PART I

DESCRIPTIVE

NOTE.—Throughout this publication the following conventions apply:—

(a) Words in capital letters indicate the actual markings on the controls concerned.

(b) The numbers quoted in brackets after items in the text refer to the illustrations in Part VII.

(c) Unless otherwise stated, all speeds and Mach numbers quoted are " indicated."

1. Introduction

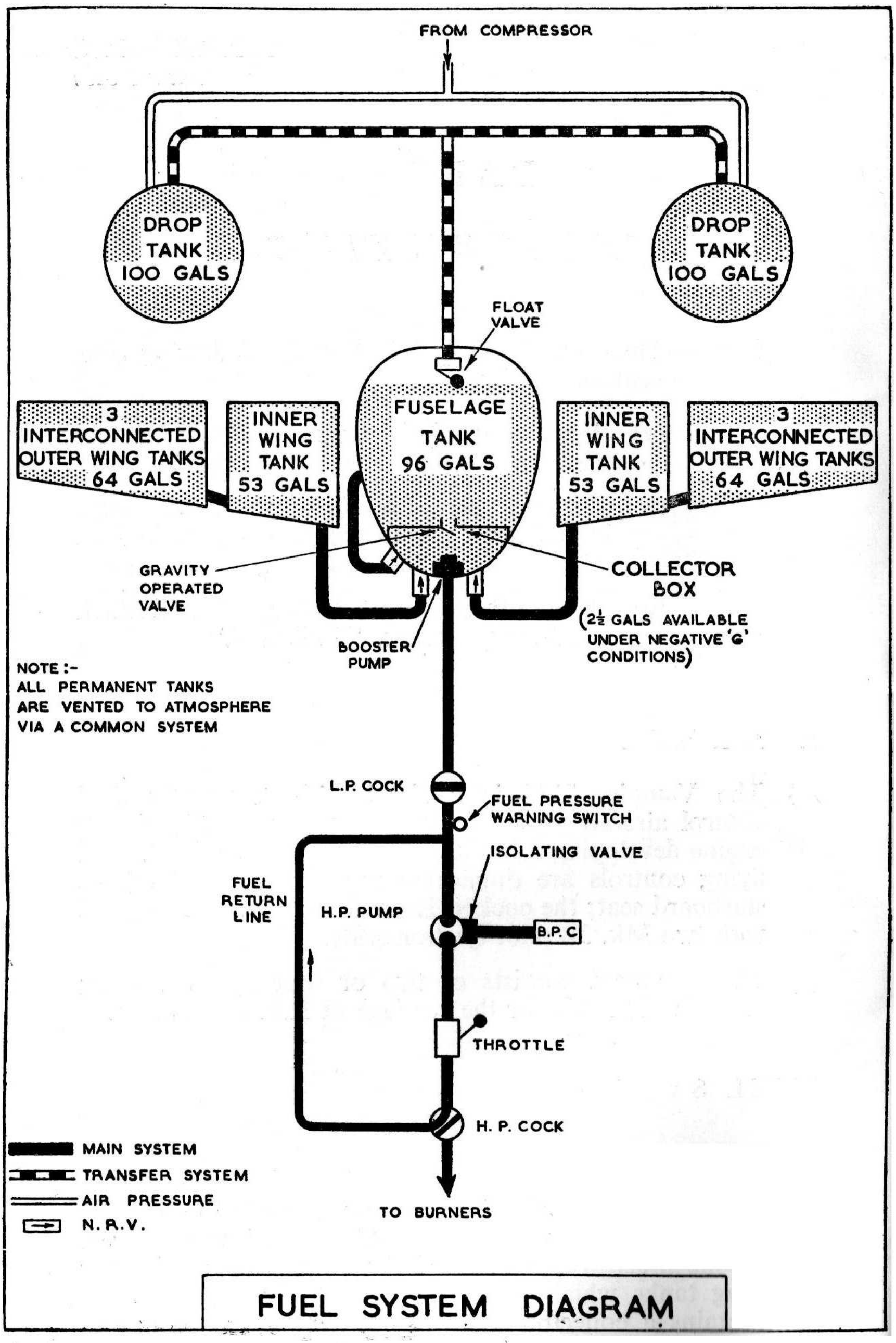
(a) The Vampire T 11 is a side-by-side two-seater dual control aircraft powered by a single Goblin 3 turbo-jet engine developing 3,200 lb. static thrust at sea level. All flying controls are duplicated for the occupant of the starboard seat; the cockpit is pressurised and is equipped with two Mk. 3B pilot-ejection seats.

(b) The armament consists of two or four 20 mm. guns; provision is made for the carriage of R.P. and bombs.

FUEL SYSTEM

2. Fuel tanks

(a) Fuel is carried in nine internal tanks, one in the fuselage and four in each wing. The tanks in each wing consist of one inner wing tank and three interconnected outer wing tanks which act as a group. The fuselage tank contains a collector box which should permit approxi-



FUEL SYSTEM DIAGRAM

mately 15 seconds flight under negative G conditions. Wing drop tanks may be carried and may be jettisoned by pulling back the WING TANKS JETTISON lever positioned between the seats.

(b) The total internal fuel carried is 330 gallons made up as follows:—

	Gallons	*lb. AVTAG (7·7 lb./gall.)*
Fuselage tanks	96	739
Inner wing tanks 2 × 53 gall. ..	106	816
Outer wing groups 2 × 64 gall. ..	128	985
Total (internal) ..	330	2,540
Wing drop tanks 2 × 100 gall. ..	200	1,540
Total (all tanks) ..	530	4,080

3. Fuel contents gauge

A single electrical fuel contents gauge (18) calibrated in pounds registers the combined fuel contents of all internal tanks when the Ground/Flight switch is at Flight, and is mounted centrally on the instrument panel. When SRIM 2284 is embodied the gauge is moved to the port instrument panel. There is no fuel gauge for the drop tanks; the main gauge will begin to show a drop in fuel level when the drop tanks have emptied.

4. Fuel asymmetry gauge

Mod. 3598 introduces a fuel asymmetry gauge, having three indicator needles. The two upper needles indicate the port and starboard wing fuel contents and the bottom needle indicates fuel asymmetry. This asymmetry needle moves over a central green sector, for " safe-to-spin " conditions, with red sectors on either side of the green indicating the " unsafe-to-spin " condition. The needle moves in the direction of the heavy wing. When the needle is in the green sector the fuel asymmetry does not exceed 30 gallons (230 lb.) maximum.

NOTE - Mods 3598 & 9 now cancelled.

5. **Fuel transfer system**

Fuel from the internal wing tanks is fed by gravity to the fuselage tank collector box. Fuel from the drop tanks is transferred to the fuselage tank by air pressure from the engine. The transfer commences when about 120 pounds have been used from the fuselage tank, the rate of transfer being controlled by a float-operated valve near the top of the tank.

6. **Fuel system**

(a) An electrically-driven booster pump, in the fuselage tank collector box, delivers fuel through the L.P. cock and filter to a single engine-driven H.P. pump. The booster pump is controlled by a switch (49) below the turn and slip indicator. A red light below the selector dimmer control (17) comes on when the pump is switched off or when pressure from the pump is below a satisfactory minimum.

(b) From the H.P. pump fuel is delivered through the throttle and H.P. cock to the engine.

7. **L.P. fuel cock**

The low pressure fuel cock is controlled by a lever (17) marked FUEL OFF ~~(aft)~~ DOWN FUEL ON ~~(forward)~~ UP situated under the engine controls box on the cockpit port wall. On no account should this control be used to stop the engine except in an emergency.

ENGINE CONTROLS

8. **Goblin Mk. 3 engine**

(a) *General*

The engine is a centrifugal gas turbine developing 3,200 lb. static thrust at sea level. The main engine systems include:—

An electric starting system (see para. 11).
Relighting facilities (see para. 12).
A high-pressured fuel system monitored by a barometric pressure control.
Self-contained oil system.

(b) *Oil system*

Oil is carried in the engine sump, the oil capacity of which is 10 pints. One pressure pump maintains a continuous circulation through a filter to the engine and aircraft accessories and to ~~three~~ TWO metering pumps which supply oil to the front and rear bearings ~~and the governor.~~ A/C

9. **Throttle control**

(a) The throttle levers (5) move in quadrants marked SHUT-THROTTLE-OPEN one on each pilot's engine control box.

(b) A jet pipe temperature gauge and an r.p.m. indicator are mounted on the left of the instrument panel.

10. **H.P. fuel cock**

The high pressure fuel cock is controlled by a lever (3) marked OPEN (forward)—SHUT (aft) situated inboard of the port throttle lever. This lever should always be used to stop the engine.

11. **Engine starting system**

(a) The engine is started by an electric motor which rotates the engine to the required light-up and self-sustaining speed. The circuit for the electric current supply is controlled by the interlinked starter and master switches (32) at the lower centre of the instrument panel and the starter circuit-breaker. The starting sequence is controlled entirely by a clockwork time switch.

(b) The time switch is fully wound initially by pressing the starter button for about two seconds. When the button is released, current is supplied to the starter motor. After 4 to 7 seconds, during which time the engine is rotated slowly, the starter motor accelerates the engine to a suitable r.p.m. (700–900) for light-up. At this speed the igniter plugs light up the fuel and the starter motor further assists the engine in acceleration.

(c) After a total period of 30–40 seconds the time switch cuts off the starting circuit and the engine accelerates under its own power to idling r.p.m. 3,000 ± 200.

12. Engine relighting system

A pushbutton (4) is incorporated in the end of the H.P. cock lever. It should be pressed to energise the igniter plugs when relighting in flight. It may also be used as an audible check that the H.E. ignition is functioning. The relight system will operate irrespective of the engine starter master switch.

13. H.P. pump isolating valve

(a) The output of the H.P. pump is monitored by the B.P.C. through the pump servo system. A solenoid-operated isolating valve is fitted to enable the pump to be isolated from the servo system. When the FUEL PUMP ISOLATING SWITCH (48) adjacent to the booster pump switch is on, the valve isolates the H.P. pump from the servo system and the pump then moves to full stroke and is controlled only by the pump overspeed governor and by the throttle position.

(b) The isolating valve is primarily intended as a means of restoring power in flight if failure of the servo system causes a sudden drop in engine r.p.m. It may also be used as a safeguard against failure of the system during take-off, if desired. It must be switched OFF as soon as a safe height is reached, otherwise overfuelling will occur, resulting in rising j.p.t. and increasing r.p.m. as height is gained.

NOTE.—If failure of the servo system occurs whilst isolated there is a probability of fuel starvation leading to flame-out when the switch is returned to OFF.

14. Engine fire-extinguisher

(a) The combined fire-extinguisher pushbutton (29) and engine FIRE warning light is on the right of the upper panel above the flap position indicator. When Mod. 3471 is incorporated a second red light (28) is positioned

alongside the pushbutton. The presence of fire is indicated by either or both warning lights coming on, but more certainly by the latter. The fire-extinguisher cannot be operated unless electrical power is available. When Mod. 3524 is incorporated power is available direct from the aircraft battery. In unmodified aircraft the Ground/Flight switch must be in the Flight position at r.p.m. below generator cut-in speed. Above this cut-in speed the position of the Ground/Flight switch is immaterial.

(b) Fire warning indication is subject to three different modification states:

(i) *Mod.* 3238. Comprising 10 non-resetting flame detectors in the engine bay and 8 resetting detectors around the combustion chambers. If the fire warning light comes on and the throttle is then closed the warning light will remain on if a fire has occurred but will go out if a hot gas leakage is present. If a fire has occurred the warning light will remain on after the fire has been extinguished.

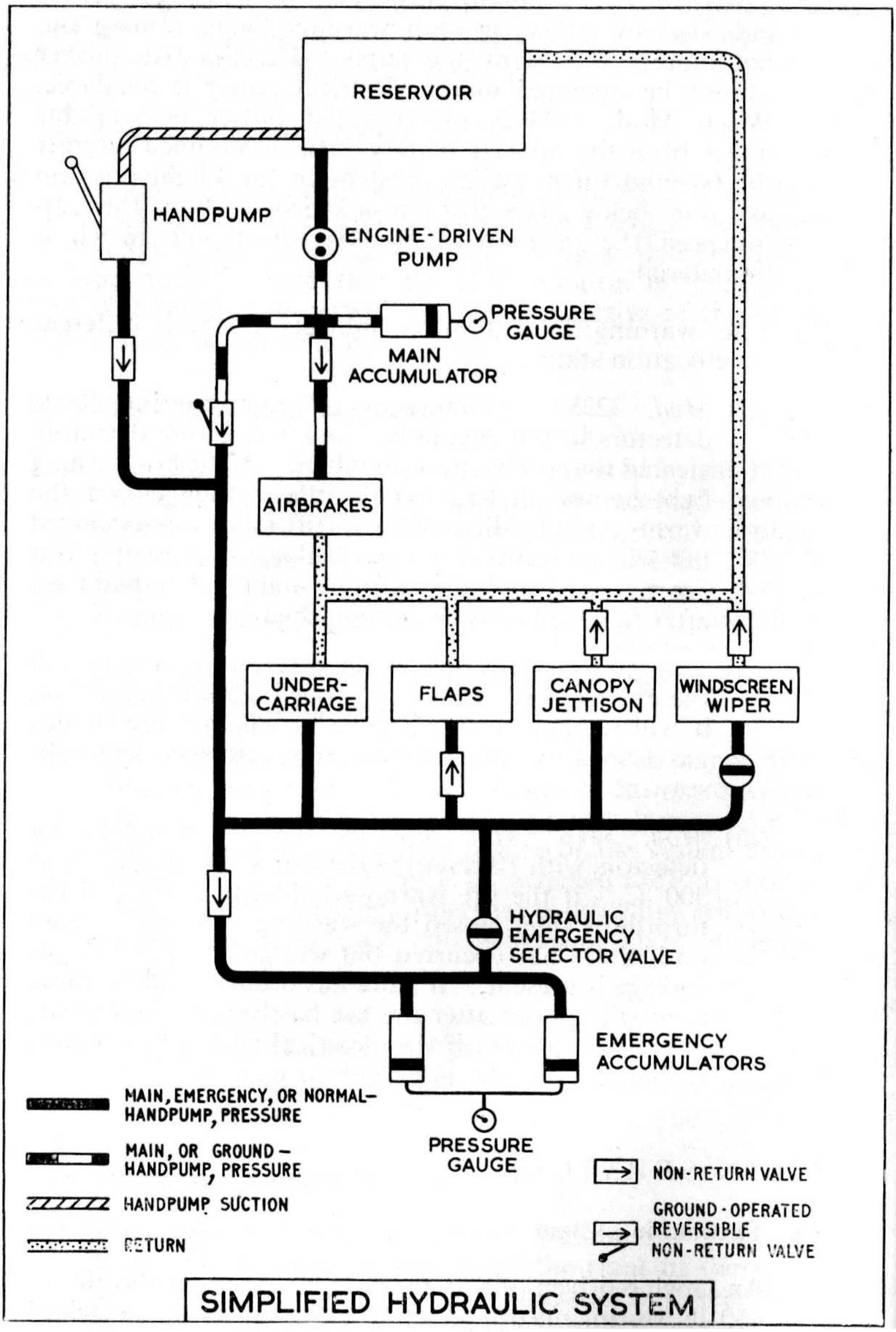
(ii) *Mod.* 3475. This deletes the 8 resetting detectors in the engine bay. If the fire warning light comes on, it will remain on irrespective of whether fire or hot gas leakage is present and irrespective of any subsequent action.

(iii) *Mod.* 3418. This replaces the 10 non-resetting detectors with 10 resetting detectors, set to operate at 300° C. If the fire warning light comes on and the throttle is then closed the warning light will remain on if a fire has occurred but will go out if a hot gas leakage is present. If a fire has occurred the warning light will go out after the fire has been extinguished; it will also go out if the electrical wiring has burned through.

MAIN SERVICES

15. Pneumatic system

An engine-driven air compressor charges a bottle to 450 lb./sq. in. maximum for the operation of the wheel



SIMPLIFIED HYDRAULIC SYSTEM

brakes, hood seal and hood raising mechanism. A standard triple pressure gauge (16) is on the left-hand side of the upper panel.

16. Hydraulic system

(a) An engine-driven pump supplies pressure in the hydraulic system for the operation of the:—

Undercarriage
Flaps and airbrakes
Hood jettisoning
Windscreen wiper

(b) (i) Pre-mod. 3627 an accumulator is fitted in the system to ensure rapid operation of the services. If the engine-driven pump fails, the accumulator may provide enough reserve of pressure to lower the undercarriage once; in addition sufficient pressure may also remain to operate the flaps. The pilot must be prepared to assist these selections as outlined in para. 24.

(ii) Post-mod. 3627, two additional accumulators are provided for the emergency operation of the undercarriage, flaps and hood jettison systems. The accumulators are isolated from these systems by a selector valve controlled by a yellow-and-black painted EMERGENCY HYDRAULICS lever between the pilots' seats. When the lever is pulled aft in the direction of the arrow the accumulators are in circuit. The airbrakes cannot be operated by the accumulators; the windscreen wiper can be operated, but its use thereby is not recommended.

(c) A handpump, located between the seats at shoulder height, is provided for ground test and for emergency operation of undercarriage, flaps and hood jettison systems. It may also be used to charge the mod. 3627 accumulators. The airbrakes cannot be operated in the air by the handpump. The maximum effect is produced only when the handpump is operated at full stroke. When not in use the handpump should be left in the up position.

17. Electrical system (24-volt)

(a) *D.C. supply*

(i) A single engine-driven generator supplies the whole of the electrical system and charges two 12-volt batteries connected in series.

(ii) A generator failure warning light is on the right of the instrument panel. The warning light indicates when the generator is not supplying power.

(iii) The Ground/Flight MASTER SWITCH (53) is below the centre of the instrument panel. It should be pulled out for Ground and pushed IN FOR FLIGHT. Two external sockets are fitted, one on each side of the fuselage. The socket midway along the starboard underside *is for ground starting only*. The socket on the port side of the fuselage nose is for ground test use. All electrical services (except automatic engine starting) can be connected to the ground battery when it is plugged into the port socket.

(iv) The Ground/Flight switch must be set in before electrical power is available to the starting system from an outside source.

(b) *A.C. supply*

(i) Two type 100A inverters are fitted. No. 1 inverter normally supplies the flight instruments and No. 2 acts as a standby to meet the case of failure of No. 1 inverter.

(ii) Below the port instrument panel are two circuit breakers, one for each inverter supply. A magnetic indicator (51) which shows black when No. 1 inverter is supplying power and white when change-over to No. 2 inverter occurs or when electrical supply is lacking, and a reset pushbutton (50) are on the starboard instrument panel. The flight instruments switch (33) is adjacent to the starter master switch.

(iii) When the FLIGHT INST switch is set ON before starting the engine, No. 2 inverter starts up and ~~erects~~ the artificial horizon and causes the Mark 4F

A2/1 SUPPLIES

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compass to function. The magnetic indicator remains white. Post F.T.C. Mod. 101 the indicator changes to black during start up. Pre F.T.C. Mod. 101, after start up, when engine r.p.m. are above generator cut-in speed, automatic change-over to No. 1 inverter occurs and the indicator changes to black.

(iv) During taxying, if engine r.p.m. are reduced below generator cut-out speed the inverters will auto-change to No. 2 and the indicator will show white. If this occurs engine r.p.m. should be increased and if necessary the reset pushbutton pressed to re-engage No. 1 inverter. With F.T.C. Mod. 101 fitted auto-change should not occur until well below engine idling r.p.m. In this case if the indicator reverts to white No. 1 inverter is unserviceable.

WARNING.—The reset pushbutton must not be used during flight when auto-change-over has occurred or incorrect operation of the magnetic indicator may result.

(v) After take-off, operation of the port undercarriage door lock micro-switch completes a circuit to a hold-in relay which ensures continuity of the inverters circuit should the FLIGHT INST switch subsequently be set inadvertently to OFF. This hold-in relay operates despite any subsequent undercarriage lowering. After flight either inverter may only be switched off by setting the Ground/Flight switch to the Ground position.

18. **Oxygen system**

(a) The oxygen supply is contained in four interconnected cylinders. The regulator (12) at the port side of the instrument panel controls the flow to the port economiser and to the starboard regulator (44). The economisers are fitted behind the ~~starboard~~ PORT seat. Adjacent to the bottles is fitted a charging valve, access to which is gained through the fuselage nose panel.

(b) Mod. 3432 introduces an automatic line valve, incorporating an ON/OFF lever (2), between the supply cylinders and the regulator, the on/off cock of which is locked fully on. Below 8,000 feet the line valve lever may be used as a master control and oxygen is only supplied with the lever ON. At 8,000 feet the lever, if OFF, moves automatically to ON and cannot be turned OFF again until height is reduced below 8,000 feet.

AIRCRAFT CONTROLS

19. Flying controls

The flying controls are conventional. Each control column handgrip incorporates a brake lever, gun firing switch, bomb/R.P. release switch and camera operating switch. The rudder pedals are adjustable for leg reach by lifting them from one slot to another.

20. Flying controls locking gear

The flying controls locking gear consists of a "Y" shaped fitting, which connects the rudder pedals and control column, and a quick release pin which prevents the upper portion of the stick from moving, thereby locking the ailerons.

21. Trimming tab controls

(a) The elevator trimming tab control wheel (8) is positioned on the side of each engine control box. An indicator (19) is fitted at the top left-hand side of the instrument panel.

(b) No pilot-operated controls are fitted for aileron and rudder trim, but a ground adjustable tab is fitted on each aileron and each rudder.

22. Undercarriage control and position indicator

(a) The selector lever (11) on the left of the cockpit extends from the rear of the engine control box. The selector lever (65) on the right is mounted in a quadrant on the starboard wall. Each lever has two positions, UP and DOWN and being mechanically interconnected, either may be used to operate the undercarriage. When the weight of the aircraft is on the wheels, the port selector lever is locked in the DOWN position by a solenoid operated plunger.

(b) A standard position indicator (24) is above the centre of the instrument panel. An undercarriage WARNING light (22) is below the indicator and comes on if any of the wheels is locked up and the throttle is less than a third open.

23. Flaps control and position indicator

(a) The selector lever (10) on the left of the cockpit extends from the rear of the engine control box. The selector lever (62) on the right is in the quadrant on the starboard wall. Each lever has three positions, UP-NEUTRAL-DOWN and either may be used to operate the flaps.

(b) Any flap setting up to 80° can be obtained by returning the selector lever to neutral when the desired setting has been reached. The selector should normally be left in the up or down position when the flaps are fully up or fully down.

(c) The flap position indicator (30) is fitted above the rate of climb indicator.

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24. Undercarriage and flaps emergency operation

(a) As soon as hydraulic failure is suspected ensure that the flap selector lever is at neutral and the windscreen wiper selector is at OFF to avoid unnecessary dumping of fluid via the flap or windscreen wiper pipelines.

(b) If the engine-driven pump fails, and Mod. 3627 is not embodied the handpump between the seats can be used to operate the undercarriage, flaps and windscreen wiper after selecting the desired service by the normal selector lever. Up to 115 strokes of the hydraulic handpump may be necessary to lower the undercarriage fully.

(c) If Mod. 3627 is embodied select the desired service and, if the main accumulator has insufficient pressure, move the EMERGENCY HYDRAULICS lever fully aft.

(d) If it is required in an emergency to retract the undercarriage, when on the ground, the solenoid-operated plunger which retains the undercarriage operating lever in the DOWN position can be overridden by setting either of the two U/C OVERRIDE guarded switches (15), (54) to ON. Undercarriage UP may then be selected.

25. Airbrakes control

(a) Two positions only—ON and OFF—can be selected by the lever (9) which is duplicated at the port and starboard engine control boxes.

(b) The airbrakes cannot be operated by the hydraulic handpump in flight.

26. **Wheelbrakes control**

The wheelbrakes are controlled by the lever on each control column handgrip. To lock the brakes in the on position, either lever can be pressed and the parking catch engaged.

GENERAL EQUIPMENT AND CONTROLS

27. **Hood operation**

(a) The hood may be locked from the inside by pulling back the internal locking handle and then engaging the catch. The safe position of the catch is indicated by a red line on the hood member. When the catch is fully engaged the hood seal cock is operated to inflate the hood seal.

(b) The hood is opened from the inside by disengaging the locking catch, pushing the locking handle fully forward and then pressing the shielded pushbutton (14) on the left of the instrument panel to raise the hood pneumatically. The hood support strut is held open by a spring-loaded handle which must first be pulled before closing the hood again.

(c) The hood is opened from outside by lifting and then turning through 90° the flush fitting external handle, housed at the aft end of the hood. A press-to-release button must first be pressed before the lever can be raised. Turning the lever may require some force.

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28. **Hood jettisoning**

(a) When the handle (56) above the Ground/Flight switch is pulled a hydraulic selector valve is operated to actuate a hydraulic jack. The jack releases the hood support strut, the latches and the hinges. The front of the hood should then spring up under the action of the pneumatic hatch lifting strut when it will be blown clear of the aircraft.

(b) A certain minimum hydraulic pressure is required to actuate the jack and if normal pressure is not available

and Mod. 3627 is not embodied the jack may be operated by the handpump.

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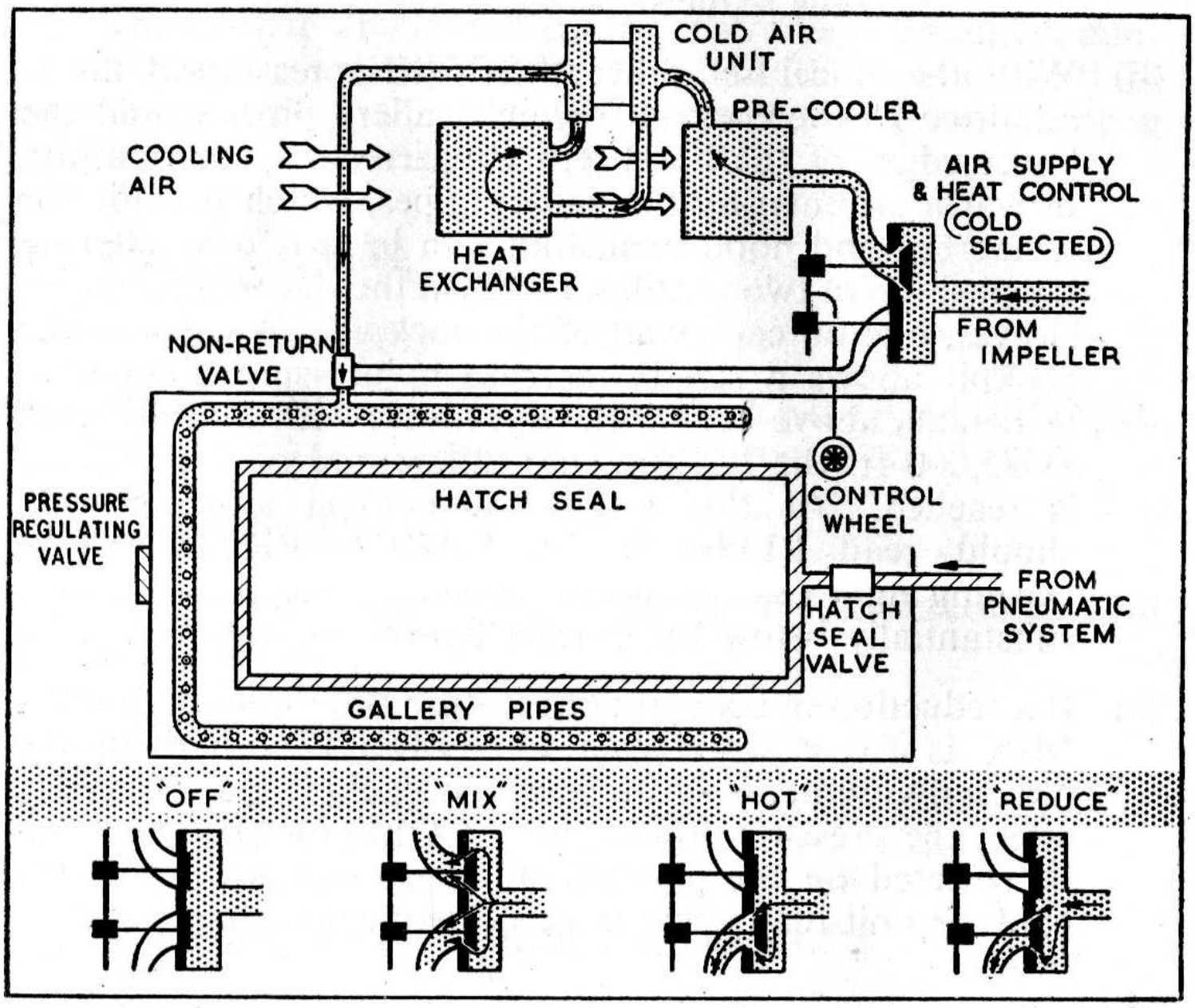
(c) If Mod. 3627 is embodied, pull the jettison handle and, if necessary move the EMERGENCY HYDRAULICS lever aft.

29. Cockpit pressurising, heating and ventilation



COCKPIT PRESSURIZATION AND HEATING

(a) The pressurisation heating and ventilation system is controlled by a wheel (1) on the port wall which alters the settings of two valves, one admitting hot air and one cold air. The hot air is obtained direct from the engine impeller. The cold air supply is from the same source, but is first passed through a cold air unit in the port wing. The settings of the wheel are as follows:—

OFF	Both valves shut, no pressurisation.
COLD	Hot air valve shut, cold air valve fully open.
MIX	Both valves partially open. As the wheel is

moved towards HOT the hot air valve opens further and the cold air valve closes.

HOT — Cold air valve shut, hot air valve fully open.

REDUCE — Cold air valve shut, hot air valve partially open. The temperature of the incoming air remains the same, but since its volume is reduced the overall cockpit temperature is thus reduced.

(b) With the wheel set other than OFF pressurised air is admitted to the cockpit through gallery pipes round the lower edges of the hood and windscreen. The quantity of warm air entering the gallery pipes, which provide for windcreen and hood demisting, can be varied by altering the position of two ventilators (63) in the shape of rotatable sleeves, one on each wall of the cockpit. A valve in the cockpit allows a steady increase in pressure differential at heights above 12,000 ft., increasing with altitude until at 35,000 ft. the full pressure differential of 3 lb./sq. in. is reached. At this height the cockpit altimeter (25) should read 21,000 ft. A CABIN PRESS LOW warning light (26) comes on whenever the pressure falls substantially below the correct figure.

(c) If a reduction of cockpit temperature is desired at altitude, MIX is to be preferred to REDUCE otherwise the reduced volume of air entering the cockpit may adversely affect the pressure differential. COLD or MIX *must not* be selected on the ground otherwise overheating of the cold air unit may occur with subsequent damage.

30. **Windscreen de-icing, windscreen wiper and d/v. panels**

(a) The W'SCREEN DE-ICER PUMP control (55) is above the Ground/Flight switch. The handle is turned anti-clockwise to unlock and pushed in to raise pressure. As the handle returns to the out position, the windscreen is sprayed.

(b) Two d/v panels are fitted, one on each side of the main windscreen. Each is locked shut by a sliding bolt. AND SCREW CHAMP

(c) The hydraulically-operated windscreen wiper for the port windscreen is controlled by an ON-OFF-PARK knob (13) below the port instrument panel.

31. **Cockpit lighting**

(a) *U/v and red lamps*

These are controlled by three on/off dimmer switches on the extreme left of the instrument panel.

(b) *Emergency lamp*

This, fitted above the centre instrument panel, is controlled by the EMERGENCY LIGHT switch (37) in the centre of the instrument panel and powered by a separate 2·4v. alkaline battery.

32. **External lighting**

(a) *Identification lights*

The DOWN IDENT lights STEADY-OFF-SIGNAL switch (35) is adjacent to the emergency lamp switch.

(b) *Navigation lights*

The on/off switch (46) is below the generator failure warning light.

(c) *Landing lamp*

The landing lamp switch (38) is on the starboard side of the instrument panel.

33. **Electrically-operated flight instruments**

(a) The Mk. 4F compass and artificial horizon are operated by A.C. electrical power (see para. 17 (b)).

(b) *Turn and slip indicator*

The turn and slip indicator is available whenever D.C. electrical power is available. When no power is available, the word OFF appears in a window in the dial of the instrument.

34 **E2 compass**

This is positioned above the centre of the instrument panel.

35. **Pitot head heater**

The pitot head heater switch (47) is adjacent to the navigation lights switch.

36. **Emergency equipment**

(a) *First aid kit*

This is on the aft portion of the hood behind the port seat.

(b) *Crowbar*

This is on the starboard wall.

(c) *Hand fire-extinguisher*

A hand fire-extinguisher (61) is on the cockpit floor, starboard side, forward.

EJECTION SEATS MK. 3B

37. **General**

(a) Two Mk. 3B pilot ejection seats are fitted, each incorporating a type ZF or ZH harness, headrest, parachute container for the Mk. 9 or Mk. 19 parachute, a seat well for the dinghy and emergency oxygen supply and leg restraining straps.

(b) At the rear of each seat is the 50 ft./sec. ejection gun and a drogue gun. Stowages for the seat safety pins are on either side of each seat.

(c) When Martin Baker Mods. 293, 387 and 491 are all embodied a G-stop is incorporated to prevent the opening of the main parachute if the speed of the seat after ejection is too high for safe deployment. The switch prevents the operation of the barostatic time delay unit until the speed of the seat has fallen to a safe figure.

(d) Irrespective of the Mod. state, the seat can be used at 200 feet and above provided that the aircraft's flight path is parallel to the ground. If the aircraft is descending or nose-down, more than that minimum altitude will be required.

EJECTION SEAT MK.3B

38. **Seat adjustment handle and lean-forward release**

The seat height may be adjusted by the handle on the starboard side of the seat. The harness lean-forward release is to the rear of this lever.

39. **Manual override D-ring**

The manual override D-ring is fitted over the rip-cord D-ring. If manual separation from the seat is necessary the override D-ring should be pulled to its fullest extent. The parachute is then disconnected from the automatic opening line and the protective canvas flap over the rip-cord D-ring is removed.

40. **Ripcord D-ring**

This is normally covered by a canvas flap retained in position by two press studs and is removed by the action of pulling the manual override D-ring. It is provided for manual opening of the parachute should either the seat fail to eject or automatic opening of the parachute fail after ejection.

41. **Leg restraining straps and adjusting controls**

(a) The straps ensure that the occupants' legs are drawn back automatically and restrained close to the seat pan during ejection, thus providing clearance and preventing the legs being blown apart after ejection. The straps pass through snubbing units, at the front of the seat pan, which allow the straps to pass freely down through the unit but prevent them passing upwards. An adjusting button under each snubbing unit, when pressed, allows the occupant to adjust the cords to give comfortable leg movement in the aircraft.

(b) After ejection the legs are held in position until the occupant is separated from the seat. The restraining straps are then pulled through the leg restraint garter D-rings to free the legs.

42. **Normal operation of the seat**

(a) When either firing handle is operated the seat is ejected and the drogue gun fired half a second later.

(b) All leads incorporate quick releases which are automatically broken on ejection.

(c) As the seat is ejected a static line readies the barostatic time-delay mechanism. When the free descent reaches 10,000 ft. or at once if ejection has taken place below that height and provided that the G-stop has not operated, the barostat removes an obstruction from the gear train of the mechanism allowing it to operate.

(d) After three seconds (1¼ with G-stop fitted) the seat harness is released, the seat-stabilising drogues are freed and by a connecting lifting line the face screen is disconnected and the parachute deployed. The occupant is momentarily prevented from leaving the seat by two restraining straps until deployment of the parachute lifts him clear of the seat.

OPERATIONAL CONTROLS

43. **Radar controls**

(a) *Rebecca* 8

The control panel (39) is below the starboard gunsight and the indicator is below the port gunsight. When SRIM 2284 is embodied the indicator is moved to the position formerly occupied by the j.p.t. gauge.

(b) *I.F.F. controls*

The MANUAL ON/OFF and G/D switches (64) together with the central AUTO pushbutton are on the starboard wall.

44. **Radio controls**

The TR. ~~1934/1935~~ control unit (57) and changeover switch (52) is below the instrument panel. A mic./tel. socket is attached to each seat and a press-to-transmit switch (6) is in the end of each throttle lever twist-grip. The R/T muting switch (58) is below. THE ALTIMETER. R/T

45. **Gyro gunsights Mk. 5**

The GGS master retracting switches (23) (31) are on the inboard sides of the mountings. The selector dimmer

(17) and GUNS/RP selector switches (59) (60) are on the port side of the instrument panel and the electrically-operated ranging control is incorporated in the throttle twist-grip. Circuit breakers (41) are provided on the instrument panel. A changeover switch (42) for the ranging control is on the starboard side of the instrument panel.

46. **G.G.S. emergency lowering**

Should either gunsight fail to lower by the normal method, emergency lowering may be effected by striking the knob (21) (36) adjacent to the gunsight, a hard blow.

47. **G.45 camera**

(a) The cine-camera automatically operates during both R.P. and gun firing when the camera master switch (at 40) is ON. An aperture switch (at 40) is positioned on the right-hand side of the instrument panel.

(b) The test switch (43) is below the G.G.S. circuit breakers.

48. **Gun firing**

(a) Gun firing controls are located on each control column and consist of a firing switch and a safety switch. Both safety switches must be at FIRE before either firing switch will fire the guns. When the catch is at SAFE and the camera master switch on the upper panel is ON, the cine-camera can be operated by pressing the port button on either control column.

(b) A micro switch in the nose-wheel well isolates the firing circuits when the nose-wheel is down and locked. For added safety, when the guns are loaded, the electrical leads to the gun firing units should be left unconnected until just before flight.

49. **R.P. firing and bomb release**

(a) A BOMBS/R.P. master selector switch (45) is on the starboard panel together with a PAIRS-SALVO switch. A firing push switch is on each control column.

(b) The bomb selector and fusing switches are also on the starboard panel. Bomb release is by the same push switch as for R.P. firing; the master switch in this case must be set to BOMBS.

(c) A safety break is provided in each main wheel well for the R.P. circuits.