

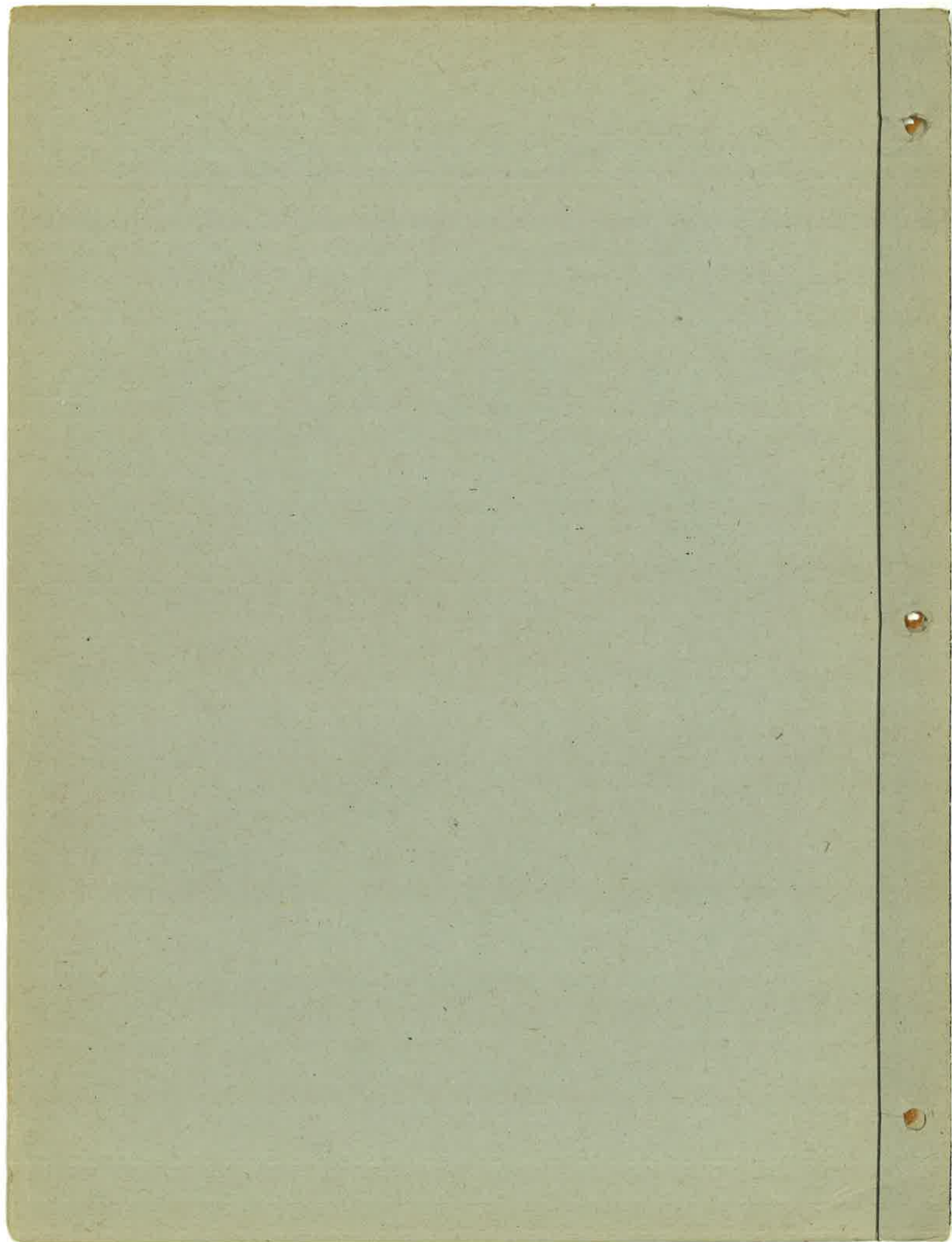
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B-26
D-40

PILOT TRAINING MANUAL FOR THE



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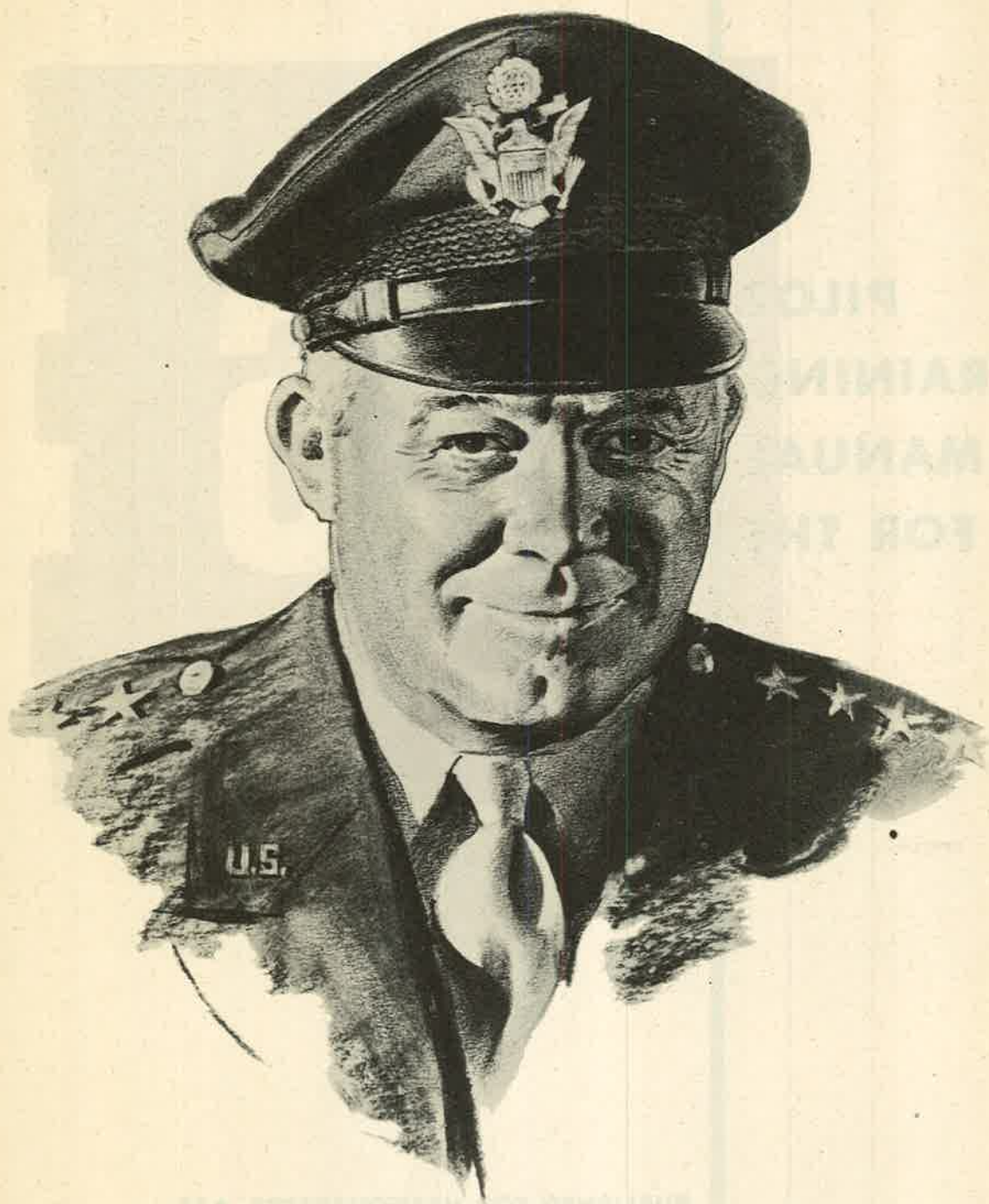
**PILOT
TRAINING
MANUAL
FOR THE**

B-26

PUBLISHED FOR HEADQUARTERS, AAF

OFFICE OF ASSISTANT CHIEF OF AIR STAFF, TRAINING

BY HEADQUARTERS, AAF, OFFICE OF FLYING SAFETY



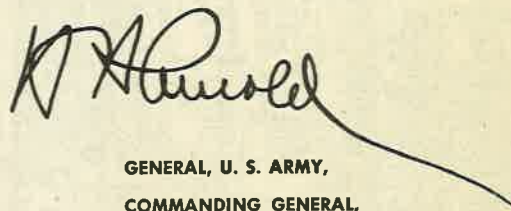
Foreword

This manual is the text for your training as a B-26 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 duty 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.

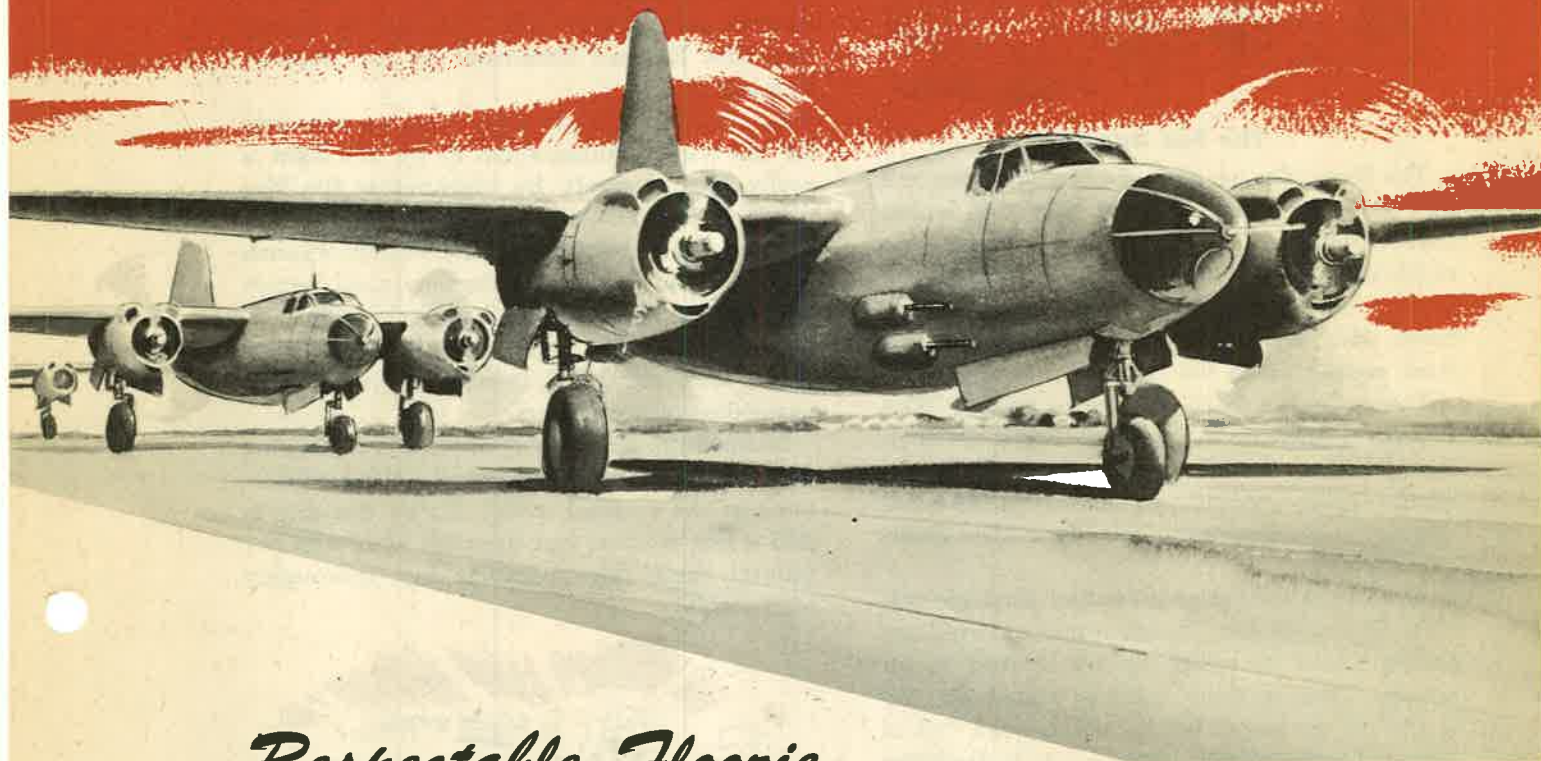
This training manual does not replace the Technical Orders for the airplane, which will always be your primary source of information concerning the B-26 so long as you fly it. This is essentially the textbook of the B-26. Used properly, it will enable you to utilize the pertinent Technical Orders to even greater advantage.



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



THE B-26



Respectable Floozie

Reprint from Time Magazine—January 31, 1944

Allied bombers were back again, plowing and harrowing the "secret-weapon," "rocket-gun," "special-military" coast of France. The most successful aircraft on the job was a plane that had just lived down an unjust but bad reputation: the U. S. Martin Marauder.

Marauder pilots swept in day after day, returned with astonishingly low losses. The operation was all so brisk, business-like and efficient that it was hard to remember that the sleek, cigar-bodied B-26 had come close to being washed up as an unruly failure, not many months ago.

Good piloting and crack operations have changed all that. In the European Theater, the

B-26's operations have been almost monotonously successful. Its rate of loss on missions runs around 0.3%, lowest in the theater. Early this month it set a record of 1,500 sorties by individual planes, without a loss. The Air Forces top command, which had expected to taper off production, this week let the Glenn L. Martin Co. announce that B-26 contracts were being increased, instead.

Among Army airmen major credit for the Marauder's comeback goes to slim, youthful (38) Brigadier General Samuel E. Anderson, commander of the Marauder squadrons in Britain. Within 6 months Anderson and his staff reshaped the Marauder outfit from a misused, ineffective stepchild into a high-stepping member of the Eighth Air Force.

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The Bad Name

The Marauder never was a dog, but someone had given it a bad name. It bore the double onus of being a floozie, and from the right side of the tracks; the B-26 emerged in 1940 from the highly regarded Glenn Martin plant at Baltimore, Md., but its detractors thought it had been rushed along too fast.

Presently the B-26 was being called "The Flying Prostitute" (because some airmen thought that the 65-foot wingspread, for so much airplane, constituted "no visible means of support"). By derivation, it became "The Baltimore Whore."

Air Forces men gave it another sardonic tag, "The Widow-Maker." Student pilots started out joking about it, ended up by scaring themselves. Training-field crashes added to the legend of the ship's habits; she needed "all of Texas" for the takeoff; she came in to land like a cold flat-iron; she stalled like a Model T Ford running on kerosene. All that and much more.



On the credit side, the B-26 did have a good combat record in the Pacific, where it pounded Jap ships and supplies. But the first squadrons to reach England last year ran into hard luck again.

The Conversion

Sam Anderson decided first that too much had been expected of the plane. Overzealous publicity had led the Air Forces to expect a miracle ship with fighter-plane speed and Fortress carrying capacity. Anderson scrapped all previous notions, treated the ship as a medium bomber for medium altitudes, got it moved from the Bomber Command to Air Support Command.

He installed a rigid daily training schedule for his crews, taught them to fly and fight a really "hot" aircraft. By midsummer the Marauders tackled the broad assignment of pounding the Luftwaffe's northwestern French airfields. By October Anderson could report that the enemy squadrons had been pushed inland 40 miles. He kept at it, developed new tactics for evading flak, trained his bombardiers to needle-point precision.

Meanwhile, Martin engineers were carrying out recommendations for nearly 100 modifications in the original model. Today the ship is still a fast woman, but the men who take her around these days consider her thoroughly respectable.



One of the proudest boasts cocky Maraudermen now toss around is this: "She's a man's airplane—separates the men from the boys."

In England recently some U.S. pilots, inordinately proud of their hot sweetheart, were enlarging on this theme while two B-26's planed in, landed and taxied back to the line. One airman gazed fondly at the sleek Widow-Maker. "Yep," he said, "it's a man's airplane."

On the line, the two newly arrived Marauder pilots climbed out. They were blue-uniformed girls of the British Air Transport Auxiliary.



"FIRST HUNDRED"

Reprint from Time Magazine—May 22, 1944

Just before dark, the sleek, fast B-26 Marauder circled her English air base and slipped in to a smooth landing. Technical Sergeant William L. Stuart, a taciturn, red-haired Texan, heaved an eloquent sigh, rubbed his grease-stained hands together, got out his tools and prepared to go to work.

The ship rolling up to his dispersal station, the "Mild & Bitter," had just made history: she was back from her 100th combat mission. Sergeant Stuart, her crew chief, had sweated out every one of the 100 for her; now he would check her over and get her ready for Mission 101. "Mild & Bitter" thus joined the select company of famed warplanes of World War II—planes like the embattled Fortresses "Memphis Belle" and "Hell's Angels," and the R.A.F.'s Lancaster "S for Sugar."

Quiet Type

But "Mild & Bitter" had no record of hair-raising escapes. Her saga was one of good luck and almost monotonous efficiency. She had lugged 166 different airmen to battle; 26 were decorated, but not one got a Purple Heart. During her robust career she acquired some 50 flak holes, but never any damage that Bill Stuart and his ground crew could not repair overnight.

On her first combat flight, last July 28, she

led a sweep over Abbeville; the 100th mission was to bomb an airfield at Evreux, near Paris. In between she had taken the targets as they came; power plants, E-boat pens, air bases, all around France up to Holland and back. She still had her original Pratt & Whitney, 2000 Hp engines. No one had picked any soft spots for the ship, even when she neared her record. Her last two missions were done between dawn and sunset, her last four in 36 hours.

Successful Type

Ninth Air Force men were proud of "Mild & Bitter," proud also that her performance so well underlined the striking success in the European Theater of the whole B-26 Marauder type. Once regarded by many airmen as a hot and dangerous aircraft, the B-26 has proved to be the outstanding medium bomber of the European air war. Its combat losses (less than 0.3%) are the lowest in the theater.

Crew Chief Stuart (who named the plane after hearing Englishmen ordering their pints of mild & bitter in a local pub) tried hard to think of something spectacular that had happened to the ship. On one raid, it is true, a burst of flak fountained up right through the open bomb bay. Hot steel fragments rattled against cold steel bombs with a hellish din. But nothing happened.

The record of the B-26 is equally good in all other theaters of operations.

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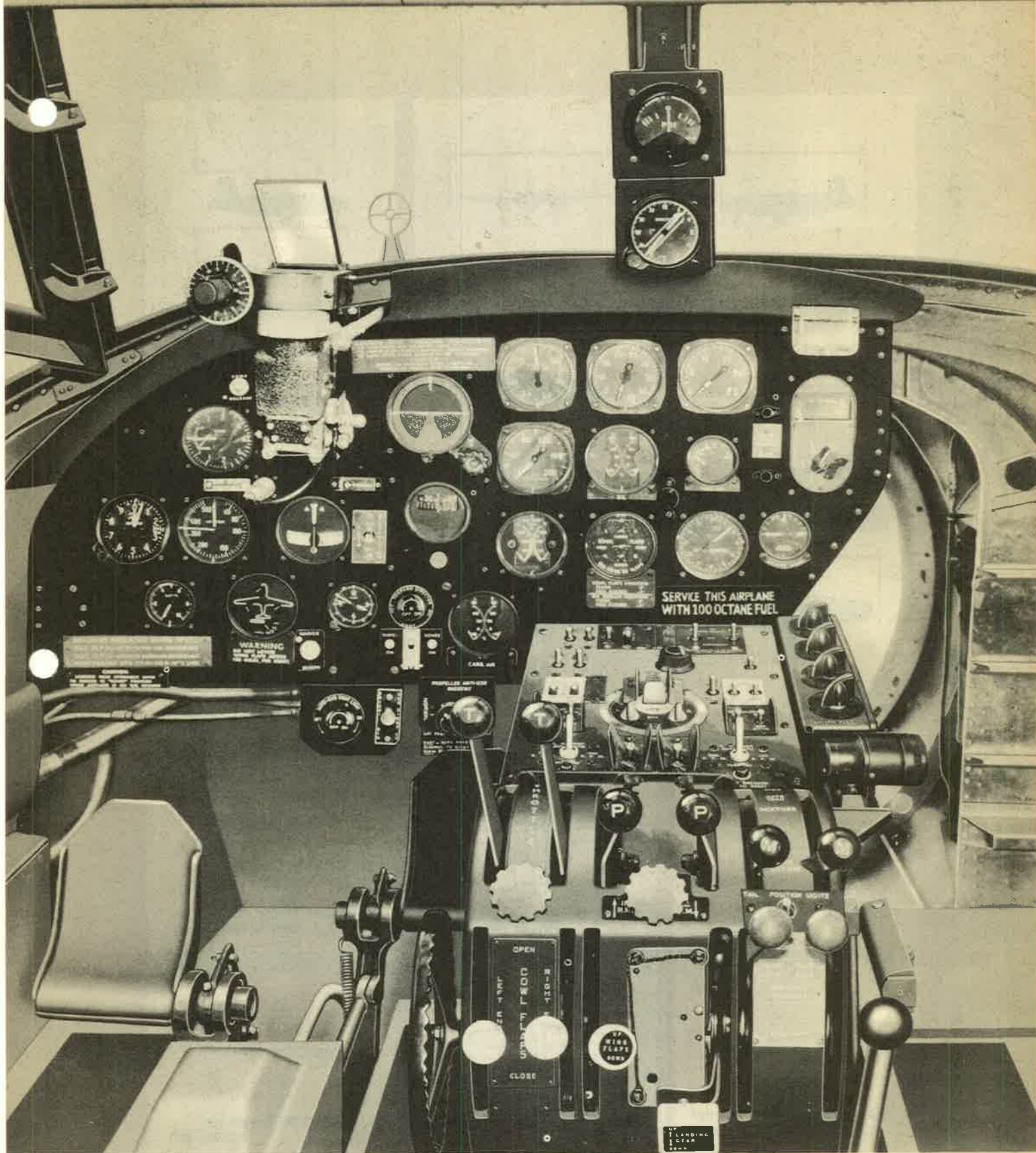
SECTION

1

THE AIRPLANE

INTERIOR ARRANGEMENT AND CREW POSITIONS





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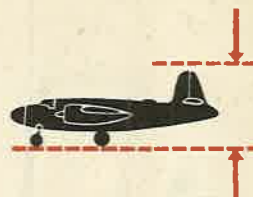
DIMENSIONS



LENGTH 58'2"



SPAN 71'0"



HEIGHT 21'6"



DIHEDRAL 1°17'



WING INCIDENCE
B1&C, 3°30' - F&G, 7°



HORIZONTAL STABILIZER
INCIDENCE -5°



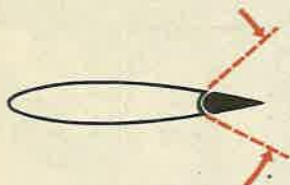
STABILIZER SPAN 28'0"



DIHEDRAL 8°



AREA WINGS 664.1 SQ. FT.



AILERONS, UP 20° OR 8"
DOWN 15° OR 6"



RUDDER, RIGHT 25° OR 21"
LEFT 25° OR 21"



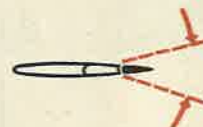
ELEVATORS, UP 20° OR 12.5"
DOWN 12° OR 7.5"



AILERON TABS, UP 15° OR 1.25"
DOWN 15° OR 1.25"



RUDDER TAB, RIGHT 15° OR 1.5"
LEFT 15° OR 1.5"



ELEVATOR TAB, UP 10°
DOWN 20°

DESCRIPTION OF THE B-26



The articles from Time Magazine tell the story. They admit that at one time there was a lack of know-how, a lack of understanding of the B-26. She was a misunderstood wench. That lack of know-how and that misunderstanding are things of the past.

The B-26 is generally considered the world's outstanding medium bomber. It is a 2-engine, high-wing, all-metal product of the Glenn L. Martin Co. Known popularly as the Marauder, the B-26 is powered by two Pratt & Whitney R-2800-43 engines, and is pulled through the air by two electrically controlled Curtiss electric propellers. The propellers are 4-bladed, full-feathering.

The B-26 has a tricycle landing gear, which is hydraulically operated. The main landing gear retracts forward and up into the engine nacelles. The nose gear retracts backward and up into the well under the pilot's floor. The hydraulic system also operates the bomb bay doors, brakes, wing flaps, cowl flaps, oil cooler shutters, and carburetor air controls.

Controls of the conventional dual type are installed. The pilot's rudder pedals incorporate brake pedals.

Depending on the model, either eleven or twelve hard-hitting .50-cal. M-2 machine guns are installed. One flexible gun is mounted in the transparent nose, two in the waist compartment, two in the electrically operated Martin deck turret, and two tail guns mounted in a hydraulically operated Bell turret. All these guns are aimed and fired manually. You, as pilot, have fixed guns that you aim and fire just as if you were flying a fighter. Four fixed package guns are mounted along the fuselage. A fifth fixed gun may be mounted in the bombardier's compartment.

If a good offense constitutes a good defense, you have defense to spare in the B-26. This tremendous amount of firepower that you are able to use against the enemy is one of the big reasons why B-26 losses have been so low, while the bag of enemy planes has been high.

The bomb bay is in the center section of the fuselage, and will hold more than 2 tons of bombs.

The forward section of the fuselage accommodates the pilot, copilot, navigator-bombardier, and the radio operator. The aft section includes stations for the waist gunner, the deck turret gunner, and the tail gunner. You enter the forward compartment through the nose-wheel well, and the aft section through either of the side hatches of the waist compartment.

Throughout this manual reference is made to four series of B-26 airplanes.

1. The B-26B-1 refers to the long-wing models produced at Baltimore, from the B-26B-10 to the B-26B-55, inclusive.

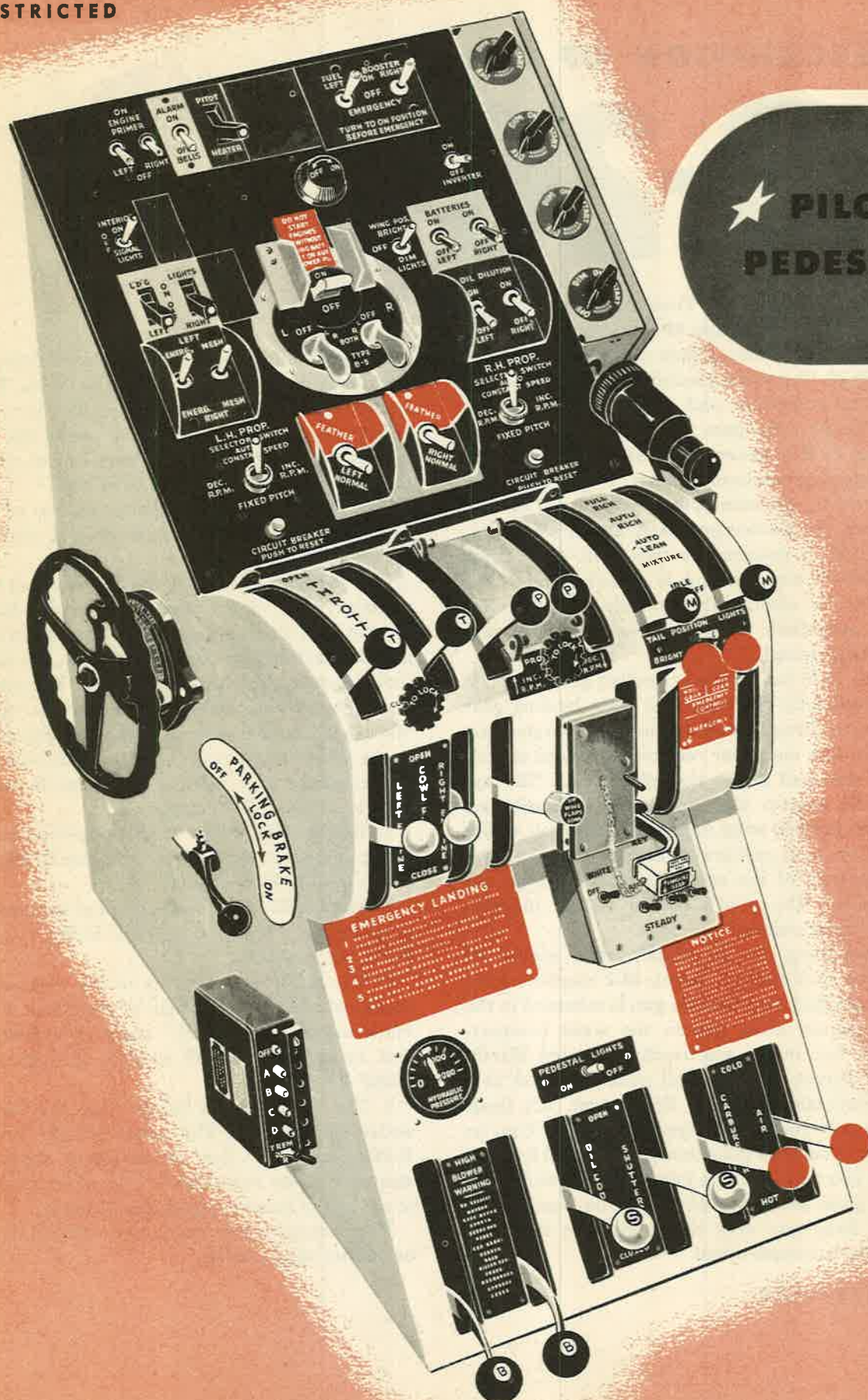
2. The B-26C series refers to all of the models produced at Omaha from the B-26C to the B-26C-40, inclusive.

3. The B-26F series refers to the twist-wing model which has a 7° angle of incidence. Previous models have a 3½° angle of incidence, and include the B-26F models through the B-26F-6 models.

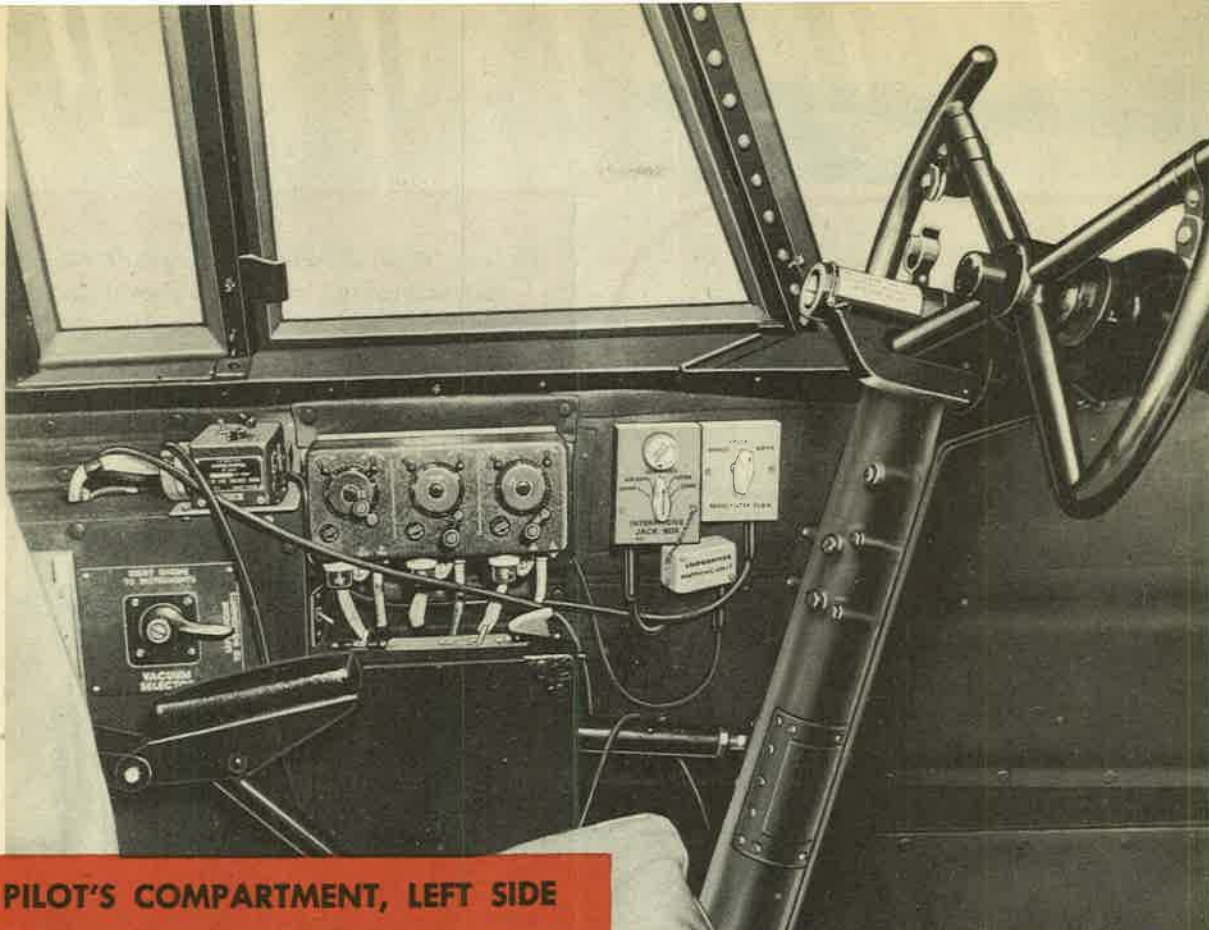
4. The B-26G series differs from the B-26F series only slightly. The major change in the B-26G series is that Army-Navy standard equipment has been added whenever possible to aid in the interchangeability of parts.

This manual is not concerned with the short, or 65-foot wing models.

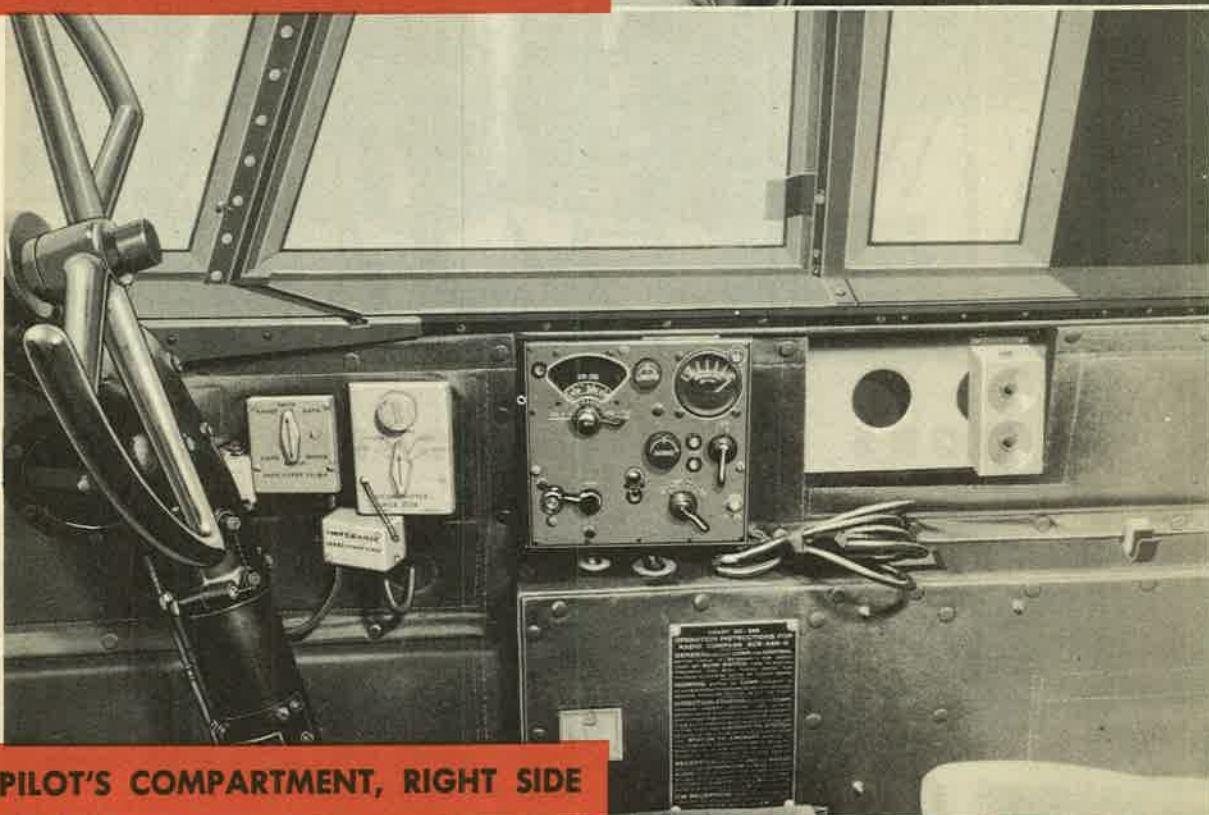
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**★ PILOT'S
PEDESTAL**



PILOT'S COMPARTMENT, LEFT SIDE

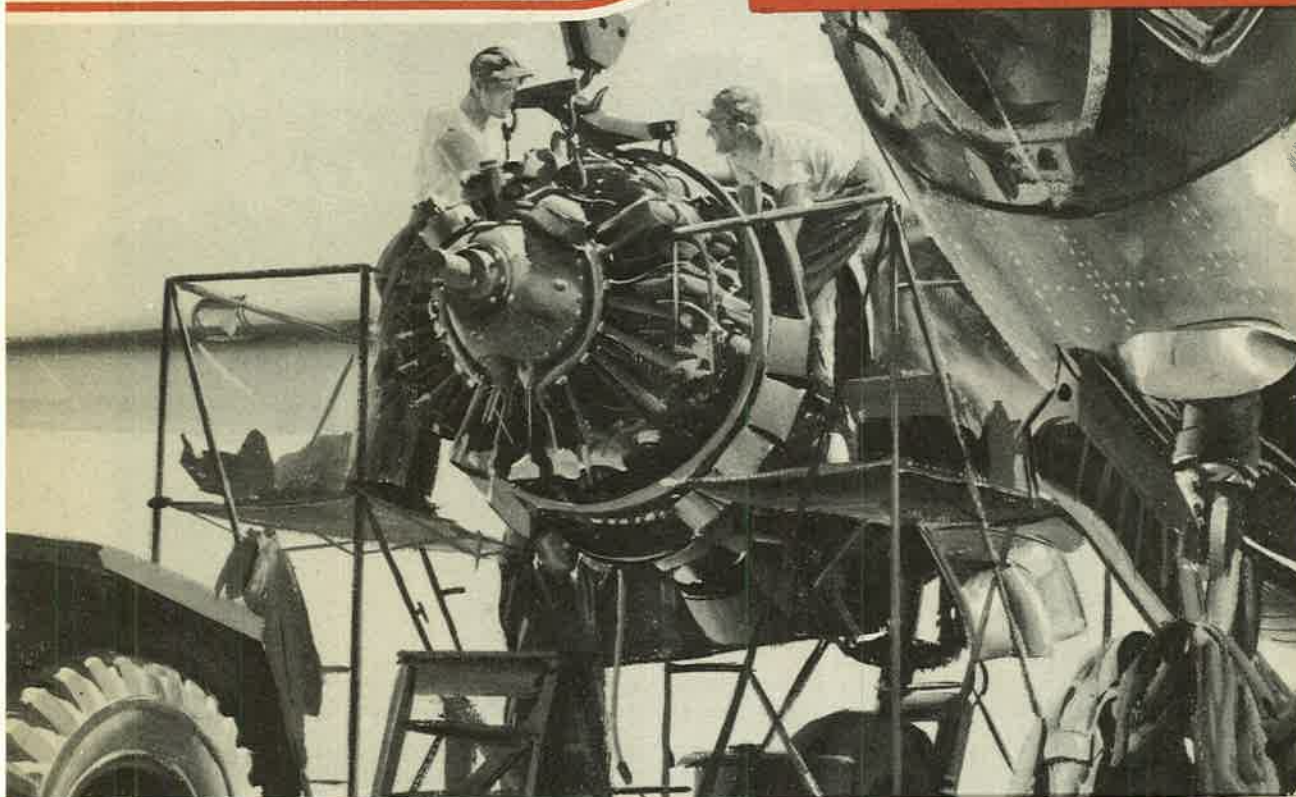


PILOT'S COMPARTMENT, RIGHT SIDE

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THE ENGINES

Two Pratt & Whitney R-2800-43 engines provide plenty of power for the B-26. These engines are 18-cylinder, twin-row, air-cooled radials, developing 2000 Hp each at sea level. Each engine has an internal, single-stage, 2-speed, gear-driven supercharger.



FACTORS AFFECTING OPERATION

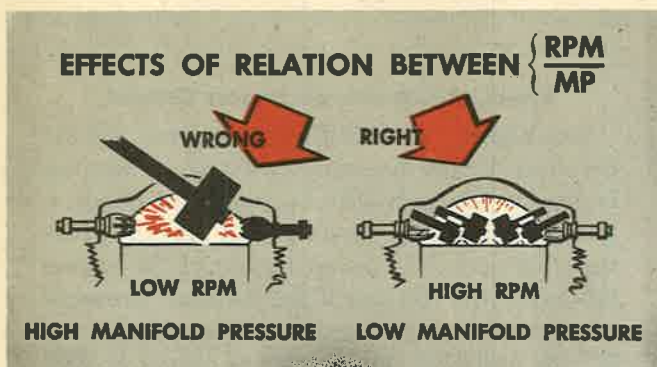
Pre-ignition

Pre-ignition is the ignition of the mixture within a cylinder before the sparkplug fires. It is caused by a hot spot within the cylinder, such as an overheated sparkplug, overheated exhaust valve, carbon deposit, etc. Once pre-ignition starts, it becomes progressively worse. The timing of the engine becomes uncontrolled and roughness and/or detonation results. The engine becomes overheated and you lose power.

Detonation

Under normal conditions, the fuel charge in a cylinder burns relatively slowly. When detonation occurs, the first part of the charge within the cylinder burns normally. This compresses the unburned part of the charge until the pressure and temperature within the cylinder rise so high that the unburned portion of the charge explodes, or detonates.

Detonation literally hammers the walls of the



cylinders and causes the knock with which you are familiar in an automobile. Because of wind and other outside noise you can't hear the engine knock in an airplane.

Even mild detonation causes overheating; valve, piston, and cylinder-head burning; piston scuffing, and piston ring and valve damage. Severe detonation causes engine failure in a short time. Detonation can cause **complete engine failure during the short time that it takes you to make a takeoff run.**

The indications of detonation are roughness and overheating of the engine.

Some of the factors which you can control, and which increase the tendency of the engine to detonate, are:

- Fuel of low octane rating.
- High inlet air temperatures.
- Using **HIGH** blower at low altitudes.
- Lean mixtures.
- High manifold pressures.
- Low engine speeds.
- High cylinder-head temperatures.

Always make sure that your airplane is serviced with fuel of Grade 130, Specification AN-F-28 Grade 100/130.

**SERVICE THIS AIRPLANE WITH
GRADE 130 FUEL. IF NOT AVAIL-
ABLE, T.O. NO. 06-5-1 WILL BE CON-
SULTED FOR EMERGENCY ACTION**

Use carburetor heat only when known icing conditions exist, and then only to raise your temperature high enough to prevent icing. If no icing prevails, and the carburetor air control is hydraulically operated, leave it in **COLD** for takeoff and landing, and in the neutral position at all other times. Occasionally check the carburetor air temperature to make sure that the hot air door has not crept open. If the control is mechanically operated, leave it in the **COLD** position except when applying heat.

Do Not Take Off in HIGH Blower

Never use **HIGH** blower below 10,000 feet except when removing sludge from the blower clutches. The higher impeller speed greatly increases the mixture temperature because the mixture pressure increases. The increased mixture temperature causes detonation.

The tendency to detonate is greatly influenced by the fuel-air ratio, particularly when aromatic fuel is used.

Use **AUTO-RICH** at any power setting above 60% normal rated power, and for all ground operation. In the Climb and Cruise section you will find the correct manifold pressures and rpm for various power settings, including 60%.

Do not use excessively high manifold pressures except when necessary, and then only with the proper rpm.

Do not use any rpm less than 2100 with man-

THE FOLLOWING CHART SHOWS THE PROPER RATIO BETWEEN RPM AND M/P IN THE RANGE ABOVE CRUISING

52."	2700 RPM
48."	2600 RPM
45."	2500 RPM
42."	2400 RPM
38."	2300 RPM
35."	2200 RPM
32."	

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ifold pressures in excess of 31" Hg. As manifold pressures increase, increase your rpm proportionately. Detonation depends not only on the peak temperatures and pressures, but also on the length of time the mixture is exposed to this temperature and pressure. Always reduce manifold pressure before you reduce rpm.

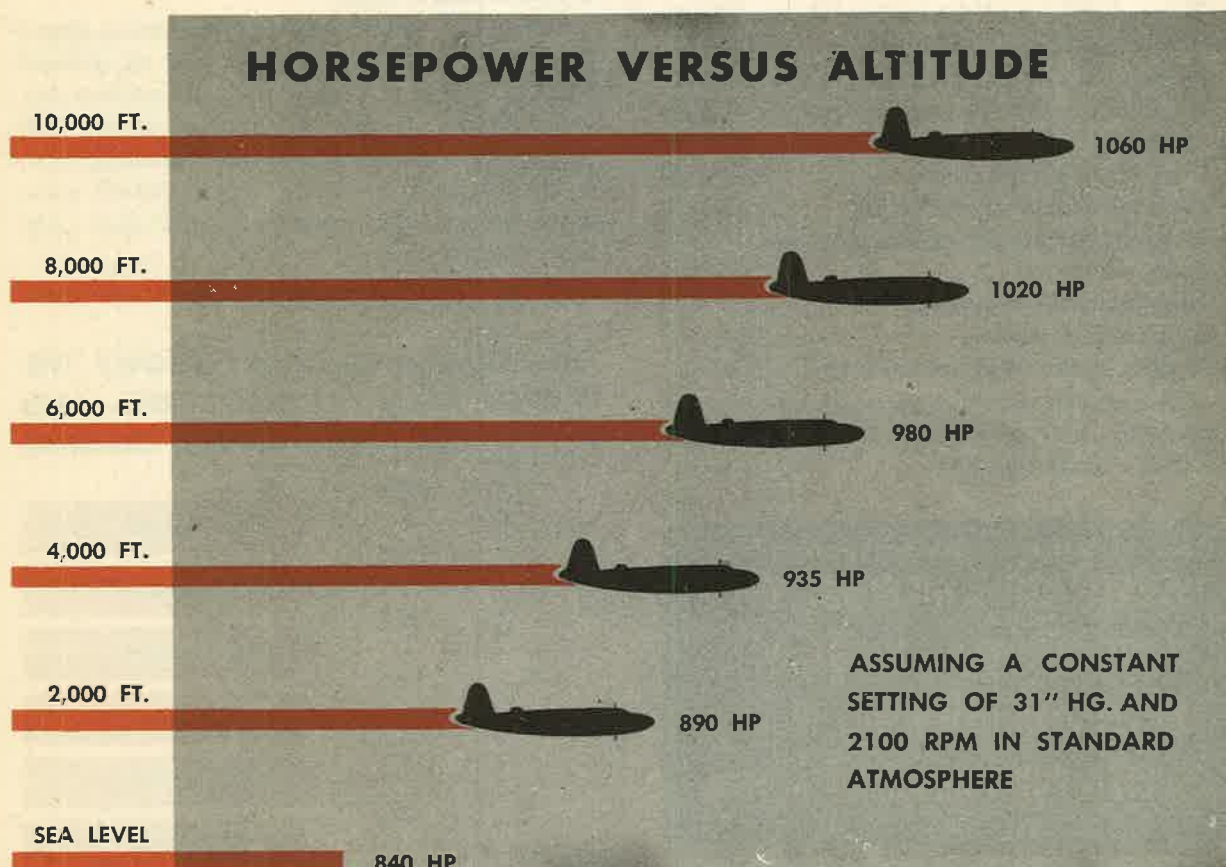
Never exceed normal cylinder-head temperatures. High cylinder-head temperatures tend to heat the mixture to a greater degree and increase detonation tendencies. After detonation occurs, overheating weakens the cylinders, valves, and pistons.

KNOW THE PROPER MANIFOLD PRESSURE FOR 60% POWER AT ALL ALTITUDES

Effect of Altitude on Power Output

The higher you climb the less dense the air becomes. To get the same weight of air into the engine as you gain altitude, you must obtain a greater volume by opening your throttles further. However, the power output of the engine increases with altitude if the manifold pressure and rpm are kept constant. For example: at 31" Hg. and 2100 rpm the power output at 2000 feet is 890 Hp. At 10,000 feet the power output, with the same manifold pressure and rpm settings, is 1060 Hp. The main reason for this power increase is that the engine doesn't have to work so hard to push out the exhaust gases, since the outside pressures are less.

The chart in the Climb and Cruise section shows you the proper manifold pressure and rpm, for any desired percentage of power, plotted against altitude.



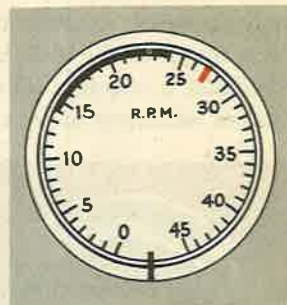
PROPER OPERATING LIMITS OF ENGINES



353 MPH MAXIMUM IAS



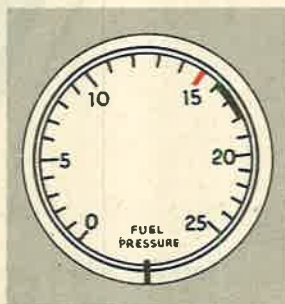
52" HG. MAXIMUM FOR TAKEOFF
20 TO 41" HG. OPERATING RANGE



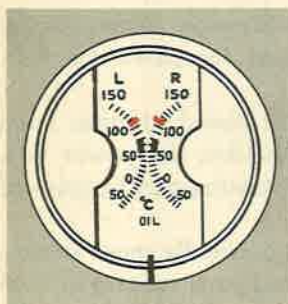
2700 RPM MAXIMUM FOR TAKEOFF
1400 TO 2400 RPM OPERATING RANGE



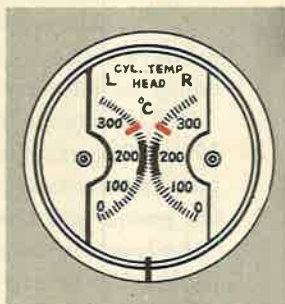
100 PSI MAXIMUM FOR TAKEOFF
25 PSI MINIMUM FOR IDLING
60 TO 90 PSI OPERATING RANGE



15 PSI MINIMUM IN FLIGHT
16 TO 18 PSI OPERATING RANGE



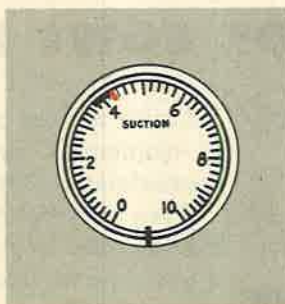
105°C MAXIMUM
60°C TO 80°C OPERATING RANGE



260°C MAXIMUM FOR TAKEOFF
150°C TO 232°C OPERATING RANGE



10 PSI MAXIMUM
6 TO 8 PSI OPERATING RANGE



4.25" HG. MAXIMUM FOR TAKEOFF
3.75" TO 4.25" HG. OPERATING RANGE

1. Do not exceed 52" Hg. or 2700 rpm for takeoff.

2. Do not exceed 41" Hg. and/or 2400 rpm (100% normal rated power) for more than 5 minutes except in emergencies.

3. Do not exceed 31" Hg. and/or 2100 rpm for continuous cruise except in emergency or in combat.

4. Do not operate in AUTO-LEAN above 31" Hg. and/or 2100 rpm.

5. Do not exceed a cylinder-head temperature of 260°C in AUTO-RICH or 232°C in AUTO-LEAN.

6. Do not dive the airplane power-off. Use a minimum of 12" to 15" Hg.

7. Do not exceed 2880 rpm.

8. Do not attempt to make the mixture lean by pulling the mixture control farther back than AUTO-LEAN. AUTO-LEAN is the only position which will provide a proper lean mixture.

When reducing power, always reduce manifold pressure before you reduce rpm.

When increasing power, always increase rpm before you increase manifold pressure.

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PROPER OPERATION OF BLOWERS

Shift the blowers once every 2 hours to remove the sludge which forms in the clutches of the blower. Allow at least 5 minutes between shifts so that the clutches will have time to cool.



CHECK FLUCTUATION OF OIL PRESSURE AND MANIFOLD PRESSURE

Check the fluctuation of the oil pressure, as well as the manifold pressure, when you shift blowers. The oil pressure should drop momentarily and then return to normal.

Make sure that you are locked in either HIGH or LOW blower. Do not leave the control lever in an intermediate position. Do not



SHIFT BLOWERS WITH A QUICK DEFINITE MOTION

hesitate when you change blower speeds, but use a quick, definite motion.

Do not use HIGH blower when you can use LOW blower because:

1. The increased compression increases the mixture temperature and increases the tendency to detonate.

2. The higher impeller speed absorbs from 100 to 300 additional Hp from the power output, and increases fuel consumption because of the power absorbed.

At lower settings it is decidedly more advantageous for you to increase your rpm up to 2100 than it is for you to go into HIGH blower.

PROPER USE OF COWL FLAPS

Leave the cowl flaps full OPEN for all ground operations.

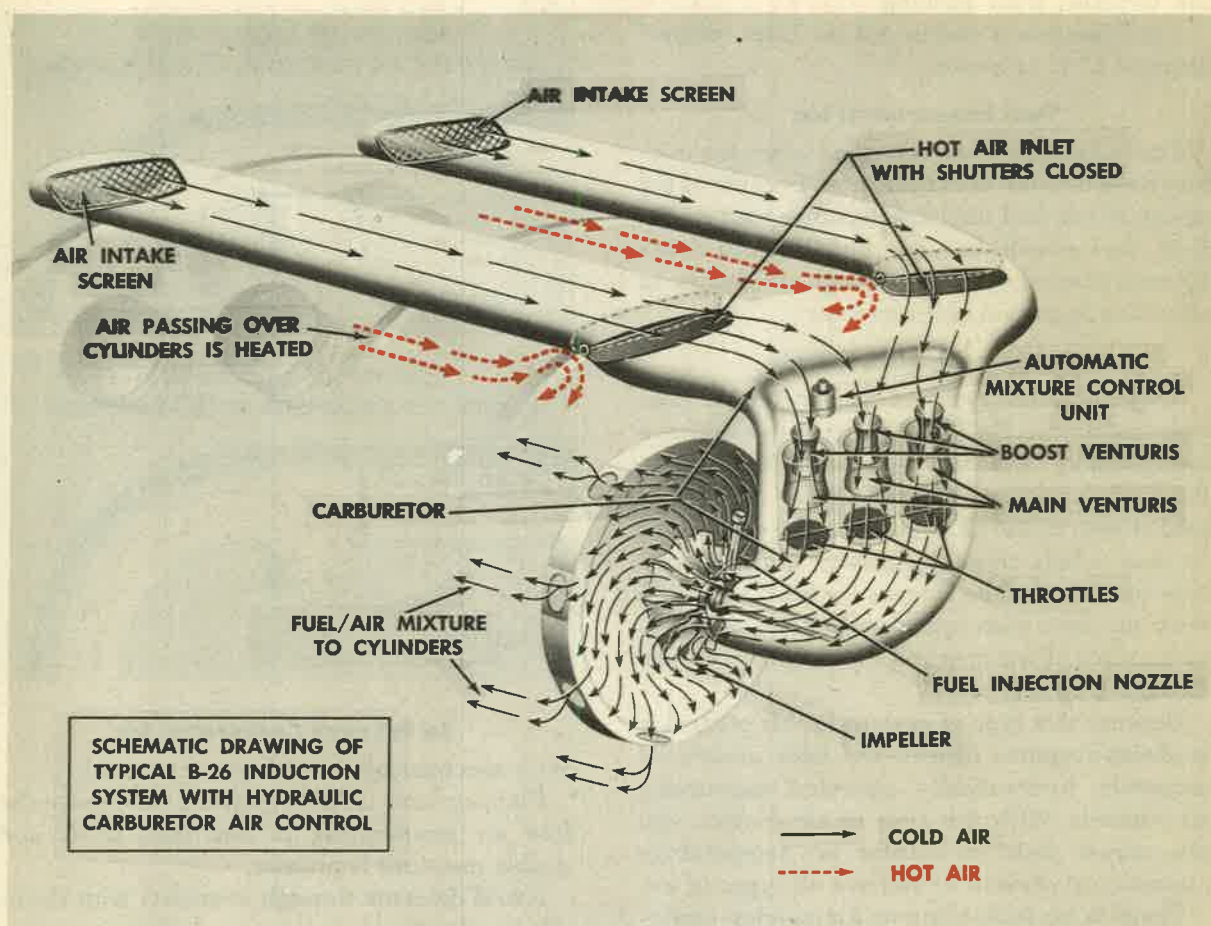
Leave the cowl flaps full OPEN for takeoff.

Adjust the cowl flaps to keep the cylinder-head temperatures below 260° C in AUTO-RICH and 232° C in AUTO-LEAN.

Under normal conditions, set the cowl flaps to maintain a cylinder-head temperature of approximately 200° C for cruising.

Open the cowl flaps at the end of your landing roll, and leave the cowl flaps OPEN after the engines are stopped on the ground.

HIGH CYLINDER-HEAD TEMPERATURES SPELL DANGER!



INDUCTION SYSTEM ICING

Of the types of ice affecting induction systems, the three following are the most common.

Impact Ice

Impact ice forms when water, which existed originally as snow, sleet and/or supercooled water, hits surfaces which are colder than 0°C .

Impact ice occurs only when visible moisture is present, and the outside air temperature is less than 5°C . If the intake screens are installed, they become clogged by the impact ice, cutting off the flow of air. If you do not have intake screens installed on the airplane it affects the metering elements and then the airflow. When you fly through clouds or freezing rain, keep carburetor air temperatures above 5°C .

Throttle Ice

Throttle ice forms when the air flows through a restriction, and is cooled because of the increased kinetic energy of the air.

Throttle ice occurs only when the throttle butterfly valves are less than 45° open and when visible moisture is present and the outside temperature is less than 5°C . It will affect the airflow and may cause your throttle butterfly valves to become immovable.

To avoid encountering throttle ice, take the following precautions:

1. Avoid descents through overcasts at low temperatures with throttles nearly closed.
2. Vary throttle settings often to prevent

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the throttles from sticking.

3. Maintain a carburetor air inlet temperature of 5° C or above.

Fuel Evaporation Ice

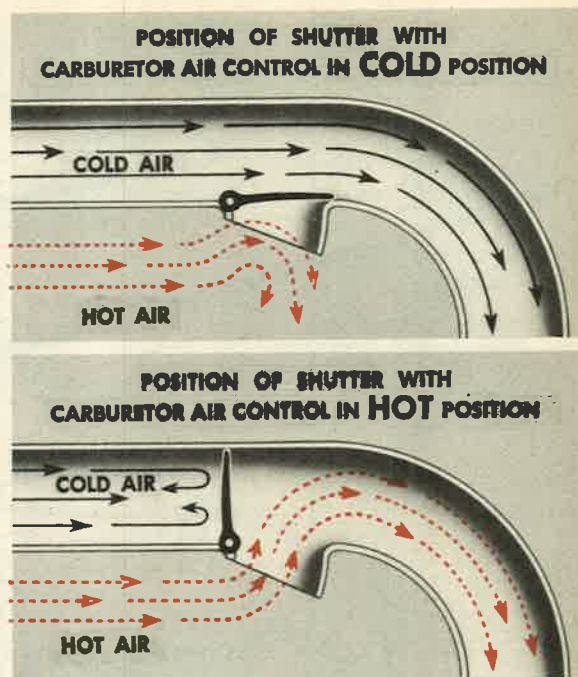
Fuel evaporation ice is formed when the mixture cools because of evaporation. Because of the design of the fuel discharge spinner ring on the B-26, fuel evaporation ice probably will never be encountered in large enough quantities to affect the operation of the engine.

Carburetor Air Controls

There are two types of carburetor air controls installed in B-26's. The earlier models have mechanically actuated 2-position controls. In the COLD position, the carburetor air door is held closed. In the HOT position, the carburetor air door is held closed by gravity and ram pressure until the intake screens ice up. The carburetor air door then opens and allows an alternate source of warm air off the cylinders to pass through the carburetor.

Because this type of carburetor air control is ineffective against throttle ice, later models incorporate hydraulically operated carburetor air controls. With this type of air control, you can adjust your carburetor air temperature manually to prevent or remove all types of ice.

There is no such thing as a non-icing carburetor. It is true that pressure type carburetors, such as those with which the B-26 is equipped, are not as subject to icing as are gravity feed types. However, you must always be on the alert for icing, even with pressure type carburetors, whenever the free air temperature is less than 5° C and visible moisture is present.



To Prevent Carburetor Ice

With mechanical carburetor air control:

Place control in HOT position whenever the free air temperature is less than 5° C and visible moisture is present.

Avoid descents through overcasts with throttles nearly closed.

With hydraulic carburetor air control:

Maintain carburetor air temperature above 5° C.

To Remove All Carburetor Ice

With either type control, place carburetor air control in full HOT position.

GROUND OPERATION

Never try to clear an engine which is apparently fouled up by using high manifold pressure with the mixture control in AUTO-LEAN.

Regardless of what a crew chief or anyone else tells you, this is a direct violation of proper engine operation. It is the surest way to promote detonation on takeoff. If you ever see a

crew chief, an engineering officer, or anyone else do this, report the violation to your Operations officer.

If you think the plugs are fouled, make a full power check. In most instances this will clear the fouled condition. If the power check fails to clear engine, return the airplane to the line.

Use Auto-Rich for all ground operations

THE FUEL SYSTEM

The fuel system of the B-26 is simple. You must understand the diagrams which are shown in this section, the functions of the various units, and their proper operation. There are four self-sealing tanks installed. They include the two main tanks and the two auxiliary tanks. Either metal or self-sealing bomb bay tanks may be installed.



FUEL SYSTEM IN THE B-26, B-1 AND C MODELS

The main tanks hold 360 gallons each and are installed in the wings, inboard of the nacelles. The auxiliary tanks hold 121 gallons each and are installed in the wings, outboard of the nacelles. You can fly at 60% power for about 5 hours with all of the wing tanks filled. You will have a normal reserve supply remaining.

You can drop the bomb bay tanks in an emergency with either of the two salvo systems. Either pull the red ball handle in the pilot's compartment, or open the bomb bay doors and salvo from the bombardier's compartment. (See Emergency section.)

Fuel Flow

Fuel is supplied to the engines from the main tanks only. The left main tank supplies the left engine; the right main tank, the right engine. There is no crossfeed installed. A fuel transfer system is used to transfer fuel from the other tanks to the main tanks.

The fuel is supplied to the engines through

two low inboard ports in each of the main tanks. Because of this, it is dangerous to make slips or vertical banks in the B-26. The low engine may cut out.

From the main tanks, the fuel goes into the booster pumps. The booster pumps take the place of the wobble pump, found on most aircraft.

Turn the booster pumps ON for:

- (1) Starting
- (2) Takeoff
- (3) Landing
- (4) Below 1000 feet
- (5) Above 10,000 feet

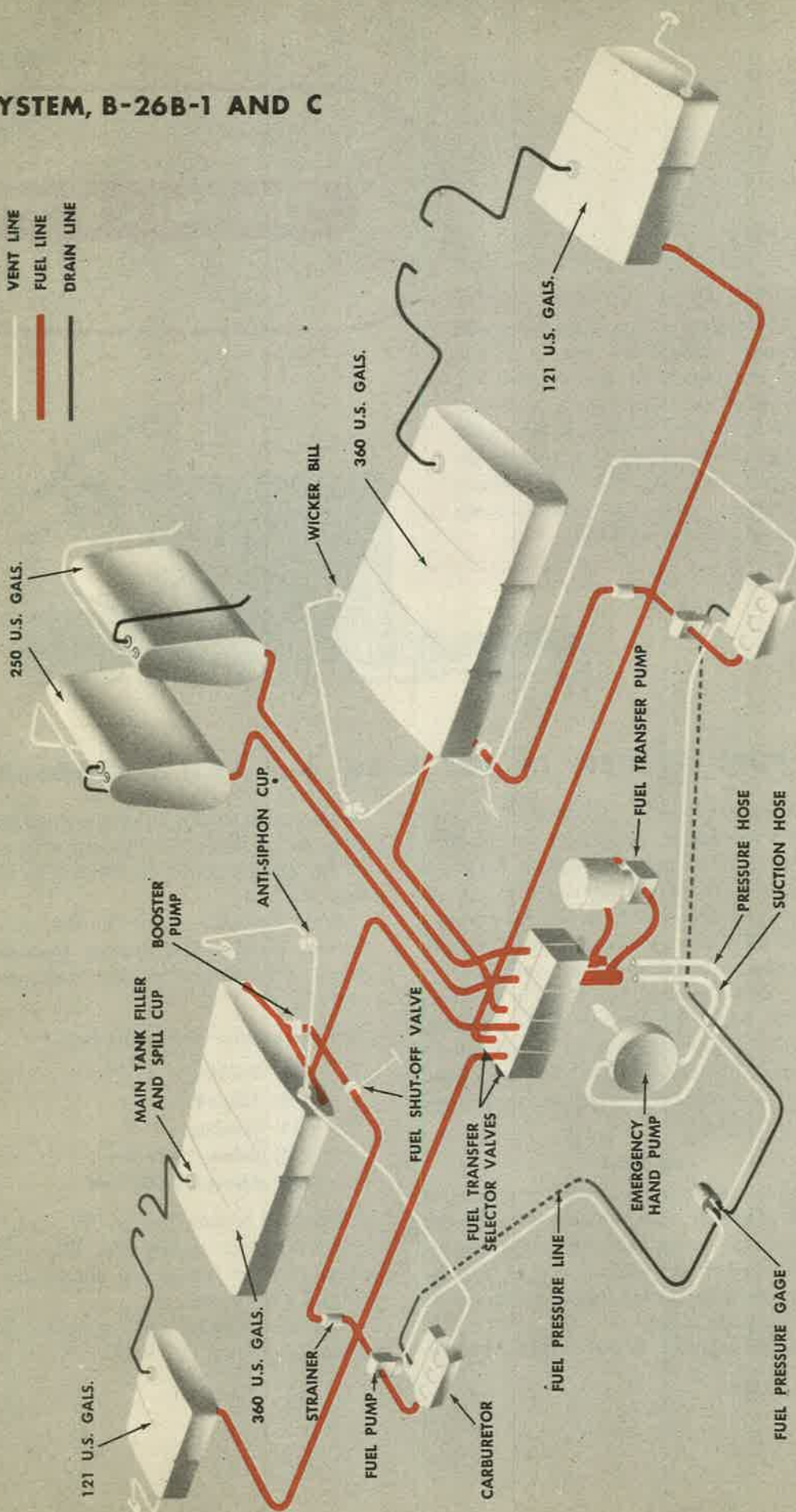
Turn the booster pumps ON, also, if the fuel pressure drops excessively. The normal fuel pressure when you use the booster pumps alone is from 8 to 10 psi.

The later models have 2-speed booster pumps. Turn the pumps ON (which is low speed) ex-

FUEL SYSTEM, B-26B-1 AND C

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VENT LINE
FUEL LINE
DRAIN LINE



RESTRICTED

cept in event of failure of your engine-driven pump, in which case they should be turned to **EMERGENCY** (high speed).

After the fuel leaves the booster pumps it goes through the fuel shut-off valves in the forward bomb bay. The shut-off valves are safetied in the ON position, and should remain there except in emergencies such as fire, or when maintenance is performed on the fuel system.

From the shut-off valves the fuel passes through strainers, which are located at a low point in each engine nacelle. The strainers are used to prevent water and dirt from entering the carburetor.

The fuel then goes through engine-driven pumps, one on each engine. The normal pressure built up by these pumps is from 16 to 18 psi each. Each fuel pump has a bypass valve, so that if the pump fails the fuel can still reach the engine when the booster pump is on. The bypass valve also lets fuel flow to the engine when you are starting, before the engine-driven pump becomes effective.

Carburetor

The fuel pumps force the gas into the carburetors. The carburetor is a diaphragm, pressure-injection type which injects the fuel into the blower section through a spinner ring on the impeller shaft.

There is an automatic mixture control in the carburetor so that you have a constant mixture at any altitude. **FULL RICH** cuts out the automatic mixture control.

These mixture control settings are used:

AUTO-LEAN—31" Hg. and/or 2100 rpm or less.

AUTO-RICH—above 31" Hg. and/or 2100 rpm.

The carburetor has a fuel-head enrichment valve which gives you a rich mixture at high power to help cool the engine. An idling metering jet gives you the correct mixture at idling speeds.

There is an electric primer on the carburetor. With the booster pump ON, press the primer switch for 2 seconds to fill the lines with fuel before you engage the starter. Prime and engage simultaneously to start the engine. The

primer furnishes fuel only to the top eight cylinders of the engine.

A drain is incorporated in the lower part of the supercharger section to remove any excess fuel discharged into the blower. This drain is vented to the lower outside of the engine nacelle. When you use the mixture control for starting, it is easy to overprime in warm weather. Fuel running out of the supercharger drain is usually a good indication of overpriming, except in very cold weather.

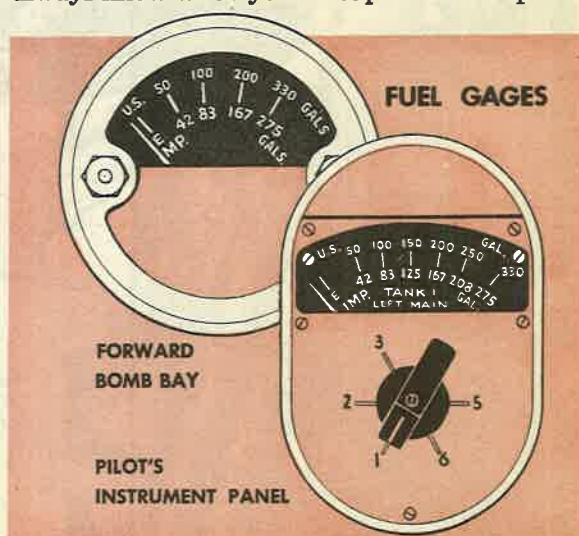
Fuel Instruments

You have a fuel pressure gage and a fuel quantity gage on the instrument panel. The fuel gage floats are located toward the rear, inboard in the main tanks. Because of their position, the gage is more accurate at lower scale readings than at higher readings.

The fuel gages are not too accurate. Do not depend on them alone. Know by visual inspection how much fuel you have before you start the airplane. Figure your fuel consumption so that you can have an accurate check against the fuel gage at all times. **Be fuel conscious.**

On later models of the B-26 a mechanically actuated dial instrument, located in the forward bomb bay, indicates the quantity of fuel in the main tanks.

There is no warning device to let you know when your fuel pressure is low. Keep an eye on the fuel pressure gage so that you will always know when your fuel pressure drops off.



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Fuel Consumption

The normal fuel consumption of the two engines at sea level follows:

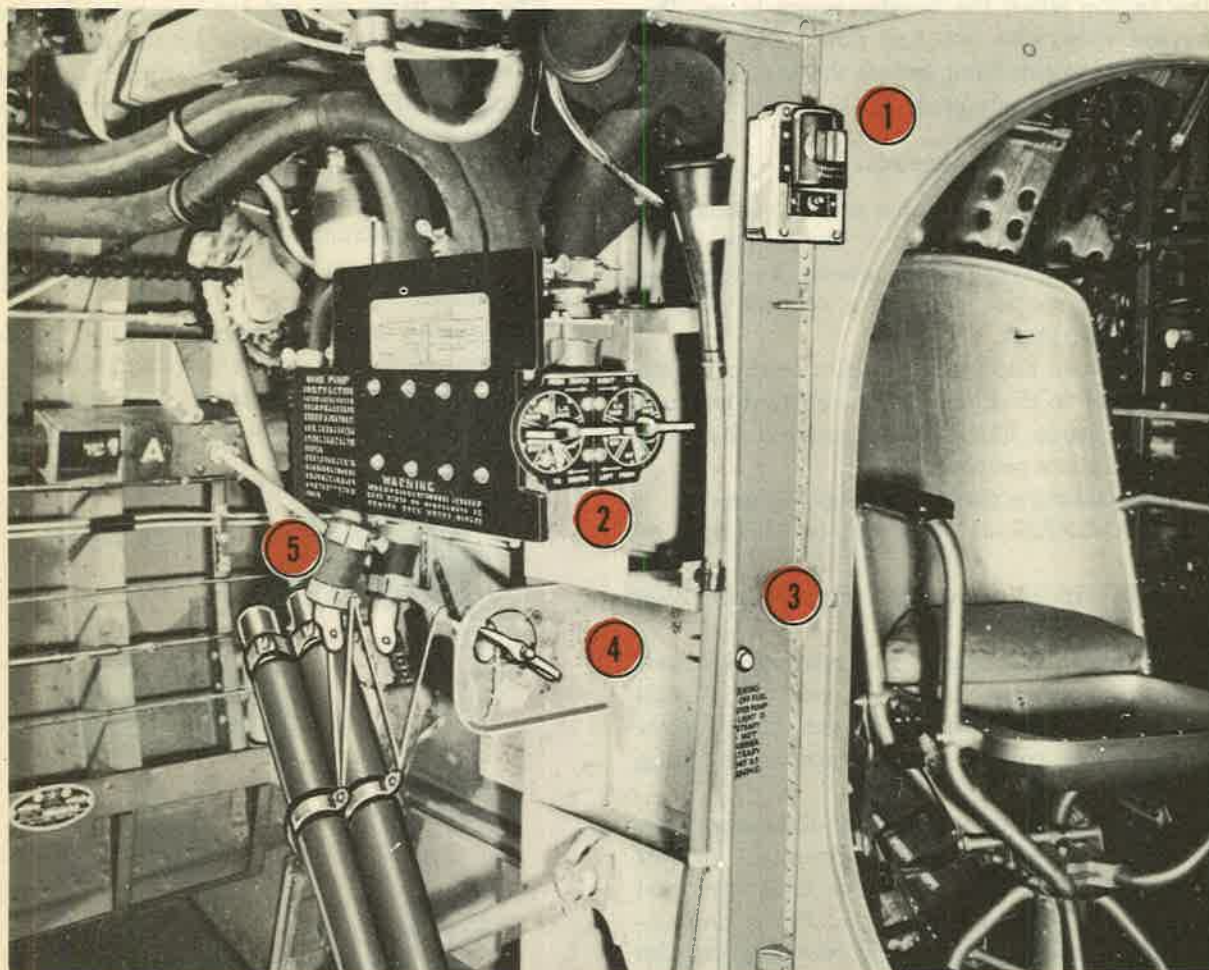
	Power Setting	Gal/Hour
TAKEOFF	52" Hg. 2700 rpm AUTO-RICH	552
100% Power (Normal Rated)	41" Hg. 2400 rpm AUTO-RICH	378
60% Power (Normal Rated)	31" Hg. 2100 rpm AUTO-LEAN	151

FUEL TRANSFER SYSTEM

Normal Operation

The fuel from the auxiliary and bomb bay tanks must be transferred into the main tanks before you can use it. You have an electric fuel transfer pump which will pump approximately 12 gallons a minute in either direction at low altitudes. This rate of flow decreases at higher altitudes. The electric motor never should be turned ON unless **both** transfer valves are set on the proper tanks. Never turn the fuel trans-

- 1 FUEL TRANSFER PUMP SWITCH
- 2 FUEL TRANSFER SELECTOR VALVES
- 3 WARNING LIGHT
- 4 FUEL SHUT-OFF VALVE FOR LEFT ENGINE
- 5 EMERGENCY HAND PUMP HOSE FITTINGS



fer selector valves OFF or try to change their position when the transfer pump is ON.

Keep the transfer valves and pump OFF when you are not transferring fuel.

Valve Positions When You Transfer Fuel

1. One on tank from which fuel is being transferred.
2. One on tank to which fuel is being transferred.
3. Push electric motor switch toward the to side.

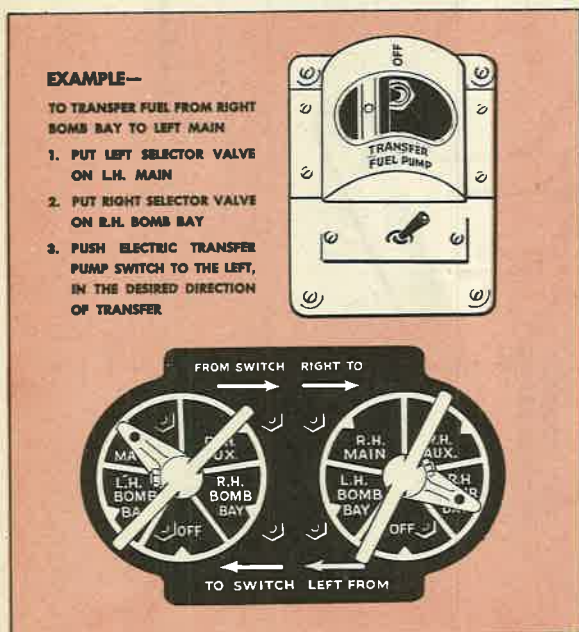
Check for fuel flow by feeling one of the hoses connecting the fuel transfer pump to the fuel-transfer valve.

A warning light is located under the transfer pump switch. If air or vapor is being pumped through the lines, the warning light comes on. When it burns continuously, stop the transfer.

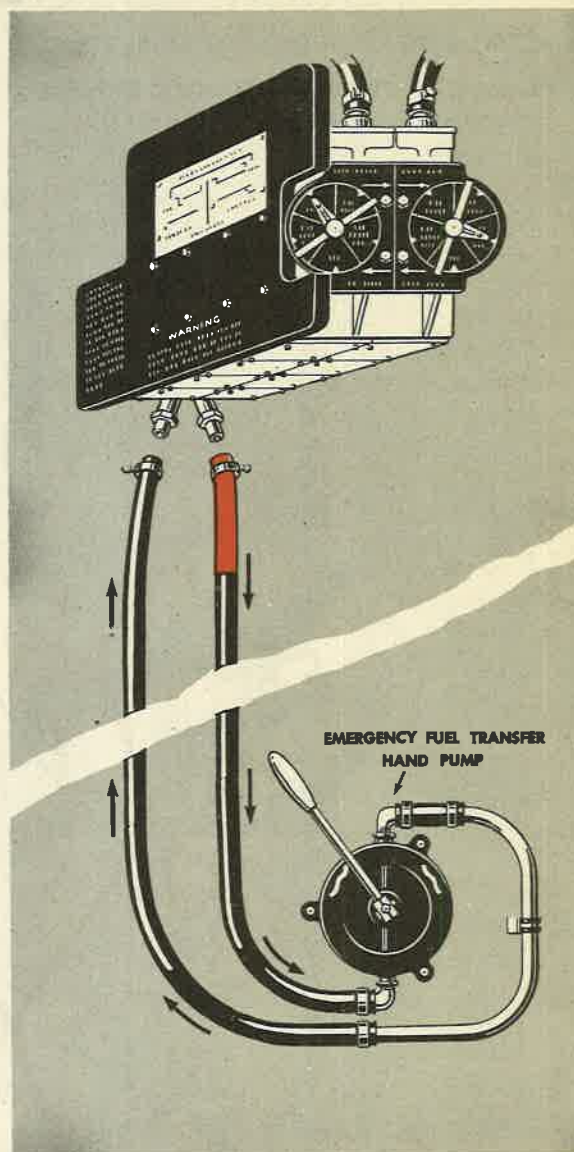
Check the transfer of fuel by timing, by the warning light, and by the fuel gage.

Turn the transfer pump OFF after the transfer is completed. Then turn the valves OFF.

Don't overfill the main tanks when you transfer. The fuel you lose might bring you home. It is a good idea only to fill within 25 gallons of total capacity when you transfer fuel.



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It is difficult to transfer fuel at high altitudes, particularly if the fuel is warm, because of the danger of vapor lock. Transfer your fuel below 10,000 feet to insure proper operation.

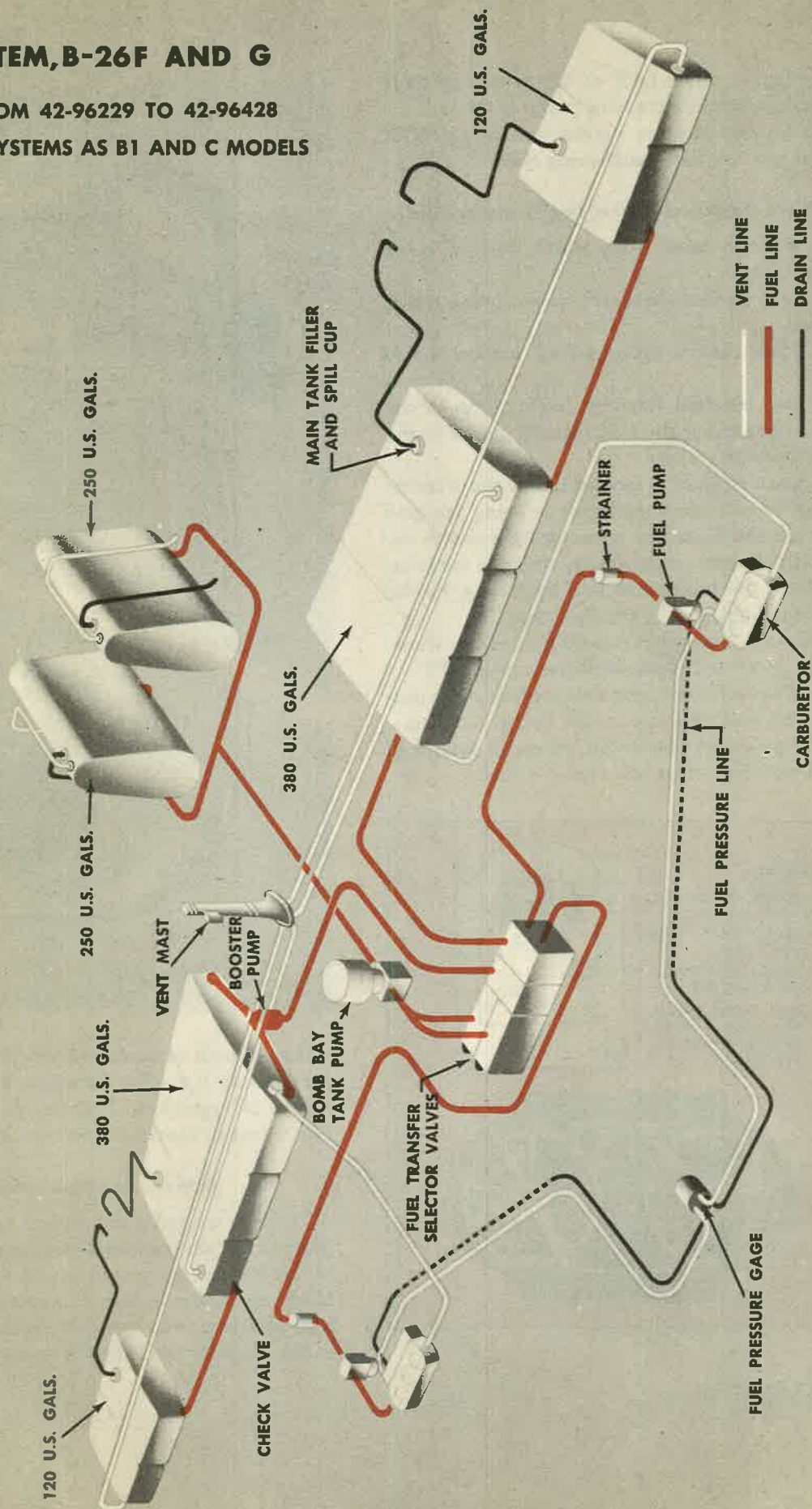
Emergency Operation

There is a hand pump which can be used in place of the electric transfer pump. The red end of the hose is connected to the from side; the black end to the to side. Remove the plugs and feel with your hand to check that the red hose is the suction end. (See Emergency section.)

FUEL SYSTEM, B-26F AND G

F MODELS FROM 42-96229 TO 42-96428
HAVE SAME SYSTEMS AS B1 AND C MODELS

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FUEL SYSTEM IN LATE F's AND ALL G MODELS

Because of the position of the filler necks in the late F's and all G models, the main tanks hold 380 gallons each, 20 gallons more than the B-1's, C's or early F models. The auxiliary tanks in these models hold 120 gallons each.

The main and auxiliary tanks are directly connected by special fuel resistant hose. A check valve allows fuel to flow from the auxiliary tanks into the main tanks only.

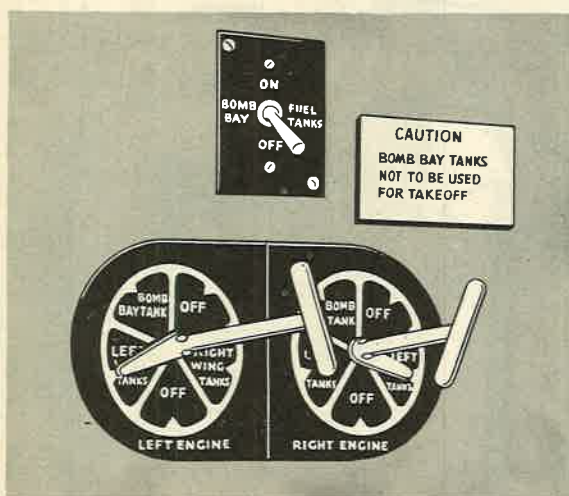
Fuel selector valves are designed to allow you to select the tanks you wish to use. No transfer system is used or needed in the late F's or the G models.

Along with the pilot's fuel selector valve controls, located on the bulkhead panel above the entry opening between the pilot's and navigator's compartments, there is a special fuel booster pump which is turned ON whenever you use fuel from the bomb bays. The bomb bay tanks are always interconnected if more than one is used.

There are no fuel shut-off valves, since the fuel selector valves have OFF positions.

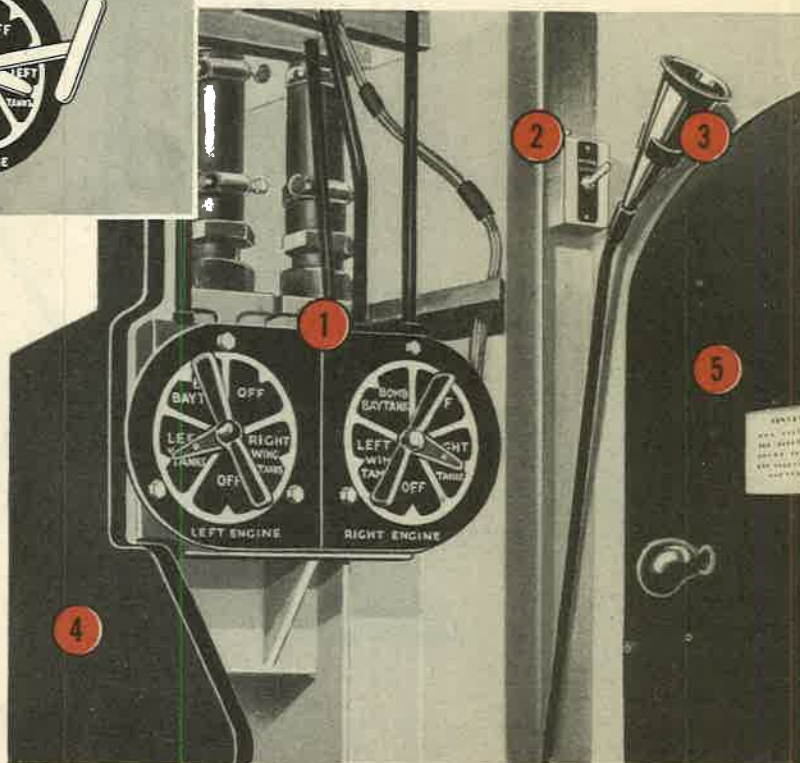
Bomb bay tanks may be jettisoned by the salvo switch in the pilot's, bombardier's, or waist gunner's compartment. Always be sure to turn the selector valves to the wing tanks before you salvo. (See Emergency section.)

Don't allow a tank to run dry before you switch tanks: Vapor locks will occur if you do. Check the selector valve for a definite click into place. Start, take off, land, and fly at low altitudes on the wing tanks so that you can have the use of the booster pumps.



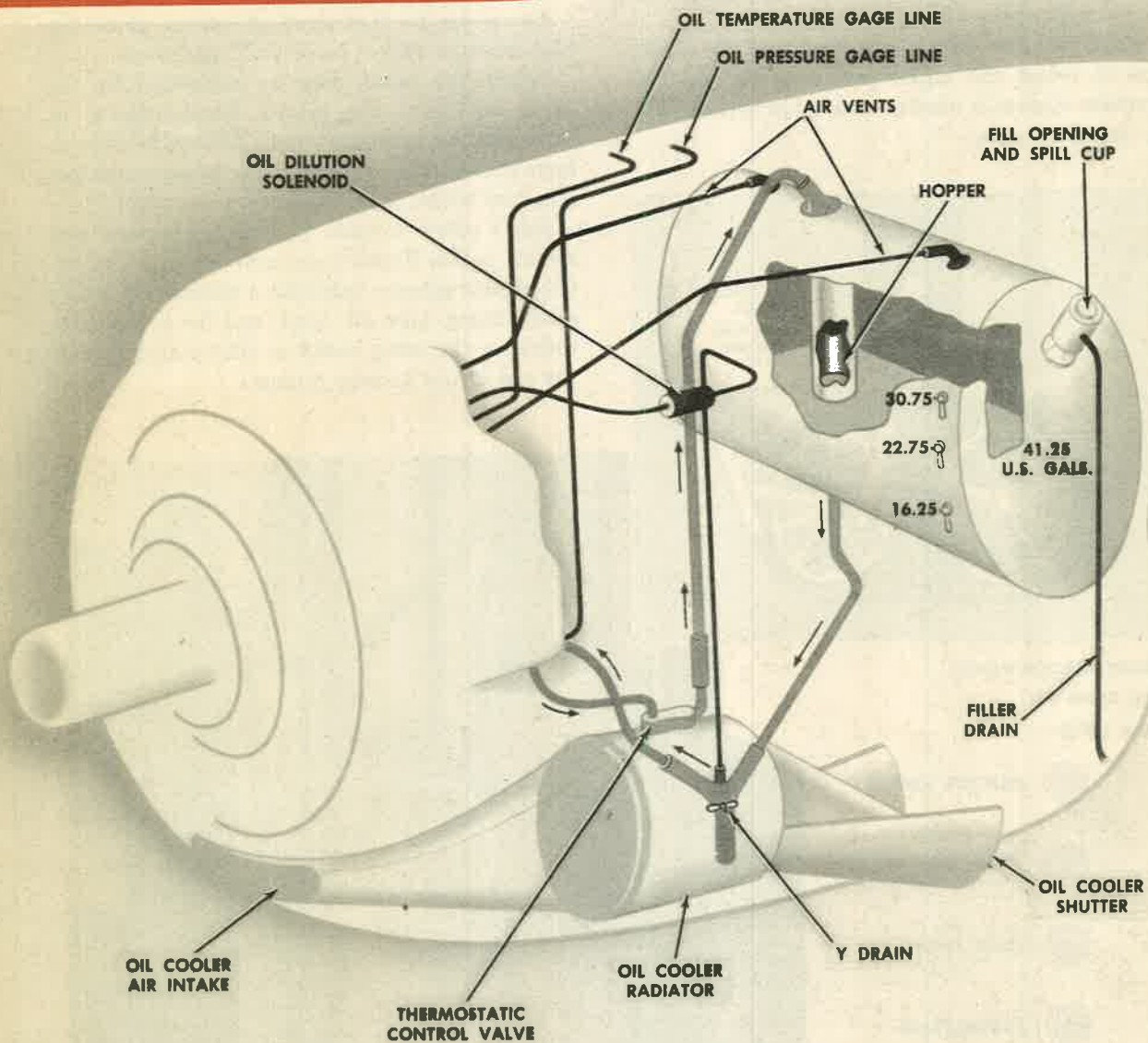
PILOT'S SELECTOR VALVES
AND BOMB BAY
TANK SWITCH

- 1 SELECTOR VALVES
- 2 DOME LIGHT SWITCH
- 3 RELIEF TUBE
- 4 ARMOR PLATE
- 5 DOOR LEADING TO RADIO OPERATOR'S AND NAVIGATOR'S COMPARTMENT



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THE OIL SYSTEM



OIL SYSTEM DIAGRAM

It is necessary for you to understand the oil system of the B-26, its capacities, its function, its operation, temperatures, pressures, and the system in general.

There are two hopper-type oil tanks on the B-26, one in each nacelle. Each holds 41.25 gallons (165 quarts) of oil.

Lubricating oil for the moving parts of the engine is forced through the oil lines by a gear type pressure pump, located in the engine accessory section.

The temperature of the oil is controlled by radiators, thermostats and oil cooler shutters.

Built in scavenger pumps recover the oil from the sumps after it is used.

Two oil screens are installed to prevent dirt from getting into the engine.

How to Measure the Oil in the Tanks

There are three petcocks located on the end of the tanks. If you open the top petcock and oil drains out, you have at least 30.75 gallons in that tank. If it doesn't come out of the top petcock, but does out of the second, you have at least 22.75 gallons. If neither of the two top petcocks show any oil, but it comes out of the bottom petcock, you have at least 16.25 gallons.

The oil tanks are filled to the top of the filler neck, which leaves sufficient space for the oil to expand, or for oil dilution.

The maximum allowable oil consumption per engine on the B-26 is 33 quarts per engine per hour at 100% normal rated power, and 21 quarts at 60% normal rated power. Normal oil consumption is approximately 7 quarts per engine per hour.

Oil Pressure

The high-pressure system, which furnishes oil to all parts of the engine except the accessory section, is controlled by a thermostatic relief valve. It is set at approximately 350-400 psi until the oil temperature reaches 40° C. The pressure then returns to normal, 75-85 psi. The high pressure of 350-400 psi is seldom reached, but it is set this high in order to insure proper lubrication under conditions of high viscosity. A momentary pressure as high as 400 psi is normal for the first start of the day, or after the oil has been cooled below 40° C.

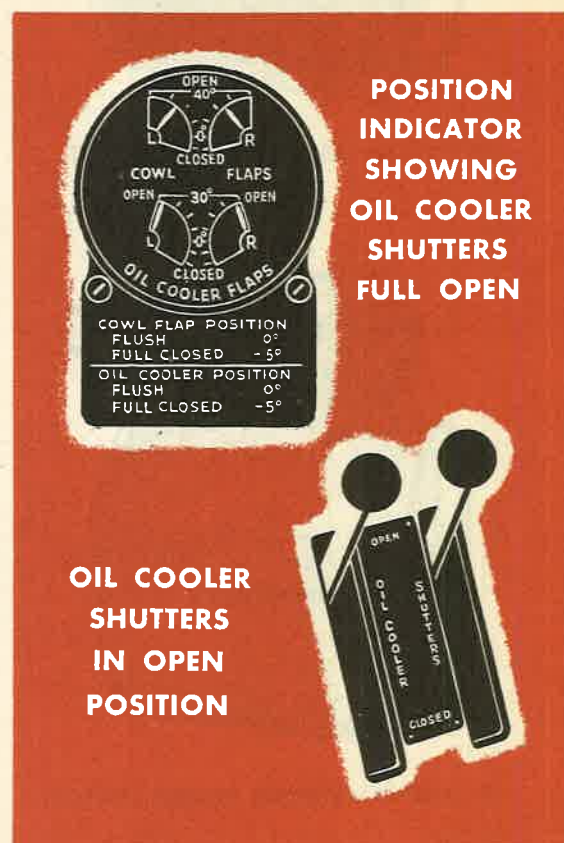
The low-pressure system, which supplies oil to the accessory section of the engine, is metered through the fuel pump drive shaft to prevent the main system from being regulated by the low-pressure relief valve. Pressure in this system is normally about 25 psi.

Oil Temperature

Oil temperature is an important check of the oil system and engine that you must make.

The temperature of the oil under normal conditions can be regulated by the hydraulically operated oil cooler shutters, which you can operate from the cockpit. There is an instrument on the panel which indicates the position of the shutters.

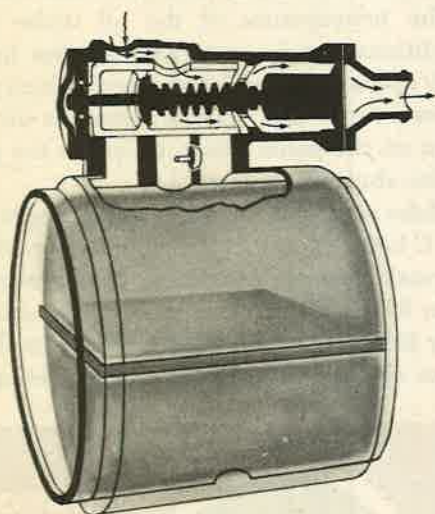
Make sure that the oil temperature is at least 50° C before you run the engine over 1000 rpm. Normal desired operating temperatures are from 60° to 80° C. If the oil temperature goes over 105° C and cannot be reduced by the operation of the oil cooler shutters, reduce your



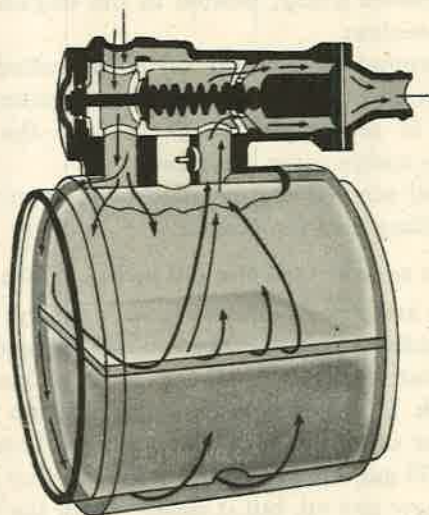
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power until the temperature returns to within maximum allowable limits.

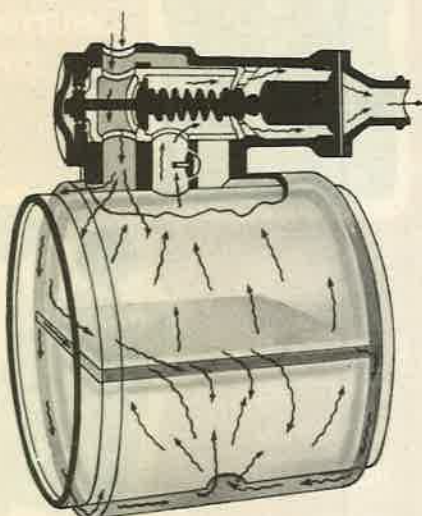
When the oil comes from the engine it passes through a thermostat. If the oil is below 40°C , it is passed around the radiator so that it will not be cooled further. A relief valve in the thermostat allows oil to bypass the radiator if the radiator becomes clogged with congealed oil.



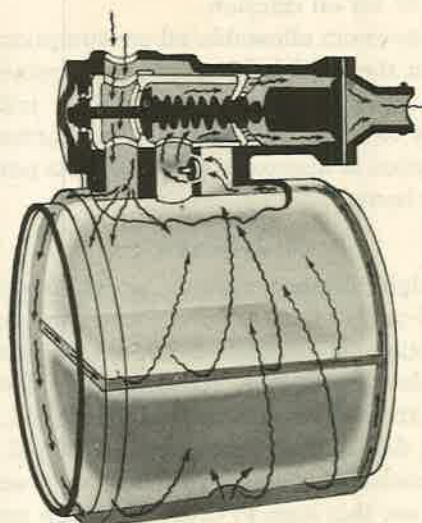
OIL COOLER ASSEMBLY AT COLD START



OIL COOLER ASSEMBLY DURING WARM-UP



OIL COOLER ASSEMBLY DURING COOLING



OIL COOLER ASSEMBLY DURING DECONGEALING

Oil Congealing

There is danger of oil congealing whenever the outside air temperature drops below 10°C . Take off, climb, and cruise with the shutters partially closed whenever the outside air temperature drops to 10°C or below. Set your oil cooler shutters at approximately 5° open unless

the outside temperature drops below 0° C, in which event they should be 0° open. Note: The shutters will close to a -5° position.

Your first indication of oil congealing is a drop in oil pressure, followed by excessively high oil temperature.

Under extreme conditions the oil pressure drops so low that no oil reaches the front section of the engine. This means that the propeller governor can't get oil and that the propeller will go into fixed pitch. This is a positive indication that a low-pressure condition exists. In this circumstance, reduce power before proceeding with your correction for congealing oil.

If you open the shutters to get the temperature down in a case like this, you merely ag-

gravate the situation. Whenever you are in doubt as to the reason for a high rise in your oil temperature during cold weather, close the shutters for a minute or so and watch your oil temperature. If it rises farther, the shutters may have been closed too much in the first place, and no congealing was present. But if it rises slightly, and then slowly begins to drop, congealing was probably beginning, and the oil was being bypassed through the thermostat relief valve.

If the temperature goes over 105° C it may take 5 minutes or more for the oil to become free, even at outside temperatures above 0° C. In extreme conditions it will be necessary to land to avoid damage to the engine.

Control your oil temperature at all times

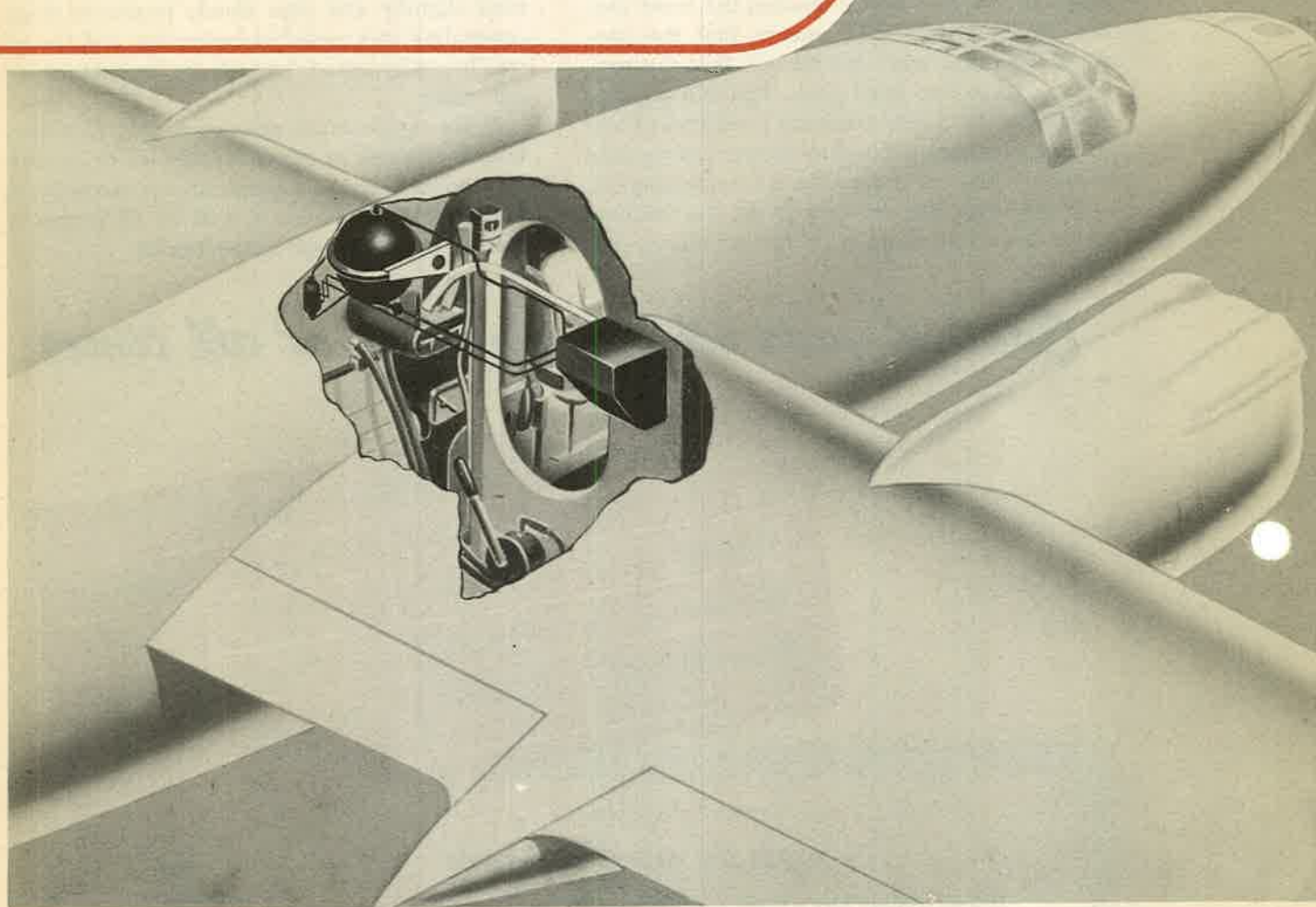
DESIRED OPERATION LIMITS			
	Desired	Maximum	Minimum
Oil Temp.	60°-80°	105°	50°
Oil Press.	75-85 psi	90 psi	60 psi
Idling Oil Pressure	75-85 psi	350-400 psi (cold start)	25 psi

NOTES ON ENGINE OIL SYSTEM

The oil system has a built-in oil screen, to keep dirt out of the engine. It has a bypass valve, in case it gets clogged, and a pressure valve to keep oil from flowing into the lower cylinders when the engine is stopped. The scavenger pump is also provided with an oil screen. The Y drain provides a means of draining the happer tank.

Normal oiling is accomplished by forced lubrication, except that the cylinder walls are oiled by a spray system. Oil dilution is covered fully under Cold Weather Operation.

THE HYDRAULIC SYSTEM

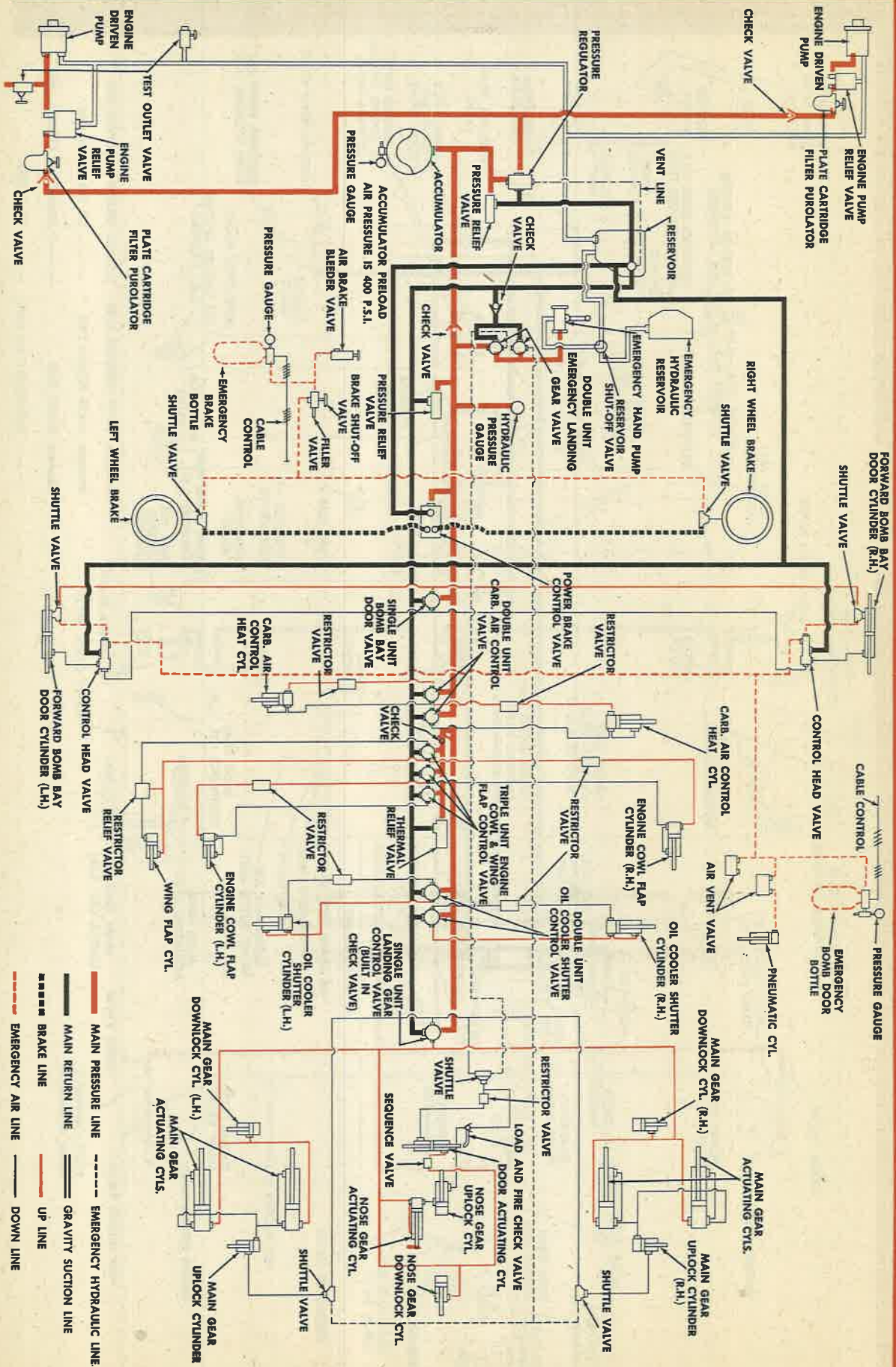


Before you go on your own in a B-26 you must know the hydraulic system, its function, how to operate the hydraulic units correctly, how to check for proper operation, and complete emergency hydraulic operation.

The hydraulic system of the B-26 is an open system of the accumulator-pressure regulator type. This means that hydraulic fluid is supplied from the main hydraulic reservoir to two

engine-driven pumps under atmospheric pressure. The two pumps supply the pressure to a main pressure line. A pressure regulator in the main pressure line regulates the pressure to keep it within the range between 850 and 1050 psi. The accumulator acts as a pressure reservoir and guarantees a sufficient amount of pressure for the proper operation of the hydraulic units under all normal operating conditions.

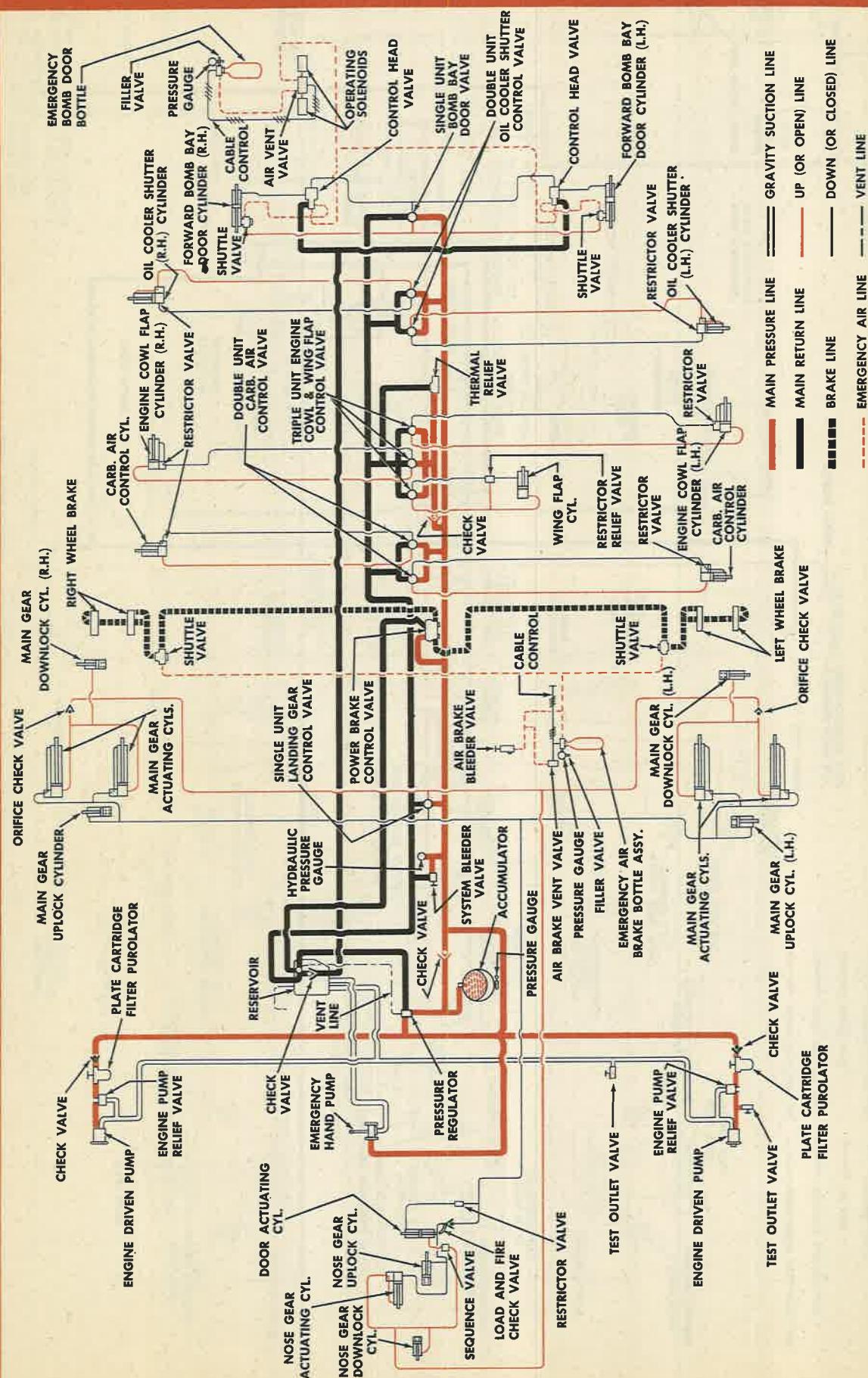
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F and G Models

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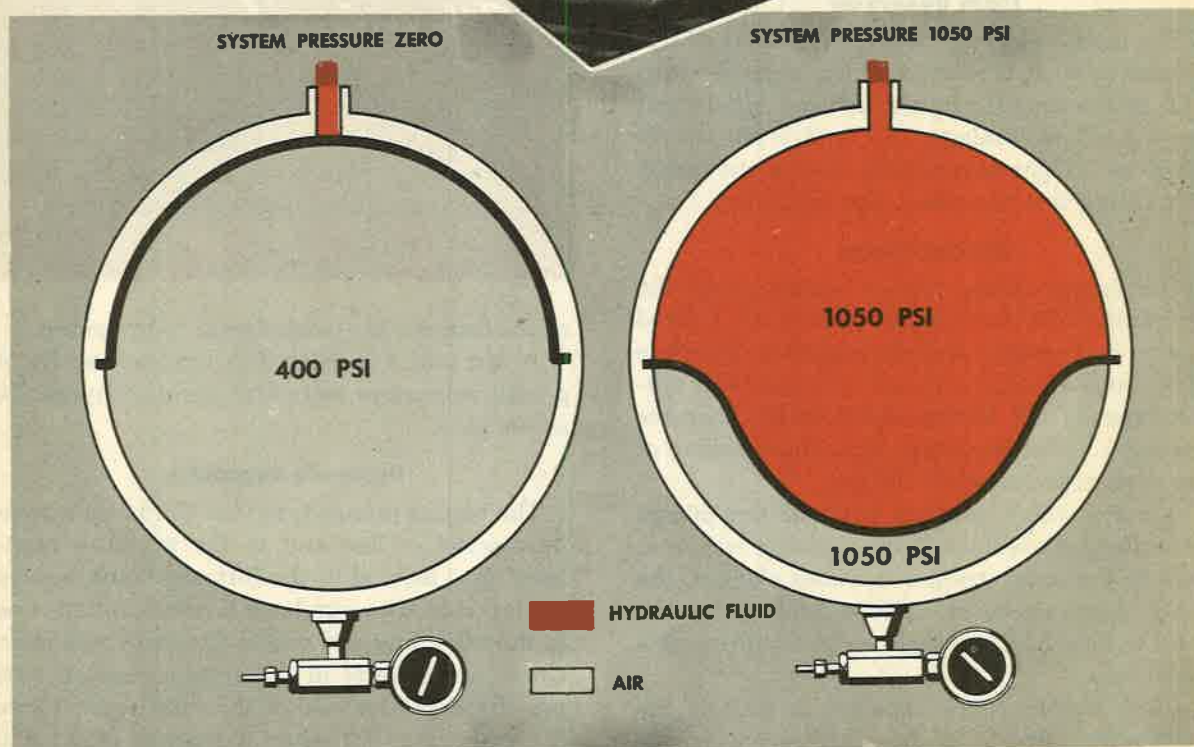
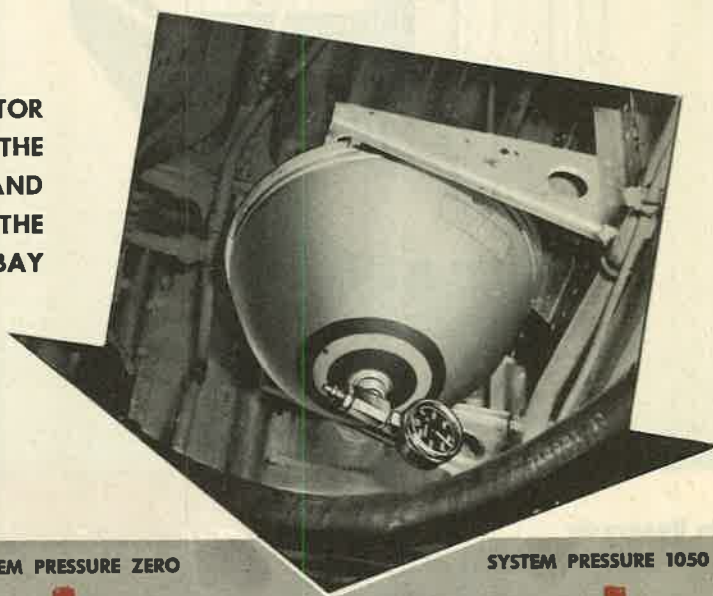
Accumulator

The accumulator is a metal sphere, divided in the middle by a neoprene diaphragm. The lower section contains air under a normal pressure of 400 psi when the pressure in the hydraulic system is zero. When the fluid surges through the lines under a pressure of 1050 psi, it goes into the accumulator until it compresses the air in

the bottom part to the same pressure, 1050 psi. When you need instant pressure—for your brakes, for example—the accumulator provides sufficient fluid under adequate pressure for positive operation. The accumulator also prevents surges in the hydraulic system.

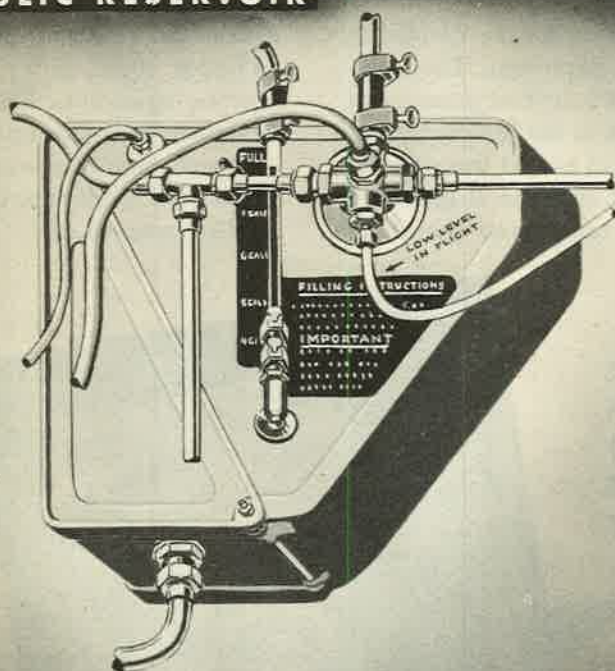
The accumulator works on the principle that while fluid is only minutely compressible, air is readily compressed.

**THE ACCUMULATOR
IS MOUNTED IN THE
FORWARD LEFT HAND
CORNER OF THE
FORWARD BOMB BAY**



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MAIN HYDRAULIC RESERVOIR



Main Reservoir

The main reservoir holds $8\frac{3}{4}$ gallons of hydraulic fluid. It is located on the right forward wall of the forward bomb bay and filled from the top of the fuselage. The fluid level is indicated by a sight gage on the side of the reservoir facing the catwalk in the bomb bay.

Engine Pumps

The engine-driven pumps which pump the hydraulic fluid through the system are located one on each engine accessory section. They are of the constant-displacement type and their output depends only on the engine speed. They are normally under load only when the pressure of the system drops below 850 psi.

A relief valve protects each of the pumps from possible overload. If the pressure regulator fails or the cuno strainer becomes clogged, the relief valve opens at 1200 psi and allows the fluid to flow back through the pump through a relief line.

Cuno strainers are installed to protect the system from dirt. Both the relief valves and the

Warning!

Unless the system pressure is zero, a considerable amount of fluid may be trapped in the accumulator. Make sure that the pressure is zero when you check the reservoir to see that it has sufficient fluid.

cuno strainers are located next to the pumps.

A test outlet is located in the left nacelle to permit retraction tests and periodic hydraulic inspections.

Pressure Regulator

The engine pumps force the fluid into a common pressure line and to the pressure regulator. It is located in the forward bomb bay on the left side. The regulator has two outlets, one to the main line and one to the main reservoir. Until the pressure in the system reaches 1050 psi, the regulator allows the fluid to flow into the main line, but when it reaches 1050 psi it

bypasses the fluid back to the reservoir. When the pressure again drops to 850 psi the regulator allows the fluid to flow back into the main pressure line.

These units, together with the main pressure and the main return lines, comprise the normal pressure system used for normal operation.

Auxiliary System

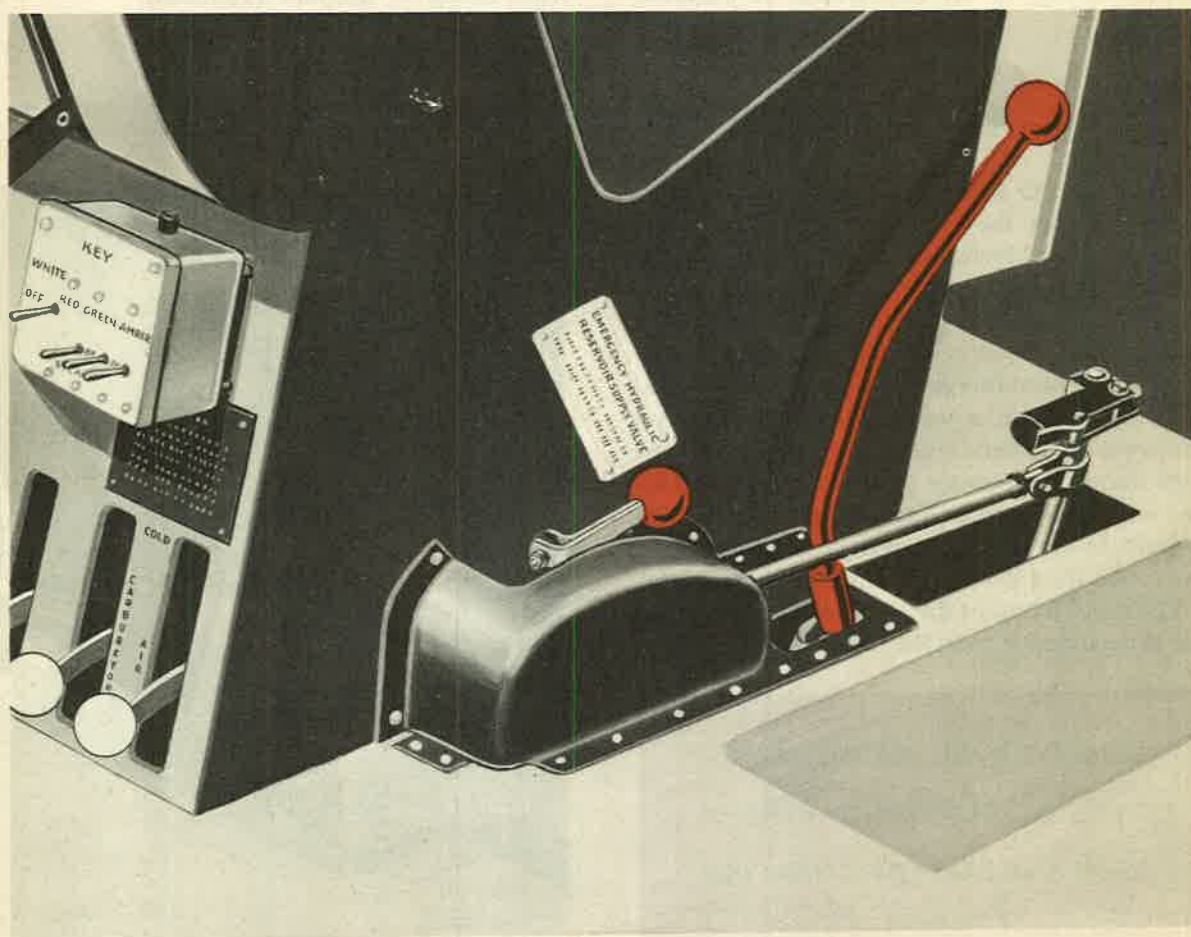
Should the main hydraulic system fail, there is an auxiliary system which you can use. This provides you with an alternate means of operating the various hydraulically operated units throughout the airplane.

AUXILIARY UNITS IN THE B-1 AND C MODELS

There is an auxiliary reservoir located in the right aft corner of the bombardier's compartment. It holds 3½ gallons and is used only if all of the fluid is gone from the main reservoir.

A selector valve at the right-hand side of the pedestal, next to the hand pump, selects the tank from which the system gets its fluid

through the hand pump. Normally, it is safetied in the forward position so that the hand pump uses fluid from the main reservoir. In an emergency, break the safety and pull the selector valve to the rear. With the selector valve in this position, the hand pump uses hydraulic fluid from the auxiliary reservoir.



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Nose Gear Emergency Control

The nose gear emergency control is located on the upper face of the pedestal. In the up, or NORMAL position, it connects the hand pump to the main pressure line. In the down, or EMERGENCY position, it connects the hand pump to the emergency nose gear down-line. In the down position it also connects the main pressure line to the main return line. This provides a method of bleeding the pressure off when the engines are not running, or lowering the pressure in flight. You can also bleed off pressure by the use of the flaps or the brakes.

Main Gear Emergency Control

The main gear emergency control is located just to the right of the nose gear emergency control. Keep in the up, or NORMAL position, unless needed in an emergency. It connects

the hand pump to the emergency main gear down-line when it is placed in the down, or EMERGENCY position.

Hand Pump

When you use the hand pump, pressure is supplied directly to the main pressure line. You do not pump fluid into the accumulator. The fluid is kept away from the accumulator by a ball check valve in the main pressure line between the hand pump and the accumulator. The valve also allows the hand pump to operate the system normally in case of damage to the engine pumps or the lines in the nacelles.

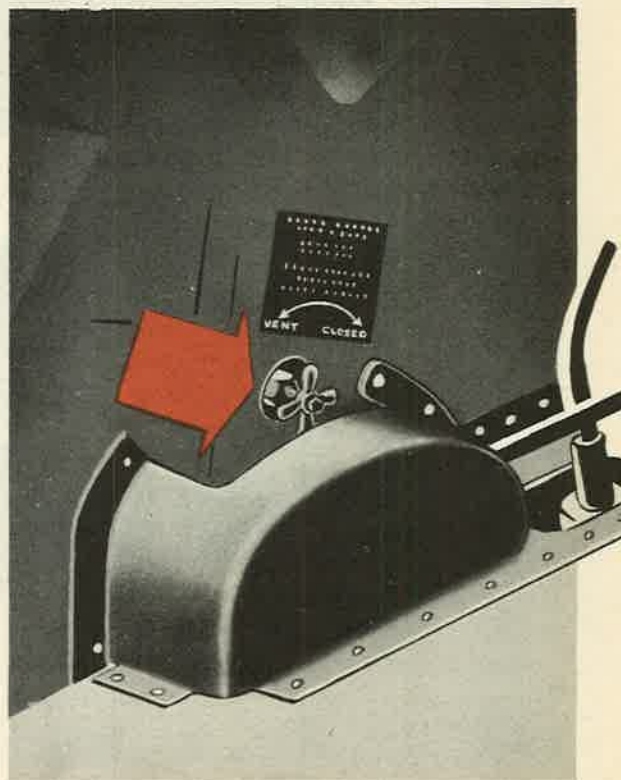
A combination thermal and hand pump relief valve is set at 1200 psi. It is connected beyond the ball check valve between the main pressure and the main return lines to prevent excessive pressure from being built up by the hand pump or thermal expansion.

AUXILIARY UNITS IN F AND G MODELS

The F and G Models differ from the earlier models in that they have a mechanical emergency means of lowering the landing gear. (Refer to Emergency section for operation of the mechanical system.) Therefore, the auxiliary reservoir, reservoir selector valve, and the nose and main gear emergency controls are not installed. However, a vent valve is installed on the lower right-hand side of the pedestal. It connects the main pressure line to the main return line and allows you to bleed the pressure on the ground to check the accumulator pressure or hydraulic fluid level of the main reservoir.

The hand pump in the F's and G's operates in the same manner as in the other models.

**BE SURE YOU KNOW WHICH
TYPE OF AUXILIARY SYSTEM
IS IN THE AIRPLANE YOU FLY**



THE ELECTRICAL SYSTEM

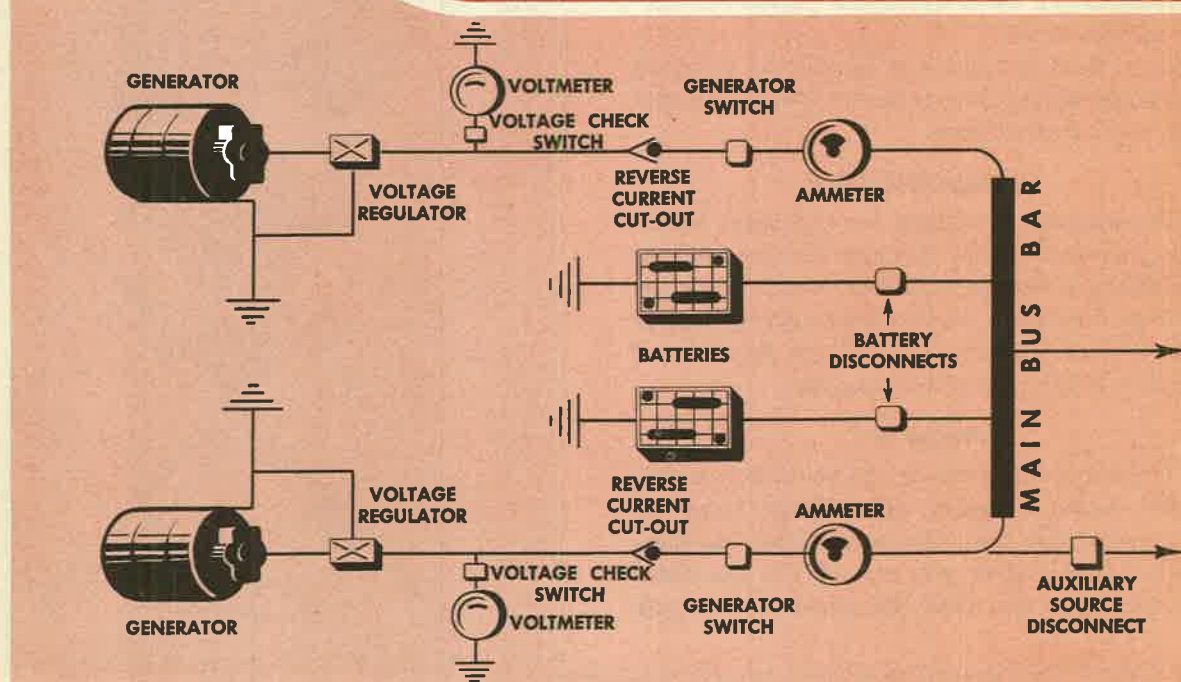


DIAGRAM OF BASIC B-26 ELECTRICAL SYSTEM

The electrical system isn't hard to understand if you use your imagination. Just think of it as a water system. Water flows through a pipe; electricity flows through a wire. Water is

under pressure in the pipe which is measured in pounds per square inch; electricity is under pressure in the wire, measured in voltage. The quantity of water is measured in gallons; the quantity of electricity is measured in amperes.

Water is resisted as it flows through the pipe according to the roughness or smoothness of the inside of the pipe; electricity is resisted according to the material of which the wire is made.

The bigger the pipe, the more water will flow through it; the bigger the wire, the more electricity will flow through it. You must drain off the water with a drain pipe after you use it; you must drain off the electricity with a ground wire after it is used.

Remember:

PRESSURE = VOLTAGE

QUANTITY = AMPERES

RESISTANCE = RESISTANCE (in Ohms)

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BASIC SYSTEM

While you study the diagram of the basic electrical system on the previous page, remember to keep the water system comparison in mind to help you understand it better.

Generator

The generator is to an electrical system what a pump is to a water system. It pumps electricity into the lines.

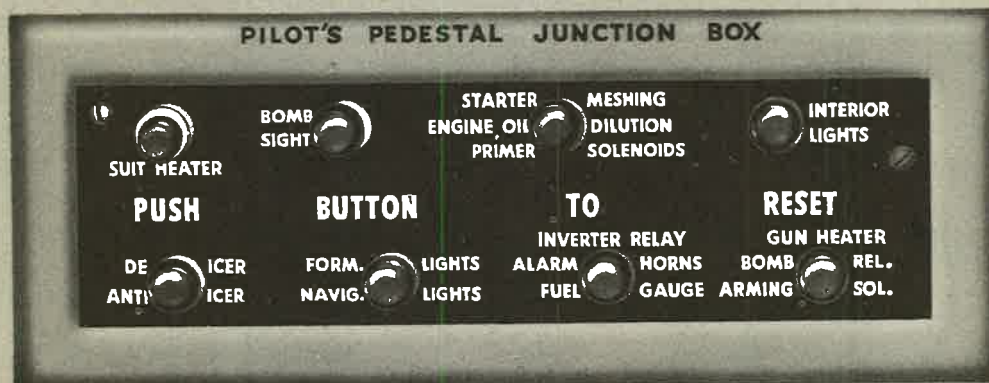
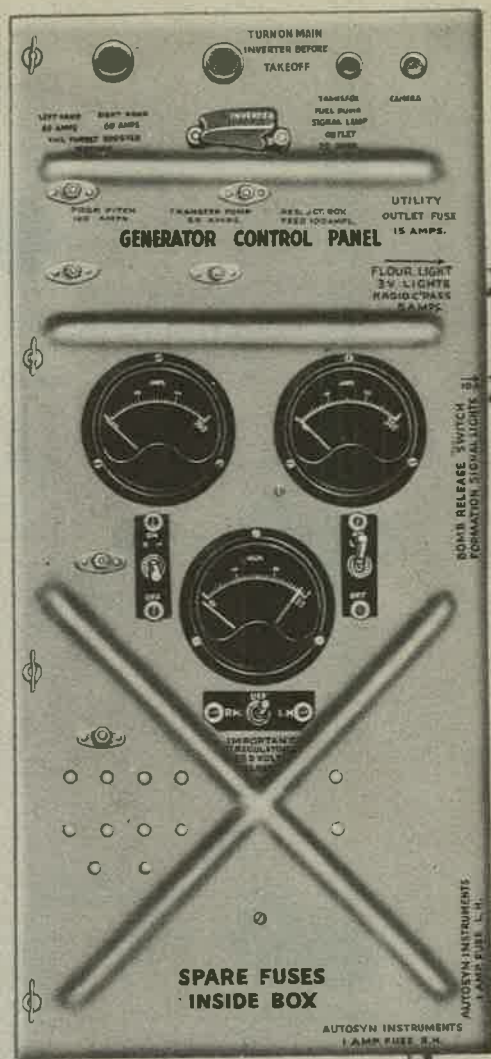
Each B-26 generator is capable of pumping 200 amperes, far more than you will need under any normal conditions.

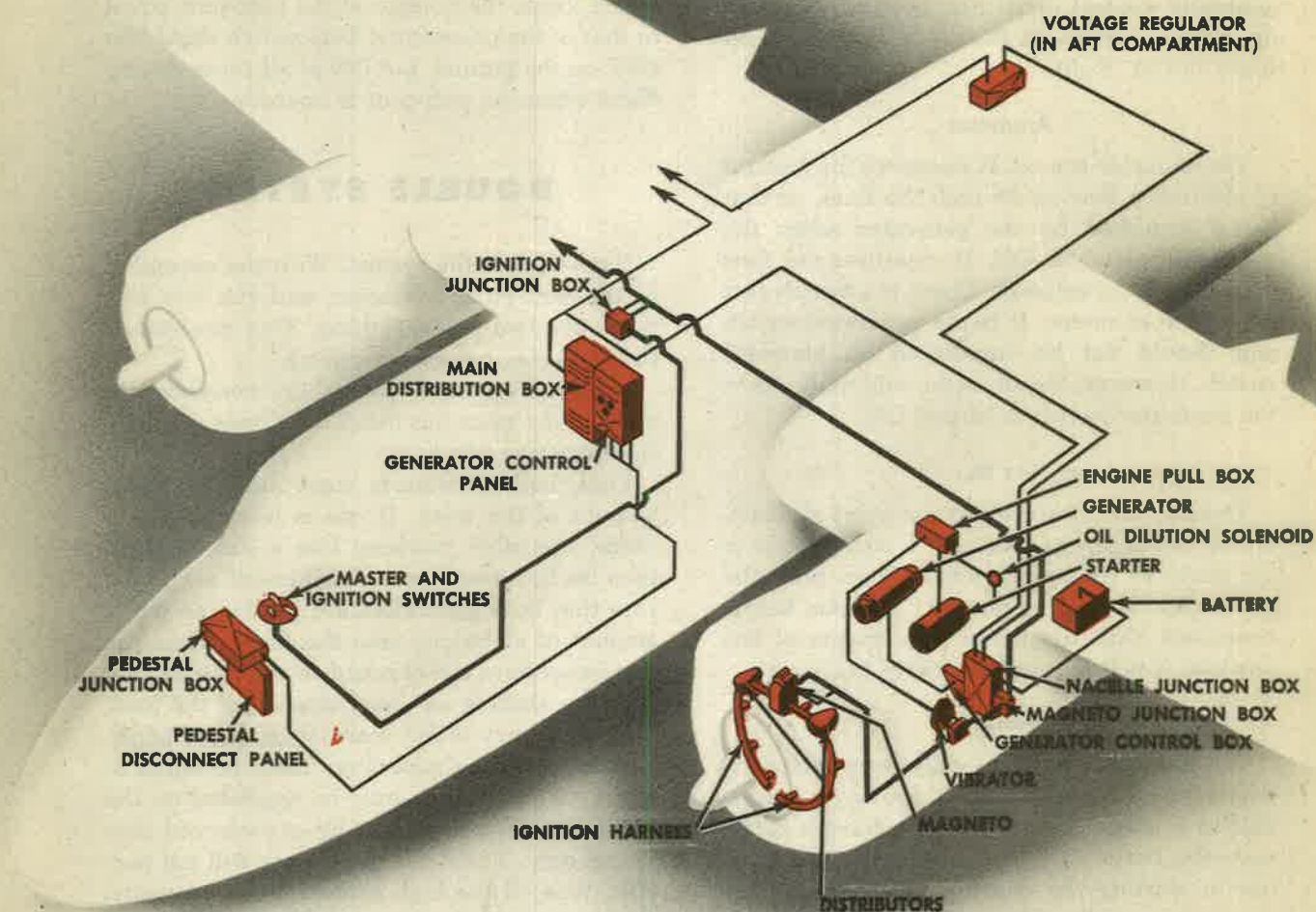
Voltage Regulator

The amount of voltage (or pressure) which the generator pumps through the lines is controlled by a voltage regulator, which keeps the voltage in the line coming from each generator constant at 28 volts. The voltage regulator is located in the rear of the airplane.

Voltmeter

There is a voltmeter on the generator control panel which measures the voltage from the generator after the voltage regulator has done its job. Even after you cut off the generator switches you can read the amount of voltage





PLACEMENT OF VARIOUS UNITS COMPRISING B-26 IGNITION AND ELECTRICAL SYSTEMS

being produced by the generators. On the ground, when you are checking the generators for parallel operation, the generator switches should be cut OFF in order to read the correct voltage. Only cut in the voltmeter when you want a reading.

Reverse Current Relay

Next on the line is a reverse-current cut-out, commonly called a reverse-current relay. It corresponds to a check valve in a water system.

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It lets electricity flow from the generator into the system when the generator is putting out at least 26 volts, but when its output drops below that point the generator's contact with the rest of the system is automatically cut off. This prevents electricity from the battery or the other generator from flowing through the faulty generator, and possible damage to the system.

Generator Switch

Next in line is the generator switch, which is

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just like a cut-off valve in a water system. It is operated by the engineer. It is located on the generator control panel just back of the radio operator's position. It should be left ON at all times during flight.

Ammeter

The ammeter is next. It measures the amount of electricity flowing through the lines, or that being furnished by the generator when the generator switch is ON. It measures the flow of electricity in amperes. There is a switch just below the ammeter. **It is the generator switch and should not be considered an ammeter switch.** However, the ammeter only reads when the generator switch is turned ON.

Bus Bar

The line finally arrives at the point of distribution called the bus bar, which corresponds to the main water supply point. From here the electricity is used as needed. The bus bar is connected with the many components of the airplane which require electricity to operate.

Battery

The generator isn't the only source of electricity in the airplane. Just as you have a reservoir in a water system, you also have a reservoir—the battery—in the electrical system for use in starting the engines, or whenever the generators aren't working. Electricity is merely drained from the battery, which can be disconnected when you don't need it by the use of the battery-disconnect switch.

Putt-Putt

Some airplanes also have a putt-putt. The putt-putt is a gasoline-engine-driven generator which has a voltage regulator and puts out the same voltage as a regular generator. It can, however, put out only 70 amperes of current. There is no switch to cut off the flow of electricity coming from the putt-putt when it is running. It is either located in the rear of the airplane, or it is kept on the ground and plugged

into the engine nacelle when it is needed. On some putt-putts there is an equalizer switch which keeps the voltage of the putt-putt equal to that of the generators. This switch should be OFF on the ground, but ON at all times during flight when the putt-putt is operating.

DOUBLE SYSTEM

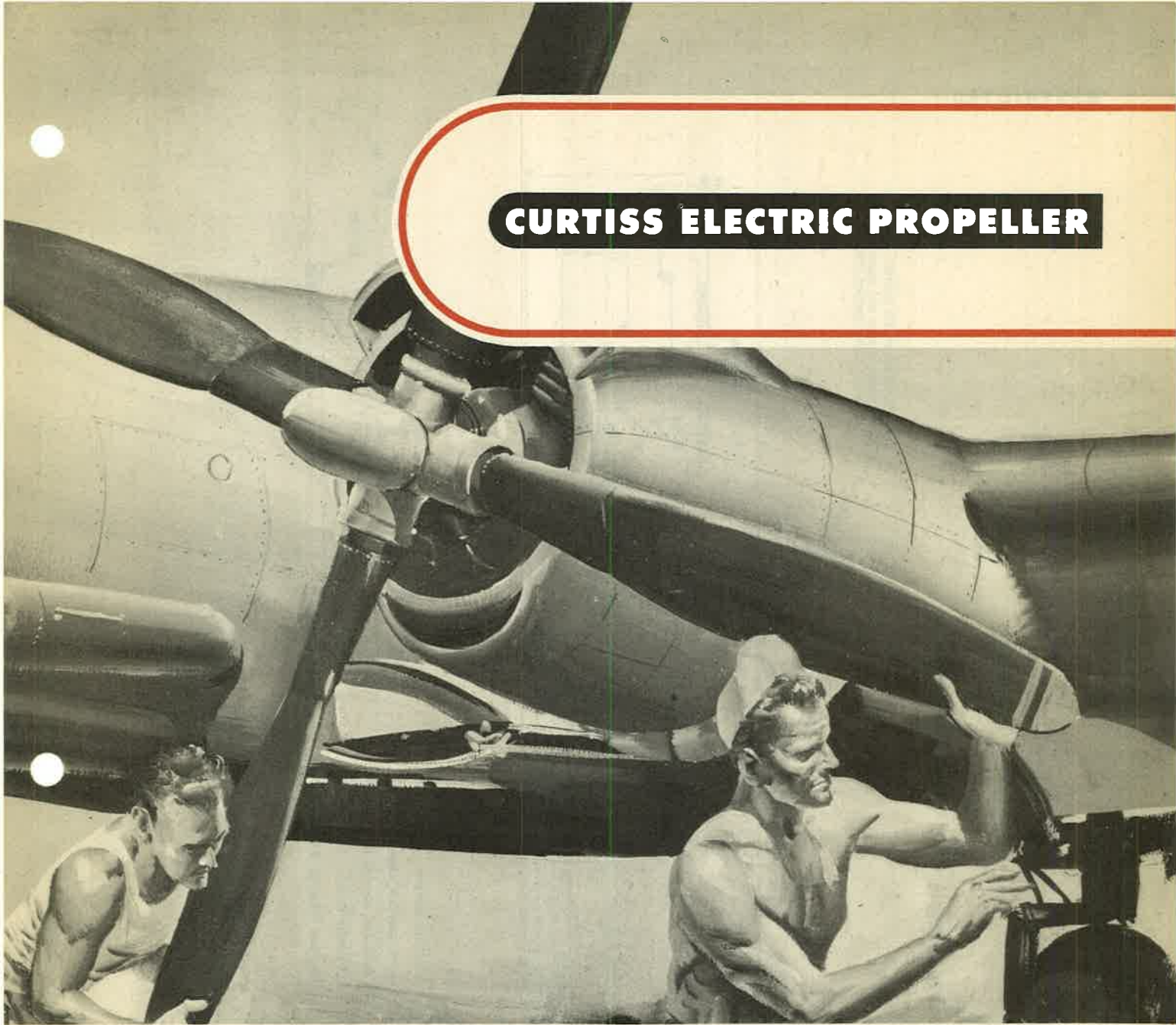
Now—double the system. With the exception of the putt-putt, voltmeter, and the bus bar, there are two of everything. Two generators, two batteries, two of everything.

All five sources of supply are connected to one and the same bus bar. That brings up a few complications.

First, both generators must share an equal amount of the work. If one is working like a horse, the other working like a sick donkey, then the horse will soon wear himself out. Make sure that both generators are putting an equal amount of electricity into the lines. When the two generators are checked to make sure that both are sharing an equal amount of the load, they shouldn't differ more than 20 amperes. Voltage from the generators must be equal to within .5 volts. They may be regulated on the ground or in the air, but by experienced personnel only. Tip: If the generators will not parallel, turn off the high generator momentarily, then turn it back on again. This may correct the condition. Remember, the generators and putt-putt are set to develop 28 volts. The batteries store electricity under a pressure of 24 volts. Total capacity of both batteries together is 68 ampere hours.

There you have the electrical system of the B-26 in its simplest form. You should know and understand the proper operation of switches and the units they operate. You should keep informed at all times during flight as to the operation of the system. It effects electrical propellers, lights, instruments, etc. Know what to do in case of emergency. Emergency operation is covered in the Emergency section.

Know the location of all fuses and circuit breakers



CURTISS ELECTRIC PROPELLER

On the B-26 you will use the Curtiss Electric Propeller. You know the principle of operation: the angle of the blade is controlled while in flight to provide maximum efficiency and maintain constant engine speed under varying operating conditions.

Auto Constant Speed

In **AUTO CONSTANT SPEED** a governor and a relay maintain constant engine speed within the limits of the blade travel.

RESTRICTED

Remember that **AUTO CONSTANT SPEED** is the proper setting for all normal operations. **FIXED PITCH**, **INC RPM** and **DEC RPM** are auxiliary means of control.

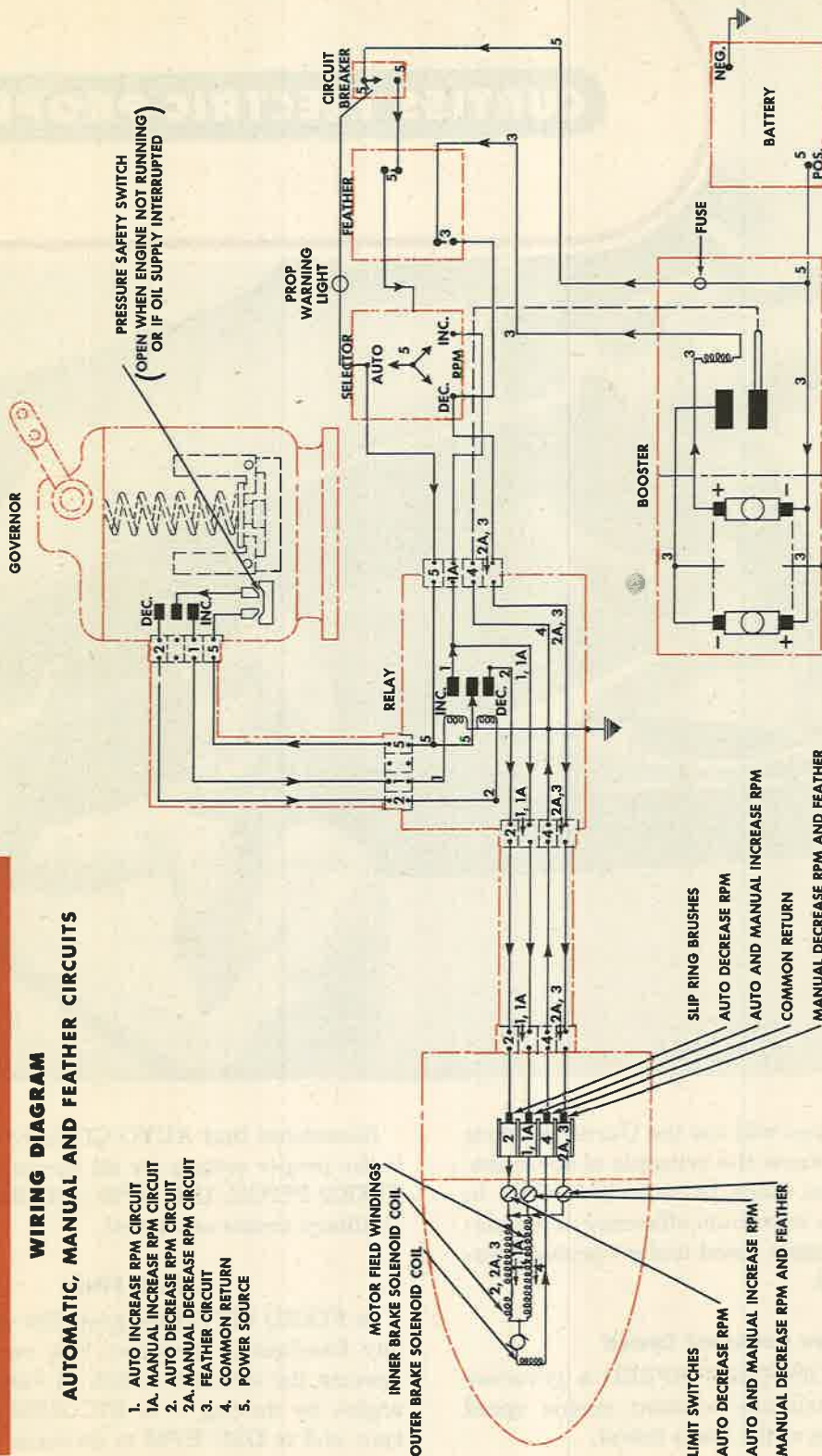
Fixed Pitch

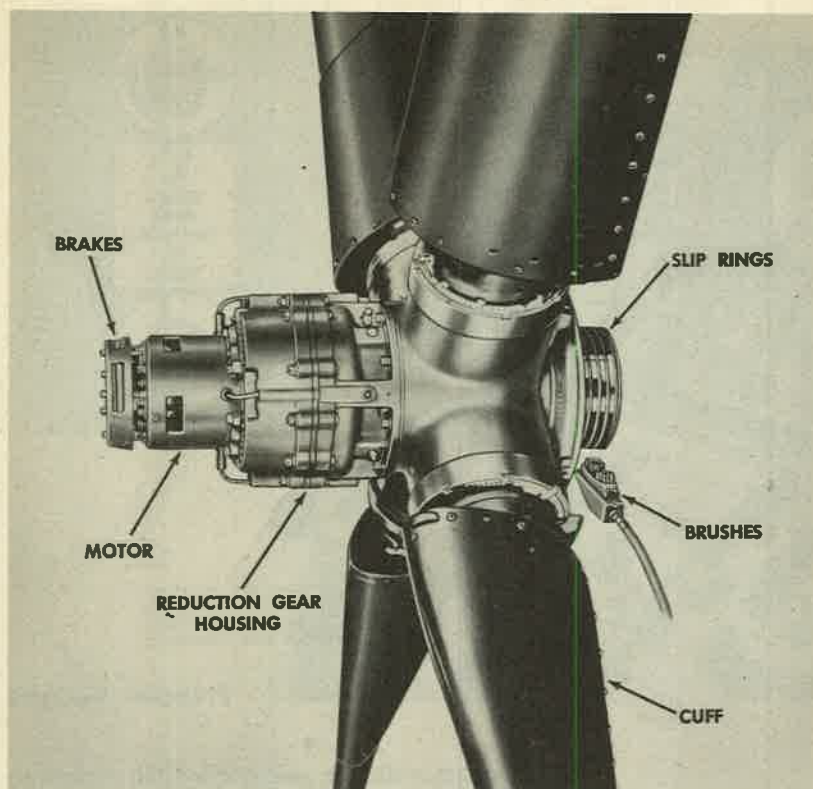
In **FIXED PITCH** the propeller operates like any fixed-pitch propeller. You can, however, operate the selector switch to vary the blade angles by moving it to **INC RPM** to increase rpm, and to **DEC RPM** to decrease rpm.

CURTISS ELECTRIC PROPELLER

WIRING DIAGRAM AUTOMATIC, MANUAL AND FEATHER CIRCUITS

1. AUTO INCREASE RPM CIRCUIT
- 1A. MANUAL INCREASE RPM CIRCUIT
2. AUTO DECREASE RPM CIRCUIT
- 2A. MANUAL DECREASE RPM CIRCUIT
3. FEATHER CIRCUIT
4. COMMON RETURN
5. POWER SOURCE





PROPELLER ASSEMBLY

Propeller Motor

The blade angle of the propeller is controlled by an electric motor. Since you must increase or decrease the angle of the blades, the motor is reversible.

Propeller Brakes

The propeller motor has two brakes. One brake stops the rotation of the blades of the propeller when you cut off the current to the propeller motor. It also holds the angle constant when the motor isn't operating. The other brake allows the rpm to increase at the same rate it decreases.

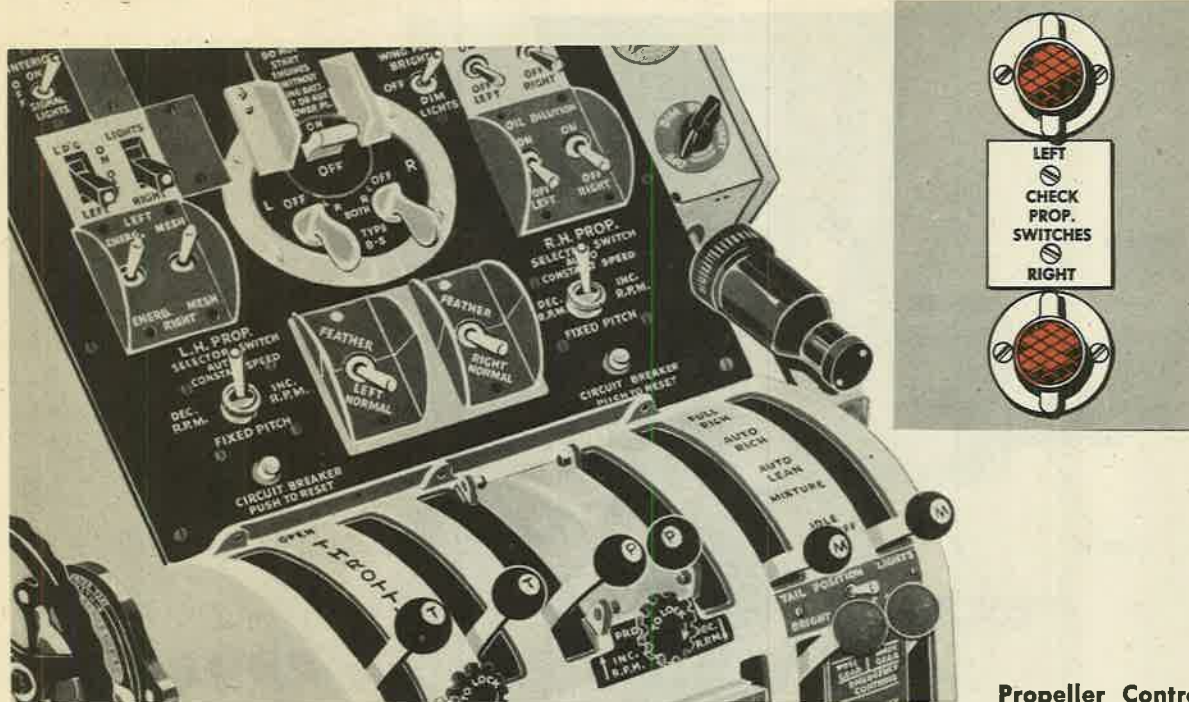
Limit Switches

Electrical limit switches limit the maximum and minimum blade angles under normal operation. A third limit switch limits the maximum blade angle when you are in AUTO CONSTANT SPEED. This prevents the propeller from feathering if the governor control linkage is shot away.

Selector Switch

The selector switch controls the operations of the propeller. It is a 4-position switch. Operating in AUTO CONSTANT SPEED, the selector switch is full forward. In FIXED PITCH, the selector switch sticks straight up, and it can be moved either to DEC RPM or INC RPM to decrease or increase the rpm. It is spring-loaded in the last two positions and must be held until proper corrections in rpm can be made. When released, it springs back to the FIXED PITCH position.

Under normal operations, a propeller can be feathered by moving the feather switch to FEATHER, but if the feather booster motor fails for any reason, the propeller can be feathered by holding the selector switch to DEC RPM. It takes about three times as long to feather a propeller with the selector switch as it does with the feather switch. The feather switch should always be returned to NORMAL after the propeller is feathered.



Propeller Controls

Governor Control

The governor control levers are located on the pedestal. Pull them back and you decrease rpm. Push them forward and you increase rpm. Adjust them to provide for desired rpm settings, such as for takeoff, climb, cruise, and for various maneuvers.

Propeller Circuit Breaker

There is a propeller circuit breaker for each propeller which takes the place of a fuse and which protects the circuit from electrical overload. Its normal operating position is pushed in.

The circuit breaker operates like a pop-out cigaret lighter on an automobile. When an overload occurs in the electrical system the circuit breaker gets hot and pops out, exposing a red and white band about the base of the button.

To re-set the circuit breaker, push the button back in again. If in normal flight and you have sufficient altitude, wait about 15 seconds for the circuit breaker to cool off, then push it back in. If it stays pushed in, you know the overload was only temporary and you can continue with normal operation. If it continues to pop out, hold it in long enough to make the correct rpm

adjustments with the selector switch and then release the button. Continue to try at intervals to make the button stay pushed in.

Feather Switch

There is a switch for each propeller which allows you to feather that propeller. The switch is moved to FEATHER and in from 6 to 8 seconds, the blade of the propeller turns its leading edge into the wind, offering minimum drag.

Don't develop featheritis. Make sure that the engine is not putting out any power. When you are at low altitudes, however, and immediate action is necessary, you must feather the propeller as quickly as possible. **Take enough time (and remember this)—make sure you are not feathering the propeller of the good engine.**

Warning Lights

The warning lights are located on the instrument panel and light up when the selector switch is not in AUTO CONSTANT SPEED, when the circuit breaker pops out, or when the feather switch is in the FEATHER position. They are installed primarily to warn you to not take off with the selector switch in fixed pitch or with the circuit breaker popped out.

COMMUNICATION EQUIPMENT



The radio equipment which you have in the B-26 is the best that American ingenuity has been able to produce. It is no good, however, unless you know how to use it properly.

The B-26 contains the following communication equipment:

- A 10-station interphone system.

- Two medium-frequency and one low-frequency command receivers.

- Two medium-frequency command transmitters.

- A 4-channel VHF command transmitter and receiver.

- An automatic radio compass.

- An all-frequency (except VHF) liaison transmitter.

- A marker beacon receiver.

- An all-channel IFF transponder.

- An emergency transmitter.

- A frequency meter.

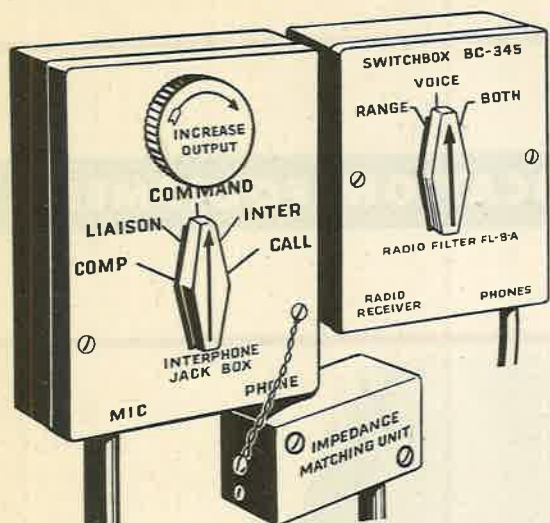
The least that you should know about the communication equipment is how to use each piece of equipment, and how to tune the sets.

MISCELLANEOUS EQUIPMENT

Interphone Jackboxes

Interphone jackboxes are located at ten different stations throughout the airplane. With the exception of the tail gunner's station which has only interphone, these jackboxes enable a crew member to listen to, or transmit on, any

RESTRICTED



of the radio equipment that is operating, or to talk by interphone with any other position in the airplane. Each box contains a 5-position switch, a volume control and two outlets, one for a mike and one for a headset. The five positions are:

1. COMPASS
2. LIAISON
3. COMMAND (Includes VHF)
4. INTERPHONE
5. CALL

The CALL position is spring-loaded, and the control must be held in that position. Regard-

less of what equipment you are listening to, any other member of the crew can call you or you can call him by use of the CALL position.

For more detailed information concerning the uses of the interphone system, see the section on Gunnery.

Impedance Matching Units

If your headset has a red plug, make sure an impedance matching unit is installed in the jackbox or filter box, and that your headset is plugged into it. The interphone system was designed for a high-impedance headset, but this headset has been replaced by a low-impedance one in order to obtain better fidelity and intelligibility.

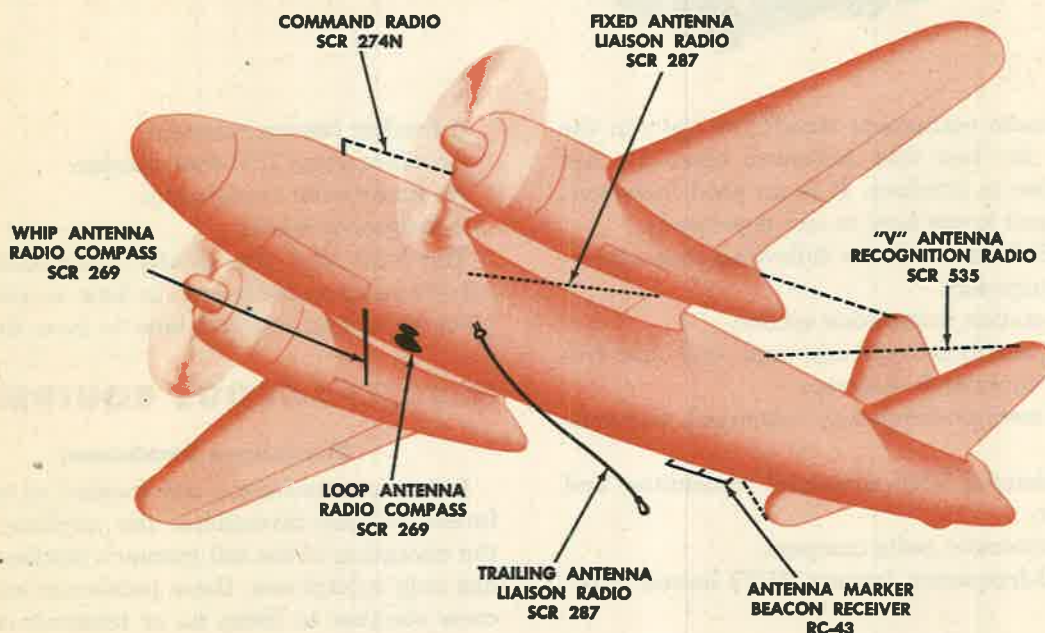
Filter Box

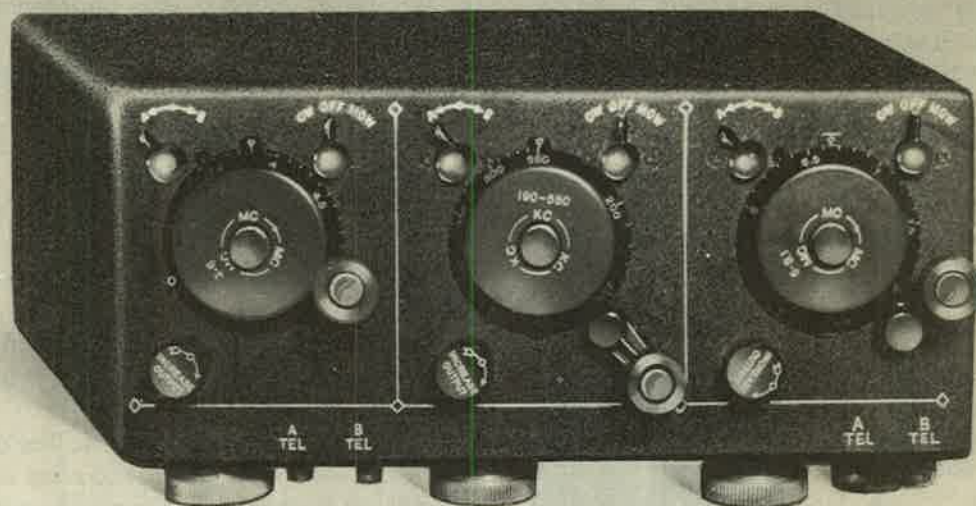
The familiar RANGE-VOICE-BOTH filter box is installed at the pilot's and copilot's stations to allow you to listen to the range, voice broadcasts, or to both at the same time. Be sure that your headset is plugged into the filter box and the filter box into the interphone jackbox.

Throat Mike

A throat mike enables you to talk and still have both hands free.

The throat mike should fit about as tightly as a necktie and be placed well up on your throat.





SCR 274N COMMAND TRANSMITTER
CONTROL BOX



SCR 274N COMMAND RECEIVER CONTROL BOX

USE OF COMMAND SETS

To Receive on a Medium or Low-Frequency Command Receiver (SCR 274N)

1. Select proper frequency band and receiver.
2. Turn A-B switch to A.
3. Turn CW-OFF-MCW switch to MCW. (If CW code is to be used, turn to CW.)
4. Tune in proper frequency.
5. Adjust volume with INCREASE OUTPUT control.
6. Repeat steps 1 through 5 for other receivers if desired.

Any crew member can receive by setting his jackbox control to COMMAND.

Note: Do not allow more than three jackboxes to be on COMMAND at one time, or reception of range signals will be faulty.

The two command sets are used by the pilot more than any of the other radio equipment, with the possible exception of the interphone.

You will use the command sets to contact towers, range stations, and other aircraft.

Note: Receive range stations on MCW.

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To Transmit on Medium Frequency Command Transmitter (SCR 274N)

1. Turn power switch ON.
2. Turn CW-TONE-VOICE switch to VOICE. (Unless CW or TONE is to be used, in which case turn to proper position.)
3. Place transmitter selector switch on 1 or 2.

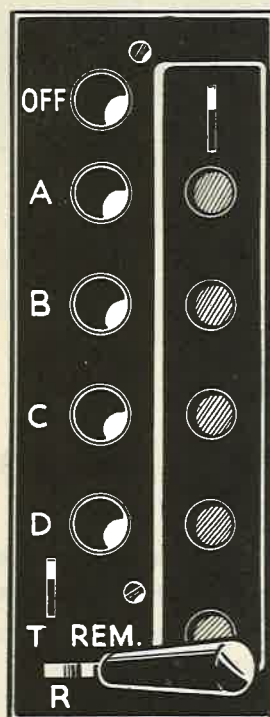
4. Depress mike button to talk.

A key is provided on the transmitter control box to send code.

Any crew member can transmit by setting his jackbox control to COMMAND.

VHF TUNING UNIT
LOCATED ON LEFT SIDE
OF PILOT'S PEDESTAL

VHF-MED. FREQ. SWITCH
LOCATED JUST AHEAD
OF VACUUM SELECTOR
VALVE



To Receive or Transmit on the VHF Command Set (SCR-522)

1. Select the desired channel, and press the proper lettered button. (When you press the button you also turn the set on.)
2. Set the toggle switch to REM.
3. Depress mike button to talk.

Any crew member can receive or transmit by turning his jackbox to COMMAND.

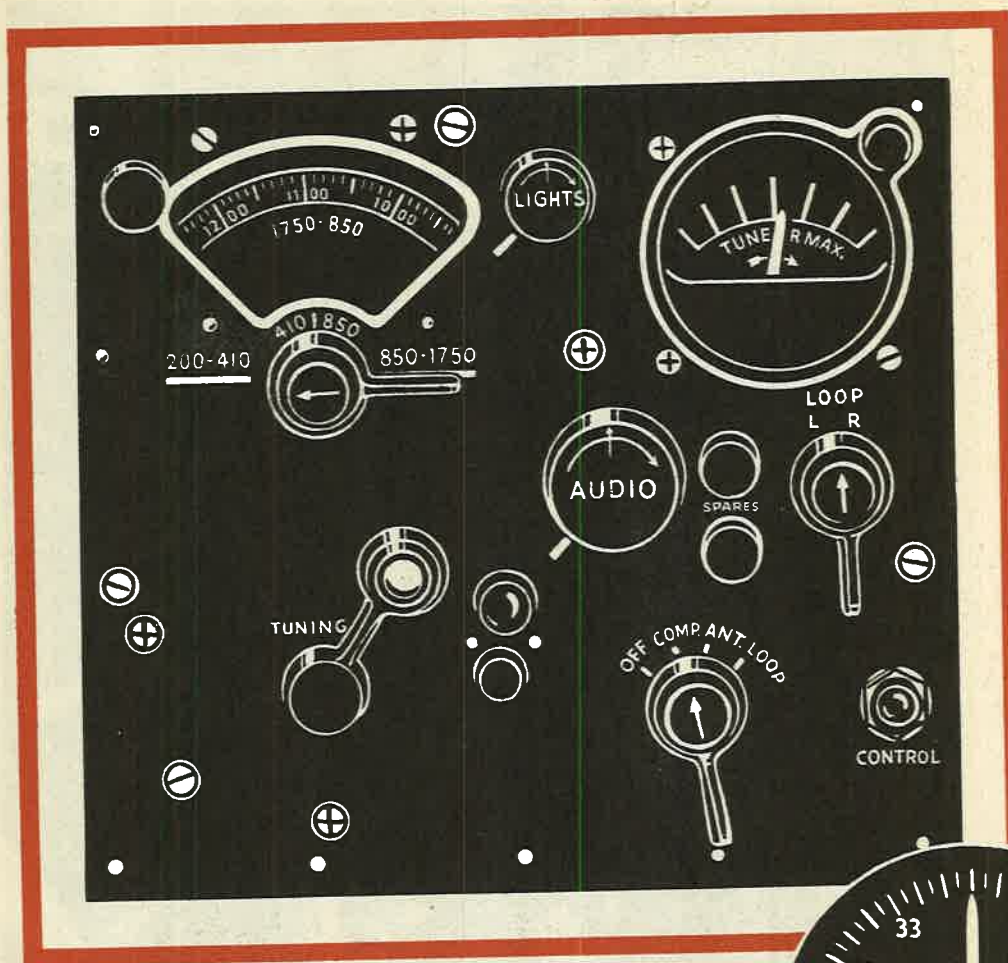
Quick Trouble-shooting Checklist for Command Equipment

Reception:

1. Headset plugged into impedance matching unit.
2. Impedance matching unit plugged into filter box.
3. Filter box on BOTH.
4. Jackbox on COMMAND.
5. Jackbox volume control to full INCREASE.
6. Proper receiver CW-OFF-MCW switch on MCW.
7. Proper receiver A-B switch on A.
8. Proper receiver volume control to full INCREASE OUTPUT.
9. Correct frequency tuned in. Try other stations and listen for background noise and static. If still no background noise is heard try the following:
 - (a) Change headsets.
 - (b) Plug headset into jackbox.
 - (c) Have another crew member plug his headset into one of the A channels on the receivers in the navigator's compartment.
 - (d) Check the fuses of the receiver you are using.

Transmission:

1. If no side tone is heard when you try to talk, check:
 - (a) Throat mike plugged into jackbox.
 - (b) Power supply ON.
 - (c) Jackbox volume control to full INCREASE.
 - (d) Try copilot's mike button.
 - (e) Modulator unit fuses.
2. If you hear a side tone but get no answer, check:
 - (a) Transmitter selector switch on correct transmitter.
 - (b) VHF-MED. FREQ switch on MED. FREQ.
 - (c) CW-TONE-VOICE switch on VOICE.
 - (d) Antenna current at least 2 amperes.
 - (e) Loose antenna wires.
 - (f) Frequency on the transmitter (in the radio operator's compartment).



USE OF RADIO COMPASS

You can use the radio compass to get bearings, radio fixes, for orientation, and in making let-downs and low approaches.

To Operate Radio Compass

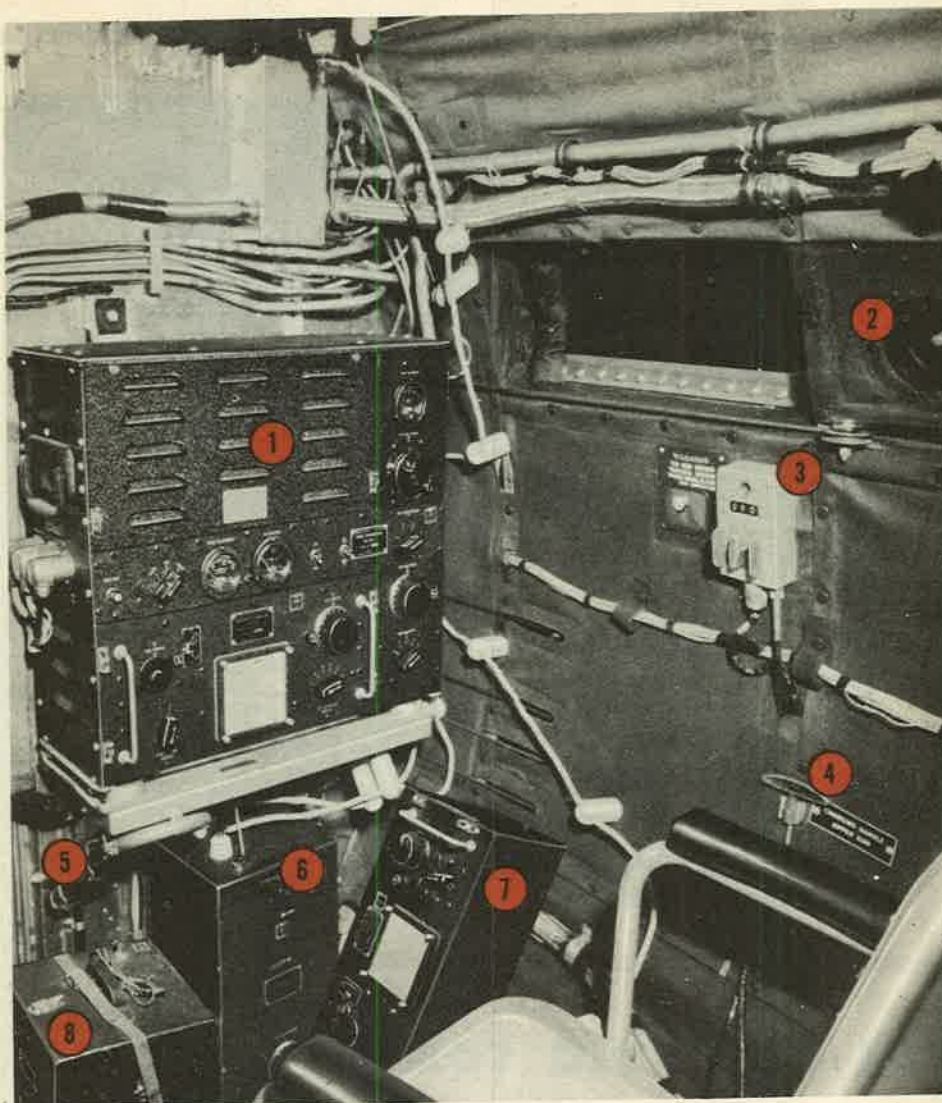
1. Make sure that the whip antenna is extended.
2. Turn the OFF-COMP-ANT-LOOP switch to ANT.
3. See that the green control light is burning. If it isn't, push the control button.
4. Select desired band with band-change switch.
5. Tune in proper frequency to maximum rise on tuning meter.

6. If you want to take a bearing or to home on a station, switch the OFF-COMP-ANT-LOOP switch to COMP. The station's relative bearing is shown on the indicator.

Any crew member can listen by setting his jackbox control to COMPASS.

Note: When you do an aural null problem, switch the VOICE-CW switch to CW.





1 LIAISON
TRANSMITTER

2 DISC-TYPE
VENTILATOR

3 TRAILING
ANTENNA REEL
CONTROL

4 CHARGING
HANDLE, UPPER
LEFT PACKAGE
GUN

5 LOOP ANTENNA
DEHYDRATOR

6 ANTENNA
TUNING UNIT

7 SPARE LIAISON
TRANSMITTER
TUNING UNIT

8 FREQUENCY
METER

Use of Liaison Equipment

The radio operator controls the liaison equipment. It is used for long-range transmitting and receiving between aircraft, or from aircraft to ground.

Use of Marker Beacon Receiver

The marker beacon receiver is turned on by turning on the radio compass. It will receive only the 75 Mc signal that is transmitted by Z markers over a cone of silence, and by fan marker beacons. When this signal is received, the marker beacon light on the instrument panel goes on.

Use of IFF Transponder

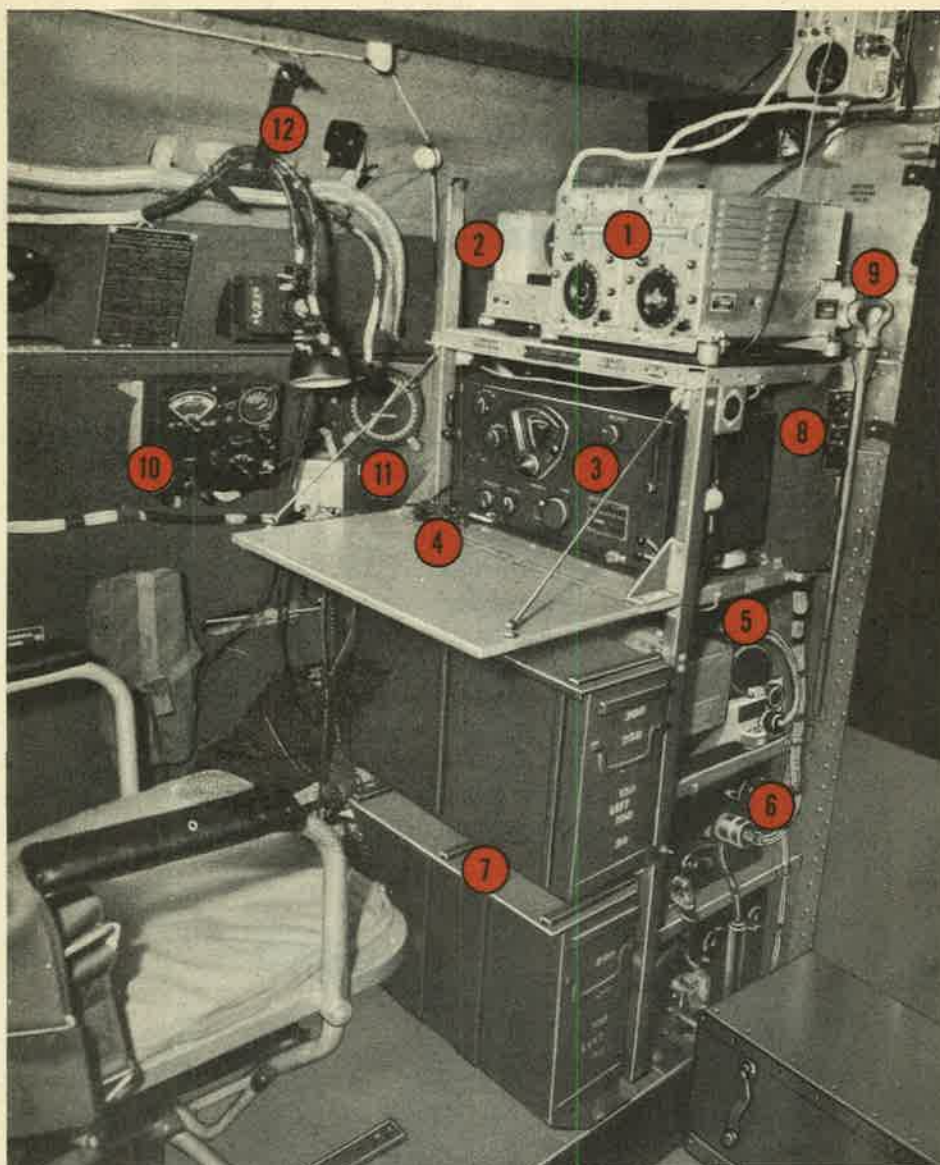
IFF equipment should be installed and operated only when you are flying in areas where challenge is probable.

PILOT'S IFF EMERGENCY
SWITCH



DETONATOR BUTTONS

RESTRICTED



- **COMMAND TRANSMITTERS (SCR-274N)**
- **COMMAND MODULATOR**
- **LIAISON RECEIVER**
- **LIAISON TRANSMITTER KEY**
- **COMMAND RECEIVERS (SCR-274N)**
- **RADIO COMPASS RECEIVER**
- **AMMUNITION BOXES FOR LEFT PACKAGE GUNS**
- **RADIO JUNCTION PANEL AND CIRCUIT BREAKERS**
- **SPARE WHIP ANTENNA**
- **RADIO COMPASS CONTROL BOX**
- **RADIO COMPASS BEARING INDICATOR**
- **MOUNT FOR IFF CONTROL BOX**

To operate the IFF transponder, select the correct channel to be used at the time you are flying. Turn the set ON. If you are in serious trouble, turn the green covered switch marked **EMERGENCY** on the pilot's instrument panel or pedestal to ON. Be sure the detonator is hooked up whenever the IFF equipment is installed.

Use of Emergency Transmitter

An emergency transmitter is installed in the B-26 for use in emergency landings on land or water. Hydrogen balloons, a hydrogen generator, a kite, a spare antenna, a signal lamp,

and instructions for the operation of all units are included. The transmitter is watertight and will float.

Note: Do not use the AA position as a distress signal—use only the SOS position on the automatic keyer. The set transmits on 500 Kc, the international distress frequency.

Use of Frequency Meter

A crystal-controlled frequency meter is installed to allow you or your radio operator to check and set the frequency of any of your command and liaison equipment. It is normally stowed under the liaison transmitter.

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THE HEATING & VENTILATING SYSTEM

There are two systems to provide heat for crew members on a B-26. One is the exhaust manifold cabin heaters. The other is electrically heated clothing.



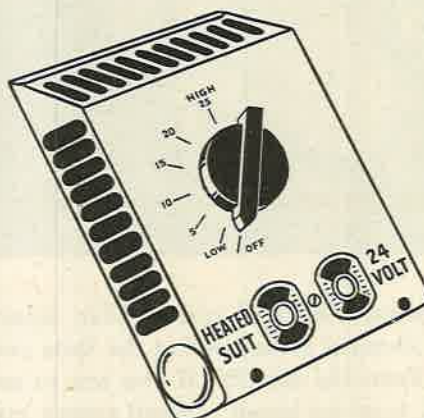
Heating and Ventilating Controls

The cabin heaters are controlled by valves in the navigator's compartment. Air to be heated for the forward compartments is taken from the leading edge of the right wing, outboard of the nacelle. A spill valve is located in the air intake duct in the accessory section. Its purpose is to cool the accessory section during hot weather to prevent vapor locks. It is important that this valve be opened during hot weather. It must be closed during cold weather so that heat may be

supplied to the cockpit. The air is passed around the inboard exhaust manifold and can either be drawn into the forward compartment or spilled overboard, as desired. The same system provides heated air for defrosting the pilots' and bombardier's windshields.

Air for the aft compartments follows a similar path on the left side of the airplane to the navigator's compartment. It is then piped to the aft compartments.

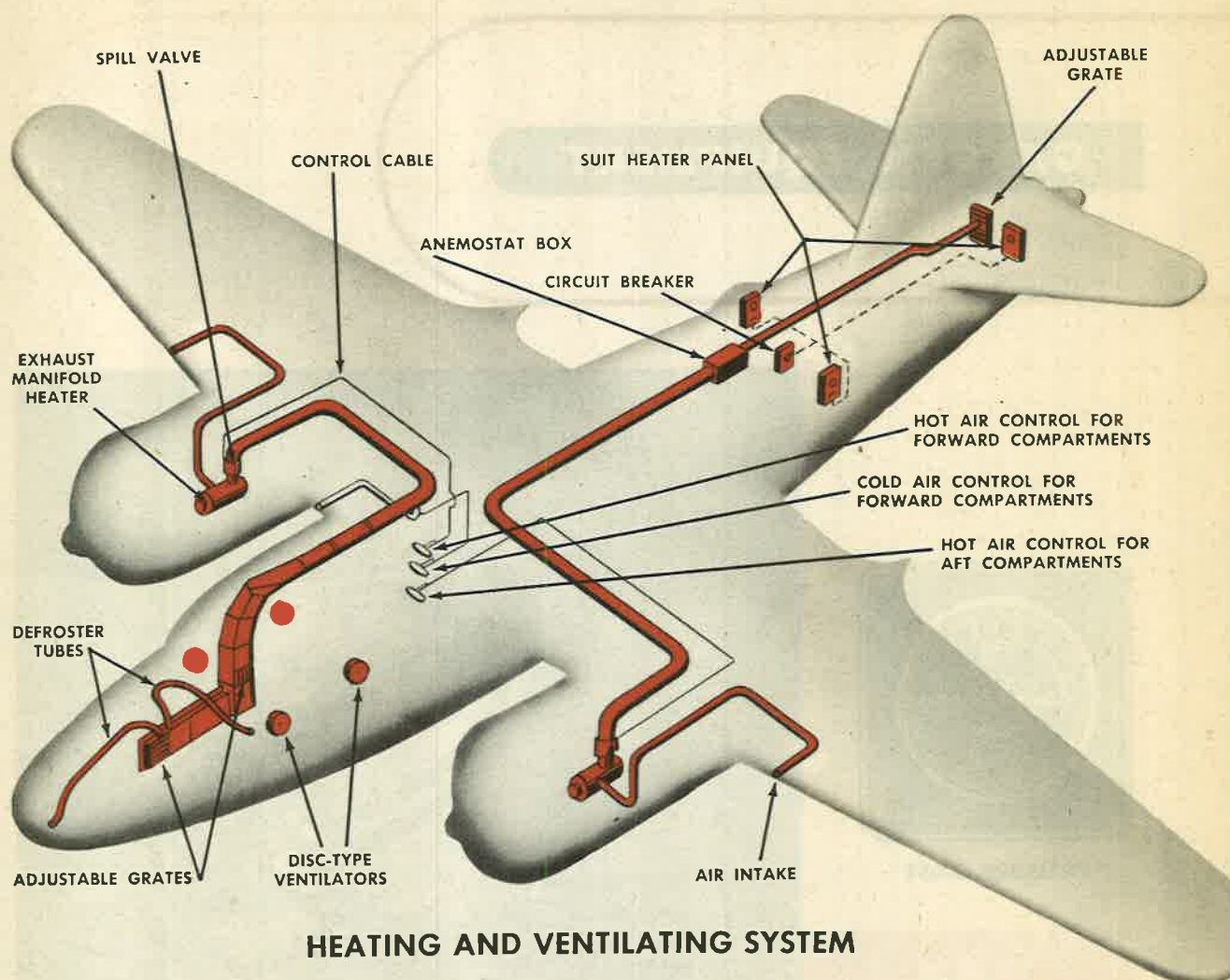
Cold air can be drawn into the forward compartments through a duct on the leading edge of the wing, inboard of the nacelle.



Electric Suit Rheostat

Electrically heated clothing outlets are provided at various stations throughout the airplane for the members of the crew. Rheostats are provided at each outlet to control the heating of each individual unit.

RESTRICTED



HEATING AND VENTILATING SYSTEM

Notes on Operation of Heat Units

Cabin heaters must be off for takeoff to avoid filling the cockpit with oil smoke. They should also be off in combat to keep the cabin from being filled with carbon monoxide in case the heater is damaged. Use cabin heat cautiously during cold weather to avoid cracking the windows.

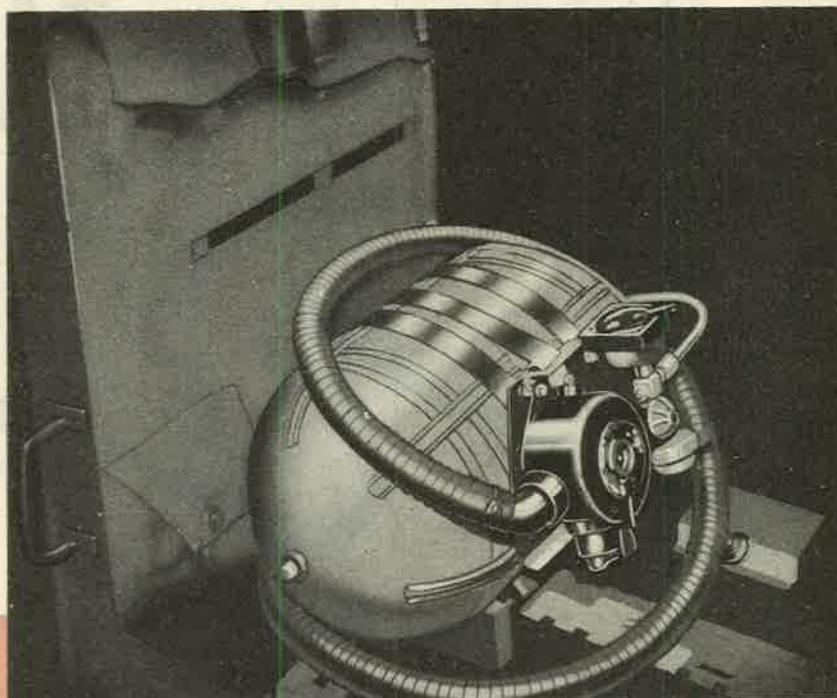
Make sure that all units of the electrical suits are plugged in properly. Plug electric suits only into the socket marked **HEATED SUIT**. Do not use enough heat to allow perspiration to form. Unless the cold is uncommonly severe, turn the electrical suits off in case of a generator failure.

RESTRICTED

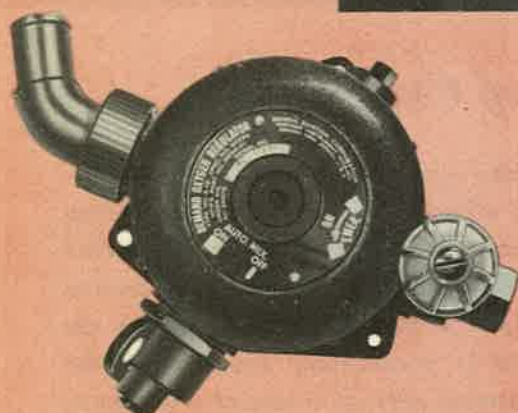
OXYGEN EQUIPMENT



PRESSURE GAGE



PILOT'S PORTABLE OXYGEN UNIT



REGULATOR

B-26 oxygen equipment consists of three portable low-pressure type tanks, each equipped with built-in regulator, pressure gage, and re-fill valve. These units are normally stowed at the following positions in the airplane.

1. Behind the pilot's seat.
2. Under the navigator's table.
3. Behind the navigator's seat.

In the stowed position, the tanks are seated in wooden mounts and held in position by web straps attached to the floor of the airplane. Refer to your PIF for details regarding the proper operation and use of this equipment.

EMERGENCY EQUIPMENT

Life Raft

A 6-man life raft is stowed in the top of the navigator's compartment. It can be launched either from the inside of the airplane or from the outside. When it is launched from the inside it inflates itself. When you launch it from the outside you have to pull the CO₂ bottle release manually. A recently inspected raft must be aboard at all times.

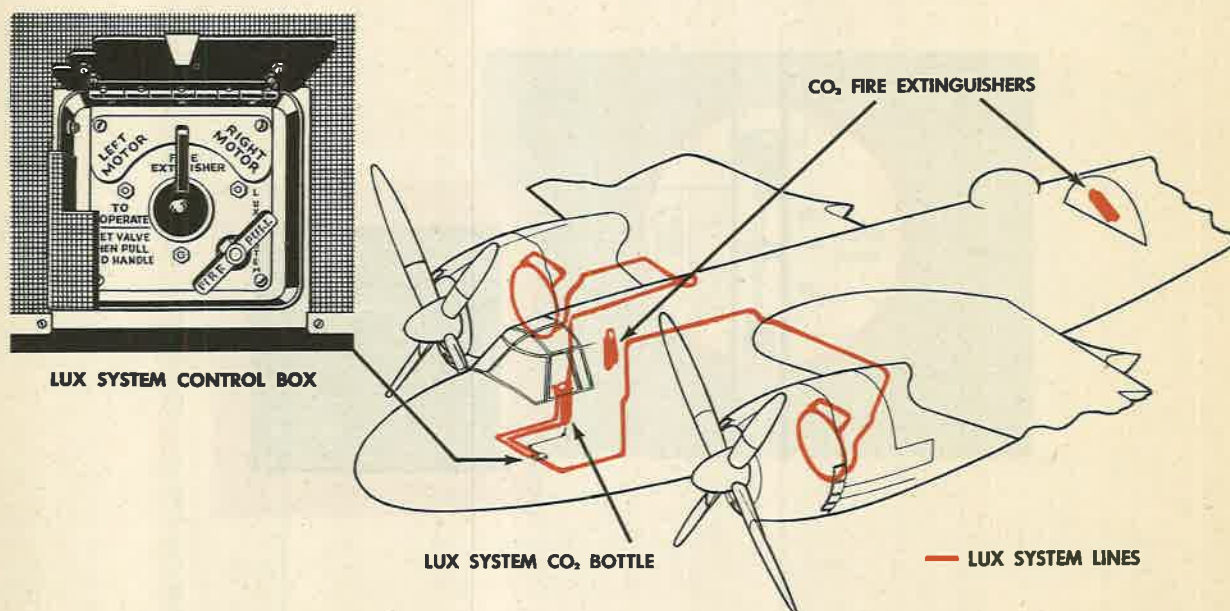
Axes

On models which do not incorporate the gunner's emergency exit there are two crash axes installed; one on the aft side of the step into the pilot's compartment, one on the right side of the

turret framework. On models which have a gunner's emergency exit only the axe in the forward compartment is installed.

Engine Lux System

An engine fire extinguisher of the Lux type may be installed in each nacelle. The controls are located on the floor between the pilot's and copilot's seats. Turn the selector valve to the proper engine and pull the handle to discharge the extinguisher bottle. You can use it only once. A red indicator plug is installed just aft and below the copilot's window on the outside of the fuselage. If this plug isn't installed and intact, the system may have been used. You must have it checked.



RESTRICTED

Hand Fire Extinguishers

You have two hand fire extinguishers to help put out cabin fires. One is behind the pilot's seat, and the other aft of the turret in the top of the compartment.

Windshield Defrosters

Ducts run from the cabin heating system to positions which enable you to defrost the windshield. Apply heated air to the windshields cautiously to avoid cracking.

Wing De-icers

There are de-icer boots on the leading edge of the wing, and on the vertical and horizontal stabilizers on some airplanes. Your control for their operation is located between the generator control and main distribution panels on some models. On other models the control is located aft of the pilot's seat on the left side of the compartment.

Propeller Anti-icing System

The propellers have standard slinger rings which evenly distribute anti-icing fluid over the blades. The fluid is pumped from the tank in the aft bomb bay to the slinger rings by a

small electric pump which you control with the rheostat on the instrument panel.

IFF Destructor Switches

There are two red buttons installed on the copilot's side of the cockpit. Push these two buttons to destroy the IFF transponder.

Signal Lamp

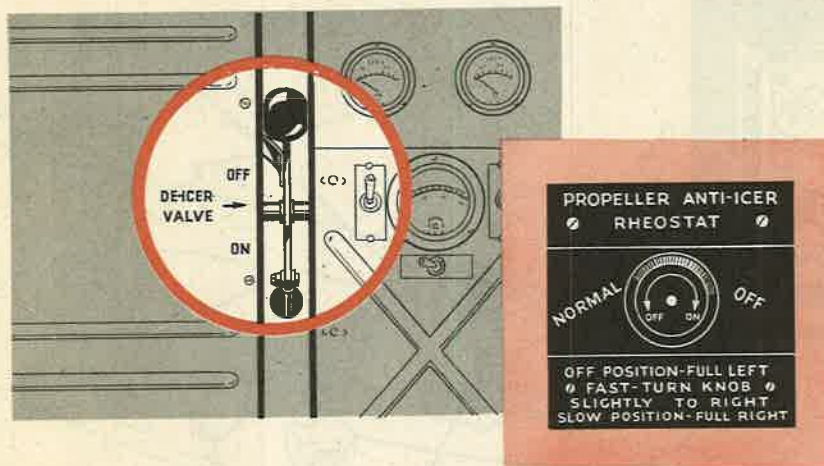
A C-3 type Aldis signal lamp is provided for interplane communication. It is stowed just back of the radio operator's seat on the floor. It is plugged in on the radio equipment rack.

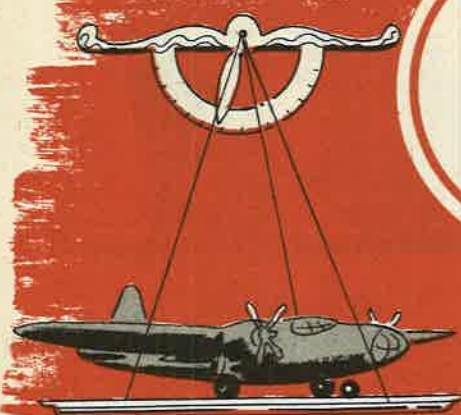
Very Pistol

A Very pistol is stowed in the radio operator's compartment, on the floor. There is an opening provided in the roof of the fuselage just back of the copilot's head through which you insert the pistol for firing in flight.

Alarm Bells or Horns

Four alarm bells or horns are located throughout the plane. You control them with a switch on the pedestal. The switch is not spring-loaded, and can be turned on and off at will. Proper alarm signals are listed in the Emergency section.





WEIGHT AND BALANCE



The day when a pilot flew by the seat of his pants is past. One by one the decisions that were made by intuition or hunches have been taken over by an orderly system based on knowledge and understanding. The invariable result has been greater safety and operating efficiency.

The loading of aircraft, especially heavy aircraft, is no exception. The ever-changing conditions of modern airplane operation, resulting in more and more complex combinations of cargo, fuel, crew, and armament, have outmoded old rule-of-thumb methods. The necessity for getting the utmost in efficiency out of any given flight has highlighted the need for a precise system of control over the weight and balance of aircraft.

Improper loading cuts down the efficiency of an airplane from the standpoint of ceiling, maneuverability, rate of climb, and speed. At worst, it can be the cause of failure to complete a flight, or for that matter, failure even to start it, with probable loss of life and destruction of valuable equipment, because of abnormal stresses it can place upon the airplane's structure or because of changed flying characteristics of the airplane.

RESTRICTED



Overloading

1. Causes a higher stalling speed.
2. Always results in lowering of airplane structural safety factors which may be critical during rough air or takeoffs from poor fields.
3. Reduces maneuverability.
4. Increases takeoff run.
5. Lowers angle and rate of climb.
6. Decreases ceiling.
7. Increases fuel consumption for given speed (decrease in miles per gallon).
8. Increases tire load factors.



RESTRICTED



CG Too Far Forward

1. Increases fuel consumption (less range).
2. Decreases speed for given power.
3. Tends to increase diving moment beyond control.
4. May cause critical condition during flap operation.
5. Increases difficulty in getting tail down during landing.
- 6.. Overstresses nosewheel.
7. Results in dangerous condition if tail structure is damaged or surface is shot away.



CG Too Far Aft

1. Creates neutrally stable to unstable condition.
2. Increases stall tendency.
3. Decreases speed.
4. Decreases range.
5. Increases pilot strain in instrument flying.
6. Results in a dangerous condition if tail structure is damaged or surface is shot away.

Note: If the CG is aft more than 26% of the mean aerodynamic chord (MAC) the nose gear will rise off the ground in the F and G models.



**TACTICAL
WEIGHT and BALANCE CLEARANCE**

FORM F

AIRPLANE NO. FROM TO

LOAD ADJUSTER

FUEL OIL BOMBS

WEIGHT LOADING RANGE

PIF

In order to load the B-26 properly, use the Form F and load adjuster. The PIF contains detailed instructions for the

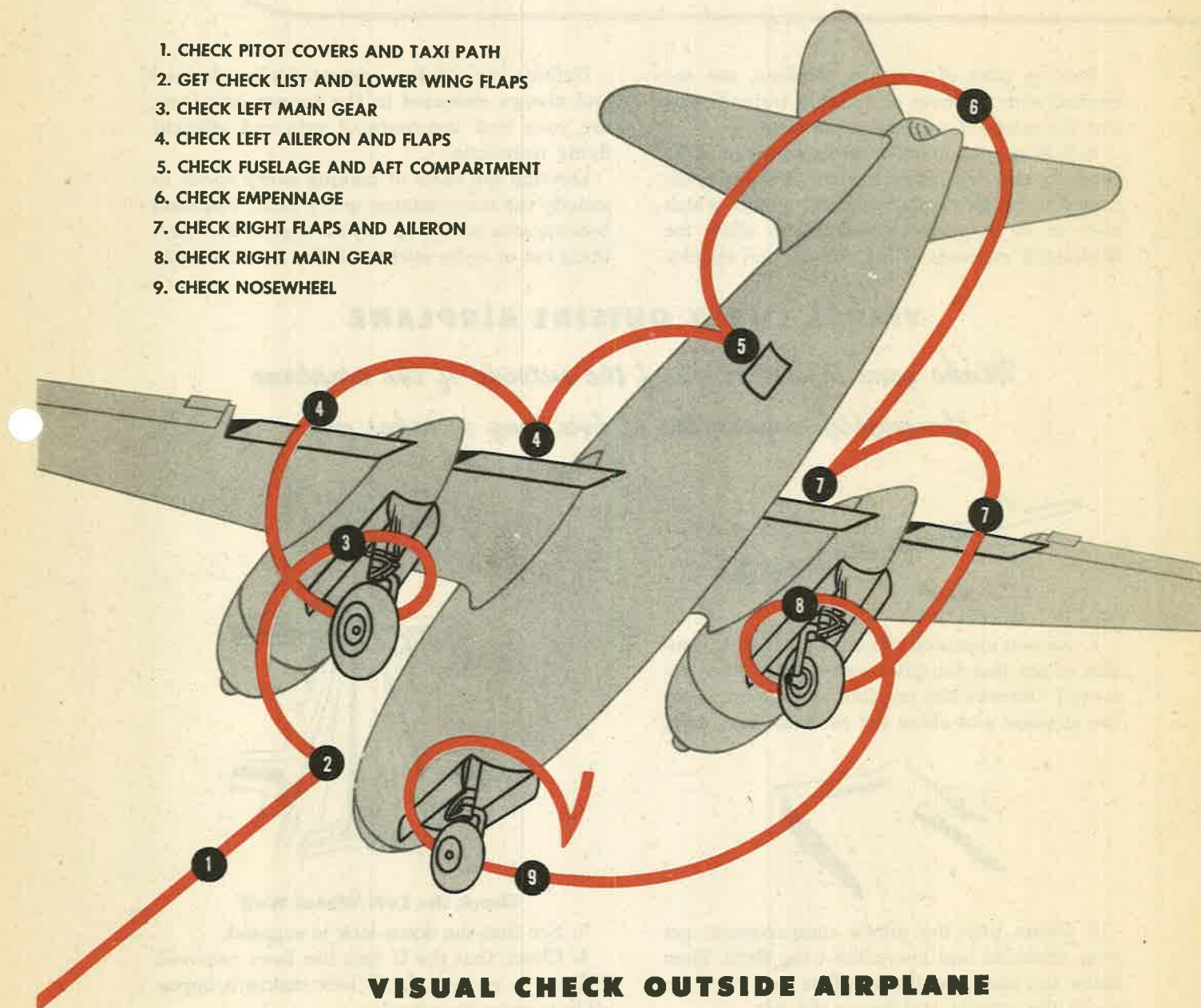
In order to load the B-26 properly, use the Form F and load adjuster. The PIF contains complete and detailed instructions for the proper operation of the load adjuster.

SECTION

2

NORMAL OPERATION

1. CHECK PITOT COVERS AND TAXI PATH
2. GET CHECK LIST AND LOWER WING FLAPS
3. CHECK LEFT MAIN GEAR
4. CHECK LEFT AILERON AND FLAPS
5. CHECK FUSELAGE AND AFT COMPARTMENT
6. CHECK EMPENNAGE
7. CHECK RIGHT FLAPS AND AILERON
8. CHECK RIGHT MAIN GEAR
9. CHECK NOSEWHEEL



VISUAL CHECK OUTSIDE AIRPLANE

PRE-FLIGHT CHECKS AND STARTING

You, as pilot of a heavy airplane, are entrusted with the lives of a highly trained crew and the safety of valuable equipment.

A B-26 has too many controls which must be properly set, too many instruments and indicators to be checked, too many things which have to be in perfect condition, to allow for haphazard methods of inspections and checks.

Definite procedures, systematically planned and always executed in the proper sequence, are your best insurance of safe and efficient flying technique.

Develop the habit of making every check in exactly the same manner every time. You soon become so accustomed to your checks that anything out of order sticks out like a sore thumb.

VISUAL CHECK OUTSIDE AIRPLANE

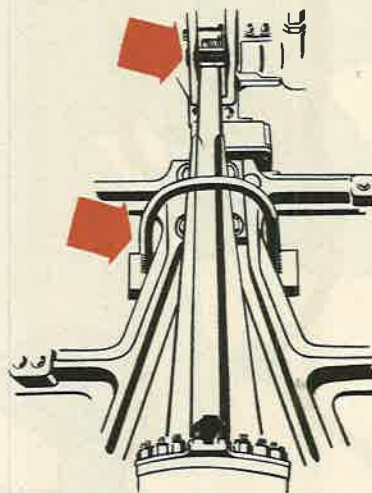
Make your visual check of the outside of the airplane thoroughly, regardless of how long it takes you.



1. As you approach the airplane, check visually to see that the pitot covers have been removed. Observe any possible obstructions near the airplane and along the probable taxi path.



2. Climb into the pilot's compartment, get your checklist and lower the wing flaps. Then leave the inside of the airplane and begin to check the outside, starting on the left.



Check the Left Wheel Well

3. See that the down-lock is engaged.
4. Check that the U lock has been removed. Failure to remove the U lock makes it impossible to raise the wheels.



5. Make sure there are no hydraulic leaks and that the strut extension is between 3 and 4 inches.

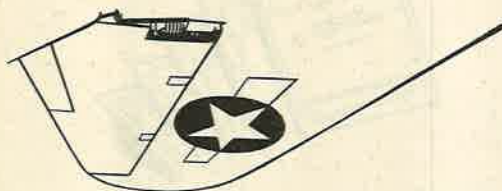


6. Grasp the brake shuttle valve and make sure all lines are tight.



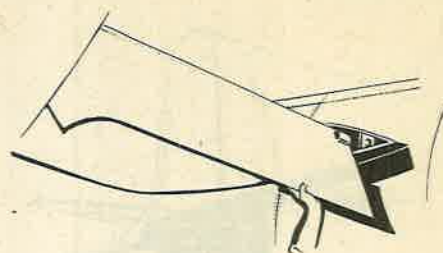
7. Check the left tire for proper inflation and also to make sure that there are no breaks, cuts or blisters on it. Check also to see that the slippage of the tire on the rim does not exceed $\frac{1}{8}$ inch.

8. See that the chock is in place.

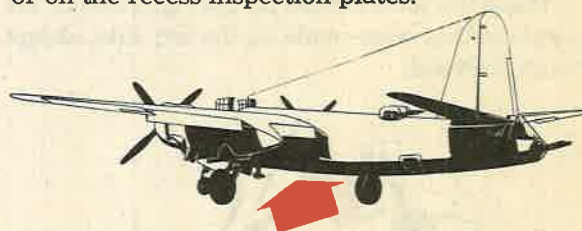


9. Check the left aileron for holes in the fabric.

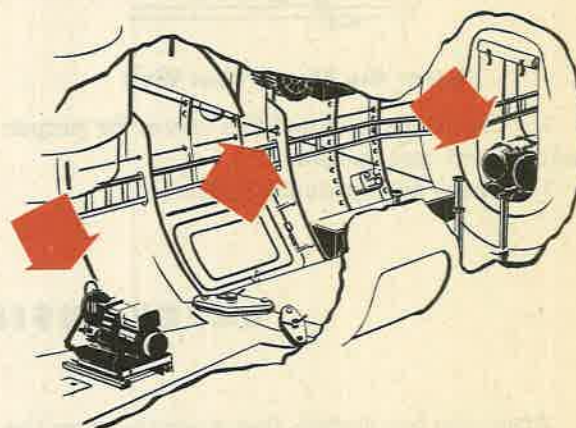
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10. Check the left flap for firmness. Properly adjusted, it should move only slightly when you try to move it with your hand. Make sure there are no cracks along the trailing edge of the flap or on the recess inspection plates.



11. Check the left side of the fuselage for wrinkles and buckles. If either wrinkles or buckles are found, check your Form 1 immediately. If the condition hasn't been written up and okayed by the engineering officer, notify him immediately.



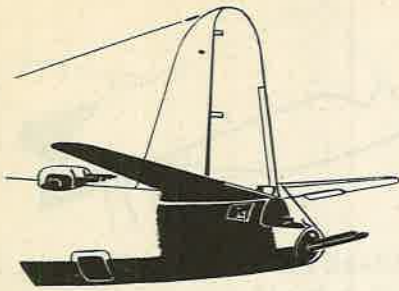
Standing Outside, Look Into the Aft Compartment

12. Check the load and/or ballast for proper distribution and make sure it is secure.

13. Make certain that the control cables are clear of all obstructions.

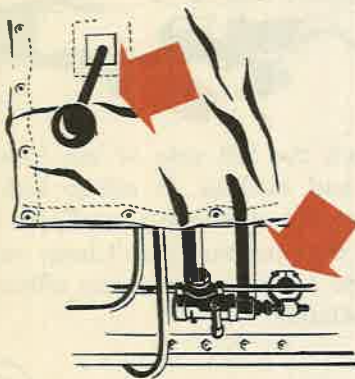
14. Make sure that nothing has been placed on or near the exhaust pipe of the putt-putt to create a fire hazard.

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15. Check the tail control surfaces for holes in the fabric.

Make the same checks on the right side of the airplane that were made on the left side, except work forward.



Enter the Nosewheel Well

16. Check the load and fire valves for proper adjustment and operation.

17. Check for hydraulic leaks.

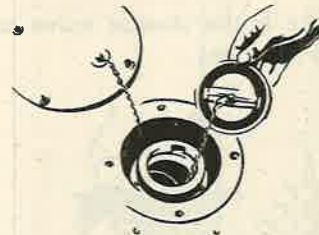


18. Make sure that the down-lock is in place.



19. The strut extension of the nosewheel oleo should be from 4 to 5 inches.

20. Check the tire for cuts, breaks or blisters; also for proper inflation and for slippage.



You or some member of your crew should visually check the main and auxiliary wing tanks for fuel level, and the wing tank covers for security.

CHECK INSIDE AIRPLANE

After you are certain that everything on the outside of the airplane is satisfactory, enter the airplane through the nosewheel well.

1. All of the forms—Forms 1 and 1A, Preflight Inspection Report, Form F (see Weight and Balance), Clearances, G-File (T.O.'s), Radio Facility Chart, Radio Aids to Airways Flying, Instrument Approach Procedures, maps—should be laid out on the navigator's desk. Thoroughly check those forms which concern

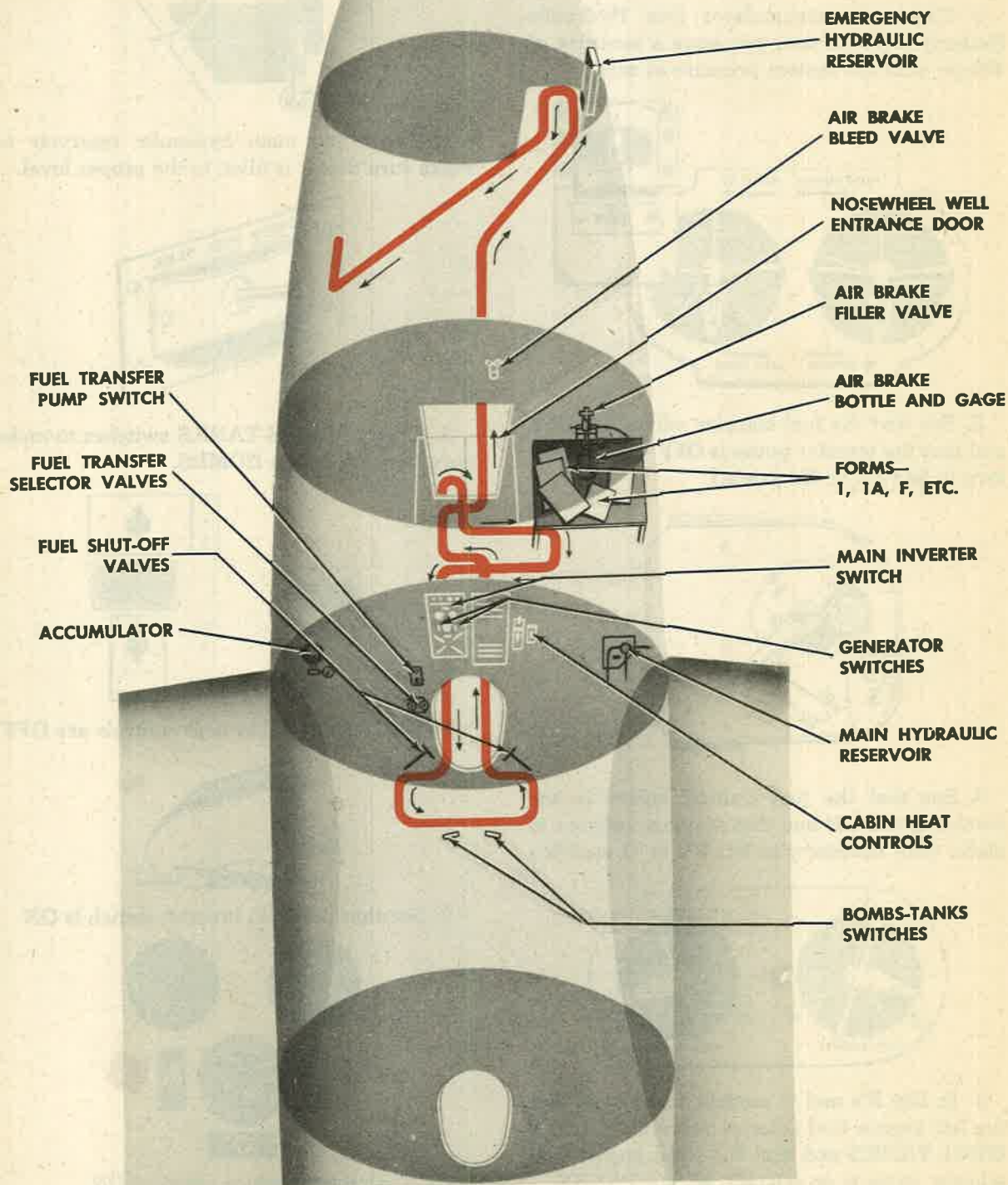


the operation of the airplane. Check the last five to make sure they are aboard and readily available if and when needed.

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**CHECK
INSIDE
AIRPLANE**

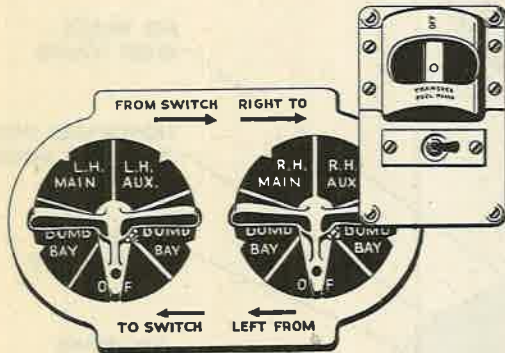


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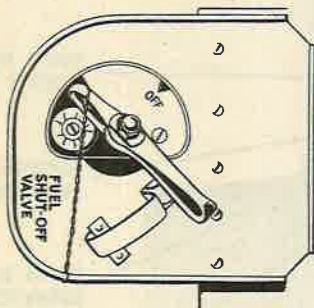
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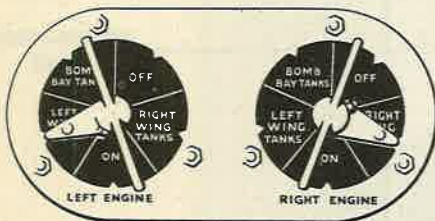
2. Check the accumulator (see Hydraulic System) to make sure you have a pressure of 400 psi with the system pressure at zero.



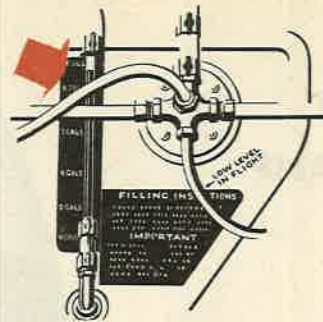
3. See that the fuel transfer valves are OFF and that the transfer pump is OFF. (Not necessary in late F's or G models.)



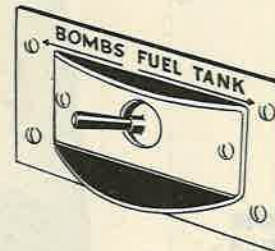
4. See that the fuel shut-off valves in the bomb bay are ON and that they are safetied in place. (Not necessary in late F's or G models.)



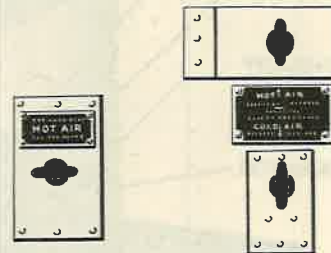
5. In late F's and G models, make sure that the left engine fuel selector valve is on LEFT WING TANKS and that the right engine fuel selector valve is on RIGHT WING TANKS.



6. Check the main hydraulic reservoir to make sure that it is filled to the proper level.



7. Check BOMBS-TANKS switches to make sure they are set on BOMBS.



8. See that the cabin heat controls are OFF.

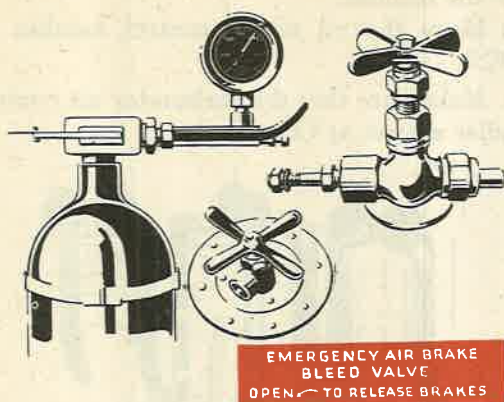


9. See that the main inverter switch is ON.

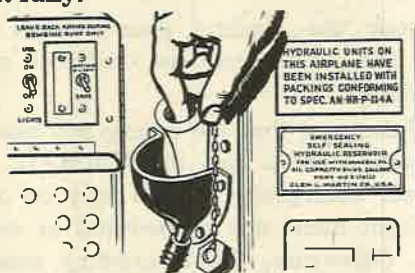


10. Turn the generator switches ON.

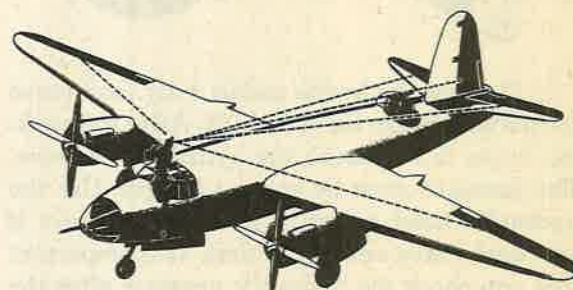
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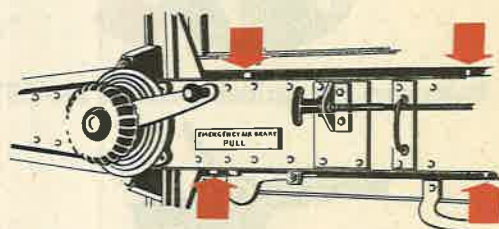
11. Check the air brake system. First, check for a pressure reading of from 1000 to 1200 psi. Then, check the filler valve (if it is installed) to see that the valve will open and close. Close the valve slightly and then open it fully. Finally, check the bleed valve. Open it slightly and then close it fully.



12. Check fluid level of the emergency hydraulic reservoir in the bombardier's compartment (if installed).



14. While you manipulate the controls, have the copilot stand up by his seat and call out the directions in which control surfaces and trim tabs move.



15. After the controls have been checked, close and lock the hatches. Visually check the lock pins to make sure they are in place.

COCKPIT CHECK AND STARTING PROCEDURE

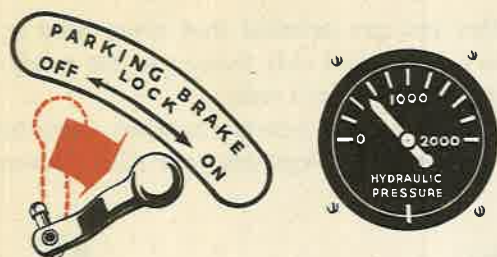
The correct seat position should enable you to depress the brake pedal fully with the rudder fully extended, without interfering with the full backward travel of the control column or the proper operation of the parking brake. If you must make a concession, it is better to allow for a full movement of the control column. Once you find a seat arrangement which suits you,

look for reference points, and it will be easier to adjust your seat on subsequent flights.

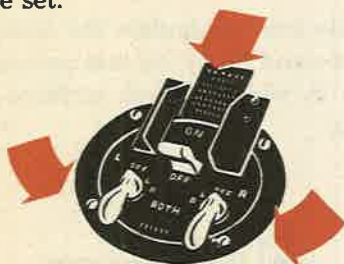
Put your parachute on. Do not fasten the straps until you are 1000 feet up, but have them ready to fasten. You are the last to jump if it is necessary to abandon the airplane in flight, so take no chances.

Fasten your safety belt and harness.

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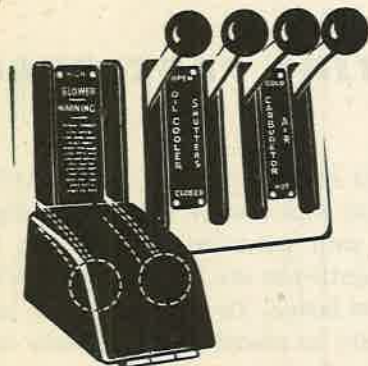
1. Depress the brake pedals fully, and move the parking brake handle to ON. After the parking brake is set, check the hydraulic pressure. The pressure must be at least 500 psi. Use the hydraulic hand pump to build up pressure if you don't have enough at first. It is important that you check the hydraulic pressure **after** the brakes are set.



2. Make sure the ignition switches are OFF.



3. Have the propellers pulled through if the airplane has been sitting idle for any length of time.

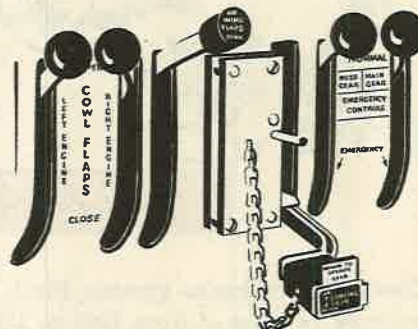


4. See that the supercharger control handles

are in LOW BLOWER, and that the guard is over the handles.

5. Move the oil cooler control handles to OPEN.

6. Make sure that the carburetor air control handles are set at COLD.

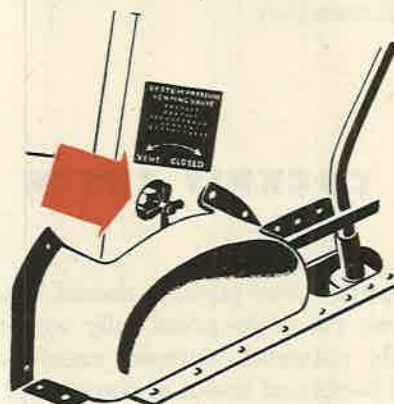


7. See that the cowl flap control handles are at OPEN.

8. See that the wing flap control handle is full UP.

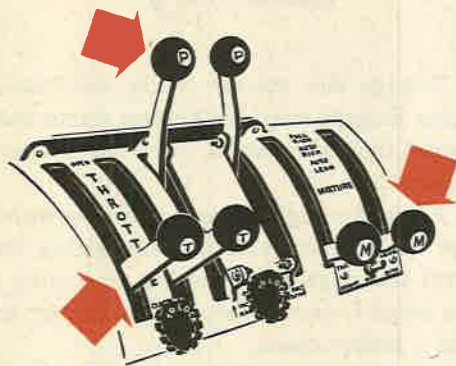
9. Check the landing gear control lever DOWN and locked, and see that both guards are in place.

10. Make sure that the emergency nose and main gear controls are in NORMAL. Note: Nose gear emergency control may be on the lower right hand side of pedestal in early F models. Otherwise, the emergency nose and main gear controls are not installed in the F and G models.

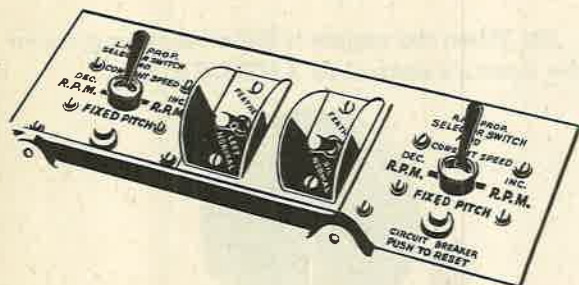


11. See that the hydraulic vent valve on the F and G models is closed. Open it slightly, and then close fully.

STARTING ENGINES



1. Set the throttles to a position on the quadrant approximately $\frac{1}{4}$ to $\frac{1}{2}$ open.
2. Set the propeller governor control levers full forward (INC RPM).
3. Make sure that the mixture control levers are in IDLE CUT-OFF.



4. See that the propeller selector switches are in AUTO CONSTANT SPEED.
5. See that the feathering switches are in NORMAL.
6. Make sure that both circuit breakers are pushed in.



7. Post the fire guard outside of the airplane. Signify which engine you intend to start first.
8. Call for the ground crew to stand clear of both propellers.

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9. Turn master ignition switch ON.
10. Turn both magneto switches to BOTH.
11. Auxiliary power on.

USE OF AUXILIARY POWER FOR STARTING

Use an auxiliary source of power for starting except in emergencies.

The proper use of battery switches with and without an auxiliary power source:

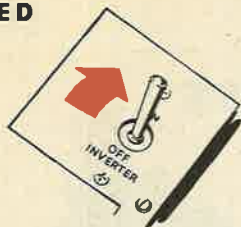
ON if an auxiliary source of power is used which employs no batteries, or if the airplane's own batteries are used for starting purposes.

OFF if an external source of starting power employing batteries is used.

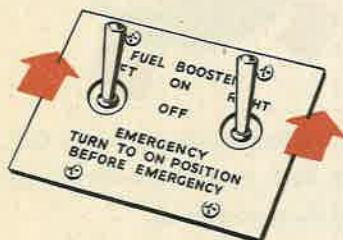
Some airplanes have a putt-putt, which can be used if no external source of power is available. On the ground only, the standard signal for starting the putt-putt is one short ring of the alarm bell. The signal to stop the putt-putt is two short rings of the alarm bell.

Test the operation of the auxiliary power source. To do this, turn the battery switches momentarily to OFF. Observe the cowl flaps, the oil cooler shutter indicators, or the fuel gage. If the auxiliary power source has been stopped or disconnected, the indicators will fall to zero.

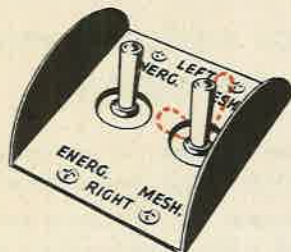
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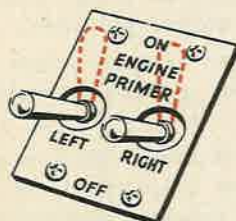
12. Turn the inverter switch, located on the pedestal, to ON.



13. Turn both of the booster pumps ON.



14. Move the meshing switch momentarily forward, then backward, to make sure that the starter brushes are properly seated.



15. Turn the primer ON approximately 2 seconds to fill the lines with fuel.

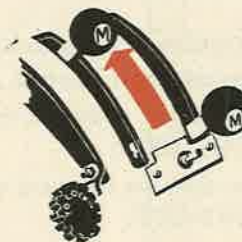


16. Energize the starter of the engine to be started. Energize for 10 seconds.



17. Engage the starter while continuing to energize. Engage until the engine starts, but not for longer than 15 seconds. Turn the primer ON as required.

18. After the engine starts to fire, continue to engage the starter with the energizing switch off until the engine is running smoothly. This gives a boost from the induction vibrator, which creates a hotter spark.



19. When the engine is definitely firing, move the mixture control to AUTO-RICH.



20. Reduce the throttle to keep the rpm between 800 and 1000.



21. Check the oil pressure gage. It must show a reading of at least 25 psi within 30 seconds after starting. If it doesn't, stop the engine and investigate.

22. Repeat Steps 15 through 21 for the second engine.

Starting Tips

If the engine stops after it has been started, return the mixture control to IDLE CUT-OFF, then open the throttle fully. Caution: As the engine begins to run again, retard the throttle to prevent overspeeding.

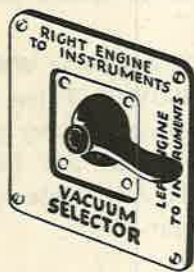
If the engine doesn't start after priming, push the mixture control to AUTO-RICH for a slow count of three. Then return to IDLE CUT-OFF for a slow count to five. Repeat this process if the engine still refuses to fire.

In warm weather, if fuel drains from the engine nacelle you have probably overprimed.

If the engine does not start after 15 seconds, close the mixture control, turn off the ignition switches, open the throttle, and have the propeller backed off to disengage the starter. Wait at least 30 seconds before you attempt to re-start.

AFTER STARTING ENGINES

1. See that the starter switches are both in the center position. The switches sometimes stick, causing a heavy drain on the batteries.
2. Turn both booster pumps OFF.
3. Be sure that all gyro instruments are uncaged.



4. Check the vacuum pressure for 3.75" to 4.25" Hg. on each pump.



5. See that the putt-putt is off.
6. Make sure that the oil temperature is at least 50°C and that the oil pressure is below 90 psi.
7. Put on your throat mike and headset.
8. Turn on your radio and tune to the control tower frequency. Call in for taxi instructions.
9. Signal the ground crew to remove the wheel chocks.

TAXIING THE B-26

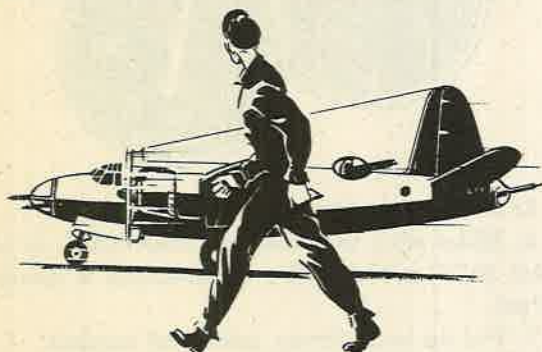
Do's

The B-26 is an easy airplane to taxi. You have excellent visibility, the airplane has inherent directional stability, and the nosewheel prevents nose-overs. However, don't become reckless. You can still get yourself into a lot of trouble unless you use extreme caution at all times. Here are some do's and don'ts which will help you taxi the B-26. Abide by them.

1. KNOW YOUR TAXI PATH. Before you get in the airplane, take a look at your probable taxi path. Make sure the area is clear of obstructions.



2. KEEP YOUR HEAD AND EYES MOVING AT ALL TIMES WHEN YOU ARE TAXIING.



3. TAXI SLOWLY. Never taxi faster than a man's brisk walk when you taxi in congested areas.

4. KEEP YOUR RPM WITHIN SENSIBLE LIMITS.

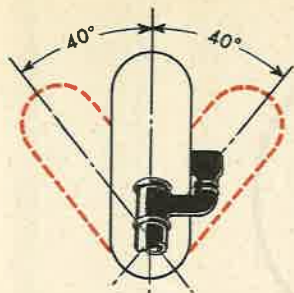
If possible, it is best to keep your rpm between 600 and 800 when taxiing. This doesn't mean that you can't pull the throttles all of the way back if necessary, or that you can't use slightly more throttle on soft turf.

5. USE THROTTLES AND BRAKES WISELY. Keep the airplane headed in the proper direction with the use of throttles and rudder as much as possible. When you have to use your brakes, use them sparingly and intermittently, to prevent them from overheating.

6. ADJUST THROTTLES AS NECESSARY TO KEEP A STRAIGHT TAXI PATH. You gain rudder control in increasing amounts above 15 mph.

7. TURN SLOWLY WHEN THE AIRPLANE IS MOVING SLOWLY. Turns in excess of 10 mph place increasingly heavy strains on the B-26. Fast, sharp turns are hard on tires, struts, and wheels. Anticipate turns by slowing down the airplane.

8. MAKE ALL TURNS WITH REDUCED INSIDE THROTTLE.



9. KEEP THE NOSEWHEEL WITHIN ITS LIMITING ANGLE OF 40° TO EACH SIDE. Great strain is placed on the nosewheel when you attempt to exceed the 40° swivel. The nose strut is liable to break.

10. ALWAYS HEAD THE AIRPLANE INTO THE WIND WHENEVER POSSIBLE WHEN YOU STOP FOR AN ENGINE RUN-UP.



11. ALWAYS STOP WITH NOSEWHEEL STRAIGHT. When you stop the airplane, make the last few feet of your roll straight ahead so that the nosewheel is straight. Ease to a stop. If the nosewheel isn't straight, the strut may break off when you apply power.

Don't's

1. DON'T ATTEMPT TO CHANGE THE DIRECTION OF TRAVEL OF THE AIRPLANE WHEN YOU FIRST START MOVING IT. Wait until you are rolling and can see in which direction the nosewheel is headed.

2. DON'T BLAST OTHER AIRPLANES OR GROUND INSTALLATIONS WITH YOUR PROP WASH.

3. DON'T USE MORE POWER THAN IS NECESSARY.

4. DON'T TAXI IN A CONGESTED AREA WITHOUT A GROUND CREW TO GUIDE YOU. You can't see the wingtips of the B-26 from the cockpit. A guess isn't good enough.

5. DON'T TAXI OVER DOUBTFUL TERRAIN UNTIL YOU HAVE INVESTIGATED IT.

6. NEVER MAKE A SHARP TURN BY LOCKING ONE MAIN WHEEL WITH THE BRAKE.

7. DON'T REVERSE YOUR DIRECTION OF TAXI TRAVEL UNTIL THE AREA BEHIND YOU IS CLEARED. If you have to return the airplane to the line, make sure the taxi path is clear. Remember that taxi strips are one-way streets.

8. DON'T TURN SHARPLY INTO YOUR PARKING POSITION. Come up behind the parking position and move the airplane straight ahead.

9. NEVER STOP THE ENGINES WHEN YOU BEGIN YOUR FINAL ROLL INTO YOUR PARKING AREA. Your hydraulic pumps are useless with the engines stopped, and you may find you have no brakes.

When in doubt - stop!

RUN-UP AND CHECKS



1. Run one engine up to 2000 rpm and turn the magneto switch to R, back to BOTH (allow sufficient interval at BOTH for engine to clear), to L, and return to BOTH. If you get a drop of more than 75 rpm with the switch at either position, give the engine a full power check and then recheck the mags. If you still have a drop of over 75 rpm, return to the line.

Full Power Check

To make a full power check, run the engines up to 52" Hg. or to full throttle if you cannot obtain 52" Hg. You should get 2700 rpm in most cases before you reach 52" Hg. or full throttle. The additional manifold pressure provides a check on the propeller governor setting and on the engine at high cylinder pressures. Under some extreme conditions it will not be possible to get 2700 rpm with 52" Hg., but in no case should the engine give less than 2600 rpm. The manifold pressure required to get 2700 rpm will depend on these factors:

- A. Air density, affected by altitude and temperature.
- B. Wind direction and velocity.
- C. Low blade angle setting of prop.
- D. Condition of the engine.

To determine the fourth factor you must properly evaluate the first three. In general, it will take less than 52" Hg. to obtain 2700 rpm if:

- A. The field elevation is well above sea level.
- B. The free air temperature is high.
- C. The wind is strong and you are heading into it.
- D. The low blade angle setting is 16° instead of 17° or 18°. (You can read these settings on the propeller cuff.)

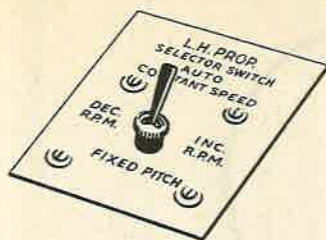
With a good engine on a warm day, at about 2500 feet above sea level, facing into a brisk wind, and with a low blade angle setting of 16°, it may only take 38"-40" Hg. to get 2700 rpm, and at full throttle you will get only 48"-49" Hg.

With a good engine on a cool day, at close to sea level, with no wind or facing perpendicular to the wind, and with a low blade angle setting of 18°, it may take 52" Hg. to get 2650 rpm.



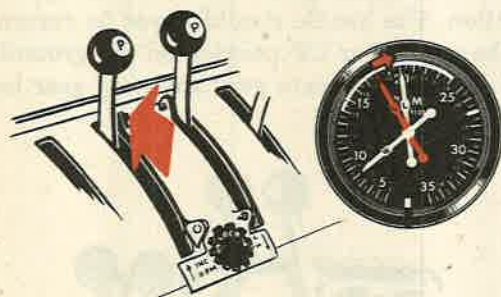
2. If the mags check O. K., next move the selector switch to DEC RPM. Hold the switch there until the rpm drops 100-200. Return the selector switch to FIXED PITCH.

3. Move the selector switch to INC RPM and see that the rpm returns to 2000.



4. Return the selector switch to **AUTO CONSTANT SPEED**.

5. Pull the propeller governor control back to reduce the engine speed 100-200 rpm. Wait until you are sure that the tachometer does not oscillate. Any more than two oscillations indicate excessive sludge in the propeller governor or a bad propeller brake. Do not take off in an airplane which has an oscillating tachometer unless the oscillations are caused by instrument error. If the tachometer is at fault it shows up on the selector switch check.



6. Move the propeller governor control full forward and see that you get 2000 rpm.

7. Reduce the power to idling on the engine checked.

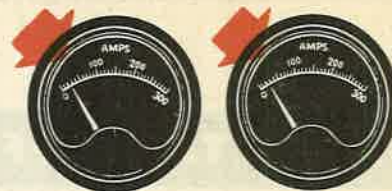
8. Check the other engine and propeller in the same manner.

After you are better acquainted with your equipment, you may want to make both engine checks simultaneously. If you do, be careful that your brakes do not slip.

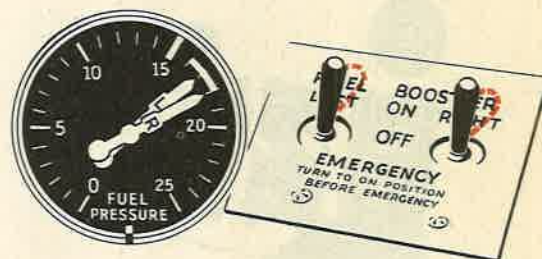


9. After you have checked both engines and propellers, increase the power on both engines to obtain 2000 rpm.

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10. Have the engineer check the generators for correct voltage and amperage. The generators should read within 20 amps of each other. If there is a greater difference in their output, one generator places a heavy drain on the other. The voltage of the two generators should differ no more than .5 volts under no-load conditions.



11. Check the fuel pressure. You should get from 16 to 18 psi on both engines.

12. Turn the booster pumps ON and see that you get approximately the same reading on the fuel pressure gage that you got with them off. A small fluctuation in fuel pressure is normal.



13. Check the oil pressure to see that you have 75 to 85 psi.

14. Check the oil temperature to see that it is between 60°C and 80°C.

15. Check your cylinder-head temperatures to make sure that they are between 120°C and 220°C.

If either engine exceeds 220°C cylinder-head temperature, idle the engine back. If the temperature doesn't return to normal, return the airplane to the line.

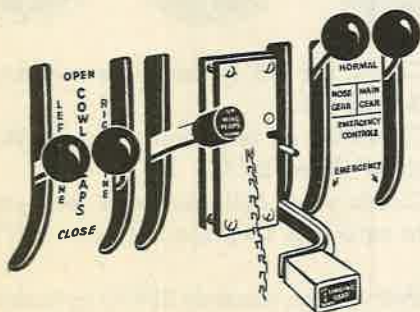
After you complete all of these checks, reduce the rpm on both engines to idling.

BEFORE TAKEOFF CHECK

After you complete your run-up, make the following checks:

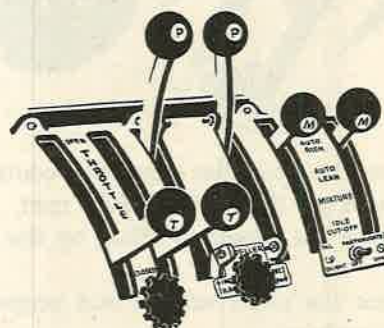


1. Supercharger controls in LOW. Guard in place.
2. Oil shutters in proper position to maintain desired oil temperature. Control handles in neutral position.
3. Carburetor heat controls in COLD position.
4. Hydraulic pressure 850 to 1050 psi.



5. Cowl flaps in full open position. Cowl flap control handles in neutral position. Cowl flaps should always be open on takeoff, regardless of temperature.

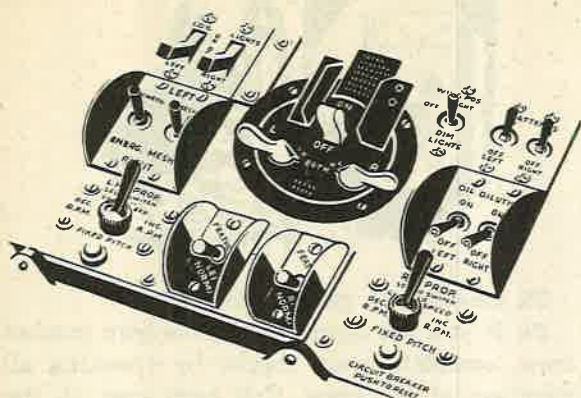
6. Wing flaps set between $\frac{1}{4}$ and $\frac{3}{4}$.
7. Landing gear down-lock removed. Safety cocked. Landing gear handle in the DOWN position. The handle should **never** be returned to the neutral or UP position on the ground.
8. Emergency main gear and nose gear handles in NORMAL.



9. Set throttle friction to prevent throttles from slipping on takeoff if you **have** to move your hands from the throttles. Do not set friction so tight that you can't move the throttles easily.

10. Set propeller governor controls far enough forward to insure maximum rpm. Do not force the controls against the front of the pedestal. Set friction, but not so tight that you cannot move the controls in an emergency.

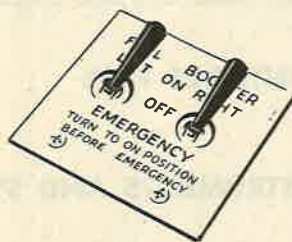
11. See that the mixture control is in AUTO-RICH. Make sure that the mixture control clicks into place when you set it in AUTO-RICH.



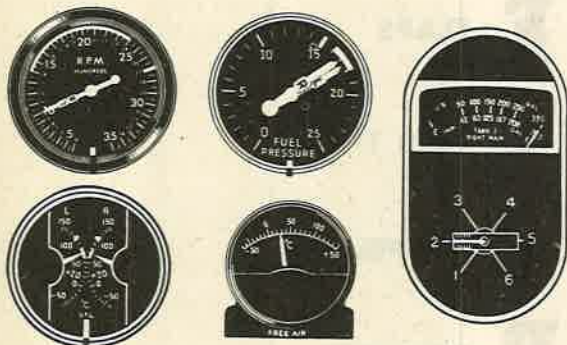
12. Check to see that the propeller selector switches are in **AUTO CONSTANT SPEED**. Make sure that the feathering switches are in **NORMAL**. Make sure that the circuit breakers are both pushed in. See that neither warning light is glowing.

13. Make sure that **both** magneto switches are on **BOTH**.

14. Make sure that the battery switches are **ON**.



15. See that both booster pumps are **ON**. Leave them **ON** until you have at least 1000 feet of altitude.



16. Check your fuel gage again to insure adequate fuel.

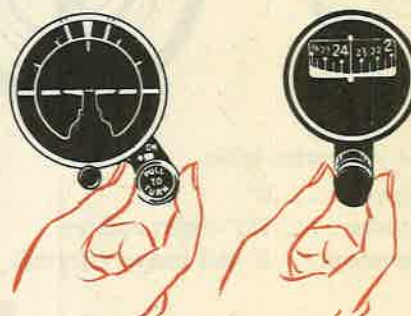
RESTRICTED

17. Check fuel pressure between 16 and 18 psi.

18. Check oil temperature between 60° and 80°C.

19. Check oil pressure between 75 and 85 psi.

20. Check your cylinder-head temperatures between 120° and 220°C.



21. Set all of your gyro instruments.



22. Check your altimeter.

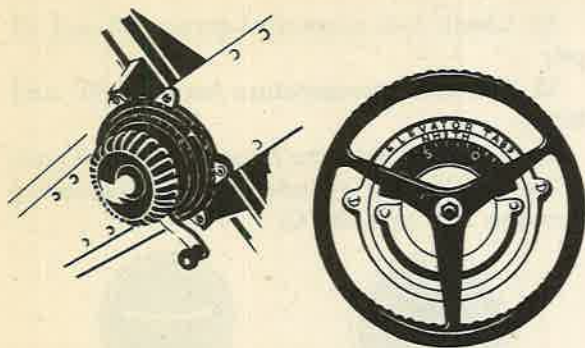


23. Check your suction pressure gage to see that it is between 3.75" and 4.25" Hg.

MAXIMUM INDICATED DIVING SPEED
353 M.P.H. UP TO 37,000 LBS. GROSS WEIGHT
300 M.P.H. 37,000 TO 38,200 LBS. GROSS WEIGHT
 WEIGHT & BALANCE DATA (T.O. 01-1-40) IN DATA CASE

24. Check the instrument panel for placarded instructions. Read and understand them.

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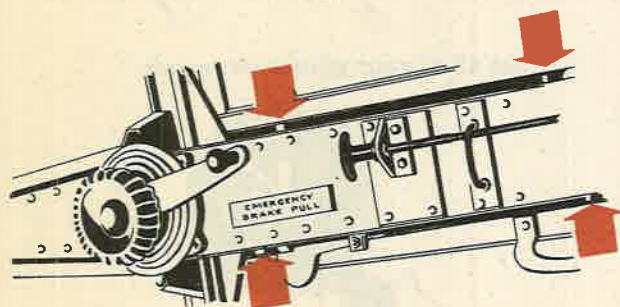


25. Set your trim tabs:

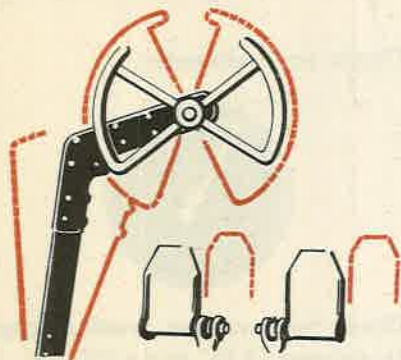
Aileron 0°

Rudder 1½° right rudder

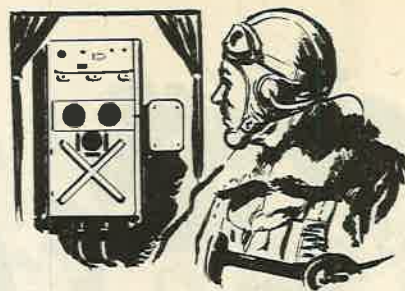
Elevators . . . 3° tail heavy (normal load)



26. See that all hatches are secure. Close and lock side windows.



27. Make sure that all controls are free in movement to both extremes.



28. Check both generators ON.

29. If you are flying with your own combat crew, complete your checks by checking all members of the crew. Call each man on the interphone and ask "Check O. K.?" Each member of the crew must answer: "Checked O. K.," pledging that he has performed all his duties and checks successfully. This check must be unanimous before you proceed further.

If you are merely flying transition, see that the other crew members are standing by on interphone. In this circumstance, they will not have checklists.

Before you leave your position and taxi out to the runway, make this final check:

C
I
G
F
T
P
R

CONTROLS FREE

INSTRUMENTS AND SWITCHES

GAS AND MIXTURE CONTROL

FLAPS

TRIM TABS

PROPELLERS

RUN-UP

NORMAL TAKE OFF



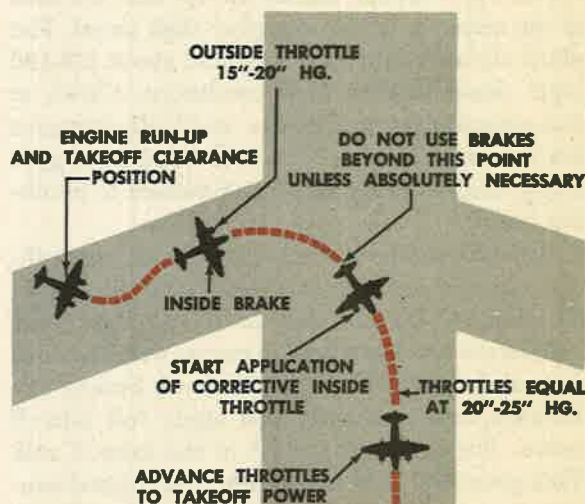
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TAKEOFF

If you are sure that everything is satisfactory for takeoff, that the runway is clear, that there are no airplanes in the pattern to interfere with your takeoff—then, and only then, call the tower for your takeoff clearance. Never call for a clearance until you are **ready** to take off. **Never delay your takeoff after the tower clears you.**

Taxi to takeoff position. If a roll-out is desired, start a wide turn just short of the runway. Use a combination of throttle and brake. The outside engine should be increased to between 15" and 20" Hg. When you are within approximately 45° of being straight down the runway, begin to apply inside throttle to straighten out the airplane.

As you advance the throttles, the airplane may have a tendency to swerve. Correct for this by the use of throttles and rudder. Don't use brakes after the roll-out is completed except in emergency.



RESTRICTED

After you have the airplane headed straight down the runway, advance the throttles to not over 52" Hg. Take a quick glance at the instruments. Include your manifold pressure, rpm, oil pressure, fuel pressure, and flap indicator.

During the early part of the takeoff run the airplane accelerates rapidly. You obtain rudder control early.

Get the nosewheel off the ground at approximately 80-90 mph.

Establish an angle of attack which allows the airplane to fly itself off the ground.

After your wheels leave the ground and you are sure that you will not make contact with the ground again, give the signal to raise the wheels.

Shout loudly, "Gear up!" For a visual signal, raise your right thumb.

The copilot will repeat: "Gear up," then move the landing gear lever UP.

Keep your right hand on the throttles throughout the takeoff until you reduce power and start a normal climb. If you lose an engine just after leaving the ground the yaw will tend to roll the airplane. You may have to reduce power to maintain control.

Do not brake your wheels after the takeoff. It is unnecessary and dangerous.

Short-field Takeoff

The short-field takeoff is made in the same manner as a normal takeoff except that the nose of the airplane is raised higher than usual. The plane should come off the ground about 110-120 mph, depending on load conditions. Climb at this airspeed at full power until all obstacles are cleared. Then lower the nose slightly to gain single engine flying speed and reduce to climbing power.

Approximately $\frac{3}{4}$ flaps (30°) is the most efficient setting for a short takeoff and climb over an obstacle. Do not wait until you start your roll before lowering flaps. Line up with the runway and apply 30" Hg. with your brakes set. Release brakes quickly and apply full takeoff power during the first part of the takeoff roll. This provides good acceleration and good control. Do not use your brakes on the takeoff roll.



CLIMB AND CRUISE

CLIMB

Your objectives following takeoff are a safe and comfortable clearance over any obstacles present and the concurrent attainment of a safe climbing speed of 160 mph.

After all obstacles are cleared, reduce your power to 41" Hg. and 2400 rpm. Trim airplane.

After you gain 100-200 feet of altitude over all obstacles, raise your flaps. You must increase your angle of attack slightly to offset the loss of lift which occurs when you raise your flaps. This will prevent you from losing altitude, especially at night, or when you are on instruments. As the flaps come up, re-trim the airplane. Remember: The ship will not fly on single engine with flaps down.

The most critical point in B-26 operation is the interval on takeoff between the time you leave the ground and the time you attain critical single engine speed with gear and flaps up.

Normally, reduce your power setting to 35" Hg. and 2300 rpm after your flaps are up and you have 160 mph. If necessary, however, you can continue your climb at 41" Hg. and 2400 rpm. Don't be in too big a hurry to use your cowl flaps. Give the engines a chance. If the cylinder-head temperatures go as high as 230°C with your cowl flaps open, lower the nose slightly and increase your speed.

Watch your oil temperature. Remember that you can control oil temperature better by reducing your rpm than by increasing your airspeed. Do not let the oil temperature go above 80°C. Also avoid low oil temperatures during cold weather. Your oil may congeal.

Always climb the airplane with the mixture control in AUTO-RICH.

CRUISE

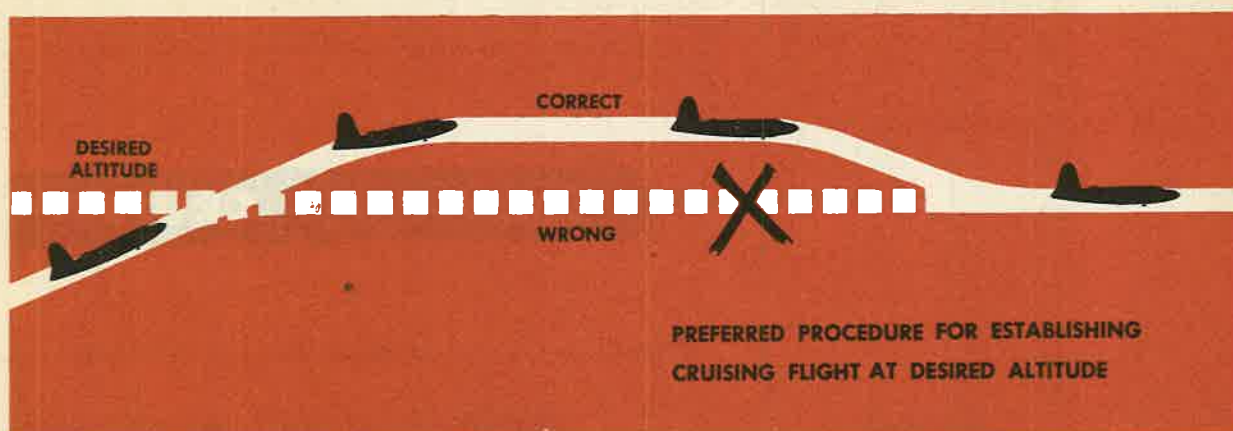
Leveling Off

Before you begin to level off it is a good practice to climb to a position slightly above your desired cruising altitude. Level off, and adjust your power to the desired cruising settings. Wait until the engine has cooled down to approximately 180°C before you close the cowl flaps to attain cruising cylinder-head temperature. There is generally a lag of about 3-5 minutes in your cylinder-head temperature gage.

Check your instruments for normal operation. Make sure that your temperatures are O. K. before you move the mixture control to AUTO-LEAN.

NEVER USE AUTO-LEAN ABOVE 31" HG. AND/OR 2100 RPM

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When you have properly adjusted your engine controls, the cowl flaps, and oil shutters, and have reached approximate cruising speed, lower the nose slightly and lose altitude to the desired cruising level. When you level off at your cruising altitude you will have 10-15 mph more airspeed than if you had merely climbed to your cruising level.

Desired Maximum and Minimum Cruising Pressures and Temperatures

	Min.	Desired	Max.
Cylinder-head temperature . .	150°C	190°-210°C	232°C
Oil temperature . .	50°C	60°-80°C	105°C
Oil pressure . . .	60 psi	75-85 psi	90 psi
Fuel pressure . .	15 psi	16-18 psi	19 psi



Trim

Always keep the airplane trimmed to fly hands off, whether you are in a climb, a glide, or cruising. You have much less work if you trim the airplane properly. The performance of

the airplane is also greatly improved. Remember to change your trim any time you change any of the following:

1. Power
2. Airspeed
3. Altitude
4. Position of landing gear
5. Position of flaps
6. Position of cowl flaps (large changes only)
7. Load (fuel supply or bombs)
8. Position of crew or load

Use proper power settings at all times.

Remember that you must leave the fuel booster pumps on above 10,000 feet and below 1000 feet.

Always keep a close check on your fuel consumption. Always know how much fuel you have whether your fuel gage is working or not.

Cruising Descent

For better fuel consumption, to save time, and to provide additional crew comfort, begin your let-down to traffic altitude as far as 100 miles out. (If you are on an instrument clearance, you must obtain permission from Airways Traffic Control before you make a cruising descent.) You can do this by figuring your altitude above traffic altitude and your time to go to destination. Make a rough mental calculation of the rate of descent to hold. For example, if you are at 10,000 feet, the field is at 1000 feet and you wish to fly traffic at 2000 feet above the ground, you will have to lose 7000 feet. If you have 35 minutes to go, let down at 200 feet per minute and cruising airspeed.

CLIMB AND CRUISING CONTROL CHART



FOR PRATT & WHITNEY R-2800-43 AND -41 ENGINES IN B-26 TYPE AIRCRAFT								
MIXTURE		CRUISING RANGE ONLY AUTO-LEAN					CLIMB AUTO-RICH	
POWER		40%	45%	50%	55%	60%	75%	100%
APPROX. FUEL FLOW G. P. H.		101	111	123	136	151	260	378
RPM		1700	1800	1900	2000	2100	2300	2400
ALT.	MAX. RANGE IAS	USE M/P IN INCHES Hg. FOR ALTITUDE AS INDICATED						
M.S.L.	177	30.5	31	31	31	31	35	41
2000'	176	29.5	30	31	31	31	35	41
4000'	174	28.5	29	30	30.5	31	34.5	40.5
6000'	173	27.5	28	29	30	30.5	33.5	39.5
8000'	172	26.5	27.5	28	29	30	33	38
10,000'	171	25.5	26.5	27.5	28	29	32	35
12,000'	170	24.5	25.5	26.5	27	28	31	41*
Do Not Exceed 31" Hg. and/or 2100 rpm in AUTO-LEAN 1. Values charted under AUTO-LEAN are for straight and level sustained flight cruising conditions only. 2. For Maximum Range—Read IAS opposite desired cruising altitude. By trial and error, choose percentage of power from chart that will approximate this airspeed. 3. Use AUTO-RICH for takeoff, climb, formation flying, bombing missions, high speed, single engine operation, and landing. 4. Before moving mixture control to AUTO-LEAN after climb to desired altitude for cruising, allow cylinder-head temperature to cool to cruising temperature. 5. For all other conditions not covered in above chart, refer to cruising control chart, T.O. 01-35EB-1 or 01-35EC-1, in the G File in airplane. *HIGH blower								

**For proper
climb and
cruising settings
use this card**

You can obtain the following information from the card.

1. Mixture control setting.
2. Percentage of power.
3. Approximate fuel consumption.
4. Manifold pressure.
5. RPM.
6. IAS for maximum range.
7. Climb and cruising range.

Mixture Setting

Use AUTO-LEAN throughout the entire cruising range only. Use AUTO-RICH for the climbing range.

Percentage of Power

The percentages listed were derived using 2×1600 Hp as 100% normal rated power.

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Fuel Consumption

The values shown for fuel consumption are for both engines and are only approximate. Fuel consumption varies with different engines.

Manifold Pressure

Values listed for manifold pressure are for standard atmospheric conditions. These conditions do not vary enough under normal operating conditions to make this error serious.

RPM

These values are accurate throughout the range of the card.

IAS for Maximum Range

These airspeeds remain constant for any given altitude regardless of weight conditions. Maximum range means: Greatest distance possible for given amount of fuel. It is something that every pilot must know and understand. To find maximum range from the card:

1. Select the altitude at which you desire to fly and read the maximum range IAS from the card opposite that altitude.

2. By trial and error, select the percentage of power from the card that gives you the closest airspeed to the maximum range airspeed.

3. Jockey power slightly by increasing manifold pressure to increase speed, and decreasing rpm to decrease speed, until correct maximum range airspeed is obtained.

Caution: Do not increase manifold pressure more than 3" Hg. above charted values without increasing rpm.

Climb and Cruising Range

Normal cruising is between 40% and 60% of power. Climbing should normally be done at 75% of power. Do not exceed 100% of power for continuous operation. Do not exceed 31" Hg., 2100 rpm, for continuous cruising.

Use of HIGH Blower

You will notice that use of HIGH blower is indicated at only one point on the Climb and Cruising Control Card—to obtain 100% power at 12,000 feet. To shift to HIGH blower at an altitude lower than that recommended would only detract from the efficiency of your

engines. The recommended altitude for shifting blowers varies with the percentage of power being employed. For example, when using 45% power, you should shift blowers at 21,500 feet—when using 60% power, the shift should be made at 15,000 feet.

Because most B-26 operation is performed at lower altitudes, it is seldom necessary for you to shift your blower setting except for a 5-minute period once every 2 hours to clear the blower clutches of sludge.

In order to avoid all possible damage to the engines and blowers, use the following procedure when shifting blowers.

To Change to HIGH Blower

1. Remove guard from blower control handles.

2. Reduce manifold pressure to approximately 25" Hg.

3. Reduce rpm to approximately 1800.

4. Move control quickly, and without any hesitation, to HIGH blower.

5. Check to see that the oil pressure fluctuates and that the manifold pressure increases.

6. Check to make sure that the control handle is firmly locked in the HIGH position.

7. Repeat Items 2 through 6 for the other engine.

8. Adjust rpm to desired setting.

9. Adjust manifold pressure to desired setting.

To Change to LOW Blower

1. Reduce manifold pressure to approximately 25" Hg.

2. Reduce rpm to approximately 1800.

3. Move control handle quickly and without any hesitation to LOW blower.

4. Check to make sure that the oil pressure fluctuates and that the manifold pressure decreases.

5. Check to make sure that the control handle is firmly locked in the LOW position.

6. Repeat Items 1 through 5 for the other engine.

7. Adjust rpm to desired setting.

8. Adjust manifold pressure to desired setting.

9. Place guard over control handles.

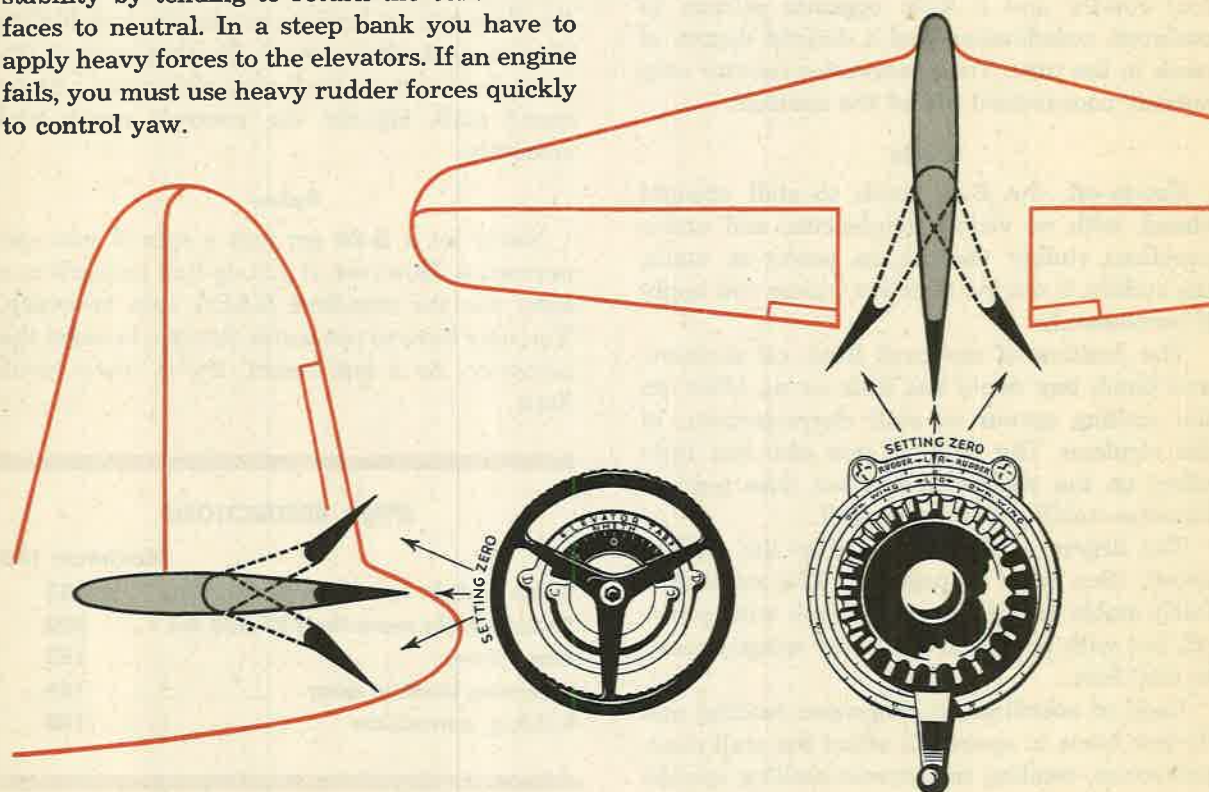
FLIGHT CHARACTERISTICS

The B-26 has a high wingloading. It can take plenty of punishment, but you must know and respect its tolerances. It wasn't built for acrobatics, inverted flight, or violent stall maneuvers. It is not a pursuit-type airplane.

Trim Tabs

One of the outstanding characteristics of the B-26 is that the rudder and elevator trim tabs are anti-servo. Because of this, you must apply comparatively heavy pressures to these controls. The anti-servo tabs provide additional stability by tending to return the control surfaces to neutral. In a steep bank you have to apply heavy forces to the elevators. If an engine fails, you must use heavy rudder forces quickly to control yaw.

Trim the airplane to fly hands off. Place the airplane in the desired attitude with manual control pressures. Neutralize the control pressures with trim tabs until the airplane maintains the desired attitude with your hands and feet off the controls. Don't use the trim tabs to change or correct attitude. Use them after you establish climb, descent, or straight and level flight. **Do not trim off the back pressure which you have to apply in turns.** To do so destroys the feel of the airplane. Trim tab settings for



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takeoff vary with load conditions and rigging, but these given in the checklist are approximately correct for a properly loaded and properly rigged plane.

When lowering the landing gear you need about 2° additional tail-heavy trim. Full flaps require about 5° additional tail-heavy trim.

Trim tabs, particularly the rudder trim, are sensitive even at low speeds. Your trim change is slight even with large power or airspeed changes. At high speeds, all trim tabs and controls are taut and sensitive. Warning: Do not make large changes in trim at high speeds.

Change of Speed

The B-26 requires considerable time to accelerate in flight when you add power. It is also hard to lose speed when you reduce power. You are most concerned with this when flying in formation and when flying in the traffic pattern. Plan ahead.

Turns

Turn entries require more rudder than aileron. Generally, you have to hold some bottom rudder and a little opposite aileron to maintain coordination and a desired degree of bank in the turn. Turn recoveries require only normal, coordinated use of the controls.

Stalls

Power-off, the B-26 tends to stall straight ahead, with no vicious tendencies, and under excellent rudder control. In power-on stalls, the rudder is not too effective unless you apply it immediately.

The position of the cowl flaps, oil shutters, and bomb bay doors has little or no effect on the stalling speeds or stall characteristics of the airplane. The landing gear also has little effect on the stalling speed, but does tend to increase stability during the stall.

The degree of bank does affect the stalling speed. (See chart on page 87.) The airplane is fairly stable in stalls during a bank with power off, but with power on the lower wingtip tends to stall first.

Lack of coordination, improper loading and de-icer boots in operation affect the stall characteristics, tending to increase stalling speeds.

The power-off stall is preceded by a definite buffeting of the tail surfaces because of the spoilers on the inboard section of the wing. This buffeting occurs early when all conditions are ideal, later when lack of coordination, improper loading, or de-icers affect the stall.

In a power-on stall in a B-26 there is less warning, and stall characteristics are more vicious.

The use of wing flaps lowers the stalling speed. You also get less warning of an approaching stall if the flaps are extended.

If one wing drops in a stall, don't try to bring the low wing up with the aileron. Ease the elevator control forward to pick up flying speed and then use a coordinated roll-out.

The B-26 goes into a secondary stall if you hold the elevator control full back after the initial stall. However, the secondary stall is no more vicious than the initial stall.

The B-26 is particularly sensitive to high-speed stalls. A high-speed stall results from abrupt movement of the elevator, causing momentary high angles of attack to the relative wind and increased wingloading. Hence, start the flare-out on landing gradually, and higher than in most other aircraft. Reefing back on the controls in a steep bank may also cause a high-speed stall. Handle the controls easily and smoothly.

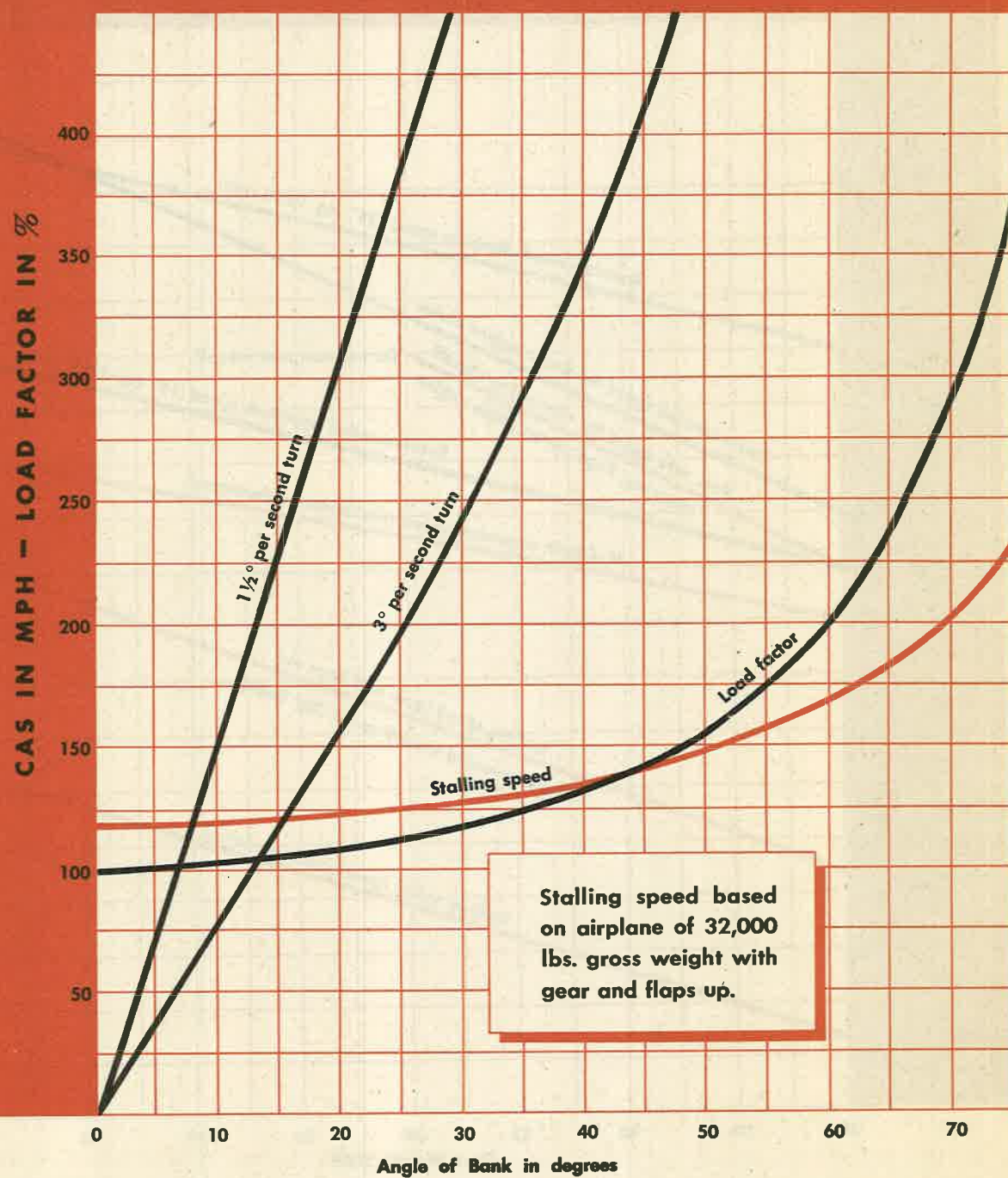
Spins

Never let a B-26 get into a spin if you can prevent it. However, if you do find yourself in a spin, use the standard NACA spin recovery. You may have to use inside throttle to assist the recovery. As a last resort, try to lower your flaps.

SPEED RESTRICTIONS

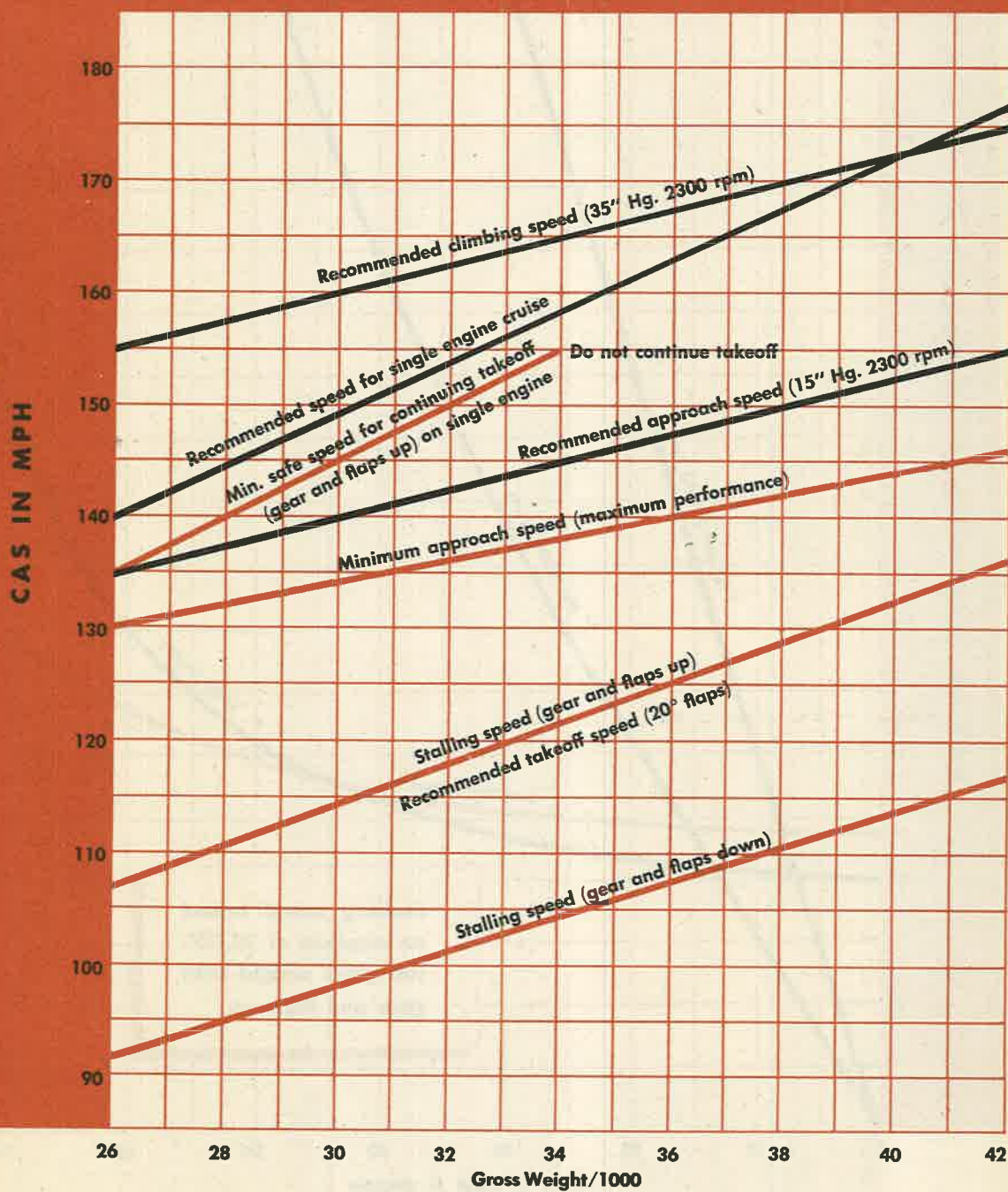
	Maximum IAS
Gross weight less than 37,000 lbs.	353
Gross weight more than 37,000 lbs.	300
Flaps down	185
Lowering landing gear	165
Raising astrodome	190

**EFFECT OF DEGREE OF BANK
ON RATE OF TURN, LOAD FACTOR AND STALLING SPEED**



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CHARACTERISTIC SPEEDS



APPROACH AND LANDING

The B-26 is easy to land. You have plenty of power; there is no tendency to groundloop; your visibility is excellent, and the tricycle landing gear helps to make your landing easier. Because of the tricycle gear, full-stall landings are not usually made. Because the CG is forward of the main gear, the nosewheel tends to drop on contact with the runway. Fly the airplane onto the runway.

Use power as you need it on the approach and landing. Have enough excess speed to permit you to flare out and still ease the airplane onto the runway.

The B-26 is big and heavy; set it down gently. Remember that you have 16 to 21 tons of airplane under you. There is practically no tendency for it to bounce, because of the tremendous reduction in speed when the heavy main gear touches the runway; and because of the location of CG with respect to the main gear.

The two most important considerations in landing are:

1. Make sure that the runway is long enough for B-26 landings.
2. Maintain at least 140 mph on the final approach.

BEFORE ENTERING TRAFFIC

The Checklist

1. Make sure that all crew members have accomplished their checklists before landing, if you are flying with your own combat crew.



2. Check both superchargers in LOW blower; guard in place.

3. Adjust the oil cooler shutters according to outside temperature, as well as oil temperature. Normally, open them a bit further because you will increase the rpm.

4. Check carburetor air control in COLD.

5. Check the cowl flaps and cylinder-head temperatures.

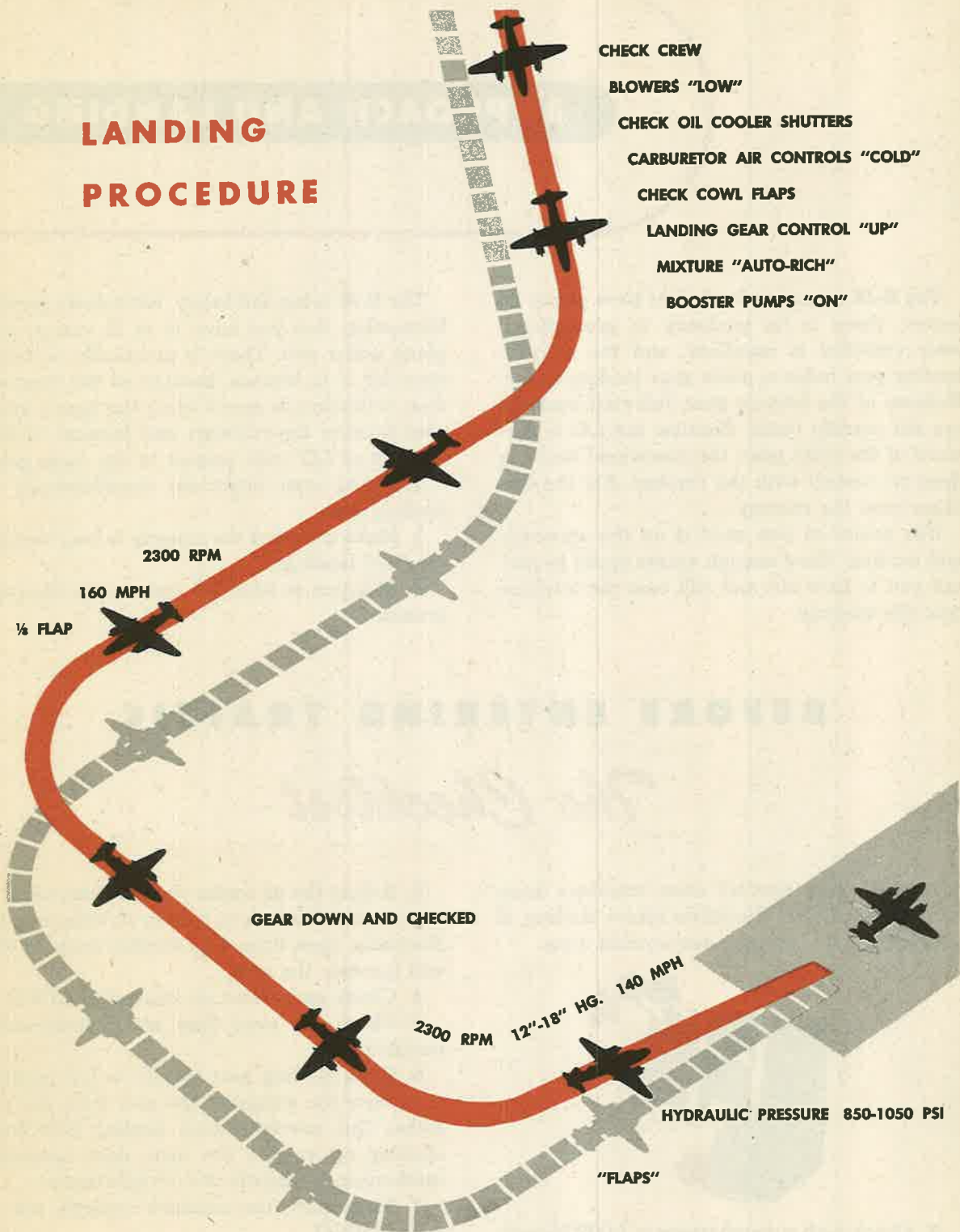
6. Place landing gear handle in UP position to remove the weight of the gear from the uplocks. This prevents main landing gear from sticking up in case the main door operating mechanism is slightly out of adjustment.

7. Make sure the mixture controls are in AUTO-RICH.

8. Turn booster pumps ON.

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LANDING PROCEDURE



IN TRAFFIC

The Checklist

1. Set both propellers to 2300 rpm.



2. Slow the airplane to 160 mph.



3. Lower $\frac{1}{8}$ flaps.



4. Have copilot move landing gear handle to full DOWN position. The signal for wheels down is a definite downward movement of the right thumb, plus a shouted command, "Gear down."

5. See that the landing gear indicators flick into place.

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6. Check the landing gear visually. Your copilot can check the right main gear, you the left main gear, the engineer the nosewheel. Check the warning horn or indicator lights (if installed).

7. Lower balance of flaps if and when you want them. Normally, don't extend full flaps until you are lined up on the final approach.



8. See that the hydraulic pressure is between 850 and 1050 psi.

You, as pilot, should make this memory check on the final approach:

G GAS
U UNDERCARRIAGE DOWN
M MIXTURE AUTO-RICH
P PROPELLERS 2300 RPM

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NORMAL LANDING

Plan the approach to permit a straight glide for the last 1000 feet of altitude with not less than 12" or more than 18" Hg.

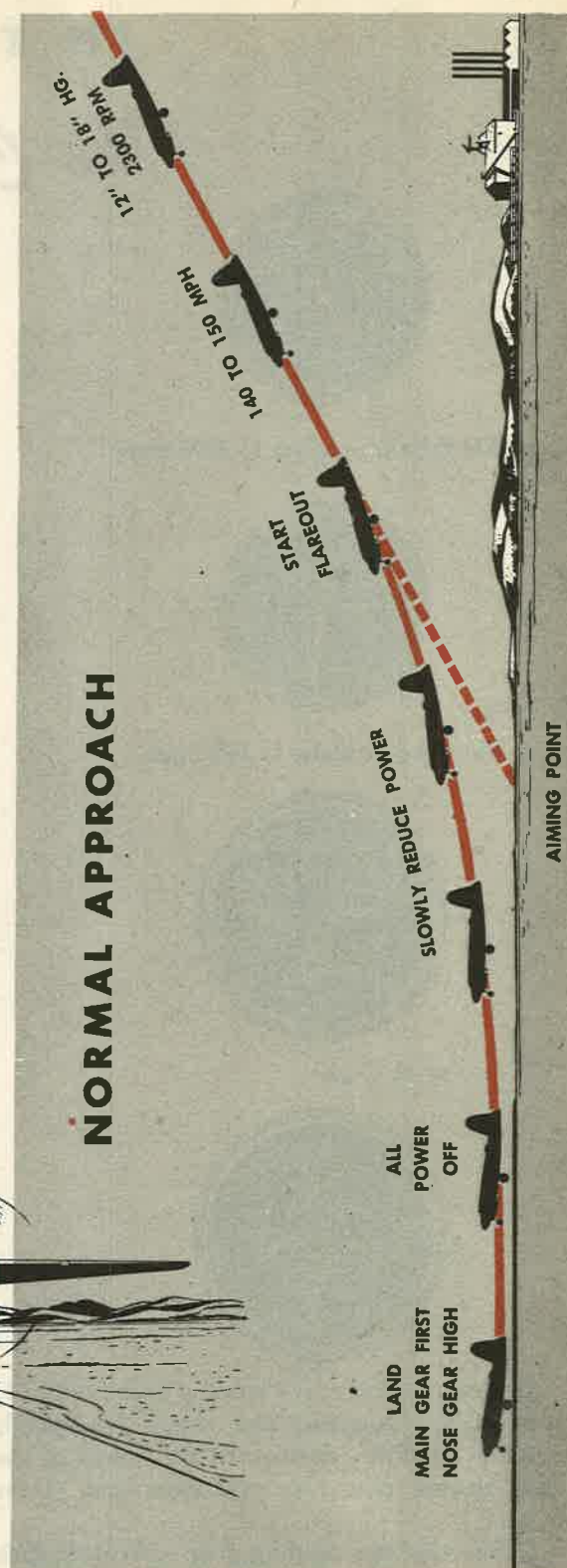
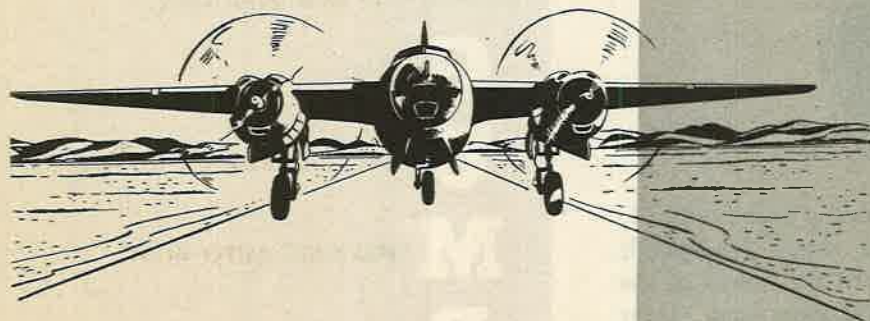
If your approach permits, it is best to aim for a spot 50 to 100 yards short of the runway, and plan to flare out onto the runway. This allows you to use most of the runway. The old rule of getting into the first $\frac{1}{3}$ of the field wasn't meant for B-26's. Try to land within the first 50 to 100 yards of the runway. Be careful not to undershoot.

The airspeed on the approach should be 140-150 mph, depending on the load.

Start the flareout smoothly at approximately 50-100 feet to avoid a high-speed stall, which accompanies sudden and abrupt elevator movements.

As you pull the nose up in the flareout, reduce power until the airplane is in a landing position. When it assumes a normal landing attitude, cut off all power. Even a small amount of power causes the airplane to float. Be careful not to let the nose drop when the main gear makes contact, since the nose becomes increasingly heavy as you reduce power and lower the airspeed. Keep your right hand on the throttles until the landing roll is completed.

**DON'T LET THE NOSE DROP
WHEN THE MAIN GEAR MAKES CONTACT**



SHORT-FIELD LANDINGS

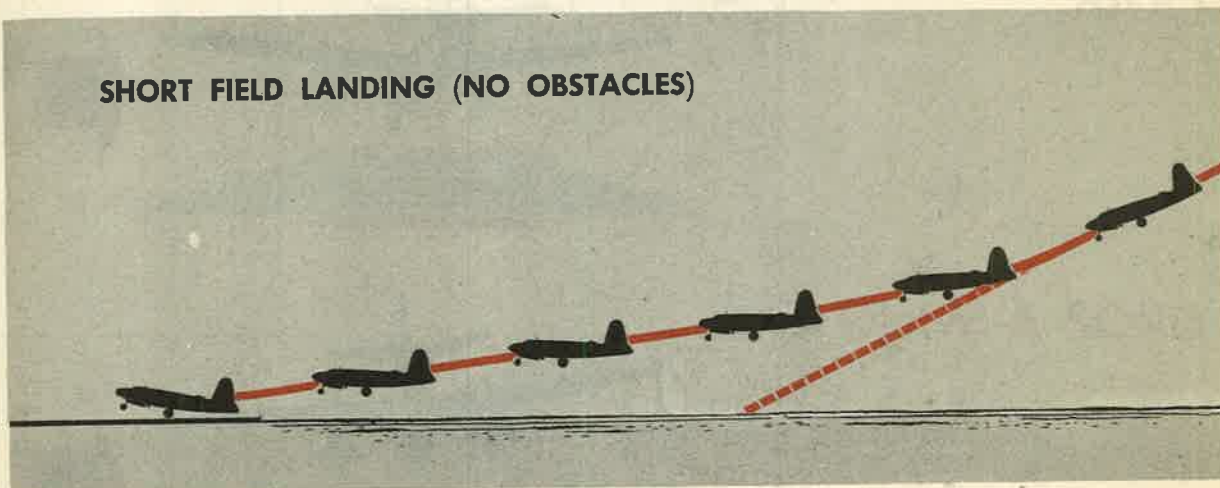
Because of its weight and its approach and stall characteristics, the B-26 requires more runway than most aircraft. This means that at some fields where other planes have ample room to make normal approaches and landings, you have to make a short-field approach and landing in a B-26. Good short-field landing technique is a prime necessity for you. Your approaches to a short-field landing vary, depending on whether obstacles are present.

If there are no obstacles, make your approach to undershoot the runway. When near the ground, add power and slow-fly the plane

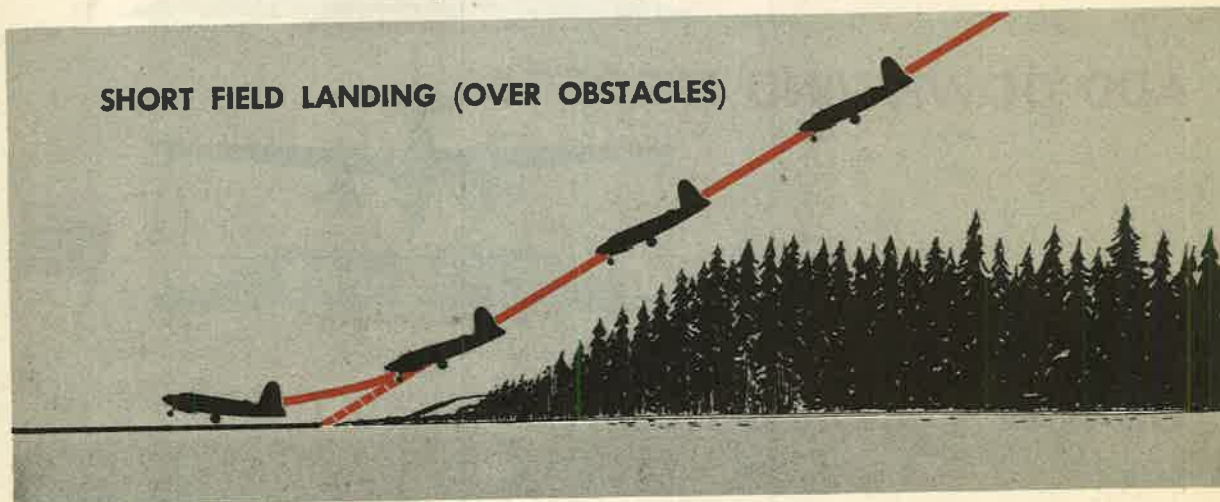
up to the end of the runway in approximately a landing attitude, cut your throttles, and land.

If there are obstacles on the approach, make your approach to land as close to the end of the runway and with as little flareout as possible. This means that you have to use more power and fly at a slower airspeed during the last part of your approach. Do not allow your rate of descent to exceed 500 feet per minute. Don't forget that high-speed stalls occur much more easily at low airspeeds. Keep your airspeed and rate of descent constant. Use the controls easily and smoothly.

SHORT FIELD LANDING (NO OBSTACLES)



SHORT FIELD LANDING (OVER OBSTACLES)



CROSSWIND LANDINGS

Any of the methods illustrated below can be used to land a B-26 in a crosswind. Which you use is a matter of personal preference. The primary consideration is to use the method which best enables you to have all drift killed at the instant of impact on landing. If you release your drift correction too soon, you may encounter a small amount of drift just before contact with the runway. In this circumstance, it is best to allow the upwind wheel to touch the runway

first. There is no danger of a groundloop. Because of the tricycle landing gear, the airplane straightens itself out automatically.

Because crosswind landings are not a major problem, it is usually better to choose a longer runway than a shorter one when a crosswind is the only consideration. If there is a choice between a 3000-foot runway into the wind and a 4000-foot runway crosswind, take the 4000-foot runway, all other things being equal.

CRAB



DROP A WING



ADD DOWNWIND THROTTLE



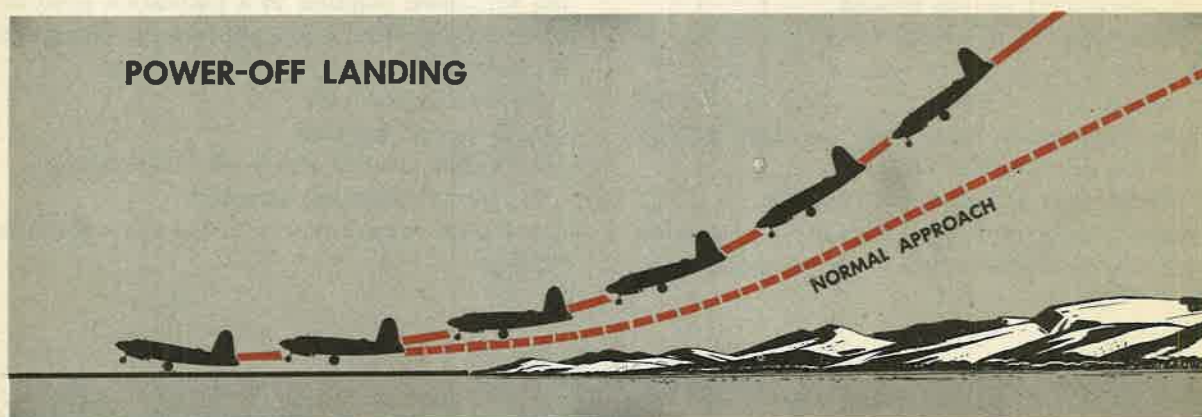
OR ANY COMBINATION OF THESE THREE

PARTIAL-FLAP LANDINGS

In low-visibility and low-ceiling approaches it is sometimes desirable to land with only partial flaps so that less drag develops. Full flaps make a go-around more difficult. Make your

approach at a slightly higher airspeed and at a flatter glide angle. If you make no-flap landings, make them at 10-15 mph greater approach speeds than full-flap landings.

POWER-OFF LANDINGS



You can make 90° power-off approaches in the B-26. The glide is steep and the rate of descent is approximately 2500-2800 feet per minute. This necessitates a higher approach speed (approximately 10 mph) than normal

power-on approaches. You must also start a smooth flareout about 50 feet higher than in a normal power-on landing. Because of the nose-down attitude of the airplane and the high rate of descent, high-speed stalls occur easily.



LOW-VISIBILITY AND LOW-CEILING APPROACHES

Use the standard procedure as outlined in the Basic Instrument Manual, T.O. 30-100B-1, for low-visibility approaches, except that the initial turn should be to the right in a B-26.

Do not lower the landing gear or more than ½ flaps until the runway is in sight.

During a low-ceiling approach, the field is usually visible from any point in the traffic pattern. If it isn't, use the low-visibility approach procedure.

On a low-ceiling approach, fly a normal downwind and base leg, but lower from ¼ to ½ flaps on the downwind leg. Be prepared to add power and change trim. Do not make turns too steep or too near the ground.

GO-AROUND PROCEDURE

Most of your preparation for a go-around on landing is made before you enter traffic and on the downwind leg. The main thing to remember is to **fly the airplane at all times**.

Make up your mind early as to whether you should go around. It's a lot easier to go around from high on the approach, where you have altitude and airspeed, than it is to wait until you are almost on the ground.

Regardless of where or when you decide to go around, these are the points to consider:

Add plenty of power. You tend to add too little. Remember that drag increases greatly with the gear and flaps down.

Watch your airspeed and altitude.

Don't apply power too rapidly. Too sudden application of power will cause temporary en-

gine overspeeding and loss of thrust.

Keep the airplane trimmed and fly the airplane at all times.

Raise your landing gear as soon as possible.

Open the cowl flaps to keep the engines from overheating.

Milk up the flaps as soon as practicable to help reduce drag. You can raise the flaps from the full-down position to a half-down position immediately without any appreciable change in lift but with a great reduction in drag.

As soon as you have:

1. Gear and flaps up
2. Ample altitude above all obstructions
3. Normal climbing airspeed

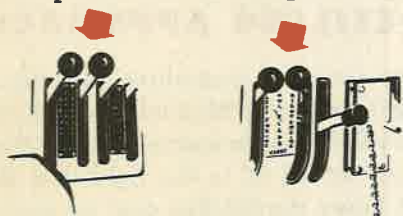
you should reduce power to the normal climb settings.

AFTER LANDING

After you land, hold the nose fairly high until your elevator control begins to be sloppy. Then lower the nose gear to the runway gently. You roll at approximately 60 to 80 mph, depending on the amount of flaps you have used. Don't forget to keep your hand on the throttles.

Apply your brakes evenly and intermittently.

After the landing roll is completed, your copilot completes the following checklist:



1. Oil shutter controls OPEN.
2. Cowl flap controls OPEN.



3. Move propeller governor controls to full INC RPM.



4. Turn booster pumps OFF.



5. Replace landing gear control lock.
6. Move wing flap control UP.

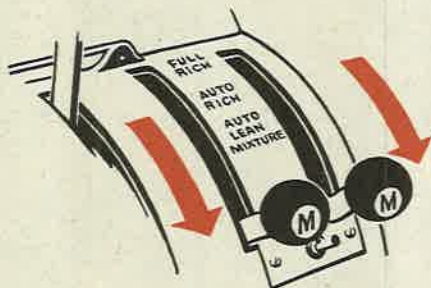
It is usually necessary to move the flap handle to neutral before replacing the lock on the landing gear control handle.

Note: Leave all hydraulic controls in an operating position on the ground.

TO STOP THE ENGINES



1. Run the engines at 1000 rpm.



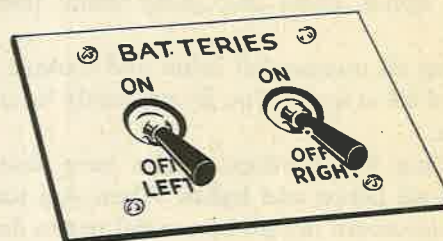
2. Pull mixture controls to IDLE CUT-OFF.



3. Move throttles to full open position as the engines stop firing.



4. Turn magneto switches OFF after propellers stop turning.

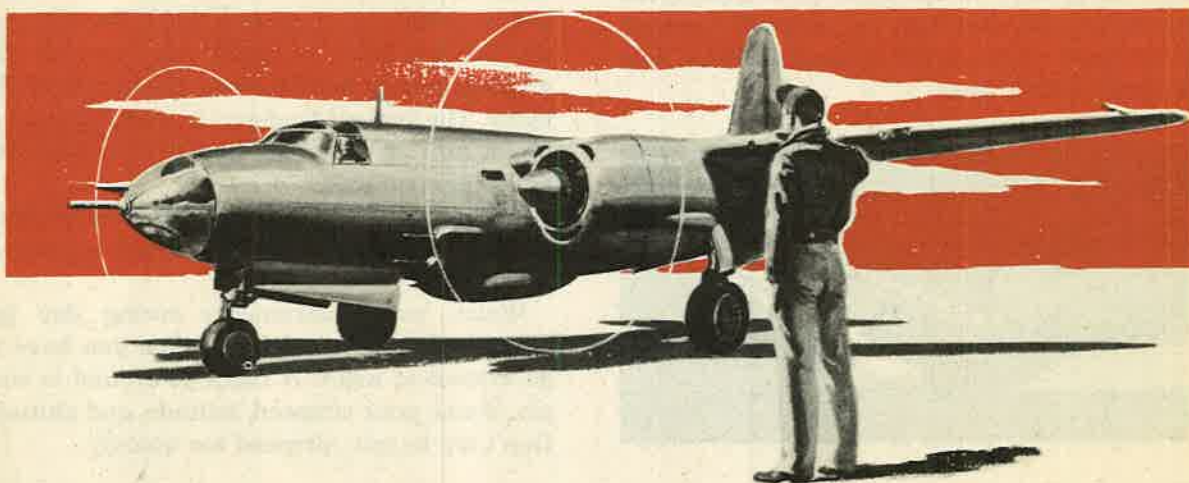


5. Turn radios OFF.

6. Turn battery switches and all other operating switches OFF.



7. Complete Forms 1 and 1A.



NIGHT FLYING

Your PIF contains many valuable tips on night flying. Read and study them; then use them.

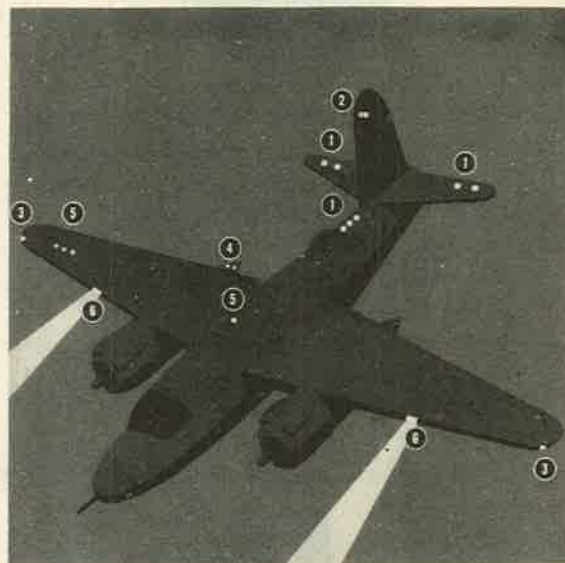
Keep all unessential cabin and cockpit lights turned off at night. You fly primarily by instruments.

During the preflight make sure that you check all lamps and lights. When you turn on the fluorescent lamps, be careful not to damage the rheostats by rough treatment. Make certain you have a flashlight available for immediate emergency use.

When you taxi at night, use the landing lights only as much as is absolutely necessary. Always know where you are going. Watch for other aircraft and obstructions. You must be doubly alert at night. Taxi slowly.

Takeoff

You use instruments for about 90% of your takeoff. Get accustomed to them before you start the takeoff run. The nose comes up high, cutting down the visibility. To avoid flying back into the ground, do not level off to gain speed too soon after leaving the ground. Increase your speed while slowly gaining altitude. Rely on your instruments.



- | | |
|-------------------------|------------------------------------|
| 1. FORMATION LIGHTS | 4. FORMATION BOMBING SIGNAL LIGHTS |
| 2. TAIL POSITION LIGHTS | 5. RECOGNITION LIGHTS |
| 3. WING POSITION LIGHTS | 6. LANDING LIGHTS |

Approach and Landing

Night approaches and landings are similar to those made by daylight, except that you use a little more speed on the approach. This is because your depth perception is not as reliable as in daytime operations. Look for obstructions before going into a strange field. Do not turn the landing lights on until you are near the ground, and do not fly down the beams of the lights. The general tendency is to undershoot at night. Aim for the green lights at the approach end of the runway.

Be sure to stop soon enough after landing. The ground seems to go by much slower at night.

Watch your instruments during day go-arounds. It comes in handy when you have to go around at night. A night go-around is simple. Watch your airspeed, attitude, and altitude. Don't try to gain airspeed too quickly.

INSTRUMENT FLYING

DON'T UNDERESTIMATE THE IMPORTANCE OF INSTRUMENT FLYING

Because this section is brief, do not be misled into believing that instruments are not important to a B-26 pilot. The art of instrument flying is always the most valuable talent possible for any pilot in any aircraft.

This section is brief because the 30-100 Series of Technical Orders are the finest, most comprehensive works on instrument flying ever written.

Know these Tech Orders thoroughly. Without repeating their text, there are only a few

**MAKE THE 30-100 SERIES OF
TECH ORDERS YOUR BIBLE OF
INSTRUMENT FLYING**

things which can be said about flying the B-26 on instruments.

The B-26 is a good instrument airplane. It is sensitive to control and consistent in its reactions. Like any fast, heavy ship, it must be flown on instruments a great deal of the time, even under contact conditions. No such ship can be flown entirely by the seat-of-the-pants method. Night flying in particular is almost entirely instrument work, and night takeoffs are instrument takeoffs. The principal things to remember in instrument flying are:

1. Smoothness on the controls.
2. Proper use of trim tabs.
3. Good coordination.
4. Small corrections.

Because of the high cruising speed of the B-26, it is even more necessary to plan ahead than in most other aircraft. For the same reason, make all your corrections small—smaller than for a slower airplane.

INSTRUMENT VERSUS CONTACT FLYING

Learn to fly the B-26 on instruments in the same manner, with the same familiarity, and with the same speed and smoothness of control that you use when flying contact. This is especially true, for example, of your rate of entry into turns. An excessively slow turn entry makes it necessary to build in back pressure

before you establish the desired degree of bank. This almost invariably creates difficulty in maintaining altitude and degree of bank during the turn. If you make the turn entry at the same rate you use when flying contact, the degree of bank is already established by the time the back pressure is needed.

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DON'T RELY ON YOUR RATE OF CLIMB INDICATOR IN TURNS

The lag in this instrument increases in direct proportion to your airspeed. Rely, instead, on your altimeter and gyro-horizon to help you maintain altitude in turns.

Coordination

Entry into and recovery from B-26 turns requires normal coordinated use of the controls. But, instrument or contact, coordination in the turn requires a little bottom rudder and top aileron. You can't make good B-26 turns with your feet off the rudder pedals.

Instrument Takeoff

Make instrument takeoffs in the same manner as contact takeoffs. Simply use your directional gyro to help you keep a straight course down the runway and your gyro-horizon to help you maintain the correct attitude after leaving the ground.

In short, fly the B-26 on instruments exactly as if you were flying contact.

PREDETERMINED POWER SETTINGS

Desired performance, comprising desired airspeeds under various drag conditions in level flight and desired rates of climb or descent, is governed by your use of power. Predetermined power settings aid greatly in establishing desired performance. Exact settings vary slightly in individual airplanes with various load conditions. However, a minor throttle change generally is all that is necessary to achieve desired performance using the following:

DESIRED PERFORMANCE	APPROX. POWER SETTING
Level flight at 170 IAS	26" Hg. 2100 rpm.
Level flight at 160 IAS (half flaps)	30" Hg. 2100 rpm.
Level flight at 160 IAS (wheels down)	35" Hg. 2300 rpm.
Descent, 500 feet per min. at 170 IAS	20" Hg. 2100 rpm.
Descent, 500 feet per min. at 160 IAS (half flaps)	23" Hg. 2100 rpm.

DESIRED PERFORMANCE	APPROX. POWER SETTING
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Instrument Let-down

Make your instrument let-down at 160-170 mph. The exact let-down procedure varies with the location, but in many cases it is good practice to lower $\frac{1}{2}$ flaps before hitting the low cone on the final approach. This has the following advantages:

1. It increases the stability of the plane.
2. It increases your visibility when you break out because the nose is lower.
3. It decreases the stalling speed.

4. It decreases the lag in lowering flaps later, or may make further lowering of flaps unnecessary.

5. It prevents excessive cooling during the let-down.

Actual Versus Practice Instruments

There is only one recommended difference between actual or practice instrument flying in the B-26. In actual instrument flying, **limit your degree of bank to no more than one needle width.**

OPERATION IN EXTREME WEATHER

COLD WEATHER OPERATION

Some B-26's are especially equipped to permit operation in extremely cold weather. There are differences in correct operation procedure during cold weather which you should know and remember.

Preflight Inspection

Besides the regular preflight inspection of the B-26 under normal operating conditions, you also must perform the following preflight if the temperature falls to 0°C or below:

1. Preheat engines (if equipment is available). It may take as long as 2 hours to heat the engines when the temperature is extremely low.
2. Preheat oil to approximately 95°C just before starting engines.
3. Check for proper operation of all fuel valves and pumps.
4. Check the Y and oil pump drains for ice and congealed oil.
5. Check for proper operation of all de-icer, anti-icer, defroster, and heating equipment.
6. Remove all frost, snow, ice, and water from the wings, tail, and control surfaces.



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Cold Weather Starting

If you have preheated the airplane properly, start the airplane in the normal manner. Observe the following precautions:

1. Do not use the battery for initial starts except in emergency. If the battery must be used, store it in a warm place until just before you need it.
2. Avoid overpriming. Prime only when the engine is turning over.
3. Keep the cowl flaps open for all ground operation when the engines are running.
4. Do not exceed 1000 rpm until your oil pressure is normal.

If you have not preheated the engines, more prime is necessary. Fuel draining from the engine nacelles in cold weather is not necessarily an indication that you have overprimed.

Cold Weather Takeoff

If you take off from a snow-covered or slushy field, extend and retract the landing gear and flaps several times during the first part of the flight to keep them from freezing in the up position.

Regardless of the outside temperature, take off with the cowl flaps open. Close, or nearly close, the oil cooler shutters to prevent the oil from congealing. Use some carburetor heat when climbing in cold rain, snow, or sleet, or when visible wing icing conditions exist.

Warning: Do not take off with de-icer boots operating.

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Cold Weather Cruising

Carburetor heat is not usually required when you are cruising unless visible moisture is present. If icing occurs, turn carburetor heat full ON.

Oil congeals easily. Watch your oil temperature closely.

Cold Weather Approach

During cold weather operation, make power-on approaches so that the engine will not be cooled too much. Close the cowl flaps on the approach.

Be extremely careful when you apply brakes after landing on slippery runways.

Correct Procedure for Oil Dilution

1. Idle engine between 1000 and 1200 rpm.
2. Check to make sure oil temperature is below 50°C.
3. Check oil pressure to make sure that the pressure remains above 15 psi.
4. Determine minutes required for dilution. (See Table.)
5. Turn booster pumps OFF for oil dilution.
6. Place dilution switches ON.

Note: A drop in fuel pressure occurs if the dilution is normal.

7. When dilution time has elapsed, stop the

engines in the normal manner. Continue to hold oil dilution switches ON.

8. When propellers stop turning, release the dilution switches.

9. Turn the booster pumps ON and see that the fuel pressure returns to normal, to make sure the oil dilution solenoids are not stuck in the open position. If the solenoids stick, the fuel pressure is low (approximately 4 psi). Notify the crew chief if the solenoids stick.

Time Required for Oil Dilution

ANTICIPATED LOWEST OUTSIDE AIR TEMPERATURE	DILUTION TIME (IN MINUTES)
40° F to 10° F.....	3
10° F to -20° F.....	5
-20° F to -50° F.....	8

On the Ground

When you park the airplane on snow or ice, as in arctic regions, place a layer of fabric, grass, straw or other insulatory material under the wheels. If you don't, hunks of rubber are pulled from the tires when you move the airplane.

Never set the brakes until after they have cooled.

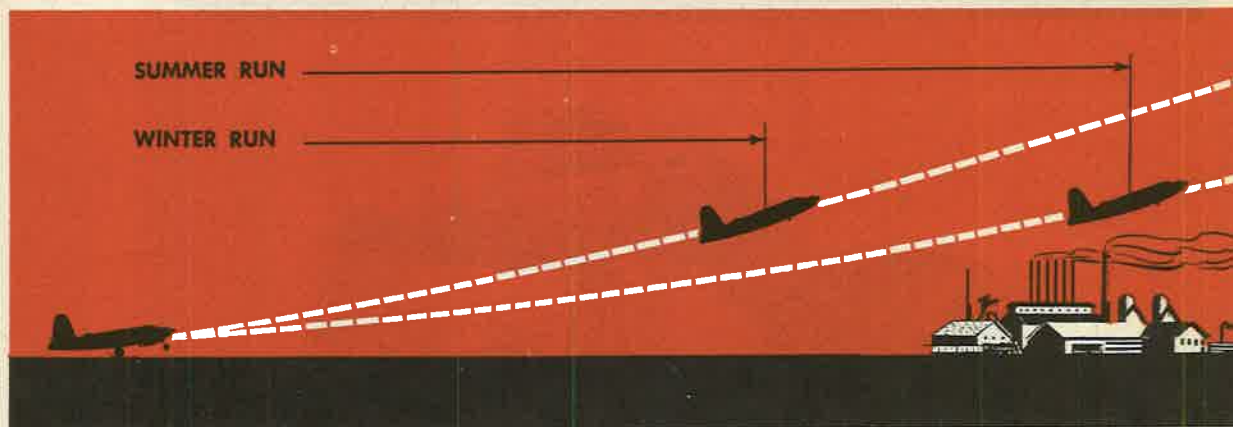
Taxi carefully on icy surfaces. Brakes are usually ineffective on icy surfaces.



HOT WEATHER OPERATION

Operation in extremely hot weather offers little difficulty. Remember that your takeoff run is longer.

Avoid overheating on the ground. Be sure that cylinder-head temperatures do not exceed 220° C before starting takeoff.



BAD WEATHER OPERATION

General

Visibility during rain is poor. Try to delay your landing until the rain stops, but if you have to land in the rain, open the front and side windows to increase visibility.

An instrument takeoff is best in bad weather. Do not rely on the actual horizon when it is snowing or raining. Use your instruments.

Taxiing in Mud or Sand

When you taxi on sand or soft ground, turn the airplane gently with the throttles and brakes. Never pivot on one wheel. Be sure to keep the airplane rolling.

When you attempt to straighten the airplane after a turn, the nosewheel has less tendency to trail properly as the depth of the rut increases. A tire which has sunk in excess of 2 inches causes a harmful trailing reaction on the nosewheel. The nosewheel tends to reverse itself.

When the nosewheel sinks more than 2 inches a crew member should look out through the nosewheel door and signal to you the posi-

tion of the nosewheel. If you get stuck, apply brakes, then full throttle. Release brakes and you usually come out.

Takeoff in Mud or Sand

Consider carefully the weight of the airplane, wind velocity, the length of the runway, obstructions, and the altitude of the field before you take off in mud or sand.

If the end of the runway is obstructed, use $\frac{3}{4}$ (30°) flaps.

After you apply full takeoff power, pull back on the control column so the nose lifts from the ground as quickly as possible. This relieves the weight on the nose during the takeoff run.

Landing in Mud or Sand

Make a normal landing in either mud or sand.

Note: The nose will be more difficult to hold off under these conditions.

Keep the airplane straight with the rudder after lowering the nosewheel to the runway. Use the brakes sparingly. They tend to make the airplane skid on slick or slippery surfaces.

EMERGENCY OPERATION



PROPELLER EMERGENCIES

If the propeller governor fails you lose the use of AUTO CONSTANT SPEED. The propeller becomes a fixed pitch propeller, and reacts to throttle and speed changes. Governor failure on takeoff results in your engine overspeeding. In flight, it is apparent whenever you

change airspeed or power.

The propeller needs electricity to operate. It cannot get electricity if:

1. The generators and batteries are OFF.
2. The selector switch is in FIXED PITCH.
3. The circuit breaker is not pushed in.

PROCEDURE

During Takeoff Run



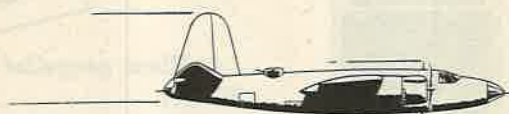
1. Try to reduce the rpm to 2700 by moving the propeller governor control toward DEC RPM.
2. If the propeller governor control does not return the engine speed to 2700 rpm, discontinue takeoff immediately.

Shortly After Takeoff



1. Hold airplane straight and level.
2. See that the circuit breaker button is pushed in.
3. Control rpm with selector switch. Note: Remember that with a fixed pitch prop, your rpm increases as your speed increases.
4. Do not return selector switch to AUTO CONSTANT SPEED.
5. If the selector switch will not decrease your rpm, leave the selector switch in FIXED PITCH and use your feather switch to decrease your rpm to the desired setting. Warning: It only takes from 6 to 8 seconds to fully feather a propeller with the feather switch. It is not spring-loaded; keep your hand on the switch so that you can return it to NORMAL when you achieve the desired rpm correction.
6. If the selector switch or the feather switch does not reduce rpm, reduce power on the overspeeding engine to keep the rpm below 3000.

While Cruising



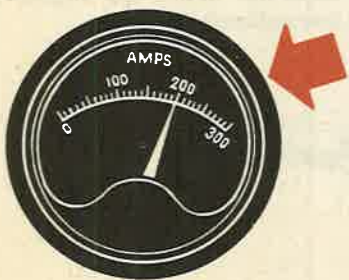
1. Set both selector switches to FIXED PITCH.
2. Control rpm with selector switches.

Landing in Fixed Pitch



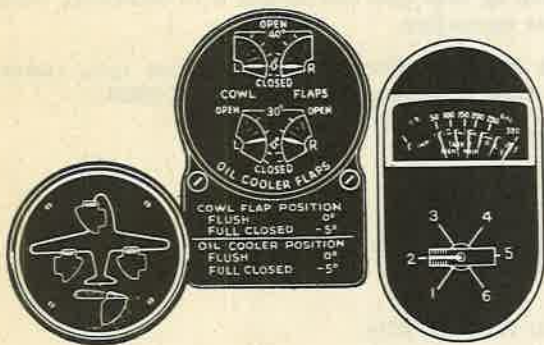
1. If one governor fails in flight, land with both propellers in FIXED PITCH.
2. Use selector switches to establish 2300 rpm at 160 mph and 25" Hg.

ELECTRICAL EMERGENCIES



Failure of One Generator

One generator generally produces sufficient current to operate all necessary equipment, and this is therefore not considered an emergency condition. If the generator load exceeds 200 amps, turn off all possible equipment until the load is less than 200 amps.



Failure of Both Generators

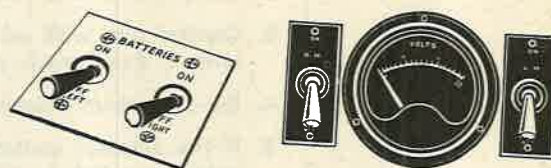
When the batteries are low you have an indication of the failure of both generators. The autosyn and selsyn instruments begin to fluctuate, and the radio receivers begin to fade. The most important units affected by an electrical failure are the propellers. If you detect failure of the generators before the batteries are completely run down, you still have a small reserve

of electricity you can use to check instruments and to re-set your propellers periodically.

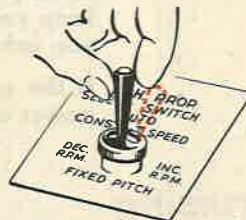
Caution: Use the batteries only as you need them.

Procedure

General



1. Turn the battery and generator switches OFF.



2. Place propeller selector switch in **FIXED PITCH**.
3. Turn off all other electrical equipment.



4. Have the engineer start the putt-putt immediately (if installed). The putt-putt will aid the batteries when you turn them on to check the instruments and to adjust rpm.

5. Turn the battery switches ON every 10 or 15 minutes to check the instruments and to make rpm corrections as needed.

6. Land as soon as possible.

Landing

1. Land in **FIXED PITCH**. You cannot rely on having enough electricity remaining in the batteries for **AUTO CONSTANT SPEED** operation.



2. Use selector switches to establish 2300 rpm at 160 mph and 25" Hg.

Complete Electrical Failure

In complete electrical failures, none of your electrical equipment operates. A complete electrical failure is usually caused by a short circuit of the main bus bar.

Procedure

General

1. Turn the battery and generator switches OFF.
2. Place the propellers in **FIXED PITCH**.
3. Turn off all other electrical equipment.
4. Land as soon as possible.

WARNING: Do not turn on putt-putt or batteries because of the fire hazard.

HYDRAULIC EMERGENCIES

FAILURE OF THE HYDRAULIC SYSTEM

WHEN YOU HAVE A HYDRAULIC FAILURE REMEMBER THAT IT AFFECTS THE FOLLOWING HYDRAULIC SYSTEMS: LANDING GEAR, FLAPS, BRAKES, COWL FLAPS, OIL COOLER SHUTTERS, BOMB BAY DOORS, AND CARBURETOR AIR CONTROL.

A hydraulic failure is indicated when one of the hydraulic units fails to operate.

The greatest single cause of hydraulic failure

is the loss of fluid through a broken hydraulic line. Other causes include failure or sticking of the pressure regulator and air locks in the lines.

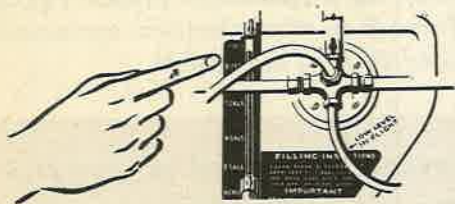
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Procedure

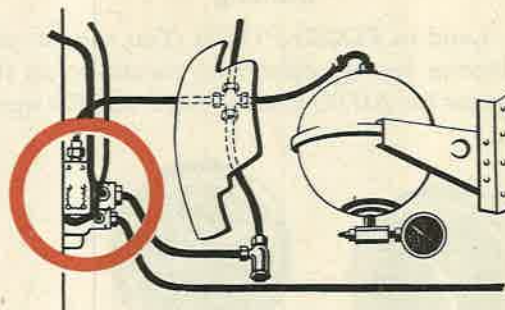
General



1. Check the hydraulic pressure.



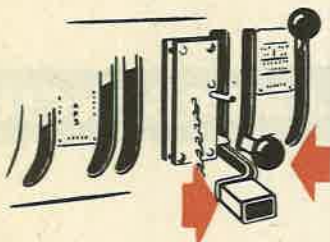
2. If the hydraulic pressure is at zero, check the main reservoir to make sure that you have an adequate supply of fluid.



3. If there is fluid present, feel the pressure regulator. If it is warm, the regulator is probably stuck. A tap usually frees the poppet valve and allows the fluid to flow into the system.

4. If the pressure fails to build up after you tap the pressure regulator, or if there is no fluid in the system, use the following procedure:

TO LOWER LANDING GEAR ON B-1 AND C MODELS

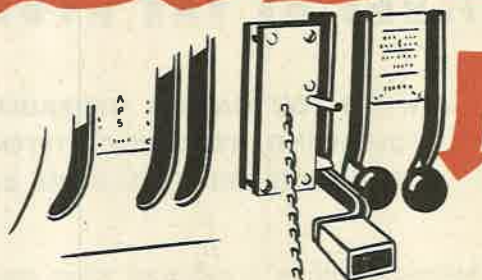


1. Place landing gear lever DOWN.
2. Move nose gear emergency lever to EMERGENCY.



3. Pump with hand hydraulic pump until the nose gear is down and locked.

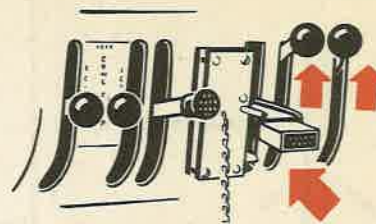
NOTE: If pressure fails to build up when you use the hand pump in the normal manner, pull the red lever at the base of the hand pump to the aft position, cutting in the auxiliary reservoir.



4. Move main gear emergency lever to EMERGENCY.



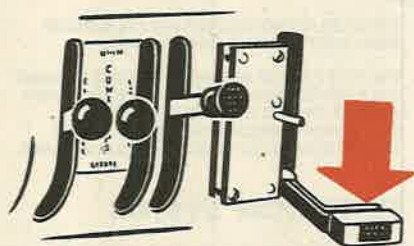
5. Pump with hand hydraulic pump until main gear is down and locked.



6. Return landing gear lever to the neutral position.

7. Return the nose gear and main gear emergency controls to NORMAL position.

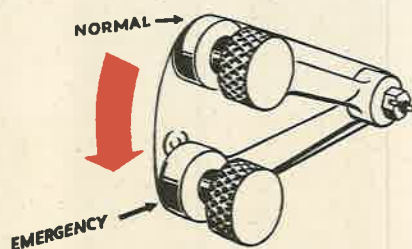
TO LOWER LANDING GEAR ON EARLY F MODELS



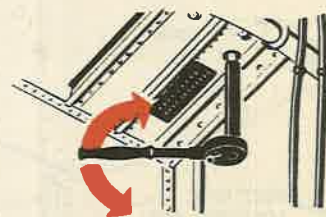
1. Place the landing gear lever DOWN.



3. Pump the hand hydraulic pump until the nose gear is down and locked.



2. Move the nose gear emergency valve to EMERGENCY.



4. Insert main gear emergency ratchet into the socket located in right top of forward bomb bay and release main gear up-lock pins. Gear will lower and lock in place.

TO LOWER LANDING GEAR ON LATE F AND ALL G MODELS

1. Place landing gear lever DOWN.

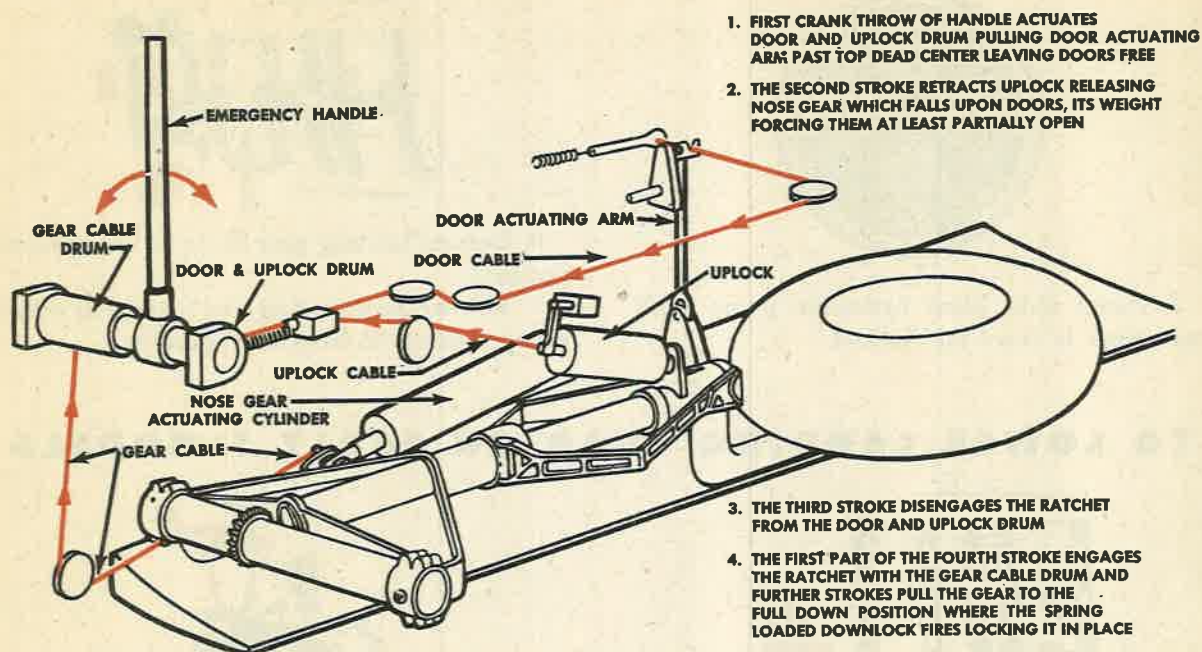


2. Crank nose gear down with lever in bombardier's compartment.

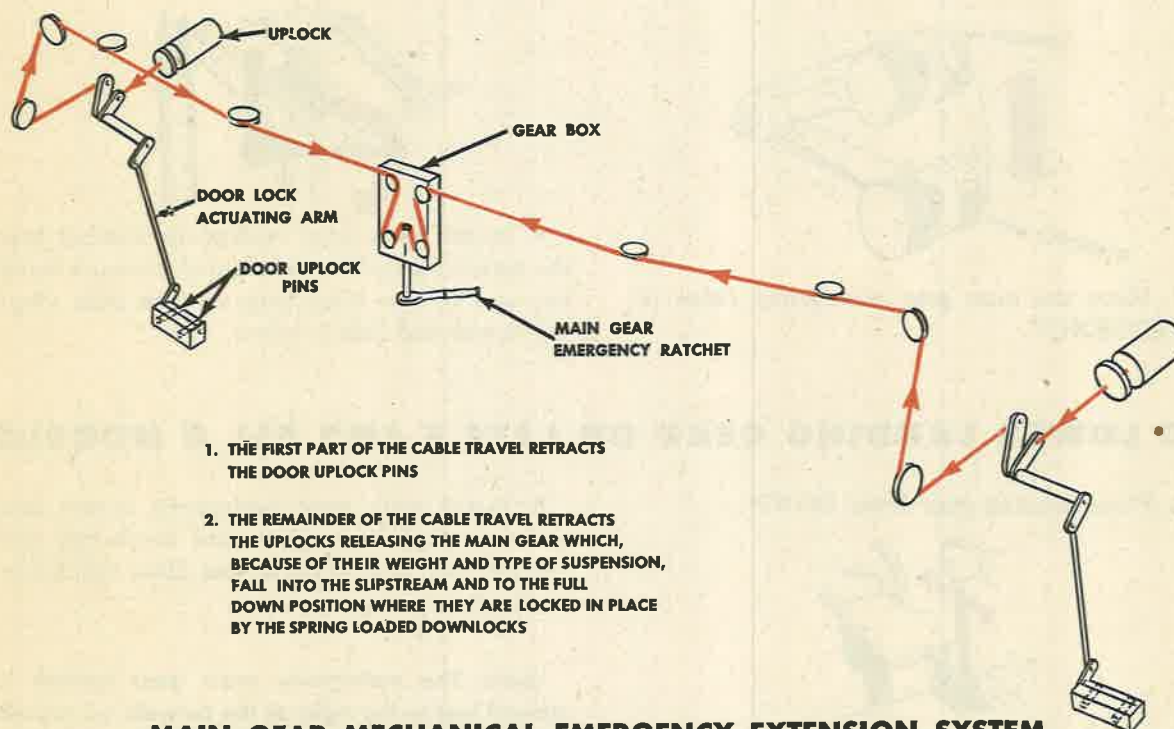
3. Insert main gear emergency ratchet into socket in right top of forward bomb bay and release main gear up-lock pins. Gear will lower and lock in place.

Note: The emergency main gear ratchet is stowed just to the right of the catwalk on the aft side of the bulkhead between the forward bomb bay and the radio operator's compartment.

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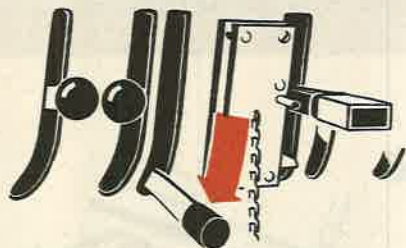
NOSE GEAR MECHANICAL EMERGENCY EXTENSION SYSTEM



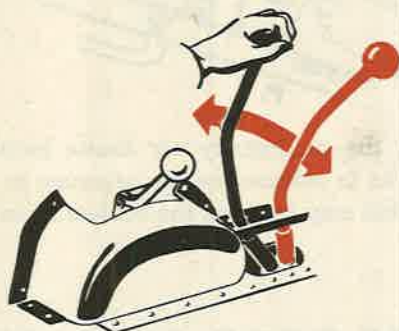
MAIN GEAR MECHANICAL EMERGENCY EXTENSION SYSTEM

TO LOWER FLAPS

1. See that all hydraulic controls are in "NEUTRAL."



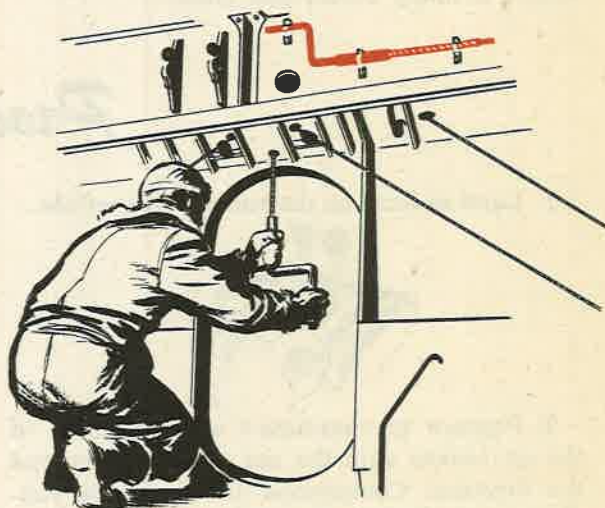
2. Place the flap control DOWN.



3. Use the hand hydraulic pump to lower the flaps to the desired position.
4. Return the flap control to the neutral position.

If the flaps fail to extend when you use the hand hydraulic pump, use the following procedure:

1. Place flap control DOWN.



2. Insert emergency wing flap crank into the socket at the rear of the forward bomb bay.
3. Crank the flaps down to the desired position.

Leave the crank in the socket. The wind will raise the flaps if the crank is removed from the socket.

TO OPERATE THE BRAKES

1. Land normally with the brakes released.
2. Immediately after all wheels are on the ground, depress both brakes evenly.

3. Work hand pump to build up pressure.

Note: It is impossible to build up pressure in the brake operating cylinders until the brakes are depressed. Don't fully release either brake after you once depress them and the pressure is built up, because fluid and pressure will be lost if they are released.

4. If you are unable to obtain braking action by the above procedure, use the emergency air brake system as a last resort.



ONCE DEPRESSED DO NOT
FULLY RELEASE EITHER BRAKE

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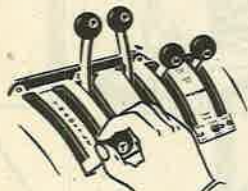
EMERGENCY AIR BRAKES

Never use the emergency air brakes if the normal braking system is working. Normal use of the brakes stops the airplane as quickly as the air brake, and with better control of the airplane. Use the following procedure if a brake failure is likely before you land:

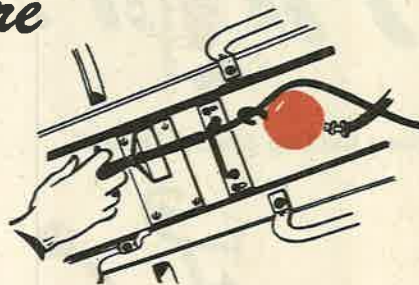
NOTE: Because there is no auxiliary reservoir in the F and G models, be especially prepared to use the air brake system in an hydraulic emergency.

Procedure

1. Land as short on the runway as possible.



2. Prepare to counteract uneven action of the air brakes with the use of the rudder and the throttles. Compressed air cannot be supplied to the brakes selectively.

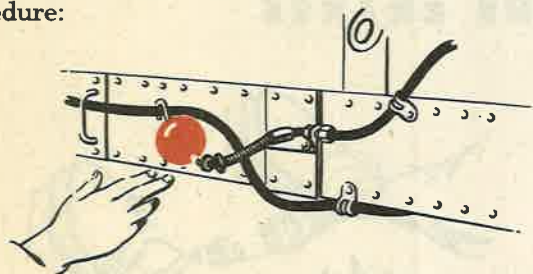


3. Pull the emergency air brake handle in quick jerks to release the air pressure in short surges. This may prevent the brakes from locking.

EMERGENCY SALVO AND BOMB BAY DOOR OPERATION

(B-1 AND C MODELS)

If it is impracticable to open the bomb bay doors or to salvo your load by means of the bomb bay door selector handle in the bombardier's compartment, use the following procedure:



To Salvo Load and Lighten Airplane

Pull emergency bomb bay release handle full forward. Hold it full forward until your torpedo, bomb bay tanks, or bombs have been salvoed. It takes less than 5 seconds for the complete salvo.

To Close Doors

1. When the salvo is complete, release the handle. If you have operating hydraulic pressure, the bomb bay doors close. It may take as long as 40 seconds for the hydraulic pressure to close the doors in this case.

2. If operating hydraulic pressure is **not** available to close the bomb bay doors, use the procedure outlined under Emergency Closing of Bomb Bay Doors, Late B-1 and C Models.

Use for Emergency Exit

1. Pull emergency bomb bay release handle full forward and hook it securely. This keeps the bomb bay doors open for at least 5 minutes.
2. If time permits, kill your hydraulic pressure by placing the nose gear emergency lever DOWN. This helps to keep the bomb bay doors open longer.

EMERGENCY CLOSING OF BOMB BAY DOORS

(LATE B-1 AND C MODELS)

If operating hydraulic pressure is not available, on certain later models you can use the following procedure to close the bomb bay doors after an emergency salvo.

1. Release the emergency bomb bay release handle.

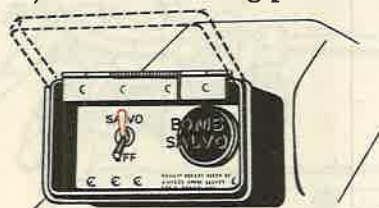
2. Attach the bomb hoist hook to the piston rod of the bomb bay door operating cylinder, passing the cable through the guide pulleys provided.

3. Crank the doors closed with the hoist.

EMERGENCY SALVO AND BOMB BAY DOOR OPERATION

(F AND G MODELS)

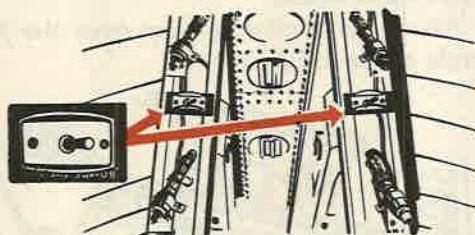
If it is impracticable to open the bomb bay doors or to salvo your load by any of the normal means, use the following procedure:



To Open Doors and Salvo

Move any of three salvo switches (they are in the bombardier's, pilot's and waist gunner's compartments) to the SALVO position. This allows air pressure to open the doors. When the doors are fully open, the electrical system salvos torpedo, bombs and tanks.

Warning: Both BOMBS-TANKS switches must be on BOMBS, or their respective racks won't work.



To Close Doors

Bomb bay doors on F and G models remain open indefinitely after an emergency salvo. Operating hydraulic pressure is not admitted into the lines of the door system, except when

the solenoids are actuated to OPEN or CLOSE. If operating hydraulic pressure is available, use this procedure:

1. Return all salvo switches to OFF.

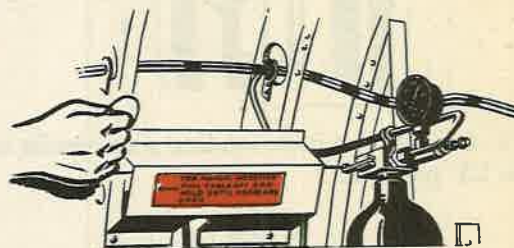
2. Hold either the pilot's or bombardier's bomb bay door switch in the CLOSED position until the doors are fully closed.

3. If operating hydraulic pressure is not available, use the procedure outlined under Emergency Closing of Bomb Bay Doors, F and G Models.

If the salvo switch fails to open the bomb bay doors in the foregoing procedure, use the following:

To Open Doors and Salvo

1. Move the salvo switch to the SALVO position.



2. Pull the cable attached to the operating solenoid of the bomb bay emergency air bottle and hold until the doors are fully open. When the doors are fully open, the electrical system salvos the load.

To Close Doors

Use the procedure previously outlined.

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EMERGENCY CLOSING OF BOMB BAY DOORS

(F AND G MODELS)

If operating hydraulic pressure is not available to close the bomb bay doors, use the following procedure:

1. Return all salvo switches to OFF.
2. Mount the bomb hoist on the fittings provided. (On the aft side of the rear spark bulk-

head, above the crew access opening.)

3. Connect the hoist hook into the triangular ring stowed immediately above the walkway.
4. Raise the ring with the hoist to operate the cables connected to the bomb bay door operating mechanism.

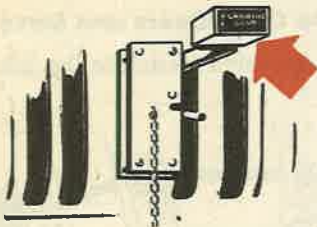
FAILURE OF LOAD AND FIRE VALVE

In some emergencies, the nose gear doors open but the nose gear fails to extend. This may indicate that the load and fire valve has not fired.

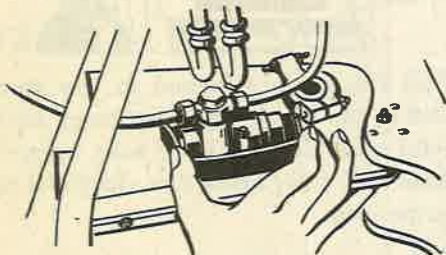
Procedure

Place the main landing gear lever in the UP position. This kills the pressure and allows the engineer to fire the valve in any of the following ways.

In some airplanes, an emergency load and fire valve tool is located beneath the canvas bag that holds the surface control locks. If the tool is available, follow this procedure:

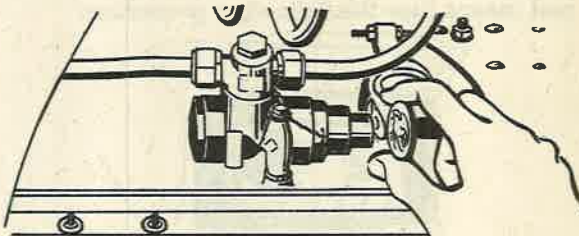


1. See that the main landing gear handle is in the UP position.



2. Have engineer take the tool and clamp it firmly on the load and fire valve.

3. Place the main landing gear lever in the DOWN position. This operates the valve in most cases and usually lowers the nosewheel.

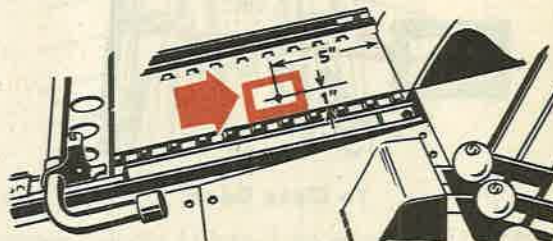


If the tool is not available, use the following procedure:

With the landing gear lever in the UP position, have the engineer insert a coin over the valve, preferably a quarter or half-dollar. This should allow the striker to actuate the valve when the landing gear lever is placed in the DOWN position.

There is a third method which you can use to fire the load and fire valve. Use it after all other attempts have failed.

1. Allow the copilot to take over the flight controls of the airplane.



2. Measure back 5 inches from the bottom rear of the brake control cover (this is the raised cover extending back between the rudder).

der pedals on the pilot's side of the cockpit) and one inch over to the left from the inside edge of the right-hand track of the pilot's sliding seat. This is a point approximately over the load and fire valve.

3. Carefully gouge a small hole (3 to 4 inches square) through the dural floor at this point. Be extremely careful, as engine control cables and hydraulic lines are also located under this point.

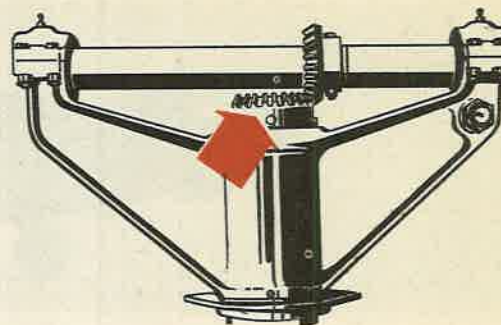
4. When the plunger end of the load and fire valve is exposed:

(a) See that main landing gear handle is UP.

(b) Press the load and fire valve plunger with a screwdriver and hold it. At the same time, place the main landing gear handle in the DOWN position.

(c) Hold the load and fire valve in until the nose gear is down and locked.

(d) Check the landing gear indicator to see that it indicates that the nose gear is down and locked.



(e) As a final visual check to insure that the nose gear is fully extended and locked into position properly, have the engineer check that 8 or 9 teeth (depending on the type of nose strut installed) are showing on the upper shank of the nose strut, and that the down-lock is extended.

Note: In late F's and all G models the nose gear can be lowered mechanically if the load and fire valve fails. (See page 109.)

LANDING GEAR EMERGENCY LANDINGS

Seldom do both the nose gear and the main gear fail at the same time. One is usually working, even when the other cannot be operated by emergency methods. When failure does occur, the best check you have that the gear is not fully down and locked is your landing gear indicator on the instrument panel. (On some B-26's a warning horn or gear-down light is also installed.)

Sometimes, after repeated attempts, the landing gear lowers but the selsyn indicator still indicates that one of the main wheels is not locked down. This may be an indicator failure rather than a gear failure. Reverse the leads of the main gear selsyn transmitters at the main distribution panel to check this. For example, if it is your **left** main gear which does not go down and lock, and, after reversing the transmitter leads, it is your **right** main gear which does not indicate locked—you can be assured that it is an instrument failure.

However, if all attempts at emergency gear extension fail, be guided by the following.

Procedure

Land with the nose gear up and the main gear down only if a hard-surface runway is available. On any other surface, make a belly landing.

Landing With Main Gear Down, Nose Gear Down but Unlocked

1. Move the CG to the farthest aft allowable limit.

Note: To move CG aft, if no movable load is available, have the crew move into the aft section. Caution all crew members to brace and cushion themselves as they would for a crash landing.

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2. Use the emergency hand pump to keep the hydraulic pressure as high as possible (about 1200 psi).

3. Land with the tail as low as possible.

4. Retract flaps and feather propellers to help keep the nose off the runway as long as possible.

5. Move mixture control to IDLE CUT-OFF.

6. Turn master ignition switch OFF.

7. Operate hand pump steadily to sustain nose gear with hydraulic pressure during the landing run.

8. Try to jar the down-lock into place by tapping the nosewheel lightly on the runway.

9. Apply brakes smoothly and sparingly. Do not turn or taxi until you have checked the down-lock and are sure it is engaged.

Landing With Main Gear Down, Nose Gear Retracted

1. Move the CG to the farthest aft allowable limit.

2. Execute a tail-low landing.

3. Retract flaps and feather the propellers.

4. Place mixture control in IDLE CUT-OFF.



5. Turn master ignition switch OFF. Use this type of landing only if a hard-surface runway is available.

Landing With All Gear Up on a Hard-Surface Runway

Note: If only one main gear is down and locked, retract the other main gear and land with all gear up. If only the nose-wheel lowers, retract it and land with all gear up.

1. Warn the crew to take crash landing positions.

2. Turn off all unnecessary electrical equipment (except batteries and generators).

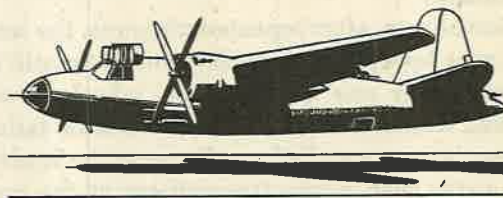
3. When you are sure of making the field;

(a) Put the mixture controls in IDLE CUT-OFF.

(b) Feather both propellers.

(c) Cut off master ignition switch.

OPEN ESCAPE HATCHES



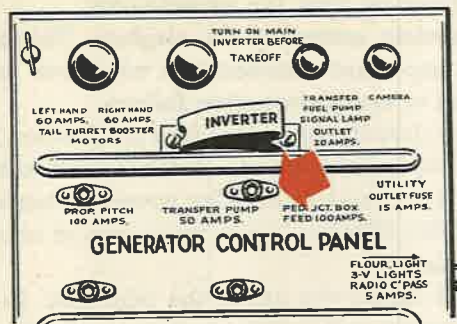
4. Just before making contact with the runway, have copilot open pilot's escape hatches.

Note: If a hard-surface runway is not available, do not feather the propellers; they may plow into the earth, tearing out an engine. Make sure the copilot's seat is well forward—out of the path of the side arc of the propeller.

EMERGENCY FUEL TRANSFER

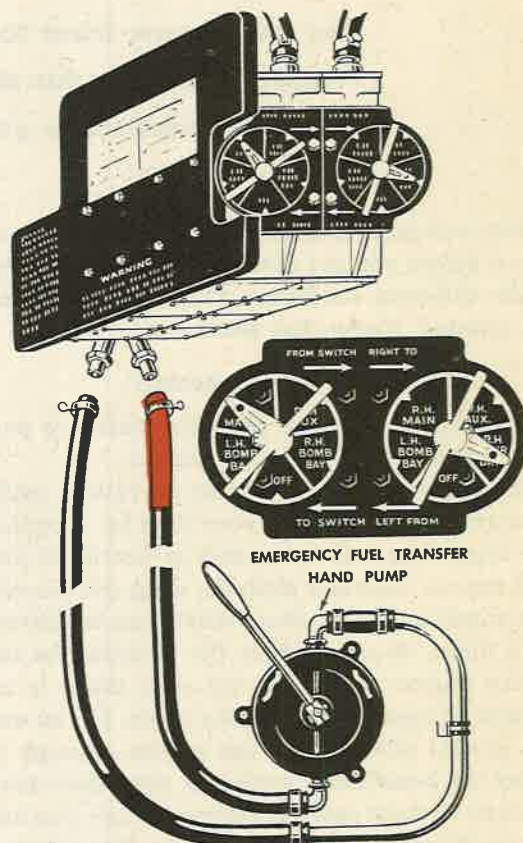
There is a fuel transfer hand pump in the B-26 for emergency transfer of fuel when the electric transfer system fails. Note: This does not apply to the late F's or the G models which have no transfer system.

Procedure



1. Check fuel transfer pump circuit breaker.
2. If the electric transfer pump still doesn't work, use the following procedure:
 - (a) Turn transfer selector valves OFF.
 - (b) Decide from which tank the fuel is to be taken.
 - (c) Attach the **red** (suction) hose connected to the bottom of the hand pump to the nozzle behind the transfer valve **from which** the fuel is to be transferred. Make sure that you have the right hose by placing your hand over the end of the hose and operating the fuel transfer hand pump. You will feel suction if you have the correct hose.
 - (d) Attach the **black** (pressure) hose to the nozzle behind the transfer valve **to which** the gas is to go.
 - (e) Turn the selector valves to the proper position and transfer with the hand pump.

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EXAMPLE: TO MAKE EMERGENCY HAND TRANSFER FROM RIGHT BOMB BAY TO LEFT MAIN

1. ATTACH RED HOSE TO RIGHT OUTLET FITTING
2. ATTACH BLACK HOSE TO LEFT OUTLET FITTING
3. PUT RIGHT SELECTOR VALVE ON R.H. BOMB BAY
4. PUT LEFT SELECTOR VALVE ON L.H. MAIN
5. OPERATE EMERGENCY HAND PUMP

ENGINE FAILURE

**You must know what to do when you have an engine failure.
Proper procedure for single engine flight is the most exacting and
important procedure you ever have to learn.**

There is general information which you must know before you get down to actual procedures under different conditions. Don't take anything for granted. Know that you know.

General Information

An airplane must be properly loaded to perform satisfactorily on single engine.

In emergency single engine operation, while in normal flight, lighten your load by dropping the bomb bay fuel tanks and/or bombs. If you still cannot maintain altitude, drop the aircraft armament and other items which can be spared.

In flight, do not feather the propeller of the faulty engine until you are sure there is no chance of starting the engine again. If you can get partial power from the engine—enough to offset the benefit of a feathered propeller—don't feather. In most cases of engine failure, you can get partial power from the engine. Sometimes a reduction in manifold pressure causes the engine to start again.

Do not feather the propeller on an engine producing partial power just to save the engine. The engine is not worth the risk encountered. Exceptions, however, include an engine which is vibrating viciously, or an engine which develops fire in the nacelle. In case of fire in the engine nacelle, feather the propeller and cut off the fuel to the bad engine. When complete engine failure occurs at a low altitude, feather

the propeller of the bad engine immediately; you have no time for experiments.

Maintain control of the airplane. This is the most important consideration when you have a partial or complete engine failure.

Any time the propeller does not feather, even after operation of the feather and selector switch, move the propeller governor control to full DEC RPM to lessen resistance as much as possible.

Understand the use of the trim tabs. In general, relieve all rudder pressure with the rudder trim tab. The greater your airspeed, the less rudder trim you need. Use only a minimum of aileron control and aileron trim. Use of the aileron distorts the airflow over the wing and decreases efficiency.

Engine Failure on Takeoff

Keep your head and follow the correct procedures when an engine fails on takeoff.

Forethought and practice of simulated engine failures will give you the general idea. What you do when it actually happens, however, depends on how well informed you have become on single engine operation, and how well you react in emergencies.

Keep your hand on the throttles on takeoff. In case an engine quits, you may have to reduce power on the good engine. The B-26, in a climbing attitude with full power, is extremely

difficult to control on single engine. If you can maintain complete control with the good engine at full takeoff power there is no need to reduce power. However, control pressures in this case are extremely heavy. If you begin to lose control, your only course is to reduce the power of your good engine to a point where you can maintain complete control. Don't forget! Control is by far the most important factor.

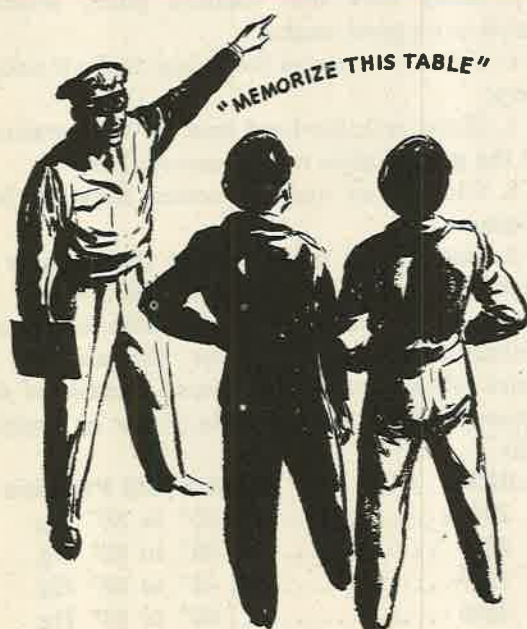
You must decide whether you can maintain flight or whether you must land the airplane

straight ahead. You are the one who has to decide, and you must do it instantly. Study the problem of engine failure on takeoff so that you will act instinctively if it ever happens.

As you know, your main objective just after the takeoff is to obtain a safe single engine speed as quickly as possible. A low, full-power climb is your best method of reaching a safe single engine speed of 160 mph.

Here are some figures on single engine operation that you should memorize:

	GROSS WEIGHT		
	28,000 LBS.	32,000 LBS.	36,000 LBS.
Most efficient speed for single engine operation	145 mph	155 mph	165 mph
Minimum safe speed for continuing flight, assuming engine fails just after takeoff. Flaps up, gear up	140 mph	150 mph	160 mph
Flaps down and/or gear down	Do not continue flight. Cut remaining engine and land straight ahead.		



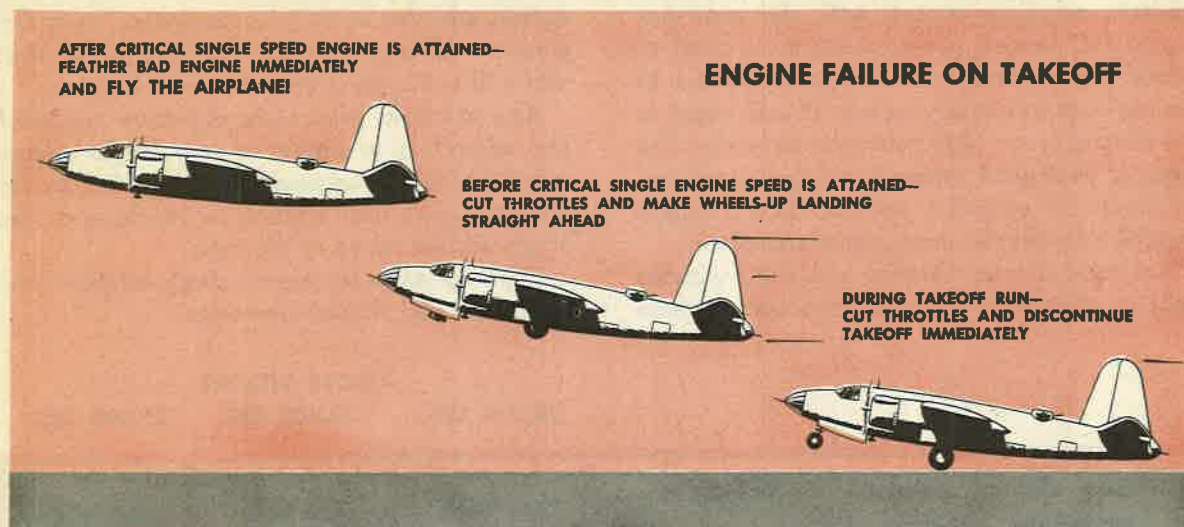
Single Engine Procedure During Takeoff Run

Close both throttles and stop straight ahead.

Single Engine Procedure Shortly After Takeoff and Before Critical Single Engine Speed is Attained

Time permitting, the following steps will be performed in order:

1. Retard both throttles.
2. Lower nose of airplane to maintain flying speed.
3. If landing gear hasn't already been started up, place landing gear handle in UP position.
4. Lower $\frac{1}{2}$ flaps.
5. Turn master ignition switch OFF.
6. Move mixture controls to IDLE CUT-OFF.
7. Have copilot open escape hatches just before contact with the ground.



Single Engine Procedure on Takeoff, but Just After Critical Single Engine Speed Is Attained at Low Altitude

1. Maintain control of the airplane. Note: Do not use aileron for directional control.
2. Feather the **bad** engine immediately. Warning: Make sure you feather the **bad** engine.
3. Keep airspeed above critical single engine speed.
4. Leave as much power on **good** engine as possible until you reach a safe altitude.

Engine Failure in Flight

Procedure

1. Re-trim the airplane.
2. Place mixture control of both engines in AUTO-RICH.
3. Apply sufficient power to the **good** engine to maintain airspeed and altitude.
4. Try to get the **bad** engine started again or producing partial power. Check the following: Ignition switch to BOTH. Fuel pressure. Try various throttle settings. Try mixture control in different positions.

Apply carburetor heat to check for icing.

Warning: Be careful when you apply carburetor heat at high altitudes, as the enriching effect may cause a further loss of power.

Check for Partial Power

1. Fully retard the throttle on the **bad** engine.
2. Trim the airplane for hands-off flight with the propeller windmilling.
3. Maintain a constant airspeed and slowly advance throttle on the **bad** engine. If the airplane yaws **towards** the good engine, the **bad** engine is producing partial power.
4. If the **bad** engine still fails to produce power, feather the propeller.
5. Make sure that vacuum pump selector valve is on **good** engine.
6. Salvo bombs and bomb bay tanks if necessary.
7. Keep cylinder-head and oil temperatures of the **good** engine within correct limits.
8. Close cowl and oil cooler flaps on **bad** engine.
9. Use enough power on the **good** engine to maintain proper airspeed and altitude.

One of the following settings should be sufficient; sometimes, however, the airplane is more efficient with less power because of decreased torque. Use as little power as practicable.

RPM	Manifold Pressure
2300	35" to 38" Hg.
2400	38" to 42" Hg.
2500	42" to 45" Hg.
2600	45" to 48" Hg.
2700	48" to 52" Hg.

SINGLE ENGINE LANDINGS



Procedure

Turns may be made in either direction, provided you hold airspeed constant at or above critical single engine speed. Proper coordination and smoothness of control movement are important.

1. Keep airspeed above 140 mph during the approach.
2. Extend wheels only after you are sure you

can reach the field.

3. Extend flaps as needed.
4. As good engine is throttled back, re-trim the airplane.
5. Lose speed and altitude gradually. Make your glide with partial power on the good engine. Remember that the airplane does not hold altitude with gear down and one engine out.

STARTING DEAD ENGINE IN FLIGHT

Procedure

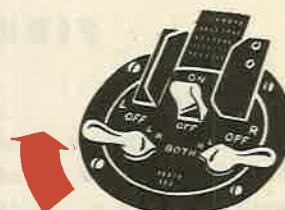


1. Set feathering switch to **NORMAL** position.



2. Move propeller governor control lever to full **DEC** RPM.

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3. Turn ignition switch **ON**.
4. Hold the propeller selector switch in **INC** RPM until the engine is windmilling at approximately 800 rpm.



5. See that oil pressure is up.

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6. Move mixture control lever to AUTO-RICH. Check fuel pressure.



7. Set manifold pressure at 20" Hg. for warm-up.

8. Increase rpm slowly, in stages. At approximately 1400-1500 rpm you can switch to AUTO CONSTANT SPEED and use automatic control from that point on. Do not apply cruising power with cylinder-head temperature less than 100° C and oil temperature less than 50° C.

9. If the engine fails to start, close the mixture control, open throttle, and allow propeller to windmill, clearing out the engine.

10. Repeat the foregoing procedure.

FAILURE OF PROPELLER TO UNFEATHER

1. Check feather switch.
2. Check propeller circuit breaker.
3. Check the generator on the good engine for proper operation.
4. If engine still fails to unfeather, try the following procedure:

(a) Place the selector switch in AUTO CONSTANT SPEED.

(b) Energize the starter for about 10 seconds.

(c) Engage the starter and continue to energize for approximately 15 seconds. This may allow the propeller to unfeather.

LACK OF POWER AFTER PROPELLER UNFEATHERS

1. Make sure that magneto switches are on BOTH.
2. See that mixture control is in AUTO-RICH.

3. Have the engineer see that fuel shut-off valve is full ON.

4. Try various throttle and rpm settings.

FIRES DURING FLIGHT

General

1. Warn all crew members to attach parachutes and stand by for further instructions.
2. Use all applicable fire extinguishers.
3. Gain as much altitude as possible.
4. If the fire cannot be brought under control, you must decide whether to abandon the airplane, ditch it, or make a crash landing.

Cabin Fires

1. Close all windows and ventilators.
2. If it is an electrical fire, turn battery and generator switches OFF. Put propellers in FIXED PITCH.
3. If a fuel or oil line is leaking, shut off all applicable valves.

4. If gasoline, oil, or similar combustible liquids are involved, use the hand CO₂ extinguisher.

Wing Fires

1. Turn battery and generator switches OFF.
2. Place propellers in FIXED PITCH.
3. If a fuel or hydraulic fluid fire, turn off all applicable valves.
4. Try to extinguish the fire by side-slipping the airplane away from the fire.
5. If this fails, decide whether to abandon the airplane, ditch it, or make a crash landing.

Flare Fires

If your flare bombs ignite while in the rack, release them immediately.

BAIL-OUT, DITCHING, CRASH LANDING

SIGNALS

You must notify your crew of your decisions as to whether the plane is to be abandoned in flight, ditched, or crash-landed. If time permits, you can best effect this notification (1) by word of mouth from crew member to crew member, or (2) by interphone. Where time does not permit, the situation is probably so critical that it demands immediate action with a minimum of confusion and delay. Experience has shown that crew members are often confused by the intricate series of alarm bell signals devised to inform them of the status of the airplane and its commander's decisions on abandonment, ditching or crash landing. For this reason it is felt that any preliminary alarm bell signals such as, "Attention," "Emergency lifted," etc., are superfluous and conducive to misunderstanding.

The following alarm bell signals are standard for all B-26 operations.

Prepare to Bail Out



Three sharp, short rings, each of no more than one second duration.

Bail Out . . . One Long Ring



Prepare for Ditching or Crash Landing



Six sharp, short rings, each of no more than one second duration.

Brace for Impact . . . One Long Ring



Signal your crew to brace for impact approximately five seconds before making contact.

BAILOUT

If possible, the navigator determines your correct position and the radio operator transmits a distress signal, which should include the position of the airplane. The radio operator also turns his IFF set to EMERGENCY.

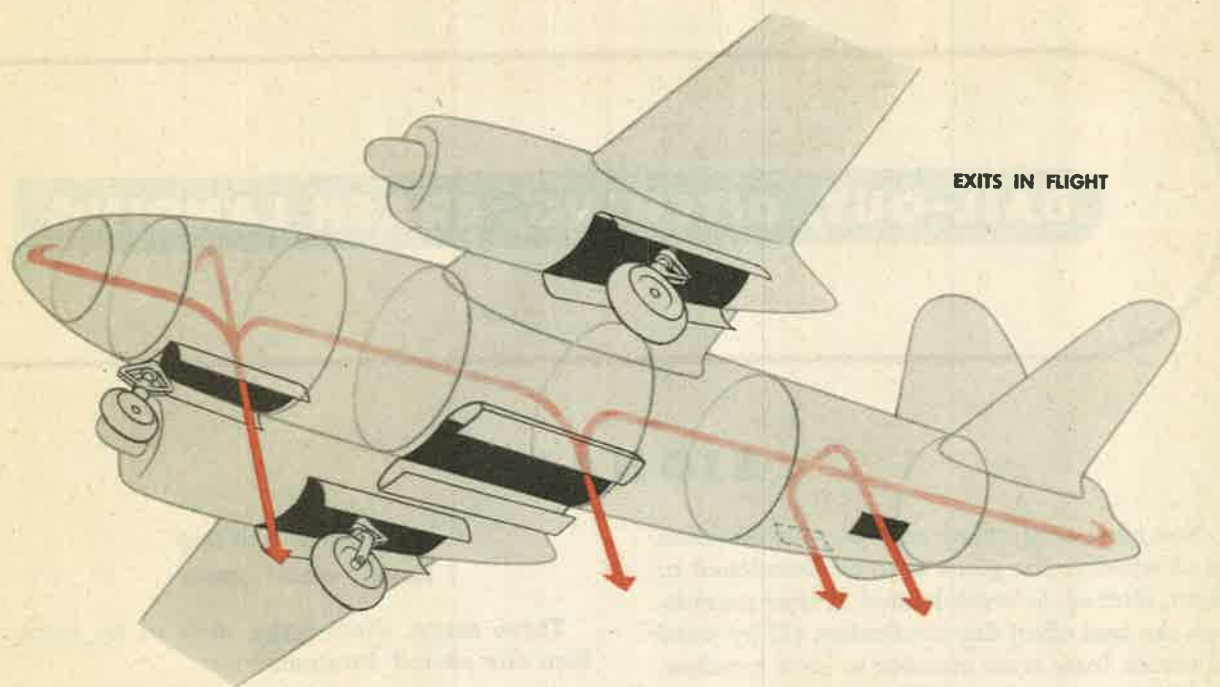
Exit From Forward Compartments in Flight

The most direct exit from the pilot's or the bombardier's compartment is through the nose-wheel well entrance hatch.

Exit from the radio operator's and navigator's compartment is made through the forward bomb bay doors. The forward bomb bay doors are opened in the following ways:

1. Open from bombardier's compartment by use of the bomb bay door selector handle.
2. Press emergency nose gear handle to EMERGENCY and fasten pilot's emergency bomb bay release handle full forward.
3. In the F and G models, turn any salvo

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switch to SALVO or open doors hydraulically with pilot's bomb bay door switch.

Note: If time and circumstances permit, all crew members in the forward compartment exit through the nose gear well.

Exit from Aft Compartments

Raise the waist gun hatches. Men in aft compartment exit through the waist gun hatch openings.

DITCHING

Preparation

1. Determine wind direction and velocity.
2. Navigator gives the airplane's correct position to the radio operator.
3. Radio operator sends distress calls, stating the position of the airplane. The pilot also turns the IFF emergency switch to ON.
4. Salvo bombs and bomb bay tanks.

If the bomb bay tanks are empty, don't salvo them. They will add to your buoyancy.

5. Navigator opens upper hatch in his compartment.

6. Crew assumes correct ditching positions.

Note: No crew member should remain in the aft compartments during ditching if there is time for him to go forward. If time prevents his going forward, he should brace against bulkhead and exit through rear escape hatch.

Ditching Procedure

1. Approach with power on to flatten glide.
2. Feather both propellers before hitting the water.
3. Copilot opens pilot's and copilot's escape hatches just before contact with the water.
4. Turn master switch OFF just before contact.
5. If there is a wind (under 30-35 mph) blowing at right angles to the swells, or if the wind is blowing parallel with the swells, ditch parallel along the top of the swells.
6. If there is a high wind blowing at right angles to the swells, ditch into the wind toward the top of a swell.
7. Land only slightly tail-low. Don't stall it in.

Warning: Caution all crew members to re-

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main at their ditching stations until the airplane is completely at rest. They may mistake a first glancing impact for the final one and leave their stations too soon, with resulting injuries.

8. After you land, launch your life raft.

To Launch Life Raft From Inside Airplane

- (a) Pull red handle to release door.
- (b) Continue pull to release and inflate raft.

Note: The life raft door can serve as an exit for personnel in the navigator's compartment. Push up on the canvas bag after releasing the raft. The canvas bag will push out and a large aperture will be cleared for use as an exit.

To Launch Life Raft From Outside Airplane

- (a) Turn handle to release life raft door.
- (b) Remove door and pull cable attached to CO₂ bottle.

9. Radio operator removes emergency radio transmitter (Gibson Girl), signal light, Very pistols, and flares.

10. Crew exits as shown in diagram.

11. Cast off lines from the life raft. Paddle a short distance from the airplane to avoid undertow created by the airplane when it sinks.

How to Assist Rescue

The emergency radio transmitter operates from the life raft with a kite aerial. Complete instructions are printed on the set. The transmitter emits an MCW signal tuned to the international distress frequency of 500 Kc. You may also use the manual sending key.

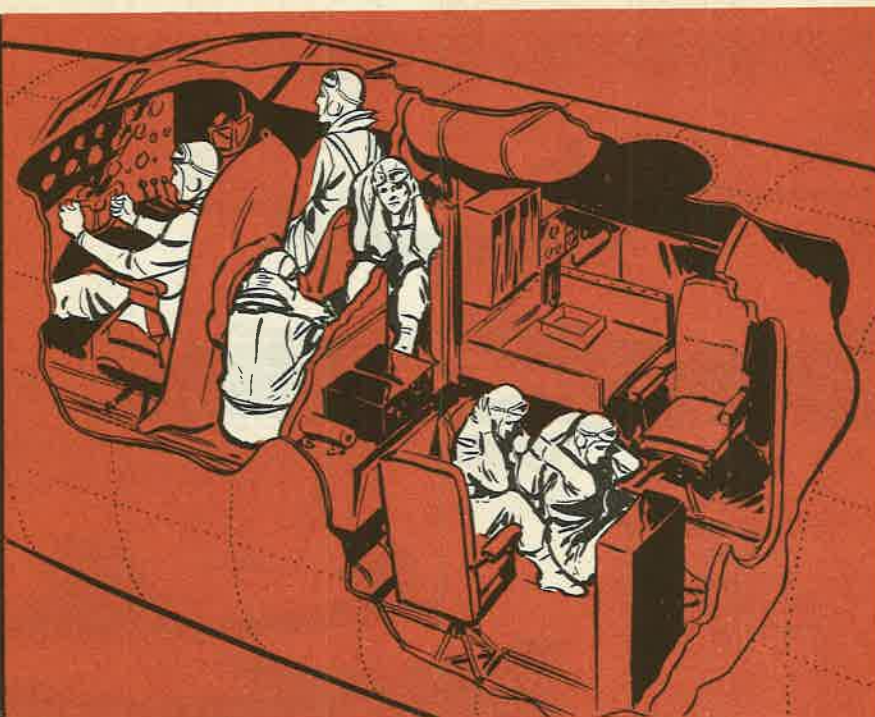
All crew members should put on their yellow caps. Use your signal equipment judiciously to attract rescuers. Observe instructions included with your rations.

Crash Landing

Notify the crew to assume crash landing positions. All crew members remain seated and braced until the airplane comes to rest.

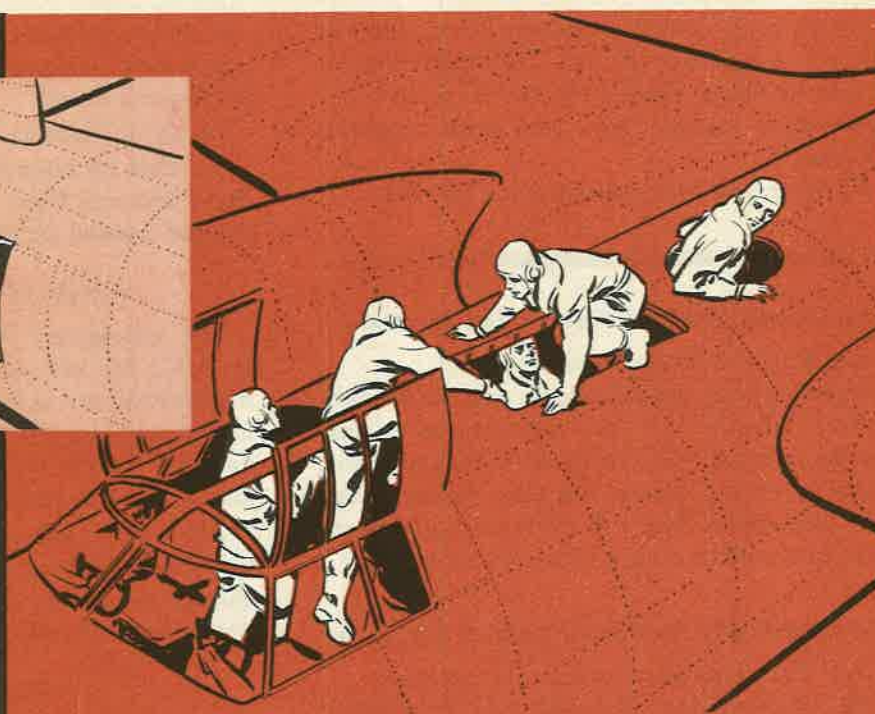
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**CRASH
LANDING
AND
DITCHING
STATIONS**



Crew Members Will Take Stations as Indicated upon Signal from Pilot

**EMERGENCY
EXIT ON
GROUND
OR WATER**

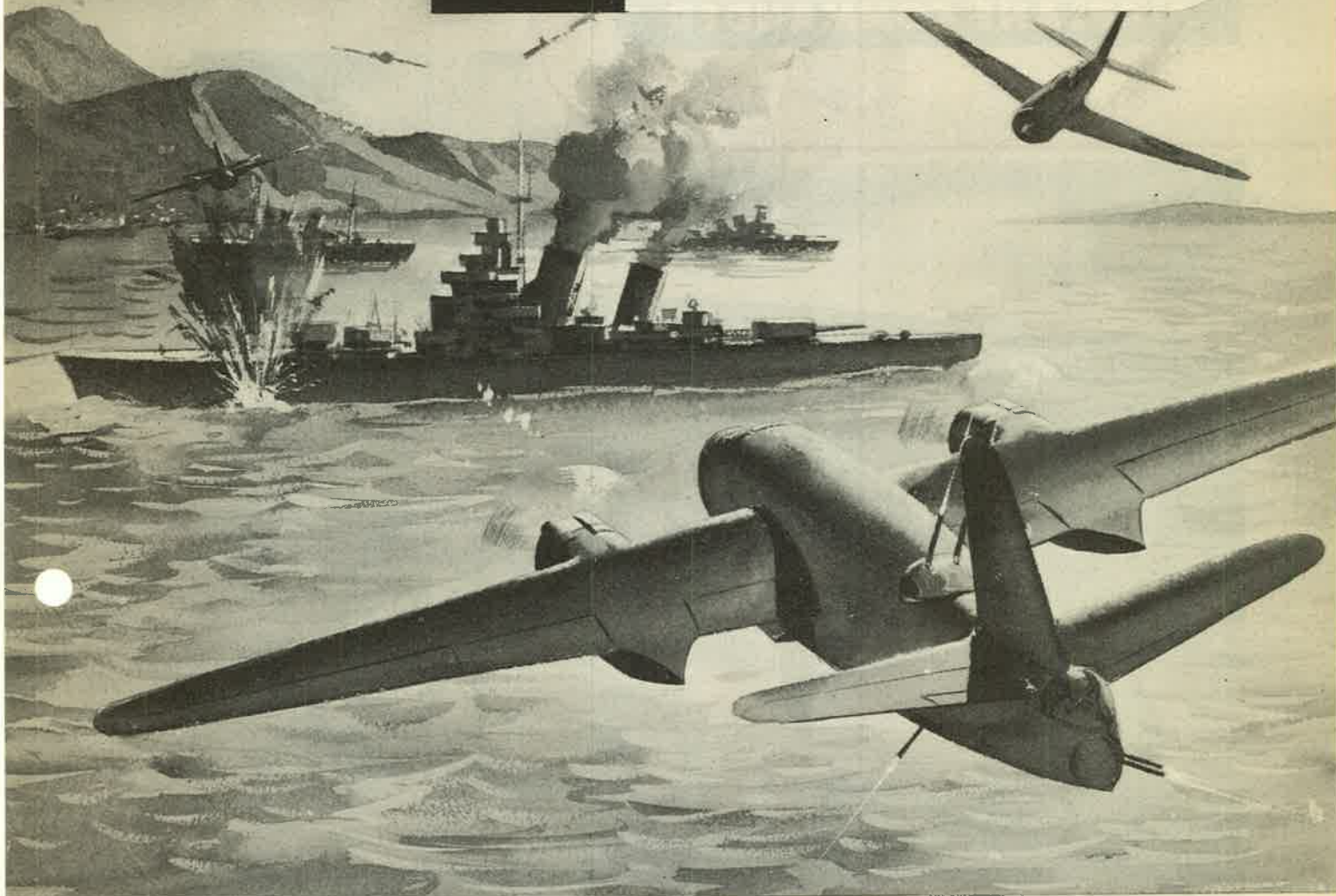


When the Airplane Comes to a Stop After a Crash Landing, the Crew Members Exit from the Airplane in the Manner Shown in Diagram

SECTION

4

THE SIX MAN WEAPON



MARAUDERS . . . In the illustration above you see B-26's at work—crippling enemy transportation and destroying vital supplies. The harassing and destruction of enemy supply and transportation facilities is one of the most important tasks our Air Force is called upon to perform. Marauders have an enviable record of efficient and effective performance of their share in this job. Sleek, fast and deadly—they are truly six-man weapons.

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AIRPLANE COMMANDER



The B-26 is a teamwork airplane. You are captain of the team. Your success in combat and the safety of your crew and airplane depend upon how well you organize and lead your crew during training.

When you are assigned a crew, you are no longer just a pilot—you hold a command post and all the responsibilities that go with it. You are flying a six-man weapon. It's your airplane, and it's your crew; you are responsible

for them, not only when you're flying, but for the full 24 hours in every day.

Your crew is made up of specialists—every one an expert in his line. Each one contributes his important part to the whole. You must know their capabilities as well as their shortcomings. Know their backgrounds, their personalities, their individual problems, their needs for specific training. Know them as men, as well as specialists.

Keep Your Crew Happy

As airplane commander you are responsible for the daily welfare of every man in your crew. See that they are properly quartered and clothed and fed. See that they are paid when they should be paid. Away from home, help them temporarily if they run short of funds. In brief, they are your crew, a little specialized army all your own, and their physical and mental well-being is your responsibility.

Supervise Your Crew's Training

Your primary responsibility toward your crew is to see that every man is completely trained to take his place on the team. You are responsible for seeing that your team is capable of safe, efficient and successful conduct on all missions during training and combat operation. Supervise the training of the team both on the ground and in the air. Check their progress



constantly. Consult with the supervisory personnel in charge of their training. Organize your own supplementary training program for yourself and your crew. You have only a short time to perfect the training of your crew and to learn how to coordinate their jobs in the most efficient manner. The job must be done thoroughly. Use every available minute. When you are grounded because of weather or lack of airplanes, take your entire crew to the mock-up section or to the engineering, communications, or armament sections. The heads of the various sections are there to help you train your crew and will cooperate in every way. Be sure that every man is present during these visits. Every man should know every other man's job, and

no man on your crew will ever know so much about his own job that he cannot learn more. **You, in particular, must be fully familiar with every man's job.** A knowledge of every piece of equipment in the airplane and an understanding of every man's problems, procedures, and duties is your prerequisite to the proper coordination of your crew's activities. Strive for this knowledge continuously, to equip yourself to do your job better. Insist that every other member of your crew does the same. The resulting flexibility means the difference between success and failure.

Health, Equipment and Morale

Never forget that you are preparing your crew for combat. You are responsible for every man's ability to do his job in the best possible manner. To do this, you have to extend your leadership over your crew's every activity. You are responsible for their presence and punctuality at all formations, for seeing that they get the proper amount of rest each night, and that their conduct, when off the post, is such that it does not interfere with the proper and alert performance of their duties the following day. You must see that they are completely immunized and certified physically fit for combat early in their training, and that they receive every issue of equipment to which they are entitled prior to going overseas.

You should inspect every member of your crew just before boarding the airplane for a mission. See that each man has a properly fitted parachute, a properly fitted Mae West in good condition if you plan any over-water operation, and proper clothing for the expected temperatures. Also, at this time you should see that each man is presentable in clothing and person. This, of course, is not the only time you should be concerned with your crew's appearance. This may seem reminiscent of your cadet school days, and for this reason you may object to supervising your crew's extra-curricular activities to the extent of regulating their conduct and their personal appearance. You cannot, however, over-emphasize the morale effect of neat appearance, nor the detrimental effects of lack of rest and over-indulgence.



Creating Confidence

As airplane commander, you are the one on whom your crew depends to survive. This means that you must know how to do things technically and how to manage your crew. You must learn of how things should be done so that you may have complete confidence in your ability to cope with any situation. Confidence is contagious. If you are confident of your abilities, so will your crew be confident. With their confidence in you as their leader they will gain increased confidence in their own jobs. But remember, confidence should follow, not precede, knowledge.

Encourage your crew to think and act for themselves. If you are confident that a man can do a job and that he understands your policies, tell him what you want done and then leave him alone.



GIVE CREDIT WHERE IT IS DUE

Practice Fair Treatment

Don't forget to give a man a pat on the back when he does a good job. Look for things to praise as well as to criticize. Criticize your crew members' mistakes promptly, but privately. Commend them publicly. Praise is more productive than censure. Strive for a maximum of efficiency and contentment and a minimum of punishment. It is useless to punish a man who has done his best. Punish carelessness, but remember that the only objective of punishment is to prevent repetition, not to satisfy personal grievances. Unfair treatment breeds ill will. Be on the level. Praise and punish your crew impartially.

Never lie to your crew. Truth is the greatest builder of trust, respect and confidence. Never make a promise unless you fulfill it. Never give an order unless you enforce it. Don't allow your own sour disposition to enter into your conduct toward your crew. If you pull a boner, don't try to spread out the blame and take out your chagrin on your crew. Don't create an unpleasant atmosphere by being sarcastic and contemptuous.

Take time to explain a job and take pride in the way you explain it. Keep your men trained and busy. Avoid useless hardships, but insist on strict adherence to high standards of performance and diligent application.



TAKE AN INTEREST IN YOUR CREW'S WELFARE

Maintain Normal Discipline

Never ignore your crew. Take a personal interest in their welfare, but **above all things avoid intimacy with them.** Familiarity breeds contempt and social disagreements often carry over to your work. There is no better way to promote efficiency and to maintain esprit de corps than to observe a certain amount of formality. Your little army is a military organization, and as its commander you must lead it in the establishment of a high standard of military conduct and discipline. Don't take this advice lightly. It is a natural tendency to become lax in the observance of military conduct and courtesies within your own crew. The recognition of the dependency of each man on every other man, and the feeling that you're all in the same boat, tends strongly toward the attitude that every man of the crew is of equal importance. This is true—the success or failure of the team depends on the way each man performs his individual duties and fulfills his individual responsibilities. But each man's individual duties must be coordinated with the rest of the crew. This is your job, and to do it well and properly you must have, particularly in times of emergency, the unquestioning obedience of every member of your crew. And, whether you believe it or not, if you call your engineer by his first name, it won't be long before he calls you by yours. Sooner or later, a situation will arise where the engineer tells you in so many words, on the basis of his familiarity, that you don't

know what you're talking about. Don't expose yourself to anything of this kind. It isn't fair to the man or the other members of your crew. Broad experience has proven:

A crew whose commander does not maintain normal military discipline ceases to be a crew—a team—and becomes a group of individuals.

There isn't one man in ten thousand capable of combining familiarity with unquestioned obedience in times of emergency.

Exploit Your Crew's Capabilities

If you are fortunate enough to have men on your crew who have more practical experience in certain lines than you have, invite their advice to yourself and the other men in the crew. Your crew will quickly find out what you don't know anyway, and they will respect you for recognizing your own limitations.

Make every effort to instill a sense of duty, pride, and a strong feeling of mutual obligation and confidence among your crew.

Maintain Crew Harmony

You must be on harmonious terms with your crew. Any dissension or conflict results in the formation of cliques within the crew, and the subsequent collapse of morale, military organization, and discipline. This cannot be tolerated.

Make sure that you are not at fault if dissension does occur. Make every effort to establish friendly relations, but if it is impossible, request proper authority to have the troublemaker removed from your crew. Remember: First, find out who is at fault; second, make every effort to establish harmony; third, if all efforts fail, try to have the troublemaker, or troublemakers, replaced. Always consult with your flight commander, squadron operations officer, and squadron commander before you give a man up as a bad job. Through their experience, it may be that they can help you to salvage the dissenter.



Pilot's Checklist

BEFORE STARTING ENGINES

OUTSIDE AIRPLANE

1. PITOT COVERS OFF
2. LEFT GEAR & FLAPS checked; U lock removed
3. LOAD & BALLAST secure
4. RIGHT GEAR & FLAPS checked; U lock removed
5. NOSE GEAR checked
6. FUEL checked visually—covers secure

INSIDE AIRPLANE

1. FORMS (1, 1A, F, Preflight, etc.) checked & signed
2. FUEL CUT-OFF VALVES safetied ON
3. FUEL TRANSFER SYSTEM pump OFF—valves OFF
4. FUEL SELECTOR VALVES (F & G MODELS) proper tanks
5. AIR BRAKE SYSTEM 1000 psi—valves checked
6. CONTROLS & TRIM TABS checked visually; free & proper movement

STARTING ENGINES

1. PARKING BRAKE ON
2. HYDRAULIC PRESSURE 500 psi minimum
3. CHOCKS in place
4. PROPELLERS pulled through & CLEAR
5. THROTTLES ¼ to ½ open
6. BATTERY & IGNITION SWITCHES ON
7. BOOSTER PUMPS ON
8. PRIME as required
9. ENERGIZE approximately 10 seconds
10. MESH maximum 15 seconds
11. MIXTURE CONTROL IDLE CUT-OFF—then AUTO-RICH when engine fires.

DURING WARM-UP

1. OIL PRESSUREminimum 25 psi
2. RPMbelow 1000
3. COWL FLAPSOPEN
4. HYDRAULIC PRESSURE850 to 1050 psi
5. BLOWERSLOW
6. OIL COOLER SHUTTERSas desired
7. CARBURETOR AIR CONTROLCOLD position

RUN-UP

1. FULL POWER CHECK (if desired)26-2700 rpm at 52" Hg. at MSL
2. MAGNETO CHECK (at 2000 rpm)75 rpm maximum drop
3. PROPELLER CHECK (at 2000 rpm)selector switch—feather switch—
governor control
4. GENERATORS (at 2000 rpm)each 28 volts—max. diff. 20 amps

BEFORE TAKEOFF

1. CARBURETOR AIR CONTROLCOLD position
2. COWL FLAPSOPEN
3. WING FLAPSas required
4. LANDING GEAR SAFETY CATCHESremoved
5. PROPELLER GOVERNOR CONTROLSfull INC RPM
6. MIXTURE CONTROLSAUTO-RICH
7. PROPELLER SELECTOR SWITCHES &
CIRCUIT BREAKERSselectors AUTO CONSTANT
SPEED—breakers pushed in
8. PROPELLER WARNING LIGHTnot glowing
9. BATTERY SWITCHES & BOOSTER PUMPSON
10. FUEL GAGEadequate supply
11. FUEL PRESSURE16 to 18 psi
12. OIL TEMPERATURE60° to 80°C
13. OIL PRESSURE75 to 85 psi
14. CYLINDER-HEAD TEMPERATURE120° to 220°C
15. GYRO INSTS. & ALTIMETERset
16. VACUUM PRESSURE3.75" to 4.25" Hg.
17. HATCHESclosed & locked
18. TRIM TABSset for takeoff
19. CONTROLSfree
20. GENERATORSON

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DURING FLIGHT

1. ALL HYDRAULIC CONTROLS.....in neutral position

	Min.	Desired	Max.
2. CYLINDER-HEAD TEMP.	150°C	190°-210°C	232°C
3. OIL TEMPERATURE	50°C	60°- 80°C	105°C
4. OIL PRESSURE	60 psi	75-85 psi	90 psi
5. FUEL PRESSURE	15 psi	16-18 psi	19 psi

ALLOWABLE ENGINE OPERATION

USE AUTO RICH ABOVE 60% POWER

TAKEOFF (max. duration 5 minutes)

MILITARY POWER (max. duration 5 minutes.)

RPM.....2700 max.

RPM.....2700 max.

M/P.....52" Hg. max.

M/P (to 10,000 ft.).....52" Hg.

Do Not Use High Blower.

M/P (above 10000 ft.).....47" Hg.

FOR PRATT & WHITNEY R-2800-43 and -41 ENGINES IN B-26 TYPE AIRCRAFT

MIXTURE		CRUISING RANGE ONLY AUTO-LEAN					CLIMB AUTO-RICH	
POWER		40%	45%	50%	55%	60%	75%	100%
APPROX. FUEL FLOW—G.P.H.		101	111	123	136	151	260	378
R.P.M.		1700	1800	1900	2000	2100	2300	2400
ALT.	MAX. RANGE I.A.S.	USE M/P FOR ALTITUDE AS INDICATED						
MSL	177	30.5	31	31	31	31	35	41
2000'	176	29.5	30	31	31	31	35	41
4000'	174	28.5	29	30	30.5	31	34.5	40.5
6000'	173	27.5	28	29	30	30.5	33.5	39.5
8000'	172	26.5	27.5	28	29	30	33	38
10000'	171	25.5	26.5	27.5	28	29	32	35
12000'	170	24.5	25.5	26.5	27	28	31	41*

DO NOT EXCEED 31' HG. AND/OR 2100 RPM IN AUTO-LEAN

1. VALUES CHARTED UNDER AUTO-LEAN ARE FOR STRAIGHT AND LEVEL SUSTAINED FLIGHT CRUISING CONDITIONS ONLY.
2. FOR MAX. RANGE—Read indicated airspeed opposite desired cruising altitude. By trial and error choose percentage of power off chart that will approximate this airspeed.
3. Use AUTO-RICH for Takeoff, Climb, Formation Flying, Bombing Missions, High Speed, Single Engine Operation and Landing.
4. Before moving mixture control to AUTO-LEAN after climb to desired altitude for cruising, allow cylinder-head temperature to cool to cruising temperature.
5. For all other conditions not covered in above chart, refer to cruising control chart, T.O. 01-35EB-1 or 01EC-35 -1, in the "G" file in airplane.

*HIGH blower

BEFORE LANDING

1. CREWchecked
2. DE-ICERSOFF
3. CARBURETOR AIR CONTROLS.....COLD position
4. MIXTURE CONTROLSAUTO-RICH
5. BOOSTER PUMPSON
6. RPM2300
7. LANDING GEARdown & locked
8. FLAPSas required
9. HYDRAULIC PRESSURE850 to 1050 psi

AFTER LANDING**AFTER LANDING ROLL COMPLETED**

1. OIL COOLER SHUTTERS.....OPEN
2. COWL FLAPSOPEN
3. PROPELLER GOVERNOR CONTROLS.....full INC RPM
4. BOOSTER PUMPSOFF
5. LANDING GEAR SAFETY LOCKS.....in place
6. WING FLAPSUP

STOPPING ENGINES

1. ALL ELECTRICAL EQUIPMENTOFF
2. RPM1000
3. OIL DILUTIONas required
4. MIXTURE CONTROLSIDLE CUT-OFF
5. THROTTLESfull OPEN
6. ALL IGNITION SWITCHES.....OFF after props stop
7. FORMScompleted & signed



COPilot



Your copilot is your deputy airplane commander. He is your direct assistant in the performance of your own duties and is assistant supervisor and coordinator of your crew. He is second in command of the airplane and crew and assumes your duties and responsibilities automatically during your absence. He must be fully equipped to assume your duties in the air as well as on the ground. If you are incapacitated during flight, the responsibility for successful completion of the mission falls directly on him.

He has a big job—a tough job. Aside from his normal duties, it is his responsibility to double-check your every activity. He must be fully familiar with your policies on every subject pertaining to flying and the supervision and coordination of your crew. Consult and counsel with him constantly until you are sure that he thoroughly understands his job, and yours. Teach him everything you know and everything you learn.

You must have a complete understanding with your copilot regarding his normal duties.

STANDARD COPILOT PROCEDURE

Before Takeoff

1. Assist the pilot and crew with their pre-flight checks.
2. Watch carefully for any obstructions while taxiing.
3. Have headset on at all times when the pilot has his removed.
4. See that the airplane doesn't creep while the pilot is running up the engines.
5. Read checklist to pilot prior to takeoff.



During Takeoff Run

1. Keep right hand on propeller governor controls during the takeoff run.
2. Keep the propellers synchronized as nearly

as possible, making whatever minor adjustments are necessary with the propeller governor controls. Be particularly on the alert for runaway prop. Take the necessary corrective action immediately in accordance with the predetermined desires of the pilot.

3. Make a quick visual check of all instruments during the takeoff run, particularly fuel pressure, oil pressure, and oil temperature. Report any discrepancy to the pilot immediately.



During Climb From Takeoff

1. Raise landing gear on pilot's signal.
- Caution:** Do not mistake pilot's adjustment of trim tabs, etc., as the signal to raise the gear.

Definitely identify the signal visually and aurally. See that airplane is clear of ground and is airborne. Then raise landing gear level to UP position, being careful not to disturb the flap handle.

(Do not return the landing gear lever to the neutral position until each gear has been visually checked for full retraction and you have checked the gear position indicator.)

2. Return and synchronize propeller rpm to the settings indicated by the pilot by both verbal and visual (four fingers for 2400 rpm, three fingers for 2300 rpm, etc.) signal. Make the final synchronization by sound.



Cruising

1. Turn booster pumps OFF on pilot's signal.
2. Adjust cowl flaps and oil cooler shutters to maintain the desired cylinder-head and oil temperatures.
3. Continuously check all instruments and notify pilot of any discrepancies.
4. Be particularly alert for the presence of other aircraft in the vicinity.

Before Landing

1. Read checklist to pilot before landing.
2. Lower landing gear on pilot's verbal and visual signal. Check gear down and locked both visually and by gear position indicator.
3. Lower flaps on pilot's verbal and visual signal.
4. Check hydraulic pressure.

After Landing

1. After the landing roll is completed, open cowl flaps and oil cooler shutters to full OPEN and check that the carburetor air controls are in COLD. Leave all hydraulic controls in an operating position.
2. Move governor controls to full INC RPM.
3. Turn booster pumps OFF.
4. Replace landing gear control lock.
5. Raise wing flaps on pilot's signal (leave control in UP position).
6. Be particularly alert for all taxi obstructions while returning to the line.
7. Review checklist to be sure that everything has been done before leaving the airplane.

Practice Makes Perfect

Nobody learns anything without practice. You can't expect your copilot to know your job in all its aspects unless he has the opportunity to do things himself. He must be proficient in every aspect of B-26 operation, including takeoff, cross country flight, formation, bombing, gunnery, instruments, and landings. How proficient he is depends equally on **how much practice** you make possible for him and how much effort is put into correcting his errors of technique. You and your instructor can talk to him all day about how to land the airplane, but he'll never learn until he has made a few himself. Arrange for your own or any other of the regular instructor pilots to give him a session of landings some day when you are scheduled for an instrument team ride.

During your training, see that your copilot has an opportunity to practice every one of the tasks which make up your job as airplane commander. He should perform them under proper supervision and should repeat them until he and you are confident that he thoroughly understands the particular item and is proficient and reliable in its accomplishment.

Your copilot is the deputy airplane commander

CREW CHECKLISTS



Each member of your crew has specific duties to perform before takeoff, during flight, before landing, and after landing. There is a checklist covering these duties for every man, other than the copilot, who is responsible for the same checklist as you are. You must be fully familiar with the proper performance of these duties and know why they are necessary. As pilot, you are responsible for using your own checklist to assure the proper performance of your own duties. As airplane commander, you are responsible for seeing that each man in your crew uses his checklist to assure the complete and proper performance of his duties. Before takeoff, check each member of your crew by interphone and make sure that he has accomplished his checklist. Make a similar

check just before entering the traffic pattern to land. Note that each checklist incorporates the procedure to be followed in emergency. Be sure that you completely indoctrinate your crew on abandon-ship, ditching, and crash-landing procedures. The best way to do this is to hold either a ditching-crash landing drill or an abandon-ship drill at the end of every training flight. Rotate the two procedures to provide a maximum of training in each. Don't tolerate horseplay or laxity on the part of any crew member in these drills. This is a deadly serious business and must be regarded as such. Insist that every man simulate the emergency completely. Time each drill to see that you are obtaining increased efficiency from each member of the crew.

BOMBARDIER-NAVIGATOR



Your bombardier-navigator is the busiest man in your crew. He is third officer in the administration of the crew and is in command when you and the copilot are absent. He is the armament and gunnery officer, and supervises the loading of all bombs and the installation of all guns and ammunition. His direct assistant in this job is your armorer-gunner. Aside from these extra duties, he has to navigate you from here to there and return, with possibly a small intermission at your destination for the purpose of "dropping a few in the old pickle barrel." Because he doubles in brass twice over, he uses two checklists.

Navigator's Checklist

Before Takeoff

1. Check instruments and calibration cards.
2. Check maps, charts, computer, plotter, divider, pencil and celestial equipment.
3. Synchronize airplane clock with all others.
4. Check bomb racks and bomb-fuel selector switch.
5. Check bombing equipment.
6. Check and secure nose gun.
7. Fasten safety belt and stand by on interphone.

During Flight

1. Keep log of flight.
2. Record weather observations.
3. T-slots inserted in all guns when not firing.

Before Landing

1. Clear and secure guns.
2. Fasten safety belt.
3. Stand by on interphone.

After Landing

Complete log.

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Emergency Procedure

1. Three short rings—Prepare to bail out.
 - a. Check life vest if over water.
 - b. Secure parachute.
 - c. Advise all crew members location.
 - d. Stand by on interphone.
2. One long ring—Bail out!
 - a. Exit through forward bomb bay or nosewheel well.
3. Six short rings—Prepare for ditching.
 - a. Advise pilot of wind direction.
 - b. Remove parachute.
 - c. Check life vest.
 - d. Take position on floor of navigator's compartment.
 - e. Place cushions behind head and back.
 - f. Clasp hands behind head.
4. One long ring—Brace for impact.
 - a. After airplane is at rest, release life raft and exit through life raft aperture or navigator's hatch, carrying navigator's equipment.

Note: Same procedure as No. 3 and 4 for crash landing.

Bombardiers' Checklist

Before Takeoff

1. Check bomb racks and bomb-fuel selector switch.
2. Check bomb load.
3. Check bombing equipment.
4. Preflight bombsight.
5. Check altimeter with pilot.
6. Check and secure nose gun.
7. Fasten safety belt and stand by on interphone.

Before Bombing

1. Pull pins on bombs.
2. Open bomb bay doors.

Before Landing

1. Turn off switches.
2. Stow bombsight.
3. Clear and secure gun.
4. Replace pins in undropped bombs.
5. Fasten safety belt.
6. Stand by on interphone.

Emergency Procedure

1. Get out of nose.
2. Use navigator's checklist.

ENGINEER-GUNNER

Your engineer should be on speaking terms with every rivet, cable, wire and hydraulic line in the airplane. He should have the broadest practical knowledge of the operation and maintenance of the airplane, its engines, and equipment. He must be qualified to make regular pre-flight, daily, 25, 50, and 100-hour inspections, and to make all necessary minor repairs and adjustments. Your best bet to insure that he is fully qualified is to see that he works on the line, helping the regular maintenance personnel as much as possible. Engineering officers will welcome the prospect of your engineer's help, if only for a couple of hours—providing

your engineer is willing to work and learn. Too often, crew engineers report to the engineering section to gain practical experience and after working only a short while, they leave. Or, if they do stick it out, they do their work in such a desultory manner as to hinder rather than help the crew chief on whose ship they are working. The first few times you send your engineer out to work on the line, see that he stays on the job and conducts himself properly.

His routine check of the airplane inside and out covers every item on your pilot's checklist, plus a few of his own and a visual check of the fuel level in each wing tank.



Engineer-Gunner's Checklist

Before Takeoff

1. Routine airplane check—outside, inside.
2. Inverter ON; navigator's hatch open.
3. Nosewheel straight before run-up.
4. Check generators.
5. Brace on floor between navigator and radio operator.

During Flight

1. Check generators every 15 minutes.
2. Visually check engines and instruments.
3. Visually check airplane interior periodically.

Before Landing

1. Navigator's hatch open.
2. Visually check all three wheels.
3. Brace on floor between navigator and radio operator.

After Landing

Check Form 1A.

Emergency Procedure

1. Three short rings—Prepare to bail out.
 - a. Check life vest if over water.
 - b. Secure parachute.
 - c. Stand by on interphone.
2. One long ring—Bail out!
 - a. Exit through forward bomb bay or nosewheel well.
3. Six short rings—Prepare for ditching.
 - a. Remove parachute.
 - b. Check life vest.
 - c. Take position behind copilot's seat.
 - d. Place cushions behind head and back.
 - e. Clasp hands behind head.
4. One long ring—Brace for impact.
 - a. After airplane is at rest, exit through copilot's hatch, life raft aperture, or navigator's hatch.

Note: Same procedure as No. 3 and 4 for crash landing.

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RADIO OPERATOR-GUNNER

Your radio operator must be fully familiar with all communications equipment in the airplane. He cannot achieve such familiarity entirely on training flights and in ground school classes. See that your radio operator spends as much time as possible working in the communications section. He can learn a lot by observing or helping regular radio maintenance personnel both in the shop and on the line. Also, there is always a practice key somewhere with which he can increase his proficiency at sending and receiving.

Radio operators are subject to the same vagaries and temptations as engineers. Exercise the same precautionary supervision until you are sure your radio operator applies himself properly without it.

Be sure that your radio operator properly utilizes his time in flight. Too many of the boys prefer to listen to Glen Gray rather than work AACs. Arm yourself with the conviction that he can never get too much practice or know too much about his job as radio operator and gunner. Insist that he keep busy every minute in the air, either at his liaison set or at his battle station practicing sighting and aiming. Be sure that he understands that he is to record and report to you the text of all pertinent messages, such as weather reports, received from AACs or the group ground station. Inform him of his responsibility to render an accurate report of your position every half hour and to report to you immediately if he is unable to establish contact.



Radio Operator's Checklist

Before Takeoff

1. Preflight radio.
2. Check for radio aids.
3. Check for classified radio equipment.
4. Check location of emergency radio.
5. IFF detonator plug out.
6. Trailing wire antenna in.
7. Fasten safety belt and stand by on interphone.

During Flight

1. Insert IFF plug.
2. Stand by on liaison.
3. Send position reports.
4. Record weather broadcasts.
5. Maintain log.

Before Landing

1. IFF detonator plug out.
2. Trailing wire antenna in.
3. Fasten safety belt.
4. Stand by on interphone.

After Landing

All radio equipment off; log completed.

Emergency Procedure

1. Three short rings—Prepare to bail out.
 - a. Check life vest if over water.
 - b. Secure parachute.
 - c. Secure static line to emergency radio equipment.

- d. Turn IFF to EMERGENCY.
- e. Stand by on interphone.

2. One long ring—Bail out!

- a. Exit through forward bomb bay or nosewheel well.

3. Six short rings—Prepare for ditching.

- a. Open navigator's hatch.
- b. Turn IFF to EMERGENCY; liaison transmissions as pilot directs.
- c. Remove parachute.
- d. Check life vest.
- e. Take position on floor in front of navigator.
- f. Place cushions behind head and back.
- g. Clasp hands behind head.

4. One long ring—Brace for impact.

After airplane is at rest:

- a. Stand by with emergency radio equipment for exit.
- b. Exit through navigator's hatch or life raft aperture.

Note: Same procedure as No. 3 and 4 for crash landing.

ARMORER-GUNNER

Your gunner is the hardest man in your crew to keep busy in flight. Your training curriculum calls for only a limited number of practice gunnery missions, but nothing prevents you from having your gunner practice turret operation and sighting and aiming at every opportunity. Because of his lack of other duties, he has more time for this sort of practice than any other member of the crew.

See that he spends plenty of time in the squadron armament section. He can learn much through helping the regular armament personnel install and load guns, repair and service turrets, and doing general shop work. The armament personnel will welcome his assistance.

Your gunner should also understudy your engineer. He should be thoroughly trained to act as his assistant.

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Armorer-Gunner's Checklist

Before Takeoff

1. All guns and turrets checked.
2. All guns in position and secure.
3. Ammunition checked.
4. Hatches closed.
5. Fasten safety belt and stand by on interphone.

During Flight

1. Check all guns for proper functioning.
2. T-slots inserted when not firing.

Before Landing

1. All guns in position, cleared and secure.
2. Hatches closed.
3. Fasten safety belt.
4. Stand by on interphone.

After Landing

Remove all guns and ammunition.

Emergency Procedure

1. Three short rings—Prepare to bail out.
 - a. Check life vest if over water.
 - b. Secure parachute.
 - c. Stand by on interphone.
2. One long ring—Bail out!
 - a. Exit through waist aperture.
3. Six short rings—Prepare for ditching.
 - a. Remove parachute.
 - b. Check life vest.
 - c. Close all hatches in aft compartment.
 - d. Go forward to take position behind pilot's seat, closing bulkhead doors behind you.
 - e. Place cushions behind head and back.
 - f. Clasp hands behind head.
4. One long ring—Brace for impact.
 - a. After airplane is at rest, exit through pilot's hatch, navigator's hatch or life raft aperture.

Note: Same procedure as No. 3 and 4 for crash landing.



NAVIGATION

Your navigator must always know the correct position of your airplane. You are the airplane commander, however, and if you get lost, it is **you** who are responsible. You must know where you are at all times.

In an emergency, the thing which you usually want to know is: Which way to the nearest airfield? If you know the answer to that question when an emergency occurs, it may mean the safety of your airplane and your crew.

Both you and your copilot must know sufficient navigation to be qualified to check on your navigator, and to take over his duties in an emergency.

A clear understanding of your navigator's work also helps you to coordinate his activities with yours and with the other crew members.

Remember that your navigator has been trained for his job. He is a specialist. It is okay to question him, to try to determine how proficient he is in his work, **but respect his opinion.**

Planning Your Flight

Plan your flight completely before you leave the line. The navigator should have his course drawn before the takeoff. Insist on this point. You, the copilot and the navigator get together and discuss the flight while you are still on the

ground. Give your navigator every assistance—particularly on his first missions with your crew.

Points Which Should Be Included in Your Discussion

1. Weather forecast along your route and at your destination.
2. Flight plan to initial point.
3. Proposed cruising altitude.
4. Original magnetic heading.
5. Airfields along your route which can be used in an emergency.
6. Prominent check points along your route.

Before you start the engines, see that the watches of all crew members are synchronized.

Make sure that the compasses are not overdue for swinging, and that no previous pilot has observed that either instrument needs compensation. Note: Whenever your proposed flight includes legs of considerable distance, your navigator must check his compass for accuracy by cross reference with his astrocompass, or by checking it against a highway or railroad of known heading.

See that the sectional charts covering the proposed route are aboard, regardless of the type of navigation employed.

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During Flight

Keep a constant check on your position at all times during flight. Use a different method than that being used by your navigator. Use any one of the following methods:

Keep your radio compass tuned to the station which affords you the best indication of your position or course at any particular time. Good general orientation is available by this method.

Have your copilot, or any other crew member whose regular duties do not interfere, track the airplane by pilotage solely for the purpose of providing practice in terrain identification.

Use the sectional charts for this. Rotate this duty so that all of your crew members may become as proficient as possible in terrain identification.

Note: Never delegate the sole responsibility for navigating to an enlisted member of your crew.

Tune your command receiver to stations along and bordering your route. By cross reference between the quadrant signals you receive and your Radio Facility Chart, good general orientation is possible. Also, beam legs crossing your course give you good lines of position.

Fully familiarize yourself with outstanding check points and the terrain around often-visited airports and along often-flown routes.

Pilot-Navigator Cooperation

The navigator must follow the track of the airplane constantly. He can do this by pilotage, dead reckoning, celestial navigation, radio navigation, or by a combination of these methods.

The navigator needs your cooperation in order to do his job. Work closely with him, help him to get started in his work correctly, and you will be rewarded with a good navigator.

Keep your heading, altitude, and airspeed as constant as possible. There are four variables with which your navigator is concerned—heading, altitude, airspeed, and wind. Heading, altitude, and airspeed are in your control. Do your part in holding these variables constant, and the navigator can take care of the wind factor.

If you change heading, altitude, or airspeed for any reason, tell the navigator. Do this before making the change, if possible. If it is not possible, note the time of the change and give him full information as soon as you can. Be sure that your navigator understands why the changes you make are necessary. This helps promote good pilot-navigator relationship.

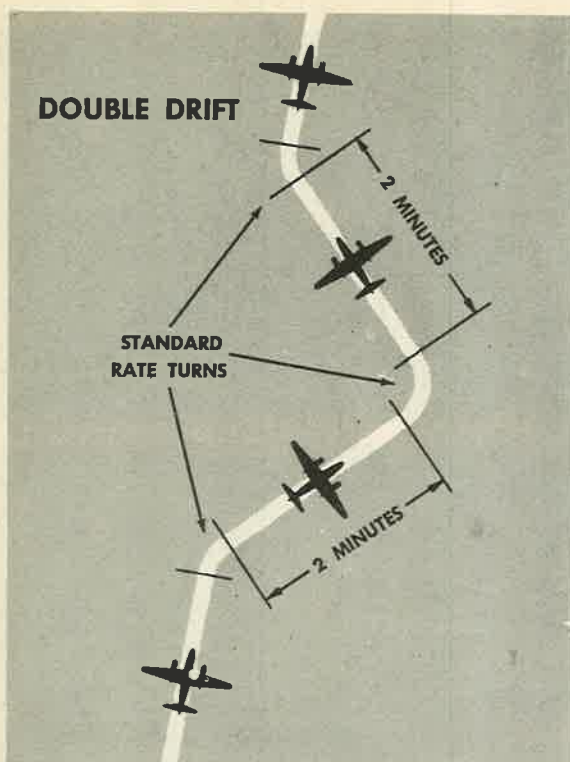
Make sure that you apply placarded compass deviations to all of the magnetic headings the navigator gives you.

NAVIGATION MECHANICS

The navigator has a choice of several methods to determine the effect of the wind on the track of the airplane. Here are the methods and some tips on how you can help to make them accurate.

Double Drift

A double drift requires precision flying. Make your turns exactly standard rate (one needle width). Time the legs accurately. (2 minutes.) Hold an exact course. Hold the wings



as level as possible on the straight-away. Roll makes it almost impossible to get accurate drift meter readings.

Radio Fix

When your navigator-radio operator team is taking radio bearings to obtain a fix, **hold your heading.**

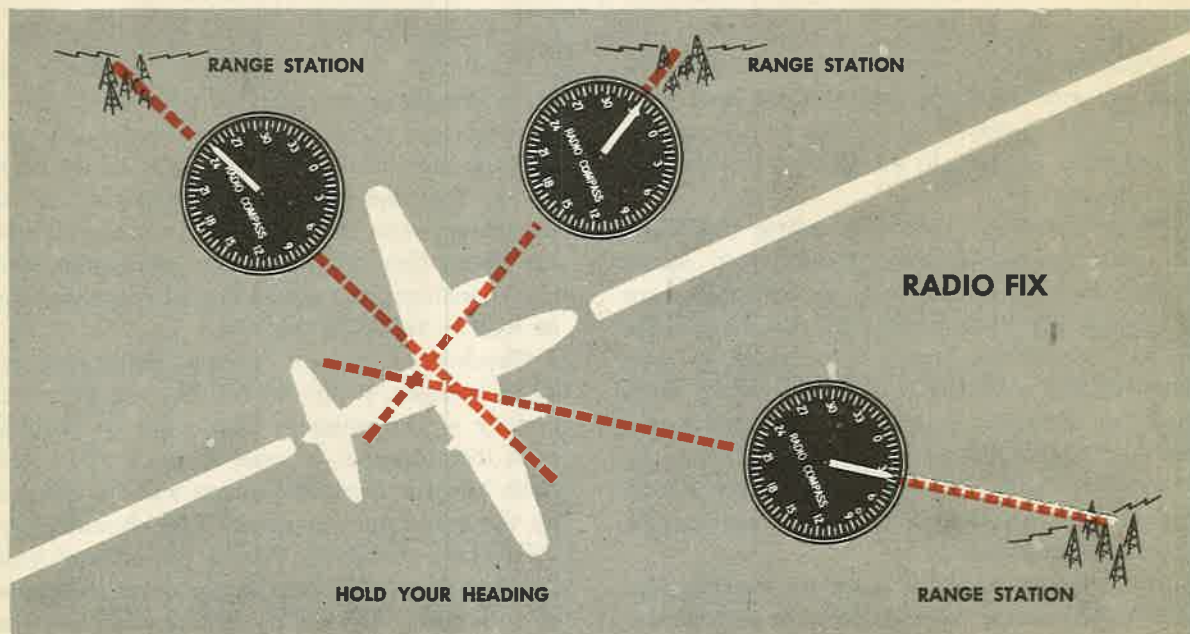
A radio fix is predicated upon a constant heading of the airplane while the bearings are being taken. Roll or pitch have little effect upon the accuracy of radio bearings. Heading is the important thing.

Celestial Fix

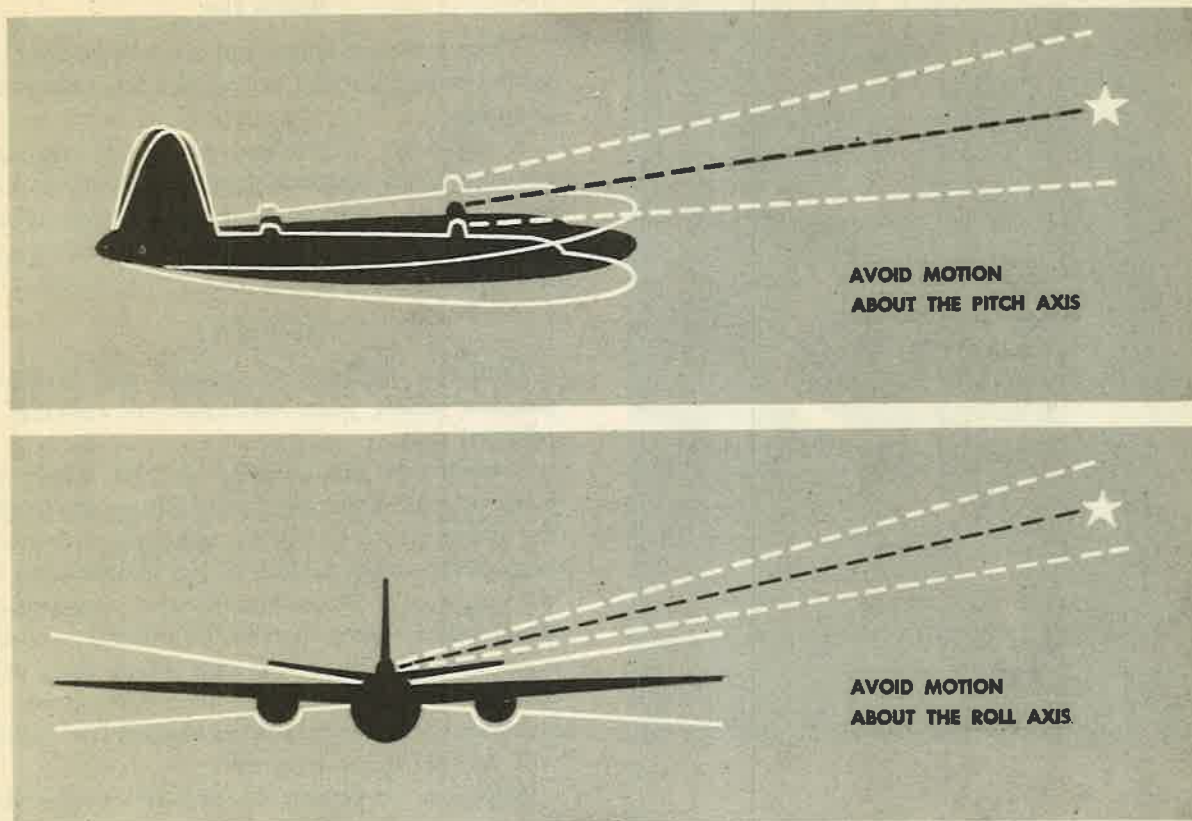
Hold the airplane as straight and level as possible when your navigator is making a celestial shot.

Concentrate particularly on the factor of pitch or roll, whichever most affects the angle the navigator is trying to establish, but don't neglect the other factor. If, for instance, he is shooting a star 90° to your course, any roll of the airplane makes an accurate reading exceedingly difficult. Pitch has less effect than roll on such readings. If the navigator shoots a star directly ahead or behind the airplane, pitch will become most important.

Ask your navigator to explain briefly the use of the octant and how changes in attitude of the airplane increase the difficulty of obtaining accurate celestial sights.



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NAVIGATION HINTS

When you are on course at your cruising altitude, at cruising speed, and you are over your initial point, notify your navigator. Choose an initial point as close to the field as possible, or directly over it.

Fly out your navigator's heading and ETA. On training flights, even though you know exactly how far and in what direction you are off course, fly your navigator's heading. If he doesn't realize his error, keep track of your position, but continue to fly his heading until his ETA. Give him every chance to realize and correct his own mistakes. Do not, however, endanger the flight. Under combat conditions, call any errors you may note to the navigator's attention immediately.

Ask the navigator for a report periodically. Check the position which he reports against the method of navigation which you are employing.

Encourage your navigator to utilize other crew members as much as possible. If he is looking for a check point, he should notify you; you can alert the entire crew to be on the lookout so that the point can be reported to the navigator when it is sighted. Six pairs of eyes are better than one. This also gives your other crew members an added sense of responsibility, as well as valuable practice.

Check your navigator's log at the completion of each flight. It should tell the chronological history of the mission. You must be familiar with logs in order to read the story they tell. Each of your navigator's logs will be checked by the squadron navigator. You should check with him periodically for his criticism of your navigator's work. Your navigator is a member of your crew. His ability reflects the cooperation and guidance which you give him.

FORMATION FLYING



When you get to combat you will find that your best insurance for becoming a veteran of World War II is a good, well-planned, well-executed formation. Formation flying is just about everything in combat. Groups which are noted for their efficiency in formation flying are usually as well-known for their low casualty rate and their effective operations.

A properly flown formation affords you many advantages and much better protection. Controlled firepower, maneuverability and movement of a number of aircraft, concentrated bombing pattern, better fighter protection—

these are some of the desirable things which good formations provide.

Don't Straggle

Don't straggle—the one cardinal rule you must always follow when flying formation. A straggler in combat is asking for it. **Stay in position.** A straggler cuts down on the maneuverability, loses added protection and leaves a gap which endangers all of the other airplanes in the formation.

The Jap and the Hun will do all they can to make you straggle. Don't make their job easier.

STANDARD SIGNALS

FLUTTER AILERONS: Repeated and comparatively rapid movement of ailerons.



ATTENTION: Used on the ground or in the air to attract attention of all pilots in the formation. Stand by for radio message or further signal. When on ground and in proper position to take off, this signal will normally mean "Ready to take off."



FISHTAIL OR YAW: By rudder control during flight, move the tail of the airplane alternately and repeatedly right and left.

OPEN-UP FORMATION: Where applicable, this may be used to order a search formation.



SERIES OF SMALL DIVES AND/OR ZOOMS:

PREPARE TO LAND: An order to each pilot in the formation to prepare to land. In the absence of further signals the landing will be made in the normal landing formation of the unit, which should be predetermined. Any change in formation for landing will be ordered by supplemental signal by radio.

DIP RIGHT (LEFT) WING:



From any formation other than echelon go into echelon of flights to the right (left).

Being in an echelon of flights to the right (left), go into echelon of individual airplanes to the same side. Being in an echelon of individual airplanes, if wing is dipped on the side to which airplanes are echeloned, form echelon of flights to the same side. Being in an echelon of flights or individual airplanes, if wing is dipped on the side away from the echelonment, form same echelon to the opposite side.

ROCK WINGS:

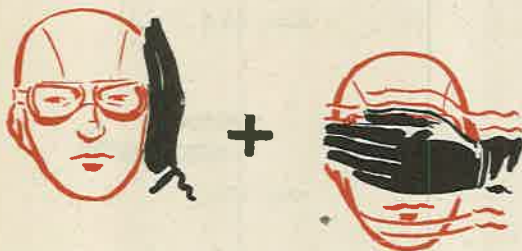
Slow, repeated, rocking motion of airplane about longitudinal axis, by gradual use of ailerons.

Wing movement to be slower and of greater amplitude than in "Flutter of ailerons."



ASSUME NORMAL FORMATION:

From any other formation, go into the normal closed-up formation for the unit concerned. This formation is to be prescribed in each group and/or squadron.



RADIO OUT OF COMMISSION:

Hold hand to headset and then swing hand up and down in front of face several times, as in "cease firing."

When necessary or desirable this signal may be given by an occupant of the airplane other than the pilot.

Units Comprising Formation



FLIGHT

In medium bombardment there are three main units which may comprise a formation.

SQUADRON

In bombardment formation of light normally consists of three aircraft.

GROUP

Two or three flights flying in formation constitute a squadron.

Normally three or four squadrons in formation constitute a group.

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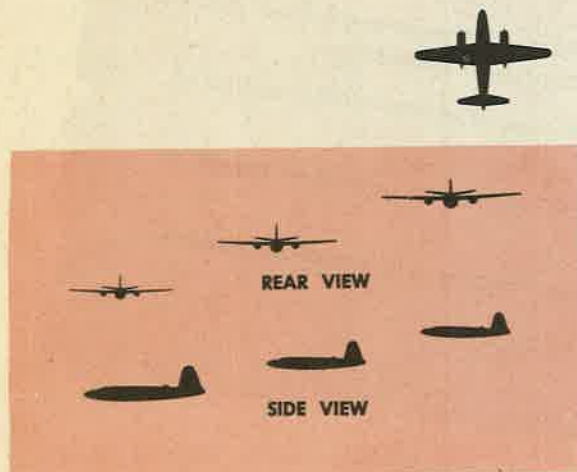
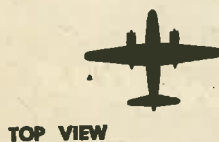
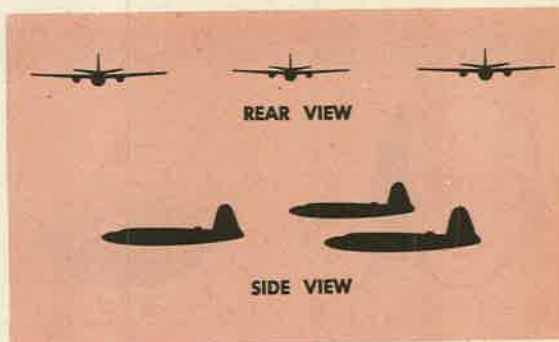
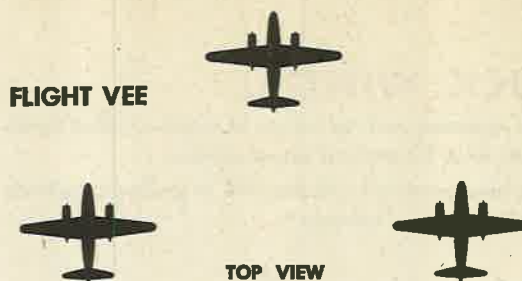
TYPES OF FORMATIONS

Basic Formations

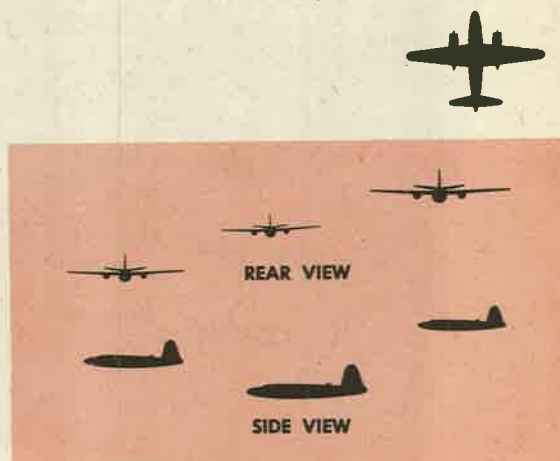
A basic formation is a formation designated for a particular mission. It may vary from mission to mission. It is the formation from which all other types of formations used on a particular mission evolve, and it is the one resumed when the rock-wings signal is given.

The following basic formations are normally used for the B-26:

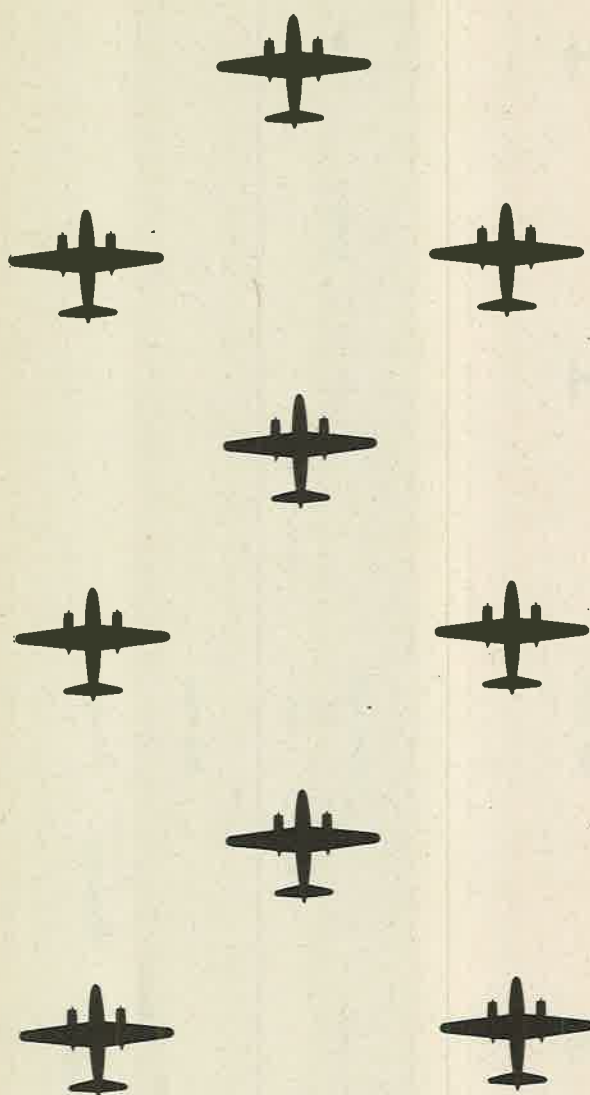
Flight.....Vee
Squadron.....Javelin Down
Group.....Stagger



TOP VIEW



SQUADRON JAVELIN DOWN



TOP VIEW

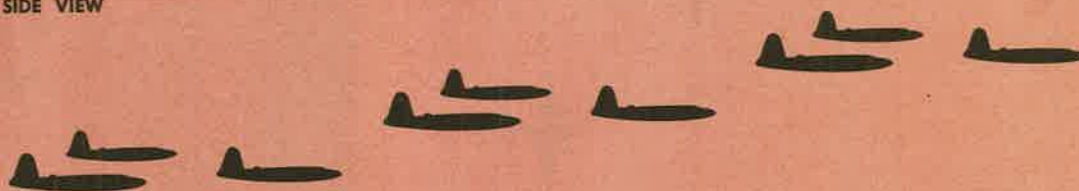
Air Discipline

There is no place among combat outfits for primadonnas. There is no place for a man who questions authority, fails to obey orders in the air, or who practices rugged individualism during flight. He endangers not only his own life, but the lives of many others, as well as valuable equipment. If you have a legitimate complaint, make it. But do your complaining on the ground. If you ever have a complaint which you believe should be aired, make the critique your court.

REAR VIEW

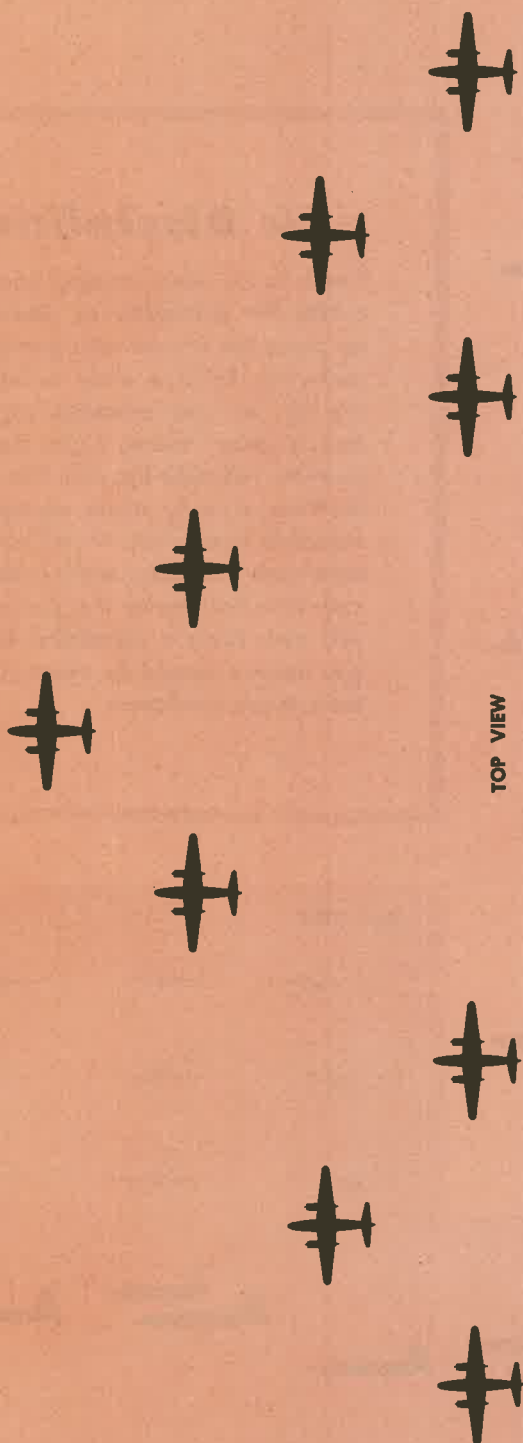


SIDE VIEW



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SQUADRON VEE

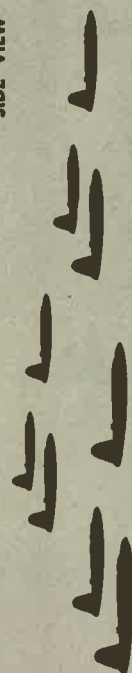


TOP VIEW



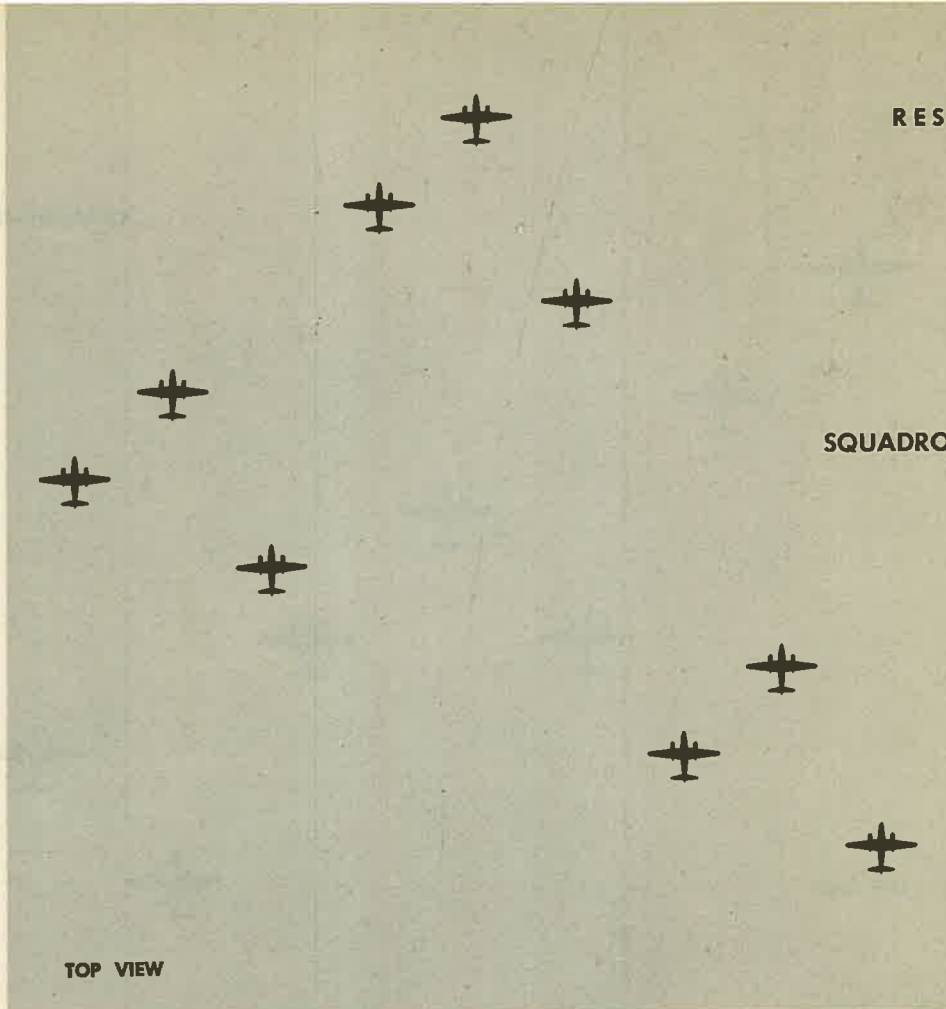
REAR VIEW

SIDE VIEW



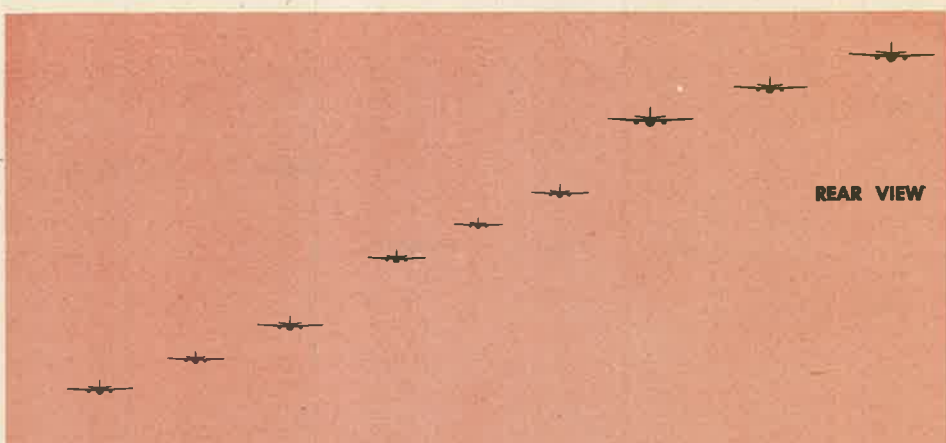
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SQUADRON STAGGER

TOP VIEW



REAR VIEW

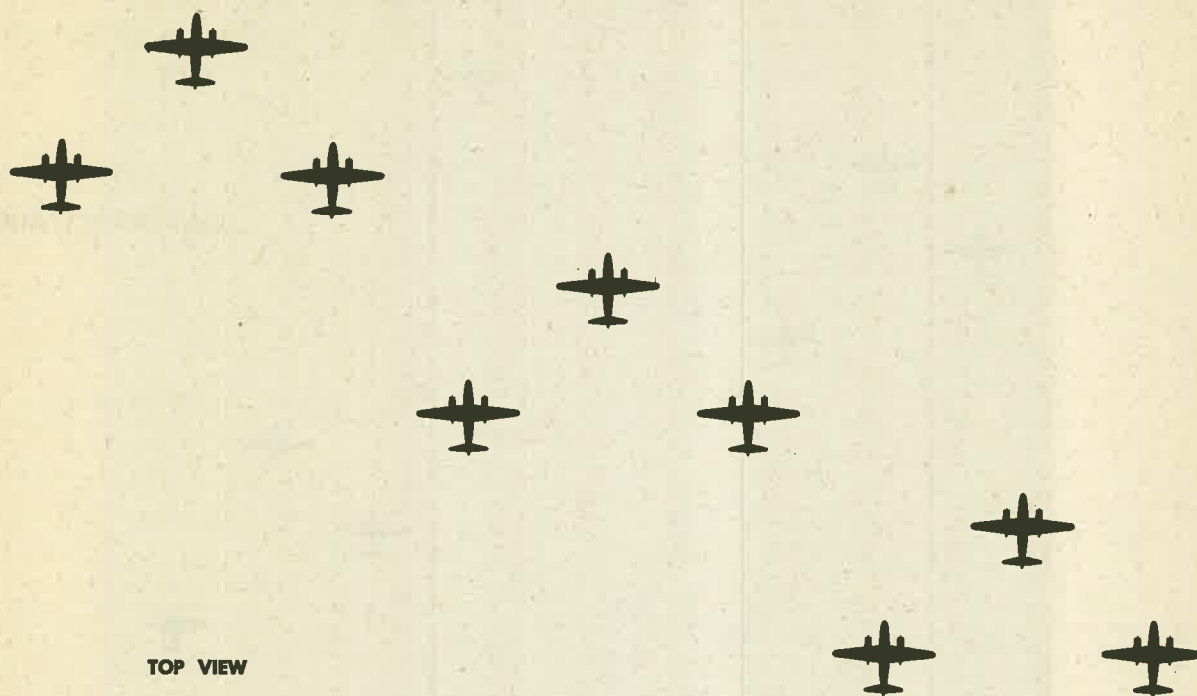


SIDE VIEW

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SQUADRON ECHELON



REAR VIEW

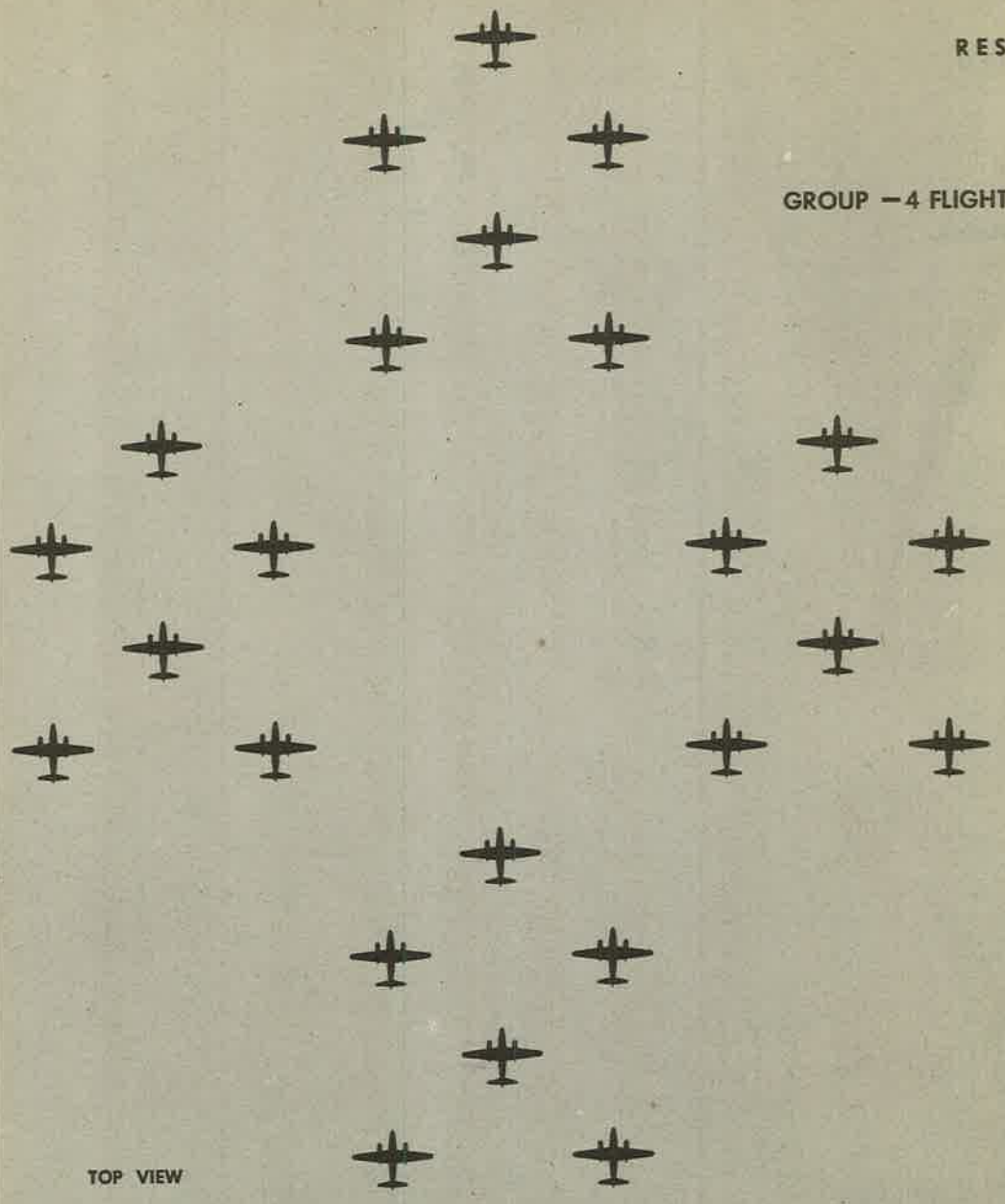


SIDE VIEW



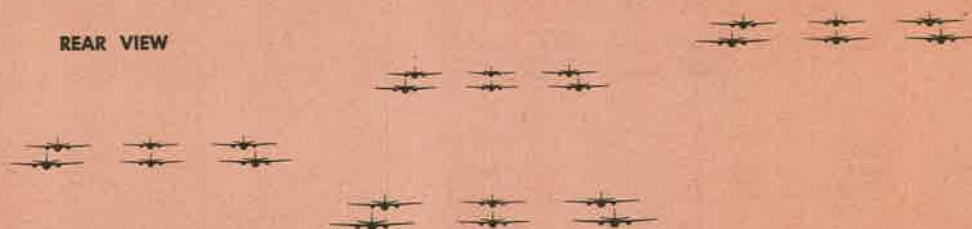
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GROUP - 4 FLIGHT DIAMOND

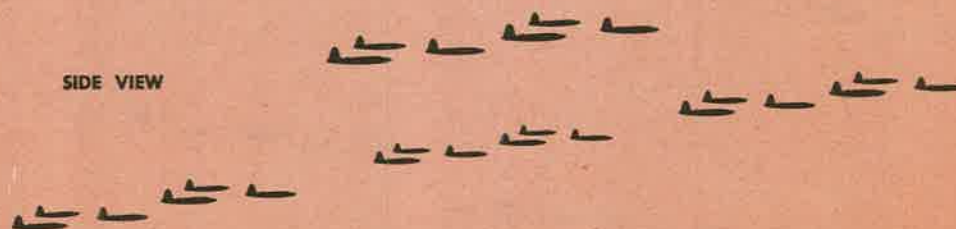


TOP VIEW

REAR VIEW



SIDE VIEW



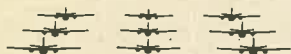
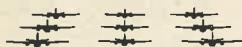
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GROUP STAGGER

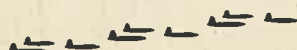
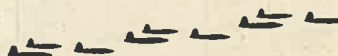
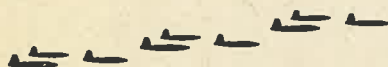


TOP VIEW

REAR VIEW



SIDE VIEW



FORMATION LEADER

No job is more important than leading a formation, unless it is the job of following the formation leader. Confidence plays a large part in successful formation work. The only way to breed this confidence is always to do a good job of flying formation—whether you are the leader or a wingman.

When you are a formation leader, always remember that unless your wingmen have absolute confidence in you they are going to hesitate, falter, fall behind, and fly raggedly. Your formation straggles all over the sky.

Here are some tips which will make you a better formation leader:

Signals

Make your signals distinct. Leave no question as to what you mean by a signal. Do not, however, make your signals so violent that you endanger your wingmen, or startle them.

Maneuvers

Never make sudden and abrupt movements.

If you do, your wingmen cannot follow you. Make each movement coordinated, smooth, and slow enough so that the weakest member of your formation can follow you. **Precision flying is a must.** Allow plenty of room. Remember the size of your formation. Fly by instruments.

Power Settings

Fly at reduced throttle. Your wingmen must have a considerable margin of power in order to stay in formation properly. Plan ahead.

Position

Make sure that your wingmen keep their proper position. As leader of the formation, **you** are directly responsible for the safety and conduct of every plane in it.

Briefing

Follow the briefing as closely as possible. Do not deviate from your briefing plan more than is absolutely necessary. Your wingmen and the rest of the formation become confused.

WINGMAN

If you are flying as a wingman (and remember that there are more wingmen than there are leaders) you have definite responsibilities if the formation and mission are to succeed.

Have confidence in your leader. If you disagree with him, say so after you are back on the ground. You have enough to do without questioning authority while in formation.

Anticipate your leader's moves. If he starts into a turn away from you, add throttle immediately. Don't wait until he is completely out of the turn. **Don't straggle.**

Joining Formation

Joining a formation is an art in itself. The longer it takes a formation to assemble, the more gasoline consumed, the more time wasted.

Remember that it is an almost impossible job to overtake an airplane from behind. You have

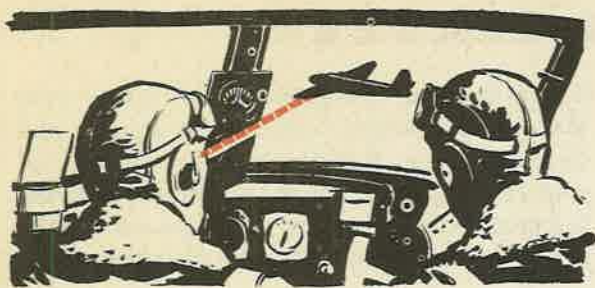
to get your nose out in front of the airplane you are trying to overtake, cutting across the circle the other airplane is flying. You should lead the other airplane just as you would in throwing a pass to an end cutting across behind the line of scrimmage in football. Fly toward the position the other airplane will be at the time of interception, not toward the position he is in at present.

Don't attempt to shorten your flight path so much that you approach him at a 90° angle. This is dangerous.

Always keep your lead airplane in sight. If the assembly circle is to the left, it is especially easy to lead him by keeping him in sight through the copilot's windshield.

As you near the formation, reduce your power enough to avoid over-running. Maneuver so that you approach the formation from the rear. Ease into position carefully.

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As a Wingman

Make small corrections constantly to maintain your correct position in the formation. Your left hand can easily become sore and blistered if the flight is a long one. Some pilots recommend wearing a glove on your left hand to alleviate this.

Keep your eyes on your leader. Turn with him, bank with him—**stick with him**.

Hold your correct distance from other aircraft. Steady, accurate flying stamps you as a better pilot than does dangerous, close flying.

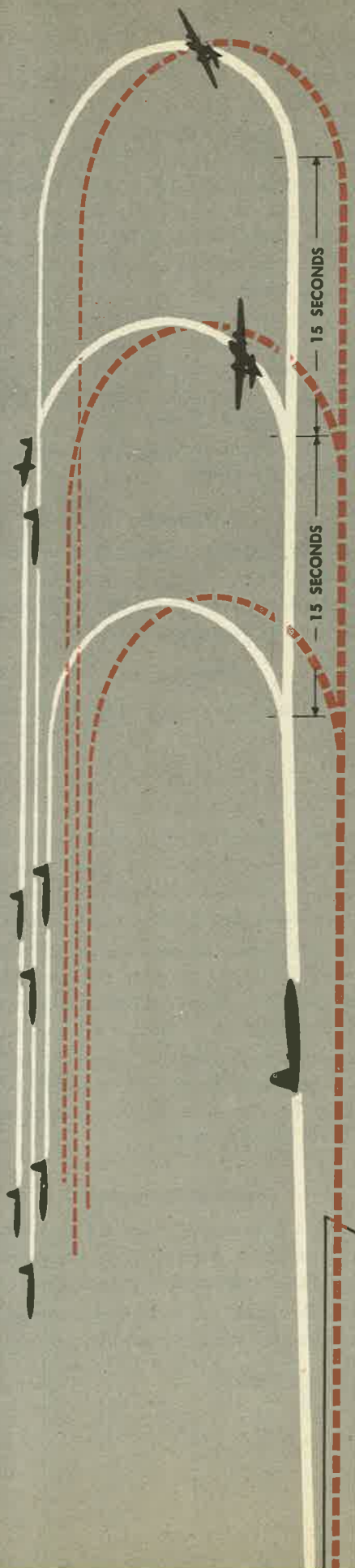
Common Errors of Wingmen

Certain errors are common with B-26 wingmen. They should be known and avoided.

Some of these errors are:

1. Too high an rpm for continuous cruising in formation. Set to minimum allowable rpm for maximum manifold pressure you expect to use. Also, remember that you must use AUTO-RICH above 31" Hg. and/or 2100 rpm.
2. Getting out of position. Too high, too low, dropping behind, getting ahead of leader, getting too close.
3. Making throttle adjustments too radical.
4. Flying with one wing low.
5. Making corrections too great, with dangerous results.
6. Failure to watch the lead airplane closely enough.
7. Pilot sticks his head in the cockpit to make adjustments of auxiliary controls.
8. Not changing positions properly.
9. Not knowing signals.
10. Failure to hold correct position during turns.
11. Reactions too slow.
12. Failure to make takeoff or landing at proper interval.

JOINING FORMATION





Cross-Under

When you go into echelon formation, one man must cross under the other two ships and up into position as No. 3 man in the echelon.

To start the cross-under, drop about 50 feet below the lowest ship under which you must pass. As you lose this altitude, you tend to gain speed. You may have to compensate for this by reducing power.

Remember: Keep both of the other airplanes in sight all of the time you are crossing under.

After you have lost the necessary altitude, begin your cross-under. Use a slight, coordinated bank rather than a slip. As you reach a point underneath or back of the No. 2 airplane, increase your power.

Anticipate this need for additional power. Remember that you have to climb back up into position and need more power.

PREPARATIONS FOR FORMATION FLYING

There is probably no other part of flying in which timing is more important than in formation flying. You must be on time! Otherwise, the entire formation is held up. All pilots should synchronize their watches to the second. In combat this may mean the success or failure of the entire mission.

Alert

Alert means that all departments have been notified. You must be able to take off on 2 hours' notice.

Briefing

You are briefed before starting on any formation flight. At this briefing you are told:

1. Basic formation to be used.
2. Name and number of leader's airplane.
3. Order of command within the formation.
4. Your position.
5. Number of airplanes in formation.
6. Signals to be used.
7. Communication frequencies to be used.

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8. Exact route to be flown, with alternate route.
9. Taxi, takeoff, and landing system to be used.
10. Formation instrument procedure.
11. Bombing procedure (if bombing mission).
12. Time of takeoff.
13. Emergency procedure.

Use this list as a checklist. Never leave a briefing with a half-understood idea or foggy notion in your head. Ask questions. **Make sure while you are still on the ground.**

Stations

From briefing you progress to Stations. The airplane has been fueled, armed, and loaded with bombs. You and your crew have been

briefed, as have all the other crews, to take part in the formation. All checks are made. You must be ready to take off on 15 minutes' notice.

Starting

After your airplane has been completely serviced—engines run up and checked, all checklists completed, and hatches closed—it is ready to taxi out.

Taxi-Out and Takeoff

The taxi-out is the time at which the lead airplane leaves its position on the ramp and proceeds to the takeoff runway, the other airplanes following in proper order. The lead airplane begins its takeoff run at the time scheduled as takeoff time.

TAKEOFF AND ASSEMBLY

Aircraft in the formation take off at 30-second intervals. Proper coordination and timing of the takeoff makes the assembly much easier.

The aircraft alternate in using each side of the runway. Pilots who creep down the runway while waiting to take off make it difficult for the pilot following to time the takeoff interval. Takeoff interval is timed from the moment the airplane starts to roll, not from the time it is airborne.

The lead airplane maintains an airspeed of 175 mph and climbs at the rate of 200 to 300 feet per minute after the takeoff until final assembly or until reaching a predetermined assembly altitude.

The leader holds a straight course after take-

off for the times prescribed below (timed from the beginning of the takeoff), after which time he begins a $\frac{1}{2}$ needle-width turn to the left or right, as prescribed.

Flight—2 minutes

Squadrons—6 planes—3 minutes
9 planes—4½ minutes

Groups—take off by squadrons and assemble above the field at 2000 feet.

Each airplane begins its turn 15 seconds after the airplane ahead has started to turn. Any formation which uses this procedure for takeoff is completely assembled by the time the formation leader has made his 180° turn and is passing back over the upwind end of the field.

LANDING PROCEDURE

The procedure you use in landing is flexible. At your overseas base the procedure may vary according to the situation. Use the procedure outlined here during your training.

The formation, after obtaining landing clearance, approaches downwind parallel to the runway at 180 mph having previously taken interval by flights. With the flight in echelon on this

approach, the leader gives the landing signal. At the approach end of the landing strip, the No. 1 airplane of the first flight breaks away, followed at 15-second intervals by No. 2 and No. 3, in that order, each pilot lowering his gear as he desires. This should give 30-second spacing on the runway providing each pilot duplicates the turn used by the preceding airplane.

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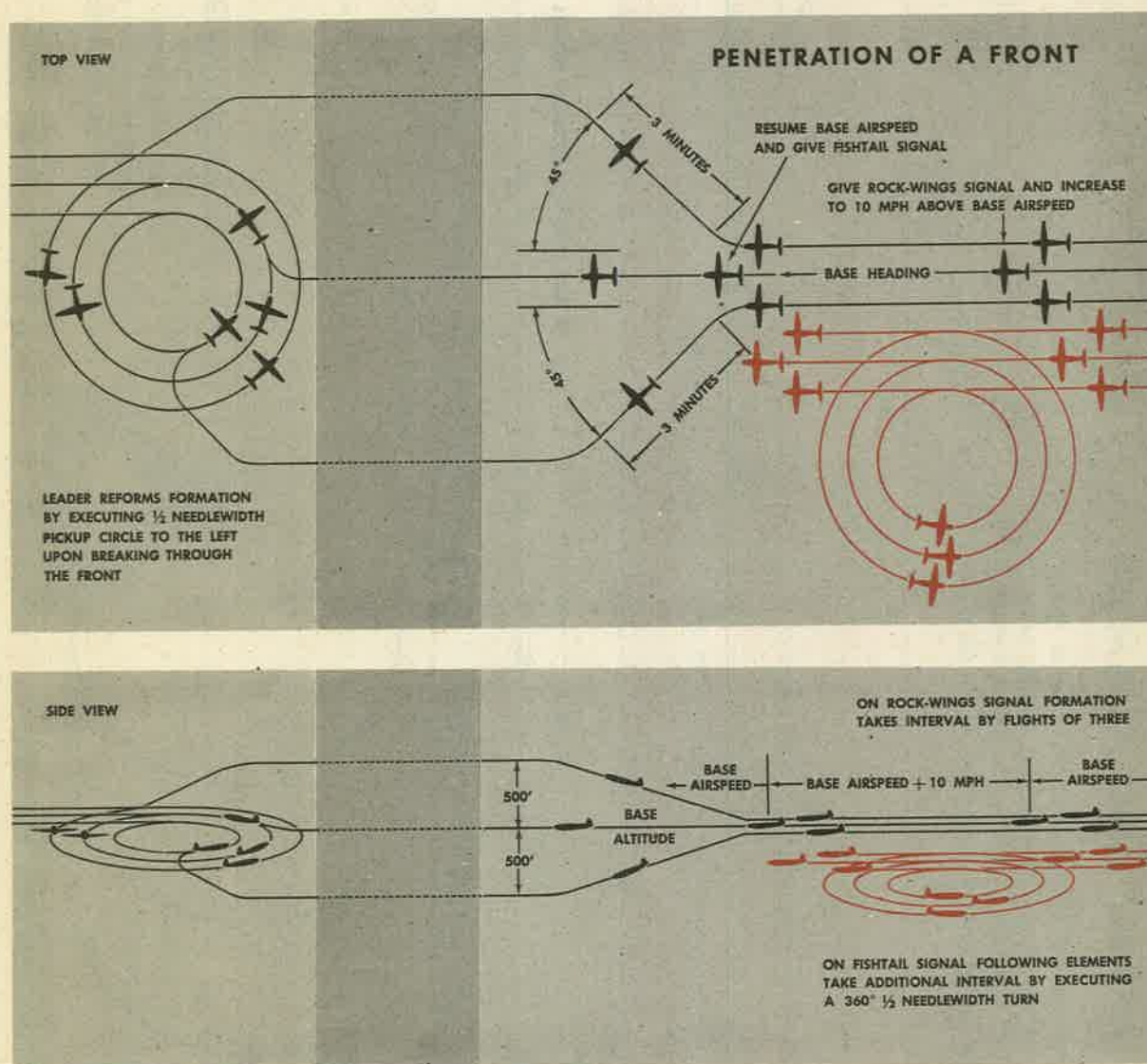
FORMATION INSTRUMENT PROCEDURE

General

If it is necessary for the formation to ascend or descend through an overcast, or to penetrate a front, use the following formation instrument procedures. If the formation leader has made the decision to go through, he must level off at his base altitude and fly his base compass heading at a definite base airspeed. Base altitude, heading and airspeed must be flown long

enough before frontal or overcast penetration for all airplane commanders in the formation to be able to identify them. This completed, the formation leader gives the following signals in the order designated:

1. Positive rocking of wings.
2. Increase in airspeed of 10 mph.
3. Call by radio to formation. (The radio signal may be omitted if circumstances demand radio silence.)

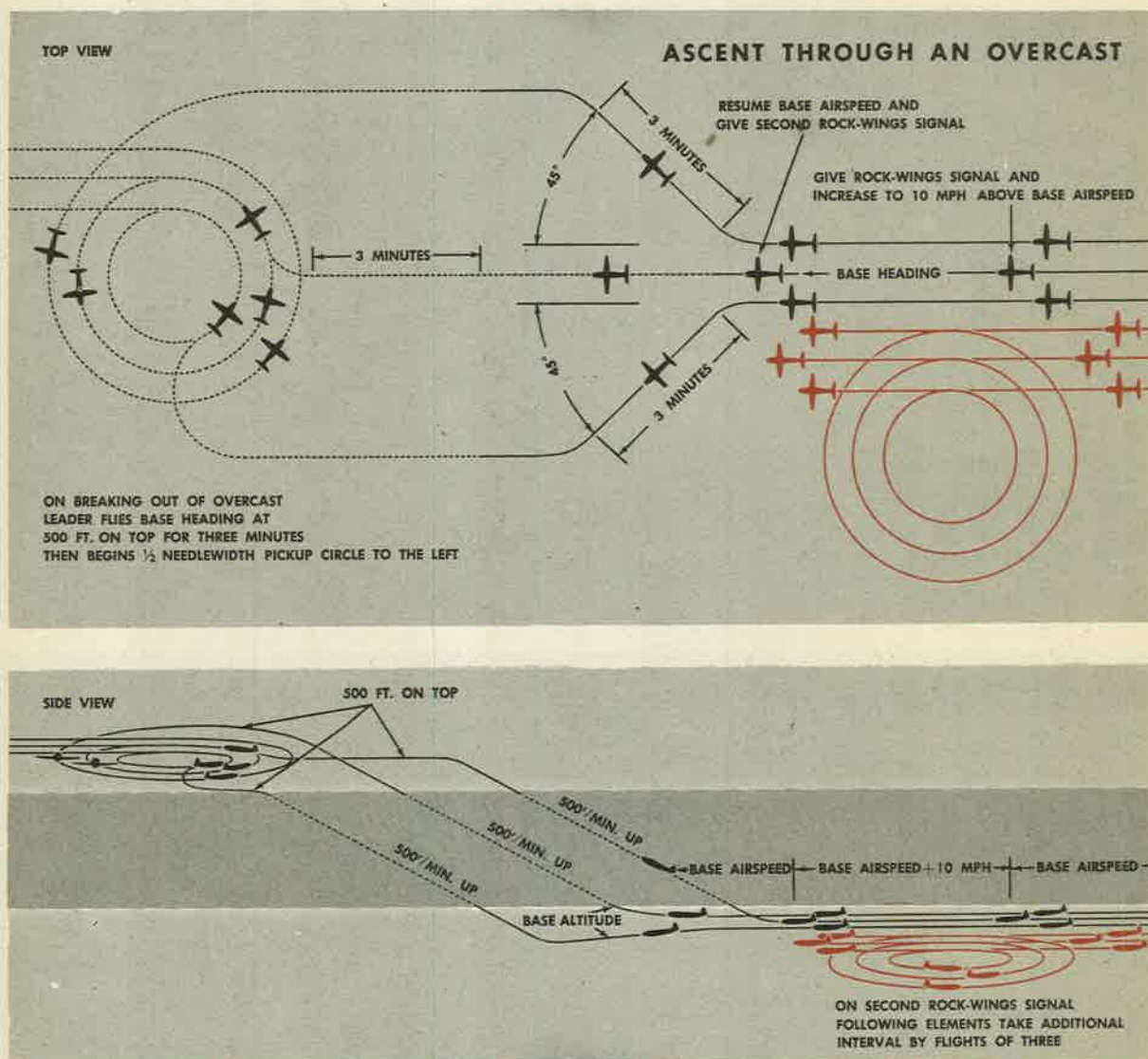


Penetration of a Front

The altitude, airspeed, and heading held by the formation just before the rock-wings signal was given by the leader are the base altitude, airspeed, and heading.

Immediately upon receipt of these signals, the formation takes interval by flights of three. This interval is merely a loosening up of the formation. As the formation approaches the point of frontal penetration, the formation leader retards his airspeed to the base airspeed, makes a positive fishtail, and penetrates

the front at the base altitude, airspeed, and heading. On receiving the fishtail signal and resumption of base airspeed, No. 2 and No. 3 wingmen of the first flight turn 45° to the right and left of the base heading, respectively. Each holds this heading for 3 minutes, then resumes base heading, during which time the No. 2 man climbs to an altitude 500 feet above the base altitude and the No. 3 man descends 500 feet below base altitude. Both climb and descent are made at the base airspeed. Both penetrate the front at the designated base airspeed and heading. On breaking through the front, the



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formation leader begins a $\frac{1}{2}$ needle-width turn to the left and maintains this turn until he has picked up his formation or allowed sufficient time for the rest of his formation to join, at which time formation proceeds on course.

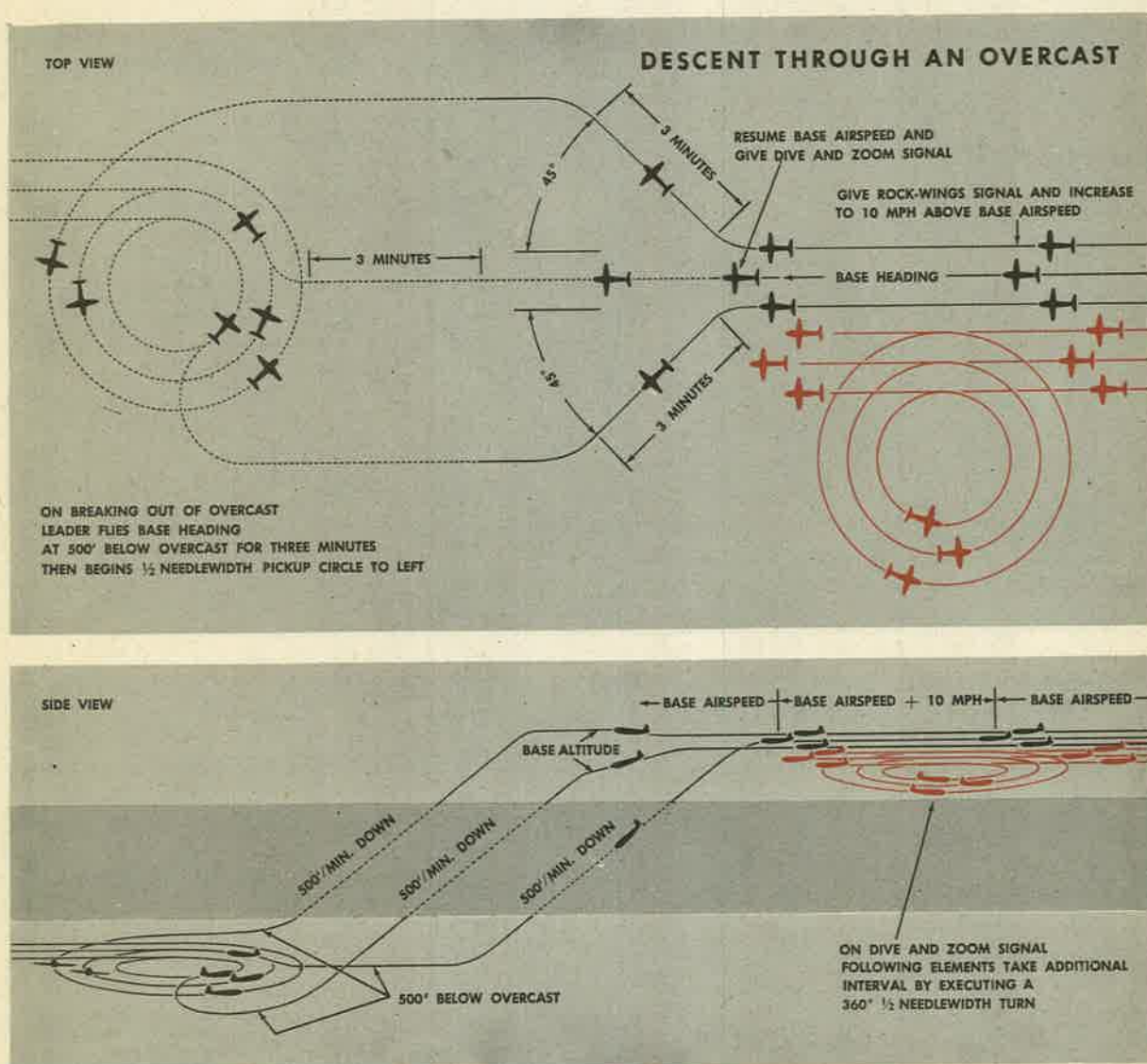
On receiving the fishtail signal of the formation leader (given just before entering the front), the remaining elements of the formation execute a $\frac{1}{2}$ needle-width turn through 360° , at the completion of which the second flight of the formation penetrates the front in the same manner as the first flight. These maneuvers continue until all flights have made

penetration. For a rough estimate of the time required for this maneuver, take the number of flights times 4 minutes, plus the time required for one airplane to fly through the front.

Ascent Through an Overcast

The altitude, airspeed, and heading the formation was flying just before the signal given by the leader is the base altitude, airspeed, and heading, as was the case in the penetration of the front.

Immediately upon receiving the signals the formation takes interval by loosening up. When



the leader is satisfied that the formation has received his signals, he slows down to base airspeed, makes a positive rocking of his wings and begins his ascent into the overcast at a rate of climb of 500 feet per minute. On breaking out of the overcast, the leader continues on his heading for 3 minutes at 500 feet above the overcast, after which he begins a $\frac{1}{2}$ needle-width turn to the left and continues to circle until he has picked up the rest of his formation. He will then proceed on course.

On receiving the second rock-wings signal, No. 2 and No. 3 wingmen turn 45° to the right and left, respectively, and hold this heading for 3 minutes. They then resume the base heading and begin the ascent into the overcast at 500 feet per minute.

On receiving the second rock-wings signal (given just before ascent into overcast) the rest of the formation executes a $\frac{1}{2}$ needle-width turn through 360° , at the completion of which the second flight begins its ascent in the same manner as the first flight. This continues until all flights have made their ascent. An approxi-

mation of the time required to complete the maneuver is the number of flights times 4 minutes, plus the time required for one airplane to ascend through the overcast.

Descent Through an Overcast

The descent of a formation through an overcast follows the same procedure as the ascent, with the exception that each plane descends at 500 feet per minute and the signal just before making the descent is a dive and zoom instead of rocking wings.

Critique

The critique is one of the most important parts of formation work. It is a meeting immediately after the mission. During this meeting, errors which have occurred are corrected, questions are answered, complaints are heard, and the mission in general is thoroughly discussed.

The importance of the critique cannot be over-emphasized. The success of future missions depends largely on how thorough your critique is.



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BOMBING



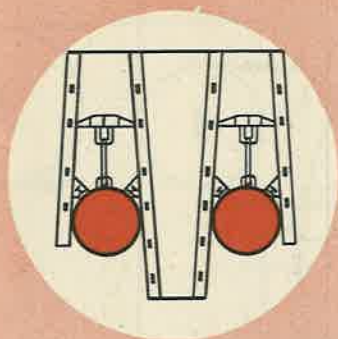
When a particular command in a combat theater plans a mission and alerts thousands of men, burns hundreds of thousands of gallons of fuel, fights its way to and from the target at a cost of lives and equipment, then every bomb must count! Remember that the primary purpose of a bomber is to carry bombs with which to destroy a given target. It is for this and this alone that the bomber was designed and its crews trained. It is up to the bombardier to

find the one point in space to release the bomb so that it will hit the target. As pilot of that bomber, more of this responsibility falls upon you than you have perhaps realized. You may have the best bombardier in the world, but unless you are capable of flying your B-26 exactly where and how your bombardier wants it flown on the bombing run, he cannot be expected to hit the target. Teamwork is the only thing that will put the bomb on the target.

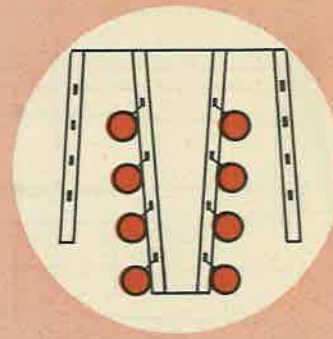
BOMBING EQUIPMENT

Although the B-26 has two bomb bays, only the forward bomb bay carries bombs. The rear bomb bay has been sealed, the bombing equipment removed, and its use discontinued for the most part in later models. Only the forward

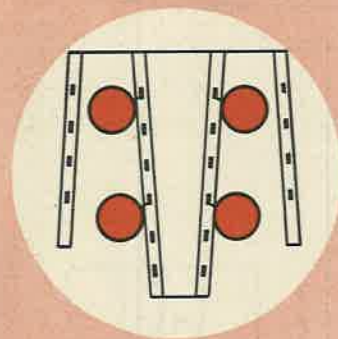
bomb bay and its controls are discussed in this section. The forward bomb bay has four vertical racks, making a total of 20 bomb stations. Each station has B-7 shackles and either A-2 or A-4 release units. It has clearances to pro-



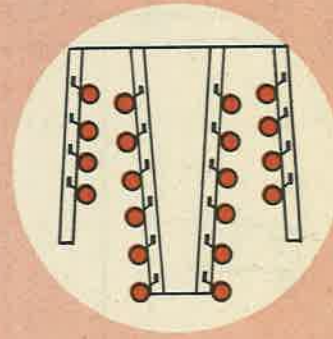
1600 OR 2000 LB. BOMBS



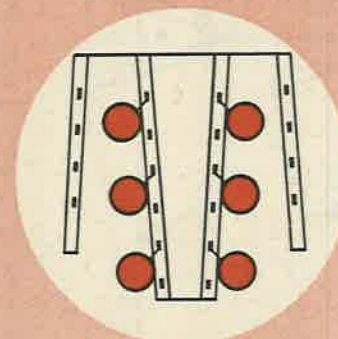
300 LB. BOMBS



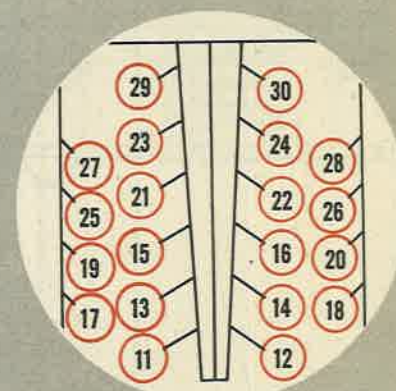
1100 LB. BOMBS



100 LB. BOMBS

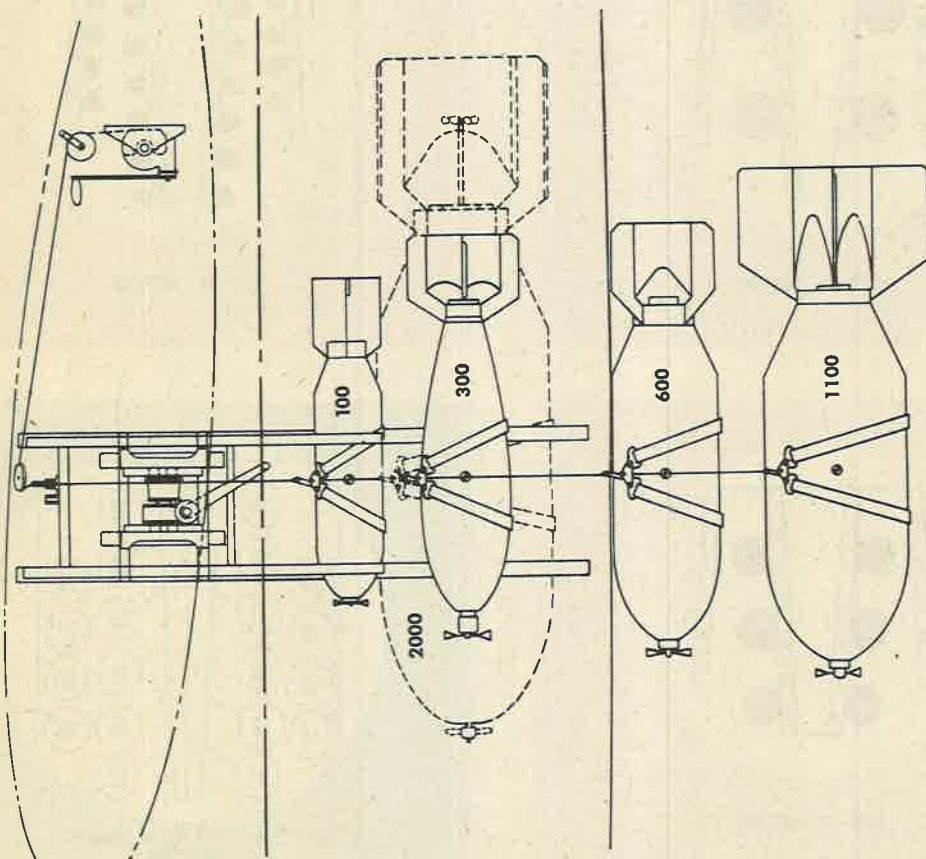
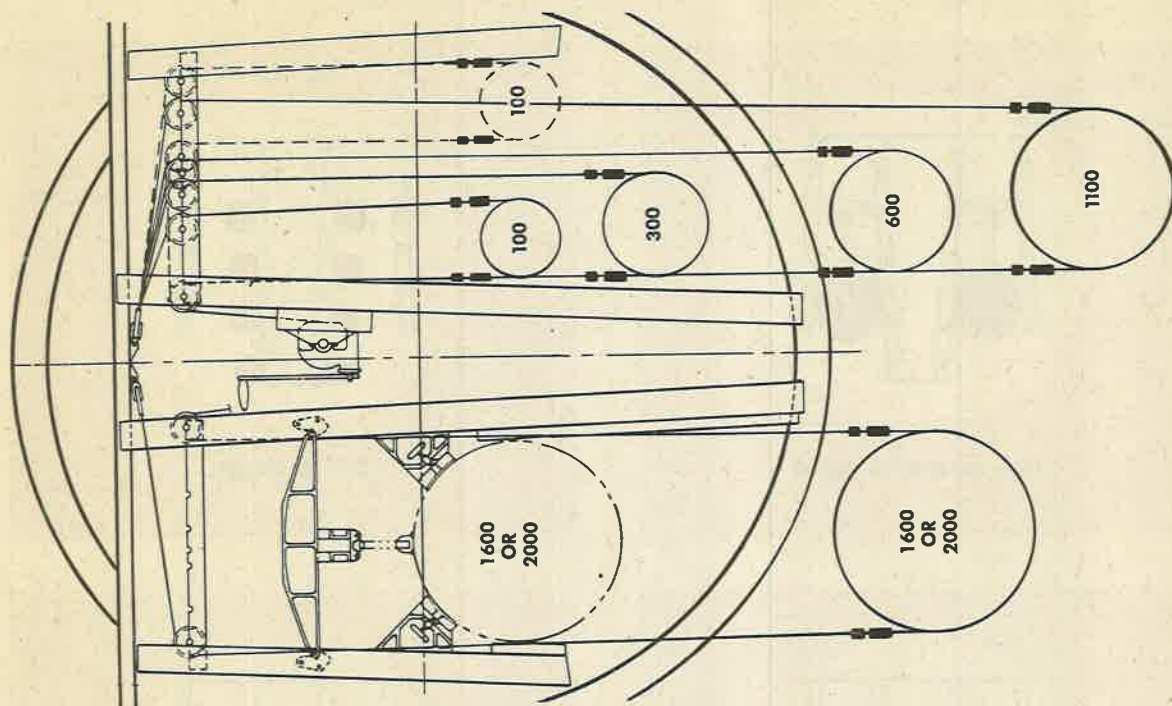


600 LB. BOMBS



BOMB RACK STATION NUMBERS
(LOOKING FORWARD)

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BOMB HOIST ARRANGEMENT
FORWARD BOMB BAY

vide for any of the following bomb loads:

1. Two 2000-lb. or 1600-lb. demolition bombs.
2. Four 1100-lb. demolition bombs.
3. Six 600-lb. demolition bombs.
4. Eight 300-lb. demolition bombs.
5. Twenty 100-lb. demolition bombs.

This makes a total maximum capacity in the forward bomb bay of 4400 lbs.

The bomb bay doors are normally opened and closed by hydraulic operating mechanism, the control for which is in the bombardier's compartment. An emergency control, already discussed in Emergency Operation, is in the pilot's compartment for operation by the pilot. This emergency control opens the bomb bay doors by means of air pressure. This control salvos all bombs safe.

The bombardier can release bombs by the following means:

1. Electrical selective release.
2. A bomb release intervalometer control

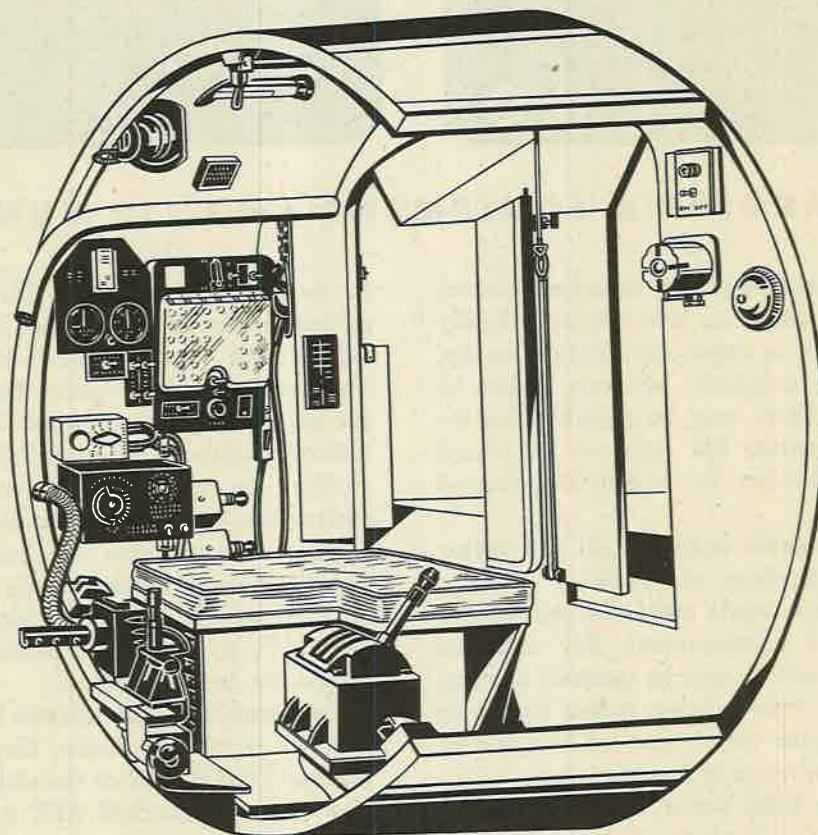
which may be set for either selective or train release.

3. A manual salvo release of all bombs simultaneously.

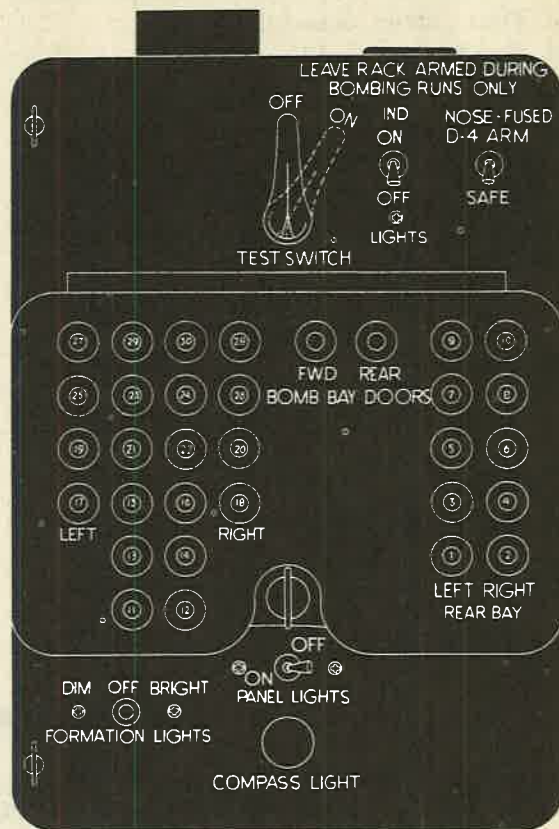
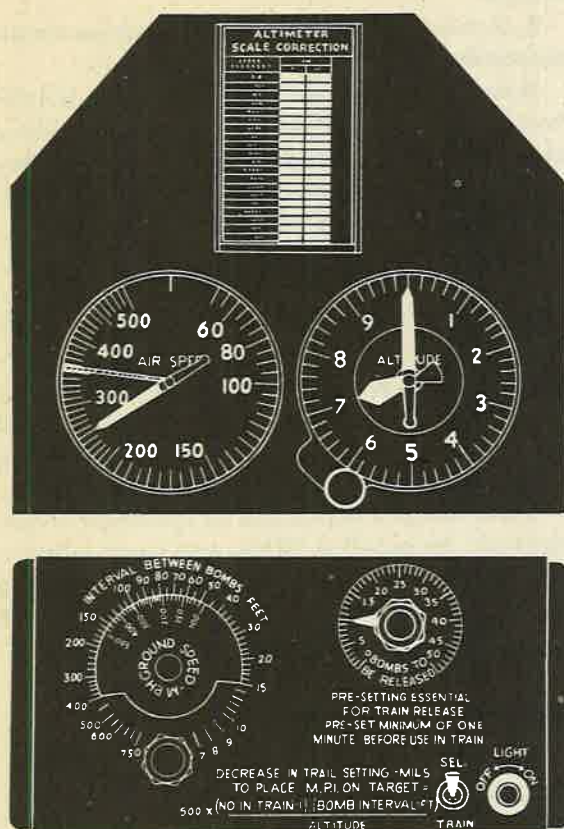
Note: A D-4 switch is used with British bombs. Bombs are released with nose fuses armed or safe, according to position of this switch. The D-4 switch is also used to arm 2000-lb. bombs when carried in D-6 adapters.

There is a bomb hoist to aid in handling various types of bombs. The hoist is accessible from the catwalk running between the bomb racks. This hoist may also be used on later-model aircraft to close the bomb bay doors. One end of the cable is attached to the piston rod of the bomb bay doors cylinder, the other to the bomb hoist. Pullies guide the cable.

Either the D-8 bombsight or a Norden bombsight can be installed. When you carry either a 2000-lb. bomb or a 1600-lb. armor-piercing bomb, it is necessary to install a special D-6 shackle adapter and control mechanism.



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BOMBARDIER'S EQUIPMENT AND ITS FUNCTION

The bomb rack selector switches control bomb rack selector units which automatically release the bombs in order, from bottom to top, thus preventing collisions between bombs in the bomb bay. They may be switched on individually to control the right or left hand racks in the bomb bay, or used in any desired combination.

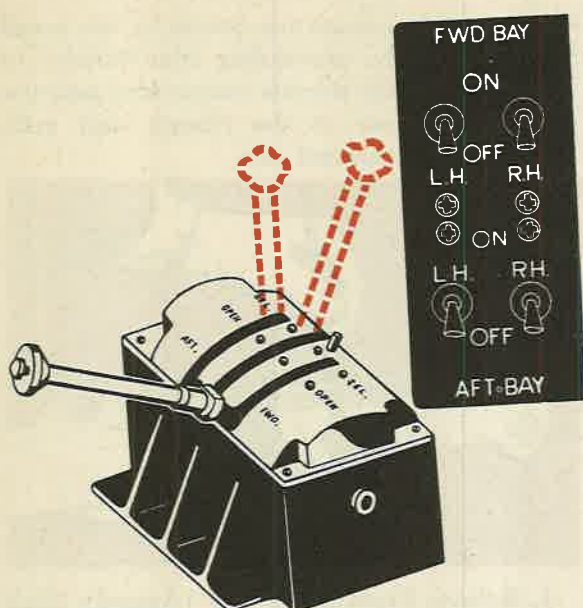
The intervalometer must be set for either selective or train release of bombs.

A bomb release toggle switch is installed at each side of the compartment. For selective release, either switch may be pressed to drop each bomb. For train release, either switch is pressed once, after which the intervalometer drops the selected train of bombs.

The indicator light panel contains a small electric light for each of the 20 bomb stations

in the bomb bay. When the indicator light switch is turned on, a panel light corresponding to each cocked bomb release unit glows. The bomb bay door panel lights go on when the bomb bay doors are open. The bomb station indicator lights go out as each bomb is dropped. Holding the test switch on momentarily discloses defective bulbs. The nose-fuse D-4 switch is used when bombs are nose-fused. Bombs may be released armed or safe according to the position of the switch. This switch should always be in the SAFE position except when bombs are being released.

The bomb bay door selector handle opens the forward bomb bay doors. Use either the slot marked FORWARD or the slot marked BOTH. The other slot marked AFT is no longer used, as the aft bomb bay is sealed. To open the



doors, push the handle forward in either of these two slots to the position marked OPEN. To prepare the bomb shackles for electrical release, the handle is moved forward to the SELECTIVE position. To salvo everything in the bomb bay at one time, turn the handle 90° and move to the SALVO position. Caution: Before shifting from the OPEN position to either the SELECTIVE or the SALVO position, check the bomb bay door indicator lights to be sure the doors are open. To close the doors, return the handle to the CLOSED (rear) position.

To Release Bombs

To drop bombs in train, first determine your groundspeed in mph. Set your groundspeed reading in mph on your intervalometer opposite the distance in feet you want between each bomb when it hits the ground. Then set the BOMBS TO BE RELEASED pointer to the number of bombs you want to release. For example, if you want to drop five bombs in train a distance of 100 feet from each other, at a groundspeed of 220 mph, first set 220 mph opposite 100 feet on the intervalometer. Then set the BOMBS TO BE RELEASED pointer to 5. Now turn the indicator light switch on. A panel light should glow for each loaded bomb station. If you are using British bombs with nose fuses, you next turn the nose fuse D-4 switch to the

ARM position so the nose fuses are armed. This switch, of course, should always be off except during actual bombing. The tail fuses are armed automatically when the bombs are released.

If you are bombing in formation at night, turn your formation light switch on. Push the bomb bay door handle to the OPEN position in the BOTH slot, wait until the bomb bay door light glows, indicating the doors are open, then push the handle on forward to the SELECTIVE position in order to prepare the bombs for electrical release. Turn on the forward bomb bay rack selector switch. When the firing point is reached, lift the safety cover on either bomb release toggle switch and press the switch, watching the panel lights go out as the predetermined number of bombs are released by the intervalometer. As each bomb is released, the bomb release light on the pilot's panel and the red release light on the right engine nacelle cone go on. Then close the bomb bay doors and turn all the switches off.

Selective Release

Pull the toggle switch on the intervalometer to the SELECTIVE position to release the bombs as you desire without using the intervalometer. Turn the indicator light panel switch ON and test the bulbs as you did when dropping bombs in train. If using British bombs, turn the D-4 switch on to the ARM position as before. The D-4 switch is also used when arming 1600-lb. and 2000-lb. bombs which are hung on the special D-6 adapters. These big bombs, either nose or tail fused, are not automatically armed when released electrically. With either nose or tail fuses, they must be armed before release by setting the D-4 switch to ARM. (And again, if you are bombing in formation at night, turn on your formation bombing switch.) Open the bomb bay doors as before and set the handle in SELECTIVE. Next, turn on the bomb rack selector switches. When the firing point is reached, flip either right or left release toggle switch. Press once for each bomb to be dropped, watching the indicator lights go out as each bomb drops. Close the doors and turn off all switches.

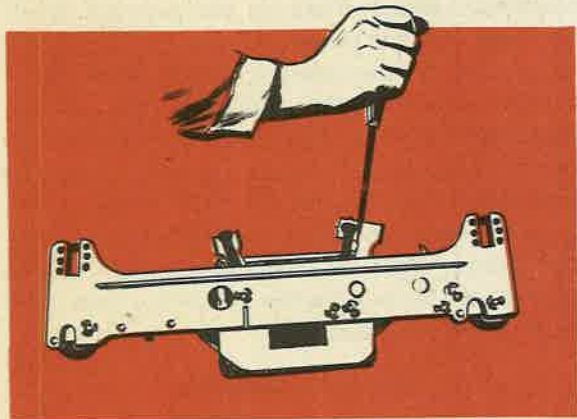
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Emergency Release

There are four ways of releasing bombs in an emergency:

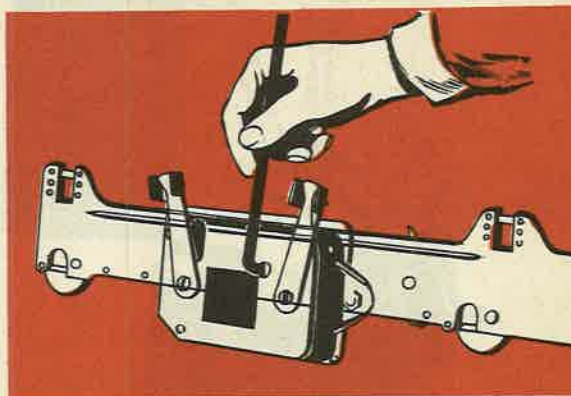
1. **Bombardier's Salvo:** Shift the bomb bay door handle to the **SELECTIVE** position in the center slot, lift the grip and rotate 90°, then shift forward to **SALVO** position. The contents of the bomb bay will be released safe.

2. **Pilot's Salvo:** Pull the emergency bomb release handle forward to salvo bombs safe. (See **Emergency** section.)



3. **Release From Bomb Bay (Safe):** Shift the bomb bay door handle to the **OPEN** position.

You can then release the bombs in the bomb bay individually, proceeding from bottom to top, by prying the shackle release arm past the spring-loaded ear of the release unit arm. Bombs will be released safe.



4. **Release From Bomb Bay (Armed):** Shift the bomb bay door handle to the **OPEN** position. Insert an offset screwdriver in the screw head on each release unit and turn towards **TRIP** to release bombs tail armed.

Caution: If using British bombs, be sure the D-4 switch is in the **SAFE** position before you salvo bombs. If the bombs are nose-fused they are released with the nose fuses armed or safe according to the position of the D-4 switch.

DIFFERENCES IN B-26 F AND G MODELS

The following items in the bombing equipment in B-26 F and G models differ from those listed in the preceeding section.



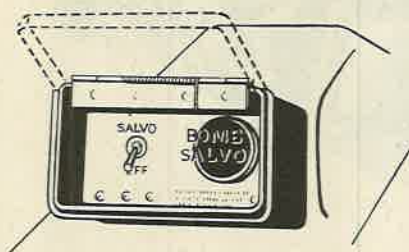
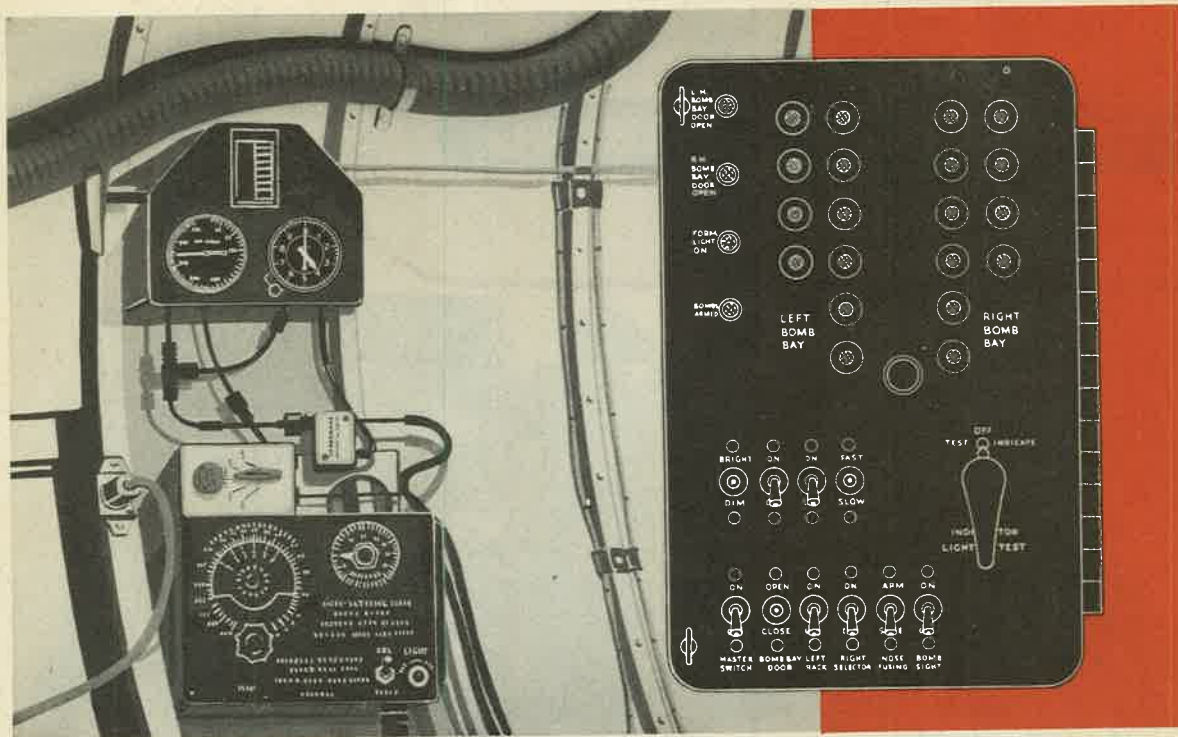
Bomb Bay Door Control Mechanism

Although the bomb bay doors still open hydraulically, a new electrical control replaces

the bomb bay door selector handle, previously located at the left side of the bombardier's compartment. Instead of this control, an electrical toggle switch opens the doors. There is one on the pilot's pedestal and a duplicate on the bombardier's control panel. To open or close bomb bay doors, merely move this switch to **OPEN** or **CLOSE**. The bomb bay door indicator lights on both the pilot's instrument panel and the bombardier's control panel glow when the doors are open.

Emergency Opening and Salvo System

In addition to the change made in the bomb bay door control system, there is a new emergency door opening and salvo control system in the F and G models. There are three salvo switch stations: one overhead in the bombar-



dier's compartment, one in the pilot's compartment on the brake valve cover between the pilot's rudder pedals, and one in the waist gunner's compartment. For their proper operation in case of emergency, see the Emergency section.

Electrical Non-Emergency Salvo

To open the bomb bay doors from the pilot's compartment and salvo the contents of the bomb bay without discharging the emergency air bottle:

To Open the Doors and Salvo

1. Return the salvo switch to OFF.
2. Hold either pilot's or bombardier's bomb bay door switch in the OPEN position until the

doors are fully open.

3. Move the salvo switch to SALVO.

To Close the Doors

1. Return the salvo switch to OFF.
2. Hold either the pilot's or bombardier's bomb bay door switch in the CLOSED position until the doors are fully closed.

If the foregoing procedure fails to open the bomb bay doors:

To Open the Doors and Salvo

1. Turn the bomb bay door manual control valve (located in the right forward section of the forward bomb bay) to the DOORS OPEN position.

2. When the doors are fully open, move the salvo switch to SALVO.

To Close the Doors

1. Return the salvo switch to OFF.
2. Turn bomb bay door manual control valve to the DOORS CLOSED position. After the doors are fully closed, return the valve to its neutral position.

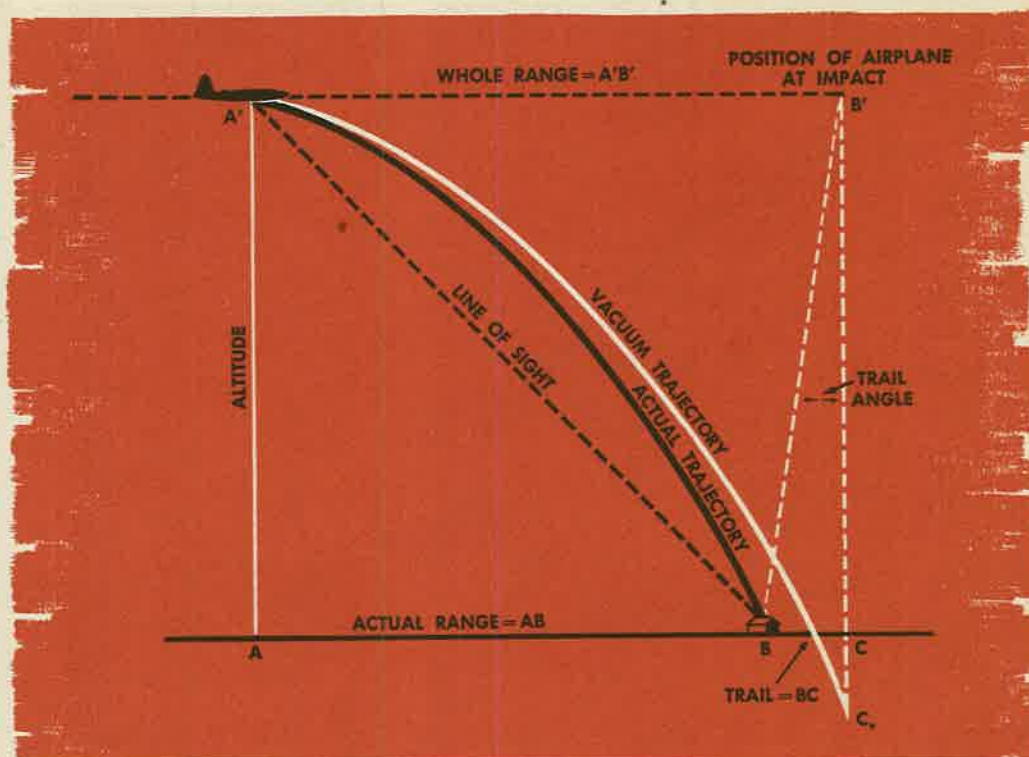
THEORY OF BOMBING



This section is not intended to explain the complete theory of bombing, but rather to help you, as pilot of the B-26, to understand some of the more important bombing theories that enable you to make a better bombing run.

First, a simple description of what happens when you drop a bomb from an airplane. As the target comes in sight, the bombardier, looking through his bombsight, sets up a sighting angle. This is approximately the angle formed by a line from the airplane perpendicular to the ground and another line from the airplane to the target. The dropping angle is the sighting angle at the moment of release. The sighting angle changes as you approach the target, and at the instant it becomes the same as the dropping angle you release the bomb. It is

not as simple as this, however, as several other factors have to be considered. Not the least of these is trail. Trail is the distance the bomb lags behind the airplane at the instant of impact because of wind resistance. The Norden bombsight automatically determines the dropping angle for any airspeed or altitude. It does not, however, determine trail. Trail must be pre-set into the sight according to the ballistics of the type bomb being dropped and the altitude and airspeed at which the bomb is to be dropped. It is because of this trail that it is important for you to fly your airspeed and altitude exactly. Remember that the foregoing is true only of synchronous bombing with the Norden bombsight and does not apply to fixed-angle bombing with the D-8 bombsight.



SYNCHRONOUS BOMBING

The following examples give some idea of the importance of flying exact airspeed and altitude when engaged in synchronous bombing.

Suppose you are flying a bombing mission at an altitude of 10,000 feet, and an airspeed of 180 mph, and your airspeed is 5 mph too fast. In this instance the impact point would be 193 feet short of the target. Why short? You would naturally expect the bomb to go over the target with the airspeed higher than it was supposed to be. The reason it falls short is that not enough trail has been pre-set into the bombsight to compensate for the extra airspeed.

This causes the bombardier to release the bomb too soon. Conversely, an airspeed too slow will result in the bomb falling over the target.

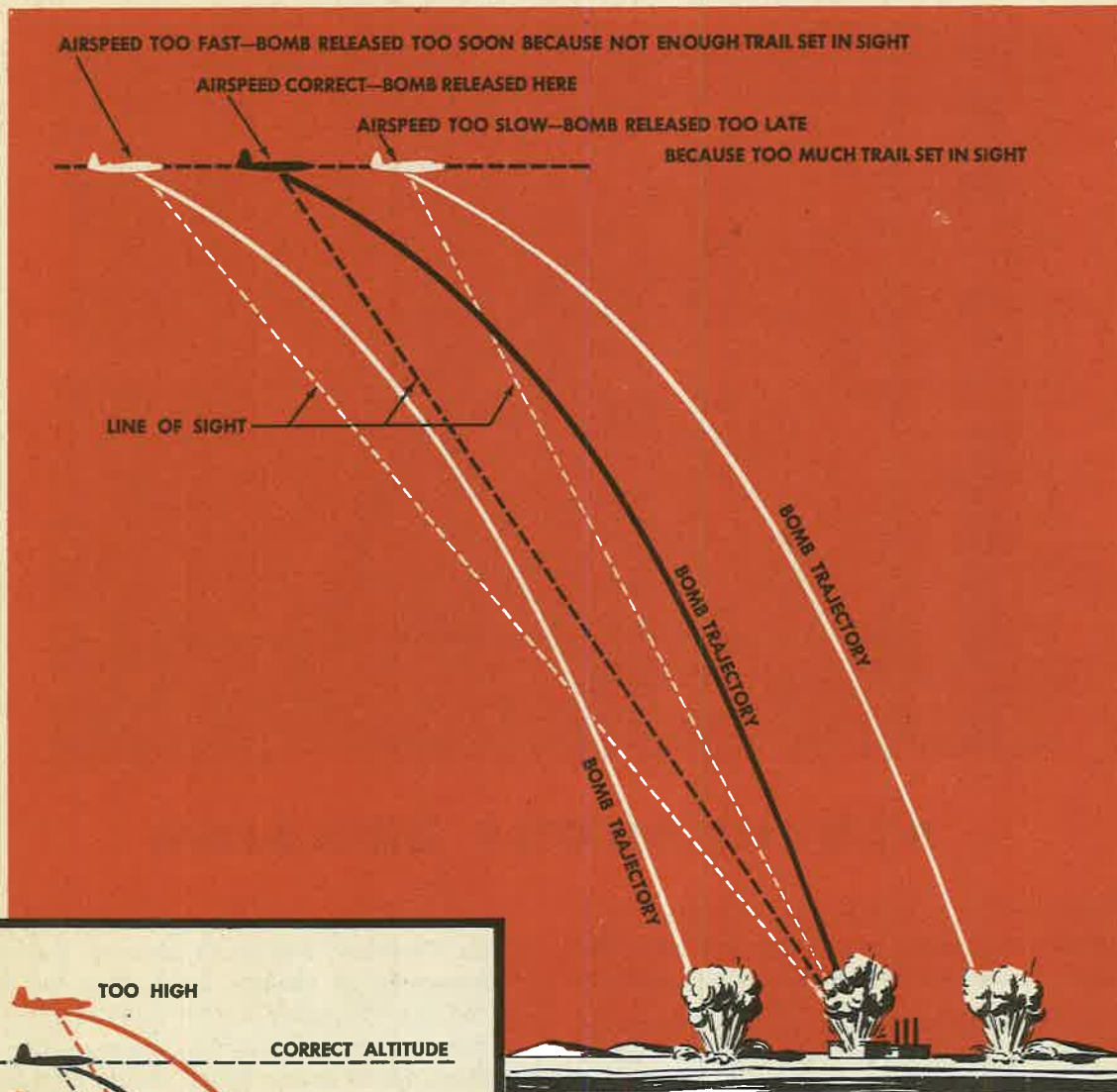
Now suppose that you are to fly the bombing mission at an altitude of 10,000 feet and an air-

speed of 180 mph and that you are 100 feet too high. The bomb will hit 63 feet over the target. Conversely, an altitude lower than the designated one will result in a hit short of the target.

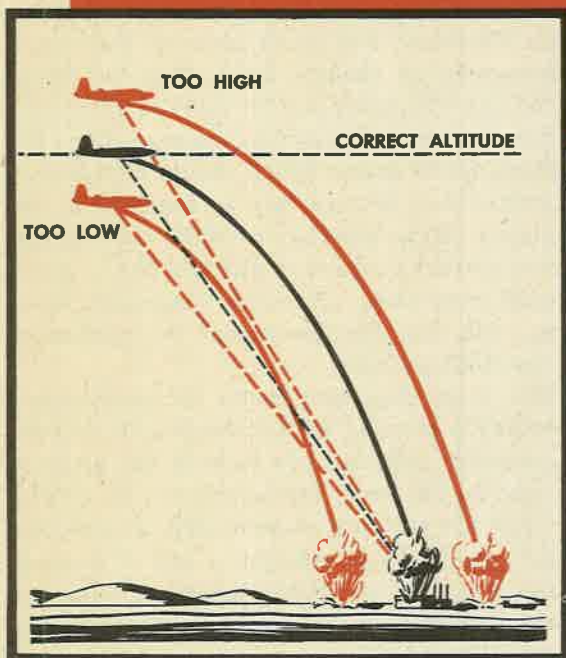
You can see that in synchronous bombing the altitude factor is one which should be followed closely; yet it is secondary to airspeed in importance. If the pilot has to make a choice between correct airspeed or altitude, the airspeed should come first. You must remember, however, that the altitude cannot be overlooked in the final analysis.

The most important factor in synchronous bombing is leveling the bombsight. When your bombardier calls for you to level the airplane so that he can level his bombsight, be careful to level the airplane as accurately as you possibly can. If the bombsight is out of level as little as a half a bubble length, it causes a greater error than any of the other bombing errors noted.

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EFFECT OF AIRSPEED IN
SYNCHRONOUS BOMBING



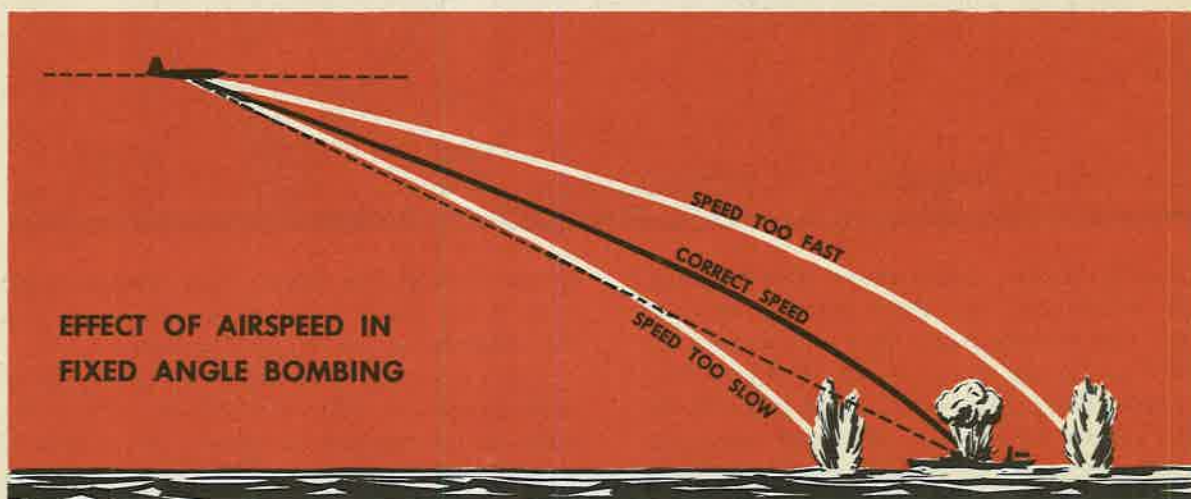
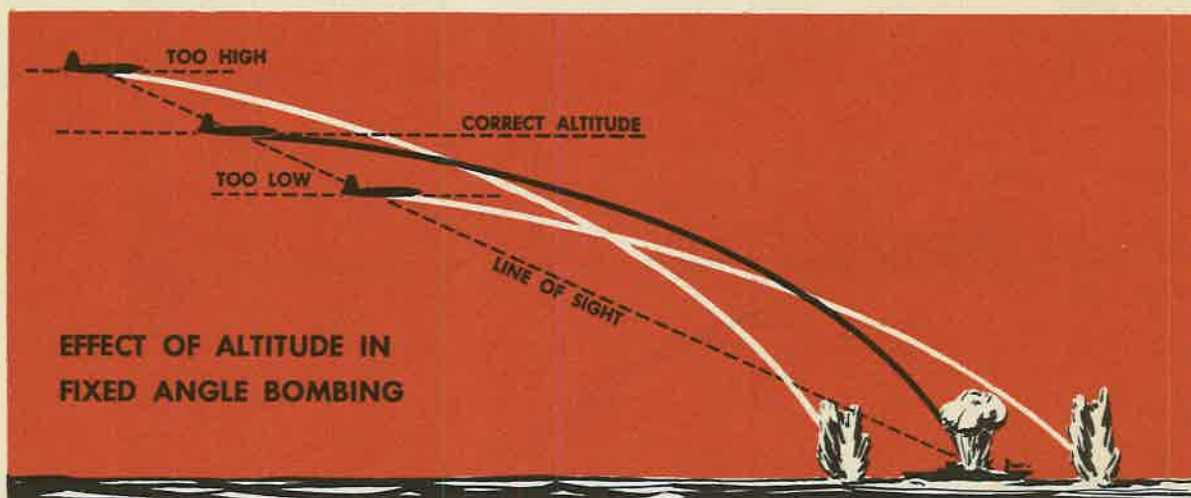
EFFECT OF ALTITUDE IN
SYNCHRONOUS BOMBING

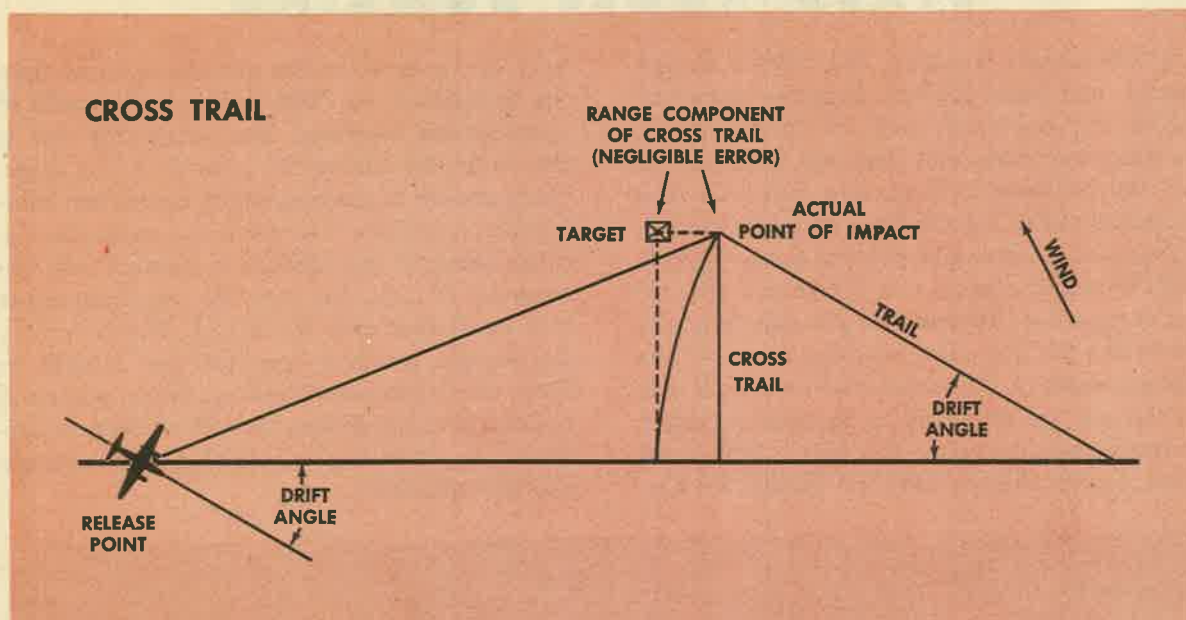
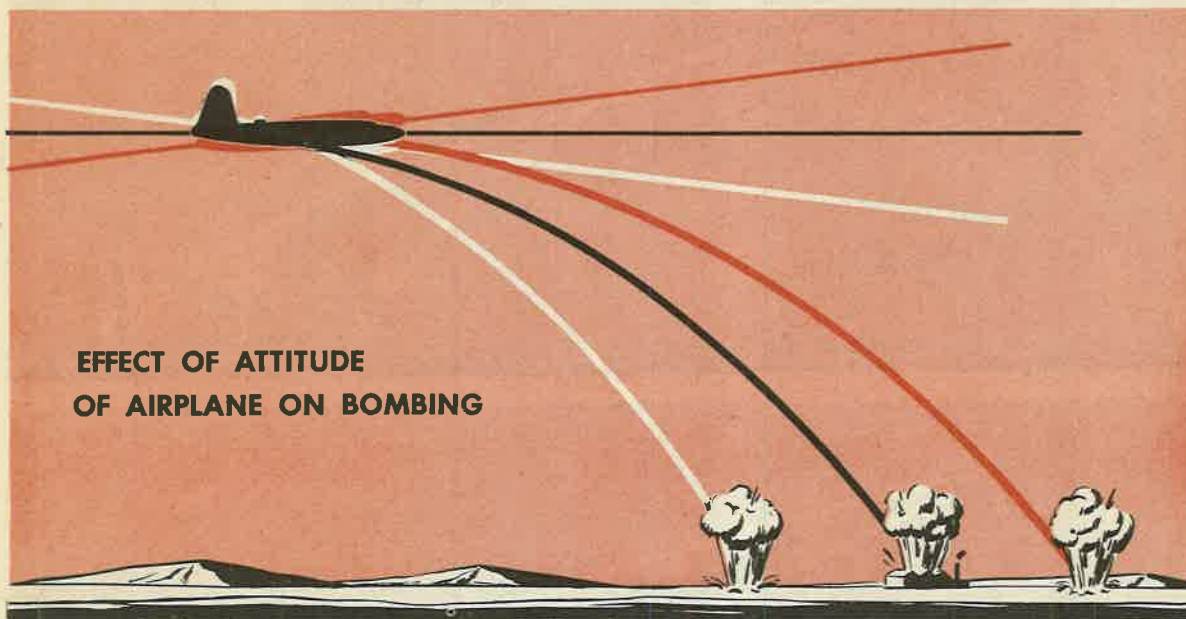
FIXED-ANGLE BOMBING

In fixed-angle bombing, the factors change greatly, and exact altitude becomes more important than exact airspeed. In the first place, the dropping angle and trail are both pre-set into the bombsight. These are found in pre-computed tables for the type of bomb used.

Suppose, for example, you are flying a fixed-angle bombing mission at a designated altitude and airspeed of 100 feet and 180 mph and you are 44 feet too high. The resulting error will be 132 feet **short** of the target. Conversely, if you are too low, the error will be beyond the target. In fixed-angle bombing the bomb falls short when you are higher than the designated alti-

tude, and over when the altitude is lower than the designated one. **This is just the opposite of synchronous bombing.** The reason for this is that in fixed-angle bombing the dropping angle, being pre-set in the bombsight, causes the bombardier to release the bomb too soon. On the other hand, if the altitude is correct and the airspeed 10 mph too fast, the resulting error will be 37 feet over the target. The factors in fixed-angle bombing are just the reverse to those in synchronous bombing. When you must make a choice between correct altitude or airspeed in fixed-angle bombing, the altitude should come first.



CROSS TRAIL**EFFECT OF ATTITUDE OF AIRPLANE ON BOMBING**

Another factor which enters into bombing, over which you can exert some control, is drift. You already know that you correct for drift by crabbing into the wind. What you may not have realized, however, is that, in effect, the wind causes the bomb to drift away from the target after it is released. Correct for this by flying a parallel course upwind of a course line

drawn through the target. This correction for drift of the bomb is known as cross-trail. See the diagram at the top of this page.

One more important bombing factor greatly concerns you as pilot—the attitude of the airplane at the moment of release. The effects of various airplane attitudes on the bomb is shown in the second illustration above.

Summary

METHODS OF BOMBING

SYNCHRONOUS:

1. High altitude (above 1500 feet).
2. Airspeed most important.
3. Bombsight—has to be synchronized, both in range and deflection.

FIXED-ANGLE:

1. Low altitude.
2. Altitude most important.

REVIEW OF BOMBING PROBLEM

SOLVING THE RANGE PROBLEM:

1. You must know: altitude, groundspeed, trail.
2. You must find: whole range, actual range, tangent of dropping angle.

SOLUTION OF DEFLECTION PROBLEM:

1. You must know trail.
2. You must find: drift angle, cross-trail.

ERRORS IN SYNCHRONOUS BOMBING

IN ALTITUDE AND AIRSPEED:

1. Flying too high—bomb will hit over.
2. Flying too low—bomb will hit short.
3. Flying too fast—bomb will hit short.
4. Flying too slow—bomb will hit over.

IN TRAIL AND CROSS-TRAIL:

(Under no-wind conditions)

1. Too little trail set in sight—bomb will hit short.
2. Too much trail set in sight—bomb will hit over.

IN TRAIL AND CROSS-TRAIL:

(With wind)

1. Too little cross-trail set in sight—bomb will hit short and downwind.
2. Too much cross-trail set in sight—bomb will hit over and upwind.

IN DROPPING ANGLE:

1. Too small—bomb will hit over.
2. Too large—bomb will hit short.

ERRORS IN FIXED-ANGLE BOMBING

IN ALTITUDE AND AIRSPEED:

1. Flying too high—bomb will hit short.
2. Flying too low—bomb will hit over.
3. Flying too fast—bomb will hit over.
4. Flying too slow—bomb will hit short.

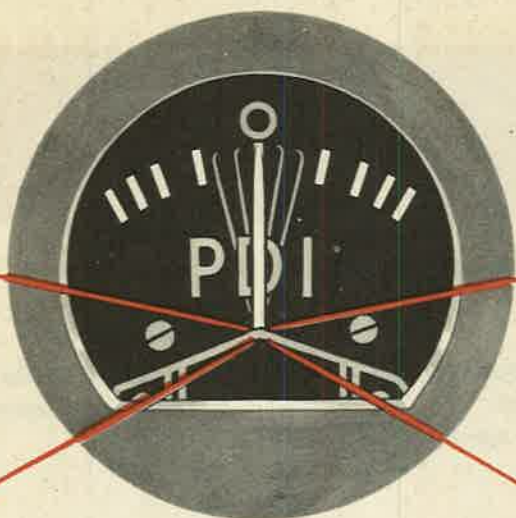
IN TRAIL AND CROSS-TRAIL: No effect.

IN DROPPING ANGLE:

1. Too small—bomb will hit over.
2. Too large—bomb will hit short.

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PDI



PDI means Pilot's Direction Indicator. This instrument correlates the pilot and the bombardier. It is through this instrument that the bombardier is able to tell you which way to turn the plane in order to have the correct course position at the release point. A great portion of the teamwork between you and the bombardier must come through this instrument. You can better understand how to follow this instrument if you familiarize yourself with the entire bombing problem, and the means by which the sight solves this problem.

Think Ahead

The bombardier moves the needle of the PDI right or left through the sight. If the desired correction is to the right, the needle moves to the right, and you must turn the ship into the needle. Learn to anticipate the movements of this needle. As the needle approaches zero, roll out of the bank. If you lead the needle, you are level when the needle comes to rest on zero; otherwise, you overcorrect and the needle continues on past zero. Then you have to make another correction.

Tips on Making PDI Corrections

There is no exact agreement about the methods for making PDI corrections. You must completely familiarize yourself with the problem, then develop your own method. In general, a coordinated turn is best for the large correc-

tions early in the bombing run. Near the end of the run, after the course has been established, you may make small skidding corrections. One frequent mistake is to assume that every movement of the PDI is a correction by the bombardier. This is not true. The instrument is stabilized by the bombsight stabilizer unit, and once the course is set up, the slightest change results in a correction being registered by the PDI. Any false movements you make register false corrections.

It is best to make your corrections by using the gyro compass in conjunction with the PDI. Most pilots are more adept at this method because they are more familiar with this instrument and its lag and compensation features. The maximum correction of the PDI is equal to a $5\frac{1}{2}^\circ$ turn, however, while the maximum correction of the sight is only 3° . Bear this in mind and you can judge the amount of correction necessary according to the PDI indication, then make the correction by use of the gyro compass. Be patient when flying PDI. Make your corrections slow and easy.

In flying the PDI there are two things you must remember about the sighting equipment: First, if you bank too much in making a correction, you black out the sight for the bombardier, and at the same time cause the sight to precess. Second, if your skidding corrections are too great and too much force is set up, the sight gyro will tumble.

HIGH-ALTITUDE SYNCHRONOUS BOMBING

In the B-26, high-altitude synchronous bombing usually refers to bombing between 7000 and 14,000 feet. The Norden bombsight is generally used. Although the C-1 automatic pilot was designed to be used on the bombing run in conjunction with this sight, it has been proved that the pilot should fly the bombing run manually in the B-26.

Precision Plus

The bombing run is essentially an instrument run which requires complete coordination between you and your bombardier. You must concentrate on the fact that you are flying instruments throughout the entire bombing run. Exact altitude and airspeed must be held without climbing or diving. The PDI must be held at zero.

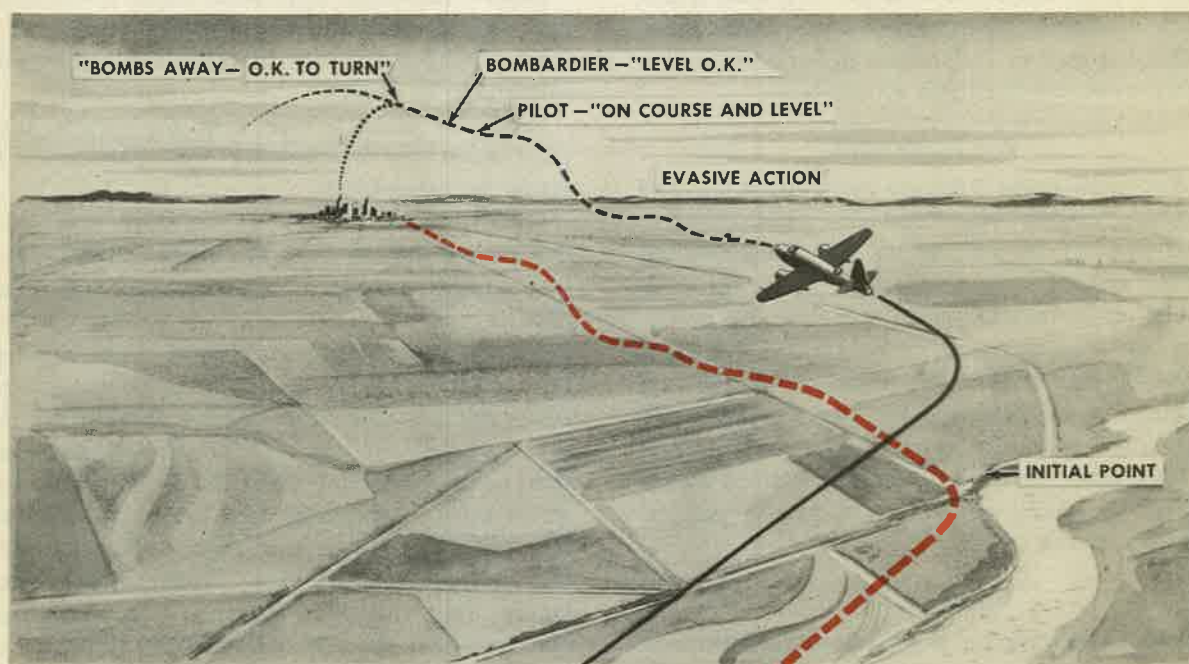
In bombing, as in landing, the approach must be accurate. You know how easy it is to land after a good approach. Exactly the same thing applies to the bombing run; direct hits come only after accurate approaches. Your maximum allowable tolerance in heading is 15°.

Initial Point

To begin the bombing approach you start at your I.P., which in bombing language means initial point. This is merely some point in the vicinity of the target from which the approach is made. It is generally chosen because it is more readily identified than is the target. In the B-26 you should endeavor to make your turn into the bombing approach to the left, as you can get lined up with the target faster and more accurately this way. It is difficult to see the target in a turn to the right.

Power and Airspeed

Before you begin the bombing run, increase your rpm to at least 2100. This will give more immediate response when you use your throttles. Have approximately 15 mph more airspeed than the designated bombing airspeed, to compensate for the airspeed loss when the bombardier opens the bomb bay doors. Remember that you must make the synchronous bombing approach with precision. Everything must be



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coordinated and exact. Hold acceleration and deceleration to a minimum; make corrections as rapidly and as smoothly as possible. Make no bank greater than 15°.

On Course and Level

As you turn on the target approach, have your bomb bays open. Tell the bombardier "On course" over the interphone. Have the ship level so the bombardier may uncage his gyro and level at once. The bombardier must level his bombsight before the beginning of each bombing run. The bombardier acknowledges over the interphone the fact that he has leveled and is ready to start the run. As soon as this is complete the bombardier starts to set up the collision course. After the correct drift relationship is set up between the target and the

airplane, the bombardier may request another level. If he does, acknowledge and level immediately. When level, the bombardier will say over the interphone, "Level O. K."

Bombs Away—O. K. to Turn

Remember that you should be flying instruments during the entire bombing run. As you are now approaching the release point, do your utmost to keep your instrument readings exact, your airplane as level as possible, and your corrections small and gentle. After the bomb or bombs are released, do not turn until the bombardier tells you, "Bombs away, O. K. to turn," as he must cage his gyro and secure his switches. If you turn before he does this, there is a possibility of tumbling the sight gyro. A tumbled gyro may lead to material damage.

LOW-ALTITUDE BOMBING

Low-altitude bombing, commonly known as fixed-angle bombing, is done with the D-8 bombsight and is not to be confused with skip bombing, which, while it is fixed-angle bombing, is performed under specific conditions which cause the bomb to skip. Very little fixed-angle bombing is performed in the B-26. However, it is well to understand it, for certain conditions require this type of bombing.

D-8 Bombsight

For fixed-angle bombing runs, using the D-8 bombsight, you must know the wind direction and velocity, as well as the magnetic heading of the approach, to obtain the correct ground-speed, drift, and dropping angle for the bombing run. The dropping angle on the D-8 sight must be pre-set into the sight before the run begins. This dropping angle, for a given set of conditions, is found in precomputed tables. You must work a double drift solution before bombing—at bombing altitude, and in the general vicinity of the target.

Bombing Run

The procedure for the fixed-angle approach is similar but not as complicated as the syn-

chronous bombing approach. It should, however, conform to the following description in the main points. The bombardier and pilot are encouraged to develop a technique which best suits them.

Before the target approach, the airspeed and approach heading must be decided upon.

The bombardier tells the pilot the computed altitude to be flown.

After the plane is turned on the course, the pilot gives the bombardier the "On course" signal by interphone.

In this type of bombing, the pilot must receive his direction from the bombardier by interphone, as the PDI is not connected with this type of sight. It is just as important for you to keep your altitude and airspeed exact in this kind of bombing as in synchronous bombing. Although you may make sharper banks than in synchronous bombing, as there are no gyros in this bombsight, you must be careful not to make your corrections too large. Be certain that your ship is in a level-flight attitude at the exact moment of release. Upon release, the bombardier takes the necessary steps to secure his equipment and then signals the pilot, over the interphone, "Bombs away, O. K. to turn."

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SKIP BOMBING

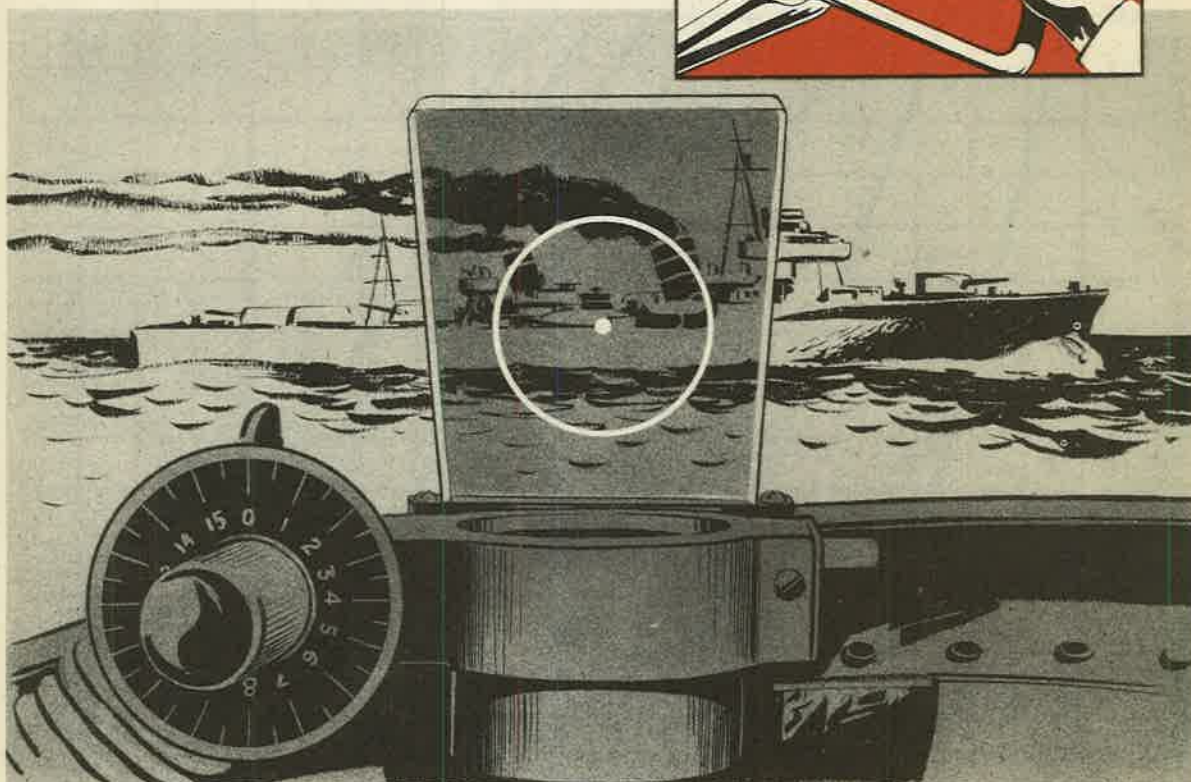
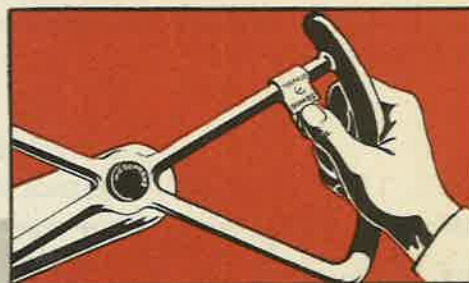
Skip bombing is ordinarily done with a modified variation of the N-6A gunsight, with the pilot making the releases. The rudiments of this type of bombing are simple, depending more upon your skill as a flyer than on your knowledge of bombing. It is necessary to know how to obtain the dropping angle from the chart and how to apply this figure to the sight.

Low-altitude bombing may or may not be skip bombing. To be classed as skip bombing, the bomb must be released under such conditions of altitude and groundspeed that the bomb trajectory is flat enough to cause the bomb to be deflected from its initial impact point, whether on land or water. A rule of thumb that may assist you to determine whether or not the bomb will skip: In order to skip, the bomb must be released at an altitude lower than one foot for each mile per hour in groundspeed the airplane is traveling. Be

careful not to release the bomb too low, however, especially over water. Bombs have been known to skip back up into the airplane from which they were released.

Bombing Run

To begin the run, you should line up on the target, then approach it, using whatever evasive action is necessary. By first lining up on the target, then beginning the evasive action, you are better able to judge the point at which you wish to roll out into level flight for your bomb release. A 4 or 5-second straight approach is all that is necessary for the attack.



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You must level at the instant of release; otherwise, your bomb is thrown out on a line tangent to the arc of your turn. Use necessary evasive action in the breakaway following the release. Under actual combat conditions, take full cover afforded by trees, hills, etc. Remember that in this type of low-altitude bombing, the altitude factor is the most important. Looking through the sight as you approach the target, you see the reticle (circle and dot) traveling along the ground. When you are within 5 seconds of the target, bring the airplane to the proper altitude and airspeed and fly it straight and level until the dot of the reticle reaches the base of the target. If more than a 25 mph crosswind is blowing, offset the aiming point upwind an estimated distance that will set up a collision course. Naturally, if the target is moving it is necessary to offset the aiming point in the direction the target is traveling.

Errors

Personal error of a fraction of a second in pressing the firing switch causes a large error on the ground. Too, a larger error results if the airplane is climbing or diving at the instant of release. If you are 25 feet off in altitude, an error of 115 feet on the ground results when you are bombing at 250 mph and 100 feet altitude. Any consistent error you may have can be corrected by changing the sighting angle as described in the chart. The following charts are derived from actual bombing experience and were drawn up by bombing experts. The first chart shows you the distance that a bomb travels through the air as determined by the altitude and airspeed at the instant of release. The second chart gives you the information necessary to set up your sight for any given skip bombing conditions.

SKIP BOMBING CHART
DISTANCE BOMB TRAVELS THROUGH THE AIR

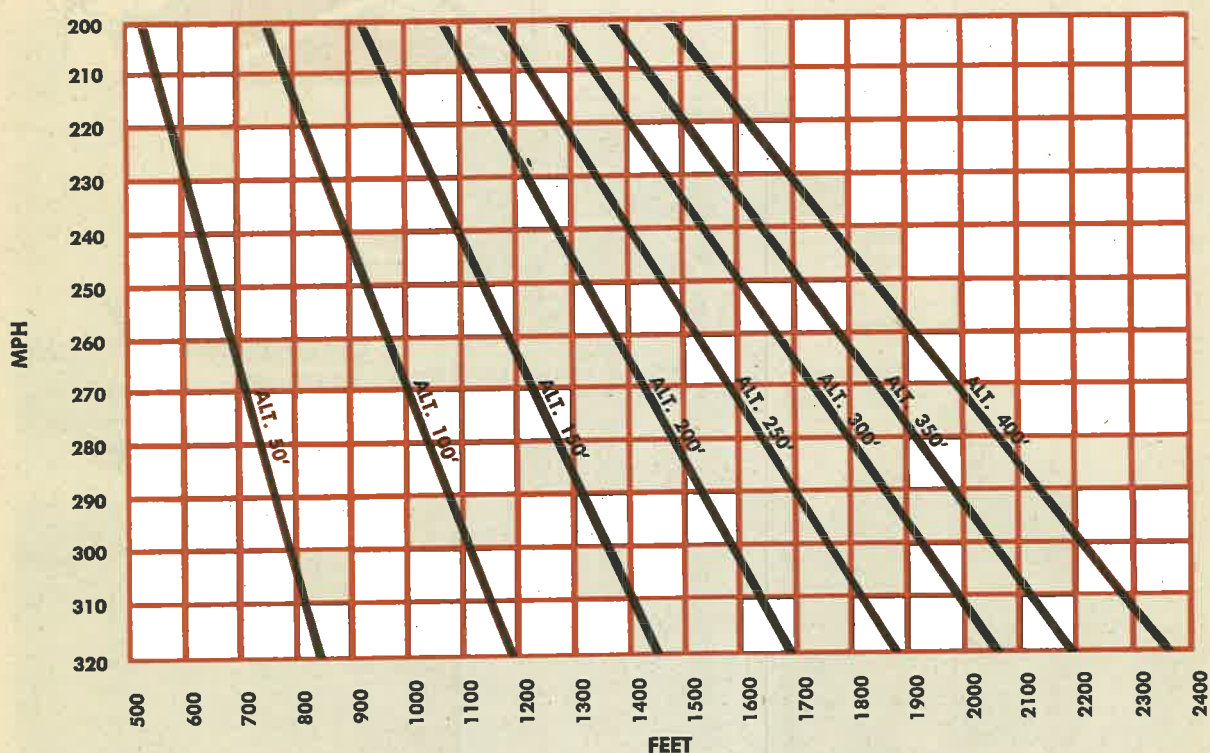


TABLE OF SIGHTING ANGLE (IN DEGREES)**FOR USE IN B-26 TYPE AIRCRAFT****Ground Speed—MPH**

ALT.	200	210	220	230	240	250	260	270	280	290	300
50'	8.8	8.0	7.3	6.7	6.2	5.7	5.3	4.9	4.5	4.1	3.8
100'	11.1	10.2	9.4	8.7	8.1	7.5	7.0	6.6	6.2	5.8	5.4
150'	12.8	11.9	11.0	10.2	9.6	9.0	8.4	7.9	7.4	7.0	6.6
200'	14.1	13.2	12.3	11.5	10.8	10.1	9.5	9.0	8.5	8.0	7.5
250'	15.5	14.4	13.5	12.6	11.8	11.1	10.4	9.9	9.4	8.9	8.4
300'	16.6	15.5	14.4	13.5	12.7	12.0	11.3	10.7	10.1	9.6	9.2
350'	17.8	16.5	15.4	14.5	13.6	12.8	12.1	11.5	10.9	10.4	9.0
400'	18.5	17.4	16.3	15.3	14.4	13.6	12.9	12.2	11.6	11.0	10.5

NOTE: IF BOMBS ARE 50 FEET OVER, OR YOU DESIRE TO PURPOSELY DROP 50 FEET SHORT, SUBTRACT THE FOLLOWING VALUES FROM THE GIVEN ANGLES, REGARDLESS OF ALTITUDE.

200 to 240 MPH	250 to 270 MPH	280 to 300 MPH	Above 300 MPH
0.5	0.4	0.3	0.2

IF BOMBS ARE 50 FEET SHORT, ADD THE FOLLOWING VALUES TO ABOVE TABLES FOR CORRECTION.

200 to 240 MPH	240 to 270 MPH	280 to 300 MPH	Above 300 MPH
0.4	0.3	0.2	0.1

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Combat bombing is normally done in formation. It is one of two types: precision pattern bombing or area bombing. These two types differ in several respects.

Precision pattern bombing is the art of placing bombs on a specific target by a precise sighting operation. Area bombing is the placing of a large number of bombs in a given area. Effectiveness depends upon the number of airplanes employed, the size and total weight of the bombs carried, and the length of time necessary to make the release.

The B-26, in general, is a precision bomber, flying during daylight at medium altitude, attacking targets such as gun emplacements, submarine pens and airdromes. Its success depends largely on the skill and the knowledge of the combat crew team.

Evasive Action

The purpose of evasive action is to prevent the enemy anti-aircraft gunner from predicting the position of your airplane at the instant his projectile reaches its point of detonation. It

is not possible to make hard and fast rules concerning evasive action because of the many factors involved. However, if you understand some of the principles of anti-aircraft fire you are better able to cope with situations involving it.

Types of Flak

Anti-aircraft fire falls into two main categories—light flak and heavy flak.

Light flak generally consists of 7.92 mm. machine gun fire (effective range—2400 feet), and fire from 20 mm., 37 mm., 40 mm., and 50 mm. dual purpose automatic weapons. Of the automatic weapons employed, about 20% are 37 mm. (effective range—5000 feet), and 70% are 20 mm. (effective range—3500 feet).

This type of anti-aircraft fire is directed manually, using estimated lead. It may be classified as uncontrollable fire, is therefore unpredictable. Appropriate evasive action is weaving, or jinking. The amount and violence of the action depends upon the type and size of formation.

Heavy flak comes from 75-mm. to 155-mm. rapid-fire batteries. It is directed by remote sighting mechanisms employing a predictor and fire control center. This type of fire is encountered from 8000 feet up to a maximum vertical range of 35,000 feet. It is this type of anti-aircraft fire which you must understand and employ evasive action to avoid.

Evasive Action Is Not a Science

Evasive action is the maneuvering employed to avoid hostile anti-aircraft fire. Excessive roughness or abrupt maneuvers bordering on acrobatics are unnecessary in good evasive action. A small change in the variables is often as good or better than large changes. Experienced pilots have said that a small change which cannot be detected easily from the ground is much better than a large one which can. The particular tactics employed on any one mission depend upon conditions existing at that time, and upon any unexpected developments. You must understand from the start that no set plan of evasive action can be used as an exact formula. Rather, the tactics you employ must depend on your ingenuity and understanding of hostile

anti-aircraft gun emplacements and methods of fire in that theater, so that you may outsmart the enemy fire control officer. An attempt to follow a set pattern in every mission would, of course, be suicidal. The principles outlined here, therefore, must be accepted only as a guide.

How and When the Enemy Tracks You

Basically, an anti-aircraft gun employs a sight which determines the same data that the bombardier determines with his bombsight. The anti-aircraft gunner, however, uses only certain portions of his trajectory; he sets a time fuse on the projectile, causing it to explode at a point in the air where he predicts the plane will be. Evasive action is employed to insure that the airplane is not at the position predicted. Mere zigzagging or weaving the formation in a regular curve pattern does not disrupt the anti-aircraft gunner's prediction. To lead a formation successfully over defended areas you must understand this point.

Although you may expect anti-aircraft fire at any time while flying over hostile territory, it is generally in a narrow belt, approximately 2 minutes' flying time outside the bomb release line around defended targets. You must expect it at all times in the vicinity of vital hostile installations.

Mechanics of Outsmarting the Enemy

You must accomplish two things by evasive action. First, allow the anti-aircraft gunner to track you and predict a position at which he will fire his gun to hit you. Second, you must place your plane outside this predicted position, thus outsmarting the anti-aircraft gunner.

If, by employing violent zigzagging tactics, you do not allow the anti-aircraft gunner to track your plane, the enemy may fire a box of flak ahead of you. This box of flak is used by anti-aircraft artillery when a target is of vital importance and the approaching bomber's future position cannot be predicted. To place a box of flak in front of an approaching bombing assault, the enemy must bring every available anti-aircraft gun into action and literally pump anti-aircraft shells into an area approximately 2000 feet square in front of the formation. This

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method of anti-aircraft fire is expensive to the enemy and he is reluctant to use it if the assaulting bombers can be tracked. The box of flak is also costly to any formation forced to fly through it, and no evasive action other than avoiding the area can be planned. It is necessary, therefore, if you are to outsmart the hostile anti-aircraft by evasive action, to allow yourself to be tracked.

The question then arises as to how long the enemy should be allowed to track the formation. The approximate answer may be found in the following manner.

When the initial point is reached, turn along the axis of attack and follow this new course, then:

1. Allow 10 seconds for the enemy to predict your future position.
2. Plus 5 seconds for him to cut his fuse and get the projectile in the air.
3. Plus 1 second per 1000 feet of altitude for time of flight of the projectile.
4. From this total subtract 15 seconds.
5. The remainder is considered the safe time you may continue along your new course, knowing that you are being tracked.

The rule-of-thumb, therefore, is to allow 1 second for every 1000 feet of altitude as the safe time for straight and level flight along any one heading before you change to a new one. Your greatest danger in exceeding this time occurs on the final bombing run.

You must constantly strive to reduce the time of straight and level flying necessary to the bomb release line. On the other hand, you must allow enough time for your formation to settle down after the last turn so that the wingmen and the Tail-end Charlies are not forced to waste their bombs. It can be readily seen that the use of large, unwieldy formations would require a bombing run of such length that accurate anti-aircraft fire could be expected at or before the bomb release line.

Breakaway

You must be judicious in your breakaway from the target if you are the leader of a bombing formation. A sudden diving turn causes the rear elements of your formation, which may not have reached the bomb release line, to have a tendency to release their bombs from a turn to avoid straggling. The lead bombardier should close the doors as soon as the last ship in the formation has released his bombs. The bombardiers in the wing ships should close theirs on the leader. This makes it easier to remain in formation. The same type of flying tactics employed in evasive action serve to get the formation out of the target area. You must remember one main point—every plane in your formation must be given an opportunity to get its bombs away without having to worry about whether the rest of the formation is going to run off and leave it.

PILOT-BOMBARDIER TEAM

Much has been said about the pilot-bombardier team. This cannot be over-emphasized. You must understand each other's problem. You expect your bombardier to know his job and give you the fullest cooperation, and he expects the same of you. Your mutual cooperation must not end with the bombing run. Get in the habit of analyzing your problems and missions on the ground.

Dry runs are essential to the bombing team.

While learning, there is a tendency for pilots to blame all dry runs on their bombardier, whereas many of the reasons for the dry runs are actually of your making. It is admittedly tiring to make repeated runs over the target. This, however, is one of the most important phases of air work as well as one of the most tedious. Do not become discouraged or disgusted. Make certain that you learn something from each run.

Cooperate with your bombardier

GUNNERY

Gunnery missions are acid tests of your ability as an airplane commander. No other single type of mission places such a high demand on your ability to coordinate and control your crew, nor so closely approximates the problems you meet on every combat mission. **Your objective on gunnery missions is maximum training with maximum safety.**

Preparation

You, as airplane commander, are responsible for seeing your entire crew is briefed and that the members understand each gunnery mission. All members of your crew must be present and must give their undivided attention to the brief as it is delivered.

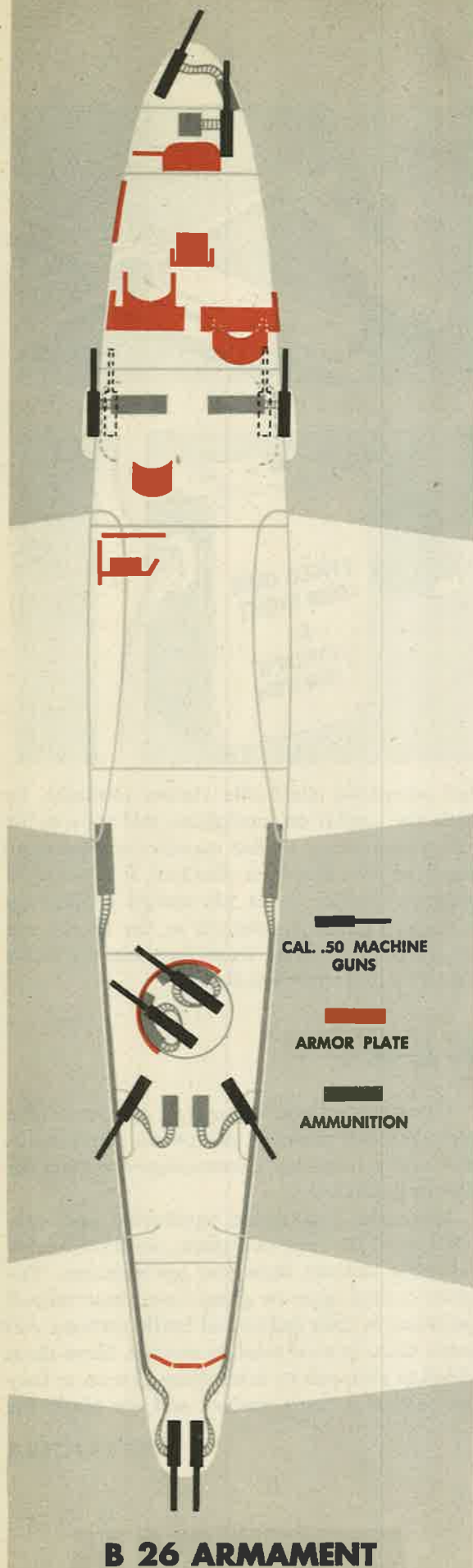
Gunnery mission briefs cover all normal items, such as target regulations, route to be flown, weather, etc., and particular emphasis is placed on fire control instructions.

Supervision

Your ship's gunnery officer is usually your bombardier-navigator. He is assisted by your armorer-gunner. In addition, on all gunnery practice missions, you carry a gunnery instructor who also assists your bombardier-navigator. This team is responsible to you for the safe and efficient conduct of all details of a gunnery mission. They supervise the installation, adjustment and loading of all guns. They act as trouble-shooters and advisers during flight. They supervise the proper clearing and stowing of all guns after firing is completed before leaving the target area. They supervise the dismounting, return, repair, and cleaning of all guns. They see that all brass and unexpended ammunition is returned to the armament section,

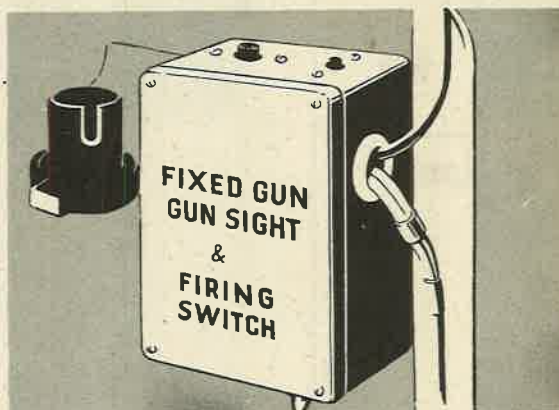
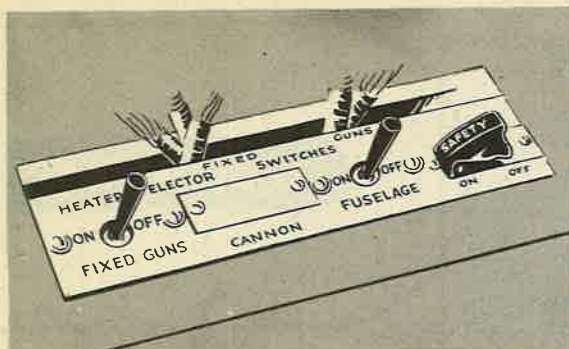
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B 26 ARMAMENT

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and that the necessary reports covering the number of rounds fired, etc., are prepared.

Battle Station Preflight

Each crew member is responsible for the preflight check of his assigned battle station, performed in accordance with the published checklist pertaining to his station. As each crew mem-

ber completes his battle station preflight, he calls the copilot on interphone and reports his check completed. In this manner, an operating check of each station is obtained. It is essential that the copilot be at his station sufficiently early to receive the reports as the checks are completed. He must avoid keeping the crew members from further duties.

INTERPHONE

Be sure that you have good interphone communication with every station. Interphone is the tool which you, as airplane commander, must use constantly to coordinate your crew in flight. Interphone is the means by which every crew member is kept abreast of what is going on at all other stations in the airplane.

Because of the extensive use of interphone necessary for you to control the fire from the various stations properly, good interphone contact and proper interphone technique are especially important to gunnery missions.

There are several things you can do to promote the best possible interphone communication and to make the maximum preparation for gunnery missions.

Whenever practicable, applicable and irrespective of the type of mission, send your crew to battle stations once you are airborne. The practice they gain in going from their takeoff positions to their individual battle stations will serve them in good stead in combat. Have them check in with you by interphone as soon as they are settled at their stations and are ready for

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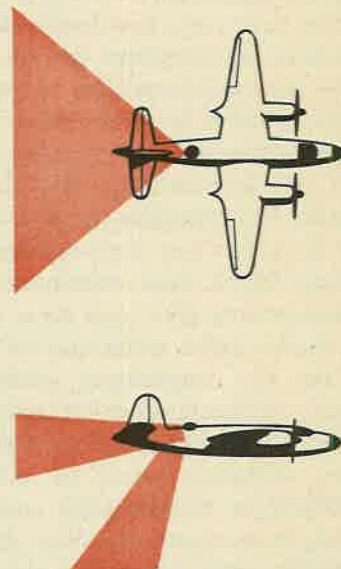
CREW ARMOR PLATE PROTECTION



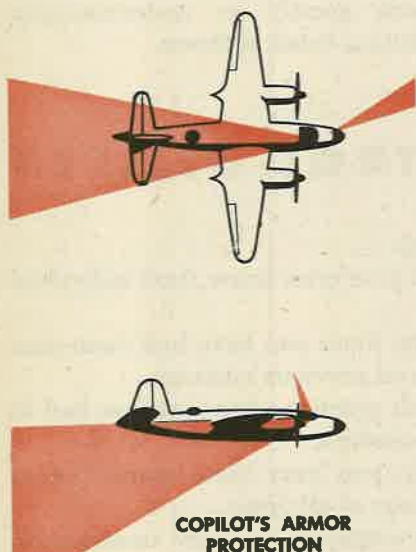
PILOT'S ARMOR PROTECTION



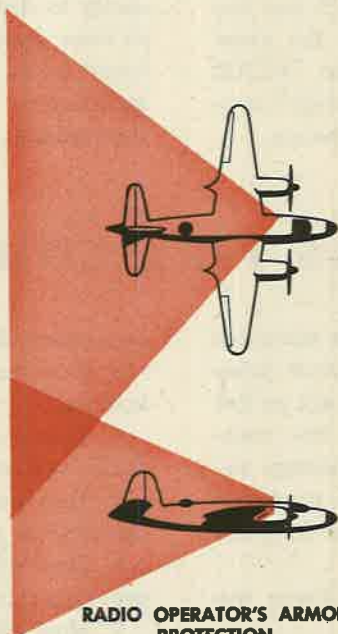
BOMBARDIER'S ARMOR PROTECTION



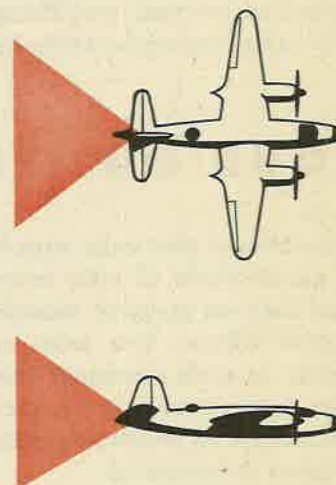
TURRET GUNNER'S ARMOR PROTECTION



COPLOT'S ARMOR PROTECTION



RADIO OPERATOR'S ARMOR PROTECTION



TAIL GUNNER'S ARMOR PROTECTION

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business. Have them unlimber their guns and track anything in sight. Every man on your crew needs as much sighting and aiming from his battle station as he can get. Any time you are at a loss as to how to keep any member of your crew constructively occupied, send him to his battle station to do sighting and aiming. While your crew is at battle stations, keep up a running conversation on the interphone. Rotate your conversations to provide the maximum practice for every man. Point out prominent terrain features, possible targets that they can use for tracking, etc.—anything you can think of to stimulate the use of the interphone. Be sure that you don't monopolize the conversation. Word your communications in such a manner as to give your crew as much practice in throat mike technique as possible.

Use the interphone exclusively as your means of communication with the other members of your crew during flight. Insist that all crew members stand by either on INTERPHONE or COMMAND constantly. Use the interphone constantly. You should check periodically with every member of your crew during flight. Try to keep their interest in their training aroused by keeping them fully informed of the progress of the mission in which you are engaged. Unless you do, you'll find the tail gunner asleep and the rest of the crew listening to "The Lone Ranger" on WCXR instead of learning something that might save your collective necks three months hence.

Use Standard Procedure

See that you and your crew employ the standard interphone procedure for all communication. No special codes, numbers, symbols, etc., should be adopted. Your crew is subject to a change in personnel at any time. If any one man fails to understand clearly an order or general point of information, he endangers the safety of the entire crew. To forestall this possibility, use the standard procedure as follows:

(Tail Gunner): "Tail gunner to pilot, over."

(Pilot): "Pilot to tail gunner, over."

(Tail Gunner): "Tail gunner to pilot, (message)."

Naturally, in circumstances where time is at a premium the establishment of contact can be eliminated, so that the procedure becomes:

(Tail gunner): "Tail gunner to pilot, bogies high at 7 o'clock."

See that your crew knows how to adjust their headsets and throat mikes properly with particular emphasis on the necessary tension and position required for intelligible throat mike transmission. Advise your crew to speak slowly and to use the lower ranges of voice pitch when making interphone transmissions. The higher tones of the voice lend themselves easily to distortion. Excitement normally tends to raise your tone of voice. Habitual use of the lower voice ranges in normal interphone communication aids greatly in understandable transmission during times of stress.

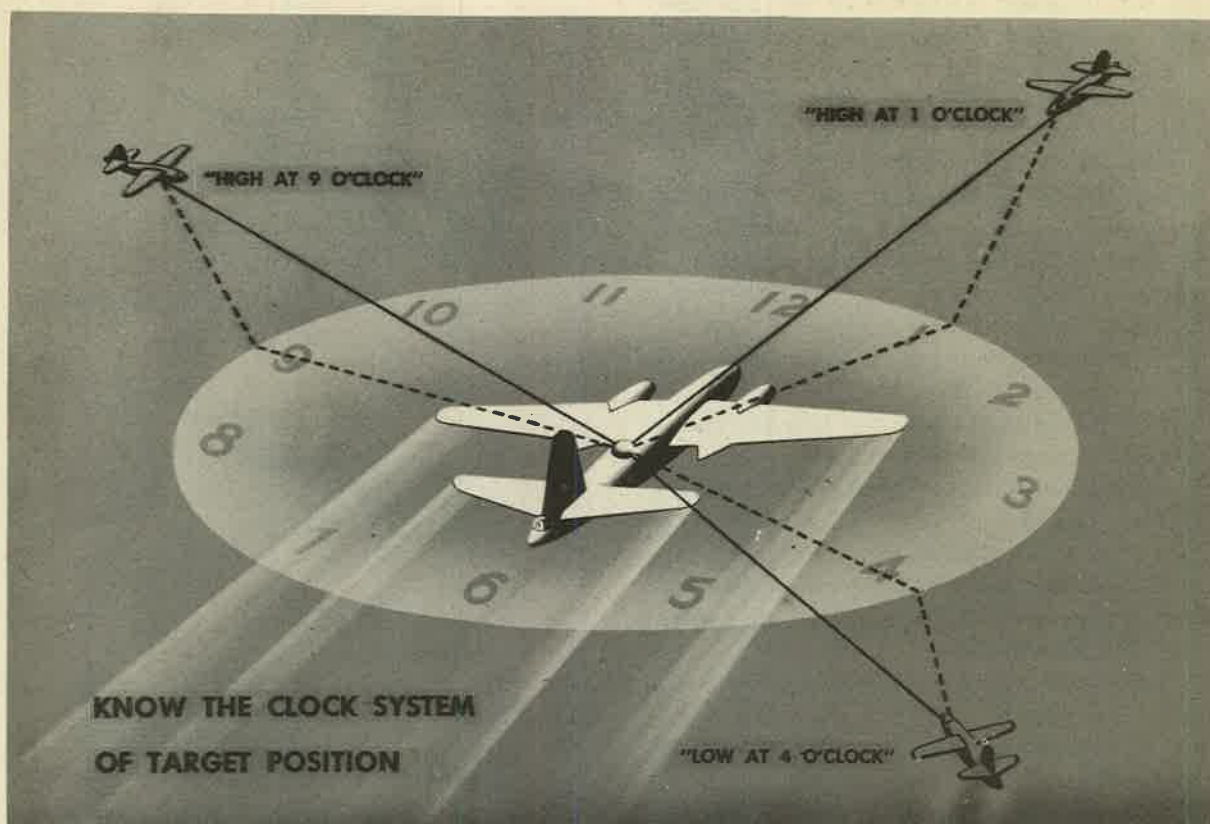
YOUR DUTIES AS FIRE CONTROL OFFICER

As always, you must supervise the activities of all members of your crew, but your principal duty on gunnery missions is to act as fire control officer. You must control fire completely in such a manner that no damage results to personnel or property. The ease and efficiency with which you perform this duty are a direct reflection of:

1. How well you and your crew know the armament equipment.
2. How many sessions you've held in the

armament shop.

3. How well your crew know their individual stations.
4. How many times you have had them man battle stations on previous missions.
5. How much practice your crew has had in interphone procedure.
6. How often you have used interphone on previous missions of all types.
7. How thoroughly your crew understands gunnery fundamentals.



SAFETY PRECAUTIONS AND PROCEDURES

Guns are not to be charged until you have given definite permission. You should give this permission only after you are in the target area, have ascertained that the area is clear, and have received proper clearance to fire. Each crew member reports by interphone when his guns are charged and he is ready to fire.

Designate relative target position and clear individual guns to fire on every pass. For example, "Target is at 9 o'clock low; turret and waist guns clear to fire." **Fire is conducted only from the stations you expressly clear.**

You must make every effort to fly your pattern in such a manner as to insure a clear shot for the stations cleared to fire. The gunnery instructor should advise you regarding the efficiency of your pattern.

Gun safeties are not disengaged until after clearance to fire has been given and are re-engaged immediately at the command "Cease

firing." They are left in **safe** position at all other times. At the command "Cease firing," all stations cease fire.

Fire must be conducted only in the proper direction.

1. Air-to-ground targets: Only along the stipulated target heading.

2. Air-to-water gunnery: Never toward shore unless more than 10 miles out. Never toward surface vessels unless more than 8 miles distant.

3. Air-to-air: Never closer than 30° to the tow-plane.

All crew members not firing are to aid the pilot in watching for other aircraft in the area or approaching surface vessels.

All stoppages must be reported immediately to the airplane commander. You in turn send the gunnery instructor to that station to supervise the clearing of the gun. You are advised

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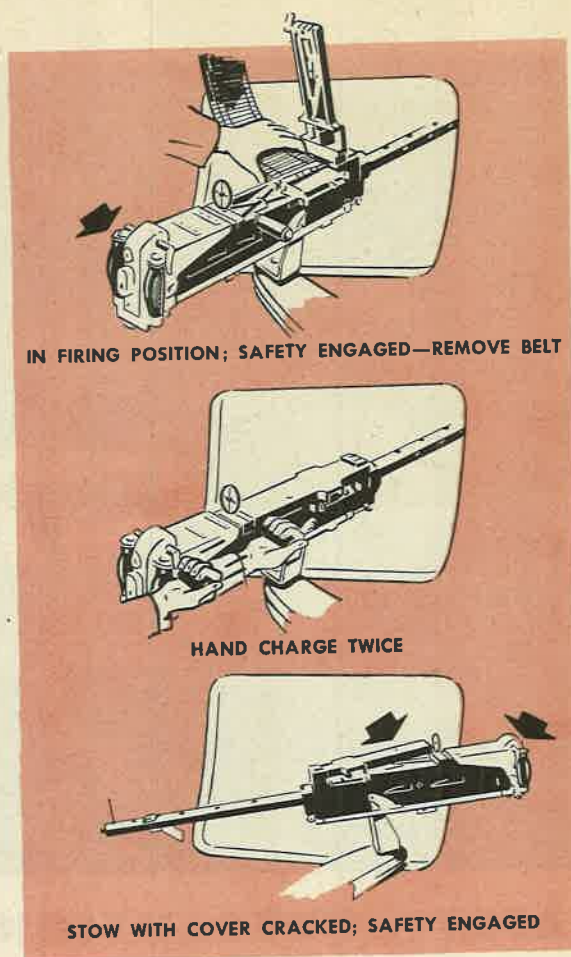
when the stoppage is cleared or the gun designated as jammed. Jammed guns are unloaded so far as possible and stowed with cover cracked and safety engaged. Guns should not be returned to the stowed position until there is no possibility of accidental discharge.

When fire is completed at any station, the guns are cleared and stowed immediately.

1. Swing gun to a firing position.
2. Check safety engaged.
3. Raise cover and remove belt.
4. Close cover and hand charge twice to insure that chamber is clear.
5. Open cover and retract bolt to make visual check of feedway, T-slot chamber.
6. Stow gun with cover cracked open 1/2 inch and safety engaged.

It is your responsibility to see that:

1. The bombardier-navigator checks all stations for proper clearance and stowage before leaving the target area.
2. Each crew member gathers and stows all brass at his station.
3. Crew members clean their own guns after the mission.
4. All unexpended ammunition is returned to armament section.
5. All crew members must be present at the mission critique.



TOW-TARGET GUNNERY

Either you or your copilot must guard the assigned interplane frequency at all times during tow-target missions. You must be constantly alert for messages or signals from the pilot of the towplane. If interplane radio contact fails, the pilot of the towplane will use these visual signals:

Rock wings—"clear to fire."

Dive and zoom—"cease firing."

You can signal the towplane that you have completed firing by pulling alongside and executing a peel-off.

In addition to the regular safety precautions, the following general rules apply particularly to tow-target gunnery.

On tow-target missions, no firing is done:

1. Until the target is fully extended.
2. Until voice or visual clearance to fire has been given by the pilot of the towplane.
3. When the firing ship is closer than 600 feet to the towplane.
4. When the angle of fire from the towplane's course is less than 30 degrees.
5. When the towplane is turning.



GUNNERY TIPS

- ★ On air-to-water or air-to-ground fixed gunnery missions, avoid freezing on the sight. There is a common tendency to neglect altitude considerations when you are firing the fixed guns at a ground or water target.
- ★ On air-to-water flexible missions, approach the target area at an altitude above 1000 feet to insure sufficient visibility to ascertain that the area is clear.
- ★ On over-water missions, don't forget that your depth perception is not to be trusted because of lack of reference objects.
- ★ When firing your fixed guns from air to ground, do not turn gun switches ON until firing pass is started. Turn them OFF as soon as you pass over target.

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