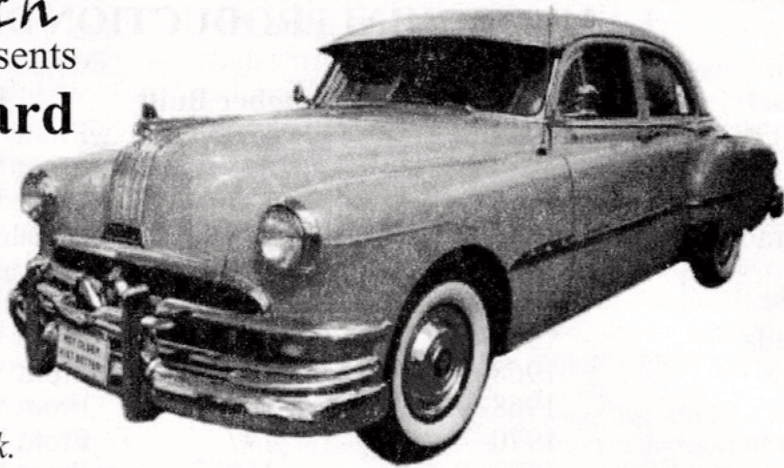


Orest Lazarowich
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but
**Moving
Forward**

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Repair and Restoration
of your old Car and Truck.*



Engine Oil/Coolant Leaks

Greasy oil stains on a garage mat or on the garage floor that is under your collector car should be attended to. Power wash the radiator, engine, transmission and power steering, if so equipped. Start at the top and work down to remove as much dirt and grime as possible. Raise the vehicle on four safety stands. Spread some newspapers under the radiator, engine and transmission. Start the engine and rev it up a number of times to move the oil spray around. Shut the engine off. Next day or so check the stains on the newspapers. If the stains under the engine are dark brown or dark amber and feel greasy, it is probably motor oil. A pinkish stain under the power steering pump or hoses on older vehicles indicates a power steering fluid leak. On newer vehicles it will be a dark brown and will smell different than engine oil. A green or orange stain with a sweet smell is antifreeze. A red or pink greasy stain under the transmission can be an automatic transmission pan or front transmission seal leak. Some aluminum transmission castings have been proven porous and will leak. A darker greasy stain under a standard transmission at the clutch housing can be a rear seal or rear bearing problem. If the rear engine seal is leaking motor oil it will cause the clutch to slip, fix this leak as soon as possible. A worn front bearing or seal in a standard transmission will cause a similar clutch problem. A leak at the rear of a transmission can be caused by a seal or wear on the sliding yoke of the driveshaft.

At the rear of most engine blocks there will be one or two core (frost) plugs. Core plugs seal the holes in the block and head after the core sand is shaken out. At one time they were called frost or freeze plugs, and they were supposed to push out



if the engine overheated or low temperatures caused freezing, thereby preventing cracking the casting. Don't you believe it.

Use antifreeze of the proper strength for your area. There is also a camshaft plug at the rear of the engine. This plug prevents the loss of oil that pressurizes the rear cam journal. Use a mechanic's mirror and a good light or a combined mirror/light to diagnose this plug. Check the core plugs for coolant leaks at the same time. If there is a leak at either plug, you may have to remove the engine assembly from the chassis to properly replace the plugs. There are other ways such as removing the transmission and tilting the rear of the engine assembly down and maybe, only maybe, you might be able to get at the plugs. Using a hole-saw to cut an opening in the firewall directly behind the core plugs might provide a working area. Either way it's a lot of work. Sometimes a pellet of Stop Leak might fix a weeping coolant plug.

Engine oil leaks can occur at the valve covers on in-line L-head engines and I-head en-

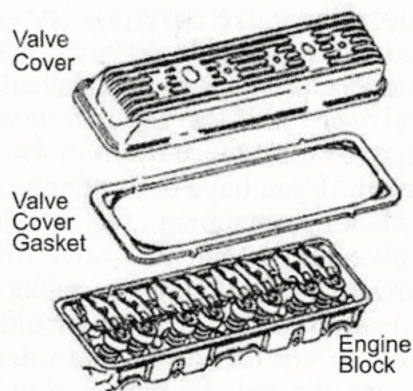
gines. On V8 engines the intake manifold gaskets may need replacing. Gaskets at the oil pan, timing chain cover and front and rear crankshaft seals may need replacing. The older the engine the more likely the cork gaskets have shrunk and hardened. Neoprene seals lose their shape and leather seals harden over time allowing oil to leak by. Fixing these leaks involves the labour of removing the part, cleaning the surfaces and installing the new gaskets. Do not over tighten bolts. Use a torque wrench set to specifications. Crankcase additives may slow down a small leak, but the sooner you repair leaks the fewer engine problems you will encounter. On some vehicles the engine has to be removed to replace the pan gasket. Engine oil leaks can also be caused by overfilling the oil pan or by a plugged Positive Crankcase Ventilation (PCV) valve allowing pressure to build up inside the engine. Check engine oil, power steering reservoir, and antifreeze levels, and if they are low due to a leak, locate the leak and repair it.

If the oil leak is at the top of the engine, it is probably caused by the valve cover gaskets or a missing oil cap. A leak at the bottom can be caused by an oil pan gasket, loose oil filter or cannister, oil pan drain plug, front/rear crankshaft seals, and timing chain/gear cover. Check for a missing oil dipstick or a dipstick that does not fit properly (wrong dipstick). On filter canisters that are mounted to the head or intake/exhaust manifold check the oil lines and fittings for leaks. Check the line that goes to the oil pressure gauge on the dash. If the gauge is electrical, check to make sure the sensor is tight to the engine block. On older vehicles check the crankcase breather tube for clogging or damage at the bottom end. Power steering leaks can be at the pump, pump fittings or hoses. The early sign of a pump leak is a whining sound when the steering wheel is turned. The whine is caused by lack of oil in the reservoir. Adding oil will fix the noise, but the leak has to be fixed. Exhaust leaks caused by blown or burnt out exhaust manifold gaskets have to be replaced.

Valve Covers

The valve cover gasket sits between the engine head and the valve cover on I-head engines.

On in-line L-head engines the gasket is between the engine block and the valve cover. On Ford V8 L-heads the valve cover is the intake (battle ship) manifold. In time the valve cover bolts can



work loose. The action of the valves sprays a lot of oil inside the valve cover, and as the rpms increase the oil seeps out past a dry or cracked gasket. Over tightening valve cover bolts will not stop old gaskets from leaking, and it may warp steel valve covers. Aluminum covers may crack. Lower the vehicle to a comfortable working height. Cover the fenders, and reposition your belt buckle (if necessary) to prevent any fender damage. Check service manual procedure. Disconnect the battery ground cable. On the in-line or V8 I-head engines remove the valve cover(s) by removing the necessary fasteners. Use a putty knife between the gasket and the head to loosen the gasket and lift the valve cover off. Remove the old gasket. Clean both gasket surfaces. Check the valve cover rails for straightness with a straight edge. Use a ball peen hammer and a length of angle iron to straighten the rails by gently tapping on the bolt holes. Purchase the necessary gasket(s). Apply a single bead of gasket sealer around the lip of the valve cover. Use RTV silicone sealer, if recommended in the service manual. Position the gasket on the cover. Apply a single bead of sealant to the valve cover gasket, and place the valve cover on the cylinder head. Use blue thread locker on the fasteners and install and torque the fasteners to specifications.

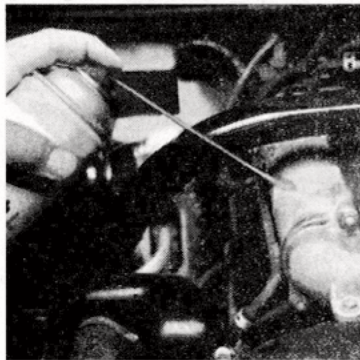


On in-line L-heads check for a removable steel panel on the outside of the right side inner fender skirt. If there is one, remove the front right wheel, and support the frame on a safety stand. Remove the inspection panel. Wipe the block and valve cover(s) clean, and run the engine to make sure that there is an oil leak in this area. If there is, re-

move the valve cover(s). Try not to remove the exhaust pipe unless you really have to. On some models the vent tube is attached at the rear of the valve cover. If there is no removable panel, there may be a bit more room in the engine compartment. If you have been hearing any valve noises - clicking or tapping - this is the time to check the valve adjustment. The valve lifter must be at its lowest point before you make any adjustment. Clean the block area of any old gasket material, and do not let any fall into the valve chamber. Clean the valve cover(s). Apply sealant to the cover, position the gasket on the cover and apply sealant to the gasket. Install the valve cover(s). Torque the fasteners. Start the engine, and check for leaks. Replace the inner panel and tire, if of this style. Connect the battery.

The dual intake manifold used on Ford L-head engines with a dual downdraft carburetor distributes the fuel/air mixture to the cylinders. To provide proper fuel vaporization, small passages in the bottom of the manifold casting line up with passages to the exhaust system in the cylinder block. This allows the exhaust gases to flow through the heating chamber of the manifold warming it and the fuel/air mixture. As the temperature increases a thermostat in the exhaust opens and allows the hot gases into the exhaust system. An intake manifold gasket leak will cause poor engine performance. The leak will allow additional air to mix with the air/fuel mixture, causing the engine to run lean.

Check for any sign of oil seepage at the front and back of the manifold which could indicate a loose manifold. Run the engine at idle and spray some carburetor cleaner along the intake manifold where it attaches to the engine block. If the speed changes, there is a gasket leak. Tighten the attaching bolts and spray again. If the speed does not change, you have probably fixed the problem. If the speed changes, replace the intake manifold gasket.



PAGE 14 - SKINNED KNUCKLES

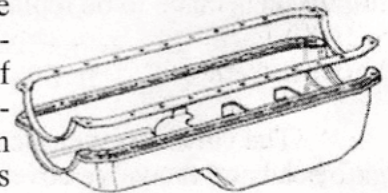
Replacing Oil Pan Gasket and Rear Seal

There are three types of rear main crankshaft seals: rope or wick, neoprene split or one piece. The following procedure will replace a neoprene split seal. This type of seal is designed with ribs around the lip which help to direct the oil back into the oil pan. The lip must face the inside of the engine to prevent the oil from leaking. If it is installed backwards, it will leak immediately on start up. Before you start this repair, start the vehicle and let it idle 15 minutes or so and then look for a leak. Check the back of the oil pan and make sure the leak



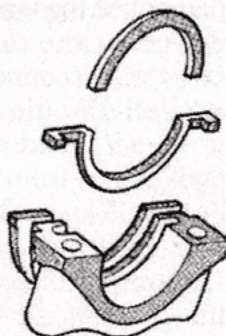
is not coming from higher up on the block, such as the valve cover gaskets on an I-head engine. Check the fuel pump gasket and make sure it is not leaking. Once you are sure the leak is at the rear main seal check the service manual to see if the engine has to be removed or raised slightly so the oil pan will clear the front crossmember or steering linkage when you remove it. I must tell you that depending on the type of engine (in-line or V8) it might be easier to remove the engine, if you have the use of an engine hoist. Disconnect the battery ground strap. Raise the vehicle to a comfortable working height. If necessary, raise the engine or disconnect the steering linkage now. Don't get caught with a hanging oil pan that you can't get out from under the engine. Do not damage the radiator/fan assembly or the distributor, if it is located at the rear of the engine. Order a pan gasket set and a rear bearing seal for your particular engine. Drain the oil. If the mileage indicates you are very close to an oil and filter change, remove the filter. Install the oil pan drain plug and a new filter now.

Remove the oil pan bolts. Remove the starter, if your socket set cannot get in to loosen the oil pan bolts



along the side of it. Remove the oil pan for cleaning and inspection of any cracks. It may be necessary to rotate the crankshaft before the oil pan will come out. Remove the rear bearing cap bolts, and tap the cap loose and remove it. Do not remove or nick the bearing shell. Keep it in place. At the bench remove the seal from the bearing cap groove using a small screwdriver. Clean the groove out. Wipe the outside of the seal that fits the bearing cap with liquid soap, and slide the seal in place. Make sure the lip faces inward. Cover the bearing cap with a clean cloth To remove the upper seal, drive one edge of the seal down very carefully with a small brass pin punch, and tap it out far enough to catch with a pair of needle nose pliers, and pull it out following the direction of the crank. Inspect the seal bearing surface for any nicks or scratches that would tear up the new seal. Use crocus cloth to smooth out any imperfections. Wipe the bearing surface clean.

There should be a plastic installation tool with the seal set. Basically it's a piece of plastic with a short tip the width of the seal. To install the new seal, coat the outside with liquid soap and oil the lip. Place the seal on the crankshaft with the lip pointing **TO-WARD** the front of the engine. Position the tool tip between the crankshaft and the groove in the block to cover the sharp edge. Position the seal on the tip of the tool, and push one end of the seal into the block. Keep firm pressure on the seal, and roll the seal around the crankshaft.



Keep the tool in position until both ends of the seal are level with the block. Put a very thin dab of RTV sealant on the mating surfaces of the seal ends. Oil the bearing in the rear bearing cap, and fit the main bearing to the engine block. Snug the bolts up, and hit the bearing cap once or twice to line up the pieces. Torque the rear bearing cap bolts 80 foot pounds. Check the torque on the other main bearing caps.

Clean the engine block, oil pan and the oil pan gasket surfaces. Spray surfaces with brake

cleaner to help remove any remaining gasket material. Apply gasket cement to the oil pan, and position the oil pan gasket on the oil pan. Apply gasket cement to the oil pan gasket. Position the oil pan on the block, and install all the oil pan bolts and snug them tight. Torque to specifications using a criss-cross pattern starting at the center. Install starter and any other parts that may have been removed. Lower the vehicle, and refill the crankcase with oil. Start the engine, and check for oil leaks.

Coolant Leaks

The head gasket forms a seal between the engine block and the cylinder head(s). This seals both the combustion chamber and the coolant passages. Most head gasket leaks are between the combustion chamber and the coolant passages in the engine. A blown head gasket usually shows up as an overheating problem. Coolant is drawn in with the air/fuel mixture, and during combustion the high pressure forces the exhaust gases into the coolant passages. Once the engine is turned off, the coolant left in the cylinder seeps past the rings and into the oil pan. Coolant mixed with engine oil forms a milky substance which has very little lubricating qualities. Add coolant to the radiator when the engine has cooled down. Leave the radiator cap off, and start the engine. If you see bubbles (exhaust gas) in the coolant, the head gasket(s) need replacing. On a V8 engine remove the center spark plugs, and if the electrodes are clean, the head gasket is leaking on that side.

If there is no internal coolant leak, it must be external. Check the water pump, thermostat housing, hoses, hose clamps and radiator. Water pumps have a small hole in the casting called a "weep" hole. A small amount of moisture around this hole is not a problem. If this develops into a leak, replace the water pump. Buy an exchange Reman pump and save time and money on this repair. If the water pump has a backing plate, it is possible the gasket between the housing and the backing plate is leaking. Troubleshoot this leak, and if the pump bearing is at all noisy, replace the pump. Replace leaking heater and radiator hoses. Replace a leaking thermostat housing or gasket as necessary. Cracks or splits in a radi-

ator should be repaired at the radiator shop. A pin hole leak can be repaired with a radiator sealant in an emergency situation.

Check the core plugs on the bottom sides of the engine block for any dark stains which indicate coolant leaks caused by rusty frost plugs. The core holes on the sides of the block can contain the block heater(s). The core plugs can be cup-type or a domed disc. To remove a leaking core plug drive it into the block with a large punch, and then pry it out with a screwdriver blade. Remove any old sealant from the counterbore in the block, and check for any corrosion (rust). If you are using water in a radiator, add rust inhibitor. Buy a new domed or cup type plug of the correct size made of brass, if they are available at your parts store or a regular steel one. I use non hardening Permatex sealer on both the plug and the hole/counterbore to prevent any antifreeze leaks. Drive a cup type plug in with a socket of suitable size that fits the outside of the core plug. If you use a socket that fits inside the core plug, you might decrease the outside diameter and cause an early coolant leak. To secure a domed disc type plug in the engine block coat the disc and counterbore with non hardening sealer, and use a large diameter punch and a hammer to depress the center of the disc about 1/2 the height of the crown. Clean up any excess sealer. Fill the radiator and cooling system with a 50/50 mix of water and antifreeze. Start the engine, and check for leaks.

There are core plugs in locations where you have to remove parts to access the core plug. In the worst case you have to remove the engine from the chassis. There is also the case of not having enough room to drive the new core plug in after you pry the old one out. An expandable rubber plug that can be used instead of the metal core plug is available in different size diameters and lengths. There is a metal expansion plug with no rubber or plastic parts sold by Dorman Products under the name "Quick-Seal" p/n 568-010 that can also be used where space is limited. This type of



core plug is tightened in place by a retaining nut. It is not driven in.

On some I-head V8 engines it is possible to have a coolant leak on the inner edge of the gasket close to the coolant passage in the intake manifold. This is an internal/external leak because the coolant will find its way into the valve chamber and the oil pan. You might smell coolant but not see it. Wipe the area around the water passage clean and let the vehicle sit overnight. In the morning check for any antifreeze seepage at the intake manifold. Coolant in the oil pan will dilute and contaminate the oil, which may lead to bearing wear and engine failure. The oil and filter must be changed and the leak found and corrected. If you have been adding small amounts of antifreeze and cannot find an outer leak, check the engine oil. If the oil on the dipstick is milky/foamy, there is coolant in the oil. This could be caused by a faulty intake manifold gasket, if there is no evidence of a head gasket leak.

Place fender covers on both fenders. Disconnect the negative battery terminal. Drain the radiator into a suitable drain pan, and move the pan out of the work area. Remove any hoses connected to the air cleaner, and remove the air cleaner. Disconnect the upper radiator hose. Disconnect throttle rod and transmission lever rod, if so equipped. Disconnect fuel, vacuum and choke lines from the carburetor. Remove the carburetor. This makes it easier to get to the distributor, if it is located at the rear of the engine. Disconnect the coil wire from the coil. Remove the distributor cap, and tie it out of the way with the spark plug wires attached. Disconnect the coil wire from the distributor. Mark the position of the rotor to the intake manifold with a black flow pen. Remove the distributor. Remove the heater hose and the temperature indicator sensor from the intake manifold. Remove the intake manifold bolts. Note any changes in length, and mark their position. Use a rubber mallet to tap the intake manifold loose, and remove it from the engine. Move the intake manifold to the bench for cleaning.

Carefully check the gasket for damage near the coolant ports to check if coolant is leak-

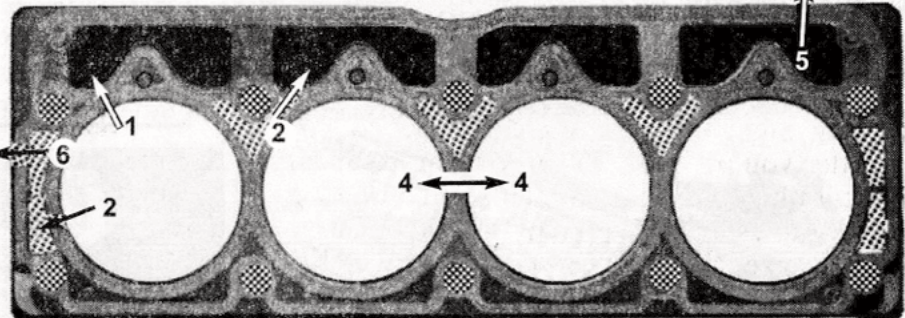
ing past the gasket. In some cases there may not be a gasket - only a layer of RTV sealant. Check for any break in the bead. Lay a lint free cloth over the pushrod and lifters to catch any old gasket material that you will be cleaning off the heads. Plug the ports in the head with newspaper. Clean off any old gasket material with a gasket scraper or a sturdy putty knife with an edge bevelled at thirty degrees. If RTV sealant was used instead of end gaskets, clean the end castings. Remove the newspaper plugs and the cloth. Wipe the gasket surfaces with brake spray. At the bench clean off any old gasket material on the intake manifold, and wipe the surfaces with brake clean. Install the new gaskets according to manufacturer's instructions. Use RTV sealant around the water passages. Position the end seals and make sure they are in place when you install the intake manifold. You can use RTV sealant instead of the end seals, if you are so inclined. Snug the fasteners in place using a criss-cross method of tightening. Torque fasteners during the final tightening round. Install the distributor as per rotor position marking. Install the carburetor and the carburetor linkages. Attach the heater hose and the temperature sensor. Connect the battery. Check the condition of the upper radiator hose and replace if necessary. The hose should not be hard or too spongy or be swollen or cracked. Install the coolant. Check for leaks. Road test. Check for leaks and re-torque the intake manifold bolts.

Replacing the Head Gasket

Read and then reread the engine section in the service manual regarding cylinder head gasket replacement. The following is a general procedure for replacing the head gasket on an in-line flat head engine: Disconnect the battery. Drain the coolant into a suitable container, and set it aside out of the work area. Cover the fenders, and disconnect the battery. If a temperature gauge sender unit is attached to the head by a capillary tube, remove it very carefully to prevent

damaging the capillary tube. Spray the capillary tube nut with penetrating oil. Hold the gland nut that is threaded into the head, and loosen the tube nut. Slide the bulb out of the gland nut. Remove the top radiator hose. Remove the distributor cap with the wires attached. Cover the distributor body with a baggy. If the filter bracket is attached to the head, remove the fasteners, and tilt the filter case away from the head. Do not kink the filter lines, if they are steel. Remove the spark plugs. Remove any carburetor controls that are attached to the head. Remove the head bolts only when the engine is cold to prevent warping the head. Make a diagram of lengths and any special bolts that hold any operating device. Make up a set of T-handles, and weld them to some old spark plug bodies, and then screw them into the spark plug holes to help you lift the head up and out of the engine compartment. If this is a six or eight cylinder head, get a buddy to help you and lift the head straight up and out of the engine compartment. Do not drag it off the block as you may damage the valves.

Examine the old gasket, and find its point of failure. Most of these four, six and eight cylinder in-line flat head engines have been repaired many times, and if the gasket is solid, the problem can be a cracked head or block and/or a warped head or block. Check the head and block for cracks. Rust spots will usually lead to a crack. You may not have a steel straight edge to check the head and the block for warpage. You can use a steel ruler of the proper length or an aluminum



- Head Bolts
- Coolant
- Oil to Cam
- Oil Return

1. Compression leak to crankcase - smoking, blow-by, misfire
2. Compression leak to cooling jacket - overheating, bubbles in coolant, coolant overflow from radiator or recovery bottle
3. Coolant leak to crankcase - coolant in oil
4. Compression leak between cylinders - misfire, rough idle
5. Oil leak to outside of engine - low oil level
6. Coolant leak to outside of engine - coolant level low

level. Insert a thin feeler gauge between the head or block and the steel ruler or level. Allowable lengthwise clearance is 0.006 inches on a six cylinder and 0.004 inches on a four cylinder. Side-ways 0.002 inches. Unless both surfaces are flat the gasket will never seal tightly. Reinstalling a new gasket on a warped head or block will allow you to fix the leak again in very short time. Service the block and head, if necessary.

Scrape the block clean of any carbon and old gasket material. Bring the pistons up to top dead center, and scrape off any carbon. Clean the bolt and block threads with a tap and die of the correct size. Make up a couple of aligning pins using old head bolts. Cut the heads off, and saw a screwdriver slot in each. Screw them into the block at the front and the back. Place a new head gasket the right side up, and check each bolt hole and water passage for alignment. Follow the manufacturer's instructions for installation and use of a sealant. I have found Permatex Copper Spray will seal small imperfections in the block or head. If you are replacing the head gaskets on

a Ford flathead with aluminum cylinder heads, use a copper head gasket, and let the engine cool completely before rechecking the bolt torque. Get a buddy to help position the head and slide it over the aligning pins. Start a couple of bolts, and then remove the guides. Head bolts that pass into the water jacket should be coated with gasket sealer. Position all the bolts. Torque in a sequence starting in the middle and expanding outward in a circle. Make at least three passes to bring the bolts to final torque specifications. Reassemble any parts that were removed from the head including spark plugs. Position the distributor cap on the distributor, and attach the high tension leads to the spark plugs. Fill the radiator with coolant, and add a sealer if you so wish. Start the engine and check for coolant leaks. If there is a leak, find it, and repair it. Connect the battery. Let the engine run to normal operating temperature with the exhaust vented to the outside. Shut the engine down, and recheck the torque on the cylinder bolts. Reinstall the hood, if it was necessary to remove it to gain access to the engine compartment.

Happy Motoring.

S.K.



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NEXT MONTH:
Replacing Timing Gears/Chains

Editor's Note: To take Mr. Lazarowich's article just a step further, be sure, when installing a gasket, that the gasket material is the correct one and is compatible with the material that it is used for. If in doubt, or to obtain the correct gasket(s) for your restoration project, please contact Olson's Gaskets. They will be happy to advise you.

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