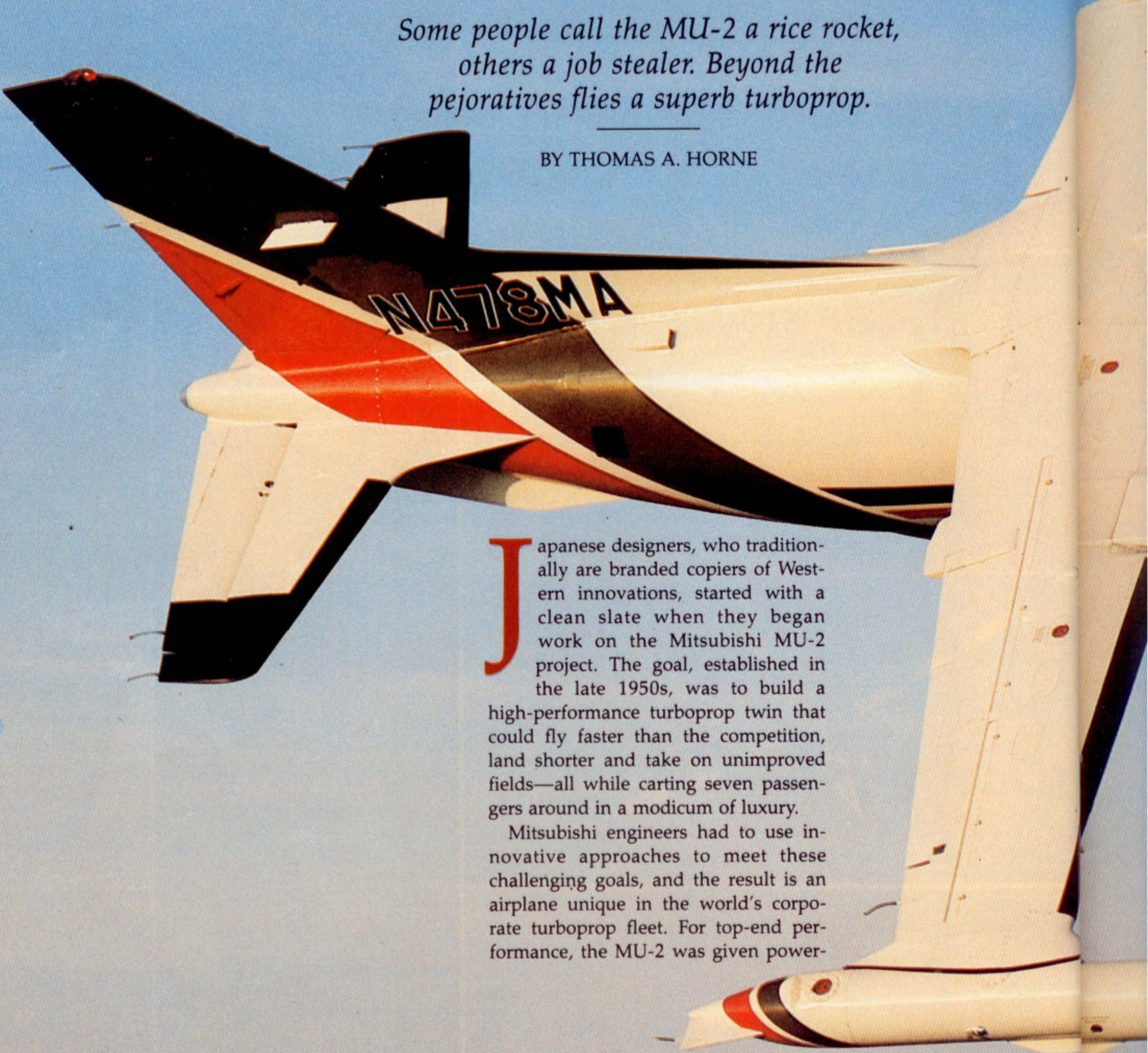
MITSUBISHI MARQUISE

Some people call the MU-2 a rice rocket, others a job stealer. Beyond the pejoratives flies a superb turboprop.

BY THOMAS A. HORNE



Japanese designers, who traditionally are branded copiers of Western innovations, started with a clean slate when they began work on the Mitsubishi MU-2 project. The goal, established in the late 1950s, was to build a high-performance turboprop twin that could fly faster than the competition, land shorter and take on unimproved fields—all while carting seven passengers around in a modicum of luxury.

Mitsubishi engineers had to use innovative approaches to meet these challenging goals, and the result is an airplane unique in the world's corporate turboprop fleet. For top-end performance, the MU-2 was given power-

PHOTOGRAPHY BY ART DAVIS

ful Garrett AiResearch TPE331 turboprop engines and relatively small, laminar-flow wings. Full-span, Fowler-type flaps provide the extra lift and lower stall speed needed for slow flight and short-field takeoff and landing speeds. To handle the shocks from rough fields, fuselage-mounted landing gear based on that of the Lockheed F-104 fighter (Mitsubishi at one time built F-104s under license from Lockheed and the U.S. Government) was chosen. And the MU-2's high-wing design permits two feet of propeller ground clearance, protecting the props from stone damage and ground strikes.

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The MU-2's Federal Aviation Administration type certificate was granted in November 1965. From the moment it was introduced into the United States, the airplane created a sensation. Its smooth lines, aggressive appearance, heavy-duty construction, spoilers and flaps injected some fresh air and advanced concepts into the turboprop market. The lure of having a near-STOL hot rod capable of blasting out of a 2,000-foot strip, then scorching along at a King Air-killing 300-plus KTAS also played a large part in earning the MU-2 its place in the American market. It has a macho appeal as a pilot's airplane—a reputation built on speed and its unconventional control feel and the perception that it is difficult to land smoothly, irksome in a crosswind and difficult to control if an engine fails.

There are spoilers for roll control in the MU-2, and the idiosyncrasies of this control arrangement challenge many pilots on their first few outings. The good news about the spoilers is that they bring crisp turns without the adverse yaw that ailerons produce. They also are more effective than ailerons at slow airspeeds. The bad news is that they create large amounts of drag, and in an engine-out situation this is the last thing you need when trying to reconfigure the airplane for a single-engine climb.

First impression of the spoilers' control feel is that they have the artificial feel of an arcade-game linkage. There is a flat spot in the control yoke's linkage, and when you release the controls, the yoke springs back to the horizontal, center position.

Since the spoilers cannot be used to trim the MU-2 in the roll axis, Mitsubishi gives the airplane electrically driven trim ailerons. These ailerons are at the flaps' trailing edges and can be positioned up to 14 degrees up or down to help trim the airplane wings-level. The drill for trimming is to leave the yoke in the center and blip the trim switch until the wings level.

During takeoff and landing, spoiler inputs should be kept to a minimum. The spoilers are so sensitive that the pilot could enter a pilot-induced-oscillation as he chases his roll inputs.

For takeoff, using 20 degrees of flaps is standard procedure. This enlarges the airplane's small wing area by 42 square feet (it measures only 178 square feet, just four square feet larger than a Cessna 172's wings). This increases lift and lowers the MU-2's stall speed from 106 knots (clean configuration) to 85 knots.

Even with the help of the flaps, there is exposure to a period of marginal controllability should an engine fail on climb-out. With a rotation speed of 90 knots, a gear retraction time of 13 seconds and a Vyse (single-engine best-rate-of-climb speed) of between 140 and 152 knots, an MU-2 can take several tense seconds to accelerate to a safe climb speed, if an engine fails in the initial stages of the climb-out. Compounding the mystery of how long this can take is the absence of any accelerate/go charts in the performance section of the MU-2 manual. An accelerate/go chart indicates the distance an airplane will need to clear a 50-foot obstacle, assuming an engine failure at lift-off and immediate feathering of the inoperative engine. Configuration changes bring with them the need to retrim the MU-2 about all three axes. It takes a while to acquire the deft touch that an MU-2 pilot needs to make efficient roll and yaw trim inputs. This work load is an unwelcome chore during instrument approaches and can be a dangerous distraction for untrained pilots coping with an emergency.

Landings provide the most challenge for MU-2 pilots. Experienced instructors claim that a minimum of 30 landings is required for an initiate to get the hang of it, true of any airplane in this category. The usual procedure is to come down final at 120 knots with 20 degrees of flaps, then cross the threshold at 90 to 100 knots (depending on the airplane's gross weight) and touch down at 80, carrying a small amount of power. The thrust levers—the turboprop equivalent of a reciprocating engine's throttles—should be positioned just ahead of Flight Idle.

Full flaps (40 degrees) can be selected on final approach when committed to land, but their use is discouraged in single-engine landings and in IFR conditions when ceilings are near minimums. If a single-engine go-around becomes necessary, a full flap MU-2, as will any twin, will take too long to reconfigure for a climb, and the pilot may have to nose the airplane over in order to pick up the necessary climb airspeed. The low-ceiling caveat has to do with the airplane's tendency to balloon while lowering the last increment of flaps. The problem is that it may balloon back into the overcast, necessitating a missed approach.

The MU-2's high wing loading (65 pounds per square foot in the newer Marquise models) and propeller drag often means a high sink rate if power is removed as the airplane nears touch-

Much of the equipment in the MU-2's well-equipped cockpit is standard, including a Sperry autopilot/ flight-director system. A known-icing package is also standard. Passengers are well accommodated, too.

continued

down. This is usually followed by a firm arrival on the main gear. The nosewheel is soon to follow (unless the pilot hauls back on the stick), and the impression of a hard landing is reinforced by the noise transmitted through the airframe by the fuselage-mounted landing gear. Though the airplane can be made to land smoothly, greasers are infrequent and experienced only by those who diligently keep the power in until the main wheels touch. You must fly the airplane right onto the runway.

Once the airplane has touched down, reverse thrust can shorten the ground roll dramatically. This is perhaps the most satisfying element of an MU-2 landing. Landing distances of 1,800 feet are common, and precise pilots rarely miss the first turnoff.

To keep the landing from becoming any more exciting, pilots must be prepared for the yawing that frequently accompanies an MU-2 arrival. With so much weight on the nosewheel (approximately 1,700 pounds on the newer models), the weight of the fuel in the tip tanks and the rarity of pulling equal amounts of reverse thrust on each engine, the airplane can begin yawing during the rollout. Crosswinds aggravate this situation.

The operation of the Garrett AiResearch TPE331 engines is a snap, especially in the more recent Solitaire and Marquise. These engines come with a single redline (SRL) computer, the brain behind the newer Garretts'

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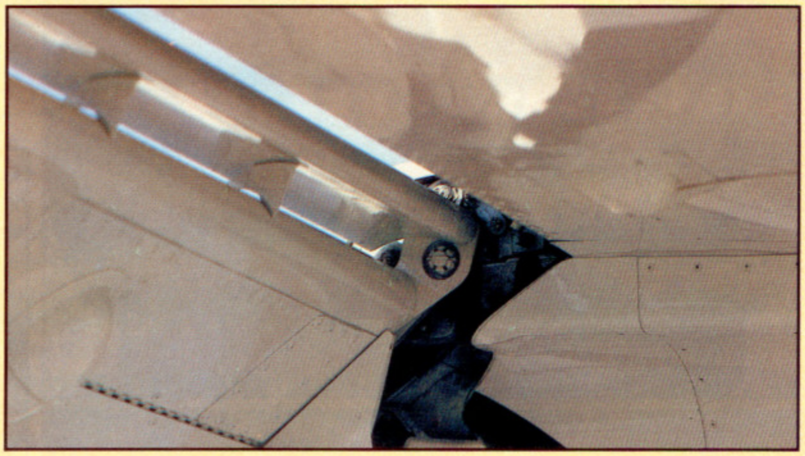
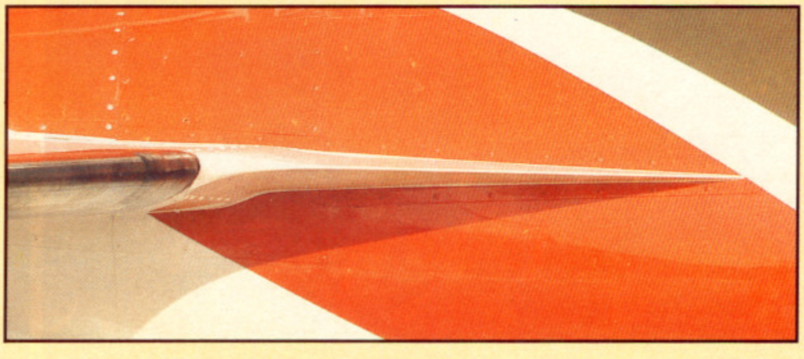
The distinctive shape of the MU-2 is apparent from any angle. The main gear doors are huge.



The large slotted, Fowler-type flaps increase wing area from 178 square feet to 220 square feet when extended to the 20-degree (takeoff and approach position. The above picture shows the flaps fully extended. The horizontal stabilizer has a pronounced inverted airfoil shape (below). The strake has a sharp leading edge.



starting sequence. Other modern turboprop twins (such as the Gulfstream Commander 1000 and Fairchild) also use the SRL-equipped TPE331.

Push the Start button on the power quadrant, and the computer starts the engine for you. The engine rotates, fuel is admitted to the combustion chamber, and ignition occurs at 10-percent rpm. The computer also "calculates" ambient temperature and pressure conditions to allow a constant exhaust gas temperature redline limit of 650°C. This relieves the pilot from figuring a different redline before each engine start. The pilot still must monitor the engines' temperatures, though, so that limitations are not exceeded. Earlier models (from the MU-2B through the MU-2P) do not have engines with SRL computers, and pilots must calculate redlines using a chart. The SRLs' main drawback is that the engines will not start if they malfunction.

Because the TPE331s have a single-shaft design, and are mated with wide-chord propellers, Garrett engineers had to come up with a means of reducing the huge amounts of drag that a failed engine's windmilling propeller could generate. The TPE331's propeller is connected to the same shaft that holds the engine's compressor and turbine wheels. When a propeller windmills, it drives the entire engine. A negative torque sensing (NTS) system is used on TPE331s to sense when the propeller is turning the engine. If the propeller begins to windmill, the NTS signals the propeller to move toward the Feather position, reducing drag. This is sometimes referred to as an auto-feathering device. That is incorrect. The NTS merely allows the windmilling propeller's speed to match the dying engine's rotational speed; the pilot still has to move the condition levers to Emergency Stop to feather the propeller completely. Taking off with an inoperative NTS system is prohibited.

Garrett powers all MU-2s to some impressive true airspeeds. Even the first MU-2Bs, with the 605 eshp (equivalent shaft horsepower: the addition of the exhaust thrust to the engine's rated horsepower) engines, could turn in a 269-knot cruise speed. A new Marquise's engines put out 778 eshp and 307 KTAS. The Solitaire, the short-body hot rod of the series, does 320 KTAS at its maximum cruise power of 98-percent rpm.

Over the years, Mitsubishi has been able to say that the MU-2 is the fastest corporate turboprop in the world. This title recently has been challenged by the 293-knot Cessna Conquest II and the new, 321-knot Beech Super King Air 300. Still, at their lightest weights, highest power settings and most favorable operating conditions and altitudes, the new Piper Cheyenne III will do 296 KTAS, the Beech Super King Air F90, 269 and the Gulfstream Commander 1000, 303. The MU-2, known informally as the "rice rocket," bests all these speeds, but only when operating between 18,000 and 21,000 feet.

That is what the performance charts say, but some operators say that MU-2s with the "pre-Century" (TPE331-10) engines (the TPE331-25AA, -1, -5, and -6) lose power above 10,000 feet or so. Most of these gripes center around the older Garretts' inclination to lose available power after about 1,000 hours of operation. Some have found that premature compressor and turbine blade wear are to blame.

The Solitaire's and Marquise's -10 engines have had problems, too. Premature carbon build-ups have prompted Garrett to design what it calls a carbon-free combustion chamber for -10 engines built after mid-1983.

But these problems pale in significance when you consider the costly airworthiness directives (ADs) levied against several hundred engines in the MU-2 fleet. A series of expensive ADs, beginning with AD 78-4-5 and culminating with AD 84-1-4, require that many pre-Century engines have their third-stage turbine wheels replaced. This AD resulted from several incidents and accidents in which defective turbine wheels failed catastrophically.

Garrett prefers to keep all of its engines' maintenance work in its 21 service centers and seven overhaul shops. Garrett shops will take care of the AD compliance for a flat rate of $5,900 per engine. Overhauls run an average of $63,800 per engine. Hot-section maintenance is billed at a flat rate of $20,000 per engine. Hot-section work must be performed at 1,800-hour intervals and involve cleaning, inspection and repair of the combustion chamber, compressor and turbine wheels.

Non-Garrett-approved service facilities may be able to beat Garrett's prices in certain cases. For example, Montana Jet Star, of Billings, Montana, says it will do Garrett overhauls for $50,000 per engine and a hot-section for anywhere from $3,500 to $15,000—depending on maintenance needs.

If the MU-2's engines have been troublesome, its airframe has proven unusually reliable. There have been 13 airframe ADs, most of them minor. Mitsubishi reports a dispatch reliability of 98 percent and at one time offered a 25,000-hour warranty on the airframe. Today, a Mitsubishi spokesman says, the warranty extends "several years."

When the MU-2 was introduced in the United States in 1967, Mitsubishi Heavy Industries contracted with the Mooney Aircraft Company to handle the MU-2's American assembly, sales and maintenance operations. Mooney built an assembly facility in San Angelo, Texas, where MU-2 parts—shipped in three crates from the primary factory in Nagoya, Japan—were made into the finished product.

Mooney ran the Mitsubishi program until 1970, when Mooney's bankruptcy and charges against Mooney corporate chiefs convinced the home office to assume direct control. Mitsubishi established a wholly owned subsidiary, Mitsubishi Aircraft International, to take care of its aviation business. Since 1970, MAI has expanded the San Angelo plant and established a worldwide corporate headquarters in Dallas.

From the early days of the "Mooney MU-2" through the current Solitaire and Marquise models, the airplane has undergone a series of hefty jumps in power, gross weight and useful load. The airplane's electrical, environmental

continued

and pressurization systems also have been refined over the years. This, and competitive pricing (an average-equipped 1967 MU-2B sold for approximately $390,000; a 1967 Beech King Air A90 went for about $420,000) started sales off on a strong note.

But by 1981, MU-2s had been involved in several attention-getting accidents. NTSB began to question the MU-2's design. One investigation centered on the Garrett engines. Investigators wondered if toxic fumes leaking past an engine seal, through the pressurization system and into the cabin caused a number of unexplained accidents. Investigations, however, exonerated the MU-2's engines and pressurization system. Though still puzzled, NTSB gave the MU-2 a clean bill of health.

A series of 31 fatal accidents that took place between 1975 and 1983 prompted NTSB to issue safety recommendation A-83-56, in which it recommended that the FAA conduct a special certification review of the MU-2. The FAA agreed, and ordered a certification review. All the subjects mentioned in the recommendation have been included in the review.

NTSB wanted a study of the airplane's engines, fuel, autopilot and flight control systems; flight in known-icing-conditions characteristics; inoperative engine characteristics; and handling characteristics during IFR landing approaches. Critics of the MU-2 latched onto the sensationalism, and its reputation as a "pilot-killer" was born.

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Some pilots call the large main gear enclosures dolly partons.

Now the MU-2's strengths have been cast in a new light. The wings and powerplants that drive the airplane to such high speeds now are being scrutinized. Is the yaw and roll produced by asymmetric thrust inordinate for this category of airplane? Are special operational procedures necessary? Does the potential exist to improve the Garrett engine's design and maintenance procedures? Most of the engine-failure accidents involved high-time MU-2 pilots. Why, NTSB wondered, were they not able to handle an emergency procedure with which they should have been prepared to deal?

The fuel system is being questioned because of double-engine flameout accidents. The fuel system was designed with simplicity and low pilot work load in mind. Bleed air from the engines' compressors pumps fuel from the tip tanks to two outer wing tanks. From there, electric transfer pumps move fuel to a center tank. The engines draw from the center tank only. The tanks deplete from the tips inward, and there is a manual override to help balance fuel loads in the outer wing tanks. There are no crossfeed controls.

The fuel systems' biggest drawback is that contaminants in any one tank eventually will find their way to both engines. The 1967 MU-2B had an additional problem: A lack of discrete systems for pressurized air to the deicer boots and tip tanks meant that, if these airplanes lost pressurization, they lost the use of their tip fuel and boots, too. This problem was corrected beginning with the MU-2D models.

The MU-2's behavior in icing conditions was included in the NTSB recommendation out of a suspicion that the MU-2's high wing loading and spoilers may compromise the airplane's performance in icing conditions, though the wording of the recommendation was not specific on this point. The implication was that the airplane's inability to handle icing may have caused several otherwise unexplainable accidents.

Still other accidents caused by what NTSB calls a "sudden, unexplained loss of control" brought up the question of the MU-2's stability in instrument meteorological conditions. The NTSB recommendation suggests that the MU-2 is too short-coupled, trim-hungry and squirrely to be anything but a Pandora's box in IFR flight.

As we go to press, the certification review had not been completed. But a Mitsubishi spokesman stated that so far tests had proven that the MU-2 is "in compliance with all the certification requirements that were in effect at the time the MU-2 received its type certificate."

Some safety experts believe that the pattern of MU-2 accidents suggests economic roots. According to this theory, when the MU-2 was young, it attracted clientele from well-heeled corporations and from the ranks of those seeking high-performance twin-engine turboprop airplanes—those who had a professional attitude toward flying and who maintained their proficiency.

As MU-2s entered the used market, they represented a relatively inexpensive way for less affluent owner/pilots to move up from piston twins to a much faster turboprop. The Garrett AD, the accidents and the certification review have all driven the selling price of used MU-2s to ever-lower levels. The Aircraft Bluebook prices of the earlier, less powerful, low-TBO and less refined models are especially tempting. A 1967 MU-2B is listed at $125,000; the 1968 MU-2D can go for as low as $130,000, according to book prices. Even later models—such as the 1972 to 1974 MU-2K, with its 724-eshp engines, higher service ceiling, 3,600-hour TBO, dual electrical bus and battery system and higher useful load—reportedly will go for some $320,000. Tempting, for those looking at the prices of new turboprops that cannot go as fast. The danger is that operators with an unprofessional attitude may try to bargain with safety and opt for a cursory, cut-rate check-out.

Mitsubishi and FlightSaftey International (FSI) realize that the MU-2 is a demanding airplane and that pilot knowledge, competence and proficiency are the keys to preventing accidents (see "Turbine Time in the Box," this page). Since 1975, FSI has been conducting pilot training for the MU-2 at its training center in Houston. In 1982 and 1983, Mitsubishi paid substantial portions of more than 150 pilots' tuition for the course. The cost of the FSI pilot initial course is included in the price of all new MU-2s. Used MU-2s sold through the Mitsubishi used aircraft department also have the FSI course included in their price. FSI's MU-2 pilot initial course costs $6,750; recurrent training costs $3,275 for a single, one-week session or $4,725 for a package of two annual one-week sessions.

Mitsubishi offers its own scaled-down version of a proficiency program in its P.R.O.P. (Pilot's Review of Proficiency) seminars and videotapes.

Compounding the MU-2's troubled

TURBINE TIME IN THE BOX

In the MU-2's tailcone, behind the mirror at the aft cabin, is a large, 200-amp circuit breaker. If it pops (as it is wont to do during engine starts), if the pilot flies with the electrical system in this state and if the airplane loses an engine-driven generator and a battery, the remaining generator and battery will not be able to power the airplane's full electrical system. The MU-2 uses a dual-bus electrical system, but if the big circuit breaker behind the mirror has popped, the advantages of this system are cut in half. If the 200-amp circuit breaker does not check out during the preflight bus tie check, the pilot has to perform some extra preflight duties. He has to remove the mirror, then reset the circuit breaker (a broom handle works well) before taking off.

This little procedure, while not as critical to the safety of flight as the handling of an engine failure, is indicative of the detail imparted to pilots who attend FlightSafety International's pilot training courses. It is a procedure that you will not find in the Mitsubishi pilot's operating handbook, but one that the well-trained MU-2 pilot should know. The absence of this and other important details in the MU-2's operating handbook makes the FSI course a valuable addition to a pilot's competence. Amplified explanations of both normal and emergency procedures are missing in the MU-2's manual as well as accelerate/go performance charts.

FlightSafety International is an impartial broker of safety. It has no airplanes to sell—only five days, 20 hours of ground school and 10 hours of simulator flight in its pilot initial curricula. FSI represents the big league in the world of pilot training and proficiency. With a client list that includes the flight departments of virtually every major American corporation and courses for nearly every heavy piston twin, turboprop and business jet on the market, FSI's training centers enjoy a booming business.

At the heart of the FSI training program is a fleet of very sophisticated simulators. Manufactured by a subsidiary of FlightSafety, these simulators create a very realistic environment in which to practice emergency procedures and gain familiarity with an airplane's performance limitations.

In the simulator's cockpit, you will find everything that appears in the real airplane, right down to the ashtrays. A computer ensures that the simulator will react to pilot inputs in an authentic manner. Surrounding the windshield are projectors that give the pilot realistic nighttime scenes that include not only runways and airports, but other geographic features—bridges, obstructions, causeways, monuments, whatever a particular airport environment calls for.

The beauty of the simulator is that it allows you to experience dire emergencies without the worry of crashing—and allows you to repeat emergency procedures until you are proficient.

In the MU-2 simulator a pilot can experience engine failures on takeoff—this cannot be simulated safely using the airplane. Until the pilot has his procedures nailed down, he probably will "crash." It is an effective way of showing the right and wrong ways to handle an emergency.

But engine failures are just one of a myriad of emergencies in store for the MU-2 trainee. Here are some of the emergencies you can look forward to in training:

Hot start; hung start; failed overspeed governor during runup; engine fire on the takeoff roll; split flap after takeoff; engine failure immediately after takeoff; generator failure; inverter failure; boost pump failure; single-engine ILS, VOR and NDB approaches; electrical fire; trim aileron failure; landing-gear malfunctions; pitch trim runaway; engine failure during VFR approach; engine failure at MDA and DH during instrument approaches; single-engine go-around.

An instructor can dial in any number of malfunctions or meteorological hazards. He pushes one button, and you lose the fuel cap on the tip tank and begin venting fuel overboard. He pushes another, and the NTS fails. He dials in an overgross condition, moves the center of gravity too far aft, sets an engine on fire, punches up severe turbulence and icing, then makes you shoot an approach with a fuel imbalance in zero-zero weather conditions. All of this is possible, and very convincing.

If simulator time is the glamorous portion of an FSI course, the ground school is the meat and potatoes. The curriculum is designed so that you learn about a system in a morning session, then ride the simulator in the afternoon for hands-on experience.

FSI claims that it has achieved a 20-percent penetration of the MU-2 pilot population. The percentage should be higher; the MU-2 is kind only to the proficient.

Perhaps the cost of the course ($6,750 for the pilot initial) drives some operators away, even though reduced insurance rates are available to FSI graduates.

But fast-and-dirty check-outs are a false economy in the MU-2. It may be perfectly legal for a pilot to earn his multi-engine rating in a Piper Seminole, then plunk down his cash and hop in an MU-2 as pilot in command. Some salesmen use this as a pitch to a prospective purchaser's ego.

But there is a right way and a wrong way to transition to one of the hottest turboprops in the world. And a few touch and goes in the pattern is just not enough.

The MU-2 training courses are held at FSI's Houston Learning Center, 7525 Fauna at Airport Boulevard, Houston, Texas 77061; 713/644-1521. *—TAH*

MARQUISE

image is the recent protectionist sentiment against products of Japanese origin. Ever since the early 1960s, Japanese goods have claimed an ever larger share of the American market. And what began with television sets, computers, automobiles and steel, conservatives fear, may yet extend to the aviation industry. Concerned executives representing Piper, Beech, Cessna, Mooney, Gulfstream Aerospace and Fairchild Aircraft have formed the American Business Aircraft Committee (ABAC). This organization has sent letters to many major corporations urging that they buy American-made airplanes. The committee echoes the general feeling pervading American business today: that foreign, govern-

SPOTTER'S GUIDE

MU-2A

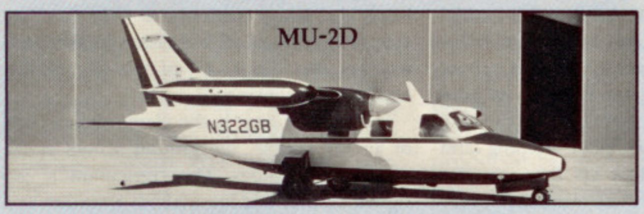
Design work on the MU-2 in 1959. The first prototype of an MU-2 had its maiden flight in September 1963. This model, designated the MU-2A, was powered by two 562-eshp Turbomeca Astazou IIK engines. Plans to market the MU-2A were canceled in 1965 after three aircraft were built.

MU-2B

First flew March 11, 1965. Marketed 1965 to 1967; 28 sold. Powered by 605-eshp Garrett TPE331-25AA or AB engines; 2,000-hour TBO. Seats seven to nine. Certified ceiling, 25,000 feet; 4.16-psi pressurization system. Max cruise, 315 KTAS. Empty weight, 5,615 pounds; max takeoff weight, 8,930 pounds. Fuel capacity, 295 gallons. Price new, $390,000; current blue book price, $125,000.

MU-2C

An unpressurized version sold to the Japanese Ground Self-Defense Force for liaison and reconnaissance.



MU-2D (MU-2B-10)

Marketed in 1968; 16 sold. Powered by 605-eshp TPE331-25AA engines; 2,000-hour TBO. Seats seven to nine. Speed, ceiling and pressurization specifications same as MU-2B. Empty weight, 5,700 pounds; max takeoff weight, 9,350 pounds. Fuel capacity, 289 gallons. The D was the first of the series to use wet wings. Preceding models have bladder tanks. Price new, $403,000; current blue book price, $130,000.

MU-2E

An unpressurized search and rescue version built for the Japanese Air Self-Defense Force.

MU-2F (MU-2B-20)

Marketed 1968 to 1972; 112 sold. Uprated, 705-eshp Garrett TPE331-1-151A Century engines; 3,600-hour TBO. Seats seven to nine. Five-psi pressurization system. Max cruise, 296 KTAS. Empty weight, 6,300 pounds; max takeoff weight, 9,920 pounds. Fuel capacity, 375 gallons. Price new, $437,000 to $482,000; current blue book price, $260,000 to $287,000.

MU-2G (MU-2B-30)

First of the long-body MU-2s. Relocation of main gear in fuselage pods gives wider cabin dimensions. Marketed 1970 to 1971; 45 sold. Same engines as F model. Seats seven to 10. Certified ceiling, 25,000 feet, five-psi pressurization system. Max cruise, 283 KTAS. Empty weight, 6,700 pounds; max takeoff weight, 10,800 pounds. Fuel capacity, 375 gallons. Price new, $528,000 to $570,000; current blue book price, $265,000 to $270,000.

MU-2J (MU-2B-35)

Long-body. Marketed 1972 to 1974; six sold. Powered by 724-eshp TPE331-6-251M engines; 3,600-hour TBO. Seats seven to 11. Certified ceiling 25,000 feet. Max cruise, 300 KTAS. Empty weight, 6,800 pounds; max takeoff weight, 10,800 pounds. Price new, $622,000 to $745,000; current blue book price, $360,000 to $375,000.

MU-2K (MU-2B-25)

Marketed 1972 to 1974; 77 sold. Same engines as J model. Seats seven to nine. Max cruise, 317 KTAS. Empty weight, 6,350 pounds; max takeoff weight, 9,920 pounds. Price new, $568,000 to $632,000; current blue book price, $320,000 to $335,000.

ment-subsidized manufacturers are flooding the U.S. market with goods artificially priced at very low levels. ABAC claims that foreign aircraft manufacturers such as Embraer, Canadair, de Havilland, Avions Marcel Dassault, Israeli Aircraft, British Aerospace and Mitsubishi have an unfair advantage over U.S. manufacturers. "The buyer of a foreign airplane (or almost any other product) may be saving a few dollars while overlooking the cost to the U.S. economy in lost taxes, lost jobs, higher unemployment benefits and a slower recovery from recession," ABAC asserted. To point out what it considers the magnitude of the problem, ABAC claims 43 percent of all business jets delivered in the United States in 1983 were foreign products.

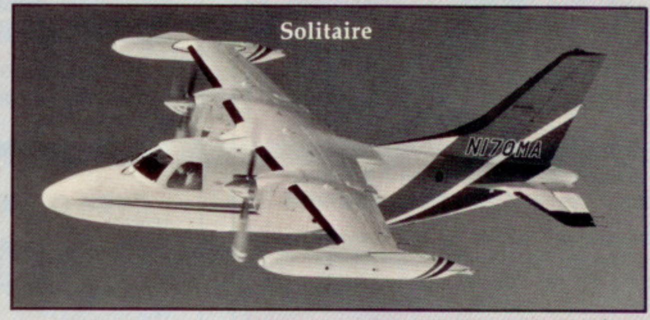
That Mitsubishi is a Japanese firm,

MU-2L (MU-2B-36)
Long-body. Marketed 1975 to 1976; 33 sold. Powered by 776-eshp TPE331-6-251M engines. Seats nine to 11. Six-psi pressurization system. Max cruise, 296 KTAS. Empty weight, 7,570 pounds; max takeoff weight, 11,575 pounds. Price new, $794,000 to $790,000; current blue book price, $450,000 to $465,000.

MU-2M (MU-2B-26)
Marketed 1975 to 1976; 28 sold. Powered by 724-eshp TPE331-6-251M engines; 3,600-hour TBO. Seats seven to nine. Certified ceiling, 28,000 feet; six-psi pressurization system. Max cruise, 317 KTAS. Empty weight, 6,892 pounds; max takeoff weight, 10,470 pounds. Price new, $687,000 to $708,000; current blue book price, $360,000 to $375,000.

MU-2N (MU-2B-36, -36A)
Long-body. Marketed 1977 to 1978; 42 sold. Powered by 776-eshp TPE331-5-252M engines. Certified ceiling, 25,000 feet. Max cruise, 296 KTAS. Empty weight, 7,696 pounds; max takeoff weight, 11,575 pounds. Slower-turning engines at takeoff power (1,591 rpm; earlier MU-2s developed 2,000 rpm), new four-blade propellers and better soundproofing mark this and all succeeding models. King Gold Crown radios, radar and flight director standard. Price new, $915,000 to $995,000; current blue book price, $550,000 to $575,000.

MU-2P (MU-2B-26A)
Marketed 1977 to 1978; 46 sold. Powered by 724-eshp TPE331-5-252M engines; 3,600-hour TBO. Certified ceiling, 28,000 feet. Max cruise, 316 KTAS. Empty weight, 6,898 pounds; max takeoff weight, 10,470 pounds. King Gold Crown radios, radar and flight director standard. Price new, $785,000 to $850,000; current blue book price, $425,000 to $450,000.



Solitaire (MU-2B-40)
Marketed 1979 to 1984; 55-plus sold. Powered by 727-eshp TPE331-10-501M engines; 3,000-hour TBO. Seats seven to nine. Certified ceiling, 31,000 feet. Max cruise, 321 KTAS. Empty weight, 7,101 pounds; max takeoff weight, 10,470 pounds. Fuel capacity, 415 gallons. Full IFR equipment standard. Price new, $980,000 to $1,852,000 (1983). Current blue book price, $520,000 to $1,000,000 (1982).

Marquise (MU-2B-60)
Long-body. Marketed 1979 to 1984; 128-plus sold. Powered by 778-eshp TPE331-10-501M engines; 3,000-hour TBO. Seats nine to 11. Certified ceiling 31,000 feet. Max cruise, 307 KTAS. Empty weight, 7,650 pounds; max takeoff weight, 11,575 pounds. Fuel capacity, 415 gallons. Full IFR equipment standard from 1980 on. Price new, $1,235,000 (1979) to $1,852,000 (1983); current blue book price, $690,000 to $1,852,000 (1983).

—TAH

MARQUISE

that Japan has been so successful in cornering large markets in the United States and that Japan discourages many U.S. imports through protective tariffs and complicated quota schemes, does not help Mitsubishi's case against America's protectionists. Though the Japanese government's powerful Ministry of International Trade and Industry promotes Japanese business abroad, Mitsubishi is not government-owned or -operated. Still, the company is linked with the dumping practices of other Japanese products. The fact is, with 735 total sales, the MU-2 represents a minor threat to domestic turboprop manufacturers. Beech's King Air sales total 3,662, and Piper has sold a total of 897 turboprop twins since 1974. Cessna's total twin turboprop sales are 502—in only four years.

Mitsubishi points out that all of its MU-2 turboprops and Diamond-series turbojets are assembled in Texas and that the company thus benefits the American economy. Mitsubishi pays American taxes, employs American labor and uses American materials in the construction of its airplanes. The company claims that 70 percent of an MU-2's parts and labor are American.

For all the clamor, MU-2 owners and operators still have a fierce loyalty to the airplane. But Mitsubishi may be tiring of the MU-2. There is talk of a new-generation Mitsubishi turboprop's appearance in four years and the suspension of MU-2 production. There is evidence that Mitsubishi is devoting most of its energy to its new entrants in the business jet market, the Diamond IA and upcoming Diamond II.

Regardless of Mitsubishi's future disposition of the MU-2, it is a safe bet that this controversial airplane will endure as a general aviation classic and will continue to live out its image as one of the most potent, most challenging and most misunderstood of all corporate twins. □

Mitsubishi MU-2B-60 Marquise
Base price $1,675,000
Price as tested $1,735,210
AOPA Pilot Operation/Equipment Category*: All-weather
Base price includes full complement of IFR equipment, Sperry SP1-401c/RD-44 flight director and altitude-heading system and known-icing certification.

Specifications

Powerplants	Two Garrett AiResearch TPE331-10-501M 715 shp, 778 eshp
Recommended TBO	3,000 hr
Propellers	Two Hartzell, four-blade, constant speed, full-feathering, reversible-pitch, 98-in dia; blade model LT 10282B-5.3R
Length	39 ft 5.4 in
Height	13 ft 8 in
Wingspan	39 ft 2 in
Wing area	178 sq ft
Wing loading	65 lb/sq ft
Power loading	8 lb/hp
Seats	11
Cabin length	19 ft 8 in
Cabin width	4 ft 11 in
Cabin height	4 ft 3 in
Empty weight, std	7,650 lb
Empty weight, as tested	7,854 lb
Max ramp weight	11,625 lb
Useful load	3,925 lb
Useful load, as tested	3,721 lb
Payload w/full fuel	1,225 lb
Payload w/full fuel, as tested	1,021 lb
Max takeoff weight	11,575 lb
Max landing weight	11,025 lb
Zero fuel weight	9,950 lb
Fuel capacity, std	2,780 lb (2,700 lb usable) 415 gal (403 gal usable)
Oil capacity, ea engine	6 qt
Baggage capacity	600 lb, 44 cu ft

Performance

Takeoff distance, ground roll	1,825 ft
Takeoff distance over 50 ft obst	2,170 ft
Accelerate/stop distance	3,300 ft
Max demonstrated crosswind component	22 kt takeoff 18 kt landing
Rate of climb, sea level	2,250 fpm
Single-engine ROC, sea level	425 fpm
Max level speed, 20,000 ft	307 kt
Cruise speed/Range w/45-min rsv, std fuel, ISA (fuel consumption, ea engine)	
Recommended cruise power, 96% rpm, 100% torque or 650°C EGT	
14,000 ft	296 kt/950 nm (698 pph/104.1 gph)
28,000 ft	280 kt/1,350 nm (464 pph/69.2 gph)
Maximum range power	
14,000 ft, 67% torque	255 kt/1,000 nm (558 pph/83.2 gph)
28,000 ft, 61% torque	273 kt/1,375 nm (450 pph/67.1 gph)
Max operating altitude	31,000 ft
Service ceiling	29,750 ft
Single-engine service ceiling	18,200 ft
Landing distance over 50-ft obst	1,880 ft
Landing distance, ground roll	1,128 ft

Limiting and Recommended Airspeeds

Vmc (Min contdrol w/critical engine inoperative) flaps 20 degrees	99 KIAS
Vx (Best angle of climb)	128 KIAS
Vy (Best rate of climb)	134 KIAS
Vxse (Best single-engine angle of climb)	140 KIAS
Vyse (Best single-engine rate of climb)	152 KIAS
Va (Design maneuvering)	191 KIAS
Vfo (Flaps operating)	
0 to 5 degrees	175 KIAS
5 to 20 degrees	155 KIAS
20 to 40 degrees	120 KIAS
Vfe (Max flap extended)	
5 degrees	175 KIAS
20 or 40 degrees	155 KIAS
Vle (Max gear extended)	175 KIAS
Vlo (Max gear operating)	
Extend	175 KIAS
Retract	175 KIAS
Vno (Max structural cruising)	250 KIAS
Vne (Never exceed)	250 KIAS
Vr (Rotation)	90 KIAS
Vsı (Stall clean)	106 KIAS
Vso (Stall in landing configuration)	81 KIAS

All specifications are based on manufacturer's calculations. All performance figures are based on standard day, standard atmosphere, at sea level and gross weight, unless otherwise noted.
**Operations/Equipment Categories are defined in June 1983 Pilot, p. 96. The prices reflect the costs for equipment recommended to operate in the listed categories.*

FROM SAMURAI TO SAN ANGELO

Mitsubishi Heavy Industries is a huge, diversified conglomerate that manufactures everything from ships to soft-ice-cream machines, steel mills to dry-cleaning equipment, locomotives to automobiles and oil rigs to airport mobile lounges. Aircraft manufacturing is only one part of MHI's business interests.

Mitsubishi, which means three diamonds in Japanese, was founded in 1857 by a samurai, Iwasaki Yataro. He managed to take over all the commercial and shipping business in his native district. The Japanese government, which saw in Iwasaki a way to free Japan of dependence on foreign shipping, bought him 13 ships to help him fulfill his contracts. By 1879, Mitsubishi's fleet was a major economic force in East Asia.

Mitsubishi entered aviation in 1920, when it designed a carrier-based torpedo bomber for the Japanese Imperial Navy. By the end of World War II, Mitsubishi had built 57 types of warplanes (including the notorious Zero-sen fighter and Ki-67 series of bombers) totaling more than 18,000 aircraft and 52,000 engines.

Mitsubishi's interest in aircraft continued in the postwar years. Under terms of licensing agreements, Mitsubishi built North American F-86 fighters, Lockheed F-104s, McDonnell Douglas F-4Js and F-15s and Sikorsky helicopters. Mitsubishi also builds a supersonic fighter of its own design, the F-1, and a supersonic trainer, the T-2. There is also the Diamond series of business turbojets and, of course, the MU-2 series of business turboprops. Total Mitsubishi aircraft delivered number approximately 20,100. *—TAH*