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Forecast: 'Continued Cold'

■ ■ With the forthcoming increasing frequency of weather forecasts predicting "continued cold," there will be a corresponding increase in pilots tucking their planes in for the winter and heading for warm firesides.

But why? While many pilots, especially the relatively new and inexperienced ones, are actually afraid of winter flying—citing too many operational problems and flight hazards—they are actually missing out on some of the best flying weather they'll ever see. Winter weather, while admittedly bringing ice, snow, and other annoyances, also offers beautiful flying conditions, including unlimited ceiling and visibilities, comfortably smooth air, and, as a bonus, good crisp air to stir up your summer-drugged and latent energies.

On the other hand, storing an airplane for the winter merely allows it to collect dust, dirt, rodent nests, and other undesirable additions. A thorough check for both plane and pilot is required when spring finally rolls around again. Most irritating of all, the plane's expenses—hangar, taxes, mortgage—continue whether it is flown or not.

So, let's take a look at the entire subject of cold weather operations, and see just how it differs from warm weather flying. Basically, the airplane operates the same in winter as it does in summer, but it does require more assistance from the pilot to allow it to operate efficiently and safely under the more rigorous conditions of winter.

Good winter operation actually begins several months prior to the first cold spell. While it's still fairly warm weather, run your plane into the shop and have the mechanic correct all the little problems that have been bugging you all summer, the ones you hated to bother with during those nice lazy flying days. While they were just minor aggravations during the summer, they can quickly develop into major ones in the winter.

While your ship is in the shop, give the engine a thorough check, beginning

with the electrical system. If necessary, replace plugs, points, and other items. Make sure the battery is up to full power. If it isn't and won't hold a charge, replace it.

Move on through all the other systems, checking and replacing where necessary. Be sure all fuel and oil connections are tight. If available, install oil baffles, and, in exceptionally cold weather areas, lag the oil tank and lines to prevent congealing.

Another good item to check in extremely cold operating areas is the tension of all control cables. To assure proper tension, have them adjusted with a tensiometer.

Give particular attention to your induction and exhaust systems. Not only can defects here affect your engine starting, but cracked or poorly joined exhaust sections can allow carbon monoxide to be drawn into the cabin via your cabin heat ducts. The dangers of carbon monoxide are well enough known so we won't belabor them here. Suffice it to say that at the least you'll have severe eye irritation, a splitting headache, shortness of breath, and often violent nausea, proceeding on to death within an hour with just a 0.1% concentration of carbon monoxide.

A quick and easy check on your heater system efficiency is merely to turn on the unit during a fall flight, then feel the amount of heat output and watch for any undesirable side effects. This way, you can fly with the windows open if you have to, without becoming chilled or overheated, and also have extra protection if any carbon monoxide should be present. Use a CO detector if available, but in any case have the system ground checked before winter sets in.

If your plane has a fixed gear with wheel pants, remove the pants and store them for the winter, to prevent ice, slush, and mud from becoming packed inside them, then freezing in flight and locking the wheels.

To properly cover all these points,

it is a good idea to make a check list covering these items, plus any others which may be called for in your owner's manual, before putting your aircraft in the shop. Even better, schedule your periodic inspections so they come due on or about Oct. 1. This will allow you to get in those last few days of good summer/fall flying and still be ready for the first siege of winter.

If at all possible, get your plane inside a hangar for the winter. Not only will this move prevent weather damage and keep the entire plane free of snow and ice for closer examination during your preflight inspections, it also will allow you to make your preflights inside the hangar, out of the snow, cold rain, and bone-chilling winds. The net result?—relatively comfortable working conditions, enabling you to make an unhurried, thorough, and proper preflight.

Always a good operational practice, a thorough preflight inspection is a critical necessity in winter. Usually, a pilot will carefully check his fuel and oil levels, and add to them if necessary, but all too often that will be the extent of his inspection. Little thought will be given to the snow and ice covering the wings and tail surfaces; a quick brush to get the big deposits off, and that's it.

The fallacy of this thinking is proven at least once every winter, when a light-plane (and sometimes one not so light) staggers off the end of the runway, then settles back to earth with a resounding crash, usually a fire, often several fatalities, and always widespread but wholly unwelcome publicity. The cause? A thin coating of ice or snow, or even just a heavy frost, which was just uneven enough to spoil the airflow over the wing and deprive the craft of its lift.

Therefore, be sure all the coating is off your plane (including the top of the fuselage, where it has little effect upon lift but does add weight), thereby removing the airflow destroyer and

making all surfaces easily available for inspection. Be sure all movable surfaces are just that, and are not frozen stiff. A word of caution here: use a kitchen broom or mop, or even heavy gloves, during your scraping work, or you'll end up with bleeding or frozen hands.

Gloves are also a good precaution when running the other parts of your preflight, such as opening access doors, draining gas sumps, and so on. Chapped hands are no fun, especially when gas soaked, and usually result in the pilot's hurrying his walk-around so he can get inside his plane.

Speaking of gloves, prior to setting out for the airport and your trip, give some thought to the entire problem of suitable clothing. Wear warm clothes for the outside work, but be able to take off the outer layer once the plane's cabin warms up en route. However, don't leave those outer layers in the car at the airport just because you have a heater which really works. You might end up at another airport where you have to wait outside for ground transportation, not to mention the possibility of your heater going out en route—or, the saints forbid, you might have an unscheduled landing and have to walk a considerable distance for help. So, be prepared.

Check all fuel drains and sumps carefully. The best method is to use a transparent container, so that you can get an accurate picture of what's coming out of your drains. It is always a good idea to drain a particular sump, check it carefully, empty the container, and then go through the draining process again, thus getting a double check. Drain enough to get a good idea of how much water is there, continuing until no more is evident.

An item often forgotten is the pitot-static system. You should have a cover for your pitot head, and it should be on at all times while the plane is on the ground, winter and summer. If one isn't available, check carefully to make sure that the head isn't loaded with ice or snow, and if you have a pitot heater, check it before takeoff. Be equally certain that the static pressure vents are clear and unobstructed.

Whatever you do, *don't hurry your preflight!*

With your outside work done, climb in and carefully check the inside. Move all controls to determine proper operation, and try all switches to be sure they haven't frozen in one position.

When the temperature gets down to 25° Fahrenheit or below, your plane will usually require preheating. Simply the application of warm air directly into the engine compartment, preheating makes starting easier by warming the engine oil to an easier flowing condition and baking out any moisture in the ignition system. Warming the various engine parts allows them to expand to normal operating clearances from their frozen, contracted condition.

It is also good policy to heat the cabin area. This will allow the various instruments to warm up to normal operating

capabilities, prevent sticking switches and controls, and make for a more comfortable pilot environment. Whatever you are heating, have an amply sized fire extinguisher immediately at hand.

If available, use an external power source, either from a battery cart, car jumper, or auxiliary power unit (APU). Not only will you get a quicker and more powerful start, but you will also save the plane's battery for other operations.

Exact starting procedures are hard to spell out, considering the many different engine installations. However, if you do not have an engine or airplane manual which gives the starting sequence for your particular craft, here is a general "rule of thumb" sequence which has successfully started many engines of up to 450 h.p.:

1. Switches off, and pull prop through five or six times.
2. Prime 10 to 12 long, *slow* strokes.
3. Switches on, fuel pump on, starter on. If your engine has no fuel pump, add fuel by slowly moving the throttle full forward and aft until the engine fires and runs normally, then move the throttle to approximately $\frac{1}{4}$ to $\frac{1}{3}$ r.p.m.
4. DO NOT IDLE engine. Idling will merely foul the plugs and make the engine run rough or quit altogether; warm up at 800 to 1,000 r.p.m.
5. Watch temperatures and pressures. If oil pressure does not start to rise within 30 seconds, or read within its normal operating range within 60, shut down engine and check the oil system for leaks.
6. When all temperatures and pressures have stabilized, you are ready to taxi out for run-up.

Starting a fuel injection engine is similar, except priming is done by fuel boost and the engine is started with the mixture in idle cutoff. This type engine is often tricky to start, especially when hot, so it would be best to dig out the handbook and review carefully the section on starting.

When taxiing out, taxi slowly, using just enough power to keep your ship moving. This not only prevents excessive speed build up, which may preclude quick stopping on a slick surface, it also cuts down on the amount of slush, ice, or other muck which is thrown up against the plane by the wheels and the prop wash. It goes without saying that you will avoid all possible puddles, snowbanks, and other moisture areas.

Runup is normal, with particular attention being paid to temperatures

and pressures, and to carburetor heat. (Note: Do *not* use carburetor heat on takeoff, due to overheating and possibly excessive power loss, unless you notice an increase in r.p.m. when you pull the heat on.) Be sure all controls are free and have full travel, and if you have controllable pitch props exercise them two or three times to remove the cold oil from the pitch change mechanisms.

On takeoff, pick as dry a part of the runway as possible, to avoid slush and other wet impedimenta. When airborne after a slushy takeoff run, cycle the gear several times to help clear off the gear's moving parts and prevent it from freezing in the up position.

Cold weather cruising is very little different from warm weather operation, the principal exception being that more careful attention is paid to engine temperatures and pressures in order to quickly determine any power loss. This will be noticed first in the form of a drop in manifold pressure or falling off of r.p.m., followed by a loss of airspeed. The cause? Ice! Apply carburetor heat till your power loss is regained and your airspeed is back where it was. Watch carefully for a repeat of the problem, and apply heat as needed.

Pay particular attention to your oil temperature. If it continually indicates low, at your first opportunity install additional baffles or otherwise block off some of the cold air flow over the oil cooler.

At roughly half-hour intervals in extremely low temperatures, constant speed props should be cycled several times to prevent the oil in the pitch change mechanisms from congealing.

Fuel management also requires a bit more consideration. While actual cruise fuel consumption will vary but little from warm weather demands, don't forget the amount it took you to get the engine(s) started and warmed up. In extreme cases, you can easily consume 10% of your total fuel capacity just getting started, warmed up, taxied, and off the runway (and this doesn't take into consideration any excessive taxi or takeoff delays on busy airports, either). Thus, make allowances for this initial ground consumption, and adjust your planned flight time accordingly. Also, don't run one tank dry before switching to another; switch with a normal reserve in the first. This will allow you sufficient reserve fuel if you should switch to the second tank and then find its tank-to-engine line, or even the valve itself, frozen shut, thereby preventing any fuel flow.

If you have an exhaust-type cabin heater, stay alert to the possibility of exhaust gas seepage into the cabin area.

Winter offers some of best flying weather of year, if you are prepared to take advantage of it. Techniques for winterizing your plane and flying it in frigid temperatures are not difficult to learn

Not only will this gas irritate your eyes and general sense of well-being, it will also indicate the possibility of carbon monoxide. Should you smell exhaust gas, shut off the heater at once, cross-ventilate, and plan to land as soon as possible. Reminder: here is one reason for the warm clothes!

When nearing your destination, plan your approach so that you don't have to make any long, power-off descents. This causes too rapid engine cooling, with subsequent poor power response when the throttle is shoved forward. Occasionally, it will mean a pure and simple case of the engine quitting. If this should happen, look for a forced landing spot, because the chances are against your getting the engine started again in that condition, even if you do have sufficient altitude to attempt an air start. Always use carburetor heat *before* you throttle back.

Post-flight, taxi slowly in to your parking spot, again avoiding puddles and slush. Let the engine run at 1,000 r.p.m. for a minute, in order to stabilize all temperatures and pressures, and check for normal indications throughout. Shut down, and fill the fuel tanks as soon as possible.

A word here about winter fuels and oils: Generally speaking, any fuel from a regular airport tank or truck will be all right, but if taken from drums beware of water. Of course, you'll drain your sumps before your next flight, regardless, if you're on the ground more than a few hours or remain overnight.

Oil, delivered in sealed containers,

should present no problems. Naturally, you will want the proper type—detergent, nondetergent, ashless dispersant, mineral, synthetic—and weight—20, 30, 40, 50—specified for your particular engine. You don't remember these? Then find out now, and paste the information on your instrument panel where it will be readily available. Just don't mix them.

Some engine manufacturers require, or at least recommend, draining the oil sump occasionally to eliminate any collected moisture from the sump. This is especially desirable during cold weather, particularly after a series of short trips where the engine has been allowed to cool completely between flights. Check your flight manual to determine if this is recommended for your engine.

While winter does bring some new operational problems, careful checking of your aircraft and attention to detail will enable you to throw snowballs at "Old Man Winter," and proceed to enjoy some of the year's best flying weather. □

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Weather Conditions Favorable To Icing

Winter flying in a greater part of the United States calls for knowledge on the part of the pilot of conditions that are favorable to icing, particularly on the outside surfaces of the aircraft. The just-published 1969 edition of the AOPA Handbook for Pilots* contains specific information on this subject. Prepared for the Handbook by Duane E. Best from Government sources, the item says in part:

"The total effect of aircraft icing is a loss of efficiency both from an aerodynamic standpoint and a power standpoint. This loss of efficiency results in a number of adverse conditions, such as decreased lift, increased drag, higher stalling speeds, loss of power, increased fuel consumption, lower flying speeds and decreased maneuverability.

"It is impossible to establish exact temperature limits wherein icing may be encountered. The most severe structural icing occurs usually between 32°F (0°C) and 14°F (-10°C). It is not uncommon to find structural icing at temperatures as cold as -13°F (-25°C). Fast freezing rime ice, from supercooled water droplets, may accumulate at temperatures down to -40°F (-40°C).

"Structural ice may accumulate at rates varying from less than one-half inch per hour to as high as one inch per minute for brief periods of two or three minutes. The most dangerous icing conditions are usually associated with freezing rain or freezing drizzle; it can build hazardous amounts of ice in a few minutes.

"Carburetor icing may occur in clear air at temperatures far above freezing when the humidity is high. Accumulations may occur at temperatures as high as 77°F (25°C). Carburetor ice is most serious when the temperature and dew point are near 68°F (20°C), and may occur at temperatures as low as 14°F (-10°C). Fuel vaporization and air expansion within the carburetor cause an extreme temperature drop that will turn any moisture to ice whenever that cooling effect reaches 32°F (0°C) or colder."

*AOPA Handbook for Pilots 1969; published by the Aircraft Owners and Pilots Association, Washington, D. C. 20014. Price \$2.75 to members; \$4.25 to nonmembers. □