Pilot Training Manual for the Mitchell Bomber

B-25

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Foreword

This manual is the text for your training as a B-25 pilot and airplane commander.

The Air Forces' most experienced training and supervisory personnel have collaborated to make it a complete exposition of what your pilot duties are, how each will be performed, and why it must be performed in the manner prescribed.

The techniques and procedures described in this book are standard and mandatory. In this respect the manual serves the dual purpose of a training checklist and working handbook. Use it to make sure that you learn everything described herein. Use it to study and review the essential facts concerning everything taught. Such additional self-study and review will not only advance your training, but will alleviate the burden of your already overburdened instructors.

This training manual does not replace the Technical Orders for the airplane, which will always be your primary source of information concerning the B-25 so long as you fly it. This is essentially the textbook of the B-25. Used properly, it will enable you to utilize the pertinent Technical Orders to even greater advantage.

H. H. Arnold

GENERAL, U.S. ARMY,
COMMANDING GENERAL,
ARMY AIR FORCES

HISTORY OF THE MITCHELL BOMBER B-25

Welcome to the Mitchell bomber!

You are going to fly a champ with a long line of firsts to her credit!

First to see action on every fighting front.

First Army airplane to sink an enemy sub.

First medium bomber to fly from a carrier deck.

First warplane to pack a 75-mm. cannon.

It all started when the Army asked for designs of a medium bomber to be submitted. That was on 25 January, 1939. Forty days later the B-25 was born!

Daughter of a slide rule, with neither wind-tunnel tests nor prototypes to study, the performance of the B-25 was a series of figures on an engineer's drawing board.

Yet, 19 days after Hitler marched into Poland, in September, 1939, the Army awarded the North American Aviation Company a contract for 148 Mitchell bombers, one of the largest orders written up to that time.

In less than 2 months, following a number of modifications, the mock-up was approved. Exhaustive tests by Army engineers followed, and in August, 1940, the first B-25 was test-flown and its performance found to be better than the claims its designers had made for it.

Since that time, hundreds of changes in design have been made, but the general appearance of all models of the B-25 has not changed.

Designed to carry a bomb load of 3500 lb. and a crew of 5, it has operated efficiently with heavier bomb loads and a crew of 6. Early in the war, when it was engaged in emergency evacuation work, the B-25 carried 26 men and their baggage a distance of 700 miles. On one occasion it carried 32 men and their baggage with auxiliary and main fuel cells full.

Red-lined at 340 mph, cruising easily at 200 mph, the Mitchell, when emergencies have arisen, has exceeded 340 mph, with no disastrous effects.

Its low landing speed has been a boon to flyers who have had to operate from jungle strips and airfields blasted from mountain sides.

Combat experience led to changes in design and armament – more firepower, spare fuel tanks, power-driven turrets, and larger escape hatches, which were added to meet the need for quick exit from a damaged plane.

In April, 1942, the Mitchell made history. Under the leadership of Brigadier General Ralph Royce and Colonel John Davies, 13 B-25's set out from an unidentified base for the island of Mindanao, 2000 miles away. On this, the longest bombing expedition in the history of aerial warfare, the planes flew 2000 miles to a secret base where a store of gasoline was hidden. For 2 days they hit the Japs who were advancing on Bataan, then headed for home without loss.

Less than a week later came the Doolittle raid on Tokyo, with 16 B-25's taking off from the deck of the aircraft carrier Hornet. It can now be told that the tail guns in the B-25's on that raid were painted broomsticks which Major General Doolittle ordered installed after learning that Jap pilots had been ordered to stay out of range of the American tail-stingers.

During the early days of the submarine menace, B-25's were equipped with special wing bomb racks, operating successfully in the submarine hunt and again proving their versatility and capacity for modification.

Arctic operation meant new problems in heating and defrosting for the B-25. They were overcome. Long over-water hops, with hours of precision instrument flying, brought the installation of the automatic pilot, taking the strain off our flyers. For action against the Jap navy, torpedo racks were installed. A multitude of combat problems found the B-25 ready for adaptation to meet them, its most recent and spectacular adaptation being the installation of the 75-mm. cannon in the B-25 G and B-25 H.

The use of the B-25 as a low-altitude attack plane led to the removal of the lower turret. It was replaced by .50-cal. waist guns and a power-operated tail turret. For more effective defense, the upper turret was moved forward.

Package guns—two .50-cal. mounted on each side of the fuselage and firing forward—plus four .50-cal. installed in the nose above the cannon, have transformed the B-25 into a flying machine-gun company, superbly effective for strafing.

The evolution of the Mitchell bomber does not end here. Every day, as experience mounts and new tactics develop, the B-25 proves its versatility, ready to run with the hare or hunt with the hounds—an airplane of which its pilots may well say: It does the job!

DUTIES AND RESPONSIBILITIES OF THE *Airplane Commander*

The commander of the B-25 must be more than a pilot. As his title implies, he must be a leader of men—a leader in a special sense. He must not train his crew as automatons, but as a team which will use initiative and perform its tasks to one end only . . . the success of the mission.

You are the leader. The successful coordination of the work involved in getting your plane to its objective and back to its base depends a great deal on the way in which you lead.

When you are thoroughly familiar with the jobs the members of your crew are doing, you've won half the battle of being the commander of your airplane.

The second half of the battle consists in knowing your men as individuals as well as members of the crew. Do you know where your tail gunner was born? Is your crew chief married? What work was your navigator doing before he got in the Army? How does your bombardier like his job on the B-25?

Naturally, you don't ask these questions of your crew as if you were a desk sergeant at the night court. If you're going about things the right way, you may never have to ask. Your men will volunteer the information. Men always talk about themselves when they're fairly sure their listener is really interested.

They'll know whether you're interested if you look out for their comfort on flights and between flights. If you're away from base overnight, you may find it necessary to finance one crew member or another. Be sure that every crew member is properly fed, quartered, and clothed. The manner in which you take care of their needs will make or mar your reputation with your crew.

You need a lot of tact in handling these things. Your best rule of thumb for getting to know and take care of your crew should go something like this: "Is my interest in the crew getting the best out of them for the teamwork I need to fly my plane?" But be sure you don't overdo it. Your tail gunner isn't going to be too happy if you tell him that his crap-shooting is blistering his trigger finger. But you're not overdoing it if you pull a plate of gas-forming food out from under his hungry eyes just before a high-altitude mission.

Crew Discipline

Discipline in an air crew means that you are commanding respect and getting your orders obeyed. It also means that a lot of the time you're not finding it necessary to give orders at all. Your crew members are performing their duties without having to be told.

A good way to develop the jitters about your plane and your crew is by keeping them at a distance, talking to them pompously, and by showing favoritism or uncertainty in your decisions.

In a little while you'll find yourself working on one side of a 10-foot wall while your crew works on the other.

On the other hand, you won't get discipline by dropping all distinctions between commander and crew and letting the waist gunner call you Joe.

Somewhere between these two methods there is a happy medium which will insure that any order you give will bring instant obedience and maintain respect and mutual confidence.

You can be friendly without becoming familiar, understanding without becoming a father-confessor, and firm without emulating Simon Legree. Give direct orders only when there is a need for orders. Once you issue an order, **see that it is always obeyed.**

Ready for Action

Are your guns working? The only way you can be sure is to know how competent and reliable your gunners are. It is disastrous to get caught by a swarm of enemy fighters and find that your guns won't function.

What about your navigator? Does he know his job well enough to get you over that pinpoint target a thousand miles from any visible fix?

Is your bombardier sure that his equipment is in perfect condition? Has he remembered to warm up his bombsight to prevent fogging at the critical moment?

You can't know the precise answers to all the questions involved in having your plane ready for action—but you can know most of the important questions. Learn enough about every man's job so that you can ask the right questions, and you'll find that your crew will be there with the right answers at the right time.

PRACTICAL *Questions*

1. Can all members of your crew fly at high altitudes without discomfort or physical handicap?
2. Does any member of your crew get airsick?
3. Can the copilot take over in emergency?
4. Does the radio operator understand D.F. aids?
5. Do the gunners know how to unload and stow their guns?
6. Do the engineer and the copilot (and do you) know how to use the load adjuster and how to load the airplane properly?
7. Do the engineer and copilot (and do you) use the control charts to check your power settings and the efficient performance of your airplane?
8. Does your crew know emergency procedure and signals?
9. Is each member of your crew properly equipped?
10. What can you do to prevent or relieve anoxia, air sickness, and fatigue?
11. Is your crew familiar with first-aid treatment?
12. Can you improve the morale of your crew?

These are some of the practical questions which you as airplane commander must be able to answer.

THE COPILOT

The copilot is the executive officer—your chief assistant, understudy, and strong right arm. He must be familiar enough with every one of your duties—both as pilot and as airplane commander—to take over and act in your place at any time.

He must be able to fly the airplane under all conditions as well as you would fly it yourself.

He must be proficient in engine operation and know instinctively what to do to keep the airplane flying smoothly, even though he is not handling the controls.

He must have a thorough knowledge of cruising control data and know how to apply his knowledge at the proper time.

He is also the engineering officer aboard the airplane, and maintains a complete log of performance data.

He must be able to fly good formation in any assigned position, day or night.

He must be qualified to navigate by day or at night by pilotage, dead reckoning, and by use of radio aids.

He must be proficient in the operation of all radio equipment in the pilot's compartment.

In formation flying, he must be able to make engine adjustments almost automatically.

He must be prepared to assist on instruments when the formation is climbing through an overcast, so you can watch the rest of the formation.

Remember that the more proficient your copilot is **as a pilot**, the better able he is to perform the duties of the vital post he holds as your second in command.

Be sure that he is always allowed to do his share of the flying, in the copilot's seat, on take-offs, landings, and on instruments.

Bear in mind that the pilot in the right-hand seat of your airplane is preparing himself for an airplane commander's post too. Allow him every chance to develop his ability and to profit by your experience.

THE BOMBARDIER-NAVIGATOR

As a navigator it is the bombardier-navigator's job to direct your flight from departure to destination and return. He must know the exact position of the airplane at all times. For you to understand how to get the most reliable service from your navigator, you must know as much about his job as possible.

Navigation is the art of determining geographic positions by means of (a) pilotage, (b) dead reckoning, (c) radio, or (d) celestial navigation, or any combination of these four methods. By any one or combination of methods the navigator determines the position of the airplane in relation to the earth.

Instrument Calibration

Instrument calibration is an important duty of the navigator. All navigation depends directly on the accuracy of his instruments. Correct

RADIO OPERATOR

There is a lot of radio equipment in today's B-25's. There is one particular man who is supposed to know all there is to know about this equipment. Sometimes he does, but often he doesn't. His deficiencies often do not become apparent until the crew is in the combat zone when it is too late. Too often pilots and crews lose their lives because the radio operator has accepted his responsibility indifferently.

It is impossible to learn radio in a day. It is imperative that you check your radio operator's ability to handle his job before taking him overseas as part of your crew. To do this you may have to check with the various instructors to find out any weakness in the radio operator's training and proficiency and to help overcome such weaknesses.

The radio operator is required to:

1. Render position reports every 30 minutes.
2. Assist the navigator in taking fixes.
3. Keep the liaison and command sets properly tuned and in good operating order.
4. Understand from an operational point of view:
   (a) Instrument Landing
   (b) IFF
   (c) VHF
   and other navigational aids.
5. Maintain a log.

In addition to being radio operator, the radio man is also a gunner. During combat he leaves his watch at the radio and takes up his guns. He often has to learn photography. Some of the best pictures taken in the Southwest Pacific were taken by radio operators.

THE ENGINEER

Size up the man who is to be your engineer. This man should know more about the airplane you are to fly than any other member of the crew. If there are deficiencies in his training you may be able to fill them in.

Think back on your own training. In many courses of instruction, you had a lot of things thrown at you from right and left. You had to concentrate on how to fly; where your equipment was concerned, you learned to rely more and more on the enlisted men, particularly the crew chief and the engineer, for advice.

Pilot and engineer must work closely together to supplement and fill in the blank spaces in each other's education.

To be a qualified combat engineer, a man must know his airplane, his engines, and his armament equipment thoroughly.

He must work closely with the copilot, checking engine operation, fuel consumption, and the operation of all equipment.

He must be able to work with the bombardier, and know how to cock, lock, and load the bomb racks. It is up to you to see that he is familiar with these duties and, if he is hazy concerning them, to have the bombardier give him special help and instruction.

He should have a general knowledge of radio equipment, and be able to assist in tuning transmitters and receivers.

Your engineer should be your chief source of information about the airplane. He should know more about the equipment than any other member of the crew—yourself included.

You, in turn, are his source of information about flying. Bear this in mind in all your discussions with the engineer. The more complete you can make his knowledge of the reasons behind every function of the equipment, the more valuable he will be as a member of the crew. Someday his extra knowledge may save the day in an emergency.

Generally, in emergencies, the engineer is the man to whom you turn first. Build up his pride, his confidence, his knowledge. Know him personally; check on the extent of his knowledge. Make him a man upon whom you can rely.

THE GUNNERS

Your gunners belong to one of two distinct categories: turret gunners and flexible gunners.

The power turret gunners must have good coordination.

While the flexible gunners do not require the same delicate touch as the turret gunner, they must have a fine sense of timing.

All gunners should be familiar with the coverage area of all gun positions, and be prepared to bring the proper gun to bear on the target.

They must be experts in aircraft identification.

They must be thoroughly familiar with the machine guns. They should know how to maintain the guns, how to clear jams and stoppages, and how to harmonize the sights with the guns.

During training flights, the gunners should be in their turrets, tracking with the guns even when actual firing is not practicable. Other aircraft flying in the vicinity offer excellent tracking targets, as do automobiles, houses, and other ground objects during low-altitude flights.

Keep your gunners' interest alive at all times. Any form of competition among the gunners themselves should stimulate their interest.

Finally, each gunner should fire the guns at each station to familiarize himself with the other positions.

Rules to Be Enforced on Every Flight

Smoking

1. No smoking in airplane at an altitude below 1000 feet.
2. No smoking during fuel transfer.
3. Never attempt to throw a lighted cigarette from the airplane. Put it out first.

Parachutes

1. All persons aboard will wear parachute harness at all times from takeoff to landing.
2. Each person aboard will have a parachute on every flight.
3. Carry at least one spare parachute in the plane.

Propellers

1. Always enter and leave the plane to and from the rear.
2. No person will leave the airplane when propellers are turning unless ordered to do so by the airplane commander.

Oxygen Masks

1. Oxygen masks will be carried on all flights where altitude **may** exceed 10,000 feet.
2. Day: All persons will use oxygen starting at 7000 to 10,000 feet on all day flights where altitude at any time may exceed 12,000 feet.
3. Use oxygen for all flights at 8000 ft. or above when the duration of the flight may exceed 4 hours.
4. Night: All persons will use oxygen from the ground up on all flights during which altitude may reach 10,000 feet.

Training

1. Tell your crew the purpose of each mission and what you expect each to accomplish.
2. **Keep the crew busy throughout the flight.** Get position reports from the navigator; send them out through the radio operator. Put the engineer to work on the cruise control and maximum range charts. Require the copilot to keep a record of engine performance. Give them a workout. Encourage them to use their skill. A team is an active outfit. Make the most of every practice mission.
3. **Practice all emergency procedures as often as possible—bailout, ditching and fire drill.**

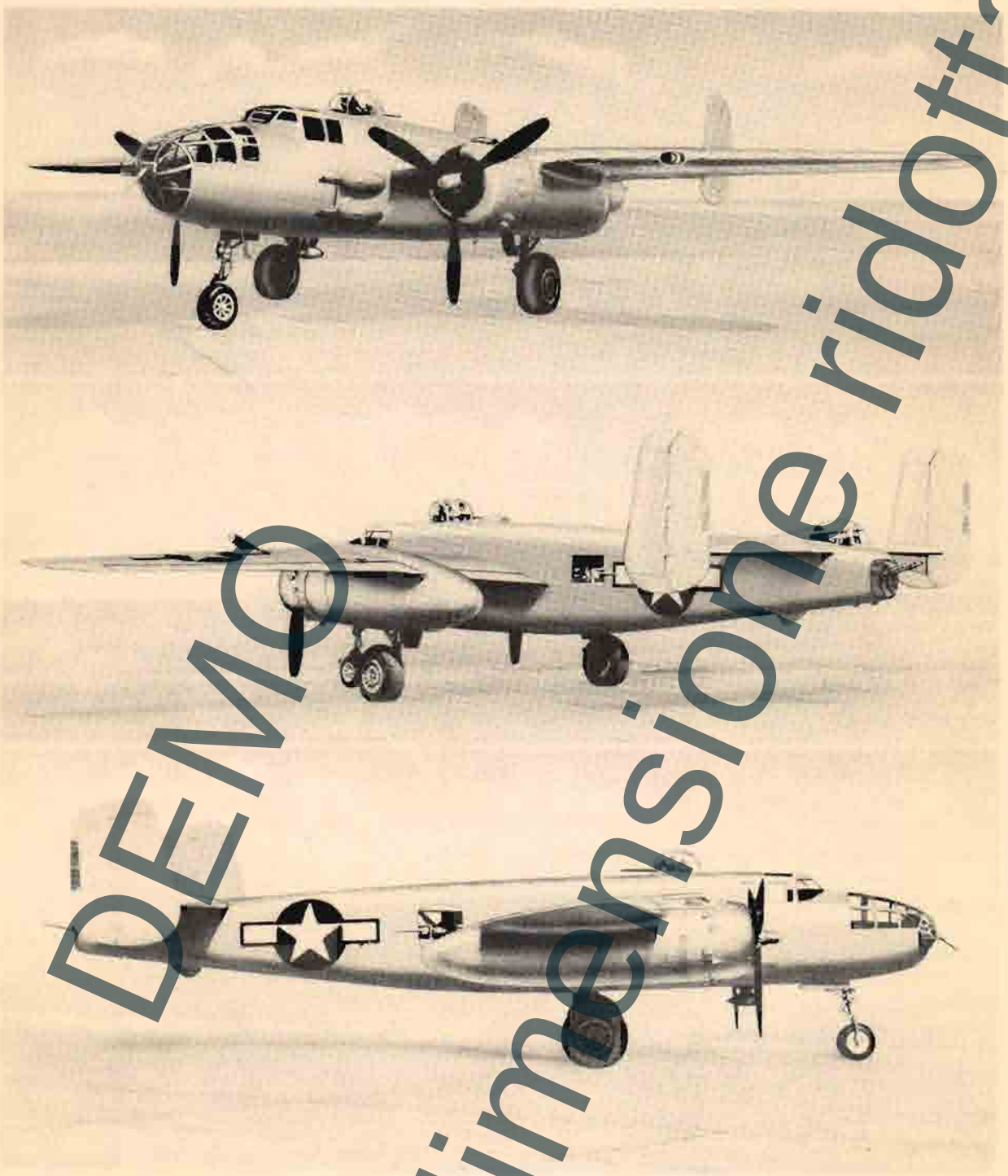
Inspections

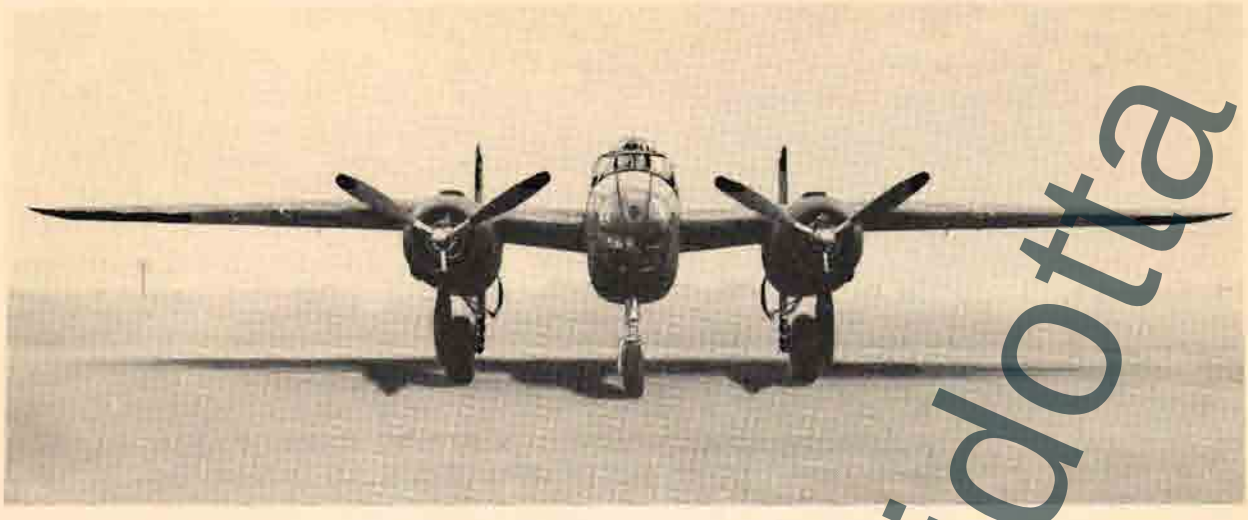
1. Check your airplane with reference to the particular mission you are undertaking. **Check everything.**
2. Check your crew for equipment, preparedness, and understanding of what you expect from them.

Interphone

1. Assure yourself that all members of the crew are standing by their interphones at all times. **Insist on clear, well-controlled voices. Speak slowly and clearly.**
2. Require reports by interphone every 15 minutes from all crew members when on oxygen.

General Description





★ The Mitchell medium bomber is a high-speed, mid-wing land monoplane. Positive dihedral in the inner and negative dihedral in the outer wing panels give the plane a gull-wing appearance, while adding control and maneuverability. ★ A twin tail section with large rudders increases stability and maneuverability and allows a greater concentration of firepower to the rear.

A tricycle landing gear adds to the ease of landing, prevents groundlooping, and provides the pilot with maximum visibility during ground operation. It also permits a wide range of loading to obtain maximum bomb and weight carrying capacity.

Underslung Wright Cyclone engines drive Hamilton hydromatic propellers and deliver 1700 Hp each at full power.

The fuselage is a semi-monocoque, four-longeron, stressed skin structure. The bombardier's, pilot's, and navigator's compartments are located in that order, forward of the bomb bay. The radio operator's, gunner's, and photographer's compartments are located in that order aft of the bomb bay.

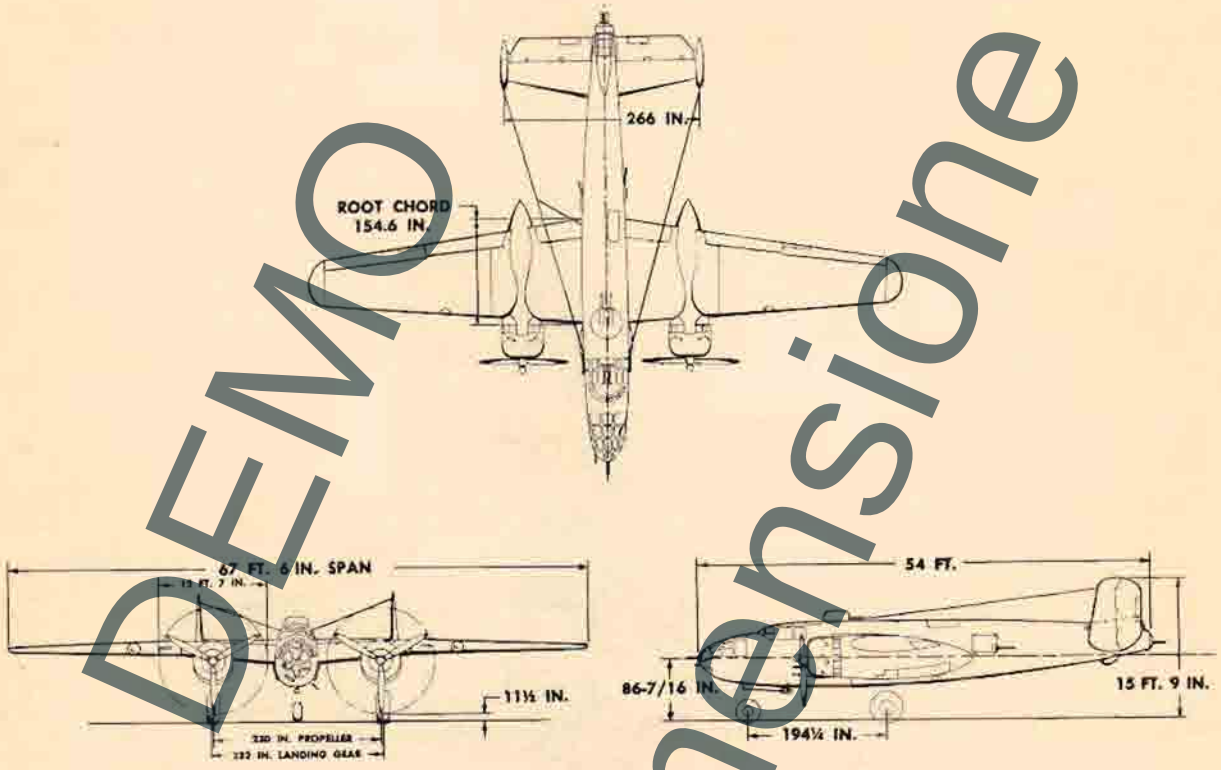
Each engine has individual self-sealing fuel and oil systems. Fuel transfer systems allow extra fuel, carried in fuselage tanks, to be transfered to the main system. There is a cross-feed in the fuel system for emergency operations.

Two 24-volt batteries supply electric power for starting and initial operation. Two generators recharge the batteries and supply power when engine speed permits their operation. Each engine has a dual-ignition system.

The B-25 has standard communication and bombardment equipment. Its armament is varied but follows AAF standards. Models of the plane have been converted for varying tactical needs by the addition of .50-cal. machine guns and the 75-mm. cannon.

There are electrically driven power turrets on some models and a hydraulically driven tail turret on others.

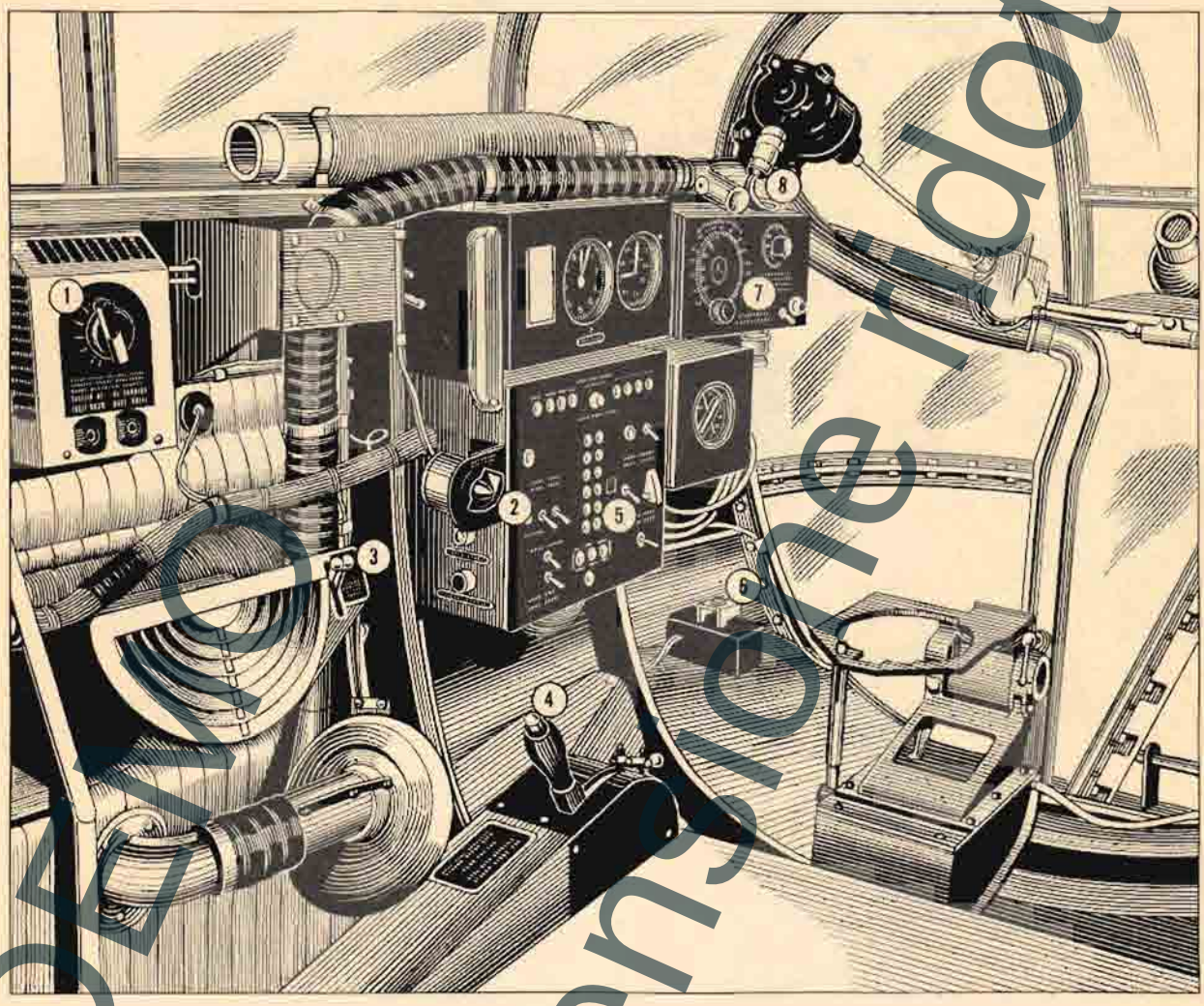
The plane has standard lighting, heating and hydraulic systems.



The airplane dimensions are: Span 67 feet 6 inches, length 54 feet, height 15 feet 9 inches. The airplane empty weighs approximately 20,300 lb.; loaded to maximum capacity, 35,500 lb.

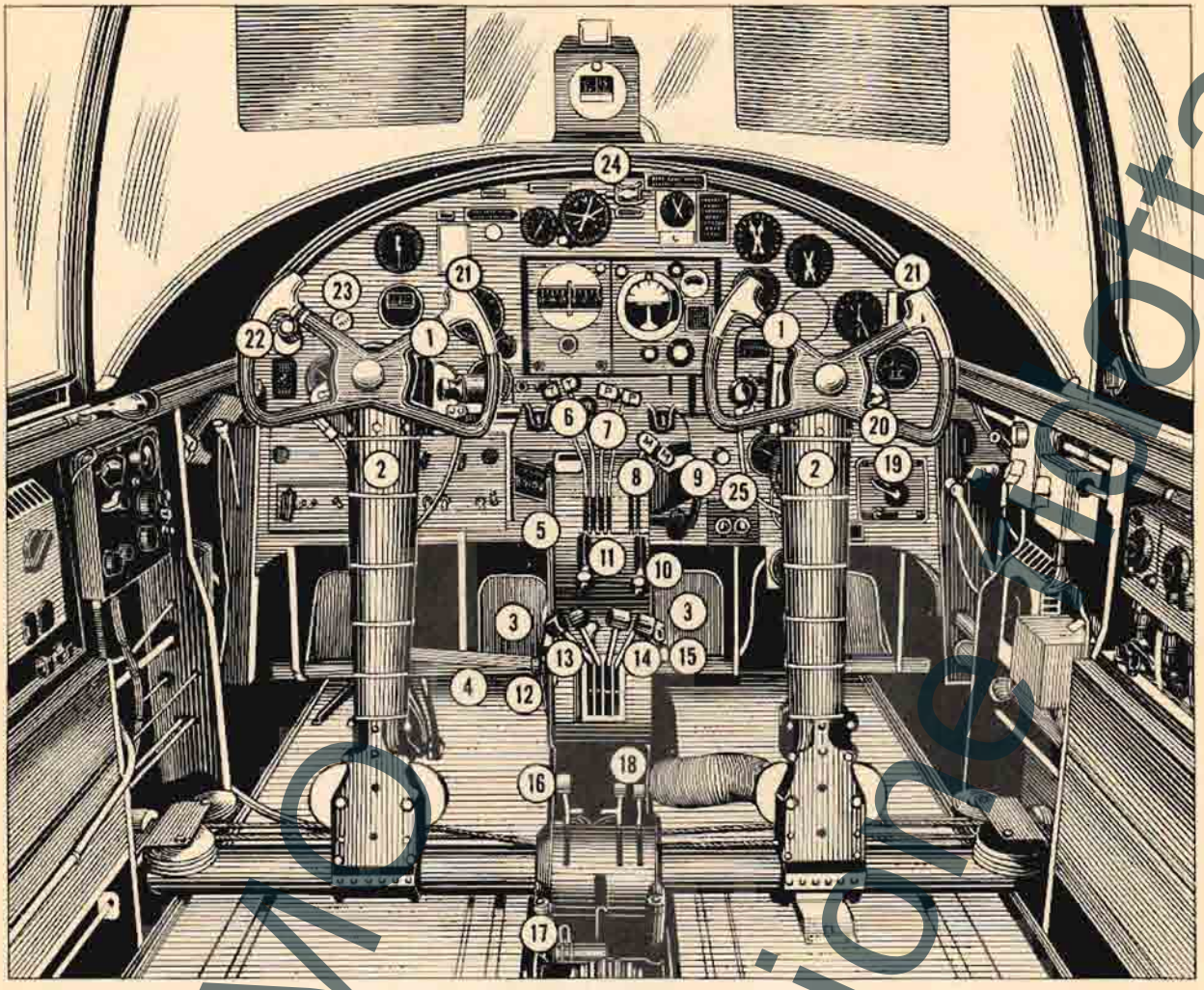
Location of Controls

B-25 C and D



BOMBARDIER'S COMPARTMENT—LEFT SIDE

1. Heated Clothing Electrical Outlet Control
2. Bombsight Window Anti-Icer Rheostat
3. Ventilation Outlet Control
4. Bomb Bay Door and Bomb Control Handle
5. Bomb Control Panel
6. Bomb Release Switch
7. Selective Train Switch Interval Control
8. Bombsight and Windshield Defrosting Unit

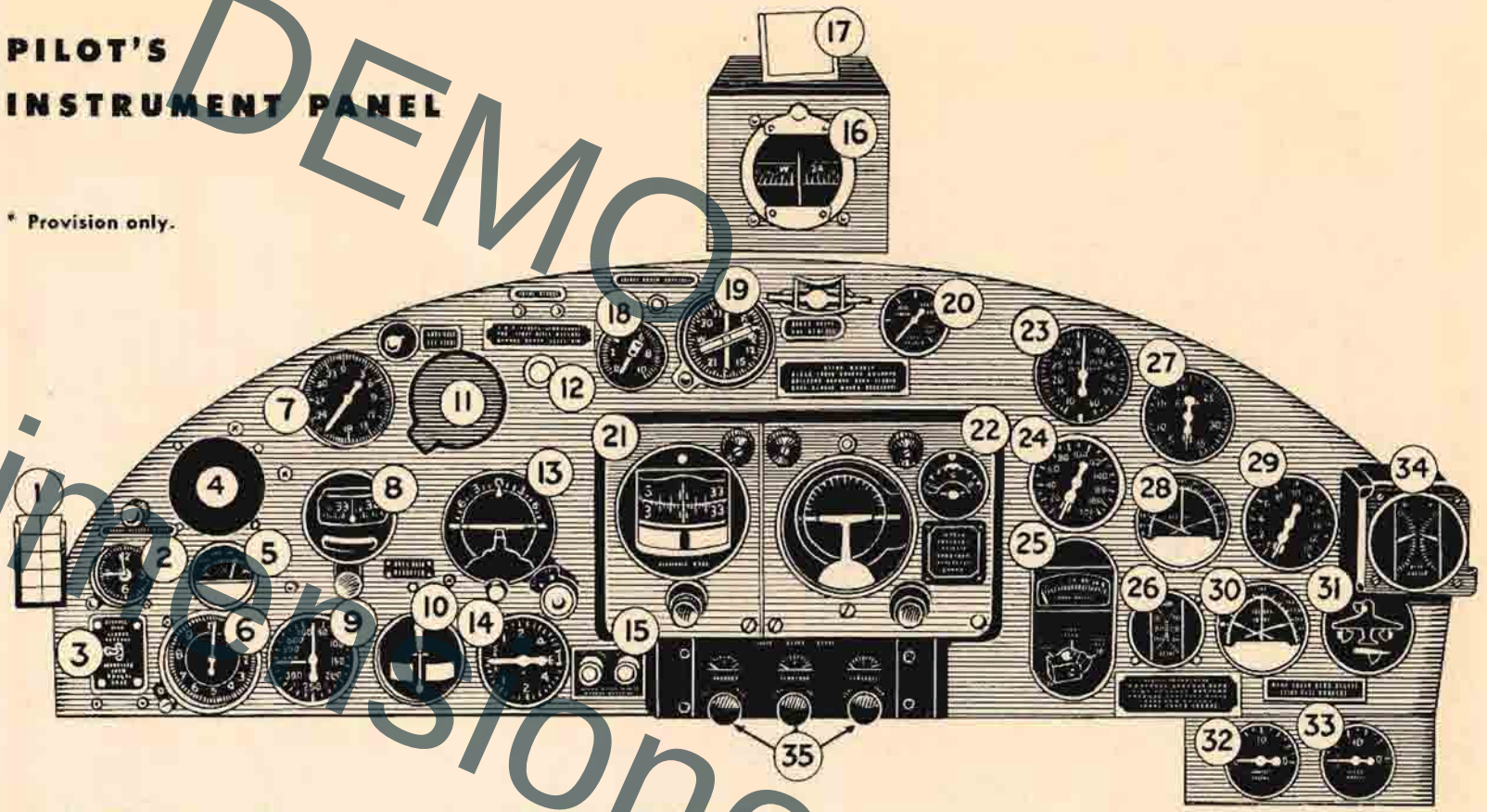


PILOT'S COMPARTMENT – GENERAL FORWARD VIEW

1. Aileron Controls
2. Elevator Controls
3. Rudder Controls
4. Surface Control Lock
5. Elevator Trim
6. Throttles
7. Propeller Controls
8. Mixture Controls
9. Parking Brake Handle
10. Propeller & Mixture Control Lock
11. Throttle Control Lock
12. Auto-Pilot OFF-ON Control
13. Supercharger Controls
14. Oil Cooler Shutters
15. Carburetor Air Heat Controls
16. Wing Flaps
17. Landing Gear
18. Engine Cowl Flaps
19. Engine Fire Extinguisher
20. Instrument Panel Fluorescent Light Switch
21. Throat Microphone Switches
22. Gun Trigger Switch
23. Bomb Release Button
24. Emergency Bomb Release
25. Detonator Switch

PILOT'S INSTRUMENT PANEL

* Provision only.



1. Altimeter Correction Card
2. Pilot's Clock
3. Static Pressure Selector Valve
*4. Pilot Director Indicator
5. Free Air Temperature Indicator
6. Altimeter
7. Radio Compass
8. Directional Gyro
9. Airspeed Indicator
10. Bank and Turn Indicator
*11. Accelerometer
12. Bank and Turn Needle Valve
13. Flight Indicator
14. Rate of Climb Indicator
15. Nose Wheel Turn Indicator
16. Magnetic Compass
17. Compass Correction Card
18. Suction (Vacuum) Gage
19. Remote Reading Compass
20. Auto Pilot Oil Pressure Gage
21. Auto Pilot Directional Gyro Unit
22. Auto Pilot Bank and Climb Gyro Unit
23. Manifold Pressure Gage
24. Oil Pressure Gage
25. Main Tanks Fuel Level Indicator
26. Auxiliary Tanks Fuel Level Indicator
27. Tachometer Indicator
28. Oil Temperature Indicator
29. Fuel Pressure Indicator
30. Cylinder Head Temperature Indicator
31. Landing Gear and Flap Position Indicator
32. Hydraulic Pressure Gage
33. Brake Pressure Gage
34. Carburetor Air Temperature Indicator
35. Auto-Pilot Servo Speed Control Knobs

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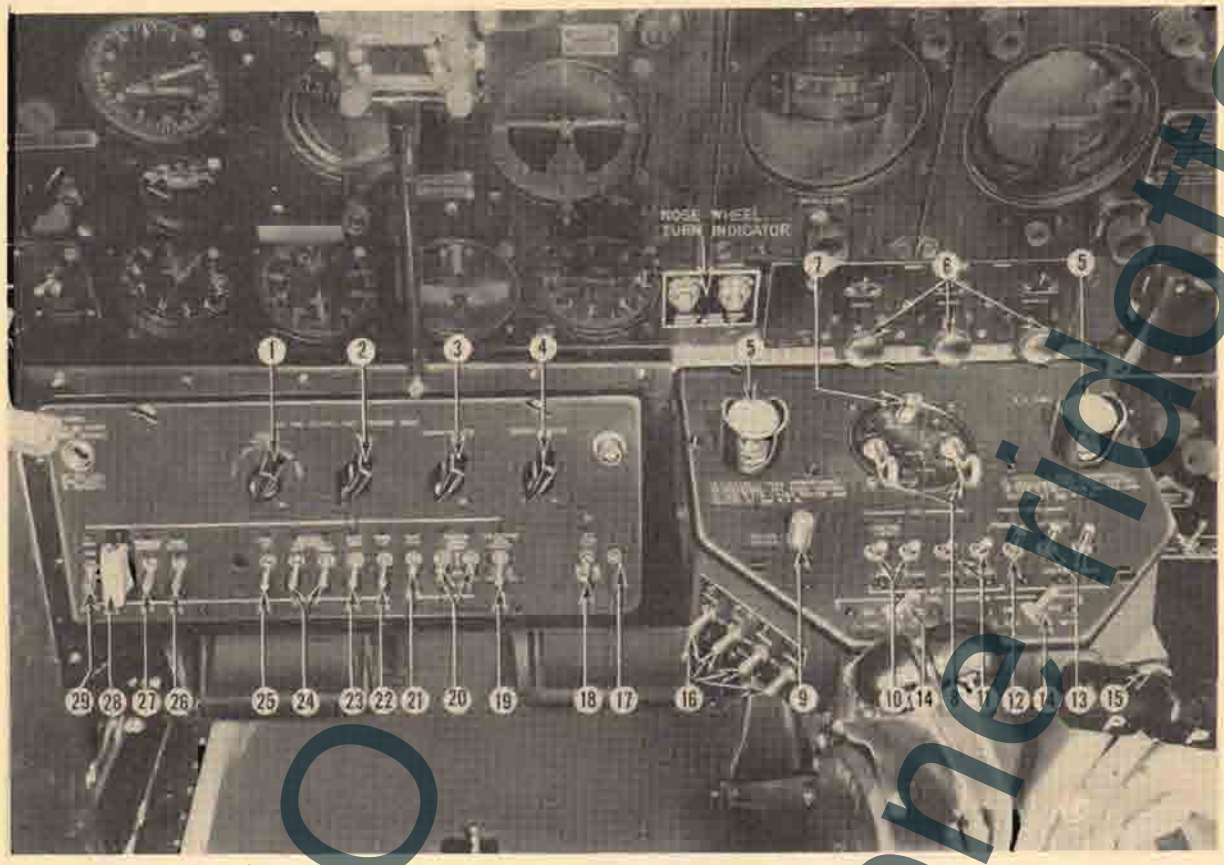
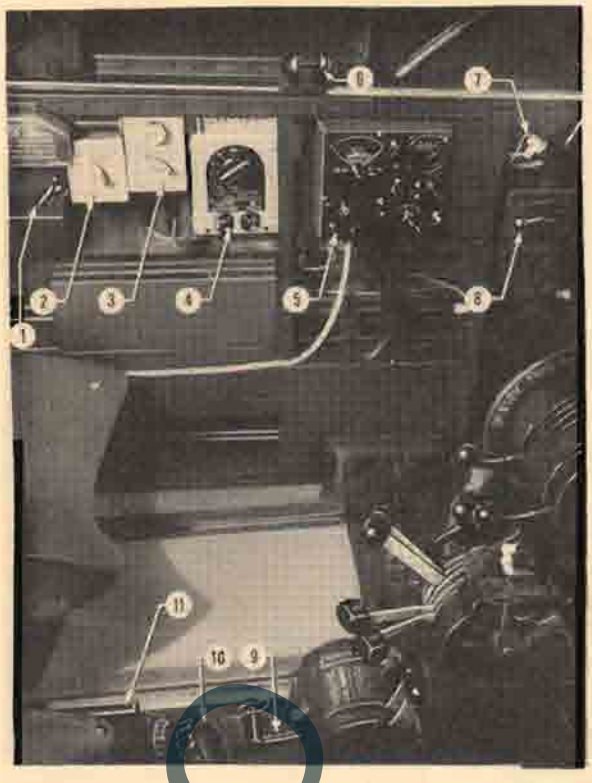


PILOT'S SWITCH PANEL AND CONTROL PEDESTAL PANEL

1. Propeller Anti-Icing Rheostat
2. Compass Light Rheostat
3. Formation Light Rheostat
4. Torpedo Director Light Rheostat
5. Propeller Feathering Buttons
6. Servo Speed Control Knobs
7. Ignition Safety Switch
8. Ignition Switches
9. Recognition Light Keying Switch
10. Landing Light Switches
11. Fuel Booster Pump Switches
12. Engine Primer Switch
13. Starter Switches
14. Auxiliary Wing Tank Transfer Pump Switches
15. Pilot's Auxiliary Bomb Door Control
16. Recognition Light Switches
17. Bombardier's Signal Switch
18. Radio Compartment Heater Control
19. Oil Dilution Switch
20. Position Light Switches
21. Cockpit Lights
22. Dome Light Switch
23. Pitot Heat Switch
24. Battery Disconnect Switches
25. Passing Light Switch
26. Carburetor De-Icer Switch
27. Windshield Defrosting Blower Switch
28. Alarm Bell Switch
29. Gun Safety Switch



PILOT'S COMPARTMENT—LEFT SIDE

1. Pilot's Air Flow Control
2. Filter Switch Box
3. Radio Jack Box
4. Heated Clothing Electrical Control
5. Radio Compass Control Unit
6. Pilot's Sliding Window Control
7. Adjustable Spotlight
8. Ventilation Inlet
9. Landing Gear
10. Aileron Trim
11. Hydraulic Hand Pump

PILOT'S COMPARTMENT—RIGHT SIDE

1. Radio Transmitters
2. Radio Receivers
3. Heated Clothing Electrical Control
4. Filter Switch Box
5. Radio Jack Box
6. Adjustable Spotlight
7. Co-Pilot's Sliding Window Control
8. Ventilation Inlet

GET THE NOSEWHEEL UP QUICK ON TAKEOFF IN MUD OR SAND

Don't try to move the airplane over soft ground with the nosewheel towbar alone. This will break the nosewheel strut and pull it from under the nose of the plane. Attach chains to the main wheel struts for towing. Guide the nosewheel with the tow bar.

To take off from mud, sand, or a rough field, raise the nosewheel quickly to relieve the weight during the run.

Land normally on mud or sand. Make every effort to hold the airplane straight without using the brakes. This prevents skidding on a slick surface. Great side loads are applied to the gear in skids of this type and must be avoided.

Common Taxiing Errors

Riding the brakes. Depress the toe pedals only when necessary.

Rough braking action. Avoid this by anticipating the need for brakes.

Rough or no use of the throttles.

Improper use of the rudders. There is a common tendency to forget that there are rudders. When the runway and taxi strip are clear, let the plane roll free and control with rudders.

Failure to clear the area. This is the cause of most taxi accidents. There is no excuse for taxi accidents.

Fast taxiing in congested areas.

Turning with the inside wheel not moving.

TAXIING TIPS

Never pivot on the inside wheel during a turn.

Never turn sharply at high speeds.

Do not use more power than necessary when taxiing.

Be extremely careful when taxiing on a strange airfield.

In the immediate vicinity of other planes, never taxi faster than is necessary to maintain control. Always proceed under guidance from the ground.

When taxiing over soft smooth terrain and there is a tendency of the wheels to dig in, don't stop.

Keep the plane moving unless the situation is dangerous. If in doubt, stop. Get out and look. Have a crew member walk ahead of the plane until you are out of trouble.

Do not turn sharply into the parking area. Come up behind the parking position and move the airplane ahead slowly.

Never cut the engines with the idea of rolling to a stop. Lack of hydraulic pressure may cause brake failure.

Do not run up engines if light planes are behind you.

Short-Field Takeoff

Muddy or Rough Ground Takeoff

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SHORT-FIELD LANDINGS

You have all heard a lot of discussion on the importance of accurate short-field landings. Combat requires that you be able to operate under conditions that are close to the absolute limit of the airplane's performance.

But even at home, if you took off this afternoon and the hydraulic system failed in flight, you would have a perfect example of the necessity for short-field landings in everyday flying. You would have to make an accurate short-field landing to be sure that there was ample room to stop with the emergency air brake.

Short-field landings are necessary where:

1. The field is unobstructed but small.
2. The runways are blocked by obstacles, power lines, trees, etc.

Training in short-field landings improves your technique and builds up confidence for normal landings.

Short-field landings are closely related to power-on full-flap stalls and power-off full-flap stalls, with the gear down.

Practice slow flying before trying this type of landing. The technique is as follows:

For the field without obstructions:

1. Place the base leg farther from the field than normal.
2. Establish a normal full-flap glide.
3. **Undershoot the field.**
4. Hold the usual speed to the roundout and gradually pull up the nose, increase the power and go directly into slow flying.

Since no obstruction is present, do this close to the ground, enabling you to land almost immediately when the power is cut.

As you approach the desired point of landing, reduce power. Since the plane is in a landing attitude and approaching the power-off stalling speed as you reduce power, you must land almost immediately.

A maximum use of brakes is permissible in this type of landing.

Remember—You are deliberately flying toward a chosen point of landing at approximately power-off stalling speed. When power is cut, you must be ready to land.

For the field with obstructions:

The type of approach you just made is obviously impractical for this landing.

1. Establish a normal full-flap power glide.
2. Plan this glide to clear the obstruction with power. Don't depend on your judgment from too high an altitude.
3. Control the attitude of the plane to gain a level or slightly nose-high attitude as you clear the obstruction.

4. Reduce the airspeed to slightly above the power-off stalling speed.

As the obstacle is cleared, use power in accordance with the height of the obstacle. Place the plane in a tail-low attitude and use the throttles to control the rate of descent. Do not reduce power too quickly or the plane will drop in for a hard and dangerous landing.

Caution—Do not use a dragging approach. Study the diagrams carefully and use them in your planning.

Maintain at all times on the approach a speed not less than the power-off stalling speed of your plane. The exaggerated attitude of the B-25 at lower speeds makes recovery difficult.

In this type of maneuver, don't cut your power suddenly. The plane stops flying and starts falling when the power is completely cut. If the power is reduced gradually, the airplane slowly settles down to a soft, short landing.

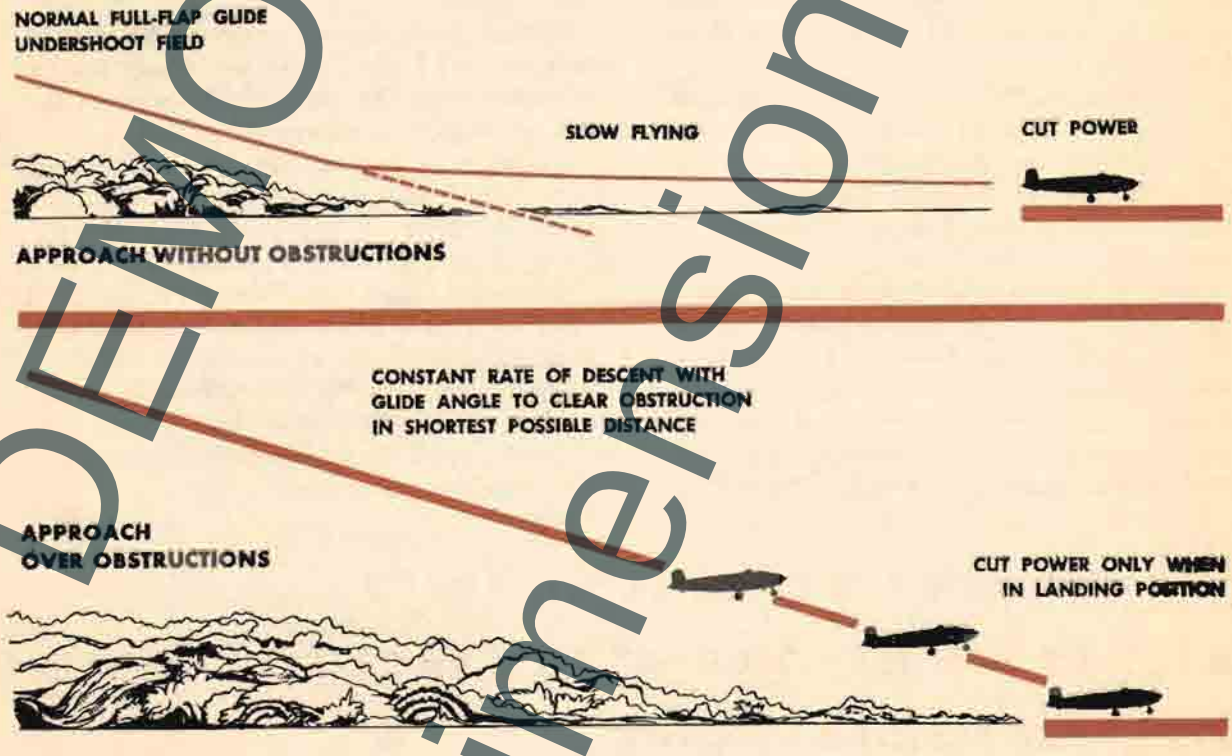
Maximum use of brakes is permitted on this maneuver.

This procedure is used by airline and military pilots where field conditions make it imperative. Pilots use it often in tactical flying. Its sole purpose is to approach the field at the lowest safe airspeed and land accurately as soon as the power is cut.

If you lack sufficient feel of the airplane to do this, practice slow flying, stalls, and this type of approach at a safe altitude before it is used.

Common Errors

1. Excessive speed on the approach.
2. Crossing the obstruction too high and landing longer than necessary.
3. Slow flying from traffic altitude to the ground.
4. Cutting power upon crossing the obstacle regardless of altitude, and dropping in. This is extremely dangerous with the B-25.
5. Poor coordination of throttle and airspeed.



SINGLE ENGINE OPERATION

Single engine operation of the B-25 follows a logical pattern of procedure. The plane flies efficiently on one engine at a reduced speed.

Beyond a weight of 32,000 lb. you will experience some difficulty in maintaining altitude. This should never be a serious handicap, since you can always correct it by ridding the plane of excess weight.

Competent ground and air instruction must precede any single engine practice or operation. On the ground your training should include a detailed account of the technique of single engine flying and cockpit drill in the sequence of operation.

You can't get too much cockpit time.

Accidents never just happen. They are the culmination of a chain of events. Don't be cocksure; this breeds a lack of respect for your plane, and this is the first step toward trouble.

In the air you must know what to expect from aerodynamic forces: the difference in handling at different speeds, the effect of open and closed bomb bay doors, the dropping of excess weight, and the futility of using flaps except in landing.

Each airplane has a critical single engine speed. In the B-25 it is 140 mph for normal load weights.

Critical single engine speed is the slowest speed at which the rudder has a safe margin of control over the unbalanced thrust of the one live engine, at maximum power.

Maximum power settings for single engine flight depend on the particular conditions. You can apply power in direct relation to the airspeed. At high speeds it is possible to use take-off power settings for a short time.

For all normal single engine operation, keep your power settings at maximum climb or below. The airplane becomes difficult to control beyond this power setting unless you have excess airspeed. If you have excess speed, you don't need excessive power.

CRITICAL SINGLE ENGINE AIRSPEED MUST BE MAINTAINED AT THE SACRIFICE OF ALL OTHER CONSIDERATIONS

Procedure

1. Airspeed—Maintain or get 140 mph by diving if necessary.

2. Directional control—Obtain and hold directional control by using rudder. Slight aileron aids coordination but excessive use raises the stalling speed.

Use the trim tabs to help you hold the plane if manual control is too difficult.

Make these checks:

a. Check your ignition switches.

b. Check your fuel cut-off valves.

c. Move mixture control to "FULL RICH."

d. Turn the booster pumps "ON."

You can make these checks in far less time than it takes to read these lines; they may save the engine, and they prevent featheritis.

3. Increase power to the limit allowed by airspeed and rudder control—Advance both prop controls and both throttles. It is sometimes difficult to tell which engine is out. As a precaution, apply power to both engines.

A good method when you are not sure: If the plane wants to turn to the right, the right engine is dead; to the left, the left engine is dead. If you are on instruments, your bank-and-turn needle points to the dead engine.

4. Reduce drag. **Throttle back. Decrease rpm. or feather the prop. Mixture "IDLE CUT-OFF"** gear and flaps up, generators on—Feather the propeller by pushing the feathering button down. The prop will feather, and when it does the button will return to normal position.

Close cowl flaps on dead engine.

5. Reduce fire hazard—After the prop stops turning, cut off the fuel and ignition on that engine. Set the Lux system to the dead engine, and be prepared if a fire breaks out.

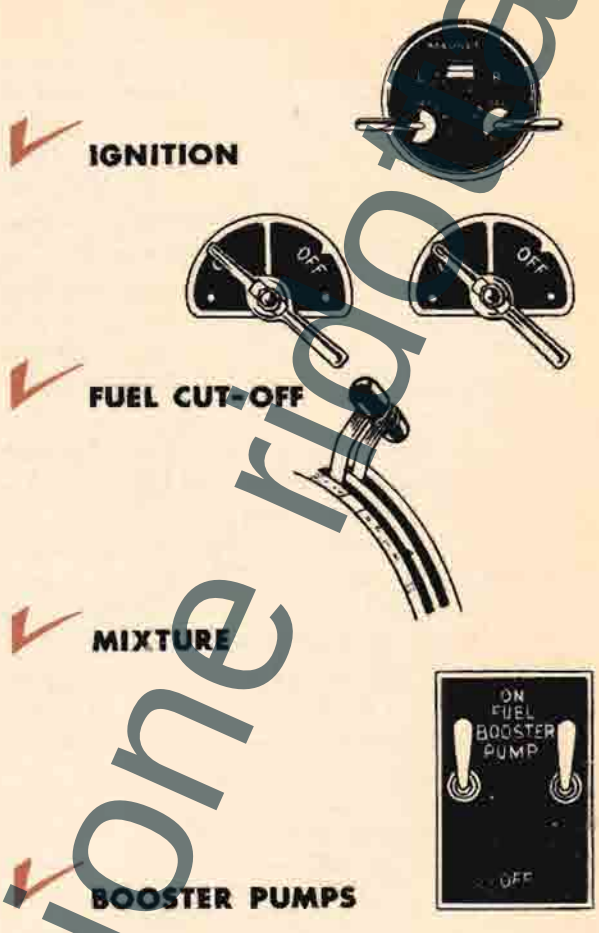
6. Trim—Trim the plane for hands-off flight.

This may seem a complicated procedure; however, when you have practiced it a few times, when you know exactly what you are going to do, the entire procedure requires less than 10 seconds.

Trouble Search

First—Switch the vacuum selector to the good engine to get accurate readings of instruments.

BEFORE YOU FEATHER



With the plane under control, try to find out what caused the trouble, and, if possible, make temporary repairs. Check all fuses, cut-off valves, pop-out switches, lines and wiring as well as you can.

Don't try to re-start the engine if you don't know what is wrong. It is much simpler to make a single engine landing than to fight a fire.

Adjust the cowl flaps and the oil cooler shutters as desired. Reduce weight if the plane is excessively heavy. Drop bombs, bomb bay tank, tools; in fact, anything that will come loose, if necessary. Make final adjustments on the trim and power setting.

Single Engine Practice

Remember that you are trimmed for single engine flight at one airspeed only. If the airspeed or power setting is changed you must re-trim.

On a practice flight try this: Trim the plane for a speed of 160 or 170 mph. Then advance or retard the throttle. Allow the plane to fly itself —it will immediately start hunting a stable flight condition. It will turn, climb, and dive all over the sky, finally falling off into a spiral or spin if you do not take over the controls.

Now return the controls to the power setting for which you are trimmed. Hold the plane manually until the airspeed returns to its proper setting. The airplane will again fly hands off.

Now for the single engine turns. The old theory that you must never turn into the dead engine is false. You can turn in either direction. If you can make a good coordinated turn into the good engine you can do the same thing into the dead engine.

Practice some turns in both directions. You will find no difference as long as the airspeed is constant. Lose a slight amount of altitude in the turn to keep the airspeed constant. Do not blast roughly on the throttles to maintain airspeed. This is a dangerous fault, leading to loss of control when carried too far.

Steep turns on a single engine are not necessary. The weight of the plane increases rapidly as the angle of bank increases, and as no benefit is derived from steep turns, it is foolhardy to try them when full power is not available.

Engine Failure on Takeoff

This is a tricky proposition for any pilot to handle. When the engine fails before you gain CSE speed, retract the wheels and land straight ahead. There is far less danger in a belly landing than in attempting to go around with too low an airspeed.

If you are in the air, however, and have CSE speed, you can go around without too much difficulty.

You must know your procedure and your airplane. Work quickly, accurately, and efficiently. **Don't get panicky.**

Don't get featheritis—be sure the engine is out, not just spitting a little.

Use the same procedure, but notice that the first three parts of it are already accomplished.

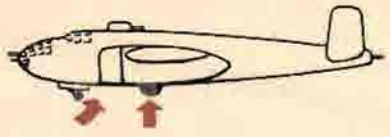
1. **Airspeed**—You either have CSE speed or you land straight ahead.

2. **Directional Control**—This is an instinctive reaction. Use rudder pressure at the first feel of yaw.

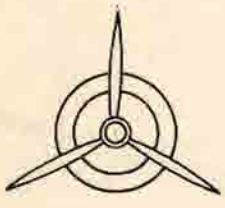
3. **Increase power**—Takeoff power has already been applied. It may be necessary to reduce power to maintain control.

A TURN INTO THE DEAD ENGINE IS OK

4. **Reduce Drag**

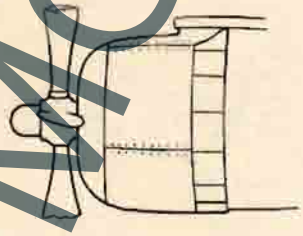


a. Raise the wheels

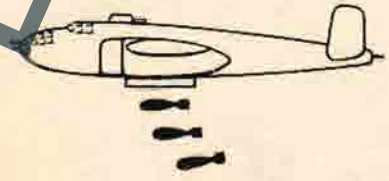


b. Feather the prop

c. Raise flaps to 15°



d. Close cowl flaps on dead engine



e. Drop weight if necessary

5. **Reduce Fire Hazard**
6. **Trim**
7. **Trouble Search**

EFFECT OF POWER AND AIRSPEED ON SINGLE ENGINE OPERATION

To fly safely on single engine you must know the effect of power on rudder control at various airspeeds. This is vital to your safety when practicing go-around procedures and other maneuvers that require quick changes in power settings.

At 140 mph (CSE speed) directional control can be maintained with takeoff power on the good engine. At airspeeds below 140 mph the plane will turn into the dead engine if power is not reduced. When power is reduced in accordance with the airspeed, directional control can be maintained until normal stalling speeds are reached.

Practice this maneuver with the propeller unfeathered at a safe altitude before attempting single engine landings. Perform this maneuver straight ahead and in turns to the right and left. Practice from level flight and in a simulation of a landing glide, with various degrees of flap settings to determine limits at which a go-around may be made.

You may practice this maneuver with wheels and flaps up to determine its characteristics, but, since this maneuver is used to practice for single engine landings and go-arounds, perform it with wheels and flaps down after its effect is determined.

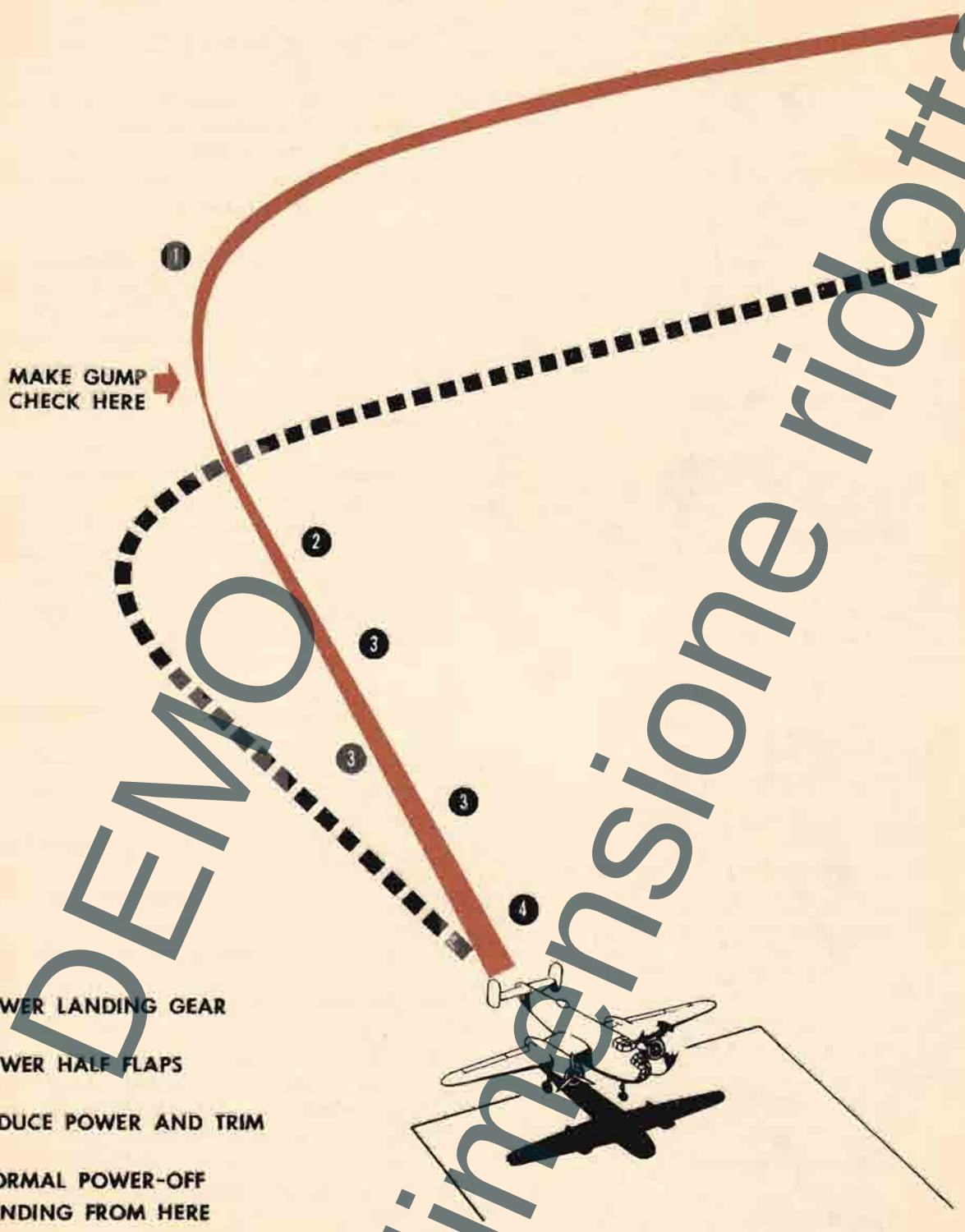
With power set for normal climb reduce the airspeed below 140 mph until the plane starts to turn toward the dead engine, even though you are holding full opposite rudder.

Recover by reducing power and lowering the nose.

For practice, hold definite airspeeds (for example, 115 mph or 120 mph), and add as much power as you can control.

This maneuver is excellent practice for single engine landings, and go-around procedures. When the airspeed is below CSE speed you know how much power you can safely add to prevent undershooting and to start a go-around procedure.

Single Engine Landing



1. LOWER LANDING GEAR
2. LOWER HALF FLAPS
3. REDUCE POWER AND TRIM
4. NORMAL POWER-OFF LANDING FROM HERE

Single engine landings should remove any lingering doubts you may have about the B-25 and its ability as a single engine performer.

You have flown on one engine, turned on one engine. Now you will make single engine landings. This maneuver is simple, safe, and vital for your continued safety.

Fly this maneuver with the propeller unfeathered to allow for recovery from a bad approach. By following this simple procedure you get an exact simulation of single engine flight:

1. While practicing single engine flight set the prop at "DEC. RPM" and feather an engine.
2. Trim the plane for hands-off flight.
3. Unfeather the engine, leaving the prop control set at "DEC. RPM," and apply enough power to the engine you feathered to again have the plane trimmed for hands-off flight.

You have, in effect, found out exactly how much the feathered propeller reduces drag on the airplane. By adding only enough power to return the plane to a trimmed condition without changing the trim tabs, you have simply applied power to offset the drag caused by a windmilling propeller.

This is an exact simulation of single engine operation, including the landing effect of the feathered prop. With a feathered prop, when the power is cut on the good engine, drag is induced, making the plane slew into the good engine during the last stage of landing.

Set the prop at 2400 rpm on the approach so that you have maximum climbing power available for a go-around if it is needed.

The landing procedure is as follows:

1. Fly a normal traffic pattern, except that you do not lower landing gear until you are on the approach.
2. On the approach, lower and check the gear, check brake and hydraulic pressure, set props at 2400 rpm.
3. Lower half flaps—use the rest of the flaps and the power to increase the accuracy of the approach.
4. Never let the airspeed fall below 140 mph on the approach until you are positive the landing can be made.
5. Reduce power and reduce trim. Never allow the power reduction to get ahead of the trim. The ideal approach is one where the power is reduced, then the trim, then power, then trim—and so on throughout the approach.
6. Maintain 140 mph until the landing is in the bag, then lower the remaining flaps and reduce power to make an accurate landing.

The plane will have a tendency to yaw into the good engine as the power is cut off completely. This yaw is present when the propeller is feathered and so should not be changed by cutting power on the engine you have set up to act as a feathered prop. This yaw is easily controlled with the rudder; since you expect it, you will have no trouble.

This technique is sound as it does not make too great a demand on the pilot's judgment. As you approach the ground your ability to properly gage distance and depth increases, allowing you to make good use of the remaining power and flaps for an accurate landing. This in turn greatly reduces the possibility of overshooting or undershooting.

Never try to recover from a bad approach with one engine. Once the power has been cut and the speed is below 140 mph, go ahead and land.

Common Errors

1. Overshooting—a combination of errors. Setting the base leg improperly, Airspeed too high on the approach, and taking too much time to accomplish procedures on the approach.
2. Forgetting to lower the landing gear. This is usually the result of the normal habit of lowering gear on the downwind leg, cutting off the warning horn or lights, and not making the landing check properly.
3. Failure to re-trim the airplane properly.
4. Attempting to make an accuracy landing from the top of the approach.
5. Undershooting and using too much power.

Single Engine Go-Around

Successful single engine go-around depends on an early decision that a go-around is necessary. You can start a go-around procedure at a low altitude and from a low airspeed on the approach, but it is difficult and dangerous.

Make Your Decision Early

The procedure is:

1. Maintain CSE speed at all times on the approach.
2. Apply normal climbing power, this will be sufficient if the procedure is started early on the approach.
3. Reduce drag.
   a. Wheels up.
   b. Prop "DEC. RPM" (on bad engine).
   c. Flaps up to 15° until safe altitude and airspeed are obtained.
4. Trim the plane for hands-off flight.

If you have to go around under emergency conditions, apply all the power you can hold without losing directional control.

Note: Keep flaps ½ down when practicing this, since in emergency conditions the maneuver will start before you have lowered full flaps.

If sufficient altitude is available, nose down to increase airspeed when power is applied to start a go-around.

TIPS ON SINGLE ENGINE OPERATION

Practice single engine operation with the propellers feathered and unfeathered.

Keep the prop feathered for a maximum of 5 minutes in cold weather and 15 minutes in warm weather. If you exceed these time limits the engine cools too much. The oil drains into the bottom cylinders and makes starting difficult and dangerous.

Warm engines gradually when recovering from single engine practice.

Keep all experiments within safe bounds.

Don't allow your airspeed to vary in turns.

Don't blast the throttles to maintain airspeed in turns.

Hold the nose up when rolling out of turns or you will lose too much altitude.

Remember—When at high altitudes the B-25 may lose some altitude, but when you reach denser air at lower altitudes it will hold altitude easily.

When attempting to make a medium turn, establish the proper degree of bank. Otherwise the turn will be uncoordinated.

Hold the airspeed for which you have trimmed. This will save you a lot of wear and tear mentally and physically. **The B-25 flies easily on one engine if it is properly trimmed.**

Re-starting the dead engine

Turn the ignition switches "ON."

Turn the gasoline "ON."

Prop control (bad engine) full "DEC. RPM."

Mixture "FULL RICH."

Depress the feathering switch until the engine rpm is 800.

Release the feathering switch and resume control with the engine controls.

Move prop pitch and throttles forward slowly —not to exceed 1400 rpm and 15" Hg. until the cylinder-head temperature starts to increase.

Warm the engine as you would on the ground and apply cruising power after cylinder-head temperature is normal.

Oil shutters and cowl flaps as desired.

Re-trim.

Warning: If no feathering action occurs within 90 seconds, release feathering button to avoid burning out feathering motor.

AUXILIARY HYDRAULIC PUMP AND EMERGENCY HYDRAULIC SELECTOR VALVE

The auxiliary hydraulic pump is a double-action hand pump for use as a source of pressure if the main hydraulic system fails.

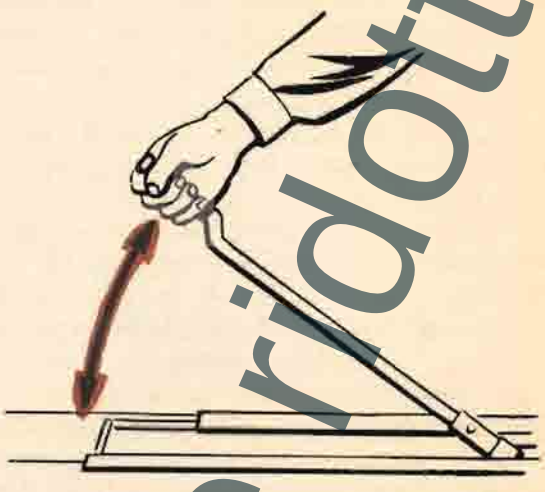
It is between the pilot's and copilot's seats and either man uses it.

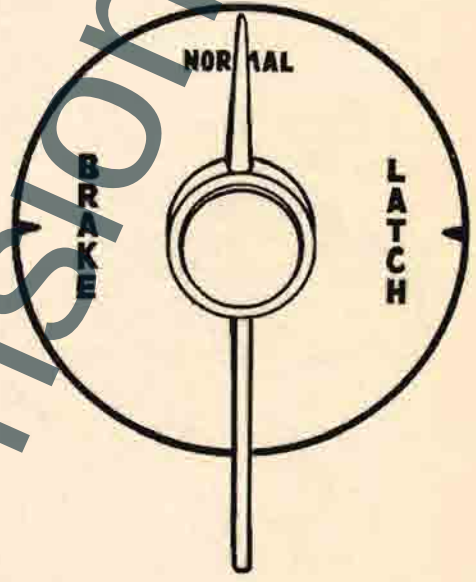
A selector valve, directly behind the hand pump on the floor, distributes the pressure from the hand pump.

The selector valve has three positions, "NORMAL," "BRAKE," and "LATCH." In "NORMAL" position the pressure from the hand pump is distributed through the normal hydraulic lines. In "BRAKE" position the pressure goes directly to the brake accumulator and then to the brakes. In "LATCH" position the pressure goes directly to the landing gear down-latch pins.

Use this auxiliary source of hydraulic pressure to make all normal hydraulic actions when the engine driven pumps fail.

You can use it to aid or replace the engine-driven pumps.





Note

If down-position latchpins of the main landing gear do not engage, turn emergency hydraulic selector valve to "LATCH." Operate the hand pump until position indicator shows main landing gear latchpins in place.

Use this procedure regardless of whether you have employed the main or emergency hydraulic systems for lowering the landing gear.

The yellow flags which show up on the position indicator will always warn you if the latchpins are not engaged.

NEVER PUMP THE LATCH PINS INTO PLACE UNLESS THE MAIN WHEELS ARE FULL DOWN

EMERGENCY HYDRAULIC WHEEL LOWERING SYSTEM

The B-25 has an emergency hydraulic wheel lowering system to provide power if the main hydraulic wheel lowering system fails. The system provides for simultaneous lowering of main landing gear and nose gear.

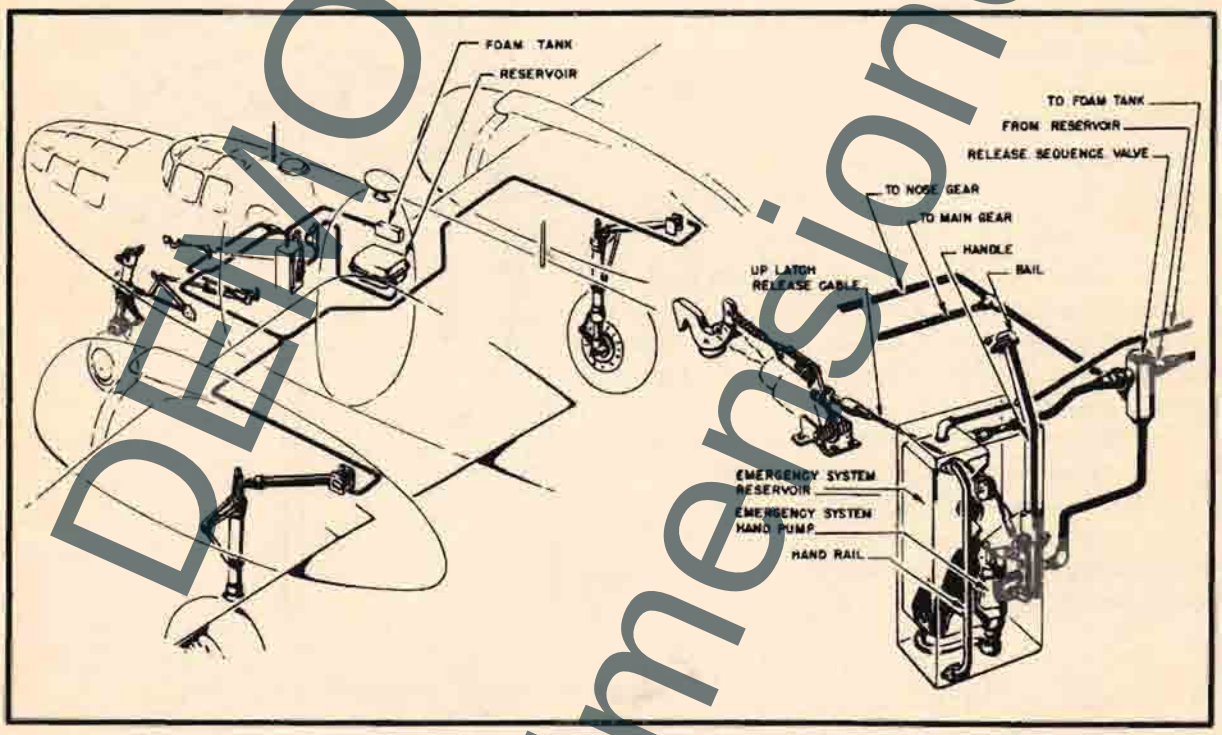
The system consists of an emergency hand pump and a hydraulic fluid reservoir, both in the navigator's compartment. The complete system incorporates automatic valves to regulate normal and emergency flow of fluid to the operating struts, a nosegear up-lock release cable connecting the hand pump handle and the up-lock latch, and fluid transmission lines.

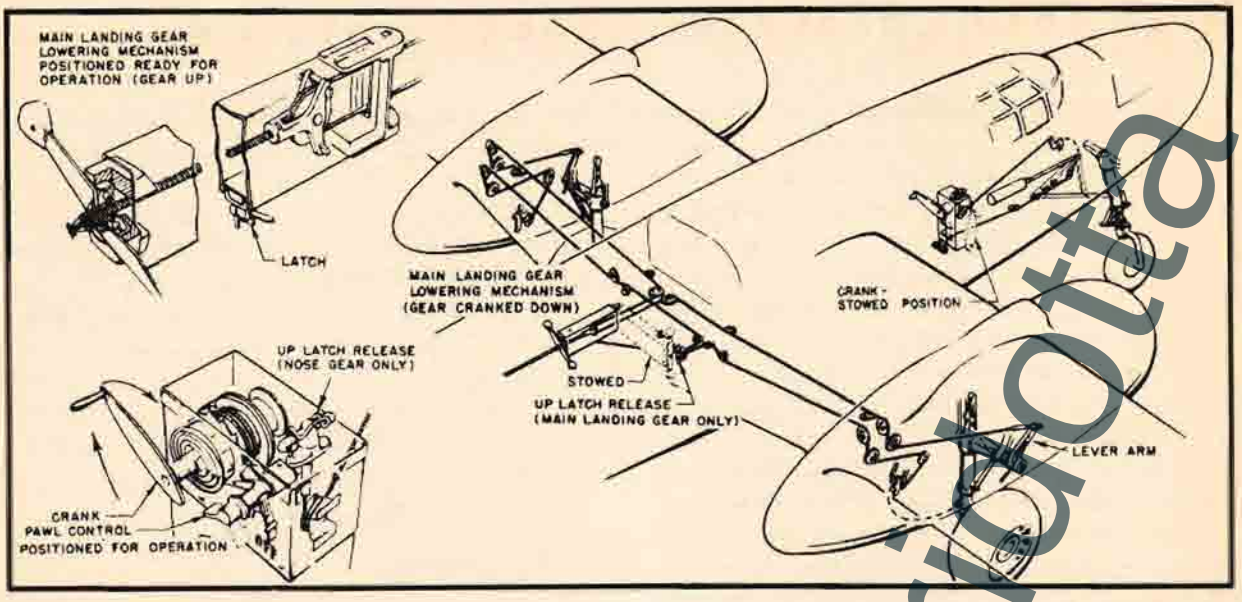
The emergency reservoir fills automatically when the main reservoir is filled, and the fluid is available for the emergency lowering of the landing gear even if the main hydraulic system fluid is completely lost.

Operation

If the hydraulic system fails completely, take the following steps:

1. Return to the home base if possible. Report your trouble briefly to the tower.
2. Climb to an altitude of at least 5000 feet above the surrounding terrain.
3. Reduce your airspeed below 150 mph.
4. Place landing gear control handle in pilot's compartment "DOWN."
5. Operate emergency hand pump one full stroke to release nose gear up-lock. Check landing gear indicator to see whether nose gear is partially extended. If not, give the pump handle another full stroke.
6. Operate the hand pump until gear is down and locked. Employ your normal checks to insure that gear is actually down and locked.





7. Return pump handle to forward position and safety it.

Some earlier models of the B-25 have mechanical emergency wheel lowering controls. In these models, you lower the main landing gear and the nose gear separately. The controls consist of screw jacks and a series of cables which operate directly on the wheels.

In the event of **complete** failure of your landing gear hydraulic system, operate the emergency controls as follows:

1. Establish effective interphone communication between the crew member operating the mechanism and the pilot.
2. Return to the home base if possible. Report your trouble to the tower.
3. Climb to an altitude of at least 5000 feet above the surrounding terrain.
4. Reduce the airspeed below 150 mph (120-130 mph recommended.)
5. Place landing gear control handle in pilot's compartment "DOWN."
6. Swing screw jack in radio compartment to the operating position.
7. Pull up-latch release and check to see that the main gear has released.
8. Operate the screw jack (clockwise) to lower the gear.
9. Use normal landing gear check to see that the gear is down and locked.
10. Release the tension slightly on the screw jack after the gear is down and locked.

Warning: Don't return this system to a stowed position until the plane is safely on the ground, with the landing gear locked to prevent its folding up.

You must stow this system before the wheels can again be operated hydraulically.

Nosewheel

The lowering device for the nosewheel is in the navigator's compartment, on the step into the pilot's compartment.

To operate:

1. Pull nose gear release.
2. Check to see that the gear has released.
3. Turn the nosewheel pawl "ON."
4. Place crank on shaft, turn clockwise to lower.
5. Check locked position normally after the gear is full down.

Warning: The nosewheel lowering cable operates every time the nosewheel is raised or lowered. It is engaged by the pawl to lower the wheels. If the pawl is accidently turned to "ON" the hydraulic system will tear the nosewheel cable out of the plane.

This pawl must be left "ON" after it is used until the plane is on the ground and braced against mishap.

WING FLAP EMERGENCY LOWERING SYSTEM

In the event of **complete** failure of the main hydraulic system, an emergency mechanical flap lowering mechanism is available. It is important to remember to use the emergency mechanism only when the hydraulic system failure is **complete,** as the two systems oppose each other. Use of the emergency system while hydraulic pressure is still available will seriously damage the mechanical system.

The emergency mechanism is in the radio compartment. Be sure the interphone communication between the crew member operating the mechanism and the pilot is 100% effective.

Before entering the traffic pattern it is advisable to lower partial flaps. This enables you to get desired amount of flaps earlier on the final approach.

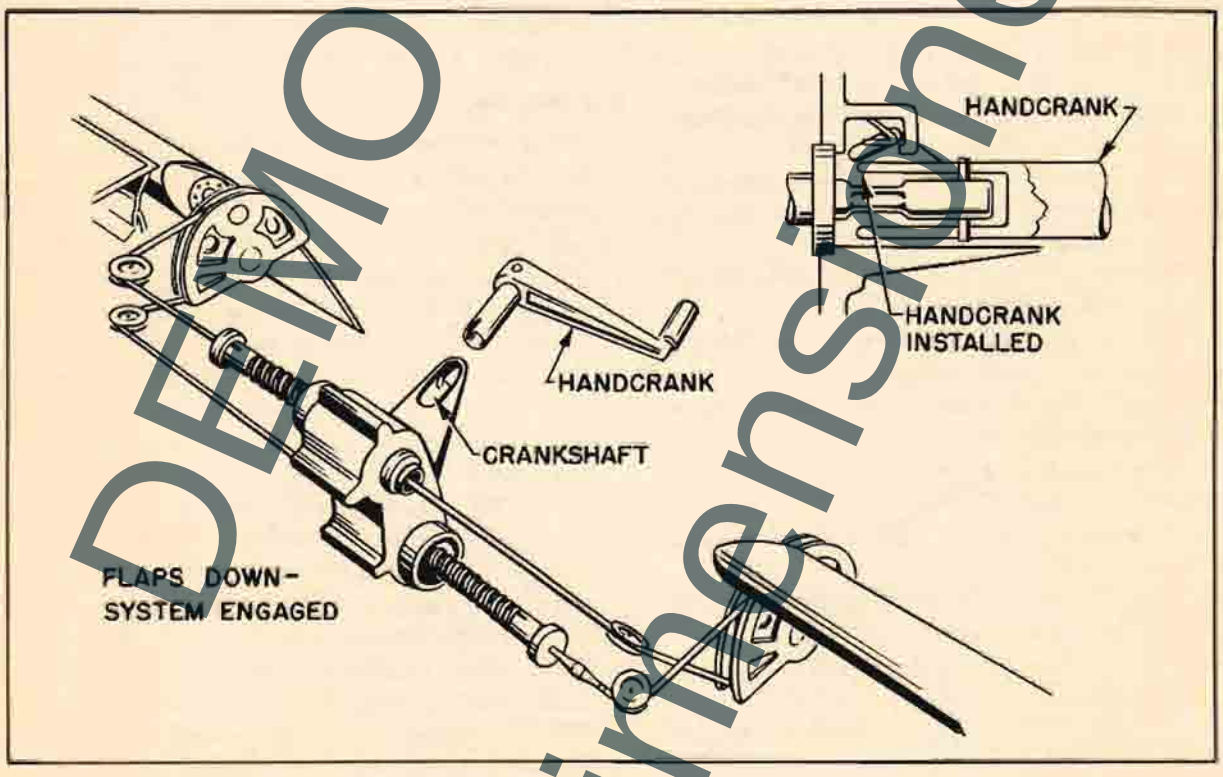
Operation

1. Reduce airspeed below 150 mph.
2. Move pilot's flap control "DOWN."
3. Remove hand crank from stowage position on forward wall of radio compartment and engage it with the shaft.
4. Rotate crank clockwise until you obtain the desired amount of flaps—14 turns will give you half flaps; 27 turns, full flaps.
5. To lock flaps in position, remove the crank.

Note: If go-around is necessary, turn crank counterclockwise to full stop position. (This operation does not raise the flaps, but releases the pressure on them and the force of the slipstream raises them.)

Warning

Before operating the flaps hydraulically again, be sure that your mechanical system is fully disengaged. To disengage, rotate crank counterclockwise until checked. Remove crank and return to its stowage position.



EMERGENCY OPERATION OF BOMB BAY DOORS

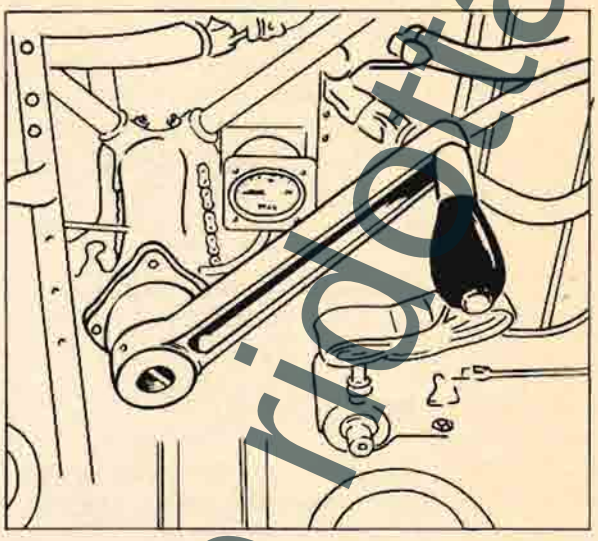
Mechanical

The bomb bay doors will automatically open approximately ⅔ of the way in the event of a hydraulic failure.

Use the mechanical system only when hydraulic pressure fails.

1. Move bombardier's control handle to "OPEN." The doors are open and the racks are locked in this position.
2. Install crank on the shaft in the rear of the navigator's compartment, just under the navigator's table. The crank is stowed on the lower right longeron opposite the crank shaft.
3. Turn the crank clockwise to open the doors. Reverse to close them.
4. Thread strap (secured to crank handle) through the down strap on the floor.

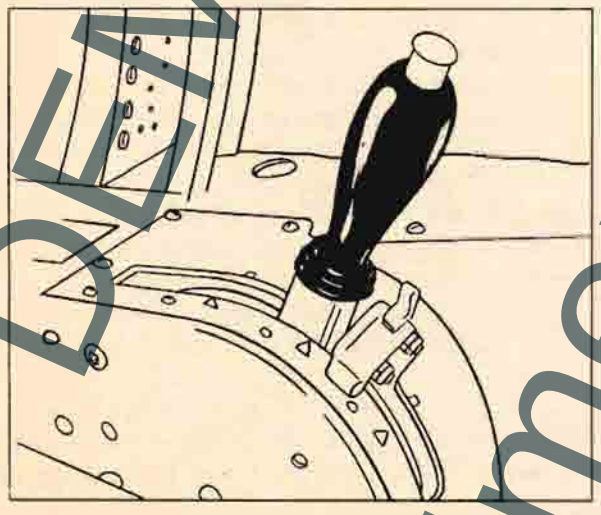
Note: The doors are normally held open and closed by hydraulic pressure. The doors will stay open unsecured but must be safetied in the closed position.



EMERGENCY BOMB BAY DOOR CRANK

EMERGENCY SALVO RELEASE

When your hydraulic system is in operation you can salvo all of your bomb load, both internal and external, by moving the bomb control handle to the "SALVO" position.



BOMB CONTROL HANDLE

All bombs are dropped safe when salvoed, unless you have an arming control in use on your plane. In that case you can salvo them either armed or safe.

Your bomb bay droppable tank is suspended on bomb shackles in the bomb bay; the pilot and bombardier both have control of these racks and may salvo both bombs and bomb bay tank.

To Operate

1. Push the bombardier's control handle to "SALVO."
2. Pull the pilot's emergency salvo release; this will automatically open the bomb bay doors and salvo your load.

Now to return the system to normal operation.

If the bombardier's control has been used, simply move the control handle to "CLOSED."

If the pilot's emergency release has been used:

1. Move the bombardier's control handle to

"SALVO"; this recocks pilot's emergency release.

2. Move control to "CLOSED."

If your plane has an auxiliary control for torpedo work, you may push down and pull out this control, which is on the right side of the pilot's control pedestal. This enables you to close the doors from the pilot's compartment.

If you use this control, however, you must re-open the doors with it before you can regain control with the bombardier's control handle.

To salvo the torpedo you must:

1. Open the bomb bay doors with the auxiliary control.

2. Pull the emergency salvo release (this also jettisons the wing bombs.)

Warning

On the torpedo only it is necessary to open bomb bay doors to use the emergency salvo release.

Note: On some B-25J and B-25H airplanes the bombing controls are electrical. In the event of electrical failure you cannot salvo the bombs or bomb bay tank.

PILOT'S BOMB CONTROL PANEL

EMERGENCY OPERATION—HYDRAULIC BRAKE

EMERGENCY HYDRAULIC SELECTOR VALVE

Before landing, if there is less than 1000 lb. pressure indicated on the brake system pressure gage:

1. Turn hydraulic selector valve to "BRAKE."

2. Operate the hand pump until indicator shows 1000 lb. sq. in. minimum and no more than 1450 lb. sq. in.

3. Operate continuously while landing and taxiing as the initial pressure in the accumulator is insufficient for normal landing.

4. If, on landing, you cannot maintain sufficient pressure, use the emergency air brake system.

5. If you cannot build up 600 lb. pressure in the accumulator, pick a field with at least a one-mile runway, land and use the air brake system.

Always make a short-field landing when your brake pressure is low.

EMERGENCY OPERATION—AIR BRAKES

Use this Air Brake System only in extreme emergencies.

Use it when normal hydraulic system has failed and you cannot develop sufficient pressure with your auxiliary hydraulic hand pump.

When you are sure you must use the air brake system, choose the field with the largest runways within range of your airplane. The runway should be at least one mile long for a safe landing. Make a short-field landing.

Dissipate all the speed you can safely lose before using your air brake, but don't wait until you are out of runway!

You cannot use these brakes selectively. Be ready to counteract any uneven braking action with the throttles.

Operation

1. Pull up sharply on the air brake handle to break the safety wire.
2. Lower the handle immediately. Lower it by hand, as the handle is spring-loaded and will be pulled back past neutral if it is allowed to snap down.

The air pressure is applied to the brakes at the extreme top of the brake handle's travel, and released at the extreme bottom of the travel. In neutral, the air pressure is locked in the brakes and air bottle.

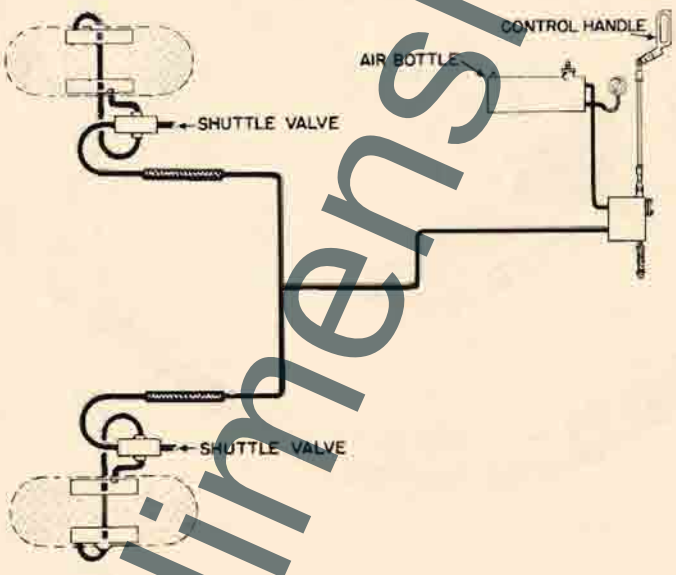
3. Apply braking action in a series of quick, sharp applications. If you apply the brakes continuously for two to three seconds most of the pressure will be transferred to the brake drums and the brakes may lock.
4. To release the brakes, move the brake handle all the way down. It will release pressure in the brakes only at the end of its travel.
5. After you accomplish one complete braking action and the plane stops, there should be a small residue of air still in the emergency air brake bottle. You can use brakes a second time only at a greatly reduced power.
6. You must depend only on the original braking actions and should, on coming to a stop, call the tower and have the plane towed in. Any attempt to taxi with the limited braking action available is extremely dangerous.

Warning

Placing handle in neutral position must be done by hand; the spring load on the handle will snap it into release position and exhaust the air pressure.

Chock wheels before brakes are released.

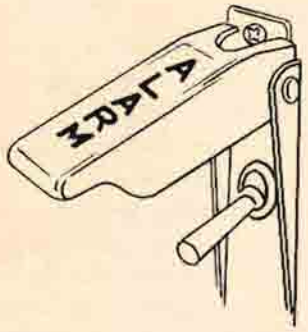
Bleed hydraulic brake system after using the air brake system.



Miscellaneous Emergency Equipment

ALARM BELLS

The alarm bells are located at all crew stations. A switch on the lower left section of the pilot's switch panel controls them.



LIFE RAFT

A life raft equipped with a CO_2 cylinder for instantaneous inflation is stowed in the upper forward left corner of the radio compartment. For proper use, see ditching.

LIFE PRESERVERS

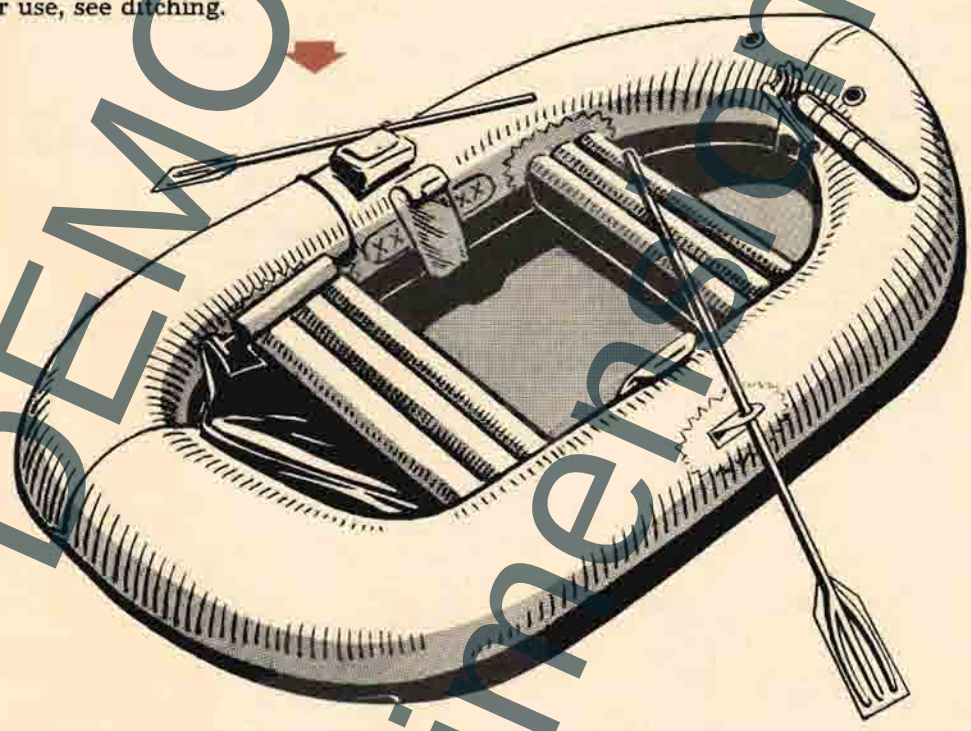
The back cushions on the pilot's and copilot's seats are filled with kapok and will serve as life preservers.

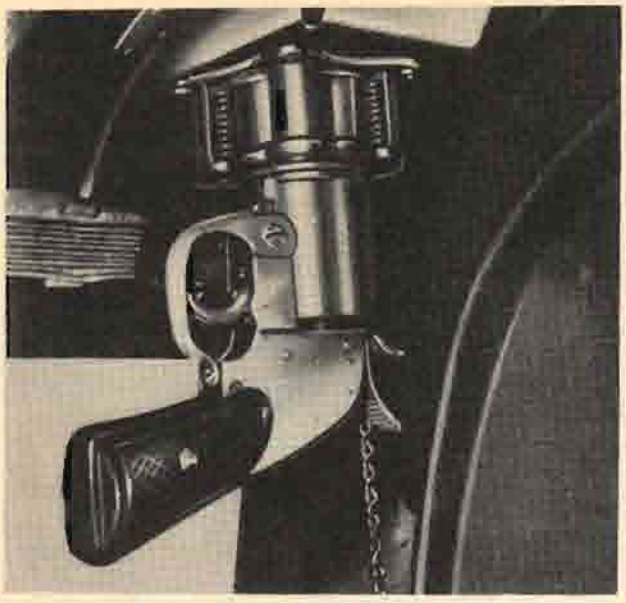
EMERGENCY FUEL PUMP

In late-series airplanes there is an emergency fuel transfer hand pump on the floor of the navigator's compartment. If the electric fuel system fails, you can transfer fuel from the bomb bay tanks to the wing tanks with this pump.

PYROTECHNIC SIGNAL PISTOL

On later planes, an M-8 type pyrotechnic pistol is stowed in a canvas holster in the navigator's compartment as loose equipment.





Warning

Don't load this pistol except when it has been placed in the mount provided in the upper left corner of the navigator's compartment.

RADIO DEMOLITION SWITCH

On later airplanes, a switch controlling the charge for demolishing the identification radio in an emergency is on the right instrument subpanel. Depress both buttons simultaneously to set off the charge.

HAND AX

There is a hand ax on the right side of the fuselage in the radio operator's compartment.

FIRST-AID KITS

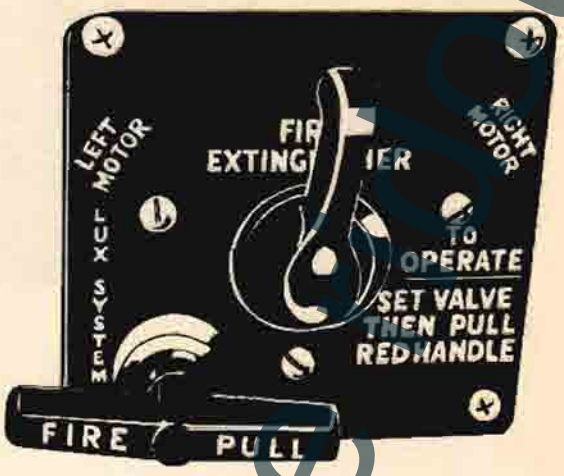
Two first-aid kits are provided, one on the left side of the navigator's compartment, the other on the right side of the radio compartment. The number of kits is often increased when the ship engages in tactical operation.

FIRE EXTINGUISHERS

FUSELAGE FIRE EXTINGUISHER

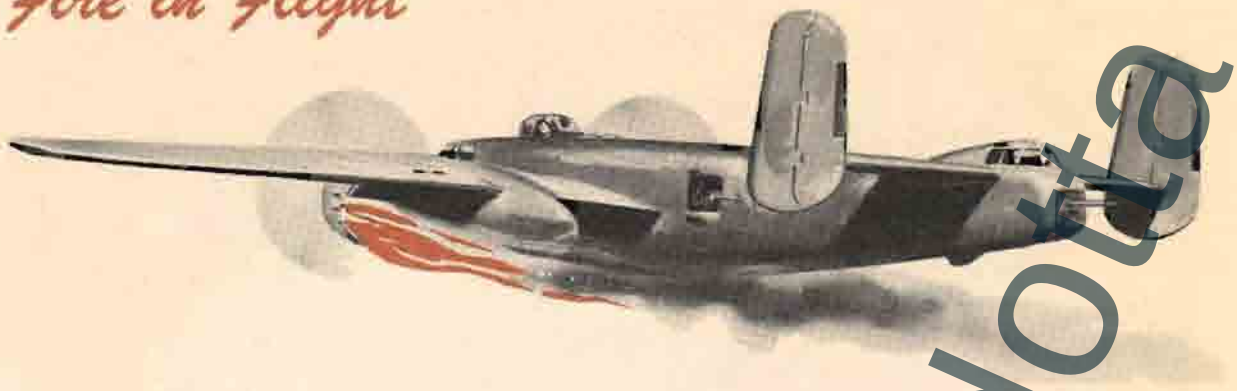
Carbon dioxide fire extinguishers are at the right side of the navigator's compartment and at the right side of the radio operator's compartment.

There is an engine fire extinguisher system for both engines. It is controllable from the copilot's station. A safety fuse for indicating a premature discharge is on the right side of the fuselage above the nosewheel.



FIRE EXTINGUISHER SYSTEM

Fire in Flight



The deadly enemy of all flyers is fire in the air. All aircraft fires have three main causes:

1. Fire caused by enemy action.
2. Engine fires.
3. Spontaneous combustion.

Enemy Action

The best advice on this is preventive advice. Get them before they get you! If enemy action starts a fire in one of your engines, use the following procedures for fighting it.

Engine Fires

Formerly a great many fires started in the carburetor. To combat a carburetor fire:

1. Cut off gas to the engine.
2. Mixture control in "IDLE CUT-OFF."
3. Throttle full forward.

This quickly empties the carburetor and exhausts the fuel that is burning. In most cases no other action need be taken.

At present, because of the many improvements in carburetion, few engine fires start in this manner. The most common cause today is the mechanical failure of some part.

An immediate use of your CO_2 bottle will only halt the fire momentarily. Don't use it until:

1. Gasoline cut-off valves "OFF."
2. Prop at "INC. RPM" to blow out the fire.
3. Open the throttle.
4. Feather the prop when the fuel runs out.
5. Cut switches after prop stops turning.
6. Now, if you need it, use the CO_2 bottle.
   a. Set selector switch to desired engine.
   b. Pull the handle. This discharges the CO_2 on the flames.
   (Open the cowl flaps before doing this.)

Don't under any circumstances try to re-start the engine under these conditions. Your CO_2 is exhausted and a recurrence of the fire will leave you with no defense at all.

The danger of fire, other than the natural hazard of the flame, is that the heat may melt or injure the control cables, wing spars, etc.

Do your best to combat engine fires, but don't stay with the ship so long that an explosion traps you.

Spontaneous Combustion

A good, clean airplane prevents spontaneous combustion. Clean off all oil and gas whenever it gets on, or in, a plane. Oily rags, etc., must not be allowed to accumulate. To combat such fires close off the compartment in which they are started and use your hand extinguishers.

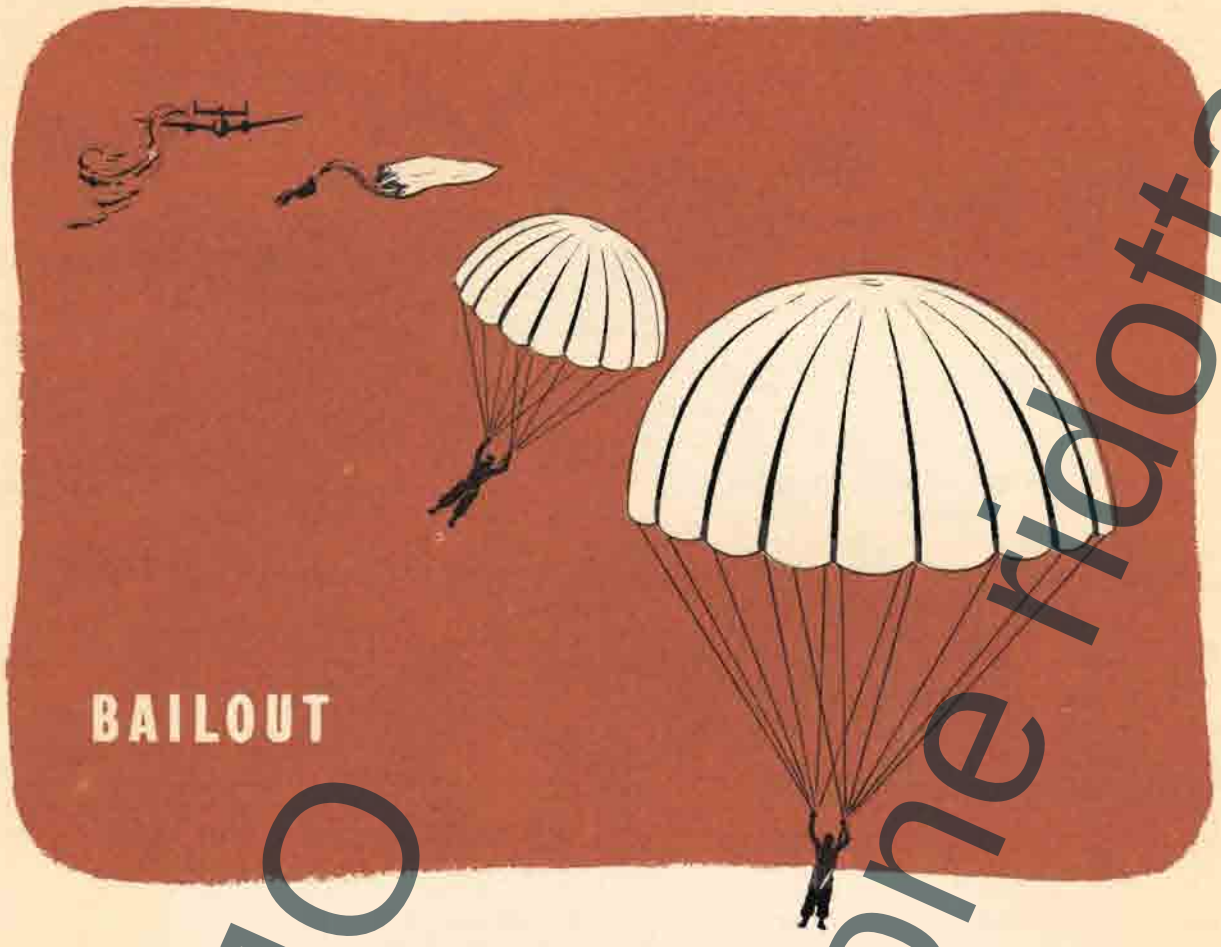
Electrical failures and shorts may cause fires. So if the seat of your electrical pants should start to smoke, take out the plug, take off the pants, and put out the fire.

Remove fuses from inverters, dynamotors, and instruments whenever the fire is localized.

On late-series planes automatic circuit breakers replace the fuses. Excessive heat breaks the electrical contacts and disconnects the source of trouble.

If flames are visible do not re-set the cut-outs.

To combat fire caused by enemy action use the techniques described above, depending, of course, on where they start.



Take good care of your parachute. Keep it clean and free of grease and moisture.

Preflight Your Chute Before Every Flight.

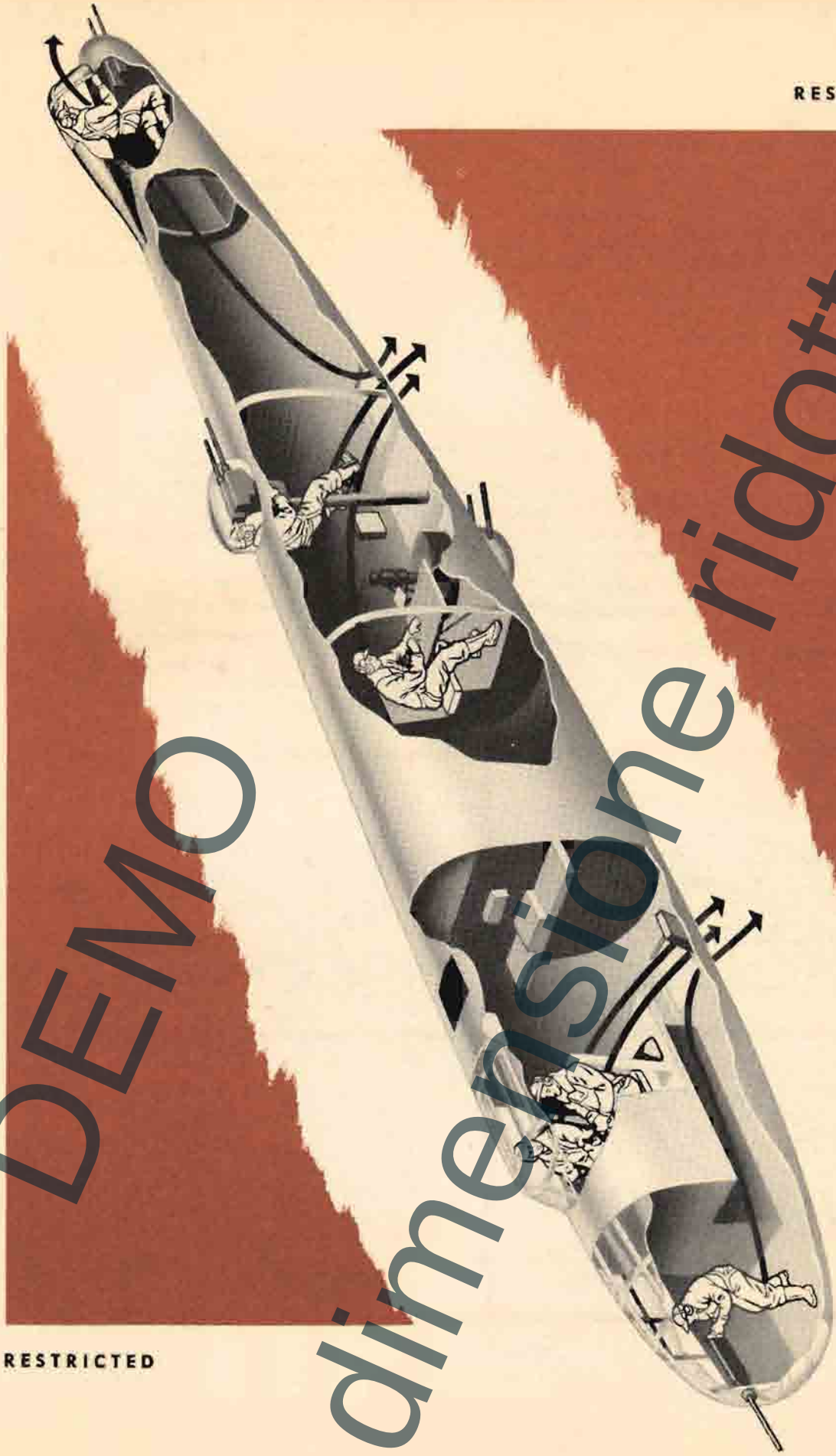
See that there are no loose threads, rips or tears in the case. See that the seal is intact, the release pins straight, and that the chute has been recently inspected and checked.

Instruct your crew in the use of their parachutes and on the necessity for instant obedience to the bailout order. A few seconds' delay at the escape hatch can easily prove fatal not only to the man who hesitates but to the rest of the crew.

You are the last man out. Have your crew well drilled and instructed.

Check with the ground crew on the condition and operation of the escape hatches. Spot checks show that these hatches are often overlooked on the periodic inspections.

EMERGENCY HATCH RELEASE



Procedure

When you decide that the ship must be abandoned, give the alarm by interphone and alarm bell, at which time the engineer and rear gunner release the emergency doors.

The first warning informs the crew that they must prepare to bail out.

The second warning is an order to the crew to jump. As each crew member gets ready to leave the plane, he advises you by interphone that he is leaving.

How To Jump

1. Face rear of ship and place hands on structure above rear of hatch.

2. Lower legs through opening. The slipstream will carry your legs up against the underpart of the fuselage. Twist your shoulder to the left to prevent injury to the head on the way out. Push away from the plane with your hands.

3. When you are sure that you are clear of the plane, look directly at the ripcord release and take hold of the handle.

4. Straighten your legs, keeping your feet together, and pull the release. In a low-altitude jump, pull the release as soon as possible.

For further information on bailout technique, consult your **Pilot's Information File.**

The order in which the crew leaves the plane is as follows:

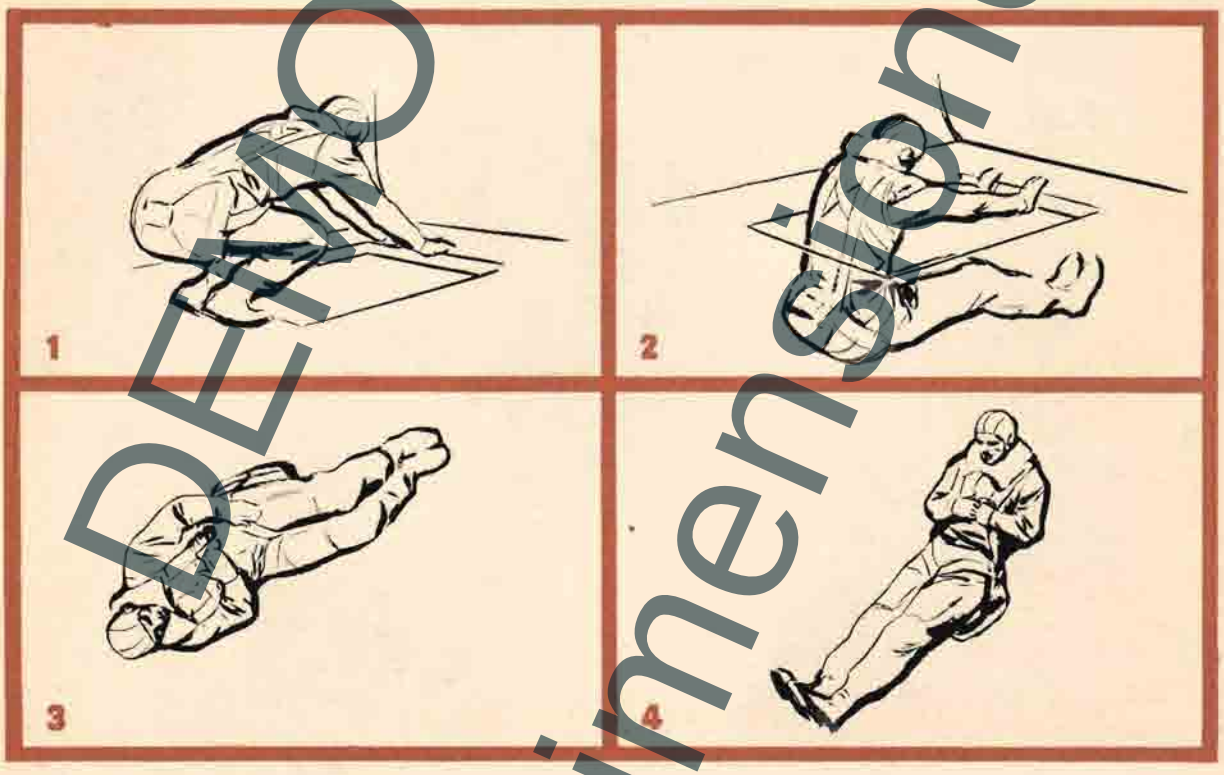
Forward Hatch: 1. Engineer
2. Bombardier-navigator
3. Copilot
4. Pilot

Rear Hatch: 1. Gunner
2. Radio operator.

If you have had a hydraulic failure, be sure that the bomb bay doors are not partially open when you jump. These doors fall open ⅔ of the way when the hydraulic system loses its pressure.

Procedure for Reclosing Bomb Bay Doors

1. Open inner door—this door will not open with the bomb bay door crank installed.
2. Install crank on coupling.
3. Close doors and fasten crank to floor.
4. Complete bailout procedure.



FORCED LANDINGS

Forced landing in the B-25 is at best a difficult job. Fortunately, the B-25's exceptional single engine ability will bring you home unless you have a failure of both engines. You will seldom need to set down in rough country.

Many pilots have made successful landings in wild, rough country. You can get some valuable tips from their experiences.

Never land wheels-up except on a known airfield. Soft ground, plowed fields, ridges, and gullies cause the plane to nose over and tear up, and increase the fire hazard tremendously.

If you make a belly landing the plane will in most cases toboggan over the ground and escape serious damage.

Although the shock and deceleration are less than in a forced landing at sea, they are great enough to necessitate bracing for the impact. Brace and cushion yourself as well as you can. You will save yourself from some hard knocks, if not more serious injuries.

Pick your spot carefully. If you have any control over where you are to land, pick a spot near a road, phone line, small town, or other settlement. This will insure immediate medical attention or quick communication if medical aid is not on hand.

Prepare the Plane

Throw out excess weight, thus lowering the landing speed.

Throw out loose objects to prevent them from flying through the plane on impact.

Keep first-aid kits on your person. In case of fire they will not be forgotten and burned.

Open the escape hatches to prevent jamming on impact.

Inflate your Mae West to help you absorb the shock of landing.

Prepare the Crew

Remove loose cords, parachute harness, radio cords, etc.

Fasten safety belts and shoulder harness.

Proceed to crash stations and remain throughout landing.

Landing the Plane

Make a normal full-flap approach to the landing.

Do not feather propellers unless it is necessary to stretch the glide. If the props are feathered, the tips will not bend aside on impact but will dig into the ground, rupturing wing tanks

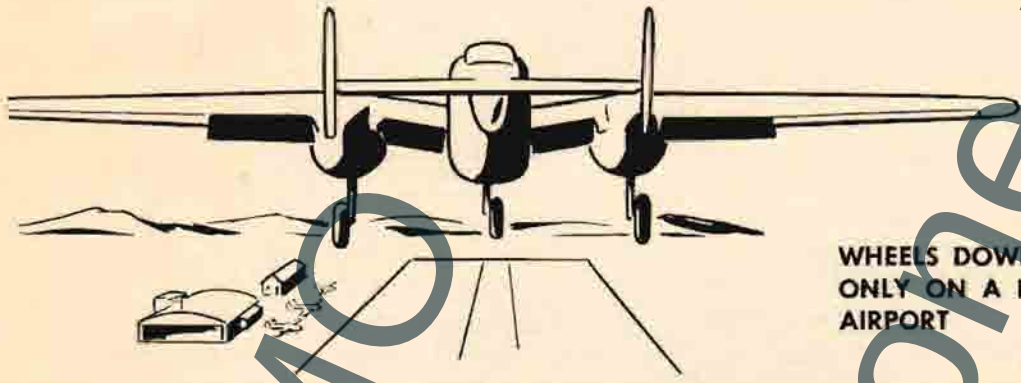
and engine mounts and adding to the fire hazard. They may also break and throw tips through the fuselage, creating an unnecessary hazard from the flying metal.

Keep wheels up. Remember, however, that the reduced drag from the wheels in a raised position will increase the normal gliding distance of the plane. Make allowances for this in your landing. Don't make a turn close to the ground at low airspeed. Plan your approach to land straight ahead. Before touching down, cut all switches to reduce the fire hazard.

Make a nose-high landing, but do not exaggerate the attitude to the point where there is danger of throwing the nose into the ground when the tail strikes.

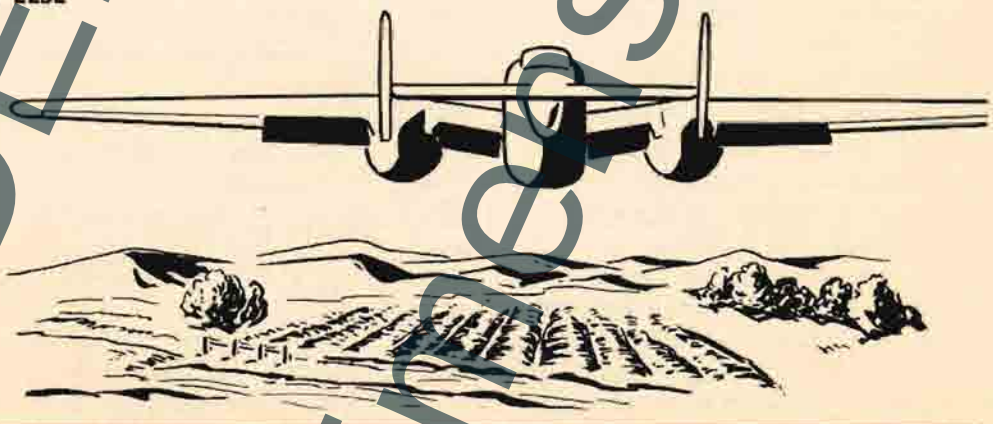
Call the roll immediately after leaving the plane. Be sure that no one is left inside in a dazed condition. In the excitement it is easy to lose a man for a few seconds. If the plane starts to burn this may be long enough to prevent his rescue.

Crash stations are the same as those used for ditching.



WHEELS DOWN
ONLY ON A KNOWN
AIRPORT

WHEELS UP
ON ANYTHING ELSE



Ditching

With the tactical needs of World War II calling for the operation of land planes over vast stretches of water, airmen faced a new hazard: ditching—the forced landing of land planes at sea.

From the analysis of actual ditching reports, plus the results of tests made with scale models, there has come a body of information so comprehensive that today ditching is a matter of tried and proven procedure.

Like any procedure, it must be practiced to be effective. Safeguard yourself and your crew by consistent practice.

Successful ditching depends on the speed and efficiency with which each crew member carries out his duties, and on the coordination of all efforts.

The two major factors which may necessitate ditching your airplane are lack of fuel and mechanical failure. It is well to bear in mind, however, that many ditchings have been avoided by thorough knowledge of the airplane and its characteristics under all conditions.

When To Ditch

Start preparation for ditching as soon as you feel the slightest doubt that your mission will be completed successfully.

You are responsible for the welfare of your crew. It is your duty to see that they are prepared well in advance of the actual ditching.

Do not delay your decision too long. Your crew must have as much time as possible to prepare. Once your decision is made, notify the crew by interphone and the alarm bell "Prepare to ditch!"

Radio Procedure

Start emergency radio procedure immediately. Your best chance for rescue lies in correct and speedy radio procedure before ditching. Radio operator and pilot must fully understand the specific radio procedure in their particular theater of operations.

If you transmit distress signals that you are ditching, but are lucky enough to make land,

fuselage and may snap the nose into the water violently before the plane can lose its excess speed.

Escape Procedure

Front Cockpit

1. Copilot—through top escape hatch. Check, or manually release the life raft. Proceed to the rear of the plane to assist men in their escape.

2. Pilot—through top escape hatch. Aid the crew members in the front cockpit to escape. Take parachute to raft.

3. Engineer—through top escape hatch. Stand by to assist pilot and navigator. Carry equipment to the raft.

4. Navigator—through the top escape hatch. Stand by to assist pilot. Carry equipment to raft.

Rear Compartment

1. Radio operator—through lower right escape hatch. Take equipment to the raft.

2. Gunner — through lower right escape hatch. Take equipment to the raft.

COLD WEATHER OPERATIONS

Cold weather operations bring visions of long arctic nights, glaciers, Eskimos, and stories you have heard of the Far North.

But it is well to bear in mind that during the winter months many sections of the United States have climatic conditions requiring just as much specialized maintenance as the Arctic.

Granted that the conditions are not as severe, it is still important that you know how to care for your plane.

Starting Engines

Make a normal start by following the procedure on the pilot's checklist. If you have trouble starting the engines, take the following supplementary measures:

1. Pull the props through about 15 blades before engaging the starter. The engines will need a lot of priming for a cold weather start. If possible use external power for cold weather starting.

2. If the engine fails to start, check plugs for moisture. Make another attempt to start the engine when the plugs are dry.

3. Always make a normal start before using the oil dilution system. If, after the engines are running, your oil pressure is too high or is fluctuating and drops off when the rpm is increased, dilute the oil. (See dilution procedure under After Landing.)

Note: Use this method only if time and extreme temperature conditions do not permit normal engine warm-up.

4. Do not run the engines at more than 1200 rpm until the oil has reached a temperature of 20°C.

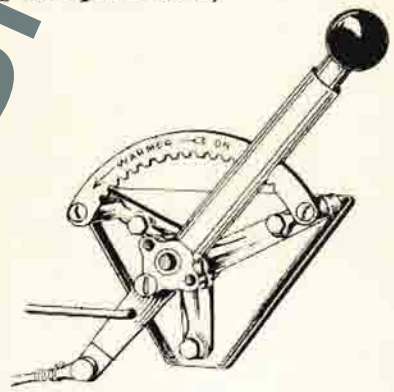
5. If icing conditions exist, place carburetor air control handles in "ICING" until the induction system is free of ice.

Takeoff

1. Never take off if there is any snow, ice, or frost on the wings. Even the thinnest layer of frost may cause loss of lift and treacherous stalling characteristics. In extreme conditions it may be necessary to taxi out to the takeoff position before removing the protective covers from the flight surfaces.

2. In ordinary operation, carburetor air controls should be in "NORMAL" for takeoff. In extremely cold weather, however, it is often advisable to place carburetor air control in "ICING" during takeoff to insure proper fuel vaporization.

(You will seldom find these extreme conditions in the continental United States. In arctic zones, consult experienced pilots before employing this procedure.)



Warning

Your cabin heaters must be "OFF" before takeoff.

Flight

1. Your anti-icing and de-icing equipment is primarily intended as a means of getting you out of icing levels. Don't fly in icing levels any longer than is absolutely necessary.

2. Check your free air temperature gage before any flight where ice is anticipated.

3. After taking off from snow or slush-covered fields, operate the landing gear and flaps through several cycles to insure against the gear and flaps freezing in the up position.

4. Turn the pitot tube heater "ON" when moisture is present. Pitot tube heat should not be applied until the airplane is on the takeoff run or actually in the air, as there is insufficient cooling in the pitot head while the plane is stationary. **Note:** With pitot tube heat "ON" your magnetic compass may oscillate as much as 15°.

ANTI-ICING

Emergency provision is made to prevent ice formation on the propellers, and on the bombsight window by an alcohol anti-icing system.

The alcohol anti-icing system has two supply tanks, one in each engine nacelle against the outboard wall. They carry isopropyl alcohol. The tank in the right-hand nacelle has a capacity of 10 gallons and supplies fluid through separate line systems for anti-icing of the propeller blades and the bombardier's window. A standpipe reserves 1.5 gallons for the bombsight window after the supply for the propellers is exhausted. The tank in the left-hand nacelle is used for carburetor de-icing. It is similar to the one in the right nacelle except that special inter-rib recesses on the outboard side increase the capacity to 15 gallons. Each system has its own pump, filters, and check valves to keep the fluid readily available near the point of application and to prevent draining of the fluid during dives.

There is no fluid level gage inside the airplane. The fluid level is checked by means of overflow plugs mounted on the tank.

Propeller Anti-Icing

Conventional slinger rings are provided for the propellers. A fluid metering pump in the right-hand nacelle forward of the tank is controlled by a rheostat on the pilot's switch panel. With a slight turn to the right, the control operates the pump at its maximum speed. Further rotation of the control to the right reduces the speed of the pump to any desired volume. The pump is capable of supplying from .36 to 3.17 gallons per hour to each propeller ring.

Whenever icing conditions are encountered, start the pump immediately in order to supply sufficient fluid to coat propeller surfaces before ice formation if possible. However, if ice has already formed—as indicated by rough engine performance – turn the rheostat to fast-flow position until the ice has been removed and the engines run smoothly. Then turn the rheostat to a position which will supply sufficient fluid to prevent further ice formation. Use the fluid as sparingly as possible. Remember that the capacity of the supply tanks is only 10 gallons. Keep in mind the length of time you may have to use the pump and the fact that the fluid in the reservoir must also be kept available for anti-icing the bombardier's window. During missions on which the bomb window anti-icing system is not needed, the fluid supply in the reservoir is sufficient for 1 hour and 20 minutes' continual operation with the rheostat turned to the fast-flow position. At the minimum flow setting, the supply will last for 11 hours and 48 minutes.

Bombsight Window

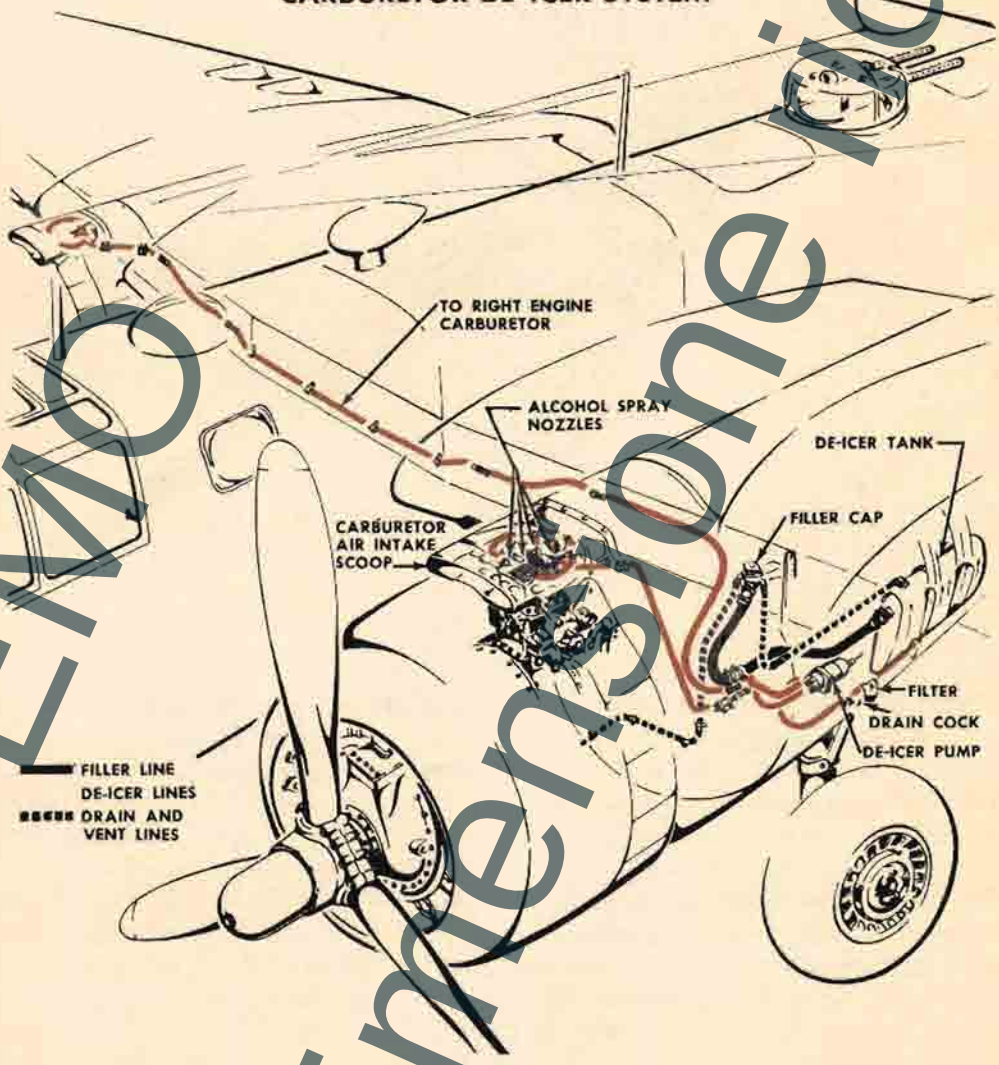
The bombardier's compartment window has perforated anti-icing tubes across the top of the center panel, plus a vertical wiper assembly. Fluid for the spray tube comes from the same tank used for the operation of the propeller anti-icer. The available supply includes the 1.5 gallons reserved by the standpipe within this tank. A rheostat control mounted forward of the instrument panel on the left side of the bombardier's compartment regulates fluid flow.

The check valve in the fluid supply line to the bomb window tubes is in the compartment ceiling and is readily available to the bombardier should minor adjustments be necessary during flight. Turning the visible screw to the right restricts the rate of flow.

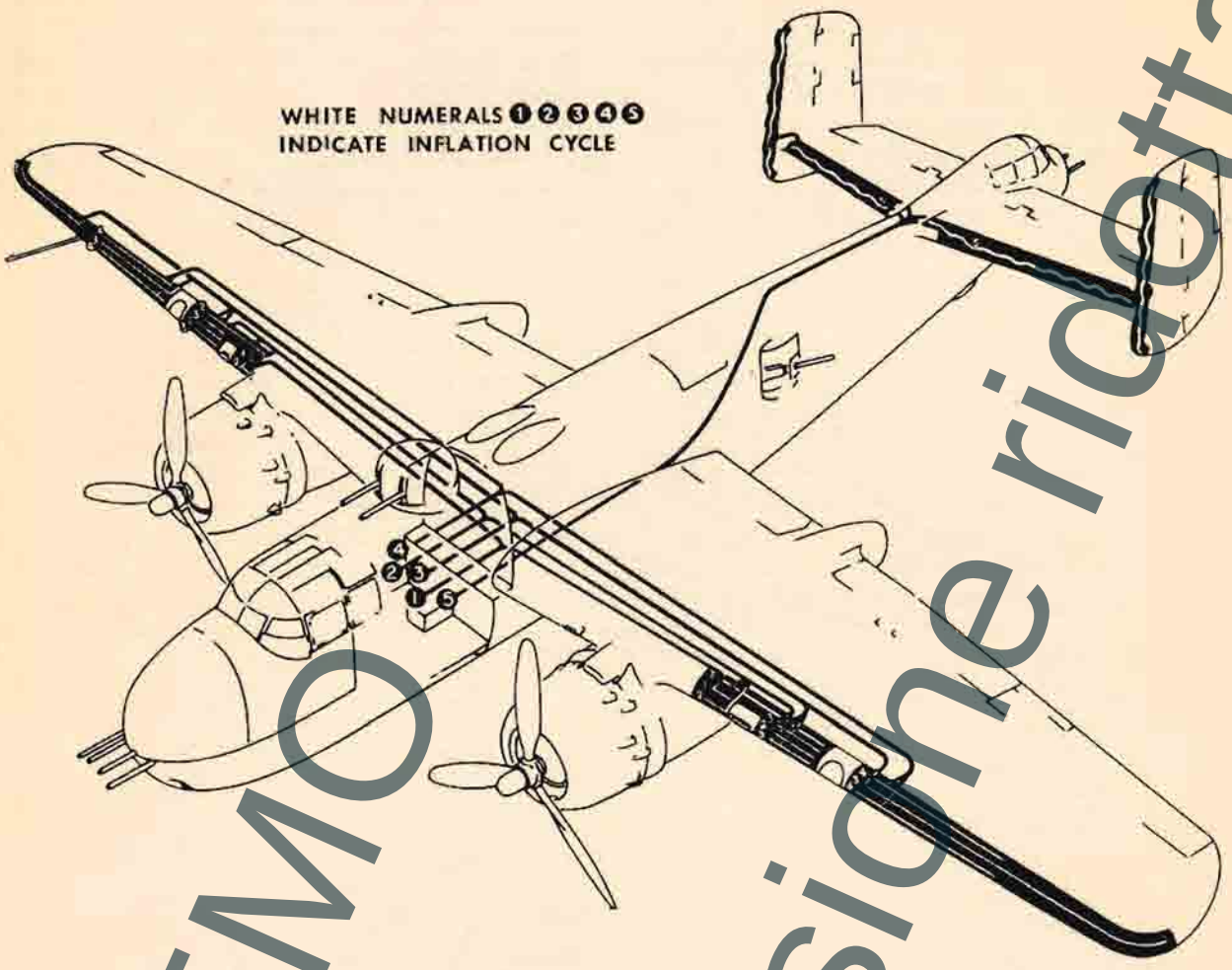
The electric motor which drives the windshield wiper through a flexible cable assembly is controlled by two switches in the lower left corner of the box control panel. The first switch may be set to "FAST" or "SLOW" and the motor turned "ON" by means of the second switch. To prevent injury to the motor or the wiper, the switch must not be turned "ON" while the bomb window is dry.

The installation of this equipment precludes the use of a pilot's windshield spray. A field service installation may, however, be made on these aircraft to provide a clear-vision windshield. This is a 6-ply, chemically treated glass window. The outboard sections are in a neutral pressure area and may be removed in extreme icing conditions to provide direct vision ahead.

CARBURETOR DE-ICER SYSTEM



SURFACE DE-ICER SYSTEM



Conventional air-inflation de-icer boots are mounted on leading edges of wings and empennage. A rotary distributor valve in the well of the navigator's compartment furnishes air to the boots in a 5-phase cycle every 40 seconds.

When the de-icer system is not in operation, suction provided by the vacuum pumps on both engines prevents aerodynamic negative pressures from raising the de-icer boots.

Operation of the surface de-icing system is automatic when the control is turned "ON."

There is a pressure gage for the de-icer system in the rear of the navigator's compartment. This gage should read approximately 7 lb. sq. in. under normal operating conditions. Should the pressure go above 10 lb. sq. in., the maximum pressure, immediately turn the control "OFF" and check for the difficulty.

Caution: Do not operate the de-icer during landing or takeoff. Never operate the de-icer system at speeds above 230 mph; negative pressure on leading edge of wings will expand the de-icer boots, causing them to rupture.

DEFROSTING SYSTEMS

The pilot's windshield section, bombardier's bombsight window, bombsight, and the navigator's astrodome can be defrosted by warm air from the airplane heating system. The bomb bay window, the astrodome, and the pilot's windshield receive heat whenever the heating system is on.

The bombsight warm air supply is controlled by a lever on the defrosting tube located on the left side of the bombardier's compartment.

There is a door for cleaning the bombsight window. When not in use, the bombsight defrosting tube can be stowed in clips along the left side of the bombardier's compartment.

When not in use, the end of the astrodome defroster tube can be stored on the left side of the navigator's compartment directly inboard of the window on the upper longeron. To use it, attach the end of the tube to the nozzle permanently installed in the astrodome, or place it in the alternate position by hooking it to the rear of the astrodome.

There is a flexible auxiliary defrosting tube on the floor of the pilot's compartment at the base of the control column. You can remove the free end from the storage clip and extend it as needed for defrosting the interior of the top side windows in the pilot's compartment. The push-pull selector control on the lower panel in front of the copilot directs the flow of air either to the windshield or to the auxiliary defrosting tube.

Special blowers assist the flow of air to the pilot's compartment defrosting system and to the bombsight window in the bombardier's compartment. Switch controls for the blowers are on the pilot's switch panel and on the bombardier's control panel.

This heating and defrosting system is slightly modified and adapted for the different series of B-25 planes. There are no provisions for heating or defrosting the nose of the series G and H planes, and other slight changes occur in other models. Information on these changes may be found in the T.O.'s for these planes.

HEATING SYSTEM

The airplane has two independent heating systems; one for heating the navigator's, pilot's, and bombardier's compartments, the other for heating the radio operator's compartment and the interior of the fuselage aft of it. Each system has a Stewart-Warner heater burning a mixture of fuel and air. The forward heating system will operate only when the left engine is running, and the aft system only when the right engine is running.

The heater for the forward system is in the left wing center section and a system of hot air ducts leads forward along the left wall of the fuselage. The pilot may obtain more air at high altitude and slow airspeed by operating the air flow control at the left side of his seat. The air travels from the intake scoop on the leading edge, through the heaters, to valve equipped outlets in each forward compartment.

Controllable cold air scoops are provided for the pilot, copilot, and bombardier.

Do not open any of the three escape hatches during flight to obtain ventilation. The drag these open hatches create lowers the efficiency of the plane and in some flight attitudes will cause unstable flight characteristics.

A direct control for the aft heater system, mounted on the heater itself, is just aft of the lower turret on the left wall of the radio operator's compartment.

There is also a master control switch on the pilot's switch panel for emergency use and to aid the pilot in keeping the heater off during takeoff and landing. The flexible tube leading from the blower and heater unit heats the interior of either the upper or lower turret.

The heating and ventilating system is designed so that you can always obtain hot or cold air when either heater is on or off, respectively, by opening air outlets in the compartment. The temperature of the air is regulated by the air temperature control in the navigator's compartment, which sets the heater in operation and governs its heat output. Both the air temperature control and the pilot's air flow control regulate the heating and defrosting air simultaneously.

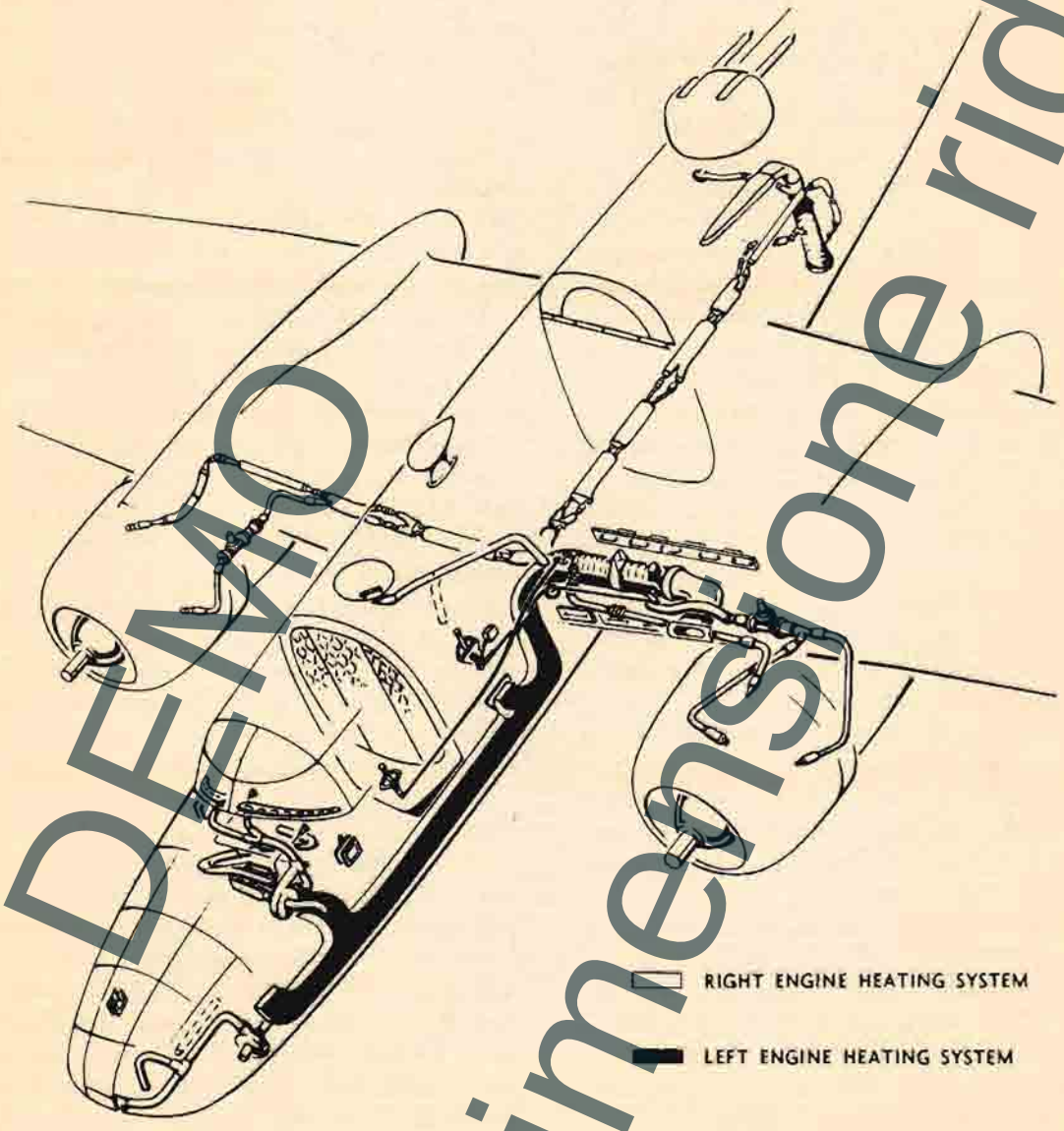
The first movement of the heater control in the radio operator's compartment actuates a micro-switch turning the heater igniter on and starting the blower. Additional movement of the control opens the heater throttle for additional heat output.

The heater in the left wing center section will automatically shut off its heating chamber if it becomes too hot, and will re-start when the temperature lowers.

If the temperature in the wing compartment that contains the heater becomes too high, the heater will automatically shut off but will not re-start until it has been serviced.

Warning

WHEN TAKING OFF OR LANDING, IN ORDER TO HAVE FULL POWER AVAILABLE, HEATING SYSTEM MUST BE OFF.



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