Cancelled now AP 113E-0411-16 A2/142

Do not destroy.

Chapter 39

PUMP, FUEL, PDC. 909

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DISMANTLING

General

1. Complete overhaul may be carried out by approved R.N. and R.A.F. maintenance units having suitable machining facilities and test equipment. Where these are not available the pump should be returned to the manufacturer for overhaul.

2. In addition the following special tools are required.

Table 1
Special tools

Description	Part No.	Fig.
"C" spanner for impeller	021261	4
Tool for pressing in stationary sleeve (flexibox seal)	021258	5
Tool for assembling Flexibox seal	021259	6
Impeller clearance gauge	021287	7

3. The following paragraphs describe the dismantling of the component to its individual parts. Where dismantling is considered unnecessary, the operator may select the relevant paragraphs and carry out the work only as far as is required.

4. In the following paragraphs the numbers in parentheses correspond to the item numbers in figs. 2 and 3. For identification of parts refer to Table 4.

Pump

5. Starting at the lower end of the pump. For Mk. 1 pump, remove the three Nyloc

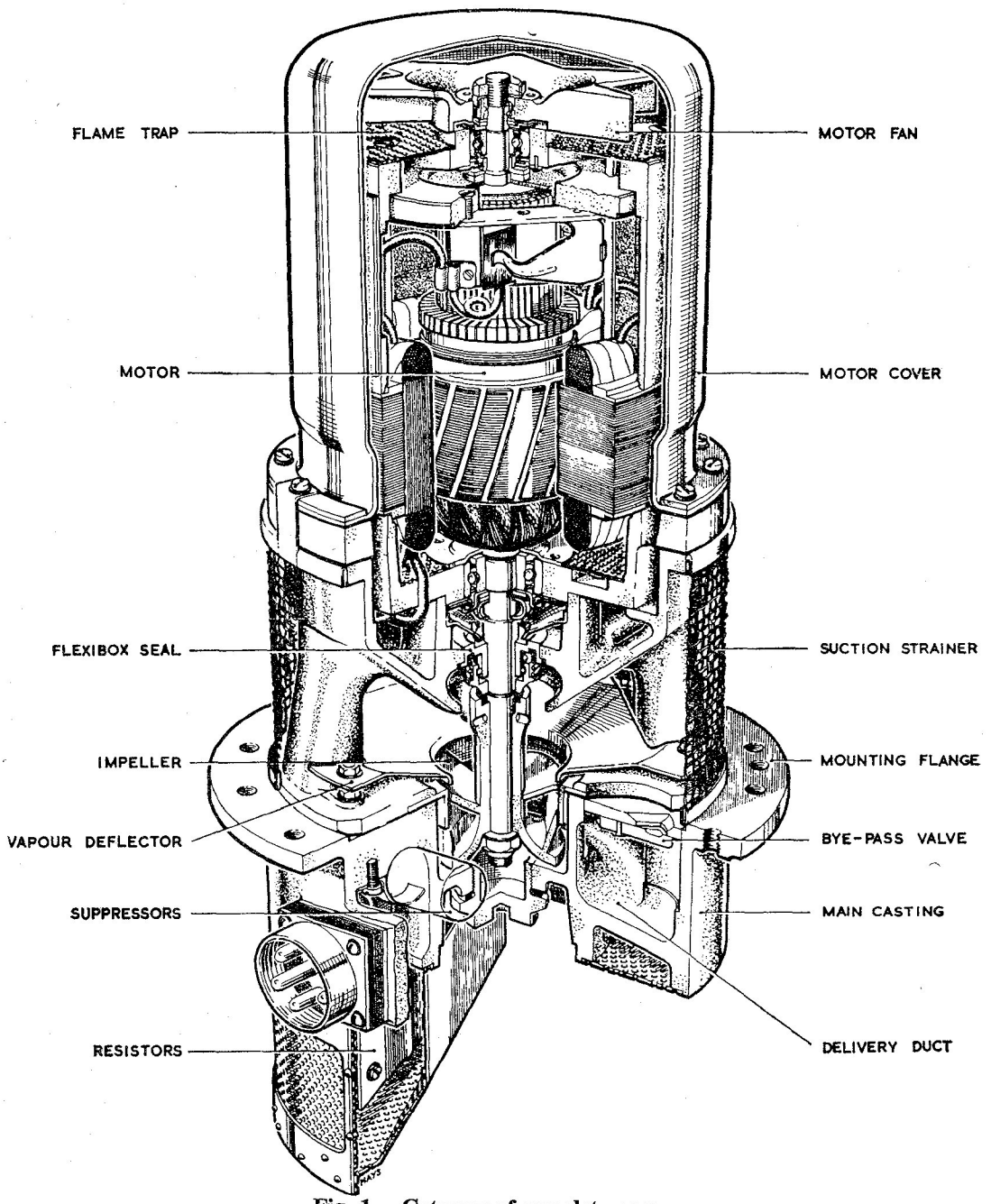

Fig. 1. Cutaway of complete pump.

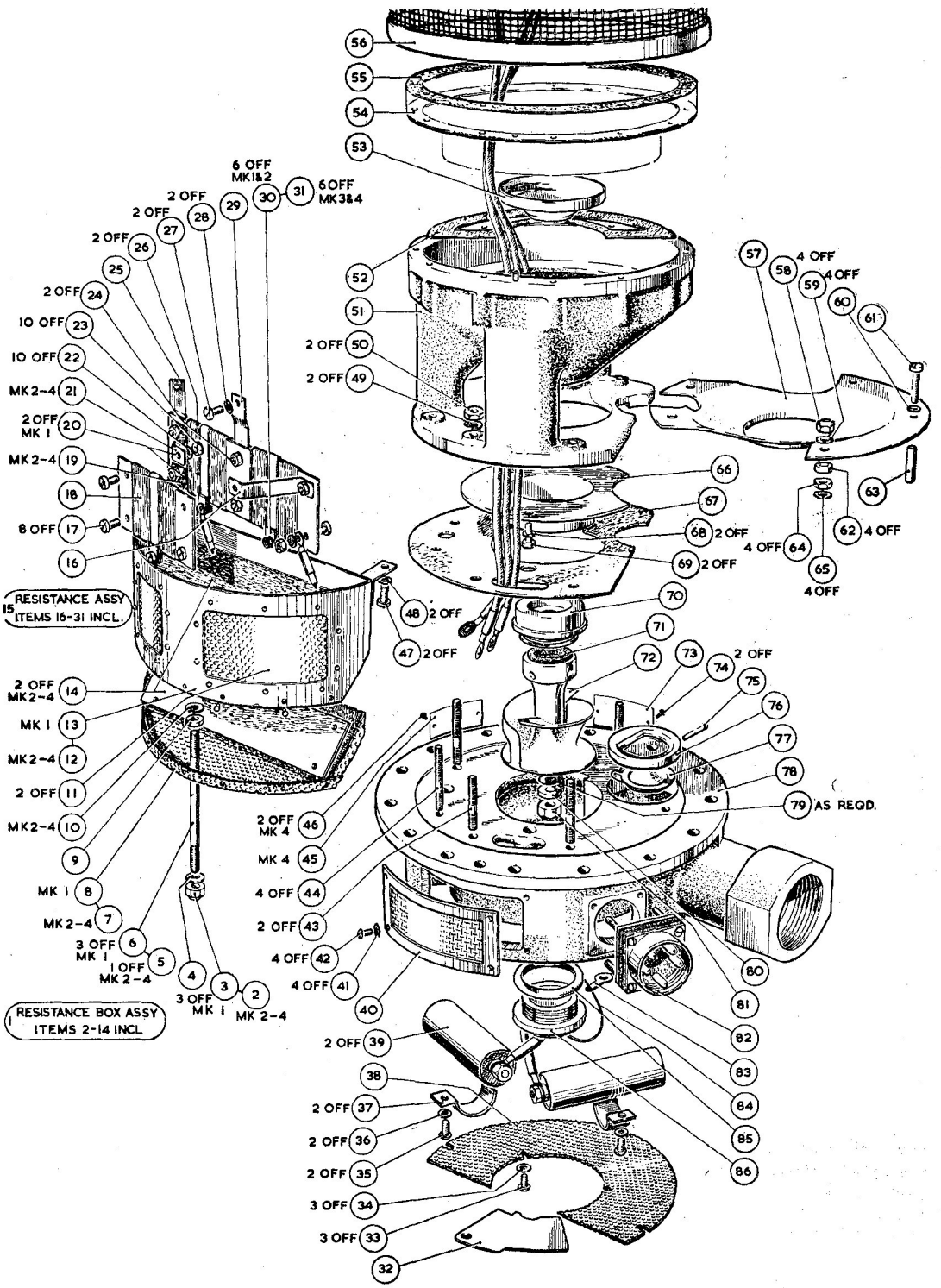

Fig. 2. Exploded view of pump.

nuts (3) and washers (4). For Mk. 2, 3 and 4, remove the two screws (47) and lockwashers (48). In each case the resistance box can now be drawn off.

6. To remove the air baffle (32), slacken off nut (9), with washer (10), and take out stud (6). On the Mk. 1 pump there is no need to remove the other two studs, unless the threads show signs of damage.

7. Remove the two screws (27) and lockwashers (28); disconnect the resistance assembly, which is now free for dismantling. The two screws (35) and lockwashers (36) are removed with the two clamp brackets (37), releasing the two suppressors (39) which can be disconnected. Take out the breeze plug (82) and disconnect by pushing back the cable sleeves, exposing soldered joints, and unsoldering.

8. To remove the suction strainer (56) together with the motor cover (122), and ring (121), take out the eight screws (123), and the four screws (120) locked with wire, plus their twelve lockwashers (124) and (119). Withdraw the locking wire (84) from the drain plug (86) and remove the latter with its joint washer (85). The Nyloc nut (81) on the end of the motor shaft can now be removed with its washer (80) and any shims (79), while the impeller (72) is held with the "C" spanner (Tool No. 021261).

9. The whole motor unit can now be parted from the pump unit by withdrawing the shaft through the impeller and Flexibox seal, leaving the former, and possibly the latter, trapped, but loose between the two castings. To part the main casting (78) from the yoke (51). Take off the four Nyloc nuts (58) and four washers (59). Remove the screw (61), washer (60) and spacer (63): this releases the vapour deflector (57) and allows the remaining four loose washers (62), six nuts (50) and (64) and washers (49) and (65) to be removed. The yoke can now be drawn off the studs, allowing the vapour deflector to be lifted over the impeller.

10. The suction cover (66) is removed by taking out two screws (69) and lockwashers (68). By now the free part of the Flexibox seal (70) may have fallen out. To remove the stationary part, press out with the special press tool No. 021258, inserted from the motor end of the yoke. The gland sealing cone (53) may now be pulled or pressed out.

11. On the main casting, the impeller (72) can now be lifted out. Take out the by-pass valve assembly; from it remove the split pin (75) and take the flap (77) from the valve seating (76). The casing and vapour deflector studs (43 and 44) need to be removed only if the threads show signs of damage. The side air strainer (40) is removed by taking out four screws and lockwashers (42 and 41). The bottom air strainer (38) is released by unscrewing three screws (33) with washers (34). One of these screws holds the casing drain plug tab washer (83).

Motor

12. To dismantle the motor proceed as follows:—

The fan nut (125) and tab washer (126) should first be removed, whilst carefully gripping the drive end of the spindle in a vice fitted with cable clamps, taking great care not to damage the spindle in any way. It is stressed that this procedure be adhered to, for if an attempt is made to remove this nut by holding the fan (128) to stop the shaft rotating, the fan itself may easily be damaged. Remove the fan key (129) from the shaft. The two fan spacing washers (118) and shim(s) (116 or 117) may now be lifted off.

13. Remove the twelve screws (132) and lockwashers (133) to release the two dust covers (134). Mk. 2–4 pumps are fitted with dust cover insulators (135) which can then be lifted off.

14. Remove the two brush terminal screws (106) and washers (105) to allow brushes (104) to be removed from brush holders (103). Suitably mark the brush and holder to ensure each brush is returned to its correct box. Bend back field coil leads so as not to cause obstruction when continuing the dismantling. Unscrew the two through bolts (109) and remove the tab washers (92) and nut (91). The commutator end frame (107 or 108) can be lifted from the rocker and bearing attached. Ensure that the brush holders to not scrape the commutator. Do not separate the flame trap (131) or bearing retainer (136) from the commutator end frame, as these are secured with drive screws and need only be removed if in need of renewal.

15. The field assembly (96 or 97) may then be lifted off, taking care that the motor leads do not catch in their passage through the drive end frame (148). The spacer (137), washer (138) (Mk. 1 only) and slinger (139) may then be removed from the commutator end of the armature (98 or 99) spindle at this stage.

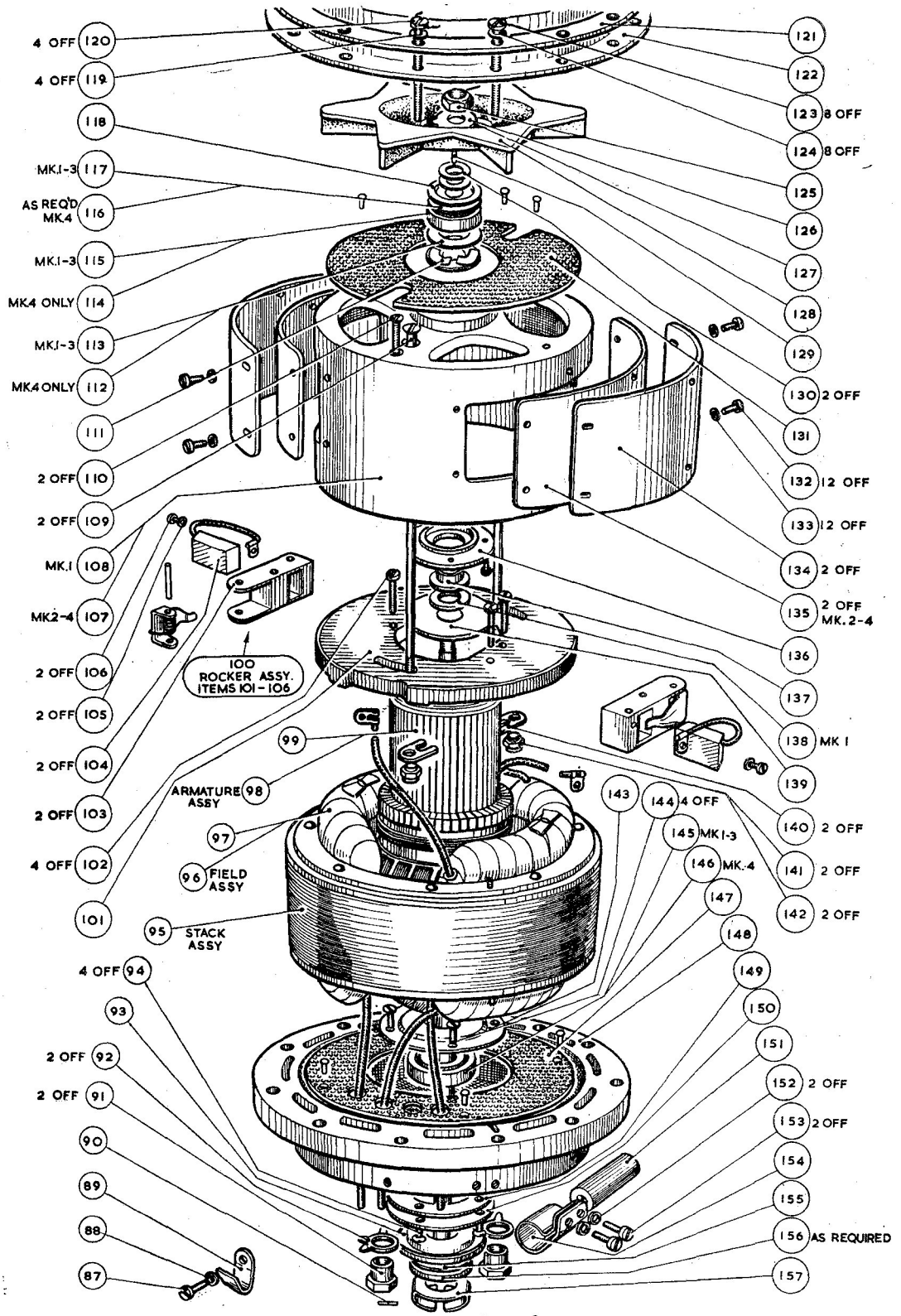

Fig. 3. Exploded view of motor.

16. Should it be necessary to remove the brush rocker assembly (100) from the commutator end frame assembly, its position must be carefully marked. The two brush gear screws (110) and clinch nut assemblies (140–142) are removed to free the brush rocker (101). The two holders (103) can then be separated from the rocker by removing four screws (102).

17. Press the bearing (114 or 115) out of the commutator end frame assembly by pushing outwards, as the bearing retaining plate (136) on the inside of the end frame is fixed with drive screws and should therefore not be removed. In the case of Mk. 1–5 pumps, the bearing loading spring (111) and grease shield (113) must be removed from the bearing housing, if they do not come out with the bearing. In the case of Mk. 4 pumps a washer (112) will be found in lieu of grease shield (113).

18. The shaft pin (90) must be withdrawn before the Twickclip (157) is removed from the drive end of the armature spindle until it is released from the bearing (145 or 146) and drive end frame, at the same time being extremely careful not to bend or damage the spindle. Do not remove the flame trap (147) from the drive end frame (148) as this is secured with drive screws.

19. Remove the inner (143) and two outer bearing retainers (149 and 150) and relevant eight screws (144 and 94) from the drive end frame assembly. The drive end bearing (145 or 146) may now be pressed out. Remove the two screws (153) with their lockwashers (152) to remove saddle and release capacitor (151).

Note . . .

Do not detach the field coils from the field assembly (96 *or* 97). *See para.* 22.

INSPECTION AND REPAIR

20. The armature (not commutator) and field coil assemblies are cleaned with rag moistened with petrol, taking care to keep away from the windings and connecting wires. The drive end bearing must be repacked with approved anti-freeze grease. Test electrical connections to ensure they are sound. The commutator may be cleaned with white linen.

21. The following table details the examination required after dismantling and the action to be taken.

Table 2

Inspection, causes and remedies

Item	Inspection	Action if faulty
Armature	Insulation resistance to shaft. Use a 500 volt megger	Prolonged drying at 120 deg. C. when thoroughly clean, until infinity reading is obtained on megger
	Commutator for loose conductors	Reject for rewinding
	Dirty commutator	Clean with white linen and after with very fine glass paper
	Commutator for scoring and burnt segments	Skim commutator The minimum permissible diameter for further use is 1·32 in. Clean out slots with hacksaw blade of suitable thickness Commutator to be true with spindle to within 0·003 in. clock reading
	Fouling of armature on pole pieces	Examine bearings for side play. Renew if faulty Check armature spindle for eccentricity (max. 0·002 in.). Renew armature if defective
	Short or open-circuited conductors. Use volt drop tester or growler	Clean undercutting on commutator. If still unsatisfactory, reject armature

Table 2—contd.

Inspection, causes and remedies

Item	Inspection	Action if faulty
Yoke and field coil assembly	Insulation resistance of coils to frame	Prolonged drying when clean at 120 deg. C. until infinity reading is obtained on megger
	Continuity resistance of coils. Use a 500 volt megger. Series 0·0139 to 0·0155 ohms. Shunt 5·1 to 5·8 ohms measured at 15 deg. C.	Reject complete field assembly
	Condition of field coil insulated sleeving	If damaged, cover with additional sleeving
Brushgear	Condition of each part	If damaged or corroded, renew
	Brushes for wear: new length (long side) 0·7812 in.	Renew brushes if long side is worn below 0·5625 in.
	Fit of brushes in brush boxes	Brushes should slide freely in brush boxes. Remove all trace of carbon dust
	Tension of brush spring 20 to 24 oz.	Renew brush holder if springs weak or broken
Resistors and suppressors	Test for continuity using 500 volt megger, see fig. 8	Renew if faulty
	Capacitor connections must be disconnected during this test	
Ball races	For damage	Renew
	Friction in turning	Renew
	Excessive side play	Renew
	Excessive end play (0·004 in. max.)	Renew
Flexibox fuel sealing gland	Scoring of seal face	If slight, relap to a mirror finish. If excessive, renew
	Sleeve seal damaged	Renew
Impeller	Scoring of carbon seal face and wear	If slight, relap to a mirror finish. If excessive, renew impeller
Strainers	Damaged gauge	Renew
Electrical connection	Chipped Bakelite plates, or damaged threads	Renew
By-pass valve	Seal between valve flap and seating.	Renew
	Faces should be lapped together	

22. If the field coils are unserviceable, no attempt must be made to detach them. The complete assembly must be renewed. Repairs to the field coil end connections where faulty insulation is concerned may be carried out, or baking of the complete assembly where insulating tests are low due to dampness.

23. The commutator must be lightly skimmed and polished, making sure that the diameter does not fall below 1·32 in. After skimming, the insulation slots must be cleaned of burrs and blown out with dry compressed air. The commutator must run true with armature shaft within 0·003 in. clock reading.

24. Examine the brushes for wear, and if worn below 0·5625 in. on longer edge they must be renewed. If they are still usable, it is necessary to ensure that they are returned to their original brush box and they should therefore have been suitably marked before removal (*see para.* 14). In addition, check the fit of the brushes in their boxes and the condition of the brush springs. The brushes must slide freely in the brush boxes, and if there is any sign of corrosion of the brushgear a new assembly should be installed.

25. Clean the field assembly of carbon dust, etc., using dry compressed air. If new brushes are fitted they must be bedded to the contour of the commutator over the full width of arc, with at least 80 per cent of its face area in contact. After this operation the whole armature and brushgear assembly should be blown up with dry compressed air prior to final assembly.

26. Examine the condition of the bearings. Check that the grease shields are not damaged in any way, suggesting possible cracking or breaking of the ball cages. Holding the outer race between the fingers, slowly rotate the inner race, feeling for excessive friction or binding of the tracks. Check for any possible excessive side or end play. If any of the above faults are apparent, the bearing must be renewed.

27. All castings should be examined to ensure that they have no corrosion or cracks. Machined mating surfaces must be smooth, clean and free from any residue of jointing compounds, etc.

RE-ASSEMBLY

Motor

28. Had it been found necessary to remove either the flame trap (131) or bearing retainer (136) from the commutator end frame (107 or 108), this re-assembly procedure must be followed.

29. In the case of the flame trap, six new hole positions must be made for six new drive screws, with the flame trap in its original position, ensuring that the inside diameter of the flame trap and commutator end frame are concentric and that sufficient clearance is given for through bolts (109) and screws (110). For bearing retainer (136), four new hole positions must be made accurately on the same P.C.D., and new drive screws fitted. A similar procedure follows if flame trap (147) had been removed from drive end frame (148).

30. After fitting new motor components as required, replace the drive end frame assembly inner bearing retainer (143), setting the four screws (144) in with air drying varnish to lock them.

31. Press the bearing (145 or 146) into the drive end frame (148). Fit the two outer bearing retainers (149 and 150) by replacing four screws (94), which are to be set in with air drying varnish.

32. Enter the field coil assembly (96 or 97) end connections into the cable passages in the drive end frame (148) and thread them through. Locate yoke and field coil assembly on the drive end frame; ensure that the locating dowel pin engages in the hole provided.

33. Enter the armature (98 or 99) into the partly assembled motor and press the shaft into position in the drive end frame bearing (145 or 146).

34. Place the slinger (139), washer (138) (Mk. 1 only) and spacer (137) on the commutator end of the armature shaft and assemble the commutator end frame (107 or 108). If the brushgear has been dismantled, it should be replaced as follows.

35. Correctly position the two brush holders (103) on the brush rocker (101) (it is assumed they were marked before dismantling) and secure with four screws (102) which are locked with air drying varnish.

36. Loosely fit the brushgear assembly to the commutator end frame with the two screws (110) and clinch nut assemblies (140–142). Rotate the brushgear assembly until the positioning marks (made when dismantling) line up. Tighten the screws (110), ensuring that the forked ends of the clinch nut plates (140) provide clear passage for the two through bolts (109).

37. Fit the commutator end frame, locating the dowel pin in the yoke and field coil assembly (96 or 97), and finally fit the two through bolts (109) to sleeve nuts (91) and lock with new tab washers (92).

38. In the case of Mk. 1–3 pumps, replace the bearing loading spring (111) and bearing grease shield (113) in commutator end frame bearing housing and press bearing (115) into position. For Mk. 4 pumps, bearing loading spring (111) and washer (112) is placed in commutator end frame bearing housing and bearing (114) pressed into position.

39. Fit slinger (93) and washer (155) on to drive end of armature shaft and washers (156) as required. Fit a new Twickclip (157) and replace shaft pin (90).

40. Insert capacitor (151) in saddle (154) and fasten to drive end frame (148) with two screws (153) and lockwashers (152). Remake electrical connection.

41. Fit shim(s) (116 or 117), bearing grease shield (118), two fan washers (130) and fan key (129), on to the commutator end of the armature shaft. Fit the fan (128), using a new tab washer (126) under the fan nut (125).

Note . . .

Do not hold fan when tightening fan nut, see para. 12.

42. Replace the two carbon brushes (104), into their correct boxes (*para.* 14). Join brush leads with the field coil end connections and secure with two screws (106) and lockwashers (105), fastening to their respective brush holders (103).

43. Finally replace dust covers (134) and insulators (135) to commutator end frame with twelve screws (132) and lockwashers (133). Dust cover insulators (135) are not fitted to Mk. 1 pumps.

Pump

44. All joints and lockwashers to be renewed when re-assembling.

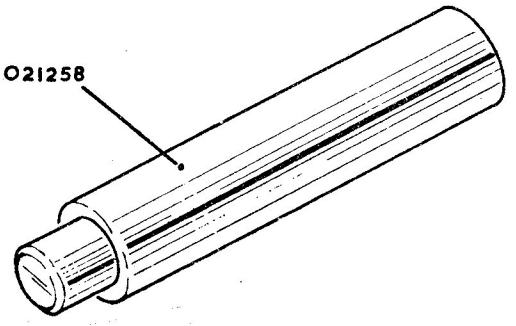

Fig. 4. Tool for pressing in stationary sleeve

45. Press in the stationary sleeve of the Flexibox seal (70) from the lower end of the pump yoke (51) with the special tool No. 021258 (*fig.* 4), having smeared the mating surfaces with Hermeticol.

46. Position the joints (52 and 54), then, making sure that the vapour deflector (57) is in place, lower the motor on to the pump, carefully feeding the motor leads through the duct provided in the pump. Line up the locating dowel, with the location hole in the drive end frame (148).

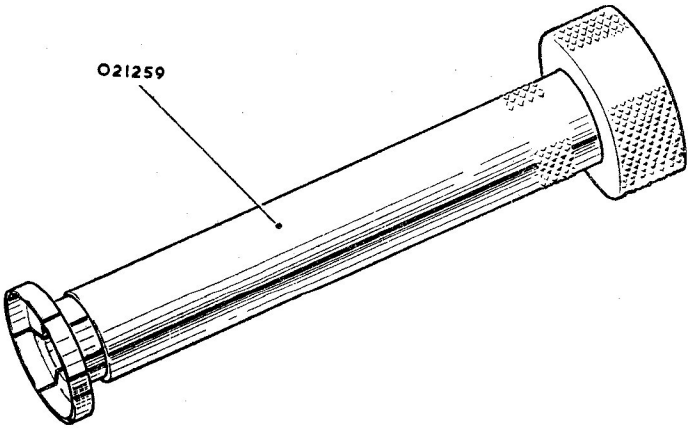

Fig. 5. Tool for assembling flexible seal.

47. Temporarily insert three motor screws (123) equally spaced at this juncture.

48. Fit the suction cover with two screws (69) and lockwashers (68). The free part of the Flexibox seal should be pushed home with the special tool No. 021259 (*fig.* 5). Slide the impeller up the shaft, allowing the shaft pin to engage in the slots in the top of the impeller. The carbon bearing ring (71) will now be in contact with the base of the seal.

49. Screw the Nyloc nut (81), with its washer (80), and tighten the nut by holding the impeller with a "C" spanner, special tool No. 021261 (*fig.* 6).

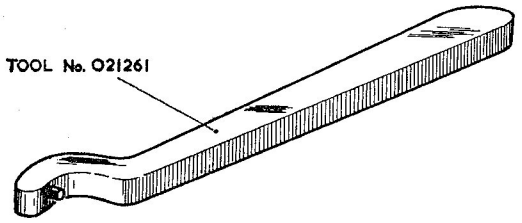

Fig. 6. " C " spanner for impeller.

50. Should the impeller suction face not now be flush with the edge of the suction cover, shims should be added below the impeller as required; when these two faces are flush, the Flexibox seal is correctly loaded.

51. The impeller clearance must now be checked, using tool No. 021287 (*fig.* 7). Check also for concentricity, using a dial test indicator, with the motor in a "V" block. For both these procedures the impeller shaft is rotated by turning the fan on top of the motor by hand.

52. The three motor screws can now be removed (*para.* 47) and the motor cover (122) with its ring (121) and joint (55) can be positioned. Insert ten of the twelve motor screws (120 and 123) with washers (119 and 124), ensuring that the four screws (120) with holes for locking wire are equally spaced around the rim, and that the two unused screws (which take the strainer brackets), will be diametrically opposite.

53. Assemble the by-pass valve; hinge the valve flap to the valve seat by the split pin. Press this assembly home, ensuring that the flap opens in the correct direction, *i.e.*, that the flap would be forced on to its seating when the pump is delivering fuel.

54. Fit the joint (67), then lower the yoke over the studs in the main casting, carefully feeding the leads through the breather duct provided. Screw on six nuts (50 and 64) with washers (65 and 49) and tighten. Fit four washers (62) to the longer studs and lower the vapour deflector (57) in position, adding four

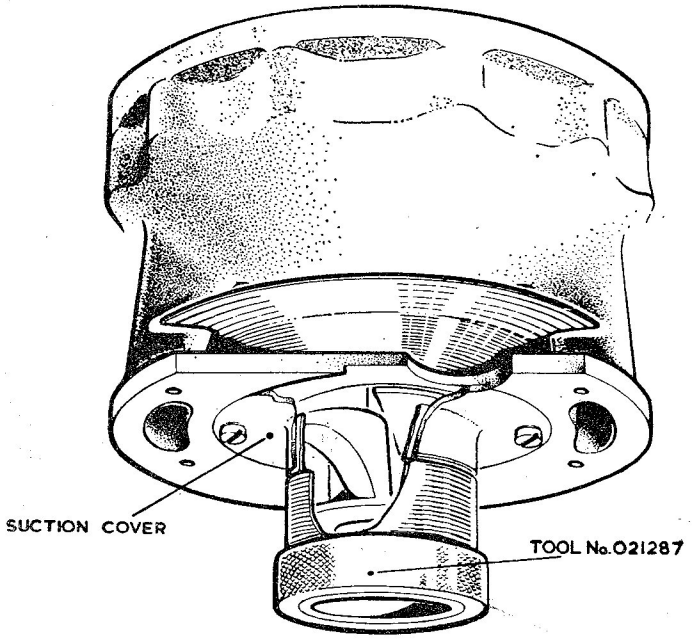

Fig. 7. Impeller clearance gauge.

washers (59) and Nyloc nuts (58) to longer studs. Below the front of the vapour deflector lip, fit a distance piece (63) held by a screw and lockwasher (60 and 61). Insert the pump casing drain plug (86) with a new joint washer (85).

55. Connect up the two suppressors (39) and clamp them in position in the casting with the two brackets (37), their screws (35) and washers (36). Remake the electrical connections with the breeze plug (82) and remount the plug.

56. Replace the bottom air breather (38), fasten the tab washer (83) with one of the two screws (33) and washers (34) on the inner circumference of the breather; the third screw and washer must go in the hole in the breather farthest from the resistance box position. The casing drain plug can now be locked with wire (84).

57. Run the nut (9) and its washer (10) down the long stud (6). Insert the long stud through the hole in the air baffle (32), screw the stud into the casting and tighten the free nut (9) against the baffle.

58. Assemble the two resistors (26 and 18), connect them up, and secure them to the brackets (25 and 29) with their screws and washers (27 and 28) to the pump casting. In the Mk. 1 pump the resistance box is threaded on to the three studs (6), the nuts (3) and washers (4), locking the box in position. In the case of the Mk. 2, 3 and 4 pumps the two screws (47) and washers (48) replace two of the studs (6).

59. The side air breather (40) is held by four screws (42) and lockwashers (41).

60. Finally, lower the suction strainer (56) over the motor cover and fasten with the two remaining motor screws. The four motor screws (120) can now be locked with wire.

TESTING

General

61. After final assembly the pump unit complete is now ready for testing for operational service.

Running light test

62. Run the motor light for a period sufficient to ensure that the brushes are bedded over 80 per cent of their axial width and over the whole circumference thickness.

(1) Motor to be fitted with open-ended canister to act as a cooling cowl.
(2) Run the motor at 9,000 rev/min., this speed to be obtained by an external regulating resistance in the shunt circuit.
(3) Brush polarity to be changed every two hours during bedding to prevent excessive brush wear.

Overspeed test

63. Run the motor at 15,000 rev/min. for 10 minutes. During this run there must be no signs of excessive noise or vibration.

Continuity resistance test

64. Measure the resistance of the armature windings and field coils, corrected to 15 deg.C. The values must lie within the following limits:—

(1) Armature windings (180 deg. apart): 0·121 to 0·141 ohms.
(2) Field coils (per coil):
Series 0·0139 to 0·0155 ohms.
Shunt 5·1 to 5·8 ohms.

Performance test

65. The rotation of the shaft looking at the commutator end shall be clockwise. The motor speed when coupled to a suitable brake and run at 29 oz. in. torque on a terminal voltage of 26 volts must not be less than 5,900 rev/min. or more than 6,100 rev/min. The motor speed when coupled to a suitable brake and run at 33 oz. in. torque on a terminal voltage of 28 volts must not exceed 6,900 rev/min. The current consumption must not exceed 12·5 amperes.

High voltage test

66. The insulation resistance of the motor must withstand a test pressure of 500 volt (r.m.s.), 50 cycles per second a.c., applied between live parts and the frame for a period of one minute.

67. The insulation resistance between live parts and the frame must exceed 2 megohms when measured at a test potential of 250 volt d.c. These measurements are to be made with the motor hot.

Rating of motor and speed control

68. The rating is continuous, maximum voltage at high altitude fast speed. Fifteen minutes rating, with maximum voltage at low altitude fast speed. The speed control, due to shunt field variation (three resistors mounted on pump), is two medium speeds, two fast speeds and one slow speed.

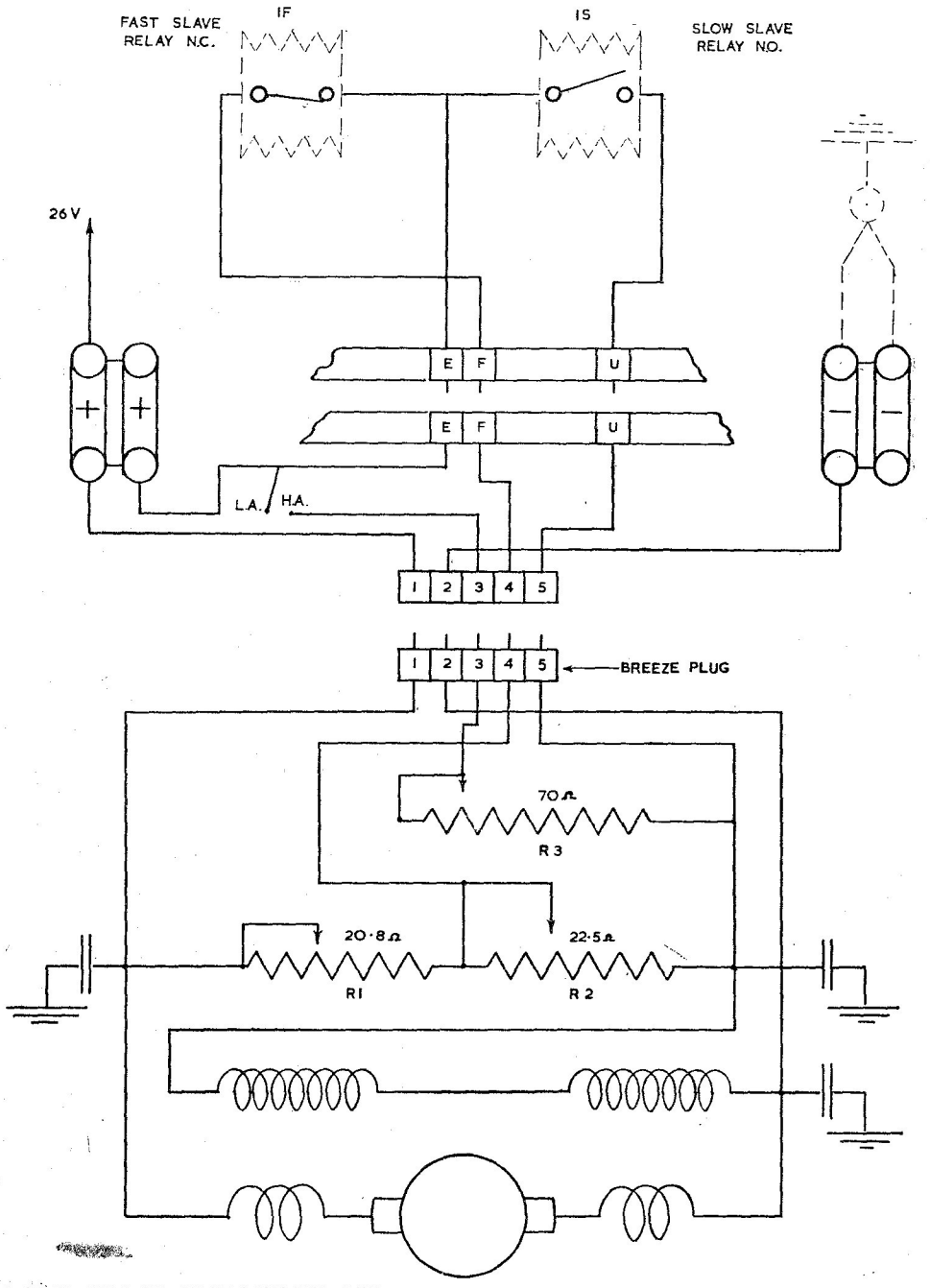

TABLE OF SHUNT FIELD AND SHUNT REGULATOR DATA

CONDITION		FIELD A	TOTAL A	FIELD W	REGR.W	TOTAL W
LOW ALT	SLOW	2·11	2·11	54·8	O	54·8
	MEDIUM	·74	·74	6·9	12·3	19·2
	FAST	·47	·47	2·8	9·5	12·3
HIGH ALT	SLOW	2·11	2·11	54·8	O	54·8
	MEDIUM	·88	·88	9·7	13·1	22·8
	FAST	·66	·66	5·5	11·8	17·3

R1 34Ω RESISTANCE – MAX CURRENT - 1·15 AMPS – 45 WATTS RATING.
R2 34Ω RESISTANCE – MAX CURRENT - 1·15 AMPS – 45 WATTS RATING.
R3 107Ω RESISTANCE – MAX CURRENT - 0·65 AMPS – 45 WATTS RATING.

Fig. 8. Circuit diagram.

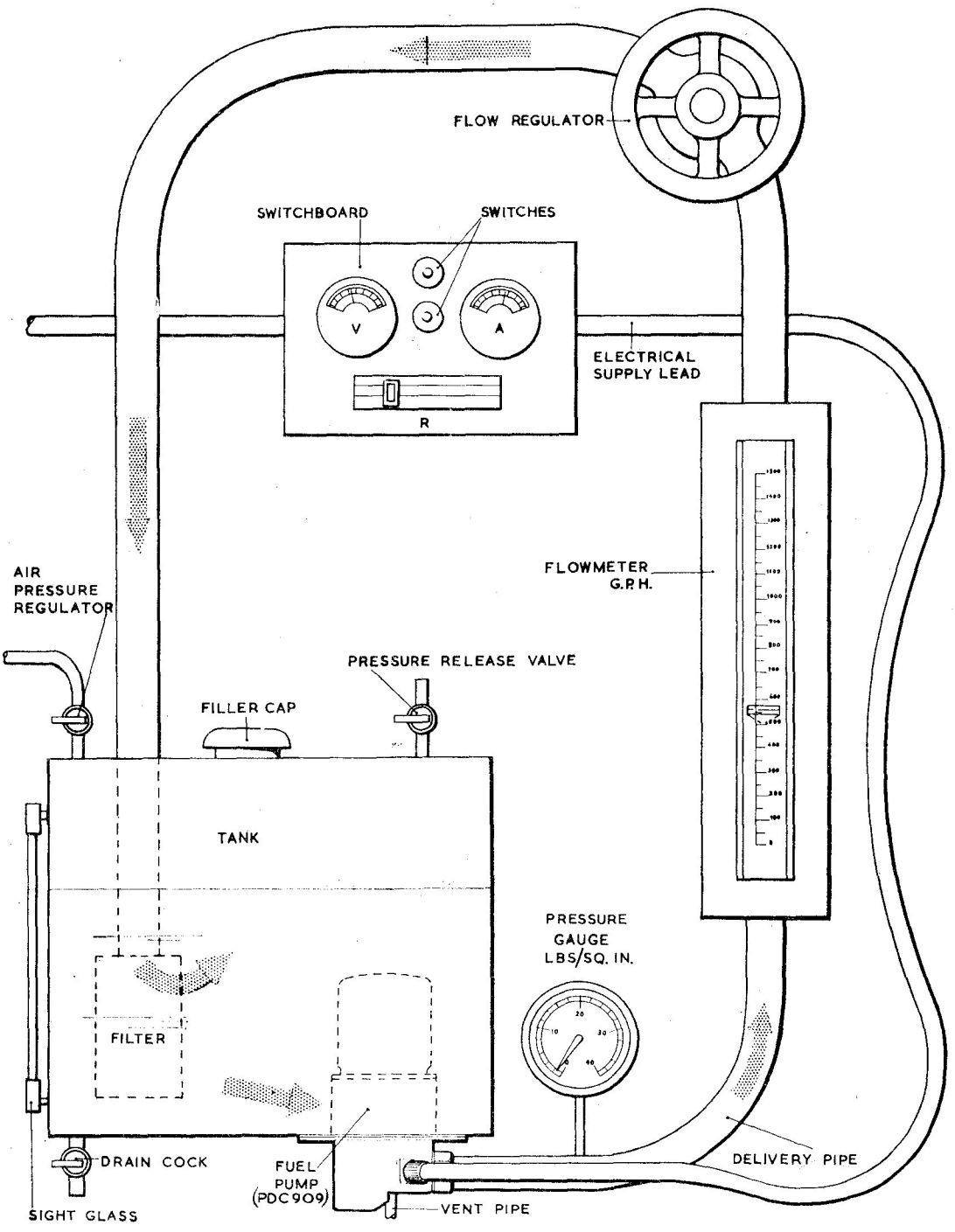

Fig. 9. Test rig.

Refuelling requirements

69. It must be possible to pressure refuel the tank directly through the pump at a maximum rate of 76 gallons per minute with a pressure of 10 lb/in². The suction by-pass valve should be made to open during refuelling operations to prevent the motor from rotating. Aviation fuels used may be Aveat, Avtag or Avtur.

Starting test

70. The assembled pump shall start satisfactorily when 16 volt d.c. supply is applied. For this test the pump shall be fully primed and completely submerged. A suitable test ◄ rig is shown (*fig.* 9). This test should be at Low Altitude Fast Speed. ►

Dry running test

71. The pump shall be mounted clear of the fuel and run dry for not less than 5 minutes with 28 volt d.c. applied at low altitude fast speed. The current during this test shall be observed and must not exceed 7·5 amperes.

Gland leakage tests

◄ **72.** The pump is to be fully primed under 1 foot head of fuel, over which a superimposed air pressure of 16 lb/in² is to be applied. Observations are to be made for:—

(1) External leakage of fuel.
(2) Internal leakage of fuel.
(3) Gland leakage of fuel.

The allowable rate of leakage past the gland is 1 c.c. per hour. No other leakage is permissible. ►

Calibration test

73. The no delivery pressure at the pump outlet, including the corresponding fuel tank of the aircraft for which the pump has been designed, shall not exceed 30 lb/in² when running on the maximum voltage at "low altitude fast speed".

74. At all five speeds the pump is to be run under a fuel head pressure of 6 in. above the pump inlet for 30 minutes at "low altitude fast speed" with 26 volt d.c. supply, delivery pressure 11 lb/in². Switch to "high altitude fast speed" and run for a further period of 15 minutes. Flow rate 300 gallons per hour. Calibrate by adjustment of resistance assemblies given in Table 3.

Table 3

Calibration test

Speed Class	Fuel flow in g.p.h.	Pressure in lb/in²	d.c. voltage
Low altitude speed	1100	◄ Not less than 10·5	26
Low altitude medium speed ..	Closed valve	15 to 16	26
Low altitude fast speed	Closed valve	18·5 to 19·5	26
High altitude fast speed	Closed valve	16 to 17	26
High altitude medium speed ..	Closed valve	14 to 15	26
Slow speed	Closed valve	9 to 12 ►	26

The maximum current is 19 amperes

A4047. Wt. 38859/3228. 1750. 8/60. M°C. 999–225.

Table 4—contd.

Schedule of parts, PDC. 909, Mk. 1, 2, 3 and 4 fuel pump

Item No.	Description	Maker's Part No.	Mk.	No. off per pump
77	Flap (by-pass valve)	03962	1–4	1
78	Casing, pump	013960	1–4	1
79	Shim (impeller setting)	09874	1–4	As reqd.
80	Washer (impeller nut)	09883	1–4	1
81	Nut (Simmonds) Nyloc, hexagon, thin type, $\frac{1}{4}$″ BSF	AGS 2002/I/H	1–4	1
82	Breeze plug (complete)	CZ 50359	1–4	1
83	Washer, tab (casing drain plug)	06359	1–4	1
84	Wire, locking (drain plug), chrome/nickel non-corrodible steel	22 s.w.g. DTD189	1–4	6″
85	Joint washer (for drain plug)	AGS 1186, Mk. F	1–4	1
86	Casing (drain plug)	09858	1–4	1
87	Screw (cable clip), 6 BA ch. hd. × $\frac{3}{8}$″ long	BSS A31/A12	1–4	1
88	Lockwasher (cable clip) (Barber & Coleman, type 12), 6 BA	Shakeproof	1–4	1
89	Clip, cable	Z/8323/98	1–4	1
90	Pin, shaft	Z/8323/76	1–4	1
91	Nut (through bolt)	Z/8323/87	1–4	2
92	Lockwasher (through bolt), $\frac{1}{4}$″ right angle tab washer	BSS SP43/E	1–4	2
93	Slinger, drive end	Z/8323/50	1–4	1
94	Screws (bearing retainer), 6 BA csk. hd. × $\frac{1}{4}$″ long	BSS A33/A8	1–4	4
95	Stack assembly	Y/8323/A	1–4	1
96	Field assembly	W/8352/2	2–4	1
97	Field assembly	W/8323/2	1	1
98	Armature assembly	X/8352/1	2–4	1
99	Armature assembly	X/8323/1	1	1
100	Brush rocker assembly (items 101–106 incl.)	Y/8352/2	1–4	1
101	Brush rocker	X/8323/10S	1–4	1
102	Screw (brush box), 4 BA ch. hd. × $\frac{3}{4}$″ long	BSS A31/B24	1–4	4
103	Brush holder (Morgan Crucible) (spring 105355/4)	1051196	1–4	2
104	Brush	Z/8323/45	1–4	2
105	Lockwasher (brush)	13533	1–4	2
106	Screws (brush), 4 BA ch. hd. × $\frac{1}{4}$″ long	BSS A31/B8	1–4	2
107	Frame, commutator end	W/8323/36	2–4	1
108	Frame, commutator end	2860581	1	1
109	Through bolt	Z/8323/61	1–4	2
110	Screw (brushgear), 4 BA csk. hd. × 1″ long	BSS A33/B32	1–4	2
111	Spring (bearing loading)	Y/8323/48	1–4	1
112	Washer (commutator end)	Z/8352/108	4	1
113	Shield, bearing grease	Z/8323/53	1–3	1
114	Bearing, double-shielded (commutator end)	R.D.H.72 DOT	4	1
115	Bearing (commutator end)	SKF. R722 HOFF 107PND37	1–3	1
116	Shim	Z/8323/74	4	As reqd.
117	Shim	Z/8323/74	1–3	1
118	Shield, bearing grease	Z/8323/54	1–4	1
119	Lockwasher (motor screws)	04006	1–4	4

Table 4—contd.

Schedule of parts, PDC. 909, Mk. 1, 2, 3 and 4 fuel pump

Item No.	Description	Maker's Part No.	Mk.	No. off per pump
120	Screw (motor)	015634/N	1–4	4
121	Ring (motor cover)	013832	1–4	1
122	Cover (motor)	013819	1–4	1
123	Screw (motor), 2 BA ch. hd. × 1″ long	BSS A31/C32	1–4	8
124	Lockwasher (motor screws)	04006	1–4	8
125	Nut, fan, $\frac{1}{4}$″ BSF	BSS A16Y/EP	1–4	1
126	Lockwasher, fan, $\frac{1}{4}$″ straight tab washer	BSS SP41/E	1–4	1
127	Bush (supplied integrally with fan)	Z/8323/62	1–4	1
128	Fan	Z/8323/37	1–4	1
129	Key, fan	Z/8323/75	1–4	1
130	Washer, fan	AGS 1582/A	1–4	2
131	Flame trap (commutator end)	Z/8323/57	1–4	1
132	Screw (dust cover), 6 BA rd. hd. × $\frac{3}{16}$″ long	BSS A32/A6	1–4	12
133	Lockwasher (type 12, stock No. 1204), 6 BA	Shakeproof (13585)	1–4	12
134	Dust cover	X/8323/39	1–4	2
135	Insulator (dust cover)	X/8323/39	2–4	2
136	Bearing retainer	Z/8323/52	1–4	1
137	Spacer	Z/8323/84	1–4	1
138	Washer (commutator)	Z/8323/97	1	1
139	Slinger (commutator end)	Z/8323/58	1–4	1
140	Nut plate (brushgear)	Z/8323/67	1–4	2
141	Insert, clinch nut (N.S.K. 3225/5)	Y/8323/68	1–4	2
142	Clinch nut (brushgear)	Y/8323/68	1–4	2
143	Bearing retainer	Z/8323/51	1–4	1
144	Screws (bearing retainer), 6 BA csk. hd. × $\frac{1}{4}$″ long	BSS A33/A8	1–4	4
145	Bearing (drive end)	SKF. 6201Z HOFF 112 P.ND 3201	1–3	1
146	Bearing, double-shielded (drive end)	HOFF 112 PP	4	1
147	Flame trap, drive end	Z/8323/56	1–4	1
148	Frame, drive end (machined)	W/8323/35	1–4	1
149	Bearing, retainer	Z/8323/96	1–4	1
150	Bearing, retainer	Z/8323/55	1–4	1
151	Capacitor (Dubilier) (·75 mfd 160 v. d.c.)	A.M. STORES Ref. 5c/3602	1–4	1
152	Lockwasher (capacitor) (Barber & Coleman, type 12), 6 BA	Shakeproof	1–4	2
153	Screw (capacitor), 6 BA ch. hd. × $\frac{3}{8}$″ long	BSS A31/A12	1–4	2
154	Saddle (capacitor)	Z/8323/91	1–4	1
155	Washer, shaft, $\frac{7}{16}$″ i/d, 12 s.w.g., plain	BSS SP16/L	1–4	1
156	Washer, Twickclip, $\frac{7}{16}$″ i/d, 26 s.w.g., plain	BSS SP10/L	1–4	As reqd.
157	Twickclip	Z/8323/49	1–4	1

Appendix 1

Schedule of fits, clearances and repair tolerances

All dimensions in inches — Pump, Fuel, PDC. 909

Item No.	Description	New dimension	Permissible worn dimension for further use	New clearance	Permissible worn clearance	Remarks
1	Brush length long	·7812	·5625	—	—	Brush shortens approx. ·055 in. in 500 hours
2	Commutator diameter	1·39 1·40	1·32	—	—	Diameter reduces approx. ·001 in. in 500 hours
3	Armature end float	—	—	—	·005	—
4	Armature shaft in drive end ball rod	diam. ·482 ·487	—	—	—	Inner race clamped to shaft on both faces
5	Armature shaft in commutator end ball race	diam. ·285 ·290	—	—	—	Inner race clamped to shaft on both faces
6	Flexible seal	·669	·664	—	—	Load 3 to 3½ lb. at working length ·669 in.
7	Impeller diameter Suction cover bore	1·549 1·550 1·5625 1·5637	1·545 1·5652	max. ·0147	·020	Should not be worn by contact, but might be scratched by abrasives in pumped fuel. Minimum radial clearance (allowing for impeller eccentricity) not to be less than ·003 in.
8	Impeller carbon ring	·151 ·161 thick	·133	—	—	Slight scoring can be removed by lapping but final thickness must not be less than stated

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