

PART I DESCRIPTIVE

- NOTE.—(a) Words in capital letters indicate markings on the controls concerned.
- (b) The numbers quoted in brackets after items in the text refer to the illustrations in Part VI.
- (c) Unless otherwise stated, all airspeeds and mach numbers quoted are "Indicated."

Introduction

- (a) The Vampire FB5 or FB9 is a single-seat jet-propelled fighter-bomber or ground-attack fighter, powered by a Goblin Mk. 2 engine developing 3,100 lb. static thrust at sea level. The cockpit is pressurized.
- (b) Four 20 mm. guns are carried within the fuselage; provision is made for the carriage and release of RP's and/or bombs.
- (c) The FB9 differs from the FB5 mainly in the method of cockpit pressurization.

FUEL AND OIL SYSTEMS

1. Fuel tanks

- (a) There are nine internal self-sealing tanks, one in the fuselage and four in each wing. In addition, a drop tank

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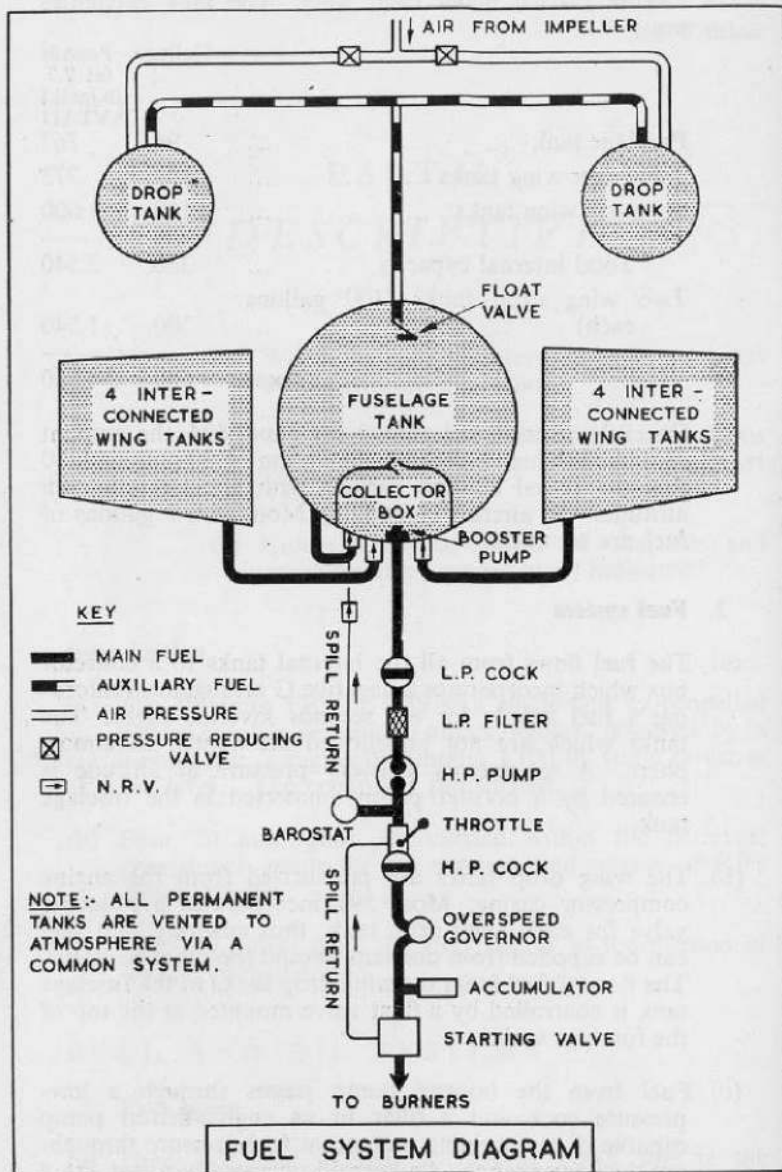
can be carried under each wing. The tank capacities are:—

	Gallons	Pounds (at 7.7 lb./gall.) AVTAG
Fuselage tank	96	767
Two inner wing tanks	104	773
Six outer wing tanks	130	1,000
Total internal capacity	330	2,540
Two wing drop tanks (100 gallons each)	200	1,540
Total	530	4,080

- (b) On early aircraft, not embodying Mod. 694, the amount of unusable fuel is up to a maximum of 30 gallons (230 lb.), the actual amount varying with aircraft tail-down attitude. On aircraft embodying Mod. 694, 5 gallons of fuel are unusable.

2. Fuel system

- (a) The fuel flows from all the internal tanks to a collector box which incorporates a negative G arrangement affording a fuel supply for ten seconds inverted flight. The tanks which are not pressurized are vented to atmosphere. A satisfactory delivery pressure at altitude is ensured by a booster pump, immersed in the fuselage tank.
- (b) The wing drop tanks are pressurized from the engine compressor casing; Mod. 591 incorporates a reducing valve for each wing drop tank, thus ensuring that fuel can be supplied from one tank should the other be holed. The flow of fuel from the wing drop tanks to the fuselage tank is controlled by a float valve mounted at the top of the fuselage tank.
- (c) Fuel from the booster pump passes through a low-pressure cock and a filter to an engine-driven pump capable of maintaining a constant fuel pressure throughout the power range. An aneroid-operated barostat, fitted



to the delivery line of this pump, controls the fuel supply by returning surplus fuel to the collector box as height is gained; the engine r.p.m. therefore remain substantially constant at any selected throttle opening. From the engine-driven pump, fuel passes to the throttle (fuel control valve) and the high-pressure cock. A minimum pressure valve ensures that, regardless of the throttle setting, sufficient pressure will be maintained at the burner ring to prevent flame extinction at altitude. Maximum pressure at the burner ring is controlled by an overspeed governor. From the overspeed governor, fuel passes to the starter valve, and the line is tapped to supply an accumulator. The purpose of the accumulator is to provide a fixed quantity of fuel at a known pressure at the moment of starting. A dump valve drains any fuel present in the system before the pressure builds up on starting. When stopping the engine, it prevents free fuel from draining into the combustion chambers after the pressure has fallen.

3. Fuel cocks

The low pressure fuel cock is controlled by a lever (20) mounted under the engine control box on the cockpit port wall. It has two positions marked FUEL OFF (down and back) and FUEL ON (forward and up). The high pressure fuel cock is controlled by a lever (11) mounted outboard of the throttle lever; when in the forward position it is held by a spring catch. There are no separate fuel cocks for the wing drop tanks.

4. Fuel booster pump and pressure warning light

- (a) The booster pump is controlled by an on-off switch (54) on the electrical panel.
- (b) A fuel pressure warning light (27) is above the left-hand side of the instrument panel. This light will come on when the booster pump ceases to deliver fuel; normally when the booster pump is switched ON, the warning light should go out. The light will be on at all times when the booster pump is switched off.

5. Fuel contents gauges

- (a) A single pacitor-type gauge (40), below the instrument panel, shows the total contents of all internal tanks whenever electrical power is available. At a later date the gauge will be replaced by one reading the contents in pounds; such gauges give a more accurate indication of available fuel, since they are not affected to any great extent by changes in fuel density.
- (b) On early Mk. 5 aircraft, five electrically-operated desynn-type contents gauges may be fitted which individually record the contents of the inner wing, outer wing and fuselage tanks as indicated on the dials of the instruments.

6. Oil system

- (a) There is no oil tank, but the engine has a sump which contains about 1½ gallons of oil for lubricating the engine-driven accessories and the impeller bearings.
- (b) The oil temperature gauge (24) is fitted on the left-hand side of the instrument panel. An oil pressure gauge is fitted on early aircraft only.

ENGINE CONTROLS

7. Throttle control

The throttle control lever which moves in a quadrant marked SHUT-THROTTLE-OPEN, extends from the engine control box. The throttle damper (12) is on the side of the engine control box.

8. Engine starting system

- (a) The electrical starter motor is controlled by an automatic system operated by the engine starting pushbutton (49) and interlinked starter and master switches (51) on the electrical panel. This pushbutton, which should be pressed for about two seconds and then released, sets in motion the timing switch which automatically operates

the starting sequence, giving first a turning period sufficient for the attainment of the correct r.p.m. for the "light up" and then a further period to accelerate the engine to idling r.p.m. before the starter motor is cut out.

- (b) An auxiliary starting switch (48) is fitted forward of the master and starter switches. It should be switched ON as soon as the burners light up to cause a third relay to function, allowing full current for the starter motor, thus assisting the engine to attain idling r.p.m. It should be switched off as soon as idling r.p.m. have been attained.
- (c) A booster coil pushbutton (10) on the cockpit left-hand coaming is for testing the ignition equipment.
- (d) When high energy ignition equipment is fitted, the booster coil test button is superseded by a rotary clockwork time switch. This switch, marked IGNITION ON-OFF, is fitted in the place formerly occupied by the oil pressure gauge. When the switch is rotated clockwise from OFF to ON, current is supplied to the h.e. ignition units for about 20 seconds, by which time the switch has returned to OFF. The switch is used for relighting in flight and for ground testing.

9. Engine instruments

A jet pipe temperature gauge (25), an r.p.m. indicator and an oil temperature gauge (24) are mounted on the left-hand side of the instrument panel. In addition some aircraft have a rear-bearing temperature gauge and an oil pressure gauge.

10. Engine fire-extinguisher and warning light**(a) Fire warning**

A warning light (34) is situated below the GGS selector dimmer. Four fusible-type flame detectors are mounted around the engine. If a fire occurs, the switches give a permanent indication irrespective of whether the fire is subsequently extinguished, or not.

(b) *Extinguisher operation*

The extinguisher bottle, in the port wing root, may be operated, providing electrical power is available, by pressing the pushbutton (47) on the electrical panel on the starboard shelf. Above generator cut-in speed electrical power is available from the generator irrespective of the position of the GROUND/FLIGHT switch. Below generator cut-in speed the GROUND/FLIGHT switch must be at FLIGHT. When Mod. 3522 is incorporated the fire extinguishers can be operated irrespective of the position of the GROUND/FLIGHT switch.

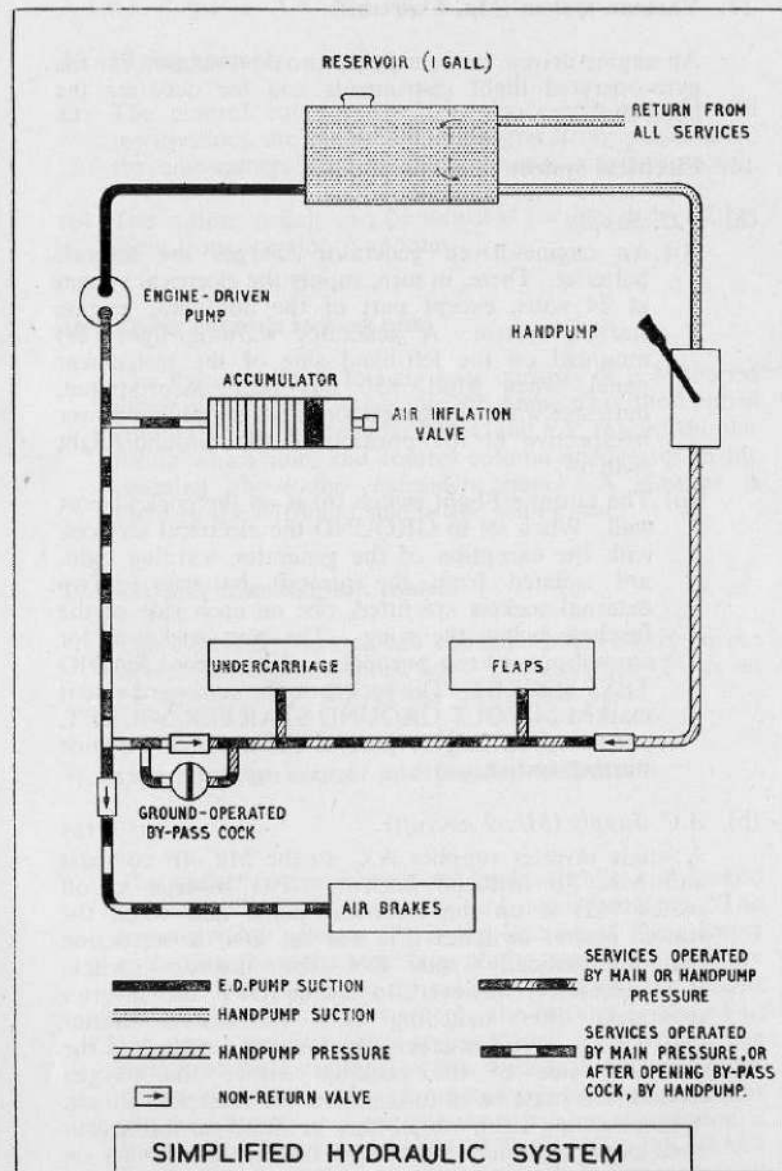
MAIN SERVICES

11. Hydraulic system

- (a) An engine-driven pump supplies fluid at a pressure of 2,500 lb./sq. in. for the operation of the undercarriage, flaps and airbrakes. Incorporated in the circuit is an accumulator which is charged initially on the ground with air to a pressure of 1,250 lb./sq. in. It provides a reserve of hydraulic pressure in an emergency for one one-way operation of the undercarriage and flaps or airbrakes.
- (b) A handpump (22), on the left of the pilot's seat, can be used to provide sufficient pressure in an emergency for the operation of the flaps and undercarriage after first selecting the service required by the normal selector lever. The handpump will not operate the airbrakes in flight, but on the ground may be used to test the circuit after first opening a manually-operated non-return valve in the delivery line from the handpump.

12. Pneumatic system

An engine-driven compressor charges a bottle for the operation of the wheelbrakes. The triple pressure gauge (46) on the right-hand side of the instrument panel, shows the available pneumatic pressure; when fully charged this should be 450 lb./sq. in. The maximum pressure at each brake should be 150 lb./sq. in.



13. Vacuum system (Mk. 5 aircraft)

An engine-driven vacuum pump provides suction for the gyro-operated flight instruments and for deflating the hood seal.

14. Electrical system

(a) D.C. Supply

(i) An engine-driven generator charges the aircraft batteries. These, in turn, supply the electrical system at 24 volts, except part of the automatic engine starting system. A generator warning light (28) mounted on the left-hand side of the instrument panel, when Mod. 850 has been incorporated, indicates when the generator is not supplying power irrespective of the position of the Ground/Flight switch.

(ii) The Ground/Flight switch (6) is on the cockpit port wall. When set to GROUND the electrical services, with the exception of the generator warning light, are isolated from the aircraft batteries. Two external sockets are fitted, one on each side of the fuselage below the wing. The port socket is for normal ground test purposes and is marked RADIO TEST SOCKET. The socket on the starboard side is marked 24 VOLT GROUND STARTER SOCKET, and is wired only to part of the automatic engine starting system.

(b) A.C. Supply (Mk. 9 aircraft)

A single inverter supplies A.C. to the Mk. 4F compass and Mk. 3B artificial horizon. The inverter on/off switch (52) is on the electrical panel and when the starter master switches (51) are set ON, a restriction bar automatically sets ON the inverter switch. It is necessary, however, to switch OFF the inverter separately after switching OFF the starter master switches. A circuit breaker, fitted at the rear end of the starboard side of the cockpit above the oxygen economiser, must be in to complete the electrical circuit. A red warning light, which may be fitted on the instrument panel adjacent to the flight instruments, comes on if inverter failure occurs.

AIRCRAFT CONTROLS

15. Flying controls

- (a) The control column is of the spade-grip pattern and incorporates the brake lever, the gun firing pushbutton, the cine-camera control and a press-to-transmit switch.
- (b) The rudder pedals can be adjusted for length by lifting them from one slot to another.

16. Flying controls locking gear

The flying controls locking gear consists of a V-shaped fitting which joins a peg on the floor, near the control column, to the port rudder pedal, and a V-shaped tubular fitting which joins the control column spade-grip to the coaming above the instrument panel. A stowage is fitted to the left-hand side of the pilot's seat.

17. Elevator trimming tab control

The elevator trimming tab control wheel (19) is on the side of the engine control box. The indicator (29) is on the top left-hand side of the instrument panel.

18. Undercarriage control and position indicator

(a) Control

The undercarriage is operated hydraulically and locked mechanically in both the up and down positions. The undercarriage selector (2) is the longest of three levers extending from the rear face of the engine control box and has two positions, up and down. When the weight of the aircraft is on the wheels, the selector is locked in the down position by a spring-loaded lock. When the weight of the aircraft is off the wheels, this lock is withdrawn electrically. In an emergency, the undercarriage can be selected up when the aircraft is on the ground if the switch (5) marked U/C EMERGENCY RETRACTION, fitted on the cockpit port wall, is first operated.

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(b) Position indicator

A standard undercarriage position indicator (13) is on the bottom left-hand side of the instrument panel. An additional red light, positioned above the top centre of the instrument panel, on the right of the elevator trim indicator, comes on if a wheel is not locked down and the throttle is less than a quarter open.

19. Flap control and position indicator

- (a) Operation of the flaps is controlled by the selector lever (1) next to the undercarriage selector lever. It has three positions, up, neutral, and down, and any angle up to 80° can be obtained by returning the selector lever to neutral when the desired setting has been reached. Normally the selector should be left in the down position when the flaps are fully down, and in the up position when the flaps are fully up.
- (b) A flap position indicator (14) is fitted next to the undercarriage position indicator. The marking at 30° is the take-off position. The marking at 40° has no special significance.

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20. Undercarriage and flaps emergency operation

- (a) If the hydraulic pump fails and accumulator pressure is exhausted, the handpump to the left of the seat can be used to operate the undercarriage and flaps. Possible dumping of hydraulic fluid can be prevented by setting the flap selector to neutral immediately hydraulic failure is suspected.

NOTE.—Up to 115 strokes of the hydraulic handpump may be necessary to lock the undercarriage down.

- (b) In an emergency the undercarriage can be retracted when the aircraft is on the ground. The undercarriage emergency retraction switch (5) must first be switched ON (back) before the undercarriage selector lever can be operated.

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21. Airbrakes control

A lever (3), the shortest of three extending from the rear face of the engine control box, has two positions, ON and OFF. The airbrakes cannot be operated by the handpump in flight.

22. Wheelbrakes control

The brake control lever and parking catch are on the control column. Differential control of the brakes is obtained by movement of the rudder pedals.

COCKPIT EQUIPMENT

23. Hood operation

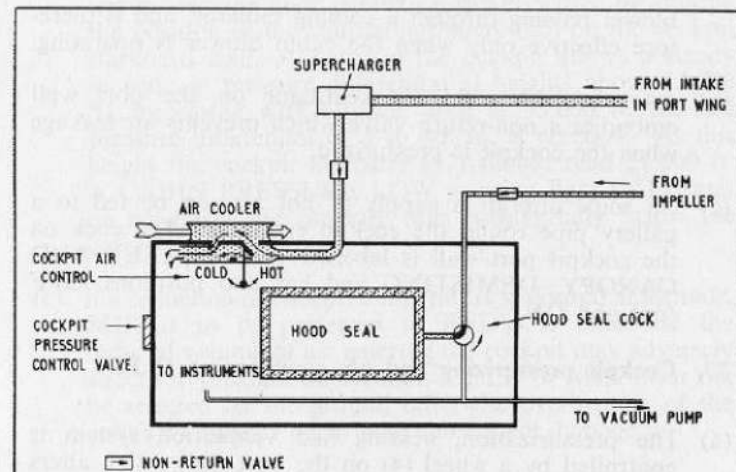
- (a) The hood is opened and closed by the crank handle (55) mounted on the cockpit starboard wall. A peg on the crank handle locks it in any desired position when the handle is released.
- (b) When closing the hood the crank handle should be rotated as far forward as possible to ensure that the peg engages in the last locking hole, thus providing for the efficient working of the hood seal.
- (c) A lanyard (45), introduced by mod. action, is provided above the hood seal cock, and when attached to the hood winding handle prevents inadvertent unwinding of the handle in flight.
- (d) A pushbutton, on the outside of the fuselage on the starboard side, labelled PRESS—TO SLIDE CANOPY BACK, enables the hood to be operated from outside. There is a retractable foot-step on the port side of the fuselage.
- (e) *Hood jettisoning*
The jettison lever (36) is on the right-hand coaming. If Mod. 3577 or 3578 is embodied the hood can be jettisoned from the fully closed position, even with the hood seal inflated, at speeds above 110 knots. If either of these modifications are not embodied the hood must be opened to the limit imposed by the hood winding handle lanyard.

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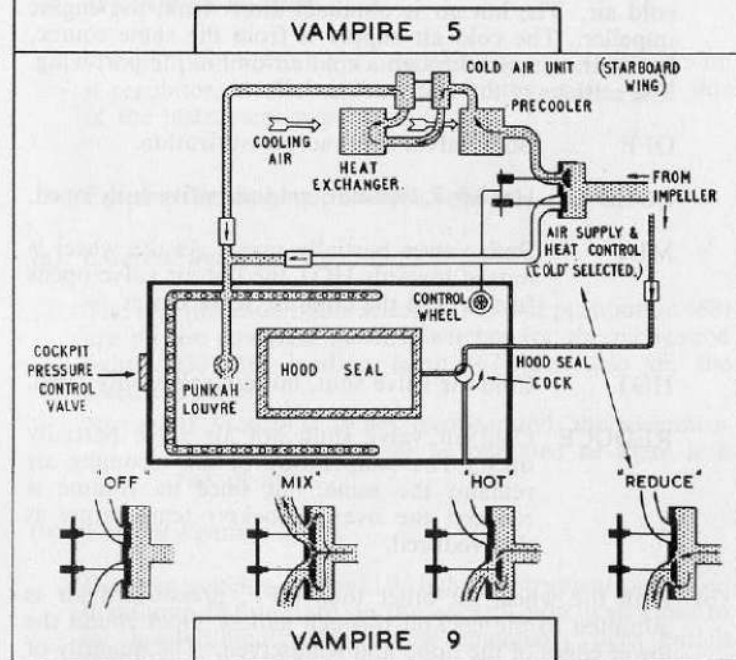
24. Hood sealing and cockpit altimeter

- (a) The hood seal cock (50) is mounted on the cockpit starboard wall forward of the hood crank handle. When ON, the cock admits air pressure to the seal from the engine impeller casing. The seal cock must not be ON when the hood is open.
- (b) When the hood is fully closed and the seal cock ON, the crank handle will foul the seal cock if an attempt is made to wind the hood open. This serves to remind the pilot to turn off the seal before opening the hood.
- (c) The cockpit altimeter (37), a cockpit pressure gauge (35) and a warning light (38) are on the right-hand side of the instrument panel. The warning light will indicate when the cockpit pressure is $\frac{1}{2}$ lb./sq. in. (1 lb./sq. in. if Mod. 871 incorporated) less than the correct pressure for the altitude of the aircraft; it may flicker on and off during the climb.



25. Cockpit pressurizing (F.B.5)

Cockpit pressure is supplied by an engine-driven cabin blower which can be engaged by the lever marked ON-CABIN BLOWER-OFF. This lever is forward of the hood seal cock and should be moved down for pressurizing and up when pressure is not required. The cockpit pressure is automatically controlled by a valve which spills air to atmosphere. Below approximately 15,000 ft. the valve is fully open and there is no build-up of pressure in the cockpit. Above this height the valve spills less air and so permits the differential pressure to increase progressively with height, up to a maximum of 3 lb./sq. in. (equivalent to 21,000 ft.) at 35,000 ft.



26. Cockpit heating and ventilation (F.B.5)

- (a) The cockpit heating is controlled by a lever marked HOT-CABIN BLOWER AIR-COLD mounted on the cockpit starboard wall at the rear of the electrical panel. This lever regulates the amount of air from the cabin

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blower passing through a cooling radiator, and is therefore effective only when the cabin blower is operating.

- (b) An adjustable cold air ventilator on the port wall embodies a non-return valve which prevents air leakage when the cockpit is pressurized.
- (c) On some aircraft a supply of hot air can be fed to a gallery pipe round the cockpit coaming. The cock on the cockpit port wall is labelled WINDSCREEN AND CANOPY DEMISTING and has two positions, OFF (up) and ON.

27. Cockpit pressurizing and air conditioning (F.B.9)

- (a) The pressurization, heating and ventilation system is controlled by a wheel (4) 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 pressurization.
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, pressurized 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

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windscreen and hood demisting, can be varied by altering the position of the ventilating louvre (65) on the cockpit starboard wall. 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 (37) should read 21,000 ft. A CABIN PRESSURE LOW warning light (35) 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.

28. Windscreen de-icing

A hand pump (42) for windscreen de-icing, together with a regulator, is mounted on the bottom right-hand side of the instrument panel.

29. External lighting and cockpit lighting

(a) External lighting

The identification lights selector (59) and pushbutton (68) are on the electrical panel. Switches for the navigation lights (58) and landing lamp (67) are also on the electrical panel.

NOTE.—If Mod. 934 is not incorporated, the identification lights must not be operated as there is a risk of fire.

(b) Cockpit lighting

Dimmer switches (8) for U/V lights, instrument panel and floodlamp lighting are on the cockpit port wall close to the ground/flight switch. The emergency light switch (7) is located in the same position.

30. **Pressure head heater**

The switch (57) for the pressure head heater is on the electrical panel.

31. **Flight instruments and compasses**

(a) Mk. 5 aircraft have suction-driven flight instruments. There is no vacuum pressure gauge. An R.I. compass is fitted, controlled by the switch on the electrical panel. An E2 compass is fitted.

(b) *Mk. 9 aircraft*

(i) The turn and slip indicator operates whenever electrical power is available. The Mk. 3B artificial horizon (with fast erection button) (30) and Mk. 4F compass (41) operate whenever A.C. supply is available (see para. 14(b)). A red warning light, if fitted, on the instrument panel indicates whenever electrical supply is lacking.

(ii) A standby compass (32) is mounted adjacent to the G.G.S.

(iii) Mod. 951 introduces a Lear radio compass. The amplifier and loop are in the nose of the aircraft in place of the I.F.F. set. The control box is on the inboard face of the electrical panel and the indicator is on the wedge plate.

32. **Seat adjustment**

A lever (69) on the right-hand side of the seat provides for height adjustment.

33. **Oxygen system**

The Mark 11C regulator (39) is mounted on the right-hand side of the instrument panel.

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- (c) (i) When Mod. 3433 is embodied an automatic line valve, incorporating an ON/OFF lever, is introduced into the oxygen system between the bottle and the regulator. The regulator is wire-locked in the fully ON position.
- (ii) Below 8,000 feet the line valve ON/OFF lever can be used as a master control and oxygen is only supplied if the lever is in the ON position. At 8,000 feet the lever, if in the OFF position, moves automatically to the ON position, thus turning on the oxygen supply. The lever cannot be returned to the OFF position again until height is reduced below 8,000 feet.
- (iii) The oxygen contents can be checked before flight by moving the line valve lever to ON. After flight it is important that the lever is returned to the OFF position to avoid wastage of oxygen.

34. **Emergency equipment**

(a) *First-aid kit*

This is stowed on the inside face of the port ammunition door.

(b) *Crowbar*

A crowbar is stowed in spring clips on the armour plate to the left and rear of the seat.

(c) *Desert equipment*

Desert equipment can be stowed as follows:—

Water bottle	Reached from outside by opening the port ammunition access door.
Cartridges	} Reached from outside by opening the star-board ammunition access door.
Heliograph	
Compass	
Very pistol	
Ordinary rations	} On floor of cockpit to right and left-hand side of pilot's seat.
Flying rations	
Water bottle	
Tool kit	
Signalling strips	
A.P.3031	

OPERATIONAL CONTROLS

35. **Guns, R.P., bombs and cine-camera operation**

(a) The gun-firing mechanism is electrically operated and has a push-button fitted on the control column spade-grip. The pushbutton has a spring-loaded safety flap which must be lifted before the guns can be fired. When the flap is at SAFE and the cine-camera master switch (60) is ON, the cine-camera can be operated independently by pressing the cine-camera control. When it is set to FIRE, the gun-firing push-button will fire the guns. The cine-camera will operate simultaneously providing the cine-camera master switch is ON. A camera test switch is below item (18).

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- (b) When the nose wheel is lowered, a micro-switch prevents the guns from being fired. To fire the guns when on the ground, the aircraft must first be trestled and the nose wheel retracted.
- (c) The gyro gunsight master switch (61) is on the electrical panel. The combined dimmer and selector control (33) is on the top right-hand side of the instrument panel, and the ranging control is incorporated in the throttle grip. A camera recorder can be fitted on the gyro gunsight (31). The R.P. guns selector switch (63) is above the electrical panel.
- (d) The R.P. PAIRS-SALVO selector switch (64) is on the electrical panel. The firing pushbutton (9) is mounted in the end of the throttle control lever and can be used for the release of bombs after operating the coupled master-selector switch (66) which is on the electrical panel and marked R.P.-BOMBS. The R.P. auto selector switch is behind and inboard of the electrical panel.
- (e) The bomb selectors, the fusing switches and the bomb distributor salvo switch are on the rear end of the electrical panel at (64).
- (f) The bombs and carriers are jettisoned by the operation of the wing drop tank jettison lever (23). There is no means of jettisoning the R.P.

36. Radio and radar equipment

- (a) The T.R. 1934 V.H.F. controller (26) is on the lower left-hand side of the instrument panel. The press-to-transmit button is on top of the control column. In early aircraft, a T.R.1464 controller may be below the oil temperature gauge.
- (b) The I.F.F. control unit (43) with F and D switches and the controller (44) are on the lower right-hand side of the instrument panel. The G pushbutton (16), G distress switch (15) and the auto/manual switch (17) are on the lower left-hand side of the instrument panel.

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- (c) The mic-tel socket is on the forward side of the pilot's seat.
- AL/1 (d) The standby V.H.F. system is controlled by the ~~gauge~~^{GANGER} switches (18) on the bottom arch panel of the instrument panel. When the switches are moved upwards the single-channel standby set, which is powered by a separate battery, is brought into use.

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