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AIR PUBLICATION 1592B

Pilot's Notes

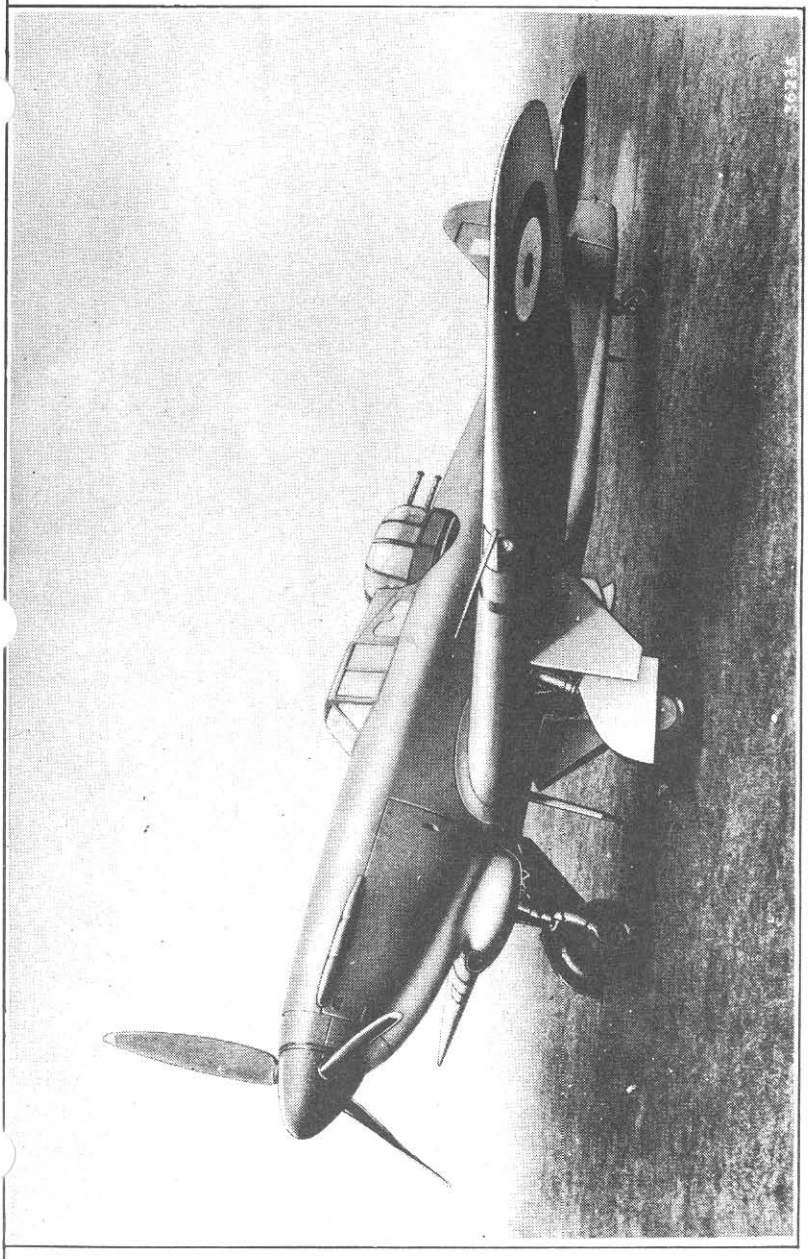
PILOT'S NOTES

THE DEFIANT II AEROPLANE
MERLIN XX ENGINE

Prepared by direction of the
Minister of Aircraft Production

A. C. Rowlands.

Promulgated by order of the Air Council.



DEFIANT II

FRONTISPIECE

Pilot's Notes

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Amendt. List No.	1	4	12	13	14		18	11/E	8	10
Prelimy. matter										
Leading Partics.										
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Section 1	✓	✓		✓						
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LIST OF SECTIONS

(A detailed List of Contents is given at the beginning of each Section)

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SECTION 1

PILOT'S CONTROLS AND EQUIPMENT

AND GENERAL EMERGENCY EQUIPMENT AND EXITS

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SECTION 1

PILOT'S CONTROLS AND EQUIPMENT

AND GENERAL EMERGENCY EQUIPMENT AND EXITS

INTRODUCTION

1. The layout of the flying and operational controls and equipment in the pilot's cockpit is illustrated in figs.1 to 3 at the end of this Section, each item being given a number which is quoted when the item is referred to in the text. A simplified fuel system diagram is shown in fig.4, and a diagram of the parachute exits and emergency equipment is shown in fig.5.

Aeroplane controls

Control column

2. The control column is operated in the normal way and is mounted on the forward edge of the pilot's seat. The spade grip is of standard type incorporating a brake-operating lever (47), and a gun-firing pushbutton (48) for use when the gun-firing control is taken over by the pilot.

Rudder control

3. The rudder bar and pedals are of normal design and operation and can be adjusted in flight for leg reach by means of a foot-operated starwheel at the centre of the rudder bar.

Rudder trimming tab control

4. This control consists of a hand lever (29) mounted on the lower port side of the cockpit. The forward end of the lever forms a pointer which moves over a scale, marked one division from neutral to port, and six divisions from neutral to starboard. The pointer should be turned to the direction in which is is desired to trim. The tab also serves as a balance tab from any setting of trim.

Elevator trimming tab control

5. This control consists of a geared hand winch (40) mounted on the port side of the cockpit. The handle should be rotated in the direction in which it is desired to trim. Tab movement is indicated by a pointer on a scale calibrated in tenths of tab movement from the neutral position.

Undercarriage and flaps (hydraulic) controls

6. The undercarriage units and the flaps are raised and lowered hydraulically by means of an engine-driven pump or a hand pump (69), the operations being controlled by means of selector levers (31) and (30) respectively. An emergency selector lever (35) for lowering the undercarriage only, when the normal system has failed, is also provided. These three levers are mounted in a control box on the port side of the cockpit. A safety catch is provided on the undercarriage selector lever to prevent its being inadvertently moved to the UP position when the aeroplane is on the ground.

7. Operation of undercarriage.- To raise or lower the undercarriage, the normal procedure is as follows:-

(i) Ensure that the emergency selector lever (35) is fully up and secured.

(ii) Release the safety catch, move the selector lever (31) to either the UP or DOWN position and release. The lever should return automatically to neutral when the operation is complete.

(iii) If the operation has to be carried out by means of the hand pump, select the position (as in (ii)) and operate the hand pump for approximately 110 full strokes to raise or 170 full strokes to lower (one full stroke comprises a complete up-and-down movement of the pump handle). On completion of the operation as shown by the indicators, if the selector lever (31) does not return automatically to neutral, move it by hand.

8. Undercarriage indicator.- This instrument (5) is mounted at the top of the instrument panel and operates as follows:-

(i) Two green lights indicate locked DOWN.

(ii) Two red lights indicate locked UP.

(iii) No lights indicate intermediate position.

The lamps can be dimmed for night use by turning the central knob of the indicator anti-clockwise. Two sets of lamps are provided, the reserve set being brought into use by a pull on the control knob.

9. EMERGENCY LOWERING of Undercarriage.- When both normal systems have failed, the undercarriage should be lowered as follows:-

(i) Set the normal selector lever (31) in its neutral position.

(ii) Push the emergency selector lever (35) fully DOWN; this lever has a safety catch which must be released before the lever can be moved.

(iii) Operate the hand pump (up to 200 full strokes may be required, one full stroke being a complete up-and-down movement of the pump handle).

10. Flap control

(i) The flaps selector lever (30) is on the control box. To lower or raise the flaps fully, move the flap selector DOWN or UP, and release. The lever should return automatically to neutral when the operation is complete.

(ii) To lower or raise the flaps partially, move the selector to DOWN or UP until the desired flap setting is obtained, then return to neutral.

(iii) Flap position indicator. The flap position indicator (23) is on the port instrument panel and shows the position of the flaps at all times.

ENGINE CONTROLS

11. Boost controls

(i) The throttle lever (41) is mounted in a control box on the port side of the cockpit. The throttle lever is checked at the climbing boost position, unless the grip lever (45) is raised - the throttle can then be opened to give +12 lb/sq.in. boost for take-off at sea level only.

(ii) The boost control cut-out (21) is on the port side of the instrument panel. The cut-out must be pulled out to give maximum boost for combat: the following boosts will be obtained:-

In M gear	+12 lb/sq.in.
In S gear	+14 lb/sq.in.

12. Mixture controls

(i) On aircraft in which Mod.311 is incorporated, mixture control is entirely automatic.

(ii) If Mod.311 has not been incorporated, the mixture control lever (39) is beside the throttle lever on the control box. A safety catch must be lifted to move the mixture lever forward from R (rich) to W (weak). If the throttle is closed, the mixture control lever is automatically returned to R.

13. Propeller speed control. The control lever (36) for the Rotol 35° constant-speed propeller is mounted in the port side of the control box. Movement of the lever forward will increase the engine r.p.m. and movement aft will decrease the engine r.p.m.

14. Two-speed supercharger control. The two-speed supercharger control (22) is situated on the port side of the instrument panel. With the knob in its aft position moderate supercharging is obtained, full supercharging being given by the forward position.

15. Radiator flap control. This control consists or a hand winch (37) mounted on the starboard side of the cockpit.

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Fuel supply

16. The fuel supply (see fig.4) is contained in two main tanks, and two auxiliary tanks whose contents are transferred to the main tanks when required.

17. Main fuel cock control.- This handle (24) is mounted on the port side of the instrument panel and is of star form. The four positions of the cock are engraved ALL ON, PORT ON, STARB. ON and ALL OFF, a pointer on the handle indicating the settings of the cock. In flight, the fuel cock should be set to ALL ON as long as the quantities of fuel in the tanks are approximately equal. If one tank contains appreciably more than the other, the fuel cock should be set to the fuller tank to equalize their contents. If one tank empties before the other, it should be turned off before it is completely exhausted, to prevent air being drawn into the system. After flight, the cock should be set to either PORT ON or STARB. ON to close the balance pipe and prevent fuel from seeping through a non-return valve from one tank to the other. This is important if the aeroplane is standing with one tank lower than the other.

18. Pressure control cock.- This cock (62) is mounted adjacent to the fuel transfer selector valve and has two operating positions, PRESSURE ON MAIN TANKS, and NORMAL VENTING SYSTEM. Pressurising is operative only about 20,000 ft. (see Sect.2).

19. Fuel transfer.- The selector valve (61) is mounted on the starboard side of the cockpit and is operated by two pushbuttons, one for each auxiliary tank. The appropriate pushbutton must be pressed and held in during the period of transfer. (For 29 gallons, this period will vary between 1½ minutes at 20,000 ft. and 2½ minutes at 30,000 ft.). The two buttons must not be pressed simultaneously. Transfer of fuel should not be carried out until the contents of the main tank has fallen to approximately 10 gallons. Fuel may be lost by venting if, during transfer, the contents of the main tank exceeds approximately 37 gallons under top speed conditions or 33 gallons under cruising conditions.

Priming pumps

20. Two priming pumps are mounted on the starboard side of the instrument panel, one (55) for priming the induction pipes and the other (14) for priming the engine-driven fuel pump.

Magneto switches

21. These switches (3) are mounted on the top centre of the instrument panel and are locked in their OFF positions by a finger-operated slide bar (2) which controls the undercarriage indicator master switch. Before the magnetos can be switched ON the slide bar must first be moved to port, which operation switches ON the undercarriage indicator.

Engine electric starting

22. Pushbuttons for the starter motor (54) and the booster coil are mounted on the starboard side of the instrument panel.

Slow-running cut-out

23. The slow-running cut-out is operated by a pull on a knob (56) on the starboard side of the instrument panel.

Operational equipment and controls

Radio controls

24. The aeroplane is equipped with a combined transmitter-receiver, either type T.R.1133A or type T.R.9D, located behind the pilot's seat. (The T.R.9D cannot be fitted when T.3074 - R.3075 is installed).

25. T.R.1133A installation.- With this installation a pushbutton electrical control unit is fitted on the port side of the cockpit. The remote contactor (80) and contactor ON/OFF switch (82) are fitted on the starboard side of the cockpit and the master contactor is mounted in the rear fuselage on the port side. The microphone-telephone socket (67) is fitted on the starboard side of the fuselage beside the seat.

26. T.R.9D installation.- The contactor gear and microphone-telephone socket are as described for the T.R.1133A installation, but the pushbutton electrical control unit is replaced by a type C mechanical controller.

27. R.3003 installation.- The master switch for the installation and two pushbutton switches (81) are located on a panel on the starboard side of the cockpit, the pushbuttons being covered with a flap marked DANGER.

28. T.3074 - R.3075 installation.- The master switch (65) is mounted on the starboard side of the cockpit and the main control unit (28) on the port side of the cockpit.

Intercommunication

29. Besides the normal intercommunication system between the pilot and the gunner, connected to the T.R.1133A radio installation, red and green call lights are provided for signalling between the cockpit and gun turret. The pilot's lamps (6) are mounted at the top centre of the instrument panel and are fitted with flap screens for dimming purposes. The switch-box (78) for controlling the lamps is mounted at the base of the control column spade grip and fitted with two finger levers, the shorter, red lever controlling the red lamp in the gun turret and the longer, green lever controlling the green lamp.

Ancillary equipment and controls

Oxygen equipment

30. The pilot's oxygen supply is obtained from two containers one being mounted in each undercarriage recess. A standard regulator (25) is mounted on the instrument panel and the bayonet connection for the mask hose is mounted on the starboard side of the seat.

Station-keeping lamps

31. These lamps are controlled by a switch (76) and two dimmer switches

(63) on the starboard side of the cockpit.

Windscreen de-icing

32. The pump (19) and a metering valve for this system are mounted on the fluid tank forward of the control column.

Signal discharger

33. The signal cartridges are each fired by a pull on a control handle (15) on the starboard side of the instrument panel.

Landing lamp control

34. The landing lamps are controlled by a switch (38) mounted on the control box. When the switch is in the central position the lamps are off, and movement to port or starboard lights the appropriate lamp. The dipping of the lamps is controlled by the lever (83) mounted in the control box.

Cockpit heating

35. The flow of warm air into the cockpit can be adjusted by means of a ratchet-controlled lever (49) on the port side of the cockpit.

Cockpit ventilation

36. A pipe leading from the front of the oil cooler to the cockpit, provides the pilot with the means of passing a stream of cool air over his face. The volume and direction of the flow are governed by a valve (20) mounted on the lower port side of the instrument panel.

Emergency equipment and controls

Exits

37. The hood can be jettisoned in flight by means of a device operated by a red-painted lever at the top starboard side of the hood. A sharp blow on the lever breaks a locking wire and enables a spring to force the hood upwards into the airstream, the resulting air pressure carrying the hood clear of the aeroplane.

38. Whenever possible the gunner should abandon the aeroplane through the opening made by sliding aside the cupola doors. If the cupola cannot be used, the gunner should escape through the service hatch in the floor of the fuselage aft of the gun turret, but first the turret must be rotated to the "guns forward" position, and the undercarriage lowered to retract the rear aerial mast.

Forced landing flares

39. The flare release levers (68) are mounted on the starboard side

of the cockpit. To release a flare, the knob on the appropriate lever must be pulled to release a safety catch and the lever then pulled upwards.

Fire extinguisher

40. The fire extinguisher system is operated manually by a pushbutton switch (60) on the starboard side of the cockpit, or automatically by a flame switch, an inertia or crash switch, or a gravity switch.

Crash axe and first-aid outfit

41. These items are stowed on the starboard side of the fuselage aft of the gun turret.

Port fires

42. These are mounted on the port side of the cockpit (27) and when rubbed together, ignite and can be used to set fire to the aeroplane.

Seat and hooding

Seat and harness

43. The pilot's seat can be adjusted for height by means of a lever (74) on the starboard side of the seat. The harness release lever (58) is mounted on the starboard side of the cockpit.

Hooding

44. The cockpit hood slides fore-and-aft and contains sliding panels in the roof and port side; the sliding panel in the roof can be locked open by means of a press-stud fastener. The hood can be locked in the closed, fully open and one of two intermediate positions by means of spring-loaded plungers which are released by a small lever at the port top corner of the hood. To open the hood beyond its third position, a further catch (34) must be released, thus cautioning the pilot that the hood is encroaching on the gun sweep.

Miscellaneous

Locking of flying controls

45. Gear is provided to lock the flying controls in the neutral position when the aeroplane is parked. The gear consists of a barrel clamp and two rigidly attached tubular arms. The clamp fits round the control column and the longer arm plugs into a socket at the top of the rudder bar pivot. The shorter arm extends over the pilot's seat and prevents the aeroplane being flown with the controls locked. The pilot's seat must be in its lowest position before the controls can be fitted. Stowage for the controls is provided in the port undercarriage recess.

Key to fig. 1

INSTRUMENT PANEL

1. Instrument-flying panel
2. Undercarriage indicator switch
3. Magneto switches
4. Intercommunication switch
5. Undercarriage indicator
6. Call-lights
7. Clock
8. Engine-speed indicator
9. Oil pressure gauge
10. Boost gauge
11. Oil temperature gauge
12. Radiator temperature gauge
13. Fuel pressure gauge
14. Priming pump
15. Signal discharger control
16. Fuel contents gauges
17. Compass correction card
18. Magnetic compass
19. Windscreen de-icing pump
20. Ventilation valve
21. Automatic boost cut-out
22. Two-speed supercharger control
23. Flaps indicator
24. Fuel cock control
25. Oxygen regulator
26. R.3075 indicator

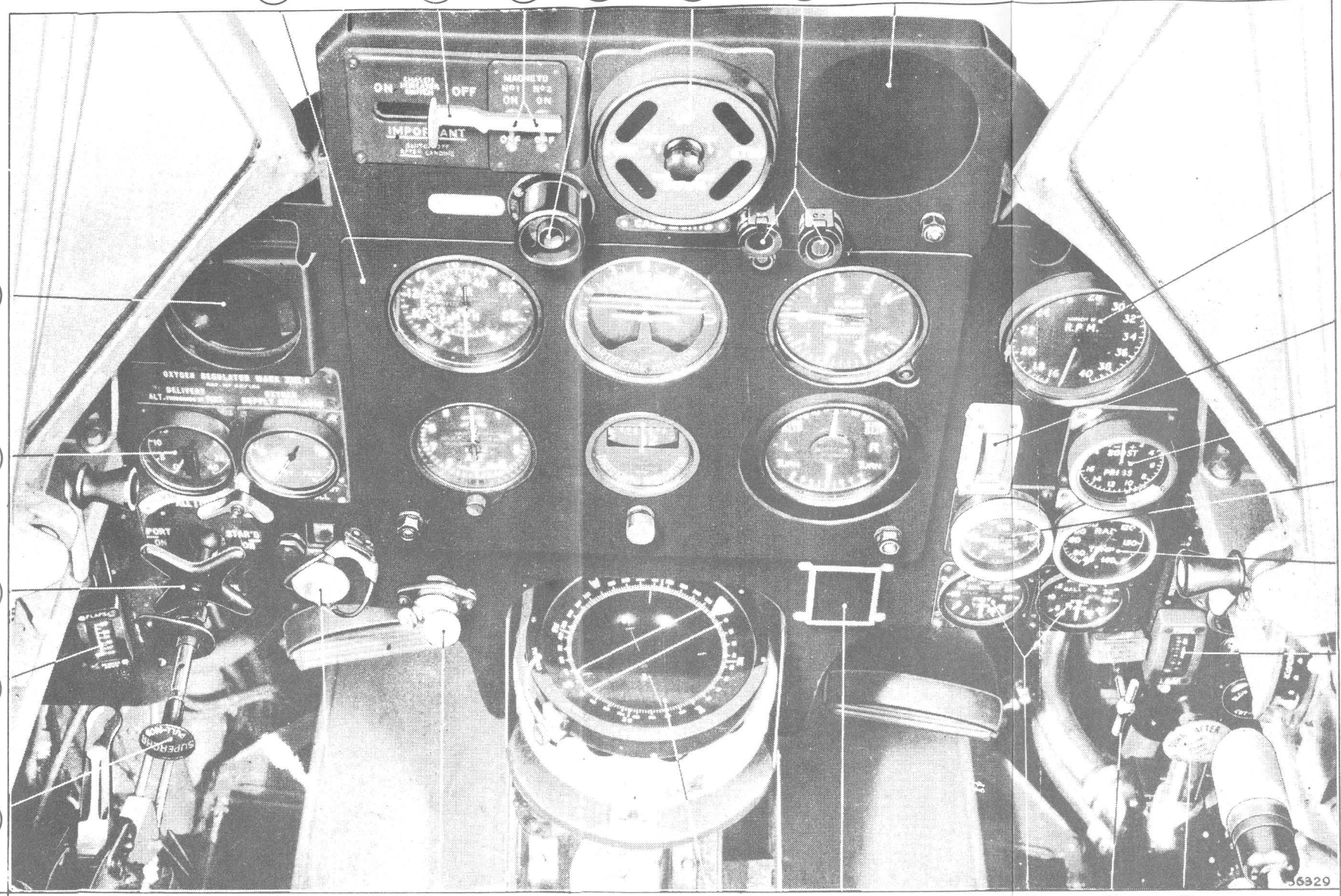

FIG. 1

INSTRUMENT PANEL

FIG. 1

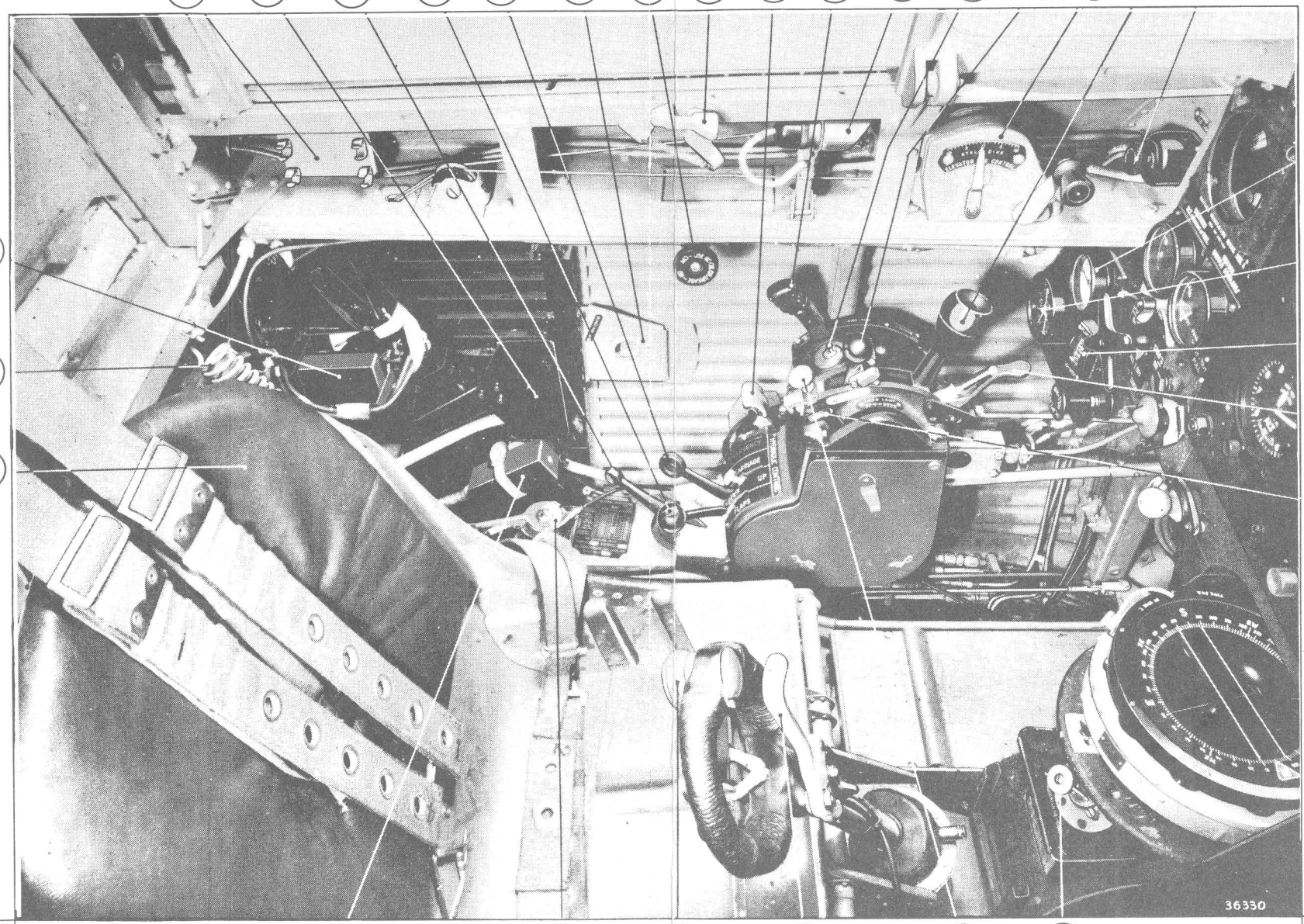

FIG. 2

PORT SIDE OF COCKPIT

FIG. 2

Key to fig.2

PORT SIDE OF COCKPIT

19. Windscreen de-icing pump
23. Flaps indicator
27. Stowage for Portfires
28. Mounting for R.3075 unit
29. Rudder trimming tab control
30. Flaps control
31. Undercarriage control
32. Mounting for radio controller
33. Oxygen stop valve
34. Catch for sliding hood
35. Undercarriage emergency control
36. Airscrew speed control
37. Cockpit lamp
38. Landing lamp switch
39. Mixture control
40. Elevator trimming tab control
41. Throttle control
42. Cockpit lamp dimmer switch
43. Hydraulic pressure gauge
44. Brake triple pressure gauge
45. Throttle check lever
46. Mixture control adjustable stop
47. Brake lever
48. Gun-firing button
49. Cockpit heating control
50. Radio control unit
51. Seat
52. Seat springs
53. Accumulator stowage
83. Landing lamp dipping lever

Amended by A.L.No.4

Key to fig.3

STARBOARD SIDE OF COCKPIT

10. Boost gauge
11. Oil temperature gauge
13. Fuel pressure gauge
14. Fuel pump priming control
15. Signal discharger control
37. Cockpit lamp
42. Cockpit lamp dimmer switch
51. Seat
54. Engine starter switch
55. Induction priming pump
56. Slow-running cut-out
57. Radiator shutter control
58. Harness release lever
59. Identification lamp switchbox
60. Fire extinguisher switch
61. Fuel transfer selector valve
62. Fuel pressure control cock
63. Station-keeping lamp dimmer switches
64. Voltmeter
65.) R.3075 switches
66.)
67. Tel-mic socket
68. Flare release lever
69. Hydraulic hand pump
70. Fuseboxes
71.) Radio switches
72.)
73. Generator field switch
74. Seat raising handle
75. Pressure head heating switch
76. Station-keeping lamp switch
77. Navigation lamp switch
78. Call-lights switchbox
79. Electrical junction box
80. Radio contactor
81. R.3003 switches
82. Contactor switch

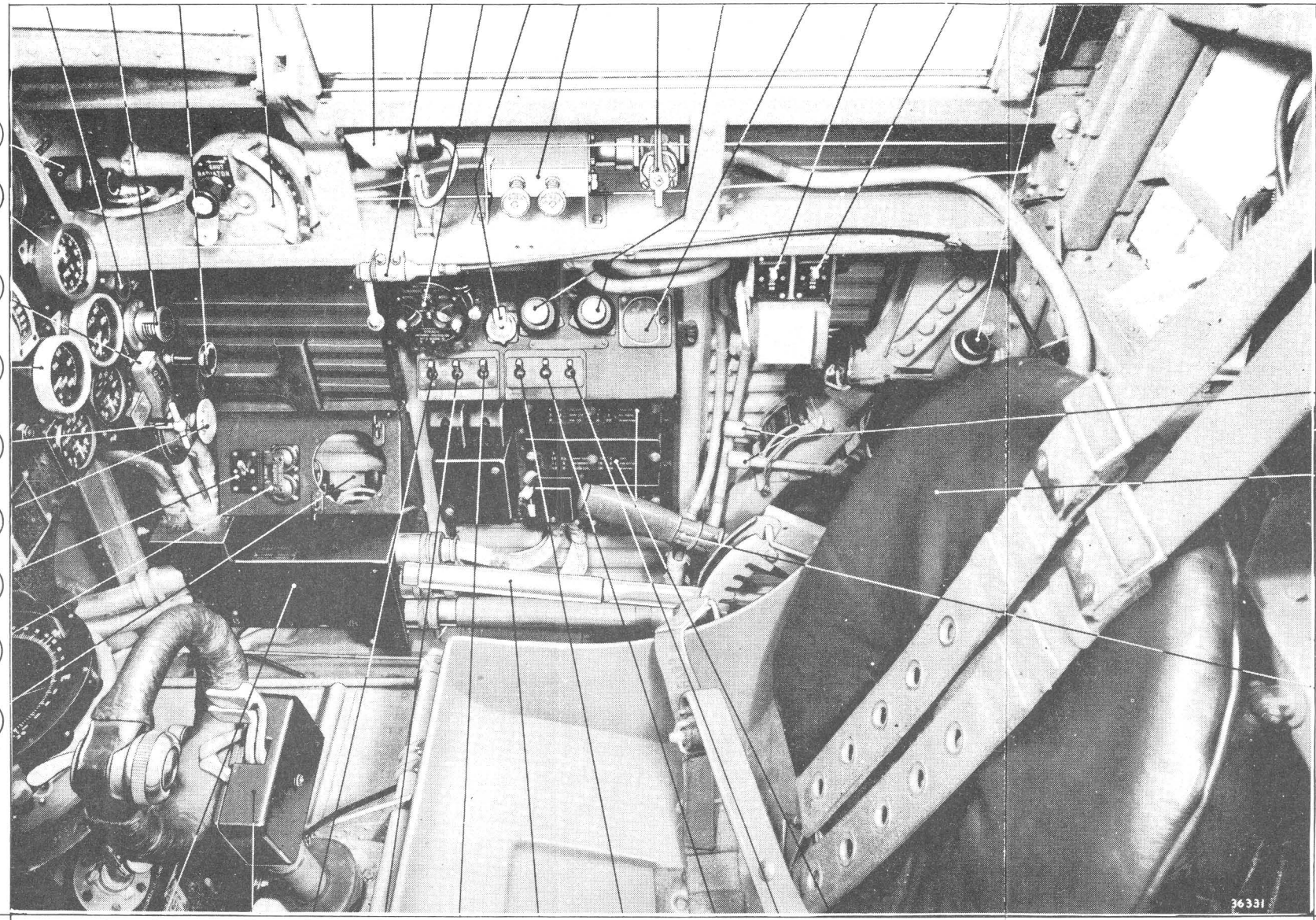

FIG. 3

STARBOARD SIDE OF COCKPIT

FIG. 3

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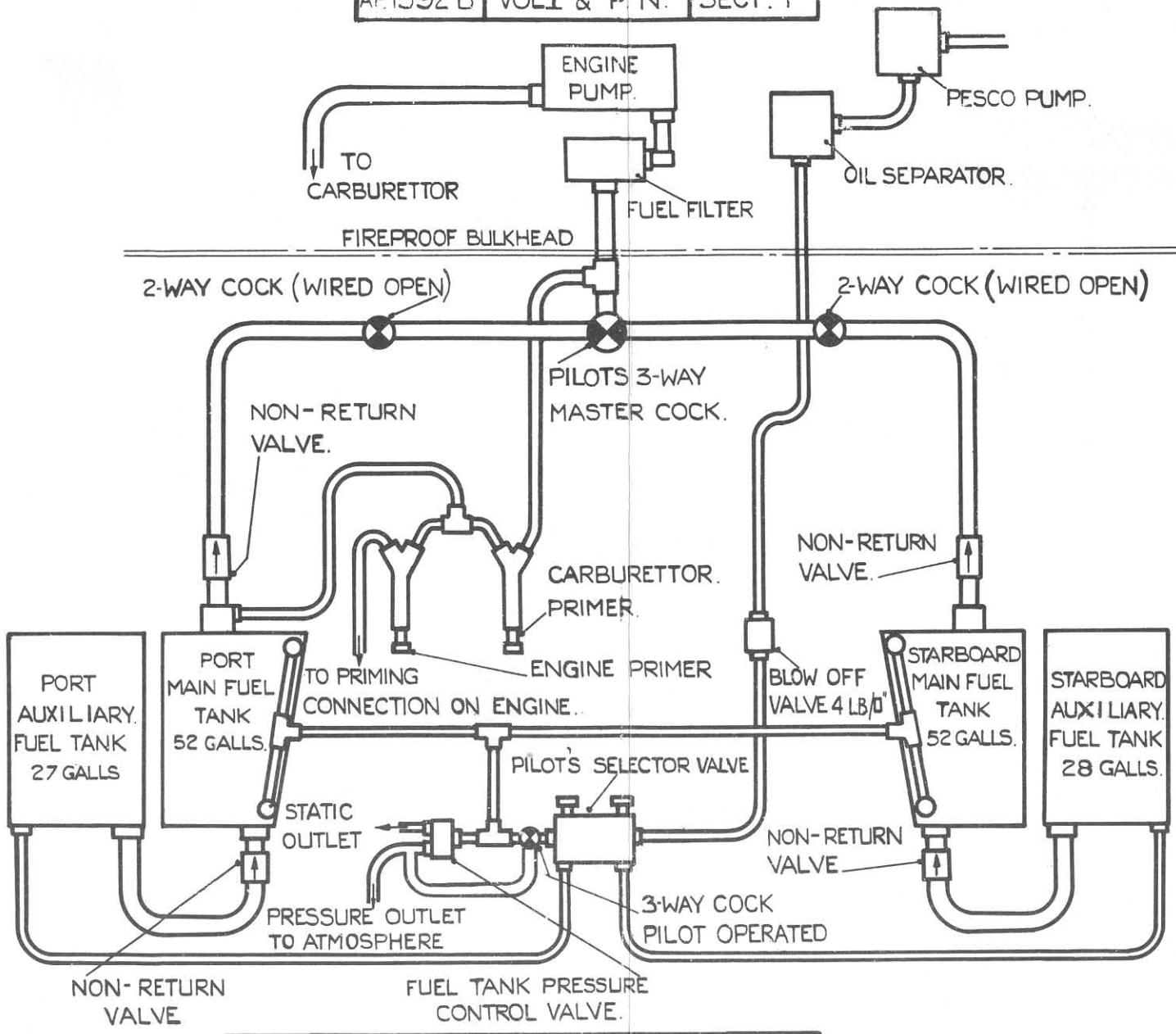

FIG 4.

FUEL SYSTEM DIAGRAM

FIG. 4

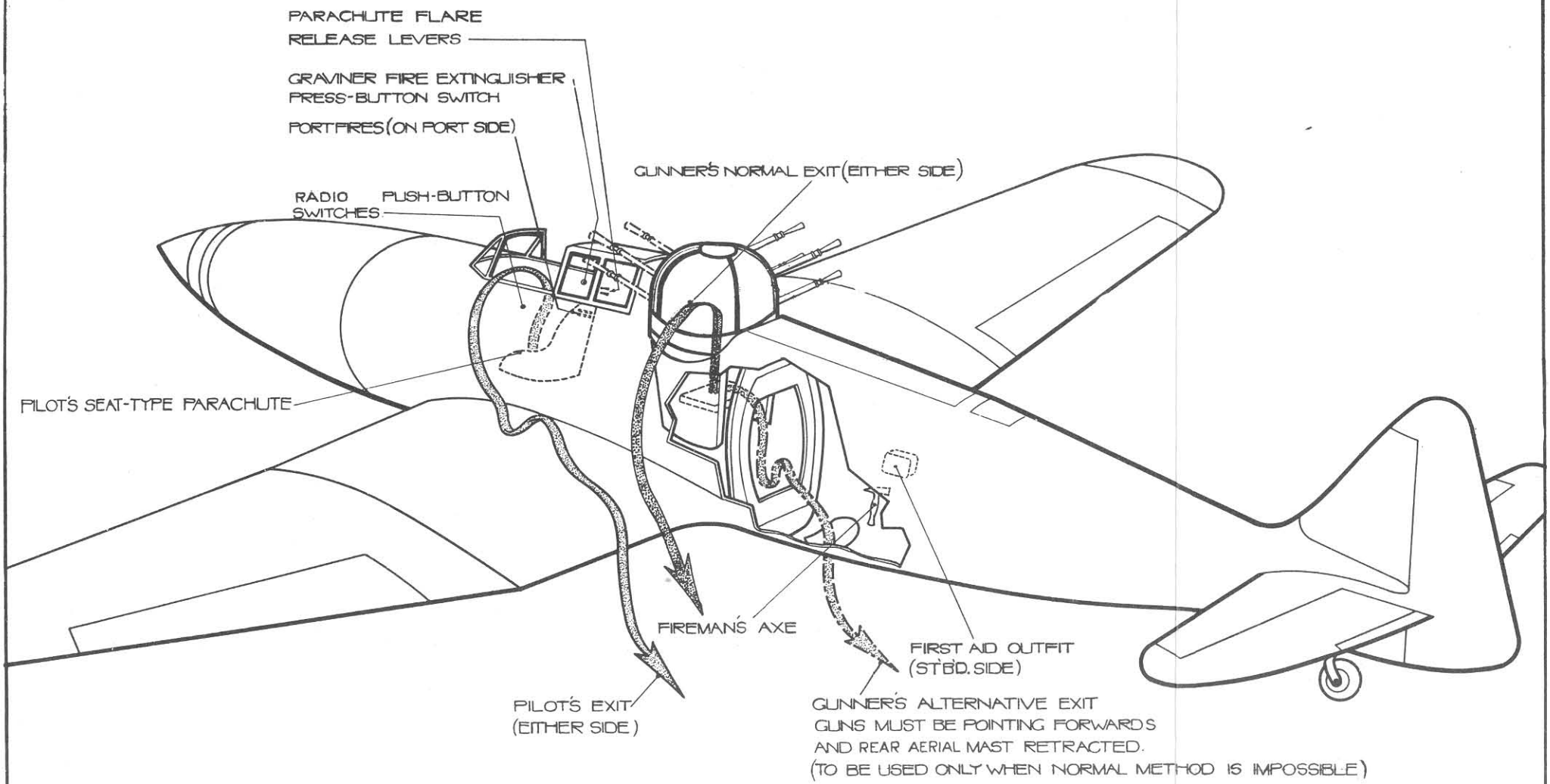

FIG. 5

PARACHUTE EXITS AND EMERGENCY EQUIPMENT

FIG. 5

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SECTION 2

HANDLING AND FLYING NOTES FOR PILOT

Note:- The flying technique outlined in these notes is based on A.P.129, Flying Training Manual Part I, Chapter III and A.P.2095, Pilot's Notes General, to which reference should always be made if further information is required.

1. ENGINE DATA, MERLIN XX

(i) Fuel.- 100 octane only.

(ii) Oil.- See A.P.1464/C.37.

(iii) The principal engine limitations are as follows:

		R.p.m.	Boost lb/sq.in.	Temp. °C. Coolant	Oil.
MAX. TAKE-OFF TO 1,000 FT.		3,000	+12		
MAX. CLIMBING 1 HR LIMIT	M	2,850	+ 9	125(135)	90(100)
	S	2,850	+ 9	125(135)	90(100)
MAX. RICH CONTINUOUS	M	2,650	+ 7	105(115)	90(100)
	S	2,650	+ 7	105(115)	90(100)
MAX. WEAK CONTINUOUS	M	2,650	+ 4	105(115)	90(100)
	S	2,650	+ 4	105(115)	90(100)
COMBAT 5 MINS LIMIT	M	3,000	+12*	125(135)	105
	S	3,000	+14*	125(135)	105

NOTE. The temperatures in brackets may be used if necessary, for short periods.

Obtainable by pulling the boost control cut-out.

F.S/1

Amended by A.L.No.14/H.

OIL PRESSURE:	NORMAL: 60/80 lb/sq.in. MINM : 45 lb/sq.in.
MINM. TEMP. FOR TAKE-OFF:	OIL: 15°C COOLANT: 60°C.

2. FLYING LIMITATIONS

Maximum speeds in m.p.h. I.A.S:

Diving:	360	(If Mod.339 is incorporated, 390 m.p.h.I.A.S. is permitted).
Undercarriage down:	160	
Flaps down:	140	

3. PRELIMINARIES

(i) Check that undercarriage and flaps selectors are at neutral.

(ii) Switch on undercarriage indicator and check that undercarriage is locked (green lights).

(iii) See that turret is locked guns forward. See para.11.

4. STARTING ENGINE AND WARMING UP.

(i) Set fuel cock to ALL ON, if the contents of the two tanks are approximately equal. See para 9 (iii).

(ii) Set controls as follows.

Throttle	- ½ inch open
Mixture	- RICH
Airscrew speed control	- Fully forward
Supercharger	- MOD (pull out)
Radiator shutters	- OPEN.

(iii) High volatile fuel (Stores ref. No.34A/111) should be used for priming if possible at temperatures below freezing. Operate the upper priming pump until the suction and delivery pipes are full; this may be judged by a sudden increase in resistance.

(iv) Switch on ignition and press the starter and booster coil buttons for periods of not more than 20 seconds, with a 30 seconds wait between each. Prime the engine as rapidly and vigorously as possible while it is being turned; it should start after the following number of strokes.

Air temperature °C:	+30	+20	+10	0	-10	-20
Normal fuel:	3	3½	7	12½		
High volatile fuel:				4	7½	15

(v) At temperatures below 0°C. it may be necessary to continue priming after the engine fires until it picks up on the carburettor.

(vi) Release the starter button, and when the engine is firing steadily, release the booster coil button. Screw down the priming pump.

(vii) Run the engine slowly for half a minute, then warm up at a fast tick-over.

Amended by A.L. No.12/F.

5. TESTING ENGINES AND INSTALLATIONS.

While warming up:-

(i) Check main air pressure: minimum 100 lb/sq.in.
maximum 300 lb/sq.in.

(ii) Check the operation of the engine-driven hydraulic pump by lowering and raising the flaps.

After warming up.-

(iii) Open up to maximum boost for weak mixture cruising and exercise and check, with pauses between changes, the operation of the two speed supercharger.

(iv) At the same boost exercise and check the operation of the propeller.

(v) Raise the catch, open the throttle fully and check boost and r.p.m. Drop the boost by 2 lb/sq.in; the r.p.m. should fall by about 50.

(vi) Reduce to maximum boost for rich mixture cruising and test each magneto in turn; the drop should not exceed 150 r.p.m.

6. FINAL PREPARATIONS FOR TAKE-OFF.

Drill of vital actions.- T.M.P.,Fuel, Flaps, Supercharger and Radiator.

T - Trimming tabs - Elevator zero.
Rudder fully STARBD.

M - Mixture - Rich

P - Propeller - Speed control fully forward.

Fuel - Check contents; cock to ALL ON if contents equal.

Flaps - UP

Supercharger - MOD (pull out)

Radiator - OPEN

Note.- Flaps may be set 30° down if the take-off is restricted.

7. TAKE-OFF

(i) There is a tendency to swing left as the aircraft gathers speed.

(ii) On reaching 120 m.p.h. I.A.S. reduce to climbing boost and r.p.m.

(iii) Climb at about 160 m.p.h. I.A.S.

(iv) Close the cockpit hood to at least its third position so that the turret can be rotated. See para.11.

8. CLIMBING

(i) The speed for maximum rate of climb is 140 m.p.h. I.A.S. up to 20,000 feet, but at this speed the nose is high, and 160 m.p.h. I.A.S. is recommended. Above this height reduce speed by one m.p.h. per thousand feet. For maximum rate of climb change to S ratio at about 13,000 feet.

NOTE. If Marston radiators are fitted the initial climbing speed must not be less than 160 m.p.h. I.A.S. owing to excessive temperature.

(ii) Normally the fuel tank pressure venting control should be left at NORMAL VENTING, but at high altitudes in summer or tropical conditions rough running or loss of power may result from fuel boiling. If this occurs, the control should be set to PRESSURE ON MAIN TANKS. The control should be kept at NORMAL VENTING in combat, as the self sealing of the tanks will not be effective while the tanks are under pressure.

9. GENERAL FLYING

(i) Stability is satisfactory.

(ii) There is practically no change of trim when the undercarriage or flaps are lowered.

(iii) The fuel cock should be at ALL ON in flight so long as the contents of the main tanks are approximately equal, but a watch must be kept on the contents, and if one contains appreciably more than the other the cock should be set to the fuller tank.

(iv) If Marston radiators are fitted, it may be necessary to open radiator shutters in level flight.

Issued with A.L. No.8/C.

10. ECONOMICAL CRUISING.

(i) The recommended speed for greatest range is 160 m.p.h. I.A.S., and the best height is near 20,000 feet. For maximum range M ratio should be used below 20,000 feet.

(ii) The speed should be increased below about 5,000 feet.

11. COCKPIT HOOD AND TURRET.

(i) The turret should not be rotated to or from the guns fully forward position when the cockpit hood is open past the third position without first ensuring that the guns are elevated sufficiently to clear the hood. An additional safety catch is fitted at the third position to remind the pilot that if the hood is opened further, it will then encroach on the gun sweep. The rear fairing will retract automatically on opening the cupola doors when the doors are in the aft position and the front fairing when the doors are in the front position.

(ii) For take-off and landing the turret must be locked in the guns fully forward position and cupola doors locked closed. This will allow the cockpit hood to be opened fully and will also provide an exit for the gunner through the service hatch, below the turret, in the event of an emergency such as the aeroplane "nosing over".

(iii) After take-off, the pilot must close the cockpit hood to at least the third position, to allow the turret to be operated over the full sweep.

(iv) To obtain maximum performance, the cockpit hood must be closed fully, and the turret locked in the guns fully aft position so that the fairing will be up.

12. STALLING.

(i) The stalling speeds at 8,500 lb are:

Flaps and undercarriage up 95 m.p.h. I.A.S.
Flaps and undercarriage down 83 m.p.h. I.A.S.

(ii) With flaps and undercarriage up, one wing drops to a vertical position, but not violently. This may develop into a gentle flick roll if the control column is held back. With flaps and undercarriage down one wing drops gently.

13. SPINNING.

Spinning is not permitted.

14. AEROBATICS.

Aerobatics are permitted by pilots who have written authority of their Squadron commander. Before aerobatics are begun, the pilot must warn the air gunner. High accelerations are to be avoided.

15. DIVING.

The aeroplane is stable in flight and should be trimmed into a dive.

16. APPROACH AND LANDING.

(i) Reduce speed to 140 m.p.h. I.A.S. and carry out the drill of vital actions, U.M.P. Supercharger and Flaps.

U - Undercarriage	- DOWN Check by indicator.
M - Mixture	- RICH
P - Pitch	- Airscrew speed control fully forward.
Supercharger	- MOD (pull out)
Flaps	- Fully down.

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(ii) Recommended speeds for the approach in m.p.h.I.A.S.:

	Flaps down	(Flaps up)
Engine assisted	100	(110)
Glide	110	(120)

17. MISLANDING

Climb at about 110 m.p.h. I.A.S. and delay raising the flaps until a safe height of about 400 feet has been reached.

18. AFTER LANDING

(i) Change to S ratio once and back to M ratio.

(ii) Let the engine idle for a short time, then operate the slow-running cut-out. Switch OFF after the engine stops.

(iii) If the aeroplane is to be left standing for some time, turn the fuel cock to STAR'D ON, or PORT ON. This is important if standing one wing down.

19. UNDERCARRIAGE FAILURE

(i) If green indicator lights fail to show after selecting undercarriage down.

(a) Pull knob in centre of indicator to see if lamps are defective.
(b) Throttle back to $\frac{1}{3}$. If locks are not engaged, warning horn should sound.
(c) If the above tests show that undercarriage is not locked down, put undercarriage selector DOWN and hold DOWN for not more than 5 seconds.

(ii) If undercarriage fails to lower at all on the engine pump.

(a) Return undercarriage selector neutral. Push emergency selector DOWN. Handpump until indicator shows that undercarriage is locked down, or very considerable resistance is felt to handpumping.

(b) Return emergency selector to normal position. Flap selector DOWN. Attempt to lower flaps with handpump.

NOTE. If flaps cannot be lowered, approach at 10 m.p.h. above normal I.A.S. See para.16(ii).

20. POSITION ERROR

The corrections for position error are as follows:

From	95	105	115	125	140	160	185	220
To	105	115	125	140	160	185	220	250
Add				2	4	6	8	10
Subtract	4	2	0					

21. FUEL CAPACITY

Two main tanks	104	gallons (52 gallons each)
Port auxiliary tank	27	"
Starboard auxiliary tank	28	"
	159	"

22. FUEL CONSUMPTIONS

(i) Weak mixture consumptions in gallons/hour

Boost lb./sq.in.	R.P.M.		
	2650	2300	2000
+4	57	51	47
+2	53	47	43
0	48	43	39
-2	43	39	35
-4	38	34	31

These figures are correct for M gear between 8,000 and 20,000 feet
" " " " for S gear between 14,000 and 30,000 feet.

(ii) Rich mixture consumptions

R.P.M.	Boost lb./sq.in.	gallons/hour
3,000	+12	about 115
2,850	+ 9	95
2,650	+ 7	80