EMERGENCY INSTRUCTIONS

Model B-26, B-26A, B-26B Airplanes

July 31st, 1942

The instructions given on the following pages are those which have been followed on previous occasions and may therefore be considered as the best procedure available under the noted conditions. However, unforseen conditions may arise which have not previously been experienced. It is therefore essential that each pilot and crew member thoroughly familiarize himself with the airplane and its operating systems in order to satisfactorily accomplish intended missions.

ELECTRICAL SYSTEM EMERGENCIES

A. In the event that a complete failure of the electrical system is imminent; i.e., both generators have ceased to function and this fact has not been noted in time to save the remaining energy in the batteries; usually there will be an indication of the coming failure by oscillation of the Landing Gear and Flap indicator and/or oscillation of the Autosyn Instruments:

1. Place Propeller Toggle Switches in FIXED PITCH.

2. IMMEDIATELY turn off both Generator Switches (This is important).

3. IMMEDIATELY turn off both Battery Switches.

NOTE: Even though Propeller Toggle Switch remains in AUTOMATIC, propellers automatically fix when electrical current is cut, but place Propeller Toggle Switch in FIXED PITCH position to prevent surge when batteries are turned back on. Remember that any change in air speed immediately changes the RPM. For instance, if cruising speed was 200 IAS, RPM 2000, manifold pressure 25", and altitude 5000 feet at time electrical current is lost, or you place propellers in fixed pitch, your RPM will remain the same as long as you accurately hold your altitude and Air Speed. If you allow nose to drop and your air speed increases to 220 MPH you may get an increase of from 200 to 400 RPM. Conversely, if you allow Airplane to climb, your RPM will immediately decrease. This entirely normal re-action of Propellers in a fixed pitch condition, sometimes in moments of stress, causes pilots to believe that Propellers are "running away" or conversely "trying to feather". Naturally changes in throttle settings will also affect your RPM; for you are now flying a Fixed Pitch Propeller Type Airplane.

After 15 to 30 minutes flying, your batteries should rebuild sufficient energy to allow you approximately five (5) minutes; (this is an estimate only), to set your propellers to desired RPM by use of INCREASE and/or DECREASE RPM Switches.

4. For landing purposes in FIXED PITCH, it has been found by experimenting that a good optimum setting is approximately 2200 RPM, with 25" manifold pressure at 150 MPH. This will give you plenty of power if needed, to drag in the field or go around again.

B. The next condition of an electrical emergency to be considered is the discovery that both Generators have failed but that the Batteries are not completely discharged. In this condition, it is estimated from the known capacities of the Batteries that you have at least thirty minutes of full operation. In this case, if you are still several hours from a landing, follow the same procedure:

1. Set Power and RPM to Desired Cruising.

2. Place Propeller Toggle Switches to FIXED PITCH.

3. Turn off both Generator Switches.

4. Turn off both Battery Switches.

Now, with a known reserve of electrical energy in batteries, it is possible to turn on Battery Switches every ten or fifteen minutes, to check Engine Instruments, etc., reserving sufficient energy to make a normal landing at destination with Propeller Toggle Switches in AUTOMATIC. If any doubt of sufficient current when preparing to land, follow procedure of setting propellers, etc. as outlined in (A-4) above.

PROPELLER EMERGENCIES

PROPELLER GOVERNORS

CASE I.

On some take-offs, especially where Throttles are "Jammed" ON too suddenly to allowable rated power of 49", one or both engines may over-rev momentarily causing a howling sound. This is entirely normal and governors usually control the RPM back to 2600 or 2650 RPM. If, however, as acceleration of airplane increases, and the RPM goes above the allowable without instantly coming back:

1. Cut Throttles - discontinuing take-off.

   NOTE: On most fields this can be done with absolutely no danger even after reaching take-off speeds of from 100 to 110 MPH.

2. Check to see if Propeller Safety Switches are ON and if Propeller Toggle Switches are in AUTOMATIC. If these are in proper settings - governor failure is indicated.

3. Have Governor setting checked.

In many cases where Propellers go to as high as 2700 to 2725 RPM on take-off run, it is caused by Governor setting being a little high. An experienced pilot generally has time enough during take-off run to see if they hold at this RPM and also to try his Propeller Governor Controls to see if they decrease the RPM, and hold it. In any case of doubt, however, cut throttles and discontinue take-off.

CASE II.

If shortly after take-off a propeller Governor fails, allowing RPM to increase rapidly, causing what is known erroneously as a "Run-Away" Propeller, the seriousness of this emergency depends mainly on the Air Speed, RPM and Power at time of Governor failure.

If for instance governor failed at 120 MPH with Landing Gear retracting or fully retracted with 48" HG Manifold Pressure and 2600 RPM, your Air Speed is naturally increasing, so RPM starts increasing rapidly. If Air Speed is held at 120 MPH, RPM should remain nearly constant at 2600. However, the natural inclination and in fact, IMPERATIVE one is to obtain a safer airspeed, of at least 150 MPH. In doing this, RPM will probably increase to 3000 RPM or more. We are making this problem difficult by assuming that the DECREASE RPM Switch and FEATHERING SWITCH are also Inoperative.

Naturally, if DECREASE RPM Switch is working, the correction is relatively simple by allowing Air Speed to increase where desired and holding RPM within safe limits by means of the DECREASE RPM Switch.

Continuing our problem, however, from the point 120 MPH, 48" and 2600 RPM and the propeller starts "Running Away", the following procedure will be accomplished very rapidly.

1. Leave good Engine alone but be prepared for YAW toward "Run Away" Engine.

2. Pull back Propeller Governor Control Handles, if RPM does not decrease immediately.

3. Hold Propeller Toggle Switch to DECREASE RPM, and if RPM does not decrease immediately.

4. Release Propeller Toggle Switch to FIXED PITCH POSITION.

5. Reduce Manifold Pressure on "Run Away" Engine to hold RPM at a maximum of 3000.

6. WATCH FOR YAW - DON'T FORGET TO FLY AIRPLANE. Until safe Air Speed and Altitude is reached, this is of more importance than anything else! It may be necessary at this point to reduce power and RPM on good Engine to keep Airplane under control. Use Trim Tabs to obtain best flying conditions to hold 150 MPH in level flight. As you drop nose, power must be reduced to keep from increasing Air Speed (which in turn will cause fixed Propeller to increase RPM). Keep good Engine slightly down and make all turns (gentle only) toward it. Return toward landing position.

It should be possible now by experimenting to find the best setting for the "Run-Away" Engine. Reduce Manifold Pressure to reduce RPM as low as possible, holding Air Speed constant but do not reduce Manifold Pressure below 15" until ready to land. Use extreme caution in making approach, being especially careful not to undershoot. Try to make your landing a good 400' to 500' inside field, remembering that this airplane can be brought to a stop in a very short distance.

CASE III.

From the above procedure it can be seen that a Propeller Governor failure while at cruising speeds and altitudes is a relatively simple problem, even should both Propeller Governors fail simultaneously.

By all laws of averages, this is an extremely remote possibility, except in the case of a partial or complete electrical power failure, which is not truly a governor failure but would cause propellers to fail to respond to governors.

Propeller setting and Landing Procedure is fully covered under the heading of ELECTRICAL SYSTEM EMERGENCIES.

HYDRAULIC EMERGENCIES

These can be evidenced in several ways such as: (1) failure of landing gear to retract fully after take-off, (2) pressure gauge reading below normal, or (3) pressure gauge reading "0".

CASE I. B-26, B-26A, B-26B Airplanes.

Hydraulic pressure normal before take-off, but Landing Gear fails to retract after take-off. This generally indicates an air lock around Hydraulic Pumps, but may be a more serious condition, so if possible follow this procedure:

1. Return Landing Gear Handle to "DOWN" position.
2. Pump Landing Gear down and locked with Hydraulic Hand Pump (on Right Side of Pedestal).
3. Pump Flaps down as desired.
4. All White Handles to "NEUTRAL". (Important)
5. Check Landing Gear Indicator that Gear is down and locked.
6. Depress Brakes; pump up pressure to approximately 1200#. Release and repeat several times.
7. Land, with Brakes slightly depressed (WARNING: Do not land with brakes locked.) and co-pilot steadily pumping Hand Pump. Do not fully release Brake Pedals at any time during glide and landing run, for this will release the pressure being built up on them by the Hand Pump. With this procedure, it should be possible to make a normal braking stop. If not, use Emergency Air Brake Handle (on Center Stringer above and to the right of Pilot's head).
8. Have Hydraulic System checked for mal-functioning.

If air is present in system, "Bleeding" can be accomplished from cock-pit by the following procedure on ground:

IMPORTANT: CHECK FOR PROPER RESERVOIR LEVEL AND ACCUMULATOR AIR PRESSURE.

1. Both Engines idling.
2. All White Handles to "NEUTRAL" - except Landing Gear, which is down.
3. Slowly push Emergency Nose Gear Handle (Red) to full "DOWN" position.

4. Slowly pump Brake Pedals twenty to thirty times, fully depressing and releasing.

5. Place Emergency Nose Gear Handle (Red) to Full "UP" position.

6. Increase RPM to 1000 - 1200.

7. Hydraulic Pressure should go to Normal - 950 - 1050#.

8. If not, repeat above procedure and check.

9. If no Hydraulic Pressure results, the mal-functioning probably caused by other than air in system.

In the event that Hand Pump (as outlined in #2 above) fails to pump Landing Gear down, "Bleeding" procedure in air may be tried as follows:

1. Climb to safe altitude (2000' to 4000') and trim airplane for level flying.

2. Have member of crew check for leaks and that there is sufficient Hydraulic Fluid in Reservoir.

3. Reduce RPM to 1600 - 1800, increasing power to comfortably hold altitude at approximately 150 MPH. Pilot must not forget to hold altitude and air speed while he is busy with "Bleeding" procedure. Straight flying with no turns, or turns of gentle bank only, recommended.

4. All White Painted Handles "NEUTRAL".

5. Emergency Nose Gear Handle (Painted Red) to Full "DOWN" position.

6. Slowly pump Brake Pedals, Full "DOWN" and release, 20 to 30 times.

7. Emergency Nose Gear Handle (Painted Red) Full "UP".

8. Check Hydraulic Pressure Gauge. If indication of pressure (100# to 300#) is shown immediately, wait one to three minutes. If pressure does not come up to normal, repeat above procedure. Usually, two to three operations will be successful and Hydraulic system will function normally thereafter.

If after two or three "Bleeding" operations, no Hydraulic Pressure can be obtained, it is recommended that the Emergency Gear procedure as outlined on Pedestal be used.

It must be stressed at this point, that "Bleeding" is useless if Hydraulic failure is caused by loss of Hydraulic Fluid, so it is

necessary to check that sufficient fluid is available before starting "Bleeding" procedure.

CASE II. Loss of Hydraulic Fluid (B-26 and B-26A Airplanes)

There is a Stand Pipe in the Hydraulic Reservoir which, in case of leaks anywhere in the normal hydraulic system, retains enough fluid to lower Landing Gear by means of an Emergency Landing Gear System. This procedure is outlined on Pedestal and is as follows:

1. Main Landing Gear Handle (White) to "DOWN" position.

2. Emergency Nose Wheel Handle (Red) to "DOWN" position.

3. Pump hand pump until Nose Gear is down and locked.

4. Emergency Main Gear Handle (Red) to "DOWN" position.

5. Pump Hand Pump until Main Gear is down and locked.

   NOTE: One Main Gear usually will unlock and go to the down position first. Keep pumping Hand Pump and the other will go down and lock.

6. Return Emergency Main Gear Handle and Emergency Nose Wheel Handle (Red) to "UP" position.

7. Place Main Landing Gear Handle (White) to "NEUTRAL".

8. With Flap Handle "DOWN", pump Flaps down and return Handle to "NEUTRAL". If there is insufficient pressure remaining to pump Flaps down, place Flap Control Handle (White) to "DOWN" position. (This is important). Member of crew may now crank flaps down mechanically, by means or crank on Rear Bulkhead of Forward Bomb Bay.

9. Check Air Bottle forward of Navigator's Seat to see that Valve is open and pressure is normal (1000#).

10. If possible, use braking procedure outlined in #7, Case I, but landing can be made using Emergency Air Brake. Do not pull until you have used as much of your landing run to kill off speed, as is consistent with safety. This must always be a matter of the pilot's judgement, however. Remember that when the Air Brakes are pulled, the Brakes are locked fully on and exert powerful braking action, so if the speed can be decreased to 40 to 50 MPH or less, tires, propeller tips, etc. may be saved from damage.

CASE III. Loss of Hydraulic Fluid (B-26B) Where Emergency Tank Has Been Provided, Stand Pipe in Main Tank Has Been Removed)

1. Same procedure as above, except place valve (which is located right of pilot pedestal) to "EMERGENCY" position and make certain that this valve is in extreme position for emergency.

In any case of hydraulic failures, where the "Bleeding" procedure is unsuccessful, resort to the Emergency Landing Gear procedure.

LOAD AND FIRE VALVE EMERGENCIES

Nose Wheel Gear

There have been two instances where Pilot's Entrance Ladder has not been folded up and secured before take-off, resulting in damage to Nose Wheel Doors when Gear is retracted. This in turn will prevent Nose Wheel Gear Load and Fire Valve from operation when it is desired to lower Landing Gear. The Main Gears will operate normally, but the Nose Wheel will not unlock. It is essential that the crew be familiar with location of this valve as it will be necessary to "feel" for it when following this procedure. One should practice on ground finding this valve and proper placing of index and third finger on it, in order to hold it in firing position. This valve is located out of sight, forward and slightly to right of Bell Crank on upper end of rod to left Nose Wheel Door and on forward side of Cross Member Casting. The valve lies parallel to this cross member with plunger facing toward left.

CAUTION: Do not practice when gear is in normal operating condition because normal valve-operating cam may pinch fingers against plunger.

A. The procedure is as follows:

1. Place Landing Gear Handle in "UP" position.

2. One of the crew, while standing in Navigator's Compartment, opens sliding hatches, resting body weight on left hand placed on cockpit floor.

CAUTION: Do not rest weight on Nose Wheel which will be directly under you.

3. Reach right hand under and forward until valve is located; placing index and third finger on EDGES of valve plunger.

4. Press valve plunger in and hold - Tell or signal pilot to immediately return Landing Gear Handle to "DOWN" position. Hold valve in until Nose Wheel goes to "DOWN" and locked position.

B. Should it be impossible by above procedure to locate valve with fingers or impossible to press it in and hold it; there is another procedure by which it is possible to obtain direct access to this Valve:

1. Flying will be done from Co-pilot's position during this procedure.

2. Measure back 5 inches from bottom rear of brake control cover (this is the raised cover extending back from between Rudder Pedals on Pilot's side) and one inch over to the left from inside edge of Right hand track of Pilot's Sliding Seat. This point will be approximately over Load and Fire Valve.

3. Carefully "gouge" a small hole (3" to 4" square) through dural floor. Extreme caution must be used as engine control cables and hydraulic lines are under this point.

4. Plunger end of Load and Fire Valve will be exposed and can be pushed in with screwdriver or other suitable means as follows:

   a. Main Landing Gear Handle "UP" position.

   b. Press in Load and Fire Valve and hold; simultaneously placing Main Landing Gear Handle to "DOWN" position.

   c. Hold Load and Fire Valve in until Nose Gear is "DOWN" and locked.

   d. Check Landing Gear Indicator for Gear "DOWN" and Locked.

In some rare cases, with hydraulic system normal but with improper adjustment of Load and Fire Valve, the Nose Wheel Gear will not release. Either of above procedures may be followed, but use caution if the first or "finger" method is tried as the valve operating cam may come around and strike center of valve plunger while being held in.

MAIN GEAR

There may be a condition, usually rare, with Hydraulic Pressure normal where one, or the other of the Main Gear, Load and Fire Valves refuse to fire when Landing Gear Handle is placed to "DOWN" position. On one known occasion, this was made to function by the following procedure, which will be included in this list, in case it should ever be needed again. This may or may not work, but if it does, will save a "belly landing".

1. Try retracting and lowering Gear several times to see if it will work. If not, retract Main Gear.

2. Climb to fairly high altitude (10,000 to 12,000') as altitude will be lost during "Bleeding" operation.

3. Set Propeller Governor Controls to full High Pitch (Low RPM - approximately 1300) with as much power as is safe; not to exceed 25" HG. above 6000' or 31" HG. below 6000'.

4. Landing Gear Handle to "UP" position.

5. Bleed Hydraulic Pressure as LOW as possible (300 - 600#) by placing Emergency Nose Gear Handle DOWN and pumping Brakes.

6. While continuing "Bleeding" to hold Pressure as low as possible, Main Landing Gear Handle (White) to DOWN position. If mal-functioning Wheel has not released before 2000' is reached, advance RPM and Power and climb up to altitude. Repeat procedure. If not successful, a "belly landing" is indicated. When it is decided that a "Belly landing" is necessary.

   a. Retract gear. Leave Main Landing Gear Handle in "UP" position.

   b. Place Emergency Nose Gear Handle "DOWN".

   c. Bleed system as low as possible. (300 - 600#)

   d. Place Main Gear Handle in "DOWN" position.

      NOTE: At this point the good main gear may unlock if it is impossible to bleed hydraulic pressure low enough. Obviously if this happens it will be necessary to RETRACT all gear and make a full "belly landing".

   e. Pump Nose Gear "DOWN" and "LOCKED" by hand pump.

      NOTE: According to the Pilot's Manual, it is better to make a "belly landing" with Nose Gear DOWN and LOCKED.

   f. Return main gear handle to NEUTRAL.

ENGINE FAILURE AT TAKE-OFF

A. Probably the most serious emergency which can arise during take-off is failure of one or both engines. Action possible by the pilot in event of failure of both engines is very limited, therefore, this discussion will be restricted to recommended procedure in event of failure of one engine.

1. If one engine should fail during the ground run of a take-off, the immediate result would be that the airplane would swerve. The pilot should immediately cut the other engine and use the brakes as much as possible. It will be impossible, even with a light load, to continue the take-off with one engine.

2. Sudden failure of one engine during the short interval immediately after leaving the ground and before reaching the minimum speed for flying on single engine will cause the airplane to become uncontrollable, and if this takes place, the pilot should cut the other engine and land straight ahead. It is not practical to state definitely the minimum speed for single engine flying as this is determined to a large extent by the pilot's capabilities, the gross weight of the airplane, the power available from the remaining engine and the position of the landing gear. The average pilot on the alert and reacting quickly will be able to continue take-off with a normal gross weight, the landing gear in the process of retracting, if the air speed at the time of engine failure is not less than approximately ~~135~~ 130 M.P.H. The airplane speed should not be allowed to drop below the minimum of approximately ~~135~~ 150 M.P.H. at any time during flight on one engine.

3. The following actions on the part of the pilot, arranged in proper sequence, should enable him to accomplish the most possible in event of one engine failure.

a. Immediately apply all the rudder possible into the running engine and at the same time bank the airplane with the running engine down until a reasonable straight course can be maintained.

b. Retract the landing gear if it is not already retracted.

c. Feather the propeller on the failing engine. This action should be deliberate as it would naturally be disastrous to make a mistake and feather the running engine. Also, there is always a bare possibility that the failing engine may pick up and start running again.

d. Increase the power of the running engine to the fullest extent possible but do not greatly exceed rated take-off manifold pressure as this will lead to detonation with a consequent loss of power. Do not exceed rated manifold pressure at all if it is not necessary.

e. Reduce rudder forces, which will be heavy, by use of the rudder trim tab, thereby enabling the flight to continue on a straight course with the wings nearly horizontal. Do not under any circumstances permit the running engine to get above the failing engine

while flying at a slow speed. It is suggested that 200 M.P.H. be the minimum speed at which a turn is made into the failing engine while at low altitude.

f. If the pilot is using 60° wing flap for take-off, it will be necessary to raise the flaps as soon as possible in order to decrease drag. This will be a difficult operation at low altitude and at slow speeds. In order to prevent loss of altitude when the flaps are raised, it will be necessary to counteract the loss of lift by immediately pulling the nose up. If conditions are critical, i.e., low altitude and slow speed, the flaps should be raised in several steps or increments in order to avoid large changes in either speed or altitude.

g. The drag of the airplane may be further reduced, therefore increasing single engine performance, by closing the cowl flap and oil cooler shutter on the engine with the feathered propeller.

4. When making a single engine landing it should be remembered that the airplane cannot maintain altitude on one engine with the landing gear extended. The rudder trim tab used for single engine flight should be at least partially reduced before landing to prevent high rudder forces when the one engine is throttled. It should also be pointed out that the pilot is in serious difficulty again if he completely overshoots the landing field while on one engine with the landing gear down. On such a landing, the pilot should under no circumstances permit the speed to fall below 135 M.P.H. until he is definitely sure of making the landing.

NOSE GEAR UNLOCKED

There have been several cases where - Nose Wheel is down but lock pin does not insert (due to faulty alignment). This is indicated by warning horn when throttles are retarded and by position of Nose Gear Indicator Instrument. Successful landings have been accomplished with no damage, by the following procedure:

1. Move C. G. rearward (within allowable limits) by moving ballast or crew members rearward.

2. Co-pilot increase hydraulic pressure as high as possible by Hand Pump (Usually about 1200 lbs.).

3. Make normal Two-Point (Nose Up) Landing on Main Gear as close to end of run way as is consistent with safety. Co-pilot steadily pump hand pump during entire landing run and keep hydraulic pressure as high as possible (Hydrualic Pressure keeps Nose Gear from collapsing so this is important). Immediately after landing, lower nose wheel gently for a slight tap on run way, and raise again slightly, holding off as long as possible. (This probably will tap Lock Pin in place). Use as much of runway as possible without use of brakes, keeping control column all the way back. When necessary, apply brakes smoothly, avoiding sudden application.

"IMPORTANT" When airplane has stopped, DO NOT MOVE AGAIN UNTIL NOSE GEAR LOCK PIN IS VISUALLY CHECKED. If the landing jolted it in place - proceed with normal Taxi-in to line. If Nose Gear still unlocked, lock by some mechanical means usually easily accomplished.

a. Check hydraulic pressure for normal.

b. All White Painted Handles to NEUTRAL except Landing Gear.

c. Chock wheels or pull emergency air brake and Release Brakes (Important).

d. Cut engines.