

Chapter 5

CONTROL VALVE ASSEMBLY

(Ghost Part No. 49305 and 603244)

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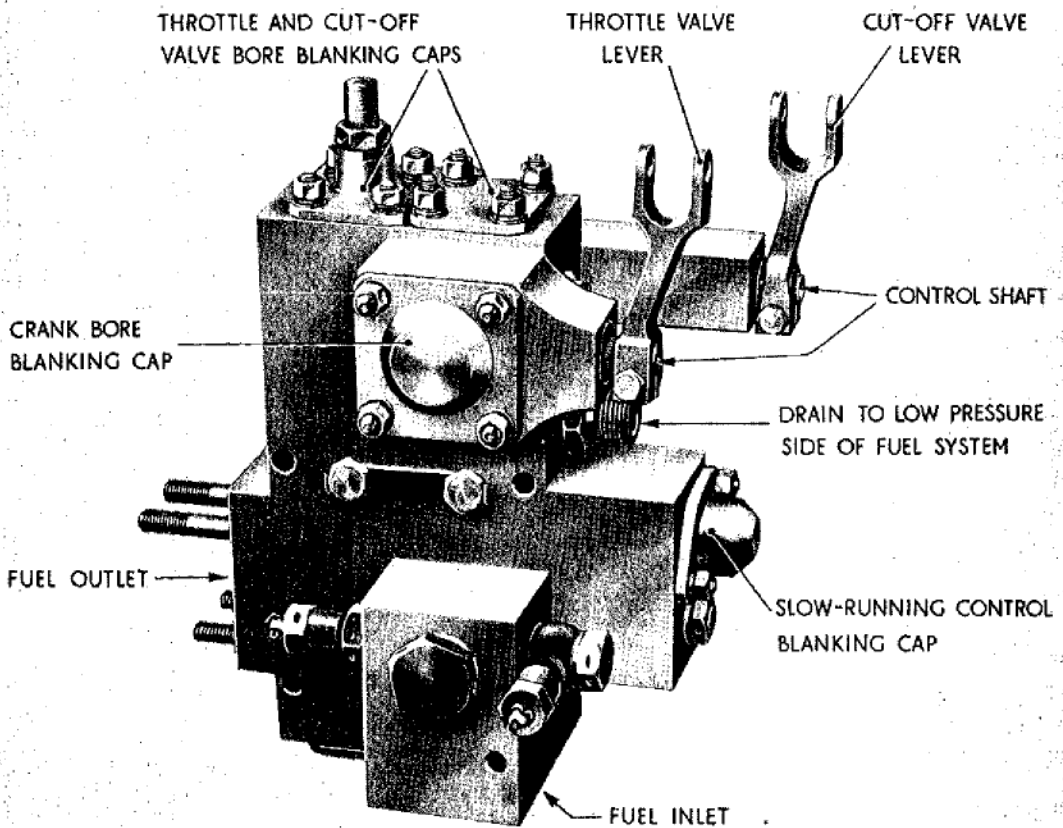


Fig. 1. Control valve assembly

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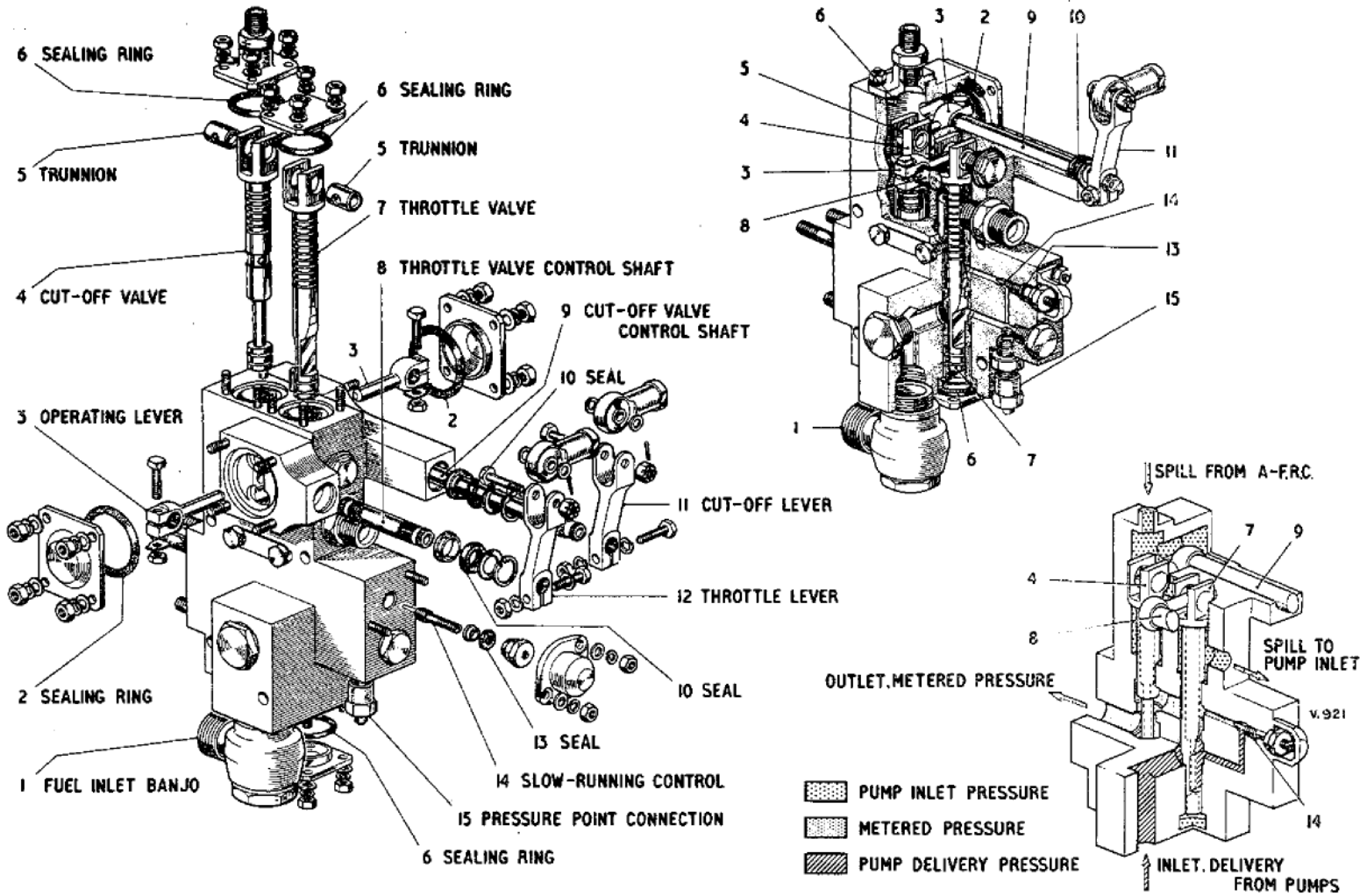


Fig. 2. Throttle valve and cut-off valve

Introduction

1. The control valve regulates the quantity of fuel allowed to pass to the burners, and so acts as a throttle to control the engine speed. The assembly consists of a light alloy body containing a graduated metering needle which is connected to the pilot's throttle lever, and a high pressure fuel cut-off valve which is connected to the H.P. cut-off lever in the cockpit.

Description (fig. 2)

2. The body of the control valve assembly consists of a light alloy block machined to accommodate the throttle valve and the cut-off valve and drilled to provide the necessary fuel passages.

3. The throttle valve plunger (7) is of stainless steel and its centre portion is profiled to a graduated cross section. The valve slides in a bronze sleeve containing a number of orifices which align with inlet and outlet passages in the body, and the profiled portion of the valve alters the effective area of the metering orifice through which passes the fuel supply to the burners. The upper end of the throttle valve is machined to form an eye to which the throttle lever (12) is linked. Both ends of the throttle valve bore in the body are enclosed by blanking caps which are sealed with rubber rings.

4. The steel cut-off valve (4) operates in a second bronze sleeve parallel to the throttle valve. To obviate the risk of hydraulic hammer due to the sudden closing of the cut-off valve, a bleed hole is drilled in the cut-off valve to divert the fuel delivery back to the low pressure side of the fuel system. Flats are machined to form a taper on the shank of the cut-off valve to allow it to operate as a coarse throttle should the normal throttle control fail. The valve bore in the body is blanked and sealed by a blanking cap and rubber ring at each end.

5. Both the throttle valve sleeve and the cut-off sleeve are a close fit in the body, but to guard against leakage, which would destroy the metering quality of the throttle valve, three rubber sealing rings are fitted to grooves in each sleeve. The adjustable slow-running bleed (14) is fitted in the body at right angles to the throttle valve.

6. The pilot's throttle control is linked to the throttle lever on the control valve

assembly and this lever is in turn linked to the operating lever in the body of the assembly. A short shaft (8) serrated at either end connects the two levers, the serrations on the shaft corresponding to internal serrations in the levers. The outer lever is clamped to the shaft by means of a bolt, nut and two spring washers. The inner (operating) lever (3) is similarly clamped to the shaft by a square-headed bolt and a thin nut locked by a tab-washer. The operating lever engages with a hole in a trunnion (5) which is inserted in the eye end of the throttle valve; movement from the throttle lever being transmitted through the serrated shaft to the operating lever which in turn transmits it via the trunnion to the throttle valve. A seal, distance piece, washer, and circlip are inserted in the body at the throttle lever end of the shaft to prevent any leakage.

7. The operating lever assembly is enclosed in the body by a blanking cap, fitted with a rubber sealing ring and secured by four nuts, spring and plain washers.

8. The cut-off valve linkage (9) is identical with that of the throttle valve.

Operation

9. Fuel from the engine-driven fuel pumps flows into the body inlet connection and through the throttle valve sleeve; the flow being governed by the position of the throttle valve in relation to a shoulder in the bronze sleeve. The position of the valve is selected by the pilot according to the engine speed required. The throttle valve is designed so that over the first part of its travel there are equal increments of r.p.m. for equal amounts of lever movement whilst over the latter part of its travel (at higher engine speeds) there are equal increments of thrust—not r.p.m.—for equal amounts of lever movement. To enable the small fuel flow required for idling speed to be adjusted conveniently there is a subsidiary orifice which by-passes the throttle control orifice and which is adjustable by means of a pointed screw (fig. 4).

10. The H.P. fuel cut-off valve, which is in effect a cock in the main fuel outlet passage for the control valve assembly, enables the pilot to stop the engine when shutting down normally or in an emergency.

11. When the cut-off valve is in the open position, there is a free passage for fuel from the throttle valve to the control valve outlet

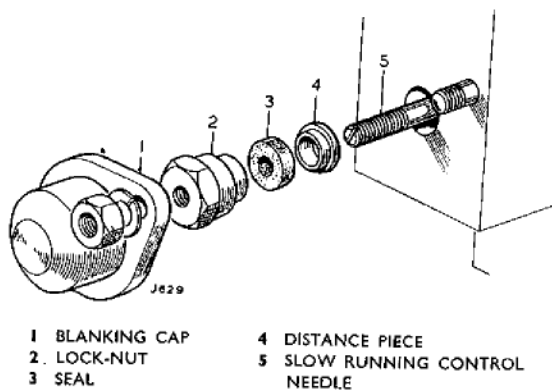


Fig. 3. Slow-running bleed screw and lock-nut

connection and thus to the distributor and burners. When the cut-off valve is in the closed position the outlet is closed and the fuel diverted back to the low pressure side of the fuel system.

Installation

12. Instructions for removing and refitting the control valve assembly are contained in the engine Air Publication.

Servicing

Slow-running adjustment

13. A tolerance of plus or minus 200 r.p.m. is permitted on the nominal slow-running speed and it should be understood that this speed is influenced by atmospheric pressure. Do not alter the setting of the slow-running control needle unless adjustment is essential. When making any adjustment to the slow-running control needle ensure that the throttle valve is fully closed.

14. To adjust the slow-running speed, remove the slow-running control blanking cap. Using adjusting tool T.75864 complete with driver bit T.76311, release the lock-nut and turn the slow-running needle anti-clockwise to increase the slow-running r.p.m., and vice versa. When a satisfactory slow-running speed has been obtained, lock the setting by tightening the lock-nut; ensure that the setting is correct after the lock-nut has been tightened. Fit the blanking cap, plain and spring washers, and the two nuts.

Rectification of leakage

15. Complete dismantling of the fuel control valve is not permissible unless the unit, when re-assembled, can be properly tested on a suitable test rig. Leakage from the slow-running control needle, or from the crank or

valve bore blanking caps can, however, be rectified without extensive dismantling.

16. If leakage around the slow-running control needle cannot be remedied by tightening the locking nut, the seal may be changed thus. Unscrew the two 2 B.A. plain nuts which secure the slow-running control blanking cap. Remove the two spring and plain washers, and the blanking cap. Remove the locking nut and unscrew the slow-running needle until the seal is exposed; by noting the number of complete turns the needle is unscrewed, re-adjustment of the slow-running speed will be simplified. Remove the seal and examine the exposed surface of the needle for signs of scoring which might be the cause of the leak. If the needle is considered satisfactory, fit a new seal (Part No. 19766), ensuring that the distance piece is correctly positioned on the needle. Refit the locking nut. If the needle is unserviceable a new needle must be fitted. Screw in the needle and re-adjust the slow-running speed as described in para. 14.

17. Leakage around the crank or valve bore blanking caps may be due to a defective

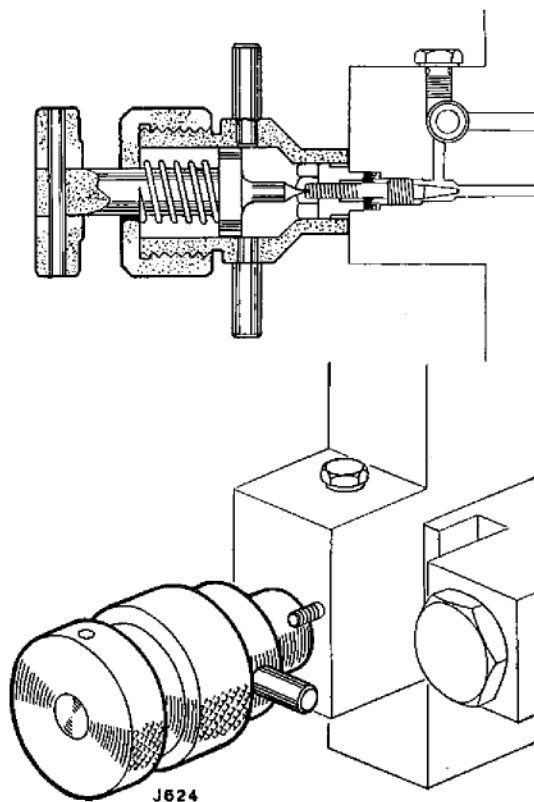


Fig. 4. Slow-running adjustment

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sealing ring. To renew either of these rings unscrew the four 2 B.A. plain nuts and remove the spring and plain washers and the blanking cap. Extract the sealing ring from the recess in the control valve body or remove it from the spigot on the blanking cap. Ensure that each detail part is perfectly clean and free from damage. Fit a new sealing ring (Part No. N4281 for the valve bores, and N4282 for the crank bores) and refit the blanking cap.

18. Leakage around the exposed end of either control shaft may be due to failure of the seal in the counterbore just behind the lever which is attached to the end of the shaft. To change either of these seal rings, extract the split pin, unscrew the 2 B.A. slotted nut, and withdraw the bolt which couples the control rod to the lever on the control valve assembly; take care to retain the two steel washers which are fitted each side of the rod-

end bearing. Mark the end of the control shaft and the lever so that the lever can be refitted in the same relative position. Loosen the clamping nut and bolt and ease the lever off the serrated end of the shaft. Prise out the circlip, washer, and damaged seal from the counterbore in the control valve body. Ensure that the distance piece is correctly located within the counterbore around the shaft and that both counterbore and shaft are perfectly clean and undamaged; if the shaft is badly scored it is unlikely that the fitment of a new seal will rectify the leakage. Fit a new seal (Part No. 40199) over the serrated end of the shaft and into the counterbore. Refit the washer and the circlip; if there is any doubt about the serviceability of the circlip, a new one (Part No. N4248) must be fitted. By reference to the marks previously made on the shaft and lever, refit the lever and tighten the nut on the clamping bolt. Reconnect the control rod to the lever.

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