

# PART I

## DESCRIPTIVE

### INTRODUCTION

1. **The Tempest V** is a single seat low wing monoplane fighter fitted with a Sabre IIA engine and a de Havilland four blade 35° hydromatic propeller.

### MAIN SERVICES

#### 2. Fuel system

- (i) Fuel is carried in four self-sealing tanks, one in the fuselage just aft of the engine, one in the inner portion of each wing between the main spars, and a fourth in the nose portion of the port wing. Fuel is delivered to the carburettor by an engine-driven pump. Three levers (60, 61 and 62) marked INTER SPAR, MAIN and NOSE TANK mounted on the right-hand side of the cockpit, control the fuel cocks. The cocks are closed when the levers are in the aft position.

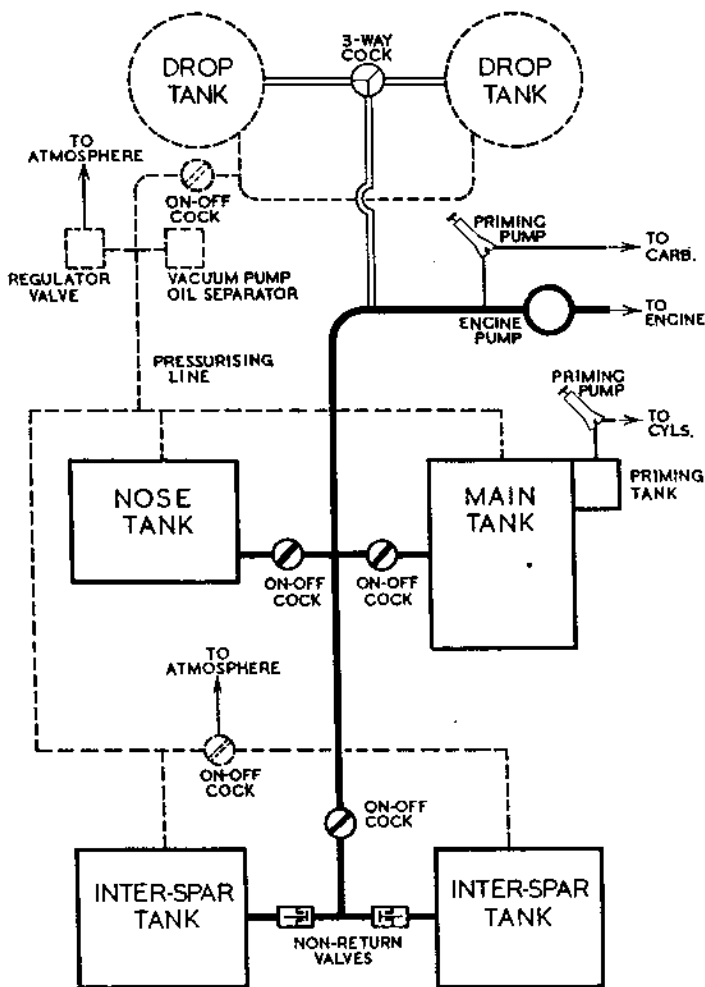
The tank capacities are as follows :—

Main tank	.. ..	76	gallons
2 Inter-spar tanks (28 gal- lons each)	.. ..	56	„
Nose tank (if fitted)	.. ..	30	„
Total	.. ..	<u>162</u>	„

In addition, two auxiliary drop tanks of 45 gallons each may be carried, one under each wing.

- (ii) To meet the possibility of engine cutting due to fuel boiling in warm weather at high altitudes, the tanks can be pressurised (operative above 15,000 ft., or on later aircraft 10,000 ft.). Pressurising, however, impairs the self-sealing of tanks and should, therefore, be turned off if a tank is holed. Three fuel contents gauges are on the right-hand side of the instrument panel. They are of the direct reading type, the largest dial (19) recording the contents of the main tank, the upper window of the gauges (18) the contents of the inter-spar tanks, and the lower window (if fitted) the contents of the nose tank.

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## FUEL SYSTEM DIAGRAM

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- (iii) *Priming System:* Cylinder priming fluid consisting of a mixture of 70% fuel and 30% engine oil is contained in a tank of 5 pints capacity mounted on the starboard side of the main tank in the fuselage.
3. **Oil system.**—Oil is supplied from a tank containing 16 gallons of oil with 2 gallons air space fitted immediately aft of the fuselage fuel tank. The system incorporates a thermostatic valve which is open at oil outlet temperatures above 50° C. and an oil cooler which forms an integral part of the radiator. A separate relief valve set at 55 lb./sq.in. blow-off pressure is provided between the scavenge pump and the oil cooler to prevent possible damage to the oil cooler when starting up in cold weather. This relief valve short circuits the entire oil system and discharges into the suction side of the engine oil delivery pump.
4. **Coolant system.**—The system is thermostatically controlled, the radiator being by-passed until the coolant reaches 85° C (the thermostat is fully open at 105° C.). The radiator shutter is hydraulically controlled.
5. **Hydraulic system.**—An engine-driven hydraulic pump which maintains a pressure of approximately 1,800 lb./sq.in., supplies the power for operating the undercarriage, the wheel doors, the wing flaps and the radiator shutter. A handpump (53) is fitted in the cockpit on the left-hand side for use in the event of engine pump failure.
6. **Pneumatic system.**—An engine-driven compressor charging a storage cylinder supplies compressed air at 450 lb./sq.in. for operating the brakes, undercarriage assister, camera unit and gun-firing mechanism. A triple pressure gauge (26) is fitted on the left-hand side of the instrument panel.
7. **Electrical system.**—A 24-volt engine-driven generator supplies two 12-volt accumulators for the operation of the whole electrical system. A power failure warning lamp (25) mounted on the right of the instrument panel, comes on when the generator is not charging the accumulators. There is no generator switch. The voltmeter (78) is on the electrical panel on the right-hand side of the cockpit.

**AIRCRAFT CONTROLS**

**8. Flying controls and locking devices.**

- (i) The control column is of the spade-grip pattern and incorporates the brake lever, and gun and camera firing controls. The rudder bar is fitted with two-position rudder pedals and is adjusted for reach by a foot-operated wheel central on the rudder bar.
- (ii) The locking devices are stowed in a bag on the left-hand side of the cockpit and comprise a hinged clamp and four cables. The clamp is fitted to the control column with the projecting lugs in contact with the fork-end nuts of the aileron tie-rods, and the front two cables are hooked on to the rudder pedals. With the seat adjusting lever in the third notch from the top, the rear cables are hooked to each side of the seat and the cables tensioned by adjusting the rudder bar and then raising the seat.

9. **Trimming tabs**—The trimming tab controls are mounted on the left-hand side of the cockpit. The elevator tabs are controlled by the large handwheel (54) on the inboard side of the control box, while the rudder tab is controlled by the smaller handwheel (28) at the top of the box. Both wheels work in the natural sense and the tab position indicators are fitted between them.

10. **Undercarriage control**.—The undercarriage selector lever (49) moves in a slot on the left-hand sloping panel, marked UP in the forward and DOWN in the aft position; the knob of the lever must be turned clockwise before the lever can be moved. A safety catch (48), outboard of the lever must be pushed to FREE before the lever can be moved to UP, and automatically returns to LOCK when the lever is moved to the DOWN position.

**11. Undercarriage indicators**

- (i) The electrical visual indicator (6) on the left-hand side of the instrument panel has three green lights (for main wheels and tailwheel) and two red lights (for main wheels only). The indicator lights show:

Green     .. Corresponding wheel locked down.

Red        .. Corresponding main wheel between locks.

No lights .. Main wheels locked up and fairings closed.

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The knob in the centre should be pulled out to put the reserve set of green lights into operation and rotated to operate the anti-dazzle screen. The indicator switch (1) on the instrument panel is interlocked with the ignition switches so that the indicator must be switched ON before the ignition switches can be operated.

- (ii) The mechanical visual indicator consists of buttons which protrude through the upper surface of each wing when the corresponding wheel is down.
12. **Undercarriage warning light.**—A red light (4) on the left-hand side of the instrument panel comes on if the throttle is less than one-third open and the wheels are not locked down. No warning horn is fitted.
13. **Undercarriage emergency release.**—In the event of failure of the engine-driven pump the wheels may be lowered by the handpump. If this is ineffective, the main wheels can be lowered by gravity on releasing the mechanical up-locks by operating the two red painted foot pedals one beneath each sloping panel. The wheels travel beyond the vertical in order to lock down, and a pneumatic assister jack is incorporated in the mechanism to assist the wheels in the later stage of the operation. The control (40) for the assister jack is mounted forward of the engine control box.
- The tailwheel lowers automatically on failure of the hydraulic system and locks on touching down, though the corresponding green light may not show that it has done so.
14. **Flaps control and indicator.**—The flaps are controlled by a lever (52) on the left-hand sloping panel. The lever has three positions marked UP, DOWN and VALVE SHUT. The flaps can be arrested in any desired intermediate position by returning the lever to VALVE SHUT. It is important, however, that the lever be returned to the VALVE SHUT position after the flaps have been fully lowered, as, when the flaps lever is set to DOWN the blow off pressure is lower than that required for retracting the undercarriage fully. In the event of failure of the engine-driven pump, the flaps can be operated by handpump.

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An indicator is fitted on the top left-hand side of the instrument panel.

15. **Wheel brakes.**—The control lever for the pneumatic brakes is fitted on the control column spade grip. A parking catch is provided. Differential control of the brakes is provided by a relay valve connected to the rudder bar. The triple pressure gauge (26) on the instrument panel shows the air pressure in the storage cylinder and at each brake.

### ENGINE CONTROLS

16. **Throttle control.**—The throttle lever (35) is gated at the climb position. A bomb release switch is incorporated in the top of the lever. The friction adjuster also adjusts the friction of the propeller speed control lever.
17. **Propeller speed control.**—The control lever inboard of the throttle lever is moved forward to INCREASE REVS. The propeller is governed down to 1,600 r.p.m. to allow stretching a glide if the engine has failed but oil pressure is still available. For ground or flight operation, however, the normal minimum is 2,000 r.p.m.
18. **Supercharger control.**—The lever (33) at the rear of the engine control box is moved downward for S ratio and upward for M ratio.
19. **Radiator shutter control.**—The radiator shutter is hydraulically operated and is controlled by a lever (51) on the left sloping panel outboard of the flap control lever; movement to DOWN opens the shutter. In the event of engine-driven pump failure, the shutter can be operated by the handpump.
20. **Starting and slow-running cut-out control.**—The lever (43) on the left sloping panel has three positions: START, NORMAL and CUT-OUT. At START a stop is introduced into the throttle quadrant to give the throttle setting for starting, but a safety catch (44) beside the lever must be moved down before START can be selected. The friction adjuster for the throttle lever should be slackened off as otherwise the stop is difficult to feel.

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21. **Fuel tank pressurising.**—The cock control (63) is on the right-hand shelf and is turned anti-clockwise to ON.
22. **Priming pumps.**—Two 40 c.c. priming pumps are mounted one above the other on the right-hand sloping panel. The upper pump primes the engine cylinders with fluid drawn from the special tank, and the lower pump primes the carburettor with fuel from the main supply. The pump handles are released by unscrewing and should be screwed down after use.
23. **Ignition switches.**—The main switches (2) are on the left-hand side of the instrument panel and are prevented by a sliding bar from being switched on unless the undercarriage indicator switch is also on. Four ignition testing buttons are fitted in a box on the left-hand side of the cockpit above the port top longeron. If ignition trouble is suspected and there is a drop in r.p.m. when one or other of the main switches is switched off, press each button in turn and note which reproduces the drop in r.p.m. while both main switches are ON. By so doing, considerable time will be saved in locating the trouble.
24. **Cartridge starter and booster-coil pushbuttons.**—These are on the left-hand side of the instrument panel and must be depressed simultaneously in order to start the engine.
25. **Starter re-loading control.**—The toggle (77) on the right-hand shelf is used to insert the next of the five cartridges provided into the breech.
26. **Oil dilution.**—A pushbutton (76) is provided on the right-hand shelf just aft of the starter reloading control, but the system has not yet been fitted to this engine.

## **COCKPIT EQUIPMENT**

27. **Seat harness.**—The seat harness is of a new type. All four straps can be adjusted in a similar way to the leg straps on Sutton harness. Stowage for leg straps is provided on either side of the cockpit.

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The harness should be adjusted so that the junction box is immediately below the parachute quick release box. No harness release is as yet provided and if for any reason the straps are loosened, care must be taken to see that they do not slip off the shoulders. (Harness release will be introduced by Mod. 103).

28. **Cockpit hood.**—The winding gear is on the port side of the cockpit. The spring-loaded knob (36) of the winder crank must be pulled inboard and held against the spring while the crank is turned. When the knob is released a pin on the bottom of the knob engages in one of the holes in a locking plate and the hood is then locked in position. Before getting out of the cockpit the knob on the crank lever should be pulled out as far as possible and turned until a projection on the knob engages a small recess on the crank lever thus holding the pin free of the holes in the locking plate and permitting the hood to be moved from the outside by hand. The hood may be locked in the closed position from outside by releasing a spring-loaded locking bolt on the outside of the starboard side panel to engage in a slot on the hood bottom rail. If the hood has been locked, the bolt must be pressed in and given a quarter turn to retain it in its depressed position or the hood cannot be fully closed from inside the cockpit.
29. **Windscreen.**—The centre panel on some early aircraft is of the dry air sandwich type. This is connected by a rubber pipe to a rubber expansion bag which is contained in a fibre cylinder fitted immediately below the windscreen. If misting occurs the pipe should be disconnected and dry air introduced before re-connecting the pipe.
30. **Cockpit lighting.**—Two lamps are fitted at the top of the instrument panel and are controlled by two dimmer switches (11 and 14) just inboard of them. A third lamp above the electrical panel is controlled by a dimmer switch at the forward end of the panel, and a fourth lamp above the trimming tab control box is controlled by a dimmer switch (45) at the top of the left-hand sloping panel. The compass light is controlled by a dimmer switch (15) on the instrument panel.



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31. **Cockpit heating.**—The supply of warm air to the cockpit is controlled by a lever (64) on the starboard cockpit wall: the lever is moved downwards from OFF to ON. Two ventilators are provided, one on each side of the instrument panel.

### OPERATIONAL CONTROLS

32. **Guns.**—The guns are fired electro-pneumatically by the pushbutton on the control column handle; the button being turned clockwise from SAFE to FIRE. The compressed air supply is taken from the same source as the brake supply, and the available pressure is shown by the gauge on the instrument panel.
33. **Reflector gun sight.**—A reflector gun sight is mounted on a bar above the instrument panel. A dimmer switch (12) is mounted on the instrument panel and has three positions, marked OFF, NIGHT and DAY.
34. **Camera gun.**—The camera gun is mounted inside the radiator fairing and is operated by the gun-firing button on the control column, a succession of exposures being taken the whole time the button is depressed. A footage indicator and an aperture switch are mounted on a plate on the right-hand shelf; the camera master switch (70) is on the electrical panel. A separate pushbutton on the control column operates the camera gun independently of the guns. When not in use, the plug to the indicator should be put in the dummy socket on the shelf.
35. **Radio.**—The radio installation, carried behind the pilot, comprises a TR1143 and A1271 beam approach. Provision is also made for IFF equipment.