

# MU-2

*Magazine*

JULY 2014  
Third Edition



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[www.MU-2aircraft.com](http://www.MU-2aircraft.com)

Photo: John D. Moore,  
MU-2 Owner/Operator

## A Commitment To The MU-2

This is now the third issue of the MU-2 Magazine. Not having ever published a magazine before, it has been an experience. One full of deadlines, decisions on articles, and finding advertisers who have not been part of our past daily routines.

It has, however, been a very fulfilling experience. We get the chance to talk about the airplane with new and interesting people. We find out things that we otherwise might never have known about, such as the how and why regarding your ultimate decision to own and operate an MU-2.

### *Why We Fly The MU-2*

The people and the planes that are featured in this magazine are found through our visits to the field to meet operators, PROP attendees, owner/operator conference attendees, and the like. It never ceases to amaze me the variety of reasons for owning one of these great aircraft.

What is very clear to me is that everyone, once an owner, tends to stick with the MU-2 for a much longer period of time when compared with other makes of turbine powered aircraft. As varied as the lines of work or personal use are between owners, I continually find that there are a few common reasons for sticking with the MU-2 for so long.

### *Efficiency, Reliability and Support*

The common threads, of course, are efficiency, reliability and support. As rated by your responses to the Mitsubishi Heavy Industries America survey at PROP 2014, efficiency and reliability were the top two reasons, with support at a close number three slot.

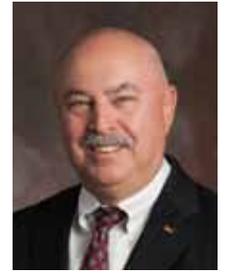
Having just completed our semi-annual meeting with Mitsubishi Heavy Industries (MHI) and other people responsible for support, there is a general consensus that MHI is making a long term commitment

to continue the MU-2 support programs. What that means in exact terms is still a matter of ongoing research, but the team that is in charge of these support programs includes a crowd of young, enthusiastic people who are preparing to carry on the support work.

Please enjoy this month's magazine and don't forget to let us know how we are doing and what we can include to make this a valuable information product for you.

Pat Cannon

*Pat Cannon is President of Turbine Aircraft Services. He is an FAA Designated Pilot Examiner, former MU-2 Demo Pilot, and Safety Expert.*



The Mitsubishi MU-2, one of Japan's most successful aircraft, is a high-wing, twin-engine turboprop with a pressurized cabin. Work on the MU-2 began in 1956. Designed as a light twin turboprop transport suitable for a variety of civil and military roles, the MU-2 first flew on September 14, 1963. More than 700 MU-2 aircraft were built before the aircraft went out of production in 1986. Presently, nearly 300 MU-2 aircraft remain in operation with the majority of the fleet registered in the U.S.

Turbine Aircraft Services (TAS) is under contract to Mitsubishi Heavy Industries America, Inc. (MHIA) to assist with the support of the MU-2. TAS distributes MHIA issued publications and serves as liaison between MHIA and MHIA's contracted Service Centers, Vendors and Training Agencies.



*MU-2 Magazine, July 2014. Cover photo by Jan Glenn, taken during PROP 2014 photo shoot.*

Notice: Although this publication will provide you with useful information regarding the operation of your airplane, it is not and cannot be a substitute for your compliance with all applicable requirements from the appropriate airworthiness authorities.

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## PROP 2014 In Review, Moving Forward

By Tom Goonen

*Tom Goonen is the MU-2 Program Manager for SimCom. He provides both in-aircraft and simulator training for all models of the MU-2.*

May 3rd signaled the end of PROP 2014. Initial review of the numbers shows it was a huge success. The primary goal of PROP (Pilot's Review Of Proficiency) is to enhance safety. To that end, how do we utilize the information provided at PROP as we move forward? We do this by taking the information provided and putting it into practice in our daily operation of the MU-2.

Pat Cannon reviewed accidents so we can learn from the results and make better decisions than those involved in the accidents. Rick Wheldon, Adam Wysong, Helmuth Eggeling, and I provided presentations on optimizing aircraft performance and reducing pilot workloads by efficiently operating the MU-2. Recurring themes throughout the presentations were: 1) Be prepared, 2) Follow established procedures, and 3) Use only FAA-approved checklists.

I have often said the "good news and bad news" about the MU-2 is that, if properly maintained, it is a very reliable airplane. Reliability allows complacency to set in, so if we encounter a malfunction, it catches us totally by surprise. Proper training has proven to keep us better prepared for the unexpected. Adam and I videotaped engine out procedures and performance in the aircraft under very controlled conditions. By no means were we suggesting operators repeat those scenarios in the aircraft, as many emergencies cannot be safely practiced in the airplane. However, when you attend simulator training, you have the perfect opportunity to sharpen your flying skills by flying those scenarios in a safe and controlled environment.

This is one of the major benefits to simulator training. Many emergencies that cannot be safely practiced in the airplane can be performed in the simulator. By utilizing only in-aircraft training, certain emergencies can only be discussed and not actually

performed. By only discussing certain emergencies, it is possible to have misconceptions as to how certain malfunctions present themselves, and how difficult they can be to handle. This is where simulator training can be priceless. Those same emergencies can not only be addressed in a scenario that is controlled and completely safe, they can also be performed over and over again, until the student fully understands them.

A second important aspect of following established procedures was evident in the presentations of all of the speakers. Mitsubishi has gone to great lengths to establish proper procedures for the operation of the MU-2. Pat's accident reviews showed many of the detrimental results of not following established procedures. If you, as an operator, feel you have a better way, by all means submit it to either TAS or Mitsubishi directly. In the meantime, I would discourage people from being "test pilots."

Another recurring theme was the requirement to use only the FAA-approved checklist. There were several questions posed during the presentations that revealed there were some misunderstandings. In some cases, it was due to a lack of familiarity with the checklist. In other cases, it was due to the fact that people were unaware of changes to the checklist mandated by the Flight Standardization Board (FSB). The importance of this checklist is so high that the FSB has given the approved checklist priority over the manufacturer's flight manual.

The PROP committee is now moving forward by reviewing all of the critiques submitted and will soon begin planning for PROP 2016. We welcome all suggestions you have for PROP 2016 and the chance to improve on a successful legacy of PROP seminars.



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# Tom Bond, MU-2 Pilot

By Mike Taylor

*Mike Taylor is a former aircraft design engineer, 24-year aviation industry veteran, current marketing consultant and private pilot.*

Every few months I have the pleasure of meeting another MU-2 owner/operator. This time it was Tom Bond, an attorney from Texas. I figured I'd like him since I'm from Texas, and we've got a reputation here for being friendly folks.

I first learned that Tom has been a pilot since the early 1980s. Tom informed me he's owned many airplanes. Starting with trainers, he proceeded moving up in scale. "Isn't this what ordinary pilots do?" Tom continued, "The MU-2 was my 17th airplane when I bought it the first time and the 19th when I bought it back." He informed me he'd taken a "very nice" Duke in trade for it a year ago and now the Duke's for sale.

Originally bought in 2007, Tom explained how he'd met the MU-2's previous owner, "We used to see each other at a rural airport. I was visiting ranches and thought the airplane was really neat. I had heard a lot about the MU-2." Tom was flying a Cessna 421 at the time and told its present owner, the MU-2 was "really cool." Tom asked him, "Let me know if you ever want to sell it." Eventually, he called.

In preparation for his next move up, Tom started to research the MU-2. He punctuated, "This was before the SFAR implementation. I did lengthy research, read all the news and accident reports I could find." Due diligence an evident priority, Tom was determined to make himself very comfortable with the impending purchase. Tom concluded, "With proper training, I was assured the MU-2 would be the most capable plane for my purposes."

Tom trained with Shawn McDonell in Salina, Kansas, who put him through "MU-2 boot camp," as he said. Tom added, "I've never looked back. I love the plane. I love what it can do."

But about a year ago Tom sold his vacation property in Colorado and invested in a ranch in Texas. The thought was that he no longer needed a turboprop. His sights turned to piston singles to fly around Texas, and the MU-2 was "traded for a nice [Beechcraft] Duke."

Next, Tom sold his ranch in Texas and bought a ranch in Colorado. With two kids in Texas and two in Colorado, he realized he needed more capability in an aircraft. The Duke required full fuel to get to Colorado nonstop. And while this was doable, there was no room left for baggage considering weight.

In talking with the guy to whom he had sold/traded the MU-2, Tom learned of his intentions to sell it and move up to a jet.

## Owner/Operator Spotlight

So, eventually the two made a deal, and Tom bought back his previously owned MU-2. "It was the best decision I ever made. I like this airplane because I know it well," he declared.

This time Tom did his recurrent training at Simcom, where upon he immediately began flying the MU-2 to Colorado.

I asked Tom about his expectations for the airplane, wanting to know more about how he uses it. He replied that he rarely flies for work; it was purchased just for family use. "Having owned it for approximately six years, it served that role well," he professed.



*N383TX, an MU-2 M-model owned and flown by Tom Bond, attorney-at-law.*

Tom's passion for flying has always been separate from his work. For 30 years he's been in the legal profession. On occasion, he would fly himself on a business trip. At times, he would take a business associate along. But the primary use of the aircraft he'd owned was for family travel.

Although Tom's firm is very large, with national and international offices, in his Austin office Tom knows of only one law partner who

is a pilot. The joy of flying seems to be on a truly personal level for Tom.

Of all the Cheyenne, Turbo Commander, and piston twins he's flown, for the money nothing compares to the MU-2, according to Tom. His aircraft is an M-model. As such, it has higher pressurization, i.e. higher service ceiling, and can carry 1000 lbs. of people and bags, features that have been very appealing to him.

I asked Tom, where did his passion for flying begin? Following his first round of graduate school, Tom returned to Austin. Shortly thereafter, he took four hours of flying lessons "just because I had always wanted to do this," he avowed.

He later moved and took a job. This was around 1973/4. Fast-forward, and Tom finished law school and passed his bar exam in 1982. The following day he started flight school.

Tom earned his single-engine pilot certificate and instrument ratings at the former Tim's Airpark, later named Austin Executive Airpark Airport (not to be confused with Austin Executive Airport, KEDC). Presently, Tom bases his MU-2 at Georgetown Municipal Airport approximately 40 miles north of Austin, TX.

On one memorable trip, Tom and his wife took two of their children (he clarified: two young couples) nonstop to Denver for a weekend. Tom informed me, "The MU-2 was perfectly suited for this kind of travel,"—six passengers plus baggage. He

## Tom Bond (continued)

summarized, "In any other aircraft it would have cost twice as much, considering both purchase price and maintenance, for a trip like that."

Tom confers that his story is like others who fly the MU-2. Many have had the opportunity to trade their aircraft, or to move up (for example, to a small jet), but later realized they missed their MU-2. Jokingly, Tom agreed he did not share this sentiment with the seller of his MU-2 the second time around, as moving up to a small jet was precisely what he intended to do.

"It's a phenomenal aircraft for the money. For a lot more money, you can buy a bigger airplane," said Tom. He concurred it will be interesting to follow the seller who is looking at a CitationJet. But Tom is convinced many CitationJets would not carry the load of the MU-2 on a similar mission profile. However, the desire for many pilots is to continue going up the ladder, and he's certain the seller will enjoy the process. According to Tom, "I've had bigger turboprop planes. I was never really interested in a jet. But he certainly was."

When asked about his current missions for the MU-2, Tom noted he has a place near Durango, Colorado, and flies to Denver regularly. In addition, he flies around Texas, sometimes to the Midwest and Louisiana. Nevada will be a future destination and a west coast trip is planned for the Fall.

He really appreciates the MU-2's ability to load it up and go. "It's

been very reliable," he states. In the six years he's flown it, he's only left it on the ground twice, with minor issues. Tom's M-model has the earlier TPE331-6 engines. It's moderate in weight, but does 280-282 knots on 72 gallons per hour, a combination that he seems quite pleased with.

Tom left me with the impression he takes an evenhanded approach to life, his work and his flying. As a litigator, facilitator and family man, this makes sense. Flying is as methodical as an approach to choosing an aircraft. There's a process to arriving at a comfortable solution. It entails discovery and analysis. There are goals and, ultimately, the satisfaction of reaching them.

When asked about his favorite airplane, Tom trumpeted, "The MU-2 is at the top of the list. I've owned several very nice planes, but it is remarkably more capable and more durable than any of the others I've had. It carries more, flies faster on relatively less fuel, and performs better in hot and cold conditions. In a typical year it is only in the shop for its regular maintenance and maybe one other day trip to Intercontinental Jet Services Corporation for non-scheduled stuff." He concluded, "The plane is there now, in Tulsa, for its annual and some panel upgrades."

For Tom Bond, satisfaction with the MU-2 came about through a process. His perfect airplane is well defined by the journey it took to get there. I believe that's what makes Tom so pleased with the airplane he loves.



# mt-propeller

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# MT Propeller Performance Review

By Ken Sutton

*Ken Sutton is a retired commercial pilot, independent business advisor, and current MU-2 pilot/owner N616KL.*

Product Spotlight

I've been getting a lot of questions from the MU-2 community about my experience with the MT propellers. It took a bit to get things sorted, and a bit longer to get quantifiable data. But I'm finally where I need to be with these propellers.

Rather than repeating my story over and over, I wrote up a short review of my experience for Joe Megna, my service rep at Jet Air. Most of the inquiries have funneled through Joe to me. I figured the best way to handle this would be to put something on paper that he could send his customers when they asked. Now that the review is complete, it dawned on me that maybe everyone in the MU-2 community would benefit from reading it.

To be clear, I have absolutely no connection with Mike Laver on the MT props. In fact, I purchased mine in a one-off special side-deal with MT through my cousin who has a relationship with MT Propeller. I just want to be clear that I'm in no way promoting these, and I have absolutely no financial interest in MT or any of their dealers. I'm doing this just to share with those that might be interested, my experience with this relatively new product for the MU-2.

I own an MU-2B-25 (K-model) that I purchased last year. It came with Hartzell 3-blade props. The props had been overhauled the year before.

Joe Megna, and his team at Jet Air, put the airplane through a very complete mechanical and avionics restoration right after I purchased it. As any MU-2 owner/operator would understand, I was thrilled with what I had once I began to fly the airplane. My only serious complaint about the airplane was that it was a little louder than I really had hoped it would be, particularly in the cockpit. I tried both the Bose and Lightspeed Zulu headsets, and neither seemed to knock down the noise as much as I found comfortable. It is for this initial reason that I turned to the MT propellers.

I had MT propellers on my previous airplane, a C-310 for eight years. On the 310, they not only knocked down the noise, but they seriously reduced vibration throughout the airframe. So it wasn't a particularly hard sell to think that they might turn the MU-2 into a more comfortably quiet and smoother ride.

My cousin, with a background in aeronautical engineering, and pilot for American Airlines, first turned me on to the MT propellers. He had obtained a number of STCs for MT propellers on various aircraft, including the first reversible propeller for a Super Cub. While he didn't own the STC for the MU-2, he did have a lot to discuss with me when I asked him about putting the MTs on the MU-2.



He had been working for a few years with a commuter airline in Canada operating Merlins. They had been having serious gearbox issues with their fleet. They hired my cousin to find a solution. He examined their issue, and believed that the MT propellers would solve their gearbox problems. They installed one set on an airplane in the fleet and ran it for the next six months to see if it would work. Sure enough, that airplane flew past the time when they expected the gearbox to fail, and after teardown, found none of the same issues they had been having.

They put in an order with MT to convert half their fleet. Another year passed, and a strange second-order effect was discovered. Their hot section costs on the aircraft converted to the MTs plummeted. In fact, the reduction in hot section costs went down so much, they determined hot section cost savings alone would pay for the conversion of the rest of the fleet.

While they are still converting the fleet as quickly as they can get the new props from MT, they are thrilled with the result. It is hypothesized that the MT's lower rotational mass allows the starter/generator to spin the engine faster, reducing the duration of peak EGT on every start. Much like putting your finger through the flame of a candle, the faster you can put your finger through the flame (the shorter the duration) the less damage it does to your skin (your hot section).

Needless to say, I was pretty sure the MTs would be a good long-term investment in my MU-2. We ordered a set and they were installed in late January 2014. I spent the next couple of months while we were waiting for them to arrive, performing a series of noise tests in my airplane with the 3-blade Hartzell props. I used a digital sound meter\* to measure the dB in different flight regimes, across several flights. I then statistically measured the variance to ensure there weren't any statistical outliers that could skew the data (there weren't), and I then averaged across those flights in each regime. The results are included in a table at the end of this review.

Due to my own schedule and the time it took to get the new MTs installed, I didn't fly the airplane for over a month. When I did get back in the airplane, I was very anxious to see what differences I would find. Most certainly, there were several.

From the very first engine start, it was clear the engine was turning faster during the start. Perhaps that will payoff in lower hot section costs in the future... I cannot quantify this at all, however. After starter cutout, my procedure was always to bring the power lever over the flight idle gate to the ground idle gate. With the MTs I found that when I did this, I would bring the props off the locks. So initially, I needed to be very careful about

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## Sorrells' Sideslips

By

Ralph Sorrells-MHIA Deputy General Manager

### ACCIDENT INVESTIGATION STATUS

Serial No. 306, Owassa, OK, November 10, 2013

As most of you know, one of the hats I wear at MHIA is that of air safety investigator and as such, I am privileged to be accepted by the National Transportation Safety Board (NTSB) as a Party to the Investigation on MU-2 accidents. While I am bound by regulation to not discuss the details of ongoing investigations, I can say that the NTSB is very close to issuing their Factual Report on the November 10, 2013, Owasso, Oklahoma accident (CEN14FA046) of a MU-2B-25 piloted by Dr. Perry Inhofe, the son of Oklahoma's Senator James M. Inhofe. This has been a very detailed and comprehensive investigation involving numerous tests and analysis. The Power Plant Report section alone will exceed 100 pages of text and figures. As part of the Factual Report, you will see an operations report and a radar analysis/profile. A Probable Cause report will be issued shortly after the Factual Report has become public. As these reports are issued, MHIA will notify you so that you will have full information on the NTSB findings. At that point I will be free to discuss the accident.



### ANGLE OF ATTACK SYSTEM

Just an update on the AOA system, manufactured by Alpha Systems, that MHIA is working on: We are currently conducting flight tests on the system and expect to have an STC available soon at a very attractive price. The AOA that we are working on will consist of a transducer located on the underside of the outer right wing panel that will utilize an existing inspection panel and an indicator to be mounted in the cockpit in view of the pilot. It will feature an aural alert through the headset. MHIA will issue a Service News to notify you of the STC availability.

### OTHER ENGINEERING PROGRAMS IN PROGRESS

- U.S. source, Industrial Tube, for ducts, tubing and hoses: Certification has been completed and production is starting soon.
- New vendor, Helimec, for (non-leaking) sniffle valves: Parts are in production for future spares.
- Stretched acrylic cockpit side windows for future spares: A U.S. vendor is being evaluated.

It was really good seeing so many of you at the PROP 2014 seminars. We're already working on PROP 2016. Please let us know what you'd like to see.

Keep 'em Flying Safely



## SFAR Issues

By Pat Cannon, President  
Turbine Aircraft Services, Inc.

All of you who attended PROP 2014 heard me talk about the effort being expended by Mitsubishi and TAS to clean up the profiles and training curriculum in SFAR 108. The work being accomplished by MHIA and TAS actually started back in 2009 after full implementation of the SFAR training requirement.

Shortly after training centers and instructors began using the training profiles, inquiries by instructors and training attendees began filtering into my office. There were two essential messages. The first was about the VMC demonstration required in the profile. Although approved by the FAA, the setup procedures were not in conformity with the FAA Flight Training Handbook. The FAA Handbook recognizes that if a pilot is faced with an engine failure on takeoff, that trimming the rudder to correct for the single engine condition may not happen in a timely manner prior to reaching VMC. The SFAR training profile did not take that into consideration, but instead instructed the pilot to set up for the training maneuver by trimming the rudder to a single engine condition prior to adding full power on the operative engine for the demonstration. While entirely safe, it sets up a less realistic scenario and the resulting rudder forces during performance of this profile would not be as strong as would be experienced if an actual engine failure were experienced after takeoff near VMC.

The second area was the requirement on the Single Engine Non-Precision Approach profile to leave the landing gear retracted until visually sighting the runway environment. This procedure exists because of single engine performance limitations with the landing gear extended. Unless the aircraft is at a very light weight, it may not be able to maintain the MDA altitude if the gear is extended. This limitation was experienced by the FAA during the Flight Standards Board Review in 2005 and became a profile limitation to avoid uncommanded descent below MDA in the single engine configuration. The unstable nature of this approach procedure and the idea of a potential gear up landing

was a concern throughout the MU-2 community. With the FAA Flight Standards Board approval of CDEFA Approach procedures in Revision 4 of the MU-2 Flight Standards Board Report, MHI wishes to get these procedures into the field quickly for use during training.

These concerns were presented to the FAA in Washington, DC, who listened to our concerns and then responded that these requested changes were going to be a very low priority on the FAA's to-do list. It was at this time that TAS and MHIA began to petition the FAA not only to change these profiles, but to remove the profiles and training curriculum from the body of the SFAR in the Federal Register and to place them in a separate document which would allow timely updating of procedures without dragging the aircraft through the full NPRM process. That process could take as long as three years.

Subsequently, after the Colgan accident, followed by the Air France accident, which both involved a full aerodynamic stall and lack of proper recovery technique, the FAA commissioned a board made up of industry experts to evaluate and make recommendations as to how to prevent this from happening in the future. It was known that the pilots of Colgan and Air France, after reaching a full aerodynamic stall, failed to lower the nose to reattach the airflow. Instead, they attempted to maintain altitude and increased the pitch attitude which caused the angle of attack to go far beyond the point where control was lost. These findings ultimately resulted in recommendations to change the stall recognition and recovery training for all fixed wing aircraft training programs.

The findings of this board resulted in an Advisory Circular AC120-109, which modified the stall recognition and recovery procedure. Upon stall recognition, the pilot is prompted to lower the angle of attack sufficiently to reverse the downward trend

(Continued on page 12)



bringing the power lever over the flight idle gate, or the overspeed governor check wouldn't be possible.

After a more precise setting of the blade angles, this problem disappeared. Now I can bring the power levers over the flight idle gate without bringing the props off the locks. In addition, I find bringing the props off the locks to be much smoother and easier than with the Hartzell props, especially in cold weather.

The next thing I noticed was how little residual thrust there is with the MTs. With the Hartzell props, I always needed to drag the brakes when taxiing to keep from building up too much taxi speed. Not with the MTs! The Hartzell props have a blade angle of 12-degrees at flight idle. The MTs have a blade angle of just 6.5-degrees at flight idle. This means that the range from ground idle to flight idle with the MTs is approximately half of what it is with the Hartzell props. Therefore, it takes a lot more power lever movement off the ground idle stop to get the airplane rolling, and it takes very little braking to keep taxi speed under control.

I truly didn't notice much difference in sound on the ground after engine start and during taxi out. However, once the power is pushed up for takeoff, the sound is much different. In part, I suspect that the decrease in the noise level combined with the sound being at a different harmonic range, allows the noise cancellation technology in the noise cancelling headsets to do a much better job than before. Regardless of the cause, the noise level is noticeably less than with the Hartzell props, as can be seen in the table at the end of this review.

Takeoff isn't significantly different in the way the airplane handles. However, there is a significant difference in the way it performs. The five blades vs. three blades make a big difference in how quickly the airplane accelerates when you push up the power. This was never a significant issue for me before. However, for those operating out of shorter runways, this most certainly could be a significant improvement. I can't really quantify it in feet, but it is very obvious once you experience it.

Landing is a bit different. If you have your flight idle torque set properly, you'll find that as you come to flight idle as you touch down, with the blade angles at 6.5-degrees rather than 12-degrees, the airplane decelerates much faster. In part, as you wait for the beta lights to come on, the props are already at half the blade angle they are with the Hartzell props. This means my stopping distance has clearly been reduced. In addition, I never, ever use reverse.

Beta with the MTs feels like reverse felt with the Hartzell props. Going into reverse with the MTs is so effective as to be what I consider to be uncomfortable for the passengers. Again, it's nice to have it, but mostly unnecessary for my operations. For those operating out of short runways, this would be a significant enhancement to their operation, I'm certain.

One significant point that must be discussed is the MT's impact on true airspeed. This was a serious concern before I had them installed. With my 310, I went from two-blade Hartzells to three-blade MTs and found that my true airspeed went down five knots from 177 to 172. This 2.8-percent decrease in TAS was really disappointing in the 310. I didn't know what to expect with the MU-2 that was consistently producing a TAS of 310+ knots.

Fortunately, I had data that helped me quantify the effect for both the 310 years ago, and now for the MU-2. I was able to compare the TAS at different altitudes and temperatures with the Hartzell props, and then the MT props. Surprisingly, what I found is that there is zero difference in TAS with the MTs on the MU-2. This is surprising because of not only my experience with the 310, but merely the fact that this much of a change surely must have some impact on TAS. Oddly, it does not. Not even one knot difference. So this concern pleasantly turned out to be a non-event.

One problem did plague us for several months after the installation. On certain flights, I noticed a significant vibration that would come and go. It was very unpredictable, and seemingly nothing I could do would bring it on or take it away. Eventually, I



came to realize the vibration was only occurring on flights when the airplane was heavily loaded— within about 300-400 pounds of max gross weight, or higher. When the airplane was lightly loaded, I wouldn't notice the vibration.

Joe and his team worked very hard to identify the source of the problem. We narrowed it down to a high frequency vibration that we first noticed in the noise cancellation of the headsets that then migrated to a low frequency vibration we could feel in the floor with our feet, and eventually through the seat and control yoke. In leaving no stone unturned, I even flew the airplane to MT's US headquarters in DeLand, Florida, to have them perform a detailed inspection of the props to ensure everything was in order. They determined the manufacture of the props was perfect, as was the assembly and installation.

I discussed the problem at length with my cousin and he suggested that the high frequency vibration we initially felt must be coming from something moving extremely fast. He suggested a parasitic vibration at high frequency was very unlikely. He suggested we take a hard look at the engines, and particularly those parts of the engines that spin very fast.

After a short discussion, Joe suggested we take a look at the starter/generators first. He told me that the starter/generator bearings need to be replaced with regularity, or they will wear and could be the source of our vibration. Sure enough, the previous owner did not have the bearings replaced when the starter/generators were "overhauled" the two previous times, and mine now had more than 800 hours on their bearings. After the starter/generators were then removed for overhaul, Joe found the bearings to be badly worn and the armature to "rattle" back and forth when turned. With the starter/generators removed, Joe also suggested we remove the tach generators to see what condition they were in, and sure enough one of the tach generators was severely worn and near the point of failure. Either one of these issues could certainly be the cause of the high frequency vibration we were sensing in our headsets.

Repaired and out for our first test flight, immediately we could tell a difference in the headset. We loaded the airplane to gross weight to ensure we would be able to duplicate the vibration, and not only did the high frequency vibration disappear, but so too did the low frequency vibration.

The theory here is that the lightweight MT props simply uncovered a problem that the heavier and higher vibration Hartzell props had masked. Recall, it had been over a month since I had last flown my airplane once the MTs were installed. I didn't have another MU-2 to fly to compare side by side the differences. So my observations were from memory. Since I hadn't owned the airplane but for less than six months, I really didn't have a deep memory to draw upon.

So what happened to the low frequency vibration, and what was that all about? Recall that the airplane only demonstrated the low vibration when heavily loaded. The idea here is that the stress on the wing spar being greater when heavily loaded allowed the high frequency vibration from either the starter/generator bearings, and/or the bad tach generator to migrate to the rest of the airframe as a low frequency pulse. Take that stress off the wing

spar when more lightly loaded, and the low frequency vibration was being absorbed, rather than transmitted to the rest of the airframe.

So where does that leave us now? There's still a little vibration in the airframe. I was thinking that we would consider removing the prop governors at the next 100-hour inspection to have them overhauled. My thought was that the lighter/shorter MT blades needed prop governors that were in top condition to maintain RPM against even the slightest air load changes that weren't being accomplished perfectly by my governors.

However, I had the opportunity to fly in another MU-2, a slow-turn 4-blade version the other day. I hadn't flown in any other MU-2 with the Hartzell props, 3-blade or 4-blade, since mine had been converted to the MTs. I was truly surprised, and in a strange



Hartzell Propeller above, MT Propeller below. Photos courtesy of Ken Sutton.

## MT Propeller (continued)

way, delighted to see how much more vibration and noticeable noise there was in this Hartzell equipped airplane.

This airplane had just had its Hartzell props rebuilt with several new blades just over a year ago. So it wasn't like this was an outlier example. It's just that I had forgotten what it was like to fly with the Hartzell props. The little low frequency vibration I still feel from time to time is absolutely nothing, when compared to the Hartzell-equipped MU-2 I just had the chance to experience on

the same day I had just flown mine for two hours. That's about as good of a side-by-side comparison that can be made! Needless to say, this experience reinvigorates my love for these MT propellers.

Finally, you may have noticed I haven't once said anything about the way they look. For some, that's likely where they start with the MTs. For me, it's just a significant bonus! They truly do make the MU-2 look as it should. In my view, it completes the look from something that looked quite dated, before.



## Noise Test Results - Table 1

Hartzell 3-Blade Props			MT Props			Difference with MT Props		
	Cockpit	Cabin		Cockpit	Cabin		Cockpit	Cabin
	dB	dB		dB	dB		dB	dB
Taxi out	91.5	93.0	Taxi out	86.0	84.5	Taxi out	-5.5	-8.5
Takeoff	98.5	88.0	Takeoff	89.5	85.5	Takeoff	-9.0	-2.5
Cruise 99.5%	102.0	91.0	Cruise 99.5%	94.0	87.5	Cruise 99.5%	-8.0	-3.5
Cruise 98.0%	100.0	89.0	Cruise 98.0%	93.5	87.0	Cruise 98.0%	-6.5	-2.0
Cruise 97.0%	105.0	93.5	Cruise 97.0%	95.0	85.5	Cruise 97.0%	-10.0	-8.0
Cruise 96.0%	104.5	93.0	Cruise 96.0%	93.0	84.5	Cruise 96.0%	-11.5	-8.5
Reverse	101.0	91.5	Reverse	92.5	89.0	Reverse	-8.5	-2.5
Taxi in	91.5	90.0	Taxi in	86.0	85.0	Taxi in	-5.5	-5.0

In terms easier to understand, the 8.0 dB decrease in cockpit dB in cruise at 99.5% RPM equates to a 42.6% decrease in perceived noise or "loudness."

\*Extech 407736 Digital Self-Calibrating Digital Sound Meter Accurate to +/-1.5 dB.

## SFAR Issues (continued)

of airspeed or to reattach the airflow to the flying surfaces if already stalled. This new procedure eliminates the requirement to maintain altitude during stall recovery and the words "minimal loss of altitude" were subsequently removed from all FAA Practical Test Standards used for training and testing at all pilot certificate levels. Effectively, the FAA has required that this long time and well ingrained procedure be forever changed in the interest of reducing loss of control accidents, which are the highest percentage of accidents in all phases of flight. Industry has been asking for this change for some time, but these two accidents, with their accompanying loss of life, finally got the ball rolling.

Of course, SFAR 109 and its profiles still contain the prompt for "minimal loss of altitude", so while the rest of industry goes forward into the new stall training procedures, Mitsubishi is stuck with procedures published in the Federal Register that cannot be changed without a full NPRM procedure, which by the estimate of the FAA, could be three years or more. At the same time, the FAA also recognized the critical nature of the requirement to change the SFAR and agreed in late 2012 to begin a process known as immediate rulemaking. While this process has taken far more time than is inferred by the word "immediate", MHIA and TAS

were assured in a meeting on May 12, that this rule change was in the process and that results should be realized and announced in the near future.

In the meantime, MHI and MHIA are concerned about the time between now and when the formal change of the profiles will be authorized. MHIA has issued a letter to the FAA stating that it wishes to make every training facility, instructor and MU-2 pilot aware of the new procedures for VMC recovery, Stall Recognition and Recovery, and CDFA Approach procedures. MHIA is not willing to "wait it out", noting the possibility that the old, current SFAR procedures do not represent the highest level of safety that can be achieved during training. MHIA wishes to take the highest level of safety as its standard and will begin distributing the new profiles to all MU-2 trainers for immediate use in their training programs. The FAA has no objection to this action.

During your next training interval, please make sure that you take these corrected or added profiles into account, specifically that of Stall Recognition and Recovery. This critical maneuver must be taught and performed correctly to achieve the highest level of flight safety.





**Dan Arnold**  
 MU-2 Charter Customer

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**The MU-2 support program once again placed number one in the 2013 AIN Product Support Survey.**

