FOR OFFICIAL USE ONLY

AIR PUBLICATION 1530 A

Pilot's Notes

PILOT'S NOTES

BLENHEIM I AEROPLANE

TWO MERCURY VIII ENGINES

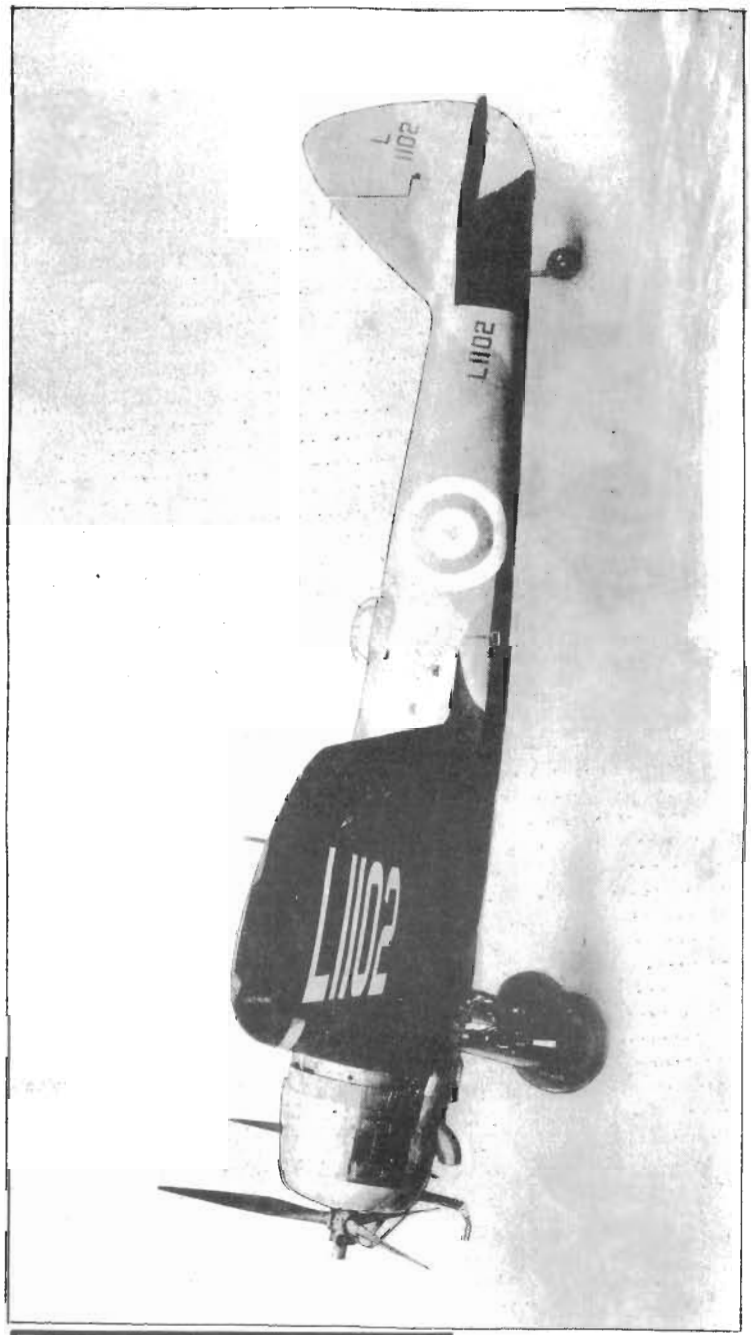
Promulgated for the information and guidance of all concerned.

By Command of the Air Council,

DONALD BANKS.

AIR MINISTRY.

To be returned on leaving Unit



The Blenheim I aeroplane

A.P.1530A	PILOT'S NOTES
FRONTISPIECE	

F.S./1

FOR OFFICIAL USE ONLY

AIR PUBLICATION 1530 A

Pilot's Notes

PILOT'S NOTES

BLENHEIM I AEROPLANE

TWO MERCURY VIII ENGINES

Promulgated for the information and guidance of all concerned.

By Command of the Air Council,

DONALD BANKS,

AIR MINISTRY

AIR PUBLICATION ....

Volume I

Pilot's Notes

AMENDMENT CERTIFICATE

Incorporation of an amendment list in this publication should be certified by inserting the amendment list number, initialling in the appropriate column and inserting the date of incorporation.

Holders of the Pilot's Notes will receive only those amendment lists applicable to the preliminary matter, introduction and sections 1 and 2.

Amendt. List No.										
Prelimy. matter										
Leading Partics.										
Introducn.										
Section 1										
Section 2										
Section 3										
Section 4										
Section 5										
Section 6										
Section 7										
Section 8										
Section 9										
Section 10										
Section 11										
Section 12										
Date of incorpn.										

Continued overleaf

Note to official users

Air Ministry Orders and Volume II leaflets as issued from time to time will 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 linking-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 overriding authority.

LIST OF SECTIONS

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

R.T.P./150.1000.4/39

INTRODUCTION

1. The Blenheim I is an all-metal low-wing monoplane fitted with two Mercury VIII engines and variable-pitch airscrews. It is designed and equipped for day-bombing duties and accommodation is provided for a crew of three, consisting of pilot, bomb aimer or navigator and gunner or wireless operator.

2. The fuselage is of monocoque construction throughout, alclad being used for the skin, stringers and formers. The main plane is a two-spar stressed-skin cantilever structure with alclad covering and spars having alclad webs and laminated booms of high-tensile steel; it is constructed in three portions, the port and starboard outer planes and the centre plane, and is tapered in chord and thickness. The centre plane is built into and forms an integral part of the fuselage, the spars being continuous through the fuselage. The fin and tail plane are cantilever structures constructed mainly of alclad, and the rudder, elevators and ailerons have a tubular spar, alclad plate ribs and fabric covering.

3. An inward-opening door on the roof forward of the gun turret and a short ladder inside provide the means of entry to the rear cabin and turret, and the pilot's cockpit and the bomb-aiming station can be entered through a sliding hood over the pilot's seat. Footrests and handgrips and a non-slip walkway on the main plane are provided on the port side. The nose of the aeroplane is covered with transparent panelling and the pilot with his controls and equipment is accommodated on the port side forward of the main plane front spar. At a lower level and extending from the front spar right up to the nose, is the equipment for the bomb aimer or navigator, which includes two folding seats. Emergency exits on each side of the pilot are provided in the transparent panelling. A seat for the gunner is incorporated in the gun turret, which is of the hydraulically-operated Bristol type, and the wireless equipment is located aft of the turret.

4. The alighting gear consists of two retractable undercarriage units, one under each engine nacelle, and a non-retractable castering tail wheel unit. The undercarriage units are operated hydraulically and, when retracting, swing backwards and upwards into the engine nacelles, leaving a small segment of the tyre protruding. Electrical and mechanical indicators and a buzzer in the pilot's cockpit indicate the position of the units. Each undercarriage unit has two Vickers oleo-pneumatic shock-absorber legs and the tail wheel unit has a single Dowty oleo-pneumatic leg. Dunlop pneumatically-operated brakes, with differential control by means of a relay valve connected to the rudder controls, are fitted to the undercarriage.

5. The ailerons and elevators are operated by means of a control column with a spectacle-type handwheel and the rudder by pendulum-type pedals, pivoted at the top. A ground-adjusted

trimming tab is fitted to each aileron and, for directional and longitudinal trimming, tabs controllable by the pilot are inset in the trailing edges of the rudder and elevators; the rudder tab, in addition to its trimming function, is arranged to give an automatic servo action. Mk.IV auto-controls are fitted and dual controls may be installed side-by-side with the main controls. Hydraulically-operated split-trailing-edge flaps extend from the fuselage sides to the ailerons.

6. The two Mercury VIII engines are installed in nacelles at the outboard ends of the centre plane. Long-chord cowlings are fitted over the engines, the exhaust collector forming the leading edge, and controllable gills that govern the flow of cooling air are fitted round the trailing edge. Fuel is carried in two fuel tanks, one between the spars of the centre plane on each side, and is supplied to the engines by engine-driven pumps, but there is a sufficient head of fuel for gravity supply. Each engine has a separate oil tank and oil cooler mounted in the nacelle. The engines may be started either electrically or by hand.

7. The armament consists of a fixed Browning gun, mounted in the port plane and controlled pneumatically from a pushbutton on the pilot's control column, a Lewis gun in the gun turret and various alternative bomb loads. The main bomb load is carried under the fuselage in cells in the centre plane; the cells have spring-loaded doors that are opened by the weight of the falling bomb. Practice bombs can be carried on light-series carriers secured to the bottom of the fuselage aft of the main bomb cells and flares can be carried in small cells at the centre plane roots.

8. A 12-volt 500-watt generator driven by the port engine provides for lighting and general services, including two landing lamps in the leading edge of the port outer plane, bomb release and fusing, pressure head and gun heating, camera motor, undercarriage indicators etc. Two accumulators are provided, one for engine starting on the starboard floor of the front fuselage and the other, for the general services, on the port side forward of the turret. Other equipment includes an F.24 camera, G.22 camera gun, signal pistol, oxygen apparatus, valise-type dinghy, first-aid outfit etc.

SECTION 1

CONTROLS AND EQUIPMENT IN

PILOT'S COCKPIT

SECTION 1

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

SECTION 1

CONTROLS AND EQUIPMENT

IN PILOT'S COCKPIT

Introductory

1. The layout of the flying and other controls and equipment in the pilot's cockpit is illustrated and referenced in figs. 1 - 4 at the end of this Section; a key to the items referenced is given facing each illustration. Explanatory notes, where necessary, on the function and operation of particular items are given in this Section.

Fuel and oil

2. The fuel and oil to be used with the Mercury VIII engines are:-

Fuel .... Specification D.T.D.230 (Stores Ref.34A/59)
Oil ..... Specification D.T.D.109 (Stores Ref.34A/32 & 33).

Aeroplane controls

3. Control column.- Aileron control is obtained by rotation of the spectacle-type handwheel at the top of the control column (12); elevator control is obtained in the normal manner. The handwheel incorporates a brake operating lever (19) and a spring-loaded catch (18) for retaining the lever in the "on" position for parking is fitted near the lever pivot point. The catch is engaged by operating the brake lever, pressing down the catch and releasing the lever; the catch is then held in position but will spring out of the way when the brake lever is pressed down. In connection with parking, attention is drawn to A.M.O. A.114/38 in which are listed precautions to be observed when parking aeroplanes with differentially-controlled brakes. The button (22) on the handwheel controls the firing of the fixed gun in the port outer plane.

4. Rudder control.- The rudder is controlled by pendulum pedals (9), pivoted at the top. For leg reach, the pedals are adjustable by means of a handle (78) at the bottom of the instrument panel.

5. Trimming tab controls.- The trimming tabs are controlled by handwheels on the right-hand side of the seat at the forward edge; the larger, outboard wheel (5) is for the elevator tabs and the smaller, inboard wheel (6) is for the rudder tabs.

The elevator tab handwheel should be rotated forwards to the position marked NOSE DOWN to counteract slight tail heaviness, and vice versa, and the rudder tab handwheel rotated forwards to the position marked TURN STARBOARD to counteract any slight tendency of the aeroplane to turn to port, and vice versa. In the case of the elevators, when the wheel is rotated forwards, the trimming tabs are raised and the air striking the tab exerts a downward force on the elevators and relieves the pilot from the prolonged effort of holding the control column slightly forward. The rudder tab operates in a similar manner but, in addition, has a servo action, the control linkage in the rudder being arranged to move the tab, at any setting, in the opposite direction to the rudder movement. Indicators (26) and (27) at the starboard side of the instrument panel show the position of the tabs; the starboard indicator (26) is for the elevator tabs.

6. Undercarriage and flaps (hydraulic) controls.- Raising and lowering of the undercarriage units and of the flaps are controlled from spade-grip push-pull handles on the right-hand side of the pilot's seat. The forward handle (49) controls the undercarriage and is shielded by a hinged cover to prevent its inadvertent use; the after handle (51) controls the flaps. In addition there is a selector handle (53) controlling a valve that directs fluid either for the operation of the turret or for the operation of the undercarriage and flaps.

7. The turret cannot be in operation at the same time as the undercarriage and flaps and before the undercarriage and flaps controls are operated, the selector handle must be pushed fully down. The undercarriage and flaps can then be lowered by pushing down their control handles or raised by pulling them up. When none of the three services is required to be in operation the selector handle should be in the central or off position, thus returning the fluid direct to the return circuit. The flaps handle has also a central or off position but this should be used as little as possible, especially when the flaps are in the raised position. An off position is not provided for the undercarriage handle.

8. In the event of failure of the engine-driven hydraulic pump (or failure of the port engine, by which the pump is driven) the undercarriage and flaps can be operated by means of a hydraulic hand pump which is worked by a handle (50) on the right-hand side of the seat.

9. Undercarriage position indicators and warning buzzer.- The up and down positions of each undercarriage unit are indicated by red and green lamps at the ends of the indicators (71) and the movement of each unit is shown by a pointer moving along a slot between the lamps. When the undercarriage is fully retracted a red lamp at the forward end of the indicator for each unit is illuminated. Immediately the locks for the retracted position are released the red lamps go out and the downwards travel of the undercarriage units is indicated by the pointers. When the undercarriage units are fully down the green lamps are illuminated. The switch (29) for the indicator lamps is fitted on the instrument panel.

10. An electrical warning buzzer in the nose of the aeroplane sounds if the throttle levers are moved back more than two-thirds of the way from the full-open position with the undercarriage

retracted. The buzzer remains in operation with the throttle levers in this position so long as the undercarriage remains fully retracted. The throttle buzzer switches are interconnected electrically with those for the top undercarriage switches so that the red lamps and the buzzer go out of action simultaneously.

11. Undercarriage ground safety links.- In order to prevent inadvertent retraction of the undercarriage when the aeroplane is on the ground, ground safety links are provided for fitting to the radius rod knee joints on the undercarriage. A red streamer is fitted on each link to enable the pilot to see from the cockpit if the link has been left in position, before taking-off.

12. Flaps position indicator.- A mechanical indicator (66) on the port side of the cockpit shows the position of the flaps by means of a pointer moving along a slot.

Engine controls

13. Throttle and mixture controls.- Two throttle control levers (64) and two mixture control levers (63) are fitted on the port side of the cockpit. The gate markings and positions for the levers vary according to whether type A.V.T.85E or A.V.T.85MB carburettors are fitted to the engines. In order to prevent movement of the levers owing to vibration, a friction adjuster for the stiffness of the controls is fitted at the side of the quadrant.

14. Fuel cocks controls.- The fuel tank cocks and the cocks on the balance pipes between the suction and delivery pipes for each engine are controlled from a bank of levers on the starboard side of the cockpit behind the pilot's seat. The two top levers, which have red and green knobs for port and starboard respectively, control the tank cocks, and the two bottom levers, marked S and D. for suction and delivery respectively, control the balance cocks. When the levers are in the forward position, the cocks are on.

15. Fuel priming pumps and starting magneto switches.- The fuel priming pump and the starting magneto switch for each engine are mounted in the engine nacelles.

16. Air-intake shutter controls.- The air intake shutter control levers are mounted at the top of the control bank on the port side behind the pilot's seat and have red and green knobs for port and starboard respectively. They control the supply of either hot or cold air to the carburettors and should be pushed down to supply hot air.

17. Carburettor cut-out controls.- The carburettor cut-out controls, which are mounted at the middle of the control bank on the port side behind the pilot's seat, have red and green knobs for port and starboard respectively and are shielded by a spring-loaded cover to prevent their inadvertent use. When the controls are pulled the fuel supply for slow running is cut off thus enabling the engines to be stopped after the magnetos are switched

off.

18. Airscrew pitch controls.- The airscrew pitch controls are mounted at the bottom of the control bank on the port side of the pilot's seat and have red and green knobs for port and starboard respectively. The controls should be pulled out to put the airscrewsin coarse pitch.

19. Cowling gills controls.- The opening and closing of the cowling gills that govern the flow of cooling air for the engines are controlled by a handwheel (54) on the right-hand side of and behind the pilot's seat. To close the gills the handwheel should be rotated forwards.

Seating, exits etc.

20. Pilot's seat.- The pilot's seat (7) is constructed to take a seat-type parachute and has hinged armrests, the right-hand rest (56) being arranged to hinge back and the left-hand rest (59) to hinge upwards. The seat can be adjusted for height by means of a long lever on the left-hand side of the seat; the lock for fixing the seat at any desired height can be released by twisting the grip at the end of the lever.

21. Safety harness release control.- In order to allow the pilot to lean forward without undoing his safety harness (55), a lever (52) on the right-hand side of the seat is connected, behind the seat, to a catch on a spring-loaded drum on which the ends of the safety harness shoulder straps are wound. This type of safety harness is not yet fitted to all Blenheim aeroplanes.

22. Cockpit hood.- Exit from the cockpit can be made by sliding back the hood over the pilot. The hood is secured in the closed position by a catch lever at the forward end.

23. EMERGENCY EXIT WINDOWS.- On each side of the pilot there is a window (92) that can be opened upwards and outwards and used as an emergency exit. To open the window, press in the catch lever (91) and lift it up. The windows should be opened only in an emergency. A part of the emergency window on the port side can be slid backwards; to release the catch, which is on the after edge, unscrew the knurled knob and push the catch forward, and to lock the sliding part in the closed position, secure the catch and lock it by screwing in the knurled knob.

24. Forward hinged windows.- A hinged window is provided on each side forward of the emergency exit windows. The window (14) on the port side hinges upwards and forwards and has a catch on the roof for securing it in the open position, and the starboard (23) hinges downwards. A screw is provided at the top aft corner of the port window for forcing the window open if it becomes frozen to the draught-excluder rubber.

25. Direct-vision window and air deflector.- To provide direct vision if the windscreen is obscured, a panel (17) on the port side of the windscreen is arranged to slide downwards; it is secured in the closed position by a catch (16) at the top. An air deflector is fitted outside the windscreen and can be raised by pushing in the control (22a) on the starboard side of the instrument panel; in the raised position of the deflector, a catch

on the instrument panel fits into a hole in the control rod. As there is a considerable blast of air if the deflector is not raised, it is advisable to raise it before opening the window.

26. Sun Blinds.- Fittings for sun blinds are provided on the roof of the cockpit.

Operational equipment

27. Vacuum change-over control.- The artificial horizon, the direction indicator and the turn indicator on the instrument flying panel are operated either by a venturi on the outside of the fuselage or by a vacuum pump on the port engine. In the event of failure of the pump or of the port engine, the venturi can be selected by means of the change-over cock control (21) on the starboard side of the instrument panel. The vacuum available is shown on the gauge (20) above the cock control.

28. Bomb and flare release controls.- The pilot has control over the master bomb switch, bomb and flare selection, fuzing and releasing and bomb jettisoning; release of the bombs is also under the control of the bomb aimer by means of the firing switch (84). Until the master switch (76) is placed in the ON position, bomb releasing cannot take place. When flares are carried, the flares switch (73) must be in the OFF position to prevent the flares from being released if the bombs are jettisoned.

29. Landing lamp controls.- Each landing lamp in the leading edge of the port main plane has a completely independent electrical circuit and is controlled by a switch (81) on the port side of the cockpit. In the central position of the switch knob, both lamps are off and, when the switch knob is moved inboard or outboard, the inboard or outboard lamp is illuminated respectively. The lever (67) on the inboard side of the throttle and mixture control quadrant controls the dipping of both lamps; to dip the lamp beam the lever should be pushed forward. As the lamp is spring-loaded towards the dipped position, a gate for holding the lever in the aft position is provided on the lever quadrant.

30. Oxygen equipment.- A standard oxygen regulator unit (28) is fitted on the starboard side of the instrument panel and a bayonet union socket (57) for the low pressure supply to the oxygen mask is located forward of the airscrew pitch controls.

31. Wireless remote controls.- A standard controller (59) to provide the pilot with control over the wireless equipment is fitted on the port side of the cockpit. The upper lever of the controller, which operates the change-over switch of the wireless unit, should be pushed forward for "receive" and pulled back for "send"; the wireless unit can be switched off by moving the lever to the central or off position. The lower lever, which operates the tuning circuit of the receiver should be preset before taking-off but can subsequently be used for any fine-tuning adjustment that may be necessary. The serrated central knob on the controller is a remote volume control; it should be

turned clockwise to increase the volume, and vice versa. In some cases, according to the type of wireless unit fitted, only the send-receive control is connected up. The combined microphone and telephone socket is fixed to the front edge of the seat.

32. Signal pistol.- The signal pistol is mounted on the starboard side of the cockpit and fires through a tube (1) extending to the lower surface of the fuselage. Stowage for cartridges is provided on the starboard side forward of the main plane spar.

33. Signalling switchboxes.- The identification switchbox (88) provides for independent or simultaneous use of the upward and downward identification lamps through the morsing key or, alternatively, a steady illumination from either or both lamps, and the identification switchbox (85) for morsing or steady illumination from the formation-keeping lamps; on the switchbox (85), only the down switch should be used. The spring pressure on the key may be adjusted by disengaging the lock at the upper left-hand corner and turning the ring until the required pressure is obtained when the lock should be released to engage in one of the slots.

Flying control locking gear

34. The flying control locking gear is stowed on the port side of the fuselage above the main plane rear spar. The procedure for locking the flying controls is as follows:-

(i) Hold the control column in the central position.

(ii) Attach the gear by means of the bracket between the two longer struts to the left-hand portion of the wheel.

(iii) Secure the aft end of the strut to the eye attachment on the fixed structure behind the pilot's seat.

(iv) Fix the hinged clamp to the bottom of the control column.

(v) Fix the C-clamps to the rudder pedals.

Miscellaneous equipment

35. Fire extinguishers.- A fire extinguisher is fitted above the main plane front spar behind the pilot and another is fitted on the starboard side forward of the entrance hatch.

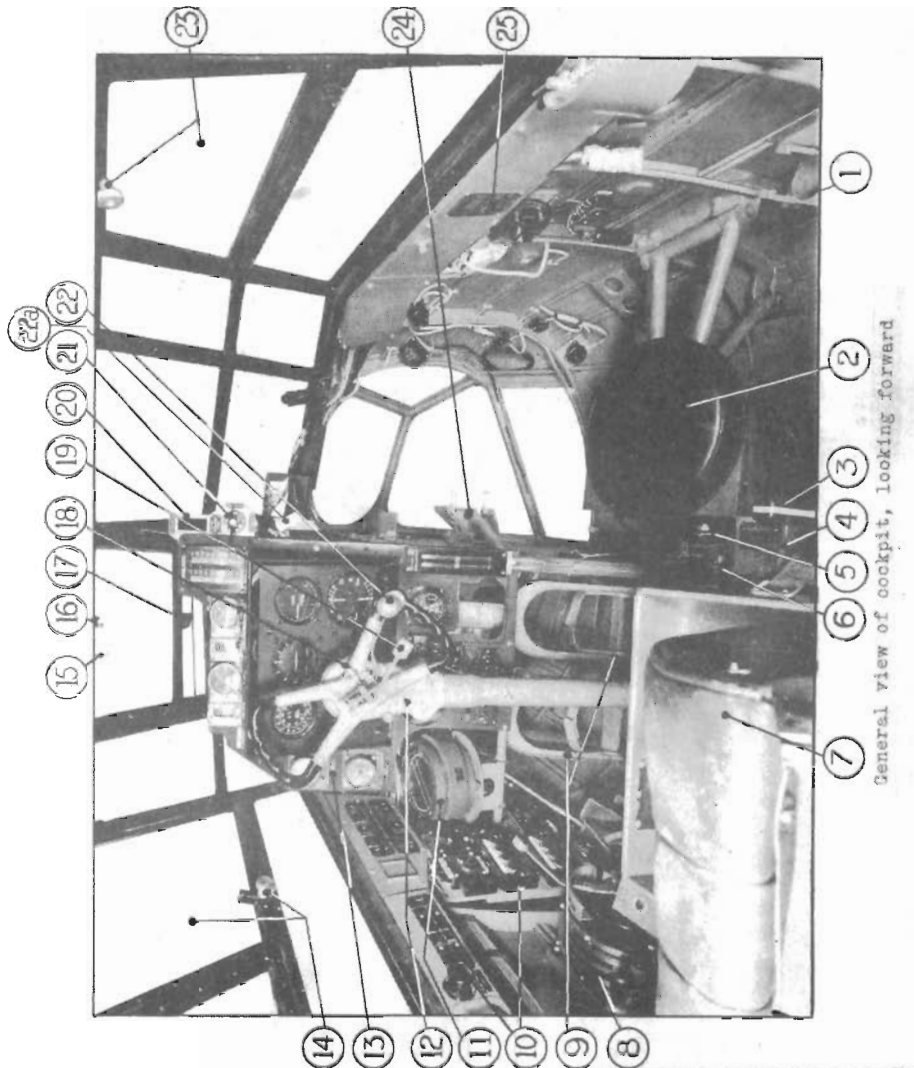
36. First-aid outfit.- A first-aid outfit is stowed on the starboard side forward of the entrance hatch.

37. Camera gun loading handle.- A loading handle for the G.22 camera gun, which can be mounted under the nose of the fuselage, is fitted on the right-hand side of the seat. The handle changes the film and sets the shutter; an indicator showing the number of exposures made is fitted at the side of the handle.

Key to fig. 1

Note.- Fig. 1 is intended to give a general idea of the layout of the cockpit. To avoid obliterating the illustration with reference marks, not all the items shown are referenced, but only the primary items, or those that do not appear or are not quite in their proper perspective in figs. 2 - 4. Obvious items, such as the control column and seat, when they also appear in figs. 2 - 4, are not again referenced.

1. Signal pistol firing tube
2. Bomb-aimer's seat
3. Hydraulic hand pump handle
4. Shield over undercarriage control handle
5. Elevator trimming tab handwheel
6. Rudder trimming tab handwheel
7. Pilot's seat
8. Engine controls (see fig. 3, items 63 and 64)
9. Rudder pedals
10. Bomb switches (see fig. 3, items 65, 68, 70 and 72-76)
11. Compass
12. Control column
13. Instrument panel (see fig. 2)
14. Hinged panel on port side and catch
15. Bead sight
16. Clip for securing (17) in closed position
17. Direct-vision window (shown in open or lowered position)
18. Brake operating lever parking lock
19. Brake operating lever
20. Vacuum gauge
21. Vacuum change-over, venturi to pump
22. Gun firing button
23. Hinged panel on starboard side and catch
24. Course setting bomb sight mounting
25. Engine data plate



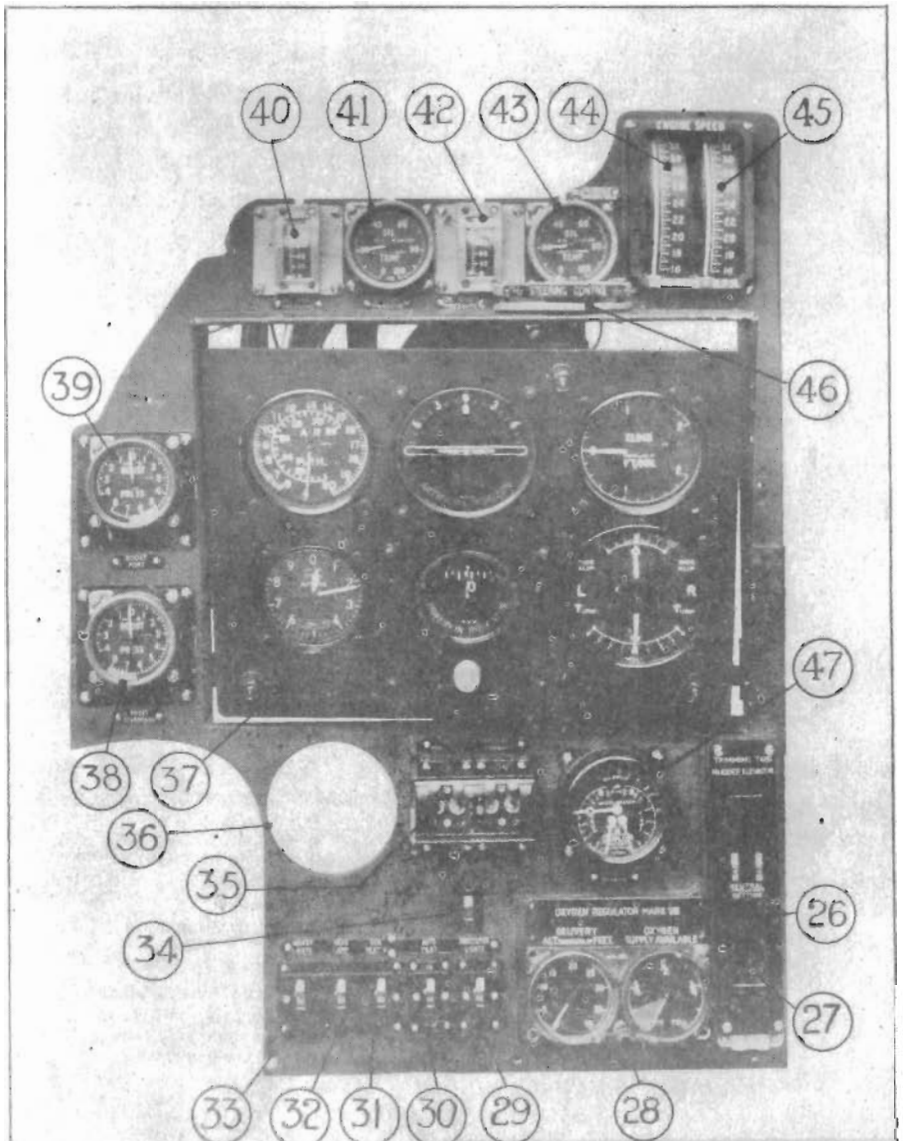
General view of cockpit, looking forward

F.S/S.

A.P.1530A	PILOT'S NOTES
SECT.1	FIG.1

Key to fig. 2

26. Elevator trimming tabs position indicator
27. Rudder trimming tab position indicator
28. Pilot's oxygen regulator
29. Undercarriage indicator lamps switch
30. Auto-controls cut-out switch
31. Fixed gun heating switch
32. Head lamp switch
33. Navigation lamp switch
34. Auto-controls main switch
35. Engine magneto switches
36. Clock mounting
37. Instrument-flying panel
38. Boost pressure gauge, starboard engine
39. Boost pressure gauge, port engine
40. Oil pressure gauge, port engine
41. Oil temperature gauge, port engine
42. Oil pressure gauge, starboard engine
43. Oil temperature gauge, starboard engine
44. Engine speed indicator, port engine
45. Engine speed indicator, starboard engine
46. Auto-controls steering lever
47. Brake triple pressure gauge



Instrument panel

A.P.1530A	PILOT'S NOTES
SECT.1	FIG.2

F.S/T.

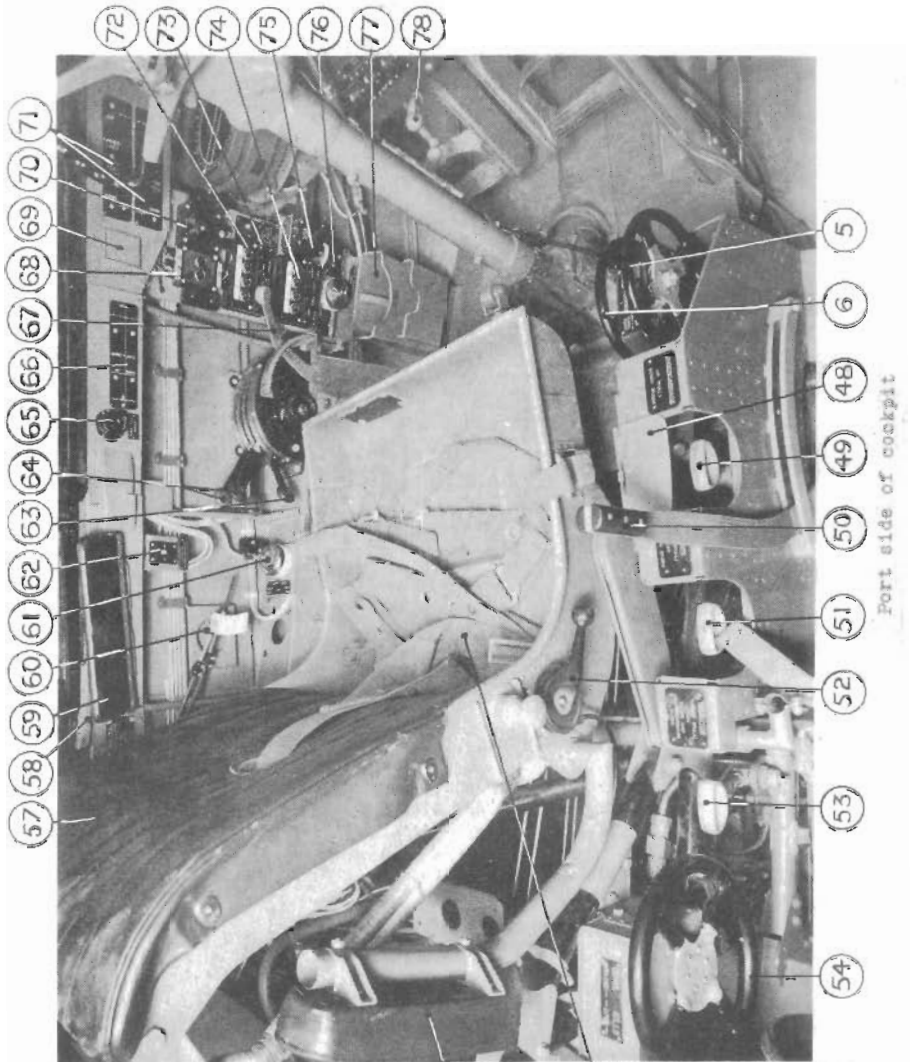
Key to fig. 3

5. Elevator trimming tab handwheel
6. Rudder trimming tab handwheel
48. Shield for undercarriage control handle
49. Undercarriage control handle
50. Hydraulic system hand pump handle
51. Flaps control handle
52. Safety harness release lever
53. Turret or flaps - undercarriage selector handle
54. Cowling gills control handwheel
55. Safety harness
56. Armrest, starboard (shown hinged back)
57. Oxygen socket (hidden by seat)
58. Lever for opening port emergency exit window
59. Armrest, port (shown hinged up)
60. Wireless remote control unit
61. Landing lamp switch
62. A.S.I. pressure head heating switch
63. Mixture control levers
64. Throttle control levers
65. Bomb firing switch
66. Flaps position indicator
67. Landing lamp control lever
68. Bomb nose-and-tail fuzing switches
69. Compass card holder
70. Bomb jettison switch
71. Undercarriage position indicators
72. Flare and practice bomb selector switches
73. Flare switch
74. Bomb selector switch
75. Bomb container jettison switch
76. Bomb release master switch
77. Cases for maps
78. Handle for rudder pedal leg-reach adjustment

Also on port side but not shown in fig. 3 are:-

(i) Above pilot's head, reading forward, (a) engine starting pushbuttons (shielded), port and starboard, (b) fuel contents gauge pushbutton, (c) fuel contents gauges, port and starboard and (d) floodlamp and dimmer switch.

(ii) On control bank at side of and just behind pilot's seat, reading downwards, (a) carburettor air intake shutter controls, port and starboard, (b) carburettor cut-out controls (shielded), port and starboard and (c) variable pitch airscrew controls, port and starboard.



F.S/9

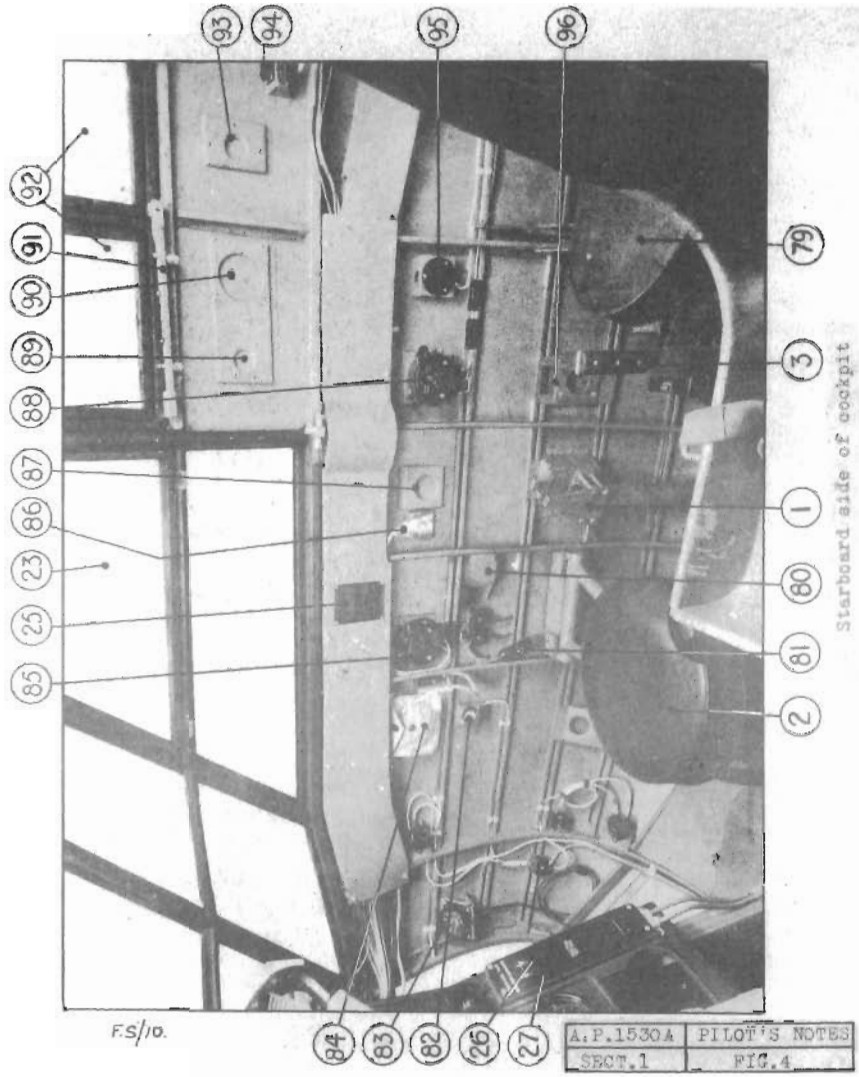
Key to fig. 4

1. Signal pistol firing tube
2. Bomb-aimer's seat
3. Hydraulic hand pump handle
23. Hinged window on starboard side
25. Engine data plate
26. Elevator trimming tab position indicator
27. Rudder trimming tab position indicator
79. Navigator's seat
80. Wedge for dual engine controls
81. Bomb-aimer's telephone and microphone socket
82. Signalling lamp socket
83. Air temperature gauge
84. Bomb-aimer's bomb firing switch (in pocket)
85. Formation-keeping lamps signalling switchbox
86. Navigator's oxygen socket
87. Auto-controls clutch lever
88. Identification lamps signalling switchbox
89. Auto-controls control cock
90. Auto-controls attitude control
91. Lever for opening starboard emergency exit window
92. Starboard emergency exit window
93. Auto-controls speed lever
94. Auto-controls re-setting switch
95. Camera supply socket
96. Camera control wedge

Also on starboard side but not shown in fig. 4 are:-

(i) On panel near roof, (a) engine cylinder temperature gauges, port and starboard and (b) auto-controls pressure gauges, main, nose heavy and tail heavy.

(ii) Below (i), tank, suction and delivery cock controls for fuel system.



SECTION 2

HANDLING AND FLYING NOTES

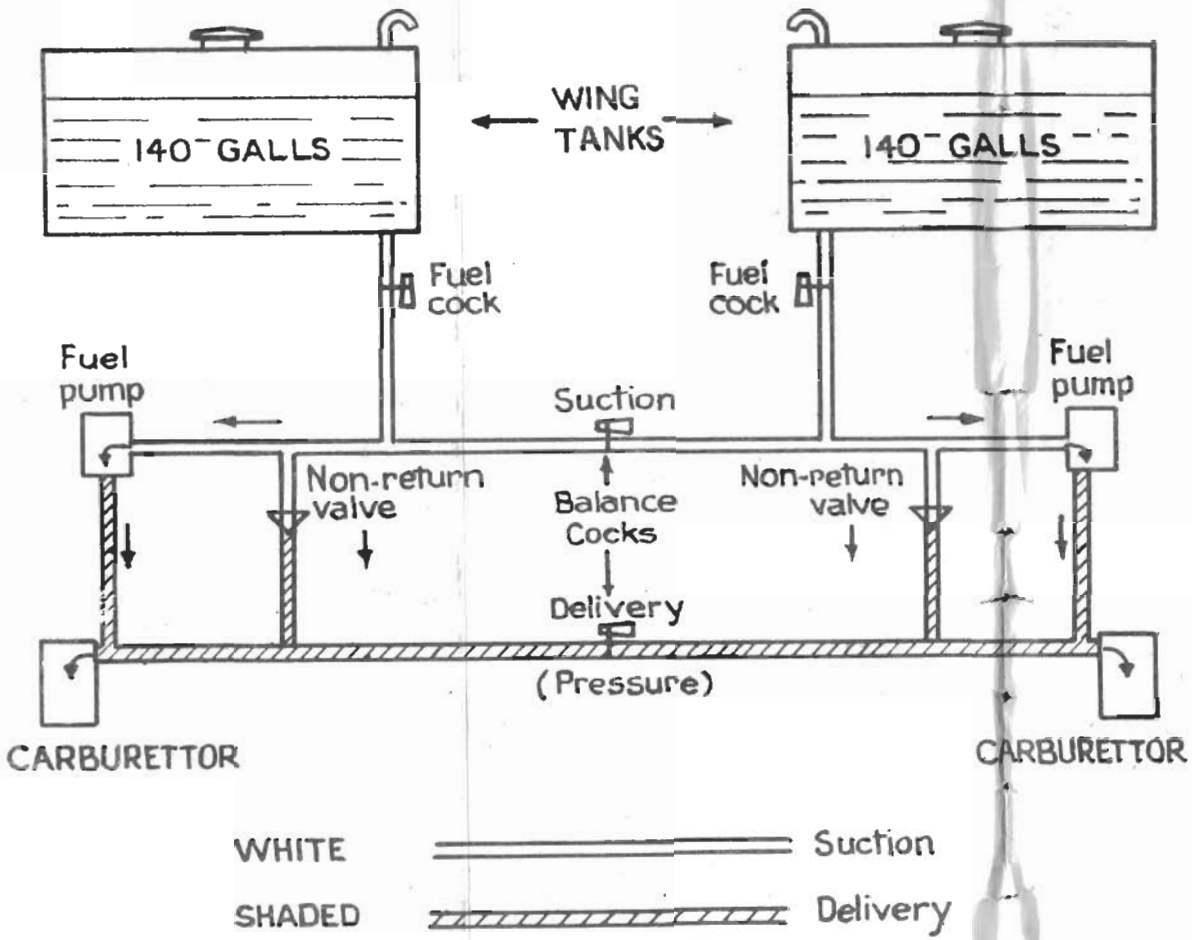
FOR PILOT

AIR PUBLICATION 1530A
Volume I

SECTION 2

LIST OF CONTENTS

ADDENDUM



USE OF FUEL COCKS

	Fuel cocks	Balance cocks	Remarks
Normal	Both ON	Both OFF	Each tank supplies its own engine.
To use one tank only	One ON	Suction ON	Fuel sucked from one tank by both engine pumps.
If engine pumps on one side fail	Both ON	Both ON	To open the delivery balance cock is essential so that one pump can feed both engines. The suction balance cock is also opened if supply from both tanks at once is desired.
If one engine fails	Both ON	Suction ON	If supply from both tanks is desired.

FIG. 1 | AP 1530 A | Vol. 1 | Section 2

FUEL SYSTEM DIAGRAM

FS/3.

SECTION 2

HANDLING AND FLYING NOTES FOR PILOT

Preparation for flight

1. Note the following:-

(i) Care must be taken to ensure that the total load of the aeroplane, and the disposition of the load, is in accordance with the Weight Sheet Summary.

(ii) Ensure that the safety pins are removed from the radius rods of both undercarriage units; these locks, which prevent folding of the radius rods and retraction of the undercarriage, are provided with small red pennants.

Preliminaries

2. On entering the cockpit proceed as follows:-

(i) See that the undercarriage selector lever is in the DOWN position.

(ii) Switch on the undercarriage indicator and see that the green lights are showing; the lights indicate that the undercarriage is locked.

(iii) Set the air intake heat control to the position for admitting cold air.

(iv) Set the cowling gills fully open.

(v) Pull the airscrew control knobs out to give fine pitch.

(vi) Check the movement of all flying controls.

Starting the Engines

Note.- For full details of the Mercury VIII engine reference should be made to A.P.1491B, Vol.I.

3. It is recommended strongly that until such time as the pilot is thoroughly conversant with starting procedure, he should be in his seat ready for flight before the engines are started; this will ensure that unnecessary running of the engines prior to take-off is eliminated.

(i) Check the contents of all fuel tanks.

(ii) Set the fuel cock levers as required; normally both fuel cock levers should be turned ON and both balance cock levers turned OFF (see fig.1).

(iii) Give order to ground personnel to prime the induction system of each engine; six to eight full pumps are required for a cold engine but less if hot.

(iv) Give order to ground personnel to switch ON the starting magnetos.

(v) Ensure that all personnel are clear of the airscrews.

(vi) Set the mixture control levers to NORMAL and move both throttle levers forward approximately half an inch on the quadrant; it is important that the throttle levers are moved gently forward otherwise the accelerator pumps of the carburettors will be brought into action and cause fuel to flow into the air intakes with consequent risk of fire.

(vii) Switch on the main magneto switches.

(viii) Press the starter button of each engine in turn; the starter should not be used continuously for periods of more than 10 seconds.

(ix) Warm up the engines at a fast tick over until the oil temperature is at least 5°C.

Checking Engines and Installations

4. The throttles may be opened fully only for the shortest periods necessary for the checks to be made.

During warming-up

(i) Instruct ground personnel to switch OFF starting magnetos and whilst doing so check the fuel pressure; this should be 2½ - 3 lb./sq.in.

(ii) Check operation of hydraulic engine pump by putting the flaps DOWN and returning to UP.

During running-up

For each engine in turn, check:-

(i) Static r.p.m. (fine pitch) 2,300 - 2,400
Boost +5 lb./sq.in.

(ii) Oil pressure; a pressure of 100-150 lb./sq.in. will be obtained with the oil at any temperature below 40°C. The pressure will fall to normal (80 lb./sq.in.) as the temperature rises.

(iii) Check the engine for even running on each magneto; this should be done at full take-off boost and the drop in r.p.m. must not exceed 100.

Note.I.- For engines fitted with type A.V.T.85E carburettors the above tests and the take-off should be made with the mixture control lever in the OVER-RIDE position and the throttle lever fully forward. After tests return the mixture control to NORMAL.

Note.II.- For engines fitted with type A.V.T.85MB carburettors the tests and the take-off should be made with the mixture control in the NORMAL (automatic rich) position, and the throttle fully forward to TAKE-OFF position.

(vi) Check pressure in the air cylinder for brakes; minimum for taxying 100 lb./sq.in.

Preparation before taxying out for take-off

5. Before taxying out for take-off proceed as follows:-

(i) Set all trimming tabs to neutral.

(ii) Check that undercarriage selector cock is DOWN and indicator is showing green lights.

(iii) Check that the airscrew control knobs are pulled out to FINE-PITCH position.

(iv) See that the cowling gills are fully open for taxying; they must be closed before the take-off.

(v) If the take-off is to be made with use of flaps they should be depressed 15°.

Taxying-out

6. Before opening up the engines for taxying see that the brake parking device is released. Taxying is normal and changes of direction should be made by means of the rudder and engines where possible. During prolonged taxying check the cylinder temperatures and the pressure for the brakes.

Delay prior to take-off

7. If the take-off is delayed for any reason, the engines should be cleared by opening them up one at a time against the brakes.

Take-off

Note.- With engines fitted with type A.V.T.85E carburettors, the take-off must be made with the mixture control lever in the OVER-RIDE position and the throttle fully forward. With engines having the type A.V.T.85B carburettors the mixture control lever should be at the NORMAL (automatic rich) position and the throttle fully forward to the TAKE-OFF position.

8. The take-off must be made with the airscrews in fine pitch, the cowling gills fully closed and, if the aeroplane is fully loaded or the run is restricted, with the flaps depressed 15°. The following points should be noted:-

(i) The aeroplane has a slight tendency to swing to the right; this is corrected readily by use of the rudder.

(ii) The take-off is normal but the aeroplane should not be pulled-off too quickly during the run; but allowed to fly-off.

(iii) Directly the aeroplane is clear of the ground the undercarriage selector should be pulled to the UP position to retract the undercarriage.

(iv) Hold the aeroplane down until a speed of 120 m.p.h. A.S.I. reading at least is attained, then gradually climb.

(v) If the flaps have been used for the take-off the control lever should be pulled UP at a height of about 500 ft. and at an A.S.I. reading of not less then 120 m.p.h.

(vi) Set the airscrews to coarse pitch.

(vii) Place the hydraulic selector valve in the NEUTRAL position.

(viii) Open the cowling gills and set them according to the cylinder temperatures; max. permissible for climbing 200°C.

(ix) Set the mixture controls and throttle the engines back to give normal climbing boost (see para. 32).

Precaution during take-off

9. As a safeguard in the event of an engine failing following the take-off, a steep angle of climb should not be attempted. The pilot should hold the aeroplane down for as long as practicable, aiming at clearing the aerodrome boundary by a small margin, and then continue at a speed of not less then 120 m.p.h. A.S.I. reading.

Engine failure during take-off

10. Should one engine fail during take-off proceed as follows:-

Immediate action

(i) Push the control column forward to assume level flight, and maintain a straight course by means of the rudder.

(ii) Keep the throttle of good engine fully open.

(iii) Make sure the undercarriage is UP.

(iv) If airscrews are in fine pitch, push the control knob of the airscrew of the failed engine IN to give coarse pitch; this will reduce drag. OUT

Subsequent action

(v) Adjust the rudder trimming tab to release the load on the foot.

(vi) When the aeroplane is fully under control it should be held in a gentle climb at a speed of not less then 100 m.p.h. A.S.I. reading.

(vii) Climb straight until an altitude of 1000 ft. is attained, when gentle turns can be made against the good engine.

(viii) The undercarriage should not be lowered until the aeroplane is in a position for a straight approach for landing. After lowering the undercarriage lower the flaps fully. (If the port engine has failed it will be necessary to lower the undercarriage and flaps by hand)

(ix) During the final approach regulate the glide by use of the engine. It is vital not to overshoot. OBVIOUSLY

Note.- When flying on one engine the cowling gills must be kept closed, as much as possible, because the aeroplane cannot maintain height with the gills fully open.

Climbing

11. At full throttle the best climbing speed is about 150 m.p.h. A.S.I. reading, up to 10,000 ft. Above this altitude reduce the climbing speed by 2 m.p.h. per 1,000 ft.

Note the following:-

(i) Instructions on the correct use of the throttle and mixture control levers of the two types of carburettors in use, and the correct method of using the air intake heat control are given in para.32.

(ii) During the climb watch carefully the cylinder temperatures and adjust the cowling gills as required. The maximum permissible temperature is 200°C but it should be kept well below this figure if possible.

Cruising

12. Instructions on the correct setting of throttle and mixture control levers, of the alternative carburettors, for cruising conditions are given in para.32.

(i) Continuous cruising.- For continuous cruising, a maximum engine speed of 2,400 r.p.m. and a boost pressure of +3½ lb./sq.in. must not be exceeded. For all-out level flight a maximum speed of 2,750 r.p.m. and a boost pressure of +5 lb./sq.in. must not be exceeded; this speed must not be employed for a period of more than five minutes.

(ii) Economical cruising.- For economical cruising, the engine speed and boost pressure must not exceed 2,400 r.p.m. and +1½ lb./sq.in. respectively.

(iii) Most economical cruising.- For most economical cruising

the engines should be throttled down to the lowest speed necessary for the occasion; the aeroplane has a good reserve of power and will fly with the engines throttled down to less than 1,600 r.p.m. For a normal cross-country flight it is recommended that the engines be operated at a boost pressure in the region of +1 lb./sq.in.; this will ensure economical operation, with particular regard to the length of periods between engine overhauls, routine maintenance and life of sparking plugs etc.

(iv) Cylinder temperatures.- During cruising the cylinder temperatures should be kept well below the maximum permissible (180°C) by setting the cowling gills as required, but care must be taken to ensure that the gills are not fully open at high I.A.S. because they are liable to be strained by the air pressure.

(v) Oil temperatures.- Check the oil temperatures frequently and keep them below the limits laid down; in para.32(iv).

General flying characteristics

13. The aeroplane is normal and easy to fly and exhibits no trace of vice. Attention is drawn to the following:-

(i) Trimming tab controls must only be used for trimming the aeroplane in flight and not for manoeuvring or landing purposes.

(ii) The aeroplane is stable and can be flown "hands off" and "feet off" when the trimming tabs have been adjusted.

(iii) The change of trim on operation of the undercarriage, cowling gills, throttle levers etc., is slight and well within the range of control of the elevator.

(iv) Directional stability is good; for normal flying, including turns, and particularly instrument flying, rudder control is not required.

(v) The elevator control is light and powerful in a turn and the pilot should not pull the aeroplane round too rapidly in a steep turn, especially if the centre of gravity is at or near the aft limit.

Approach and landing

14. Until the pilot is thoroughly used to the aeroplane the approach should be made with some engine on a straight glide. Use of the engine will, of course, flatten the angle of approach. Before approaching to land check the pressure in the air cylinder for brakes; a minimum pressure of 120 lb./sq.in. is necessary for efficient braking. Then:-

(i) Reduce speed to 150 m.p.h. A.S.I. reading.

(ii) Push the hydraulic selector valve DOWN.

(iii) Lower the undercarriage; after observing that both units of the undercarriage are down, check by means of the indicator that they are locked. Green lights should appear.

(iv) Push the control knobs of the airscrews to give FINE PITCH.

(v) Place mixture control levers into the OVER-RIDE position if A.V.T.85E carburettors are fitted.

(vi) Cruise at not more than 180 m.p.h. A.S.I. reading into the desired position for the approach and then lower the flaps by pushing the control valve DOWN. (Check by means of the indicator).

(vii) Close the cowling gills.

(viii) Open the port cockpit window.

(ix) Trim the aeroplane. (This is not absolutely essential but it will facilitate landing).

15. Approach.- With undercarriage and flaps down and engines fully throttled back, the correct gliding speed for the approach is 85 - 90 m.p.h. A.S.I. reading; this should be regarded as the minimum. If the approach is to be made with the use of engines a lower gliding speed of 75 - 80 m.p.h. may be employed. Note the following:-

(i) Normally the preliminary approach should be made by flying with flaps down to the position from which the final glide is made. After which the final approach should be made with the engines fully throttled back.

(ii) Should it be necessary to circle the aerodrome again after the undercarriage and flaps have been lowered, the throttles should be opened immediately before speed is lost and the airspeed maintained at 85 - 90 m.p.h. A.S.I. reading. If it becomes necessary to raise the flaps it is important that before doing so a speed of at least 120 m.p.h. A.S.I. reading, and an altitude of at least 500 ft. are attained. Sudden raising of the flaps results in a sudden reduction of lift and the aeroplane inevitably loses a certain amount of height. This is of no importance if the aeroplane is sufficiently high, but it may be serious below 300 ft.

16. Landing.- If the engines are used for the final approach the throttle levers should not be pulled back fully until after flattening-out. A three point landing should be made by pulling the control column fully back whilst holding-off just clear of the ground. If the final approach is made without use of engines, sudden change of attitude should be avoided by gliding at ample speed and commencing to flatten-out in good time. Attention is drawn to the following:-

(i) It is important to land tail down, in a stalled condition with the control column fully back. The aeroplane can then be stopped in approximately 300 yds. with efficient brakes and on level ground.

(ii) If a tail-up landing is made the run will be indefinite

and might be any distance up to 600 yds. before the aeroplane can be stopped.

17. Before taxying in.- Proceed as follows:-

(i) Open the cowling gills, fully.

(ii) Raise the flaps.

(iii) Place the mixture control levers in to NORMAL if A.V.T.85E carburettors are fitted.

Procedure at end of flight

18. After the last flight of the day, push the airscrew control knobs in to give COARSE PITCH and open up each engine in turn, to about 2000 r.p.m.; this will have the effect of leaving the airscrews in the coarse-pitch setting when the engines are stopped and will assist maintenance. To stop the engines proceed as follows:-

(i) Allow the engines to run with the throttle levers fully back for about one minute; this will permit the scavenge pump to remove surplus oil from the crankcase.

(ii) Pull out the cut-out device control of each engine in turn until the engine stops.

(iii) Switch OFF the main magnetos.

(iv) Turn OFF all fuel cocks.

(v) See that the locking pins for each undercarriage unit are inserted.

(vi) Switch OFF undercarriage indicator.

Diving

19. The maximum diving speed is 285 m.p.h. A.S.I. reading. At less than one-third throttle opening the engine speed must not exceed 2,750 r.p.m.; at more than one third throttle opening the engine speed may exceed 2,750 r.p.m. for periods of not more than 20 seconds with a momentary maximum speed of 3,120 r.p.m. Attention is drawn to the following:-

(i) When diving the flaps must be UP, the airscrews must be in COARSE PITCH and the cowling gills closed or nearly closed.

(ii) For diving purposes the aeroplane should be trimmed as for level flight. The elevator trimming tabs must not be used to assist in recovery from a dive.

(iii) The maximum diving speed of 285 m.p.h. A.S.I. reading is permissible in a steady dive only. Rapid recovery, coarse or rapid change of the diving angle and steep turns must be avoided at speeds approaching the maximum permissible diving speed.

(iv) In a dive the highest airspeed is obtained generally when the limiting r.p.m. are reached with one-third throttle opening. A steeper dive, but at a speed below the maximum permissible, will be obtained generally with the engines throttled fully back and when the limiting r.p.m. for this condition is reached.

(v) The following information has been obtained from diving tests made with this aeroplane:-

Altitude at commencement of dive	5,000 ft.
Angle of dive (one-third throttle opening).	17°
Speed going into dive	150-180 m.p.h. A.S.I.
Altitude at commencement of recovery	2,000 ft.
Speed at bottom of dive	240-285 m.p.h. A.S.I.
Height lost during recovery	500-900 ft.

Forced landing due to engine failure

20. Unless a field of ample size or suitable ground is available the undercarriage should be left up, and if the failure occurs at a low altitude an immediate attempt should be made to lower the flaps. Flaps must be fully down for the landing, if possible, even if not lowered until the last few feet, as they considerably reduce the landing speed, and if the undercarriage is down they reduce the run. Note the following:-

(i) The undercarriage when down acts as an efficient air brake, therefore, if there is ample height, it may be left up to extend the glide, whether it is lowered finally or not. If it is to be lowered the operation must be commenced in good time as it goes down slowly by hand.

(ii) Before landing switch off the engines and turn off the fuel supply.

Crew drill for forced landing

21. The pilot is to issue the warning "Prepare for forced landing". This should be done by R/T intercommunication or by written chit. Then the following action is to be taken by the crew:-

Pilot:-

(i) Open port emergency exit.

(ii) Undo quick releases or parachute harness and free himself of harness as far as possible.

(iii) Tighten Sutton harness or safety belt.

(iv) Proceed to make the forced landing.

Air Observer

(i) Open starboard emergency exit and sliding roof.

(ii) Detach parachute pack and release harness.

(iii) Fasten himself securely with the safety belt.

Air Gunner

(i) Open camera hatch and top rear hatch.

(ii) Disconnect accumulator leads.

(iii) Detach parachute pack and release harness.

(iv) Wind in trailing aerial, if there is time.

(v) Take up position on floor behind the rear fuselage cross member.

Note.- If time permits the Air Observer should go to the rear cabin and take-up a position beside the Air Gunner.

Forced descent on water

22. Stowage of dinghy.- In this aeroplane the valise carrying the emergency gear must be stowed between the ladder and the starboard side of the fuselage, immediately below the emergency exit aft of the main plane. The operating cord should be securely attached to the ladder.

23. Responsibility for the dinghy.- At all times the responsibility for the dinghy is the duty of the Wireless Operator or Air Gunner allotted to the aeroplane. Before any flight is made over water, the occupant of the turret is to make a brief examination of the valise, to ensure that there is a free passage for the valise, containing the dinghy, from the stowed position to the exit. Also he must ensure that the end of the operating cord is securely attached to the ladder.

24. Drill in the event of a forced descent on water.- The following is the sequence of operations:-

(i) During the glide down, all roof emergency exits are to be opened by the crew, who are then to brace themselves in their seats to avoid being thrown forward and injured when the aeroplane strikes the water.

(ii) As soon as the aeroplane has come to rest in the water the valise is to be thrown out of the exit by the occupants of the turret.

(iii) If the distance the valise falls from the aeroplane has not paid out all the operating cord, continue to pull the cord in sharp jerks, and so operate the head, which in turn will pierce the sealing disc in the CO_2 cylinder, and allow the dinghy to inflate.

(iv) The crew are to board the dinghy, as soon as it is inflated, in the order: Wireless Operator (or Air Gunner) Air Observer, Pilot.

(v) If the dinghy should be upside down on inflation, pull down on one side to turn it over.

(vi) It is essential to board the dinghy as soon as possible, if the aeroplane is not provided with flotation gear.

(vii) As soon as all the crew are on board sever the cord connecting the dinghy to the aeroplane.

(viii) When in the dinghy pull in the container holding the marine distress signals and topping-up pump.

(ix) If the sea drogue is not out, throw it overboard to prevent drift due to windage on the dinghy.

(x) If dinghy is not inflated fully, top it up as soon as possible.

25. Method of boarding dinghy.- An alternative type of dinghy is supplied with the valise emergency gear. The method of boarding either is as follows:-

(i) Type C.- If boarding from the water, climb over the waisted portion of one of the sides (not over the CO_2 cylinder) kicking the feet away from the dinghy to prevent the dinghy turning over. If difficulty is experienced in boarding, one member of the crew should hang on to a side while other members board from the opposite side.

(ii) Type H.- This dinghy is provided with rope ladders to assist in boarding, and stabilizing pockets to prevent it turning over when being boarded. To board from the water, grasp the rope at the top of the ladder with the right hand, steady the ladder with the left hand on one of the lower rungs, place the left foot in the lowest rung of ladder and climb into the dinghy. The dinghy will tilt at a small angle until the stabilizing pockets commence to come out of the water; the weight of water in the pockets, however, will provide sufficient ballast to prevent the dinghy turning over.

Failure of one engine during normal flight

26. The aeroplane with a full load (all up weight 12,500 lb.) will maintain height on one engine provided the cowling gills are closed, or nearly closed, and provided the flaps are not lowered below 15°. At high speeds, the result of sudden failure of one engine is quite mild, and the resulting yaw can be corrected easily by the controls, even without use of rudder. Note the following:-

(i) On the failure of one engine, it is easy to keep straight at first, but if height is maintained the air speed will drop and full use of the rudder trimming tabs will be required.

(ii) When flying on one engine, fully close the cowling gills and throttle back the good engine to about 1,950 r.p.m. (keep the airscrews of both engines in coarse pitch); the A.S.I. reading should be about 120 m.p.h.; if the aeroplane will climb in this condition, throttle back slightly to the r.p.m. which will maintain height, and so ease the engine.

(iii) Watch the cylinder and oil temperatures, but do not open the cowling gills if it can be avoided; in this emergency cylinder temperatures are permitted up to 190°C and oil temperature up to 80°C. During a prolonged flight on one engine, it may be possible that conditions can be improved by climbing carefully at full throttle to cooler atmosphere, and then throttling down again to maintain height.

(iv) On the failure of one engine, the suction balance cock of the fuel system should be opened as soon as possible so that the good engine is supplied from both tanks.

(v) Turns should be made towards the good engine; to maintain height the turns should be gentle and they can be made and straightened out again without the use of the rudder.

Flying in poor visibility

27. When flying in bad visibility open the port side window, as the front panels may become opaque. If following land marks it is better to keep these on the port side. When flying at low airspeeds the cylinder and oil temperatures should be watched carefully and the cowling gills adjusted accordingly.

Stalling

28. The aeroplane has a vicious stall with the flaps up, one wing drops, and 300 - 400 ft. are lost in the recovery. With flaps down and engines throttled fully back the aeroplane cannot usually be stalled, but with a little engine the stall may be almost as vicious as with the flaps up. Note the following:-

(i) With flaps up, cowling gills closed and the throttles partly open there is no warning of the imminence of a stall. Under other conditions warning is only given when the stall is approached slowly and carefully. Thus if the controls are mishandled at slow speeds no warning can be expected at all.

(ii) To prevent a spin and to recover from a stall in which a wing has dropped, opposite rudder must be applied and the control column pushed forward.

(iii) The following information is the result of stalling tests made with this aeroplane with the throttle levers fully back:-

Condition	Stalling speed (less position error)
(a) Flaps up and gills closed	67 m.p.m. A.S.I. reading
(b) Flaps up and gills open	71 m.p.h. A.S.I. reading
(c) Flaps down and gills closed	61 m.p.h. A.S.I. reading
(d) Flaps down and gills open	61 m.p.h. A.S.I. reading

Note.- In (c) and (d) the aeroplane probably is not completely stalled.

Correction of A.S.I. reading for Position Error

29 Note the following:-

At 100 m.p.h. indicated air speed	add	13.4 m.p.h.
At 120 m.p.h. indicated air speed	add	10.5 m.p.h.
At 140 m.p.h. indicated air speed	add	8.5 m.p.h.
At 160 m.p.h. indicated air speed	add	7.0 m.p.h.
At 180 m.p.h. indicated air speed	add	6.0 m.p.h.
At 200 m.p.h. indicated air speed	add	5.4 m.p.h.
At 220 m.p.h. indicated air speed	add	5.0 m.p.h.

Fuel capacity and consumptions

30 Note the following:-

(i) Effective fuel capacity

Two tanks in centre main plane		
Port tank	-	140 gallons
Starboard tank	-	140 gallons
Total effective capacity	-	280 gallons

(ii) Fuel consumptions.- The following information will be found useful in determining endurances:-

Maximum consumptions per engine at altitudes stated -

Climbing ..... (at +5 lb./sq.in. boost)	82	galls. per hour	at 13,000 ft.
Maximum cruising ..... (Mixture control "NORMAL")	58	galls. per hour	at 4,500 ft. (approx.)
Economical cruising ..... (Mixture control "Weak")	40	galls. per hour	at 10,000 ft. (approx.)
All-out level	84	galls. per hour	at 14,000 ft.
Most economical cruising ...	17	galls. per hour	at 14,000 ft.

Oil capacity

31. There are two oil tanks, one per engine; each has an effective capacity of 8.5 gallons.

Notes concerning the Mercury VIII engine

32. The following should be noted:-

Note I.- In the case of the A.V.T.85E carburettor, the mixture control is operated manually from the cockpit. The mixture is set for take-off by putting the mixture control lever into the OVER-RIDE position, and for economical cruising conditions by weakening the mixture till a drop of 70 r.p.m. (3% of cruising r.p.m.) is obtained and then opening the throttle to restore the r.p.m. to their original value.

Note II.- In the case of the A.V.T.85MB carburettor, the automatic mixture control has two positions only, i.e. NORMAL and WEAK; there are no intermediate positions. The adjustment of the mixture strength to meet the varying conditions of altitude is effected by the automatic unit on the engine. The mixture control lever can only be moved into the WEAK position when the throttle lever is in the economical cruising range.

Note III.- If +5 lb./sq.in. boost is used for climbing, the mixture control lever, in the case of the A.V.T.85E carburettor, should be changed from OVER-RIDE to NORMAL position when the boost pressure drops to +3½ lb./sq.in. (this will occur at about 7,500 ft.). For similar conditions the throttle lever of the A.V.T.85MB carburettor should be changed from TAKE-OFF to RATED position, and the mixture control left at NORMAL. It is emphasised, that the prolonged use of fully rich mixture results in rough running and heavy fuel consumption, and it may therefore be more advantageous to employ a maximum boost of +3½ lb./sq.in. early in the climb for normal flying.

(ii) Limiting operation conditions:-

Take-off (up to 1,000 ft. or for 3 minutes).	Maximum r.p.m. 2650 Minimum r.p.m. 2050 at maximum boost (+5 lb./sq.in.)
Climb	Maximum r.p.m. 2650 at maximum boost (+5 lb./sq.in.)
Maximum cruising Mixture control normal	Maximum r.p.m. 2400 at maximum boost (+3½ lb./sq.in.)
Economical cruising Mixture control weak (fully forward) Throttle lever cruising range	Maximum r.p.m. 2400 at maximum boost (+1½ lb./sq.in.)
All-out level (5 minute limit)	Maximum r.p.m. 2750 at maximum boost (+5 lb./sq.in.)
Maximum dive (20 seconds limit)	Momentary maximum r.p.m. 3120 at maximum boost (+5 lb./sq.in.)

(iii) Oil pressures

Normal	80 lb./sq.in.
Emergency minimum (5 minute limit)	65 lb./sq.in.

(iv) Oil inlet temperature

Minimum for opening up (with H.I.O.P.)	5°C
Maximum for continuous cruising	70°C
Maximum for climbing	80°C
Emergency maximum (5 minute limit)	85°C

(v) Cylinder temperatures

Maximum climb	200°C
Maximum cruising	180°C
Maximum all-out level (5 minute limit)	240°C

Use of air intake heat control

33. A more general use of warm carburettor intake air than is normally the case has been found necessary with the Mercury VIII engines installed in this aeroplane. The air intake heat controls should therefore be in the WARM position for all operational conditions except the following:-

(i) When starting up the engine

(ii) When the boost pressure exceeds +3½ lb./sq.in.

(iii) When the atmospheric temperature exceeds 15°C.

34. The following should be carefully noted:-

(i) The pilot must note the reading of the air temperature thermometer when he throttles back after TAKE-OFF to +3½ lb./sq.in. boost, or less, and set the air intake heat controls to suit the conditions.

(ii) Although the dial of the air temperature thermometer is not directly in front of the pilot, being primarily intended for the bomb-aimer, it is possible for the pilot to read it sufficiently accurately for the purpose of these instructions in all ordinary circumstances. In night flying or any other case when the pilot has difficulty in reading the thermometer himself, he must arrange for the assistance of one of the crew.

(iii) The pilot must check the setting of the air intake heat controls from time to time in flight, and particularly when changing height, or when entering or emerging from cloud or rain.

(iv) Important.- When conditions of excessive humidity are known to exist, i.e. flying through heavy clouds, snow or rain, the air intake heat controls must be in the WARM position irrespective of the boost pressure or the atmospheric temperature.

ADDENDUM

THE INFORMATION GIVEN IN PART I OF THIS ADDENDUM IS NOT NORMALLY PART OF THE PILOTS NOTES ISSUED BY THE AIR MINISTRY. THE ADDENDUM HAS BEEN COMPILED BY BOMBER COMMAND AS THE RESULT OF EXTENSIVE FLYING EXPERIENCE OF THE BLENHEIM.

SEQUENCE OF SETTING AND CHECKING CONTROLS

NOTE 1 :- IT IS OF VITAL IMPORTANCE THAT A PILOT SHOULD LEARN THE LOCATION, CORRECT METHOD OF OPERATION AND SEQUENCE OF CHECKING OF BOTH ENGINE AND AIRFRAME CONTROLS BY HEART, BEFORE FLYING THE AIRCRAFT.

NOTE 2 :- This sub-section has been divided into two parts for ease of reference. PART I contains those items of operation of vital importance and PART II a comprehensive list of all main items of operation, both parts being set out in stage and sequence.

PART I.

(a) BEFORE TAKE OFF.	Selector Cock	- Down.	MEMORISE.
	Tabs	- Set.	"S.T.O.P.
	Over-ride	- Rich.	GILLS AND
	Pitch	- Fine.	FLAPS".
	GILLS AND FLAPS	- CLOSED - 15° (Only if necessary)	
(b) AFTER TAKE OFF.	Undercarriage	- UP immediately.	MEMORISE.
	Pitch	- Coarse immediately.	"U.P.
	GILLS AND FLAPS.	- Partly Open. - Up.	At safe height and speed i.e. 500 ft.- 120 M.P.H. GILLS AND FLAPS."

S./1

(c) BEFORE LANDING.

Selector	- Down	MEMORISE.
Undercarriage	- Down (and check)	S.U.P. with
Pitch	- Fine	Open Window"
OPEN WINDOW	- LOWER FLAPS (Less than 120 M.P.H.)	"Lower Flaps".

PART II.

(a) BEFORE TAXYING OUT.

Open side window (to aid communication with ground crew).
Turn on Fuel Cocks.
Start Up.
Warm Up.
Set Airscrews in Fine Pitch.
Run Up and test Magnetos.
See that Fitter checks Fuel Pressure.

DO NOT RUN ENGINES ON GROUND FOR LONG PERIODS AT LESS THAN 1,000 R.P.M. OR ENGINE FAILURE ON TAKE-OFF MIGHT RESULT.

(b) TAXYING OUT.

Check Brake Pressure.
Use Brakes only when necessary.

(c) BEFORE TAKING OFF.

Ensure that undercarriage is properly locked.
Push selector cock down.
Set flaps 15° down. (If necessitated by full load and restricted take-off run).
Set trimming tabs at neutral.
Set airscrews to fine pitch.(If not already done).
Set mixture controls full boost.
Close cowling gills. (OF VITAL IMPORTANCE).
Ensure that rudder, elevator and aileron controls are unlocked and move freely.

(d) AFTER TAKING OFF.

Raise undercarriage immediately.
Set airscrews to coarse pitch immediately.
Raise flaps at 500 ft. and not less than 120 M.P.H.
Return mixture controls to normal.
Climb at good forward speed. (Negligible climb until 120 M.P.H. reached).
Adjust gills for correct setting.
Place selector cock in neutral.

(e) BEFORE LANDING.

Slow down to 150/160 M.P.H.
Place selector cock down.
Lower undercarriage.
Set airscrews to fine pitch.
Place mixture controls in over-ride.
Lower flaps at about 100 M.P.H. (Not more than 120 M.P.H.).

(f) AFTER LANDING.

Flaps up.
Boost normal.
Airscrews in coarse pitch. (After taxying in and prior to switching off).

NOTES ON INSTRUMENT FLYING APPROPRIATE TO THIS TYPE OF AIRCRAFT. (INCLUDING DATA ON BLIND LANDINGS.)

1. INSTRUMENT FLYING.

Keep feet off the rudder.

Steer by Aileron control.

A change of direction or course is made by gentle bank.

If the aircraft needs a little permanent bank to keep it flying straight, apply rudder bias in the direction of the bank, and fly level.

There are two main instruments, the Artificial Horizon (officially called the Gyro Horizon) and the Directional Gyro.

The Artificial Horizon has a small model monoplane which the pilot imagines himself to be flying from behind.

He regulates its attitude in Pitch and Bank in relation to parallel wires behind it, and in so doing flies his machine in the same attitude as the model. If the monoplane is below the parallel wires his aircraft is diving. If it is banked to the right in relation to the parallel wires, his aircraft is banked to the right.

The Directional Gyro can be set to the compass course and indicates deviations from a straight path positively and steadily.

The airspeed indicator, rate of climb indicator and altimeter are used as a check of the Artificial Horizon and the compass as a check of the Directional Gyro.

2. The Method is as Follows.

On encountering cloud or bad visibility fly straight by the indication of the Directional Gyro, and keep level in Pitch and Bank by the Artificial Horizon. See that the compass is set to the course, take the reading at the lubber's line, and adjust the Directional Gyro to this reading. If preferred it may be set to "0".

Keep an eye on the altimeter, Air Speed Indicator, and Rate of Climb Indicator.

Check the Direction Gyro by the compass periodically. It may wander and require resetting every 15 or 20 minutes. If it spins, as it is quite likely to do in bumps, stop it, restart it and use it to fly straight without bothering about the figure it indicates. Or it may be reset.

3. Turns.

The Reid and Sigrist Turn Indicator is mainly useful for getting out of trouble such as a spin, as it is the only gyro instrument which will continue to indicate correctly in steep turns and spins.

It also gives a figure for Rate of Turn.

The 2 instruments to be mainly used for turning are the same as for straight flying - namely the Artificial Horizon and the Directional Gyro.

Turns are done as in ordinary Visual Flying, Ailerons being used to control the amount of bank shown on the Artificial Horizon (or the Rate of Turn shown on the Turn Indicator), and elevator being used to control the height of the model in relation to the cross wires, and so to keep the speed constant.

Feet must be kept off the rudder, as the inherent qualities of the aircraft ensure the requisite combination of controls, save the pilot much concentration, and greatly reduce the chances of loss of control due to misuse of rudder.

In bad bumps the aircraft will tend to oscillate slightly in yaw. There is no tendency towards loss of control, but as it is uncomfortable, feet may be put on the rudder to steady it.

NOTES ON NIGHT FLYING APPROPRIATE TO THIS TYPE OF AIRCRAFT.

(INCLUDING DETAILS OF NIGHT FLYING EQUIPMENT, I.E., FLARES, LIGHTING SYSTEM, LANDING LIGHTS AND ETC.)

NIGHT FLYING.

1. The Blenheim is quite easy to fly and land at night, provided the sequences are strictly observed, even more so than in the daytime.

2. PREPARATION.

In addition to the normal preparation for night flying, (testing lights and so on), the following should be done.

Setting Landing Lights. (See - Fig.3 - 61 and 67).

Switch on one landing light to see where the beam is, and quickly move the lever to get the light in the best spot for landing. This is fairly well forward, about 50 yards, but not too much so, or it will come too close in ahead, and will be too far away. Then change the switch over, and see where the other beam comes. Use the better one, and set this, but note the position of the other. Remember whether to switch inwards or outwards for the better beam.

Note the position of the lever.

Do not keep these powerful lights on for more than a few seconds.

3. TAXYING.

It is very difficult to see anything on the ground by the light of the central lamp, even if hooded, and the landing light should not be used.

Taxy slowly towards the flare path (Taxying Post).

4. BEFORE TAKE-OFF.

Increase the light of the instrument board flood-light until instruments are clearly seen by its light. The luminous markings are NOT good enough for taking off or landing.

It may seem slightly less easy to see outside, but it is most important to be able to see the Airspeed and Altimeter clearly, both when taking off and when landing.

Carry out Essential Actions exactly as in daylight. When permission to take-off is received, taxy well down towards the obstruction light to get all possible benefit from the flare path (which will probably consist of 2 glim lamps at 1 and 6 positions, and red obstruction lights).

5. Take-off in the normal way, getting the undercarriage up as quickly as possible - then pitch and flaps.

On a dark but starlit night, when the last light has been left behind, it is impossible to see the ground, or any horizon, (and the altimeter usually registers below zero just after the take-off). Therefore get into the habit of keeping the window panels steady on the stars ahead, to maintain a constant climbing angle, and watch the airspeed and altimeter.

On a moonlit night there is no difficulty, but on a dark night with sky overcast, the landing light must be used to light up the ground until a safe height of 2 or 300 feet is reached.

Thus, either the landing light, or the stars, or the moonlight, will enable an accurate initial climb to be made, with the aid of the floodlit instrument board, and if one engine were to fail, the pilot could keep the aircraft straight and level until speed was gained, provided these rules are observed.

6. ECONOMY OF LIGHTS.

Lights should be economised by turning off the recognition lights directly after the take-off. The cockpit floodlights may be dimmed, (but the upright type of oil-pressure gauge is not then easy to see). Remember to increase the light again for landing, so that the airspeed indicator can be clearly seen.

7. GENERAL.

As the all-round view is bad, care must be taken not to lose height merely relying on the altimeter, but lights on the ground, lakes, rivers and anything else must be kept in view to judge height.

The landing light should only be used for landing (or taking off if necessary).

Get used to the position of the various light switches by feel, specially those for the upward and downward recognition lights.

It is a good plan to set the starboard cockpit flood-light pointing at the flaps indicator for use when needed.

8. APPROACHING AND LANDING.

The following is the sequence.

(a) Get into position to approach the flare path from the port quarter, ("lee quadrant") on a left hand circuit, but almost straight towards the control point, at about 1,000 feet.

(b) Send aircraft letter, and, when permission to land is received, switch on the recognition light and complete the circuit of the flare path, lowering the under-carriage at the same time and carrying out the rest of the sequence ("S.U.P. and Open Window").

(c) Fly away to leeward, close gills if open, and check the setting of the landing light lever.

(d) Turn in, (shine the floodlight on the flap indicator), lower flaps - (watch the indicator and then turn out the light) and approach on a flat glide with enough engine to make straight for the flare path at about 75 - 80 m.p.h. Test the landing light once on the way down.

P.T.O.

(e) Wait until about 200 yards short of the flare path before switching on the landing light. Aim to flatten out between the obstruction light and No.1 flare.

(f) Keeping an eye on the air-speed indicator, concentrate on the ground in the circle of light, focussing the eyesight on any objects - such as ruts, camel-thorn or stones. Flatten out, then shut off the engines, and then land 3-point as in daylight.

(g) Keep straight; do not use the brakes if possible, and do not swing until almost stopped; but stop short of the obstruction lights, at all costs, as these represent the end of the landing area. They are 750 yards from No.1 flare.

(h) Switch off the landing light and recognition lights at once.

9. If the surface of the ground is smooth mutti or sand, clear of plants or ruts, it may be impossible to see it in the light of the lamp and judge height.

In this case the aerodrome floodlight must be used, (or a full flare path).

The method of landing is the same in these cases, except that, although the landing lamp may be used in addition;

(a) With the floodlight, landing is almost the same as landing by daylight, as the surface is well lighted up;

and

(b) With the flare path, it is better to concentrate on the flare-path only, rather than keep half an eye on the flare path and half on the circle of light from the aircraft landing lamp.

10. FAILURE OF LANDING LIGHT.

If the landing lamp fails, and there is a full flare path laid out, or a floodlight actually turned on, the landing may be completed.

But if there are only guiding lights, the engines should be opened up and no landing made.

The floodlight should then be called for.

NOTES ON FORMATION FLYING.

1. In order to keep these Notes as concise as possible, little will be said about formation flying, as the principles are exactly the same as in the case of other aircraft.

Remarks will be confined to notes on Taking-off and Landing.

2. TAKING OFF.

The following method has been evolved. This has been found best for avoidance of dust and rapidity in getting a large formation into the air.

The aircraft taxy down the edge of the aerodrome (or taxying strip) in line astern, about one length apart, until opposite the point on the aerodrome from which the take off is to be made. The order is exactly as it will be in the formation (1, 2, 3 etc.).

The leader then turns onto the aerodrome and taxies straight across the aerodrome across wind, followed by the others in exact line astern about 2 lengths apart. When the leader stops all stop (when closed up to 2 lengths).

All then prepare to take-off ("S.T.O.P.- GILLS AND FLAPS"). After a short pause the leader turns into wind, and all turn into wind (into line abreast).

When the leader sees all are turned into wind, he will open out the engines and take off, followed by the others in quick succession, each pilot starting before the V of dust from the aircraft next in front comes up to him (that is about 1 or 2 lengths after the one in front).

The aircraft get into the air several lengths apart, and then close up.

10 or 12 aircraft can be got off a large aerodrome within about five minutes of starting to taxy out, by this method.

The direction of the wind will, of course, regulate the method and direction of taxying out, and whether aircraft go off in echelon right or echelon left, but the latter is automatically decided by the direction in which the leader turns.

The formation can be very quickly closed up by the leader slowing down to about 150 m.p.h., and carrying out a slow turn (radius about 2 miles) to allow aircraft to "cut the corner".

3. LANDING.

It is quite easy to land in formation with Blenheim aircraft, but it requires a turn of very wide radius and long approach to the aerodrome, and so a better method has been developed which is much quicker and more satisfactory. Final approval for its standardisation is awaited.

The actual signals used will not be indicated, as these are not yet standardised and would normally be given by R/T.

The following is the method.

On arrival at the aerodrome the leader gives the signal "Lower Undercarriages - GO". This should be done so that it is completed before the aerodrome is passed, without a turn being necessary.

The ultimate object is to land all the aircraft of each flight on the aerodrome almost simultaneously, but actually in quick succession, in echelon. If this is always done in "Echelon Right", and the wind in relation to the taxying strip is in such a direction that aircraft have to turn right after landing, the result is that the leader and all other aircraft have to remain stationary on the landing area until the last aircraft has landed. Thus the aerodrome may be awkwardly obstructed for the last 2 or 3 aircraft, for inexperienced pilots.

To obviate this the signal "Line Astern - Left" or "Line Astern - Right" is given.

The formation then fly the remainder of the circuit of the aerodrome, keeping about 100 yards apart, and the leader turns in to land in the normal way, lowers flaps and makes an approach [with use of engines to flatten the glide slightly and ensure landing accurately on the desired part on the aerodrome].

He will either land on the extreme left or the extreme right of the aerodrome according to which way he will have to turn to get clear.

That is, if the tarmac or taxying strip is on the right, he will land on the extreme right, and vice versa. This is what determines whether he gives the signal "Line Astern - Left" or "Right".

Supposing the signal was "Line Astern - Left," the leader requires aircraft to land on his left; he will land on the extreme right edge of the aerodrome and the other aircraft will land in close succession on his left [as if in echelon].

As the leader, and then each other aircraft in turn, completes his landing run, he turns off the aerodrome towards the tarmac on the right.

This has been found to be very simple and efficient in practice, and a very quick way of getting a large formation down.

If there are 2 or more flights, the whole formation forms line astern in this way, but flights keep about a mile apart to give enough time for the flight landing to get clear before the next come in.

The reason it is quick is that a very wide circuit and very long approach is not necessary, and, even if the last aircraft is 4 miles behind the first, it will be on the ground within about 2 minutes of the first.

Approval for standardising this method for Blenheim aircraft has been asked for, but has not yet been given.

ABANDONMENT OF AIRCRAFT

Instructions for abandonment of the Blenheim I aeroplane are given in A.M.O. A.57/1938 and A.351/1938.

CASUALTIES.

ACTION TO BE TAKEN TO REMOVE CASUALTIES, BOTH IN THE AIR AND ON THE GROUND, APPROPRIATE TO THIS TYPE OF AIRCRAFT.

Removal of Casualties of the Crew of Blenheim Aircraft.

1. IN FLIGHT.

(i) If the casualty is the Air Observer, instruct the air gunner to render first aid if circumstances permit. No attempt should be made, however, to remove him from his seat.

(ii) If the casualty is the Air Gunner, the air observer should be instructed to lay him full length on the floor of the aircraft with his head resting on a parachute pack or rolled up flying clothing.

(iii) All air observers and air gunners should be acquainted with first aid procedure.

2. ON LANDING.

(i) If the casualty is the air observer, he is to be evacuated by being lifted through the cabin roof. He is then to be laid down on the port wing and slid gently down, feet first, to the trailing edge. Thence he should be lowered on to a stretcher, placed on the ground parallel to the fore and aft line of the aircraft and with its head immediately beneath the trailing edge of the port wing.

(ii) If the wireless operator is a casualty, he should be lowered through the emergency exit in the floor of the fuselage near his seat, a stretcher being placed on the ground at that point in readiness to receive him.


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