MOONEY 252

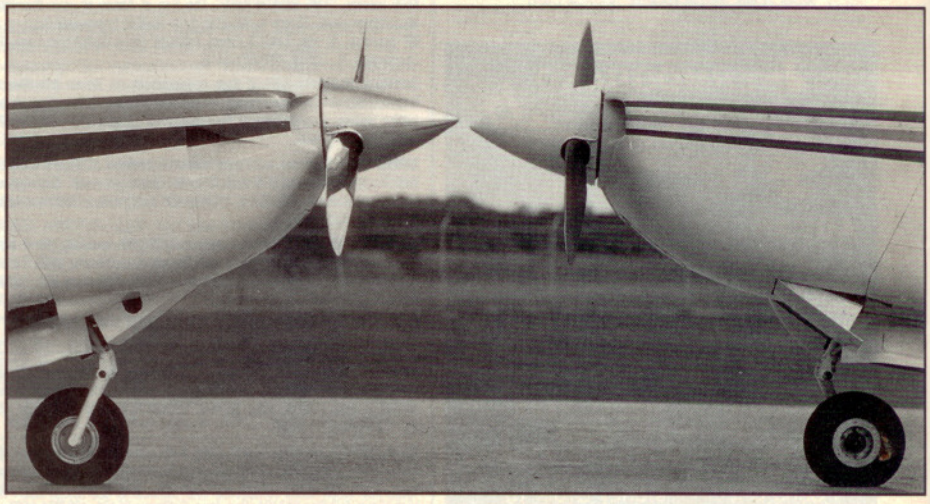
Attention to the flow of air through and around the M20K's engine has resulted in more speed and efficiency.

BY MARK M. LACAGNINA

Several years ago, Mooney Aircraft Corporation stopped naming its airplanes, choosing instead to use top speeds, in miles per hour, as monikers. In 1973, Mooney's best seller, the M20F Executive, was extensively tweaked and redesignated the M20J 201. That means the naturally aspirated airplane can hit a top speed of 201 mph. Its stablemate, the turbocharged M20K, introduced in 1978, *used* to be known as the 231. But the M20Ks now being rolled out of the final assembly hangar in Kerrville, Texas, have a different number painted on their fuselages: 252. According to Mooney, the airplane now can hit 252 mph (219 knots) at 24,000 feet, making the Mooney 252 one of the fastest piston singles in production.

This performance has been pulled, almost literally, from the air. Attention to the flow of air around and through the engine has resulted in substantial improvements to induction and cooling efficiencies.

Induction air enters a NACA duct, rather than a separate channel in the cooling air inlet, and flows into a filter assembly that is more than twice as large as the 231's assembly. Upstream from the filter is a Garrett AiResearch turbocharger, which has replaced the previously used Roto-Master (née Rajay) unit. Hot air leaving the turbocharger compressor passes through a 42-square-inch intercooler (heat ex-



The 231 (right) takes in cooling and induction air through inlets on either side of the spinner and exhausts the cooling air through two cowl flaps. The 252 (left) has larger inlets for cooling air, a NACA duct for induction air and a large, one-piece cowl flap.

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changer) that reduces the temperature of the induction air by about 50 percent. The induction manifold has been tuned (that is, the sizes and lengths of the various tubes and fittings have been carefully selected) to provide a more precise flow of air into each of the six combustion chambers. The fixed wastegate system formerly used in the 231's Teledyne Continental TSIO-360 engine has been eliminated. The new engine, designated the TSIO-360-MB, has a variable wastegate that is adjusted to its proper position by a density controller. (During a climb, the Mooney 231 requires frequent throttle adjustment to maintain a desired manifold pressure. The new turbocharger wastegate and controller automatically maintain the selected pressure.)

The cooling air inlets, on either side of the spinner, now are much larger. The 252 has one electrically actuated cowl flap—a rectangular piece of aluminum beneath the landing and taxi lights on the front of the cowl. When fully opened, the new cowl flap has a smaller exit area than the two large, manually actuated flaps on the 231. But, according to Mooney, the new cowl flap is more efficient and creates less drag.

The electrical system has received a much-needed upgrade (see "The Electric Airplane," June 1981 *Pilot*, p. 107). It is now a 28-volt system, and dual 70-amp alternators are an option. A standby vacuum system now is standard equipment.

The Mooney 252 has inboard gear doors that cover (1) the wheels when they are retracted and (2) the wheel wells when the main gear is extended. Maximum gear extension speed has been increased eight knots to 140.

The cockpit side moldings have been sculpted and the arms rests widened to provide more shoulder room and comfort. There is a folding arm rest between the two front seats, as well.

Airplane spotters should have no difficulty distinguishing a 252 from a 231. The giveaway is the rounded side windows. One wag suggested they make the new airplane look a bit like the original Mark 20 and Mark 21. The effect, however, is not at all unpleasant.

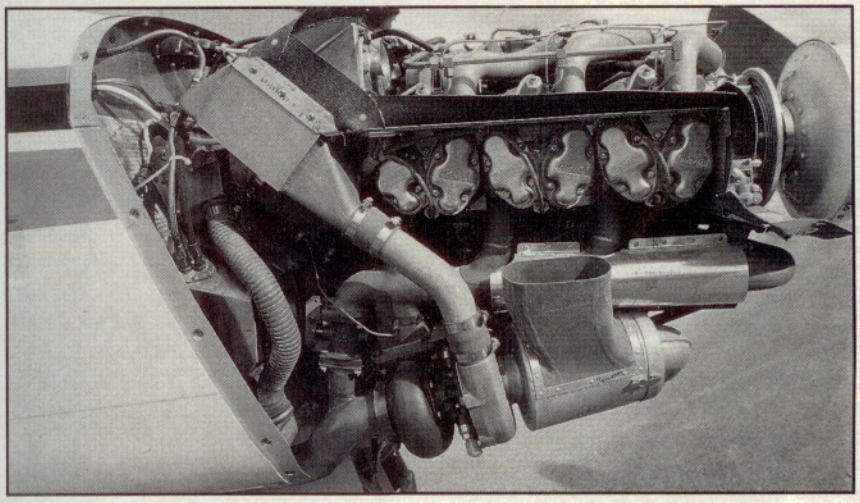
I flew the first production 252, N252JS, with Robert A. Kromer, an engineering test pilot for Mooney Aircraft. We did not have enough time for a thorough evaluation of the airplane's systems and performance, so we agreed on a good test of the induction and cooling systems refinements. We would climb at maximum continuous power and at best-rate-of-climb speed (Vy) to 23,000 feet (FL 230). In normal operations, this is what a pilot would do to get up to altitude as quickly as possible to take advantage of a tailwind.

The starter turned the engine over surprisingly quickly, a result of the more powerful electrical system. Used to the lumpy idle of the 231's engine, I was pleased by the relative smoothness of the new powerplant. On takeoff, I carefully brought the throttle right to the firewall. Only one slight adjustment of the throttle was required to maintain 36 inches of manifold pressure (the new redline—it used to be 40 inches) during the climb to FL 230.

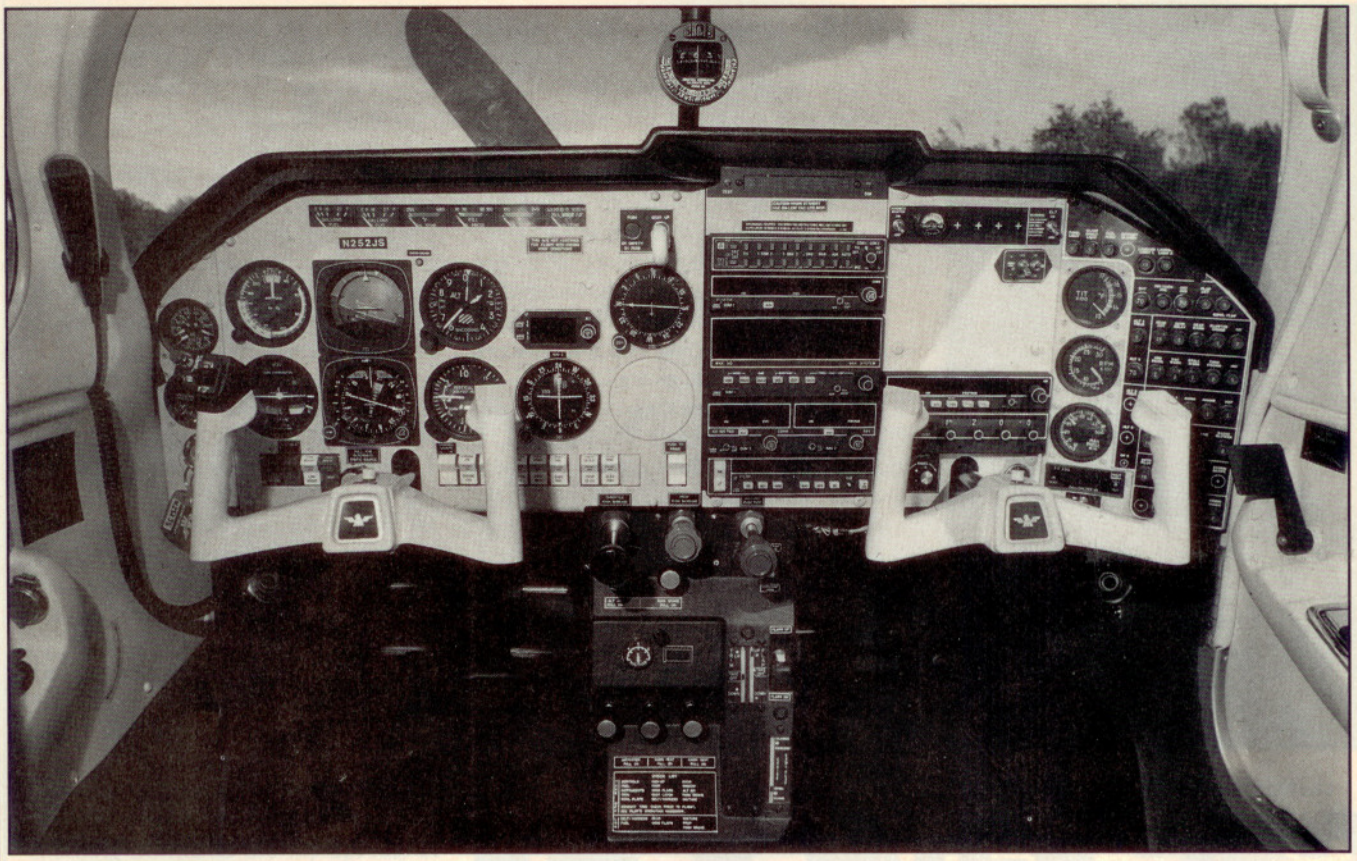
Air traffic control was cooperative, clearing us right up to FL 230; the only disruptions to the climb were a few turns to comply with vectors and frequent lowerings of the nose—which is very high at Vy—to check for traffic ahead. From Kerrville's 1,620-foot runway, in temperatures about 10°C warmer than standard, we reached 9,000 feet in 6.5 minutes and 15,000 feet in 12.5 minutes. The vertical speed indicator was showing a steady 1,000 fpm as I began to level off at our target altitude, 20.3 minutes after takeoff. Throughout the climb, the cylinder head and oil temperature indicators stayed in the middle of their green arcs.

We could have gone higher—much higher—if we had had the time. Maximum operating altitude is 28,000 feet. Critical altitude—the density altitude at which the engine no longer can maintain manifold pressure necessary for rated maximum continuous horsepower—is 24,000 feet. Critical altitude for the 231 is 15,000 feet.

The TSIO-360-MB engine is rated at 210 hp, continuous, at 36 inches and 2,700 rpm. The engine was designed to be run at 78.6 percent power, with mixture adjusted to peak turbine inlet temperature (TIT) or 1,650°F maximum, for high-speed cruise. At FL 230, with 28 inches and 2,500 rpm, true airspeed was 205 knots, and fuel burn was 75 pph (12.5 gph). The last time I took a Moo-



A relatively large filter assembly and turbocharger are mounted on the lower right side of the Continental TSIO-360-MB engine. An intercooler (the boxlike device) cools the hot, compressed air before it enters the tuned induction manifold (tubes on top of the engine).



White panel and control wheels come with the Special Edition package of luxury options for the 252; a standby vacuum system is standard equipment. Dual, 70-amp alternators are now optional and should do much to meet the power demands of the typical M20K avionics complement.

ney 231 up high, I recorded 195 knots and 67.2 pph (11.2 gph) at 75 percent power at 23,000 feet.

Cylinder head and oil temperatures were well within their limits, but I cracked the cowl flap, anyway, to see what would happen. (This would be necessary if the engine began to run too hot.) Unlike the 231's cowl flaps, which could either be closed, opened fully or placed in one trail position, the 252's cowl flap can be adjusted to any position desired by the pilot. I adjusted the cowl flap to one-quarter of its open travel; indicated airspeed decreased about two knots and cylinder head and oil temperatures dropped noticeably.

I made another cruise check at 55 percent power at FL 230—170 knots and 51.6 pph (8.6 gph)—before beginning our descent. When ATC asked that we expedite the descent through 18,000 feet, the optional speed brakes system came in handy. I reduced power to 20 inches and 2,200 rpm, the minimums for keeping the engine warm, and maintained 160 knots, indicated. The vertical speed indicator dropped to its peg, 2,000 fpm, and stayed there.

Below 18,000 feet, I decreased our rate of descent to 1,000 fpm (to save my ears from further beating by the rapidly increasing pressure). Indicated airspeed with the speed brakes deployed was 135 knots; when they were retracted, the airspeed increased to 150 knots.

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I squeezed in one last cruise check at 78.6 percent power at 12,500 feet—density altitude, 14,000 feet—and recorded 185 knots and 75 pph (12.5 gph). Then we then headed for San Antonio International Airport.

On the way, Kromer pointed out some of the new cabin features. The panel and control wheels in N252JS are white (I wonder what the effect is at night); black still is available, if the customer so desires. The ride, at least from the pilot's seat, now is more comfortable with the larger left arm rest, the addition of the new center arm rest and the sculptured sidewalls.

The higher gear-extension speed makes it easier to slow down the slippery Mooney in the pattern. Extension of the gear at 140 knots resulted only in a mild pitch-up. The new inboard main gear doors seem to eliminate a lot of noise and vibration when the gear are extended.

The 252 is an impressive airplane. In many ways, Mooney's turbocharged four-seater always has been tough to beat; now, it is even tougher. Base price is $118,750; complete price information was not available at press time, but I'd estimate that N252JS, the first production Mooney 252, will end up with about $176,000 on its sticker. When I visited Kerrville early in November, the target certification date was two weeks away, and Mooney dealers already had placed 21 orders.

Pilot's first experience with the Mooney 252 was all too brief (we had to severely stretch some deadlines just to get a précis in this issue). There still is much to explore and evaluate. We want to get a detailed technical briefing on all of the modifications and refinements, explore the new electrical system and generally wring out the airplane from sea level to its maximum operating altitude. Once we have done all that, *Pilot* will provide a more thorough report on the new airplane.

Stay tuned. □