

Chapter I

OVERSPEED GOVERNOR, Mk. 4

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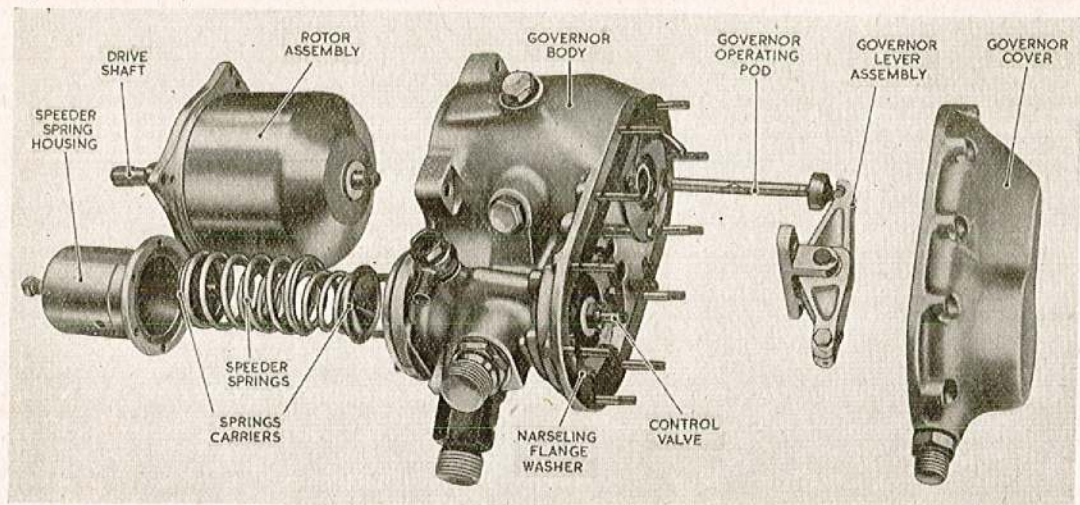


Fig. 1. Exploded view of governor unit

GENERAL

1. During all work on the governor extreme cleanliness must be observed, and every precaution must be taken to ensure that all parts are thoroughly clean. To prevent damage to nuts, bolts and unions, by rounding off the flats and corners, box or ring spanners should be used whenever possible.

2. All paper joints or gaskets, banjo washers etc., must be replaced by new ones whenever disturbed, and new split pins, tab-washers and locking wire must always be used.

SPECIAL TOOLS

3. The repair of governor units necessitates the use of special tools and rigs and these are of two categories (a) those which are provisioned and (b) those which are to be manufactured from local resources.

4. All the special tools required are detailed in the following list, and a fully dimensioned drawing is given in fig. 2 for the tool to be manufactured locally.

- T.71104—Vice block, rotor shaft.
- T.71140—Ring spanner, rotor shaft nut.
- T.71141—Ring spanner—retaining rotor shaft.
- T.71142—Jig, compressing—rotor casing.
- T.71143—Drift, governor weight spindle.
- T.71144—Pin, assembling governor weights.
- T.71149—Castellated box spanner for cut-off valve housing sleeve nuts.

- T.71220—Plug gauge, 0.2036 in. (No. 60 only) rotor shaft slot width, governor sliding bar in rotor shaft. *C/C*
- T.71221—Plug gauge, 0.6905 in. (No. 60 only) rotor shaft bush bore, rotor shaft in sliding spring carrier. *C/C*
- T.71221—Plug gauge, 0.6905 in. (No. 60 only) sliding spring carrier bore, fixed spring carrier in sliding spring carrier. *C/C*
- T.71965—Plug gauge, 0.2536 in. (No. 60 only) rotor shaft bore. *C/C*
- T.71151—Static knife edge fixture (balance of governor weight assembly).
- T.71152—Inserter and extractor rocker bush.
- T.71153—Pressure test unit—cut-off valve in housing (including blanking caps 2 off inlet and outlet unions).
- T.71145—Block - pivot, governor weight moment check.
- T.71146—Pivot pin used with T.71145.
- Chemical balance, governor weights moment check.
- T.71147—Inserter and extractor, cut-off valve housing. Standard spirit level used with T.71151.

CHECKS AND PRECAUTIONS BEFORE DISMANTLING

5. The following checks should be made before dismantling. Study any complaints reported with the governor, and carefully examine its exterior for any visible signs of damage; check that the locking wire is not broken. Ensure that all connections which

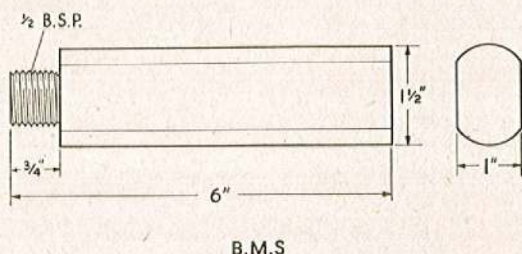


Fig. 2. Locally made tool (vice carrier)

open to atmosphere have been securely covered to prevent the entry of any foreign matter into the interior of the governor. Ascertain whether damage has been caused to threads and connections during transit.

6. If possible carry out a leakage test as described under "Testing" (*para. 62*) to ascertain whether wear has taken place between the barrel and control valve.

DISMANTLING THE MAIN ASSEMBLY

General

7. The following instructions for dismantling the overspeed governor are listed in the recommended sequence of operations.

8. It is advisable to have clean metal or wooden trays available in which to place the component parts of each governor unit. To prevent the accidental interchange of components during dismantling and re-assembling, the parts of one governor unit only should be on the bench at the same time. Under no circumstances are parts from one unit to be stored in the same tray as parts from other units.

9. To prevent damage to components, sever all external lock-wires with standard wire cutters.

10. Remove the fuel inlet connection and its washer. Do not disturb the fuel delivery connection, fuel drain banjo, oil drain union, blanking plugs and washers unless they are damaged. If the extension drive is fitted this should now be removed after unscrewing the four retaining nuts.

Governor lever assembly

11. Mount the rotor shaft vice block T.71104 in a vice, and insert the splined governor drive into the mating splines in the block.

12. With the unit firmly held continue with the following operations:—

- OP. 1. Bend back the tabs and unscrew and remove the ten nuts retaining the governor cover to the casing and remove the washers.
2. Withdraw the cover and the "Nar-seling" flange washer.
3. Bend back the locking tabs and unscrew and remove the two nuts retaining the governor lever bracket to the casing.
4. Lift off the bracket complete with the governor lever assembly.

Rotor assembly

13. With the main assembly still fitted in vice block T.71104 remove the rotor assembly from the main casing as follows; for details of dismantling the rotor sub-assembly see *para. 18*.

- OP. 1. Withdraw the governor operating rod.
2. Using ring spanner T.71141, unscrew and remove the rotor shaft nut and lift out the tab-washer.
3. Remove the governor from the vice block and turn through 180 deg. Unscrew and remove the two screws locating the governor flange.
4. Withdraw the rotor assembly from the governor casing.

Diaphragm and control valve

14. To facilitate dismantling, a holder should be made up locally on the lines indicated in fig. 2. Screw the threaded end of the holder into the inlet port of the governor and hold the other end firmly in a vice, and continue with the operations listed below.

- OP. 1. Leaving two diametrically opposite nuts, unscrew and remove four of the six speeder spring housing retaining nuts and remove the spring washers.
2. Press down the speeder spring housing against the action of the springs, and remove the two remaining nuts and spring washers.
3. Withdraw the housing and the two speeder springs complete with the two spring carriers.

- OP. 4. Turn the assembly in the vice and unscrew and remove the six nuts and washers from the flexible disc studs.
5. Withdraw the split pin from the castellated nut at the governor lever end of the control valve. Loosen and remove this nut with one spanner whilst holding the assembly with a second spanner on the nut at the other end of the valve.
6. Dismantle the diaphragm assembly at the governor lever end of the control valve in the following sequence: Lift off the stepped washer followed by the disc fixing ring, remove the Neoprene sealing disc and withdraw the plain washer remove the second disc fixing ring and the second Neoprene sealing disc. Finally remove the remaining stepped washer.
7. Withdraw the control valve, complete with the remaining diaphragm assembly, from the speeder spring end of the casing.
8. Holding the valve by the central necked portion in suitable clamps, remove the remaining split pin and castellated nut. Take off the stepped washer, Neoprene sealing disc fixing ring, second stepped washer and second Neoprene sealing disc from the fuel control valve.
9. Remove and discard the two paper washers at either end of the valve.

Do not attempt to dismantle the control valve barrel nut or the control valve barrel; if, however, owing to wear this is considered necessary, reference should be made to para. 53 of this chapter.

Rotor bearing (small)

15. Remove the lock-wire, unscrew and remove the four set-screws, and withdraw the bearing retaining plate. Extract the bearing with a suitable drift.

DISMANTLING THE SUB-ASSEMBLIES

Governor lever bracket assembly

16. Extract the two split pins at either end of the governor lever spindle and tap out the spindle; care must be taken not to mislay any of the 15 needle rollers which will now be free to fall out. Remove the governor lever from its bracket. If it is considered necessary to remove the lever bush, reference should be made to para. 54 of this chapter.

17. Hold the lever firmly in a soft-jawed vice and withdraw the adjusting screw, after first removing the split pin and unscrewing and removing the castellated nut and the locking bolt.

Rotor assembly

18. Dismantle the rotor assembly as follows:—

- OP. 1. Mount the rotor casing compressing jig T.71142 in a vice and fit the rotor assembly to the bottom plate. Assemble the top plate and evenly tighten the three wing nuts (*fig. 3*).
2. Using spanner T.71141, undo and remove the fixed spring carrier.
3. Evenly release the three wing nuts and lift off the top plate of jig T.71142, withdraw the rotor casing and the governor spring.
4. Extract the sliding springs carrier, taking care to note the total thickness of shims which will be required when reassembling.
5. Turn the sliding spring carrier bush until it is possible to withdraw the sliding bar.
6. Extract the spring carrier bush and pad.

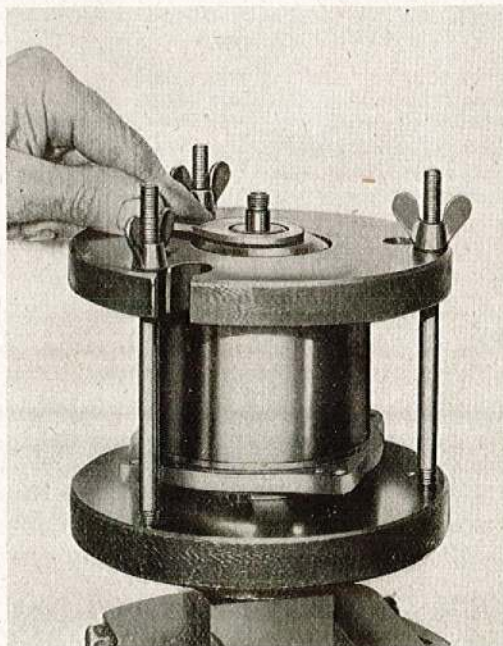


Fig. 3. Removing spring carrier nut with rotor assembly mounted in jig

- OP. 7. Encircle the governor weights with a rubber band, and with a rawhide mallet tap the governor flange and bearing housing away from the assembly.
8. Reverse the assembly in the jig, unlock the tab-washers and using spanner T.71140 unscrew and remove the ball bearing retaining nut.
9. Using the heel bar T.71148, extract the bearing.

If it is considered necessary to remove the governor weights, the following procedure should be adopted. Using pin T.71144 tap out the governor spindle. Remove the weight complete with its needle rollers and pin T.71144. Repeat this procedure on the remaining three governor weights. Care must be taken not to mislay any of the needle rollers or washers. One washer and 30 needle rollers will be found in each weight.

CLEANING

19. It is important that the bench upon which work is to be done is scrupulously clean, and kept free from dirt and swarf. It is recommended that the bench be covered with zinc sheeting or linoleum and that clean containers be available in which to keep the various parts removed. All parts must be thoroughly cleaned and washed before re-assembly; a parawash machine having a kerosine bath and spray gun is recommended for this purpose. Hard brushes or abrasives of any kind must not be used. After washing, all parts must be dried by compressed air; rag must not under any circumstances be used for this purpose.

INSPECTION

General

20. All viewing and inspection checks are described in this section with the exception of those for ball bearings, for which reference must be made to A.P.1464B. When carrying out any dimensional checks, reference should be made to the Schedule of Fits and Clearances, Part 2 of this Volume.

Distortion checks

21. Distortion checks are not normally necessary. If any parts show signs of distortion they must be renewed.

Permissible wear

22. All parts subjected to wear must be checked with the Schedule of Fits and Clearances, Part 2 of this Volume.

Redundant and consumable parts

23. It is usual during inspection, to reject all parts rendered redundant by the embodiment of essential modifications, and the inspector must therefore have complete information concerning modifications so that redundant parts can be rejected.

24. Tab-washers, split pins, gaskets, Neoprene diaphragms and other consumable parts will be rejected during dismantling.

Scores and surface damage

25. The standard of acceptance for parts which have scores and other forms of surface damage varies according to the position of the scores. If these are in an area where the operating efficiency of the unit might be affected, the part must be rejected. If, on the other hand, the scores are in an area where neither the efficiency nor safety is impaired the part or parts may be accepted, subject to the discretion of the inspector in charge. Any scores noted on the sliding members of the governor weight assembly must be carefully polished out.

Installation connections

26. All connections should be examined for condition of threads, and joint faces, also for damage and cleanliness.

Governor casing

27. Inspect the casing generally for cracks and flaws especially at the various radii and on the flanges. Check all studs for tightness and for damaged threads. Scrutinize all internal tappings and ensure that these are clean and free from damage.

28. Check that the control valve barrel and nut are not loose in the casing.

Governor flange, bearing housing and rotor casing

29. Visually examine all three components for damage, especially for cracks round the studs, screw and drain holes in the casing.

Operating rod

30. Examine the rod generally for damage, paying particular attention to the thrust bearing pad; slight score marks on the rod may be lightly dressed out, cracks will naturally be a cause for rejection. Check the diameter of the rod with a micrometer to ensure that it conforms with the specified dimensions. If the bearing is defective the whole rod assembly must be renewed.

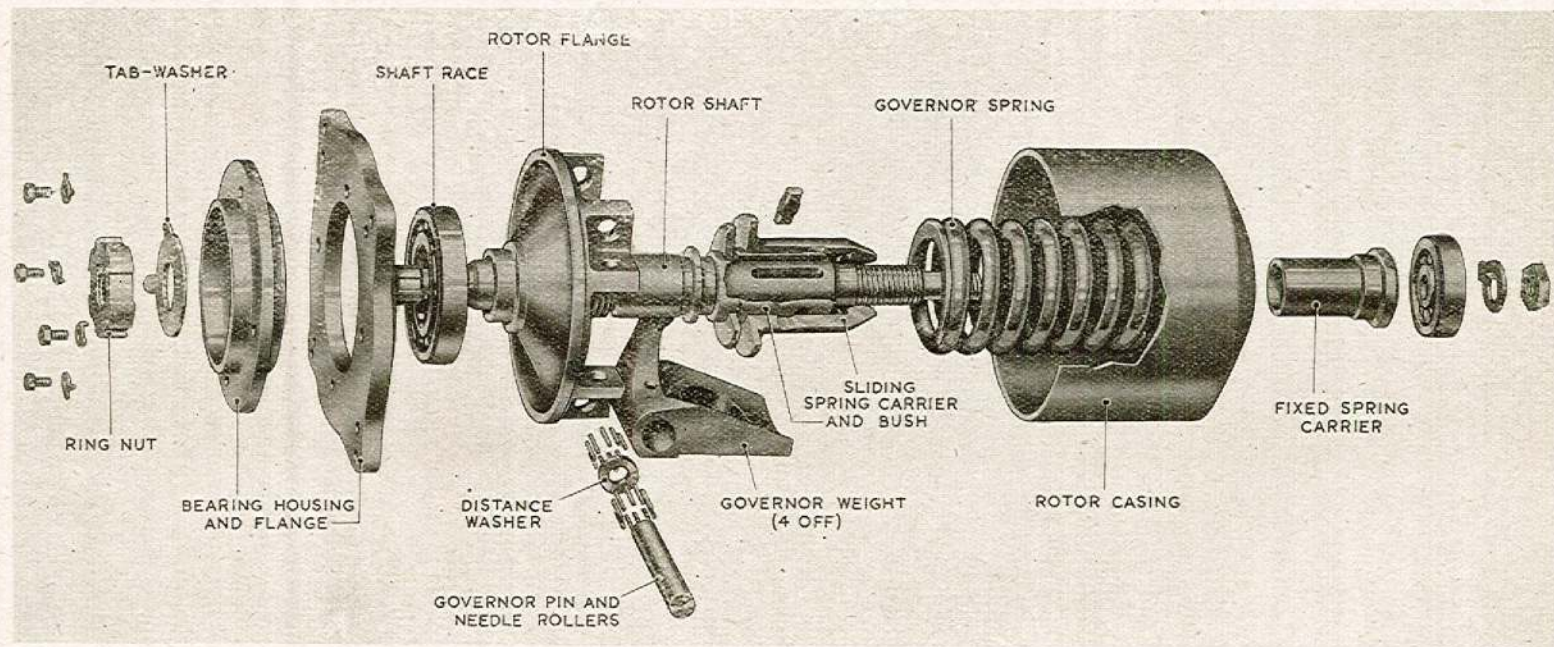


Fig. 4. Exploded view of rotor assembly

Rotor shaft

31. Inspect the shaft generally for cracks, corrosion, and damaged threads; and then continue with the following specific inspection checks.

- OP. 1. With the plug gauge T.71965, check the operating rod bore in the rotor shaft.
2. Using a micrometer, measure the diameter of the shaft and check against the figures given in the Schedule of Fits and Clearances.
3. With plug gauge T.71220, check the slot in the rotor shaft.
4. Measure the thickness of the governor sliding bar with a micrometer and check the clearance between the bar and the rotor shaft slot.
5. Check that the clearance between the operating rod and the rotor shaft bore is within the permissible limits.

Sliding spring carrier, bush, and fixed spring carrier

32. Visually inspect the three components for obvious damage marks, and check their outside diameters with a micrometer, to the Schedule of Fits and Clearances; in addition, carry out the following checks with the plug gauges supplied in the tool kits.

- OP. 1. With plug gauge T.71221, check the sliding spring carrier bush bore. Calculate whether the clearance between the rotor shaft and the bush bore is within the limits.
2. Using the same plug gauge, check the sliding spring carrier bore.
3. Check the clearance between the fixed spring carrier and the sliding spring carrier bore.

Governor weights

33. Visually examine for cracks, signs of corrosion, or any form of damage. If one weight is found to be unserviceable, a complete new set must be fitted and the entire rotor assembly rebalanced as described in para. 55 of this chapter.

34. With feeler gauges check the clearance between the governor weights and their retaining brackets on the rotor flange.

Fuel control valve and barrel

35. Inspect the valve and barrel for scores and wear, and check the diameter of the valve. If the results of these checks show that wear has taken place, both the valve and barrel must be renewed (*para.* 53). Confirmation of wear will have been provided by the leakage test which was carried out before the unit was dismantled.

Diaphragm fixing rings and stepped washers

36. Visually inspect for damage, paying special attention to the areas around the stud holes in the fixing rings.

Springs

37. Examine the springs for cracks sharp edges, corrosion, signs of fatigue, and distortion. Test the springs for load to the figures given in the Schedule of Fits and Clearances. The two spring housings must be inspected for any signs of damage, cracks or bruises.

Magnetic crack detection

38. If any doubt exists as to the soundness of any stressed ferrous components it should be subjected to a magnetic crack detection test. Details of the procedure and equipment for electro-magnetic crack detection are given in A.P.880C.

RE-ASSEMBLING THE SUB-ASSEMBLIES

General

39. Before the actual building of the governor is commenced, various sub-assemblies must be completed; these are dealt with first so that the assembling of the governor may be treated in a straightforward unbroken sequence of operations.

40. Throughout all re-assembly operations great care must be taken to ensure freedom and smooth working of all parts, particularly governor weights, all working surfaces must therefore be smeared with lubricating oil to specification D.E.D.2472D.

Governor lever bracket assembly

41. Apply a liberal coating of oil, OM-71, to the lever bush bore, and carefully replace the 15 needle rollers. Insert a short slave spindle to keep the rollers in position until the spindle is finally assembled.

42. Holding the bracket firmly in a vice, position the lever, complete with its 15 rollers and slave spindle.

43. Using a rawhide mallet, tap the spindle into position in place of the slave spindle. Insert and lock split pins in the holes provided at either end of the spindle.

44. Check the side play of the lever in the bracket with feeler gauges. Remove the bracket complete with lever assembly from the vice.

45. If desired, the governor lever may be fitted to its bracket during the main assembling, after securing the bracket to the casing.

Rotor assembly (fig. 4)

46. Mount the driving end of the rotor shaft complete with rotor flange and bearing in vice block T.71104 and then continue with the following operations:—

- OP. 1. Refit the governor weights in the following manner. Take one weight and place in position, replace the pin T.71144 by the weight spindle, and repeat this procedure on the remaining three weights. Using feeler gauges check the clearance between the thrust faces on the rotor flange and the weights. Should the needle rollers be separated from their governor weights, a light smear of oil should be applied to the bore of the weight and 15 rollers fitted, followed by the washer, the spindle, and the remaining 15 rollers.
2. Replace the ground washer with its chamfered side downwards on to the governor weight pads.
3. Fit the sliding spring carrier bush small bore downwards.
4. Align the holes in the spring carrier bush with the slot in the rotor shaft, and insert the sliding bar through bush and shaft ensuring that the bar is so placed that the bush can be turned. Remove the assembly from the vice block and turn it upside down, at the same time holding the spring bush. This will allow the bar to drop in its slot in the rotor shaft. Rotate the bush through 90 deg., thus preventing the sliding bar from falling out during assembly.
5. Return the assembly to its original position in the vice block, and press the sliding spring carrier complete with the adjusting shims over the carrier bush.

- OP. 6. Replace the governor spring.
7. Mount the assembly in the jig 71142, which should be held in the vice. Fit the rotor casing, add the top plate of the jig and evenly tighten the three wing nuts.
8. Refit the fixed spring carrier 71128 taking care that it enters the light alloy sliding spring carrier without causing damage and tighten with spanner T.71141.
9. Loosen the three wing nuts, remove the top plate and lift the assembly from the jig, replace the bottom half of the jig by the vice block T.71104 and reposition the assembly.
10. Using a rawhide mallet, tap the bearing housing and rotor flange into position. Assemble the bearing and secure with the bearing retaining nut, lock with the tab-washer.
11. Check that the assembly is quite free to rotate.

MAIN ASSEMBLY

General

47. Having built up the sub-assemblies detailed in the preceding paragraphs, continue with the main assembly described below:—

Diaphragm and control valve

48. To facilitate re-assembly, reference should be made to fig. 5 which shows an exploded view of the diaphragm assemblies.

49. Clean the valve and barrel. Place a new paper washer at either end of the valve. Continue with the operations listed below.

- OP. 1. Fit the holder shown in fig. 2 to the inlet port of the casing and mount in a vice with the holder in a vertical position.
2. Smear the control valve lightly with oil and fit it into position with its conical end towards the drive shaft, and holding it with the right hand replace the stepped washer stepped side uppermost, followed by a new Neoprene diaphragm. Add the fixing ring, recessed side inwards, and the plain washer. Fit the second Neoprene diaphragm, followed by the second fixing ring, again recessed side inwards; finally add the remaining washer stepped side inwards.

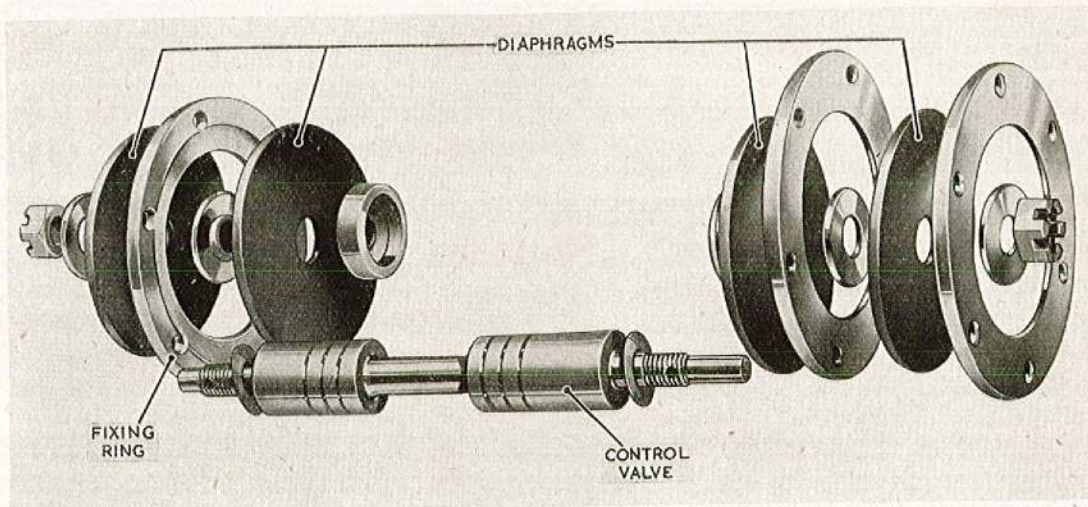


Fig. 5. Exploded view of diaphragm assembly

- OP. 3. Replace the castellated nut and tighten finger-tight, fit the six nuts and washers.
4. Assemble the diaphragm at the opposite end of the valve in the following manner:— replace the piston valve joint washer and the piston valve stop. Assemble the Neoprene diaphragm followed by a washer stepped side inwards. Fit the fixing ring also recessed side inwards, continue by replacing the second Neoprene diaphragm and the second stepped washer again stepped side inwards.
5. Replace the castellated nut and tighten finger-tight.
6. With two open-ended spanners tighten the two castellated nuts so that the split pin holes are in alignment. Insert and lock the two split pins.
7. Refit one of the speeder spring carriers followed by the two springs and the remaining carrier.
8. Position the housing ensuring that the vent hole lies in line with the oil drain union.
9. Assemble the six spring washers and replace the housing retaining nuts.
10. Upon completing the preceding operations the diaphragm assembly must be pressure tested with the

aid of the pressure testing unit T.71153. Blank off the inlet and outlet connections using the plugs provided with T.71153, apply a air pressure of 30 lb. per sq. in. to the fuel drain connection and immerse the whole unit in kerosine; there must be no leakage from the diaphragm.

Rotor assembly

50. Before replacing the rotor assembly fit the small rotor bearing to its housing and press both the housing and race into the casing. Continue the main assembly as described below:—

- OP. 1. Insert the rotor assembly into the casing and locate by the two screws.
2. Place the assembly in the vice block T.71104 and assemble the bearing retaining plate; secure with the four set-screws, which should then be wire-locked.
3. Fit a tab-washer and replace the rotor shaft nut, tighten with spanner T.71141. Do not bend up the tab-washer until completion of the endurance test (*para.* 76).
4. Smear the operating rod with oil and insert.

Governor lever assembly

51. Reassemble the governor lever bracket in the following sequence of operations:—

- OP. 1. Place the governor lever bracket complete with the governor lever assembly on to its studs in the casing.
2. Fit the two tab-washers and the two retaining nuts; do not lock the washers until completion of the testing operations.
3. Replace the governor lever adjusting screw.

Miscellaneous

52. The remainder of the assembly procedure consists of fitting unions and blanks. The governor lever cover should not be re-assembled until after the final test.

- OP. 1. Replace all blanks complete with copper washers.
2. Replace any connections that have been disturbed.

- OP. 3. Remove the complete assembly from the vice block.
4. Fit the extension drive adapter.

REPLACEMENTS

Fuel control valve and barrel

53. As both the valve and the barrel are lapped together, both must be replaced if either parts show signs of wear.

- OP. 1. Heat the casing to approximately 100 deg. C. in oil and, using the extractor T.71149, withdraw the control valve barrel nut.
2. Extract the worn barrel using the extractor T.71147, and remove the barrel joint washer.
3. Re-heat the casing to approximately 100 deg. C. in oil, and using the same tool as in Op. 1, T.71147, fit the new barrel, first inserting the new joint washer.

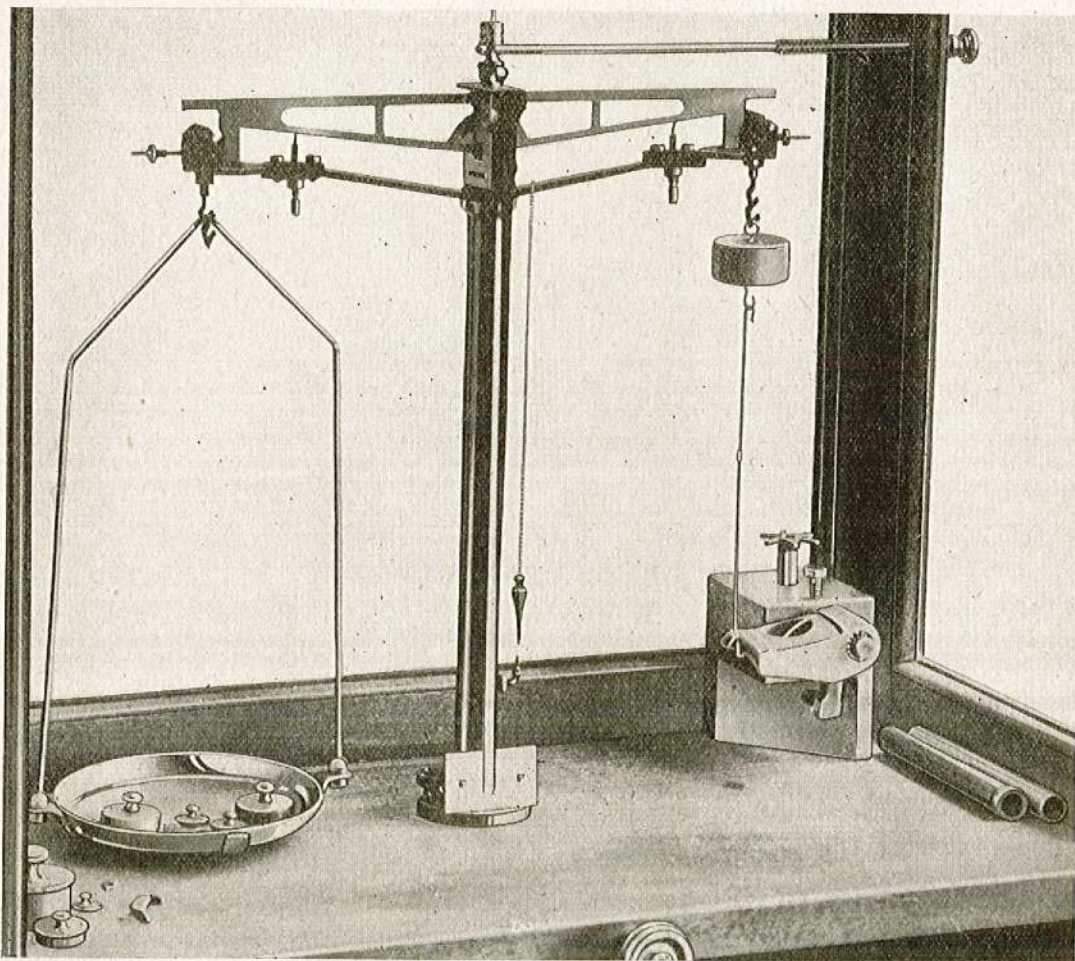


Fig. 6. Checking weights for moment

- OP. 4. Replace the control valve barrel nut whilst the casing is hot.
5. Slight distortion of the barrel will occur as a result of being shrunk in. It is therefore necessary to lap the valve to the barrel, using fine carborundum paste grade H.500.WF. Upon completion of this operation, thoroughly wash the barrel out with kerosine.

Governor lever rocker bush

54. If it is found that the bush is worn beyond the permissible limits, a replacement must be fitted, the tool T.71152 being used both for extracting the old bush and fitting the new one.

Governor weights

55. As stated in para. 33, if one weight is damaged a complete new set must be fitted. Before assembling the weights to the rotor shaft, check each weight for moment as detailed in Op. 1. It is important that the weights are assembled in a dry condition for this check.

OP. 1. Check each weight for moment, by assembling it with the needle rollers and pivot T.71146. Clamp the spindle firmly in the block T.71145 and suspend the opposite end of the weight by a thread from a chemical balance from which one scale pan has been removed (fig. 6).

Note . . .

The maximum variation between the four weights of a set must not exceed 0.5 gm. as found by this method. The spindle and bearings used for this check must be retained with their respective governor weights until and during final assembly.

2. Assemble the complete rotor assembly as detailed in para. 46.
3. Support the assembly on the two knife edges of fixture T.71151 as shown in fig. 7. Balance to within 0.9 gm. in. should be obtained by removal of metal from the governor weight spindle bosses on the flange. When there is no tendency for the rotor to take up any one position on the knife edges it will indicate that unit is in balance.

RIG TESTS

General

56. Carefully record all calibration and endurance test results for subsequent entry in the official test record sheet.

57. The fuel used throughout the test is to be aviation turbine fuel to which 1 per cent. by volume of lubricating oil OM370 has been added. The temperature of the fluid must not exceed 40 deg. C. Checks must be made at regular intervals to ensure that the fuel conforms to this standard.

58. The fine mesh or fabric filter which is incorporated in the line before the pump (fig. 8), should be cleaned frequently throughout the testing operations.

59. No provision for lubrication of the governor is necessary during test running, provided it has been assembled in an oily condition.

60. Care must be taken throughout testing to isolate the low pressure gauges before high pressures are obtained.

61. Mount the governor on the test rig (fig. 9) and proceed with the following tests.

Fuel leakage test

62. Remove the valve rocker cover and with the governor stationary and the restrictor valve (fig. 8) closed, apply a fluid pressure of 800 lb. per sq. in. at the fuel inlet connection. Hold this pressure for 30 minutes and measure the fluid leakage from the fuel drain connection. This leakage should not exceed 2 pints over the 30 minute period. Examine for any other external

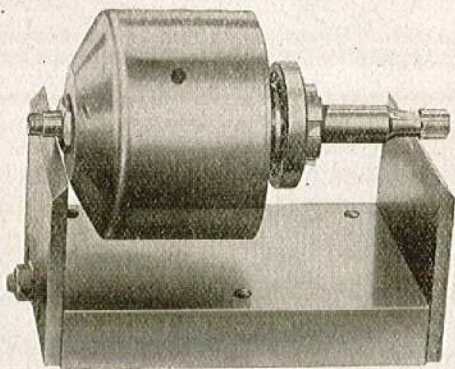
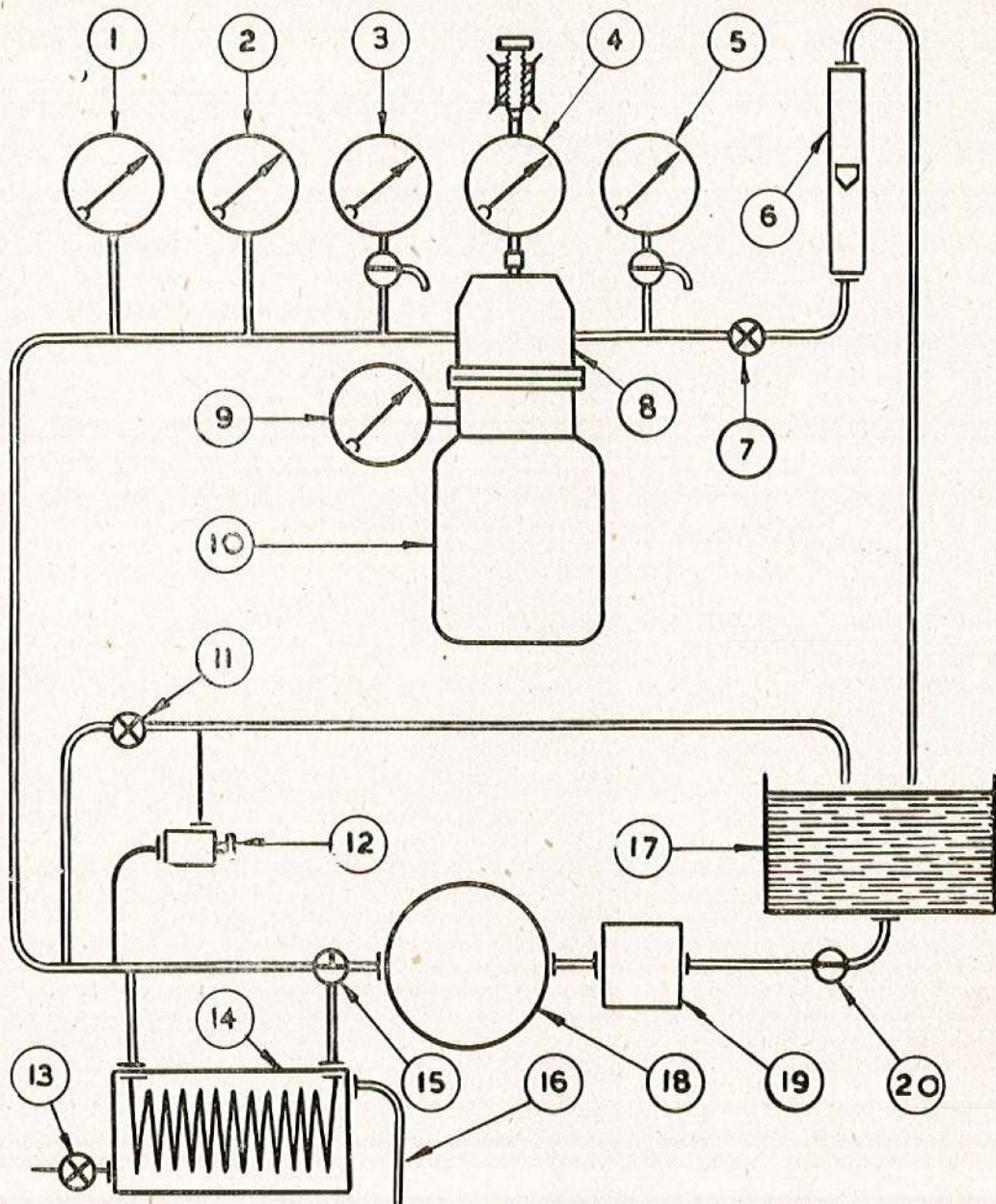


Fig. 7. Balancing the rotor assembly



- | | |
|---|--|
| 1 THERMOMETER 0-60 deg. C | 11 FLOW CONTROL VALVE † |
| 2 PRESSURE GAUGE 0-1,200 lb. per sq. in. | 12 ADJUSTABLE RELIEF VALVE |
| 3 PRESSURE GAUGE 0-100 lb. per sq. in. | 13 WATER SUPPLY RESTRICTOR VALVE |
| 4 VALVE TRAVEL DIAL INDICATOR | 14 COOLER |
| 5 PRESSURE GAUGE 0-30 lb. per sq. in. | 15 TWO-WAY COOLER VALVE |
| 6 "ROTAMETER" FLOWMETER 0-600 gall. per hr. | 16 WATER DRAIN |
| 7 RESTRICTOR VALVE "A" | 17 30 GALLON FUEL SUPPLY TANK |
| 8 GOVERNOR UNDER TEST | 18 PUMP 0-550 gall. per hr. at 1,000 lb. per sq. in. max. pressure |
| 9 TACHOMETER 3,000-4,000 r.p.m. accurate to ± 10 r.p.m. | 19 FILTER—FABRIC or 0-002 MESH GAUZE |
| 10 VARIABLE SPEED MOTOR * | 20 STOP VALVE |

* 1 H.P. at 3,000-4,000 r.p.m. continuous with sensitive speed control.

† Fine adjustment needle type capable of passing 550 gall. per hour with a max. pressure drop of 20 lb. per sq. in.

Fig. 8. Diagrammatic layout of test rig

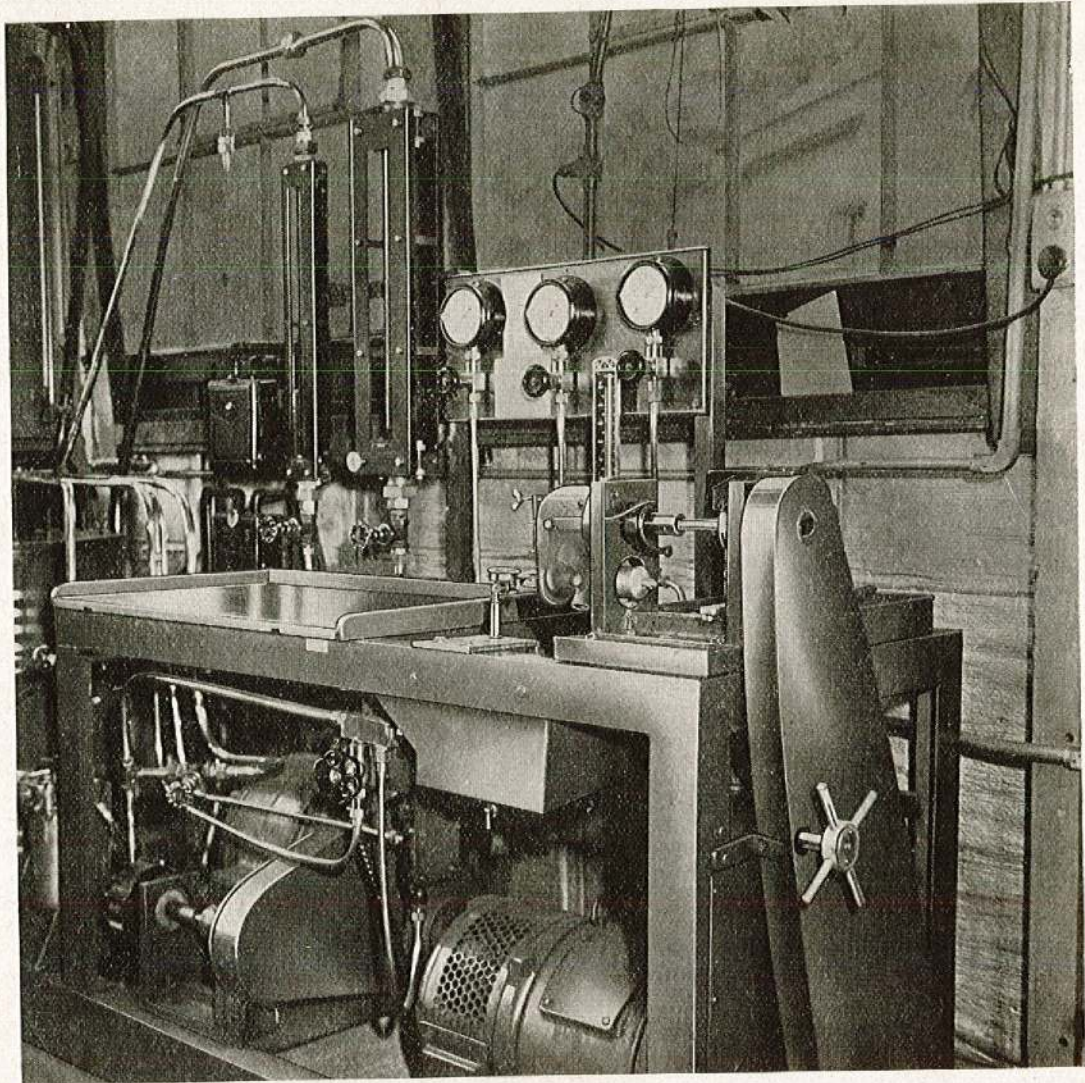


Fig. 9. Governor unit test rig

leaks. Upon completion of this test, check that the valve spindle is free to move in the barrel, indicating whether any shrinkage of the barrel has taken place.

Fuel flow test

63. Set the adjusting screw in the valve rocker lever so that the operating rod is not under load and is just free to rotate; tighten and split pin the adjusting screw lock-nut.

64. Set the dial indicator (*fig. 10*), in such a position that any movement of the valve, within its range of travel, will register on the indicator.

65. With the restrictor valve fully open and the governor stationary, apply a fluid pressure of approximately 50 lb. per sq. in. at the fuel inlet connection.

66. Throughout the following flow test a pressure difference of 50 lb. per sq. in. between gauges at the governor inlet and outlet must be maintained. A departure from this pressure drop is permissible within the range of ~~44~~ 45 to 55 lb. per sq. in. but in this case the flow must be corrected to the equivalent at a pressure drop of 50 lb. per sq. in. on the square law assumption as follows:—

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$$W = W_1 \frac{50}{P_1}$$

where W = Equivalent flow at a pressure difference of 50 lb. per sq. in.

W_1 = Observed flow at a pressure difference of P_1 lb. per sq. in.

P_1 = Observed pressure difference in lb. per sq. in.

Clamp the rocker lever pre-setting tool, supplied with the test rig, to the rocker lever as shown in fig. 10 and by means of the adjusting screw in the tool set the valve so that the "lifts" given in the following table are indicated, in turn, on the dial indicator. The flow at each setting must be within the limits given in the table.

Valve lift (inches)	Fluid flow (gallons per hour)		
	maximum	minimum	
0	630	550	} At 50 lb. per sq. in. pressure difference
0.075	525	450	
0.15	130	90	
0.25	30	20	

Functional test

67. Start the motor and with the fuel supply to the governor cut off, set the speeder spring at the slowest setting, that is, with the adjustment fully unscrewed. Speed up the governor and record the speed at which the valve is in the following eight positions.

Just commencing to move. 0.01 in.; 0.05 in.; 0.10 in.; 0.13 in.; 0.15 in.; 0.20 in.; 0.25 in.

68. All these readings must be taken with the speed progressively increasing. On no account should the desired valve position be obtained by "dropping back" after over-running the position.

69. Repeat the above observations with the valve position at 0.05 in.; 0.13 in.; and 0.15 in., but this time with the speed falling. The hysteresis or difference between rising and falling speeds must not exceed 25 r.p.m. at each of the above three valve positions. Excessive hysteresis indicates friction between the sliding members of the unit.

70. Repeat the tests described in the preceding paragraphs with the speeder spring set at the fastest setting, that is, with the adjustment screwed full in.

71. The nominal governor speed of 3,400 r.p.m. must lie approximately mid-way between the speeds obtained with the adjustment fully unscrewed as described in para. 67, and the adjustment screwed fully in as described in para. 70, for a valve lift of 0.13 in., this condition being controlled by the number of adjusting shims fitted between the sliding spring carrier and main spring.

72. Set the speeder spring approximately at the mid position so that the governor speed of 3,400 r.p.m. produces a valve lift of 0.13 in. on a rising speed. Run the governor at this setting for a period of 1 hour.

73. On completion of the endurance run, check that the speed and hysteresis at the 0.13 in. valve lift are unchanged from the original recording.

74. Feed oil OM71 by means of a metering pump, calibrated to Tecalemit Specification P.E.7710, at not less than 150 millilitres per hour at a temperature of 40-45 deg. C. to the drive housing and run the governor at 3,400 r.p.m. for a period of 15 minutes. On completion of this test examine all oil seals for leakage. No leakage is permissible.

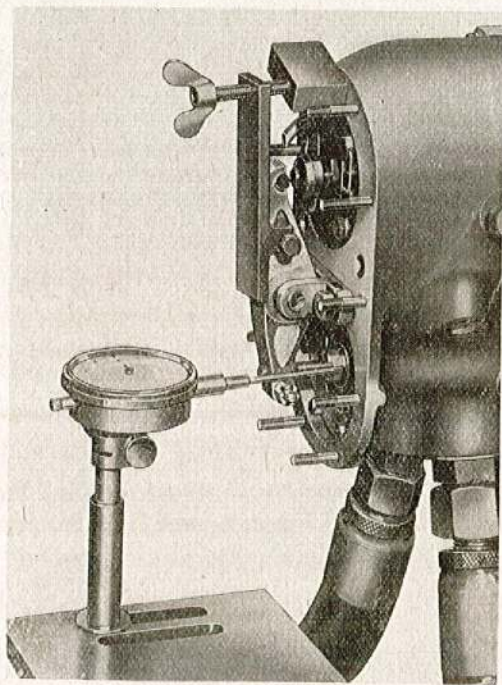


Fig. 10. Checking valve lift

INHIBITING

75. With the governor unit still mounted on the rig and the speed set at 3,400 r.p.m., disconnect the oil feed pipe and supply inhibiting oil OM-13 by means of a forced feed lubricator until only inhibiting oil flows from the drain. Remove the unit from the rig and again examine all oil seals for leakage.

76. Place the unit so that the inlet port is vertical, pour in inhibiting oil OM-13 until clean oil flows from the outlet connection.

Blank off all connections with approved blanks.

PREPARATION FOR DESPATCH

77. Check the inlet and outlet connections drains, unions and blanking plugs for tightness and wire-lock.

78. Cover all external steel parts with grease PX1 and wrap the complete unit in grease-proof paper. Pack in special container together with copy of the test record sheet.

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