

Chapter 1

PRESSURIZING VALVE AND SHUT-OFF COCK TYPE PVS.1/7D

LIST OF CONTENTS

	Para.		Para.
General	1	Rebuilding the unit	
Special tools	3	Shut-off cock assembly	23
		Operating lever and pinion shaft assembly	27
		Pressurizing valve assembly	29
		Top cover	35
		Installation connections	36
Dismantling the unit		Rig testing	38
Inlet connection housing	4		
Installation connections	6	Calibration "A"	
Pressurizing valve assembly	7	Leakage tests	39
Operating lever and pinion shaft	10	Torque and overlap tests	40
Shut-off cock assembly	13	Pressurizing valve calibration	41
Cleaning	14	Pressure tests	42
Replacements	16		
		Calibration "D"	
Inspection		Leakage tests	43
Visual inspection	17	Torque and overlap tests	45
Distortion checks	19	Pressurizing valve calibration test	46
Permissible wear	20		
Redundant and consumable parts	21	Procedure after rig test	
Scores and surface damage	22	Installation connections	47
		Wire-locking	49
		Inhibiting	50
		Blanking	51
		Packing for despatch	52

LIST OF ILLUSTRATIONS

	Fig.		Fig.
Dismantled view of pressurizing valve and shut-off cock unit, Type PVS.1/7D	1	View of fixture, lap and holder T.177126 for lapping pressurizing valve sleeve faces and plunger	5
View of unit mounted on dismantling fixture T.169476	2	View showing special tools T.177124 for insertion of pinion through seal in sleeve	6
View showing use of extractor T.180079 for withdrawal of orifice plate	3	View showing adapter T.177127 fitted for test rig purposes	7
View showing lapping holder T.177123 for shut-off cock in use	4	Diagrammatic layout of test rig	8

GENERAL

1. The unit described in this chapter is the Type PVS.1. To this type number an installation code number "7" is added together with a calibration code letter "D." The unit shown exploded in fig. 1 is the pressurizing valve and shut-off cock Type PVS.1/7D. Installation and calibration codes vary with the requirements of different engines.

2. The importance of cleanliness cannot be too highly emphasised and every precaution must be taken to ensure that all parts are thoroughly clean. To prevent damage to nuts and bolts, box or ring spanners must be used whenever possible. It is recommended that slave nuts and washers be used in those instances where components are assembled temporarily.

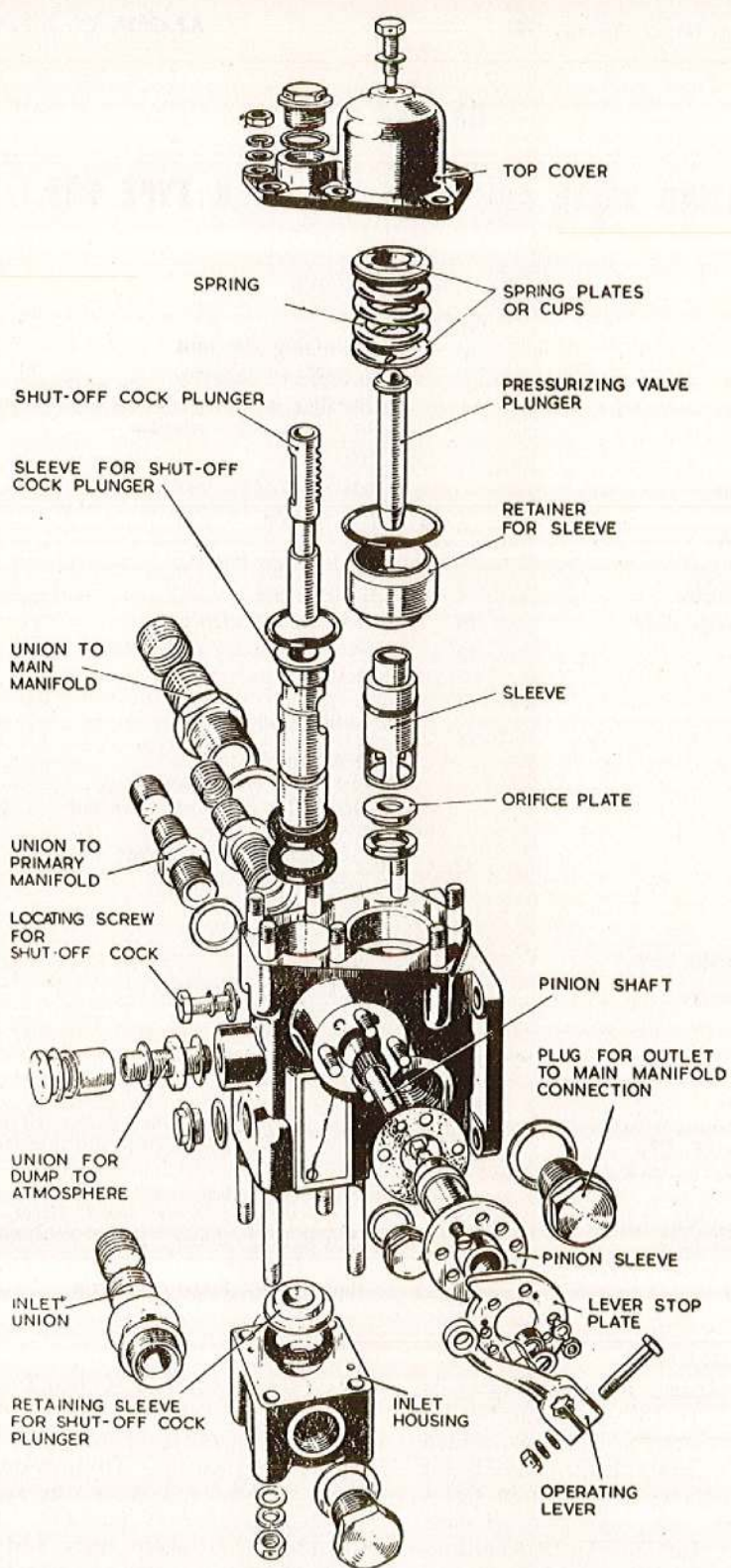


Fig. 1. Dismantled view of pressurizing valve and shut-off cock unit, Type PVS.1/7D

RESTRICTED

SPECIAL TOOLS

3. The repair of these units necessitates the use of special tools which are detailed in the following list.

- R.36 Rig, test
- T.169476 Fixture, assembling and dismantling
- T.177123 Lapping holder for H.P. cock plunger
- T.177124 Tool, for inserting seal in pinion shaft sleeve
- T.177125 Spanner, box, for tightening inlet housing and top cover nuts
- T.177126 Fixture, lap and holder, for lapping pressurizing valve sleeve faces and plunger
- T.177127 Adapter, for test rig ($\frac{1}{8}$ in. / $\frac{1}{8}$ in. B.S.P.)
- T.180079 Extractor for orifice plate

DISMANTLING THE UNIT

Inlet connection housing

4. Mount the unit on the dismantling fixture T.169476 in the reverse position to that shown in fig. 2. Unscrew the four nuts which secure the housing to the main body, and remove the housing complete with the Grover and plain washers.

5. Lift off the oil seal and retaining sleeve for the shut-off cock plunger. Unscrew the plug and the union from the inlet housing and remove together with the sealing washers.

Installation connections

6. Remove the unit from the fixture T.169476 and mount as shown in fig. 2. The various installation fittings need not be removed unless damaged, or their removal is called for by the inspector-in-charge.

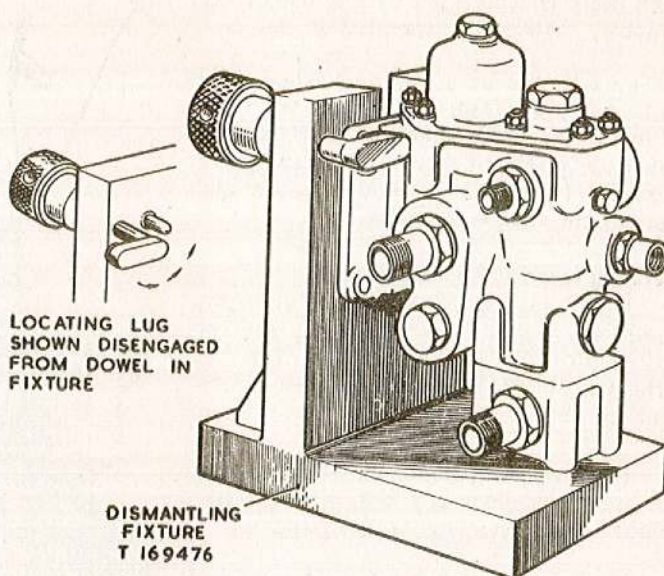


Fig. 2. View of unit mounted on dismantling fixture T.169476

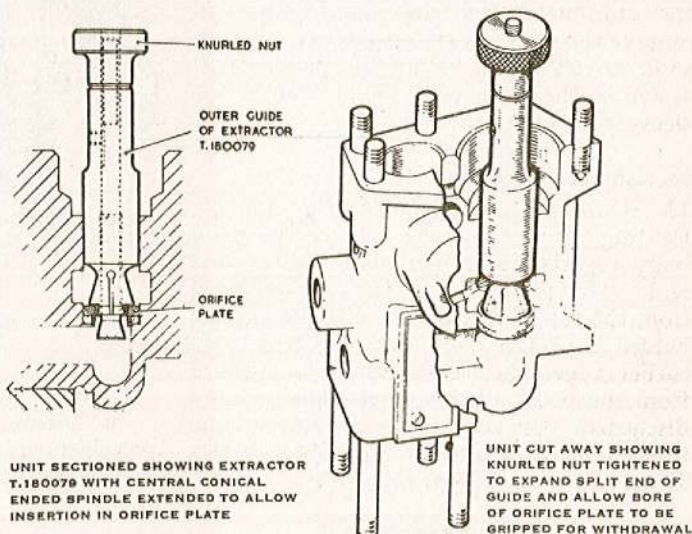


Fig. 3. View showing use of extractor T.180079 for withdrawal of orifice plate

Pressurizing valve assembly

7. Unscrew the seven $\frac{1}{4}$ in. nuts which secure the top valve cover to the main body and remove the cover and two seal rings.

8. Remove the two spring plates, spring, spring retainer, plunger, sleeve, orifice plate and seal ring. On units pre-Mod. 192 the sleeve will be in two pieces with an interposed seal ring, a lower and sealing ring, but

no separate orifice plate. Removal of the orifice plate is facilitated by the use of the extractor, T.180079, illustrated in fig. 3.

9. The adjustment screw and shims need not be removed from the domed centre of the top cover unless damaged. If removal of the adjustment screw is necessary, the thickness of the shims should be noted and recorded for future reference.

Operating lever and pinion shaft

10. Turn the operating lever to the fully closed position and measure from the top of the shut-off cock plunger to the top face of the casing. Make a note of this measurement for use on re-assembling.

11. Remove the pinch bolt which secures the operating lever to the pinion shaft. Remove the lever, plain washer, and seal.

12. Unscrew the four tab-washer locked nuts which secure the stop-plate to the main body. Mark the relative positions of the stop-plate and the main body and remove the plate. Remove the two counter-sunk screws which secure the pinion shaft sleeve to the main body and withdraw the sleeve and joint packing.

Shut-off cock assembly

13. Unscrew and remove the plunger locating screw from the side of the main body together with the plain washer and seal. The plunger may then be removed from the top of its sleeve, using the lapping holder T.177123 as shown in fig. 4. On earlier types the sleeve should be pushed from the body, the two seals removed and discarded. On later types the sleeve is an interference fit and is not normally removed. Remove the unit from the fixture.

CLEANING

14. All parts must be thoroughly cleaned and washed before re-assembling, using a para-wash machine, having a kerosine bath and spray gun with adequate filtering facilities, suitable nozzle jets, and sufficient force to clean out all internal passages. Hard brushes, rag or abrasive of any kind must not be used.

15. It is important that the bench upon which the cleaned parts are placed is scrupulously clean. It is recommended that the bench be covered with zinc sheeting

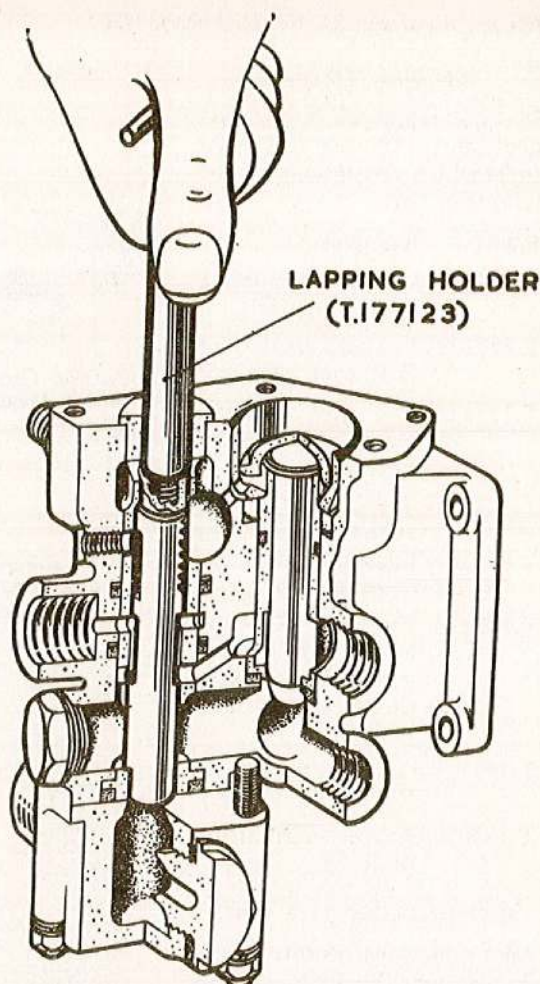


Fig. 4. View showing lapping holder T.177123 for shut-off cock in use

or linoleum, and that several clean containers be available in which to keep the various parts.

REPLACEMENTS

16. All parts are interchangeable with the exception of the two plungers and their sleeves, and the pinion shaft. If a plunger or sleeve is renewed, these must be a lapped fit, using the lapping tools as shown in fig. 4 and 5. The pinion shaft and rack teeth of the plunger are selectively fitted on initial assembly. If renewed, it must be ensured that the teeth mesh freely without excessive backlash or binding. As the shut-off cock sleeves in later types are an interference fit in the body, they are not normally removed. On time-expired

RESTRICTED

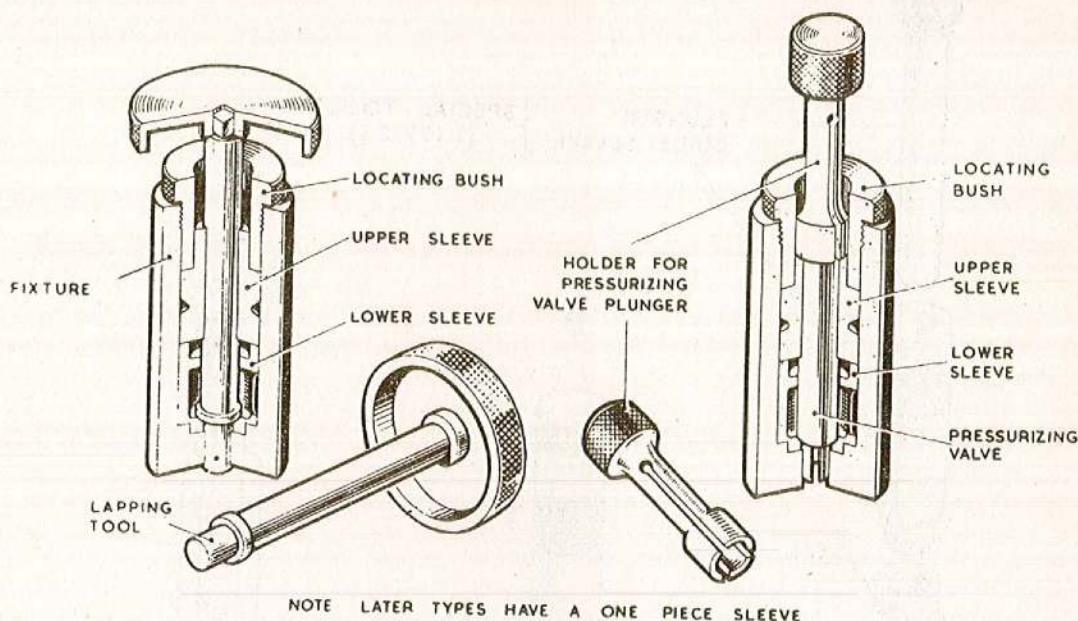


Fig. 5. View of fixture, lap and holder, T.177126 for lapping pressurizing valve sleeve faces and plunger

overhauls the stop-plate must be discarded and a new one fitted.

INSPECTION

Visual inspection

17. Every part of the unit must be visually inspected for damage and cleanliness. Nuts and screwed connections should be inspected for damage on the threads, faces, and spanner flats. The main body, cover plates, and similar parts must be examined for superficial damage, bent studs, damaged joint faces and any other form of damage which may make the part unserviceable.

18. Moving parts must be examined for scores, pitting and corrosion and dimensionally checked as called for in the Schedule of Fits and Clearances.

Distortion checks

19. Distortion checks are not normally necessary.

Permissible wear

20. All parts subject to wear should be checked against the Schedule of Fits and Clearances.

Redundant and consumable parts

21. It is usual during inspection to reject all parts rendered redundant by the embodiment of essential modifications. Tab-washers, split pins, joint packings, rubber sealing rings, and other consumable parts will be scrapped during dismantling.

Scores and surface damage

22. Scores on moving parts or joint faces which will impair the operational efficiency of the unit, calls for the rejection of such parts.

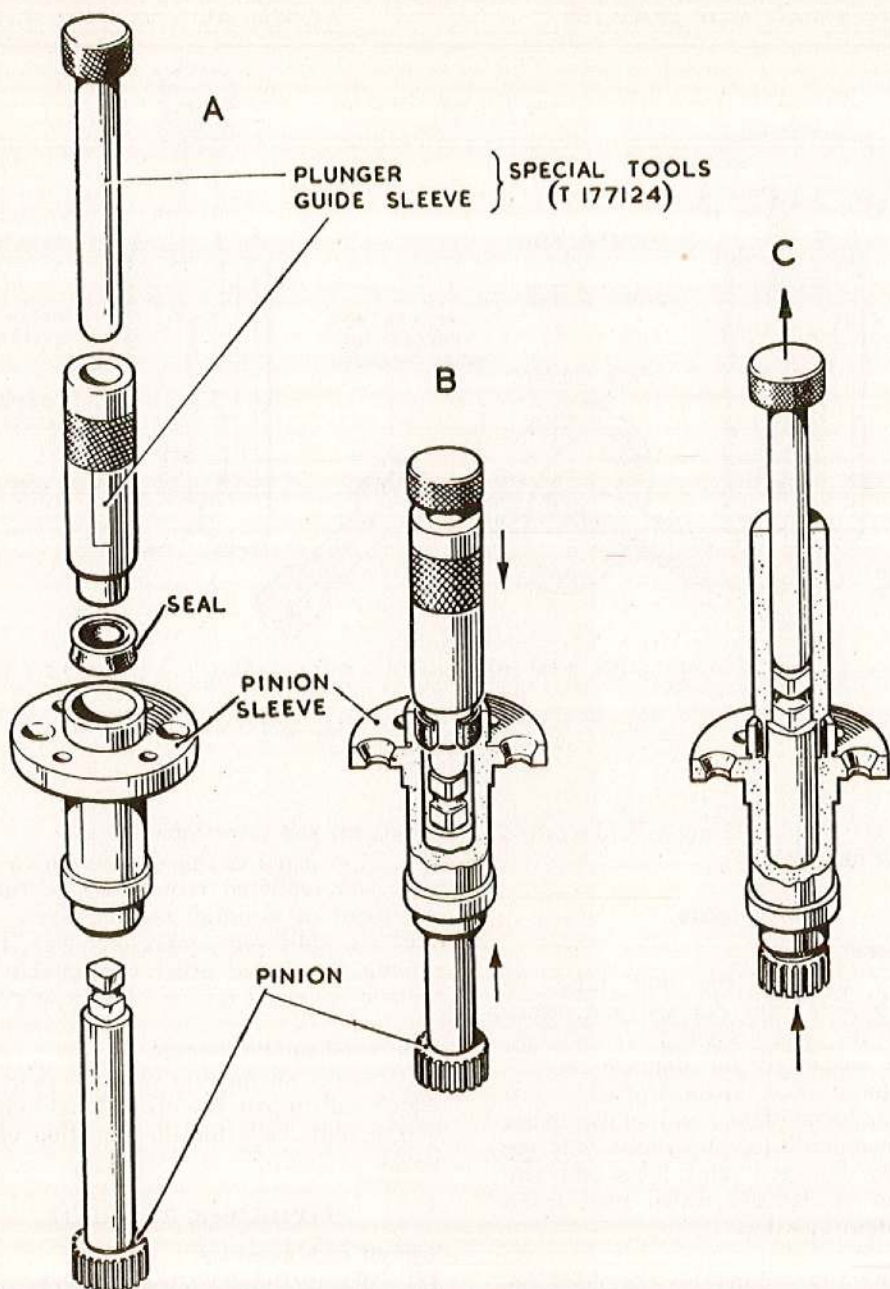
REBUILDING THE UNIT

Shut-off cock assembly

23. Mount the body of the unit on the assembling fixture T.169476, as illustrated in fig. 2.

24. On early types, fit two new seals into the recesses in the main body around the shut-off cock, plunger sleeve bore, and smear white petroleum jelly (Stores Ref. 34D/656) in the bore.

25. Ensure that the hole in the sleeve is correctly aligned with the locating screw hole in the main body. Fit the plunger



- A** EXPLODED VIEW OF PINION, PINION SLEEVE, SEAL AND SPECIAL TOOLS.
- B** PLACE SEAL IN PINION SLEEVE, INSERT GUIDE SLEEVE AND PLUNGER, THEN INSERT PINION TO CONTACT PLUNGER.
- C** HOLD GUIDE SLEEVE FIRMLY IN SEAL WHILE PINION IS PUSHED THROUGH.

Fig. 6. View showing special tools T.177124 for insertion of pinion through seal in sleeve

RESTRICTED

sleeve and press fully into position. On later types the sleeve is an interference fit and will not have been removed.

26. Smear white petroleum jelly (Stores Ref. 34D/656) in the bore of the sleeve. Insert the plunger, using the lapping tool T.177123 to facilitate this operation. Fit the locating screw complete with seal and washer and manipulate the plunger so that the end of the screw fits into the end of the plunger slot. Tighten the screw and ensure that the plunger is free over its controlled range.

Operating lever and pinion shaft assembly

27. Assemble a joint packing to the pinion sleeve facing on the main casing. Fit the pinion shaft into the sleeve and seal in accordance with the illustrated details in fig. 6 and temporarily add the stop plate and operating lever. Set the plunger to the position noted during dismantling and with the lever on the fully closed stop and the stop-plate to main casing marks in line, engage the teeth of the pinion with those of the rack. Check that the lever will move over the full range between the stops, then, without disengaging the pinion, remove the operating lever and stop-plate and fit the two countersunk screws which secure the pinion sleeve.

28. Refit the stop-plate and secure with four 2 B.A. tab-washer locked nuts. Fit the special plain washer to the pinion spindle, add the operating lever and make secure with pinch bolt, cover washer and nut. To the end of the plunger furthest from the lever, fit the retaining sleeve, sealing ring and inlet connection housing. Secure the housing with four — plain washers, Grover washers and nuts.

Pressurizing valve assembly

29. Fit the seal in the base of the bore for the pressurizing valve sleeve and locate the seal in the groove of the sleeve for the pressurizing valve; this will be in the upper sleeve on pre-Mod. 192 types.

30. On pre-Mod. 192 units, locate a new felt washer correctly in the upper step of the lower sleeve for the pressurizing valve plunger, then fit this sleeve into its bore in the main body. Fit the upper sleeve into position on the lower sleeve.

31. On types embodying Mod. 192, lower the orifice plate into position on the seal in the base of the bore, followed by the plunger sleeve.

32. Fit the sleeve retainer on to the pressurizing valve sleeve. Insert the pressurizing valve plunger and ascertain that it is a good sliding fit.

33. Locate the two joint seals correctly on the joint face of the main body upon which the top cover is fitted, one around the seal retainer and the other round the flange of the shut-off cock sleeve.

34. Assemble the two spring plates to the helical spring and locate correctly with the plunger in the main body.

Top cover

35. Lower the cover on to the main body and secure with seven plain washers, Grover washers and nuts. If the adjusting screw and plug have been disturbed, refit the screw with its original shims and ensure that the screw engages correctly with the upper spring plate during tightening. Refit the plug and washer and tighten.

Installation connections

36. Assemble the following connections to the main body in readiness for rig testing:—

- (1) Union and sealing washer for dump to atmosphere connection.

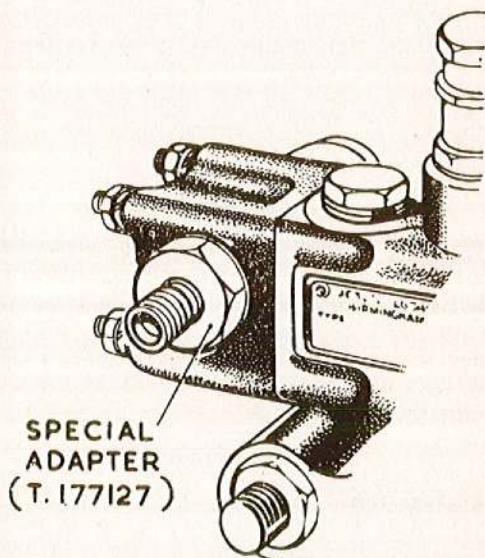


Fig. 7. View showing adapter T.177127 fitted for test rig purposes

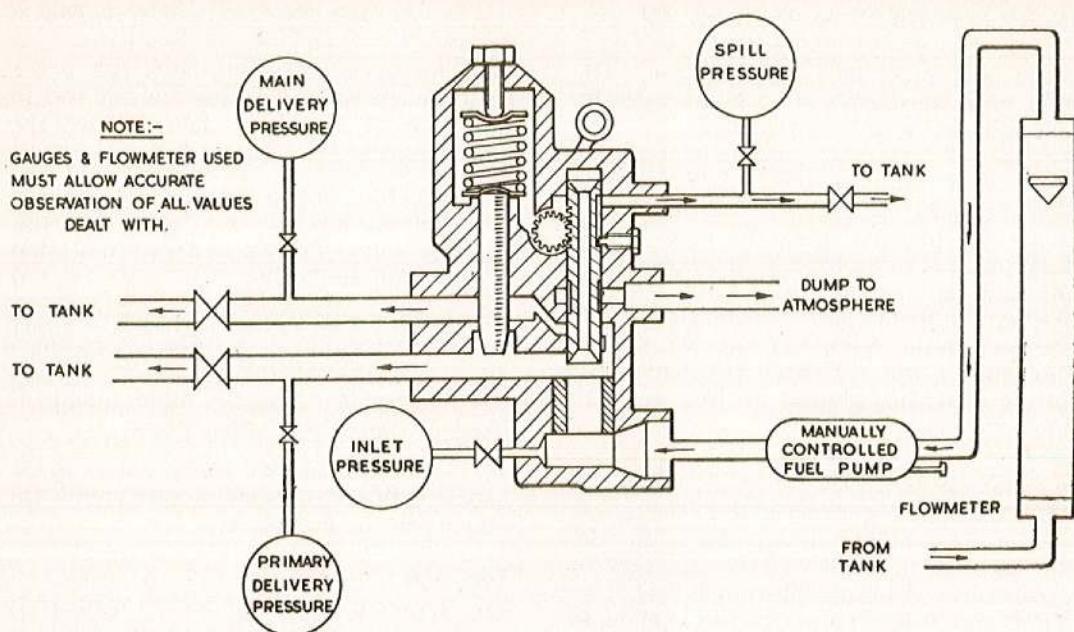


Fig. 8. Diagrammatic layout of test rig

- (2) Union and sealing washer for spill connection to pump inlet.
- (3) Union and plug (with sealing washers), for primary manifold outlet connection.
- (4) Union and sealing washer for the main manifold outlet connection; instead of the plug and sealing washer fit the special $\frac{3}{8}$ in. / $\frac{1}{8}$ in. B.S.P. double male adapter T.177127 and washer as shown in fig. 7 to serve as a pressure gauge connection point during rig testing.

37. The unit should then be carefully checked for correct assembly before being tested on the rig.

RIG TESTING

38. The fuel used throughout these tests is to be Aviation turbine fuel to specification D.Eng.RD.2482 latest issue; the temperature must be between 20 deg. C. and 26 deg. C., maximum specific gravity 0.810. A diagrammatic layout of the test rig is illustrated in fig. 8.

CALIBRATION "A"

Leakage tests

39. Five leakage tests are to be made to ascertain that the shut-off cock and pressurizing valve plungers are a satisfactory fit in their respective sleeves, and that the

seals are sound. These tests are made as follows:—

- Op. 1. Mount the unit on the rig as shown in fig. 8 and fit suitable slave connections to enable the various rig pipes to be connected.
2. Open the shut-off cock, and set the primary delivery pressure of the fuel to 1,000 lb. per sq. in. by restricting the cock downstream of the main delivery from the unit and collect the leakage from the atmospheric drain in a measuring cylinder. This must not exceed 40 c.c. per minute.
3. With the shut-off cock still open, set the primary delivery pressure of the fuel to the values as stated in Op. 2 and measure the leakage from the spill connection by allowing it to run into a measuring cylinder. This must not exceed 100 c.c. per minute.
4. Close the shut-off cock, set the inlet pressure of the fuel to 300 lb. per sq. in. and measure the leakage from the delivery lines by running the fuel into a measuring cylinder. This leakage must not exceed 35 c.c. per minute.
5. With the shut-off cock still closed, set the spill pressure to a maximum of 25 lb. per sq. in. by restricting the

RESTRICTED

spill line, and ascertain that the leakage of fuel from the atmospheric dump does not exceed 15 c.c. per minute. Ensure that no leakage occurs from the pinion shaft. Repeat this test with the spill pressure set to 300 lb. per sq. in. and check that the leakage from the atmospheric dump does not exceed 35 c.c. per minute, again with no leakage from the pinion shaft.

6. Finally, open the shut-off cock, and set the pressure in the primary passages to 60 lb. per sq. in. by restricting the primary delivery line and ascertain that the leakage from the main delivery line does not exceed 1,000 c.c. per minute.

Torque and overlap tests

40. Carry out the following torque and overlap tests:—

- Op. 1. With the shut-off cock still open set the delivery pressure to 1,000 lb. per sq. in. and the flow of fuel to 600 gallons per hour. Then check the torque required to close the shut-off cock. This value must not exceed 10 lb. in.

2. With the shut-off cock still open, set the delivery pressure to 175 lb. per sq. in. and the flow to 90 gall. per hour. Slowly close the shut-off cock and note the increase in inlet pressure; this must not exceed a value of 200 lb. per sq. in.

Pressurizing valve calibration

41. The following test is for final calibration.

- Op. 1. With the shut-off cock open, gradually increase the restriction in the delivery line until the pressurizing valve opens. This will be indicated by an increase in fuel flow from the main delivery line. The delivery pressure at this point should be between 75 and 85 lb. per sq. in. It may be necessary to adjust the loading of the spring controlling the operation of the pressurizing valve to obtain this setting, and for shims either to be removed or added until the desired

value is obtained; this must be recorded on the official test sheet.

- Op. 2. With the shut-off cock still open, fully restrict the primary delivery line to ensure that all fuel passes through the pressurizing valve into the main delivery line.
3. Carefully set the flow and primary delivery pressure to each of the values listed in the accompanying table in turn, and check that the main delivery pressure readings are within the limits specified.

**PRESSURIZING VALVE CALIBRATION
TABLE, CODE "A"**

Flow in Gall. per hr.	Primary delivery pressure in lb. per sq. in.	Main delivery pressure lb. per sq. in.	
		Max.	Min.
15	98	91	86
25	115	106	101
50	157	145	139
100	217	199	192
200	420	398	380
300	610	574	564
350	700	669	659
400	790	766	757

Pressure tests

42. Two pressure tests are to be made as follows:—

- Op. 1. Open the shut-off cock and set the delivery pressure to 1,500 lb. per sq. in. and ascertain that there is no leakage from the joints or through the main body.
2. Close the shut-off cock and with the spill pressure set to 300 lb. per sq. in. check that no leakage occurs from the joints or through the main body.
3. In the event of leakage, trace and rectify.

CALIBRATION "D"

Leakage tests

43. Five leakage tests are to be effected to ascertain:—

- (1) Leakage from the dump to atmosphere.
- (2) Leakage returned to pump inlet.

- (3) Leakage past the pressurizing valve orifice.
- (4) Total leakage to the burners and dump.
- (5) External leakage.

44. Mount the unit on the rig as shown in fig. 8 and fit suitable slave connections to enable the various rig pipes to be connected.

Op. 1. Open the shut-off cock and set the inlet pressure to the unit at 1,000 lb. per sq. in. and the flow at 500 gall. per hr. Ascertain that the leakage from the dump to atmosphere does not exceed 40 c.c. per minute.

2. With the shut-off cock still open set the inlet pressure to 1,000 lb. per sq. in. and the flow to 500 gall. per hr. Check the leakage from the return to pump inlet connection; this should not exceed 100 c.c. per minute.

3. With the shut-off cock again open, set the inlet pressure to 125 lb. per sq. in. and check that the leakage past the pressurizing valve and out of the main delivery connection does not exceed 500 c.c. per minute.

4. Close the shut-off cock and set the inlet pressure to 300 lb. per sq. in. and the flow to 150 gall. per hr. approximately and ascertain that the total leakage to the burners and dump does not exceed 35 c.c. per minute.

5. Open the shut-off cock, set the inlet pressure to 1,100 lb. per sq. in. and the flow to 500 gall. per hr. and ascertain that there is no external leakage from the unit.

Torque and overlap tests

45. Carry out the following torque and overlap tests.

Op. 1. With the shut-off cock open, the inlet pressure set to 1,000 lb. per sq. in. and the flow set to 500 gall. per hr. attach a spring balance to the operating lever of the shut-off cock. Check that the maximum torque required first to close and then to open the cock does not exceed 10 lb. in.

Op. 2. With the shut-off cock still open, set the inlet pressure to 300 lb. per sq. in. and the flow to 100 gall. per hr. Close the cock and ascertain that the increase in inlet pressure does not exceed 30 lb. per sq. in.

Pressurizing valve calibration test

46. Set the primary and main manifold pressures to the values listed in the table below and check that the flow readings are as specified for both increasing and decreasing pressures. A maximum permissible hysteresis limit of 10 gall. per hr. is allowed.

**PRESSURIZING VALVE CALIBRATION
TABLE, CODE "D"**

Manifold pressure lb. per sq. in.	Flow gall. per hr.	
	Primary	Main
	Min.	Max.
190-200	5	56
220	5	80
250	10	110
300	60	165
350	110	210
400	160	250
500	260	330
600	380	390
700	510	435
800	635	470
		505

PROCEDURE AFTER RIG TEST

Installation connections

47. Upon satisfactory completion of these tests remove the unit from the test rig and mount it on the assembling fixture T. 169476 (fig. 2). Remove all slave connections and ensure that the following installation parts are complete:—

- (1) Union for return to pump inlet with washer.
- (2) Union with washer for dump to atmosphere connection, distance piece with washers and cap nut.
- (3) Union with sealing washer for inlet housing. Remove the adapter T.177127 and washer and fit the plug and sealing washer.
- (4) Union for outlet to primary manifold with washer, and plug and washer on the other side of the main body.

RESTRICTED

- (5) Union for outlet to main manifold with washer, and plug and washer on the other side of the main body.

48. Repeat pressure tests as in para. 42 or 43 as applicable. If satisfactory lock all tab-washers.

Wire-locking

49. Upon satisfactory completion of all tests wire-lock the adjusting screw to the plug in the valve cover and the sleeve locating screw to the plug adjacent to the spill connection, using 20 S.W.G. stainless steel wire. The remaining wire-locking is

carried out after the unit is fitted to the engine.

Inhibiting

50. Inject flushing oil to specification D.T.D.587 into the inlet connection of the unit, operating the shut-off cock during the process.

Blanking

51. Fit dust caps to all connections.

Packing for despatch

52. Copy all test figures on to the approved record sheet and pack the unit in a suitable container.

This file was downloaded
from the RTFM Library.
Link: www.scottbouch.com/rtfm

Please see site for usage terms,
and more aircraft documents.

