Main

SUPPLEMENT
REVISION

MODEL 208B (675 SHP)

PILOTS OPERATING HANDBOOK
AND FAA APPROVED
AIRPLANE FLIGHT MANUAL

REVISION 10
20 February 2007

PART NUMBER:
D1329-S1-10

THE FOLLOWING SUPPLEMENT S1 - REVISION 10 IS PRINTED IN ITS ENTIRETY AND SHOULD BE INSERTED INTO SECTION 9 OF THE PILOT'S OPERATING HANDBOOK, IF THE AIRPLANE IS EQUIPPED WITH FLIGHT INTO KNOWN ICING EQUIPMENT.

THE LOG OF APPROVED SUPPLEMENTS FURNISHED WITH THIS SUPPLEMENT REPLACES ALL EARLIER DATED VERSIONS OF THE LOG.

IT IS THE AIRPLANE OWNER'S RESPONSIBILITY TO MAKE SURE THAT THEY HAVE THE LATEST REVISION TO EACH SUPPLEMENT OF A PILOT'S OPERATING HANDBOOK, AND THE LATEST ISSUE "LOG OF APPROVED SUPPLEMENTS." THE LOG OF APPROVED SUPPLEMENTS FURNISHED WITH THIS REVISION WAS THE LATEST VERSION AS OF THE DATE IT WAS SHIPPED BY CESSNA; HOWEVER, SOME CHANGES MAY HAVE OCCURRED, AND THE OWNER SHOULD VERIFY THIS IS THE LATEST, MOST UP-TO-DATE VERSION BY REFERRING TO THE LATEST CESSNA PROPELLER AIRCRAFT REVISION STATUS CHECKLIST OR BY CONTACTING CESSNA PROPELLER CUSTOMER SERVICE: TELEPHONE (316) 517-5800, FAX (316) 942-9006.

Main

Cessna
A Textron Company

Pilot's Operating Handbook and FAA Approved Airplane Flight Manual

CESSNA MODEL 208B (675 SHP)

SUPPLEMENT S1

KNOWN ICING EQUIPMENT

SERIAL NO._____

REGISTRATION NO._____

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the Known Icing Equipment package is installed.

APPROVED BY _____
for
Donald W. Mallonee
Executive Engineer
Cessna Aircraft Company
Delegation Option Manufacturer CE-3

DATE OF APPROVAL 15 July 1996

Member of GAMA

15 JULY 1996

REVISION 10 - 20 FEBRUARY 2007

SUPPLEMENT S1

KNOWN ICING EQUIPMENT

Use the Log of Effective Pages to determine the current status of this supplement.

Pages affected by the current revision are indicated by an asterisk (*) preceding the page number.

Supplement Status	Date
Original	15 July 1996
Revision 1	17 January 1997
Revision 2	8 September 1999
Revision 3	12 October 2000
Revision 4	25 June 2001
Revision 5	23 April 2004
Revision 6	2 March 2005
Revision 7	27 June 2005
Revision 8	5 December 2005
Revision 9	24 August 2006
Revision 10	20 February 2007

LOG OF EFFECTIVE PAGES

Page	Page Status	Revision Number
*S1-1 thru S1-5	Revised	10
S1-6 thru S1-8	Revised	9
*S1-9	Revised	10
S1-10 thru S1-11	Revised	9
*S1-12 thru S1-48	Revised	10
*S1-49 thru S1-54	Added	10

APPROVED BY

FAA APPROVED UNDER 14 CFR PART 21 SUBPART J
Cessna Aircraft Co.
Delegation Option Authorization DOA-220084-CE

DOA

DATE OF APPROVAL 02-20-07

SUPPLEMENT S1
KNOWN ICING EQUIPMENT

SECTION 1
GENERAL

The flight into known icing equipment package allows flight penetration of icing conditions as defined by 14 CFR Part 25 Appendix C envelopes for continuous maximum and intermittent maximum icing. These conditions do not include, nor were tests conducted in, all icing conditions that may be encountered (e.g., freezing rain, freezing drizzle, mixed conditions or conditions defined as severe). Flight in these conditions are prohibited. Some icing conditions not defined in 14 CFR Part 25 Appendix C have the potential of producing hazardous ice accumulations, which (1) exceed the capabilities of the airplane's ice protection equipment, and/or (2) create unacceptable airplane performance. Pilots are advised to be prepared to divert the flight promptly if hazardous ice accumulations occur.

NOTE

Whenever icing conditions are encountered, immediate action should be taken to exit these conditions before airplane performance is degraded to a point where a climb, which is normally the best action to take, may not be achievable due to the residual ice buildup.

The flight into known icing equipment package includes pneumatic de-icing boots on the wings, wing struts, main landing gear legs, cargo pod nosecap (if cargo pod installed), horizontal and vertical stabilizer leading edges, electrically-heated propeller blade anti-ice boots, detachable electric windshield anti-ice panel, pitot/static heat system, and a standby electrical system. The wing, wing strut, landing gear, cargo pod and stabilizer de-ice system includes a de-ice pressure annunciator. A light is provided that illuminates the left inboard wing to aid in visually detecting ice accumulation during night operations. Some airplanes may also be equipped with a windshield ice detector light, and a low airspeed awareness and/or advisory system.

As used in this supplement, rime ice formation is opaque, "milky" like ice that roughly conforms to the wing airfoil shape. Clear ice formation is translucent-like ice that forms a double horn type shape with horns protruding above and below the wing airfoil leading edge.

(Continued Next Page)

GENERAL (Continued)

Mixed ice formations have characteristics of both rime and clear ice to some extent. The known icing equipment will not provide complete protection for continuous operation in extremely wide-spread areas of heavy cloud freezing moisture content.

The in-flight ice protection equipment is not designed to remove ice, snow or frost accumulations on a parked airplane sufficiently enough to ensure a safe takeoff or subsequent flight. Other means (such as a heated hangar or approved de-icing fluids) must be used to ensure that all wing, wing strut, landing gear, cargo pod, tail, control, propeller, and windshield surfaces and the fuel vents are free of ice, snow, and frost accumulations, and that there are no internal accumulations of ice or debris in the control surfaces, engine intakes, pitot-static system ports, and fuel vents prior to takeoff. Ice accretion that occurs outside of a cloud is not defined by 14 CFR 25 Appendix C and must be exited immediately.

WARNING

IF THESE REQUIREMENTS ARE NOT ACCOMPLISHED, AIRCRAFT PERFORMANCE WILL BE DEGRADED TO A POINT WHERE A SAFE TAKEOFF AND CLIMBOUT MAY NOT BE POSSIBLE.

WING, WING STRUT, MAIN LANDING GEAR LEG, CARGO POD NOSECAP AND STABILIZER DE-ICE BOOTS

The pneumatic de-ice boot system installed on the leading edges of the wings, wing struts, main landing gear legs, cargo pod nosecap and horizontal and vertical stabilizers is designed to remove ice after accumulation in flight rather than prevent ice formation. The system components include the pressure line which leads from the engine bleed air system pressure regulator to the vacuum ejector used in the airplane vacuum system, three flow control valves and pressure switches, a timer, a system switch and circuit breaker, an annunciator, and the supply lines and pneumatically-operated surface de-ice boots. In operation, the boots expand and contract, using pressure from the engine bleed air system to the flow control valves when they are closed or vacuum created by the dumping action of the flow control valves when they are open. Normally, vacuum is applied to all boots to hold them against the leading edge surfaces. When a de-icing cycle is initiated, vacuum is removed and pressure is applied to inflate the boots. Ice on the boots will then be removed by normal in-flight air forces.

(Continued Next Page)

GENERAL (Continued)

WING, WING STRUT, MAIN LANDING GEAR LEG, CARGO POD NOSECAP AND STABILIZER DE-ICE BOOTS (Continued)

NOTE

Optimum performance of the de-ice and anti-ice boots is dependent on keeping the boots clean and coated with an ice adhesion depressant such as ICEX II.

Controls for the normal operation of the de-icing system consist of a three-position toggle switch, labeled BOOT PRESS, on the de-ice/anti-ice switch panel, a pressure indicator light in the annunciator panel, and a "pull-off" type circuit breaker on the left sidewall circuit breaker panel. When the switch is placed in the AUTO (upper) position and released, it will activate one de-icing cycle.

Each time a cycle is desired, the switch must be pushed to the AUTO position and released. The switch is off when placed in the middle position. In the event of a malfunction in the timer, causing erratic operation of a sequence of a cycle, the switch can be held momentarily in the MANUAL (lower) position to achieve simultaneous inflation of all the de-ice boots. If necessary, the system can be stopped at any point in the cycle (deflating the boots) by pulling the circuit breaker labeled DE-ICE BOOT. During a normal de-icing cycle, the boots will inflate according to the following sequence: first the horizontal and vertical stabilizer boots will inflate for approximately six seconds, then the inboard wing, main landing gear leg and cargo pod nosecap boots inflate for the next six seconds, followed by the outboard wing boots and wing strut boots for another six seconds. The total time required for one cycle is approximately 18 seconds.

The pressure indicator annunciator, labeled DE-ICE PRESSURE, should illuminate approximately three seconds after initiating a cycle and remain on approximately three additional seconds until the end of the first sequence. Through each of the remaining two sequences of the cycle, the annunciator will remain off during pressure buildup for about three seconds and then illuminate for about three seconds. The system may be recycled six seconds after the completion of a cycle, if necessary. The absence of illumination during any one of the three sequences of a cycle indicates insufficient pressure for proper boot inflation and effective de-icing ability. Additionally, any deviation from the sequence described above could indicate a malfunction of some other portion of the system, and icing conditions should be avoided.

(Continued Next Page)

GENERAL (Continued)

PROPELLER ANTI-ICE BOOTS

The propeller anti-ice system provides protection for the propeller blade surfaces when icing conditions are encountered. The system is operated by a three-position toggle switch, labeled PROP, on the DE-ICE/ANTI-ICE switch panel. When the switch is placed in the AUTO (upper) position, electric current flows to an anti-ice timer which cycles the current simultaneously to the heating elements in the anti-ice boots on the three propeller blades in intervals of 90 seconds ON and 90 seconds OFF. The anti-ice timer will reset when the anti-ice switch is placed in the OFF position.

This 90 second cycle allows ice to buildup on the propeller boots, then sheds it during the ON cycle. Due to the propeller blade ice shedding characteristics, a slight propeller vibration occurring at the start of the propeller anti-ice ON cycle and lasting 20-30 seconds is considered normal. This vibration may be more pronounced with the Hartzell composite propeller. However, if the vibration continues longer than 30 seconds, or is perceived by the pilot as being excessive, exercising the propeller control lever and returning it to MAX position will shed the remaining ice on the blades. If the vibration continues, refer to the Propeller Anti-Ice System Malfunction checklist in Section 3 of this supplement.

NOTE

An oil-operated pressure switch installed in the electrical circuit is utilized to prevent the propeller anti-ice system from being turned on without the engine running. A failure of this switch will be undetected unless the ammeter is monitored continuously.

The switch is off when placed in the middle position. In the event of a malfunction in the anti-ice timer, the switch can be held for 90 seconds in the MANUAL (lower) position to achieve emergency propeller anti-icing. When operating in the MANUAL (lower) switch position, it is important to cycle the switch in intervals of 90 seconds ON and 90 seconds OFF, the same cycling that occurs when the switch is in the AUTO position.

(Continued Next Page)

GENERAL (Continued)

PROPELLER ANTI-ICE BOOTS (Continued)

WARNING

IF THE PROPELLER ANTI-ICE SWITCH IS HELD IN THE MANUAL POSITION WITHOUT BEING CYCLED EVERY 90 SECONDS, ICE ON THE BOOTS MELTS AND RUNS BACK PAST THE BOOTS AND REFREEZES. THIS BUILDUP OF RUNBACK ICE MAY CAUSE A LOSS IN PROPELLER EFFICIENCY WHICH REDUCES AIRPLANE PERFORMANCE. THIS CHARACTERISTIC MAY BE MORE PRONOUNCED WITH THE HARTZELL COMPOSITE PROPELLER.

Operation of the anti-ice system can be checked by monitoring an ammeter, labeled PROP ANTI-ICE AMPS, near the upper left corner of the instrument panel. The system is protected by two "pull-off" type circuit breakers, a control circuit breaker labeled PROP ANTI-ICE CONT and a heater circuit breaker labeled PROP ANTI-ICE. Both circuit breakers are located on the left sidewall switch and circuit breaker panel.

WINDSHIELD ANTI-ICE PANEL

The windshield anti-ice system assures adequate visibility for a landing during flight conditions where ice may form on the windshield. A detachable, electrically heated, glass panel mounts to the base of the windshield in front of the pilot. A quick disconnect feature utilizing a spring-loaded release pin is provided to facilitate ease of installation and removal. The panel may be stowed in the airplane when not in use; a padded cover is provided for protection against scratches, breakage, and wiring damage. Windshield anti-icing is controlled by a three-position toggle switch, labeled W/S on the de-ice/anti-ice switch panel. Some aircraft are equipped with a large sized windshield anti-ice panel, which contains two heat elements and is controlled by two three-position toggle switches labeled PRIMARY and SECONDARY. When the switch(es) is(are) placed in the AUTO (upper) position, electric current regulated by a controller flows to the anti-ice panel to prevent the formation of ice in the protected segment of the windshield. An annunciator, labeled WINDSHIELD ANTI-ICE, illuminates to indicate that the system is operating.

(Continued Next Page)

GENERAL (Continued)

WINDSHIELD ANTI-ICE PANEL (Continued)

NOTE

The SECONDARY heat element in the large windshield anti-ice panel is slaved to the temperature controller of the PRIMARY panel, and will only function in AUTO if the PRIMARY switch is in the AUTO position, and the automatic controller is operative.

The switch(es) is(are) off when placed in the middle position. In the event of a malfunction in the system controller circuitry, the switch(es) can be held in the Manual (lower) position to achieve windshield anti-icing. The system is protected by two "pull-off" type circuit breakers, a control circuit breaker labeled W/S ANTI-ICE CONT and a heater circuit breaker labeled W/S ANTI-ICE. Both circuit breakers are located on the left sidewall switch and circuit breaker panel. The large anti-ice panel is protected by three "pull-off" type circuit breakers; a control circuit breaker labeled W/S ANTI-ICE CONT and two heater circuit breakers labeled W/S ANTI-ICE PRIMARY and W/S ANTI-ICE SEC.

Circuit breakers for the windshield anti-ice panel are located on the left sidewall switch and circuit breaker panel.

The heated glass panel should be installed whenever icing conditions are a possibility on a proposed flight, especially if the freezing level is near or at the surface.

(Continued Next Page)

GENERAL (Continued)

PITOT-STATIC HEAT SYSTEMS

A left pitot-static heat system is installed to assure proper airspeed indications in the event icing conditions are encountered. The system is designed to prevent ice formation rather than remove it. System components include heating elements in the left pitot-static tube, a two-position toggle switch, labeled PITOT/STATIC HEAT, on the de-ice/anti-ice panel, and a "pull-off" type circuit breaker, labeled LEFT PITOT HEAT, on the left sidewall switch and circuit breaker panel. When the pitot-static heat switch is turned on, the elements in the pitot-static tube are heated electrically to maintain proper operation in icing conditions.

A second, independent pitot-static system is included for operation of the right flight instruments only. The system has a heated pitot-static tube on the leading edge of the right wing. The heating elements in the right pitot-static tube are controlled by the two-position toggle switch, labeled PITOT/STATIC HEAT, on the de-ice/anti-ice switch panel. Circuit protection is provided by a "pull-off" type circuit breaker, labeled RIGHT PITOT HEAT, on the left sidewall switch and circuit breaker panel.

STANDBY ELECTRICAL SYSTEM

The standby electrical system serves as a standby power source after starting in the event the main generator system malfunctions in flight. The system includes an alternator operated at a 75-amp capacity rating. The alternator is belt-driven from an accessory pad on the rear of the engine.

The system also includes an alternator control unit located forward of the circuit breaker panel, a standby alternator contactor assembly on the left front side of the firewall and two switches on the left sidewall switch panel.

(Continued Next Page)

GENERAL (Continued)

STANDBY ELECTRICAL SYSTEM (Continued)

The standby system switches are a two-position toggle-type switch, labeled STBY POWER, and a guarded two-position switch/breaker, labeled AVIONICS STBY PWR. The guard covering the standby avionics power switch must be lifted in order to select the ON position. Circuit protection and isolation is provided by two circuit breakers, labeled STBY PWR, on the left sidewall circuit breaker panel. Field excitation to the alternator control unit is supplied through diode logic from a circuit breaker in the standby alternator relay assembly or the KEEP ALIVE No. 2 circuit breaker in the main power relay box. System monitoring is provided by two amber annunciators, labeled STBY ELECT PWR ON and STBY ELECT PWR INOP, in the annunciator panel. Total amperage supplied from the standby electrical system can be monitored on the airplane volt/ammeter with the selector switch in the ALT position.

Any time the standby electrical system is turned on, standby power will automatically be supplied to the main buses if system voltage drops.

(Continued Next Page)

GENERAL (Continued)

STANDBY ELECTRICAL SYSTEM (Continued)

WARNING

IN THE EVENT OF A GENERATOR SYSTEM FAILURE, THE ALTERNATOR-DRIVEN STANDBY ELECTRICAL SYSTEM, WHICH HAS 75-AMP CAPACITY RATING, CAN SUPPLY ESSENTIAL EQUIPMENT WHEN NONESSENTIAL LOADS ARE ELIMINATED. DURING A NIGHT FLIGHT IN ICING CONDITIONS, IT IS POSSIBLE TO HAVE AN ELECTRICAL LOAD OF APPROXIMATELY 110 AMPS. THIS ELECTRICAL LOAD CAN BE REDUCED TO THE STANDBY ELECTRICAL SYSTEM CAPACITY (75-AMPS) BY TURNING OFF THE FOLLOWING EQUIPMENT:

- **ALL EXTERNAL LIGHTS.**
- **THE FAILED GENERATOR (TRIP).**
- **AUTOPILOT AND WEATHER RADAR AND/OR ENOUGH OTHER NONESSENTIAL AVIONICS AND LIGHTS TO PREVENT BATTERY DISCHARGE, AS INDICATED BY THE AMMETER WITH THE BATT POSITION SELECTED OR ILLUMINATION OF THE RED VOLTAGE LOW ANNUNCIATOR.**
- **FOR AIRPLANES EQUIPPED WITH THE LARGE WINDSHIELD ANTI-ICE PANEL TURN THE SECONDARY SWITCH TO OFF.**

(Continued Next Page)

GENERAL (Continued)

WING ICE DETECTOR LIGHT

An ice detector light is flush-mounted in the left wing leading edge-to-fuselage fairing to help detect ice on the wing at night by lighting the leading edge of the wing. The system includes the ice detector light and a two-position toggle switch that is located on the de-ice/anti-ice switch panel and is labeled WING LIGHT. There is also a "pull-off" type circuit breaker on the left sidewall circuit breaker panel and is labeled ICE DET LIGHT. The switch is spring-loaded to the OFF (lower) position and must be held in the ON (upper) position to keep the ice detector light on.

WINDSHIELD ICE DETECTOR LIGHT (If Installed)

A red windshield ice detector light is installed on the lower inboard area of the pilot's windshield. It is turned on by moving the DAY/NIGHT switch to NIGHT. If there is no ice on the windshield, a clear and distinct red circle reflection will be present above the light. If there is ice on the windshield, the reflection of the red circle will become diffused and the area of red light will increase. The windshield ice detector light should not be the only way to detect ice.

(Continued Next Page)

GENERAL (Continued)

LOW AIRSPEED AWARENESS SYSTEM

An advisory annunciator is installed just above the annunciator panel and is labeled BELOW ICING MIN SPD. This annunciator illuminates when the PROPELLER ANTI-ICE switch is in the AUTO position and the indicated airspeed is less than 110 knots. This annunciator will illuminate with a white background color. After initially obtaining 110 knots after takeoff, any subsequent airspeed decrease below this value will cause the annunciator to illuminate with an amber background color and flash. An aural horn will also sound to alert the pilot to the need to take appropriate action to increase airspeed. For approaches with flaps at 10° or 20° the horn may be cancelled by pushing the switch light. The horn aural will cease and the light will illuminate white color and be steady.

NOTE

- This system replaces the previous Low Airspeed Advisory System.
- This system does not function with PROP ANTI-ICE in MANUAL or OFF modes.

AIRSPEED REMINDER BUG (if installed)

A green reminder bug is installed on a ring on the outside of the airspeed indicator. This bug may be set at initial indicated cruise speed to aid the pilot in monitoring airspeed loss due to ice accretion.

ENGINE INERTIAL SEPARATOR AND HEATED STALL WARNING SYSTEMS

See Section 7 of the basic Pilot's Operating Handbook for descriptions of these standard/required equipment items.

SECTION 2
LIMITATIONS

REQUIRED TRAINING

Specific training for flight into icing conditions provided by Cessna Aircraft Company is required to be successfully completed by the pilot in command within the preceding 12 calendar months for any flight into known or forecast icing conditions.

Completion of either of the following courses will meet this training requirement:

Caravan Cold Wx Ops Onsite C14694 (CAC14694)
Caravan Cold Wx Ops Online C14695 (CAC14695)

PREFLIGHT

Takeoff is prohibited with any frost, ice, snow, or slush adhering to the wings, horizontal stabilizer, vertical stabilizer, control surfaces, propeller blades, or engine inlets.

WARNING

EVEN SMALL AMOUNTS OF FROST, ICE, SNOW OR SLUSH ON THE WING MAY ADVERSELY CHANGE LIFT AND DRAG. FAILURE TO REMOVE THESE CONTAMINANTS WILL DEGRADE AIRPLANE PERFORMANCE AND MAY PREVENT A SAFE TAKEOFF AND CLIMBOUT.

(Continued Next Page)

LIMITATIONS (Continued)

VISUAL/TACTILE CHECK

To assure the absence of frost, a tactile check of the wing leading edge and upper surface per Section 4 of the POH is required in addition to a visual inspection if the OAT is below 10°C (50°F). During ground icing conditions, takeoff must be accomplished within 5 minutes of completing the tactile inspection unless the airplane is operated per 14 CFR 135.227(b)(3).

Ground icing conditions are defined as:

1. The OAT is 2°C (36°F) or below and visible moisture is present (i.e. rain, drizzle, sleet, snow, fog, water is present on the wing, etc.), or,
2. The OAT is 5°C (40°F) or below and conditions are conducive to active frost formation (e.g. clear night with a dew point temperature/OAT difference of 3°C (5°F) or less).

Takeoff is prohibited if frost, ice or snow may reasonably be expected to adhere to the airplane between the tactile check and takeoff (e.g. snow near freezing temperature with no de-icing/anti-ice fluid application).

WEIGHT LIMITS

Maximum weight for flight into known icing conditions:
Cargo Pod Installed: 8550 lbs.
Cargo Pod Removed: 8750 lbs.

(Continued Next Page)

LIMITATIONS (Continued)

REQUIRED EQUIPMENT

This airplane is approved for flight into icing conditions as defined by 14 CFR Part 25 Appendix C continuous maximum and maximum intermittent icing envelopes only if the following Cessna (drawing number 2601066) and FAA approved equipment is installed and is fully operational:

1. Wing and wing strut leading edge de-ice boots.
2. Horizontal stabilizer leading edge de-ice boots.
3. Vertical stabilizer leading edge de-ice boots.
4. Propeller anti-ice boots.
5. Windshield anti-ice panel.
6. Pitot-static tube heat system (left).
7. Standby electrical system.
8. Wing ice detector light.
9. Engine inertial separator.
10. Heated stall warning system.
11. Lower main landing gear leg leading edge de-ice boots. (With Cargo Pod installed)
12. Cargo pod nosecap de-ice boot. (With Cargo Pod installed)
13. Low Airspeed Awareness (LAA) System.

Pneumatic de-ice boots, windshield anti-ice panel and propeller anti-ice boots must be operated in AUTO mode when in icing conditions. Exit icing conditions as soon as practical if operation in MANUAL mode is required.

In addition, refer to Section 2 of the basic Pilot's Operating Handbook for a complete listing of other required equipment.

MAXIMUM OPERATING ALTITUDE LIMITS

Certificated Maximum Operating Altitudes:

Icing Conditions (if so equipped): 20,000 feet.

Any flight condition with any ice on the airplane: 20,000 feet.

(Continued Next Page)

LIMITATIONS (Continued)

ENVIRONMENTAL CONDITIONS

Known icing conditions are defined by 14 CFR Part 25, Appendix C. These conditions do not include, nor were tests conducted in, all icing conditions that may be encountered (e.g., freezing rain, freezing drizzle, mixed conditions or conditions defined as severe).

WARNING

FLIGHT IN THESE CONDITIONS ARE PROHIBITED.

Some icing conditions not defined in 14 CFR Part 25 Appendix C have the potential of producing hazardous ice accumulations, which (1) exceed the capabilities of the airplane's ice protection equipment, and/or (2) create unacceptable airplane performance and stall speed increase. Pilots must be prepared to divert the flight promptly if hazardous ice accumulations occur. Inadvertent operation in these conditions may be detected by:

1. Unusually extensive ice is accreted on the airframe in areas not normally observed to collect ice.
2. Accumulation of ice on the upper or lower surface of the wing aft of the protected area.
3. Heavy ice accumulations on the windshield, or when ice forms aft of the curved sections on the windshield.
4. Ice forms aft of the protected surfaces of the wing struts.

If these conditions are encountered, the pilot must take immediate actions to exit these conditions.

Continued Flight in icing conditions is prohibited after encountering one or more of the following:

1. Airspeed of 120 KIAS cannot be maintained in level flight.
2. Airspeed decrease of 10 KIAS that cannot be prevented by increase to max continuous power.
3. MEA or MOCA (if applicable) on current leg falls into area "C" of icing service ceiling chart contained in Section 5 of this supplement.

Exit strategies must be determined during preflight planning.

(Continued Next Page)

LIMITATIONS (Continued)

MINIMUM SPEED IN ICING CONDITIONS

Minimum airspeed in icing conditions, for all flight phases including approach, except takeoff and landing.

Flaps Up: 120 KIAS
Flaps 10: 105 KIAS
Flaps 20 95 KIAS

Exception for climbing to exit icing operations:

When climbing to exit icing conditions the following airspeeds may be used only for the duration of the climb to exit operation. Maneuvering should be limited to 30° banked turns or less.

Flaps Up: 110 KIAS
Flaps 10: 95 KIAS

(Continued Next Page)

LIMITATIONS (Continued)

MINIMUM SPEED IN ICING CONDITIONS (Continued)

WARNING

THE AURAL STALL WARNING SYSTEM DOES NOT FUNCTION PROPERLY IN ALL ICING CONDITIONS AND SHOULD NOT BE RELIED UPON TO PROVIDE ADEQUATE STALL WARNING IN ICING CONDITIONS.

FLAP SETTINGS IN ICING CONDITIONS

When holding in icing conditions the flaps must be UP.

With ice suspected on the airframe, or operating at 5°C (40°F) or less in visible moisture, **Do Not Extend Flaps Beyond 20° for Landing**.

Flaps must be extended to at least 10° during all phases of flight (takeoff and landing included) at airspeed below 110 KIAS, except when following the published POH/AFM procedures when operating with ground de-icing/anti-icing fluid applied.

AUTOPILOT OPERATION IN ICING CONDITIONS

Autopilot operation is prohibited when operating in icing conditions which are outside the 14 CFR defined conditions in the Environmental Conditions.

Minimum speed in icing conditions with autopilot engaged - 110 KIAS

Autopilot must be disconnected once every 10 minutes in icing conditions to check for any out of trim conditions caused by ice build up.

(Continued Next Page)

LIMITATIONS (Continued)

PLACARDS

1. The following placard must be installed in the airplane **NEAR THE COMPASS** (airplanes equipped with the large anti-ice panel):

OPERATION OF THE ANTI-ICE PANEL MAY CAUSE A COMPASS DEVIATION OF MORE THAN 10 DEGREES.

2. The following placards must be installed in the airplane **IN FULL VIEW OF THE PILOT:**

The markings and placards installed in this airplane contain operating limitations which must be complied with when operating this airplane in the Normal Category.

Other operating limitations which must be complied with when operating this airplane in this category are contained in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

No acrobatic maneuvers, including spins, approved.

This airplane is approved for flight into icing conditions if the proper optional equipment is installed and operational. See POH for weight and altitude restrictions relating to ice.

This airplane is certified for the following flight operations as of date of original airworthiness certificate:

DAY - NIGHT - VFR - IFR

3.

CONTINUED FLIGHT IN ICING CONDITIONS IS PROHIBITED AFTER ENCOUNTERING ONE OR MORE OF THE FOLLOWING:

AIRSPEED OF 120 KIAS CAN NOT BE MAINTAINED IN LEVEL FLIGHT.

AIRSPEED DECREASE OF 10 KIAS THAT CANNOT BE PREVENTED BY INCREASE TO MAX CONTINUOUS POWER.

MEA OR MOCA IF APPLICABLE ON CURRENT LEG FALLS INTO AREA "C" OF ICING SERVICE CEILING CHART CONTAINED IN SECTION 5 OF THE POH/AFM KNOWN ICING EQUIPMENT SUPPLEMENT.

(Continued Next Page)

PLACARDS (Continued)

4.

120 KIAS MINIMUM IN ICING FLAPS UP EXCEPT 110 KIAS IF CLIMBING TO EXIT ICING

5.

DO NOT TAKEOFF WITH ICE/FROST/SNOW ON THE AIRCRAFT.

6. For airplanes not equipped with Low Airspeed Awareness System:

DISCONNECT AUTOPILOT AT FIRST INDICATION OF ICE ACCRETION.

SECTION 3

EMERGENCY PROCEDURES

INADVERTENT ICING ENCOUNTER AT WEIGHTS ABOVE 8550 POUNDS (Cargo Pod Installed)

1. **Ignition Switch - ON.**
2. **Inertial Separator - BYPASS.**
3. **PITOT/STATIC, STALL, WINDSHIELD, and PROP ANTI-ICE - ON.**
4. **Altitude/Course - CHANGE (as necessary).**
5. **BOOT PRESSURE Switch - AUTO and release (as required).**

NOTE

All of the anti-ice and de-ice systems are designed to function properly at weights up to 8750 pounds. However, because of the reduced climb performance and higher cruise angle of attack, flight into known icing conditions is not approved above 8550 pounds with the cargo pod installed. With the cargo pod removed, the full gross weight of 8750 pounds is approved for flight in icing conditions.

INADVERTENT ICING ENCOUNTER AT ALTITUDES ABOVE 20,000 FEET

1. **Ignition Switch - ON.**
2. **Inertial Separator - BYPASS.**
3. **PITOT/STATIC, STALL, WINDSHIELD, and PROP ANTI-ICE - ON.**
4. **AIRSPEED - 160 KIAS maximum.**
5. ALTITUDE - DESCEND to 20,000 feet or below as soon as practical.
6. BOOT PRESSURE Switch - AUTO and release (as required).
7. Ignition Switch - OFF after 5 minutes operation.
8. Operate in accordance with NORMAL PROCEDURES in this supplement at altitudes of 20,000 feet or below.
9. Do not climb above 20,000 feet with any residual ice on the airplane, regardless of atmospheric conditions.

(Continued Next Page)

EMERGENCY PROCEDURES (Continued)

ENGINE INERTIAL SEPARATOR MALFUNCTION

1. Inertial Separator - BYPASS.
2. Engine Torque Indicator - MONITOR for proper operation by noting torque drop (typically 100 to 150 foot-pounds).

If inertial separator fails to operate to the BYPASS mode:

3. Ignition Switch - ON.
4. **Exit icing conditions as soon as possible.**

PROPELLER ANTI-ICE SYSTEM MALFUNCTION

If uneven anti-icing of the propeller blades is indicated by excessive vibration:

1. Propeller Control Lever - CYCLE (Max to Min) then return to MAX.
2. PROP ANTI-ICE and PROP ANTI-ICE Control Circuit Breakers - PUSHED IN.
3. PROP ANTI-ICE Ammeter - CHECK for proper operation. The ammeter should indicate 20 to 24 amps for 90 seconds and then zero amps for 90 seconds.
4. If ammeter continuously indicates zero amps:
   a. PROP ANTI-ICE Switch - CHECK in AUTO position.

If zero amps indication persists:

   b. PROP ANTI-ICE Switch - MANUAL and hold for 90 seconds. Repeat procedure at 90-second intervals.
   c. Exit icing conditions as soon as practical.

NOTE

Low Airspeed Awareness (LAA) system will be inoperative.

If zero amps indication still persists:

   d. Exit icing conditions as soon as possible.

(Continued Next Page)

EMERGENCY PROCEDURES (Continued)

PROPELLER ANTI-ICE SYSTEM MALFUNCTION (Continued)

WARNING

WHEN OPERATING PROPELLER ANTI-ICE SYSTEM IN THE MANUAL MODE, WHICH REQUIRES THAT THE SWITCH BE HELD IN THE LOWER POSITION, IT IS IMPORTANT TO CYCLE THE SWITCH IN INTERVALS OF 90 SECONDS ON AND 90 SECONDS OFF. IF THE SWITCH IS HELD IN THE MANUAL POSITION WITHOUT BEING CYCLED OFF EVERY 90 SECONDS, RUNBACK ICE MAY BUILD UP ON THE PROPELLER BLADES CAUSING A LOSS IN PROPELLER EFFICIENCY, WHICH REDUCES AIRPLANE PERFORMANCE. THIS CHARACTERISTIC MAY BE MORE PRONOUNCED WITH THE HARTZELL COMPOSITE PROPELLER.

5. If ammeter reading is below the green arc indicating that the propeller blades may not be de-iced uniformly:
   a. PROP ANTI-ICE Switch - OFF.
   b. Cycle propeller control lever from MAX to MIN and back to MAX at frequent intervals to aid in ice shedding.
   c. Exit icing conditions as soon as possible.

NOTE

- A slight propeller vibration occurring at the start of the propeller anti-ice ON cycle and lasting 20-30 seconds is due to propeller blade ice shedding characteristics and is considered normal. This vibration may be more pronounced with the Hartzell composite propeller.

- To check the heating elements and anti-ice timer for one complete cycle, the system must be left on for approximately three minutes.

(Continued Next Page)

EMERGENCY PROCEDURES (Continued)

PROPELLER ANTI-ICE SYSTEM MALFUNCTION (Continued)

CAUTION

IF, AFTER EXITING ICING CONDITIONS, ENGINE VIBRATION DEVELOPS OR PERSISTS THAT IS NOT TRACEABLE TO ICING OR ANOTHER CAUSE, REDUCE PROPELLER RPM TO SMOOTHEST CONDITION, PLAN A LANDING AT THE NEAREST AIRPORT, AND CHECK THE SECURITY OF THE ANTI-ICE BOOTS AND LEADS AS A POSSIBLE CAUSE.

PNEUMATIC DE-ICE BOOT MALFUNCTIONS

NOTE

The de-ice pressure annunciator should illuminate 3 times, approximately 3 seconds each time, during the 18-second cycle.

1. DE-ICE BOOT Circuit Breaker - PUSHED IN.
2. Suction Gage - CHECK.

If instrument vacuum is below normal and/or there is an audible leak in the forward cabin or left wing root area, expect a broken engine bleed air line and:

3. Exit icing conditions as soon as possible using available non-vacuum powered instruments for attitude information.

If instrument vacuum is normal:

3. BOOT PRESSURE Switch - MANUAL and HOLD for approximately 9 seconds.
4. Leading Edges - VISUALLY OBSERVE for simultaneous inflation of all visible leading edge boots.
5. DE-ICE PRESSURE Annunciator - OBSERVE (should illuminate within 6 seconds after activating BOOT PRESSURE Switch to MANUAL position).

(Continued Next Page)

EMERGENCY PROCEDURES (Continued)

PNEUMATIC DE-ICE BOOT MALFUNCTIONS (Continued)

If de-ice press annunciator does illuminate (MANUAL Mode)

6. BOOT PRESSURE Switch - MANUAL and release (continue as required to shed ice).
7. Exit icing conditions as soon as practical.

If the de-ice pressure annunciator does not illuminate or any of the leading edge boots do not inflate:

6. **Exit icing conditions as soon as possible.**
7. Maintain a minimum speed of 120 KIAS with flaps up (110 KIAS if climbing) or higher. If unable to maintain this airspeed in level flight, allow altitude to decrease to maintain airspeed or extend flaps to 10° and maintain a minimum airspeed of 105 KIAS or higher (95 KIAS if climbing).
8. If there are unshed ice accumulations along the wing, wing strut, and stabilizer leading edges during an approach and landing, follow the Normal Procedures under Section 4 of this supplement.

WARNING

IN HEAVY ICING CONDITIONS, IT MAY NOT BE POSSIBLE TO MAINTAIN ALTITUDE OR PROPER GLIDE PATH ON APPROACH; IN THIS CASE, IT IS IMPERATIVE THAT A SAFE AIRSPEED BE MAINTAINED. THE AURAL STALL WARNING HORN MAY NOT FUNCTION.

(Continued Next Page)

EMERGENCY PROCEDURES (Continued)

LEADING EDGE DE-ICE BOOTS REMAIN INFLATED (Green De-ice Pressure Annunciator Illuminated)

1. Boots - OBSERVE horizontal stabilizer, wing inboard, main landing gear leg, wing outboard and wing strut boots for any that may remain inflated.

If any of the leading edge boots remain inflated after the normal cycle period:

2. DE-ICE BOOT Circuit Breaker - PULL to deflate boots.
3. Boots - OBSERVE for any that may remain inflated and:
   a. If all boots are deflated, continue flight; be prepared to reset circuit breakers long enough to inflate boots with BOOT PRESSURE Switch for an additional cycle and again pull the circuit breaker, as required if de-icing conditions continue.
   b. If any boots remain inflated, exit icing conditions as soon as possible.

If it can be visually verified that all leading edge boots are deflated, assume a fault in a pressure switch or the annunciator system and:

4. Proceed to destination using visual monitoring of leading edge boots during and after each cycle to verify proper function.

NOTE

Expect a 10 knot increase in stall speeds if any of the wing leading edge boots are inflated.

WINDSHIELD ANTI-ICE PANEL MALFUNCTION

1. (Small Windshield Anti-ice Panel):
   Windshield Anti-ice Switch - CYCLE to OFF and then AUTO.
   (Large Windshield Anti-ice Panel):
   PRIMARY Switch - CYCLE to OFF and then AUTO.
2. W/S ANTI-ICE and W/S ANTI-ICE CONTROL Circuit Breakers - PUSHED IN.
3. Windshield Anti-ice (Green) Annunciator - CHECK ILLUMINATED.

(Continued Next Page)

EMERGENCY PROCEDURES (Continued)

WINDSHIELD ANTI-ICE PANEL MALFUNCTION (Continued)

If windshield anti-ice annunciator does not illuminate:

4. (Small Windshield Anti-ice Panel):
   Windshield Anti-ice Switch - MANUAL and HOLD.
   (Large Windshield Anti-ice Panel):
   PRIMARY and SECONDARY Windshield Anti-ice Switches - MANUAL and HOLD.
   (Large Windshield Anti-ice Panel):
   If either the PRIMARY or SECONDARY heat elements malfunctions:
5. CONTINUE to destination and plan a STRAIGHT-IN APPROACH, if possible.

NOTE

Circling approaches were demonstrated with either the PRIMARY or SECONDARY panels of the large windshield anti-ice panel failed. In the event that a straight-in approach is not possible, preference should be given to a circling approach with turns that are in the direction of the operating half of the windshield anti-ice panel.

If ice remains on windshield anti-ice panel during landing approach:

6. Execute a forward slip as required for visibility through the left portion of the windshield.

HEATED PITOT/STATIC TUBE MALFUNCTION

1. LEFT PITOT HEAT and RIGHT PITOT HEAT Circuit Breakers - PUSHED IN.

If ice begins to form near the static port of the left pitot/static tube (from compensation ring to aft end of tube) or if erroneous readings on the pilot's flight instruments are suspected:

2. Flight Instruments - COMPARE IAS, ALT, and VSI (left and right).
3. ALT STATIC AIR - PULL ON.

NOTE

The static pressure alternate source is connected to the left flight panel instruments only.

(Continued Next Page)

EMERGENCY PROCEDURES (Continued)

HEATED PITOT/STATIC TUBE MALFUNCTION (Continued)

4. Refer to Section 5 of the basic Pilot's Operating Handbook for airspeed and altimeter corrections when using alternate static air.

If ice begins to form near the pitot port (forward end) of the pitot/static tube:

5. Indicated Airspeed - EXPECT NO RELIABLE INDICATION.
6. Fly the airplane using attitude, altitude, and power instruments.

GENERATOR MALFUNCTION (Red Generator Off and/or Amber Stby Elect Pwr ON Annunciators Illuminated)

Refer to the Standby Electrical System supplement in Section 9 for emergency procedures in the event of a generator failure.

In the event of a generator system failure, the alternator-driven standby electrical system has the capacity to supply essential equipment when nonessential loads are shed. The possible load of 110 amps during a night cruise flight in icing conditions can be reduced to the standby electrical system capacity by turning off the following equipment:

1. All external lights.
2. The failed generator (TRIP).
3. Autopilot and weather radar and/or enough other nonessential avionics and lights to prevent battery discharge as indicated by the ammeter with the BATT position selected or illumination of the red VOLTAGE LOW annunciator.
4. For airplanes equipped with the large windshield anti-ice panel, turn the SECONDARY switch to OFF.

HEATED STALL WARNING TRANSDUCER MALFUNCTION

If ice is observed forming on the stall warning vane or its mounting plate:

1. STALL WRN Circuit Breaker - PUSHED IN.
2. With continued ice buildup, expect no stall warning horn during slow speed operation.
3. Approach Speeds - MONITOR indicated airspeed.

(Continued Next Page)

EMERGENCY PROCEDURES (Continued)

LOW AIRSPEED (Amber Below Icing Min Spd Annunciator Illuminated Flashing and Aural Warning)

- If Enroute (Flaps Up)
  (1) Autopilot - DISCONNECT.
  (2) Power - INCREASE power to increase airspeed above 110 KIAS.
  (3) Icing Conditions - EXIT immediately.
  (4) Airspeed - 110 KIAS minimum or greater during exit.

CAUTION

FLAPS MUST BE EXTENDED TO A MINIMUM OF 10 DEGREES ANYTIME AIRSPEED IS BELOW 110 KIAS.

- If On Approach (Flaps 10° or 20°).
  (1) Autopilot - DISCONNECT.
  (2) Below Icing Min Spd Switch Light - PUSH (Horn will cancel, light will illuminate white steady).
  (3) Power - INCREASE to give best speed possible on approach (Flaps 10° and 120 KIAS recommended).
  (4) Approach - CONTINUE.
  (5) Airspeed - MONITOR (Observe Min airspeeds for icing with flaps 10° and 20°).

(Continued Next Page)

EMERGENCY PROCEDURES (Continued)

INADVERTENT ENCOUNTER WITH FREEZING RAIN OR FREEZING DRIZZLE OR OTHER PERFORMANCE CRITICAL ICING SITUATION

NOTE

Refer to Limitation section for visual cues to identify severe icing conditions (freezing rain or freezing drizzle).

- Enroute
  (1) Power - INCREASE to maximum takeoff power (not to exceed 805° ITT or 101.6% N_g).
  (2) Airspeed - MAINTAIN 120 KIAS or greater (110 KIAS if climbing to exit icing condition).
  (3) DE-ICE BOOTS - CYCLE to obtain best possible clearing.
  (4) ATC - NOTIFY and request priority handling to exit condition.

- Approach
  (1) Power - INCREASE as required to maintain airspeed and glidepath (not to exceed 805° ITT or 101.6% N_g).
  (2) Airspeed - 120 KIAS (or greater).
  (3) Flaps - 10°.
  (4) DE-ICE BOOTS - CYCLE to obtain best possible clearing.
  (5) ATC - NOTIFY and request priority handling and straight in approach.
  (6) Airspeed - Maintain 120 KIAS if possible (observe minimum speed for flight in icing with 10° flaps of 105 KIAS).

WARNING

THE AIRPLANE MUST NOT DEPART OR BE FLOWN INTO AN AIRPORT WHERE FREEZING RAIN OR DRIZZLE CONDITIONS ARE BEING REPORTED.

SECTION 4

NORMAL PROCEDURES

PREFLIGHT INSPECTION

1. Wings - Visual and tactile inspection to make sure clear of ice and frost.
2. Horizontal Stabilizer - Visual or tactile inspection to make sure clear of ice and frost.
3. Vertical Stabilizer - Visual inspection to make sure clear of ice and frost.
4. Wing Ice Detector Light Switch - ON and CHECK for illumination.
5. DAY/NIGHT Switch to NIGHT - Windshield Ice Detector Light (if installed) CHECK for illumination.
6. PITOT/STATIC and STALL HEAT Switches - ON (for 30 seconds maximum, ensure pitot covers are removed).
7. LOW AIRSPEED ADVISORY SYSTEM (if installed) - CHECK for illumination when prop anti-ice is ON.
8. PITOT/STATIC and STALL HEAT Switches - OFF.
9. Battery Switch - OFF.
10. Stall Warning Transducer - PERCEPTIBLY WARM.
11. Pitot/Static Tubes - CLEAR and VERY WARM.
12. Wing, Wing Strut, Main Landing Gear Leg, Cargo Pod Nosecap and Stabilizer De-ice Boots - CHECK for tears, abrasions and cleanliness.
13. Propeller Anti-ice Boots - CHECK condition of boots and heating elements.
14. Control Surface Static Dischargers - CHECK condition.

(Continued Next Page)

NORMAL PROCEDURES (Continued)

ABBREVIATED PILOT CHECKLIST

Pilots should familiarize themselves with expanded procedure descriptions before using this abbreviated checklist. This checklist is intended for use in typical icing conditions with normal aircraft performance.

BEFORE STARTING ENGINE

1. Inertial Separator - BYPASS (Visible moisture and below 5°C, 40°F)

BEFORE TAKEOFF

1. Windshield Anti-Ice Switch - AUTO (Primary and Secondary, if installed)
2. PROP ANTI-ICE Switch - AUTO
3. PROP ANTI-ICE Ammeter - CHECK
4. LOW AIRSPEED AWARENESS Annunciator - ILLUMINATED WHITE
5. PROP ANTI-ICE Switch - MANUAL
6. PROP ANTI-ICE Ammeter - CHECK
7. Power Lever - SET for 400 ft lbs
8. BOOT PRESSURE Switch - AUTO
9. DE-ICE PRESSURE Annunciator - CHECK
10. BOOT PRESSURE Switch - MANUAL
11. DE-ICE PRESSURE Annunciator - CHECK
12. Inertial Separator - CHECK
13. Power Lever - IDLE
14. Standby Power - CHECK
15. PITOT/STATIC HEAT - ON (OAT below 5°C, 40°F)
16. STALL HEAT, WINDSHIELD ANTI-ICE and PROPELLER ANTI-ICE Switches and Internal Separator Control - AS REQUIRED for takeoff and climbout

NORMAL PROCEDURES (Continued)

TAKEOFF

1. Wing Flaps-20° (Flaps UP if using TYPE II, III or IV anti-ice fluid)
2. Power - Set for TAKEOFF
3. Annunciators - CHECK
4. Rotate - 70-75 KIAS (83 KIAS flaps UP)
5. Flaps - RETRACT (95 KIAS to 10°, 110 KIAS to UP)

INFLIGHT (Climb, Cruise, and Descent)

1. PITOT/STATIC, STALL, WINDSHIELD, PROP ANTI-ICE and Inertial Separator - ON for visible moisture conditions below 5°C (40°F)
2. Propeller Control - SET for 1900 RPM
3. Power Lever - INCREASE to maximum as required
4. Climb Airspeed - 120 KIAS, (Minimum 110 KIAS, Flaps UP or 95 KIAS, Flaps 10° if climbing to exit icing)
5. BOOT PRESSURE Switch - AUTO and release as required to shed ice

BEFORE LANDING

1. Flaps - 10°
2. Airspeed 120 KIAS
3. Landing Distance - COMPUTE (Handbook plus 110%)
4. BOOT PRESSURE Switch - AUTO and release prior to landing

(Continued Next Page)

NORMAL PROCEDURES (Continued)

LANDING

1. Flaps - 10° (Flaps 20° Maximum)
2. Airspeed - 120 KIAS
3. Power Lever - REDUCE slowly in flare
4. LAA Warning - CANCEL (below 110 KIAS)
5. Power Lever - IDLE (after touchdown)
6. Brakes - AS REQUIRED

BALKED LANDING

1. Power Lever - MAXIMUM POWER
2. Flaps - RETRACT (95 KIAS to 10°)
3. Airspeed - 95 KIAS minimum for climb

AFTER LANDING

1. PITOT/STATIC, STALL, PROP ANTI-ICE Switches - OFF
2. Windshield Anti-ice and Inertial Separator Control - OFF (no visible moisture or above 5°C (40°F))

NORMAL PROCEDURES

AMPLIFIED PROCEDURES

BEFORE TAKEOFF

CAUTION

TO PREVENT BLISTERING THE CARGO POD DE-ICE BOOT (IF INSTALLED), GROUND OPERATION IN A RIGHT CROSSWIND OR OPERATING THE PROPELLER IN BETA OR FEATHER SHOULD BE KEPT TO A MINIMUM.

1. (Small Windshield Anti-ice Panel):
   WINDSHIELD ANTI-ICE Switch - AUTO and MANUAL.
   Observe increase in generator output and illumination of WINDSHIELD ANTI-ICE annunciator in both switch positions.
   (Large Windshield Anti-ice Panel):
   PRIMARY Windshield Anti-ice Switch - AUTO.
   SECONDARY Windshield Anti-ice Switch - AUTO and MANUAL.
   PRIMARY Windshield Anti-ice Switch - MANUAL.
   For each switch movement, observe change in generator output and illumination of WINDSHIELD ANTI-ICE annunciator.
2. Prop Anti-ice Switch - AUTO.
3. Prop Anti-ice Ammeter - CHECK in green arc range and for periodic cycling. The ammeter should indicate 20 to 24 amps for 90 seconds, and 0 amps for 90 seconds (Below Icing Min Spd Annunciator will illuminate Steady White).
4. Prop Anti-ice Switch - MANUAL.
5. Prop Anti-ice Ammeter - CHECK in green arc range.
6. Power Lever - ADJUST for 400 FT-LBS TORQUE.
7. BOOT PRESSURE Switch - AUTO and release. Visually check inflation and deflation cycle of stabilizer, wing inboard, main landing gear leg, wing outboard and wing strut de-icing boots.

(Continued Next Page)

NORMAL PROCEDURES (Continued)

BEFORE TAKEOFF (Continued)

8. DE-ICE PRESSURE Annunciator - CHECK ON within three seconds, and OFF after 18 seconds with approximate two-second OFF periods after 6 and 12 seconds.
9. Boots - CHECK VISUALLY FOR COMPLETE DEFLATION to the vacuum hold-down condition.
10. BOOT PRESSURE Switch - MANUAL and hold. Visually check inflation of all visible boots and illumination of DE-ICE PRESSURE annunciator within 6 seconds.
11. Inertial Separator - CHECK for torque drop between NORMAL and BYPASS modes. Return control to BYPASS if moisture is present below approximately 5°C (40°F).
12. Power Lever - IDLE.
13. Standby Power - CHECK per Standby Electrical System supplement in Section 9 of the basic Pilot's Operating Handbook.
14. Pitot/Static Heat - ON when OAT is below 5°C (40°F).
15. Stall Heat, Windshield Anti-ice and Propeller Anti-ice Switches, and Inertial Separator Control - AS REQUIRED for takeoff and climb out conditions.

CAUTION

DO NOT OPERATE PITOT/STATIC, STALL WARNING, AND PROPELLER ANTI-ICE HEATERS FOR PROLONGED PERIODS ON GROUND.

(Continued Next Page)

NORMAL PROCEDURES (Continued)

IN FLIGHT

1. Before Visible Moisture Is Encountered Below Approximately 5°C (40°F).
   a. Inertial Separator Control - Bypass.
   b. PITOT/STATIC HEAT Switch - ON.
   c. STALL HEAT Switch - ON.
   d. Windshield Anti-ice Switch(es) - AUTO.

CAUTION

LARGE WINDSHIELD PANEL REQUIRE BOTH PRIMARY AND SECONDARY SWITCHES TO AUTO.

NOTE

Under non-icing conditions (especially at night), turn the windshield anti-ice switch(es) OFF to avoid a mild impairment (distortion) of vision through the panel that occurs when the heating elements in the panel are activated during the on cycle.

   e. PROP ANTI-ICE Switch - AUTO.
   f. PROP ANTI-ICE Ammeter - MONITOR.

CAUTION

IF THE AMMETER INDICATES UNUSUALLY HIGH OR LOW AMPERAGE DURING THE 90-SECOND CYCLE OF OPERATION, A MALFUNCTION HAS OCCURRED AND IT IS IMPERATIVE THAT (1) THE SYSTEM BE TURNED OFF, SINCE UNEVEN ANTI-ICING MAY RESULT, CAUSING PROPELLER UNBALANCE AND ENGINE ROUGHNESS, AND (2) THAT ICING CONDITIONS BE AVOIDED.

(Continued Next Page)

NORMAL PROCEDURES (Continued)

IN FLIGHT (Continued)

NOTE

A slight propeller vibration occurring at the start of the propeller anti-ice ON cycle and lasting 20-30 seconds is due to propeller blade ice shedding characteristics and is considered normal. This vibration may be more pronounced with the Hartzell composite propeller. Rapid cycling of the propeller control lever from 1900 RPM to 1600 RPM and back up to 1900 RPM will aid the propeller anti-ice boots in shedding any residual ice. Repeat this procedure as required.

2. During Icing Encounters:
   a. Propeller - 1900 RPM.
   b. Power - INCREASE as required to maintain safe airspeed or to climb out of icing conditions, if feasible. When climbing through icing conditions, it is recommended that the Maximum Climb Power rating be used (1900 RPM and 1865 FT-LBS, not to exceed 765°C ITT or 101.6% N_g).
   c. Climb Airspeed - 120 KIAS RECOMMENDED to reduce ice buildup on the areas aft of the de-ice boots, which include the underside of the wings, horizontal stabilizer and bottom of cargo pod or fuselage. However, if a climb through icing conditions can be accomplished quickly to non-icing conditions on top, then a climb at 110 KIAS is recommended to minimize exposure time to the icing conditions. If 110 KIAS with flaps UP does not produce a perceivable rate-of-climb and descent to exit icing is not an acceptable option, the flaps may be lowered to 10 degrees and climb at 95 KIAS may be used. This configuration should only be used for the duration of the exit icing maneuver. Maneuvering should be limited to 30° banked turns or less. Once clear of icing, the airplane should be re-accelerated to 110 KIAS or more and the flaps retracted.

(Continued Next Page)

NORMAL PROCEDURES (Continued)

IN FLIGHT (Continued)

WARNING

- **THIS AIRPLANE MUST NOT DEPART FROM OR BE FLOWN INTO AN AIRPORT WHERE FREEZING RAIN OR DRIZZLE CONDITIONS ARE BEING REPORTED.**
- **IF FREEZING RAIN OR DRIZZLE CONDITIONS ARE ENCOUNTERED IN FLIGHT THEY MUST BE EXITED IMMEDIATELY.**

Inadvertent operation in these conditions may be detected by:

1. Unusually extensive ice is accreted on the airframe in areas not normally observed to collect ice.
2. Accumulation of ice on the upper or lower surface of the wing aft of the protected area.
3. Heavy ice accumulation on the windshield, or when ice forms aft of the curved sections of the windshield.
4. Ice forms aft of the protected surfaces of the wing struts.

(Continued Next Page)

NORMAL PROCEDURES (Continued)

IN FLIGHT (Continued)

In addition, operation in the following conditions may require extra pilot vigilance to assure that no ice is adhering to the airplane due to small changes in temperature:

1. Flight in visible rain or drizzle at temperatures below 5°C (40°F) outside air temperature (OAT).
2. Droplets that splash or spatter on impact at temperatures below 5°C (40°F) outside air temperature (OAT).

NOTE

When none of the severe icing conditions visual cues are continuing to occur, the airplane has exited the severe icing conditions.

a. Ice Detector Light Switch - ON as required.
b. Airspeed reminder bug - SET (if installed) at initial cruise speed prior to a significant ice accretion.
c. Ice Buildup - MONITOR until approximately 1/4 to 3/4 inch thick on leading edges.

NOTE

The de-icing boots are intended for removal of ice after it has accumulated, rather than preventing its formation. The de-ice boots should generally be cycled with ice accretions of 1/4 to 3/4 inch of ice on the wing leading edge. The rate of airspeed degradation is also an important consideration for determining when to cycle the de-ice boots. For high rates of airspeed decay, or when airspeed approaches the minimum airspeed for icing (120 KIAS), the boots may be cycled with as little as 1/4 inch of ice accretion. For conditions where airspeed is not a concern, the de-ice boot cycle may be delayed until 3/4 inch of ice is accreted.

(Continued Next Page)

NORMAL PROCEDURES (Continued)

IN FLIGHT (Continued)

d. BOOT PRESSURE Switch - AUTO and release. The switch must be actuated after each complete boot cycle if additional cycles are required.

NOTE

Cycling the de-ice boots during high speed cruise or descent produces a mild nose-up pitching moment which is easily controlled by less than 10 pounds of control wheel force. Also, cycling the de-ice boots increases stall speeds by up to 10 knots.

e. Enroute Airspeed - MONITOR. Exit the icing conditions immediately if airspeed decreases 10 KIAS or airspeed falls below 120 KIAS. Maintain a minimum speed of 120 KIAS except if climbing to exit, maintain a minimum speed of 110 KIAS.

NOTE

- If 110 KIAS with flaps UP does not produce a perceivable rate-of-climb and descent to exit icing is not an acceptable option, the flaps may be lowered to 10 degrees and climb at 95 KIAS may be used. This configuration should only be used for the duration of the exit icing maneuver. Once clear of icing condition, the airplane should be re-accelerated to 110 KIAS or more and the flaps retracted.
- During prolonged icing encounters in cruise, increase engine power to maintain cruise speed as ice accumulates on the unprotected areas, and to preclude ice buildup on the fuselage under surfaces, cargo pod nosecap and lower wing surfaces.
- An accumulation of clear ice on the leading edges may cause even larger performance losses than those associated with an equal quantity of rime ice.

(Continued Next Page)

NORMAL PROCEDURES (Continued)

IN FLIGHT (Continued)

NOTE

- The autopilot may be used in icing conditions if not prohibited (see limitations section). However, every 10-15 minutes the autopilot should be disconnected to detect any out of trim conditions caused by ice buildup. If significant out of trim conditions are detected, the autopilot should remain off for the remainder of the icing encounter so that the pilot may monitor for additional force buildup.

WARNING

- **WHEN DISCONNECTING THE AUTOPILOT WITH ICE BUILDUP ON THE AIRPLANE, THE PILOT SHOULD BE ALERT FOR OUT OF TRIM FORCES. PILOT CONTROL WHEEL INPUT SHOULD BE APPLIED AS REQUIRED TO PREVENT POTENTIAL UNDESIRED FLIGHT PATH DEVIATIONS.**
- **MONITOR AIRSPEED IN ICING CONDITIONS WITH THE AUTOPILOT ENGAGED. THE AUTOPILOT WILL MAINTAIN ALTITUDE OR VERTICAL SPEED AT THE EXPENSE OF AIRSPEED AS DRAG INCREASES DUE TO ICE ACCRETION ON THE AIRPLANE.**
- **IF PRE-STALL BUFFET OR UNCOMMANDED PITCH OSCILLATIONS ARE ENCOUNTERED, REDUCE PITCH ATTITUDE WHILE INCREASING POWER TO MAX CONTINUOUS SETTING. PROMPTLY EXTEND FLAPS TO 10° TO HELP STABILIZE THE AIRPLANE. IF NECESSARY, DO NOT ATTEMPT TO MAINTAIN ALTITUDE UNTIL POSITIVE RECOVERY FROM BUFFET IS ACHIEVED. INCREASE AIRSPEED TO 110 KIAS OR GREATER BEFORE RETRACTING FLAPS. IF THE FLAPS ARE SUBSEQUENTLY RETRACTED, MAINTAIN AT LEAST 10 KIAS ABOVE INITIAL BUFFET AIRSPEED.**

(Continued Next Page)

NORMAL PROCEDURES (Continued)

BEFORE LANDING

1. Configuration - Plan an approach with flaps 10° and 120 KIAS when on final.

WARNING

DURING MODERATE OR SEVERE ICING ENCOUNTERS, MAINTAIN MAXIMUM POSSIBLE AIRSPEED ON APPROACH (OBSERVE V_{MO} AND FLAP LIMITATIONS) LANDING WITH PARTIAL POWER MAY BE REQUIRED. OBSERVE MINIMUM SPEED IN ICING CONDITIONS (SEE LIMITATION).

2. Flaps - Plan landing with flaps 10°. If field length dictates the use of additional flaps, do not extend flaps beyond 20° with ice suspected on airframe or when operating at 5°C (40°F) or less in visible moisture.
3. BOOT PRESSURE Switch - AUTO and release prior to landing (approximately 500 ft AGL).

WARNING

DO NOT CYCLE THE BOOTS DURING LANDING (BELOW APPROXIMATELY 500 FT AGL) BECAUSE BOOT INFLATION MAY INCREASE STALL SPEEDS BY AS MUCH AS 10 KNOTS.

(Continued Next Page)

NORMAL PROCEDURES (Continued)

LANDING

1. Recommended 50 ft airspeed with ice on the airplane:
   a. Flaps 10°: 120 KIAS
2. If 120 KIAS can not be maintained or other airfield constraints dictate use of other flaps or speeds, the following speeds can be used at the discretion of the pilot.
   a. Flaps UP 110-120 KIAS
   b. Flaps 10° 105-110 KIAS
   c. Flaps 20° 95-100 KIAS

WARNING

THE ABOVE SPEEDS PROVIDE A RANGE OF SPEEDS THAT WILL PROVIDE ADEQUATE MARGIN ABOVE STALL FOR MOST ICING ENCOUNTERS WITH NORMALLY FUNCTIONING ICE PROTECTION SYSTEMS. FOR UNUSUAL ICE ACCRETIONS, SYSTEM MALFUNCTIONS OR IF AERODYNAMIC PRE-STALL BUFFET IS ENCOUNTERED, PROMPTLY INCREASE AIRSPEED AT LEAST 10 KIAS ABOVE THE BUFFET ONSET SPEED. DO NOT ATTEMPT TO MAINTAIN ALTITUDE OR GLIDE PATH UNTIL POSITIVE RECOVERY FROM BUFFET IS ACHIEVED.

3. Some power may be required during landing flare to avoid a sudden sink rate with ice accretion on the airplane.
4. During Landing Rollout - DO NOT USE REVERSE THRUST, unless required, to prevent residual ice on the airframe from being drawn into the propeller.

BALKED LANDING

CAUTION

GO-AROUND IS DISCOURAGED AFTER ANY SIGNIFICANT ICING ENCOUNTER. IF UNAVOIDABLE, THE FOLLOWING PROCEDURE SHOULD BE USED.

1. Power Lever - MAXIMUM POWER.
2. Flaps - FLAPS 10°.
3. Airspeed - MINIMUM 105 KIAS (95 KIAS if climbing).

SECTION 5

PERFORMANCE

STALL SPEEDS

Ice accumulation on the airframe may result in a 20 KIAS increase in stall speed. Either buffet or aural stall warning should be treated as an imminent stall.

WARNING

- **THE AURAL STALL WARNING SYSTEM DOES NOT FUNCTION PROPERLY IN ALL ICING CONDITIONS AND SHOULD NOT BE RELIED UPON TO PROVIDE ADEQUATE STALL WARNING IN ICING CONDITIONS.**
- **IF PRE-STALL BUFFET OR UNCOMMANDED PITCH OSCILLATIONS ARE ENCOUNTERED, REDUCE PITCH ATTITUDE WHILE INCREASING POWER TO MAX CONTINUOUS SETTING, PROMPTLY EXTEND FLAPS TO 10° TO HELP STABILIZE THE AIRPLANE. INCREASE AIRSPEED TO 110 KIAS OR GREATER BEFORE RETRACTING FLAPS. IF THE FLAPS ARE SUBSEQUENTLY RETRACTED, MAINTAIN AT LEAST 10 KIAS ABOVE INITIAL BUFFET AIRSPEED.**

(Continued Next Page)

PERFORMANCE (Continued)

RATE-OF-CLIMB

Ice accumulation on the airframe may cause a loss in rate-of-climb. Expect the service ceiling of the airplane to be significantly reduced. With some ice accretions, climbing to exit icing conditions may not be an option. Even after cycling the de-ice boots, residual ice on the airframe can result in a decrease in climb performance and service ceiling compared to a clean airframe.

PRE-FLIGHT PLANNING

Figure S1-1 may be used for estimation of enroute altitude capability in icing conditions. After entering the chart with expected cruise weight, ambient temperature at altitude and cruise altitude the pilot may plan the flight as follows:

AREA A: These altitudes should be available under most icing conditions for prolonged periods of time.

AREA B: These altitudes may or may not be sustainable by the airplane depending on the type and amount of ice that forms on the airplane over a period of time.

AREA C: These altitudes will probably not be available after ice begins to accrete on the airplane. Exiting the icing condition by climbing may not be possible.

NOTE

Exit strategies for icing conditions should be determined during pre-flight planning.

(Continued Next Page)

PERFORMANCE (Continued)

ENROUTE TOOL FOR EXITING ICING

Figure S1-1 must be used as one criteria for exiting icing conditions. See LIMITATIONS Section of this supplement under ENVIRONMENTAL CONDITIONS. Once enroute, if icing conditions are encountered such that ice begins to accrete on the airplane, the pilot MUST make his/her decision as follows:

AREA A: If current route leg MEA or MOCA (if applicable) falls in this area, it is recommended that the pilot exit the icing conditions as soon as practical.

AREA B: If current route leg MEA or MOCA (if applicable) falls in this area, the pilot must exit the icing condition as soon as practical.

AREA C: If current route leg MEA or MOCA (if applicable) falls in this area, the pilot must exit icing conditions immediately.

CAUTION

- REGARDLESS OF WHICH AREA THE AIRPLANE IS OPERATING, THE PILOT SHOULD CONTINUE TO MONITOR ICE BUILDUP AND AIRSPEED DECAY AND BE PREPARED TO EXIT ICING IMMEDIATELY IF ICING CONDITIONS WORSEN.
- Data on this chart is based on flight testing with critical ice shapes derived for 14 CFR Part 25, Appendix C icing envelope. While some icing conditions will result in ice accretions that result in performance better than shown here, some icing conditions (freezing drizzle or freezing rain) will result in considerably worse performance.

(Continued Next Page)

PERFORMANCE (Continued)

ENROUTE TOOL FOR EXITING ICING (Continued)

ICING SERVICE CEILING
FLAPS UP - 110 KIAS

CONDITIONS:
Maximum Climb Power
1900 RPM
Inertial Separator - BYPASS
Cabin Heat - ON

NOTES:

1. **Maximum icing weight without cargo pod installed = 8750 lbs. Maximum icing weight with cargo pod installed = 8550 lbs.**
2. **Torque set at 1865 foot-pounds or lesser value must not exceed maximum climb ITT of 765°C or N_g of 101.6%.**
3. Severity of pilot icing reports can be aircraft dependent. Light ice reports from large aircraft may be moderate or severe ice for small aircraft.

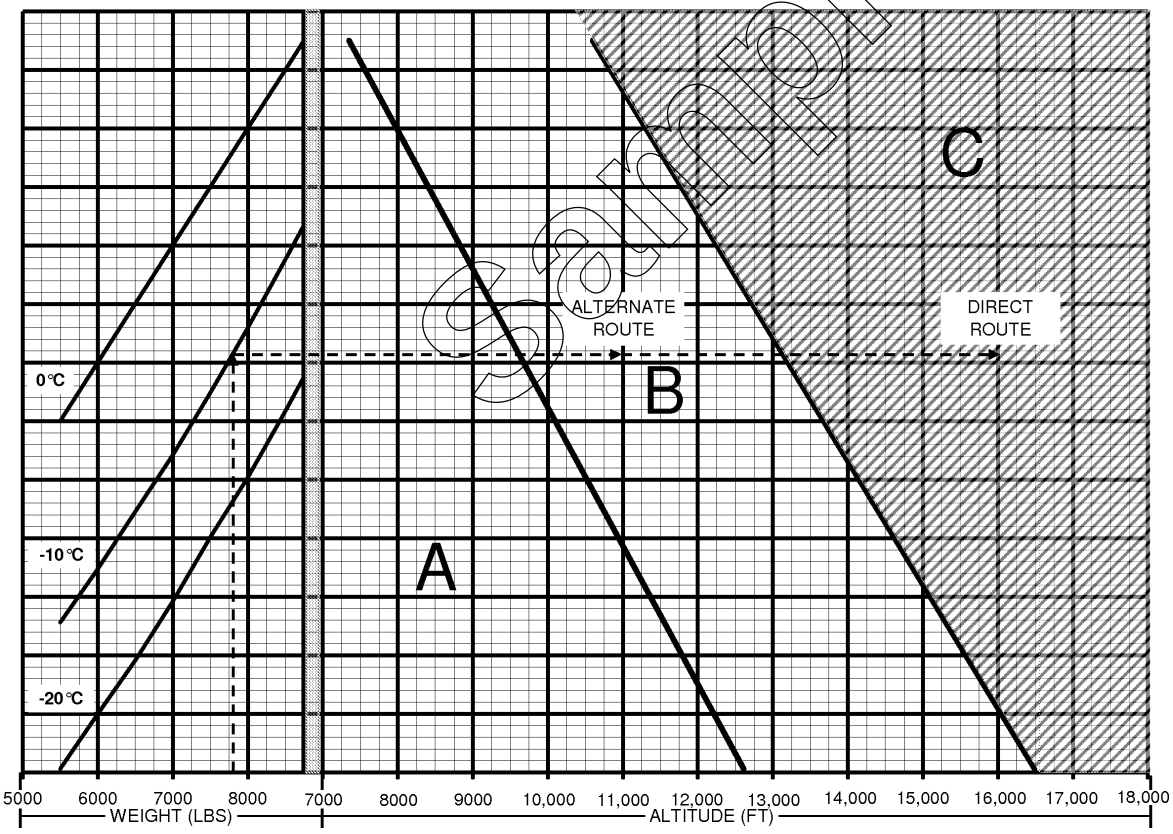

Figure S1-1*

(Continued Next Page)

PERFORMANCE (Continued)

ENROUTE TOOL FOR EXITING ICING (Continued)

Example use of Icing Service Ceiling Chart:

Direct Route: KSLC to KTWF (DIRECT)

Takeoff Weight:	7900 lbs
MEA:	16,000 ft
OAT at Altitude:	-10°C
Weight at Altitude:	7800 lbs

Pre-flight Planning:

Per Figure S1-1, initial operation is in area C, indicating that prolonged exposure to icing conditions will not allow the airplane to climb to this altitude.

Enroute Limitations:

If icing is encountered the pilot must exit icing immediately since enroute operation fell in Area C.

Alternate Route: KSLC to KTWF (KSLC to OGD to LCU to KTWF)

Takeoff Weight:	7900 lbs
MEA:	11,000 ft
OAT at Altitude:	-10°C
Weight at Altitude:	7800 lbs

Pre-flight Planning:

Per Figure S1-1, initial operation in area B. Depending on severity of icing, the airplane should be able to reach this altitude in a climb, but that pilot should monitor ice build up closely.

Enroute Limitations:

If icing conditions are encountered the pilot must exit the icing conditions as soon as practical. The pilot should monitor airspeed closely to assure compliance with other exit icing criteria.

(Continued Next Page)

PERFORMANCE (Continued)

CRUISE PERFORMANCE

Ice accumulation on the airframe may cause a cruise speed reduction of 40 KIAS or more. Even after the de-ice boots are cycled, residual ice on the airframe can result in a decrease in cruise performance of 20 KIAS or more. Cruise performance may continue to decrease with each successive cycle of the de-ice boots. Observe minimum airspeed and airspeed change limitations contained in Section 2 of this supplement.

See Figure S1-2 for expected indicated cruise speed after initial ice accretions at various altitudes, temperatures and weights. These figures may be used as a flight-planning tool to determine which altitudes may offer some initial margin above the minimum speed in icing limitation. In all cases if 120 KIAS cannot be maintained or a 10 KIAS loss of airspeed occurs, the pilot must exit icing conditions.

(Continued Next Page)

PERFORMANCE (Continued)

CRUISE PERFORMANCE (Continued)

(WITH OR WITHOUT CARGO POD INSTALLED)
ICING CRUISE PERFORMANCE

CONDITIONS:
Maximum Cruise Power
1900 RPM
Inertial Separator - BYPASS
Cabin Heat - ON

NOTES:

1. **Maximum icing weight without cargo pod installed = 8750 lbs. Maximum icing weight with cargo pod installed = 8550 lbs.**
2. **Torque set at 1865 foot-pounds or lesser value must not exceed maximum climb ITT of 765°C or N_g of 101.6%.**
3. Severity of pilot icing reports can be aircraft dependent. Light ice reports from large aircraft may be moderate or severe ice for small aircraft.
4. Residual ice accreation on airplane after de-ice boot cycle.

		8750 LBS		8550 LBS		6000 LBS	
ALTITUDE FT	TEMP DEG C	TORQUE FT-LBS	KIAS	TORQUE FT-LBS	KIAS	TORQUE FT-LBS	KIAS
2000	0	1865	139	1865	139	1865	143
2000	-10	1865	139	1865	140	1865	143
2000	-20	1865	141	1865	141	1865	145
4000	0	1865	137	1865	137	1865	140
4000	-10	1865	137	1865	138	1865	142
4000	-20	1865	139	1865	139	1865	143
6000	0	1830	133	1831	133	1835	138
6000	-10	1865	135	1865	136	1865	140
6000	-20	1865	137	1865	137	1865	141
8000	0	1662	125	1662	126	1667	131
8000	-10	1829	132	1829	133	1833	137
8000	-20	1865	134	1865	134	1865	139
10,000	0	1507	117	1508	118	1513	125
10,000	-10	1666	124	1667	125	1671	130
10,000	-20	1796	129	1797	130	1801	135
12,000	0	1357	108	1358	109	1365	117
12,000	-10	1505	116	1506	117	1513	124
12,000	-20	1630	122	1631	123	1636	129
14,000	0	1220	97	1220	99	1229	110
14,000	-10	1356	107	1357	108	1365	117
14,000	-20	1477	113	1477	114	1483	121

Figure S1-2

(Continued Next Page)

PERFORMANCE (Continued)

LANDING PERFORMANCE

1. Reference recommended 50 ft airspeed with ice on airframe in Section 4 of this supplement.
   a. FLAPS UP LANDING - Increase POH Total Landing Distance by 120%.
   b. FLAPS 10° LANDING - Increase POH Total Landing Distance by 110%.
   c. FLAPS 20° LANDING - Increase POH Total Landing Distance by 100%.