

**SUPPLY
PUMP
FOR
SGE**

SERVICE INSTRUCTIONS

For
SGE GEAR TYPE
FUEL SUPPLY PUMPS

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DESCRIPTION

The SGE Fuel Supply Pump is a positive displacement, gear type, flange mounted, clockwise or counter-clockwise rotation unit that incorporates pressure regulation and hand priming features.

This supply pump is gear driven, with a spring loaded relief valve which limits the maximum fuel pressure.

OPERATION

The SGE Fuel Supply Pump is fitted with two meshing gears, one an integral part of the drive shaft, that draw fuel oil from the supply side of the system and pump it through a final stage filter into the fuel injection pump.

Fuel oil enters through the inlet check valve and duct to the suction side of the meshed gears where it is carried in the gear cavities to the pressure side and forced out through the outlet check valve at a prescribed pressure (refer to Figure 1).

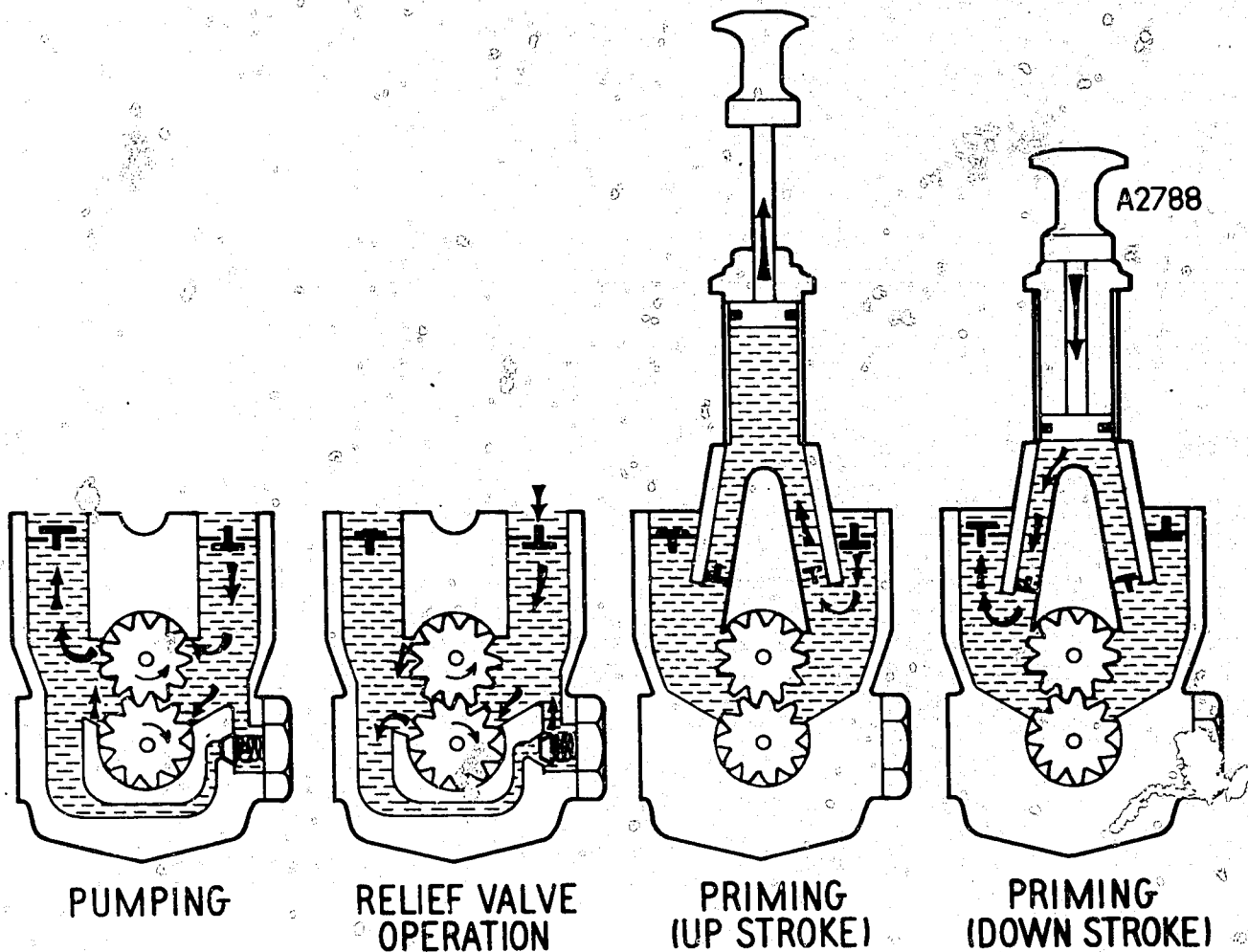


FIGURE 1 - SUPPLY PUMP AND HAND PRIMER OPERATION

The spring loaded relief valve is located in the pump cover, and a duct connects the valve seat to the pressure side of the pump. When discharge pressure is too high, it overcomes the preloading

of the valve which then opens sufficiently to bypass fuel to the suction side of the pump and so relieves the system from the effects of excess pressure build up.

The direction of fuel flow through the pump is indicated by an arrow on the pump cover.

A hand priming pump (hand primer) is mounted on top of the supply pump cover to provide a means of manually filling the low pressure areas of the fuel injection system. When the plunger is raised, the suction effect lifts the pump inlet and hand

primer check valves off their seats thereby permitting fuel to flow into the barrel of the hand priming pump. When the plunger is pressed downward, the resulting compression of the fuel in the barrel forces the hand primer and pump outlet check valves off their seats which permits the fuel to flow through the pump and supply line to the injection pump.

EXPLANATION OF TYPE DESIGNATION

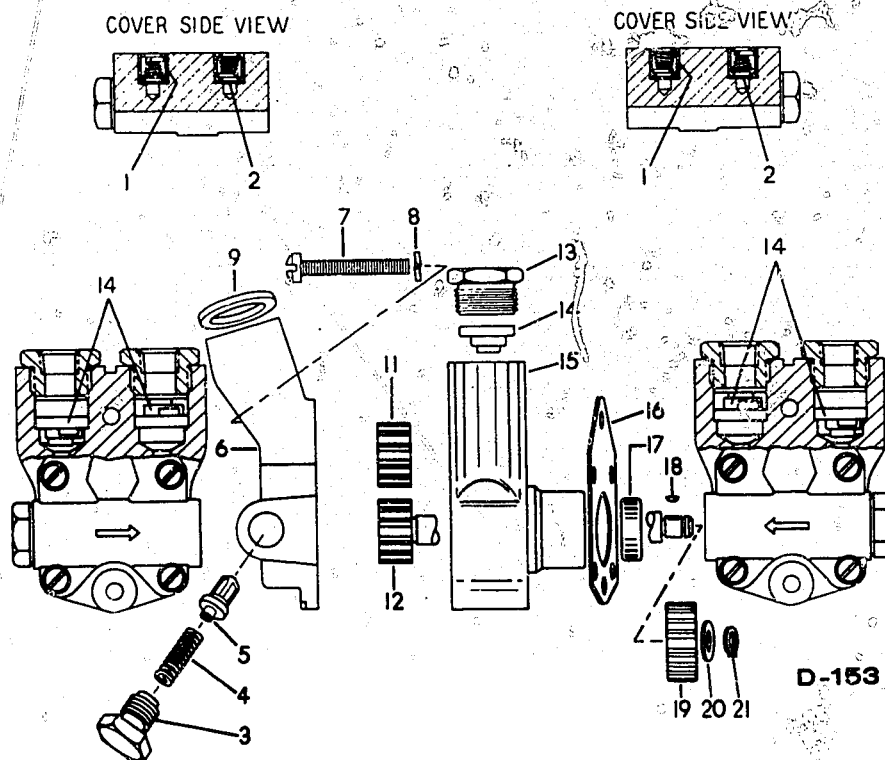
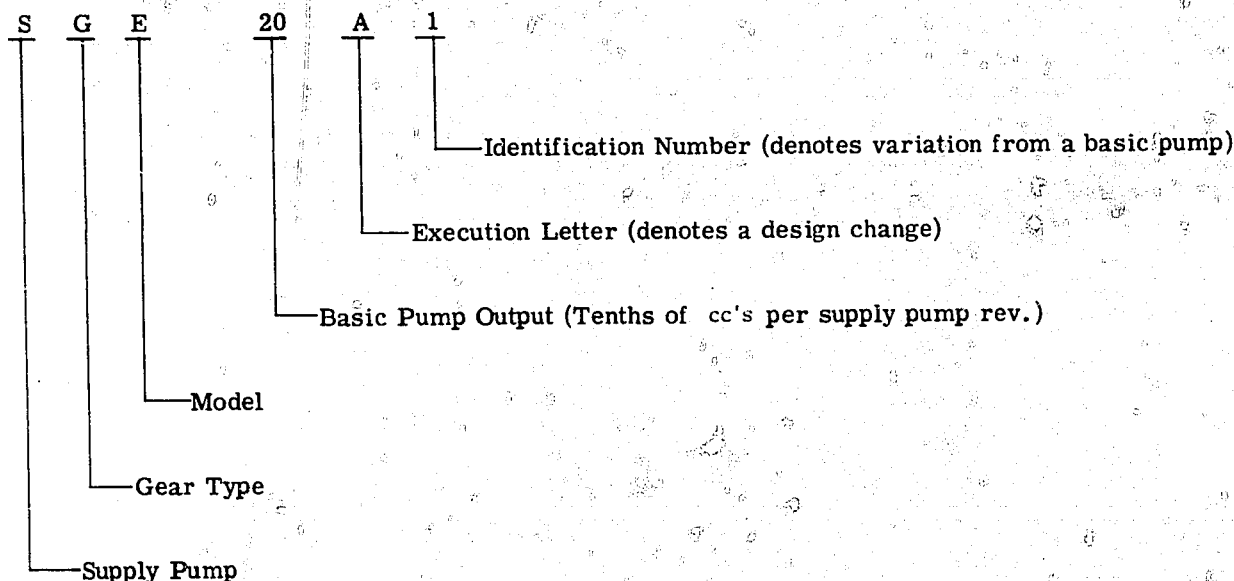


FIGURE 2 - EXPLODED VIEW OF SGE FUEL SUPPLY PUMP

1. DISASSEMBLY

NOTE: Unless otherwise indicated, tool numbers enclosed in parentheses are Bacharach part numbers; all others refer to illustration numbers in Figure 2.

- 1) Remove retaining ring (21) with number 22 "Tru-Arc" pliers, TSE 76176 (72-5002), and spacing washer (20) if present.
- 2) Remove drive gear (19) and key (18) from shaft.
- 3) Remove cover fastening screws (7), lock washers (8), cover (6) and gasket (10).

NOTE: Tap cover with a mallet to loosen gasket.

- 4) Remove idler gear (11), drive shaft (12) and gasket (16) from housing (15).
- 5) Remove oil seal (17) from housing by pressing from rear (through drive shaft bore).
- 6) Clamp housing (15) in a soft-jawed vise, then remove relief valve screw (3),

spring (4) and valve (5).

- 7) Remove hand primer and gasket (9) from cover (6). Refer to Manual Section D275/3025 for hand primer service instructions.
- 8) Remove fuel fittings (13) from housing.
- 9) Remove hand primer check valve assemblies (1) by tapping cover (6) on a wood block, then remove "O" ring gaskets (2).
- 10) Fuel inlet and outlet check valves (14) need not be removed except when their condition necessitates replacement. When such is required, use an appropriate size tap, or similar tool, to remove the valves.

2. CLEANING

- 1) Wash all parts in Varsol or an equivalent cleaning agent.
- 2) Remove all traces of gasket (16) from housing.

3. INSPECTION

| <u>PART</u> | <u>INSPECT FOR FOLLOWING CONDITION(s)</u> | <u>CORRECTIVE ACTION WHEN REQUIRED</u> |
|------------------------|---|--|
| 1) Retaining ring (21) | Damage, looseness - must fit tight in shaft groove. | Replace ring. |
| 2) Spacing washer (20) | Damage. | Replace washer. |
| 3) Drive gear (19) | Chipped, scored, worn or damaged teeth. Worn bore. | Replace gear. |
| 4) Oil seal (17) | (Not re-usable) | Replace seal. |
| 5) Pump housing (15) | Cracked, porous, warped. Scored gear contact surfaces and/or shaft bore. Loose or damaged idler gear pin. Damaged threads. Loose oil seal fit. Scored or scratched sealing face. | Replace housing. |
| 6) Cover (6) | Cracked, warped or porous. Scored or out-of-round valve bore. Scored, scratched or coined valve seat. Damaged threads. Damaged check valve bores. Scored or scratched sealing face. | Grind or lap smooth and flat. Replace cover. Grind or lap smooth and flat. |

- continued -

| PART | INSPECT FOR FOLLOWING CONDITION(s) | CORRECTIVE ACTION WHEN REQUIRED |
|--|---|---------------------------------|
| 7) Idler Gear (11) | Scored or damaged faces. Chipped, scored, worn or damaged gear teeth. Scored or worn bore. | Replace gear. |
| 8) Drive shaft and gear (12) | Scored or damaged gear faces. Chipped, scored, worn or damaged gear teeth. Scored, worn (oil seal contact area), bent or damaged shaft. Worn keyway. | Replace drive shaft. |
| 9) Key (18) | Loose, damaged. | Replace key. |
| 10) Screws and lock washers | Damaged. | Replace. |
| 11) Gaskets and "O" rings | (Not re-usable) | Replace. |
| 12) Relief valve screw (3) | Damaged threads and/or sealing surface. | Replace. |
| 13) Relief valve spring (4) | Broken, nicked or worn (flat spots). | Replace. |
| 14) Relief valve (3) | Scored or damaged seat. Scored or damaged flutes. Worn at spring contact area (valve must slide freely in cover bore). | Replace valve. |
| 15) Check valves (1) | Damaged or broken spring. Damaged valve seat. Scored or damaged O.D. | Replace valve(s). |
| 16) Fuel fittings (13) | Damaged. | Replace. |
| 17) Fuel inlet and outlet check valves (14) | Broken spring. Damaged or eroded valve plate or seat. Check spring action by pressing down (inlet valve) or lifting (outlet valve) valve plate which must snap back on seat when released. Lift outlet valve plate by bearing against edge with length of wire or small rod. | Replace valve(s). |
| 4. REASSEMBLY | | |
| 1) Apply a thin coat of clear sealer, TSE 76121 (72-0047), to O.D. of oil seal (17), and to seal bore in housing (15). | 5) Apply film of grease, LU 3003, to "O" rings (2) and check valve bores in face of cover (6), then assemble "O" rings to bottom of bores. | |
| 2) Coat lips of oil seal (17) with clean S.A.E. #20 or #30 oil. | 6) Assemble hand primer check valves (1) in bores as follows (Refer to Figure 3): | |
| 3) Place housing (15), with sealing face on a clean, soft cloth, on an Arbor Press. | a. For valve behind head of arrow on cover - large hole in valve must face outward. | |
| 4) Position oil seal (17) in bore and press to seat in housing. | b. For valve behind end of arrow on cover - small hole in valve must face outward. | |

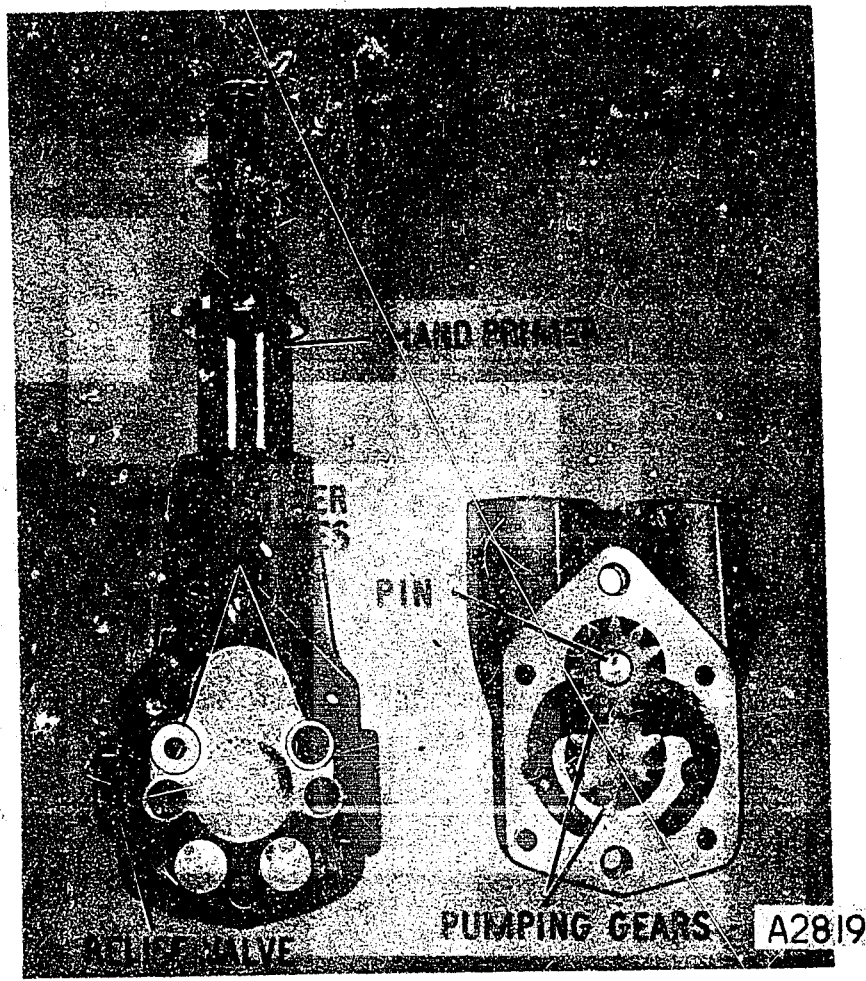


FIGURE 3 - HAND PRIMER CHECK VALVES AND PUMPING GEARS

- 7) Apply film of test oil to idler gear pin in housing (15), and to drive shaft (12).
 - 8) Assemble drive shaft (12) to bore in housing and idler gear to gear pin. Remove housing from vise.
 - 9) Place assembly on a suitable surface plate and check face of gear height with respect to sealing face of housing. Gears must be 0.0002" to 0.0008" below sealing face of housing; if lower, replace gear(s). If necessary, grind (Use a 320 Grit Wheel, or finer) and/or lap gear faces until the required clearance is obtained.
CAUTION: DO NOT Use Shims under Gear(s) to obtain this Dimension.
 - 10) Remove burrs and break sharp corners on O.D. of gear(s) 0.002 - 0.003" with a fine Arkansas stone, then lubricate thoroughly with test oil and reassemble to housing (15).
 - 11) Apply a thin film of Glyptal Lacquer (General Electric Co. No. 1202), or equivalent, to sealing face (cover side) of housing (15).
 - 12) (DELETED)
 - 13) Assemble cover (6), lock washers (8) and screws (7) to housing (15); torque screws to 30 - 35 in. lb. Remove excess lacquer.
 - 14) Install relief valve (5), spring (4) and screw (3). Torque screw to 35 - 40 ft. lb.
- NOTE:** New housings contain gears that are machined to the correct height.

- 15) Press fuel inlet and outlet check valves (14) into housing (15) as follows:
 - a. For valve nearest head of arrow on cover - valve disc must face down.
 - b. For valve nearest end of arrow on cover - valve disc must face up.
 - 16) Place housing (15) in soft-jawed vise, assemble fuel fittings (13) to ducts and tighten fittings to a torque of 70-75 ft. lb.
 - 17) Assemble Woodruff key (18) and drive gear (19) to shaft.
 - 18) Assemble retaining ring (21) to shaft with number 22 "Tru-Arc" pliers, TSE 76176 (72-5002). If required, use spacing washer(s) (20) to fill space between gear and retaining ring. Refer to service parts list for washer dimensions.
 - 19) Install gasket (9) and hand primer assembly to cover (6). Tighten hand primer to a torque of 35 - 40 ft. lb.
- NOTE:** The following step is effected when the fuel supply pump is assembled to the fuel injection pump.
- 20) Apply a film of clear sealer to mounting pad of housing (15), then assemble gasket (16) to pad.

5. TESTING

5.1 Fuel Leakage

- 1) Install a 1/4" NPTF plug in the pump outlet.
- 2) Apply 30 P.S.I. air to pump inlet and immerse pump in test or fuel oil for 3 minutes minimum. Air bubbles indicate a leak that must be corrected - refer to the following:

| <u>LEAKAGE AREA</u> | <u>CORRECTIVE ACTION</u> |
|--------------------------------|--|
| a. Idler gear pin | Replace housing. |
| b. Oil seal | Replace seal and/or drive shaft. |
| c. Between housing and cover | Refinish sealing faces and reassemble with new gasket. |
| d. Porous housing and/or cover | Replace porous part. |
| e. Relief valve outlet | Replace valve and/or cover if seat is damaged or scored. |
| f. Hand primer gasket | Replace gasket. |
| g. Hand primer | Repair or replace hand primer. |

5.2 Regulating Pressure

- 1) Mount supply pump on injection pump or a suitable fixture to permit driving the pump.

NOTE: When mounted on an APE 8VBB injection pump, the supply pump turns two times injection pump camshaft speed.

- 2) Connect a hose from the oil tank through a filter and into the suction side of the supply pump (Refer to Figure 4).
- 3) Connect a hose from the supply pump outlet through a 0 - 100 PSI pressure gauge and a manually operated regulating valve and into the tank (Refer to Figure 4).

CAUTION: If testing supply pump on injection pump, supply pressurized lube and fuel oil to injection pump in order to keep injection pump lubricated.

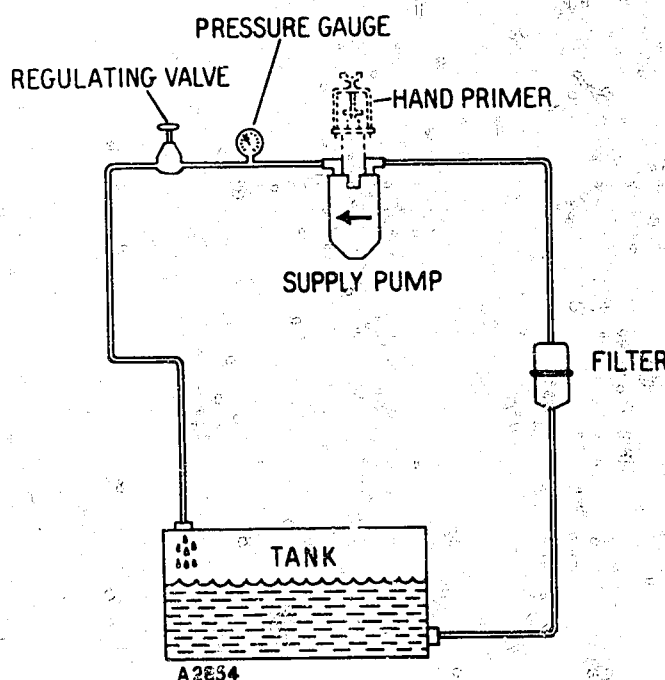


FIGURE 4 - REGULATING PRESSURE TEST SETUP

- 4) With the regulating valve open, start the Test Stand and operate supply pump at Full Load Engine Speed.
- 5) Slowly close the regulating valve being careful not to exceed the maximum gauge pressure.
- 6) Read the stable gauge pressure.
- 7) Refer to applicable Supply Pump Parts List to obtain the required relief pressure limits.
- 8) If the required pressure is not obtained, replace gears and/or other worn or damaged parts and repeat foregoing test.

NOTE: Normal regulating pressures are as follows:

| NOMINAL SUPPLY PUMP RELIEF PRESSURE | SELF- REGULATING PRESSURE |
|---|---------------------------------|
| 30 PSI | 24 - 34 PSI |
| 60 PSI | 54 - 68 PSI |
| 75 PSI | 68 - 83 PSI |

- 9) The condition of the pumping gears can be checked as follows:
 - a. Open regulating valve.
 - b. Disconnect inlet tubing, allow fuel to drain out and re-connect to pump inlet.
 - c. Start test stand and operate supply

pump at 150 RPM (75 Injection Pump RPM).

- d. Fuel oil should be pumped from the supply pump outlet within 30 seconds.
- e. If otherwise, replace pumping gears and/or check valves and repeat test to insure adequate pump priming features.

5.3 Hand Priming

- 1) Open regulating valve in test setup and drain supply pump.
- 2) Check operation of hand primer and check valve assemblies by manually operating plunger with full, steady strokes. Test oil must spill from pump outlet within 50 or 60 strokes; if otherwise, repair or replace hand primer and/or check valves (1) and repeat test.
- 3) Should test oil leak past plunger stem, repair or replace hand primer.

6. TORQUES

| ITEM | PERMISSIBLE TOLERANCE | |
|----------------------------|-----------------------|------------|
| | MINIMUM | MAXIMUM |
| Fuel fittings (13) | 70 ft. lb. | 75 ft. lb. |
| Cover fastening screws (7) | 30 in. lb. | 35 in. lb. |
| Relief valve screw (3) | 35 ft. lb. | 40 ft. lb. |
| Hand primer | 35 ft. lb. | 40 ft. lb. |



SERVICE INSTRUCTIONS For AMERICAN BOSCH SGE SUPPLY PUMPS (Supplement)

SUBJECT: Replacing Oil Seals in Supply Pump Housings

- INFORMATION:
1. SGE supply pump housings have been changed to accept greater diameter oil seal, SE 1061. Housings requiring use of SE 1061 have identification letter "M" stamped on housing.
 2. SE 1034 will soon become unavailable. Earlier housings (no "M" stamping) will then require use of two SE 1060.

- INSTRUCTIONS:
1. Disassembly and replacement instructions for oil seals used with latest supply pump housing ("M" identification stamping) will be identical to those denoted in Manual Section D 280/3200.
 2. Special instructions are required for disassembly and replacement of oil seals used with earlier supply pump housing (no "M" stamping).
 - A. Remove old seal(s) by pressing out from rear of housing (through drive shaft bore) or by extracting with a puller (ie-Snap-on tool # A-78).
 - B. Clean and remove old sealer from surfaces in supply pump housing seal bore.
 - C. Apply thin coat of clear sealer to O. D. of oil seals and I. D. of respective bore in housing.
 - D. Carefully place housing on clean plate with seal bore upward.
 - E. Position first SE 1060 with lip edge facing downward in bore and press until seated in housing (Use socket with approximately same O. D. as seal as pressing-in tool).
 - F. Position second SE 1060 with lip edge upward and repeat pressing operation. (Seals will be back to back-refer to Figure 1).
 - G. Coat lips of oil seals with SAE #20 or #30 oil and proceed with assembly per instructions in Manual Section D 280/3200.

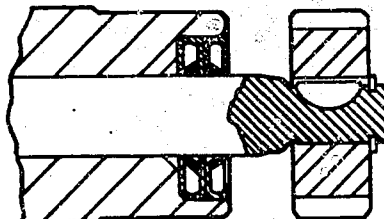


FIGURE 1

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