

RESTRICTED  
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AN 01-20EF-1  
A.P. NO. 2099C

*PILOT'S FLIGHT OPERATING  
INSTRUCTIONS*

*FOR*

ARMY MODELS  
B-17F and G  
BRITISH MODEL  
FORTRESS II

This publication shall not be carried in aircraft on combat missions or when there is a reasonable chance of its falling into the hands of the enemy.

AUGUST 1, 1943

## SECTION I DESCRIPTION

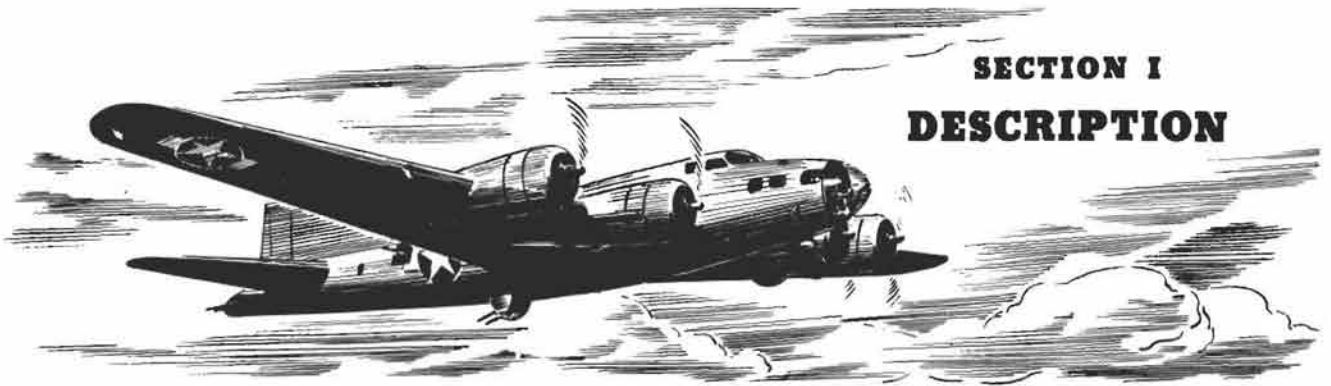


Figure 1 - B-17F in Flight

### 1. AIRPLANE.

a. Model B-17F and G bombardment airplanes are four-engine-midwing monoplanes. The approximate over-all dimensions are: length, 74 feet 9 inches; height, taxiing position, 19 feet 1 inch; span, 103 feet 9 inches.

b. Electrically operated landing gear, tail gear, wing flaps, bomb bay doors, and hydraulically operated brakes and cowl flaps are provided.

c. The crew includes pilot, copilot, navigator, bombardier, upper turret gunner, lower turret gunner, radio operator, side gunner(s), and tail gunner. The airplane can be entered either through the main entrance door on the right side of the airplane just forward of the horizontal stabilizer, or through the front hatch in the bottom of the fuselage below the pilot's compartment.

d. Defensive armament of the B-17F consists of three turrets, each mounting two .50 calibre machine guns, and five single flexibly mounted .50 mounted .50 calibre machine guns. The B-17G has an additional power turret just below the nose of the airplane and controlled from the bombardier's compartment.

e. Provisions are made for loading 2000-pound or smaller bombs on racks within the bomb bay, and one bomb, up to 4000 pounds may be carried under each wing.

f. Automatic flight control equipment is provided.

### 2. POWER PLANT.

a. **ENGINES.** - The Wright model R-1820-97 engines are air-cooled, nine-cylinder radial aircraft

engines, equipped with integral reduction gears through which the propellers are driven.

b. **TURBOSUPERCHARGERS.** - A type B-2 General Electric turbosupercharger is provided for each engine to boost manifold pressure for take-off and high-altitude flight. Superchargers are controlled by automatic hydraulic regulators adjusted from the pilot's control pedestal.



Figure 3 - Power Plant

c. **PROPELLERS.** - The Hamilton standard three-blade propellers are hydromatically controlled with constant-speed and full feathering provisions.

d. **AUTOMATIC ENGINE CONTROL.** - Should engine control cables be shot away, four of the controls will automatically assume predetermined positions: throttles, wide open; superchargers, 65 percent power; intercoolers, cold; and propellers, 1850 rpm. Functioning of the automatic control at one unit will not affect placement of controls at other units, or of similar controls on other engines.



Figure 2  
Three-quarter  
Rear View

### 3. FLIGHT INSTRUCTIONS.

#### a. BEFORE ENTERING PILOTS' COMPARTMENT.

- (1) Check weight and balance data, form F, AN 01-1-40.
- (2) Check forms 1 and 1A and sign exceptional release if necessary.
- (3) Check flight engineer's report of preflight inspection.

#### b. ON ENTERING PILOTS' COMPARTMENT. - Check for all flights:

##### PILOT

##### COPILOT

- |  |  |
|--|--|
| (1) Emergency ignition switch "ON."  |  |
| (2) Check each battery switch separately with either inverter on.  |  |
| (3) Master battery switches "ON."  |  |
| (4) Turn hydraulic pump switch "ON." If it is momentary "AUTO-MANUAL" type, it should remain in "AUTO" unless the pump fails to operate. |  |
| (5) Landing gear control switch in neutral.  |  |
| (6) Flap control switch in neutral.  |  |
| (7) Have copilot set parking brake.  | (7) Set parking brake at command of pilot. |
| (8) Ascertain free movement of flight control column, wheel and rudder pedals to the extremities of their operating range.               |  |

#### c. SPECIAL CHECK FOR NIGHT FLIGHTS.

- |   |  |
|---|--|
| (1) Master battery switches "ON."             |  |
| (2) Turn control panel lights "ON."           |  |
| (3) Turn side control panel lights "ON."      |  |
| (4) Test operate the instrument panel lights. |  |
| (5) Test operate the landing lights.          |  |

##### WARNING

Do not permit lights to burn more than 5 seconds during test.

- |   |
|---|
| (6) Test operate the identification lights. |
| (7) Test operate the passing lights.        |
| (8) Test operate the position lights.       |



d. STARTING ENGINES.

PILOT

- (1) If the engines have stood for over 2 hours, have the propellers turned over three complete revolutions by hand. Be sure ignition switches are "OFF."
- (4) Cabin heat control in "OFF" or "COLD" position.
- (5) Move turbo controls to "OFF."
- (6) Post fire guard.
- (7) Open all fuel shut-off valves.
- (8) Crack throttles (approximately 1000 rpm).
- (9) Direct copilot to open carburetor air filters.
- (10) Set propeller controls for high rpm.
- (11) Turn magneto switch for engine affected to "BOTH."
- (13) Direct copilot to start engines. Recommended starting order is 1-2-3-4.

COPILOT

- (2) Order flight engineer to open manual shut-off valve and set selective check valve to "SERVICING" position.
- (3) Check hydraulic pressure, both gages (600 to 800 pounds per square inch). Order flight engineer to close manual shut-off valve. Set selective check valve to "NORMAL" position.
- (4) Open cowl flaps and return valves to "LOCKED" position.
- (5) Fuel transfer valves and pump switch should be "OFF." Have flight engineer check them.
- (6) Set fire extinguisher selector valve (if installed) to engine being started.
- (7) Move intercooler controls to "COLD."
- (8) Turn carburetor air filters "ON" when directed by pilot.
- (9) Move mixture controls to "ENGINE OFF."
- (10) Set primer to "OFF" position.
- (11) Start No. 3 fuel booster pump for primer pressure. It should be 6 to 8 pounds per square inch.
- (12) Start fuel booster pump for engine affected.
- (13) Start engines when directed by pilot.

(a) OLD-TYPE STARTER.

1. Move starter switch of engine affected to "START" position and hold for approximately 30 seconds.
2. While starter switch is in "START" position, unlock primer, set to engine affected, and expel air from line by pumping until a solid charge of fuel is obtained.
3. When directed by pilot, move starter switch to "MESH" position.

(b) NEW-TYPE STARTER.

1. Throw "START" switch to engine affected and energize for 12 seconds.

## PILOT

- (14) When the engine fires, move the mixture control to "AUTOMATIC RICH."

### CAUTION

Do not advance the throttles as lean mixture and backfire hazard will result.

- (18) If no oil pressure is indicated within 1/2 minute after starting, direct copilot to stop engine with mixture control. Cut ignition and investigate.
- (19) In case of fire in the exhaust system, run up the engine in an attempt to blow out the fire. If this fails, direct copilot to stop the engine.
- (20) Close cowl flaps if the fire is in nacelle 1 or 2.
- (21) If fire is not smothered by closing the cowl flaps, close fuel shut-off valve, stop booster pump, and direct copilot to pull fire extinguisher, both charges if necessary.
- (22) Before resuming operations after fire, be sure that CO<sub>2</sub> cylinders are replaced.

## COPILOT

2. Throw "MESH" switch while "START" switch is held on.
- (14) When the starter is meshed, prime with quick strokes (to atomize the primer charge) until the engine fires.

- (15) If necessary to prevent engine from quitting due to lack of fuel, pump primer with several slow strokes.

### CAUTION

Return primer to "OFF" position.

- (16) Shut off booster pump if fuel pressure from engine pump remains steady.
- (17) If engine stops, return mixture control to "ENGINE OFF" immediately, cut ignition switch and repeat the starting procedure.
- (18) After engine starts, check for indication of oil pressure. If no pressure is indicated within 1/2 minute, notify pilot; move mixture control to "ENGINE OFF" when directed by pilot.
- (19) When directed by pilot, stop engine by moving mixture control to "ENGINE OFF."
- (20) Close cowl flaps if the fire is in nacelle 3 or 4.
- (21) Pull fire extinguisher charges (if available) at command from pilot.

### NOTE

If engine accessory cowling is not installed, it is unlikely that the fire can be extinguished by the CO<sub>2</sub> system. External fire extinguishers must, therefore, be used.



e. ENGINE WARM-UP.

PILOT

- (1) When oil temperature begins to rise and oil pressure is 50 pounds per square inch, open throttles 1000 to 1250 rpm.
- (2) When engines are thoroughly warmed, the rpm may be increased for instrument check.

COPILOT

- (1) Notify pilot when oil temperature begins to rise and oil pressure is 50 pounds per square inch.
- (2) Notify pilot when maximum temperature and pressure values are reached.

CAUTION

2500 rpm must not be maintained for more than 1/2 minute and the following values must not be exceeded:

Fuel pressure	16 lb/sq in.
Oil pressure	80 lb/ sq in.
Oil temperature	88°C (190.4°F)
Cylinder temperature	205°C (401°F)

f. EMERGENCY TAKE-OFF.

(1) If the airplane has been on the "alert," the engines will have been started, and will be warm and ready for take-off by the time the flight crew gets within the airplane. The pilot will proceed with a routine take-off, being careful not to exceed 46 inches Hg manifold pressure.

(2) If an emergency take-off is necessary with cold engines, due to the lack of a ground crew, the following procedure should be followed:

(a) Start engines, using oil dilution as soon as engines fire in order to get minimum oil pressure of 70 pounds per square inch.

(b) Fuel pressure should be at least 12 pounds per square inch.

(c) Set wing flaps for take-off, leave cowl flaps less than 1/3 open to expedite warm-up. Proceed with take-off. Do not exceed 46 inches Hg manifold pressure.

g. ENGINE AND ACCESSORIES GROUND TEST.

PILOT

- (1) Direct gunner to secure lower turret with guns pointing rearward.
- (2) Set altimeter.
- (3) A.F.C.E. switches "OFF," all knobs on control panel, "POINTERS-UP," turn control, "CENTERED."
- (4) Set propeller controls for high rpm and lock.

COPILOT

- (1) See that all doors and hatches are closed.
- (2) Hydraulic pressure should be 600 to 800 pounds per square inch on each gage.
- (3) With ignition and battery switches "ON," hydraulic switch in "AUTO," warning and indicator lights should be:  
  
Tail wheel unlocked - On (red)  
Landing gear - On (green)  
Hydraulic pressure: Service - Off.  
Emergency - Off.  
Vacuum - Off.
- (4) Check all fuel quantities.

## PILOT

- (5) Turn command radio on.
- (6) Flight controls unlocked. Move them to the limits of their ranges to insure free operation.
- (9) Contact control tower for clearance.
- (10) Signal ground crew to remove wheel chocks.
- (11) With mixture controls in the "AUTOMATIC RICH," check ignition at 1900 to 2000 rpm.

### NOTE

The rpm drop should not exceed 100 when switching from two magnetos to one.

- (12) Check propeller governor at 1500 rpm by moving control to low rpm. When rpm decreases to approximately 1100, return control to high rpm position and lock.
- (13) Run up each engine individually and adjust supercharger regulator control stops for 46 inches Hg manifold pressure at full throttle and 2500 rpm.

### IMPORTANT

This adjustment must be made as quickly as possible and must not exceed 1/2 minute for each engine.

- (14) Set trim tabs in neutral.
- (15) Check flight controls.

### WARNING

Operate to full extent of their ranges to insure free and proper movement.

- (16) Close window.

## COPILOT

- (5) Set intercooler controls to "COLD" unless icing conditions exist.
- (6) Cowl flaps should be open. Check visually.
- (7) Wing flaps up. Switch in neutral.
- (8) Tail wheel unlocked. Locking handle should be in up position.

- (11) Check the following during ignition check:

Fuel Pressure: Desired - 12 to 16 lb/sq in.  
Maximum - 16 lb/sq in.  
Minimum - 12 lb/sq in.

Oil Pressure: Desired - 75 lb/sq in.  
80 lb/sq in.  
70 lb/sq in.

Oil Temperature: Desired - 70°C (158°F)  
Maximum - 88°C (190°F)  
Minimum - 60°C (140°F)

Cylinder Temperature: 205°C (401°F)  
Maximum

- (13) Notify pilot if any temperature or pressure reading is not satisfactory.

- (15) Turn all fuel boost pumps "ON."

- (16) Close window.



#### h. TAXYING.

##### PILOT

- (1) Inboard throttles may be locked for taxiing with outboard engines.

##### COPILOT

- (1) Notify pilot if:

Cylinder temperature exceeds 205°C (401°F).  
Oil pressure exceeds 75 pounds per square inch or is less than 15 pounds per square inch for idling engines.  
Oil inlet temperature exceeds 70°C (158°F).  
Fuel pressure is over 16 pounds per square inch or under 12 pounds per square inch.

- (2) Lock tail wheel (warning lamps off) after airplane has taxied to take-off position.

#### i. TAKE-OFF.

##### PILOT

- (1) Refer to the Take-Off Chart, Appendix II.
- (2) Turn generator switches "ON."
- (3) Open throttles slowly to FULL THROTTLE (3 to 5 seconds). Hold three-point position until airplane leaves ground.
- (4) With a runaway turbo or propeller, follow the following instructions:
  - (a) THROTTLE BACK FIRST.
  - (b) Move turbo control to "OFF."
  - (c) If necessary, set propeller controls (figure 40-3) in "LOW RPM." There is small likelihood of a runaway turbo, but the danger is great if it occurs during a take-off. The pilot MUST be alert during the take-off to note immediately and correct any excessive manifold pressure.
- (5) When airplane is clear of the ground, direct copilot to retract the landing gear.
- (6) Accelerate to speed for cruising climb.

##### COPILOT

- (5) Retract landing gear at command from pilot.
- (6) Cylinder head temperatures must not exceed 260°C (500°F) (5 minutes maximum).  
  
Oil pressure - desired - 80 lb/sq in.  
Oil Temp - desired - 70°C (158°F)  
Fuel Pressure - 12 to 16 lb/sq in.
- (7) Adjust intercooler control to "COLD" unless icing conditions prevail.



j. ENGINE FAILURE DURING TAKE-OFF.

PILOT

- (1) Failure of an engine during take-off may not be noticeable immediately except for a resultant swing. If, therefore, a swing develops, and there is room to close the throttles and pull up, this should be done.
- (2) If it is necessary to continue with the take-off, even though one engine has failed, hold the airplane straight by immediate application of rudder. Gain speed as rapidly as possible. See that the landing gear is up, or coming up, and feather the propeller of the dead engine. Re-trim as necessary.

COPILOT

- (1) Press proper propeller feathering switch when ordered by pilot.

k. CLIMB. (Refer to climb chart, Appendix II.)

PILOT

- (1) Reduce manifold pressure with supercharger controls.
- (2) Reduce rpm as required for climb.
- (3) Make a visual check of engines 1 and 2.
- (4) Adjust trim tabs as required.
- (5) Order copilot to set carburetor air filter switch to "FILTER OFF" at 8000 feet unless dust conditions are found above that altitude.

COPILOT

- (2) Adjust cowl flaps as required to maintain proper cylinder head temperature.
- (3) Make a visual check of engines 3 and 4.
- (5) When ordered by pilot, move switch to "FILTER OFF."

WARNING

Switch must never be left in the "FILTER ON" position above 15,000 feet.

l. LEVEL FLIGHT.

PILOT

- (1) Refer to Cruising Control Charts, Appendix II.
- (2) Use full throttle and set power with turbo regulators at all altitudes.

COPILOT

- (2) Set mixture controls to "AUTOMATIC LEAN," below 2100 rpm, 30 inches Hg manifold pressure.

CAUTION

Do not exceed 30 inches Hg manifold pressure below 2100 rpm.

CAUTION

Instantaneous load factors above the allowable can be reached very easily with rough elevator control movements. In turbulent air or in combat maneuvering, corrections should be made very smoothly.

## PILOT

## COPILOT

- (3) Adjust cowl flaps as required to maintain proper cylinder head temperatures.
- (4) Stop booster pumps until needed (which will be above 15,000 feet).
- (5) Begin flight performance log and made entries in Form I as required.

### m. PROPELLER FEATHERING.

## PILOT

## COPILOT

### (1) TO FEATHER A PROPELLER.

- (a) Notify copilot to stop engine affected.
- (b) Turn automatic flight control equipment switches "OFF."
- (c) Notify copilot to press proper feathering switch.
- (d) When propeller stops, turn proper ignition switch to "ENGINE OFF."
- (e) Close throttle.
- (f) Adjust trim tabs as required.
- (g) Turn automatic flight control equipment switches "ON."
- (h) If the engine is not to be restarted, order engine fuel transferred to other tanks as required.
- (i) When No. 2 engine is affected:
  1. The glycol pump is inoperative. If cold air is not desired in the cabins, shut off heating and ventilating system by moving control handle fully aft.
  2. When one vacuum pump is inoperative, (engine No. 2 or 3): Set vacuum pump selector ("GYRO INSTR.") valve to the other vacuum pump. (De-icer pressure will thus be reduced and de-icer vacuum will not be available. De-icer system will, therefore, operate inefficiently.)

- (a) Move mixture control of affected engine to "ENGINE OFF."
- (b) Stop the booster pump if running.
- (c) Press proper feathering switch.
- (d) Close cowl flaps of engine affected.
- (h) Assist aerial engineer to transfer fuel from the dead engine tank.

### (2) TO UNFEATHER A PROPELLER.

## PILOT

## COPILOT

- (a) Notify copilot which engine is to be restarted.
- (b) Turn automatic flight control equipment switches "OFF."

- (a) Set propeller control to "LOW" rpm.
- (b) Set intercooler control to "HOT" position.

## PILOT

- (d) Crack proper throttle to 1000 rpm approximately.
- (e) Turn ignition switch to "BOTH."
- (f) Press proper feathering switch and hold it closed until engine speed reaches 1000 rpm.
- (g) Open throttle slowly to 1200 rpm.
- (h) Adjust trim tabs as desired.
- (i) Maintain 1200 rpm until notified by copilot that oil temperature is 70°C (158°F).
- (k) Synchronize manifold pressure and rpm with other engines.

## CAUTION

Above 15,000 feet, power must be adjusted with turbo control - full throttles.

- (l) Adjust trim tabs as required.
- (m) Turn automatic flight control equipment switches "ON."

## NOTE

When No. 2 propeller is unfeathered, the pilot may turn on the heating and ventilating system by moving the control to any position between one-half and fully forward.

## n. GENERAL FLYING CHARACTERISTICS.

### (1) GENERAL STABILITY.

(a) Increasing the power on the inboard engines causes the airplane to become slightly tail heavy, while a change of power on the outboard engines has no appreciable effect upon the trim.

(b) Closing the cowl flaps on the inboard engines causes a similar tail heaviness, but cowl flaps on the outboard engines have a negligible effect upon the trim.

(c) With the airplane properly trimmed for a landing with power off and flaps down, the pilot may apply power, throw the flap switch into the up position and go around with no change in trim tab setting

## COPILOT

- (c) Close cowl flaps.
- (d) Start proper booster pump (if above 15,000 feet).
- (e) Check fuel quantity in proper tank.
- (f) When engine speed reaches 1000 rpm, move mixture control from "ENGINE OFF" to "AUTOMATIC RICH."
- (i) Notify pilot when oil temperature reaches 70°C (158°F).
- (j) When cylinder head temperature reaches 205°C (401°F), open cowl flaps as required for continuous operation.
- (k) Adjust intercooler control as required.

if a second approach is necessary. The flaps retract at a satisfactorily slow rate.

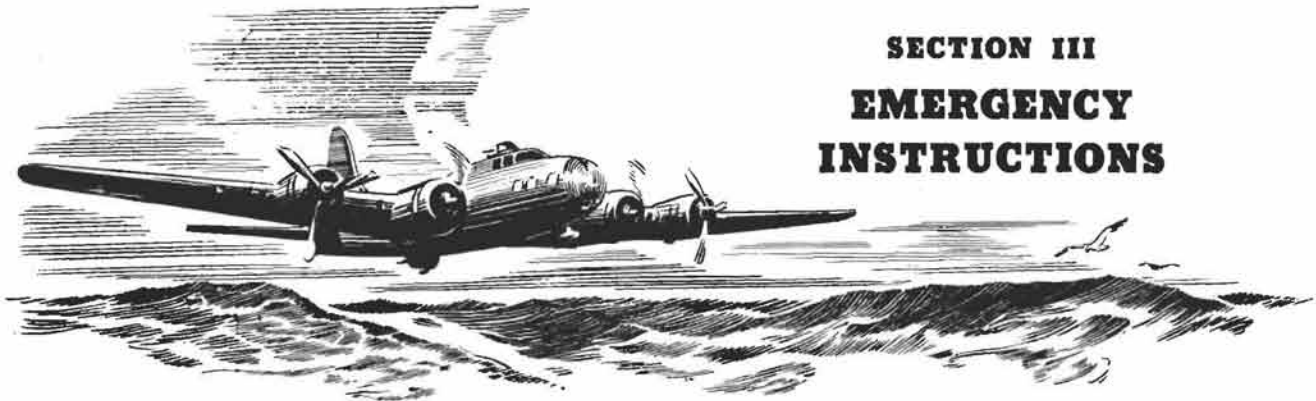
(2) TAKE-OFF. - During the take-off run, directional control should be maintained with rudder movement and throttles, differential throttling being done with the outboard engines as much as possible.

(3) CLIMB. - The airplane will require very little elevator trim and the elevator control pressure will build up rapidly as the climbing speed is reduced below normal.

(4) LEVEL FLIGHT. - In normal flight, turns can be made very smoothly with aileron control only. In instrument flight, the pilot should pay special attention

# SECTION III

## EMERGENCY INSTRUCTIONS



### 1. HAND CRANKS.

Cranks for manual operation of landing gear, wing flaps, and bomb bay doors, and for hand starting of engines, are stowed on the aft bulkhead of the radio compartment. Crank extensions for use when operating engine starters, bomb doors, and wing flaps are stowed adjacent to the cranks.

### 2. EMERGENCY OPERATION OF LANDING GEAR.

Each main landing gear may be operated separately by means of a hand crank connection in the bomb bay, one to the left of the door in the forward bulkhead, and one to the right. To raise one of the landing wheels, insert the crank into the connection and rotate clockwise. Turn the crank counterclockwise to lower the wheel.

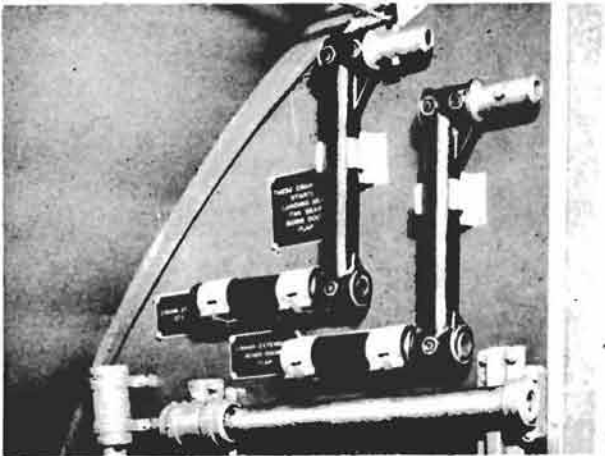


Figure 30 - Hand Cranks Stowed

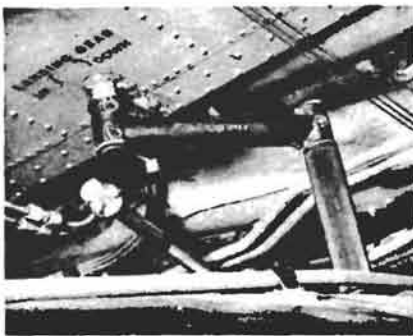
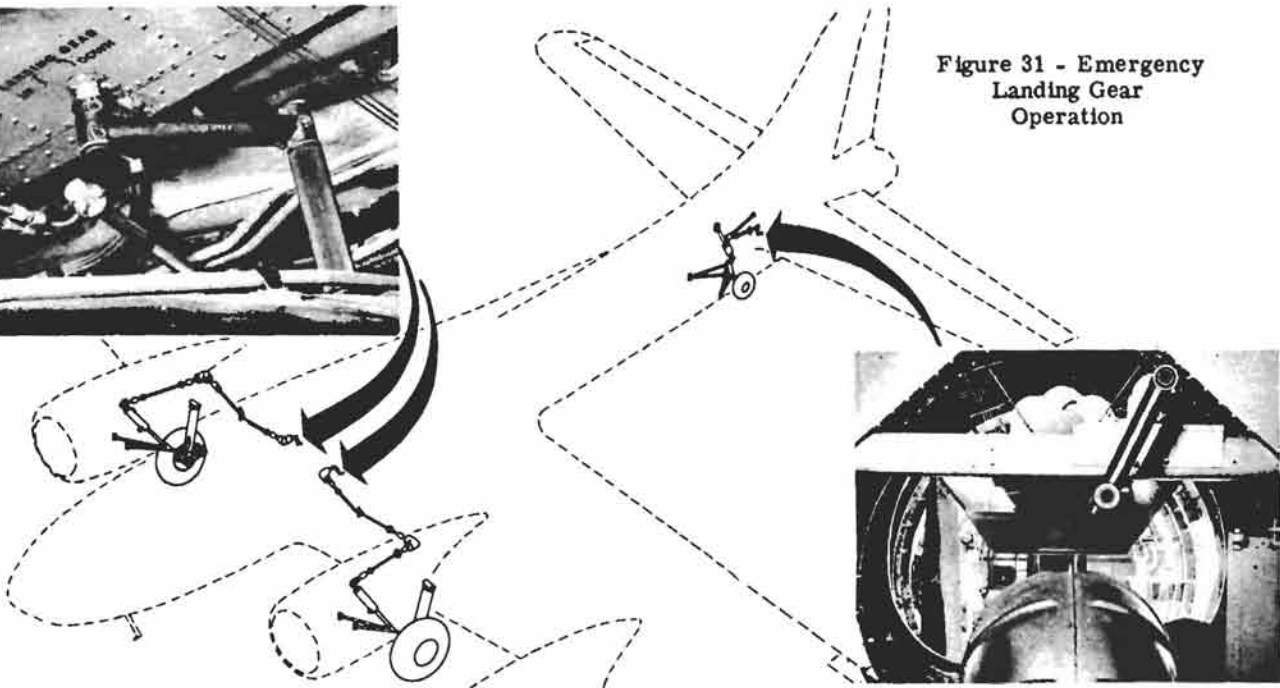


Figure 31 - Emergency Landing Gear Operation



## DANGER

Be sure the landing gear electric switch is "OFF" before you attempt hand cranking.

### 3. EMERGENCY OPERATION OF THE TAIL WHEEL.

The crank used for manual operation of the landing wheels is also used for manual operation of the tail wheel. Insert the crank into the connection in the tail wheel compartment and rotate as desired.

### 4. EMERGENCY OPERATION OF WING FLAPS.

Lift the camera pit door in the floor of the radio compartment and insert the hand crank into the torque connection at the forward end of the pit. Rotate the crank clockwise to lower the flaps and counterclockwise to raise them.

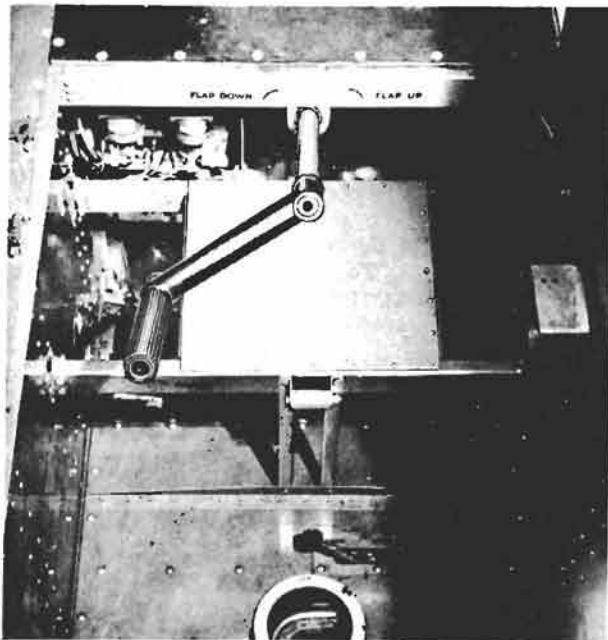


Figure 32 - Emergency Wing Flap Operation

### 5. EMERGENCY OPERATION OF BOMB BAY DOORS.

Insert the hand crank into the torque connection in the step at the forward end of the catwalk in the bomb bay and rotate clockwise to close the doors and counterclockwise to open them.

### 6. EMERGENCY BOMB RELEASE.

a. An emergency release handle is located at the pilot's left and another at the forward end of the catwalk in the bomb bay. Pull either handle through its full travel. The first portion of the stroke releases

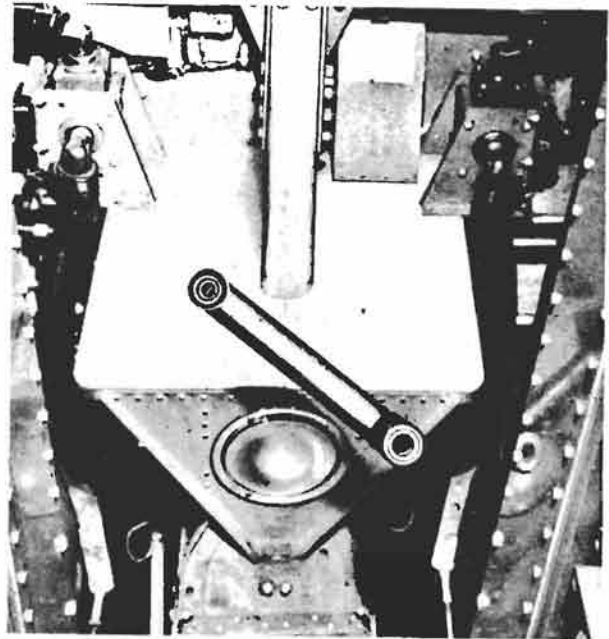


Figure 33 - Emergency Bomb Bay Door Operation

the bomb door latches, permitting the doors to open independently of the retracting screw, as shown in figure A. The latter portion of the stroke releases all external and internal bombs salvo and unarmed.

b. DOOR RETRACTION AFTER EMERGENCY RELEASE. - If the spring in the emergency release mechanism under the hinged door beneath the pilot's compartment floor has not entirely retrieved the linkage as shown in B, reset by pushing at the hinge of the link as shown in C. Operate the retracting screws electrically (or manually) to the fully extended position. This will engage the latches between the screws and door fittings as shown in D. The doors may now be retracted in the normal manner.

#### AT PILOT'S LEFT



#### IN BOMB BAY



Figure 34 - Emergency Bomb Release Handles

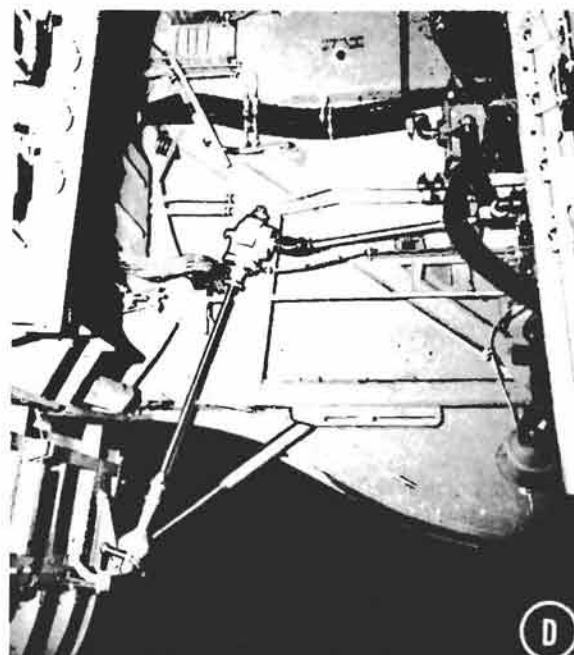
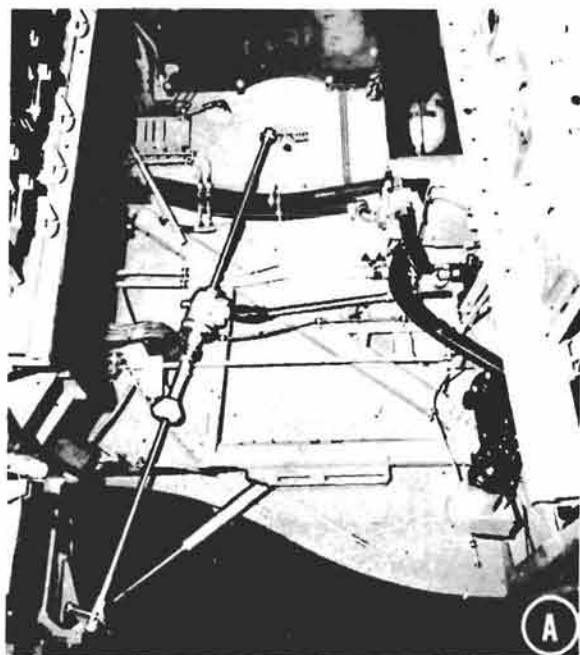
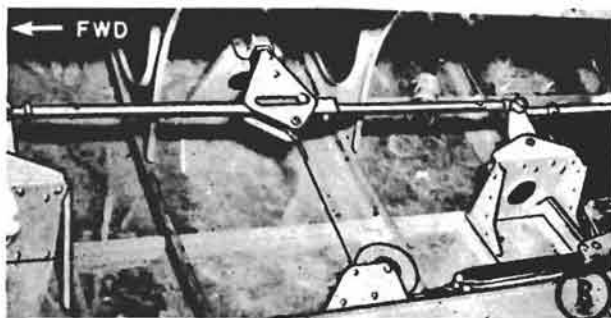


Figure 35 - Emergency Bomb Release Procedure

## 7. FIRE IN FLIGHT.

In case of engine or wing fires, open the emergency exits; signal stand by to abandon: one long ring (approximately 6 seconds). In case of a cabin fire, exits should NOT be open; signal stand by to abandon, exits closed: one long ring (approximately 6 seconds), and one short ring (approximately 2 seconds).

### a. FUSELAGE FIRES.

(1) Three carbon dioxide fire extinguishers are located, one on the aft bulkhead of the navigator's compartment, one on the right rear bulkhead of the pilots' compartment, and one on the forward face of bulkhead of the radio compartment.

(a) To use; stand close to fire, raise horn, and direct gas to base of fire, holding on to rubber-insulated tubing.

## WARNING

Do not grasp metal horn on top of cylinder. White discharge is "dry ice"; avoid frost bite.

(b) To shut off flow of gas, return horn to clip on side of cylinder. Extinguisher must be recharged after each use.

(2) Two carbon tetrachloride fire extinguishers are located one at the copilot's left, and one aft of the main entrance door.

(a) Stand as far as possible from the fire when using a carbon tetrachloride extinguisher; effective range is 20 to 30 feet.

(b) To operate, turn handle and pump plunger. Keep stream full and steady. To shut off, push handle in and turn until sealing plunger is depressed.



## WARNING

When sprayed on a fire, carbon tetrachloride produces phosgene, an extremely poisonous gas, which can be harmful even in small amounts; and if inhaled in excessive quantities may prove fatal. Do not use in a confined area and do not stand near fire. OPEN WINDOWS AND VENTILATORS immediately after fire is extinguished.

### b. ENGINE FIRES DURING FLIGHT.

#### (1) If caused by fuel or oil leakage:

(a) Close fuel shut-off valve of engine affected.

(b) Feather propeller immediately. This stops the pumping of oil to the flames, and should be done before so much oil is lost that the propeller cannot be feathered and additional damage is caused by wind-milling.

(c) Slow the air speed as much as possible.

(d) Close the cowl flaps.

(e) Pull CO<sub>2</sub> charge (if available).

## CAUTION

Leave propeller feathered. Do not attempt to restart engine while hot.

#### (2) Fire in exhaust due to overrich mixture:

(a) Move mixture control to lean.

(b) Attempt to blow out fire by engine run-up.

(c) Close cowl flaps.

(d) Close fuel shut-off valve to engine affected.

(e) Pull CO<sub>2</sub> charge (if available).

### 8. EMERGENCY BRAKE OPERATION.

The emergency system operates the brake only. Pressure is applied through two hand-operated metering valves on the pilots' compartment ceiling; the left lever controls the left wheel, and the right lever controls the right wheel. If it is impossible to rebuild the pressure in the service system, use of the following procedure is recommended:

a. Manual shut-off valve "CLOSED."

b. Selective check valve "NORMAL."

c. Check pressure in emergency accumulator: 650 to 800 pounds.

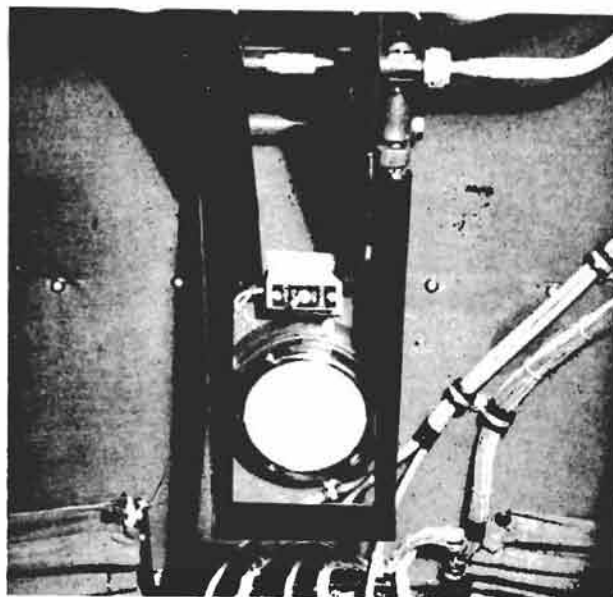


Figure 36 - Emergency Brake Handles

## CAUTION

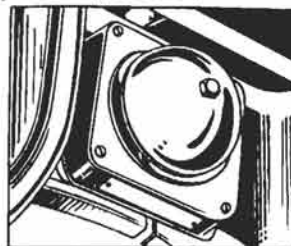
Do not attempt to raise the accumulator pressure with the hand pump.

d. Pilot: Operate throttle and rudder.

e. Copilot: Operate emergency brake control.

## WARNING

DO NOT "PUMP" EMERGENCY BRAKES. The pressure supply is limited and repeated applications may result in complete loss of emergency braking control.



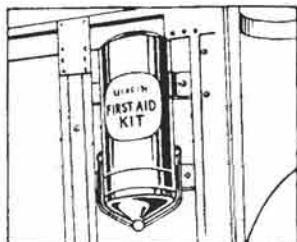
### 9. WARNING SIGNALS.

The pilot can communicate with the crew by means of the interphone system, phone call lamps, and the alarm bell system. For emergency purposes, the alarm bell should be used according to prearranged signals which are thoroughly understood by the crew. A toggle switch on the pilot's electrical control panel operates three bells located, one under the navigator's table, one on the wall above the radio operator's table, and one in the tail compartment above the tail wheel boot.



## 10. FIRST-AID KITS.

First-aid kits are located on the bomb-sight storage box in the navigator's compartment, on the wiring diagram box on the back of the copilot's seat, and on the bulkhead forward of the lower turret.



## 11. ABANDONING AIRPLANE IN FLIGHT.

**a. ESCAPE DOORS AND HATCHES.** - All doors and hatches are quickly releasable. The side gunner's windows slide forward to open. Bomb doors may be opened by either of two emergency release handles, one at the left of the pilot and the other at the forward end of the catwalk in the bomb bay.

### b. SIGNAL.

(1) Stand by to abandon: one long ring (approximately 6 seconds).

(2) Abandon airplane: three short rings (approximately 2 seconds each).

**c. SWITCHES.** - The situation will determine whether fuel and electrical systems should be turned off prior to abandoning the airplane. Under normal conditions outside of combat zones, the master ignition switch battery switches and fuel shut-off valve switches should be turned off.

## 12. CRASH LANDING.

### a. SIGNAL.

(1) Stand by for crash landing; by interphone.

(2) Abandon: four short rings (approximately 1/2 second each).

(3) Pilot should:

- Cut engines.
- Turn master switch "OFF."
- Turn battery switches "OFF."
- Turn fuel shut-off valve switches "OFF."

### b. EGRESS.

(1) All crew members will take proper stations, remove parachutes, and fasten safety belts upon receiving interphone warning.

(2) At the signal to abandon, all crew members will leave the plane through the most practicable exit. (See figure 37.)

(3) In addition to the seven standard exits, the two side windows in the pilot's compartment are possible exits.

(4) In case some of the exits are blocked by fire, damage, or congestion, it may be best to make exit through a rupture in the fuselage, if any have occurred. Caution is required in this process to avoid fatal cuts from metal or broken glass.

(5) If there is imminent danger of fire, all personnel should disperse at least 50 feet from the airplane.

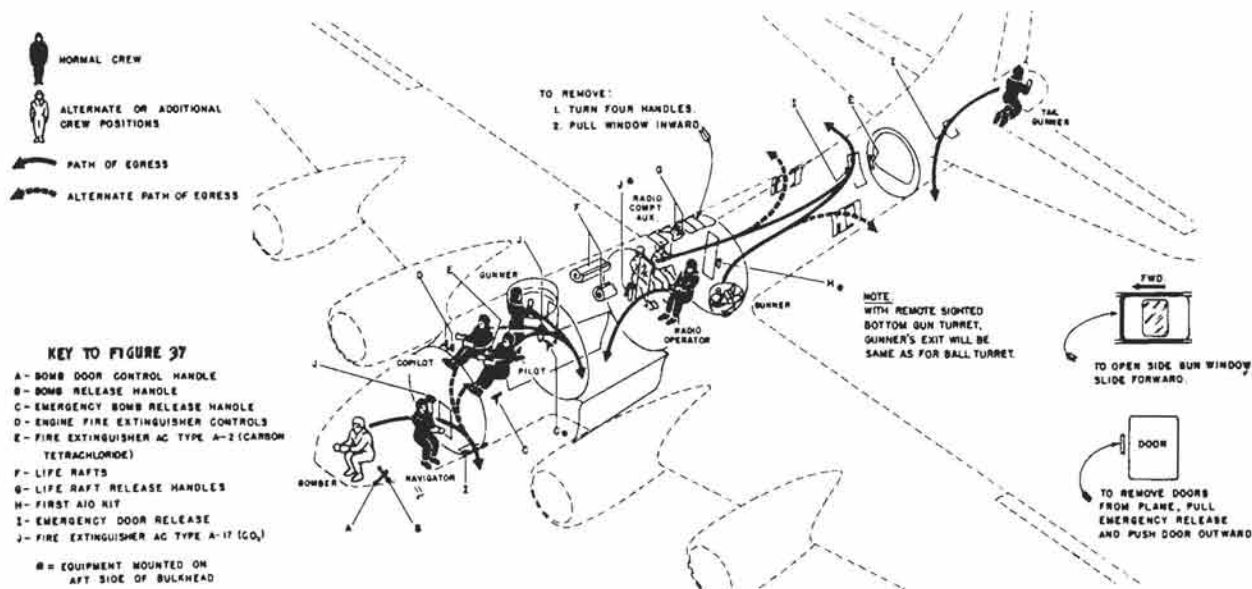
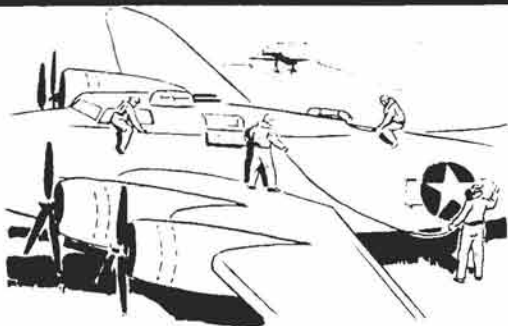


Figure 37 - Emergency Escape Routes

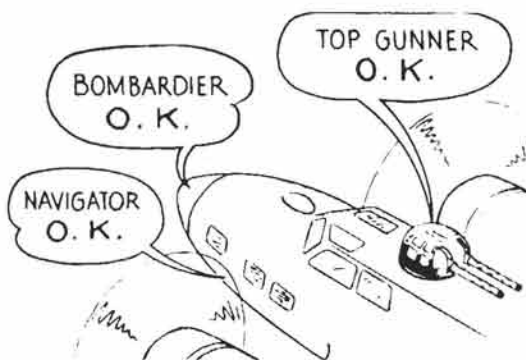
### 13. FORCED DESCENT AT SEA

1



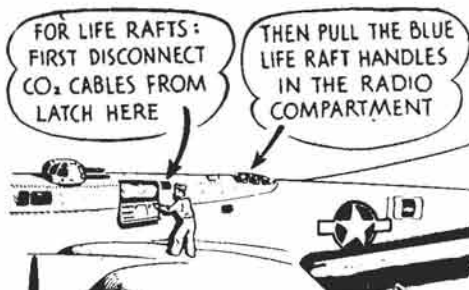
As complete evacuation of the airplane should not take over 30 seconds, preflight practice drills should be participated in by all crews who are to make a flight over water, or whose operations are generally over water.

4



Each crew member will acknowledge the command over the interphone.

2



A complete and careful inspection of emergency equipment should be made before each long over water flight. Check life rafts, emergency kit bags (provisions), and emergency radio equipment. The kit bags and radio are stored aft of the radio compartment.

5



The bombardier after acknowledging the command, will jettison bombs, or bomb bay tanks if more than half full, and close the bomb bay doors. If there is not sufficient time to release the bombs and close the bomb bay doors, ascertain that the bombs are "SAFE" and leave the doors closed.

3



When it becomes evident that the airplane is to be forced down at sea due to lack of fuel, or that an altitude of at least 1,000 feet cannot be maintained, the pilot gives warning over the interphone.

#### WARNING!

This command must, if possible, be given while the fuel supply is still sufficient for 15 minutes of flight. The chances for a successful landing are much greater, if power is used.

6



The navigator will determine the position and inform both the pilot and the radio operator. He will take with him the instruments necessary to make simple computation while on life rafts.

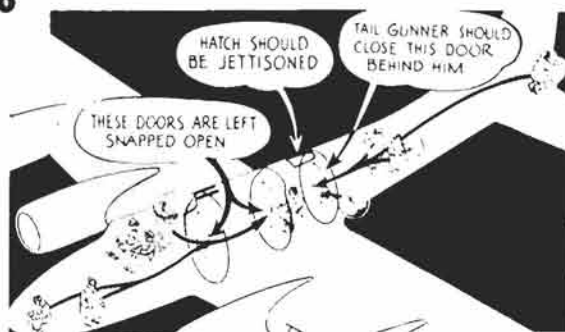
## FORCED DESCENT AT SEA

7



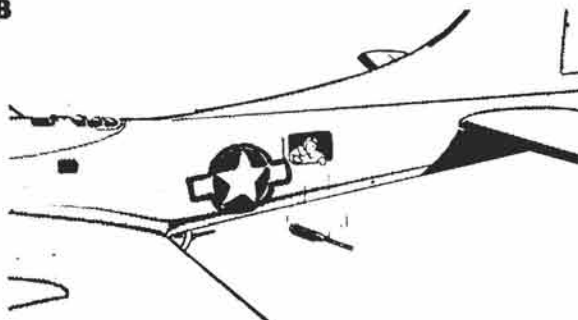
The radio operator will jettison the hatch cover. Then, when directed by the pilot, he will send an appropriate distress signal and position. After completing this duty, he will bring the emergency radio set into the radio compartment.

10



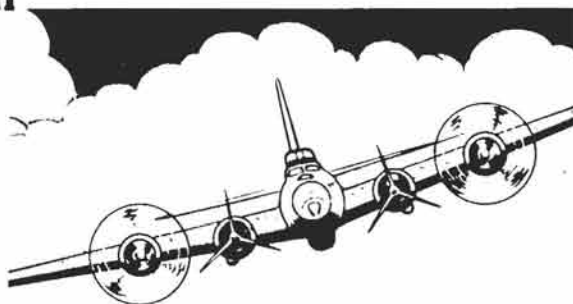
After completing his individual duties, each member goes to the radio compartment which is the crash station for all but the pilot and copilot.

8



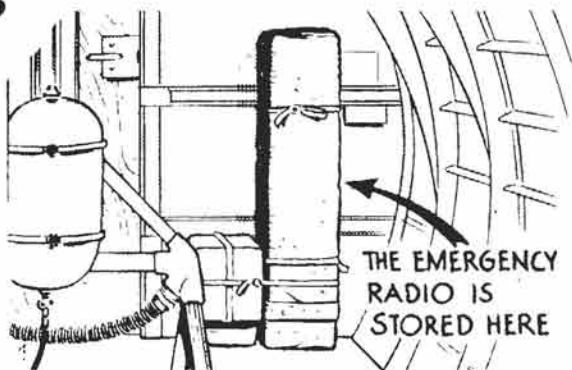
The side gunners will jettison the side guns as they make very dangerous battering rams. If there are no side gunners, this duty should be given to other crew members before flight.

11



The pilot will direct the copilot to cut the two inboard engines, if the two outboard engines are functioning satisfactorily, and to feather their propellers.

9



A crew member appointed before flight will take the emergency kit bags to the radio compartment.

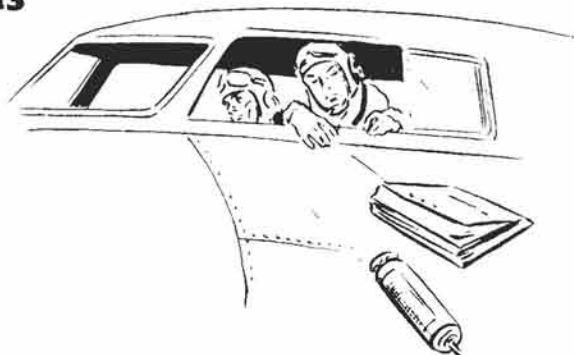
12



Both the pilot and the copilot will strap themselves in their seats. If the side windows are to be used as exits, slide windows open, then close, insuring freedom of operation. Leave them closed until after the impact. **CAUTION!** Place axe handy in event of jamming.

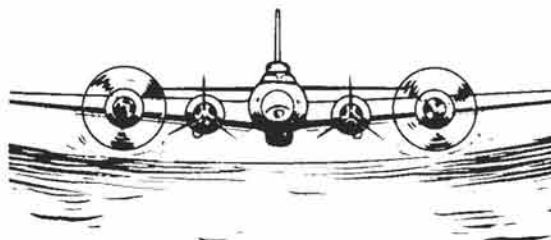
## FORCED DESCENT AT SEA

13



Be sure all emergency equipment is in the radio compartment. Throw overboard any equipment that might come loose.

16



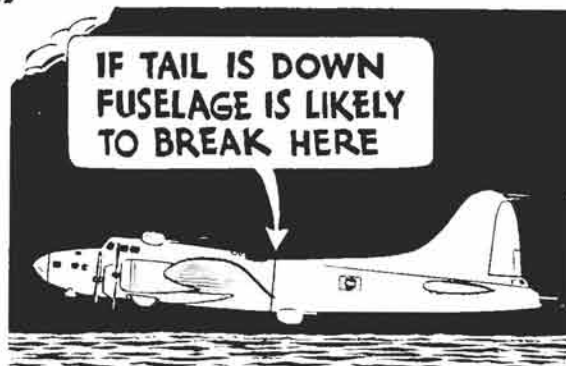
The pilot should attempt to set the airplane down in a trough, which is usually cross wind. The two out-board engines are used for control and to flatten the approach. The landing gear should be up, the flaps lowered medium, and the ignition switches cut a foot or so above the water.

14



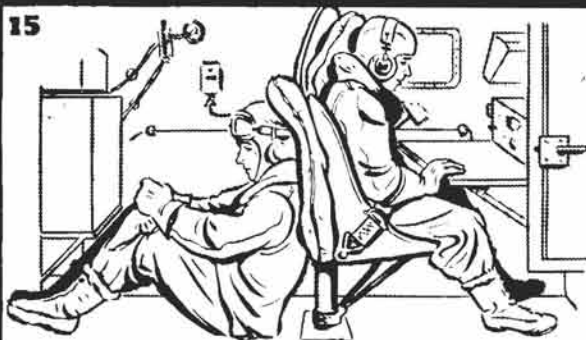
Remove cushions from seats for head protection and take crash positions. Do not take a position in the center of the compartment as ball turret upper structure makes this unsafe. Brace head against solid structure, if possible. Do not leave these positions until plane has come to rest as there will probably be more than one shock.

17



The water should be touched at about 90 mph. Come in as level as possible.

15



All members should have life vests on, parachutes removed, and should have on all extra clothing to be worn on rafts. At night, turn off all bright internal lights and use only the amber lamps.

18



As soon as the airplane has come to rest the predesignated member will pull the life raft handles.

## FORCED DESCENT AT SEA

19



During preflight drill, men should be assigned to evacuation duties. Each man should be familiar with these so that in case of accident alternate men can carry on. Each man should know his order.

22



### WARNING!

Do not jump on an inverted raft, as this will expel the air trapped under it and righting becomes more difficult.

20



Pilot and copilot will exit through their side windows or through the radio compartment hatch. Decide which before flight.

### CAUTION!

No crew member should inflate his life vest until he has emerged from the airplane.

23



The rafts should be fastened together so they will not drift apart. Once aboard the rafts a check should be made to locate leaks. Repair them with the kit provided in the raft. Keep away from the airplane, if it floats but stay in the vicinity if possible. Do not remove wet clothing. Do not talk more than necessary; it dries the mouth. Do not move more than necessary; it takes energy.

21



If the life raft is inflated upside down, one man should jump into the water and right it. If there are handling patches on bottom of raft, grasp them with both hands, and with knees on buoyancy chamber, lean back and prepare to be submerged for a moment. Even the largest raft will turn over.

24



A signal kit containing a pistol and flares is in a waterproof sealed pocket of the life raft. It may be advisable to leave the kit sealed in the pocket until a ship or a plane is sighted so as to have dry signal equipment.



#### 14. EMERGENCY OPERATION OF RADIO EQUIPMENT.

##### a. PORTABLE EMERGENCY RADIO TRANSMITTER (Type SCR-578-A).

###### (1) GENERAL.

(a) A complete self-contained portable emergency transmitter is stowed on the right rear side of bulkhead 6, and is provided for operation anywhere away from the airplane. It is primarily designed for use in a small boat or life raft, but it may be placed in operation anywhere a kite can be flown or where water may be found.

(b) When operated, the transmitter emits an MCW signal and is pretuned to the international distress frequency of 500 kilocycles. Automatic transmission of a predetermined signal is provided. Any searching party can "home" on the signal with the aid of a radio compass.

(c) No receiver is provided.

###### (2) REMOVAL FROM AIRPLANE.

(a) If the airplane has made an emergency landing on water, the emergency set should be removed at the same time that the life raft is removed. The set is waterproof and will float, and it is not necessary to take any precautions in keeping the equipment out of the water; however, be sure that it does not float out of reach.

(b) The emergency set may be dropped from the airplane by use of the parachute attached. The altitude of the airplane when dropping the equipment should be between 300 and 500 feet. To drop the equipment, the following steps should be observed:

1. Tie the loose end of the parachute static line to any solid metal structure of the airplane.

###### CAUTION

Be sure that the static line is in the clear and will not foul.

2. Throw the emergency set out through a convenient opening in the airplane. Parachute will be opened by the static line.

###### CAUTION

Do not attach static line to any part of one's clothing or body when throwing the equipment through the opening.

(3) OPERATION. - Complete operating instructions are contained in one of the bags which contain the equipment. Complete instructions for the use of the transmitter are also located on the transmitter itself.

b. INTERPHONE EQUIPMENT FAILURE. - In the event of interphone equipment failure, the audio frequency section of the command transmitter may be substituted for the regular interphone amplifier. To make this connection, the pilot should place his command transmitter control box channel selector switch in either channel No. 3 or 4 position. Set the interphone jack-box selector switch on the "COMMAND" to place the interphone equipment in operation.

###### NOTE

When the command transmitter control box channel selector switch is set in either the No. 3 or 4 position for emergency operation of the interphone equipment, it is not possible to establish communication with any station or any other airplane. It is possible at all times to resume normal command set operation by placing the channel selector switch of the command transmitter control box in either the No. 1 or 2 position.

c. SUBSTITUTION OF RADIO COMPASS RECEIVER FOR LOW FREQUENCY COMMAND SET RECEIVER. - If the low frequency receiver of the command set fails, the radio compass receiver may be substituted, with the pilot having direct control over the compass receiver. To complete this emergency hook-up, the pilot must set his interphone jack-box selector switch in the "COMP" position and then place the radio compass selector switch in the "ANT" position. The radio compass can then be tuned as desired.

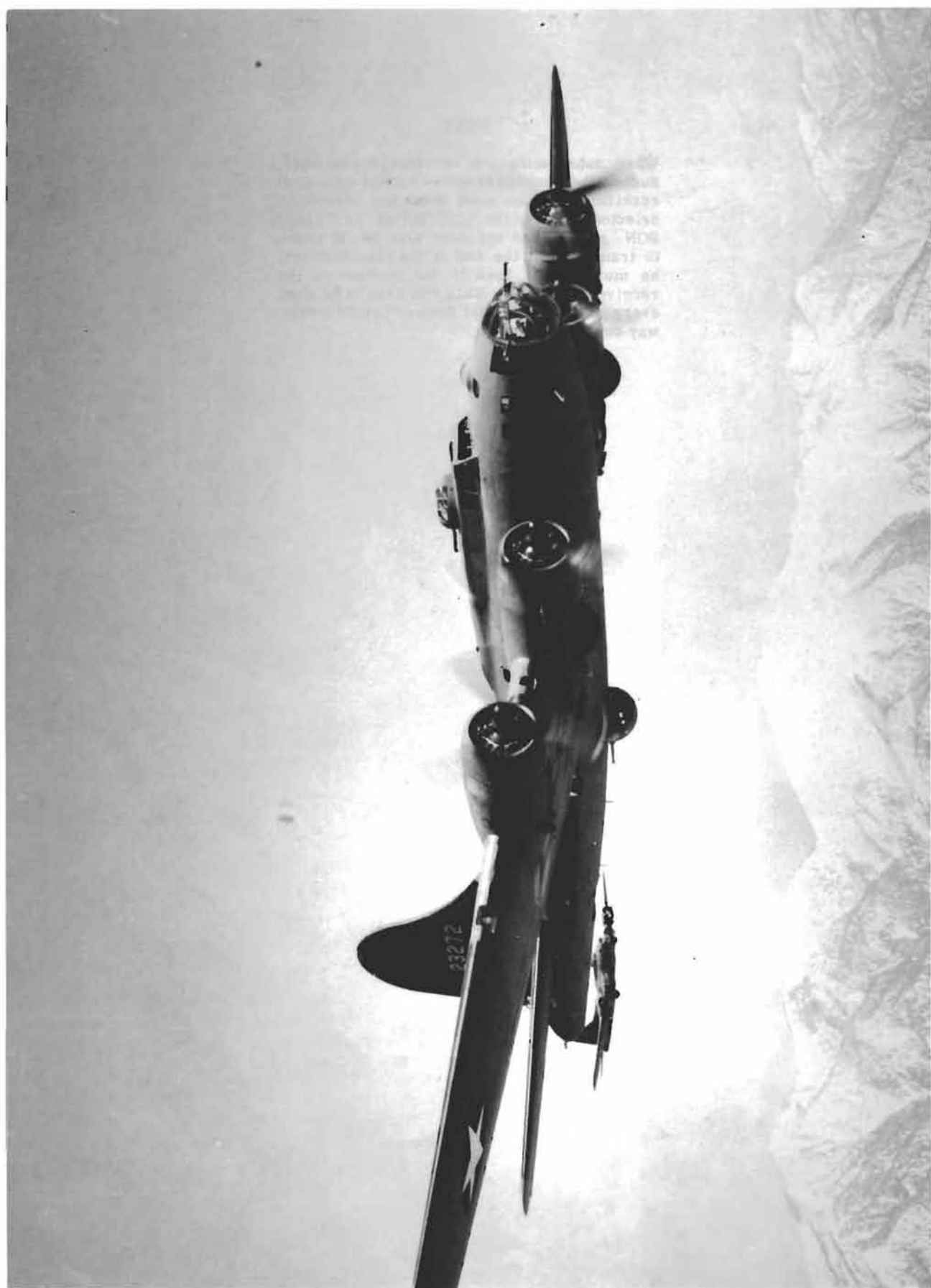
d. SUBSTITUTION OF LIAISON RECEIVER FOR LOW, MEDIUM, AND/OR HIGH FREQUENCY COMMAND RECEIVER. - In case of the failure of the low, medium, and/or high frequency receiver of the command radio equipment, the liaison receiver may be substituted, but the pilot will have only limited control over it. The pilot should first call the radio operator on the interphone system and tell him what frequency he desires to receive, that he is switching the interphone selector switch to the "LIAISON" position, and for him (the radio operator) to tune in this frequency and maintain the setting until further advised.

e. COMMAND SET TRANSMITTER FAILURE. - In case of failure of the command set transmitter, the liaison transmitter may be substituted. The pilot should first call the radio operator on the interphone and have him adjust the liaison transmitter to the frequency he desires to use. He should then set his interphone selector switch to the "LIAISON" position and operate his microphone button in the same manner that he did when the command set was in operation. When he is through using the liaison transmitter, the pilot should place the interphone selector switch in the "INTER" position and tell the radio operator to cut the liaison transmitter off, so as to reduce the load on the electrical system.

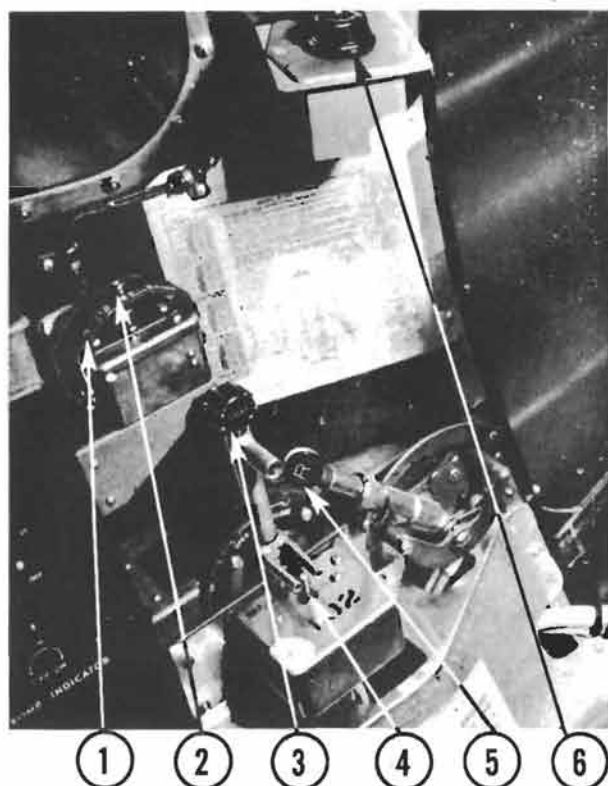
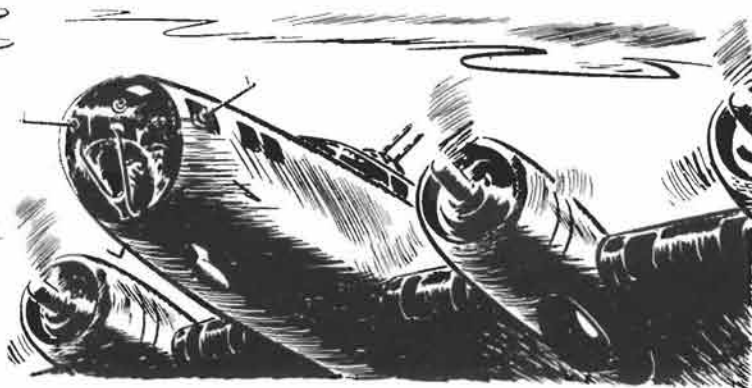
#### NOTE

When substituting one receiver for another, such as the compass receiver for the command receiver, the pilot must move his interphone selector switch to the "COMMAND" or "LIAISON" position, as the case may be, in order to transmit. At the end of the transmission, he must switch back to the position of the receiver being used. This will have to be done every time that the pilot desires to hold a two-way conversation.





## SECTION IV BOMBARDIER'S COMPARTMENT



KEY TO FIGURE 38

1. BOMB RELEASE SWITCH GUARD
2. BOMB RELEASE SWITCH
3. BOMB DOOR CONTROL HANDLE
4. BOMB DOOR SWITCH
5. BOMB RELEASE HANDLE
6. BOMBARDIER'S LIGHT SWITCH

Figure 38 - Bomb Controls

### 1. BOMB CONTROLS.

a. Bombs are normally released electrically, but can be released mechanically in an emergency. Electrical control provides for individual release of bombs either singly (selective) or continuously at predetermined intervals (train). Mechanical control is always in "SALVO," by operation of the bombardier's release handle or by operation of the emergency release handles. The bomb release handle has three positions.

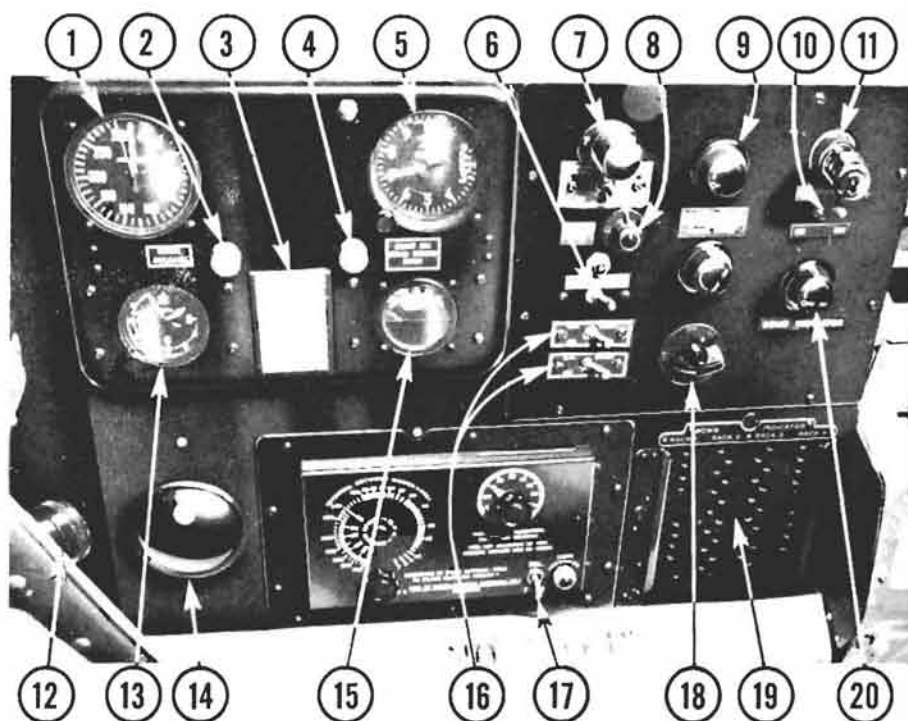
(1) In the "LOCK" position the bomb racks are locked against any release of bombs except by means of the emergency release handles.

(2) In the "SELECTIVE" position the bomb racks are prepared for electrical release by manual operation of the release switch, or by automatic operation through the bomb sight.

(3) The "SALVO" position, when the bomb doors are open, mechanically releases all bombs simultaneously and unarmed.

b. The bombardier's release switch, mounted on the forward end of the control panel, operates in either direction to energize the release unit solenoids through the interval release control mechanism. A hinged guard prevents accidental operation of this switch.

c. The interval release control unit is mounted at the bottom of the bombardier's control panel and may be set to provide either "SELECT" or "TRAIN" release. On airplanes serial Nos. 42-5050 and on, four switches on the bombardier's control panel permit selection of any external or internal rack for electrical release. Two indicator lamps beside the rack selector switches correspond to the external racks. Two additional rack selector switches in the bomb bay permit elimination of either right or left bomb bay from the release circuit if bomb bay fuel tanks are carried. Bomb release sequence is given in figure 40. Any rack or combination of racks may be eliminated from the release sequence by turning off



KEY TO FIGURE 39

- |                               |                            |                                 |                            |
|-------------------------------|----------------------------|---------------------------------|----------------------------|
| 1. AIR SPEED INDICATOR        | 6. PILOT CALL SWITCH       | 12. ULTRA-VIOLET SPOT LIGHT     | 17. BOMB INTERVAL SWITCH   |
| 2. BOMB RELEASE WARNING LAMP  | 7. PANEL LIGHT             | 13. CLOCK                       | 18. ULTRA-VIOLET SPOTLIGHT |
| 3. ALTIMETER SCALE ERROR CARD | 8. PHONE CALL LAMP         | 14. ASH RECEIVER                | 19. BOMB INDICATOR         |
| 4. BOMB DOOR WARNING LAMP     | 9. WARNING LAMP RHEOSTAT   | 15. FREE AIR THERMOMETER        | 20. BOMB INDICATOR CONTROL |
| 5. ALTIMETER                  | 10. EXTENSION LIGHT SWITCH | 16. BOMB RACK SELECTOR SWITCHES | KNOB                       |
|                               | 11. EXTENSION LIGHT        |                                 |                            |

Figure 39 - Bombardier's Control Panel

the respective selector switch on the bombardier's control panel.

d. A bomb arming solenoid in each external rack is controlled by a switch on the bombardier's panel. A red indicator lamp beside the switch is on when the bombs are armed.

#### NOTE

Some B-17F airplanes not equipped for external racks have only two rack selector switches and no bomb arming switch on the bombardier's panel. A few airplanes have no rack selector switches on the bombardier's panel but have a three-position switch in the bomb bay to turn off either internal rack.

e. The bomb door control handle is at the left of the bombardier, forward of the control panel, and operates a double-throw toggle switch controlling the solenoid switches for the bomb door retracting motor. A lug on the side of the handle is located so that when the door handle is in the "CLOSED" position, the bomb release lever cannot be moved out of the "LOCK" position.

#### CAUTION

If bombs are carried above the 2000-pound bomb, they **MUST NOT** be released until the D-6 shackle and adapter have been removed. This definitely requires "SELECTIVE" release control for the 2000-pound bomb.