ADMIRALTY
AIR MINISTRY

FUEL SYSTEM COMPONENTS (GENERAL) FOR GAS-TURBINE AERO-ENGINES

This is A.L. No. 14 to A.P.4282, Volume 2, Part 3

Section 7. List of Chapters: *delete* "*(To be issued later)*" after the title of Chapter 3 and *write* "(A.L.14)" in the outer margin against the deletion. *Insert* this Chapter 3 to follow Chapter 2. *Record* the incorporation of this A.L. in the Amendment Record Sheet.

ENGINEER

Chapter 3

ACCELERATION CONTROL AND METERING VALVE (Nene Mk. 10100 and 10200 Series E.C.U.)

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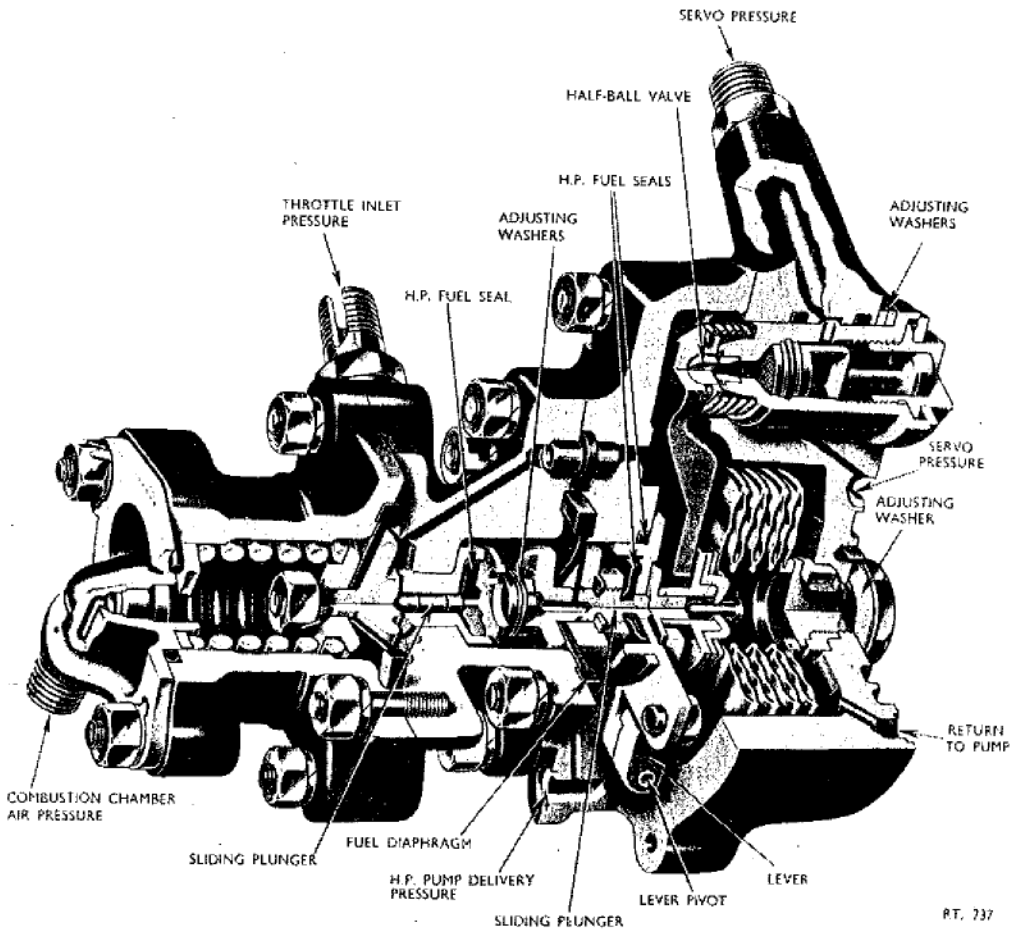

Fig. 1. Sectioned view of acceleration control unit

PRELIMINARY INFORMATION

1. The information in this chapter applies to the acceleration control unit (A.C.U.) and metering valve unit (M.V.U.) fitted to Nene aero-engines.

2. It is assumed that the units have been separated from the engine fuel pumps in accordance with the instructions contained in A.P.4282A, Vol. 2, Part 3, Sect. 2, Chap. 2. Prior to dismantling the units, if their condition permits, they should be subjected to a preliminary calibration test, details of which will be found elsewhere in this chapter. The results of the test will indicate the condition of the units and the attention which they may require.

3. Cleanliness during reconditioning is essential and care must be taken to avoid damaging components during handling or storage. When dismantling or assembling the A.C.U. the sequence given in this chapter must be followed, or the unit will be damaged.

SPECIAL TOOLS

4. The following is a list of special tools required for reconditioning the acceleration control and metering valve units:—

G.204983	Withdrawing tool, A.C.U. orifice body
T.199617	Dogging tool, M.V.U.
G.62338	Checking gauge, A.C.U. capsule chamber
T.177720	Checking gauge, A.C.U. pin seals
D.33772	Jaw spanner, with adapter
BES.1400	Torque spanner, A.C.U.
T.177721	Checking gauge, A.C.U. pin seals

M.H.338	Socket
T.188573	Test fixture, A.C.U.
T.199613	Blanking plug, M.V.U.
T.199614	Blanking plug, M.V.U.
T.199618	Withdrawing tool, M.V.U.
T.186059	Assembly block, M.V.U.
T.199618	Extractor, M.V. seats
T.199104	Assembling fixture, M.V. seats

DISMANTLING THE A.C.U.

Air chamber

5. To dismantle the A.C.U. proceed as follows:—

(1) Unscrew the 2 B.A. tab-washered nuts which secure the cover of the air chamber. Lift off the cover and the sealing ring, and remove the adjusting washer and spring from the air chamber.

(2) Remove the 2 B.A. nuts and the Grover and pen steel washers which retain the air chamber. Lift off the chamber and the air diaphragm.

(3) Remove the 2 B.A. tab-washered nut from the stem of the diaphragm and separate the locating plate, diaphragm and centre-piece.

Body assembly

6. Dismantle the body assembly as follows:—

(1) Unscrew the 2 B.A. nuts and remove the Grover and pen steel washers retaining the body assembly. Separate the body from the rocker lever housing and remove the sliding plunger, contact button, adjusting washers, fuel transfer tube and the fuel diaphragm.

(2) Ease the seal over the nipple of the diaphragm stem, remove the 1 B.A. tab-washered nut and separate the locating plate, diaphragm and centre-piece.

Rocker lever housing

7. Continue dismantling as follows:—

(1) Remove the 2 B.A. nuts and washers which retain the rocker lever housing. Separate the lever housing from the capsule chamber and remove the half-ball, spring, capsule adapter and plunger stop.

(2) Remove the 2 B.A. tab-washered nuts which secure the hinge plate in the housing and withdraw the rocker lever and hinge plate.

Capsule chamber

8. Complete the dismantling of the A.C.U. as follows:—

(1) Remove the $\frac{5}{16}$ in. B.S.F. tab-washered nut and adjusting washers and withdraw the capsule from the chamber.

(2) Unscrew the 2 B.A. tab-washered nuts and remove the cap-nut lock-plate from the orifice assembly. Unscrew the $\frac{1}{4}$ in. B.S.F. cap-nut and extract the primary filter from the orifice.

(3) Use a pair of long nosed pliers to remove the circlip which retains the secondary filter in the orifice, then extract the filter.

(4) Using the tool G.204983, withdraw the flanged orifice body from the body of the capsule chamber (*fig.* 2) and detach the adjusting washers.

DISMANTLING THE M.V.U.

9. The M.V.U. has a primary valve and a secondary valve (*fig.* 3) and an identical dismantling procedure is used for both valves as follows:—

(1) Cut the locking wire, remove the cap-nut and splined adjusting nut.

(2) Screw the spring carrier into the housing as far as possible, insert the tool T.199617 into the orifice of the outlet connection until it engages with the flutes of the valve, and remove the 2 B.A. nuts from the valve.

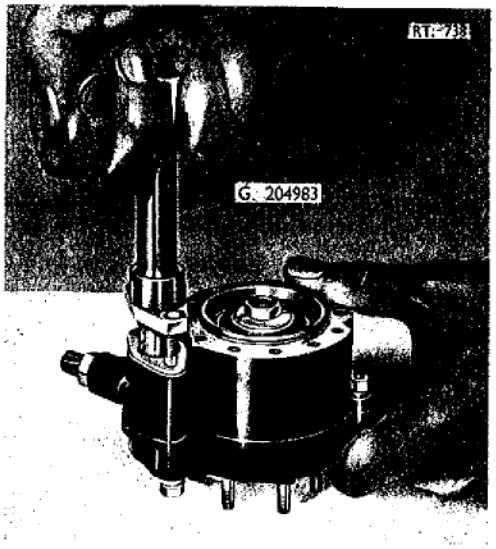

Fig. 2. Withdrawing the orifice body

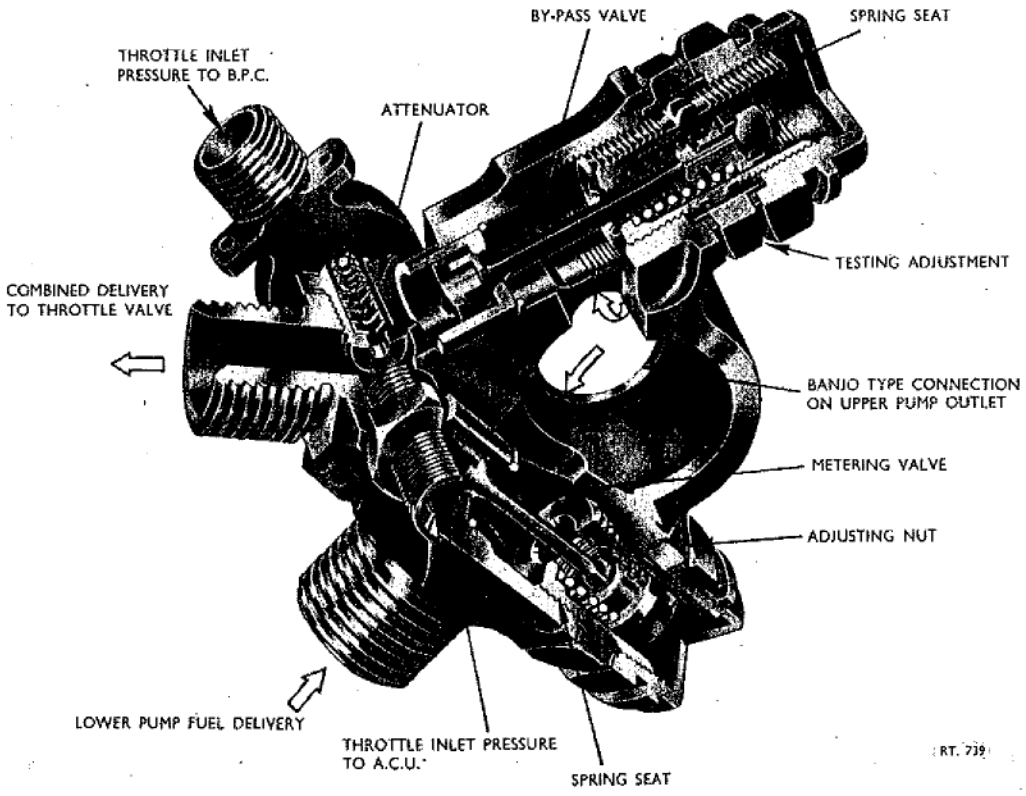

Fig. 3. Sectioned view of metering valve unit

(3) Remove the collar, spring and spring carrier, then withdraw the valve through the outlet orifice.

10. When both valves are removed continue as follows:—

(1) Unscrew the cap-nut from the attenuator body and remove the banjo, spring retaining plug and spring.

(2) With the orifice in the attenuator body pointing downwards, a light tap will remove the five orifice plates and four spacing rings which form the attenuator.

CLEANING

11. The A.C.U. and the M.V.U. will normally be clean internally and it is most important to maintain this condition. The work bench must be scrupulously clean and to facilitate this it should be covered with zinc sheeting or linoleum. A clean container in which to put the dismantled parts will also be required. All parts must be thoroughly cleaned and washed before re-assembling; a kerosine bath and spray gun is recommended for this purpose. No hard brushes or abrasives of any kind must be used. After washing, all parts must be dried by compressed air; rag must *not* be used for this purpose.

INSPECTION

Redundant parts

12. All parts made redundant by the embodiment of modifications must be set aside during inspection.

Consumable parts

13. The following parts must be discarded during dismantling, irrespective of their condition:—

Joint packings
Rubber seals and sealing rings
Diaphragms
Tab-washers
Locking wire and aluminium washers

Dimensional checks

14. Parts which are subject to wear must be dimensionally checked and must be within the limits specified in the Schedule of Fits, Clearances and Repair Tolerances, Vol. 2, Part 2 of this Air Publication.

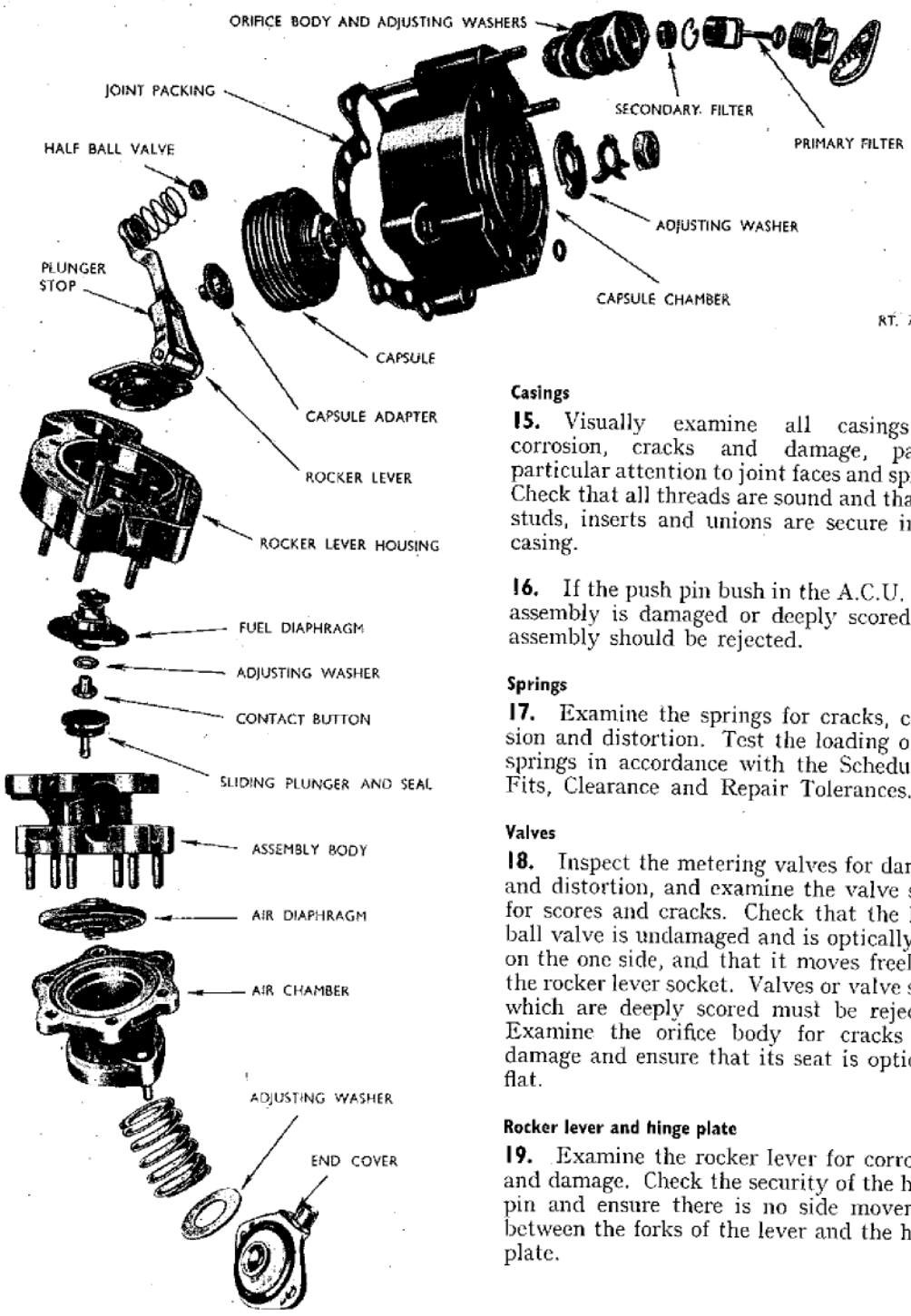

Fig. 4. Exploded view of acceleration control unit

Casings

15. Visually examine all casings for corrosion, cracks and damage, paying particular attention to joint faces and spigots. Check that all threads are sound and that the studs, inserts and unions are secure in the casing.

16. If the push pin bush in the A.C.U. body assembly is damaged or deeply scored, the assembly should be rejected.

Springs

17. Examine the springs for cracks, corrosion and distortion. Test the loading of the springs in accordance with the Schedule of Fits, Clearance and Repair Tolerances.

Valves

18. Inspect the metering valves for damage and distortion, and examine the valve seats for scores and cracks. Check that the half-ball valve is undamaged and is optically flat on the one side, and that it moves freely in the rocker lever socket. Valves or valve seats which are deeply scored must be rejected. Examine the orifice body for cracks and damage and ensure that its seat is optically flat.

Rocker lever and hinge plate

19. Examine the rocker lever for corrosion and damage. Check the security of the hinge pin and ensure there is no side movement between the forks of the lever and the hinge plate.

Capsule

20. Inspect the capsule for corrosion and punctures and check the condition of the soldering. Immersion in hot water will reveal any punctures in the capsule.

Remaining details

21. Examine the filters for broken wires and distortion; such defects entail rejection of the filters. Check the attenuator orifice plates and distance rings for corrosion and distortion; ensure that the holes in the plates are unobstructed. The sliding plunger, the contact button and the moving internal parts of the A.C.U. must be perfectly free from burrs and scores. Examine the splines of the adjusting nuts and spring carriers for fretting, and the remaining items for superficial damage.

ASSEMBLING THE A.C.U.

Capsule chamber

22. To assemble the A.C.U. proceed as follows:—

(1) Fit a locating washer and a rubber sealing ring over the threaded extension of the capsule, then lower the capsule, threaded extension first, into the chamber.

(2) The extension which protrudes through the hole in the face of the chamber, must be secured with an adjusting washer, tab-washer and nut.

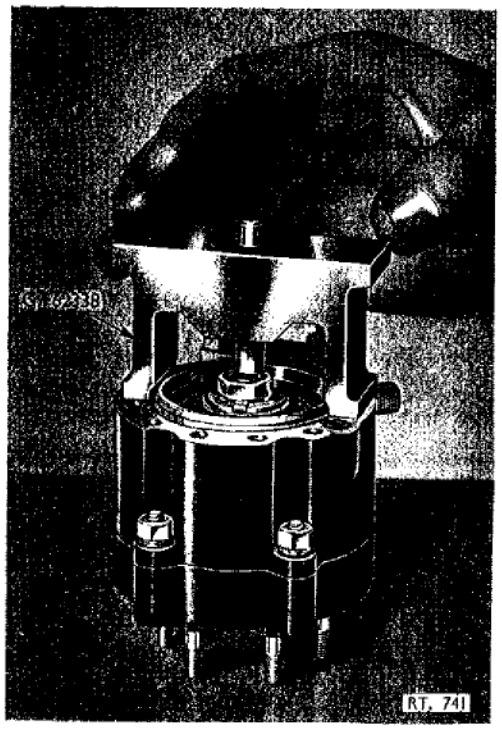

Fig. 5. Checking the height of capsule retaining nut

Inspectional check

23. Make the following inspectional check:—

(1) Mount the checking gauge G.62338 on to the joint face of the capsule chamber, as shown in fig. 5, and check the distance from the face of the chamber to the top face of the nut. If necessary the adjusting washer beneath the nut must be changed to obtain a dimension of 0·265 + 0·005 in.

24. When the distance from the top face of the nut to the face of the chamber is correct, continue the assembling as follows:—

(1) Bend up the tab-washer to lock the capsule retaining nut.

(2) Fit two new sealing rings into the grooves in the bore of the orifice housing.

(3) Place the shims under the flange of the orifice body.

(4) Using the tool G.204983, press the orifice body into the housing and secure it with 2 B.A. slave nuts.

Rocker lever housing

25. Continue the assembling as follows:—

(1) Place a new seal on the underside of the hinge plate and press the hinge plate, complete with rocker lever and spring, over the four studs and into the rocker lever housing.

(2) Secure the plate with 2 B.A. nuts and tab-washers; bend up the locking tabs.

(3) Open the rocker lever and position the plunger stop between the forks of the lever, with the head of the plunger nearest the hinge plate.

(4) Close the rocker lever and slide the capsule adapter over the stem of the plunger stop.

(5) Pass the half-ball valve through the inside of the valve spring and locate it in the lever cup.

(6) Fit the rocker lever housing to the capsule chamber, interposing a joint packing.

(7) Secure the housings together with 2 B.A. nuts, plain and spring washers.

Inspectional check

26. Make the following inspectional check:—

(1) Locate the stem of the dismantled fuel diaphragm in the part of the setting

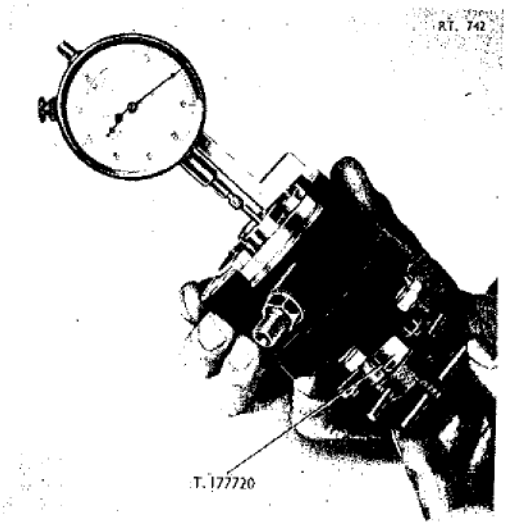

Fig. 6. First stage inspectional check

tool T.177720 which is secured to the face of the rocker lever housing with 2 B.A. nuts. Screw the guide plug into the orifice body and position the needle to touch the half-ball valve.

(2) Secure the dial indicator and attachment to the capsule chamber and with the indicator contacting the needle, as illustrated in fig. 6, screw in the small knurled screw on the fixture and check the movement registered on the dial. The total movement must be between 0·001 and 0·004 in., and if necessary the shims under the flange of the orifice body must be changed to obtain this movement.

Body assembly and diaphragm

27. Remove the part of the checking tool which is attached to the face of the rocker lever housing, and extract the diaphragm stem from the tool. Continue assembling as follows:—

(1) Slide the diaphragm over the stem, add the locating plate, tab-washer and 1 B.A. nut.

(2) Use the jaw spanner D.33772 with adapter M.S.A.P. and the BES.1400 torque wrench to tighten the nut to 12 lb. in. (10 lb. in. dia. reading).

(3) Lock the tab-washer and ease the seal over the nipple of the stem.

(4) Position the assembled diaphragm, seal end first, in the rocker lever housing.

(5) Place the adjusting shims under the head of the contact button and slide the button into the diaphragm stem.

(6) Press a seal on to the stem of the sliding plunger.

(7) Insert the plunger into the body assembly from the fuel diaphragm side of the body.

(8) Place a sealing ring round the fuel transfer tube and position the tube in the passage in the joint face of the body.

(9) Carefully fit the body assembly to the rocker lever housing.

(10) Secure the assembly with 2 B.A. nuts, pen steel and Grover washers.

Inspectional check

28 Make the following inspectional check:—

(1) With the guide-plug and needle, and the dial indicator, in the position used for the first inspectional check, attach the plate and knurled screw T.177721 to the joint face of the body assembly and secure the plate with nuts and washers (*fig.* 7).

(2) Tighten the knurled screw in the fixture and observe the movement on the dial indicator. If it is necessary to adjust the movement, which must be between 0·010 and 0·017 in., the shims beneath the contact button should be changed.

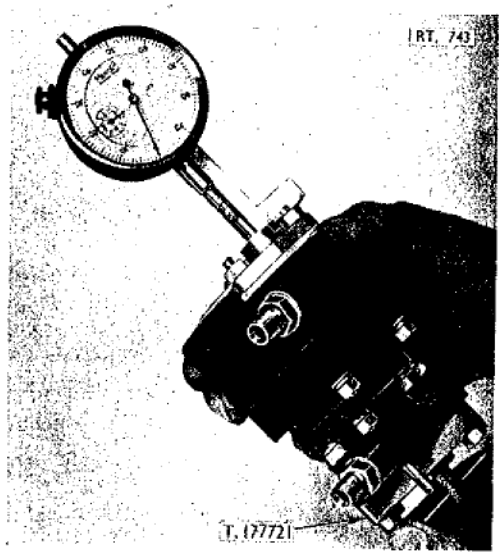

Fig. 7. Second stage inspectional check

29. Remove the complete setting fixture from the assembly and proceed with the assembling as follows:—

(1) Insert the flat secondary filter in the bore of the orifice body, and retain the filter with a circlip.

(2) Position the primary filter in the orifice and secure the assembly with a blanking plug, interposing an aluminium washer.

(3) Remove the 2 B.A. slave nuts from the flange of the orifice body.

(4) Place a lock-plate over the head of the blanking plug and one of the studs, and secure the assembly with a 2 B.A. tab-washered nut; bend up the locking tabs.

(5) Fit a 2 B.A. nut, plain and Grover washer to the remaining flange stud.

Air chamber and diaphragm

30. Proceed with the assembling as follows:—

(1) Slide the diaphragm over the stem and fit the locating plate, tab-washer and 2 B.A. nut.

(2) Use the socket M.H.338 with adapter M.S.A.P. and the BES.1400 torque wrench to tighten the nut to 24 lb. in.

(3) Lock the tab-washer.

(4) Fit the diaphragm, with the stem nut uppermost, into the assembly body.

(5) Position the air chamber on the assembly body and secure it with 2 B.A. nuts, pen steel and Grover washers.

(6) Place a spring and an adjusting washer in the air chamber.

(7) Position a sealing ring on the end cover and fit the cover to the air chamber. The air-intake connection must point rearwards, i.e. to the left of the metered pressure connection when the latter is vertical and in the twelve o'clock position.

(8) Secure the cover with 2 B.A. nuts and tab-washers; do not bend up the tabs at this stage.

Test fixture

31. Complete the assembling of the A.C.U. as follows:—

(1) Place sealing rings round the spigot of the joint face; in the low-pressure fuel passage, which also enters the joint face; and in the pump delivery aperture in the face of the rocker lever housing.

(2) Mount the unit on the test fixture T.188573, ready for rig testing.

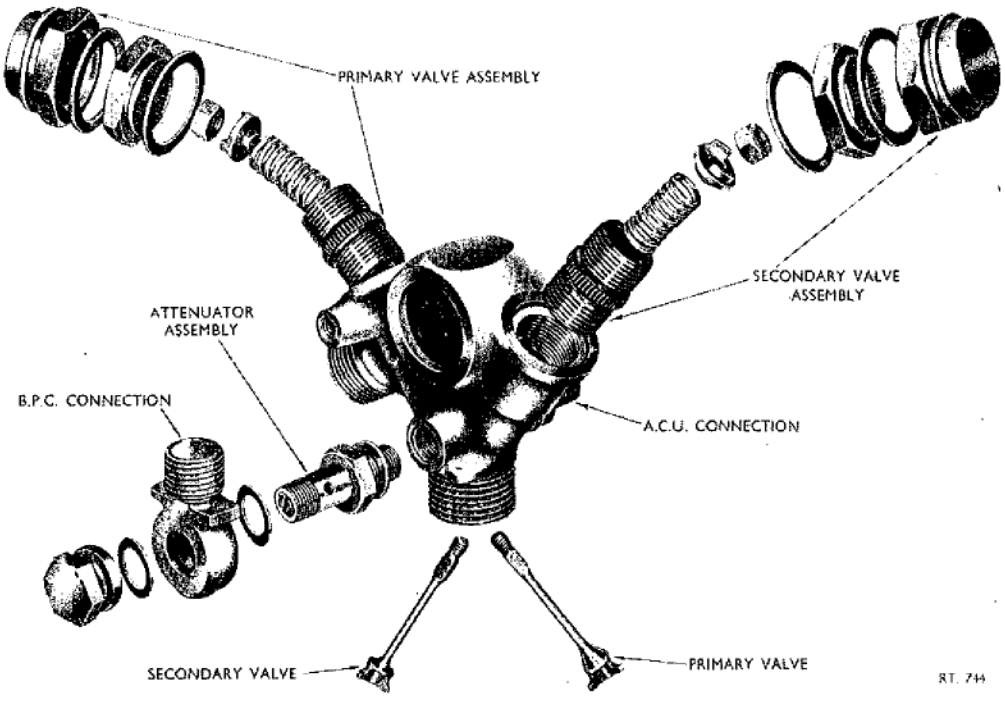

Fig. 8. Exploded view of metering valve unit

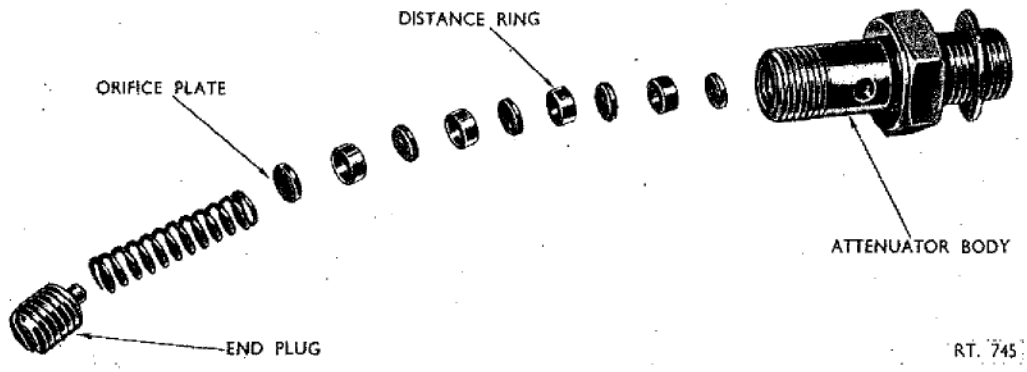

Fig. 9. Exploded view of attenuator assembly

ASSEMBLING THE M.V.U.

Attenuator assembly

32. There are five orifice plates and four distance pieces in the attenuator (*fig.* 9) and to assemble them proceed as follows:—

(1) The first orifice plate to be fitted in the attenuator body must have a hole in the centre and must be followed by a distance piece. The next three plates must have off-set holes and be interposed with distance pieces. The holes in these plates must be off-set in relation to each other. The final plate must have a hole in the centre and be followed by the spring and retaining screw which is screwed in flush with the end of the connection.

(2) Place an aluminium washer and the banjo round the attenuator body.

(3) Screw on the cap-nut, interposing an aluminium washer.

Primary and secondary valves

33. On the initial build of the M.V.U. the primary valve assembly should not be fitted. The blanking plug T.199613 must be fitted in place of the valve to allow a leakage check of the secondary valve to be made during rig test. The primary valve has a conical seat, and its housing has the pump delivery connection entering its side. When the valve is assembled it can be treated like the secondary valve as follows:—

(1) Pass the valve through the main outlet connection and position it in the orifice of the valve seating.

(2) Use the tool T.199617 to engage the flutes of the valve; screw the spring carrier into the housing as far as possible

(3) Place the spring and collar round the stem of the valve in the carrier, add a 2 B.A. nut, tighten the nut and then allow the collar to spring back and secure the assembly.

(4) Unscrew the carrier until the spring retains the valve in position.

(5) Locate the splined adjusting nut, with an aluminium washer interposed. Add a second aluminium washer and screw on the cap-nut.

34. The M.V.U. is then ready for rig testing together with the A.C.U.

REPAIR

General

35. The repair of the A.C.U. and the M.V.U. is mainly effected by the renewal of unserviceable parts; on receiving a new part, check the part number and try the part for fit.

Replacing a metering valve seat

36. If the metering valve seat is to be replaced proceed as follows:—

(1) Remove the retaining ring which is located above the valve seat.

(2) Heat the casing in an oven to a temperature of 125 deg. C.

(3) Use the extractor T.199618 to withdraw the seat from the spring carrier side of the casing.

(4) Re-heat the casing to a temperature of 125 deg. C.; freeze the valve seat to — 79 deg. C. for a period of 20 minutes.

(5) Mount the casing on the assembling fixture T.199104.

(6) Position the valve seat with the shoulder uppermost in the casing, and press the seat fully into the bore of the casing.

(7) Fit the valve seat retaining ring into the casing.

RIG TESTING

General

37. The A.C.U. and the M.V.U. must be tested as a pair in conjunction with two size 'C' fuel pumps. The appropriate adapter must be fitted to the universal fuel rig J.46080.

38. The test performance must be accurately recorded on a test certificate and submitted to a test inspector for approval. The conditions under which the units are to be tested will be found in the test schedule (Appendix A) which appears at the end of this Chapter.

39. The fuel used throughout the test is to be to Specification D.Eng.R.D. (latest issue) at a temperature of between 20 and 26 deg. C.

Secondary valve internal leakage checks

40. Install the engine upper fuel pump on the rig and mount the M.V.U. on the outlet connection of the pump. Use a slave cap-nut with provision for a pressure tapping on it, to secure the M.V.U.

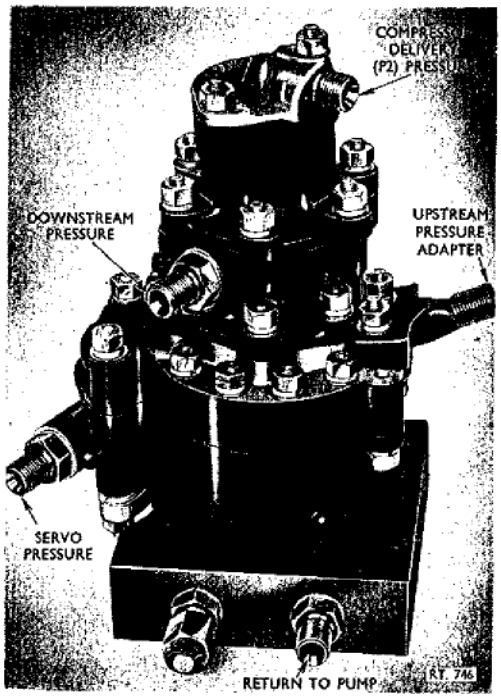

Fig. 10. Acceleration control unit on test fixture

41. With the primary metering valve blanked off, connect the B.P.C. connection on the M.V.U. to a pressure gauge. Blank off the downstream connections to the A.C.U. and connect the upstream connection to a pressure gauge. Run the rig and supply the M.V.U. with fuel at the specified flow. For this test it is advisable to have a suitable container into which to spill the flow.

42. Set the secondary valve to give the test schedule conditions, reduce the speed of the rig to give the desired pressure drop across the valve and measure the leakage from the main delivery connection. The leakage must be within the specified limits.

43. Stop the rig, remove the blanking plug from the primary valve seat and fit the valve assembly in its place, as described in para. 31.

A.C.U. internal leakage checks

44. For the internal leakage checks of the A.C.U., both the engine fuel pumps can be installed on the rig; the M.V.U. should remain on the outlet connection of the engine upper pump, and the A.C.U. should be mounted on the test fixture T.188573 (*fig.* 10). A slave blanking cover will be required in the position normally occupied by the A.C.U. on the engine lower pump servo housing.

45. There are three internal leakage tests to which the A.C.U. must be subjected and the connections to be made to perform each test are as follows:—

(1) Blank off the upstream and downstream pressure connections from the M.V.U. Apply the pump pressure specified in the test schedule to the servo connection on the A.C.U. and measure the leakage through the half-ball valve at the "return to pump" connection. The leakage must be within the test schedule limits. If the leakage is excessive it may be necessary to change the half-ball valve and repeat the test.

(2) Re-connect the upstream pressure connection from the M.V.U. to the A.C.U., pressurize the unit in accordance with the test schedule and measure the flow through the auto-bleed at the downstream connection on the A.C.U. The flow must conform to the test schedule limits. If the leakage through the auto-bleed is not within the specified limits, it may be necessary to change the fuel diaphragm stem which incorporates the auto-bleed passage, and repeat the test.

(3) With the upstream and downstream pressure connections from the M.V.U. connected to the A.C.U., the A.C.U. servo connection blanked off, and the test schedule conditions of pump pressure and pressure drop, the leakage past the seals must be measured. The leakage should be measured at the "pump return" connection and must be within the specified limits. If the seal leakage is excessive it may be necessary to change the seals in the A.C.U. and repeat the test.

Preliminary setting of the M.V.U. and A.C.U.

46. At this stage of the test the A.C.U. should be fitted on to the servo housing of the engine lower fuel pump, and the system connected in accordance with the diagramatic layout (*fig.* 11).

47. The $\frac{5}{16}$ in. B.S.F. capsule retaining nut on the A.C.U. forms the minimum flow stop for the pump to which it is attached. When the A.C.U. is fitted to a pump therefore, it is necessary to check the minimum flow setting of the pump. For information concerning the

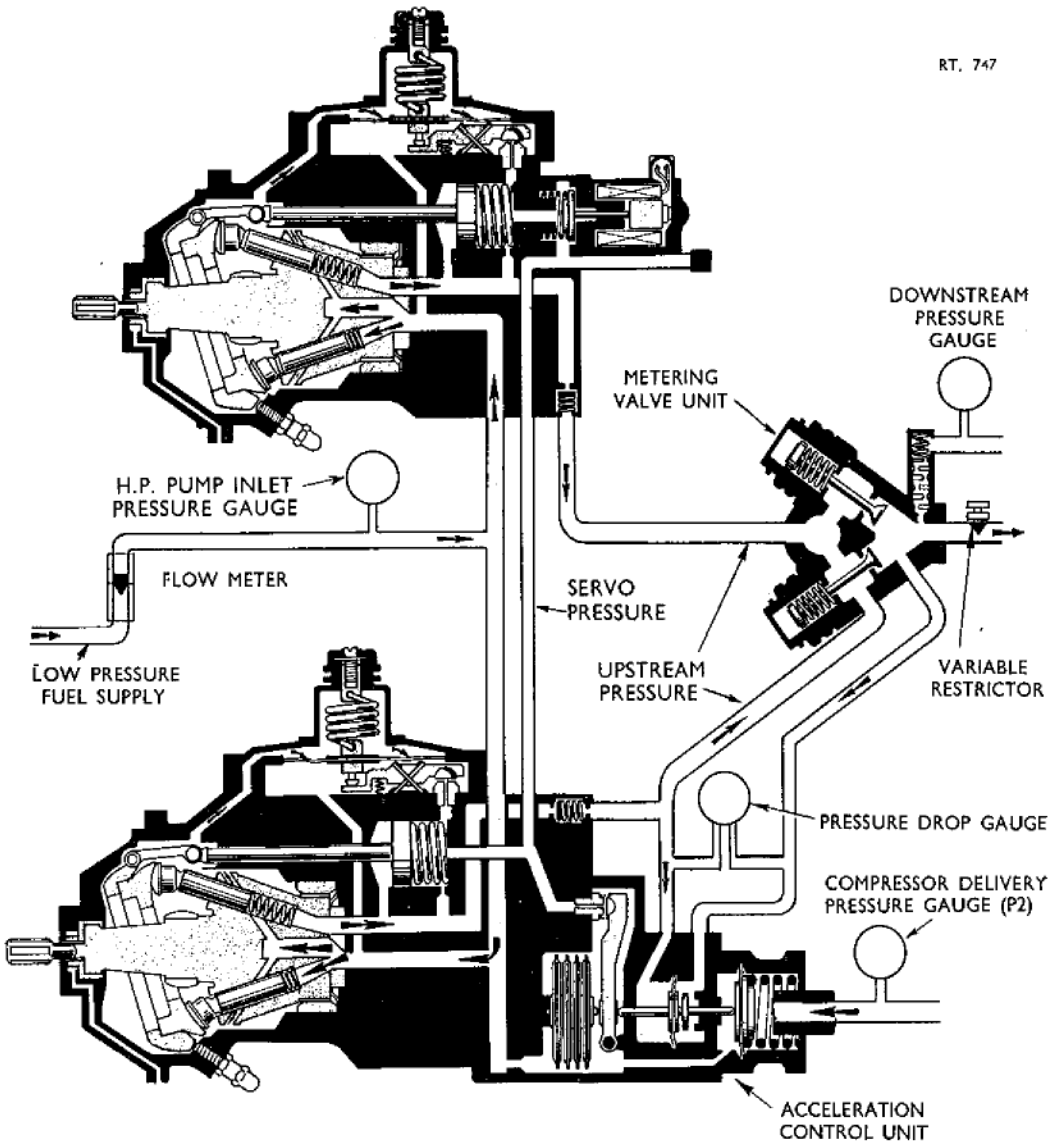

Fig. 11. Diagrammatic layout

fitting of the A.C.U. to the pump, and the minimum flow setting, reference should be made to A.P.4282A, Vol. 2, Part 3, Sect. 2, Chap. 2.

48. Start the rig, screw out the M.V.U. secondary valve adjustment by hand until it is tight and secure the lock-nut. Set the M.V.U. primary valve to the conditions of flow and pressure drop at the downstream pressure, given in the test schedule.

49. Adjust the manual control in the air supply line, restrict the pump inlet pressure and regulate the downstream pressure restrictor to give the test schedule conditions. The fuel flow must then be within the schedule limits. If the flow is outside the limits it will be necessary to stop the rig and remove the end cover from the A.C.U. air chamber. Change the adjusting shim, replace the end cover and recheck the flow. A difference of 0·001 in. in the thickness of the shim is the approximate equivalent of 3·6 gall. per hour.

Pressure sensitiveness

50. The pressure sensitiveness of the unit must be checked by noting the change in

A.C.U. AND METERING VALVE CALIBRATION GRAPH

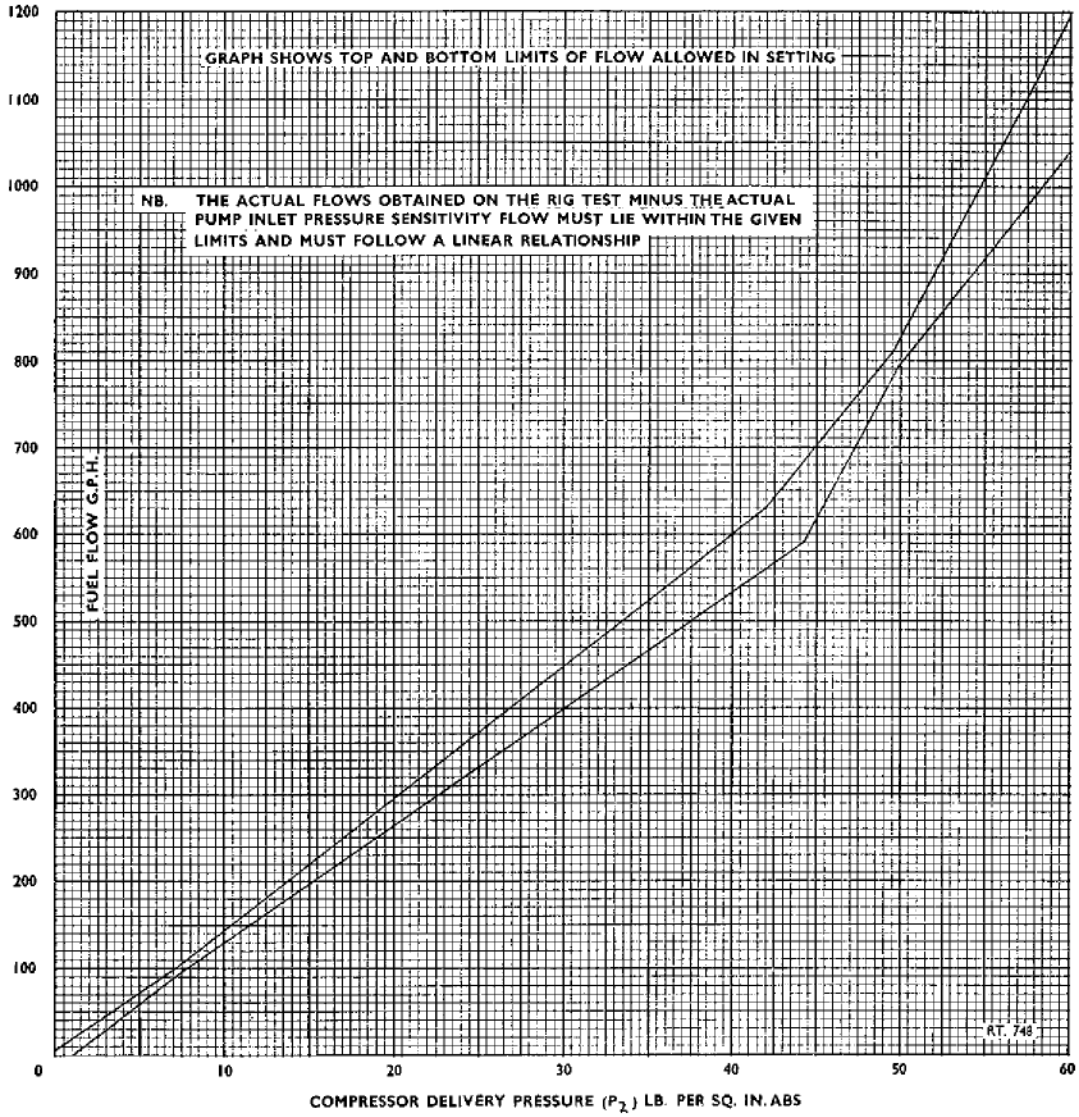

Fig. 12. Calibration graph

flow which occurs when (a) the downstream (throttle valve inlet) pressure from the M.V.U. or (b) the H.P. pump inlet pressure is varied over the range given in the test schedule.

Note . . .

If the flow increases *with an increase in pump inlet pressure or downstream pressure, sensitiveness is regarded as positive. Conversely, if the flow* decreases *for an increase in pump inlet pressure or downstream pressure, then the pressure sensitiveness is regarded as negative.*

51. The pressure sensitiveness must be within the specified limits.

52. When the pressure sensitiveness of the unit is not within the specified limits it will be necessary to stop the rig and remove the diaphragms from the A.C.U. for examination. If the diaphragm is found to be damaged or distorted it will be necessary to renew the damaged part. The push pin seal settings which are described as inspectional checks in para. 24 and 26 should be checked before assembling the unit and repeating the pressure sensitiveness tests.

Final metering valve settings

53. Set the primary and secondary metering valves to give the test schedule conditions, allowing for pump inlet pressure sensitiveness.

Preliminary calibration

54. The air pressure (P.2) and downstream pressure must be increased in accordance with the test schedule, from the lowest to the highest values. The pressure must then be decreased correspondingly, until the lowest value is again reached. At each point of the calibration the flow must be recorded and corrected for actual pump inlet pressure sensitiveness, i.e. if the sensitiveness is positive it must be added to the flow, and when negative it must be subtracted. The flow must then be within the specified limits and the maximum hysteresis of 10 gall. per hour must not be exceeded.

Endurance

55. To ensure that all moving parts are correctly mated and to allow for any 'settling', the units must be given an endurance test under the conditions specified in the test schedule.

56. Re-check the metering valve settings to determine whether any excessive 'settling' has occurred, and if necessary adjust the valves to regain the test schedule conditions.

Dismantling for inspection

57. Remove the units from the rig and dismantle them for the inspection of the working parts. The extent of the dismantling operation is dependent on the discretion of the Inspector-in-Charge, and both units must then be assembled and again installed on the rig.

Repeat tests

58. All the previous rig tests must be repeated. When the metering valve settings are checked, the flow must not differ from that obtained on the previous test by more than the specified limit.

Pressure test for external leakage

59. Thoroughly dry the exterior of both units. Apply the pressure stated in the test schedule, by adjusting the variable restrictor in the downstream line, and ensure that both units are free from external leakage.

INHIBITING AND DISPATCH

60. The units should now be removed from the rig and flushed with the inhibiting oil. Instructions for inhibiting are contained in A.P.4471A, Vol. 1. Complete all the lock-wiring, fit the dust caps, and check the serial number of the A.C.U. and M.V.U. The test certificate, completed and approved, is to accompany the units which are then ready for fitting on the engine.

APPENDIX A

TEST SCHEDULE

Nene acceleration control units

Fuel

Aviation turbine fuel to Specification D.Eng.RD.2482 (latest issue), at a temperature between 20 to 26 deg. C. Pump speed 2,900 r.p.m. unless otherwise stated.

Test	Condition	Period	Pump inlet pressure lb. per sq. in.	Pump delivery pressure lb. per sq. in.	P_2 air pressure lb. per sq. in. abs.	Downstream pressure lb. per sq. in.	Fuel flow gall. per hour	Pressure drop lb. per sq. in.	Remarks
1	M.V.U. SECONDARY VALVE LEAKAGE TEST								
						0	150	100	
						0		80	Check the leakage at 80 lb. per sq. in. pressure drop. Maximum leakage 400 cc. per minute
2	A.C.U. INTERNAL LEAKAGE TESTS								
(a)				2,000					Servo leakage must not exceed 0·5 cc. per minute
(b)				50					Flow through auto-bleed must not exceed 300 cc. per minute
(c)				100				50	Seal leakage must not exceed 5 cc. per minute
3	PRELIMINARY SETTING OF A.C.U. AND M.V.U.								
(a)						250	150	68	
(b)			5		7	200	95+20		Obtain the flow by changing the adjusting shim in the P_2 air chamber
4	PRESSURE SENSITIVENESS								
(a)			5		7	200 to 250			Downstream (throttle valve inlet) pressure to be varied from 200 to 500 lb. per sq. in. Pressure sensitiveness limits 0 to −20 gall. per hour
(b)			5 to 20		7	200			Pump inlet pressure to be varied from 5 to 20 lb. per sq. in. pressure sensitiveness (A) limits +5 to −5 gall. per hour

Test	Condition	Period	Pump inlet pressure lb. per sq. in.	Pump delivery pressure lb. per sq. in.	P_2 air pressure lb. per sq. in. abs.	Downstream pressure lb. per sq. in.	Fuel flow gall. per hour	Pressure drop lb. per sq. in.	Remarks
5	FINAL METERING VALVE SETTINGS								
(a)			5		7	200	95+A±2		Set primary valve to give 95 + pump inlet pressure sensitiveness ± 2 gall. per hour
	e.g. If A is — 3 G.P.H., flow is set at 90 to 94 G.P.H.								
(b)			5		49·7	900			Set secondary valve to give 800 + the pump inlet pressure sensitiveness ± 10 gall. per hour
6	PRELIMINARY CALIBRATION								
			5		Pump speed 2,900 r.p.m.				
							Max.	Min.	
					2·5	100	38	22	*Setting points. Note.—The actual flows minus the actual pump inlet pressure sensitiveness (A) must be within the limits given and follow a linear relationship
					7	200	97	93*	
					10	250	142	130	
					14·7	300	217	195	
					19·7	350	290	262	
					24·7	400	365	328	
					29·7	475	441	395	The pressure drop should also be recorded at each calibration point
					34·7	550	518	462	
					39·7	600	596	530	
					44·7	700	695	610	
					49·7	900	810	790*	
					54·7	1100	995	912	
7	ENDURANCE								
		1 hour			2 to 60				Operate the P_2 pressure from 2 to 60 lb. per sq. in. abs., and back, once every 2 minutes during the duration of test
8	CHECK FOR EXCESSIVE SETTLING								
	Repeat test No. 5 parts (a) and (b)								

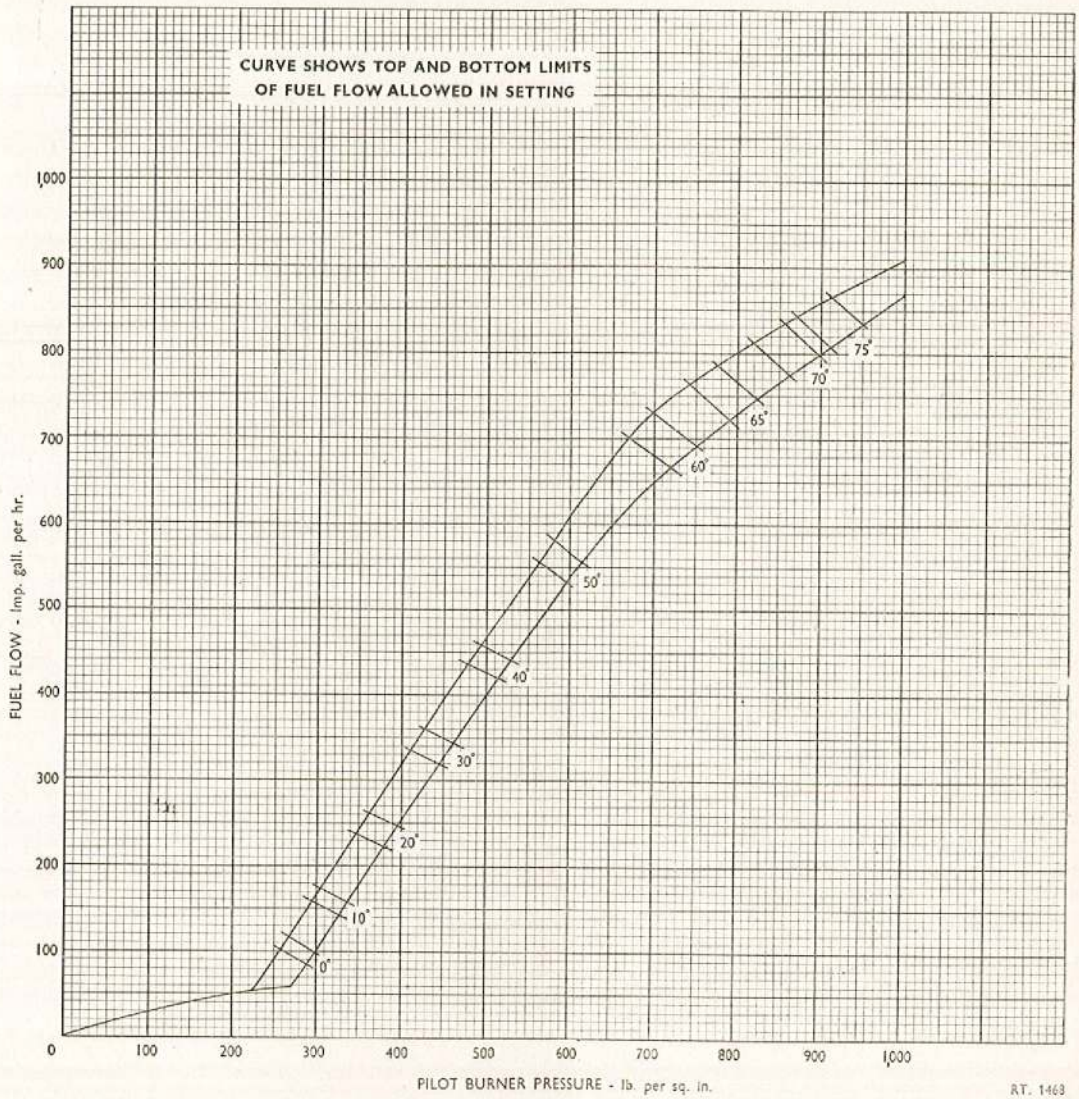

Fig. 2. Throttle valve and pressurizing valve calibration graph (F.C.U. type BA.70573)

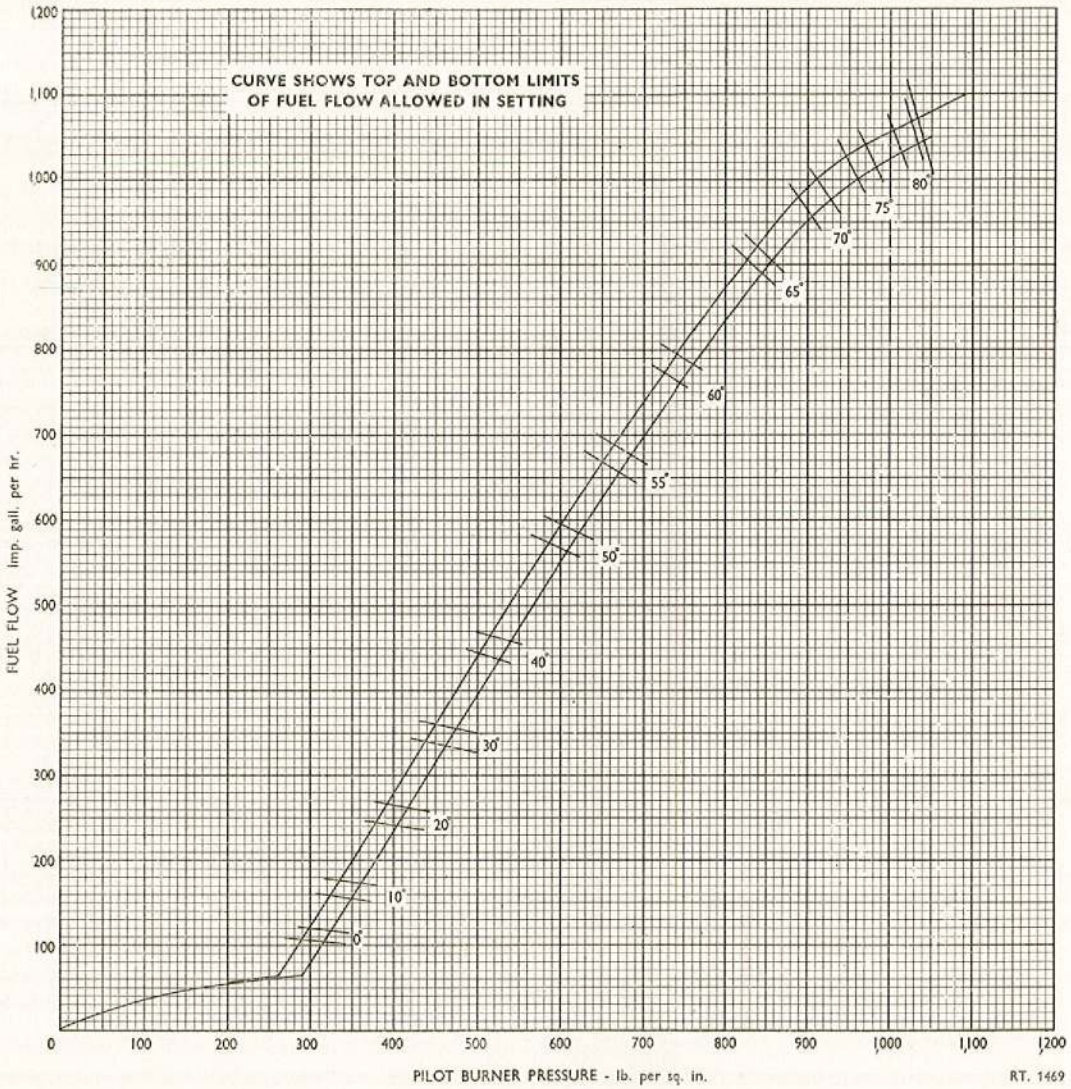

Fig. 3. Throttle valve and pressurizing valve calibration graph (F.C.U. types BA.61076 and BA.60351)

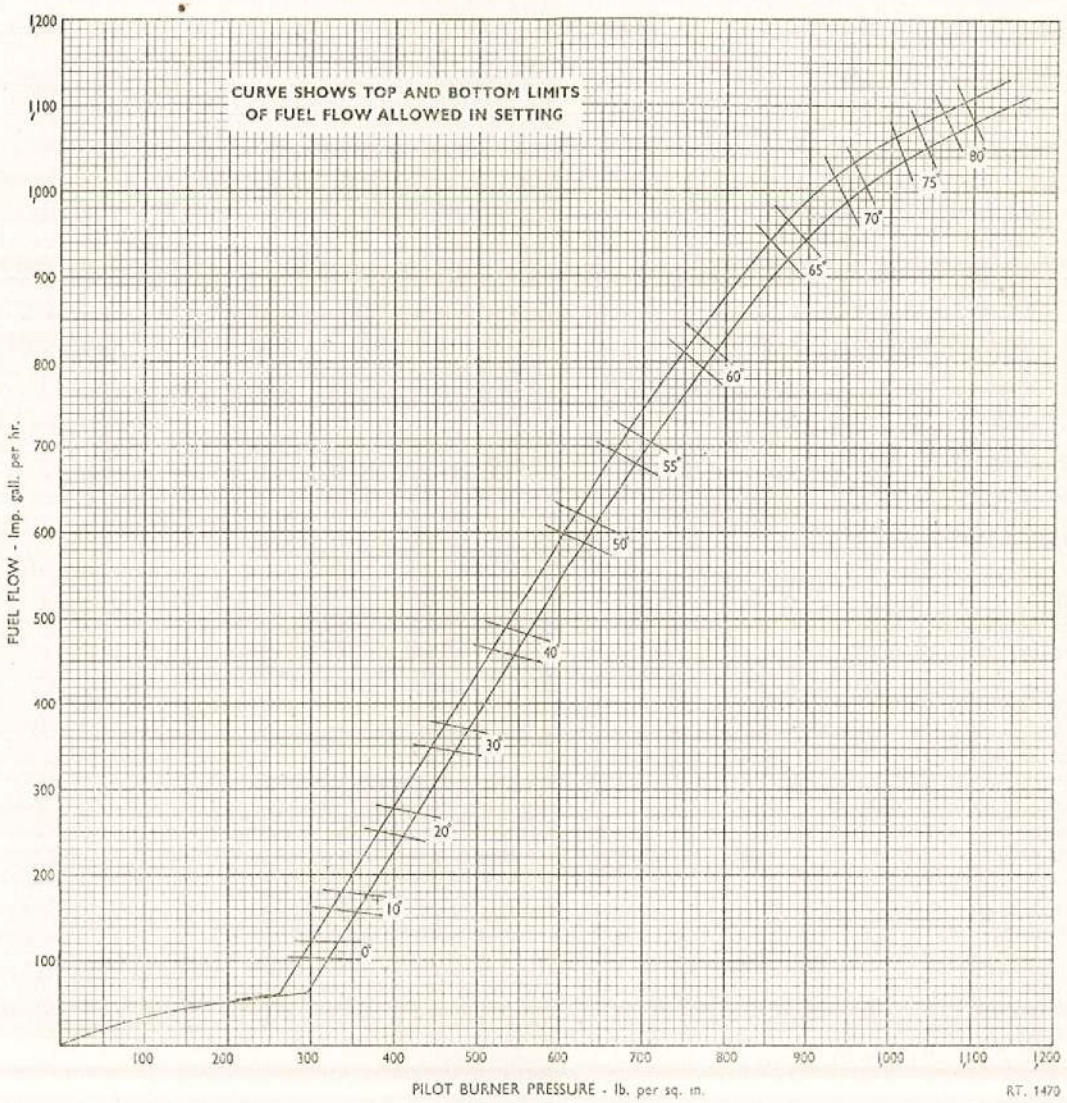

Fig. 4. Throttle valve and pressurizing valve calibration graph (F.C.U. types BA.62403 and BA.73323)

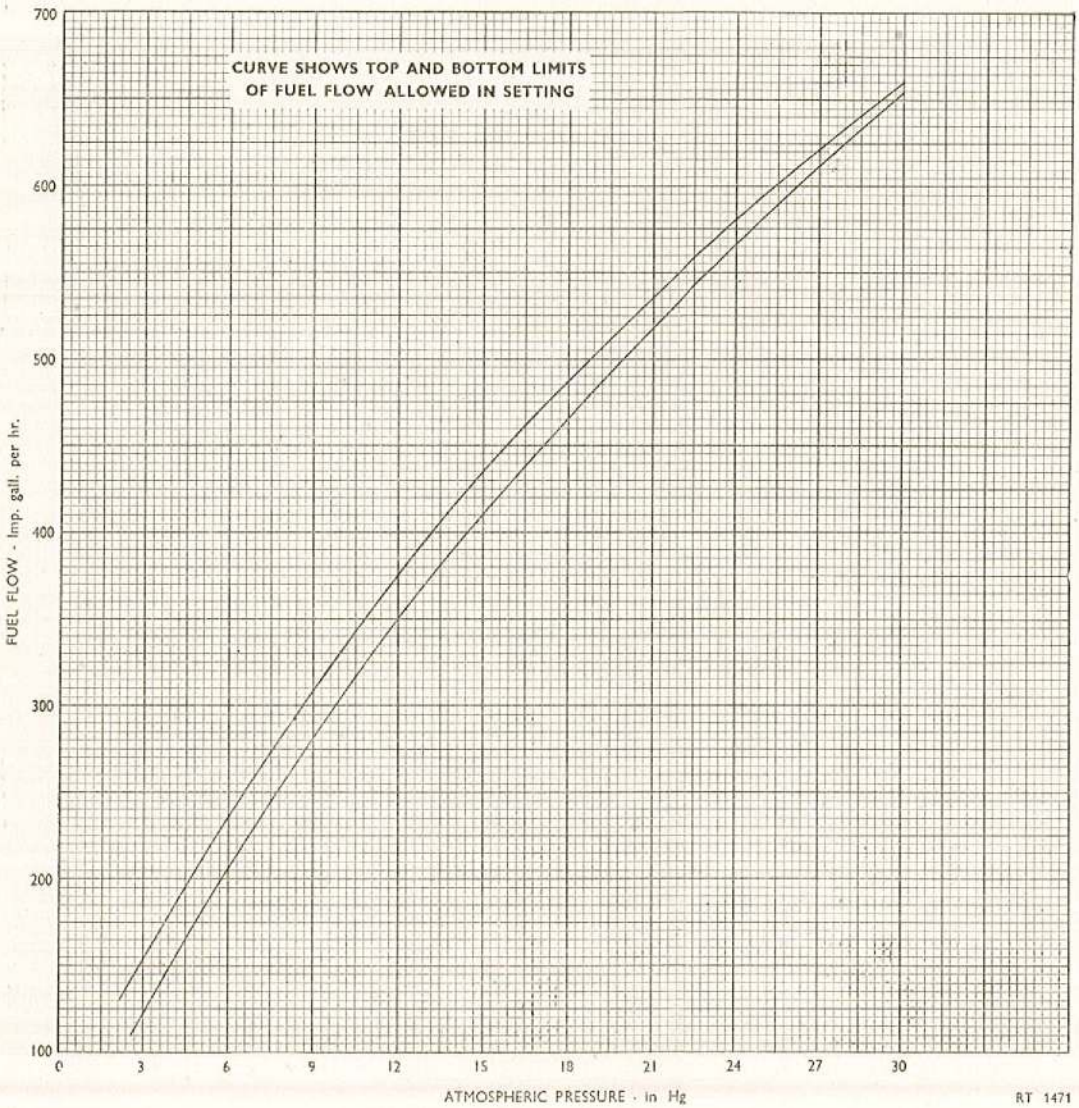

Fig. 5. Combined B.P.C. and control unit calibration graph (F.C.U. type BA.70573)

TEST SCHEDULE 2—*contd.*

Test	F.C.U. type	Throttle setting degrees	H.P. cock position	Fuel flow Imp. gall./hr.	Remarks
16	Ram pressure check				
	All types	80	Open		Fuel filter inlet pressure=15 lb./sq. in.
		Apply 5 lb./sq. in. (gauge) ram pressure to the capsule chamber and record the fuel flow			
	BA.70573	Minimum fuel flow=900 gall./hr.			
	BA.61076 BA.60351	Minimum fuel flow=1,150 gall./hr.			
	BA.62403 BA.73323	Minimum fuel flow=1,175 gall./hr.			
17	Altitude characteristics				
	BA.70573	As required for fuel flow	Open		
		Set the throttle to give the fuel flow required for the day's barometric pressure, as ascertained in test 14. Apply maximum depression to the capsule chamber three consecutive times, then apply depression in stages of 5, 10, 15, 20 and 25 in. Hg.			
		Record the fuel flow, atmospheric pressure and pump pressure (ascending and descending) and check that the results, when plotted, conform to the limits shown on the calibration graph (*fig.* 5)			Maximum pump hysteresis=10 lb./sq. in.
	BA.61076 BA.60351 BA.62403 BA.73323	As required for fuel flow	Open		
		Procedure as for BA.70573 with the throttle set to give the appropriate fuel flow, as ascertained in test 14, the depression applied in stages of 5, 10, 15, 20, 25 and 27 in. Hg. and using the calibration graph (*fig.* 6 *or* 7) for checking results			Maximum pump hysteresis=10 lb./sq. in. No figures are required at 27 in. Hg. depression

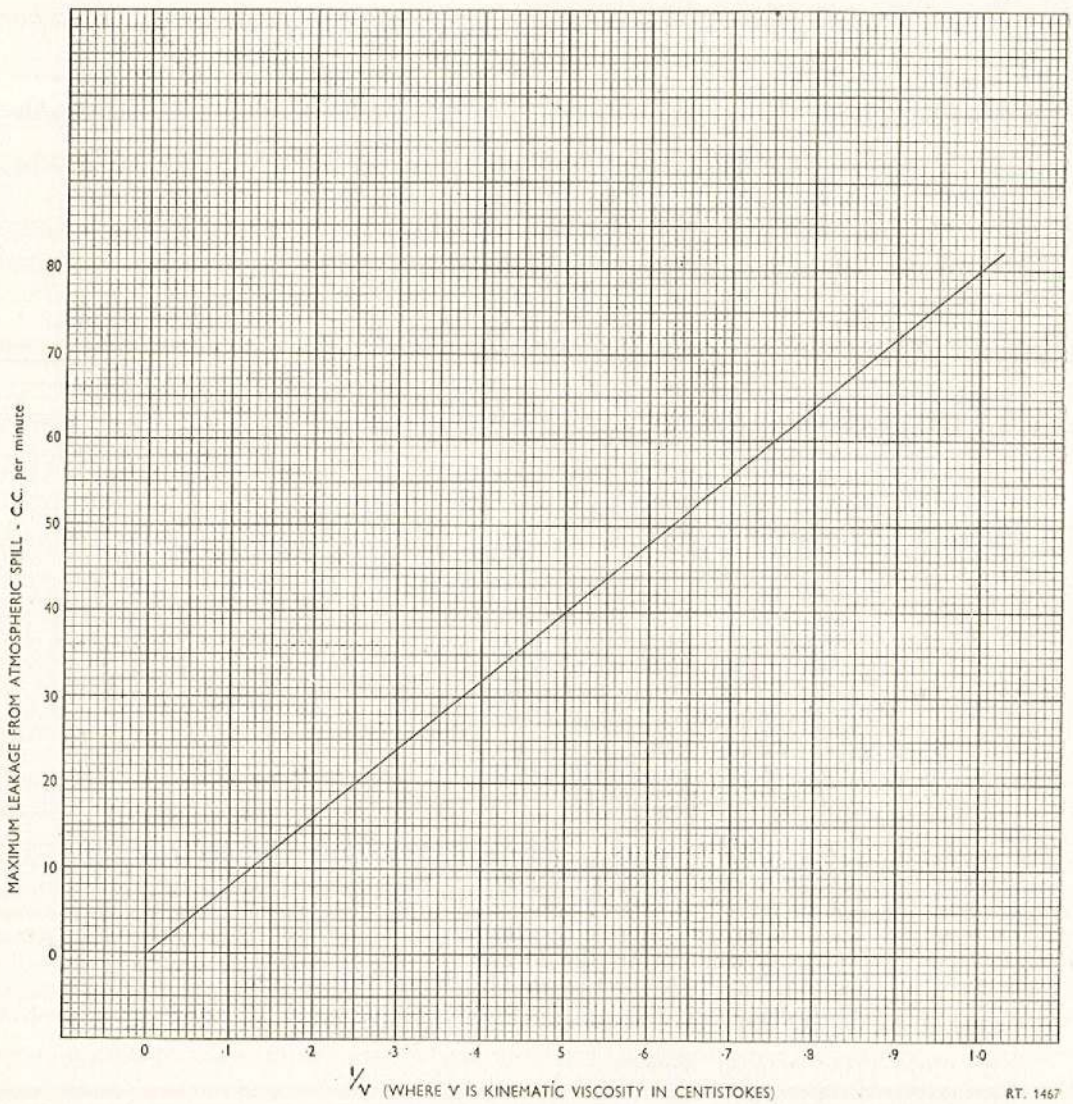

Fig. 1. Maximum atmospheric spill leakage at 900 lb. per sq. in. pilot burner pressure (F.C.U. all types)

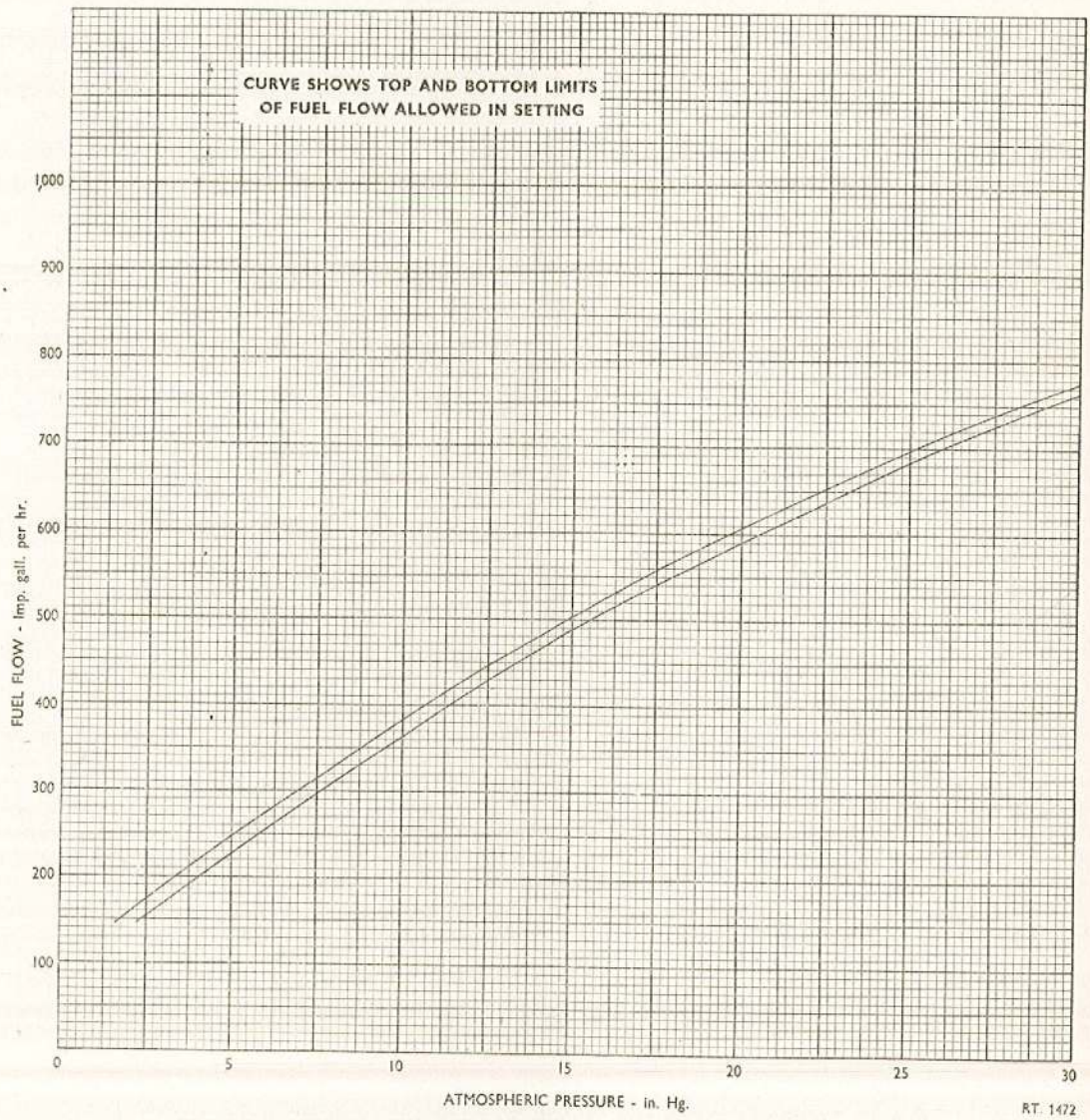

Fig. 6. Combined B.P.C. and control unit calibration graph (F.C.U. types BA.61076 and BA.60351)

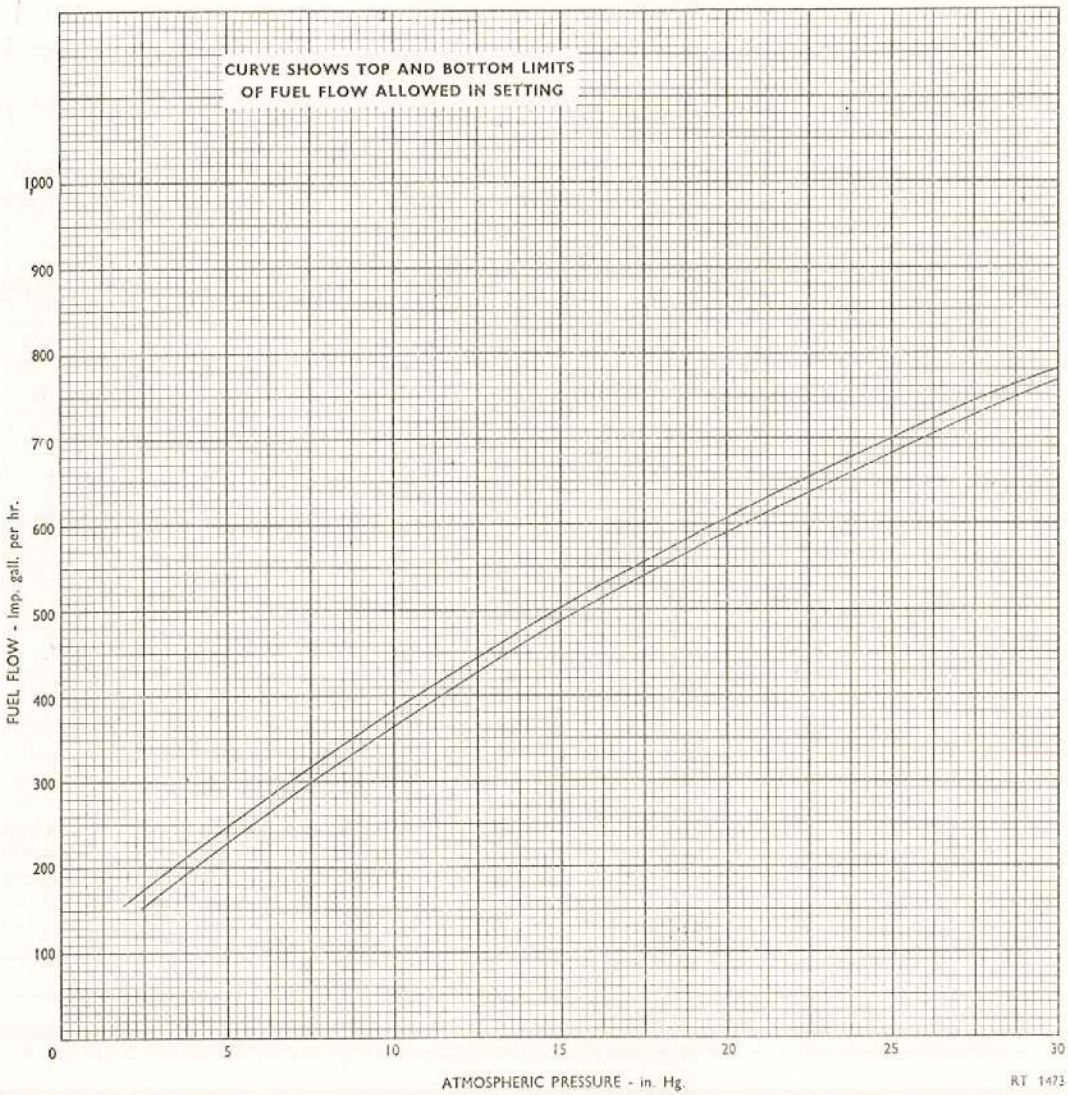

Fig. 7. Combined B.P.C. and control unit calibration graph (F.C.U. types BA.62403 and BA.73323)

P26980 166839/5675 3/57 1250 C & P **Gp. 1**

Test	Condition	Period	Pump inlet pressure lb. per sq. in.	Pump delivery pressure lb. per sq. in.	P_2 air pressure lb. per sq. in. abs.	Downstream pressure lb. per sq. in.	Fuel flow gall. per hour	Pressure drop lb. per sq. in.	Remarks
9	EXTERNAL LEAKAGE TEST								
			2,000						Apply 2,000 lb. per sq. in. fuel pressure and check the units for external leakage

Tests after inspection

When the units have been dismantled in accordance with the requirements of the Inspector-in-Charge, inspected and assembled, all the preceding tests must be repeated.

Note . . .

When the final check for excessive settling is made the maximum deviation from the flow obtained on test 8 (*a*) *is* $\pm$ 10 *gall. per hour.*

P22295 36694/3254 8/53 1200 C & P Gp. 1
B (AL14)