

Mooney Scores With 'PC'

After flights in Mark 21, PILOT editor describes new 'positive control' feature of Mooney line as 'one of smartest pieces of standard equipment any manufacturer has added in recent years'

Mooney Mark 21 With 'PC'

SPECIFICATIONS:

Mark 21	Four-place, low-wing monoplane
Engine	Lycoming O-360-A1D, 4 cyl.; rated 180 h.p. at 2,700 r.p.m.
Propeller	Mooney 74 in.; metal; constant speed, controlled pitch
Length	23 ft., 2 in.
Height	8 ft., 4.5 in.
Wing span	35 ft.
Wing area	167 sq. ft.
Landing gear	Manual retraction with spring assist. (electric gear optional)

Weight

Maximum gross weight (lbs.)	2,575
Empty weight (lbs.)	1,525
Useful load (lbs.)	1,050
Maximum baggage capacity (lbs.)	120
Useful fuel capacity (gals.)	52

Loading

Wing loading (lb./sq. ft.)	15.4
Power loading (lb./h.p.)	14.3

PERFORMANCE:

Speed (True airspeed, average gross weight of 2,200 lbs., corrected to standard atmospheric conditions)	
Max. cruise speed at 7,500 ft., 2,500 r.p.m., 79%-142 h.p. (m.p.h.)	182
Optimum cruise speed at 10,000 ft., 2,300 r.p.m., 69%-124 h.p. (m.p.h.)	171
Economy cruise speed at 10,000 ft., 2,300 r.p.m., 62%-111 h.p. (m.p.h.)	159
Stall speed, gear and flaps down, power off (m.p.h.)	57
Best climb speed over obstacle, sea level, takeoff flaps, gear down, i.a.s. (m.p.h.)	85
Best on-course climb speed, i.a.s. (m.p.h.)	120
Rate of climb, sea level (f.p.m.)	1,010
Normal on-course climb at 120 m.p.h., 2,550 r.p.m. (f.p.m.)	600
Takeoff run, 0 m.p.h. wind, sea level (ft.)	890
Landing run, 0 m.p.h. wind, sea level (ft.)	550
Service ceiling (ft.)	17,200
Range	
Normal at 10,000 ft., no reserve, 171 m.p.h. (mi.)	929
Maximum at 10,000 ft., 122 m.p.h. (mi.)	1,031
Price: Mark 21 Standard	\$16,450

When it comes to imagination, perseverance and aggressiveness, few companies in aviation history have surpassed a little manufacturer (well, figuratively speaking) down in Kerrville, Tex., named Mooney. There is something about being the underdog among general aviation manufacturers that has inspired Mooney to turn itself into a remarkably successful manufacturer in a few short years. In 1954 the company was virtually bankrupt and had a \$200,000 deficit. Now, 10 years later, the company has an AA-1 Dun and Bradstreet rating, and Mooney President Hal Rachal predicts AAA-1 by this spring.

In many ways, the 1965 *Mark 21* offers a good insight into the reasons for this dynamic success. Though the basic airplane is essentially the old plywood *Mark 20* (which didn't sell too well), the similarity ends there. Today's all-metal *Mark 21* is as different from that original wooden airplane as the present-day Ford is different from the Model T. The differences are what have helped make Mooney one of the hottest general aviation companies in the world.

The 1965 *Mark 21* is one of the quietest single-engine airplanes I've ever flown. This is due to the great care with soundproofing. The comfort of all four seats also is surprisingly good for so small an airplane. And, because the plane is so compact, the 180 h.p. Lycoming O-360-A1D gives it excellent performance for its power. Several cruising speed checks in N7877V, which I flew for this article, averaged out at about 170 m.p.h. true at approximately 75% power, at 5,000 feet. According to Mooney's charts, fuel consumption is just under 11 g.p.h. at that power, and range at gross weight, in still air, is over 800 miles. This makes the *Mark 21* a very useful, economical piece of high-performance transportation.

Styling and comfort in the cabin are even improved over the 1964 model, although there has been some reduction in the size of the windshield and side windows, primarily to enhance the soundproofing. The eye-appeal is excellent and obviously has been aimed at women.

For all the changes, the *Mark 21* retains the excellent flight characteristics of its predecessors. With flaps and gear up and full rear trim, the plane simply won't stall with the engine idling. It

just settles gently at 62 m.p.h. indicated. By running the power up to 1,900 r.p.m., I got it to stall at 60 (just a gentle bobbing of the nose up and down), after which it settled at about 300 f.p.m. With flaps and gear down, it also won't stall with the engine idling; it just mushes downward. At 2,000 r.p.m. it stalled at 55 indicated. I could only conclude that almost any pilot who is able to fly the Mooney at all, and if he could keep just half his wits about him in an emergency (such as instrument weather), can set up the *Mark 21* so that it will bring him down to the ground at minimum speed, under excellent control, and at a rate not much different from that of a parachute. There are two versions of the *Mark 21*: the standard 21 and the Super 21, which has a 200 h.p. Lycoming and fuel injection. 77V was a standard *Mark 21*, with carburetor. Base price of the *Mark 21* is \$16,450; it's \$18,450 for the Super, which averages about 10 m.p.h. faster cruising speed.

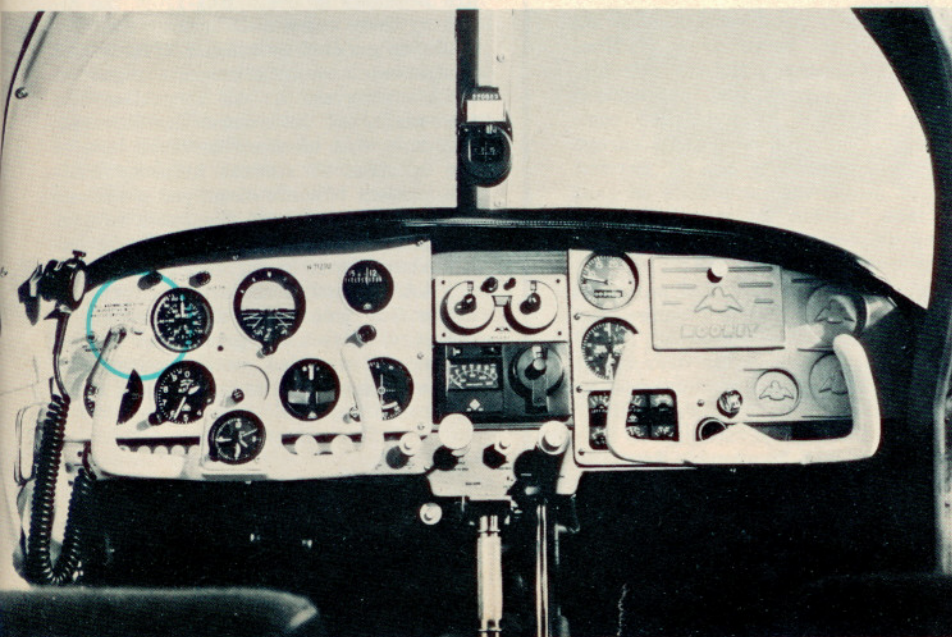
And now for "PC", one of the smartest pieces of standard equipment any manufacturer has added in recent years. PC stands for "positive control," a term that made me twitch perceptibly because of its more widely known and unpleasant connotation in the field of air traffic control. PC is a simple Brittain autopilot that runs continually, including takeoffs and landings. Mooney officials make a big fuss over their contention that PC is really not an autopilot, but actually is—as Ralph Harmon (AOPA 22880), Mooney vice president and chief engineer, insists—"lateral stability augmentation." He insists that the difference is that an autopilot is a "device that offers the pilot command functions." The distinction strikes me as a bit misty. I've had Brittain autopilots in my former *Bonanza* and in my present *Twin Comanche*. With just the "On" switch left on, I've had PC for many years. Only if I flip the switch one more stop do I get what Harmon calls "command functions." But I've used my autopilot in exactly the PC manner for years, including landings and takeoffs. It works wonderfully well, always has, and the advertising label isn't worth haggling over. All that's really important is that the potential purchaser understands what PC is.

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Mooney's Mark 21's: At the top is a standard Mark 21, the model Author Karant writes about in this article. The lower plane is the Super 21, which is powered by 200 h.p. fuel-injected Lycoming engine, and has a maximum cruise speed of 187 m.p.h. and a service ceiling of 19,500 feet

Normal takeoff in a Mark 21 requires a run of about 890 feet at sea level. Manually operated gear retraction is standard for the Mark 21, but electrically operated landing gear may be obtained as optional equipment



Mooney's PC, therefore, is a Britain autopilot with the on-off switch always on. There's a spring-loaded button under the pilot's left thumb on the control wheel which, when held down by the pilot, momentarily disconnects the autopilot from control. But the moment the pilot removes his thumb, the PC is again engaged. It's easily overcontrolled, even when engaged.

Several things about PC are very significant to general aviation. First, it's standard equipment—and at no extra charge; price of the 1965 *Mark 21* is the same as that for 1964. Second, it's built right into the airplane and is operating whenever the plane is. And third (and probably most obvious), it's the greatest single forward step toward helping the inexperienced pilot—who, despite the best efforts of the Weather Bureau, occasionally gets caught in unpredicted or unknown weather—keep his plane out of the deadly spiral dive and loss of control.

While PC is a major step forward in the field of aviation safety, its greatest selling point probably will be as a labor-saving device. It flies the airplane very well, and with an excellent level of precision. Just by adjusting a little trim knob (also on the control wheel) to the left or right, you can have PC fly accurate tracks all day long, while you just lean back and relax.

PC has also produced an interesting sidelight. It has brought a small group of Supermen out of the woodwork, egotistical aeronauts who proclaim PC to be bad for the same basic reasons these same superlative control-manipulators have been opposing the AOPA 360° Rating, the FAA's Blue Seal, tricycle landing gears, the *Ercoupe*, and all autopilots no matter what their names. This is the "a-little-knowledge-is-a-dangerous-thing" school of thought which, if carried to an obvious conclusion, would probably take us back to the open cockpit (the wind keeps you awake, a comfortable cabin could be dangerous because you might fall asleep), the tail skid (tail wheels enable pilots to steer too easily), and no brakes on the landing gear. After all, shouldn't a really first-class member of the Superman Club be able to land his airplane and have it roll to an unbraked

Mooney Mark 21 instrument panel provides ample space to accommodate radio and navigation equipment suited to the type of flying the pilot plans to do, up to full instrumentation. Radio com/nav equipment is at the center of the panel shown above. A Narco UDI-3 DME is located just below the Narco Mark 12 transceiver. Flight instruments are concentrated on the left side, in front of the pilot's seat. Disengagement controls for Mooney's "PC" system are conveniently located on the control wheel. The "PC" cutoff button (circled) is near the pilot's left thumb; the "PC" system's roll trim valve is just above the clock. Gear retraction lever and hydraulic-pump handle, controlling the wide-span flaps, are at the bottom of the panel in the center; the gear handle is at the left

stop all by itself, due entirely to his superior judgment and skill?

One aviation writer recently expanded his chest so that his badge of courage sparkled especially brightly, and allowed as how PC violates the habit he's built up over his years of instrument flying, in which he makes small heading corrections with the rudder. The key, of course, is that he wants you to know he's been flying instruments for years, and that he's dedicated to delicately pushing his rudder pedals, like the atomic scientist manipulates his cyclotron. He attempts to condemn PC further by laying bare other facets of his Superman ego, railing against the pilot having to explain himself to a piece of machinery (later on he calls it "bowing to the will of that machinery"), then winds up by condemning PC for taking much of the skill and pride out of flying!

Certainly, this type of person needs recognition, love and understanding. But he is not necessarily qualified to pass judgment on advances in the state of aeronautical sciences. Such heroic pretensions, all too prevalent in aviation, must not be permitted to stand in the way of general aviation's growth.

PC is not only here to stay, I'll even predict it spreads to other manufacturers (under whatever name anyone wants to call it). The state of the art in autopilots is such that a simple, durable, highly dependable unit can—and should—be in every airplane being flown by nonprofessional pilots (though it's interesting to see how much even the pros use the autopilots in their airline and corporation transports). But to Mooney, the aggressive and imaginative underdog in general aviation for so long, must go credit for having been first to take this long step forward. And Dr. Karl Frudenberg (AOPA 96042), head of Brittain Industries, certainly deserves an accolade for his perseverance in selling the "always-on" autopilot idea, after being turned down by some of the older, but unfortunately more smug, manufacturers of general aviation aircraft. Frudenberg had been advocating the idea for several years, without success. But now that Mooney has it, watch for others to belatedly jump on the bandwagon.

The value of PC to the *Mark 21* as a labor-saving device is obvious, and one cross-country trip is more than enough to convince an owner. But I was also interested in its safety features. So I simulated several times the kind of situation the panicky non-IFR pilot gets into, the one that ends up in a spiral dive.

I held down the spring-loaded button on the control wheel, to disconnect PC from the plane's controls. Then I stood 77V up on a wing tip several times. When the attitude was quite extreme, I took my hand off the wheel. This automatically reengaged PC. Instantly, the unit took over in a smooth, positive leveling of the wings. But one other hazard quickly became evident. If the plane gets away from the pilot and becomes upset in that manner—with the

wheels and flaps up—PC will level the wings, but it's not connected to the elevator. It's quite easy to get into a high-speed dive. In my simulated spiral dives with 77V, I quickly found myself with the airspeed indicator up against the red line (189 m.p.h.).

For maximum safety, then, the pilot should slow down the plane if he runs into IFR weather, put down the gear, and leave the rest to PC. In a true emergency, I'd put the gear down as quickly as possible, no matter what the airspeed. This has proved to be a significant safety technique in most retractable-gear airplanes. Some time ago, Beech even revised the *Bonanza's* landing gear so that it can safely and routinely be lowered at cruising speed.

The *Mark 21* is so clean that, like the *Bonanza*, it also builds up speed very quickly in a dive. The Mooney gear, which is still manually operated (but now can be converted to being electrically operated for \$700) is harder to put down at cruising speed, but it can and should be done in an emergency. PC will then do the rest.

The 1965 *Mark 21* will do much to enable Mooney sales people to continue to crow about the dominant position they've built for themselves in the "single-engine retractable" portion of the industry. The *Mark 21* is very economical to operate, easy to fly and an excellent instrument airplane (especially with PC). The electric landing gear will probably make it more attractive to women; it can be retrofitted to any retractable Mooney from 1962 on, retracts in four seconds, lowers in three. They've added an interesting safety feature to the electric gear: even though the pilot may actuate the gear switch for retraction, the gear won't retract until the airspeed is up to 80.

Rachal estimates they'll produce 780-800 new planes during 1965, for an estimated \$12,000,000. In 1964 they produced 630 units worth \$9,000,000. In a recent press conference, Rachal—who's primarily an attorney and financial expert—said Mooney's profit margin before taxes is 7-8%, compared with 14-15% for others in the aviation industry, and over 19% for General Motors.

Rachal also is not averse to making predictions about general aviation and has an unusually good record at it. He predicted that the certification of Mooney's new *Mustang*, with its 310 h.p. supercharged Lycoming, pressurized cabin, and price tag of \$29,990 completely equipped with everything except radio, would mark the end of current models of single-engine planes in that price class "within 24 months" after *Mustang* deliveries start. This remarkable big brother of the *Mark 21* already is flying, will cruise over 230 m.p.h. at 24,000 feet, has 1,000 miles' range, has cabin pressure of 8,000 feet at 19,600 feet, and will be able to fly over about 80% of all bad weather encountered by aircraft today. The plane's ceiling? Over 35,000 feet.

Yes, a lot has happened down in Kerrville, Tex., since Mooney almost went broke in 1954. ●