McCulloch J-2 in flight at Lake Havasu City, Ariz.

McCulloch J-2 Meets The Press

by DON DOWNIE
AOPA 188441

■■ Lake Havasu City, Ariz.—Flying McCulloch's new J-2 could be habit-forming. This mighty mite of a gyroplane handles just differently enough from a conventional airplane to make things interesting and even a little challenging. However, it's far different than asking a "fixed-wing" pilot to transition into a helicopter in a couple of hours.

FAA criteria call for 15 hours to put a gyroplane rating on your existing license and 40 hours if you're starting from "ground zero." This would be an interesting 15 hours, and by the time you'd begun to master the little devil, it would be much more fun than exasperation.

McCulloch's newly certificated J-2 represents three years and $3,000,000 worth of concentrated effort preceded by five years of design work by Drago K. "Gish" Jovanovich. It's a two-place, side-by-side gyroplane with a 180 h.p. Lycoming engine driving a wooden Sensenich pusher prop. The three metal blades of the rotating wing are 13 feet long and operate in "freewheeling" autorotation except for a pre-takeoff spin-up.

The only controls in the cockpit of the J-2 that you won't find in any fixed-wing aircraft are the rotor-engage handle on the firewall aft of the pilot's head (pusher engine) and the helicopter-like lever at the far left of the left seat. These controls are used to engage the three "V" belts that start the rotor spinning. It takes about 35 seconds for the blades to come up to the required 500 r.p.m. prior to takeoff with 1,850 r.p.m. showing on the engine tachometer. When you release the engage handle, the whole spin-up system disconnects, putting the blades in a 4° up angle and making them completely freewheeling. This vertical thrust lifts the J-2 so that only about 250 pounds remains on the tricycle landing gear at full gross weight of 1,550 pounds. For takeoff, apply full throttle and "rotate" at about 30 m.p.h. indicated. Ground roll is between 100 and 150 feet depending on wind and density altitude.

The spin-up handle has a helicopter-type twist-to-advance throttle that's linked with a conventional push-pull throttle mounted in the center of the cockpit.

Speed, weight and density altitude affect the rotor speed. In cruising configuration, about 105 m.p.h., at sea level, the rotor will stabilize at about 320 r.p.m. At 8,000 to 9,000 feet in a 2-G turn, the r.p.m. might go to 480. Unlike the helicopter, rotor speed is completely automatic and in no way critical to flight. The J-2's rotary wing does not stall, as such. In fact, we flew it backwards on two separate occasions. At less than zero airspeed, the reaction of the conventional rudders reverses and the rate-of-sink is some 1,500 f.p.m., but a little forward stick pressure puts you right back in business. At zero airspeed, power off, the rate-of-sink is 1,200 to 1,300 f.p.m. and at 60 m.p.h., the normal approach speed, you're dropping 850 to 900 f.p.m., power off.

New two-place gyroplane presents 'interesting and challenging' experience to fixed-wing pilot. Price tag of $19,950 placed on recently certificated vehicle

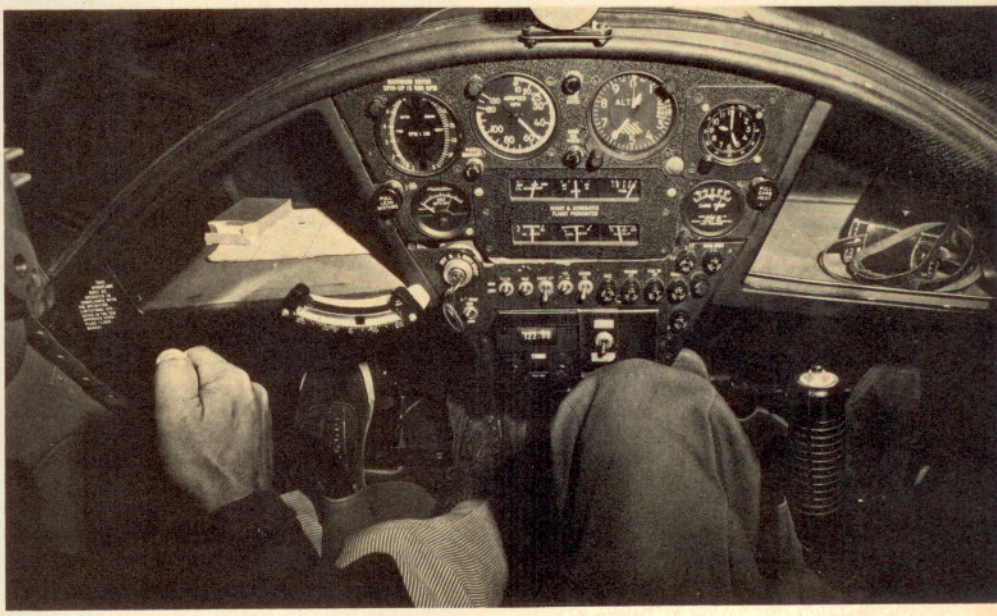
Power-off approaches are similar to an autorotation landing in a helicopter, since the J-2's rotor is always in autorotation except for the pre-takeoff spin-up.

We flew the jazzy J-2 with James Reichert (AOPA 212774), of Los Angeles, director of McCulloch's flight test program and the first man to fly this new model. Our rotary-winged bird was N2171M, the J-2 used for the FAA's certification program. After a walk-around inspection on the sunny ramp beside the Colorado River at Lake Havasu, we climbed into the side-by-side cockpit. There is considerably more leg-room inside than you'd imagine at first glance. Baggage goes under the seats and there were two glove compartments beside the center-mounted instrument panel. Plans are under way for a full panel of instruments that may take the place of these open compartments.

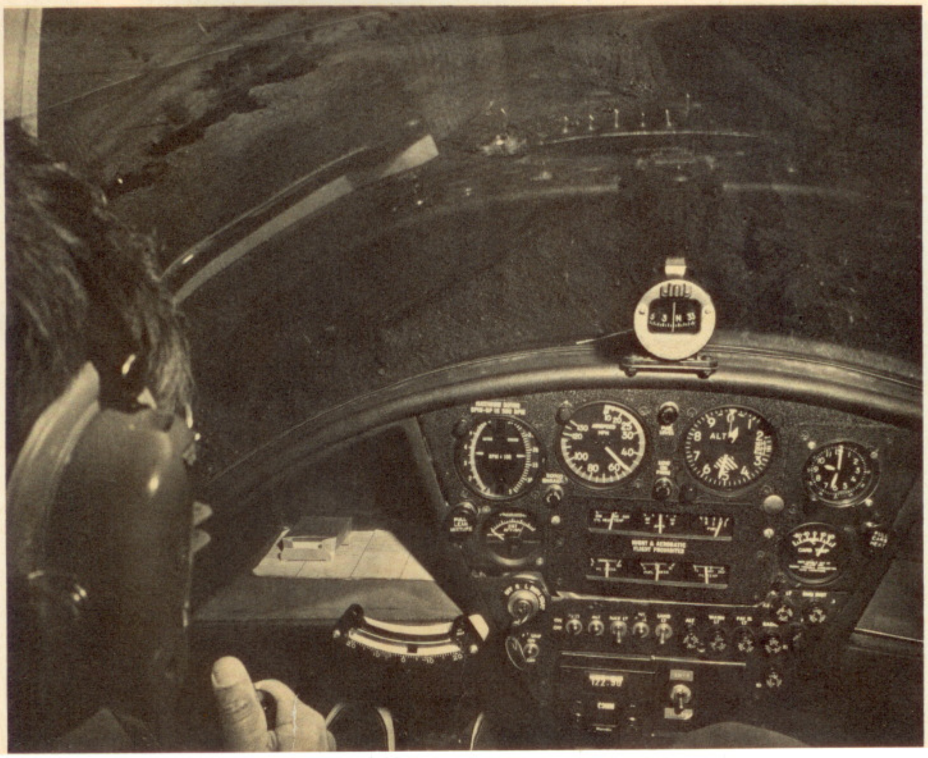
Reichert, an engineering graduate and veteran member of the Society of Experimental Test Pilots, went through the step-by-step checklist and then started the engine. "Just prior to spin-up," he explained, "you'll feel a little vibration and probably hear the 'V' belts squeal a little as the rotor blades begin to turn, but once the blades begin to pick up speed, the noise and vibration decrease."

We wore headsets and talked via intercom since there was considerable cabin noise from the nearness of the pusher engine and minimum soundproofing on the test flight model. However, the noise was no problem and the rotor blades were soon up to speed. Reichert released the brakes—left side only on this particular ship—and applied full power. As soon as the rotor spin-up was disengaged, you could feel the J-2 lift up almost on tip-toes even before we started to roll. As we passed 30 m.p.h., and less than 100 feet down the runway with a late afternoon breeze, the nose came up and we were flying. Even at the slow end of the speed spectrum, control reaction was positive. On subsequent takeoffs and during slow flight under 40 m.p.h. at 10 feet off the ground for the entire 6,400 feet of the main Lake Havasu runway, I found the control pressures light enough so that I consistently over-controlled on the first attempts. However, on our second flight the following morning, there was some improvement. It is readily apparent why 15 hours of transition are required for a gyroplane rating. The J-2 flies almost like a conventional airplane but there are just enough subtle differences to justify this transition time.

We climbed out over London Bridge and the expanding McCulloch real es-



J-2's cockpit in flight. About only controls different from those in fixed-wing craft are rotor-engage handle on firewall aft pilot's head and helicopter-like lever at far left of left seat.



Gyroplane approaching short runway on a road near Lake Havasu. Approach speed is 50 m.p.h. and engine r.p.m. is 1,800.

tate development at Havasu City and leveled off at 2,000 feet. I found an initial tendency to overcontrol on everything but the rudders, causing a little pilot-induced oscillation (PIO). After our first flight, the J-2 test pilot explained that the gyrocopter had a pendulum effect with the rotor hub acting as the top of the pendulum. There is about one-tenth-of-a-second time delay between application of control pressure and rotorcraft response. Until you have a little time to become accustomed to this split-second time delay, you find yourself adding stick force just as the initial force begins to take effect. A couple of hours in the air would completely eliminate this over-controlling.

Lawrence C. Mattera, McCulloch president, with a main frame member for J-2 fuselage. He is standing in front of new manufacturing building at Lake Havasu City.

We tried shallow and tight turns over the colorful desert scenery, green golf courses and blue lake. It takes added power to maintain altitude in steep turns just like any other flying machine. There's a predictable torque effect from the pusher prop and liberal right rudder is required at slow speed with high power settings.

The J-2 doesn't stall, as such. We tried a power-off "stall" and dropped the airspeed to zero. There was a mild tailslide, just enough to show up in reversal of rudder forces, and we were settling at 1,500 f.p.m. However, just relax the back pressure on the stick and your nose drops with the expected pick-up in airspeed.

Before our second flight, I asked for a piece of string and some sticky tape. We taped the string on the short nose cone of the J-2 and watched it whip 180° forward during our backup maneuver.

I had expected the J-2 to be a problem in both climb and glide since there's no reference point in front of the stubby nose. It didn't work out that way and the only reason I can come up with for this is the fact that you can see the rotating tips of the rotor blades in front of the top of the Plexiglas windshield. It provides a subtle reference point that works fine.

Gyro head on J-2. The design is by D. K. Jovanovich, holder of 16 patents on important helicopter designs. *Photos by the author*

All in all, there was no buffeting, little or no vibration, and a surprising sense of stability for such a small aircraft. The steep approach during power-off descents is easy to learn and there's ample kinetic energy in the rotor blades for a smooth flareout following a 60 m.p.h. approach.

One of the most important plus factors of the J-2's STOL concept lies in its superb visibility. Like a helicopter, you can pick the exact spot where you want to put the wheels and then put them there. Fixed-wing STOL models tend to lose this straight-ahead visibility as flareout begins.

Toward the end of our second flight, Reichert suggested a 10-foot-high flight down the runway with a landing on the "Lake Havasu City" sign painted on the tarmac. I asked him which letter he wanted to use.

Our final landing was on the proper numbers with a speed slow enough so the tailskids touched along with the main gear. The J-2 is an interesting flying machine. Once a pilot has mastered its minor differences from the fixed wing, he'd have a gold-plated ball doing safely what is usually considered impossible. When McCulloch sets up its school for dealer's chief pilots, I'd like to go along as a "guinea pig" student and add a gyroplane rating to my license. It would be well worth the time and effort.

In a preflight briefing, Lawrence C. Mattera, president of McCulloch Aircraft Corporation and helicopter pilot for the past 13 years, explained how the J-2 will be manufactured and distributed. The J-2 has a $19,950 FAF Havasu City, Ariz., price tag. At press time, 233 orders with $1,000 deposits were on hand. All production will take place at Havasu City with a 60,000-square-foot building already being filled with components. A new 100,000-square-foot manufacturing building will be completed at the Arizona site by June.

Production is keyed for 200 units in the first year, with J-2s going together in groups of 10. Nearly 100 production employees are either in Arizona or in the process of moving and a year-end force of 150 is anticipated.

Mattera estimated J-2 maintenance costs to be about one-third those of a conventional helicopter. Direct operating costs are figured at $10.57 per hour with $5.04 for 10½ gallons of fuel @ 48 cents, 53 cents for oil and changes, $1 toward engine overhauls, $2 for rotor components and drive system maintenance, $1 per hour for a 100-hour inspection, and a catch-all additional $1 per flight hour for unscheduled maintenance. Dealers will carry a supply of zero-time rotor-head assemblies and heads will be replaced at 600-hour intervals to be returned to the factory for disassembly and inspection. This inspection time will probably increase as more time is put on the J-2s. It takes only two hours to change rotor-heads.

Selection of the wooden Sensenich pusher propeller with conventional bonded leading edges was dictated by weight, cost and resistance to both abrasion and fatigue. Since most of the weight is off the wheels of the J-2 before the start of the short takeoff roll, "foreign object" damage has not been significant. Considering some of the rocky off-airport landing sites used by the J-2 in the Havasu area, this propeller performance was surprising to me.

Mattera advised that the J-2 had been designed for a working market with flight schools, dirt-moving contractors, farmers and ranchers as the initial owners. Factory-direct dealers will include present FBOs who sell noncompetitive fixed-wing aircraft, flying schools, maintenance shops, companies with aviation departments, fleet operators, helicopter companies, and new-to-aviation dealers who have a minimum of $75,000 to invest.

The new McCulloch J-2 concept has a great deal going for it besides manufacturing experience and money. The J-2 design should be with us for a long time to come. □