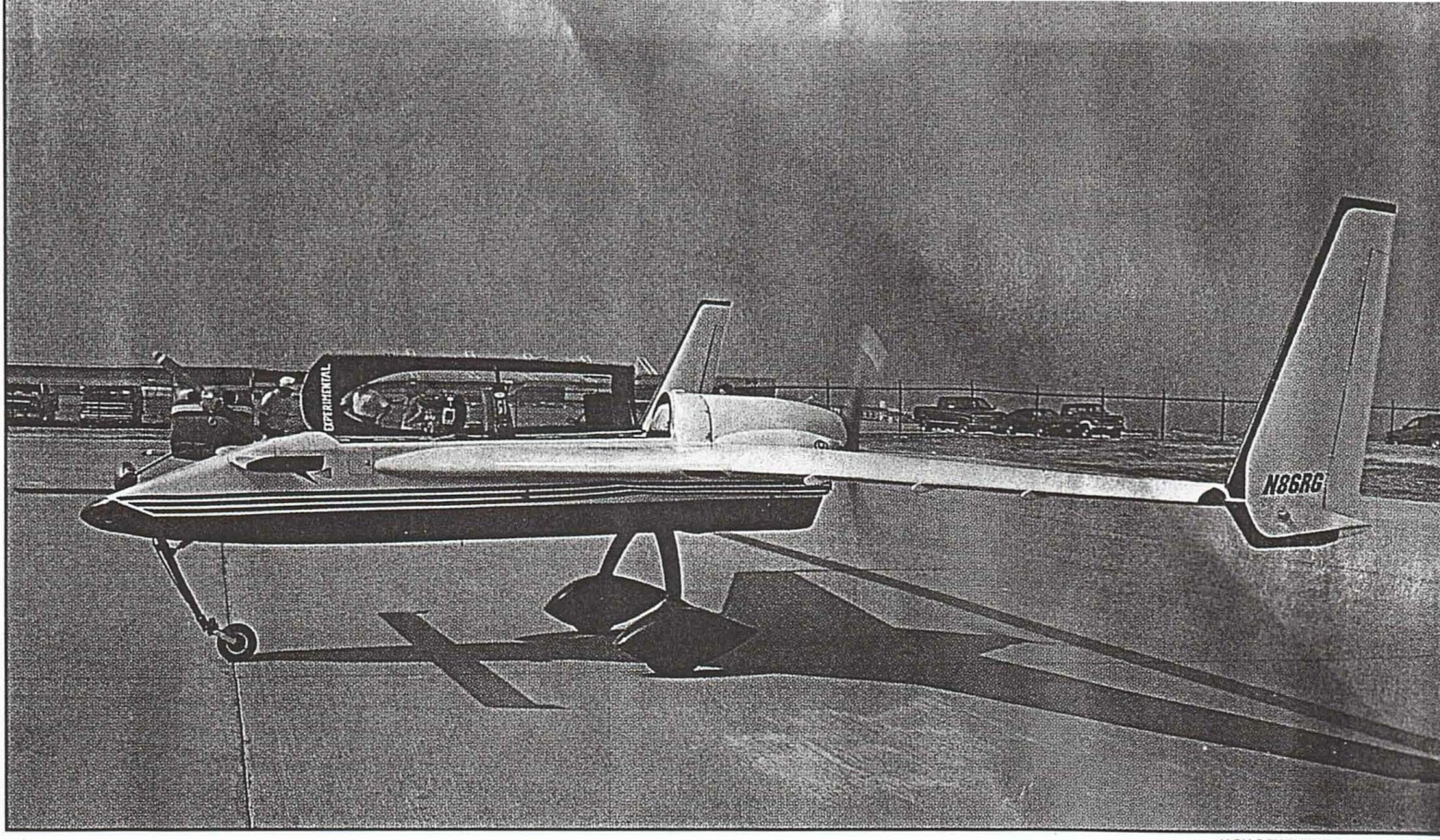


JACK COX PHOTOS

A LONG-EZ THAT GOES HM-M-M-M

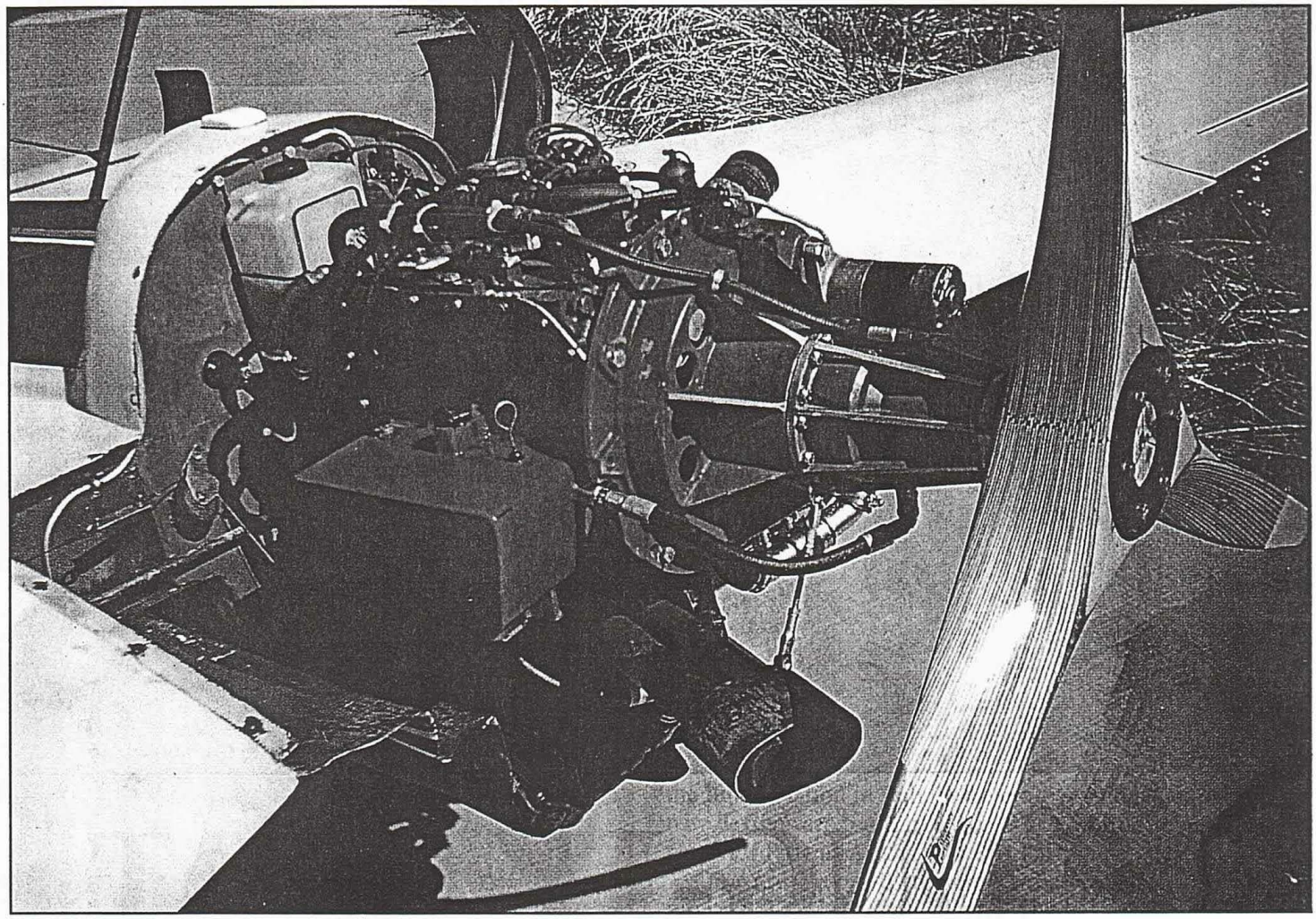
Power by Mazda

BY DICK CAVIN

If you were one of the fortunate ones who attended Oshkosh '95 you probably noticed there were two full lines of auto engine powered homebuilts on display. If you saw the extra heat around the area, it was probably the result of imaginations being set afire again.

One of those who caused blood to pound in EAAers veins again was a Mazda 13B powered Long-EZ by a young Delta Airlines mechanic, Ron Gowan of Roanoke, TX.

It was a decade or so back when news of the NSU Wankel rotary reached the U.S. and excited EAAers with the prospect of a turbine-like en-



gine at salvage yard prices.

Cold water was thrown on that dream when Cessna terminated a year long test of a Curtiss Wright rotary in a C-182, supposedly because of excessive fuel burn, among other objections.

In that era, long time EAAer Harold Gallatin showed up at the annual Convention with a single spool Wankel rotary mounted on the back of a pickup, running it often to the delight of spectators.

For reasons not totally clear, there was an almost total dearth of news about the rotary engine in homebuilts for over a decade. Mazda did have problems with early engines, but since 1986 when they put the present 13B engine in the RX-7 (a $30,000 luxury sport), it's been a jewel of an engine.

In 1978 Jim Thompson of Tucson, AZ put an earlier Mazda 12A in a BD-4, with only so-so results. A few years ago I did an article on a single spool Mazda in an ultralight that Gene Eubanks of McKinney, TX built and flew, but this didn't evoke a great groundswell of interest in the rotary powerplant at that time.

Ron Gowan had bought Long-EZ plans in 1985 and in two years he was flying it with a used Lyc. O-235 (with 430 hours since new). After he had put 300 hours on it, it got sick enough to need a top overhaul. The bill was $2200! After another 400 hours it shelled out on him and this time he had had enough.

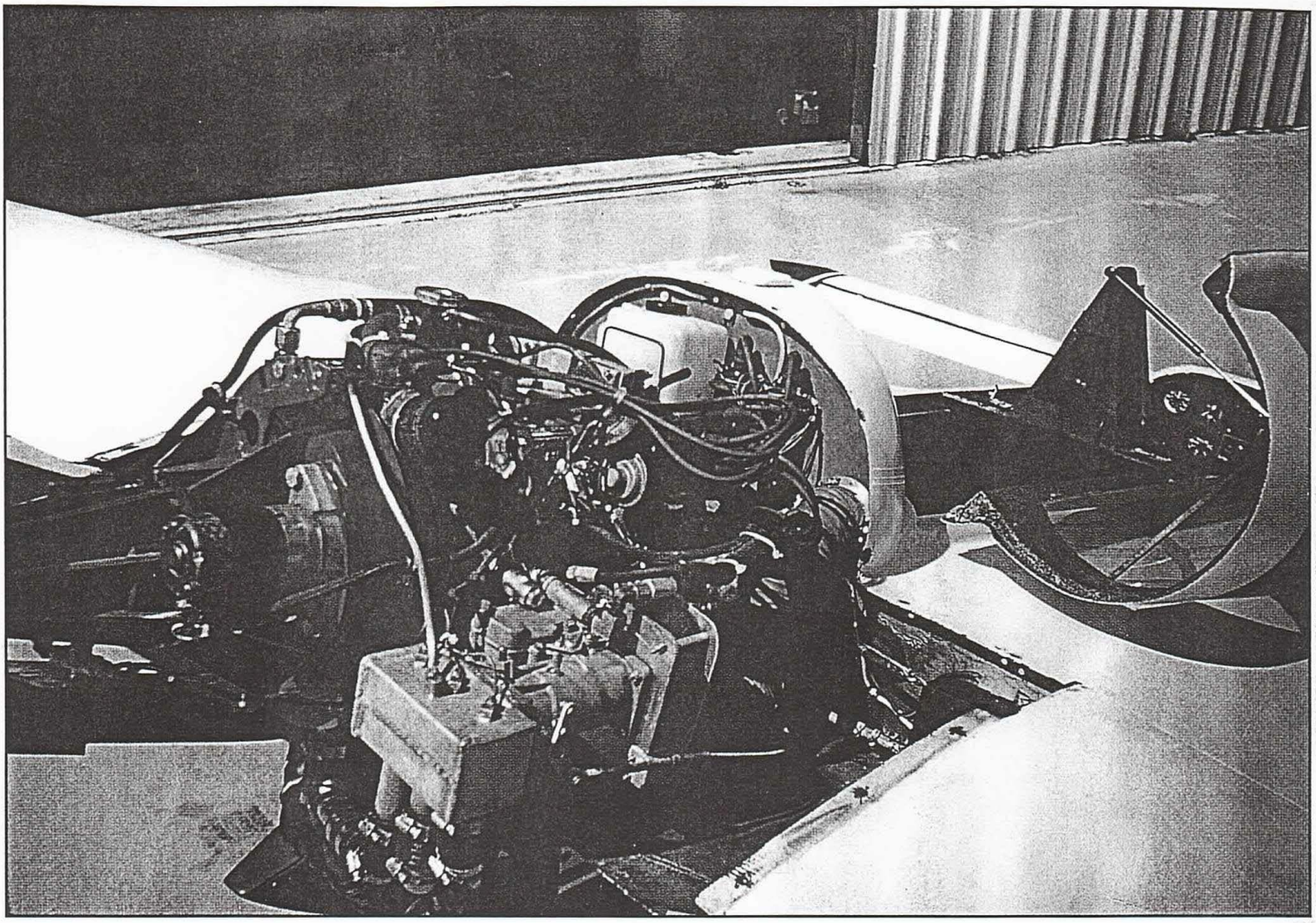
In the meantime, Ron had started on still another project, a non-sanforized version of Rutan's Defiant twin pusher, to be powered by two Mazda 13B rotaries. This one would have to stay in limbo awhile, as he would have to rob it of one of its two powerplants.

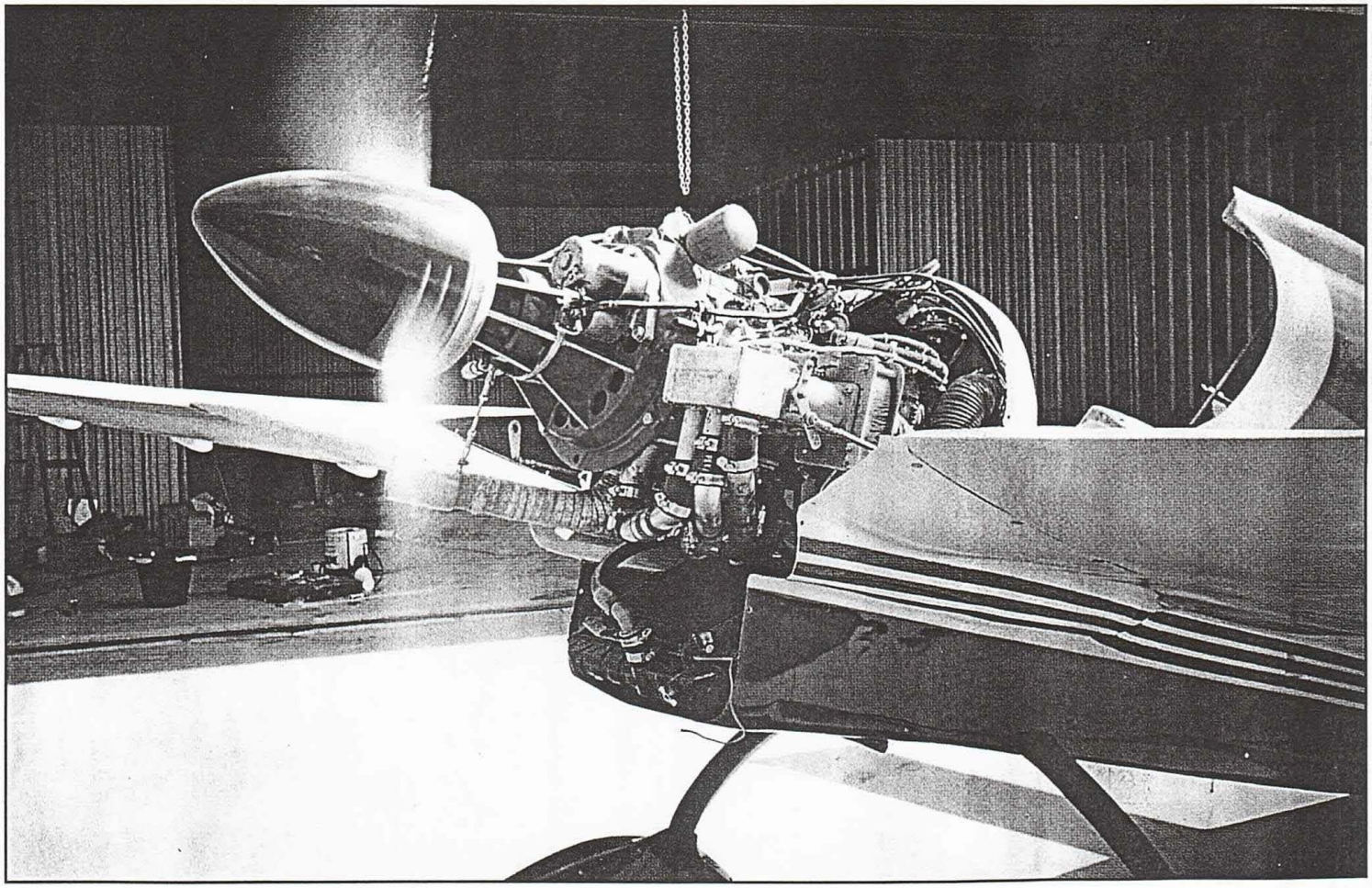
Ron had bought two Mazda 13Bs, an '87 and an '89, for $1000 each, so he chose the best of the litter—the '89—with only 13,000 miles on it. His exceptional mechanical talents started to show up here. A new cowling and motor mount were obviously necessary, so he removed the old firewall and made a dummy from it.

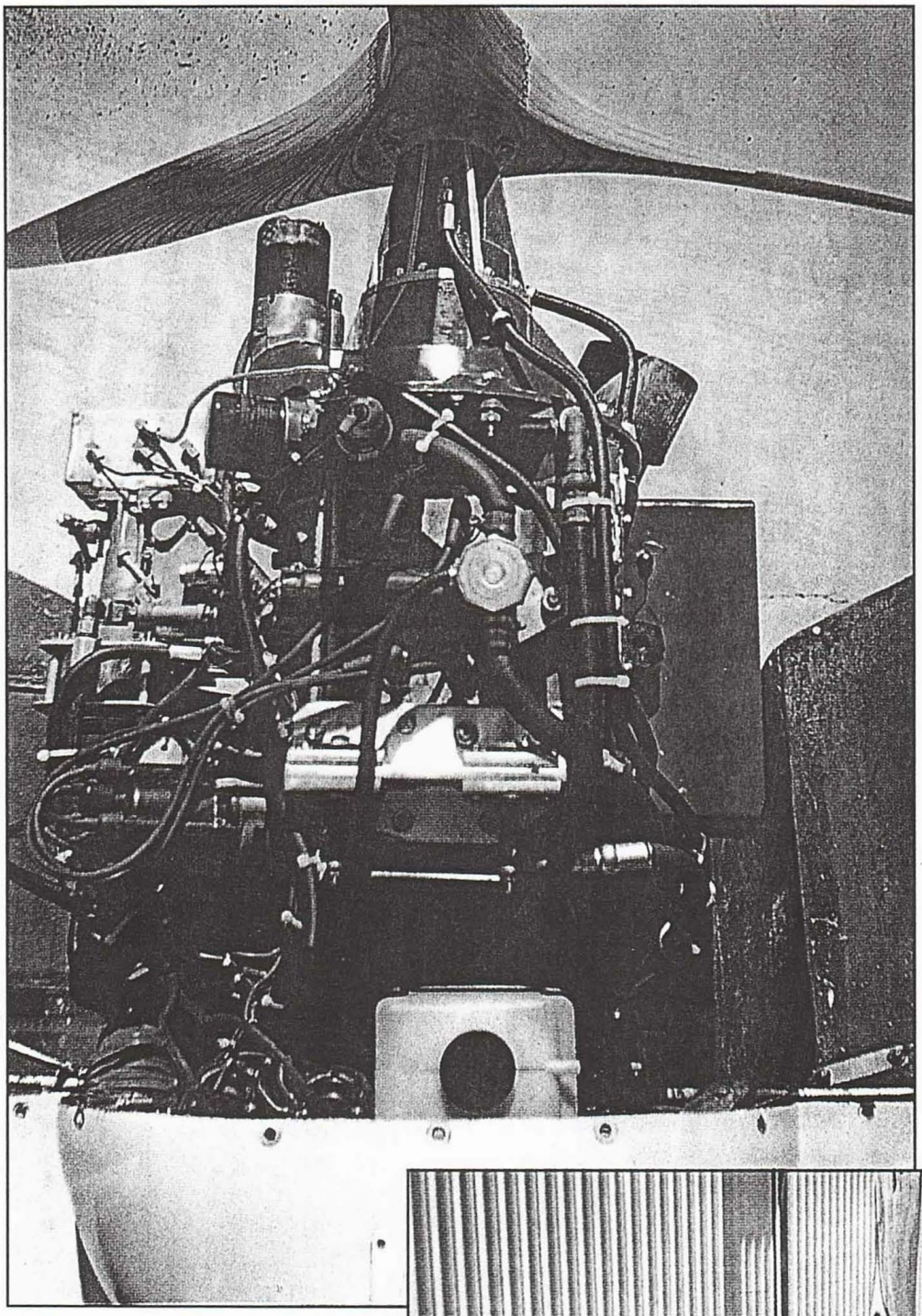
After rechecking his CG figures, he laid the firewall on the bench, hanging the engine above it from the ceiling on a hoist. Using 5/8" PVC pipe and a hot glue gun he made a dummy engine mount (slick, huh?). He then fabricated a welding jig around the PVC mount and welded up the mount from 5/8" x .049 4130 tubing, using Rutan's engine mount plans as a guide.

Paring off every excess ounce of weight, he chose to use a Geo Metro alternator, saving 3 lbs. over the original (and some space). The Metro alternator fit like it was made for it. For the carburetor he chose the Marvel Schebler HA-6 aircraft carb (cost $200 vs $1200 for a fuel injector), a side draft design, again saving a little weight and giving him a high CFM flow. He built up an aluminum plenum chamber 3" x 3" x 6" downstream from the carb, with an air filter upstream of the carb, with a ram air valve further upstream on the firewall.

His ingenuity again showed as he designed and fabricated his intake manifold, which runs about 24" from the plenum chamber to the intake ports. To eliminate expensive bendings he used parts of six 1-1/2" steel sink drainage pipes, held together with 1-1/2" radiator hose and hose clamps.





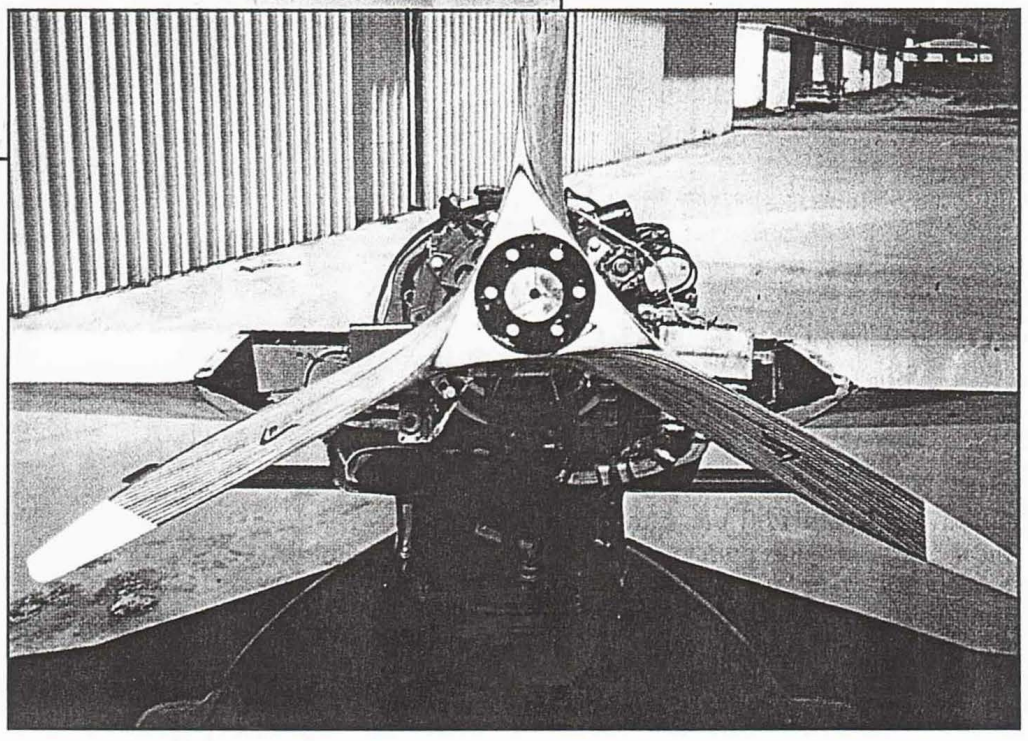


max static rpm increased from 5600 to 5800!

Ron used the stock 1985 Mazda vacuum advance distributor with point ignition system, mounting the two ignition coils vertically on the firewall. The 4 spark plugs are stock Mazda, look like aircraft plugs, and are expensive. Ron said, "So I can sleep better," he installed two small batteries in the nose. Both are independent and are charged through an isolator circuit, which he purchased at an RV shop. This guarantees electrical reliability, even though the alternator might fail. The electrical system also operates the two facet electric fuel pumps, one of which is a backup, since there is no engine driven fuel pump.

For additional reliability Ron purchased a special pulley from Racing Beat in California, which is 3/4" smaller in diameter than the stock pulley, which drives both the water pump and the alternator, reducing accessories rpm by 50%. Two separate belts are used, so that if the first belt (driving the water pump and alternator) should break, the second belt drives the water pump only.

For the cooling system Ron uses a Honda Civic radiator and a J.C. Whitney oil radiator mounted underneath the engine in a tandem arrangement, tightly sealed in a plenum chamber. Intake cooling air is via a manually controlled movable



From the exhaust ports to the pusher prop in the Long-EZ is rather short and he designed and fabricated his own of stainless steel 2-1/2" dia. tubing. His first engine testing showed even idle rpm exhaust noise was . . . well, fierce, unacceptable. It definitely needed a muffler of some sort. Ron plugged the ends of the pipes and drilled a series of 1/2" dia. holes several inches back. He then built a shroud around the pipe, with about a 1/2" gap between it and the pipe. Not only was the noise now well within the acceptable range, but surprisingly the

door on a belly mounted NACA scoop. Both radiators are set at about a 45° angle to the firewall to face incoming air squarely. There is also another small radiator in the nose, connected to the engine via a 5/8" aluminum line. This radiator also doubles as a cabin heater in cold weather.

Ron chose not to use a thermostat, knowing that if the $5 thermostat fails in the closed position it could be a mighty expensive lesson. A plastic coolant overflow bottle is mounted on the upper firewall. The system is filled with 5 quarts of standard 50/30 coolant mix.

At cruise the coolant runs at 13 lbs. of pressure with coolant temperature varying with OAT. On a 100° day the system can reach 200-210°F at extended full power down low, but on a cold day he can fly at full power down low and not exceed 175°F. The NACA dust and radiator position form an inlet diffuser somewhat like the P-51s.

Ron formerly used an auxiliary cooling fan for ground cooling, but it quit after some 40 hours of running, possibly because it was windmilling too fast. Right now ground cooling is pretty poor without it, especially after a low level flight on a hot day, but he's working on that problem.

The Mazda 13B installation has been relatively trouble free, except for a nuisance type oil leak around the gear box seal. He cured that by going to a double edge seal around the Ross Aero bell housing adapter and venting the oil tank into the intake manifold. No more leaks.

In his early testing phase he was using a two-blade prop. At 1500' above MSL he was indicating 190 mph, turning 6200 rpm. He now has a 3-bladed Performance prop and he can now indicate 190 mph turning only 5900 rpm. He says it is not only quieter but also nearly turbine smooth.

He said that cruising at 12,500 ft. and turning 5500 rpm his IAS was 160 mph. Fuel burn at that power setting is about 8.5 gal/hr., which is quite close to a 160 hp Lycoming's. He can use just about any gasoline, aviation or auto grade, with very little observable difference.

Ron's Long-EZ with its original O-235 weighed 825 lbs. empty, with no wheel pants, no starter, only minimum equipment, etc. The empty weight with the Mazda is 975 lbs., which includes wheel pants, starter, heavier paint, comparing favorably with other Long-EZs with Lycoming O-320 power.

Ron says his total cost for the converted Mazda 13B engine, gear box, and oil tank is under $4500. His experience points the way for dependable, reasonably priced powerplants for a variety of aircraft now and in the future.

His next experiment with the 13B will be to turbocharge the engine. At the moment he has over 175 hours on the Mazda 13B, all nearly trouble free hours, he hastens to add. While the economics of an automotive type engine was the original stimulus for the 13B installation, he now is high on the reliability, smoothness and ruggedness of the Mazda. And, too, he always has strong kudos for Ross Aero's staff for their fine reduction drive and on-target advice.

So keep a sharp ear cocked at your next fly-in. Quite likely you'll be hearing more and more sounds that hum-m-m.

(Want more information on Ron's installations? Contact him at 316 Darrell Rd., Roanoke, TX 76262, 817/491-4646.) ◆