

Induction Icing

Ben Ellison (WA) - Thanks for inviting my input on carburetor icing. I have summarized what (we think) we know about the mechanism of carburetor ice formation.

Float Type Carburetors:

1. The throttle plate experiences drastic cooling due to the evaporation of fuel which is sprayed on it by the upstream fuel jet. The thermodynamic "venturi" effect, which is popularly assumed to be responsible for ice formation, is insignificant. Water vapor in the air condenses on the cold throttle plate and freezes, with ice accumulating on both sides. Engine roughness from distortions in cylinder to cylinder fuel distribution is often the first warning symptom, followed by substantial power loss as the growing ice deposit obstructs induction airflow. Final engine failure can either be a rich or lean failure depending on subtleties of ice ball geometry.

2. Another form of icing can occur in Marvel-Schebler carburetors (as well as in the Ellison TBI as explained below) when small air bleed passages in the idle system as well as the main metering circuit are occluded with one or more small particles of ice. The result is excessive rich roughness that may occur over a narrow RPM range or may be present over the full range of throttle openings. When the en-

gine finally quits it is a rich failure.

Throttle Body Injectors:

The Ellison Throttle Body Injector (TBI), with no throttle plate downstream of the point of fuel injection, at first glance appears to be ice proof. Unfortunately, many of our customers have never gone beyond the first glance in spite of our warnings. A TBI, in any given application, may go years without accumulating any ice. Unfortunately, some of our customers feel that since the TBI ices up so infrequently, they won't be quite as dead as if it happened often. As with the Marvel-Schebler carburetor, the same two ice mechanisms are possible in the TBI. Here's how:

1. The same extreme temperature drop occurs in the TBI as with the M-S and for the same reason. With no throttle plate downstream of the fuel input there is little for the ice to adhere to. It is possible however, for ice to form on the side wall of the TBI downstream of the throttle slide. TBI owners can convince themselves of this danger by running their engine at 1500 RPM for a while on a humid day with the cowl removed; the diffusion section of their TBI will look like a Popsicle. Serious ice formation doesn't happen very often, but it only takes once to have your widow's attorney looking for my phone number. Deadly ice formation can occur in the manifold of engines with cold intake pipes such as VW conversions and

Continental engines, to name a few.

2. Idle circuits of most of our TBI models include an air bleed passage that makes the fuel behave as though it had much lower viscosity. On humid days, when operating at idle for extended periods of time, the bleed orifice (located in the bottom of the slide cavity) will ice over, causing idle mixture to slowly enrich. Cycling the throttle a couple of times will sometimes clear the ice but the application of carb heat is the only sure cure. As the fuel contribution of the idle circuit diminishes as the throttle is opened, bleed circuit icing has negligible effect on power but can result in the engine quitting in a decent if the throttle is retarded far enough. This is a critical problem in EZes because the driver, not being able to see the prop, has no good way of knowing that he's a glider pilot.

V-6 For Sale

Chevy V-6 4.3L engine with all aluminum block and heads. Oil pump and water pump driven piggy back from accessory case. Was installed on my Velocity, but I ran out of time. Includes Northwest Aero of Auburn, WA reduction drive, engine mount, custom radiator, top & bottom cowl assembled and ready to mount on Velocity. \$13,000 located in Sebastian, Florida. Call:

Byron McKean,
Payson, AZ
520-474-7097

Canopy Access Door

During a recent trip, looking at EZ projects for new ideas, I came across Jim Leturgey's Long-EZ in Gasport, NY. Almost everyone, who has installed the canopy access door, has been bothered with air leaks from that flexible door. Jim's approach has been to increase the stiffness to achieve more reliable sealing and provide a more secure mounting for the door's lock. He has also changed the hinge geometry to reduce the possibility of leaks. That is important in NY's cold winters.

