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PILOT'S FLIGHT OPERATING INSTRUCTIONS

FOR

ARMY MODEL
B-25H

NAVY MODEL
PBJ-1H

AIRPLANES

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LIST OF REVISED PAGES ISSUED

NOTE: A heavy black vertical line, to the left of the text on revised pages, indicates the extent of the revision. This line is omitted where more than 50 percent of the page is revised.

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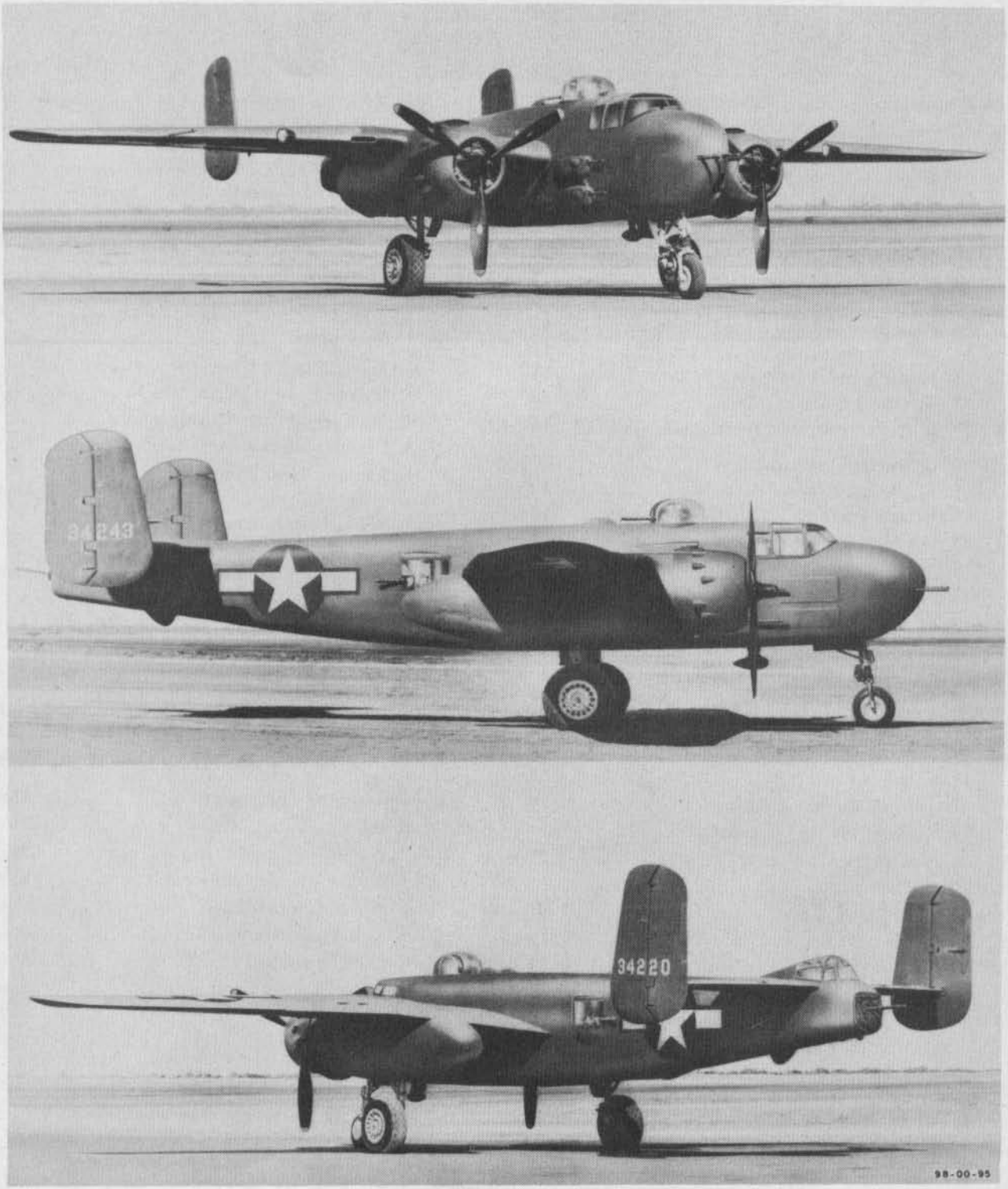

Figure 1—Three Views of Airplane

SECTION I
DESCRIPTION

1. GENERAL.

The North American B-25H medium bombardment airplane is a mid-wing land monoplane powered by two Wright Cyclone R-2600-13 or -29 engines. It has a wing span of 67 feet 7 inches, a length of 51 feet 3¾ inches, and a height of 16 feet 4 3/16 inches. Characteristic features are a tricycle landing gear and a double fin and rudder empennage. B-25H-1 airplanes are equipped with a 75-mm cannon and twelve .50-caliber machine guns. B-25H-5 and subsequent airplanes carry a 75-mm cannon and fourteen .50-caliber machine guns. The airplane is equipped to carry bombs or depth charges, and provisions may be made to carry a torpedo.

2. BLOCK NUMBERING SYSTEM.

To clarify the relationship between the various groups of serial numbers used on B-25H airplanes, the following block numbering system has been adopted:

Block Number	*Serial Numbers Included*
B-25H-1-NA	AF43-4105 to 4404
B-25H-5-NA	AF43-4405 to 4704
B-25H-10-NA	AF43-4705 to 5104

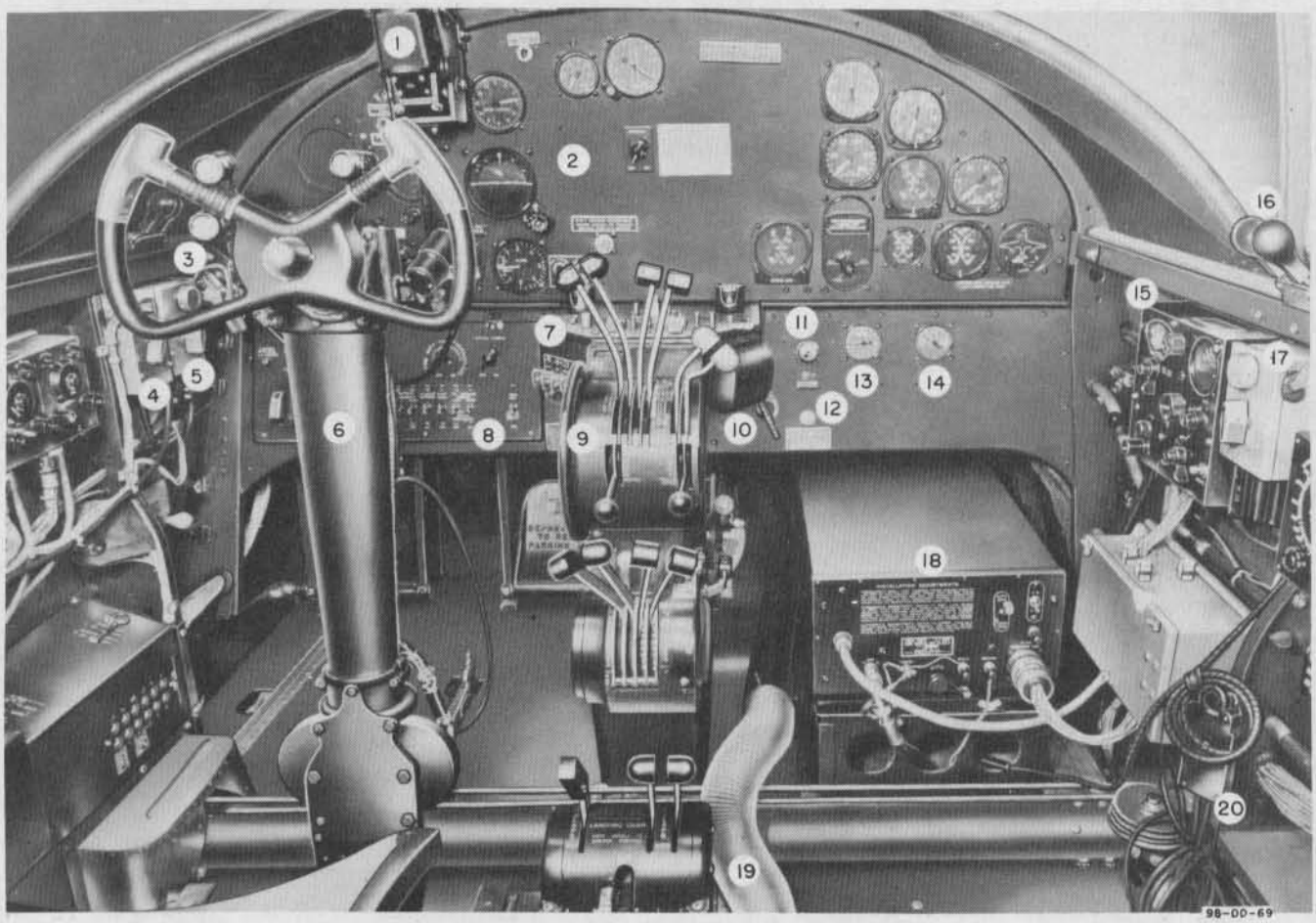

Figure 2—Pilot's Compartment—Front View

KEY TO FIGURE 2

1. Gun Sight
2. Instrument Panel
3. Surface De-Icer Control
4. Filter Switch Box
5. Interphone Jack Box
6. Control Column
7. Control Pedestal Switch Panel
8. Pilot's Switch Panel
9. Pilot's Control Pedestal
10. Parking Brake Handle
11. Extension Light
12. Defroster Control
13. Hydraulic System Pressure Gage
14. Brake System Pressure Gage
15. Radio Compass Controls
16. Sliding Window Handle
17. Interphone Jack Box
18. Radio Compass Unit
19. Flexible Defroster Tube
20. Throat Microphone Switch

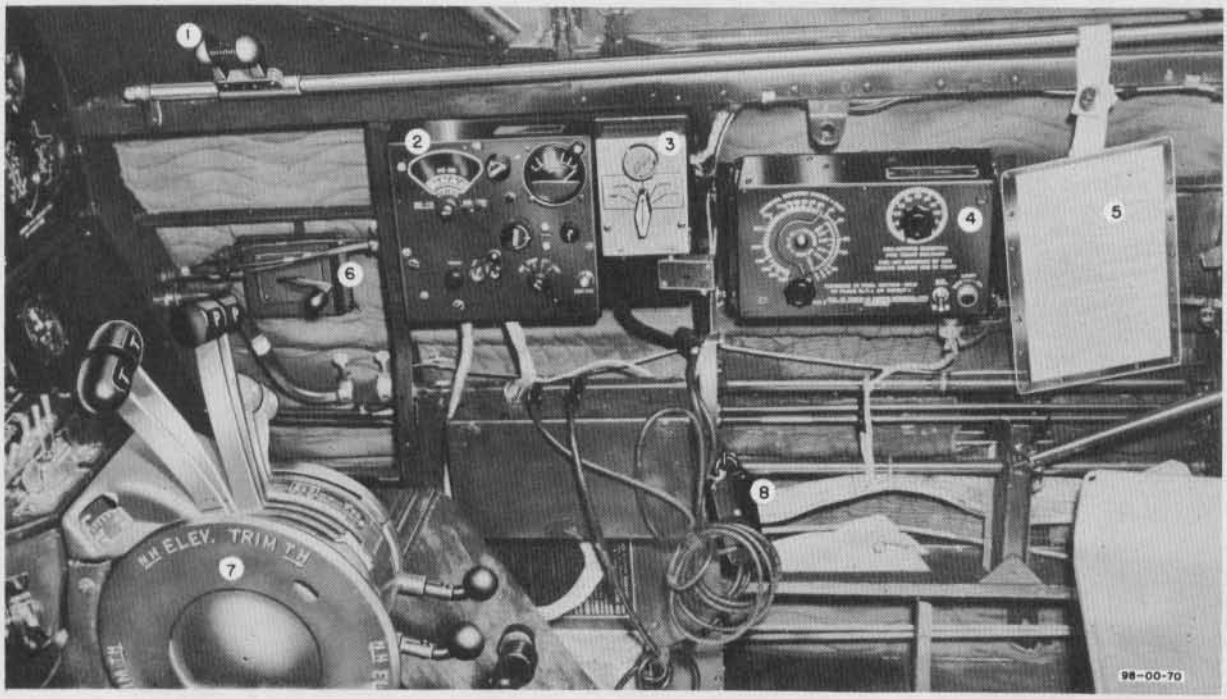

Figure 3—Pilot's Compartment—Right Side

KEY TO FIGURE 3

1. Sliding Window Handle
2. Radio Compass Controls
3. Interphone Jack Box
4. Bomb Release Interval Control
5. Pilot's Check List
6. Fresh Air Ventilator
7. Elevator Trim Tab Control Wheel
8. Throat Microphone Switch

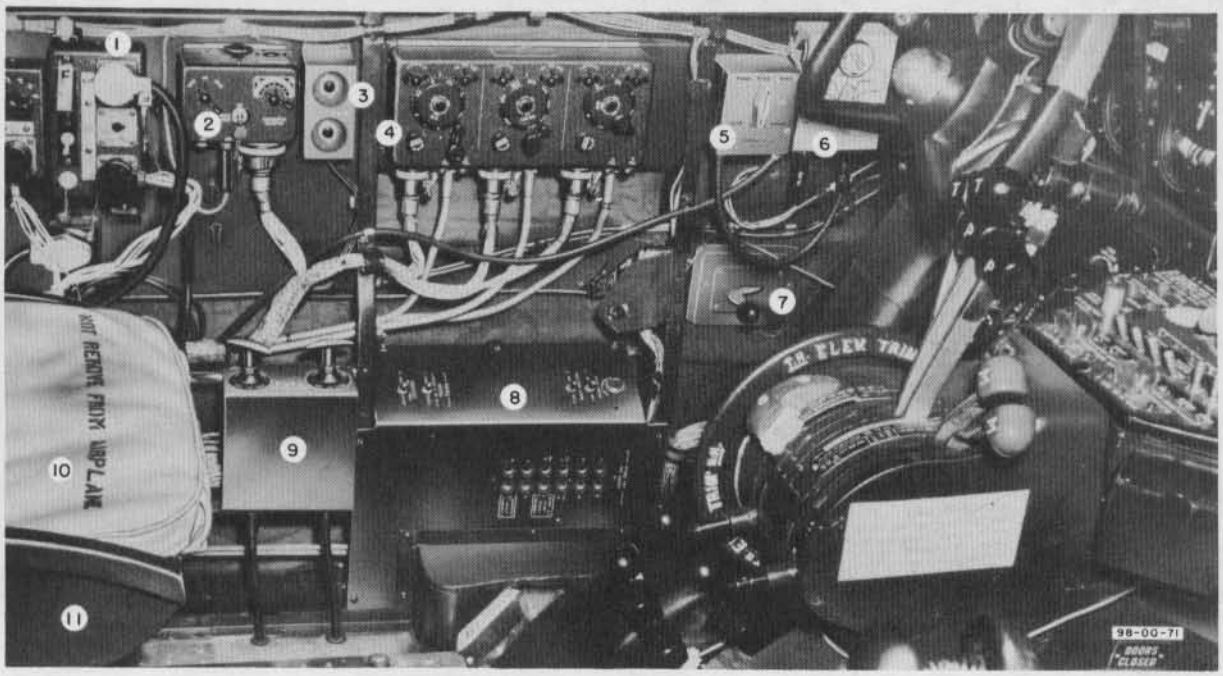

Figure 4—Pilot's Compartment—Left Side

KEY TO FIGURE 4

1. SCR-695 Controls
2. Transmitter Selector Controls
3. Detonator Switches
4. SCR-274 Controls
5. Filter Switch Box
6. Interphone Jack Box
7. Fresh Air Ventilator
8. Guns and Bomb Control Panel
9. Fuel Shut-Off Controls
10. Cushion
11. Pilot's Seat

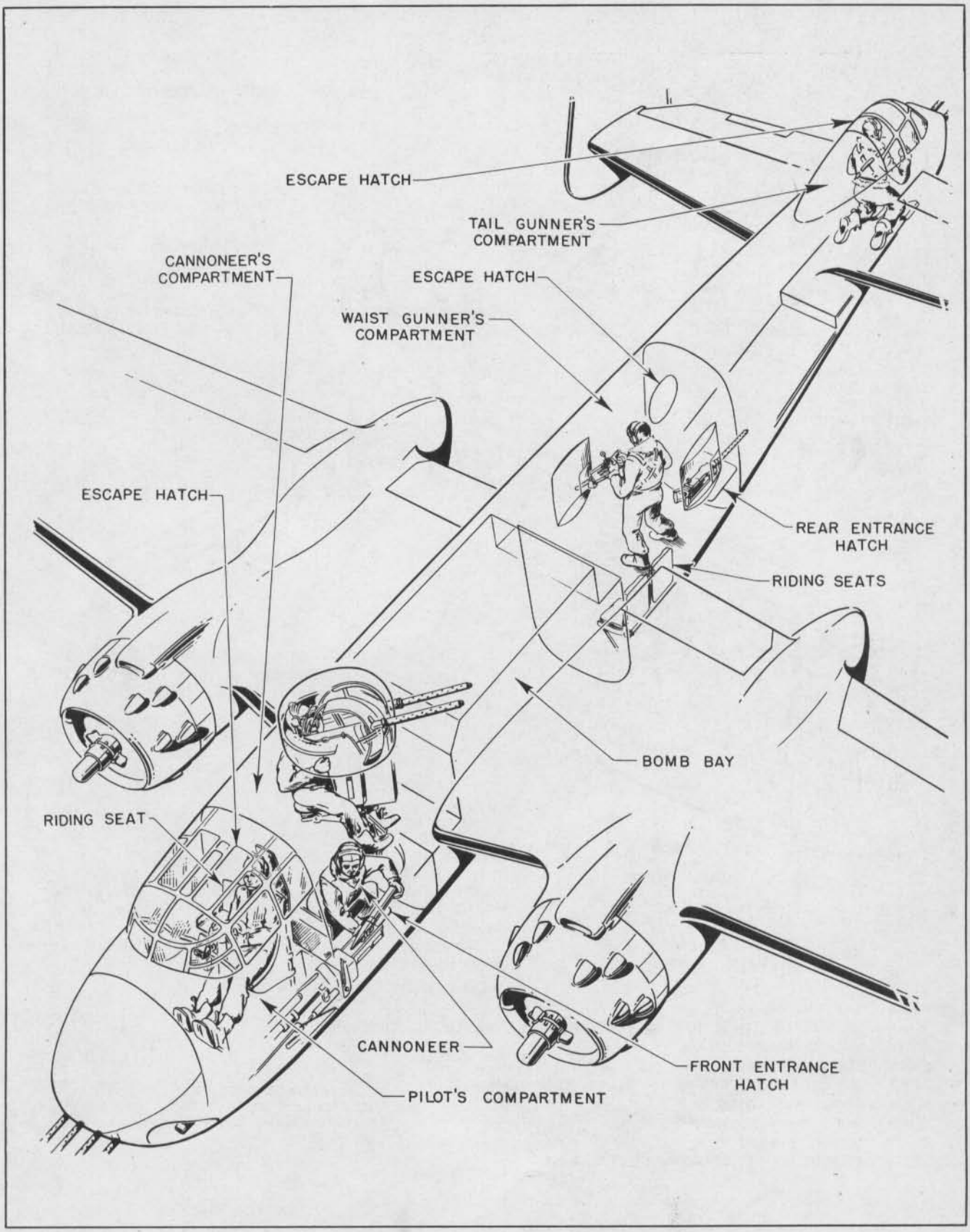

Figure 5—Fuselage Arrangement

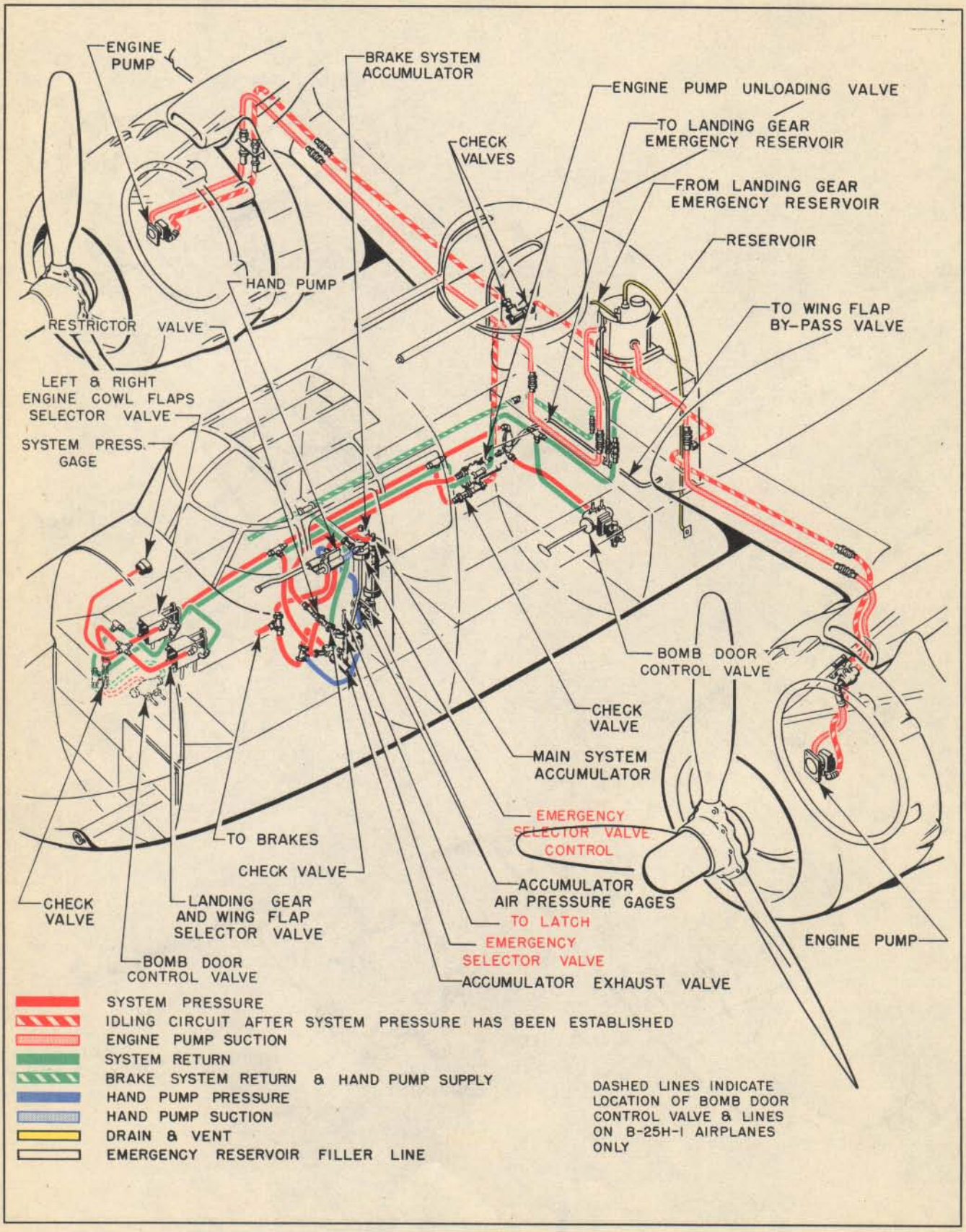

Figure 6—Hydraulic Power System

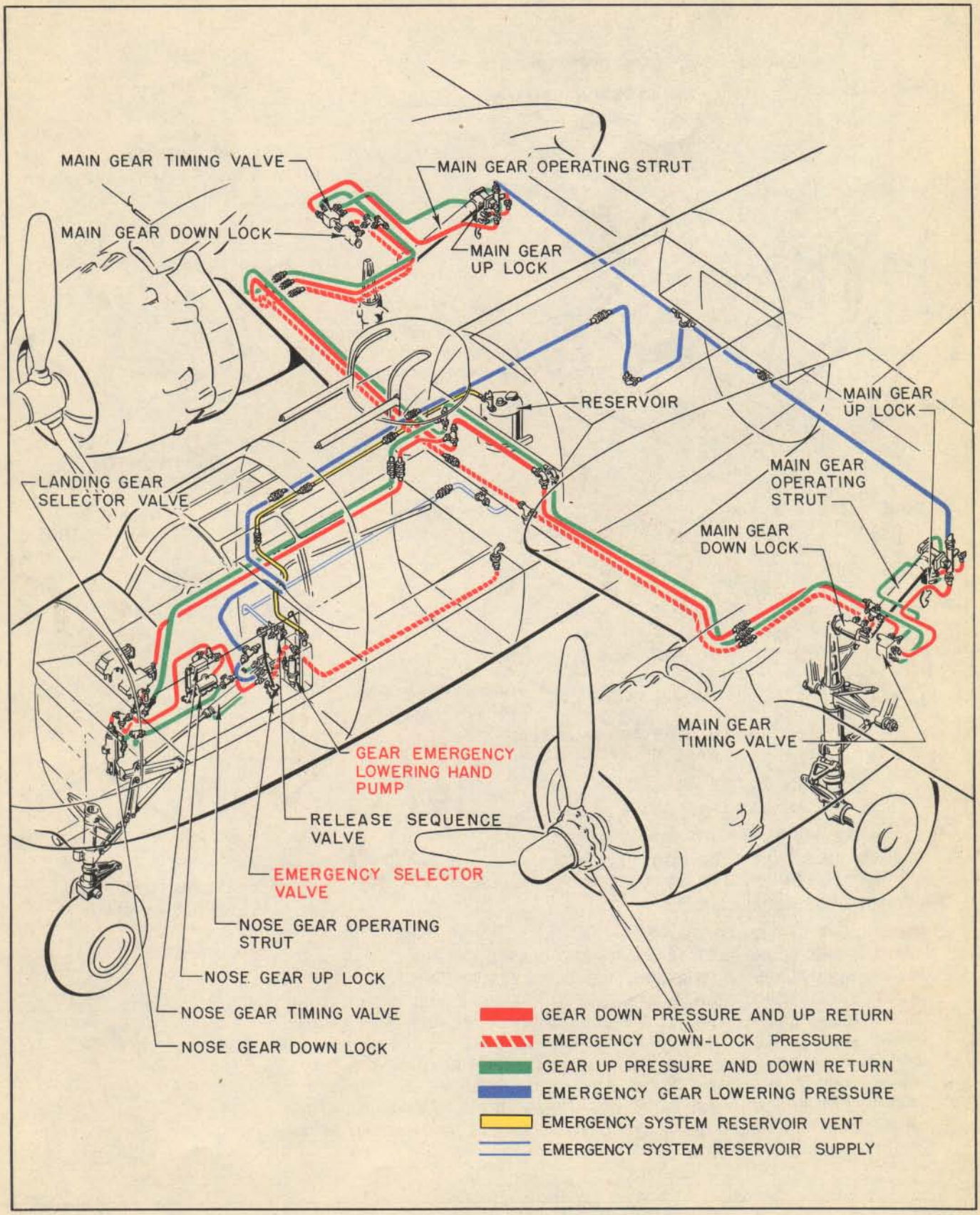

Figure 7—Hydraulic Landing Gear System

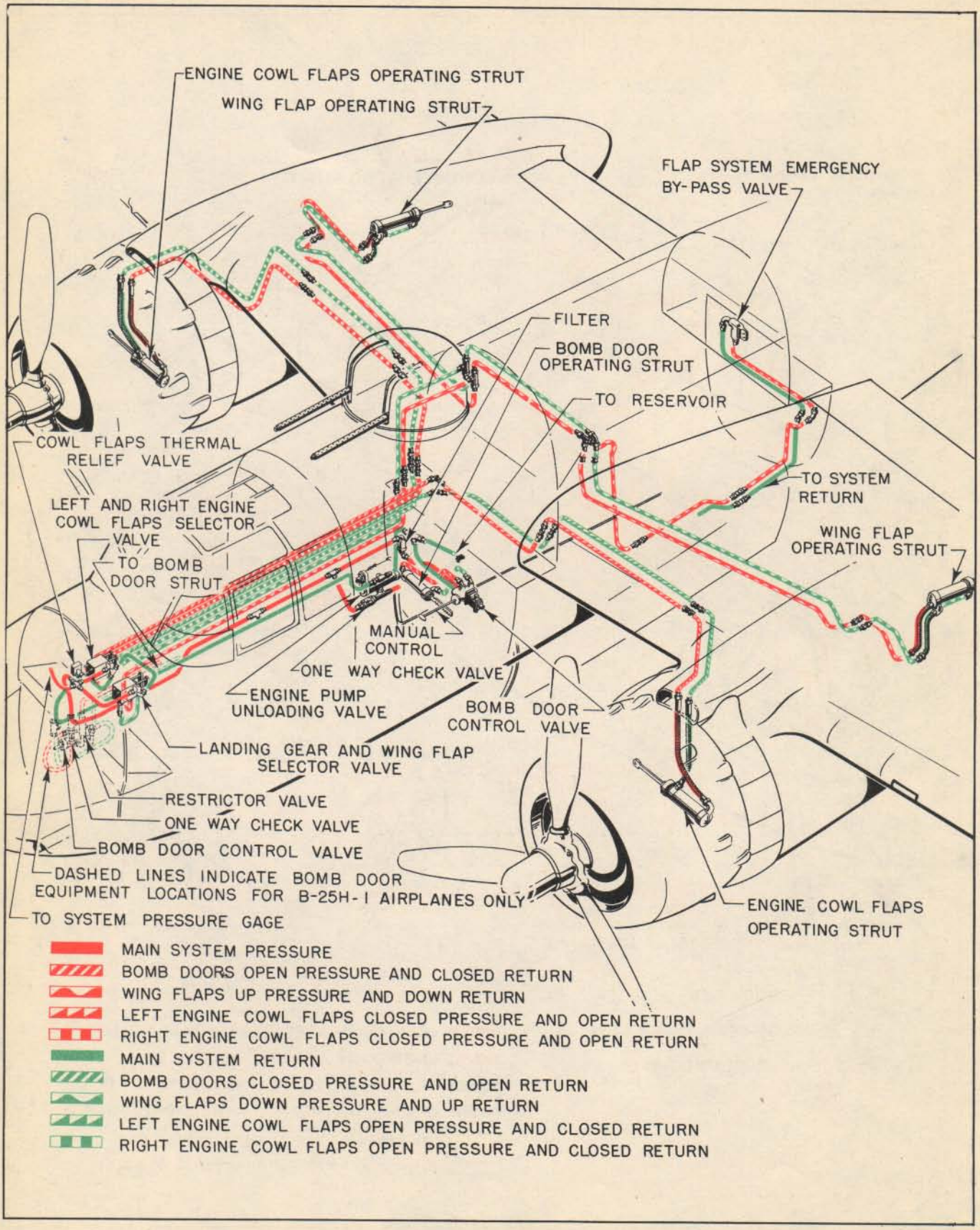

Figure 8—Hydraulic System—Wing Flaps, Cowl Flaps, and Bomb Doors

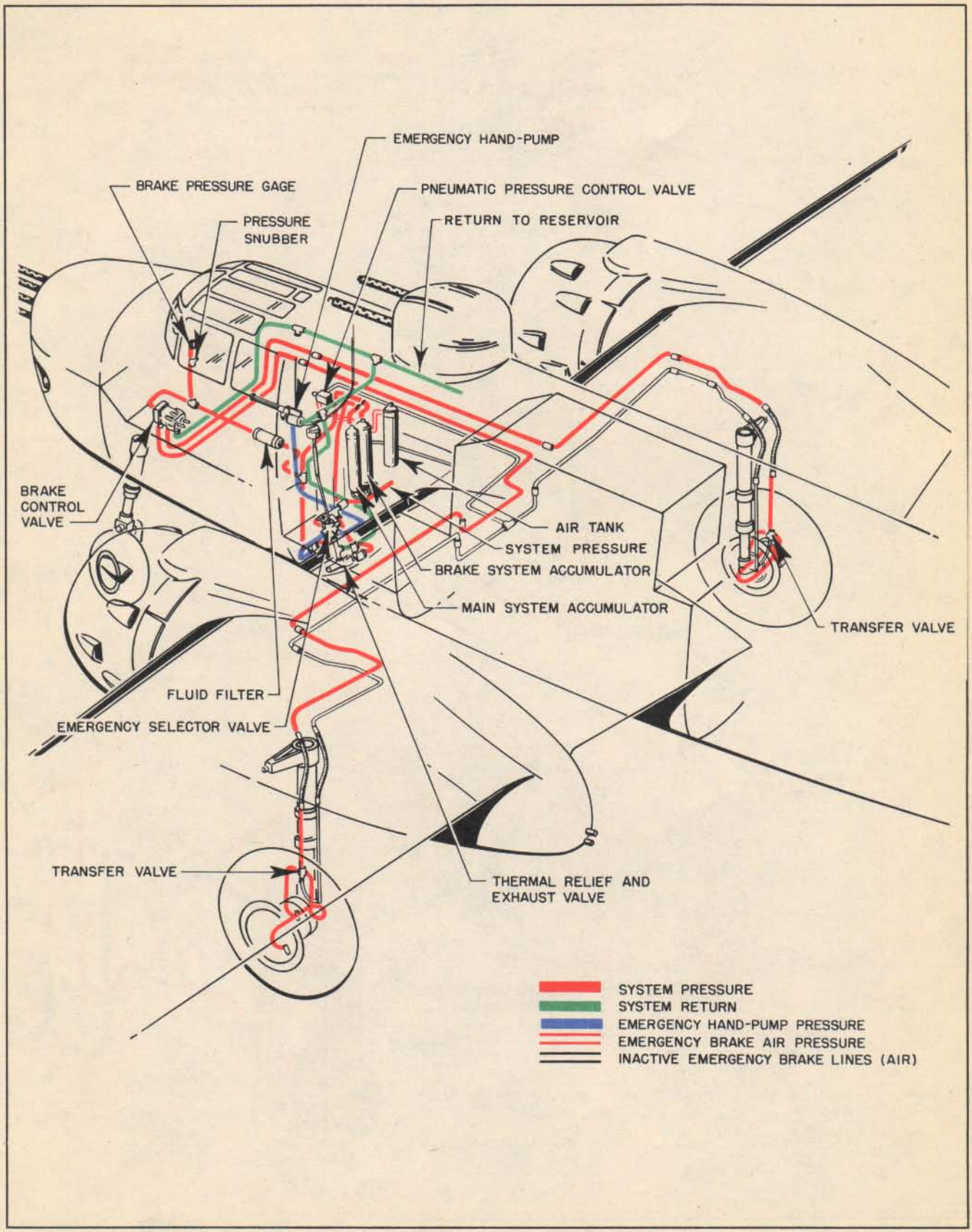

Figure 9—Hydraulic Brake System

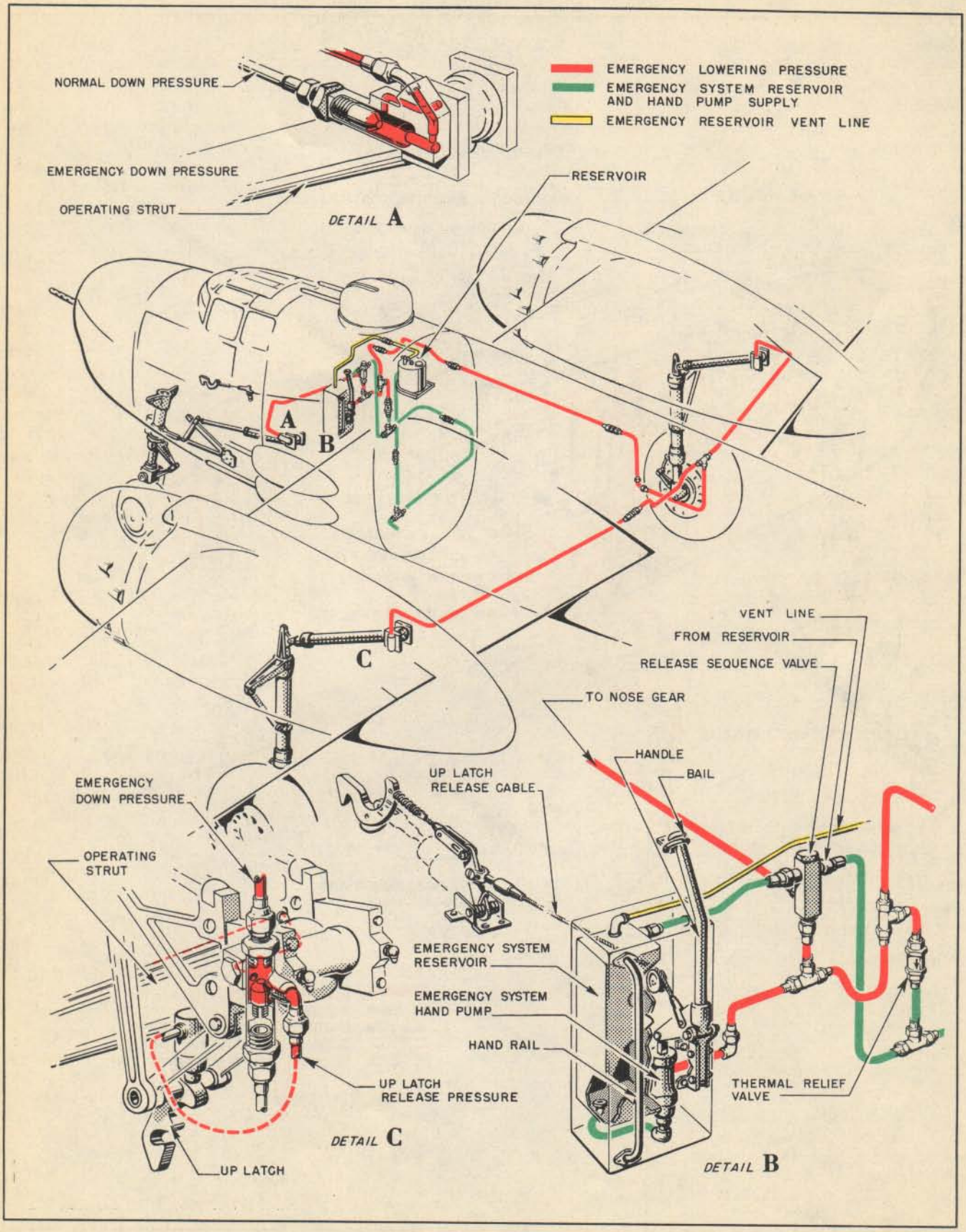

Figure 10—Landing Gear Hydraulic Emergency Lowering System

3. DUTIES OF CREW MEMBERS.

In addition to flying the airplane, the pilot fires the cannon and the forward fixed guns, releases the bombs, and operates the command and identification radios. The navigator-cannoneer navigates the airplane, operates the radio sending key, and loads the cannon. The upper turret gunner is also flight engineer. In addition to firing the waist guns, the waist gunner operates the photography equipment, and the liaison radio on B-25H-10 and subsequent airplanes only. The tail gunner operates the rear turret. See figure 5 for fuselage arrangement.

4. FLIGHT SURFACES.

The rudders, elevators, and ailerons are controlled by duplicate cable systems; thus, the loss of any one control cable will not seriously cripple the airplane. The rudders and ailerons are equipped with combination booster and controllable trim tabs. The elevators have controllable trim tabs which are set for no boost. A bungee installed in the elevator control system reduces stick loads. A locking system affecting all of the control surfaces simultaneously is controlled by a handle on the floor in front of the control column.

5. LANDING GEAR.

a. GENERAL.—The landing gear is hydraulically operated. The main gear retracts into the engine nacelles, and the nose gear into the fuselage. Doors cover the gear openings in both the retracted and extended positions.

b. NOSE GEAR.—The swivel-type nose gear strut incorporates a centering device which operates when the strut is fully extended (wheel off ground). A hydraulic shimmy damper on the strut resists side loads occurring in taxiing, take-off, and landing, thus preventing a sudden movement of the wheel. The nose wheel may be released from the shimmy damper for towing purposes.

6. WHEELS AND BRAKES.

The wheels are of the smooth-contour type. The nose wheel tire is equipped with a dual-seal inner tube for protection against a blowout or puncture. The main wheels are equipped with dual multiple-disc hydraulic brakes. An air brake system is provided for use in the event of a complete hydraulic failure.

7. HYDRAULICS.

a. NORMAL.—A single high-pressure hydraulic system operates the tricycle landing gear, wing flaps, engine cowl flaps, bomb bay doors, and brakes. If one of the engine-driven hydraulic pumps fails, the other will provide sufficient pressure for the operation of the hydraulic system.

b. EMERGENCY.—An emergency hydraulic system, with hand-pump and selector valve located to the right of the pilot's seat, permits operation of the system even though both engine-driven pumps fail, or, with the airplane on the ground and the engines inoperative. A separate hydraulic system provides for the emergency lowering of the landing gear in the event of complete failure of the general system, with loss of fluid. Emergency mechanical systems are provided for the operation of the wing flaps and bomb bay doors. A small reserve of fluid is retained under pressure in the accumulator for use if the engine pumps fail. This reserve is not adequate for complete raising or lowering of the landing gear, but is sufficient for a one-way operation of the wing flaps, engine cowl flaps, or the bomb bay doors. The brake accumulator retains sufficient pressure for approximately three brake pedal applications (both wheels) even though both engine pumps should fail.

8. POWER PLANT.

a. ENGINES.—The airplane is powered by two Wright R-2600-13 or R-2600-29 air-cooled, 14-cylinder engines. Low gear supercharger ratio is 7.06:1 and high gear ratio is 10.06:1. The propeller gear ratio is 16:9. Engine equipment includes a Holley carburetor incorporating an electric primer valve. Individual, flame-damping exhaust stacks reduce glare during night flying. Use fuel conforming to Specification No. AN-F-28, 100 octane. Under certain conditions when the airplane is within the continental United States, Specification No. AN-F-26, Grade 91 fuel should be used (see T. O. 02-1-38). Use oil conforming to Specification No. AN-VV-O-446a, Grade 1120.

b. ENGINE RATINGS.

Ratings	*Brake HP*	*RPM*	*Blower*
Sea Level	1500	2400	Low
Take-off	1700	2600	Low
Normal	1500	2400 at 6,700 ft.	Low
	1350	2400 at 13,000 ft.	High
Military	1700	2600 at 5,500 ft.	Low
	1450	2600 at 13,500 ft.	High

c. CARBURETOR AIR.—The carburetor air induction system control lever has two positions, NORMAL and ICING. Each air scoop is equipped with a filter which may be replaced by a baffle when necessary.

Note

Unfortunately, the impression exists among some mechanics and pilots that the carburetor air filter causes a serious loss in airplane performance. The effect of installing a filter is merely equivalent to closing the throttle slightly. This means that for all altitudes less than critical, where manifold pressure limits prevent full throttle opening, the filter has no effect at all on engine power output or airplane performance. Manifold pressure affords the best indication of engine power, and at a given manifold pressure the engine will develop the same power regardless of whether or not a filter is installed. The only time that airplane performance would benefit from removal of the filter is when the throttle is full open and still more manifold pressure would be permissible. When the filter is installed, only cold ram air passes through the filter element. Heated air will not be filtered.

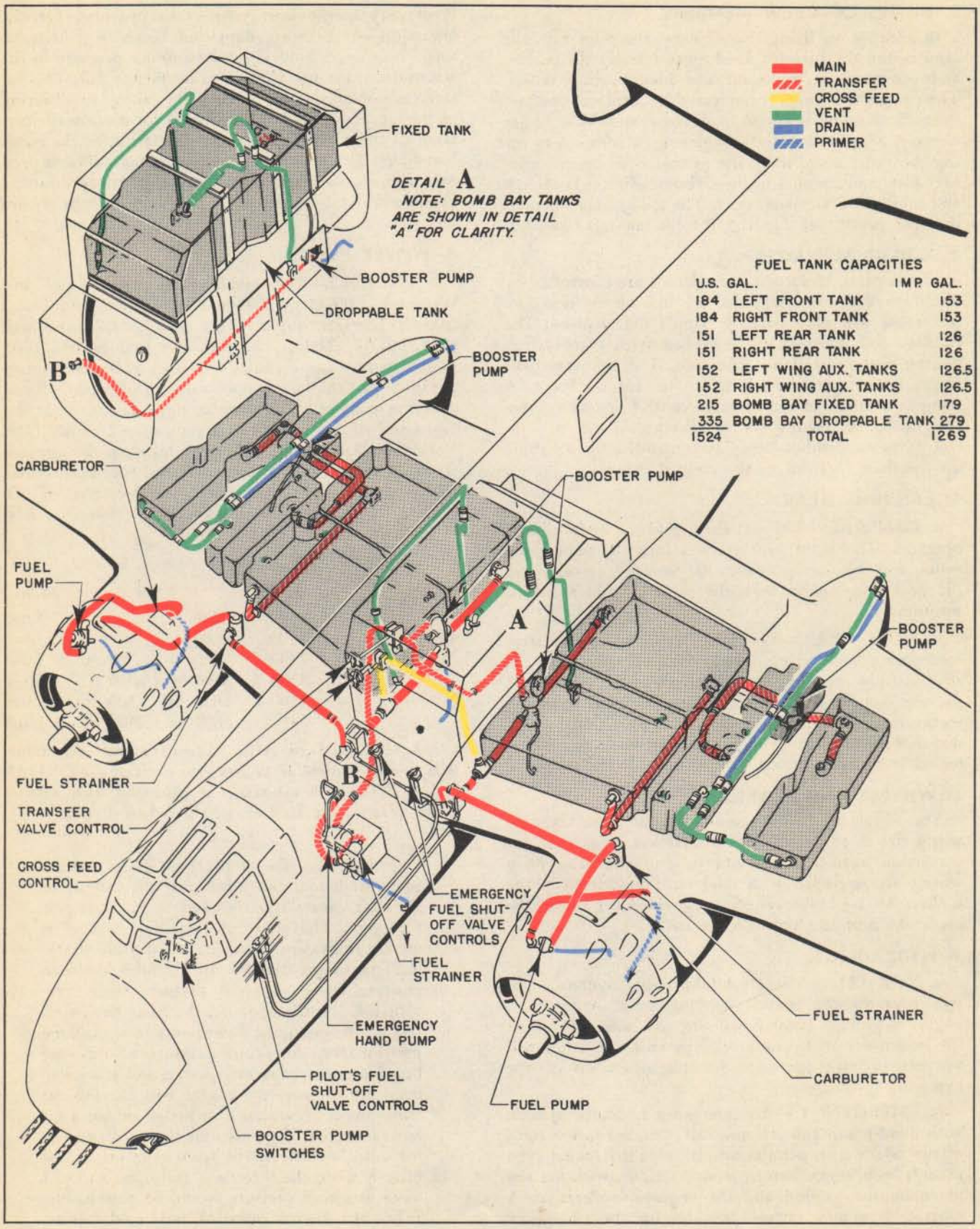

Figure 11—Fuel System

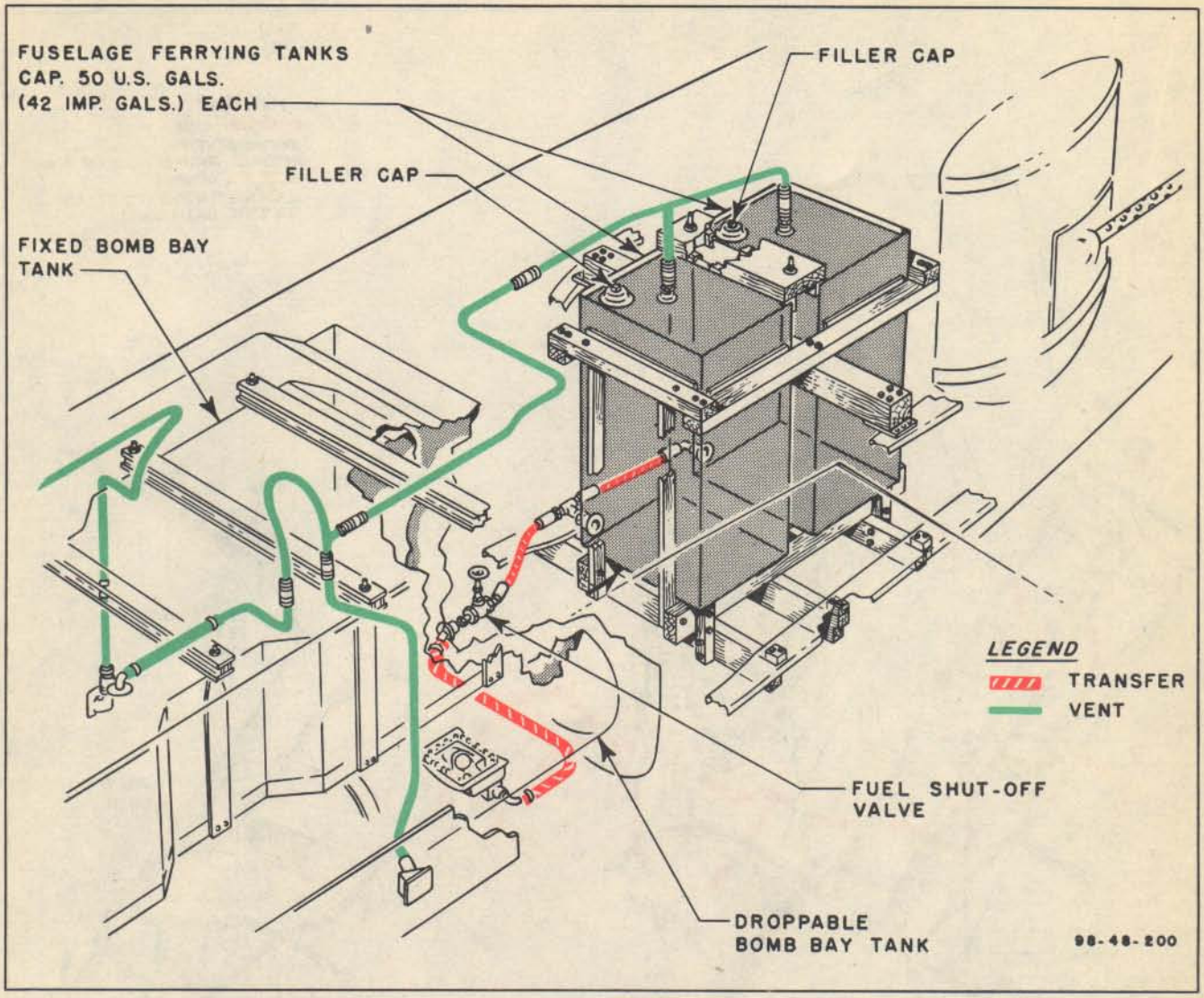

Figure 12—Auxiliary Fuselage Ferrying Tanks

d. PROPELLER.—The Hamilton Standard hydromatic, full-feathering propellers have a blade diameter of 12 feet 7 inches and are controlled by double-capacity governors which are set by means of levers on the pilot's control pedestal. The electrically driven feathering pumps are controlled by two push buttons on the control pedestal switch panel. Propeller pitch settings are 22 degrees low and 90 degrees high.

9. FUEL SYSTEM.

a. GENERAL.—An independent fuel system is provided for each engine. The main fuel supply is carried in four large self-sealing wing tanks, two located in each wing center section between the fuselage and the engine nacelle. The auxiliary fuel supply consists of six smaller self-sealing tanks installed in groups of three in each wing center section outboard of the main fuel tanks, and a self-sealing tank in the upper portion of the bomb bay. A droppable metal tank may be installed in the bomb bay beneath the upper tank when no bombs are to be carried. The fuel flow is from the main tank, through a booster pump to a fuel strainer, then to the engine-driven fuel pump which delivers the fuel to the carburetor. Fuel transfer and fuel cross-feed systems are installed. The priming system is electrically operated. All transfer and main feed lines are of the self-sealing type. For long-range ferrying flights, two metal tanks may be installed in the waist gunner's compartment.

b. CROSS-FEED SYSTEM.—The cross-feed fuel system comprises a fuel line connecting the two main feed lines which serve the respective engines, a valve in this cross-connecting line, and two check valves. The two check valves are located in the fuel line leading to the shut-off valve, one on either side of the bomb bay forward of the fuel booster pump. These check valves are connected by the cross-feed fuel line, which is carried across the top forward end of the bomb bay. The cross-feed valve is mounted in the upper right-hand corner

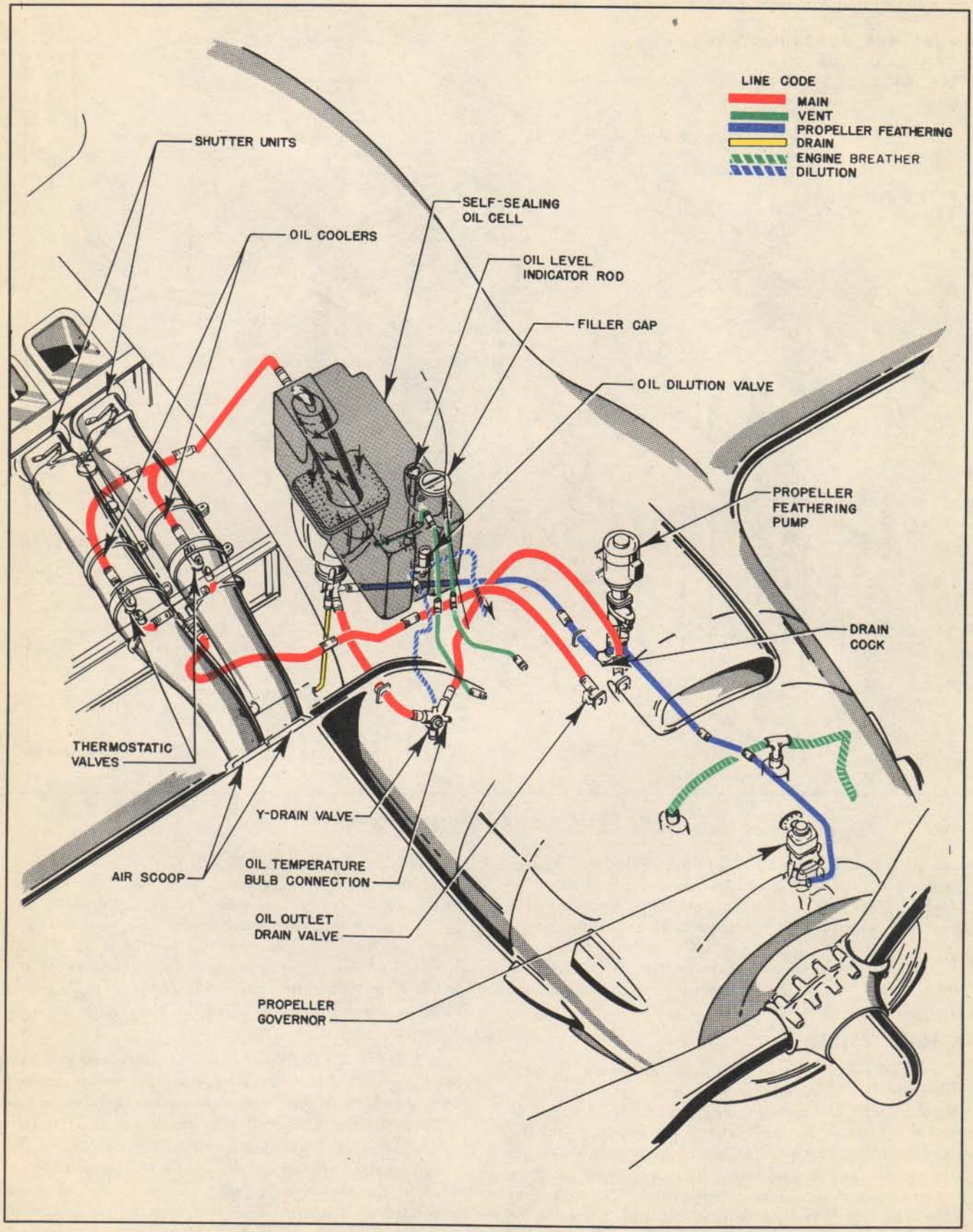

Figure 13—Oil System

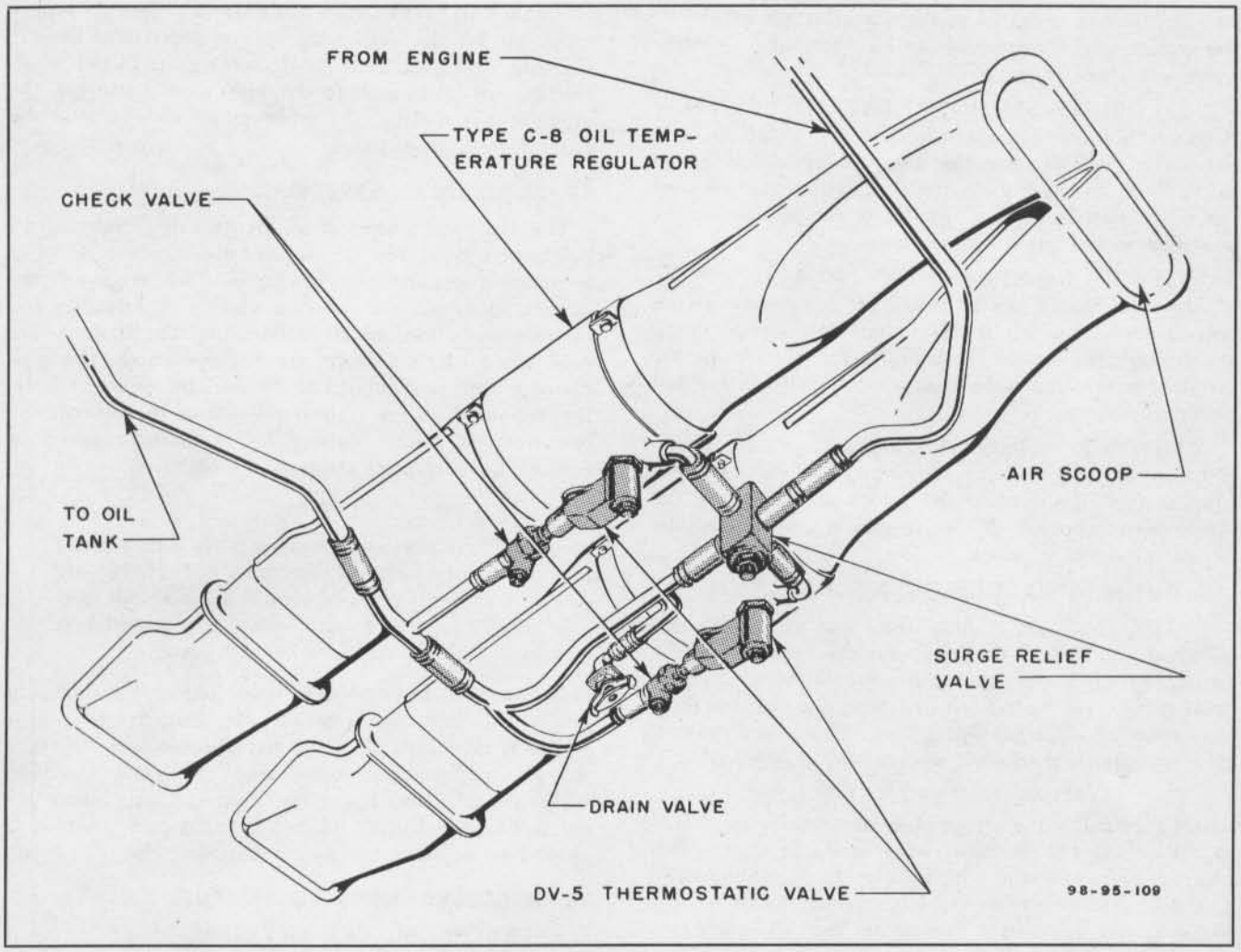

Figure 14—Oil System Surge Protection

of the bomb bay on the after side of the bulkhead separating the navigator's compartment from the bomb bay. The cross-feed valve control is on the forward side of the bulkhead to the right of the other fuel system controls. The cross-feed valve is similar in construction and principle to the fuel shut-off valves. Each check valve consists of a housing, an inlet port, two outlet ports, and a gravity-loaded flapper valve hinged so that it lies flat on its seat except when it is forced up and open by pressure from underneath. One of the outlet ports leads to the shutoff valve, the other to the cross-feed valve. Both outlet ports are above the flapper valve.

c. The cross-feed fuel system is used only in the event of certain emergencies. The situations in which cross-feed is used are:

(1) Failure of one engine, in which case all of the fuel remaining in the tanks can be used by the other engine.

(2) Loss of fuel in the cells in the wing on one side of the airplane, in which event the fuel remaining in the other wing cells can be used by both engines.

10. OIL SYSTEM.

Each engine is provided with an independent oil system. A self-sealing oil tank is located in each nacelle. On B-25H-1 and -5 airplanes, oil is taken from the circulating oil to supply the propeller feathering system. On B-25H-10 and subsequent airplanes, a standpipe in the oil tank sump provides a reserve supply of oil for propeller feathering. Scavenged oil flows through two oil temperature regulators in each wing. Air enters a scoop at the leading edge of each wing, passes through the oil radiators, and exits through apertures on the upper trailing edge of the wing. The air ducts are equipped with full-closing shutters which are operated by levers on the pilot's control pedestal. The air duct shutters have been removed from airplanes Serial No. AF43-4345 and subsequent.

11. HEATING AND VENTILATING SYSTEM.

a. B-25H-1 AIRPLANES.

(1) GENERAL.—The airplane is equipped with two distinct heating systems, each operating independently of the other. The heater in each system burns a

fuel-air mixture taken from the supercharger section of the engine, and the systems can be operated only when the engines are running.

(2) FRONT SECTION HEATING SYSTEM.—A heater is located in the left wing center section, and the outlet ducts are installed in each forward compartment. With the heater off, the duct system may be used for ventilation in flight. Ventilators for outside air are provided in the pilot's compartment.

(3) AFT COMPARTMENT HEATING SYSTEM.—The heater located in the aft compartment contains a blower which serves to circulate compartment air through the heater. Ventilators for outside air are installed beside the waist gun windows and in the tail turret station.

(4) DEFROSTING SYSTEM.—There are provisions in the airplane for defrosting the pilot's windshields, any glass area in the pilot's compartment, the upper turret canopy, the waist gun windows, and the tail turret sighting panel.

b. B-25H-5 AND SUBSEQUENT AIRPLANES.

(1) GENERAL.—Three heaters of the type which mix raw fuel and air at the heater are installed on the airplane. Each heater, except the forward one, depends upon ram air for operation; therefore, the airplane must have attained sufficient flying speed before the cannoneer's and aft compartment heaters can be operated.

(2) PILOT'S COMPARTMENT HEATER.—A heater forward of the armor plate bulkhead is connected to the pilot's compartment by a series of ducts. This heater may be operated with the airplane on the ground. The duct system may be used for ventilation when the heater is not operating. Ventilators for admitting outside air are on each side of the pilot's compartment.

(3) CANNONEER'S COMPARTMENT HEATER.—The heater in the left rear corner of the cannoneer's compartment supplies warm air for the cannoneer's compartment. Ventilating air may be admitted into the compartment through the heater when the heater is off.

(4) AFT COMPARTMENT HEATER.—The heater on the left side of the fuselage aft of the waist gun window serves the aft compartments of the airplane. The heater is connected by a series of ducts to outlets in the waist gunner's compartment and the tail gunner's station. Ventilating air may be admitted into the compartment through the duct system when the heater is off. Controllable ventilators for ventilating the airplane in flight are located beside the waist gun windows and in the tail gunner's station.

(5) DEFROSTING SYSTEM.—The heaters supply warm air for the defrosting system. Ducts and flexible defroster tubes are used for defrosting the pilot's windshields, any glass area in the pilot's compartment, the upper turret canopy, the waist gun windows, and the tail turret sighting panel.

12. ELECTRICAL SYSTEM.

The electrical system is of the 24-volt direct-current, single-wire type. The structure of the airplane serves as a common ground return circuit. Two engine-driven generators supply the power to charge the batteries and to operate the various electrical units. The batteries are used when the generators are not operating. The generator output is regulated to 28 volts by voltage regulators mounted on the right-hand side of the cannoneer's compartment. Either battery has sufficient capacity to operate the airplane's electrical system.

Note

The batteries are adequate only for a short period of direct use, and then only if they are in a properly charged condition, and if all electrically operated equipment not essential is turned off to conserve battery power.

An external power socket is located on the outboard side of the right engine nacelle, aft of the fire wall. This power is used instead of the airplane batteries for starting the engines and operating the electrical system while the airplane is on the ground. An adapter for connecting the British type of external power supply is stowed in the external socket compartment.

13. MISCELLANEOUS EQUIPMENT.

a. TRACER BULLET GOGGLES.—Four pairs of tracer bullet goggles are stowed as loose equipment in the box in the 75-mm cannon ammunition rack.

b. SERVICE LADDER.—A service ladder is lashed inside the aft section of the fuselage.

c. COVERS.—Weatherproof dust covers are provided for the forward part of each engine nacelle, for the transparent parts of the pilot's compartment, the upper turret, the waist gunner's windows, and the tail gunner's station. Canvas covers are also provided for the landing gear shock strut piston.

d. BLIND-FLYING HOOD.—A cloth hood, which may be suspended from the top of the pilot's enclosure during instrument-flying maneuvers, is furnished as loose equipment and stowed above the left side waist gunner's window.

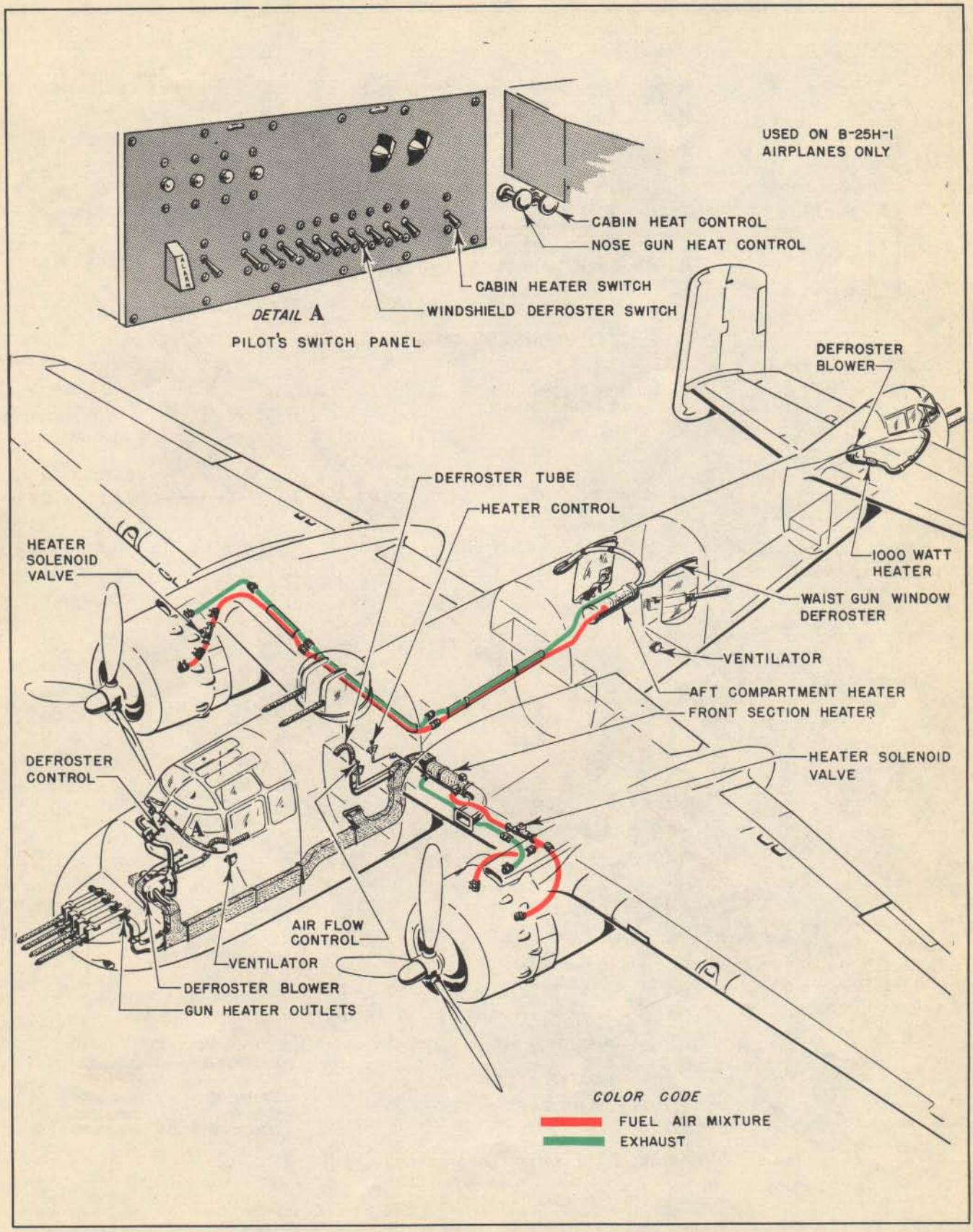

Figure 15—Heating and Ventilating System—B-25H-1 Airplanes

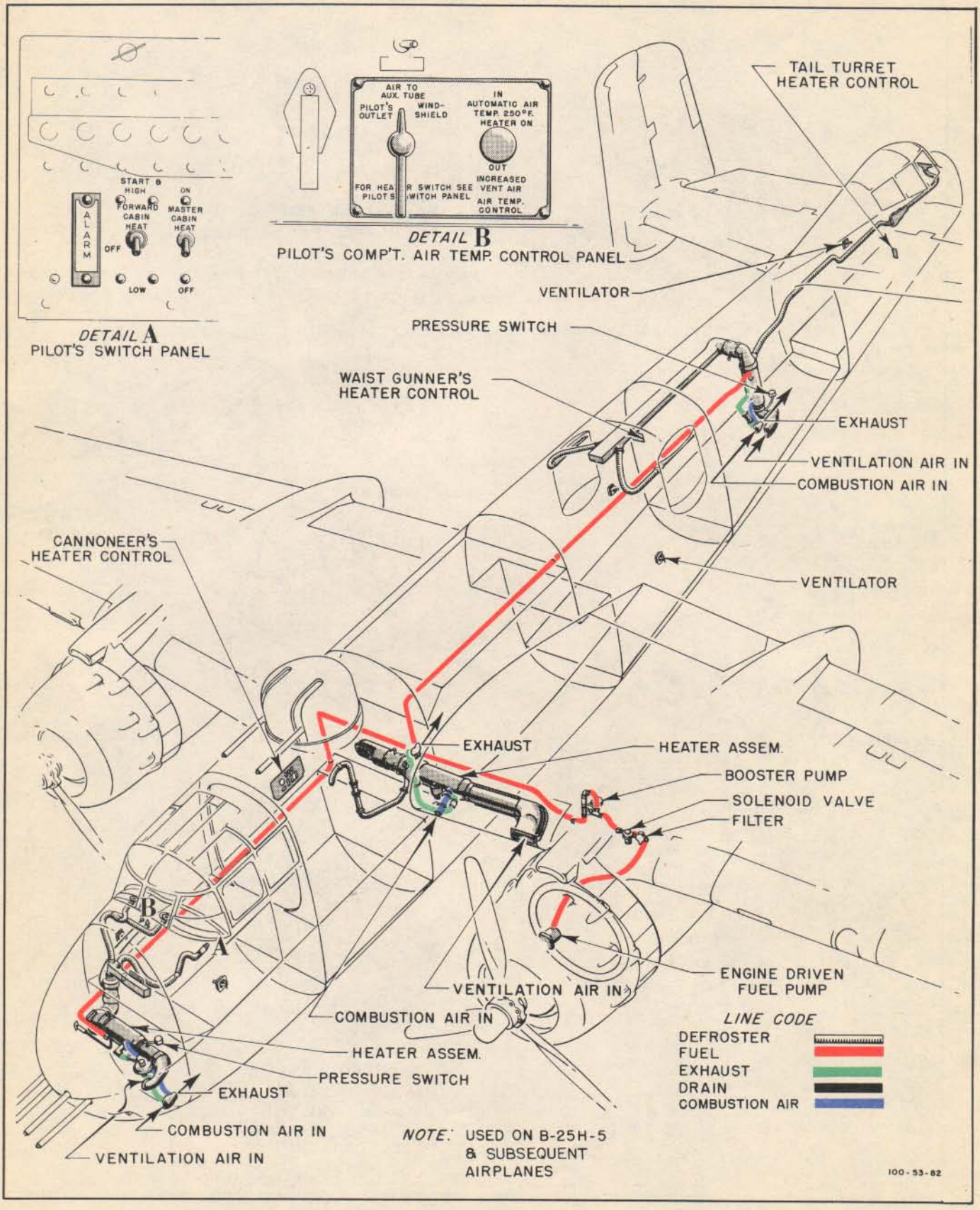

Figure 16—Heating and Ventilating System—B-25H-5 and Subsequent Airplanes

SECTION II
PILOT OPERATING INSTRUCTIONS

Note

A pilot's check list in the pilot's compartment is available for a quick check of airplane operations.

1. FLIGHT RESTRICTIONS.

The following maneuvers are prohibited:

Loop	Immelmann	Vertical Bank
Spin	Inverted Flight	
Roll	Vertical Dive	

2. BEFORE ENTERING PILOT'S COMPARTMENT.

a. Make sure that the airplane has been serviced and is ready for flight, particularly in regard to proper quantities of fuel, oil, hydraulic fluid and oxygen.

b. Ascertain that the amount of fuel, oil, ammunition, and special equipment carried is suited to the mission to be performed and that allowable limits of weight and cg are not exceeded. (See AN 01-1-40.)

c. See that airplane is headed into the wind.

d. Make certain nose gear towing pin is engaged (cap on).

e. See that nose hood is securely latched.

f. Enter cannoneer's compartment and check the following:

(1) Switch ON the generator-disconnect and inverter switches, located on the generator control panel.

(2) Make certain that the fuel cross-feed valve, and the bomb bay tank transfer valve are OFF. These controls are located at the rear of the compartment. (Alternate controls for the fuel shut-off valves are located to the left of the pilot's seat.)

(3) Check emergency brake air pressure (550-600 pounds per square inch).

(4) Check hydraulic and brake accumulator pressures for a minimum of 400 pounds per square inch.

(5) See that deflector plate on forward end of bomb bay crawl deck is securely latched.

3. ON ENTERING PILOT'S COMPARTMENT.

a. The following procedure should be carried out prior to all flights:

(1) Have waist gunner make certain that wing flap emergency crank is stowed.

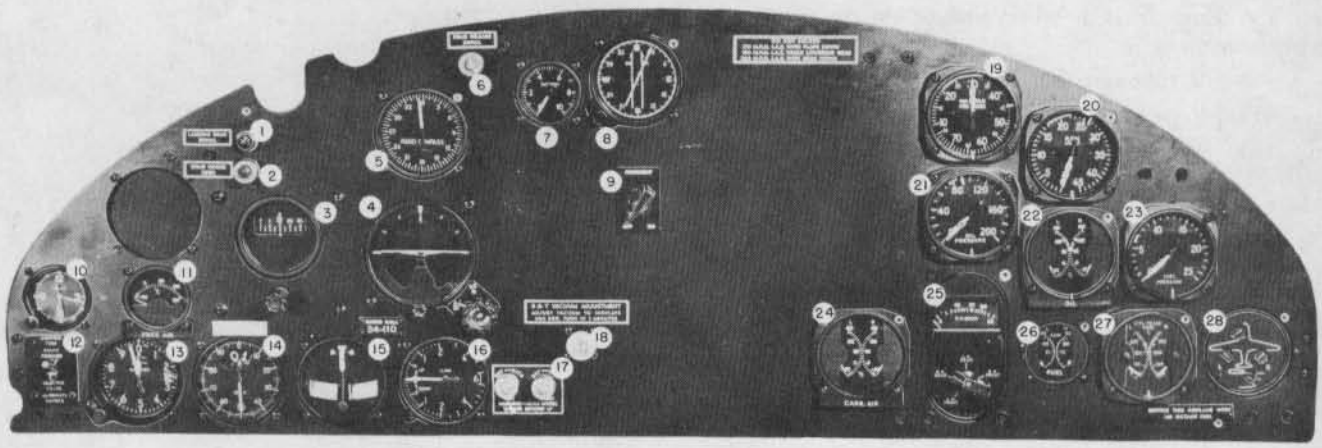

Figure 17—Instrument Panel—B-25H-1 and -5 Airplanes

KEY TO FIGURE 17

1. Landing Gear Signal Light
2. Bomb Door Signal Light
3. Turn Indicator (Gyro)
4. Flight Indicator
5. Radio Compass Azimuth Indicator
6. Bomb Release Signal Light
7. Suction Gage
8. Remote Compass Indicator
9. Gun Sight Rheostat
10. Clock
11. Free Air Temperature Indicator
12. Static Selector Valve
13. Altimeter
14. Air-Speed Indicator
15. Bank-and-Turn Indicator
16. Rate-of-Climb Indicator
17. Nose Wheel Position Indicator Lights
18. Bank-and-Turn Needle Valve
19. Manifold Pressure Indicator
20. Tachometer Indicator
21. Oil Pressure Indicator
22. Oil Temperature Indicator
23. Fuel Pressure Indicator
24. Carburetor Air Temperature Indicator
25. Main Fuel Level Gage
26. Auxiliary Fuel Level Gage
27. Cylinder Temperature Indicator
28. Landing Gear and Wing Flap Position Indicator

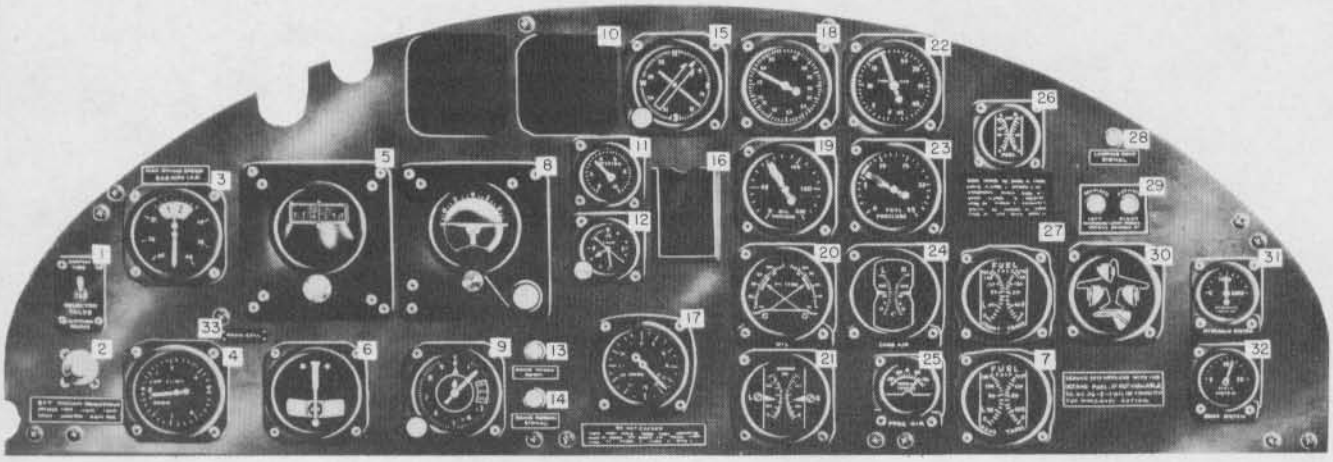

Figure 18—Instrument Panel—3-25H-10 Airplanes

KEY TO FIGURE 18

1. Static Pressure Selector Valve
2. Bank and Turn Needle Valve
3. Airspeed Indicator
4. Rate-of-Climb Indicator
5. Directional Gyro
6. Bank and Turn Indicator
7. Rear Main Tanks Fuel Level Gage
8. Flight Indicator
9. Altimeter
10. Provisions for Glide Path Indicator
11. Suction Gage
12. Clock
13. Bomb Door Indicator Light
14. Bomb Release Signal Light
15. Remote Reading Compass Indicator
16. Card Holder
17. Radio Compass
18. Manifold Pressure Indicator
19. Oil Pressure Indicator
20. Oil Temperature Indicator
21. Cylinder Head Temperature Indicator
22. Tachometer
23. Fuel Pressure Indicator
24. Carburetor Air Temperature Indicator
25. Free Air Temperature Indicator
26. Auxiliary Tanks Fuel Level Gage
27. Front Main Tanks Fuel Level Gage
28. Landing Gear Signal Light
29. Nose Wheel Position Indicator Light
30. Landing Gear and Flap Position Indicator
31. Hydraulic Pressure Gage
32. Brake Pressure Gage
33. Radio Call Placard

(2) Have upper turret operator make sure that bomb door emergency crank is stowed.

(3) Have crew members unlock emergency ground escape hatches.

(4) See that ignition switches are OFF.

(5) Set parking brakes.

(6) Unlock flight controls and check for free and proper movement, watching control surfaces for correct response.

(7) Make sure the bomb controls are in their inoperative positions.

(8) See that the safety switches for the cannon and guns are in the SAFE position.

(9) Set the altimeter to the correct barometric pressure.

(10) Test gun sight illumination by operating rheostat control in center of instrument panel.

b. When night flying is anticipated, the following additional check should be made. (Battery-disconnect switch ON.)

(1) Test fluorescent instrument light by operating rheostat control on left side of control column.

(2) Test cockpit extension light on right-hand instrument subpanel.

(3) Test position lights by moving switches on pilot's switch panel to BRIGHT and DIM.

(4) Test landing lights by operating switches on control pedestal switch panel.

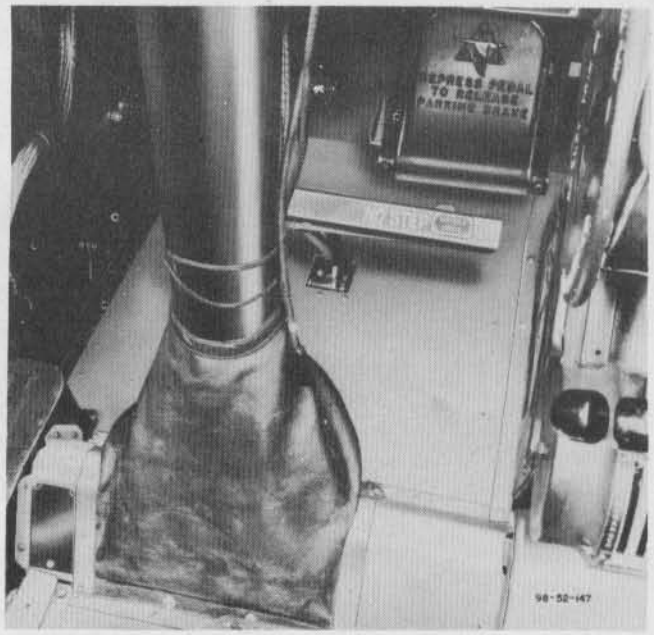

Figure 19—Surface Control Lock

WARNING

Do not leave the landing lights on when the airplane is on the ground, as the heat generated by the lamps will melt the Plexiglas lenses.

(5) Test operation of recognition lights. Switches are located on control pedestal switch panel.

Note

Do not operate recognition lights longer than 10 seconds on the ground.

4. STARTING ENGINES.

a. The sequence of operations listed below should be followed when starting the engines:

(1) Have ground personnel turn the propellers 3 to 4 revolutions by hand.

(2) Open throttles ¾-inch (1000 to 1200 rpm). As engine starts, retard throttle slightly.

(3) Move propeller control levers to full INCREASE RPM.

(4) Move mixture control levers to IDLE CUT-OFF.

(5) Make certain that the supercharger control levers are locked in LOW.

(6) Open cowl flaps; then place levers in neutral position.

Note

Always return the cowl flap control levers to neutral position immediately after obtaining the desired position of the flaps. In this position, fluid will not be pumped overboard should a cowl flap line break.

(7) Move carburetor air control levers to NORMAL.

(8) If airplane has oil cooler shutters installed, move levers to CLOSED position.

(9) See that emergency fuel shut-off valve controls are ON.

(10) Turn ON the battery-disconnect switches, located on the pilot's switch panel.

(11) Turn ON the fuel booster pump switches, located on the control pedestal switch panel. Check the fuel pressure gage for 4 to 5 pounds pressure.

(12) Turn ON the ignition safety switch, located on the pilot's control pedestal.

(13) Turn the ignition switch for the engine to be started first to the BOTH position.

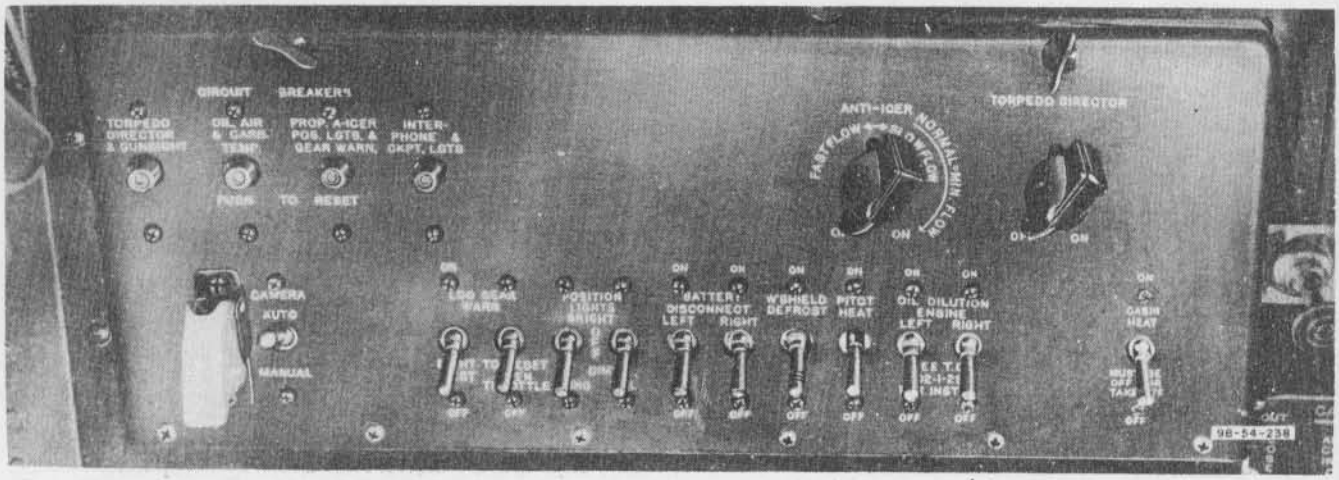

Figure 20—Pilot's Switch Panel—B-25H-1 Airplanes

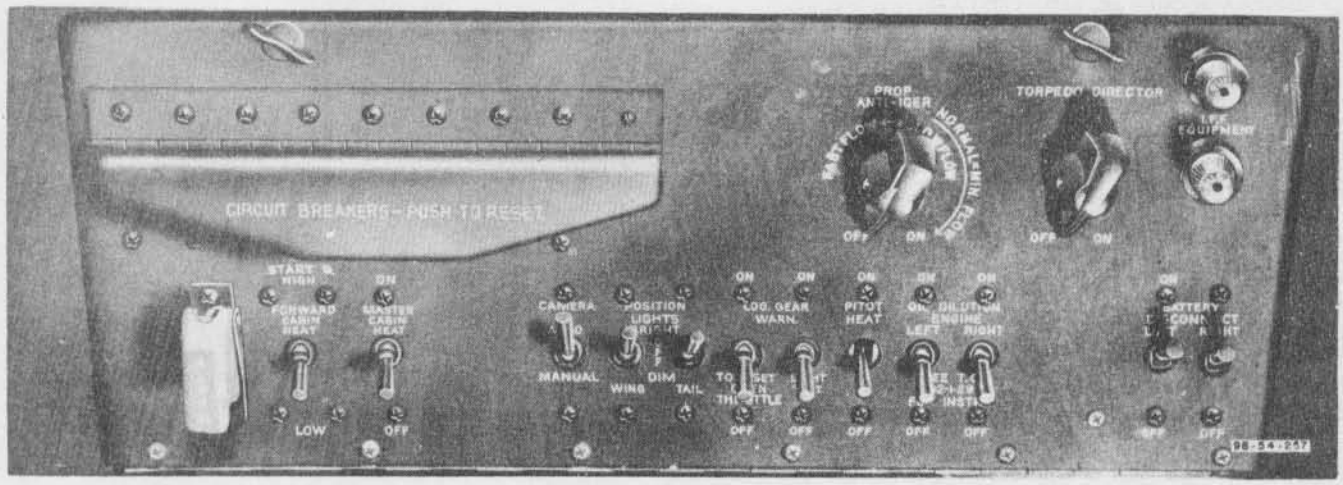

Figure 21—Pilot's Switch Panel—B-25H-5 and Subsequent Airplanes

(14) Press starter energizing switch on control pedestal switch panel to LEFT or RIGHT, depending on which engine is being started first, and hold in place for a maximum of 10 seconds when using an external power supply (battery cart), or 20 seconds when using the airplane's batteries.

Note

Whenever possible, an external power supply should be used to start the engines. If external power is not available, use a portable energizer or handcrank. DO NOT use airplane's batteries to start engines except in an emergency.

(15) While energizing, prime engine 2 seconds.

(16) Check to see if propeller is clear.

(17) Press MESH switch to LEFT or RIGHT, depending on which engine is being started first. Prime the engine while engaging, until it fires evenly.

(18) As engine starts, move mixture control to FULL RICH.

(19) Check oil pressure. If pressure is not up to 40 pounds within 30 seconds, stop engine and investigate.

(20) Follow procedures (13) through (19) for starting other engine.

5. ENGINE WARM-UP.

Warm engine at 1200 rpm until oil temperature shows a definite increase and oil pressure remains steady when throttle is opened. If oil cooler shutters are installed, open shutters at oil temperature of 40°C (104°F).

6. EMERGENCY TAKE-OFF.

Use oil dilution to obtain proper oil pressure at moderate power, and as soon as the engine will take the throttle, taxi out and take off. Apply throttle slowly but steadily.

WARNING

Overdilution may easily result in very low oil pressure after the engine is warm; therefore, dilution should be used carefully.

7. ENGINE AND ACCESSORIES GROUND TEST.

a. After starting, engines should be warmed up and ground tested as follows:

(1) Turn booster pumps OFF and check for a fuel pressure of 6 to 7 pounds.

(2) Check propeller controls at 1600 rpm by pulling controls back to full DECREASE RPM and noting rpm drop of approximately 350 to 400 rpm. Return controls to full INCREASE RPM.

(3) Check L and R magnetos at 2000 to 2100 rpm, maximum rpm drop 100. If rpm drop is greater, return switch to BOTH, run engine to 40 in. Hq manifold pressure for a few seconds, and then recheck at 2000 to 2100 rpm.

(4) At 700 rpm check OFF position of ignition switches.

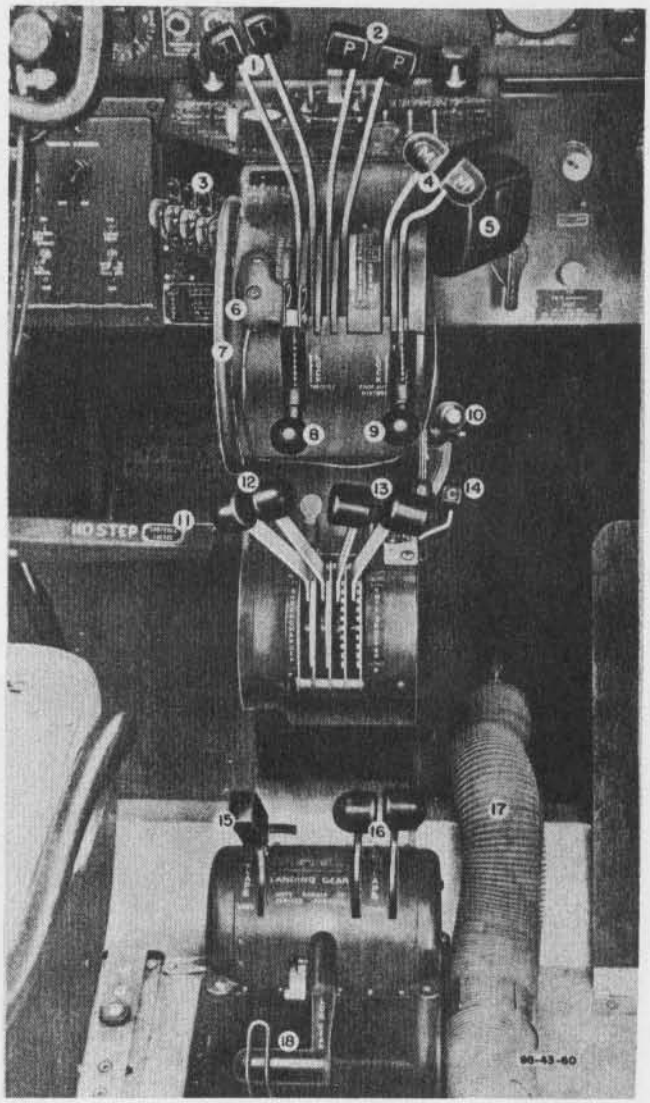

Figure 22—Pilot's Control Pedestal

KEY TO FIGURE 22

1. Throttle Controls
2. Propeller Controls
3. Recognition Light Switches
4. Mixture Controls
5. Ash Trays
6. Landing Gear Warning Light Switches
7. Elevator Trim Tab Control Wheel
8. Throttle Control Lock
9. Propeller and Mixture Control Lock
10. Bomb Control Handle
11. Surface Control Lock
12. Supercharger Controls
13. Oil Shutter Controls
14. Carburetor Air Controls
15. Wing Flap Control
16. Cowl Flap Controls
17. Flexible Defroster Tube
18. Landing Gear Control

(5) Check supercharger clutch operation: Set propeller to full INCREASE RPM, engine speed to 1700 rpm, and supercharger to HIGH blower. Open throttle to 30 in. Hg maximum manifold pressure, and shift to LOW blower. Manifold pressure should show a sudden decrease of not less than 1½ in. Hg.

(6) Check operation of cowl flaps and wing flaps.

(7) At 1600 rpm, check voltage at 28-28.5, amperes 20-60 per generator, and suction 3.75-4.25 in. Hg.

(8) Check hydraulic pressure (800-1100 pounds per square inch).

(9) Check brake pressure (1000-1200 pounds per square inch).

(10) Check radios for proper operation.

(11) Check with crew members to see that entrance hatches are closed.

8. TAXIING.

a. GENERAL.—When taxiing, the airplane must begin to roll freely from its stationary position before any attempt is made to change direction of motion. No turn should be attempted until the initial direction of motion has been determined by "giving the airplane its head" through the even application of the engines without the use of brakes.

Note

This restriction is necessary because of the excessive side loads developed in the nose wheel assembly.

b. TURNS IN MUD OR SAND.—While taxiing in mud or sand, turn the airplane by moderate use of the brakes and engines, avoiding pivoting on one wheel. The minimum radius of turn of the inside wheel can be approximately 10 feet. When attempting to straighten the airplane out of a turn, it will be found that the nose wheel has less tendency to trail properly as the depth of the tire sink (depth of rut) increases.

c. NOSE WHEEL TURN INDICATOR.—An indicator containing two warning lights is installed on the instrument panel. These lights serve to warn the pilot when the nose wheel is turned beyond 15 degrees in either direction. Their action is fully automatic. The brilliancy of the lights may be adjusted by twisting the jewel light caps to DAY or NITE.

Note

Upon reaching the take-off position, stop the airplane cross-wind so that approaching airplanes may be plainly seen.

9. BEFORE TAKE-OFF.

a. Check the following:

(1) Cabin heat switch OFF (B-25H-1 only).

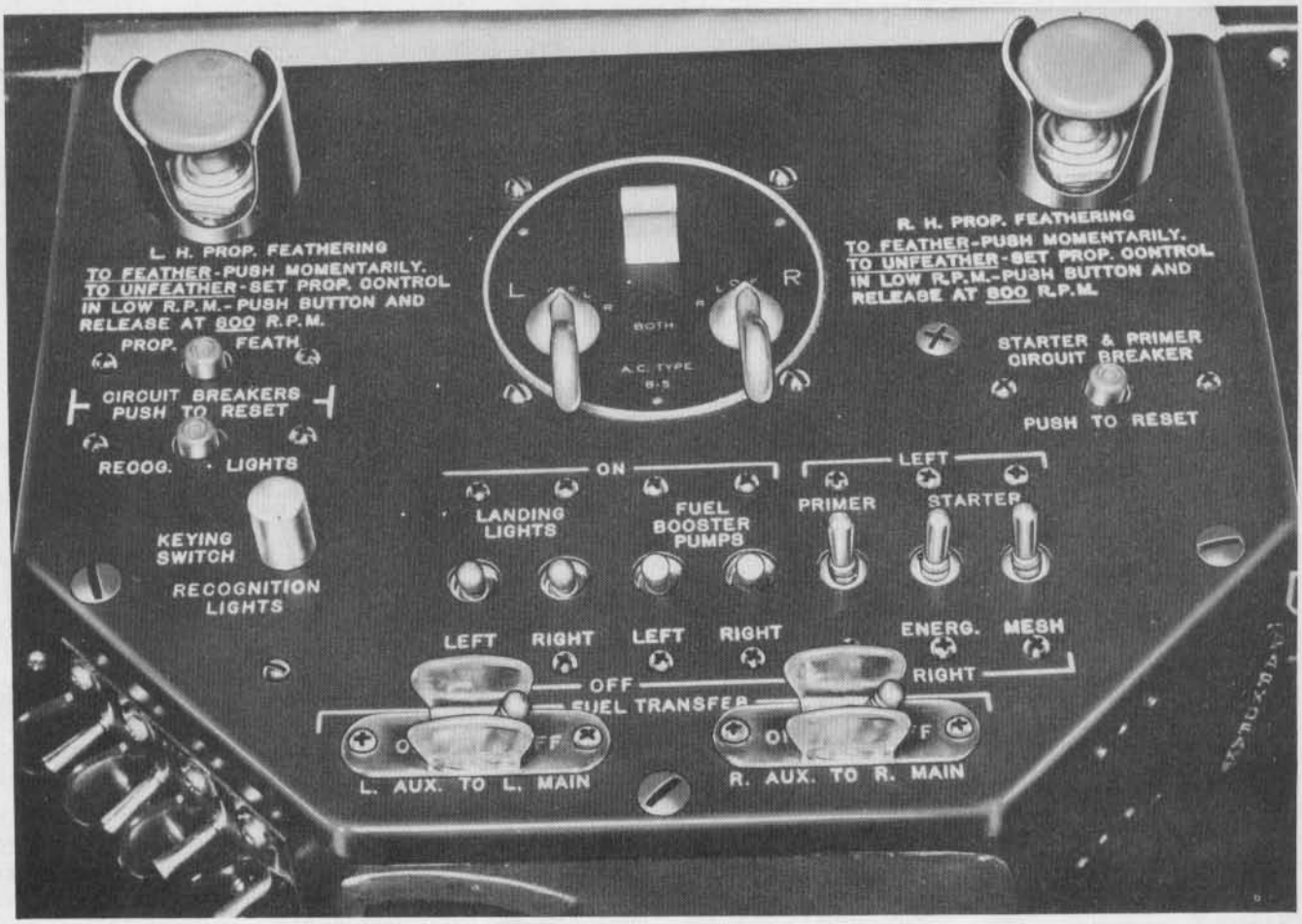

Figure 23—Control Pedestal Switch Panel

(2) Turrets pointing directly aft; waist guns stowed.

(3) Check flying controls for free movement (watch control surfaces).

(4) Check elevator, aileron, and rudder trim.

(5) Generator and inverter switches ON.

(6) De-icer control OFF (when airplane is winterized).

(7) Check fuel levels.

(8) Fuel booster pumps ON. Fuel pressure 6-7 pounds.

(9) Propeller full INCREASE RPM.

(10) Mixture FULL RICH (lock snug).

(11) Supercharger LOW (locked).

(12) Oil cooler shutters OPEN (when installed).

(13) Carburetor air NORMAL.

(14) Cowl flaps OPEN (control neutral).

(15) Emergency hydraulic selector valve NORMAL.

(16) Emergency brake control safetied. Air pressure 550-600 pounds.

(17) Pilot's static pressure selector valve AIRSPEED TUBE position.

10. TAKE-OFF.

a. When the field is clear, quickly check the following:

(1) Wing flaps 20 degrees down for normal take-off, 30 degrees down for obstacle clearance (control neutral).

(2) UNCAGE gyro instruments.

(3) Cylinder temperature 260°C maximum for 5 minutes.

(4) Oil pressure 75-90 pounds.

(5) Oil temperature 20°C minimum, 95°C maximum.

b. Open throttles to 44.3 in. Hg manifold pressure, and take off at 2600 rpm (5 minutes maximum).

WARNING

When airplane is serviced with fuel, Grade 91, Specification AN-F-26, operate engines within limits specified on placard on pilot's control column.

11. ENGINE FAILURE DURING TAKE-OFF.

a. The chances of an engine failing during take-off can be greatly reduced by observing the following practices:

(1) Run up engine carefully and check thoroughly before take-off.

(2) Hold the airplane down so as to reach single-engine control speed as soon as possible.

(3) Retract the landing gear as soon as the airplane is definitely airborne.

(4) Retract the flaps as soon as the airplane reaches a safe altitude.

b. If an engine fails during take-off, the pilot must at once decide whether he can feather the engine and continue flight, or cut the good engine and land straight ahead. The decision to continue flight will be based on the gross weight of the airplane and the air speed attained at the time of engine failure. If sufficient air speed for single engine operation has been reached, the inoperative engine should be feathered immediately and the flight continued. Closing the cowl flaps on the dead engine will also lower the drag. The gear should be retracted before this point is reached. Remember that the performance is greatly reduced with the gear and flaps extended.

c. If the engine fails immediately after take-off before single-engine flying speed is attained, act quickly as follows:

(1) Depress the nose at once so that the air speed does not drop below stalling speed.

(2) If bomb bay tank is installed, release immediately.

(3) Make sure the landing gear has started to come up. There is no time to take further action; and even if it is only unlocked and on the way up, the gear will collapse on landing.

(4) Lower the wing flaps fully, if possible.

(5) Move mixture control to "IDLE CUT-OFF" and turn off the ignition safety switch.

(6) Turn off battery-disconnect switch.

(7) Land straight ahead, only changing direction sufficiently to miss obstructions.

d. If engine flying speed is attained, proceed as follows:

(1) Feather propeller on dead engine.

(2) Retract landing gear as quickly as possible.

(3) If bomb bay tank is installed, drop to lighten load. Close bomb doors to cut drag.

(4) Raise the flaps slowly to prevent spilling airplane.

(5) Keep the air speed well above the stalling speed for the gross weight at which you are flying.

12. CLIMB.

a. As soon as the airplane is sufficiently clear of the ground, proceed as follows:

(1) Unlock landing gear control handle and move to "UP" position. Note landing gear position as shown by indicator on instrument panel.

(2) Raise the flaps when sufficient air speed is attained and all obstacles are sufficiently cleared. (Raise flaps by placing control in "UP" position and then returning to neutral.)

(3) Adjust cowl flaps and oil cooler shutters (when installed) as required.

(4) Check the cylinder head and oil temperatures and the oil pressure.

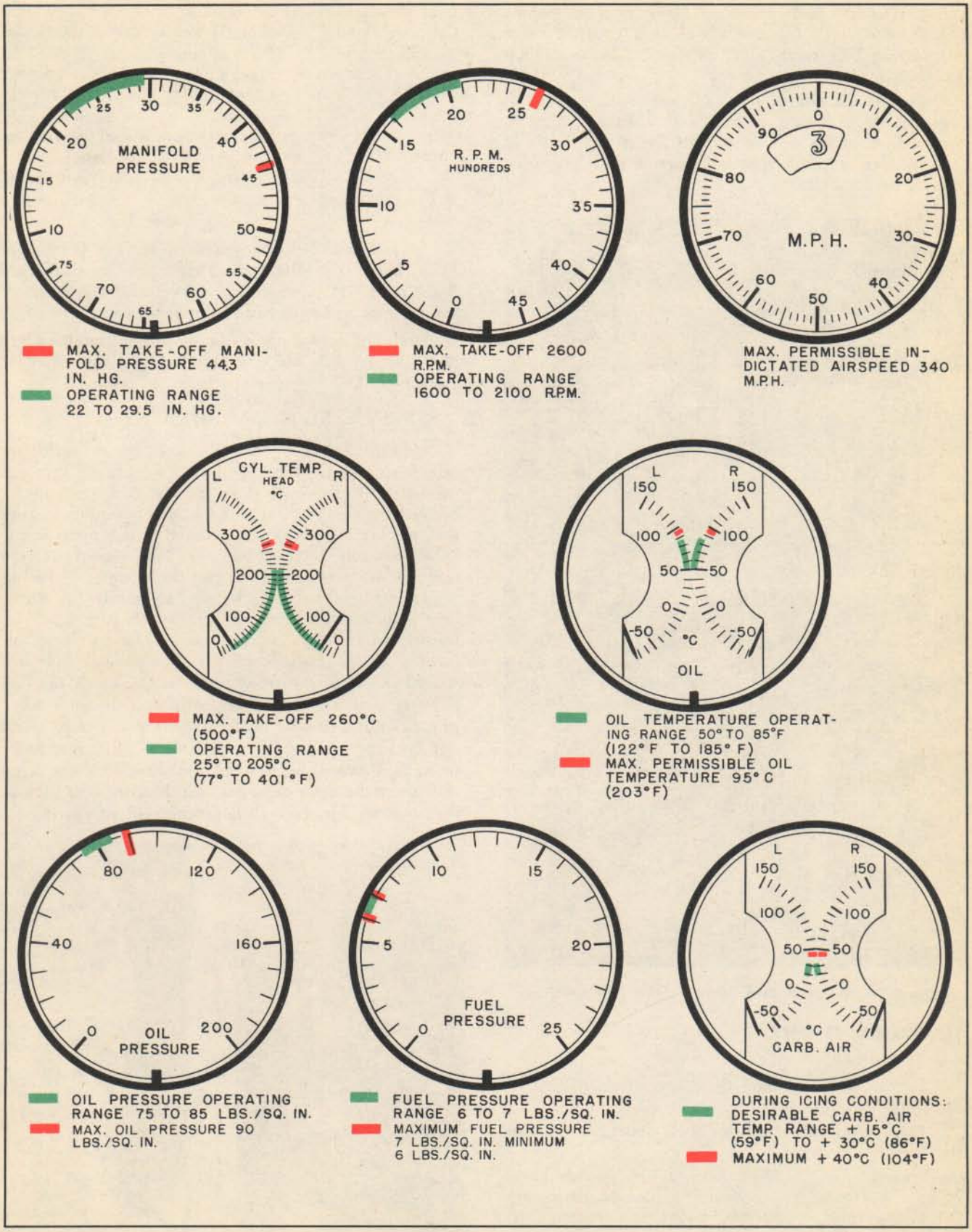

Figure 24—Instrument Limitations

(5) Check fuel pressure. Have booster pumps "ON" below 1000 feet and above 10,000 feet. Booster pumps may be turned "ON" as required between 1000 and 10,000 feet.

(6) As the rate of climb can vary widely, depending on weight being carried and altitude, refer to the take-off, climb, and landing charts in Appendix II for the rate of climb applicable to the particular mission to be conducted.

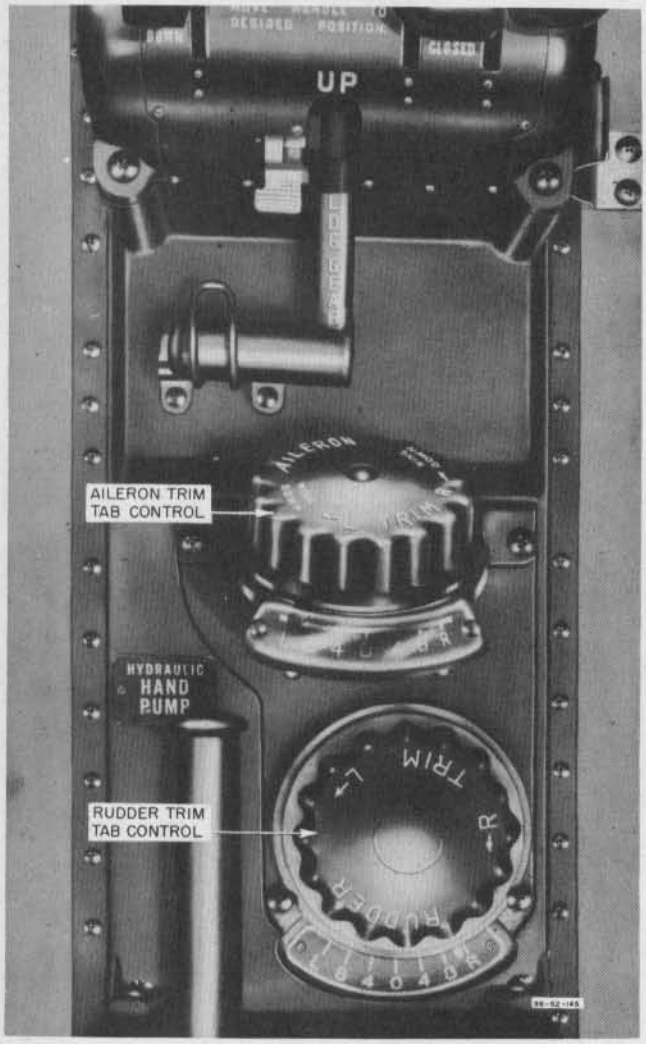

Figure 25—Aileron and Rudder Trim Tab Controls

13. DURING FLIGHT.

a. GENERAL.

(1) Set propeller and throttle controls to desired RPM and manifold pressure.

(2) Periodically check for these desired instrument readings:

Oil Pressure	80-85 pounds (75 pounds minimum, 90 pounds maximum)
Oil Temperature	50-70°C (40°C minimum, 85°C maximum continuous, 95°C maximum for 15 minutes)
Fuel Pressure	6-7 pounds.
Cylinder Head Temperature	Military power 260°C maximum for 5 minutes. Maximum continuous power climb 260°C maximum for 15 minutes. Maximum continuous power level flight 218°C maximum. Cruising power 205°C maximum.
Voltage	28-28.5.
Suction	3.75-4.25 inches Hg.

(3) When altitude warrants, shift supercharger from LOW to HIGH at 1700 rpm. In prolonged flight in HIGH ratio, shift to LOW ratio every 2 hours for 15 minutes to remove sludge from clutch.

(4) For engine operation, see specific engine flight chart, Section III, and composite cruising control chart, Appendix II.

b. FUEL SYSTEM MANAGEMENT.

(1) AUXILIARY FUEL.—Fuel in the auxiliary cells must be transferred to the main fuel cells before it can be fed to the engine. To transfer fuel, start one or both of the auxiliary fuel cell transfer pumps by placing the switches on the control pedestal switch panel in the "ON" position. There are no valves to be opened or closed during this operation. Whenever the quantity of fuel in a main fuel cell has been reduced sufficiently, as shown on the liquidometer fuel level indicator, fuel should be transferred from the auxiliary cells. During this transfer the selector switch on the liquidometer indicator should be set to the front main cell to which the fuel is being transferred, in order to inform the pilot when to turn off the transfer pump. The transfer pump should not be kept running after the cell is full, since leaky filler caps may cause loss by overflow. If there is no leakage at the filler caps, fuel will be circulated back to the auxiliary fuel cells through the vent connections.

Figure 26—Fuel Transfer and Cross-feed Controls

(2) BOMB BAY TANK FUEL.—Before the fuel carried in the bomb bay tank may be used it is necessary to transfer the fuel to the left or right front main fuel cell. To transfer fuel, proceed as follows:

(a) Turn fuel transfer valve control from "OFF" position to either "FUS. TANK TO LEFT WING" or "FUS. TANK TO RIGHT WING."

(b) Turn ON transfer pump switch on generator control panel.

(c) Set main liquidometer selector switch to the main fuel cell to which fuel is being transferred. Watch gage in order that transferring operation may be stopped when cell is full, to avoid overflow.

Note

It is usually desirable to keep the main fuel cells as nearly full as possible by transferring fuel from the bomb bay tank at frequent intervals. This is advisable because it might become necessary to jettison the bomb bay tank. If such a situation should arise, it would be desirable to have as much of the total fuel supply as possible in the self-sealing wing cells. No provision is made for transferring fuel from the wing cells back into the bomb bay tank.

(d) When transfer operations are finished, shut OFF transfer pump switch and place fuel transfer valve control in "OFF" position.

(3) EMERGENCY FUEL TRANSFER.—If bomb bay tank transfer pump fails, proceed as follows:

(a) Set transfer valve control to desired position and unstrap handle on pump at base of turret in cannoneer's compartment.

(b) Pull handle forward and down approximately 90°, then move handle back and forth. This action draws fuel from the bomb bay tank and pumps it into whichever main cell has been selected.

(c) When transfer operation is completed, return handle to stowed position and strap in place. Return selector valve control handle to "OFF" position.

(4) OPERATION OF CROSS-FEED FUEL SYSTEM.—The cross-feed fuel system is for emergency use only. In case of failure of one engine, all of the fuel remaining in the tanks can be used by the other engine. In the event of loss of fuel from the wing cells on one side of the airplane, the fuel remaining in the other wing cells can be used by both engines. The cross-feed valve is left OFF except when the system is in use.

(a) To use the cross-feed system it is necessary to open the cross-feed valve, and desirable to turn ON one of the fuel booster pumps. However, when the cross-feed valve is open, both fuel booster pumps should NOT be used. With the right-hand booster pump ON, the right-hand cross-feed check valve remains open, but the left-hand check valve closes due to the excess pressure on its top side from the booster pump that is running. Fuel then flows from the right wing cells to both engines, but not back into the left wing cells because of the closed left-hand check valve. With the left-hand booster pump ON, the right-hand check valve closes and the left-hand one remains open. In this case, fuel flows from the left wing cells to both engines. If one of the engines is out of commission, the fuel shut-off valve on that side can be closed, allowing the entire flow to go to the other engine.

14. GENERAL FLYING CHARACTERISTICS.

The general flying characteristics of the airplane are conventional, and no special emphasis need be placed on any particular normal condition of flight. The normal accepted technique and procedure governing the flying of bimotored bombardment aircraft should be adhered to in the flying of this airplane.

15. MANEUVERS PROHIBITED.

a. Only normal flying attitudes are permitted when the airplane is loaded to a specified maximum loaded weight for safe flight.

b. The following maneuvers are prohibited:

Loop	Immelmann
Spin	Inverted Flight
Roll	Vertical Dive
	Vertical Bank

16. STALLS.

The airplane has excellent stall characteristics. The stalls are not violent and recovery can be made simply by dropping the nose of the airplane. A slight rolling tendency is easily counteracted by the application of opposite aileron control or a slight amount of rudder. The stalling characteristics of the airplane are not affected by changes of the gross weight, the setting of the wing flaps, or the operation of the de-icer shoes. The stalling speed, however, is affected by these variables. (See figure 27.) The application of power tends to reduce the stalling speed further, dependent upon the amount of power used, the thrust component of which is converted into lift. A warning is given several miles per hour above the actual speed of the stall by a slight buffeting on the elevator and the horizontal stabilizer. There is no reversal of elevator force during the stall.

17. SPINS.

Recovery from spins is accomplished in the conventional manner in this airplane.

18. DIVING.

The maximum indicated diving air speed is 340 mph at normal gross weight. Recovery from dives should not be too abrupt in order to avoid placing excessive load factors on the structure. Dives and subsequent pull-outs should be tempered in accordance with the roughness of the air and the gross weight of the airplane.

19. NIGHT FLYING.

a. In flying this airplane at night, the sequence outlined for daylight operation should be even more strictly observed. In addition, the pilot and crew members should familiarize themselves with the location of the different lights and their control switches.

(1) INSTRUMENT LIGHTING. — Turn on the fluorescent lamp by turning the rheostat knob (on the left side of the control column) to START until the light comes on; then switch to either ON or DIM position. Rotating the lens housing selects the visible or invisible illumination for the instruments.

(2) COCKPIT EXTENSION LIGHT.—An extension light with a six-foot cord is mounted on the right-hand instrument subpanel for use when a small amount of light is desired. A similar light is mounted under the command transmitter to permit illumination of the 75 mm ammunition box and the cannon breech.

(3) POSITION LIGHTS. — The position light switches are on the pilot's switch panel. Two intensities of light are available: "BRIGHT" and "DIM."

(4) LANDING LIGHTS.—Switches for the landing lights are located on the control pedestal switch panel.

(5) RECOGNITION LIGHTS.—Set the switches, located on the control pedestal switch panel, for the light or combination of lights desired. Place the switches in "STEADY" position for continuous operation and in "KEY" position for intermittent operation, by means of the keying switch. The keying switch is located directly above the bank of four recognition light switches.

20. APPROACH AND LANDING.

a. APPROACH.—When the airplane approaches the field, this sequence of operations should be followed:

(1) De-icer control OFF.

(2) Turrets pointing directly aft; waist guns stowed.

(3) Fuel booster pumps ON.

(4) General hydraulic pressure 800-1100 pounds per square inch.

(5) Brake pressure 1000-1200 pounds per square inch.

(6) Set propeller controls at 2100 rpm.

(7) Set mixture controls at "FULL RICH" (lock snug).

(8) Set supercharger controls in "LOW" (lock).

(9) Open oil cooler shutters (when installed).

(10) Close cowl flaps (controls neutral).

(11) Lower landing gear to "DOWN" position and lock. Do not lower gear above 170 mph. Check position of gear by indicator and warning light.

(12) Turn "OFF" master heater switch.

(13) Lower wing flaps. (Do not lower flaps above 170 mph.)

WARNING

Do not exceed 170 mph with flaps down. If landing is not made, raise flaps slowly after sufficient altitude and speed are obtained.

b. LANDING.

(1) Having turned into the field and lowered the flaps, maintain a correct gliding speed. Adjust the elevator trim tabs to assist in landing. Having stopped after landing, raise the flaps and turn off the fuel booster pump. Open cowl flaps before taxiing.

(2) When landing in mud or sand, a normal landing should be made. Hold the airplane straight by use of the rudder with minimum use of the brakes. This action minimizes the possibility of skidding, which may occur on a slick surface.

21. STOPPING ENGINES.

a. To stop engines, proceed as follows:

(1) Set propeller controls at full "INCREASE RPM."

(2) Prior to stopping, run the engines at a speed of 800 to 1000 rpm and shift the supercharger levers from "LOW" to "HIGH" at 30-second intervals for a period of 5 minutes. This procedure serves to wash out any sludge which may have accumulated in the supercharger clutches. Lock the supercharger levers in "LOW."

(3) Idle at 800-1000 rpm to cool engines.

(4) When a cold weather start is anticipated, follow the oil dilution procedure outlined in Appendix III.

(5) Run engines at 1200 rpm for not more than 30 seconds to permit efficient scavenging of crankcase oil; then move mixture controls to "IDLE CUT-OFF" and simultaneously open throttles.

22. BEFORE LEAVING PILOT'S COMPARTMENT.

a. After engines stop, proceed as follows:

(1) Cage gyro instruments.

(2) Turn OFF all switches.

(3) Set parking brakes.

WARNING

Do not set parking brakes while they are hot.

(4) Fasten landing gear control lock.

(5) Lock flying controls.

(6) When engine is sufficiently cool, close cowl flaps.

(7) Place carburetor air control handles in "ICING" position.

(8) If airplane is not to be serviced by ground crew, lock all entrance hatches upon leaving airplane.

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SECTION III

FLIGHT OPERATING DATA

1. AIR-SPEED LIMITATIONS.

a. Do not exceed an air speed of 340 IAS.

b. Do not exceed an engine speed of 2880 rpm.

c. Do not lower landing gear at a speed in excess of 170 IAS.

d. With landing gear down and wing flaps up do not exceed an air speed of 200 IAS.

e. Do not lower main landing gear or nose gear by means of emergency hydraulic lowering system at a speed in excess of 150 IAS.

f. Do not lower wing flaps or fly airplane with wing flaps down at a speed in excess of 170 IAS.

g. Do not lower wing flaps by means of the emergency mechanical system, or fly airplane after flaps are lowered by mechanical system at indicated air speeds in excess of 150 IAS.

h. Do not open bomb bay doors at an air speed in excess of 290 IAS.

i. Do not operate de-icer system at speeds above 230 IAS.

2. AIR-SPEED CORRECTION CHART.

Calibrated Indicated Air Speed—MPH	*IAS*	*Altimeter Error (Feet) (Add to Altimeter Reading)*	
		S.L.	15,000
100	99	20	30
120	118	25	40
140	137	30	50
160	156	40	65
180	176	50	80
200	195	65	100
220	214	80	130
240	234	100	160
260	253	125	200
280	272	150	240
300	291	180	290

3. SPECIFIC ENGINE FLIGHT CHART.

a. Operating limitations and characteristics of the R-2600-13 or R-2600-29 engine are summarized on the Specific Engine Flight Chart for ready reference. Flight operating personnel should be thoroughly familiar with this information.

b. Engine power ratings shown on the chart are defined as follows:

(1) TAKE-OFF. — Maximum recommended for take-off under the specified time limit of five minutes.

(2) MILITARY.—Maximum recommended for operation for periods not exceeding 15 minutes.

(3) NORMAL RATED (MAXIMUM CONTINUOUS).—Maximum recommended for operation with rich mixture in climb and level flight.

(4) MAXIMUM CRUISE.—Maximum recommended for operation with lean mixture.

(5) MINIMUM SPECIFIC CONSUMPTION. — The power at which greatest range can be obtained under average loading conditions.

4. LOAD AND BALANCE.

A load adjuster with carrying case and a Weight and Balance Data Handbook (AN 01-1-40) are furnished with each airplane. The load adjuster, which is similar to a slide rule, is used to check the load and balance from basic airplane to loaded airplane to insure that the weight distribution of all items loaded will not produce an unsafe balance condition. The airplane model designation stamped on every load adjuster indicates that the instrument may be used for balance calculations on any airplane of that particular model. However, the *index figure* entered in the carrying case identification card, or on Chart C of the Handbook, is correct only for the airplane whose serial number is printed on the card or handbook, and represents the balance moment of only that one particular basic airplane.

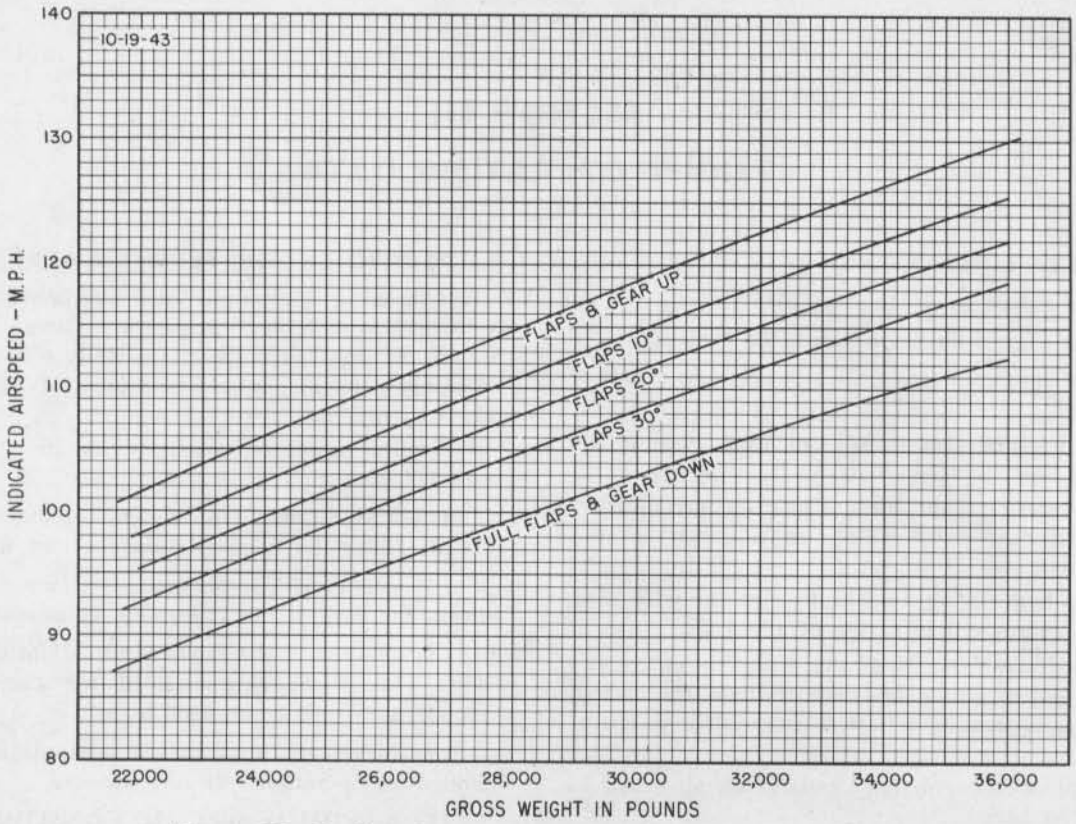


Figure 27—Stalling Speed Chart Specific Engine Flight Chart

SPEC. AN-H-8 DEC. 18, 1942 — FORM ASC-512

AIRPLANE MODELS

B-25H

SPECIFIC ENGINE FLIGHT CHART

ENGINE MODELS

R-2600-13 OR
R-2600-29

CONDITION	FUEL PRESSURE (LB/SQ. IN.)	OIL PRESSURE (LB/SQ. IN.)	OIL TEMP. °C	OIL TEMP. °F	COOLANT TEMP. °C	COOLANT TEMP. °F		
DESIRED	6-7	80-85	50-70					
MAXIMUM	7	90	85 95 (CLIMB)					
MINIMUM	6	75						
IDLING	6-7	25						

MAX. PERMISSIBLE DIVING RPM: 2880

CONDITION	ALLOWABLE OIL CONSUMPTION
MAX. CONT.	28 U.S.QT/HR
MAX. CRUISE	15 U.S.QT/HR
MIN. SPECIFIC	— U.S.QT/HR

OIL GRADE: (S) 1120 (W) 1100

SUPERCHARGER TYPE:

FUEL GRADE: 100 OCTANE

OPERATING CONDITION	RPM	MANIFOLD PRESSURE (BOOST)	HORSE-POWER	CRITICAL ALTITUDE WITH RAM	CRITICAL ALTITUDE NO RAM	BLOWER	USE LOW BLOWER BELOW:	MIXTURE CONTROL POSITION	FUEL FLOW (GAL/HR/ENG.) U.S.		MAXIMUM CYL. TEMP. °C	MAXIMUM CYL. TEMP. °F	MAXIMUM DURATION (MINUTES)
TAKE-OFF	2600	44.3	1700	SEA LEVEL		LOW	ALWAYS	FULL RICH	215		260		5
WAR EMERGENCY	2600	49	1850	SEA LEVEL		LOW	ALWAYS	FULL RICH			260		5
MILITARY	2600	41.5 44	1700 1400	4500 13,000		LOW HIGH	10,500	FULL RICH	215 203		260		5
NORMAL RATED (MAX. CONT.)	2400	37.5 41	1500 1300	6700 13,500		LOW HIGH	11,000	FULL RICH	180 190		218		CONT.
MAXIMUM CRUISE	2100 2100	28.5 29.5	1005 905	12,500 18,500		LOW HIGH	16,000	CRUISING LEAN	80 85		205		CONT.
MINIMUM SPECIFIC CONSUMPTION	1600 1800 1900 2100 2000	29.5 27 26 F.T. F.T.	710 750 800 920 820	SEA LEVEL 5000 10,000 15,000 20,000		LOW LOW LOW LOW HIGH	16,000	CRUISING LEAN	51 55 59 73 74		205		CONT.

REMARKS: *MINIMUM SPECIFIC CONSUMPTION FIGURES ARE FOR AVERAGE MAXIMUM RANGE CONDITIONS.*

SECTION III

FLIGHT OPERATING DATA

1. AIR-SPEED LIMITATIONS.

a. Do not exceed an air speed of 340 IAS.

b. Do not exceed an engine speed of 2880 rpm.

c. Do not lower landing gear at a speed in excess of 170 IAS.

d. With landing gear down and wing flaps up do not exceed an air speed of 200 IAS.

e. Do not lower main landing gear or nose gear by means of emergency hydraulic lowering system at a speed in excess of 150 IAS.

f. Do not lower wing flaps or fly airplane with wing flaps down at a speed in excess of 170 IAS.

g. Do not lower wing flaps by means of the emergency mechanical system, or fly airplane after flaps are lowered by mechanical system at indicated air speeds in excess of 150 IAS.

h. Do not open bomb bay doors at an air speed in excess of 290 IAS.

i. Do not operate de-icer system at speeds above 230 IAS.

2. AIR-SPEED CORRECTION CHART.

Calibrated Indicated Air Speed—MPH	*IAS*	*Altimeter Error (Feet) (Add to Altimeter Reading)*	
		S.L.	15,000
100	99	20	30
120	118	25	40
140	137	30	50
160	156	40	65
180	176	50	80
200	195	65	100
220	214	80	130
240	234	100	160
260	253	125	200
280	272	150	240
300	291	180	290

3. SPECIFIC ENGINE FLIGHT CHART.

a. Operating limitations and characteristics of the R-2600-13 or R-2600-29 engine are summarized on the Specific Engine Flight Chart for ready reference. Flight operating personnel should be thoroughly familiar with this information.

b. Engine power ratings shown on the chart are defined as follows:

(1) TAKE-OFF. — Maximum recommended for take-off under the specified time limit of five minutes.

(2) MILITARY.—Maximum recommended for operation for periods not exceeding 15 minutes.

(3) NORMAL RATED (MAXIMUM CONTINUOUS).—Maximum recommended for operation with rich mixture in climb and level flight.

(4) MAXIMUM CRUISE.—Maximum recommended for operation with lean mixture.

(5) MINIMUM SPECIFIC CONSUMPTION. — The power at which greatest range can be obtained under average loading conditions.

4. LOAD AND BALANCE.

A load adjuster with carrying case and a Weight and Balance Data Handbook (AN 01-1-40) are furnished with each airplane. The load adjuster, which is similar to a slide rule, is used to check the load and balance from basic airplane to loaded airplane to insure that the weight distribution of all items loaded will not produce an unsafe balance condition. The airplane model designation stamped on every load adjuster indicates that the instrument may be used for balance calculations on any airplane of that particular model. However, the *index figure* entered in the carrying case identification card, or on Chart C of the Handbook, is correct only for the airplane whose serial number is printed on the card or handbook, and represents the balance moment of only that one particular basic airplane.

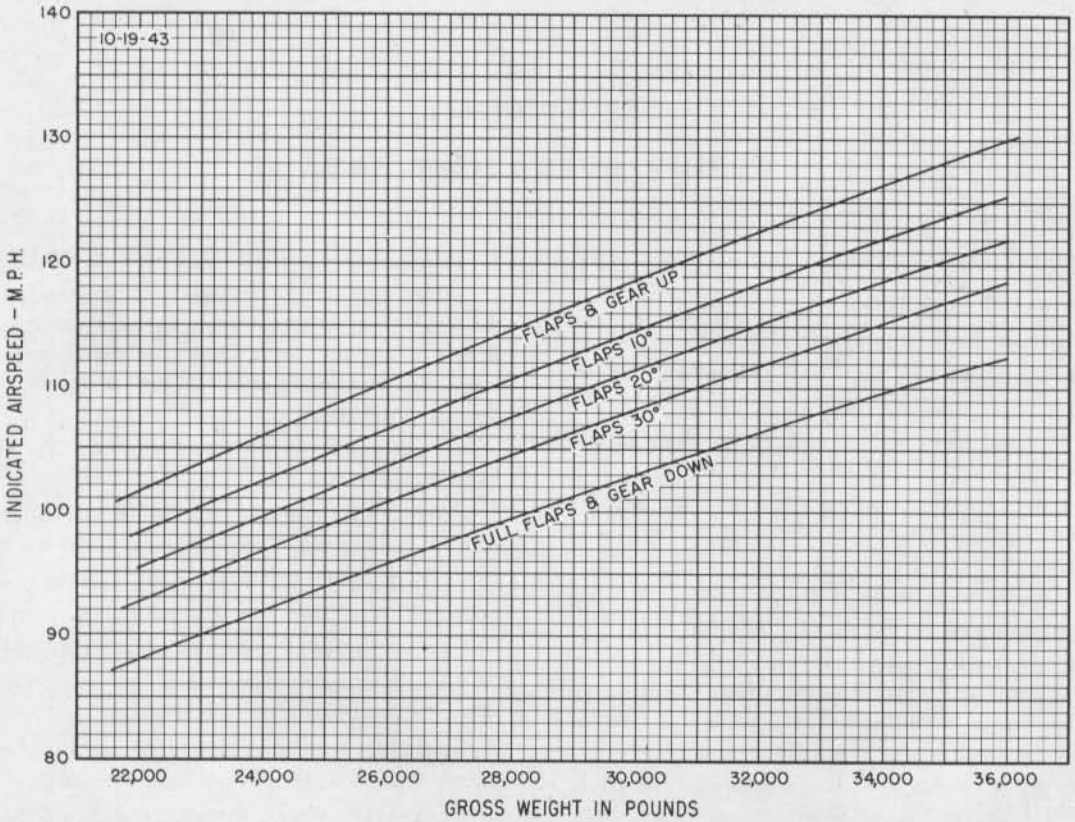


Figure 27—Stalling Speed Chart Specific Engine Flight Chart

SPEC. AN-H-8 DEC. 18, 1942 FORM ASC-512

AIRPLANE MODELS B-25H

SPECIFIC ENGINE FLIGHT CHART

ENGINE MODELS R-2600-13 OR R-2600-29

CONDITION	FUEL PRESSURE (LB/SQ. IN.)	OIL PRESSURE (LB/SQ. IN.)	OIL TEMP. °C	OIL TEMP. °F	COOLANT TEMP. °C	COOLANT TEMP. °F
DESIRED	6-7	80-85	50-70			
MAXIMUM	7	90	85 95 (CLIMB)			
MINIMUM	6	75				
IDLING	6-7	25				

MAX. PERMISSIBLE DIVING RPM: 2880

CONDITION	ALLOWABLE OIL CONSUMPTION
MAX. CONT.	.28. U.S.QT/HR
MAX. CRUISE	.15. U.S.QT/HR
MIN. SPECIFIC	.—. U.S.QT/HR

OIL GRADE: (S) 1120 (W) 1100

SUPERCHARGER TYPE:

FUEL GRADE: 100 OCTANE

OPERATING CONDITION	RPM	MANIFOLD PRESSURE (BOOST)	HORSE-POWER	CRITICAL ALTITUDE WITH RAM	CRITICAL ALTITUDE NO RAM	BLOWER	USE LOW BLOWER BELOW:	MIXTURE CONTROL POSITION	FUEL FLOW (GAL/HR/ENG.) U.S.		MAXIMUM CYL. TEMP. °C	MAXIMUM CYL. TEMP. °F	MAXIMUM DURATION (MINUTES)
TAKE-OFF	2600	44.3	1700	SEA LEVEL		LOW	ALWAYS	FULL RICH	215		260		5
WAR EMERGENCY	2600	49	1850	SEA LEVEL		LOW	ALWAYS	FULL RICH			260		5
MILITARY	2600	41.5 44	1700 1400	4500 13,000		LOW HIGH	10,500	FULL RICH	215 203		260		5
NORMAL RATED (MAX. CONT.)	2400	37.5 41	1500 1300	6700 13,500		LOW HIGH	11,000	FULL RICH	180 190		218		CONT.
MAXIMUM CRUISE	2100 2100	28.5 29.5	1005 905	12,500 18,500		LOW HIGH	16,000	CRUISING LEAN	80 85		205		CONT.
MINIMUM SPECIFIC CONSUMPTION	1600 1800 1900 2100 2000	29.5 27 26 F.T. F.T.	710 750 800 920 820	SEA LEVEL 5000 10,000 15,000 20,000		LOW LOW LOW LOW HIGH	16,000	CRUISING LEAN	51 55 59 73 74		205		CONT.

REMARKS: *MINIMUM SPECIFIC CONSUMPTION FIGURES ARE FOR AVERAGE MAXIMUM RANGE CONDITIONS.*

SECTION IV

EMERGENCY OPERATING INSTRUCTIONS

1. GENERAL.

All emergency instructions have been assembled in this section to facilitate quick reference by the flight crew. Members of the crew should thoroughly acquaint themselves with these instructions before their first flight in this airplane. Ground drills in emergency operations, exiting from airplane, and ditching are highly recommended.

2. EMERGENCY EXITS ON GROUND.

In addition to the forward and aft hatches, an emergency exit from the airplane may be made through the top of the cockpit enclosure, through the two cockpit side window sliding panels, the hatch on the aft right side of the fuselage, or the transparent hood of the tail gunner's station, which may be released by pulling the handle located above and slightly forward of the tail gunner's station.

3. ENGINE FAILURE DURING FLIGHT.

a. SINGLE-ENGINE FAILURE.—If only one engine fails, refer to the single-engine cruising charts in Appendix II and follow these instructions.

Note

The flying characteristics of this airplane with single-engine failure are exceptionally good and the airplane need not be abandoned unless the fuel is depleted. For maximum range conditions, fly at the lowest possible altitude and use the engine operating conditions as shown on the charts.

(1) Feather the propeller on the dead engine immediately. To feather the propeller, push propeller feathering control momentarily. To unfeather, set propeller control in "DECREASE RPM;" push feathering control and release at 800 rpm.

Note

In practice feathering while flying, the period of time the propeller is left in the feathered position should not exceed 15 minutes.

(2) Shut off the fuel to the dead engine. The shut-off valves may be controlled from either the handles to the left of the pilot's seat or the controls on the cannoneer's shelf in the aft end of the cannoneer's compartment.

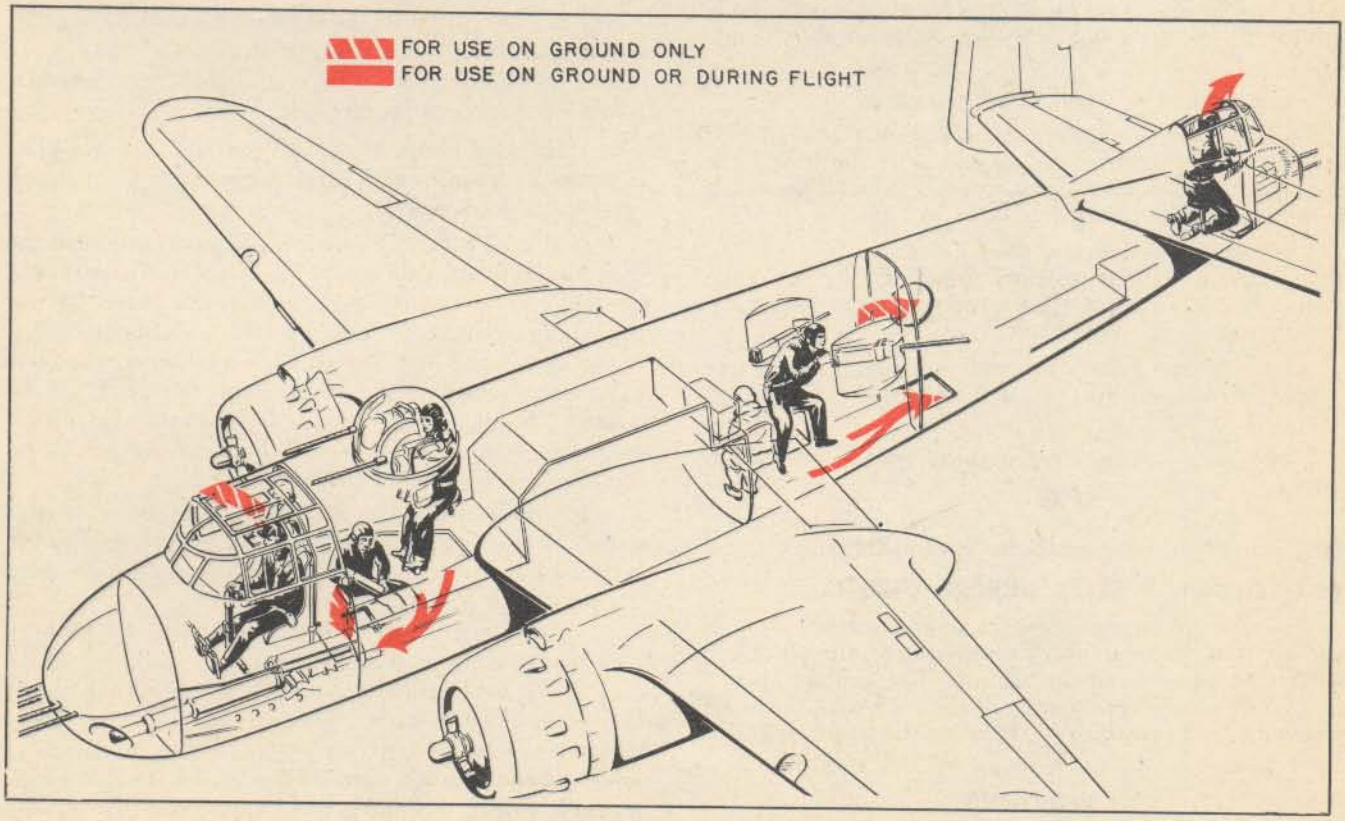


Figure 28—Emergency Exits

(3) All electrical equipment not necessarily required for flight should be turned off to prevent excessive current drain on the remaining generator.

(4) The airplane may be easily trimmed to fly hands off with one engine inoperative.

(5) When landing, the live engine should be in full "INCREASE RPM," in case full power is needed.

(6) In the single-engine approach to a landing, gradually reduce the power and trim the rudders accordingly to prevent sudden yaw. During the approach, maintain sufficient power to control the airplane and do not lower flaps fully until safe landing is assured. It must be remembered that after the glide is started, with subsequent lowering of air speed, level flight cannot be resumed even with full power until the airplane has been dived to regain the air speed lost.

Note

The pilot should practice single-engine operation.

b. TWO-ENGINE FAILURE.—With two-engine failure, the airplane may be abandoned (see paragraph 4), ditched (see paragraph 5), or brought in for a dead-stick landing, as the case requires. However, it should be kept in mind that the dead-stick landing qualities of this airplane are very good. For a landing with both engines dead, follow these instructions:

(1) Depress the nose of the airplane to remain above stalling speed.

(2) Turn off the ignition safety switch.

(3) If it is necessary to stretch the glide, feather both propellers. Windmilling propellers help for short landings.

(4) Shut off the fuel to both engines.

(5) Release bomb bay tank, if installed. If available, use hydraulic pressure to open and close the bomb bay doors; otherwise, order turret operator to crank the doors by the mechanical linkage.

(6) Lower the flaps to desired position by use of hydraulic hand-pump if system is intact. If the hydraulic system has failed, order the waist gunner to lower the flaps by use of the handcrank.

(7) Do not lower the landing gear. There is less chance of injury to the crew if the airplane is landed on its belly.

(8) Turn off battery-disconnect switch just before landing.

(9) Land into the wind in normal landing attitude, only changing direction sufficiently to avoid obstructions.

4. EMERGENCY EXITS DURING FLIGHT.

During flight, emergency egress should be made through the hatch in the cannoneer's compartment, the aft hatch, or the tail gunner's emergency exit. The airplane should be abandoned upon command of the pilot over the interphone or by a prearranged signal of the warning horns.

WARNING

Do not use pilot's escape hatch in flight—for ground use only.

5. DITCHING INSTRUCTIONS.

a. GENERAL.—These instructions are for the general guidance of all members of the crew in the event of a forced landing at sea, which is called "Ditching."

b. AVOIDING DITCHING.—Many ditchings could have been avoided by proper operation of the airplane and a thorough knowledge of its operating characteristics under all circumstances. The pilot should be thoroughly familiar with the Flight Operation Charts in Appendix II of this handbook. The pilot should know the proper method of flying this airplane in event of a single-engine failure (see paragraph 3), and he should fully understand the operation and limitations of the fuel system, particularly those controls which are used to transfer fuel from one tank to another or to shut off the fuel supply to an engine. The pilot should be practiced in flying the airplane at different weights at heights above 3000 feet, with one engine inoperative. It is extremely important that the pilot know the best speed and altitude for maintaining flight at reduced power under various kinds of circumstances.

(1) LIGHTENING THE LOAD.—If height cannot be maintained above a reasonable altitude because of failure of one engine, icing conditions, or other circumstances, lighten the load of the airplane by jettisoning these items:

(a) The bomb load or torpedo.

(b) The bomb bay droppable fuel tank, if not required in the attempt to reach a friendly base.

(c) Waist guns and ammunition, including 75-mm ammunition, if not liable to attack.

(d) Camera and other equipment not essential to the navigation of the airplane.

c. PREPARATION FOR DITCHING.—If the pilot is certain he cannot reach land, preparation for ditching must begin immediately.

(1) THE SIGNAL.—The pilot must command the crew by interphone to prepare for ditching. There should also be a prearranged signal, such as the letter "D" repeated three times. In addition, the warning horn system may be used as a signal. Each member of the crew must acknowledge the command of the pilot by the answer "Navigator ditching," "Tail gunner ditching," etc., and should then move to his ditching station so the pilot can adjust trim and lower the flaps.

(2) THE PILOT'S DUTIES.—The pilot coordinates the work of the crew, and makes certain they are carrying out the proper ditching procedure. In addition, the pilot must perform these tasks:

(a) Destroy confidential equipment by pushing both detonator buttons simultaneously.

(b) In accordance with the situation, use one of the three priority calls: SOS, or May Day by radio telephone; I may require assistance; I may be forced to land without further signal. Give a time and position; transmit course, height, ground speed maintained, and estimated position of ditching (this information secured from navigator).

Note

On airplanes having liaison radio equipment, the above duty will be performed by the waist gunner-radio operator.

(c) Destroy secret papers.

(d) Be sure bombs, torpedo, or ferrying tank has been dropped and bomb doors are closed. However, if there is not sufficient time to accomplish this, keep the doors closed and check the bomb controls at "SAFE." This is absolutely essential.

(e) Release pilot's escape hatch. This must be done to prevent hatch from being jammed upon impact.

(f) Check landing gear UP.

(g) Switch on landing lights, if darkness or hazy weather conditions make this necessary, providing the lights do not cause reflections which disturb vision.

Note

Although the surface of the water may be seen in the beam of the landing lights, judgment of height by this means may not be correct.

(3) NAVIGATOR'S DUTIES. — The navigator should have a constant knowledge of wind speed, direction, drift, and fixed position of the airplane. He should always know the fuel consumption in relation to his estimated time of arrival. At the pilot's command, the navigator will:

(a) Calculate position of airplane.

(b) Advise pilot of position, course, and speed maintained.

(c) Advise pilot of estimated position of ditching.

(d) Inform pilot of surface wind and direction.

(e) Destroy secret papers and place charts, with latest position marked on them, in satchel.

(f) Make certain lower hatch is securely closed.

(4) CREW DUTIES.—Upon the pilot's order to prepare for ditching, each crew member shall acknowledge the order, remove his parachute, and then proceed as follows:

(a) UPPER TURRET GUNNER. — If there is sufficient altitude, drop all 75-mm shells through the ejection chute, and then go to ditching station.

(b) TAIL GUNNER.—If not needed for combat, and if there is sufficient altitude, release escape hatch and go forward to assist waist gunner.

(c) WAIST GUNNER (Aided by Tail Gunner).

1. Release each gun from its mount and lift it high enough to slacken tension on the bungee cables; and as the tail gunner pulls the cable forward, unsnap each cable.

2. Unload guns, disconnect feed chutes and sacks, and throw each gun through its respective window.

3. Chop the remaining glass from the side windows with the hand axe.

4. Have tail gunner throw camera and other predetermined unnecessary equipment overboard.

5. Each man proceed to his ditching station.

d. SEA AND WIND CONDITIONS AFFECTING DITCHING.

(1) GENERAL.

(a) With a calm sea, there may be a little or no wind, making it essential to ditch with the lowest IAS possible. Such a sea is deceptive with regard to judgment of altitude, particularly if the surface is "glassy." If there are ripples upon the surface, judgment of altitude is improved.

(b) Waves always move with the wind except when close in shore and in fast flowing estuaries. Waves are the direct result of the wind which creates and maintains them.

(c) "Swell" is an undulating movement of the surface caused by past or distant disturbances by action of the wind. A swell does not necessarily move with the wind, and it has no breaking crests. If the wind is blowing across the swell, a cross-sea is created with the waves (which are moving down-wind) running on the swell.

(2) WIND DIRECTION.—In the absence of any fixed mark (land, lightship, etc.) or floating object not under way, the pilot can only judge his motion relative to the motion of the waves.

(a) Waves move down-wind and the line of the wind can be taken to be at right angles to the lines of the wave crests.

(b) If there is sufficient wind, waves break, and they break down-wind. This can readily be observed from a low altitude. If the aircraft is flown at right angles to the breaking waves, the direction of drift will be apparent.

(c) If there is enough wind to blow the spray off the wave crests, the direction in which the spray moves is reliable.

(d) Where the surface is not broken up, it is possible to watch gusts rippling the surface in great sweeps, which indicate the wind direction.

(e) Wind on the surface of the sea sometimes produces a series of lines known as "wind lanes," which appear as alternate strips of light and shade. This is a reliable indication of surface wind direction.

(3) STRENGTH OF WIND.

(a) The roughness of the sea is an indication of the strength of the wind, if it has been blowing at the same strength in the same direction for some time.

(b) The wind will be stronger than the appearance of the sea suggests if it is freshening, blowing off a nearby shore, running with tide or swell, and during heavy rain.

(c) Breaking waves may be due to shallow water, and in such circumstances must not be used as a means of calculating wind speed and direction.

(d) General indications of wind speed are as follows:

1. A few white crests	10 to 20 mph
2. Many white crests	20 to 30 mph
3. Streaks of foam along the water	30 to 40 mph
4. Spray from the crests	40 to 50 mph

e. PROCEDURE DURING DITCHING.

(1) GENERAL.

(a) The pilot must maintain intercommunication with the crew until the last moment and warn them of the impending impact. It is absolutely essential that the crew be braced against impact when the airplane is ditched. However, it is not reasonable to expect a crew to remain braced for long periods; and if they are not in communication with the pilot, the temptation to get up and see how things are progressing may end in one of them being caught out of a ditching station with consequent injury.

(b) The crew must not relax or release themselves in their ditching stations until the airplane has come to rest. The first impact of the tail should not be mistaken for the shock against which they are on guard; it will be followed by a much greater shock as the nose strikes the water after a correct tail-down ditching.

Note

Serious casualties have occurred in those cases where crew members have not taken up proper ditching stations, or where they have relaxed before the final impact. These instructions are the result of experience based on many ditchings, and should be implicitly followed. If there are apparent defects in the official procedure, the attention of higher authority must be drawn to the fact. There is still much to learn concerning ditching, and improvements in procedure can still be made.

(2) HANDLING THE AIRPLANE (Important Procedure).

Note

The following is recommended:

(a) Ditch airplane before fuel is exhausted, in order to maintain power during landing operation.

(b) Lower flaps to medium setting ONLY. (A steep nose-down descent is dangerous due to possible erroneous altitude conception.)

(c) Use engines to flatten out approach.

(d) With only one engine available, use only a little power to flatten approach.

CAUTION

Maintain a *margin* or rudder power in hand right down to the stall. DO NOT open up engine during final stages of landing.

(e) If no power is available, use normal glide approach speed to ensure control and some margin of speed after flattening out.

(f) Choose point for ditching:

1. Towards an oncoming swell preferred.
2. Steep swell—Along top.
3. Long ocean swell—Up-wind; on upslope towards top.
4. Along a swell across wind—On upslope of swell.

(g) If possible, hold off until all excess speed above stall is lost at the normal three-point (slow landing) attitude.

(h) In a short, moderate, or calm sea, if the airplane bounces, the control column should be held hard back. In the average short sea, the tail should touch the crest of a wave; and as soon as it does so, the nose should be kept up as much as possible. This should cause the forward section to touch down approximately under the cg on the next wave crest.

WARNING

From the air, the open sea always appears much more calm than it actually is.

f. DITCHING CHARACTERISTICS.—The airplane should land tail down. There will be a slight impact as the rear of the airplane strikes, and this will then be followed by a very severe impact with violent deceleration, in most cases. If the airplane has been brought down too fast, a bounce will occur. The nose will bury as the airplane comes to rest; however, if the landing has been carried out correctly, the effect of the nose burying will be minimized and the structure may not collapse.

g. ABANDONING AIRPLANE.

(1) GENERAL.—There are two critical periods in ditching.

(a) The actual handling of the airplane on the water; this is the sole responsibility of the pilot.

(b) The immediate abandonment of the airplane in an orderly manner after ditching; this requires the perfect coordination of the entire crew. Even in a training fuselage in a hangar this cannot be done efficiently without a great deal of advance practice. Far less can be expected after a severe shock in a fuselage rapidly filling with water unless the procedure has been painstakingly planned and practiced. Every crew member must know his job to the last detail. Many crews have saved themselves by carrying out a well-executed abandonment of the airplane. It requires advance practice—a great deal of it.

(2) PROCEDURE.—The procedure after the airplane has come to rest, is as follows:

(a) The crew must not release themselves until the airplane comes to rest.

(b) This airplane has a life-raft release in the pilot's compartment and the waist gunner's compartment. Should both of these mechanisms fail, the life raft may be released from outside the airplane by pulling up on the life raft stowage compartment handle, located above the left-hand flap trailing edge in the fuselage.

CAUTION

Operate the manual release of the life raft as soon as the airplane comes to rest, but *not before.* Pulling the release before or during ditching can result in inadvertent release of the life raft as the airplane strikes the water, and the possibility of the life raft drifting out of reach.

(c) As soon as the airplane comes to rest after the final impact, personnel will rise from the ditching stations and collect the equipment detailed to them. Leave in the correct order by the hatch assigned you, and carry that equipment allocated to you. Remember that the emergency radio is the most vital piece of equipment required in the life raft to assist rescue.

(d) On emerging, inflate your life jacket. Do not be surprised to find that waves may be breaking over the airplane, and it is possible to be swept off the airplane. Hold on to the outside of the hatch and await a favorable moment to board the life raft, but be careful not to block the escape hatch or to hinder the tempo of abandonment to any great extent.

(e) If the life raft should inflate inverted, an endeavor should be made to right it from the wing if the airplane is not sinking rapidly; otherwise, one (and one only) of the crew should jump into the sea and right it. There are two methods of doing this, depending on the type of life raft:

1. If there are handling patches on the bottom of the raft, pull on them with both hands, placing the knees on the buoyancy chamber. While still hauling on the handling patches, lean back and prepare to become submerged for a moment. Even the largest life raft will turn over.

2. If the raft has a ladder arrangement on it rather than the handling patches, place your toe on the bottom of the ladder, and grasp the two nearest stabilizing pockets. Lean back and haul on the pockets while pressing on the ladder with your foot.

Note

Do not jump onto the inverted life raft, as that expels air trapped beneath it and makes righting more difficult. The line which attaches the life raft to the airplane is light so that it will break if the airplane sinks while the raft is still attached.

h. BOARDING LIFE RAFT.

(1) If the ditching has been made into the wind, the life raft should float toward the empennage and the boarding should not be difficult.

(2) If a cross-wind ditching has been made, the airplane will tend to swing into the wind. If the life raft is on the up-wind side of the airplane, there is a danger of its becoming wedged beneath the wing as the airplane rolls and swings into the wind. If the raft is on the down-wind side there is danger of its getting beneath the fuselage or tail assembly, which may be thrashing up and down as the airplane weathercocks into the wind.

Note

Look out for jagged edges which might puncture the life raft.

(3) Do not jump into the life raft; doing so could damage it and endanger the lives of the entire crew.

(4) One man in the raft can be of great assistance in helping the others aboard.

(5) Avoid getting any wetter than is absolutely necessary. Wet clothes must NOT be taken off; it is far warmer with wet clothes on than off. In hot weather the body should be covered from the sun.

(6) On every life raft there is a heaving line to be used in aiding crew members to reach the raft.

(7) All the above actions concerning the boarding of the raft are comparatively simple if the life jacket is fully inflated. If this jacket has been partly inflated by mouth, the mouth valve must be closed before using the CO_2 bottle. A nonswimmer can feel quite confident in a fully inflated jacket, providing the leg straps are secure.

i. ABOARD THE LIFE RAFT.

(1) GENERAL.

(a) Once everyone is aboard, the pilot should call the roll, give the order to cast off, and then the crew should paddle away from the airplane.

(b) The whole crew should then rig the life raft cover.

(c) Once the raft cover is rigged, bail out most of the water.

(d) The crew member, so detailed, should check for leaks and stop them up with the repair material provided. Another member of the crew is also detailed to connect up the inflating bellows and inflate until the raft is rigid. If any of the crew are in the water, inflation of the raft will make boarding easier.

(2) USE OF EMERGENCY RADIO TRANSMITTER.—The SCR-578 radio equipment consists of a transmitter, antenna accessories, and a parachute, all contained in two canvas bags stowed in the aft compartment of the airplane. The importance of ensuring that this equipment reaches the life raft after ditching cannot be too highly stressed. It is the duty of the whole crew to know where this equipment is stowed, so that it will reach the life raft in any event. Follow these instructions:

(a) PREPARING THE TRANSMITTER.—Remove the transmitter from the bag and place it on the floor of the raft, securing it to the raft if possible. Remove the crank from its stowed position on top of the transmitter case and install it. There is only one crank, so it much be handled with care.

CAUTION

Do not attempt to operate the radio equipment when there is lightning; severe injury to personnel could result.

(b) RAISING ANTENNA.—There are two antennas, one attached to a kite and the other to a balloon. The kite is easier to handle, but if there is not sufficient wind velocity, it will be necessary to use the balloon.

1. THE KITE.—Remove the kite from the accessory bag and assemble it by pushing the "spiders" outward into a "snap" position (similar to an umbrella). Attach the antenna swivel clasp to one of the eyelets of the kite. Then, while standing in the raft (if possible), slowly let out the antenna through the hands, being careful to prevent the kite from touching the water. The pigtail at the lower end of the antenna is used to attach the antenna to the life raft.

Note

It is important that the antenna be fully extended.

2. INFLATION OF THE BALLOON.—Carefully remove the balloon from the can. The inflating tube is screwed into the top of the generator; remove generator stowage plugs. Wet the needle of the inflating tube and insert it into the balloon valve up to the shoulder. Lower the generator into the water to the depth of the first red line, and hold it there for ten minutes. Then lower the generator to the second red line and hold there until the balloon is completely inflated. Keep the balloon neck from crimping.

Note

If a bubbling sound is heard, raise the generator to the lower red line until it stops. At no time raise the generator out of the water. More complete information will be found in the booklet stowed in the accessory case attached to the transmitter.

(c) OPERATING TRANSMITTER. — After strapping the transmitter between the legs and releasing the ground wire into the water, set the switch on the face of the transmitter to the desired position. Then turn the crank with sufficient speed to light the indicator lamp, and the transmitter will radiate a signal or the signal lamp will be lit. The transmitter is adjusted to the antenna by turning the tuning control for maximum brilliancy of the TUNE TO BRIGHTEST indicator.

(3) OTHER MEANS OF ASSISTING RESCUE.

(a) When craft are in a position to see signals, fire the life raft pistol or any available pyrotechnics, but conserve as much as possible.

(b) Floating flashlights should be carried by each member of the crew. At night these will allow any member of a crew to show his position if he is separated from the others in the water. These lamps can also be used for signaling. They should be tested periodically without breaking the seal.

(4) RATIONING OF FOOD AND WATER.—This is the duty of the pilot. If he is not there, this duty falls to the elected captain of the life raft.

(a) WATER. — For the preservation of life, water is more valuable than food. It is of the greatest importance that the drinking water available reaches the raft and that extreme care is taken to avoid any loss. Drink nothing the first 24 hours. Thereafter, drink one pint daily, in small quantities at a time. Do not try to conserve the supply by limiting your daily intake to less than this. Diminish the loss from sweating by keeping as cool as possible and exerting yourself as little as possible during the heat of the day. In hot weather keep the body cool by dampening (not soaking) the clothing with sea water.

(b) SOLID FOODS.—The pilot will take stock of available rations in the raft and make provision for rationing on a basis of three meals a day for at least six days. The number of days over six for which the pilot makes provision will depend on the distance from shore and the success of aircraft and life raft signals.

(c) ENERGY TABLETS. — These tablets are packed in the emergency flying ration. Use these tablets strictly in accordance with the instructions printed on the container.

6. LANDING GEAR EMERGENCY LOWERING SYSTEM.

a. GENERAL. — An emergency hydraulic lowering system is provided for the concurrent operation of the main landing gear and nose gear. The system consists of an emergency hand-pump and a hydraulic fluid reservoir, both in the cannoneer's compartment, the necessary automatic valves to regulate normal and emergency flow of fluid to the operating struts, a nose-gear up-lock release cable interconnecting the hand-pump handle with the up-lock latch, and fluid transmission lines. The emergency reservoir is connected to the main system reservoir in such a manner that it is automatically filled when the main system reservoir is filled, and is available for emergency lowering of the landing gear EVEN IF THE MAIN HYDRAULIC SYSTEM FLUID IS COMPLETELY LOST.

b. OPERATION.—The following is the procedure to be followed when operating the landing gear emergency hydraulic lowering system:

(1) The landing gear control handle in the pilot's compartment must be in the "DOWN" position.

(2) Unlatch bail to release emergency lowering pump handle on the forward wall of cannoneer's compartment.

WARNING

The nose gear up-lock is released by a cable interconnected with the emergency hand-pump handle. The first stroke must therefore be a FULL one. Check pilot's landing gear position indicator to see that the nose gear is partially extended; if it has not been released from the up-lock, give the pump handle another FULL stroke to release the gear from the up-lock.

(3) Operate emergency hand-pump until gear is DOWN and LOCKED.

(4) Retard throttle momentarily to ascertain that gear is locked down, as evidenced by failure of warning light to appear.

(5) Return the emergency pump handle to the "UP" position and latch it. Keep pump handle latched when not in use.

WARNING

DO NOT lower the landing gear by means of the emergency hydraulic system above 150 mph indicated air speed. The airplane should be in level flight or preferably in a gliding attitude.

Note

The landing gear cannot be retracted by the emergency hydraulic system.

c. EMERGENCY HYDRAULIC OPERATION OF MAIN LANDING GEAR DOWN-POSITION LATCHES.

IMPORTANT

The following emergency operation should be accomplished whenever the main landing gear down-position lockpins fail to engage automatically, regardless of the method used to lower the main landing gear. (Yellow flags on position indicator instrument are visible when lockpins are not engaged.)

(1) With gear fully extended (check position indicator) turn emergency hydraulic selector valve to LATCH.

(2) Operate pilot's hydraulic hand-pump until position indicator shows main landing gear lockpins in place.

CAUTION

Main landing gear must be fully down prior to using hand-pump, and airplane speed must not be greater than 150 mph. Pressure sufficient to damage lockpin linkage can be obtained with the hand-pump if operated when gear is not fully down.

(3) If the lockpins should inadvertently be pumped to the latched position before the gear is fully extended, the following procedure may be attempted:

(a) Turn the emergency selector valve to NORMAL to relieve hand-pump pressure on the lockpins.

(b) Again operate the hand-pump as instructed above, to force the gear past the lockpins.

(c) With the gear fully extended (check position indicators), return the emergency hydraulic selector valve to latch and operate the hand-pump until the position indicator registers that the lockpins are in place. However, as the above procedure may not work in every case, do not rely on it but consider it rather as a corrective procedure to be attempted only in an extreme emergency.

7. WING FLAP EMERGENCY LOWERING EQUIPMENT.

a. To operate the wing flap emergency control proceed as follows:

(1) Move the hydraulic flap control in the pilot's compartment to the extreme "DOWN" position.

(2) Remove the handcrank from its stowage position on the forward bulkhead of the waist gunner's compartment, and engage it with the shaft which is located under a flap on the ledge of the bulkhead above the crank stowage position.

(3) Rotate the crank clockwise until the flaps are in the desired position.

(4) To lock the flaps, remove the crank.

(5) When it is desired to return the flaps to normal operation, engage the crank and turn it counterclockwise as far as it will go; then remove the crank and restore it to its stowed position.

8. EMERGENCY BRAKE OPERATION.

a. EMERGENCY HYDRAULIC BRAKE OPERATION.—Before landing airplane, if there is less than 1000 pounds per square inch pressure indicated on the brake system pressure gage, build pressure in the brake system accumulator as follows:

(1) Turn emergency hydraulic selector to BRAKE.

(2) Operate hydraulic hand-pump until brake system pressure gage indicates at least 1000 pounds per square inch and not more than 1450 pounds per square inch.

IMPORTANT

While applying brakes after landing, operate hand-pump continuously to maintain as much pressure as possible in the brake system accumulator as the initial accumulator pressure alone is not adequate for the amount of brake application required for a normal landing. Apply brakes slowly and do not pump pedals. In this way, accumulated pressure will be conserved.

(3) If a pressure of at least 600 pounds per square inch cannot be built up in the brake system accumulator prior to landing, a field with at least one mile runway should be found in order to land the airplane safely.

b. EMERGENCY AIR BRAKE CONTROL.

IMPORTANT

The air pressure brake system will be used only as a last resort to stop the airplane if the emergency hydraulic hand-pump operation outlined above cannot be accomplished, or if the pressure obtained with the hand-pump is inadequate for stopping the airplane on the landing field available. WHEN IT IS KNOWN IN ADVANCE THAT THE EMERGENCY AIR PRESSURE BRAKE SYSTEM MAY HAVE TO BE USED DURING LANDING,

CHOOSE THE LONGEST RUNWAY AVAILABLE AND MAKE THE SHORTEST LANDING POSSIBLE. The airplane should be allowed to lose as much speed as possible, consistent with safety, prior to applying the air brakes. As brakes cannot be applied selectively, the pilot must be ready to counteract any uneven action with the throttle.

(1) To apply the emergency air brake, pull up sharply on the control handle (in order to break safety wire) and lower handle halfway almost immediately. Repeat this operation, applying brakes by very quick, successive upward pulls of the handle from the intermediate position until the desired amount of brake action is obtained. Spring action aids in lowering the handle to the halfway (intermediate) position; in this position the air pressure to the brakes will be maintained.

(2) To release the emergency air brakes it is only necessary to push handle fully down to its normal position.

(3) The air brake may be reapplied with reduced force after having released the pressure in the above manner, by again pulling up on the control handle. The amount of brake action obtained during a second application is dependent upon the length of time the handle was held up during the first application. For example, full pressure is exerted upon the brake discs when the handle is held up for two or three seconds. By applying the brakes in this manner only one-third of maximum pressure can be obtained during second application. However, the pilot should depend on only one application.

WARNING

To place the handle in the intermediate position, the handle must be lowered by hand. If handle is released suddenly, a spring will return the handle to its normal position and release the pressure from the brakes. After a landing during which the air brakes were used, taxiing should be done very carefully as little, if any, brake pressure will be available. Before air brakes are released, it may be necessary for ground crews to block the wheels.

CAUTION

After using emergency air brake system, hydraulic brake system must be bled.

9. EMERGENCY GUN TURRET OPERATION.

a. UPPER TURRET.—In case of turret power failure, it is possible to stow the guns manually by means of the handcrank and extension shaft stowed at the base of the turret. This is accomplished as follows:

(1) Lower the guns by attaching the extension shaft to the elevation speed reducer located forward of gun sight, attaching the handcrank to the extension shaft, and turning the handcrank clockwise (looking down).

(2) Rotate the turret so the guns point straight aft by engaging the handcrank with the end of the azimuth shifter shaft, located at the base of the turret, pulling the shaft out approximately ½ inch with the crank, and turning the crank. The turret rotates clockwise when the crank is turned counterclockwise (looking from the shaft end).

b. TAIL TURRET.—If the hydraulic or electric systems of the turret fail, operate the guns manually as follows:

(1) Open the elevation and azimuth bypass valves, located between the armor plate and upper section of the control tower.

(2) Swing open the armor plate panels to gain access to the manual grips mounted above and between the guns.

(3) Move the guns manually by the grips. The manual grips are moved into position by pulling release pin, lifting handles, and turning clockwise as viewed from top. Fire the guns by pressing the trigger switches on the grips, or by pulling the mechanical triggers on the grips if the electrical circuit is defective.

Note

If the electrical circuit fails, it will be necessary to break the ammunition belts into 75-round units, since the booster motor will be inoperative.

10. EMERGENCY BOMB OR DROPPABLE FUEL TANK RELEASE.

When the hydraulic system is functioning properly, the bomb load or the droppable fuel tank is released as follows:

a. On B-25H-1 airplanes, move the bomb control handle to "SALVO." To close bomb doors after releasing bombs or fuel tank, move bomb control handle to "DOORS CLOSED."

b. On B-25H-5 and subsequent airplanes, lift up the antisalvo guard and actuate the bomb salvo switch. To close bomb doors after releasing bombs or fuel tank, turn bomb master switch "ON" and move the bomb doors control switch to "CLOSE".

WARNING

Prior to releasing bombs in an emergency, position the bomb nose fusing switch as desired. When over friendly territory, turn switch OFF; when over enemy territory, turn switch ON. On B-25H-5 and subsequent airplanes, the bomb master switch must also be "ON" to accomplish an armed salvo release.

11. BOMB BAY DOOR EMERGENCY OPERATION.

The manual opening of bomb bay doors is to be accomplished only in the event of complete hydraulic system failure. If the bomb bay doors fail to open when the bomb control handle is placed in the "DOORS OPEN" position (on B-25H-5 and subsequent airplanes, bomb doors' control switch in "OPEN"), as evidenced by failure of the bomb door indicator light to illuminate, proceed as follows:

Figure 29—Life Raft Emergency Radio

a. On B-25H-5 and subsequent airplanes only, pull out on the bomb door control valve override handle at the base of the upper turret.

b. Remove bomb bay door operating handcrank from its stowage on the lower right longeron opposite the turret pedestal.

c. Place the crank in the drive socket on the forward face of the upper turret pedestal with the handle positioned upwards.

d. Turn crank clockwise to open the doors, and counterclockwise to close the doors. An automatic clutch mechanism incorporated in the crank makes it possible to operate the crank in either direction and helps hold the doors in position.

IMPORTANT

After closing the bomb bay doors with the crank, thread the strap on the crank handle through the tie-down loop on floor below crank, and tighten securely. This is necessary as the brake action of the crank clutch mechanism is not sufficient to hold doors closed. Normally, the doors are held in the open and closed positions by hydraulic pressure. It is not necessary to secure operating crank with the strap to hold bomb bay doors in the open position.

WARNING

If it is necessary to make an emergency exit through the front entrance hatch when the bomb bay door handcrank is installed, first untie the strap and open the bomb doors; then remove the handcrank. The doors will remain in the open position when the crank is removed. The handcrank must be removed to make it possible to raise the inner door of the hatch. As the bomb bay doors fall approximately two-thirds open when there is hydraulic system pressure failure, regardless of the position of the bomb controls, an emergency exit through the front entrance hatch might result in serious personal injury if the bomb doors were only partially opened.

12. EMERGENCY TORPEDO RELEASE.

To release the torpedo in an emergency, proceed as follows:

a. On B-25H-1 airplanes, move the bomb control handle to "SALVO." This action will open the bomb bay doors and release the torpedo. Close the doors by moving the bomb control handle to "DOORS CLOSED." In case of hydraulic failure, which will be indicated by a bind between the "DOORS OPEN" and "SEL" posi-

1. LIFE RAFT
2. FIRST-AID KIT
3. WING FLAP CRANK AND DRIVE
4. PYROTECHNIC RECOGNITION SIGNAL PISTOL
5. FIRST-AID KIT
6. LIFE RAFT RADIO
7. FIRE EXTINGUISHER
8. HAND AXE
9. INCENDIARY GRENADE MOUNT
10. FUEL TRANSFER PUMP
11. BOMB BAY DOOR CRANK AND DRIVE
12. INCENDIARY GRENADE MOUNT
13. FIRE EXTINGUISHER
14. LANDING GEAR EMERGENCY LOWERING
15. LIFE PRESERVER CUSHION
16. RADIO DEMOLITION SWITCH
17. ALARM HORN SWITCH
18. BATTERY-DISCONNECT SWITCH
19. PROPELLER FEATHERING SWITCH
20. FUEL BOOSTER PUMP SWITCHES
21. IGNITION SWITCH
22. BOMB AND BOMB BAY FUEL TANK RELEASE
23. EMERGENCY AIR BRAKE HANDLE
24. HYDRAULIC HAND-PUMP
25. HYDRAULIC SELECTOR VALVE

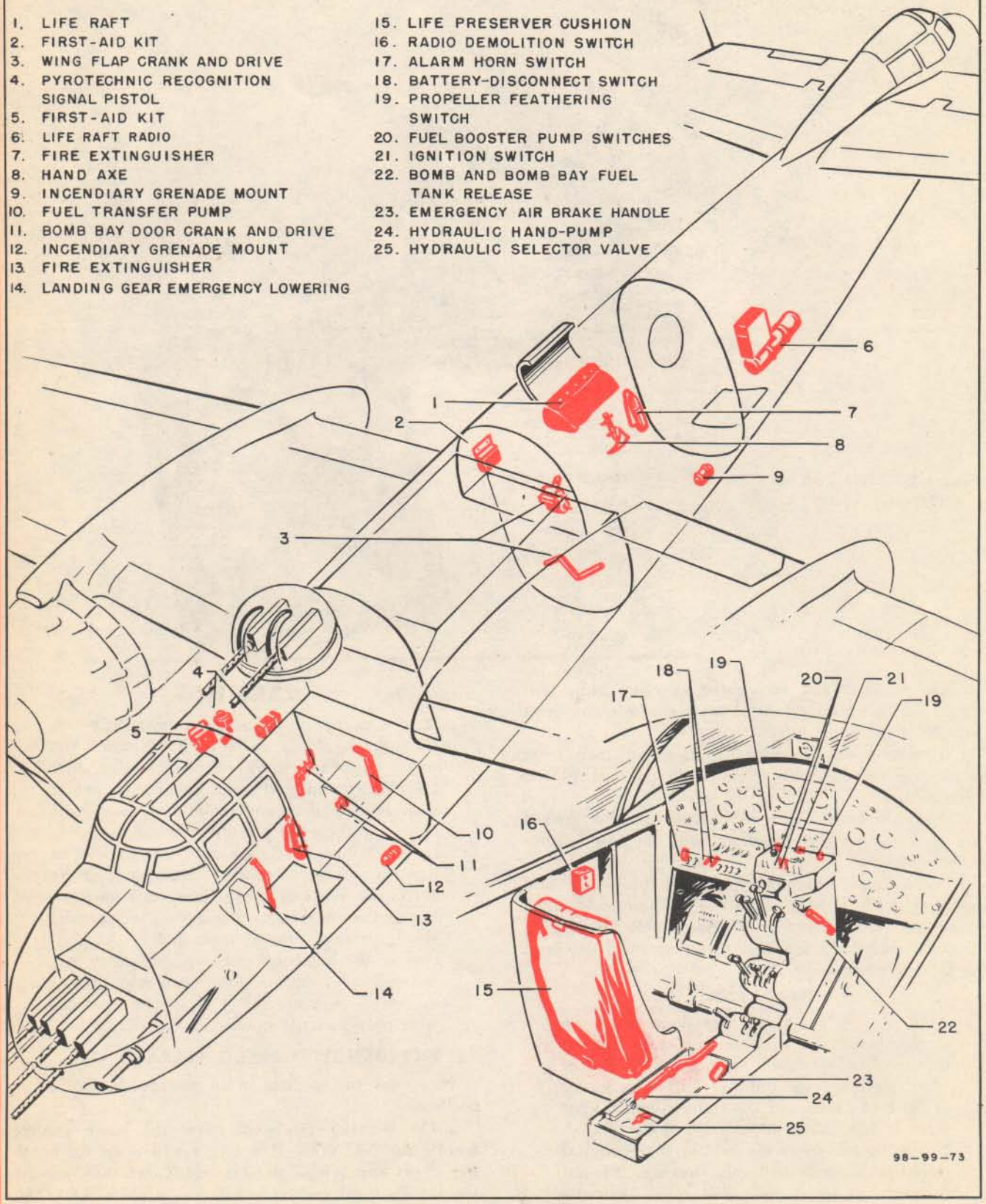


Figure 30—Emergency Equipment

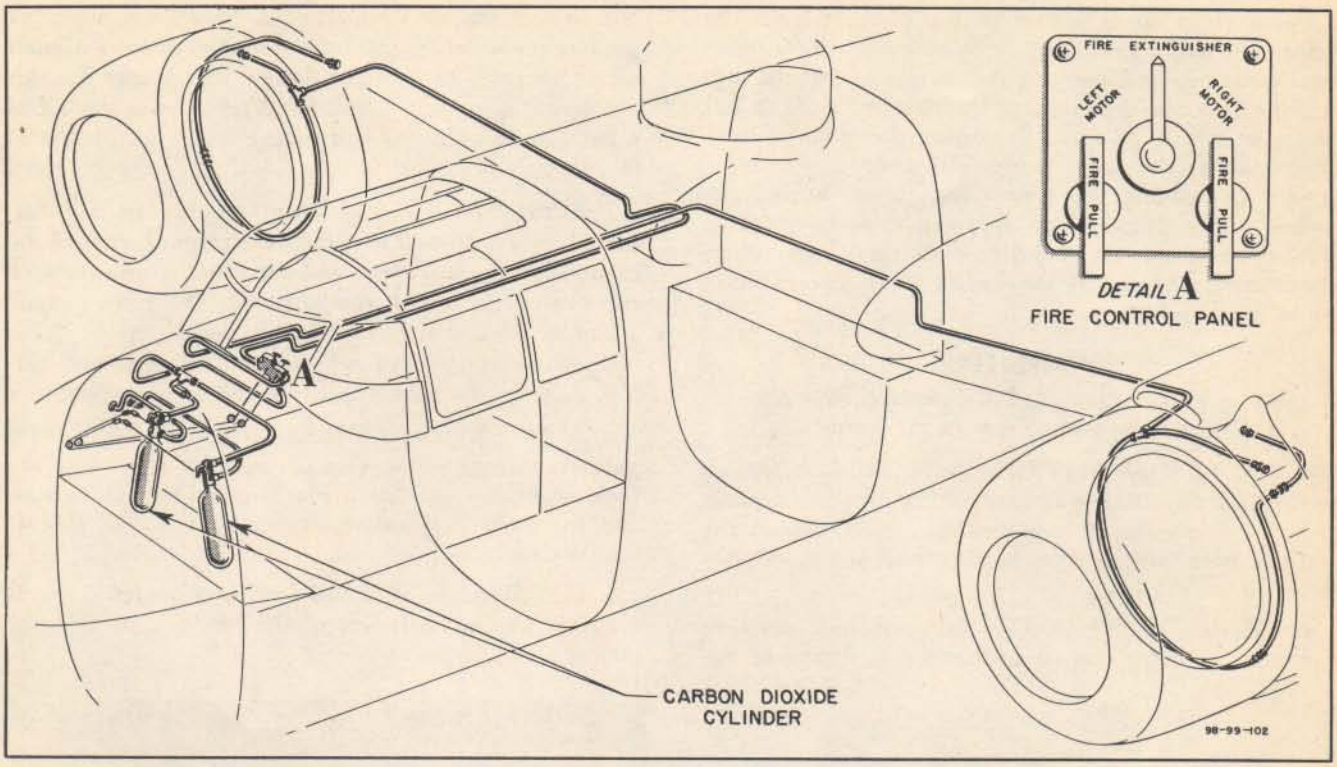


Figure 31—Engine Fire Extinguisher System

tions when the control handle is operated, the doors must be manually opened.

b. On B-25H-5 and subsequent airplanes, lift the antisalvo guard and actuate the bomb salvo switch. This will open the bomb doors and release the torpedo. To close the bomb bay doors, turn master bomb switch "ON," and bomb doors control switch to "CLOSE."

13. ENGINE FIRE EXTINGUISHER SYSTEM.

A pressure-type CO_2 engine fire extinguisher system, incorporating two CO_2 cylinders, is installed on B-25H-5 and subsequent airplanes. The fire extinguisher control on the right instrument subpanel consists of a release handle for each cylinder and a selector valve. The system may be used to direct the gas from one or both cylinders to either engine, as desired. Safety fuses for indicating a premature discharge of either cylinder are located on the right side of the fuselage above the nose wheel. Operation of the system is as follows:

a. Set selector valve handle to "RIGHT MOTOR" or "LEFT MOTOR."

b. Pull one of the red handles marked "FIRE PULL."

c. The system can be used again for the same or opposite engine by setting the selector valve handle as desired, and pulling the other red handle.

14. MISCELLANEOUS EMERGENCY EQUIPMENT.

a. ALARM HORNS.—The alarm horns located at all crew stations are controlled by a switch in the lower left section of the pilot's switch panel. The switch lever is red and bears the word ALARM.

b. LIFE RAFT.—A life raft, stowed in the upper forward left corner of the waist gunner's compartment, is provided for use after a forced water landing. Necessary emergency equipment, including rations, oars, hand-pump, signal flare pistol, rubber patches, etc., is stowed in the life raft. A CO_2 cylinder for the inflation of the raft, is also a part of the unit.

c. LIFE PRESERVER.—The back cushion on the pilot's seat is filled with kapok and may be used as a life preserver.

d. EMERGENCY FUEL PUMP.—An emergency fuel transfer hand-pump is located on the floor of the cannoneer's compartment. In the event of failure of the electric pumping system, fuel may be transferred from the bomb bay tanks to the wing tanks by the operation of this hand-pump.

e. EMERGENCY FUEL SHUT-OFF VALVE.—Two emergency fuel shut-off valves on the shelf at the aft end of the cannoneer's compartment are for use should the pilot be unable to operate the shut-off valve in the cockpit.

f. INCENDIARY GRENADE MOUNTS.—A mount or retainer for stowing an incendiary bomb is located at the lower left side of the cannoneer's compartment. Another is situated in the aft left section of the waist gunner's compartment.

g. PYROTECHNIC RECOGNITION SIGNAL PISTOL.—An M-8 type pyrotechnic pistol is stowed in a canvas holster in the cannoneer's compartment as loose equipment. For use, it is placed in the mount in the

forward right upper corner of the compartment. The pistol is installed in the mount by removing the friction-type cover cap and inserting the muzzle so that the lugs fit into the slots, then turning the pistol to right or left as far as it will go while depressing the mount release trigger above the pistol barrel. The pistol may then be loaded by moving the breech lock lever, behind the mount release trigger, and applying force on the butt until the breech opens, and then inserting the signal into the chamber and closing the breech, which automatically cocks the pistol.

WARNING

As no safety is provided, the pistol should not be loaded except when it is in the mount.

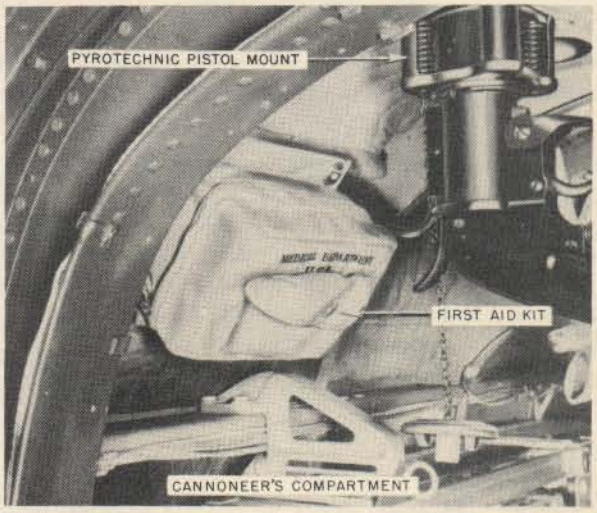
b. RADIO DEMOLITION SWITCH. — A switch controlling the charge for demolishing the identification radio in an emergency is located on the left side of the cockpit. Both buttons must be depressed simultaneously to set off the charge.

i. EMERGENCY RADIO.—An emergency portable radio for use if the airplane is abandoned, stowed on the left side in the aft compartment, provides a means of sending code messages or automatic distress signals either by radio or by light flashes. The power for this equipment is generated by a handcrank. An antenna and a balloon and kite for suspending it, are also included in the kit.

j. FIRST-AID KITS. — Two first-aid kits are furnished; one is stowed in the forward right corner of the cannoneer's compartment and the other in the forward right corner of the aft compartment. These kits include a supply of compresses, dressing, iodine swabs, jelly, morphine tartrate, and sulfanilamide crystals and tablets, as well as a pair of scissors and a tourniquet.

k. FIRE EXTINGUISHERS.—Two CO_2 fire extinguishers are furnished. One of these is installed in the forward side of the armor plate behind the pilot's seat, and the other is mounted on the right side of the aft compartment.

l. HAND AXE.—A hand axe for emergency use is mounted on the right side of the fuselage in the waist gunner's compartment.



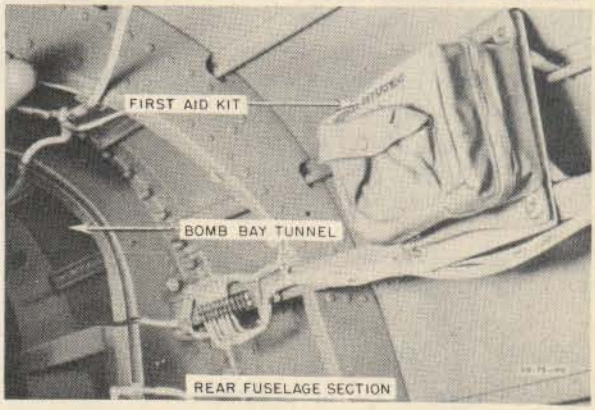


Figure 32—Pyrotechnic Pistol and First-Aid Kit

KEY TO FIGURE 32

1. Gentian Violet Jelly
2. Iodine Swabs
3. Adhesive Compresses
4. Tourniquet
5. Bandage Scissors
6. Directions for Use of Kit
7. Dressings
8. Morphine Tartrate
9. Sulfanilamide Crystals
10. Sulfanilamide Tablets

SECTION V
OPERATIONAL EQUIPMENT

1. PILOT.

Note

The following instructions apply only to operational equipment not normally used by the pilot during flight. For flight operating instructions, see Section II.

a. BOMBING EQUIPMENT—
B-25H-1—AIRPLANES.

(1) DESCRIPTION.—A bomb control handle, located on the right side of the engine control pedestal, may be moved to lock the controls so that bombs cannot be released, to position the racks for a selective (electrical) release, or to salvo all bombs installed. A bomb control panel, on the pilot's left, incorporates 12 bomb station indicator lights and their on-off switch, and a bomb nose fusing switch and its indicator light. A type B-3 bomb interval control on the right side of the pilot's compartment provides either "TRAIN" or "SELECTIVE" release of bombs. A bomb release switch is on the pilot's aileron control wheel. A type A-1 bomb sight assembly, located on top of the N-3B gun sight, provides the pilot with a bomb sight for minimum altitude (horizontal) bombing.

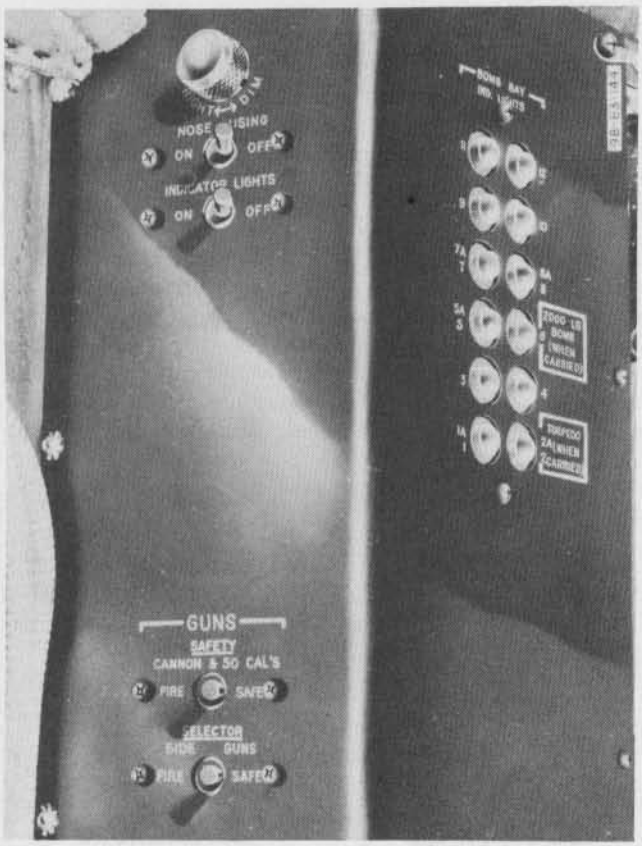


Figure 33—Bomb Control Panel—B-25H-1 Airplanes

(2) OPERATION.

(a) GENERAL.—The bomb control handle cannot be moved from one setting to another until the handle is moved outboard and the plunger knob on top of the handle is depressed. When moving the handle from the "DOORS CLOSED" to the "SEL" position, first move the handle to the "DOORS OPEN" position and wait until the bomb door signal light illuminates; then move the handle to the "SEL" position. To move the bomb control handle from "SEL" to "SALVO" position, move the handle toward "DOORS CLOSED" to clear the catch, pull the antisalvo guard aside, and then move the handle to "SALVO."

CAUTION

DO NOT force the bomb control handle into any position.

(b) INOPERATIVE POSITION OF CONTROLS.—When the bomb controls are not in operation, position them as follows:

1. Bomb control handle in "DOORS CLOSED" position with the antisalvo guard in place.

2. Bomb nose fusing switch "OFF."

3. Train-selective switch in "TRAIN" with the counter at "ZERO."

4. Indicator light switch "OFF."

(c) TRAIN RELEASE.—To release the bombs in a TRAIN, proceed as follows:

1. Set train-selective switch in "TRAIN."

2. Set interval selector dial at the position which will give the desired spacing of bombs at the ground speed at which the airplane is traveling.

3. At least one minute prior to operation of the bomb interval control, place the counter at the setting corresponding to the number of bombs to be released.

4. Move pilot's bomb sight adjustment head to the desired predetermined bomb sighting angle and adjust gun sight rheostat to proper amount of brilliancy.

5. Move bomb control handle to "DOORS OPEN" position. When bomb door position indicator lights, move bomb control handle to the "SEL" position.

6. Turn bomb nose fusing switch "ON" (if desired).

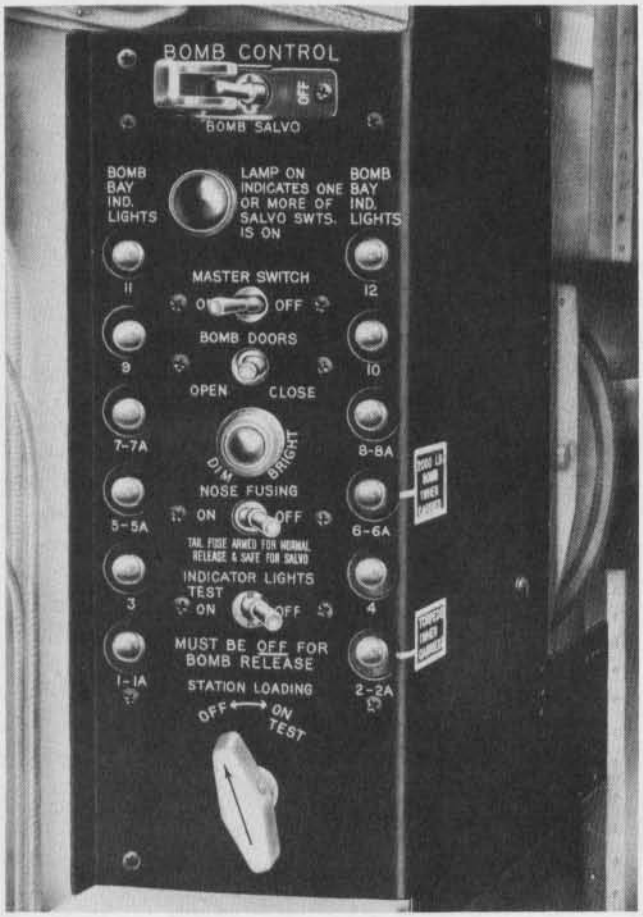


Figure 34—Bomb Control Panel—B-25H-5 and Subsequent Airplanes

7. Press bomb release. A momentary pressure on the bomb release switch will suffice to release the total number of bombs for which the counter is set. It is not necessary to retain the release switch in the depressed position until all bombs have been dropped. If it is desirable to stop a train of bombs before the total number of bombs selected has been dropped, manually return the counter to "ZERO" or switch the bomb interval control to "SELECTIVE."

8. Turn bomb control handle to "DOORS CLOSED."

9. Return bomb controls to their inoperative positions.

(d) SELECTIVE RELEASE.—The procedure for a selective release is as follows:

1. Set train-selective switch in "SELECTIVE."

2. Move pilot's bomb sight adjustment head to desired predetermined bomb sighting angle and adjust gun sight rheostat for proper brilliancy.

3. Move bomb control handle to "DOORS OPEN" position. When the door position indicator light illuminates, move the bomb control handle to the "SEL" position.

4. Turn bomb nose fusing switch "ON" (if desired).

5. Press bomb release switch once for each bomb to be released.

6. Return bomb control handle to "DOORS CLOSED" position.

7. Return bomb controls to their inoperative positions.

(e) SALVO RELEASE.—To release bombs in a SALVO, hinge the antisalvo guard upward and move bomb control handle to "SALVO." Should there be a hydraulic system failure, follow the procedure outlined in *(f)* below.

Note

If over enemy territory, nose fusing switch "ON;" all bombs will drop in a SALVO armed. If over neutral territory, nose fusing switch "OFF;" all bombs will drop in a SALVO unarmed.

(f) OPENING BOMB BAY DOORS WITH HANDCRANK.—If the bomb control handle is moved to the "DOORS OPEN" position and the bomb doors do not open (indicated by nonillumination of the bomb door position indicator light), leave the bomb door control handle in the "DOORS OPEN" position and instruct the cannoneer to open the bomb doors with the handcrank. When the bomb doors are open, move the bomb control handle to either "SALVO" or "SEL," as desired.

CAUTION

Always have the bomb racks checked after all bombs have been released, to make sure no bombs are hung up on the racks.

b. BOMBING EQUIPMENT—B-25H-5 AND SUBSEQUENT AIRPLANES.

(1) DESCRIPTION.—The bombing equipment is electrically controlled. The bomb control panel on the left side of the pilot's compartment contains a bomb salvo switch, bomb doors control switch, nose fusing switch, bomb master switch, indicator light test switch, station loading test switch, and 12 bomb station indicator lights. The bomb interval control is on the right side of the pilot's compartment and the bomb release switch is on the aileron control wheel. A bomb sight assembly on top of the gun sight is mounted on the instrument cowl.

(2) OPERATION.

(a) INOPERATIVE POSITION OF CONTROLS.—When the bomb controls are not in operation, position them as follows:

1. Master switch "OFF."

2. Nose fusing switch "OFF."

3. Bomb bay doors closed with bomb doors control switch in neutral.

4. Guard down over bomb salvo switch.

5. Train-selective switch in "TRAIN" with counter dial at "O."

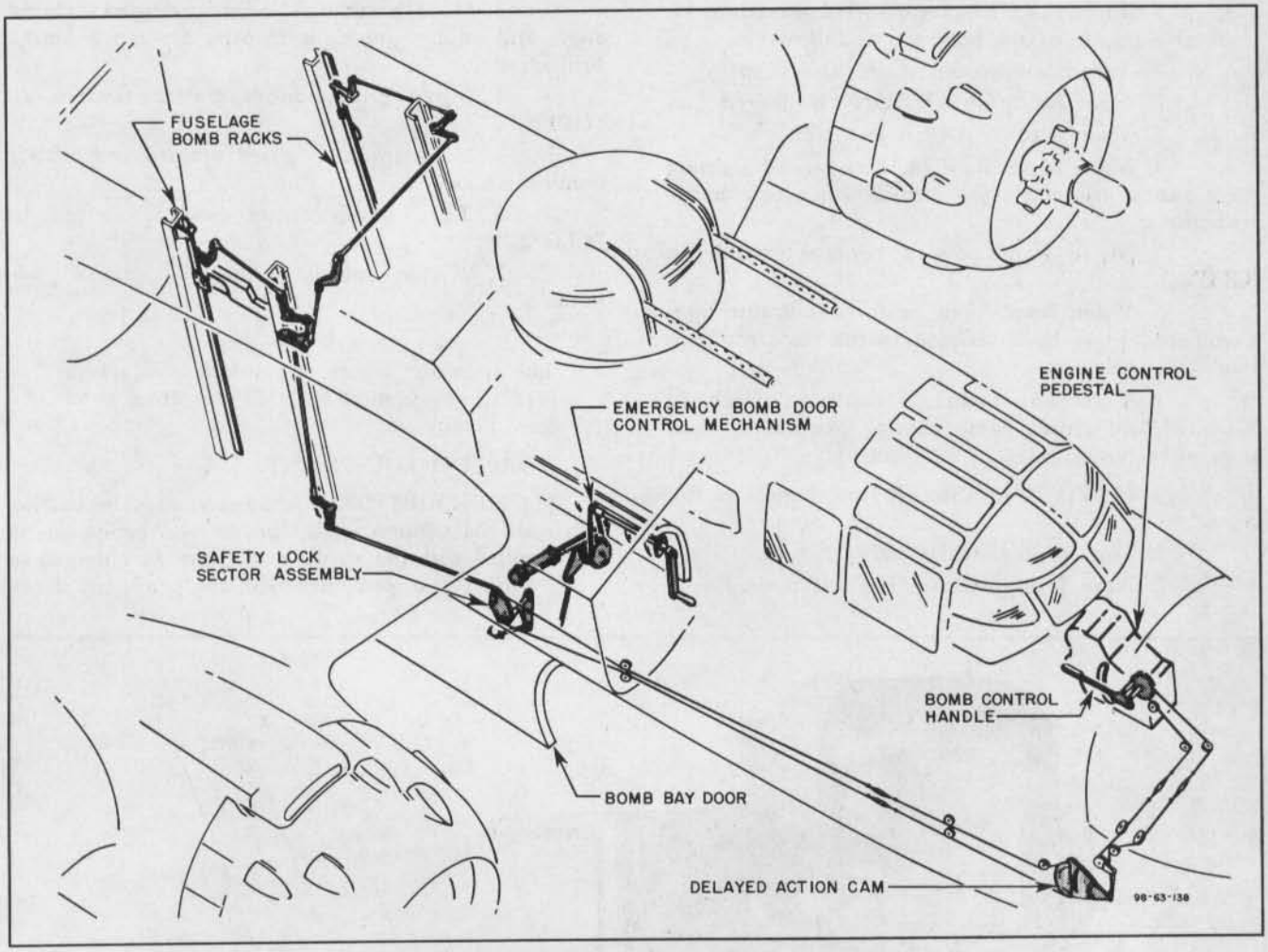


Figure 35—Bomb Rack Control System

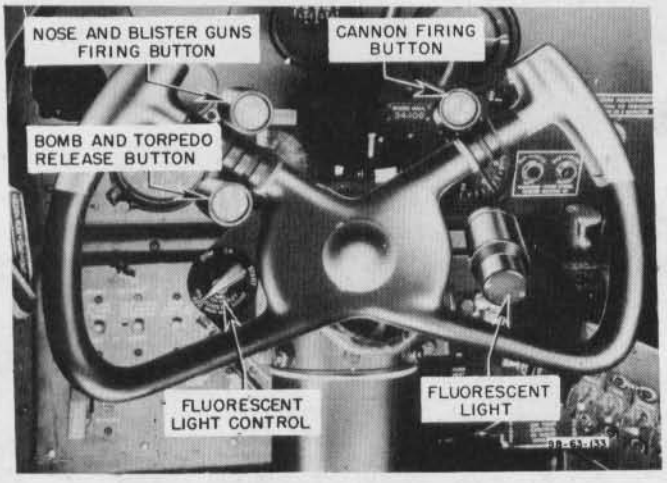


Figure 36—Pilot's Gun and Bomb Controls

(b) TRAIN RELEASE.—To release bombs in a train, proceed as follows:

1. Turn bomb master switch "ON."
2. Nose fusing switch "ON" if desired.
3. Set train-selective switch to "TRAIN."
4. Set interval selector dial to position which will give the desired spacing of bombs at the ground speed which the airplane is traveling.
5. At least one minute prior to operation of the bomb interval control, set the counter dial in accordance with the number of bombs to be released.
6. Move bomb sight adjustment head to the desired bomb sighting angle and adjust gun sight rheostat for reticle image brilliancy.
7. Move bomb doors control switch to "OPEN."
8. When bomb door position indicator light illuminates, press bomb release switch.

Note

To stop a train of bombs before the total number of bombs selected has been dropped, return the interval control counter dial to "0" or switch the train-selective switch to "SEL."

9. When all bombs have been released, move bomb doors control switch to "CLOSE," and return bomb control switches to their inoperative positions.

(c) SELECTIVE RELEASE.—The procedure for a selective release of the bombs is as follows:

1. Turn bomb master switch "ON."
2. Nose fusing switch "ON" if desired.
3. Train-selective switch on "SEL."
4. Move bomb sight head to desired sighting angle and adjust gun sight rheostat for reticle image brilliancy.
5. Move bomb doors control switch to "OPEN."
6. When bomb door position indicator light illuminates, press bomb release switch once for each bomb to be released.
7. Turn bomb doors' control switch to "CLOSE" and return bomb control switches to their inoperative positions.

(d) SALVO RELEASE.—Release bombs as follows:

1. Turn master switch "ON."
2. Nose fusing switch "ON" if desired.
3. Move bomb sight head to desired sighting angle and adjust gun sight rheostat for reticle image brilliancy.
4. Move bomb doors control switch to "OPEN."
5. Move antisalvo guard upward and actuate bomb salvo switch.
6. Turn bomb doors control switch to "CLOSE."
7. Return controls to their inoperative positions.

Note

The indicator lights test switch and station loading switch must be "OFF" in order to release bombs.

c. TORPEDO EQUIPMENT.

(1) DESCRIPTION.—A torpedo may be carried as an alternate bomb load. The torpedo equipment is not supplied with the airplane and must be obtained as a kit. With the torpedo installed, the bomb bay doors

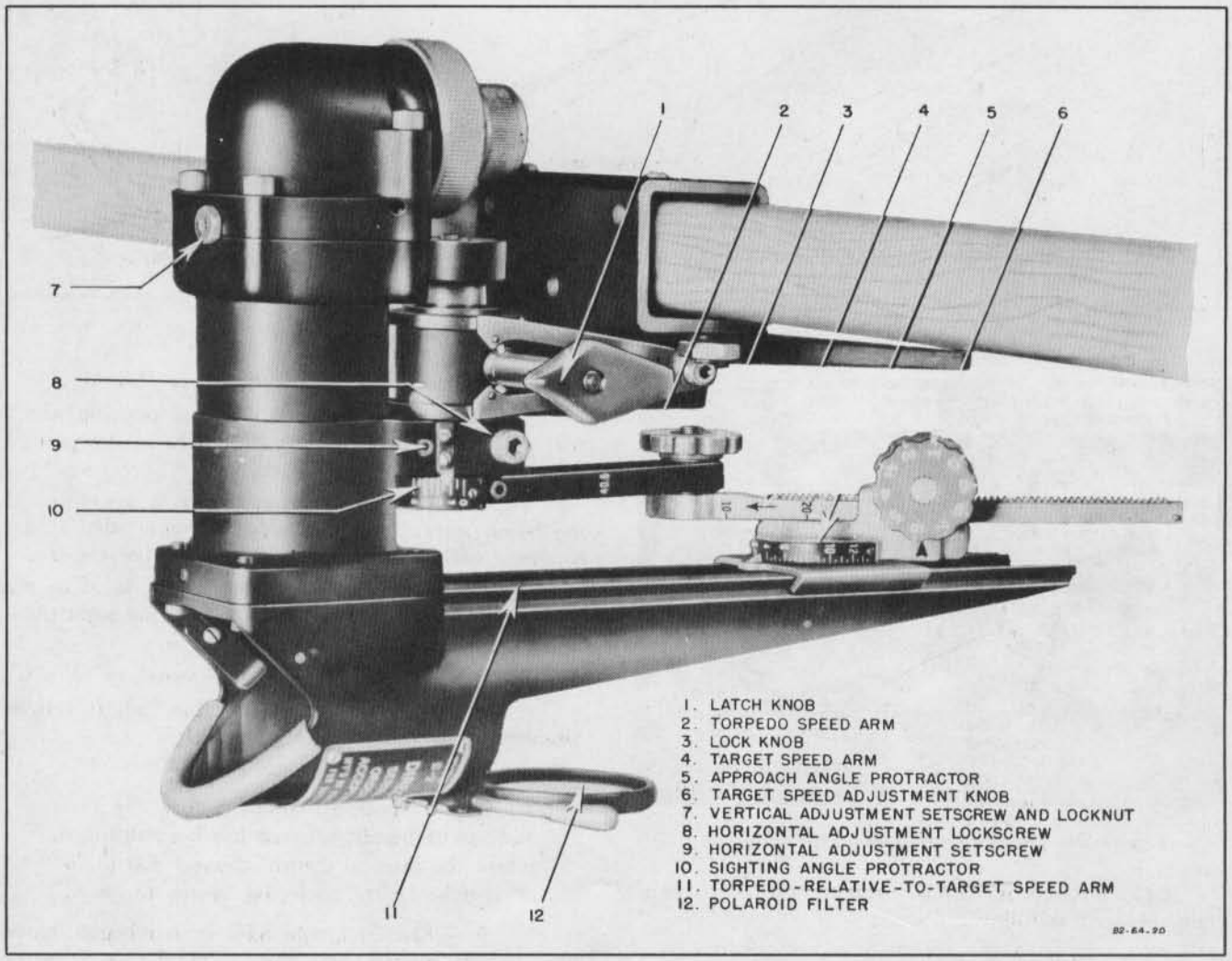


Figure 37—Torpedo Director

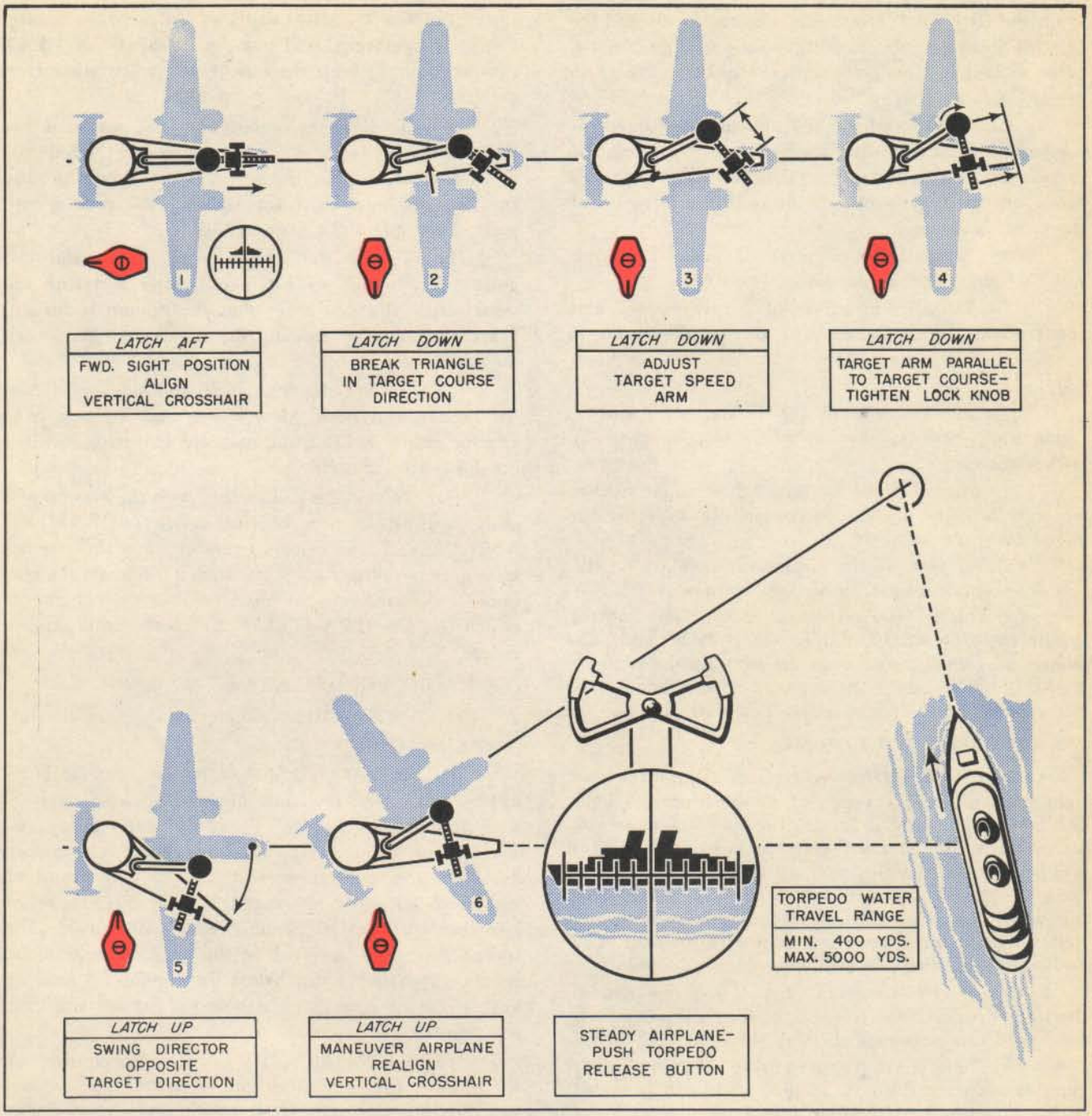


Figure 38—Operation of Torpedo Director

are only partially closed and rest against the pads on the torpedo rack. The doors must be fully opened before dropping the torpedo. After the torpedo is released, the protruding parts of the torpedo rack automatically retract and the bomb doors may then be closed. No bombs can be carried in the bomb bay when the torpedo rack is installed.

(2) OPERATION.—The torpedo is released as follows:

(a) Set bomb interval control train-selective switch in SELECTIVE.

(b) On B-25H-1 airplanes, move bomb control handle to "DOORS OPEN." When bomb door position indicator light illuminates, move bomb control handle to "SEL." On B-25H-5 and subsequent airplanes, turn bomb master switch "ON," and move bomb doors control switch to "OPEN."

(c) Prior to launching the torpedo, the airplane must be maneuvered, and corresponding adjustments made on the torpedo director in accordance with the following steps:

1. Approach target from desired direction.

With the latch knob (Item 1 in Figure 38) aft and the director locked in the forward position, align the airplane so that the luminous vertical crosshair appears on target.

2. With lock knob (3) loosened and the target arm unlatched by turning knob (1) down, break the linkage out into a triangle so that the small engraved arrow on the target arm is pointing in the direction of the target course.

3. Estimate the target speed in knots and adjust the target speed adjustment knob (6).

4. Estimate direction of target course and rotate target arm to appear reasonably parallel to target course. Lock the triangle by tightening the lock knob (3).

5. Turn latch knob (1) up and swing the director sight into the position where torpedo arm (2) latches forward.

(d) Maneuver the airplane left or right so that target is brought anew into coincidence with the luminous vertical crosshair.

(e) As soon as the airplane is steadied on the new interception course, press bomb release switch.

(f) On B-25H-1 airplanes, return bomb control handle to "DOORS CLOSED." On B-25H-5 and subsequent airplanes, turn bomb doors' control switch to "CLOSE." When doors have closed, return bomb control switches to their inoperative positions.

d. GUNNERY EQUIPMENT.

(1) DESCRIPTION.—A type N-3B optical gun sight equipped with a Type A-1 combination gun sight and bomb sight head is located on the left side of the glare shield. An auxiliary ring-and-bead sight is also provided; the ring sight is on the shield to the right of the gun sight and the bead sight is forward of the windshield. On B-25H-5 and subsequent airplanes, a gun sight aiming point camera is mounted in the nose. The pilot sights and fires the following guns:

(a) A 75-mm cannon (type T-13) mounted in the tunnel beneath the left side of the pilot's compartment, and firing forward through the nose.

(b) Four fixed, forward-firing M-2 .50-caliber guns mounted in the nose section, each gun provided with a 400-round ammunition box.

(c) Two fixed .50-caliber guns, mounted in separate blisters on the right side of the fuselage opposite the cannoneer's compartment. On B-25H-5 and subsequent airplanes, two fixed .50-caliber guns are also mounted on the left side of the fuselage. Each gun is provided with a 400-round ammunition box.

(2) OPERATION.

Note

The nose guns are charged manually prior to flight. The cannon is loaded and the blister guns are charged manually by the cannoneer during flight.

(a) On B-25H-1 airplanes only, when heating system is operating, pull out the NOSE GUN HEAT control knob to keep the nose guns at operating temperature.

(b) To sight the cannon and nose guns, see that the gun sight reflector is set at 0 degrees. If the reflector is set for bombing or the gun sight is inoperable, use the ring-and-bead sight for sighting the cannon and guns. Turn gun sight rheostat ON.

(c) To fire the cannon, turn the cannon and guns safety switch to FIRE and, after receiving the signal from the cannoneer that the cannon is loaded, fire the cannon by pressing the cannon trigger switch on the control wheel.

(d) To fire the nose guns and side guns, turn the cannon and guns safety switch and the side guns selector switch to FIRE and press the gun trigger switch on the control wheel.

(e) To operate gun camera with the cannon and guns, turn the camera control switch to "CAMERA AND GUNS." The camera operates when the cannon, nose guns, or blister guns are fired. To operate the gun camera without firing the guns, turn the camera control switch to "CAMERA ONLY" and press either trigger switch.

e. RADIO EQUIPMENT.

(1) DESCRIPTION.—The pilot operates the following radio equipment:

(a) COMMAND SET.—The command set, SCR-274-N, consists of two transmitters and three receivers with independent control boxes for each group, an antenna switching relay, and the necessary accessory items for interconnection of the units. The group of command set units is located in the upper forward left-hand corner of the cannoneer's compartment. The control boxes are mounted on the left-hand side of the pilot's compartment just below the window. A sending key on the navigator's chart board is for use with this equipment.

(b) IDENTIFICATION.—The set consists of the receiver and transmitter unit, a control box, detonator switches, an inertia crash switch, and two indicator lamps. The transmitter-receiver unit is mounted on the shelf immediately aft of the bomb bay in the forward part of the waist gunner's compartment, and the indicator lamps and the inertia crash switch are just adjacent. The detonator buttons and the control box are located on the left-hand side of the pilot's compartment.

(c) RANGE FILTER EQUIPMENT.—An RC-798 range filter serves to separate the voice-given weather reports from the beacon signals. The switch box for this equipment is mounted on the left-hand side of the pilot's compartment adjacent to the interphone jack box.

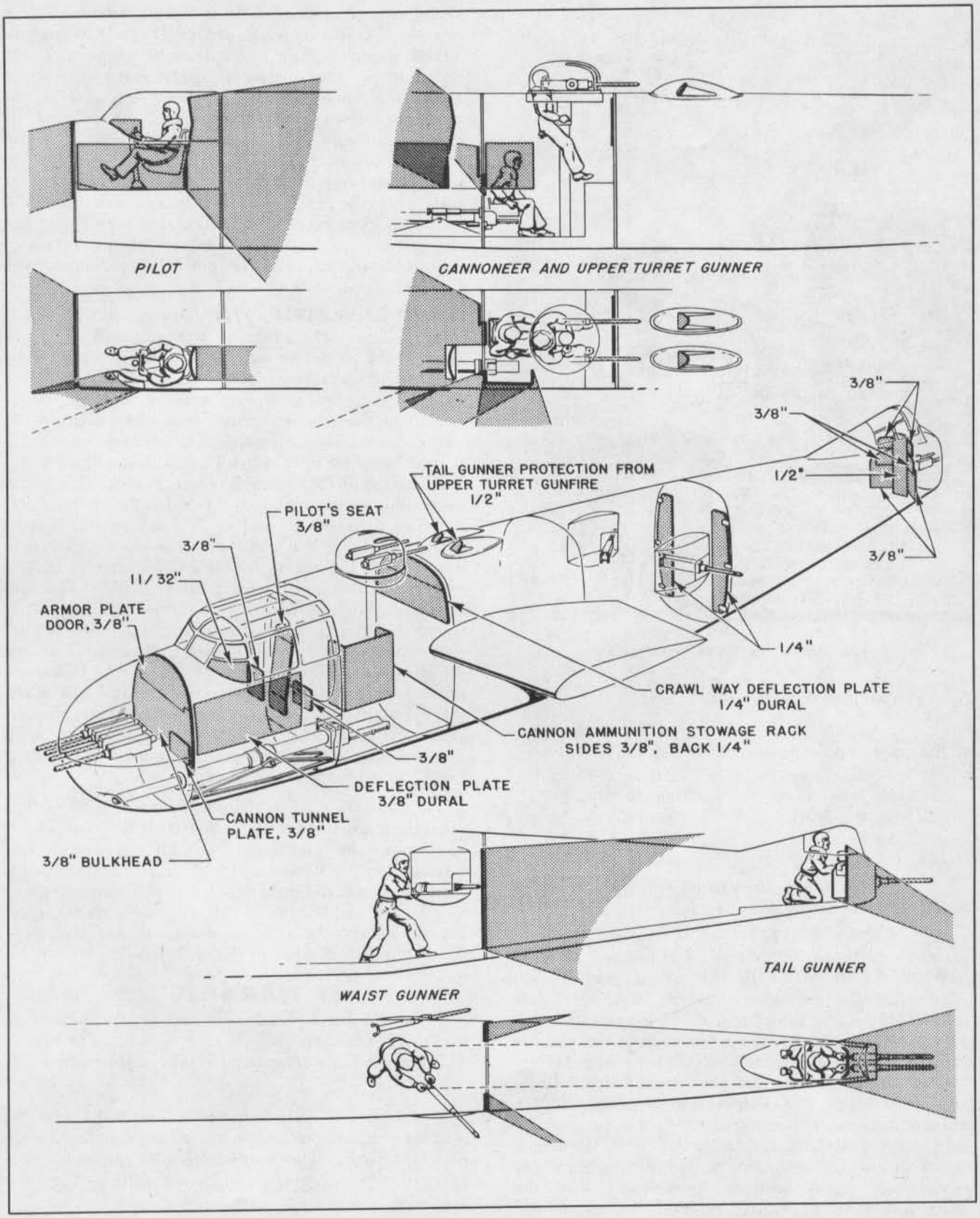


Figure 39—Armor Protection

Figure 40—Gun Sight Installation

(2) OPERATION.

(a) COMMAND SET.—The frequency range of the command set is as follows:

BC-457 Transmitter	4000 to 5300 kc
BC-459 Transmitter	7000 to 9100 kc
BC-453 Receiver	190 to 550 kc
BC-454 Receiver	3000 to 6000 kc
BC-455 Receiver	6000 to 9100 kc

There are no spare coils required for either the transmitters or the receivers.

1. TRANSMITTER.—The transmitter control box contains three switches marked as follows: TRANS. POWER, TRANSMITTER SELECTOR, and TONE-CW-VOICE. On the switch marked TRANSMITTER SELECTOR will be found four divisions, two of which are used, the other two being reserved for the possible addition of transmitters. Markings on the switch TONE-CW-VOICE clearly indicate the type of signal being transmitted. With the switch turned to the TONE position, a signal is transmitted which is approximately 100 percent modulated at 1000 cycles. With the switch turned to the CW position, a "continuous wave" or unmodulated signal will be transmitted. With the switch turned to the VOICE position, the microphone from any jack box switched to the command position will be operative and voice will be transmitted when the push-to-talk button at the station is pressed. For long-range communication, CW is most effective, TONE next, and VOICE is least effective. On the CW and the TONE positions, the microphone is inoperative and signaling by code is accomplished by either of two keys mounted on the transmitter control box and on the navigator's chart board. If so desired, an external key may be plugged into the jack marked KEY. If the operator so desires, the push-to-talk button for the microphone may be used as a key for transmission of code when the control box switch is turned to the CW or TONE position. A microphone may be plugged into the jack marked MIC if the operator wishes to transmit voice over the command set only, rather than through the interphone system.

2. RECEIVER.—The receiver control box is divided into three identical sections, each of which controls the particular receiver to which it is electrically and mechanically connected. Reception of a signal of specific frequency is accomplished by the use of the section of the receiver control box which controls the particular receiver involved. The desired receiver is turned on or off by a switch located in the upper right-hand corner of the control box section used. This switch in addition to having an OFF position has two selective positions marked CW and MCW, each of which is an ON position and indicates the type of signal which is to be received. On the underside of the receiver control box are located two phone jacks marked A TEL and B TEL through which receiver signals and transmitter sidetone signals may be heard from the command set only. These are not normally used because the command set is connected into the interphone system, and transmission or reception may be carried on from any of the seven interphone stations located throughout the airplane. To increase the volume of the signal, the knob in the lower left-hand corner of the control section is turned in a clockwise direction.

(b) IDENTIFICATION EQUIPMENT.—The radio set SCR-595 or the radio set SCR-695 is placed in operation by turning the ON-OFF switch to the ON position. Allow 5 minutes for the set to warm up. Information concerning the selector switch, the emergency switch, and the G-band switches can be obtained from the communications officer in charge. To stop the equipment, turn all switches to the OFF position.

WARNING

The destructor plug is to be inserted only when the airplane is ready to take off and is to be removed immediately after the airplane has landed.

The dual push-button switch marked DANGER is pressed when the airplane is to be abandoned over enemy territory. The buttons must be pressed simultaneously. The destruction of the set will not harm the airplane.

(c) RANGE FILTER.—The radio range filter has three positions which are used as follows: Position 1 marked RANGE permits the reception of the range

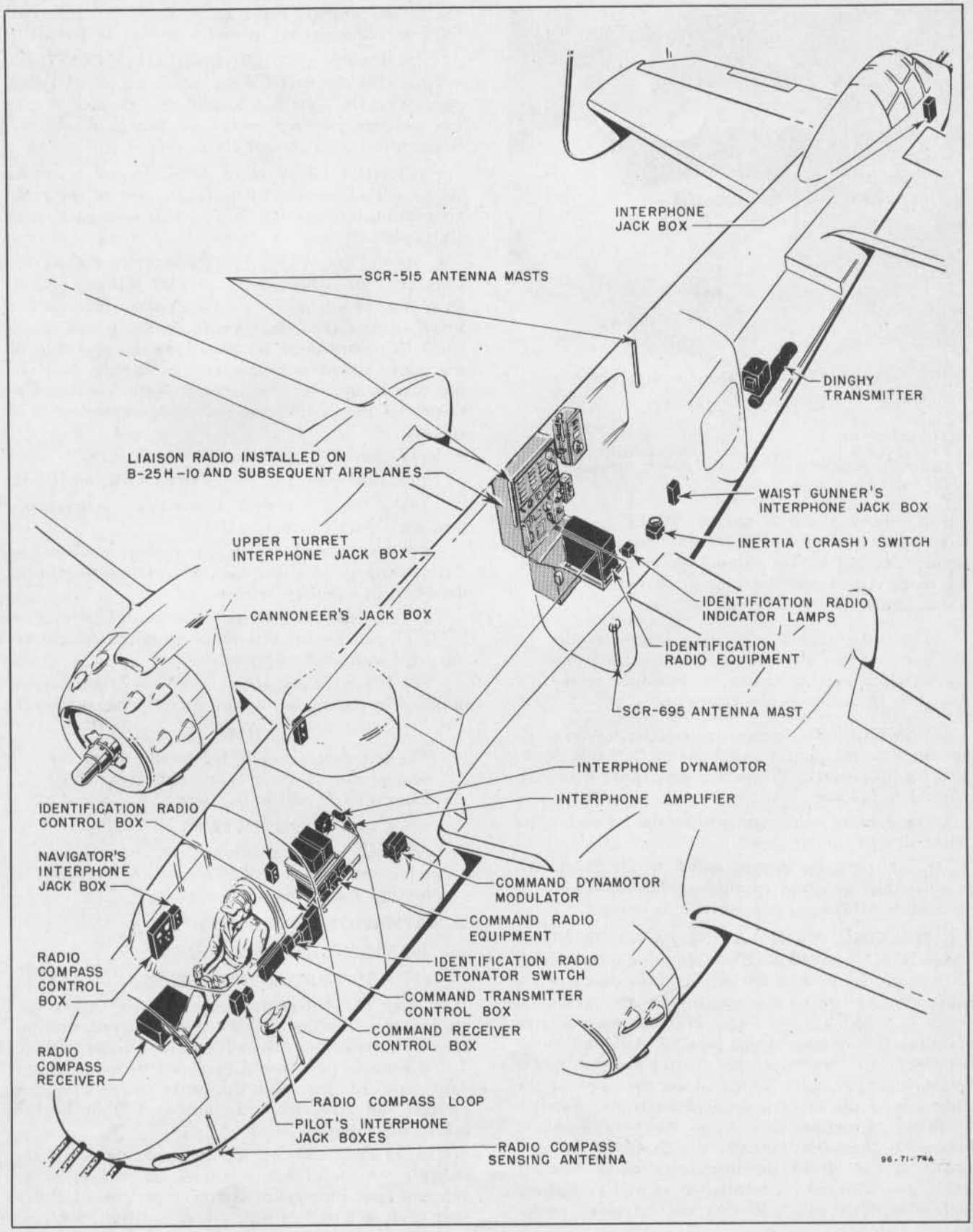


Figure 41—Radio Location Diagram

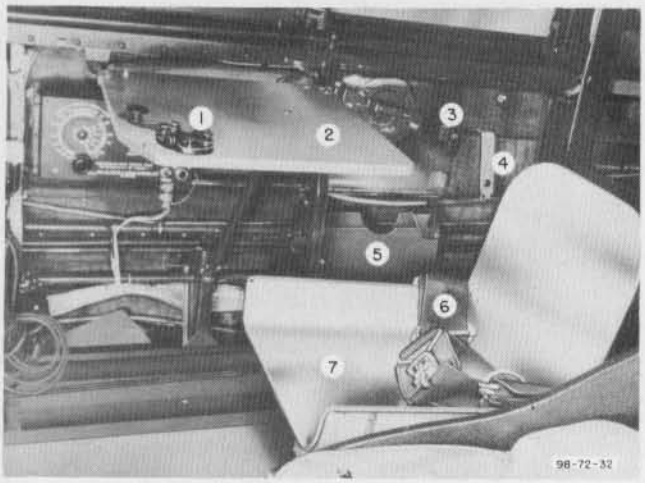


Figure 42—Navigator's Equipment

KEY TO FIGURE 42

1. Transmitter Key
2. Folding Table
3. Driftmeter Support
4. Folding Table Stowage Strap
5. Map Case
6. Safety Belt
7. Navigator's Seat

signal only. Position 2 marked VOICE permits the reception of the voice-given weather reports only. Position 3 marked BOTH permits the reception of both the range signals and the voice-given weather reports.

Note

The range signal referred to above is the beacon signal of the simultaneous range setup, in which weather reports are broadcast on the same frequency as the beacon signal.

f. CAMERA.—The camera can be operated manually by means of the camera switch on the left side of the pilot's switch panel. To operate the camera manually, proceed as follows:

(1) Ask the waist gunner to set the intervalometer at the desired shutter speed.

(2) Depress the camera switch to the MANUAL position. The switch is spring-loaded to return to the CAMERA AUTO position when it is released.

g. HEATING, VENTILATING, AND DEFROSTING—B-25H-1 AIRPLANES.—Operation of both heaters is controlled by a master switch on the pilot's switch panel. This switch is for emergency use and provides a means by which the pilot may keep the heaters from operating during take-off and landing. A hot air outlet is located just forward of the control pedestal, and a flexible defroster tube is located on the floor at the right side of the lower pedestal. Heat is also directed, by means of manual controls, to the windshield and nose guns. There is a ventilator at each side of the compartment, just aft of the instrument panel. Hot air outlets may be used for ventilation as well as heating. Operation of the pilot's heating and defrosting equipment is as follows:

(1) CABIN AIR.—This control is located below the control pedestal switch panel on the left side. Pull OUT to admit hot air; push IN to shut off hot air.

(2) CABIN AND WINDSHIELD DEFROSTERS.—Turn ON defroster blower switch on pilot's switch panel. Pull OUT control, located on right side of control pedestal, to direct heated air through flexible defroster tube; push control IN to defrost windshield.

(3) NOSE GUN HEAT.—This control is located at the left of the control pedestal; next to the cabin air control. Pull control OUT to heat nose guns; push IN to shut off heat.

h. HEATING, VENTILATING, AND DEFROSTING—B-25H-5 AND SUBSEQUENT AIRPLANES.—Operation of all heaters on the airplane is controlled by the master cabin heat switch on the pilot's switch panel. No restrictions are placed on the operation of the pilot's compartment heater. The heating duct system may be used for ventilation in warm weather. Operation of the heating and defrosting equipment is as follows:

(1) Turn ON master cabin heat switch.

(2) Turn cabin heat switch to START and HIGH.

(3) If less heat is desired after heater is operating, turn cabin heat switch to LOW.

(4) Use control on right instrument subpanel to divert warm air to either the pilot's outlet, windshield defroster, or auxiliary defroster tube.

(5) If heater is delivering too much heat even in "LOW," pull out on the air temperature control on the right instrument subpanel.

(6) When heater is off, ventilating air may be obtained by pulling out on the air temperature control.

Note

The left engine should be running when the heaters are operated, since fuel is obtained from the left engine fuel pump.

IMPORTANT

After all heaters are turned off, turn master cabin heat switch OFF. This switch shuts off heating system booster pump.

2. NAVIGATOR-CANNONEER.

a. NAVIGATION EQUIPMENT.

(1) DRIFTMETER OPERATION.

(a) The driftmeter, at the right of the navigator-cannoneer's riding seat, is normally stowed, with the eyepiece forward, on two rails provided under the seat. The driftmeter port should be closed by means of the door provided. Place the driftmeter in the operating position and make sure that both catches are hooked before attempting to use it.

(b) Look through the eye lens and rotate the reticle control until the drift lines are parallel to the apparent line of motion of objects on the ground. When over land or water on which there are few prominent or readily identifiable objects, keep the eye fixed on the reticle and observe the general movement of the back-

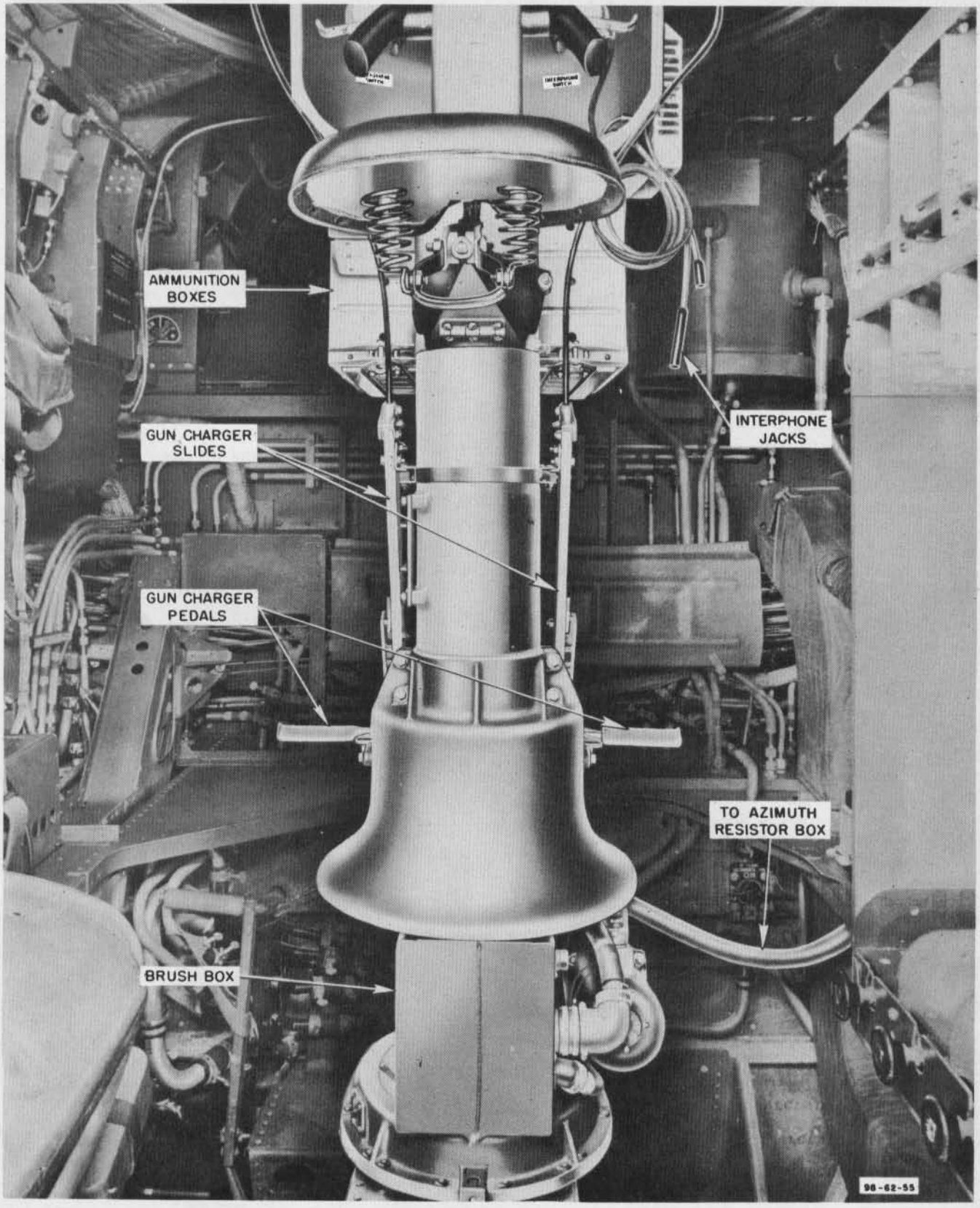


Figure 43—Upper Turret

ground without attempting to follow any one ground object. The pointer on the drift dial will then show the drift of the aircraft to the left (plus) or to the right (minus).

(c) The driftmeter may be operated by use of the pantograph pointer instead of the reticle lines. With the point of the needle visible in the eye lens and a pencil in the pantograph holder, follow, by means of the pantograph system, the movement of an object (on the ground) across the field of the eye lens. The pencil will leave a line on the ground glass. Then move the indicator knob of the reticle control until the parallel lines align themselves with the line drawn on the ground glass plate. The pointer on the drift scale will then indicate the drift to the left or right.

(d) To determine ground speed, the altitude of the airplane must be known and the airplane must be kept in level flight while a reading is taken. Set the reticle lines of the driftmeter by determining the existing drift of the aircraft. With a stop watch, check the time required for an object on the ground to cross the eye-lens field from one timing line to the other. Then locate the time in seconds on the dial of the computer and set reading against the height of the airplane on the height scale. The ground speed in miles per hour will be indicated by the black line on the dial marked MPH, and the speed in knots by the red line marked KNOTS.

(2) RADIO COMPASS.

(a) DESCRIPTION.—The radio compass, SCR-269, consists of a receiver, a control box, an azimuth indicator, a rotatable loop, a terminal box, and the necessary accessories for interconnection of the units. The radio compass receiver is located on the floor of the pilot's compartment below the right-hand side of the instrument panel. The control box is mounted on the right side of the pilot's compartment just above the terminal box. The azimuth indicator is mounted on the upper left-hand portion of the pilot's instrument panel. The loop is mounted on the lower forward part of the fuselage below the pilot's compartment. The terminal box is attached to the right side of the pilot's compartment adjacent to the radio compass receiver.

(b) OPERATION.

1. Turn on radio compass receiver by moving switch on remote control box—located on right side of pilot's compartment—to COMP, ANT, or LOOP. With the switch turned to COMP, both the rotatable loop and the fixed antenna are in use; in the position marked ANT, only the fixed antenna is in use; and with the switch turned to LOOP, only the rotatable loop is in use.

2. Select frequency band desired by rotating the band switch control to one of its three marked positions.

b. CANNON LOADING.

(1) PREPARATION.

(a) Unfold and lower the cannoneer's seat.

(b) Latch the cannon recoil guard; the guard is on the front entrance hatch door.

(c) Unlatch the cannon recoil guide plate, swing inboard, and lock.

(d) Raise the ammunition loading tray to the loading position.

(e) Fasten the leg strap.

(f) Always close the breech when the cannon is not in use.

WARNING

Never, under any circumstances, use the hands to release the extractors in order to close the breech lock. Use an empty cartridge case, or the wooden loading ram which is stowed on the right side of the compartment.

(2) LOADING.

(a) Open the breech with the cocking wrench stowed on the panel on the right side of the compartment. Attach the wrench to the spline shaft at the left side of the cannon breech ring and push the wrench down. Remove and stow the wrench.

(b) Release the ammunition lower rack lock for each section by pulling out the lock knob.

(c) Remove a round from the rack, place it on the loading tray, and push it into the chamber with the wooden loading ram.

(d) Notify the pilot that the cannon is loaded for firing.

(e) Load succeeding rounds similarly each time the cannon breech opens with the recoil of the cannon.

(f) If a shell fails to fire, the cannon or firing circuit may be inoperative or the round defective. After waiting five minutes, open the breech with the cocking

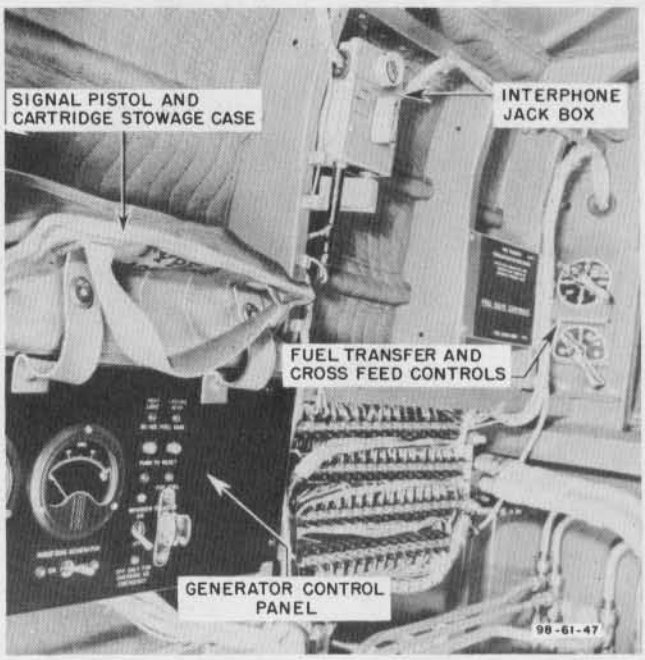


Figure 44—Cannoneer's Compartment—Right Side

Figure 45—Heater Controls

wrench, remove the round from the chamber, and jettison it through the ejection chute.

WARNING

If the cannon misfires, be sure to wait five minutes before removing the live round or attempting to determine the cause of the malfunction. Stay to one side of the cannon until the round is removed.

c. BLISTER GUNS.—Charge the blister guns by pulling out and releasing the charging handles.

3. UPPER TURRET GUNNER.

a. UPPER TURRET.

(1) DESCRIPTION.—A Bendix Model R upper turret is located in the aft portion of the cannoneer's compartment. The turret, electrically powered and amplidyne controlled, is equipped with two flexibly mounted .50-caliber guns and a 400-round ammunition box for each gun, and a Type N-6A optical gun sight.

(2) OPERATION.

WARNING

Do not operate the turret without an adequate power supply. If the voltage supply at the turret drops below 20 volts, serious damage to the turret or to the airplane may result. When the turret is operated on the ground, the airplane engines should be running, or an external power supply which provides a constant 28-volt supply should be used. Operation of the turret on the airplane batteries should be kept to an absolute minimum.

(a) PREPARING TURRET FOR OPERATION.

1. Adjust the footrests and seat.

Note

Do not step on the azimuth motor, brush box, or the electrical conduit when taking position or descending from the turret.

2. Turn on the turret main power switch. Turn on the switch to supply the heated clothing unit, extension light, and gun sight. These switches are located in the left side of the airplane in the turret power control box. Turn on the gun sight switch on the gun sight and adjust the intensity with the rheostat.

3. To heat the clothing, connect the plug of the heated clothing wire to the outlet in the rheostat outboard of the right control handle; then place the control to the lowest setting required for comfort. Maintain the heated clothing at the lowest temperature necessary for comfort, as perspiration caused by excessive heat at medium outside temperatures produces an unpleasant chilling effect when lower temperatures are reached. The proper amount of heat is being used when the wearer is not conscious of external heat except possibly on the abdomen and the back of the hands.

4. Plug in the microphone and headset circuits and turn the jack box knob to the desired position.

5. Charge the guns by raising the footrest pedals with the toes until they latch, and then press the pedals down to the footrest position. Use this same method for removing a faulty cartridge during firing.

(b) COMBAT OPERATION.

DANGER

Do not depress the trigger firing switches on the control handles, as the guns are operative as soon as the main power switch is turned on.

1. The turret can be rotated continuously (360°) in azimuth, and the guns swing from almost straight up to one degree below horizontal. The speed of the turret can be varied from ¼° to 12° per second in low speed, and from ¼° to 33° per second in high speed. The gun firing circuit cuts out individually for each gun to prevent it from firing into the propellers, vertical stabilizers, and the tail turret enclosure.

2. To rotate the turret in azimuth, rotate the control handles clockwise or counterclockwise about the vertical axis. The turret moves in the same direction as the handles. Movement of the guns in elevation follows the up or down movement of the control handles. The speed of rotation of the turret and guns is proportional to the degree of rotation of the control handles from the neutral position. For fast slewing speed in azimuth or elevation, press the high-speed switch on either control handle.

3. Grip the control handles and depress the safety switches. As the switches are wired in parallel, it is not necessary to have both depressed.

4. Look through the sight to train the guns on

the target. The dot in the center of the reference circle indicates the point on which the guns are trained.

5. To fire the guns, press the trigger switch on either control handle.

6. When the turret is not in use, return the guns to a horizontal position and point them straight aft. Then turn off the turret main power switch.

Note

In an emergency, the guns can be stowed manually as described in Section IV.

b. HEATING AND VENTILATION—B-25H-1 AIRPLANES.

(1) STARTING HEATER.

(a) Close the airflow control.

(b) Set heater control in "OFF" position.

(c) Ask pilot to set master cabin heat switch on pilot's switch panel to "ON," and to maintain the left engine manifold pressure at approximately 27 in. Hg.

(d) Move heater control to "ON."

(e) After heater starts, adjust heater control and airflow control to obtain desired heat delivery.

(f) Adjust control on duct below left shelf to obtain proper heat in compartment.

Note

If heater does not start in 1 to 3 minutes (cold outside air temperatures may require a longer starting period), move heater control further toward full "ON" position. Moving the heater control back and forth may also aid the starting. If the heater still does not start, ask the pilot to vary the manifold pressure and mixture setting. The heater will start and operate better on a lean mixture. In extremely cold weather, leave the airflow control in closed position at all times, regardless of altitude and air speed. If heater goes out at high manifold pressures, it may be restarted by reducing manifold pressure and repeating starting procedure. If heater continues to go out at high manifold pressures, try retarding the heater control toward the "OFF" position so as to decrease the flow through the heater.

(2) VENTILATION.—The heating duct system may be used for ventilation when the heater is not operating, by simply opening the airflow control for the desired amount of cold air.

c. HEATING AND VENTILATION—B-25H-5 AND SUBSEQUENT AIRPLANES.

(1) STARTING HEATER.

Note

The heater can be started only after the airplane has attained sufficient air speed to ensure an adequate flow of combustion air to the heater.

(a) Have pilot turn ON master cabin heat switch.

(b) Turn cabin heat switch on generator control panel to "START and HIGH."

(c) If less heat is desired after heater is operating, place switch in "LOW."

(d) If heater is delivering too much heat in "LOW," open air temperature control on inboard end of heater.

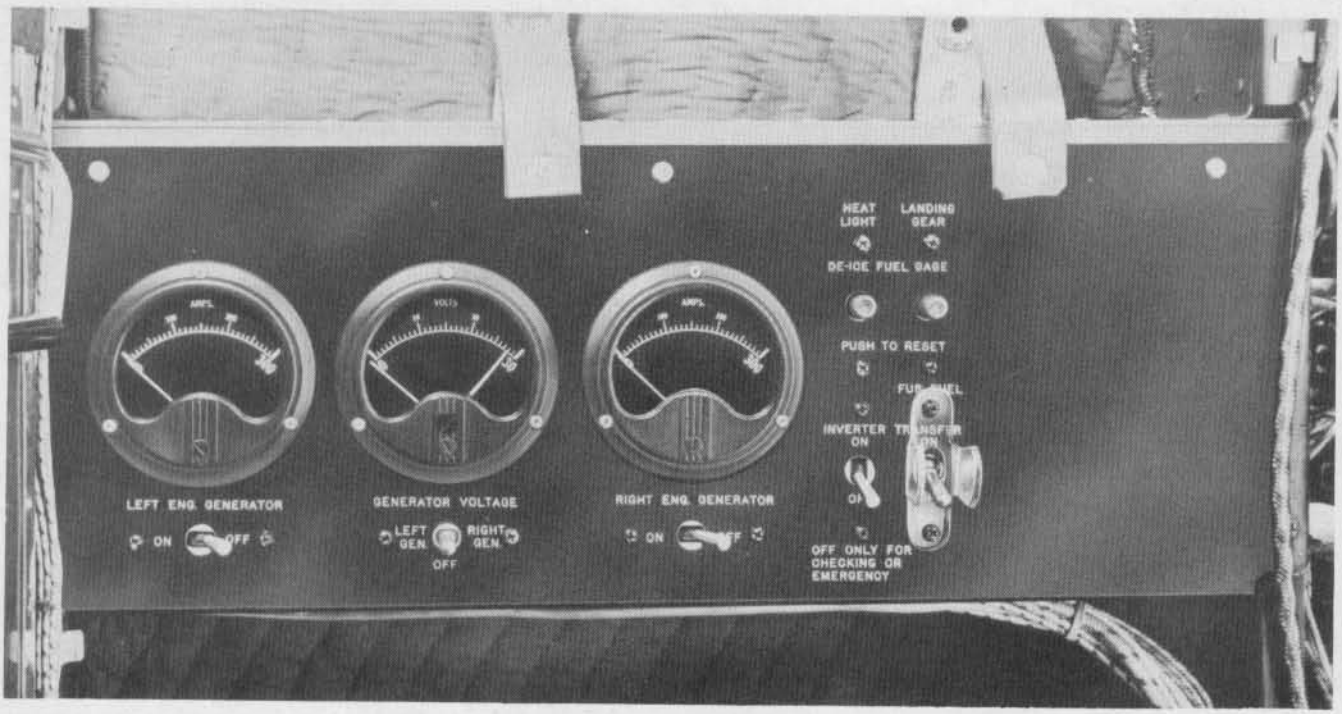


Figure 46—Generator Control Panel—B-25H-1 Airplanes

(2) VENTILATION.—When the heater is off, the duct system may be used for admitting ventilating air by opening the air temperature control.

d. ELECTRICAL EQUIPMENT.

(1) GENERATOR CUTOUT SWITCHES.—The generator cutout switches are mounted on the generator panel on the right side of the cannoneer's compartment. These switches must be turned "ON" during engine run-up or while the airplane is in flight. This allows the reverse-current relay to cut the generator into the electrical load when the generator output reaches between 26 and 27 volts. In an emergency or forced landing, turn the switches to the "OFF" position. Doing this in flight will prevent any further damage to the generator and the discharging of the battery into the generator. This will also greatly minimize any possibility of fire in case of a crash landing.

Note

During one-engine operation or should one generator fail, it is important not to draw more than 200 amperes from the one generator still operating. If possible, keep the load below this figure to prevent the generator from overheating and eventually failing.

The batteries are adequate only for a flight of short duration, and then only if they are in a properly charged condition and all electrically operated equipment not essential in flight is turned off so as to conserve battery power.

(2) GENERATOR AMMETERS AND VOLTMETER.—During long flights, if the batteries have become fully charged and there is little load in the electrical system, the ammeter readings for the generator may be low. This is a normal condition and does not indicate that the generator, regulator, or reverse-current relay is faulty. If the generator shows approximately normal voltage on the voltmeter of the generator control panel, the voltage regulator and generator are in working condition.

Note

The voltmeter and switch have been deleted on AAF 43-4165 and subsequent airplanes.

(3) INVERTER SWITCH.—An inverter switch is located on the generator control panel. As the switch controls the alternating current to various items, it is imperative that this switch be in the "ON" position at all times except when testing, or in an emergency.

(4) EXTENSION LIGHT.—An extension light for the illumination of the 75-mm ammunition box and cannon breech is mounted directly below the command radio transmitter.

4. WAIST GUNNER.

a. FLEXIBLE GUNS.

(1) DESCRIPTION.—Two flexible .50-caliber guns, one mounted in a Plexiglas window at each side of the fuselage aft of the bomb bay, are operated by the waist gunner. Each gun is provided with a 200-round ammunition box.

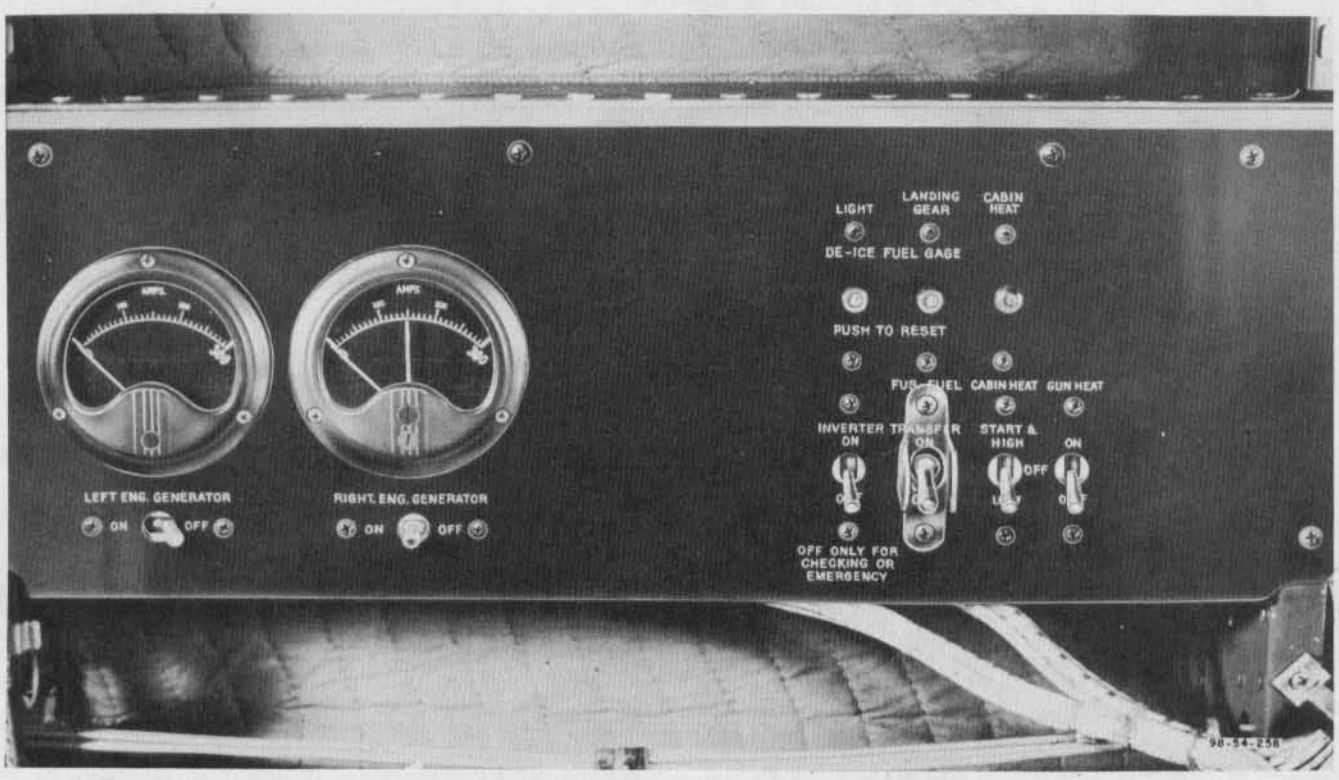


Figure 47—Generator Control Panel—B-25H-5 and Subsequent Airplanes

(2) OPERATION.

(a) PREPARATION FOR FIRING.

1. Release gun from stowage position by pushing plunger on aft end of gun adapter.

2. Charge gun by pulling back and releasing charging handle.

3. Move the safety to FIRE.

(b) FIRING GUN.

1. Sight through ring-and-bead sight and fire gun by pulling trigger.

2. After firing, move the safety to SAFE and stow gun.

b. LIAISON RADIO—B-25H-10 AND SUBSEQUENT AIRPLANES.

(1) DESCRIPTION.—The liaison set includes a transmitter, an interchangeable tuning unit, a receiver, telegraph key, dynamotor, antenna tuning unit, and junction box. The equipment, when installed, is located on the right side of the waist gunner's compartment.

(2) OPERATION.

(a) LIAISON TRANSMITTER.—The following are general instructions for operation of the liaison transmitter.

1. Select tuning unit covering the desired frequency on which transmitter is to operate. Set dials B, C, and D in accordance with calibration chart on tuning unit. Select desired type of emission by turning switch marked "TONE-CW-VOICE." Turn filament switch to position corresponding to type of emission to be used. Turn transmitter power switch "ON."

2. Place antenna change-over switch in desired position. If trailing antenna is to be used, turn control knob on antenna reel box to "OUT."

3. Close either the telegraph key or microphone button, depending upon type of emission selected. Tune dial C to maintain a resonant point indicated by the milliammeter. Turn dial M until full antenna current is shown on antenna current meter. Retune dial C for resonance point.

Note

When operating transmitter, make certain that dial pointers on milliammeter and voltmeter do not exceed the red marks on dial scales.

(b) LIAISON RECEIVER.—Turn monitor switch, located to right of antenna reel box, to "NORMAL." Turn on liaison receiver by means of switch marked "OFF, MVC" (manual volume control), and "AVC" (automatic volume control). Tuning or searching should be done with the switch turned to "MVC" position; after the desired signal has been tuned in, the switch should be moved to the "AVC" position. Frequency band selection is accomplished by the BAND SWITCH knob on the face of the receiver case under the dial window. Dial calibrations corresponding to the band selected are revealed by the dial mask.

WARNING

Do not remove or replace tubes in any of the equipment while equipment is turned on.

(c) TRAILING ANTENNA CONTROL.—To extend the trailing antenna, the control knob is turned right from the "OFF" to the "OUT" position; to retract the antenna, the control knob is turned left from the "OFF" to the "IN" position. A three-digit visible counter indicates the number of turns made by the antenna in extending, and reverse during retraction. The zero point may be reset by means of a small knurled thumb wheel.

Note

An amber light above the counter will illuminate if the trailing antenna is left in an extended position as the main landing gear starts to descend. Do not use the trailing antenna for transmitting while on the ground.

The approximate tuning ranges for the trailing antenna are as follows:

KC	*Length in Feet*	*Counter Reading*	*Length in Feet*	*Counter Reading*
	1/4-Wave		*3/4-Wave*	
2000	123	108		
3000	82	72		
4000	62	54		
5000	49	44	147	130
6000	41	36	123	108
7000	35	30	105	92
8000	31	28	93	82
9000	27	24	81	72
10,000	24	22	73	64

c. PHOTOGRAPHIC EQUIPMENT.

(1) DESCRIPTION.

(a) GENERAL.—The photographic station, in the fuselage immediately aft of the bomb bay, is provided with a single camera and a mount assembly. A long window in the floor of the fuselage permits camera swing over a wide angle.

(b) CAMERA.—The type K-24 camera which does not require vacuum pressure for its operation, is used. Roll film is used and permits a number of exposures without reloading or other manual attention. A 24-volt motor integral with the camera unit supplies the power to simultaneously move the film and rewind the camera shutter when the shutter is tripped by an electrical impulse from the intervalometer.

(c) CAMERA MOUNT.—The camera mount permits the camera to swing 50° fore or aft of the vertical position. Two wing nuts on either side of the camera may be loosened to change the camera angle. Two bolts secure the camera in the mount.

(d) INTERVALOMETER.—The type B-3 intervalometer sets up preselected intervals between exposures when the automatic timing feature is being used. The buttons on the face of the instrument provide a

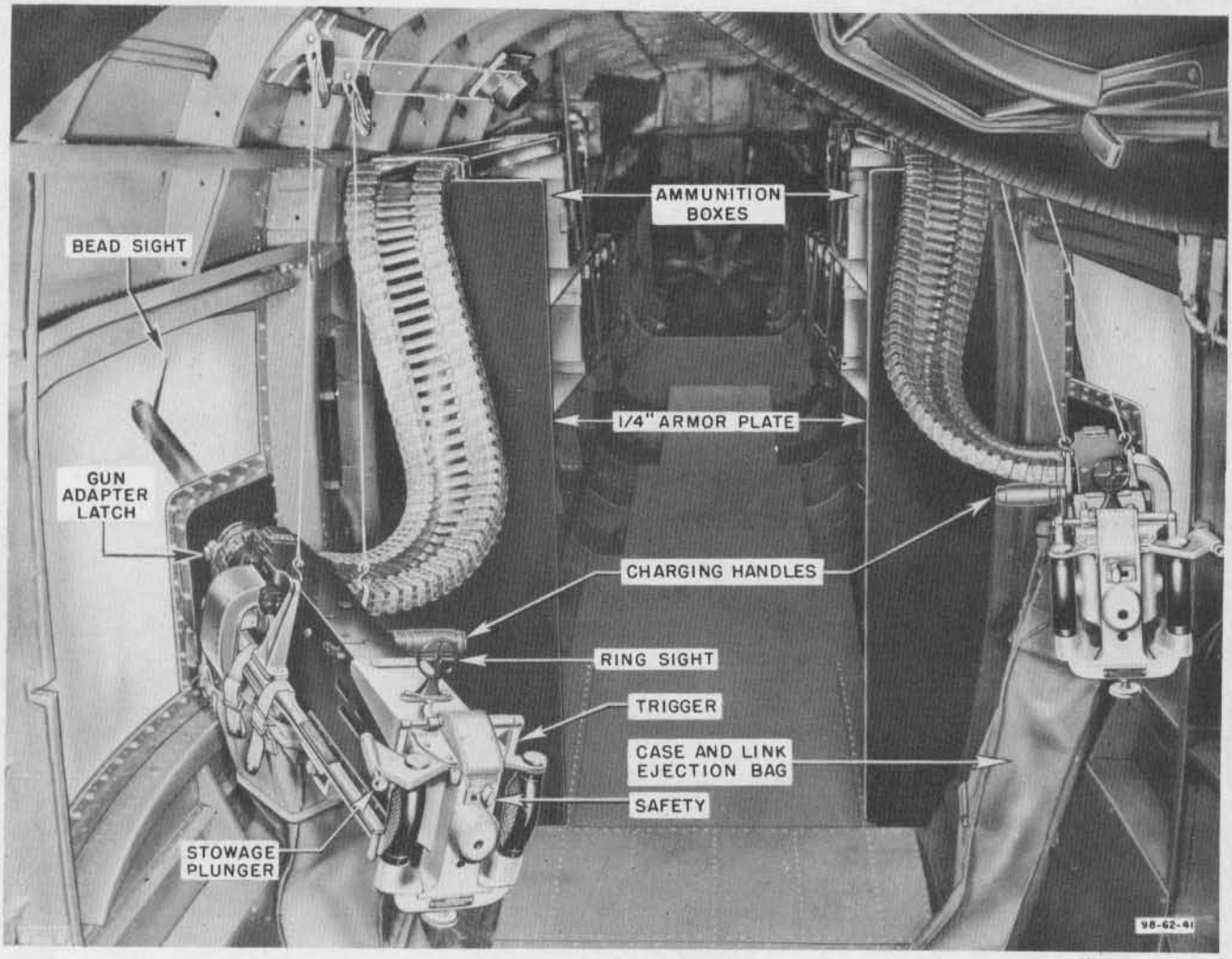


Figure 48—Waist Gunner's Compartment—Aft View

means of making a single exposure or starting and stopping the automatic mechanism. A dial graduated in intervals of from 2 to 120 seconds in one second increments makes possible the selection of the desired time delay. A jeweled warning light built into the intervalometer flashes two seconds before the camera is tripped, allowing the operator sufficient time to level the camera.

(2) OPERATION OF CAMERA.

(a) AUTOMATIC OPERATION.—The camera electrical circuit is designed to operate the camera automatically when the bomb bay doors are fully open. The desired shutter speed can be set on the intervalometer at any time before the bomb bay doors are opened.

(b) HAND OPERATION. — The camera can be operated by hand as follows:

1. Turn the handcrank on the right side of the camera until the mechanism disengages.

2. Press the metal button at the forward right side of the camera.

(c) CAMERA HEATER.—The camera heater will operate automatically when the heater cord is plugged into the socket above the camera mount. If the circuit breaker cuts off the electric current, it can be reset by pressing the button above the camera heater plug.

d. AFT COMPARTMENT HEATER—B-25H-1 AIRPLANES.

(1) STARTING HEATER.

(a) Ask pilot to place master cabin heater switch in "ON" position and to maintain a manifold pressure of approximately 27 in. Hg on the right engine.

(b) Place heater control ON. This action will start heater and also turn on fan at front of heater.

(c) Adjust heater control to obtain desired amount of heat.

(d) Place waist gun window defroster control on aft end of heater in desired position to obtain warm air for the compartment or for the waist gun windows.

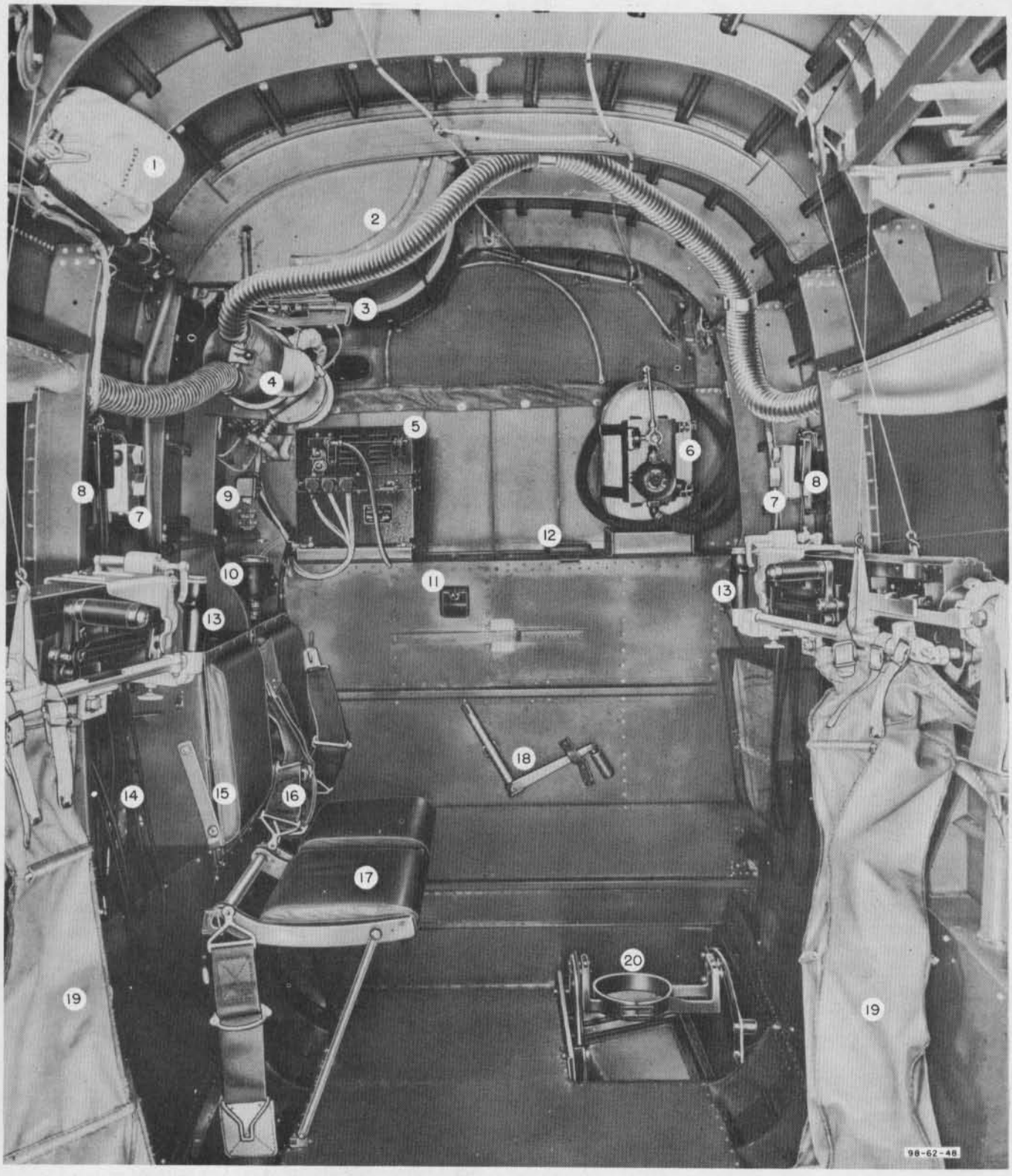


Figure 49—Waist Gunner's Compartment—Forward View

KEY TO FIGURE 49

1. Blind Flying Hood
2. Life Raft Stowage
3. Life Raft Release Handle
4. Aft Compartment Heater
5. SCR-695 Radio
6. Portable Oxygen Unit
7. Interphone Jack Box
8. Throat Microphone Switch
9. Indicator Lamps
10. Inertia Crash Switch
11. Ash Tray
12. Emergency Wing Flap Crank Access
13. .50-Caliber Waist Gun
14. Fresh Air Ventilator
15. Folding Seat Stowage Strap
16. Safety Belt
17. Riding Seat
18. Emergency Wing Flap Crank
19. Case and Link Ejection Bag
20. Camera Support

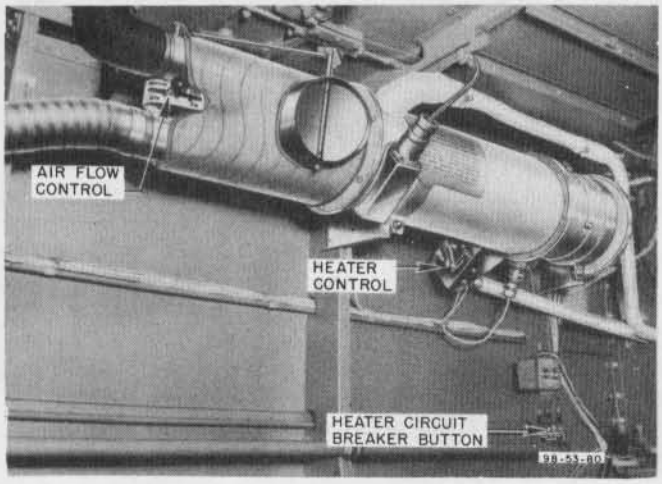


Figure 50—Aft Compartment Heater—B-25H-1 Airplanes

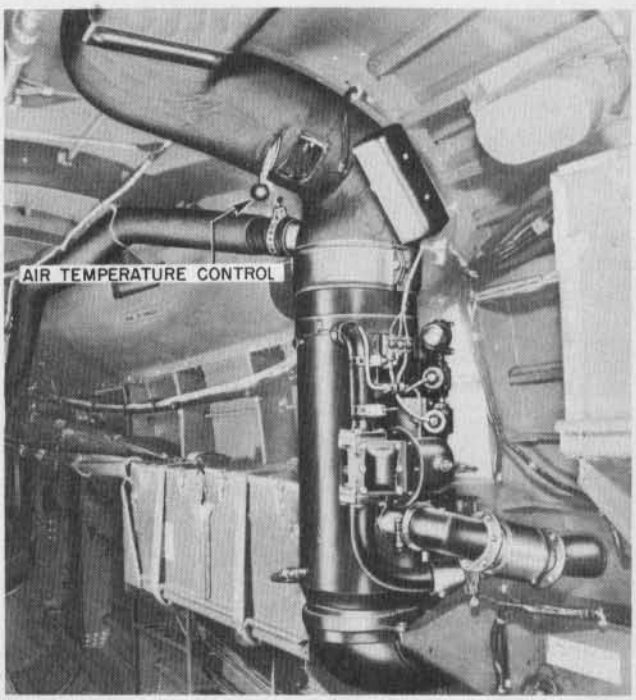


Figure 51—Aft Compartment Heater—B-25H-5 and Subsequent Airplanes

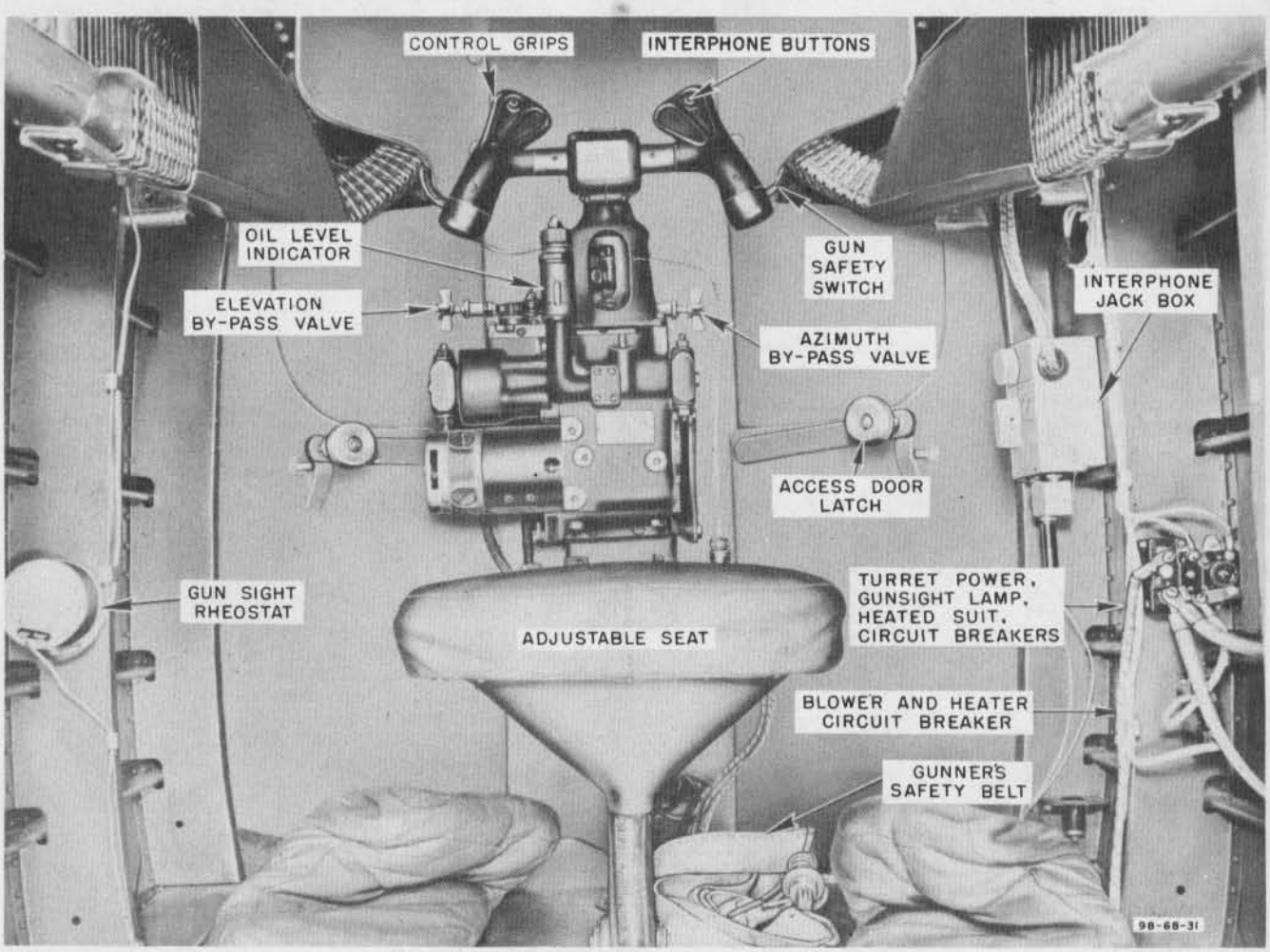


Figure 52—Tail Turret

Note

If heater fails to start, or goes out at high manifold pressures, refer to note under paragraph 3.*b.*(1)*(f)* for information concerning restarting.

e. AFT COMPARTMENT HEATER—B-25H-5 AND SUBSEQUENT AIRPLANES.

(1) STARTING HEATER.

Note

The heater can be started only after the airplane has attained sufficient air speed to ensure an adequate flow of combustion air to the heater.

(a) Have pilot turn ON master cabin heat switch.

(b) Turn cabin heat switch on frame above waist gun window to "START and HIGH."

(c) If less heat is desired after heater is operating, place switch in "LOW."

(d) If heater is delivering too much heat in LOW, open air temperature control at top of heater.

(e) Adjust control on heater duct outlet in waist gunner's compartment to obtain desired amount of warm air.

(f) When heater is off, open air temperature control to admit ventilating air.

f. SIGNAL LIGHT.—The type C-3A signal lamp is stowed in a small case under the waist gunner's riding seat. The lamp is provided with four filters for various signaling operations; red, green, amber, and neutral gray. The gray filter, for night signaling, cuts the light to approximately 10 percent of its original intensity. Plug the lamp into the 24-volt outlet of the heated clothing rheostat. The lamp, a sealed-beam quick-signaling type, is controlled by a trigger switch on the handle. The lamp is aimed by means of sights at the top of the reflector.

5. TAIL TURRET GUNNER.

a. TAIL TURRET.

(1) DESCRIPTION.—A Bell model M-7 electro-hydraulic turret, equipped with two .50-caliber guns and a type N-8 optional gun sight, is mounted in the tail.

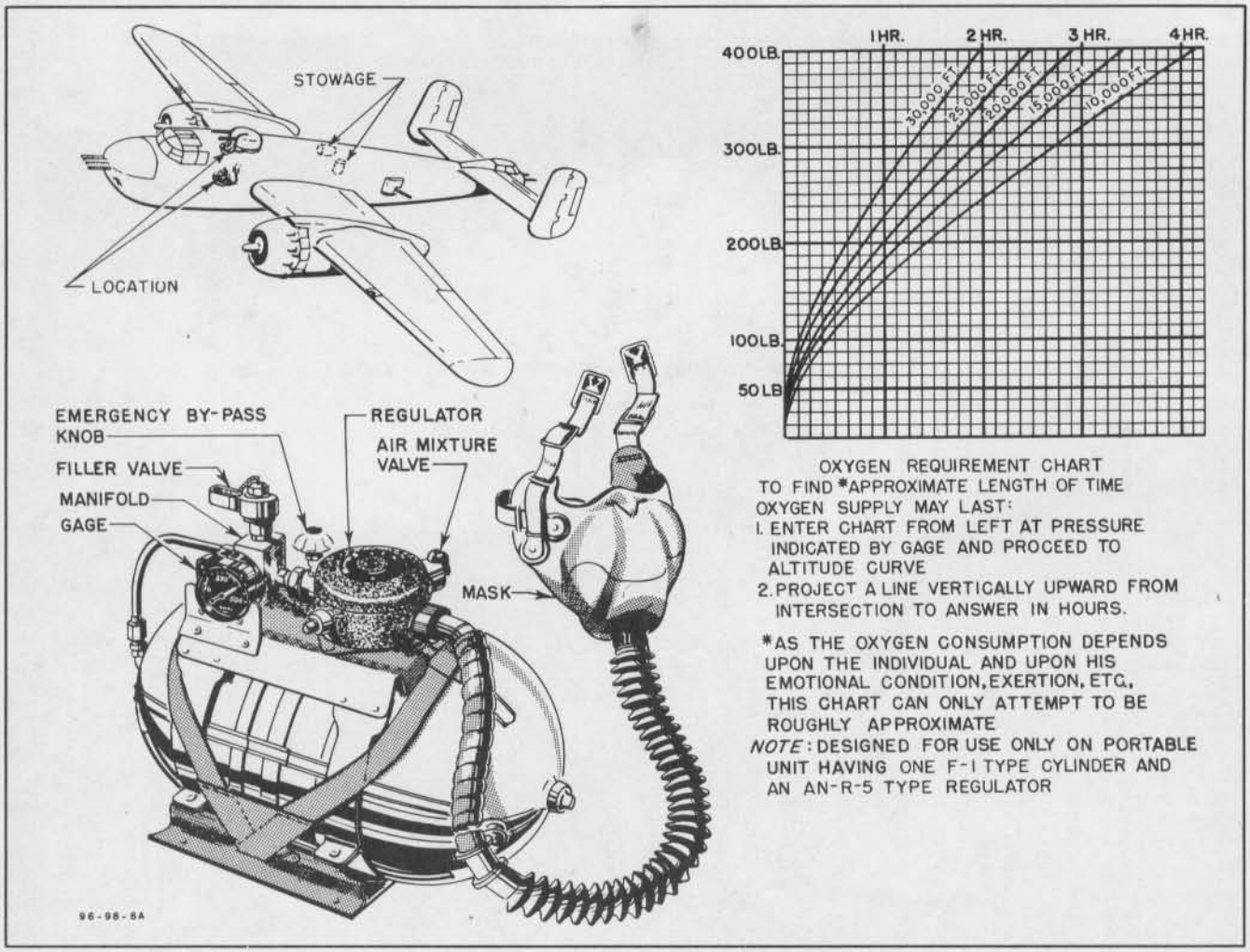


Figure 53—Portable Oxygen Unit

Each gun is provided with a 600-round ammunition box and an ammunition booster motor.

(2) OPERATION.

(a) CHARGING GUNS.

1. Lower the guns approximately 10°. Turn off the main power switch.

CAUTION

Always turn off the main power switch when charging the guns or working on the guns or turret.

2. Gain access to the charging handles on the guns by swinging down the sliding armor plate panel at each side of the control handles.

3. Charge each gun by pulling back and releasing its charging handle.

(b) COMBAT OPERATION.

1. Turn on the main power switch, located on the frame to the gunner's right, the gun sight rheostat, on the frame to the gunner's left, and the lamp switch on the gun sight housing. If the gun sight lamp does not come on, press the gun sight lamp circuit-breaker button located at the main power switch.

2. Movement of the guns is controlled by movement of the two interconnected control handles on the control tower. Each handle has a gun trigger switch, an interphone switch, and a safety switch. Each pair of switches is in parallel; therefore, the turret can be controlled with either the right or left hand.

3. The direction of gun movement in elevation and azimuth is relative to the direction of movement of the control handles about their vertical axis and horizontal axis. Speed of gun movement is proportional to the degree of movement of the handles from the neutral positions.

4. Maximum movement in elevation is 40 degrees up and 35 degrees down from horizontal. Maximum movement in azimuth is 38 degrees to each side of the center line of the airplane.

Note

The guns can be operated manually in an emergency (see Section IV).

b. TAIL TURRET DEFROSTER BLOWER AND HEATER, B-25H-1 AIRPLANES.—Turn on the defroster blower and 1000-watt electric heater by placing toggle switch on the frame at the left side of the gunner's seat in the "ON" position. The amount of air and air temperature to the sighting panel may be adjusted by the control on the duct at the gunner's right.

CAUTION

If defroster blower does not operate, turn switch OFF immediately. Unless there is a flow of air through the electric heater, there is danger of burning out the heating element within the heater.

c. HEATING AND DEFROSTING—B-25H-5 AND SUBSEQUENT AIRPLANES.—To obtain warm air in the compartment, open control on anemostat at left side of tail gunner's station. To obtain warm air for defrosting the tail turret sighting panel, turn ON control beside the anemostat. A switch for the aft compartment heater, located to the left of the tail gunner's seat, may be used to turn the heater LOW and OFF if the waist gunner's switch is OFF, but cannot be used to turn the heater "OFF" if the switch in the waist gunner's compartment is turned to either "START and HIGH" or "LOW."

6. OXYGEN SYSTEM.

a. DESCRIPTION.

(1) One portable low-pressure oxygen unit is located on the floor behind the pilot's seat, and the other attached to the ceiling in the forward right corner of the navigator-cannoneer's compartment. Each unit consists of a cylinder, filler valve, regulator, gage, mask tube, manifold, and the necessary lines, fittings, and supports. When not in use, the units are stowed on brackets at the rear entrance to the bomb bay crawlway.

(2) CYLINDER.—A type F-1 low-pressure oxygen cylinder of the externally reinforced type is used. The other parts of the unit are mounted on the cylinder.

(3) FILLER VALVE.—A 40326-A filler valve provides a means of filling the unit, permitting the oxygen to enter the system but preventing the flow from reversing. The valve prevents oxygen from escaping through the filler opening under a pressure range of from 10 to 450 pounds per square inch.

(4) REGULATOR.—A type AN-R-5 demand regulator automatically controls the flow and dilution of the oxygen. As the user inhales, a diaphragm collapses and opens a valve which permits oxygen to flow through the regulator, where it mixes with free air in an amount governed by a bellows-type valve in accordance with the barometric pressure. The oxygen is thus diluted by free air, in inverse proportion to the altitude, in order to conserve the supply. A control enables the user to close the air intake port and render the automatic mixing mechanism inoperative; pure oxygen then flows to the mask as required by the inhalation. An emergency valve on the unit allows the oxygen to bypass the regulator; the valve is controlled by a red knob. The type A-12 regulator which may also be used is similar in design to the AN-R-5, and contains all of the above-mentioned features.

(5) PRESSURE GAGE.—A type K-1 gage indicates the oxygen supply by denoting the pressure within the cylinder. The dial is calibrated to show pounds per square inch pressure in 50-lb graduations from 0 to 500.

(6) MASK TUBE.—An AN 6003-2 low-pressure tube assembly conducts the oxygen mixture from the regulator to the mask intake tube. The mask end is provided with a jaw-type stowage clamp. The other end is clamped to the regulator adjustable elbow.

(7) MASK.—The portable unit is designed for use with A-9, A-10, or A-10-A type oxygen masks. A correctly fitted mask of the proper type is extremely important.

b. OPERATING INSTRUCTIONS.—Normal operation of the portable oxygen system is automatic. If the mask is correctly fitted and the system is tight and in proper condition, the user's breathing will set the system in operation and release the right mixture of oxygen for the altitude at which the unit is being operated. If the mixture valve does not function properly, it may be turned OFF by turning the thumb lever on the regulator. This will allow pure oxygen to flow to the mask as required by the inhalation of the user. If failure of other parts of the regulator is suspected, the entire regulator mechanism may be bypassed by turning the red emergency knob in a counterclockwise direction. However, for normal operations, the automatic mixture valve must be turned ON and the emergency bypass knob turned OFF, in order to conserve the oxygen supply.

WARNING

Before taking off, flying personnel should make sure that sufficient oxygen is provided for the projected flight and that the masks are of the correct type and fit. It is also important that the entire system be free from oil and grease at all times. If oil or grease comes in contact with any part of the equipment, it should be wiped off immediately. Failure to do this may result in an explosion.

7. MISCELLANEOUS EQUIPMENT.

a. INTERPHONE EQUIPMENT.

(1) DESCRIPTION.—The interphone equipment, RC-36, includes an amplifier, a dynamotor, one jack box for each interphone station, one microphone (throat type) for each crew member (5), and one low impedance head set for each crew member (5). A low impedance adapter is installed at each interphone station, the stations being located as follows: The pilot's interphone jack box is mounted on the left-hand side of the pilot's compartment just aft of the instrument panel. The navigator's interphone jack box is mounted on the right-hand side of the pilot's compartment aft of the radio compass control box just below the window. The cannoneer's interphone jack box is mounted on the right-hand side of the cannoneer's compartment just below the cartridge cases for the right-hand .50-caliber blister guns. The upper turret operator's jack box is mounted on the upper right-hand side of the cannoneer's compartment opposite the upper turret column. Two gunner's jack boxes are installed in the aft section, forward of each waist gun blister. The rear turret operator's jack box is mounted on the left-hand side of the airplane opposite the tail gunner's seat.

(2) OPERATION.—The interphone jack box has five selective positions marked on the face of the box. Each position is used as follows:

(a) Position 1 marked COMP. In this position the audio output of the radio compass only will be heard.

(b) Position 2 marked LIAISON. In this position no signal will be heard since provision for liaison equipment has not been made.

(c) Position 3 marked COMMAND. In this position the command receiver output and sidetone of the command transmitter will be heard, and the microphone push-to-talk switch operates the command transmit-receive relays. The microphone will modulate the command transmitter when the push-to-talk switch is closed and the transmitter control box is in the VOICE position.

Note

In the above three positions, a limited control over the volume can be had by turning the increase-output knob.

(d) Position 4 marked INTER. All jack boxes turned to this position provide an intercommunication system between crew members. The microphone is connected to the input of the interphone amplifier and the headphones to the output of the same amplifier. The volume control is not effective in this position.

(e) Position 5 marked CALL. This is an emergency call position in which all of the positions of all jack boxes are placed in parallel across the output of the interphone amplifier. Should an emergency arise in which a crew member wishes to call an interphone station in use, he may do so by switching his jack box to the CALL position. The microphone is connected to the input of the interphone amplifier. This position is effective at all interphone stations. The handle must be held in the CALL position as it is spring-loaded to return to the INTER position.

b. SEATS.

(1) PILOT'S.—The pilot's plywood seat is adjustable, both vertically and horizontally. The back cushion is filled with kapok, and may be used as a life preserver.

(2) NAVIGATOR'S. — A metal seat beside the pilot's seat is for the use of the navigator. The back of the seat is hinged so that it can be folded down to permit passage through the compartment.

(3) CANNONEER'S.—A metal seat is provided in the cannoneer's compartment. The back of the seat folds down and the entire assembly can be pulled flat against the right wall of the compartment, clear of the front entrance hatch. A leather strap with a snap fastener secures the seat in the stowed position.

(4) SIDE WAIST AND REAR TURRET GUNNERS' SEATS.—Two padded seats, located on the left side of the fuselage just aft of the bomb bay are for the side waist gunner and the rear turret gunner.

c. SAFETY BELTS.—All seats, except the cannoneer's seat, are provided with safety belts.

d. RELIEF TUBES.—Relief tubes are installed in the

right side of the cannoneer's compartment and on the right side of the waist gunner's compartment. Normally the pilot, navigator, and upper turret gunner use the forward relief tube, and the side waist gunner and the rear turret gunner use the aft relief tube. On B-25H-5 and subsequent airplanes, the location of the relief tube has been moved from the cannoneer's compartment to the left side of the pilot's compartment.

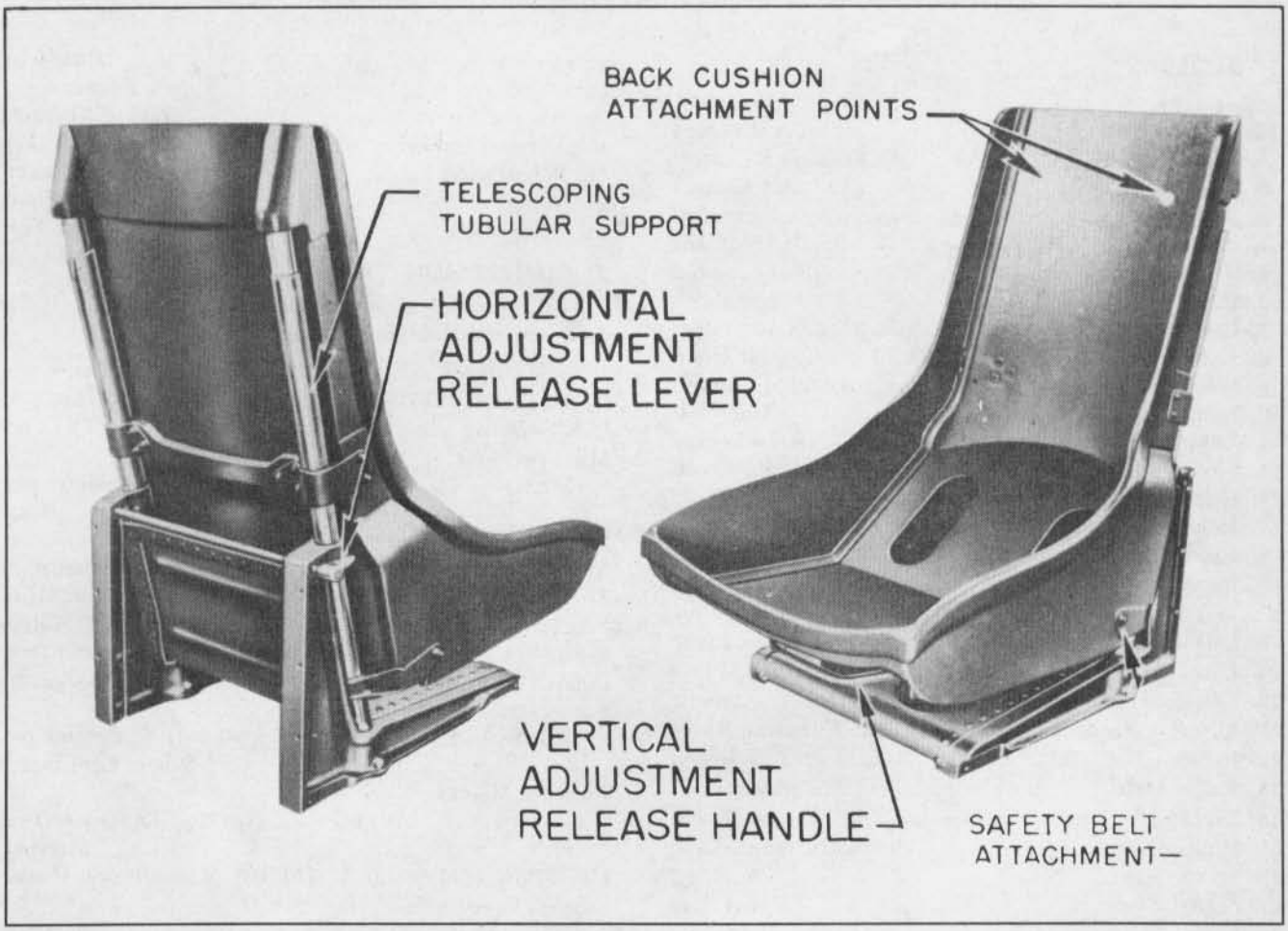


Figure 54—Pilot's Seat

APPENDIX I
GLOSSARY AND CONVERSION TABLES

1. GLOSSARY.

American Terminology	*British Terminology*
1. Accumulator	Pressure Reservoir
2. Air Filter	Air Cleaner
3. Airfoil	Aerofoil
4. Airplane	Aeroplane
5. Antenna	Aerial
6. Battery	Accumulator
7. Carburetor	Carburettor
8. Cockpit Enclosure	Cockpit Hood
9. Control Stick	Control Column
10. Empennage	Tail Unit
11. Engine (Power Plant)	Aero-Engine
12. Fire Wall	Fireproof Bulkhead
13. Horizontal Stabilizer	Tail Plane
14. Indicated Air Speed	Air-Speed-Indicator Reading
15. Land	Alight
16. Landing Gear	Undercarriage
17. Left	Port
18. Left Wing	Port Main Plane
19. Lines	Pipes
20. Manifold Pressure	Boost
21. Mooring Rings	Picketing Rings
22. Radio	Wireless
23. Radio Mast	Rod Aerial
24. Right	Starboard
25. Right Wing	Starboard Main Plane
26. Shock Strut	Oleo Leg
27. Signal Flare	Signal Star
28. Surface Control Lock	Locking Gear
29. Surface Controls	Flying Controls
30. Vertical Stabilizer	Fin
31. Windshield	Windscreen
32. Wing	Main Plane
33. Wing Tips	Plane Tips

2. CONVERSION TABLES.

The following general table of conversions may be used where calculations are necessary:

Multiply	By	To Obtain
U. S. Gallons (gal.)	0.833	(Imp. gal.) Imperial Gallons
U. S. Gallons	3.785	(l) Liters
Miles per hour (MPH)	1.609	(KmPH) Kilometers per Hour
Miles per hour	0.8684	Knots
Miles	1.609	(km) Kilometers
Miles	0.8684	Nautical Miles
Feet (ft.)	0.3048	(m) Meters
Inches (in.)	2.54	(cm) Centimeters
Pounds (lb.)	0.4536	(kg) Kilograms
Pounds per sq. in. (lbs./sq. in.)	0.0703	(kg/sq. cm) Kilograms per Square Centimeter
Inches of Mercury (in. Hg)	2.54	(cm Hg) Centimeters of Mercury
Horse Power (HP)	1.014	(MHP) Metric Horse Power
Degrees Centigrade (°C) + 17.8	1.8	(°F) Degrees Fahrenheit

APPENDIX II

FLIGHT OPERATING CHARTS

1. GENERAL.

a. This Section contains twenty-three charts of the following types:

(1) TAKE-OFF CHARTS.—Two take-off charts are included: one to be used when carrying no external load; the other, when carrying torpedo.

(2) FLIGHT OPERATION INSTRUCTION CHARTS.—Three of these tabular charts are applicable when carrying no external load, two are to be used when carrying torpedo, and two apply to single-engine operation. Each chart applies to a specific weight range.

(3) COMPOSITE CRUISING CONTROL CHART.—This chart shows the proper rpm and manifold pressure adjustments necessary to hold various air speeds constant throughout flight. Full instruction for its use is contained in paragraph 3.

(4) LONG-RANGE FERRYING CHARTS.—The charts in this group fall into the categories listed below:

(a) Range Correction for Fuel Temperature.

(b) Long-Range Cruising Data—2 Engine (tabular charts).

(c) Long-Range Cruising — Single Engine (graphic charts).

(d) Maximum Range.

(e) Maximum Endurance.

2. FLIGHT PLANNING.

a. GENERAL.

(1) The charts on the following pages serve as an aid in selecting the proper power and altitude to be used for obtaining optimum range of the airplane. On each chart, range and IAS are listed in statute miles.

(2) If the flight plan calls for a continuous flight where the desired cruising power and air speed are reasonably constant after take-off and climb, and the external load items are the same throughout the flight, the fuel required and flight time may be computed as a single section flight. If this is not the case, the flight should be broken up into sections, and each leg of the flight planned separately since dropping of external bombs or tanks causes considerable changes in range and air speed for given power. (Within the limits of the airplane, the fuel required and flying time for a given mission depend largely upon the speed desired. With all other factors remaining equal in an airplane, speed is obtained at a sacrifice of range, and range is obtained at a sacrifice of speed.)

b. USE OF CHARTS.

(1) Although instructions for their use are shown on the Flight Operation Instruction Charts, the following expanded information on proper use of the charts may be helpful.

(2) Select the Flight Operation Instruction Chart for the model airplane, and for gross weight and external loading to be used at take-off. The amount of gasoline available for flight planning purposes depends upon the reserve required and the amount required for starting and warm-up. Reserve should be based on the type of mission, terrain over which the flight is to be made, and weather conditions. The fuel required for climb and time to climb to various altitudes is shown on the Take-Off, Climb, and Landing Chart. Fuel remaining after subtracting reserve, warm-up, and climb fuel from total amount available is the amount to be used for flight planning.

(3) Select a figure in the fuel column in the upper section of the chart equal to, or the next entry less than, the amount of fuel available for flight planning. Move horizontally to the right or left and select a figure equal to, or the next entry greater than, the distance (with no wind) to be flown. Operating values contained in the lower section of the column number in which this figure appears represent the higher cruising speeds possible at the range desired. It will be noted that the ranges listed in Column I are correct only at sea level and are conservative for the other altitudes shown. The ranges shown in Column II and other columns to the right of Column II can be obtained at any of the altitudes listed in the Altitude Column. All of the power settings listed in a column will give approximately the same number of miles per gallon if each is used at the altitude shown on the same horizontal line with it. Note that the time required for the flight may be shortened by selection of the higher altitudes. In long-range cruising it is important that altitude air speed and rpm be held constant. The manifold pressure should be changed as required to hold the above values reasonably constant. The flight duration may be obtained by dividing the required distance by the true speed for the required altitude.

(4) The flight plan may be readily changed at any time en route, and the chart will show the balance of range available at various cruising powers by following the Instructions for Using Chart printed on each chart.

IMPORTANT

The preceding instructions and accompanying charts do not take into account the effect of wind. Adjustments to range values and flight duration to allow for wind may be made by any method familiar to the pilot, such as by the use of a flight calculator or a navigator's triangle of velocities.

c. SAMPLE PROBLEM.

(1) To travel 1300 miles round trip with 2000 pounds of bombs and full wing tanks (974 gallons) at an altitude of 10,000 feet with 20 minutes of rated power while over the object.

4/20/44

SPEC. AN-H-8 Dec. 18, 1942 FORM ASC-510

AIRPLANE MODELS

B-25H

NO EXTERNAL LOAD

TAKE-OFF, CLIMB & LANDING CHART

ENGINE MODELS

R-2600-13 OR R-2600-29

TAKE-OFF DISTANCE (IN FEET)

GROSS WEIGHT (IN LBS.)	HEAD WIND MPH	HARD SURFACE RUNWAY						SOD-TURF RUNWAY						SOFT SURFACE RUNWAY					
		AT SEA LEVEL		AT 3,000 FT.		AT 6,000 FT.		AT SEA LEVEL		AT 3,000 FT.		AT 6,000 FT.		AT SEA LEVEL		AT 3,000 FT.		AT 6,000 FT.	
		GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.
36,000	0	4600	5700	5200	6400	6700	8100	5300	6300	6000	7200	7600	9200	8000	9000	9300	10,500	11,500	13,000
	17	3400	4200	3600	4600	4800	5900	3700	4500	4200	5200	5500	6900	5600	6400	6600	7700	8200	9500
	34	2400	3100	2500	3200	3300	4300	2500	3300	3000	3800	4000	5200	4000	4600	4800	5700	5900	7000
	51	1400	2000	1500	2100	1900	2700	1400	2200	1900	2600	2600	3600	2500	3000	3200	3800	3700	4800
32,000	0	3300	4200	3700	4700	4700	5900	3700	4600	4000	5000	5300	6600	5500	6300	5900	6800	8200	9500
	17	2400	3100	2700	3500	3400	4400	2700	3400	2900	3700	3600	4600	3900	4500	4200	5000	6100	7100
	34	1600	2300	1800	2600	2300	3200	1900	2500	2000	2700	2500	3300	2700	3200	3100	3700	4400	5300
	51	1000	1600	1200	1800	1400	2100	1300	1800	1400	1900	1600	2200	1700	2100	2100	2500	3000	3600
28,000	0	2300	3000	2500	3300	3000	4000	2500	3300	2700	3500	3200	4200	3500	4200	3700	4500	4800	5800
	17	1700	2300	1800	2500	2200	3100	1800	2500	1900	2700	2300	3100	2500	3100	2700	3300	3500	4300
	34	1200	1700	1300	1800	1500	2300	1300	1800	1400	2000	1600	2300	1600	2200	1800	2400	2400	3000
	51	700	1100	800	1200	900	1600	900	1300	1000	1500	1200	1700	1000	1500	1200	1600	1400	1800

NOTE: INCREASE DISTANCE 5% FOR EACH 10°C ABOVE 0°C (5% FOR EACH 20°F ABOVE 32°F)

ENGINE LIMITS FOR TAKE-OFF 2600 RPM & 44 IN. HG

CLIMB DATA

COMBAT MISSIONS USE 2400 RPM & (LOW) -38 (HI) -41 IN. HG

FERRY MISSIONS USE 2100 RPM & 31 IN. HG

GROSS WEIGHT IN LBS.	TYPE OF CLIMB	S. L. TO 3000 FT. ALT.			6000 FT. ALT.				9000 FT. ALT.				12,000 FT. ALT.				15,000 FT. ALT.				BLOWER CHANGE
		BEST I.A.S. MPH	FT/MIN	TIME FROM S. L.	BEST I.A.S. MPH	FT/MIN	TIME FROM S. L.	FUEL FROM S.L. U. S.	BEST I.A.S. MPH	FT/MIN	TIME FROM S. L.	FUEL FROM S.L. U. S.	BEST I.A.S. MPH	FT/MIN	TIME FROM S. L.	FUEL FROM S.L. U.S.	BEST I.A.S. MPH	FT/MIN	TIME FROM S. L.	FUEL FROM S.L. U.S.	
36,000	COMBAT	155	700	4.1	155	660	8.5	100	155	500	13.5	125	155	420	20.0	165	150	200	31.0	220	10,500
	FERRY	155	330	9.5	155	310	19.0	115	155	250	29.0	155	155	140	43.0	200	155	80	70.0	290	13,000
32,000	COMBAT	150	960	3.0	150	920	6.2	85	150	740	10.0	105	150	660	14.5	130	145	420	21.0	160	10,500
	FERRY	155	490	6.2	155	480	12.5	95	155	420	19.0	120	155	300	27.0	145	155	230	39.0	190	13,000
28,000	COMBAT	150	1260	2.4	150	1220	4.8	80	150	1020	7.4	95	150	940	10.5	110	145	680	14.5	130	10,500
	FERRY	155	690	4.5	155	690	9.0	80	155	620	13.5	100	155	490	19.0	120	155	420	25.0	140	13,000

NOTE: INCREASED ELAPSED CLIMBING TIME 10 % FOR EACH 10°C ABOVE 0°C FREE AIR TEMPERATURE (10 % FOR EACH 20°F ABOVE 32°F) FUEL INCLUDES WARM-UP AND TAKE-OFF ALLOWANCE

LANDING DISTANCE (IN FEET)

GROSS WEIGHT IN LBS.	BEST I. A. S. APPROACH MPH	HARD DRY SURFACE						FIRM DRY SOD						WET OR SLIPPERY					
		AT SEA LEVEL		AT 3,000 FT.		AT 6,000 FT.		AT SEA LEVEL		AT 3,000 FT.		AT 6,000 FT.		AT SEA LEVEL		AT 3,000 FT.		AT 6,000 FT.	
		TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL
34,000	120	3900	1900	4100	2100	4400	2300	4200	2200	4400	2400	4800	2600	9300	7400	10,200	8200	11,100	8900
31,000	120	3600	1700	3800	1900	4100	2100	3900	2000	4100	2200	4400	2400	8700	6800	9400	7800	10,200	8200
25,000	110	3100	1400	3300	1500	3500	1700	3000	1600	3500	1800	3800	1900	7200	5500	7800	6000	8400	6600

NOTE: FOR GROUND TEMPERATURES ABOVE 35°C (95°F) INCREASE APPROACH I.A.S. 10% AND ALLOW 20% INCREASE IN GROUND ROLL.

REMARKS: *THE MAXIMUM LANDING WEIGHT FOR THIS AIRPLANE IS 32,300 LBS. THE CHART HAS BEEN TABULATED TO A GROSS WEIGHT OF 34,000 LBS. TO ALLOW FOR INTERPOLATION BETWEEN WEIGHTS.*

LEGEND
I.A.S.: Indicated Air Speed
M.P.H.: Miles Per Hour
S.L.: Sea Level
U.S.: U. S. Gallons
IMP.: Imperial Gallons
NOTE: All Distances are Average
RED FIGURES HAVE NOT BEEN FLIGHT CHECKED

Figure 55—Take-Off, Climb, and Landing Chart—No External Load

4/20/44

SPEC. AN-H-8 Dec. 18, 1942 FORM ASC-510

AIRPLANE MODELS

B-25H

WITH TORPEDO

TAKE-OFF, CLIMB & LANDING CHART

ENGINE MODELS

R-2600-13 OR R-2600-29

TAKE-OFF DISTANCE (IN FEET)

GROSS WEIGHT (IN LBS.)	HEAD WIND MPH	HARD SURFACE RUNWAY AT SEA LEVEL GROUND RUN	AT SEA LEVEL TO CLEAR 50' OBJ.	AT 3,000 FT. GROUND RUN	AT 3,000 FT. TO CLEAR 50' OBJ.	AT 6,000 FT. GROUND RUN	AT 6,000 FT. TO CLEAR 50' OBJ.	SOD-TURF RUNWAY AT SEA LEVEL GROUND RUN	AT SEA LEVEL TO CLEAR 50' OBJ.	AT 3,000 FT. GROUND RUN	AT 3,000 FT. TO CLEAR 50' OBJ.	AT 6,000 FT. GROUND RUN	AT 6,000 FT. TO CLEAR 50' OBJ.	SOFT SURFACE RUNWAY AT SEA LEVEL GROUND RUN	AT SEA LEVEL TO CLEAR 50' OBJ.	AT 3,000 FT. GROUND RUN	AT 3,000 FT. TO CLEAR 50' OBJ.	AT 6,000 FT. GROUND RUN	AT 6,000 FT. TO CLEAR 50' OBJ.
36,000	0	4600	5700	5200	6400	6700	8100	5300	6300	6000	7200	7600	9200	8000	9000	9300	10,500	11,500	13,000
	17	3400	4200	3600	4600	4800	5900	3700	4500	4200	5200	5500	6900	5600	6400	6600	7700	8200	9500
	34	2400	3100	2500	3200	3300	4300	2500	3300	3000	3800	4000	5200	4000	4600	4800	5700	5900	7000
	51	1400	2000	1500	2100	1900	2700	1400	2200	1900	2600	2600	3600	2500	3000	3200	3800	3700	4800
32,000	0	3300	4200	3700	4700	4700	5900	3700	4600	4000	5000	5300	6600	5500	6300	5900	6800	8200	9500
	17	2400	3100	2700	3500	3400	4400	2700	3400	2900	3700	3600	4600	3900	4500	4200	5000	6100	7100
	34	1600	2300	1800	2600	2300	3200	1900	2500	2000	2700	2500	3300	2700	3200	3100	3700	4400	5300
	51	1000	1600	1200	1800	1400	2100	1300	1800	1400	1900	1600	2200	1700	2100	2100	2500	3000	3600
28,000	0	2300	3000	2500	3300	3000	4000	2500	3300	2700	3500	3200	4200	3500	4200	3700	4500	4800	5800
	17	1700	2300	1800	2500	2200	3100	1800	2500	1900	2700	2300	3100	2500	3100	2700	3300	3500	4300
	34	1200	1700	1300	1800	1500	2300	1300	1800	1400	2000	1600	2300	1600	2200	1800	2400	2400	3000
	51	700	1100	800	1200	900	1600	900	1300	1000	1500	1200	1700	1000	1500	1200	1600	1400	1800

NOTE: INCREASE DISTANCE 5 % FOR EACH 10°C ABOVE 0°C (5 % FOR EACH 20°F ABOVE 32°F) ENGINE LIMITS FOR TAKE-OFF 2600 RPM & 44 IN. HG

COMBAT MISSIONS USE 2400 RPM & (LOW) -3B (HI) -42 IN. HG

CLIMB DATA

FERRY MISSIONS USE 2100 RPM & 31 IN. HG

GROSS WEIGHT IN LBS.	TYPE OF CLIMB	S. L. TO 3000 FT. ALT. BEST I.A.S. MPH	FT/MIN	TIME FROM S. L.	6000 FT. ALT. BEST I.A.S. MPH	FT/MIN	TIME FROM S. L.	FUEL FROM S.L. U. S.	9000 FT. ALT. BEST I.A.S. MPH	FT/MIN	TIME FROM S. L.	FUEL FROM S.L. U. S.	12,000 FT. ALT. BEST I.A.S. MPH	FT/MIN	TIME FROM S. L.	FUEL FROM S.L. U.S.	15,000 FT. ALT. BEST I.A.S. MPH	FT/MIN	TIME FROM S. L.	FUEL FROM S.L. U.S.	BLOWER CHANGE
36,000	COMBAT	155	650	4.5	155	600	9.5	105	155	430	15.0	135	155	360	23.0	175	150	130	36.0	245	10,500
	FERRY	155	240	13.0	155	220	26.0	135	155	160	40.0	195	155	40	75.0	280					13,000
32,000	COMBAT	150	900	3.2	150	850	6.5	90	150	670	10.5	110	150	580	15.5	140	145	340	22.0	180	10,500
	FERRY	155	400	7.5	155	390	15.5	95	155	320	24.0	135	155	200	36.0	175	155	120	55.0	240	13,000
28,000	COMBAT	150	1190	2.5	150	1150	5.0	80	150	940	8.0	95	150	850	11.5	115	145	600	15.5	140	10,500
	FERRY	155	580	5.0	155	570	10.5	85	155	510	16.0	105	155	370	23.0	130	155	300	32.0	160	13,000

NOTE: INCREASED ELAPSED CLIMBING TIME 10 % FOR EACH 10°C ABOVE 0°C FREE AIR TEMPERATURE (10 % FOR EACH 20°F ABOVE 32°F) FUEL INCLUDES WARM-UP AND TAKE-OFF ALLOWANCE

LANDING DISTANCE (IN FEET)

GROSS WEIGHT IN LBS.	BEST I. A. S. APPROACH MPH	HARD DRY SURFACE AT SEA LEVEL TO CLEAR 50' OBJ.	AT SEA LEVEL GROUND ROLL	AT 3,000 FT. TO CLEAR 50' OBJ.	AT 3,000 FT. GROUND ROLL	AT 6,000 FT. TO CLEAR 50' OBJ.	AT 6,000 FT. GROUND ROLL	FIRM DRY SOD AT SEA LEVEL TO CLEAR 50' OBJ.	AT SEA LEVEL GROUND ROLL	AT 3,000 FT. TO CLEAR 50' OBJ.	AT 3,000 FT. GROUND ROLL	AT 6,000 FT. TO CLEAR 50' OBJ.	AT 6,000 FT. GROUND ROLL	WET OR SLIPPERY AT SEA LEVEL TO CLEAR 50' OBJ.	AT SEA LEVEL GROUND ROLL	AT 3,000 FT. TO CLEAR 50' OBJ.	AT 3,000 FT. GROUND ROLL	AT 6,000 FT. TO CLEAR 50' OBJ.	AT 6,000 FT. GROUND ROLL
34,000	120	3900	1900	4100	2100	4400	2300	4200	2200	4400	2400	4800	2600	9300	7400	10,200	8200	11,100	8900
31,000	120	3600	1700	3800	1900	4100	2100	3900	2000	4100	2200	4400	2400	8700	6800	9400	7500	10,200	8200
25,000	110	3100	1400	3300	1500	3500	1700	3000	1600	3500	1800	3800	1900	7200	5500	7800	6000	8400	6600

NOTE: FOR GROUND TEMPERATURES ABOVE 35°C (95°F) INCREASE APPROACH I.A.S. 10% AND ALLOW 20% INCREASE IN GROUND ROLL.

REMARKS: *THE MAXIMUM LANDING WEIGHT FOR THIS AIRPLANE IS 32,300 LBS. THE CHART HAS BEEN TABULATED TO A GROSS WEIGHT OF 34,000 LBS. TO ALLOW FOR INTERPOLATION BETWEEN WEIGHTS.*

LEGEND
I.A.S.: Indicated Air Speed
M.P.H.: Miles Per Hour
S.L.: Sea Level
U.S.: U. S. Gallons
IMP.: Imperial Gallons
NOTE: All Distances are Average

RED FIGURES HAVE NOT BEEN FLIGHT CHECKED

Figure 56—Take-Off, Climb, and Landing Chart—Torpedo

MODEL(S): B-25H

ENGINE(S): R-2600-13 OR R-2600-29

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 35,000 TO 32,000 POUNDS

EXTERNAL LOAD ITEMS: NONE

LIMITS	R. P. M.	M. P. (IN. HG.)	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	TOTAL G. P. H.
WAR MAX.	2600	49	LOW	FULL RICH	5 MIN.	
MILITARY POWER	2600	41.5 44	LOW HIGH	FULL RICH	5 MIN.	215
NORMAL RATED	2400	37.5 41	LOW HIGH	FULL RICH	CONT.	180 190

INSTRUCTIONS FOR USING CHART: Select figure in FUEL column equal to or less than amount of fuel to be used for cruising. Move horizontally to left or right and select RANGE value equal to or greater than the statute or nautical air miles to be flown. Vertically below and opposite desired cruising altitude (ALT.) read optimum R. P. M., I. A. S. and MIXTURE setting required.

NOTES: Column I is for emergency high speed cruising only. Columns II, III, IV and V give progressive increase in range at a sacrifice in speed. Manifold pressure (M. P.), gallons per hour (G. P. H.) and true airspeed (T. A. S.) are approximate values for reference. For efficiency maintain indicated airspeed (I. A. S.) hourly. Adjust RPM slightly if necessary to avoid exceeding manifold pressure more than 3 in. Hg.

I			FUEL	II			III			IV			FUEL	V		
RANGE IN AIR MILES			U. S.	RANGE IN AIR MILES			RANGE IN AIR MILES			RANGE IN AIR MILES			U. S.	RANGE IN AIR MILES		
STATUTE	NAUTICAL		GAL.	STATUTE	NAUTICAL		STATUTE	NAUTICAL		STATUTE	NAUTICAL		GAL.	STATUTE	NAUTICAL	
			974	① 84 GAL. ALLOWANCE NOT AVAILABLE IN FLIGHT							①		974			
750	650		890	970	840		1120	970		1350	1170		890	1510	1320	
670	580		800	870	760		1010	870		1220	1050		800	1360	1180	
590	510		700	760	660		880	750		1060	920		700	1190	1040	
500	440		600	650	570		750	650		910	790		600	1030	890	
420	360		500	540	470		630	540		760	660		500	860	750	

MAXIMUM CONTINUOUS						ALT.	OPERATING DATA						OPERATING DATA						OPERATING DATA						ALT.	MAXIMUM RANGE					
R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.	Feet	R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.	R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.	R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.	Feet	R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.
						40000																			40000						
						35000																			35000						
						30000																			30000						
						25000																			25000						
						20000																			20000						
2400	215	F.R.	F.T.	340	275	15000	2150	205	F.R.	34	250	260	2250	190	F.R.	F.T.	205	245	2100	180	C.L.	F.T.	145	230	15000						
2400	230	F.R.	F.T.	305	275	10000	2250	220	F.R.	F.T.	250	260	2100	210	F.R.	30	205	245	2050	200	C.L.	29	155	235	10000	2000	180	C.L.	28	135	215
2400	250	F.R.	38	340	275	5000	2150	225	F.R.	33	240	250	2050	210	F.R.	31	195	230	2050	205	C.L.	30	150	225	5000	1900	175	C.L.	28	120	195
2400	250	F.R.	38	315	255	S. L.	2150	230	F.R.	34	225	235	2050	210	F.R.	31	180	215	2000	205	C.L.	30	145	210	S. L.	1700	175	C.L.	29	110	175

NOTES

① ALLOW 84 GAL. FOR WARM-UP, TAKE-OFF & INITIAL CLIMB PLUS ALLOWANCE FOR WIND, RESERVE & COMBAT AS REQ'D.

HIGH BLOWER ABOVE HEAVY LINE ONLY.

EXAMPLE

AT 34,000 LB. GROSS WT. WITH 890 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 84 GAL.) TO FLY 1250 STAT. AIRMILES AT 10,000 FT. ALT. MAINTAIN 2050 RPM AND 200 MPH IND. AIRSPEED WITH MIXTURE SET CRUISING LEAN.

LEGEND

I. A. S.: INDICATED AIRSPEED
M. P.: MANIFOLD PRESSURE
G. P. H.: U. S. GAL. PER HOUR
T. A. S.: TRUE AIRSPEED
S. L.: SEA LEVEL
F. T.: FULL THROTTLE
F. R.: FULL RICH
A. R.: AUTO-RICH
A. L.: AUTO-LEAN
C. L.: CRUISING LEAN

Figure 57—Flight Operation Instruction Chart—No External Load—35,000 to 32,000 Lbs.

MODEL(S)

B-25H

ENGINE(S): R-2600-13 OR R-2600-29

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 33,000 TO 30,000 POUNDS

EXTERNAL LOAD ITEMS

NONE

LIMITS	R. P. M.	M. P. (IN. HG.)	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	TOTAL G. P. H.
WAR MAX.	2600	49	LOW	FULL RICH	5 MIN.	
MILITARY POWER	2600	41.5 44	LOW HIGH	FULL RICH	5 MIN.	215
NORMAL RATED	2400	37.5 41	LOW HIGH	FULL RICH	CONT.	180 190

INSTRUCTIONS FOR USING CHART: Select figure in FUEL column equal to or less than amount of fuel to be used for cruising. Move horizontally to left or right and select RANGE value equal to or greater than the statute or nautical air miles to be flown. Vertically below and opposite desired cruising altitude (ALT.) read optimum R. P. M., I. A. S. and MIXTURE setting required.

NOTES: Column I is for emergency high speed cruising only. Columns II, III, IV and V give progressive increase in range at a sacrifice in speed. Manifold pressure (M. P.), gallons per hour (G. P. H.) and true airspeed (T. A. S.) are approximate values for reference. For efficiency maintain indicated airspeed (I. A. S.) hourly. Adjust RPM slightly if necessary to avoid exceeding manifold pressure more than 3 in. Hg.

I			II			III			IV			V		
RANGE IN AIR MILES		FUEL U. S. GAL.	RANGE IN AIR MILES		FUEL U. S. GAL.	RANGE IN AIR MILES		FUEL U. S. GAL.	RANGE IN AIR MILES		FUEL U. S. GAL.	RANGE IN AIR MILES		
STATUTE	NAUTICAL		STATUTE	NAUTICAL		STATUTE	NAUTICAL		STATUTE	NAUTICAL		STATUTE	NAUTICAL	
		1524	① 74 GAL. ALLOWANCE NOT AVAILABLE IN FLIGHT								① 1524			
1230	*1070*	1450	1660	*1440*		1960	*1700*		2280	*1980*	1450	2500	*2180*	
1110	*960*	1300	1480	*1290*		1750	*1520*		2040	*1770*	1300	2250	*1950*	
1020	*880*	1200	1370	*1190*		1620	*1410*		1890	*1640*	1200	2080	*1800*	
930	*810*	1100	1260	*1090*		1480	*1290*		1730	*1500*	1100	1910	*1650*	
850	*740*	1000	1140	*990*		1350	*1170*		1570	*1360*	1000	1730	*1500*	
760	*660*	900	1030	*890*		1210	*1050*		1420	*1230*	900	1560	*1350*	
680	*590*	800	910	*790*		1080	*930*		1260	*1090*	800	1380	*1200*	
590	*510*	700	800	*690*		940	*820*		1100	*950*	700	1210	*1050*	
510	*440*	600	680	*590*		810	*700*		940	*820*	600	1040	*900*	

MAXIMUM CONTINUOUS						ALT. Feet	OPERATING DATA						OPERATING DATA						OPERATING DATA						ALT. Feet	MAXIMUM RANGE					
R. P. M.	I. A. S. M.P.H.	MIXTURE	M. P. In. Hg.	G. P. H.	T. A. S.		R. P. M.	I. A. S. M.P.H.	MIXTURE	M. P. In. Hg.	G. P. H.	T. A. S.	R. P. M.	I. A. S. M.P.H.	MIXTURE	M. P. In. Hg.	G. P. H.	T. A. S.	R. P. M.	I. A. S. M.P.H.	MIXTURE	M. P. In. Hg.	G. P. H.	T. A. S.		R. P. M.	I. A. S. M.P.H.	MIXTURE	M. P. In. Hg.	G. P. H.	T. A. S.
						40000																			40000						
						35000																			35000						
						30000																			30000						
						25000																			25000						
2400	185	F.R.	F.T.	260	255	20000	2250	180	F.R.	F.T.	215	250	2050	165	F.R.	F.T.	175	225							20000						
2400	220	F.R.	F.T.	340	280	15000	2150	205	F.R.	34	240	265	2200	195	F.R.	F.T.	190	250	2100	185	C.L.	F.T.	145	235	15000						
2400	235	F.R.	F.T.	305	275	10000	2200	225	F.R.	32	240	265	2050	205	F.R.	29	190	245	2050	200	C.L.	29	155	240	10000	1950	180	C.L.	27	125	215
2400	250	F.R.	38	340	280	5000	2100	225	F.R.	32	220	245	2050	210	F.R.	30	185	230	2000	205	C.L.	30	145	225	5000	1850	180	C.L.	28	115	195
2400	255	F.R.	38	315	260	S. L.	2100	225	F.R.	33	210	230	2050	210	F.R.	31	175	215	2000	205	C.L.	30	135	210	S. L.	1650	180	C.L.	29	105	180

NOTES

① ALLOW 74 GAL. FOR WARM-UP, TAKE-OFF & INITIAL CLIMB PLUS ALLOWANCE FOR WIND, RESERVE & COMBAT AS REQ'D.

HIGH BLOWER ABOVE HEAVY LINE ONLY

EXAMPLE

AT 32,000 LB. GROSS WT. WITH 900 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 74 GAL.) TO FLY 1350 STAT. AIRMILES AT 10,000 FT. ALT. MAINTAIN 2050 RPM AND 200 MPH IND. AIRSPEED WITH MIXTURE SET Cruising Lean.

LEGEND

I. A. S.: INDICATED AIRSPEED
M. P.: MANIFOLD PRESSURE
G. P. H.: U. S. GAL. PER HOUR
T. A. S.: TRUE AIRSPEED
S. L.: SEA LEVEL

F. T.: FULL THROTTLE
F. R.: FULL RICH
A. R.: AUTO-RICH
A. L.: AUTO-LEAN
C. L.: CRUISING LEAN

Figure 58—Flight Operation Instruction Chart—No External Load—33,000 to 30,000 Lbs.

MODEL(S)
B-25H

ENGINE(S): R-2600-13 OR R-2600-29

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 30,000 TO 26,000 POUNDS

EXTERNAL LOAD ITEMS
NONE

LIMITS	R. P. M.	M. P. (IN. HG.)	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	TOTAL G. P. H.
WAR MAX.	2600	49	LOW	FULL RICH	5 MIN.	
MILITARY POWER	2600	41.5 44	LOW HIGH	FULL RICH	5 MIN.	215
NORMAL RATED	2400	37.5 41	LOW HIGH	FULL RICH	CONT.	180 190

INSTRUCTIONS FOR USING CHART: Select figure in FUEL column equal to or less than amount of fuel to be used for cruising. Move horizontally to left or right and select RANGE value equal to or greater than the statute or nautical air miles to be flown. Vertically below and opposite desired cruising altitude (ALT.) read optimum R. P. M., I. A. S. and MIXTURE setting required.

NOTES: Column I is for emergency high speed cruising only. Columns II, III, IV and V give progressive increase in range at a sacrifice in speed. **Manifold pressure** (M. P.), gallons per hour (G. P. H.) and true airspeed (T. A. S.) are approximate values for reference. For efficiency maintain indicated airspeed (I. A. S.) hourly. Adjust RPM slightly if necessary to avoid exceeding manifold pressure more than 3 in. Hg.

I		FUEL	II		III		IV		FUEL	V	
RANGE IN AIR MILES		U. S.	RANGE IN AIR MILES		RANGE IN AIR MILES		RANGE IN AIR MILES		U. S.	RANGE IN AIR MILES	
STATUTE	NAUTICAL	GAL.	STATUTE	NAUTICAL	STATUTE	NAUTICAL	STATUTE	NAUTICAL	GAL.	STATUTE	NAUTICAL
		974	① 74 GAL. ALLOWANCE NOT AVAILABLE IN FLIGHT ①						974		
750	640	900	940	820	1140	990	1470	1280	900	1680	1460
660	570	800	840	730	1010	880	1310	1140	800	1500	1300
580	500	700	730	630	890	770	1150	990	700	1310	1130
500	430	600	630	540	760	660	980	850	600	1120	970
410	360	500	520	450	630	550	820	710	500	930	810
330	290	400	420	360	510	440	650	570	400	750	650
250	210	300	310	270	380	330	490	420	300	560	480
160	140	200	210	180	250	220	330	280	200	370	320
80	70	100	100	90	120	110	160	140	100	180	160

MAXIMUM CONTINUOUS						ALT.	OPERATING DATA						OPERATING DATA						OPERATING DATA						ALT.	MAXIMUM RANGE					
R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.	Feet	R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.	R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.	R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.	Feet	R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.
						40000																			40000						
						35000																			35000						
						30000																			30000						
						25000																			25000						
2400	195	F.R.	F.T.	260	270	20000	2300	185	F.R.	F.T.	240	260	2150	180	F.R.	F.T.	200	250	1950	160	C.L.	F.T.	140	225	20000						
2400	225	F.R.	F.T.	340	285	15000	2200	215	F.R.	35	260	275	2250	205	F.R.	F.T.	205	260	2100	190	C.L.	F.T.	145	245	15000						
2400	240	F.R.	F.T.	305	280	10000	2250	230	F.R.	F.T.	260	275	2100	220	F.R.	30	205	260	2050	205	C.L.	29	145	240	10000	1850	175	C.L.	26	110	210
2400	255	F.R.	38	340	280	5000	2200	235	F.R.	33	250	260	2050	220	F.R.	31	190	240	2000	205	C.L.	29	135	225	5000	1700	175	C.L.	27	100	190
2400	255	F.R.	38	315	260	S. L.	2150	235	F.R.	34	230	240	2050	220	F.R.	31	175	225	1950	205	C.L.	29	125	210	S. L.	1500	170	C.L.	29	90	170

NOTES

① ALLOW 74 GAL. FOR WARM-UP, TAKE-OFF & INITIAL CLIMB PLUS ALLOWANCE FOR WIND, RESERVE & COMBAT AS REQ'D.

HIGH BLOWER ABOVE HEAVY LINE ONLY

EXAMPLE

AT 29,000 LB. GROSS WT. WITH 900 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 74 GAL.) TO FLY 1400 STAT. AIRMILES AT 10,000 FT. ALT. MAINTAIN 2050 RPM AND 205 MPH IND. AIRSPEED WITH MIXTURE SET CRUISING LEAN.

LEGEND

I. A. S.: INDICATED AIRSPEED
M. P.: MANIFOLD PRESSURE
G. P. H.: U. S. GAL. PER HOUR
T. A. S.: TRUE AIRSPEED
S. L.: SEA LEVEL
F. T.: FULL THROTTLE
F. R.: FULL RICH
A. R.: AUTO-RICH
A. L.: AUTO-LEAN
C. L.: CRUISING LEAN

Figure 59—Flight Operation Instruction Chart—No External Load—30,000 to 26,000 Lbs.

NOTES

① ALLOW 89 GAL. FOR WARM-UP, TAKE-OFF & INITIAL CLIMB PLUS ALLOWANCE FOR WIND, RESERVE & COMBAT AS REQ'D.

HIGH BLOWER ABOVE HEAVY LINE ONLY.

EXAMPLE

AT 32,000 LB. GROSS WT. WITH 1100 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 89 GAL.) TO FLY 1500 STAT. AIRMILES AT 5000 FT. ALT. MAINTAIN 2000 RPM AND 195 MPH IND. AIRSPEED WITH MIXTURE SET CRUISING LEAN.

LEGEND

I. A. S.: INDICATED AIRSPEED
M. P.: MANIFOLD PRESSURE
G. P. H.: U. S. GAL. PER HOUR
T. A. S.: TRUE AIRSPEED
S. L.: SEA LEVEL
F. T.: FULL THROTTLE
F. R.: FULL RICH
A. R.: AUTO-RICH
A. L.: AUTO-LEAN
C. L.: CRUISING LEAN

Figure 60—Flight Operation Instruction Chart—Torpedo—33,000 to 30,000 Lbs.

MODEL(S)

B-25H

ENGINE(S): R-2600-13 OR R-2600-29

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 33,000 TO 30,000 POUNDS

EXTERNAL LOAD ITEMS

1 TORPEDO

LIMITS	R. P. M.	M. P. (IN. HG.)	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	TOTAL G. P. H.
WAR MAX.	2600	49	LOW	FULL RICH	5 MIN.	
MILITARY POWER	2600	41.5 44	LOW HIGH	FULL RICH	5 MIN.	215
NORMAL RATED	2400	37.5 41	LOW HIGH	FULL RICH	CONT.	180 190

INSTRUCTIONS FOR USING CHART: Select figure in FUEL column equal to or less than amount of fuel to be used for cruising. Move horizontally to left or right and select RANGE value equal to or greater than the statute or nautical air miles to be flown. Vertically below and opposite desired cruising altitude (ALT.) read optimum R. P. M., I. A. S. and MIXTURE setting required.

NOTES: Column I is for emergency high speed cruising only. Columns II, III, IV and V give progressive increase in range at a sacrifice in speed. Manifold pressure (M. P.), gallons per hour (G. P. H.) and true airspeed (T. A. S.) are approximate values for reference. For efficiency maintain indicated airspeed (I. A. S.) hourly. Adjust RPM slightly if necessary to avoid exceeding manifold pressure more than 3 in. Hg.

I		FUEL	II		III		IV		FUEL	V	
RANGE IN AIR MILES		U. S.	RANGE IN AIR MILES		RANGE IN AIR MILES		RANGE IN AIR MILES		U. S.	RANGE IN AIR MILES	
STATUTE	NAUTICAL	GAL.	STATUTE	NAUTICAL	STATUTE	NAUTICAL	STATUTE	NAUTICAL	GAL.	STATUTE	NAUTICAL
		1189	① 89 GAL. ALLOWANCE NOT AVAILABLE IN FLIGHT ①						1189		
880	*760*	1100	1100	*950*	1310	*1140*	1580	*1370*	1100	1760	*1530*
800	*690*	1000	1000	*870*	1190	*1040*	1430	*1240*	1000	1600	*1390*
720	*620*	900	900	*780*	1070	*930*	1290	*1120*	900	1440	*1250*
640	*550*	800	800	*690*	950	*830*	1150	*990*	800	1280	*1110*
560	*480*	700	700	*600*	840	*720*	1000	*870*	700	1120	*970*
480	*410*	600	600	*520*	710	*620*	860	*740*	600	960	*840*

MAXIMUM CONTINUOUS						ALT.	OPERATING DATA						OPERATING DATA						OPERATING DATA						ALT.	MAXIMUM RANGE					
R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.	Feet	R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.	R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.	R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.	Feet	R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.
						40000																			40000						
						35000																			35000						
						30000																			30000						
						25000																			25000						
						20000																			20000						
2400	205	F.R.	F.T.	340	260	15000	2200	195	F.R.	F.T.	265	250	2300	185	F.R.	F.T.	210	235	2100	170	C.L.	F.T.	145	215	15000						
2400	220	F.R.	F.T.	305	260	10000	2300	215	F.R.	F.T.	270	255	2100	195	F.R.	30	200	235	2050	190	C.L.	29	155	225	10000	2000	170	C.L.	27	130	200
2400	235	F.R.	38	340	260	5000	2200	220	F.R.	33	250	240	2050	200	F.R.	31	190	220	2000	195	C.L.	31	155	215	5000	1950	165	C.L.	28	125	185
2400	235	F.R.	38	315	240	S. L.	2150	220	F.R.	34	235	225	2050	200	F.R.	31	180	205	2000	195	C.L.	31	140	200	S. L.	1650	160	C.L.	29	105	165

MODEL(S): B-25H

ENGINE(S): R-2600-13 OR R-2600-29

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 30,000 TO 26,000 POUNDS

EXTERNAL LOAD ITEMS: 1 TORPEDO

LIMITS	R. P. M.	M. P. (IN. HG.)	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	TOTAL G. P. H.
WAR MAX.	2600	49	LOW	FULL RICH	5 MIN.	
MILITARY POWER	2600	41.5 44	LOW HIGH	FULL RICH	5 MIN.	215
NORMAL RATED	2400	37.5 41	LOW HIGH	FULL RICH	CONT.	180 190

INSTRUCTIONS FOR USING CHART: Select figure in FUEL column equal to or less than amount of fuel to be used for cruising. Move horizontally to left or right and select RANGE value equal to or greater than the statute or nautical air miles to be flown. Vertically below and opposite desired cruising altitude (ALT.) read optimum R. P. M., I. A. S. and MIXTURE setting required.

NOTES: Column I is for emergency high speed cruising only. Columns II, III, IV and V give progressive increase in range at a sacrifice in speed. Manifold pressure (M. P.), gallons per hour (G. P. H.) and true airspeed (T. A. S.) are approximate values for reference. For efficiency maintain indicated airspeed (I. A. S.) hourly. Adjust RPM slightly if necessary to avoid exceeding manifold pressure more than 3 in. Hg.

I			FUEL	II			III			IV			FUEL	V		
RANGE IN AIR MILES			U. S.	RANGE IN AIR MILES			RANGE IN AIR MILES			RANGE IN AIR MILES			U. S.	RANGE IN AIR MILES		
STATUTE	NAUTICAL		GAL.	STATUTE	NAUTICAL		STATUTE	NAUTICAL		STATUTE	NAUTICAL		GAL.	STATUTE	NAUTICAL	
			670	① 70 GAL. ALLOWANCE NOT AVAILABLE IN FLIGHT ①									670			
470	*410*		600	600	*520*		720	*620*		900	*780*		600	1020	*880*	
390	*340*		500	500	*430*		600	*520*		750	*650*		500	850	*740*	
310	*270*		400	400	*340*		480	*410*		600	*520*		400	680	*590*	
230	*200*		300	300	*260*		360	*310*		450	*390*		300	510	*440*	
150	*130*		200	200	*170*		240	*210*		300	*260*		200	340	*290*	
80	*70*		100	100	*80*		120	*100*		150	*130*		100	170	*140*	

MAXIMUM CONTINUOUS						ALT.	OPERATING DATA						OPERATING DATA						OPERATING DATA						ALT.	MAXIMUM RANGE					
R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.	Feet	R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.	R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.	R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.	Feet	R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.
						40000																			40000						
						35000																			35000						
						30000																			30000						
						25000																			25000						
						20000																			20000						
2400	210	F.R.	F.T.	340	265	15000	2200	200	F.R.	F.T.	255	255	2250	190	F.R.	F.T.	205	245	2100	180	C.L.	F.T.	150	230	15000						
2400	255	F.R.	F.T.	305	265	10000	2250	215	F.R.	F.T.	255	255	2100	200	F.R.	30	200	240	2050	195	C.L.	29	155	230	10000	1850	160	C.L.	26	115	190
2400	240	F.R.	38	340	265	5000	2150	220	F.R.	33	245	245	2050	205	F.R.	31	185	225	2000	195	C.L.	30	145	215	5000	1750	160	C.L.	27	105	175
2400	240	F.R.	38	315	250	S. L.	2150	220	F.R.	34	225	225	2050	205	F.R.	31	175	210	2000	195	C.L.	30	135	200	S. L.	1550	160	C.L.	29	95	160

NOTES

① ALLOW 70 GAL. FOR WARM-UP, TAKE-OFF & INITIAL CLIMB PLUS ALLOWANCE FOR WIND, RESERVE & COMBAT AS REQ'D.

HIGH BLOWER ABOVE HEAVY LINE ONLY

EXAMPLE

AT 28,000 LB. GROSS WT. WITH 600 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 70 GAL.) TO FLY 800 STAT. AIRMILES AT 5,000 FT. ALT. MAINTAIN 2,000 RPM AND 195 MPH IND. AIRSPEED WITH MIXTURE SET CRUISING LEAN.

LEGEND

I. A. S.: INDICATED AIRSPEED
M. P.: MANIFOLD PRESSURE
G. P. H.: U. S. GAL. PER HOUR
T. A. S.: TRUE AIRSPEED
S. L.: SEA LEVEL

F. T.: FULL THROTTLE
F. R.: FULL RICH
A. R.: AUTO-RICH
A. L.: AUTO-LEAN
C. L.: CRUISING LEAN

Figure 61—Flight Operation Instruction Chart—Torpedo—30,000 to 26,000 Lbs.

MODEL(S)
B-25H
SINGLE ENGINE OPERATION
ENGINE(S): R-2600-13 OR R-2600-29

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 29,000 TO 27,000 POUNDS

EXTERNAL LOAD ITEMS
NONE

LIMITS	R. P. M.	M. P. (IN. HG.)	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	TOTAL G. P. H.
WAR MAX.	2600	49	LOW	FULL RICH	5 MIN.	
MILITARY POWER	2600	41.5 44	LOW HIGH	FULL RICH	5 MIN.	215
NORMAL RATED	2400	37.5 41	LOW HIGH	FULL RICH	CONT.	180 190

INSTRUCTIONS FOR USING CHART: Select figure in FUEL column equal to or less than amount of fuel to be used for cruising. Move horizontally to left or right and select RANGE value equal to or greater than the statute or nautical air miles to be flown. Vertically below and opposite desired cruising altitude (ALT.) read optimum R. P. M., I. A. S. and MIXTURE setting required.

NOTES: Column I is for emergency high speed cruising only. Columns II, III, IV and V give progressive increase in range at a sacrifice in speed. Manifold pressure (M. P.), gallons per hour (G. P. H.) and true airspeed (T. A. S.) are approximate values for reference. For efficiency maintain indicated airspeed (I. A. S.) hourly. Adjust RPM slightly if necessary to avoid exceeding manifold pressure more than 3 in. Hg.

I			FUEL	II			III			IV			FUEL	V		
RANGE IN AIR MILES			U. S.	RANGE IN AIR MILES			RANGE IN AIR MILES			RANGE IN AIR MILES			U. S.	RANGE IN AIR MILES		
STATUTE	NAUTICAL		GAL.	STATUTE	NAUTICAL		STATUTE	NAUTICAL		STATUTE	NAUTICAL		GAL.	STATUTE	NAUTICAL	
				○ ____ GAL. ALLOWANCE NOT AVAILABLE IN FLIGHT ○												
1200	1040		1100	1320	1140											
1090 980	940 850		1000 900	1200 1080	1040 930											
870 760	750 660		800 700	960 840	830 730											
650 540	560 470		600 500	720 600	620 520											
MAXIMUM CONTINUOUS																
R. P. M.	I. A. S. M.P.H.	MIXTURE	M. P. In. Hg.	G. P. H.	T. A. S.	ALT. Feet	OPERATING DATA						OPERATING DATA						OPERATING DATA						ALT. Feet	MAXIMUM RANGE					
						40000 35000 30000																			40000 35000 30000					
						25000 20000 15000																			25000 20000 15000					
						10000																			10000					
2400	165	F.R.	38	170	180	5000																			5000					
2400	170	F.R.	38	160	170	S. L.	2200	145	F.R.	35	125	150													S. L.					

NOTES

○ ALLOW ____ GAL. FOR WARM-UP, TAKE-OFF & INITIAL CLIMB PLUS ALLOWANCE FOR WIND, RESERVE & COMBAT AS REQ'D.

EXAMPLE

AT 29,000 LB. GROSS WT. WITH 1000 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 0 GAL.) TO FLY 1150 STAT. AIRMILES AT S. L. FT. ALT. MAINTAIN 2200 RPM AND 145 MPH IND. AIRSPEED WITH MIXTURE SET FULL RICH.

LEGEND

I. A. S.: INDICATED AIRSPEED
M. P.: MANIFOLD PRESSURE
G. P. H.: U. S. GAL. PER HOUR
T. A. S.: TRUE AIRSPEED
S. L.: SEA LEVEL
F. T.: FULL THROTTLE
F. R.: FULL RICH
A. R.: AUTO-RICH
A. L.: AUTO-LEAN
C. L.: CRUISING LEAN

Figure 62—Flight Operation Instruction Chart—Single Engine—29,000 to 27,000 Lbs.

MODEL(S)
B-25H
SINGLE ENGINE OPERATION

ENGINE(S): R-2600-13 OR R-2600-29

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 27,000 TO 25,000 POUNDS

EXTERNAL LOAD ITEMS

NONE

LIMITS	R. P. M.	M. P. (IN. HG.)	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	TOTAL G. P. H.
WAR MAX.	2600	49	LOW	FULL RICH	5 MIN.	
MILITARY POWER	2600	41.5 44	LOW HIGH	FULL RICH	5 MIN.	215
NORMAL RATED	2400	37.5 41	LOW HIGH	FULL RICH	CONT.	180 190

INSTRUCTIONS FOR USING CHART: Select figure in FUEL column equal to or less than amount of fuel to be used for cruising. Move horizontally to left or right and select RANGE value equal to or greater than the statute or nautical air miles to be flown. Vertically below and opposite desired cruising altitude (ALT.) read optimum R. P. M., I. A. S. and MIXTURE setting required.

NOTES: Column I is for emergency high speed cruising only. Columns II, III, IV and V give progressive increase in range at a sacrifice in speed. Manifold pressure (M. P.), gallons per hour (G. P. H.) and true airspeed (T. A. S.) are approximate values for reference. For efficiency maintain indicated airspeed (I. A. S.) hourly. Adjust RPM slightly if necessary to avoid exceeding manifold pressure more than 3 in. Hg.

I		FUEL	II		III		IV		FUEL	V	
RANGE IN AIR MILES		U. S.	RANGE IN AIR MILES		RANGE IN AIR MILES		RANGE IN AIR MILES		U. S.	RANGE IN AIR MILES	
STATUTE	NAUTICAL	GAL.	STATUTE	NAUTICAL	STATUTE	NAUTICAL	STATUTE	NAUTICAL	GAL.	STATUTE	NAUTICAL
			○ GAL. ALLOWANCE NOT AVAILABLE IN FLIGHT ○								
890	770	800	970	840	1090	940					
780	680	700	850	740	950	820					
670	580	600	730	630	810	700					
560	480	500	610	530	680	590					
450	390	400	490	420	540	470					
330	290	300	360	310	400	350					
220	190	200	240	210	270	230					
110	90	100	120	100	130	110					

MAXIMUM CONTINUOUS						ALT.	OPERATING DATA						OPERATING DATA						OPERATING DATA						ALT.	MAXIMUM RANGE					
R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.	Feet	R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.	R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.	R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.	Feet	R. P. M.	I. A. S. M.P.H.	MIX-TURE	M. P. In. Hg.	G. P. H.	T. A. S.
						40000																			40000						
						35000																			35000						
						30000																			30000						
						25000																			25000						
						20000																			20000						
						15000																			15000						
2400	150	F.R.	F.T.	150	175	10000	2300	145	F.R.	F.T.	140	170													10000						
2400	170	F.R.	38	170	190	5000	2250	160	F.R.	35	145	175													5000						
2400	175	F.R.	38	160	180	S. L.	2250	165	F.R.	36	140	170	2100	145	F.R.	33	110	150							S. L.						

NOTES

○ ALLOW GAL. FOR WARM-UP, TAKE-OFF & INITIAL CLIMB PLUS ALLOWANCE FOR WIND, RESERVE & COMBAT AS REQ'D.

EXAMPLE

AT 27,000 LB. GROSS WT. WITH 700 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 0 GAL.) TO FLY 900 STAT. AIRMILES AT S. L. FT. ALT. MAINTAIN 2100 RPM AND 145 MPH IND. AIRSPEED WITH MIXTURE SET FULL RICH.

LEGEND

I. A. S.: INDICATED AIRSPEED
M. P.: MANIFOLD PRESSURE
G. P. H.: U. S. GAL. PER HOUR
T. A. S.: TRUE AIRSPEED
S. L.: SEA LEVEL
F. T.: FULL THROTTLE
F. R.: FULL RICH
A. R.: AUTO-RICH
A. L.: AUTO-LEAN
C. L.: CRUISING LEAN

Figure 63—Flight Operation Instruction Chart—Single Engine—27,000 to 25,000 Lbs.

(a) The gross weight will be approximately 31,000 pounds; thus figure 58 should be used.

(b) The 20 minutes of rated power will use about 100 gallons over a distance of 100 miles, leaving 974 less 54 in climb and the above 100, or 820 gallons for traveling the remaining 1200 miles.

(c) Column IV, figure 58, shows that 1260 miles require 800 gallons; thus 1200 miles will use 760 gallons (1200/1260 x 800), leaving 60 gallons as reserve (820 less 760). The operating conditions at 10,000 feet will be 200 mph IAS, 2050 rpm, 29 in. Hg in cruising lean. The time required for the flight will be 5 hours (1200 miles/240 mph) + 20 minutes of rated power or 5.35 hours total.

(2) However, as an alternate the maximum range condition may be used (Column V). This column shows 1210 miles on 700 gallons, leaving 120 gallons as reserve. The time required will be 1200/215 or 5.6 hours + the 20 minutes rated power or 6 hours total. Under this plan it will take 40 minutes longer than problem (1) but will give a reserve of 120 gallons as against 60 gallons for the original plan.

(3) Suppose such a flight as in (1) had to be changed in flight because of weather conditions or some other factor and it was necessary to drop to 1000 feet. First a fix was obtained and it showed 500 miles to get home. Inasmuch as the same Column IV is used, the fuel required will remain the same although at the lower altitude the time required will be longer. The additional time for the 500 miles will be 500/210 (sea level) less 500/240 (10,000 feet) or 2.38 less 2.08 which is 20 minutes longer to complete the trip.

(4) If arrival over a check point is late, indicating that head winds have been encountered, similar reference to the charts and calculations will allow the pilot, while in flight, to select new cruising conditions for safe arrival at his destination.

IMPORTANT

The controlling conditions during cruising are engine rpm and indicated air speed. Hold these two things at their proper value (at the flight altitude) adjusting the manifold pressure as necessary, and you will be successful, arriving on time and with the safe fuel reserve you counted on.

This may be difficult to believe if all your training has emphasized the importance of manifold pressure. Your tendency will be to keep rpm and manifold pressure right on the dot and let the indicated air speed wander all over the lot to suit itself. But for successful cruising, particularly long-range cruising, treat the chart figures for manifold pressure as approximations only and let your engine rpm and IAS, faithfully held, bring you safely in.

3. COMPOSITE CRUISING CONTROL CHART.

(See figure 64.)

a. PURPOSE OF CHART.—Inasmuch as the range charts described in the preceding paragraphs give maximum ranges for constant air speeds only, periodic adjustments of engine power must be made in order to maintain the charter constant air speed against decreases occurring in gross weight because of fuel consumption. Accordingly, the Composite Cruising Control Chart shows the proper rpm and manifold pressure adjustments necessary to hold various air speeds constant throughout flight.

b. GENERAL INFORMATION.

(1) Indicated air speeds charted are for the pilot's instrument and include the calibration for the pitot boom position error but not the instrument mechanical error (which varies for different ships). Therefore, in using the chart, this instrument correction, as evaluated by laboratory calibration, must be applied to the values for indicated air speed shown before the actual pilot's air-speed instrument reading can be determined.

CAUTION

Both bhp and air speed cannot be read from the same point on the chart except for the case of 22,000 pounds gross weight.

(2) The fuel flows shown in gallons per hour are the total for two engines.

(3) A gross weight approximation scale is shown at the bottom of the chart for determining the gross weight changes during the flight due to fuel consumption, so that revisions can be made to the operating conditions.

c. TO DETERMINE OPERATING CONDITIONS REQUIRED FOR ANY DESIRED TRUE AIR SPEED AT ANY GROSS WEIGHT.—Enter the chart with density altitude (determined from pressure altitude and temperature) and the true air speed for which the flight is charted. Project the point vertically downward to the 22,000-pound gross weight line (base line). Follow the line, parallel to the gross weight correction lines, to the intersection with the line of airplane gross weight. Project the intersection point vertically to the charted altitude and read rpm, manifold pressure, and fuel flow by interpolation.

(1) EXAMPLE. *(Illustrated on figure 64.)*—To find the operating conditions corresponding to 190 mph true air speed, 8000 feet pressure altitude at +5°C free air temperature, and 30,000 pounds gross weight: Entering the chart at +5°C and 8000 feet pressure altitude, a density altitude of 9000 feet is determined. Follow the 9000-foot line to the intersection with the line of 190 mph true air speed. This intersection occurs at 163 mph pilot's uncorrected indicated air speed. (To obtain actual pilot's indicated air speed, apply instrument correction. If, for example, the instrument reads 2 mph high in this range, the actual instrument reading would be 165 mph.) Project this point vertically along the 163

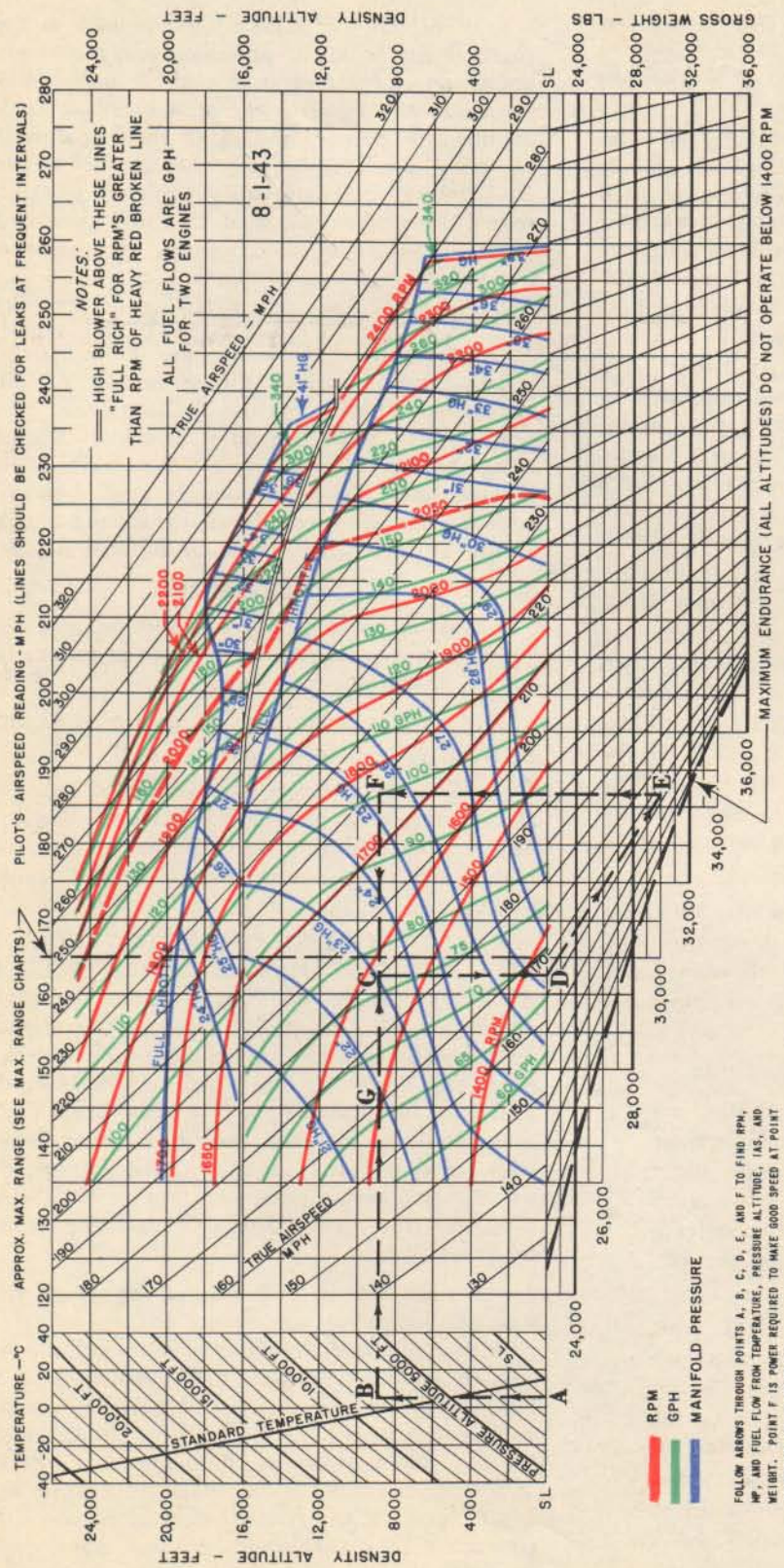


Figure 64—Composite Cruising Control Chart

mph indicated air speed line to the base line of 22,000 pounds gross weight. Follow the line parallel to the weight correction lines and locate the intersection point with the 30,000-pound line. Project this point vertically to 9000 feet and read 1760 rpm, 25.3 in. Hg manifold pressure, and a fuel flow of 101 gallons per hour.

d. TO DETERMINE AIR SPEED FOR ANY DESIRED OPERATING CONDITION AT ANY GROSS WEIGHT.—Enter the chart with density altitude (determined from pressure altitude and temperature) and operating conditions of flight. Project this point vertically to the airplane gross weight line. Proceed from here, parallel to the gross weight correction lines, to the intersection with the base line of 22,000 pounds gross weight. Project the intersection point vertically to the charted altitude and read the air speed.

(1) EXAMPLE.—To find the air speed corresponding to 1900 rpm, 11,000 feet pressure altitude at −12°C free air temperature, and 28,000 pounds gross weight: Entering the chart at −12°C and 11,000 feet pressure altitude, a density altitude of 10,300 feet is determined. Follow the 10,300-foot line to the intersection with 1900 rpm (correct manifold pressure is 26.2 in. Hg) and project this point vertically to the line of 28,000 pounds gross weight. Follow the line, parallel to the weight correction lines, to the intersection with the base line of 22,000 pounds gross weight. Project the intersection to 10,300 feet and read 222 mph true air speed and 186 mph pilot's uncorrected indicated air speed. (To obtain actual pilot's indicated air speed, apply the instrument correction. If, for example, the pilot's instrument reads 2 mph high in this range, the actual instrument reading would be 188 mph.)

e. TO DETERMINE NECESSARY ADJUSTMENT OF MP AND RPM.—Set the manifold pressure and rpm to the charted values as required to give the speed or range desired. Adjust the power slightly as required (increase or decrease manifold pressure and rpm together to increase or decrease speed) until the necessary indicated air speed is obtained. This establishes power and fuel flow for non-standard atmospheric conditions. Do not increase the manifold pressure more than two inches above the charted values without raising the rpm. Do not decrease the rpm below 1400.

f. TO DETERMINE THE MAXIMUM ENDURANCE FOR ANY GROSS WEIGHT AT ANY DENSITY ALTITUDE.—Enter the chart with the gross weight and project this point horizontally to the intersection with the maximum endurance line. Follow the line, parallel to the weight correction lines, to the intersection with the base line. Project the intersection point vertically to the density altitude line (determined from pressure altitude and temperature) and read the true and indicated air speeds. Then project the intersection of the gross weight line and the maximum endurance line vertically to the density altitude line and read the rpm, manifold pressure, and fuel flow.

(1) EXAMPLE.—To find the maximum endurance for a gross weight of 28,000 pounds and a density altitude of 10,300 feet (determined from pressure altitude of 11,000 feet and temperature of −12°C): Entering the chart at 28,000 pounds gross weight, follow the 28,000-pound line to the intersection with the maximum endurance line; then follow the line, parallel to the weight correction lines, to the intersection with the base line of 22,000 pounds. Project this point vertically to the intersection with the density altitude line of 10,300 feet and read 166 mph true air speed and 138 mph indicated air speed. Then project the intersection of 28,000-pound line and the maximum endurance line vertically to the intersection with the 10,300-foot density altitude line and read 1620 rpm, 23 in. Hg manifold pressure, and a fuel flow of 82 gph.

g. TO DETERMINE AIR SPEED FOR ANY DESIRED RPM AT ANY GROSS WEIGHT (for Torpedo).—Enter the chart with density altitude (determined from pressure altitude and temperature) and rpm of flight. Project this point vertically to the airplane gross weight line. Follow the line, parallel to the weight correction lines, to the intersection with the base line of 22,000 pounds gross weight. Project the intersection point vertically to the charted altitude and read the chart indicated air speed. Then enter the torpedo correction chart with the chart indicated air speed, project vertically to the curve, and read the pilot's true indicated air speed. With this pilot's true indicated air speed and the density altitude, determine the true speed from the cruising control chart.

(1) EXAMPLE (Torpedo).—To find the air speed corresponding to 1900 rpm, 9500 feet pressure altitude at +5°C free air temperature, and 31,500 pounds gross weight: Entering the chart at +5°C and 9500 feet pressure altitude, a density altitude of 10,500 feet is determined. Follow the 10,500-foot line to the intersection with 1900 rpm (correct mp is 26.2 in. Hg) and project this line vertically to the line of 31,500 pounds gross weight. Follow the line, parallel to the weight correction line, to the intersection with the base line of 22,000 pounds gross weight. Project the intersection to 10,500 feet and read 175 mph indicated air speed. Enter the torpedo chart with 175 mph chart indicated air speed, project vertically until it intersects with the curve and read 160 mph IAS true or 192 mph true air speed by using 160 IAS on cruising control chart at density altitude of 10,500 feet. (To obtain actual pilot's indicated air speed, apply the instrument correction. If, for example, the pilot's instrument reads 2 mph high in this range, the actual instrument reading would be 162 mph.)

h. TO DETERMINE OPERATING CONDITIONS REQUIRED FOR ANY DESIRED TRUE AIR SPEED AT ANY GROSS WEIGHT (Torpedo).—Enter the chart with the density altitude (determined from pressure altitude and temperature) and true air speed for which the flight is charted. Read the IAS true and enter the correction chart with the IAS true; project horizon-

tally to the curve and read IAS chart. Again enter the master chart with the IAS chart, project vertically down to the intersection with the base line of 22,000 pounds gross weight. Follow the line, parallel to the weight correction line, to the airplane gross weight line. Project vertically up to the density altitude and read the engine settings.

(1) EXAMPLE (Torpedo). — To find the operating conditions corresponding to 8000 feet pressure altitude at +5°C free air temperature, a true air speed of 172 mph, and a gross weight of 30,000 pounds: Entering chart at +5°C and 8000 feet pressure altitude, a density altitude of 9000 feet is determined. Follow the 9000-foot line to the intersection with 172 mph true air speed or 147 mph pilot's air speed. (To obtain actual pilot's indicated speed, apply the instrument correction. If, for example, the pilot's instrument reads 2 mph high in this range, the actual instrument reading would be 149 mph.) Enter the correction chart with 147 mph indicated air speed, project horizontally to the intersection with the curve and read 163 mph IAS chart. Enter the chart with 163 mph IAS chart, project vertically to the base line of 22,000 pounds gross weight. Follow the line, parallel to the weight correction line, to 30,000 pounds gross weight, project vertically to the 9000-foot line, and read 1760 rpm, 25.3 in. Hg manifold pressure, and 101 gph.

4. LONG RANGE FERRYING.

a. GENERAL.—All long-range ferrying charts are based on a take-off gross weight of 33,400 pounds and a fuel load of 1624 gallons. For a take-off gross weight and fuel load other than the preceding conditions, see paragraph 4.*c*(2)*(a)* below.

CAUTION

These charts are valid only if the carburetor mixture setting is in the CRUISING LEAN position.

If the power settings do not give the desired speed, vary the manifold pressure and rpm together as shown on the charts.

b. LONG-RANGE CRUISING CHARTS.

(1) TWO-ENGINE OPERATION.—TABULAR. *(Figures 66 to 73.)*—To determine the gross weight, engine settings, and range covered for long-range cruising for any given time of flight: Enter the table at the hour of flight and read horizontally the gross weight, rpm, mp, fuel flow, fuel used, and the range covered.

EXAMPLE: *(Figure 66.)*—To determine the gross weight, engine settings, and range covered at the end of 11 hours of flight at 1000 feet: Enter the table at 11 hours and read horizontally 27,180 pounds gross weight, 1420 rpm, 28.9 in. Hg manifold pressure, 82 gph fuel flow, 165 IAS, 1037 gallons of fuel used, and 1937 miles as the range covered.

(2) SINGLE-ENGINE OPERATION. *(Figures 74, 75, 76.)*—To determine the hourly engine settings for long-range cruising for any starting gross weight: Enter the chart at the gross weight and project vertically to each condition. To obtain the next hourly setting, subtract one hour from the hours remaining, corresponding to the initial condition; and from the point on the hours' remaining line, project vertically to obtain the necessary conditions.

(a) EXAMPLE. *(Figure 74.)*—To obtain the hourly settings for single-engine operation at an initial weight of 27,700 pounds at 1000 feet: Enter with an initial gross weight of 27,700 pounds and project vertically to obtain 7.1 hours remaining, 2160 rpm, 33.5 in. Hg manifold pressure, 117 gph fuel flow, and 1100 miles remaining. The second hour engine settings would be 6.1 hours remaining, 27,000 pounds, 2130 rpm, 32.9 in. Hg manifold pressure, 109 gph fuel flow, and 950 miles remaining. The total distance covered during the first hour on single engine would be 1100 minus 950, or 150 miles.

c. MAXIMUM RANGE CHARTS.

(1) TWO ENGINE OPERATION. *(Figures 77, 78, 79.)*—To determine the operating conditions for flight at the speed required for maximum range for any gross weight and any altitude: Enter the chart at the given gross weight, project vertically to given altitude in each group, and read the corresponding rpm, manifold pressure, and fuel flow.

(a) EXAMPLE. *(Figure 77.)*—To determine the operating conditions for a flight at the required speed for maximum range with a gross weight of 31,000 pounds at 1000 feet: Enter the chart at 31,000 pounds and project vertically to the 1000-foot altitude in each group and read 1530 rpm, 29.2 in. Hg manifold pressure, 564 pounds per hour or 94 gph fuel flow, and 170 IAS.

(2) OPERATION WITH OTHER WEIGHT CONDITIONS.—To obtain the data for long-range operation at a gross weight for conditions other than 33,400 pounds and 1624 gallons at take-off, use the Climb Control Chart and the Maximum Range Chart to determine each hourly operating condition.

(a) EXAMPLE.—To determine the operating conditions for a take-off gross weight of 32,000 pounds (no external load and no upper turret) and 1400 gallons of fuel at an operating altitude of 1000 feet: Obtain from the climb control chart, by estimating, 24 gallons of fuel used to climb to 1000 feet, which leaves a weight of 31,860 pounds and a fuel total of 1376 gallons. The operating conditions for the first hour are obtained from the line extending vertically from 31,860 pounds. Read 1570 rpm, 29.2 in. Hg manifold pressure, a fuel flow of 97 gph or 582 pounds per hour, and 170 IAS. The operating conditions for the second hour correspond to 31,860 less 582 (pounds of fuel used in the first hour of flight), or 31,280 pounds. These readings are 1530 rpm, 29.2 in. Hg manifold pressure, a fuel flow of 95 gph or 570 pounds per hour, and 170 IAS. The third hour operating conditions correspond to 31,280 less 570, or 30,710 pounds.

(3) SINGLE-ENGINE OPERATION. *(Figure 80.)* —To determine the operating conditions for flight at the speed for maximum range for any gross weight and any altitude: Enter the chart at the given gross weight, project the point vertically to a given altitude in each group, and read the corresponding rpm, manifold pressure, and fuel flow.

(a) EXAMPLE. *(Figure 80.)*—To determine the operating conditions for a flight at the required speed for maximum range with a gross weight of 28,000 pounds at an altitude of 5000 feet: Enter the chart at 28,000 pounds gross weight, project this point vertically to the 5000-foot altitude curve in each group, and read 2200 rpm, 33.6 in. Hg manifold pressure, and 800 pounds per hour or 132 gph fuel flow, respectively.

(4) SINGLE-ENGINE FAILURE DURING LONG-RANGE FLIGHT.—In case of a single-engine failure on a long-range flight, note the hours past, gallons used, gross weight, and the range covered. Proceed with this gross weight to the single-engine maximum range chart, and for the desired altitude, make the proper engine settings and continue the flight.

(a) EXAMPLE. *(Figure 80.)*—If the single-engine flight is to be made at 1000 feet, note the gross weight (27,200 pounds) and the fuel remaining (340 gallons) at the time of engine failure. Enter the chart with 27,200 pounds and determine the operating conditions of 2140 rpm, 33.1 in. Hg manifold pressure, and a fuel flow of 675 pounds per hour or 112 gph. Thus, at the end of the first hour, the gross weight is 27,200 less 675, or 26,525 pounds, and the distance covered is 155 miles. The operating conditions at the end of the second hour will correspond to 26,525 pounds, or 2110 rpm, 32.5 in. Hg manifold pressure, and 625 pounds per hour or 102 gph. The weight at the end of the second hour will be 26,525 less 625, or 25,900 pounds, and the third hour operating conditions will correspond to this weight.

d. MAXIMUM ENDURANCE CHARTS.

(1) TWO-ENGINE OPERATION. *(Figure 81.)*—To determine the operating conditions for flight at the required speed for maximum endurance for any gross weight and any altitude: Enter the chart at the given gross weight, project vertically to the given altitude in each group, and read the corresponding pilot's indicated air speed, rpm, manifold pressure, and fuel flow.

(a) EXAMPLE.—To determine the operating conditions for a flight at the required speed for maximum endurance with a gross weight of 28,000 pounds at an altitude of 10,000 feet: Enter the chart at 28,000 pounds gross weight, project this point vertically to the intersection with the 10,000-foot altitude line in each group, and read 139 mph pilot's indicated air speed, 1540 rpm, 24.6 in. Hg manifold pressure, and 504 pounds per hour or 84 gph fuel flow, respectively. Obtain the hourly engine settings as above by progressively subtracting the hourly fuel flows from the gross weight.

(2) SINGLE-ENGINE OPERATION. *(Figure 82.)* —To determine the operating conditions for a flight at the required speed for maximum endurance for any gross weight and any altitude: Enter the chart at the given gross weight, project this point vertically to the given altitude in each group, and read the corresponding pilot's indicated air speed, rpm, manifold pressure, and fuel flow, respectively.

(a) EXAMPLE.—To determine the operating conditions for a flight at the required speeds for maximum endurance with a gross weight of 28,000 pounds at an altitude of 8000 feet: Enter the chart at 28,000 pounds gross weight, project this point vertically to the 8000-foot curve in each group, and read 138 mph pilot's indicated air speed, 2220 rpm, 33 in. Hg manifold pressure, and 792 pounds per hour or 132 gph fuel flow, respectively. Obtain the hourly engine settings as above by progressively subtracting the hourly fuel flows from the gross weight.

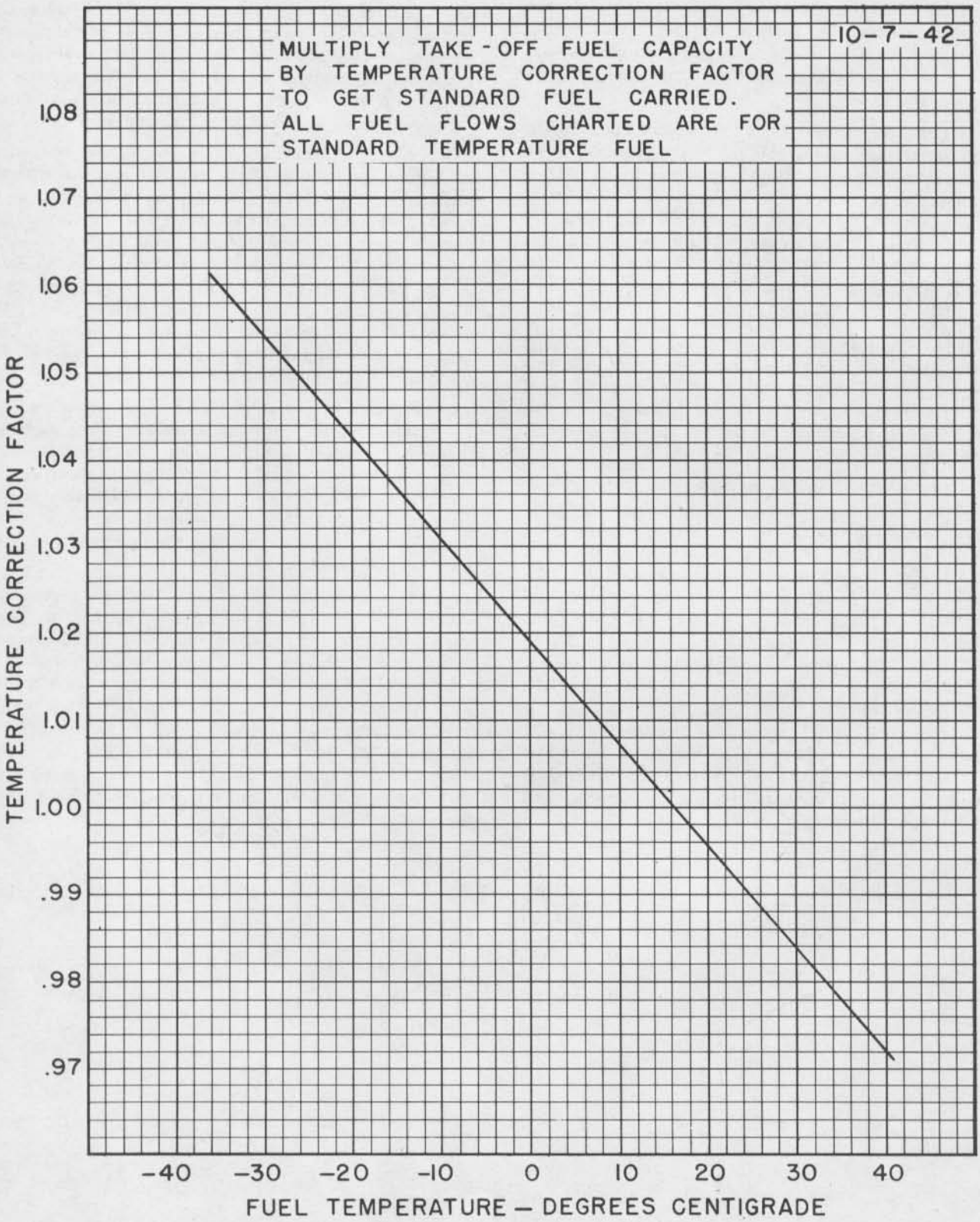


Figure 65—Range Correction for Fuel Temperature Chart

ALTITUDE 1000 FT.
(Upper Turret Removed)

Take-off:

2600 RPM, 44 in. Hg MP. Gross Weight, 33,400 lbs., 1624 gal.

Climb:

2400 RPM, 38 in. Hg MP, 155 IAS. Fuel used, 24 gal. Distance, 5 miles.

TWO-ENGINE DATA

Hours of Level Flight	Weight (Lbs)	IAS (MPH)	Average True Speed (MPH)	RPM	MP (In Hg)	Fuel Flow (Gal/Hr)	Fuel Used (Gal)	Range (Miles)
0	33,260	175	182	1625	29.2	104	24	5
1	32,630	175	182	1605	29.2	102	128	187
2	32,020	170	177	1560	29.2	97	230	369
3	31,440	170	177	1535	29.2	95	327	546
4	30,870	170	177	1520	29.2	94	422	723
5	30,300	170	177	1505	29.2	92	516	900
6	29,750	165	172	1470	29.2	89	608	1077
7	29,220	165	172	1455	29.2	87	697	1249
8	28,700	165	172	1445	29.1	86	784	1421
9	28,180	165	172	1435	29.1	84	870	1593
10	27,680	165	172	1430	29.0	83	954	1765
11	27,180	165	172	1420	28.9	82	1037	1937
12	26,690	165	172	1415	28.7	81	1119	2109
13	26,200	165	172	1410	28.6	80	1200	2281
14	25,720	165	172	1410	28.4	79	1280	2453
15	25,250	150	156	1400	26.8	71	1359	2625
16	24,820	149	155	1400	26.5	70	1430	2781
17	24,400	147	153	1400	26.1	68	1500	2936
18	23,990	146	152	1400	25.7	67	1568	3039
18:50							1624	3215

Climb at rated power and level off 500 feet above desired cruising level. Gain a speed at least equal to cruising speed of first hour period before reducing power, then let airplane sink to cruising level; set RPM and MP for first hour setting. Pay particular attention to trimming airplane for hands-off flight. Move mixture to CRUISING LEAN; check cowl flaps, wing flaps, and landing gear. If sufficient airspeed cannot be obtained within 2 MPH at any time during flight, move back one or two hours on the cruise chart until speed is regained. If too much speed is obtained, advance one or two hours to the RPM and MP combination which will give desired airspeed.

Figure 66—Long-Range Cruising Data—Upper Turret Removed—1000 Ft.

ALTITUDE 5000 FT.
(Upper Turret Removed)

Take-off:

2600 RPM, 44 in. Hg MP. Gross Weight, 33,400 lbs., 1624 gal.

Climb:

2400 RPM, 38 in. Hg MP, 155 IAS. Fuel used, 54 gal. Distance, 20 miles.

TWO-ENGINE DATA

Hours of Level Flight	Weight (Lbs)	IAS (MPH)	Average True Speed (MPH)	RPM	MP (In Hg)	Fuel Flow (Gal/Hr)	Fuel Used (Gal)	Range (Miles)
0	33,080	175	193	1770	27.1	108	54	20
1	32,430	175	193	1750	27.0	106	162	213
2	31,790	170	188	1700	26.8	101	268	406
3	31,190	170	188	1680	26.8	100	369	594
4	30,590	170	188	1665	26.7	98	469	782
5	29,920	165	182	1615	26.5	93	567	970
6	29,360	165	182	1595	26.4	91	660	1152
7	28,810	165	182	1580	26.3	90	751	1334
8	28,270	165	182	1565	26.2	88	841	1516
9	27,750	165	182	1555	26.2	87	929	1698
10	27,220	165	182	1540	26.1	85	1016	1880
11	26,710	165	182	1525	26.0	84	1101	2062
12	26,210	165	182	1515	26.0	83	1185	2244
13	25,710	165	182	1505	25.9	82	1268	2426
14	25,220	149	165	1445	25.0	74	1350	2608
15	24,780	148	164	1435	24.8	72	1424	2773
16	24,340	147	163	1425	24.7	71	1496	2937
17	23,920	146	162	1420	24.5	70	1567	3100
17:48							1624	3230

Climb at rated power and level off 500 feet above desired cruising level. Gain a speed at least equal to cruising speed of first hour period before reducing power, then let airplane sink to cruising level; set RPM and MP for first hour setting. Pay particular attention to trimming airplane for hands-off flight. Move mixture to CRUISING LEAN; check cowl flaps, wing flaps, and landing gear. If sufficient airspeed cannot be obtained within 2 MPH at any time during flight, move back one or two hours on the cruise chart until speed is regained. If too much speed is obtained, advance one or two hours to the RPM and MP combination which will give desired airspeed.

Figure 67—Long-Range Cruising Data—Upper Turret Removed—5000 Ft.

ALTITUDE 8000 FT.
(Upper Turret Removed)

Take-off:

2600 RPM, 44 in. Hg MP. Gross Weight, 33,400 lbs., 1624 gal.

Climb:

2400 RPM, 38 in. Hg MP, 155 IAS. Fuel used, 84 gal. Distance, 32 miles.

TWO-ENGINE DATA

Hours of Level Flight	Weight (Lbs)	IAS (MPH)	Average True Speed (MPH)	RPM	MP (In Hg)	Fuel Flow (Gal/Hr)	Fuel Used (Gal)	Range (Miles)
0	32,900	175	202	1850	26.5	112	84	32
1	32,220	175	202	1830	26.3	110	196	234
2	31,560	170	196	1785	25.9	105	306	436
3	30,930	170	196	1770	25.7	102	411	632
4	30,320	165	190	1725	25.3	97	513	828
5	29,740	165	190	1710	25.2	95	610	1018
6	29,170	165	190	1695	25.0	94	705	1208
7	28,610	165	190	1680	24.9	92	799	1398
8	28,050	165	190	1665	24.8	90	891	1588
9	27,510	165	190	1650	24.6	89	981	1778
10	26,980	165	190	1640	24.5	88	1070	1968
11	26,450	165	190	1630	24.4	86	1158	2158
12	25,940	165	190	1620	24.3	85	1244	2348
13	25,430	150	173	1530	23.4	77	1329	2538
14	24,960	149	172	1515	23.2	75	1406	2711
15	24,510	148	171	1500	23.0	74	1471	2883
16	24,070	146	169	1490	22.8	72	1545	3054
17:06							1624	3240

Climb at rated power and level off 500 feet above desired cruising level. Gain a speed at least equal to cruising speed of first hour period before reducing power, then let airplane sink to cruising level; set RPM and MP for first hour setting. Pay particular attention to trimming airplane for hands-off flight. Move mixture to CRUISING LEAN; check cowl flaps, wing flaps, and landing gear. If sufficient airspeed cannot be obtained within 2 MPH at any time during flight, move back one or two hours on the cruise chart until speed is regained. If too much speed is obtained, advance one or two hours to the RPM and MP combination which will give desired airspeed.

Figure 68—Long-Range Cruising Data—Upper Turret Removed—8000 Ft.

ALTITUDE 10,000 FT.
(Upper Turret Removed)

Take-off:

2600 RPM, 44 in. Hg MP. Gross Weight, 33,400 lbs., 1624 gal.

Climb:

2400 RPM, 38 in. Hg MP, 155 IAS. Fuel used, 104 gal. Distance, 38 miles.

TWO-ENGINE DATA

Hours of Level Flight	Weight (Lbs)	IAS (MPH)	Average True Speed (MPH)	RPM	MP (In Hg)	Fuel Flow (Gal/Hr)	Fuel Used (Gal)	Range (Miles)
0	32,780	175	208	1880	26.1	116	104	38
1	32,080	175	208	1860	25.9	113	220	246
2	31,400	170	202	1815	25.5	108	333	454
3	30,750	170	202	1800	25.3	106	441	656
4	30,120	165	196	1760	24.8	100	547	858
5	29,520	165	196	1740	24.6	98	647	1054
6	28,930	165	196	1725	24.5	97	745	1250
7	28,350	165	196	1710	24.3	95	842	1446
8	27,780	165	196	1700	24.1	93	937	1642
9	27,220	165	196	1685	24.0	92	1030	1838
10	26,670	165	196	1670	23.8	90	1122	2034
11	26,130	165	196	1660	23.7	89	1212	2230
12	25,590	151	180	1600	22.7	79	1302	2426
13	25,120	149	178	1585	22.5	77	1381	2606
14	24,660	148	177	1575	22.2	76	1458	2784
15	24,200	147	176	1565	22.0	74	1534	2961
16:13							1624	3175

Climb at rated power and level off 500 feet above desired cruising level. Gain a speed at least equal to cruising speed of first hour period before reducing power, then let airplane sink to cruising level; set RPM and MP for first hour setting. Pay particular attention to trimming airplane for hands-off flight. Move mixture to CRUISING LEAN; check cowl flaps, wing flaps, and landing gear. If sufficient airspeed cannot be obtained within 2 MPH at any time during flight, move back one or two hours on the cruise chart until speed is regained. If too much speed is obtained, advance one or two hours to the RPM and MP combination which will give desired airspeed.

Figure 69—Long-Range Cruising Data—Upper Turret Removed—10,000 Ft.

ALTITUDE 1000 FT.
(Upper Turret Installed)

Take-off:

2600 RPM, 44 in. Hg MP. Gross Weight, 33,400 lbs., 1624 gal.

Climb:

2400 RPM, 38 in. Hg MP, 155 IAS. Fuel used, 24 gal. Distance, 5 miles.

TWO-ENGINE DATA

Hours of Level Flight	Weight (Lbs)	IAS (MPH)	Average True Speed (MPH)	RPM	MP (In Hg)	Fuel Flow (Gal/Hr)	Fuel Used (Gal)	Range (Miles)
0	33,260	175	182	1700	29.2	110	24	5
1	32,600	175	182	1675	29.2	108	134	187
2	31,950	170	177	1610	29.2	103	242	369
3	31,330	170	177	1590	29.2	101	345	546
4	30,720	170	177	1570	29.2	99	446	723
5	30,130	165	172	1525	29.4	94	545	900
6	29,570	165	172	1510	29.2	92	639	1072
7	29,010	165	172	1495	29.2	91	731	1244
8	28,470	165	172	1480	29.2	89	822	1416
9	27,930	165	172	1470	29.2	88	911	1588
10	27,410	165	172	1460	29.2	87	999	1760
11	26,880	165	172	1450	29.1	85	1086	1932
12	26,370	165	172	1440	29.0	84	1171	2104
13	25,870	165	172	1430	28.9	83	1255	2276
14	25,370	150	156	1400	27.7	74	1338	2448
15	24,930	149	155	1400	27.4	73	1412	2604
16	24,490	147	153	1400	27.0	71	1485	2759
17	24,060	146	152	1400	26.7	70	1556	2912
17:58							1624	3060

Climb at rated power and level off 500 feet above desired cruising level. Gain a speed at least equal to cruising speed of first hour period before reducing power, then let airplane sink to cruising level; set RPM and MP for first hour setting. Pay particular attention to trimming airplane for hands-off flight. Move mixture to CRUISING LEAN; check cowl flaps, wing flaps, and landing gear. If sufficient airspeed cannot be obtained within 2 MPH at any time during flight, move back one or two hours on the cruise chart until speed is regained. If too much speed is obtained, advance one or two hours to the RPM and MP combination which will give desired airspeed.

Figure 70—Long-Range Cruising Data—Upper Turret Installed—1000 Ft.

ALTITUDE 5000 FT.
(Upper Turret Installed)

Take-off:

2600 RPM, 44 in. Hg MP. Gross Weight, 33,400 lbs., 1624 gal.

Climb:

2400 RPM, 38 in. Hg MP, 155 IAS. Fuel used, 54 gal. Distance, 20 miles.

TWO-ENGINE DATA

Hours of Level Flight	Weight (Lbs)	IAS (MPH)	Average True Speed (MPH)	RPM	MP (In Hg)	Fuel Flow (Gal/Hr)	Fuel Used (Gal)	Range (Miles)
0	33,080	175	193	1850	27.4	115	54	20
1	32,390	175	193	1825	27.3	113	169	213
2	31,710	170	188	1760	27.1	107	282	406
3	31,070	170	188	1740	27.0	105	389	594
4	30,440	165	182	1685	26.8	100	494	782
5	29,840	165	182	1665	26.7	98	594	964
6	29,250	165	182	1645	26.6	96	692	1146
7	28,670	165	182	1630	26.6	95	788	1328
8	28,100	165	182	1610	26.5	93	883	1510
9	27,540	165	182	1600	26.4	92	976	1692
10	26,990	165	182	1580	26.3	90	1068	1874
11	26,450	165	182	1565	26.2	88	1158	2056
12	25,920	165	182	1555	26.2	87	1246	2238
13	25,400	150	166	1470	25.5	78	1333	2420
14	24,930	149	165	1460	25.3	76	1411	2586
15	24,480	147	163	1450	25.1	74	1486	2751
16	24,030	146	162	1440	25.0	73	1560	2914
16:52							1624	3055

Climb at rated power and level off 500 feet above desired cruising level. Gain a speed at least equal to cruising speed of first hour period before reducing power, then let airplane sink to cruising level; set RPM and MP for first hour setting. Pay particular attention to trimming airplane for hands-off flight. Move mixture to CRUISING LEAN; check cowl flaps, wing flaps, and landing gear. If sufficient airspeed cannot be obtained within 2 MPH at any time during flight, move back one or two hours on the cruise chart until speed is regained. If too much speed is obtained, advance one or two hours to the RPM and MP combination which will give desired airspeed.

Figure 71—Long-Range Cruising Data—Upper Turret Installed—5000 Ft.

ALTITUDE 8000 FT.

(Upper Turret Installed)

Take-off:

2600 RPM, 44 in. Hg MP. Gross Weight, 33,400 lbs., 1624 gal.

Climb:

2400 RPM, 38 in. Hg MP, 155 IAS. Fuel used, 84 gal. Distance, 32 miles.

TWO-ENGINE DATA

Hours of Level Flight	Weight (Lbs)	IAS (MPH)	Average True Speed (MPH)	RPM	MP (In Hg)	Fuel Flow (Gal/Hr)	Fuel Used (Gal)	Range (Miles)
0	32,900	175	202	1910	27.0	119	84	32
1	32,190	175	202	1880	26.8	116	203	234
2	31,490	170	196	1835	26.4	110	319	436
3	30,830	170	196	1820	26.2	108	429	632
4	30,180	165	190	1765	25.7	102	537	828
5	29,570	165	190	1750	25.5	100	639	1018
6	28,970	165	190	1735	25.4	98	739	1208
7	28,380	165	190	1720	25.2	96	837	1398
8	27,810	165	190	1705	25.1	95	933	1588
9	27,240	165	190	1690	25.0	93	1028	1778
10	26,680	165	190	1680	24.8	92	1121	1968
11	26,130	165	190	1665	24.7	91	1213	2158
12	25,580	151	174	1565	23.9	80	1304	2348
13	25,100	149	172	1550	23.7	79	1384	2522
14	24,630	148	171	1535	23.5	77	1463	2694
15	24,160	147	170	1525	23.3	76	1540	2865
16:06							1624	3050

Climb at rated power and level off 500 feet above desired cruising level. Gain a speed at least equal to cruising speed of first hour period before reducing power, then let airplane sink to cruising level; set RPM and MP for first hour setting. Pay particular attention to trimming airplane for hands-off flight. Move mixture to CRUISING LEAN; check cowl flaps, wing flaps, and landing gear. If sufficient airspeed cannot be obtained within 2 MPH at any time during flight, move back one or two hours on the cruise chart until speed is regained. If too much speed is obtained, advance one or two hours to the RPM and MP combination which will give desired airspeed.

Figure 72—Long-Range Cruising Data—Upper Turret Installed—8000 Ft.

ALTITUDE 10,000 FT.

(Upper Turret Installed)

Take-off:

2600 RPM, 44 in. Hg MP. Gross Weight, 33,400 lbs., 1624 gal.

Climb:

2400 RPM, 38 in. Hg MP, 155 IAS. Fuel used, 104 gal. Distance, 38 miles.

TWO-ENGINE DATA

Hours of Level Flight	Weight (Lbs)	IAS (MPH)	Average True Speed (MPH)	RPM	MP (In Hg)	Fuel Flow (Gal/Hr)	Fuel Used (Gal)	Range (Miles)
0	32,780	175	208	1935	26.7	123	104	38
1	32,040	175	208	1915	26.5	120	227	246
2	31,320	170	202	1870	26.0	114	347	454
3	30,630	170	202	1850	25.8	112	461	656
4	29,960	165	196	1800	25.3	106	573	858
5	29,330	165	196	1785	25.1	104	679	1054
6	28,700	165	196	1765	24.9	102	783	1250
7	28,090	165	196	1750	24.7	100	885	1446
8	27,490	165	196	1735	24.5	98	985	1642
9	26,900	165	196	1720	24.4	96	1083	1838
10	26,330	165	196	1710	24.2	94	1179	2034
11	25,760	165	196	1695	24.1	92	1273	2230
12	25,210	150	179	1620	23.0	82	1365	2426
13	24,720	148	177	1605	22.7	80	1447	2605
14	24,240	147	176	1590	22.5	78	1527	2782
15	23,770	146	175	1575	22.3	76	1605	2958
15:15							1624	3000

Climb at rated power and level off 500 feet above desired cruising level. Gain a speed at least equal to cruising speed of first hour period before reducing power, then let airplane sink to cruising level; set RPM and MP for first hour setting. Pay particular attention to trimming airplane for hands-off flight. Move mixture to CRUISING LEAN; check cowl flaps, wing flaps, and landing gear. If sufficient airspeed cannot be obtained within 2 MPH at any time during flight, move back one or two hours on the cruise chart until speed is regained. If too much speed is obtained, advance one or two hours to the RPM and MP combination which will give desired airspeed.

Figure 73—Long-Range Cruising Data—Upper Turret Installed—10,000 Ft.

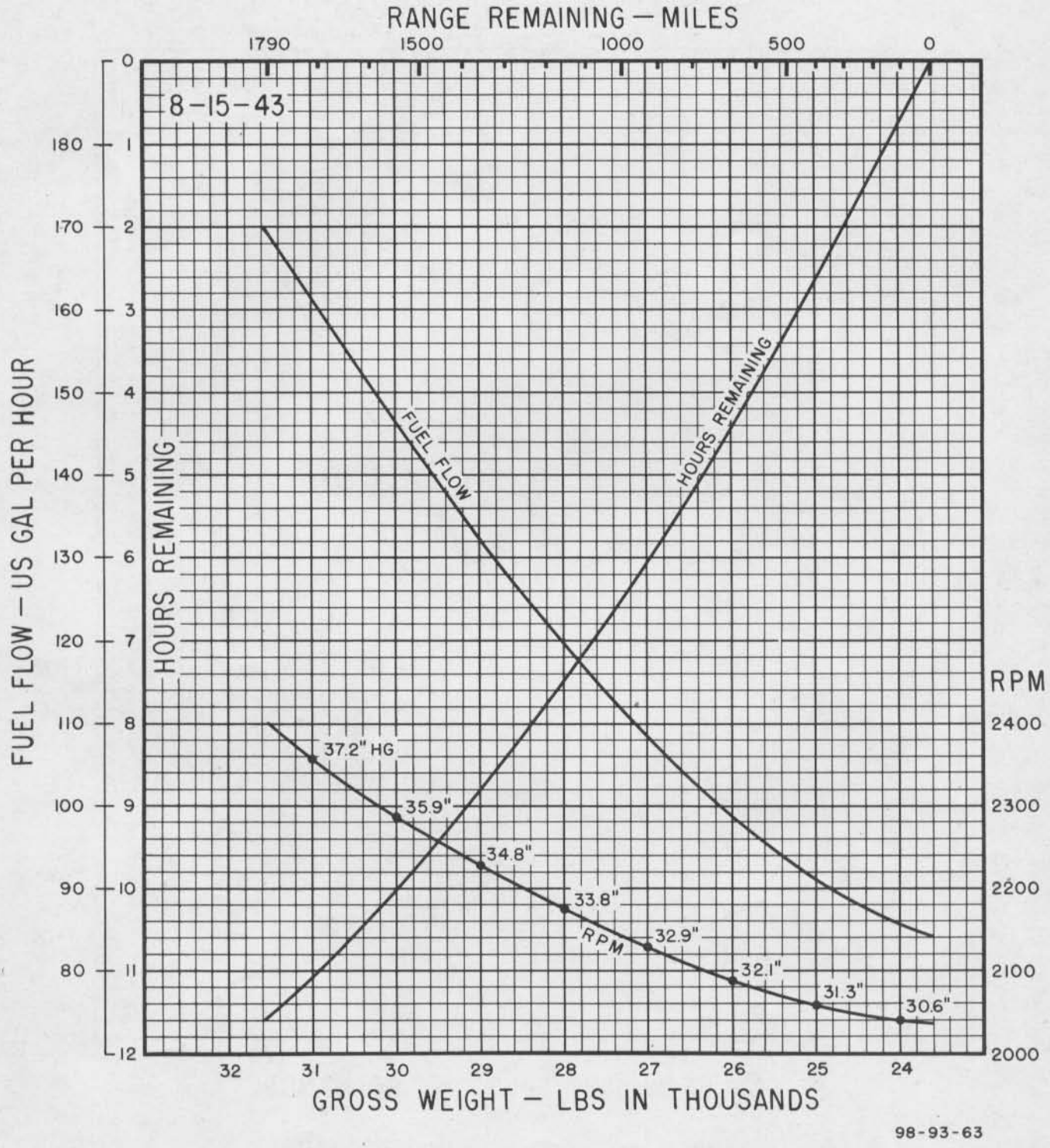


Figure 74—Long-Range Cruising Chart—Single Engine—1000 Ft.

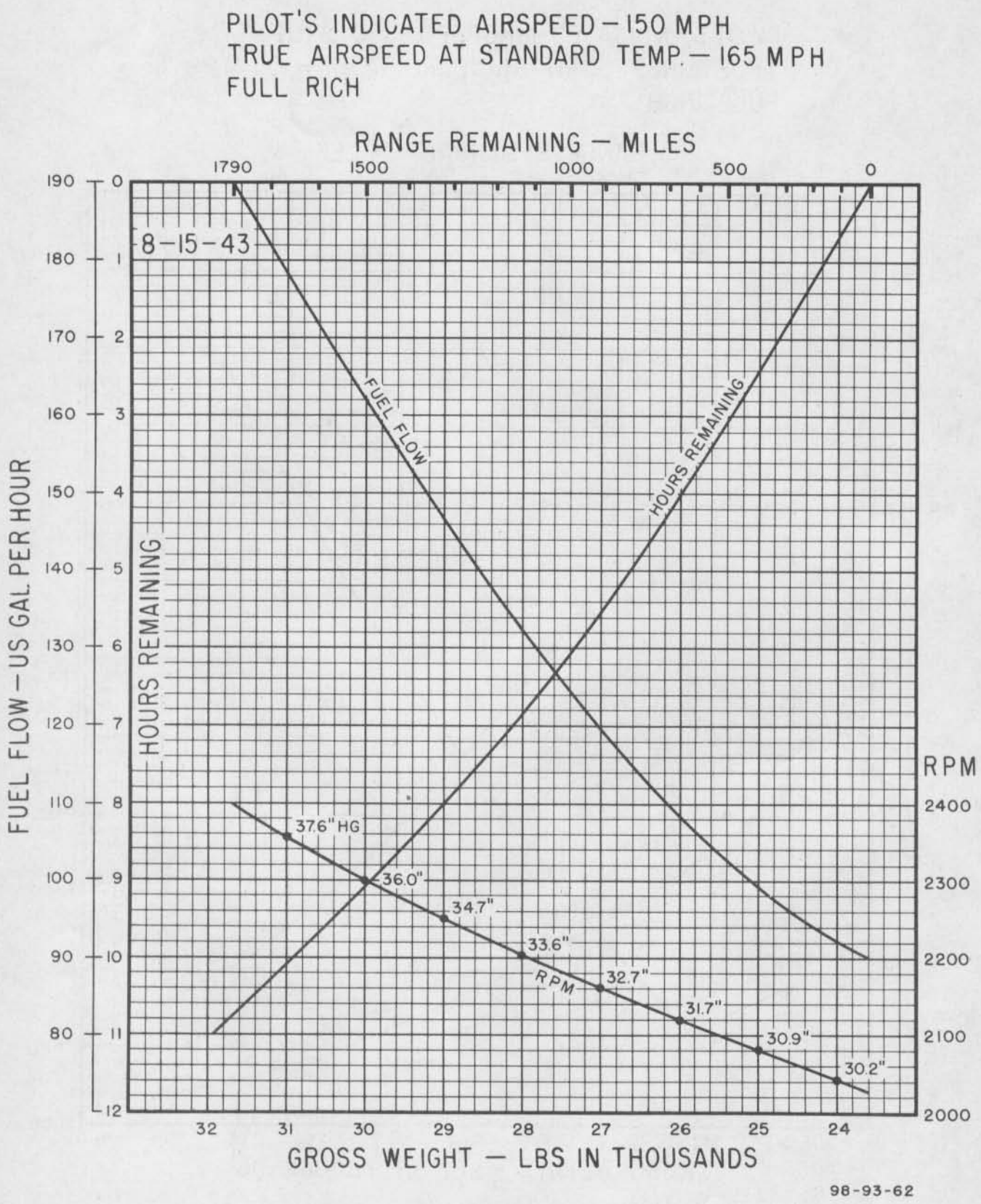


Figure 75—Long-Range Cruising Chart—Single Engine—5000 Ft.

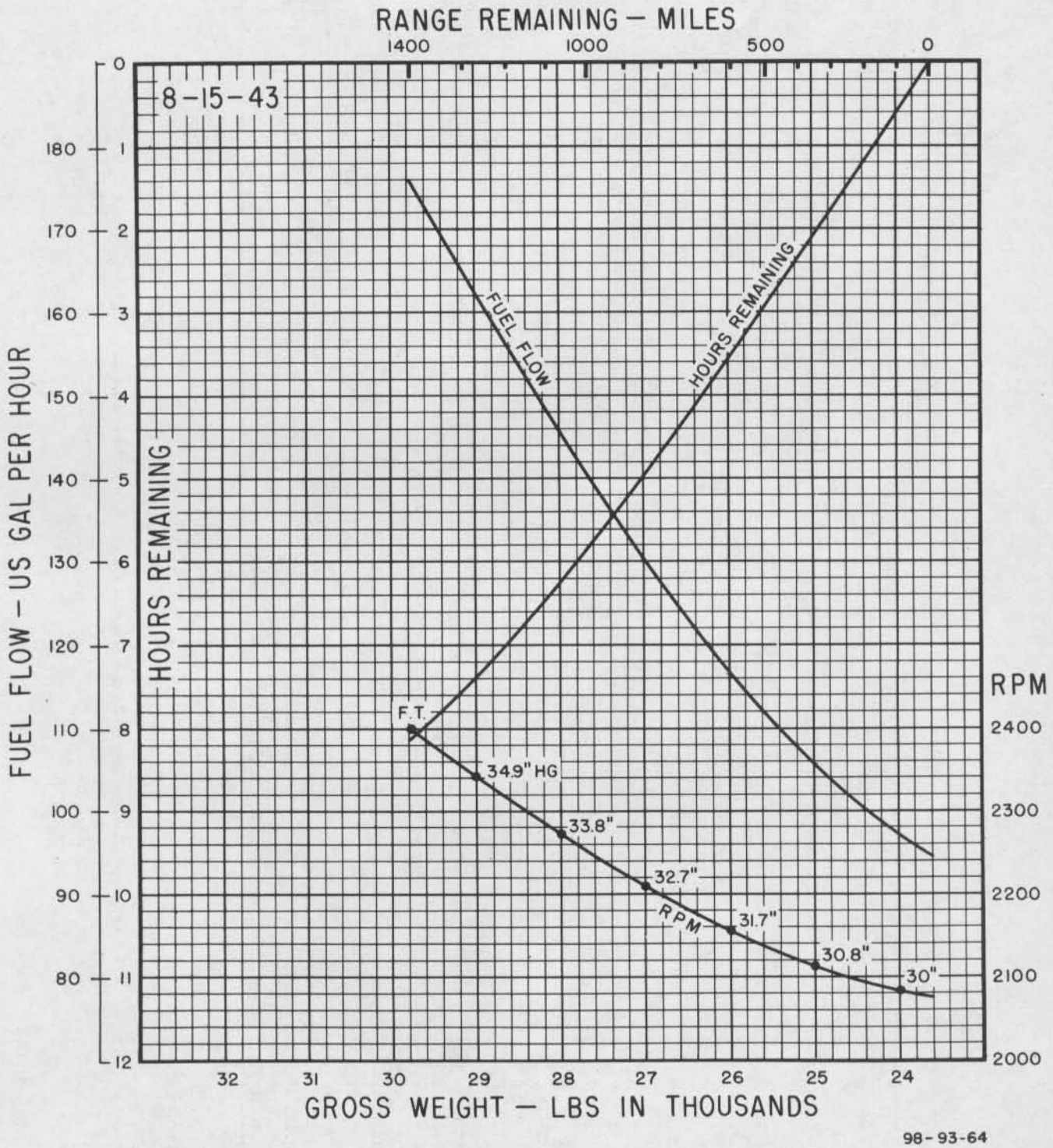


Figure 76—Long-Range Cruising Chart—Single Engine—8000 Ft.

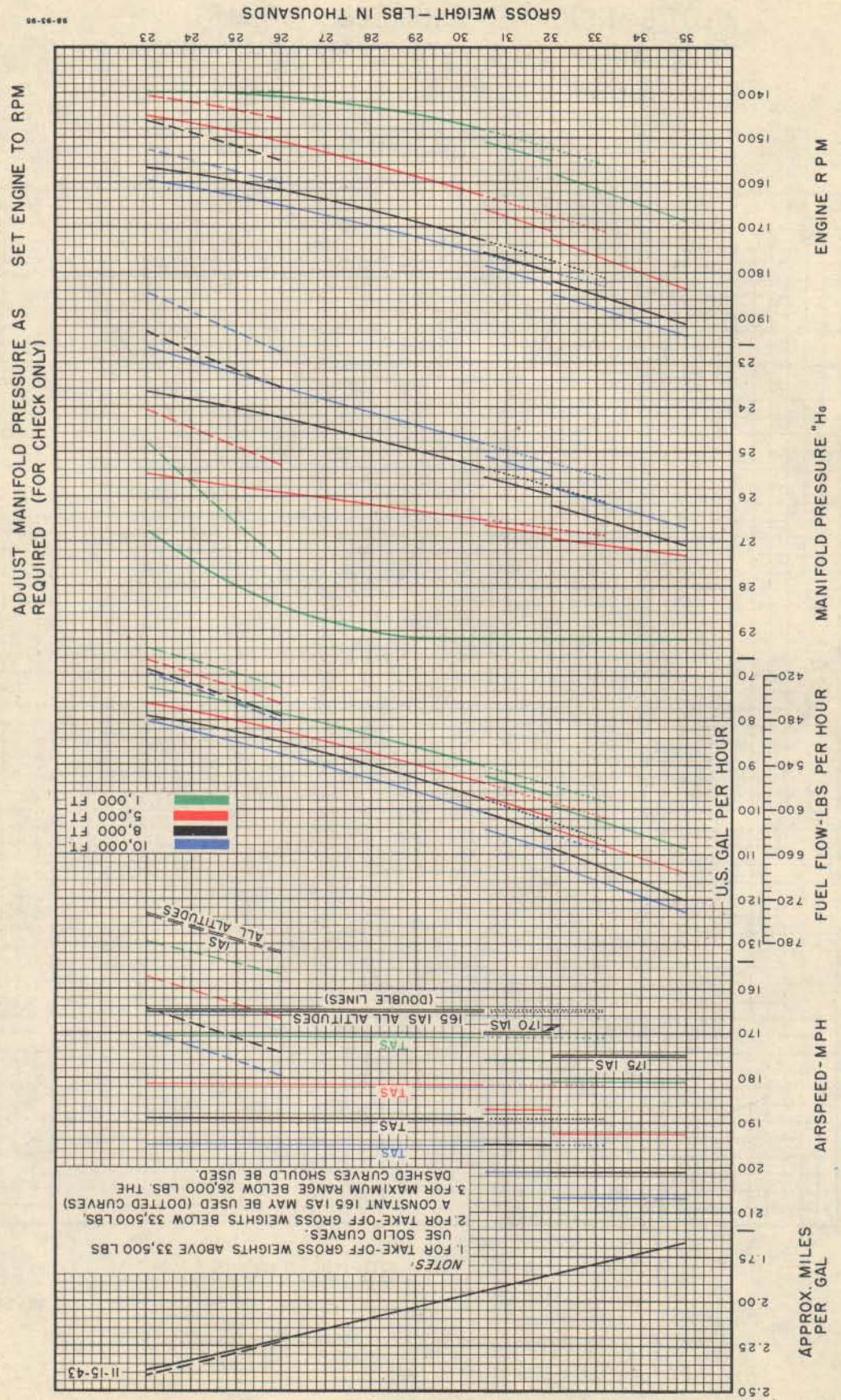


Figure 77—Maximum Range Chart—Upper Turret Removed—No External Load

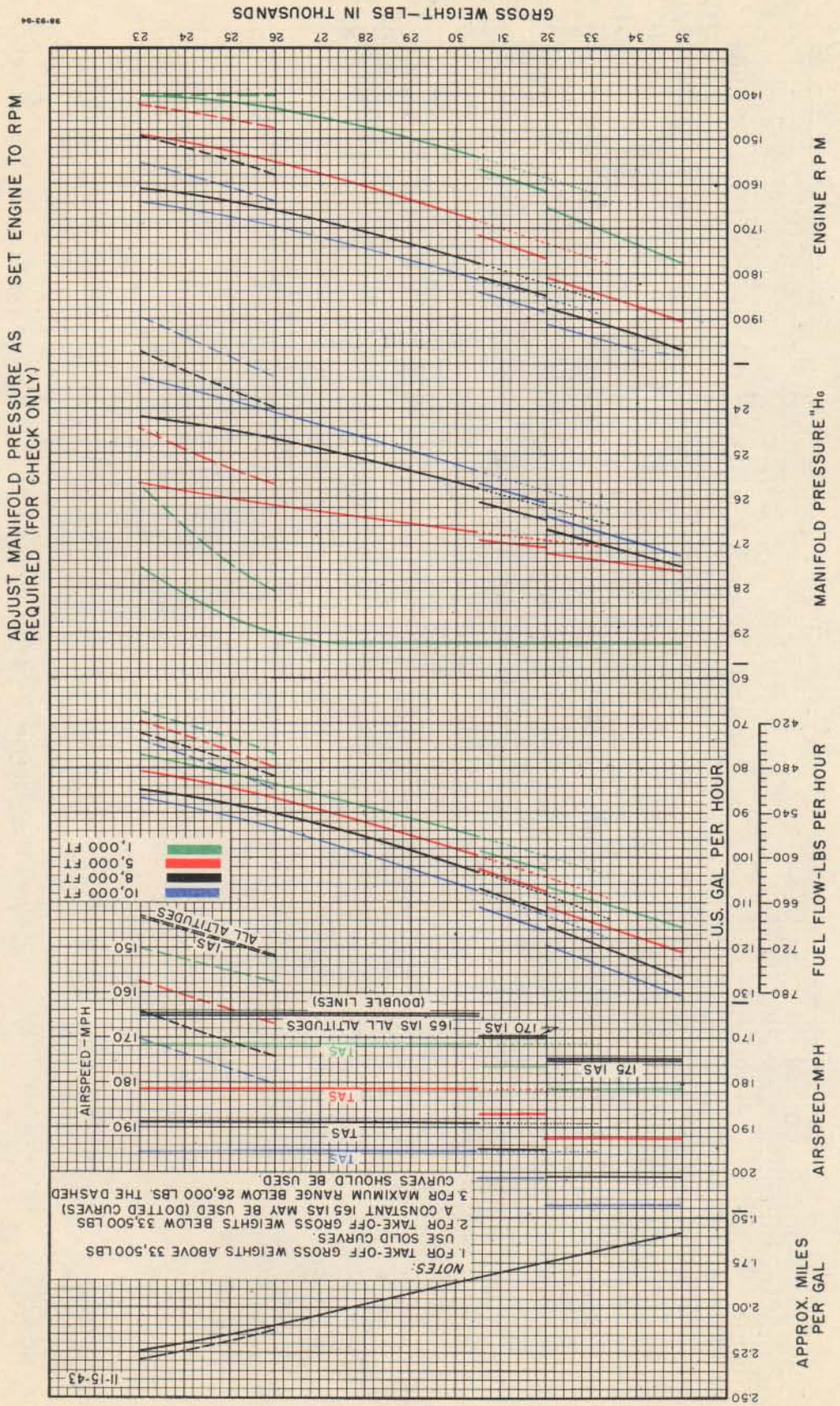


Figure 78—Maximum Range Chart—Upper Turret Installed—No External Load

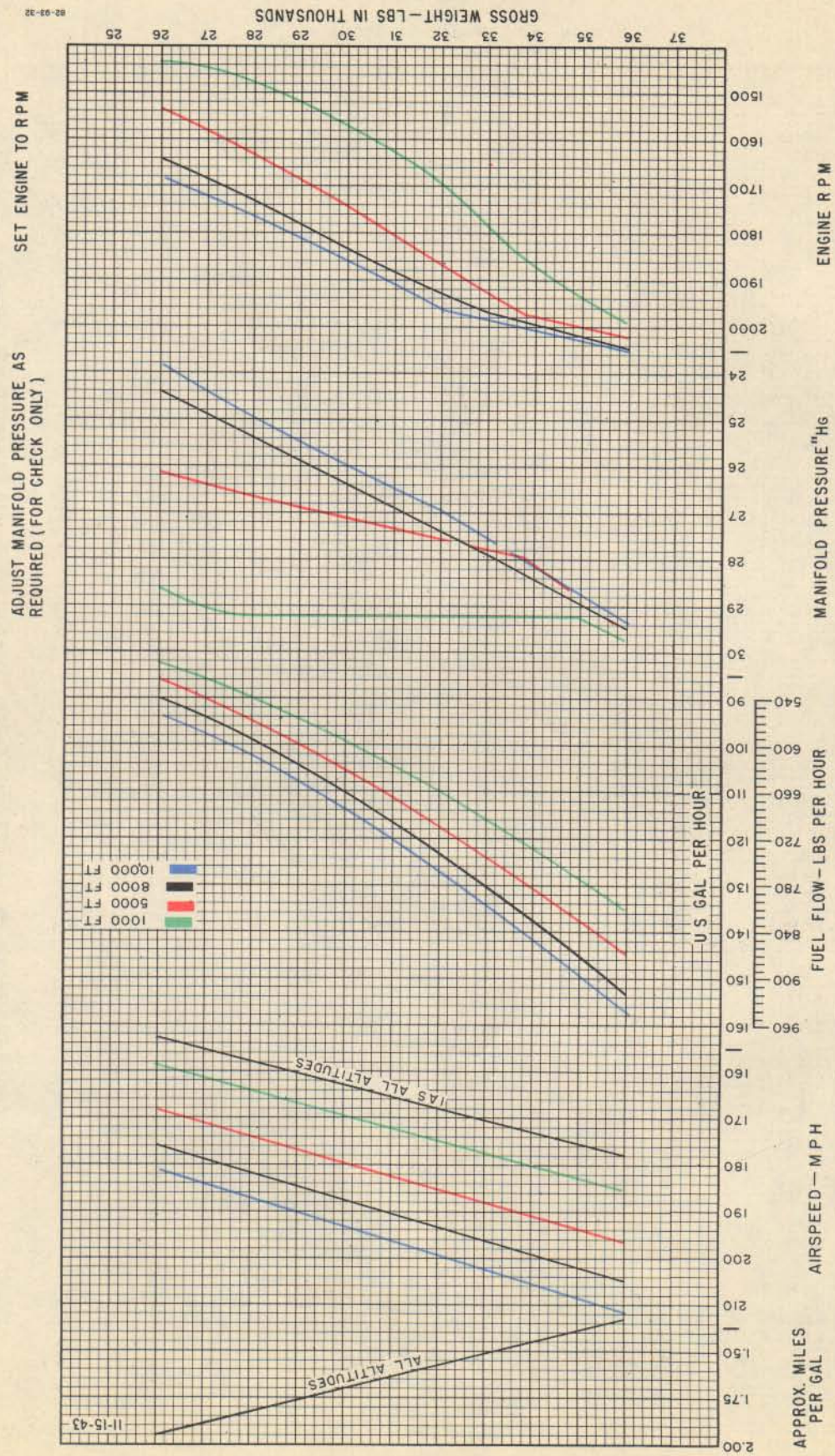


Figure 79—Maximum Range Chart—Torpedo

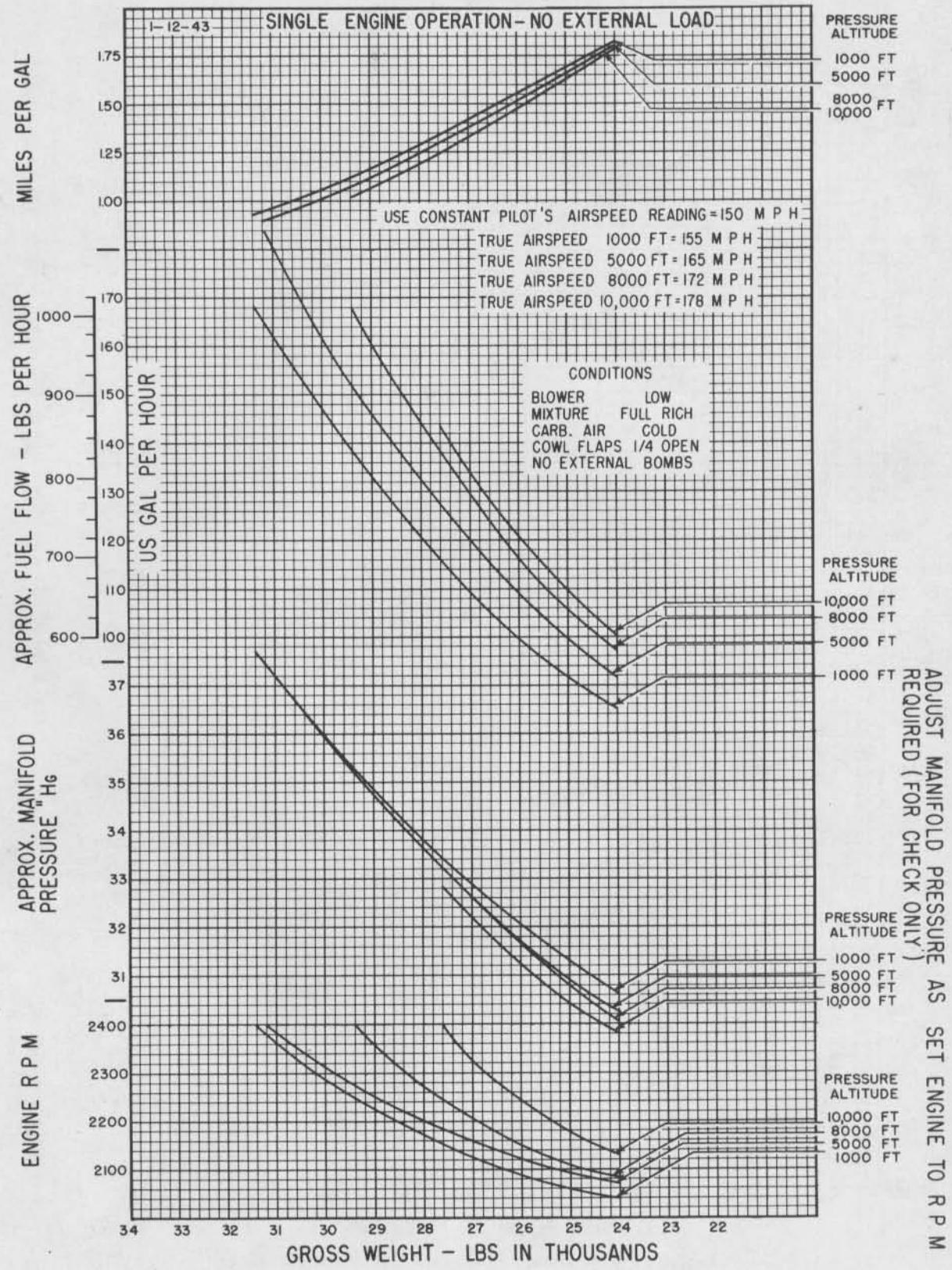


Figure 80—Maximum Range Chart—Single Engine

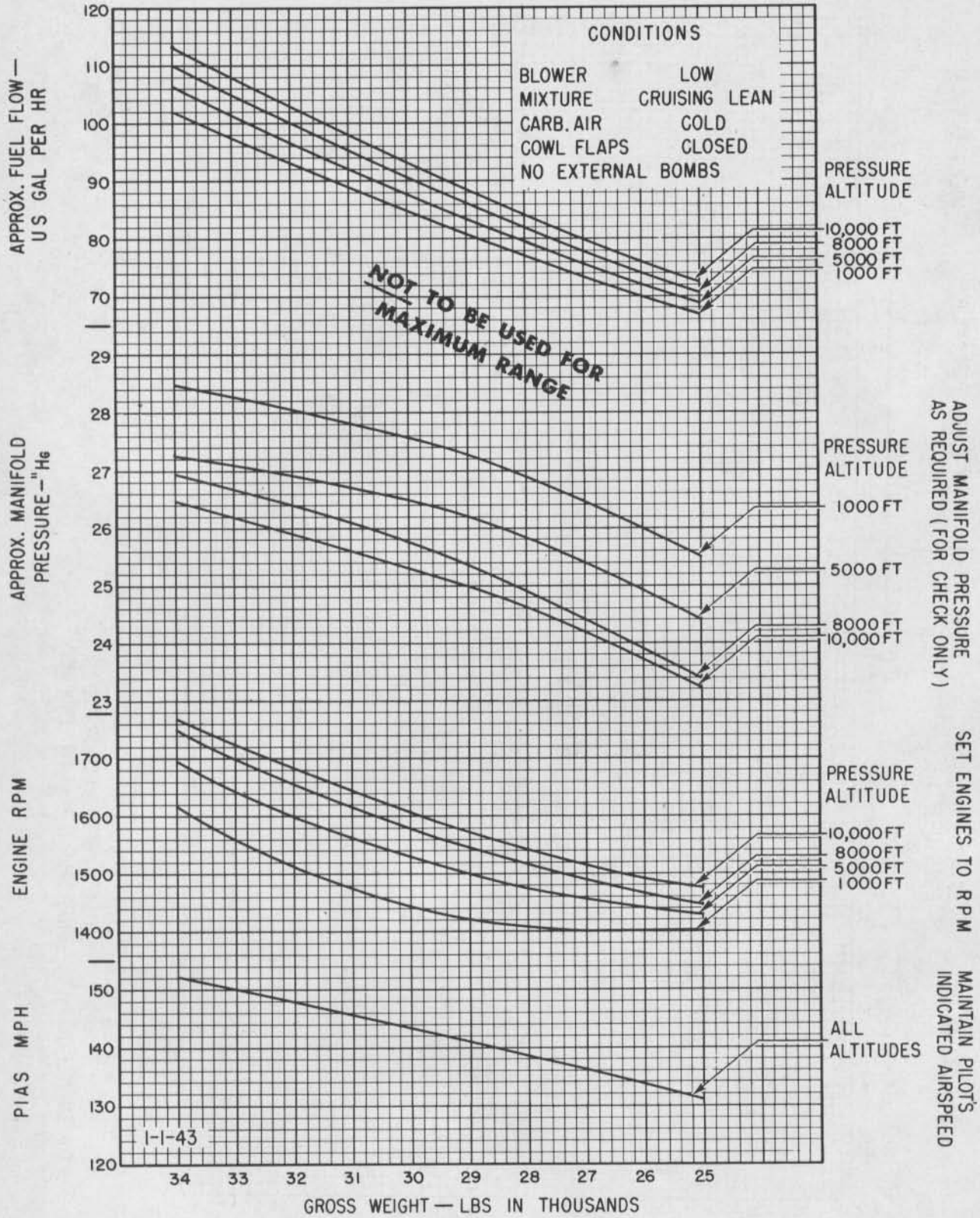


Figure 81—Maximum Endurance Chart—Two Engines

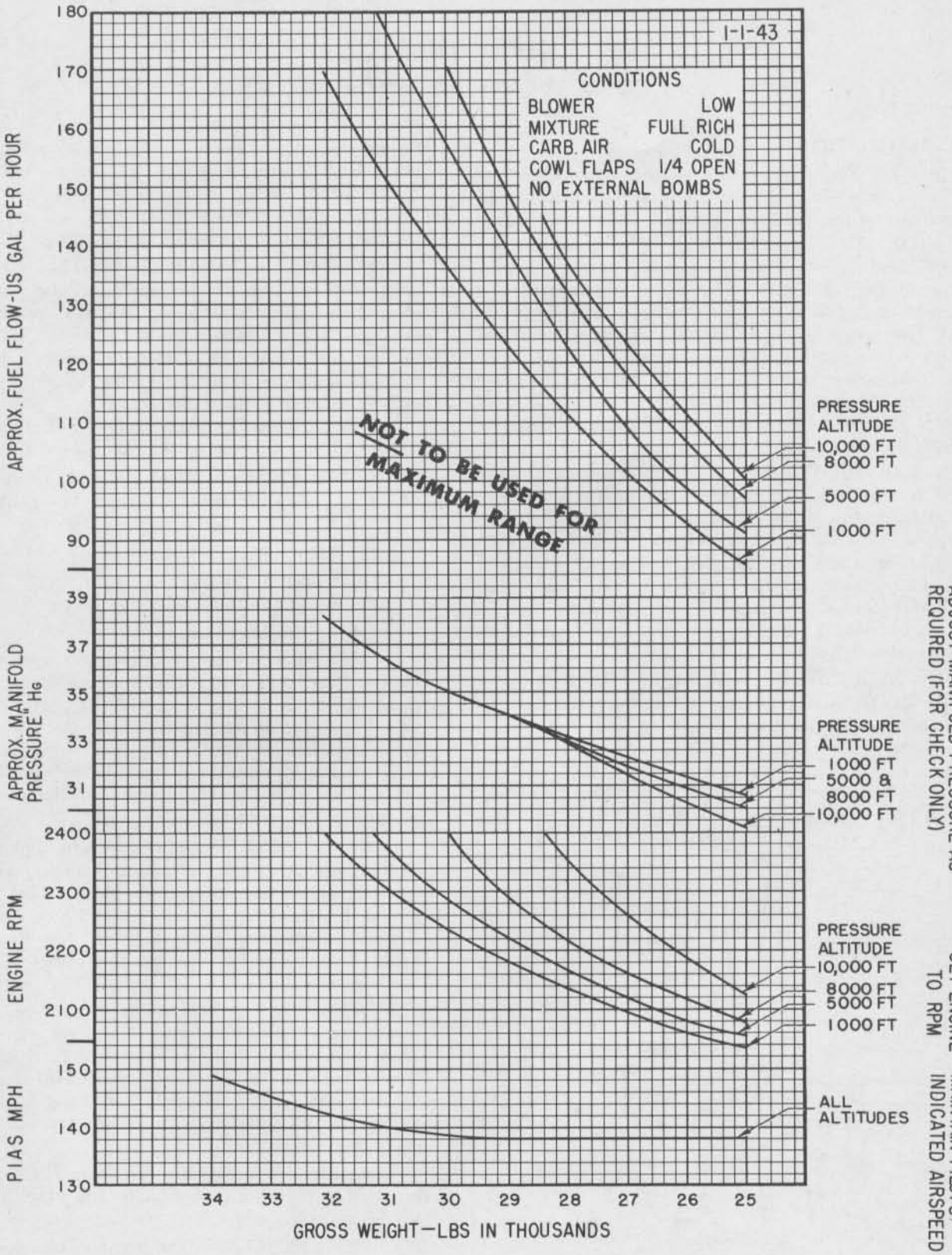


Figure 82—Maximum Endurance Chart—Single Engine

APPENDIX III
COLD WEATHER PROVISIONS

1. DESCRIPTION.

a. GENERAL.—The cold weather installations on this airplane are described below, with instructions for their use in the sequence they will be needed.

b. OIL DILUTION SYSTEM.—The oil dilution system withdraws engine fuel from a fitting at the fuel inlet to the carburetor and introduces it into the oil system at the oil Y drain fitting, where it mixes with the oil. This action lowers the viscosity of the oil and facilitates engine starting in cold weather. Each engine has an independent oil dilution system, and a control switch for each system is mounted on the pilot's switch panel. Thus, the oil in each engine may be diluted either selectively or simultaneously.

c. CARBURETOR HEAT.—The carburetor heat system consists of a cold air door and a warm air door interconnected by linkage and controlled from the pilot's control pedestal. The control has two positions, NORMAL and ICING. In the NORMAL position, the cold air door is open and the warm air door is closed. In the ICING position, the cold air door is closed and the warm air door is open to admit warm air from behind the engine cylinders.

d. CARBURETOR AIR THERMOMETERS.—A dual dial carburetor air temperature indicator, mounted on the right side of the instrument panel, indicates icing possibilities in the carburetors. A resistance bulb in each carburetor air scoop is connected electrically to the indicator and transmits the temperature of the air entering the carburetor to the indicator.

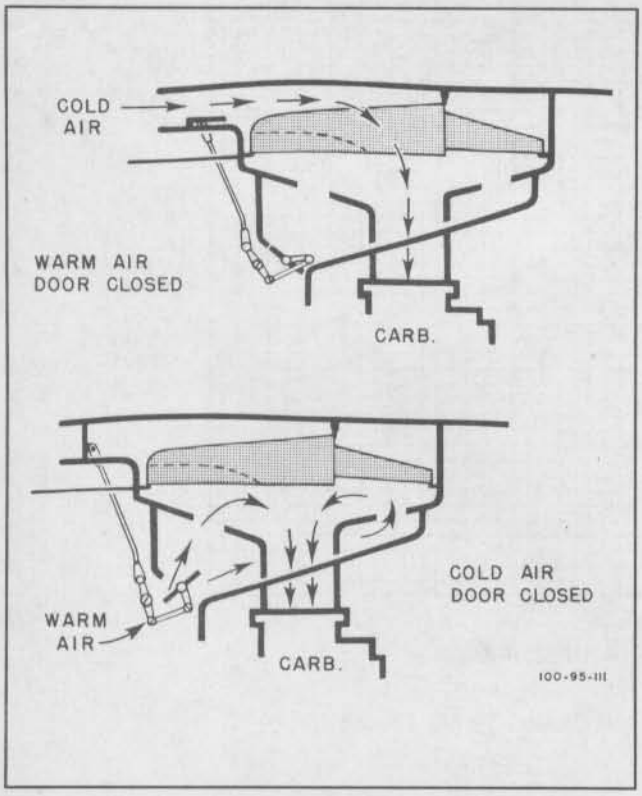


Figure 83—Carburetor Air Operation

e. PROPELLER ANTI-ICER SYSTEM.—The propeller anti-icer system comprises an alcohol fluid tank, electric pump, and propeller anti-icer slinger rings. Leading edge feed shoes for the propeller blades will be installed in the field as they are needed. The system distributes alcohol along the leading edges of the propeller blades to prevent the adhesion or accumulation of ice on the propellers. The operation of the system is controlled by a rheostat on the pilot's switch panel.

f. WING, ENGINE, AND PROPELLER COVERS.—The following covers are furnished with the airplane:

(1) Engine covers.
(2) Front section cover.
(3) Upper turret cover.
(4) Waist gun window covers.
(5) Tail turret cover.

Each engine cover is equipped with ground heater sleeves. The front sleeve directs warm air to the propeller reduction gear housing and the propeller dome. The rear sleeve directs warm air into the engine accessory compartment. A sleeve on the front section cover directs warm air into the cockpit through the left sliding window opening. Wing and propeller covers will be furnished by the AAF.

g. SNOW AND ICE TIRES.—Snow and ice tires will be installed at jump-off points on airplanes assigned to cold weather operation by the AAF. These tires are provided with metal cleats to assure traction when the airplane is operating from snow or ice-covered flying fields. A snow and ice tread tire should not be used on the nose wheel.

h. DEFROSTER PANELS.—Raymond type defroster panels are installed on the windshield of the airplane. These panels serve to retain the warm air from the defroster ducts in the area of the windshield in order to keep these important areas free from frost, fog, and ice. When not installed, the panels are stowed as loose equipment.

i. CLEAR VIEW PANEL.—A clear vision panel is installed in the pilot's windshield. The panel is opened for better vision while flying in snow, rain, or sleet.

j. WING DE-ICERS.—The flight surface de-icer system consists of inflatable rubber shoes on the leading edges of the wings and empennage, inflated from the pressure side of the two engine-driven vacuum pumps. During flight, when the system is not in operation, vacuum pump suction prevents the negative air pressure

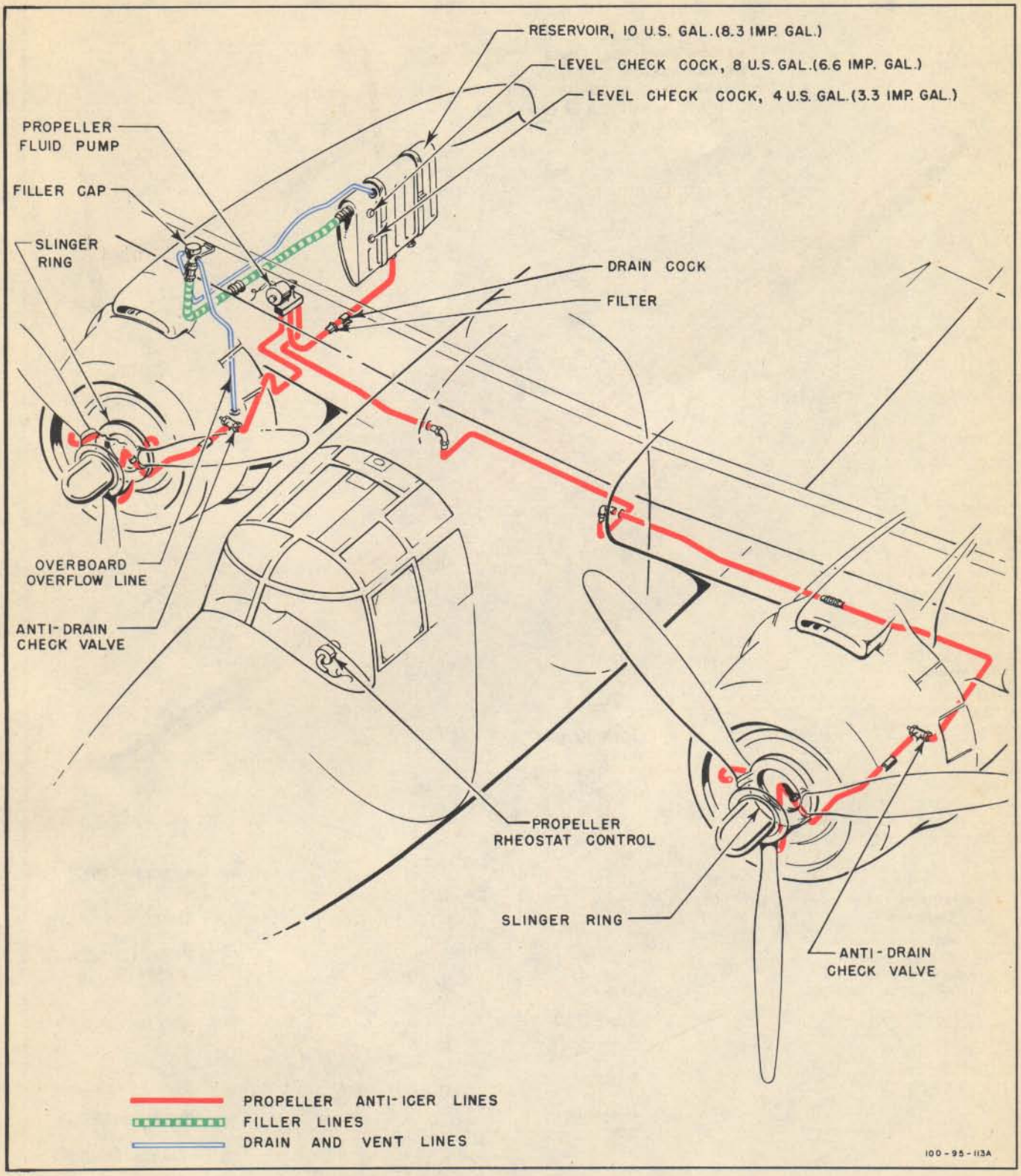


Figure 84—Propeller Anti-Icer System

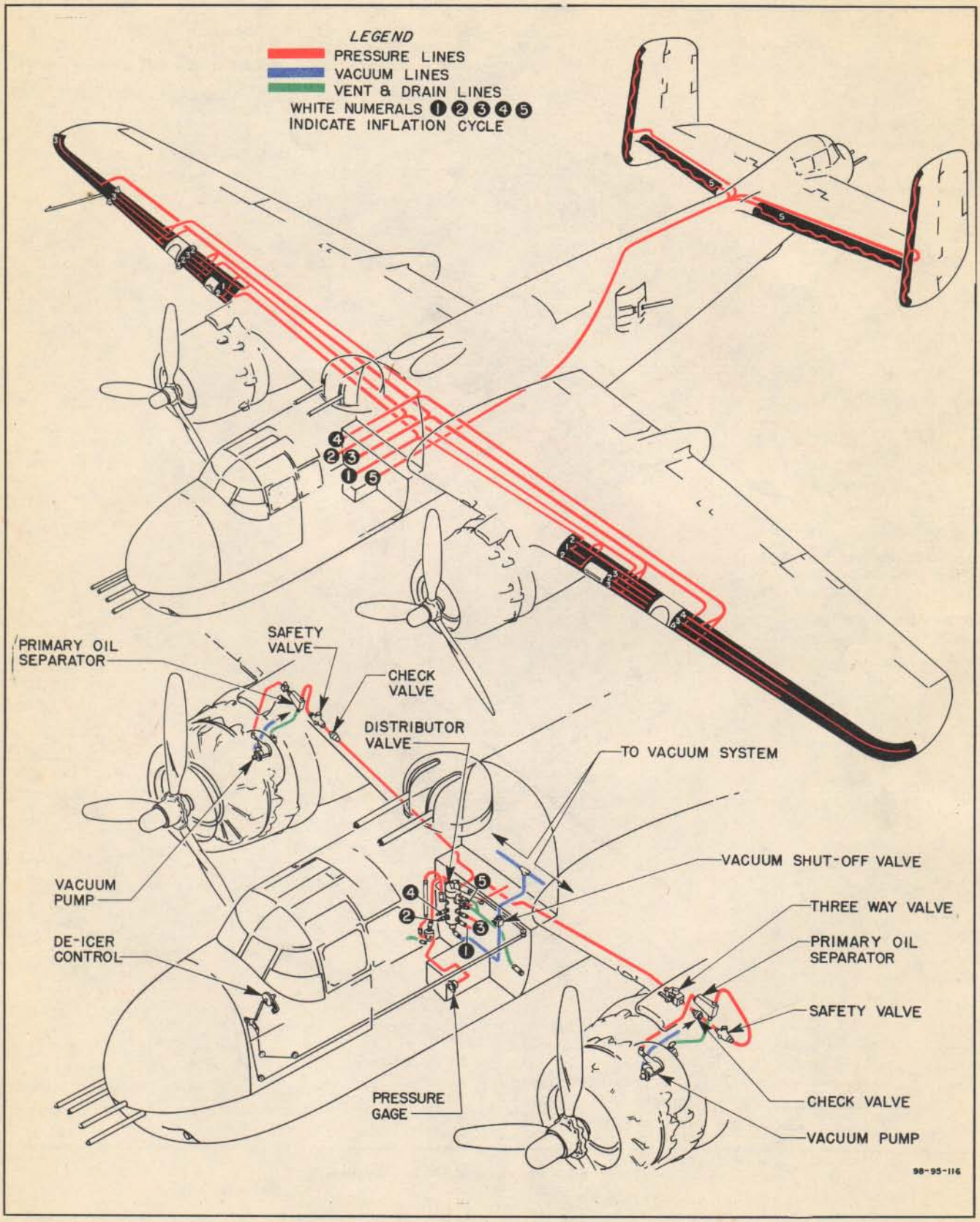


Figure 85—Surface De-Icer System

on the airfoils from raising the de-icer shoes. The de-icer shoes will be installed at the discretion of the AAF.

2. OPERATION.

a. STARTING ENGINE.

(1) A normal start should be made by following the procedure listed on the pilot's check list. Below are supplementary instructions to be followed if any difficulty is encountered when starting the engine.

(a) Turn the engine over several revolutions by hand before engaging the starter. Considerable priming is necessary for start in cold weather. Prime the engine by pushing the primer switch to "ON" for one second and "OFF" for two seconds. Repeat this procedure while energizing, and while the engine is being turned over by the starter, operate the primer switch until firing is regular.

(b) If the engine fails to start, moisture on the spark plugs may be the cause. Remove at least one plug from each cylinder and warm the plugs to dry the points. Make another attempt to start the engine immediately after replacing the plugs.

(c) In starting each engine, a normal start should be made without regard to the oil dilution system. After starting engine, if a heavy viscous oil is indicated by oil pressure that is too high, or by oil pressure that fluctuates or falls back when the engine rpm is increased, the dilution switch may be pushed "ON" to dilute the oil and correct this condition. This method should be used only if time and extreme temperature conditions do not permit normal engine warm-up.

Note

Overdilution is likely to result under these conditions because of low oil flow and a cold engine which holds back evaporation. If dilution is used during warm-up, close observance of the oil pressure will be necessary during the time of dilution and through the remainder of the warm-up and take-off to determine whether or not the oil has been over-diluted, resulting in low oil pressure.

(d) Do not run the engines at more than 1200 rpm until the oil has reached a temperature of 20°C (68°F).

(e) Ordinarily the carburetor air control handles will be in the NORMAL position. However, during extended ground operation under icing conditions and before take-off, place the control handle in the ICING position until the ice has been eliminated from the induction system.

b. TAKE-OFF.

(1) Do not take off with snow, ice, or frost on the wings. Even loose snow cannot be depended upon to blow off, and only a thin layer is necessary to cause loss of lift and very treacherous stalling characteristics. Under some conditions, it may be necessary to taxi out to the take-off position before removing the protective covers from the flight surfaces, since frost formation can be very rapid.

(2) If deep, heavy snow interferes with the take-off run, but does not prevent the airplane from being taxied, move slowly up and down the take-off course several times to pack down the snow on the runway before attempting the actual take-off.

(3) When taking off or landing on a narrow strip of clear ice, cross winds are particularly dangerous because of poor maneuverability caused by lack of traction. If the wind is gusty, the airplane may be blown completely off the ice before control can be regained.

(4) The carburetor air control should not normally be used during take-off. Under icing conditions, the control is placed in the ICING position prior to take-off to ensure that all ice is eliminated from the induction system. However, immediately after take-off when power is reduced, the carburetor control may be placed in the position desired.

(5) Make sure that both cabin heaters are OFF before attempting take-off.

c. FLIGHT.

(1) After taking off from snow or slush-covered fields, operate the landing gear and flaps through several cycles to prevent the gear and flaps from freezing in the UP position.

(2) Turn "ON" the pitot tube heater. This should not be done when the airplane is on the ground, as there is insufficient cooling in the pitot head.

(3) If ice starts to form on the propellers, turn anti-icer rheostat control to NORMAL. By adjusting the control to various positions, the amount of anti-icer fluid being delivered to the propellers by the pump may be varied.

(4) If ice starts to form on the leading edges of the wing and empennage, turn surface de-icer control handle on left side of pilot's compartment to "ON."

CAUTION

Do not operate de-icer during landing or take-off. Do not operate de-icer system at speeds above 230 mph indicated air speed.

Note

An emergency shut-off valve near the distributor valve in the cannoneer's compartment is used to prevent loss of instrument readings in the event of de-icer system failure.

(5) When icing of the carburetor is indicated by a gradual loss of rpm and manifold pressure without a change being made in the throttle position or attitude of flight, place carburetor air control handles in the ICING position.

(6) Carburetor icing is less likely to occur under extreme conditions of cold than when free air temperature is between −7° and 16°C (19° and 61°F). It is good practice to place the carburetor air controls in the ICING position for one to two minutes every half-hour during flight to preclude the possibility of carburetor icing.

(7) Increase propeller speed by approximately 200 rpm every half-hour to assure continued governing at extremely low temperatures. Return to the desired cruising rpm as soon as the tachometer shows that the governor is functioning.

(8) Stay on a prearranged flight course as closely as possible so that searchers will be able to find you if you are forced down. Except in extreme emergency, it is better to land or crash-land than to bail out.

d. LANDING.—Temperature inversions are common in winter, and the ground air may be 15° to 30°C (27° to 54°F) colder than that at altitude. Therefore, care must be taken to avoid excessive cooling when letting down. Lower the landing gear and use flaps to reduce air speed while descending. Retain considerable power and, if possible, maintain the oil temperature above 20°C (68°F) and the head temperatures above 150°C (302°F) during all let downs. Lower readings than these may result in the engines' cutting out or the failure of the engines to respond when the throttles are advanced.

e. AFTER LANDING.

(1) OIL DILUTION.—To obtain sufficient dilution of the oil to facilitate starting, the engine should be allowed to cool—either by idling or stopping after flight—before dilution is begun. This will prevent rapid evaporation of the gasoline and ensure that the viscosity of the oil has been reduced sufficiently. In most cases it will be found that the engines have cooled sufficiently for dilution by the time the airplane reaches the flight line. Dilute the engines at 1000 rpm for the time indicated below, consistent with the lowest expected air temperature:

Temperature 2°	*Time-Minutes* B-25H-1	B-25H-5 and Subsequent	*Max. Allow. Cyl. Head*	*Temp. °C Oil*
—6 to —18 (21 to 0°F)	6	3	150	50
—18 to —29 (0 to —20°F)	10	5	145	45
—29 to —40 (—20 to —40°F)	14	7	140	40
—40 to —51 (—40 to —60°F)	21	11	140	40

At the completion of the above dilution period, run both engines up to 1500 rpm, continuing dilution, and operate each propeller governor through three complete cycles. Release dilution switch and decrease engine speed; then stop engines.

Note

If temperatures approach limits during 1000 rpm dilution, shut down for 10-15 minutes to cool engine; then start engine and finish dilution procedure.

3. PERSONAL CONSIDERATIONS.

a. GENERAL.—Personnel undertaking Arctic operations should very carefully prepare for flight or ground activities. Failure to comply with the instructions below may result in physical discomfort or serious injury to the persons involved. Follow the instructions and you will find Arctic operation more pleasant.

b. SWEATING.—Sweating is always dangerous in sub-zero temperatures. If your feet or other parts of your body perspire, make sure that your clothing and body are absolutely dry before you go outside in severe weather conditions. Ice will form in the clothing, and damp portions of the body will freeze almost immediately.

c. CLOTHING.—Suitable and adequate clothing should be worn at all times. The greatest danger of freezing is in the spring when the sun shines brightly and the temperature warms up to 15°F (—10°C) or 25°F (—4°C) during the day, as personnel is tempted to go out wearing less clothing than usual. At sundown the temperature will drop rapidly, although many hours of daylight may be left. During the night the temperature may drop as low as —50°F (—46°C).

d. FACE MASKS.—In extreme temperatures, face masks should be worn.

e. OVEREXERTION.—When the temperature is —25°F (—32°C) or below, there is danger of freezing the lungs through deep breathing following overexertion. If you unknowingly overexert and start gasping large breaths of air, put your head down and breathe from inside your clothing until the heavy breathing stops.

f. SHELTER.—Light tent shelters or heated nose hangars must be provided to enable maintenance crews to work efficiently with tools and equipment.

g. INSULATING TOOLS.—Metal tools may be insulated against cold by wrapping the handles with a light cord.

h. GASOLINE SPILLAGE.—Gasoline spilled on the hands or clothing in sub-zero weather has an effect similar to that of liquid air; it will freeze flesh in a few seconds after contact.

i. FORCED LANDING.—In case of a forced landing, personnel is directed to remain in the vicinity of the aircraft in order to conserve energy, to avoid exertion, and to simplify rescue, as it is impossible to traverse normal Arctic terrain except under the most favorable circumstances.

j. SERVICING.—All personnel in any way concerned with servicing the airplane in very cold weather should keep these basic cautions firmly in mind:

(1) Tools or other metal articles should not be grasped with the bare hands during sub-zero weather, as the skin will freeze to the article or surface and the result will be a painful tearing of the flesh.

(2) When making emergency repairs or when replacing equipment in very cold weather, extreme care should be taken to avoid placing too great a tension upon nuts, bolts, cables, etc., as these will expand upon warming and might "freeze" or snap.

(3) Small parts dropped into snow are very difficult to find, and personnel should be careful to avoid loss of essential parts.