Malibu Mirage: The Ultimate Piston Single?

Henry Ford reportedly said to a prospective buyer of the Model T that any color he wanted was available, as long as it was black. For pilots seeking a cabin-class, pressurized piston single, the choice is similar, according to Jeff Schweitzer, who owns a 1996 Mirage and serves as editor of the Malibu Mirage Owners Association magazine: You can buy any plane you like, as long as it's a New Piper Malibu Mirage.

By Jeff Schweitzer, Ph.D. | December 13, 2000

The Malibu Mirage has the rare distinction of being in a class by itself. No other plane currently in production can claim to be a six-place cabin-class pressurized piston single. In spite of a complicated history, the aircraft ultimately lives up to its reputation as a full-capability IFR platform providing comfort and reliability in the flight levels. The Malibu Mirage offers performance and comfort similar to many cabin-class twins, with significantly lower operating costs.

The Malibu Mirage is actually two different airplanes. The Malibu, designated the PA-46-310P, was first introduced to the public in late 1982, and rolled off the production line in 1984. The Mirage (PA-46-350P), also called the Malibu Mirage to create some confusion, came into the world in

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ABOUT THE AUTHOR ...

Jeff Schweitzer spent much of his youth underwater pursuing his lifelong fascination with marine life. He obtained his doctorate from the University of California through his neurobehavioral studies of sharks and rays. He has published in an eclectic range of fields, including neurobiology, marine science, international development, environmental protection and aviation.

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1989, with a new engine, greater maximum gross takeoff weight and a slightly more modern cockpit design. I will refer to the original bird as the Malibu and the later version as the Mirage. The two share many common characteristics, and in those cases, the Mirage will be used as the example. When the designs diverge significantly, both will be compared. Malibu pilots believe that the older aircraft is the better of the two, for reasons that will become clear below, while Mirage pilots have a different view. This debate is reminiscent of the heated argument one hears about French versus California wines, blondes versus brunettes and Ford versus Chevrolet.

Looking Back

In order to appreciate the airplane and its capabilities, some historical perspective is needed. That includes a brief background on Piper itself, which has a rich history full of failure, trauma and triumph paralleling the story of modern aviation.

William Taylor was an oilman in Bradford, Pa., when he joined the Taylor Aircraft Company board of directors in the 1920s after investing $400 in the company. He had no aviation experience, but he did have a degree in mechanical engineering from Harvard, and had the experience of fighting in the Spanish-American war. He also knew how to hire some good talent, including Walter Jamouneau, who is known for bringing forth the J-3 Cub in all of its bright yellow glory (the "J" stands for Jamouneau). Walter claimed to have an aeronautical engineering degree from Rutgers University. To his great credit and our long-lasting good fortune, Piper overlooked the small fact that Rutgers did not have an aeronautical engineering course. Shortly after coming on board, Taylor and Piper quickly discovered they had different philosophies in developing the Cub, with Piper insisting on building a basic, cheap, easy-to-fly airplane (now called "faster, better, cheaper" at NASA). Piper eventually paid Taylor, with whom he clashed more and more frequently, a total of $250 per month for three years to buy out Taylor's interest in the company.

A fire in 1937 destroyed Piper's Bradford factory, and the company relocated to a silk mill in Lock Haven, Pa., becoming Piper Aircraft Corporation. For nearly 50 years, Bill Piper's Lock Haven factory churned out about 77,000 aircraft.

Initially, an aviation boom made anything seem possible in the early days of the move to Lock Haven. But the post-war sales boom for private airplanes quickly deflated. In 1948, when many companies went belly-up, Piper concentrated on transforming the popular Cruiser into the Vagabond, the Pacer and then the TriPacer. The latter airplane had tricycle landing gear, a new development for Piper, which previously produced airplanes with only the conventional tailwheel configuration.

Singles To Twins

In 1954, Piper introduced the Apache, the company's first all-metal airplane, and Piper's first twin. The name

Jeff and his wife live in central Texas, moving there after retiring from the White House as Assistant Director for International Science and Technology.

Prior to owning his Mirage, Jeff took advantage of being a renter by flying Cessnas (152, 172, 182 and the twin T303), Beeches (Bonanza V35, A36 and Baron 58), and Pipers (Seminole, Senecas II, III and IV). He prefers his 1996 Mirage.

Jeff chronicles many of his flying adventures in leading aviation journals, including *Flying*, *Private Pilot*, *Plane & Pilot*, and *IFR*. He also writes more sedate articles on weather and safety in those same magazines. Jeff is the editor of the *Malibu Mirage Magazine*.

was in recognition of Bill Piper's own American Indian roots, and was the first in a line of models named after Native Americans. The Apache's success allowed Piper to open a new research and development facility in Vero Beach, Fla., at an old U.S. Navy facility. Piper's presence in Florida eventually led to a manufacturing facility in Vero Beach, where the Cherokee (PA-28 series) was designed and produced. The design of the original four-place Cherokee became the foundation for the Warrior, Archer, Dakota, Arrow, and Saratoga, all together representing more than half of Piper's fleet. The PA-28 was stretched into the PA-32, or Cherokee Six, to accommodate six people. The PA-32 family also includes the six-seat Saratoga II TC. Piper now had experience with six-seat aircraft.

Equally important to the eventual development of the Malibu was Piper's introduction of a cabin-class twin in 1967. The PA-31 Navajo was designed at the start for business use, and from that model followed the Navajo Chieftain, the largely-forgotten Mojave, and eventually the twin-turboprop Cheyenne series. Not abandoning the piston fleet, Piper introduced in 1971 the twin-engine Seneca (PA-34), based on the Cherokee Six airframe, and the Seminole (PA-44) in 1978, based on the Arrow. Piper has built more than 20,000 twin-engine airplanes.

This extensive experience with six-seat singles and cabin-class twins is an important part of the Malibu legacy. But unlike many Piper aircraft designs that evolved from existing airframes, Piper started at ground zero in designing the Malibu. After three years of development, the Malibu became the flagship of the Piper fleet, and in a small way revolutionized personal aviation, offering creature comforts, and many of the capabilities, usually found in small business jets at a small fraction of the cost.

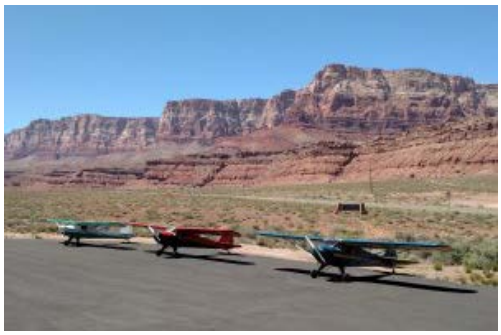
A Bad Spell

But not all was well for either Piper or the Malibu. Through a series of economic downturns, declining sales throughout the aviation community, problems within the company and other events too complicated to list here, Piper filed in July 1991 a voluntary petition for reorganization under Chapter 11 of the U.S. Bankruptcy Code. During the worst of this reorganization period, the company delivered just 41 airplanes. Dark days were not confined to corporate woes, however. Between May 1989 and March 1991, the PA-46 suffered a string of seven fatal accidents, and the airplane became the unhappy target of an intensive investigation by the FAA and NTSB. The thought was that the airplane was somehow flawed and breaking up in flight due to design problems. An emergency airworthiness directive (AD) was issued by the FAA in March 1991 prohibiting Malibu pilots from flying in instrument conditions, and prohibiting the use of the autopilot, the control wheel steering button and vertical trim control to change altitude. (The autopilot could still be used for level flight under the AD). In addition, the altitude preselect and vertical speed select, if installed, had to be physically removed from the aircraft. Finally, the AD stated that pitot heat and alternate induction air had to be used in all phases of flight except takeoff and landing.

After a loud chorus of protests (leading eventually to the founding of the Malibu Mirage Owners and Pilots Association), the FAA rescinded the AD. But then, in a fit of bureaucratic weirdness, the FAA issued another AD prohibiting flight in or near thunderstorms, icing and moderate to severe turbulence. The odd implication was that all other aircraft could fly in or near thunderstorms. The new AD also prohibited using the autopilot (the King KFC 150) for altitude changes.

Re-certification

Perhaps most important for current and future owners of the Malibu and Mirage, the FAA ordered a special certification review (SCR) of the PA-46. This SCR was perhaps the most comprehensive of any undertaken and required most of a year to complete. The conclusion was that the airframe and the autopilots were in full compliance. The results of the review are impressive.



Structural analysis demonstrated that the wings would flutter at 600 knots and the tail at about 1,000 knots. To put that in perspective, Vne is 198 KIAS. The airplane passed every other test with ease, including out-of-trim tests and tests of G forces at speeds as high as 200 KIAS, which is 40 knots higher than required. The aircraft was tested extensively at and below maneuvering speed using different weights and CGs. In all cases the plane stalled, as it is deigned to at maneuvering speed, before reaching the limit of 3.8 Gs. So-called "checked maneuvers" were performed from 150 to 200 KIAS, also at different weights and CGs, in which the test pilot violently pulled on the yoke, then suddenly pushed. This test is meant to simulate a panicked pilot in turbulence. The tests yielded data from -2.5 to 4.2 Gs, well beyond that required, and the aircraft had only one surprise for engineers: The strength of the tail was much greater than anticipated.

As a result of this exhaustive review, 60 recommendations were put forward, many related to the autopilot, and many already addressed voluntarily by pilots through previously issued service bulletins. But the review left no doubt about the strength and integrity of the Malibu and Mirage. Along with the V-tail Bonanza, the Malibu Mirage has the distinction of being the most thoroughly tested single-engine aircraft in the general aviation fleet. The problem turns out to be pilot training. The study indicated that many pilots moving into a Mirage often do not have sufficient respect for the complexity of this type of high-performance aircraft nor the harsh environment of the flight levels.

A New Beginning

With the Malibu and Mirage back on track, and a revival of general aviation in the mid-'90s becoming evident, Piper was positioned for a comeback. In the summer of 1995, President and CEO Chuck Suma, and a core group of employees, took over the assets of the old company, giving birth to The New Piper Aircraft Inc. The recovery at Piper since then has been remarkable. Just three years later, in 1998, 295 new aircraft rolled out of the factory, and annual production has been in the range of 300 ever since. Subsequent years saw significant product enhancements throughout the Piper fleet, including new engine and fuel management systems, new avionics from Garmin, new autopilots and Smartboots™. Also, Piper unveiled its new Malibu Meridian, a single-engine turboprop that just received its certification this year. The first Meridian was delivered in November 2000.

A strengthened Piper, a bright future for general aviation, and a clean bill of health for the company's flagship piston single combine to make the Malibu and Mirage attractive purchases, either used or new. But a decision between the two is not trivial. Just as we reviewed the history of Piper as a means of understanding the genealogy of the PA-46, we now need to delve into the details of the Malibu, and compare them to the newer Mirage, in order to reveal the relative merits of the two designs.

Continental vs. Lycoming

The biggest difference between the later-model Malibus and the Mirages are the engines — a Continental for the former and a Lycoming for the latter. The Malibu PA-46-310P flew out the factory with a 310-hp turbocharged Teledyne Continental Motors (TCM) engine (TSI0-520-BE) developed specifically for that airplane. That engine was designed for lean-of-peak (LOP) operations, and this led many pilots not familiar with LOP to run the engine rich of peak (ROP), outside the parameters recommended by the manufacturer. For additional, detailed information on lean-of-peak operations, an excellent place to start is John Deakin's series of "Pelican's Perch" columns here on *AVweb*. Early in the life of the Malibu, the TCM engine proved troublesome for many reasons beyond the leaning issue. Piston pins and crankshaft bearings, not to mention main bearings, turned the engine into a nightmare for many pilots. An ugly battle between Piper and TCM eventually led to a voluntary grounding of the airplane. In addition to engine woes, the nose gear, which rotates 90 degrees when

fitting into its bay, had frequent problems. The early hydraulic system for the landing gear failed often, was sensitive to dirt and required intensive maintenance. Eventually, though, the engine and system problems were successfully addressed.

During the time that the Malibu and TCM were having the greatest publicity problems, Piper introduced the Malibu (Malibu Mirage actually), with a TIO-540-AE2A 350-hp Lycoming engine. The engine is designed for rich-of-peak operation. The new engine weighed about 113 pounds more, but the maximum takeoff weight was increased by 200 pounds as well. The Lycoming was not trouble-free, however. The power plant seems to suffer more from vibration than the Continental. The excessive vibration sometimes leads to problems of cracked exhaust pipes and fittings, broken brackets, fatigued metal parts and bolts that back out, among other ills. Lycoming engines also seem to have a problem with oil consumption, and this has been my personal experience. For these reasons the Continental, and Malibu, are seen by many now to be the most desirable package. Mirage owners feel differently, obviously.

To complicate matters, the Lycoming engine has come under renewed attack recently. Engines shipped after August 25, 1995, with serial numbers listed in a Special Advisory (59-800), need to have the rod bearings replaced, and many engines need to have main bearings replaced as well. Prior to replacing the rod bearings, an oil change is required every 10 hours, along with a mandatory filter and suction screen inspection. In addition, a lawsuit has been filed alleging widespread engine problems throughout the entire fleet.

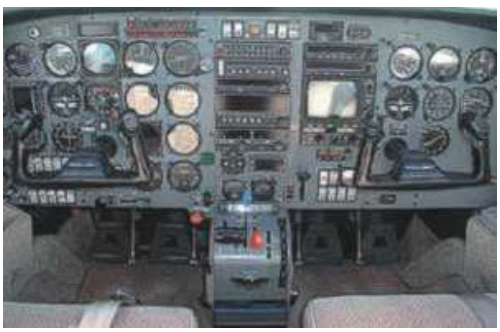
Without commenting on the lawsuit, my personal experience with Lycoming has been positive. Lycoming paid to have my rod bearings replaced as soon as the parts became available, without hassle.

Choices

The choice between a Malibu and a Mirage is ultimately a choice between the two engines. Choose your weapon. Good luck reaching TBO with either one, particularly without overhauling the top end first. These engines seem to need a top overhaul on average about every 650 hours or so. At this stage, both engines have gone through rough periods, and both have ardent supporters. Again, the choice is a matter of taste.

While different engines constitute the greatest distinguishing characteristics of the two planes, a few other difference are worth noting. Perhaps the most significant is that early Malibus have Gar-Kenyon gear, parts for which are becoming difficult to obtain. Also, Piper modified a number of other systems when introducing the Mirage. The hydraulic system was changed, engine cooling was redesigned, the cabin door was made more robust, and the flaps were changed from hydraulic to electric operation. The Mirage also had a dual-bus electric system, internal windshield de-ice, dual alternators, dual vacuum pumps, and an auxiliary heater for the cabin. (Cabin heating is still not good in these airplanes).

Common Features



Even so, the planes are more similar than not. Emergency gear extension is free-fall and easy to accomplish in practice. Flaps and ailerons take up significant real estate. The size and motion of the flaps is one reason for the impressive stall speed of 59 knots. The ailerons and one-piece elevator are mass-balanced, and all primary flight controls are commanded by cable.

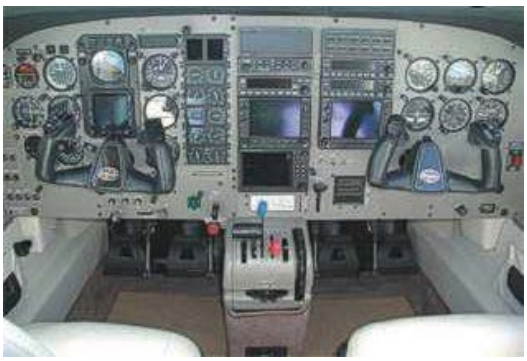
Both aircraft are constructed using conventional aluminum alloy, but extensive use is made of flush riveting. Drag is further minimized

by skins being butted end-to-end instead of lapped. Rivets have largely been replaced by internal bonding. Even in the early days of production, computer-aided manufacturing was used on the factory floor. The high aspect-ratio wings span 43 feet, making for a good high-altitude ride, but also making the plane a little bumpy in turbulence. Yaw dampers are a must. Each wing contains 60 useable gallons. Each wing tank feeds into a collector sump, where a boost pump is activated when the pilot selects left or right tank. The tail juts upwards to 11.3 ft. The plane sits impressively on the tarmac.

Cabin Class Comfort

Entering the aircraft through the air-stair clamshell door leaves no doubt about the cabin-class nature of the beast. The Malibu has chains covered with fabric supporting the doors, while the Mirage has retractable cables. Steps automatically deploy on the door when the bottom half of the clam is lowered. Locking the door for flight is accomplished with a large handle turned 90 degrees, and four green gauges indicate the door is sealed.

The cabin is large, light and inviting. Passengers are ensconced in a room 49.5 in. wide and 47 in. tall, with 38 in. and 37 in. of headroom in the front and rear seats, respectively. From the instrument panel to the rear bulkhead is a generous 148 in. Many airplanes have plush leather seats, all of which recline. Each passenger has a private reading light, cup holder and ventilation outlet. A folding writing table sits between the right fore and aft passenger seats. The rear baggage compartment is located behind the aft seats, holding 20 cubic feet or 100 lbs, all within the pressure vessel. (The forward baggage space just behind the engine is of limited use due to CG limitations, in spite of the stated 100 lb max, but the space is nice to have for light gear).



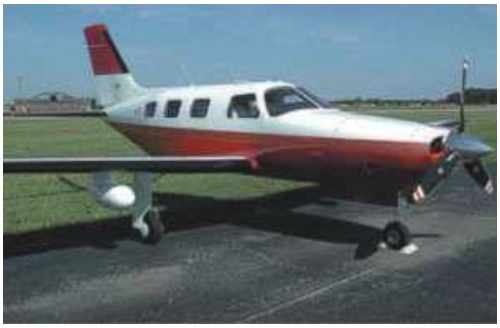
The cockpit is easily accessed between the two forward seats and is spacious and properly organized for this class of airplane. Visibility is excellent and noise levels are quite low, largely due to a pressurized cabin, and the fact that the forward baggage compartment insulates the cockpit from the engine. Instruments are logically presented. The Transicoil Enhanced Digital Indicators provides analog and digital readouts of all relevant engine parameters, fuel flow, and outside temperature. A big difference in cockpit organization was introduced in 1996, when some of the switches were moved overhead, freeing up panel real estate, and making cockpit organization more ergonomically friendly. The seats recline, move fore and aft, and up and down. Two large drawers behind the pilot and co-pilot seats provide convenient storage for charts, approach plates, maps, and emergency items that should be within easy reach. Large pockets are also on both sides of the cockpit just in front of the seats. Heating and air vents are individually controlled on both sides.

The Nitty Gritty

The electrical system is robust, with dual 28-volt, 75-amp alternators and a 24-volt, 10-amp-hour battery. Circuit breakers are also on both sides of the cockpit, making access to some a bit awkward. Breakers for the autopilot and autotrim are on the right side, near the panel. The pilot has to reach over, and then around the yoke, to pull those. The hydraulic pump breaker, which is pulled during emergency gear extension, is on the left within easy reach. Almost all other switches are of the large rocker variety. The battery, alternators, mags, nav lights, de-icing equipment, heaters, blowers, air conditioner, dump switch and yaw damper are all rockers. Interior lighting is controlled by rotating reostats.

The de-icing system is effective, although any icing encounter should be exited immediately as with any GA airplane. One big change in the de-icing system to note is that in 1995 Piper went to a glass heated windshield on the pilot's side. The de-ice boot inflation system is divided into three six-second segments, automatically cycling through the segments with one push of the boot switch. The wing

boots inflate in two stages, with the lower half inflating first, then the upper. Watching the boots in action in ice is impressive. New Mirages now have the Smartboot™ system by BF Goodrich, which detects and measures ice buildup, indicates when to activate the de-ice system, and verifies that ice has been removed. With either the old or new systems, using the autopilot in icing is a bad idea. An ice bridge can easily form, resulting in loss of elevator control. Other weather gear in most cockpits include the WX-1000 Stormscope™ and RDR-2000 Vertical Profile radar.



New airplanes have a number of changes in the panel. For example, the new airplanes have dual Garmin 430s, versus the KLN 90B found in earlier years. Most of the PA-46 fleet has a KFC-150 autopilot in the panel, with a flight director, auto electric trim, altitude hold and VOR/LOC/GS coupling. Model year 2000 planes, however, have an S-TEC System 55 Flight Control System. The move to the S-TEC system is considered controversial by many people. The debate about rate-based versus attitude-based autopilots is fairly heated, but in reality the difference is more one of taste and preference (again similar to the wine or hair color discussion above). But the difference is worth a small digression.

Rate-based systems such as S-Tec/Meggitt use the electric turn coordinator rate gyro, which does not depend upon the aircraft vacuum system or attitude gyro. With a rate-based unit like the S-Tec/Meggitt, if either the vacuum system or attitude gyro fails, the turn coordinator and the autopilot are unaffected. Having a separate gyro control the attitude indicator and autopilot could be an advantage in IMC if one fails. Also, a rate gyro will not tumble due to unusual attitudes. Because they do not tumble, rate gyros will function in any attitude and are not damaged or worn excessively by unusual attitudes. On the other hand, with attitude-based autopilots, attitude information is better for rapid recovery in turbulence because the roll signal is not influenced by yaw angle or rate. Also, an attitude-based system banks the aircraft at a pre-set maximum bank angle (usually 20 degrees), independent of aircraft speed. As a result most attitude based autopilots handle turbulence better than rate autopilots because they are able to correct the turbulence input more rapidly with less course error. Proponents of both systems claim that one gives a better, smoother ride. In either case, all new Mirages have the S-Tec/Meggitt system for better or worse.

Finally, new airplanes have 3-blade Hartzell props, compared to the old standard 2-blade, although four-blade propellers are also STC'd for the Malibu and Mirage. Several other modifications are available. An extended range tank, which actually consists of new filler ports farther outboard that yield additional capacity in the wet wing, provides for 10 more gallons per side, or about another hour of flight. A TCM IO-550 is STC'd for the Malibu, but not the Mirage. Several interior mods are also available.

Time To Fly

The complicated history of the airplane, and controversies suffered through the years, are quickly forgotten when nestling into the left seat. Start-up procedures are straightforward for anyone used to turbocharged engines. Taxiing requires a firm step on the pedal, but control is tight and comfortable. The plane has some complicated systems, and these need to be carefully examined in the run-up. This includes a thorough ground test of the autopilot, a review of all the Transicoil readouts, and confirmation that you have 28 volts and both alternators on line. Set the cabin pressure. The pressurization system is nearly foolproof, easy to use and reliable, but a little care is needed if you want to avoid maxing out the pressure vessel on each flight.

Takeoff And Climb

1996 Malibu Mirage Statistics

Price: $695,000

Engine: Lycoming TI0-540-AE2A, 350 hp, 6 cylinders

Propeller: Hartzell 2 blade, constant speed

Weights

The tower clears you for takeoff. Fuel pump on, AC off, strobes on, transponder on, and throttle full forward. Takeoff using full throttle (42 in.) and 2,500 RPM gives reasonable acceleration, but you'll know that you are not flying a jet. Rotate at 80 knots, gear up, climb at 120 knots, and at 1,000 feet AGL, reduce throttle to 35 in. and switch off the fuel pump. This configuration will typically give about 900 feet per minute, keep the CHTs below 400 degrees, the TIT below 1650 degrees, and consume about 35 gph. (Mixture is full rich in all climbs). Somewhere in the climb the airspeed will have to dip to 110 knots to maintain 900 fpm. At higher altitudes, again depending on conditions, the climb rate will have to be reduced to 500 to 700 fpm to keep the CHT and TIT happy.

At cruise, reduce to 28 in., 2,500 RPM and lean to about 20 gph, again depending on altitude and temperature. Sometimes leaning will be limited by TIT, other times by CHT. I never let TIT exceed 1650 nor CHT 400 in any condition. To avoid a fuel imbalance of more than 10 gallons per side, a switch between left and right tanks will be necessary during the climb. If you want to extend the range, go to 26 in./2,400 RPM, and the fuel burn will be about 18 gph.

Cruise Performance

Regardless of book values, experience shows that the airplane will hit a true airspeed of just over 200 knots, burning 20 gph, in the flight levels, at 28 in./2,500 RPM. To maintain realistic reserves, I have never planned a trip over 800 nm without a fuel stop (I do not have extended range tanks), and that only in VMC. If the destination is marginal or worse, my longest distance gets reduced to 600 nm. These limits are conservative, but practical and safe.

The PA-46 handles well above and below 18,000 feet. Control authority is surprisingly good all the way up to FL250. One downside to the long, high-aspect-ratio wings is a low maneuvering speed. In a normal descent, staying at or below Va is nearly impossible. Most pilots I know descend at the top of the green arc, unless the air is turbulent. I personally avoid that by requesting a cruise descent well prior to my arrival. (At 20,000 feet, I start my descent 120 miles from the destination, using a leisurely 500 fpm rate until I get to warmer altitudes when I can start reducing power). The landing gear is an effective speedbrake, and can be lowered at 165 knots (170 on the Malibu). Once down, the gear can be left out to nearly the top of the yellow arc (Vne). The Mirage can dive with the best of them if necessary with gear down and flaps up. But lowering the gear at altitude is not optimal unless you need to get to the ground quickly. The first notch of flaps can be lowered at the same time as the gear for more stately descents.

Approach And Landing

Back at the airport, the landing is conventional with no surprises. Intercept the localizer with 20 in. Hg, 2,500 RPM at 120 KIAS. Gear down and first notch of flaps at glideslope intercept will give you a 500 fpm descent at 100 KIAS, right down the pipe. Full flaps and 80 knots over the numbers set you up for landing.

Cost Of Ownership

The PA-46 is

MGTOW: 4,300 lbs. Standard Empty Equipped

Weight: 3,080 lbs.

Standard Useful Load: 1,238 lbs.

Dimensions

Wing Area: 175 square feet

Wing Span: 43 feet

Length: 28.9 feet

Height: 11.3 feet

Cabin Length: 148 inches

Cabin Width: 49.5 inches

Cabin Height: 47 inches

Headroom: 38 inches (front and middle seats), 37 inches rear seats

Fuel and Oil

Useable Fuel: 120 USG

Oil Capacity: 12 qts

Baggage Capacities

Forward area: 100 lbs, 13 cubic feet

Rear area: 100 lbs, 20 cubic feet

Range

Normal Cruise: 1,055 nm (you'll never see it)

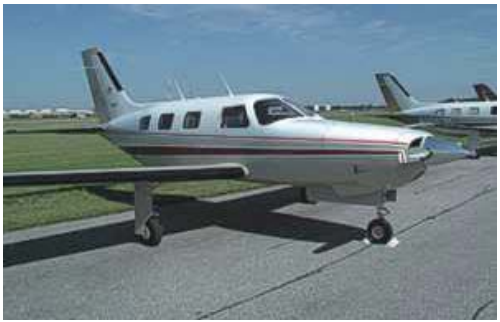
Economy Cruise: 1,340 nm (you'll never see it)

Performance

High Speed Cruise: 213 knots (norm cruise pwr, mid cruise wt)

Max Speed: 220 knots (at mid cruise weight)

Stall: 58 knots (full flaps)



an amazing machine, wonderful to fly, but expensive to maintain. Actual cost per hour figures vary widely between pilots, flying new and old machines and using different methods of accounting. In my first year of ownership, flying about 200 hours, my experience has been that the cost of ownership and operation (both direct and indirect) is on the order of $250 to $300/hour. Direct costs include those expenses directly related to flying the airplane: oil, gas and maintenance (airframe, avionics, prop and engine). Indirect costs are incurred whether the plane is in the air or not, and include insurance, hangar, pilot supplies, and database subscriptions. My figure is admittedly somewhat inflated because of expensive first-year maintenance and upgrades that will not be recurrent. Also, I hope to fly closer to 300 hours next year, bringing down the hourly cost. Others may find the final figure closer to $200/hour or even less. These numbers do not include the cost of financing the purchase.

Service Ceiling: 25,000 feet

Max Differential Pressure: 5.1 psi

Takeoff Distance Ground Roll: 1,090 feet

Total over 50-foot obstacle: 2,090 feet

Landing Dist Ground Roll: 1,020 feet

Total over 50-foot obstacle: 1,960 feet

The Malibu Mirage is a proud flagship of Piper's piston line of aircraft. While a long distance from the J-3 Cub in the most obvious ways, the Malibu Mirage is an appropriate product of Piper's dream of building affordable planes dating back to the Cub. The price tag of a Mirage will definitely take one's breath away, but the airplane is actually modestly priced compared to its closest cousins, the cabin-class twins. Once when asked if he liked being thought of as the "Henry Ford of aviation," Piper reportedly replied that a more accurate description would be that Henry Ford was the "Bill Piper of automobiles." No doubt, in that long tradition, William Piper would be proud of the Malibu Mirage.