2nd EDITION

A.P. 1721A—P.N.

PILOT'S NOTES

FOR

BEAUFIGHTER

MARKS IC and IF

TWO HERCULES III or XI ENGINES

PROMULGATED BY ORDER OF THE AIR COUNCIL

RESTRICTED

(FOR OFFICIAL USE ONLY)

AMENDMENTS

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

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NOTES TO USERS

THIS publication is divided into five parts: Descriptive, Handling, Operating Data, Emergencies, and Illustrations. Part I gives only a brief description of the controls with which the pilot should be acquainted.

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. A93/43).

Words in capital letters indicate the actual markings on the controls concerned.

Additional copies may be obtained from A.P.F.S., Fulham Road, S.W.3, by application on R.A.F. Form 294A, in duplicate, quoting the number of this publication in full—A.P. 1721A—P.N.

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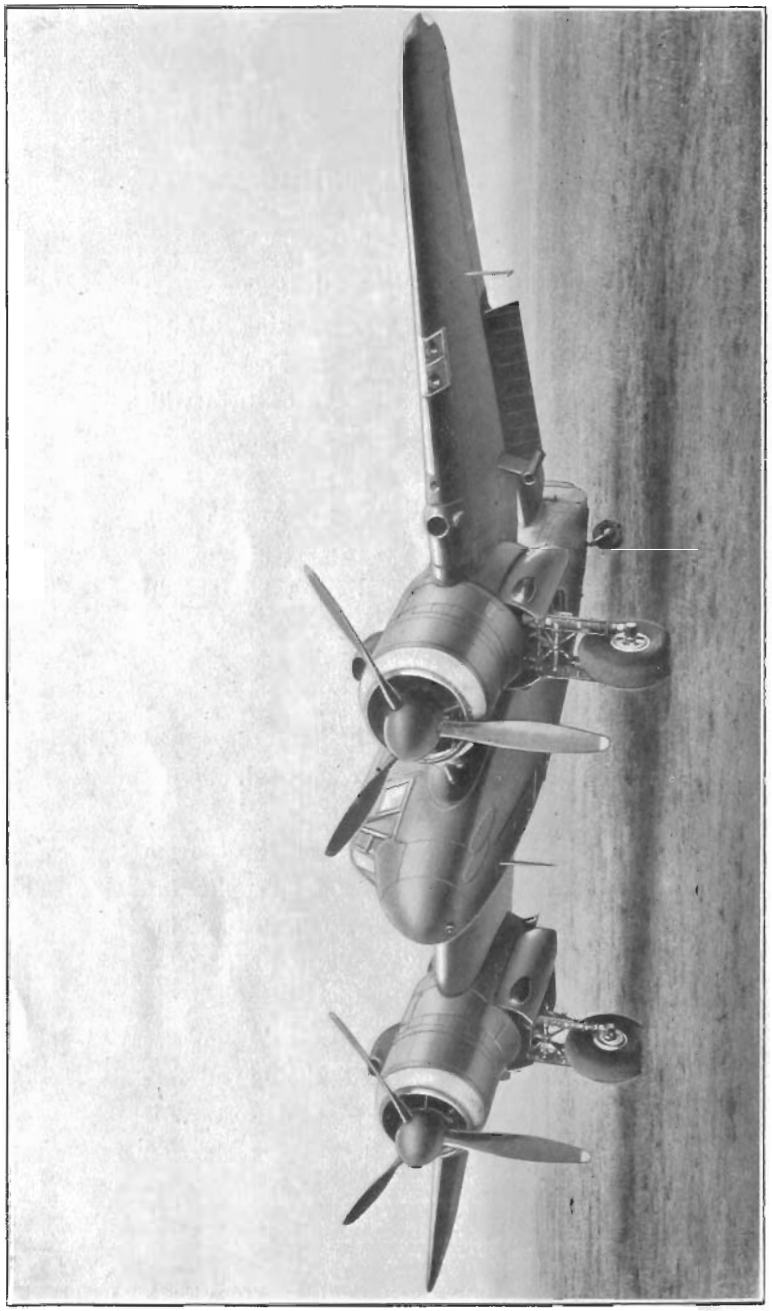

BEAUFIGHTER IC AND IF

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Pilot's Notes

BEAUFIGHTER IC & IF PILOT'S NOTES

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PART I

DESCRIPTIVE

NOTE.—The numbers quoted in brackets after items in the text refer to the key numbers of the illustrations in Part V.

FUEL AND OIL SYSTEMS

1. **Fuel tanks**

(i) There are two main tanks, inner and outer, on each side interconnected by a cross balance pipe, controlled by a balance cock, as shown in Fig. 1.

(ii) Later aircraft also have additional long-range tanks—shown by dotted lines—which form, in effect, enlarged outer main tanks. The outermost of these tanks displace the wing guns which are not fitted on aircraft so equipped.

2. **Fuel gauges and cocks**

(i) Contents gauges (65) and (97) are fitted for all tanks. On later aircraft with long-range tanks the gauges for these are on the top of junction box No. 8 on the starboard side. A master switch (92) controls all these gauges.

(ii) Fuel pressure gauges (39) and (41) (on later aircraft replaced by low pressure warning lights) are on the instrument panel. They are controlled by the contents gauges master switch (on later aircraft by the undercarriage indicator switch).

(iii) Fuel cocks.—The controls for the three cocks of the fuel system are mounted under the sill tube on the port side. The handwheels (54 and 55) control the tank cocks and the lever (53) controls the suction balance cock. The small handwheel controls the starboard tanks cock, and is coloured green, and the large handwheel controls the

port tanks cock and is coloured red. Each handwheel has three positions clearly marked on the rim, TANKS OFF, OUTER TANKS ON, INNER TANK ON, and ball catches register with holes when the selected cock position is uppermost. The handwheels are rotated in a clockwise direction from the TANKS OFF position to open the cocks. On later aircraft there is a knob on each wheel; these are at the top in TANKS OFF position. The knob of the lever that operates the suction balance cock is marked S and is coloured black. The lever should be moved down to open the cock.

3. **Oil system.**—There is one tank for each engine with an effective capacity of 17 gallons, giving a total of 34 gallons. Pressure (27) and (28) and temperature (44) gauges are on the instrument panel.

4. **Worth oil dilution system.**—This is fitted on later aircraft, the operating switches being mounted at the engine nacelles.

MAIN SERVICES

5. **Electrical services**

(i) A 24-volt D.C. generator on the starboard engine, in parallel with a battery, supply current for:

All lighting circuits
Engine starters
Instruments
Cowling gill motors
Guns and cine-camera
Pressure-head heating
Fire-extinguishers
Dinghy release (on later aircraft)

(ii) Early aircraft have an ammeter in the charging circuit which gives an indication to the observer should power fail. Later aircraft have a power failure warning light or, where this is not fitted, the voltmeters in the generator circuit which normally read about 29 volts indicate that power has failed if the voltage falls to about 26.

(iii) An 80-volt A.C. generator on the port engine supplies current for the special radio equipment when fitted.

6. **Hydraulic system**

(i) Fluid is circulated by two pumps, one on each engine. A bypass is opened by a hydraulic power lever (68), which should always be OFF (bypass open) in the air when services are not required, to prevent overheating of the hydraulic pumps. The lever should always be ON when the aircraft is on the ground.

(ii) A handpump (100) is used:
(*a*) for ground operation when engines are not running, or for emergency use in flight (with hydraulic power lever ON) *see* Part IV.

(*b*) for emergency lowering of flaps and undercarriage through separate pipe lines, which are brought into operation by setting an emergency selector (67) ON. This selector must never be ON unless the hydraulic power lever is OFF and on some aircraft an interlock safeguards this. Until Mod. 853 is incorporated this system must not be used with the flap lever at neutral; it must be set DOWN or UP when it is possible to lower flaps and undercarriage together only. With Mod. 853 the undercarriage can be lowered first with flap lever at neutral, and on some aircraft an interlock returns the flap lever from UP to neutral when the emergency selector lever is set ON (*see* Part IV).

7. **Pneumatic system**

(i) A compressor on the starboard engine charges cylinders and supplies compressed air for operating:

Wheel brakes
Fuel jettison valves
Landing flare release
Guns

There is a gauge by the equipment crate on the port side registering cylinder pressure and a triple reading gauge (49) in the brake circuit.

(ii) Vacuum pumps, one on each engine, operate the flying instruments and there is a change-over cock (50), which enables either pump to be selected. On early aircraft only, there is a vacuum gauge (48).

AIRCRAFT CONTROLS

8. **Primary controls.**—These are conventional in design and operation, and the pendulum type rudder pedals (12) are adjustable for reach by a handle under the instrument panel.

9. **Trimming tabs.**—The elevator tab control (82) with its indicator (80), rudder (11), and aileron (99) tab controls with integral indicators, operate in the natural sense.

10. **Undercarriage control.**—The lever (71) is set UP to retract, and DOWN to lower, the main and tail wheel units.

11. **Undercarriage safety locks**

(i) A spring-loaded pin locks the lever in the DOWN position while the aircraft is on the ground. The pin is withdrawn when the aircraft is airborne and, if required, the lock can be over-ridden by depressing the knob on the lever.

(ii) Locking pins, inserted by hand in the knuckle joints of the inboard radius rods, provide an additional safety measure. They have red flags attached to them and must be withdrawn before flight.

12. **Undercarriage indicators and horn**

Three indicators (14) show the position of each main wheel and the tail wheel. Indications are:

Wheel locked up	UP on red background
Wheel locked down ..	DOWN on green background
Between locks, or indicator off	Black and white dazzle lines

The indicator switch (47) is interlocked with the ignition switches. A warning horn sounds if the throttles are less than one-third open when any wheel is not locked down.

13. **Flaps control and position indicator.**—The lever (70) is set UP to raise and DOWN to lower the flaps. When an intermediate position is required the lever should be returned to neutral as soon as the desired setting is reached. The indicator (69) is to the left of the flap lever.

14. **Wheel brakes.**—The pneumatic brakes are operated by a lever (6) on the handwheel. For parking, a spring-loaded catch retains the lever in the on position. When twin brakes are fitted by Mod. 802 a pressure of 85/90 lb./sq.in. gives as much braking power as can safely be applied.

NOTE.—On certain aircraft there is a lock fitted to the tail wheel to hold it central while taking off and landing. The control for this is a push-pull handle to the right of the pilot's seat. To free the wheel, pull up. To lock, press the small knob on handle then push down.

ENGINE CONTROLS

15. **Throttle and mixture controls**

(i) The throttle levers (61) are gated at CRUISING and climbing (RATED) positions. The mixture lever is interlocked with the throttle levers so that it returns to NORMAL if either throttle is closed, or opened beyond the cruising gate.

16. **Propeller speed controls.**—With 20° propellers the extreme aft position of the lever (60) gives positive coarse pitch. On a few Hydromatic constant-speed propeller installations the aft position of the levers also selects positive coarse pitch. On most Hydromatic installations, however, the aft position gives about 800 r.p.m. under governor control, and is used to reduce drag with a failed engine. With both Hydromatic types the throttles should be closed to at least the cruising position before the lever is pulled right back.

17. **Two-speed supercharger controls.**—The two-speed supercharger controls (76) are mounted aft of the throttle and mixture controls. There are two positions only to which the lever should be moved, forward to fully supercharged marked S, and back to medium supercharged marked M.

18. **Carburettor air-intake controls.**—The air-intake shutter levers (77) are outboard of the two-speed supercharger controls. The lever for the PORT engine air intake has a red knob and that for the STARBOARD has a green. The levers are set forward for cold air and back for hot air.

19. **Cowling gills controls.**—The two cowling gill motor switches (79) are aft of the supercharger controls. They have three positions marked OPEN, OFF, and CLOSED. The knobs must be depressed when setting the switches to OPEN or CLOSED; when the required gill setting is reached the switch should be returned to OFF and the knob pulled out. Red warning lights by the switches indicate when the motors are in operation.

20. **Carburettor cut-out controls.**—The carburettor cut-out controls (52) are in a control box with a spring-loaded hinged cover fitted to the top of the front spar on the port side. The port engine control has a red knob and the starboard a green one.

21. **Starting magneto switches.**—These are mounted on the engine nacelle structures.

22. **Starter controls.**—The pushbuttons (32) are on the instrument panel.

OTHER CONTROLS

23. **De-icing controls**

(i) *Propeller de-icing.*—On early aircraft only, the control (95) is mounted on the starboard sill tube, and has clearly marked on it the OFF and ON positions. When the knob of the control is rotated in a clockwise direction the speed of the electric-driven ejector pumps is increased, and when rotated in a counter-clockwise direction the speed is decreased.

(ii) *Windscreen de-icing.*—A handpump is fitted below the intercommunication pushbutton on the starboard side under the instrument panel.

(iii) *Pressure-head heating.*—The switch is on the switch block (90) above the compass to starboard.

24. **Oxygen system controls.**—Two (on later aircraft three) cylinders supply oxygen to a standard regulator (63) with (on some early aircraft) a bayonet socket (93) on the starboard side. On later aircraft an economiser replaces the socket. Similar equipment is installed at the observer's station.

PART II

HANDLING

25. Fuel system management

(i) Take-off and climb on inner tanks.

(ii) Unless jettison valves are fitted to inner as well as outer tanks, inner tanks should normally be used up first.

(iii) At a safe height, tanks may be used until exhausted but, particularly when flying low, it is preferable to change over when the gauge of the emptying tank shows 20 gallons.

(iv) The approach to land should if possible not be made on tanks containing less than 20 gallons.

(v) The balance cock should normally be OFF except:

(*a*) If all fuel on one side has been exhausted or lost.

(*b*) In the event of engine failure, *see* paras. 47 and 48.

26. Preliminaries

On entering the cockpit set or check the following:

(i)	Hydraulic power lever ..	ON
(ii)	Undercarriage operating lever	DOWN—leave locking pin engaged

(iii) Switch on the indicator to confirm that the undercarriage is locked.

(iv)	Check brake pressure ..	Minimum 100 lb./sq.in.
(v)	Brakes	ON (after testing rudder control).

(vi) Switch on fuel gauges and check contents of tanks.

27. Starting the engines and warming up

(i) Set the controls as follows:

Balance cock	OFF
Fuel cocks	INNER TANKS ON
Throttles	¾ inch open. Do not pump the throttle levers as this will cause too rich a mixture
Mixture	NORMAL
Propeller: de Havilland 20° ..	Fully back
Hydromatic ..	Fully forward
Superchargers	M ratio
Air intake	COLD
Gills	Open

(ii) It is not necessary to prime the carburettors unless the aircraft has been standing for a week or more. If necessary, this must be done by the ground crew.

(iii) Have each engine turned slowly by hand for at least two revolutions of the propeller in order to ensure that oil will not cause a hydraulic lock of pistons or sleeves.

(iv) High volatility fuel (stores ref. 34A/111) should be used, if an external priming connection is fitted, for priming at air temperatures below freezing. Instruct the ground crew to work the priming pump for the induction system until the suction and delivery pipes are primed. This may be judged by a sudden increase in resistance to the plunger.

(v) Switch ON the ignition and instruct the ground crew to switch ON the starting magnetos.

(vi) Press the starter button for each engine in turn, for periods of not more than 20 seconds, with a 30 seconds wait between each. The ground crew will prime the induction system of each engine while it is being turned, and the engine should start after the following number of strokes if cold; if K.40 (40 c.c. effective) pumps are fitted, divide by four (giving an incomplete stroke where necessary):

Air temperature °C. ..	+30	+20	+10	0	−10	−20
Normal fuel	3	4	7	12		
High volatility fuel ..				4	8	18

(vii) It will probably be necessary for the ground crew to continue priming after the engine has fired and until it picks up on the carburettor.

(viii) The ground crew will switch off the starting magnetos and screw down the priming pumps.

(ix) Open up gradually to about 1,000 r.p.m.

(x) De Havilland 20° propeller.—When the engines have been running for about a minute, move the propeller speed controls slowly fully forward.

NOTE.—On aircraft fitted with 20° propellers. When the engines are being kept warm in readiness for immediate take-off, the propeller controls should be kept fully forward.

28. **Testing engines and installations**

During warming up:

(i) Check the hydraulic pressure (if gauges are fitted) on both engines.

(ii) Check suction of vacuum pumps, if gauge is fitted.

After warming up, for each engine in turn:

NOTE—The following comprehensive checks should be carried out after repair inspection (other than daily) or otherwise at the pilot's discretion. Normally they may be reduced in accordance with local instructions.

(iv) Open up to not more than 1,500 r.p.m. and check operation of the two-speed supercharger: oil pressure should drop momentarily at each change.

(iv) Open up to weak mixture cruising boost and test operation of constant-speed propeller and exercise if sluggish.

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

(vi) At rich mixture cruising boost test each magneto in turn. The drop should not exceed 50 r.p.m.

29. **Taxying out**

(i) Before taxying, see that the ground crew remove and hold up the undercarriage safety links and stow them in the aircraft.

(ii) Instruct the ground crew to make certain that both EMERGENCY escape HATCHES are correctly fastened.

(iii) Brake pressure must not fall below 100 lb./sq.in.

30. **Check list before take-off**

H—Hydraulic power lever ..	ON
T—Trimming tabs Elevator..	One inch nose down on indicator.
Aileron and rudder ..	NEUTRAL
M—Mixture	NORMAL
P—Propeller..	FINE (fully forward)
F—Fuel.	Check contents of tanks and cock settings to INNER TANK ON. Balance cock OFF
F—Flaps	Up or 20° down, selector neutral
Supercharger	M ratio
Gills	One-third open
Tail wheel lock (if fitted) ..	Locked (after turning into wind)

NOTE.—Under normal conditions the use of flaps for take-off is unnecessary, but 20° may be used for taking off from restricted spaces or when taking off at loads approaching 24,000 lb.

31. **Take-off**

(i) Taxi forward a few yards into wind to straighten the tail wheel.

(ii) To ensure that both engines are responding evenly, open up slowly to about 2,000 r.p.m. and then open up fairly quickly to the TAKE-OFF position.

(iii) There is a slight tendency to swing to starboard which should be prevented by leading with the starboard throttle until the rudder becomes effective.

(iv) Raise the tail early to lessen the tendency to swing (and on rough ground to 'bucket'). Hold the nose in a constant attitude and let the aircraft fly itself off.

32. **After take-off**

(i) Safety speed is 160 m.p.h. (140 knots) I.A.S.

(ii) Raise the undercarriage as soon as safely airborne, the thumb catch on the operating lever should not be disengaged; it does not lock the lever unless the wheels are on the ground.

(iii) If down, raise flaps at a safe height.

(iv) Set hydraulic power lever OFF. (This is important to prevent overheating of pumps.)

33. **Climbing**

(i) The recommended climbing speed is 160 m.p.h. (140 knots) I.A.S.

(ii) For ease of control, especially at high take-off weights in conditions of poor visibility, a higher speed such as 170 m.p.h. (150 knots) I.A.S. will be found desirable.

34. **General flying**

(i) *Elevator control.*—The trimming tab is very powerful, and while it may be used to assist manœuvres it should be applied slowly and carefully to avoid imposing excessive stresses in the structure.

(ii) *Stability:*

(*a*) *Unmodified aircraft.*—At high speeds the aircraft is just stable in pitch, but at lower speeds, when climbing or approaching to land, it becomes unstable and cannot be flown "hands off" for more than a few seconds at a time. The instability is more pronounced when the flaps are lowered.

(*b*) *Modified aircraft.*—With dihedral tail and weight on control column.—The aircraft is longitudinally stable in level flight down to 140 m.p.h. (120 knots) I.A.S. On the climb, it is neutrally stable or slightly stable at the speed for maximum rate of climb. On the glide the aircraft is stable both with flaps and undercarriage up and down.

(iii) *Changes of trim:*

Flaps down	Nose goes down
Undercarriage down ..	Nose goes down slightly
Gills open	Nose goes down

(iv) *Handling in turns.*—Going into a steep turn from level flight at 230 m.p.h. (200 knots) I.A.S. requires considerable force on the control column, but, as the turn tightens and speed falls off the aircraft tends to tighten in the turn; a slight forward pressure should be applied to the control column to counteract this. During the earlier part of the turn slight buffeting of the elevators occurs which dies away as the turn tends to tighten. There is ample warning of the stall, which is preceded by 'snatch' of the ailerons, but a slight forward movement of the control column is sufficient to decrease the rate of turn.

(v) *Flying at low airspeeds:*

(*a*) When flying in conditions of bad visibility, near the ground, open the cockpit side windows.

(*b*) Do not lower the undercarriage unless to make a precautionary landing on safe ground.

(*c*) Speed may be safely reduced to about 130 m.p.h. (112 knots) I.A.S. provided that no rapid manœuvre is attempted.

(*d*) In extreme cases, flaps should be lowered about 15°–20° and speed reduced even as low as 120 m.p.h. (105 knots) I.A.S.

(*e*) Engine speed should be maintained at maximum cruising r.p.m. so that ample power is available if the throttles are opened suddenly in an emergency.

(vi) *Use of warm and cold air intakes.*—*See* A.P. 2095 Pilot's Notes General.

(vii) *Flying on compass course.*—After firing 20 mm. guns, in combat or otherwise, a one second burst (about 10 rounds per gun) should be fired as soon as possible with the aircraft flying level on compass North, before attempting to fly by the P.4 compass, or returning to base. This ensures that the deviation is restored to the values recorded on the deviation card. The observer's compass is not affected.

35. **Stalling**

The stalling speeds in m.p.h. I.A.S. are:

		At 19,500 lb.	At 22,000 lb.
Flaps and undercarriage up		95 (82 knots)	100 (86 knots)
		105 (90 knots)	110 (95 knots)*
,,	,, down	80 (68 knots)	85 (73 knots)
		97 (84 knots)	102 (90 knots)*

*With A.S.I. connected to static vent.

36. **Diving**

(i) Leave the propeller speed control set to give cruising r.p.m.

(ii) The aircraft should be trimmed into, and out of, the dive; on recovery, which should be as gradual as possible especially at high weights, the elevator trim control must be used slowly. (*See* para. 34 (i).)

37. **Approach and landing**

(i) *Stability.*—The stability differs markedly according as the aircraft has or has not been modified. (*See* para. 34 (ii).) On unmodified aircraft the instability on the glide is increased when the flaps are lowered, and it is recommended that they should not be lowered beyond the 20° position until the end of the last turn, especially at night.

(ii) *Preliminary approach.*—Undercarriage lowering may be begun at 170 m.p.h. (152 knots) I.A.S., and flap lowering at 150 m.p.h. (130 knots) I.A.S. Speed must be reduced to 135 m.p.h. (116 knots) I.A.S. as soon as possible and before the flaps are fully down.

(iii) *Checks before landing.*

Brakes	Check pressure 100 lb./sq.in.
H—Hydraulic power lever ..	ON
U—Undercarriage	DOWN
M—Mixture	NORMAL
P— Propeller	Speed controls fully forward
Superchargers	M ratio
F—Fuel	Tank contents and cock settings
F—Flaps	Fully DOWN
Tail wheel lock (if fitted) ..	Locked

(iv) Recommended speeds for final approach at 21,000 lb. in m.p.h. I.A.S. are:

	Flaps down	Flaps up
Engine assisted ..	* 100 (86 knots)	120 (104 knots)
Glide	* 115 (100 knots)	135 (116 knots)

*With A.S.I. connected to static vent, add 20 m.p.h. (17 knots).

NOTE.—Turns during gliding approach should only be executed at 5 to 10 m.p.h. above these speeds, and turns with steep bank, or near the ground, should not be attempted.

38. **Mislanding**

(i) The aircraft will climb easily at climbing power with flaps and undercarriage down.

(ii) Raise undercarriage immediately.

(iii) Climb at 120 m.p.h. (105 knots) I.A.S. and raise flaps at not less than 300 to 400 feet. The flaps come up slowly and there is a slight tendency to sink, but only as they come up from the 20° to fully up positions, with a slight change of trim to nose up.

39. **After landing**

(i) Raise flaps, and if a tail wheel lock is fitted, unlock before taxying.

(ii) With De Havilland 20° propellers set speed controls fully back and open up engines sufficiently to change pitch to coarse.

(iii) Leave hydraulic power lever—ON.

(iv) Run engines for two minutes at 800 to 900 r.p.m. and then stop them by pulling the carburettor cut-outs; and shut throttles. After engines have stopped, switch off ignition and all electrical services and close fuel cocks.

(v) See that the undercarriage safety locking pins are replaced.

40. **Oil dilution**

See A.P. 2095 and note the correct period is 4 minutes during which the engines should be run at 900 to 1,000 r.p.m.

PART III

OPERATING DATA

41. Engine data

(i) HERCULES III:

(*a*) *Fuel.*—100 octane (training units 87 octane or higher with Hercules III engines).

(*b*) *Engine limitations for Hercules III:*

		R.p.m.	Boost lb./sq.in.	Temp. °C. Cylr.	Oil
MAX. TAKE-OFF TO 1,000 FEET	M	2,800	F.T.	—	—
MAX. CLIMBING 1 HOUR LIMIT	M	2,400	+2½	250	80
	S				
MAX. RICH CONTINUOUS	M	2,400	+2½	230	70
	S				
MAX WEAK CONTINUOUS	M	2,400	-1	230	70
	S				
COMBAT	M	2,800	F.T.	260	90
5 MINS. LIMIT	S	2,800	+6½	260	90

OIL PRESSURE:
NORMAL .. .. 80 lb./sq.in.
EMERGENCY MINIMUM .. .. .. 70 lb./sq.in.

MINIMUM TEMP. FOR TAKE-OFF, OIL: .. .. 5°C.

DIVING:
MAXIMUM BOOST .. .. +4 lb./sq.in.
MAXIMUM R.P.M. 3,120

2,800 r.p.m. may be exceeded only for 20 seconds, with throttles not less than one-third open and in M gear only.

(ii) HERCULES XI (Operational):

(*a*) *Fuel.*—100 octane only.

(*b*) *Engine limitations for Hercules XI:*

		R.p.m.	Boost lb./sq.in.	Temp. °C. Cylr.	Oil
MAX. TAKE-OFF TO 1,000 FEET	M	2,800*	+6¾	—	—
MAX. CLIMBING 1 HOUR LIMIT	M	2,500	+3½	270	90
	S				
MAX. RICH CONTINUOUS	M	2,500	+3½	270	80
	S				
MAX. WEAK CONTINUOUS	M	2,500	zero	270	80
	S				
COMBAT 5 MINS. LIMIT	M	2,800*	+6¾	280	100
	S				

OIL PRESSURE:
NORMAL .. .. 80 lb./sq.in.
EMERGENCY MINIMUM (5 MINS.) .. .. 70 lb./sq.in.

MINIMUM TEMP. FOR TAKE-OFF .. OIL: 5°C.
MAXIMUM TEMP. AT START OF TAKE-OFF CYLR: 230°C.
MAXIMUM TEMP. FOR STOPPING ENGINES CYLR. 230°C.

*Limited to 2,800 r.p.m. by propeller governor setting.

DIVING:
MAXIMUM BOOST .. .. +6¾ lb./sq.in.
MAXIMUM R.P.M. 2,950

2,800 r.p.m. may be exceeded only for 20 seconds, with throttle one-third open, and in M gear only.

(iii) HERCULES XI (Training):

The following limitations apply for use with 87 octane fuel in training:

		R.p.m.	Boost lb./sq.in.	Temp. °C. Cylr.	Oil
MAX. TAKE-OFF TO 1,000 FEET	M	2,800	+5	—	—
MAX. CLIMBING 1 HOUR LIMIT	M	2,400	+2½	270	90
	S				
MAX. RICH CONTINUOUS	M	2,400	+2½	270	80
	S				
MAX. WEAK CONTINUOUS	M	2,200	zero	270	80
	S				
COMBAT 5 MINS. LIMIT	M	2,800	+5	280	100
	S				

OIL PRESSURE:
NORMAL .. .. 80 lb./sq.in.
EMERGENCY MINIMUM (5 MINS.) .. .. 70 lb./sq.in.

MINIMUM TEMP. FOR TAKE-OFF .. OIL: 5°C.
MAXIMUM TEMP. FOR TAKE-OFF .. CYL: 230°C.
MAXIMUM TEMP. FOR STOPPING ENGINES CYL: 230°C.

42. **Position error correction**

At 19,500 lb. the corrections are as follows:

From ..	120	145	175	205	235	265	m.p.h.
To ..	145	175	205	235	265	300	I.A.S.
Add ..	4	2	0				knots or
Subtract ..				2	4	6	m.p.h.
From ..	105	125	150	175	205	230	knots
To ..	125	150	175	205	230	260	I.A.S.

With A.S.I. connected to static vent the position error may be neglected at all speeds.

43. **Flying limitations**

(i) This aircraft is designed for the duties of a long-range reconnaissance fighter and intentional spinning and aerobatics are not permitted. (*See* A.P. 2095.)

(ii) Maximum speeds in m.p.h. I.A.S.:

Diving	400 (340 knots)
Lowering flaps	150 (130 „)
Flaps fully down	135 (116 „)
Undercarriage down	150 (130 „)

(iii) Maximum weights:

(*a*) Normal take-off, all forms of flying and landing, 21,000 lb.

(*b*) For aircraft having Mods. Nos. 773, 792, 878, 879 and 914 incorporated:

Take-off and straight flying—24,000 lb. (Gentle turns and dives are permitted at this weight but recovery must be gradual and any violent use of the controls must be avoided until the weight of the aircraft has been reduced to 22,100 lb.)

Landing and all forms of flying—22,100 lb.

NOTE.—Pilots undergoing training, unless experienced and competent should not fly the aircraft at weights in excess of 21,000 lb.

44. **Maximum performance**

(i) *Climbing:*

(*a*) The speeds for maximum rate of climb are:

150 m.p.h. (130 knots) I.A.S. from S.L. to 16,000 ft.
145 m.p.h. (125 knots) I.A.S. from 16,000 to 20,000 ft.
140 m.p.h. (120 knots) I.A.S. from 20,000 to 25,000 ft.
135 m.p.h. (116 knots) I.A.S. above 25,000 ft.

(*b*) Above full throttle height, as boost begins to fall off, follow it back with the throttle lever.

(*c*) Change to S gear when boost has fallen to $+\frac{1}{2}$ lb./sq.in. (about 7,500 feet).

(ii) *Combat:*

Change to S gear if the boost in M gear is less than +4 lb./sq.in. (Hercules XI) or +2 lb./sq.in. (Hercules III).

45. **Maximum range**

(i) *Climbing*:

As for maximum performance.

(ii) *Cruising—maximum range*:

(*a*) The recommended speed is 180 m.p.h. (155 knots) I.A.S.

(*b*) Use weak mixture and maximum weak continuous boost (if obtainable) reducing r.p.m., which may be as low as 1,900, to give the recommended I.A.S. At low altitude, do not reduce boost even if the recommended speed is exceeded.

(*c*) If the recommended speed cannot be maintained in M gear at maximum weak continuous r.p.m., accept a speed of 170 m.p.h. (145 knots) I.A.S. If this speed cannot be maintained, change to S gear.

46. **Fuel capacities and consumptions**

(i) Fuel capacity in gallons:

Main Tanks Inner	376	
„ „ Outer	174	
	—	550
Long-range tanks		132
		682

(ii) Approximate fuel consumptions for the aircraft are:

(*a*) With Hercules III engines:

Mixture	R.P.M.	Boost lb./sq.in.	Gallons/hour Total
Rich	2,800	+4	About 270
,, ...	2,400	+2½	,, 194
Weak	2,400	−1	,, 112
,, ...	1,900	−5	,, 60

(*b*) With Hercules XI engines:

In rich mixture:

Boost lb./sq.in.	R.P.M.	Consumption Gals./hr.
+6¾	2,800	About 290
+3½	2,500	,, 222

In weak mixture:

Boost lb./sq.in.	M ratio @ 10,000 ft. R.P.M.			S ratio @ 15,000 ft. R.P.M.		
	2,400	2,200	2,000	2,400	2,200	2,000
0	117	—	—	111	104	—
−1	111	102	—	107	98	92
−2	104	96	85	101	92	87
−3	96	88	79	96	87	81
−4	87	81	73	90	81	75
−5	—	—	67	—	—	—
−6	—	—	61	—	—	—

For every 2,000 ft. *above* height stated *add* 1 gal./hr.
,, 2,000 ft. *below* ,, ,, *deduct* 1 ,,

PART IV

EMERGENCIES

47. **Engine failure during take-off**

(i) If safety speed (160 m.p.h. (138 knots) I.A.S.) has not been attained, close both throttles and make best landing possible.

(ii) If it is necessary to raise the undercarriage while still on the ground, the thumb catch on the undercarriage operating lever must first be released.

(iii) If safety speed has been attained, throttle back to the RATED gate and then climb at about 140 m.p.h. (120 knots) I.A.S.

(iv) If fuel failure is suspected, climb to a safe height (say 3,000 feet) before attempting to rectify this by opening the balance cock (*see* para. 48).

48. **Failure of one engine in flight**

(i) At a weight of 20,400 lb. height can be maintained at cruising boost and r.p.m., and rudder control is adequate down to about 125 m.p.h. (118 knots) I.A.S. For continuous flight on one engine, speed should be about 150 m.p.h. (130 knots) I.A.S. Set propeller speed control of failed engine fully back.

NOTE.—The throttle should *never* be so far opened that full rudder is required to keep the aircraft straight.

(ii) If flying by instruments it is advisable first to close both throttles and then open the live engine up slowly.

(iii) When investigating the cause of failure try the dead engine on its own alternative tank. If this does not succeed, try setting balance cock on with all tanks on failed engine side off; if the live engine then shows signs of lack of fuel, turn off the balance cock *immediately*. The balance cock should only be left on if this proves to be the only means of getting the dead engine to run.

(iv) If it proves impossible to keep defective engine running, fuel from the failed engine side may be used for the live engine by opening the balance cock.

(v) *Correct speeds for approach on one engine:*

(*a*) Before flaps are lowered 130 m.p.h. (112 knots) I.A.S.

(*b*) After lowering flaps, 115 m.p.h. (100 knots) I.A.S.

49. **Fuel jettisoning**

By pulling up the red painted lever (46) on the instrument panel just above the main magneto switches, the fuel in each outer tank (on later aircraft the four main tanks) can be jettisoned. The lever controls a pneumatically operated jettison valve on each tank.

NOTE.—With full tanks, the main bulk of fuel can be jettisoned from the outer main tanks, and on aircraft with jettison valves on inner tanks from all main tanks, in about one minute. To jettison progressively pull the lever (or levers on aircraft with selective controls) for a few seconds at a time, check contents gauges between each operation, until gauges indicate that not more than the desired quantity remains in all tanks.

50. **Undercarriage and flaps emergency operation**

(i) Never use the emergency system unless the normal engine pump system has failed, then use the handpump emergency system as follows:

(*a*) Set hydraulic power lever .. OFF
Set emergency selector .. ON
Then pump.

NOTE.—The undercarriage and flaps will come down together if the flaps and undercarriage levers remain either UP or DOWN (*if Mod. 853 has not been incorporated the flap lever must be left UP or set DOWN*). They cannot be raised by means of the emergency system.

(*b*) After incorporation of Mod. 853, to lower the undercarriage only, set flap lever neutral. (On later aircraft an interlock does this when the emergency selector is set to ON.) The flaps can be lowered subsequently by setting the flap lever DOWN.

(ii) Should the emergency system fail, try the handpump through the normal system as follows:

Set emergency selector .. .. OFF
Set hydraulic lever .. .. ON
Set flap and undercarriage levers as required.

Flaps and undercarriage can be raised as well as lowered by this means.

NOTE.—Pumping, through either the normal or emergency pipe lines, at about one full double stroke per second, the flaps and undercarriage take not less than three minutes to reach the fully down position and may take longer.

51. **Fire-extinguishers**

(i) The Graviner engine fire-extinguishers are automatically operated by combined gravity and impact switches. The gravity part is inoperative when the undercarriage is retracted. Two shielded pushbuttons (19 and 20), one for each engine, provide manual control.

(ii) Two hand fire-extingishers are stowed as shown in Fig. 6.

(iii) For actions in the event of fire in an engine in flight, *see* A.P. 2095 Pilot's Notes General.

52. **First-aid outfit**

A first-aid outfit is stowed on the starboard side of the rear fuselage forward of the rear spar.

53. **Emergency exits**

(i) The pilot's entrance hatch is also used as a parachute exit. To open, pull the bottom catch release lanyard smartly, the airstream will then open the hatch and force it into the top catch. The observer's hatch is opened in a similar manner.

When the front hatch opens there may be some change of trim to tail heavy but this can be easily held.

NOTE.—(*a*) When testing operation of escape hatches in flight, which should be carried out after every minor inspection, this should be done at about 140 m.p.h. I.A.S., just before landing, but at a safe height.

(*b*) Should the escape hatches open unintentionally in flight an attempt may be made to close them as follows:

Rear hatch at 200 m.p.h. (175 kts.) I.A.S. or less.
Front hatch at 120 m.p.h. (100 kts.) I.A.S. with flaps at 20° and undercarriage down.

(ii) A further emergency exit is provided on the starboard side of the cockpit by a special window (9) which can be jettisoned. The window is held shut by plunger bolts in catch brackets at each end and is jettisoned by pulling the lever in the centre aft and pushing the window outward.

(iii) A hatch in the cockpit roof also provides exit. It is hinged on the starboard side and opens outward. The hatch is held shut by plunger bolts, in catch brackets at each end on the port side, and may be opened by first releasing the locking arrangement and then pulling down the handle in the centre. A wire cable is attached to the rear end of the hatch to prevent it from opening too far. On Fighter Command aircraft this hatch has a sliding observation panel. To open, pull lever down and back. To lock closed, push lever forward and up. The observer's hood can also be used and opens in a similar manner.

54. **Emergency signalling**

The emergency signalling (on early aircraft only) is used only when abandoning the aircraft and is an entirely independent circuit. There is a switch (90) and a shielded pushbutton (34) for signalling to the observer. The pushbutton is to warn the observer to prepare to abandon the aircraft and the switch to give the final order to abandon. The switch should not be depressed until the warning lamp (35) on the instrument panel lights up informing the pilot that the observer is ready to abandon the aircraft.

55. **Air-sea rescue equipment**

Dinghy equipment and releases.—A multi-seat dinghy is provided in a blow-out stowage built into the trailing edge of the port wing. The dinghy is secured to the interior of the stowage structure by a painter cord of low

breaking strength; a pack containing rations, drinking liquid, paddles and recognition devices is provided in the dinghy compartment, connected to the dinghy lifeline by the lanyard provided on the pack.

There are three variations of the Beaufighter dinghy installation:

(i) With the dinghy type "H" and operating head type "G" provision is made for manual operation only by means of a handle on the dinghy stowage cover.

(ii) With dinghy type "H" and operating head type "H" there are, in addition to an immersion switch for automatic electrical operation of the type "H" operating head, three manual pull-offs:

(*a*) Internally on the port side immediately aft of the pilot's shoulder.

(*b*) Internally on the port side, below the astro hatch.

(*c*) Externally forward of leading edge of fin.

(iii) With dinghy type "L" operated manually and automatically as for (ii).

In addition to the multi-seat dinghy, the following are provided as personal issue:
For pilot: "K" type dinghy in "A" type pack.
For observer: "K" type dinghy in "C" type pack.

56. **Ditching**

See A.P. 2095 and note:

(i) Flaps should be set 30° down.

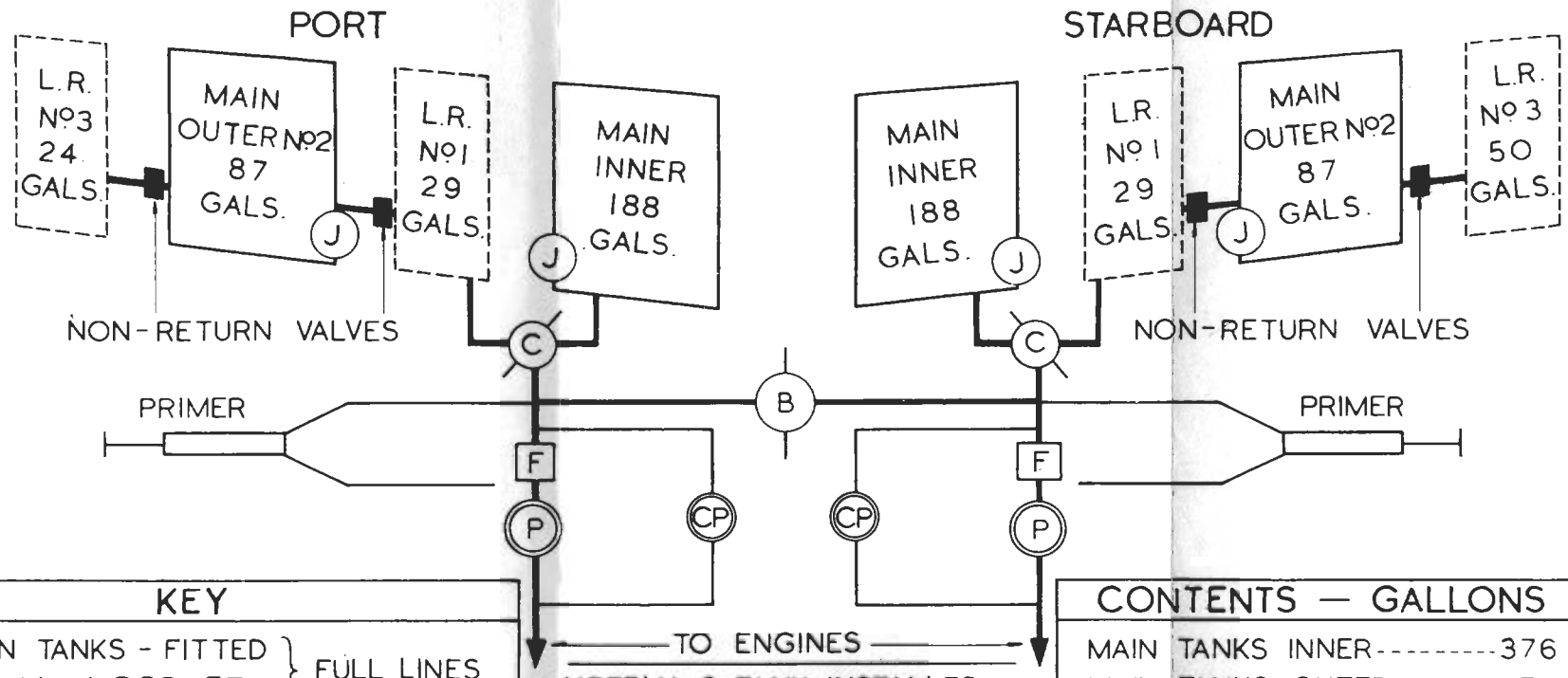
(ii) Should the undercarriage be down an attempt should be made to raise it (if there is time) or in any case to unlock it, if necessary with the handpump through the normal pipe lines, i.e. emergency selector OFF, power lever ON, undercarriage selector UP.

(iii) The deceleration is likely to be severe and much water may come over the nose and into the cockpit. The aircraft may swerve.

PART V

ILLUSTRATIONS

	Fig.
Fuel system diagram	1
General view of cockpit	2
Pilot's instrument panel	3
Port side of cockpit	4
Starboard side of cockpit	5
Emergency exits and equipment ..	6



KEY

MAIN TANKS - FITTED TO ALL AIRCRAFT	FULL LINES
L.R. TANKS LONG RANGE	BROKEN LINES
ENGINE DRIVEN PUMPS	P
FILTERS	F
CARBURETTOR PRIMING PUMPS	CP
MAIN FUEL COCKS	C
BALANCE COCK	B
FUEL JETTISON VALVES	J

NOTE: No.3 TANK INSTALLED IN PLACE OF MACHINE GUNS

FUEL JETTISON

THE JETTISON CONTROL OPENS JETTISON VALVES ON THE FOUR MAIN TANKS. FUEL WILL ALSO DRAIN FROM No 3 L.R. TANKS THROUGH THE OUTER JETTISON VALVES - BUT SLOWLY.

NOTE - FUEL IN No 1 L.R. TANKS IS NOT JETTISONABLE.

CONTENTS — GALLONS

MAIN TANKS INNER	376	
MAIN TANKS OUTER	174	
MAIN TANKS TOTAL		550
L.R. TANKS - ALL		132
TOTAL - ALL TANKS		682

FIG 1

FUEL SYSTEM DIAGRAM

FIG 1

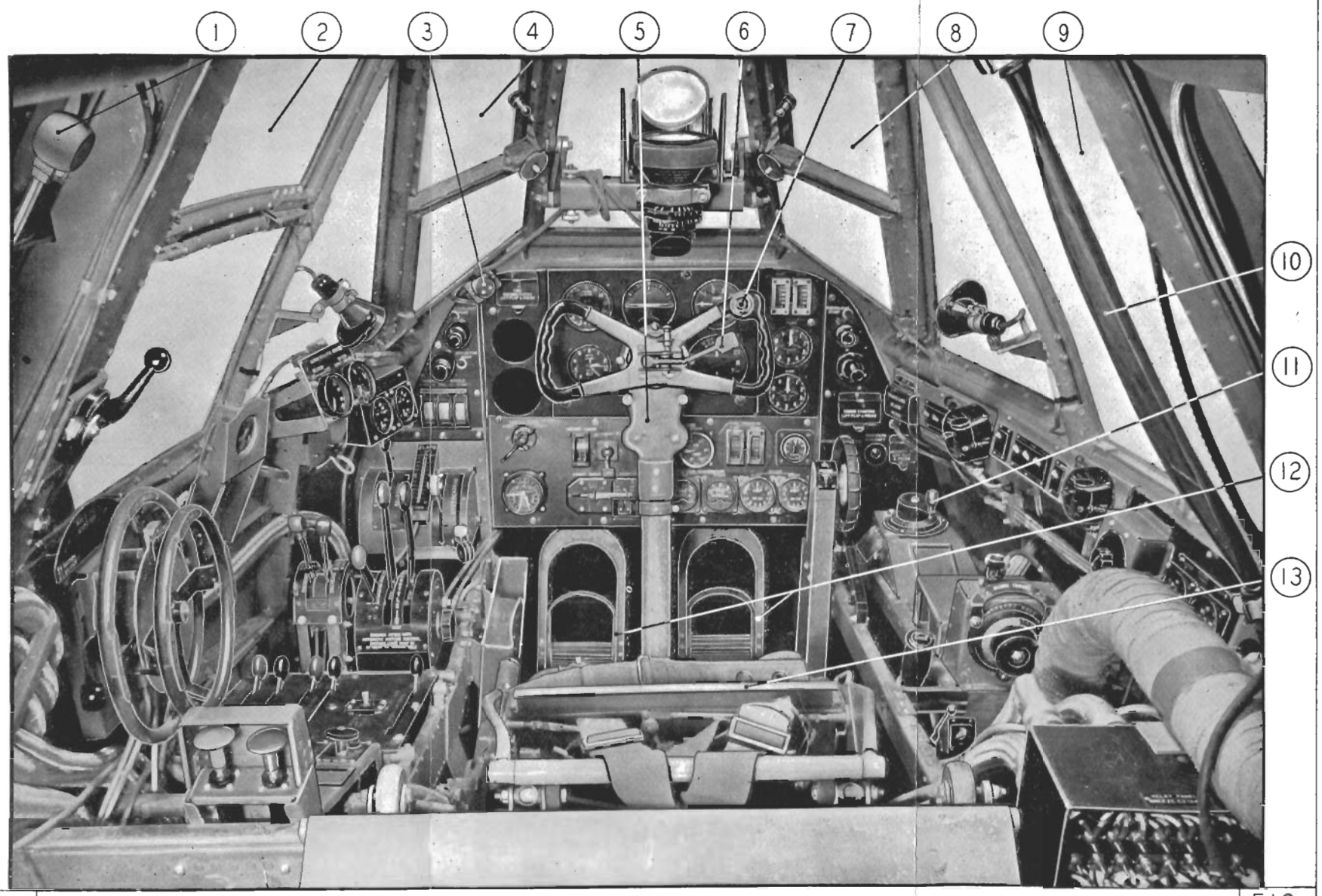


FIG. 2

GENERAL VIEW OF COCKPIT

FIG. 2

KEY TO *Fig. 2*

GENERAL VIEW OF COCKPIT

1. Pilot's entry and exit hatch lever.
2. Port window.
3. Reflector sight socket.
4. Direct-vision window (port).
5. Control column.
6. Brake lever.
7. Gun-firing push-button.
8. Direct-vision window (starboard).
9. Starboard emergency exit window space (window not fitted).
10. Sanitary bottle.
11. Rudder trimming tab control.
12. Rudder pedals.
13. Seat (shown collapsed).

KEY TO *Fig. 3*
PILOT'S INSTRUMENT PANEL

14. Undercarriage and tail wheel position indicators.
15. Clock.
16. Reflector sight dimmer switch (deleted).
17. Cockpit lamp dimmer switch (port).
18. Beam approach visual indicator.
19. Fire-extinguisher pushbutton port—(shielded).
20. Fire-extinguisher pushbutton starboard—(shielded).
21. Altimeter.
22. Airspeed indicator.
23. Artificial horizon.
24. Direction indicator.
25. Rate-of-climb indicator.
26. Turn and bank indicator.
27. Oil pressure gauge (port).
28. Oil pressure gauge (starboard).
29. Engine speed indicator (port).
30. Cockpit lamp dimmer switch (starboard).
31. Ventilator.
32. Engine starting pushbutton (port and starboard).
33. Engine speed indicator (starboard).
34. Abandon aircraft pushbutton shielded —(on early aircraft only).
35. Abandon aircraft lamp (on early aircraft only).
36. Intercommunication signalling lamp and pushbotton.
37. Air temperature gauge.
38. Boost gauge (starboard).
39. Fuel pressure gauge (starboard) (a warning light on later aircraft).
40. Boost gauge (port).
41. Fuel pressure gauge (port) (a warning light on later aircraft).
42. Engine cylinder temperature indicator (starboard).
43. Engine cylinder temperature indicator (port).
44. Oil temperature gauges (port and starboard).
45. Main magneto switches (port and starboard).
46. Fuel jettison lever.
47. Undercarriage and tail wheel indicators switch.
48. Vacuum gauge (on early aircraft only).
49. Pneumatic system triple pressure gauge.
50. Vacuum pump change-over cock control.

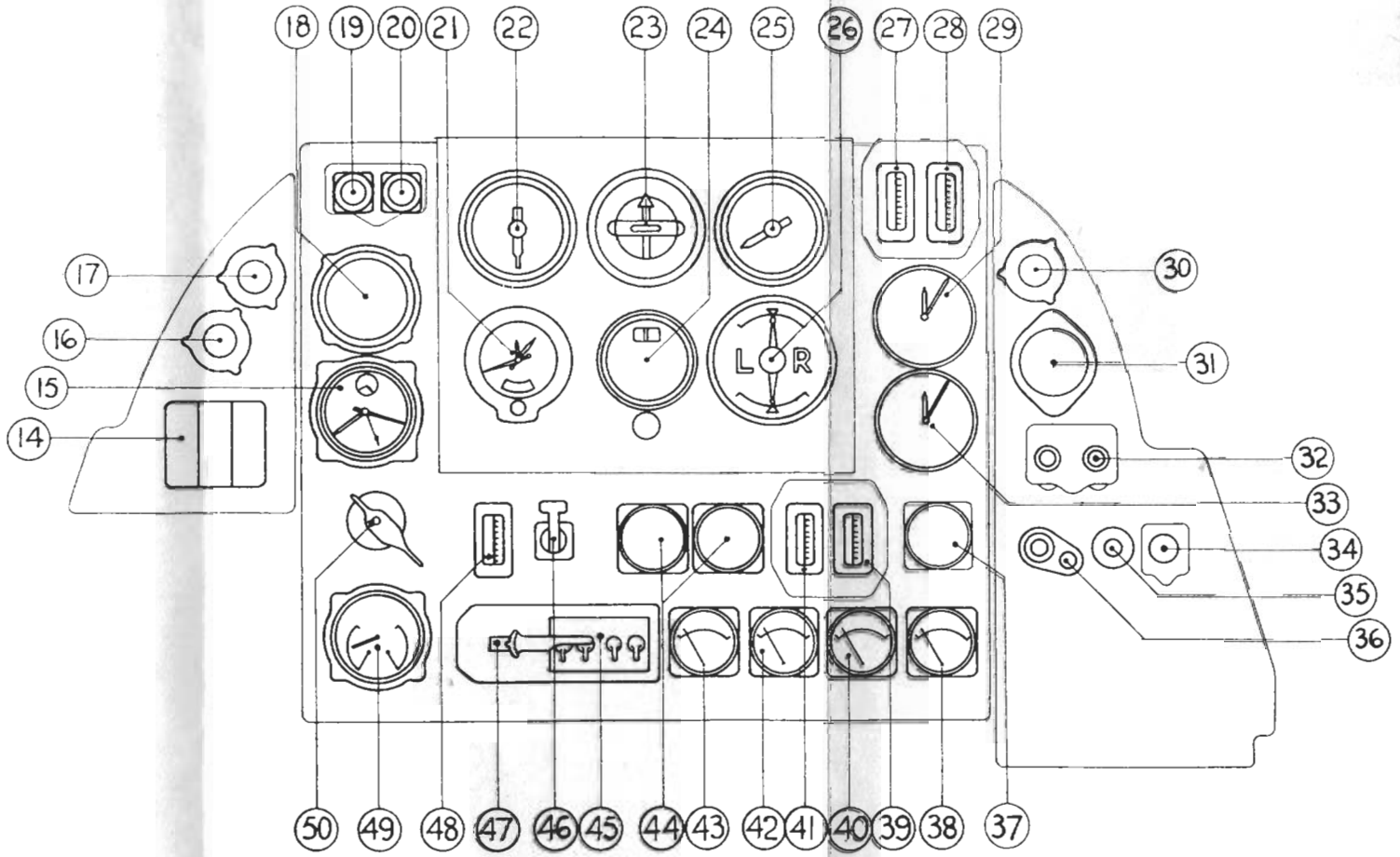


FIG 3

PILOT'S INSTRUMENT PANEL.

FIG 3

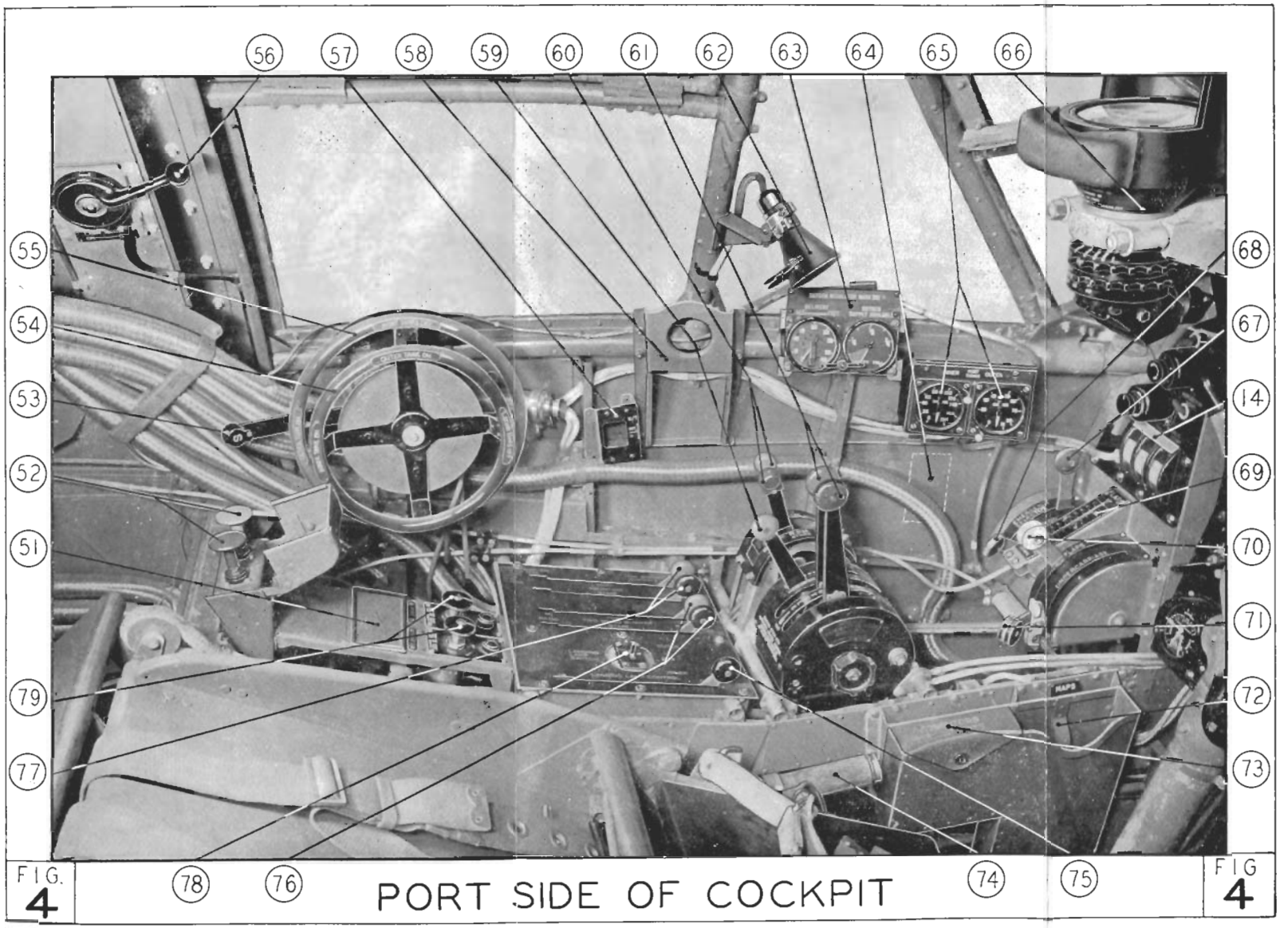


FIG. 4 PORT SIDE OF COCKPIT FIG 4

KEY TO *Fig. 4.*
PORT SIDE OF COCKPIT

14. Undercarriage and tail wheel position indicators.
51. A.S.I. correction card holder.
52. Carburettor cut-out controls.
53. Fuel suction balance cock lever.
54. Starboard fuel tank cocks handwheel.
55. Port fuel tank cocks handwheel.
56. Cockpit heating control.
57. Wireless frequency changing switch mounting.
58. Wireless remote controller mounting.
59. Mixture control.
60. Propeller speed controls.
61. Throttle controls.
62. Cockpit lamp.
63. Oxygen regulator.
64. Engine data plate.
65. Fuel contents gauges for port tanks.
66. Reflector gun sight.
67. Hydraulic emergency selector lever.
68. Hydraulic power lever.
69. Flaps position indicator.
70. Flaps control lever.
71. Undercarriage and tail wheel control lever.
72. Map case.
73. Height and airspeed computor stowage.
74. Height adjustment lever for seat.
75. Landing lamps dipping control.
76. Two-speed supercharger controls.
77. Carburettor air-intake controls.
78. Landing lamps switch.
79. Cowling gills controls and indicator lamps.

KEY TO *Fig. 5*
STARBOARD SIDE OF COCKPIT

66. Reflector sight.
80. Elevator trimming tabs position indicator.
81. Ground-to-air signal card holder.
82. Elevator trimming tabs control.
83. Landing flare release push-buttons.
84. Downward identification lamp switches (red, green and clear).
85. Signalling switchbox for indentification lamps.
86. Compass deviation card holder.
87. Stowage for spare reflector sight filaments.
88. Headlamp switch (deleted).
89. Cockpit lamp.
90. 3-unit switchbox (navigation lamps, abandon aircraft and pressure head heating).
91. Compass mounting.
92. Fuel gauges switch.
93. Oxygen socket.
94. Signalling switchbox for formation-keeping lamps.
95. Propeller de-icer control.
96. Beam approach control unit.
97. Starboard tank fuel contents gauges.
98. Camera gun footage indicator wedge plate.
99. Aileron trimming tab control.
100. Hydraulic handpump handle.
101. Sutton harness release lever.
102. Camera gun master switch.

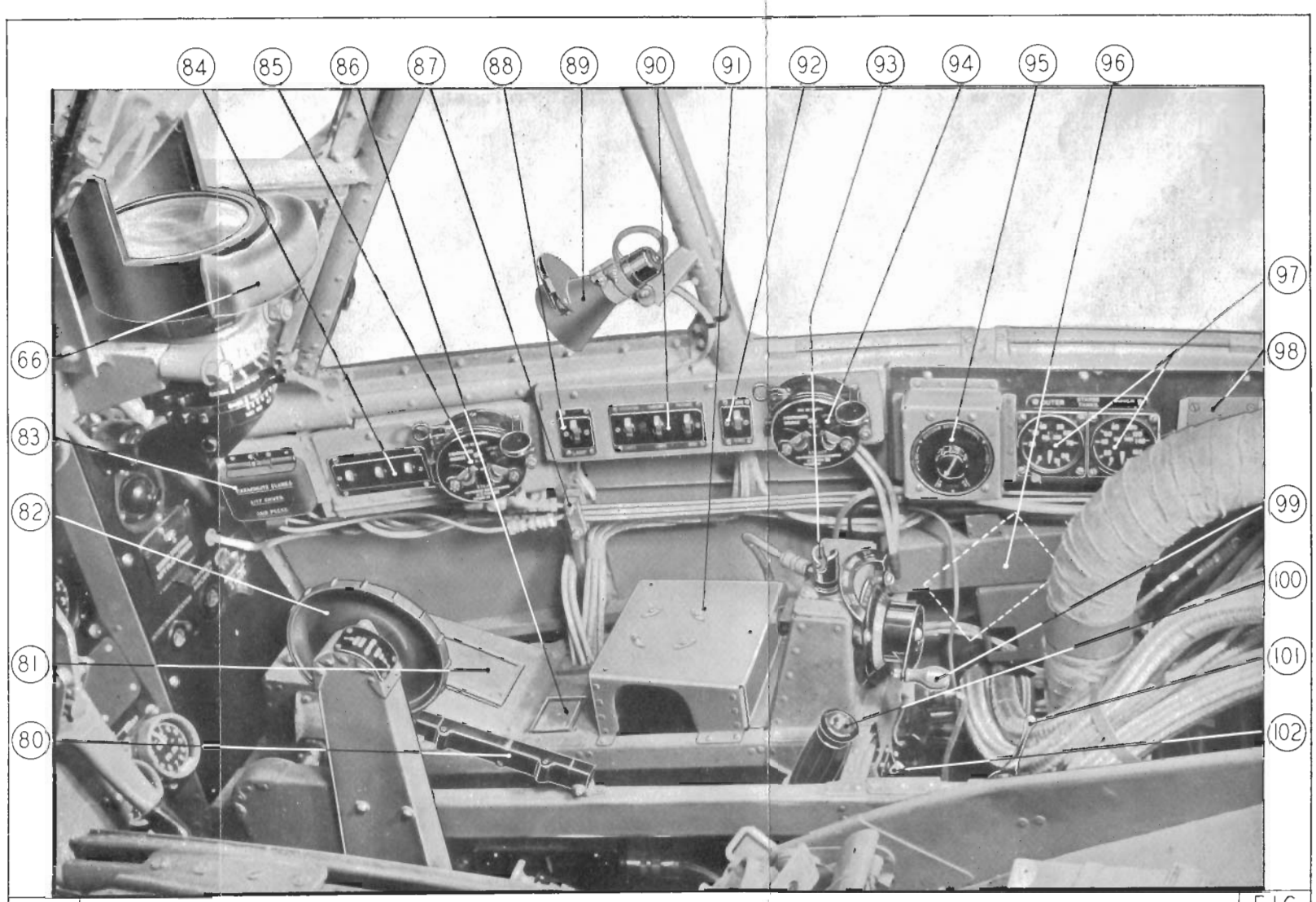


FIG 5 STARBOARD SIDE OF COCKPIT FIG. 5

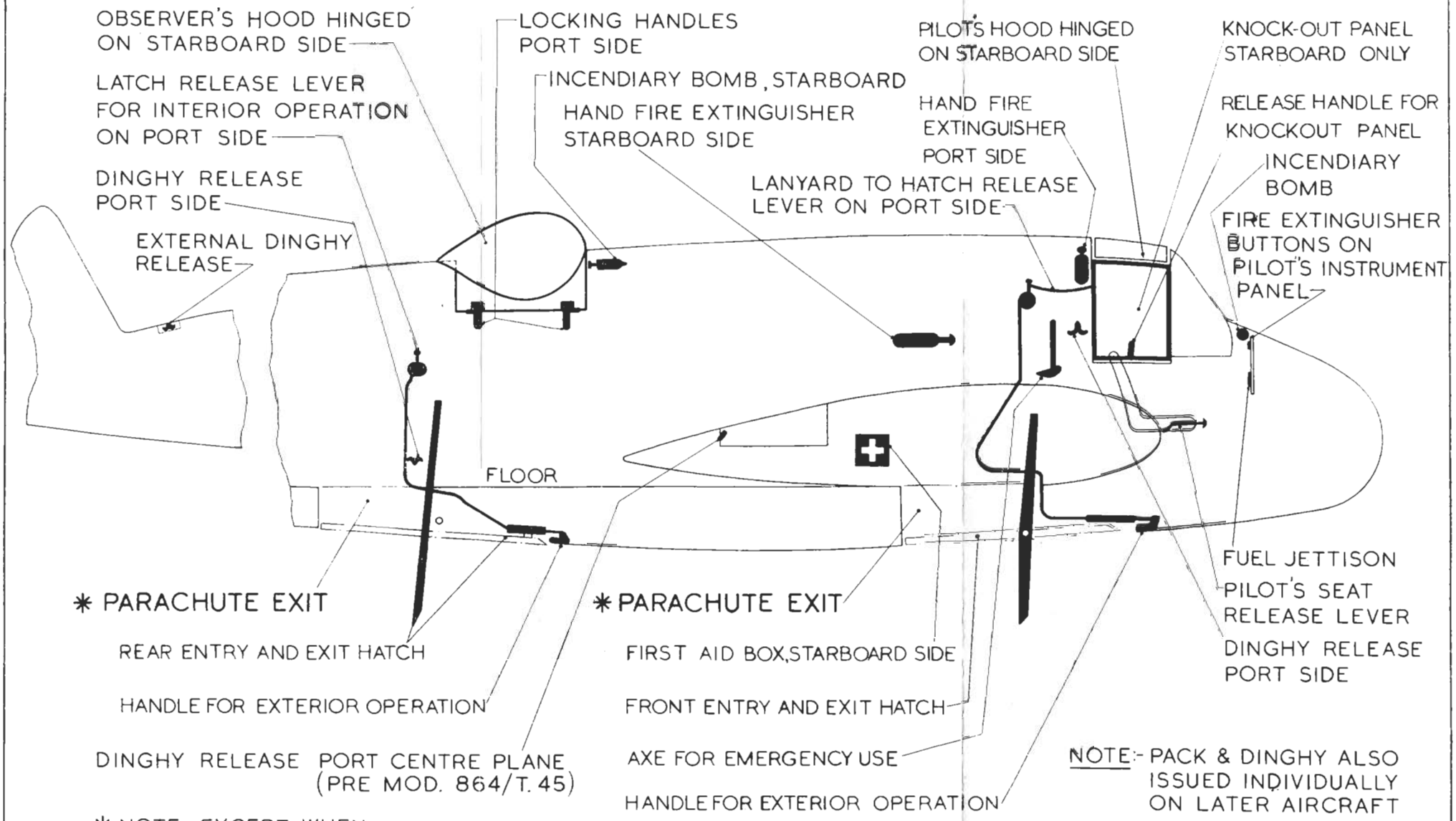


FIG 6

EMERGENCY EXITS AND EQUIPMENT

FIG 6

(1041) Wt. 8028/N545 1,500 12/43 C.P. Ltd. Gp. 784


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