

DODGE TRUCK

B-4 SERIES

SHOP MANUAL

**MODELS: B-4-B, B-4-C, B-4-D, B-4-PW, B-4-DU, B-4-EU, B-4-F,
B-4-G, B-4-GA, B-4-H, B-4-HA, B-4-HM, B-4-HMA, B-4-J, B-4-JA,
B-4-JM, B-4-JMA, B-4-K, B-4-KA, B-4-KMA, B-4-R, B-4-RA, B-4-T,
B-4-TA, B-4-V, B-4-VA, B-4-Y, B-4-YA, B-4-YX**

SECTION 6

COOLING SYSTEM

**DODGE DIVISION
CHRYSLER CORPORATION
DETROIT 31, MICHIGAN**

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TIGHTENING REFERENCE

<i>Part Name</i>	<i>Size (inch) and number of threads per inch</i>	<i>Torque (foot-pounds)</i>
Fan attaching screw.....	$\frac{5}{16}$ — 18	12 to 17
Water outlet elbow stud.....	$\frac{3}{8}$ — 24	25 to 30
Water outlet elbow cap screw.....	$\frac{3}{8}$ — 16	25 to 30

COOLING SYSTEM

1. REMOVAL AND INSTALLATION OF RADIATOR CORE (ALL MODELS EXCEPT B-4-DU AND B-4-EU)

NOTE

Radiator core removal and installation procedure for B-4-DU and B-4-EU Route Van models is outlined in Paragraph 21 in this section.

a. Removal

To remove the radiator core, proceed as follows:

- (1) Remove hood (radiator shell on C.O.E. models) and drain the cooling system.
- (2) Disconnect the engine inlet and outlet hoses. On C.O.E. models, remove the radiator filler neck.
- (3) On all models (except C.O.E. models), remove the radiator tie rods.
- (4) On the B-4-J, B-4-K, B-4-R, B-4-T, B-4-V and B-4-Y models, remove the fan blade assembly.
- (5) Remove the cap screws from radiator core to support and lift out the core. On the B-4-PW, remove the core and shell assembly and remove the core from the shell.

b. Installation

To install the radiator core, perform the operations above in reverse order.

2. REMOVAL OF WATER PUMP (ALL MODELS EXCEPT B-4-DU, B-4-EU)

NOTE

Water pump removal procedure for B-4-DU and B-4-EU Route Van models, is outlined in Paragraph 22 in this section.

To remove the water pump, proceed as follows:

- (1) Drain the cooling system.
- (2) Loosen generator bracket pivot bolt and remove the fan belt.
- (3) Disconnect water pump by-pass hose and engine inlet hose.

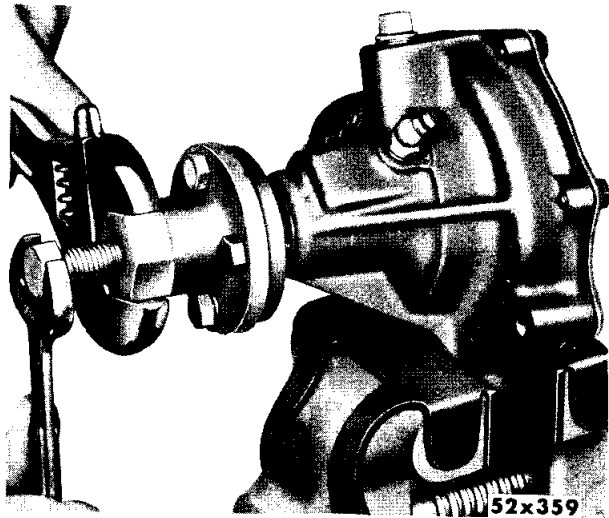


Fig. 1—Removing Hub from Water Pump Shaft

- (4) Remove cap screws which hold pump body to cylinder block and lift out water pump assembly.
- (5) Remove fan blades, pulley and by-pass elbow.

On C.O.E. models, remove the radiator shell.

After installation, adjust the fan belt, lubricate the water pump with water pump grease and fill the cooling system.

3. DISASSEMBLY AND ASSEMBLY OF WATER PUMP (B-4-B, B-4-C, B-4-D, B-4-PW, B-4-DU, B-4-EU) (FIG 2, PAGE 6)

a. Disassembly

To disassemble the water pump, proceed as follows:

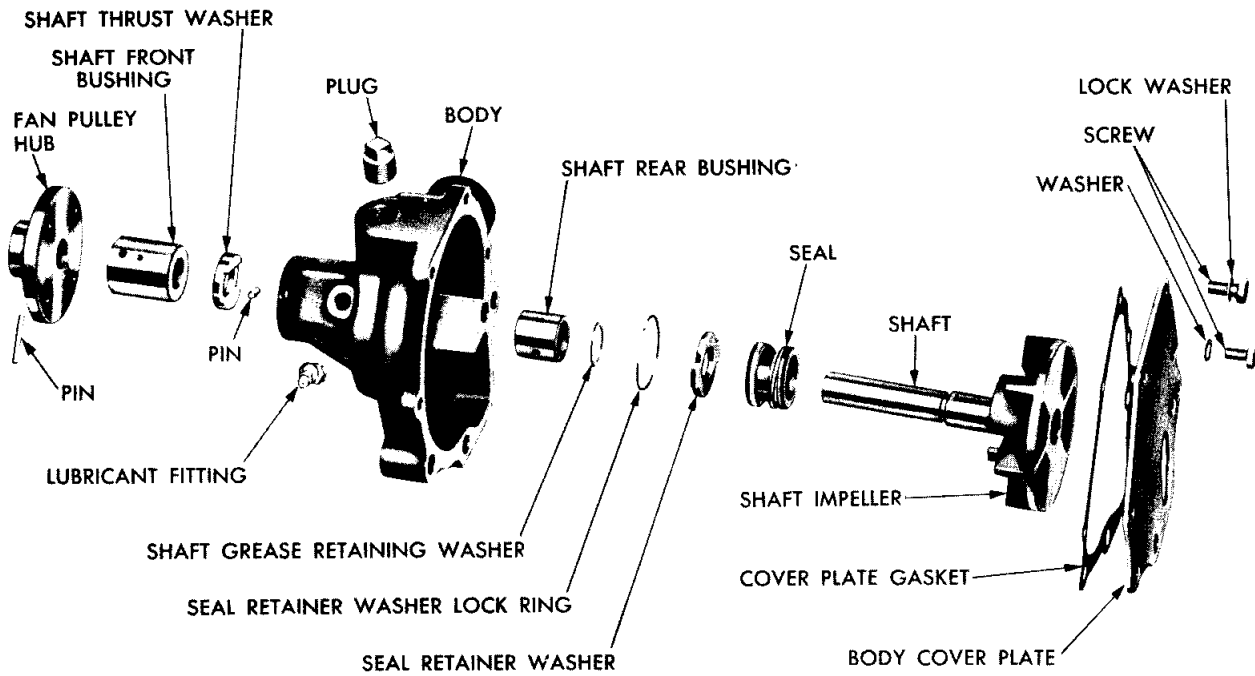
- (1) Remove cap screws which hold the cover to the pump body and take off the cover.
- (2) Drive out fan pulley hub pin.
- (3) Pull hub off shaft (Fig. 1).
- (4) Pull impeller and shaft assembly out of the pump body:
- (5) Drive out pin which holds the impeller to the shaft (if so equipped). This operation is not necessary if *new* shaft, impeller and seal assembly is to be installed.

(Continued on page 6)

SERVICE STANDARDS (CONT'D)

MODEL DESIGNATION →	B	C	D	PW	DU	EU	F, G, GA	H, HA, HM, HMA	J, JA, K, KA, JM, JMA, KMA	R, RA	T, TA, V, VA	Y, YA, YX
Thickness	2 1/4" 465.4	2 1/4" 465.4	2 1/2" 464.	3" 395.	2 3/4" 467.	2 3/4" 467.	3" 467.	3" 467.	3 3/4" 467.	3" 469.	4" 469.	4" 512.5
Frontal area (sq. in.)	Permanent by-pass and choke type thermostat	Permanent by-pass and choke type thermostat	Permanent by-pass and choke type thermostat	Permanent by-pass and choke type thermostat	Permanent by-pass and choke type thermostat	Permanent by-pass and choke type thermostat	By-pass thermostat	By-pass thermostat	By-pass thermostat	By-pass thermostat	By-pass thermostat	By-pass thermostat
Circulation Control	On dash	On dash	On dash	On dash	On dash	On dash	On dash	On dash	On dash	On dash	On dash	On dash
Engine Heat Indicator.	17 1/2	17 1/2	17 1/2	17	17	17	21 1/2	21 1/2	22 1/2	30 3/4	30 3/4	34
Cooling System Capacity (quarts) ..	157 to 162° F.	157 to 162° F.	157 to 162° F.	157 to 162° F.	157 to 162° F.	157 to 162° F.	157 to 162° F.	157 to 162° F.	157 to 162° F.	157 to 162° F.	157 to 162° F.	157 to 162° F.
Temperature when thermostat starts to open	183° F.	183° F.	183° F.	183° F.	183° F.	183° F.	183° F.	183° F.	183° F.	183° F.	183° F.	183° F.
Temperature when thermostat is fully open	Under hood—left side	Under hood—left side	Under hood—left side	Outside— in center	Under hinged radiator grille	Under hinged radiator grille	Under hood—left side	Under hood—left side	Under hood—left side	Under hood—left side	Under hood—left side	Under hood—left side
Location of radiator filler	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes
Pressure type radiator filler cap												
Location of drain cock and plugs (All Models)												
Hose Sizes ---												
Radiator outlet, upper ---	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 3/4"	1 3/4"	1 3/4"
Inside diameter...	3 3/4"	3 3/4"	3 3/4"	4"	3 1/4"	3 1/4"	3 3/4"	3 3/4"	3 3/4"	3 3/4"	3 3/4"	3 3/4"
Length	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"
Radiator outlet, lower ---	6 3/4"	6 3/4"	6 3/4"	7 3/4"	3 1/4"	3 1/4"	3 3/4"	3 3/4"	3 3/4"
Inside diameter...	1 3/4"	1 3/4"	1 3/4"	2"	1 3/4"	1 3/4"	1 3/4"	1 3/4"	1 3/4"
Length	9 1/4"	9 1/4"	9 1/4"	7"	10 3/4"	10 3/4"	8 1/2"	8 1/2"	8 1/2"	2 1/8"	2 1/8"	2 1/8"
Radiator inlet ---	Formed hose	Formed hose	Formed hose	Formed hose	Formed hose	Formed hose	Formed hose	Formed hose	Formed hose	Formed hose	Formed hose	Formed hose
Inside diameter...												
Length												

Lower front edge of radiator and lower edge of water jacket, left side of engine.



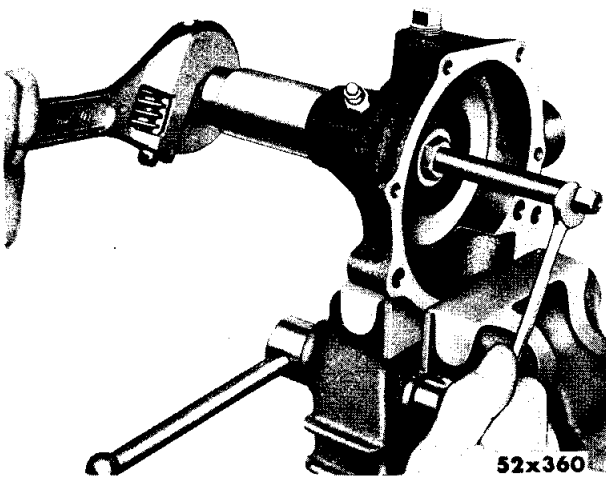
51x616A

Fig. 2—Water Pump (Disassembled) (B-4-B, B-4-C, B-4-D, B-4-PW, B-4-DU and B-4-EU)

- (6) Drive front bushing pin into shaft hole of bushing to permit removal of the bushings.
- (7) Remove rear and front bushings from the pump body (Fig. 3), pulling them out from the front.

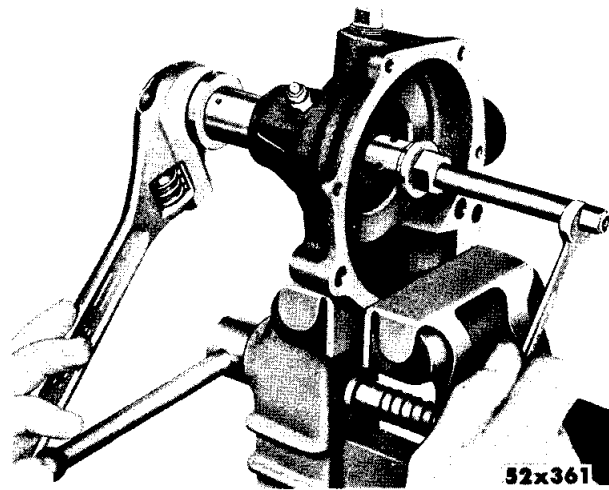
b. Assembly

When assembling the pump, be sure to insert the pump shaft thrust washer into the pump body before pressing in new bushings (Fig. 4). Then, continue to assemble in the following sequence:



52x360

Fig. 3—Removing Water Pump Shaft Bushings, Tool C-373 (B-4-B, B-4-C, B-4-D, B-4-PW, B-4-DU and B-4-EU)



52x361

Fig. 4—Installing Water Pump Shaft Bushings, Tool C-373 (B-4-B, B-4-C, B-4-D, B-4-PW, B-4-DU and B-4-EU)

- (1) Install impeller on shaft so that the back of impeller is flush with end of shaft. *Do not pin impeller to shaft.*
- (2) Install water pump seal.
- (3) Install water pump seal retainer washer.
- (4) Install water pump seal retainer lock ring. (If a new shaft, impeller and seal assembly is installed, omit Operations 1 through 4.)
- (5) Line burnish the bushings and reface the housing (Fig. 5).
- (6) Before installing the shaft assembly containing the bellows seal, be certain to place the grease retaining washer behind the rear bushing. This washer prevents excessive lubricant from damaging the seal.
- (7) Slide shaft assembly through rear bushing, thrust washer and front bushing, aligning shaft and washer. Push the shaft assembly into pump, compressing seal and spring. Look into the water inlet and check the clearance between the snap ring and the seal retaining washer. This should not be less than $\frac{3}{32}$ inch. When correct clearance is obtained, drill the shaft and install the impeller pin.
- (8) Mark the end of the shaft to indicate the direction of the hub pin hole. (This operation is not necessary when a new shaft is installed.) Then, press a new fan pulley hub onto the pump shaft, leaving a clearance (between the bushing and hub) of .033 inch for shaft end play, measured with a feeler gauge (Fig. 6).

CAUTION

The fan pulley hub MUST fit the shaft tightly. If a hub is removed, install a new one. A hub that has been pressed on, pressed off and then pressed on again will not fit properly.

- (9) Drill through the shaft and hub so that the new hole is at a right angle to the old hole in the shaft. This will be indicated by the mark made on the end of the shaft before the new hub was pressed on.
- (10) Remove all traces of the old gasket and

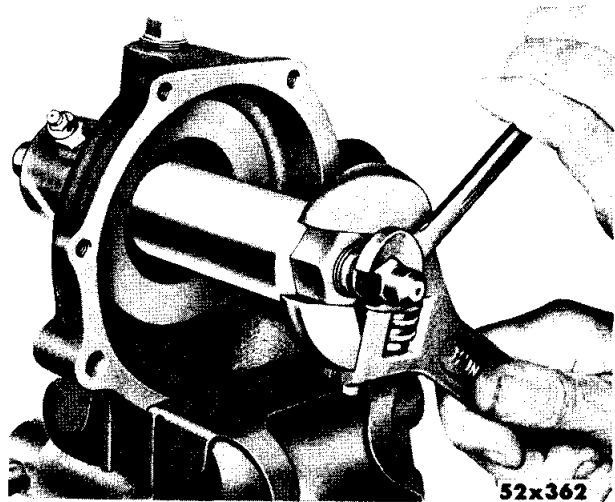


Fig. 5—Line Burnishing Bushings
(B-4-B, B-4-C, B-4-D, B-4-PW, B-4-DU, B-4-EU)

install a new gasket. Lubricate the pump and install it on the engine.

4. DISASSEMBLY AND ASSEMBLY OF WATER PUMP (B-4-F, B-4-G, B-4-H, B-4-J, B-4-K) (FIG. 7)

a. Disassembly

To disassemble water pump, proceed as follows:

- (1) Remove fan pulley hub pin and hub.

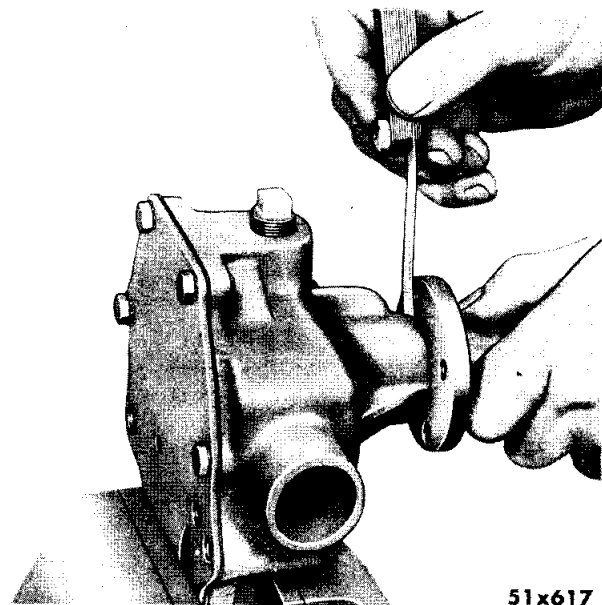


Fig. 6—Checking End Play of Water Pump Shaft
(B-4-B, B-4-C, B-4-D, B-4-PW, B-4-DU, B-4-EU)

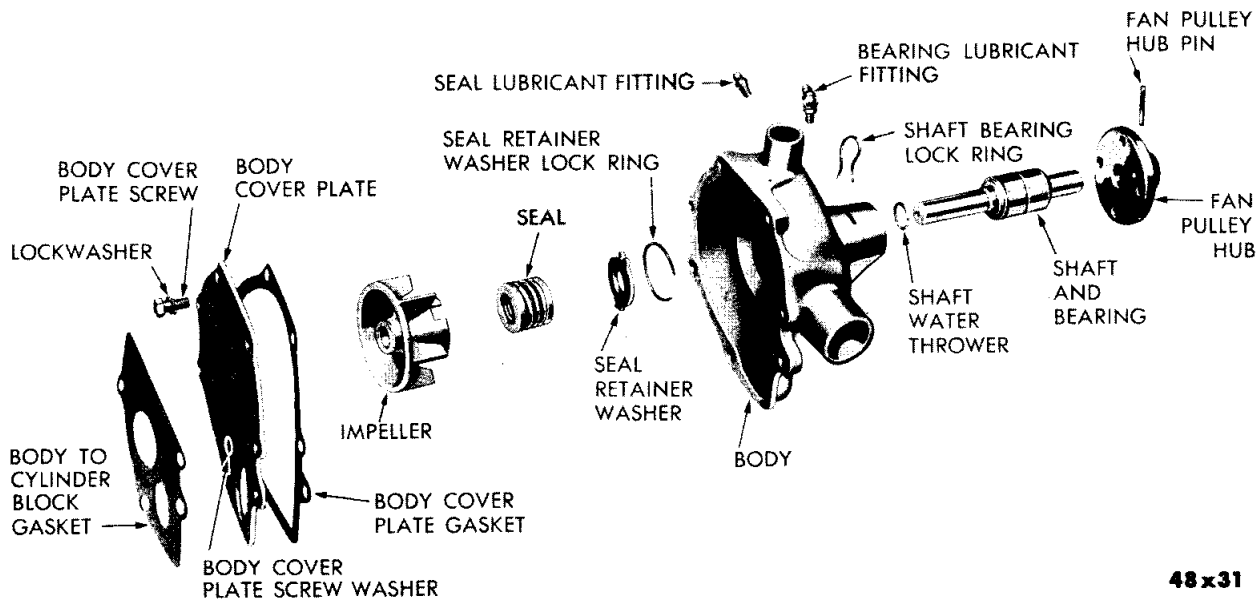


Fig. 7—Water Pump (Disassembled) (B-4-F, B-4-G, B-4-H, B-4-J, B-4-K)

- (2) Remove bearing lock ring (Fig. 7) and bearing grease fitting.
- (3) Remove water pump body back plate.
- (4) Drive out the impeller shaft through the front of the pump housing. Remove the impeller.

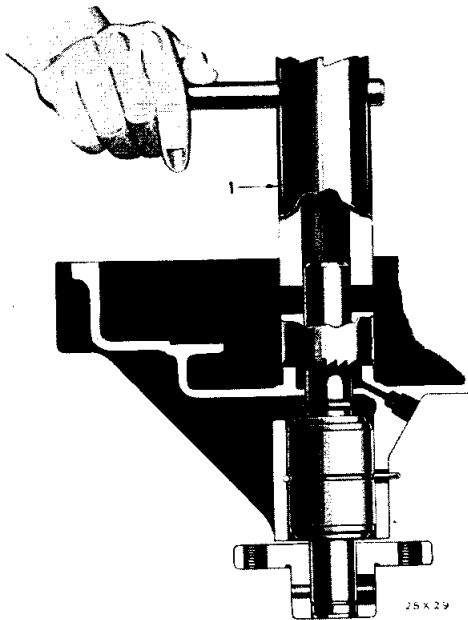


Fig. 8—Refacing Water Pump Housing
(B-4-F, B-4-G, B-4-H, B-4-J, B-4-K)

1 — Tool C-551

b. Assembly

When assembling the pump, use a new hub and impeller because the bore of the old hub or impeller may be distorted. Install the hub so that it is flush with end of the shaft.

After new seal parts have been installed in new impeller, face the pump body (Fig. 8). The tool has cutters on both ends (one for roughing and the other for finishing). The shaft of the pump should be used as a pilot for the tool. After facing the pump body, press the new impeller with new seal parts onto the water pump shaft.

Then, by looking in the water inlet, check the clearance between seal washer and washer lock ring. This clearance should be $\frac{3}{32}$ inch. It is controlled by pressing the impeller on the shaft until the correct clearance is obtained.

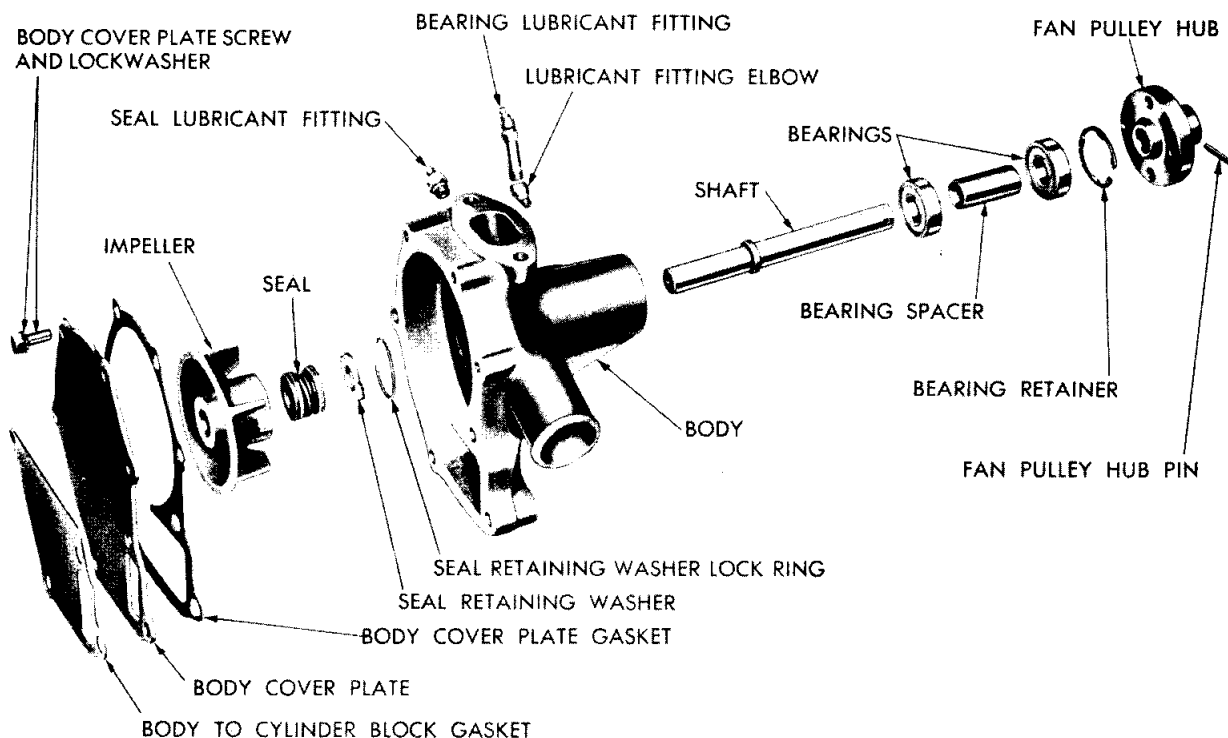
When lubricating the pump, rotate the shaft to insure complete lubrication. Make certain the grease vent holes are open.

5. DISASSEMBLY AND ASSEMBLY OF WATER PUMP (B-4-R, B-4-T, B-4-V, B-4-Y) (FIG. 9)

a. Disassembly

To disassemble the water pump, proceed as follows:

- (1) Drive the pin out of the fan pulley hub.



48 x 32

Fig. 9—Water Pump (Disassembled) (B-4-R, B-4-T, B-4-V and B-4-Y)

- (2) Pull the fan pulley hub off the shaft, as shown in Figure 1.
- (3) Remove the water pump body back plate.
- (4) Remove the snap ring from the front of the impeller shaft front bearing. From the impeller end, drive the shaft out through the front of the housing.
- (5) Remove the impeller shaft bearings and spacer.

b. Assembly

When assembling the pump, use a *new* hub and impeller. When the hub of impeller is pulled out, the bore of the hub or impeller may become distorted. As a result, these parts then would fit loosely on the shaft.

To install a new seal assembly remove the impeller as described in Step 5, and assemble the new seal parts in a new impeller. Then, face the pump body, as shown in Figure 8. The seat refacing tool has cutters on both ends (one for roughing and the other for finishing). The shaft of the pump should be used as a pilot for the tool. After facing the pump body, the new impeller with new seal parts should be pressed on the water pump shaft.

The end play of the water pump shaft should be from .004 to .008 inch measured with a feeler gauge between the pump body and the snap ring.

When lubricating the pump, rotate the shaft to insure complete lubrication. Make certain that the grease vent holes are open.

6. THERMOSTAT — REMOVAL AND INSTALLATION

Two types of thermostats are used on the B-4 Series truck models — the choke type thermostat and the by-pass type thermostat.

B-4-B, B-4-C, B-4-D, B-4-PW, B-4-DU and B-4-EU models are equipped with the choke type thermostat and permanent by-pass. The other truck models are equipped with the by-pass type thermostat (Fig. 10).

When installing either type of thermostat, make sure that the proper gasket is used between the thermostat flange and the cylinder head. When installing the choke type thermostat, position the unit so that the word "top" etched on the thermostat shoulder is facing the outlet connection (Fig. 11).



Fig. 10—Typical View of By-Pass Thermostat

- 1 — Cylinder water outlet elbow, water pump by-pass elbow and hose
- 2 — Thermostat gasket
- 3 — Thermostat by-pass ports
- 4 — Water pump by-pass elbow gasket
- 5 — Thermostat
- 6 — Cylinder water outlet elbow gasket

When installing the by-pass type thermostat, be sure that the rubber gasket is in place between the shoulder of the thermostat and the elbow flange. If this is not done, water will leak by the thermostat and the engine will not warm up properly in cold weather.

The by-pass thermostat has four by-pass

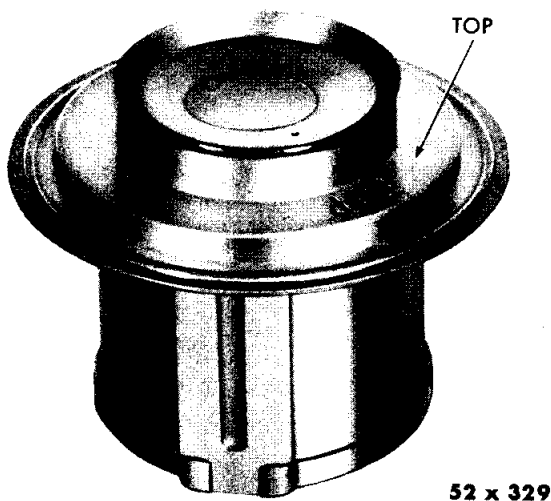


Fig. 11—Choke Type Thermostat Showing Proper Installation Position

ports (3, Fig. 10). It is important that these ports be in the proper position. The thin brige that divides the ports should be in line with the front and rear of the truck. This will place the two wide faces to the right and left.

During the warming-up period, water circulates through the cylinder block. The thermostats are designed to start opening from 157 degrees to 162 degrees F. and will be fully opened at approximately 183 degrees F.

To test either type of thermostat for correct opening temperature, carefully open the end of the valve and insert the end of a cord into the valve opening. Allow the valve to close on the cord. Then, suspend the thermostat and an accurate thermometer in a pail of water. Heat the water and, at the exact instant the thermostat valve opens and releases the cord, take the thermometer reading which should be from 157 degrees F. to 162 degrees F.

At 183 degrees F. (thermometer reading), the thermostat should be wide open. The temperature at which the thermostat opens is very important. The thermostat should be tested whenever the cooling system is checked.

NOTE

When the engine has been exposed to extreme freezing temperatures, or has been overheated, be sure to test the thermostat. Excessive temperature may cause the bellows of the thermostat to stay in the expanded position—wide open. If such is the case, replace the thermostat.

The thermostats can not be adjusted or repaired. If a unit has failed, install a new thermostat.

7. WATER TEMPERATURE INDICATOR (THERMOMETER)

The temperature of the water in the cylinder block is indicated by a thermometer on the instrument panel.

The dial assembly of this unit is operated by a gas that expands or contracts when heated or cooled. This gas is enclosed in a metal bulb that is connected to the dial assembly by a thin (capillary) tube. The bulb is screwed into the water jacket of the cylinder block. If the unit fails to indicate properly, or operate correctly,

install a new complete unit (tube, dial and bulb).

When working on the engine, or when removing the cylinder head, work with care to avoid damaging the tube or bulb. Also, avoid making sharp kinks in the tube.

The thermometer will not withstand a temperature in excess of 250 degrees F. If the gauge unit on the instrument panel has a permanent set and will not return to 100 degrees F. when cold, it may have been exposed to extreme hot or cold temperatures.

If the inaccuracy of the thermometer is not more than 30 degrees F. it may be possible to correct the instrument reading by bending the link which connects the instrument operating tube with the pointer. Check the metal bulb by immersing in water and testing it at approximately 140 degrees and 212 degrees F., after this adjustment.

8. FAN BELT ADJUSTMENT

NOTE

There are two fan belts on the B-4-R, B-4-T, B-4-V and B-4-Y models.

To assure satisfactory generator and water pump operation, keep the fan belt (or belts) adjusted so that the fan belt (or belts) can be deflected about $\frac{1}{4}$ inch with the fingers midway between the pulleys. To adjust the fan belt (or belts), proceed as follows:

- (1) Loosen the generator mounting bracket pivot bolt.
- (2) Loosen the adjusting strap lock screw.
- (3) Pull outward on the generator until the belt (or belts) is under proper tension. While holding the generator in this position, tighten the adjusting strap lock screw and the pivot bolt.

CAUTION

Do not overtighten the belt (or belts). Never make the fan belt adjustment by moving the generator with a pry bar.

9. ENGINE TEMPERATURE

Correct engine operating temperature helps promote better fuel economy and engine per-

formance. The engine of a truck, used in a service which requires frequent stops, such as door to door delivery, often will not operate at an economical temperature, especially in cool or cold weather. In such instances, water vapor, resulting from normal fuel combustion, collects in the crankcase. This condition can not be avoided. An engine operating below normal temperature, or at comparatively low speeds, will have an excessive accumulation of water in the crankcase oil.

In truck service that requires frequent stops, such as door to door delivery, it is recommended that the engine be operated at a higher temperature. This may be accomplished by using a thermostat which opens at a higher temperature (180 degrees to 185 degrees F.). This thermostat should not be used with anti-freeze solutions which have a boiling point less than 200 degrees F. As an alternative, a cover enclosing part of the radiator grille may be used. In some cases, it may be necessary to use both a high temperature thermostat and a cover, in order to reduce condensation in the crankcase.

Gas fumes and water vapor are circulated in the crankcase by the revolving of the crankshaft and are drawn from the crankcase by vacuum created by the forward travel of the truck. Fresh air is drawn in through the breather pipe and exhausted through the ventilator outlet pipe on the right side of the crankcase at the rear.

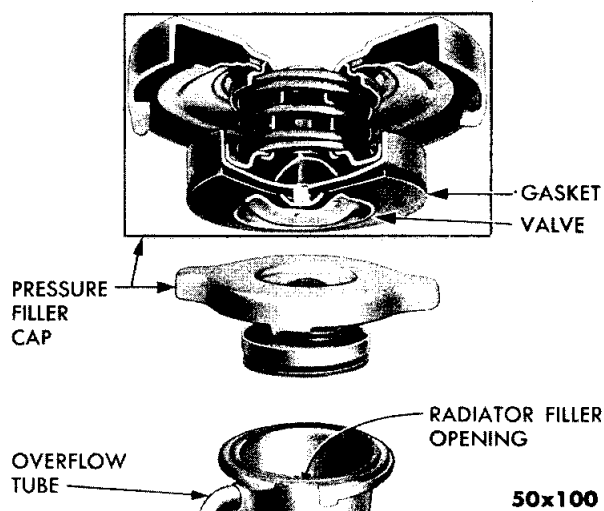


Fig. 12—Pressure Type Radiator Filler Cap

10. PRESSURE TYPE RADIATOR FILLER CAP (TRUCKS SO EQUIPPED) (FIG. 12, PAGE 11)

Some of the B-4 Series Truck models (refer to Service Standards) are equipped with a pressure type radiator filler cap (Fig. 12). This cap is designed to allow the engine to operate at a higher than normal operating temperature without noticeable loss of coolant.

Under normal operating conditions, pressure is not built up in the cooling system. However, if the temperature of the coolant in the system rises, due to engine idling for a long period, extended operation of truck in low gear on

steep grades, operation in high altitudes, etc., the valve in the bottom of the filler cap closes, seating against the gasket. When this takes place, the cooling system becomes pressurized up to approximately 4½ pounds, the valve and seat raise and the built-up pressure is allowed to escape through the radiator overflow tube.

When removing the pressure type radiator filler cap, allow the built-up pressure to escape by turning the cap counter-clockwise to the stop. After the pressure has been released, press the cap downward and continue to turn it counter-clockwise.

MAINTENANCE

11. DRAINING THE COOLING SYSTEM

To drain the radiator and cylinder block, open the radiator drain cock and also remove the drain plug (or open the drain cock) at the lower edge of the water jacket on the left side of the engine.

12. SERVICING THE RADIATOR

Only clean, soft water should be used in the radiator and the cooling system of the engine. If hard water is used, scale will form, not only

in the radiator core, but also in the cylinder block and the cylinder head as well. This scale, or lime deposit, causes hot spots within the engine and will plug the tubes in the radiator core. If the water is dirty, the foreign material in it will also plug the tubes in the radiator core and restrict the flow of the coolant. And, in extreme cases, the foreign material may collect in the engine, cause overheating and eventually, engine failure.

If the engine overheats and the fan belt, fan, and coolant level in the upper expansion tank are found to be satisfactory, it will be necessary to clean and flush the entire cooling system in order to correct the condition. In addition, all grease, oil, dirt and other obstructions, must be removed from the fins of the radiator core so that the entire cooling area of the core can readily transmit into the air stream the heat of the coolant.

A very effective and safe radiator cleaner to use for this purpose is the MOPAR Radiator Cleaner. This cleaner, when used as recommended, loosens, dissolves and removes most of the rust and scale in most cooling systems. However, in order to obtain the best results, the directions on the container should be followed. After the cleaner has been in the cooling system the correct period of time, the engine and radiator should be completely drained. Then, the cooling system should be refilled slowly (to avoid rapid cooling and distortion of parts) with clean, soft water (if available).

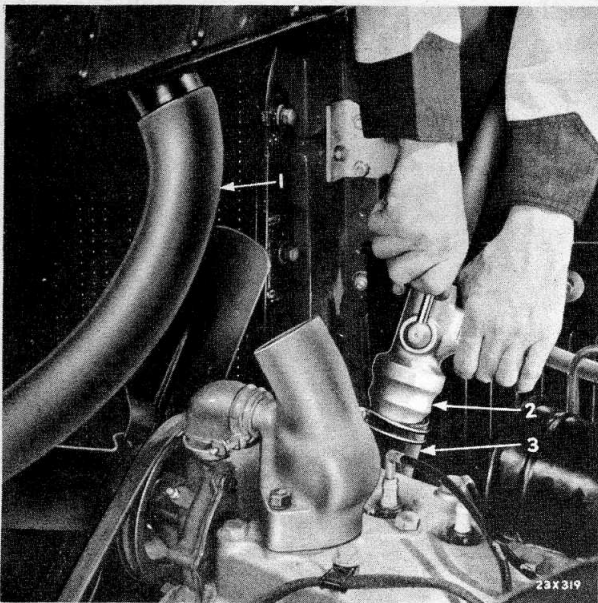


Fig. 13—Flushing Radiator with Flushing Gun
(Typical View)

1 — Water outlet hose
2 — Flushing gun
3 — Radiator outlet hose—lower

13. CLEANING THE RADIATOR

The following procedure is recommended for all trucks and should be performed at least once a year to assure efficient cooling system operation. To clean the radiator, proceed as follows:

- (1) Drain the coolant from the cooling system by opening all drain cocks.
- (2) Refill the cooling system with fresh, soft water and add the contents of one can of MOPAR Cooling System Cleaner (Number 1 top compartment of package).
- (3) Install radiator cap. Run the engine at fast idle speed from 30 to 45 minutes for moderate cases. (Be sure to partially cover the radiator in order to raise the coolant temperature between 180 degrees to 190 degrees F. The solution must be used hot.)

NOTE

If the radiator is badly plugged, it may be necessary to repeat the above procedure and to leave the cleaner in the system up to approximately 48 hours. If this procedure does not correct the condition, reverse flush the radiator and cylinder block with flushing gun or pressure purger.

- (4) Stop the engine and drain the system completely by opening the drain cocks.
- (5) Close the drain cocks and refill with clean, fresh, soft water.
- (6) Next, pour the conditioner (Number 2 bottom compartment of package) into the radiator.
- (7) Run the engine for 10 minutes. Then, drain the cooling system, and with the drain cocks open, flush the cooling system with clean water.
- (8) Close the drain cocks and refill the cooling system with clean, fresh, soft water.
- (9) During the summer, use MOPAR Rust Resistor in the cooling system to prevent the formation of rust. **THIS IS IMPORTANT!**

CAUTION

Handle the cooling system cleaner with care. The contents of the container will burn the

skin, damage clothing or the finish of the truck. Wash the hands promptly after using the cleaner. If the cleaner is spilled or splashed onto clothing or the finish of the truck, rinse immediately with plenty of water.

14. REVERSE FLUSHING THE COOLING SYSTEM WITH FLUSHING GUN

Reverse flushing the cooling system is performed by forcing air and water through the system in the direction opposite that of the normal water flow in the system. Reverse flushing will help to loosen and remove deposits of rust, scale, and sediment more thoroughly than ordinary flushing.

In addition to flushing the cooling system, be sure that the radiator core openings are not blocked so that the air can circulate through them. Apply air pressure to the back of the radiator to remove bugs, leaves or dirt.

a. Reverse Flushing Radiator

Reverse flush the radiator before using MOPAR Cooling System Cleaner. This will permit the cleaner to do a better job. To perform reverse flushing, drain the radiator and disconnect the hose from the radiator inlet. Then, connect a long piece of hose to the radiator inlet. Refer to Figure 13. This hose should extend outside the engine compartment to allow water and sediment to drain without spilling on the engine or other parts of the truck.

Disconnect the radiator outlet hose at the outlet tube and insert the flushing gun in the hose. First, make sure that water will flow through the radiator. Then, apply normal water pressure. A pulsating flow of water will loosen sediment faster than steady flow. If water will flow through the core, apply air pressure at short intervals into the stream of water to help remove the sediment and scale.

CAUTION

Use of excessive water or air pressure may result in damage to the radiator core when using the reverse flushing gun. Therefore, be sure that water can flow through the radiator core before applying air pressure.

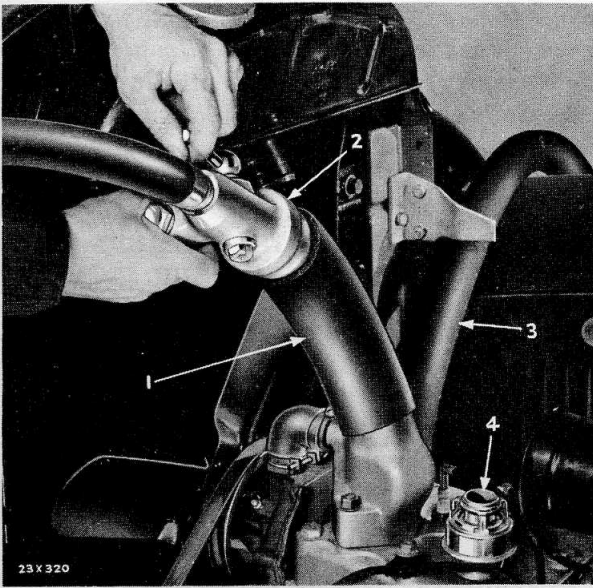


Fig. 14—Flushing Cylinder Block with Flushing Gun
(Typical View)

1 — Radiator inlet hose
2 — Flushing gun
3 — Water outlet hose
4 — Thermostat removed

b. Using Cooling System Cleaner

After reverse flushing the radiator core, connect the inlet and outlet radiator hoses and use MOPAR Cooling System Cleaner. Be sure to follow the instructions on the container.

c. Reverse Flushing Cylinder Block

The use of the cooling system cleaner, after the radiator is reversed flushed, will ordinarily clean the cylinder block well enough to make it unnecessary to reverse flush the block.

If the cylinder block is badly clogged with rust and scale and reverse flushing is necessary, first remove the water distributor tube. If this tube is not removed, the sediment in the block may plug the tube or the slots in the tube which direct the flow of water toward the valve ports. On older trucks, it may be advisable to remove the core hole plugs on the left side of the cylinder block to permit thorough cleaning of the cylinder block.

To reverse flush the cylinder block, remove the thermostat and connect a piece of hose to the water pump inlet. The hose should extend beyond the engine compartment to prevent water from splashing onto the engine or other parts of the truck. Connect the radiator inlet hose to the thermostat housing and insert

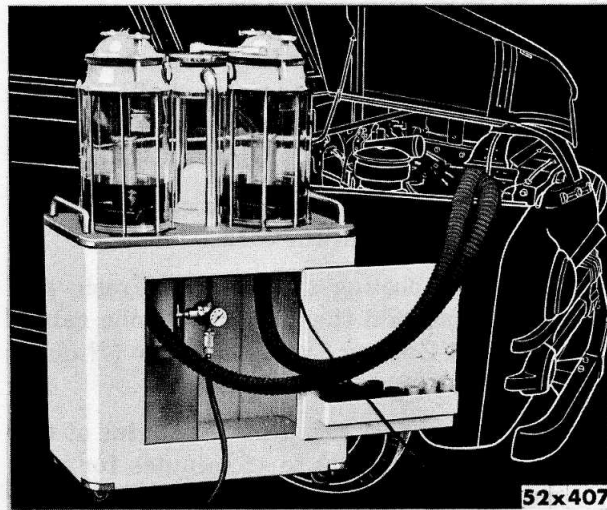


Fig. 15—Pressure Purger Cooling System Cleaner,
Tool MT-276

flushing gun. Refer to Figure 14. Force the water and air through the block until clean water drains out. Then, remove gun from the radiator inlet hose and insert in the water pump inlet. Flush the block in the direction the coolant normally flows.

15. REVERSE FLUSHING THE RADIATOR WITH PRESSURE PURGER (FIGS. 15 AND 16)

This method of reverse flushing is accomplished by forcing air and water through the system in the direction opposite to that of the normal flow of the coolant. Thus, when forced through the system in this direction, the water works behind and underneath the scale and sediment deposits, loosening them. The following instructions are based on the use of the Pressure Purger Cooling System Cleaner, Tool MT-276 (Fig. 15), which can be used to clean a badly plugged cooling system that will not clear when the usual cleaning procedure is followed. However, regardless what pressure cleaning equipment is used to clean the cooling system, be sure to follow closely the manufacturer's instructions in order to obtain the best results.

To reverse flush the radiator, fill each cylinder of the pressure purger, tool MT-276, with water to the top of the filter trap (Fig. 16). Then, proceed as follows:

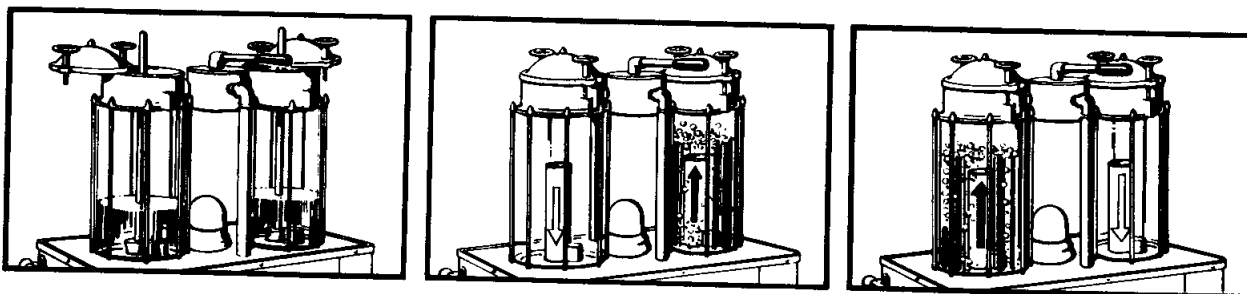
- (1) After the cylinders have been filled with water to the correct level, heat the water by snapping on the heating elements.

- (2) Drain the radiator and disconnect the hoses while the water is heating in the purger.
 - (3) Remove the bolts that hold the water outlet connection to the water pump housing. Remove the connection and lift out the thermostat. Replace the connection and tighten the bolts securely.
 - (4) Connect the purger hoses to the upper and lower radiator connections (inlet and outlet).
 - (5) Pour one-half of the contents of the package of Purgite into the hot water in each cylinder (Fig. 16).
 - (6) Swing the operating handle of the purger to the Number 1 position and hold it there until the solution has been forced into the opposite cylinder (Fig. 16). Then, swing the operating handle rapidly to the Number 2 position until no more rust and scale are brought into the opposite cylinder (Fig. 16).
 - (7) Continue this procedure from five to ten minutes to make sure that the radiator has been purged.
 - (8) Disconnect the purger hoses.
- Clean the cylinder block with the purger as outlined in the following paragraph.
- (2) Connect the purger hoses to the water outlet and water inlet connections.
 - (3) Pour one-half of the contents of the package of Purgite into the hot water of each cylinder (Fig. 16).
 - (4) Swing the operating handle of the purger to the Number 1 position and hold it there until the solution has been forced into the opposite cylinder (Fig. 16). Then, swing the operating handle rapidly to the Number 2 position until no more rust and scale are brought into the opposite cylinder (Fig. 16).
 - (5) Continue this procedure from five to ten minutes to make sure that the cylinder block has been purged.
 - (6) Disconnect the purger hoses. Install thermostat and new outlet connection gasket. Tighten bolts securely.
 - (7) Reinstall radiator hoses (if satisfactory for further use) and tighten clamps securely. Refill cooling system with clean, fresh, soft water.
 - (8) Inspect the radiator and cylinder block and repair if necessary.

16. REVERSE FLUSHING THE CYLINDER BLOCK WITH PRESSURE PURGER (FIGS. 15 AND 16)

To reverse flush the cylinder block with Pressure Purger Cooling System Cleaner, tool MT-276, proceed as follows:

- (1) Empty purger of all deposits. Refill cylinders with water to the top of the filter trap (Fig. 16). Heat the water by snapping on the heating elements.



52x406

Fig. 16—Pressure Purger Operation

CAUTION

Never add cold water or anti-freeze to an overheated engine when the level of the cooling medium is low. The introduction of cold liquid will cause sudden contraction of overheated metal. This may result in cracks or fractures of cylinder head or block. When in doubt, allow the engine to cool before adding water or anti-freeze to the radiator.

18. RADIATOR RUST RESISTOR

One of the most important precautions that should be observed in the maintenance of trucks is the prevention of the formation of scale, rust and corrosion in the cooling system.

When rust first forms in the radiator and cylinder block, it forms a coating which acts as an insulation material. As a result, heat is not dissipated into the coolant and overheating may occur. This type of overheating may not be indicated by the engine heat indicator on the instrument panel. But, the condition may result in the burning of valves and other difficulties within the engine. Then, as corrosion progresses in the cooling system, rust and scale may flake off interior surfaces and clog the radiator or water passages in the engine, causing overheating.

If corrosion is not checked, the water distributing tube may become so corroded that its walls will be eaten through at various points. The water distributing tube performs an important function. It directs coolant to the hottest points of the engine — the valves and valve seats. These extremely hot points are cooled by streams of coolant which pass through specially located holes in the water distributing tube. If corrosion occurs and the water distributing tube is eaten through at other locations, the valves will not be properly cooled and valve burning will result.

Consequently, it is very important that MOPAR Rust Resistor be used continuously in the cooling system of the truck to prevent corrosion and the formation of rust.

One pint of MOPAR Rust Resistor is sufficient for the treatment of the cooling systems of all Dodge truck models, except B-4-R, B-4-T,

B-4-V and B-4-Y. In these latter models, due to larger cooling system capacities, use two pints of rust resistor.

If, during the winter months, an anti-freeze containing a rust inhibitor is used, it will not be necessary to add MOPAR Rust Resistor. When the cooling system of the truck is drained in the spring, add MOPAR Rust Resistor as recommended when refilling.

19. ANTI-FREEZE SOLUTIONS

Commercial liquids are available which may be used to prepare anti-freeze solutions satisfactory for truck cooling systems. Among these are Denatured Alcohol, Methanol (synthetic wood alcohol) and Ethylene Glycol. It is recommended that the cooling system be cooled before adding an anti-freeze solution.

Denatured Alcohol and Methanol are subject to evaporation, especially on heavy runs. If such a liquid is used as anti-freeze solution, test the solution at least once a week during the winter season. If necessary, add the required amount of anti-freeze to protect the system against the lowest anticipated temperature.

These liquids, if spilled on the vehicle, should be washed off immediately with a generous quantity of water to prevent damage to the finish.

When using Ethylene Glycol, thoroughly clean and flush the entire cooling system before adding the anti-freeze.

Also, tighten all hose connections. If necessary, replace these parts to obtain tight joints. It is important that the cylinder head gasket be kept tight to prevent leakage. The use of water pump grease is further precaution against leaks at the water pump shaft.

If the solution in the radiator is low, add a solution of water and anti-freeze in the proper proportions to protect the cooling system against freezing. Large additions of water will dilute the anti-freeze already in the system.

CAUTION

Solutions containing sodium chloride (common salt), calcium chloride, magnesium chloride, or any inorganic salt, should never be used as an

anti-freeze. Water soluble organic products such as sugar, honey, or glucose or any organic crystalline compounds are not recommended. Mineral oils such as kerosene or engine oil may

damage rubber parts and therefore prove harmful.

Best results are obtained by using factory recommended MOPAR Anti-Freeze.

ROUTE VAN COOLING SYSTEM

20. DESCRIPTION

The cooling system of the Route Van models is similar to that used in the conventional truck. The radiator core has a large frontal area to aid in cooling during low speed operation.

21. REMOVAL AND INSTALLATION OF RADIATOR CORE (FIG. 17)

To perform the above operations, proceed as follows:

- (1) Drain radiator.
- (2) Disconnect and remove the upper and lower radiator hoses.
- (3) Remove the lower front radiator grille panel.
- (4) Remove the four support studs.
- (5) Lift the radiator assembly up and out.

When the radiator core is installed, connect the hoses, close the drain valves and refill the cooling system with the proper amount of coolant.

22. REMOVAL AND INSTALLATION OF WATER PUMP

Perform the operation as follows:

- (1) Drain cooling system.

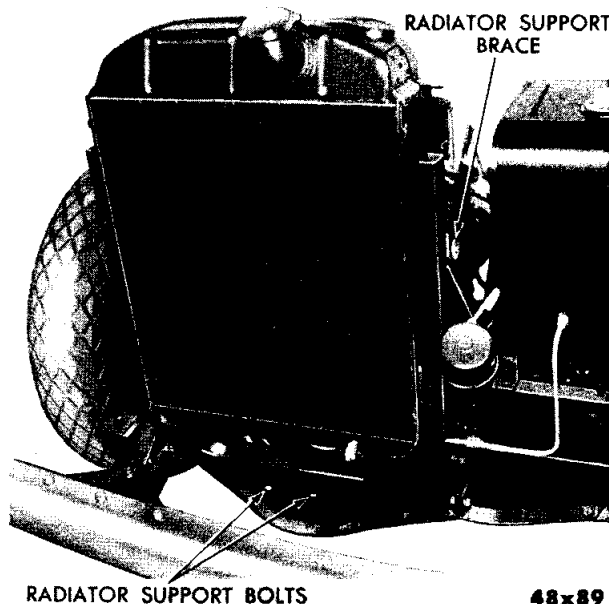


Fig. 17—Radiator Support Bolts—Radiator Support Brace

- (2) Loosen the generator bracket pivot bolt and remove the fan belt.
- (3) Remove the fan blades, pulley and by-pass elbow.
- (4) Remove mounting bolts and pump.

Before replacing the water pump, install new gaskets and replace broken or worn hoses.

SERVICE DIAGNOSIS

CONDITIONS — POSSIBLE CAUSES — REMEDIES

SERVICE DIAGNOSIS

23. EXTERNAL LEAKAGE

Possible Causes

- a. Loose hose clamps.
- b. Defective rubber hose.

- c. Broken radiator seams.
- d. Worn water pump.
- e. Loose core hole plugs.
- f. Damaged gaskets, or dry gaskets, if engine has been stored.

- g.* Warped cylinder head.
- h.* Cracked cylinder head.
- i.* Cracked cylinder block.
- j.* Cracked thermostat housing (water outlet elbow).
- k.* Leak at heater connections.
- l.* Leak at water temperature indicator bulb (in head).
- m.* Leak at exhaust manifold center studs (long).
- n.* Water pump attaching bolt leak—through hole into cylinder block water passage.

Remedies

- a.* Inspect and tighten clamps. Replace if necessary.
- b.* Replace defective hose.
- c.* Remove radiator and solder seams. Test radiator for possible leaks before installation.
- d.* Remove and recondition water pump.
- e.* Remove loose core hole plug, clean out hole and install new plug.
- f.* Inspect for leaks at water pump, cylinder head, thermostat housing (water outlet elbow) and by-pass tube flange. Replace gaskets as required.
- g.* Replace cylinder head and gasket. Tighten bolts to specified torque and in sequence.
- h.* Replace cylinder head and tighten as outlined above.
- i.* Replace cylinder block.
- j.* Replace thermostat and housing.
- k.* Tighten heater connections as necessary.
- l.* Tighten nut or replace adaptor.
- m.* Remove long studs and coat with suitable sealing compound. Reinstall and inspect for leaks.
- n.* Remove bolts and coat with sealing compound. Reinstall and inspect for leakage.

24. INTERNAL LEAKAGE

Possible Causes

- a.* Warped cylinder head.
- b.* Blown cylinder head gasket.
- c.* Cracked cylinder wall.
- d.* Loose cylinder head bolts.
- e.* Cracked valve port.
- f.* Sand holes or porous condition (cylinder block).
- g.* Porous condition around distributor hole in cylinder block.
- h.* Crack in cylinder block at valve chamber.

Remedies

- a.* Replace cylinder head and gasket. Tighten bolts in sequence to required torque.
- b.* Replace gasket and tighten bolts as described above.
- c.* Replace cylinder block.
- d.* Tighten cylinder head bolts in sequence to specified torque.
- e.* Weld the crack in the valve port or replace the cylinder block.
- f.* Weld the sand holes or replace the cylinder block.
- g.* Correct this condition by using a good sealing compound. For best results, follow the manufacturer's suggestions.
- h.* Replace cylinder block.

25. OVERFLOW LOSS

Possible Causes

- a.* Refer to Causes listed in Paragraph 26 below.
- b.* Boiling (overheating).
- c.* Leak in cylinder head gasket.
- d.* Restricted radiator.
- e.* Overfilling.

Remedies

- a.* Refer to Remedies listed in Paragraph 26 below.

b. Common causes of overheating directly traceable to the cooling system are: clogging, improper circulation of coolant, or running engine when coolant level is low. Other causes are: incorrect ignition or valve timing, dragging brakes, overloading of truck, operating in heavy sand or mud, excessive engine idling, or operating under extreme conditions of heat and altitude.

Make sure fan belt (or belts) is tight, properly adjusted, in good condition and not slipping. Be sure water pump impeller is operating. Impeller pin may be sheared off. Inspect hose connections for tightness, hoses for plugging, collapsed condition, or damage. Test for plugged radiator and make certain outside of radiator is free from bugs, leaves, etc., that would restrict airflow. Check cylinder block for restricted water distributing tube or passages.

c. Replace cylinder head and gasket. If leak is internal, check oil for contamination. Drain, flush and refill to correct level.

d. Reverse flush radiator.

e. Fill radiator to approximately 1 inch below filler neck. Due to expansion within system, excess water is forced out of the overflow tube. This may give a false impression that a leak has developed in cooling system.

26. POOR CIRCULATION

Possible Causes

- a. Restricted radiator core.
- b. Restricted water jacket.
- c. Restricted water distributing tube.
- d. Low coolant level.
- e. Collapsed radiator hose.
- f. Water pump impeller loose on shaft.
- g. Fan belt loose.
- h. Scale in cylinder block.

Remedies

- a. Drain and reverse flush radiator.
- b. Drain system, disconnect radiator hoses and reverse flush cylinder block.
- c. Remove water distributing tube and in-

spect for rust, corrosion or restrictions in water outlet holes. Replace if necessary.

d. Refill radiator to approximately 1 inch below filler neck.

e. Replace radiator hose. Check clamps for fatigue. Replace as necessary.

f. Remove and recondition water pump.

g. Check driving surfaces of fan belt (or belts) and tighten. If belt (or belts) is frayed or checked, or greasy on the sides or bottom, replace and adjust.

h. Use MOPAR Cooling System Cleaner to correct this condition. After correction, add MOPAR Rust Resistor to cooling system to prevent recurrence.

27. CORROSION

Possible Causes

- a. Impurities in water.
- b. Failure to use rust resistor in cooling system.
- c. Improper draining and service.
- d. Air leaks in cooling system.

Remedies

a. Drain and flush radiator and cylinder block until clean. Refill system with clean water and add MOPAR Rust Resistor. (This rust resistor contains a special water softener.)

b. Drain and flush radiator and cylinder block until clean. Refill system with clean water and add MOPAR Rust Resistor.

c. When draining system, be sure that the drain cock in cylinder block is open. In severe cases of restriction, remove the drain cock to allow large particles of sediment to be washed out.

d. Tighten all hose connections. Check for possible leaks in cylinder head gasket. Inspect water level in system. If necessary, fill system to required level.

28. OVERHEATING

Possible Causes

- a. Refer to Causes listed in Paragraph 26.

- b. Excessive sludge in crankcase of engine.
- c. Radiator core air passage plugged.
- d. Obstruction in front of radiator.

Remedies

- a. Refer to Remedies listed in Paragraph 26.
- b. Drain lubricating oil from crankcase. Refill to required level with light flushing oil. Then, operate engine at slow speed for about 15 or 20 minutes. Drain and refill crankcase with proper grade of oil. Refer to Lubrication section in this manual. In severe cases of sludging, remove oil pan and clean inside of block by hand.
- c. Thoroughly clean out the passages from the back of radiator core with air pressure.
- d. Remove any obstruction that may block entry of air to radiator.

29. OPERATING FACTORS THAT MAY CAUSE HIGHER THAN NORMAL COOLANT TEMPERATURE

Possible Causes

- a. Incorrect ignition timing.
- b. Incorrect valve timing.
- c. Low oil level.
- d. Tight engine.
- e. Defective heat control valve.
- f. Clogged, defective muffler or exhaust pipes.
- g. Dragging brakes.
- h. Overloading truck.
- i. Driving in heavy sand or mud.
- j. Engine laboring on grades.
- k. Excessive engine idling.
- l. Excessive "stop" and "go" operation.

Remedies

- a. Check ignition timing and adjust as needed.
- b. Check valve timing and adjust as required.
- c. Inspect condition of oil. Drain and refill to proper level, if necessary.
- d. Use extreme care during engine "break-in". Drive as recommended in Driver's Manual—at moderate speeds—not too slow. Check oil and water levels often and add water or oil as needed.
- e. Replace heat control valve spring and inspect valve stop for wear or damage. Replace stop if necessary.
- f. Check exhaust system for restrictions and parts for damage or rust. Replace parts as needed.
- g. Correct "dragging brakes" as outlined in Brakes section in this manual.
- h. Avoid overloading truck.
- i. When operating in sand or mud, watch temperature indicator and drive with care to avoid overheating engine.
- j. To avoid engine lugging or laboring on grades, shift as recommended in Driver's Manual.
- k. Avoid excessive engine idling.
- l. Watch temperature indicator during excessive "stop" and "go" driving to avoid engine overheating.

30. OVERCOOLING

Possible Causes

- a. Defective thermostat.
- b. Inaccurate temperature gauge.

Remedies

- a. Check thermostat for operation and replace as necessary.
- b. Check water temperature gauge and replace as needed.