ENGINUITY PROMISING POWERPLANTS From AMW to Zoche and every interesting design in between

BY BUZ MARTEN

ith the acceptance by the Federal Aviation Adminis-tration of new, simplified certification requirements for Primary and Very Light Aircraft categories, a number of manufacturers are considering the production of new-design lightplanes for an eager, growing, A lot of attention now focuses





ultralights worldwide.

Measuring less than $2 \times 2 \times 1.5$ feet with accessories and integral reduction drive, it's about half the volume and weight of a Lycoming O-235, while producing virtually the same horsepower: 115 at sea level for three minutes. Moreover, it is modestly boosted by a small turbocharger with automatic wastegate, and it can deliver 100 hp, continuously, all the way up to about 16,500 feet.

Using a combination of liquid cooling for the cylinder heads and air and oil cooling for the rest of the engine, the Rotax 914 apparently needs no fuel enrichment cooling. Its specific fuel consumption is listed at .4 pound

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Automotive engines like the Toyota Lexus V-8 may hold promise for aviation applications.

One Dyna-Cam test engine has amassed nearly 4,000 hours and is still showing full compression.

Colorado Springs, Colorado 80904; telephone 719/632-4959.

Dyna-Cam

vain for a large, mainstream licensee. While this design has languished per horsepower per hour, which translates to cruise consumption under 5 somewhat in recent years, suffering Recently, it was resurrected and from the universal slump in aviation installed in a Piper Arrow in which it gallons per hour. The 914's projected price tag of has completed more than two years of capital investment, many feel it never-\$10,000 is little more than half that of proving flights. He centrit monsive metto theless has too many good features to The Dyna-Cam's 16-inch diameter be ignored much longer. Its six douthe normally aspirated O-235, so it (excluding radiator), 300-pound ble-acting pistons and 12 combustion could power some very capable future chambers are arrayed around and parweight, low specific fuel consumption two-seaters. Several hundred copies of the 80-hp Model 912-its non-turbo allel to the propeller shaft. A two-(.4 pound/horsepower/hour), and vircousin-have already been delivered tually vibration-free running cap the lobed sinusoidally ground drive cam impressive list of attributes that would on the shaft absorbs power via rollers to reportedly happy customers. in the pistons to provide a four-stroke seem to add up to a forward techno-For information, contact: LEAF; cycle with each revolution. With a logical move. Bold capitalists are Incorporated, 331 South 14th Street,

parts count half that of a conventional four-stroke engine, the liquid-cooled Dyna-Cam generates 210 hp at 2,000 rpm and a whopping 650 foot-pounds of torque at 1,200 rpm. One test engine has amassed nearly 4,000 hours and is still showing full compression and excellent running characteristics.

Originally conceived by the late Dr. Karl Herrmann and refined by the father/son team of Ed and Dennis Palmer, the engine was fully certified by the Civil Aeronautics Administration (forerunner of the FAA) for aircraft and helicopters in 1960.

The engine then sat on the shelf for 25 years while the owners looked in

requested to contact Dennis Palmer (he's making a public stock offering) at 105 North Irena, Number 1, Redondo Beach, California 90277; telephone 10/543-2917.

Canadian Airmotive "CAM 100" A large amount of market research and the detailed preparation of a business plan preceded the development and introduction of this engine, which targets the niche once occupied by the Continental O-200. Though uncertified at present, it has completed the Federal Aviation Regulations Part 22 endurance test with no problems and has completed several hundred hours of flight in 11 aircraft.

With about the same installed weight as the O-200, it has less frontal area and has demonstrated substantial improvements in smoothness, quietness, and economics. Cruise fuel burn is said to be about 3 gph (30 percent better than the O-200).

Based upon the extremely successful and reliable Canadian-built (from 1984 to 1987) Honda Civic engine of 1,488-cubic-centimeter displacement, it's a remanufactured, aluminum, four-cylinder in-line with overhead cam and 12-valve head, rated (conservatively) at 100 hp. Modifications for raft use include: a re-profiled camshaft, an easily inspected open cog-belt reduction drive (2,500 maximum propeller rpm), dual electronic ignition, slightly increased operating clearances, carburetor heat, and a lightweight, direct-drive alternator. Engine and drive carry initial TBOs of 700 and 1,000 hours respectively, which are expected to at least double with field experience.



The time may have come for the long-languishing Dyna-Cam (right and below) if funding can be found.

plied by Geschwender's well-proven Hy-Vo chain drive, the propeller is twisted at 1,650 rpm with a force of 1,790 foot-pounds. Other features include: lower cost both to buy and to rebuild, efficiency, and far lower



take maximum loads in stride.

Ag operators, warbirdreplica builders, and other power-hungry individuals can contact Geschwender at 6010 Thornton Drive, Number 1118, Lincoln, Nebraska 68512; telephone 402/761-2322, 423-7942.

Mosler

Mosler Motors, Incorporated, produces a respected line of two- and four-cylinder engines for ultralights and small kitplanes like the Avid Flyer and Kitfox. Like its European competitor, Limbach, Mosler engines share little with their VW progenitor. All reciprocating and rotating parts are specially manufactured, and the cases are extensively

reworked to, among other things, accept a much beefier crank with a double-size drive-end bearing.

Ranging from 40 to 82 hp, all 1993 models develop rated power at 3,200 rpm with a 3,400-rpm redline and the advantages of direct drive. Mosler claims its engines provide more thrust than similarly powered, geared competition. Complete dominance of the 1991 and 1992 European Ultralight Championships by Moslers seems to bear this out. Contact: Mosler Motors, Incorporated, 140 Ashwood Road, Hendersonville, North Carolina 28739; telephone 704/692-7713.



The big Geschwender Ford V-8 could replace the venerable Pratt & Whitney R1340.

nology, this compact, 242-cubic-inch jewel makes extensive use of lightweight alloys in the block, the twincam heads, and many other parts even down to the valve lifters. Its five main bearings are located with no less than six bolts each to produce an exceptionally strong and rigid lower end. Using an efficient 10.1:1 compression ratio and four inclined valves per cylinder, it makes 250 hp and 260 foot-pounds of torque without breaking a sweat.

Toyota

This giant automaker has been making tentative moves into general aviation for some time, having acquired some fixed-base operations in Japan and one in Long Beach, California, and, among other projects, testing an aircraft variant of the Lexus engine.

Secrecy is near total. Fingers point to Mojave and Scaled Composites, with neither confirmation nor denial. We do know for sure that a pair of Levus V-8s have flown Mosler claims its engines provide more thrust than similarly powered, geared competition.

> Mosler's diminutive engines are widely used in the ultralight and kitplane arenas.



For further details, you might try checking with the CIA.

No-Name V-8

This very promising engine, which is now flying and performing superbly, has, as yet, no manufacturer of record. Rather, it's a product of the "performance aftermarket industry"-hot-rodders, to which has been added appropriate aircraft technology. Based on General Motors' Chevrolet "smallblock" V-8 engine, it has few-if any-Goodwrench parts. Its closest relative is a sprint-car engine with modified, beefed-up aluminum block and heads, super-





blade material).

With fuel injection and normal aspiration, the engine routinely makes more than 900 hp at 9,000-plus rpm with excellent reliability (for a race engine).

To convert this screaming firebreather to an aircraft engine, the cam is re-profiled to produce an appropriate power curve, and the maximum horsepower is derated to about 450 at 4,500 rpm.

This allows the engine to operate in a very lightly stressed regime at all times, suggesting a high time between engine rebuilds, which can be done for about the price of one new Lycoming cylinder.

The propeller speed reduction unit (PSRU) is manufactured by Universal Engineering Company in Winamac, Indiana. It's an enclosed, pressureoiled, link-plate chain of the Hy-Vo type, which is well proven over decades of use in heavy front-drive vehicles and industrial uses, such as rock-crushing mills, where they operate for thousands of hours without attention. There is provision for a prop governor.





Zoche's unique radial diesels may soon be certified in Germany, with U.S. approval expected to follow:

The No-Name V-8 package is smaller and

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weighs less than an engine with 100 fewer horsepower.

Universal also markets dual-plug cylinder heads of aluminum. True dual ignition is achieved either with a single magneto in the standard distributor hole plus an electronic cranktrigger ignition, or with dual cranktriggers (which requires a backup battery to achieve full duality).

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The complete power packageincluding radiator-is smaller and weighs a bit less than the Lycoming installation in a Piper Mirage, on which it has a 100-hp edge. Yet the specific fuel consumption is so much better-about .37 pound/horsepower/hour-that the total fuel burn is about the same. The engine can reportedly be produced for about onethird the cost of the Lycoming, so you could picture an unpressurized, V-8 version of the Malibu selling for maybe \$100,000 less, offering the same cruise numbers at Warrior altitudes. Or you could keep the pressurization, add modest, part-time supercharging, and end up having Cheyenne speeds in the flight levels, burning about 20 gph. Gerry Greth of Concord, California,

to sign up for your complete registration package and take advantage of valuable discounts by registering in advance.

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has installed an Ellison fuel-injected version of this engine in his Cirrus VK30 in which it has performed to expectations so far. (The aircraft is currently down for a wing rebuild following a gear-collapse incident.)

Ray Ward of Houston, Texas, has flown his Triaviathon-winning BD-4 about 140 hours with a Holly-carbureted version installed. Preliminary data gathered in the boxy, fixed-gear craft show a 4,000-fpm climb rate, 210-knot cruise, and 20 miles per gallon at 220 miles per hour.

Certification has been explored, with initial encouragement from the FAA and overseas agencies. Production awaits a producer and the market.

Zoche Aero-Diesels While other new designs rely upon complex electronic controls to achieve their goals of performance and reliability, Michael Zoche's unique, patented, one- or two-row, four- or eight-cylinder radial diesels are entirely mechanical, displacing not a single electron to make impressive power for their size and weight. The four-cylinder, 150-hp ZO O1A, running on Jet A or diesel fuel, displaces just 163 cubic inches and weighs 185 pounds complete. By using a two-stroke cycle scavenged by a gear-driven supercharger and a turbocharger, it acts like a four-stroke with twice the displacement, making rated power at a propeller-compatible 2,500 rpm. With full pressure, all-attitude crankcase oiling, a low 1,540-fpm piston speed, and turbine inlet temperatures always under 1,000 degrees Fahrenheit, Zoche's claim of a 2,000hour TBO is believable. The 300-hp ZO O2A adds a second row of cylinders to double the engine's displacement and horsepower, and it weighs in at just 259 pounds with all accessories, including prop governor, starter, alternator, and fuel and oil filters. Maximum diameter for both engines is 24.7 inches. That, with excellent fuel specifics (.36 pound/ horsepower/hour) and low heat rejection, promises tight, sleek, and efficient installations. And with a cylinder

Contact Zoche for more information at: Keferstrasse 13, 8000 Munchen 40, Germany; telephone 49/8934 45 91, fax 49/8934 24 51.

Other designs bearing mention include the gas/oil two-strokes made by AMW, Incorporated, in Spartanburg, South Carolina, and by Rotax. They are both good, uncomplicated powerplants, offering small size and excellent power for weight. The Rotaxes are well proven (some are certified), and interest in the AMWs is strong among homebuilders. But many airmen agree that two drawbacks separate two-strokes from the pack. Put simply, they burn a lot of fuel (30 to 50 percent more than a comparable fourstroke), and that fuel must be blended with oil—daunting prospects for the serious cross-country flier.

True aviation hardware junkies have been living in lean times for a couple of decades. Finally, the burning of a lot of midnight oil by a new breed of pioneers is putting a glow on the horizon that may signal a new day. Stay tuned.



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