Chapter 2

SERVICING AND MINOR REPAIRS

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LIST OF ILLUSTRATIONS

INTRODUCTION

1. The components of the Plessey I.P.N. turbo-starter system require very little attention between the routine periods stipulated in the aircraft servicing schedule. The components fall into three categories:—(1) Electrical, (2) Electro-mechanical, and (3) Mechanical.

SERVICING

2. The servicing and minor repairs of the electrical components and of the electrical portions of the electro-mechanical components are covered in detail in the Air Publications shown below:

(1) Control box, motor contactor, ignition switch and the electrical portion of the high pressure switch, in A.P.4343C.

(2) Motor driving the fuel pump and air blower, in A.P.4343D.

(3) Electrical portion of the solenoid valve, in A.P.4343E.

(4) High frequency ignition unit, in A.P.1374G. Additionally, electrical checks which are appropriate to the servicing of the complete system have been included in this chapter.

3. Faulty items should be renewed, but their dismantling and repair may be carried out only where the necessary test gear is available. Full dismantling, assembling and major repair instructions for the mechanical components are given in Vol. 6, Part 2, 3 and 4. The extent to which servicing and minor repairs may otherwise be carried out is described in the succeeding paragraphs.

Insulation tests

4. Measurement of the insulation resistance should be carried out at the intervals stated in the servicing schedule and whenever the electrical wiring has been disturbed. The starter and battery master switches should be switched OFF and then the following units disconnected:—motor contactor, control box, ignition unit, solenoid valve (if accessible), and the aircraft batteries. For the following tests a 250-volt megger should be used.

Between circuits

5. (1) With the starter push button operated, the insulation resistance between sockets A and B in the 2-pin socket at the control box end of the lead should not be less than 5 megohms.

(2) If the solenoid valve socket can be removed, the insulation resistance between sockets B and C in the 4-pin RED socket at the control box end should not be less than 5 megohms.

(3) The insulation resistance between sockets B and D in the RED socket at the control box end should not be less than 5 megohms.

(4) The insulation resistance between socket D in the 4-pin RED socket at the control box end and socket A in the 2-pin socket at the ignition unit end should not be less than 5 megohms.

(5) The insulation resistance between sockets A and B, B and C, and C and D in the 4-pin BLUE socket at the control box end should not be less than 5 megohms.

Between wiring and earth

6. (1) The insulation resistance between earth and sockets B and D in the 4-pin RED socket at the control box end should not be less than 5 megohms.

(2) The insulation resistance between earth and socket C of the 4-pin RED socket at the control box end with the socket at the solenoid valve disconnected, should not be less than 5 megohms.

(3) The insulation resistance between earth and sockets A, B and C in the 4-pin BLUE socket at the control box end should not be less than 5 megohms.

Fuel consumption tests

7. Place a voltmeter across the motor leads at the nearest junction box to the motor. Fill the starter fuel tank to a predetermined mark and carry out a start, checking the voltage during the combustion cycle and the length of time of combustion using a stop watch. Measure the quantity of fuel (in c.c.) required to refill the tank to the mark and divide this quantity by the time of combustion to obtain the fuel flow per second.

8. If the rate of flow is lower than that specified below for the voltages quoted, then the complete pump, blower and motor assembly must be returned for overhaul.

Motor terminal volts (load)	Fuel flow, cm^3/sec. LTSA 150 Pre-Mod. 193	LTSA 150 Mod. 193	LTSA 70
16	260	310	230
22	300	340	250
26	340	360	300

Fuel priming and fail safe checks

9. When either the starter electrical or fuel system has been disturbed, fuel priming and fail safe checks must be carried out in accordance with the procedure described in Sect. 1, Chap. 3.

MINOR REPAIRS

Starter motor

10. The only minor repairs permitted on the starter motor are those stated in the following paragraphs and the renewal of O-rings (*para.* 21 to 29). The main components of the starter must not be disturbed, but the atomizer may be dismantled sufficiently to clear the air valve and check the fuel valve. Should any unserviceability occur which cannot be rectified by the repairs specified in this chapter, the starter should be returned for major repair.

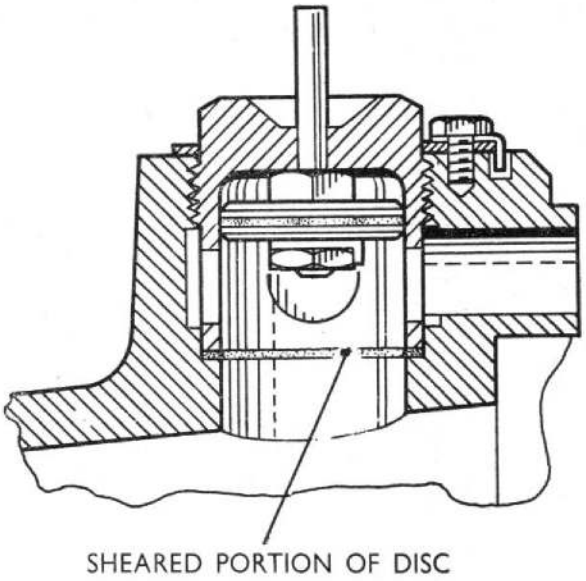


Fig. 1. Burst safety disc

Safety disc

11. A burst safety disc is indicated by the protrusion through the safety disc holder of the stem on which the disc is mounted (*fig.* 1). To renew a burst disc, proceed as follows:—

(1) Remove the locking screw and the star locking washer, and unscrew the safety disc holder.

(2) Lift out the disc assembly and ensure that the sheared outer edge of the disc is also removed from its seating.

(3) Thoroughly clean any residual carbon from the seating.

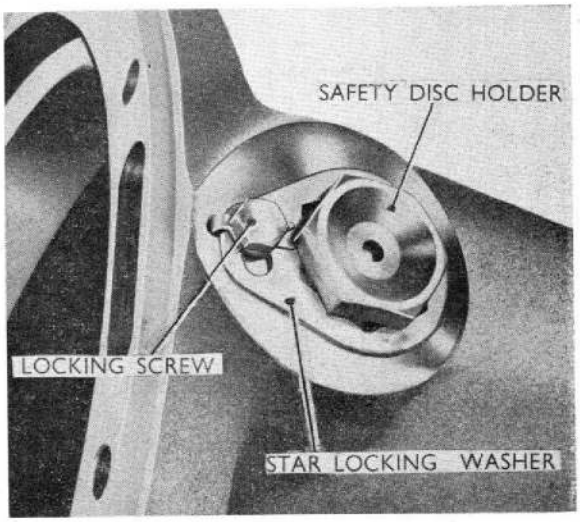


Fig. 2. Method of locking safety disc assembly

(4) Insert a new safety disc assembly in the combustion chamber, apply ZX-13 to the threads and tighten the safety disc holder with a torque spanner set at 32 lb. ft.

(5) Fit the star locking washer and the locking screw together with a new tab washer (fig. 2).

Igniter plug

12. To remove an igniter plug, disconnect the leaf from the plug and remove and discard the three securing set-bolts. The top cap of the plug should be easily removable, but if the plug body cannot be moved by hand owing to accumulated carbon, insert two of the securing screws into the two threaded holes of the body and tighten evenly. This action will break the carbon and enable the plug body to be withdrawn without damage. Finally, the gasket should be removed.

13. To fit a new igniter plug, proceed as follows:—

(1) Place a new gasket in position.

(2) Separate the plug cap from the plug body. (The bolts and nuts holding the two portions together are for transportation and storage purposes only and should be transferred to the old plug if it is to be reconditioned).

(3) Insert the plug body into the combustion chamber, ensuring that the earth electrodes are orientated at right-angles to the direction of fuel flow from the atomizer (fig. 3).

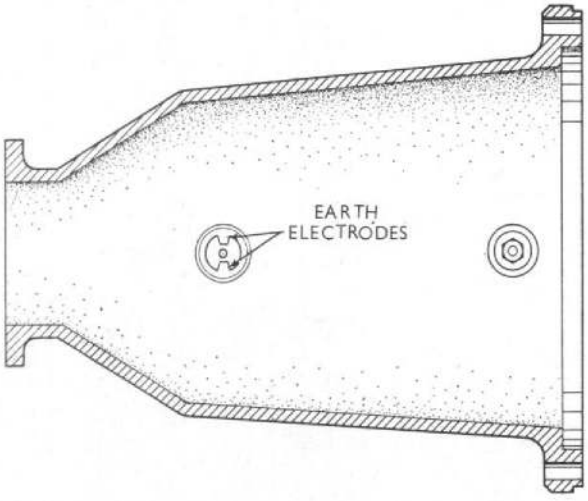


Fig. 3. Orientation of igniter earth electrodes

(4) Fit the plug cap in position, with the elbow orientated to the most convenient position to receive the plug lead.

(5) Apply compound ZX-13 to the threads of three new bolts, assemble a tabwasher to each bolt and attach the plug assembly to the combustion chamber. Using a 2 B.A. box spanner and a 4 in. tommy bar disposed so that it protrudes equally from each side of the spanner, fully tighten the securing bolts, and lock with the tabwashers.

Note . . .

The bolts must be tightened evenly to avoid distortion of the plug assembly.

14. If it is necessary to renew an igniter plug lead, this can be done without removing the plug from the starter. The lead should be disconnected from the plug and from the connector on the end plate. When the new lead is fitted it must be wire-locked.

End plate fitting, LTSA 150

15. Remove the end plate fitting as follows:—

(1) Remove the six bolts securing the atomizer to the combustion chamber; two of these bolts will also release the air hose. Remove the atomizer complete with the fuel hose.

(2) Disconnect the igniter leads from the end plate fitting.

(3) Remove the two 2 B.A. nuts and withdraw the bolts securing the speed control switch plug to the end plate fitting.

(4) Remove the two 2 B.A. nuts and withdraw the bolts securing the vent tube union assembly to the end plate fitting. Dismantle the union assembly.

(5) Ease the end plate fitting over the end of the exhaust manifold.

16. The procedure for installing the end plate fitting is the reverse of that given for its removal, new O-rings being fitted to the vent pipe union and speed control plug joint, in accordance with the procedure described in para. 21. All unions and plugs must be wire-locked where provision is made and the atomizer assembled to the combustion chamber as stated in para. 32.

Fuel pump, air blower and motor unit

17. The only minor repairs permitted on the fuel pump, air blower and motor unit, are the renewal of O-rings (para. 24 to 26) and the cleaning of the air filter (para. 18). The three components must not be separated, and if any one of them becomes unserviceable, the complete assembly must be returned for repair.

Air filter

18. The procedure for cleaning the air filter is as follows:—

(1) Remove the four fixing screws and the perforated cover.

(2) Wash the gauze and the perforated cover in benzine (rags or brushes must not be used) and allow to dry in the atmosphere.

The greatest care must be taken to prevent dirt or foreign matter entering the air blower while the filter is removed.

H.P. switch, anti-dribble valve and solenoid valve

19. The only minor repair permitted on this component is the renewal of certain O-rings (para. 27 and 28).

Ignition switch (fig. 4)

20. The pressure setting of the switch may be checked and readjusted as follows:—

(1) With the switch removed from the aircraft, secure a blanking plug over one of the unions and fit the unit to a pneumatic test rig.

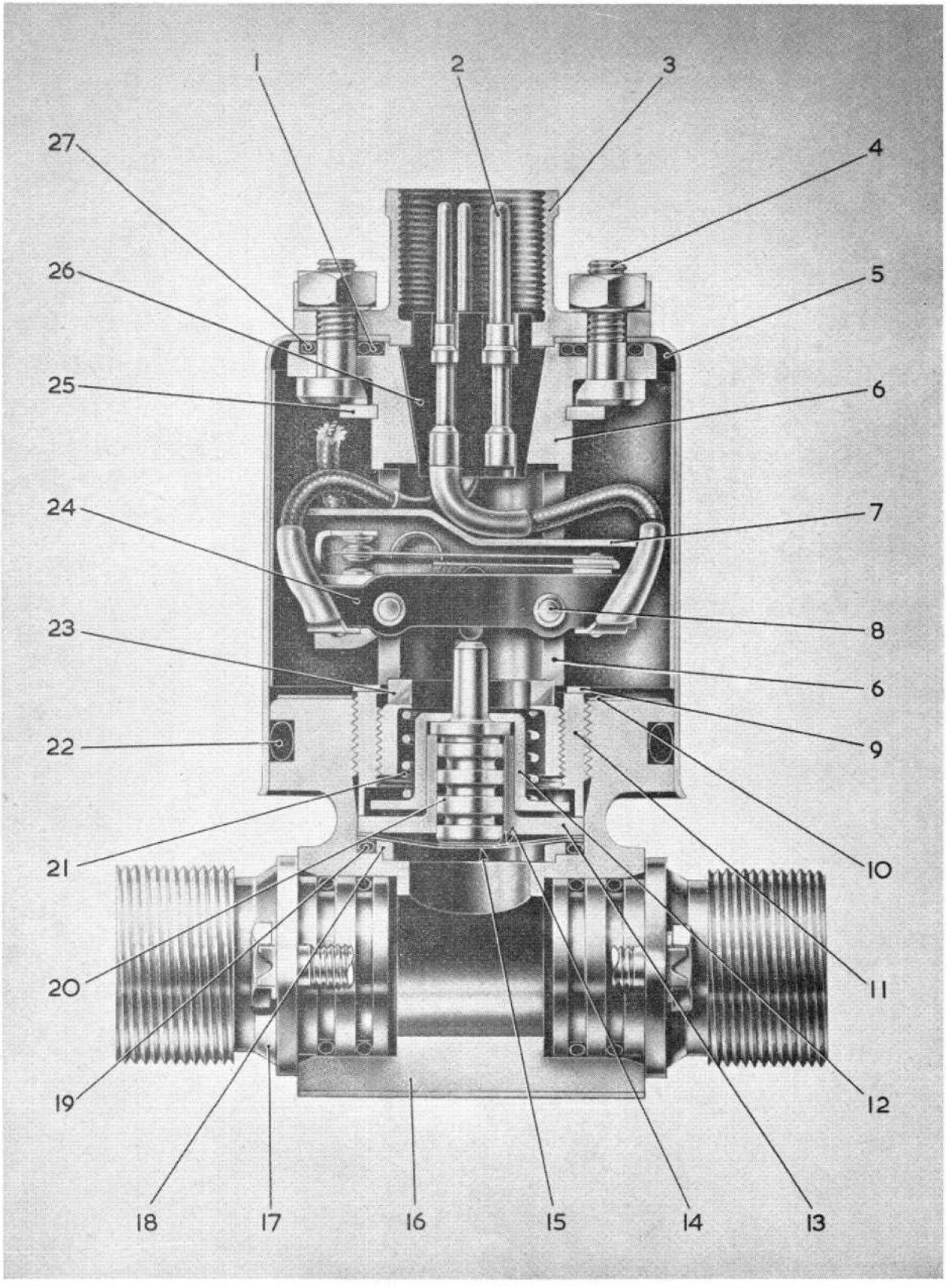


Fig. 4. Ignition switch

Key to Fig. 4

1 O-RING
2 DUMMY PIN
3 PLUG BODY
4 BOLT
5 SEALING CAP
6 SWITCH HOLDER
7 SWITCH SHIELD
8 6 B.A. BOLT
9 SHIM
10 INSULATING RING
11 CLAMPING SCREW
12 SPRING CAP
13 DIAPHRAGM SUPPORT PLATE
14 RUBBER DIAPHRAGM
15 TERYLENE DIAPHRAGM
16 SWITCH BODY
17 CONNECTION
18 O-RING SUPPORT
19 O-RING
20 ACTUATOR ROD
21 SPRING
22 O-RING
23 ADJUSTING SCREW
24 ACRO SWITCH ASSEMBLY
25 RETAINING RING
26 PLUG MOULDING
27 O-RING

(2) Connect an electrical circuit tester to pin A and C in the connector plug.

(3) Apply air pressure; the switch should operate at 40 to 45 lb/in².

(4) If the pressure requires resetting, partially dismantle the switch as follows:—

(a) Remove the nuts and tabwashers from the electrical plug body fixing bolts (4).

(b) Remove the plug body (3).

(c) Withdraw the sealing cap (5), which will require a strong pull off due to the sticking effect of the seal; it must not be levered off.

(d) Remove the two 2 B.A. bolts and special tabwashers securing the Acro switch holder to the main body.

(e) Lift off the holder; carefully note the number and position of the insulating rings (10) and locking shims (9) and retain them for re-assembly. The clamping screw (11) which retains the diaphragms must not be disturbed or the resetting of the pressure will be nullified after a number of starts.

(5) Screw out the adjusting screw (23) by hand to reduce the pressure setting ◄ ; one full full turn will make a difference of approximately 2 lb/in². ► Temporarily re-assemble the switch holder to the main body with the insulating rings and locking shims correctly positioned and recheck the pressure setting on the rig. Repeat until the correct pressure setting of 40 to 45 lb/in² is obtained.

Note . . .

The bottom of the locking slots in the adjusting screw (23) *must not come above the level of the top of the clamping screw* (11) *otherwise the locking shims* (9) *will not seat correctly. If this occurs during the pressure resetting, a weaker spring must be fitted in place of the existing spring by removing the adjusting screw and ◄ fitting spring* 37*F*/20783. ►

(6) When the correct pressure setting has been obtained, fit new special tabwashers to the two 2 B.A. bolts securing the switch holder to the main body and ensure that the original insulating rings and locking shims are correctly fitted. Tighten the bolts evenly and lock the tabwashers.

(7) Reassemble the sealing cap and plug body with new tabwashers fitted under the two securing bolt nuts.

(8) ◄ Operate the switch a number of times to bed-in the new spring then recheck the unit for correct operation and operating pressure. ►

(9) Replace switch in the aircraft.

RENEWAL OF O-RINGS

21. O-rings which should be renewed during first line servicing are specified in the following paragraphs. It is imperative that when an O-ring has been disturbed a new one must be fitted. In all cases the new O-rings must be lightly smeared with grease XG-275 and they must not be damaged or displaced from their seatings during reassembly of components. All tabwashers must be renewed on reassembly and union connections wire-locked wherever provision for this is made. Anti-seize compound ZX-13 must be applied to the threads of all retaining bolts prior to torque loading on reassembly of components.

Starter motor

Atomizer

22. The replacement of O-rings in each type of atomizer involves dismantling and reassembling the unit. As the minor servicing and repair also involves O-ring change both are dealt with concurrently in para. 30 to 48.

Oil filler plug

23. When necessary the O-ring on the oil filler plug should be renewed in accordance with the procedure outlined in para. 21.

Fuel pump, air blower and motor unit

Air dump valve

24. (1) Slacken the four screws securing the valve cap to the housing, at the same time holding the cap against the valve spring tension until the securing bolts are clear of the housing.

(2) Remove the cap and withdraw the spring guide, spring, valve and valve seat.

(3) Renew the O-rings on both the valve and the valve seat in accordance with the procedure described in para. 21.

(4) Assemble the components in the reverse order to that given for dismantling.

Relief valve

25. (1) Slacken the four screws securing the valve cap to the housing, at the same time holding the valve cap against the valve spring tension until the securing bolts are clear of the housing.

(2) Remove the valve cap, spring, retainer and ball.

(3) Unlock the tabwasher and unscrew the valve seat.

(4) Renew the O-rings on the valve cap and the valve seat in accordance with the procedure described in para. 21.

(5) Assemble the components in the reverse order to that given for dismantling, ensuring that any shims used between the valve cap and the spring are replaced correctly.

Fuel inlet adapter

26. Remove the adapter from the housing, renew the O-rings in accordance with the procedure described in para. 21, and replace the adapter.

H.P. switch, anti-dribble valve and solenoid valve

27. Remove the fuel inlet and outlet union connectors and the blank from the anti-dribble valve body and renew the O-rings on these components in accordance with the procedure described in para. 21. Renew the O-rings in the solenoid non-return valve in the same manner.

28. Renew the O-rings, between the solenoid valve and the anti-dribble valve as follows:—

(1) Slacken the bolts from the fuel inlet union and anti-dribble valve blank. This is to ensure that the four bolts quoted in sub-para. (2) are free of the barrel nuts.

(2) Remove the four bolts and separate the anti-dribble valve and solenoid valve bodies.

(3) Renew the two O-rings in accordance with the procedure described in para. 21.

(4) Ensure that the mating surface of the two bodies are perfectly clean.

(5) Assemble the components in the reverse order to that given for dismantling, ensuring that the four bolts, sub-para. (2), are secured before the two bolts in sub-para. (1).

Ignition switch

29. Disconnect the fuel pipes, remove the two union connectors and renew the O-rings in accordance with the procedure described in para. 21.

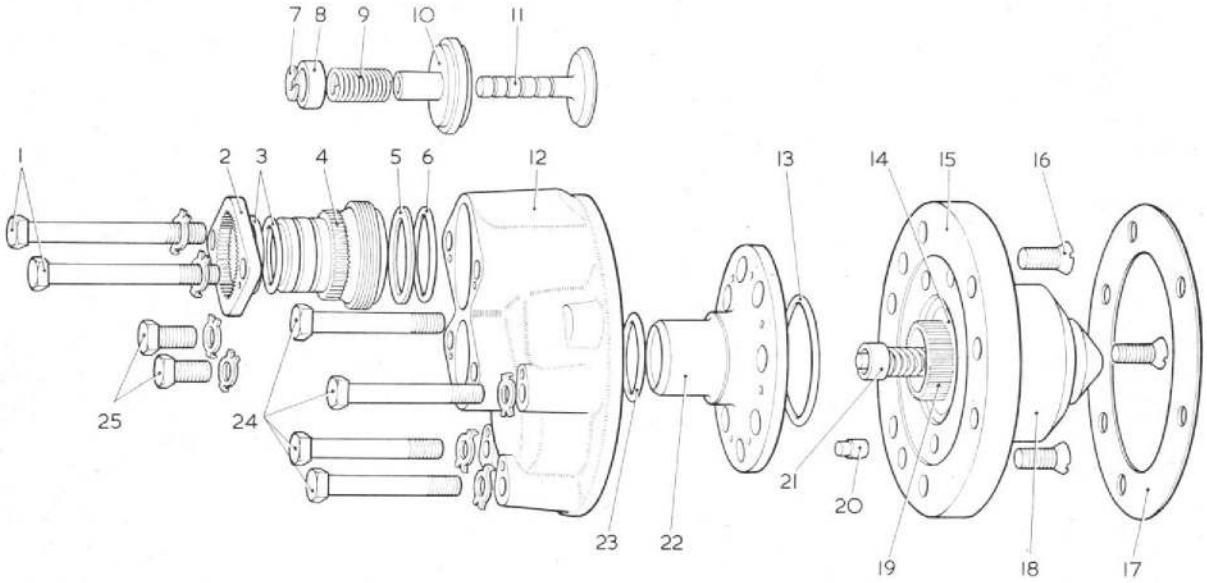
ATOMIZER FUEL VALVE CHECKS

Note . . .

The atomizer body and housing are made of aluminium alloy and must not be gripped in a vice during any of the following operations.

Forward entry type head (fig. 5)

30. The following method is used to remove the atomizer from the combustion chamber and check the fuel valve:—



1 AIR HOSE SECURING BOLTS AND MAIN ATTACHMENT BOLTS (LONG)
2 LOCK PLATE
3 O-RINGS
4 AIR VALVE SLEEVE
5 ALUMINIUM BACKING WASHER
6 O-RING
7 SPRING RETAINING WASHER
8 DISTANCE WASHER
9 SPRING
10 AIR VALVE GUIDE
11 AIR VALVE PLUNGER
12 ATOMIZER HOUSING
13 P.T.F.E. O-RING
14 P.T.F.E. SEALING RING (RECTANGULAR SECTION)
15 ATOMIZER BODY
16 RETAINING SCREWS (ATOMIZER BODY TO HOUSING)
17 GASKET
18 SWIRL CHAMBER
19 FUEL VALVE RETAINING NUT
20 LOCATING PIN
21 FUEL VALVE
22 FUEL VALVE SLEEVE
23 O-RING
24 MAIN ATTACHMENT BOLTS (SHORT)
25 FUEL HOSE SECURING BOLTS

Fig. 5. Atomizer, forward entry type head

(1) Remove the two bolts (25) securing the fuel hose to the atomizer, disconnect the fuel hose, remove and discard the O-rings (fig. 7).

(2) Remove the two bolts (1) securing the air hose to the atomizer and combustion chamber and remove the air hose and air valve assembly as detailed in para. 47.

(3) Remove the four remaining securing bolts (24) and withdraw the atomizer through the end plate fitting. Discard the gaskets (17) from each face of the end plate.

(4) Place the atomizer on a bench with the swirl chamber (18) uppermost, remove the three countersunk screws (16) and separate the atomizer body (15) from the housing (12).

(5) Separate the fuel valve sleeve (22) from the atomizer housing and remove the O-ring (23) from the throat of the housing.

(6) Remove the P.T.F.E. O-ring (13) from the atomizer body (15) and discard it. Do not disturb the rectangular section P.T.F.E. sealing ring (14) which is located in the atomizer body around the fuel valve retaining nut (19).

(7) Mark the position of the locating pin (20) in the atomizer body. Remove and retain this pin.

(8) Dismantle, clean and replace the air valve assemble as detailed in para. 47.

31. Check the fuel valve as follows:—

(1) Position the atomizer body with the fuel valve (21) uppermost and the swirl chamber clear of the bench.

(2) Fill the space between the fuel valve retaining nut and valve assembly with I.P.N. fuel. Leakage will be apparent if the fuel level falls. A slight "weep" of not more than one drop per minute is acceptable.

(3) If there is a leak, empty the fuel from the nut, depress the fuel plunger against the spring and direct a steam of compressed air into the nut to remove any particles of foreign matter which may be lodged on the seating.

(4) Refill the nut with I.P.N. fuel and recheck. If leakage continues, change the atomizer.

32. If the fuel valve does not leak, reassemble the atomizer, using new O-rings, as follows:—

(1) Replace the air valve assembly as instructed in para. 50.

(2) Place a new P.T.F.E. O-ring (13) in the recess in the atomizer body around the rectangular section sealing ring (14) which has not been disturbed.

(3) Locate the fuel valve sleeve (22) on the atomizer body (15) with the locating pin replaced in the position marked before removal. Check that the air vent holes in the atomizer body are centrally disposed in the eight air vent holes in the fuel valve sleeve.

(4) Lubricate and position the O-ring (23) in the groove in the throat of the atomizer housing (12).

(5) Loosely attach the atomizer body to the atomizer housing with the three countersunk screws and insert the main attachment bolts (1 and 24) in the six holes.

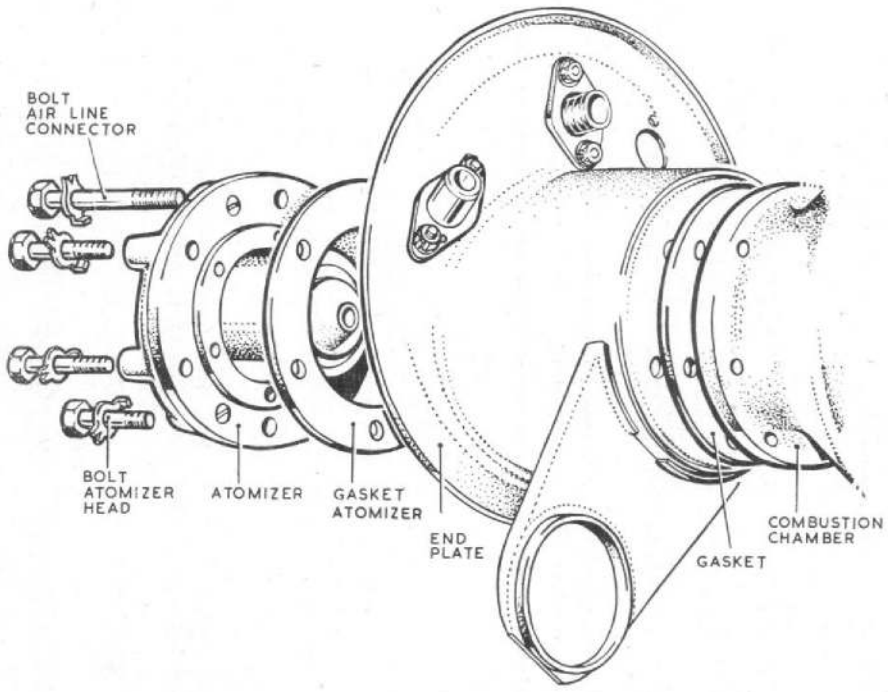


Fig. 6. End plate, atomizer and combustion chamber (forward entry type head)

(6) Clamp the two castings together with slave nuts on the attachment bolts, and using feeler gauges to measure the gap, adjust the relationship of the body and the housing until an even gap is obtained between the faces of the two components.

(7) Tighten the three countersunk screws (16) and remove the slave nuts and attachment bolts.

33. Remove any loose particles of carbon from the combustion chamber and ensure that the drain hole in the bottom of the nozzle plate is clear. Blow through the drain hole with compressed air.

34. Clean the mating faces of the combustion chamber and the atomizer and assemble them together with two new aluminium gaskets, one fitted on each side of the end plate, and with the air valve at the top (fig. 6).

35. Apply ZX-13 to the threads of the six securing bolts and fit new tabwashers. Insert the four short atomizer securing bolts (24) to retain the atomizer on the combustion chamber. Position the air valve sleeve lock plate (2) with shoulder inserted in the housing, fit new O-rings, (3) offer up the air hose (fig. 7), to the atomizer head and insert the remaining two long securing bolts (1) through the hose assembly, lock plate, atomizer and combustion chamber.

36. Tighten the bolts evenly to a torque loading of 15 lb.ft. to avoid distortion of the castings; lock the tabwashers.

37. Lubricate and fit two new O-rings in the fuel hose (fig. 7) and insert it into the atomizer head. Ensure the hose is held in correct alignment with the orifice in the atomizer and gently push it into position with a slight oscillatory movement. If undue resistance is felt during this operation withdraw the hose, ensure the O-rings are not damaged, then ascertain, and rectify, the cause of resistance before reassembling the hose. Fit the two hexagon-head screws (25). Tighten and lock the tabwasher.

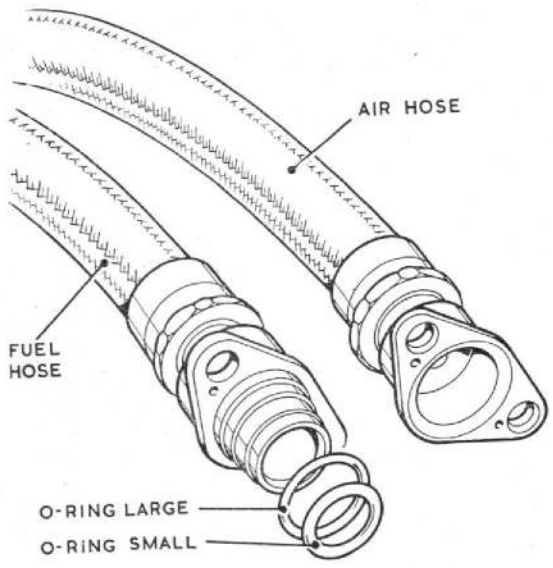


Fig. 7. Flexible hoses and assemblies (fuel and air)

38. Carry out normal priming and fail-safe checks. Whilst these are in progress examine the system for fuel leaks at pipe joints which would indicate damaged O-rings. No leakage is permissible.

Side entry type head

39. There are three states of atomizer and connecting pipes as shown in the following table.

Engine group 5E and 23E

Sealed with O-rings (fig. 8).

Engine group 5/E1

Air pipe sealed with O-rings.

Fuel pipe sealed with a.c.a. seal at atomizer end (fig. 9); the combustion chamber end is sealed with O-rings in a muff (*Mod. S* 393, *Fig.* 12, *Chap.* 1).

Engine group 5/E2

Air pipe and fuel pipe sealed with a.c.a. seals at the atomizer end (fig. 10); the combustion chamber end of each pipe is sealed with O-rings in a muff (Fig. 11A, Chap. 1).

Note . . .

The atomizer, the fuel pipe and the air pipe must not be separately changed in this engine group; the complete assembly only may be replaced.

Removing the atomizer

40. (1) Group 5/E and 23E (fig. 8).

(a) Unlock the four tabwashers and remove the nuts and bolts (2) and (13) at each of the pipe joints and release the fuel and air pipes.

(b) Unlock the six tabwashers and remove the bolts (1) securing the atomizer to the combustion chamber.

(c) Remove the atomizer and ◄ discard ► the gasket (11).

(2) Group 5/E1 (fig. 9).

(a) Unlock the two tabwashers and remove the nuts and bolts (13) at the air pipe joints.

(b) Remove the two bolts (2) at the fuel pipe joint.

(c) Unlock the six tabwashers and remove the bolts (1) securing the atomizer to the combustion chamber.

(d) Remove the atomizer and discard the gasket (11).

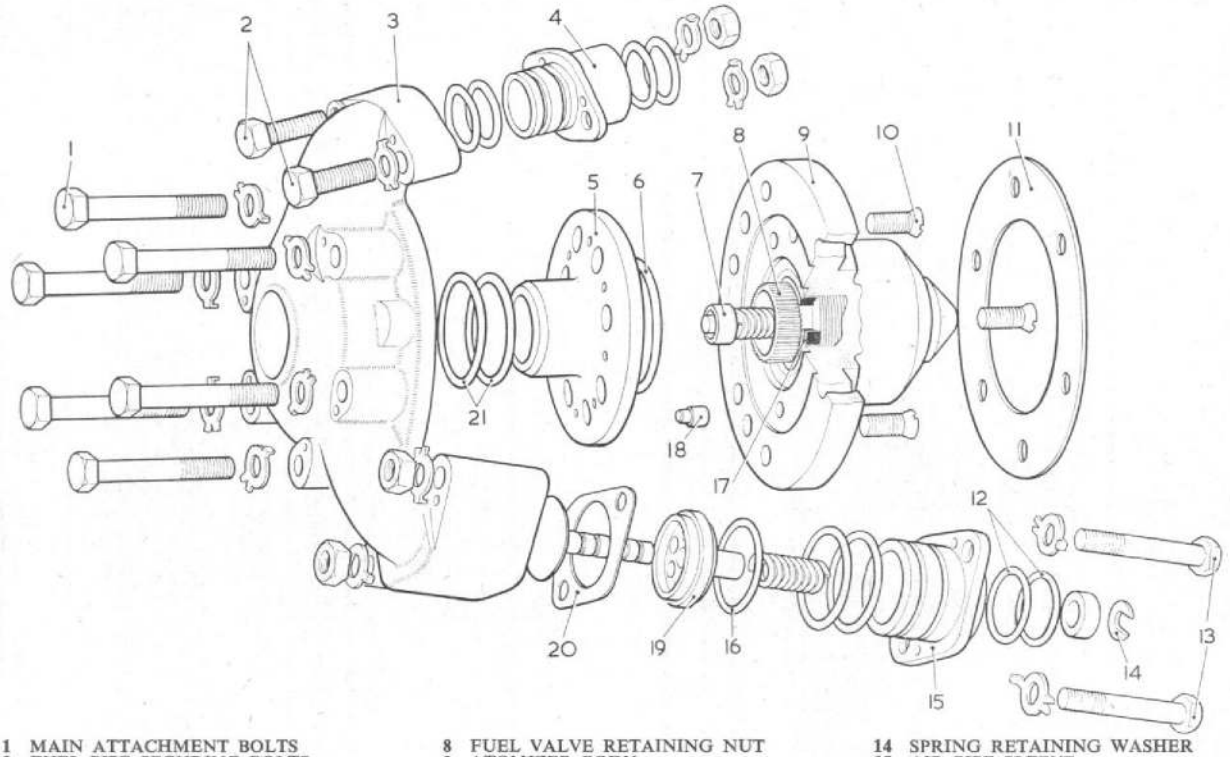
Note . . .

Ensure that the fuel pipe remains in the fuel and air connecting block.

(3) Group 5/E2 (fig. 10).

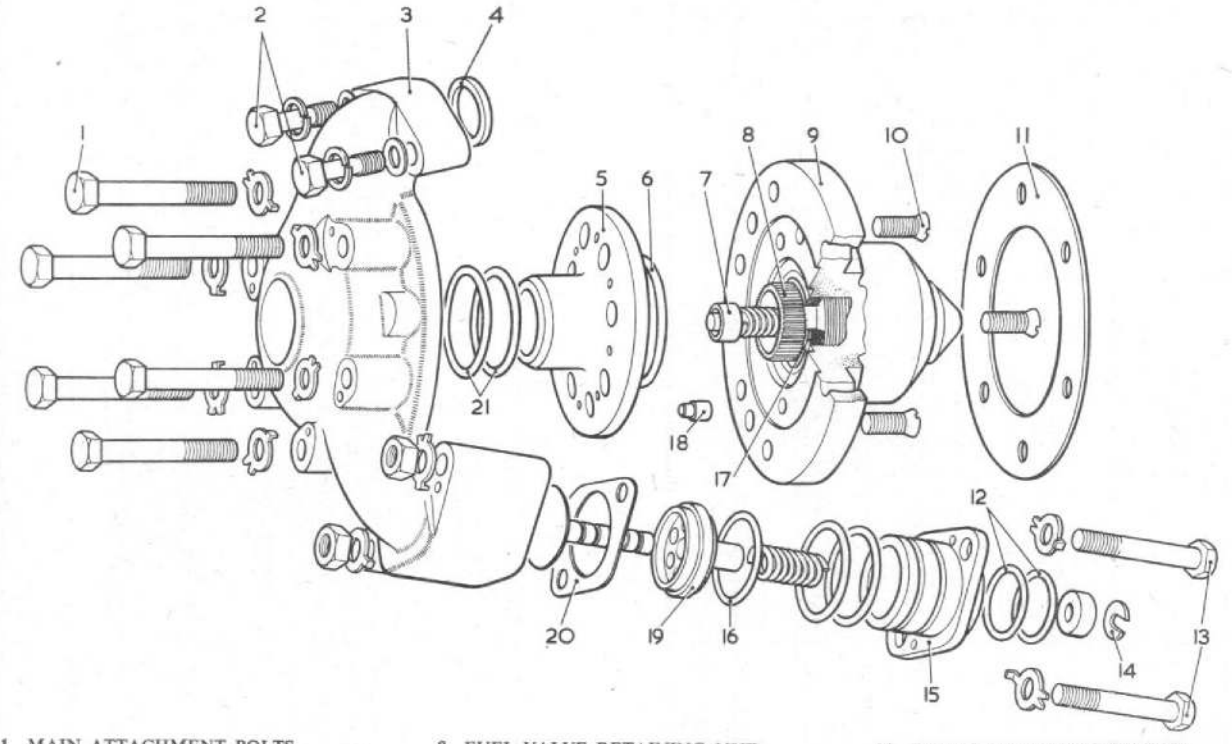
(a) Remove the four bolts (2) and (23) at the fuel pipe and air pipe joints.

(b) Unlock the six tabwashers and remove the bolts (1) securing the atomizer to the combustion chamber.



1 MAIN ATTACHMENT BOLTS
2 FUEL PIPE SECURING BOLTS
3 ATOMIZER HOUSING
4 FUEL PIPE SLEEVE
5 FUEL VALVE SLEEVE
6 O-RING
7 FUEL VALVE
8 FUEL VALVE RETAINING NUT
9 ATOMIZER BODY
10 RETAINING SCREWS (ATOMIZER BODY TO HOUSING)
11 ATOMIZER GASKET
12 O-RINGS
13 AIR PIPE SECURING BOLTS
14 SPRING RETAINING WASHER
15 AIR PIPE SLEEVE
16 O-RING
17 P.T.F.E. RING
18 LOCATING PIN
19 AIR VALVE GUIDE
20 AIR PIPE SHIMS
21 O-RINGS

Fig. 8. Atomizer, side entry type head



1 MAIN ATTACHMENT BOLTS
2 FUEL PIPE SECURING BOLTS
3 ATOMIZER HOUSING
4 A.C.A. SEAL
5 FUEL VALVE SLEEVE
6 O-RING
7 FUEL VALVE
8 FUEL VALVE RETAINING NUT
9 ATOMIZER BODY
10 RETAINING SCREWS (ATOMIZER BODY TO HOUSING)
11 ATOMIZER GASKET
12 O-RINGS
13 AIR PIPE SECURING BOLTS
14 SPRING RETAINING WASHER
15 AIR PIPE SLEEVE
16 O-RING
17 P.T.F.E. RING
18 LOCATING PIN
19 AIR VALVE GUIDE
20 AIR PIPE SHIMS
21 O-RINGS

Fig. 9 ◂ Atomizer, side entry type head (Mod. S 393) ▸

(c) Remove the atomizer and discard the gasket (11).

Dismantling the atomizer

41. (1) Group 5/E, 5/E1 and 23E only (fig. 8 and 9). Remove the air pipe sleeve (15) and shims (20).

(2) Group 5/E2 only (fig. 10). Remove the air pipe sleeve (16) and shims (20).

(3) Group 5/E and 23E only (fig. 8). Remove the fuel pipe sleeve (4) and discard the four O-rings.

(4) Separate the fuel valve sleeve (5) from the atomizer housing (3) and remove the two O-rings (21) from the throat of the housing.

(5) Remove the O-ring (6) from the atomizer body (9) and discard the O-ring.

Note . . .

Do not remove the rectangular section P.T.F.E. ring (17) *which is located around the fuel valve retaining nut.*

(6) ◄ Mark ► the position of the locating pin (18) in the atomizer body. Remove and retain the pin.

Checking the fuel valve

42. Check the fuel valve for leaks as detailed in para. 31.

Assembling the atomizer (fig. 8, 9 and 10)

43. If there is no leak from the fuel valve; assemble the atomizer, using new O-rings, as follows:—

(1) Position the O-ring (6) in the recess in the atomizer body (9) around the rectangular section P.T.F.E. sealing ring (17).

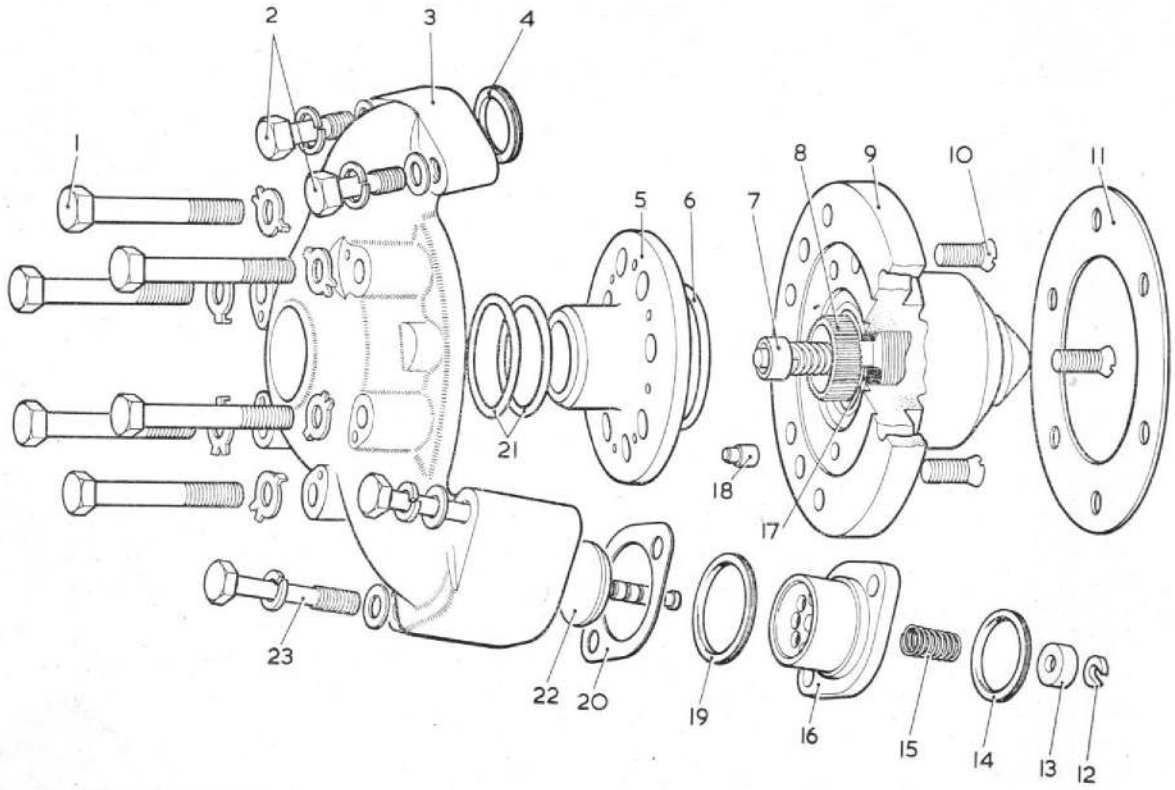
(2) Replace the locating pin (18) in the position marked prior to removal.

(3) Locate the fuel valve sleeve (5) on the atomizer body in its previous position with the eight air vent holes in the atomizer centrally disposed on the corresponding holes in the fuel valve sleeve.

(4) Lubricate and position the two O-rings (21) in the grooves in the throat of the atomizer housing (3).

(5) Loosely assemble the atomizer body to the housing with the three countersunk screws (10) and insert the six main attachment bolts (1).

(6) Clamp the two castings together, using slave nuts on the main attachment bolts, and, using feeler gauges to measure the gap, adjust the relationship of the body and housing until an even gap is obtained between the faces of the two components.



1 MAIN ATTACHMENT BOLTS
2 FUEL PIPE SECURING BOLTS
3 ATOMIZER HOUSING
4 A.C.A. SEAL
5 FUEL VALVE SLEEVE
6 O-RING
7 FUEL VALVE
8 FUEL VALVE RETAINING NUT
9 ATOMIZER BODY
10 RETAINING SCREWS (ATOMIZER BODY TO HOUSING)
11 ATOMIZER GASKET
12 SPRING RETAINING WASHER
13 DISTANCE PIECE
14 A.C.A. SEAL
15 AIR VALVE SPRING
16 AIR PIPE SLEEVE
17 P.T.F.E. RING
18 LOCATING PIN
19 A.C.A. SEAL
20 AIR PIPE SHIMS
21 O-RINGS
22 AIR VALVE
23 AIR PIPE SECURING BOLTS

Fig. 10. Atomizer, side entry type head (LTSA 140)

(7) Tighten the countersunk screws and remove the slave nuts and securing bolts.

(8) Group 5/E, 5/E1 and 23E only (fig. 8 and 9). Replace the air valve assembly as detailed in para. 48.

Fitting the atomizer to the combustion chamber

44. Remove any loose particles of carbon from the combustion chamber and ensure that the drain hole in the bottom of the nozzle plate is clear. Blow through the combustion chamber with compressed air. Fit the atomizer to the combustion chamber, as follows:—

(1) Group 5/E and 23E only (fig. 8). Lubricate and fit four new O-rings to the fuel pipe sleeve (4) and assemble the sleeve to the housing.

(2) Group 5/E1 and 5/E2 only (fig. 9 and 10). Fit a new a.c.a. seal in the throat of the fuel inlet.

(3) Group 5/E2 only (fig. 10). Insert a new a.c.a. seal (19) in the throat of the air inlet, replace the shims (20) on the air pipe sleeve (16). Insert the sleeve into the atomizer housing and position an a.c.a. seal (14) in the recess in the air pipe sleeve.

(4) Clean the mating faces of the combustion chamber and the atomizer.

(5) Group 5/E and 23E only (fig. 8). Fit a new gasket (11) to the atomizer, assemble the atomizer to the combustion chamber ensuring that the fuel and air pipes enter the appropriate sleeves squarely.

Note . . .

Be especially careful to avoid damaging the O-rings during this operation,

(6) Group 5/E1 only (fig. 9). Ensure that the sleeves originally fitted to the fuel pipe adapter are in position and that the a.c.a. seal is fitted to the fuel inlet on the atomizer housing. Fit a new gasket (11) to the atomizer, assemble the atomizer to the combustion chamber ensuring that the air pipe enters the sleeve squarely and the spigot on the fuel pipe enters the recess in the fuel inlet of the atomizer housing.

(7) Group 5/E2 only (fig. 10). Ensure that the shims originally fitted to the fuel and air pipe adapter are in position and that an a.c.a. seal is fitted to the air inlet sleeve and the fuel inlet of the atomizer housing. Fit a new gasket (11) to the atomizer, assemble the atomizer to the combustion chamber ensuring that the spigot on the air pipe enters the air sleeve and the spigot on the fuel pipe adapter enters the fuel inlet of the atomizer housing.

(8) Apply ZX-13 to the threads of the six atomizer securing bolts, fit new tabwashers to the bolts and secure the atomizer to the combustion chamber. Torque load the bolts to 15 lb. ft. then lock the tabwashers.

(9) Group 5/E and 23E only (fig. 8). Replace the bolts (2) and (13), tabwashers and nuts in the fuel and air pipe connections, tighten the nuts and lock the tabwashers.

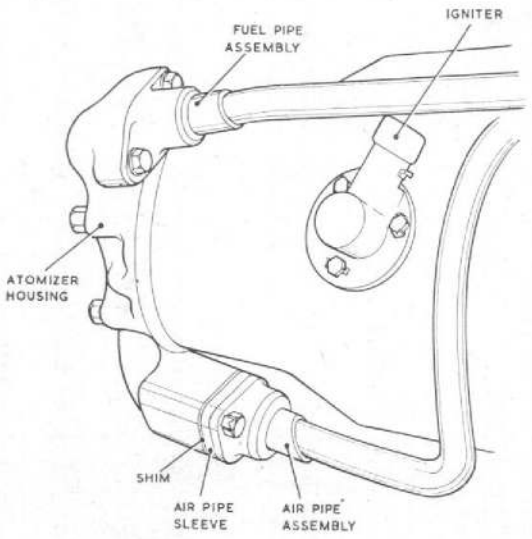


Fig. 11. Fuel and air pipes (side entry type head)

(10) Group 5/E1 only (fig. 9). Replace the bolts, spring washers and plain washers (2) in the fuel pipe connection and the bolts, tabwashers and nuts in the air pipe connection; tighten the nuts and bolts and lock the tabwashers.

(11) Group 5/E2 only (fig. 10). Replace the bolts, spring washers and plain washers (2) and (23) in the fuel pipe and air pipe connections and tighten the bolts. Check that there is a gap of 0·050 to 0·090 in. between the air pipe and its guard and the fuel pipe and its guard.

Proof test

45. Carry out normal priming and fail-safe checks and examine the pipe joints whilst these are in progress. Leakage at the joints will indicate damaged O-rings.

46. Carry out one dead-crank start and immediately afterwards look for fuel leaks especially around the fuel pipe to atomizer joint. No leakage is permissible.

ATOMIZER-AIR VALVE CLEANING

Forward entry type head (fig. 5)

47. The following method is used to remove, clean and reassemble the air valve assembly:

(1) Unlock the two tabwashers, remove the bolts (1) securing the air hose to the atomizer; discard the tabwashers.

(2) Remove the air hose and air valve sleeve lock plate (2).

(3) Using tool MK 12854 unscrew the air valve sleeve (4) remove and discard the O-rings (3).

(4) Remove and retain the aluminium backing washer (5).

(5) Prick out the O-ring (6) from around the air valve guide in the housing (12) and remove the air valve assembly.

(6) Remove the spring retaining washer (7) from the valve stem (11) and dismantle the assembly.

(7) Immerse the components in boiling water, wash off all deposits and dry thoroughly using an air line.

(8) Reassemble the air valve assembly and insert this into the atomizer housing (12); be certain that it fits squarely on to its seating.

(9) Lubricate and insert a new O-ring (6) into the housing around the air valve guide (10).

(10) Position the aluminium backing plate (5) on this O-ring.

(11) Lubricate and fit two new O-rings (3) in the grooves on the air valve sleeve (4) and screw this into the atomizer housing (12). Tighten with tool MK 12854.

(12) Position the lock plate (2) on the atomizer housing (12) with the shoulder inside the housing and offer up the air hose to the atomizer.

(13) Apply ZX-13 to the threads of the two securing bolts (1) fit new tab washers, insert and tighten the bolts to a torque loading of 15 lb. ft. Note that these are two of the six bolts securing the atomizer to the combustion chamber.

Side entry type head (fig. 8, 9 and 10)

48. The following method is used to remove, clean and reassemble the air valve assembly:—

(1) Remove the atomizer from the combustion chamber as described in para. 40.

(2) Remove the air pipe sleeve (15); remove and retain the shims (20).

(3) Remove and discard the four O-rings from inside and outside the sleeve.

(4) Prick out the O-ring (16) from around the air valve guide (19) in the housing (3) and remove the air valve assembly.

(5) Remove the spring retaining washer (14) and dismantle the air valve assembly.

(6) Immerse the components in boiling water, wash off all deposits and dry thoroughly using an air line.

(7) Reassemble the air valve and insert the assembly into the atomizer housing. Be certain that it fits squarely on to its seating

(8) Lubricate and position a new O-ring (16) in the housing around the air valve guide (19). Using the air pipe sleeve (15) without O-rings, as a ram, press the O-ring into position. Remove the sleeve and ensure the O-ring is seated correctly on the guide.

(9) Lubricate and assemble four new O-rings in the grooves inside and outside the air pipe sleeve.

(10) Replace the shims (20) on the air pipe sleeve (15) and carefully insert the sleeve into the atomizer housing. Ensure the O-rings are not damaged during this operation.

(11) Replace the atomizer on the combustion chamber as detailed in para. 44 and carry out the tests specified in para. 45 and 46.

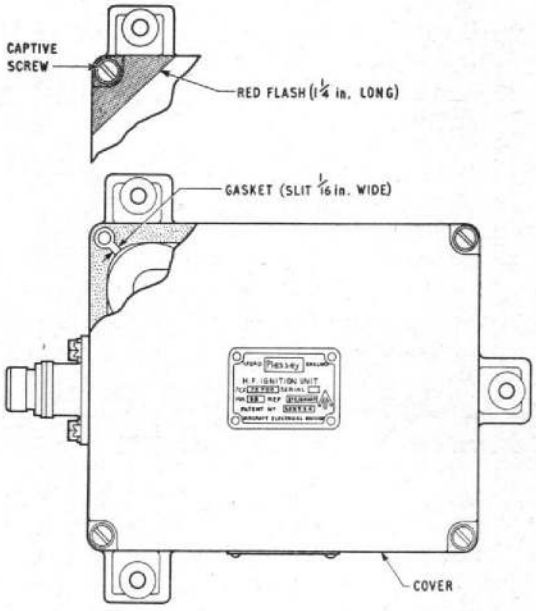


Fig. 12. Ignition unit cover

IGNITION UNIT-PRESSURE EQUALISING
(*fig.* 12)

49. The following operations must be carried out in a clean dust-proof room, under the supervision of a competent authority; the contents of the unit must not be interfered with in any way.

(1) Remove the cover by releasing the four captive screws.

(2) Remove the gasket and cut a slit in it, $\frac{1}{16}$ in. wide, from the inside edge to the hole in the top left-hand corner.

(3) Replace the gasket and cover as in fig. 12 and paint a red flash on the cover in red cellulose finish to D.T.D.809A extending $1\frac{1}{4}$ inches at the edges from the corner of the cover.

Note . . .

It is very important that all ignition units conform to fig. 12 *and that the red flash on the lid covers the slit in the gasket.*

IGNITION SWITCH— PRESSURE CORRECTING

50. Owing to diaphragm stretch the pressure setting increases in service and, if not corrected, results in late ignition. On an attempted start immediately following a previous start this would cause "A" failures or a heavy bang at the start of combustion; the pressure setting does not increase later if readjusted after the first "settling".

51. Readjust as detailed in para. ◄20.►

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