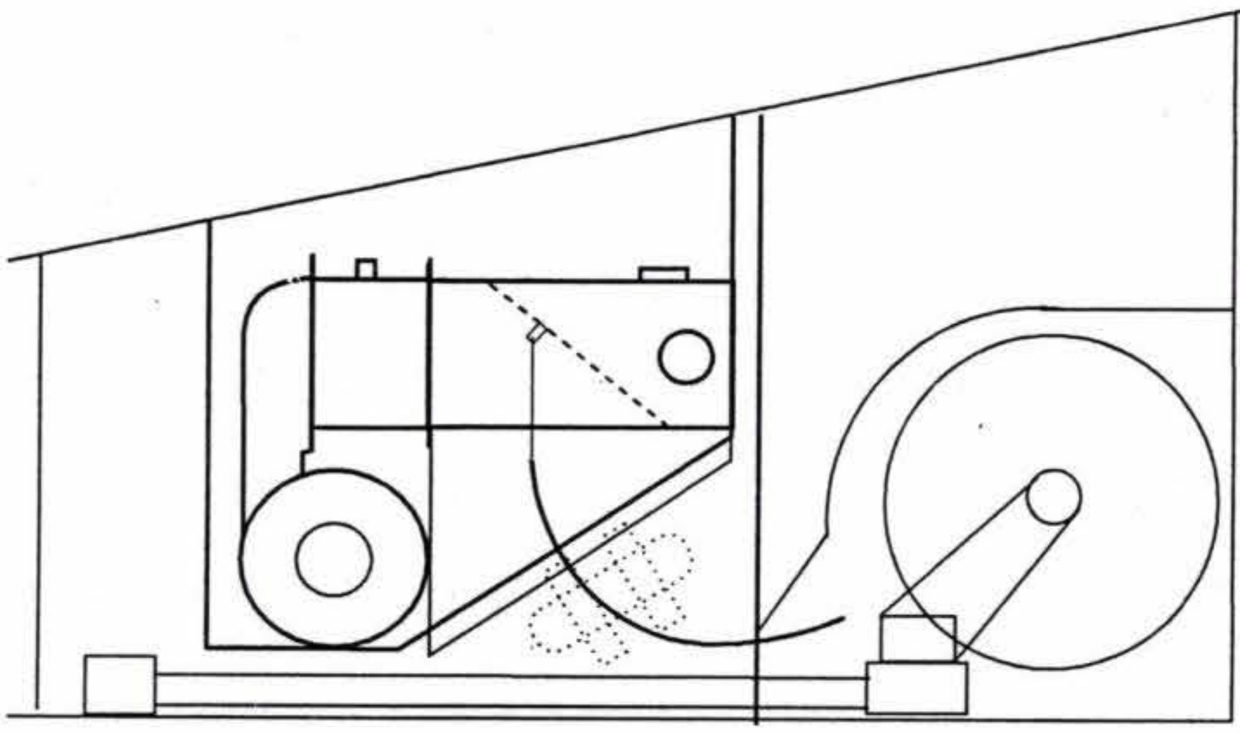
EZ Heat

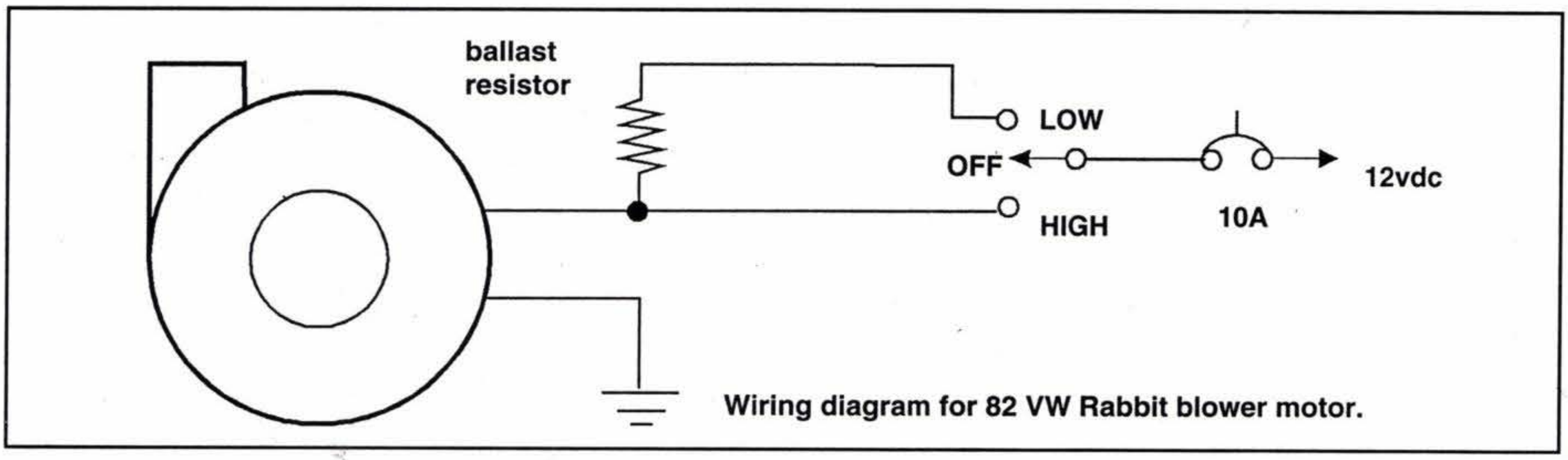
Leave your blanket and mittens at home for this flight.

By John McAvoy

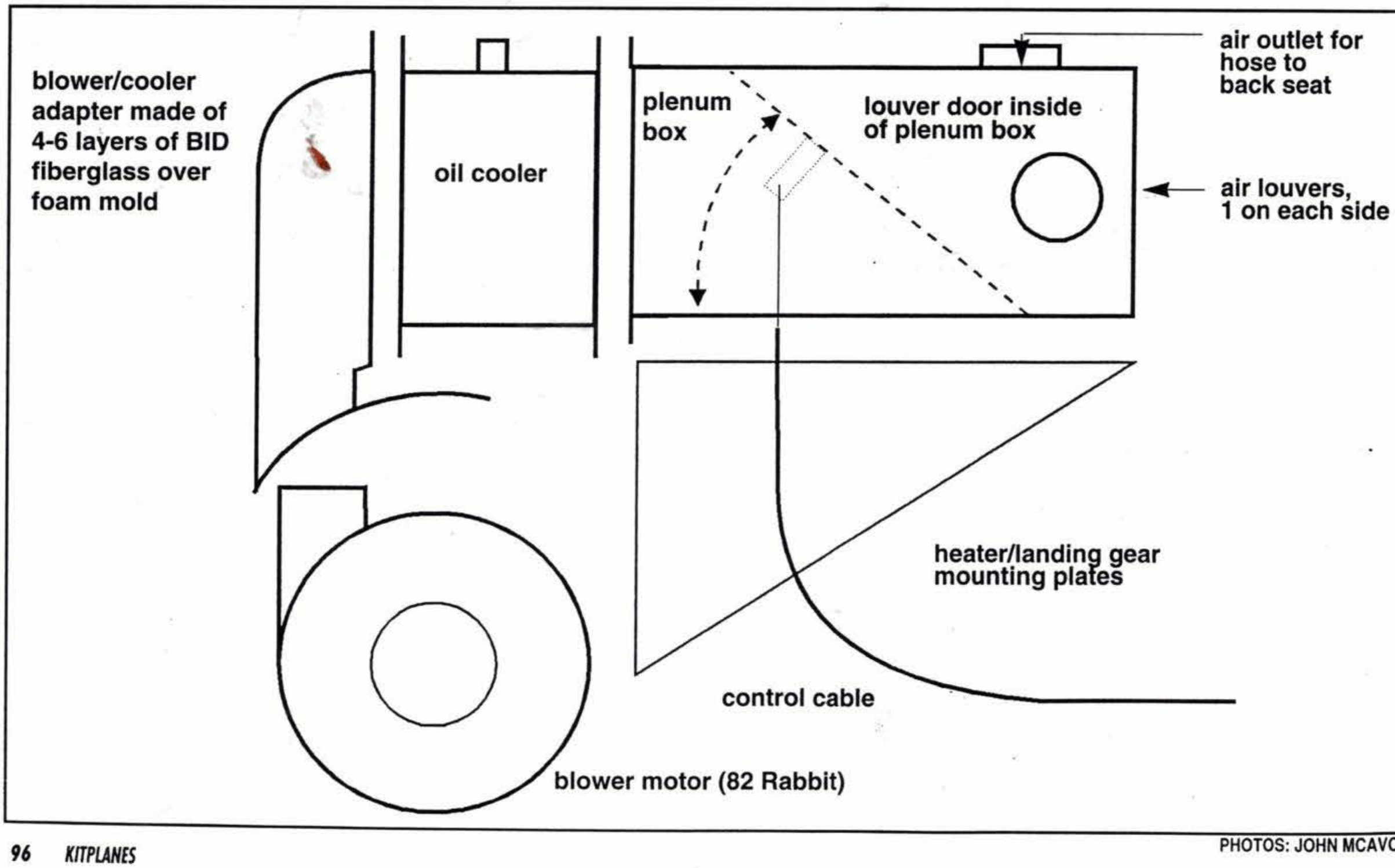
There I was at 17,500 feet. It was nighttime and -5°F outside. I was wearing pants, a short sleeve shirt and tennis shoes with one pair of socks. It was getting a little *warm*, so I turned the heat down a bit. Was this a dream? No, I actually had heat in my EZ!

A problem that plagues every EZ driver is how to stay warm. All sorts of heat sources have been tried, some working better than others. But more often than not, the front seat occupant usually ends up with cold feet.

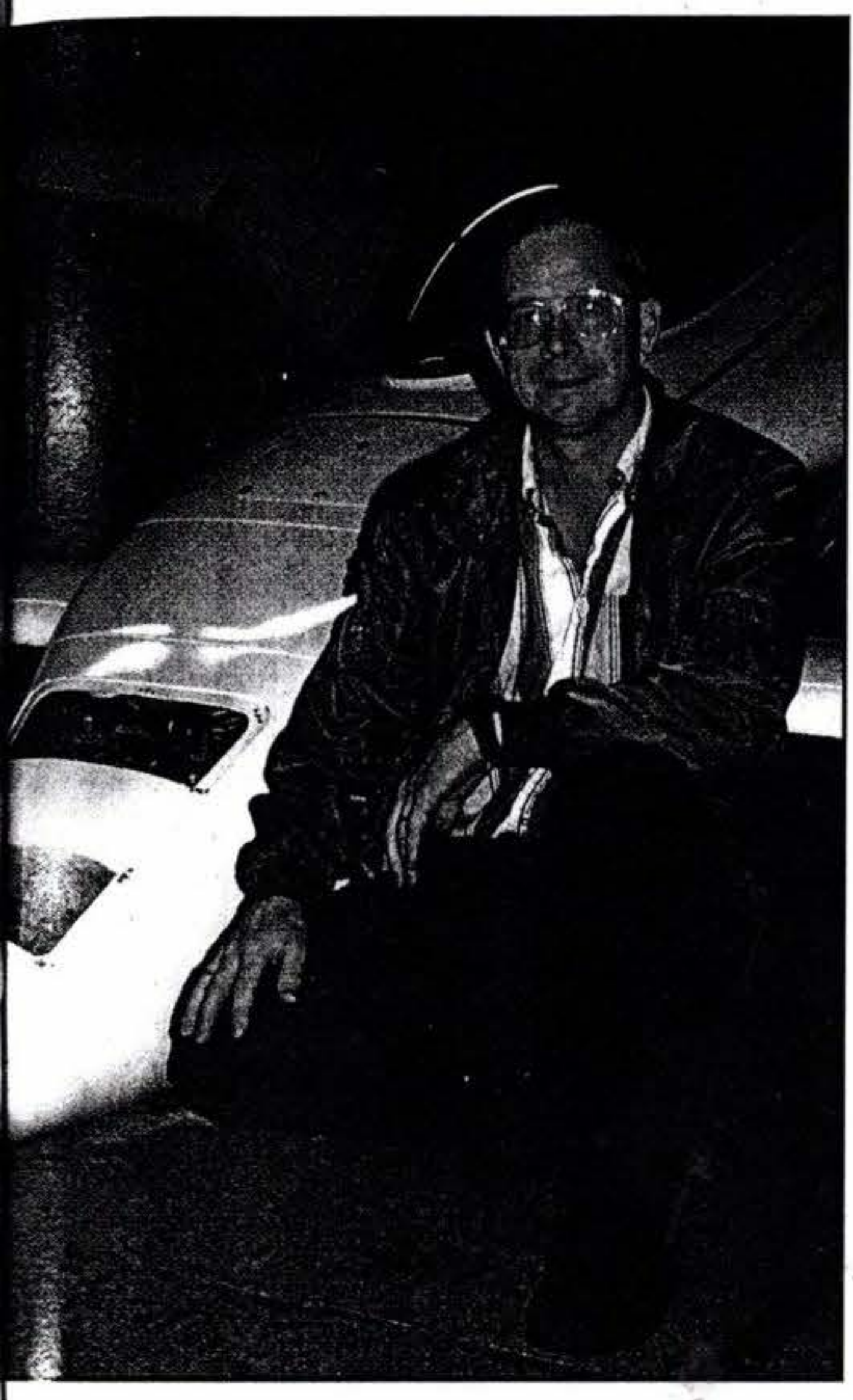




Wiring diagram for 82 VW Rabbit blower motor.



PHOTOS: JOHN MCAVOY

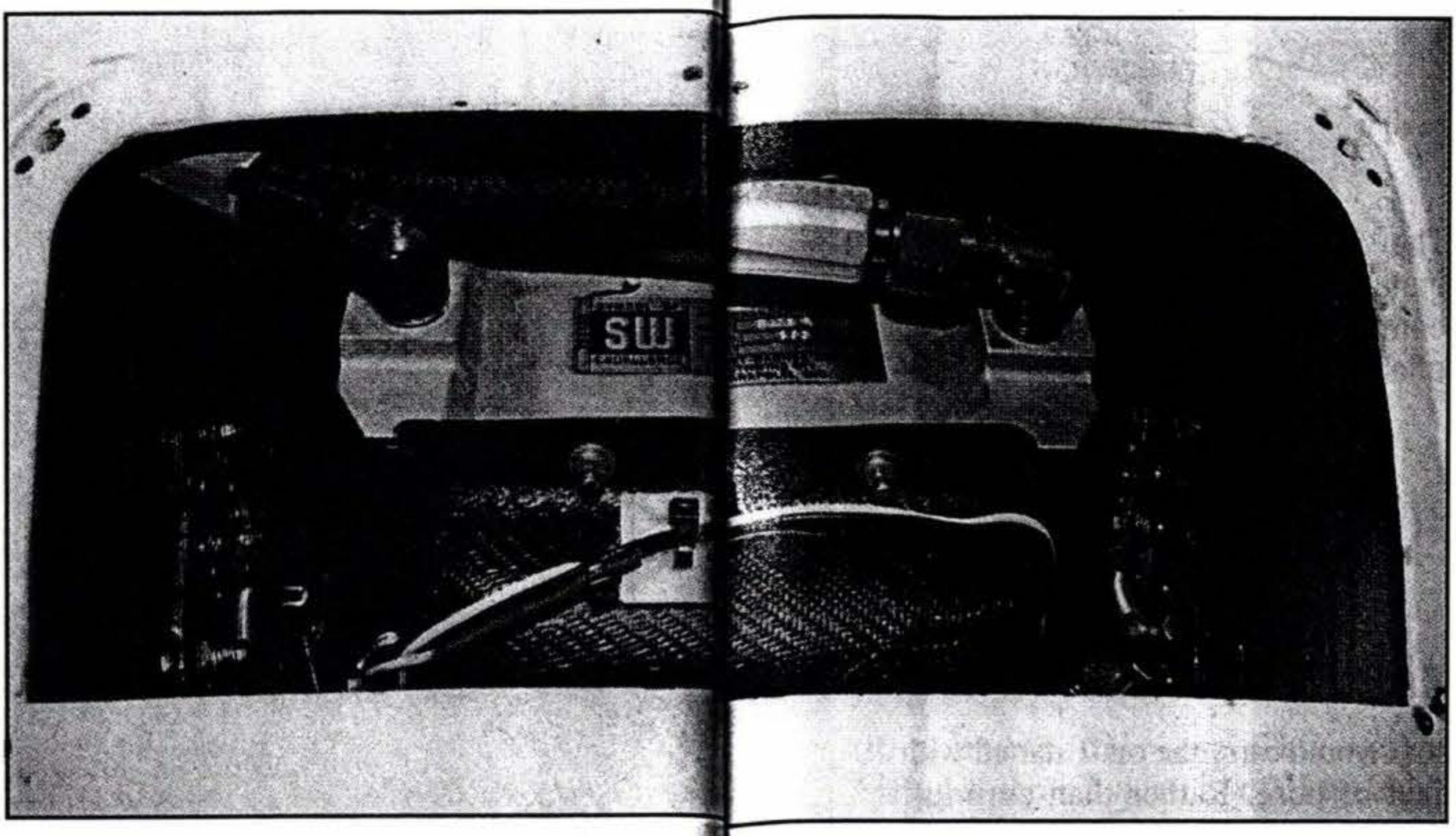


Author John McAvoy designed and built a cockpit heating system for his Long EZ.

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

Hunting and Gathering

After spending several hours in the local junkyard, I found a blower motor from a 1982 VW Rabbit that would do the job. It was compact, light and powerful. The blower was under the hood in front of the windshield. I had to twist, turn, cuss and pry a little, but it came out



McAvoy's heating system uses a VW Rabbit's blower motor and fittings from Aircraft Spruce.

Heat

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without having to take the hood off. (Don't forget the ballast resistor, you'll need it for low speed.)

There wasn't a lot of engineering involved, just cutting to fit. I planned to tuck the blower 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 nosegear 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 onto my toes and also out through the top where it was hosed to the back seat to warm passengers' 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 plan would work.

Warming Up

One area not shown on the drawings was the requirement to seal off airflow 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 nosegear 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. Then I superglued the 2-inch foam on the end of the blower and carved the shape I needed for it to mate to the oil cooler. I used four to five layers of BID fiberglass everywhere, making sure to overlap onto the blower. This is how I would mount the adapter to the blower.

After curing, 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 using black RTV and rivets. The oil cooler was mounted to the adapter using Tinnerman nutplates.

The plenum box is made of several pieces of 0.050-inch 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 goes to the cockpit area. This helps serve as a temperature control.

I used two inexpensive air vent nozzles from Aircraft Spruce, one on each side. The air direction can be adjusted 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

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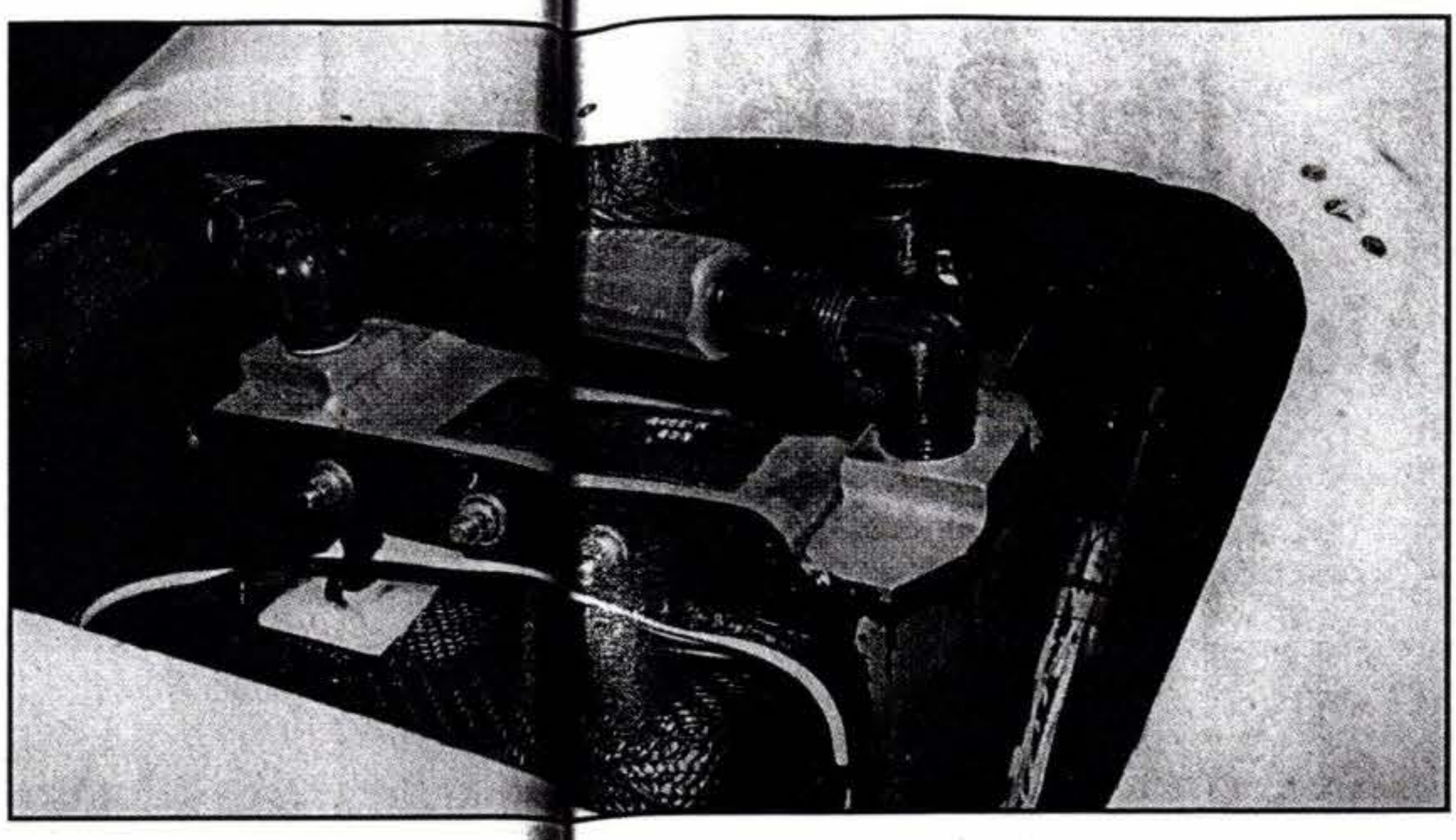

The installation is compact but effective.

that would carry the oil. I started with 30 feet 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 to the engine so that oil was first routed to the nose before it went through the main oil cooler. I get maximum heat from the heating system this way.

The blower wiring was simple. I used a three-position switch (high, low and off in the center position.) I mounted the low speed ballast resistor near the blower intake where it would get plenty of airflow. I did have to add a 10-amp circuit breaker to power the blower.

Operating Procedures

As suspected, air tends to leak in through the nosegear area rather than out. If I place the temperature control on full Overboard (plenum door fully open) and turn the blower OFF, air comes in through the nosegear openings, up past the plenum door, through the oil cooler and blower and into the cabin. The end result is that it starts getting warm in the cabin.

Through some experimentation, I've come up with the best operational procedures. In cold weather, I use the blower speed for main cabin heat control. I leave the push control in full Cabin position. In warm weather, I leave the push control in Cabin position. When I turn the blower OFF, no heat should be generated inside the cockpit.

In hot weather, if the oil temperature becomes excessive, I place the push control to Overboard and turn on the blower. This helps cool oil and dumps the heat overboard.

Warm Results

The entire installation added about 10 pounds to the nose. This weight includes about 1 quart of oil. I used one of the solid-side oil coolers that is able to withstand high pressures better than the finned-side coolers. I don't think there is a significant weight difference using a blower vs. ram air. By the time all the glass work and paint is complete, it should even out.

With the blower, I have heat while taxiing and holding at the runway, and when it's hot, I have oil cooling while 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 two weeks at 5 hours a day to install. A lot of that time was spent cutting cardboard and seeing what would fit in such a small area. I lost a day just looking around the auto junkyard for airplane parts.

Some disadvantages of the installation are no fresh air through the heater (but I can open the air vent if I need to); getting to the gear retract mechanism for maintenance will be a lot more difficult now; there will always be a quart of oil that doesn't come out during oil changes; and I've added 10 pounds of weight to the nose.

This exchanger should be able to produce temperature differentials of 40-60°F. If -10°F ram air is used as the source, I expect to see a 30-50°F air temp at the heater output. However, by recirculating cabin air, the intake air is constantly increasing in temperature. A 40°F intake temperature will easily result in an 80°-100°F heater outlet temperature—even at 18,000 feet. **KP**

FOR MORE INFORMATION on this heating system, contact John McAvoy, 79 Polaris Ct., Milpitas, CA 95035; 408/263-1684.