EO 05-60A-1

ROYAL CANADIAN AIR FORCE

PILOTS OPERATING INSTRUCTIONS

CANSO 2F AND 2SR

Issued on Authority of the Chief of the Air Staff

EDMOND CLOUTIER, C.M.G., O.A., D.S.P.
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15 MAY 53

LIST OF RCAF REVISIONS

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NOTES TO USERS

1 This publication is divided into five parts: Description, Handling, Emergency Handling, Operating Date and Special Installations.

2 PART 1 - DESCRIPTION of the controls and equipment with which the pilot should be acquainted.

3 PART 2 - HANDLING describes the normal handling of the aircraft by the pilot.

4 PART 3 - EMERGENCY HANDLING describes the emergency handling of the aircraft by the pilot.

5 PART 4 - OPERATING DATA gives the flying and engine limitations and includes information on fuel consumption, range and endurance under various conditions of flight.

6 PART 5 - SPECIAL INSTALLATIONS gives instructions on use of special fitments to the aircraft.

7 These notes are complementary to EO 05-1-1 - Pilot's Operating Instructions General and assume a thorough knowledge of its contents.

8 In the text, words written in capital letters, indicate actual markings on the controls concerned.

9 Comments and suggestions should be forwarded through the usual channels to Air Force Headquarters.

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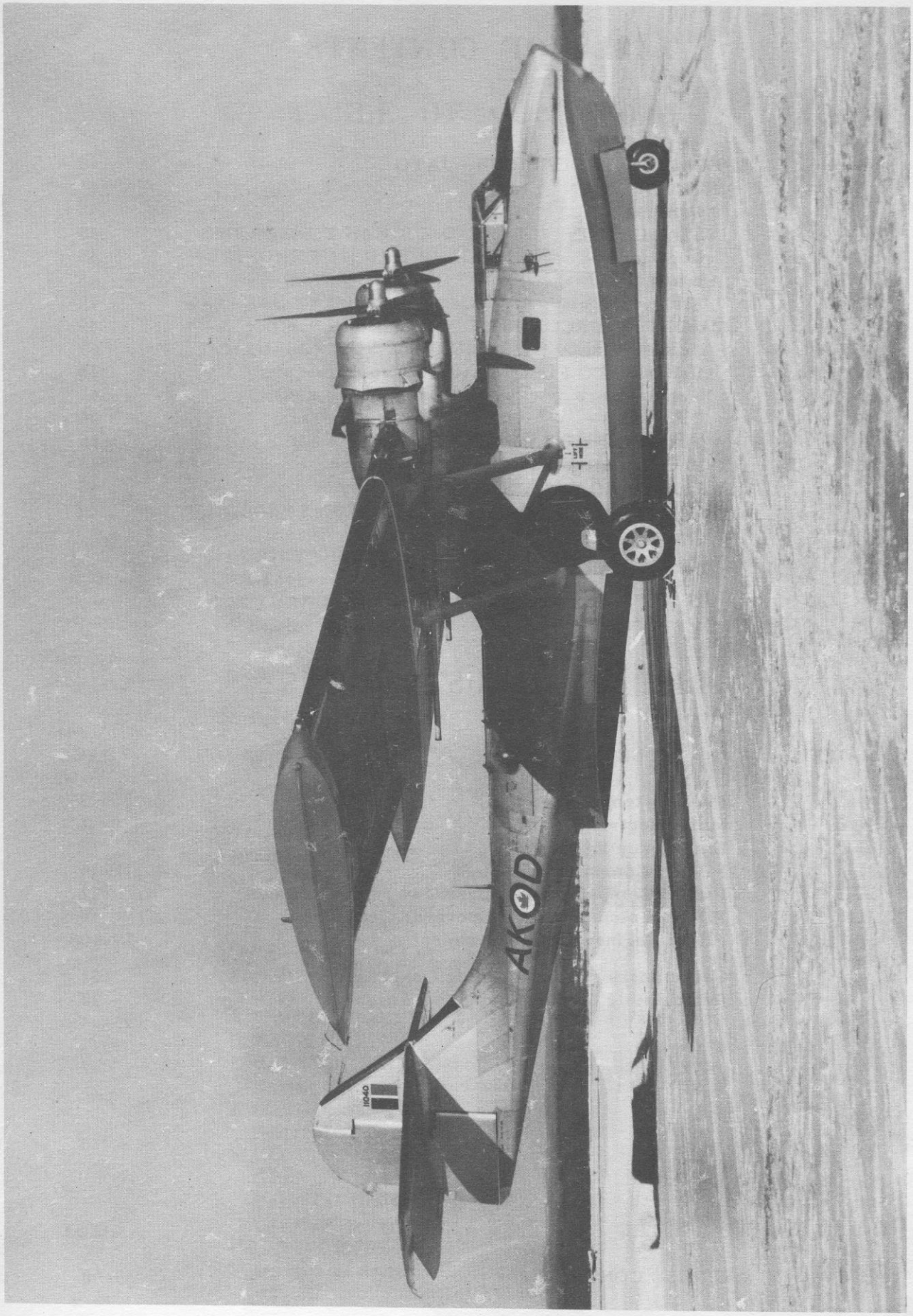


Three Quarter View of Canso 2 Aircraft

PART 1

DESCRIPTION

INTRODUCTION

General

1 The Canso 2F or 2SR aircraft is a twin-engined, semi-centilever, high wing amphibian with retractable wing top floats and landing gear.

Airframe

2 The airframe is of all-metal stressed skin, semi-monocoque construction with the exception of the ailerons, rudder, elevators and trailing edge of the wing which are of metal construction with a fabric covering. The hull is divided into seven main compartments:

(a) Mooring and bomber's compartment.

(b) Pilot's compartment.

(c) Wireless and navigation compartment.

(d) Engineer's compartment.

(e) Bunk or freight compartment.

(f) Entry compartment.

(g) Tunnel compartment.

NOTE

A bulkhead separates each compartment with water-tight doors fitted in bulkheads 2, 4, 6 and 7.

3 The cargo version of the Canso 2F or 2SR is fitted with sliding doors in place of the plexiglas blisters, thereby permitting the loading of bulky pieces of equipment. Plywood cargo flooring is used in the entry compartment, freight compartment, engineer's compartment and wireless-navigation compartment to facilitate the loading of freight. Loading considerations are discussed further in Part 4 of this publication.

Engines

4 The aircraft is fitted with Pratt and Whitney R1830-92 single speed blower, fourteen cylinder "Twin Wasp" engines with Stromberg injection carburettors. The engines are equipped with a combination electric-inertia direct cranking starter. For emergency use, a hand crank is stowed on the aft face of bulkhead #4.

Propellers

5 Hamilton Standard Hydromatic three blade, quick feathering, constant speed type propellers are employed on the aircraft.

Operational Equipment

6 In its present form, the aircraft is being used as a freighter and for air-sea-rescue operations. Consequently, some Canso 2 are equipped with special search and navigational equipment.

LEADING PARTICULARS

7 Leading particulars are as follows:

Dimensions Span -	
Floats Retracted	104' - 0"
Floats Lowered	100' - 0"
Length	63' - 10 1/2"
Height - On Landing Gear	20' - 1/4"
On Water (approx.)	15' - 0"
Prop Clearance - To Ground	8' - 4 3/4"
To Water (approx.)	4' - 3 1/4"
Weight -	
Weight empty (approx.)	18,975 lbs.
Normal All-Up Weight	30,500 lbs. 29000
Fuel and Oil Tank Capacities -	
Fuel Capacity	1460 Imp. gals.

Fuel and Oil Tank Capacities (Cont'd)

Oil Capacity	108 Imp. gals. (Foaming space 6 Imp. gals. each Tank)

FUEL SYSTEM

General

8 A fuel system chart is installed on the decking to the port of the fuel gauges, see Figure 1-7.

Induction System

9 Fuel is inducted through a Stromberg injection type carburettor and supplies mixture to the integral supercharger.

Fuel Tanks

10 Fuel is carried in two integrally constructed tanks in the wing centre section. Each tank has a capacity of 730 Imperial gallons.

Fuel Selector Controls

11 The fuel system is so arranged that, through the operation of the fuel tank selector valve controls, see Figure 1-7, the fuel may be supplied to either or both engines from either of the tanks.

Primer

12 The fuel primer pump is located on the port side of the engineer's compartment, see Figure 1-7.

Fuel Wobble Pumps

13 Two wobble pumps are incorporated in the system to supply pressure before starting the engines or if the fuel pressure fails during flight. The wobble pumps are located at the top of the flight engineer's instrument panel.

Fuel Pressure Gauges

14 Fuel pressure gauges are mounted on the lower centre of the engineer's instrument panel.

Contents Gauge

15 The sight gauges are in the engineer's compartment at the fore and aft bulkheads overhead. Charts are furnished in the engineer's compartment on the starboard side for the calibration of the fuel in the tanks at various attitudes of the aircraft. A level gauge is added to ensure accurate interpretation of the aircraft's attitude.

Cross-Feed Fuel System

16 A cross-feed valve on the engineer's panel allows fuel to be supplied to both engines from the engine-driven fuel pump of either engine.

Fuel Flow Meters

17 The fuel flow meters are above the instrument panel on the forward bulkhead #4. They are of the tapered tube and float type.

Fuel Jettison Controls

18 The fuel tank dump valve controls are located directly over the engineer's head. The lever should be pulled to release the fuel. The dump valve will close when the handle is released, allowing a selected quantity of fuel to be dumped. The outlets for jettisoned fuel are the two pipes extending beyond the trailing edge of the wing aft of the engine nacelles. The dump valves should be used only in extreme emergencies because of the dangerous condition created by fuel vapour when fuel is dumped.

Fuel Strainer Drains

19 Two C-2 strainers connected to the control cocks are drainable in flight, without disturbing the flow of fuel to the engine, by means of shut-off cocks in the engineer's compartment.

OIL SYSTEM

General

20 There is a complete oil system for each engine. The removable oil tanks are built as part of the monocoque nacelle.

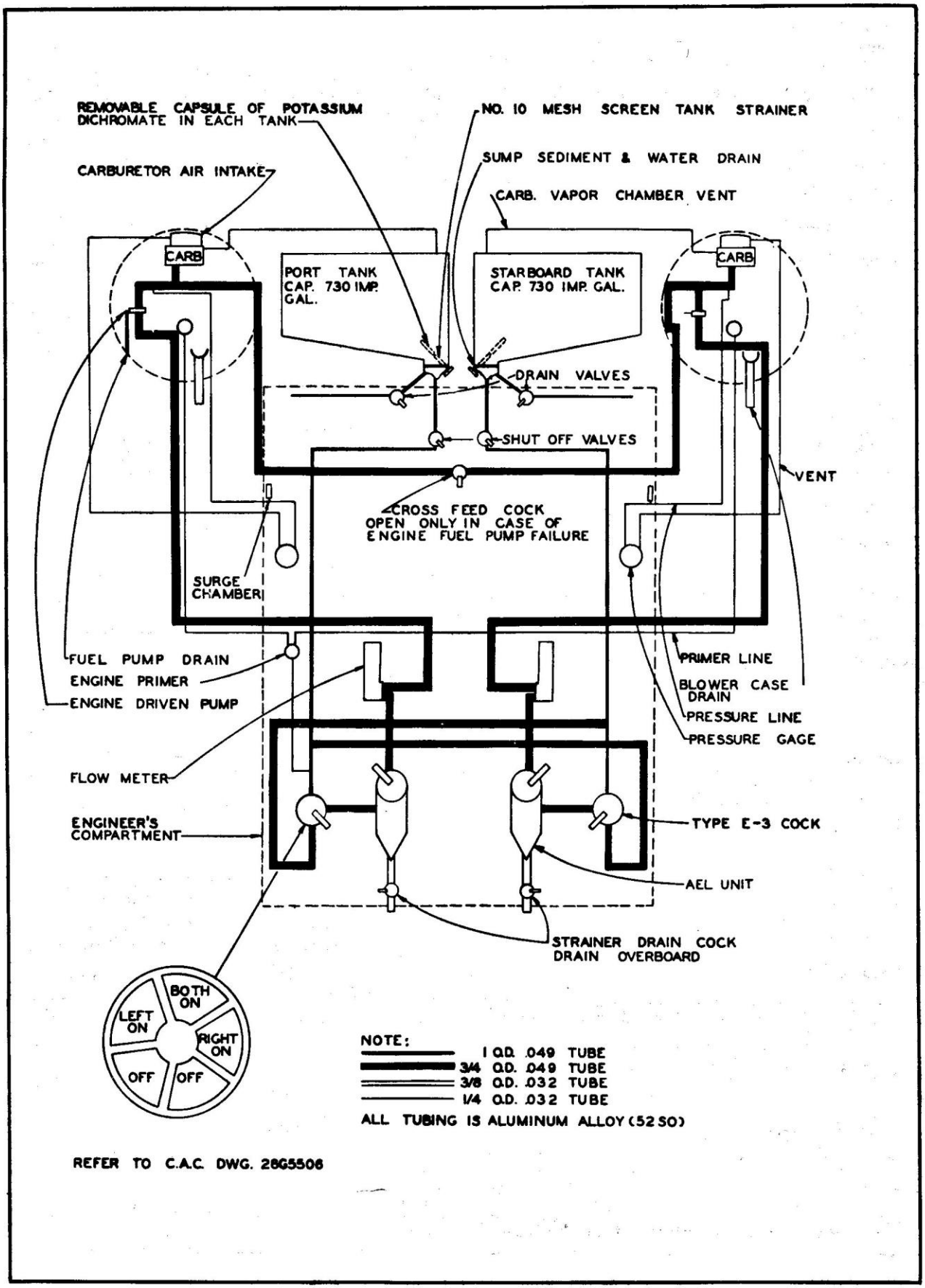


Figure 1-1 Fuel System Diagram

Oil Tanks

21 The capacity of each oil tank is fifty-four Imperial gallons. Each oil tank contains a well which directs the hot oil returning from the engine directly to the bottom of the tank and back to the engine during the engine warm-up period.

Pressure Gauges

22 The oil pressure gauges are located at the bottom centre of the engineer's panel in the engine gauge unit.

Temperature Gauges

23 The oil temperature gauges are located at the bottom centre of the engineer's panel in the engine gauge unit.

Quantity Gauge

24 The oil quantity gauge on the engineer's panel is of the electric liquidometer type. It indicates the amount of oil remaining in the tanks. By use of the selector switch, it will give a reading for either the port or starboard tank.

Oil Cooler Shutters

25 Thermostatically controlled shutters at the rear of the oil cooler shut off the air stream through the cooler, when the temperature of the oil falls below the temperature for which the thermostat is set.

Oil Dilution System

26 The oil dilution solenoid switches are attached to the hull on the starboard side of the aircraft beside the engineer's instrument panel.

HYDRAULIC SYSTEM

General

27 A pressure accumulator type hydraulic system works the undercarriage, up and down latching mechanisms, nose wheel doors, brakes and automatic pilot. The system operates in a pressure range of 800 to 1000 psi.

Engine-Driven Pump

28 The engine-driven pump which is located on the starboard engine, supplied hydraulic pressure to the system accumulator and the brake accumulator.

Hand Pump

29 The hand pump is located inboard of the co-pilot's seat. This hand pump is included in the hydraulic system for use when the engine-driven hydraulic pump fails to supply sufficient pressure. The hand pump may be used to supply pressure to any unit operated by the main hydraulic system.

Pressure Gauge

30 The hydraulic system pressure gauge is mounted on the starboard side of the pilot's instrument panel. The gauge indicates engine-driven pump pressure and should read between 800 and 1000 psi. when the hydraulic system is being operated.

AUXILIARY POWER UNIT

General

31 The auxiliary power plant with hand starter, is located on a shelf on the shear panel at the port side between station 4.0 and 4.2. The unit is a single cylinder, 4 horsepower Eclipse model. The set consists of a 24-volt DC 1500 watt generator, bilge pump, shock mounts, control box and auxiliary float chamber. Fuel for the unit is obtained from the port fuel tank through a manual control valve on the engineer's instrument panel. An oil tank of two gallons capacity is mounted on the unit. The controls for the engine are on the engine itself. Engine outlets for the muffler and bilge pump are on the port side of the hull.

ELECTRICAL SYSTEM

General

32 A 24-volt system with ground return is used. The capacity of each of the two engine-driven generators is above that required for normal flying and the usual electrical services required can be maintained by either of the two engine-driven generators or by the APU generator.

33 The electrical system supplies the following services:

(a) All aircraft lighting.

(b) Radios.

(c) Starting circuit.

(d) Ignition system.

(e) Undercarriage warning lights.

(f) Wing tip float retraction and extension.

(g) Pitot head heater.

(h) Bomb release.

(j) Warning and fog horn.

(k) Propeller anti-icer.

(l) Windshield wipers.

(m) Two-unit hot plate.

(n) Visual signal system.

Ignition System

34 The ignition system, a dual magneto type is controlled by a switch on the control yoke in the pilot's compartment.

Starting System

35 The engine starter switches are mounted on the engineer's instrument panel. The group consists of three switches, energizer and mesh for port engine, booster selector switch, energizer and mesh for starboard engine.

Main Switches

36 Aircraft battery and generator switches are located on the main electrical panel on the fore side of #4 bulkhead beside the wireless operator's seat. There is a smaller electrical switch panel on the forward face of bulkhead #2 in the pilot's compartment. Some of these switches are in series with switches on the main distribution panel and both must be on to operate the service required.

Main Fuses

37 These are located in the main electrical panel positioned as described above.

Spare Fuses

38 Spare fuses are stowed inside the main electrical panel.

Wing Tip Floats

39 The retraction and extension of the wing tip floats is carried out electrically. The switch for these operations is mounted on the flight engineer's panel. There is a warning light on both the pilot's and engineer's instrument panels which lights when the throttles are partly closed and the floats are UP.

Hot Plate

40 A two-unit electrical hot plate is installed on the starboard side of the flight engineer's compartment for making warm meals and hot drinks.

Visual Signal System

41 The visual signal system consists of panels of switches and marked lights with identical positional arrangement for the pilot and the engineer. The system for the pilot is on the control yoke and the one for the engineer is on his instrument panel. The visually indicated operations are as follows: RAISE FLOATS, LOWER FLOATS, FULL RICH, AUTO RICH, AUTO LEAN, STOP ENGINES, RECALL, INTERPHONE, SECURE.

42 The visual system is operated by two-way control switches. Either switch turns the light on or off. The pilot may signal the engineer to perform certain operations by turning a light on. The engineer may signal "done" by turning the light off.

BRAKE SYSTEM

General

43 The hydraulically operated brake system is a part of the general hydraulic system and includes a separate accumulator to maintain pressure when the engine pump fails. The ac-

cumulator also supplies pressure to the brakes when the aircraft is parked.

Wheel Brakes

44 The main wheel brakes are located on the upper half of the pilot's and co-pilot's rudder pedals and are controlled by toe pressure.

Parking Brake

45 The brakes may be locked ON for parking by applying toe pressure on the pilot's rudder pedals and by turning the parking brake knob (located just below and to the right of the co-pilot's instrument panel) in a counter-clockwise direction. The parking brake is released by pressing on the brake pedals.

VACUUM SYSTEM

General

46 The vacuum system operates the pilot's, co-pilot's and auto pilot's gyro instruments on the vacuum side and supplies pressure on the pressure side for the operation of the wing and tail surface de-icer boots.

Vacuum Pumps

47 A vacuum pump is mounted on each engine and a changeover cock allows selections to be made for operating the different sets of instruments from the pump on either engine.

Vacuum Gauge

48 The vacuum gauge is located on the auto pilot instrument panel in the centre of the pilot's main instrument panel. The reading on the gauge should normally be 3 1/2"-4" Hg.

Vacuum Pump Selector Cock

49 The vacuum pump selector cock is positioned on the lower port side of the pilot's instrument panel. This cock allows selection of either port or starboard engine pump to operate either the pilot's or co-pilot's group of gyro instruments.

FLYING CONTROLS

General

50 The flying controls are of the conventional type except that the control column is of the yoke type spanning the cockpit and on which are mounted two control wheels, one for the pilot and one for the co-pilot. Standard installations also provide two sets of rudder pedals. The rudder pedals are adjustable for reach.

Trim Tab Controls

51 The elevator tab control handle is located on the ceiling of the pilot's compartment just aft of the control quadrant. Turning the handle clockwise noses the aircraft up. Turning the handle counter-clockwise noses the aircraft down. The rudder tab control knob is located just aft of the elevator tab control handle. The aileron tab control is mounted on the port side of the pilot's instrument panel.

Control Locking Gear

52 Provision is made for locking the control column and control wheel to the bulkhead over the pilot's seat. The rudder control lock is mounted permanently on the port side of the cockpit under the pilot's side window. This may be engaged while taxiing to assist the pilot when braking action is required.

Undercarriage Selector Lever

53 The undercarriage selector lever is mounted below the port side of the pilot's instrument panel. A lock pin is incorporated in the selector assembly to prevent movement of selector lever when aircraft is on the ground or in the water. A chain is also provided as an additional safeguard. To raise undercarriage, unfasten chain, pull out locking pin, move selector handle to UP position and then replace locking pin in UP position. To lower undercarriage, pull out locking pin, move selector to DOWN position and replace locking pin in DOWN position.

Undercarriage Warning Lights

54 The undercarriage warning lights are located on the starboard side of the pilot's instrument panel. The lights are marked WHEELS UP, WHEELS DOWN, and NOSE WHEEL DOOR LOCKED. When the undercarriage is in a position as indicated by the lights, it remains locked until the position is changed.

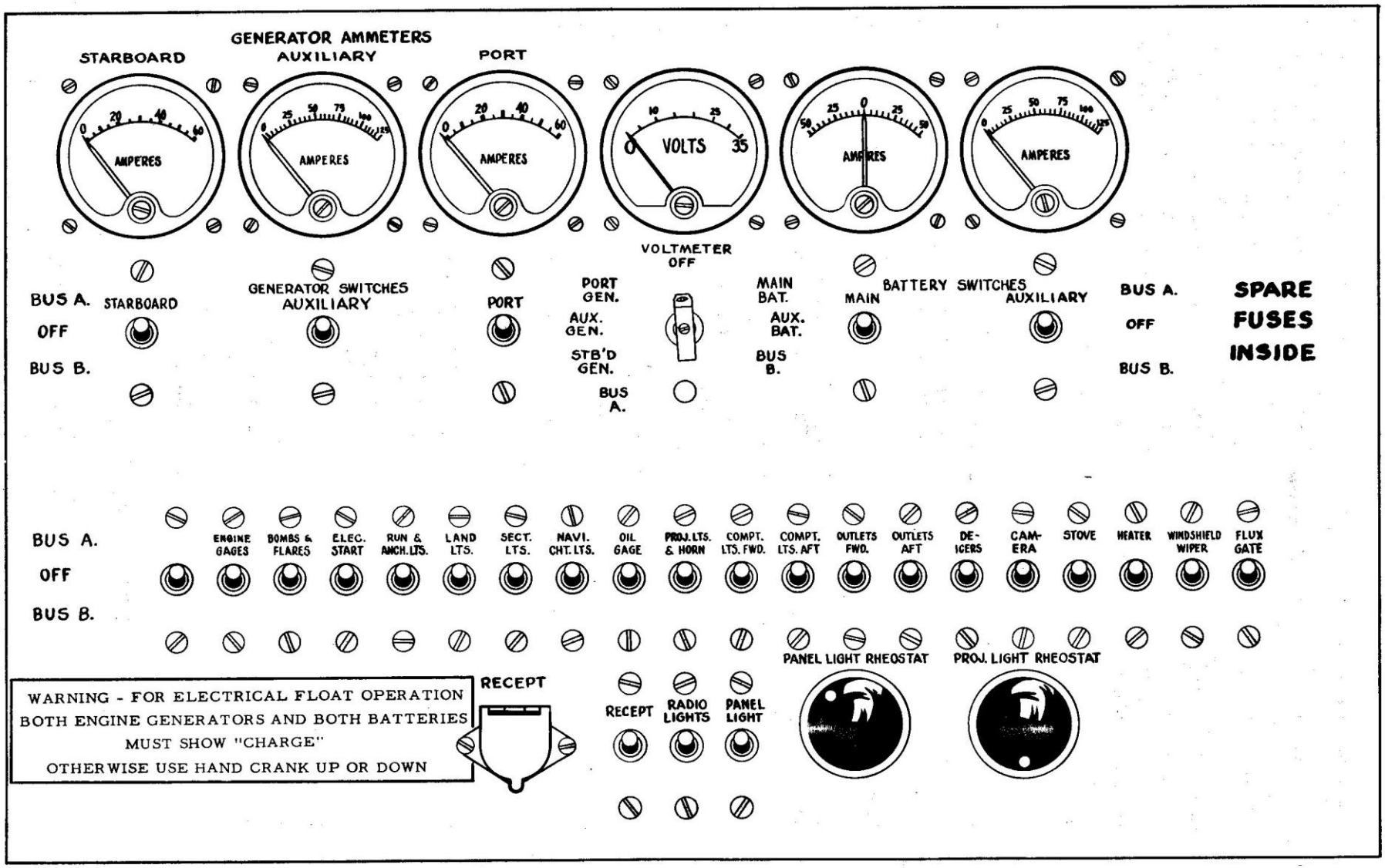


Figure 1-2 Main Electrical Panel

AUTOMATIC PILOT

General

55 The aircraft is fitted with a Sperry A3 Automatic Pilot, incorporated in the aircraft hydraulic system. The gyro pilot instrument panel including gyros and indices controls is positioned in the lower centre of the pilot's instrument panel. For information on the operation of the auto-pilot, see EO 05-1-1, Pilot's Notes General.

Limitations

56 It is important that the auto-pilot be disconnected when rough air is encountered and when operating the undercarriage.

ON and OFF Valve

57 The main oil valve is mounted on the port side of the pilot's instrument panel. This should be turned ON before engaging the auto-pilot.

Servo Engaging Control

58 This is located on the ceiling of the pilot's compartment aft of the elevator and rudder trim tab control.

Hydraulic Pressure Gauge

59 The auto-pilot hydraulic pressure gauge is mounted on the lower right hand corner of the auto-pilot instrument panel. The normal operating pressure is 150 psi.

ENGINE CONTROLS

Throttle Controls

60 The throttles are located in the engine control quadrant on the ceiling of the pilot's compartment forward of the elevator and rudder tab control.

Mixture Controls

61 The mixture controls are mounted on top of the engineer's instrument panel. The pilot has no manual control over these levers. There are four positions: IDLE CUT-OFF, AUTO LEAN, AUTO RICH, and FULL EMERGENCY RICH.

Carburettor Air Temperature Controls

62 These controls are mounted on the engineer's panel. There are two positions for selection, DIRECT and ALTERNATIVE. In the alternative position, air is taken from an opening inside the engine cowling. In the DIRECT position, this opening is closed, and air enters the carburettor scoop from the outside air duct at the nose of the cowling.

Propeller Speed Controls

63 The propeller speed controls are located on the throttle quadrant, overhead between the pilots. Their movement is conventional in operation. An electric synchroscope is mounted on the pilot's instrument panel between the tachometers to assist in synchronizing the engines.

Throttle Quadrant Friction Nuts

64 There are two friction nuts on either side of the throttle quadrant, one for the throttles and one for the propeller controls.

Feathering Controls

65 The feathering controls for the propellers are immediately forward of the throttle quadrant on the ceiling of the pilot's compartment.

Cowl Gill Controls

66 The cowl gill controls are located below the flight engineer's panel. To operate the control, turn the crank in the direction indicated by the arrow.

FLIGHT AND ENGINE INSTRUMENTS

General

67 The cockpit is equipped with the normal flight instruments common to other aircraft. The only engine instruments in the cockpit are the manifold pressure gauges tachometers, synchroscope, auto-pilot oil pressure gauge, hydraulic pressure gauge and vacuum gauge. The remaining engine gauges and duplicates of the manifold pressure gauges and tachometers are in the flight engineer's compartment.

LIGHTING SYSTEM

General

68 The switches for the exterior lights, landing lights, compartment lights, compass and panel lights are located on the pilot's switch panel which is mounted on #2 bulkhead over the door between the pilots. The appropriate main switch on the main electrical panel must also be ON before the pilot can operate the individual groups of lights.

HEATING AND VENTILATION SYSTEM

General

69 The aircraft is fitted with a Janitrol heating system and six ports in the hull to provide ventilation. Sliding windows are also provided on either side of the pilot's cockpit and in the flight engineer's compartment.

Janitrol Heater

70 The Janitrol heater is fastened to the ceiling of the bunk compartment on the port side and the air scoop for the heater projects through the ceiling immediately forward of the heater. Heated air is led through flexible tubing to the various compartments of the hull and is ejected through individual punka louvres.

Operation of Janitrol Heater

71 Open scoop. Select heater switch on main electrical panel. Turn on the fuel supply cocks in the flight engineer's compartment and bunk compartment. Switch on the pre-heat switch on the Janitrol heater for a maximum of two minutes (depends upon outside air temperature). Select heater switch on bulkhead #6 to HIGH or LOW depending upon amount of heat required.

72 To stop the heater, close fuel valve to heater, place heater switch on bulkhead #6 to OFF, and after two minutes, close scoop. Finally, turn off heater switch on the main electrical panel.

NOTE

Ensure that heater is off before landing. (Red warning light on pilot's instrument panel will be off when the heater is off).

g DE-ICING EQUIPMENT

Propeller Anti-Icing Controls

73 A propeller anti-icing fluid tank, holding three Imperial gallons, is mounted on the port side, aft face of bulkhead #4 and supplies alcohol to the slinger ring positioned aft of the hub of each propeller. A rheostat control for controlling the output of the anti-icing fluid pump is located on the pilot's instrument panel. The correct switch on the main electrical panel must be placed in the ON position before the system will operate.

Airframe De-Icing Controls

74 De-icing shoes are fitted on the leading edge of the wing, on the tail plane, and on the fin. A vacuum pump on each engine supplies air to the bladders of the shoes through a rotary air distributor valve. The rotation of the valve results in a pulsating action of the shoes. When the de-icing system is not operating, the air from the vacuum pumps is exhausted to atmosphere around the oil separators in each nacelle. The switch for operating the distributor valve motor is on the main electrical panel, and the distributor, valve control is located on the ceiling of the pilot's compartment, aft and starboard of the trim tab controls.

Windscreen Anti-Icing Controls

75 The control for the windshield anti-icer is on the starboard side of the pilot's instrument panel next to the hull. The hand pump forces alcohol through perforated tubing which lies along the lower frame of the windscreen. The alcohol supply is contained in a tank located beneath the coaming of the instrument panel on the starboard side.

Windscreen De-Froster Controls

76 Heated air is led through flexible tubing up the port side of the hull in the pilot's compartment from the main supply line of the Janitrol heater. In the flexible tubing extending across the top of the instrument panel coaming below the windscreen are two punka louvres which direct heated air onto the windscreen.

Windscreen Wiper Controls

77 A windscreen wiper system is provided for the two forward windscreens. These wipers are electrically operated and are controlled by switches on the windshield wiper control box mounted on the ceiling of the pilot's compartment to the port of the throttle quadrant. After the switch has been selected on the main distribution panel, turn on the circuit breaker switch on the wiper control box and select either FAST or SLOW speed. If ice forms on the windscreen, alcohol may be pumped onto the windscreen to aid removal. Do not operate the wipers on dry windscreens.

Pitot Head Heater Switch

78 The pitot static tube is equipped with an integral heater which prevents ice from forming on the tube. The heater is controlled by a switch on the main distribution panel in series with a switch on the pilot's electrical panel.

CREW SEATING ARRANGEMENTS

Location

79 The position and adjustments for the seats of the crew members are:

Pilots'

(a) Fore and aft adjustment by lifting lever on inboard side of the seats. Vertical adjustments are made by moving the lever at the front of the seat to the right and tilting the seat.

Radio Operator's

(b) A swivel type, non-adjustable chair will lock in the straight forward position for take-off and landing.

Navigator's

(c) A swivel type chair identical to radio operator's chair. In some models, the navigator's position is in the bow compartment and a stool type seat is provided.

Engineer's

(d) A fixed seat in the engineer's compartment.

Air Gunner's

(e) Two fold down seats are provided in the blister compartment, mounted on the rear face of bulkhead #6. An additional canvas sling type seat for a gunner is located in the bow compartment.

COMMUNICATIONS EQUIPMENT

General

80 Most aircraft are fitted with the following communications equipment, located as described in the following paragraphs:

Interphone.
Command Transmitters (2).
Command Receivers (3).
AT 12HF Transmitters (2) liaison.
AT 12LF Transmitter (1) liaison.
AR 6 Liaison Receiver.
MN 26K Radio Compass.
AN/APN1 Radio Altimeter.
Marker Beacon.
SCR 522A "Command" Radio (VHF).

Interphone

81 For crew member to crew member communication and for multiple crew member participation in radio operations, an interphone jackbox is installed at each crew member's station. The pilot's station box is installed on the port side of the hull outboard of the pilot, and the co-pilot's station box is located similarly on the starboard side. The engineer's box is in his compartment on the starboard side. The navigator's station box is located on the radio loop control panel. The station box which serves the radio operator is underneath his table on the starboard side. The first and second gunners' boxes are over the door on the aft face of bulkhead #6, one on each side of the hull. Two living compartment station boxes are on the aft face of bulkhead #5 above the passageway. The tunnel gunner's station box is on the port side of the hull, slightly forward of the tunnel gun hatch. The bomber's station box is located on the starboard side of the bomber's compartment, just below the gun hatch.

82 The interphone system functions as follows when the jackbox selector switch is placed:

(a) On "Compass", supplies audio output of radio compass receiver.

(b) On "#1 Equipment", supplies audio radio output of radio receiver (AR 6) and liaison transmitter sidetone (AT 12).

(c) On "#2 Equipment", supplies audio radio output of command receivers and VHF receiver, and sidetone from command and VHF transmitters.

(d) On "i/c", permits communication with any other crew member whose jackbox selector switch is on "i/c".

(e) On "Emergency Call", permits any member of the crew to call any other crew member regardless of setting of the other member's selecting switch.

Command Radio

83 Two transmitters, each with a pre-set frequency, three receivers, a modulator and dynamotor unit, and an antenna relay unit are located on racks outboard and below the pilot's seat on the port side. All operating adjustments are made on pilot's remote controls located above the centre of the windscreen. This equipment provides for comparatively short range transmission of CW or MCW signals on either of two pre-set frequencies, and for the reception of CW or MCW signals in the 190-550 kc , 3-6 mc , and 6-9.1 mc bands. Simultaneous reception on more than one band is possible.

Liaison Radio

84 The three AT 12 transmitters provide for the transmission of CW or MCW signals on the 200-500 kc band on the LF transmitter, and for transmission on the 2.5 to 13 mc band on each of the two HF transmitters. The AR 6 receiver provides for CW or MCW reception in the 140 kc to 21 mc range. Two antennae are available for use. One is fixed and the other is a trailing wire, both attached to a change-over switch. The trailing antenna is manually controlled from a reel assembly mounted above and forward of the radio operator's table.

Radio Compass

85 The radio compass, type MN 26K, consists of the following: a control box fixed to the hull above and at the aft end of the navigator's table: radio compass indicators mounted beside the control box and on the pilot's instrument panel, port side; a radio compass loop mounted on top of the wing between the engines; a loop dehydrator located above the radio operator's table; a receiver mounted on the port upper portion of bulkhead #4, extending to the edge of the navigator's table. In some aircraft , the receiver is mounted on the radio equipment shelf on the starboard side of the aircraft. This set is operated by the navigator and provides for the reception of CW and MCW signals in the 200-1750 kc band, with or without indications of the direction from which the signals are arriving. For aural identification of CW signals, the "CW-Voice" switch mounted on the receiver must be in "CW" position, although the compass and homing features of the set will function properly on CW signals with this switch on "Voice".

AN/APN1 Radio Altimeter

86 The radio altimeter unit consists of dial, range adjuster and green-amber-red limit lights. If fitted, the installation is usually attached to a bracket on the centre of the instrument panel coaming. The dial of the radio altimeter is on the left, the limit lights are in the centre, and the range adjustor is on the right.

SCR 522A Command Radio (VHF)

87 The pilot's remote controls for operating this set are located on the starboard side of the pilot's seat. It is operated in the same manner as in other aircraft .

Marker Beacon Receiver

88 A marker beacon receiver is mounted on the radio equipment shelf on the starboard side of the aircraft. Provision is made for visual and audio signals from the receiver through a 3-light marker beacon receiver unit mounted on the upper port side of the pilot's instrument panel. Audio signals are received by selecting the "Marker Audio" switch to ON and the jackbox to "#2 Equipment". The light group and

audio signals give an indication of air-way, inner and outer markers.

RADAR EQUIPMENT

Rebecca

89 Some aircraft are fitted with Rebecca for navigational requirements.

Loran

90 In addition to the Rebecca set, some aircraft are also fitted with Loran.

EMERGENCY EQUIPMENT

First Aid

91 Stowage is provided for a first aid kit on the starboard forward face of bulkhead #6. A strap with the stencilled marking "FIRST AID" holds the kit in place.

Hand Fire Extinguishers

92 Provisions are made for carrying one five-pound CO_2 portable extinguisher and three CO_2 hand fire extinguishers of two-pound capacity each. The five-pound CO_2 extinguisher is carried in a bracket on the forward face, port side of bulkhead #4. The three two-pound extinguishers are mounted as follows: one on the aft face of bulkhead #6 just below the door on the starboard side; one on the forward face of bulkhead #5 on the port side just above the floor; and one on the forward face of bulkhead #2 below the door.

Engine Fire Extinguishers

93 A 7 1/4 pound CO_2 bottle with seat type valve is carried in a bracket on the aft face of bulkhead #4 on the port side. A selector valve, for selecting either power plant with a remote control release handle, is located below the engineer's instrument panel. There is a "red disc" visible on the port side of the aircraft at bulkhead #4; if the bottle is not intact, the red disc will have been blown out by the discharge.

Signal Pistol

94 One signal pistol (Mark 2) is stowed in a canvas holder on the port forward side of bulkhead #7. There is provision for the stowage of 34 signal cartridges in canvas containers on the forward face of bulkhead #7 on both sides of the aircraft.

Emergency Pyrotechnics

95 Six marine distress signals are stowed on the aft side of bulkhead #7, two on the port side and four on the starboard side of the aircraft.

Emergency Exits

96 For abandoning the aircraft in flight, the blister hatches only are to be used. To abandon the aircraft on land or water after the aircraft has come to rest and the engines stopped, the following exit points may be used: sliding hatch above each pilot; inward opening door above navigator's table; hatch in the top of the turret in the bow compartment; and the blister hatches.

Dinghy Equipment

97 Two dinghies are strapped to the hull on the port and starboard side of the passageway aft of bulkhead #5. Two dinghy oars are strapped to the hull on the starboard side of the passageway between bulkheads #6 and #7.

Parachutes

98 Eight parachutes are stowed in the aircraft in positions accessible to the crew members. Each is secured in position by a fabric panel with an elastic cord in the upper end which hange from a hook. The lower end is rivetted to the bracket. They are placed as follows:

Two on the aft face of bulkhead #2.
Two on the front inboard corner of the navigator's table.
One on the port forward face of bulkhead #6.
One on the starboard side forward face of bulkhead #6.
One on the starboard side forward face of bulkhead #4.
One on the starboard side of the hull forward of bulkhead #6.

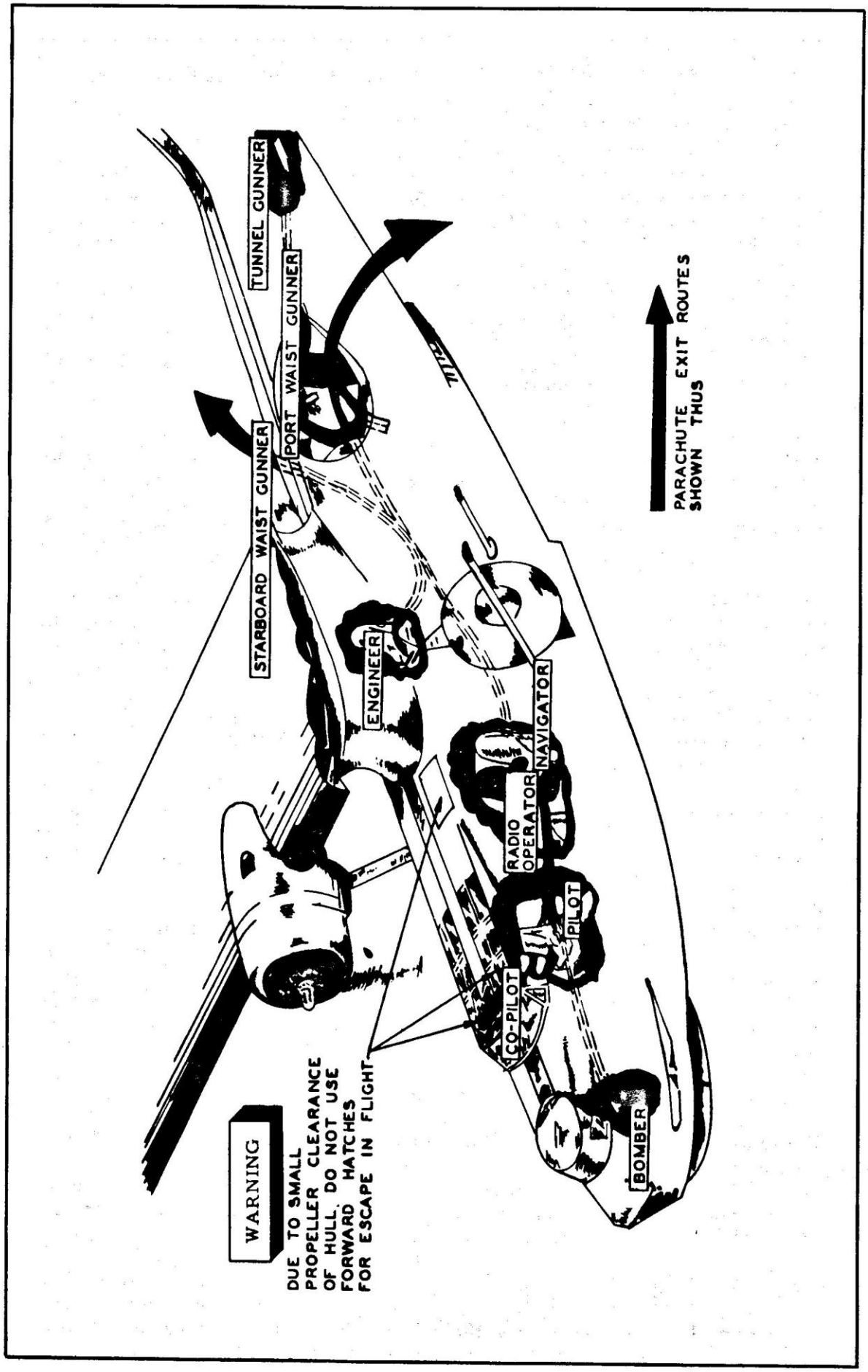


Figure 1-3 Emergency Exits

Fog Horn

99 An electrically operated fog horn is located on the aft face of bulkhead #5. The switch for operating the horn is on the pilot's switch panel. A bracket for installing the horn on the outside of the aircraft is located on the port side of the hull below the engineer's window.

MISCELLANEOUS EQUIPMENT

Parachute Flares

100 Six parachute flares are stowed in a rack below the navigator's table. In later aircraft, they are in racks in the tunnel compartment. Two flare holders are installed just aft of bulkhead #7, one on either side of the tunnel gun hatch. Flares should not be kept in these holders during take-off, landing, or while the aircraft is on the water.

101 Flares are released by pulling the flare release handles located on the forward face of bulkhead #2 above the door in the pilot's compartment. Each handle is connected to a cable which extends aft through the hull to the flare holders and when pulled, releases the flare stowed in its respective side of the aircraft. On later aircraft , the flares are released electrically by pushing two buttons on the port side of the pilot's switch panel.

Sea Markers

102 Six Mark 2 aluminum sea markers are stowed aft of bulkhead #7 on the port side.

Night Drift Signals

103 Six Mark 2 flame floats are stowed aft of bulkhead #7, on both sides of the aircraft.

Hoisting Sling

104 Provision is made for attaching the hoisting sling to fittings on the upper surface of the wing at the centerline of the aircraft. The sling is stowed in the aircraft on the front face of bulkhead #5 in the engineer's compartment.

Food Locker

105 Provision is made for stowing food in the locker located aft of bulkhead #4 on the starboard side below the two-burner hot plate.

Water Tanks

106 The aircraft carries two corrosion resistant steel water tanks having a capacity of 3.7 Imperial gallons each. The tanks are mounted above the two-burner hot plate in the engineer's compartment.

Water Distilling Unit

107 A water distilling unit is installed on the floor aft of bulkhead #4 on the starboard side of the aircraft. In some aircraft , the unit is mounted in the tunnel compartment on the starboard side. The capacity of the unit is two quarts per hour. Fuel is supplied by a separate fuel tank with built-in pump.

Entrance Ladder

108 A removable ladder is provided for entrance to the aircraft through the blister hatches. It is normally stowed on the port side at the chine of the hull between bulkheads #6 and #7.

Toilet and Relief Tube

109 A dry toilet is situated between bulkheads #6 and #7 on the port side of the aircraft. Waterproof toilet bags are stowed on the starboard side of the compartment. The relief tube is stowed aft of bulkhead #7 on the port side.

Airframe and Engine Tool Kits

110 Provision is made for storage of the special airframe and engine tool kits in the aft portion of the tool and gear locker located on the port side forward of bulkhead #5.

Buoy Hook and Line

111 A 100-foot coil of one-inch manilla rope is stowed on the starboard side, forward of bulkhead #1. The buoy hook is strapped to the aft port face of bulkhead #1 at the floor line.

Boat Hook

112 An eight-foot boat hook is stowed athwartship on the aft face of bulkhead #5 just below the door.

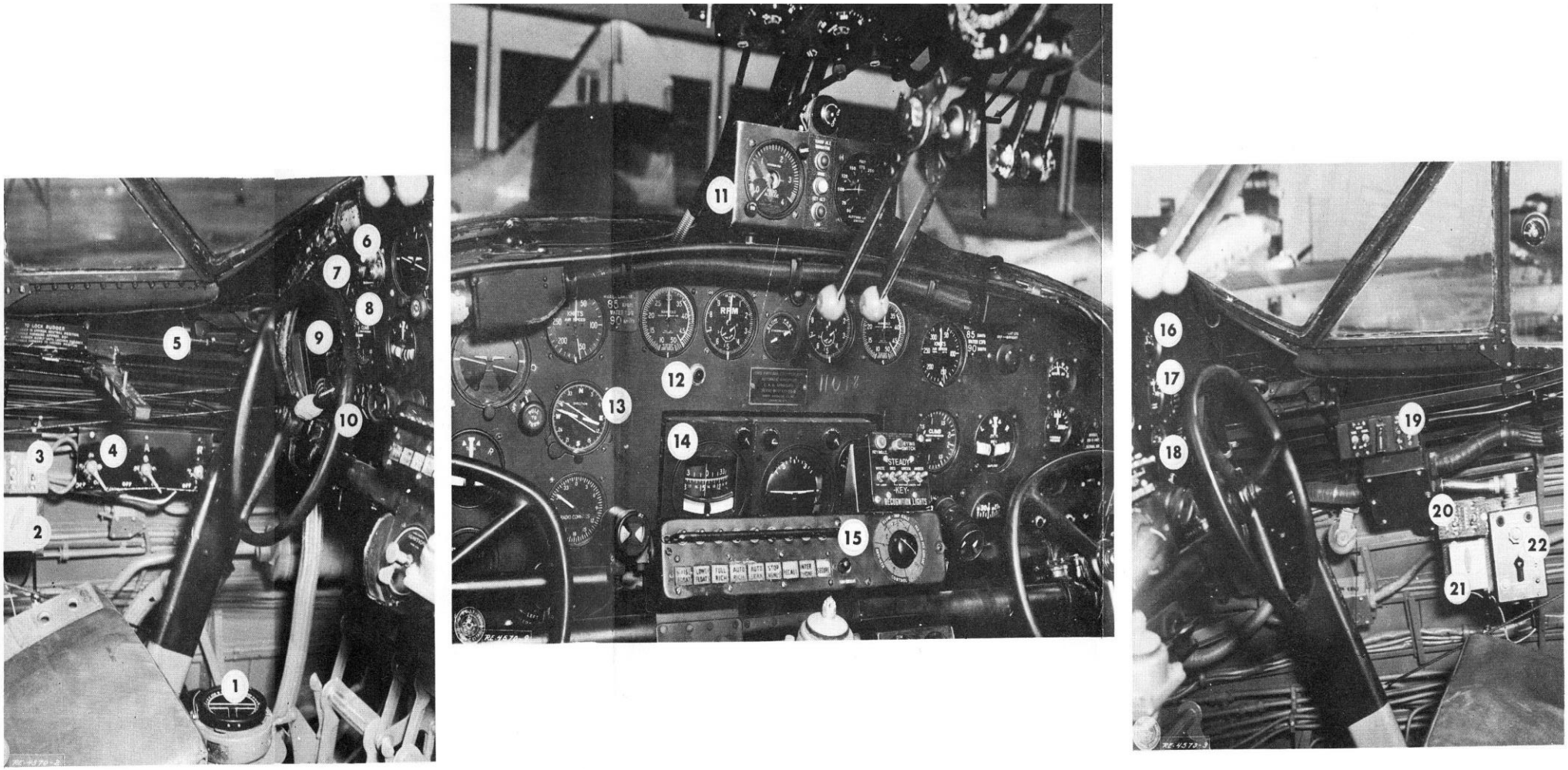


Figure 1-4 Pilots' Compartment

1. P4 Compass
2. Radio Filter Box
3. VHF/HF Selector and Marker Beacon Audio Switches
4. Gyro Pilot Individual ON/OFF Controls
5. Ventilation Control
6. Marker Beacon
7. Vacuum Gauge
8. Rate of Climb Indicator
9. Gyro Pilot Pressure Selector
10. Altimeter
11. Radio Altimeter
12. Heater Warning Light
13. Fluxgate Compass
14. Gyro Pilot
15. Pilots' Signal Lights System
16. Outside Air Temperature Gauge
17. Hydraulic Pressure Gauge
18. Wind De-Icer Pressure Gauge
19. IFF Switches
20. VHF/HF Selector and Marker Beacon Audio Switches
21. Radio Filter Box
22. Radio Jack Box

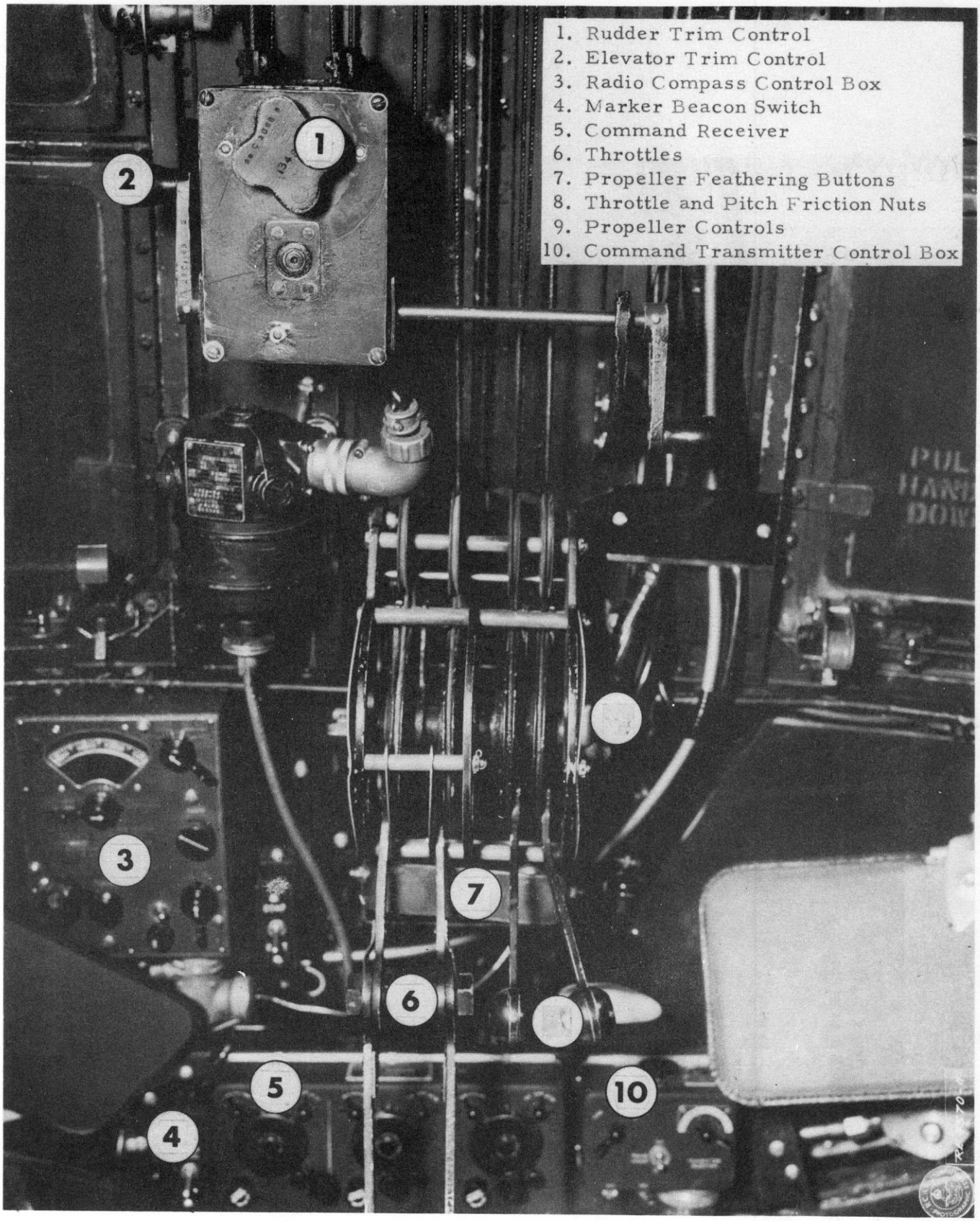


Figure 1-5 Pilots' Compartment - Overhead Forward Panel

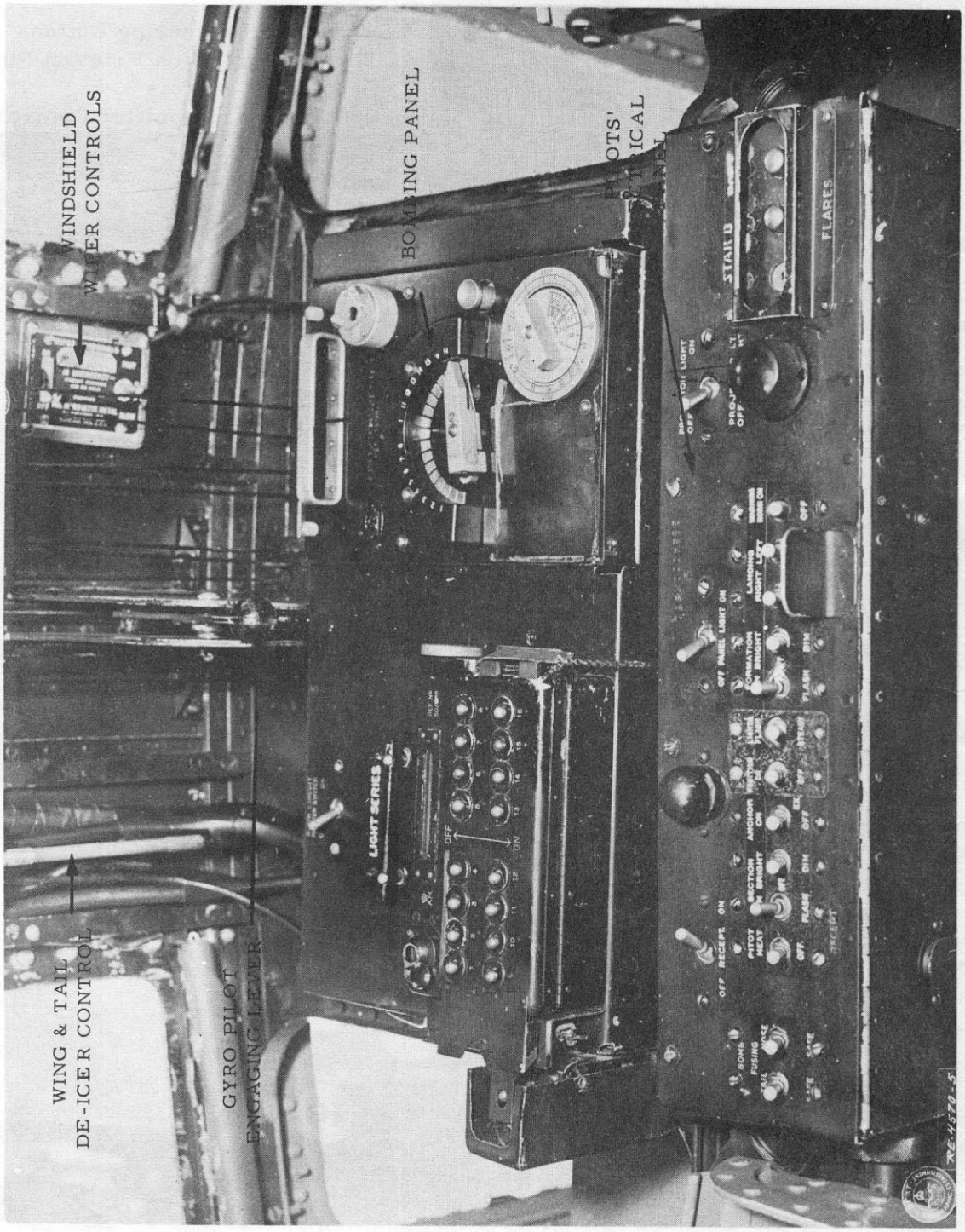
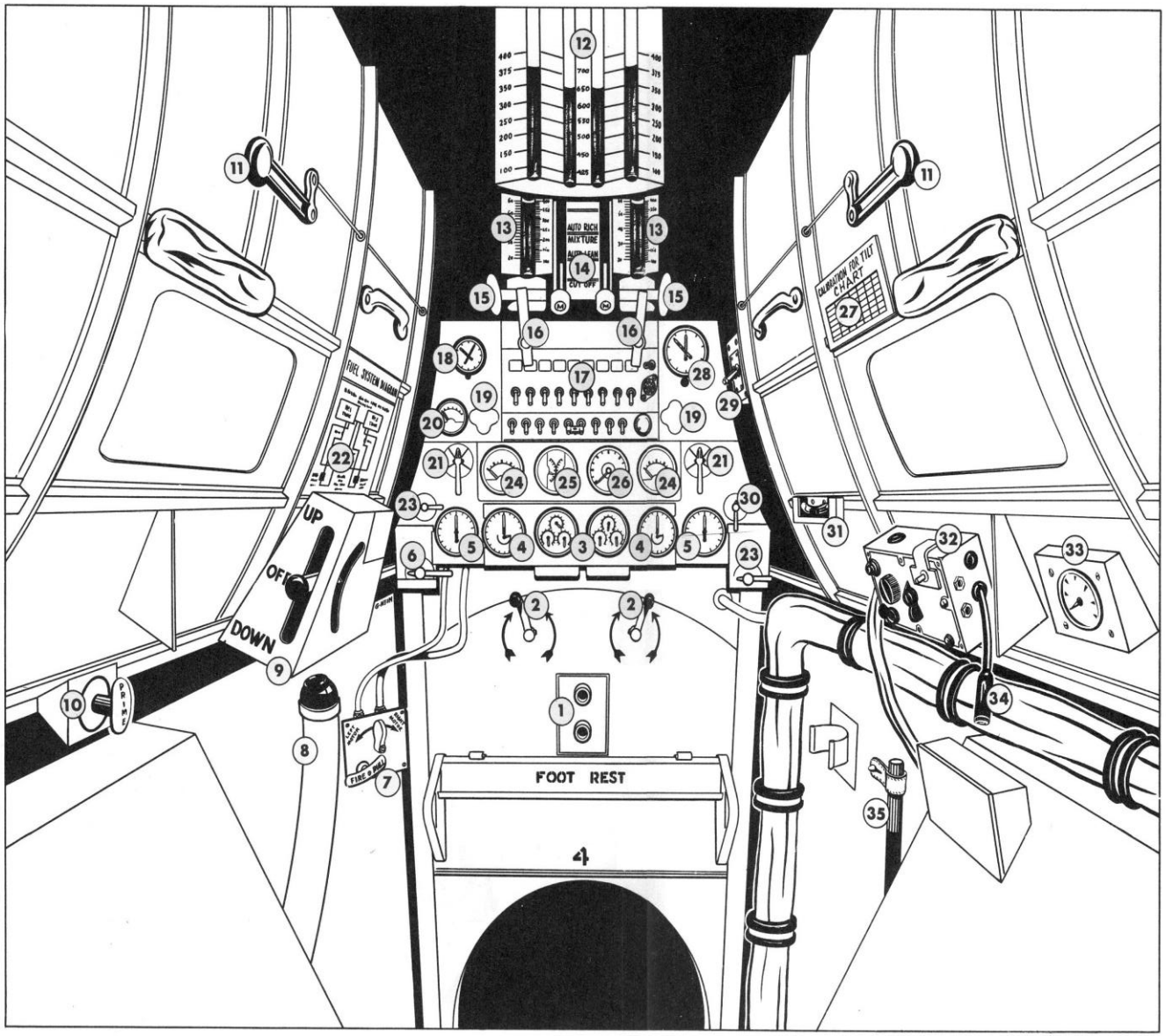


Figure 1-6 Pilots' Compartment - Overhead Rear Panel



1. Manual float-lowering gear
2. Engine cowl flaps controls
3. Oil temperature, oil and fuel pressure gauges
4. Tachometers
5. Boost gauges
6. Engine cross-feed
7. Engine fire extinguisher
8. Hot and cold air duct
9. Float raising and lowering selector unit
10. Engine primer
11. Fuel dump valves
12. Fuel contents gauges
13. Fuel flow meters
14. Mixture controls
15. Fuel flow meter by-pass controls
16. Fuel wobble pumps
17. Engineer's electrical panel containing:
    - A. Flight engineer's signal light system
    - B. Starter booster switch
    - C. Starter switches
    - D. Oil quantity gauge switches
    - E. Light switches
    - F. Float warning light
18. Eight-day aircraft clock
19. Carburettor temperature controls
20. Outside air temperature gauge
21. Fuel cocks
22. Fuel system diagram
23. Fuel strainer drain cocks
24. Cylinder head temperature gauges
25. Carburettor air temperature gauge
26. Oil contents gauge
27. Calibration for tilt chart
28. Altimeter
29. Oil dilution switches
30. Auxiliary power unit fuel cock
31. Angle of chord line level
32. Radio jack-box
33. De-icer system pressure gauge
34. Head-set plug-in jack
35. Float raising and lowering (manual) crank stowage

Figure 1-7 Flight Engineer's Compartment

ANCHORS

113 Anchors are classified as follows:

Sea Anchor

(a) The sea anchor is stowed on the floor forward of bulkhead #7 on the starboard side of the aircraft.

Folding Anchor

(b) One 30-pound non-magnetic, folding anchor and 150 feet of 1/4" corrosion resistant steel cable is installed in the bow. A compartment which will open and drain to the exterior is provided for stowage of the anchor. A reel and crank on the port side of the bow compartment is provided for the anchor line. A pendant line of 3/8" corrosion resistant steel is attached to the keel to carry the anchor load, or tow line load, into the hull. The free end of the pendant incorporates a clamp which may be fitted to the anchor line when a load is on the gear.

PART 2

HANDLING

PRELIMINARIES

1 Before entering the aircraft, check:

(a) On land.

(1) Undercarriage and control locks removed.

(2) Oleo legs - proper inflation.

(3) Tires - condition - inflation - creep.

(4) Nose wheel scissors - security.

(b) On water.

(1) General condition of wing tip floats and hull above the water line.

2 After entering the aircraft, check:

(a) On land.

(1) Visual signal and intercom systems.

(2) Auto pilot OFF. Auto pilot oil pressure selector OFF.

(3) Propeller anti-icer control checked and OFF; wing de-icer OFF.

(4) All controls and trim tabs for full and free movement.

(5) Gun blisters on cargo doors locked.

(6) Camera hatch in rear tunnel closed and secured.

(7) Undercarriage selector locking chain released.

(8) Brakes ON, hydraulic pressure 1000 psi.

(9) Undercarriage indicator light ON (wheels down).

(b) On water.

(1) Items (1) to (6) of paragraph 2(a) and in addition ensure that ALL bilges are pumped out.

OPERATION OF THE FUEL SYSTEM

Tank Selection

3 — Normally both fuel cocks should be set to BOTH ON. Either engine cock can be set to drain fuel from either tank, if required (e.g. engine failure, balancing fuel load, etc.). The cross feed cock should be left OFF at all times unless a fuel pump failure occurs.

Wobble Pumps

4 The fuel hand pump for each engine is used in starting and as initial stand-by in case of fuel pump failure.

STARTING PROCEDURE

Starting the Engines

5 Instruct the flight engineer to start the APU. The flight engineer and pilot will then proceed as follows:

(a) On the first start of the day, clear the carburettors of air in the following manner:

(1) Work the fuel pump to obtain 10 psi.

(2) Set the mixture control to AUTO RICH for one second, then return to IDLE CUT-OFF.

(3) Allow time for surplus fuel to drain away.

(b) Check:

(1) Throttles - 1" open.

(2) Prop controls - fully forward.

(3) Mixture controls - IDLE CUT-OFF

(4) Carb. heat - COLD

(5) Gills - OPEN

(c) Have each engine turned over by hand.

(d) Set engine fire extinguisher selector to engine to be started.

(e) Set ignition switch to BOTH ON.

(f) Maintain 10 - 16 psi fuel pressure and prime engine (3 to 6 strokes depending on temperature).

(g) Energize starter for 12 - 15 seconds (max. 20 secs.).

(h) Set starter switch to MESH (and continue priming in cold weather).

(j) As soon as the engine starts to fire, move the mixture control to AUTO RICH. If the engine shows signs of being over-rich, return to AUTO LEAN or, if necessary, to IDLE CUT-OFF until it is running smoothly.

Failure in Starting

6 If the engine fails to start:

(a) Stop priming and move the mixture control to IDLE CUT-OFF.

(b) Wait until the propeller stops rotating.

(c) Switch OFF the ignition.

(d) Ensure that the flywheel stops rotating by setting switch to MESH; then return switch to the central position.

(e) Have the propeller turned forward half a revolution by hand to ensure that the flywheel is disengaged from the engine. If the engine has been overprimed, open the throttle and have the engine turned forward by hand.

WARMING UP PROCEDURE

Gills

7 The engine cowl gills may be closed to assist in warming up, but must be in the OPEN position while taxiing.

Pressures and Temperatures

8 Keep the engine turning over at 800 rpm until the oil pressure rises above the minimum. If there is no register on the oil pressure gauge within thirty seconds, stop the engine. Continue the warm up at not lower than 1000 rpm until all pressures and temperatures are at minimums or higher. Test the vacuum change-over cock.

Compass and Repeaters

9 If a flux-gate compass is installed, ensure that the master switch is ON and check that the gyro is erect (red light out) and uncaged. Check that the repeater is operating by comparing with the pilot's P4 compass (if installed) and with the runway heading.

Radio

10 Ensure that the radio master switch is turned ON and check all sets required for communication purposes with ground control.

Electrical Panel

11 Switch ON generators and check the charge rate. Turn ON all electrical switches required for the flight.

TAXIING PROCEDURE

12 For taxiing procedure on land:

(a) Check hydraulic brake pressure - 1000 psi.

(b) Check floats UP.

(c) Engage rudder control lock to facilitate braking.

(d) Avoid sharp turns - the nose wheel scissors bolt is easily sheared under side load.

13 For taxiing procedure on water:

(a) Check undercarriage UP and locking chain secured.

(b) Check floats down and bow compartment secured.

(c) Do not use more than 15" boost for prolonged taxiing, or the engine will overheat.

(d) Do not allow the engines to idle below about 1000 rpm for longer than is necessary, and after idling, give each engine a burst of about 2000 rpm before take-off. If taxiing for any distance, the mixture control should be set to AUTO LEAN to avoid fouling the plugs.

(e) Keep the control column right back; this improves control and reduces the amount of water coming over the cabin.

(f) Turning out of wind is easier if a swing is started and kept up, but it is difficult to steady the aircraft on a crosswing or downwind course. In wind speeds above 15 kts., it is impossible to keep the aircraft across wind even with the use of windward engine, but it is possible to taxi with the wind on the quarter.

(g) When taxiing above 6 kts. into or across a moderate wind, the windscreen is liable to become covered in spray, obscuring forward visibility. Use of windscreen wipers will overcome this, but should not be started until windscreen is wet.

(h) When taxiing downwind, it is sometimes more effective to reduce power to minimum and to lower the wheels.

CAUTION

When taxiing in rough water - It is advisable that the hatch in number one compartment be closed when taxiing under rough water conditions. If it must be open, extra caution is required otherwise a large amount of water may be shipped. As of Jul 49, there are Canso aircraft with electrical equipment (i.e. fluxgate compass amplifier) in the nose which may be shorted, if unprotected from water entering via the hatch. Such an unserviceability might be a serious handicap particularly in Arctic latitudes.

ENGINE AND ACCESSORY CHECK

Testing the Engine

14 For testing the engine after warm up:

(a) Check the propellers (at 20" boost) by pulling the control to the full coarse position and then return to full fine.

(b) Check magnetos - preliminary check at 20" MP before opening up.

(c) Have the engineer apply carburettor heat and note rise in temperature.

(d) Open up to 48" MP and check rpm (2700).

(e) Throttle back to 30" MP and check each magneto (max. 100 rpm drop).

(f) On the first start of each day, hold in feathering button momentarily to check feathering motor (drop of 200-300 rpm) then pull out the button.

Accessories

15 Check accessories as follows:

(a) Wing de-icer control (8-~~10 psi and 40~~ sec. cycle).

(b) Check and bleed the auto-pilot.

(c) Windscreen alcohol and wipers.

TAKE-OFF PROCEDURE

16 Vital actions before take-off on land:

(a) Hydraulics - pressure 1000 psi - U/C selector locking chain released.

(b) Trim tabs - elevator - 3° nose up (at 28,000 lbs.).

Aileron - Neutral
Rudder - Neutral

(c) Tension - throttle and propeller friction nuts adjusted.

(d) Mixture - AUTO RICH (signal).

(e) Fuel - BOTH ON.

(f) Gills - OPEN.

(g) Carb. Heat - COLD.

(h) Ensure rudder control lock released.

NOTE

General practice is to have the flight engineer call out a take-off check of (d) to (g) over the intercom.

17 Vital actions before take-off on water:

(a) Hydraulics - check undercarriage UP and locking chain secured.

(b) Ensure camera hatch and cargo doors secured. Inflate gun blister and hatch gaskets (if fitted).

(c) As for land items (b) and (h).

NOTE

In case of fuel pump failure during take-off, use the wobble pump vigorously and do not open cross-feed valve until power has been reduced.

When operating on water, full carburettor heat should be applied momentarily just prior to take-off. This will prevent condensation and guard against icing in the carburettor.

18 Take-off on land:

(a) Normally there is no tendency to swing - on cross wind, brake and/or differential throttle may be required until rudder becomes effective (35-40 kts.).

(b) Lift the nose wheel off at 50-60 kts., and ease the aircraft off at 75-80 kts. depending on the load.

(c) Brake the wheels before selecting UP.

(d) Allow the speed to build up to 85-90 kts. before climbing away.

19 Take-off on water:

(a) Hold the control column hard back and partially open throttles until spray is clear of propellers, then open up to full take-off power.

(b) When hump speed is reached (40-45 kts.) ease control column forward to assist the aircraft onto the step. If porpoising occurs, the motion can be stopped by a very slight backward pressure on the wheel.

NOTE

At heavy loads with the CG forward, there is a strong tendency for the nose to dig in.

(c) Ease the aircraft off the water at 70-75 kts. (32,000 lbs.).

(d) Allow speed to build up to 85 kts. before selectiong FLOATS UP.

NOTE

If intended take-off run is through taxiing path, wait until swell has decreased to a safe height.

20 Take-off on heavy sea:

(a) In rough water, it is essential that the nose of the aircraft is held clear of heavy seas throughout the take-off run. A semi-stall take-off is recommended and is carried out as follows:

(1) Hard back on the control column and open throttles to full power.

(2) Ease the control column slightly ahead as the speed increases, but keep the nose well up.

(3) Pull the aircraft off the water at 60-65 kts.

21 Vital actions after take-off from land:

(a) Check undercarriage fully UP and nose wheel doors closed.

(b) All temperatures and pressures below maximum allowable.

22 Vital actions after take-off from water:

(a) Deflate gun blister gaskets (if used).

(b) All temperatures and pressures below maximum allowable.

FLYING CHARACTERISTICS

General

23 Engine speed range of 2,450 to 2,650 rpm should be avoided as it may produce a vibration in the structure of the aircraft.

Stability

24 The aircraft is stable about all axes in normal flight, except as noted below:

(a) Lateral stability becomes poor in the landing conditions and is impaired by lowering the floats. The floats, therefore, are not to be lowered when landing on wheels.

(b) The aircraft is directionally stable except at large angles of yaw. In a large yaw the rudder control loads reverse and the rudder moves hard over. At the same time the ailerons tend to move over to increase the yaw. Should this occur, the throttles are to be closed and the nose depressed to effect recovery. Deliberate sideslipping is to be avoided and in the event of engine failure, the live engine should be throttled back initially and the swing checked by vigorous use of rudder.

Change of Trim

25 When wheels are down - slightly nose down. When wheels are up - slightly nose up.

NOTE

A slight swing may occur if main wheels do not retract simultaneously.

Climbing

26 The speed for maximum rate of climb is 90 kts. IAS to 6,000 feet, then reduce speed by 2 kts. per thousand feet.

Cruising

27 It is recommended that all cruising operations be conducted in a range not to exceed 70% of the normal rated power (1,050 hp.). When cruising at 70% normal rated power, the engine speed should be 2270 rpm which results in 140 BMEP and the mixture control should be in the auto rich position.

28 When cruising at powers below 70% normal rated power, the engine speed should be adjusted so as not to exceed 135 BMEP and the mixture should be in the auto lean position. Cruise control data will be found under Part 4 - OPERATING DATA.

Stalling

29 A good margin of speed should be kept on turns, and steep turns at low altitudes avoided, especially when heavily loaded. At 34,500 lbs. the approach to the stall is at about 67 kts. IAS. Rudder control becomes uncertain at 3 to 5 kts. before elevator and aileron control are lost. The aircraft sinks rapidly, but with little tendency to drop either the nose or a wing at the following speeds:

At 26,000 lbs.	-	58-62 kts.
At 30,500 lbs.	-	63-67 kts.

PRACTICE FEATHERING IN FLIGHT

Feathering

30 The following procedure is to be adhered to for all practice feathering, and if time and circumstances permit, it is recommended for use on actual engine failures:

(a) Close the throttle of engine to be feathered.

(b) Set the propeller control to full coarse.

(c) Have the engineer set the mixture control to IDLE CUT-OFF position.

(d) Push the propeller feathering control button.

NOTE

If the feathering action does not occur within ninety seconds, pull the control button out.

(e) Have the engineer turn OFF the fuel if propeller is to remain feathered for any period.

(f) Turn OFF ignition. Turn OFF generator switch.

(g) Have the engineer close the gills on the dead engine.

Unfeathering

31 When unfeathering, proceed as follows:

(a) Turn the ignition switch to BOTH ON, and turn ON the generator switch.

(b) Have the engineer turn ON the fuel selector.

(c) Hold in the propeller feathering control until the propeller windmills at 800 rpm.

(d) Have the engineer set the mixture control to the AUTO RICH position.

(e) If the engine tends to overspeed by reason of the feathering button failing to release itself at 800 rpm, pull out the feathering control button.

(f) Warm up the engine gradually at low rpm, and resume normal power after all temperatures and pressures are above minimums.

AUTOMATIC PILOT OPERATING PROCEDURE

Ground Check

32 For ground check, proceed as follows:

(a) Turn ON gyro pilot oil pressure selector and check pressure (125-150 psi.).

(b) Align all follow-up indices and check speed valves to average (3 to 4). Engage auto pilot.

(c) Operate all controls to full travel in each direction - allowing thirty seconds at each extreme to bleed off air.

(d) Disengage auto pilot and turn OFF oil pressure selector valve.

Flight Operation

33 For flight operation, proceed as follows:

(a) Trim aircraft to fly "hands off".

(b) Repeat (a) and (b) of paragraph 32. Adjust speed valves to desired sensitivity.

NOTE

If speed valves are turned below "1" to OFF position, the control will be locked in that position.

(c) The auto-pilot may be overpowered in an emergency.

(d) After disengaging the auto-pilot, turn OFF the oil pressure selector valve.

LANDING PROCEDURE

Vital Actions Before Landing on Land

34 Vital actions before landing on land are as follows:

(a) Select wheels DOWN, and have the engineer check main and nose wheels.

NOTE

Normal practice is for engineer to use "down latch" rod to check main wheels, and "emergency lever" in the forward plug of wheel cover to check nose wheel. See Part 3, EMERGENCY HANDLING.

(b) Check "wheels down" indicator light ON and hydraulic pressure - 1000 psi.

(c) Check brake pressure gauge (if fitted) - 1000 psi.

(d) Check auto-pilot oil pressure selector OFF.

(e) Check cabin heater OFF (red light out).

(f) Adjust propeller control for 2300 rpm.

(g) Check with Engineer for:

Mixture	-	AUTO RICH
Fuel	-	BOTH ON
Carb. Heat	-	COLD
Gills	-	Positioned (mid pos'n. or closed)

NOTE

At night, it is advisable to cover "floats up" warning light on the instrument panel.

NOTE

Just prior to landing when approaching the touchdown point, the propeller controls should be placed in the full fine position.

Vital Actions Before Alighting on Water

35 Vital actions before alighting on water are as follows:

(a) Have the engineer select FLOATS DOWN and check visually (black mark on strut).

(b) Have engineer check main and nose wheel UP and nose wheel doors locked CLOSED.

(c) Check indicator light "wheels UP" and throttle back to check that "floats UP" light is out.

(d) Have engineer check rear tunnel hatch closed and secured - blister or cargo doors locked shut; inflate gun blisters and hatch gaskets (if fitted)

(e) For additional checks see paragraph 34 operations (d) to (g).

Final Approach

36 At normal landing weight (approximately 27000 lbs.) the recommended final approach speeds are:

(a)	On land	-	80 kts
(b)	On water	-	85 kts

NOTE

For light loads, these speeds may safely be lowered by 5 kts.

LANDING (ON LAND)

37 A conventional tricycle gear landing is employed - the nose slightly above the horizontal. Hold the nose wheel off the ground as long as possible, but do not apply the brakes before the nose wheel is on the ground. If the nose wheel starts to shimmy, it is recommended that the brakes be applied strongly to dampen this action.

ALIGHTING (CN WATER)

Normal (Fine Attitude - Power Assisted)

38 When nearing the surface, round out to the landing position (nose slightly above the horizontal) with about 12 to 15" boost. Allow the aircraft to settle on to the water and start to close the throttles slowly at the instant of touching water. It is important to keep sufficient back pressure on the control column to hold the nose-up attitude until the aircraft slowed down to the point of falling off the step. The tendency of the nose to "dig in" is most noticeable at the forward CG positions and is accentuated when throttling back.

Glide (Power OFF)

(a) Approach at 5 kts above the normal approach speed, and commence to round out slightly before that for normal, - otherwise as above.

Semi-Stall (Recommended for Rough Water)

(b) Use a glide approach of 95 kts commencing to round out 10 to 15' above the water level. Ease back on the control column to maintain altitude (3 to 8' above the water) and make sure that the control column is fully back at the moment of touching the water. Hold the control column fully back until the aircraft has lost forward speed. It is especially important to keep the wings level in this type of landing.

"Glassy Water"

(c) Glide to within 300' of water level, then apply sufficient power to attain the normal landing attitude. Trim the aircraft and adjust the throttle to maintain 200 ft./min. descent. The IAS should normally read about 75 kts. Hold this condition until after the touch-down, and complete the landing run as for a normal landing.

Mislanding

39 A normal overshoot requires no special procedure except that if full power is em-

ployed, the propeller control should be in full fine.

Cross-Wind Landing

40 On land, cross-wind landings are carried out in the same manner and under the same conditions as for other conventional type twin-engine aircraft. Cross-wind landings on water are to be avoided if at all possible, because of the danger of dragging a wing tip float and/or water looping. If unavoidable, care must be taken to ensure that the wings remain level at all times.

Vital Actions after Landing

41 After the landing, the Flight Engineer is to carry out the following drill:

(a) Open the cowl gills.

(b) Move the mixture control to AUTO LEAN.

MOORING AND ANCHORING

Handling during Mooring

42 For handling during mooring:

(a) Inform the engineer that the aircraft is to moor up, or sound "M" on the warning horn.

(b) One crew member should proceed to bow, and two members must stand by the drogue stations.

(c) Call for port, starboard or both drogues when the aircraft speed through the water is less than 5 kts.

NOTE

In many cases, it is possible to dispense with the use of drogues by lowering the landing gear to slow up the aircraft. On aircraft with cargo doors, it is very easy to foul the drogue line, and therefore, if it is necessary to stream a drogue, a spare crew member should stand by to assist.

d) Approach the buoy as slowly as possible; bring the aircraft up with the buoy on the port bow. Do not cut the engines until the bow crew have secured the slip-line or caught the "D" ring with the boat hook.

NOTE

Signals on the warning horn for streaming and spilling drogues should be arranged beforehand with all crew members.

Mooring to a Buoy

43 To moor to a buoy:

(a) Secure the aircraft to the buoy by means of the slip-line through the "D" ring and make fast to the bollard on the port side.

(b) Pick up the buoy mooring pendant and place the grommet over the bollard.

(c) Remove the end of the aircraft mooring bridle from the anchor box, shackle it to the buoy pendant and house the shackle.

(d) Take the grommet of the mooring pendant off the bollard and make fast the free end of the lizard from the mooring bridle.

(e) Cast off the slip-line and pay out the mooring pendant and bridle. Ensure that the aircraft bridle takes all the strain.

Anchoring

44 For anchoring:

(a) Obtain the crank from the engineer's compartment.

(b) See that the reel is locked.

(c) While standing on mooring platform, remove the anchor from its box. Unfold the anchor and drop it over the side, threading the cable through the run on the mooring platform.

(d) By using the brake, allow the cable to feed out slowly to the length desired. When operating on lakes, the length of anchor cable should be three times the depth of the water. When operating in tidal waters, the cable length should be five times the depth of the water.

(e) Lock the reel and attach the clamp on the mooring bridle to the anchor cable.

(f) Use the brake to permit the cable to feed out until the entire anchor pull is taken by the mooring bridle. Sufficient slack should be left to ensure that no pull will be put on the reel lock mechanism.

(g) Lock the reel and make fast the lizard line.

(h) In conditions of high wind and/or strong tides, precautions should be taken to ensure that the anchor lies flat. A second anchor or weight on the cable may be used if necessary.

Weighing Anchor

45 To weigh anchor:

(a) Wind in anchor cable slack before weighing anchor; endeavour to break manually if possible, if not, use engines.

(b) Unlock the reel and wind in the cable until the clamp on the mooring bridle is accessible from the mooring platform.

(c) Lock the reel and release the cable clamps.

(d) Unlock the reel and crank in the cable until the anchor hangs just below the surface of the water.

(e) Lock the reel and hoist the anchor aboard, taking care that it does not come in contact with the hull.

(f) Fold and stow the anchor, stow the mooring bridle and lizard in the anchor box.

(g) Draw in the free cable and lock the reel.

END OF FLIGHT PROCEDURE

Oil Dilution

46 It is the responsibility of the servicing personnel to carry out oil dilution on the aircraft. Pilots should be familiar with the dilution procedure as laid down in EO 10A-1-1K.

Stopping the Engines

47 Allow the engines to idle at 1000 rpm and ensure that the cylinder head temperatures are below 200°C before stopping the engines. Have the engineer place the mixture control in IDLE CUT-OFF and turn OFF the ignition switches after the engine stops.

Before Leaving the Aircraft

48 Before leaving the aircraft, engage the rudder control lock and secure the control column with the locking bar.

(a) On water - ensure that all hatches are secured and all removable water-tight bulkheads are in position.

(b) On land - insert the surface control locks and chock the main wheels. In conditions of high wind, or if the aircraft is to be left unguarded, it is advisable to place a suitable support under the keel at station #7.

Tie Down

49 The aircraft may be lashed down at each main wheel and at the nose wheel. The floats must be lowered to attach the wing lines through the tie-down rings on the nose of the float.

PART 3

EMERGENCY HANDLING

ENGINE FAILURE PROCEDURES

Feathering

1 If conditions are critical and it is necessary to feather quickly, push in the feathering button immediately, then follow out procedure listed in Part 2, Paragraph 30 (Practice Feathering in Flight).

Failure During Take-Off

2 In the event of an engine failure during take-off, a landing should be made straight ahead. Only if lightly loaded should an attempt be made to continue climbing and then only if safety speed (80-85 kts) has been attained.

Failure in Flight

3 In the event of failure in flight, proceed as follows:

(a) Feather the dead engine as described in Part 2, Paragraph 30 (Practice Feathering in Flight).

(b) Turn off the fuel cock to the dead engine.

(c) Check vacuum selector cock to the live engine.

(d) At 30,500 lbs., the rate of climb is 70' per minute at 87 kts TAS at standard sea level, with one engine operating at take-off power, the other propeller windmilling and the landing gear and floats retracted. At 32,500 lbs. and the same conditions, the rate of climb is zero.

NOTE

If the starboard engine fails, the hydraulic hand pump will provide pressure as required.

MAIN SERVICE EMERGENCY PROCEDURES

Undercarriage

4 The manual hydraulic system should be used in case of failure of the engine-driven pump. Proceed as follows:

(a) Rotate the landing gear selector lever to the DOWN position.

(b) Lower the gear by building up the hydraulic pressure with the hand pump.

5 In the case of failure of the hydraulic system, use the manual lowering system as follows:

(a) On main wheels:

(1) Select DOWN.

(2) Release the UP locks by pulling out and turning the tee handles at the main wheel wells 1/4 turn.

(3) Work the gear down by rocking the aircraft.

(4) Use the "down-latch" rod to straighten out the main support struts to lock the gear down. This is done by inserting the down-latch rod through the door and operating as follows:

a. Engage the short end of the lever over the bolt provided on the auxiliary keel.

b. Guide the outside end of the rod into the strut socket located just above the pivot point on the strut.

c. Pushing firmly on the lever will straighten out the struts and the gear will lock down.

(b) On nose wheel:

(1) Select DOWN.

(2) Unlock the wheel doors by pushing the door lock handle aft (located on the starboard side forward of bulkhead #1), thus releasing the door lock pins.

(3) Insert the hydraulic hand pump handle, or emergency lever handle in the aft end of the starboard door torque tube (located aft of bulkhead #2), and push inboard (counter clockwise) rotating the torque tube and thus opening the nose wheel well doors.

(4) Lock the torque tube in the "doors open" position by swinging the locking link inboard over the lug on the torque tube and fitting. Insert locking pin and retain with safety pin.

(5) Remove the aft nose wheel cover plug, insert the emergency lever through the hole and strike the end of the up-latch sharply, thus unlocking the nose wheel.

(6) Attach the emergency lever to the torque tube between the packing unit and the jack fitting so that the ratchet pawl fits into the teeth of the jack fitting. Using the lever as a ratchet, force the gear into the down position. To lock, use a slow heavy push.

(7) Remove the forward plug of the wheel unit cover to examine the down lock, and use the lever to determine if the down latch is locked. If it is locked, the red band on the lever will not be visible.

NOTE

After an emergency lowering, be certain to release the emergency door locking pin before operating the gear again.

Brakes

6 In the case of failure of the engine-driven hydraulic pump, sufficient pressure should remain in the brake pressure accummulator (1000 lbs.) for a normal landing. The hydraulic hand pump may be used to build up this pressure in the air.

Floats

7 If the electrical system fails, the floats may be lowered manually as follows:

(a) Insert the hand crank (located on the bulkhead below the engineer's panel), in the socket at the bulkhead.

(b) Two crank positions are used so that high speed operation may be used when loads are light and crank moved to the low speed socket as the loads become heavier.

(c) Visual check and crank load will determine when the floats are fully down (or up).

LANDING WITH ASYMMETRIC POWER

Single Engine Landing - On Land

8 When landing on land with single engine, follow these instructions:

(a) Because of the time required to check the undercarriage locked DOWN, it is advisable to lower the gear as in a normal circuit. In fact, with the starboard propeller feathered, it will be necessary to use the hydraulic hand pump to complete the down selection which will require more time than the normal selection.

(b) All turns should be made with the live engine on the inside of the turn and care taken to avoid side slipping at low airspeeds, see Paragraph 24, Part 2.

(c) Keep extra height in hand, if possible, and make the final approach in a glide at 85-90 kts. Rudder trim should be reduced when certain of reaching the landing area.

(d) If necessary, the live engine may be used carefully to regulate the approach.

Single Engine Landing - On Water

9 When landing on water with single engine, follow these instructions:

(a) The floats may be lowered as in a normal circuit.

(b) As for (b), (c) and (d) above.

CRASH LANDING DRILL

General

10 If no suitable water (or land) area is available in the event of a forced landing, it is recommended that the landing be made with both wheels and floats retracted. Use a precautionary "power approach", aiming to touch down with as low an airspeed as possible. All the crew must have their harness securely fastened and extra crew or passengers in "crash" positions (i.e. sitting on flooring facing aft with their backs braced against the bulkheads).

DINGHY DRILL

General

11 In abandoning the aircraft on the water, there will normally be sufficient time for all the passengers and the crew to leave through gun blister (or cargo) doors. The dinghies are usually carried in the bunk or blister compartment and are launched through the gun blisters.

ACTION IN THE EVENT OF FIRE

Engine

12 In the event of an engine fire in flight, the following drill should be carried out:

(a) Close the throttle of the engine on fire.

(b) ~~Instruct the engineer to~~ turn off the fuel.

(c) Feather the propeller.

(d) ~~Instruct the engineer to~~ move the extinguisher selector control to the engine on fire and when the propeller has stopped, pull the CO_2 release control handle.

(e) Close the engine cowl gills.

Fuselage

13 In the event of fire starting in the fuselage, turn off the fuel supply to the heating unit and use the hand fire extinguishers on the fire.

ABANDONING THE AIRCRAFT

In Flight

14 All crew and passengers must use the gun blister (or cargo) doors.

NOTE

Since the cargo doors are NOT designed to be jettisoned, extreme care should be exercised in opening the doors in flight. The doors will probably tear off and may cause damage to the tail plane or injury to personnel.

On Land or Water

15 When the engines are NOT running, abandon aircraft as follows:

Pilots

(a) Through the sliding panel on each side of the cockpit roof.

Radio Operator and Navigator

(b) Through the hatch in the roof on the port side over the navigator's table.

Remainder of Crew and Passengers

(c) Through the gun blister (or cargo) doors.

NOTE

Pilots are warned of the proximity of the propellers to the cockpits. Do NOT use the sliding roof or side windows (except for ventilation) when the engines are running.

PART 4

OPERATING DATA

INTRODUCTION

General

1 The information contained in Part 4 has been taken from existing data only. As further information becomes available, revisions will be issued.

LOADING INSTRUCTIONS AND LIMITATIONS

Take-Off Limits

2 The following are the maximum allowable all-up weights and the conditions applicable to each:

(a) 32,500 - to be used at the discretion of the squadron commander in an operational emergency.

(b) 30,500 - normal maximum permissible all-up weight.

Explanation of Loading Chart, see Figure 4-1

3 Reference should be made to AIR-31-4, Appendix 1, for definitions of the terms used. As each aircraft differs slightly from all other aircraft of the same type, it is necessary to use the weight and balance report of the individual aircraft for determining the CG position after loading.

4 The basic weight and index of the aircraft must be known or determined by weighing the aircraft. The basic weight is equal to the tare weight plus the removable equipment (ladders, radios, fire extinguishers, etc.).

5 The following example is used to demonstrate how to determine the CG position:

ITEM	Wt. (lbs.)	Arm (index)	Moment in.pounds
Basic Weight	20,751	245.2	5,089,228
Pilot & Co-pilot	360	108	38,880
Navigator	180	160	28,800
Radio Operator	180	200	36,000
Flight Engineer	180	255	45,900
Parachutes	100	190	19,000
Tool kits	43	283.3	12,180
Fuel (600 Imp gals.)	4,320	266.2	1,150,000
Oil (75 Imp. gals.)	675	207.4	140,000
Gross	26,789		6,559,988

6 A check against Figure 4-2 shows that the moment falls within the permissible limits for this weight of 6,550,000 and 6,880,000 in. lbs., and therefore the aircraft's centre of gravity is satisfactory for flight.

7 Another method of arriving at the centre of gravity location is to divide the gross moment (6,559,988 in. lbs.) in paragraph 5, Part 4, by the aircraft gross weight (26,789 lbs.) and the Figure of 244.9" is the result. By reference to Figure 4-1, it is seen that this figure is between the CG limits of 244.4" forward and 255.5" aft.

FLYING LIMITATIONS

General

8 The following limitations should be adhered to when flying this aircraft:

(a) Undercarriage down (lever flight) Max. 120 kts IAS.

(b) Diving Speeds - Still Air - Turbulent Air

32,500 lbs.	150 kts.	125 kts.
30,500 lbs.	160 kts.	130 kts.
26,000 lbs.	187 kts.	150 kts.

(should be less if circumstances will permit)

(c) Service ceiling:

30,500 lbs.	- approx. 15,000 ft.
17,000 lbs.	- approx. 20,000 ft.

AIRSPEED POSITION ERROR CORRECTION

PEC Table

9 The corrections for position error are as follows:

70 - 90 kts. IAS	Add 6 kts.
90 - 100 kts. IAS	Add 8 kts.

ENGINE LIMITATIONS

Engine Data, P & W Twin Wasp R1830-92/ SIC3G

10 The principal engine limitations are:

(a) Operating limits:

	RPM	MP "Hg	BHP	Critical Altitude	Mixture	Cylr.	Temp. °C Oil Max.	Temp. °C Oil Min.
Take-off (5 min.)	2700	48	1200	4800	AR	260	100	40
Max. climb cont.	2550	41	1050	7500	AR	232	85	40
Max. level cont.	2550	38	1000	9900	AR	232	85	40
Max. weak cont.	2250	29	700	13000	AL	232	85	40

NOTE

To prevent overboosting under low temperature conditions, reduce the above take-off manifold pressure 1" mp for each 11°C (20°F) of ambient temperature below standard temperature of 15°C (59° F).

(b) Oil pressure - safe operating range:

2550 - 2700 rpm	80 - 100 psi
2000 - 2200 rpm	65 - 100 psi
1600 rpm	55 - 90 psi

Desired (at 2200 rpm, 60°C oil temp.) - 80 - 90 psi idling minimum - 15 psi.

(c) Fuel pressure - Maximum 16 psi
Minimum 14 psi
Idling 7 psi

(d) The maximum permissible rpm is 3060 rpm.

(e) The maximum carburettor air temperature is 38°C but applies only when preheat is used.

FUEL CONSUMPTION

General

11 The following is the approximate fuel consumption in Imperial gallons per hour for the aircraft at 2,000' in AUTO LEAN:

Boost " Hg	RPM 1900	1800	1700	1600
28	64	60	57	54
27	61	58	55	52
26	59	56	53	50
25		53	50	48

12 Additional data is contained below:

(a) Consumption for take-off (per engine) - 135 Imperial gallons.

(b) Consumption for normal climb (per en-

gine - 60 Imperial gallons (average per hour).

(c) Consumption for cruising (per engine) - 32 Imperial gallons (average).

MAXIMUM PERFORMANCE

Climb

13 The speed for maximum rate of climb is 90 kts. IAS to 6,000', then reduce speed by 2 kts. per thousand feet.

Take-Off Distance

14 Take-off distances are as follows:

	Light	Heavy
No wind	2500'	3500-4000'
20 mph wind	2000'	3000-3500'

Landing Distance

15 Leading distances are as follows:

	Light	Heavy
No wind	3000'	3500'
20 mph wind	2500'	3000'

NOTE

These distances could be further reduced in an emergency - power approach, stall landing on end of runway followed by hard application of brakes would reduce run 500-1000'.

CRUISE CONTROL

Maximum Range

16 Maximum range at 30,500 lbs. will be obtained by flying at about 87 kts. IAS. Reduce speed by 5 kts. for each 3500 lbs. reduction in weight.

Use of Cruise Control Table

17 Table 1 gives the normal throttle and rpm settings for two specific BHP requirements at altitudes at standard temperature. The fuel consumption for these settings is also included along with directions for the correction of change of atmospheric temperatures from standard. This table is applicable to cruise control in AUTO LEAN mixture position only.

TABLE 1
CRUISE CONTROL

ENGINE OPERATION - CANSO 2F or 2SR
R-1830-92 ENGINES

TAKE OFF MAX.	- Auto Rich	- 2700 rpm	- 48" Hg. Manifold Pressure
CLIMB	- Auto Rich	- 2325 rpm	- 37" Hg. Manifold Pressure (3,000')
CRUISE	- Auto Lean		

FUEL CONSUMPTION (Gals. per Hr. 2 Engines)		67 Imp./80.5 US		74 Imp./89 US	
ALTITUDE	STANDARD TEMP°C	RPM (550 BHP)	MP	RPM (600 BHP)	MP
0	15	1750	32	1900	32
1000	13	1750	32	1900	32
2000	11	1750	31.5	1900	31.5
2500	10	1750	31.5	1900	31.5
3000	9	1750	31.5	1900	31.5
4000	7	1750	31.0	1900	31.0
5000	5	1750	31.0	1900	31.0
6000	3	1750	31.0	1900	31.0
7000	1	1750	30.5	1900	30.5
7500	0	1750	30.5	1900	30.5
8000	-1	1750	30.5	1900	30.5

TABLE 1 (Cont'd)

FUEL CONSUMPTION (Gals. per Hr. 2 Engines)		67 Imp./80.5 US		74 Imp./89 US	
ALTITUDE	STANDARD TEMP°C	RPM (550 BHP)	MP	RPM (600 BHP)	MP
9000	-3	1770	29.5	1900	30.0
10000	-5	1800	29.0	1920	30.0
11000	-7	1850	28.0	1950	29.0
12000	-9	1900	27.5	2000	28.5
12500	-10	1900	27.5	2000	28.0
13000	-11	1950	27.0	2050	27.5
14000	-13	2000	26.0	2100	27.0
15000	-15	2050	25.5	2150	26.5
% RATED BHP (ABOVE CALCULATIONS WITHOUT RAM)		52.5%		57%	

CORRECTION FOR CARBURETTOR AIR VARIATION FROM STANDARD TEMPERATURE

	PART THROTTLE	FULL THROTTLE
Carb. Air Above Standard	Add 0.5" Man. pressure for each 10°C above Std.	All 25 RPM for each 10°C above Std.
Carb. Air Below Standard	Subtract 0.5" Man. pressure for each 10°C below Std.	Subtract 25 RPM for each 10°C below Std.

NOTE

This table is prepared for the guidance of pilots who do not wish to use engine curves to determining engine settings.

Either this Table or P & W Engine Curve T1680-11 should be used to determine engine settings, see Figure 4-3.

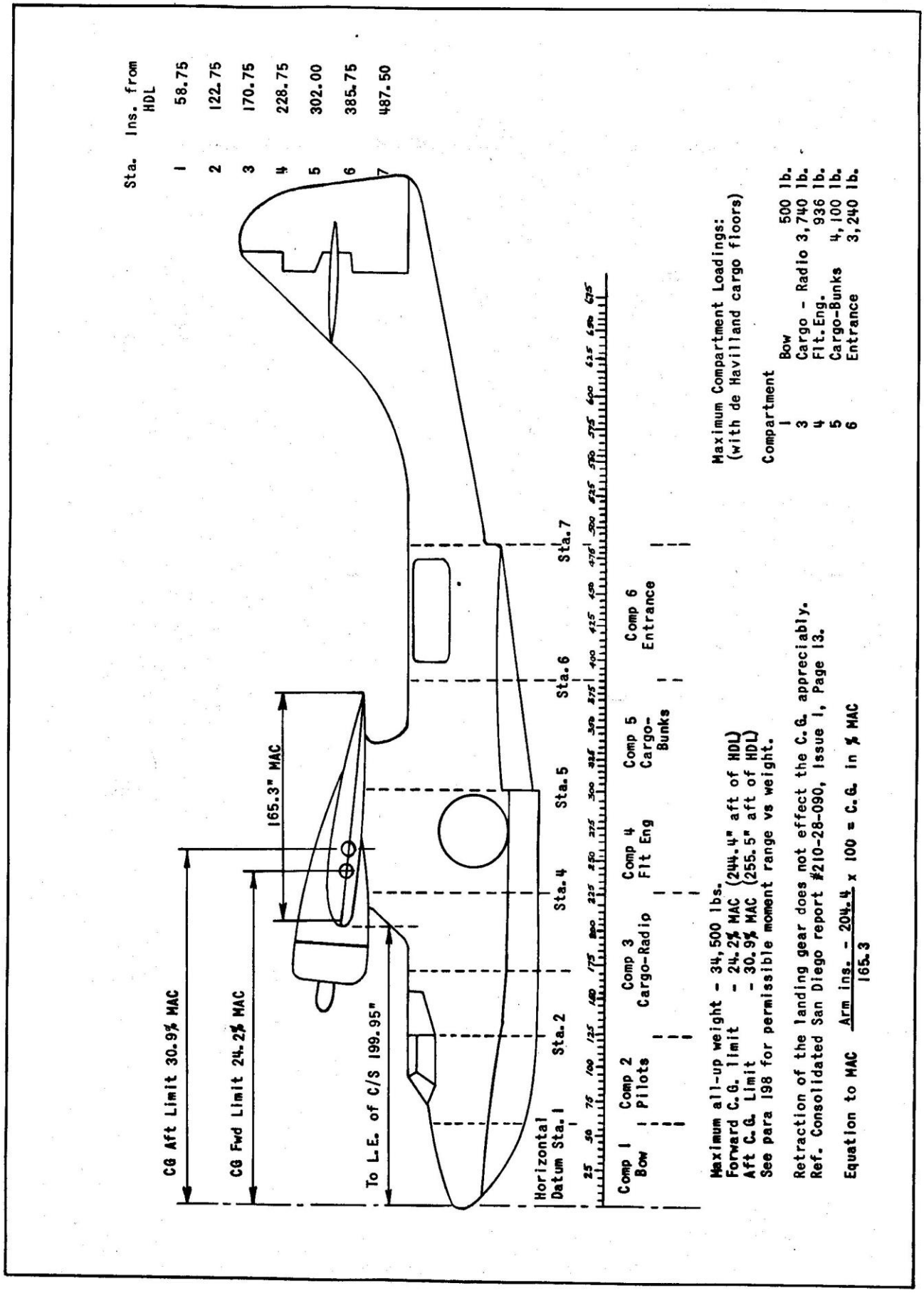


Figure 4-1 Canso Sectional and Loading Chart

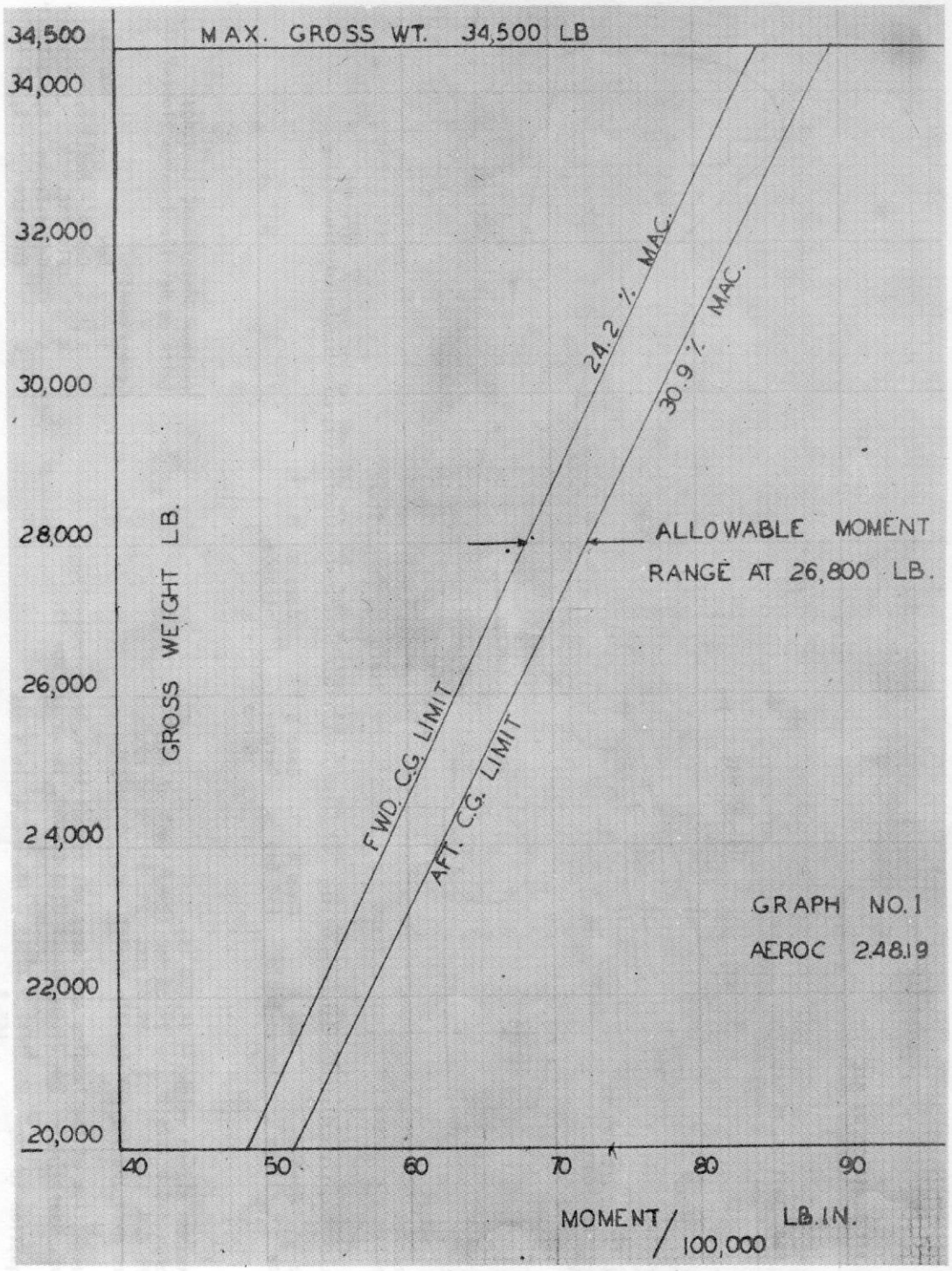


Figure 4-2 Permissible Moment Range vs Weight

EO 05-60A-1

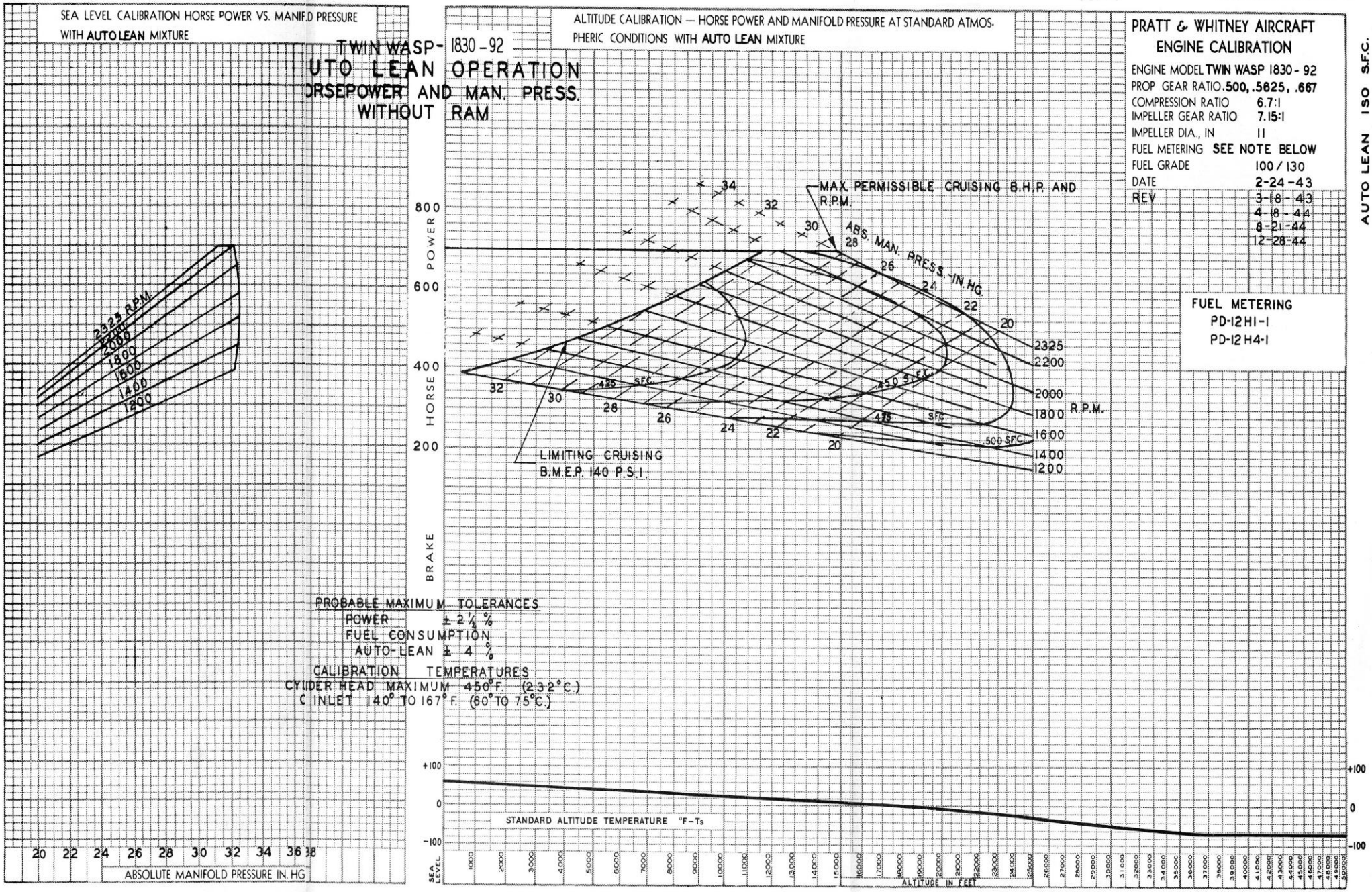


Figure 4-3

PART 5

SPECIAL INSTALLATIONS - JATO

INTRODUCTION

General

1 The procedures and data hereunder have been taken from USAF TO 01-5MD-10 - Installation of Jato Attachment Kit - 0A-10 and 0A-10A dated 1 Aug 46. These data are subject to further tests and revisions by the RCAF and are to be read in conjunction with the following RCAF EOs:

(a) EO 30-100FC-2 - Description and Maintenance - JATO Rocket Motor 14-AS-1000 D-4 and D-5.

(b) EO 30-100FC-10 - Demarcation of Responsibilities.

INSTALLATION

Location

2 The JATO motor attachment fittings are located two to a side on the fuselage of the aircraft just forward of the main entrance way. The individual bottle releases are on the interior walls of the aircraft immediately forward of the bulkhead between the entrance and freight compartments.

Internal Stowage

3 Provision is made for the vertical stowage of 4 JATO motors inside the aircraft. When on detached operations, the pilot should ensure that JATO motors are stored where the air temperature is within the permissible limits, see EO 30-100FC-2.

Firing Circuit

4 The JATO control box is mounted on the flying control yoke beside the engine ignition switches. The control box consists of a master switch and two selector switches which enable the motors to be fired in pairs. When the master switch is turned ON, a red warning light on the control box also comes on. The pilot's firing button is mounted on the port side of the first pilot's control wheel.

TAKE-OFF PROCEDURE

General

5 The four JATO bottles are to be mounted on the aircraft in accordance with the instructions laid down in EO 30-100FC-2. Pilots are to consult Figure 5-1, JATO Firing Chart, for recommended firing times during take-off.

Use of JATO Firing Chart

6 In general, the most help is gained from the JATO units when two are fired to bring the aircraft up on the step and the remaining two are fired so as to leave about two seconds jet assistance left over in the air. The chart is designed to give this result. A considerable overlap of the thrust will exist at low gross weights and high winds. The time given in the charts should be counted from the time when the engines reach full take-off manifold pressure. It is recommended that the second set of JATO units be fired by air-speed indications, and this figure is given on the charts where applicable. The gross weight shown on the take-off chart does not include the gross weight of the units being used during that particular take-off. Pilots will therefore subtract the weight of the JATO units installed from the gross weight of the aircraft to arrive at the correct weight to be used with the chart.

Performance

7 It has been found that normal take-off time is reduced by more than 75% with the employment of four JATO units. Flying characteristics are not changed by the use of JATO. There is an obvious increase of power when the JATO units are applied. The slight stiffening of the controls, because of the rapidly

increased airspeed, is normal for any aircraft during take-off. The only noticeable change when taking off the four unit equipped aircraft rather than the standard aircraft is an increase in acceleration and a tendency for take-off events to occur more rapidly.

Take-Off

8 Proceed as follows:

(a) On entering cockpit, see that all JATO switches are OFF.

(b) Check circuit for continuity. Leave switch OFF.

(c) Check with crew that igniter leads are connected before leaving beach or before boarding boat leaves.

(d) Check wind, gross weights and sea condition and ascertain correct firing time for JATO units.

(e) Select JATO unit to be fired first and place master switch ON.

(f) After full manifold pressure is reached, fire the first units after the designated lapsed time. It may be desirable to have the co-pilot signal the correct firing time.

(g) Release button when thrust is felt and select second JATO unit ON.

(h) Fire the second set of units according to the chart.

(j) Upon completion of take-off, place all JATO switches OFF and inform crew to drop expended JATO units if considered advantageous.

NOTE

JATO motors will always be fired on take-off when installed, and will not be carried as a standby source of power to be used only in the event of engine failure.

Take-Off Precautions

9 The best take-off time will result when the aircraft is pulled off the water as early as possible and then immediately levelled off to use the remaining thrust to build up speed. Pilots should note that there is approximately one second delay before the JATO units come up to full thrust. This should be allowed for when attempting to use the thrust in emergencies.

Handling after Use

10 If an immediate landing is executed, the following cautions must be exercised when detaching the fired JATO motor:

(a) Consider the nozzle and aft region of the chamber body to be at 371°C. (700°F.).

(b) In the event of a safety diaphragm "blow-out", do not attempt to detach the motor from the aircraft until it has ceased emanating smoke from the safety cap ports and nozzle, and cools off.

WEIGHT AND BALANCE

General

11 The following weight data are figured on the basis of four loaded JATO units installed on the aircraft:

(a) Basic weight of loaded units - 804 lbs.

(b) Basic moment-arm - 375" from datum.

(c) Basic moment (loaded units) - 301,500 inch-pounds.

(d) Basic weight of expended units - 484 lbs.

(e) Basic moment(expended units) - 181,500 inch-pounds.

KNOTS WIND		GROSS WEIGHT						
		24000	26000	28000	30000	32000	34000	36000
0	1st Firing Seconds	0	0	0	3	8	10	12
	2nd Firing Secs. / Knots	6 / -	8 / -	11 / 40	15 / 45	20 / 48	29 / 50	41 / 54
5	1st Firing Seconds	0	0	0	1	5	8	10
	2nd Firing Secs. / Knots	4 / -	7 / -	9 / 39	13 / 44	17 / 47	25 / 49	36 / 53
10	1st Firing Seconds	2	0	0	0	3	7	9
	2nd Firing Secs. / Knots	2 / -	5 / -	7 / -	10 / 43	15 / 46	21 / 48	31 / 52
15	1st Firing Seconds	1	0	0	0	0	6	8
	2nd Firing Secs. / Knots	1 / -	3 / -	5 / -	8 / 42	12 / 45	18 / 47	27 / 50
20	1st Firing Seconds	0	2	0	0	0	2	7
	2nd Firing Secs. / Knots	0 / -	2 / -	3 / -	6 / -	9 / 44	14 / 46	22 / 49
25	1st Firing Seconds	0	0	2	0	0	0	6
	2nd Firing Secs. / Knots	0 / -	0 / -	2 / -	4 / -	7 / -	12 / 45	18 / 48
30	1st Firing Seconds	0	0	1	2	0	0	2
	2nd Firing Secs. / Knots	0 / -	0 / -	1 / -	2 / -	5 / -	9 / 44	14 / 47
35	1st Firing Seconds	0	0	0	1	0	0	0
	2nd Firing Secs. / Knots	0 / -	0 / -	0 / -	1 / -	4 / -	7 / 43	12 / 46

Figure 5-1 Jato Firing Chart - Canso 2

NOTE

First firing is done the number of seconds after engines are up to full manifold pressure.

Second firing is done the number of seconds after engines are up to full manifold pressure or the number of knots airspeed whichever comes first. Airspeed is given only for cases where the results will be more accurate using them.