

AIR PUBLICATION 1688A, B, F & G

PILOT'S NOTES

**ALBEMARLE I, II, V & VI
AIRCRAFT**

TWO HERCULES XI POWER PLANTS Mk. I

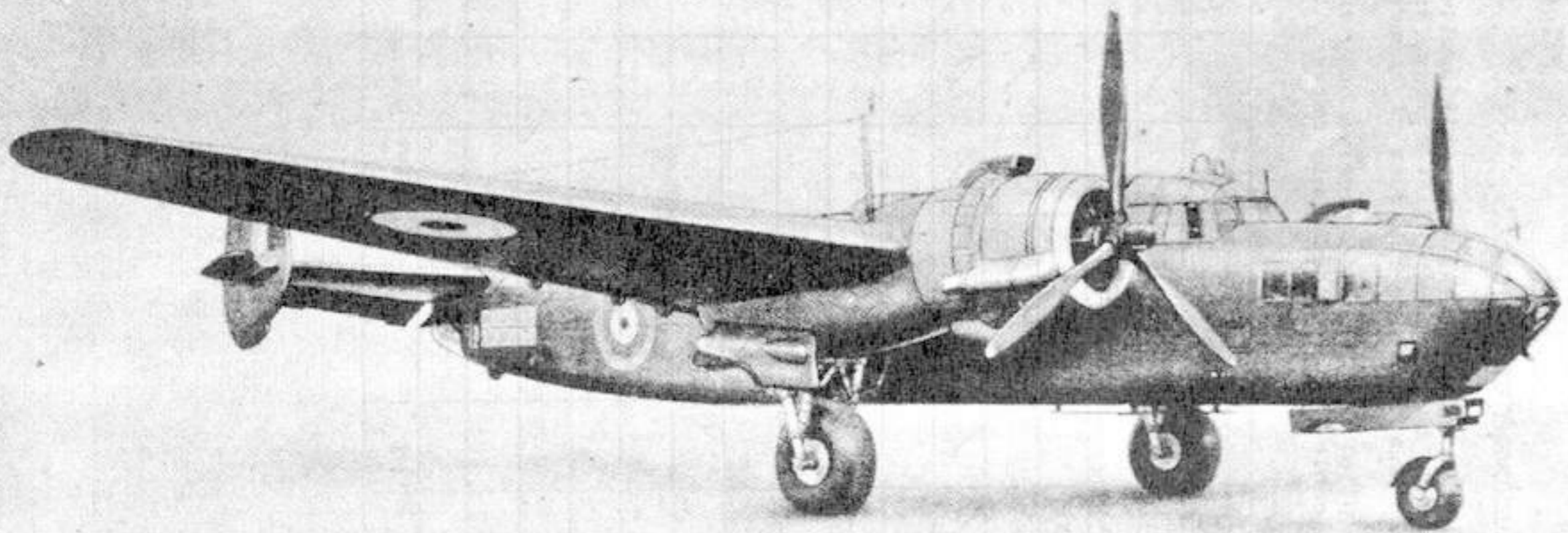
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AIR MINISTRY



ALBEMARLE I

[illegible]

NOTES TO OFFICIAL USERS

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

June 1942

AIR PUBLICATION 1688A
Pilot's Notes

LIST OF SECTIONS

Section 1:

Pilot's Controls and Equipment and General Emergency
Equipment and Exits.

Section 2:

Handling and Flying Notes for Pilot.

R.T.P./1352	1200	6/42
RTP/2567	500	4/45

SECTION 1
CONTROLS AND EQUIPMENT FOR PILOT
AND
GENERAL EMERGENCY EQUIPMENT AND EXITS
LIST OF CONTENTS

	Para.
INTRODUCTION	1
MAIN SERVICES	
Fuel System	2
Oil System	3
Hydraulic System	4
Pneumatic System	5
Electrical System	6
AIRCRAFT CONTROLS	
Primary flying controls	7
Duel controls	8
Automatic flying controls	9
Suction pump change-over cock control	10
Tab controls	11
Undercarriage control	12
Undercarriage indicator and warning horn	13
Flap control	14
Flap position indicators	15
Flap and undercarriage emergency operation	16
Brakes	17
ENGINE CONTROLS	
Throttle and mixture controls	18
Propeller speed and feathering controls	19
Two-speed supercharger control	20
Carburettor air-intake control	21
Cowling gill controls	22
Oil cooler shutters	22A
Slow-running cut-out control	23
Fuel cock controls	24
Priming pumps	25
Ignition switches	26
Booster coil switches and starter buttons	27
Oil dilution	28
Engine instruments	29
COCKPIT ACCOMMODATION AND EQUIPMENT	
Pilot's seats control	30
Doors and windows	31
Curtains	32
Cabin lightning	33
Cabin heating and ventilation	34
Oxygen	35
Vacuum flasks	36
Sanitary accommodation	37
Map case	38
OPERATIONAL EQUIPMENT AND CONTROLS	
Guns	39
Camera (deleted)	40
Bomb door control	41
Bomb steering indicator	42
Bomb release	43
Bomb jettison control	44
Reconnaissance flares (bombers only)	45
Glider-tug release	45a

NAVIGATIONAL, SIGNALLING AND LIGHTING EQUIPMENT										Para.
Wireless .. .. .	..	..	..	..	..	..	..	..	..	46
Intercommunication .. .. .	..	..	..	..	..	..	..	..	..	47
Blind approach installation .. .. .	..	..	..	..	..	..	..	..	..	48
Signal pistol .. .. .	..	..	..	..	..	..	..	..	..	49
Navigation, identification and formation lamps .. .. .	..	..	..	..	..	..	..	..	..	50
Landing lamps .. .. .	..	..	..	..	..	..	..	..	..	51
Glider signalling switch .. .. .	..	..	..	..	..	..	..	..	..	51a
Paratroop signalling switch .. .. .	..	..	..	..	..	..	..	..	..	51b
DE-ICING EQUIPMENT										
Pressure head heater switch .. .. .	..	..	..	..	..	..	..	..	..	52
EMERGENCY EQUIPMENT										
Fire extinguisher system .. .. .	..	..	..	..	..	..	..	..	..	53
Parachutes .. .. .	..	..	..	..	..	..	..	..	..	54
Main parachute exits .. .. .	..	..	..	..	..	..	..	..	..	55
Alternative parachute exits .. .. .	..	..	..	..	..	..	..	..	..	56
Crash exits .. .. .	..	..	..	..	..	..	..	..	..	57
Dinghy .. .. .	..	..	..	..	..	..	..	..	..	58
Type VII emergency pack .. .. .	..	..	..	..	..	..	..	..	..	58a
Marine distress signals .. .. .	..	..	..	..	..	..	..	..	..	59
Axe .. .. .	..	..	..	..	..	..	..	..	..	60
First Aid .. .. .	..	..	..	..	..	..	..	..	..	61
Destruction of equipment .. .. .	..	..	..	..	..	..	..	..	..	62

LIST OF ILLUSTRATIONS

	Fig.
Flying control locking device	1
Pilot's cockpit - general	2
Pilot's cockpit - details	3
Instrument panel	4
Fuel system diagram	5
Parachute exits and emergency equipment	6

SECTION 1

CONTROLS AND EQUIPMENT FOR PILOT

INTRODUCTION

1. The Albemarle I, II, V & VI are paratroop carriers fitted with tricycle undercarriage and powered by two Hercules XI engines. The Mark VI has a freight loading door in the side. All aircraft may be equipped as glider tugs or medium bombers.

MAIN SERVICES

2. Fuel System: (Fig. 5) There are four main tanks - one in each wing and two in the fuselage - and three auxiliary tanks in the fuselage

WING TANKS	(200 gallons each):	400 gallons
FUSELAGE TANKS	(204 and 165 gallons):	369 "
AUXILIARY TANKS	(210 gallons each):	630 "
Total capacity:		<u>1,399 gallons</u>

3. Oil System: Two pairs of oil tanks hold $29\frac{5}{8}$ gallons in each pair for normal range and 47 gallons in each pair for long range.
4. Hydraulic system: Two hydraulic pumps - one on each engine - and two accumulators operate the undercarriage, flaps, bomb doors and carburettor air-intake shutters. A gauge (omitted on later aircraft) on the instrument panel marked HYDRAULIC PRESSURE (32) shows the pressure available in the accumulators. A hand pump (6) with Emergency Selector knob (10) on the starboard side of the cockpit can also be used to operate all services, or to lower the undercarriage through separate pipelines.
5. Pneumatic system: An engine-driven air compressor - on the port engine - feeds two storage cylinders for operation of the brakes. A gauge (49) on the instrument panel shows the air pressure in the cylinders.

6. Electrical system: Two generators, one on each engine, with separate accumulators supply power as follows:

Port generator - HT and LT units, turret, engine starters, propeller feathering, ignition boost, fire extinguishers, internal lighting (part), steering indicator, R.3003, oil dilution, auto controls, beam approach, R.P.M. indicators, port cowling gills, and flying lights.

Starboard generator - Heated clothing, interior lighting (part), dinghy switch, bomb release, pressure head, camera, undercarriage indicator, fuel gauges and pressure warning lamps, flap indicators, starboard cowling gills; and landing, intercommunication and compass lights.

Note: If one engine or generator fails, the drain on the accumulator should be reduced to a minimum by limiting the use of unnecessary services. On later aircraft, both generators charge the two accumulators connected in parallel so that, should one generator or accumulator fail, the other will operate all services.

AIRCRAFT CONTROLS

7. Primary flying controls: These are conventional, the rudder pedals being adjusted for reach by a handle (67) under the instrument panel. The locking gear (87) is stowed on the port side of the fuselage near the bomb aimer. Method of fitting is shown in fig. 1.
8. Dual controls: The dual control column (7) is stowed on the starboard side of the cockpit, behind the second pilot's folding seat (8). The rudder pedals (9) are permanently attached to the control system. To put into operation in flight:
- (i) Unfold the second pilot's seat.
 - (ii) Unship the dual control column and fit it into the socket on the right-hand side of the cockpit. Both the main and dual control columns must be central for this operation and the gear must be meshed correctly.
 - (iii) Turn the footrests of the rudder pedals down into position.

9. Automatic flying controls on early planes only - are on the left of the pilot and include cock (60), course and speed (61) main (61a), attitude (62), and clutch (63) controls. The pressure gauge (54) is on the left side of the instrument panel. The bomb aimer's steering control is at his station in the nose.
10. Section pump change-over cock control: There is a suction pump on each engine, from either of which the blind-flying instruments may be driven. Change-over cock (23) is on the instrument panel. To the left of this, some planes have a suction gauge (22).
11. Tab controls: Elevator rudder and aileron trimming tab controls (80, 82, 83) are grouped to the right of the pilot's seat, each control being moved in the sense of the trim required
12. Undercarriage control: The lever (78) is moved UP to raise and DOWN to lower the undercarriage. The lever is automatically locked in the DOWN position by a spring loaded catch to the right of the lever slot. The catch is released by moving it to the right.
13. Undercarriage indicator and warning horn: An indicator (45) on the left of the instrument panel shows:

3 green lights	-	All wheels locked down
3 red lights	-	All wheels unlocked
No lights	-	All wheels locked up

Each wheel operates the corresponding light. The green lamps are duplicated, pulling out the knob brings the spare lamps into operation. Rotating the same knob interposes a dimming screen. The indicator switch (15) in the centre of the instrument panel is interlocked with the ignition switches. A horn and red light (43) on the instrument panel gives warning when the throttles are closed if the undercarriage is not locked down. The push switch (30) on the right of the instrument panel is for testing the horn and warning light. A fabric patch, doped over a hole in the nose-wheel housing at the forward end, may be torn off to check that the nose wheel is locked down. Two sliding sleeves are painted green and when the nose wheel is safely locked down, these come together to form one continuous strip of colour

14. Flap Control: The flap lever (76) has three marked positions - UP, TAKE-OFF and DIVE AND LAND; to select the latter a catch on the lever must be raised. (Note - if an intermediate position is marked LAND, it is wrongly marked. The DIVE position should be used for landing). To obtain intermediate flap settings the lever should be set to the neutral position when the desired setting is indicated and on later aircraft a notch in the quadrant enables the neutral position to be selected by feel.
15. Flap position indicators: There are two indicators (44) - showing position of flaps in degrees - on the left of the instrument panel.
16. Flap and undercarriage emergency operation: If the engine pump fails it should be possible to operate, once only, through the normal controls. If not successful, alternatives are:
- (i) The hand pump can be used to operate through the normal pipelines. In this case the EMERGENCY SELECTOR knob (10) beside the hand pump must be left in the NORMAL position.
 - (ii) If the above method fails the undercarriage can be lowered by pressing the EMERGENCY SELECTOR knob (10) into the EMERGENCY position and using the hand pump, which then operates through an independent pipe-line system.
17. Brakes: The lever (66) on the left of the control hand-wheel operates the main wheel brakes, which are controlled differentially by the rudder pedals. A brake-pressure gauge (57) is on the left of the instrument panel.

ENGINE CONTROLS

18. Throttle and mixture controls: The throttles (71) are gated at CRUISING (weak) and RATED (climbing and cruising rich) positions. The single mixture lever (72) has two positions, RICH and WEAK, and returns automatically to RICH if either throttle is closed or opened beyond the CRUISING gate.
19. Propeller speed and feathering controls: The two levers (77) for the de Havilland Hydromatic propellers are primed by moving them into the DECREASE R.P.M. position and holding fully down. The feathering buttons (18) are on the instrument panel. When the buttons are pressed for feathering they are held in electrically until feathering is complete. When the buttons are pressed for unfeathering they must be held in by hand until the required r.p.m. are reached.

20. Two-speed supercharger control: is by a single lever (73) on the control bracket.
21. Carburettor air-intake control: The alternative hot and cold intakes are operated hydraulically by a single lever (79) on the trimming tab control box.
22. Cowling gill controls: The two switches (74) on the top of the engine control box are pushed down and turned anti-clockwise to open and clockwise to close the gills. The gills can be left in any intermediate position by switching OFF. The two lights (35) on the instrument panel show when the motors are working,
- 22A Oil cooler shutters: On Mk V & VI aircraft larger oil coolers with manually controlled shutters are fitted. The control lever, mounted to the right of the trim tab box, is set down to close, and up to open, the shutters with five intermediate gated positions. To operate, push the lever to the right to disengage, and set as required. With these larger coolers coring is liable to occur and the shutters should be kept as far closed as possible. An indication of coring is an abnormal rise of oil temperature without a corresponding rise in cylinder temperature. If this occurs, close the shutters until the oil temperature falls.
- MK V
& VI
only
23. Slow running cut-out control: The pull-out knob (19) for the slow-running cut-out is in the centre of the instrument panel.
24. Fuel cock controls: (Fig. 5). The main fuel system is controlled by a distributor cock (58) and two engine master cocks (64) to the left of the pilot. The contents gauges (46, 47, 48) for the main tanks are on the instrument panel. The auxiliary tank cock is operated by a cock control mounted on the starboard side of the bulkhead at the rear of the cockpit. This cock is turned by a key which is stowed beside the three auxiliary tank contents gauges on the bulkhead at the rear of the cockpit.
25. Priming pumps: Two pumps are fitted on the engine starting panel (11) on the starboard side of the cockpit. On early aircraft the induction priming pump has a small round handle and this requires approximately four times the number of strokes as the large pump, with a grip handle, fitted to later aircraft. The wobble pump which is furthest aft, primes the carburettors. There are two distributor cocks, at the top of the panel; on early aircraft the one for the carburettor priming is above the one for the induction whilst on later aircraft these positions are reversed.

26. Ignition switches: The main switches (21) are on the instrument panel and are prevented, by a sliding bar, from being switches ON unless the undercarriage indicator switch is also ON.
27. Booster-coil switches and starter buttons: are on the engine starting panel (11) on the starboard side of the cockpit.
28. Oil dilution: There are two push-buttons on the engine starting panel (11)
29. Engine instruments: Engine-speed indicators (17), fuel-pressure gauges (35), oil-pressure gauges (39) boost-pressure gauges (37) are in the centre of the instrument panel. To the left of these are the cylinder-temperature gauges (41).

NOTE: The standard instrument flying panel (13) has been modified by the transposition of the air-speed indicator and the rate-of-climb indicator in order to make the former visible for take-off (see A and B, Figs 2 and 4).

COCKPIT ACCOMMODATION AND EQUIPMENT

30. Pilot's seat control: The pilot's seat is adjusted for height by means of a handle with thumb button release on the left of the seat. The back can be adjusted by a lever (86) on the right of the seat. The harness is released by pressing the lever (88) on the left of the seat. To unfold the second pilot's seat:-
 - (i) Release the stowage strap and pull the seat down.
 - (ii) Unfold the legs and plug them into the two sockets in the floor.
 - (iii) Lift the backrest and clip the harness to the top left side.
31. Doors and windows: Although the main entrance is in the nose it is preferable to use the doors in the roof of the centre section, as use of the nose entrance may result in damage to equipment. Access to the roof doors is by ladder against the trailing edge of flap at root of port wing. The doors open inwards, the latch, on the port door, being reached from the outside through a flap in the door. The rear entrance door has a flap for access to the latch and there are built-in footsteps. A direct vision window (3) is on each side of the main windscreen. There is a window at each side of the navigator's station, which may be opened by rotating the small handle near the window ledge.

32. Curtains: are provided for all windows in the nose portion (except windscreen), the cockpit roof, and the windows in the crawlway entrance door.
33. Cabin Lighting: A cockpit floodlight and dimmer switch is on each side of the cockpit. Compass light is in the roof of the windscreen, the dimmer switch being on the port side (65).
34. Cabin heating and ventillation: A steam heating system is used for cabin heating on early planes. The control, on the armoured bulkhead aft of the radio operator, has two levers, the upper controlling the hot and the lower the cold air supply. On later planes a direct heating system is used with a single control lever on the armoured bulkhead.
35. Oxygen: The pilot's regulator (50) is on the left of the instrument panel and the bayonet socket (84) on the trimming tab control box. Bayonet sockets and flowmeters are fitted at each crew station. Portable oxygen bottles are carried at the five main stations.
36. Vacuum flasks: (12) are stowed near each crew station.
37. Sanitary accommodation: A sanitary bottle for the use of the whole crew is stowed on the starboard side of the centre fuselage, just forward of the entrance door.
38. Map cases: One is behind the pilot's seat and another in the navigator's table.

OPERATIONAL EQUIPMENT AND CONTROLS

39. Guns: There is no fixed gun on this aircraft; a measure of forward fire being obtained from the turret. There is a fire control station in the streamlined blister in the pilot's cockpit hatch.
40. Camera: deleted.
41. Bomb door control: The lever (81) is mounted on the trimming tab control box. A linked switch prevents the bombs from being released until the doors are fully open.
42. Bomb steering indicator: (34) This is in the centre of the instrument panel.
43. Bomb release: The pilot has a bomb release switch (75) on the engine control box, the jettison and master switch (27), controlled by the pilot, is on the right of the instrument panel and is on early aircraft only.
44. Bomb jettison control: The bomb container jettison switch (25) is on the right side of the instrument panel with the bomb jettison remote control (26) mounted beneath it.

45. Reconnaissance flares (bomber only): These are stowed in the rear portion of the centre fuselage near the entrance door. A launching tube, through which the flares are released by the upper gunner, is fitted into a hole in the floor.

45a. Glider-tug release: The release for the glider-tug cable is below the controls on the engine control box

NAVIGATIONAL, SIGNALLING AND LIGHTING EQUIPMENT

46. Wireless: This includes a T.1154/R.1155 installation with D.F. loop in forward part of fire control dome in the cockpit roof and visual indicator (31) on right of instrument board. The trailing aerial winch is behind the pilot. There is a T.R.9F set with remote control (2) in port roof and a switch on port side of crash arch; fire controller's switch is on crash arch, starboard side. The mixer control (59) is on the left of the pilot's seat. The control for the R.3003 (or R.3090) is on the wireless operator's table, the pilot's switch and destructor being on the starboard side of the cockpit.

47. Intercommunication: There are call lights and sockets at each of the crew stations. The pilot's call light and control unit (14) is on the instrument panel, the socket (85) being on the right of the pilot's seat

48. Blind approach installation: The control is in the port side of the cockpit roof (1), and the visual indicator (55) on the left of the instrument panel.

49. Signal pistols: One is fitted on the starboard side of the cockpit roof behind the wireless operator. Another is mounted in the floor to the left of the pilot. The cartridges are stowed in racks below the pistol on the starboard side and behind the pilot on the port side.

50. Navigation, identification and resin lamps: The navigation lamps switch (52) is on the left of the instrument panel. The identification lamp switches and signalling switchbox are on the starboard side of the cockpit, forward of the dual control column. The switch for the resin lamps is on the starboard side below the identification lamp switches

51. Landing lamps: The switch (69) and control lever (70) are mounted on the engine control box

51a. Glider signalling switch: is on the starboard side below the identification lamp switches.

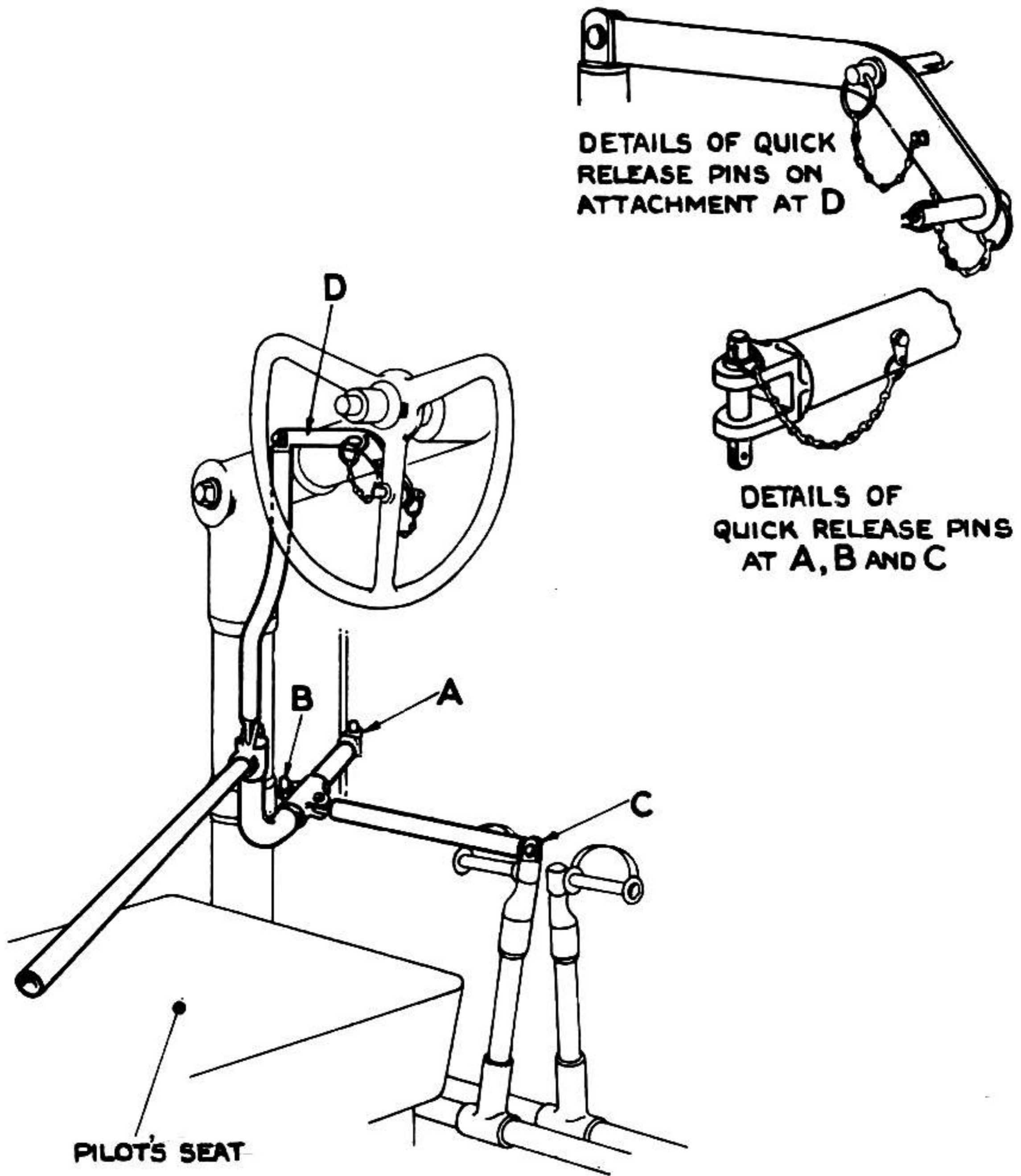
51b. Paratroop signalling switch: is in the centre above the instrument panel.

DE-ICING EQUIPMENT

52. Pressure head heater switch (51) is on the left side of the instrument panel.

EMERGENCY EQUIPMENT (See Fig. 6.)

53. Fire extinguisher system: Two engine fire extinguisher buttons (16) and (20) are on the instrument panel. The engine extinguishers also operate automatically under certain fire or crash conditions. Four hand extinguishers are carried (see fig. 6).
54. Parachutes: Lap-type parachutes are provided, the pilot's and wireless operator's being stowed in the cockpit (see fig. 6). Stowage for the navigator's parachute is in the bomb aimer's compartment and for the gunner's parachute, near the turret (fig. 6)
55. Main parachute exits: Crew in forepart - Hatch over spar of crawlway. Crew in rear part - Hatch in fuselage floor just aft of gun turret.
56. Alternative parachute exits: Crew in forepart - in cockpit roof. Crew in rear part - Top hatch forward of tail plane.
57. Crash exits: In cockpit roof. Turret cupola and hatch aft of turret.
58. Dinghy: A type H Mark III dinghy stowed in the top of the centre fuselage aft of the turret may be inflated and released in any of three ways:-
- (i) By pulling to the fullest extent, the handle on the starboard side of the fuselage, just inside the mid top escape hatch.
 - (ii) By pulling, to the fullest extent, the hand-loop immediately outside the top rear escape hatch. In this case unstick the hand-loop from the fuselage covering to which it has been doped.
 - (iii) Automatically, by the immersion switch.
- 58.a A type VII emergency pack is stowed below the mid top exit on the starboard side on later aircraft to supplement the provisions carried in the pack in the dinghy compartment.
59. Marine distress signals: The usual signals are attached to the dinghy. On some aircraft three are also stowed in the centre fuselage near the flare stowages
60. Axe: This is stowed on the starboard side of the fuselage just forward of the wireless operator.
61. First Aid: One outfit is on the starboard side of the fuselage near the engine starting panel and another at floor level on the port side forward of the camera. The latter is accessible only from outside the fuselage (fig 6)
62. Destruction of equipment: In addition to the crash switch for the R.3003, a firing key is fitted on the starboard side of the cockpit (4). On later aircraft two incendiary bombs are stowed on the armoured bulhead for destroying the aircraft.



ATTACHMENT POINTS

- 1-FIT END OF SOCKET A TO LUG ON STRUCTURE
- 2-ATTACH LUG B TO COLLAR ON CONTROL COLUMN
- 3-FIT C INTO FORK END AT TOP OF RUDDER LEVER
- 4-PUSH PIN OF ARM D THROUGH HOLE IN ARM THEN THROUGH HOLE IN HANDWHEEL

FIG.

I

FLYING CONTROL LOCKING DEVICE

FIG.

I

KEY TO FIGS 2, 3 & 4

- | | |
|--|--|
| 1. Blind approach control unit | 48. Fuel contents gauges, wing tanks |
| 2. T.R.9F control | 49. Pneumatic pressure gauge |
| 3. Direct-vision window | 50. Oxygen regulator |
| 4. R.3003& demolition switch | 51. Pressure head heater switch |
| 5. Engine priming selector cock | 52. Navigation light switch |
| 6. Hydraulic hand pump | 53. Formation lights switch |
| 7. Dual control column | 54. Automatic controls, pressure gauge |
| 8. Second pilot's seat | 55. Blind approach indicator |
| 9. Dual control rudder pedals | 56. Flare releases - inoperative (remain on early planes only) |
| 10. Hydraulic emergency selector | 57. Brake pressure gauge |
| 11. Engine starting panel | 58. Distributor cock control |
| 12. Vacuum flask stowage | 59. Mixer box |
| 13. Instrument flying panel | *(60. Cock control |
| A. Rate-of-climb indicator | (61. Course and speed control |
| B. Airspeed indicator | (61a. Main switch |
| 14. Intercom & warning light | (62. Attitude control |
| 15. Undercarriage indicator switch | (63. Clutch lever |
| 16. Fire extinguisher button (port engine) | 64. Engine cock controls |
| 17. Engine speed indicators | 65. Compass light switch |
| 18. Feathering buttons | 66. Main wheel brake lever |
| 19. Slow running cut-out | 67. Rudder pedal adjuster |
| 20. Fire extinguisher button (starboard engine) | 68. Nose wheel brake lever (disconnected) |
| 21. Ignition switches | 69. Landing lamp switch |
| 22. Suction gauge (early planes) | 70. Landing lamp control |
| 23. Suction pump cock | 71. Throttle levers |
| 24. Clock | 72. Mixture lever |
| 25. Bomb container jettison switch | 73. Supercharger lever |
| 26. Bomb jettison remote control | 74. Cowling gill switches |
| 27. Bomb jettison and master switch, type F (early aircraft) | 75. Bomb release switch |
| Cowl gill indicators (later aircraft). | 76. Flap control lever |
| 30. Undercarriage horn switch | 77. Propeller control lever |
| 31. Direction finding visual indicator | 78. Undercarriage control |
| 32. Hydraulic pressure gauge | 79. Air intake control |
| 33. Air temperature gauge | 80. Elevator trim control |
| 34. Bomb steering indicator | 81. Bomb door control |
| 35. Fuel pressure gauges | 82. Rudder trim control |
| 36. Boost pressure gauges | 83. Aileron trim control |
| 37. Oil temperature gauges | 84. Oxygen socket |
| 38. Cowling gill motor warning lights. | 85. Blind approach and inter-communication socket |
| 39. Oil pressure gauges | 86. Seat back control |
| 41. Cylinder temp. indicators | 87. Control locking device |
| 43. Undercarriage warning light | 88. Harness release |
| 44. Flap position indicators | |
| 45. Undercarriage indicator | |
| 46. Fuel contents gauge, rear fuselage tank. | |
| 47. Fuel contents gauge, front fuselage tank. | |

* Auto controls on early planes only

FIG 2

①

②

③

A

B

③

④

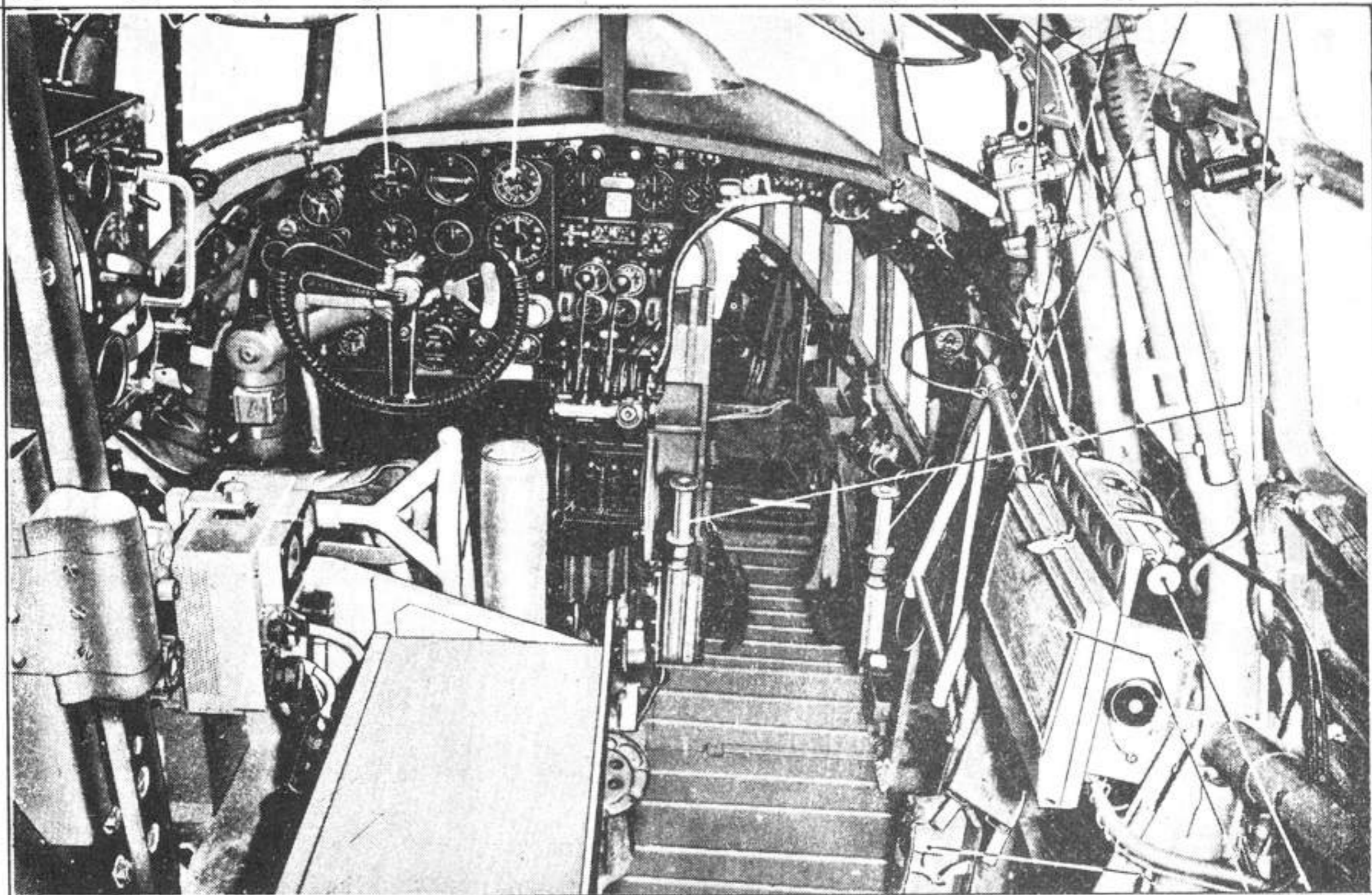
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FIG 2

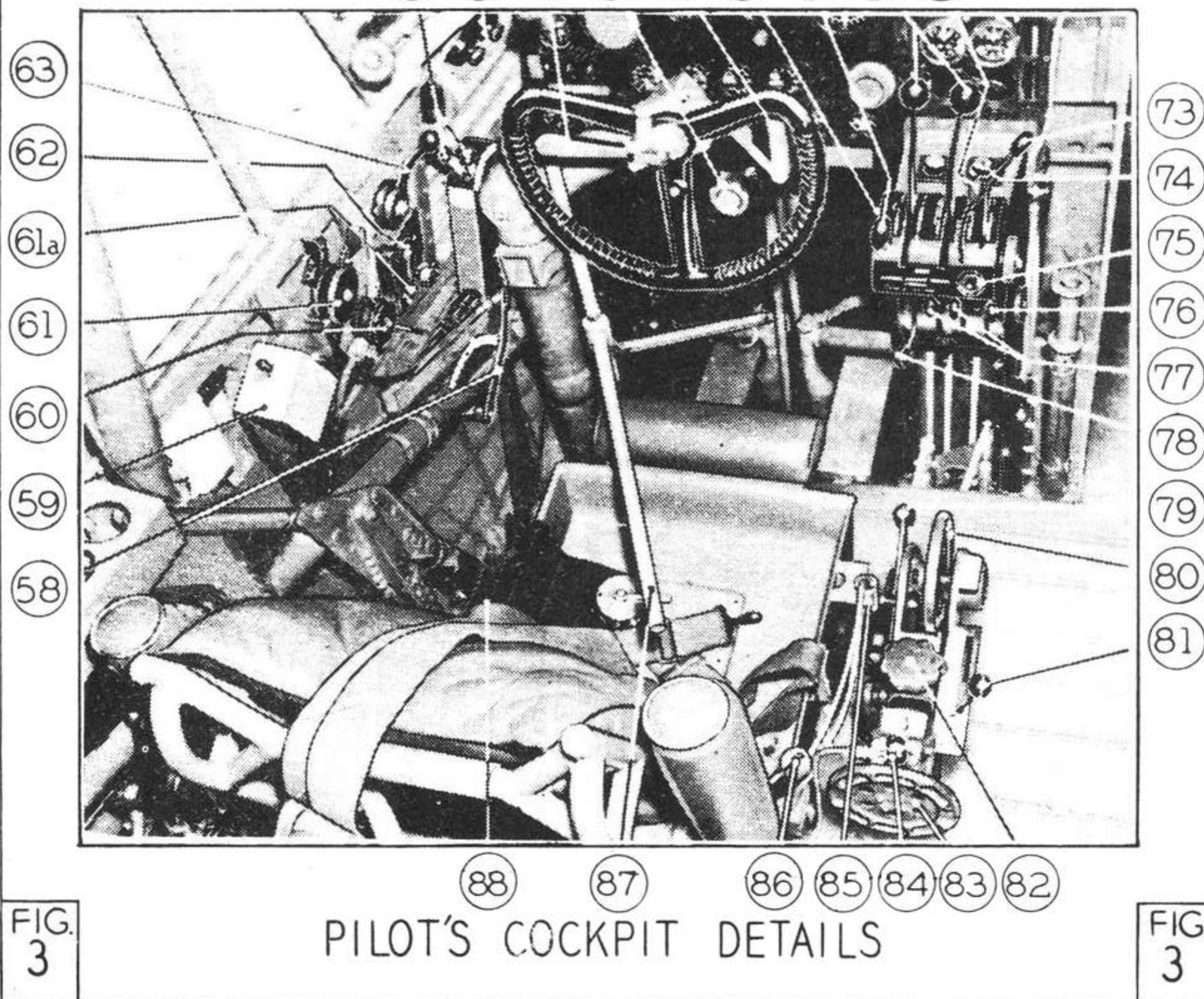
PILOT'S COCKPIT - GENERAL

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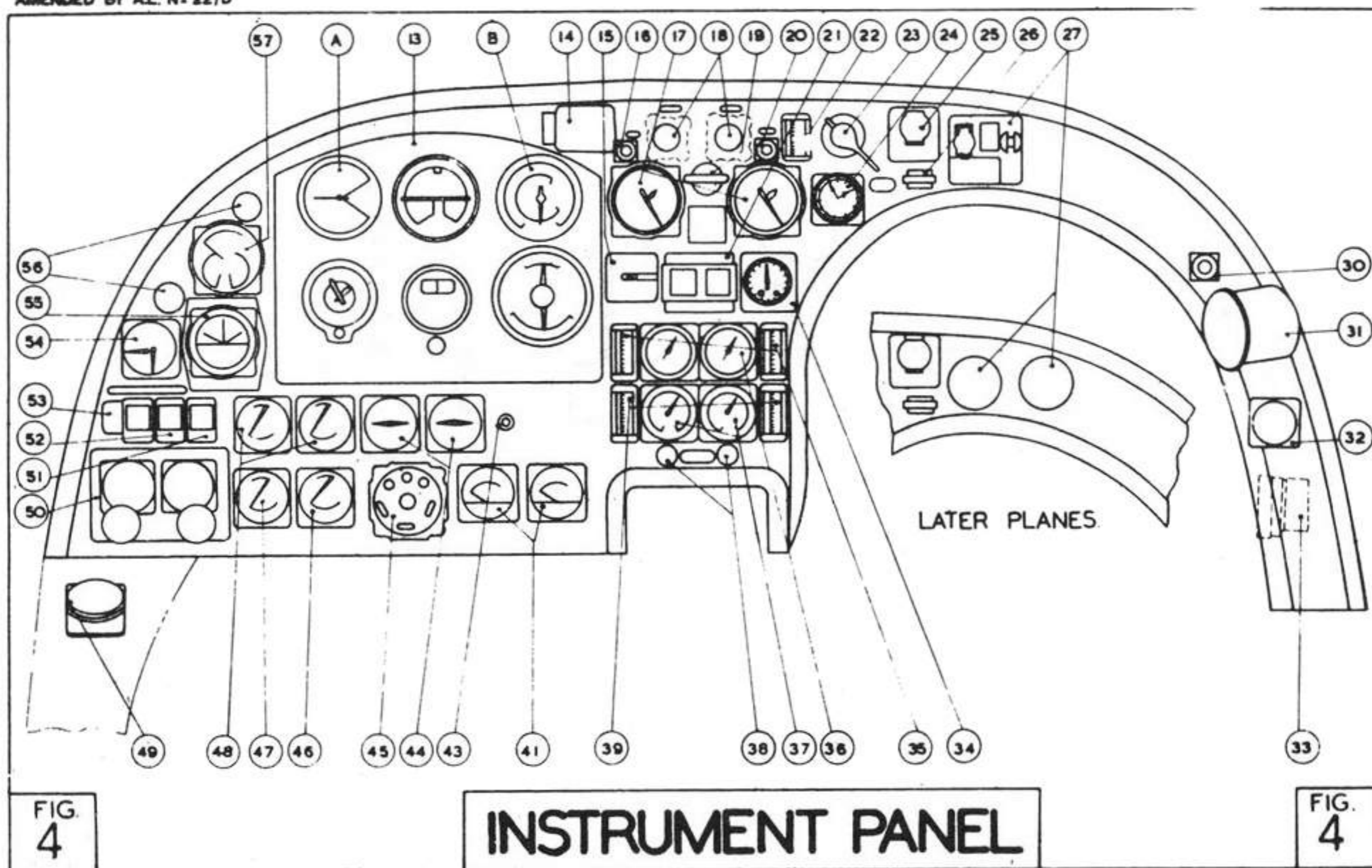
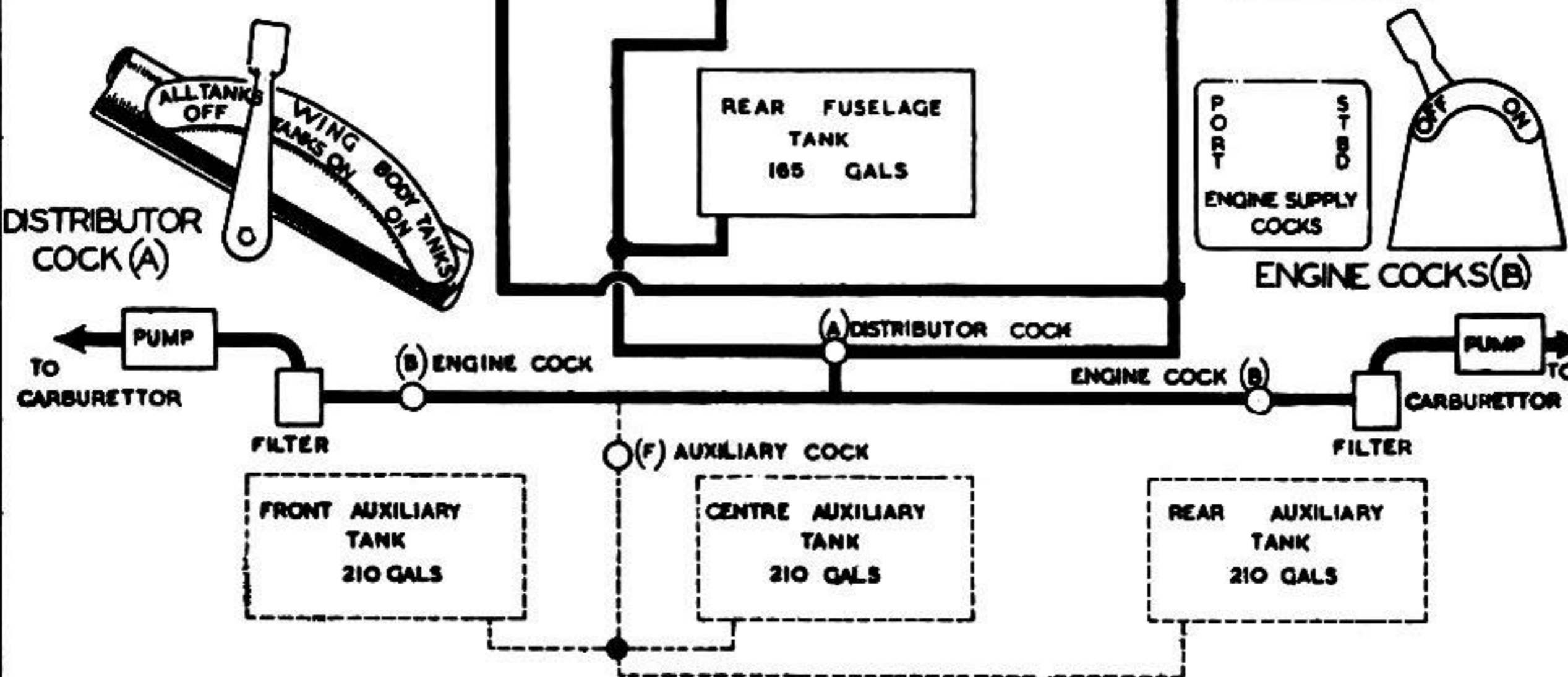


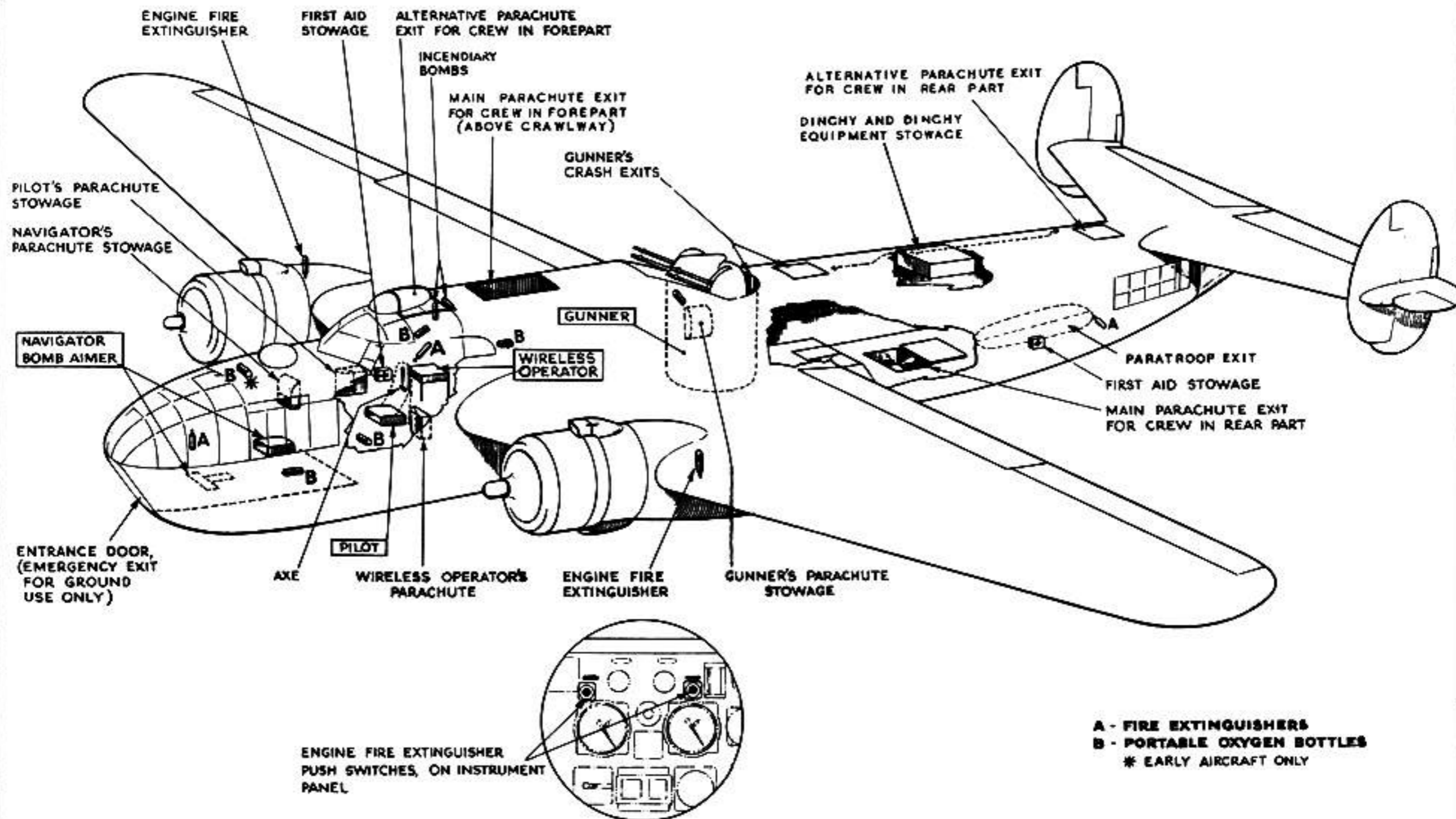
FIG 5



AP1688A VOL. 18 P.N. SECT. 1

FIG 5

FUEL SYSTEM DIAGRAM



HANDLING AND FLYING NOTES FOR PILOT

1. ENGINE DATE: HERCULES XI

(i) Fuel: 100 octane only

Oil: See A.P.1464/C.37

(ii) The principal engine limitations are as follows:

		Boost		Temp. °C	
		R.P.M.	lb./sq.in.	Cylr.	Oil Inlet
MAX, TAKE-OFF	*				
To 1,000 ft.		2,800	+6 $\frac{3}{4}$	-	-
MAX. FLIMBING	M)				
$\frac{1}{2}$ Hr. limit	S)	2,500	+3 $\frac{1}{2}$	270 (290)	90
MAX. RICH	M)				
CONTINUOUS	S)	2,500	+3 $\frac{1}{2}$	270 (290)	80
MAX. ECONOMICAL	M)				
CONTINUOUS	S)	2,500	0	270 (290)	80
MAX. ALL-OUT	M)				
5 MINS. LIMIT	S)	2,800	+6 $\frac{3}{4}$	280 (300)	100

Temperatures in brackets are permitted only when operational conditions make observance of the normal limitations impracticable.

MAX. CYLINDER TEMPERATURE AT START OF
TAKE-OFF: 230°C

2. FLYING LIMITATIONS

(i) Maximum speeds for:

Bomb doors open:	315 m.p.h. I.A.S.
Diving flaps up:	315 m.p.h. I.A.S.
Diving flaps down:	200 m.p.h. I.A.S.
Undercarriage down:	145 m.p.h. I.A.S.

(ii) Maximum weights for:

Take-off and straight flying only: 36,500 lb.
Landing and all forms of flying: 32,500 lb.

3. PRELIMINARIES

(i) On entering the cockpit check the following:

(a) Brakes	On
(b) Undercarriage selector lever	DOWN
(c) Flap selector lever	UP
(d) Bomb Doors	CLOSED

Note: If the hydraulic accumulators are charged the services will function even if engines are not running.

(ii) Switch on undercarriage and flaps indicators and gauges

(iii) Prime propeller controls in the fully down position.

4 STARTING ENGINES AND WARMING UP

(i) Set fuel cocks to BODY TANKS ON (normally) or WING TANKS ON (if fuller) and engine supply cocks to ON.

(ii) Set engine controls as follows:

Throttles	$\frac{3}{4}$ inch open
Mixture control	NORMAL
Propeller controls	INCREASE R.P.M.
Superchargers	LOW
Carburettor air intake	COLD
Cowling gills	OPEN *

In very cold weather the cowl gills and chain may be iced up, therefore, run the engine for 2 minutes before operating the cowling gills motor. Failure to observe this precaution may damage both the driving shaft and the motor.

- (iii) It is not necessary to prime the carburettors unless the aircraft has been standing for a week or more.

Note: When priming the carburettors the engine supply cocks must be in the OFF position.

- (iv) Have each engine turned slowly by hand for at least two revolutions of the propeller in order to ensure that oil will not cause a hydraulic lock of pistons or sleeves.
- (v) High volatile fuel (Stores Ref: 34A/111) should be used for priming at air temperatures below freezing. Turn the primer suction cock to FROM PETROL SYSTEM ORDINARY FUEL or SPECIAL STARTING FUEL, and work the cylinder priming pump until the suction and delivery pipes are full. This may be judged by a sudden increase in resistance
- (vi) Switch ON ignition.
- (vii) Switch on the booster-coil switch and press the starter button for each engine in turn, for periods of not more than 20 seconds with a 30 seconds wait between each.
- (viii) The induction system of each engine will be primed while it is being turned, and the engine should start after the following number of strokes if cold:

Air Temperature C	Small pump		Large pump	
	Normal fuel	High Vol. fuel	Normal fuel	High Vol. fuel
+30	3	-	1	-
+20	4	-	1	-
+10	7	-	2	-
0	10	3	2½	½
-10	-	8	-	2
-20	-	18	-	4½

- (xi) At temperatures below 0°C it will probably be necessary to continue priming after the engine has fired and until it picks up on the carburettor.
- (x) Switch off booster coil when the engine is running steadily.
- (xi) The priming pump must then be screwed down, and all priming cocks turned off.
- (xii) Idle for a minute at low r.p.m. then warm up at a fast tick-over.

5. TESTING ENGINES AND INSTALLATIONS

During Warming up:

- (i) Test the hydraulic system by lowering and raising the flaps
- (ii) Allow pressure to build up and check gauge;
1400 to 1450 lb./sq.in.

Amended in Vol 1 by A.L.No.31.
Amended in Pilot's Notes by .AL/G.

After Warming Up for each engine in turn:

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

- (iii) At 1,500 r p m exercise and check operation of two-speed supercharger by changing to S ratio and back to M
- (iv) Open up to zero boost and test operation of the constant speed propeller by moving the lever slowly down..During this test prime the propeller control in the fully down position. Return the lever fully up.
- (v) Open the throttle fully and check static boost and r.p.m.
- $6\frac{3}{4}$ lb./sq.in. at 2,800 r.p.m
- (vi) Close the throttle slowly to maximum rich continuous boost, and, if propeller is still constant speeding, further until r.p.m. drop slightly. Test each magneto, the drop should not exceed 50 r.p.m.

6. TAXYING OUT

- (i) Check brake pressure (150 lb./sq in.) before taxying
- (ii) While taxying, hold the control column forward.
- (iii) Avoid overstraining the nose-wheel by turning too sharply, and do not attempt to turn when not in forward motion.

7. CHECK LIST BEFORE TAKE-OFF

- | | |
|-------------------|--|
| T - Trimming tabs | - All zero |
| M - Mixture | - NORMAL |
| P - Propeller | - INCREASE R.P.M. |
| Fuel | - Check contents and main
cocks to fuller tanks.
Engine supply cocks ON. |
| Flaps | - TAKE-OFF |
| Supercharger | - LOW |
| Gills | - $\frac{1}{4}$ OPEN |

8. TAKE-OFF

- (i) Turn into take-off direction and taxi forward a short distance to straighten the nose wheel.
- (ii) Open up against the brakes, at least until the engines are responding evenly.
- (iii) Keep the control column central until the aircraft has gained considerable speed, but any tendency for the nose wheel to dig in must be checked.
- (iv) When airspeed reaches about 100 m.p.h. I.A.S. at 36,500 lb. pull the aircraft off the ground by moving the control column progressively back. When light, take-off speed may be 80 m.p.h. I.A.S.
- (v) Safety speed is 130 m.p.h. I.A.S.

9 CLIMBING

- (i) Half open the gills at about 500-600 feet.
- (ii) At safe height, change over to auxiliary tanks (if carried.) These should be used before the main tanks are emptied.
- (iii) Speeds for maximum rate of climb:

	m.p.h. I.A.S.
Between sea level and 15,000 feet.	130
Between 15,000 feet and 18,000 feet	125
Above 18,000 feet	120

- (iv) For maximum range climb at 140 m.p.h. I.A.S. at maximum climbing boost and r.p.m. It is not possible to climb satisfactorily in weak mixture at full load.
- (v) Change to S gear when boost has fallen by 3 lb./sq.in. (about 7,500 feet).

10. ECONOMICAL CRUISING

- (i) At medium and high altitude: Fly in M gear and weak mixture just short of zero boost (if obtainable) and reduce speed by reducing r.p.m. which may be as low as 1,700 if this will give the recommended speed. Change to S gear if the recommended speeds given below cannot be obtained in M gear at 2,500 r.p.m.
- (ii) At low Altitude: Fly in M gear and weak mixture just short of zero boost at 1,700 r.p.m. and accept whatever speed this gives unless it falls below the speeds recommended (see iii) when the r.p.m. should be increased.

Amended by A.L.No.16/C.

(iii) Recommended speeds:

Out	145 m.p.h. I.A.S.
Home	130 m.p.h. I.A.S.

If one average speed is to be used throughout fly at 140 m.p.h. I.A.S.

(iv) Warm air intakes will not appreciably affect air miles per gallon.

11. GENERAL FLYING

(i) Stability: The longitudinal stability is satisfactory except with the C.G. aft.

(ii) Change of trim:

Undercarriage down:	Slightly tail heavy
Flaps to take-off from UP	Strongly nose up
Flaps to fully down from take-off	Little change
Bomb doors open	No change

(iii) All-out level flight: Small increases in all-out level speed may be obtained by reducing r.p.m. to 2,650 between 4,500 and 12,000 feet. S ratio should be used above 4,500 feet.

12. STALLING

(i) The stalling speeds in m.p.h. I.A.S. are as follows:

	At 29,000 lb.	At 36,000 lb.
Undercarriage and flaps up	85	95
Undercarriage and flaps down	70	80

(ii) Characteristics are:

(a) Gentle but considerable sink before the stall.

(b) Little warning of stall apart from slight vibration.

(c) A wing may drop gently at the stall.

(d) Elevators are not very effective in the recovery if throttles are not opened.

13. MANOEUVRES

(i) Spinning and aerobatics are not permitted.

- (ii) The aircraft must not be subjected to violent manoeuvres at any speed, and care must be taken to avoid imposing heavy loads in recovery from dives or by rapid turns at high speed.

14. DIVING

The aircraft must be trimmed into the dive in the normal way, whether the flaps are fully down or up.

15. CHECK LIST BEFORE LANDING

- (i) Check brake pressure (150 lb./sq.in.)
- (ii) Reduce speed to 150 m.p.h. I.A.S. by lowering flaps to take-off position.
- (iii) Check:
 - U - Undercarriage DOWN
 - M - Mixture NORMAL
 - P - Propeller INCREASE R.P.M.
 - Superchargers LOW
 - F - Flaps Selector lever fully down to DIVE AND LAND

(iv) Correct speeds for approach (m.p.h. I.A.S.)

	<u>at 32,500 lb.</u>	<u>at 26,500 lb.</u>
(a) Engine assisted	105	95
(b) Glide	120	110

- (v) The rate of descent must be checked just before the touch-down, and the pilot must try to land the aircraft by letting the main wheels skim on to the ground, with the nose wheel kept just clear of the ground for as long as possible
- (vi) The aircraft must be given as long a landing run as possible after the touch-down and brakes must be used as lightly as possible and only when all three wheels are firmly on the ground.

WARNING: It is important to avoid any sudden forward pitching of the aircraft on landing.

16. MISLANDING

- (i) Raise the undercarriage immediately.
- (ii) When the undercarriage is locked UP raise the flaps to TAKE-OFF position - there is no noticeable sink or change in trim.

- (iii) After gaining speed and height raise the flaps to the UP position - there is a considerable nose down change in trim, but the movement of the flaps is slow.

17. AFTER LANDING

- (i) Raise the flaps and open the gills before taxiing.
- (ii) Check brake pressure.
- (iii) Change to S ratio once and back to M ratio.
- (iv) Park the aircraft with the nose wheel straight.
- (v) To reduce the risk of fire in the induction system and to prevent subsequent hydraulicing, stop engines as follows:
 - (a) Run engine at 800 to 900 r.p.m until cool.
 - (b) Open up slowly and evenly to -2 lb./sq.in. boost for 5 seconds.
 - (c) Close throttle slowly and evenly, taking about 5 seconds, until speed falls to 800 to 1,000 r.p.m. and run at this speed for 2 minutes, or longer if diluting; pull cut-out and switch off ignition after engine stops.
- (vi) Switch off indicators and turn OFF all fuel cocks.

18. OIL DILUTION

See A.P.2095. The dilution period should be 4 minutes at 900/1000 r.p.m. (not over 1000 r.p.m.)

19. ENGINE FAILURE

- (i) During take-off:
 - (a) Safety speed is 130 m.p.h. I.A.S.
 - (b) It is also necessary to have enough height to raise the flaps, as in the TAKE-OFF position they decrease single-engine performance.
 - (c) The propeller of the dead engine must be feathered immediately.
 - (d) Any bomb load should be jettisoned as soon as possible
 - (e) At 29,000 lbs. it may be possible to climb away slowly.

(ii) In-flight:

Fly in M ratio at 2,650 r.p.m. and $+3\frac{1}{2}$ lb./sq in. boost at 130 m.p.h. I.A.S. This will give the slowest possible rate of descent from altitude and should allow level flight below 4,009 feet unless the engine failure has occurred soon after take-off with full fuel in the main tanks.

20. UNDERCARRIAGE EMERGENCY OPERATION

- (i) In the event of failure of the engine-driven pumps, the accumulators will operate the undercarriage and flaps once, through the normal controls, provided the pressure available is 1,200 - 1,400 lb./sq.in.
- (ii) Should the above not be successful the handpump should be used. In this case the EMERGENCY SELECTOR beside the handpump must be left in the normal position.
- (iii) If the above method fails the EMERGENCY SELECTOR should be pushed forward and the handpump used, which then operates through an independent pipeline system, and only lowers the undercarriage.

21. FEATHERING AND UNFEATHERING

- (i) When feathering, the button should be held in until it stays in by itself, and then released so that it can spring out when feathering is complete. The throttle should then be closed immediately.
- (ii) When unfeathering set propeller lever to DECREASE R.P.M., hold the button in; release it when the r p.m. are 1000 to 1,300. Slight opening of the throttle may then be needed before the propeller will return to constant speeding.

22. FUEL AND OIL CAPACITIES AND CONSUMPTIONS

(i) Normal fuel capacity:

2 WING TANKS (200 gallons each):	400 gallons
2 FUSELAGE TANKS (204 and 165 gallons):	369 gallons
<u>Total normal capacity:</u>	<u>769 gallons</u>

(ii) Long-range fuel capacity:

3 AUXILIARY TANKS (210 gallons each):	630 gallons
<u>Total long-range capacity:</u>	<u>1,399 gallons</u>

(iii) Normal oil capacity:

1 Pair of tanks per engine
(29½ gallons per pair): 59 gallons

(iv) Long-range oil capacity:

1 Pair of tanks per engine
(47 gallons per pair): 94 gallons

(v) Fuel consumptions:

(a) The approximate total consumptions in RICH mixture are as follows:

Boost lb./sq.in.	R.P.M.	Consumption galls/hour
+6¾	2,800	290
+3½	2,500	222

(b) The approximate total consumptions in WEAK mixture are as follows:

Boost lb./sq.in.	M ratio At 10,000 ft.			S Ratio At 15,000 ft.		
	R.p.m.			R.p.m.		
	2,400	2,200	2,000	2,400	2,200	2,000
+1	126	117	106	120	112	104
0	118	110	100	114	106	98
-1	110	102	94	108	100	92
-2	103	95	87	102	94	86
-3	96	87	81	96	88	81
-4	88	80	74	90	82	75

For every 2,000 ft. above height quoted add 1 gall/hour
For every 2,000 ft. below height quoted subtract 1 gall/hr.

23. POSITION ERROR

The corrections for position error are as follows:

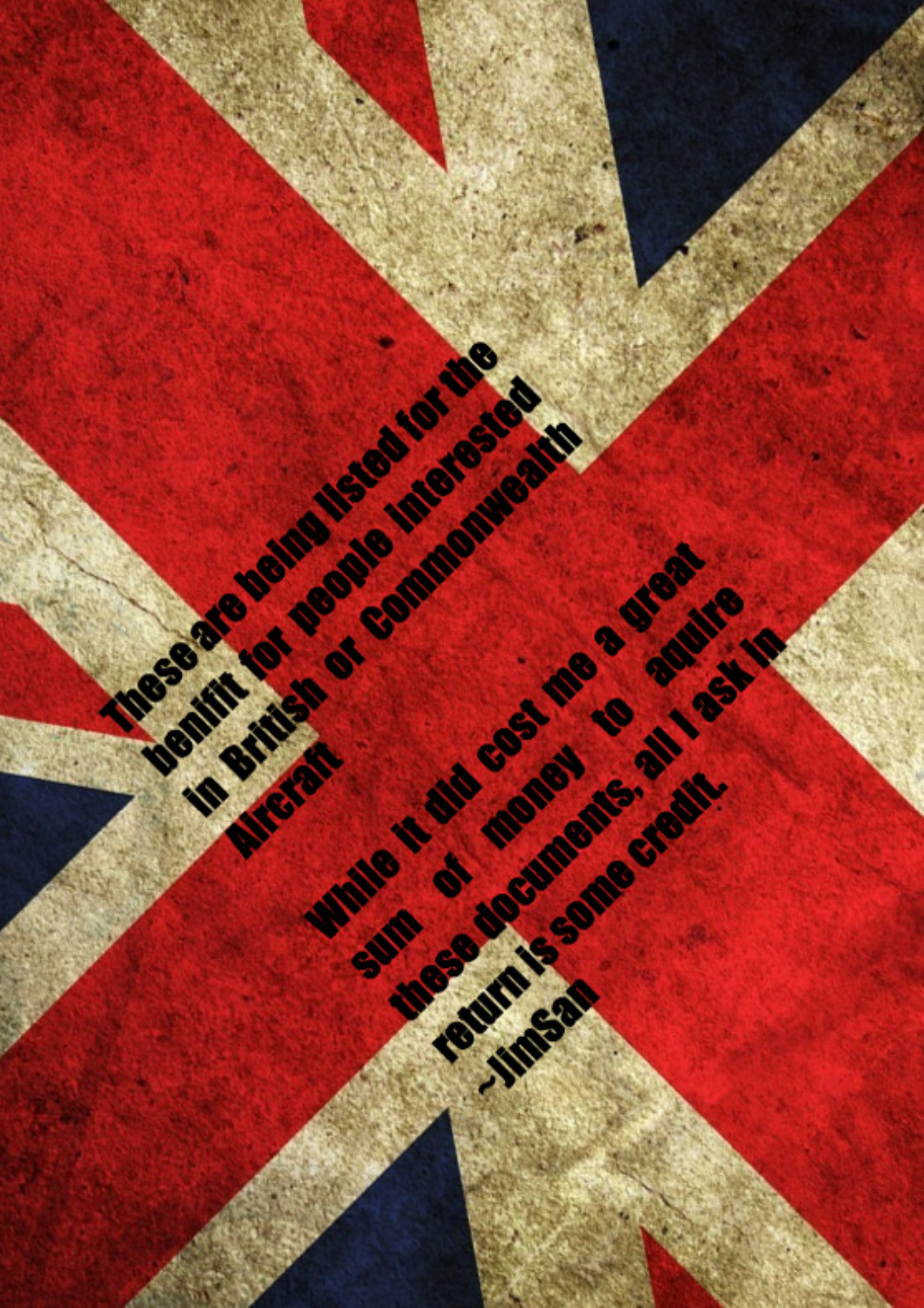
From To	120 135	135 150	150 180	180 200	200 225	225 260	m.p.h. I.A.S. m.p.h. I.A.S.
Add Subtract	8 -	6 -	4 -	2 -	0 0	- 2	m.p.h. m.p.h.

24. FUEL JETTISONING

On later aircraft the contents of the two wing tanks can be jettisoned. A panel to starboard by the pilot's seat carries a master valve and two jettison cock controls, one for each tank. To jettison the contents of a tank, the cock should be set fully ON (against the stop) and the master valve then opened to admit air so operating the jettison valve on the tank. The master valve should always be closed while the jettison cock controls are being set ON or OFF. Discharge pipes which carry the fuel clear of the tail, and flaps if down, extend automatically when the jettison cocks are turned ON, and, should a pipe fail to extend, the jettison valve in the tank does not open. The entire contents of each tank, less one gallon which remains, can be jettisoned in about 4 minutes.

25. DITCHING

- (i) It is especially important to ditch this aircraft at the lowest possible speed to avoid a tendency to dive on impact causing severe fore and aft shock and possible break up of the structure.
 - (a) Jettison bombs, if possible, and close bomb doors.
 - (b) Lower flaps to TAKE-OFF position. In conditions of good visibility, permitting accurate judgement for flattening out, flaps may be set to DIVE AND LAND position to reduce speed to the utmost.
 - (c) Ditch up wind in the absence of big waves or steep swell.
 - (d) If possible, use engines to reduce the speed of touch-down; if one engine only is available use a little power to flatten the approach.
- (ii) The crew should be prepared for severe fore and aft shock, as the retardation may be very high.
- (iii) Flotation qualities are relatively good especially if wings remain intact.



**These are being listed for the
benefit for people interested
in British or Commonwealth
Aircraft**

**While it did cost me a great
sum of money to acquire
these documents, all I ask in
return is some credit.
~JimSan**