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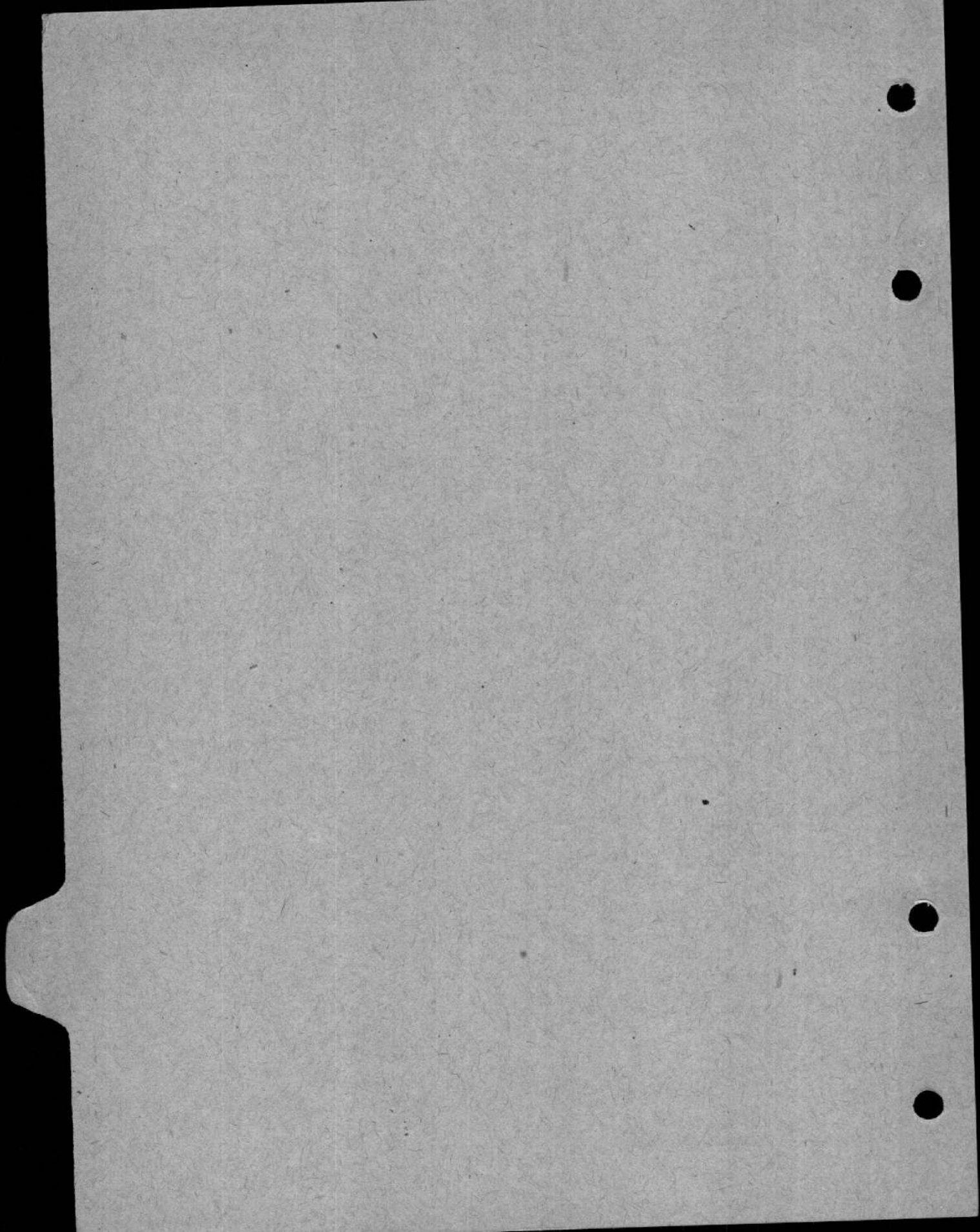
SECTION

9

HYDRAULIC AND PNEUMATIC SYSTEMS

SECT

9



SECTION 9

HYDRAULIC AND PNEUMATIC SYSTEMS

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HYDRAULIC SYSTEM

1. The hydraulic system, which is of the Lockheed "high-pressure" type, operates the alighting gear, flaps and dive brakes. A circuit diagram is given in fig. 1 of this Section and four piping illustrations are given in Sect. 4, Chap. 3. The system is described in the following paragraphs but, for a detailed description of the individual components, reference should be made to A.P.1803B, Vol. I.

Power circuit

2. An engine-driven pump supplies power to the selector valves through an automatic cut-out valve and a hydraulic accumulator. When the accumulator is charged to 2,600 lb./sq. in., the automatic cut-out valve closes, and diverts the fluid through the circuit to the reservoir. The selector unit is comprised of three sections, controlling the alighting gear,

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the flaps and dive-brake circuits. When the selector valves are at NEUTRAL the fluid is by-passed through the automatic cut-out valve back to the reservoir. A thermal relief valve is incorporated in the circuit and opens when the pressure in the fully-charged accumulator increases due to variation in atmospheric temperature, and also safeguards the circuit in the event of failure of the automatic cut-out valve. A non-return valve located in the hand-pump circuit, prevents the fluid from the engine-driven pump from entering the hand-pump delivery line. Two coupling points located on the firewall permit the use of a rig for ground test purposes.

Reservoir

3. The reservoir, which is filled with fluid as specified in the Leading Particulars, is divided into two unequal compartments by a baffle plate, the upper part of which is perforated. The hand-pump supply is taken from the bottom of the smaller compartment, while the engine driven pump receives its supply of fluid from the bottom of the larger compartment. The fluid returning from the system enters the smaller compartment and when this is full, passes through the holes in the baffle plate to the larger compartment. Therefore, a reserve of fluid is always present for hand pump operation.

Alighting gear circuit

4. The circuit is controlled by one section of the selector valve, which has two settings, UP and DOWN; a neutral setting is not provided. Fluid under pressure is directed through the jacks and back to the reservoir through the selector valve.

Flaps circuit

5. The flap selector valve provides three settings, UP, NEUTRAL and DOWN. The valve is manually returned to NEUTRAL when it is desired to set the flaps in an intermediate position suitable for take-off. Returning the valve into this position allows the pressure to pass both sides of the jack ram and maintain it in this setting.

Emergency (hand-pump) circuit

6. In the event of failure of the engine pump circuit, the flaps and alighting gear may be lowered by setting the respective selector levers to DOWN, and operating the hand pump. The dive brakes can only be operated by the hand pump when the aircraft is on the ground, and the manual control valve located on bulkhead 2 is held in the open position.

Dive-brake circuit

7. Two settings only are provided by the dive-brake selector valve, OFF and ON. The fluid under pressure passes to the jacks through a non-return valve, and is returned through the selector valve to the reservoir.

PNEUMATIC SYSTEM

8. The pneumatic system is used solely for providing pressure for operating the wheel brakes. A diagrammatic arrangement is shown in fig. 2 and a piping illustration with reservoir connections is given in Sect. 4, Chap. 3.

Supply system

9. The Heywood air compressor driven by the engine and mounted on the top of the power plant supplies air to the reservoir, which is located under the cockpit floor and is charged to a maximum pressure of 450 lb./sq. in. The maximum pressure is controlled by a regulator valve which relieves at 450 lb./sq. in. The reservoir may be charged on the ground by a compressed air bottle, a connection for which is provided on the pneumatic panel on the rear face of bulkhead 2. The lower connection adjacent to the air filter is for the use of a test gauge. Access to the pneumatic panel is obtained by opening the gun-bay doors.

Reservoir

10. The air reservoir located below the cockpit floor comprises a cylindrical shell with hemispherical ends. Integral with the ends is a boss into which is threaded a screw connection for receiving the inlet and delivery pipes. It will be found necessary to drain the reservoir periodically.

Filter

11. The air filter located on the pneumatic panel is connected into the system on the output side of the reservoir, and prevents any moisture passing from the charging point reaching the

reducing valve or brake differential unit. The filter element is a thick felt pad sandwiched between perforated metal discs. The inlet pipe is connected to the side of the unit and the outlet pipe to the top cover, while the hexagon headed plug in the bottom is for drainage purposes.

Oil and water trap

12. The oil and water trap is mounted on the pneumatic panel, and separates fluids from the air which may enter the system. The trap should be drained at daily inspection, or at the conclusion of any long flights. The drain plug is a spring-loaded threaded pin with a conical end, which forms a seal when screwed into the hole in the bottom of the body; a knurled wheel forms the opposite end of the plug. The trap is drained by disconnecting at the trap the line from the compressor, and connecting up a compressed air bottle, as the trap must be drained while under pressure in order to remove all deposits of oil sludge. The knurled wheel is turned and held until all the fluid has drained; the wheel should then be returned to the closed position.

Pressure regulator

13. The compressor delivers air to the reservoir through the oil and water trap and pressure regulator which is mounted on the pneumatic panel. The maximum pressure in the reservoir is controlled by the regulator which by-passes the delivery to atmosphere when a pressure in excess of 450 lb./sq. in. has been reached.

Pressure reducing valve

14. The reducing valve mounted on the pneumatic panel incorporates screwed connections for the inlet and outlet pipes. It is a pressure balanced valve set to reduce the pressure to 200 lb./sq. in. for delivery to the brake differential unit.

Brake differential unit

15. The differential unit is mounted on the top of the nose wheel well in the cockpit and is connected to the brake lever on the control column by a cable. A lever on the rudder-pedal layshaft is linked to a connecting rod on the differential unit, and operates the valves to provide differential braking when manoeuvring the aircraft on the ground. Access to the unit is obtained by opening the inspection cover located on bulkhead 1.

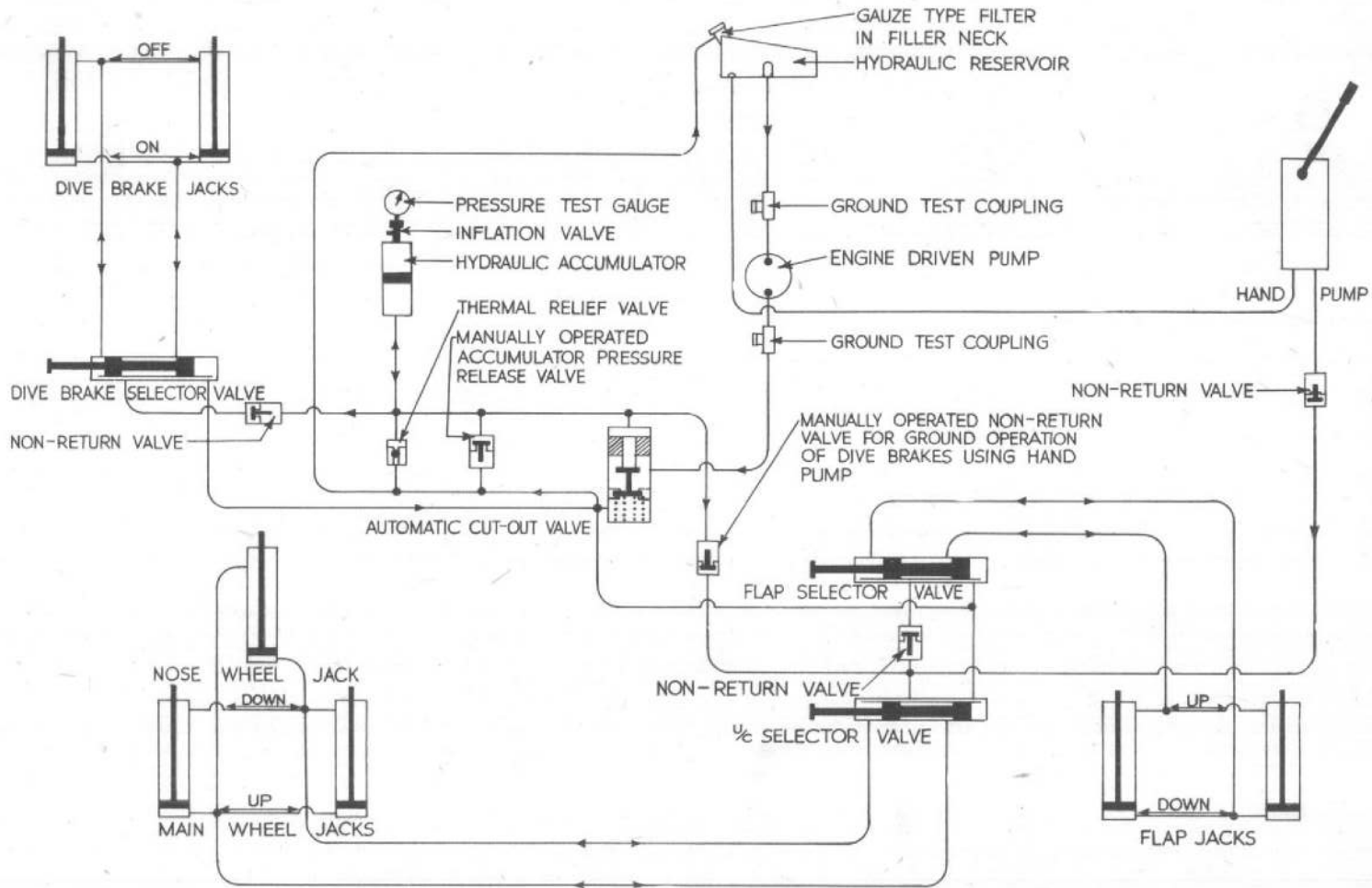


FIG. 1

DIAGRAMMATIC HYDRAULIC SYSTEM.

FIG. 1

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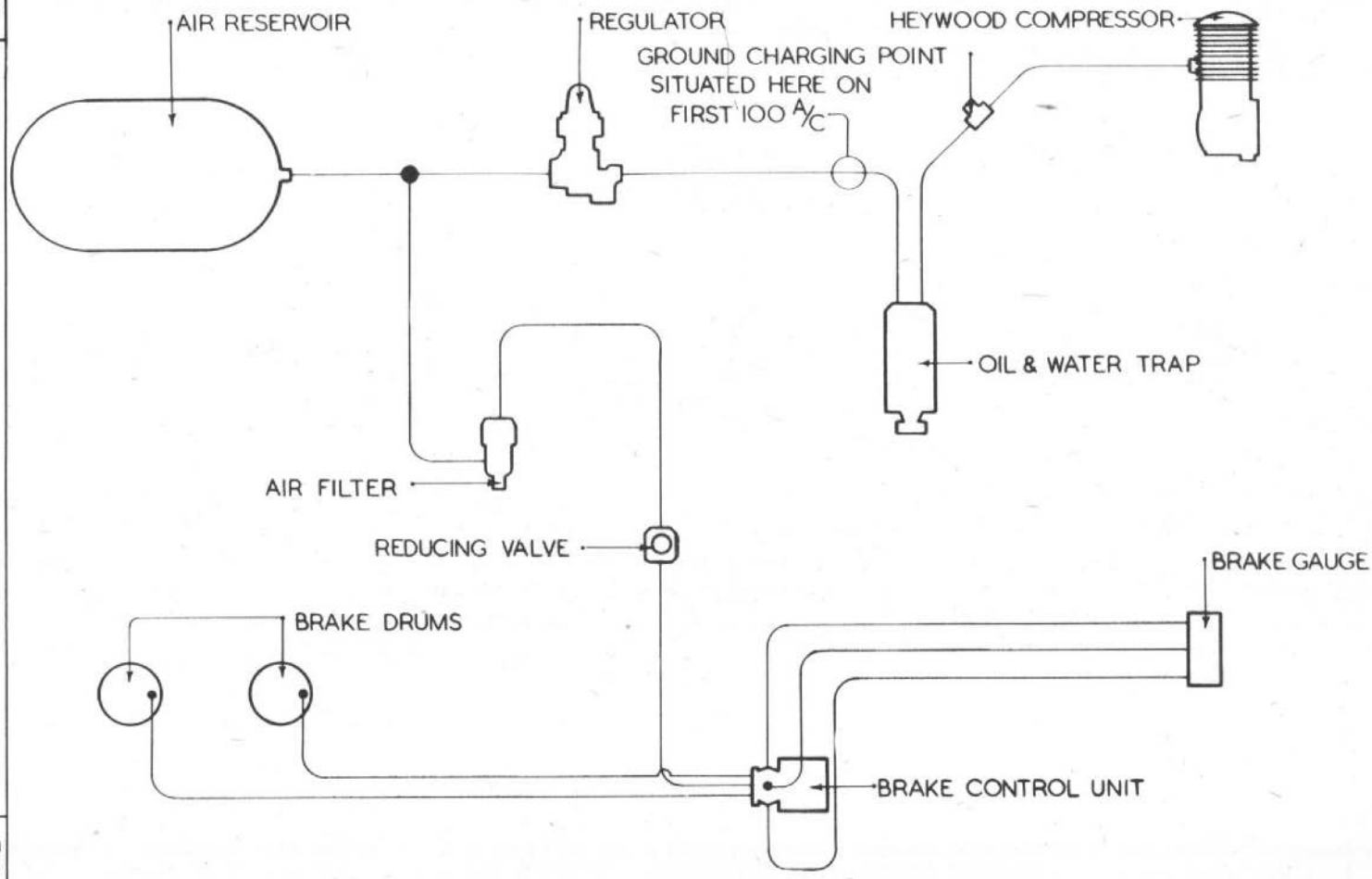


FIG 2

PNEUMATIC SYSTEM

FIG 2



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