

AIR PUBLICATION 1530 C

Pilots Notes

PILOT'S NOTES

BLENHEIM V AEROPLANE

TWO MERCURY XV OR 25 ENGINES

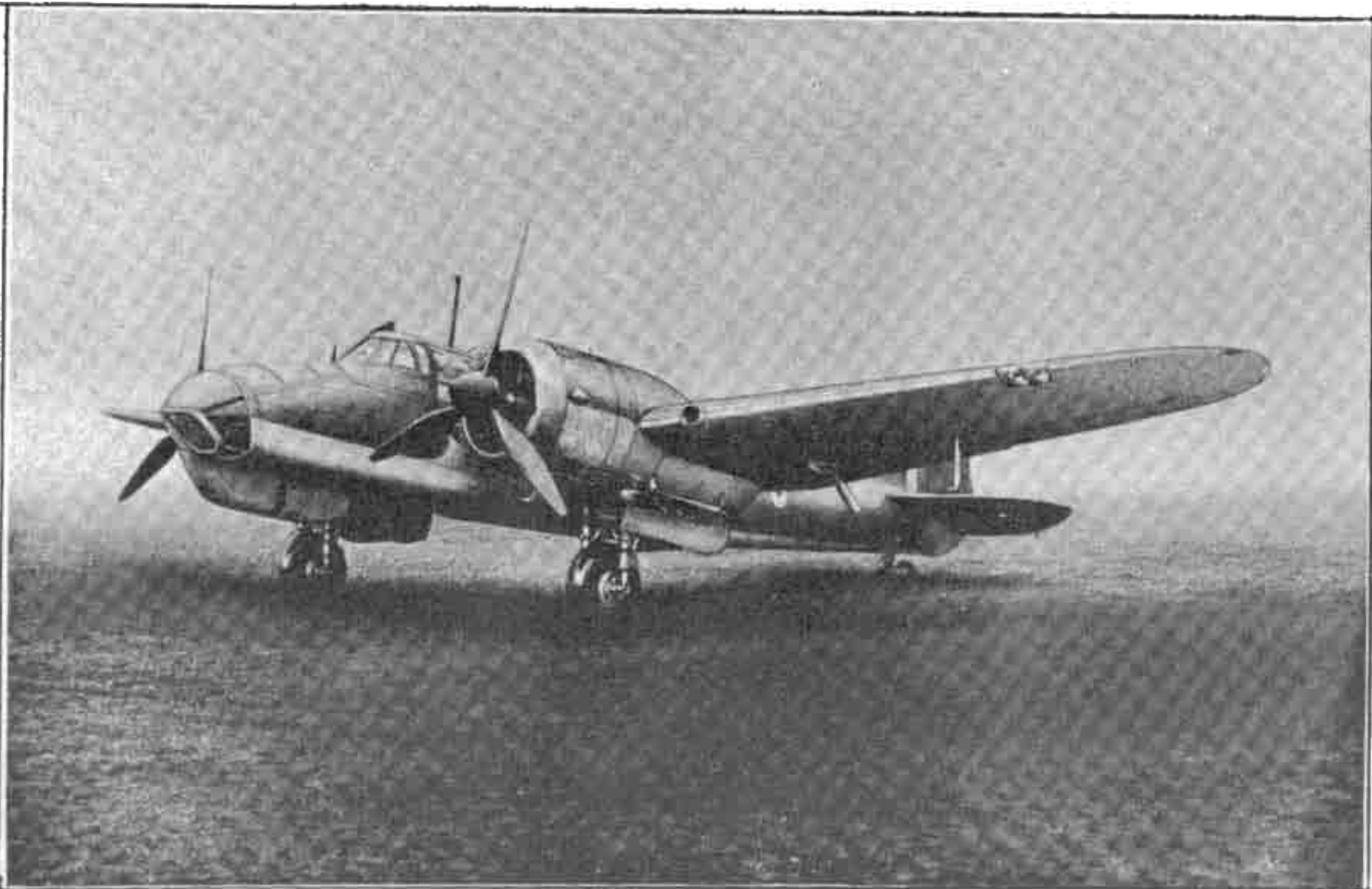
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FRONTISPIECE

BLENHEIM V

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June 1942

AIR PUBLICATION 1530C
Pilot's Notes

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BLLENHEIM V
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SECTION 1 PILOT'S CONTROLS AND EQUIPMENT

INTRODUCTION

1. This aeroplane is a medium bomber fitted with Mercury XV or 25 engines and de Havilland 20° constant speed propellers.

MAIN SERVICES

2. Fuel System:- The capacities are as follows:-

Two 140 gallon inner tanks	280 gallons
Two 94 gallon outer tanks	188 gallons
Total normal capacity	<u>468</u> gallons
Two 50 gallon overload tanks	100 gallons
	<u>568</u> gallons

Two tank cocks select OFF, INNER or OUTER tanks on each side, and a suction balance cock (normally OFF) allows the tanks on either side to be used to feed either or both engines. On later aeroplanes two 50 gallon auxiliary tanks can be fitted in the bomb cells. These are connected to a three way cock OFF, PORT and STARBOARD, and thence via a hand pump and isolating cock into the main suction balance pipe. They cannot be used for direct engine feed but are used for refilling the inner main tanks.

3. Hydraulic system:- A pump driven by the port engine operates main wheels, flaps and turret. A three position selector (71) allows operation of either wheels and flaps, or turret, the third position being neutral. An emergency handpump (69) will operate all services. There is also a cartridge-fired emergency system for undercarriage lowering.
4. Pneumatic system:- A compressor, driven by the starboard engine, charges a reservoir for brakes and gun firing. A triple pressure gauge (49) shows the reservoir pressure and the pressure at each wheel.
5. Electrical system:- The aircraft battery is charged by one generator driven by the port engine.

AEROPLANE CONTROLS

6. Flying controls:- The spectacle type handwheel is conventional. The rudder pedals are adjustable by a handle (23) under the instrument panel.
7. Dual controls:- These may be fitted at the navigator's rest seat.
8. Trimming tabs:- The elevator tab control (25) operates in the natural sense, the rudder tab control wheel (26) rotates forward for TURN STARBOARD and aft for TURN PORT. The indicators (47) are on the right of the instrument panel.
9. Vacuum change-over cock:- The engine-driven vacuum pump for operating the blind flying instruments is selected by the cock (29) on the left of the instrument panel.
10. Hydraulic selector:- A push-pull handle (71) is on the right side of the seat back. The selector may be moved from the DOWN position after the undercarriage locking pins have been inserted.

TURRET	- Up
OFF	- Central
FLAPS AND UNDERCARRIAGE	- Down

The selector must always be down when the aeroplane is on the ground.

11. Undercarriage:- The operating lever (17) is on the right of the instrument panel and has two positions only. The position indicator (9) is on the port wall of the cockpit. When the weight of the aeroplane is on the wheels the lever is locked in the DOWN position but may be released by pressing a thumb catch to the left.
12. Flaps:- The push-pull operating handle (70) is forward of the hydraulic selector, and has three marked positions. If partial lowering of the flaps is required select DOWN and return lever to OFF position when the indicator (6), mounted aft of that for the undercarriage shows the desired position.
13. Undercarriage and flaps emergency operation:-
 - (i) The handpump (69) forward of the hydraulic selector operates both undercarriage and flaps, The hydraulic selector must be down and the relevant operating lever set as required.

- (ii) The cartridge-fired emergency system can be used for lowering but not raising the undercarriage only. A white fabric cover (73) behind the navigator's rest seat conceals a pull handle which fires cartridge (not fitted on some aeroplanes).
- 13A. Undercarriage indicator & warning horn:- The indicator (9) shows the position of each unit mechanically and also embodies a red and green light for each unit, controlled by a switch (51). This must be on before the ignition switches can be operated. The green lights show when the units are locked down and the red lights remain on (they cannot be switched off) while the units are locked up. A warning horn sounds if the throttles are shut more than two thirds of the cruising range with the undercarriage up.
14. Brakes:- The brakes are controlled conventionally by a lever (10) on the control wheel (with parking catch) and by the rudder pedals.

ENGINE CONTROLS

15. Throttle and mixture controls:- The throttles (63) are gated at CRUISING (weak mixture continuous) and RATED (climbing) positions. The single mixture lever (64) has two operating positions only, NORMAL and WEAK, and returns automatically to NORMAL when either throttle is closed or opened beyond the CRUISING gate.
16. High boost control:- A lever at the top of the instrument panel has two positions marked 5 LBS and 9 LBS (15). Moving the lever to 9 LBS raises the controlled boost to an extent depending on throttle setting and gives 9 lb./sq.in. at the TAKE-OFF throttle setting. The 9 LB position is to be used only with the throttle at TAKE-OFF position however.
17. Propeller speed control:- The two levers (62) controlling the de Havilland 20° constant speed propellers work in a quadrant whose after end is marked POSITIVE COARSE PITCH. The aft position of each lever holds the propeller in fixed coarse pitch at any r.p.m. At all other positions of the levers the propeller is under constant speed control. The lever is moved forward to increase, and back to decrease the governor controlled speed.
18. Air intake heat controls:- Two levers (53) are on the left of the seat back.

19. Cowling gill controls:- On early aeroplanes the gills are manually operated by two handwheels (74) to the right of the seat back. Later aeroplanes are fitted with electric gill motors controlled by switches on the port wall of the cockpit. On incorporation of Mod.No. 5170 opening of the electrically operated gills is restricted by a limit stop - see Section 2 para.10(i) Red lights at the switches show when the motors are working.
20. Slow running cut-out controls:- There are two knobs (54) below the air intake heat controls.
21. Fuel Cock and contents gauges:- The tank cocks and suction balance cock are operated by levers (85) and (84) above the back of the navigator's rest seat. Contents gauges (81) are mounted on a panel above the cocks, with a button (82) which must be pressed to obtain readings. When fitted the auxiliary tank cocks and handpump are mounted on the starboard side of the navigator's rest seat.
22. Engine priming pumps:- The pumps are in the nacelles and operated from the ground.
23. Starting magneto and booster coil switches:- On early aeroplanes starting magneto switches are mounted in the nacelles. On later aeroplanes booster coil switches are mounted next to the starter buttons.
24. Starter buttons:- The buttons are under a flap in the roof on the left of the pilot's entrance hatch.
25. Oil dilution:- The dilution switches are in the nacelles.
26. Engine instruments:- The usual engine instruments are fitted, but the cylinder temperature gauges (83) are on the fuel contents gauge panel.

DE-ICING EQUIPMENT

27. Carburettor de-icing:- A handpump (58) for spraying de-icing fluid into either or both carburettors, with a selector cock, is on the left of the pilot's seat. See A.P.2095/7 para 2(ii) for operating instructions.
28. Windscreen de-icing:- A pump (27) is fitted on the instrument panel.

29. Pressure head heater:- The switch (45) is at the bottom centre of the instrument panel.
- OPERATIONAL EQUIPMENT AND CONTROLS
30. Gun and cine-camera control:- The wing gun and the cine-camera in the nose are fired by the button (11) on the control hand-wheel. The cine-camera footage indicator (21) and the master switch (22) are to the right of the cockpit.
31. Gun sights:- The sight consists of a ring sand-blasted on the port windscreen and a bead on a faired post forward of the windscreen.
32. F.24 camera:- The control unit for the F.24 camera in the rear fuselage is on a hinged mounting (16) to the right of the instrument panel. The pouch for the electrical lead is forward of the panel.
33. Bomb and flare release:- The bombs are fuzed and released electrically. There is a release button and navigator's hand bomb distributor can be cut out of the release circuit by disconnecting the plug (75) on the starboard fuselage side. When this plug is in, all the selector switches (3) must be OFF.
34. Main bomb control panel:- This is under the pilot's control and is fitted just forward of the throttle levers. The panel contains the following:-
- (i) Master switch (2)
 - (ii) Selector switchbox (3) (The switches are numbered 17 to 32 to correspond with the bomb and flare stations).
 - (iii) Fuzing selector switchbox, nose and tail. (4)
 - (iv) Small bomb container jettison switches. (5)
 - (v) Instruction plate, giving bomb and flare loads, together with their respective stations.
- Note:- Bombs and flares cannot be released until the master supply switch is ON.
35. Bomb steering indicator:- The indicator (38) is under the rear end of the starboard window.

36. Reconnaissance flares:- Four flares may be carried on the light series carriers under the rear fuselage.
37. Signal pistol:- The signal pistol is under the rear gunner's control.
38. D.F. loop visual indicator:- The indicator (40) is under the starboard direct-vision window. On the early aeroplanes the controls are operated by the rear gunner and on later aeroplanes by the navigator.
39. Syko cipher device:- This instrument is stowed in the well on the rear face of the front spar.
40. Beam approach:- The control for this installation is to the right of the cockpit, the visual indicator (31) being to the left of the blind flying panel. The installation in the rear fuselage is removed when desert equipment is carried.
41. Radio:- The following radio equipment is fitted:-
- (i) T.R.9F - Remote control (77) for pilot or navigator.
 - (ii) T.1154/R.1155 - Under control of rear gunner.
 - (iii) R.1155 (for D.F.) - Under control of navigator.
 - (iv) R.3003 (or R.3061) - Under pilot's control (79) and (80).
42. R.1155 switches:- Aeroplanes equipped with R.1155 at the navigator's station have a circuit switch and an aerial switch to the right of the cockpit. The forward switch, marked SPECIAL, when at OFF, is for the T.R.9F in the normal circuit, when ON it is for the T.R.9F special circuit. The aerial switch (rear one) when at OFF is for the T.R.9F; when ON it is for the navigator's R.1155. Later, the aerial switch will be superseded by a separate aerial, fitted between the mast above the front spar and a mast to the rear of the nose, with a direct lead-in to the navigator's R.1155.
43. Intercommunication:- The pilot's telephone socket (67) is clipped to the front edge of the seat. On later aeroplanes a call light to the right of the cockpit replaces the emergency signalling unit (76) fitted to early aeroplanes.

44. Headlamp, navigation and signalling switchboxes:- The headlamp switch (46) and the navigation lamps switch (44) are on the instrument panel. The headlamp switch has three positions; SIGNALLING, OFF and INDEPENDENT. When in the SIGNALLING position the headlamp is under the control of the rear signalling switchbox (7) which operates all identification lamps. The selector switches (60) for the three downward identification lamps are below the arm-rest to port. The forward signalling switchbox (8) controls the formation-keeping lamps. Only the DOWNWARD key is wired.
45. Aldis lamp:- A switch and socket (24) are on the starboard side of the cockpit.
46. Landing lamps:- The lamps in the port wing are controlled by a switch (61) to the rear of the throttle controls. The switch has three positions; OUTBOARD, OFF and INBOARD. The dipping lever (65) is forward of the mixture lever.
47. Oxygen:- There is a standard oxygen regulator unit (48) on the right of the instrument panel, the socket (55) being to the left of the seat back. Later aeroplanes are fitted with an economizer behind the seat and the bayonet union is at the top right-hand side of the seat.

EMERGENCY EXITS AND EQUIPMENT

48. Fire extinguishers:- The Graviner system is controlled by an inertia switch, a gravity switch (inoperative when the undercarriage is up) and shielded push buttons (37) on the instrument panel. Hand fire extinguishers are carried behind the pilot, on the starboard side of the rear fuselage and in the nose.
49. Bomb jettisoning:- The bomb and flare load can only be jettisoned by the pilot. Jettison by lowering the spring-loaded flap (1) shielding the two jettison bars at the bottom of the selector switchbox and pushing the bar, or bars, as required upward into the switchbox. The forward bar controls switches 17 to 24 and the rear bar 25 to 32. There is a separate jettison switch (5) for the small bomb containers above the selector switchbox. With a mixed load of bombs and small bomb containers the latter must be jettisoned first.

50. Fuel jettisoning:- The contents of the outer tanks can be jettisoned by raising a lever (52) to the left of the seat back. The jettison valves only operate so long as the main air pressure exceeds 70 lb./sq.in. After jettisoning turn off valves.
51. Destruction switches:- Two shielded push buttons (79) for R.3003 or R.3061 are on the starboard side of the cockpit.
52. First-aid:- The outfit is stowed on the starboard side of the rear fuselage.
53. Parachute exits:-
- (i) Pilot and navigator:- Opening made by jettisoning under defence guns; alternatively the entry hatch in the roof. To jettison under defence guns:
 - (a) Release seat and kneeling pads by pushing red tubular handle (18) under seat up and aft.
 - (b) Pull aft on safety pin that holds end of leather lanyard; then pull lanyard upward to release guns.
 - (ii) Rear gunner:- Opening made by jettisoning camera hatch in rear fuselage.
54. Air/Sea rescue equipment:- Early aircraft carry an M or C type dinghy. Later aircraft carry an M type 3-seat dinghy in a valise stowed adjacent to the rear top hatch. The free end of the coiled or hanked cord stowed in a pocket on the valise must be attached to a strong point on the aircraft before throwing the valise overboard. A jerk on this cord releases the dinghy and after boarding the cord should be cut with knife provided in the dinghy. A type 3 emergency provision pack is stowed below the rear top hatch. K type dinghies are also provided as personal issue to each member of the crew.

Key to Fig. 1.

1. Bomb jettison bars (FLAP OVER)
2. Bomb master switch
3. Bomb selector switches
4. Bomb fuze selector switches (nose and tail)
5. Small bomb container jettison switches
6. Flap position indicator
7. Signalling switchbox (identification lamps)
8. Signalling switchbox (formation-keeping lamps)
9. Undercarriage position indicators
10. Brake lever
11. Gun and cine-camera firing button
12. Bomb-firing button
13. Direct-vision window
14. Rear-view mirror
15. Boost over-ride
16. F.24 camera remote control (hinged mounting)
17. Undercarriage operating lever
18. UNDER DEFENCE GUNS, EMERGENCY RELEASE
19. Air thermometer
20. AXE STOWAGE
21. Cine-camera footage indicator wedge plate
22. Cine-camera master switch
23. Rudder pedal adjusting handle
24. Aldis lamp switch and socket
25. Elevator trimming-tab handwheel
26. Rudder trimming-tab handwheel

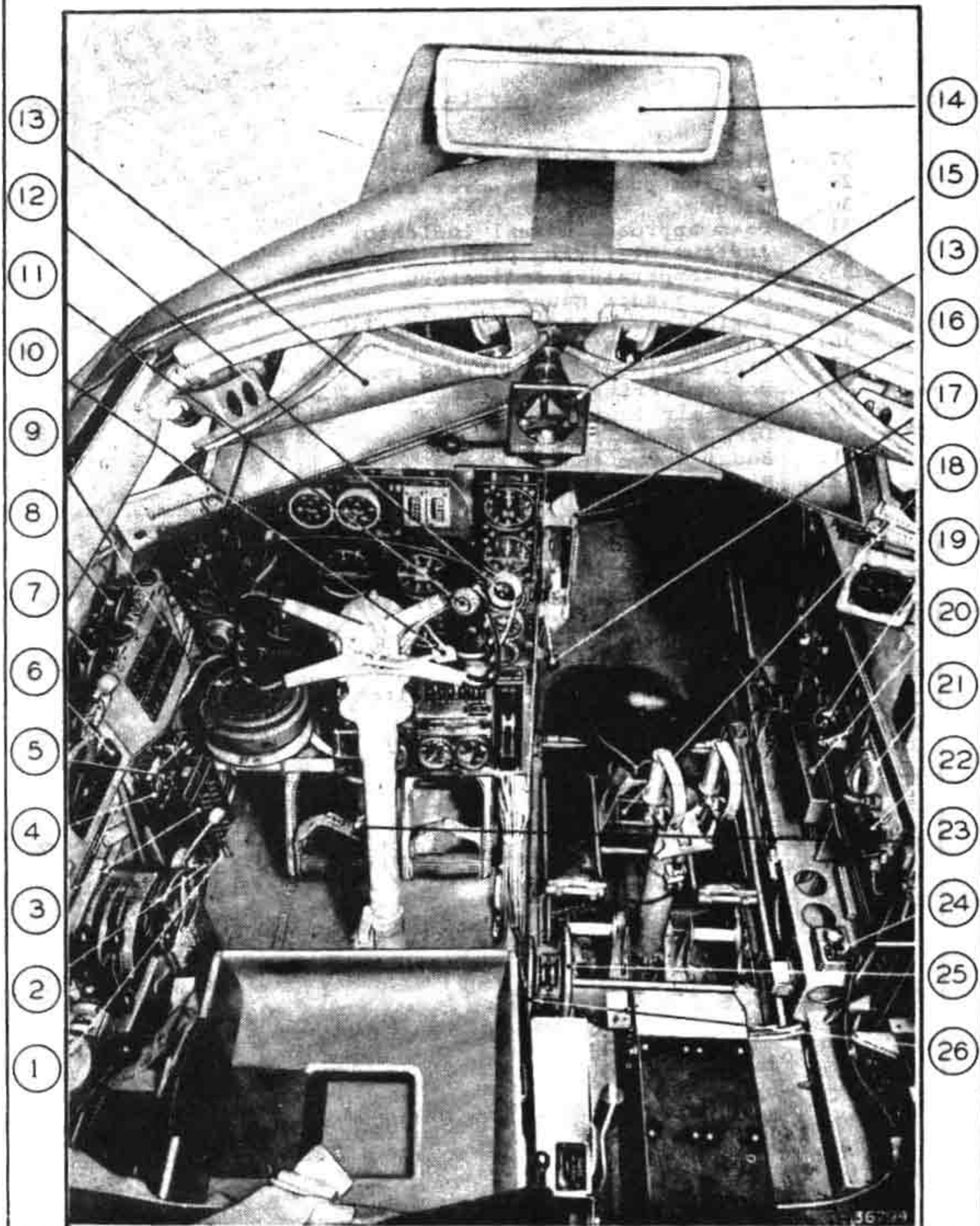


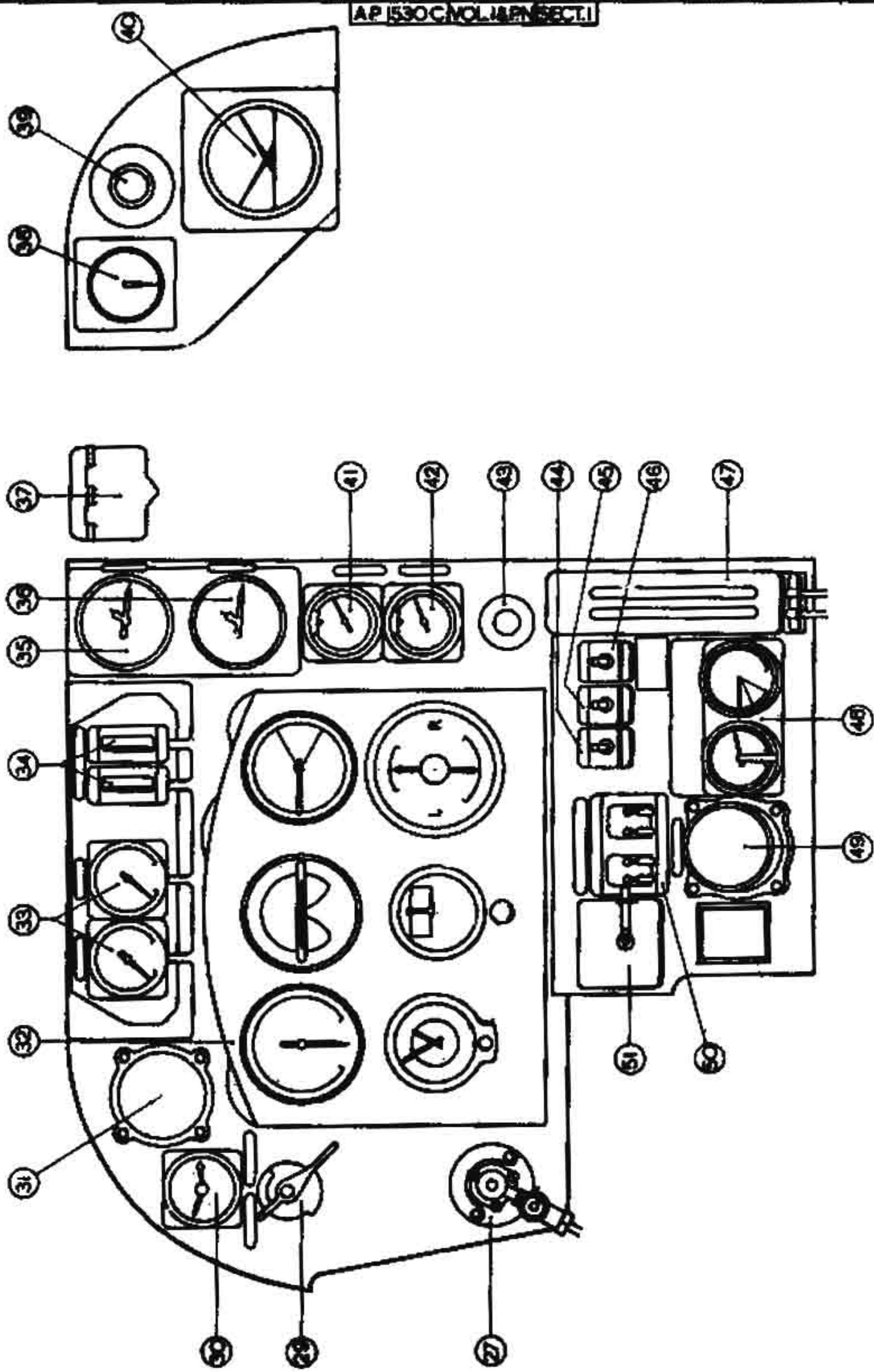
FIG.
1

PILOT'S COCKPIT-GENERAL

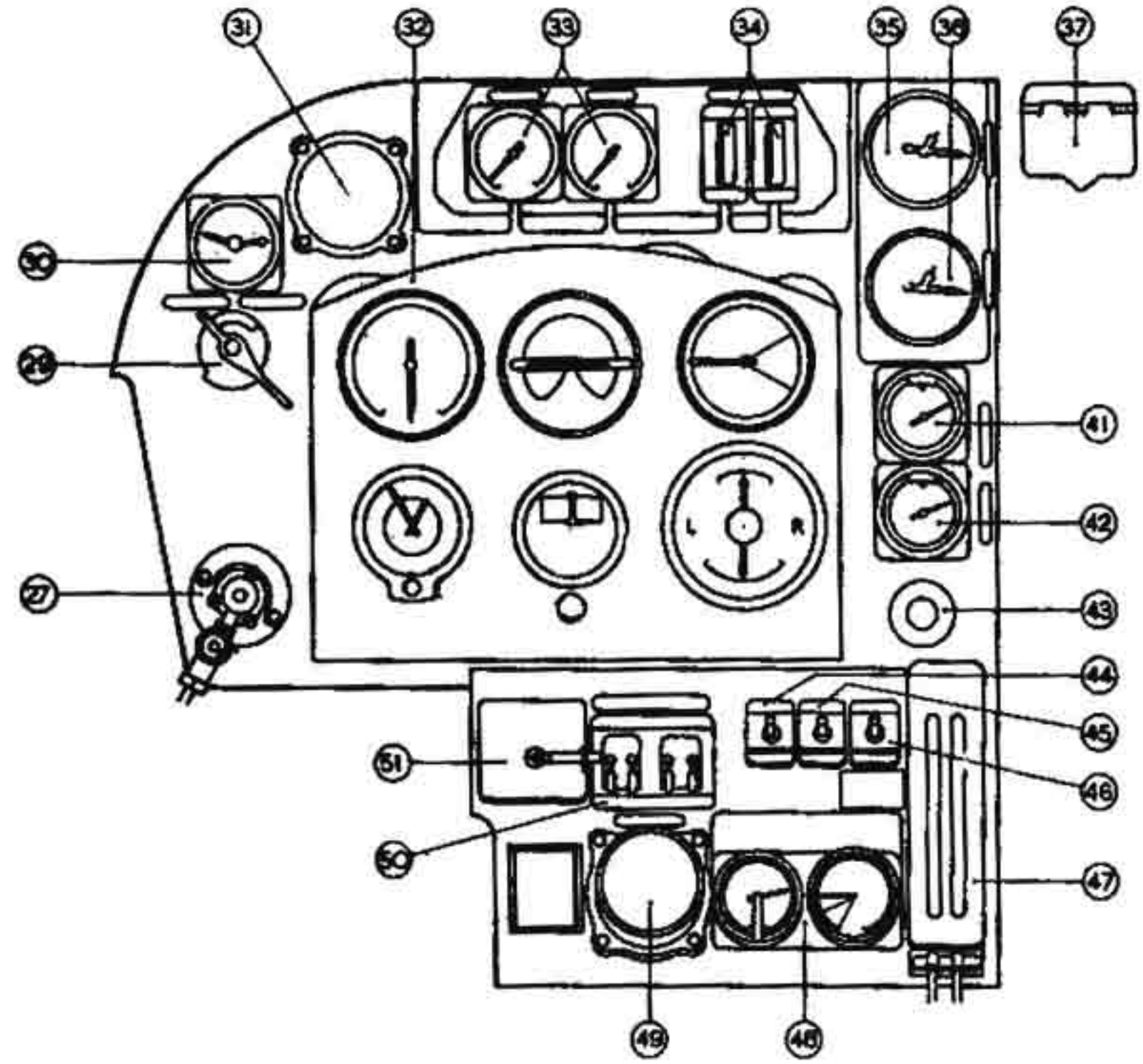
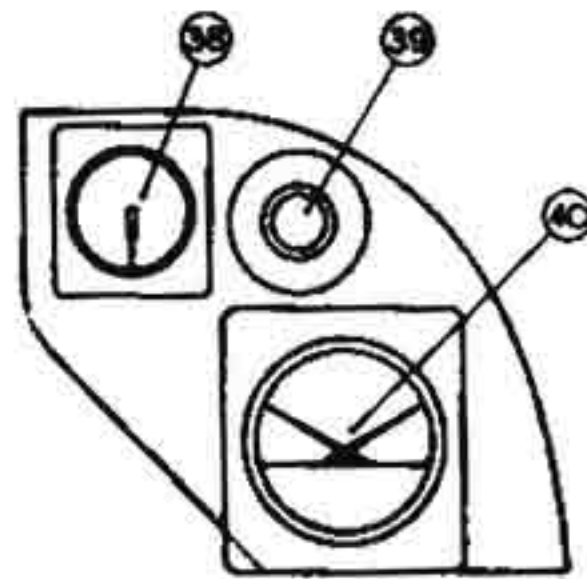
FIG.
1

Key to Fig. 2.

- 27. Windscreen de-icing handpump
- 29. Suction pump change-over cock
- 30. Clock
- 31. Beam approach visual indicator
- 32. Instrument flying panel
- 33. Oil temperature indicators
- 34. Oil pressure gauges
- 35. Engine speed indicator (port)
- 36. Engine speed indicator (starboard)
- 37. FIRE EXTINGUISHER BUTTONS (shielded)
- 38. Bomb steering indicator
- 39. Cold air louvre
- 40. D.F. visual indicator
- 41. Boost gauge (port)
- 42. Boost gauge (starboard)
- 43. Watchholder
- 44. Navigation lamp switch
- 45. Pressure head heater switch
- 46. Headlamp switch
- 47. Rudder and elevator tab indicators
- 48. Oxygen regulator
- 49. Triple pressure gauge
- 50. Ignition switches
- 51. Undercarriage indicator switch



INSTRUMENT PANEL



INSTRUMENT PANEL

Key to Fig. 3.

- 52. FUEL JETTISON CONTROL (outer tanks only)
- 53. Carburettor air-intake heat controls
- 54. Slow running cut-out controls (behind seat)
- 55. Oxygen socket
- 56. Cabin heating control (see 72)
- 57. Heated clothing socket stowage
- 58. Carburettor de-icing pump and selector cock
- 59. Armrest (folded)
- 60. Identification lamp switches
- 61. Landing lamp switch
- 62. Propeller speed controls
- 63. Throttle levers
- 64. Mixture lever
- 65. Landing lamp dipping lever
- 66. Seat adjusting lever
- 67. Telephone socket
- 68. Harness release lever
- 69. EMERGENCY HAND PUMP
- 70. Flap control lever
- 71. Hydraulic selector lever
- 72. Cabin heating supply
- 73. EMERGENCY UNDERCARRIAGE CONTROL (cartridge fired)
- 74. Cowling gill handwheels (early aeroplanes).

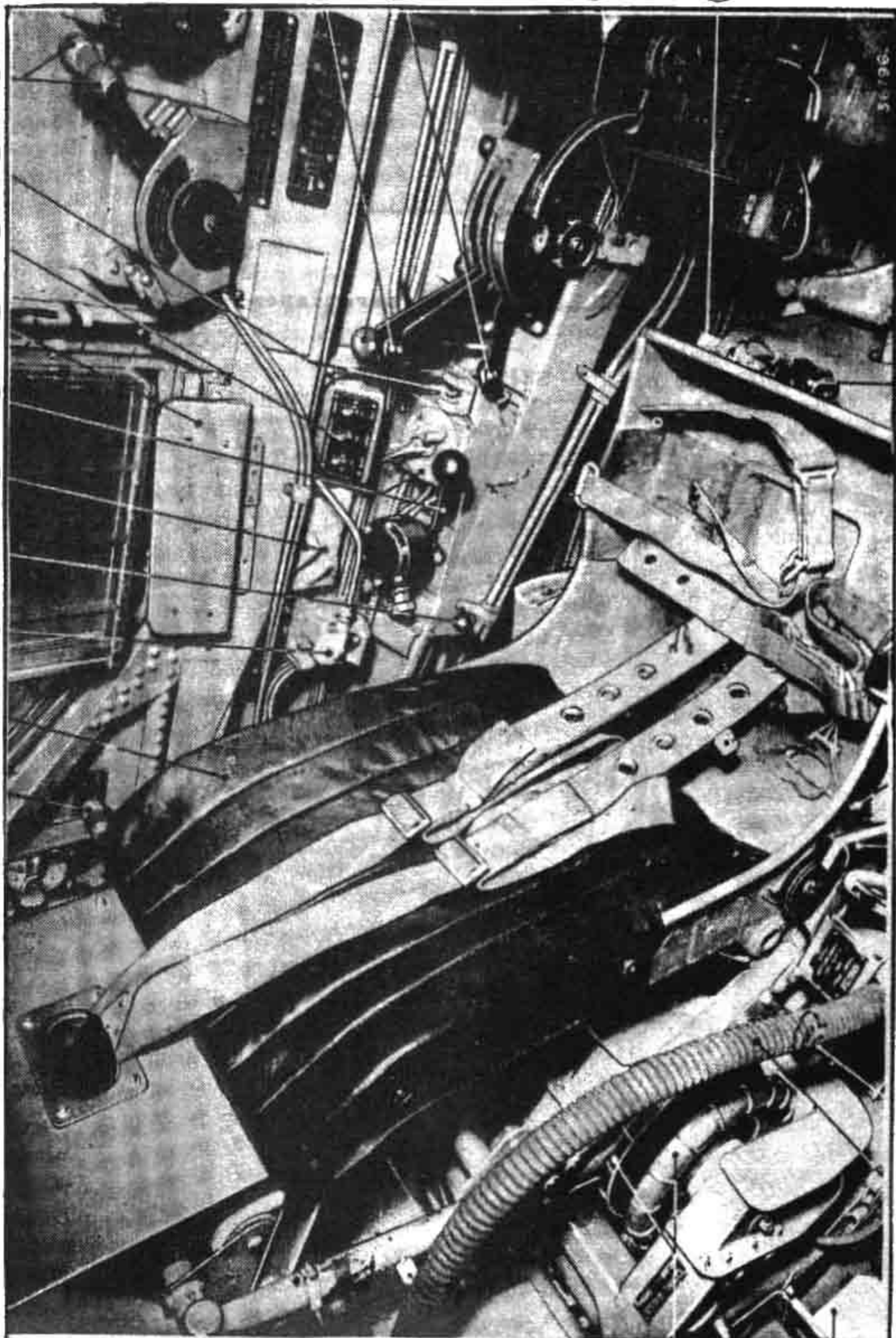
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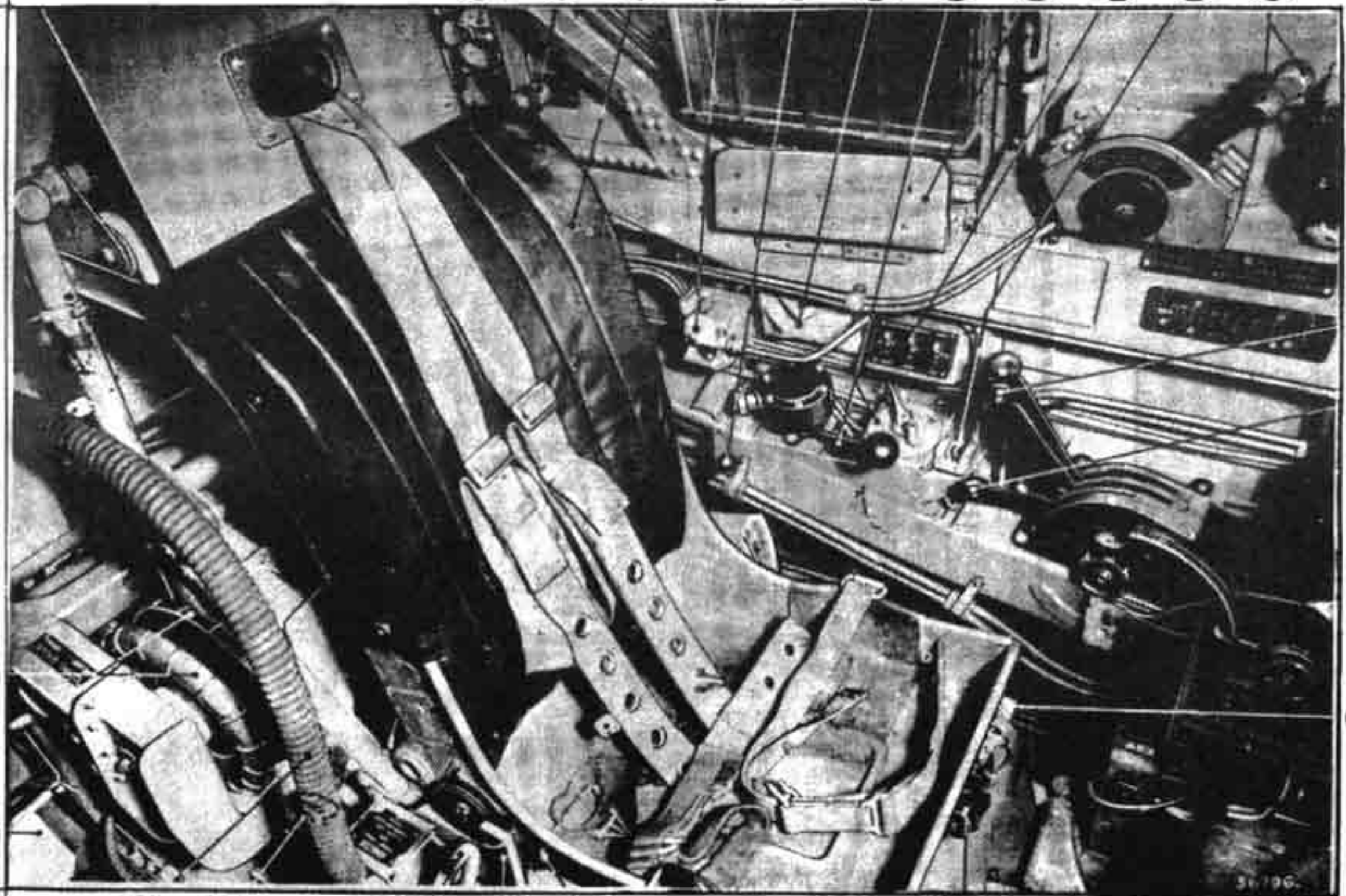
PILOT'S COCKPIT - PORT

FIG.
3

FIG
3

(63) (64) (65) (66)

(52) (53) (54) (55) (56) (57) (58) (59) (60) (61) (62)



(72) (71) (70) (69) (68) (67)

PILOT'S COCKPIT - PORT

FIG
3

(74)

(73)

FIG
3

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ney to Fig. 4.

- 75. Bomb distributor sockets
- 76. EMERGENCY SIGNALLING (early aeroplanes)
- 77. T.R.9F remote control
- 78. Dimmer switch
- 79. R.3003 DESTRUCTOR SWITCHES
- 80. R.3003 master switch
- 81. Fuel contents gauges
- 82. Fuel contents gauges, button switch
- 83. Cylinder temperature gauges
- 84. Balance cock lever
- 85. Tank cock levers

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82

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85

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75

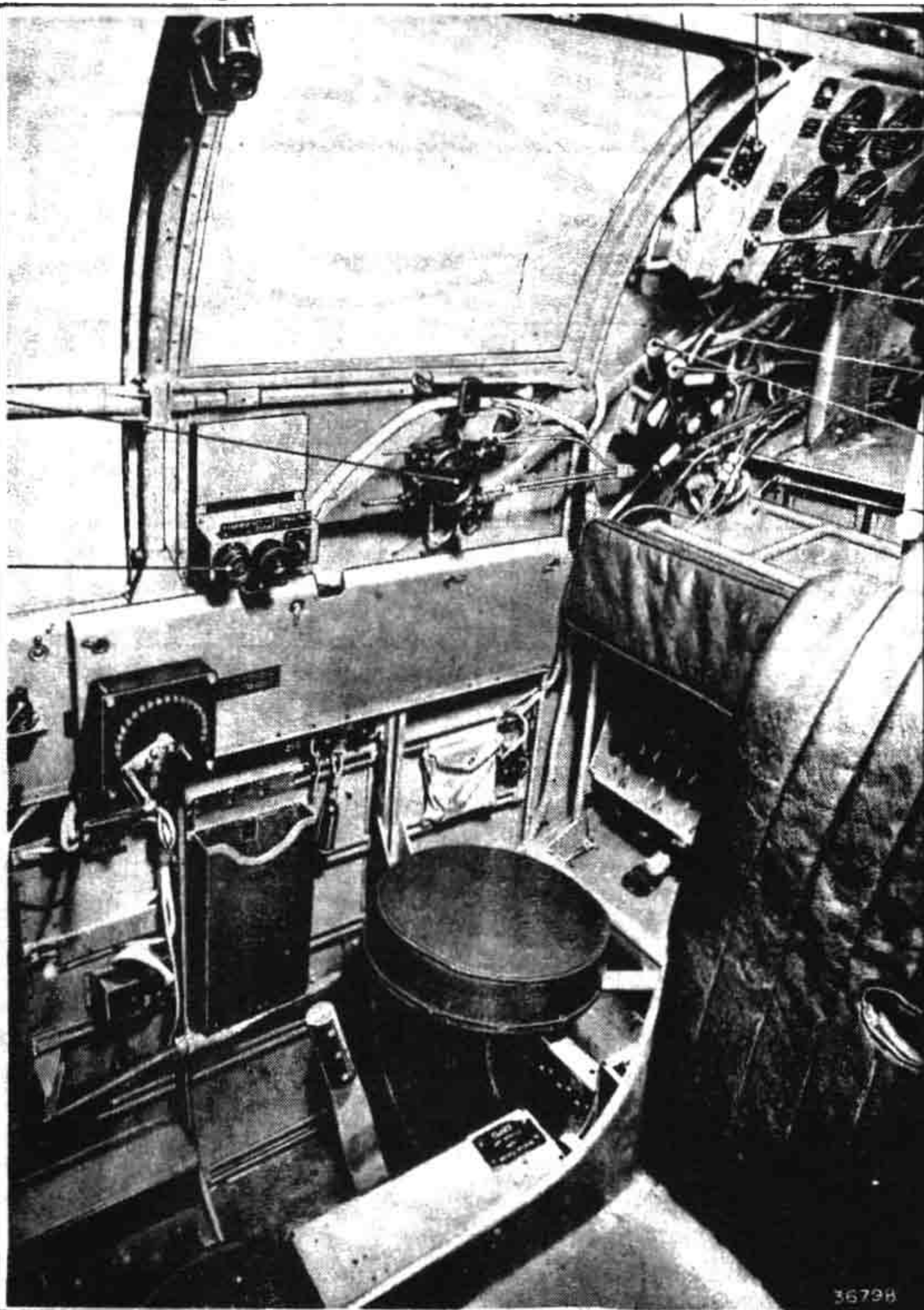
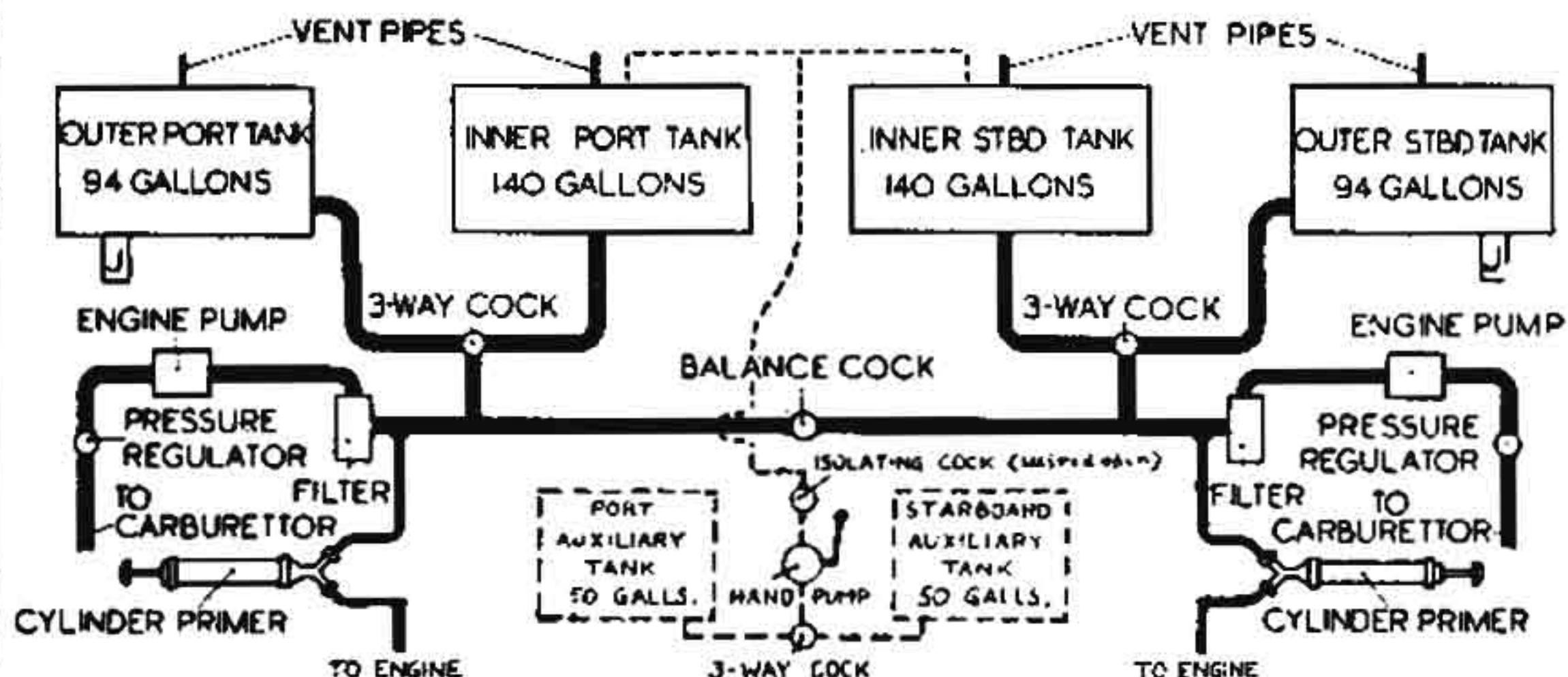


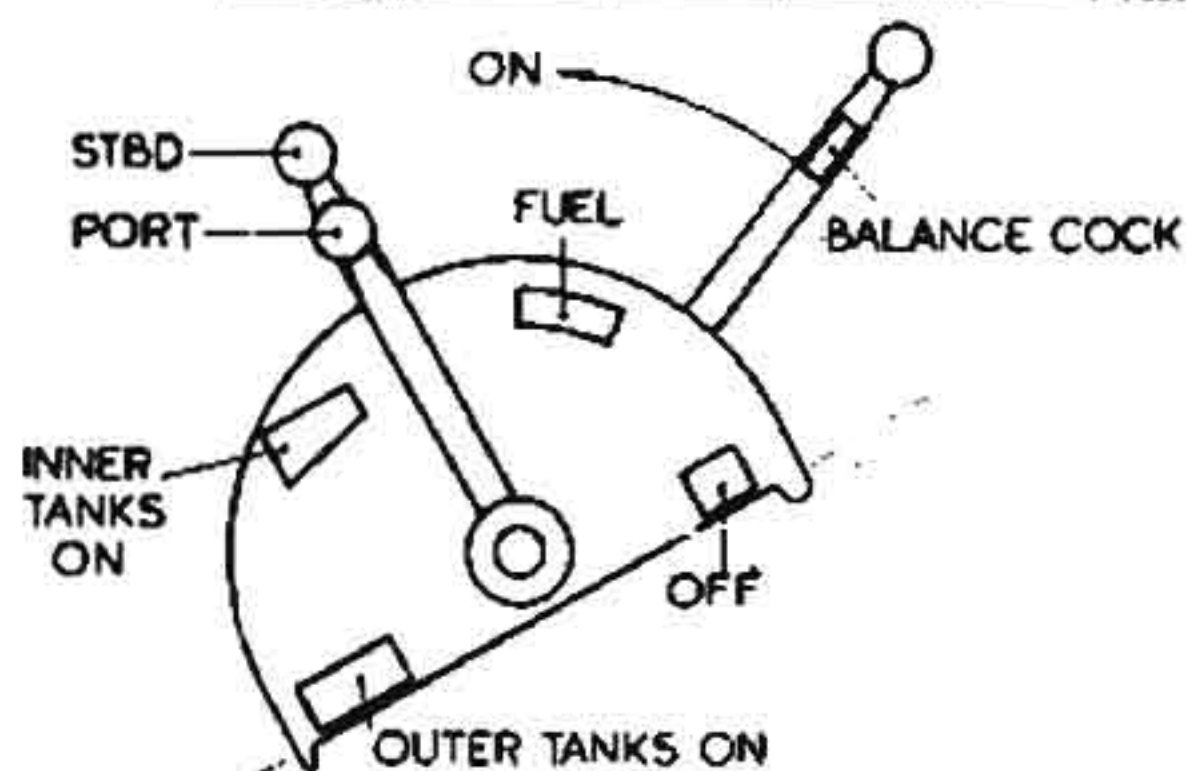
FIG.
4

PILOT S COCKPIT - STARBOARD

FIG.
4



USE OF COCKS			
CONDITIONS.	MAIN 3-WAY COCKS	BALANCE COCK	REMARKS
NORMAL	ON	OFF	USE TANKS IN PAIRS INNER OR OUTER
IF ENGINE PUMP ON ONE SIDE FAILS	EITHER BOTH INNER TANKS ON OR BOTH OUTER TANKS ON	ON	REMAINING PUMP CAN DRAW FROM EITHER TANK.
LEAKING TANK	① DAMAGED TANK ON ALL OTHER TANKS OFF ② DAMAGED TANK OFF OPPOSITE TANK ON ③ OTHER PAIR OF TANKS ON	① ON ② ON ③ OFF	PRESERVES LATERAL TRIM OF AEROPLANE OBSERVE INSTRUCTIONS GIVEN IN GENERAL NOTE BELOW

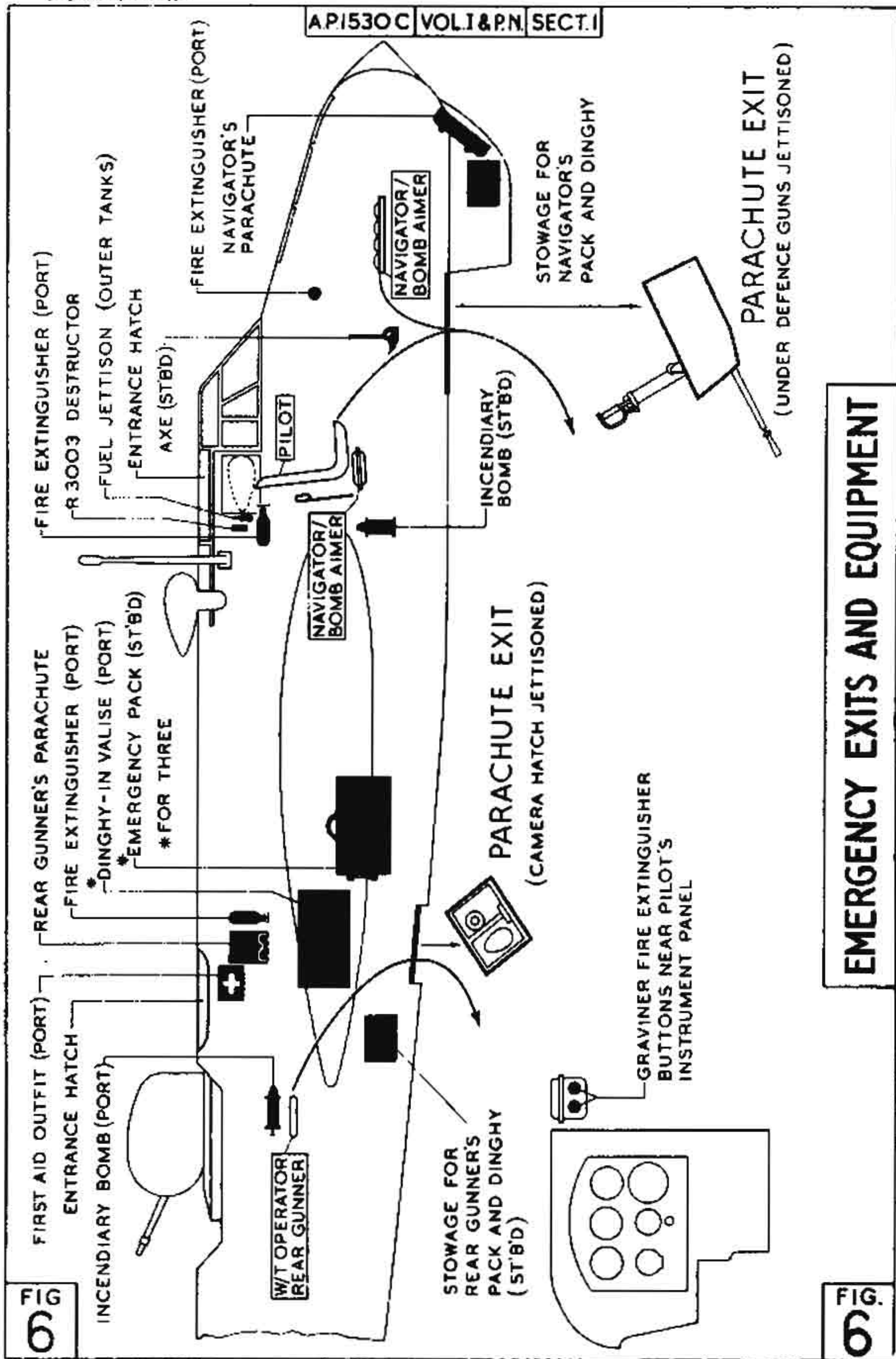


FUEL COCK CONTROLS

NOTE: MAIN 3-WAY COCKS ARE SELECTIVE I.E. THEY CAN ONLY SELECT INNER OUTER OR OFF

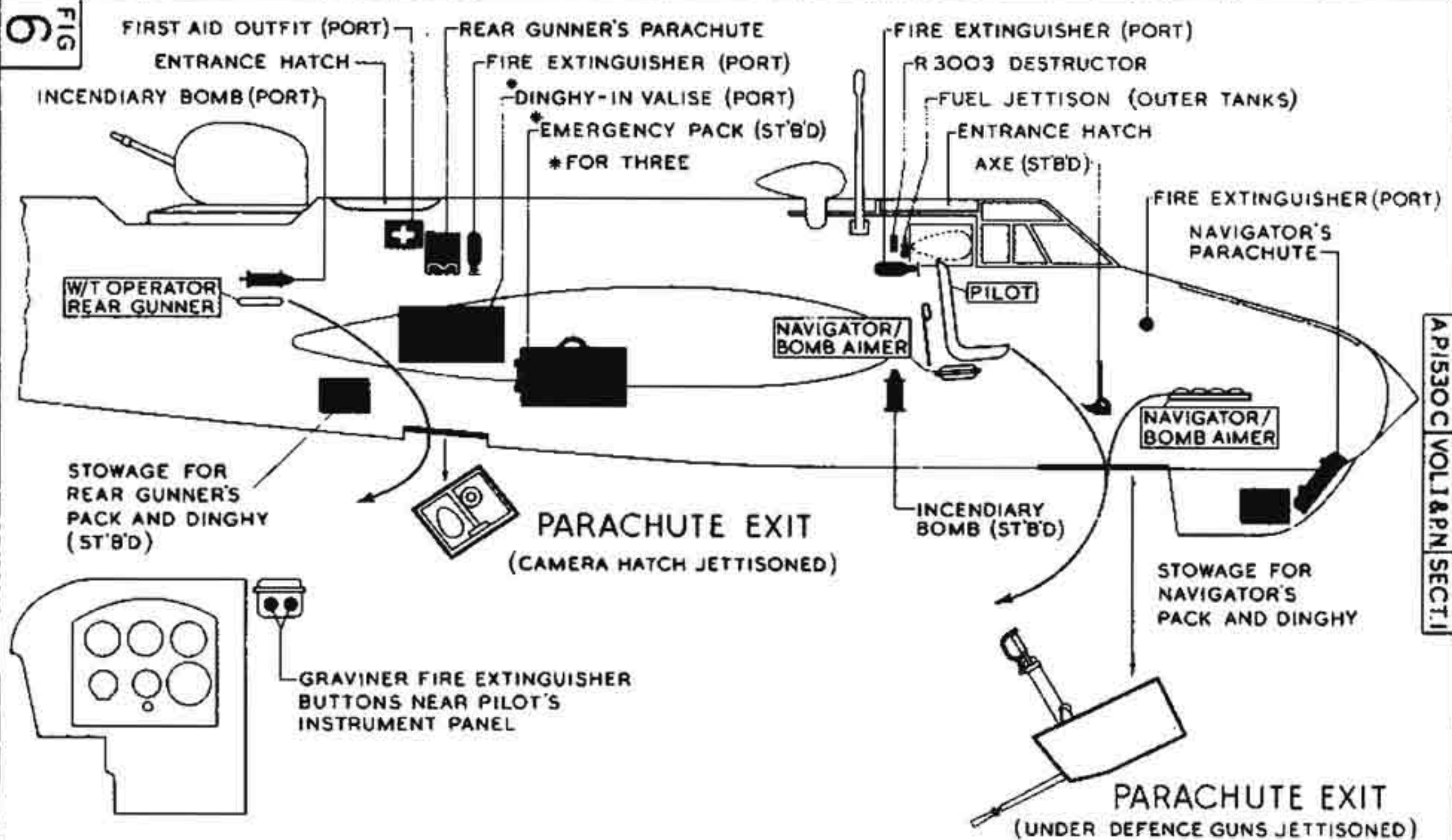
IMPORTANT

IT IS IMPORTANT TO KEEP A CHECK OF THE CONTENTS OF ALL TANKS DURING FLIGHT ANY TANK THAT IS EMPTYING SHOULD BE TURNED OFF BEFORE IT IS COMPLETELY EXHAUSTED TO PREVENT AIR BEING SUCKED INTO THE FUEL SYSTEM



EMERGENCY EXITS AND EQUIPMENT

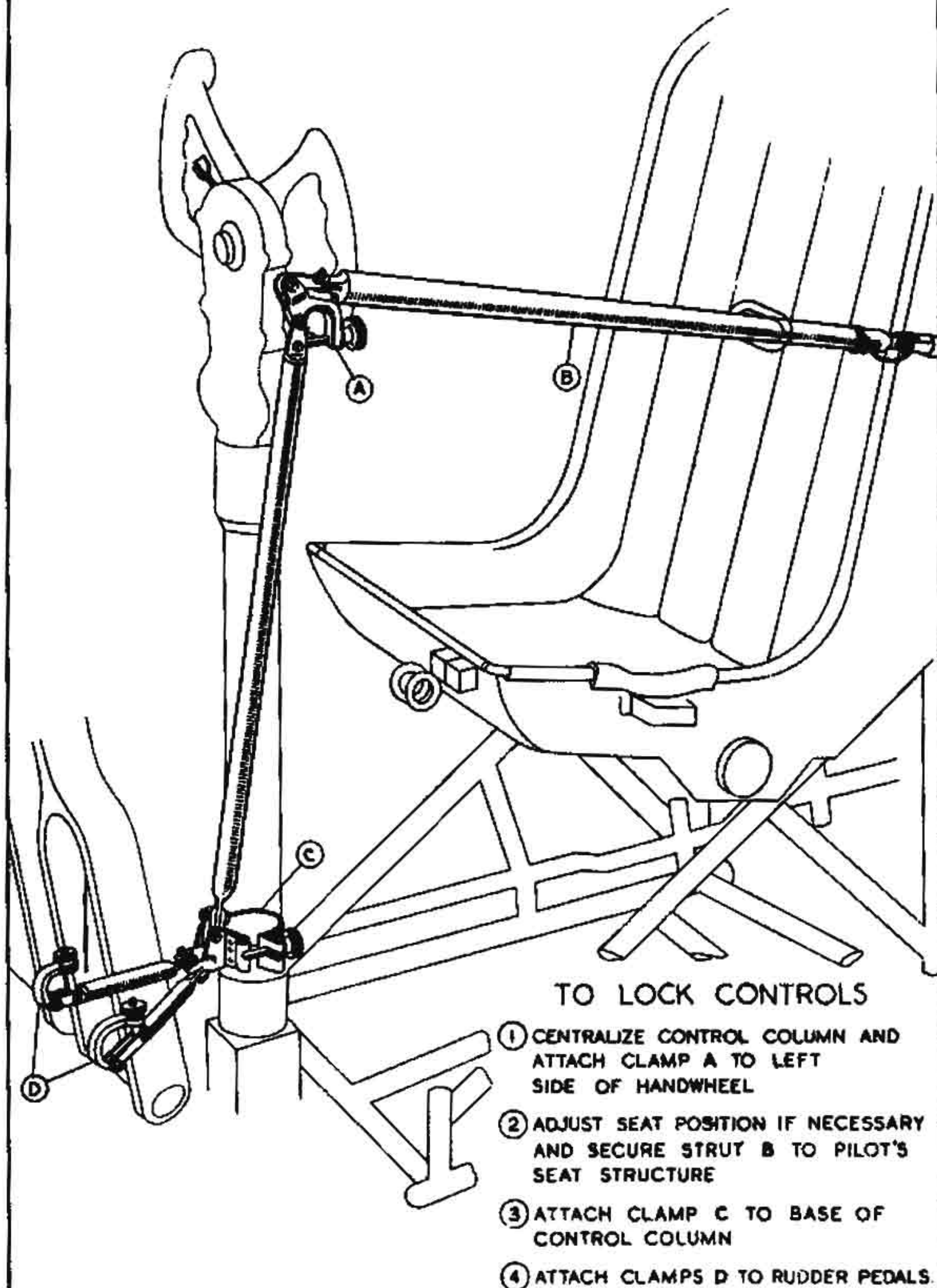
FIG. 6



API530C VOL.1 & PN. SECT.1

FIG. 6

EMERGENCY EXITS AND EQUIPMENT



SECTION 2

HANDLING AND FLYING NOTES FOR PILOT

1. ENGINE DATA, MERCURY XV or 25

- (i) Fuel:- 100 octane (or 87 octane with reduced take-off power; see (v) below).
- (ii) Oil:- See A.P.1464/C.37.
- (iii) The principal engine limitations with 100 Octane fuel are:

	R.P.M.	BOOST lb./sq.in.	Temp. Cylr.	°C. Oil Inlet
MAX.TAKE OFF TO 1000 FT. 3 MINS LIMIT	2,750	+9		
MAX.CLIMBING $\frac{1}{2}$ HR LIMIT	2,650	+5	210	80(90)
MAX.RICH CONTINUOUS	2,400	+3 $\frac{1}{2}$	190	70(90)
MAX.WEAK CONTINUOUS	2,400	+1 $\frac{1}{2}$	190	70(90)
MAX.ALL OUT $\frac{1}{2}$ HR LIMIT	2,750	+9	235	90(100)

Note:- Oil temperatures in brackets are for Mercury 25.

ALL PRESSURE: NORMAL 80 lb./sq.in.
EMERGENCY MINM. (5 MINS) 70 lb./sq.in.

OIL TEMPERATURE FOR TAKE-OFF: MINIMUM 5°C.

FUEL PRESSURE: RANGE -2 $\frac{1}{2}$ to 3 $\frac{1}{2}$ lb./sq.in.

- (iv) The following limitations must also be observed:-

Diving:- maximum boost +5 lb./sq.in.
maximum r.p.m. 3,120
2,750 r.p.m. may be exceeded
only for 20 seconds with
throttle not less than one
third open

- (v) Restrictions when using 87 octane fuel:-

TAKE-OFF	R.P.M.	Boost lb./sq.in.
TO 1,000 FT.	2,650	+5
ALL OUT 5 MINS LIMIT	2,750	+5

2. FLYING LIMITATIONS

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

Diving	325
Undercarriage down	140
Flaps down	125

(ii) Maximum weights:-

Take-off and straight flying only with
outer wing tanks full 17,500 lb.

Take-off with outer wing tanks empty 17,000 lb.

Landing and all forms of flying 17,000 lb.

Note:- With the C.G. more than 47 ins. aft the aircraft is unstable in all conditions of flight, especially at less than 150 m.p.h. I.A.S. at full load; the navigator should therefore, remain at his station in the nose whenever possible.

(iii) Bomb clearance angles for 500 lb. G.P. bomb:-

Dive	55°
Climb	40°
Bank	10°

3. MANAGEMENT OF FUEL SYSTEM

(i) Normal system:- Balance cock should be off except when it is required to feed an engine from a tank on the other side. It is preferable to use inner tanks first as outer tank fuel only can be jettisoned.

(ii) Using auxiliary tanks:- Fly on inner main tanks until about 30 gallons has been used from each tank. Then transfer fuel from either auxiliary tank as follows:-

(a) On unmodified aircraft (handpump feeds into cross-balance).

Set: Balance cock - ON
Isolating cock - ON
3-way cock auxiliary - STB'D or PORT

Pump: until feel of pump indicates that air is being sucked when stop pumping immediately to prevent engine failure due to air locks.

Set: Isolating cock - OFF
3-way cock - OFF
Balance cock (after contents
of tanks have equalized) - OFF

(b) On aircraft embodying MOD.No.5273 the isolating cock should be wired open and the hand pump delivers direct into the tops of the inner main tanks above fuel level, therefore:-

Set: Balance cock - OFF
3-way cock (auxiliary) - PORT or STB'D

Pump: Until tank is exhausted - no harm can result from pumping air.

Set: 3-way cock

(c) With either system repeat drill (a) or (b) to transfer contents of the other auxiliary tank.

(d) With system MOD.5273, after completing transfer, if contents of tanks are unequal; run both engines from the fuller tank only (suction balance cock ON) until levels equalize; then open other tank cock and close balance cock.

Note:- Auxiliary tanks should be filled by disconnecting at the 3-way cock and connecting to bowser nozzle with a suitable hose. Before flight set 3-way cock to PORT or STB'D and, with engines off, give a few strokes with the hand pump to ensure that fuel is being pumped.

4. PRELIMINARIES

- (i) See that hydraulic selector is down and undercarriage operating lever at DOWN.
- (ii) Switch on undercarriage indicator and check that undercarriage is locked down.
- (iii) If to be used, check auxiliary fuel feed - see para 3, Note.

5. STARTING ENGINES AND WARMING UP

- (i) Set the controls as follows:-
 - (a) Fuel cocks to inner tanks, balance cock off.
 - (b) Throttle $\frac{1}{2}$ " open.
 - (c) High boost control to 5 LBS.
 - (d) Mixture control NORMAL
 - (e) Propeller speed controls fully back
 - (f) Carburettor air intake heat control to COLD
 - (g) Gills open
- (ii) High volatile fuel (Stores ref. 34A/111) should be used if an external connection is fitted at air temperatures below freezing. Instruct the ground crew to work the priming pump until the suction and delivery pipes are primes; this may be judged by a sudden increase in resistance.

- (iii) If the engine is fitted with the original three nozzle priming system, the following number of strokes should be given before turning:

Air temperature °C	+30	+20	+10	0	-10
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Normal Fuel:	1	2	3	5	
--------------	---	---	---	---	--

High volatile fuel:				1	3
---------------------	--	--	--	---	---

If the engine is fitted with the seven nozzle priming system introduced by Mod.E.982, no priming should be given before turning.

- (iv) Switch on ignition and booster coil switches (if fitted), or instruct the ground crew to switch on the starter magneto.

- (v) Press the starter button for each engine in turn, for periods of not more than 20 seconds, with a 30 seconds wait between each, while the ground crew prime the engine as rapidly and vigorously as possible. The engine should start after the following number of strokes if cold:-

Air temperature °C	+30	+20	+10	0	-10
--------------------	-----	-----	-----	---	-----

Normal fuel:	2	2½	4	10	
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High volatile fuel:				2	7
---------------------	--	--	--	---	---

At air temperatures below freezing it may be necessary for the ground crew to continue priming after the engine has fired.

- (vi) When the engine is running satisfactorily, the ground crew will switch off the starting magneto (if fitted) and screw down the priming pumps. Switch off the booster coil switch (if fitted).
- (vii) After about a minute, open up to a fast tick-over.
- (viii) Set the propeller speed control slowly fully forward.

6. TESTING ENGINES AND INSTALLATIONS

While warming up:-

- (i) Check the hydraulic system by lowering and raising the flaps.

After warming up:-

- (ii) Open up to max. weak continuous boost and check operation of propellers.
- (iii) Open the throttle fully and check boost (+5 lb./sq.in.
- (iv) If using 100 octane fuel, with throttle fully open move high boost control to 9 LBS for just long enough to check that boost is 9 LBS/sq.in. and r.p.m. 2,600 to 2,700. Return high boost control before throttling back.
- (v) Open up to max. rich continuous boost and test each magneto in turn. The drop should not exceed 100 r.p.m.

7. TAXYING

- (i) Before taxiing, see that the ground crew remove and hold up the undercarriage locking pins and stow them in the aeroplane.
- (ii) Check brake pressure, 100 lb./sq.in.

8. FINAL PREPARATIONS FOR TAKE-OFF

The drill of vital actions is as follows:-

- | | | | | |
|---------------|---|--------------------|---|---|
| H | - | Hydraulic selector | - | Down |
| T | - | Trimming tabs | - | Rudder NEUTRAL
Elevator slightly
nose heavy (indicator
one inch below NEUTRAL) |
| M | - | Mixture | - | NORMAL |
| P | - | Pitch | - | Propeller speed
controls fully forward |
| Fuel | | | - | Check contents and
cock settings. |
| Flaps | | | - | 20° down |
| Gills | | | - | CLOSED |
| Boost control | | | - | 9 LBS position
(with 100 octane
fuel). |

9. TAKE-OFF

- (i) There is a slight tendency to swing to the right.
- (ii) The aeroplane should be eased off the ground by a steady backward pressure on the control column.
At 16,000 lb. the speed should be 90 m.p.h. I.A.S.
- (iii) Safety speed is 140 m.p.h. I.A.S.
- (iv) After reaching safety speed, move the high boost control to the 5 LBS position, and reduce to climbing boost and r.p.m.
- (v) When both undercarriage and flaps are up, set hydraulic selector to central (or up for turret operation). This prevents over-heating of the Engine Hydraulic Pump.

10. CLIMBING

- (i) For continuous climbing at maximum boost the gills may have to be opened to the limit stops if these are fitted. On aeroplanes with electric gill operation but no limit stops the full opening is unnecessarily wide and causes buffeting, as well as loss of climb and ceiling.
- (ii) The speed for maximum rate of climb is 130 m.p.h. I.A.S. up to 10,000 feet. Above this height reduce speed by 1 m.p.h. per 1,000 feet.

11. GENERAL FLYING

- (i) Stability:- The aeroplane is rather unstable longitudinally. Refer to para 2(ii).
- (ii) Change of trim:-

Undercarriage down	Nose down slightly
Flaps down	Nose down
- (iii) Flying at very low temperatures:- When flying in extremely low temperatures the propeller may become sluggish. Sluggish operation will be minimized by cruising in POSITIVE COARSE PITCH. Alternatively the mechanism should be exercised every quarter of an hour by moving to maximum r.p.m. slowly pulling the lever fully back, and then returning to the required r.p.m.

12. USE OF WARM & COLD INTAKE

(i) WARM intake should be used:

(a) For all flying at less than $+3\frac{1}{2}$ lb./sq.in. in boost unless the atmospheric temperature exceeds $+15^{\circ}\text{C}$ when COLD air should be used irrespective of boost.

(b) For all flying (irrespective of boost and atmospheric temperature) in conditions of high humidity, in or just below clouds, in rain, snow or sleet (WARM air may be used for warming up in very cold weather.)

(ii) COLD intake should be used for all other conditions including:

(a) Starting at all times

(b) Take-off

(c) Landing except in conditions at (i)(b).

13. ECONOMICAL CRUISING

(i) Fly in weak mixture at 1,900 r.p.m. and highest obtainable boost up to $+1\frac{1}{2}$ lb./sq.in. provided that this gives at least 140 m.p.h. I.A.S.

(ii) Otherwise increase r.p.m. to give 140 m.p.h. I.A.S.

Note: At 1,900 r.p.m. the generator may cut out and the warning light or voltmeter must be watched and r.p.m. raised slightly if necessary.

14. FUEL CONSUMPTIONS

(i) Weak mixture at 10,000 feet: total approximate consumptions in gals/hour:-

Boost lb/sq.in.	R.p.m.			
	2,400	2,200	2,000	1,900
+1	75	70	65	
0	69	65	61	58
-1	66	62	58	54
-2	61	57	53	49
-3	56	52	48	45

(ii) Rich mixture: total approximate consumptions:-

Boost lb/sq.in.	R.p.m.	Gals/hour
+5	2,650	146
$+3\frac{1}{2}$	2,400	112
$+1\frac{1}{2}$	2,400	90

15. STALLING

The approximate stalling speeds at 16,000 lb. are

Flaps and undercarriage up	80 m.p.h. I.A.S.
" " " down	70 m.p.h. I.A.S.

16. SPINNING AND AEROBATICS

Spinning and aerobatics are not permitted.

17. DIVING

Normally the propeller may be left under constant speed control; but if the engine is to be throttled back the propeller must be set to POSITIVE COARSE PITCH.

18. APPROACH AND LANDING

(i) The drill of vital actions is as follows:-

H - Hydraulic selector - Down

U - Undercarriage - DOWN

M - Mixture - NORMAL

P - Propeller - Propeller speed
controls fully
forward

Flaps - Down

(ii) Speeds for approach at 16,000 lb.-

(a) Engine assisted 95 m.p.h. I.A.S.

(b) Glide 100 m.p.h. I.A.S.

19. MISLANDING

(i) Open throttles fully. If necessary, then set high boost control to +9 lb./sq.in. position.

(ii) Raise the undercarriage immediately.

(iii) Climb at 120 m.p.h. I.A.S.

20. AFTER LANDING

(i) Gills - OPEN

- (ii) Raise the flaps, leaving the hydraulic selector down.
- (iii) Set the propeller speed controls fully back and open up engine sufficiently to change pitch to coarse.
- (iv) Stop engines by pulling slow running cut outs; switch off ignition after engine has stopped.
- (v) See that the undercarriage safety pins are replaced.

21. OIL DILUTION

See A.P. 2095/4 - The oil dilution period is 4 minutes.

22. POSITION ERROR

The corrections for position error are as follows:-

From	110	130	150	170	190	220	m.p.h.
to	130	150	170	190	220	260	I.A.S.
Add	4	2	-				
Subtract			-	2	4	6	m.p.h.

23. ENGINE FAILURE

Set the propeller of the failed engine to positive coarse pitch. The aircraft will not maintain height on one engine except when quite light. The best speed for maintaining height is 100 m.p.h. I.A.S.

24. UNDERCARRIAGE & FLAP EMERGENCY OPERATION

Should the undercarriage fail to come down on normal operation act as follows:-

- (i) Check that the hydraulic selector is - DOWN
- (ii) If the cartridge-fired system is fitted:-
 - (a) Attempt to lower flaps with the hand-pump -
 - Set the undercarriage selector - UP
 - Set the flap selector - DOWN
 - Operate hand-pump
 - Return the flap selector - NEUTRAL

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- (b) Attempt to lower the undercarriage with the hand-pump ~

Set the undercarriage selector - DOWN
Operate hand-pump
If this fails:-

- (c) Use the cartridge-fired system:-
Tear white fabric strip and pull handle

- (d) Further operation of the undercarriage is impossible, and it should not be attempted. If the wheels are down, gas pressure should hold them down even if the locks are not engaged.

- (iii) If no cartridge-fired system is fitted, the hand-pump is the only alternative to the engine pump - so:-

- (a) Attempt to lower the undercarriage with the hand-pump before the flaps (as, if the system be damaged, there may be insufficient fluid left for both) -
Leave the undercarriage selector at DOWN
Operate hand-pump

- (b) Attempt to lower the flaps:-
Set the flap selector lever - DOWN
Operate hand-pump.

