SECTION 1

PILOT'S CONTROLS AND EQUIPMENT

LIST OF CONTENTS

	Para.
INTRODUCTION	1
MAIN SERVICES	
Fuel system	2
Oil system	3
Hydraulic system	4
Pneumatic system	5
Electrical system	6
AIRCRAFT CONTROLS	
Flying controls and locking devices ...	7
Flying instruments	8
Trimming tabs	9
Undercarriage control	10
Undercarriage indicators	11
Undercarriage warning horn and light ...	12
Undercarriage emergency system	13
Flap control and indicator	14
Wheel brakes	15
ENGINE CONTROLS	
Throttle and mixture controls	16
Propeller speed control	17
Supercharger control	18
Radiator shutter control	19
Starting and slow-running cut-out control ...	20
Fuel cock control and contents gauge ...	21
Fuel tank pressurising	22
Priming pumps	23
Ignition switches	24
Cartridge starting	25
Starter re-loading control	26
Oil dilution	27
Engine instruments	28
COCKPIT ACCOMMODATION AND EQUIPMENT	
Pilot's seat control	29
Safety harness release	30
Cockpit doors and windows	31
Cockpit lighting	32
Cockpit heating	33
Heated clothing supply	34
Oxygen	35
Mirror	36
Map case	37

OPERATIONAL EQUIPMENT AND CONTROLS
Guns and cannon 38
Reflector gun sight 39
Camera gun 40
NAVIGATIONAL, SIGNALLING AND LIGHTING EQUIPMENT
Wireless 41
Navigation and identification lamps ... 42
Landing lamps 43
DE-ICING EQUIPMENT
Windscreen de-icing 44
Pressure head heater 45
EMERGENCY EQUIPMENT
Door and roof jettisoning 46
Fire extinguisher 47
Crowbar 48
Portfires 49
First-aid 50

LIST OF ILLUSTRATIONS

Fig.
Instrument panel 1
Port side of cockpit 2
Starboard side of cockpit 3
Fuel system diagram (simplified) 4

SECTION 1

PILOT'S CONTROLS AND EQUIPMENT

INTRODUCTION

1. The Typhoon I is a single seat low wing monoplane fighter fitted with a Sabre II engine and a de Havilland 35° hydromatic propeller. The Mark IA and the Mark IB differ only in their armament.

MAIN SERVICES

2. Fuel system.- Fuel is carried in four self-sealing tanks, two in each main plane, and is delivered to the carburettor by an engine-driven pump. A three-way cock control in the cockpit allows fuel to be drawn simultaneously from both main tanks or from both nose tanks as required, but not from the main and nose tanks at the same time. The tank capacities are as follows:

Two main tanks (40 gallons each):	80 gallons
Two nose tanks (37 gallons each):	74 gallons
Total:	154 gallons

To meet the possibility of engine cutting due to fuel boiling in warm weather at high altitudes the tanks can be pressurised (operative above 20,000 feet). Pressurising, however, impairs the self-sealing of tanks and should, therefore, be turned on only when fuel pressure falls below 1½ lb/sq.in. or the warning lamp (if fitted) comes on. In very warm weather at very high altitudes a rich cut may occur with the tanks pressurised and pressure must then be turned off.

3. Oil system.- Oil is supplied by a tank of 16 gallons capacity fitted immediately aft of the fireproof bulkhead. The system incorporates a viscosity valve and a cooler, which forms an integral part of the radiator.

4. Hydraulic system.- An engine-driven hydraulic pump, which maintains a constant pressure of approximately 1,800 lb/sq.in., supplies the power for operating the undercarriage and its fairing flaps, the wing flaps and the radiator shutter. A handpump (54) is fitted in the cockpit for use in the event of engine pump failure.

5. Pneumatic system.- An engine-driven air compressor and a storage cylinder supply a pressure of ~~210~~ 450 lb/sq.in. for operation of the brakes and gun-firing mechanism. A triple pressure gauge (24) is fitted on the instrument panel.

6. Electrical system.- A 24 Volt generator supplies two accumulators for the operation of the whole electrical system. A generator ON-OFF switch (71) and a voltmeter (72) are on the right-hand side of the cockpit. On later aircraft a "Power Failure" lamp, on the right-hand side of the instrument panel, comes on when the generator is not charging the accumulators.

AIRCRAFT CONTROLS

7. Flying controls and locking devices.-

(i) The control column is of the spade-grip pattern and incorporates the brake lever and gun and cannon firing control. The rudder bar is fitted with two-position rudder pedals (46 and 85) and is adjusted for reach by a foot-operated wheel 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 two front 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.

8. Flying instruments.- A standard blind flying instrument panel (2) is incorporated in the main panel. The instruments comprise: airspeed indicator, altimeter, directional gyro, artificial horizon, rate of climb and descent indicator and turn and bank indicator.

9. Trimming tabs.- The elevator trimming tabs are controlled by a handwheel (56) on the left-hand side of the cockpit and the rudder trimming tab by a smaller handwheel (33) to the left of it. Both wheels work in the natural sense and tab position indicators (55) are fitted between them.

10. Undercarriage control.- The undercarriage selector lever (50) moves in a slot on the left-hand sloping panel, marked UP in the forward position; the knob of the lever has to be turned clockwise before the lever can be moved. The safety catch (48) 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 (30) on the instrument panel comprises three green lights (for main wheels and tail wheel) and two red lights (for main wheels only). The indications are:

Green: Corresponding wheel locked down.
Red: Corresponding main wheel between locks.
No lights: Main wheels locked up.

There are two types of instrument and on both the green lights are duplicated; they differ only in the methods of putting the reserve set of green lights into operation and of operating the anti-dazzle screen. These are as follows:

To put into operation reserve green lights:	Pull knob in centre	Rotate knob in centre
To operate anti-dazzle screen:	Rotate knob	Move lever at side.

The indicator ON-OFF switch (27) on the instrument panel has a sliding bar which prevents the ignition being switched on unless this switch is on.

(ii) Mechanical indicator buttons protrude through the upper surface of each wing when the corresponding wheel is down.

12. Undercarriage warning horn and light.- A horn behind the headrest sounds and a red light (28) on the instrument panel comes on if the throttle is less than one third open and the wheels are not locked down. A push-button (3) on the instrument panel tests the horn and light.

13. Undercarriage emergency system.- In the event of failure of the hydraulic system (on early aircraft the gauge (25) provides a check) the main wheels may be lowered by means of two foot pedals (86), one beneath each sloping panel. The tail wheel 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 hydraulically controlled by a lever (52) on the left-hand sloping panel, movement forward raising the flaps. They may be set to any intermediate position by moving the lever to the VALVE SHUT position. An indicator (4) is fitted on the instrument panel. In the event of failure of the engine-driven pump they can be operated by the hand-pump.

15. Wheel brakes.- The control lever (21) for the pneumatic brakes is fitted on the control column spade grip; differential control of the brakes is provided by a relay valve connected to the rudder bar. A catch for retaining the brake lever in the on position for parking is fitted near the lever pivot. The triple pressure gauge on the instrument panel shows the air pressure in the storage cylinder and at each brake.

ENGINE CONTROLS

16. Throttle and mixture controls.- The throttle lever (42) is moved forward to the climb and TAKE-OFF positions, the latter being gated. The friction adjuster (49) also adjusts friction of the propeller speed control. On later aircraft a bomb-release switch is incorporated in the top of the lever. The mixture control lever (37) is moved forward to WEAK and is automatically set to RICH when the throttle lever is between CLOSED and 14¼° open, but at other throttle positions may be set at either RICH or WEAK as required. On some early aircraft the mixture lever is also returned to RICH when the throttle is moved beyond the climb position.

17. Propeller speed control.- The control lever (47) in the engine control box is moved forward to increase r.p.m. and the friction adjuster also adjusts the friction of the throttle lever. On some early aircraft the rear end of the slot is marked POSITIVE COARSE PITCH, though in actual fact there is no such setting of the propeller.

18. Supercharger control.- The lever (34) in the engine control box is moved downward for FULL (S ratio) supercharging and upward for MODERATE (M ratio) supercharging.

19. Radiator shutter control.- The radiator shutter is hydraulically operated by the lever (53) on the left sloping panel. The DOWN position opens the shutter. In the event of failure of the engine-driven pump the shutter may be operated by the hydraulic handpump.

20. Starting and slow-running cut-out control.- The lever (44) on the left-hand sloping panel has three positions: START, NORMAL and CUT-OUT. At START a stop is introduced into the throttle quadrant to give the throttle lever setting for starting, but a safety catch (45) beside the lever must be moved down before START can be selected.

21. Fuel cock control and contents gauge.- This control (87) is on the right-hand sloping panel and has three positions: ALL OFF, MAIN TANKS and NOSE TANKS. The fuel contents gauge (14) on the instrument panel is operated by selecting the tank required on the adjacent switch (15) and pressing the switch arm.

22. Fuel tank pressurising.- The cock control is on the right-hand decking shelf.

23. Priming pumps.- Two pumps are fitted on the right-hand sloping panel, the inboard pump (88) for priming the cylinders and the outboard pump (89) the carburettor. The pump handles are released by unscrewing and should be screwed down again after use.

24. Ignition switches.- The main switches (26) 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 switches are fitted in a box (40) on the left-hand side of the cockpit.

25. Cartridge starting.- The cartridge starter and booster-coil pushbuttons (10 and 11) are on the right-hand side of the instrument panel and must be depressed simultaneously in order to start the engine. On early aircraft the pushbuttons are on the left-hand side of the instrument panel.

26. Starter re-loading control.- The toggle (84) on the right-hand sloping panel is used to insert the next of the five cartridges provided into the starter breech.

27. Oil dilution.- A pushbutton (80) is provided on the right-hand decking shelf, but the system has not yet been fitted to this engine.

28. Engine instruments.- The engine instruments are grouped on the right-hand side of the instrument panel and comprise the following: engine speed indicator (12), boost gauge (13), oil temperature gauge (18), radiator temperature gauge (19), oil pressure gauge (20) and fuel pressure gauge (17) or warning lamp.

COCKPIT ACCOMMODATION AND EQUIPMENT

29. Pilot's seat control.- The seat is adjustable for height by means of the thumb-release lever (81) on the right-hand side of the seat (57).

30. Safety harness release.- In order that the pilot may lean forward without unfastening his harness, a release catch (66) is fitted immediately below the starboard door.

31. Cockpit doors and windows.-

(i) Each door is automatically locked when in the fully open position and is released by pulling the stay inward after easing the door outward. External and internal handles are provided and are designed so that they may be used as hand-holes to facilitate entry.

(ii) The sliding windows are operated by handles (36 and 68). To use these handles, hold the knob and press it towards the door to unlock and, still pressing, rotate clockwise to open and anti-clockwise to shut. The windows will lock in any position on release of the handles.

32. Cockpit lighting.- Two lamps are fitted at the top of the instrument panel and are controlled by dimmer switches (6 and 8) just inboard of them. A third lamp (73), on the electrical panel, is controlled by a dimmer switch (82) at the forward end of the panel and a fourth lamp, above the elevator and rudder tab controls, is controlled by a dimmer switch at the top of the left-hand sloping panel. The compass lamp is controlled from the dimmer switch (9) on the main instrument panel. On early aircraft the instrument panel lamps (41 and 62) are mounted on each side of the cockpit and the lamp for the trimming tab controls is not fitted.

33. Cockpit heating.- The supply of warm air to the cockpit is controlled by a lever on the right-hand decking shelf.

34. Heated clothing supply.- A socket for the supply of current to electrically-heated gloves and boots is stowed in clips on the electrical panel.

35. Oxygen.- A standard regulator unit (29) is fitted on the left-hand side of the instrument panel and a bayonet socket (58) is attached to the pilot's harness or, on early aircraft, is behind the pilot's left elbow. There is a regulator control (32) to the left of the pilot's seat.

36. Mirror.- A mirror providing a rearward view is fitted at the top of the windscreen.

37. Map case.- A metal case (75) for the stowage of maps and books is fitted to the right of the pilot's seat.

OPERATIONAL EQUIPMENT AND CONTROLS

38. Guns and cannon.- The machine guns and cannon are fired pneumatically by means of the push-button (23) on the control column spade grip. The compressed air supply is taken from the same source as the brake supply, the available pressure being shown by the gauge.

39. Reflector gun sight.- For sighting the guns and cannon a reflector sight is mounted on a bar (7) above the instrument panel. A dimmer switch (5) is fitted below the mounting bar and has three positions marked OFF, NIGHT and DAY respectively. When not in use, the base of the sight can be stowed forward of the sight mounting.

40. Camera gun.- A camera gun is mounted inside the radiator fairing and is operated by the gun-firing pushbutton on the control column spade-grip, a succession of exposures being made during the whole time the button is depressed. A footage indicator and an aperture switch are mounted on the wedge plate (74) above the camera master switch (79). A separate pushbutton (22) on the spade-grip operates the camera gun independently of the guns. When not in use, the plug to the indicator should be placed in the dummy socket (78) on the right-hand shelf.

NAVIGATIONAL, SIGNALLING AND LIGHTING EQUIPMENT

41. Wireless.- The aircraft is equipped with either a type T.R.9D or T.R.1133A combined transmitter-receiver, the control unit (39) for which is on the left-hand side of the cockpit. A remote contactor (1) and switch (31) are on the instrument panel, the master switch (67) being on the right-hand side of the cockpit. The R.3003 push-buttons (59) and master switch (60) are also on the right-hand side of the cockpit. The microphone/telephone socket is mounted in clips on the electrical panel or, on earlier aircraft, behind the pilot's left elbow.

42. Navigation and identification lamps.- The switch (70) for the navigation lamps is on the electrical panel to the right of the seat. The upward and downward identification lamps are controlled from the signalling switchbox (64) on the electrical panel. This switchbox has a switch for each lamp and a morsing key and provides for steady illumination or morse signalling from each lamp or both.

43. Landing lamps.- There is a landing lamp fitted in the leading edge of each main plane which is controlled by a selector switch (43) on the left-hand sloping panel and a lever (35) in the engine control box which dips the beam when moved upwards to DOWN. A friction adjuster (51) is provided, the lever returning to UP when released. The lamps cannot be illuminated together.

DE-ICING EQUIPMENT

44. Windscreen de-icing.- A tank containing the de-icing solution is mounted on the right-hand side of the cockpit and there is a pump (83) on the right-hand sloping panel. Liquid is pumped from the tank to a spray at the base of the windscreen, from which it is sprayed over the front panel.

45. Pressure head heater.- The heating element in the pressure head is controlled by a switch (65) on the electrical panel.

EMERGENCY EQUIPMENT

46. Door and roof jettisoning.- The levers (38 and 61), one on each forward doorpost, jettison the doors when pulled smartly down and inwards. They must be operated simultaneously. The roof panel is released automatically by this operation.

47. Fire extinguisher.- A pushbutton (77) on the right-hand side of the cockpit operates the Graviner extinguisher which also functions automatically under certain fire or crash conditions.

48. Crowbar.- On some aircraft a crowbar, for use in an emergency, is stowed in clips on the starboard side of the starboard heelboard.

49. Portfires.- A bag for the storage of two portfires is attached to the left-hand side of the pilot's seat. These are to be used for destroying the aircraft by fire should circumstances necessitate such action to be taken. Direction for use are on the casing of the portfires.

50. First-aid.- The first-aid outfit is stowed on the inner face of the radio access panel on the port side of the fuselage.

Key to fig. 1

INSTRUMENT PANEL

1. Radio remote contactor
2. Instrument-flying panel
3. Pushbutton for testing horn and its indicator lamp
4. Flap indicator
5. Dimmer switch for reflector sight
6. Dimmer switch for port cockpit lamp
7. Mounting bar for reflector sight
8. Dimmer switch for starboard cockpit lamp
9. Dimmer switch for compass lamp
10. Starter pushbutton
11. Booster coil pushbutton
12. Engine-speed indicator
13. Boost pressure gauge
14. Fuel contents gauge
15. Selector switch for fuel contents gauge
16. Holder for compass card
17. Fuel pressure gauge
18. Oil temperature gauge
19. Radiator temperature gauge
20. Oil pressure gauge
21. Brake lever
22. Camera button
23. Gun-and-camera button
24. Pneumatic pressure gauge
25. Hydraulic pressure gauge
26. Ignition switches
27. Master switch for undercarriage indicator
28. Horn indicator lamp

28a. Clock

29. Oxygen regulator
30. Undercarriage indicator
31. Radio remote contactor switch

31a. Watch holder

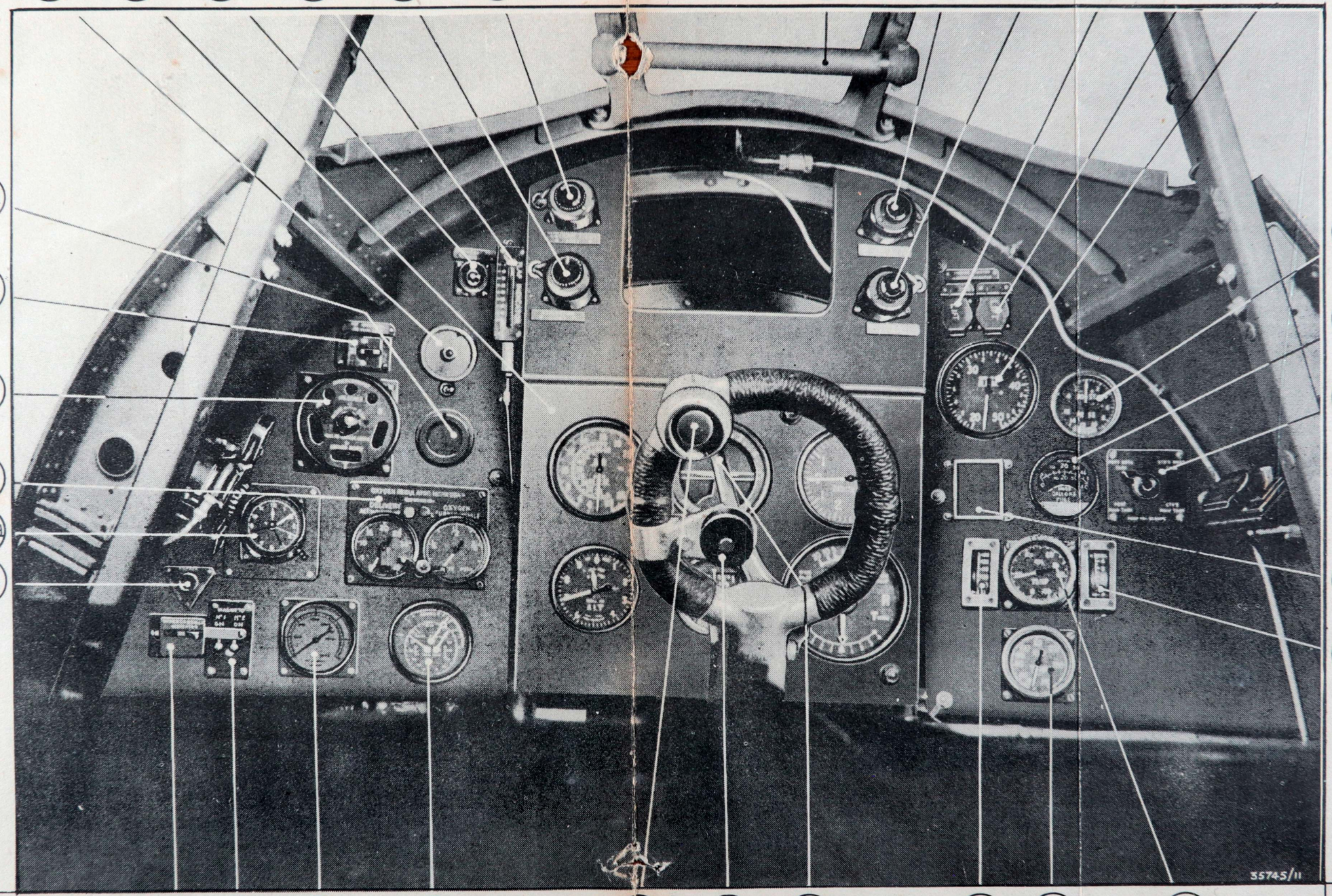

FIG. 1

INSTRUMENT PANEL

FIG. 1

Key to fig. 2

PORT SIDE OF COCKPIT

32. Oxygen master control valve
33. Rudder tab control
34. Supercharger lever
35. Landing lamps lever
36. Window-winding handle (port)
37. Mixture lever
38. Port door jettison lever
39. Radio remote controller (T.R.9D shown)
40. Ignition-testing switchbox
41. Port cockpit lamp
42. Throttle lever
43. Landing lamps switch
44. Starting, and slow-running cut-out, lever
45. Safety catch for starting, and slow-running cut-out, lever
46. Rudder pedal (left)
47. Airscrew lever
48. Safety catch for undercarriage selector lever
49. Friction adjuster for throttle lever and airscrew lever
50. Undercarriage selector lever
51. Friction adjuster for landing lamps lever
52. Flap lever
53. Radiator shutter lever
54. Hydraulic handpump
55. Elevator and rudder tab indicators
56. Elevator tab control
57. Cockpit seat
58. Oxygen socket

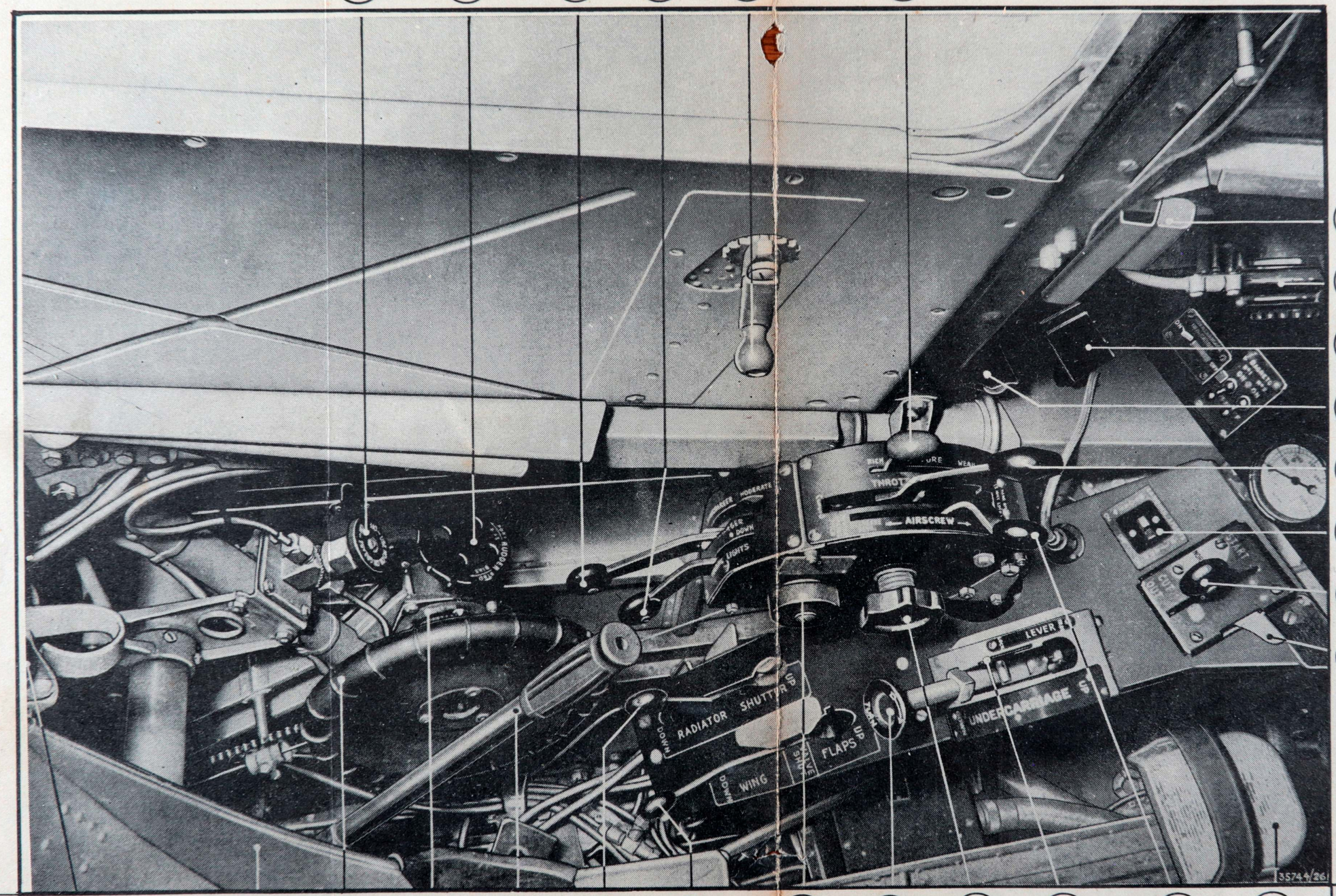

FIG. 2

PORT SIDE OF COCKPIT

FIG. 2

Key to fig. 3

STARBOARD SIDE OF COCKPIT

59. R.3003 demolition switches
60. R.3003 master switch
61. Starboard door jettison lever
62, Starboard cockpit lamp
63. Ammeter socket
64. Identification lamps signalling switchbox
65. Pressure head heater switch
66. Safety harness release lever
67. Radio master contactor heating switch
68. Window-winding handle (starboard)
69. Formation lamps switch (not used)
70. Navigation lamps switch
71. Generator switch
72. Voltmeter
73. Electrical panel lamp
74. Wedge plate for footage indicator
75. Map case
76. Parachute flare release toggle
77. Fire extinguisher pressbutton
78. Dummy socket for footage indicator plug
79. Camera master switch
80. Oil dilution switch (not used)
81. Seat height-adjusting lever
82. Dimmer switch for electrical panel lamp
83. Windscreen de-icing pump
84. Starter re-loading toggle
85. Rudder pedal (right)
86. Undercarriage emergency-lowering pedal (right)
87. Fuel cock control
88. Cylinder priming pump
89. Carburettor priming pump

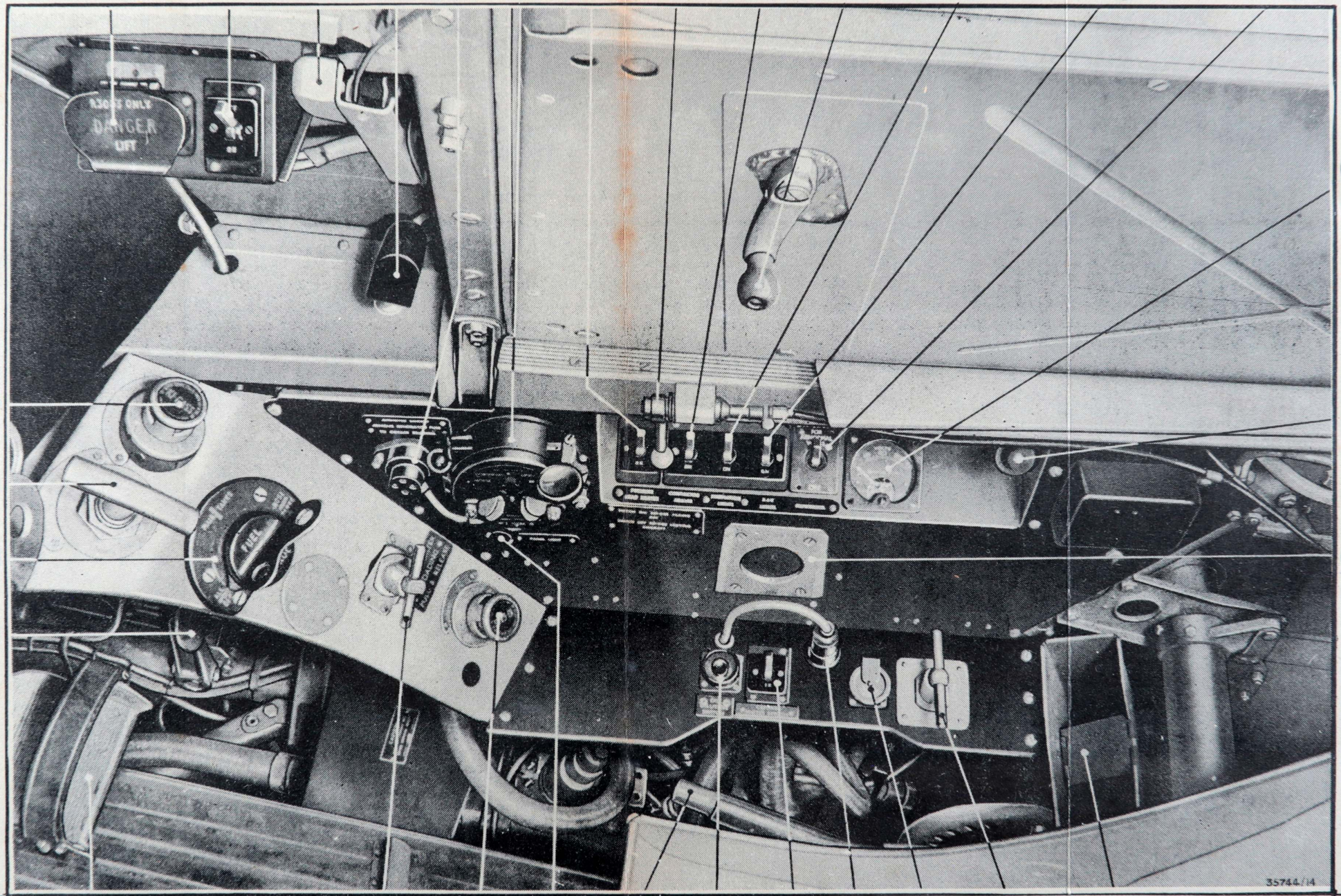

FIG. 3

STARBOARD SIDE OF COCKPIT

FIG. 3

FIG. 4 FUEL SYSTEM DIAGRAM (SIMPLIFIED) FIG. 4