

Chapter 2

SERVO THROTTLE VALVE, TYPE S.T.V.2

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General

1. The servo throttle valve type STV, is designed to provide an automatic variable restriction in the fuel flow in the event of excessive temperature or speed and is employed in conjunction with an electric pressure control, type LPC.

2. Such a system provides a simple and reliable method of controlling maximum temperature or speed with rapid recovery

following a severe correction, thus eliminating large overshings and undersings of temperature or speed. Also the pump is not called upon to make rapid and frequent alterations in stroke.

Construction

3. The servo throttle body (fig. 1) houses a valve plunger working in an orifice in the main fuel flow. A diaphragm attached to the

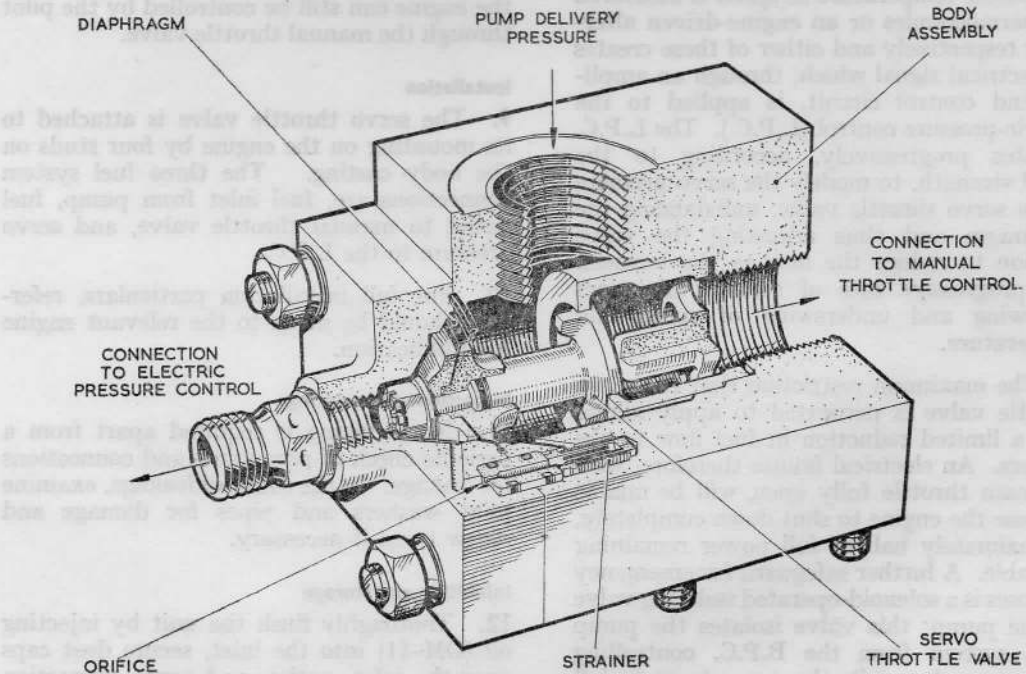


Fig. 1. Sectioned view of servo throttle valve

valve stem, divides the valve chamber from the servo chamber and is balanced by pump delivery pressure on the underside and servo pressure on the upper side.

4. Drillings between the valve chamber and servo chamber provide the flow to the servo chamber, the flow being controlled by a restricting orifice protected by a strainer. A flow from the servo chamber passes to the servo valve in the L.P.C., which, by adjusting this variable flow regulates the pressure in the throttle valve servo chamber and so, by means of the diaphragm, controls the throttle valve area.

Operation (fig. 2)

5. The servo throttle valve is operated by variation of the servo pressure creating a pressure drop across the diaphragm, thus deflecting the diaphragm centre and so moving the valve to alter the main flow area between the valve and its orifice, in accordance with control signals passed to the electro pressure control unit.

6. Excess temperature or speed is measured by thermocouples or an engine-driven alternator respectively and either of these creates an electrical signal which, through an amplifier and control circuit, is applied to the electric-pressure control (L.P.C.). The L.P.C. operates progressively, according to the signal strength, to modify the servo pressure in the servo throttle valve, unbalancing the diaphragm and thus adjusting the valve position to reduce the flow to the burners. The progressive rate of control minimizes overswing and underswing of speed and temperature.

7. The maximum restriction that the servo throttle valve is permitted to apply allows only a limited reduction in fuel flow to the burners. An electrical failure therefore, with the main throttle fully open, will be unable to cause the engine to shut down completely, approximately half of full power remaining available. A further safeguard for emergency purposes is a solenoid-operated isolating valve on the pump; this valve isolates the pump servo system from the B.P.C. controlling influence and permits the pump to go to full stroke.

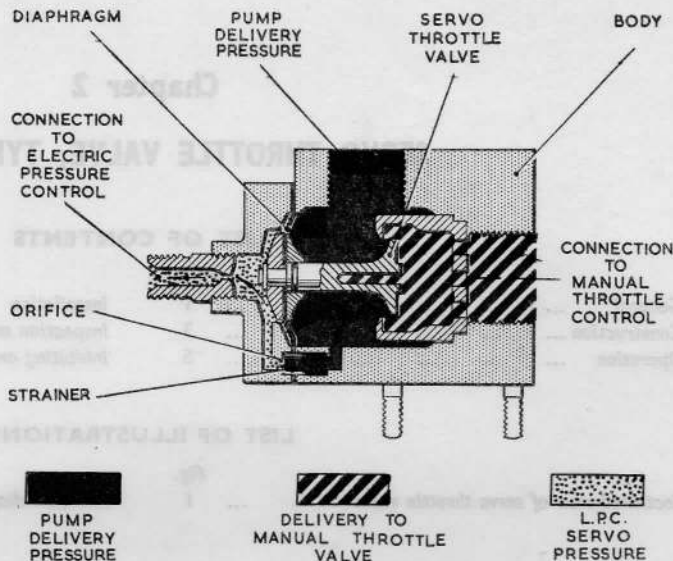


Fig. 2. Fuel flow diagram—servo throttle valve

8. In an emergency therefore, use of the isolating valve will allow the pump delivery pressure to rise to the value set by a stall valve inside the pump and will provide a flow to the burners which will be sufficient for very nearly full engine performance at sea level conditions; under these circumstances the engine can still be controlled by the pilot through the manual throttle valve.

Installation

9. The servo throttle valve is attached to its mounting on the engine by four studs on the body casting. The three fuel system connections are, fuel inlet from pump, fuel outlet to manual throttle valve, and servo pressure to the L.P.C.

10. For full installation particulars, reference should be made to the relevant engine Air Publication.

Inspection and servicing

11. No servicing is required apart from a periodic check of pipe joints and connections for leakage. In the event of leakage, examine joint washers and pipes for damage and renew them if necessary.

Inhibiting and storage

12. Thoroughly flush the unit by injecting oil (OM-11) into the inlet, secure dust caps over the inlet, outlet, and servo connection and pack the unit in a suitable container.

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