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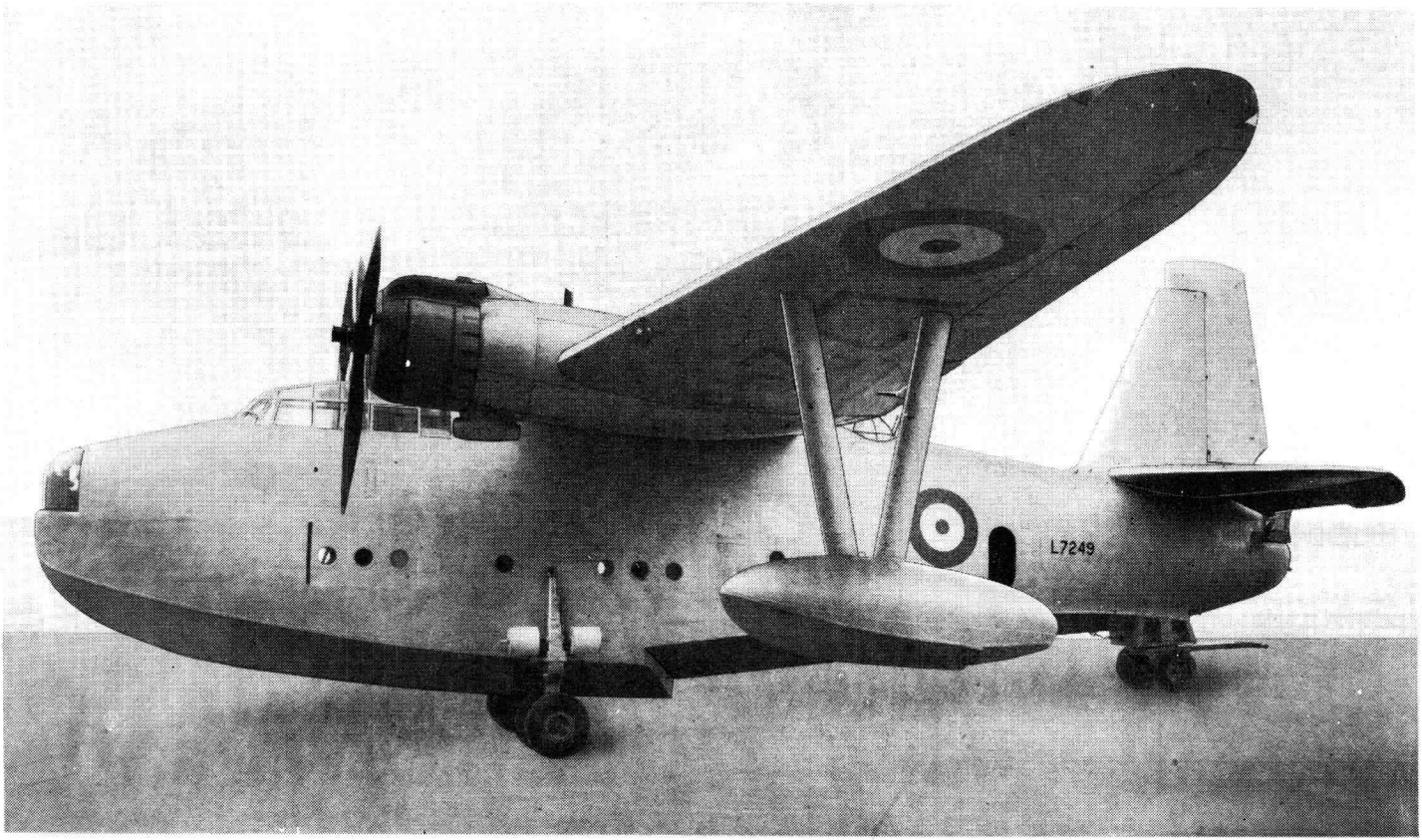
AIR PUBLICATION 1666A
Volume I

Spare

LERWICK I AEROPLANE
TWO HERCULES II ENGINES

AIR MINISTRY



SIDE VIEW OF LERWICK I AEROPLANE (FLYING BOAT)

FOR OFFICIAL USE ONLY

AIR PUBLICATION 1666A
Volume I

THE LERWICK I AEROPLANE

TWO HERCULES II ENGINES

Promulgated for the information and guidance of all concerned

December, 1939

By Command of the Air Council

A. W. STREET.

AIR MINISTRY

F.S./2

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.	1	2	3	4	5	6				
Prelimy. matter										
Leading Partics.										
Introducn.										
Section 1										
Section 2	[illegible]	[illegible]	[illegible]	[illegible]	JS	✓				
Section 3										
Section 4										
Section 5										
Section 6										
Section 7										
Section 8										
Section 9										
Section 10										
Section 11										
Section 12						OB				
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Continued overleaf

Amendt. List No.										
Prelimy. matter										
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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.										

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.)

Note:- Additional sections will be issued as and when they are prepared.

LEADING PARTICULARS

Type:..... Twin-engined, high wing monoplane, flying boat.
Duty ..... General Purposes

PRINCIPAL DIMENSIONS

Aeroplane in flying attitude -	
Span	80 ft. 10 in.
Length	63 ft. 7½ in.
Height over rudder	23 ft. 5 in.
Aeroplane on beaching chassis and tail trolley -	
Length	63 ft. 6 in.
Height over airscrew - upper blade vertical	23 ft. 6 in.
Height over airscrew - lower blade vertical	20 ft. 2 in.
Height over rudder	22 ft. 4½ in.
Height over engine cowling	19 ft. 0 in.
Hull -	
Overall length	63 ft. 7½ in.
Overall width	8 ft. 6 in.
Overall depth	14 ft. 6 in.
Draught at 28,000 lb.	3 ft. 6 in.

Main plane

Aerofoil section	N.A.C.A.23012 modified
Span of centre section	25 ft. 0 in.
Chord at centre section	13 ft. 9 in.
Chord at rib 13 (before washout)	7 ft. 2¼ in.
Incidence at centre section	$3\frac{1}{2}^{\circ}$ ± 25'
Incidence at rib 13	2° ± 25'
Dihedral, centre section	0° ± 25'
Dihedral, outer wings, at front spar between ribs 1 and 12	1° 50' ± 25'
Span of each aileron	17 ft. $10\frac{9}{16}$ in.
Chord of aileron (max.)	2 ft. 4¾ in.
Length of flap on each side of hull	17 ft. 6 in.
Chord of flaps (mean)	2 ft. 5½ in.

Tail plane

Span	25 ft. 6 in.
Chord (max.)	9 ft. 0 in.
Incidence, fixed	3°

AREAS

Main plane including ailerons	845 sq.ft.
Ailerons (two)	72 sq.ft.
Flaps -	
Centre section (two)	45.5 sq.ft.
Outer wing (two)	39.0 sq.ft.
Flaps total	84.5 sq.ft.
Tail plane with elevators	165.0 sq.ft.
Elevators (two)	30.0 sq.ft.
Fin	42.0 sq.ft.
Rudder with trimming tab	39.5 sq.ft.
Rudder trimming tab	3.1 sq.ft.

RANGES OF MOVEMENT AND SETTINGS OF CONTROL SURFACES

Tail plane		Fixed
Ailerons	Up	20° $^{+2^\circ}_{-0^\circ}$
	Down	13° $^{+1^\circ}_{-0^\circ}$
Flaps	Down	$50^\circ \pm 25'$
Elevators	Up	25° $^{+2^\circ}_{-0^\circ}$
	Down	20° $^{+2^\circ}_{-0^\circ}$
Elevator trimming tabs	Up	$6^\circ \pm 25'$
	Down	$6^\circ \pm 25'$
Rudder	Each way	30° $^{+2^\circ}_{-0^\circ}$
Rudder trimming tab	Each way	$7^\circ\ 30' \pm 25'$

FLOATS

Length	10 ft. 6 in.
Width	3 ft. 3 in.
Depth	3 ft. 2 in.
Distance between centres (approx.)	53 ft. 6 in.

ENGINES

Name	Hercules II
Number installed	Two
Type	14-cylinder, sleeve-valve, air-cooler radial, moderately supercharged.
Distance between centres	19 ft. 0 in.
Fuel	Specification D.T.D.230
Oil	Specification D.T.D.109

AIRSCREWS

Type	de Havilland, variable pitch, 20° pitch range, D.I.S.No.18, Type 6/1, (see A.P.1538, Vol.I).
Control	Constant-speed
Pitch settings	Basic 33° Coarse 32° Fine 13° 30'

TANK CAPACITIES

Fuel (normal) -	
Outboard tanks (4 of 139 gallons each)	556 gallons
Inboard tanks (2 of 112 gallons each)	224 gallons
Total	780 gallons
Fuel (overload) -	
Overload tanks (3 of 220 gallons each)	660 gallons
Total capacity of fuel tanks	1,440 gallons
Oil (normal), two tanks, each containing	28 gallons of oil plus 22.3 gallons air space
(overload) two tanks, each containing	42.5 gallons of oil plus 7.8 gallons air space
Total oil capacity of oil tanks (not including air space)	85 gallons

POSITION AND SETTING OF PRESSURE HEAD

Position.- The electrically-heated pressure head, Mk. VIIIB or Mk. VIIID, is mounted on the forward strut of the port wing tip float, 36 in. vertically down from the underside of the main plane.

Angular setting.- The pressure head should be parallel to the hull datum.

INTRODUCTION

Note.- This Introduction and Sections 1 and 2 are also issued separately as "Pilot's Notes".

1. The Lerwick I is an all-metal high wing flying boat of cantilever monoplane form and is fitted with two Hercules II air-cooled engines. It is designed and equipped for general purpose duties and carries a crew of seven. The following are the main dimensions:- span, 80 ft. 10 in.: overall length 63 ft. 7½ in.; overall height (on beaching chassis and tail trolley) over rudder, 22 ft. 4½ in.: and over airscrews with lower blade vertical, 20 ft. 2 in. The performance of lengthy training exercises is provided for by the installation of an overload fuel system, a workshop bench and vice, a lavatory, facilities for cooking and fresh water tanks. Large lockers, fitted with padded tops and used as sleeping berths, are employed as additional stowage compartments for the numerous items of equipment.

2. Accommodation for a first and second pilot, and for members of the crew acting as navigator, observer, engineer and wireless operator, is provided in an enclosed cabin which forms an upper deck of the hull forward of the main plane leading edge. Entrance to this cabin is gained through the roof of the wardroom, with the aid of a ladder, after entering the door on the starboard side of the hull. A door on the port side of the hull facilitates entry by members of the crew to the galley, from which compartment access to the wardroom may be gained after passing along the hull through the main aft-cabin and the mid stowage compartment.

3. The hull is constructed of alclad and, with the exception of the control cabin forming the upper deck, is divided by bulkheads into seven compartments of which three, the wardroom, the main-aft cabin and the galley accommodate part of the crew for whom walkways, platforms and seatings are provided. These compartments may be rendered watertight to well above the water level by swashboards which fit into the lower portion of the bulkheads, thus enabling the aeroplane to be kept afloat by isolating any one compartment which may have sprung a leak. The outer compartments form the bow, mid stowage compartment, stern compartment and tail cockpit. The control cabin and the wardroom can be heated by air led through ducts from the rear of the engine oil coolers.

4. The upper surface of the centre section above the hull between the engine nacelles, constitutes a deck over which the crew may walk without damaging the plating. There are numerous windows and hatchways in the hull through which observations can be taken by means of the various instruments carried. Three gun turrets are incorporated, one at the bow, a second at the mid decking position and a third at the

stern of the hull. The bow and mid turrets are retractable and the stern turret is built into the hull to form the tail cockpit. The turrets and the bomb doors are hydraulically operated.

5. The main plane, with the exception of the tips, is of all-metal construction and consists of a centre section and a port and starboard main plane, each outer plane being cantilevered and devoid of all external bracing. Frize type ailerons and hydraulically operated flaps are incorporated. The alclad wing tip floats are suspended on streamline struts below each main plane.

6. The tail unit, which is of all-metal construction and devoid of all external bracing, incorporates a single fin and rudder, two elevators and a tail plane. The trailing portions of the rudder and elevators are fitted with trimming tabs which are operated by means of handwheels in the control cabin.

7. All controls to the control surfaces are arranged internally. The primary flying controls comprise a control column with a spectacle type handwheel and a centre-pivoted rudder bar and provision is made for the installation of dual control in tandem. The pilot's seat is adjustable for height and the rudder pedals are adjustable for leg reach. Automatic controls are fitted to operate the ailerons, elevators and rudder when desired. Locking gear is provided for the control column and rudder control.

8. The two Hercules II engines, fitted with constant-speed variable-pitch airscrews, are each mounted in a nacelle built into the leading edge of the centre section inboard of the main plane joints. Normally the engines are started electrically but, in an emergency, may be started by hand-turning gear. The normal fuel supply is contained in six tanks mounted side-by-side between the two engine nacelles in the centre section, and the overload supply is carried in three tanks housed in a gas-tight compartment within the hull over the main aft cabin.

9. The pilot is provided with a main fuel emergency shut-off control for each of the port and starboard systems, but the cocks for operating the fuel supply during normal flight and overload conditions and for refuelling and draining are controlled from the bulkhead at the rear of the main control cabin, the pilot issuing the instructions for their operation. The pilot has full control to jettison fuel from either the tanks of the normal system or from those of the overload system.

10. Provision is made for fitting four universal bomb carriers which are arranged in pairs inside each main plane. Collectively the carriers are capable of supporting one of the following loads:- Four 500 lb. bombs, eight 250 lb. bombs, four 250 lb. type B bombs or four 250 lb. bombs with four 280 lb. bomb containers.

11. The electrical installations, for which power is supplied from a generator driven by the port engine, together with two 12 volt batteries in series, provides power for the usual lighting services, mast-head light, landing lamps and call signals, including flare release, fuel tank gauges, drogue signalling, as well as formation keeping and fleet recognition lights, camera operation and

automatic control cut-out switches. A wireless installation comprising a transmitter and receiver which provide for short, medium and long wave transmission and reception are also included; either R/T, C.W or I.C.W. may be radiated.

12. For engine starting and to conserve the current normally taken from two main electric starting batteries, a plug-in-socket is provided to allow an external power supply to be connected. The batteries from which the general electrical services derive current, are charged by the engine-driven generator during flight or by the generator incorporated in the auxiliary power unit when the aeroplane is at rest. The two main engine electric starting batteries are also charged by the generator of the auxiliary power unit.

13. The equipment of the aeroplane includes general accessories used in conjunction with armament, emergency freight and maintenance gear, miscellaneous marine and ground equipment, navigational instruments and aerial photography. An auxiliary power unit is installed for bilge pumping, refuelling, air supply and battery charging and is mounted in a special compartment in the top decking of the hull. Other equipment includes, first-aid outfit, hammock, inflatable dinghies with repair outfits, signal pistol and cartridges, flame floats, sea markers and flares, leak stoppers, fire extinguishers, parachutes, fireman's axe, handbell, drogues, special stowage for spare airscrew hub and three spare blades and airscoops which may be fitted into the portholes of the hull for ventilation purposes.

SECTION 1

CONTROLS AND EQUIPMENT IN PILOT'S CONTROL CABIN

SECTION 1

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

SECTION 1

CONTROLS AND EQUIPMENT IN PILOT'S CONTROL CABIN

Introductory

1. The arrangement of the flying and other controls and equipment in the pilot's control cabin is illustrated and annotated in figs. 1 - 10. Each item is given an individual number, and a key to the items referenced will be found at the end of this section facing each illustration. Where the items are referred to the numbers are quoted in brackets, and explanatory notes on the function and operation of particular items are given where necessary.

Fuel and oil

2. The fuel and oil to be used with the Hercules II engines are:-

Fuel ..... ~~Specification D.T.D.230~~ "100 Octane only" (Stores Ref.34A/59)
Oil ..... Specification D.T.D.109 (Stores Ref.34A/32 and 33)

Accommodation

3. Seats and harness gear.- Seating accommodation is provided for members of the crew acting as navigator, observer, engineer and wireless operator, in addition to the first and second pilots' seats at the front of the control cabin. The navigator's seat which is arranged to fold below the chart table, is free to slide athwartships to clear the starboard gangway, and the observer's seat is free to swivel. In front of the bulkhead at the rear of the cabin, a swivel type seat and a folding table are arranged at the engineer's station on the starboard side, and a seat facing forward is arranged at the wireless operator's station on the port side. All the seats are fitted with padded cushions and safety belts. The pilot's safety belt is of the body type whilst the remainder are of the lap type.

Aeroplane controls

4. Dual flying controls.- Dual flying controls and a second pilot's seat in the control cabin are arranged in tandem. The dual controls are linked into the first pilot's controls under the control cabin platform and if desired can either be disconnected or removed. When the second pilot's seat and dual controls are fitted, a table and other navigational equipment in the control cabin are removed, and observations are then taken from the wardroom, where a table, normally carried in the mid stowage compartment, is erected.

5. The two control columns for the movement of the elevators are interconnected by push-pull rods and the rudder and aileron controls are interconnected by a system comprising cables and short lengths of roller chain. The rudder bars are of the parallel motion type which pivot on interconnected vertical torque shafts. The rudder pedals are adjustable in a fore-and-aft direction for leg reach. The throttle and mixture controls are duplicated, but the first pilot only is responsible for the operation of the flaps, the bomb doors, and the controls of the elevator and rudder trimming tabs. The levers and switches for the operation of the Mk.IV automatic controls are under the direct control of the first pilot only.

6. Control column.- The control columns at their lower ends are mounted on separate rocker shafts. A quadrant (35), at the top of the control column (36), is rotated to operate the ailerons; elevator control is obtained by fore-and-aft movement of the column (36) whilst gripping the quadrant (35).

7. Rudder bar.- The rudder bar (37) is of the normal pivoted type with screw adjusters fitted horizontally at the rear of each pedal.

8. Trimming tab controls and indicator.- Two handwheels adjacent to the outboard side of the first pilot's seat, serve to operate the rudder and elevator trimming tabs. The handwheel (50) on the vertical spindle operates the rudder tab, and the handwheel (49) on the horizontal spindle operates the tabs of the elevators.

9. A triple type indicator, which is also used to register the position of the flaps (see para.11)is mounted on the instrument panel at the front of the cabin and is fitted with separate pointers to indicate, at the port side of the dial the position of the elevator trimming tabs, and at the top of the dial the position of the rudder trimming tabs. Forward movement of the elevator tab handwheel moves the port pointer (23) in a counter-clockwise direction, to trim for tail heaviness, and vice versa to trim for nose heaviness. Clockwise rotation of the rudder tab handwheel increases starboard rudder movement and the vertical pointer (22) moves over to the starboard side of the dial and vice versa.

10. Flap control and indicator.- The flap control lever (58) which is mounted on the rear of frame 7, near the port side of the first pilot's seat, is connected to the distributor valve-box of the hydraulic system by an arrangement of push-pull rods and bell crank levers.

11. The three positions UP, NEUTRAL and DOWN are labelled on the lever mounting, as well as being indicated by the pointer (21) at the right of the dial on the triple indicator which also gives the position of the rudder and elevator trimming tabs as described in para.9.

12. The pointer (21) which indicates the position of the flaps, moves in a clockwise direction for DOWN and vice versa.

Automatic flying controls

13. General.- The handlevers and switches for the operation of

the three axes Mk.IV automatic controls are on the port side of the cabin and are within easy reach of the first pilot only. A speed and steering lever (76 and 75), a clutch lever (72), a control cock lever (71) and an attitude lever (67), as well as a resetting switch (68), a main switch (69) and a cut-out switch (70) are mounted on a separate panel (30) between frames 6 and 8. There is, however, a steering control which may be operated by the occupant in the bow compartment, this control being coupled by cables to the steering lever (75) in the control cabin.

14. The aileron unit and the combined rudder and elevator unit are mounted on the port side of the hull below the control platform. The motors are fitted with sprockets around which short lengths of chain are fitted, and cables with adjusters are connected to the manual controls. A full description of the Mk.IV automatic controls will be found in A.P.1469A.

15. Steering and speed levers.- The steering lever (75) is outboard of the speed lever (76) both of which rotate about a common spindle on the mounting. To steer LEFT the outboard lever is moved backwards and vice versa; to increase speed the inboard lever is moved forward and vice versa.

16. Clutch lever.- The clutch lever (72) is pulled backwards to the OUT position to disengage the clutches and vice versa. An arrow on the mounting serves to indicate the OUT position.

17. Control cock lever.- There are three positions for the setting of the control cock lever (71), i.e. backwards for OUT, centre for SPIN and forward for IN.

18. Attitude control.- The crank handle (67) of the attitude control should be rotated counter-clockwise for UP and vice versa. The pointer on the movable disc, which is controlled by the crank handle, moves over a graduation from 0^{o} at the centre to a 25^{o} position either side to indicate the setting at which the pointer should be placed to obtain the required attitude.

Engine controls

19. Throttle control levers.- The carburettor throttle levers of the port and starboard engines are actuated by two throttle control levers (60 and 61). These levers are incorporated in a combined throttle box (48) which is mounted at the outboard side of the first pilot's seat in the control cabin. The knob of the lever (60), for controlling the throttle of the port engine, is coloured red, and the knob of the lever (61) for the starboard throttle is coloured green. The controls are oil operated, and the control levers regulate Exactor transmitting units within the combined throttle box, each unit being connected by small bore pipes, to a receiver unit in the nacelles, for operating the carburettor throttle levers of each engine. Forward movement of each control lever opens the throttle and vice versa.

Owing to the possibility of a reduction in pressure within the pipe-lines of the system it is most essential that each system should be primed before commencing to operate the controls. To prime the system the throttle control levers should be pushed fully forward beyond the TAKE OFF position and held there for a few seconds before returning the levers to the SHUT position.

20. Mixture control lever.- The mixture control lever (62), which is inboard of the two throttle control levers, operates the automatic mixture controls of both engines. The automatic control is incorporated in the throttle box (48) and the lever cannot be operated unless the throttle control levers are forward of the cruising range position. The mixture control lever is automatically returned to the NORMAL position when either or both of the throttle control levers are moved out of the cruising range. The position of the mixture control lever is forward for WEAK and backwards for NORMAL. The control is oil operated and the system should be primed before use in a similar manner to that given for the throttle control levers in para.19, with the lever fully forward and held there for a few seconds before returning the lever to the NORMAL position.

21. Throttle box instruction label.- An instruction label, to indicate the direction of movement and the function of the control levers is attached to the rear of the combined throttle box (48) in the control cabin.

22. Boost control.- The boost control in incorporated in the engine and automatic action takes place at certain throttle openings.

23. Second pilot's throttle box.- The second pilot's control box, when installed for dual control purposes, contains two throttle levers only, the hand knobs of which are coloured, one red for the port engine and the other green for the starboard engine. The levers are linked to the corresponding levers in the first pilot's throttle control box (48).

24. Airscrew controls.- The constant speed units which serve to govern the variable pitch airscrews are controlled by the two levers, which are incorporated in the combined throttle control box, outboard of the engine throttle levers in the control cabin. The lever (64) controls the unit of the port airscrew and the lever (63) the unit of the starboard airscrew. For POSITIVE COARSE PITCH the levers take the rear position and TO INCREASE REVS. the forward position. The controls are oil operated and each system, before use, should be primed by pulling the levers fully backwards and holding them for a few seconds in this position before returning the levers to the forward position .

25. Carburettor cut-out controls.- Two levers, one with a red grip and the other with a green grip for operating the carburettor cut-out controls are incorporated at the rear of the throttle box in the control cabin. The lever (53) with the red grip controls the port engine, and the lever (52) with the green grip the starboard engine. It is possible to grasp both knobs at the same time and so stop both engines simultaneously by operating both control levers in an upward direction. The levers are returned to the normal position by means

of springs attached to the cables of the control system in each engine nacelle.

26. When using the cut-out control to stop an engine, it will be necessary to close the throttle, pull out the knob of the cut-out control to release the lever and hold the lever in the upward position until the engine stops.

27. Emergency fuel cock controls.- All the fuel cocks for both the port and starboard systems, with the exception of a master fuel cock in each engine nacelle, are normally controlled from the bulkhead at the rear of the control cabin, but the master cocks in the nacelles are operated by separate levers under the control of the first pilot only. The control levers, one (54) coloured red for the port system and the other (51) coloured green for the starboard system, take the outer positions in relation to the two carburettor cut-out controls, at the rear of the throttle box (48) in the control cabin. To operate either control it will be necessary to release a catch by depressing the spring-loaded knob at the end of the lever and moving the lever to the upward position for ON and downward for OFF; the catch prevents operating the control inadvertently.

28. Carburettor air-intake heat controls.- Two horizontally opposed control levers, one (173) port and the other (196) starboard, operated from the bulkhead at the rear of the control cabin are used to control a spring-loaded shutter embodied in the air-intake of each engine. These shutters, which regulate the air flow through the hot and cold air ducts in each intake, are normally maintained in the cold air positions. The levers open outwards from each other for the SHUT position and towards each other for OPEN position. An instruction label (176) below each lever serves to indicate these positions and also those of the oil cooler controls which operate in a similar manner.

29. Cowling gill controls.- Rotatable handles (175) port (194) starboard, for controlling the gills at the rear of the engine cowls, are operated from the outer positions of the panel (153) carrying the carburettor air-intake heat, and the oil cooler controls, at the rear of the control cabin. To open the gills the handles are rotated in a clockwise direction and vice versa.

Fuel system

30. Normal and overload tanks.- The normal fuel system for both engines is contained in six tanks. These tanks, three port and three starboard, are mounted in the main plane, between the front and rear spars of the centre section. In addition three overload tanks, which form an auxiliary fuel system, are installed in the roof of the hull aft of the bulkhead 15. The normal fuel system also provides the supply to a separate priming system which is incorporated to either refill the auxiliary power unit tank, prime each engine fuel pump or dope the induction manifold of each engine.

31. Engine driven pumps draw fuel to feed each carburettor, either direct from the overload fuel system or from corresponding collector boxes fitted in the port and starboard supply of the normal fuel system. An interconnecting pipe fitted with a balance cock, between the two collector boxes, enables both sets of tanks in the main plane to supply fuel to the two engines. Any one tank of either system can be isolated or, in the event of failure of one supply, both engines can be fed if necessary from one tank only. The three port tanks and the three starboard tanks of the normal fuel system are ach coupled by two pipes to a cock, each cock being connected to the corresponding collector box.

32. Fuel-cock controls.- With the exception of the two master fuel cock controls (51 and 54) at the rear of the pilot's throttle box (48), that operate the emergency shut-off cocks for each engine, the fuel cock controls for the normal, overload and priming systems are operated from the lower portion of the bulkhead at the rear of the control cabin (see fig.10). The cocks of the normal system and those for the priming system are operated from the circular shaped panel (155) whilst the overload system cocks are operated from the rectangular shaped panel (162).

33. The ON and OFF positions of each cock are distinctly indicated on the two panels and each cock is easily identified by the label above each cock. The control panel (155) is mounted on the front of the collector boxes to which various cocks are connected, and the cock levers are numbered and marked from P1 to P8 for the port system and from S1 to S8 for the starboard, the remaining cocks Nos.9 and 10 being on the centre of the panel, above the priming pump lever (159).

34. Different coloured handles and spindles have been allotted to the fuel cocks for distinguishing the various systems. An instruction label (165) on the starboard side of the panel (155) describes the position at which the handles of the various cocks should be placed to control the various systems, and also states that, while in flight, all the cocks which have their handles coloured black should be in the OFF position. The spindles of the port cocks P1 to P8 are painted red and the spindles of the starboard cocks S1 to S8 are painted green. The handles of the port and starboard cocks, Nos.2, 3, 5 and 6 are coloured green, and the handles of cocks Nos.1, 4, 8, 9 and 10 are coloured black. Port and starboard cocks No.7 have black handles but the centre bosses are painted yellow. The three overload fuel cock controls including the control for draining, which are mounted on the panel (162), are coloured blue.

Overload system balance cock

35. An overload system balance cock (160), which is mounted between the two control panels (155 and 162) on the lower portion of the rear bulkhead (see fig.10), should be in the open position when refuelling at points 1 and 2. The handle of the cock is coloured blue and its function, when the engines are operating from the normal system, is to isolate the port and starboard portions of the normal fuel system in the event of a fracture in either of the main pipe - lines supplying each engine, but in the case of the engines operating from the overload system the cock isolates the pipeline of the star-

board engine only. Therefore when the overload system is being used cocks Nos. P6, S6 and 10 are shut and the overload balance cock (160) must be open, otherwise the fuel supply to the starboard engine will be shut off.

36. Priming system cock controls.- To supply fuel to the priming pump and to the two induction system primers (163 and 164) simultaneously, cock No.9 (156), which is coupled to the port collector box, should be in the open position. Cocks Nos.P4 (238) and S4 (234) control the output from the priming pump to the junction of the engine fuel pumps, and an inlet cock controls the output to the tank of the auxiliary power unit. When priming either of the engine pumps the pilot's master cock, corresponding to the pump being primed, must be in the open position and the inlet cock to the auxiliary power unit tank must be closed. In addition, to prime the port engine pump, cock No.P4 (238) should be open, and similarly cock No.S4 (234) for the starboard pump. When refilling the auxiliary power unit tank by means of the priming pump, the inlet cock to this tank must be open and cocks Nos.P4, S4 should be closed.

37. The various fuel systems are primed by operation of the priming pump lever (159) and care should be taken not to exceed a maximum gauge pressure of 3½ lb./sq.in. or the pressure gauges, situated in the engine nacelles, may be damaged.

Note.- The priming pump must not be operated to prime the port of starboard engines or refill the tank of the auxiliary power unit unless the position of the cocks correspond to that for the conditions given in para.37. After any priming operation the cocks affected should be returned to the OFF position.

38. Refuelling and controls.- The instructions stating the numbers of the various cocks to be operated for refuelling the six main tanks in the centre section only, the three overload tanks in the hull only and all the tanks together at refuelling points 1 and 2 will be found on the label (158) attached to the port side of the circular control panel (155) which is mounted on the bulkhead at the rear of the control cabin. In addition, instructions are given on the same label for refuelling at points 3 and 4 situated in the hull side. An instruction label (161) relating to the use of the overload balance cock (160) when refuelling at points 1 and 2 is provided adjacent to the cock. It should be noted that after refuelling, the system should be vented by operation of the two cocks P1. and S1., (233 and 235) at the top of the control panel. These cocks are normally kept in the closed position and should be opened momentarily only, to clear the air from the collector boxes.

39. Fuel-tank dipsticks.- Graduated dipsticks are provided for checking the contents of the fuel tanks, in the centre section, in addition to fuel contents gauges which are mounted on the panel (154) below the oil cooler controls, at the rear of the control cabin (see para.41). A dipstick is provided for the two inner tanks and a stick for the outer pairs of tanks. The inner tank dipstick

is marked with the letter A and the outer tank dipstick is marked with the letter B.

40. The dipstick stowages are below the auxiliary power unit in the roof at the forward end of the galley compartment. The readings on the dipstick are correct when the aeroplane is afloat. It will be necessary before inserting the dipstick to remove the filler cap of the tank by giving the cap a quick turn in a counter-clockwise direction. When replacing the cap it should be ensured that the spring clip below the cap is in full engagement with the stop in the tank.

41. Fuel-contents gauges.- Three fuel contents gauges, (177, 180 and 183) which are mounted on a panel (154) below the oil cooler controls on the bulkhead at the rear of the control cabin, indicate selectively the contents of each normal and overload fuel tank. Each gauge is easily identified by means of the label positioned below the corresponding three way selector switch which is fitted with a push-button for operating the gauge. Each gauge is operated in the first place by moving the switch over to the desired position and then pressing the push-button, when a reading will be given on the gauge. A correction tablet (186) for the fuel gauge readings of the normal system only, is mounted in line with the gauges and gives the correction for the readings obtained when the aeroplane is on the water or is on the beaching trolley.

42. Fuel-jettison controls.- The cocks for controlling the fuel jettison system are mounted on a control panel below a hinged cover (42) on the starboard side of the hull near the forward end of the control cabin. A master control cock (89), a cock (87) for the overload fuel tanks and a cock (91) for the normal fuel tanks, control air operated jettison valves in the tanks of each system. The air, which is supplied by the compressor of the auxiliary power unit, is contained in a cylinder (138) at the rear of the cabin. The master cock is connected, on the inlet side, by a pipe to the air cylinder, on the outlet side, to cocks (87) and (91) of the respective systems.

43. To jettison fuel, which is ejected through discharge pipes terminating at the bottom of the hull, it is necessary to open the master cock (89), by rotating the knob in a counter-clockwise direction, and then operate the individual cocks for releasing the jettision valves of the system selected. The jettison valves which are spring loaded are closed automatically when the cocks are returned to the OFF position. Labels on the control panel serve to identify each cock and also indicate the ON and OFF positions.

Oil system

44. Oil tank capacities.- Separate oil tanks, each fitted with a screwed filler cap accessible from below the top fairing at the rear of each engine bulkhead, are provided for the two engines. Each tank has a total capacity of 50.3 gallons but only 28 gallons of oil are carried for the normal system, leaving an air space of 22.3 gallons. For overload conditions, however, 42.5 gallons of oil are carried leaving an air space of 7.8 gallons only.

45. Oil-cooler controls.- The horizontally opposed control levers, (174) port, and (195) starboard, which regulate spring-loaded flaps in the ducts at the rear of each cooler, are installed below the air-intake shutter controls on the panel (153) at the rear of the control cabin. The instruction label situated between the two sets of control levers, indicates the OPEN and SHUT positions. The oil temperature gauges (169 and 172) for use in conjunction with the oil cooler controls of the port and starboard systems are mounted on the panel (152) immediately above the controls. Warm air from the oil coolers is led by ducts into the control cabin and into the wardroom. The air flow can be governed by controls fitted on each side of the hull in front of the bulkhead at the rear of the control cabin.

46. Oil temperature and pressure gauges. The gauges which register the inlet oil temperatures and oil pressures of the port and starboard engines, are mounted on a separate panel (152) above the carburettor air-intake heat controls, on the bulkhead at the rear of the control cabin.

47. Oil pressure relief valve.- A pressure relief valve, fitted to the inlet branch of the oil pipe to the engine, is provided so that when a cold engine is started and the oil is of relatively low temperature and high viscosity it is returned to the oil tank without passing through the oil cooler.

48. Oil tank dipstick.- A dipstick, graduated on one side to indicate the 28 and 42½ gallons normal and overlaod capacities, and on the other side from 2 to 44 gallons in steps of 2 gallons, is screwed into the top of each tank at the rear of the filler; the calibrations are correct when the dipstick is in the screwed down position.

49. To ensure adequate air space being left in the oil tank, the dipstick should always be removed from the tank before filling, so that in the event of overfilling, oil will be observed overflowing from the dipstick opening.

50. Provision for draining.- A drain cock, screwed into the boss at the base of the oil tank, allows a suitable length of flexible hose to be attached for draining purposes. The free end of the hose is led through a door at the bottom of the cowling. The drain cock lever is painted to indicate the OPEN and SHUT positions and after draining the cock should be wire-locked in the latter position.

Miscellaneous

51. Landing lamp switch and dipping control.- The landing lamp switch (65) is mounted above the flap control lever on the port side of the cabin and is OFF at the centre position. Movement of the landing lamp switch-lever over to port lights the outboard lamp situated in the leading edge of the plane, and over to starboard the inboard lamp. A landing lamp dipping control lever (59) at the rear of the switch, behind the flap control lever (58), should be moved

downwards into a catch to dip the lamps, and vice versa.

52. Signal pistol.- The signal pistol (55) is carried in a holster mounted between the two racks (56) carrying the red, white and green signal cartridges in spring clips on the port side of the control cabin against the first pilot's seat.

53. Handbell.- A handbell (120) which is employed when afloat for signalling purposes during foggy weather, is stowed on the decking of the control cabin, below the signal cartridge stowage.

54. Electrical control panel.- A panel (39) at the forward end of the control cabin on the starboard side carries a number of switch boxes which are either labelled or distinctively marked to indicate their use. Three bomb switch boxes (77), (78), (79) a main jettison switch (81) and bomb release pushbutton (80) and a jettison bomb container pushbutton (106) are mounted at the forward end of the panel, whilst distributed over the rear portion of the panel are switches for navigation lamps (104), upward identification lamps (99), mast head lamp (82), fleet recognition lamps (100), formation keeping lamps (103), intercommunication signalling unit (105), drogue signalling selector switchbox (85) and the electrical heated pressure head switch (101). The Mk.II switchbox (98) at the bottom rear corner of the panel, can be used to signal on both the fleet recognition lamps and the upward identification lamps, but the morse key and the right-hand switch of the adjacent Mk.II switchbox are permanently locked in the OFF position, the left-hand switch (103) only being used to operate the formation keeping lamps.

55. Bomb release and door controls.- A lever (41) at the rear of the electrical control panel, on the starboard side of the cabin, controls the operation of opening and closing the bomb doors below each main plane. The lever (41) is coupled by means of a link to a master switch which is employed to close the electrical circuit, the switch serving to prevent operation of the bomb release pushbutton (66), on the port side of the cabin, in the event of the bomb doors not being open. Operation of the bomb door lever (41) in a downward direction opens the doors, but owing to the delayed motion, the bombs must not be dropped until the doors are seen to be in the open position.

56. Forced landing flares.- The forward ring grip (43) for operating the release of the port flare, and the rear grip (44) the starboard flare, which are mounted on the starboard side of the control cabin, are actuated by pulling in an upward direction. The flare release pushbutton (130) is mounted at the rear of the first-aid outfit (128) on the starboard side of the cabin.

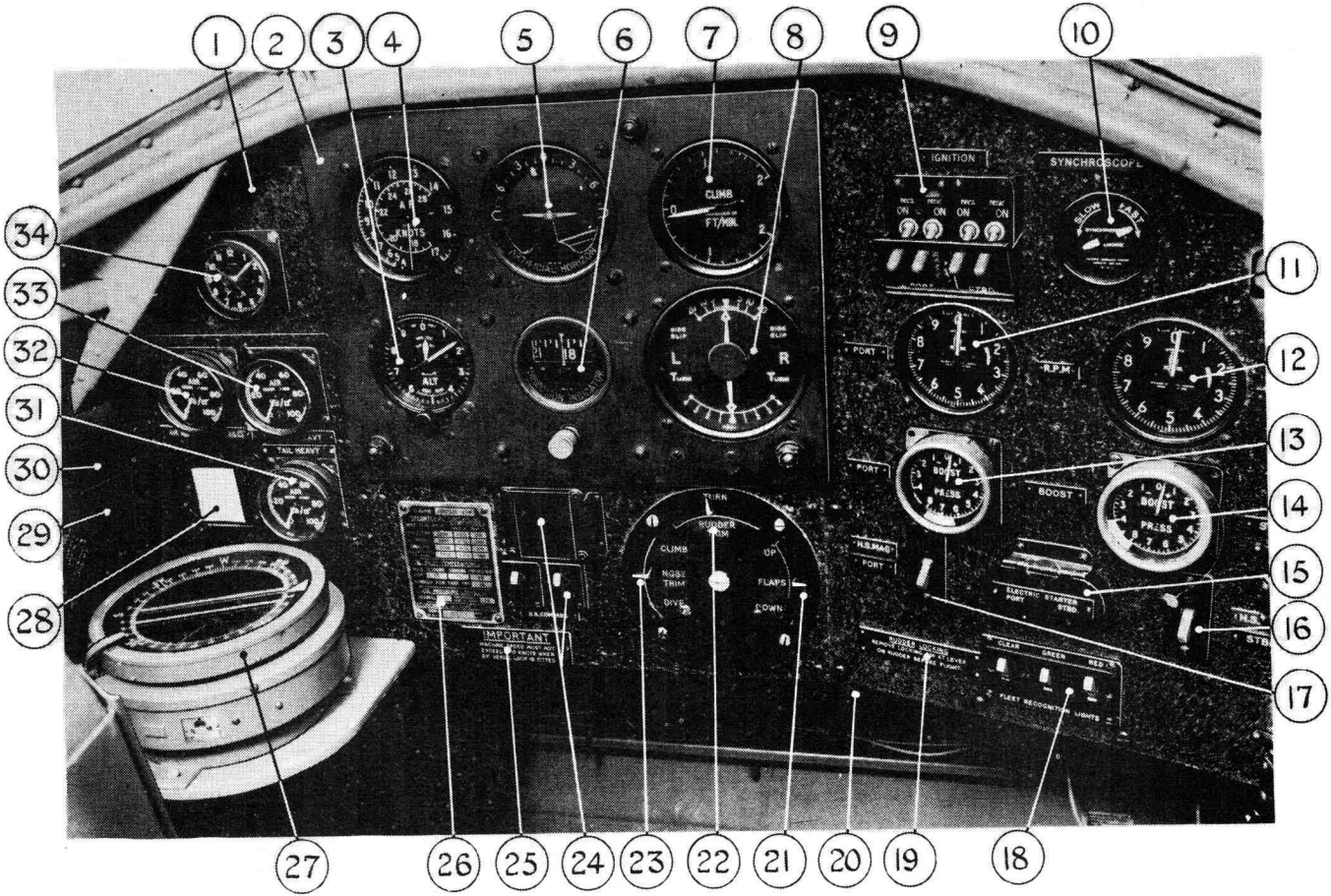
57. Writing pad.- A writing pad holder (86) hinged at the top and fitted with a bull-dog clip is capable of being held in the open position be means of a hinged support at the rear; a spring clip retains the holder in the closed position.

58. Fire extinguisher controls.- Two pushbuttons one (88) coloured red for the port control and the other (90) green for starboard, actuate the electrically operated fire extinguishers in each engine

nacelle. The pushbuttons are mounted above the fuel jettison controls, below the hinged cover (42) on the starboard side of the cabin. In addition flame switches are installed in the nacelles to operate the extinguishers automatically in the event of a fire in the engine nacelle. Also an automatic inertia switch is provided to operate the extinguishers in the event of a crash.

59. Flying controls locking gear.- The ailerons and elevators can be locked simultaneously by the application of a locking bar (20). This locking bar is normally stowed on the bulkhead below the instrument panel (1) at the front of the control cabin. To apply the locking device the aileron quadrant should be placed in the neutral position, the column pushed forward and the large fork of the locking bar passed over the centre spoke of the quadrant and locked with the aid of the tongued pin provided. With the pin of the seat locking gear engaging the second hole from the top, the opposite end of the locking bar is passed through an aperture (96) in the back of the seat and is then attached, in a similar manner to that at the front of the bar, to the cross tube of the seat structure.

60. The rudder locking gear is mounted at the top of frame 36, in the stern compartment, and consists of a spring-loaded locking pin which engages a lever of the rudder control system. The locking pin is normally maintained in the OUT position and is applied by inserting it in an upward direction into a hole in the lever, with the rudder in the mid position . A small peg on the locking pin engages a slot in the spring housing and serves to hold the locking pin in the IN position.

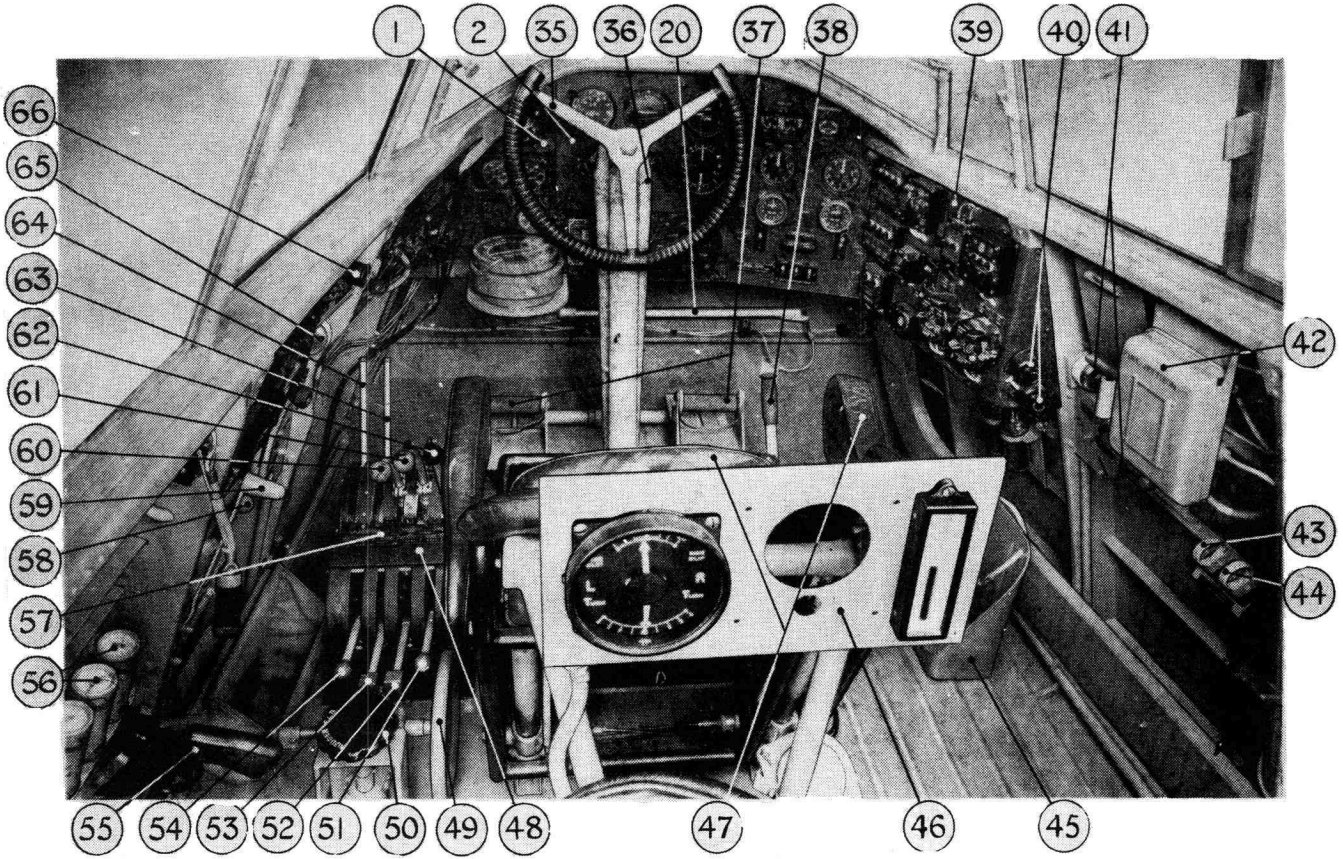


PILOT'S INSTRUMENT PANEL

Key to fig.1

Pilot's instrument panel

1. Instrument panel
2. Sub-panel
3. Sensitive altimeter
4. Air-speed indicator (knots)
5. Artificial horizon
6. Direction indicator
7. Rate-of-climb meter
8. Turning indicator
9. Ignition switches - port and starboard
10. Engine synchroscope
11. Engine speed indicator - port
12. Engine speed indicator - starboard
13. Boost pressure gauge - port
14. Boost pressure gauge - starboard
15. Engine starting pushbuttons
16. Hand starting magneto switch - starboard
17. Hand starting magneto switch - port
18. Fleet recognition lights switches
19. Rudder locking instruction label
20. Control column locking bar stowage
21. Flap position indicator
22. Rudder tab position indicator
23. Elevator tab position indicator
24. D.R. compass-card holder and switches
25. Aeroplane speed restriction label
26. Engine data plate
27. Compass
28. Compass-card holder
29. A.S.I. corrector card holder
30. Auto-controls mounting panel
31. Elevator air pressure gauge - auto-controls (tail trim)
32. Elevator air pressure gauge - auto-controls (nose trim)
33. Test cock air pressure gauge - auto-controls
34. Time-of-flight clock

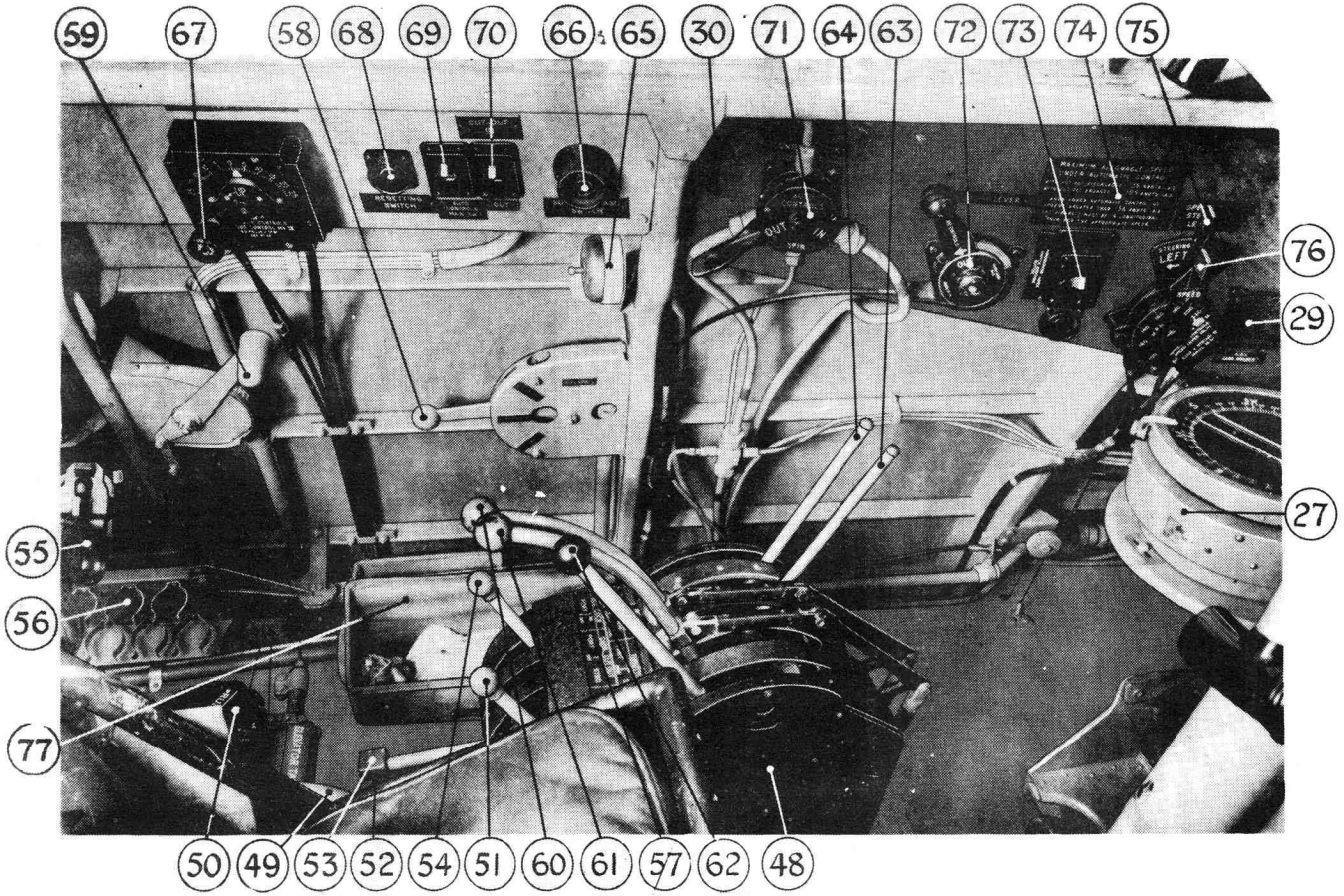


CONTROL CABIN — VIEW LOOKING FORWARD

Key to fig.2

Control cabin - view looking forward

1. Instrument panel
2. Sub-panel
20. Control column locking bar stowage
27. Compass
30. Auto-controls - mounting panel
35. Aileron control quadrant
36. Control column
37. Rudder bar
38. Flap and bomb door operating handle (hydraulic system)
39. Electrical control panel
40. Floodlamp dimmer switches
41. Bomb door switch and control lever
42. Fuel jettison and fire extinguisher control box cover
43. Forced landing flare release - port control
44. Forced landing flare release - starboard control
45. Parachute stowage
46. Second pilot's instrument panel
47. First pilot's seat and hinged arm rest
48. Throttle control box
49. Elevator trimming-tab handwheel
50. Rudder trimming-tab handwheel
51. Master fuel-cock control - starboard engine
52. Carburettor cut-out control - starboard engine
53. Carburettor cut-out control - port engine
54. Master fuel-cock control - port engine
55. Signal pistol
56. Signal cartridge case stowages
57. Throttle box instruction label
58. Flap control lever
59. Landing lamp dipping control
60. Throttle control lever - port engine
61. Throttle control lever - starboard engine
62. Mixture control lever - both engines
63. Airscrew control lever - starboard engine
64. Airscrew control lever - port engine
65. Landing lamp switch
66. Bomb release switch

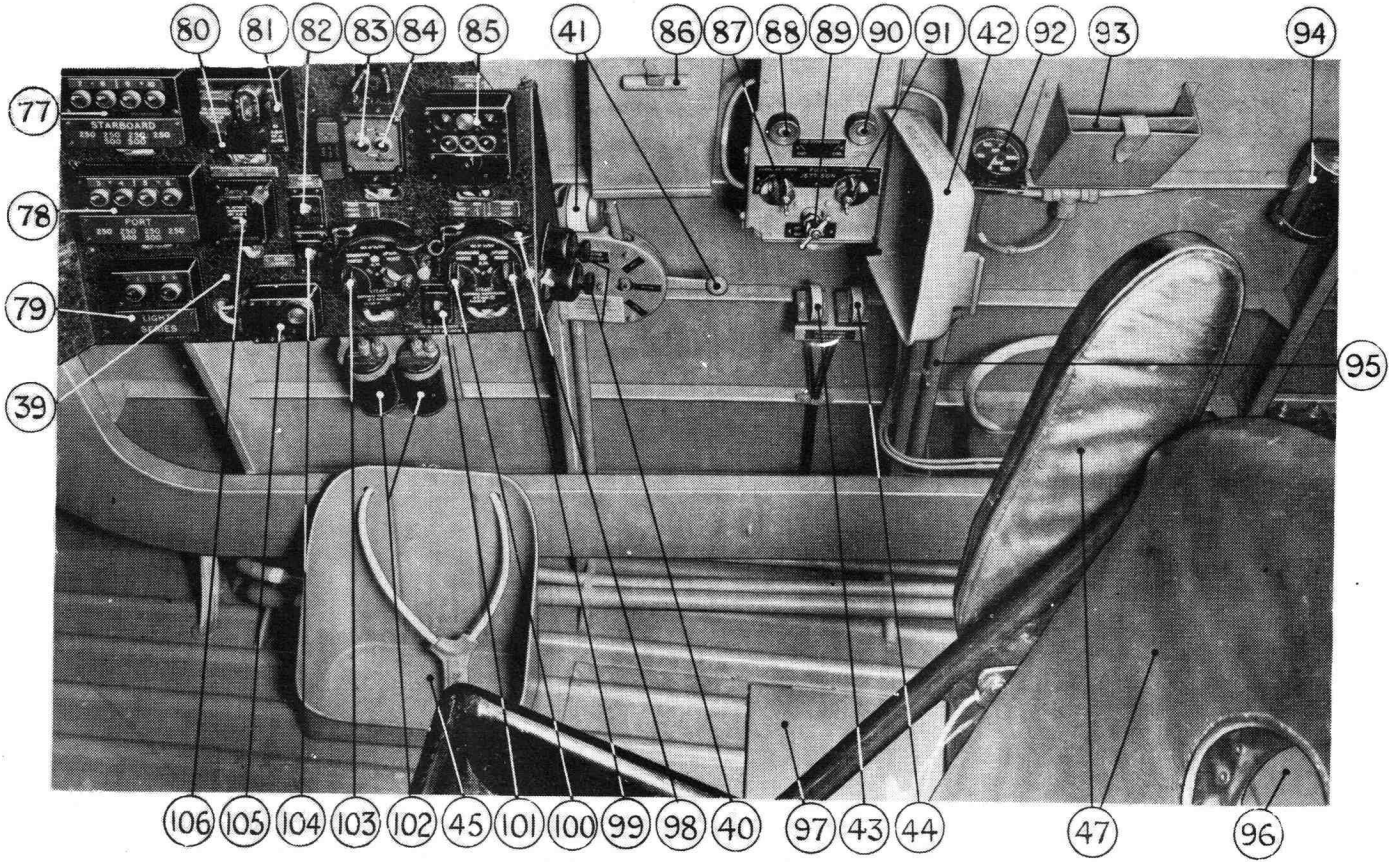


FRONT PORTION OF CONTROL CABIN - PORT SIDE

Key to fig.3

Front portion of control cabin - port side

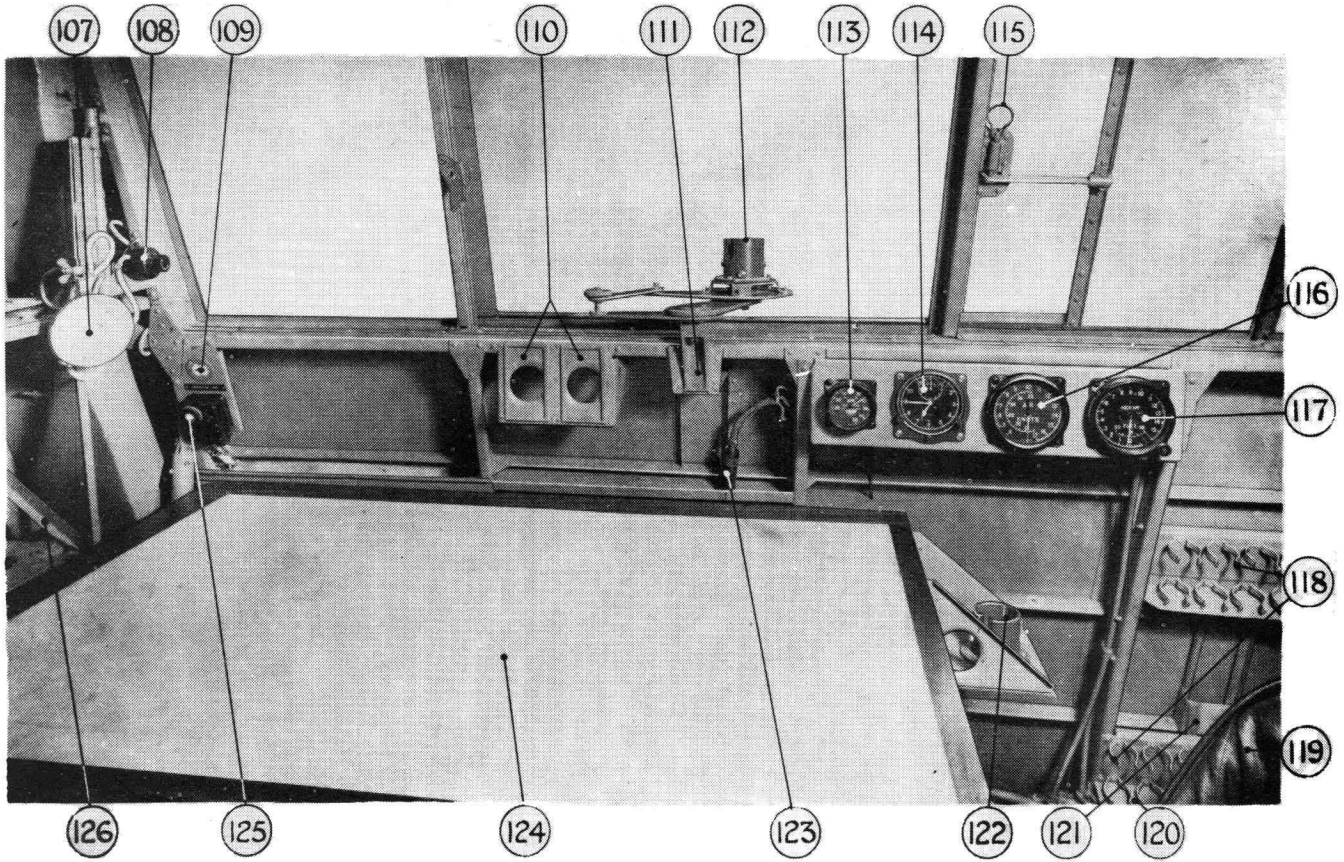
27. Compass
29. A.S.I. corrector card holder
30. Auto-controls mounting panel
48. Throttle control box
49. Elevator trimming tab handwheel
50. Rudder trimming tab handwheel
51. Master fuel-cock control - starboard engine
52. Carburettor cut-out control - starboard engine
53. Carburettor cut-out control - port engine
54. Master fuel-cock control - port engine
55. Signal pistol
56. Signal cartridge case stowages
57. Throttle box instruction lable
58. Flap control lever
59. Landing lamp dipping control
60. Throttle control lever - port engine
61. Throttle control lever - starboard engine
62. Mixture control lever - both engines
63. Airscrew control lever - starboard engine
64. Airscrew control lever - port engine
65. Landing lamp switch
66. Bomb release push-button
67. Attitude control crank handle (auto-controls)
68. Resetting switch (auto-controls)
69. Main switch (auto-controls)
70. Cut-out switch (auto-controls)
71. Control cock lever (auto-controls)
72. Clutch lever (auto-controls)
73. Windscreen wiper switch unit
74. Aeroplane speed restriction label(auto-controls)
75. Steering lever (auto- controls)
76. Speed lever (auto-controls)
77. Headphone stowage bag



FRONT PORTION OF CONTROL CABIN - STARBOARD SIDE

Key to fig.4
Front portion of control cabin - starboard side

39. Electrical control panel
40. Floodlamp dimmer switches
41. Bomb door switch and control lever
42. Fuel jettison and fire extinguisher control box cover
43. Forced landing flare release - port
44. Forced landing flare release - starboard
45. Parachute stowage
47. First pilot's seat and hinged arm rest
77. Selector switchbox - starboard bombs
78. Selector switchbox - port bombs
79. Selector switchbox - light series bombs
80. Main jettison bomb release pushbutton
81. Main jettison bomb switch
82. Mast head lamp switch
83. Bomb nose-fuse switch
84. Bomb tail-fuse switch
85. Drogue signalling selector switchbox
86. Hinged writing pad holder and clip
87. Overload fuel jettison cock
88. Fire extinguisher pushbutton - port engine
89. Fuel jettison master cock air release
90. Fire extinguisher pushbutton - starboard engine
91. Normal fuel jettison cock
92. Air pressure gauge
93. Stowage rack
94. Smokers ash container (non-fume type)
95. Flap operating handle stowage
96. Seat aperture for control column locking bar
97. Cabin floor hatch cover
98. Morse tapping key
99. Upward identification lamps switch
100. Fleet recognition lamps switch
101. Electrically heated pressure head switch
102. Boost gauge fuel traps
103. Formation keeping lamps switch
104. Navigation lamps switch
105. Intercommunication signalling unit
106. Jettison bomb container pushbutton

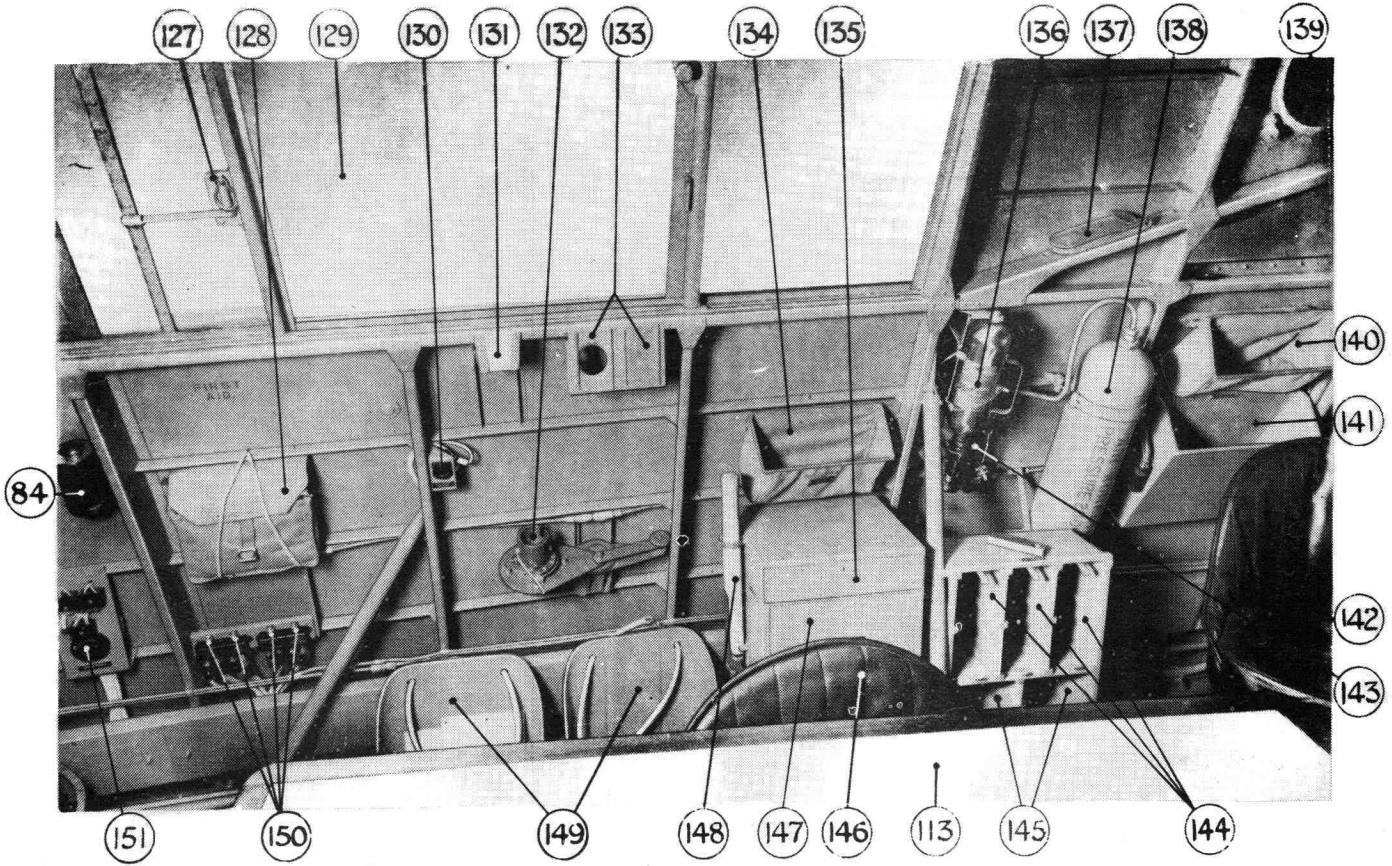


REAR PORTION OF CONTROL CABIN - PORT SIDE

Key to fig.5

Rear portion of control cabin - port side

107. Extending table lamp
108. Floodlamp dimmer switch
109. Inspection lamp plug-in socket
110. Compass data card holders
111. Compass mounting wedge plate
112. Compass mounting
113. Air temperature gauge
114. Time-of-flight clock
115. Wind deflector panel catch
116. Air speed indicator (knots)
117. Altimeter
118. Signal cartridge case stowages
119. Observer's seat
120. Fog bell stowage (on cabin floor below signal cartridge stowage)
121. Compass mounting stowage plate
122. Compass stowage bracket
123. Flood lamp
124. Navigator's table
125. Intercommunication signalling unit
126. Wireless crate

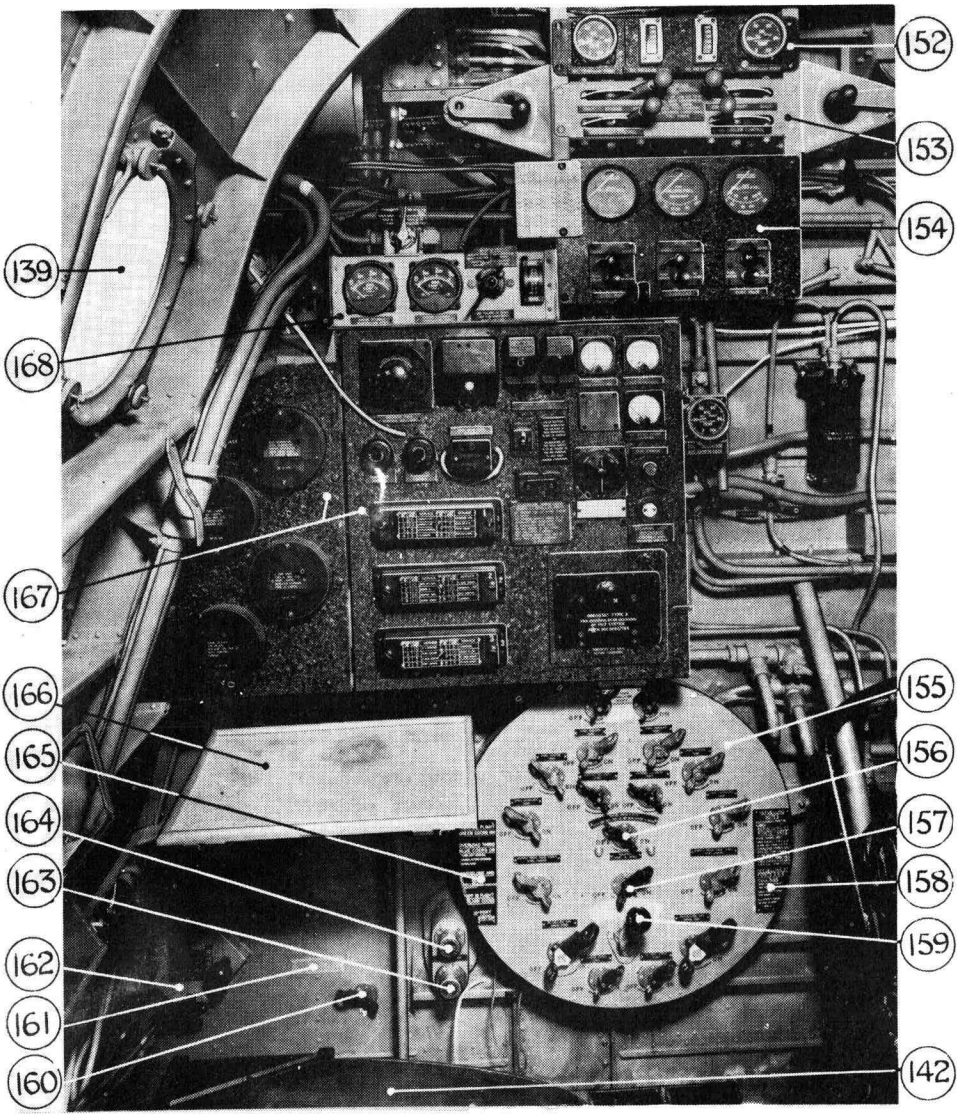


REAR PORTION OF CONTROL CABIN - STARBOARD SIDE

Key to fig.6

Rear portion of control cabin - starboard side

84. Smokers' ash container (non-fume type)
124. Navigator's table
127. Wind deflector panel catch
128. First-aid outfit
129. Sliding window
130. Flare release pushbutton
131. Compass mounting wedge plate
132. Compass mounting and stowage
133. Compass data card holders
134. Headphone stowage bog
135. Cash drawer
136. Detachable fire extinguisher
137. Inspection lamp extension stowage
138. Air cylinder
139. Port hole cover
140. Headphone stowage bag
141. Engineer's log book and diagrams stowage
142. Engineer's seat
143. Portable inspection lamp
144. Sea-markers stowages
145. Flame float stowages
146. Navigator's seat
147. Navigational instruments and book cupboard
148. Fireman's axe stowage
149. Parachute stowages
150. Battery terminals
151. Camera electrical supply socket.



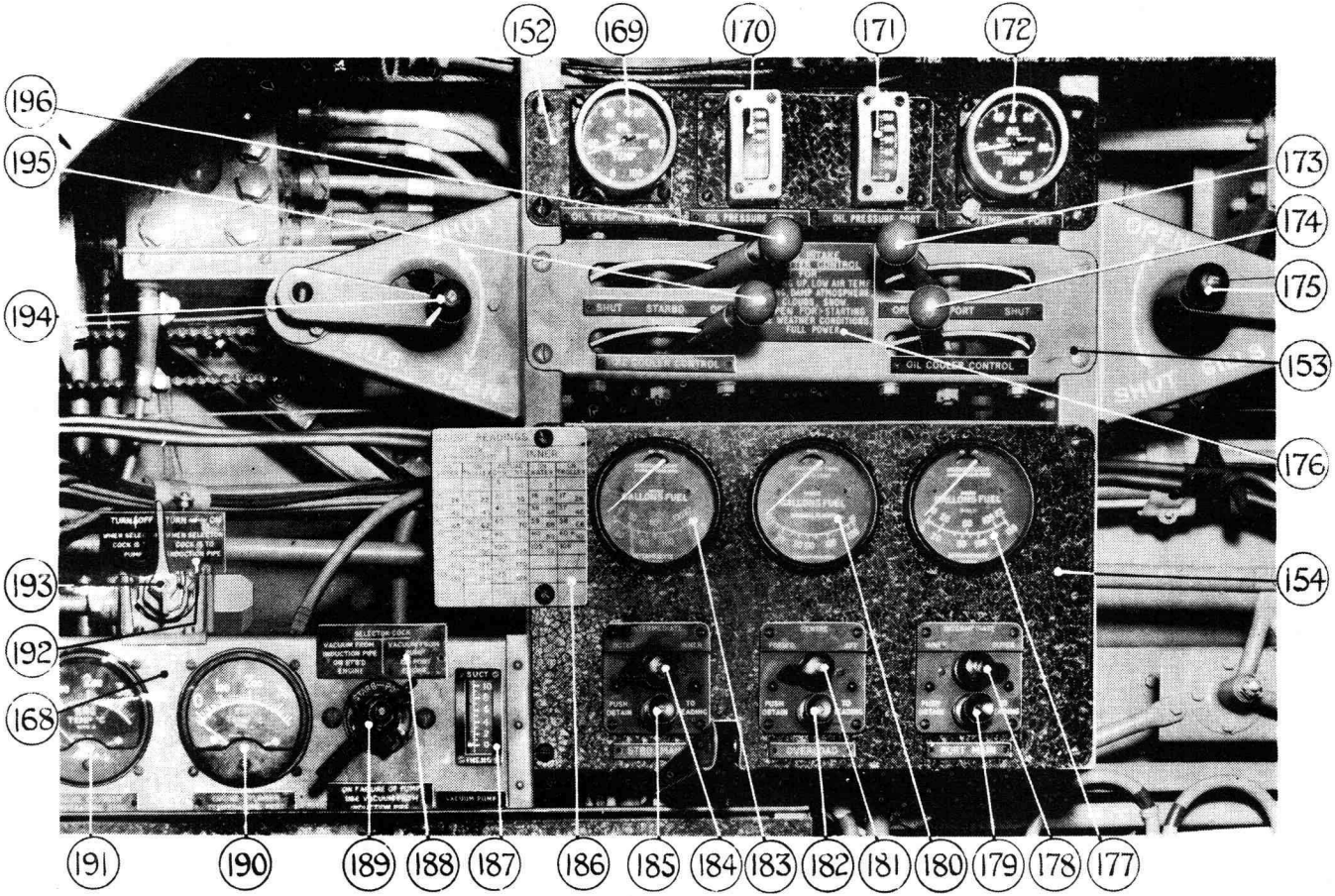
CONTROL CABIN REAR BULKHEAD

A.P. 1666A, VOL.1, SECT.1. FIG. 7

Key to fig.7

Control cabin rear bulkhead

139. Port hole cover
142. Engineer's seat
152. Oil system instrument panel
153. Air-intake, oil cooler and gill control panel
154. Fuel system instrument panel
155. Fuel system control panel
156. Fuel system priming cock (9)
157. Normal fuel system balance cock (10)
158. Instruction label
159. Priming pump handle
160. Overload fuel system balance cock
161. Instruction label.
162. Overload fuel system control panel
163. Induction manifold primer pump - starboard engine
164. Induction manifold primer pump - port engine
165. Instruction label
166. Folding table
167. Electrical control panel
168. Cylinder temperature gauges and vacuum pump control panel

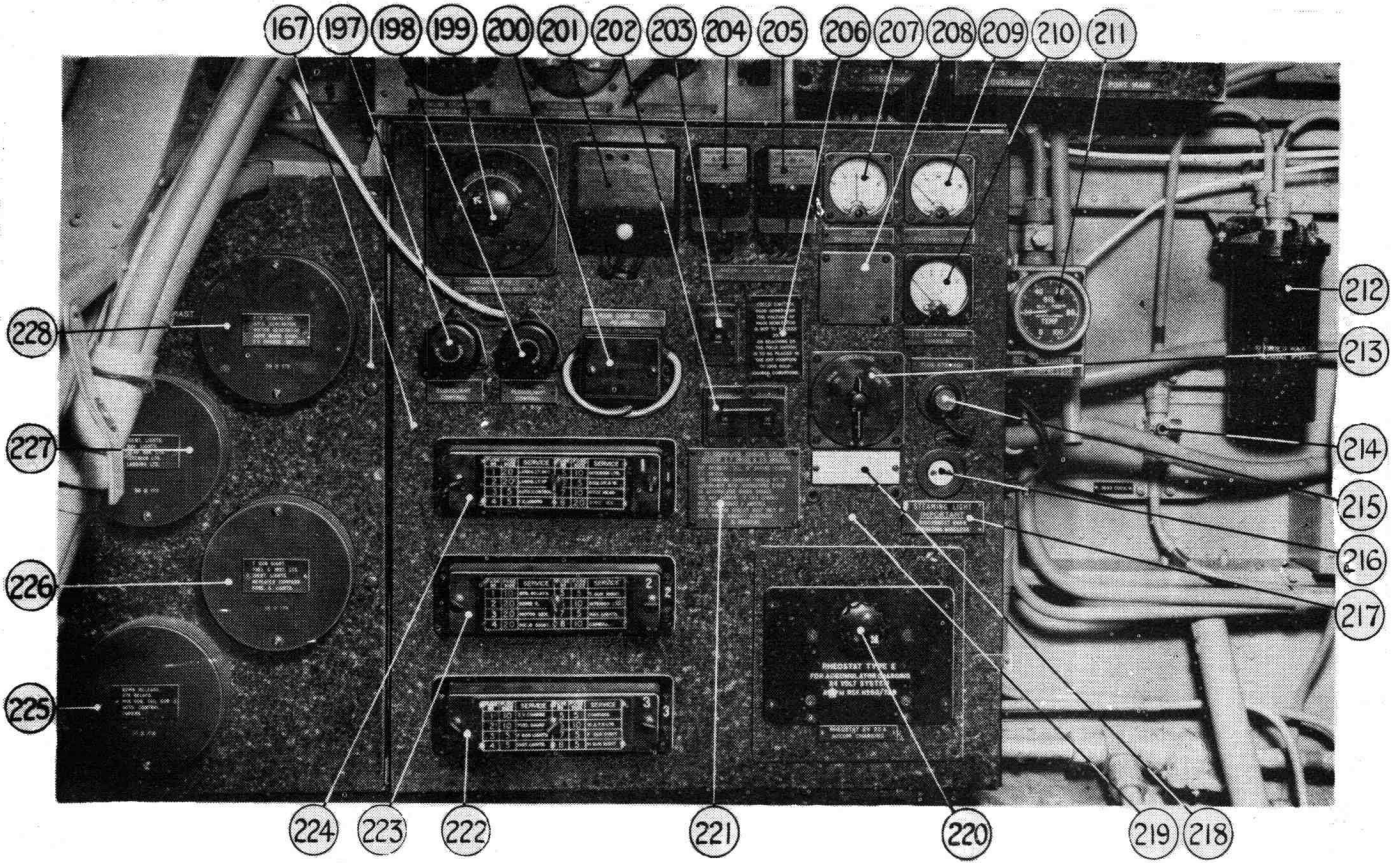


CONTROL CABIN REAR BULKHEAD - UPPER PORTION

Key to fig.8

Control cabin rear bulkhead - upper portion

152. Oil system instrument panel
153. Air-intake, oil cooler and gill control panel
154. Fuel system instrument panel
168. Cylinder temperature gauges and vacuum pump control panel
169. Oil temperature gauge - starboard system
170. Oil pressure gauge - starboard system
171. Oil pressure gauge - port system
172. Oil temperature gauge - port system
173. Carburettor air-intake heat control - port
174. Oil cooler control - port
175. Gills control handle - port control
176. Air-intake shutter control instruction label
177. Fuel-contents gauge - port system
178. Selector switch - port fuel system contents
179. Fuel-contents push-button - port system
180. Fuel-contents gauge - overload system
181. Selector switch - overload fuel system contents
182. Fuel-contents push-button - overload system
183. Fuel-contents gauge - starboard system
184. Selector switch - starboard fuel system contents
185. Fuel contents push-button - starboard system
186. Fuel gauge correction tablet
187. Pump pressure gauge
188. Vacuum selector cock instruction labels
189. Vacuum selector cock
190. Cylinder temperature gauge - port engine
191. Cylinder temperature gauge - starboard engine
192. Vacuum control cock instruction label
193. Vacuum control cock
194. Gills control handle - starboard control
195. Oil cooler control - starboard
196. Carburettor air-intake heat control - starboard

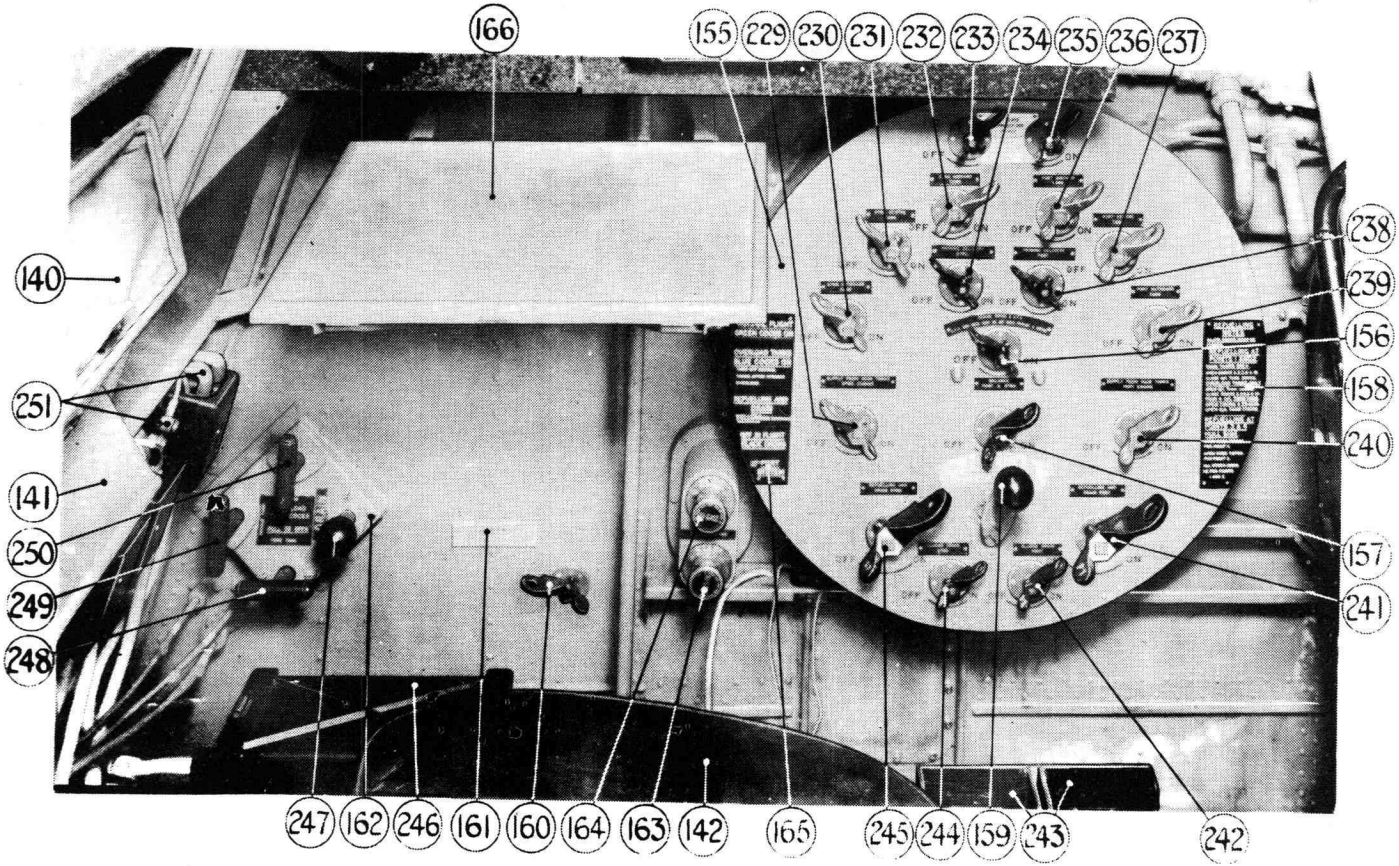


CONTROL CABIN REAR BULKHEAD - MIDDLE PORTION

Key to fig. 9

Control cabin rear bulkhead - middle portion

167. Electrical control panel
197. Engineer's floodlamp control
198. Electrical panel floodlamp control
199. Rheostat control knob - field and A.P.U. Gen.
200. Main generator fuse box
201. Engine driven general cut-out unit
202. Charging circuit switches
203. Main generator field switch
204. Landing lamp relay switch No.1
205. Landing lamp relay switch No.2
206. Main generator field switch label
207. Ammeter- engine driven generator
208. Blanking plate
209. Voltmeter - engine driven generator
210. Ammeter - 2 volt battery charging
211. Air compressor oil temperature gauge
212. Auto-controls air drier
213. Main and auxiliary generators control switch
214. Auto-controls test cock
215. Steaming lamp plug stowage
216. Steaming lamp plug-in socket
217. Steaming lamp plug instruction label
218. Generator switch instruction label
219. This item deleted
220. Rheostat control knob - 2 volt battery charging
221. Charging-switch instruction label
222. Fuse box
223. Fuse box
224. Fuse box
225. Terminal box
226. Terminal box
227. Terminal box
228. Terminal box



CONTROL CABIN REAR BULKHEAD - LOWER PORTION

Key to fig.10

Control cabin rear bulkhead - lower portion

140. Headphone stowage bag
141. Engineer's log book and diagrams stowage
142. Engineer's seat
155. Fuel system control panel
156. Fuel system priming cock (9)
157. Normal fuel system balance cock (10)
158. Instruction label
159. Priming pump lever
160. Overload fuel system balance cock
161. Instruction label
162. Overload fuel system control panel
163. Induction manifold primer pump - starboard engine
164. Induction manifold primer pump - port engine
165. Instruction label
166. Folding table
229. Fuel cock (S6)
230. Fuel cock (S5)
231. Fuel cock (S3)
232. Fuel cock (S2)
233. Vent cock (S1)
234. Primer cock (S4)
235. Vent cock (P1)
236. Fuel cock (P2)
237. Fuel cock (P3)
238. Primer cock (P4)
239. Fuel cock (P5)
240. Fuel cock (P6)
241. Refuelling the drain cock (P7)
242. Sludge drain cock (P8)
243. 2-volt battery stowage
244. Sludge drain cock (S8)
245. Refuelling and drain cock (S7)
246. Two 12-volt battery stowage
247. Overload fuel system drain control
248. Forward tank control - overload fuel supply
249. Middle tank control - overload fuel supply
250. Rear tank control - overload fuel supply
251. Battery terminal connections.

SECTION 2

HANDLING AND FLYING NOTES FOR PILOT

SECTION 2

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

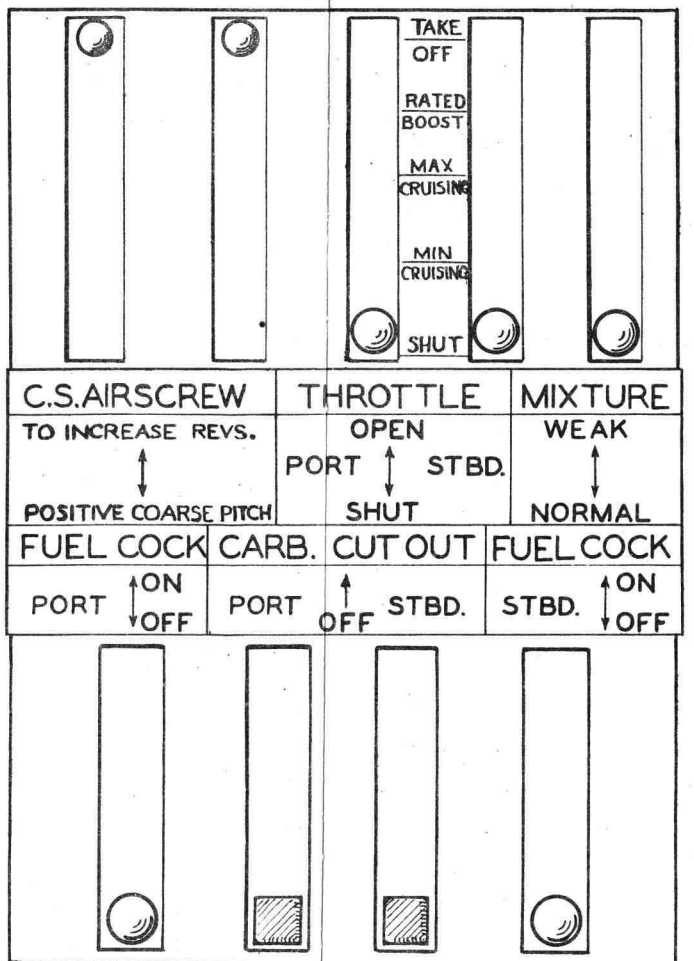
USE OF FUEL COCKS

The only cocks directly under pilot's control are master cocks marked "A" on fig. 2 ; these cocks are provided to shut off fuel supply to carburettors.

Condition	Fuel cocks	Balance cocks	Remarks
Normal (Wing tanks only)	Master, Green } ALL ON Blue, Black } ALL OFF	Normal - OFF Overload - OFF	Port and starboard sets of tanks supply respective engines
Overload	Master - both ON Blue - ON for selected tanks Green, Black } ALL OFF	Normal - OFF Overload - ON	Both engines supplied from selected tanks. Green cocks turned OFF after blue cocks turned ON
To use one wing tank only	Master - both ON Green - ON for selected tank; P6 and S6 ON; all others OFF Blue, Black } ALL OFF	Normal - ON Overload - OFF	Both engines supplied from selected tank through collector boxes and normal balance cock

NOTE.- (i) The overload balance cock, together with the normal balance cock (10), isolates the port and starboard portions of the fuel system. When cock (10) is OFF, the overload balance cock prevents fuel flowing from the wing tanks on one side through the supply pipes from the overload tanks to the main feed pipeline on the other side.

(ii) The overload system must be brought into operation whilst there is ample fuel in the normal system to ensure against airlocks.



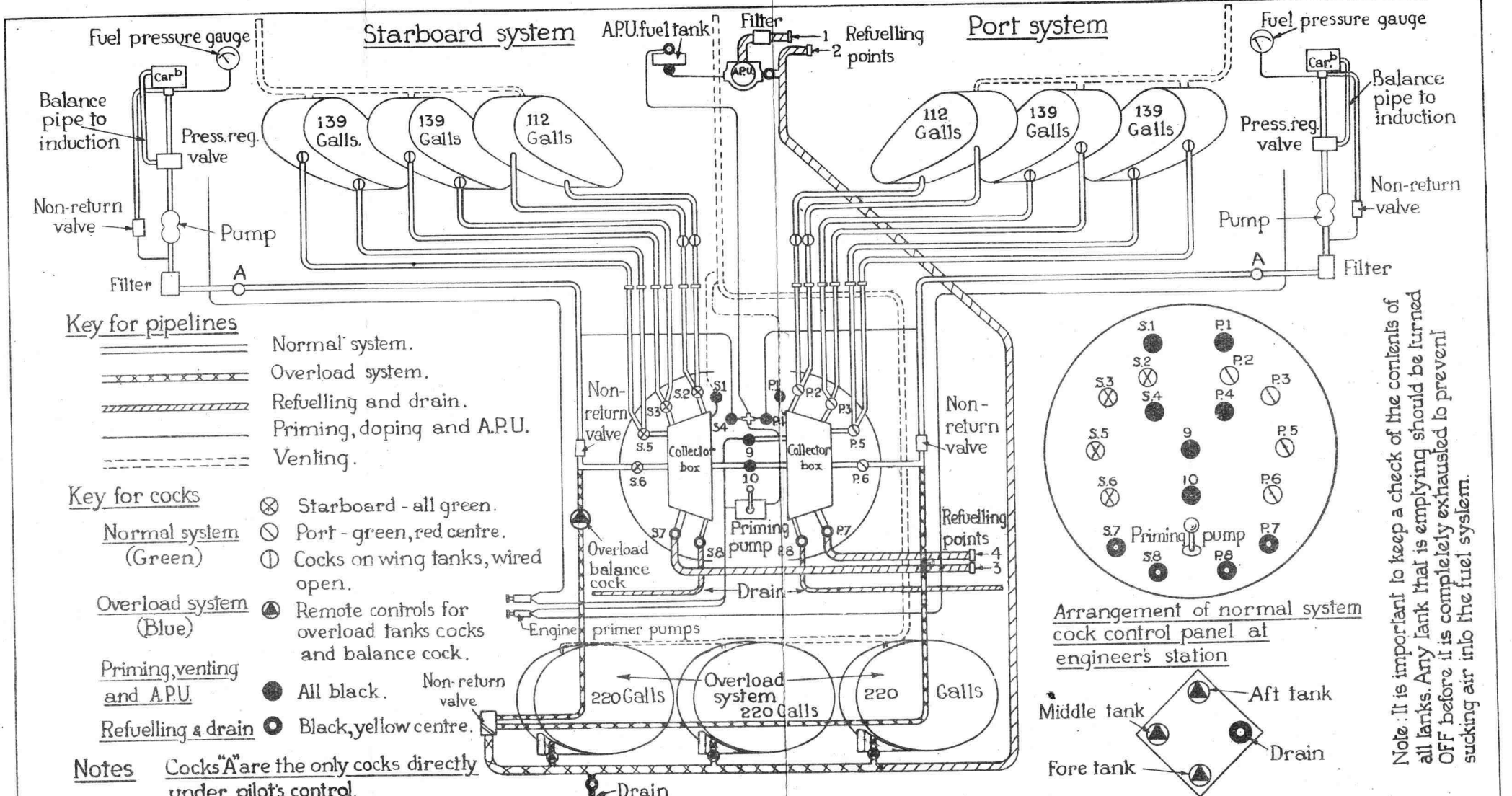
ENGINE, AIRSCREW AND PILOT'S FUEL COCK CONTROLS

PRIMING

Throttle levers - push fully forward
Airscrew and mixture levers - pull fully backward.

FIG.1 | A.P.1666A VOL.I. SECTION 2. | USE OF FUEL COCKS

F.S./3



FUEL SYSTEM DIAGRAM

AP1666A VOL.1 SECTION 2 FIG.2

SECTION 2

HANDLING AND FLYING NOTES FOR PILOT

FITNESS OF AEROPLANE FOR FLIGHT

1. Note the following:-

(i) Weight Sheet Summary.- Ensure that the total weight and disposition of the load are in accordance with the Weight Sheet Summary.

Note.- The bilges must be examined and, if necessary, pumped out.

(ii) With the C.G. aft, flying in bumpy weather is more difficult, and the stall is vicious.

(iii) Danger of carrying non-standard loads.-

(a) When any load is carried other than the normal crew and military load, it is of the greatest importance to ensure that it is disposed in such a way that the balance of the aeroplane is not disturbed. Serious accidents have occurred on a number of types owing to tail heaviness from additional load carried in the after portion of the aeroplane.

(b) As a rough rule, no additional load should be carried aft of a point approximately one-third of the wing chord behind the leading edge at the wing root, unless it is balanced by an approximately equal load the same distance forward of this point.

(c) Wherever possible, however, the C.G. position should be determined by the data provided and the loading should be adjusted to bring the C.G. within the range notified in the Weight Sheet Summary as the safe range for the particular aeroplane.

(d) Attention is drawn to A.M.O. A.254/1936.

PRELIMINARIES

2. On boarding the aeroplane proceed as follows:-

(i) See that all flying control locking devices are removed and properly stowed.

Note.- Rudder locking is in the tail.

(ii) Check the movement of the flying controls.

Refer to this Head 11.6. end of Sec 2.

(iii) See that the carburettor air-intake covers, airscrew covers and any others are removed and stowed.

(iv) Check that the main magneto switches are OFF.

(v) Prime the Exactor controls for the throttles, mixture and airscrews. Check by feel that these controls are positive in action.

(vi) Set the airscrew controls to give MAXIMUM R.P.M. (forward).

(vii) Check the operation of the hydraulic hand pump by partly lowering and then fully raising the flaps; afterwards place the selector lever in NEUTRAL.

(viii) Check that the bomb doors are closed and that the selector lever is in NEUTRAL.

(ix) See that mooring or towing bridle and slipline are ready for slipping.

(x) See that all doors and hatches, not required for slipping, are closed and secured.

(xi) In cold weather switch on the pitot head heater.

STARTING THE ENGINES

3. The engine response to a small movement of the throttle levers is powerful. Care is therefore necessary when adjusting them while starting, running up and taxying. To start the engines proceed as follows:-

(i) Turn each engine separately by electric starter for at least two revolutions of the airscrew, otherwise the high loading caused when a start is made while oil is present in the annular space between sleeve and junk head may be enough to cause serious damage.

(ii) Order the flight engineer to check the contents of all fuel tanks.

(iii) Turn ON the pilot's main fuel cocks.

(iv) Order the flight engineer to turn ON the fuel cocks of all wing tanks; for run-up, take-off and normal flying these fuel cocks should be left ON and the balance cock OFF.

(v) Order the flight engineer to prime the fuel system by means of the priming pump. A pressure of $3\frac{1}{2}$ lb./sq.in. must not be exceeded.

(vi) Order the flight engineer to prime each engine in turn. For normal conditions 8 to 10 strokes are required for each engine; if an engine fails to start, 3 to 4 additional strokes should be given.

(vii) Open the throttles $\frac{1}{2}$ in. and set mixture control to NORMAL (auto rich).

(viii) Switch ON the main magneto switches and the starting magneto switches.

(ix) Press the starter pushbutton for each engine in turn; on no account should both engines be started together. Do not keep the button pressed for more than 10 seconds at a time, and wait 30 seconds between attempts to start.

(x) When the engines are running evenly switch OFF the starting magneto switches.

(xi) Run the engines slowly for as long as is practicable before slipping the mooring, and continue to do so afterwards so that the oil is slightly warm before the engines are opened up above 1,000 r.p.m.

(xii) The engines should then be warmed up at a fast tick-over. They must not be opened up until an oil temperature of at least 5°C. is reached.

TESTING ENGINES AND INSTALLATIONS

4. The engines should be tested separately, and the throttles opened fully only for as long as is necessary to make the checks.

(i) During warming up with the aeroplane under way.-

(a) Check the fuel pressures; at least 2 lb./sq.in.

(b) Test the hydraulic engine pump by lowering and then raising the flaps and bomb doors. Return the selector levers to NEUTRAL.

(ii) Running-up.-

(a) Open each engine in turn to full throttle, or if the sea is rough to the highest r.p.m. possible (2,000 r.p.m. desirable), and check:-

Static r.p.m.	-	2,725 - 2,775
Static boost	-	Hercules II +3¼ lb./sq.in.
		Hercules IV +3 lb./sq.in.
Oil pressure	-	80 lb./sq.in.

(b) Reduce to climbing boost (+1¾ lb./sq.in. for Hercules II or + ½ lb./sq.in. for Hercules IV) and test each magneto in turn for even running; the drop should not exceed 120 r.p.m.

(c) Throttle back to 2,000 r.p.m. and test each constant-speed unit in turn by bringing the airscrew control lever slowly back to the POSITIVE COARSE PITCH position. R.P.M. should drop considerably, and should be restored when the lever is returned to its original position. Refer to this Sheet At 6, end of Sect 2.

Note.- This test must not be done at a high boost pressure, to avoid detonation.

(d) Bring the airscrew control lever back to give 1,800 r.p.m. and open and close the throttle slightly. Movements of the throttle will cause fluctuations in r.p.m., which should however return to the controlled value and remain steady.

TAXYING

5.

(i) The flaps should normally be up for taxying because the rudder control is thereby improved.

(ii) Turning out of strong winds may be dangerous as the leeward wing tip float is liable to become submerged and the aeroplane may then capsize; or if the aeroplane is fitted with modified floats the water forces may break the float attachments. If the wind is strong the aeroplane must be "sailed" with the flaps down, and not turned more than about 30° out of wind, even though the required destination may be across or down wind.

FINAL PREPARATION FOR TAKE-OFF

6. Before taking-off ensure that:-

(i) The bomb-doors are CLOSED and the selector lever is in NEUTRAL.

(ii) All other doors and hatches are closed and secured.

(iii) The controls are set as follows:-

Flaps	-	10° - 20° DOWN
Elevator tabs	-	0°(or known position for take-off)
Rudder tabs	-	2° - 3° to port
Airscrew control levers	-	MAXIMUM R.P.M. (forward)
Mixture controls	-	NORMAL (auto rich)
Carburettor air-intake heat controls	-	COLD (Setting to be made and reported by the flight engineer)

TAKING-OFF

7. The wing loading of this aeroplane is high compared with those of the majority of flying boats in service. Therefore, the take-off run is correspondingly lengthened and higher speeds are reached while still partially water-borne. At these high planing speeds more delicate handling of the elevators is required and some pounding must be expected

in any but smooth seas. The control column is best held back until the hump speed is reached, after which it can be eased forward to obtain best acceleration. Any tendency to porpoise will indicate that the tail is too high and this can be easily checked by easing back on the control column . No attempt should be made to "pull off" the water until a speed of 75 to 80 knots is reached at 28,000 lb. or 90 to 95 knots at 34,000 lb.

ACTIONS AFTER TAKING-OFF

8. (i) Raising the flaps causes appreciable sink; at heavy loads this is marked and the flaps should not be raised until a height of at least 500 ft. is reached.

(ii) Climb at 115 - 120 knots I.A.S.

(iii) At 1,000 ft., or after 3 minutes flight, synchronize the engines at +1$\frac{3}{4}$ lb./sq.in. boost (Hercules II) or +$\frac{1}{2}$ lb./sq.in. boost (Hercules IV) and 2,400 r.p.m.

ENGINE FAILURE

9. (i) If one engine fails during the take-off, close both throttles immediately and land.

(ii) If one engine fails in flight, as much load as possible must be jettisoned immediately, as the aeroplane will not maintain height on one engine. Close the throttle of the failed engine and set its airscrew speed control fully back to POSITIVE COARSE PITCH. At 110 knots I.A.S. a straight course can be maintained on the starboard engine with the starboard wing slightly depressed, and the rate of descent at 33,000 lb. is 600 ft./min. In the event of failure of the starboard engine, the speed should be maintained at 115 knots I.A.S. and the port engine must be throttled back sufficiently to allow the aeroplane to be kept straight.

CLIMBING

10. At normal load, and +1$\frac{3}{4}$ lb./sq.in. boost (Hercules II) or +$\frac{1}{2}$ lb./sq.in. boost (Hercules IV) and 2,400 r.p.m., the best climbing speed is 112 to 116 knots I.A.S. to 4,000 ft. (Hercules IV) or 5,000 ft. (Hercules II) with flaps 0° to 10° down. Above these heights reduce speed by 2 knots for every thousand feet.

THE ENGINES IN CRUISING FLIGHT

11. (i) The limiting operational conditions given in para.23 must be carefully observed.

(ii) The most economical cruising will be obtained, with the mixture control WEAK, by keeping the r.p.m. and airspeed as low as possible and the boost at about - 3 lb./sq.in.

(iii) The mixture controls must be NORMAL (auto rich) at all boost pressures above - 1 lb./sq.in. and at WEAK for all boost pressures not exceeding - 1 lb./sq.in.

(iv) The carburettor air-intake heat controls should normally be at COLD at all boost pressures above $+1\frac{3}{4}$ lb./sq.in. (Hercules II) or $+\frac{1}{2}$ lb./sq.in. (Hercules IV), and at HOT at all boost pressures not exceeding $+1\frac{3}{4}$ lb./sq.in. (Hercules II) or $+\frac{1}{2}$ lb./sq.in. (Hercules IV).

GENERAL FLYING

12. Note the following:-

(i) Trimming tabs.- These must not be used to assist manoeuvres at high speed.

(ii) Rudder control.- This is rather heavy.

(iii) Change of trim.- Flaps DOWN - Nose UP
Owing to the rapid movement of the flaps, the change of trim seems violent, but if the control column is held lightly, it will be noticed that the change of flow over the tail with varying flap angles will automatically re-set the position of the control column.

(iv) Flying limitations.-

Maximum speed for lowering flaps	- 114 knots I.A.S.
Maximum diving speed	- 250 knots I.A.S.
Maximum speed for operating the bomb doors	- Maximum level speed.

(v) At low heights steep turns should not be made; at low speeds the inner wing tip may stall, and even at normal speeds it is difficult to maintain a constant height.

STALLING

13. The stalling speeds are as follows:-

	Flaps up	Flaps down
At 28,000 lb.	84 knots I.A.S.	73 knots I.A.S.
At 35,000 lb.	93 knots I.A.S.	81 knots I.A.S.

DIVING

14. Note the following:-

(i) The maximum permissable diving speed is 250 knots I.A.S.

(ii) With the throttles less than one-third open the engines must not exceed 2,750 r.p.m. (Hercules II) or 2,800 r.p.m. (Hercules IV).

(iii) With the throttles more than one-third open the engines may be allowed to reach 3,120 r.p.m. for a period not exceeding 20 seconds.

(iv) The boost must not exceed +3½ lb./sq.in. (Hercules II) or +½ lb./sq.in. (Hercules IV).

(v) The bomb doors must not be operated during a dive; if necessary, they should be opened or closed before the dive is begun.

APPROACH AND ALIGHTING

15. Before making the approach open the throttles fully for a few seconds to synchronize the Exactor controls, test the magnetos in turn, and make all other normal preparations for alighting, such as setting the mixture controls to NORMAL (auto rich) and the airscrew controls to MAXIMUM R.P.M. Ensure that the flight engineer shuts the cowling gills and sets the carburettor air-intake heat controls to COLD. Note the following:-

(i) Approach.- At less than 30,000 lb. this should be made at 105 knots I.A.S. with the flaps fully DOWN. At 30,000 lb. and above, with the C.G. in the normal position, and flaps fully down it may not be possible to maintain the required speed, even with the control column fully forward. The approach should therefore be made with flaps 30° to 35° down and with engines on at 110 knots.

(ii) Alighting.- This is normal. If the engines cannot be fully throttled, owing to lack of positiveness in the Exactor controls, open the throttles slightly and pull them back sharply.

(iii) Mis-alighting.- The nose-heaviness caused by opening up the engines to full power when the aeroplane is trimmed for alighting is marked, and is increased when the flaps are raised, therefore the flaps should not be raised until a minimum height of 500 ft. is reached. The load on the control column can be relieved by careful use of the elevator trimming tabs.

PROCEDURE AFTER ALIGHTING

16. Note the following:- (i) The airscrews must be left in POSITIVE COARSE PITCH (for maintenance purposes). The change of pitch from FINE may be made at any convenient moment while taxying in.

(ii) To stop the engines, let them idle for about one minute, to enable the scavenge pumps to remove surplus oil from the crankcases, then operate the carburettor cut-out of each engine in turn until it stops. When the engines have stopped, switch OFF the ignition.

FLYING IN BAD WEATHER

17. The aeroplane handles well at a speed of 110 knots I.A.S. (or, in bumpy weather, 115 knots) with the flaps 20^{o} - 30^{o} DOWN.

DE-ICING EQUIPMENT

18. Carburettor de-icing equipment.- In addition to the carburettor air-intake heat control, alcohol de-icing equipment is fitted on certain aeroplanes. See A.M.O. A.175/41 for instructions for operation.

BOMB CLEARANCE ANGLES

19. The maximum angles from the horizontal at which any bomb may be dropped clear of the aeroplane structure are as follows:-

Diving ..... 30^{o}
Climbing ..... 20^{o}
Banking ..... 10^{o}

A margin of safety inside these limits must be allowed.

POSITION ERROR TABLE

20.

At	90	knots	indicated	airspeed	subtract	3	knots
"	100	"	"	"	"	2	"
"	110	"	"	"	"	1	"
"	120	"	"	"	add	1	"
"	130	"	"	"	"	2	"
"	140	"	"	"	"	3	"
"	150	"	"	"	"	4	"
"	160	"	"	"	"	5	"

FUEL CAPACITY AND CONSUMPTIONS

21. Note the following:-

(i) Effective fuel capacity.-

Main plane tanks starboard	(outer - 2)	-	139 gallons each
" " " "	(inner - 1)	-	112 " "
" " " port	(outer - 2)	-	139 " "
" " " "	(inner - 1)	-	112 " "
Normal total capacity		-	780 gallons
Overload system (3 tanks)		-	220 " each
Long-range total capacity		-	1,440 gallons

(ii) Fuel consumptions.- The following figures are approximate:-

	Gallons per hour per engine
Climbing	100 at 5,000 ft.
Maximum cruising (Mixture control NORMAL (auto rich))	100 " 5,000 ft.
Economical cruising (Mixture control WEAK)	55 " 2,000 ft.
All-out level	131 " 4,000 ft.

OIL CAPACITY

22. There are two oil tanks, one for each engine. Each tank has a total capacity of 50·3 gallons. The normal content is 28 gallons (22·3 gallons air space) and the overload content 42·5 gallons (7·8 gallons air space)

NOTES ON THE HERCULES II AND HERCULES IV ENGINES

23. For full details of the Hercules II and IV engines see A.P.1728A and C. Note the following:-

(i) Limiting operational conditions.-

	Hercules II		Hercules IV	
	Maximum boostt	Maximum R.P.M.	Maximum boost	Maximum R.P.M.
Take-off (up to 1,000 ft. or 3 minutes)	+3¼ lb./sq.in. (Minimum	2,800 2,150)	+3 lb./sq.in. (Minimum	2,800 2,320)
Climb (30 minutes limit)	+1¾ lb./sq.in.	2,400	+½ lb./sq.in.	2,400
Maximum cruising (NORMAL (auto rich))	+1¾ lb./sq.in.	2,400	+½ lb./sq.in.	2,400
Maximum cruising (WEAK)	-1 lb./sq.in.	2,400	-1 lb./sq.in.	2,350
All-out level (5 minutes limit)	+3¼ lb./sq.in.	2,750	+½ lb./sq.in.	2,800
Dive (20 secs. limit)	+3¼ lb./sq.in.	3,120	+½ lb./sq.in.	3,120
Maximum single-engine cruising (NORMAL (auto rich))	+1¾ lb./sq.in.	2,400	+½ lb./sq.in.	2,400

(ii) Oil pressures.-

Normal	80 lb./sq.in.
Emergency minimum (5 minutes limit)	70 lb./sq.in.

(iii) Oil inlet temperatures.-

Minimum for opening up	5°C.
Maximum for continuous cruising	70°C.
Maximum for climbing (30 minutes limit)	80°C.
Maximum for single-engine cruising	80°C.
Emergency maximum (5 minutes limit)	90°C.

(iv) Cylinder temperatures.-

Maximum climbing (30 minutes limit)	250°C.
Maximum cruising	230°C.
Maximum for single-engine cruising	250°C.
Maximum all-out level (5 minute limit)	260°C.

October 1941.

AIR MINISTRY.

Amendment List No.6.
to
AIR PUBLICATION 1666A.
Volume I
and Pilot's Notes.

LERWICK I AEROPLANE.

TWO HERCULES II OR IV ENGINES.

Note:- The last Amendment List to this Air Publication affecting the Pilot's Notes was A.L. No.5.

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(8)	SECTION 1.	Para. 2. Delete existing fuel specification and substitute "100 octane only".
(9)	SECTION 2.	Mark para. 2 (vi) and para. 4 (i) to refer to this sheet, and note the following: Before starting engines, the airscrew controls should be set fully back to POSITIVE COARSE PITCH. After the engines have been running for a minute or more, and before running up, the controls must be set fully forward to MAXIMUM R.P.M.
(10)	SECTION 2.	Insert this sheet at end of Section 2.

R.T.P/1007. 350. 9/41

SECTION 3

CONTROLS AND EQUIPMENT FOR CREW

SECTION 3

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

SECTION 3

CONTROLS AND EQUIPMENT FOR CREW

Introductory notes

1. For descriptive purposes, the hull is divided throughout in sequence into seven compartments namely, bow, wardroom, mid-stowage, main-aft-cabin, galley and stern. Prior to dealing with the above-mentioned compartments, a general description of the controls and equipment not situated at any particular crew station is given in paras. 4 to 32. The bow, midship and stern turrets are each dealt with separately at the end.

2. The layout of the various controls and equipment for the crew, apart from those items already dealt with in Section 1, the pilot's control cabin, is illustrated in figs. 1 to 18. These illustrations, which cover the remainder of the hull from bow to stern, will be found at the end of this section; a key to the items referenced is given facing each illustration. Items to which special reference is made in the text are followed by the relevant key number in brackets. Explanatory notes are given only where the function and operation of any particular item is not obvious or where the position of any item is not shown in figs. 1 to 18.

3. Special equipment for the purpose of facilitating handling and to assist in the preparation and maintenance of the flying boat for its operational functions may be found in the appropriate leaflets in Vol.II of this publication.

AEROPLANE EQUIPMENT

General

4. A list of aeroplane equipment (the marine equipment is listed in para.5) is given below in alphabetical order to identify and locate the stowage of the various items with which the crew in the lower portion of the hull should be familiar.

Description	Stowage position
Airscrew (spare blades)	Stern, starboard, (figs. 12 and 13).
Airscrew (boss)	Mid-stowage, starboard, (fig.5)
Awnings	Mid-stowage, port (fig.4)
Bombs, practice (stowed)	Mid-stowage, port (fig.4)
Bombs, practice (ready for use)	Stern, starboard, (figs. 12 and 13)
Bomb register gear (upper and lower)	Below wing in port and starboard nacelle

Description	Stowage position
Bomb winch	Mid-stowage, port, (figs. 4 and 5)
Bomb winch mounting	Wing, above port nacelle
Cartridges (signal), general stowage	Mid-stowage, starboard (fig.5)
Clock, cabin	Wardroom, starboard
Compass, D.R. Master	At frame 29 stern starboard (figs. 12 and 13)
Covers, airscrew engine, etc.	Mid-stowage, port (fig.4)
Cover, bow bollard	Bow, starboard
Fire extinguishers	Engine nacelles, starboard
Flares reconnaissance (stowed)	Mid-stowage, starboard (fig.5)
Flares reconnaissance, (ready for use)	Galley, starboard (fig.10)
Floats, flame (sixteen)	Mid-stowage (fig.5)
Hose refuelling	Wing, above starboard nacelle
Mooring-lamp mast	Galley, starboard (figs. 8 and 10)
Parachute (1) navigator	Bow, rear bulkhead, port (fig.2)
Parachute (1) engineer (spare)	Mid-gun platform (figs.8 and 11)
Parachute (2) observer and W/T operator (spare)	Stern, port (figs. 12 and 13)
Parachute (1) rear gunner	Stern at emergency exit (fig.14)
Platforms, engine maintenance	Each side of mid-hatch in galley (figs. 8 and 9)
Platform, airscrew and extension tubes	Main aft cabin, behind starboard bunk (fig.6)
Puffs (smoke)	Mid-stowage (fig.5)
Signalling lamp	Bow, port
Suit cases	Wardroom, port (fig.3)
Suit cases	Main aft cabin, port and starboard (fig.7)
Vice (fitters)	Galley, starboard (fig.8)

MARINE EQUIPMENT

General

5. A list of marine equipment items and their stowage position are given in the following table:-

Description	Stowage position
Anchor	Bow, starboard (fig.1)
Billows, dinghy inflation	Galley, front starboard (fig.8)
Boat hook (Grabit) and warpline	Bow, starboard (fig.1)
Boat hook shaft	Bow, starboard (fig.1)
Bollard bow cover	Bow, starboard
Chain anchor	Bow, below walkway (figs.1 and 2)
Chain locker	Bow, below walkway (figs.1 and 2)
Dinghy, type C	Galley, bulkhead below hatch (fig.9)
Dinghy, type D	Galley, starboard (figs. 8 and 10)
Doogues, complete with warp and tripping line	(2) Inboard trailing edge of port and starboard plane (1) Mid-stowage
Line, heaving	Bow, starboard (fig.1)
Line, warp	Bow, starboard (fig.2)

Description	Stowage position
Mast, mooring lamp	Galley, starboard (figs. 8 and 10)
Oars, wood	Galley, starboard (fig.8)
Pump, wing tip float, hand bilge complete with hose	Galley, starboard (fig.8)
Signals, distress marine	(3) Starboard side of galley hatch (fig.9) (3) Port side of galley hatch (fig.9) (3) Rear of bulkhead No.26 starboard (fig.12)
Stoppers, leak	Galley, starboard, above vice (fig.8)
Towing gear and mooring penant	Bow, starboard (fig.2)

CREW ACCOMMODATION

General

6. Padded cushions (72 and 76) on the lockers at each side of the wardroom and (139 and 144) at each side of the main aft cabin, and folding bunks (135 and 147) above the lockers in the latter compartment, serve as berths for the crew. Suit-cases (77) are provided and are stowed at the port side forward of the locker in the wardroom. Further suit-cases (138 and 159) are stowed at the aft end of the lockers in the main aft cabin. A hammock (272) can be slung from three attachment points in the stern compartment.

7. Immediately aft of bulkhead No.20 (153) the space on the port side is used as a galley which is provided with a food cupboard (193), ice cabinet (199) and wash basin (200); above the food cupboard provision is made for a cooking stove (201). Two five-gallon fresh water tanks (97) are mounted on the port side at the front of the mid-stowage compartment.

SANITARY ACCOMMODATION

General

8. A lavatory (276) is situated on the port side at the forward end of the stern compartment (see fig.12). It is of the pressure flush type and is flushed by operating a step lever (275) at the base of the mounting. The water chamber is replenished with the aid of a hand pump (233) mounted on bulkhead No.26 (248) at the rear of the galley. A pet cock is provided to indicate when the water chamber is full.

9. The pet cock should be opened when filling the water chamber and closed immediately the water commences to overflow. Air pressure is maintained by the hand pump (232), adjacent to the water pump (233) and is indicated by a pressure gauge. A pressure relief valve is incorporated in the water chamber and a pressure of not less than

30 lbs./sq.in. is necessary for efficient operation although the flush will work satisfactorily at much lower pressures if necessary.

ARMAMENT

Guns and turrets

10. The armament consists of seven guns, disposed in three turrets. The bow turret is provided with one Vickers gun, the midship turret with two Browning guns and the stern turret with four Browning guns. All three turrets are rotatable. The bow turret, which is free to slide in a horizontal direction, can be moved aft during mooring and anchoring operations and it can be locked in either position. The aeroplane must never be "taken off" or flown unless the bow turret is locked in the forward position. The midship turret which is retractable moves in a vertical direction between guides and is raised and lowered by means of a power operated hydraulic system. It is important to ensure that turret rotation is never attempted when the midship turret is retracted or when the stern turret doors are open. Hydraulic power for operation of the bow and stern turrets is derived from the twin Pesco pump on the starboard engine. The midship turret obtains hydraulic power from the Duplex pump, on the port engine; this pump also provides the supply for operation of the bomb doors and flaps. The turrets are described in paras. 72 to 100 and for greater detail, reference should be made to A.P.1659A, Volume I.

Bomb gear

11. The detachable components which form separate items of the bomb gear consist of an upper register gear, bomb hoisting winch, winch mounting and a lower register gear. The upper and lower portions of the register gear are both supported by the bomb beam structure situated in each engine nacelle below the plane. The winch mounting is stowed in the fairing above the port engine nacelle, whilst the bomb winch (114) is stowed separately on the port side of the mid-stowage compartment.

Bomb loading

12. The maximum permissible alternative bomb loads, which may be carried collectively on the aeroplane are as follows:-

(i) 4 - 500-lb. bombs

(ii) 8 - 250-lb. bombs

(iii) 4 - 250-lb. type B bombs

(iv) 4 - 250-lb. bombs and 4 - 280-lb. bomb containers

(v) 4 - 250-lb. bombs and 2 - 500-lb. bombs

(vi) 4 - 250-lb. bombs and 2 - 250-lb. type B bombs.

Bomb register gear

13. The 250-lb., 500-lb., and type B bombs and the bomb containers are supported from the bomb positions in each nacelle and are retained by the register gear. Each nacelle contains four register gears with alternative positions for the respective bomb loadings.

14. When it is necessary to fit the large diameter bombs to the bomb register gears in each nacelle, the two inner bomb register gears are moved slightly outboard of the centre line. To effect the change the draw bolts, situated in the bomb beam, should first be withdrawn from the beam, the bomb gear should then be moved to the new position and the draw bolts refitted.

Bomb register gear locking

15. A locking lever and locking nuts, by which the lower detachable portion of the register gear is secured to its upper portion, are provided below the detachable metal covers on the top surface of the nacelle fairing. Before hoisting a bomb into position the lower portion of the register gear should be secured to the universal carrier with the bomb attached thereto. The winch should then be mounted above the desired position with the main hoisting cable and the guide ropes passed through the nacelle and finally secured, to the lower detached portion of the register gear, by means of the bayonet fittings provided.

16. When the lower register gear, carrier and bomb have been hoisted into place, the locking lever should be moved over to the locked position, the hoisting cable and the guide rope bayonet fittings can then be detached and the locking nuts fitted; a special spanner is provided for tightening of these nuts. Slackening of the locking nuts is prevented by spring-loaded catches.

17. When the bombs are in position the winch (114) should be removed from its mounting and should be stowed at the port side of the mid-stowage compartment. The winch mounting should be retained in the port nacelle by the elastic cords and the detachable covers should then be secured to the nacelle fairing.

Practice bombs

18. Sixteen 11½-lb. practice bombs (109) are carried in a box (110) stowed at the port side of the mid-stowage compartment. These bombs are released from the hinged carrier (271) on the starboard side of the stern compartment. The carrier should first be loaded with two bombs and then swung outboard, prior to coupling the short length of electrical supply cable to the socket which provides connection for the release of the bombs by the pilot.

PYROTECHNICS

Flares - reconnaissance

19. Stowage for twenty reconnaissance flares is provided on the starboard side of the mid-stowage compartment. The flares are stacked between spacers (118) which are retained by pins (119) passing through four vertical tubes (120) forming the mounting. A floor panel at the base of the mounting should be removed to allow the bottom spacer to rest on the floor bearer when carrying the full complement of flares. The four support brackets at the base of the tubular mounting also provide stowage for the hub of the spare airscrew, when flares are not carried. The flares are ejected from the aeroplane through a chute (237) on the starboard side of the galley.

Flares - forced landing

20. Built into each side of the hull at the forward end of the galley are inclined chutes (176 and 211). These chutes are used for the discharge of the forced landing flares which are normally carried one in each chute. The orifice of each chute is above the water line at frame No.22. A hinged cap closes the inboard end of each chute. The release mechanism is under the direct control of the pilot and is dealt with in Section 1.

Marine distress signals

21 Stowage for handshields (220) and marine distress signals (221) is provided behind the maintenance platform (171) below the decking on the starboard side of the galley at the forward end.

MISCELLANEOUS

Photographic equipment

22. Provision is made for vertical and oblique photography. The electrically controlled F.24 type camera (242) is supported by an adjustable mounting at the rear of the galley on the starboard side. The controller for operation of the camera has three positions, one adjacent to the camera operating position at the starboard side of the galley, a second at the starboard side of the pilot's control cabin, and a third (39) at the port side of the bow compartment. A ring and bead sight is provided for oblique photography and can be installed adjacent to the pilot on the starboard side of the control cabin. Clips are provided for the stowage of this sight immediately below the operating position in the pilot's control cabin.

23. Vertical adjustment of the camera, which is controlled by a handle (242) at the side of the mounting, permits the porthole hatch (236) immediately below the camera, to be opened inwards on to the hull floor. This hatch is secured by six hand-screws and, after serving its purpose for vertical photography, the hatch should be closed prior to the aeroplane alighting to prevent the ingress of

water into the hull. The opening in the hull for oblique photography is one of the portholes (245), adjacent to the camera. The wedge plate (241) to which the camera drive motor can be fitted is mounted near the side of the camera operating position in the galley.

Spare airscrew hub stowage

24. The hub of the spare airscrew is stowed, at the starboard side of the mid-stowage compartment, on a pedestal attached to a $\frac{3}{4}$ in. multiply baseboard. The baseboard is secured by four captive nuts to four vertical tubes which in turn are supported by the same brackets that carry the tubular mounting (120) for flare stowage. The vertical tubes have closed tops and project above the top of the floor panel; when flares are carried this panel is removed. The spindle and the hub cap are secured to the pedestal by a shouldered bolt at the centre. A canvas cover, normally stowed in a bag (105) on the port side of the mid-stowage compartment, is provided to protect the spare airscrew hub in the stowed position.

Spare airscrew blades stowage

25. Three spare airscrew blades are stowed horizontally at the starboard side of the stern compartment. The stowage for the root end of each blade consists of a felt-lined dish (267) whilst the tip of each blade is strapped to a felt lined bracket by means of an adjustable strap (268). The root end of the blades before being stowed should be treated as follows:-

(i) Well grease the thrust races and the root end of the blade.

(ii) Wrap a strip of well greased corrugated cardboard around the shank of the blade to form a cylinder and push it under the thrust races.

(iii) Wrap a strip of corrugated cardboard around both the blade root and the race and tie together to prevent the race assembly from moving.

(iv) Enclose the blade root in the felt-lined dish (267) and tie with cord.

Drogues and stowage

26. Two 30 in. diameter drogues are folded and stowed in separate containers at the inboard trailing edge of each main plane. Stowage for a third drogue (115) is provided on the starboard side of the mid-stowage compartment. The drogues are normally launched and handled from the hatchway (214) above the top platform (172) in the galley. The port and starboard eyebolts for the shackle attachments of each drogue towing rope are visible from outside the hull aft of

the hatchway. Both the eyebolts are retractable and can be pushed outwards from inside the galley.

27. The bollards (219) for the attachment of the drogue tripping lines are located near the hatchway inside the roof of the galley as shown in fig.9. The drogue handling operations, with the aid of a drogue signalling system, are under the direct control of the pilot. Transmission and reception of the signals for manipulation of the drogues, is effected by means of a drogue signalling unit (218), in the galley; this unit is wired to the pilot's signalling unit in the control cabin.

Dinghies and stowage

28. Stowage is provided for a type C dinghy (224) complete with accessories by means of elastic cords attached to the upper portion of the bulkhead at the front of the galley. A type D dinghy (190) with separate stowage for foot and hand operated inflating bellows (188), paddles, wooden sculls (184), dinghy leak stoppers and repair outfit (182) and spare paddles is provided at the forward end of the galley on the starboard side.

Drainage and bilge systems

29. Bilge water drain valves operated by control levers, above the flooring are situated at bulkheads Nos. 6, 12, 15, 20 and 26. Each control lever is retained by a clip when the valve is shut. When open, the valves allow the bilge water to drain from fore-and-aft to the main drainage valve (160) which is located below the detachable walkway flooring at the rear of the main aft cabin as shown in fig.7.

30. This main drainage valve (160) should always be maintained in the closed position after draining the bilge water, in flight; any tendency for the flooring above this main drainage valve to assume a rocking motion when walked upon will indicate that the valve is not shut in the screwed down position due to the stem of the valve handle not being below the true level of the flooring.

31. The bilge water can also be withdrawn from the hull by the auxiliary power unit when the aeroplane is afloat. A pipe-line is led from the unit, via bilge suction filters (178) to a suction strum (162) fitted in the keelson aft of frame No.17. The flow through the bilge suction filters (178) is readily changed over from one to the other by means of a lever, so that the filter which is not in use may be cleaned without stopping the engine of the power unit. The discharge is arranged at the starboard side of the auxiliary power unit compartment and the filters (178) are on the starboard side at the forward end of the galley as shown in fig.8.

Auxiliary power unit services

32. Instructions for starting, running and maintaining air-cooled auxiliary power units are given in A.P.1507A, Vol.I. The electrical supply, bilge pumping, air supply and refuelling services provided by means of the unit are available as follows:-

(i) The generator will charge the general service batteries direct and it will also charge the main engine electric starting batteries by connecting them to the terminals illustrated in Sect.1, fig.10, item 251.

(ii) For bilge pumping (see para.31), the unit is connected by a pipe-line via bilge suction filters (178) to the suction strum (162) in the keelson near the main step. The discharge is arranged at the starboard side of the auxiliary power unit compartment.

(iii) The air compressor supplies air for the fuel jettison system. The air is stored at 200 lb./sq.in. in a 400-cub.in. capacity cylinder (see Sect.1, fig.6, item 138).

(iv) For refuelling, the unit is connected to an external fuel supply by means of a suction pipe normally stowed in the fairing above the starboard engine nacelle. The drive to the fuel pump should not be engaged with the engine running unless the appropriate fuel cocks at the rear of the pilot's control cabin, (see Sect.1) and the cock adjacent to the power unit are at their correct settings.

BOW COMPARTMENT

General

33. The bow compartment is illustrated in figs. 1 and 2. Entrance to this compartment is gained through the hinged watertight door (44) at the forward end of the wardroom. The foredeck in the bow compartment is fitted with a rotatable gun turret which can also slide in a fore-and-aft direction. Arrangements are made for bomb aiming, auto-controls steering and camera control, and when the turret is in the aft position facilities are provided for mooring and anchoring operations.

Bow turret locking

34. An opening in the roof at the rear of the bow turret aperture (5) permits operation of the port and starboard hand release levers which control the locking bolts of the turret. The turret is mounted on a frame fitted with rollers and the whole assembly can

be moved manually fore-and-aft on rails; the frame can be secured in either the fore or aft position. The turret aperture (5) allows free passage for mooring and anchoring operations when the turret is in the aft position. The turret should not be moved aft unless the gun ring is secured against rotation with the lock provided and with the gun trained to face forward; stops are also fitted to prevent rotation of the turret beyond the safety position.

Bomb-aiming aperture - panels and external door

35. A transparent panel (36) for observation purposes and a blanking panel (19), for covering the hull internally at the bomb-aiming aperture, are both interchangeable. Two pegs on the top edge and two wedge catches on the bottom secure the panels in position, and whichever panel is not in use should be stowed on the port side of the bow compartment (see fig.1, item 36). The transparent panel shields the bomb-aimer in flight when the external door at the front of the compartment is in the open position. This door is opened by rotating the handle (6) above the aperture in a clockwise direction. The blanking panel prevents damage to the door mechanism and helps to seal the bomb-aiming aperture during mooring and anchoring operations. When changing either of the panels, in flight, the external door should be in the closed position.

Bomb-aimer's seat

36. Seating accommodation for the bomb-aimer in the bow compartment is provided by means of a double folding hinged platform (27) which, together with the folding platform (9) serves to cover the bomb-aiming aperture during mooring and anchoring operations. The hinged platform (27) which is coupled by adjustable slide bars to brackets (17) for carrying the Mk.II automatic bomb sight, is held in the open position by catches (4 and 10) as shown in fig.1. A padded knee rest is fitted forward of the seat, which is also padded, and a heel rest in the form of a cross member below the seat is fitted on the sub-structure.

Bomb sight mounting and stowage

37. Mounting is provided for either a Mk. IXC or an automatic Mk.II course setting bomb sight. The Mk. IXC mounting (21) as shown in fig.1, is detachable and is shown in the stowed position (49) in fig.2. Port and starboard brackets (17) coupled to the adjustable slide bars below the folding platform (9) provide mounting for the Mk.II automatic bomb sight. Knurled nuts outboard of each slide bar enable the mounting to be secured in any desired position to suit the sight. The platform (9), which is normally used in the down position during mooring and anchoring operations, is held open by catches (4 and 10) as shown in fig.1.

Automatic bomb sight safety switch

38. The safety switch (33) for use with the automatic bomb sight is attached to a bracket on the port side of the bow compartment.

Automatic flying controls steering lever

39. The lever (30) at the port side of the bow compartment enables the bomb-aimer to steer the aeroplane, within certain limits, when using the bomb sight. This control, is inter-coupled by cables to the auto-controls steering lever in the control cabin.

Camera control

40. The camera controller (39), for operating the motor of the F.24 camera (242) in the galley, is mounted on a wedge plate on the port side of the bow compartment. The controller is coupled by means of a short electrical supply cable, plug and socket (34) to a similar connection (239) extending from the camera motor (241) at the starboard side of the galley. A cable, which has a two-pin socket at each end, is incorporated between the two compartments and is permanently installed to enable the detachable components of the camera to be readily removed when not required.

WARDROOM

General

41. A general view of the wardroom showing the starboard entrance door and steps inside the hull is given in fig.3.

Starboard entrance door

42. The door (63) hinges inwards and can be opened from either inside or outside the aeroplane. The handles outside the door, and spring-loaded discs which cover each handhole, are flush with the outside face of the door. The locking mechanism on the inside face of the door comprises four bolts that are operated by two handles (69). The door is locked when the handles are in the vertical position, and when shut, the rim of the door seats on rubber to make a watertight joint.

Hatchway cover

43. A ladder (62) within the wardroom gives access to the hatchway (61) leading to the pilot's control cabin. The hatchway cover is held in the open position by a spring catch on the starboard side of the control cabin. This cover closes the roof in the wardroom and also forms part of the flooring at the starboard side of the control cabin.

Interior heating

44. The wardroom can be heated internally during flight. Warm air, for supplying the heat direct to the wardroom is taken from the airflow passing through the fairing at the rear of the port engine oil cooler. The air from the cooler is led through ducts along the wing leading edge, through the rear of the pilot's control cabin, and thence down into the wardroom. The airflow through the oil cooler is regulated by a flap situated in the fairing at the rear of the cooler and the airflow into the wardroom is regulated by a flap within the duct at the rear of the pilot's control cabin.

45. Heating controls.- The supply of warm air from the oil cooler to the wardroom is governed at all times from the rear of the pilot's control cabin. The flap, which regulates the flow of warm air through the cooler fairing, is operated by the port oil cooler control lever (see Sect.1, fig.8, item 174). The flap regulating the flow of warm air to the wardroom is operated by a control knob (which is difficult to reach) below the roof near the rear bulkhead, at the port side of the pilot's control cabin.

Navigator's table

46. The navigating station with its associated equipment, seat and table is normally on the port side of the pilot's control cabin but, when a second pilot's seat and dual controls are fitted, arrangements are made whereby the position can be changed for observations to be recorded from a table (75) erected in the wardroom. This table is usually stowed and held by elastic cords (107) on the port side of the mid-stowage compartment. The legs of the table when erected in the wardroom fit into sockets above the flooring. Both leaves of the table can be folded to allow free passage along the gangway as shown in fig.3.

MID-STOWAGE COMPARTMENT

General

47. The location of the various items of equipment, both fixed and removable on each side of the mid-stowage compartment is given in figs. 4 and 5. The space on the starboard side between bulkheads Nos. 12 (99) and 15 (86) is utilized for the alternative stowage of either a spare airscrew hub or reconnaissance flares (120). The space on the port side at the forward end is provided with a canvas bag and frame (105) in which the following items may be stowed, namely covers (95) for the control cabin, turrets, engine and spare airscrew hub, etc; hammock (102), emergency tool kit (103), portlight windshields (104) and rope ladder (108).

48. A box (110) complete with a hinged lid, for the stowage of sixteen light series type practice bombs is fitted at the rear of the canvas bag (105) on the port side. A bomb winch (114), which is also used for spare engine slinging, is stowed at the rear of the bomb

stowage box. A drogue (115) can be stowed and held in the stowed position by straps, on the port side as shown in fig.4.

Engine starting external power supply socket

49. Port and starboard engine starter relays (123 and 124) and a power supply socket (125) are attached to the roof of this compartment. This socket enables starting current to be taken from an external source to conserve the current normally taken from the general services batteries.

MAIN AFT CABIN

General

50. The main aft cabin, at the rear of the mid-stowage compartment, is illustrated in figs. 6 and 7. The equipment in this compartment consists mainly of upper and lower bunks, lockers, stowages for suit cases and stowage for engine maintenance platforms. In addition the tanks of the overload fuel system are accommodated in the space above the roof of this compartment, and the main drainage valve (160) of the bilge water jettison system is located below the walkway flooring.

51. The upper bunks (135 and 147) when folded serve as back rests for the lower bunks and also cover the maintenance platforms (136 and 145) in the stowed positions. In the open position the upper bunks are clipped to cables (134 and 148) which are suspended from the roof at each side of the cabin as shown in figs. 6 and 7.

52. The two bilge drain flap control levers (142) are located below the hinged watertight door (112) at bulkhead No.15 (see fig.6). The drain pipes (126 and 127) from the overload tank compartment are situated near the forward bulkhead (see fig.6) and the first-aid outfit (155), the fuel jettison discharge pipes (157 and 167), the bilge suction pipe (162 and 166) together with the two bilge drain flap control levers (165) are all situated at the rear bulkhead of this compartment (see fig.7). The operation of bilge draining is described in paras. 29 to 31.

Overload fuel tanks bay

53. The overload fuel tanks are contained in a compartment bounded by the upper portions of bulkhead No.15 and bulkhead No.20. The partition below the overload fuel tanks forms the roofing in the main aft cabin. This tank compartment and the fuel jettison discharge pipes (157 and 167) at the rear of the cabin, are gas tight to prevent fumes or fuel leaking into the hull. Three large access doors in this partition are detachable to facilitate inspection of the tanks.

GALLEY

General

54. The galley compartment (which includes the midship gunner's station) extends from bulkhead No.20 to bulkhead No.26 and, together with the numerous items of equipment in the upper and lower portions of the galley, is illustrated in figs. 8 to 11.

Forward portion

55. A view of the lower portion of the galley, looking forward is shown in fig.8. The ice cabinet (199), food cupboard (193), stove (201) and other cooking utensils are shown installed at the port side, with the workshop-bench and vice (187), the bilge suction filter unit (178), and other items of marine equipment at the starboard side.

56. The ladder (195) in the lower portion of the galley gives access to the upper staging (175) which serves as a step to approach either the midship gun turret or the top platform (172) in the upper portion of the galley. The swashboard (154) shown in position at bulkhead No.20, is normally stowed on four brackets (210) above the opening at bulkhead No.20.

57. The upper portion of the galley, at the forward end, is shown in fig.9. The top platform (172) situated below the hatchway (214) leading to the upper decking of the hull, is also shown in this illustration. This hatchway and platform permit access to the auxiliary power unit at the front of the hatch and to the drogues within the inboard trailing edge of each main plane. The hatchway also provides an openir.g for the manipulation of the drogues while standing on the platform (172), and is a means of approach to the various components above the decking, and to the bomb gear and other units which are situated in each engine nacelle.

Rear portion

58. In fig.10 is shown a view of the lower portion of the galley looking aft. The lavatory air pump (232), the lavatory water pump (233), the swashboard (235) and the bilge drain flap control lever (234) are also shown in position at bulkhead No.26. The swashboard (235) is normally stowed on the starboard side of the stern compartment as shown (262) in fig.12.

59. The lower staging (196) and access ladder (195) together with the mid turret hydraulic system piping (169) and oil filter (205) are illustrated in fig.10, on the port side, and on the starboard side will be seen the water tight hatchway (236) below the camera and mounting (242). The flare release chute (237), the canvas stowage bag and frame and other items, which are not included in fig.8, on the starboard side, are also illustrated.

60. The midship turret (228) can be seen with the hydraulic system oil filter (205) and the test valves (230) in the upper portion of the galley, in fig.10. In fig.11, the turret (228) and other components above the staging (175) in the upper portion of the galley are shown to better advantage but the oil filter and test valves are not included in this view.

61. The port ammunition box (250), the upper and lower attachments of the turret port guides (251 and 252), and the articulated joints (212) and recuperator pump (229) of the turret hydraulic system are shown on the port side.

62. On the starboard side are the controls for raising and lowering the turret. These controls consist of a hydraulic hand pump (247), control valve (253), turret lock control (255) and an oil reservoir (257). The arrows inscribed on the instruction label (256), for indicating the UP and DOWN settings of the control valve, refer to the control valve lever (253) and not to the turret lock lever (255) which has a separate label below the turret bowl, where the IN and OUT positions of the lock lever (253) are inscribed and indicated by further arrows. The instructions for raising and lowering the turret are given in paras. 90 and 92.

63. The atarboard ammunition box (258) in the midship gun turret as well as the upper and lower attachments of the turret starboard guides (249 and 254) and the parachute stowage container (174) are also illustrated in fig.11.

STERN COMPARTMENT

General

64. Access to the stern compartment is gained through the port entrance door (282) at the aft end of the hull. This compartment, which extends from bulkhead No.26 to bulkhead No.38 is illustrated in figs. 12 to 15. Fig.12 is a view of the stern compartment looking forward on to bulkhead No.26 and fig.13 is a view looking aft as far as the zip-fastener curtain (287) at bulkhead No.36. This curtain can be utilized to isolate the stern compartment at the rear from the stern turret (297) which is incorporated aft of bulkhead No.38.

Forward portion

65. In fig.12 may be seen, the midship turret in the lowered position above the curtain (248) at bulkhead No.26, the hammock (272) in the slung position, and the bilge drain flap control levers (273) at the forward end of the detachable walkway flooring (274). The lavatory (276) and the port entrance door (282) and step (277) are shown on the port side, and the stowage (262) for the swashboard at

bulkhead No.26 as well as the three felt-lined dishes (267) and the straps (268) for the stowage of spare airscrews is shown on the starboard side. The sextant hatch cover stowage (270), the light series bomb carrier mounting (271), the D.R. compass mounting (260) together with the plug-in socket (261) are also shown on the starboard side. The camera magazines stowage (264) is on the starboard rear face of bulkhead No.26.

Rear portion

66. In fig.13 is shown a view of the stern compartment looking aft, and most of the items shown in fig.12, on the starboard side, are also visible in fig.13, with the exception of the hinged watertight door (295), the door locking handles (294 and 296), situated adjacent to the hinged mounting for the light series bombs (271), the D.R. compass data card holder (283) at frame 29, and the two-way roof lamp switch (284) at bulkhead No. 36.

67. On the port side (see fig.13) at frame No.30, directly connected to the switch (284), is a corresponding two-way roof lamp switch (288) and immediately below it is the mooring mast lamp switch (289) which can be moved ON or OFF from either inside or outside the hull near the port entrance door. The containers (278 and 279) between frames Nos. 30 and 31 near the port entrance door provide stowage for two parachutes on the port side of the stern compartment.

Aft portion

68. A view of the aft portion of the stern compartment complete with the stern gun turret (297) is given in fig.14. The turret access ladder (303), the turret door locking handle (298) with the turret doors (304), in the open position, are also shown. The parachute stowage container (302), the emergency push-out panel (300) and the panel release cable (301) at the rear of the zip-fastener curtain (287) are illustrated at the port side, whilst at the starboard side are illustrated, the turret electrical wiring (305), the wiring (306) for the navigation and formation keeping lamps, the head set stowage (310) and the pipe-lines (307) oil filter (308) and recuperator pump (309) of the stern gun turret hydraulic system.

Rudder locking gear

69. The rudder locking gear of the flying controls and part of the rudder and elevator controls, between bulkhead No.36 and the stern gun turret, are accommodated overhead in the aft portion of the stern compartment as shown in fig.15. In addition, the floodlamp (312) and dimmer switch (311), the elevator control rod (320) and the elevator return spring and cable (314) and the cables (315) of the rudder controls are also illustrated, as well as the elevator port and starboard hinges (316 and 320), the rudder locking lever (317) and the spring-loaded locking bolt (318) of the rudder control system.

70. Instruction labels.- It should be noted that it is dangerous to push the rudder-locking bolt (318) UP into the locked position when the aeroplane is in operation, and a label (319) to this effect is attached to the hull plating above the zip-fastener curtain (287) at bulkhead No.36. In addition the locking bolt (318) should always be withdrawn from the rudder lever (317) before flight and a label to this effect will be found on the starboard side of the instrument panel at the forward end of the pilot's control cabin.

71. Rudder locking bolt engagement.- The locking bolt (318) which is normally maintained in the OUT position by means of a spring is applied, for locking, with rudder in the mid position, by inserting it in an upward direction into a hole at the end of the rudder lever (317). A small peg on the spring-loaded locking bolt engages a slot in the spring housing and serves to hold the locking bolt in the IN position. The locking pin cannot accidentally be applied even if the spring should fail.

BOW GUN TURRET

General

72. The bow gun turret is illustrated in fig.16. One Vickers K gun is normally attached to the cradle which pivots between two brackets mounted rigidly on an inner ring of the turret. An outer ring of the turret, in which the inner ring rotates on ball bearings, is mounted on a frame to which it is secured by twelve 2 B.A. bolts. The frame is an integral part of the aeroplane and is fitted with rollers to allow the complete assembly to be moved manually fore-and-aft on runway rails. The gun should always be centralized and fully elevated with the seat and lap straps folded before moving the turret aft.

73. Elevation and depression movements are effected by means of a hydraulically powered double acting ram (352). Rotary movement of the turret is effected by means of a hydraulically powered motor. This motor is attached to the turret inner ring, which rotates, and a pinion driven by the motor engages with a gear rack attached to the outer ring, which remains stationary.

74. To facilitate free passage between the turret and the aeroplane the air gunner's seat (344) should be folded and the turret should be in the forward position. The seat, which can be locked in three positions by a lever (343) at each pivot point, should have the two locking levers disengaged to allow the seat to be folded in the position required.

Hydraulic system

75. The oil flow to and from the hydraulic system in the aeroplane is coupled, through articulated service joints, to the system in the forward turret. These joints are situated at the top of the bulkhead members aft of the turret. The hydraulic system for the forward turret derives its power from the Pesco pump on the starboard engine. This pump is also coupled to the system of the rear turret; the mid turret hydraulic system is separate and each system has to be maintained individually.

76. The control handles (340 and 349), which are mounted, one at each side, on the inner ring of the turret, are connected through a linkage to a master valve unit in the turret. This unit governs the oil flow to and from the gun elevating ram and also the motor for turret rotation.

77. The oil filter (46), the recuperator pump (52) and the test valves (51) of the forward turret hydraulic system are mounted in the bow compartment at the port side of bulkhead No.6 as shown in fig.2.

Controls

78. Two control handles (340 and 349), in which a trigger (338 and 350) and an actuating lever (339 and 348) are incorporated, control the movements of the turret for rotation, gun elevation and gun depression. The actuating levers (339 and 348) should be fully depressed to operate the master valve and power turret. These control handles (340 and 349) should be moved anti-clockwise for left rotation and clockwise for right rotation. The handles are tilted forward for gun depression and backwards for gun elevation. Both control handles are coupled together and the combined movements of either handle will produce corresponding movements of the gun.

79. The speed of operation of the turret is dependent upon the amount of movement given to the control handles when the actuating levers are depressed. It is not intended that the master valve should be used as a speed controller. The Palmer gun firing mechanism is controlled by the triggers attached to the control handles.

80. The air gunner may rotate the bow turret manually in an emergency by standing on the flooring of the hull, pulling on one of the side frame members with the right hand and moving the by-pass valve lever (351) at the left of the turret to the position marked HAND with the left hand.

Gun sight

81. The cross-member, carrying the gun sight mounting ring (325), is linked to the gun cradle and responds to the elevation and depression movements of the gun. The sight is positional at a height to suit the eye-level, when the gunner is seated in the turret.

Electrical services

82. The electrical supply for the turret flood lamp (329) and the reflector type gun sight is obtained by means of a plug and socket, in the aeroplane, adjacent to the turret. A connection is also fitted for intercommunication purposes.

MIDSHIP GUN TURRET

General

83. The midship turret (see fig.17) in the upper decking of the galley compartment is equipped with two Mk.II Browning ·303 guns. The guns are mounted in a similar manner to the gun in the bow turret. The midship turret is capable of complete rotation, and is also capable of being raised or lowered under power.

84. Two ammunition boxes, (369 and 372) each capable of holding 1,000 rounds, are clipped to the floor of the turret bowl. The belts, which are drawn through openings in each of the boxes, are fed through ducts and over flanged rollers to the guns. The air gunner's seat (371) is adjustable to any of three positions. Adjustment is effected by unscrewing two handwheels (368 and 374) at each pivot point and raising or lowering the seat as required. Care should be taken that the location pins fitted to the nuts are properly engaged in their respective grooves when rotating the handwheels for relocking the seat.

85. The gun sight mounting (383) and the electrical services for the midship turret are identical with the description given for the bow turret in paras. 81 and 82 to which reference should be made.

Hydraulic systems

86. The method of obtaining gun elevation and depression and turret rotation is identical with that for the bow turret and is effected by a hydraulic system, which derives its power from a Duplex pump driven by the port engine; this system also provides the supply for operation of the flaps and bomb doors and is in no way connected with the system of the bow and stern turrets. The oil flow to and from the hydraulic system in the aeroplane is connected to the midship turret system through the articulated service joints (212) situated at the base of the turret drum as illustrated in figs. 10 and 11.

87. A separate hydraulic system, for controlling the vertical movements of the turret, is utilized for the raising and lowering operations. This system consists of a hand pump (247), dual control valve complete with hand lever (253) and oil reservoir (257).

These items are mounted adjacent to the upper staging on the starboard side of the galley compartment and are shown in fig.11. The turret is raised or lowered by means of the hand pump (247) which forces the oil into hydraulic rams at each side of the turret slides. The changeover valve (253) is used to control the oil flow to either end of the ram cylinders. A hand operated lever (255) which forms a safety catch system for the retracting pawls of the turret, locks the turret in either the raised or lowered position as required.

Controls

88. Control of the master valve, turret rotation, gun elevation or depression and gun firing, for the midship turret, is identical with the description given for the bow turret in paras. 78 and 79 to which reference should be made. A combined gun firing cut-out and gun depression limiting device is fitted to the turret. The cut-out prevents the gun fouling the aeroplane structure when the turret is swung round to the forward position and the gun fire is interrupted when the main planes and tail unit are in the field of fire. The depression limiting device allows the guns to be fully depressed only when the turret is rotated to the port or starboard for beam firing.

89. The lever (366) of the rotation lock attached to the inner ring on the right-hand side of the turret should be moved to the position marked OUT to allow the turret to be rotated. The rotation lock of the turret is released automatically when the guns are fully elevated. The air gunner may rotate the turret manually in an emergency by depressing and turning the handle (365) of the hand rotation gear at the right-hand side of the turret while remaining seated. When the aeroplane is "taking-off" or "alighting", the midship turret should be in the lowered position with the guns fully elevated.

Raising the turret

90. To raise the turret move the turret vertical lock control lever (255, see fig.11) to the OUT position, place the control valve lever (253) at UP, and then operate the handle of the pump (247) until the locking pawls, which prevent retraction of the turret, engage in the top position.

91. The locking lever (255) is situated below the turret drum, and the IN and OUT positions are marked and indicated by arrows inscribed on a label adjacent to the lever. The control valve and lever (253) are located on the starboard side of the upper staging (175) in the galley, and the lever is set to the UP position to divert the oil flow to the lower ends of the hydraulic rams when the pump is operated. The pump is mounted forward of the control valve. The locking lever (255) will move to the IN position and lock the pawls automatically upon the turret reaching the fully raised position.

Lowering the turret

92. Before attempting to lower the turret by means of the retracting gear it is important that the guns should be pointing aft so that the opening below the turret seat is facing the upper staging (175) in the galley; in this position only can free passage be made to or from the turret. The turret should be rotated slowly, and the rotation lock lever (366) should be held over by the hand towards the IN position. Rotation of the turret should be continued until a locking plunger on the moving ring engages with a slot in the fixed ring of the turret; the lock lever may then be moved over to the fully IN position.

93. To lower the turret place the control valve lever (253) to the UP position and then operate the handle of the pump (247) to raise the turret approximately 0.125 in. in order to relieve the load from the locking pawls. The turret vertical lock control lever (255) should then be placed at OUT, to disengage the pawls, the control valve lever (253) should be moved to the position marked DOWN, and the handle of the pump (247) should be operated to lower the turret on to the rests provided at the base of the guide bars. Finally the locking pawls should be re-engaged by moving the turret vertical lock control lever (255) to the IN position.

STERN GUN TURRET

General

94. The turret at the rear of the stern compartment, which is normally equipped with four Browning ·303 guns is illustrated in fig.18. Turret rotation, gun elevation or depression and gun firing are identical with the description given for the bow turret in paras. 78 and 79 to which reference should be made. Four ammunition boxes, (398, 399, 415 and 416) each capable of holding 1,000 rounds are clipped to the turret bowl and ducts and rollers are fitted to allow the ammunition to be fed to the guns. To remove the ammunition boxes after releasing the end catches (400 and 413) it will be also necessary to release the top pin of the gun elevating ram.

95. The gun sight mounting and the electrical services for the stern turret are identical with the description given for the bow turret in paras. 81 and 82 to which reference should be made.

96. The two control handles (392 and 419) in this turret are mounted together at the upper end of a single column which is connected to the valve box in the turret bowl. The air gunner's seat (408) is mounted on an extension of the rotating ring and is non-adjustable in this instance.

97. Free passage between the stern turret and the aeroplane is effected through a pair of doors (304) at the rear of the cupola as shown in fig.14. A handle (298) attached to the frame of the port

door operates the locking bolts which secure the doors in the closed position. Handgrips and cables (385 and 425) enable the doors (304) to be closed from inside the turret. The turret should not be rotated at any time with the doors in the open position.

Hydraulic system

98. The hydraulic system for the stern turret derives power from the Pesco pump on the starboard engine. This pump is also coupled to the system of the bow turret; the midship turret hydraulic system is separate. The control handles (392 and 419) are connected to operate the master valve unit in the rear turret in a similar manner to those of the cow and midship turrets.

99. The recuperator pump (309) and the oil filter (308) of the stern turret hydraulic system are mounted on the starboard side of the stern compartment as shown in fig.14.

Controls

100. The hand lever (410) which operates a catch for locking the turret with the guns facing aft is situated at the left-hand side of the turret. The manual control handle (405) for rotation of the turret is mounted on the right-hand side of the moving ring. The Palmer accumulator (414) for gun firing, provides for a small reserve pressure in case of failure of the main supply.

Key to fig.1

Bow compartment - view looking forward

1. Port floodlamp
2. Padded headguard
3. Magazine stowage
4. Hinged platform catch - port
5. Bow gun turret aperture
6. Bow door operating handle (behind hinged platform (9))
7. Data card holder
8. Watch holder
9. Hinged platform
10. Hinged platform catch - starboard
11. Bollard covers stowage
12. Starboard floodlamp
13. Grabit boat hook shaft stowage
14. Magazine stowage
15. Starboard platform
16. Anchor
17. Mk.II Auto-bomb sight adjustable slides and mounting brackets
18. Boat hook and heaving line
19. Detachable blanking panel for bow door aperture
20. Anchor fluke stowage in starboard platform
21. Mk.IXC course setting bomb sight mounting
22. Detachable anchor winch handle
23. Anchor chain and winch
24. Anchor chain attachment fitting
25. Anchor chain stowage (below walkway)
26. Removable walkway flooring
27. Double folding seat and knee rest with heel support on flooring
28. Port platform
29. Altimeter
30. Auto-controls steering lever
31. Air-speed indicator (knots)
32. Data card holder
33. Auto-bomb sight safety switch
34. Camera electrical supply cable, plug and socket
35. Head set stowage
36. Stowage for transparent detachable panel and cover (19) for bow door aperture
37. Port platform
38. Microphone socket
39. Camera controller and wedge plate mounting
40. Terminal blocks

FIG.1

F.S./15

BOW COMPARTMENT - VIEW LOOKING FORWARD

FIG.1

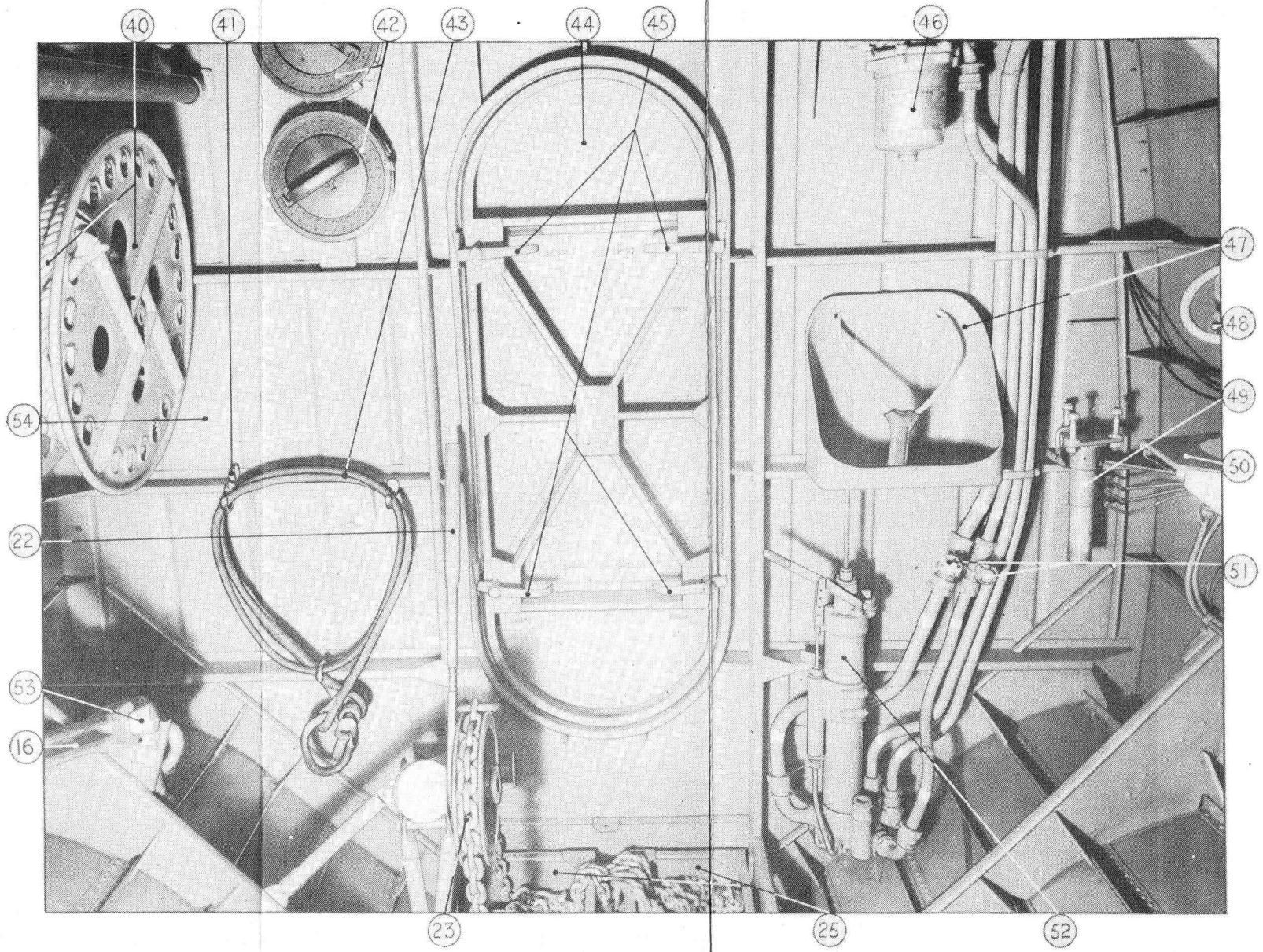


FIG.2

BOW COMPARTMENT - VIEW LOOKING AFT

FIG.2

Key to fig.2

Bow compartment - view looking aft

16. Anchor
22. Detachable anchor-winch handle
23. Anchor chain and winch
25. Anchor chain stowage (below walkway)
40. Warp drum and line
41. Winch handle stowage
42. Magazine stowage
43. Pennant rope stowage
44. Watertight door leading to wardroom
45. Door locking handles
46. Oil filter (bow turret hydraulic system)
47. Parachute stowage
48. Aldis lamp stowage
49. Mk.IXC bomb sight stowage
50. Compass mounting bracket
51. Avery test valves (bow turret hydraulic system)
52. Recuperator pump (bow turret hydraulic system)
53. Anchor head stowage bracket
54. Bulkhead No.6

Key to fig.3

Wardroom - view looking forward

44. Watertight door leading to bow compartment
45. Door locking handles
54. Bulkhead No.6
55. Control cables
56. Master fuel cock controls
57. Dual throttle and altitude controls
58. Rudder trimming tab control
59. Elevator servo motor (auto-controls)
60. Roof lamp and switch
61. Hatchway leading to pilot's control cabin
62. Access ladder
63. Starboard entrance door
64. Hand grip
65. Portlight retaining catches
66. Hinged portlights and deadlights
67. Portlight apertures
68. Portlight securing bolts
69. Hull door locking handles
70. Corrugated entrance steps
71. Canvas backrest
72. Padded cushion, forming starboard bunk above stowage lockers
73. Carpet, covering detachable walkway flooring
74. Bilge drain flap control lever
75. Navigator's table (folded position)
76. Padded cushion, forming port bunk above stowage lockers
77. Suitcase stowage
78. Turn regulator (auto-controls)
79. Aileron unit (auto-controls)
80. Turn regulator supply plug and socket
81. Rudder and elevator unit supply plug and socket
82. Portlight aperture
83. Hinged portlight and deadlight
84. Portlight retaining catch
86. Rudder and elevator unit (auto-controls)

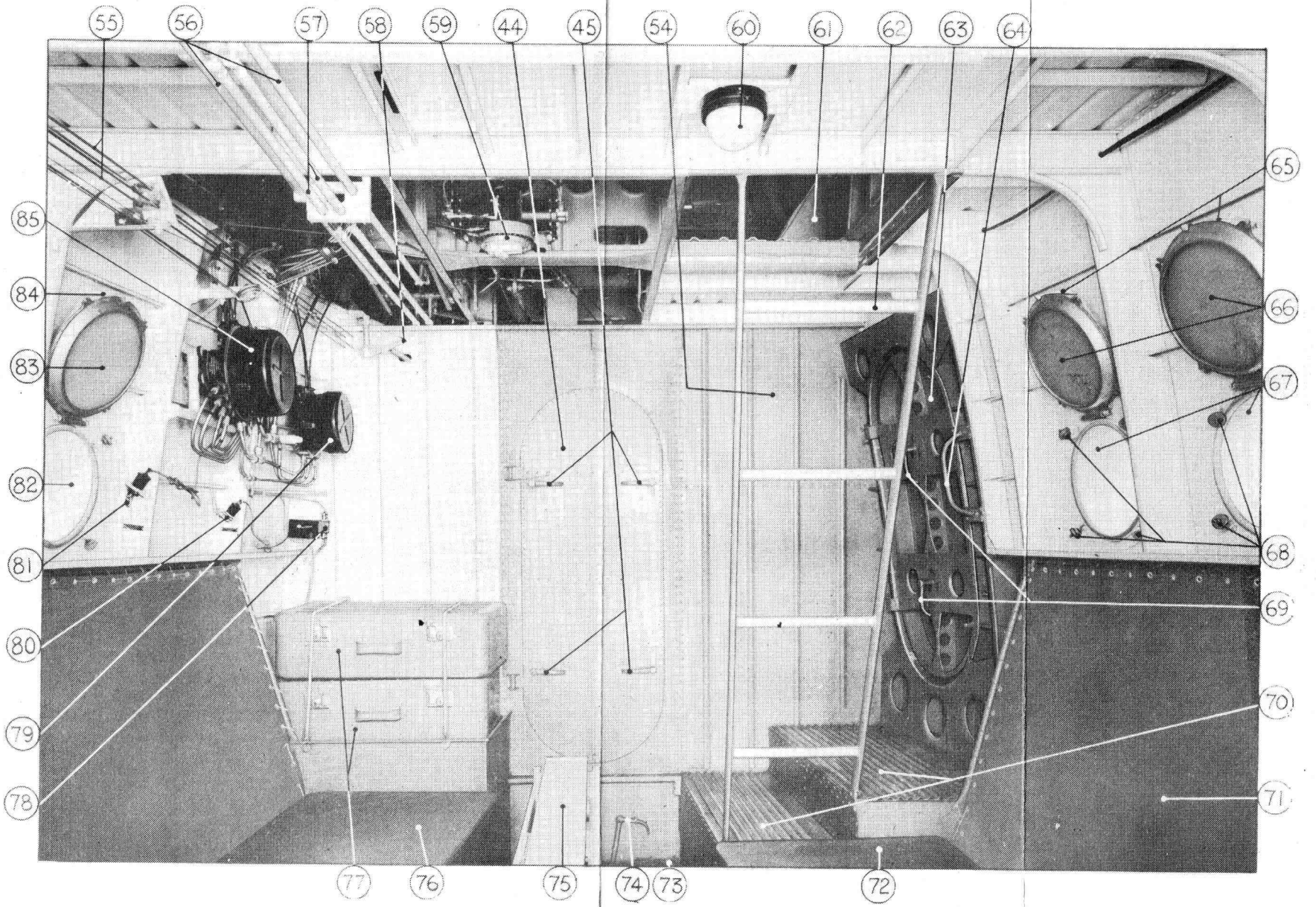


FIG.3

WARDROOM - VIEW LOOKING FORWARD

FIG.3

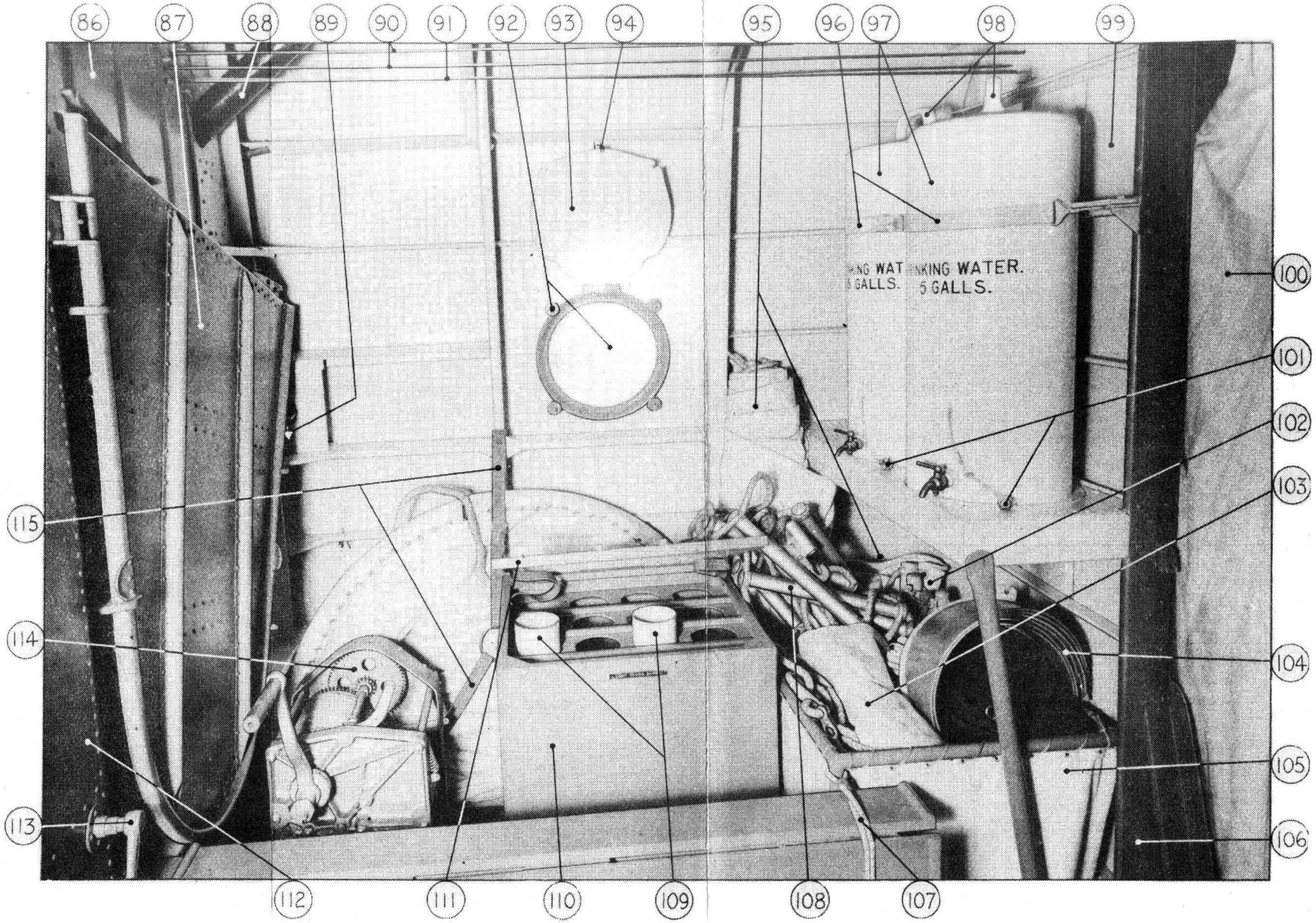


FIG.4

MID-STOWAGE COMPARTMENT - PORT SIDE LOOKING FORWARD

FIG.4

Key to fig.4

Mid-stowage compartment - port side looking forward

86. Bulkhead No.15
87. Stowage for bulkhead No.12 swashboard
88. Trailing aerial fairlead
89. Beaching chassis eyebolt and securing pin
90. Control rods
91. Control cables
92. Hinged portlight and securing bolts
93. Hinged deadlight
94. Portlight and deadlight retaining catch
95. Cabin, turret and engine covers stowage
96. Saddle straps for securing water tanks
97. Water tanks
98. Water tank handles
99. Bulkhead No.12
100. Curtain leading to wardroom
101. Drain plugs to replace tank taps when refilling
102. Hammock stowage
103. Emergency tool kit stowage
104. Portlight windshields
105. Canvas stowage bag and frame
106. Stowage for H.T.V, flame or smoke float on bottom face of bulkhead
107. Elastic cord and clip for stowage of navigator's table
108. Rope ladder stowage
109. Light series bombs
110. Bomb stowage box
111. Bomb box hinged lid
112. Watertight door at bulkhead No.15
113. Door locking handles
114. Bomb or engine slinging winch stowage
115. Drogue stowage and retaining straps

Key to fig.5

Mid-stowage compartment - view looking aft

86. Bulkhead No.15
87. Stowage for bulkhead No.12 swashboard
88. Trailing aerial fairlead
89. Beaching chassis eyebolt and securing pin
90. Control rods
91. Control cables
97. Water tanks
99. Bulkhead No.12
105. Canvas stowage bag and frame
107. Elastic cord and clip for stowage of navigator's table
110. Bomb stowage box
112. Watertight door at bulkhead No.15
113. Door locking handles
114. Bomb or engine slinging winch stowage
116. Dual controls, connecting rods
117. Flame float stowage box
118. Flares stowage spacers
119. Spacer retaining pins
120. Flares stowage tubular mounting (or spare airscrew boss stowage)
121. Signal pistol cartridges
122. Sea markers stowage
123. Starter relay - port
124. Starter relay - starboard
125. Engine starting external power supply socket

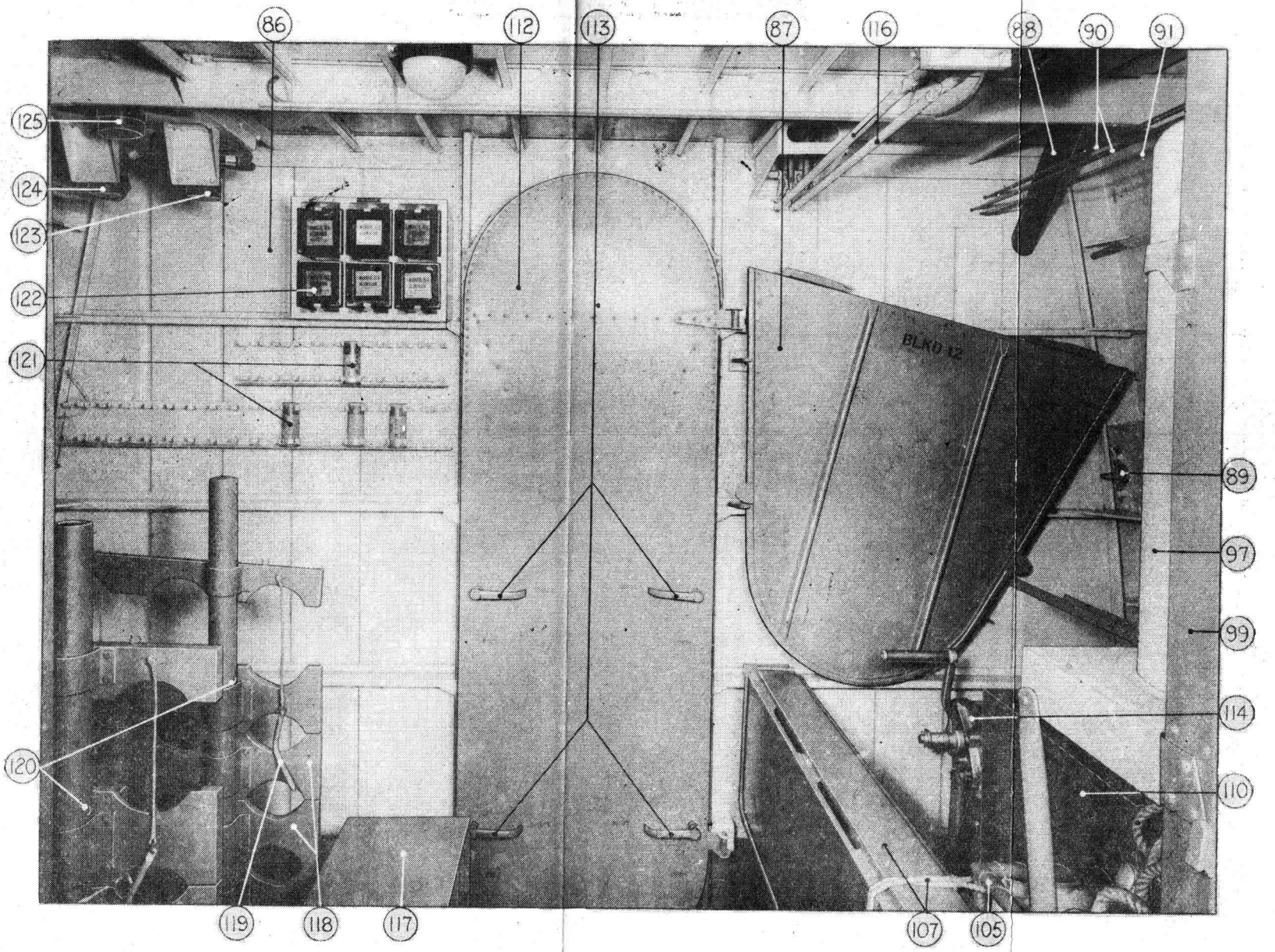


FIG.5

MID-STOWAGE COMPARTMENT - VIEW LOOKING AFT

FIG.5

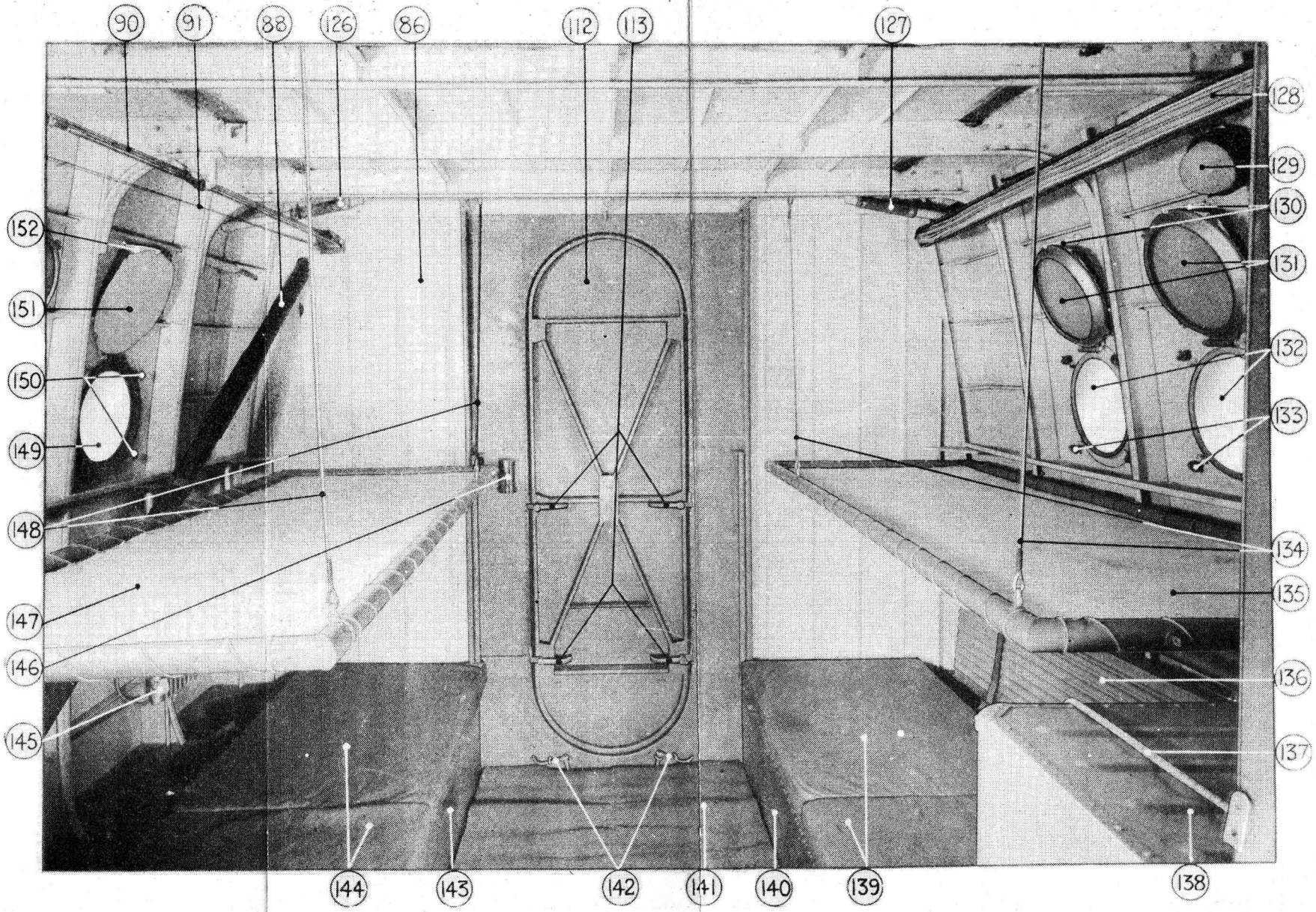


FIG.6

MAIN AFT CABIN - VIEW LOOKING FORWARD

FIG.6

Key to fig.6

Main aft cabin - view looking forward

86. Bulkhead No.15
88. Trailing aerial fairlead
90. Control rods
91. Control cables
112. Watertight door at bulkhead No.15
113. Door locking handles
126. Drain from overload tank compartment - port
127. Drain from overload tank compartment - starboard
128. Electrical cables conduit
129. Cabin lamp and switch
130. Portlight and deadlight retaining catch
131. Hinged portlight and deadlight
132. Aperture
133. Portlight and deadlight retaining bolts
134. Bunk support cables - starboard
135. Folding bunk - starboard
136. Engine airscrew platform stowage
137. Suitcase stowage cords - starboard
138. Suitcases - starboard
139. Padded cushions, forming starboard bunk above stowage lockers
140. Starboard stowage lockers
141. Carpet, above detachable walkway flooring
142. Bilge drain flap control levers
143. Port stowage lockers
144. Padded cushions, forming port bunk above stowage lockers
145. Engine and airscrew platform stowage
146. Smokers ash tray (non-fume type)
147. Folding bunk - port
148. Bunk support cables - port
149. Hinged portlight
150. Portlight retaining bolts
151. Hinged deadlight
152. Portlight and deadlight retaining catch

Key to fig.7

Main aft cabin - view looking aft

90. Control rods
91. Control cables
128. Electrical cables conduit
130. Portlight retaining catch
131. Hinged portlight and deadlight
132. Portlights aperture
133. Portlight retaining bolts
134. Bunk support cables - starboard
135. Folding bunk - starboard
137. Suitcase stowage cords - starboard
138. Suitcases - starboard
139. Padded cushions, forming bunk above starboard stowage locker
140. Starboard stowage lockers
143. Port stowage lockers
144. Padded cushions, forming port bunk above stowage lockers
147. Folding bunk - port
148. Bunk support cables - port
149. Portlight retaining bolts
150. Hinged portlight and deadlight
153. Bulkhead No.20
154. Swashboard in position at bulkhead No.20
155. First-aid outfit
156. First-aid stowage cord
157. Fuel jettison discharge pipe - port
158. Suitcase stowage cord - port
159. Suitcases - port
160. Bilge drain main valve control handle
161. Detachable walkway flooring
162. Bilge suction strum, auxiliary power unit
163. Bilge drain flap (closed position)
164. Bilge drain flap (open position)
165. Bilge drain flap control levers
166. Bilge suction, auxiliary power unit
167. Fuel jettison discharge pipe - starboard

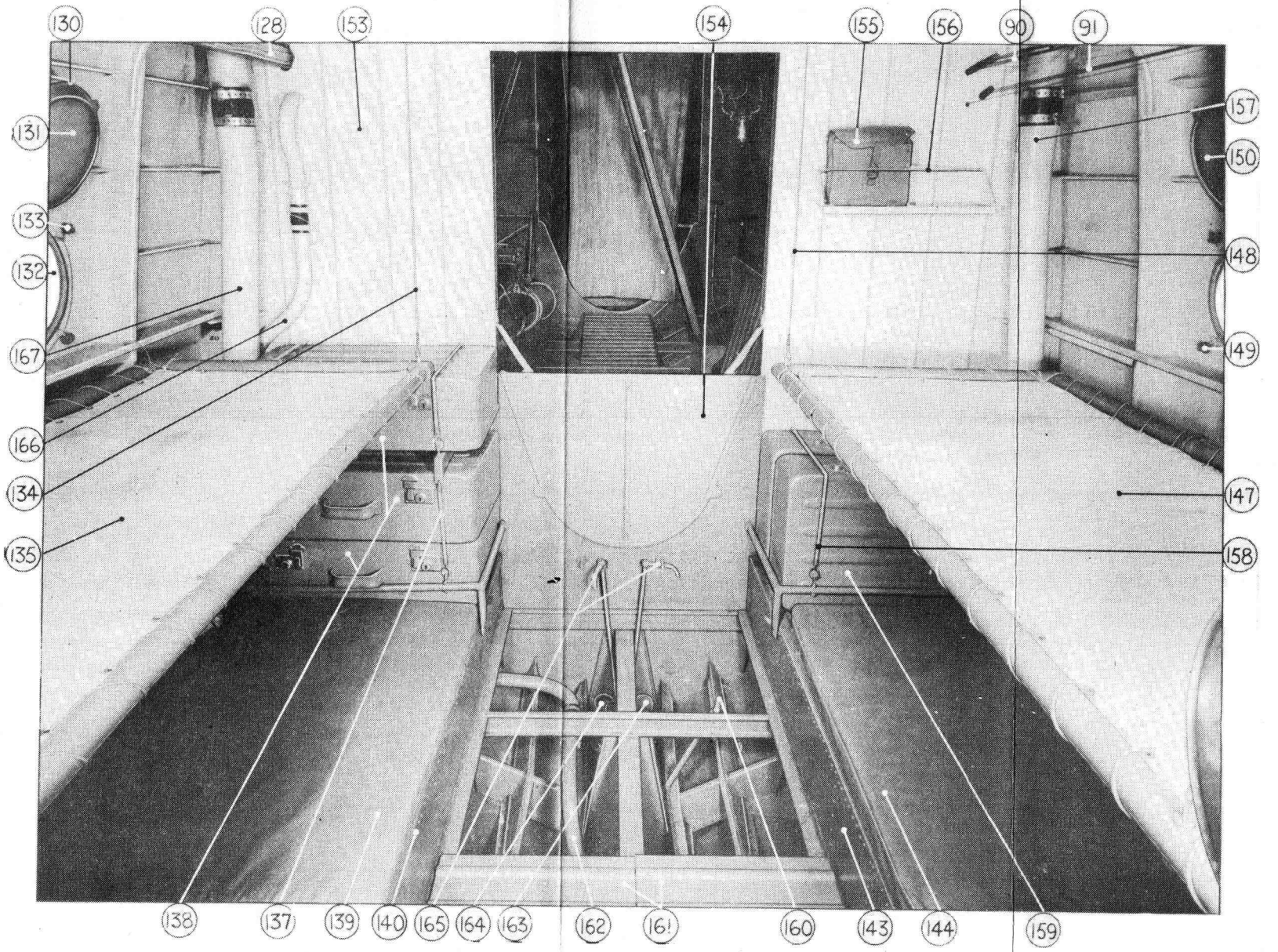


FIG.7 MAIN AFT CABIN - VIEW LOOKING AFT FIG.7

FIG.8

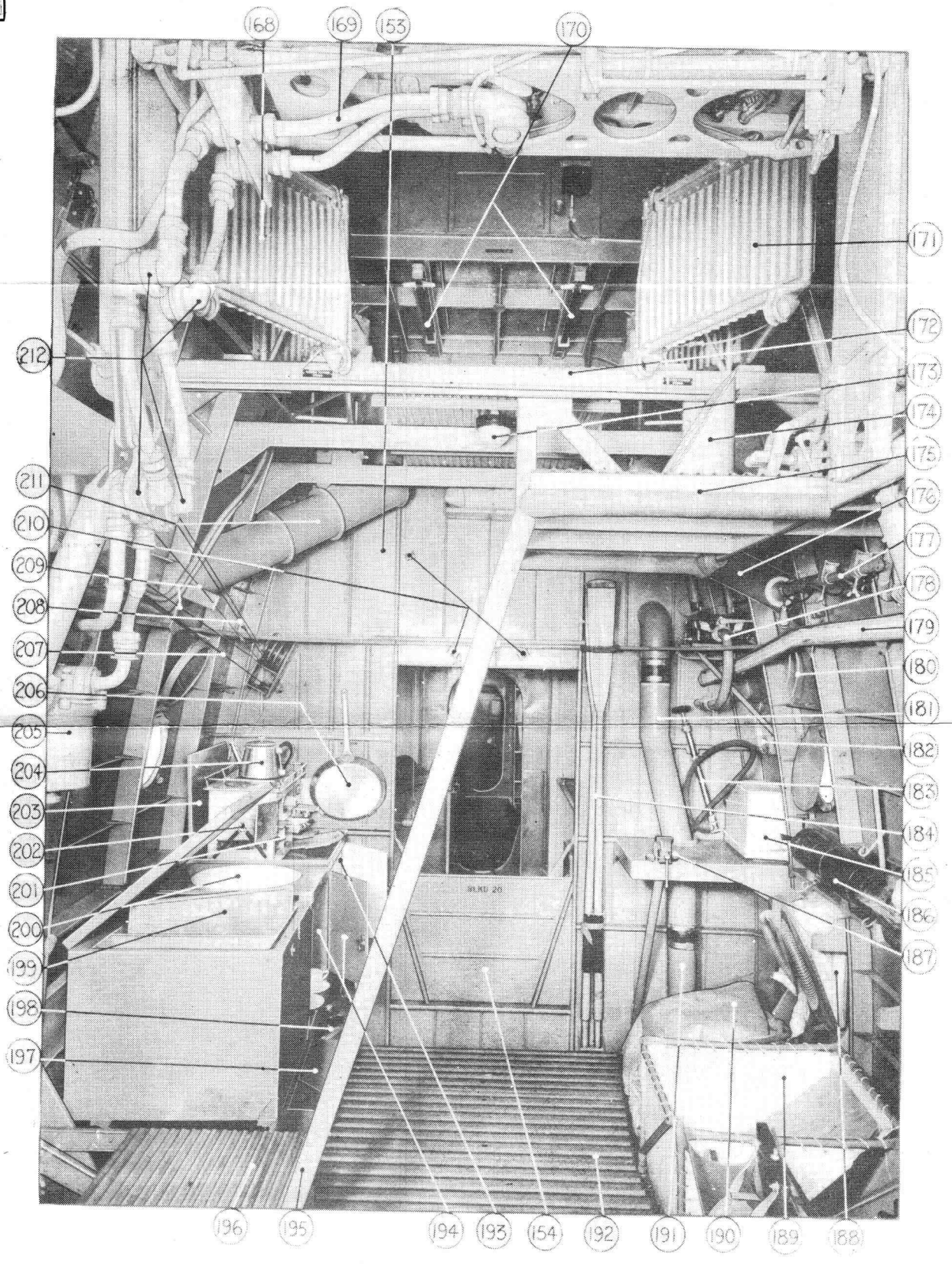


FIG.8

LOWER PORTION OF GALLEY - VIEW LOOKING FORWARD

Key to fig.8

Lower portion of galley - view looking forward

153. Bulkhead No.20
154. Swashboard in position at bulkhead No.20
168. Airscrew and engine platform stowage - port
169. Mid turret hydraulic system piping
170. Fuel tank dipsticks stowage
171. Airscrew and engine platform stowage - starboard
172. Top platform leading to hatchway
173. Cabin lamp and switch
174. Parachute stowage
175. Upper staging and head guard
176. Flare release chute - starboard
177. Mooring-lamp mast stowage
178. Bilge suction filters
179. Electrical cables conduit
180. Elastic cord for retaining first-aid outfit
181. Fuel jettison discharge pipe (upper portion)
182. Dinghy leak stoppers and repair outfit (in metal box)
183. Bilge pump for wing floats
184. Dinghy sculls stowage
185. Hull leak stoppers and repair outfit (in case)
186. Parachute flare and stowage racks
187. Workshop-bench and vice
188. Dinghy bellows stowage
189. Canvas stowage bag and frame
190. Type D dinghy in stowed position
191. Fuel jettison discharge pipe (lower portion)
192. Detachable walkway flooring
193. Food cupboard
194. Crockery cupboard and shelf
195. Access ladder leading to hatchway
196. Lower staging
197. Waste box
198. Pans and kettle stowage box
199. Ice cabinet and cover below lid of cupboard
200. Washbasin
201. Detachable cooking stove with utensils
202. Stove retaining springs
203. Detachable lid for covering wash basin
204. Tea pot
205. Turret oil filter (midship turret)
206. Frying pan stowage
207. Trimming tab cables
208. Rudder control rods
209. Elevator control rods
210. Bulkhead No.20 swashboard stowage
211. Flare release chute - port
212. Articulated joints of mid turret hydraulic system

Key to fig.9

Upper portion of galley - view looking forward

168. Airscrew and engine platform stowage - port
170. Fuel tank dipsticks stowage
171. Airscrew and engine platform stowage - starboard
172. Top platform leading to hatchway
213. Bulkhead aperture with cover removed for access to A.P.U.
214. Hatch cover and locking handle
215. Oil pressure gauge, auxiliary power unit
216. Ignition switch - auxiliary power unit
217. Starter switch - auxiliary power unit
218. Drogue signalling unit
219. Drogue tipping line bollard and attachment
220. Hand shields stowage
221. Marine distress signal stowage - behind (171)
222. Primer pump - A.P.U.
223. Bulkhead aperture for inspection of fuel pipe to A.P.U. joint
224. Type C dinghy in stowed position
225. Fuzing lanyard attachment cable and pulley
226. Fueltight casing surrounding overload system refuelling pipe
227. Fueltight casing at refuelling points 1 and 2

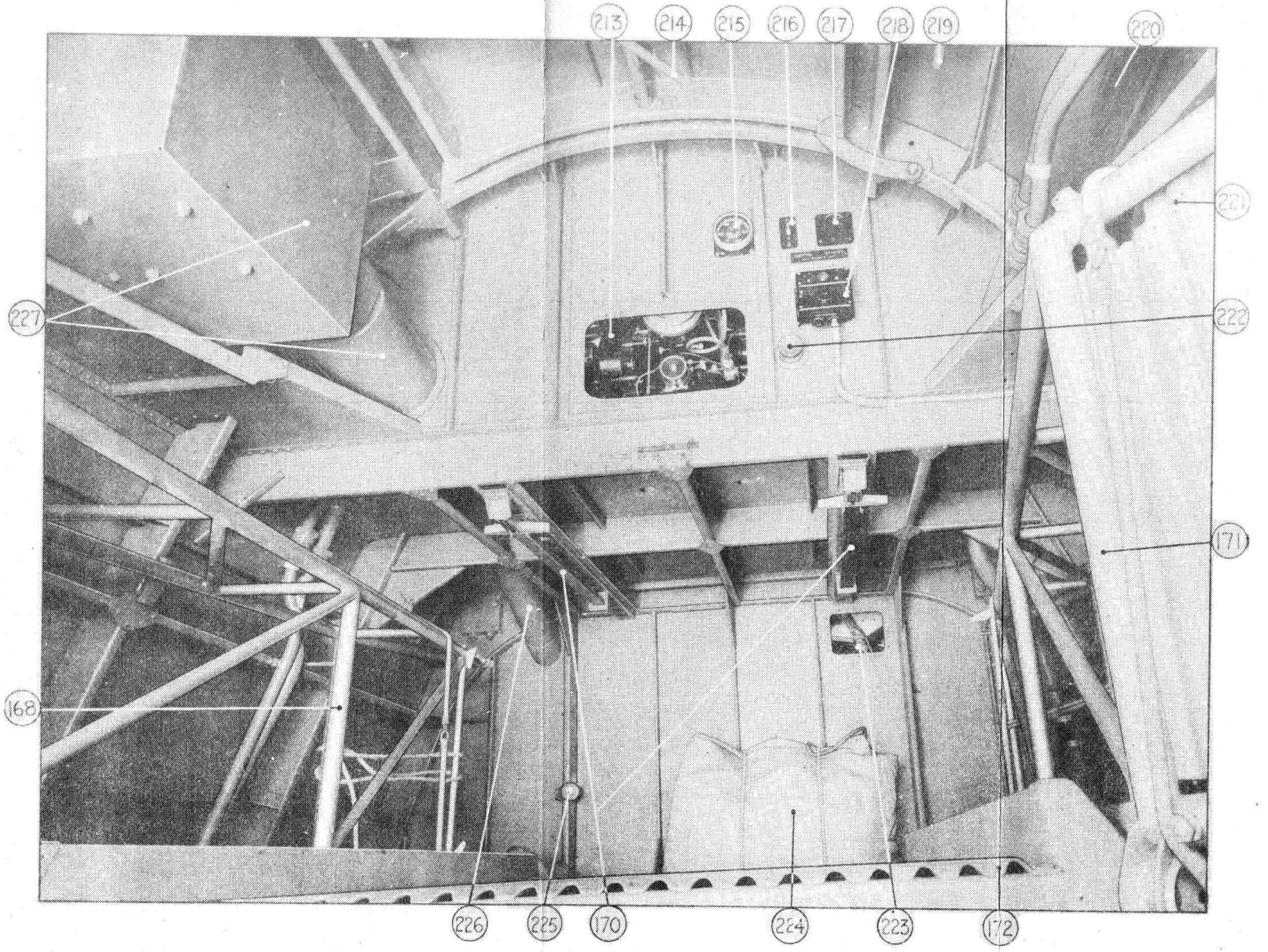
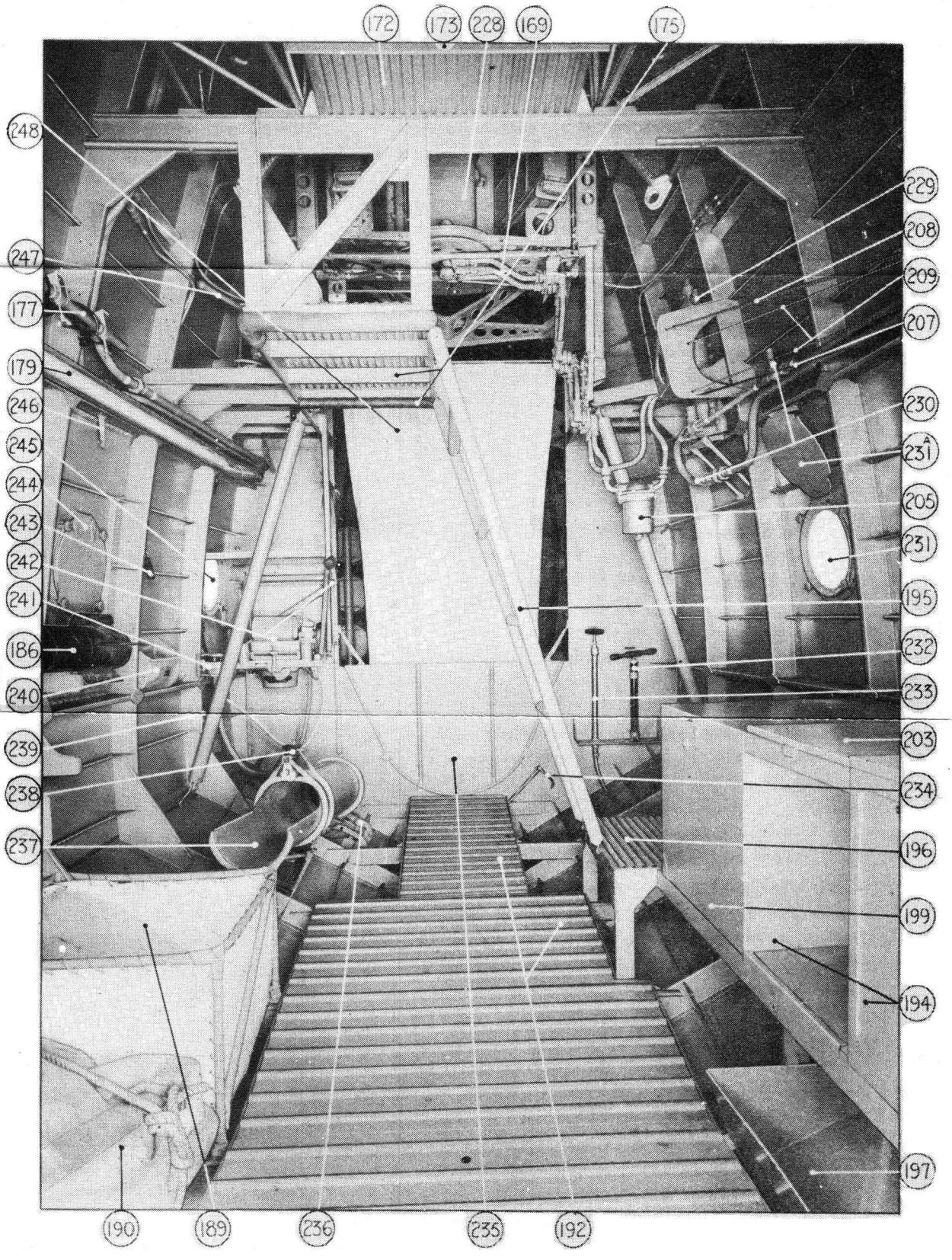


FIG.9 UPPER PORTION OF GALLEY - VIEW LOOKING FORWARD FIG.9



LOWER PORTION OF GALLEY - VIEW LOOKING AFT

FIG.10

Key to fig.10

Lower portion of galley - view looking aft

169. Mid turret hydraulic system piping
172. Top platform leading to hatchway
173. Cabin lamp and switch
175. Upper staging and head guard
177. Mooring-lamp mast stowage
179. Electrical cables conduit
186. Parachute flare and stowage rack
189. Canvas stowage bag and frame
190. Dinghy stowage
192. Detachable walkway flooring
194. Crockery cupboard and shelf
195. Access ladder, leading to hatchway
196. Lower staging
197. Waste box
199. Detachable ice box and cover below lid of cupboard
203. Detachable lid, for covering wash basin
205. Mid turret oil filter
207. Trimming tab cables
208. Rudder control rods
209. Elevator control rods
228. Midship gun turret
229. Recuperator pump (midship turret hydraulic system)
230. Avery test valves (midship turret hydraulic system)
231. Portlight
231A. Deadlight
232. Lavatory air pump
233. Lavatory water pump
234. Bilge drain flap control lever
235. Swashboard in position at bulkhead No.26
236. Watertight hatchway for flare discharge and camera aperture
237. Flare release chute
238. Flare release plug and socket
239. Camera electrical supply cable, plug and socket
240. Head set stowage
241. Camera motor and wedge plate mounting
242. Camera and mounting with height adjustment handle
243. Microphone socket
244. Portlight hinged deadlight and securing bolts
245. Portlight at the side of camera mounting for oblique photography
246. Portlight and deadlight retaining catch
247. Hydraulic hand pump for raising and lowering midship gun turret
248. Curtain at bulkhead No.26 leading to stern compartment

Key to fig.11

Upper portion of galley - view looking aft

174. Parachute stowage
175. Upper staging
195. Access ladder leading to hatchway
207. Trimming tab cables
208. Rudder control rods
209. Elevator control rods
212. Articulated joints of mid turret hydraulic system
228. Midship gun turret
229. Recuperator pump (midship turret hydraulic system)
247. Hydraulic hand pump, for vertical movement of mid gun turret
248. Curtain at bulkhead No.26 leading to stern compartment
249. Upper attachment of gun turret starboard guide
250. Detachable ammunition box, port
251. Upper attachment of gun turret port guide
252. Lower attachment of gun turret port guide
253. Control valve and lever, governing turret hand pump (247)
254. Lower attachment of gun turret starboard guide
255. Turret vertical lock control lever
256. Turret raising and lowering instruction label
257. Hydraulic hand pump oil reservoir - turret raising gear
258. Detachable ammunition box - starboard

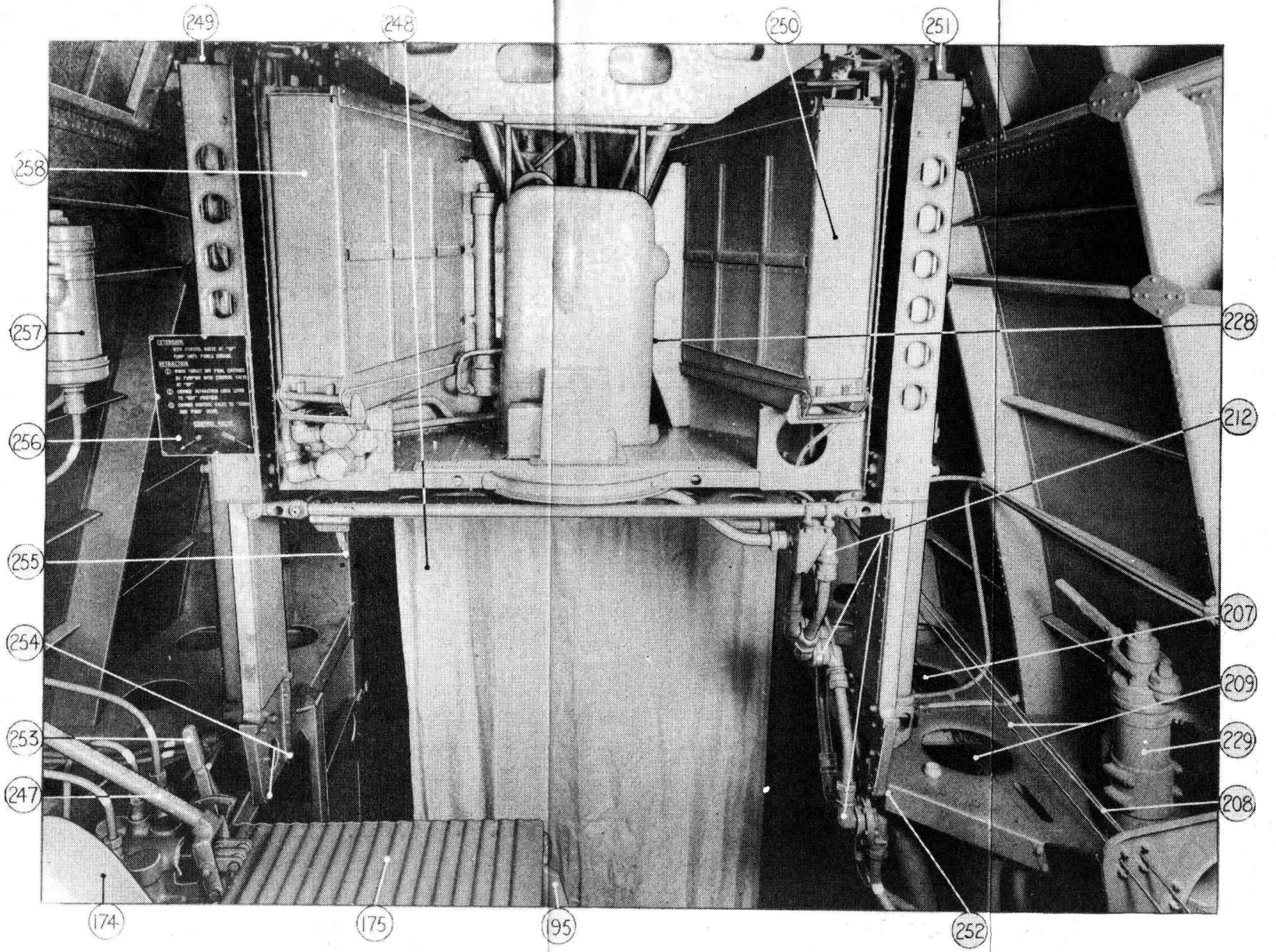


FIG.11

UPPER PORTION OF GALLEY - VIEW LOOKING AFT

FIG.11

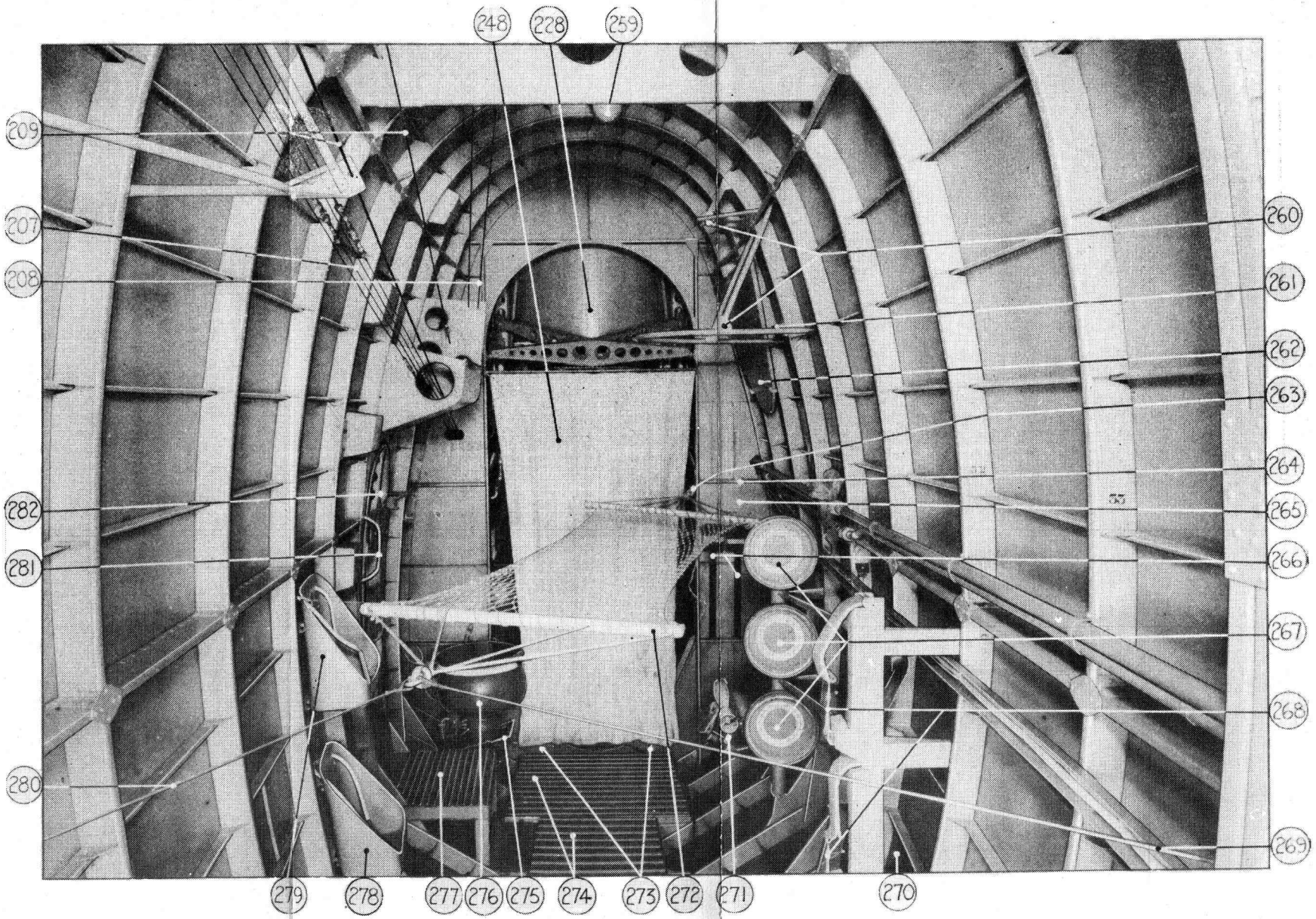


FIG. 12

STERN COMPARTMENT - VIEW LOOKING FORWARD

FIG. 12

Key to fig.12

Stern compartment - view looking forward

207. Trimming tab cables
208. Rudder control rods
209. Elevator control rods
228. Mid gun turret
248. Curtain at bulkhead No. 26 leading to galley compartment
259. Roof lamp
260. D.R. compass mounting-bracket and frame
261. D.R. compass plug-in socket
262. Stowage for bulkhead No.26 swashboard
263. Hammock attachment - forward end
264. Camera magazine stowage
265. Hand shields stowage
266. Marine distress signals stowage
267. Stowage for root ends of spare airscrew blades
268. Securing straps for tip ends of spare airscrew blades
269. Hammock attachment - starboard rear
270. Sextant hatch cover stowage
271. Hinged mounting - Light series bomb carrier
272. Hammock in slung position
273. Bilge drain flap control lever
274. Detachable walkway flooring
275. Lavatory flushing step
276. Lavatory complete with pressure gauge
277. Step at port entrance door
278. Parachute stowage
279. Parachute stowage
280. Hammock attachment - port rear
281. Handgrip
282. Port entrance door

Key to fig.13

Stern compartment - view looking aft

207. Trimming tab cables
208. Rudder control rods
209. Elevator control rods
260. D.R. compass mounting-bracket and frame
261. D.R. compass' plug-in-socket
262. Stowage for bulkhead No.26 swashboard
263. Hammock attachment hook - forward end
267. Stowage for root ends of spare airscrew blades
268. Securing straps for tip ends of spare airscrew blades
271. Hinged mounting - light series bomb carrier
272. Hammock in slung position
274. Detachable walkway flooring
276. Lavatory complete with pressure gauge
277. Step at port entrance door
278. Parachute stowage
279. Parachute stowage
280. Hammock attachment - port rear
281. Handgrip
282. Port entrance door
283. D.R. compass data card holder
284. Two-way roof lamp switch
285. Bulkhead No.34
286. Bulkhead No.38
287. Zip-fastener curtain at bulkhead No.36
288. Two-way roof lamp switch
289. Mooring-mast lamp switch
290. Clip securing door in open position
291. Door locking handle - upper
292. Portlight in door panel
293. Door locking handle - lower
294. Light series bomb door locking handle - lower
295. Hinged watertight door at bomb carrier aperture
296. Light series bomb door locking handle - upper

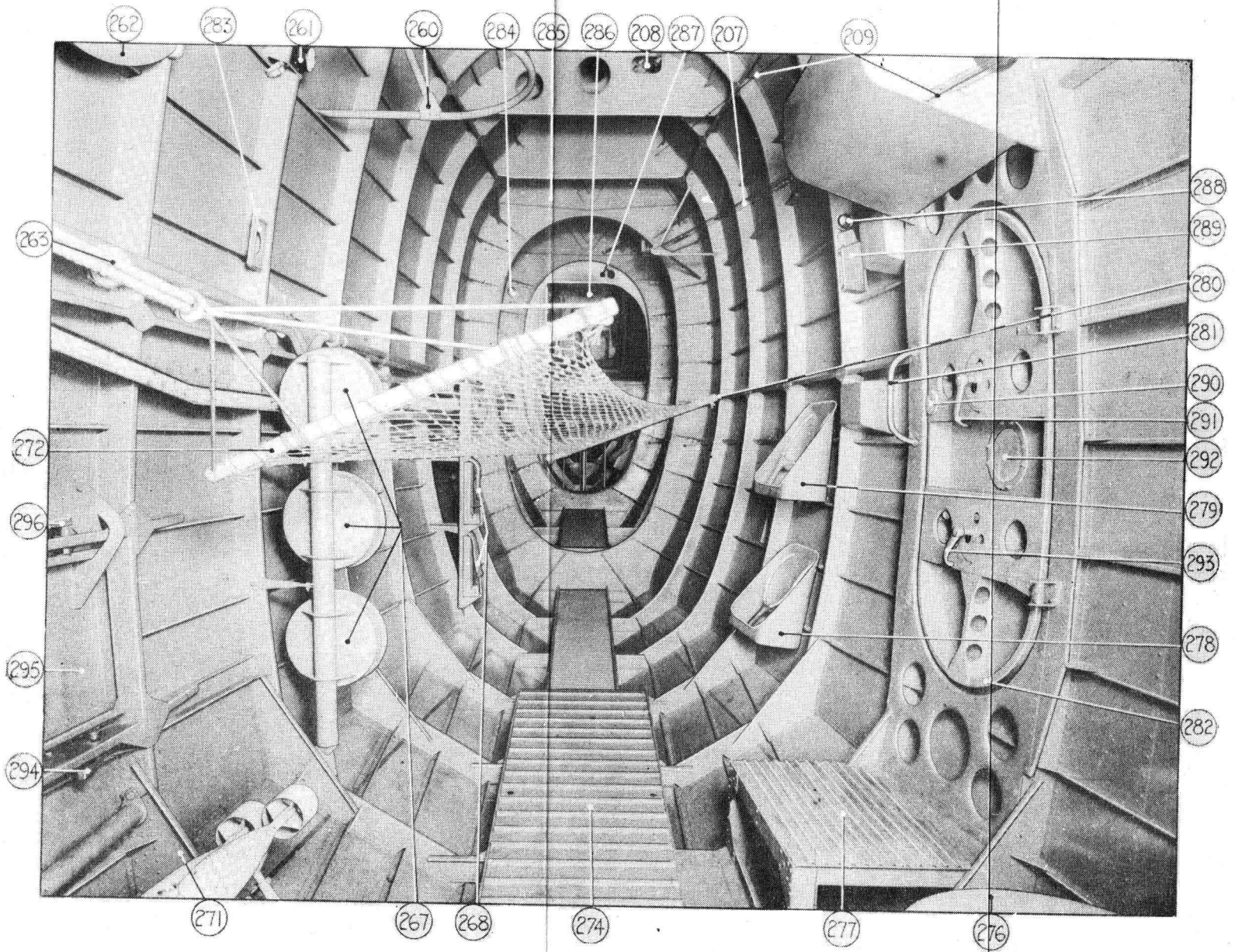


FIG.13

STERN COMPARTMENT - VIEW LOOKING AFT

FIG.13

FIG.14

REAR PORTION OF STERN COMPARTMENT - VIEW LOOKING AFT

FIG.14

Key to fig.14

Rear portion of stern compartment - view looking aft

287. Zip-fastener curtain at bulkhead No.36
297. Stern gun turret
298. Turret door locking handle
299. Simmonds nuts securing turret to framework
300. Emergency exit push-out panel
301. Emergency panel release cable
302. Parachute stowage
303. Access ladder to turret
304. Turret access doors
305. Turret electrical wiring
306. Navigation and formation-keeping lamps electrical wiring
307. Turret hydraulic system pipe-lines
308. Oil filter (turret hydraulic system)
309. Recuperator pump (turret hydraulic system)
310. Head set stowage

Key to fig.15

Rear portion of stern compartment - upward view between frames 36 and 38

287. Zip-fastener curtain at bulkhead No.36
311. Floodlamp dimmer switch
312. Floodlamp adjustable holder
313. Padded headguard
314. Elevator return spring and cable
315. Rudder control cables
316. Elevator starboard hinge
317. Rudder locking lever
318. Rudder locking bolt
319. Rudder locking pin instruction label
320. Elevator control rod
321. Elevator port hinge
322. Elevators interconnecting tube
323. Frame 37
324. Frame 38

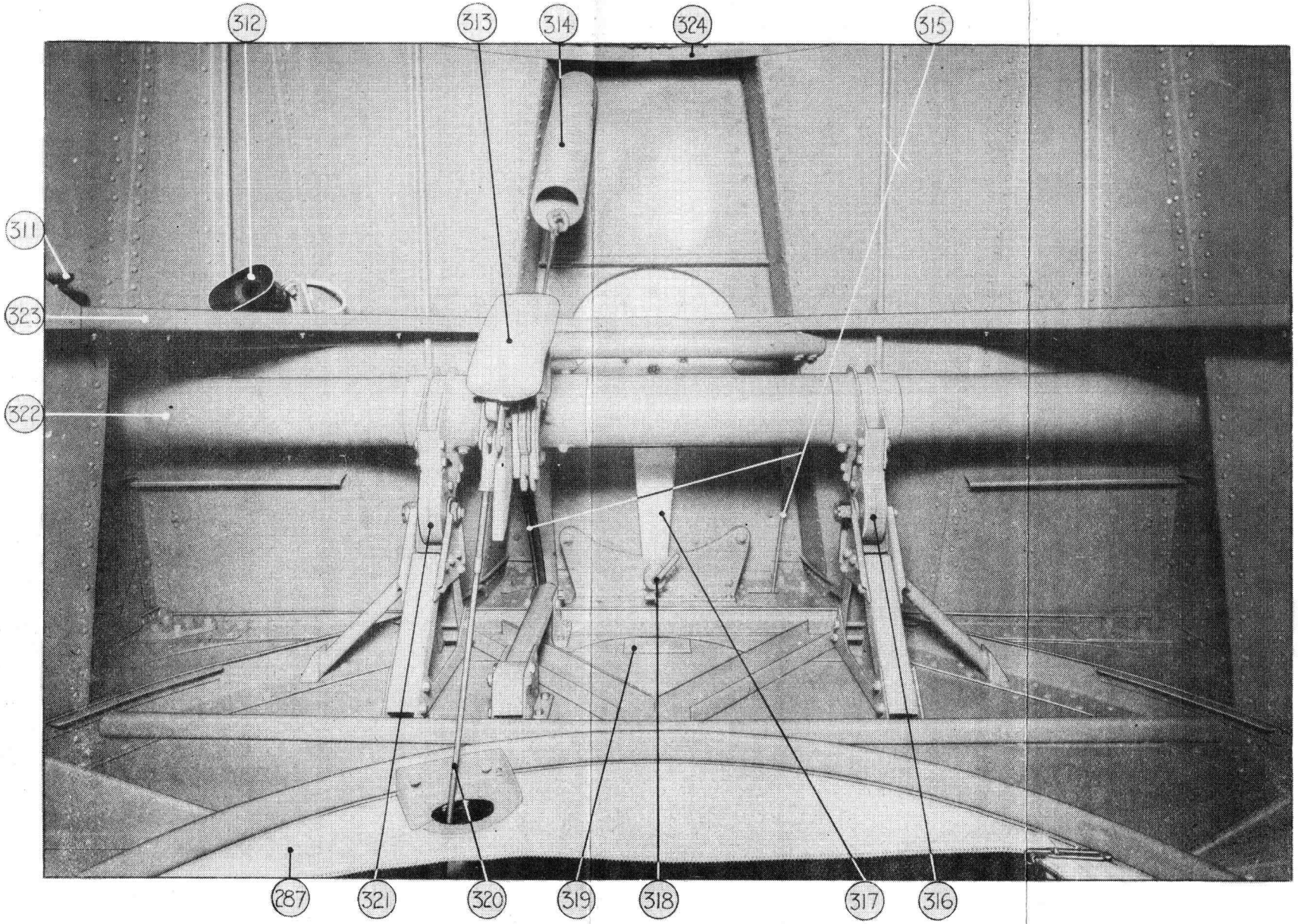
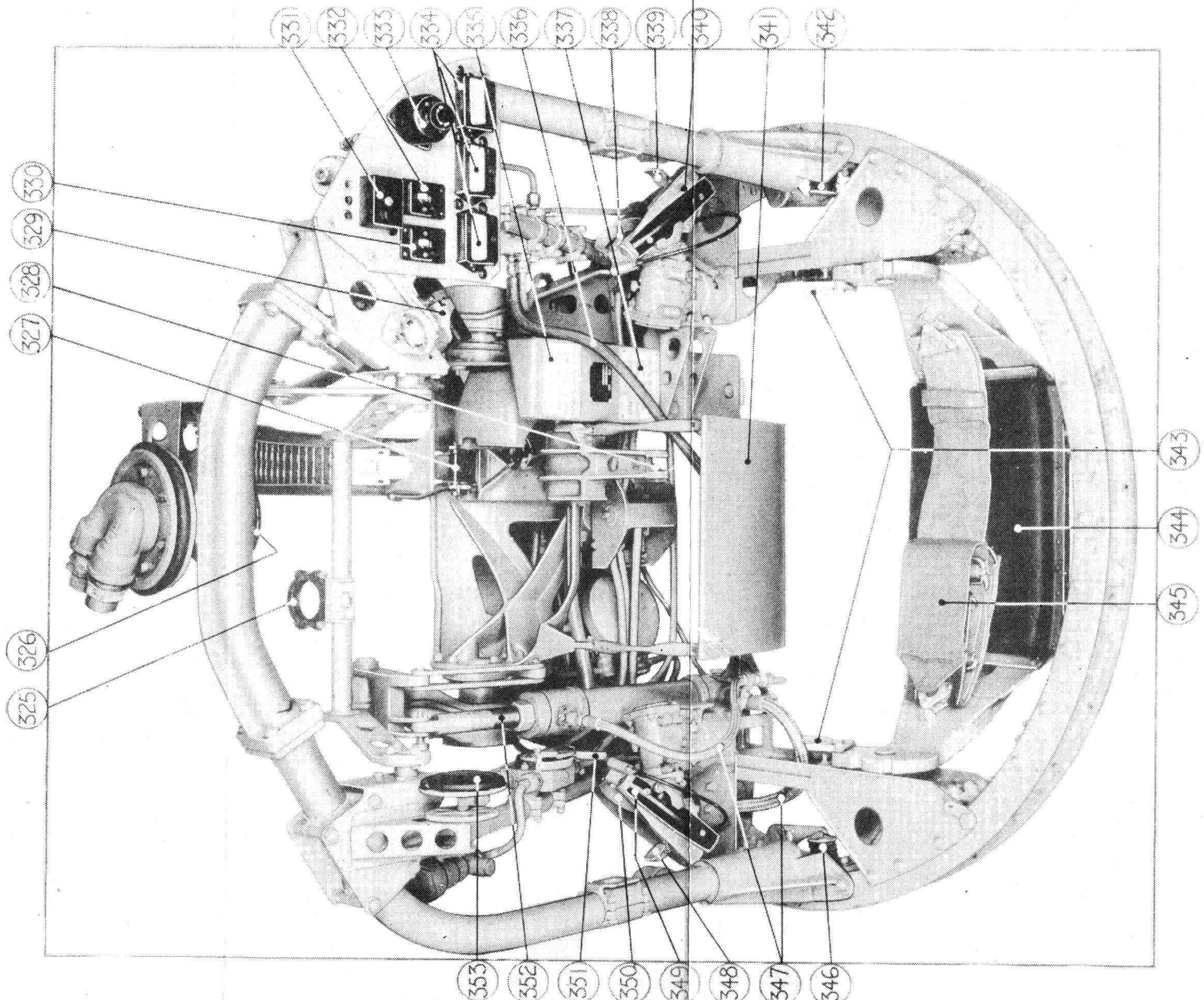


FIG.15 REAR PORTION OF STERN COMPARTMENT - UPWARD VIEW BETWEEN FRAMES 36 and 38 FIG.15



BOW GUN TURRET

FIG.16

FIG.16

Kev to fig.16

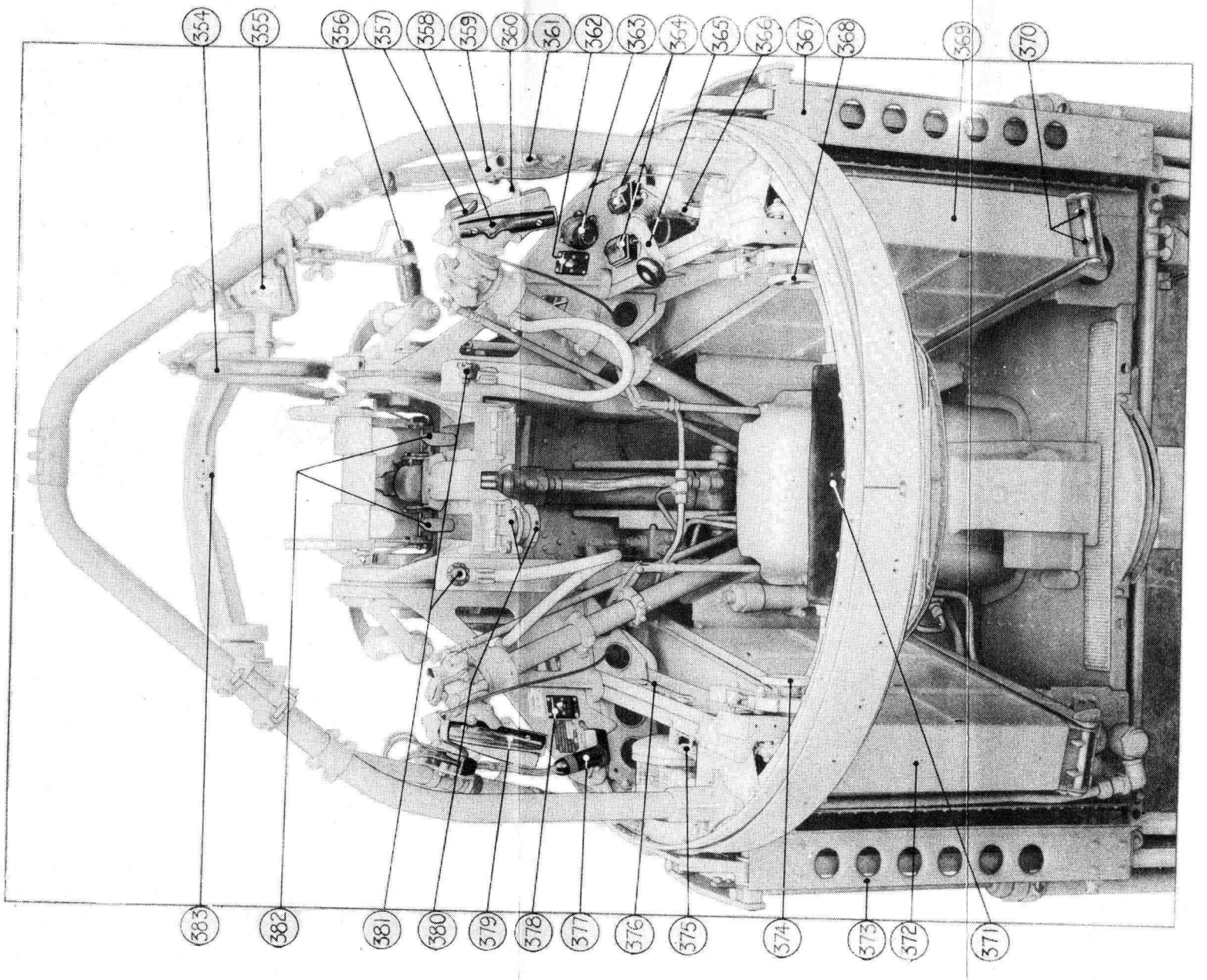
Bow gun turret

325. Gun sight mounting ring
326. Head pad
327. Gun front attachment
328. Gun rear attachment
329. Floodlamp
330. Gun sight lamp switch
331. Terminal block
332. Camera gun switch
333. Floodlamp dimmer switch
334. Fuse boxes
335. Collector box instruction label
336. Gun firing hydraulic flexible conduit
337. Turret retraction instruction label
338. Gunfiring trigger
339. Turret actuating lever
340. Turret control handle
341. Body shield
342. Turret rotation damper
343. Seat locking handles
344. Air gunner's seat
345. Harness lap straps
346. Turret rotation damper
347. Turret operation hydraulic flexible conduits
348. Turret actuating lever
349. Turret control handle
350. Gun firing trigger
351. Hydraulic system cut-out lever
352. Double acting ram
353. Gun sighting ear pad

Key to fig.17

Midship gun turret

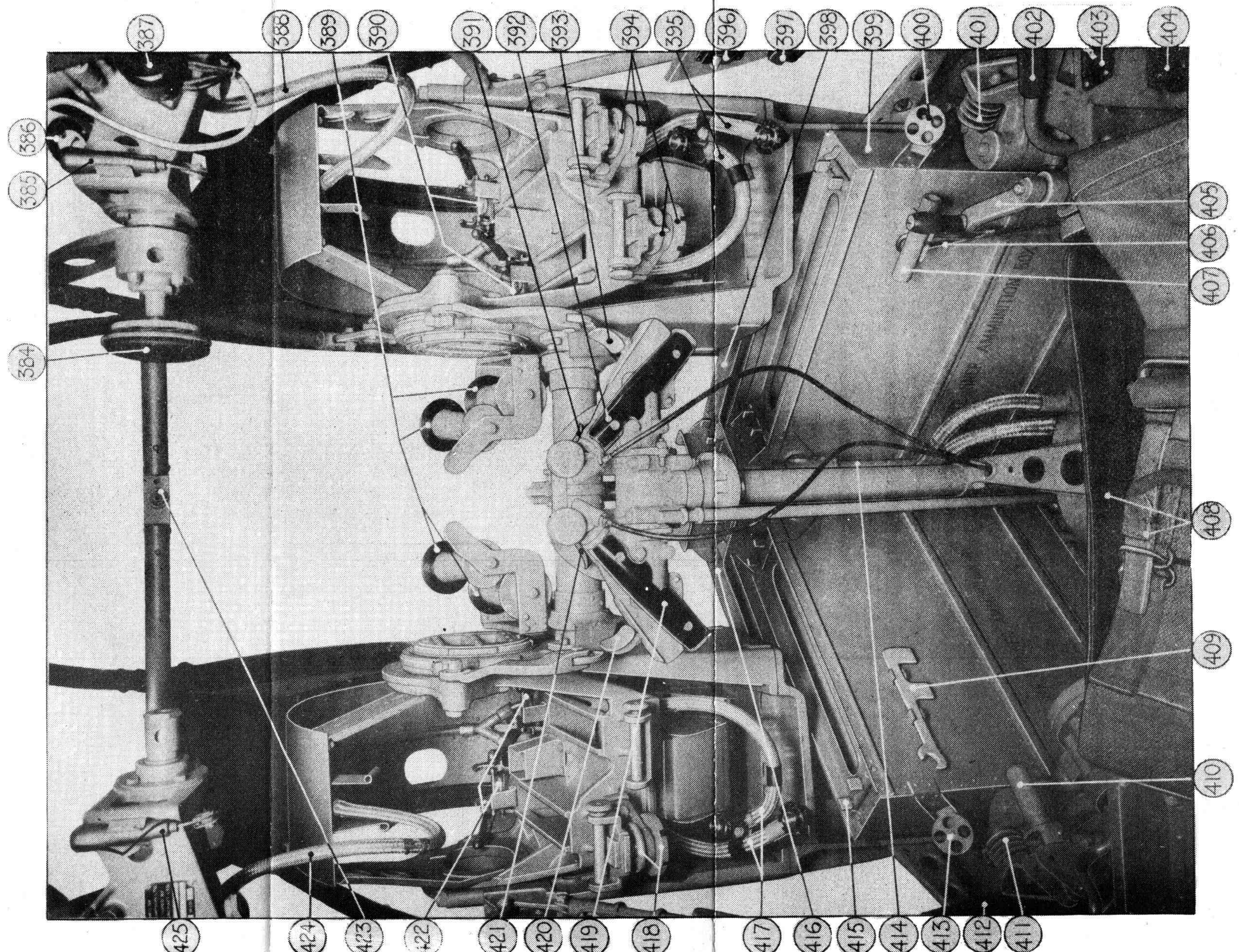
354. Gun sighting ear pad
355. Gun sight plug-in socket
356. Floodlamp
357. Gun firing trigger
358. Turret control handle
359. Gun cocking handle stowage
360. Turret actuating lever
361. Gun sight spare bulb holders
362. Gun sight lamp switch
363. Floodlamp dimmer switch
364. Fuseboxes
365. Turret rotating gear handle
366. Turret rotation lock lever
367. Turret vertical guide
368. Seat locking handwheel
369. Ammunition box
370. Ammunition box retaining catches
371. Air gunner's seat
372. Ammunition box
373. Turret vertical guide
374. Seat locking handwheel
375. Stowage bag for belt loading hook and cable and link threading tool
376. Gun setting and sight mounting ring spanner stowage
377. Microphone socket
378. Camera gun switch
379. Turret control handle
380. Gun setting adjusters at rear attachment
381. Gun firing hydraulic flexible conduits
382. Gun front attachment
383. Gun sight mounting ring



MIDSHIP GUN TURRET

FIG.17

FIG.17



STERN GUN TURRET

FIG.18

FIG.18

Key to fig.18

Stern gun turret

384. Gun sighting ear pad
385. Door closing hand grip and cable
386. Gun sight plug-in socket
387. Floodlamp dimmer switch
388. Turret operation hydraulic flexible conduit
389. Ammunition feed rollers
390. Gun front attachments
391. Gun firing trigger
392. Turret control handle
393. Turret actuating lever
394. Gun setting adjusters at rear attachments
395. Gun firing hydraulic flexible conduits
396. Gun sight lamp switch
397. Fuse boxes
398. Port outer ammunition box
399. Port inner ammunition box
400. Ammunition box retaining catch
401. Turret rotation damper
402. Hydraulic system cut-out lever
403. Camera gun switch
404. Fusebox
405. Rotation gear hand lever
406. Ammunition belt link threading tool stowage
407. Gun cocking tool stowage
408. Harness lap straps and seat
409. Gun setting and sight mounting ring spanner stowage
410. Rotation lock control lever
411. Turret rotation damper
412. Microphone socket
413. Ammunition box retaining catch
414. Palmer gun firing accumulator unit
415. Starboard inner ammunition box
416. Starboard outer ammunition box
417. Gun firing hydraulic flexible conduits
418. Gun setting adjusters at rear attachments
419. Turret control handle
420. Turret actuating lever
421. Gun firing trigger
422. Gun front attachments
423. Gun sight mounting ring
424. Turret operation hydraulic flexible conduit
425. Door closing handgrip and cable