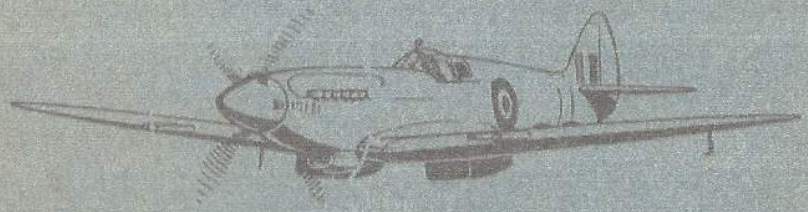
A.P. 2816 A—P.N.

PILOT'S NOTES

FOR

SPITFIRE 21

GRIFFON 61 ENGINE



PREPARED BY DIRECTION OF THE MINISTER OF SUPPLY

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PROMULGATED BY ORDER OF THE AIR COUNCIL

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AMENDMENTS

Amendment lists will be issued as necessary and will be gummed for affixing to the inside back cover of these notes.

Each amendment list will, where applicable, be accompanied by gummed slips for sticking in the appropriate places in the text.

Incorporation of an amendment list must be certified by inserting date of incorporation and initials below.

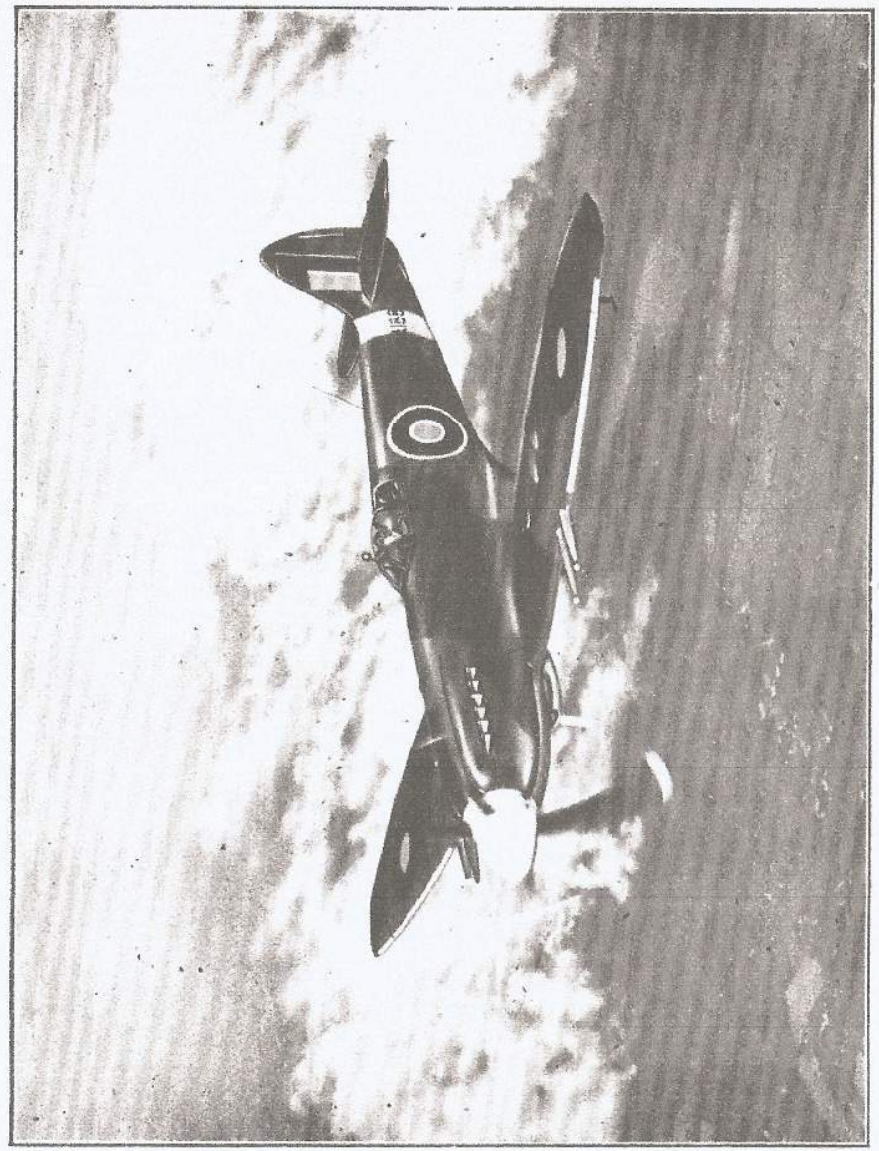
A.L. NO.	INITIALS	DATE	A.L. NO.	INITIALS	DATE
1	M-P.	21/3/50	7		
2	M-P.	17/9/51	8		
3			9		
4			10		
5			11		
6			12		

NOTES TO USERS

These Notes are complementary to A.P. 2095 Pilot's Notes General and assume a thorough knowledge of its contents. All pilots should be in possession of a copy of A.P. 2095 (*see* A.M.O. A718/48).

Additional copies may be obtained by the Station publications officer by application on Form 294A, in duplicate, to Command headquarters for onward transmission to A.P.F.S. (*see* A.P. 113). The number of this publication must be quoted in full—A.P. 2816A—P.N.

Comments and suggestions should be forwarded through the usual channels to the Air Ministry (T.F.2).



SPITFIRE 21

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SPITFIRE 21.

PILOT'S CHECK LIST

(Excluding Items of Operational Equipment)

ITEM		CHECK
1.	Weight and balance.	Within permissible limits.
2.	Authorisation book.	Sign.
3.	Form 700.	Sign.
	External checks.	
	N.B.—Start at the cockpit entrance on the port side and work clockwise around the aircraft.	
4.	Port mainplane.	Condition. Panels secure.
5.	Port flap.	Condition and position.
6.	Port aileron.	Condition. Trimmer. External control lock removed.
7.	Port navigation light.	Condition.
8.	Pressure head.	Cover removed.
9.	Port mainplane.	Condition of undersurface and leading edge. Panels secure.
10.	Port undercarriage.	Condition of doors. Brake lead secure. Tyre for cuts and creep. Valve free. Chock in position.
11.	Port radiator.	Condition. Condition of radiator flap. Absence of coolant leaks.
12.	Centre plane.	Condition of under surface. Panels secure.
13.	Engine.	Condition of propeller and spinner. Cowlings secure. Condition of air intake. Absence of oil and coolant leaks.
14.	External fire-extinguishers.	In position.
15.	Starboard radiator.	Condition. Condition of radiator flap. Absence of oil and coolant leaks.
16.	Starboard undercarriage.	Condition of doors. Brake lead secure. Tyre for cuts and creep. Valve free. Chock in position.
17.	Starboard mainplane.	Condition of undersurface and leading edge. Panels secure. External aerial secure.
18.	Starboard navigation light.	Condition.
19.	Starboard aileron.	Condition. Trimmer. External control lock removed.
20.	Starboard flap.	Condition and position.
21.	Starboard mainplane.	Condition. Panels secure.

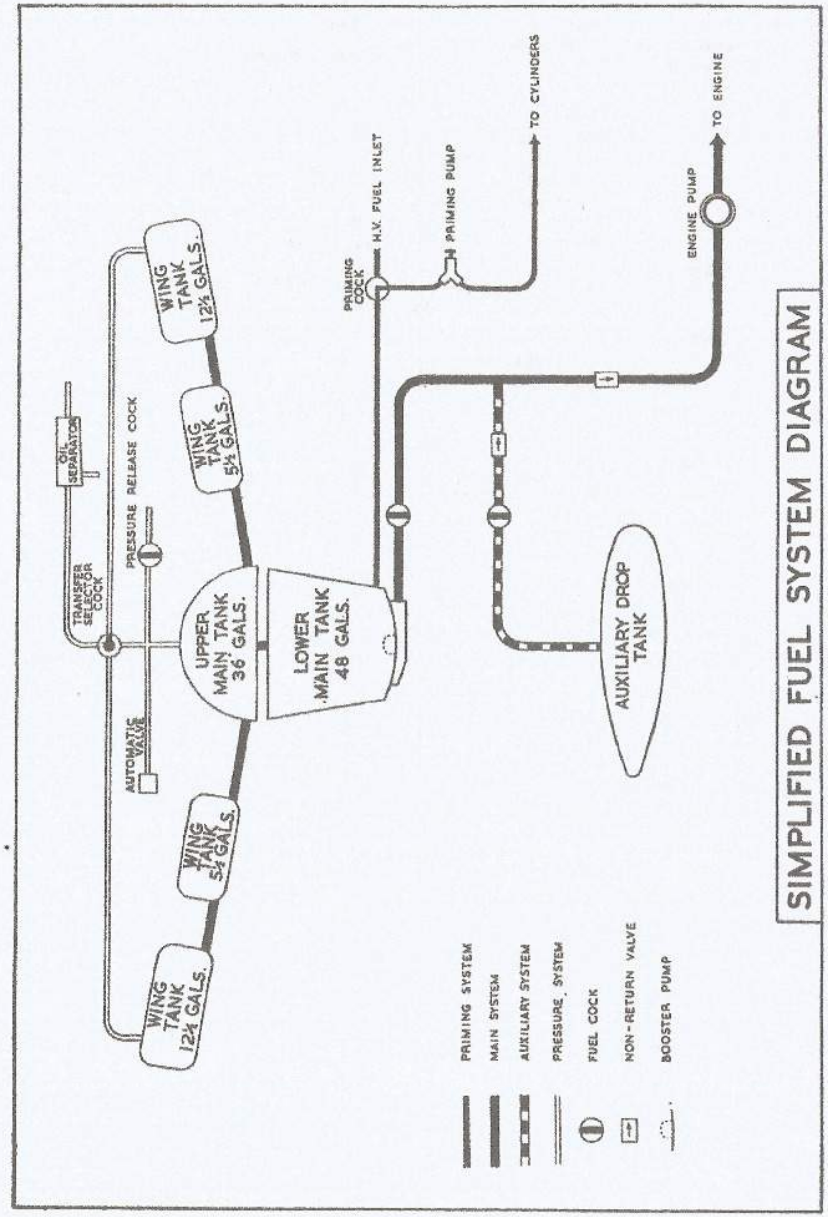
ITEM		CHECK
22.	Starboard fuselage.	Condition. Panels secure. First-aid outfit fitted. Panel shut. External aerial secure. Condition of undersurface. Condition of identification lights.
23.	Fin.	Condition. Condition of leading edge.
24.	Starboard tailplane.	Condition of upper and lower surface. Condition of leading edge.
25.	Starboard elevator.	Condition. Trimmer. External control lock removed.
26.	Rudder.	Condition. Trimmer. External control lock removed. Condition of tail light.
27.	Port elevator.	Condition. Trimmer. External control lock removed.
28.	Port tailplane.	Condition of upper and lower surface. Condition of leading edge.
29.	Tailwheel.	Condition of doors. Tyre for cuts and creep. Valve free.
30.	Port fuselage.	Condition. Panels secure.
31.	Dispersal area.	All clear around aircraft.
	Internal checks.	
32.	Internal control locks.	Removed and stowed.
33.	Cockpit hood.	Security and operation. Hood open.
34.	Undercarriage lever.	Locked down.
35.	Pilot's seat.	Adjust for height.
36.	Rudder pedals.	Adjust for length.
37.	Flying controls.	Gun firing button safe. Full and correct movement.
	Cockpit check.	
	N.B.—Switch on the electrical master switch and then work from left to right.	
38.	Cockpit door.	On latch.
39.	Crowbar.	In position.
40.	Trimmer controls.	Full and correct movement.
41.	Navigation lights.	As required.
42.	Pressure head heater.	Off.
43.	Booster pump.	Off.
44.	Generator warning light.	On.
45.	Carburettor air intake.	Filter in.
46.	R.p.m. control or override lever.	Max. r.p.m. position.
47.	Throttle.	Closed. Adjust friction.
48.	Fuel cut-off control.	Cut-off.
49.	Fuel transfer cock.	Normal.
50.	Ignition switches.	Off.
51.	Pneumatic pressure.	Supply. Delivery to each wheel brake.
52.	Tail wheel light.	On.

	ITEM	CHECK
53.	Under-carriage indicator.	Green light on. Night flying blind.
54.	Oxygen.	Delivery.
55.	Flap selector.	Air-off.
56.	Cockpit lighting.	As required.
57.	Magnetic compass.	Serviceability.
58.	Main fuel cock.	Off.
59.	Altimeter.	Set.
60.	Direction indicator.	Caged.
61.	Super-charger gear switch.	Auto. Red light out.
62.	Boost gauge.	Static reading.
63.	Fuel gauge.	Contents.
64.	Fuel pressure warning light.	On.
65.	Fuel low level warning light.	Out.
66.	Identification lights.	As required.
67.	Ki-gass primer.	Off.
68.	Priming selector.	All off.
69.	Drop tank fuel cock.	Off. Jettison lever down.
70.	Windscreen de-icer.	Operation.
71.	Under-carriage emergency lever.	Vertical position.
72.	Fuel pressurising cock.	As required.
73.	Pilot's harness.	Adjust. Test lock.

	ITEM	CHECK
74.	Brakes.	On.
	Start and warm up the engine (see para. 40).	
75.	Generator warning light.	Out.
76.	Fuel pressure warning light.	Out.
77.	Pneumatic pressure.	Supply increasing.
78.	Flaps.	Lower and raise. Selector at air-off.
79.	Direction indicator.	Set with magnetic compass. Uncage.
80.	Radio.	Test V.H.F. and other radio aids. Check altimeter setting with control.
81.	Radiator flaps.	Depress test pushbutton. Flap open. Release pushbutton.
	Run up and test the engine (see para. 41).	
82.	Chocks.	Clear.
83.	Taxying.	As soon as possible test brakes. Direction indicator for accuracy. Artificial horizon for accuracy. Check temperatures and pressures. Check brake pressures. Pressure head heater on if required.
	Checks for take-off.	
84.	Trim. Elevator. Rudder.	Neutral. Full left (back).

	ITEM	CHECK
85.	R.p.m. control or override lever.	Max. r.p.m. position.
86.	Fuel.	Contents. Main tank on. Transfer cock normal. Drop tank cock off. Booster pump on.
87.	Flaps.	Up. Selector at air-off.
88.	Super-charger.	Auto. Red light out.
89.	Carburettor air intake.	Filter in.
90.	Engine.	Clear.
91.	Harness.	Locked.
	Checks in flight as necessary.	
	Checks before landing—Reduce speed to 140 knots.	
92.	Harness.	Locked.
93.	Brakes.	Oft. Check pressures.
94.	Fuel.	Main tank on. Booster pump on.
95.	Carburettor air intake.	Filter in.
96.	Super-charger.	Red light out.
97.	Under-carriage.	Down and locked. Tail wheel light on.
98.	R.p.m. control or override lever.	Max. r.p.m. position.

	ITEM	CHECK
99.	Flaps.	Down.
	After landing—Clear runway.	
100	Pneumatic pressure.	Supply sufficient for taxying.
101.	Flaps.	Up.
102.	Booster pump.	Off.
103.	Pressure-head heater.	As required.
	On reaching dispersal. Idle the engine for 30 seconds at 800-900 r.p.m.	
104.	Fuel cut-off control.	Cut-off (fully aft).
105.	Main fuel cock.	Off.
106.	Ignition switches.	Off.
107.	Electrical services.	All off.
108.	Master switch.	Off.
109.	Direction indicator.	Caged.
110.	Chocks.	In position.
111.	Brakes.	Off.
112.	Internal control locks.	On.
113.	Pressure head.	Cover on.
114	Form 700.	Sign.
115.	Authorisation book.	Sign.



PART I
DESCRIPTIVE

NOTE.—Throughout this publication the following conventions apply :—

(a) Words in CAPITAL LETTERS indicate the actual markings on the controls concerned.

(b) The numbers quoted in brackets after items in the text refer to the illustrations in Part V.

(c) Unless otherwise stated all speeds quoted are indicated airspeeds.

INTRODUCTION

1. The Spitfire Mk. 21 aircraft is fitted with a Griffon 61 engine, having two-speed, two-stage supercharging and a Bendix Stromberg carburettor, driving a Rotol 35° five-bladed propeller. The aircraft is fully tropicalised and has an armament of four 20-mm. guns. A drop tank may be carried beneath the fuselage.

FUEL, OIL AND COOLANT SYSTEMS

2. **Fuel tanks**

Fuel is carried in six tanks, two main tanks mounted one above the other in the fuselage and two interconnected tanks in the leading edge of each wing. The lower main tank and wing tanks are self-sealing. The top main tank feeds into the lower tank and fuel in the wing tanks is transferred to the top main tank by air pressure. An engine-driven pump supplies fuel to the carburettor through a filter. The vapour return line from the Stromberg carburettor is connected to the top main tank. A drop tank of 90 gallons capacity can be fitted under the fuselage. The drop tank cannot be pressurised, fuel being drawn from it by the engine-driven fuel pump. The main and wing tanks are vented to atmosphere with the pressurising cock set to OFF. With this cock ON, the tanks are automatically pressurised above 15,000 ft. provided that the fuel transfer selector cock (37) is in the

NORMAL VENTING or PRESSURISING position. With the transfer selector cock set to PORT (or STARBOARD) WING TANKS, fuel is transferred by air pressure from the corresponding pair of wing tanks to the main tanks. Pressurising of the main tanks is then inoperative even with the pressurising cock ON.
Pressurising impairs the self-sealing qualities of the tanks and the pressurising cock should be turned OFF in the event of a tank being holed.

Permanent tank capacities are :—

Top tank	36 gallons
Bottom tank	48 gallons
2 inner wing tanks (12½ gallons each) ...	25 gallons
2 outer wing tanks (5½ gallons each) ...	11 gallons
Total	120 gallons

3. **Fuel cocks**

The cock control for the main tanks is a lever (20) mounted below the engine-starting pushbutton (18); the pressurising cock is on the right-hand side of the cockpit, to the right of the seat. It should be left ON for automatic pressurising. The transfer valve selector cock, for admitting air pressure to either pair of wing tanks, is below and slightly forward of the throttle quadrant. It is important that this cock be returned to the NORMAL position after use, or pressurising of the main tanks will not be effective. The cock control (39) and jettison lever for the auxiliary drop tank are mounted together on the right-hand side of the cockpit below the undercarriage control. The jettison lever is pulled up to jettison the drop tank, but it cannot be operated until the cock control is moved forward to the OFF position.

4. **Booster pumps**

An electric fuel booster pump is fitted in the bottom of the lower main tank. It is controlled by a three-position switch (at 22) on the electrical panel. A test pushbutton for the pump (at 21) is also fitted. The cut-off lever (30) must be in the fully aft position when the booster pump is on and the engine is not running.

NOTE.—A few early aircraft have a wobble pump instead

of an electric booster pump. It is fitted to the right of the instrument panel.

5. **Fuel contents gauges and warning lights**

The contents gauge (at 17) on the right-hand side of the instrument panel has two dials, which give readings for the combined capacity of the top and bottom main fuel tanks. A red mark (at 40 gallons) on the left-hand dial indicates when fuel should be transferred from the wing tanks. Unless deleted, the fuel pressure warning light (16) is to the right of the contents gauges on the instrument panel; it comes on when the fuel pressure drops appreciably below normal. The contents gauge and warning light are switched on and off by the MASTER SWITCH (4).
On some aircraft, a low level warning light (at 17) is fitted to the right of the main contents gauge. It comes on when sufficient fuel is left in the main tanks for only 30 minutes flying at max. economical cruising conditions.

6. **Oil System**

Oil is supplied by a tank of 9 gallons oil capacity and 3 gallons air space, mounted between the top main fuel tank and the fireproof bulkhead. The oil passes through a filter before entering the engine. A cooler is fitted inside the fairing of the starboard wing radiator and oil pressure and temperature gauges (at 15) are fitted on the right-hand side of the instrument panel.

7. **Coolant system**

The header tank is mounted above the reduction gear casing and is fitted with a relief valve. The radiator flaps are fully automatic and are designed to open at a coolant temperature of 115°C. A pushbutton (at 21) on the electrical panel is fitted for ground testing, and there is a coolant temperature gauge (at 15) on the instrument panel.

MAIN SERVICES

8. **Hydraulic system**

Oil is contained in a reservoir on the fireproof bulkhead

and passes through a filter to an engine-driven pump for operation of the undercarriage and tailwheel.

9. **Electrical system**

A generator charges a 12-volt battery which in turn supplies the whole of the electrical installation. A red light (23) on the electrical panel, marked GEN FAILURE is illuminated when the generator is not charging the battery.

NOTE.—If the electrical system fails or is damaged, the supercharger will remain in (or return to) low gear and the radiator flaps will remain closed.

A MASTER SWITCH (4) controlling the circuits for the electrically operated gauges and indicators is mounted to the right of the ignition switches and these cannot be switched on unless the master switch is ON. The master switch should be OFF at all times when the engine is not running, except when using the aircraft battery to test the instruments. All electrical services, including gauges and indicators if the master switch is on, can be tested by means of a ground battery plugged into the external ELECTRICAL & RADIO socket; with this plugged in the aircraft battery is automatically isolated.

10. **Pneumatic system**

An engine-driven air compressor feeds two storage cylinders for operation of the guns, cine camera, flaps, radiator flaps, supercharger gear-change ram and brakes. The cylinders each hold air at 300 lb./sq. in. pressure. The flap system differs from that on earlier marks in that the flaps are returned to the UP position by air pressure instead of a spring.

If the supply pressure falls appreciably below 220 lb./sq. in., a pressure maintaining valve closes to conserve pressure for operation of the flaps and wheel brakes. This renders inoperative the radiator flaps and gear change of the supercharger which will remain in (or return to) low gear. If the loss of pressure is serious the flaps and brakes may also be inoperative.

AIRCRAFT CONTROLS

11. **Flying controls**

The control column is of the spadegrip pattern and in-

corporates the brake lever, the gun firing control (35) and the independent cine-camera button (36). The rudder pedals have two positions for the feet and are adjustable for reach by rotating the star wheels on the sliding tubes.

12. **Trimming tabs**

The elevator trimming tabs are controlled by a handwheel (25) on the left-hand side of the cockpit, the indicator (2) being on the instrument panel. The rudder trimming tab is controlled by a small handwheel (24) and is not provided with a position indicator. The balance tabs on the ailerons can be adjusted on the ground to correct lateral level or to adjust the rate of roll.

13. **Undercarriage control**

The undercarriage selector lever (40) moves in a gated quadrant on the right-hand side of the cockpit. To raise the undercarriage, the lever must be moved downwards to disengage it from the slot, inwards through the gate, and then forward to the full extent of the quadrant. The lever should spring outwards through the upper gate and when the undercarriage is locked up it will automatically spring back into the upper slot.

To lower the undercarriage, the lever must be held forward for about two seconds, pulled through the upper gate and then back in one movement to the full extent of the quadrant. The lever should spring outwards through the lower gate and when the undercarriage is locked down it will automatically spring into the lower slot.

When operated in either direction the lever must be permitted to spring outboard when it reaches the end of its travel; this ensures that it can spring into the appropriate slot when the undercarriage is locked up or down. The lever must not be forced into either slot by hand. An indicator in the quadrant shows DOWN, IDLE, or UP, depending on the position of the hydraulic valve. UP or DOWN should show only during the corresponding operation of the undercarriage, and IDLE when the lever is in either slot. If mishandled or out of adjustment it is nevertheless possible for the lever to be on the wrong side of the gate, and yet for the indicator to show IDLE. It is important to check, therefore, that the lever is correctly

positioned in the slot. If, when the engine is not running, the indicator shows DOWN, it should return to IDLE when the engine is started; if it does not, probable failure of the hydraulic pump is indicated. For emergency lowering of the undercarriage, see para. 57.

14. **Undercarriage indicator**

The electrically operated visual indicator (at 6) has two semi-transparent windows on which the words UP on a red background and DOWN on a green background are lettered; the words are illuminated according to the position of the undercarriage. A roller blind is fitted for use at night.
The tailwheel light (at 6) is illuminated green when the tailwheel is locked down. All three lights are switched on and off by the master switch. On some aircraft, mechanical indicators are fitted for each main wheel They consist of rods which protrude from the upper surface of each wing when the wheels are down.

15. **Flaps control**

The split flaps have two positions only, up and fully down. They are controlled by a three-position lever (8) on the top left-hand side of the instrument panel marked UP, AIR OFF, and DOWN. The lever should be set DOWN to lower the flaps, and left in that position. To raise the flaps, the lever is set to UP and when they have been raised, it should be set and left at AIR OFF.

16. **Wheel brakes**

The brake lever is fitted on the control column spade grip and a catch for retaining it in the on position for parking is fitted below the lever pivot. A triple pressure gauge (3) showing the air pressures in the pneumatic system cylinders and at each brake, is mounted on the instrument panel. Two types of brake pressure gauge are fitted, reading to 200 lb./sq. in. and 120 lb./sq. in. respectively; with the former the brake pressure should be 140 lb./sq. in. and 80 lb./sq. in. with the latter.

17. **Flying controls locking gear**

Two struts are stowed on the right-hand side of the

cockpit, aft of the seat. The longer strut and the arm attached to it, lock the control column to the seat and to the starboard longeron, and the shorter strut, attached to the other strut by a cable, locks the rudder pedals. The controls should be locked with the seat in its highest position.

ENGINE CONTROLS

18. **Throttle**

The throttle quadrant is gated at the take-off position. Mixture control is fully automatic, and there is no pilot's control lever. The short lever (28) on the inboard side of the quadrant is a friction adjuster for the throttle (33) and r.p.m. control or override (34) levers; forward movement increases the friction damping.

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19. **Propeller control**

The r.p.m. control lever on the inboard side of the throttle quadrant varies the governed r.p.m. from 2,750 down to below 1,800. Speeds below this figure should, however, not be used except in the event of engine failure (if oil pressure is still available) when it is necessary to lengthen the glide. Later aircraft have interconnected throttle and r.p.m. controls. The interconnection is controlled by a lever similar to the normal r.p.m. control lever, known as the override lever. When this lever is set back to the stop (the AUTOMATIC position) the r.p.m. are controlled by the positioning of the throttle lever.
In any position forward of the stop, the override lever can be used in the same way as the conventional r.p.m. control lever to give higher, but not lower, r.p.m. than those given by the interconnection; when pushed fully forward the r.p.m. are governed at approximately 2,750. It must be remembered that the interconnection is effective only when the override lever is pulled back to the stop in the quadrant; indiscriminate setting of the lever to give higher r.p.m. than those obtained by the interconnection will increase fuel consumption considerably. At low altitudes the corresponding r.p.m. for a given boost with the lever set at AUTOMATIC are as follows:—

Boost (lb./sq. in.)	R.p.m.
Below +3	1,800 to 1,850
Between + 3 and + 7	1,800/1,850 to 2,250/2,400
Between + 7 and +12	2,250/2,400 to 2,725/2,775
Between +12 and +18	No further increase

20. **Supercharger controls**

The two-speed, two-stage supercharger is controlled by a switch (at 13) marked MS and AUTO NORMAL POSITION, mounted on the right-hand side of the instrument panel. When this switch is set to MS, the supercharger remains in low gear at all altitudes; when it is set to AUTO NORMAL POSITION an electro-pneumatic ram, which is controlled by an aneroid, automatically engages high gear at about 11,000 feet when the aircraft is climbing, and re-engages low gear at about 9,500 feet when the aircraft is descending.
There is a pushbutton (at 21) on the electrical panel for ground testing the gear change and a red light (at 13) beside the supercharger switch comes on whenever high gear is engaged, either on the ground or in flight.

21. **Radiator flaps control**

The pushbutton (at 21) for testing the radiator flaps is on the electrical panel. If pressure drops substantially below 220 lb./sq. in., a careful watch should be kept on oil and coolant temperatures, as the radiator flaps may no longer be operative.

22. **Fuel cut-off control**

The fuel cut-off control (30) which is used for stopping the engine, is mounted outboard of the throttle lever. It is spring-loaded and is set forward to allow the carburettor to deliver fuel to the engine. Fuel is cut off when the lever is pulled back and engaged in the gate.

23. **Cylinder priming pump and cock**

A Ki-gass type K.40 pump (41) for priming the induction system is fitted immediately forward of the undercarriage control. The induction priming selector cock control (42) on the right-hand side of the cockpit is marked

A.L.1 Para. 23 Page 19

MAIN, GROUND, and ALL OFF. The first position is used for priming with normal fuel from the main fuel tanks, and the GROUND position for priming with high volatility fuel from an outside source in cold weather.
When the engine is running the cock should be in the ALL OFF position.

24. **Ignition switches**

These (5) are on the left-hand side of the instrument panel. They cannot be switched on with the master switch OFF.

25. **Cartridge starter**

The Coffman starter breech indexing control is a pull-grip toggle (19) below the right-hand side of the instrument panel. The magazine for the starter holds five cartridges, these are fired by the engine-starter pushbutton (18) which also operates the booster coil.

26. **Carburettor air-intake control**

The filter control lever (38) on the left-hand side of the cockpit has two positions, NORMAL INTAKE and FILTER IN OPERATION. The latter position must be used for all ground running, take-off and landing, and when flying in sandy or dust-laden conditions.

NOTE.—In the air it may be necessary to reduce speed to 160 knots before the control lever can be operated. It must always be moved slowly.

27. **Oil dilution**

The pushbutton (at 21) for operating the solenoid valve is on the electrical panel.

OPERATIONAL EQUIPMENT

28. **Guns**

The guns are fired pneumatically by means of a selective pushbutton (35) on the control column spade grip. Pressing the top of the button fires the outboard guns, pressing the bottom of the button fires the inboard guns, and all four guns are fired simultaneously if the centre of the button is pressed. It is locked in the SAFE position by a catch at the bottom of the button casing. When the

catch is set to FIRE a stud projects from the top of the casing.

29. **Gun sight**

A reflector or gyro gun sight (10) is mounted above the instrument panel. The reflector sight is operated by a dimmer switch marked OFF, NIGHT, and DAY below the mounting bracket. Spare bulbs (11) are stowed in holders on the right-hand side of the cockpit. When a gyro gun sight is fitted there is a master ON-OFF switch (43) and a selector-dimmer (45) on the right-hand side of the cockpit, and the ranging control is incorporated in the throttle lever (33).

30. **Cine camera**

A G.45 cine camera is mounted in the starboard wing root and is operated by the gun-firing button, or alternatively by a separate pushbutton (36) on the spade grip. There is a master switch (at 22) on the electrical panel which must be ON before the camera will operate. A footage indicator (29) is fitted above the throttle quadrant.

31. **Bomb release controls**

When fitted, the bomb master switch and fusing switches are mounted together on the left-hand side of the cockpit, just forward of the door. The bomb release pushbutton is incorporated in the top of the throttle lever.

32. **Drop tank release**

The drop tank is released by means of the jettison lever, see para. 64.

33. **Oxygen system**

A Mk. 11C oxygen regulator (7) is fitted to the left of the instrument flying panel.

OTHER CONTROLS AND EQUIPMENT

34. **Cockpit door**

The cockpit door is provided with a two-position latch (27) which allows it to be partly opened and so prevent the hood from sliding shut.

35. **Windscreen de-icing**

A tank containing de-icing fluid is mounted on the lower right-hand side of the cockpit. There is a cock (49) on the starboard side of the cockpit and a pump and needle valve further aft. The latter controls the flow of fluid which is pumped to a spray at the base of the windscreen, over which it is blown by the slipstream. When no longer required, the plunger should be locked down by the catch and the cock returned to the OFF position.

36. **Navigation and identification lights**

The switch (at 22) controlling the navigation lights is on the top of the electrical panel. The downward recognition lights are controlled by a signalling box (44) on the right-hand side of the cockpit. Amber, red or green lights may be selected by a three-way switch on the right-hand side of the cockpit below the coaming adjacent to the gyro gun sight switch.

37. **Cockpit lighting**

This is provided by two lights mounted one on each side of the cockpit. The right-hand light may be moved vertically and the left-hand light (31) may be moved in all directions. Both lights are shielded to prevent glare, and are operated by dimmer switches (1) on the centre of the instrument panel.

38. **Sliding Hood**

(i) The sliding hood is opened from inside by means of the lanyard fitted at the top forward edge which should first be pulled down to release the catch and then back to slide the hood open. To prevent the hood sliding forward unintentionally, care should be taken to ensure that it has been fully opened so that the retaining catch has engaged and the cockpit door should be partially opened, see para. 34.

(ii) From outside the cockpit hood may be opened and closed by hand, provided that the pushbutton on top of the windscreen is first depressed.

(iii) The hood may be jettisoned in emergency, see para. 58.

FINAL CHECKS FOR TAKE-OFF

TRIM	ELEVATOR NEUTRAL RUDDER FULLY LEFT (WHEEL FULLY BACK)
PROP.	MAX. R.P.M. (OVERRIDE LEVER FULLY FORWARD)
FUEL	CHECK CONTENTS MAIN COCK ON TRANSFER COCK NORMAL BOOSTER PUMP ON
FLAPS	UP

FINAL CHECKS FOR LANDING

BRAKES	OFF CHECK PRESSURES
WHEELS	DOWN AND LOCKED
PROP.	MAX. R.P.M. (OVERRIDE LEVER FULLY FORWARD)
FLAPS	DOWN

PART II
HANDLING

39. Management of the fuel system

(i) *Use of the booster pump (or wobble pump)*
The booster pump should be on for take-off, landing, when flying at high altitude or at any time should the fuel pressure warning light come on. If a wobble pump is fitted it should be used, if practicable, in lieu of the booster pump should the warning light come on in flight.

(ii) *Order of use of tanks*

Main fuel system only.

(a) Start and warm up on the main tanks.

(b) Take-off on the main tanks and when the level of the fuel in the lower tank drops to the red mark on the gauge, transfer the fuel from one pair of wing tanks. Return the transfer valve selector cock to NORMAL after five minutes, then transfer the fuel from the other pair of wing tanks and return the selector to NORMAL after a further five minutes.

(c) When all the fuel has been transferred the selector cock must be left in the NORMAL position ; otherwise, pressurising of the main tanks will not be effective.

When a drop tank is fitted.

(d) Start, warm up and take-off on the main tanks and change over to the drop tank at a safe height. Turn off the main tanks and the booster pump.

(e) Owing to a possible delay in picking up after the engine-driven pump has run dry, it is recommended that the main tanks are turned on and the drop tank turned off before the drop tank is completely empty, working on a time basis.

(f) If it is essential to use all fuel from the drop tank, proceed as follows :—
It must be run dry only at a safe height. The drop tank cock should be turned off immediately, the main cock turned on and the booster pump switched on.

(g) If the drop tank has to be jettisoned before it is empty, first turn on the main fuel cock, then turn off the drop tank cock.

NOTE.—It is necessary to ensure that the drop tank cock is in the fully-off position when the tank is empty or has been jettisoned ; otherwise, air may be sucked into the main fuel system.

40. Starting the engine and warming up

(i) Before starting the engine, carry out the external and internal checks detailed in the Pilot's Check List.

(ii) Set the controls as follows :—

Main fuel cock... ...	ON
Throttle	1½ inches open
R.P.M. control or over-ride lever	Max. R.P.M. position
Fuel cut-off control ...	Fully aft
Priming selector cock ...	MAIN (GROUND FOR H.V. FUEL)
Carburettor air-intake filter control	FILTER IN OPERATION

(iii) With the fuel cut-off control fully aft, switch on the booster pump or work the wobble pump for 30 seconds to prime the system. Switch off the booster pump and after a few seconds set the fuel cut-off control fully forward.

(iv) Index the cartridge starter breach.

(v) Operate the Ki-gass priming pump until the fuel reaches the priming nozzles ; this may be judged by a sudden increase in resistance. High volatility fuel should be used for priming at air temperatures below freezing.

(vi) Switch on the ignition and prime with the following number of strokes if the engine is cold :—

Air Temp. °C	+30	+20	+10	0	−10	−20
Normal Fuel	½	1	1	2		
H.V. Fuel				1	2	3

Leave the priming pump plunger out and press the engine-starter pushbutton. Keep the button pressed until the engine is running steadily, as it also operates the booster coil. It may be necessary to continue priming gently until the engine picks up on the carburettor.

(vii) Screw down the priming pump and turn off the priming selector cock.

(viii) Open up slowly to 1,200 r.p.m. and warm up at this speed.

(ix) If the engine fails to start on the first cartridge, no further priming should be given except for half a stroke as each subsequent cartridge is fired, or less if the air temperature is high.

41. Testing the engine and services

While warming up at 1,200 r.p.m. carry out the checks detailed in the Pilot's Check List, items 75 to 81. After warming up until the oil temperature is 15°C. and the coolant temperature is 40°C. :—

(i) Test each magneto as a precautionary check before increasing power further.

(ii) Open up to the static boost reading (zero under standard atmosphere conditions) and exercise and check the operation of the supercharger by pressing and holding in the test pushbutton. Boost should rise slightly and the red light should come on when high gear is engaged. Release the test pushbutton, boost should fall slightly and the red light go out on return to low gear.

(iii) At the same boost, exercise and check the operation of the constant-speed unit by moving the r.p.m. control or override lever through its full governing range at least twice and then return it fully forward. Check that the r.p.m. are within 50 of those normally obtained, and check that the generator warning light is out.

(iv) Test each magneto in turn. The single ignition drop should not exceed 100 r.p.m. If it does, but there is no undue vibration, the check in (v) below should be carried out.

NOTE.—The following full power check (for which the tail must be securely tied down) may be carried out after repair, inspection other than daily, when the ignition drop at static boost exceeds 100 r.p.m. or at the discretion of the pilot. Normally, if the checks in (ii), (iii) and (iv) are satisfactory, no useful purpose will be served by a full power check.

(v) (a) Open the throttle fully and check the take-off boost and r.p.m.

(b) Throttle back to +9 lb./sq. in. boost, or further if necessary, to ensure that r.p.m. fall below 2,750, then test each magneto in turn. The single ignition drop should not exceed 100 r.p.m. If an override lever is fitted, throttle back to +4 lb./sq. in. boost and set the lever to automatic, when r.p.m. should fall to 1,800. Return the override lever to the max. r.p.m. position.

(vi) After completing the checks either at static boost or at +9 lb./sq. in. boost, steadily move the throttle to the fully closed position and check the minimum idling r.p.m., then open up to between 1,000 and 1,200 r.p.m.

(vii) Before taxying, carry out the checks detailed in the Pilot's Check List, items 82 and 83.

42. Take-off

Checks for take-off—see Pilots Check List, items 84 to 91.

(i) For a normal take-off, open the throttle slowly up to +7 lb./sq. in. only. There is a strong tendency to swing right and to crab in the initial stages, and if much power is used tyre wear on runways is severe. Power should be increased, consistent with rudder control, to +12 lb./sq. in. boost on becoming airborne.

(ii) The aircraft should be flown off at a speed of 85-90 knots. After raising the undercarriage, see that the red indicator light—UP—comes on and the tailwheel light goes out. It may be necessary to hold the lever through the gate and at the top of the upper slot until the red indicator light does come on. Failure of the wheels to lock up will spoil the airflow through the radiators and oil cooler and result in excessive temperatures.

(iii) The undercarriage should always be raised before a speed of 140 knots (170 knots with Mods. 1319 and 1592) has been attained ; otherwise, the fairing doors may be damaged.

(iv) Move the override lever (if fitted) smoothly to AUTOMATIC when comfortably airborne.

(v) Set the air-intake filter control to NORMAL INTAKE when clear of the dust laden atmosphere.

43. Climbing

(i) The recommended climbing speed is 150 knots from sea level up to 25,000 feet; speed should be reduced thereafter by 10 knots per 5,000 feet..

(ii) Use of the air-intake filter considerably reduces full throttle height.

44. General flying

(i) *Stability*
At low altitudes the aircraft is stable longitudinally and directionally, but unstable laterally. The application of yaw induces a change in longitudinal trim; this characteristic becomes very noticeable at high altitude.

(ii) *Controls*
The ailerons are very light and effective throughout the speed range ; both the rudder and elevator are powerful and sensitive.

(iii) *Changes of trim*

Undercarriage down	Nose down
Undercarriage up	Nose up.
Flaps down	Strongly nose up
Flaps up	Strongly nose down.

There is a marked change of directional trim with changes of speed and power. This should be counteracted by accurate use of the rudder trimming tab.

(iv) *Flying at reduced airspeed*
Reduce speed to 140 knots and lower the flaps. Set the r.p.m. control lever as required (automatic if an override lever is fitted) and open the sliding hood. Fly at about 140 knots and keep a close watch on oil and coolant temperatures.

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(v) *Flying in turbulent conditions*
The recommended speed up to 25,000 ft. is 175 knots.

45. Stalling

(i) The stalling speeds (engine off) in knots are :—

	Typical service load	Typical service load + 90 gall. tank
Undercarriage and flaps up	75	80
Undercarriage and flaps down	65	70

(ii) There is little warning of the approach of the stall. At the stall either wing and the nose may drop, accompanied

by snatching of the ailerons, which is more marked with the undercarriage and flaps down. Recovery is straightforward and easy.

(iii) *High-speed stall*

If the aircraft is stalled in a turn or in the recovery from a dive, some warning is given by juddering. The aircraft will generally flick to the right with strong aileron snatching. Recovery is immediate if the pressure on the control column is relaxed.

46. Spinning

(i) Practice spinning is permitted and recovery by the standard method is normal.

(ii) The spin itself is erratic ; the nose rising and falling and the rate of rotation varying, increasing as the nose falls and decreasing as it rises.
This characteristic is more marked at high altitude.

(iii) Practice spinning should not be commenced below 10,000 feet.

(iv) Recovery action should be initiated after not more than two turns of the spin have been completed.

(v) Spinning is prohibited when carrying a drop tank.

47. Diving

(i) As speed is gained the aircraft becomes increasingly tail heavy and should, therefore, be trimmed into the dive. The tendency to yaw to port should be corrected by accurate use of the rudder trimming tab.

(ii) Compressibility effects may be encountered when approaching the maximum diving speeds above 10,000 feet. These effects produce a nose down change of trim. If this change of trim is observed it must be held on the control column alone and no attempt must be made to correct it with the elevator trimming tab ; this action will not immediately prove effective, and it is likely to render the recovery violent when the Mach number falls at a lower altitude. It is equally important to avoid yawing the aircraft in an attempt to reduce speed.
For maximum permitted diving speeds see para. 53.

48. **Aerobatics**

(i) The following speeds in knots are recommended :—

Loop	280—300
Roll	190—220
Half roll off loop	300—340
Upward roll	300—390

(ii) Flick manœuvres are not permitted.

(iii) Aerobatics are not permitted when carrying a drop tank whether full or empty.

49. **Approach and landing**

Checks before landing—see Pilot's Check List, items 92 to 99.

(i) The recommended final approach speeds in knots are :—

	At max. landing weight :— 9,250 lb.	
	Flaps down	Flaps up
Engine assisted	90	95
Glide	95	100

(ii) The initial straight approach should be made some 20 knots above these figures.

(iii) When landing with a 90 gal.. drop tank the above speeds should be increased by approximately 5 knots.

50. **Mislanding and going round again**

(i) The aircraft will climb away easily with the undercarriage and flaps lowered, and the use of full take-off power is unnecessary. The throttle should be opened slowly, however, and care taken to maintain directional control.

(ii) Raise the undercarriage.

(iii) Climb at 135-140 knots with the flaps lowered.

(iv) Raise the flaps at a safe height and retrim.

51. **After landing**

(i) Before taxying, carry out the checks detailed in the Pilot's Check List, items 100 to 103.

(ii) After reaching dispersal, idle the engine . . half a minute at 800-900 r.p.m., then move the fuel cut-off control to the fully aft position.

(iii) When the engine has stopped, carry out the checks in the Pilot's Check List, items 104 to 115.

(iv) Oil dilution. The correct dilution period for this aircraft is :—
Atmospheric temperature above – 10°C., one minute.
Atmospheric temperature below – 10°C., two minutes.

PART III
OPERATING DATA

52. Engine data : Griffon 61

	Gear	R.p.m.	Boost lb./sq. in.	Temp. °C Clnt.	Oil
MAX. TAKE-OFF 5 MINS. LIMIT	LOW	2,750*	+12		
MAX. CLIMBING 1 HR. LIMIT	LOW / HIGH	2,600	+9	125	90
MAXIMUM CONTINUOUS	LOW / HIGH	2,400	+7	105	90
OPERATIONAL NECESSITY 5 MINS. LIMIT	LOW / HIGH	2,750	+18†	135	105

* With interconnected throttle and r.p.m. controls 2,775.

† Must not be used at less than 2,600 r.p.m.

OIL PRESSURE :

NORMAL	60–80 lb./sq. in.
MINIMUM	45 lb./sq. in.

MINM. TEMP. FOR TAKE-OFF :

OIL	+15°C.
COOLANT	+40°C.

53. Flying limitations

(i) The following are the maximum speed limitations :—

(a)

Between	knots
S.L. and 10,000 ft.	455
10,000 and 15,000 ft.	440
15,000 and 20,000 ft.	405
20,000 and 25,000 ft.	370
25,000 and 30,000 ft.	335
30,000 and 35,000 ft.	290
Above 35,000 ft.	265

(b) With a 90-gallon drop tank full or empty.

Between	knots
S.L. and 10,000 ft.	380
10,000 and 15,000 ft.	350
15,000 and 20,000 ft.	315
20,000 and 25,000 ft.	280
25,000 and 30,000 ft.	250
(c) Undercarriage down	140*
Flaps down	140
* On aircraft with mods. 1319 & 1592 :—	170

(ii) *Maximum weights :*

For take-off and all forms of flying ...	10,000 lb.
For landing except in emergency	9,250 lb.

(iii) *Restrictions :*

(a) Practice spinning is permitted when drop tanks are not carried (See Para. 46).

(b) With a 90-gallon drop tank, either full or empty, the aircraft is restricted to gentle manœuvres only. When necessary drop tanks should be jettisoned in straight flight at a speed not in excess of 260 knots.

54. Position error corrections

From / To	90 / 110	110 / 130	130 / 150	150 / 175	175 / 200	200 / 225	225 / 250	250 / 280	280 / 320	320 / 360	knots
Add / Subtract	8	6	4	2	0 / 0	2	4	6	8	10	

55. Maximum performance

(i) *Maximum rate of climb at climbing power*

(a) The recommended climbing speed is 150 knots from sea level to 25,000 feet, reduced thereafter by 10 knots per 5,000 feet.

(b) With the switch set to AUTO, the supercharger will automatically change to high gear at 11,000 feet. This is the optimum gear change height for a combat full power climb. Under normal climbing conditions (2,600 r.p.m. and +9 lb./sq. in. boost), the maximum rate of climb is obtained by delaying the gear change until the boost has dropped to +6¼ lb./sq. in. To do this proceed as follows :—

On aircraft not fitted with interconnected throttle and r.p.m. controls :-
Set the supercharger switch to MS, the r.p.m. control lever to give 2,600 r.p.m. and climb at the speeds quoted in (i) (a) opening the throttle progressively to maintain a boost pressure of +9 lb./sq. in. When the maximum obtainable boost drops to +6¼ lb./sq.in. set the supercharger switch to AUTO.

On aircraft fitted with interconnected r.p.m. and throttle controls :-
Set the supercharger switch to MS, the throttle to give +9 lb./sq. in. boost and climb at the speed quoted in (i) (a). As the boost falls, the throttle must not be advanced to restore it, since the r.p.m. will then be increased beyond the maximum permitted for continuous operation. When the boost has fallen to +6¼ lb./sq. in. set the supercharger switch to AUTO.

(ii) *Operational necessity*
Set the supercharger switch to AUTO and open the throttle fully. On those aircraft which do not have interconnected throttle and r.p.m. controls, the r.p.m. control lever must be advanced to the maximum r.p.m. position before the throttle is opened fully.

(iii) *Economical climbing*
On aircraft not fitted with interconnected throttle and r.p.m. controls :—

(a) Set the supercharger switch to MS, the r.p.m. control lever to give 2,400 r.p.m. and climb at the speeds given in (i) (a) opening the throttle progressively to maintain +7 lb./sq. in. boost.

(b) Set the supercharger switch to AUTO when the maximum obtainable boost is +3 lb./sq. in., throttling back to prevent overboosting as the change to high gear is made.

On aircraft fitted with interconnected throttle and r.p.m. controls :—

(c) Set the supercharger switch to MS, set the throttle to give +7 lb./sq. in. boost and climb at the speeds given in (i) (a) above.

(d) As height is gained the boost will fall, but the throttle should not be advanced to restore it, since r.p.m.

will then be increased beyond the maximum permitted for continuous operation.

(e) When the boost has fallen to +3 lb./sq. in., set the supercharger switch to AUTO.

(iv) *Cruising :—*

(a) The recommended speed for maximum range is 170 to 180 knots.

(b) *On aircraft not fitted with interconnected throttle and r.p.m. controls :—*
With the supercharger switch at MS, fly at the maximum obtainable boost with the throttle fully open (not exceeding +7 lb./sq. in.) and obtain the recommended speed by reducing r.p.m. as required.
NOTE.—(i) R.p.m. should not be reduced below a minimum of 1,800. At low altitudes, therefore, it may be necessary to reduce boost, or the recommended speed will be exceeded.

(ii) As the boost falls at high altitudes it will not be possible to maintain the recommended speed in low gear, even at maximum cruising r.p.m. and full throttle. It will then be necessary to set supercharger switch to AUTO. Boost will thus be restored and it will be possible to reduce r.p.m. again (as outlined in (b) above).

(iii) In both low and high gears, r.p.m. which promote undue rough running should be avoided.

(c) *On aircraft fitted with interconnected throttle and r.p.m. controls :—*
Set the supercharger switch to MS and adjust the throttle to obtain the recommended speed. Avoid a throttle setting which promotes rough running. At moderate and high altitudes, it will be necessary to advance the throttle progressively to restore the falling boost and thus maintain the recommended speed. As the throttle is opened, r.p.m. will increase and at a certain height, the recommended speed will be

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unobtainable even at a throttle setting which gives 2,400 r.p.m. At this height, the supercharger switch should be set to AUTO and the throttle then adjusted as before to maintain the recommended speed.

(d) To avoid the possibility of lead fouling of the plugs when operating at reduced r.p.m. and low inlet temperatures, it is recommended that the engine be cleared at climbing power for at least one minute each hour in cruising flight, and before landing.

56. Fuel capacities and consumptions

(i) Normal fuel capacity :—

Top tank	36 gallons
Bottom tank	48 gallons
2 wing tanks (12½ gallons each)	25 gallons
2 wing tanks (5½ gallons each)	11 gallons
Total ...	120 gallons

(ii) Total with a 90-gallon drop tank... ... 210 gallons

(iii) Fuel consumptions (approx. gals./hr.) :—

(a) Weak mixture (as obtained at +7 lb./sq. in. boost and below), in low gear at 5,000 feet :—

Boost lb./sq. in.	R.p.m.			
	2,400	2,200	2.000	1,800
+7	88	85	80	—
+4	74	71	67	60
+2	65	63	59	52
0	57	55	51	46
−2	50	47	43	41

For every 5,000 feet increase in height, add 4 gals./hr.

(b) Weak mixture as obtained at +7 lb./sq. in boost and below), in high gear at 20,000 feet :—

Boost lb./sq. in.	R.p.m.			
	2,400	2,200	2,000	1,800
+7	95	92	87	—
+4	82	78	74	70
+2	73	70	66	63
0	66	63	59	56
−2	59	56	52	49

(c) Rich mixture (as obtained above +7 lb./sq. in. boost) in low gear at 5,000 feet :—

Boost lb./sq. in.	R.p.m.	Gals./hr.
+18	2,750	180
+12	2,750	130
+ 9	2,600	103

PART IV
EMERGENCIES

57. Undercarriage emergency operation

(i) If the lever jams and cannot be moved to the fully down position after moving it out of the gate, return the lever to the fully forward position for a few seconds, to take the weight of the wheels off the locking pins thus allowing the latter to turn freely, then move it to the DOWN position.

(ii) If, however, the lever is jammed so that it cannot be moved either forward or downward, it can usually be released by taking the weight of the wheels off the locking pins either by pushing the control column forward sharply or inverting the aircraft. The lever can then be moved to the DOWN position.

(iii) If the lever springs into the slot and the indicator shows that the undercarriage is not locked down, hold the lever at the bottom of the slot for a few seconds. If this is not successful, raise and then lower the undercarriage again.

(iv) If the undercarriage still does not lock down, ensure that the lever is in the DOWN position (this is essential) and push the emergency lever (48) forward and downward through 110°. On some aircraft the label quotes 90°; this is incorrect. The CO_2 cylinders will lower the main wheels (if Mod. 1677 is incorporated—the tail wheel also). The lever should not be returned to its original position and no attempt must be made to raise the undercarriage until the emergency bottles have been replaced.

NOTE.—If the CO_2 cylinders have been accidentally discharged with the selector lever in the up position, the undercarriage will not lower unless the pipeline from the cylinder is broken, either by hand or by means of the crowbar.

(v) If the undercarriage has been lowered by the normal method and the main wheels have locked down satisfactorily but the tail wheel green light fails to come on, the emergency system should be used to lower the tail wheel. If, however, Mod. 1677 is not incorporated, this may not be successful.

58. Hood jettisoning

The hood may be jettisoned in an emergency by pulling the rubber knob inside the top of the hood forward and downward, and pushing the lower edge of the hood outboard with the elbows.

59. Crash landing

In the event of engine failure, necessitating a crash landing:—

(i) If oil pressure is still available the glide can be lengthened considerably by setting the r.p.m. control lever or the propeller override lever, fully back past the stop on the quadrant.

(ii) The external stores or drop tank should be jettisoned.

(iii) The fuel cut-off control should be pulled fully back and the booster pump switched off.

(iv) The cockpit hood should be opened and the door set on the catch (see para. 34).

(v) A speed of at least 120 knots should be maintained while manœuvring with the undercarriage and flaps retracted.

(vi) The harness should be tight and locked.

(vii) Flaps must not be lowered until it is abundantly clear that the selected landing area is within easy gliding reach.

(viii) The final straight approach should be made at a speed of 95 knots with the undercarriage retracted.

60. Ditching

(i) Whenever possible the aircraft should be abandoned by parachute rather than ditched, since the ditching qualities are known to be very poor.

(ii) When ditching is inevitable the drop tank or external stores (if carried) should be jettisoned (release will be more certain if the aircraft is gliding straight), and the following procedure should be observed :—

(a) The cockpit hood should be jettisoned.

(b) The flaps should be lowered in order to reduce the touchdown speed as much as possible.

(c) The undercarriage should be kept retracted.

(d) The safety harness should be kept tightly adjusted and locked and the R/T plug should be disconnected.

(e) The engine, if available, should be used to help make the touchdown at as low a forward speed as possible.

(f) Ditching should be along the swell, or into wind if the swell is not steep, but the pilot should be prepared for a tendency for the aircraft to dive when contact with the water is made.

61. **Failure of pneumatic system**

(i) If the flaps fail to lower when the control is moved to the DOWN position, it is probably due to a leak in the pipe line resulting in complete loss of air pressure and brakes will also be inoperative.

(ii) Alternatively, if a leak develops in the flap control system the flaps will lower, but complete loss of air pressure will follow and the brakes will become inoperative. (In this case a hissing sound may be heard in the cockpit after selecting flaps DOWN.)

(iii) In either case, the flap control should immediately be returned to the AIR OFF position in order to allow sufficient pressure to build up, so that a landing can be made with the brakes working, but without flaps.

(iv) As a safeguard, pilots should always check the pneumatic supply pressure after selecting flaps DOWN. If the pressure is low and does not build up a landing without brakes must be anticipated, although sufficient air may remain for their partial use.

62. **First-aid outfit**

The first-aid outfit is accessible through a hinged panel on the starboard side of the fuselage.

63. **Crowbar**

A crowbar (26) for use in an emergency is stowed on the left-hand side of the cockpit.

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64. **Drop tank and emergency bomb release**
The drop tank may be released in emergency by pulling up the handle fitted to starboard of the seat. This will also jettison any other stores carried on this carrier. The drop tank cock must be in the off position.

PART V

ILLUSTRATIONS

	Fig.
Instrument panel	1
Cockpit—left-hand side	2
Cockpit—right-hand side	3

AIR MINISTRY
March, 1950

Amendment List No. 1
to A.P. 2816A—P.N.

SPITFIRE 21

Incorporation of this Amendment List must be certified by inserting date of incorporation and initials in the spaces provided on the inside front cover of the Pilot's Notes.

PART	PARA.	AMENDMENT
	19 (Page 17)	*Amend* by gummed slip herewith.
I	23 (Page 19)	*Amend* by gummed slip herewith.
II	55 (Page 34)	*Amend* by gummed slip herewith.
	64	*Amend* by gummed slip herewith.

Affix this Amendment List to inside back cover of Notes.

AIR MINISTRY
September, 1951

Amendment List No. 2
to A.P. 2816A—P.N.
Pilot's Notes

SPITFIRE 21

Incorporation of this Amendment List must be certified by inserting date of incorporation and initials in the spaces provided on the inside front cover of the Pilot's Notes.

PART	PAGE OR PARA.	AMENDMENT
Cover		*Delete* "RESTRICTED".
II	Para. 44 (iv) (v)	*Affix* gummed slip herewith.

Affix this Amendment List to inside back cover of Notes retaining A.L.1.

KEY TO *Fig.* 1

1. Cockpit light dimmer switches.
2. Elevator trim indicator.
3. Pneumatic triple pressure gauge.
4. Electrical master switch.
5. Ignition switches.
6. Undercarriage indicator and tail-wheel light.
7. Oxygen regulator.
8. Flap selector.
9. Instrument flying panel.
10. Gun sight.
11. Spare bulbs for gunsight.
12. R.p.m. indicator.
13. Supercharger switch and indicator light.
14. Boost gauge.
15. Engine temperature and pressure gauges.
16. Fuel pressure warning light.
17. Fuel tank contents gauges and low level warning light.
18. Engine starter pushbutton.
19. Starter breech indexing control.
20. Main fuel cock control.

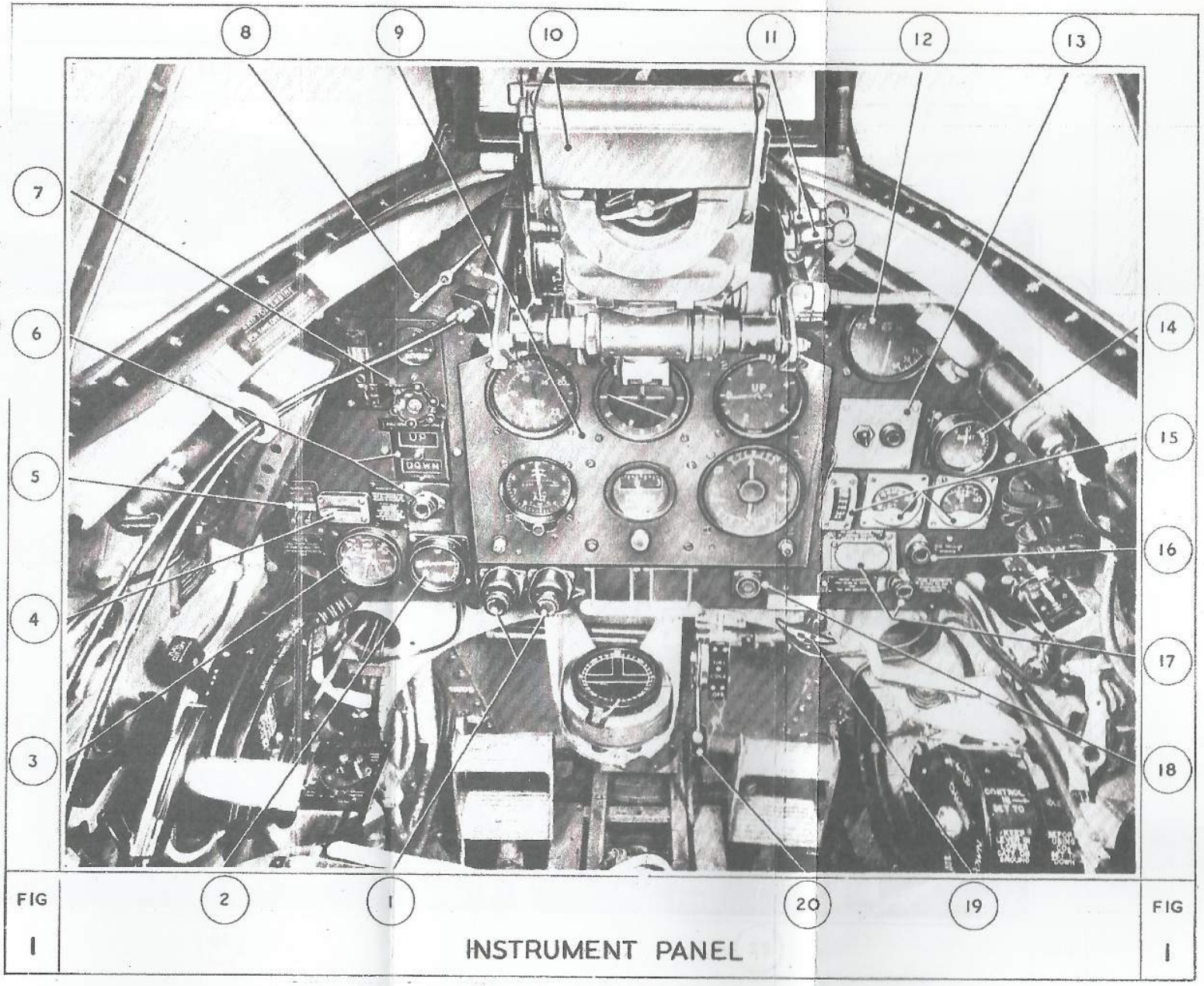

FIG 1

INSTRUMENT PANEL

FIG 1

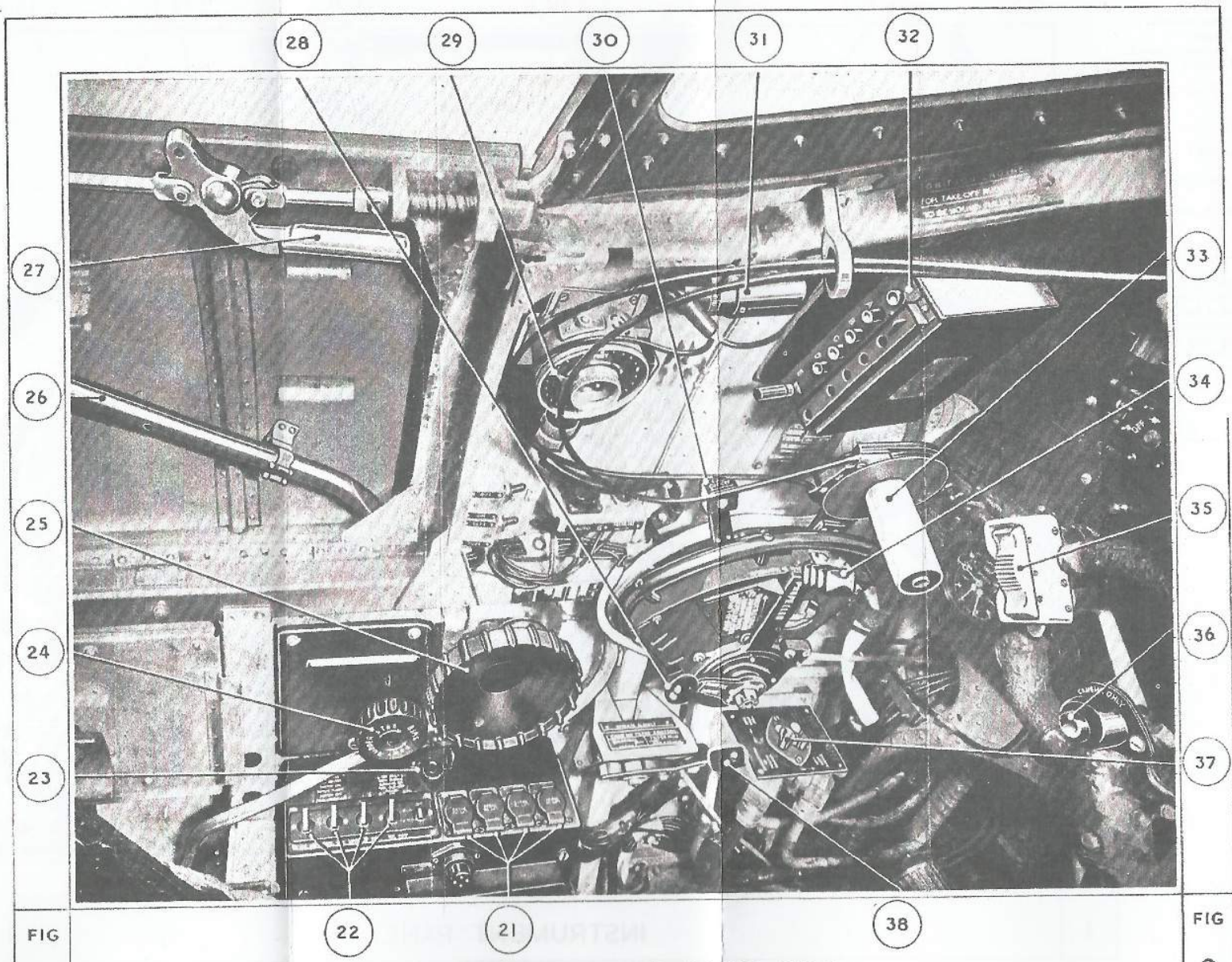

FIG 2

COCKPIT — LEFT-HAND SIDE

FIG 2

KEY TO *Fig.* 2

21. Test pushbuttons for booster pump, supercharger and radiator flaps, and oil dilution pushbutton.
22. Switches for navigation lights, pressure head heater, cine camera and booster pump.
23. Generator failure warning light.
24. Rudder trimming control.
25. Elevator trimming control.
26. Crowbar.
27. Cockpit door latch control.
28. Friction damper.
29. Cine-camera footage indicator.
30. Fuel cut-off control.
31. Cockpit light.
32. V.H.F. pushbutton controller.
33. Throttle lever and gyro gunsight ranging control.
34. R.p.m. control or override lever.
35. Gun firing pushbutton.
36. Cine-camera pushbutton.
37. Fuel transfer cock control.
38. Air-intake filter control.

KEY TO *Fig.* 3

39. Drop tank fuel cock control lever.
40. Undercarriage selector lever.
41. Induction priming pump.
42. Induction priming selector cock control.
43. Gyro gun sight master switch.
44. Signalling switch box.
45. Gyro gun sight selector dimmer.
46. Harness release.
47. Demolition switches.
48. Undercarriage emergency lever.
49. Windscreen de-icing fluid selector cock.
50. Seat adjustment lever.

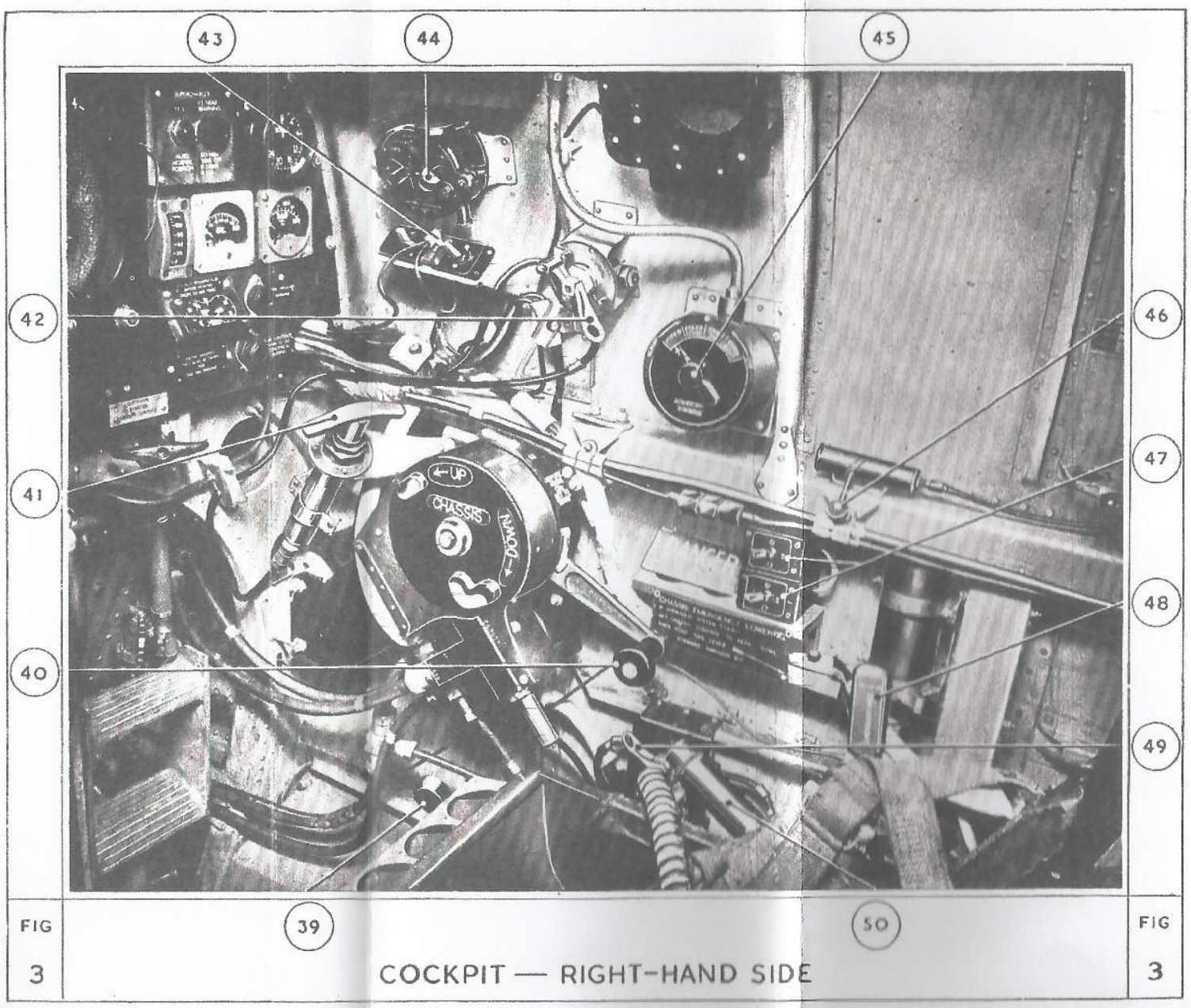

FIG 3

COCKPIT — RIGHT-HAND SIDE

FIG 3


These are being listed for the
benifit for people interested
in British or Commonwealth
Aircraft
While it did cost me a great
sum of money to aquire
these documents, all I ask in
return is some credit.
~JimSan