. The standard flow valve spring might not allow engine vacuum to close the valve. So, don't interchange flow valves without double-checking part numbers. For the high-performance engine, the proper flow valve assembly is Part No. 2264344.

Carburetor-to-Intake-Manifold Gasket

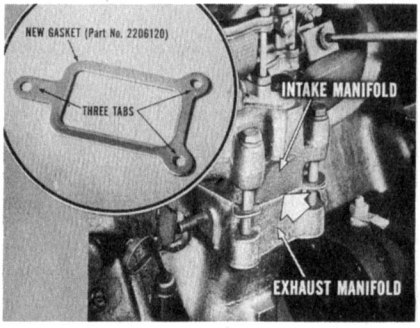
It's also smart to inspect gasket installation between the carburetor and manifold on all 1961 cars with 6-cylinder engines. The gasket must be installed so that the vacuum hole in the gasket indexes with the hole provided in the manifold for the closed crankcase ventilation

system. If the gasket is incorrectly positioned, it might block the choke piston and the step-up piston vacuum ports. And if the vacuum hole in the gasket is not positioned at the hole in the manifold, there will be a rough engine idle. The vacuum hole must line up with the manifold hole provided, or an air leak will result.



Snapping, Popping Sound

There may be occasional reports of a snapping, popping sound as the six-cylinder engine cools. It's caused by relative movement of the manifolds at the intake-to-exhaust-manifold gasket, when the exhaust manifold contracts. This movement might even cause the gasket to creep. To prevent this noise, apply MoPar "Led-Plate" (Part No. 2275437) to each side of the gasket.

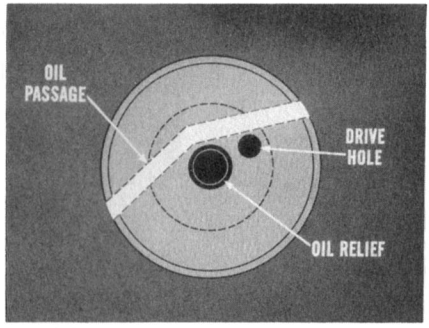


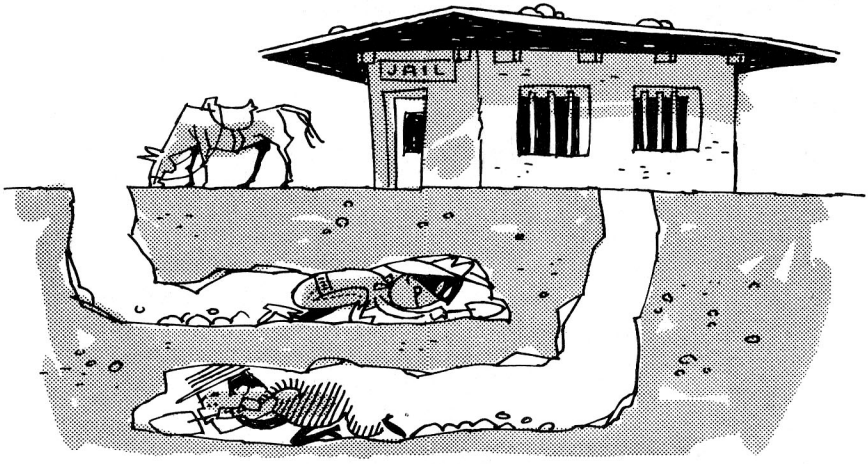
A new intake-to-exhaust-manifold gasket (Part No. 2206120) is available. It has three anchoring tabs. Use the new gasket whenever replacement is necessary, and remember to apply "Led-Plate" to each side of the gasket to prevent noise.

Hydraulic Knock—6-Cylinder Engines

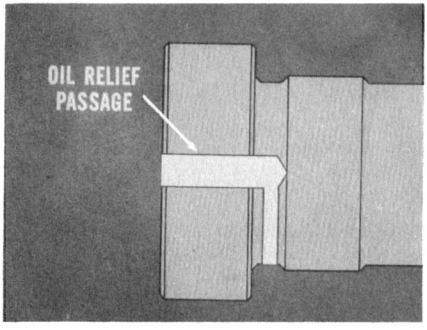
There have been a few complaints of a hydraulic-type knock at or near idle speed on 6-cylinder engines. It sounds quite a bit like a bearing knock, but is usually caused by an improperly drilled camshaft rear bearing journal.

If the camshaft oil passage that feeds oil to the rocker arm shaft is incorrectly drilled, it may break into one of the machine drive holes or into the oil relief passage. Oil pressure can then build up between the end of the shaft and the core plug, causing a knock.

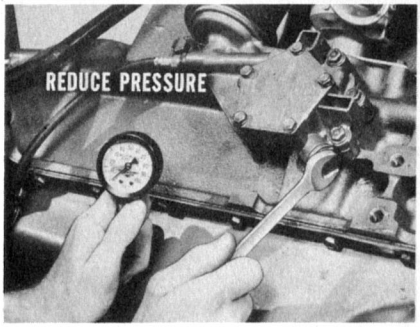




If the camshaft oil relief passage isn't drilled completely through, oil will be trapped behind the camshaft. It can force the camshaft forward and cause a knock. This can also cause leakage at the core plug.



In order to test for this type of hydraulic knock, first attach an oil pressure gauge. Run the engine to bring in the knock. Then, reduce oil pressure a noticeable amount by backing off on the oil pump relief valve nut—or temporarily remove the relief valve spring.

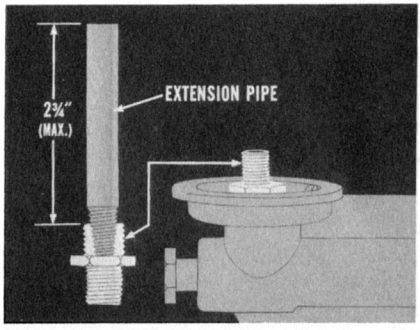


If this pressure reduction affects the knock, pull the camshaft for inspection. If it is necessary to install a new camshaft, be sure to examine it for proper drilling before making the installation.

If reducing oil pressure *doesn't* affect the noise, it is probably a mechanical noise which will have to be tracked down and corrected.

Bearing Rumble—Cold Starting

Some 6-cylinder engines may have a noise that sounds like a bearing rumble when the car is first started in cold weather. The noise goes away as soon as oil pressure builds up. This condition is generally caused by oil draining from the filter through the bearings while the engine was not running.



In a case like this, make an oil filter extension pipe out of ¼" pipe. Install this extension to provide an oil reservoir for an added oil supply during initial engine starting. Here are the detailed steps to follow for this operation:

1. Remove the oil filter from the engine oil pump.

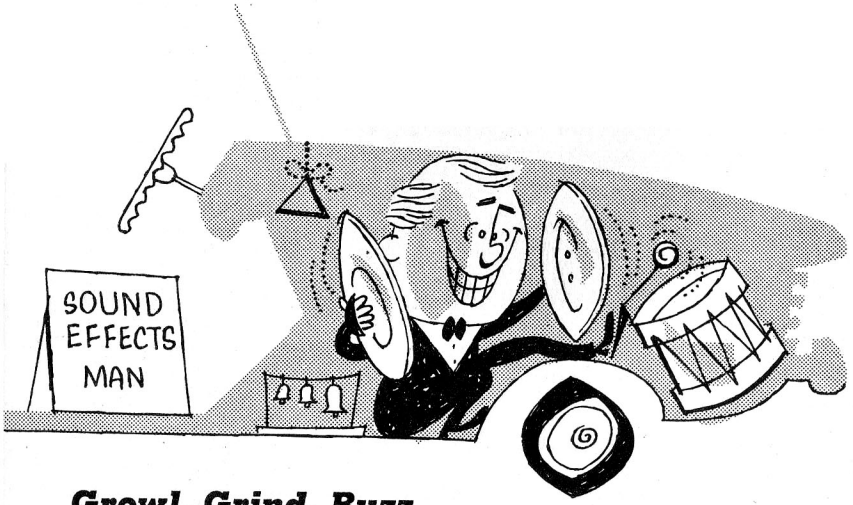
2. Use a 1″ socket wrench to remove the filter mounting adapter coupling from the pump body.
3. Use a ¼″ standard pipe tap to tap the filter adapter coupling I.D. at the upper end to a depth of ½″.
4. Make the extension pipe from standard iron pipe ¼″ x 4″ (unfinished length). Use a ¼″ pipe die to thread ¾″ at one end of the pipe.

NOTE: The extension pipe can also be made from a standard ¼″ x 4″ threaded pipe nipple available at most hardware stores.

5. Securely screw the extension pipe into the tapped end of the adapter coupling. Measure from the upper end of the adapter to the end of the extension and cut the pipe to an exact length of 2¾″. This will avoid interference with the oil filter bypass valve.
6. Install the filter adapter coupling and extension pipe in the oil pump body and tighten it securely. Finally, install the oil filter.

Oil Filter Restricts Flow

Whenever installing a new oil filter, make this preliminary test. Insert a blunt tool into the holes in the base of the filter and push against the rubber flapper valve to make sure it is free. If the rubber anti-drainback valve is stuck, it will prevent oil flow to the engine bearings. The warning light will go on, or the oil pressure gauge will register no pressure, of course, but sometimes this signal is overlooked by the owner.



Growl, Grind, Buzz

Another noise condition might turn up on some 1959 and 1960 cars equipped with the 361-, 383-, or 413-cubic-inch engines. It's a growling, grinding or buzzing sound heard most clearly at the oil pan. You can eliminate this particular noise by installing the new-type oil pump relief valve spring damper (Part No. 2202845).

Loose Fan Belt

A noise that sounds like a bad water pump or alternator bearing may be caused by a slightly loose belt. So test the belt for proper tension before inspecting pump or alternator bearings.

In most cases, a belt that runs loose will develop a glazed area, and continue to slip. It would be wise, therefore, to install a *new* belt and torque it properly—before blaming the water pump or alternator—even though the belt appears to be properly adjusted.

Exhaust Pipe

On 6-cylinder engines there is a sound that can be confused with a main bearing knock. It usually comes in when the car is accelerated under load. It's caused by the exhaust pipe hitting the frame side member—or any other part of the frame—as engine torque moves the engine on its flexible mountings. A bright spot on the exhaust pipe—where it makes contact—is the important clue. If you find the spot, use a torch to heat the exhaust pipe, and then bend the pipe to get increased clearance.

CAUTION: Don't bend the pipe too much or you'll kink it. Above all, don't try to bend the pipe *cold,* or you'll break the exhaust manifold flange.

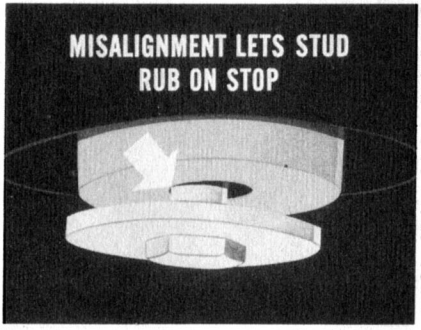
Accelerator Linkage Rattle

Some owners of 1960 and early 1961 cars have asked for correction of an accelerator linkage rattle. The cause in this case, has usually been traced to excessive end play of the accelerator bell crank in the dash-mounted bracket. About the simplest fix is to bend the shaft support tab on the left end of the bracket to reduce the amount of bell crank end play.

CAUTION: Don't bend the support bracket too much, or it will cause the linkage to bind. A slight amount of end play should remain.

Harsh Squawk

The engine spring-type rear mount may occasionally produce a harsh squawking sound. This condition can be determined by putting the car on a hoist. Then, grasp the propeller shaft near the transmission and move it up and down to see if it will bring in the noise. A squawk of this type is generally caused by misalignment of the engine mounts that lets the rear mount stud rub on the rubber stop.

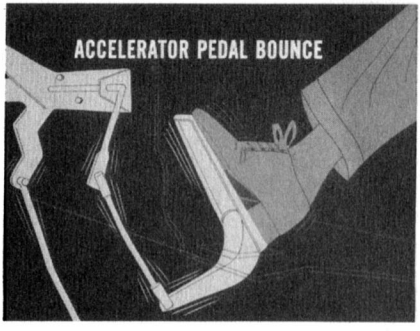


To correct the condition, loosen the front engine mounts. Shift the engine until the stud is centered in the rubber stop. Tighten the front mounts to specifications. Then, recheck for elimination of the squawk.

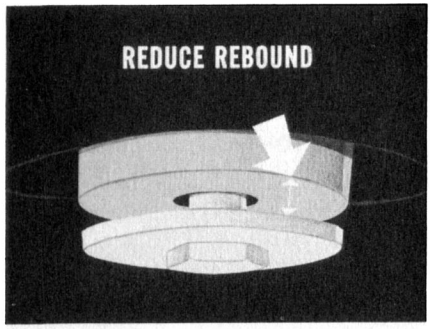
The engine spring-type rear mount is designed to permit a controlled amount of engine movement present during the operation of any engine. This design does a highly satisfactory job of minimizing the transmission of engine and drive-line vibrations.

Accelerator Pedal Bounce

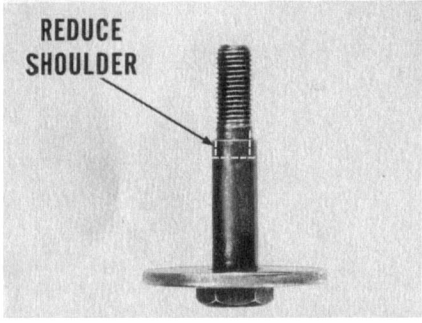
Under certain driving conditions, engine movement may cause an accelerator pedal bounce that the owner can feel through the sole of his shoe. If this pedal movement is objectionable after the engine has been properly tuned, the amount of rebound at the rear engine mount can be reduced.



In this instance, carefully measure the space between the lower stud washer and the rubber stop. This is the distance the engine can move upward on rebound, and it's usually about ¼". This measured space can be eliminated. On 1960 cars, the crossmember must be removed, but most 1961 models have the stud nut welded in place.



Remove the stud and turn it on a lathe to reduce shoulder height an amount equal to the measured space between the stud washer and stop.



NOTE: Don't replace the stud with a plain bolt. This can compress the spring fully and cause misalignment between the engine and drive line.

An alternate fix is to add just enough shims between the stud washer and rubber stop to fill in the rebound gap. But use just enough shims to fill the space or you'll change the drive-line angle.

OIL LEAK CORRECTIONS

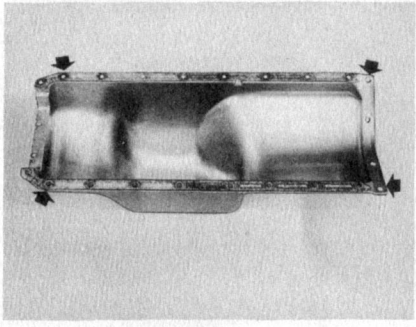
Oil Pan

Keep in mind the importance of following service manual procedure when removing and installing the oil pan. These steps are carefully outlined in the service manual.

The instructions for jacking up and blocking the engine are of special importance. Be sure to use a block of wood positioned under the forward end of the oil pan (over the bolt heads), and then raise the front end of the engine about 2″ with a jack against the wood block.

CAUTION: Do not raise the engine by jacking it up at the vibration damper.

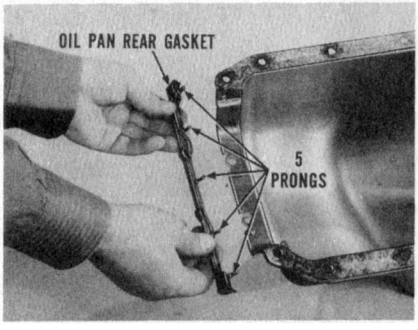
Once the engine is raised, place short pieces of 2″ x 4″ wood blocks between the engine supports and the "K" member. Then, lower the engine and remove the jack.

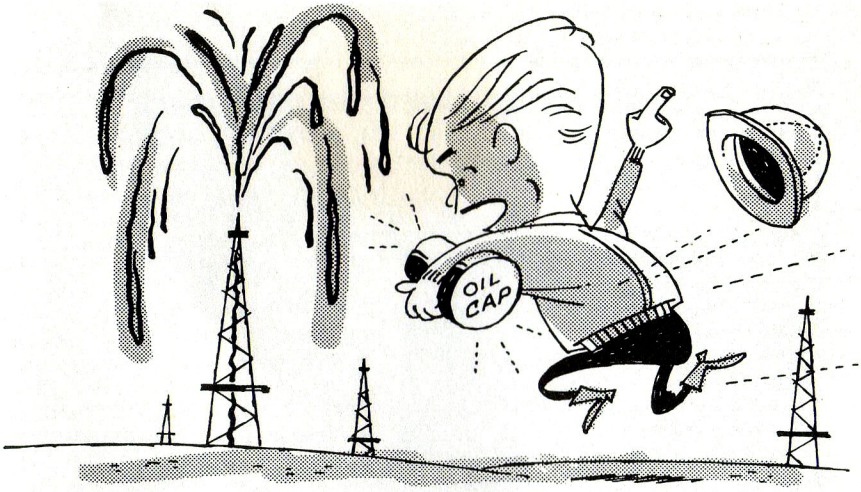


Unless the engine is jacked up and blocked that way, you won't have the working room needed – and you're apt to bend the oil pan corners. Bent corners on the pan won't seal properly and may cause an oil leak.

NOTE: Tool C-3809 can also be used to lift the 6-cylinder engine.

The oil pan rear gasket on the 6-cylinder engine has been changed. There are now *five* rubber prongs for better gasket positioning. Oil pans made since this change took place also have *five* holes. When installing the new gasket on an earlier-type pan, don't be tempted to snip off any of the prongs to make the new gasket fit. Cutting off a rubber prong can cause the gasket to shift and spoil its sealing efficiency. Instead, adapt the pan to fit the new gasket.



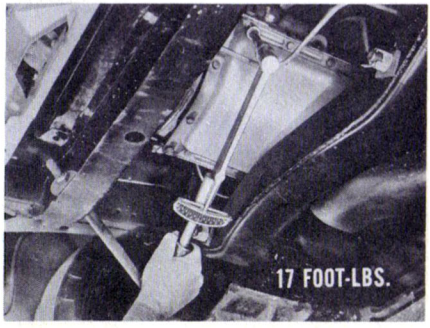


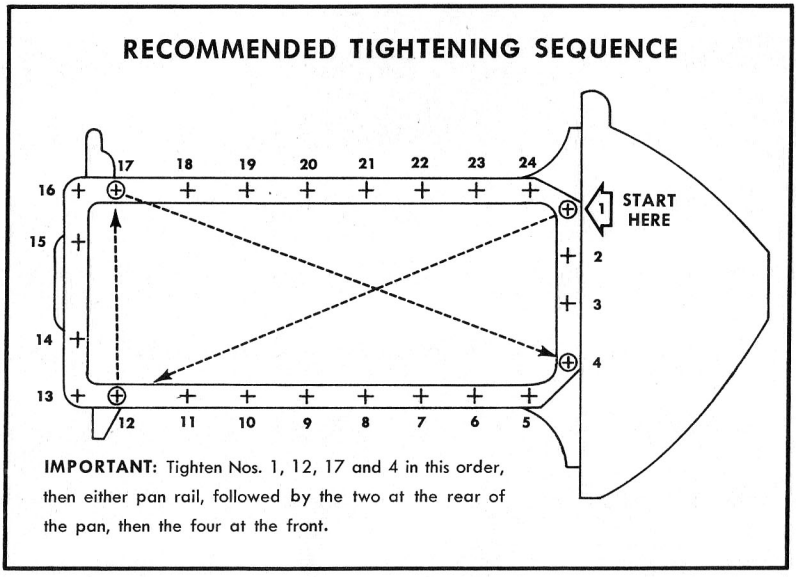
Drill three new $\frac{5}{32}$" holes in the oil pan flange. Just follow the drilling template and instruction sheet that comes with each new gasket package. And don't forget to inspect all pan attaching bolt holes to be sure they haven't been upset at their edges from over-tightening of the pan cap screws. Upset hole edges can lead to oil leaks. Flatten the holes if they have been upset.

NOTE: When you install the oil pan, make sure the oil pump inlet screen is pressed firmly against the bottom of the pan. This prevents rattles at that point and insures the proper pick-up of oil.

Oil Pan Tightening. Another thing . . . remember to tighten oil pan retaining cap screws to 17 foot-pounds. And, tighten them in their proper sequence.

The wrong sequence, or overtightening, can compress the gasket too much, or upset transmission - to - crankshaft-centerline alignment.

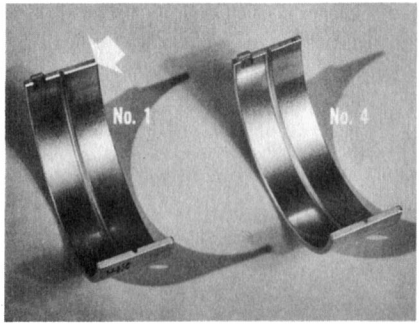




The recommended tightening sequence for oil pan retaining cap screws is shown in the accompanying illustration.

Rear Crankshaft Seal

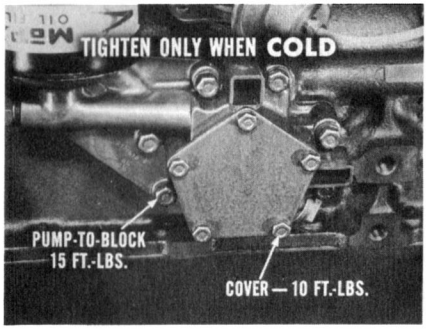
An oil leak at the rear crankshaft seal can occur if the number one and number four upper main bearing inserts have been interchanged. They can be installed that way, but the number one upper main bearing insert has a greater chamfer on the inside edge at the locating tab end to provide lubrication to the timing chain and sprockets. Putting this chamfered insert in the number four position will direct more oil against the rear main seal than it can handle.



Oil Pump

Leaks at this point can take place if the pump-to-block cap screws are too long and bottom in the holes. You can install flat washers under each screw, or cut one or two threads off each screw in order to compress the gasket enough to correct a leak.

It's also a mighty good idea to install a *new* pump-to-block gasket. The old gasket may have taken a set—or have an established leak path. And after you install the new gasket, tighten the pump-to-block cap screws evenly to 15 foot-pounds torque. Tighten the cover cap screws to 10 foot-pounds torque.

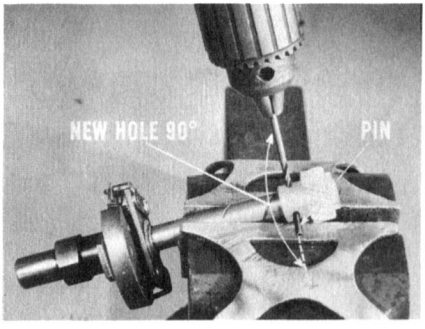


CAUTION: Remember . . . tighten oil pump cap screws *only when cold!* The aluminum and steel mating parts expand and contract at different rates.

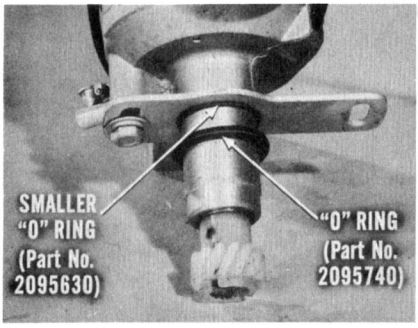
Distributor

Oil leakage from the distributor housing vent holes may be caused by the gear retaining pin hole having been drilled through the spiral groove on the distributor shaft. The pin in the groove would naturally prevent reverse wiping of the oil and it would pile up instead.

In a case like this, position the gear on the shaft with the pin inserted just far enough to hold the original location. Drill a new hole 90° from that location, and install the pin in the new hole.



If there's an oil leak between the distributor and block, remove the distributor. If you find a cork gasket used, replace it with the newer, large "O" ring (Part No. 2095740).



If the distributor already has a large "O" ring and is leaking, remove and discard this "O" ring. Slide a smaller "O" ring (Part No. 2095630) into the small undercut under the retainer plate. Then, install a new, large-size "O" ring (Part No. 2095740). Reinstall the distributor and set ignition timing to specifications.

Cylinder Head Gasket

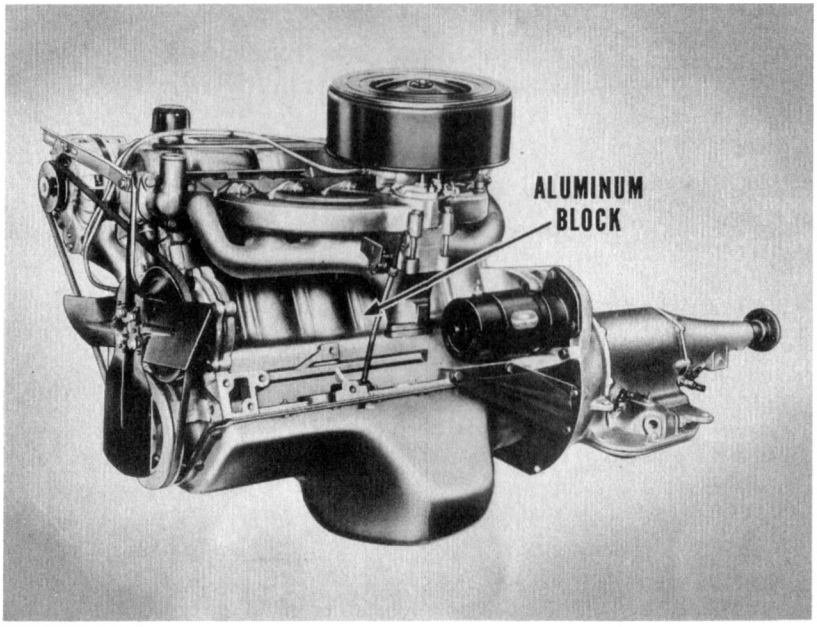
Carelessness in positioning the 6-cylinder head can damage the gasket at the right side of the engine and cause oil to leak from the valve push rod chamber. The best thing to do is follow service manual procedure in removing and installing the cylinder head.

If the cylinder head is incorrectly placed on the gasket, and then slid into place, the gasket may be damaged and set up a leak. So, take it easy. Use short guide pins, and take full advantage of the locating dowels designed to facilitate proper head installation.

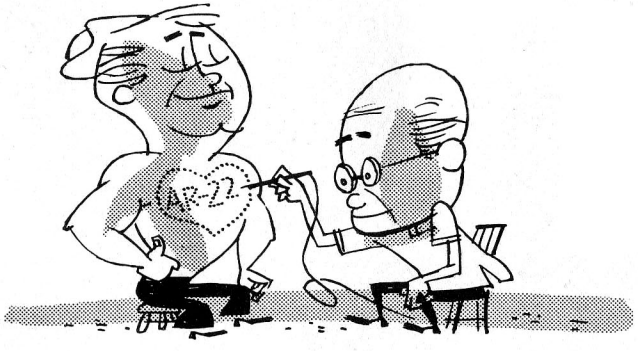
NEW 6-CYLINDER ALUMINUM ENGINE

General Description

A new 225-cubic-inch-displacement, 6-cylinder engine with an aluminum block is now in limited production for United States cars. Since one of them might be in a car that comes in for service, every technician should be familiar with certain construction features and service procedures that apply to aluminum engines.



In general, the new aluminum engine is similar in design to the cast-iron engine. It can be easily identified by visual inspection, and by the engine code identification AR-22 followed by the engine serial number stamped on a machined boss next to the number one spark plug on the right side of the block.



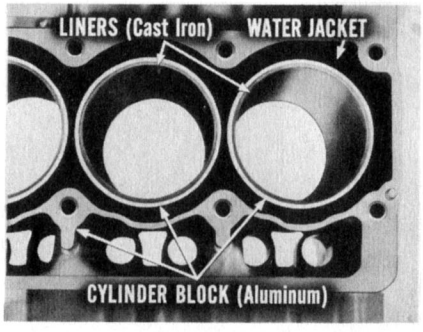
Cylinder Head. A new cast-iron cylinder head, with the word "SPECIAL" cast between the two lifting bracket pads on the left side, must be used. Combustion chamber diameters in this new head are smaller to provide a larger sealing area at the top of the block. Machined notches, also, are provided for increased push rod clearance.

This new head may be used on cast-iron blocks. But a head from the cast-iron engine cannot be used on the aluminum block because it would not seal adequately at the top of the cylinder bore.

Cylinder head bolts on the new engine have been increased to $4\frac{15}{16}$" to provide a longer thread contact in the aluminum block. If shorter bolts are used, the aluminum block can be damaged when the specified torque is applied.

Cylinder Head Gasket. A new composition asbestos steel gasket, with copper on one side, is used on the aluminum engine. The copper-clad side should be installed toward the block. Whenever this gasket is replaced, coat both sides with a thin film of Perfect Seal Sealing Compound, Part No. 1057794.

Cylinder Block. The block is an aluminum die casting with cast-iron cylinder bore liners molded into the block. Liners are not replaceable, but they may be rebored to accommodate .005", .020", or .040" oversize pistons. If it's necessary to rebore an engine, do not rechamfer the top of the liners. This would decrease sealing area and the head gasket wouldn't seal effectively.



The top of the block is cast open. This permits visual inspection and access for cleaning the water jackets.

NOTE: While working on an aluminum engine, be extremely careful not to damage any of the machined surfaces.

Main Bearings. Main bearing clearance is the same as that on the cast-iron engine. But the oil feed holes to the main bearings in the aluminum engine are in a *different location* and require *special* main bearing inserts.

New bearing packages to standardize bearing use in both the cast-iron and aluminum blocks have now been established. These bearings have two oil feed holes in the upper shells. This adapts these new bearings to both cast-iron and aluminum blocks. Part numbers are as follows:

Bearing Package No. 1 Bearing	Bearing Package No. 3 Bearing	Bearing Package No. 2 and No. 4 Bearing
2240368–Standard	2240372–Standard	2240376–Standard
2240369–.001″ u/s	2240373–.001″ u/s	2240377–.001″ u/s
2240370–.002″ u/s	2240374–.002″ u/s	2240378–.002″ u/s
2240371–.010″ u/s	2240375–.010″ u/s	2240379–.010″ u/s

CAUTION: Never install the earlier-type main bearing inserts (with one oil hole) in the aluminum block.

Main Bearing Caps. Replaceable upper and lower cast-iron main bearing caps support the crankshaft in the aluminum engine. Caps are line-bored in complete engine sets. When replacement is necessary, replace all four upper and lower caps with a matched set to assure proper alignment.

Identification numbers *stamped* on the upper caps are *cast* into the lower caps so each set of caps will be properly located. When upper and lower caps are installed, the bearing tab slots should be on the left side of the engine.

Camshaft. Camshaft bearing journals are supported in finished bores in the block, so bearing inserts are not required. Aluminum provides an efficient, wear-resistant bearing surface.

Tappet Adjustment. Because expansion characteristics are different, it is necessary to adjust the tappets differently in aluminum engines.

In other words, run the engine until normal temperature is reached. Remove the cylinder head cover and idle the engine an additional five minutes at 550 r.p.m. Then, set intake tappet clearance to .010", and set exhaust tappets to .020".

Engine Oiling. With one exception, engine oiling passages are the same as those on cast-iron engines. On the aluminum engine, the oil to the main bearings flows from the main oil gallery to counterbores at the main cap bolt holes in the block. From the counterbores, oil flows through the upper main bearing caps and inserts to the crankshaft.

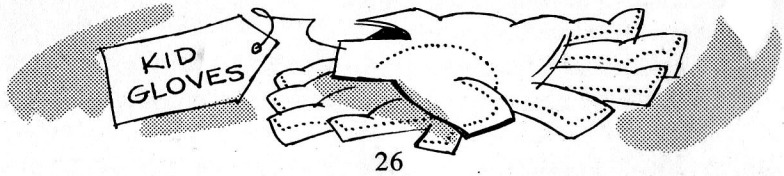
Cooling System. Care and protection recommendations here are the same as always. In certain areas where water contains more than the usual amount of chloride salts, certain contaminants might have a more corrosive effect on aluminum than on cast iron. So if you've experienced trouble with previous radiators or engines, be sure to use MoPar or Chryco antifreeze during the fall and winter months. Also, use MoPar or Chryco Rust Resistor when antifreeze protection isn't needed.

Torque Tightening Recommendations. All bolt torque specifications for the aluminum engine are the same as for cast-iron engines except torque for the main bearing caps. It's important to tighten these caps to *50 foot-pounds torque*—and no tighter.

CAUTION: All tightening on an aluminum block must be done *at room temperature—never when hot!*

Unless these torque specifications are followed, you may damage threads or distort critical dimensions because of excessive compression at aligned surfaces. Tightening bolts when an aluminum engine is at normal operating temperature can also result in coolant and oil leakage when the engine gets cold.

NOTE: It is also important to start a bolt or screw in aluminum carefully to avoid cross-threading.



Repair of Damaged or Worn Threads. You can repair damaged or worn threads in the aluminum block by using Heli-Coils. This repair consists of drilling out worn or damaged threads, retapping the hole with a special Heli-Coil Tap, and installing a Heli-Coil insert. This brings the hole back to original thread size.

Here's a chart with threaded hole sizes used in the aluminum block, plus tools and inserts necessary for thread repair. Heli-Coil tools and inserts are readily available from automotive parts jobbers.

HELI-COIL INSERT			DRILL	TAP	IN-SERTING TOOL	EX-TRACTING TOOL
THREAD SIZE	PART NO.	INSERT LENGTH	SIZE	PART NO.	PART NO.	PART NO.
1/4-20	1185-4	3/8″	17/64 (.266)	4 CPB	528-4N	1227-6
5/16-18	1185-5	15/32″	Q (.332)	5 CPB	528-5N	1227-6
3/8-16	1185-6	9/16″	X (.397)	6 CPB	528-6N	1227-6
7/16-14	1185-7	21/32″	29/64 (.453)	7 CPB	528-7N	1227-16
1/2-13	1185-8	3/4″	33/64 (.516)	8 CPB	528-8N	1227-16

CONCLUSION

You now have the information you need to diagnose and correct certain unusual engine conditions that may annoy some owners. Most of the procedures, you'll agree, are fairly open-and-shut repair techniques that any Master Technician can get down pat in a hurry.

Try them out the next time an engine comes in for the special attention an occasional noise or leak requires. You'll not only get a kick out of correcting the trouble, but you'll enjoy seeing the satisfaction each owner gets with the service you've provided. The fact that you know your stuff naturally pays off in repeat service sales!

RECORD YOUR ANSWERS TO THESE QUESTIONS ON QUESTIONNAIRE NO. 158

Accelerator linkage rattle is usually caused by excessive end play of the bell crank in its dash-mounted bracket.	RIGHT	1	WRONG
On cars with the engine spring-type rear mount, misalignment of the engine mounts may let the rear mount stud rub on the rubber stop and cause an occasional squawk.	RIGHT	2	WRONG
On engines equipped with an alternator, never turn the bright lights on when you set engine idle.	RIGHT	3	WRONG
Occasional poor cold starting can be caused by improper choke valve action due to gum deposits that make the choke vacuum piston stick in its bore.	RIGHT	4	WRONG
An engine with closed crankcase ventilation will have a rough idle and stall frequently if the flow valve is stuck in its open position.	RIGHT	5	WRONG
Before installing a new oil filter, insert a blunt tool into the holes at the base of the filter to make sure the rubber flapper operates freely.	RIGHT	6	WRONG
Main bearing inserts can be installed in any journal location on all 6-cylinder engines as long as they fit the caps.	RIGHT	7	WRONG
If the distributor gear retaining pin hole has been drilled through the spiral groove on the shaft, replace the distributor.	RIGHT	8	WRONG
If you hear a noise like a bad water pump or alternator bearing, check the pump first, then the alternator, and then the fan belt in that order..	RIGHT	9	WRONG
All tightening on an aluminum engine block must be done at room temperature—never when the engine is hot.	RIGHT	10	WRONG

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