

**PUB
A & B**

AMERICAN BOSCH DIVISION

AMERICAN
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ARMA
CORPORATION

SPRINGFIELD 7, MASS., U. S. A.

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SERVICE INSTRUCTIONS

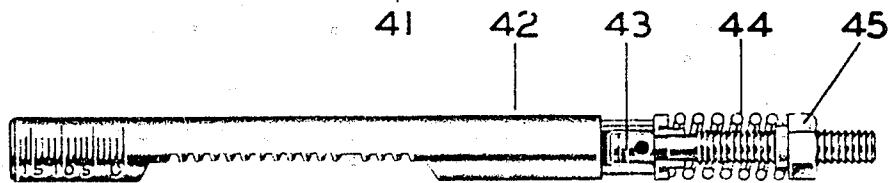
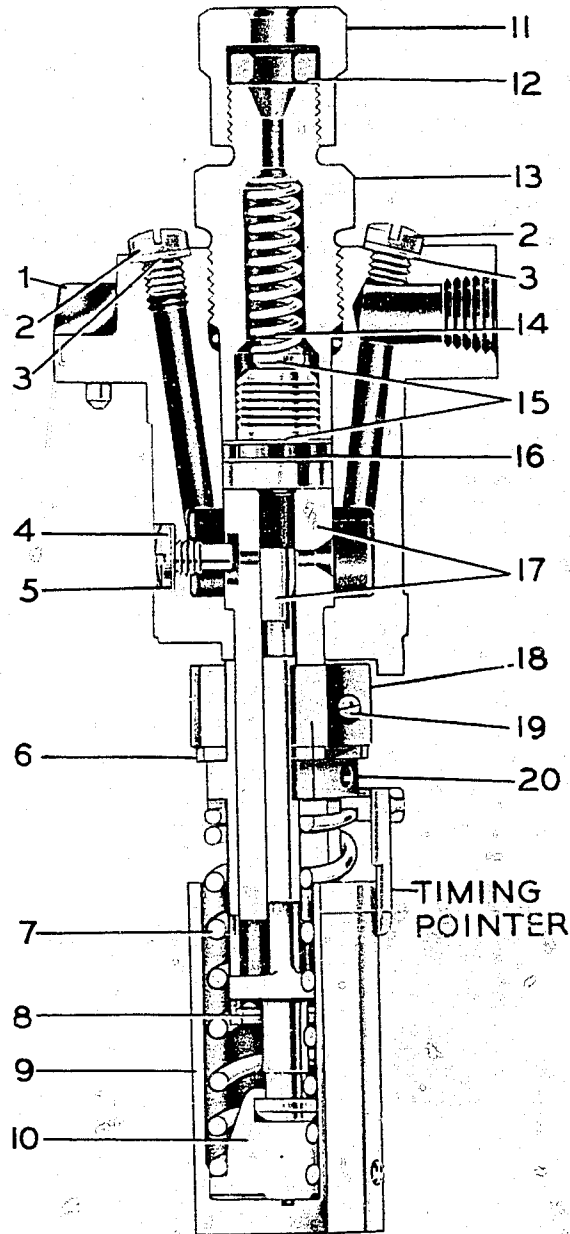
FOR

FUEL INJECTION PUMP



TYPES

PUB...A AND PUB...B



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TYPE: PUB FUEL INJECTION PUMP**DISASSEMBLY OF PUB PUMP****FOR SERVICE TOOLS AND EQUIPMENT SEE SECTION D 4000**

Prior to disassembly wash off all external dirt and grease from the unit.

Prepare a clean work bench and vise. The vise must incorporate brass jaws or equivalent.

1. Mount the pump in holding plate TSE 76142 and secure with two screws and plain washers (See Figure 1). The plate has a hole drilled to accommodate the dowel pin in the housing flange.

2. Withdraw two bleeder screws (2) and gaskets (3).

3. Place the holding plate with pump in

the vise and remove delivery nipple nut (11), delivery nipple nut washer (12), delivery valve holder (13) and delivery valve spring (14). Use socket or box type wrench to remove delivery valve holder (See Figure 2).

4. Use Service Tool TSE 7682 to extract delivery valve assembly (15) and gasket (16) (See Figure 3). When using the delivery valve extractor, screw the extractor stem until it bottoms on the delivery valve body and then turn the stem back at least half a turn. This will prevent the delivery valve body from locking to the stem after extraction.

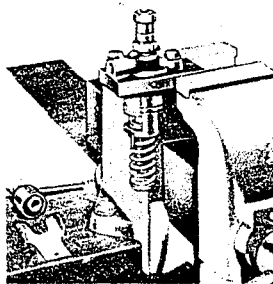


Figure 1

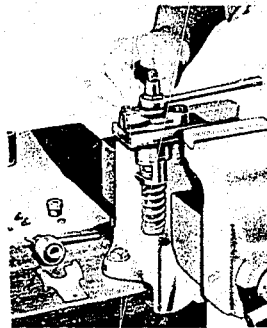


Figure 2

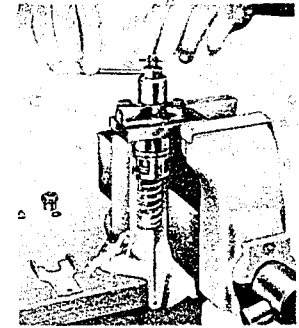


Figure 3

5. Remove the holding plate with pump housing from vise. Place plunger spring compressing tool TSE 7694-1 in the vise as shown (See Figure 4). Carefully slip the lower spring seat into the compressing tool so that the lower

spring seat (10) and the bottom coil of plunger spring (7) are separated by the compressing tool (See Figure 4). Compress the spring (See Figure 5), and slide off lower spring seat (10). Remove plunger spring (7).

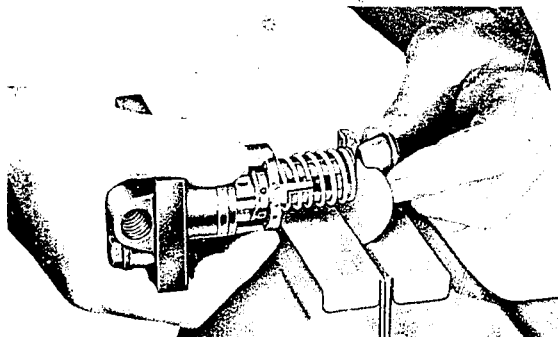


Figure 4

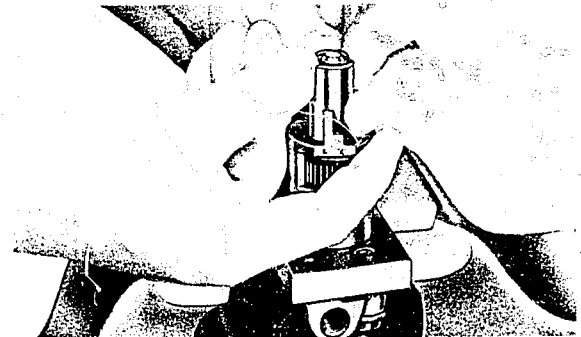


Figure 5

6. Remove the compressing tool from the vise and replace the holding plate with pump housing in the vise with plunger facing upward. Remove plunger retaining spring ring (8). The ring may be removed either by using the thumb. (See Figure 5) or masking a pair of long nosed pliers. Carefully withdraw plunger (17) and place it on a clean piece of paper, preferably wax paper.
7. Loosen clamping screw (19).
8. Remove barrel locating screw (4) and

gasket (5). Care must be exercised that the barrel does not drop out and strike the vise or floor. In the event the barrel does not come out readily a soft piece of doweling may be used to jar the barrel from its seat.

9. With the barrel removed, the control sleeve (20), guide washer (6) and control gear segment (18) can be withdrawn as a unit. The control gear clamping screw having been loosened, remove control gear (18) and guide washer (6).

CLEANING AND EXAMINATION OF PARTS

A large variety of cleaning fluids and compounds are available, but in some cases they have objectionable characteristics that make them unsuitable for cleaning fuel injection equipment parts.

Bendix and Karbonoff cleaner have been found satisfactory and are recommended as safe for cleaning pump parts. Plunger spring and painted pump housing should not come in contact with the fluids, as their action will almost immediately soften paint and remove plating. The fluids are to be used in accordance with their manufacturers' instructions.

Regular fuel oil may be used as a cleaner if more effective cleaners are not available. This will readily remove grease and dirt provided a brush is used but will not dissolve lacquers formed on the internal parts.

Wash each pump separately. The plunger and barrel assembly and the delivery valve assembly must be washed separately in clean solvent. They must also be handled individually in order to prevent them from becoming nicked by coming in contact with other parts. Brush the parts to remove stain and dirt, if necessary.

Hard or sharp tools, emery cloth, crocus cloth, jeweler's rouge, grinding compounds, or abrasives of any kind should never be used in the cleaning of pumps.

After washing the parts lay them on a clean surface, preferably wax paper.

Examine all the parts carefully. In general, it will be found that there

has been only minute wear on any of them, but abnormal conditions, such as dirt in the fuel may have caused damage to the extent that parts will require replacement. Occasionally, it may be advisable to replace a part as a precautionary measure, whereas, actually it might serve its purpose for an additional period of time.

A cracked part is a warning of imminent breakage and replacement is essential. Do not confuse surface stains with actual cracks.

HOUSING: Inspect the housing for cracks and other damage. Check the spring seat for excessive wear. Examine the timing pointer. Pointer should not be bent and must be staked firmly. Examine the housing for damaged threads.

PLUNGER AND BARREL ASSEMBLY: Preferably examine with the aid of a magnifying glass. Fine scratches, scuff marks and a dull appearance of plunger surfaces indicates considerable wear, invariably due to abrasives in the fuel oil. Such wear, particularly on the upper portion of the lapped surface above the helix, greatly reduces the accuracy of delivery and affects engine performance. Plungers in this condition must be replaced. Figure A shows an enlarged illustration of a plunger badly worn by abrasives in the fuel oil to the extent that it is necessary to install a new plunger and barrel. Figure B illustrates a plunger that has seen considerable service but is still in good operating condition. The plunger and barrel are a mated assembly and must be replaced as an assembly, never individually.

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Figure A

Examine the barrel carefully, especially the lapped end. If this surface is rusted or pitted these marks may be removed with the aid of a surface plate and lapping compound. Otherwise the plunger and barrel must be replaced with a new one.

Occasionally plungers are found to have dark discolorations and pit marks on the lapped surface, which indicates corrosion caused by fuel oil containing destructive acids or water. In such cases, the grade of fuel oil should be changed as soon as possible and the filtering system investigated. Plungers showing corrosion or pit marks on which the edge of the helix is rough or worn must be replaced with new ones, because this condition prevents proper metering of fuel.

DELIVERY VALVE AND BODY: Preferably examine with the aid of a magnifying glass. The valve should not show scratches, scuff marks, or pits on its relief piston or on the conical seating surface. Likewise, the valve body seat should not show scratches, scuff marks or pits. These indicate wear by erosion or attack by corrosion and when in this condition will affect engine performance. *Slight scuff marks can be removed from the seating surface of the valve by lapping the valve and seat together using fuel oil and talcum powder. Do not allow this lapping compound to reach the relief piston.*



Figure B

The delivery valve seats should be tested for tightness by inserting the assembly together with the delivery valve spring into the correct test device *Same as for APE-A pump*, which is then connected to the nozzle test stand.

Apply pressure of 2500 pounds per square inch and through the opening in the test device observe, if any leakage occurs. If oil leaks at this point, the seat is not tight and must be relapped. All traces of lapping compound must be removed before assembling the delivery valve to the pump. The flat lapped surface may be lapped on a surface plate, if necessary.

If badly damaged, such assemblies should be replaced. Individual parts are not interchangeable. If the valve when lubricated with clean oil does not slide to its seat of its own weight, apply clean mutton tallow and work the valve into the body with a back and forth rotary motion to remove gummy deposits. Under no circumstances use a grinding compound on the relief piston. Wash thoroughly and repeat this operation, if necessary.

DELIVERY VALVE HOLDER AND SPRING: Examine the holder for damaged threads. The spring must be free from nicks or pitting. Either of these might cause breakage. If springs are flexed by bending, cracks will become apparent. Always replace questionable springs with new ones.

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CONTROL RACK: Examine the teeth of the control rack for possible excessive wear. Slight wear is normal and replacement is rarely required.

CONTROL SLEEVE: Examine gear teeth for wear or damage. Slight wear is normal and will not appreciably affect performance. Replacement will be necessary if the wear is excessive or if the plunger guide slots are badly worn.

PLUNGER SPRING: The spring must be free from nicks or pitting. Either of these might cause breakage. If springs are flexed, cracks will become apparent. Always replace questionable springs.

SPRING SEAT: Replace with new one if examination discloses it to be badly worn. This is rarely necessary.

PLUNGER GUIDE CUP: The plunger guide cup may show wear at the outside bottom center which contacts engine cam or tappet mechanism. If wear is so pronounced that only little material remains or if any cracks are visible, a new guide cup must be installed.

BARREL LOCATING SCREW: Examine for mutilated head or damaged threads. Replace it with a new one if the spill deflecting end shows signs of erosion.

BLEEDER SCREW: Midway down the screw a hole is drilled at an angle which comes out at the bottom of the screw. Check the condition of the threads and see that the hole is not clogged or in any way obstructed.

GASKETS: Replace all gaskets with new ones.

REASSEMBLY OF PUB PUMP

The tools and equipment necessary for reassembly are identical with those required for disassembly except the delivery valve extractor is not used.

Exercise all care possible to assure cleanliness during reassembly. Be sure that all parts have been carefully examined and thoroughly cleaned in accordance with the previous section.

1. The control sleeve (20) guide washer (6) and control gear segment (18) are assembled first, to be held in readiness for installation in the pump later. The guide washer (6) is constructed with two locating pins and two flats diametrically located. One of the flats is plain, the other is made with a tooth. The plain flat is used to inscribe the calibration mark. In the event that neither the guide washer (6) or control sleeve (20) have been replaced, then the calibrating mark inscribed on the guide washer must be deleted. Use a

very fine file to delete the mark on the guide washer. *Do not file at the bench where the pump assembly is being done.* After the calibrating mark has been deleted, clean the guide washer of filings and blow off with compressed air. The deleted mark will be replaced after the pump has been calibrated. It is to be inscribed in alignment with the mark on the control sleeve. Locate the guide washer on the control gear segment so that the plain flat is beneath the clamping screw (19). Slip the control sleeve (20) into the gear segment. The guide washer will be between the control gear and control sleeve flange. Align the control gear segment slot with the center hole and notch of the control sleeve (See Figure 6). Tighten the clamping screw sufficiently to keep the assembly together. This establishes a suitable approximate setting. Further adjustment will be necessary and be made during calibration.

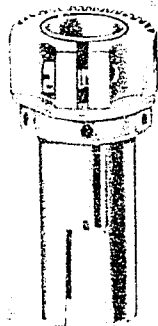


Figure 6

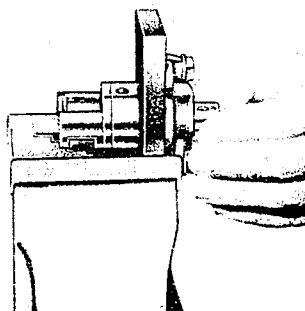


Figure 7

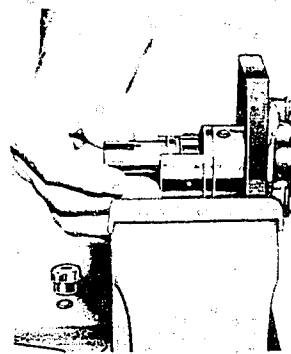


Figure 8

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2. Mount the housing to the holding plate and place the plate in the vise so that the barrel locating screw hole is on top.

Remove the plunger from the barrel, observe that there are two holes in the barrel, one round the other slotted, located diametrically. Insert the barrel into the housing part way with the slotted hole facing the barrel locating screw hole (See Figure 7). Place the control sleeve assembly into the housing and press the barrel into the sleeve aligning the slotted hole of the barrel with the barrel locating screw hole in the housing (See Figure 8).

3. Insert the barrel locating screw (4) and its gasket (5) and tighten cautiously. The end of the screw must enter the slotted hole of the barrel freely. With the barrel located properly and the locating screw in place, the barrel should be free to move vertically. Be absolutely sure that this condition exists before final tightening of the locating screw.

4. Reset the holding plate in the vise with the pump in an upright position. Insert delivery valve assembly (15) with gasket (16). Place delivery valve spring

(14) on delivery valve and position delivery valve holder (13). Screw down delivery valve holder, secure tightly but not excessively, using a socket or box type wrench. Replace the delivery nipple nut (12) and washer (11).

5. Position the two bleeder screws (2) with gaskets (3) and secure firmly.

6. Reset the pump in the vise, having the control sleeve on top. The plunger has one yoke notched. Carefully insert the plunger into the barrel having the notch on the plunger yoke align with the notch on the control sleeve (See Figure 9). Check the plunger in the barrel.

It must be absolutely free over its entire travel length in all radial positions. Sticking of a clean plunger may indicate an overtightened delivery valve holder; in which case, unloosen and retighten the delivery valve holder. If the plunger still sticks, remove the delivery valve assembly and barrel and check the seating surfaces for dirt. It may be also necessary to change the delivery valve gasket.

7. Replace plunger retaining spring (8). Be sure that the ends of the spring are positioned in the groove.

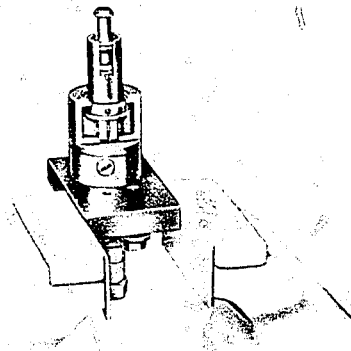


Figure 9

8. Remove the pump from the vise and position *Service Tool TSE 7694-1* in the same manner as for disassembly. Pull the plunger out of the barrel until the yoke rests on the retaining ring (8). Slip the plunger spring (7) over the plunger (17) and control sleeve (20), and into its seat in the pump housing. Position the assembly against the com-

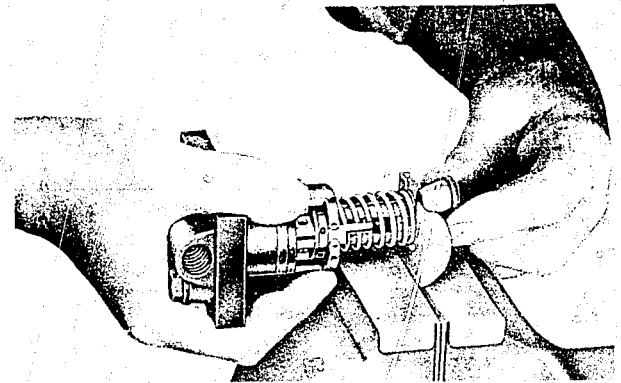


Figure 10

pressing tool in the vise and compress the plunger spring (7) until the plunger knob protrudes sufficiently to slip on the lower spring seat (10) (See Figure 10). Release the spring and slide off the unit.

9. The pump is now ready for test and calibration.