



# Three for all

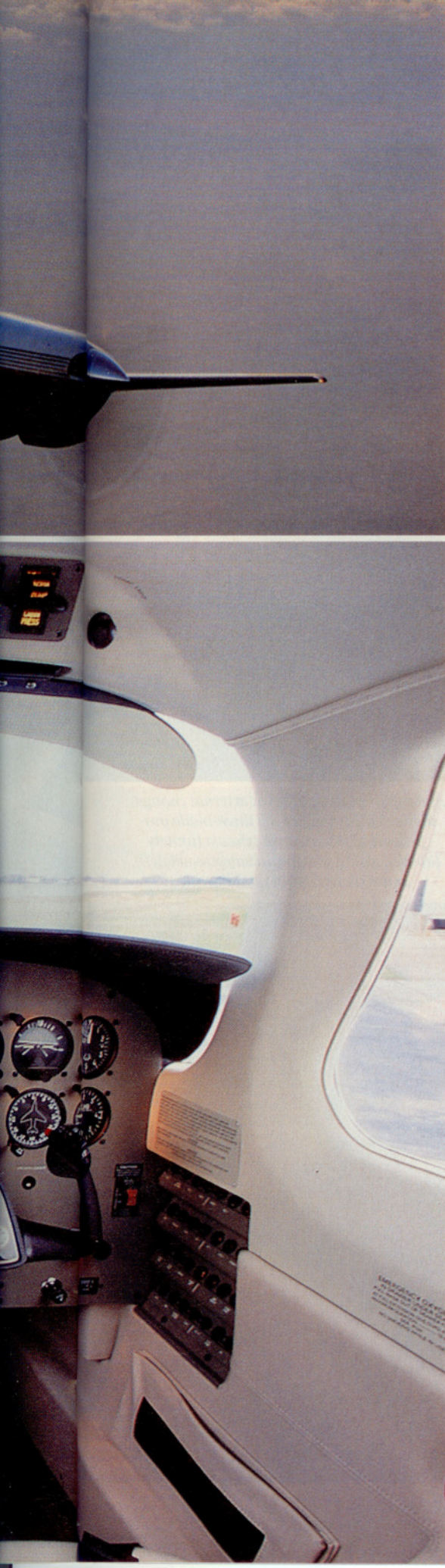
## A new three-blade prop powers the Mirage's ramp appeal

BY THOMAS B. HAINES

**Go** fast, look good. The pilot mantra is shallow but true. Sure, you can tool around in your taildragger low and slow for fun, but—seriously, folks—who among us doesn't get all lathered up over lots of turbocharged, intercooled horsepower and the curvaceous fuselage of a high-performance single? ■ The Piper Malibu Mirage has always filled the bill in performance and looks, but despite the model's 350-horsepower engine and long wing, one of the most visible indicators of big boost under the bonnet has always been missing: a three-blade propeller. The aftermarket marketers discovered nearly a decade ago that the sex appeal of three-blade propellers was almost too much for pilots to resist. ■ Trying to be responsive to customers who kept asking for snazzier propellers over the years, engineers at The New Piper Aircraft tinkered with a number of designs, including a four-blade composite prop that's popular

PHOTOGRAPHY BY MIKE FIZER





on Malibus in Europe.

Finally, last year Piper settled on a three-blade composite propeller manufactured by Hartzell. Introduced on the 1998 Mirages as standard equipment, the new prop weighs just five pounds more than the two-blade aluminum Hartzell on previous models. Because it maintains the same 80-inch diameter as the two-blade variant, the new prop does not negatively affect takeoff performance, as a smaller version might do.

As The New Piper's Larry Bardon, director of sales, puts it, the new propeller with its wide chord and highly swept tips is "worth 20 knots of ramp appeal." It does look good, giving the airplane a rakish air that plays well against the tall landing gear and the new recontoured exhaust tunnels along the bottom sides of the cowl. The re-styled exhaust channels have a larger opening at the back, allowing more air flow to improve engine cooling.

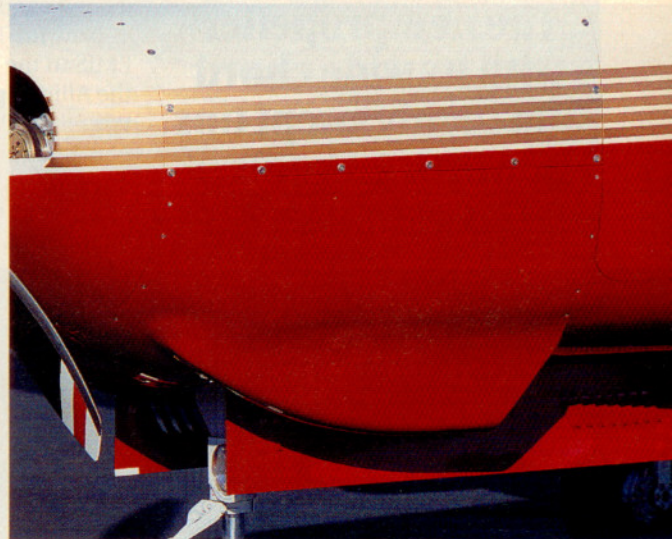
During flight tests with the three-blade propeller, the engineers found no measurable performance changes aside from a slight improvement in 50-foot obstacle clearance. On our flight tests, which occurred at about the maximum takeoff weight of 4,300 pounds, the airplane seemed to accelerate a bit better than do the older models and seemed ready to fly earlier. Most noticeable, though, is the reduced vibration level. Mirage owners will tell you that the model's 350-hp Lycoming TIO-540 engine is noted for its high vibration levels, something that Piper has tried for years to overcome. By far, the three-blade propeller is the biggest single step in the right direction. In addition, the new Mirage definitely seems quieter—both in the front and in the cabin.

### **Climb time**

It is from the comfortable backseat that I noticed through the cabin window another of the Mirage's attributes—the long wing. From that vantage point, the wing looks particularly long, slender, and graceful—definitely optimized for high-altitude, high-speed flight. And it is in that arena that the model really shines.

Climb the airplane on up to Flight

Level 250 and it will wind up to its maximum cruise speed of 215 knots true airspeed, while maintaining a comfortable 8,000-foot cabin altitude. Malibu aficionados might note that the quoted max speed is some 10 knots slower than shown in previous reports. In fact, the airplane—equipped as it is with deicing boots, radar pod, and antennas—is as fast as ever. However, earlier versions of the performance manuals quoted the higher speed because in the days when you could buy a Malibu without deicing boots and radar, you could actually squeak out 225 knots. Since the boots and radar became standard a few years ago, the books haven't changed. The charts simply footnoted the 10-knot penalty when boots and radar were installed. For 1998, Piper rewrote the manuals, changing the numbers to



more accurately portray the performance of the standard airplane.

There's something new about the boots themselves. The Mirage is the first aircraft to come standard with the BFGoodrich Smart Boots system. Sensors on the right horizontal tail detect ice, based on changes in electrical resistance. The system alerts the pilot to the presence of ice via an annunciator. When the system determines that the ice is of the correct thickness for the boots to be effective in removing it, another light tells the pilot to activate the boots. Because tailplane icing is the most difficult type for pilots to detect, Smart Boots represents a significant safety improvement.

With the dual turbochargers and intercoolers, the Lycoming will easily propel the Mirage up to FL250, but many pilots prefer to operate in the upper teens and low 20s. There the Mirage will turn in cruise speeds in the low 200s on fuel burns of about 20 gal-

lons per hour, giving it a practical range of just more than 1,000 nm with reserves.

On one of our flights we leveled off at 13,500 feet. With a cruise setting of 32 inches of manifold pressure and 2,500 rpm, leaned to 1,650 degrees Fahrenheit turbine inlet temperature and 23.3 gph, the new Mirage showed 197 knots true. Lycoming allows leaning to peak TIT or 1,750 degrees, whichever is lower. However, most conservative operators and Attitudes International, the company that provides Malibu training for Piper, recommend a maximum TIT of 1,650 degrees, which is more in line with the operating limitations that Lycoming recommends for other variants of the TIO-540.

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all is well at a glance, because in their normal positions the needles all point to the nine o'clock position. Meanwhile, you can elect to display any parameters digitally at the top of the stack. There, LCDs show exactly what's going on. In the background, the system monitors all of the parameters and immediately announces any exceedances.

The best way to use the system is to set power by using the analog displays, which react instantly. Let things settle down and then begin monitoring the digits for fine-tuning. Of course, you can become obsessed with fine-tuning by the digits. Try leaning to exactly 1,650 degrees TIT on the digital display and you'll soon use up a month's worth of curse words as the numbers jump around. Get it close with the analog, fine-tune it a bit with the digits, and call it good enough.

New for 1998 is the ability to tie the EMIS to the GPS, which in the Mirage is the AlliedSignal Bendix/King KLN-90B. With the GPS input, the system can display fuel to destination, nautical miles per gallon, gallons of reserve, and a number of other helpful calculations. Also new is the ability to digitally display power output in percentages—something that Horizon

debuted on the Seneca and Saratoga last year. Set your power and the system will tell you, in five-percent increments, the percent of power you are using. Or, select the percent of power you want and the system will tell you the manifold pressure necessary to achieve it.

Thanks to the automation and sophisticated systems, the Mirage

is a remarkably easy airplane to fly. After startup, the only thing unfamiliar to any pilot used to flying high-performance singles is the pressurization system. Just set the cabin altitude on the selector to 500 feet above the airport altitude. Then, when you are passing through 500 agl, the pressurization system will start doing its thing, allowing the cabin pressure to climb at the rate you've selected, maintaining a maximum differential of 5.5 pounds per square inch between cabin and ambient pressures.

On takeoff, feed in full throttle. The automatic wastegate system smoothly spools up the turbos and holds the max



Among the most significant external changes to the new Mirage are the three-blade propeller and recontoured exhaust tunnels (above). Inside, the annunciator panel (left) and systems control panel are new.



## In the digits

Setting power is easy and done precisely using the new Horizon Instruments analog and digital engine instruments. The Transicoil Engine Monitoring Instrument System (EMIS) debuted on the 1996 Mirage. In 1997, Piper introduced on the Seneca V, Saratoga II HP, and Saratoga II TC a similar system manufactured by Flight Line Instruments. Since then, Transicoil and Flight Line have been merged into Horizon Instruments. The system in the Mirage uses 10 analog gauges, each a little bigger than a quarter. In cruise, you can tell





manifold pressure of 42 inches all the way up to FL250. Leave the prop at the redline of 2,500 rpm. Particularly with a passenger in the aft seat, the airplane simply flies off the runway at about 80 knots. With gear and flaps up and a bit of trim, the Mirage will settle into a 120-knot cruise climb that yields about 1,100 feet per minute. No power adjustments are necessary in the climb.

Upon leveling off, slide the throttle back to the desired position, lean the mixture, and—again—leave the prop alone. There are no cowl flaps to contend with, which seems to suit the Lycoming fine, particularly with the refined cowling. During our climb to 13,500 feet on a day that was about 10 degrees warmer than standard, the cylinder head temperatures hovered between 380 and 414 degrees, well below the maximum of 500 degrees.

With the KLN-90B to help navigate and the KFC-150 flight control system, including altitude preselect and yaw damper, to do the steering, the pilot is free to work the RDR-2000 vertical profile weather radar, also standard. The base Mirage comes well equipped; add lightning detection equipment and you'd be all set. If you feel the need to

manage more electrons, the AlliedSignal EHI 40 electronic horizontal situation indicator system is available for a \$68,100 premium. Copilot instruments, once a nice-to-have option, are now standard.

New for 1998 is a bezel around the attitude indicator and HSI that conveniently houses the radio master and ground communication switches. Those who opt for the EFIS package and the Argus moving map will see the bezel sprout more switches and knobs. Also new on the panel is a redesigned annunciator panel that bristles with lights for every imaginable situation. Next to it is a new control panel for a variety of systems, including the heating and air conditioning. Gone are the push/pull knobs for controlling heat and air. Now those are managed by pushing buttons that electronically activate the systems. In flight, dual 75-amp alternators keep all the lights aglow. On

cold days, passengers will appreciate the auxiliary electric cabin heater that can also be used to warm the cabin prior to engine start if a ground power unit is hooked up.

Don't worry too much about the folks in back, though. They'll be comfortable on the standard all-leather seats, listening through the PS Engineering stereo audio panel/intercom connected to the AM/FM/CD player—with remote control. Too much coffee? A relief tube is stowed between the cockpit and cabin.

A nose baggage compartment swallows up the golf clubs.

Suitcases and hanging bags can go in the compartment behind the cabin, accessed by folding the aft seat backs forward.

All in all, not a bad way to get around.

With its light and well-harmonized flight controls, the Mirage is the best flying Piper. The short-coupled fuselage causes a bit of yawing, but the yaw



**With the dual turbochargers and intercoolers, the Lycoming will easily propel the Mirage up to FL250.**

damper takes care of it just fine. At high altitudes, you notice the pitch sensitivity—typical of all high-flying airplanes—but few pilots hand-fly at those altitudes.

As with any slippery airplane, it's difficult to go down and slow down in a Mirage. Stan Riker, an instructor at Attitudes International, suggests simply leaving cruise power set and pushing the nose over to the  $V_{NO}$  of 168 knots for the descent. That will maintain engine temperatures and allow a reasonable descent rate. If you've blown the descent planning or ATC is uncooperative, you can throw out the gear and approach flaps at 165 knots to increase drag. In that configuration and with the power back at 22 inches, you can run the airspeed right up into the yellow arc when in smooth air, while achieving descent rates of more than 4,000 fpm.

Enter the pattern at around 100 knots, slowing to 90 on downwind; cross the numbers at no faster than 80 knots or you'll find out how efficient those long wings are when the airplane enters ground effect. If you hit 80 knots, the airplane will settle nicely to the runway.

With a typical full-fuel payload of just over 500 pounds, you can carry two

adults and lots of bags. Leave some of the 120 gallons of fuel behind and you can load the seats for shorter flights.

## **The price of the Piper**

All of this performance and capability carries a base price of \$799,600, which includes a training course at Attitudes International, located next to the Piper factory.

Eight-tenths of a million dollars is big money on just about anyone's scale, but when it comes to new, the Mirage has no competition—so apparently no other manufacturer believes that it can do it better. And, as it is, Piper has no trouble selling all it cares to make. This year, the company will build 55 Mirages, up one unit from the 1997 production rate and on par with the last couple of years. All of those airplanes are spoken for by Piper's dealer network, and almost half of those are already sold to retail customers.

## **That kerosene smell**

Last fall's announcement of the new Meridian turboprop based on the Mirage airframe means new sales opportunities for the Mirage, at least in the short run. Mirage buyers who place

an order for a Meridian get a \$50,000 discount on the turboprop, part of Piper's Linkage Program that allows you to "buy a piston get a turbine." Buyers are also eligible for Piper's Step-Up Program, which guarantees the aircraft's trade-in value after an agreed-upon period. With Piper's other models the period is 18 months; it is longer for Mirage buyers opting to step up to the Meridian, since the turboprop won't be certificated until mid-2000. The Meridian's price is \$1.3 million for the first 60 airplanes and \$1.35 million for the second year—in 1997 dollars and equipped similarly to today's Mirage. For that sum Piper is guaranteeing a speed of 262 knots with a 400-shaft-horsepower Pratt & Whitney, useful load of 1,607 pounds, and range of 1,070 nm with reserves. Bardon is convinced that the speed will come in closer to 270 knots.

Surprisingly, Bardon does not see the Pilatus PC-12 and Socata TBM 700 as the Meridian's biggest competitors. Instead, he sees the customers plunking down deposits for the VisionAire Vantage single-engine jet, Century Jet, and other yet-to-be certificated models as being his prime customers. At least 75 to 80 percent of the 200 people who



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have placed orders for those airplanes are serious prospects for Piper's sales force. "That's Piper's market. People need to know we're not a paper airplane," says Bardon.

The new muscle machine does not mean the end of the Mirage, though. Mirage production will decrease by some 50 percent in the early Meridian years, Bardon predicts, as the new model's production is ramped up. Still, he suggests, "there will always be a demand for the highest-performance piston single." Apparently he too believes in the pilot mantra. □

Links to all Web sites referenced in this issue can be found on AOPA Online ([www.aopa.org/pilot/links.shtml](http://www.aopa.org/pilot/links.shtml)). E-mail the author at [thomas.haines@aopa.org](mailto:thomas.haines@aopa.org)

### 1998 Piper PA-46-350P Malibu Mirage Base price: \$799,600

Specifications	
Powerplant	Lycoming TIO-540-AE2A, 350 hp @ 2,500 rpm
Recommended TBO	2,000 hr
Propeller	Hartzell three-blade, constant speed, 80-inch diameter
Length	28 ft 8 in
Height	11 ft 6 in
Wingspan	43 ft
Wing area	175 sq ft
Wing loading	24.6 lb/sq ft
Power loading	12.3 lb/hp
Seats	6
Cabin length	12 ft 4 in
Cabin width	49 in
Cabin height	47 in
Empty weight	3,080 lb
Empty weight, as tested	3,092 lb
Maximum ramp weight	4,318 lb
Gross weight	4,300 lb
Useful load	1,238 lb
Useful load, as tested	1,226 lb
Payload w/full fuel	518 lb
Payload w/full fuel, as tested	506 lb
Maximum takeoff weight	4,300 lb
Maximum landing weight	4,100 lb
Zero fuel weight	4,100 lb
Fuel capacity, std	122 gal (120 gal usable) 732 lb (720 lb usable)
Oil capacity	12 qt
Baggage capacity	100 lb, 13 cu ft (forward), 100 lb, 20 cu ft (aft)

### Performance

Takeoff distance, ground roll	1,090 ft
Takeoff distance over 50-ft obstacle	2,090 ft

Max demonstrated crosswind component	17 kt
Rate of climb, sea level	1,218 fpm
Cruise speed/range/endurance w/45-min rsv (fuel consumption)	
@ High-speed cruise, peak TIT	215 KTAS/ 25,000 ft
	980 nm/4.8 hr (120 pph/20 gph)
@ Normal cruise, peak TIT	206 KTAS/ 20,000 ft
	1,040 nm/5.3 hr (108 pph/18 gph)
@ Long-range cruise, peak TIT	140 KTAS/ 10,000 ft
	1,450 nm/10.3 hr (66 pph/11 gph)
Maximum operating altitude	25,000 ft
Service ceiling	25,000 ft
Landing distance over 50-ft obstacle	1,950 ft
Landing distance, ground roll	1,020 ft

### Limiting and Recommended Airspeeds

V <sub>X</sub> (best angle of climb)	91 KIAS
V <sub>Y</sub> (best rate of climb)	110 KIAS
V <sub>A</sub> (design maneuvering)	133 KIAS
V <sub>FE</sub> (max flap extended)	165 KIAS
V <sub>LE</sub> (max gear extended)	195 KIAS
V <sub>LO</sub> (max gear operating)	
Extend	165 KIAS
Retract	126 KIAS
V <sub>NO</sub> (max structural cruising)	168 KIAS
V <sub>NE</sub> (never exceed)	198 KIAS
V <sub>S1</sub> (stall, clean)	69 KIAS
V <sub>SO</sub> (stall, in landing configuration)	58 KIAS

For more information, contact The New Piper Aircraft Inc., 2926 Piper Drive, Vero Beach, Florida 32960; 561/567-4361 ([www.newpiper.com](http://www.newpiper.com)).

All specifications are based on manufacturer's calculations. All performance figures are based on standard day, standard atmosphere, sea level, gross weight conditions unless otherwise noted.