Chapter 2

AIR FLOW CONTROL SYSTEM

CONTENTS

ILLUSTRATIONS

1. General

(1) This chapter instructs the removing, replacing and adjusting of air flow control system units. Refer to Sect.1 for a list of the special tools supplied for these operations and, to Sect.2, Chap.1 for the general precautions to be observed when working on the engine, for torque load data and for lubricants to be used during assembly.

(2) Fuel passages and chambers of units, supplied with fuel in operation, are to be inhibited (AP 102C-1512 to 1517 and 1522-7) when they are removed from an engine for storage.

Bleed valve control unit

2. Removing

(1) Disconnect the pipes from the unit, releasing the rigid pipes at both ends; unscrew the retaining nuts and remove the unit and filter (fitted between unit and casing) from the compressor casing. Store the unit in dry conditions; it is not to be inhibited.

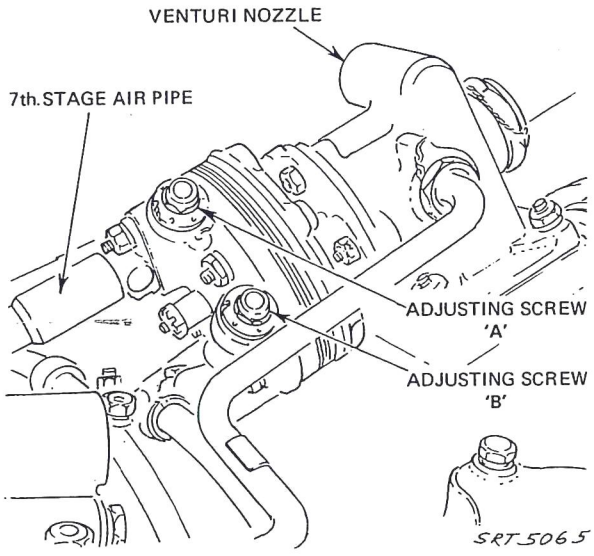


Fig.1 Air bleed valve control unit

3. Replacing

(1) Replacing is the reverse of removing. Clean and inspect all joint faces before assembly. Clean the filter carefully in clean kerosine, dry thoroughly and inspect for damage; if necessary, renew the filter.

(2) Ground run the engine and check bleed valve operation (Vol.1, Part 2, Sect.2, Chap.2). Adjust the b.v.c.u., if necessary (para.4).

Note...
Check the i.g.v. ram is correctly adjusted before attempting to adjust the b.v.c.u.

4. Adjusting

(1) Adjusting screw 'B' (fig.1) alters the valve opening and closing points, equally and in the same direction, along the rev/min range. Adjusting screw 'A' (fig.1) alters the rev/min differential between valve opening and closing and, has secondarily and to a smaller extent, a similar effect to adjusting screw 'B'.

(2) Turning adjusting screw 'B' anti-clockwise will move the opening and closing points, of the bleed valve, higher up the rev/min range and vice versa. Turning adjusting screw 'A' clockwise will increase the rev/min difference between opening and closing and, secondarily, move the opening and closing points, together, higher up the rev/min range and vice versa. Adjusting screw 'B' is five times more sensitive than adjusting screw 'A'.

(3) Effective adjusting of the bleed valve control unit to the correct settings (Vol.1, Part 2, Sect.2, Chap.2) requires the use of both adjusters in proportion to their effect, e.g. if adjusting screw 'A' is adjusted one complete turn, adjusting screw 'B' should be adjusted one fifth of a turn in the same direction.

(4) If the basic setting of the unit has been lost, it may be re-established as instructed in (a) to (e) following:

(a) With the locknuts of the b.v.c.u. adjusting screws finger tight, set the screws so that measurements of, at least, 0.255 in ('A') and 0.155 in ('B') respectively are obtained between the screw head and the locknut.

(b) Start the engine then slowly accelerate the engine to 5,900 rev/min (Avon Mk 109) or 6,200 rev/min (Avon Mk 122); maintain this speed for 1 min.

(c) Adjust screw 'B' in or out until flutter is felt at the bleed valves. If no flutter is felt, adjust screw 'B' until the bleed valves just close.

(d) Accelerate and decelerate engine, to ascertain the rev/min at which the bleed valves 'Open' and 'Close'; this will give a datum point from which to adjust the b.v.c.u.

(e) Adjust the b.v.c.u. (sub-para.(3)) until the bleed valves operate to the correct limits (Vol.1, Part 2, Sect.2, Chap.2, para.29 and 30). LM Blr

Air bleed valves

5. The three valve units mounted together on each side of the upper half casing (fig.2) are connected by short rigid pipes which prevent the removing of an individual valve unit.

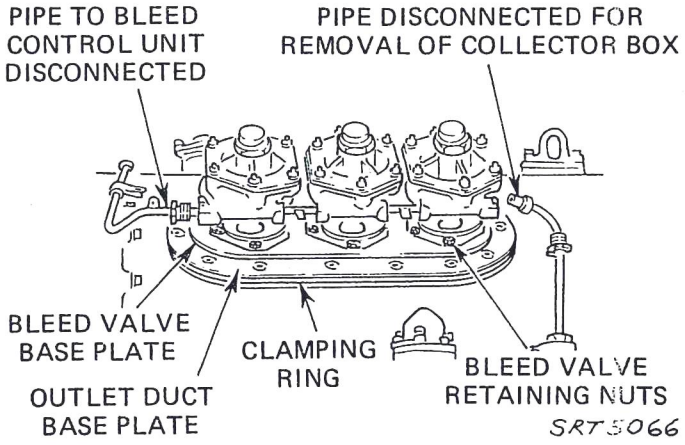


Fig.2 Air bleed valves

6. Removing

(1) To remove each three-valve assembly, disconnect the pipe, or blanking plug, from the front, and the pipe from the rear, this latter pipe is also to be disconnected from the b.v.c.u. Lift off the collector box. Unscrew the retaining nuts at the base of each valve then, lift off the three valves together. Individual valves may then be renewed. Removing the single valve on the lower half casing is straightforward.

7. Replacing

(1) Replacing is the reverse of removing. Ensure the mating faces are clean and undamaged. Do not use jointing compound at the joint with the compressor casing.

M
th

8. Serviceability check

(1) Ground run the engine and check bleed valve operation (Vol.1, Part 2, Sect.2, Chap.2).

Intake guide vane ram

9. Removing

(1) Remove the pipes from the i.g.v. ram at the gland housing face joints. Release the spring coupling from the split trunnion attaching it to the i.g.v. lever. Remove the ram retaining nuts or setscrews and withdraw the ram, with its locating dowels, from the engine. Inhibit the unit (AP 102C-1512 to 1517 and 1522-7).

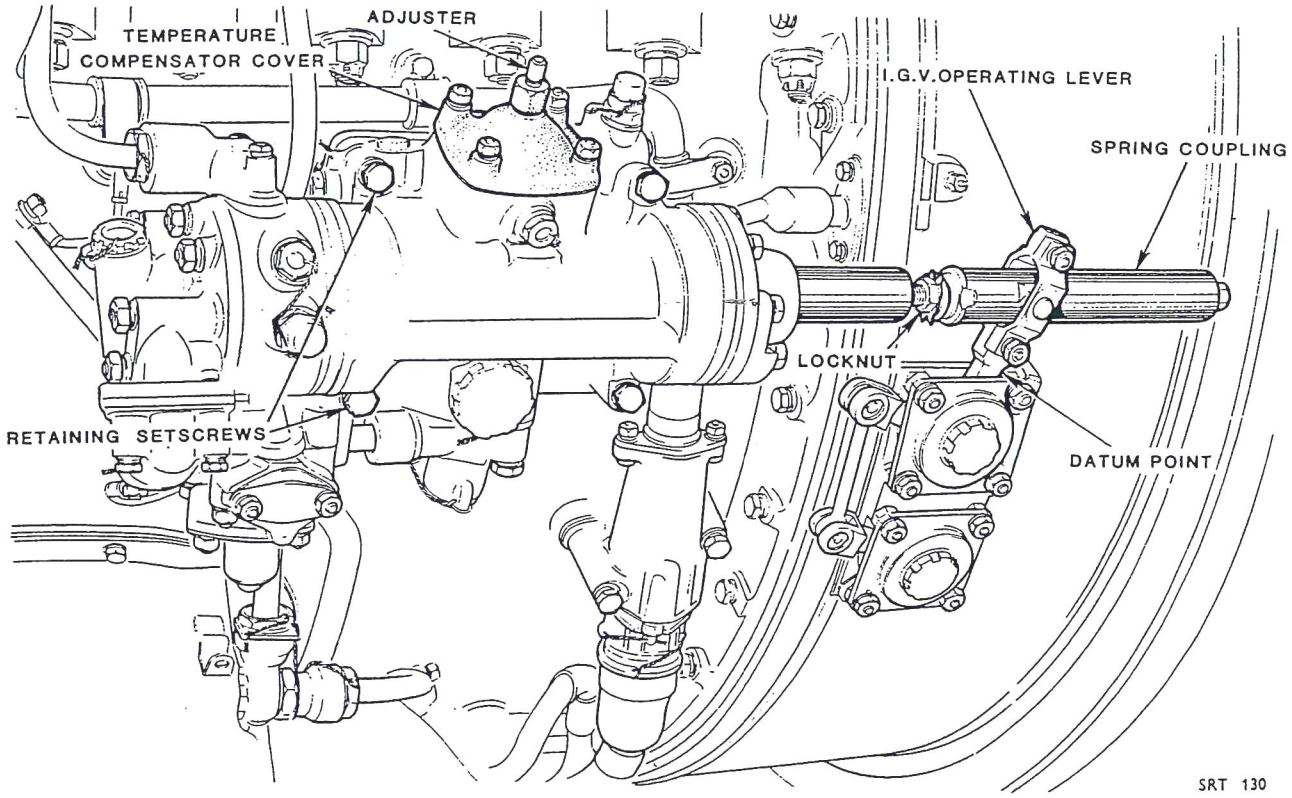


Fig.3 Intake guide vane ram

10. Replacing

CAUTION .....

To avoid imposing excessive stress on the master inlet guide vane operating lever, it is essential that the operating lever 'range of movement' is limited by the internal stops in the inlet guide vane ram.

(1) Replacing is the reverse of removing. Ensure all joint faces are clean, and flush out pipes with clean kerosine before fitting.

(2) Ensure that the inlet guide vane ram piston is fully extended on its forward internal stop and after connecting the inlet guide vane ram spring coupling to the inlet guide vanes operating lever, check that the clearance between the flat on the operating lever and the adjacent datum point on the lever bearing housing (Fig.3) is 0.150 in. This check must be carried out with the free play at the operating lever/cap assembly engagement holes to spring coupling trunnions taken up, by holding the operating lever towards the rear of the engine, which will increase the clearance at the datum point (Fig.3). If necessary, adjust the clearance by loosening the locknut between the ram piston rod and spring coupling, then turn the piston rod to obtain the correct datum clearance. When adjustment is complete, ensure the tabwasher is correctly located in its slot, then fully tighten the locknut. Re-check the gap at the datum point to ensure that the 0.150 in. clearance has been maintained.

(3) Lock the locknut by bending all four locking tabs against the nut, using pliers. Do not bend the locking tabs with a drift, because shock loading may loosen the nut. Blr

(4) Bleed the fuel system (Chap.6) and check the ram and intake guide vanes for full and free movement.

11. Serviceability check

(1) Ground run the engine; check for leaks at the disturbed joints and check ram operation (Vol.1, Part 2, Sect.2, Chap.2).

12. Adjusting

(1) To adjust the I.G.V. ram setting, slacken the adjuster (Fig.3) locknut and turn the adjuster clockwise to increase the rev/min at which the ram operates and vice versa. Tighten the locknut each time the adjuster is turned.

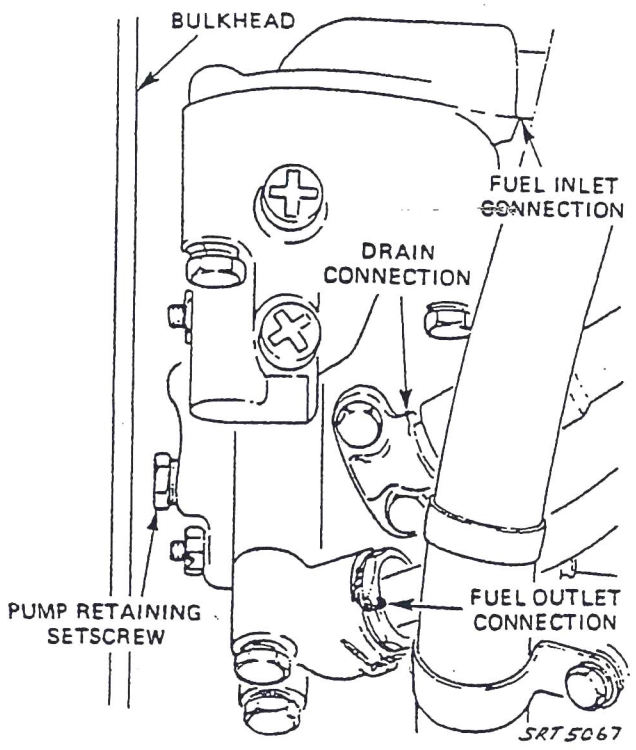
Governor pump

13. Removing

(1) Remove the screws securing the bulkhead panel next to pump (Fig.4), then remove the panel.

(2) Disconnect the three pipes from the pump; the rigid pipes should be disconnected at their elbow connection to the unit.

(3) Unscrew the governor pump retaining screws, then withdraw and remove the pump rearward, to disengage the captive quill drive shaft. If there is to be any delay before performing para.14 (Inspection of fuel inlet filter) then inhibit the unit (AP102C-1512 to 1517 and 1522-7).

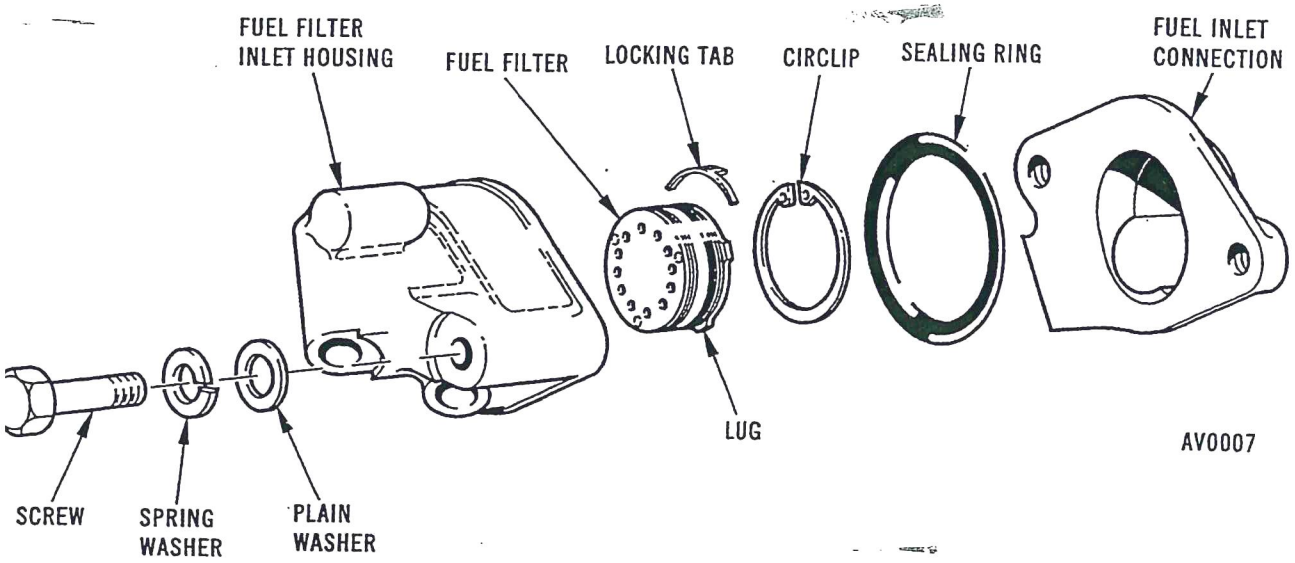


Governor pump
Fig.4

14. Inspection of fuel inlet filter (Fig.4A)

(1) Remove the two screws,together with spring washers and plain washers, securing the fuel inlet connection.

(2) Remove the circlip and locking tab securing the fuel filter; withdraw and remove fuel filter from fuel filter inlet housing.



Fuel filter - removal/inspection/assembly
Fig.4A

(3) Remove and discard the sealing ring from fuel filter inlet housing.

(4) Inspect the fuel filter for fretting/wear. Examine the surfaces of the three lugs on the top plate, and if frettage/wear is apparent, measure the sectional thickness of each lug. Experience has shown that the greatest frettage occurs on the lug which is at right angles to the wear witness line on the fuel filter bottom plate where it seats in the fuel filter inlet housing.

(a) Thickness of each lug 0.045 in or greater; accept fuel filter and refit.

(b) Thickness of any lug between 0.045 in and 0.030 in; renew filter assembly.

(c) Thickness of one or more lugs below 0.030 in; reject complete governor pump assembly.

Note...

When refitting the filter turn it through 120 degrees from the position it was when removed (bottom plate witness line at approximately a right angle to the fuel filter inlet housing).

(5) Align the three lugs on fuel filter with corresponding cutouts in fuel filter inlet housing; fully install fuel filter.

(6) Align lug on locking tab as detailed in (Fig.4A) with corresponding cutout in fuel filter inlet housing. Insert into position (in gap between lug of fuel filter and adjacent fuel filter inlet housing); ensure locking tab is fully seated and lug is within cutout.

(7) Fit circlip; ensure fully seated and ends of circlip are positioned either side of lug on locking tab.

(8) Lubricate and install new sealing ring in groove of fuel filter inlet housing (Sect.2, Chap.1).

(9) Lubricate the two screws, refer to lubricants for assembling (Sect.2, Chap.1).

(10) Align and position fuel inlet connection on mating face of fuel filter inlet housing; align screw holes. Fit two screws, together with spring washers and plain washers into corresponding holes to secure fuel inlet connection.

(11) Torque-tighten the two screws; refer to torque-tightening technique (Sect.2, Chap.1).

(12) Inhibit the governor pump (AP 102C-1512 to 1517 and 1522-7).

15. Replacing

(1) Replacing is the reverse of removing. Renew the jointing between the pump and wheelcase and torque load the retaining setscrew to 75 lbf/in. If there is insufficient room to apply a torque wrench, use a set-spanner 4 1/2 in. long.

16. Serviceability check

(1) Bleed the fuel system (Chap.6). Ground run the engine; check for leaks at the disturbed joints then, check the operation of the i.g.v. ram (Vol.1, Part 2, Sect.2, Chap.2).

Air dipping unit (Mk.121 and 122)

17. Removing

(1) Unscrew the electrical connection then, remove the three pipes at their seal housing joints (fig.5); disconnect the rigid pipes at their opposite ends. Unscrew the retaining nuts then, remove the unit.

(2) Do not inhibit this unit, but store it in dry conditions.

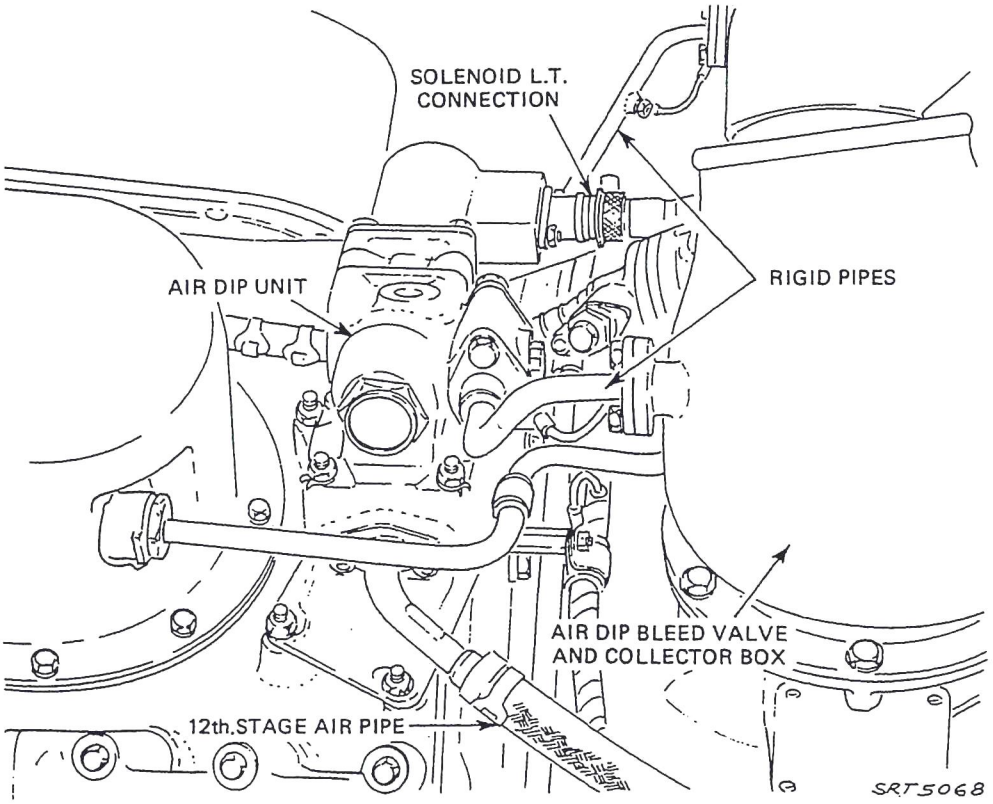


Fig.5 Air dipping unit

18. Replacing

(1) Replacing is the reverse of removing. When applying jointing compound to the joint faces of the unit and the 12-stage air supply, take care that jointing does not enter the air passages otherwise operations of the unit may be affected.

19. Serviceability check

(1) Ground run the engine and check operation of the air dipping unit (Vol.1, Part 2, Sect.2, Chap.2).