EZ HEAT

The singular problem that plagues every EZ driver is that of heat. Staying warm. All sorts of heat sources have been tried, some working better than others, but more often than not, the front seater usually wound up with cold feet.

There I was, at 17,500, it was night time and -5 F outside. I was wearing a short sleeve shirt, one pair of pants, one pair of socks, and a pair of tennis shoes (Do they still call them that?). It was getting a little warm, so I turned the heat down just a little bit. Was this a dream??? NO, I actually have got heat in the EZ....

The idea of using an oil cooler for heat isn't new. I wasn't concerned about running oil lines to the cabin, no big deal. I just didn't want to start cutting holes in my paint job to do intake and exhaust air for the heater. Then the idea hit me, Why not use a blower, like a car heater.

After spending several hours in the local junk yard, I found a candidate blower motor that would do the job. This was out of a 1982 VW Rabbit, nice and compact, light and powerful . The blower was actually easy to get to, under the hood in front of the windshield. I had to twist, turn, cuss, and pry a little, but it does come out without taking the hood off (don't forget the ballast resistor, you'll need it for low speed).

There wasn't a lot of engineering involved, mainly cut and fit. The blower would tuck down in front of the landing gear retract mechanism. This would force air through the oil cooler and into a plenum box. On the floor of the box was a door controlled by a push cable. When this door was all the way open in the Overboard position, the hot air would go out the bottom of the plenum box, into the nose gear area, and be drawn outside. When the door was closed, in the Cabin position, air inside the plenum box would exit through two side louvers and onto my toes, and also out through the top were it was hosed to the back seat to warm their toes.

Prior to starting, I made a cardboard mockup of the entire heater system and used it to test fit. After several hours of cutting and fitting, I was satisfied that the concept would work. One area that's not shown on the drawings was the requirement to seal off air flow within the retract mechanism. When the plenum door was open and hot air was blown into the retract area, I didn't want the air leaking back into the cabin, I wanted it to escape through the bottom openings around the nose gear strut and exit outside.

The blower/cooler adapter was made using a piece of 2 inch urethane foam as a mold. I put duct tape on the blower motor to act as a release. I then superglued the 2 inch foam on the end of the blower and carved the shape I needed for it to mate up to the oil cooler. I used 4-5 layers of BID everywhere, making sure to overlap onto the blower, this is how I would mount the adapter to the blower. After cure, I popped the adapter off and carved out the rest of the foam. The edges were cleaned up and mounting holes were drilled for the cooler. The adapter was then permanently mounted to the blower by using black RTV and rivets. The oil cooler is then mounted to the adapter using Tinnerman nutplates.

The plenum box is made of several pieces of .050 aluminum. I used the cardboard mockup to cut and bend the pieces to the proper size and shape. The finished box is airtight with a large door in the bottom. The door is controlled by a push cable that's goes to the cockpit area. This helps serve as temperature control. I used two of those inexpensive air vent nozzles from Aircraft Spruce, one on each side. These can be adjusted for air direction and even turned off. I also put a small port on the top to connect a hose that goes to the rear seat floor area.

Getting the oil lines from the engine to the nose was no problem. During original construction, I routed 2 inch SCAT to use as the heater duct. This would be the conduit for the Aeroquip 303-8 lines that would carry the oil. I started out with 30 ft. of hose. Rather than cutting it, I doubled it over and ran the two ends through the SCAT to the Oil cooler. I didn't cut the hose until I was absolutely sure of the routing and its length. The oil lines were connected on the engine in such a manner that oil was first routed to the nose before it went through the main oil cooler. This way I get maximum heat from the heating system.

The Blower wiring was simple, I used a three position switch (center off). One side was wired for full speed and the other side for low speed, with the center position being OFF. I mounted the low speed ballast resistor near the blower intake were it would get plenty of air flow. I did have to add a 10 amp circuit breaker to power the blower.

OPERATION

Observations - As I've suspected, air tends to leak in through the nose gear area rather than out. If I place the temp control on full Overboard, (Plenum door fully open) and turn the blower OFF, air comes in through the nose gear openings, up past the plenum door, through the oil cooler and blower, and into the cabin. The end result is, it starts getting warm in the cabin. Through some experimenting I've come up with the best operational procedures.

Cold weather - Use blower speed for main cabin heat control. Leave push control in full Cabin position.

Warm Weather - Leave push control in Cabin position. Turn blower OFF. No heat should be generated inside the cockpit.

Hot Weather - If oil temp becomes excessive, place push control to Overboard and turn on blower. This helps cool oil and dumps the heat overboard.

CONCLUSIONS

The entire installation added about 10 lbs to the nose. This number includes about 1 quart of oil.

I used one of the solid side oil coolers, these are able to withstand high pressures better than the finned side coolers.

I don't think theres a significant weight difference for using a blower vs. ram air. By the time all the glass work/paint is complete, they should even out.

By using the blower, I have heat while taxing out and sitting on the end of the runway. On the other hand, when its hot, I have oil cooling while sitting on the ground.

By installing the blower vs. ram air, there is no need to cut up the airplane. This saves time and money on the installation.

It took about 2 weeks at 5 hrs/day to do this installation. A lot of that time was spent cutting cardboard and seeing what would fit in the small area I had to work with. Plus a day lost just looking around the auto junk yard for airplane parts.

This exchanger should be able to produce temperature differentials of 40-60 degrees. If -10 deg ram air were used as the source, one would expect to see a 30-50 deg air temp at the heater output. However, by recirculating cabin air, the intake air is constantly increasing in temperature. A 40 degree intake temperature will easily result in an 80-100 degree heater outlet temperature, EVEN AT 18,000 FT.

Several disadvantages that I can think of;
1) No fresh air through the heater. (Hey, I can open the air vent if I need to).
2) Getting to the gear retract mechanism is going to be a lot more difficult than it was before if I need to do any maintenance.
3) There will always be a quart of oil that doesn't come out in the oil changes.
4) 10 lbs of weight in the nose.

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