

ORCA
MARINE COOLING SYSTEMS
BELLINGHAM, WA 98226

MerCruiser L29 MPI
7.4 / 454 TBI & CARB 86-97

Installation Instructions

300849
Full system

1. Drain system. Remove all hoses at thermostat housing. Remove the 1¼" and the 1¾" hose completely and save for a later re-installation. Remove the wire from the sending unit and then remove the sending unit. Remove the thermostat housing. Then place rag in opening to prevent small objects from falling in.
2. Place #5A grounding gasket on thermostat boss. Thread the 3/8F x 3/8M brass adapter in the center hole of the 3-hole thermostat housing. The 5/8H x 3/8M 90 brass elbow will go into the adapter so it is facing starboard. Screw the temp sending unit in the starboard hole. Plug the other hole with the 3/8 brass hex head plug or insert the alarm sending unit. Set the new 160 degree thermostat in place, then the #5 fiber gasket, the KA-118A water outlet and secure all with the 3/8 x 3-1/2 plated HCS and lock washers.

HEATER / HOT WATER: . Remove the 90 degree factory hose connecting the top of the water pump to the intake manifold. Remove the ½" hose barbs. Thread the 5/8H x 1/2M 90 brass hose elbow into the top of the water pump and point it starboard. Plug the hole in the intake manifold with the ½" brass plug. The inlet/pressure to the accessory will connect to the hose elbow in the center of the 3-hole thermostat housing. The return/suction will connect to the hose elbow on the circulating pump. ALTERNATIVE: Leave the 90 degree factory hose in place and place the ½" x 5/8" brass hose elbow in the side of the circulating pump and point it upwards.
3. Remove the upper bolt from the tensioner pulley bracket and install the port (P) steel bracket. Use the 7/16" plated flat washer behind the bracket if there is a slight offset of the head to the block. Use the 7/16" x 1-3/4" Gr 8 plated bolt and lock washer. You may have to loosen the steel oil line nut to tighten the bracket. Make sure you re-tighten the oil line nut if you do. Repeat the process on the other side with the starboard (S) steel bracket and the 7/16" x 1-3/4" Gr 8 plated bolt and lock washer. Use the aluminum spacers if needed to align the brackets.
4. Leave the white protective covering on the cushion tape and stick the pieces to the brackets. Replace the 1¾" circulating pump hose you removed in step 1 and set the heat exchanger in place. Measure and cut the 1¾" hose so it comes up as far as possible on the angled fitting on the bottom of the heat exchanger. Either reverse the 1¼" hose and repeat the process or trim it to fit based on the location of the raw water in hose. Use the 1-1/4" rubber cap and clamp to seal the fitting not used on the raw water in tee. Once you determine the proper length and cut it, leave it attached to the heat exchanger and secure using the original #20 SS clamp.
5. Temporarily set aside the heat exchanger. Disconnect both 1" hoses from the bottom of the exhaust manifolds. Remove the plastic drain elbows and replace them with the ¾"NPTM x 1" 90 degree brass hose elbows supplied in the kit. Reconnect the hoses to the brass elbows. Secure the other end of each 1" hose to the KA-118A water outlet you installed in step 2. Secure with the original #16 SS clamps. You may have to run the port hose behind the lifting eye and under the oil line hose to make it fit.

NOTE: Mercruiser shipped some engines with plastic plugs installed on the inside of the exhaust manifolds. **They may melt !!** You must remove the manifolds to check; they **are not** visible when the manifolds are attached to the engine. Replace any plastic plugs with the brass countersunk plugs supplied. You should also replace any plastic plugs in the top of the manifold.

6. Remove the exhaust elbows from the exhaust manifolds. Clean gasket surfaces carefully. Remove the $\frac{3}{4}$ " recessed plugs from the top front of both exhaust manifolds and the front face of the exhaust elbows. Now install in the starboard exhaust manifold a $\frac{3}{4}$ " x 1" 45 degree brass elbow facing it forward. Next, install in the port exhaust manifold a $\frac{3}{4}$ " x 1" 45 degree brass elbow facing it outward to just clear the remote mounted oil filter. The starboard exhaust elbow will get installed a $\frac{3}{4}$ " x 1" 45 degree brass elbow and the port elbow will get a $\frac{3}{4}$ " x 1" 45 degree elbow installed facing horizontal and inward to direct the hose between the oil filter and its SS lines. Set the appropriate Quicksilver gaskets in place (NOTE: The block-off gasket always goes directly underneath the exhaust elbow) and carefully place the exhaust elbows back in position.

V-DRIVE INSTALLATION DIFFERENCES: The exhaust elbows will have 1H x 3/4M 90 brass hose elbows installed so they are facing inward. They will connect to the raw water out tee using a 1" 90 formed hose and a copper elbow, 45 or 90.

7. Next place the heat exchanger on the brackets, connecting the $1\frac{3}{4}$ " angled fitting to the circulating pump and the $1\frac{1}{4}$ " fitting to the oil cooler. Secure both hoses with clamps provided. Double clamp the $1\frac{3}{4}$ " hose. Use the #650 T-clamps and clear covers to secure the heat exchanger to the brackets. Make sure the clamps catch the small lip on the brackets.

8. The brass hose elbows on the exhaust manifolds will connect to the short, straight fittings on the ends of the heat exchanger's expansion tank. Measure and cut the 90 degree end of one of the 1" formed hoses for the starboard connection. Repeat for the port manifold bringing the hose around the oil filter. The 1" x 1" x $1\frac{1}{4}$ " tee will connect to the $1\frac{1}{4}$ " fitting on the heat exchanger with the $1\frac{1}{4}$ " x 12" non-wire hose. If the stuffing box is fed by raw water you will use the $1\frac{1}{4}$ " x $1\frac{1}{4}$ " x $\frac{3}{8}$ " copper tee spliced in the middle of the $1\frac{1}{4}$ " x 12" hose. You may have to trim the hose to make sure the tee is centered on the engine. The 1" outlets of the copper tee will connect to the exhaust elbows. Once again, use the 1" formed hoses. The starboard hose will use the 90 degree end and fit just under the air intake. The port side goes between the oil lines and the oil filter.

9. Check all clamps for tightness and use black nylon cable ties to secure the hoses away from rubbing against metal. **Attention: Make sure the hose to the water pump is not rubbing.** Fill the cooling system with a maximum 50/50 mix of water and antifreeze. (about 10 quarts) Idle to temperature while checking for any leaks. Once operating temperature has been reached and the thermostat has opened (you can see water moving in expansion tank) the water level should be topped off to about $\frac{3}{4}$ " below the pressure cap. **CAUTION: DO NOT REMOVE THE PRESSURE CAP WHILE THE ENGINE IS HOT!!!!!! HOT STEAM AND WATER CAN CAUSE SEVERE BURNS!!!!!!**

NOTE: Completely fill any hose on the closed side of the system to eliminate trapped air. Air pockets can cause false temperature readings or "hot spots" of steam.

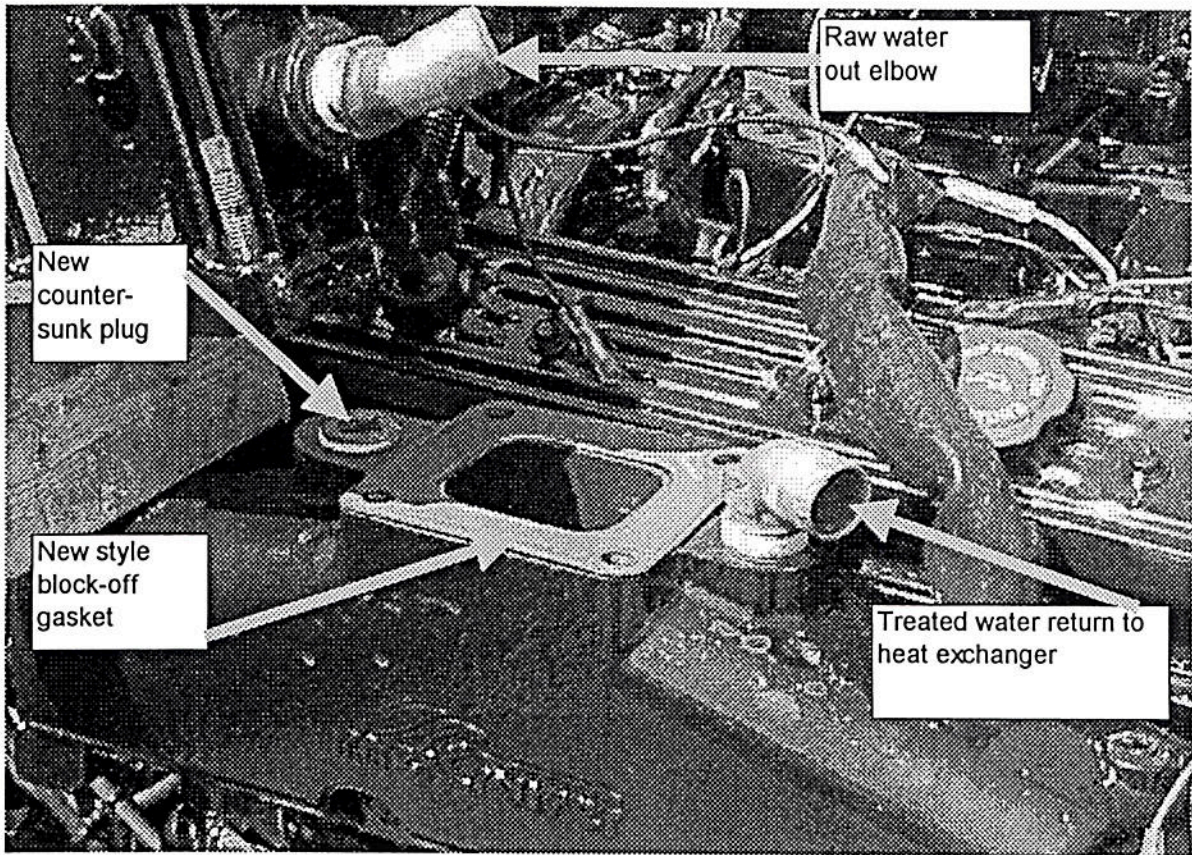
NEVER RUN ENGINE WITHOUT ADEQUATE WATER SUPPLY TO THE COOLING WATER PUMP

CAUTION:

INSTALLATION OF THE PLASTIC
COOLANT RECOVERY BOTTLE IS
CRITICAL TO THE OPERATION OF THIS
SYSTEM.

IT MAY BE INSTALLED ANYWHERE IN
THE ENGINE COMPARTMENT BUT
MUST MAINTAIN THE LIQUID LEVEL
BETWEEN THE WARM AND COLD LINES
AT ALL TIMES.

THE RECOVERY BOTTLE ALLOWS FOR
THE EXPANSION AND CONTRACTION
OF THE ANTI-FREEZE SOLUTION IN
NORMAL OPERATION.

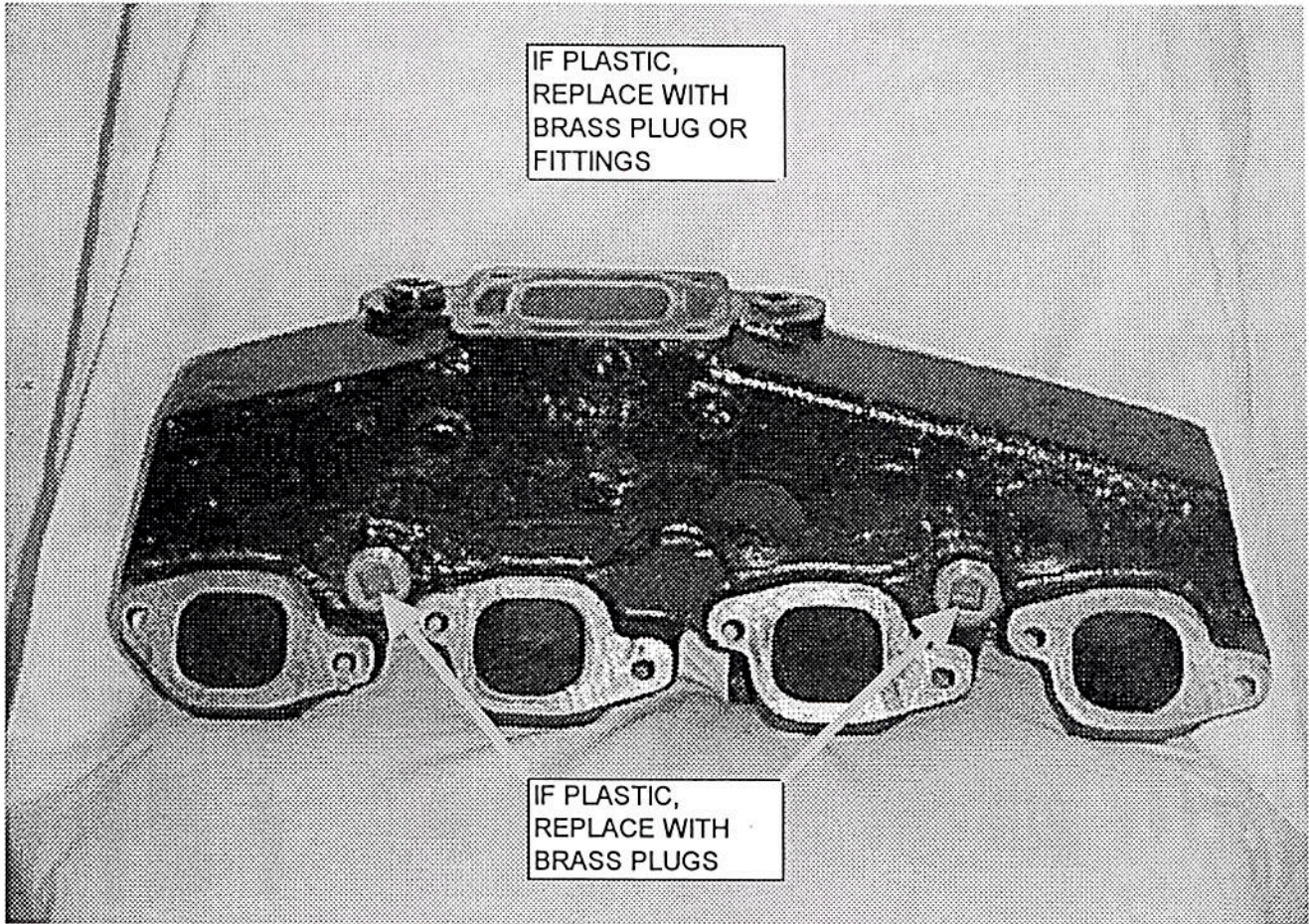


Raw water
out elbow

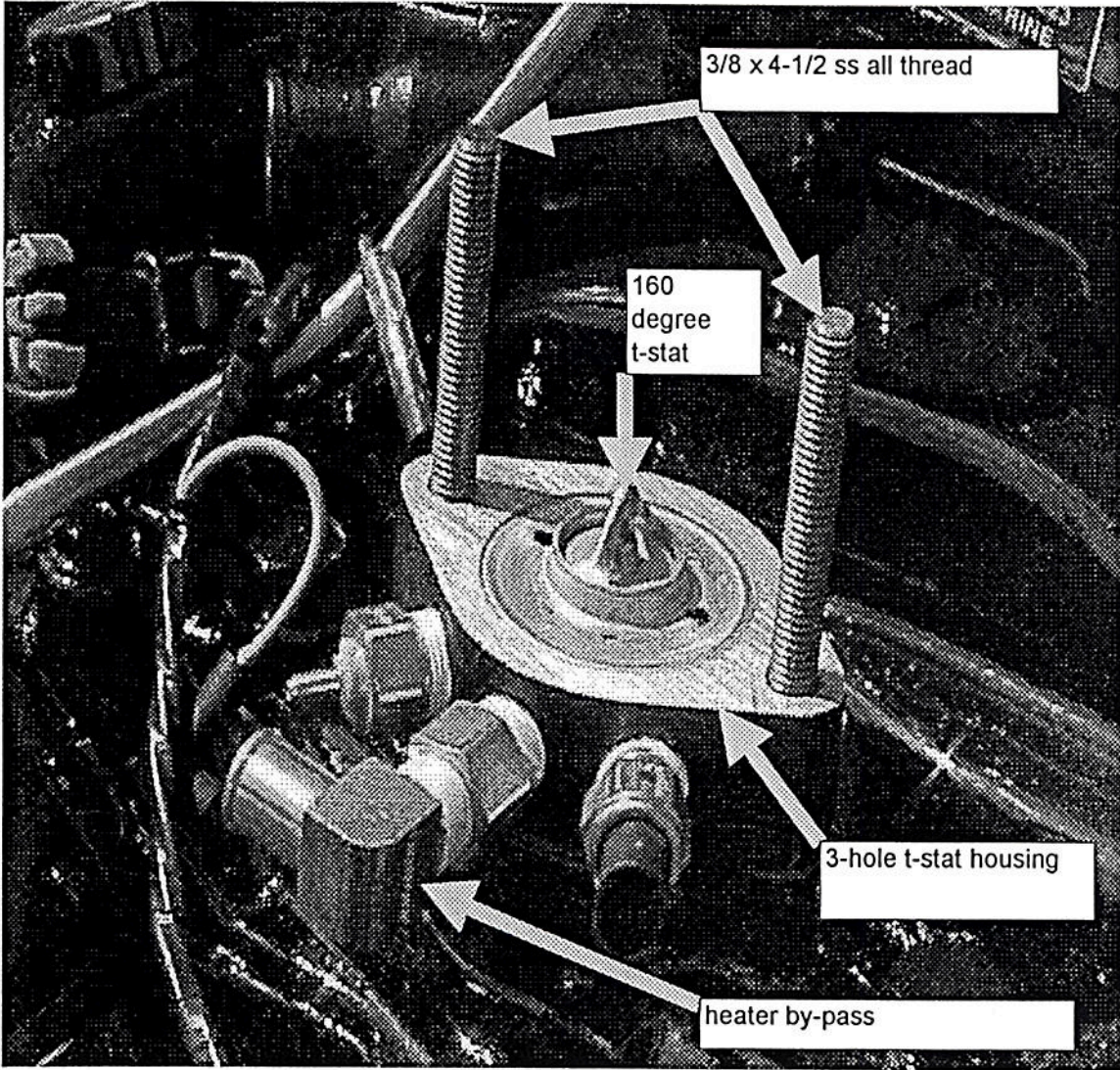
New
counter-
sunk plug

New style
block-off
gasket

Treated water return to
heat exchanger



X-MANIFOLD PLASTIC FITTINGS



3/8 x 4-1/2 ss all thread

160
degree
t-stat

3-hole t-stat housing

heater by-pass

3/8 X 3-1/2 HCS

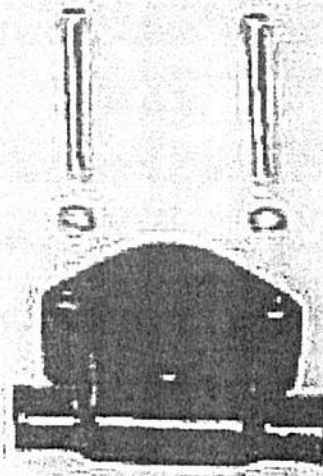
000994

3/8 LOCK WASHER

070206

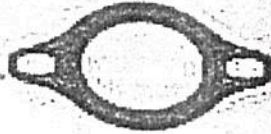
KA-118A

300430



#5 FIBER GASKET

300479



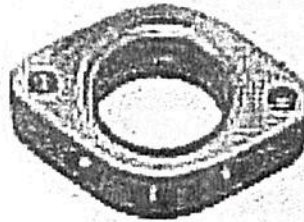
160 DEGREE T-STAT

000962



3 HOLE T-STAT HSNG

400040



3/8 X 3/8 ADAPTER

001091



3/8 SENDING UNIT

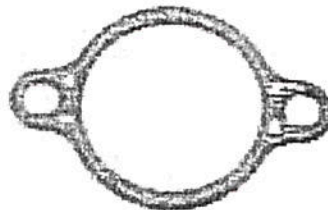
3/8 X 5/8 HOSE ELBOW

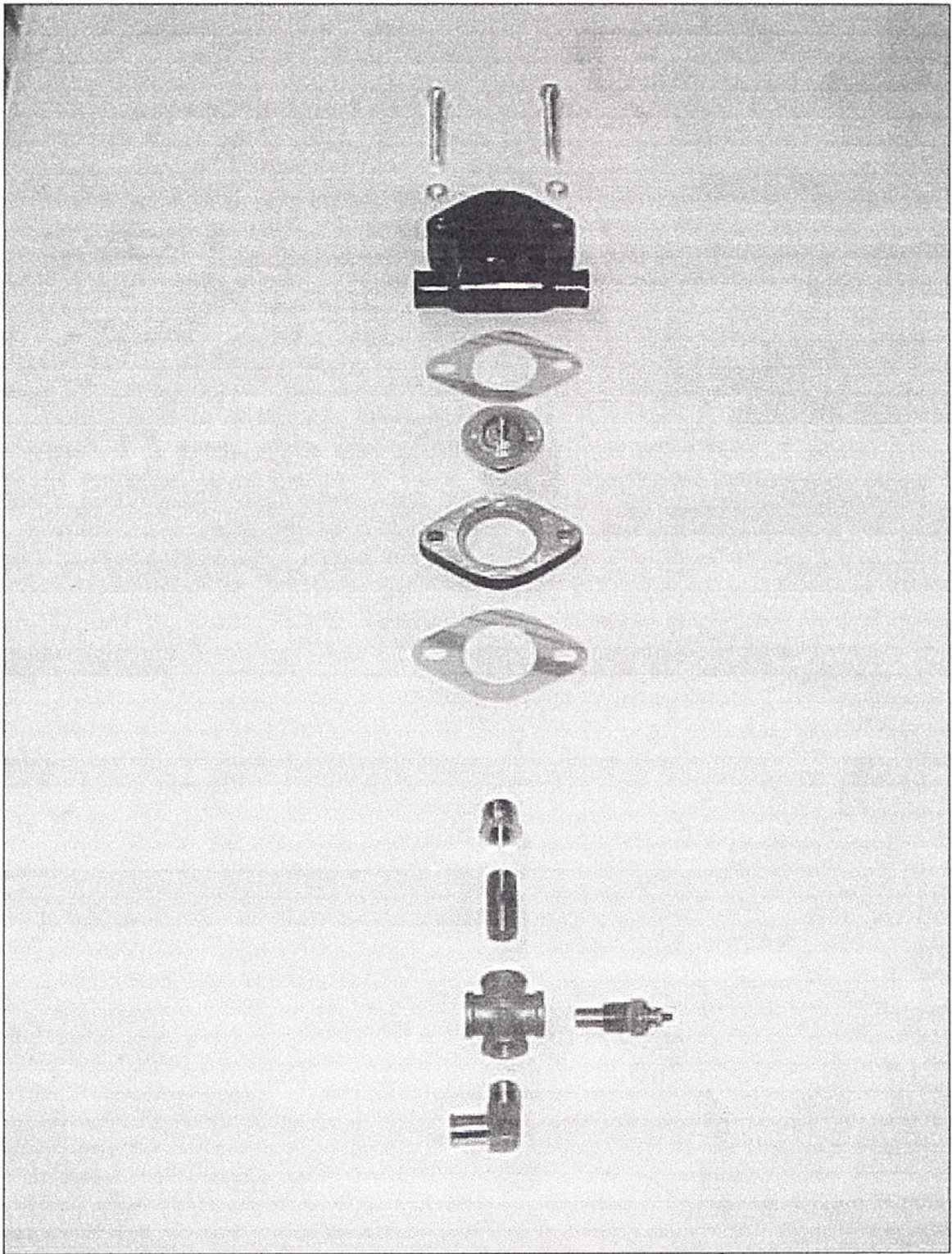
001079

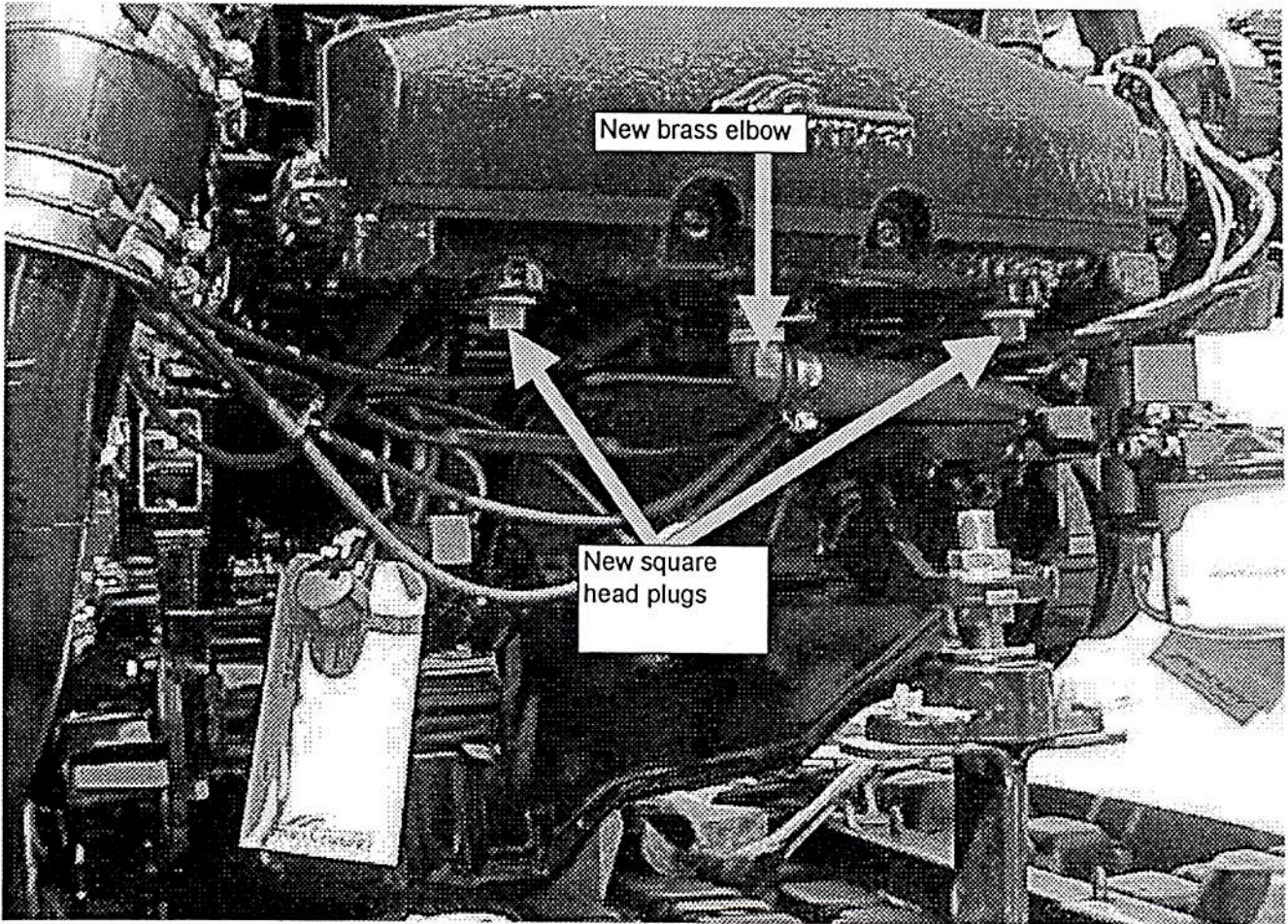


#5 BUTTON GASKET

300233

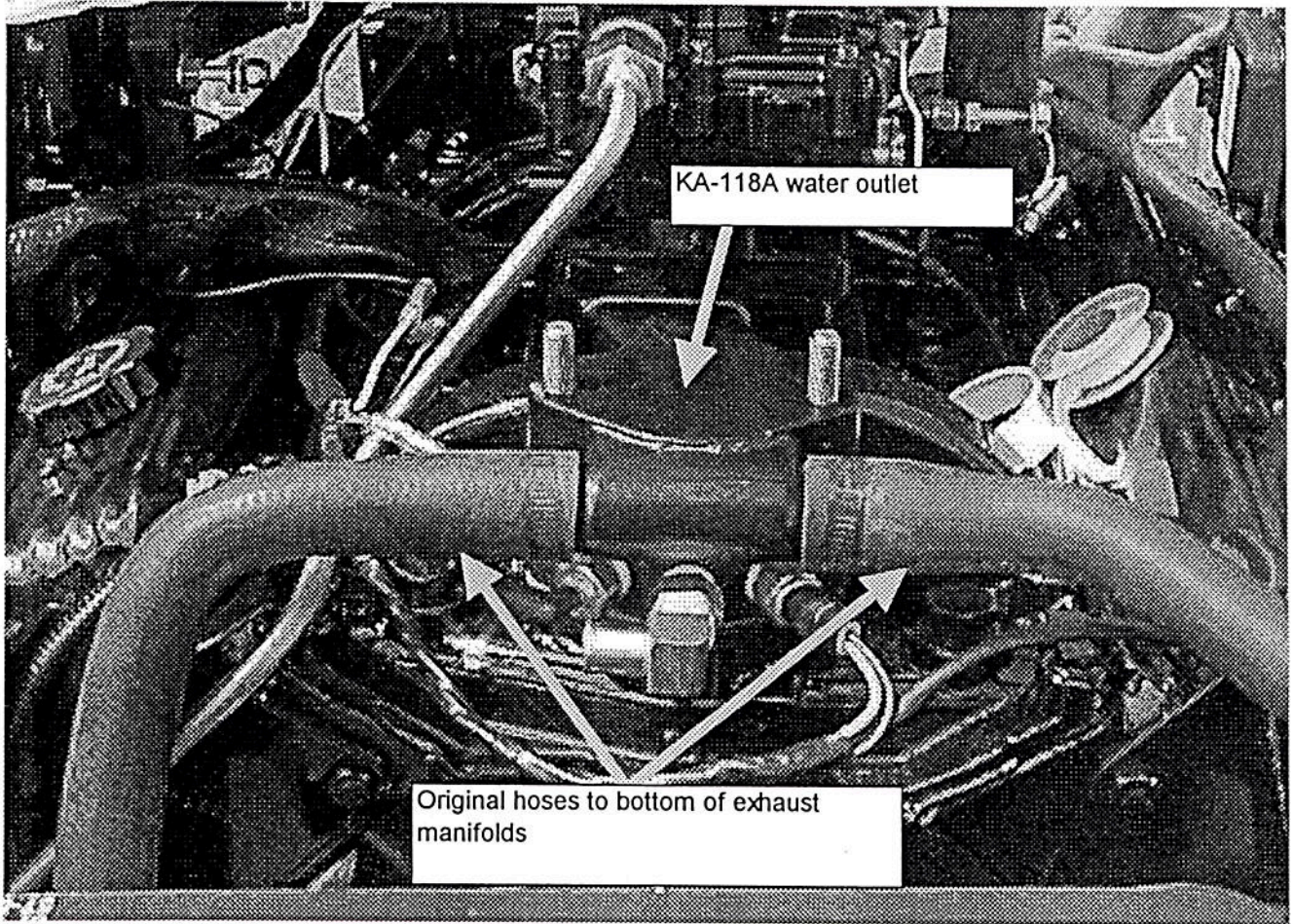






New brass elbow

New square
head plugs



KA-118A water outlet

Original hoses to bottom of exhaust manifolds