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## Chapter 6B

## PUMP, FUEL, SPE.1204 AND 1214 MK. 4

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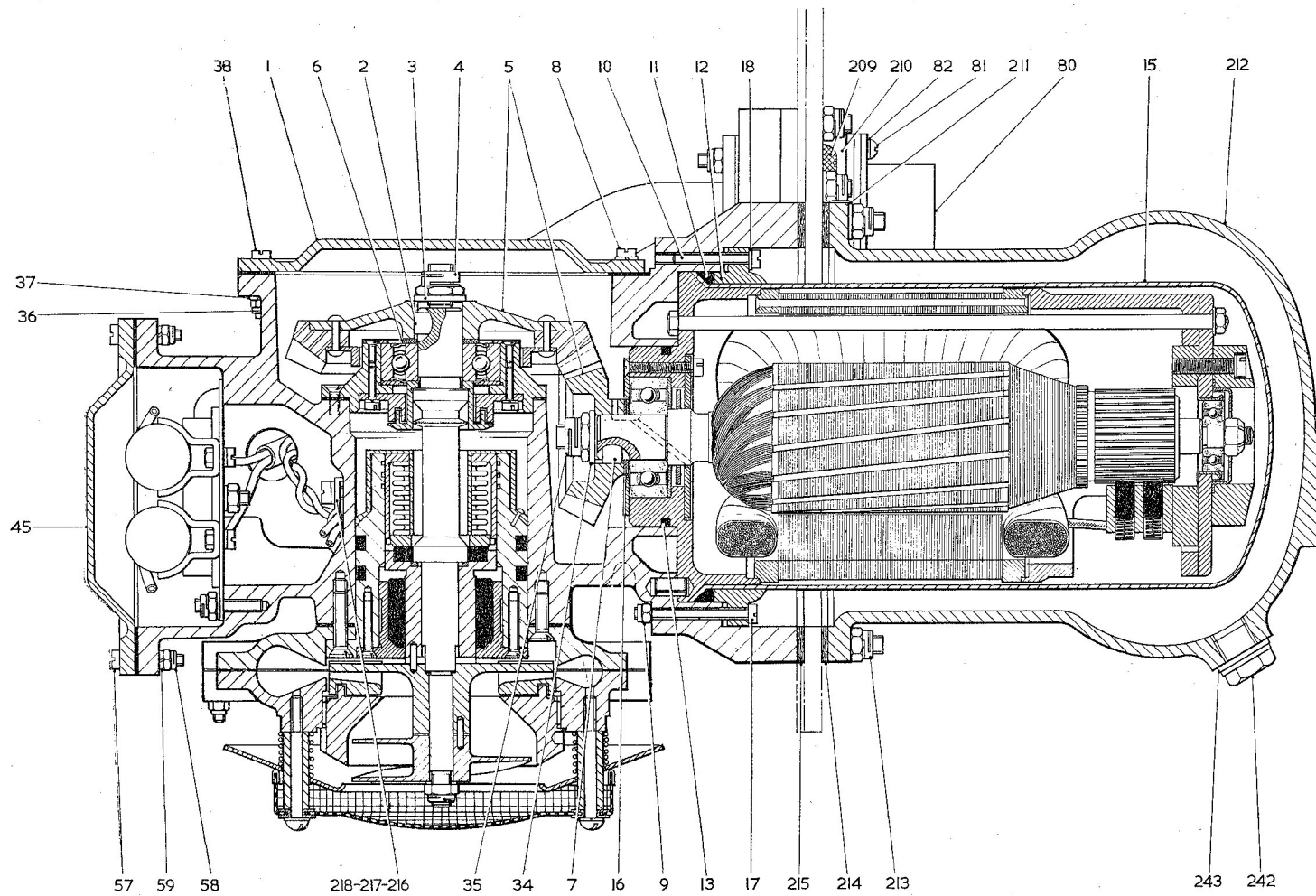
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**Fig. 26 Sectional view of pump/motor assembly**

Key to Fig. 26

1 GEAR BOX COVER	45 CAPACITOR COVER
2 BEVEL GEAR DRIVE KEY	57 CH. HD. SCREW
3 CLAMP WASHER	58 SELF-LOCKING NUT
4 SELF-LOCKING NUT	59 SPRING WASHER
5 PAIRED GEAR AND PINION	80 ELECTRICAL CONNECTION
6 BEVEL GEAR SHIM	81 RD. HD. SCREW
7 PINION DRIVE KEY	82 SHAKEPROOF WASHER
8 CH. HD. SCREW (GEAR BOX COVER)	209 BREATHER GAUZE
9 SELF-LOCKING NUT	210 BREATHER BLOCK
10 CH. HD. SCREW (MOTOR CLAMPING)	211 BONDING STRIP
11 SEAL RING (OUTER CASING JOINT)	212 FUEL JACKET
12 BOLT RING	213 SELF-LOCKING NUT (FUEL JACKET FIXING)
13 SEAL RING	214 FUEL JACKET GASKET
15 OUTER MOTOR CASING	215 PUMP GASKET
16 BEVEL PINION SHIM	216 CABLE CLEAT
17 CH. HD. SCREW (MOTOR CLAMPING)	217 SHAKEPROOF WASHER
18 SHAKEPROOF WASHER	218 CH. HD. SCREW
34 CLAMP WASHER	242 DRAIN PLUG
35 SELF-LOCKING NUT	243 DRAIN PLUG WASHER
36 SELF-LOCKING NUT	
37 SPRING WASHER	

## Introduction

1. This chapter gives details of the operations and procedure required for SPE 1204 and 1214 pumps, and the information is additional to the information given in the basic chapter for the SPE 1200 series. Generally, all the information given in the basic chapter will apply to SPE 1204 and 1214 pumps, and the basic chapter must be used in conjunction with this chapter. Illustration references are consecutive to other illustration references in the series so that reference can be made to any illustration contained in the series.

## SPE 1204 pumps

2. Reconditioning instructions for SPE 1204 pumps are generally similar to the instructions for the equivalent marks of SPE 1214 pumps, the only difference being in the by-pass duct casting (fig. 28, item 74). The SPE 1204 pump has no provision for pressure refuelling through the unit and the by-pass duct casting does not include a machined seating face for the by-pass valve plate (73). In all other details SPE 1204 pumps are identical to SPE 1214 pumps.

## General

3. The instructions given in this chapter are for the SPE 1214 Mk. 4 pump and appendices are attached at the end of the chapter to cover any difference in procedure which may apply to other mark numbers for this type of pump.

## RECONDITIONING

### Tools and test equipment

4. In addition to the special tools listed under Table 1 of the basic chapter the following tools are required for use on SPE 1204 and 1214 fuel pumps.

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**TABLE 1**  
**Special tools and equipment for SPE 1204 and 1214 fuel pumps**

Nomenclature	Part No.	Fig. No.
Location tool: lower bearing reaming	SPE 19484	35
Pressure test fixture	SPE 19485	
Gasket (large)	SPE 19486	
Gasket (small)	SPE 19487	
Special nut ( $2\frac{5}{16}$ in. long)—5 off	SPE 19488/A	38
Special nut (2 in. long)—2 off	SPE 19488/B	
Special nut ( $1\frac{5}{16}$ in. long)—5 off	SPE 19488/C	
Guide bush (Removal of bellows gland)	SPE 19494	33
Pressing sleeve	Assembling SPE 19516	37
Gland location block		
Gland housing pressure testing fixture	SPE 19519	
	SPE 19518	22

### DISMANTLING

**Separating the pump assembly from the mounting plate** (fig. 29 and 30)

5. Cut and remove the locking wire on all external screws and proceed as follows:—

(1) Remove the four screws (81) and shakeproof washers (82) to detach the electrical connection (80). Disconnect the leads from the plug pins.

(2) Remove the twenty-six self-locking nuts (213) securing the fuel jacket (212) and mounting plate, if fitted, to the pump casting studs.

(3) Withdraw the bonding strip (211),

the fuel jacket, the gasket (214), the mounting plate, and the gasket (215) from the pump casting studs.

(4) Unscrew and remove the  $1\frac{1}{2}$  in. B.S.P. plug (32) and the bonded seal washer (33) from the fuel jacket, and remove the  $\frac{1}{8}$  in. B.S.P. drain plug (242) together with the bonded seal washer (243).

**Separating the motor from the pump unit** (fig. 27, 30 and 32)

6. The motor is separated from the pump unit in a similar manner to that detailed in the basic chapter but the terminal nuts (222), shakeproof washers (91) and plain washers (90) are removed to release the

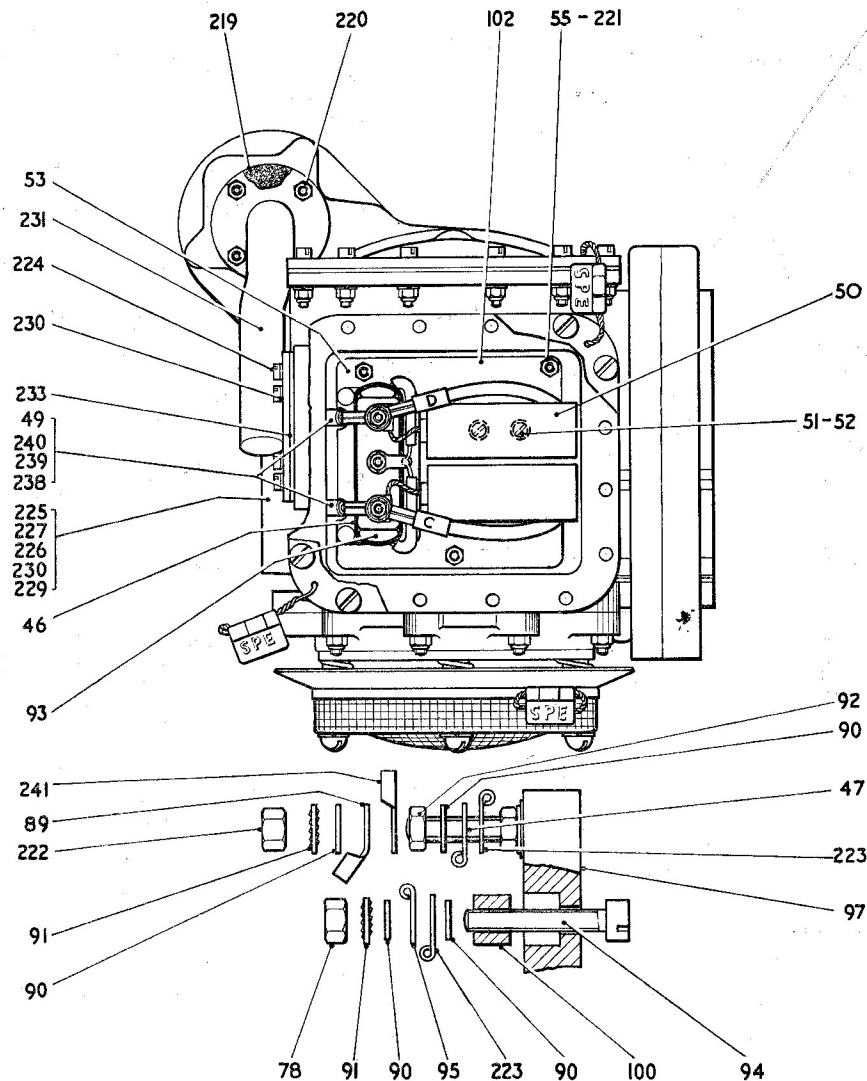
### Key to Fig. 27

46 RUBBER BAND  
47 CAPACITOR TAG  
49 LEAD ASSEMBLY  
50 CAPACITOR UNIT  
51 FIXING SCREW } CAPACITOR FIXING  
52 SHAKEPROOF WASHER }  
53 CAPACITOR MOUNTING PANEL  
55 SELF LOCKING NUT (CAPACITOR PANEL FIXING)  
78 LOCKNUT  
89 SUPPLY LEAD TAG  
90 PLAIN WASHER (4 B.A.)  
91 SHAKEPROOF WASHER (4 B.A.)  
92 LOCKNUT (4 B.A.)  
93 CONDENSER ASSEMBLY  
94 CH. HD. SCREW  
95 CABLE SHIELD EARTH TAG  
97 TERMINAL BLOCK ASSEMBLY  
100 SPACING BUSH

102 PANEL ASSEMBLY  
219 UPPER GASKET (ELECTRICAL CONDUIT)  
220 SELF-LOCKING NUT  
221 SHAKEPROOF WASHER (CAPACITOR PANEL FIXING)  
222 FULL-NUT  
223 CONDENSER ASSEMBLY TAG  
224 CH. HD. SCREW (4 B.A.)  
225 GLAND DRAIN CONDUIT  
226 LOWER GASKET } GLAND DRAIN CONDUIT  
227 UPPER GASKET }  
229 CH. HD. SCREW } GLAND DRAIN  
230 SHAKEPROOF WASHER } CONDUIT FIXING  
231 ELECTRIC LEAD CONDUIT  
233 LOWER GASKET (ELECTRICAL CONDUIT)  
238 RUBBER SLEEVE ( $\frac{1}{4}$  IN.)  
239 IDENTIFICATION SLEEVE (D)  
240 IDENTIFICATION SLEEVE (C)  
241 FIELD LEAD TAG

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**Fig. 27. Pump conduits and capacitor housing**

supply and field leads before the capacitor panel is removed. The cable sheath earthing wire must also be unsoldered from the central terminal condenser assembly tag. Before removing the motor bolt ring, remove the cheese-head screw (218) and remove the cable cleat (216); collect the shakeproof washer (217).

**Dismantling the pump unit (fig. 29)**

**Removing the by-pass duct assembly**

7. (1) Remove the four self-locking nuts (69) and withdraw the by-pass duct

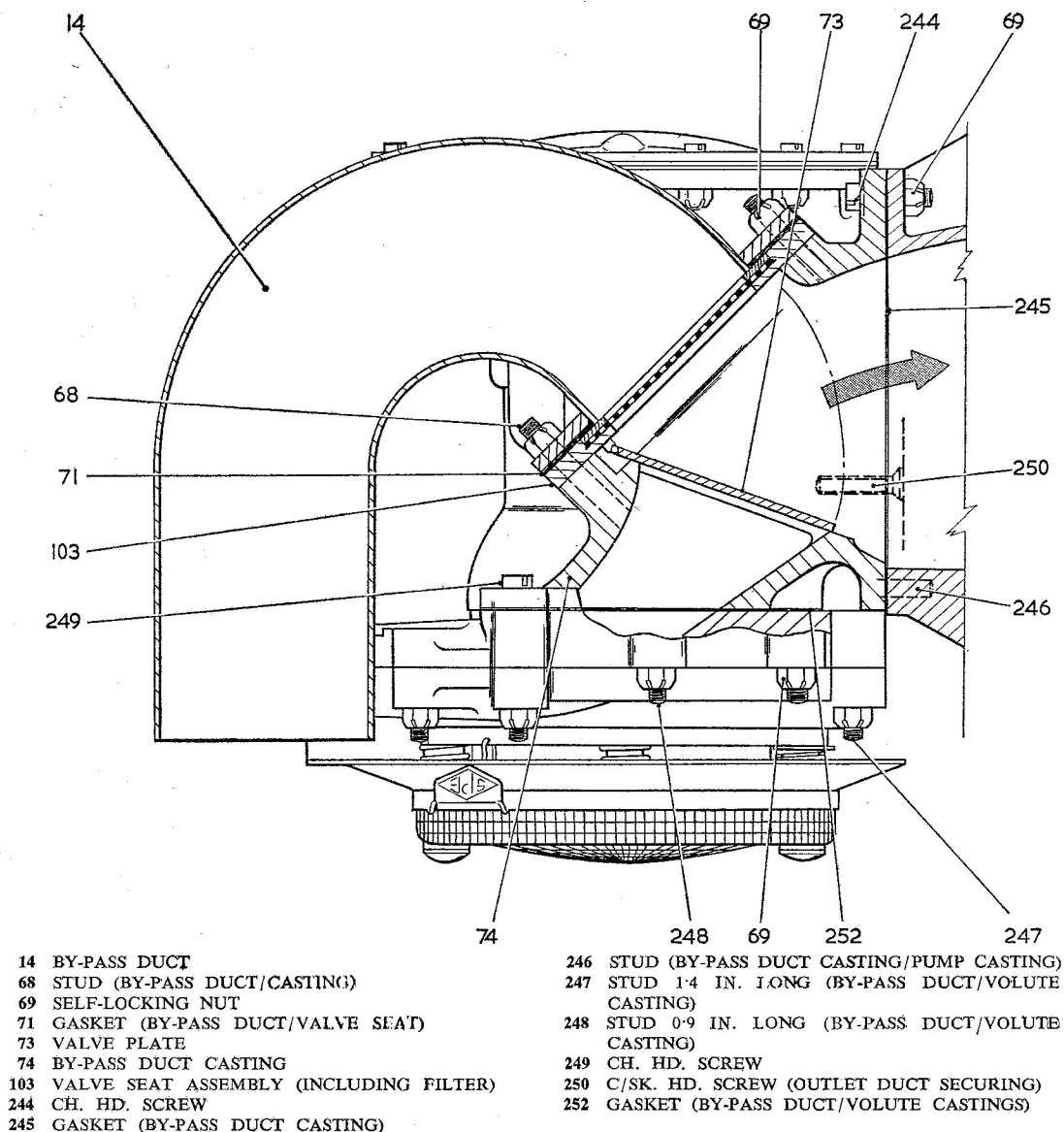
(14) from the outlet duct assembly; the seal washer (71) is replaced during assembling and can be discarded.

- (2) Withdraw the by-pass valve seat assembly (103) from the studs, and extract the valve plate (73). Remove the second gasket (71).

**Note . . .**

*The valve seat assembly should not be dismantled. If the filter or any other part is damaged, a new assembly should be fitted.*

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**Fig. 28. By-pass duct assembly**

*Removing the lower bearing assembly (fig. 32)*

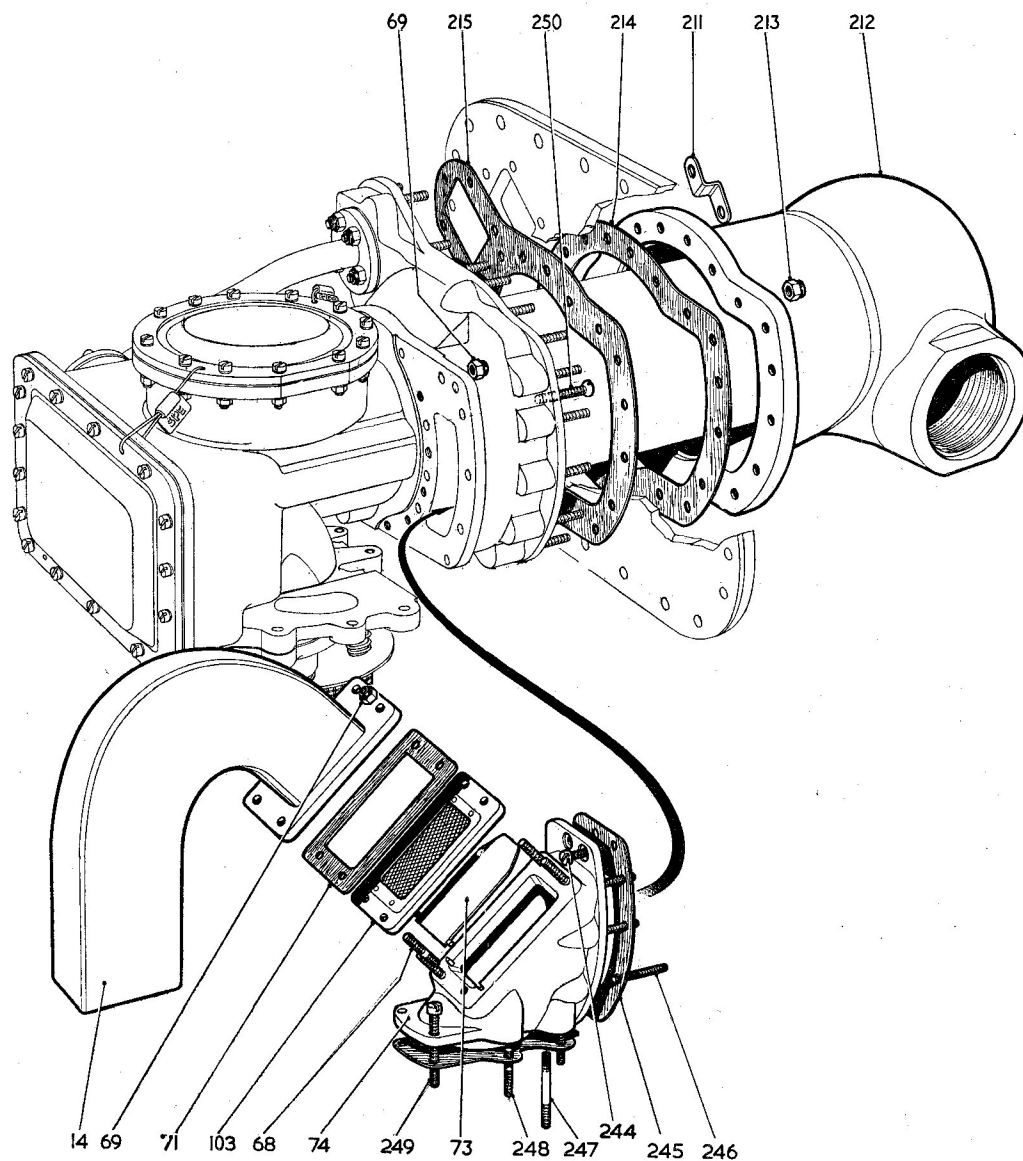
8. Remove the inlet filter and the impellers using the procedure detailed in the basic chapter. Mushroom headed screws (256) and shakeproof washers (255) are used to secure the inlet filter. Remove the lower bearing assembly as follows:—

(1) Mark the positions of the lower bearing assembly (136) relative to the bellows housing (200), and the bellows

housing relative to the volute assembly. Identify each with a common marking so that they can be assembled into the same unit, in their original positions, if they are suitable for further service.

(2) Remove the four screws (258) securing the lower bearing assembly (136) to the bellows sub-assembly (149). Use 6 B.A. screws in the two tapped holes, in the flange, to withdraw the assembly. Do not attempt to remove

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- |  |                        |
|--|------------------------|
| 14 BY-PASS DUCT                            | 214 FUEL JACKET GASKET |
| 68 STUD (BY-PASS DUCT CASTING)             | 215 PUMP GASKET        |
| 69 SELF-LOCKING NUT                        | 244 CH. HD. SCREW      |
| 71 GASKET (BY-PASS DUCT/VALVE SEAT)        | 245 GASKET             |
| 73 VALVE PLATE                             | 246 STUD               |
| 74 BY-PASS DUCT CASTING                    | 247 STUD 1-4 IN. LONG  |
| 103 VALVE SEAT ASSEMBLY (INCLUDING FILTER) | 248 STUD 0-9 IN. LONG  |
| 211 BONDING STRIP                          | 249 CH. HD. SCREW      |
| 212 FUEL JACKET                            | 250 C/SK. H.D. SCREW   |
| 213 SELF-LOCKING NUT (FUEL JACKET FIXING)  |                        |

Fig. 29. Exploded view of fuel jacket and by-pass duct

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the carbon bearing from its housing.  
*Withdrawing and dismantling the bellows housing sub-assembly* (fig. 32)

9. Remove the upper bearing housing, as detailed in the basic chapter, then proceed as follows:—

(1) Remove the five screws (146) securing the bellows housing sub-assembly (149) through the volute assembly to the pump casting. Use 4-B.A. screws in the three extraction holes to facilitate breakage of the seal and withdrawal.

(2) Extract the two seal rings (261) from the housing grooves and discard.

(3) Remove the three drive screws (153) securing the sleeve (202) to the shoulder of the bellows housing. If these screws are broken during withdrawal they should be ground flush with the housing surface after removal of the bellows gland.

(4) Pre-heat the gland housing to 125-150°C. Using the tools illustrated in Fig. 33, press out the bellows gland.

*Removing and dismantling the volute assembly* (fig. 29 and 32)

10. (1) Mark the volute and outlet duct assemblies (140 and 74) with a common identification mark so that they can be re-built into the same pump unit on re-assembly.

(2) Remove the four self-locking nuts (110) securing the volute outlet duct assembly (74) to the volute assembly (140). Three of these nuts are attached to the outlet duct studs and the fourth to the cheese-head screw (249).

(3) Remove the four countersunk-head screws (254) securing the volute assembly to the pump casting. Break the seal washers (120 and 252) to separate the components.

(4) The volute assembly need only be dismantled if the seal between the two halves is faulty or if the components are otherwise damaged. To dismantle remove the nine self-locking nuts (141) withdraw the four countersunk-head screws (257) and breaking the seal between the two components, withdraw

the lower volute casting off the studs (260 and 137) of the upper casting.

(5) The studs of the upper volute casting assembly should only be removed if damaged.

*Removing the outlet duct casting* (fig. 28)

11. (1) Remove the five nuts (69) from the two screws (244) and three studs (246) of the volute outlet duct (74).

(2) Remove the three countersunk-head screws (250) securing the inner side of the outlet duct. These screws are positioned inside the pump casting.

(3) Break the seal washer (245) between the outlet duct and the pump casting.

*Completing the dismantling of the pump casting* (fig. 30)

12. (1) The supply lead conduit (231) and the gland drain conduit (225) need only be removed if there is evidence of damage or leakage past the seal washers.

(2) To remove the supply lead conduit (231) extract the five cheese-head screws (224) and shakeproof washers (230) and remove the self-locking nuts (220). Ignore damage to the gaskets (219 and 233) which must be renewed on re-assembly.

(3) To remove the gland drain conduit (225), withdraw the three cheese-head screws (229) and shakeproof washers (230) at each fixing flange. Damage to the gaskets (226 and 227) can be ignored.

(4) Examine pump casting studs (251, 253, 259 and 54, fig. 32) for damaged threads or other faults and remove as necessary.

(5) Withdraw the dowel pin (113) only if damaged.

## ASSEMBLING

### Pump unit

*Reaming the carbon bearing* (fig. 32)

13. Use the pump casting (105) without a bellows sub-assembly (115) and proceed as follows:—

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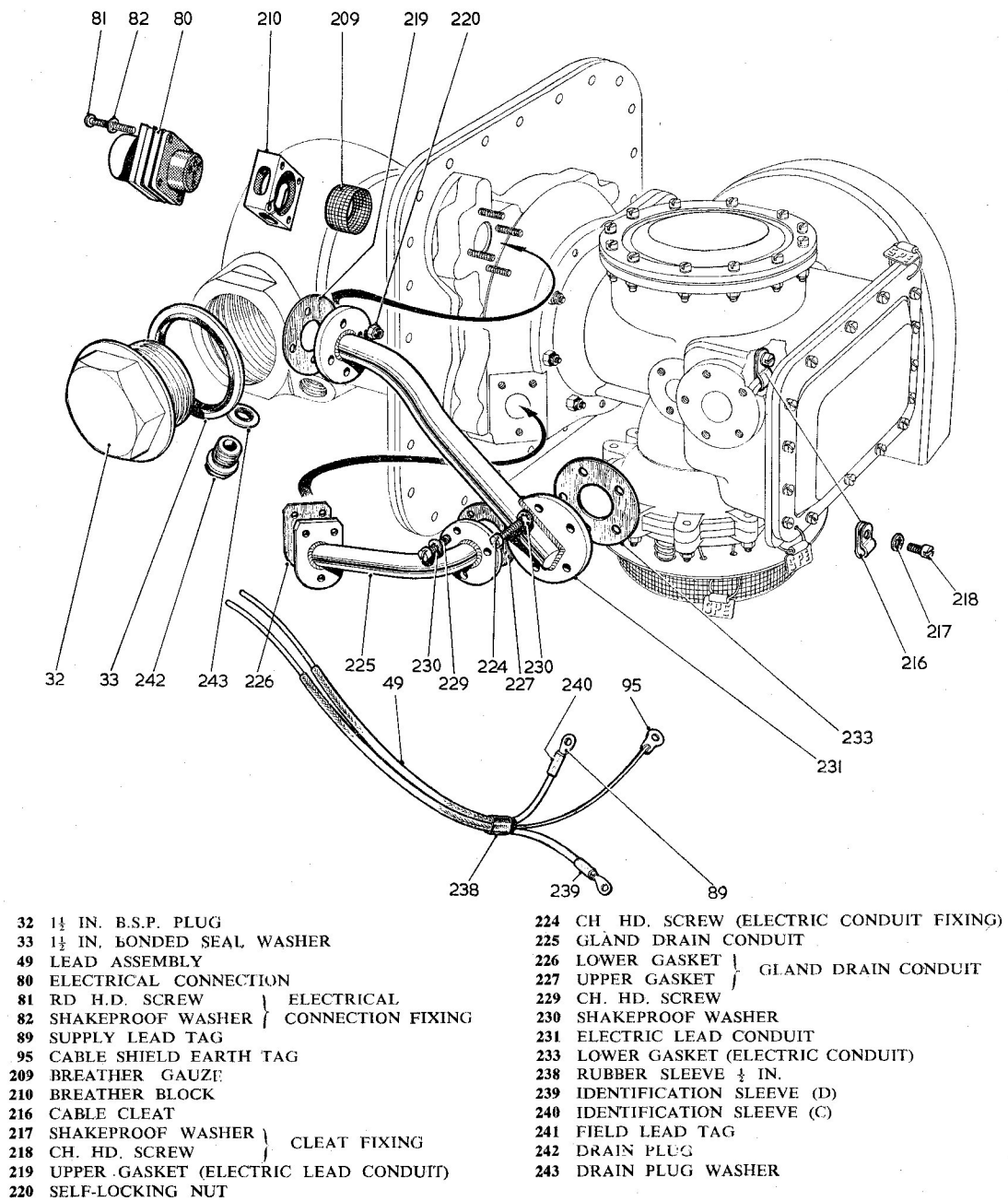


Fig. 30. Exploded view of conduits

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(1) Fit the lower bearing housing location tool SPE.19484 (fig. 35) and secure to the pump casting with two 4-B.A. cheese-head screws.

(2) Secure the lower bearing housing assembly (136) to the location tool with four countersunk-head screws (258). Lubricate the carbon bearing with kerosene fuel. Using the special reamer SPE.17378 with a guide bush SPE.17376 and collar SPE.17377 (fig. 3) ream the bearing to size (Table 3). Take great care not to chip the carbon.

(3) Mark the lower bearing housing assembly and the pump casting to ensure that they will be assembled into the same pump unit, with the same positional relationship, at a later assembly stage. Remove the bearing housing and the location tool.

#### *Preparing the pump casting (fig. 32)*

14. (1) Renew any damaged studs (251, 253, 259 and 54) in the pump casting. The twenty-one studs (259) should project 0.9 in., the five studs (253) surrounding the electrical connection position 0.6 in. and the four studs (251) for securing the supply lead conduit should project 0.4 in.

(2) Refit the dowel pin (113), if previously removed so that it projects 3.0 mm. above casting surface.

#### *Assembling and fitting the outlet duct (fig. 29)*

15. (1) Select the outlet duct (74) which is to be paired with the volute assembly of the pump being assembled (para. 16). Renew any damaged studs (246, 247, and 248) in the outlet duct, insert the studs in the positions indicated in Fig. 36; the projection of each stud must be as detailed.

#### **Note . . .**

*If a new outlet duct or volute assembly are being fitted to the pump, the volute should be pre-assembled as detailed in para. 16 (1) and (2), and the outlet duct should be positioned on it for levelling. Blend the volute and outlet duct profiles to obtain a smooth un-stepped passage between the*

*two parts. Ensure that all swarf and dust is removed from the assembly. Do not clean the volute assembly by flushing unless the joint between the two castings is tightened down fully.*

(2) Smear the mating surfaces of the outlet duct assembly and the pump casting (105, fig. 32) with Wellseal jointing compound. Position a new gasket (245), paint with Wellseal and secure the duct to the pump casting using self-locking nuts (99) on the studs (101) and on three cheese-head screws (244). Insert three countersunk-head screws (250) inside the pump casting to secure the inner side of the duct assembly. Do not fully tighten the nuts or screws at this stage.

#### *Assembling and fitting the volute assembly*

16. (1) Select the volute components originally assembled to the outlet duct (para. 10) and renew any damaged studs (260 and 137) in the upper volute casting (144). Viewing on the under-side of the casting with the straight edge horizontal at the top, insert studs (260) in the first three tapped positions (reading clock-wise) and insert studs (137) in the fourth and fifth positions. All studs should be inserted so that the projecting length is 0.6 in.

(2) Smear the mating surfaces of the upper and lower volute castings (142 and 144) with Wellseal jointing compound. Place a new gasket (143), painted with Wellseal, into position and secure the two components together, using self-locking nuts (141) on the upper casting studs and on the five countersunk-head screws (257). Do not tighten the nuts fully.

(3) Hold the volute assembly in position and check, with feeler gauges, the difference in level between the surface of the upper volute casting and the under surface of the outlet duct.

(4) Smear the mating surfaces of the upper volute casting, outlet duct and pump casting with Wellseal jointing compound. Place a new gasket (126) on the pump casting and place one or more gaskets (252) on the outlet duct to compensate for the difference in level (if any) between the two components (sub. para. (3) above).

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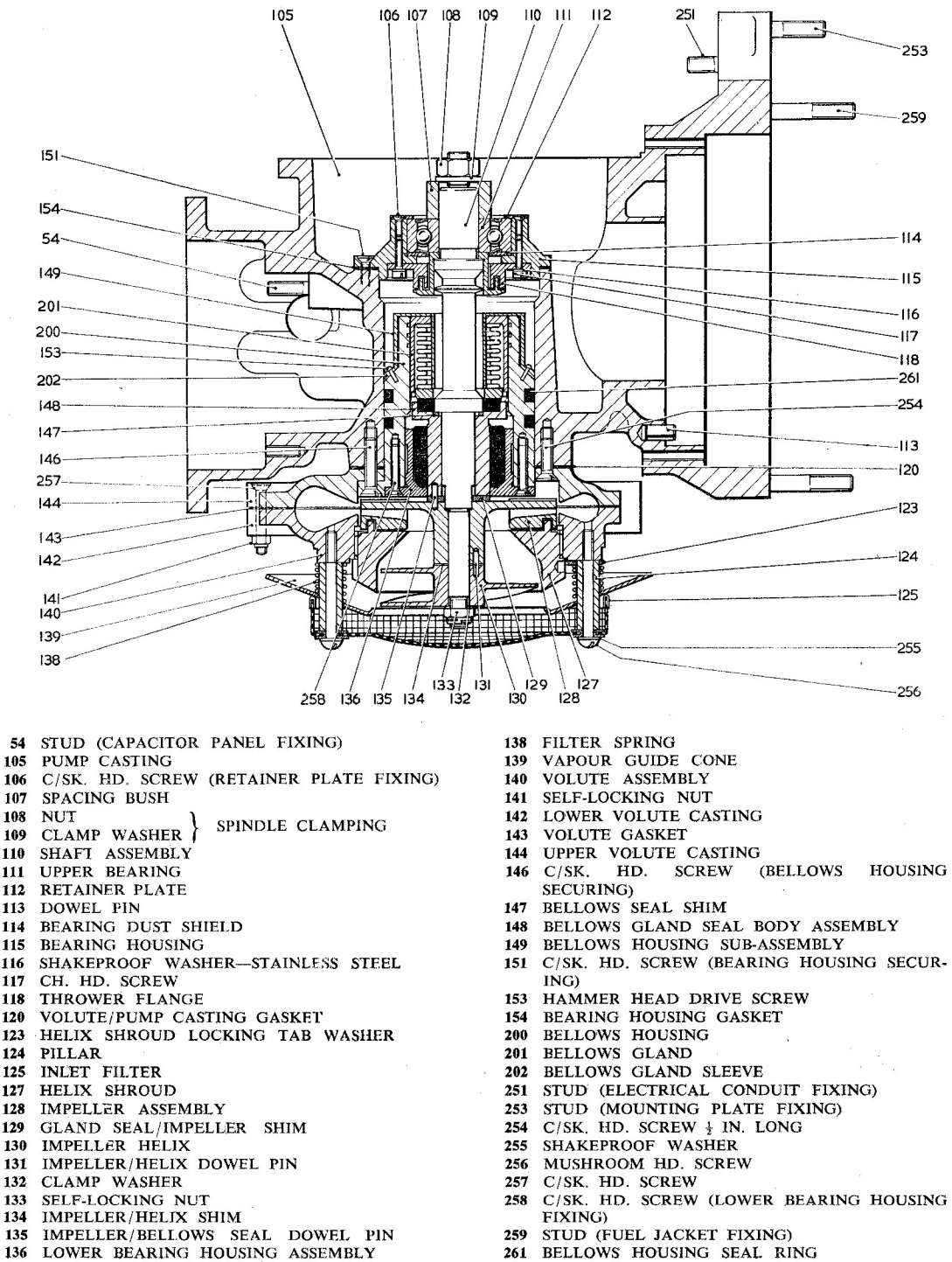


Fig. 31. Sectional view of pump unit

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## Key to Fig. 32

1	GEAR BOX COVER	124	PILLAR
2	BEVEL GEAR DRIVE KEY	125	INLET FILTER
3	CLAMP WASHER	127	HELIX SHROUD
4	SELF-LOCKING NUT	128	IMPELLER ASSEMBLY
5	PAIRED GEAR AND PINION ASSEMBLY	129	GLAND SEAL/IMPELLER SHIM
6	BEVEL GEAR SHIM	130	IMPELLER/HELIX
7	PINION DRIVE KEY	131	IMPELLER/HELIX DOWEL PIN
8	CH. HD. SCREW (GEAR BOX COVER)	132	CLAMP WASHER
9	SELF-LOCKING NUT	133	SELF-LOCKING NUT
10	CH. HD. SCREW (MOTOR CLAMPING)	134	IMPELLER/HELIX SHIM
11	SEAL RING (OUTER CASING JOINT)	135	IMPELLER/BELLOWS SEAL DOWEL PIN
12	BOLT RING	136	LOWER BEARING HOUSING ASSEMBLY
13	SEAL RING	137	STUD
15	OUTER MOTOR CASING	138	FILTER SPRING
16	BEVEL PINION SHIM	139	VAPOUR GUIDE CONE
17	CH. HD. SCREW (MOTOR CLAMPING)	140	VOLUTE ASSEMBLY
18	SHAKEPROOF WASHER	141	SELF-LOCKING NUT
34	CLAMP WASHER	142	LOWER VOLUTE CASTING
35	SELF-LOCKING NUT	143	VOLUTE GASKET
36	SELF-LOCKING NUT	144	UPPER VOLUTE CASTING
37	SPRING WASHER	146	C/SK. HD. SCREW (BELLOWS HOUSING SECUR- ING)
38	CH. HD. SCREW	147	BELLOWS SEAL SHIM
45	CAPACITOR COVER	148	BELLOWS GLAND SEAL BODY ASSEMBLY
54	STUD	149	BELLOWS HOUSING SUB-ASSEMBLY
55	SELF-LOCKING NUT	150	BEARING HOUSING GASKET
56	SHAKEPROOF WASHER	151	C/SK. HD. SCREW (BEARING HOUSING SECUR- ING)
57	CH. HD. SCREW	153	HAMMER HEAD DRIVE SCREW
58	SELF-LOCKING NUT	200	BELLOWS HOUSING
59	SPRING WASHER	201	BELLOWS GLAND
102	CAPACITOR PANEL ASSEMBLY	202	BELLOWS GLAND SLEEVE
105	PUMP CASTING	251	STUD (ELECTRICAL CONDUIT FIXING)
106	C/SK. HD. SCREW (RETAINER PLATE FIXING)	253	STUD (MOUNTING PLATE FIXING)
110	SHAFT ASSEMBLY	254	C/SK. HD. SCREW $\frac{1}{2}$ IN. LONG
111	UPPER BEARING	255	SHAKEPROOF WASHER
112	RETAINER PLATE	256	MUSHROOM HD. SCREW
113	DOWEL PIN	257	C/SK. HD. SCREW
114	BEARING DUST SHIELD	258	C/SK. HD. SCREW (LOWER BEARING HOUSING FIXING)
115	BEARING HOUSING	259	STUD (FUEL JACKET FIXING)
116	SHAKEPROOF WASHER	260	STUD
117	CH. HD. SCREW	261	BELLOWS HOUSING SEAL RING
118	THROWER FLANGE		
120	VOLUTE/PUMP CASTING GASKET		
123	HELIX SHROUD LOCKING TAB WASHER		

### Note . . .

*It is advisable to paint all gasket surfaces with Wellseal jointing compound before placing them into position, particularly when more than one gasket is being used.*

(5) Secure the duct to the volute assembly using self-locking nuts (69) on the three studs and on the cheese-head screw (249). Tighten these nuts and those of the volute assembly (subpara. (2) above). Secure the volute assembly to the pump casting with the countersunk-head screws (254). Peen metal into the screw slots to lock them, ensuring that none projects above the surface of the housing flange. *This is important as the impeller is set to this*

*surface with a clearance of only 0.008 in.*

(6) Tighten the nuts (69) and screws (250) securing the outlet duct to the pump casting; in this position metal should *not* be peened into the countersunk-head screw slots for locking purposes.

### Assembling the bellows gland housing

17. (1) If any of the drive screws (153) were broken off during dismantling, check that three new holes have been drilled in the angled shoulder of the housing (200) as detailed in Table 2.

(2) Pre-heat the bellows gland housing (200) to between 125 and 150°C. Smear

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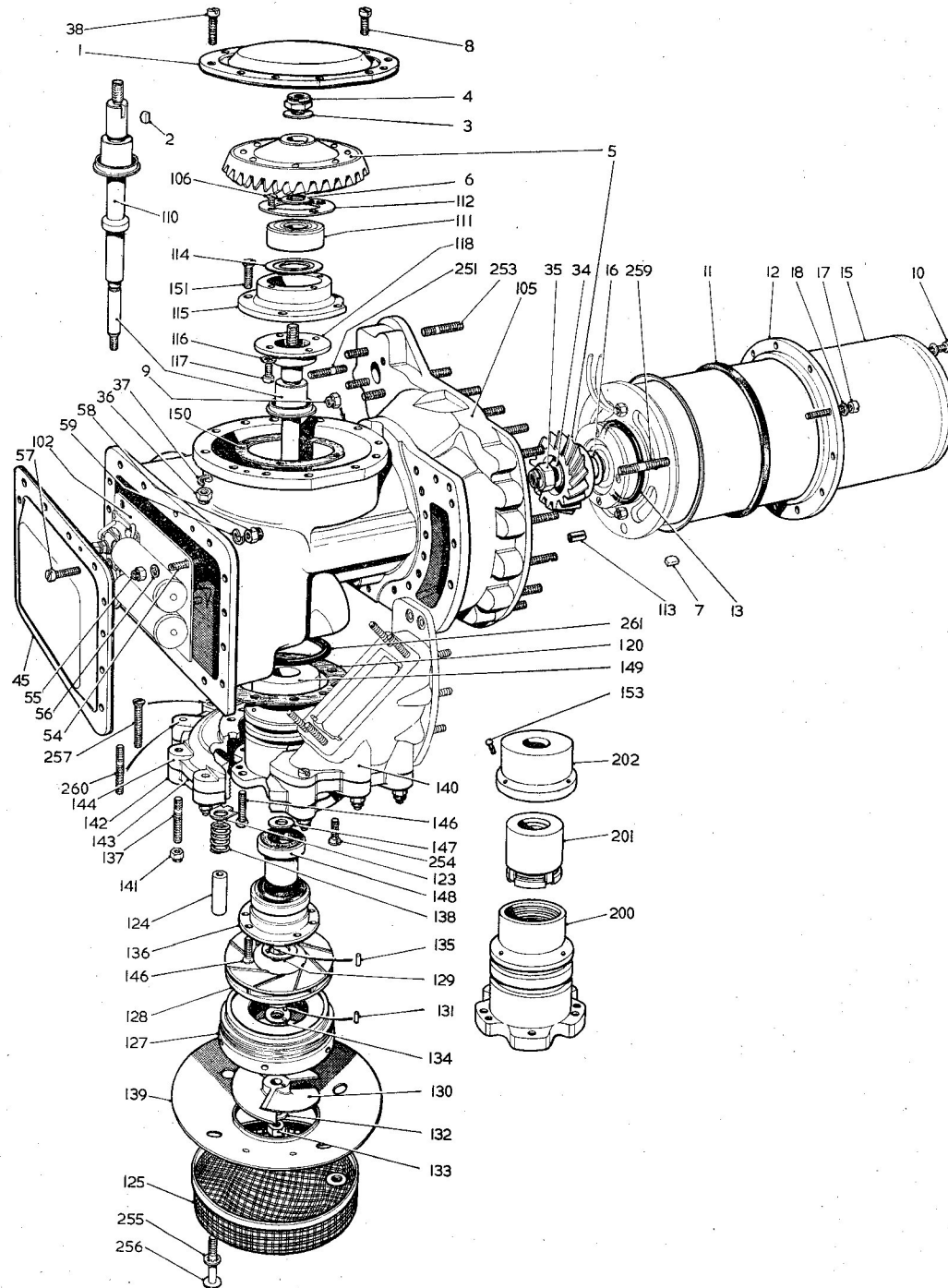


Fig. 32 Exploded view of pump unit

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the top  $\frac{1}{8}$ -inch of the bore of the housing with Hermeticoll jointing compound so that the grooves are filled. Using the tools illustrated in Fig. 37, press the re-lapped or a new bellows gland (201) into the housing so that the top face of the gland is flush with the top surface of the housing.

(3) ◀ Using the fixture illustrated in Fig. 22 pressure test the gland housing assembly. Immerse the assembly in water and apply air pressure at 20 lb./in<sup>2</sup> to the fixture adaptor. Observe for air bubbles indicating leakage between the bellows gland and housing. None is permissible. After this test, remove excess water, using a compressed air jet, then dry the assembly in a ventilated oven.

(4) Position the sleeve (202) over the housing and gland and secure with three hammer-head drive screws (153). ▶

(5) Fit two new seal rings (261) in the grooves of the housing and lubricate with a smear of Silicone MS.4 grease, compound XG-250 (Ref. No. 33H/9424829).

(6) Press the bellows into the pump casting, align the securing holes and secure with five countersunk-head screws (146).

#### *Shaft component checking and assembling*

18. Check the shaft components in the manner described in the basic chapter, assemble the upper bearing housing, carry out the bellows gland loading procedure, assemble the centrifugal impeller and helix, and assemble the filter; all the operations for assembling these components are identical to the procedures given in the basic chapter.

#### *Assembling the gland drain duct (fig. 30 and 32)*

19. (1) Smear the mating surfaces of the gland drain conduit flanges (225) the pump casting (105) and both surfaces of the gaskets (226 and 227) with Wellseal jointing compound.

#### **Note . . .**

*The gaskets should be compressed under a press to 0.022 in. thickness before fitting to improve impermeability.*

(2) Secure each flange of the gland drain duct to the casting with three cheese-head screws (229) and shake-proof washers (230).

#### **Fitting the motor unit to the pump unit**

20. The reconditioning and assembling instructions for the motor are identical to the procedures given in the basic chapter. Carry out the following operations as detailed in the basic chapter.

- (1) Bevel pinion shimming
- (2) Gear alignment
- (3) Assembling the outer motor casing
- (4) Assembling the gear box cover.

#### **Attaching the electrical conduit (fig. 30)**

21. (1) Thread the field leads marked A and B out through the port in the side of the capacitor housing and through the gasket (233) the electrical conduit (231) and a new gasket (219).

#### **Note . . .**

*The gaskets should be compressed, under a press, to 0.022 in. thickness before fitting to improve impermeability.*

- (2) Thread the electric lead assembly (49) through the conduit and gaskets, leaving the tagged end in the suppressor chamber.
- (3) Fit a rubber sleeve (238) over the two leads C and D, and fit a  $\frac{1}{2}$ -inch identification sleeving on each lead.
- (4) Fit a  $\frac{1}{2}$ -inch rubber sleeve (238) over each of the four leads to the electrical connection.
- (5) Fit a gauze (209) in the motor breather block (210).
- (6) Thread all the leads through the casting, motor breather and the rear moulding of the plug assembly. Solder leads to the appropriate plug pins and assemble the pins to the rear moulding, making sure that the pins of the leads marked A, B, C and D are assembled in similarly marked plug positions; E is not used. Move the sleeves (238) up to the moulding.

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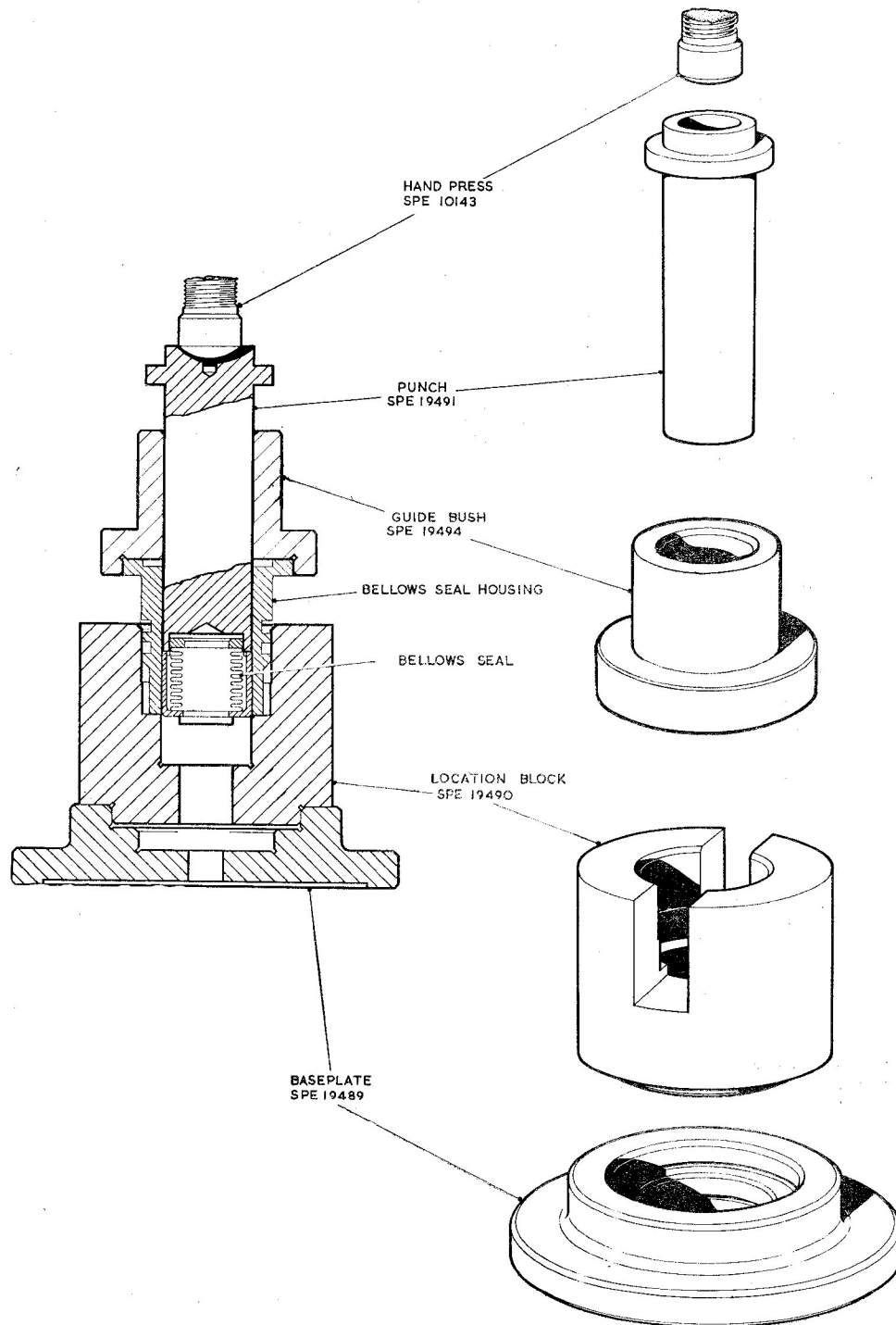


Fig. 33. Removal of the bellows gland from its housing

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(7) Re-assemble the plug and secure through the motor breather block (210) to the casting with four screws (81) and shakeproof washers (82). Position the plug with pin A uppermost.

(8) Smear the mating surfaces of the pump casting, the electric conduit flanges and both sides of the gaskets (219 and 233) with Wellseal jointing compound. Secure the upper flange of the conduit to the casting with four self-locking nuts (220) and the lower flange with five cheese-head screws (224) and shakeproof washers (230).

#### Assembling the capacitor units (fig. 30 and 27)

22. (1) Draw the excess length of leads in the electric conduit back into the capacitor housing. Secure leads A and B to the back wall of the housing using a cable cleat (216) secured by the cheesehead screw (218) and shakeproof washer (217).

(2) Check the connections to the tags (47) of the capacitor units (50). If faulty, fit a new tag or if the capacitor lead is frayed, discard and use a new unit.

(3) Secure the two capacitor units (50)

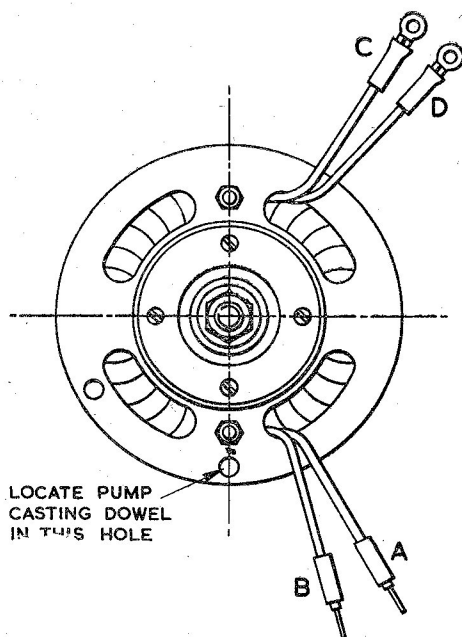


Fig. 34. Lead positioning through motor end casing

to the panel assembly (53) with the screws (51) and shakeproof washers (52).

(4) Fix the terminal block (97) to the panel assembly with the screw (94), the distance collar (100), two plain washers (90), a shakeproof washer (91) and the locknut (78). Include the centre tag of the condenser assembly (93) and the cable shield earthing tag (part of 49), between the two plain washers.

(5) Fit the condenser assembly around the terminal block, positioning one condenser along each short edge of the block, and retain with the rubber band (46).

(6) Include one condenser tag (223) and one capacitor tag (47) on each of the two outer terminals of the terminal block. Secure with a plain washer (90) and locknut (92).

(7) Using an Avometer or similar instrument check for continuity between the mounting panel and the earthed pole of the condenser; the indicated resistance must be zero.

(8) Complete the build-up of the two outer terminals of the terminal block in accordance with the sequence illustrated diagrammatically in Fig. 14. Each terminal should comprise a capacitor lead tag and a condenser tag clamped by a plain washer and locknut together with the tag of a supply lead (49) and a field lead tag clamped by a plain washer, shakeproof washer and locknut. Ensure that all connections marked 'C' are assembled to one terminal and those marked 'D' to the other.

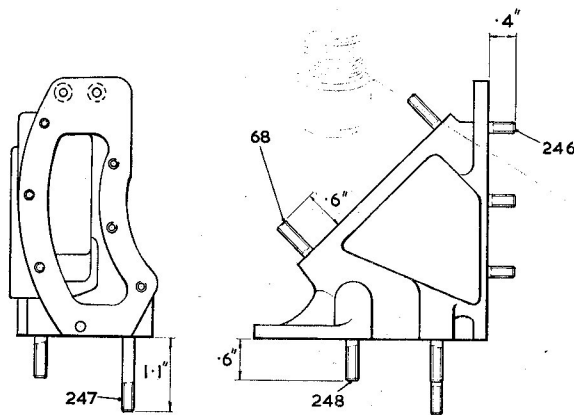
(9) Arrange the leads to the terminals so that the field leads C and D

LOWER BEARING HOUSING LOCATION TOOL  
SPE 19484



Fig. 35. Lower bearing location tool (reaming bearing)

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**Fig. 36. Outlet duct stud positions and dimensions**

traverse the capacitors and the supply leads are brought to the terminals through the edge slots in the capacitor panel assembly.

- (10) Position the capacitor panel assembly over the studs (54) in the capacitor housing and secure with nuts (55) and shakeproof washers (221). Examine all soldered connections for fractured leads or other faults which may have developed during the assembling process.

#### **Assembling the capacitor cover (fig. 32)**

23. (1) Degrease the capacitor housing flange, dry, and secure the cover (45) with sixteen cheese-head screws (57), spring washers (37) and self-locking nuts (36). The spring washers must be assembled under the nuts.
- (2) Tighten diametrically opposite nuts in turn by degrees to ensure even compression of the joint ring.

#### **Assembling the by-pass duct (fig. 29)**

24. (1) Position the valve plate (73) locating the integral hinge pins in the machined seating in the outlet duct.
- (2) Fit the by-pass valve seat assembly (103) with the lapped surface uppermost, a new paper gasket (71) and the by-pass duct assembly (14). Secure in position with four self-locking nuts (69).

#### **Pressure testing the pump assembly**

25. Fit the pressure test blanking plate SPE.19485 (fig. 38) and the two gaskets SPE.19486 and SPE.19487 to the studs of the pump casting to cover the electrical connection and the gland drain tapping; secure the cover to the studs with the special nuts SPE.19488/A (5 off), SPE.19488/B (2 off) and SPE.19488/C (5 off). Apply air pressure, at a gradually increasing rate, through a  $\frac{3}{8}$  in. B.S.P. adaptor, and pressure test the pump assembly as detailed in the basic chapter.

#### **Assembling the fuel jacket (fig. 29 and 30)**

26. (1) Assemble the water drain plug (242) and the bonded seal washer (243) to the fuel jacket (212).

- (2) Fit the plug (32) and the seal washer (33) to either of the two alternative outlets on the fuel jacket, according to the installation requirements.

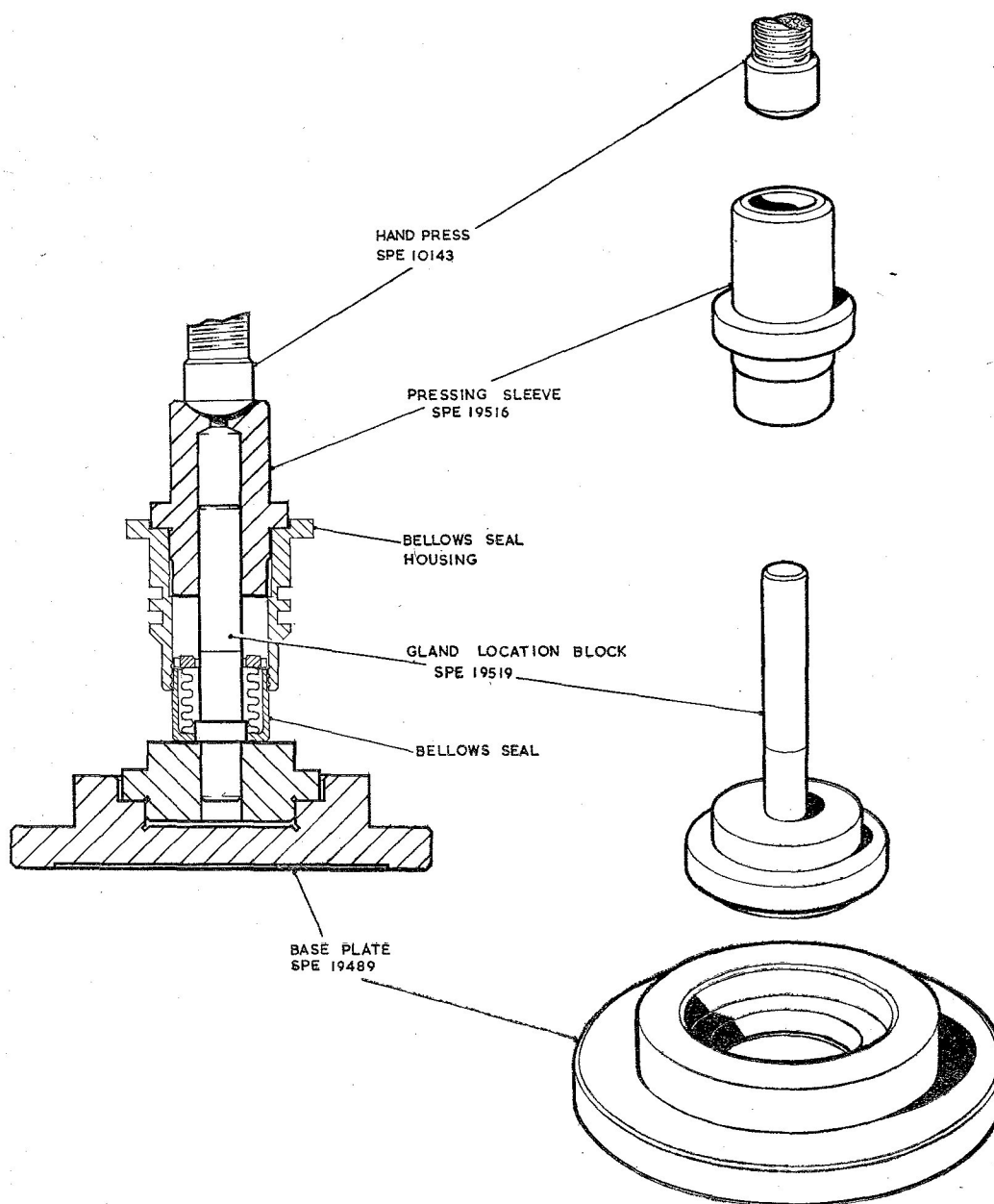
- (3) Fit new gaskets (214 and 215) together with the fuel jacket sub-assembly over the studs of the pump casting. Secure the jacket (212) in four places with self-locking nuts (213), using a suitable spacing bush  $\frac{1}{4}$  in. long under each nut. The remaining twenty-two self-locking nuts, together with the bonding strip (211) should be kept in a separate bag for use when the pump is fixed to its mounting plate.

#### **Note . . .**

*The mounting plate is not normally supplied by the pump manufacturer and may not be attached to the pump when received for reconditioning.*

- (4) If the mounting plate is available, it should be assembled between the two gaskets (214 and 215) and secured with twenty-six self-locking nuts (213). Fit the bonding strip (211) between a pump casting stud, near to the electrical connection, and a stud securing the fuel jacket. Bend the strip to suit the requirements. Use Wellseal jointing compound on all gaskets and mating surfaces. Tighten opposite nuts in turn by degrees to ensure even compression of the joint washer.

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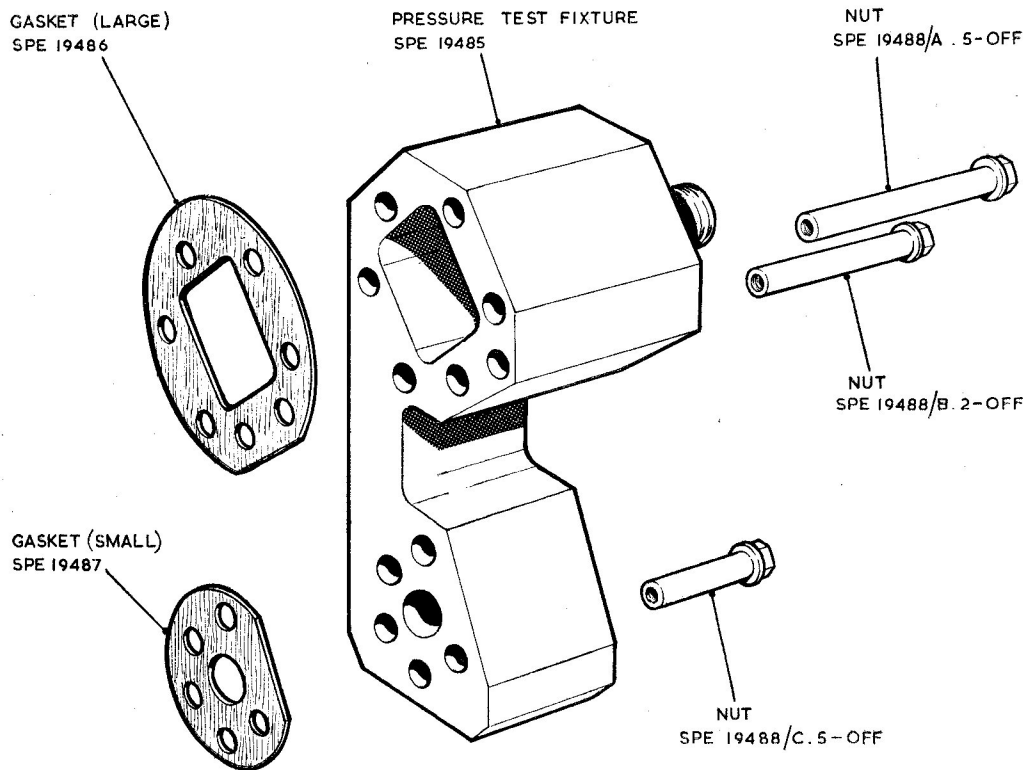
**Fig. 37. Assembling the bellows gland to its housing**

### TESTING

27. The completed pump can be tested on

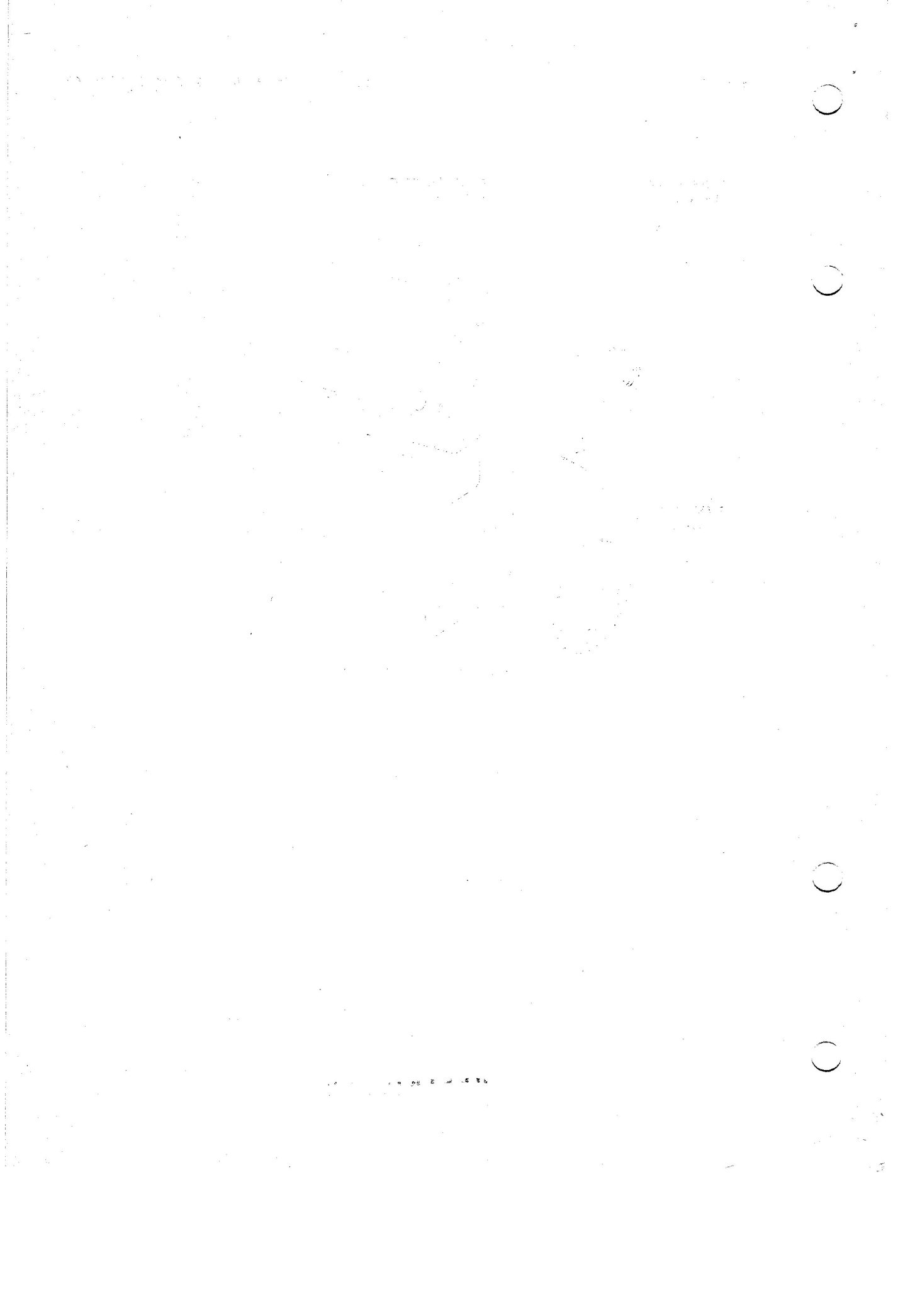
the universal fuel pump test rig (Ref. No. 5G/3494) in accordance with the procedure and data given in the basic chapter.

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**Fig. 38. Pressure test tools**

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**General**

1. This appendix details the differences between the SPE 1214 Mk. 1 fuel pump and the SPE 1214 Mk. 4 fuel pump. Where no details are given for dismantling or assembling particular components, it can be assumed that the procedures given for a Mk. 4 pump, in Chapter 6B, applies to the Mk. 1 pump.

**Separating the motor and pump units**

2. The procedure is generally similar to that given for the SPE 1214 Mk. 4 pump but the capacitor and gear box covers have separate gaskets, and in some pumps backing plates may be fitted, in place of the covers with integral bonded seal washers.

**Upper bearing assembly**

3. The Mk. 1 upper bearing assembly is illustrated in the basic chapter for the SPE 1200 series and the procedures for dismantling and assembling are also given in the basic chapter.

**Bellows housing sub-assembly**

4. The procedures for withdrawing and assembling a bellows housing sub-assembly is generally similar to the SPE 1214 Mk. 4, but the bellows sleeve (202, fig. 32) is not fitted.

**Dismantling and assembling the pump casting**

5. The supply lead and gland drain conduits on Mk. 1 pumps (231 and 225, fig. 39) need only be removed when there is evidence of damage or leakage past the seal washers. To remove the supply lead conduit (231), remove the nine self-locking nuts (235) and withdraw the two cheese-head screws (234). The gaskets (232 and 233) must be renewed when re-assembling the unit.

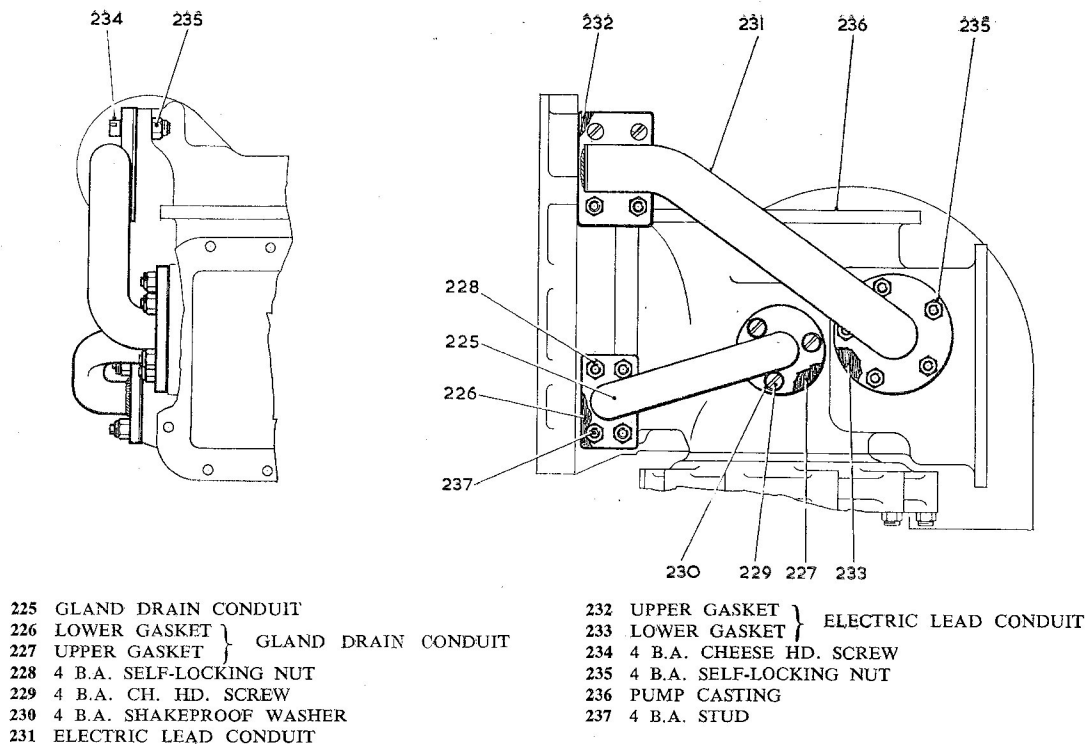
6. To remove the gland drain conduit (225), withdraw the three roundhead screws (229) and shakeproof washers (230), and remove the four self-locking nuts (228); renew the gaskets (226 and 227) when re-assembling the unit.

7. When assembling the pump casting, examine all studs for damage, renew faulty studs as necessary, and proceed generally as for the SPE 1214, Mk. 4 pump. The eleven studs used to secure the electric lead and gland drain conduits must protrude 0.4 in. on the Mk. 1 pump.

**Assembling the gland drain duct (fig. 39)**

8. (1) Smear the mating surface of the gland drain conduit flanges (225), the

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**Fig. 39. Electric supply lead and gland drain conduits**

pump casting (236) and both surfaces of the gaskets (226 and 227) with Wellseal jointing compound.

**Note . . .**

*The gaskets should be compressed, under a press, to 0.022 in. thickness before fitting to improve impermeability.*

(2) Secure one flange to the pump casting with three cheese-head screws (229) and shakeproof washers (230), and secure the other flange to the studs (237) with four self-locking nuts (238).

**Attaching the electrical conduit (fig. 39)**

9. The procedure is generally similar to the SPE 1214, Mk. 4 pump except that conduit (231) is used and is secured in seven positions with self-locking nuts (235) on the casting studs and in two positions with cheese-head screws (234) and self-locking nuts (235).

**Assembling the capacitor units**

10. On the original assembly there was no centre terminal on the terminal block, and the lower fixing stud of the panel assembly was used as the earth terminal. The assembling procedure is generally similar to the procedure detailed for the SPE 1214, Mk. 4 and it is recommended that Mk. 1 units should be modified to Mk. 4 standards whenever possible.

**Capacitor unit covers and gear box covers**

11. The assembling of both parts is similar to the procedures given for SPE 1214, Mk. 4 pumps, but separate covers and gaskets are used. Sheet metal covers, as distinct from die-cast covers, should have backing strips fitted over the cover flanges. Apply Wellseal jointing compound to the casting, cover and gasket surfaces. It is recommended that Mk. 4 type covers, with integral bonded sealing washers are fitted as replacements for Mk. 1 covers whenever possible.

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## Appendix 2

### PUMPS, FUEL, SPE 1214, MK. 1A AND MK. 2

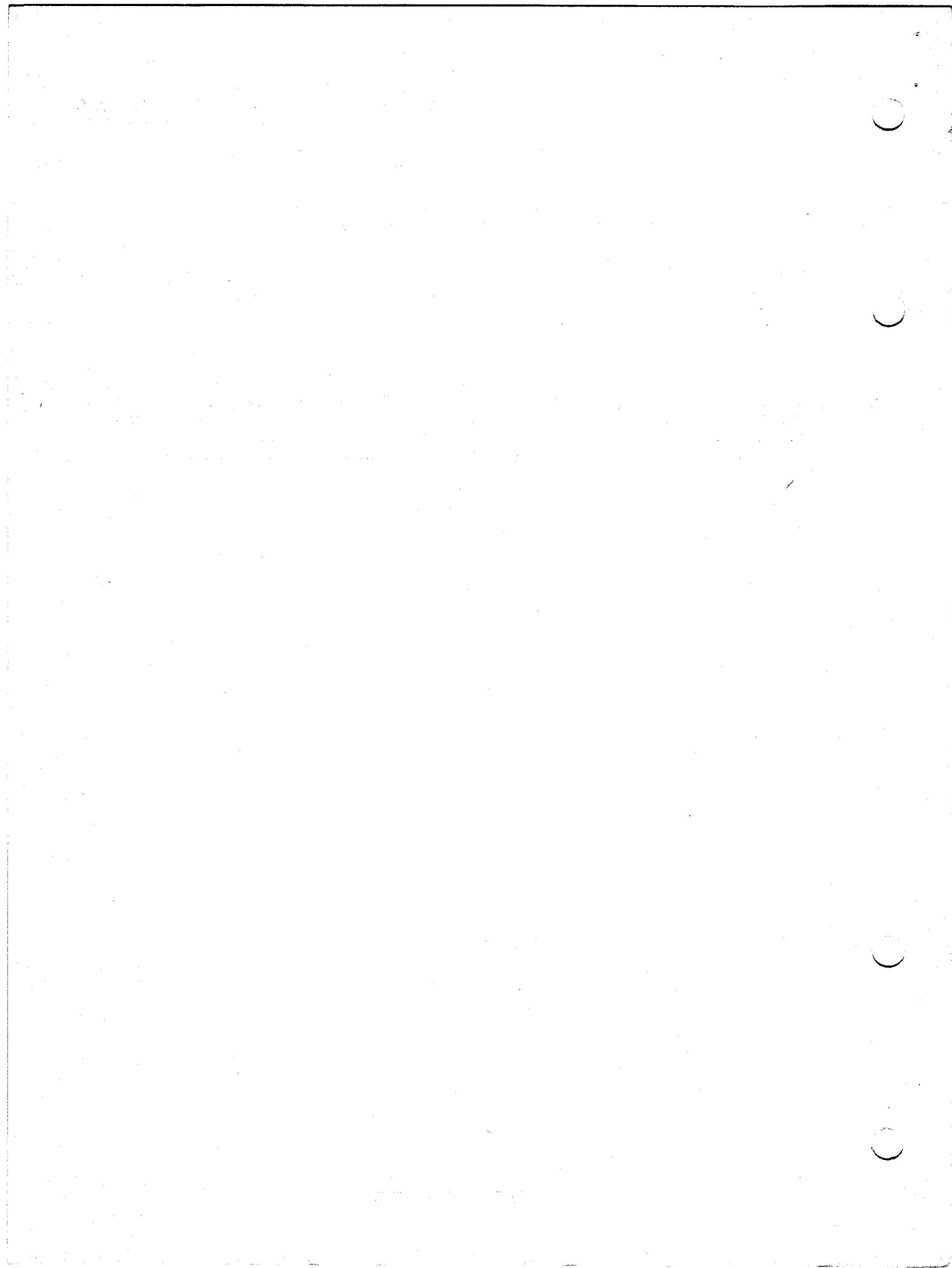
Reconditioning procedure and Test Schedules for the SPE.1214 Mk. 1A and Mk. 2 fuel pumps are generally similar to those detailed for the Mk. 1 pump in Appendix 1 with the exception of the method of assembling the electric and gland drain conduits. On the Mk. 2 pump these conduits are similar to those fitted to the Mk. 4 pump and reference should be made to Chapter 6B for details of fitting. On Mk. 1A pumps the conduits were of interim design and

any pumps of this mark should be re-built to include the Mk. 4 conduits.

**Note . . .**

*Although instructions given above enable the pump to be rebuilt to approximately its original specification, it is strongly recommended that whenever possible the unit is re-built to the latest modification standard.*

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### Appendix 3

#### PUMPS, FUEL, SPE 1214 MK. 3

Reconditioning procedures and test schedules for the SPE.1214 Mk. 3 fuel pump are generally similar to those detailed for the Mk. 4 pump in chapter 6B but separate gear box and capacitor housing covers and gaskets are fitted in place of the covers with an integral bonded sealing gasket. Sheet metal covers, as distinct from die-cast components should also have backing plates or strips fitted over the cover flanges. Use Wellseal jointing compound on the cover, casting and gasket mating surfaces when assembling the covers. It is recommended

that the Mk. 4 covers with integral bonded seal washer (fig. 32, item 1 and 45) are fitted as replacements for the Mk. 3 covers whenever possible.

**Note . . .**

*The above paragraph applies at the date of issue of this page. Introduction of modifications affecting the Mk. 4 pump and not applicable to the Mk. 3 will tend to increase the differences between Mk. 3 and Mk. 4 pumps.*

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