

SECTION I

PILOT'S CONTROLS AND EQUIPMENT

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Pilot's Controls and Equipment

Introduction

14. (i) This Section serves as a general guide to the location of all the controls, equipment and instruments in the pilot's cockpit, with the method of operating the controls wherever this is not obvious. The various main systems are covered in full in their appropriate Sections.
- (ii) Some emergency controls are included in their appropriate groups, but reference must be made to Section 2 for details of their operation.

Entry to Cockpit

15. The only entry to the cockpit is when the canopy is fully open; the operating handle (Fig. 5) on the right hand coaming is rotated to open or close the canopy. When opening the canopy, the initial turn of the handle will partially operate the canopy seal lever, to warn the pilot that it must be turned OFF before opening the canopy. To open or close the hood from the outside of the fuselage, press the button on the starboard side, marked PRESS RED BUTTON TO RELEASE HOOD, and slide the canopy as desired.

Pilot's Seat

16. (i) The standard S.B.A.C. seat has now been replaced in all aircraft by the Martin Baker Mk.2F (A) Ejection Seat, a full description of which, together with servicing instructions, is given in A.P.4288 B Vol 1, Sect. 4.
- (ii) Safety harness gear is fitted and movement of the lever projecting from the starboard thigh guard will permit the pilot to lean forward when required.

Cabin Seal

17. The canopy is fitted with a pneumatically-operated rubber seal, which is provided to exclude draughts and permit cabin pressurising. The seal is inflated when the canopy seal lever is moved to the ON position. The seal should only be in-

flated when the sliding hood is closed, and MUST be deflated before the hood is opened. The lever is situated on the starboard side of the cockpit. (Fig. 5.)

Cockpit Heating

18. Cockpit heating is provided and is controlled by a cabin blower air lever which is marked OFF-HOT-COLD, mounted on the starboard cockpit wall, to the rear of the main electrical panel. (Fig. 5.)

Cockpit Ventilation

19. An adjustable cold air ventilator is fitted on the left-hand cockpit wall, beneath the coaming. (Fig. 5.) This cold air is available if the cabin is unpressurised or if the "Ram" effect exceeds the cabin pressure.

Cabin Pressurising

20. (i) The pressurising air is supplied to the cabin from the engine impeller casing through the cabin blower air control. The air is cooled, when required, before being admitted to the cabin by passing over a radiator in the starboard cockpit wall. The pressure is automatically controlled by a Normalair Cabin Pressure Control Valve MK.11 which starts pressurising at about 10,000 ft. if the cabin blower air control is ON (Fig. 5) and (Fig. 107).
- (ii) The cabin altimeter on the right-hand side of the instrument panel will show the altitude corresponding to the cabin pressure. (Fig. 5) and (Fig. 107).

Cockpit Lighting

21. The Dual System of cockpit lighting is used and consists of red lights for general cockpit and instrument illumination and ultra-violet lights for instrument panel illumination. The ultra-violet lights are controlled by one dimmer switch. The red lights are controlled by two dimmer switches, one of which operates the red light illuminating the main electrical panel, and the other operating the three remaining

red lights. The three dimmer switches are mounted on a wooden block on the port cockpit wall just below the canopy rail and forward of the pilot. (Fig. 5.)

An emergency light is fitted to the gyro-gunsight bracket, independently supplied by a small two volt accumulator and controlled by a toggle switch located on the port cockpit wall directly under the three cockpit light dimmer switches (see Fig. 6), for use in the event of electrical system failure.

Oxygen Supply

22. On aircraft (Pre D.H. Aust. Mod. V.229) a Mk. 11C regulator is fitted to the right-hand side of the instrument panel; the high pressure control cock is fitted on the oxygen regulator which controls the supply to the oxygen economiser. (Fig. 4).

A Mk. 16A Oxygen Regulator and automatic line valve are introduced on D.H. Aust. Mod. V.229. This regulator includes an aneroid controlled flow change switch which automatically changes from NORMAL to HIGH and the line valve automatically turns on the oxygen supply at 8,000 ft. altitudes in the event of the pilot failing to do so, thus providing additional safety features.

Pitot Head Heating

23. The switch is mounted on the main electrical panel (Fig. 2); when not required it should always be switched OFF.

FLYING CONTROLS AND EQUIPMENT

Control Column and Rudder Pedals

24. These are conventional in operation; the straight handle column carries the brake control lever and parking catch, gun firing trigger, camera firing switch and the R.P./Bombs release switch (Fig. 88). The Rudder Pedals are adjustable fore and aft by lifting them against the tension of the springs from one ratchet plate to another (Fig. 89).

Trim-tab Control

25. The elevator tab is the only controllable tab in the aircraft and it is controlled by a handwheel on the throttle control box. The indicator is on the top centre instrument panel on the left-hand side (Fig. 2). (For setting Ref. Para. 92.)

Wing Flaps Control

26. The operation of the wing flaps is
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controlled by a lever to the right of the undercarriage lever (Fig. 2). The lever has a quadrant marked FLAPS UP - NEUTRAL - DOWN, and should be manually-operated to the NEUTRAL position on the completion of an operation. Any flap angle up to 80° can be obtained by returning the lever to NEUTRAL when the desired angle is shown on the position indicator. The lever should be left in the UP position for flaps UP.

Dive Brakes

27. Above the undercarriage and flap control levers on the throttle control box (Fig. 2) is positioned the lever for operating the dive brakes. The lever quadrant is marked OFF - DIVE BRAKES - ON.

Wheel Brakes

28. The brakes are operated pneumatically and are applied by operation of the lever on the control column. Differential control is obtained by operating the rudder pedals with the control lever ON. A parking catch for locking the lever in the ON position is mounted next to the brake lever.

NOTE: The cable trunnion in the brake lever is to be assembled with anti-freeze grease, and thereafter lubricated with anti-freeze oil at each daily inspection.

Undercarriage Selector Lever

29. The undercarriage selector lever is positioned on the engine control box (Fig. 2) and has two positions only: UP or DOWN. It is held in the DOWN position by an electric solenoid plunger at the control box and cannot be raised until the aircraft is clear of the ground. There is, however, an undercarriage override switch positioned on the port cockpit wall aft of the engine control box for use in emergencies.

Undercarriage Indicator

30. The indicator is positioned on the instrument panel (Fig. 2) and the indicator lamps have dimmer screens for night flying. There is a red warning light fitted next to the R.P.M. indicator on the left-hand instrument panel.

Indications are:—

- (i) Wheel units locked UP:
No lights.
- (ii) Wheel units locked UP, but throttle less than $\frac{1}{4}$ open:
One RED light (next to the R.P.M. indicator).

(iii) Wheel units between UP and DOWN:
Three RED lights (on the undercarriage indicator).

(iv) Wheel units locked DOWN:
Three GREEN lights (on the undercarriage indicator).

When the main wheels are lowered the red lights do not go out until the DOWN lock is engaged. Ground locking devices are provided (see Fig. 11).

ENGINE AND ASSOCIATED CONTROLS

Throttle Control

31. The throttle control lever is mounted on the control box on the left of the pilot (Fig. 3). There is no position marked for maximum cruising (see Pilot's Notes). The throttle level controls a metering device in the control box of the power unit regulating the amount of the fuel which is admitted to the combustion chambers and, as the amount of fuel burned is also a governing factor for r.p.m., it is in every way like the normal hand-controlled throttle.

Starting Button

32. The starter button, and interlinked starter switches are positioned at the forward end of the main electrical panel (Fig. 3). There is a ground starter socket in the port inner flap shroud for the ground starter batteries.

Fuel Tanks

33. (i) The fuel is carried in nine main tanks (one fuselage and eight wing tanks) and two drop tanks (see para. 37), one suspended under each wing. The wing tanks are connected to a fuel collector box, built inside but at the bottom of the fuselage tank, by 1 inch bore fuel pipes. The wing drop tanks are pressurised for fuel transfer, from the engine compressor casing (Fig. 96). Fuel is fed into the main fuel tank from the wing tanks but there is no control over the rate of flow.

(ii) The fuel collector box also serves as a negative "G" reservoir holding approximately four gallons of fuel, and is fitted with a gravity valve which closes on inverted flight.

NOTE: The maximum time for inverted flight is 5 seconds.

(iii) Fuel passes through the immersed fuel booster pump in the collector box, through a low pressure cock and a filter to a pair of engine driven fuel pumps located on the right-hand side of the engine wheel-case.

33A. Each wing is fitted with four flexible, self-sealing and flame-proof tanks. These are manufactured from flexsyn synthetic rubber sheet, the outside covering being glass-cloth to specification DTD.797C or 639. They are moulded to fit around the wing ribs and are supported by the tank doors.

The capacity of the four tanks is 117 gallons. All tanks are inter-connected and fitted with an external venting system. All fittings are installed in the tanks with an inner stud ring assembly and clamp ring. Inspection ports are provided to facilitate interior inspections.

Tanks number one and four are fitted with filler assemblies, tanks number two and three being filled through tank No. 4. Number one tank is fitted with anti-surge valves which prevent the fuel flowing to the outer tanks during manoeuvres.

On aircraft fitted with later type tanks anti-surge valves have been introduced in tanks numbers two and three.

Tanks number one and three are each fitted with a "Smiths" Desynn type float arm fuel gauge which transmits fuel quantities to indicators in the pilot's cockpit.

NOTE: For full particulars and repairs on above tanks, see Marston Flexible Tank Manual, Volume 1—General and Volume 2 for De Havilland Pty. Ltd. "Vampire".

Fuel Cock Control

34. The low pressure cock is controlled by a red painted lever on the underside of the control box, and the high pressure cock control is a lever mounted behind the throttle lever on the top of the control box. (Fig. 3.) There are no separate fuel cocks for the drop tanks.

Fuel Contents Gauges

35. Five fuel contents gauges are mounted below the centre instrument panel (Fig. 3). The top left and right-hand

gauges represent the contents of the inner port and starboard wing tanks respectively, the lower left and right-hand gauges the outer port and starboard set of tanks, and the centre gauge the main fuselage tank. There are no fuel contents gauges for the wing drop tanks. These gauges are only accurate when the aircraft datum is horizontal (at normal cruising speed this involves a descending flight path of about 5° to the horizontal). In level cruising flight (nose-up 5°) the gauges will read slightly low with a maximum error of about 20 gallons when the whole system contains about 100 gallons.

Owing to restrictions on the movement of the float arms in the tanks, with gauges showing zero or their maximum readings, datum horizontal, the actual usable contents of the tanks are indeterminate within the following limits:—

Gauge at zero — between 0 and 31 gals. available.

Gauge at max. reading — between 284 and 314 gals. available.

In later aircraft, recalibrated fuel contents gauges have been introduced. (Post Mod. V.119.)

These gauges are only accurate when the aircraft is in level cruising flight, i.e., datum line nose-up 5°.

The actual usable contents for these aircraft are as above.

Fuel Tank Venting

36. The centre and wing fuel tanks are vented direct to atmosphere via a common vent pipe which extends to the bottom of the engine bulkhead from the top of the centre fuel tank. To prevent panting of the wing fuel tanks, a slightly positive pressure is maintained throughout the system by introducing a relief valve in the fuel vent line.

Fuel Drop Tanks

37. The fuel drop tanks are pressurised from the engine compressor casing, for transferring the fuel to the centre fuselage tank. There are no controls for this, the pressure is on all the time. The lever for jettisoning the fuel drop tanks is located at the left-hand side of the pilot's seat (Fig. 4).

Oil System

38. On this engine no portion of the

circulating oil system is on the aircraft. There is no oil tank, but the engine sump has a capacity of 10 pints. A relief valve limits the pressure to 40 lbs. per sq. in. and spills surplus oil into the wheelcase.

Oil Pressure Gauge

39. The oil pressure gauge, which records the main engine oil pressure, is fitted on the left-hand instrument panel (Fig. 3).

Oil Temperature Gauge

40. The oil temperature gauge, which records the oil inlet temperature, is fitted on the left-hand instrument panel (Fig. 3).

Electrical System

41. A generator driven by the engine supplies 24 volt power through two 12 volt accumulators (connected in series) for:—

Instruments and cockpit lighting.
Identification, navigation and landing lamps.

Radio.

Gyro gun-sight.

Fuel booster pump.

Undercarriage warning.

Fire extinguisher.

A.D.F. 14 Radio Compass.

Engine re-lighting.

Gun operation.

NOTE: A red warning light, on the right hand side of the top instrument panel, lights when the generator is not charging, or when the engine speed is less than 5,000 R.P.M. There will, however, be no warning light if the Ground/Flight switch is switched to ground with no ground supply trolley connected to the aircraft.

OPERATIONAL CONTROLS

Gun Control

42. The finger operated trigger which acts as firing switch for the guns is accommodated, with its safety catch, in a recess in the top front face of the control column handle.

The safety catch, the serrated knob of which is located on the top of the handle, provides for positive mechanical locking and electrical isolation of the trigger and switch. The safety catch has to be moved forward before the guns can be fired (Figs. 4 and 88). Pressure on the trigger fires all four guns.

Camera Gun Control

43. The camera gun master switch, on the main electrical panel, must be ON before the camera-gun can be operated, either independently of the guns by depressing the camera switch button located directly behind the safety catch, or by depressing the gun trigger.

Gunsight and Recorder

44. The gyro gunsight, mounted in front of the pilot, can be controlled from the throttle control lever during flight manoeuvres. The gunsight switch is mounted to the rear of the main electrical panel. The gunsight recorder is controlled by the gunsight switch (Fig. 4), but is operated in a similar manner to the camera gun (i.e., by use of the switch on the control column). Two spare filaments are stowed on the starboard side of the cockpit.

NAVIGATION AND SIGNALLING CONTROLS

Radio

45. (i) The TR-1520 and I.F.F. (SCR-695-A) are no longer fitted, the TR-1520 being replaced by the TR-1936 which is installed in the ammunition bay behind the pilot's seat, accessible by the port ammunition bay door and is controlled by the control box situated mid-way up the left hand side of the instrument panel (Fig. 4). A "press to transmit" switch is also fitted, being located in the end of the throttle lever hand grip.
- (ii) Lear, A.D.F. 14 Radio Compass (Fig. 109) has been introduced on all aircraft. The control unit is fitted to the forward end of the starboard canopy rail and consists of a Dimmer switch for the Tuner dial light and a Telephone selector switch for either V.H.F. or A.D.F. The Tuner is situated on the left of the pilot's seat on the cockpit floor and provides for frequency selection and volume control. The D.F. Loop is installed in the nose of the aircraft beneath the detach-

able nose panel and is covered by a special di-electric housing which must not, under any circumstances, be painted. The Amplifier is mounted on the inside face of the port ammunition door. The Sense aerial is attached to the rear fairing of the sliding canopy, while the compass indicator is situated at the top of the right hand side of the instrument panel. The canopy must be closed in order to make contact with the aerial.

Identification Lights

46. A selector switch for selecting RED, GREEN or AMBER is positioned on the main electrical panel (Fig. 4) with a push button for operating the downward identification lights for steady illumination or signalling.

Navigation Lights

47. The ON-OFF switch for the navigation lights on the main electrical panel has been replaced by a three position switch "ON-DIM-OFF" (Vampire Mod. No. 152) to enable the intensity of the wing tip navigation lights to be reduced and thus avoid glare which is tiring and can be of possible danger when flying at night in close formation (Fig. 4).

Landing Light

48. The switch for the one landing light, on the port wing, is situated to the rear of the main electrical panel (Fig. 2). The switch has three positions, OFF - LOW - HIGH.

Compass

49. The E2A compass is mounted in front of the pilot, to the right of the gun sight (Fig. 4).

The compass is a standby in case of failure to the G3F detector unit.

Target Towing Gear

49A. Provision is now made for Target Towing Gear on all fighter aircraft. The release handle is positioned on the left of the pilot's seat between the emergency hand pump handle and the fuel tank jettison lever.



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