

AIR PUBLICATION 1582 C

Pilots Notes

PILOT'S NOTES

LYSANDER III AND IIIA AEROPLANES  
MERCURY XX ENGINE

Prepared by direction of the  
Minister of Aircraft Production

*A. J. Richards*

Promulgated by order of the Air Council.

*[Signature]*

AIR MINISTRY.

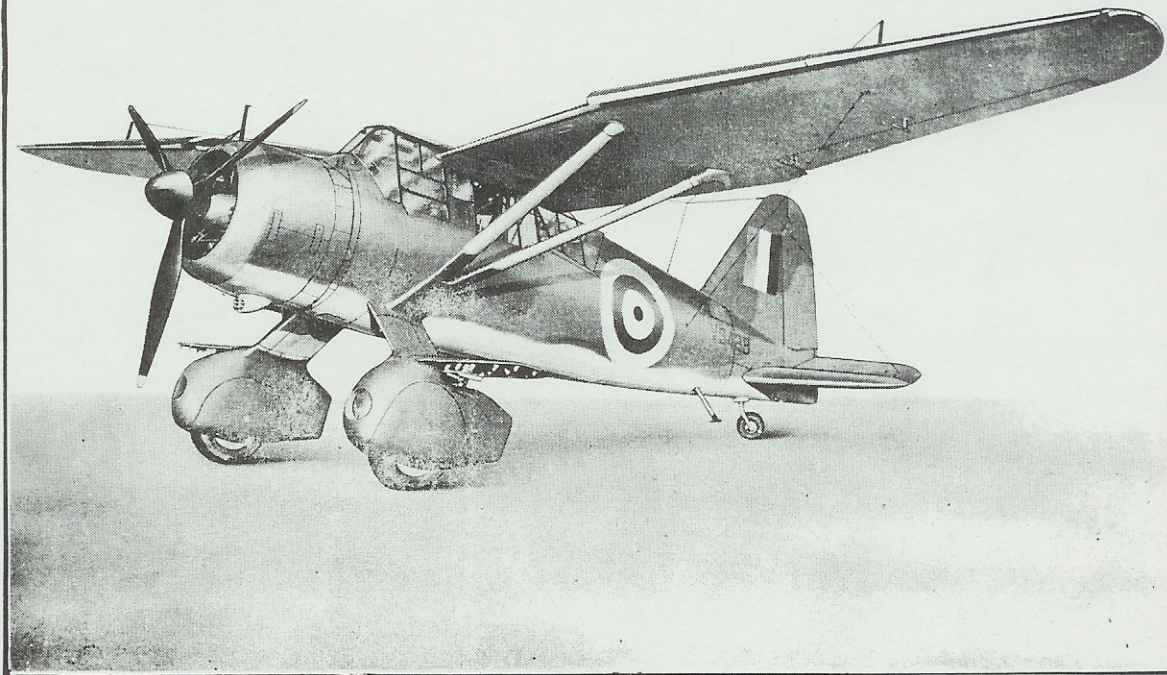
CROWN COPYRIGHT. REPRODUCED BY PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE



085979055X (087418)

Pilot's Notes Lysander III and IIIA  
Aeroplanes Mercury XX Engine





FRONTISPIECE

AP1582C.. VOLL. SECT. 1.

LYSANDER III AND III A AEROPLANE

## NOTES TO OFFICIAL USERS

Air Ministry Orders and Vol. II leaflets as issued from time to time may affect the subject matter of this publication. It should be understood that amendment lists are not always issued to bring the publication into line with the orders or leaflets and it is for holders of this book to arrange the necessary link-up.

Where an order or leaflet contradicts any portion of this publication, an amendment list will generally be issued, but when this is not done, the order or leaflet must be taken as the over-riding authority.

Where amendment action has taken place, the number of the amendment list concerned will be found at the top of each page affected, and amendments of technical importance will be indicated by a vertical line on the left-hand side of the text against the matter amended or added. Vertical lines relating to previous amendments to a page are not repeated. If complete revision of any division of the book (e.g. a Chapter) is made this will be indicated in the title page for that division and the vertical lines will not be employed.



July, 1941

Amended by A.L.No.3

AIR PUBLICATION 1582C

Pilot's Notes

LIST OF SECTIONS

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

Section 1 - Controls and equipment in Pilot's Cockpit

Section 2 - Handling and Flying Notes for Pilot

R.T.P/832. 2250. 8/41

Issued with A.L.No.3

August, 1941

AIR PUBLICATION 1582C

Volume I  
and  
Pilot's Notes

SECTION 1

CONTROLS AND EQUIPMENT IN PILOT'S COCKPIT

LIST OF CONTENTS

	<u>Para.</u>
Introduction .....	1
Aeroplane controls and equipment -	
Flying controls .....	2
Tail plane adjusting gear .....	3
Rudder bar adjustment .....	4
Slats and flaps .....	5
Engine controls -	
Throttle and mixture controls .....	6
Airscrew pitch control .....	7
Cowling gills control .....	8
Carburettor slow-running cut-out control .....	9
Air-intake control .....	10
Engine starter button .....	11
Fuel cock and tank .....	12
Priming pump and cock .....	13
Oil heating control .....	14
Gauges .....	15
Operational equipment -	
Guns and cannon .....	16
Gun, cannon and camera-gun control .....	17
Gun sights .....	18
Forced landing flares .....	19
Bomb and reconnaissance flare release control .....	20
Landing lamps .....	21
Camera sights and controls .....	22
Camera gun controls .....	25
R/T Equipment .....	26
Seating and exists -	
Access to cockpits .....	27
Front cockpit enclosure .....	28
Seat control .....	29
Harness .....	30
Miscellaneous -	
Cockpit temperature control .....	31
Axe stowage .....	32
First-aid outfit .....	33
Compass lamp and stowage .....	34
Instrument panel illumination .....	35
Armour plating .....	36
Ballast .....	37
Locking tubes for aeroplane controls .....	38

F.S./1



CONTROLS AND EQUIPMENT IN PILOT'S COCKPITINTRODUCTION

1. The notes in this section deal with the location of important controls and equipment and, where necessary, describe their function and operation. The interior of the cockpit, with each item annotated, is illustrated in figs. 1 to 5 at the end of this section. A key to the numbers is given facing each illustration and where the items are referred to in the text the relevant key number is quoted in brackets.

AEROPLANE CONTROLS AND EQUIPMENT

2. Flying controls. - These are the normal type, the spade grip of the control column carrying the usual brake control and parking lever (11) and also the selector control button (12) for the firing of either the fixed Browning guns or cannon. Provision is made for dual flying controls in the rear cockpit.

3. Tail plane adjusting gear. - Counter-clockwise movement of the handwheel (10) at the port side of the cockpit decreases the incidence of the tail plane and at the same time the pointer of the indicator (16) is moved inboard.

4. Rudder bar adjustment. - The rudder bar footplates (14) are adjustable for leg reach, the control being a knob (15) on the instrument panel.

5. Slats and flaps. - Inboard and outboard slats which open and close automatically are fitted to the leading edges along the whole length of the main planes. The outboard slats operate independently of the inboard slats. The trailing edge flaps are connected to the inboard slats and the movements are governed automatically by the speed of the aeroplane. The lower the speed, the more the flaps are lowered and the inboard slats opened.

ENGINE CONTROLS

6. Throttle and mixture controls. - The throttle control (20) and the mixture control (18), together with a friction handwheel (19), are mounted in the quadrant at the port side of the cockpit. The quadrant is marked SHUT, CRUISING and RATED TAKE OFF for the throttle positions, and NORMAL and WEAK for the settings of the two-position automatic mixture control. Closing the throttle, or opening it more than half its travel on the quadrant, with the mixture control in the WEAK position, will bring the latter back to the NORMAL position.

LIST OF ILLUSTRATIONS

	<u>Fig.</u>
Pilot's instrument panel - view to starboard .....	1
Pilot's instrument panel - view to port .....	2
Port side of pilot's cockpit .....	3
Starboard side of pilot's cockpit .....	4
Rear view of pilot's cockpit .....	5



7. Airscrew pitch control. - The two-pitch control of the airscrew is operated by means of a red knob on the instrument panel. Pushing the knob in gives fine pitch.

8. Cowling gills control. - The OPEN and CLOSED positions of the gills are shown by the sleeve (23) and the red pointer (24) at the starboard side of the cockpit. Clockwise rotation of the handle, immediately above the indicator, will close the gills.

9. Carburettor slow-running cut-out control. - This is a knob (22) at the port side of the instrument panel. The method of operation is given on a label adjacent to the knob.

10. Air-intake control. - The control is a knob (21) at the starboard side of the cockpit. Operating instructions are given on a label alongside.

11. Engine starter button. - The button (26) which is at the starboard side of the instrument panel, is protected against inadvertent operation by a hinged cover; the cover should be replaced in its original position after use.

12. Fuel cock and tank. - The fuel cock handle (27) is on the port coaming of the cockpit. The ON and OFF positions are clearly marked to locate the setting of the painted portion of the handle at the forward end. The self-sealing fuel tank is behind the armoured bulkhead (61) at the rear of the cockpit.

13. Priming pump and cock. - The fuel priming pump (28) and a 3-way priming cock (29) are on the starboard side of the instrument panel. The positions for the setting of the cock handle at OFF, PRIME CARBURETTOR and PRIME ENGINE are clearly indicated outside the mounting plate of the cock.

14. Oil heating control. - The oil heating control knob (33) at the starboard side of the instrument panel is pulled out to increase the temperature of the oil while running up the engine.

15. Gauges. - The fuel pressure gauge (30), for indicating the pressure at the carburettor inlet, the oil pressure gauge (34) and the oil temperature gauge (35) are all adjacent to the engine speed indicator (36) at the starboard side of the instrument panel. The fuel contents gauge on the top of the tank in the rear cockpit is visible through the aperture (32) in the cockpit bulkhead; the gauge is illuminated by a lamp controlled by a switch located on the panel at the rear of the throttle quadrant on the port side of the cockpit.

#### OPERATIONAL EQUIPMENT

16. Guns and cannon. - There is a fixed Browning gun carried in each undercarriage fairing. Twin Browning guns are carried in the rear cockpit on all Lysander IIIA, and in some Lysander III aeroplanes. Each fixed Browning gun is provided with 500 rounds of ammunition, and each of the twin Browning guns with 1,000 rounds. Additional armament consists of two 20 mm. Hispano fixed cannon, firing forward, these being

mounted one on each side of the undercarriage. The small cantilever wings for carrying the bomb load are normally attached to the undercarriage legs and cannot be fitted when the cannon are installed.

17. Guns, cannon and camera-gun control. - This control is a button on the control column spade grip. Early Lysander III and IIIA aeroplanes have a single button whilst later aeroplanes have a three-way type (12) to enable the fixed Browning guns or cannon to be fired together or independently. The SAFE and FIRE setting on the single button is governed by a rotatable ring and the three-way by a change-over toggle below the button. At the starboard setting of this toggle for FIRE a small indicator peg will project above the button. The camera control is that normally used for the guns. The air pressure available is indicated on the centre scale of the gauge (13) used for the brake system.

18. Gun sights. - The socket (48), dimmer switch (49) and terminal block (50) are provided for use with the reflector type gun sight mounted above the instrument panel. A sliding sun screen for use with the sight is fitted over the centre panel of the windscreen. A ring and bead sight, which is fitted as an alternative, is mounted with the bead attached to the top of the engine cowling and with the ring (51) attached to the windscreen framework above the instrument panel. The reflector sight is adjustable, through its spherical attachment, as well as the ring and the bead, for alignment with the guns.

19. Forced-landing flares. - A lever (47) working in a gated quadrant at the starboard side of the cockpit provides independent release of the two parachute flares which are carried in the rear fuselage on Lysander III aeroplanes only.

20. Bomb and reconnaissance flare release control. - The bomb-firing pushbutton is at the end of the knob on the throttle lever (20) at the port side of the instrument panel. The pilot has control over a number of switchboxes comprising bomb selector switches (52), bomb nose and tail fuze switches (53 and 54), the master bomb switch (55) and the jettison pushbuttons below the hinged covers (56 and 57) and on the switchboxes (58 and 59) respectively. The information concerning the bombs and containers carried on the light-series carrier fitted to Lysander III only, in the rear fuselage is given on labels below the switches. When reconnaissance flares or sighters are carried, the flares switch must be in the OFF position to prevent their release if the bombs are jettisoned; it should be noted that flares or sighters should not be released while the message hook is in the down position. Flares or sighters are not carried by Lysander IIIA aeroplanes.

21. Landing lamps. - The 2-way switch (46) on the port coaming is provided to operate each lamp, in the undercarriage fairing independently.

22. Camera sights and controls. - The pilot's remote controller and counter unit for operation of the F.24 camera is carried on a wedge plate (64) at the port side of the member carrying the control column.

23. For vertical photography, a camera bead sight is mounted near the remote controller wedge plate; the sight when not in use is arranged to fold downwards for stowage. A Mk.IA camera sight which is used in



conjunction with the bead sight, is attached below the fuselage structure inside the fairing adjacent to the undercarriage leg. A window in the fairing immediately below this sight is protected with a sliding cover which is operated by means of a control knob (65) at the lower edge of the instrument panel. The cover is opened by moving the control over to the left.

24. For oblique photography, the camera is sighted by means of a ring and a centre spot (66) marked on the top rear window in the port sliding door of the cockpit and by four marks stencilled on the fairing of the port front wing strut; these marks indicate sighting angles of  $10^{\circ}$ ,  $15^{\circ}$ ,  $20^{\circ}$  and  $25^{\circ}$  respectively to agree with the initial setting of the camera. For correct sighting the sliding door should be in the top closed position.

25. Camera gun controls. - When the G.22 type gun training camera is fitted to the root end of the starboard plane the shutter is operated pneumatically by the gun firing control (12) on the spade grip of the control column. The camera gun loading handle is mounted below the instrument panel on the starboard side of the cockpit and is connected to the camera by a cable control. The sights for use with this camera are the same as those used for the Browning guns (see para.23).

26. R/T Equipment. - A combined short wave R/T receiver and transmitter is mounted at the back of the rear cockpit. An R.3002 unit is also carried.

27. Access to cockpits. - Steps enclosed in the undercarriage port fairing enable the pilot to gain entrance to the front cockpit. The rear cockpit is entered from the starboard side.

#### SEATING AND EXITS

28. Front cockpit enclosure. - The sliding roof (1) over the front cockpit is held closed by a centre catch (2), and a catch (3) on the port side retains the roof in the open position. The sliding doors on each side of the fuselage can be locked in any one of three positions from inside the cockpit by spring-loaded bolts operated by a leather tab (4). Access to these tabs from outside the cockpit is obtained by first opening the sliding panel in the upper framework of the doors.

29. Seat control. - The seat (6) is adjusted for height by rotation of the handwheel (7) at the starboard side of the cockpit. The padded arm-rests (8) may be hinged downwards by applying backward pressure to the ends.

30. Harness. - Sutton harness is released by the control knob (96) at the starboard side of the pilot's seat. The seat in the rear cockpit has leg straps only.

#### MISCELLANEOUS

31. Cockpit temperature controls. - Warm air is admitted into the cockpit by pulling "out" the control knob (43) on the instrument panel; the degree of cooling is governed by the control knob (44) which must be lifted before it can be operated.

32. Axe stowage. - An axe (45) is stowed directly behind the pilot's seat on the starboard side.

33. First-aid outfit. - A first-aid outfit is stowed behind the port inspection door in the rear cockpit.

34. Compass lamp and dimmer switch. - The lamp (41) to illuminate the P.4 compass is mounted, below the oil heating control (33), behind the instrument panel. The dimmer switch (42) for the lamp is at the extreme starboard side of the instrument panel.

35. Instrument panel illumination. - The lamps (39 and 40) directly behind the pilot's seat are controlled, for instrument panel lighting, by the dimmer switches (37 and 38) at the lower edge of the instrument panel near the centre.

36. Armour plating. - The structure above the front and rear cockpits is built to form a crash pylon and the bulkhead (61) is armour plated. There is also armour plating below the pilot's seat and behind the rear cockpit. A sliding panel (60) covering an aperture (32) at the port side of the armour plated bulkhead (61) is opened by pulling the starboard ring (63), and closed by pulling the port ring (62), both of which are at the rear of the seat, as shown in fig. 5.

37. Ballast. - 140 lb. of ballast is carried above the forward end of the engine mouting on Lysander IIIA aeroplanes and 60 lb. of ballast in the same position on Lysander III only, this latter being necessary only when twin Browning guns are mounted in the rear cockpit. In the case of Lysander IIIA only, ballast is not to be carried on the rear mounting at the base of the fin, and no provision is made for the carrying of ballast weights on the starboard side of the fuselage near the fuel tank.

38. Locking tubes for aeroplane controls. - Tubes for locking the control column and rudder bar in the neutral position are stowed in a canvas bag kept behind the door on the starboard side of the rear fuselage. When in use the ends of two tubes engage slots provided in the foot plates; the other two tubes are clipped to the starboard and rear cockpit coamings respectively (see Sect.4, Chapter 2).



Key to fig. 1

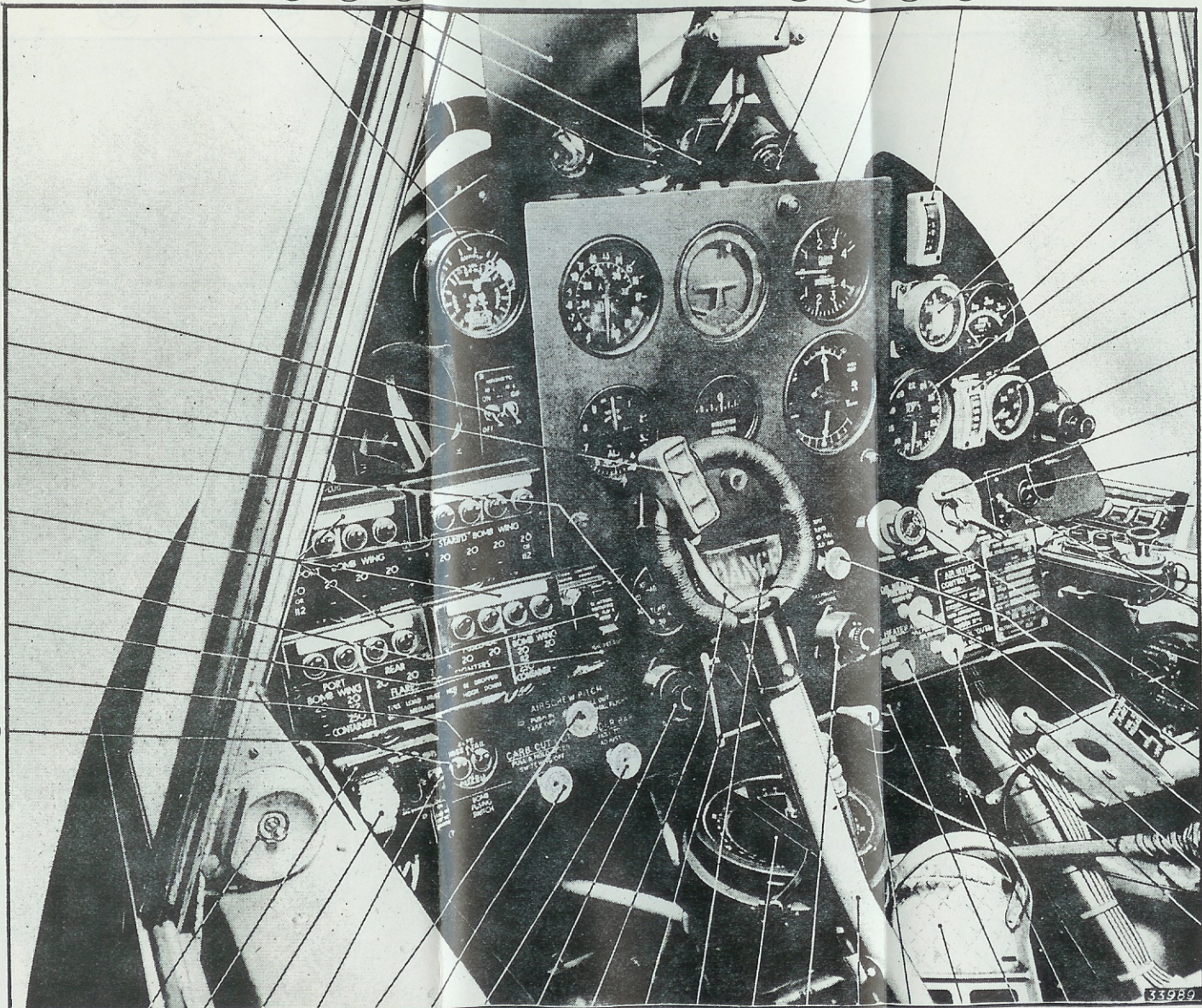
Pilot's instrument panel - view to starboard

9. Control column
11. Brake control and parking lever
12. Gun selector control pushbutton
13. Triple pressure gauge
14. Rudder bar footplate
15. Rudder bar control knob
21. Carburettor air-intake heat control knob
22. Carburettor slow-running cut-out control knob
26. Engine starting pushbutton
28. Fuel priming pump
29. 3-way priming cock
30. Fuel pressure gauge
33. Oil heating control knob
34. Oil pressure gauge
35. Oil temperature gauge
36. Engine-speed indicator
37. Dimmer switch for instrument panel floodlamp - port
38. Dimmer switch for instrument panel floodlamp - starboard
41. Compass lamp
42. Dimmer switch for compass lamp
43. Cockpit heating control knob
44. Cockpit cooling control knob
46. Landing lamp switch
47. Forced landing flare release
48. Gun sight socket
49. Gun sight dimmer switch
50. Gun sight terminal block
51. Ring sight
52. Bomb selector switches
53. Bomb nose fuzing switch
54. Bomb tail fuzing switch
55. Bomb jettison master switch
56. Flap over bomb jettison pushbutton
57. Bomb container jettison switchbox
58. Flap over bomb container jettison pushbutton
59. Bomb jettison switchbox
71. Panel for bomb distributor
72. Flying-instrument panel
73. Boost gauge
74. Cylinder temperature gauge
75. Starting magneto switch
76. Navigation and pressure head heating switchbox
77. Morsing key
78. Identification switchbox
79. Flap over R.3002 pushbuttons
80. Compass
81. Compass deviation card holder
82. Aperture for clock
83. Main magneto switches
87. Air temperature gauge
88. Airscrew pitch control knob



83  
12  
82  
87  
52  
58  
57  
54  
53

73  
74  
36  
34  
35  
42  
29  
26  
76  
77  
75  
78  
28  
44  
33  
47  
21



33989

FIG. 1

46 59 56 55 88 22 15 37 11 81 79 80 38 9 65 14 41 43

PILOT'S INSTRUMENT PANEL - VIEW TO STARBOARD

FIG. 1



13

71

48

51

A.P.1582C., VOL I., SECT. 1.

50

49

72

30

33

32

34

52

58

57

27

46

87

56

59

55

73

74

36

34

35

11

79

29

26

75

28

85

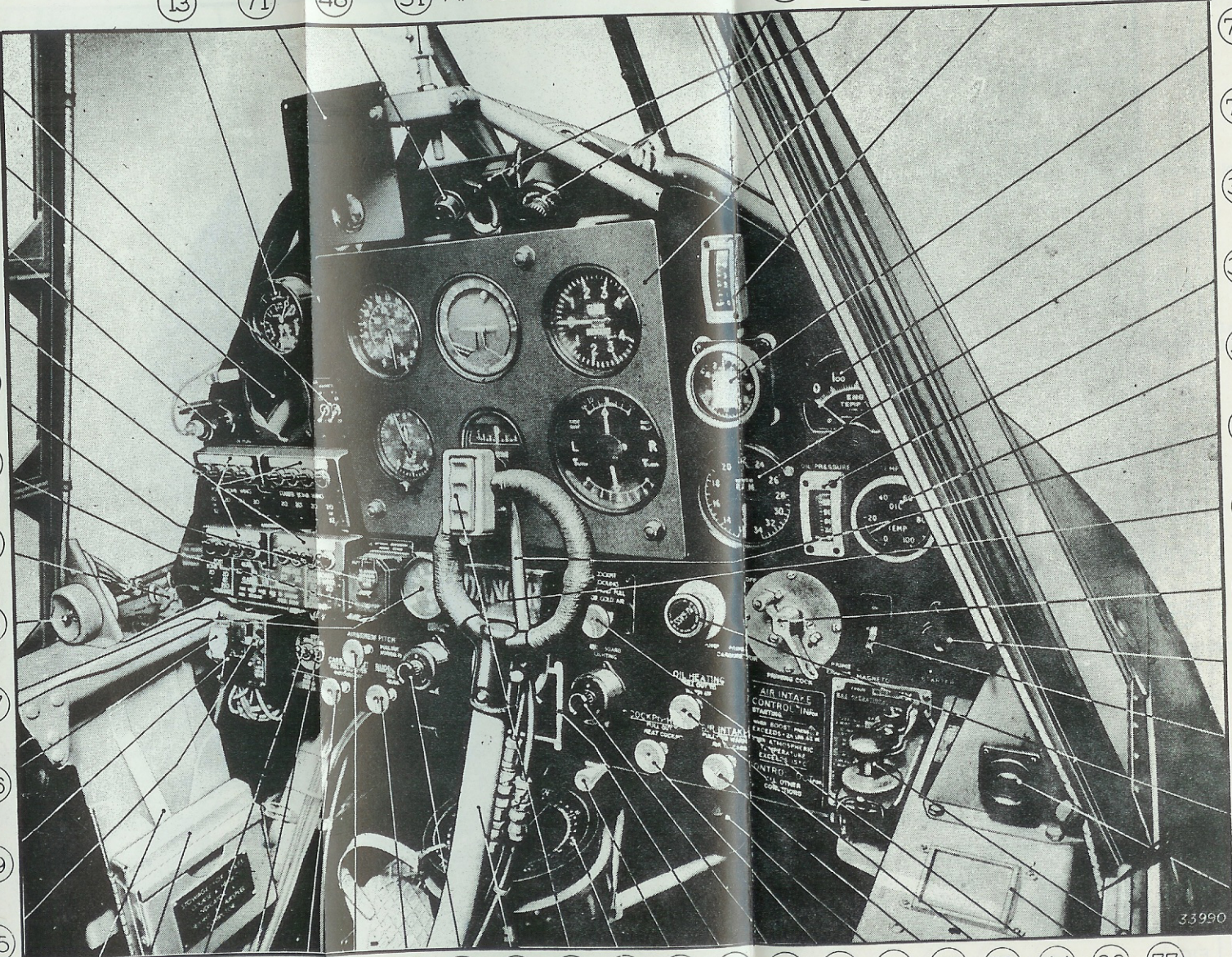


FIG. 2

PILOT'S INSTRUMENT PANEL - VIEW TO PORT

FIG. 2



## Key to fig. 2

## Pilot's instrument panel - view to port

9. Control column
11. Brake control and parking lever
12. Gun selector control button
13. Triple pressure gauge
15. Rudder bar control knob
21. Carburettor air-intake heat control knob
22. Carburettor slow-running cut-out control knob
26. Engine starting pushbutton
27. Master fuel cock control
28. Fuel priming pump
29. 3-way priming cock
30. Fuel pressure gauge
33. Oil heating control knob
34. Oil pressure gauge
35. Oil temperature gauge
36. Engine-speed indicator
37. Dimmer switch for instrument panel floodlamp - port
38. Dimmer switch for instrument panel floodlamp - starboard
41. Compass lamp
43. Cockpit heating control knob
44. Cockpit cooling control knob
46. Landing lamp switch
48. Gun sight socket
49. Gun sight dimmer switch
50. Gun sight terminal block
51. Ring sight
52. Bomb selector switches
53. Bomb nose fuizing switch
54. Bomb tail fuizing switch
55. Bomb jettison master switch
56. Flap over bomb jettison pushbutton
57. Bomb container jettison switchbox
58. Flap over container jettison pushbutton
59. Bomb jettison switchbox
65. Camera sight cover control
71. Panel for bomb distributor
72. Flying-instrument panel
73. Boost gauge
74. Cylinder temperature gauge
75. Starting magneto switch
77. Morsing key
79. Flap over R.3002 pushbuttons
80. Compass
81. Compass deviation card holder
82. Aperture for clock
83. Main magneto switches
84. Bomb distributor plug
85. Rear occupants attention pushbutton
86. A.S.I. correction card holder
87. Air temperature gauge
88. Airscrew pitch control knob
89. Computer stowage case
90. Map case



Key to fig. 3

Port side of pilot's cockpit

4. Window release tab
5. Footplate
6. Pilot's seat
8. Armrests
10. Tail plane adjusting handwheel
15. Rudder bar control knob
16. Tail plane position indicator
17. Bomb firing pushbutton
18. Mixture lever
19. Throttle friction control handwheel
20. Throttle lever
22. Carburettor slow-running cut-out control knob
27. Master fuel cock control
31. Fuel contents gauge illumination switch
46. Landing lamp switch
52. Bomb selector switches
53. Bomb nose fuizing switch
54. Bomb tail fuizing switch
55. Bomb jettison master switch
56. Flap over bomb jettison pushbutton
59. Bomb jettison switchbox
62. Armour-plated panel port control ring
64. Camera controller wedge plate
66. Camera sight for oblique photography (in port window only)
80. Compass
84. Bomb distributor plug
88. Airscrew pitch control knob
89. Computer stowage case
90. Map case
91. Telephone-microphone socket
97. Leg straps
98. Shoulder straps



62

91

66

4

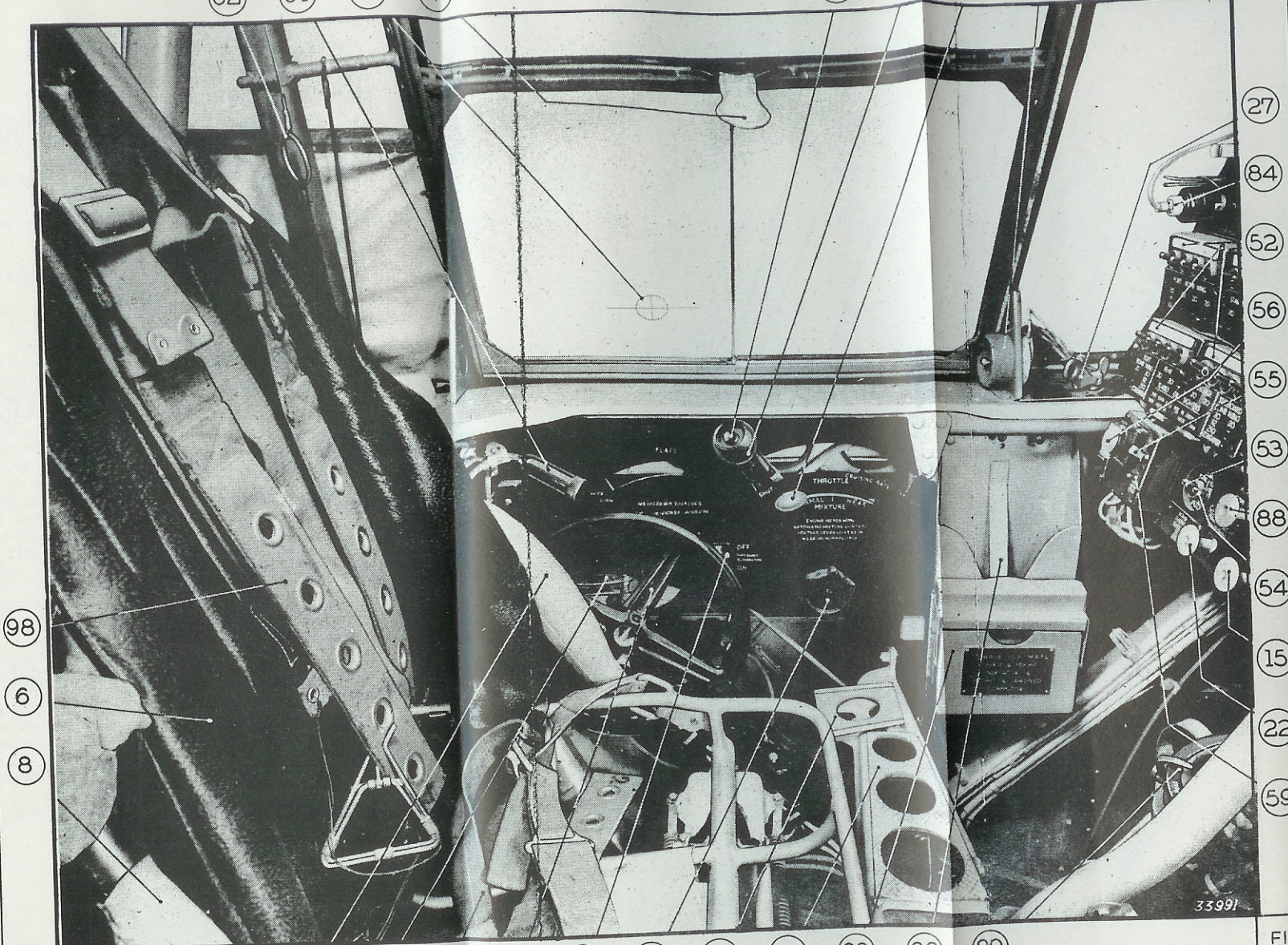
A.P 15 82 C..VOL 1.. SECT. 1.

17

20

18

46



98

6

8

27

84

52

56

55

53

88

54

15

22

59

33991

8

16

97

10

31

19

64

5

89

90

80

FS/7

FIG. 3

PORT SIDE OF PILOT'S COCKPIT

FIG. 3



76

77

85

86

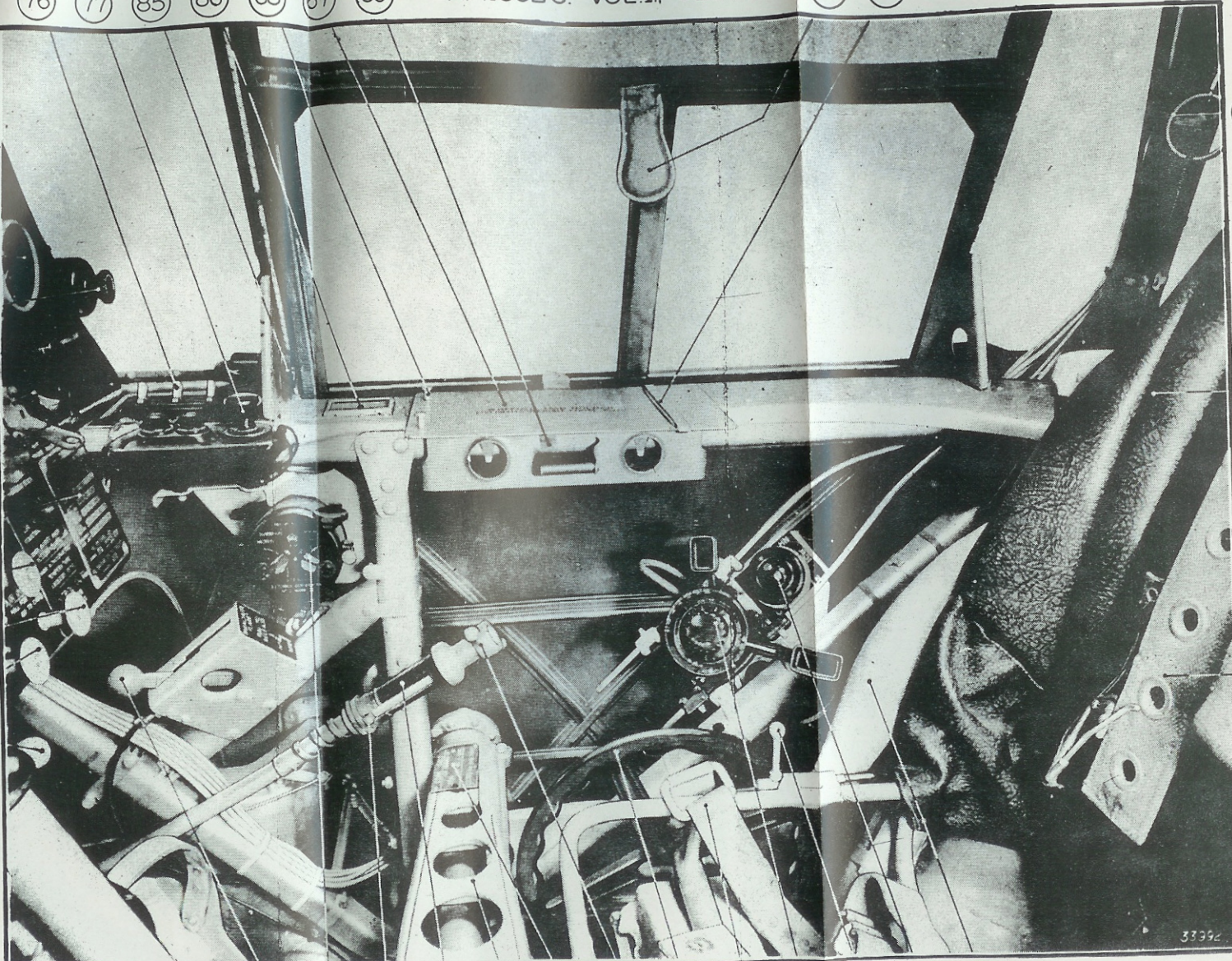
68

67

69

4

70



63

6

98

33392

35

42

26

75

29

92

33

21

43

65

FIG. 4

47

78

24

23

5

93

25

7

97

94

96

95

8

STARBOARD SIDE OF PILOT'S COCKPIT

FIG. 4



Key to fig. 4

Starboard side of pilot's cockpit

4. Window release tab
5. Footplate
6. Pilot's seat
7. Pilot's seat adjusting handwheel
8. Armrests
21. Carburettor air intake heat control knob
23. Gill control indicator sleeve
24. Gill control indicator pointer
25. Gill control handle
26. Engine-starting pushbutton
29. 3-way priming cock
33. Oil heating control knob
35. Oil temperature gauge
42. Dimmer switch for compass lamp
43. Cockpit heating control knob
47. Forced landing flare release
63. Armour-plated panel starboard control ring
65. Camera sight cover control
67. Hinged writing pad holder
68. Writing pad fasteners
69. Pencil stowage
70. Elastic band
75. Starting magneto switch
76. Navigation and pressure head heating switchbox
77. Morsing key
78. Identification switchbox
85. Rear occupants attention pushbutton
86. A.S.I. correction card holder
92. Engine data plate
93. Gill control indicator plate
94. Wireless remote controller
95. I.C.W. switch
96. Harness release control knob
97. Leg straps
98. Shoulder straps



Key to fig. 5

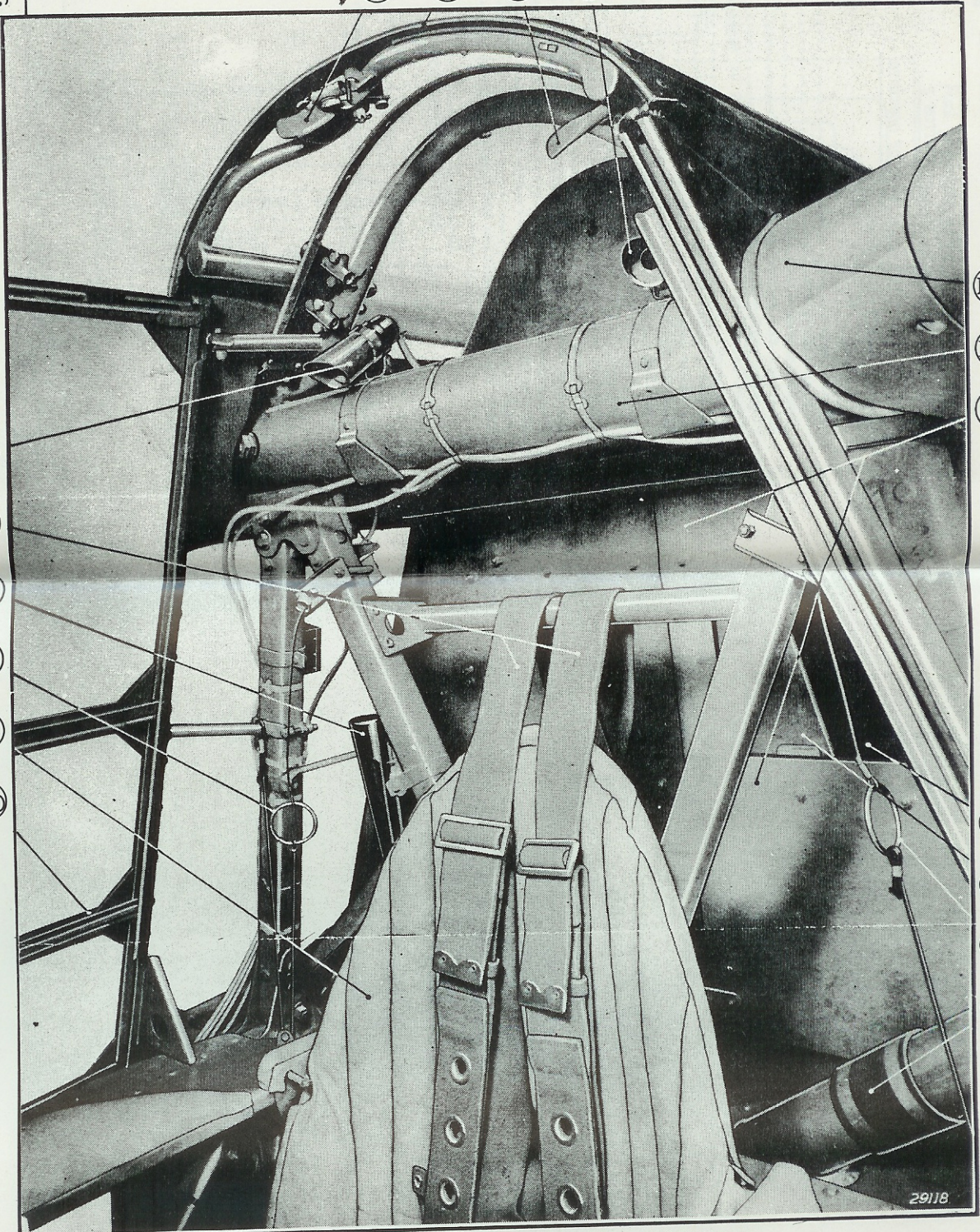
Rear view of pilot's cockpit

1. Sliding roof
2. Sliding roof centre catch
3. Sliding roof port catch
6. Pilot's seat
32. Aperture in armour-plated bulkhead
39. Instrument panel floodlamp
40. Instrument panel floodlamp
45. Axe
60. Sliding panel in armour-plated bulkhead
61. Armour-plated bulkhead
62. Armour-plated panel port control ring
63. Armour-plated panel starboard control ring
98. Shoulder straps
99. Fuel tank filler neck
100. Starboard sliding window
101. Port main plane leading edge
102. Centre section front spar



FIG. 5

- 2
- 1
- 3
- 40



- 39
- 98
- 45
- 63
- 6
- 100

- 101
- 102
- 61
- A.P.1582C, VOL. I, SECT. 1.
- 32
- 60
- 62
- 69

29118

FIG. 5

REAR VIEW OF PILOT'S COCKPIT



SECTION 2

LIST OF CONTENTS

	<u>Para.</u>
Engine Data .....	1
Flying limitations and speeds .....	2
Preliminaries .....	3
Starting the engine and warming up .....	4
Testing engine and installations .....	5
Final preparation for take-off - Drill of Vital Actions ..	6
Taking-off .....	7
Engine failure during take-off .....	8
Climbing .....	9
General flying .....	10
Stalling .....	11
Spinning and aerobatics .....	12
Diving .....	13
Approach and landing .....	14
Mislanding .....	15
Landing across wind .....	16
Procedure after landing .....	17
Flying in bad weather .....	18
Position error table .....	19
Fuel and oil capacities and consumption .....	20

LIST OF ILLUSTRATIONS

	<u>Fig.</u>
Fuel system diagram .....	1

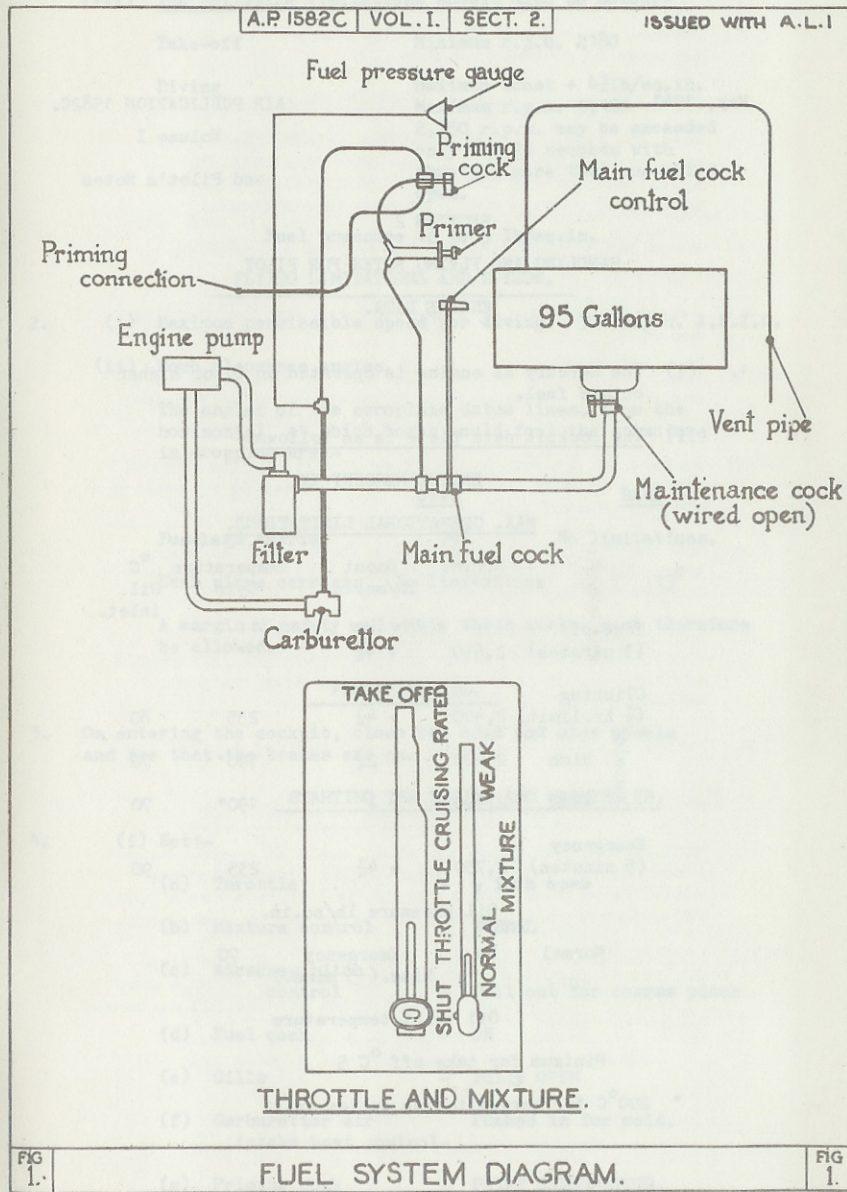


FIG 1.

FUEL SYSTEM DIAGRAM.

FIG 1.



May, 1941.

AIR PUBLICATION 1582C.

Volume I

and Pilot's Notes

SECTION 2

HANDLING AND FLYING NOTES FOR PILOT

ENGINE DATA.

1. (i) The Mercury XX engine is operated on 87 or higher octane fuel.
- (ii) The cockpit data plate is as follows.-

ENGINE MERCURY XX

MAX. OPERATIONAL LIMITATIONS.

	R.P.M.	Boost lb/sq.in	Temperature Cylr	°C Oil inlet.
Take-off (3 minutes)	2,650	+ 4 $\frac{1}{4}$		
Climbing ( $\frac{1}{2}$ hr. limit)	2,400	+ 4 $\frac{1}{4}$	235	80
Cruising	Rich	+ 2 $\frac{3}{4}$	190*	70
	Weak	+ $\frac{1}{2}$	190*	70
Emergency (5 minutes)	2,750	+ 4 $\frac{1}{4}$	235	90

Oil pressure lb/sq.in.

Normal 80      Emergency 70  
Minm. (5 mins.)

Oil inlet temperature

Minimum for take off °C 5

\* 200°C for target towing duties only.

(iii) The following limitations should also be noted.-

Take-off	Minimum r.p.m. 2180
Diving	Maximum boost + 4 $\frac{1}{4}$ lb/sq.in. Maximum r.p.m. 3,120 2,750 r.p.m. may be exceeded only for 20 seconds with throttle more than one-third open.

Fuel pressure 1 $\frac{3}{4}$  to 3 lb/sq.in.

FLYING LIMITATIONS AND SPEEDS.

2. (i) Maximum permissible speed for diving. 300 m.p.h. A.S.I.R.
- (ii) Bomb clearance angles.

The angles of the aeroplane datum lines, from the horizontal, at which bombs would foul the structure in dropping are.-

	<u>Dive</u>	<u>Bank</u>
Fuselage carrier	79°	No limitations.
Stub plane carriers	No limitations	13°

A margin of safety well within these angles must therefore be allowed.

PRELIMINARIES.

3. On entering the cockpit, close the hood and side panels and see that the brakes are on.

STARTING THE ENGINE AND WARMING UP.

4. (i) Set:-
  - (a) Throttle -  $\frac{1}{2}$  inch open
  - (b) Mixture control - NORMAL
  - (c) Airscrew pitch control - Pull out for coarse pitch
  - (d) Fuel cock - ON
  - (e) Gills - Fully OPEN
  - (f) Carburettor air intake heat control - Pushed in for cold.
  - (g) Priming cock - PRIME CARBURETTOR.



- (ii) Unscrew and operate the priming pump until a sudden increase in pressure is felt.
- (iii) Turn the priming cock to PRIME ENGINE.
- (iv) Give the engine 4 strokes of the priming pump if hot or 8 strokes if cold. At the same time with the ignition switches OFF, turn the engine by electric starter or by hand until priming is completed.
- (v) Close the priming cock and screw down the priming pump.
- (vi) Switch ON the main ignition switches and the starting magneto.
- (vii) Press the starter button (the starter should not be used continuously for more than 10 seconds with an interval of at least 10 seconds between each attempt.)
- (viii) As soon as the engine is firing evenly, switch OFF the starting magneto and turn on the oil heating by pulling out the control knob.
- (ix) Let the engine tick over slowly for about 5 minutes then open up to a fast tick over until the oil inlet temperature has reached 5°C.
- (x) During warming up, the carburettor air intake heat control may be pulled out to admit warm air during cold weather, but it must be pushed in to admit cold air before opening up the engine.
- (xi) Before opening up, push in the oil heating control knob.

TESTING ENGINE AND INSTALLATIONS.

- 5. (i) While warming up, make the usual tests of temperatures pressures and operation of controls. Brake pressure should be at least 100 lb/sq.in. and after a few minutes the airscrew control should be pushed in to fine pitch.
- (ii) After warming up, open up to about 1800 r.p.m. and then change to coarse pitch. This should cause a large drop in r.p.m. Then return to fine pitch and the r.p.m. should return to 1800.

- (iii) Open the throttle to the CRUISING position and check each magneto for even running.  
The drop in r.p.m. should not exceed 100.
- (iv) Open the throttle fully and check boost, oil pressure and r.p.m.; the latter should be 2500-2600.

FINAL PREPARATION FOR TAKE-OFF - DRILL OF VITAL ACTIONS.

6. Drill is "T.M.P. fuel and gills"

T - Tail actuating wheel - Set pointer to TAKE-OFF

M - Mixture control - NORMAL

P - Pitch - Control pushed in for fine pitch.

Fuel - ON Check contents of tank. The fuel gauge is situated just aft of the pilot to port, but it can be seen by him if the aperture in the armour plated bulkhead is open. There are two calibrations on the gauge, one for tail down and one for flying position. The gauge is not reliable below 15 gallons.

Gills - OPEN

TAKING OFF.

- 7. (i) The take-off is normal and there is little tendency to swing. The tail should not be lifted.
- (ii) Do not start to climb until safety speed of 80 m.p.h. A.S.I.R. is reached.
- (iii) A steep angle of climb can be obtained by climbing at 70 m.p.h. or even down to a minimum of 60 m.p.h. this is an emergency operation and should only be performed if necessitated by operational considerations. If engine failure occurs while climbing at this speed, the nose must be pushed down instantly, otherwise at least 600 feet will be lost before control is regained.

ENGINE FAILURE DURING TAKE-OFF.

- 8. (i) Fully wind back the tail-actuating gear wheel.
- (ii) Push the nose down and glide at 80 m.p.h. A.S.I.R. as close to the ground as possible.
- (iii) Switch OFF the ignition and turn OFF the fuel.



CLIMBING.

9. The best climbing speed with the throttle in the CRUISING position is 110 m.p.h. A.S.I.R. and the aeroplane must not be climbed continuously at less than this speed.

GENERAL FLYING.

10. (i) The controls are not well harmonised, the rudder being light, ailerons heavy, and elevator too heavy at or near maximum angle.
- (ii) The flying characteristics at very low speeds are such that a foolhardy pilot might be tempted to take liberties to which no aeroplane can with safety be subjected. Particular reference in this respect is made to stalled take-offs and climbs, stalled approaches to land, and low flying at too low an airspeed. The stall is delayed to an exceptionally large angle of attack, and can seldom be reached. But if this aeroplane does stall, a wing drops very sharply and control is entirely lost until speed is regained after loss of 1,000 feet.

STALLING.

11. (i) During straight stall tests it will be found that it is practically impossible to stall this aeroplane.
- (ii) With throttle back, the minimum speed is about 60 m.p.h. A.S.I.R. The nose does not sink, nor is there any tendency for a wing to go down, with the control column fully back.
- (iii) If this is done with full throttle, the aeroplane normally does not stall. It assumes a very steep attitude and the speed remains between 40 and 45 m.p.h. A.S.I.R., the nose moving gently up and down through about 5 to 10 degrees. It remains laterally stable with the stick fully back.
- (iv) The aeroplane can be made to stall with engine on but this should not be attempted. At the stall a wing drops and the aeroplane starts a slow right-hand spiral.

SPINNING AND AEROBATICS.

12. Spinning and aerobatics are not permitted.

DIVING.

13. (i) For engine and speed limitations, see paras. 1 and 2.

- (ii) The airscrew must always be in coarse pitch for diving.
- (iii) At high speeds the aeroplane must not be subjected to sudden manoeuvres or heavy loads.
- (iv) At speeds above 250 m.p.h. A.S.I.R., the tail actuating wheel must be wound back slightly, but it should be used with great care.

APPROACH AND LANDING.

14. (i) Reduce speed to 120 m.p.h. and check brake pressure. As soon as the engine is throttled back, the aeroplane becomes very nose heavy.
- (ii) The gliding speed can be varied from as high as is desired down to about 70 m.p.h. A.S.I.R. At about this speed the aeroplane has a high rate of descent, and only gentle turns should be attempted, care being taken not to stall. At about 80 m.p.h. A.S.I.R. the glide is much flatter, and turns up to about 45° may be made with safety.
- (iii) On a straight glide, when the speed drops to about 85 m.p.h. A.S.I.R., the inner slats will open a little, this lowering the flaps to a certain extent. The lower the A.S.I.R. is below this point, the more the flaps will be lowered, and therefore the steeper the glide. At about 95 m.p.h. A.S.I.R. the inner slats will be closed and the flaps will be fully retracted, thus allowing the gliding angle to be comparatively flat.
- (iv) The aeroplane can be sideslipped up to any normal degree of bank.
- (v) Carry out the drill of vital actions "T.M.P."

T - Tail actuating gear - wind back until aeroplane will fly "hands off" at 75-80 m.p.h.

M - Mixture control - NORMAL

P - Pitch - Control pushed in for fine pitch.

The automatic operation of the flaps causes them to take up their own position for the various conditions of flight.

At normal approach speed, 80 m.p.h., they will be approximately half down.



(vi) Engine assisted approach and landing.- Approach at 80 m.p.h. with engine running at about 1200 r.p.m. This will provide ample float when holding off. The landing is straightforward and the flaps come down fully as the aeroplane flattens out and slows down to landing speed. The throttle should not be finally closed until flattening out has been completed. Care must be taken not to hold off too high. The brakes may be applied, gently at first, soon after landing.

(vii) Glide approach.- Correct speed 85 m.p.h. A.S.I.R.

(viii) The Creeper.- Correct speed 65-70 m.p.h. A.S.I.R. Do not wind the tail actuating gear more than about 1/3 to 1/2 back, otherwise the aeroplane will become uncomfortably tail heavy when the engine is opened up in the last stages of the approach. Carry out the landing in the normal manner, closing the throttle only after making contact with the ground. The aeroplane will land tail down as soon as the control column is pulled back.

#### MISLANDING.

15. Open the throttle enough to maintain flying speed while the tail actuating wheel is wound forward. It may then be opened fully.

On no account must the throttle be opened fully with the tail actuating wheel wound back.

#### LANDING ACROSS WIND.

16. Cross-wind landings can be made satisfactorily, although they should not be attempted if the speed of the surface wind exceeds 20 m.p.h.

#### PROCEDURE AFTER LANDING.

17. Before taxiing in, open the cowling gills fully.

After taxiing in, change to coarse pitch (This may be done while taxiing in so as to avoid the necessity of opening up the engine on the tarmac).

Stop the engine by pulling out the slow-running jet cut-out control until the engine stops, and then switch OFF the main ignition switches.

Turn OFF the fuel cock.

#### FLYING IN BAD WEATHER.

18. Leave the airscrew in coarse pitch, provided that the engine continues to run smoothly.

The aeroplane can be flown with care at speeds down to about 70-75 m.p.h. A.S.I.R.

#### POSITION ERROR TABLE.

19. The corrections to the A.S.I.R. for position error are as follows:-

At 40 m.p.h. A.S.I.R.	add	15 m.p.h.
At 60 m.p.h. A.S.I.R.	"	11 m.p.h.
At 80 m.p.h. A.S.I.R.	"	6 m.p.h.
At 100 m.p.h. A.S.I.R.	"	2 m.p.h.
At 120 m.p.h. A.S.I.R.	"	0 m.p.h.
At 140 m.p.h. A.S.I.R.	subtract	4 m.p.h.
At 160 m.p.h. A.S.I.R.	"	6 m.p.h.
At 180 m.p.h. A.S.I.R.	"	8 m.p.h.
At 200 m.p.h. A.S.I.R.	"	10 m.p.h.

#### FUEL AND OIL CAPACITIES AND CONSUMPTION.

20. (i) Fuel One tank. Capacity 95 gallons  
 (ii) Oil One tank. Capacity 9 gallons  
 (iii) Fuel Consumption at S.L.

At maximum r.p.m. and boost for	Consumption Galls/hr.
Climbing	68
Cruising Rich	58
" Weak	35½
Emergency	79



21.

NOTES ON TARGET TOWING.

- (i) When launching, exchanging, hauling in cable, or releasing targets, the aeroplane should be flown at 80 to 85 m.p.h. I.A.S. at not less than 700 feet. The airscrew should be temporarily in FINE pitch. Gentle turns are advisable when exchanging targets.
- (ii) When towing, the rate of turn must not exceed rate 2.
- (iii) Rapid manoeuvres must never be made on aeroplanes equipped for towing.
- (iv) For towing only, the permissible cylinder head temperature is raised to 200° C.
- (v) The strength of the 10 cwt cable permits towing up to the following speeds.-

<u>Target</u>	<u>I.A.S. (m.p.h.)</u>
4 ft. open sleeve	140
4 ft cone (astern attack)	150
3 ft cone ( " " )	200
4 ft. (closed) low drag sleeve	200

- (vi) The approximate endurance of the aeroplane is:-

At 2,400 r.p.m., + 2 $\frac{3}{4}$  lb/sq.in. RICH 1 $\frac{1}{2}$  hours.

" " " +  $\frac{1}{2}$  " " " WEAK 2 $\frac{3}{4}$  "