

Fig. 1. Starting equipment installation on e.c.u.

9. Air leaving the starter passes through the starter exhaust duct and discharges through a port in the engine bay door.

10. The engine air valve controls the supply of air from the interconnected ducting to the hot air duct during a start. After the engine has started, the engine air valve controls the supply of air which flows from the compressor pressure delivery tapping through the non-return valve in the hot air duct and is available for starting other engines.

Rapid start system

11. The e.c.u.-mounted items of the rapid starting systems are, a pressure reducing valve attached to the starboard side of the rear bulkhead, a combustor which fits into the starter inlet duct, and two electrical leads. One lead connects to an igniter plug in the combustor, the other connects to the combustor pressure switch.

Operation

Normal start system

12. For normal starting the engine master switch and the engine ignition switch are set to ON and the air selector switch at NORMAL. When the starter button is pressed it brings into operation a relay which:—

- (1) Releases a solenoid to open the starter air control valve.
- (2) Energises the engine igniter plugs.
- (3) Energises the ground starting unit air bleed control.

Air pressure from the ground starting unit opens the starter air control valve and through a pressure switch, illuminates the lamp in the starter button to indicate that air is being delivered to the starter.

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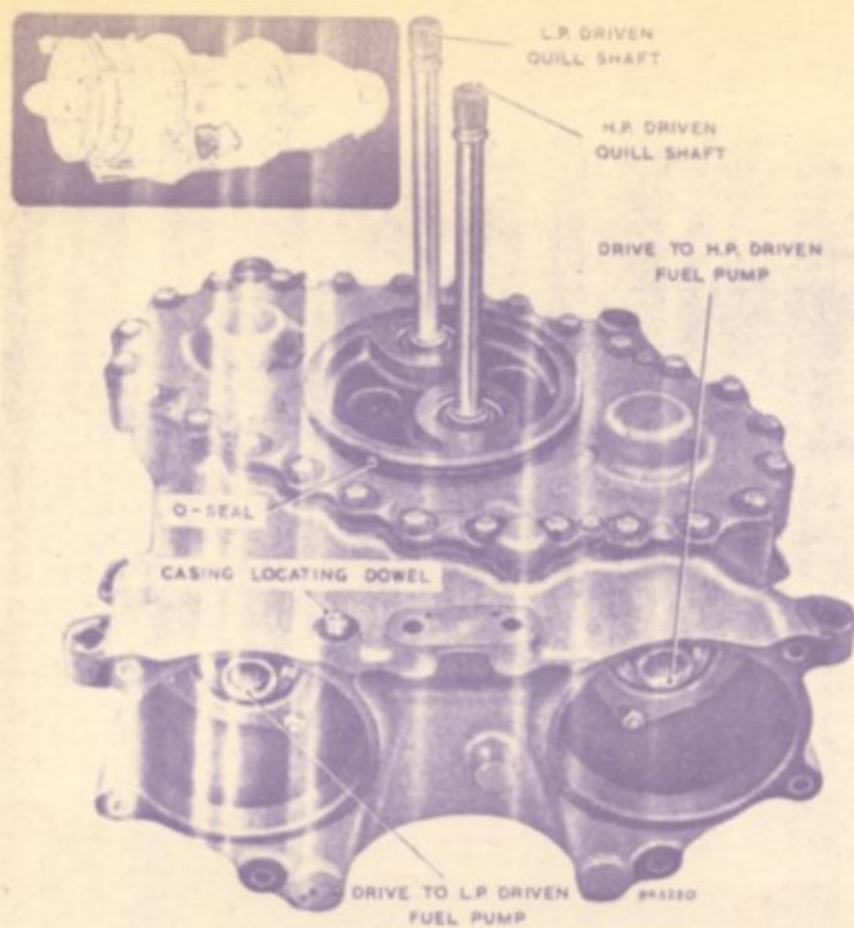


Fig. 25. Fuel pump drive outer casing—top view

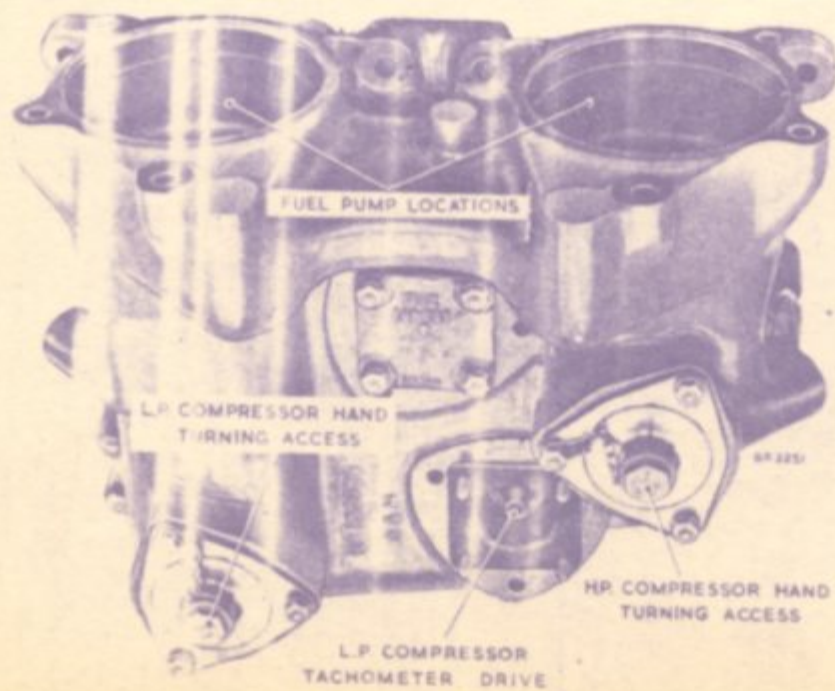


Fig. 26. Fuel pump drive outer casing—underside view

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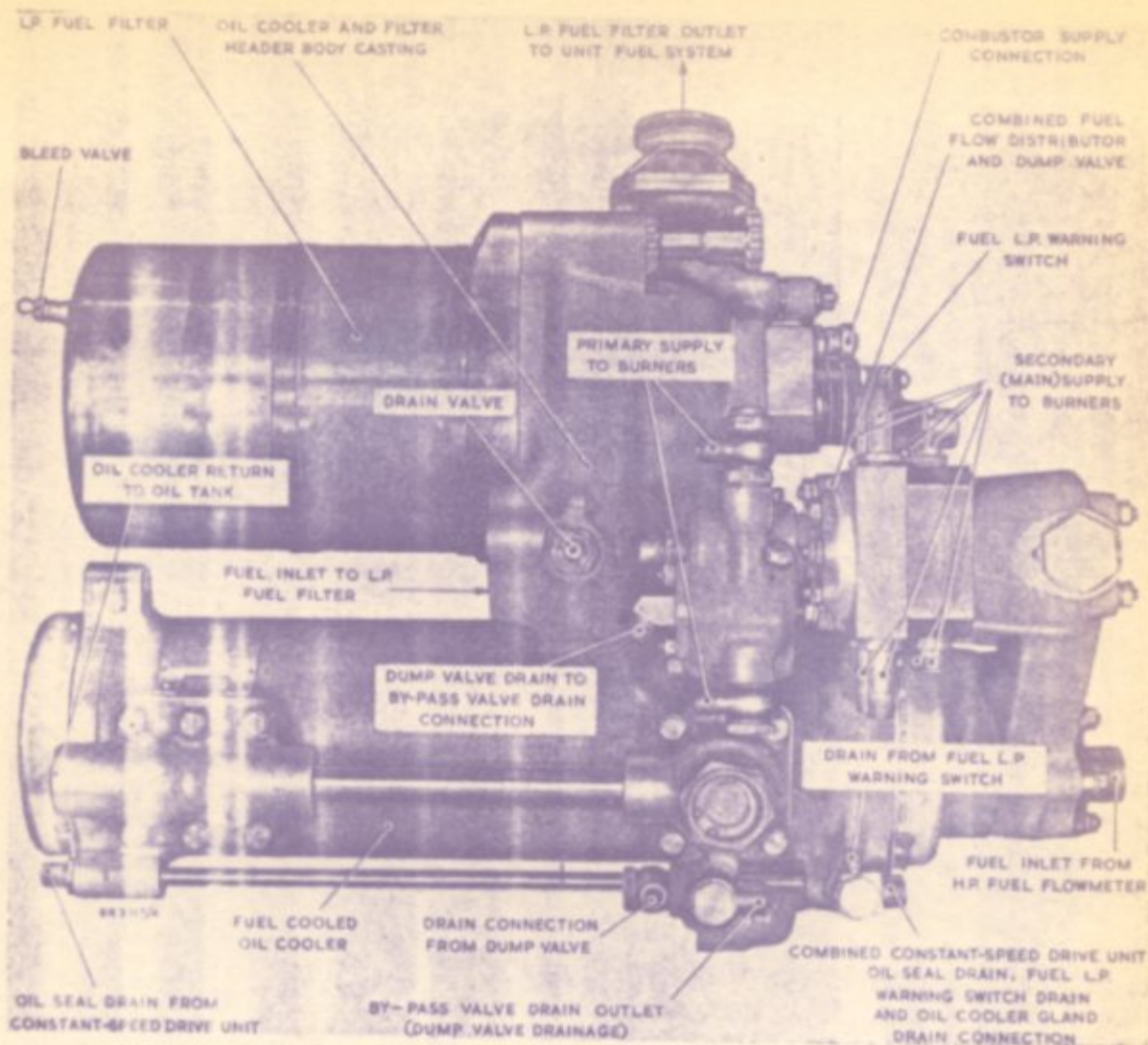


Fig. 2. Combined fuel flow distributor and dump valve, low-pressure fuel filter, fuel-cooled oil cooler, and drain connections

H.P. compressor-driven fuel pump

11. This pump is similar to the l.p. compressor-driven fuel pump with the exception that it has no double datum governor. The hydro-mechanical governor of the h.p. compressor-driven fuel pump serves as the engine overspeed governor and is set to operate at 3% above the h.p. compressor normal maximum rev/min. Should the servo bleed valve of the pump be caused to open by overspeed conditions, the output of both pumps will be reduced, and the maximum attainable rev/min of the engine will be kept within safe limits.

Full range flow control

12. This unit is the first control in the system downstream of the fuel pumps and embodies the manually operated combined throttle valve and high pressure shut-off cock, and an automatically-operated altitude-responsive flow control.

Air/fuel ratio control

13. Fitted downstream of the full range flow con-

trol, this unit is designed to limit the fuel delivery to the burners in accordance with the compressor delivery pressure during acceleration thus preventing overfueling of the engine and possible stalling of the compressor.

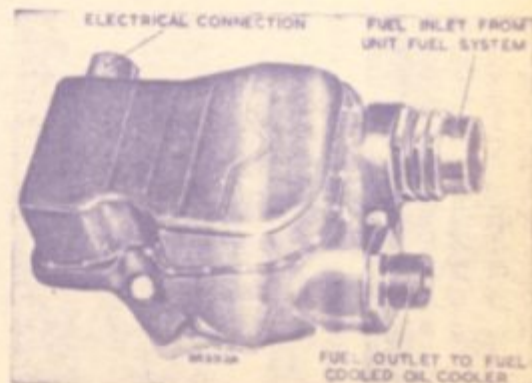


Fig. 3. High-pressure fuel flowmeter

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The l.p. compressor-driven fuel pump governor acts as the cruise and take-off datum governor for the l.p. compressor; both datum points may be adjusted (fig. 14) under the following circumstances:—

- (1) On a newly-installed engine.
- (2) When the take-off rev/min does not conform to the limit quoted for the ground setting in the Operating Limitations (provided the j.p.t. limiter is not restricting max. rev/min and an investigation proves the governor setting to be low).

(3) When a replacement fuel system has been fitted.

(4) When the cruise setting of the l.p. compressor-driven fuel pump has been disturbed.

Note . . .

Adjustment of the cruise governor also affects the take-off governor.

60. Prepare for adjustment as follows:—

(1) Drain the door tanks, then open the engine bay doors and secure them as detailed in A.P.4505B.

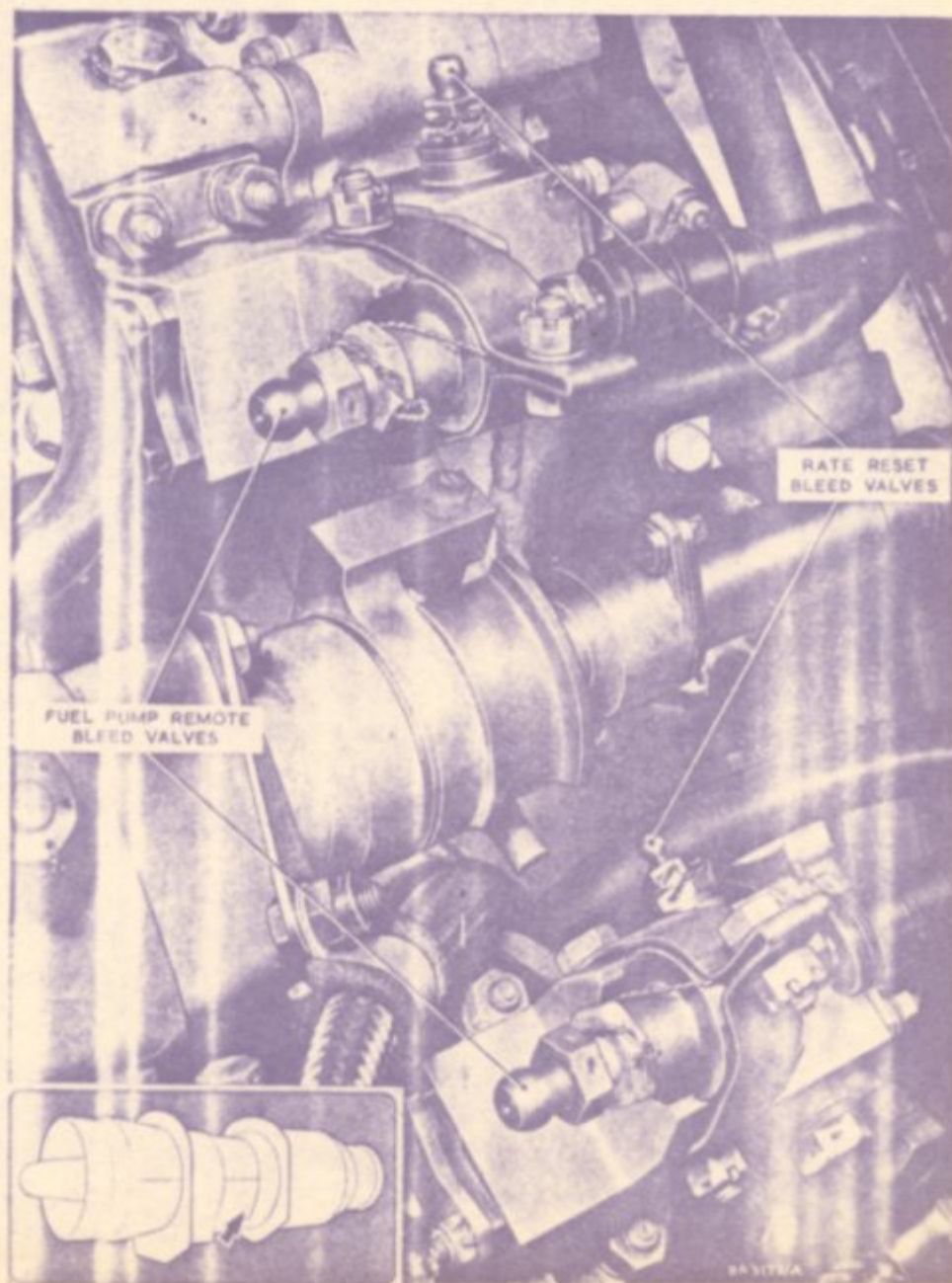


Fig. 11. Compressor-driven fuel pump remote bleeds, and rate reset bleeds
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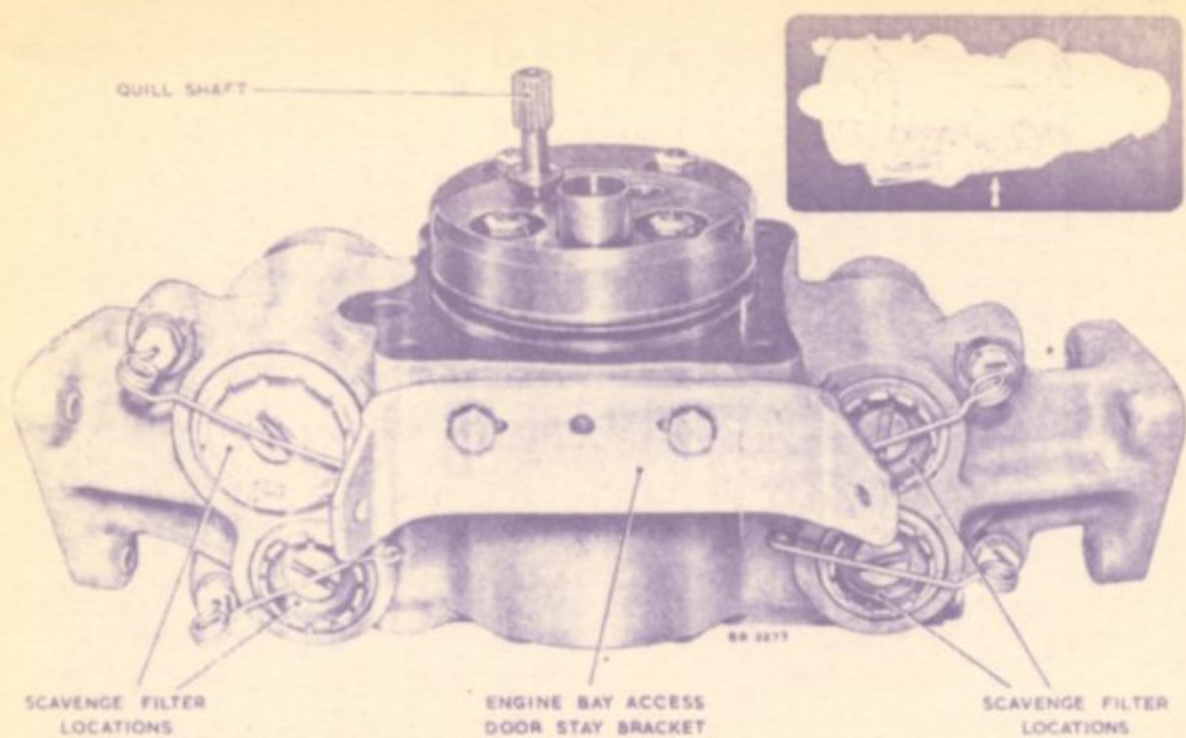


Fig. 36. Auxiliary scavenge oil pump unit—bottom view

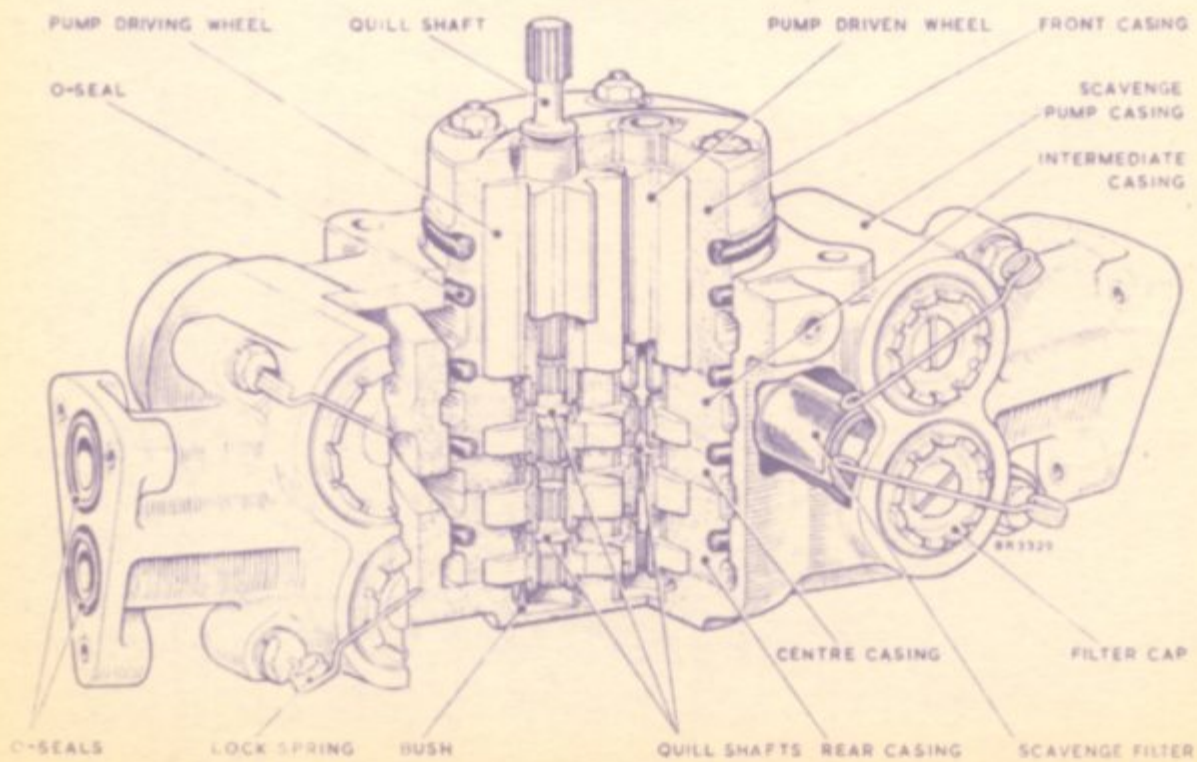


Fig. 37. Auxiliary scavenge oil pump unit

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deliver it to the burners via various automatic units which regulate the flow to suit operating conditions, as described subsequently.

MANUAL CONTROLS

5. There are two manual controls. These are the pilot's throttle control, and a two position datum-selector switch (R.P.M. GOVERNOR/J.P.T. LIMITER). The throttle control is linked directly to the combined throttle valve and high pressure shut-off cock of the full range flow control, while maximum power (TAKE-OFF) or maximum continuous power (CRUISE) datum of the l.p. compressor-driven fuel pump governor and jet pipe temperature limiter amplifier may be selected by the switch.

AUTOMATIC CONTROLS

6. Automatic control of the fuel flow, and thus of l.p. compressor rev/min and of the jet pipe temperature, together with compensation for variation in ambient conditions and air speed, is provided by the fuel system components incorporated in the metering unit. Each controlling device is described in the following paragraphs in order of fuel flow.

Fuel pumps

7. One of the twin fuel pumps is driven by the l.p. compressor, the other by the h.p. compressor. Both pumps are of the positive displacement type and incorporate hydro-mechanical governors and rate reset valves, while the l.p. compressor-driven pump

also incorporates a solenoid-operated double datum (TAKE-OFF/CRUISE) selector.

L.P. compressor-driven fuel pump

8. This pump is the medium by which the engine rev/min are controlled under all operating conditions. The servo system of both fuel pumps are interconnected; opening the servo bleed valve in either of the pumps or in any of the other automatic controls therefore, lowers the servo pressure, shortens each pump stroke and reduces the fuel flow to the burners.

9. With the R.P.M. GOVERNOR/J.P.T. LIMITER switch set to TAKE-OFF and the throttle control at OPEN the double datum hydro-mechanical governor stabilizes the maximum rev/min at its limit, through the medium of the common servo systems.

Note . . .

This governed state of maximum rev/min occurs only when the j.p.t. is below the TAKE-OFF limit and the limiter is not controlling, although selected.

10. When CRUISE is selected on the R.P.M. GOVERNOR/J.P.T. LIMITER switch and the throttle is moved to OPEN, the double datum control piston adjusts the governor spring tension of the datum control linkage to govern the engine at the max. continuous rev/min limit. Automatic correction to counteract the effects of governor creep during alterations in altitude and pump delivery pressure fluctuation is achieved through the medium of the rate reset valves fitted to both pumps.

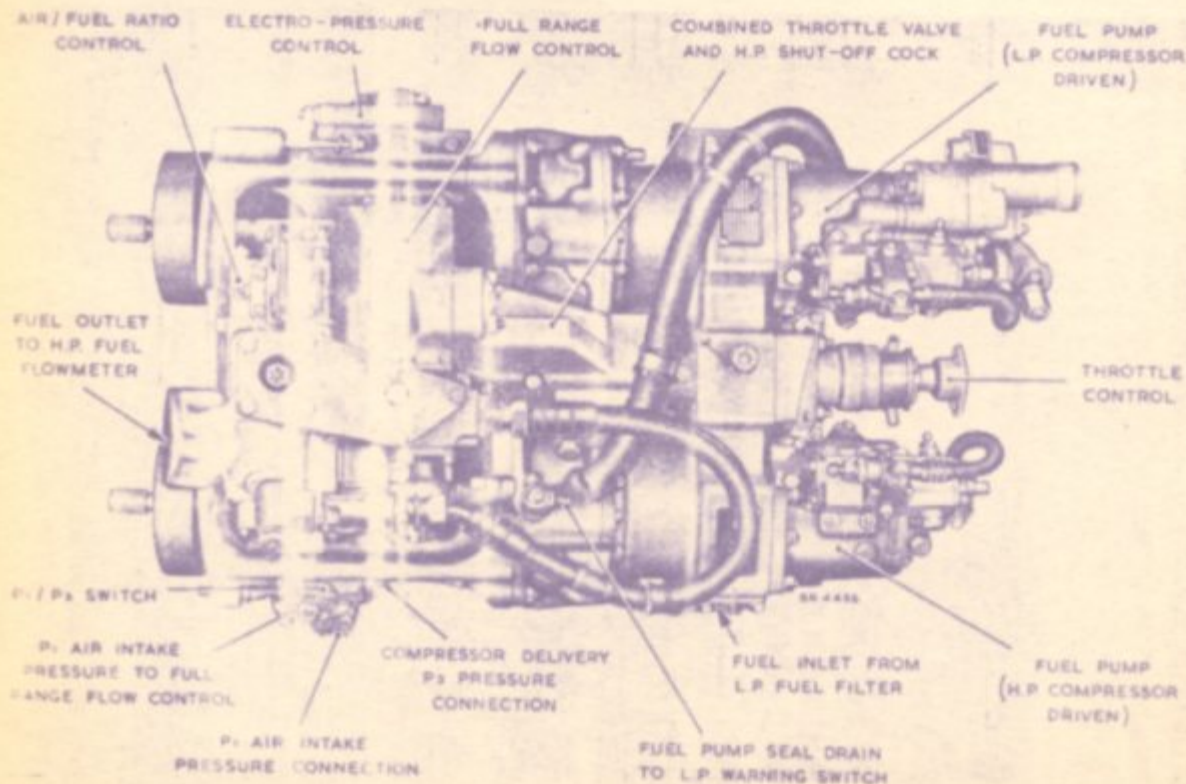


Fig. 1. Fuel system metering unit

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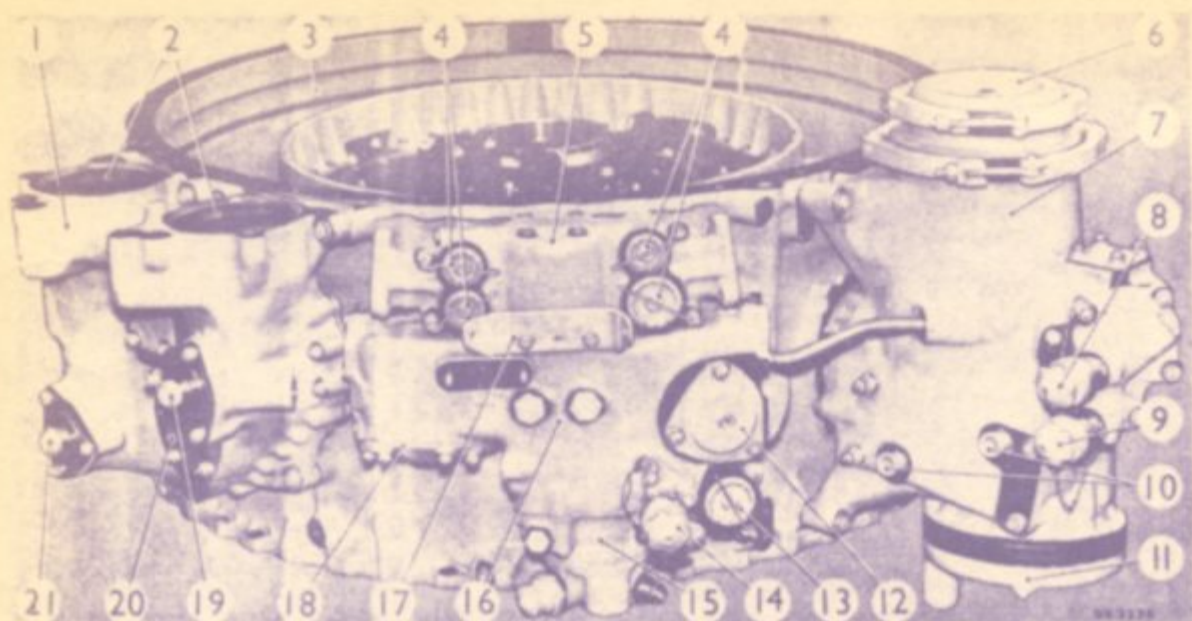


Fig. 19. Intermediate casing showing accessory drive casings in position

Key to Fig. 19

- 1 FUEL PUMP DRIVE OUTER CASING
- 2 FUEL PUMP LOCATIONS
- 3 H.P. COMPRESSOR ENTRY GUIDE BLADE LOCATION
- 4 AUXILIARY SCAVENGE OIL FILTER
- 5 AUXILIARY SCAVENGE PUMP CASING
- 6 STARTER DRIVE BLANK COVER
- 7 COMBINED DRIVE UNIT OUTER DRIVE CASING
- 8 C.S. DRIVE UNIT OIL SUPPLY TANK FILLER
- 9 C.S. DRIVE UNIT OIL SUPPLY TANK DRAIN
- 10 OIL TRANSFER DOWELS TO C.S. DRIVE UNIT OIL COOLER
- 11 C.S. DRIVE UNIT DRIVE FACE BLANK COVER
- 12 PRESSURE OIL FILTER
- 13 INTERMEDIATE SCAVENGE OIL FILTER
- 14 OIL SUMP DRAIN
- 15 MAIN OIL PUMP
- 16 OIL SUMP
- 17 ACCESS DOOR STAY BRACKET
- 18 HYDRAULIC PUMP DRIVE LOCATION
- 19 H.P. COMPRESSOR HAND TURNING LOCATION
- 20 H.P. COMPRESSOR TACHOMETER GENERATOR LOCATION
- 21 H.P. COMPRESSOR HAND TURNING LOCATION

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