

Cold Weather Flying - Cirrus N412DJ

Since most of us do our flying in 'warm' California, it is easy to forget the impact of colder weather on our flying and airplanes. In talking with DJ pilots, some are not aware of proper operations once the mercury drops below freezing. I've attached excerpts from the AFM (The great little book in the airplane) regarding Cold Weather.

Starting 'DJ':

Improper methods of starting in cold weather can severely impact the engine, or stop you from starting all together.

- Aircraft batteries are small (11AH) and lose a substantial amount of their power below freezing.
- Avoid the use of the battery during your preflight.
 - If you will be flying in the morning after a previous flight, check all components after your landing when the battery is still warm.
 - Check the electrical components with a GPU connected
- Start the plane with a GPU (tip the line guys who have to stand in the cold).
 - The AFM recommends a GPU when less than 20F - raise that limit to 32 or if the temperature was even colder overnight.
 - If GPU is not available, consider reducing electrical load during pre-flight and starting
- Use Pre-heat and be careful of the composite cowling (> \$10K)
- Avoid high RPMs (over the lowest smooth idle) until the oil temperature is in the green. NEVER takeoff until oil temperature is in the green
- Priming - be very careful -
 - DJ is different than 48F and requires a much shorter prime (2 seconds > 40 F or 5-10 < 40).
 - Overpriming washes oil from the cylinder walls.

Icing Conditions and TKS

Repeat to yourself - **DJ is not certified for flight into known icing (FIKI)**. You are a test pilot if you continue.

The TKS system is only proven not to provide a hazard to flight not for ice removal, or protection.

If you find yourself in icing, exit immediately (climb, descend, turn around, ask ATC for help).

1. Pitot Heat - ON, Heat HIGH - Defrost - ON
2. Turn on the TKS to MAX for no more than 1-2 minutes to prime, then to NORM since the tank will run dry quickly on MAX. Use MAX if icing accretion is increasing.
3. Repeat the first recommendation - **EXIT icing conditions immediately**

I've attached photos from the Cirrus Forum (not DJ) of an SR22 in icing - note the unprotected

areas covered in ice and the ice even on areas with TKS operating.

- The pilot who took these photos continued to fly in icing - which is crazy
- I've flown in FIKI aircraft for 30+ years and have encountered situations when even those airplanes could not handle icing.
- Do not test the TKS system - it wastes fluid when it might really be needed, I test it quarterly to ensure it works, and it makes a mess in the hangar.
- **DO NOT fly in icing conditions** (repeated on purpose).



Before Takeoff

During cold weather operations, the engine should be properly warmed up before takeoff. In most cases this is accomplished when the oil temperature has reached at least 100° F (38° C). In warm or hot weather, precautions should be taken to avoid overheating during prolonged ground engine operation. Additionally, long periods of idling may cause fouled spark plugs.

• WARNING •

Do not takeoff with frost, ice, snow, or other contamination on the fuselage, wing, stabilizers, and control surfaces.

1. DoorsLATCHED
2. CAPS Handle Verify Pin Removed
3. Seat Belts and Shoulder Harness..... SECURE
4. Air Conditioner AS DESIRED

• Note •

If Air Conditioner is ON for takeoff roll, see Section 5, Performance for takeoff distance change. No takeoff distance change is necessary if system remains OFF for takeoff roll.

5. Fuel Quantity..... CONFIRM
6. Fuel Selector..... FULLEST TANK
7. Fuel Pump..... BOOST
8. Mixture AS REQUIRED
9. FlapsSET 50% & CHECK
10. Transponder SET
11. Autopilot CHECK
12. Navigation Radios/GPS SET for Takeoff
13. Cabin Heat/Defrost AS REQUIRED
14. Brakes HOLD
15. Power Lever 1700 RPM
16. Alternator CHECK
 - a. Pitot Heat..... ON

Environmental Considerations

Cold Weather Operation

Starting

If the engine has been cold soaked, it is recommended that the propeller be pulled through by hand several times to break loose or limber the oil. This procedure will reduce power draw on the battery if a battery start is made.

When the engine has been exposed to temperatures at or below 20° Fahrenheit (-7° C) for a period of two hours or more, the use of an external pre-heater and external power is recommended. Failure to properly preheat a cold-soaked engine may result in oil congealing within the engine, oil hoses, and oil cooler with subsequent loss of oil flow, possible internal damage to the engine, and subsequent engine failure.

If the engine does not start during the first few attempts, or if engine firing diminishes in strength, the spark plugs have probably frosted over. Preheat must be used before another start is attempted.

• **WARNING** •

If airplane will be started using external power, keep all personnel and power unit cables well clear of the propeller rotation plane.

• **Caution** •

Inadequate application of preheat to a cold soaked engine may warm the engine enough to permit starting but will not de-congeal oil in the sump, lines, cooler, filter, etc. Congealed oil in these areas will require considerable preheat.

An engine that has been superficially warmed, may start and appear to run satisfactorily, but can be damaged from lack of lubrication due to the congealed oil blocking proper oil flow through the engine. The amount of damage will vary and may not become evident for many hours. However, the engine may be severely damaged and may fail shortly following application of high power. Proper procedures require thorough application of preheat to all parts of the engine. Hot air must be applied directly to the oil sump and external oil lines as well as the

cylinders, air intake and oil cooler. Because excessively hot air can damage non-metallic components such as composite parts, seals, hoses, and drives belts, do not attempt to hasten the preheat process.

- 1. Ignition SwitchOFF

• **WARNING** •

Use extreme caution when pulling the propeller through by hand. Make sure ignition switch is OFF, keys are out of ignition, and then act as if the engine will start. A loose or broken ground wire on either magneto could cause the engine to fire.

- 2. Propeller Hand TURN several rotations
- 3. External Power (If applicable) CONNECT
- 4. Brakes HOLD
- 5. Bat Master Switches ON (check voltage)
- 6. Mixture FULL RICH
- 7. Power lever FULL FORWARD
- 8. Fuel Pump PRIME, then BOOST

• Note •

Serials 0002 - 0278 before SB 22-73-01: In temperatures down to 20°F, hold Fuel Pump switch to PRIME for 60-120 seconds prior to starting.

Serials 0002 - 0278 after SB 22-73-01 and 0279 and subsequent: In temperatures down to 20°F, hold Fuel Pump switch to PRIME for 15 seconds prior to starting.

N412DJ

**DO NOT PRIME
FOR MORE THAN
5-10 SECONDS
WHEN COLD**

- 9. Propeller Area CLEAR
- 10. Power Lever OPEN ¼ INCH

(Continued on following page)

11. Ignition Switch..... START (Release after engine starts)

• **Caution** •

Limit cranking to intervals of 20 seconds with a 20 second cooling period between cranks. This will improve battery and contactor life

12. Power LeverRETARD (to maintain 1000 RPM)

13. Oil Pressure CHECK

14. Alt Master SwitchesON

15. Avionics Power SwitchON

16. Engine Parameters MONITOR

17. External Power (If applicable) DISCONNECT

18. Amp Meter/Indication CHECK

19. Strobe Lights.....ON

Hot Weather Operation

Avoid prolonged engine operation on the ground. Fuel BOOST must be ON for engine start and takeoff, and should be ON during climb for vapor suppression which could occur under hot ambient conditions or after extended idle.

Ground Operation of Air Conditioning System (Optional)

• **Note** •

To facilitate faster cabin cooling, prior to engine start leave the cabin doors open for a short time to allow hot air to escape cabin.

1. Control PanelSELECT Desired Mode and Temperature

2. Voltage MONITOR

• **Note** •

Decrease electrical load if battery discharge is noted.

3. Annunciator Lights CHECK

a. Verify ALT 1 caution light out and positive amps indication.

4. Engine Parameters CHECK