Chapter 3

HIGH-PRESSURE FUEL PUMPS, TYPES GC.14 AND GC.21

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LIST OF ILLUSTRATIONS

INTRODUCTION

1. The fuel pumps, types GC.14 and GC.21, which are designed for use as a dual pump installation, are basically the same as the type GC.12 pump already described in Sect. 2, Chap. 1, except for slight differences in installation fittings and calibration settings, and for the fact that one pump of the pair, namely the GC.21, incorporates a solenoid valve.

2. The installation details are denoted by a suffix figure, and the calibration setting by a suffix letter, e.g. with types GC.14/5H and GC.21/19H pumps, 5 and 19 are the installation codes for certain engines, and H is the calibration code signifying a delivery of 450 to 460 gallons per hour at a speed of 2,900 r.p.m. and a pressure of 1,200 lb. per sq. in.

3. Though each pump is a self-contained unit incorporating its own servo-control and governor assembly, their use together with a common delivery entails hydraulic interconnection of the servo-control systems. In addition the governors are set to operate at slightly different speeds to prevent them interacting as regards control at governed r.p.m.

4. The use of two pumps in parallel provides a more reliable system if advantage can be taken of full delivery from one pump in the event of defective operation of the other. The necessary interconnection of the servo control systems, however, means that any defect causing excessive leakage from the common servo control system, would cause a reduction in fuel delivery from both pumps, which normally deliver approximately equal amounts. The solenoid valve is therefore provided for use in emergency, to ensure that full delivery from at least one pump is available, despite such a possible defect.

ISOLATING VALVE

5. The solenoid valve on the type GC.21 pump (*fig.* 1) is fitted to the end cover of the control piston cylinder and incorporates an inlet union (57) for connection to the servo cylinder of the other pump, and an outlet union (44) for connecting to the servo valve of the barometric pressure control unit.

6. The solenoid-operated valve consists of an orifice (49) with a seating of tungsten carbide in communication with the pump servo cylinder through which fuel is normally fed at servo pressure to the barometric pressure control unit. When the solenoid (54) is energized, a steel valve plate (51), which is normally held clear of the orifice by a spring (48), is moved by the steel solenoid plunger (53) and aluminium push rod (52) to close the orifice.

7. The orifice is incorporated in the aluminium bronze valve carrier, which, together with the steel solenoid fixing plate (47), forms the valve chamber (50).

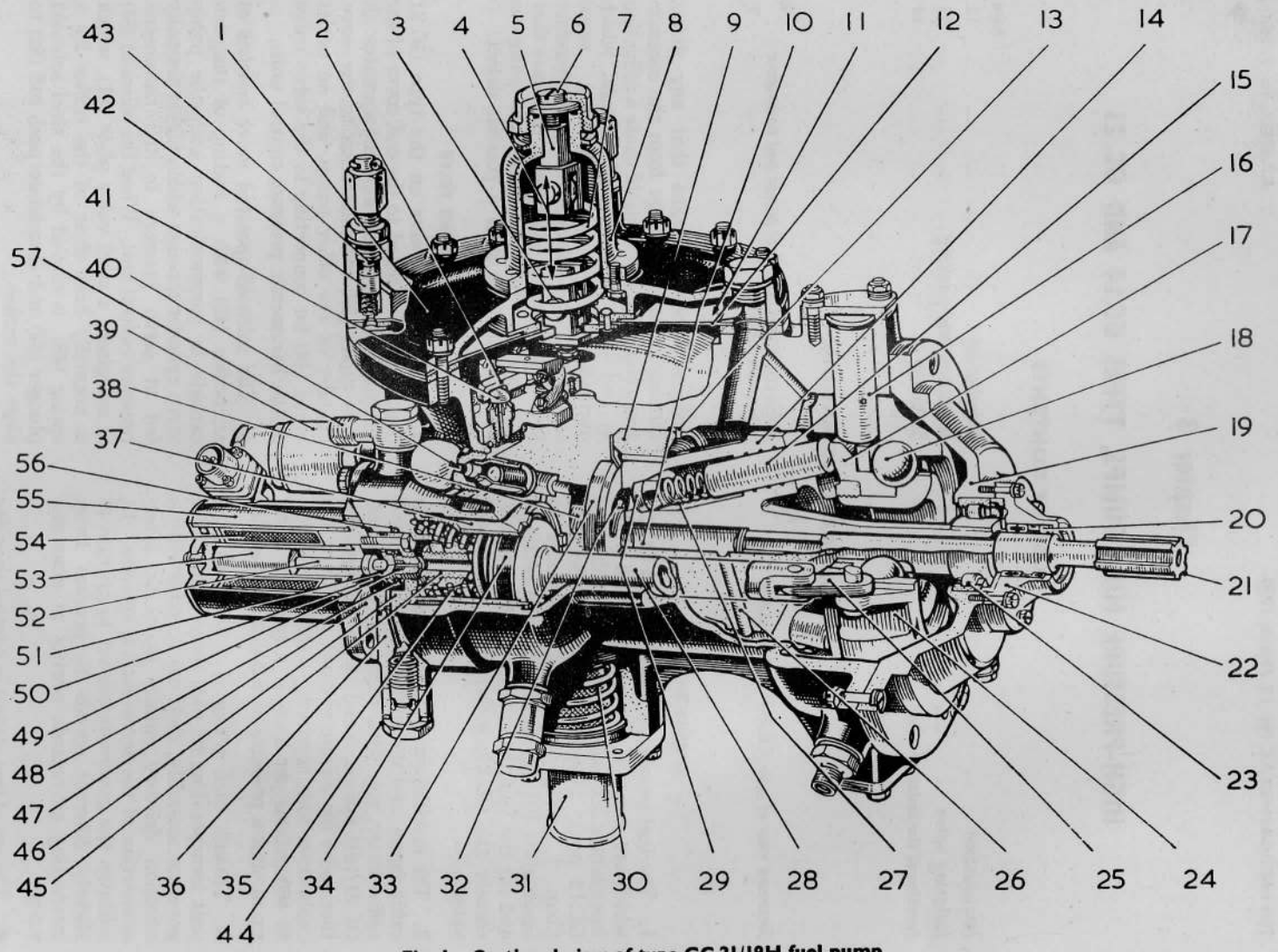

Fig. 1. Sectional view of type GC.21/19H fuel pump

KEY TO FIG. 1

1	COVER PLATE	30	GAUZE STRAINER
2	ROCKER LEVER	31	PUMP INLET
3	FORKED MEMBER	32	KIDNEY SHAPED PORTS
4	SPRING ASSEMBLY	33	PORT INSERT
5	FORKED MEMBER	34	CONTROL PISTON
6	ADJUSTING SCREW	35	SPRINGS
7	HELICAL SPRING	36	END COVER
8	HOUSING	37	STEEL LINER
9	CARBON RING	38	OUTLET PASSAGE
10	AXIAL BORE	39	PUMP OUTLET
11	SPACE ABOVE DIAPHRAGM	40	RESTRICTING ORIFICE
12	DIAPHRAGM	41	HALF-BALL VALVE
13	CIRCLIP	42	PISTON
14	ROTOR	43	BLEED VALVE
15	PISTON	44	OUTLET (to B.P.C. servo)
16	TRUNNION PIN	45	STOP
17	CAM-PLATE	46	VALVE CARRIER
18	CAM-PLATE BEARING	47	SOLENOID FIXING PLATE
19	CAM-PLATE HOUSING	48	SPRING
20	OIL SEALS	49	ORIFICE
21	SPLINED QUILL SHAFT	50	VALVE CHAMBER
22	SEAL HOUSING	51	VALVE PLATE
23	ROLLER BEARING	52	PUSH ROD
24	CONTROL RING	53	SOLENOID PLUNGER
25	LINK	54	SOLENOID
26	RADIAL DRILLING	55	SOLENOID CASE
27	RETURN SPRING	56	OIL SEALS
28	PISTON ROD	57	INLET CONNECTION (from second pump servo)
29	SPRING GUIDE		

8. Normally, when the valve is open, fuel at servo pressure enters the valve chamber, passes through a drilling in the valve carrier to an annular groove in its periphery and then through a passage in the control cylinder end cover to the outlet (44) which is connected to the barometric pressure control unit. Oil seals (56) are provided on either side of the annular groove in the valve carrier, and an aluminium bronze stop (45) is mounted centrally in the light alloy control cylinder end cover (36) to limit the movement of the pump control piston.

Function of the isolating valve

9. Reference to the description of the barometric pressure control (*Sect.* 3, *Chap.* 1) and fig. 2 of this chapter, is necessary to understand the function of the isolating valve in the dual pump system. When the valve is energized, thus isolating the servo system of the particular pump from any exterior bleed, the isolated pump will deliver fuel as controlled by its own servo system, i.e. full stroke if operating correctly; the other pump will deliver fuel as controlled by its servo system in conjunction with the barometric pressure control.

10. As the combined pump delivery pressure acts on the B.P.C., any change in pressure will cause the B.P.C. to attempt to compensate for that change, by increasing or decreasing the fuel flow of the only pump it now controls. It will thus be seen that operating the isolating valve separates the flow control of the two pumps, making one available in the event of defective operation of the other servo-system. With no defect in the fuel system, full combined pump delivery is always available.

11. A more detailed description of the isolating valve in relation to the engine fuel system is given in the relevant engine Air Publication.

INSTALLATION

12. Installation details are fully covered in the relevant engine Air Publication.

INHIBITING AND PACKING

13. This procedure is as described in Vol. 2, Part 3, Sect. 2, Chap. 1.

SERVICING

14. The servicing instructions given in Chapter 1 of this section also apply to these units.

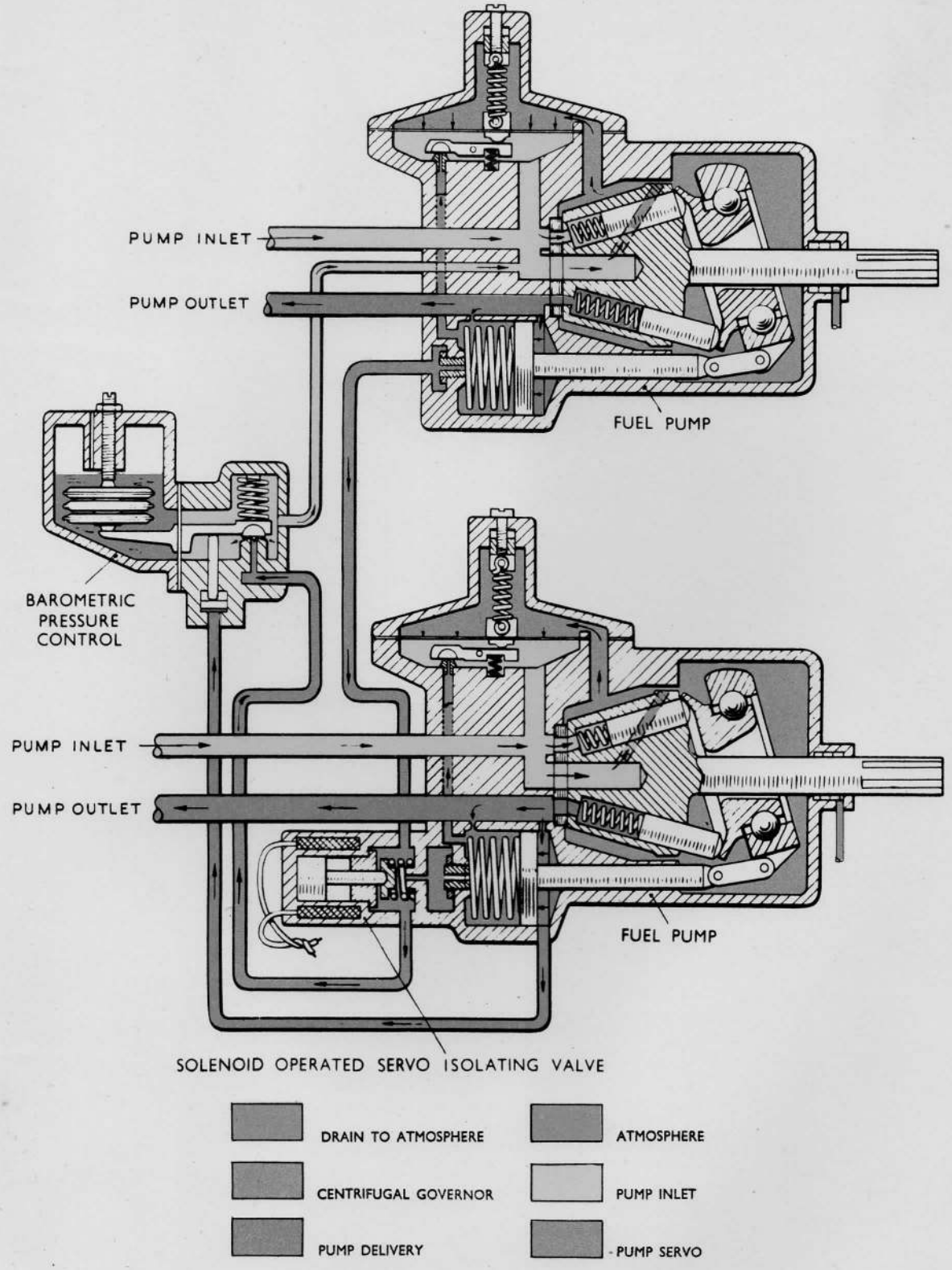

FIG. 2 SCHEMATIC DIAGRAM OF DUAL PUMPS AND BAROMETRIC PRESSURE CONTROL

PF6590 M32748/67M/C 6/51 180 C & P Gp. 959(4)