Service Reference Book

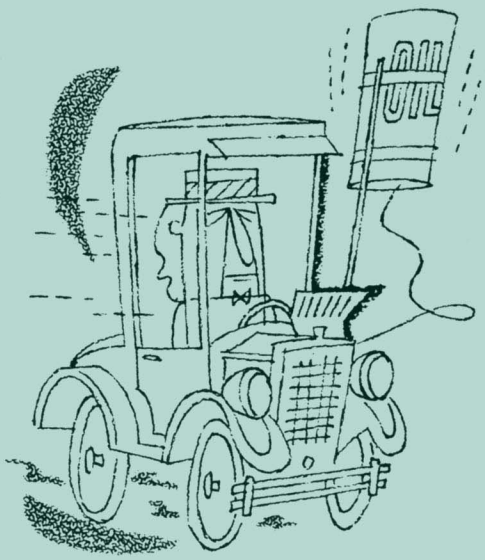
MASTER TECHNICIANS SERVICE CONFERENCE

SESSION NO. 162

ENGINE OIL CONTROL

PREPARED BY CHRYSLER CORPORATION

PLYMOUTH • DODGE • CHRYSLER • IMPERIAL



A short history of the "oil hog"

Way back when ignition points were set with a calling card and spark plugs were gapped with a thin dime, curing "oil burners" was big business.

Most cars were equipped with "oil drip pans" to catch oil leaking from the oil pan and main bearing seals. This ingenious device helped keep the floor of the family garage from developing knee-deep oil slicks. The traffic lane on the upbound side of every hill was blackened with the oil that spilled from the drip pans.

Engine ring jobs were big business in most dealerships and many a Master Technician put in a ten- or twelve-hour day boring cylinders on the engine-rebuild line. However, times have changed and so have the problems of keeping oil *in* the engine where it belongs and *out* of the combustion chambers where it certainly *doesn't* belong.

From the standpoint of service volume, the ring business isn't as important as it once was in most dealerships. From the standpoint of customer relations and satisfaction, it's more important than ever before. It's a fact that many cars that are using oil don't need rings. Oil consumption can often be cured without complete engine disassembly. It's also a fact that sometimes a ring job is the only way to stop oil consumption.

The purpose of this Tech Reference Book is to provide up-to-date information on engine oil control. It covers two equally important aspects of oil consumption. First, it will help you do a better job of determining whether or not a customer's car actually does need rings. Second, it gets down to brass tacks on the subject of re-ring service and comes up with important information that will help you do a top-notch ring job you can be proud of.

IT'S TOO BAD THERE'S NO EXACT WAY OF MEASURING THE POTENTIAL CUSTOMER SATISFACTION STORED IN EVERY MASTER TECHNICIAN'S TOOL BOX.

TABLE OF CONTENTS

ENGINE OIL CONTROL DIAGNOSIS

INTRODUCTION

When a service customer complains about oil consumption, find out as much as you can about the complaint. Is the owner using an MS oil—the recommended viscosity? Is the car used mostly for high-speed turnpike driving, or for short-trip, stop-and-go city operation? When did the problem develop? How much oil is actually being used? Has the car been serviced properly and consistently? Don't overlook a single item that might give you a clue as to where the oil is going, or why.

It is not unusual for an engine to use a little oil—this indicates that the piston rings are being properly lubricated. The type of engine operation determines *how much* oil consumption is acceptable. Under the worst conditions —short trips where the engine doesn't have a chance to get fully warmed up, or long periods of idling, for example—all engines use more oil.

OPERATING CONDITIONS

Find out if your customer has had oil and filter changes and other periodic engine maintenance performed at the recommended intervals . . . more often if conditions such as short-run operation, much idling, cold-weather operation, or operation in dust-laden air prevail. Stress the necessity of changing the oil filter and keeping the carburetor air cleaner and crankcase ventilating system clean.

OIL LEVEL

Tell the customer to shut off the engine and let it stand for a few minutes before having the dipstick checked. Otherwise, he won't be getting an accurate reading. Usually, an owner will accept and appreciate your advice because he realizes you know what you're talking about —so give him the straight word!

Use only an oil with an API classification "For Service MS" and of the right viscosity for the expected temperature. When changing oil, put in just the right amount, remembering to add an extra quart for the new oil filter. Run the engine to distribute the new oil, then give the oil time to drain down into the crankcase. Then make sure the dipstick reads "Full". If it doesn't, the owner might add oil before it is needed and assume that the engine is using too much oil.

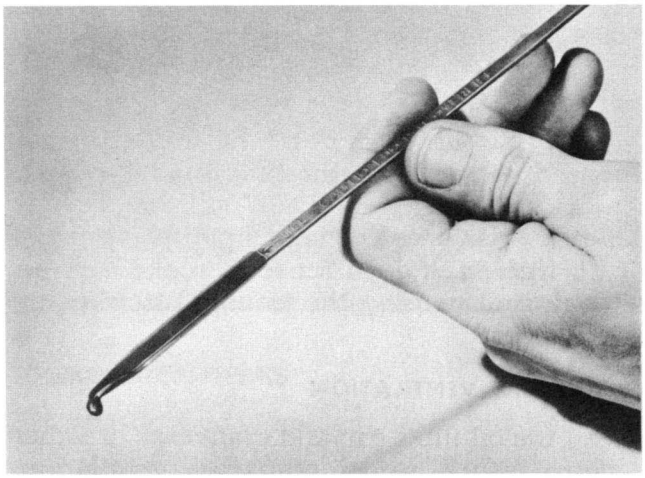


Figure 1—Check dipstick reading

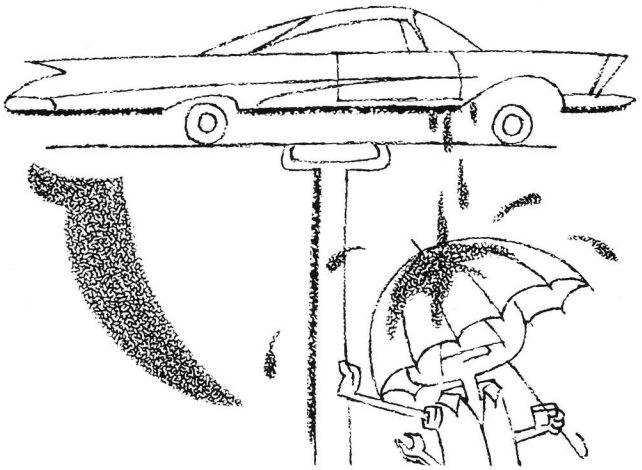
If the oil takes an unusually long time to run down into the crankcase from the rocker cover, particularly on earlier 318-cubic-inch V-8's, you should suspect that the oil drainback holes in the cylinder heads are clogged with sludge. (Engine de-sludging is covered later in this book.)

EXHAUST SMOKE

Try the easy things first. "Rev up" the engine a couple of times and watch the exhaust, particularly when the engine is decelerating. One sure sign of burning oil is excessive blue or blue-gray exhaust smoke. Don't confuse this with black smoke which indicates a rich mixture, or white "smoke" which is actually water vapor accompanying combustion gases.

OIL LEAKS

Put the car up on a hoist and look for evidence of engine oil leaks. Examine the torque converter housing or clutch housing, the edges of the oil pan and valve covers, the drain plug, the fuel pump and oil pump, the oil filter connections and the timing case cover gasket.



On slant-six engines, don't be misled by an apparent oil leak at the rear main bearing. Track it down carefully. You may find it actually originates at the fuel pump, oil pump or oil filter. It's good sense to make sure an oil leak isn't causing the trouble before going any further.

CRANKCASE VENTILATION

Clean the oil filter cap and crankcase breather pipe to insure proper crankcase ventilation. Inadequate crankcase ventilation results in abnormal sludging and oil consumption.

Figure 2—Clean crankcase breather pipe

While you're at it, clean out the carburetor air cleaner and make sure it's in good shape. If sand or other air-borne grit gets past this filter, it will end up in the cylinders. That will score the cylinder walls and wear the rings prematurely.

ENGINE OIL SLUDGE

Watch for sludge when you drain the old engine oil, particularly when it's nearly all drained out.

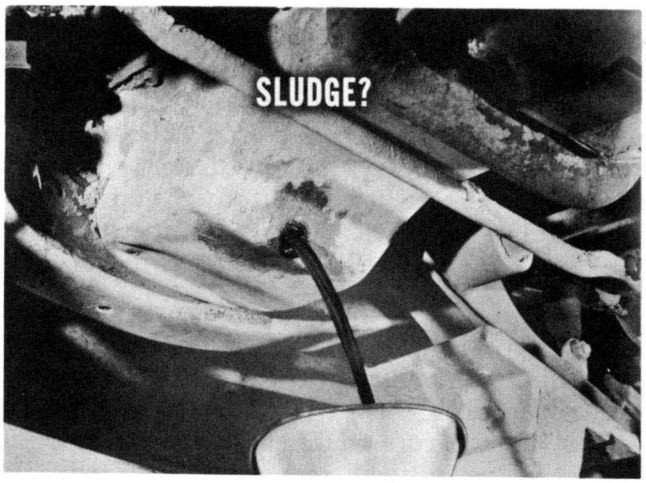


Figure 3—Watch for signs of sludge

Sludge can be caused by many things. Poor crankcase ventilation, excessive blow-by of combustion gases into the crankcase, failure to change oil at proper intervals, use of a poor grade of oil, or engine coolant contaminating the oil are some examples. Most sludge is thick and gummy, but sludge from engine coolant contamination may appear as a slightly milky discoloration in the oil.

Sludge is harmful to the engine in many ways. Not only will it clog oil passages, but it may even gum up the piston rings themselves, so that they can't do their job of controlling cylinder wall lubrication.

ROCKER CHAMBER INSPECTION

Remove the rocker covers and examine the rocker chambers and all exposed parts for possible causes of high oil consumption. Inspect the valve stem oil shields. Be sure they fit tightly on the valve stems, and aren't torn or damaged.

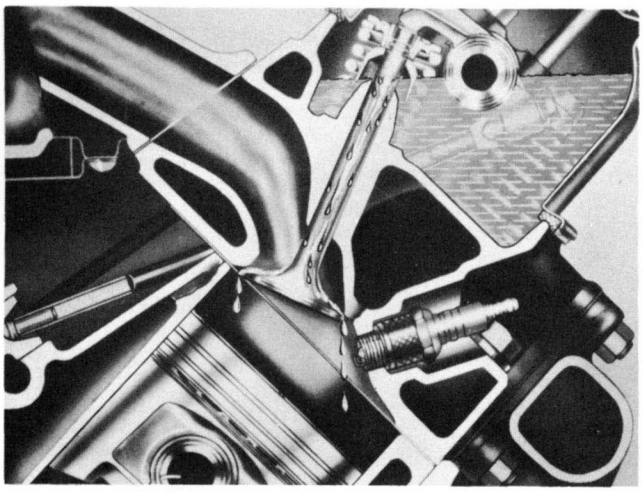


Figure 4—Oil from rocker chamber drawn into cylinder

Run the engine with the rocker covers removed and watch for any excessive flow of oil to the rocker chambers. If more oil flows into either chamber than the drainback holes can handle, the excess will flood the chamber. Intake manifold vacuum will then draw some of the oil down the valve guides to the cylinders. This can also occur if the oil drainback holes are plugged. In either event, the result is blue exhaust smoke and an oil burning complaint!

COOLANT SYSTEM LEAK TEST

If sludge, loose head bolts or other indications lead you to suspect a coolant leak into the oil, pressure-test the cooling system with the cooling system tester C-3499. Test the system at a pressure of 15 pounds per square inch. Some leaks may show up only when the engine is cold; others, only when the engine is hot.

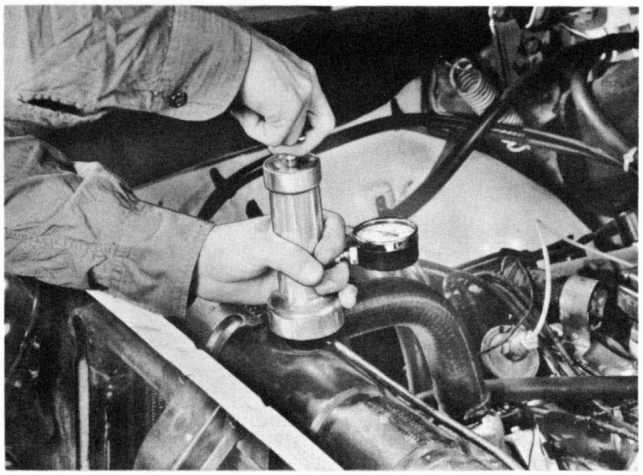


Figure 5—Pressure-testing the cooling system

Be sure the head bolts are "torqued down" to specifications. If one or more are loose, a coolant leak past the head gasket into a cylinder could develop. Eventually, the sludge resulting from this leak might gum up the rings or cause other lubrication troubles.

On V-8 engines, also test the intake manifold bolts for proper torque. A leak at the intake manifold gasket would let manifold vacuum draw oil into the cylinders from the tappet chamber.

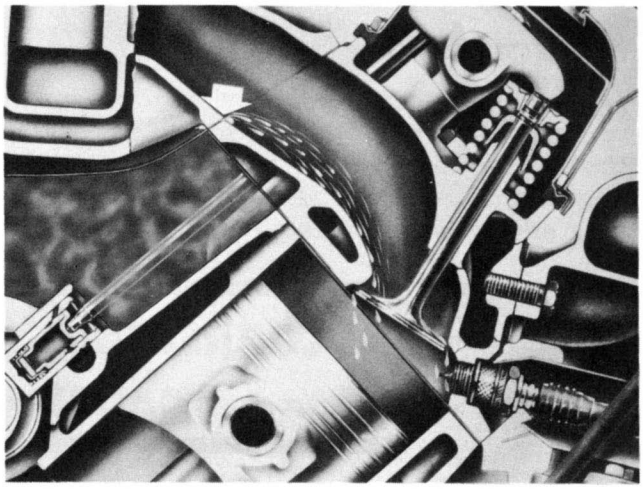


Figure 6—Oil from tappet chamber drawn into cylinder

COMBUSTION LEAKS

If you do find a coolant leak, but you don't discover any signs of external leakage, test the cooling system for fuel fumes or combustion fumes in the vapor at the radiator filler neck by using the Bloc-Chek Kit C-3685.

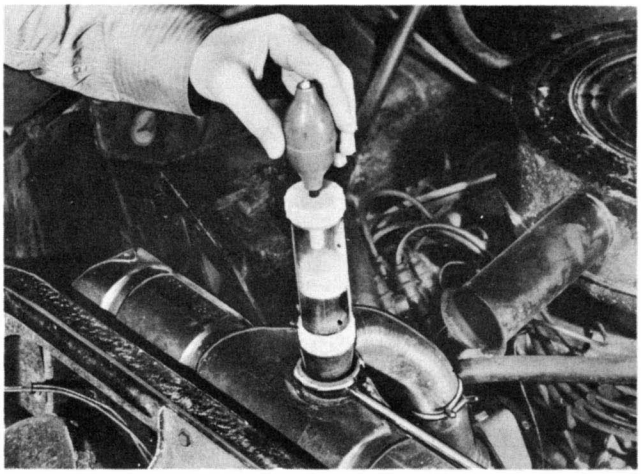


Figure 7—Testing cooling system for combustion fumes

If combustion fumes are present in the coolant of a V-8 engine, you can find out which bank of cylinders is leaking. Remove the spark plugs from one bank of cylinders and repeat the test. If fumes are still present, the leak is at the side having the plugs installed. If they're gone, the leak is at the side where you pulled the plugs.

NOTE: For this test, it's okay to run the engine for a short time on only four cylinders—but don't do so any longer than necessary.

ENGINE TEMPERATURE

If the engine seems unduly slow to warm up or if you have any other reason to doubt that the thermostat is okay, test it and install a new one if necessary. Remember, a cold-running engine contributes to sludge formation. That's one reason why 180-degree thermostats are specified for year-round use.

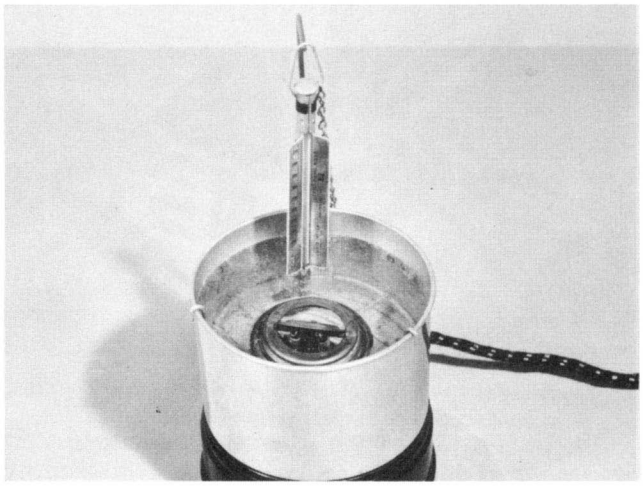
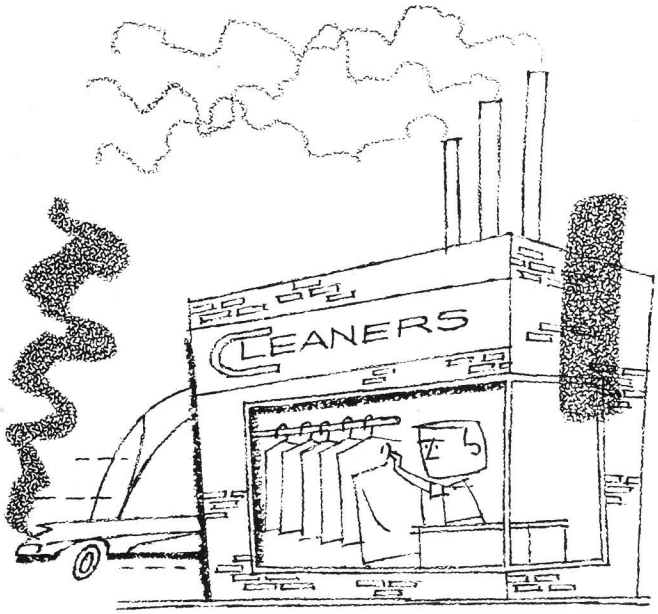


Figure 8—Testing the thermostat

CORRECTING OIL CONSUMPTION CAUSED BY SLUDGE

If there's quite an accumulation of sludge in the engine, but you feel reasonably sure it hasn't progressed to the point where other difficulties have developed, try flushing out the engine. It's worth the time it takes—and you could save your customer the cost of a ring job.



CLEAN THE ROCKER CHAMBERS

Before you do any flushing, clean all the sludge from the rocker chambers and the oil drainback holes. This sludge must be removed so that it will not be circulated throughout the engine during the flushing operation.

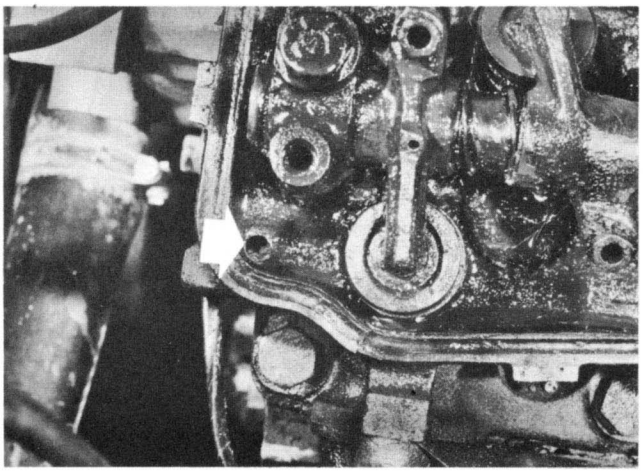


Figure 9—Clean out rocker chambers and drainback holes

If you have steam-cleaning equipment available, use it to remove all sludge. Just be sure

and plug the oil drainback holes to minimize the amount of sludge and cleaning agent washed into the crankcase. Sludge can also be removed by washing down and scrubbing the entire rocker chamber with a suitable solvent. Be sure and remove the plugs from the drainback holes before you install the rocker covers again.

CHANGE THE OIL FILTER

Install a new oil filter or a new oil filter element. This is important. Under no circumstances should you attempt to flush an engine without removing the oil filter. The flushing agent will tend to flush the dirt out of the *old* filter and distribute it throughout the engine. A new filter will trap and hold much of the sludge and dirt loosened up during the flushing operation.

DE-SLUDGING SOLVENTS

A special flushing solvent is required to remove sludge without disassembling the engine. The following procedure is based on the use of a very effective solvent with a complicated chemical name . . . ethylene glycol monobutyl ether. This is one of the few solvents that will do a quick and satisfactory job. It is usually available through local chemical or oil supply jobbers.

Following are some of the trade names under which it is available: **BUTYL CELLOSOLV, POLY-SOLV EB, DOWANAL EB**

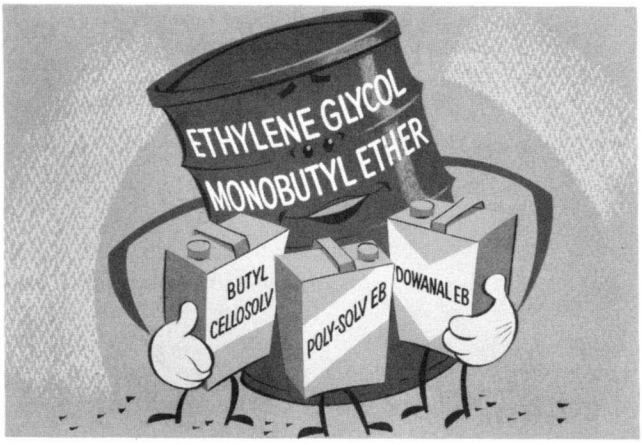


Figure 10—All members of the same family

When you purchase solvent for quick de-sludging, make sure you are getting ethylene glycol monobutyl ether.

ENGINE FLUSHING

The first step in the flushing operation is to fill the crankcase with three quarts of MS, SAE 10-W engine oil and two quarts of flushing solvent. The flushing solvent is considered a toxic irritant to the skin and eyes, so handle it carefully. Also avoid breathing the vapors or spilling on painted surfaces.

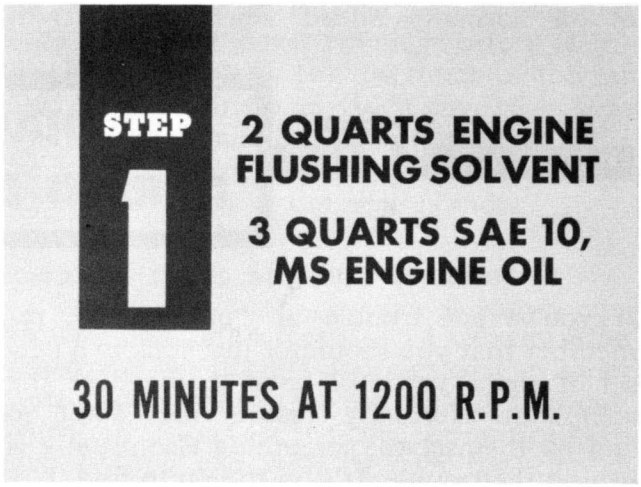


Figure 11—Flushing an engine—1st step

Run the engine at a fast idle (about 1200 r.p.m.) for 30 minutes and then immediately drain the crankcase. Keep a close eye on the oil pressure during this half hour.

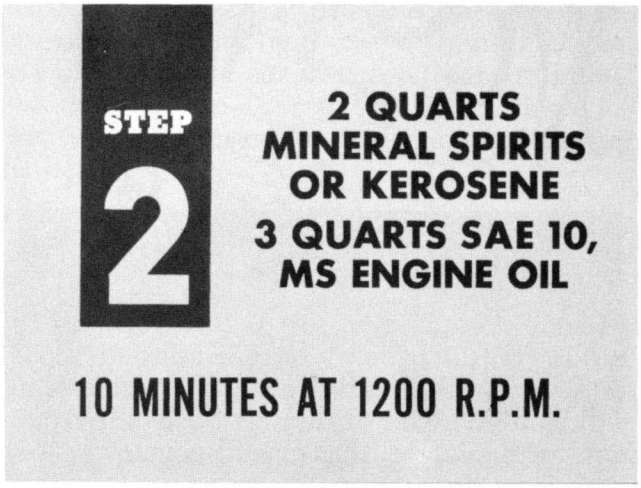


Figure 12—Flushing an engine—2nd step

For the final flushing, fill the crankcase with three quarts of SAE 10-W oil and two quarts of mineral spirits or kerosene. Again run the engine at fast idle. After 10 minutes, stop the engine and drain the crankcase.

Be sure and install a new filter. The one used while flushing is probably loaded with dirt and sludge. Fill the crankcase with the proper amount of MS engine oil of the recommended viscosity. It is good insurance to use one pint of Crankcase Detergent And Rust Inhibitor after an engine has been de-sludged. This is available as MoPar Part No. 1643271 and ChryCo Part No. 1518874.

When using this additive, omit the extra quart of oil normally added when the filter is changed. The pint of additive will bring the oil level very close to the full mark.

Have the owner drive his car for at least a thousand miles and keep a careful record of how much oil he adds and at what mileage he adds it. Insist that he use only MS oil of a high quality and correct viscosity. This will tell the story. When he reports the results of this test, you'll know if you've licked his oil consumption problem or if you have an engine overhaul on your hands.

DIAGNOSIS DURING DISASSEMBLY

If you've got trouble—an "oil burner", remember that you shouldn't just stick in a new set of rings—you still have to diagnose the complaint. Normally, piston rings don't go bad by themselves; something else usually is behind the trouble. It's up to you to find it.

Make a compression test before you pull the heads. This will help you pin-point the location and possibly the cause of trouble. This will also give you an indication of the condition of the valves. It is also important to look each part over carefully as you disassemble the engine.

CYLINDER HEADS AND GASKETS

When you remove the cylinder heads, examine the head gaskets and the mating surfaces of the cylinder heads and engine block. Look for "paths" or other indications which would show the route of a coolant leak, an oil leak or a compression leak. If you suspect leakage, inspect the mating surfaces with a straightedge. And remember that on V-8's, a leak past the intake manifold gasket might let manifold vacuum draw oil into a cylinder from the tappet chamber.

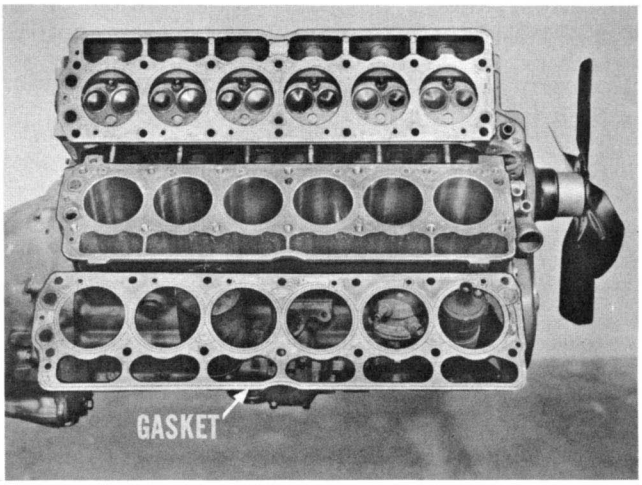


Figure 13—Inspect head gasket and mating surfaces

Inspect the valves. If the underside of an intake valve or the valve port is wet with oil, oil is getting past the guide to the cylinder.

A coating of wet oil on the piston head is an unreliable sign, as it may be due to oil getting past the valve guides, particularly on V-8's. Or it may have simply spilled in when you pulled the cylinder head.

A heavy crust of carbon over the top of the piston, except for the outer edges which appear to be washed clean by oil, indicates that the rings are not controlling the oil.

Never assume that the cylinder bores are standard size; always measure them. They may be oversize and fitted with larger pistons and rings.

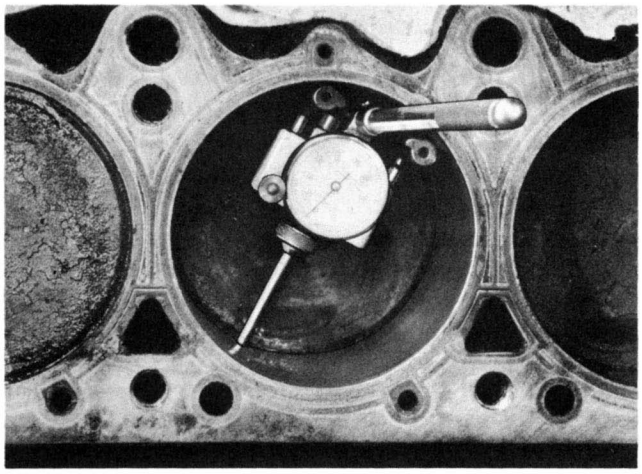


Figure 14—Measuring bore diameter

This will also tell whether the owner needs a re-ring job or new rings and pistons. Authorized service rings will do the job for you if taper is less than .010″, and out-of-round is under .005″.

Above these limits, you'll have to fit new pistons. This is the time to break the news to your customer, and change your original estimate if necessary.

PISTON TRAVEL RIDGE

Before you pull the pistons, be sure to remove all carbon from the upper end of the bore. Ream out the ridge at the top of each cylinder if it is excessive. Otherwise, you're apt to damage the piston lands when you push the piston up and out.

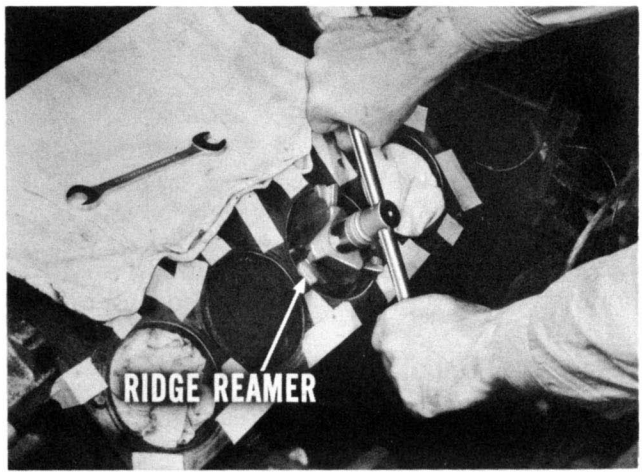


Figure 15—Reaming the cylinder ridge

The ridge reamer C-3012 is an effective tool for this job. Do one cylinder at a time. Stuff a cloth down on top of the piston and cover the other cylinders as well as all push rod holes and water jacket openings before reaming. Use care not to cut too much or too far down in the cylinder, or you'll have to re-bore to correct your mistake. When you finish, bring the piston up and get rid of all the cuttings before you go on to the next cylinder.

REMOVE PISTONS AND ROD BEARINGS

Use cap bolt protectors C-3221 to keep from scratching the bearing journals and cylinder walls when you push the pistons and rods out. When the pistons are removed, be sure to keep each bearing cap with its own rod—they're matched parts. Remove the old rings from the pistons, using a ring installing and removing tool of the right size for the job you're working on. By removing the old rings from the pistons with this tool, you'll prevent damaging the ring lands or scratching the piston.

Inspect the rod bearings and measure the journals for taper and out-of-round. Loose or worn bearings can cause oil consumption and comebacks. Follow the instructions in your Service Manual for inspecting and fitting the bearings.

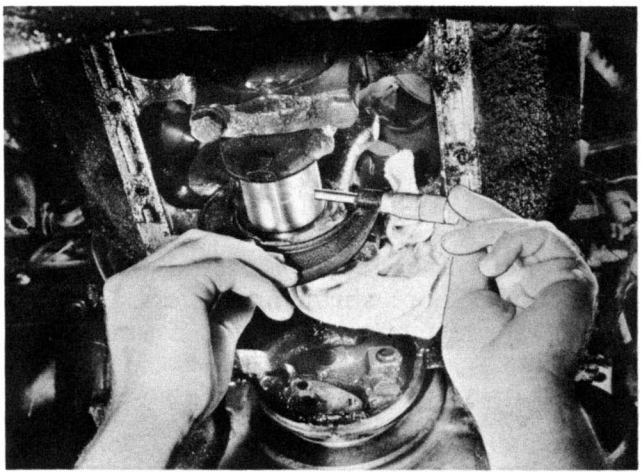


Figure 16—Measuring rod bearing journals

RECONDITIONING CYLINDER WALLS

The reconditioning of cylinder walls has been the subject of considerable recent study by service engineers and technicians. As a result of their investigations, improved techniques have been developed. The following procedures incorporate these latest ideas.

Cylinder walls must be reconditioned before new rings are installed. Otherwise, the new rings may not seat and form a good oil seal, or they might scuff the walls during break-in.

HONE SELECTION

Used carefully, the cylinder bore resizing hone C-823, equipped with 220-grit stones, is the best tool for this job. In addition to deglazing, it will reduce taper and out-of-round as well as removing light scuffing, scoring or scratches.

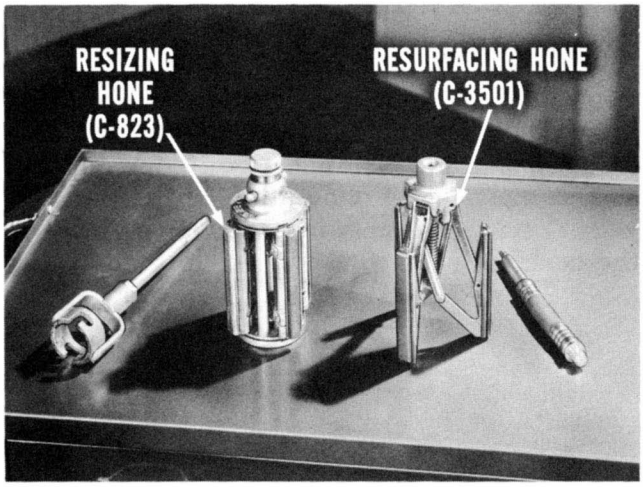


Figure 17—Cylinder bore hones

While you won't get all these advantages in the cylinder bore surfacing hone C-3501, it *will* do a satisfactory job, too, if you use it correctly.

With either hone, light honing oil is essential to produce the required results. Don't use questionable substitutes.

BEFORE YOU HONE

Cover the push rod holes and water jacket openings in the block with tape or other protective covering. Cover everything below the bores with clean oil-soaked cloths to keep out dirt and grit. Turn the crankshaft so that it won't interfere with the hone at the bottom of its stroke in the cylinder you plan on honing. If you forget this, you could break the hone stones on the crank throws or counterweights, and a broken stone will score the cylinder bore.

Scrub the hone stones in warm water and detergent to get rid of all the old oil and loose grit from previous jobs. A high degree of cleanliness now and in the operations that follow is essential to a good re-ring job.

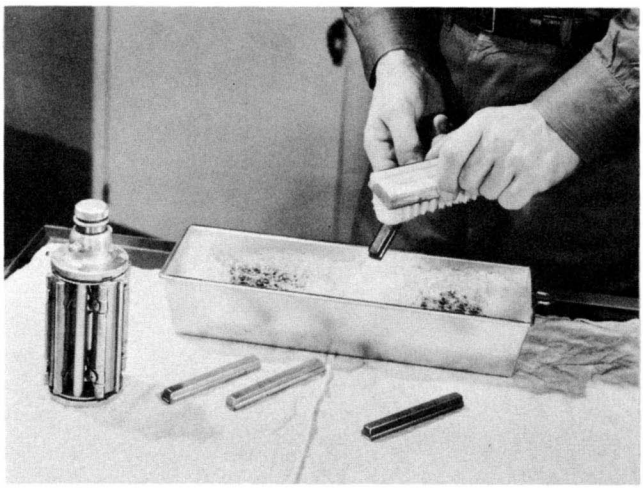
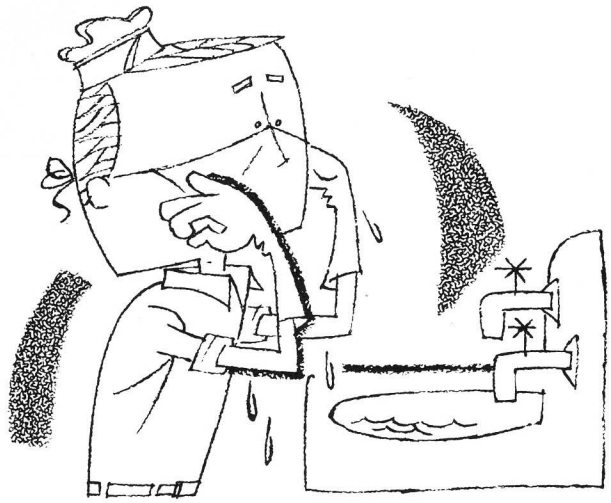


Figure 18—Cleaning the stones before use

Give the walls of the first cylinder and the hone stones a generous coat of honing oil.

USING THE RESIZING HONE C-823

When using this hone for resurfacing, set it for a light cut, so a minimum of metal is removed.



Take smooth, even strokes, the full length of the cylinder, but be sure the stones never extend more than half an inch out of the top or bottom of the bore. With this hone, a relatively slow ½-inch drill motor is used, so time your strokes so that you make about one complete up-and-down cycle each second. Stop after a few strokes, wipe the bore clean and inspect the cylinder walls.

If your strokes have been made at the right speed, the hone marks will make a cross-hatch pattern with the lines crossing at about 60°. If the included angle is too flat, you're stroking too slowly; if it's too steep, you're stroking too fast. You'll soon develop the right rhythm or "feel" for this.

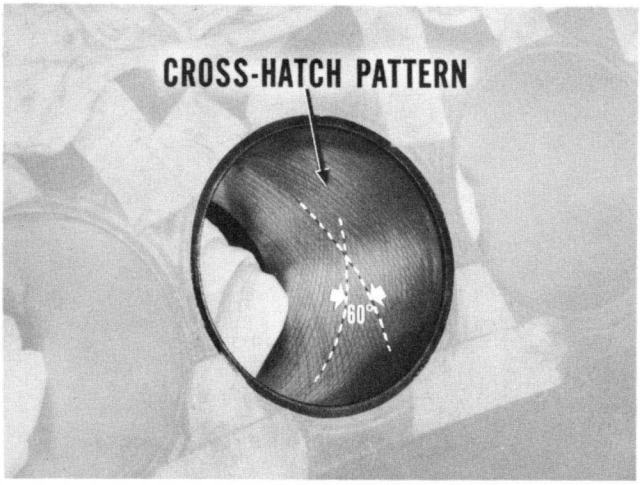


Figure 19—The proper cross-hatch pattern

Be sure and hone *every bit* of the cylinder wall surface. If necessary, take a few more strokes to clean up all low spots. But don't remove any more metal than you have to, or you may end up by having to fit oversize pistons. No more than a total of 20 strokes should be required to clean up the entire cylinder wall surface.

Don't take more than ten complete up-and-down cycles without stopping to inspect the walls again. Always squirt more honing oil on the cylinder walls and coat the hone with honing oil for each series of strokes.

CAUTION: Coarse, 60-grit stones are available for the C-823 resizing hone. These should never be used for resurfacing on jobs that are to be re-rung without fitting new pistons. If cylinder condition requires resizing and the fitting of oversize pistons, the 60-grit stones can be used for the resizing. However, 220-grit stones must always be used for the final or finishing operation.

USING THE RESURFACING HONE C-3501

Spring pressure plus centrifugal force keeps the stones of this hone in contact with the cylinder walls. Both hone speed and stone grit are important to good cylinder finish. Use a ¼" drill motor rated at 2000 r.p.m. or higher and 280-grit stones. The use of a light honing oil is also essential to a satisfactory finish that is free of chatter marks.

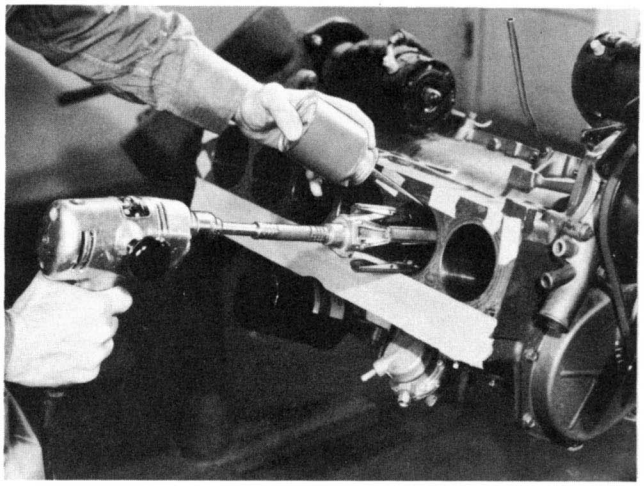


Figure 20—Using the resurfacing hone C-3501

The resurfacing hone removes very little metal. However, it is important to remove enough metal to clean up the entire cylinder wall surface. It takes a little more time and patience to accomplish this with the resurfacing hone than it does with the resizing hone.

With the resurfacing hone it will take about 60 complete strokes to resurface the cylinder wall. Take 20 strokes to get the feel of the hone and to establish the stroking speed necessary to produce a 60-degree cross-hatch pattern. When using this hone it will be necessary to stroke the hone at a faster rate than is required with a resizing hone which is driven at slower speeds with a ½" drill motor.

Once the stroking speed is established, clean the stones, wipe out the cylinder bore with an oily rag, and take twenty more strokes. Repeat this cycle until you've taken a total of about sixty strokes and the entire cylinder wall has a uniform finish.

BORE AND BLOCK CLEAN-UP

To clean the bores, scrub each one with soap, warm water and a soft-bristled brush. Really bear down! You've got to get rid of every trace of foreign matter that might ruin the new rings. Don't use gasoline, kerosene or mineral solvents. These products won't remove grit imbedded in the walls. It will remain and cause scoring or be carried through the engine.

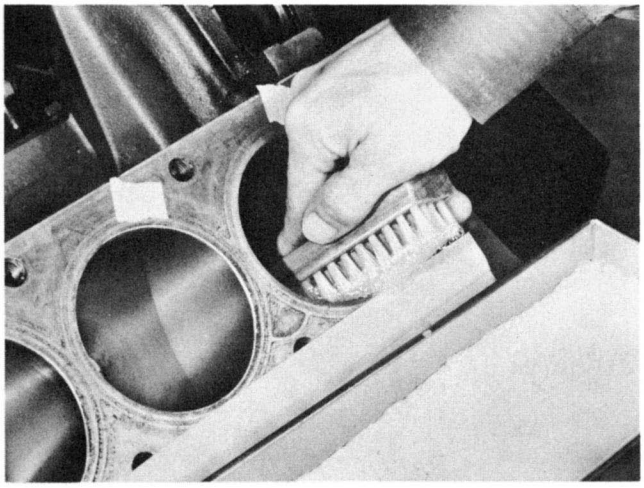


Figure 21—Cleaning cylinder bores

To be sure the cylinder walls are completely clean, wipe the cylinder with a clean white cloth. If the cloth remains clean, the bore is okay. If not, scrub it some more. When you're *sure* it's clean, coat the bore with SAE 10-W engine oil. Rust forms very rapidly on a freshly honed cast-iron surface! After they're all done, remove the oil-soaked cloths from the rod journals. Don't pull them up through the clean bores! Clean the crankshaft and everything below the bores. Remember, grit is abrasive. Don't leave any behind to grind out the bearings.

PARTS CLEAN-UP AND INSPECTION

The need for absolute cleanliness applies to every step of the reassembly procedure, too. Thoroughly clean everything—oil pan, cylinder heads, rocker covers, oil strainer, pistons and rods, etc.—before assembling the engine. Don't take a chance on ruining a good job by leaving any sludge or abrasive behind to contaminate the oil and foul the new rings.

Soak pistons in solvent just long enough to loosen deposits. Remove stubborn carbon deposits by careful scraping. Don't use a power wire brush. You might damage the plated surfaces of the piston or the ring lands. If you have to scrape near the ring lands, take care not to round off the edges of the lands. Clean the grooves with a groove-cleaning tool of the right size. Then clean out the oil drain slots in the piston. Before installing the rings on the pistons, examine the pistons for damaged skirts or lands.

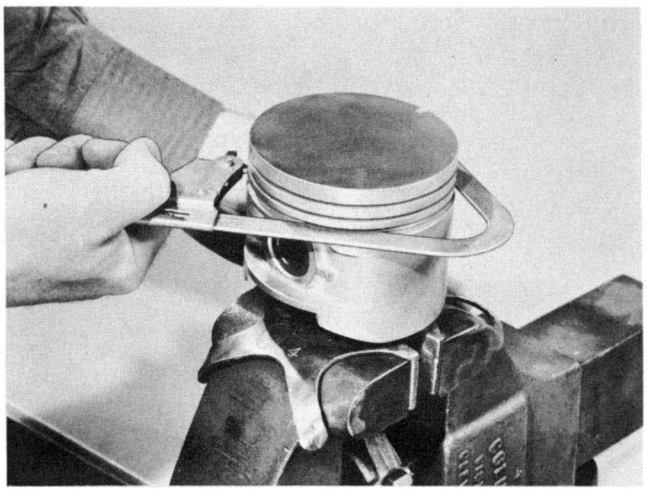


Figure 22—Cleaning piston ring grooves

Here's one more point to watch for when you're measuring ring side clearance. The top groove in the piston may wear bell-mouthed and fail to support the top compression ring as it should. So hold the new top ring in the groove and try to push a .006" feeler gauge between the ring and the upper face of the

groove. If the gauge goes in more than $\frac{1}{16}$", the groove is worn too much. Replace any pistons with any of these defects.

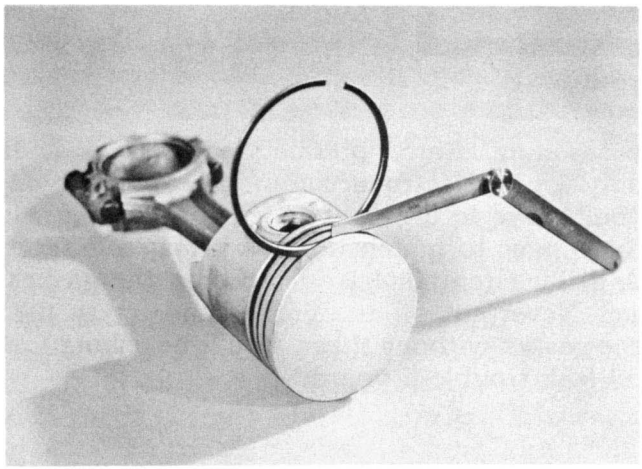


Figure 23—Measuring piston ring fit

Test the fit of each piston pin by clamping the connecting rod firmly in a soft-jaw vise and trying to rock the piston fore and aft, as illustrated. No perceptible rocking movement should exist in this direction. Don't confuse end play—a straight and level sliding movement of the piston on the pin—with axial or rocking movement that indicates a loose pin. Replace any loose pins, following the instructions in your service manual.

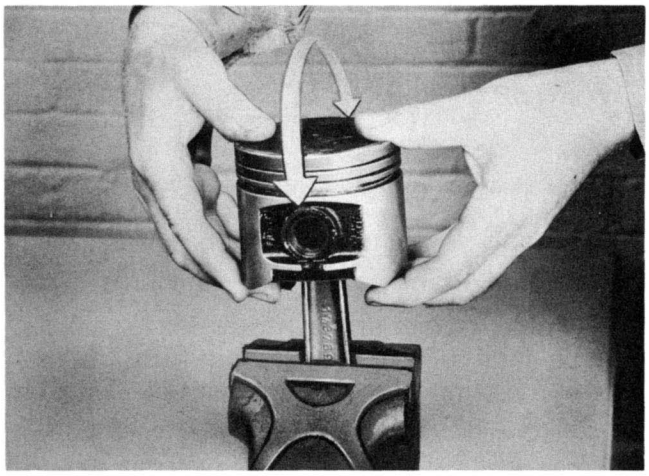


Figure 24—Testing piston pin fit

FIT AND INSTALL PISTON RINGS

The instructions packed with every MoPar and ChryCo service ring set are complete and detailed. Take a minute or two to read *all* the information before you start. The following highlights are particularly important.

Before you install the rings, measure the ring end gap in the cylinder. Use an inverted piston to push the ring down to a point less than two inches from the bottom of the cylinder, where the diameter is smallest. If you measure and

fit the ring gap near the top of the cylinder, insufficient gap may result, and the ring could close up and break under operating conditions. The piston will keep the ring square with the cylinder walls. You'll find piston ring end gaps specified in the current service manual for the engine you're working on.

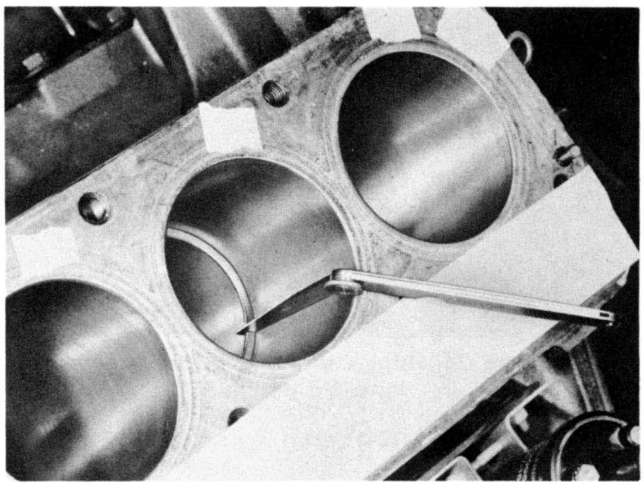


Figure 25—Measuring ring gap

Put the new top and intermediate rings on the pistons with a ring installing and removing tool. Be sure it's the right size. This tool will keep you from damaging pistons and distorting the rings. Stagger the ring gaps as described in the instruction sheet.

ENGINE REASSEMBLY TIPS

Attention to detail is essential to a good ring job. Follow instructions and specifications in the appropriate service manual. The following assembly tips deserve special mention and attention.

INSTALL PISTONS

Before installing the pistons, dip them in fresh, clean oil and use a ring compressor (C-385) to compress the rings. Be sure the rings are seated in their grooves before tightening the compressor. Turn the crankshaft to center the rod journal with the cylinder bore. Use the cap bolt protectors C-3221 on the rod bolts to avoid scratching the rod journal or cylinder bore.

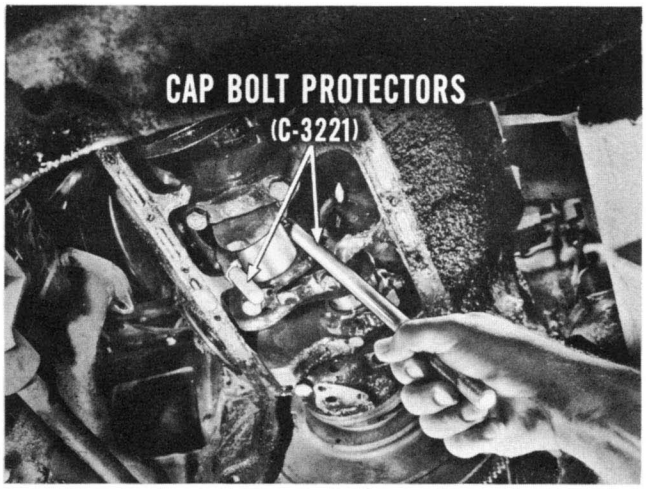


Figure 26—Using cap bolt protectors when installing pistons

ENGINE OIL PAN

When installing the oil pan, tighten the bolts to the proper torque and in the proper sequence. On slant-six engines, the oil pan should press firmly against the oil screen at the end of the oil pick-up tube — an interference fit here is essential.

The current oil pan rear gasket for the slant-six engine has five prongs for more positive positioning. Early production oil pans had only four holes to accommodate prongs; so you'll have to drill new holes in the flange of these pans to match the five-pronged gasket. A drilling template is included in the gasket set. Never cut off the prongs and try to use the gasket without them. You'll be asking for oil leak trouble if you do.

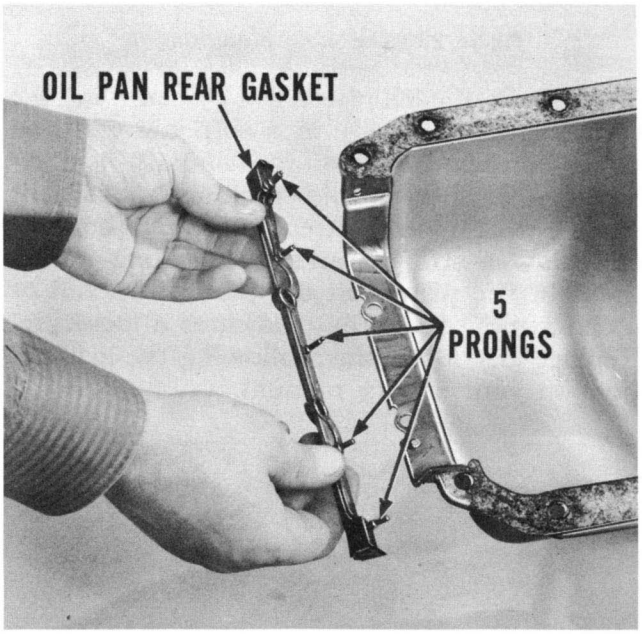


Figure 27—Installing the five-prong oil pan rear gasket for the slant-six engine

CYLINDER HEAD

Use MoPar gasket sealer on the head gaskets, and be sure the gaskets are carefully aligned when installing the cylinder heads. Tighten the head bolts to the specified torque in sequence, and when you've reached the end, go over them a second time. This will compress the gasket properly and insure even torque.

On V-8 engines, it's essential that you tighten both heads before installing and torquing down the intake manifold. And remember—you can cause yourself just as much trouble by overtorquing the manifold bolts as you can by leaving them too loose.

COOLANT AND OIL

Test the thermostat before you reinstall it and, if necessary, install new radiator and heater hoses. Add a pint of Rust Resistor, MoPar Part No. 680194 or ChryCo Part No. 396746, to the coolant. Also, it's good insurance to pressure-test the cooling system, particularly if you found evidence of coolant leakage at disassembly. Then you'll be sure there are no leaks at the head gaskets.

Install a new oil filter and put in the right amount of MS oil of the viscosity recommended for the outside temperatures. Don't forget to add an extra quart for the new filter. Break-in oil or other additives are not necessary with current MoPar or ChryCo service rings when the cylinder walls have been properly reconditioned.

FINAL ADJUSTMENTS AND TESTS

Service the carburetor air cleaner or replace the paper filter element. Look the engine over to see if you've missed anything. If everything is okay, start the engine and run it at fast idle to warm it up. Keep a close eye on temperature and oil pressure.

When the engine reaches operating temperature, adjust tappet clearances. With the car parked on as level a spot as possible, adjust the carburetor. You'll probably have to set the idle speed up somewhat faster than normal to get a smooth idle, but don't set it high enough to race the engine. Set ignition timing with vacuum advance line disconnected and plugged. See that the manifold heat control valve operates freely.

When that's all done, road-test the car. Accelerate at part-throttle a dozen times or more. *Avoid wide-open throttle acceleration* and, above all, *don't race the engine!*

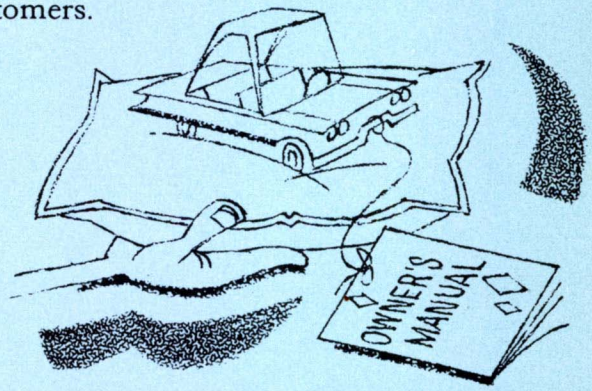
Bring the car back into the shop and park it over some clean papers. After the engine has idled a minute or so, shut it off and check the paper for signs of oil or coolant leaks. If there are none, give the job one final inspection and turn it over to its owner.

In conclusion

Your customer will probably want to know how to break in the new rings. Tell him it's not necessary to drive in any unusual manner —just follow the instructions in his owner's manual for breaking in a new engine. Have him come back for an oil change, re-tightening of the head bolts and a carburetor adjustment after 500 miles.

Stress the need for using MS oil of the right viscosity and having periodic maintenance operations performed on schedule, as outlined in his owner's manual. This is also a good time to point out to him any of the troubles that may have been caused by poor preventive maintenance, such as air cleaner neglect, infrequent oil filter changes or use of the wrong type of oil.

Proper delivery of a re-ring job is an important part of good customer relations. Do the job right—deliver the job right—counsel the customer on his responsibilities to his car. Nothing contributes more to the success and stability of a dealership than satisfied service customers.



SERVICE REFERENCE BOOK

dt

Litho in U.S.A.