Pilot's Operating Handbook and

FAA Approved Airplane Flight Manual

Supplement

for the

TKS Anti-Ice System

- Approved for Flight Into Known Icing (FIKI)
- 8.0 gallon usable capacity.
- 4.0 gallon tank in each wing.

When the TKS Anti-Ice System is installed on the aircraft, this POH Supplement is applicable and must be inserted in the Supplements Section of the Pilot's Operating Handbook. This document must be carried in the airplane at all times. Information in this supplement adds to, supersedes, or deletes information in the basic Pilot's Operating Handbook.

FAA Approved Joseph C Mieso **Date** Feb 01, 2013

for Charles Smalley, Manager
Chicago Aircraft Certification Office, ACE-115C
Federal Aviation Administration

Section 1 - General

This system, when compliant with the Kinds of Operation Equipment List and Minimum Dispatch Fluid Quantity, allows flight in icing conditions as defined by Title 14 of the Code of Federal Regulations (CFR) Part 25, Appendix C - Envelopes for Continuous Maximum and Intermittent Maximum Icing.

Section 2 - Limitations

In icing conditions the airplane must be operated as described in the operating procedures section of this manual. Where specific operational speeds and performance information have been established for such conditions, this information must be used.

At the first sign of Anti-Ice System malfunction, the aircraft must immediately exit icing conditions.

Environmental Conditions

Flight into freezing rain or freezing drizzle is prohibited.

Known icing conditions are defined by FAR Part 25, Appendix C. These conditions do not include, nor were tests conducted in all icing conditions that may be encountered such as freezing rain, freezing drizzle, mixed conditions or conditions defined as severe. Flight in these conditions must be avoided. Some icing conditions not defined in FAR Part 25 have the potential of producing hazardous ice accumulations, which exceed the capabilities of the airplane's Anti-Ice System, and/or create unacceptable airplane performance including loss of control.

Inadvertent operation in freezing rain, freezing drizzle, mixed conditions, or conditions defined as severe may be detected by:

- Visible rain at temperatures below 41°F (5°C) OAT.
- Droplets that splash or splatter on impact at temperatures below below 41°F (5°C) OAT.
- Ice on or behind the wing or horizontal tail panels that cannot be removed with Anti-Ice System HIGH flow.
- Unusually extensive ice accreted on the airframe in areas not normally observed to collect ice.

- Accumulation of ice on the upper surface or lower surface of the wing aft of the protected area.
- Accumulation of ice on the propeller spinner farther back than normally observed.

If the airplane encounters conditions that are determined to contain freezing rain, freezing drizzle, or severe icing, immediately exit condition by changing altitude, turning back, or if clear air is known to be immediately ahead, continue on course. Once clear of these weather conditions, report encountered weather to air traffic control

• Note •

The National Weather Service's Automated Surface Observing Systems (ASOS) program does not report freezing drizzle. It is the pilot's responsibility to evaluate and understand weather along the intended route and identify any potential weather hazards thru evaluation of, but not limited to, Current Observations, Pilot Reports, Area Forecasts, AIRMETS, SIGMETS, and NOTAMS.

Airspeed Limitations

Minimum airspeed for flight into known icing conditions......... 95 KIAS*

*Includes all phases of flight, including approach, except as required for takeoff and landing.

Max airspeed Anti-Ice System operation........177 KIAS and 204 KTAS

Recommended holding airspeed..120 KIAS

Weight Limits

Maximum weight for flight into known icing conditions.............. 3600 lb

Takeoff Limits

Takeoff is prohibited with any ice, snow, frost or slush adhering to the wing, stabilizers, control surfaces, propeller blades, or engine inlet.

Performance Limits

Refer to Section 5 - Performance for limitations that reflect effects on lift, drag, thrust and operating speeds related to operating in icing conditions.

Minimum Operating Temperature

Minimum Operating Temperature for Anti-Ice System..... -30°F (-34°C)

Kinds of Operation

This system allows flight into known icing as defined by Title 14 of the Code of Federal Regulations (CFR) Part 25, Appendix C - Envelopes for Continuous Maximum and Intermittent Maximum Icing.

This airplane is approved for flight into known icing conditions only if the following Cirrus and FAA approved equipment is installed and fully functional.

System, Instrument, and/or Equipment	Kinds of Operation	
	IFR Day	IFR Nt.
Placards and Markings		
Airplane Flight Manual Supplement	1	1
Ice and Rain Protection		
Windshield Spray Nozzles	1	1
Wing LH and RH Inboard Panel	1	1
Wing LH and RH Outboard Panel	1	1
Horizontal Stabilizer LH and RH Panel	1	1
Vertical Stabilizer Panel	1	1
Elevator Tip LH and RH Panel	1	1
Propeller Slinger Ring	1	1
Deicing Fluid (Must meet British Specification DTD 406B.)	As Req'd	As Req'd
Lights		
Ice-Inspection Lights		1
System Control and Annunciation	1	1
Environmental System		
Cabin Heat and Defroster System	1	1
Flight Controls		
Heated Stall Warning System and Annunciation	1	1
Navigation and Pitot Static		
Pitot Heat	1	1

Minimum Dispatch Fluid Quantity

Dispatch into known icing conditions with less than 5 gallons (19 liters) of deicing fluid is prohibited. The pilot must ensure adequate fluid quantity before each flight. If dispatching without the minimum 5 gallons and icing conditions are encountered, exit icing conditions as soon as possible.

Duration Times for 5 Gallon Minimum Dispatch Fluid Quantity:

NORM .... 90 Minutes

HIGH .... 45 Minutes

MAX .... 22.5 Minutes

Deicing Fluid Limits

Usable Tank Capacity .... 8 gal (30L)

Tank Capacity .... 8.5 gal (32L)

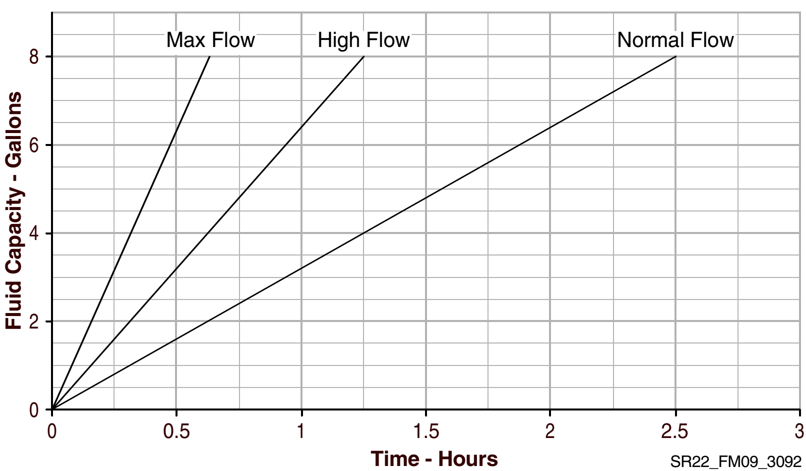
Maximum Operating Time

Continuous operation of the aircraft in conditions that promote ice accretion is prohibited. Use of the windshield de-ice system will reduce the maximum available operating time of the system.

Normal Flow Duration .... 150 Minutes (3.2 gph)

High Flow Duration .... 75 Minutes (6.4 gph)

Maximum Flow Duration .... 37.5 Minutes (12.8 gph)



Systems and Equipment Limits

Lift Transducer Heat System

Limit ground operations of Lift Transducer Heat (PITOT HEAT) to 45 seconds.

Autopilot System

Autopilot operation is prohibited when operating in icing conditions which are outside of the CFR defined conditions as stated in the preceding Environmental Conditions paragraph.

Flap System

Unless required for Emergency operations (i.e. Forced Landing), Flaps are limited to a maximum deflection of 50% when the aircraft has encountered icing conditions and/or has accumulated ice on the airframe

When holding in icing conditions the flaps must be UP (0%).

Pilot Qualification and Training

• Note •

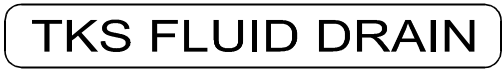
> The Pilot Qualification and Training Limitation does not apply to airplanes registered in the European Union.

The pilot-in-command must successfully complete the Cirrus Icing Awareness Course or a Cirrus Design approved equivalent training course, within the preceding 24 months prior to Flight Into Forecast or Known Icing Conditions.

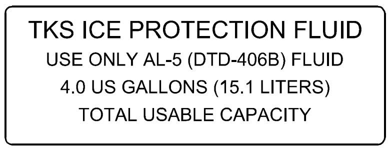
Contact Cirrus Design at (218) 529-7292 for additional information.

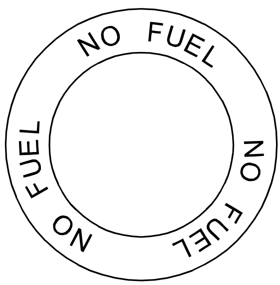
Placards

Lower wing, above anti-ice fluid drain:



Upper wing, above anti-ice fluid filler cap:





Bolster Switch Panel, left edge:

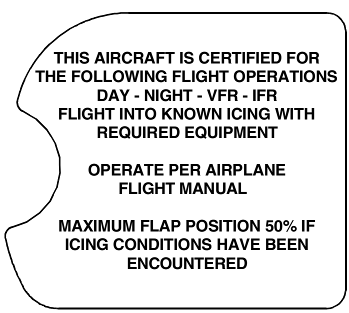


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Figure -1
Required Placards

Section 3 - Emergency Procedures

A failure of the Anti-Ice System is any condition, observed or suspected, in which the system fails to remove ice from protected surfaces including the propeller, in addition to any Anti-Ice System CAS failure annunciations. An unobserved failure may be indicated by a decrease in airspeed, anomalous handling characteristics, or airframe vibrations.

• Note •

Significant loss in cruise or climb performance may be an indication of propeller ice accretions that are not visible to the naked eye. Operation of the engine at 2700 RPM will help shed ice in severe icing conditions.

• Caution •

Continuous ice accumulations on protected areas are abnormal.

• WARNING •

With ice accumulations on the horizontal stabilizer leading edge, flaps should remain retracted for landing and the landing speed increased accordingly.

With asymmetrical ice accumulations on large portions of the wing or horizontal stabilizer, avoid flight at speeds less than 95 KIAS.

Anti-Ice System Failure / Excessive Ice Accumulation

1. ICE PROTECT A and B Circuit Breakers .... SET
2. Fluid Quantity .... SWITCH TO FULLEST TANK
3. WIND SHLD Push-Button .... PRESS
   a. Repeat operation of windshield pump to verify metering pumps are primed properly as evidenced by deicing fluid exiting windshield nozzles.
4. ICE PROTECT Mode Switch .... VERIFY HIGH
5. PUMP BKUP Switch .... ON

   If determined windshield pump is not priming:
6. Exit Icing Conditions Immediately.
7. Airspeed .... 95 KIAS OR GREATER

   Maintain a minimum airspeed of 95 KIAS or higher to stay above pre-stall buffet. If unable to maintain this airspeed, allow altitude to decrease in order to maintain 95 KIAS.
8. Minimum Approach Speed w/ Residual Ice (Flaps 50%) ... 88 KIAS

   In severe 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 stall warning system may not function and there may be little or no pre-stall buffet with heavy ice loads on the wing.
9. FLAPS .... MINIMUM REQUIRED

   When landing is assured, select the minimum flap setting required, not to exceed 50%, and maintain extra airspeed consistent with available field length. Do not retract the flaps once they have been extended unless required for go-around.

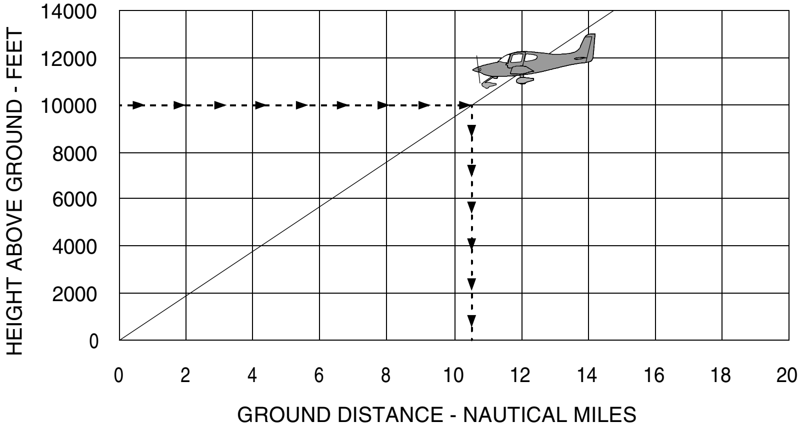
Maximum Glide with Ice Accumulation

Conditions		Example:	
Power	OFF	Altitude	10,000 ft. AGL
Propeller	Windmilling	Airspeed	92 KIAS
Flaps	0% (UP)	Glide Distance	10.5 NM
Wind	Zero		

Best Glide Speed

92 KIAS at 3600 lb

Maximum Glide Ratio ~ 6.4: 1



Section 3A - Abnormal Procedures

Windshield De-Ice System Malfunction

1. ICE PROTECT A Circuit Breaker .... CYCLE
2. Fluid Quantity .... SWITCH TO FULLEST TANK
3. WIND SHLD Push-Button .... PRESS AS REQUIRED

   If the forward field of view is overly restricted during landing approach and taxiing:

   a. Cabin Heat .... HOT
   b. Windshield Defrost .... ON
   c. Execute a forward slip as required for visibility.
   d. Avoid taxiing without adequate forward visibility.

Heated Lift Transducer Malfunction

Airframe buffet before the stall is a good indication of an impending stall.

The stall warning horn typically activates prematurely if there is ice accumulated on the lift transducer vane.

Some ice accumulation on the inboard/outboard edges of the lift transducer faceplate is considered normal.

If ice forms on lift transducer vane:

1. STALL VANE HEAT Circuit Breaker .... CYCLE
2. PITOT HEAT Switch .... CYCLE OFF, ON

If ice remains on lift transducer vane:

1. Stall Warning System ....EXPECT NO RELIABLE INDICATION

   This includes:

   - *Impending stall warning.*
   - *Stall speed indication.*
2. Airspeed .... MONITOR, DO NOT STALL
3. Fly published V_{REF} speeds ....Minimum 88 KIAS with 50% Flap

Static System Malfunction

If erroneous readings on the pilot's flight instruments are suspected the static button(s) on side of fuselage may be obstructed. Refer to *Section 3A - Abnormal Procedures, Static Source Blocked* in the basic handbook.

Anti-Ice System CAS Annunciations

• Note •

During Anti-Ice System activation, system mode changes, operation at temperatures above freezing or with warm deicing fluid, occasional ANTI ICE annunciations are normal.

Low Fluid Quantity Caution and Warning

ANTI ICE QTY

PFD Alerts Window: "Fluid quantity is low (TKS)"

ANTI ICE QTY Warning: Fluid quantity is less than 0.5 gallon. (1.9 L)

ANTI ICE QTY Caution: Fluid quantity is less than 1.0 gallon. (3.8 L)

• Note •

Depending on the selected flow rate, ANTI ICE QTY annunciation may occur at lower fluid quantities

1. Icing Conditions .... AVOID / EXIT

Low Flow Rate Warning

ANTI ICE FLO

PFD Alerts Window: "Flow rate is low (TKS)"

1. ICE PROTECT A and B Circuit Breakers .... SET
2. Fluid Quantity .... SWITCH TO FULLEST TANK
3. WIND SHLD Push-Button .... PRESS
   a. Repeat operation of windshield pump to verify metering pumps are primed properly as evidenced by deicing fluid exiting windshield nozzles.

4. ICE PROTECT Mode Switch .... HIGH

   If warning annunciation extinguishes:

   a. Anti-Ice System .... MONITOR

   If warning annunciation does not extinguishes or intermittent:

   a. PUMP BKUP Switch...ON
   b. Icing Conditions.. AVOID / EXIT

Lift Transducer Overheat Warning

AOA OVERHEAT

PFD Alerts Window: "AOA probe is overheated"

• Note •

Operation of Pitot Heat on hot days may annunciate the AOA OVERHEAT Warning when flying at slow speeds. When air temperatures are greater than 41°F (5°C), operation of Pitot Heat is at discretion of the pilot. If overheat warning is annunciated, Pitot Heat should remain OFF.

1. PITOT HEAT Switch..OFF
2. Icing Conditions .... AVOID/EXIT

Tank Control Failure Warning

ANTI ICE CTL

PFD Alerts Window: "Tank valves cannot be controlled (closed) (TKS)"

Tank selection is inoperative and both left and right are open, typical with GIA failure.

1. Icing Conditions .... AVOID / EXIT

Unreliable Fluid Quantity Warning

ANTI ICE QTY

PFD Alerts Window: "Left and right fluid quantities unknown (TKS)"

Both fluid quantities are unknown and both tanks are closed.

1. ICE PROTECT System Switch..OFF
2. Icing Conditions .... AVOID / EXIT

Low Pressure Caution.

ANTI ICE PSI

PFD Alerts Window: "Tail pressure is low (TKS)"

• Caution •

A persistent Low Pressure Caution indicates a condition in the tail section of Anti-Ice System and warrants increased caution because the tail section's smaller leading edge radius will typically collect ice more quickly and ice accretion is more difficult to monitor.

1. ICE PROTECT A and B Circuit Breakers.................................SET
2. Fluid Quantity...................................SWITCH TO FULLEST TANK
3. WIND SHLD Push-Button ....PRESS
    a. Repeat operation of windshield pump to verify metering pumps are primed properly as evidenced by deicing fluid exiting windshield nozzles.
4. ICE PROTECT Mode Switch..HIGH

    If caution annunciation extinguishes:

    a. Anti-Ice System .... MONITOR

    If caution annunciation does not extinguishes or intermittent:

    a. PUMP BKUP Switch.. ON
    b. Icing Conditions .... AVOID / EXIT

High Pressure Caution

ANTI ICE PSI

PFD Alerts Window: "Pressure is high (TKS)"

Typically indicates clogged filter.

1. Evidence of Anti-Ice Flow .... MONITOR / VERIFY
2. Icing Conditions .... AVOID / EXIT

Airspeed Caution

ANTI ICE SPD

PFD Alerts Window: "Airspeed is too low/high for ice protection (TKS)"

ANTI ICE SPD Low: Airspeed is less than 95 KIAS

ANTI ICE SPD High: Airspeed is greater than 177 KIAS or 204 KTAS

1. Airspeed..MAINTAIN 95-177 KIAS
   or less than 204 KTAS

Lift Transducer Heater Failure Caution

ANTI ICE HTR

PFD Alerts Window: "Stall warning/AoA heater has failed"

1. STALL VANE HEAT Circuit Breaker.................................. CYCLE
2. PITOT HEAT Circuit Breaker.. CYCLE
3. Icing Conditions .... AVOID / EXIT
4. Fly aircraft normally using airframe buffet as the stall warning. Ice accumulations on the lift transducer vane may result in unreliable stall warning system operation.

Fluid Quantity Imbalance Caution

ANTI ICE QTY

PFD Alerts Window: "Fluid quantity imbalance has been detected"

Imbalance between left and right sensed fluid quantity is greater than 1.0 gallon.

1. Revert to AUTO control of the fluid source to control the fluid quantity.

   If ANTI ICE FLO or ANTI ICE PSI annunciates:

   a. Revert to manual control of the fluid source to control the fluid level quantity

      (1) Fluid Quantity .... SWITCH TO FULLEST TANK

   b. WIND SHLD Push-Button.. PRESS

      (1) Repeat operation of windshield pump to verify metering pumps are primed properly as evidenced by deicing fluid exiting windshield nozzles.

   If Caution Annunciation extinguishes:

   a. Anti-Ice System .... MONITOR

   If Caution Annunciation does not extinguish or intermittent:

   a. Fluid Quantity .... SWITCH TO OPPOSITE TANK

   b. WIND SHLD Push-Button.. PRESS

      (1) Repeat operation of windshield pump to verify metering pumps are primed properly as evidenced by deicing fluid exiting windshield nozzles.

   c. Icing Conditions .... AVOID / EXIT

Left/Right Fluid Quantity Caution

ANTI ICE LVL

PFD Alerts Window: "Right/Left tank fluid quantity is unreliable (TKS)"

L / R fluid quantities on Anti Ice - TKS block of ENGINE page is "greyed out" and/or fluid quantity is marked with a "Red X". The deicing fluid sensing system has detected conflicting system information regarding the fluid quantity in the tanks.

1. Revert to manual control of the fluid source to control the fluid level quantity.

   If ANTI ICE FLO or ANTI ICE PSI annunciates:

   a. Fluid Quantity .... SWITCH TO OPPOSITE TANK

   b. WIND SHLD Push-Button .... PRESS

      (1) Repeat operation of windshield pump to verify metering pumps are primed properly as evidenced by deicing fluid exiting windshield nozzles.

Dynamic Stall Speed Band Unavailable Advisory

AOA FAIL

PFD Alerts Window: "Dynamic stall speed band is unavailable."

Angle of Attack signal has failed. This signal is used to calculate and display a dynamic stall speed awareness band (red band) on airspeed tape. With a failed AOA signal, the low speed red band extends to a fixed value of 61 knots.

Section 4 - Normal Procedures

• WARNING •

Holding in icing conditions for longer than 45 minutes may reduce margins and could result in inadequate handling and control characteristics.

Flight into known icing conditions is prohibited if porous panels do not fully "wet-out" prior to entering icing conditions, or if ANTI ICE CAS messages persist.

• Caution •

Prolonged operation of the system in clear air, above 15,000 feet MSL and temperatures less than -4 F (-20 C) can result in “flash” evaporation of water and alcohol from the anti-ice fluid. This evaporation results in a glycol rich fluid that could become “gel” like on the wing surface until aircraft enters precipitation or warmer temperatures

Limit ground operations of Lift Transducer Heat (PITOT HEAT) to 45 seconds. Operation of Lift Transducer Heat in excess of 45 seconds while on the ground may cause excessive temperature on the lift transducer faceplate and surrounding wing skin.

• Note •

This system is most effective when operated as an anti-ice system to prevent ice accretions on protected surfaces. For optimal performance, the system should be primed on the ground to verify all protected surfaces wet-out fully. The system should then be activated prior to entering icing conditions to confirm the protected surfaces wet-out fully before ice accretion begins.

The Anti-Ice System is approved for operation with ice protection fluid that has a very temperature-dependant viscosity characteristic. As the temperature of the fluid rises above freezing (32F / 0C), the fluid becomes much less viscous (thins) and pass through the porous membrane of the panels with less resistance (pressure drop). This decrease in pressure drop reduces the pressure in the panel reservoir which may not be adequate to wet-out the entire panel if the Pre-Flight Inspection is performed at warmer temperatures.

Increasing the system flow rate (MAX vs. HIGH or HIGH w/ PUMP BKUP vs. HIGH) will increase the arterial pressure of the system which promotes the complete wet-out of the porous panels.

Pre-Flight Inspection

1. Cabin
   a. Circuit Breakers .... SET
   b. Battery 1 Master Switch .... ON
   c. Flaps 100%
   d. Avionics Master Switch .... ON
   e. Cabin Speaker .... ON
   f. Cabin Doors .... CLOSE
   g. WIND SHLD Push-Button .... PRESS
      (1) Verify evidence of deicing fluid from spray nozzles.
   h. PUMP BKUP Switch .... ON
      (1) Metering Pump Duty Cycle .... Verify Continuously ON
      (2) Deicing Fluid and Endurance Indications .... CHECK
   i. PUMP BKUP Switch .... OFF
   j. ICE PROTECT System Switch .... ON
   k. ICE PROTECT Mode Switch .... NORM
      (1) Metering Pump Duty Cycle .... Verify 30s ON, 90s OFF
      (2) Deicing Fluid and Endurance Indications .... CHECK
   l. ICE PROTECT Mode Switch .... HIGH
      (1) Metering Pump Duty Cycle .... Verify Continuously ON
      (2) Deicing Fluid and Endurance Indications .... CHECK
   m. ICE Inspection Lights Switch .... ON
      (1) Verify LH and RH Operation.

Continued on following page.

n. PITOT HEAT Switch........................ON 45 seconds, then OFF

2. Empennage

a. Stabilizers Porous Panels ....CONDITION / SECURITY

(1) Verify Evidence of Deicing Fluid Along Length of Panels and Elevator Horns.

3. Right Wing Forward and Main Gear

a. Fluid Tank ....VERIFY DESIRED QUANTITY

(1) Filler Cap........................... CONDITION AND SECURITY.

(2) Fluid Vent (underside wing).................. UNOBSTRUCTED

b. Porous Panels...........................CONDITION AND SECURITY

(1) Verify Evidence of Deicing Fluid Along Length of Panels.

• WARNING •

Lift Transducer Faceplate and Vane may be HOT.

c. Lift Transducer Faceplate .... PERCEPTIBLY HOT

d. Lift Transducer Vane ....VERY HOT

(1) Verify Stall Warning audio alert after lifting stall vane with wooden tooth pick or tongue depressor.

4. Nose, Right Side

a. Ice-Inspection Light ....CONDITION / SECURITY

5. Nose Gear, Propeller, Spinner

a. Slinger Ring .... EVIDENCE OF DEICING FLUID

6. Nose, Left Side

a. Ice-Inspection Light ....CONDITION / SECURITY

b. Windshield Spray Nozzles ....CONDITION / SECURITY

7. Left Wing Forward and Main Gear

a. Fluid Tank ....VERIFY DESIRED QUANTITY

(1) Filler Cap........................... CONDITION AND SECURITY.

(2) Fluid Vent (underside wing).................. UNOBSTRUCTED

b. Porous Panels..................................CONDITION / SECURITY

(1) Verify Evidence of Deicing Fluid Along Length of Panels.

8. Left Wing Tip

• WARNING •

Pitot Probe may be HOT.

   a. Pitot Probe (underside) .... UNOBSTRUCTED
   b. Pitot Probe..VERY HOT

9. Cabin

   a. Fluid Quantity .... VERIFY 5 GALLON MINIMUM
   b. ICE PROTECT System Switch...OFF
   c. Flaps...0%
   d. Battery 1 Master Switch ....OFF
   e. Avionics Master Switch...OFF
   f. Cabin Speaker...OFF

Ice Formation Determination

Typically, a leading edge with a small radius will collect ice more quickly than a leading edges with a large radius. To help monitor possible ice accumulation, a thin metal tab is attached to the outboard end of the RH and LH stall strips. In some icing conditions this tab may be the first place that airframe ice accretion is noticeable. Additionally, refer to other areas of the aircraft, such as the horizontal tail and lower windscreen, to aid in determining if ice is accreting to the aircraft.

Before Takeoff

If icing conditions are anticipated immediately after take-off:

1. ICE PROTECT System Switch .... ON
2. ICE PROTECT Mode Switch.................................. NORM / HIGH
3. PITOT HEAT Switch .... ON
4. Cabin Heat .... HOT
5. Windshield Defrost .... ON
6. Ice-Inspection Lights .... AS REQUIRED
7. Verify airframe is free of contamination immediately before takeoff.
8. Flaps .... RETRACT as soon as practical

In Flight

If Inadvertent Icing Encounter OR Icing Conditions Exist:

1. PITOT HEAT Switch ....Verify ON
2. ICE PROTECT System Switch... ON
3. ICE PROTECT Mode Switch... NORM
4. WIND SHLD Push-Button .... PRESS AS REQUIRED
5. Monitor ice accumulation.

   If ice accretions persist on protected surfaces following each cycle:

   a. ICE PROTECT Mode... HIGH

   If ice continues accumulating on protected surfaces:

   b. ICE PROTECT Mode Push-Button .... MAX

   If ice accretions do not shed from protected surfaces:

   c. PUMP BKUP Switch .... ON
   d. Perform Anti-Ice System Failure checklist.
   e. WIND SHLD Push-Button................... PRESS AS REQUIRED
   f. Airspeed .... MAINTAIN 95-177 KIAS
      or less than 204 KTAS

While in Icing Conditions:

1. FLAPS .... UP
2. Ice-Inspection Lights .... AS REQUIRED
3. Cabin Heat ....HOT
4. Windshield Defrost..ON
5. Fluid Quantity and Endurance .... MONITOR
    a. Ensure adequate quantity to complete flight.

After Leaving Icing Conditions:

1. Anti-Ice System...OFF
2. Airspeed......................................as flight CONDITIONS DICTATE
3. Ice-Inspection Lights .... AS REQUIRED
4. Cabin Heat .... AS REQUIRED
5. Windshield Defrost.. AS REQUIRED
6. WIND SHLD Push-Button .... PRESS AS REQUIRED

Cruise

During icing encounters in cruise, increase engine power to maintain cruise speed as ice accumulates on the unprotected areas and causes the aircraft to slow down.

The autopilot may be used in icing conditions. However, every 30 minutes the autopilot should be disconnected to detect any out-of-trim conditions caused by ice buildup. If significant out-of-trim or other anomalous conditions are detected, the autopilot should remain off for the remainder of the icing encounter.

When disconnecting the autopilot with ice accretions on the airplane, the pilot should be alert for out-of-trim forces.

Approach and Landing

If Icing Conditions Exist:

1. ICE PROTECT System Switch.. ON
2. ICE PROTECT Mode Switch..HIGH
3. Monitor ice accumulation.

   If ice continues accumulating on protected surfaces:

   a. ICE PROTECT Mode Push-Button.................................. MAX

   If ice accretions do not shed from protected surfaces:

   b. PUMP BKUP Switch.. ON
   c. Perform Anti-Ice System Failure checklist.
4. WIND SHLD Push-Button ....PRESS AS REQUIRED

• Caution •

To prevent an obstructed view due to residual deicing fluid on windshield, do not operate windshield de-ice system within 30 seconds of landing.

5. Ice-Inspection Lights .... AS REQUIRED
6. Flaps 50%
7. Airspeed.. Minimum of 95 KIAS
8. Airspeed on Short Final ....88 KIAS

After Landing and Shutdown

1. PITOT HEAT Switch .... OFF
2. ICE PROTECT System Switch .... OFF
3. PUMP BKUP Switch .... OFF
4. Ice-Inspection Lights .... OFF

• Note •

When the Anti-Ice System has been used, avoid touching the airframe structure or windshield as they will be partially covered with deicing fluid. Clean the deicing fluid from the windshield and the porous panels as described in Section 8, Handling, Service, & Maintenance.

Section 5 - Performance

Airplane performance and stall speeds without ice accumulation are essentially unchanged with the installation of the Ice Protection System.

Significant climb and cruise performance degradation, range reduction, as well as buffet and stall speed increase can be expected if ice accumulates on the airframe. Residual ice on the protected areas and ice accumulation on the unprotected areas of the airplane can cause noticeable performance losses and stall speed increases even with the Anti-Ice System operating.

Stall Speeds with Ice Accumulation

Conditions:

- Weight .... 3600 LB
- CG .... Noted
- Power .... Idle
- Bank Angle .... Noted

• Note •

Altitude loss during wings level stall may be 600 feet or more.

KIAS values may not be accurate at stall.

Weight	Bank Angle	STALL SPEEDS			
		Flaps 0% Full Up		Flaps 50%	
LB	Deg	KIAS	KCAS	KIAS	KCAS
3600 Most FWD CG	0	77	76	72	69
	15	79	77	73	70
	30	83	82	75	74
	45	91	90	82	82
	60	107	107	95	98
3600 Most AFT CG	0	77	76	72	69
	15	79	77	73	70
	30	83	82	75	74
	45	91	90	82	82
	60	107	107	95	98

Enroute Climb Gradient with Ice Accumulation

Conditions:

- Power .... Full Throttle
- Mixture .... Set Per Placard
- Flaps .... 0% (UP)
- Airspeed .... Best Rate of Climb

• Note •

Climb Gradients shown are the gain in altitude for the horizontal distance traversed expressed as Feet per Nautical Mile.

Fuel flow must be set to top of green arc for all takeoffs and climbs.

Cruise climbs or short duration climbs are permissible at best power as long as altitudes and temperatures remain within those specified in the table.

For operation in air colder than this table provides, use coldest data shown.

Negative climb data shown in heavier table borders.

Weight LB	Press Altitude FT	Climb Speed KIAS	CLIMB GRADIENT - Feet / Nautical Mile, Temperature ~°C: -20	-10	0	5	ISA
3600	SL	107	407	391	375	367	
	2000	106	325	310	295	287	
	4000	104	246	231	217	209	
	6000	103	170	156	142	135	
	8000	101	96	82	69	62	70
	10000	100	24	12	-1	-7	5
	12000	98	-44	-57	-69	-75	-58
	14000	97	-111	-122	-134	-139	-119
	16000	96	-175	-186	-196	-202	-178
2900	SL	101	663	641	619	608	
	2000	100	553	532	510	500	
	4000	98	447	427	407	397	
	6000	97	346	327	308	299	
	8000	96	250	232	213	204	215
	10000	95	158	140	123	114	131
	12000	95	68	52	37	28	50
	14000	95	-15	-29	-45	-52	-25
	16000	95	-92	-107	-120	-127	-97

Enroute Rate of Climb with Ice Accumulation

Conditions:

- Power.. Full Throttle
- Mixture... As Required
- Flaps...0% (UP)
- Airspeed .... Best Rate of Climb

• Note •

Rate-of-Climb values shown are change in altitude in feet per unit time expressed in Feet per Minute.

Fuel flow must be set to top of green arc for all takeoffs and climbs.

Cruise climbs or short duration climbs are permissible at best power as long as altitudes and temperatures remain within those specified in the table.

For operation in air colder than this table provides, use coldest data shown.

Negative climb data shown in heavier table borders.

Weight	Press Altitude	Climb Speed	RATE OF CLIMB ~ Feet per Minute				
			Temperature ~°C				
LB	FT	KIAS	-20	-10	0	5	ISA
3600	SL	107	684	670	655	647	
	2000	106	559	543	526	517	
	4000	104	433	415	396	386	
	6000	103	305	285	264	254	
	8000	101	176	154	132	120	134
	10000	100	46	22	-2	-15	10
	12000	98	-86	-111	-137	-151	-114
	14000	97	-218	-246	-274	-288	-238
	16000	96	-353	-382	-412	-427	-362
2900	SL	101	1045	1030	1014	1005	
	2000	100	895	878	859	849	
	4000	98	744	725	704	693	
	6000	97	593	571	548	536	
	8000	96	439	415	390	377	392
	10000	95	285	258	231	217	244
	12000	95	129	100	71	56	97
	14000	95	-28	-59	-91	-107	-51
	16000	95	-187	-220	-254	-271	-198

Time, Fuel & Distance to Climb: Full Power Climb with Ice Accumulation

Conditions:

- Power .... Full Throttle
- Mixture .... Maintain Fuel Flow in GREEN ARC
- Weight .... 3600 LB
- Winds .... Zero
- Climb Airspeed .... Noted

• Note •

Taxi Fuel - Add 1.5 gallon for start, taxi, and takeoff.

Temperature - Add 10% to computed values for each 10° C above standard.

Fuel flow must be maintained in the dynamic green arc, per AFM Full Power Climb: Rich of Peak Technique procedure.

Press Alt FT	OAT (ISA) °C	Climb Speed KIAS	Rate of Climb (FPM)	TIME, FUEL, DISTANCE ~ From Sea Level		
				Time Minutes	Fuel U.S. Gal	Distance NM
S.L.	**15**	108	630	0.0	0.0	0.0
1000	**13**	107	568	1.8	0.7	3.2
2000	**11**	107	506	3.7	1.5	6.8
3000	**9**	106	444	6.0	2.3	11.0
4000	**7**	105	382	8.6	3.3	15.9
5000	**5**	104	320	11.7	4.3	21.7
6000	**3**	104	258	15.6	5.7	29.1
7000	**1**	103	196	20.7	7.3	38.8
8000	**-1**	102	134	28.2	9.6	53.1
9000	**-3**	102	72	42.1	13.8	80.2
10000	**-5**	101	10	145.2	43.5	281.5
11000	**-7**	100	-52	126.1	38.2	243.9
12000	**-9**	99	-114	117.4	35.9	226.5
13000	**-11**	98	-176	111.7	34.4	215.1
14000	**-13**	98	-238	107.5	33.4	206.7
15000	**-15**	97	-300	104.2	32.6	199.9
16000	**-17**	96	-362	101.4	31.9	194.2
17000	**-19**	95	-424	99.1	31.4	189.3
17500	**-20**	95	-455	98.0	31.2	187.1

Cruise Performance with Ice Accumulation

Conditions:

- Cruise Weight .... 3400 LB
- Winds .... Zero

• Note •

Aircraft with optional Air Conditioning System - Cruise performance is reduced by 2 knots. For maximum performance, the air-conditioner should be off.

Cruise data not shown for power settings resulting in airspeeds with inadequate stall margins.

2000 Feet Pressure Altitude										
		ISA -30°C (-19°C)			ISA (11°C)			ISA + 30°C (41°C)		
RPM	MAP	PWR	KTAS	GPH	PWR	KTAS	GPH	PWR	KTAS	GPH
2700	27.4	103%	160	24.6						
2600	27.4	99%	157	23.5						
2500	27.4	93%	153	22.1						
2500	26.4	89%	150	21.1						
2500	25.4	84%	146	20.0						
2500	24.4	80%	142	19.0						
2500	23.4	76%	137	18.0						

4000 Feet Pressure Altitude										
		ISA -30°C (-23°C)			ISA (7°C)			ISA + 30°C (37°C)		
RPM	MAP	PWR	KTAS	GPH	PWR	KTAS	GPH	PWR	KTAS	GPH
2700	25.4	96%	158	22.9						
2600	25.4	92%	155	21.9						
2500	25.4	87%	150	20.6						
2500	24.4	82%	146	19.5						
2500	23.4	78%	141	18.5						
2500	22.4	73%	136	17.4						
2500	21.4	69%	130	16.4						

Cruise Performance (Continued)

6000 Feet Pressure Altitude										
		ISA -30°C (-27°C)			ISA (3°C)			ISA + 30°C (33°C)		
RPM	MAP	PWR	KTAS	GPH	PWR	KTAS	GPH	PWR	KTAS	GPH
2700	23.5	89%	155	21.2	85%	155	20.1			
2600	23.5	85%	151	20.3	81%	151	19.2			
2500	23.5	80%	146	19.1	76%	146	18.1			
2500	22.5	76%	140	18.1	72%	140	17.1			
2500	21.5	72%	134	17.0	68%	134	16.1			
2500	20.5	67%	128	15.9	64%	128	15.1			
2500	19.5	63%	120	14.9	59%	120	14.1			

8000 Feet Pressure Altitude										
		ISA -30°C (-31°C)			ISA (-1°C)			ISA + 30°C (29°C)		
RPM	MAP	PWR	KTAS	GPH	PWR	KTAS	GPH	PWR	KTAS	GPH
2700	21.7	83%	150	19.7	78%	150	18.6			
2600	21.7	79%	146	18.8	75%	146	17.8			
2500	21.7	75%	140	17.7	71%	140	16.8			
2500	20.7	70%	133	16.7	66%	133	15.8			
2500	19.7	66%	126	15.6	62%	126	14.8			
2500	18.7	61%	117	14.5	58%	117	13.8			
2500	17.7	57%	108	13.5	54%	108	12.8			

10,000 Feet Pressure Altitude										
		ISA -30°C (-35°C)			ISA (-5°C)			ISA + 30°C (25°C)		
RPM	MAP	PWR	KTAS	GPH	PWR	KTAS	GPH	PWR	KTAS	GPH
2700	20.0	77%	144	18.2	73%	144	17.3			
2600	20.0	71%	136	17.0	68%	136	16.1			
2500	20.0	67%	129	16.0	64%	129	15.1			
2500	19.0	63%	120	14.9	59%	120	14.1			
2500	18.0	58%	111	13.8	55%	111	13.1			
2500	17.0	54%	100	12.8	51%	100	12.1			

Range / Endurance: Full Power Climb with Ice Accumulation

Conditions:

- Mixture ....Best Economy - Target Fuel Flow or less
- Weight ....3600 LB for Climb, Avg 3400 LB for Cruise
- Winds..Zero
- Total Fuel .... 92 Gallons

Fuel Remaining for Cruise in this table is based on climb per AFM Full Power Climb (Rich of Peak Technique) procedure.

Fuel Remaining for Cruise is equal to 92.0 gallons usable, less 1.5 gallons (pre-takeoff fuel consumed), 11 gallons (45 minute IFR reserve at 65% power), and listed volume for fuel consumed in Full Power Climb.

Range is decreased by 5% if nose wheel pant and fairings removed.

Range is decreased by 15% of nose wheel and main wheel pants and fairings removed.

For aircraft with optional Air Conditioning System: range is decreased by 1% if system in operation.

Aircraft with optional Enhanced Vision System: range is decreased by ½%.

Range / Endurance: 75% Power Cruise - Full Power Climb							
Press Alt FT	**Climb Fuel Gal**	**Fuel Remaining For Cruise Gal**	**Airspeed KTAS**	**Fuel Flow GPH**	**Endurance Hours**	**Range NM**	**Specific Range Nm/Gal**
0	**0.0**	81.8	139	17.8	4.6	639	7.8
2000	**0.7**	79.9	141	17.8	4.5	644	8.0
4000	**1.5**	78.0	143	17.8	4.5	650	8.1
6000	**2.3**	76.1	144	17.8	4.5	655	8.2
8000	**3.1**	74.1	146	17.8	4.4	659	8.4

Range / Endurance: Full Power Climb with Ice Accumulation (Continued)

Range / Endurance: 65% Power Cruise - Full Power Climb							
Press Alt FT	Climb Fuel Gal	Fuel Remaining For Cruise Gal	Airspeed KTAS	Fuel Flow GPH	Endurance Hours	Range NM	Specific Range Nm/Gal
0	**0.0**	81.8	127	15.4	5.3	674	8.2
2000	**0.7**	79.9	128	15.4	5.2	677	8.4
4000	**1.5**	78.0	129	15.4	5.2	679	8.5
6000	**2.3**	76.1	130	15.4	5.1	680	8.6
8000	**3.1**	74.1	131	15.4	5.1	681	8.7
10000	**4.0**	72.1	131	15.4	5.1	685	8.8
12000	**5.0**	70.1	132	15.4	5.0	680	8.9

Range / Endurance: 55% Power Cruise - Full Power Climb							
Press Alt FT	Climb Fuel Gal	Fuel Remaining For Cruise Gal	Airspeed KTAS	Fuel Flow GPH	Endurance Hours	Range NM	Specific Range Nm/Gal
0	**0.0**	81.8	111	13.1	6.3	696	8.5
2000	**0.7**	79.9	111	13.1	6.2	693	8.6
4000	**1.5**	78.0	111	13.1	6.1	690	8.6
6000	**2.3**	76.1	111	13.1	6.1	686	8.6
8000	**3.1**	74.1	111	13.1	6.0	682	8.7
10000	**4.0**	72.1	110	13.1	6.0	681	8.7
12000	**5.0**	70.1	110	13.1	5.9	675	8.7
14000	**6.2**	67.9	109	13.1	5.8	670	8.8

Range / Endurance: Full Power Climb with Ice Accumulation (Continued)

Range / Endurance: 55% Best Economy Cruise - Full Power Climb							
Press Alt FT	**Climb Fuel Gal**	**Fuel Remaining For Cruise Gal**	**Airspeed KTAS**	**Fuel Flow GPH**	**Endurance Hours**	**Range NM**	**Specific Range Nm/Gal**
0	**0.0**	81.8	111	11.3	7.2	803	9.8
2000	**0.7**	79.9	111	11.3	7.2	799	9.9
4000	**1.5**	78.0	111	11.3	7.1	795	9.9
6000	**2.3**	76.1	111	11.3	7.0	790	9.9
8000	**3.1**	74.1	111	11.3	6.9	784	10.0
10000	**4.0**	72.1	110	11.3	6.9	782	10.0
12000	**5.0**	70.1	110	11.3	6.8	775	10.0
14000	**6.2**	67.9	109	11.3	6.7	768	10.0

Balked Landing Climb Gradient with Ice Accumulation

Conditions:

- Power .... Full Throttle
- Mixture .... Set per Placard
- Flaps .... 50% (DN)
- Climb Airspeed .... V_{REF}

• Note •

Balked Landing Climb Gradients shown are the gain in altitude for the horizontal distance traversed expressed as Feet per Nautical Mile.

For operation in air colder than this table provides, use coldest data shown.

Climb gradient less than 3.3% shown in heavier table borders

Weight	Press Alt	Climb Speed, V_{REF}	CLIMB GRADIENT ~ Feet/Nautical Mile				
			Temperature ~°C				
LB	FT	KIAS	-20	-10	0	5	ISA
3600	SL	88	479	472	464	460	
	2000	88	397	391	383	378	
	4000	88	320	313	306	301	
	6000	88	247	240	233	229	
	8000	88	178	171	164	160	165
	10000	88	113	107	99	96	103
2900	SL	88	682	658	634	622	
	2000	88	551	529	506	495	
	4000	88	428	407	386	375	
	6000	88	313	293	273	263	
	8000	88	205	186	167	158	169
	10000	88	103	86	68	60	77

Balked Landing Rate of Climb with Ice Accumulation

Conditions:

- Power .... Full Throttle
- Mixture .... Set per Placard
- Flaps 50%
- Climb Airspeed .... V_{REF}

• Note •

Balked Landing Rate of Climb values shown are the full flaps change in altitude for unit time expended expressed in Feet per Minute.

For operation in air colder than this table provides, use coldest data shown.

Climb gradient less than 3.3% shown in heavier table borders

Weight	Press Alt	Climb Speed, V_{REF}	RATE OF CLIMB - Feet per Minute				
			Temperature ~°C				
LB	FT	KIAS	-20	-10	0	5	ISA
3600	SL	88	668	671	672	672	
	2000	88	575	576	575	574	
	4000	88	481	480	477	475	
	6000	88	386	382	377	374	
	8000	88	289	283	276	272	277
	10000	88	191	183	174	169	179
2900	SL	88	941	926	909	900	
	2000	88	790	773	754	744	
	4000	88	638	618	597	586	
	6000	88	484	462	439	427	
	8000	88	329	305	279	266	282
	10000	88	173	146	119	104	132

Landing Distance with Ice Accumulation

Conditions:

- Winds .... Zero
- Runway .... Dry, Level, Paved

• Note •

The following factors are to be applied to the computed landing distance for the noted condition:

- Normal landings will be completed with the flaps set to 50%.
- Sloped Runway - Increase table distances by 27% of the ground roll distance for each 1% of downslope. Decrease table distances by 9% of the ground roll distance for each 1% of upslope.

• Note •

The above corrections for runway slope are required to be included herein for certification. They should be used with caution since published runway slope data is usually the net slope from one end of the runway to the other. Many runways will have portions of their length at greater or lesser slopes than the published slope, lengthening (or shortening) landing ground run values estimated from the published slope as described above.

- For operation in outside air temperatures colder than this table provides, use coldest data shown.
- For operation in outside air temperatures warmer than this table provides, use extreme caution.

Landing Distance - Flaps 50%

Associated balked landing climb gradient less than 3.3% shown in heavier table borders

WEIGHT: 3600 LB **Speed over 50 Ft Obstacle:** 88 KIAS **Flaps:** 50% **Power:** Smooth power reduction from obstacle to idle at touchdown. **Runway:** Dry, Paved, Level					**Headwind:** Subtract 10% for each 13 knots headwind. **Tailwind:** Add 10% for each 2 knots tailwind up to 10 knots. **Runway Slope:** Reference Notes **Dry Grass:** Add 20% to Ground Roll **Wet Grass:** Add 60% to Ground Roll	
PRESS ALT FT	**DISTANCE FT**	**TEMPERATURE ~°C**				
		-20	**-10**	**0**	**5**	**ISA**
SL	Grnd Roll	1356	1409	1463	1489	
	Total	2833	2908	2984	3022	
1000	Grnd Roll	1406	1461	1517	1544	
	Total	2903	2981	3061	3101	
2000	Grnd Roll	1458	1516	1573	1602	
	Total	2977	3059	3143	3185	
3000	Grnd Roll	1513	1572	1632	1662	
	Total	3055	3142	3229	3274	
4000	Grnd Roll	1570	1632	1694	1725	
	Total	3138	3229	3321	3367	
5000	Grnd Roll	1629	1694	1758	1790	
	Total	3225	3321	3418	3466	
6000	Grnd Roll	1692	1758	1825	1859	
	Total	3318	3418	3520	3571	
7000	Grnd Roll	1757	1826	1896	1930	
	Total	3416	3522	3628	3682	
8000	Grnd Roll	1825	1897	1969	2005	1963
	Total	3520	3631	3743	3800	3583
9000	Grnd Roll	1896	1971	2046	2084	2025
	Total	3630	3746	3864	3924	3656
10000	Grnd Roll	1971	2049	2127	2166	2089
	Total	3746	3869	3993	4055	3733

Section 6 - Weight & Balance

Refer to Section 6 - Weight and Balance of the basic POH for current weight and balance data. Use the following table to determine the Moment/1000 for deicing fluid to complete the Loading Form in the Weight and Balance Section of the basic POH.

- Total fluid tank capacity is 8.5 gallon (32L).
- Deicing fluid weight is 9.2 pounds per gallon.

Gallons	Weight LB	Mom/ 1000@ Tank (FS148.0)	Gallons	Weight LB	Mom/ 1000@ Tank (FS148.0)	Gallons	Weight LB	Mom/ 1000@ Tank (FS148.0)
0.1	0.9	0.14	3.3	30.4	4.49	6.5	59.8	8.85
0.2	1.8	0.27	3.4	31.3	4.63	6.6	60.7	8.99
0.3	2.8	0.41	3.5	32.2	4.77	6.7	61.6	9.12
0.4	3.7	0.54	3.6	33.1	4.90	6.8	62.6	9.26
0.5	4.6	0.68	3.7	34.0	5.04	6.9	63.5	9.40
0.6	5.5	0.82	3.8	35.0	5.17	7.0	64.4	9.53
0.7	6.4	0.95	3.9	35.9	5.31	7.1	65.3	9.67
0.8	7.4	1.09	4.0	36.8	5.45	7.2	66.2	9.80
0.9	8.3	1.23	4.1	37.7	5.58	7.3	67.2	9.94
1.0	9.2	1.36	4.2	38.6	5.72	7.4	68.1	10.08
1.1	10.1	1.50	4.3	39.6	5.85	7.5	69.0	10.21
1.2	11.0	1.63	4.4	40.5	5.99	7.6	69.9	10.35
1.3	12.0	1.77	4.5	41.4	6.13	7.7	70.8	10.48
1.4	12.9	1.91	4.6	42.3	6.26	7.8	71.8	10.62
1.5	13.8	2.04	4.7	43.2	6.40	7.9	72.7	10.76
1.6	14.7	2.18	4.8	44.2	6.54	8.0	73.6**	10.89
1.7	15.6	2.31	4.9	45.1	6.67	8.1	74.5	11.03
1.8	16.6	2.45	5.0	46.0*	6.81	8.2	75.4	11.17
1.9	17.5	2.59	5.1	46.9	6.94	8.3	76.4	11.30
2.0	18.4	2.72	5.2	47.8	7.08	8.4	77.3	11.44
2.1	19.3	2.86	5.3	48.8	7.22	8.5	78.2	11.57
2.2	20.2	3.00	5.4	49.7	7.35	*Minimum Dispatch Fluid Qty		
2.3	21.2	3.13	5.5	50.6	7.49	**Usable Tank Capacity		
2.4	22.1	3.27	5.6	51.5	7.62			
2.5	23.0	3.40	5.7	52.4	7.76			
2.6	23.9	3.54	5.8	53.4	7.90			
2.7	24.8	3.68	5.9	54.3	8.03			
2.8	25.8	3.81	6.0	55.2	8.17			
2.9	26.7	3.95	6.1	56.1	8.31			
3.0	27.6	4.08	6.2	57.0	8.44			
3.1	28.5	4.22	6.3	58.0	8.58			
3.2	29.4	4.36	6.4	58.9	8.71			

Section 7 - System Description

The TKS Anti-Ice System can prevent and remove ice accumulation on the flight surfaces by distributing a thin film of ice protection fluid on the wing, horizontal stabilizer, vertical stabilizer, elevator tips, and propeller. The presence of this fluid lowers the freezing temperature on the flight surface below that of the ambient precipitation preventing the formation and adhesion of ice.

The system consists of nine porous panels, propeller slinger ring, windshield spray nozzles, heated stall warning system, ice inspection lights, two proportioning units, two metering pumps, windshield/priming pump, 3-way control valve, filter assembly, in-line strainer, outlet strainers, two fluid tanks with fluid level sensors and low level switches, filler caps and necks, test port assembly, electrical switching, and system plumbing. The system operates on 28 VDC supplied through the 7.5-amp ICE PROTECT A circuit breaker on Main Bus 1 and 5-amp ICE PROTECT B circuit breaker on Essential Bus 2.

Storage and Distribution

Two separate and symmetrical 4.25 gallon (16.1L) deicing fluid tanks are serviced through filler caps located on the upper LH and RH wings. Each tank provides a capacity of 4.0 gallons (15.1L) usable and 0.25 gallons (1.0L) unusable, which provides a total system capacity of 8.0 gallons (30.2L) usable. The tanks are sealed wet bays, integral to the wing structure, bounded by the upper and lower wing skins, main spar web, and the inboard, outboard, and lateral tank ribs. The tanks are vented from the outboard ribs to a NACA style ducts attached to access panels on the lower wing skin, just outboard of the tanks. Course-mesh outlet strainers mounted internal to the tanks prevent large objects from obstructing the tank outlets, while a fine-mesh in-line strainer protects the metering pump and windshield/priming pump from damage by contaminates

Upon activation, two single-speed metering pumps, mounted below the LH passenger seat, draw fluid from the tank and provide fluid pressure to the system at a constant-volume flow rate. The pumps operate both singularly and in parallel according to system mode selection.

If the system is ON and PUMP BKUP is selected, #1 pump will operate (if not failed) based on the mode setting (NORM or HIGH) while #2 pump operates continuously (PUMP BKUP), causing the range and endurance to decrease from the published values, e.g. selection of HIGH and PUMP BKUP will reduce range and endurance as if MAX were selected.

The manifolds of both metering pumps are connected in series and primed by an integral windshield/priming pump which draws fluid from the tank, through both metering pump manifolds, forcing the fluid to the windshield spray nozzles. In the event the metering pumps cannot prime themselves, the windshield/priming pump can be activated to draw fluid from the tank to prime the metering pump manifolds and to remove any entrapped air between the metering pumps and the fluid tank(s). A normally-closed solenoid located between the windshield pump and spray nozzles prevents fluid back flow to the metering pumps.

From the metering pumps, deicing fluid is pushed through a filter assembly, mounted adjacent to the pumps, and then carried through nylon tubing to the proportioning units located in the cabin floor-forward and empennage.

- The cabin floor-forward proportioning unit distributes fluid to the LH and RH Wing Inboard and Outboard panels and propeller slinger ring assembly.
- The empennage proportioning unit distributes fluid to the horizontal and vertical stabilizer panels and the elevator tip panels.

In addition to distributing fluid to the porous panels and propeller slinger ring, the proportioning units provide an additional, distinct pressure drop to the supply lines such that a specific flow rate is provided to each protected surface.

Porous Panels

The proportioned fluid enters the leading edge panels through the inlet fitting(s) on the inboard end of the wing and elevator tip panels, upper end of the vertical panel, and the outboard end of the horizontal panels. The outer surface of the panels is perforated with very small openings to distribute the deicing fluid along their entire length. The panels contain a porous membrane whose pores are nearly 100 times smaller than the openings of the outer surface. The leading edge of the panel serves as a reservoir as fluid entering the panel fills the cavity behind the porous membrane then overcomes this resistance to be distributed by the openings in the external surface. The inlet fitting of the inboard wing porous panel also supplies fluid to the porous stall strip through an additional capillary tube which further proportions the fluid to provide a specific flow rate to the stall strip. Each panel incorporates a vent opposite the inlet which provides a relatively large opening to release air from within the panel. A check valve prevents air from entering the panel through the vent which slows the "leak-down" of the panel during periods of inactivity

Windshield Spray Nozzles and Pump

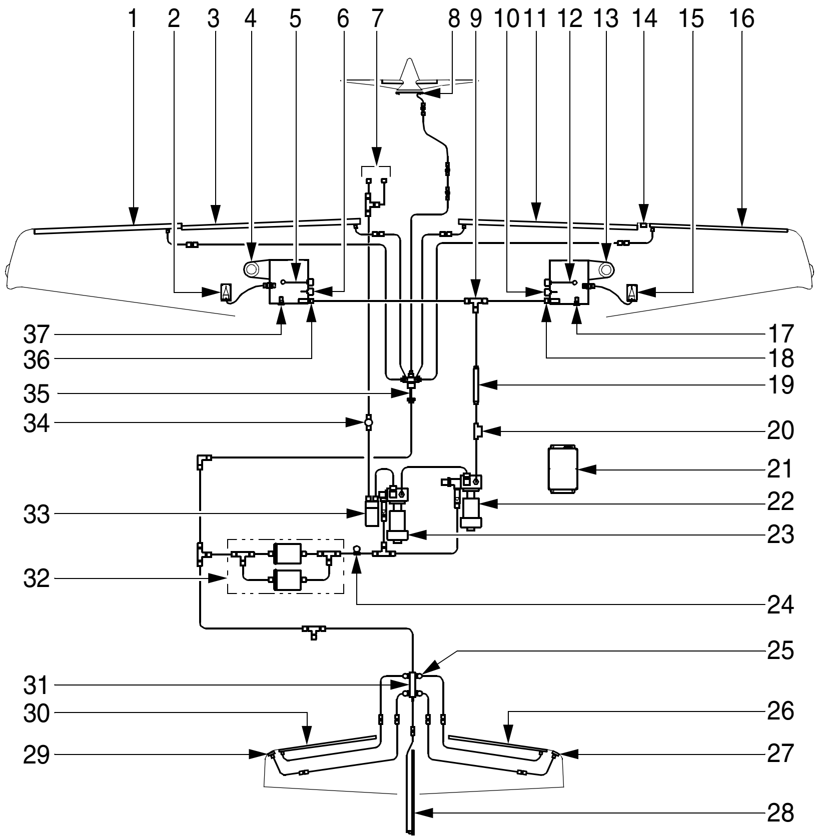
The windshield pump, located adjacent to the main metering pumps beneath the LH passenger seat, supplies fluid to the windshield nozzles. The pump also acts as a priming pump for the main metering pumps. In the event the metering pumps cannot prime themselves, the windshield pump may be activated to purge the system of any entrapped air between the main metering pumps and the fluid tank.

Propeller Slinger Ring

Deicing fluid protects the propeller by a slinger ring mounted to the spinner backing plate where the fluid is distributed by centrifugal action onto grooved rubber boots fitted to the root end of the propeller blades.

Fluid Quantity Sensing

Fluid quantity is measured by a float type quantity sensor installed in the deicing fluid tanks. A single-point fluid level switch is installed near the outlet of each tank to provide a redundant “Empty” indication to prevent the system from drawing air. An ultrasonic flow meter installed between the in-line strainer and the metering pumps continuously senses the system flow rate. The fluid quantity and flow rate information is sent to the Engine Airframe Unit, processed, and transmitted to the Engine Indicating System for display.



LEGEND

1. LH Outbd Panel
2. LH Vent
3. LH Inbd Panel
4. LH Filler Cap
5. LH Level Sender
6. LH Level Switch
7. Windshield Nozzles
8. Slinger Ring
9. 3-Way Valve
10. RH Level Switch
11. RH Inbd Panel
12. RH Level Sender
13. RH Filler Cap
14. Stall Transducer
15. RH Vent
16. RH Outbd Panel
17. RH Drain Valve
18. RH Tank Strainer
19. In-Line Strainer
20. Flow Transducer
21. Pump Control Unit
22. Metering Pump 1
23. Metering Pump 2
24. High Pressure Switch
25. Low Pressure Switches
26. RH H Stab Panel
27. RH Elevator Tip Panel
28. V Stab Panel
29. LH Elevator Tip Panel
30. LH H Stab Panel
31. Tail Proportioning Unit
32. Filter Assembly
33. Windshield Pump
34. Solenoid Valve
35. Main Proportioning Unit
36. LH Tank Strainer
37. LH Drain Valve

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Figure-2
System Schematic

System Control

System operation is controlled by five bolster panel switches and three MFD softkeys:

- Bolster Panel Switches: Metering pump operation and mode control (flow rate) are controlled by the NORM, HIGH, and MAX switches. WINDSHLD controls the windshield pump operation. PUMP BKUP is used in the event of certain system failures.
- MFD Softkeys: Tank selection is provided by three MFD softkeys on the MFD Engine Page. Automatic tank selection is provided by the default, AUTO mode. While the system is operating, the fluid quantity in each tank will be passively balanced by alternating the selected tank using the 3-way control valve.

Mode Control

- NORM controls both pumps to operate quarter-time intermittently to provide 100% flow rate, i.e. 30 seconds on, 90 seconds off.
- HIGH controls #1 pump to operate continuously to provide 200% flow rate, i.e. two times the normal flow rate.
- MAX controls both pumps to operate continuously for 2 minutes to provide 400% flow rate, i.e. four times the normal flow rate. Pump operation then reverts to the system mode selected by the ICE PROTECT Mode Switch.
- WINDSHLD controls the windshield pump to operate continuously for approximately 3 seconds.
- PUMP BKUP controls #2 pump to operate continuously to provide 200% flow rate, i.e. two times the normal flow rate. When pump backup mode is selected, an alternate circuit by-passes the Timer Box and supplies power to the #2 metering pump which in turn operates continuously.

Fluid Tank Control

- AUTO: While the system is operating, the fluid quantity in each tank is passively balanced by the avionics system using the 3-way control valve and the sensed quantity of each tank.
- LEFT: Ice protection fluid is drawn from the left tank regardless of sensed quantity.

- RIGHT: Ice protection fluid is drawn from the right tank regardless of sensed quantity.

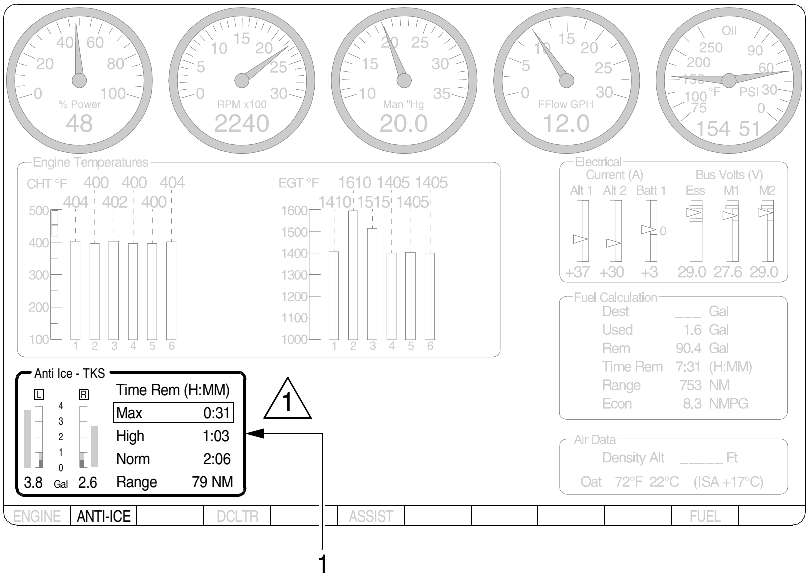
System Indicating

System Indicating is displayed as bar graphs and text in the lower left corner of the MFD ENGINE page. The bar graphs, marked from 0 to 4 U.S. gallons in 1-gallon increments, indicate LH and RH tank fluid quantity. Fluid quantity is also displayed numerically below the bar graphs in 0.1-gallon increments. When the system is operating in the default, automatic tank selection mode (AUTO), a white box is centered around the “L” and “R” located above each bar graph and a cyan box is displayed around the selected Anti-Ice System mode. During normal operation, the white box will switch between the left and right tank as the fluid level changes. In the case of an electronic display failure (reversionary mode), fluid quantity is displayed along the LH edge of the PFD and the system maintains the tank selection mode that was current when reversionary mode was activated. Manual tank selection mode is selected by pressing the ANTI-ICE softkey to access control of the LEFT and RIGHT tanks. In manual mode, a cyan box is displayed around the selected tank, gallons remaining in that tank, and the selected Anti-Ice System mode. Pressing AUTO returns the system to automatic tank selection mode.

System Endurance is displayed on the MFD ENGINE Page for the different system modes based on the total sensed fluid quantity and published system flow rates. A cyan box depicts the user selected system mode. System Range is displayed on the MFD ENGINE Page for the selected system mode based on the calculated system endurance and the current ground speed.

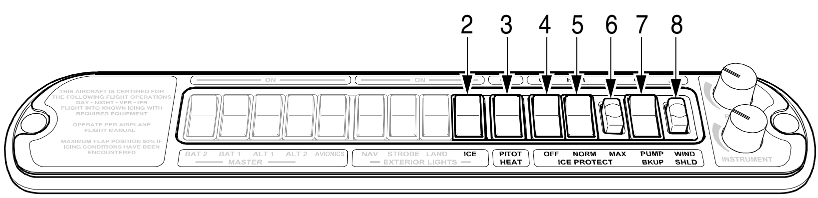
If tanks are selected manually, system range and endurance calculations use only the sensed fluid quantity of the selected tank. While in PUMP BKUP, system range and endurance calculations use the sensed system flow rate of the flow meter.

Refer to the Perspective Integrated Avionics System Pilot’s Guide for additional information on system annunciation and control.



NOTE

1 Illustration depicts system during Auto Tank Mode with LH and RH tanks ON while operating in MAX mode.



Bolster Panel

LEGEND

1. Anti-Ice System Indication
2. Ice Inspection Lights
3. Pitot and Stall Vane Heat
4. Anti-Ice System ON / OFF Switch
5. NORM / HIGH Mode Switch
6. MAX Mode Push Button
7. Pump Backup Switch
8. Wind Shield Push Button

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Figure-3
System Indication and Switching

Stall Warning System

Stall warning is provided by the lift transducer, mounted on the leading edge of the right wing and the stall warning computer located under the cabin floor. The lift transducer senses the force of the airstream on the vane, producing an electrical output to the stall warning computer. When the stall warning set-point is reached, the stall warning computer provides a signal to the avionics system to activate the stall warning aural alert and CAS message. The stall warning computer also provides the information used to generate the dynamic stall speed awareness indication (red band) on the airspeed tape which indicates the relative proximity to the aircraft stall speed based on the wing loading (weight, angle of bank, etc). The stall warning computer operates on 28 VDC supplied through the 5-amp STALL WARNING circuit breaker on the ESS BUS 2.

Ice protection for the lift transducer is provided by two faceplate heaters, one vane heater and one case heater using the PITOT HEAT switch. To prevent overheating during ground operations, a signal from the avionics is used to operate the heaters at 25% power during ground operation or 100% power while in the air. The lift transducer heat is powered by 28 VDC supplied through the 10-amp STALL VANE HEAT circuit breaker on the NON-ESS BUS.

The stall warning computer receives an signal from the avionics system to reduce nuisance stall warning while the aircraft is on the ground. The stall warning is inhibited when ground speed is less than 30 knots or airspeed is less than 55 KIAS. To allow a preflight check of the system, stall warning is enabled if RPM is less than 500 and flaps are set to 100%.

An IPS-ON discrete signal is sent to the stall warning computer when the ice protection system is set to ON. This adds additional stall warning margin to the aircraft beyond the required 5 KIAS to account for ice contamination on unprotected surfaces. Although this ensures the required margin is maintained during/after an icing encounter, it may be excessive when the aircraft is not contaminated by ice shapes.

Ice-Inspection Lights

To provide visual verification of icing conditions and confirmation of fluid flow, ice inspection lights are flush mounted to the RH and LH fuselage skin just aft of the engine cowling. The bi-directional inspection lights illuminate the leading edge of the wing and horizontal stabilizer. Components of the system include the LED light assemblies and a two-position toggle switch labeled ICE on the Exterior Lights section of the bolster switch panel.

The ice-inspection lights operates on 28 VDC supplied through the 5-amp ICE PROTECT A circuit breaker on MAIN BUS 1.

Section 8 – Handling, Service, & Maintenance

• Caution •

During long periods of non-use, the porous panel membranes may dry out which could cause uneven fluid flow during subsequent operation. Perform the Pre-Flight Inspection every 30 days to keep porous panel membranes wetted.

Use only approved deicing fluid. See Section 2, Limitations. To prevent fluid contamination, maintain a clean, dedicated measuring container and ensure mouth of fluid container is clean before dispensing. Secure the filler cap immediately after filling

Certain solvents may damage the panel membrane. Use only soap and water, isopropyl alcohol, or ethyl alcohol to clean panels. Do not wax leading edge porous panels.

Storage

To prepare the Anti-Ice System for flyable storage, fill the deicing fluid tanks and perform the Pre-Flight Inspection to verify evidence of ice protection fluid along the length of all porous panels. The tanks may then be drained until the next service interval (30 days minimum) or operation of the system is desired.

Servicing

Deicing Fluid Tanks

The deicing fluid tanks are serviced through filler caps in the upper wing skins. Each tank is individually drained and vented by lock-open/lock-close valves in the lower wing skins.

Porous Panels

Periodically clean porous panels with soap and water using a clean, lint-free cloth. Isopropyl alcohol may be used to remove oil or grease.

Metering Pump Priming

If air entered the system due to the fluid tank(s) running dry during system operation, it may require several cycles of the windshield/ priming pump to prime the metering pumps.

In the event that the metering pumps cannot prime themselves, the windshield/priming pump may be cycled, 3s ON, 3s OFF, to draw fluid from the tank to prime the metering pump manifolds and to remove any entrapped air between the metering pumps and the fluid tank(s).