

850/950 Caravan Cold Weather Ops Differences Training



FAA Required Cold Weather Training for Aero Twin STC SA02291AK

ATI-ICE-ADD, Issue 4,
November 19, 2012

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Overview

The following topics are covered in this training presentation:

- General Systems Differences
- Changes to Aircraft Limitations
- Emergency Procedures
- Changes to Normal Procedures
- Performance Differences

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Overview

- Aero Twin STC SA02291AK installs a Honeywell TPE331-12JR engine on Cessna 208 and 208B Caravans.
- AD2007-10-15 requires completion of Cessna's cold weather operations course within 12 months of conducting flight in known or forecast icing conditions.
- FAA also requires review of Aero Twin's differences training information within 12 months of conducting flight in known or forecast icing conditions.
- Completion of this training review is demonstrated by successfully completing a training evaluation.
- Aero Twin shall track pilots who have successfully completed the training review for 12 months.

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Overview

- All pertinent information for flight in known icing with Aero Twin's Honeywell powered Caravans is contained in section 9-1 of Aero Twin's Airplane Flight Manual Supplements 850-AFMS and 950-AFMS. In the event that those manuals disagree with this training document, the flight manual supplements shall take precedence.

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.

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General Systems Differences

- De-Ice Boots
 - Two water separators are installed in the system, one in engine compartment and one in tail section, to remove moisture from the bleed air for the de-ice boots and prevent boot freezing.

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General System Differences

- Propeller Anti-Ice Boots
 - AUTO mode is 68 second cycle providing power for 34 seconds to the inboard boots followed by 34 seconds to the outboard boots, with no dwell time.
 - Anti-Ice boot amperage is increased to 24-28 amps continuously.
 - MANUAL mode powers only the inboard boots and should be operated on a 34 second cycle to avoid runback issues.

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General System Differences

- Standby Electrical System
 - Alternator is driven by engine driven hydraulic system.
 - Provides 42 amps continuously when engine is run at 100% engine speed.
 - Standby Alternator Switch labeled OFF-HYD-ON
 - OFF – Turns off hydraulic motor and alternator control field.
 - HYD – Turns on hydraulic motor to drive alternator, but leaves field off.
 - ON – Keeps hydraulic motor on, and turns on alternator control field.

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General System Differences

- Engine Inlet Anti-Ice
 - Bleed air heated engine inlet.
 - Turn ignition on before turning on inlet anti-ice.
 - Turn on before entering visible moisture or other potential icing conditions. (OAT +4°C (40°F) or less).
 - Slight rise in EGT or loss of torque associated with activation of engine inlet anti-ice.

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Changes to Aircraft Limitations

- Training
 - Review of this training document and successful completion of training quiz required within preceding 12 months for flight into known or forecast icing conditions.
- Weight Limits
 - FIKI Weight limit for modified 208 increased to 8,360 lbs.
 - FIKI Weight limit for modified 208B increased to 9,062 lbs.

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Changes to Aircraft Limitations

- Required Equipment
 - Heated engine inlet is required.
 - Inertial separator is removed.
- Environmental Conditions
 - **Freezing rain, freezing drizzle, mixed, or severe conditions remain prohibited.**
 - Minimum speed which requires immediate action to exit icing conditions is increased from 120 KIAS to **130 KIAS.**
 - If airspeed of 130 KIAS cannot be maintained in level flight, you must take immediate action to exit icing conditions.

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Changes to Aircraft Limitations

- Minimum Speed in Icing Conditions **(208B only)**
 - Stall speeds of aircraft at higher gross weight in icing are higher than the stall speeds of the unmodified aircraft at the lower gross weights.
 - Minimum airspeed in icing conditions is increased to 125 KIAS with flaps up.
 - Minimum climb airspeed for exiting icing conditions is increased to 115 KIAS with flaps up.
 - Continue to limit maneuvering to 30° banked turns or less.
 - Flaps must be extended at least to 10° below 115 KIAS.

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Changes to Aircraft Limitations

- Autopilot Operation in Icing Conditions
 - Minimum speed in icing conditions with autopilot engaged is increased to 115 KIAS for the 208B.
- Placards
 - Icing Conditions and Flaps Icing Placards are modified or replaced to specify higher airspeed limitations for flight in icing conditions.

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Emergency Procedures

- All relevant emergency procedures from Cessna Icing Supplement S-1 are repeated in section 9-1-3 of Aero Twin's AFMS for the modified aircraft, regardless of whether they are modified by the engine installation. This provides a single source for emergency procedures in icing conditions.

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Emergency Procedures

- All references to the inertial separator have been removed.
- All instances requiring activation of the propeller de-ice system are preceded by activation of the ignition and engine inlet anti-ice systems.
- All instances requiring 1900 RPM have been replaced by specifying the engine speed control be set to MAX.
- ITT limitations of the PT6 have been replaced by 650°C EGT limitation for the TPE331.

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Emergency Procedures

- Engine Inlet Anti-Ice Malfunction
 - If Inlet Anti-Ice annunciator does not turn on, verify that the anti-ice system is operational by looking for associated drop in EGT or engine torque.
 - If system does not work, turn on ignition and exit icing conditions as soon as possible.

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Emergency Procedures

- Propeller Anti-Ice System Malfunction
 - Propeller Anti-Ice Ammeter should indicate 24-28 amps continuously in AUTO.
 - If you need to use MANUAL mode, cycle it ON and OFF every 34 seconds to avoid runback issues.
 - MANUAL mode only activates the inboard boots on the propeller blades.

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Emergency Procedures

- **Airspeeds (208B only)**
 - Maintain a minimum of 125 KIAS in level flight in icing conditions with flaps up.
 - Maintain a minimum of 115 KIAS during climb to exit icing conditions with flaps up.

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Changes to Normal Procedures

- The abbreviated pilot checklist from Cessna's icing supplement S-1 is included in AFMS section 9-1-4, modified as needed for the engine installation.
- Same general procedure changes for the Emergency Procedures are relevant for the Normal Procedures.

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Changes to Normal Procedures

- All references to the inertial separator have been removed.
- All instances requiring activation of the propeller de-ice system are preceded by activation of the ignition and engine inlet anti-ice systems.
- The ignition and engine inlet anti-ice systems must be turned ON whenever visible moisture is present and the OAT is below approximately 5°C (40°F).

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Changes to Normal Procedures

- All instances requiring 1900 RPM have been replaced by setting the engine speed control to MAX.
- ITT limitations of the PT6 have been replaced by 650°C EGT limitation for the TPE331.
- For the 208B, the minimum speed in icing with flaps up is increased to 125 KIAS, and the minimum exit climb speed is increased to 115 KIAS with flaps up.

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Performance Differences

- Stall Speeds
 - Stall speeds increased with higher gross weight.
 - Ice accumulation may result in a 20 KIAS increase in stall speed.
 - Aircraft may stall without warning. Do not rely on buffet or aural stall warning.
 - Maintain at least 115 KIAS with flaps up while in icing conditions. **(208B only)**

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Performance Differences

- Enroute Tool for Exiting Icing
 - New enroute tool is included in Aero Twin AFMS Section 9-1-5.
 - New enroute tool expands Cessna's enroute tool to include weights up to 9,062 pounds for the 208B and 8,360 for the 208.
 - New enroute tool does not raise the icing service ceiling for any lower weight.

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Performance Differences

- Cruise Performance
 - New cruise performance chart added to Aero Twin AFMS section 9-1-5.
 - New chart replaces PT6 power settings with those for TPE331 engine.
 - New chart provides data for increased weights.

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Performance Differences

- Landing Performance
 - Minimum flaps UP speed increased to 115 KIAS for the 208B.

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Summary

- Aero Twin training is required by FAA.
- Engine conversion allows flight in icing at higher gross weights.
- Stall speeds are increased with higher gross weight, which requires an increase in the minimum icing airspeed with flaps up for the 208B.
- New procedures inherent with change in engine operation.
- Increase in power does not exempt the aircraft from the laws of physics. **Do not fly in freezing rain, freezing drizzle, mixed, or severe icing conditions.**

Evaluation

- Complete evaluation and return to Aero Twin to receive certificate of completion for this training.
- If you have any questions, contact Aero Twin Engineering at (907)274-6166, or jkepler@aerotwin.com.



AERO TWIN, INC.

The following is an evaluation to be completed following the review of Aero Twin training document ATI-ICE-ADD and the Flight in Known Icing section 9-1 of Airplane Flight Manual Supplement 850-AFMS or 950-AFMS. The FAA requires review of that material within the 12 calendar months prior to flying the Cessna 208 or 208B equipped with Aero Twin's Honeywell engine modification, when flying into known or forecast icing conditions. The FAA also requires Aero Twin to track those pilot who have completed this review. To enable Aero Twin to do this, once you have completed this evaluation form, send it, along with proof of completion for the required Cessna cold weather ops training, to Aero Twin using the address or fax number below, or email it to jkepler@aerotwin.com. A certificate of completion will be sent to you for your records.

Name: _____ Pilot's Certificate No.: _____

Date: _____ Company (if applicable): _____

Address: _____

Phone: _____ Fax: _____ Email: _____

1. Describe the Propeller De-Ice cycle:
2. Which parts of the Propeller De-Ice Boots are activated when the switch is in MANUAL?
3. In the proper order of activation, what must be turned on when entering visible moisture when OAT is less than +4°C (40°F)?
4. Icing conditions must be exited immediately when level flight cannot be maintained at what airspeed?
5. What are the minimum allowable speeds in icing with flaps up for level flight and for climbing for the modified 208B?
6. If the Engine Inlet Anti-Ice annunciator does not illuminate, how can you tell if the system is working properly?
7. You are travelling on a route through forecast icing with a MEA of 12,000 feet. The aircraft weight is 8,000 pounds and the OAT is -10°C. What area of the Enroute Tool for Exiting Icing are you operating in, and what are the consequences of operating in that area?