AIRPLANE FLIGHT MANUAL

SECTION I

LIMITATIONS

The following limitations must be observed in the operation of this airplane:

A. ENGINES

Lycoming I0-360-C1 E6 with fuel injector Lycoming P/N LW-12586 (This engine installs on L. H. side of aircraft)
Lycoming LI0-360-C1E6 with fuel injector Lycoming P/N LW-12586 (This engine installs on R. H. side of aircraft)

ENGINE LIMITS
For all operation 2700 RPM, 200 HP

B. FUEL

100/130 Octane Aviation Gasoline (Minimum)

C. PROPELLERS

Hartzell HC-C2YK-2( )E/C7666A-O or Hartzell HC-C2YK-2( )EF/FC7666A-O
Avoid continuous operation between 2200-2400 RPM
Or Hartzell HC-C2YK-2CG( )/( )C7666A This model includes damper
(This model installs on L. H. side of aircraft) Constant Speed
Pitch Settings at 30 in. station:
High 79°-81°, Low 13.5
Diameter: Not over 76 inches
Not under 74 inches (No further reduction permitted)

Hartzell HC-C2YK-2( )LE/JC7666A-O or Hartzell HC-C2YK-2( )LEF/FJC7666A-O
Avoid continuous operation between 2200-2400 RPM
Or Hartzell HC-C2YK-2CLG( )/( )JC7666A This model includes damper
(This model installs on R. H. side of aircraft) Constant Speed
Pitch Settings at 30 in. station:
High 79° - 81°, Low 13.5
Diameter: Not over 76 inches
Not under 74 inches (No further reduction permitted)

D. INSTRUMENT MARKINGS (POWER PLANT)

OIL TEMPERATURE	
Green Arc (Normal Operating Range)	75°to245°F
Red Line (Maximum)	245°F
OIL PRESSURE	
Green Arc (Normal Operating Range)	60 PSI to 90 PSI
Yellow Arc (Caution)	25 PSI to 60 PSI
Red Line (Minimum)	25 PSI if installed or 60 PSI if installed
Red Line (Maximum)	90 PSI

TACHOMETER

For Hartzell HC-C2YK-2( )E, HC-C2YK-2( )EF, HC-C2YK-2( )LE or HC-C2YK-2( )LEF propellers:

Green Arc (Normal operating Range)	500 RPM to 2200 RPM &2400 RPM to 2700 RPM
Red Arc (Avoid continuous operation)	2200 RPM to 2400 RPM
Red Line (Maximum)	2700 RPM

For Hartzell HC-C2YK-2CG( ) or HC-C2YK-2CLG( ) propeller with dampers:

Green Arc (Normal Operating Range)	500 RPM to 2700 RPM
Red Line (Maximum)	2700 RPM

FUEL PRESSURE

Green Arc (Normal Operating Range)	14 PSI to 35 PSI
Red Line (Maximum)	35 PSI
Red Line (Minimum)	14 PSI

FUEL FLOW

Red Line (Maximum)	19.2 GPH

CYLINDER HEAD TEMPERATURE

Green Arc (Normal Range)	200° to475°F
Red Line (Maximum)	475°F

E. AIRSPEED LIMITATIONS AND INDICATOR MARKINGS (Calibrated Airspeed)

NEVER EXCEED SPEED	217 MPH
MAXIMUM STRUCTURAL CRUISING SPEED	190 MPH
DESIGN MANEUVERING SPEEDS	
Minimum Weight (2743 1bs.)	133 MPH
Maximum Weight (4200 1bs.)	146 MPH
MAXIMUM FLAPS EXTENDED SPEED	125 MPH
MAXIMUM GEAR EXTENDED SPEED	150 MPH
MAXIMUM GEAR RETRACT SPEED	125 MPH
MINIMUM CONTROL SPEED (Single Engine)	80 MPH

AIRSPEED INDICATOR MARKINGS

Green Arc (Normal Operating Range)	76 MPH to 190 MPH
Yellow Arc (Caution Range- Smooth Air)	190 MPH to 217 MPH
White Arc (flaps Extended Range)	69 MPH to 125 MPH
Radial Red Line (Never Exceed- Smooth Air)	217 MPH
Radial Red Line (Minimum Control Speed- Single Engine)	80MPH
Radial Blue Line (Best R/C Speed Single Engine)	105 MPH

F. FLIGHT LOAD FACTORS (Flaps Up)

Positive Load Factor (Maximum)	3.8 G
Negative Load Factor (Maximum)	No inverted maneuvers approved

G. MAXIMUM WEIGHT 4:00 LBS.
MAXIMUM LANDING WEIGHT 4000 LBS.

H. C. G. RANGE

Weight Pounds	Forward Limit Inches Aft of ·Datum	Aft Limit Inches Aft of Datum
2780	80.7	94.6
3400	82.0	94.6
4200	87.9	94.6

NOTES

1. Straight line variation between the points given.
2. Datum is 78.4 inches forward of wing leading edge from the inboard edge of the inboard fuel tank.
3. It is the responsibility of the airplane owner and the pilot to assure that the airplane is properly loaded. Maximum allowable gross weight 4200 pounds. See "Weight and Balance Section" for proper loading instructions.

I. UNUSABLE FUEL
The unusable fuel in this aircraft has been determined as 2.5 gallons in each wing in critical flight attitudes. (2.5 gallons is the total per side, each side having two interconnected tanks)

J. USABLE FUEL
The usable fuel in this aircraft has been determined as 46.5 gallons in each wing (46.5 gallons is the total per side, each side having two interconnected tanks).

K. PLACARDS
In full view of the pilot:

THIS AIRPLANE MUST BE OPERATED AS A NORMAL CATEGORY AIRPLANE IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS, AND MANUALS. NO ACROBATIC MANEUVERS (INCLUDING SPINS) APPROVED.

THIS AIRCRAFT APPROVED FOR VFR, IFR, DAY AND NIGHT NON-ICING FLIGHT WHEN EQUIPPED IN ACCORDANCE WITH FAR 91 OR FAR 135.

When properly equipped the above placard shall read:

THIS AIRCRAFT APPROVED FOR VFR, I F R , D A Y , NIGHT, AND ICING CONDITIONS WHEN EQUIPPED IN ACCORDANCE WITH FAR 91 OR FAR 135.

MAXIMUM TAKEOFF WEIGHT 4200 POUNDS
MAXIMUM LANDING WEIGHT 4000 POUNDS
ALL WEIGHT IN EXCESS OF 4000 POUNDS MUST CONSIST OF FUEL.

On instrument panel in full view of the pilot:

1. "DEMONSTRATED CROSSWIND COMPONENT 15 MPH"
2. "MINIMUM SINGLE ENGINE CONTROL SPEED 80 MPH"
3. "ROUGH AIR OR MANEUVERING SPEEDS'
   "2743 LB GW - 133 MPH"
   "4200 LB GW - 146 MPH"
4. "GEAR DOWN 150 MPH MAX"
   "GEAR UP 125MPH MAX"
   "EXTENDED 150 MPH MAX"

Near emergency gear release:

EMERGENCY GEAR EXTENSION
PULL TO RELEASE. SEE A.F.M.
BEFORE RE-ENGAGEMENT.

.Near gear selector switch:

"GEAR UP 125 MPH MAX"
"DOWN 150 MPH MAX"

Adjacent to upper door latch (Front and rear doors):

"ENGAGE LATCH BEFORE FLIGHT"

In full view of pilot:

WARNING- TURN OFF STROBE LIGHTS WHEN TAXIING IN VICINITY OF OTHER AIRCRAFT, OR DURING FLIGHT THROUGH CLOUD, FOG OR HAZE.

On the inside of forward baggage compartment door:

"MAXIMUM BAGGAGE THIS COMPARTMENT 100 LBS. SEE THE LIMITATIONS SECTION OF THE AIRPLANE FLIGHT MANUAL."

On aft baggage closeout:

"MAXIMUM BAGGAGE THIS COMPARTMENT 100 LBS. NO HEAVY OBJECTS ON HAT SHELF."

On instrument panel:

"SINGLE ENGINE STALLS NOT RECOMMENDED. CAN CAUSE 500 FT. LOSS OF ALTITUDE AND 15° PITCH ANGLE."

On instrument panel:

"TAKEOFF CHECKLIST
Fuel Selectors On
Electric Fuel Pumps On
Alternators On
Engine Gauges Checked
Mixtures Set
Propellers Set
Alt. Air Off
Cowl Flaps Set
Seat Backs Erect
Flaps Set
Trim Set (Stab. & Rudder)
Fasten Belts/Harness
Controls Free - Full Travel
Doors -Latched"

"LANDING CHECKLIST
Seat Backs Erect
Fasten Belts/Harness
Fuel Selectors On
Cowl Flaps Set
Electric Fuel Pumps On
Mixtures Rich
Propellers Set
Gear Down
Flaps Set- 125 MPH Max."

Adjacent to fuel tank filler cap:

"FUEL- 100/130 AVIATION GRADE- USABLE CAPACITY 46.5 GAL."

On storm window:

"DO NOT OPEN ABOVE 150 MPH."

On instrument panel:

"OIL COOLER WINTERIZATION PLATE TO BE REMOVED WHEN AMBIENT TEMPERATURE EXCEEDS 50 °F."

On switch located below engine control pedestal with windshield heating installation:

"WINDSHIELD PANEL HEAT - SEE AIRCRAFT FLIGHT MANUAL."

On engine instrument panel cover to left of engine controls with windshield heating installation:

"WARNING - THIS AIRCRAFT IS NOT APPROVED FOR FLIGHT IN ICING CONDITIONS."

In full view of the pilot for flight with the aft fuselage doors removed: "FOR

FLIGHT WITH AFT DOORS REMOVED, CONSULT THE LIMITATIONS AND PROCEDURES SECTIONS OF THE AIRPLANE FLIGHT MANUAL."

L. VACUUM GAUGE

The operating limits for the vacuum system are 4.5 to 5.2 inches of mercury for all operations.

M. FLIGHT INTO KNOWN ICING CONDITIONS

For flight in icing conditions the following equipment must be installed in accordance with Piper drawings or in an FAA approved manner:

1. Pneumatic wing and empennage boots.
2. Electro thermal propeller boots.
3. Electric windshield panel.
4. Heated pitot head.
5. Anti-icing fuel tank vents.
6. Propeller governor shield and deflectors.
7. Wing ice light.
8. Heated Stall Warning Transmitters.

SECTION II

PROCEDURES

A. NORMAL PROCEDURES

1. WING FLAP SETTINGS

Take-Off 0°
Landing 40°
The flaps are manually operated.
Flap deflection versus handle position is:

First notch	10 Degrees
Second notch	25 Degrees
Third notch	40 Degrees

2. COWL FLAPS

Cowl flaps are provided to allow manual control of engine temperatures. The cowl flaps should be open during ground operations and in climbs. In no case should the cylinder head temperatures be allowed to exceed 475° F and the oil temperatures allowed to exceed 245°F.

3. GO-AROUND PROCEDURES

If a go-around from a normal landing with the airplane in the landing configuration becomes necessary:

a. Apply takeoff power to both engines.
b. Establish positive climb.
c. Retract wing flaps.
d. Retract landing gear.
e. Adjust cowl flaps for adequate engine cooling.

B. SYSTEM OPERATIONS AND CHECKS

1. ALTERNATOR SYSTEM DESCRIPTION

The two ammeters continuously indicate the alternator outputs.

Certain regulator failures can cause the alternator output voltage to increase uncontrollably. To prevent damage, overvoltage relays are installed to automatically shut-off the alternator(s). The overvoltage trip lights adjacent to the alternator switches on the switch panel illuminate to warn of the tripped condition.

The alternator switch must be OFF to use the press-to-test feature of the overvoltage trip lights.

2. ALTERNATOR SYSTEM OPERATION

Both alternator switches should be ON for normal operation.

A preflight check should assure operation of the overvoltage lights, and that both ammeters show approximately equal outputs when both engines are at 1500 RPM or more.

Alternator outputs will vary with the electrical equipment in use and the state of charge of the battery. Alternator outputs should not exceed 60 amperes each except during engine cranking.

3. CIRCUIT BREAKERS

All circuit breakers are grouped in the lower right corner of instrument panel. To reset the circuit breakers push in on the reset button.

4. FUEL MANAGEMENT

a. Normal Operation

Each engine is normally supplied with fuel from the two interconnected tanks on the same side of the airplane. These two interconnected tanks are considered a single tank for tank selection purposes.

(1) Take-off and landing
- (a) Fuel selectors in "ON" position
- (b) Electric fuel pumps "ON"

(2) Cruising
- (a) Fuel selectors in "ON" position
- (b) Electric fuel pumps "OFF"

b. Crossfeed Operation and Single Engine Operation

A crossfeed is provided to increase range during single engine operation. Fuel system operation is as follows:

(1) Cruising
- (a) When using fuel from tank on the same side as the operating engine:
  - (1) Fuel selector of operating engine in "ON" position.
  - (2) Fuel selector of inoperative engine in "OFF" position.
  - (3) Electric fuel pumps "OFF" (except in case of engine driven pump failure, electric fuel pump on operating engine side must be used).
- (b) When using fuel from tank on the side opposite the operating engine:
  - (1) Fuel selector of operating engine in "X-FEED" (CROSSFEED) position.
  - (2) Fuel selector of inoperative engine in "OFF" position.
  - (3) Electric fuel pumps "OFF" (except in case of engine driven pump failure, electric fuel pump on operating engine side must be used).
- (c) Use crossfeed in level flight only.

(:i) Landing
(a) Fuel selector of operating engine in ON position.
(b) Fuel selector of inoperative engine in OFF position.
(c) Electric fuel pump of operating engine ON.

c. Crossfeed Operation With Both Engines Operating

In cruising flight it is permissible to operate both engines from the same tank.

d. Turning takeoffs

Fast taxi turns immediately prior to takeoff run can cause temporary malfunction of one engine during takeoff if the electric boost pumps are not in the ON position.

5. LANDING GEAR DOWN LIGHTS

The green gear down lights on the instrument panel indicate when each landing gear is down and locked. GEAR INDICATOR LIGHTS ARE DIMMED WHILE THE NAVIGATION LIGHTS ARE ON.

6. LANDING GEAR UNSAFE WARNINGS

The red landing gear unsafe light will illuminate when the landing gear is in transition between the full up position and the down and locked position. Additionally, on aircraft with serial numbers 34-7250046 and up, the light will illuminate when the gear warning horn sounds. The gear warning hom will sound at low throttle settings with the gear in the up position.

The light is off when the landing gear is in either the full down and locked or full up positions.

7. REAR CABIN AND CARGO DOORS REMOVED

a. Limitations

The airplane is approved for flight with the rear cabin and cargo doors removed.

The following limitations must be observed in the operation of this airplane with the rear cabin and cargo doors removed:

(1) Maximum speed -150 MPH.
(2) Minimum single engine control speed - 81 MPH.
(3) No smoking.
(4) All loose articles must be tied down and stowed.
(5) Jumper's static lines must be kept free of pilot's controls and control surfaces.
(6) Operation approval for VFR non icing flight conditions only.

(b) Procedure

(1) When operating with the rear cabin and cargo doors removed, it is recommended that all occupants wear parachutes.

THIS PAGE INTENTIONALLY LEFT BLANK

C. EMERGENCY PROCEDURES

1. DETECTING A DEAD ENGINE

a. Loss of Thrust
b. Nose of aircraft will yaw in direction of dead engine (with coordinated controls)

2. FEATHERING PROCEDURE

The propellers can be feathered only while the engine is rotating above 800 RPM. Loss of centrifugal force due to slowing RPM will actuate a stop pin that keeps the propeller from featherin9 ;each time the engine is stopped on the ground. Single engine performance will de1fease if the propeller of the inoperative engine is not feathered.

NOTE

If circumstances permit, in the event of an actual engine failure, the pilot may elect to attempt to restore power prior to feathering. The following actions are suggested:
(1) Mixture - As Required
(2) Fuel Boost Pump- On
(3) Fuel Selector- Crossfeed
(4) Magnetos - Select L or R only
(5) Alternate Air- On

a. Minimum Control Speed- 80 MPH.
b. Best R/C Speed Single Engine- 105 MPH.
c. Maintain Direction and Airspeed above 90 MPH.
d. Mixture Controls- forward.
e. Propeller Controls- forward.
f. Throttle Controls- forward.
g. Flaps- retract.
h. Gear- retract.
i. Electric Fuel Pumps- "ON."
J. Identify inoperative engine.
k. Throttle of inoperative engine- retard to verify.
l. Propeller of inoperative engine - feather.
m. Mixture of inoperative engine- idle cut off.
n. Trim - as required.
o. Maintain 5° bank toward operating engine.
p. Electric Fuel Pump of inoperative engine- "OFF."
q. Magnetos of inoperative engine- "OFF."
r. Cowl Flaps - close on inoperative engine, use as required on operative engine.
s. Alternator of inoperative engine- "OFF."
t. Electrical Load - reduce to prevent battery depletion.
u. Fuel Management - fuel "OFF" inoperative engine; consider crossfeed use.
v. Electric fuel pump operative engine- "OFF."

3. UNFEATHERING PROCEDURE
   a. Fuel selector inoperative engine- "ON."
   b. Electric fuel pump inoperative engine- "OFF."
   c. Throttle - open 1/4 inch.
   d. Propeller control - forward to cruise RPM position.
   e. Mixture - rich.
   f. Magneto switches- "ON."
   g. Starter- engage till prop windmills.
   h. Throttle - reduced power till engine is warm.
   i. If engine does not start, prime by turning electric fuel pump of inoperative engine on for 3 seconds and then repeat steps g., h., and i.
   j. Alternator- "ON."

4. FUEL MANAGEMENT DURING SINGLE ENGINE OPERATION

A crossfeed is provided to increase range during single engine operation. Fuel system operation is as follows:

   a. Cruising
      (1) When using fuel from tank on the same side as the operating engine:
         (a) Fuel selector of operating engine in "ON" position.
         (b) Fuel selector of inoperative engine in "OFF" position.
         (c) Electric fuel pumps "OFF" (except in case of engine driven pump failure, electric fuel pump on operating engine side must be used).
      (2) When using fuel from tank on the side opposite the operating engine:
         (a) Fuel selector of operating engine in "X-FEED" (CROSSFEED) position.
         (b) Fuel selector of inoperative engine in "OFF" position.
         (c) Electric fuel pumps "OFF" (except in case of engine driven pump failure, electric fuel pump on operating engine side must be used).
      (3) Use crossfeed in level flight only.

   b. Landing
      (1) Fuel selector of operating engine in "ON" position.
      (2) Fuel selector of inoperative engine in "OFF" position.
      (3) Electric fuel pump of operating engine "ON."

5. ENGINE FAILURE DURING TAKEOFF

The single engine minimum control speed for this airplane is 80 mph (CAS) under sea level standard conditions.

a. If engine failure occurs during takeoff ground roll and 100 mph (CAS) has not been attained, CLOSE BOTH THROTTLES IMMEDIATELY AND STOP STRAIGHT AHEAD. If inadequate runway remains to stop, then:
   (1) Throttles- CLOSED.
   (2) Brakes- apply maximum braking.
   (3) Master switch- OFF.
   (4) Fuel selectors- OFF.
   (5) Continue straight ahead, turning to avoid obstacles as necessary.

b. If engine failure occurs during take-off ground roll or after lift-off with gear still down and 100 mph (CAS) has been attained:
   (1) If adequate runway remains, CLOSE BOTH THROTTLES IMMEDIATELY, LAND IF AIRBORNE, AND STOP STRAIGHT AHEAD.
   (2) If the runway remaining is inadequate for stopping, the pilot must decide whether to abort the takeoff or to continue. The decision must be based on the pilot's judgment considering loading, density altitude, obstructions, the weather, and the pilot's competence. If the decision is made to continue, then:
      (a) Maintain heading and airspeed.
      (b) Retract landing gear when climb is established.
      (c) Feather inoperative engine (see feathering procedure).

THIS PAGE INTENTIONALLY LEFT BLANK

6. ENGINE FAILURE DURING CLIMB-

The single engine minimum control speed for this airplane is 80 mph (CAS) under sea level standard conditions.

a. If engine failure occurs when airspeed is below 80 mph (CAS) reduce the power on the good engine as required to maintain directional control. Reduce nose attitude to accelerate toward the single engine best rate of climb speed of 105 mph. Then feather inoperative engine (see feathering procedure).

b. If engine failure occurs when the airspeed is above 80 mph (CAS):
   (1) Maintain directional control.
   (2) Adjust airspeed toward the single engine best rate of climb speed of 105 mph.
   (3) Feather inoperative engine (see feathering procedure).

7. SINGLE ENGINE LANDING

a. Feather inoperative engine (see feathering procedure).
b. Do not extend landing gear until certain of making field.
c. Do not lower wing flaps until certain of making field.

Maintain additional altitude and speed during approach, keeping in mind that landing should be made right the first time and that a go-around may require the use of full power on the operating engine, making control more difficult.

A final approach speed of 105 miles per hour and the use of 25° rather than full wing flaps will place the airplane in the best configuration for a go-around should this be necessary, but it should be avoided if at all possible. Under some conditions of loading and density altitude a go-around may be impossible, and in any event the sudden application of power during single engine operation makes control of the airplane more difficult.

8. SINGLE ENGINE GO-AROUND

If a single engine go-around cannot be avoided proceed as follows:

a. Mixture - forward.
b. Propeller- forward.
c. Throttle - open.
d. Flaps- retract.
e. Landing Gear- retract.
f. Airspeed - one engine inoperative best rate-of-climb speed 105 MPH.
g. Trim - set.
h. Cowl Flap- as required (operating engine).

9. MANUAL EXTENSION OF LANDING GEAR –

Check the following before extending the gear manually:

a. Circuit breakers- check.
b. Master switch- ON.
c. Alternators- check.
d. Navigation lights- OFF (daytime).

To extend the gear, reposition the clip covering the emergency disengage control downward, clear of the knob, and proceed as listed below:

a. Reduce power; airspeed not to exceed I00 MPH.
b. Place Landing Gear Selector Switch in "GEAR DOWN LOCKED" position.
c. Pull emergency gear extension knob.
d. Check for 3 green lights.
e. Leave emergency gear extension knob out.

WARNING

If the emergency gear extension knob has been pulled out to lower the gear due to a gear system malfunction, leave the control in its extended position until the airplane has been put on jacks to check the proper function of the landing gears hydraulic and electrical systems.

10. LANDING GEAR UNSAFE WARNINGS

The red landing gear light will illuminate when the landing gear is in transition between the full up position and the down and locked position. The pilot should recycle the landing gear if continued illumination of the light occurs. Additionally, on aircraft with serial numbers 34-72500046 and up, the light will illuminate when the gear warning horn sounds. The gear warning horn will sound at low throttle settings with the gear in the up and locked position.

11. GEAR-UP EMERGENCY LANDING

a. Approach with power at a normal airspeed.
b. Leave flaps up (to reduce wing and flap damage).
c. Close the throttles just before touchdown.
d. Turn off the master and ignition switches.
e. Turn fuel selector valves to "OFF."
f. Contact the surface at minimum airspeed.

12. ELECTRICAL FAILURES

a. In the event that both overvoltage lights illuminate:
   (1) Turn off all electrical loads, except the master switch.
   (2) Turn both alternator switches OFF to extinguish the warning lights.
      (a) Turn the alternator switches momentarily ON, one at a time while observing the ammeters.
      (b) Determine the alternator showing the LEAST output amperes and turn its switch ON.

(3) Turn electrical equipment on as required but do not exceed 50 amperes output.
(4) If both alternators show approximately equal output (less than 50 amperes each).
(a) Turn both alternators "ON."
(b) Turn equipment on as required.
(c) Resume normal operation.

b. In the event that one overvoltage light illuminates:
(1) Turn off all electrical loads, except the master switch.
(2) Turn off the alternator switch associated with the overvoltage trip warning.
(3) While observing ammeters, turn the alternator switch momentarily on to verify that the alternator output is excessive, then leave the alternator switch in the off position.
(4) Turn electrical equipment on as required but do not exceed 50 amperes output.

c. In case the battery becomes depleted from a weakened condition or from excessive restart cranking, it may be necessary to perform the following procedure to get an operating alternator on the line if 'it has become disconnected for any reason.
(1) Check alternator circuit breakers, reset if tripped.
(2) Remove heavy electrical loads such as pitot head, lighting, blower motor; minimize radio load. (Do not use master switch to accomplish this.)
(3) Turn operating alternator switch to on. Turn master switch to off. Wait a short time period, then cycle master switch to on. Observe ammeter for output.
(4) If no output is noted, recycle step (3) using longer waiting periods.
(5) When power is re-established, use electrical equipment so that 50 amperes is not exceeded.

d. In case of loss of output from one alternator:
(1) Reduce electrical load as necessary to keep alternator output to 50 amperes or less.
(2) Check alternator circuit breakers, reset if necessary.
(3) Cycle the alternator switch for the inoperative alternator OFF, then ON.
(4) If step (3) fails to restore output:
(a) Maintain conditions of step (1) to continue flight.
(b) Take corrective maintenance action before further flights.

e. In case of alternator output loss due to an engine failure, reduce the electrical load as necessary to keep the alternator output to 50 amperes or less.

WARNING

Compass error may exceed 10° with both alternators inoperative.

13. VACUUM SYSTEM FAILURES

a. A malfunction of the vacuum system will become apparent as a reduction of indication on the gauge. A red button annunciator will show in case of a feathered engine or vacuum pump failure.

b. In the event of vacuum system malfunction (vacuum lower than 4.5 inches of mercury):
(1) Increase engine RPM to 2700.
(2) Descend to an altitude, if possible; at which 4.5 inches of mercury vacuum can be maintained.
(3) Use Turn Indicator (Electric) to monitor the Direction Indicator and Attitude Indicator performance.

14. ENGINE FIRE

a. In case of engine fire in flight (on the affected engine)
(1) Fuel Selector- OFF
(2) Throttle- CLOSE
(3) Propeller- FEATHER
(4) Mixture- IDLE CUT OFF
(5) Heater- OFF (In all cases of fire)
(6) Defroster- OFF (In all cases of fire)
(7) If terrain permits - Land Immediately

The possibility of an engine fire in flight is extremely remote. The procedure given above is general and pilot judgment should be the deciding factor for action in such an emergency.

b. In case of engine fire on the ground
(1) If engine has not started
(a) Mixture - IDLE CUT OFF
(b) Throttle - OPEN
(c) Turn engine with starter (This is an attempt to pull the fire into the engine.)
(2) If engine has already started and is running, continue operating to try pulling the fire into the engine.
(3) In either case stated in (1) and (2), if the fire continues longer than a few seconds, the fire should be extinguished by the best available external means.
(4) If external fire extinguishing is to be applied
(a) Fuel Selector Valves- OFF
(b) Mixture- IDLE CUT OFF

15. SPINS

Intentional spins are prohibited. In the event that an unintentional spin is encountered, recovery can be accomplished by immediately using the following procedures:

a. Retard both throttles to the idle position.
b. Apply full rudder in the direction opposite the spin rotation.
c. Let up all back pressure on the control wheel. If nose does not drop immediately push control wheel full forward.
d. Keep ailerons in neutral.
e. Maintain the controls in these positions until spin stops, then neutralize rudder.
f. Recover from the resulting dive with smooth back pressure on the control wheel. No abrupt control movement should be used during recovery from the dive, as the positive limit maneuvering load factor may be exceeded.

16. ENGINE FAILURE IN ICING CONDITIONS

If engine failure occurs during icing flight, select ALTERNATE AIR and attempt to restart engine. If unable to restart engine:

a. Feather inoperative propeller (see feathering procedure).
b. Maintain airspeed at or above 105 mph (CAS).
c. Descend if necessary to maintain airspeed.
d. Reduce electrical loads per alternator failure procedure below.
e. Avoid further icing conditions if possible.
f. Land as soon as practical.
g. Maintain at least 105 mph (CAS) during final approach.
h. Do not extend landing gear until certain of making field.
1. Do not lower wing flaps until certain of making field.
J. Use 25° flaps rather than full flaps for landing.

17. ALTERNATOR FAILURE IN ICING CONDITIONS

In the event of an alternator failure during flight in icing conditions:

a. Attempt to reset alternator overvoltage relay.
b. Check circuit breakers and reset if possible.

If unable to restore alternator:

c. Turn off all avionics except one NAVCOM and TRANSPONDER.
d. Turn off electric windshield to maintain 60 AMP load.
e. If icing conditions continue terminate flight as soon as practical.
f. Prior to landing electric windshield may be turned on *if* necessary. Battery may be depleted and gear may require free-fall extension.

18. ENGINE FAILURE WITH REAR CABIN AND CARGO DOORS REMOVED.

The single engine minimum control speed for this configuration is 81 mph (CAS). If engine failure occurs at an airspeed below 81 mph, reduce power as necessary on the operating engine to maintain directional control.

19. PROPELLER OVERSPEED

Loss of the air charge in the propeller dome may cause the propeller to overspeed if the throttle is advanced rapidly or airspeed is abruptly increased. If an overspeed condition is encountered, the propeller will not feather and the following procedure should be used.

a. Close throttle.
b. Slow aircraft to best rate of climb speed.
c. Pull propeller control back to low RPM.
d. Slowly increase throttle until propeller governor is engaged.
e. Slowly increase propeller and throttle to the desired power setting.
f. Continue flight at reduced speed and power and land as soon as practical.

If the throttle is retarded below 15-20 IN - MP at speeds above 105 MPH, the propeller may overspeed again upon reapplying power. If this occurs, follow the same procedure to regain propeller control.

D. SPECIAL OPERATING PROCEDURES

1. FLIGHT INTO KNOWN ICING CONDITIONS

Prior to dispatch into forecast icing conditions all ice protection should be functionally checked for proper operation. The windshield defroster should be turned on before entering icing conditions. Upon entering probable icing conditions accomplish the following:

a. Pitot heat- On (immediately).
b. Windshield heat- On (immediately).
c. Propeller Deice- On (immediately).
d. Wing Deice -On (after l/4to 1/2 inch accumulation).
e. Relieve propeller unbalance (if required) by increasing RPM briefly. Repeat as required.

WARNING

Do not cycle pneumatic boots with less than 1/4 inch of ice accumulation; operation of boots with less than l i4 inch ice accumulation can result in failure to remove ice. Do not hold momentary deice switch ON. If wing-tail deicer panel light illuminates for more than 20 seconds pull surface deice circuit breaker.

Heat for the stall warning transmitters is activated by the pitot heat switch. When ice has accumulated on the unprotected surfaces of the airplane, aerodynamic buffet commences between 5 and 10 mph above the stall speed. A substantial margin of airspeed should be maintained above the normal stall speeds, since the stall speed may increase by up to 12 mph in prolonged icing encounters.

If ice is remaining on the unprotected surfaces of the airplane at the termination of the flight the landing should be made using full flaps and carrying a slight amount of power whenever practical, and approach speeds should be increased by 10 to 15 mph.

Cruise speed may be significantly reduced in prolonged icing encounters. If icing conditions are encountered at altitudes above 10,000 feet it may be necessary to descend in order to maintain airspeed above best rate of climb speed (105 mph - CAS).

NOTE

Pneumatic boots must be regularly cleaned and waxed for proper operation in icing conditions. Pitot, windshield and stall warning heat should be checked on the ground before dispatch into icing conditions.

Performance

Installation of ice protection equipment results in a 30 FPM decrease in single engine climb rate and a reduction of 850 feet in single engine service ceiling.

CAUTION

If the airplane is to be flown with the heated glass panel removed, rotate the receptacle plate 180° and replace it to cover the holes in the fuselage skin. Also replace the windshield collar screws.

SECTION III

PERFORMANCE

A. STALLS

1. POWER OFF STALLS

The loss of altitude during a power off stall with gear and flaps retracted may be as much as 450 feet. The loss of altitude with gear down and 40° of flaps may be as much as 450 feet.

2. POWER ON STALLS

The loss of altitude during a power on stall with gear and flaps retracted may be as much as 550 feet. The loss of altitude with gear down and 40° of flaps may be as much as 400 feet.

3. STALL WARNING SYSTEM

The stall warning system is inoperative with the master switch off.

B. STALLING SPEEDS (MPH, CALIBRATED AIRSPEED) VS ANGLE OF BANK

ANGLE OF BANK	00	20°	40°	50°	60°
Flaps Up	76	78	87	95	108
Flaps 40°	69	71	79	86	98

C. AIRCRAFT PERFORMANCE WITH REAR CABIN AND CARGO DOORS REMOVED

All climb and cruise performance will be reduced by approximately five percent when the airplane is operated with the rear cabin and cargo doors removed.

THIS PAGE INTENTIONALLY LEFT BLANK.