It's important for all pilots, regardless of their location, to keep in mind that winter flying means making adjustments in your flying routine, starting with preflight.
Here is a refresher provided by the chief pilot and director of flight operations at New Century Air Service (NCAS) located at New Century AirCenter Airport (KIXD) in Olathe, Kan.

PREFLIGHT AND GROUND OPERATIONS

Engine preheating

Preheating is the most critical aspect of winter operations. It has been estimated that one cold-soaked engine start (starting an engine with air temperatures below 30 degrees F with no engine preheating) is the equivalent of nearly 500 hours of engine time and wear. Camshafts, pistons and cylinder walls are particularly susceptible to wear caused by insufficient lubrication during cold starts.
Most aircraft engines rely on splash lubrication; a splash system is one that depends upon the reciprocating engine to "splash" oil through the engine. When the oil is thick or the engine isn't preheated well, splash systems can't adequately distribute the oil during engine start.
Many aircraft rental companies, including NCAS, have a standard operating procedure and policy to preheat engines before flight. Aircraft owners should adopt this practice, too.
Heated hangars, along with plug in-style cylinder and oil pan heaters, can be used successfully to avoid cold-soaked wear and tear. Aircraft not in a heated hangar should be plugged in or pulled in at least 30 minutes to an hour before a scheduled flight.

Engine warmup

It is essential to warm up the engine at 1,000 to 1,200 rpm as specified by the engine manufacturer—unless of course you need to reduce the rpm to keep from exceeding the oil pressure redline. As the oil warms, rpm can be increased.
Hydraulic lifters, which adjust the valve lash to compensate for engine expansion during warmup and operation, are dependent upon warm oil to function properly. This is another reason to adequately preheat your engine and oil pan.

Slush and contamination

The safest method to ensure proper operation of the landing gear and assure wheel pant longevity is to avoid operating an aircraft on contaminated ramps, taxiways and runways—especially during thawing conditions. Slush, mud and other contaminants can be thrown into wheelwells during taxiing and takeoff. The slush can freeze and subsequently create landing gear retraction and extension malfunctions.
Aircraft that have wheel pants are susceptible to the same problems. Slush and mud can get caked in the wheel pant and cause damage to the wheel pant, as well damage the brake and wheel components.

FLIGHT OPERATIONS

Wing contamination

A common wintertime “accident waiting to happen” can occur when a pilot tries to take off with frost on the wing surface. Wind tunnel and flight tests have shown that the slightest accumulation of frost, ice and even snow can reduce lift by 30 percent and increase drag up to 40 percent.

It is critical that any wing contamination be removed before attempting flight. It is best to preheat the aircraft in a heated hangar—but if one is not available, you can use a rag and glycol spray to wipe off any wing contamination.

Aircraft exposed to blowing snow and freezing rain require a pilot’s special attention during preflight. Any openings where precipitation of any kind can enter, freeze and impede normal and proper operation must be inspected.

Some of the most common places to check for contamination and freezing include pitot tubes, heater intakes, carburetor intakes, anti-torque and elevator controls, cowl flap vents and the main wheelwells. Ensure during preflight that these areas are free of snow and ice.

Carbon monoxide

Special attention should be paid to the cabin and flight deck heaters during maintenance and even during preflight inspections. Muff style heaters are common on most single-engine airplanes, and fuel combustion heaters found on many twin-engine aircraft. (For more on this topic, refer to your November 2014 issue of Piper Flyer, or view the digital edition online at PiperFlyer.org. —Ed.)

NCAS has CO detectors installed in every one of its eight rental aircraft, but other aircraft may not have this equipment. A portable carbon monoxide detector should be in every winter pilot’s flight bag. Even the smallest crack in the heating system can emit carbon monoxide—a colorless, odorless gas—and it can be fatal. Each year, accident investigations show carbon monoxide to be a probable cause in accidents that occurred during cold weather operations.

INADVERTENT ICING ENCOUNTERS

Structural icing

If your aircraft is not equipped with de-icing or anti-icing equipment and you unintentionally start picking up ice, you should leave the icing conditions immediately. To exit, you have several options—and the best and most logical of these is a complete 180-degree turn.

Your second option is to climb or descend in an attempt to get above or below the freezing level. Keep in mind that descending is not always your best option: if you are in a temperature inversion, you may have to climb to find warmer air.

Of course, determining where icing conditions may exist begins well before ever entering the airplane. Proper flight planning, including analysis of winds and temperatures aloft forecasts and any AIRMET Zulu issuances, is key to determining where icing conditions exist and where a temperature inversion may occur.

Carburetor icing

Generally speaking, carburetor ice will form in temperatures between 32 and 50 degrees F when the relative humidity is 50 percent or greater. If visible moisture is present, carburetor ice will form at temperatures between 15 and 32 degrees F. A carburetor air temperature gauge is extremely helpful with this, as a pilot can monitor and adjust carburetor heat to keep temperatures in the proper range.

Partial throttle—especially in cruise or descent—is the most critical time for the development of carburetor ice. I recommend applying carburetor heat before reducing power, and also to use partial power during a descent to prevent carburetor icing and overcooling the engine.
To prevent carburetor icing, use a carburetor heat ground check during engine runup, and always use carburetor heat when in the icing range. Use carburetor heat on approach and descent, especially during the winter
flying months.
Warning signs of carburetor icing include the loss of engine rpm (for aircraft with a fixed pitch propeller), or a drop in manifold pressure (for aircraft with a constant speed propeller) or rough-running engine.
If you suspect carburetor icing, the "memory item" response should be to apply full carburetor heat immediately. (The engine may run rough initially while the ice melts and then will gradually increase to maximum power.)

Runway conditions
A landing surface can be treacherous in the cold weather months. Advance information about the current conditions of runways and taxiways—particularly an analysis of notams—should be obtained during preflight preparation.
Field condition notams (FICONs) that include braking action summaries are a good source of timely information for pilots. Most airports express braking action as "Good," "Fair," "Poor," or "Nil." Some larger airports will express braking action in Mμ values or friction coefficients.
Be sure you understand the field condition notams completely. Refer also to page 37 for a review of AIM 4-3-9, Runway Friction Reports and Advisories.

Other winter hazards
Snowdrifts on the sides of the runway can develop without much warning. At uncontrolled airports, I recommend that you circle the field before landing to assess the actual runway condition and look for drifts or other obstacles that may not have been reported or expected.
Despite the additional steps and special attention that winter flying requires, the challenges can be worth it. As with any flying, exercising good judgment and using a healthy dose of caution will help ensure you stay safe in the air, no matter the season.

References:
1. Piper Flying Association
2. Austin J. Hunt serves as the chief pilot and director of flight operations at New Century Air Service in Olathe, Kan.

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