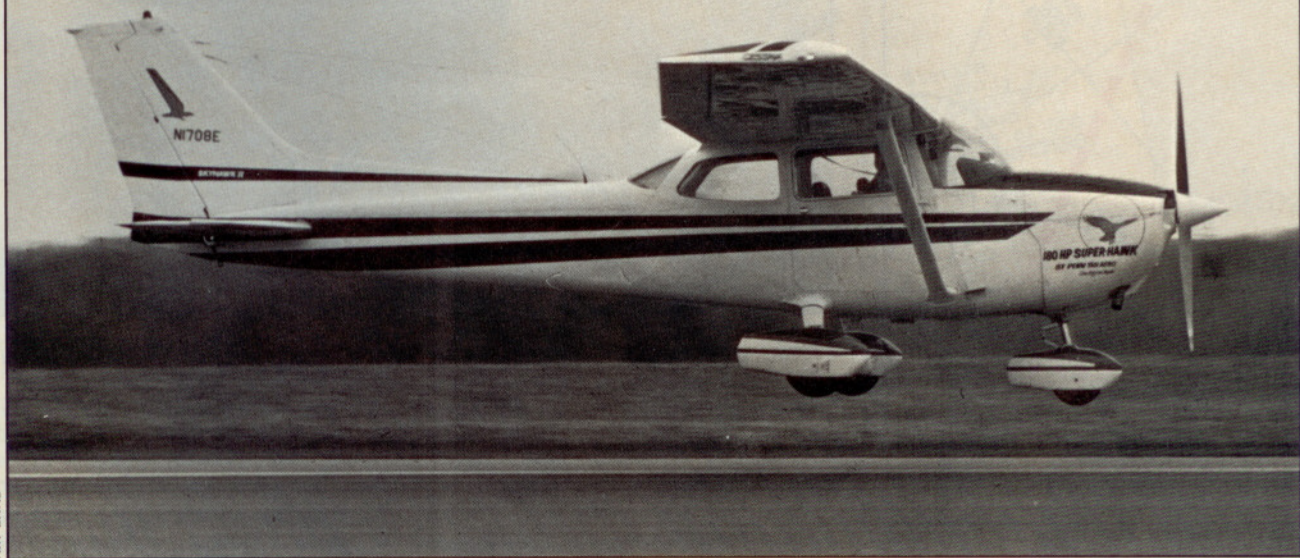


## ALTERNATIVES

# SUPERHAWK



ART DAVIS

*A little R&R does wonders for tired and broken Skyhawks. Especially when it means, "remove and replace."*

BY MARK M. LACAGNINA

Cessna's Skyhawk, the undisputed champion among four-seat singles, was delivered a vicious one-two punch a few years ago that nearly knocked it out of the ring. The first blow came from petroleum refiners, who decided to concentrate on a single grade of aviation gasoline: 100-octane low-lead. Despite the low-lead designation, the fuel contained more tetraethyl lead than the Skyhawk's 150-hp Lycoming O-320-E2D engine could handle. The engine, designed to run on 80-octane avgas, had serious problems with spark-plug fouling and valve erosion.

The second, and nearly final blow, came inadvertently from Cessna, which decided to solve the lead problem by switching to a new engine. It was a good idea that turned bad. The engine that Lycoming designed to wean the Skyhawk on 100LL proved to be troublesome from the start. The

trouble arose from inadequate lubrication of the valve train in the new 160-hp O-320-H2AD engine, especially during operation in cold weather. In addition, oil-pump and accessory drives broke frequently.

After several airworthiness directives, and after working with Lycoming to develop various fixes, Cessna discontinued the H-engine in 1981.

By then, however, nearly 6,000 Skyhawks had been produced with the troublesome O-320-H2AD engine from 1977 through 1980.

Many people are not convinced that the various fixes have made the H-engine's problems go away. A few private tweekers beat Cessna to the realization that what owners of H-engine Skyhawks needed was not more fixes but a new engine.

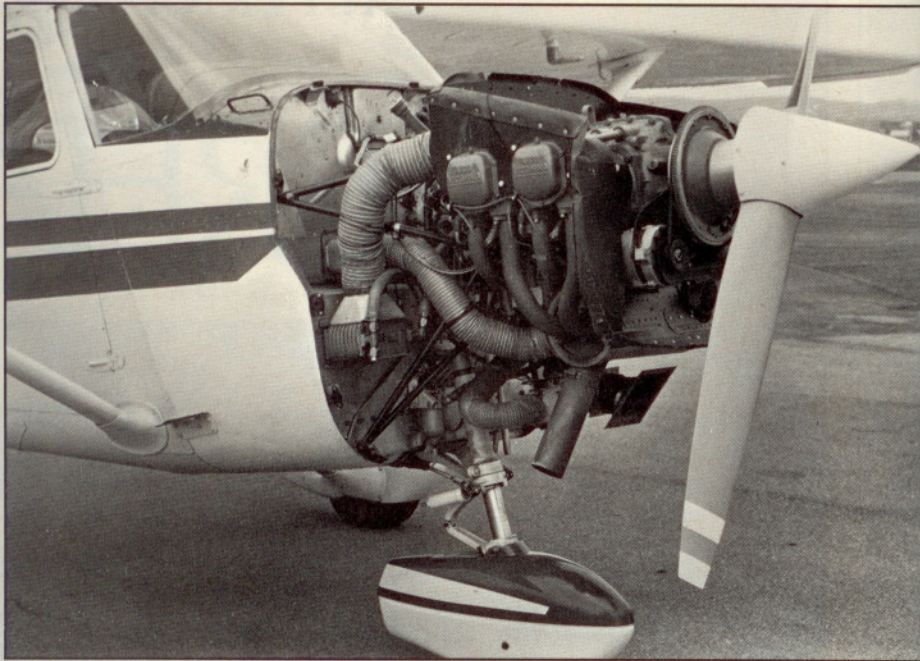
One was Daryl Middlebrook, president of Penn Yan Aero, a small shop

in the Finger Lakes region of New York that has been working on aircraft engines for nearly 40 years.

Middlebrook initially considered applying for a supplemental type certificate (STC) to replace the H-engine with a different 160-hp Lycoming O-320. He decided, however, that a 180-hp O-360 was a better choice. "The certification costs would have been the same, no matter which engine I chose," he said. "I felt the O-360 would provide a boost in performance without adding much weight."

He decided, also, to keep a fixed-pitch propeller on the bigger engine, rather than include a constant-speed prop in the conversion. The performance gains did not justify the extra cost, complexity and weight that would have been involved. Penn Yan test-flew a variety of propeller designs before settling upon a Sensenich prop for

# SUPERHAWK



*Penn Yan Aero's Superhawk conversion includes a 180-hp Lycoming O-360 engine. Standard Skyhawk cowling fits without alteration over the larger engine, but the conversion does require modification of the carburetor air intake system and exhaust-pipe extensions.*

a landplane conversion and a larger-diameter McCauley for a floatplane.

Penn Yan Aero received an STC for its Superhawk conversion last November. The STC, which originally included only N-model Skyhawks—those with the troublesome H-engine—has been expanded to include all Lycoming-powered Skyhawks. (The 150-hp O-320-E2D was used from 1968 through 1976; a 160-hp O-320-D2J replaced the H-engine in 1981. Therefore, the only Skyhawks not included in the Superhawk STC are those that were built from 1955 through 1967 with 145-hp Continental O-300 engines.)

The company claims a Superhawk can cruise at 150 mph (130 knots) at 75 percent power and 7,000 feet. This is nine knots faster than both a 160-hp Skyhawk and Cessna's new 180-hp fixed-gear Cutlass.

To see for ourselves just what the Superhawk could do, *Pilot* rented Penn Yan's certification airplane and demonstrator, N1708E, for four days. Flying lightly loaded at 75-percent power and 7,000 feet, I recorded 134 knots true airspeed. At 65 percent power and 12,000 feet, the Superhawk's true airspeed was about 130 knots. Fuel consumption at these power settings was 10 gph and 9.6 gph, respectively.

The most striking characteristic of Penn Yan's conversion, however, was the Superhawk's takeoff and climb performance. The airplane does get off the ground much more quickly than a Skyhawk. Penn Yan claims a takeoff ground roll of only 400 feet. A Skyhawk requires about 700 feet to get off the ground on a standard day.

*The Superhawk conversion also includes a fixed-pitch propeller; but it is a Sensenich, rather than standard Skyhawk-issue McCauley.*



I found 90 knots provided good visibility over the nose of the Superhawk and a good rate of climb: about 1,200 fpm, initially, and about 500 fpm climbing through 9,000 feet. At published airspeeds for best rate of climb (73 knots at sea level and 68 knots at 9,000 feet), a Skyhawk climbs at about 750 fpm, initially, and about 320 fpm at 9,000 feet.

The conversion, itself, is relatively simple. The Superhawk STC includes Lycoming O-360-A4A, -A4M and -A4N engines. The engines are almost identical. The A-engine has Bendix magnetoes; the M has Slick magnetoes; and the N has Slick magnetoes and an accessory pad for an air-conditioning system. The O-360 engines have a longer piston stroke than the O-320 and are about one inch wider. The Skyhawk's standard engine cowling can be used, without alteration, for the conversion; but some modifications are required to adapt the O-320's carburetor air box and the exhaust muffler to the new engine.

The conversion entails only two operational changes. Weight and balance data must be revised, since the larger engine adds about 16 pounds to the airplane's empty weight. In addition, the Skyhawk's certification for operation in the Utility Category—in which limited aerobatic maneuvers, such as spins and steep turns, are permitted—is revoked. A Superhawk is approved for operation only in the Normal Category—a circumstance described by Daryl Middlebrook as an alternative to "wading through another ton of FAA red tape."

There are two ways to accomplish the conversion. A Skyhawk owner can fly his airplane to Penn Yan Aero to have the work done, or he can purchase an STC kit from the company and give the job to his local shop. The former appears to be the better method for a number of reasons. Although the conversion is relatively simple, it does require some structural modifications, and Penn Yan Aero's employees have got these down to a science. The factory conversion also involves taking the Skyhawk's existing engine, no matter which one it is, in exchange. Owners who elect a field installation are faced with the difficult prospect of swapping dissimilar engines. And if it

is an H-engine, the owner may have to search far and wide to find a taker.

Penn Yan Aero charges \$13,000 to convert an N- or P-model Skyhawk—those produced with 160-hp Lycoming engines—into a Superhawk. The total cost for I- through M-models, with 150-hp Lycomings, is \$12,000. The company currently uses only factory-new Lycoming engines for the conversion. Remanufactured O-360s were used in the first few Superhawk conversions, but the company's supply of these engines has dried up.

Penn Yan Aero has converted five Skyhawks, so far, and has sold 24 STC kits for field conversions. Surprisingly, most of the kits were sold to owners of

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## SUPERHAWK

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H-engine Skyhawks. Middlebrook explained that some owners reported that they were able to sell their H-engines to homebuilt-aircraft enthusiasts and airboat builders.

A Superhawk STC kit costs \$1,595 and includes a new propeller, installation instructions, drawings and the hardware required for modification of the Skyhawk's carburetor air box and exhaust system. Penn Yan Aero estimates about 17 hours of labor are required to complete a field conversion.

A remanufactured O-360-A4A, -A4M or -A4N engine can be purchased from a Lycoming distributor for about \$11,230. The exchange rate for a dissimilar engine, such as an O-320-E or -D, is difficult to calculate. (Core credit for a straight exchange is about \$1,650.) But one thing is certain: Lycoming will not exchange an O-360 for an O-320-H2AD engine. An H-engine can be exchanged only for another H-engine.

More information on engine prices and availability can be obtained from Avco Lycoming, Williamsport Division, 652 Oliver Street, Williamsport, Pennsylvania 17701; 717/323-6181.

For more information on the Superhawk conversion, contact Penn Yan Aero, Penn Yan Airport, 2499 Bath Road, Penn Yan, New York 14527-9599; 315/536-2333. □