

PART I

DESCRIPTIVE

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

INTRODUCTION

The Sea Vampire F. Mk. 20 can be used as a fighter or interceptor for duty in tropical or temperate climates. It is a jet-propelled, single-seat aircraft with clipped wings. It has a pressure cabin and four 20 mm. guns. The power plant is a Goblin Mark 2, straight-flow-combustion, turbine-jet engine.

FUEL AND OIL SYSTEMS

1. Fuel tanks

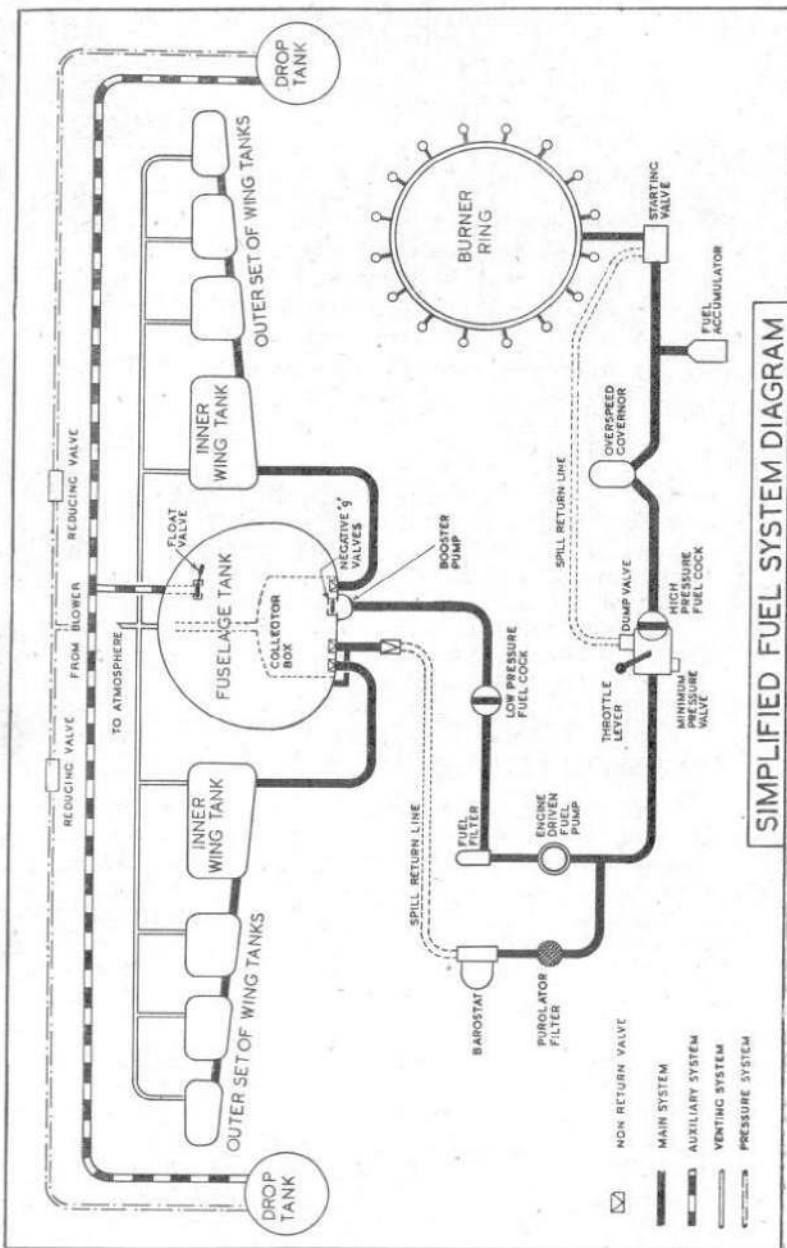
- (i) Nine permanent self-sealing tanks are fitted, one in the fuselage and four in each wing. In addition a drop tank can be suspended from each wing.

The tank capacities are as follows :—

Fuselage tank	...	...	...	96 gallons
Two inner wing tanks,	52 gallons each			*104 gallons
Two sets of outer wing tanks (comprising 3 separate cells in each outer wing),				
65 gallons each set	...	...	...	*130 gallons
Two wing drop tanks (100 gallons each)				200 gallons
Total	...			530 gallons

* See para. 36 (ii) NOTE (b).

- (ii) The fuel from all the permanent tanks passes to a collector box which also acts as a negative "g" reservoir and incorporates negative "g" valves, affording a fuel supply for ten seconds inverted flight. The tanks, which



PART I—DESCRIPTIVE

are not pressurised, are vented to atmosphere. A satisfactory delivery pressure at altitude is ensured by a booster pump, immersed in the fuselage tank.

- (iii) 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. The wing drop tanks are pressurised from the engine blower casing. Mod. 591 incorporates a reducing valve for each wing drop tank, thus ensuring that fuel can be drawn from one tank should the other be holed.
- (iv) 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 is fitted in parallel with the throttle. This ensures that at altitude, regardless of the throttle setting, sufficient pressure will be maintained at the burner ring to prevent flame extinction, providing the booster pump is ON. 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 a fuel accumulator. The purpose of the accumulator is to provide a fixed quantity of fuel at a known pressure at the moment of starting. When starting the engine, a dump valve drains any fuel present in the system, before the pressure builds up. When shutting down the engine it prevents free fuel draining into the combustion chambers after the pressure has fallen.

2. Fuel gauges

- (i) Contents gauges.

Five fuel contents gauges (44) are mounted below the centre instrument panel. 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 sets of tanks and the centre gauge the fuselage tank. The gauges will indicate the contents of their respective tanks when the

PART I—DESCRIPTIVE

MASTER SWITCH (4) is at FLIGHT. There are no fuel gauges for the wing drop tanks, which are the only tanks pressurised. Fuel transfer from the wing drop tanks to the fuselage tank will commence when the centre gauge reads 80 gallons. The centre gauge will commence to show a drop below this figure when the wing drop tanks have been emptied.

- (ii) A burner ring pressure gauge (53), which is calibrated in hundreds of pounds and records the fuel pressure at the burner ring, is fitted on the left-hand side of the instrument panel. The scale on this gauge is such that accurate reading is difficult, furthermore, the burner pressure will be influenced by height and r.p.m. and thus it is not possible to lay down definite readings for given conditions of flight. This gauge will be deleted by Mod. 680.

3. Fuel booster pump

- (i) The booster pump is controlled by an ON-OFF switch (55) on the electrical panel.

- (ii) A fuel pressure warning light (54) is on the top 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.

A.L.3
Para. 3
(ii)

4. Fuel cocks

The low-pressure fuel cock is controlled by a lever (21) which is 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 (12) mounted outboard of the throttle lever, which must be moved forward for fuel ON and back for fuel OFF. It is held in the forward position by a spring catch. There are no separate fuel cocks for the wing drop tanks, but a jettison lever is fitted (see para. 50).

5. Oil system

- (i) There is no oil tank, but the power unit has a sump which contains about 1½ gallons of oil for lubricating the engine-

PART I—DESCRIPTIVE

driven accessories and the impeller bearings.

- (ii) The oil pressure gauge (46) and the oil temperature gauge (16) are fitted on the left-hand side of the instrument panel.

MAIN SERVICES

6. Pneumatic system

- (i) An engine-driven compressor charges a bottle for the operation of the brakes. The pneumatic system and brakes triple pressure gauge (73) on the right-hand side of the instrument panel, shows the available pneumatic pressure, which when fully charged should be 450 lb./sq. in. and should give a pressure of 150 lb./sq. in. at each brake.

This pressure will still be available for the brakes should the pressure in the bottle fall as low as 240 lb./sq. in.

- (ii) An engine-driven vacuum pump provides suction for the blind flying instruments and for deflating the canopy seal.

7. Electrical system

- (i) An engine-driven generator charges two 12-volt batteries connected in series. These in turn supply the whole of the electrical system at 24 volts, except the automatic engine starting.

- (ii) A generator warning light (36) at present mounted on the top right-hand side of the instrument panel will be removed later by a retrospective Mod. 850 to a position on the left-hand instrument panel level with the fuel pressure warning light (54) and as far inboard as possible. This warning light indicates when the voltage of the generator falls appreciably below the voltage of the batteries. It is wired directly to the batteries and will, therefore, be on continuously whilst the engine is not running, irrespective of the position of the master switch.

A.L.1
para. 7 (ii)

- (iii) The master switch, with GROUND and FLIGHT positions, is fitted on the cockpit port wall. 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 the automatic engine starting system.

PART I—DESCRIPTIVE

- (a) When the master switch is set to GROUND, the electrical services are isolated from the generator and aircraft batteries. The system (except the automatic starter) can be connected to a ground battery if this is plugged into the port socket.
- (b) When the master switch is set to FLIGHT, all the electrical services, except the automatic engine starting system, are connected to the aircraft batteries. The automatic engine starting system can be operated if a 230-ampere-hour, 24-volt ground starter battery is plugged into the starboard socket, but only when the master switch is at FLIGHT.

8. Hydraulic system

- (i) Hydraulic pressure, supplied by an engine-driven pump, is stored in a pressure accumulator, for the operation of the following:—
 - Undercarriage
 - Flaps
 - Dive brakes
- (ii) Sufficient pressure will be available in the accumulator for one complete one-way operation of the undercarriage or of the flaps after failure of the engine-driven hydraulic pump.
- (iii) A handpump (24) is provided on the left of the pilot's seat for use when accumulator pressure is not available. Operation of the handpump will transmit hydraulic fluid direct from a reserve supply in the reservoir to the jacks concerned, without going through the accumulator, under sufficient pressure to operate the undercarriage and flaps at a reduced rate.

AIRCRAFT CONTROLS

9. Undercarriage controls

- (i) The undercarriage selector lever (26) is the longest of three levers extending from the rear face of the engine controls box, and has two positions only, UP and DOWN. When the wheels are on the ground it is locked in the DOWN position by a solenoid. In an emergency the solenoid can be over-riden to permit UP to be selected on the ground by a switch (1), marked U/C EMERGENCY RETRACTION, fitted on the cockpit port wall.

PART I—DESCRIPTIVE

- (ii) A standard undercarriage position indicator (14) is on the bottom left-hand side of the instrument panel. The indications are:

Wheels locked UP	... ..	No lights
Wheels between UP and DOWN		Three red lights
Wheels locked DOWN	... ..	Three green lights

There is no warning horn but an additional red light (31), is positioned on the top centre of the instrument panel on the right of the elevator trim indicator and comes on if the wheels are not locked down and the throttle is less than a quarter open.

10. Flaps control

- (i) Operation of the flaps is controlled by the selector lever (23) marked FLAPS next to the undercarriage selector lever. It has three positions: UP—NEUTRAL—DOWN. Any angle up to 80° can be obtained by returning the selector lever to neutral when the desired setting has been reached. The selector should be left in the up position when the flaps are up.
- (ii) A flaps position indicator (47) is fitted next to the undercarriage position indicator.

11. Air brakes control

A lever (22), is the shortest of three, extending from the rear face of the engine control box, and has two positions ON and OFF. The air brakes cannot be operated by the handpump.

12. Arrestor hook control and warning light

- (i) The arrestor hook control (27) is mounted on the port side of the cockpit and is pulled down to lower the hook, which cannot be re-engaged in the up position during flight. Should the lever be accidentally pulled a normal landing can be made without damage to the hook or the structure.
- (ii) A green indicator light (32) is above the undercarriage warning light and the attitude lights beneath the aircraft come on when the hook is down.
- (iii) A switch marked TRAINING SWITCH is mounted below the arrestor hook lever. When carrying out

PART I—DESCRIPTIVE

A.D.D.L's. the switch should be placed in the ON position to simulate the lowering of the deck hook ; when the switch is on, the deck hook indicator light and the aircraft attitude lights all come on.

13. Flying controls

- (i) The control column is of the spade-grip pattern and incorporates the brake lever, the gun firing pushbutton (49), and cine-camera control (48) and a spring-loaded PRESS-TO-SPEAK switch (50).
- (ii) The rudder pedals can be adjusted for length by lifting them from one slot to another.

14. Flying controls locking gear

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

15. Elevator trimming tab control

The elevator trimming tab control wheel (19) is on the side of the engine control box. The indicator (30) is on the top left-hand side of the instrument panel.

16. Wheel brakes

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.

ENGINE CONTROLS

17. Throttle control

- (i) A throttle lever (10), which moves in a quadrant, marked SHUT—THROTTLE—OPEN, extends from the engine control box. The friction adjuster (20) is on the side of the engine control box, above the elevator trimming tab control wheel.

PART I—DESCRIPTIVE

- (ii) A rear bearing temperature gauge (51), a jet pipe temperature gauge (52), a burner ring pressure gauge (53) and an r.p.m. indicator (45) are mounted on the lower left-hand side of the instrument panel. The rear bearing temperature gauge will be disconnected by Mod. 685.

18. Engine starting system

- (i) The electrical starter motor is controlled by an automatic system operated by the engine starting pushbutton (75), and interlinked starter and master switches (76) on the electrical panel on the cockpit starboard wall. 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.

An auxiliary starting switch (74) is introduced which is fitted forward of the master and starter switches. It should be operated as soon as the burners light up so as to cause a third relay to function, allowing full current for the starter motor thus assisting the engine to attain idling

A.L.2
Para. 18
(i)
Line 17

r.p.m. On some aircraft a modified system excludes the use of an auxiliary starting switch, in which case the switch will be wired in the OFF position.

- (ii) The engine cannot at present be re-started in flight.

OPERATIONAL CONTROLS

19. Guns, and gyro gun-sight

- (i) The gun firing mechanism is electrically operated. The guns selective firing pushbutton on the control column spade-grip is fitted with a spring-loaded safety flap. When the flap is at SAFE and the camera master switch (60) is ON, the cine-camera can be operated independently by pressing the camera push-switch. When it is set to FIRE the gun firing pushbutton will fire the guns and operate the cine-camera simultaneously, providing the camera master switch is ON.
- (ii) The gyro gun-sight master switch (61) is on the electrical panel, the combined dimmer and selector control (35) is on the top right-hand side of the instrument panel, and

PART I—DESCRIPTIVE

the ranging control (11) is incorporated in the throttle grip. A camera recorder can be fitted on the gun-sight.

- (iii) The stowage for a cine-camera footage indicator (72) is on the lower right-hand side of the instrument panel.

20. Catapult hooks and hold-back gear

Two catapult hooks, one under each wing, are provided for attachment of the catapulting strop

A strop for the attachment of the hold-back gear is enclosed by a spring door in the underside of the tail cone fairing: the door will spring closed when the hold-back gear is released.

21. Radio equipment

The type 89 and 90 controller units for R3121 are fitted on the lower right-hand side of the instrument panel, whilst the controller type 295 for TR1520 (18) is on the lower left-hand side of the instrument panel, next to the G switch (15), and the AUTO MANUAL control (17). The ZBX controller (66) is fitted on the electrical panel on the starboard side of the cockpit.

22. Other controls

- (i) The identification lights are controlled by a three-position selector switch (64) and operated by a pushbutton (65) both on the electrical panel.
- (ii) Switches for the pressure-head heater (56), R.I. compass (57), navigation (58), (59) and landing lamp (68) are also on the electrical panel. Mod. 475 introduces an E.2A compass.

COCKPIT EQUIPMENT

23. Canopy

- (i) The canopy is opened and closed by the crank handle (41) mounted on the cockpit starboard wall. A spring-loaded plunger locks the canopy in any desired position when the crank handle is released.
- (ii) When closing the canopy fully, the crank handle should be rotated as far forward as possible to ensure that the plunger engages in the last locking hole, thus providing

PART I—DESCRIPTIVE

for the efficient working of the canopy seal

- (iii) The canopy can be jettisoned in flight by operating the lever marked CANOPY JETTISON (39) forward of the crank handle on the cockpit starboard wall.
- (iv) A pushbutton on the outside of the fuselage, marked PRESS TO SLIDE CANOPY, permits it to be opened from outside.

24. Cockpit heating and ventilation

- (i) The cockpit heating is controlled by a lever (63) marked HOT—CABIN BLOWER AIR—COLD, mounted on the cockpit starboard wall, to the rear of the electrical panel. Cockpit heating can only be used with the cabin blower in operation.

A.L.3
Para. 24
(ii)

- (ii) An adjustable cold air ventilator (28) is fitted on the cockpit port wall, beneath the coaming. The ventilator embodies a non-return valve to prevent leakage of air when the cockpit is pressurised. On later aircraft this ventilator will be positioned further aft.

25. Cockpit sealing and pressurising

- (i) A canopy seal cock is mounted on the right-hand cockpit wall forward of the crank handle. The cock admits air pressure to the rubber seal from the engine blower casing when turned to ON, or deflates the seal through a connection to the suction side of the vacuum pump when turned to OFF. The seal must only be inflated when the canopy is closed and *must be deflated before it is opened*.
- (ii) The cockpit pressurising lever marked ON—CABIN BLOWER—OFF is mounted forward of the canopy seal lever. This lever should be moved down for pressurising and up when pressure is not required. The CABIN BLOWER is engine driven and supplies air through the cockpit air regulator. The cockpit pressure is automatically controlled by a valve which starts pressurising the cabin at about 15,000 ft. and progressively increases the differential pressure to a maximum of $2\frac{3}{4}$ lb./sq. in. at 35,000 ft.
- (iii) The cockpit altimeter (40) on the right-hand side of the instrument panel will show the altitude corresponding to the cabin pressure, and the pilot should regulate his oxygen supply to correspond with this altitude. A cockpit

A.L.1
para. 22
(ii)

PART I—DESCRIPTIVE

pressure gauge (38) and warning light (42) are also provided. The warning light glows when the cockpit pressure is $\frac{1}{2}$ lb./sq. in. below the standard; this light may flicker on and off during the climb.

26. Seat adjustment

A lever (67) on the right-hand side of the seat provides adjustment for height.

27. Oxygen system

A Mk. 11C oxygen regulator (43), high-pressure control and indicator, are mounted together on the right-hand side of the instrument panel. Access to the charging valve is gained through the starboard ammunition door.

28. Windscreen de-icing and de-misting

A handpump (71) with a regulator is mounted on the bottom right-hand side of the instrument panel, for de-icing. Mod. 650 will be introduced in later aircraft and will supply hot air for de-misting controlled by means of an ON—OFF cock on the cockpit port wall.

29. Cockpit lighting

- (i) The master switch at (8) for the instrument panel lamps only is outboard and above the emergency lamp switch.
- (ii) The emergency lamp switch (8) for the emergency lamp is positioned below the master switch.
- (iii) The u/v dimmer switch (5); instrument panel lamps dimmer switch (6) and flood lamps dimmer switch (9) (for the electrical panel only) are on the cockpit port wall.

FINAL CHECKS FOR TAKE-OFF

NEUTRAL

TRIM

L.P. COCK ON

FUEL

H.P. COCK ON

BOOSTER PUMP ON

30° DECK AND AIRFIELD

FLAPS

45° CATAPULT

OFF

AIR BRAKES

FINAL CHECKS FOR TAKE-OFF

TRIM ... NEUTRAL

FUEL ... L.P. COCK ON
H.P. COCK ON
BOOSTER PUMP ON

FLAPS ... 30° DECK AND AIRFIELD
45° CATAPULT

AIR BRAKES ... OFF

FINAL CHECKS FOR LANDING

FUEL ... CHECK CONTENTS

BRAKES ... OFF. CHECK PRESSURES

WHEELS ... LOCKED DOWN

HOOK ... DOWN

FLAPS ... FULLY DOWN ON FINAL

AIR BRAKES ... OFF

This file was downloaded
from the RTFM Library.

Link: www.scottbouch.com/rtfm

Please see site for usage terms,
and more aircraft documents.



LIGHTNING MK. 1
COVER PITOT HEAD
EB2-88-5111