IRS 'PASSIVE ACTIVITY' GOTCHAS TO WATCH FOR!

# TBM

OWNERS AND PILOTS MAGAZINE

FALL 2014

## CAN YOU RECOGNIZE A FALSE GLIDESLOPE?

FURTHER EXPLORING LOW-LEVEL WIND SHEAR

+

REVERSE THRUST
How Much Do You Really Know?

CRM:
Bumping It Up a Notch

RICE LAKE AVIATION'S REMARKABLE MT PROPELLER SUCCESS!

# What's Your Story?

**Can you explain a maintenance process ?**
**Have you traveled somewhere in your TBM worth recommending ?**
**Did you learn a valuable lesson while flying your TBM ?**

We are looking for articles for this magazine! Do you have a story about flying your TBM? How about new tips and techniques for fellow TBM owners? Maybe you can explain a maintenance process you find valuable. We want articles for TBM owners, by TBM owners and service experts!

If you have an interesting story, we are asking for you to share it with us. Articles should be 300-500 words. Accompanying photos must be 300 dpi.

*Email all submissions to Lyn Freeman, lyn@lynfreeman.com for approval.*

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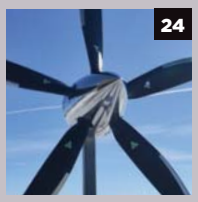



## DEPARTMENTS



## FEATURES

# News from the Top

## Carry On

Dear Members,

Words cannot adequately express the sense of loss we all feel as a result of Larry and Jane Glazer's recent accident. Larry was a gifted leader, and we were blessed to have him as our chairman and to know him as a friend. We will feel a sense of loss for a long time to come, but I know that Larry would want us to continue promoting the safety and camaraderie of our TBMOPA community. It is my distinct honor and pleasure to serve in the role of chairman. One of my main goals will be to see that we all learn from this accident and become better trained pilots as a result.

We are blessed to have so many intelligent folks within our community. All you had to do was read the posts following Larry's accident, and you could see the attempts to make sense of a loss that hit us all so deeply and, most importantly, learn from it so that we all might be safer. Please make sure to stay on top of your training and, if you have not done so already, don the oxygen mask and practice an emergency descent. Go out and fly with your favorite instructor and practice those procedures that you hope you never need — but will be able to handle like a pro should the situation occur.

There is a wealth of knowledge on our website. As winter approaches, read up on cold-weather flying and pay special attention to icing. The TBM is a wonderful machine but, remember, it is a machine and not perfect. Know the limitations of your airplane and yours as a pilot.

**There is a wealth of knowledge on our website. As winter approaches, read up on cold-weather flying and pay special attention to icing.**

### Our Organization

I am always impressed by the thoughtful comments of so many of you on our website. I don't know of any other organization that is as active and involved as our TBMOPA online community. I can't think of a week that goes by without a lively discussion about things such as which airport to fly to in a certain area or which paint shop to use or questions from a prospective TBM owner, among many other topics.

We are very fortunate to be able to enjoy the efforts of those who came before and who recognized the need to build a strong supportive owners' group. I remember looking at posts and asking for advice back in 2004 when I purchased my first TBM. The owners were both patient and helpful.

While I flew a Premier for several years, I came back again to the TBM in 2009. I missed the camaraderie of this close-knit community. Others have owners groups but very few can boast the number of owner-flown aircraft that we can. This makes a huge difference in the interaction of the group. Just ask those who are trying to mix with the professional jet jockeys in other organizations. Thank you to all who have founded and led this organization over the years. We will work diligently as a board to continue your good work.

### Going Forward

We will continue to promote safety and training along with protecting the interests of our owners. Please do your part by promoting our organization with any TBM folks you know who might not be members and encourage them to join the organization and come to our events.

I look forward to seeing everyone at our convention in New Orleans and having the opportunity to meet those in person I have not yet already met and to get reacquainted with old friends. We have many exciting events planned for our convention, and safety will be No. 1 on all our minds. We will also celebrate the life and contributions of Larry at the beginning of our convention. In the meantime, fly safely and see you in October.

Carry on we will,

***Frank J. McKee***
***Chairman TBMOPA***

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**CORPORATE OFFICES**
1931 Commerce Lane, Suite 5, Jupiter, FL 33458
Telephone: (561) 841-1551 Fax: (954) 252-3935

**FOR SUBSCRIPTIONS, REPRINTS, BACK ISSUES,**
please log onto AJPublications.com
or call 1+ (561) 841-1551

**CONTACT THE EDITOR:**
Lyn@AJPublications.com

**CONTACT THE PUBLISHER**
Thierry@AJPublications.com





# Larry Glazer

Chairman, TBMOPA
2012-2014

We are deeply saddened
by the passing of
Larry Glazer and his wife Jane.

His dreams and legacy will continue
to inspire us every day.

# TBM displays impressive numbers at Oshkosh

**By Nicolas Chabbert, senior vice president, Daher-Socata Airplane Business Unit**

This year's EAA AirVenture fly-in was a tremendous event! A fine "cocktail" that brought together such ingredients as the U.S. Air Force Thunderbirds demonstration team's debut participation at Oshkosh with the attendance of hundreds of vintage, classic warbirds and home-built airplanes. Adding to the mix was good weather – with limited rain showers and mild temperatures – plus the unique environment and camaraderie that is the trademark of this aviation gathering.

For Daher-Socata, we were honored by the Experimental Aircraft Association organizers with the show-opening presentation of our new TBM 900 in Boeing Plaza, the new name of AirVenture's center-stage hot spot, where so many notable aircraft and spectacular projects have been highlighted in the past.

At Oshkosh's Wittman Regional Airport, we welcomed the participation of 65 customers with friends and families during EAA AirVenture. More than 50 TBMs were either on-site at the venue or parked at neighboring airports.

This was the largest presence of TBMs ever during the annual aviation event, making Daher-Socata's very fast turboprop the most represented turbine aircraft type at the world-renowned gathering. TBM pilots and owners were joined by other attendees at our annual TBM Customer Appreciation Dinner, which drew 300 guests.

Daher-Socata, along with the TBM Owners and Pilots Association, worked closely with EAA in facilitating the TBM "family" at Oshkosh. This included dedicated arrival slots, amenities and even a reserved campground – named TBM Town – for owners and pilots.

We were impressed by the increased attendance – in part resulting from the "TBM 900 effect" following our March launch of this latest version, which made its first appearance at the 2014 EAA AirVenture. Also contributing to the participation is the TBM fleet's constant growth worldwide. As of Sept. 1, we had delivered 690 TBMs – including 28 brand-new TBM 900s.

The overall TBM fleet is nearing the 700-aircraft mark, accumulating more than 1,175,270 flight hours and spreading its wings across all continents. This is why we have extended our service center network to Abu Dhabi and Japan, while our new Mexican distributor, JetMach, is introducing the TBM 900 in its market area. In parallel, our longest-serving TBM distributor, New Avex of Camarillo, Calif., sold its 100th new TBM since becoming an official dealer for Daher-Socata aircraft 15 years ago. The milestone very fast turboprop is the third TBM 900 that we provided to Avex this year, and it will be delivered to its owner, John Edwards.

**The overall TBM fleet is nearing the 700-aircraft mark, accumulating more than 1,175,270 flight hours and spreading its wings across all continents.**

With impressive numbers come big responsibilities, so we cannot rest on our laurels. This is why we have plans to improve our product and customer support further. Professional Pilot's 2014 Corporate Aircraft Product Support Survey gave us an 8.01 rating, compared to 7.91 last year. If we were only second in the turboprop category, we did rank first for Company Response Time and for Technical Manuals. These results recognize achievements that come from the hard work of our support and documentation teams, and we are now looking ahead to making progress in other support areas. TBM

**Nicolas Chabbert, Senior Vice President of the DAHER-SOCATA Airplane Business unit.**

## Larry Glazer

Businessman, owner/pilot and Chairman of TBMOPA

***All of us are deeply saddened by the loss of Larry and his wife, Jane. We have known them for many years, and the global TBM family valued Larry's leadership during his chairmanship of TBMOPA. Our heartfelt sympathy goes out to their family and friends.***

Patrick Daher, Stéphane Mayer, Nicolas Chabbert,and the entire team at Daher, Daher-Socata and Socata North America.

# Get a robot to do your heavy moving

Wouldn't it be fun to run your own robot drone around the airport and the FAA couldn't say anything about it? Have you ever been able to move your airplane on the ground while sitting on the wing?

Drones and robots are all the rage these days, and they can do all sorts of jobs from spying on your neighbors to delivering pizza. But the truth of the matter is that sometimes robots actually do make your job easier.

Anthony Chan of AC Air Technology has developed a remote-control robot aircraft tug that is a true time saver. There are all sorts of solutions on the market to move your airplane in and out of the hangar. Some are cheaper than others, but price doesn't always stack up with true convenience.

Next time you bend over to hook up the tow bar to your airplane consider all the steps it takes just to get ready to move it. If it's heavy, you need a mirror or a second set of hands to hook the tow bar to the tug. You need a second set of eyes to make sure you don't smash the tail in the back of the T-hangar or touch the wing of the airplane next to you in the community hangar. If you are using a motorized tug attached to the front axle, you've got to manhandle the entire thing to steer the airplane, and going is easier than coming.

The bottom line for an aircraft tug is that it must be reliable, easy and cheap to operate, as well as available when you need it. It turns out that a remotely controlled electric robot can fill just about every need on any airplane owner's list.

If you have ever played with a remote-controlled car, you'll get the hang of operating the TrackTech in a few minutes. With the gear capture rollers, you just drive the tug up to the nose wheel (or tail wheel of a tail-dragger). It's best to leave the chocks in as you drive the tug under the wheel. It will lock in place, and you'll be ready to move the airplane in seconds. No bending, crawling around on your knees or struggling to line up and hook the tow bar.

While controlling the tug using the remote, you can walk over and check the wingtip clearance from the hangar door. Or you can steer while watching from the rear of the airplane to avoid smashing the rudder. The TrackTech tug does very well on pavement and smooth grass and it handles moderate inclines with ease. Its powerful electric motors produce enough torque to move your airplane at a brisk walking pace, and the rechargeable lithium ion battery will last for 45 minutes of normal use.

Tail wheels, nose wheels, fairings or no fairings, tugs are available to tow gross weights from 5,000 pounds to 21,000 pounds. The T2 tug comes with a Lazy Susan to enable easier maneuvering of the larger airplanes.

When you finally park the airplane in the hangar, you can leave it on the tug, ready to move next time to make it even easier. Just hook it up with the charger, and it will be ready to go.

Check out **ACAirTechnology.com** and see the photos and videos of AC Air's TrackTech tug in operation, and you might be seeing one in your future.

# Carry your own wi-fi hotspot wherever you fly

The smart phone, tablet and laptop have transformed General Aviation, but what happens when you find yourself out of range of your cellular network? Not much. So consider the possibilities of Iridium GO! which promises a satellite-backed wi-fi hotspot — absolutely anywhere! This compact, durable and portable unit enables reliable voice and data for your phone or as many as five mobile devices. Just flip up the integrated antenna, and the battery-powered unit connects quickly and automatically to the Iridium LEO satellite constellation to create a hotspot anywhere in your cockpit or for 50 feet in any direction outside. For more info, go to **SatellitePhoneStore.com**.

# Everything in its place — in style

Now that pilots are packing iPads and chargers instead of loose-leaf binders, it's probably time to reconsider how we haul them around. Flight Gear tapped a team of GA pilots to design a flight bag for the 21st Century cockpit, and the Navigator Bag is the result. Just 10 inches wide by 22 inches long by 11 inches high, the Navigator offers room to carry multiple headsets, an iPad, backup charts and all the accessories (and their endless cords and chargers!). Exterior pockets are padded to protect those headsets, iPads and hand-held GPSs, and the main compartment can even take a change of clothes if you need to. Put this flight bag on your holiday wish list with the notation to visit **Sportys.com**.


# When you need to know what you know...

Hypoxia has been in the news of late, and perhaps you've been thinking about a monitoring system that would tell you when you, as PIC, are putting yourself and your loved ones in danger. Aircraft Spruce is offering a pulse oximeter, the MD300 C201, which will give you a non-invasive way to spot-check your functional oxygen saturation of arterial hemoglobin or SpO2. Once you've established what's normal for you (at altitude and on the ground), you'll know when you need to reach for the supplemental oxygen, even if you're well below the FAA-mandated 14,000-foot altitude level. Generally speaking, that can be when your oxygen saturation level drops as little as 5 percent below normal home altitude saturation level. For details, head for **AircraftSpruce.com.**

# TRAINING FOR P

Spend the time to bump your skills up a notch. BY BILL PANARELLO

Hello, Capt. Bill, my name is Ryan from Universal Traffic Services in Grand Rapids, Mich., (KGRR) and I heard you speak on the Airline Mindset for Aviation in Muncie. I was interested in the concept for our TBM 850 . I'm looking to implement the crew concept where most of the trips are flown by two pilots."

"Wow, hey, that's great, Ryan. Pick a week, and we'll put together the PowerPoints and flight-training scenarios for you guys."

"That sounds great, Bill. We will see you soon."

I've been tortured by many flight destructors — and have enjoyed torturing others — most of my training life. I suspect it's part my desire to equip the crews and myself with a greater passion for safety and proficiency. To get a call to be part of the dream and vision of UTS, a group that does it right, is my dream and vision also. Ray, BK, Ken and Ryan showed up with big expectations, so

# RO-LEVEL CRM

it was great to meet the challenge. My son Jarad, back from a year of night flying out of Kandahar, Afghanistan, was pumped about the project, too. We had the PowerPoints for the Airline Mindset, Profiles, Icing and Radar. So, with the insurance company on board, we went to work.

I suppose making professional pilots is not as difficult as keeping them that way. Give us a challenge, and we will meet it. Staying proficient with stick and rudder, while passing on knowledge and experiences to those you fly with, takes passion and a willingness to teach and learn all you can. What an encouragement to work with the UTS guys.

Jarad and I hopped on the airlines to GRR, got settled in at the hotel and planned on flying with BK on the first night. Night flying for us old guys has actually started to be a little extra work. So Jarad and I briefed BK on the mission. We would fly with each guy individually at night and get him current. The briefing would include the illusions and distractions, flight profile and a field trip.

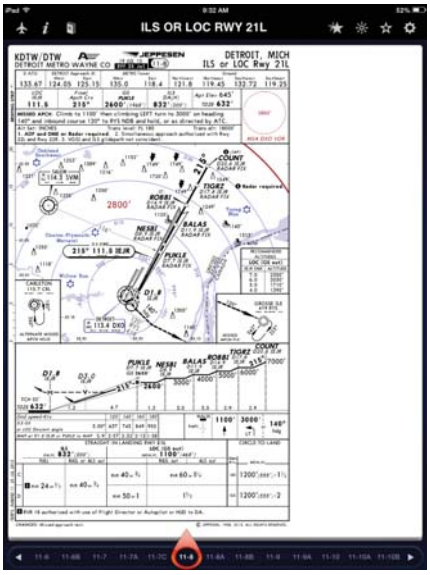
I called DTW (Detroit) approach and tower on the landline during the afternoon and told them I would like to visit. "Come on down the price is right!" they said, and we were on our way.

Civil twilight passed by, and we slipped into darkness. Being the greatest airplane ever built for G.A. allows the TBM to mingle with the big boys, and that's where we were headed. We did a two-pilot crew brief and worked on the pilot flying-pilot monitoring concept with the checklist on climb out. We picked a northwest departure out of GRR to 25,000 feet and got the Polar three arrival off the MSG transition to try out the auto Vpath feature on the G1000.

As we climbed out, Jarad was in the back taking notes for the crew-concept checklist he would be building during the week. Center got on board the mission and gave us multiple crossing restrictions and changes. We worked through the changes with the pilot monitoring, verifying the changes in the routes and altitudes before executing them.

The icing went on a thousand or so before the top-of-the-cloud deck, which was through 18,000. BK wanted the runway info at DTW, so he had it all: radios and controls, while I went off-frequency for the ATIS. Advertising ILS 21L. BK transferred the control of the aircraft to me and went about setting up and briefing for the approach. Briefing for a visual VS IMC approach is different in the amount of info to spit out, but both cover certain points. I like to start at least 30 minutes out for a good brief. I was living large on the right side with Vpath engaged and hitting the restrictions. We took the icing off in the clear. After BK plugged in the approach and verified the fixes in the FPL page, he came up for air to give the verbal brief.

The fun thing about the big airports is there could be up to four or five different ILS approaches. To find the right one, I read starting at the top of the Briefing Strip and go left to right. We read the plate date to see to see if either of us missed an update. I read the briefing strip then moved down, skipping over the top view to get a look at the side view profile. Compare the database to the plate by scrolling the fixes to the selected runway on the FPL page, including the missed approaches. Then go back to the top view for obstructions. Then go on to the 10-9 plate.




### The brief goes like this:

It will be an ILS to runway 21L at DTW. 19 JUL 13, LOC 111.5 IEJR, final approach course 215, GS at PUKLE 2600 feet, DA 832 feet, ARPT ELEV 645 feet, TDZE 632 feet, MSA 2,800 feet, MISSED APPROACH-CLIMB to 1,100 feet then hard left to 3,000 feet on a 140 HDG AND INBOUND


COURSE 120 to RYS NDB and hold. It looks like a direct entry with left turns.

**Skip to side view:**
Multiple step-down fixes, 2,600 feet to PUKLE DME 7.7 IEJR ,TCH 55 feet , PAPI on the left of the MALSR. Reread the abbreviated initial missed approach, 832 feet DA is the bottom, 200 feet above the threshold, and we need 2,400 feet RVR.

**Back to the top view:** Highest Obstacles are NW 15-20 nm.

**Now to the 10-9 page:**
Runway 21L 10,001 feet long , 1,400 feet needed, no displaced thresholds, and I will plan on Taxiway F or high speed W2 , with no pertinent NOTAMs for this approach.

Runway is dry; X-Wind component is 12 knots and gusts to 22 knots.
At 6,700 pounds landing, Vref 85 + 16 knots = Vapp 101 knots, and it's set in the TMR/REF

Info 2, call the FBO for the car, order the pizza and fuel, then take back control of the aircraft.

On vectors for final, the call came: "TBM 8UT hold 200 knots to the Outer Marker."

We were cleared for the ILS 21L. I normally shoot to cross the 1,000-foot decision point for stabilization at 100 knots. At the 500-foot decision point, you should be at Vapp. Down the slope we go at 200 knots, OM, Power Lever under 10 percent. Decelerating quickly through 178 knots, get the gear down, set flaps at T.O. and autopilot off to help with the pitch change. Below 122 knots, flaps at full, hitting 1,000 feet at 101 knots. Jet jocks, don't bother. Crossing 500 feet we're at 23 percent torque and Vapp 101 with four fat guys and 100 gallons of fuel. Cross the threshold at Vref and 50 feet, and the guys in the back will tell you how good the landing was.

Tower let us crawl down to the end of the runway to get a good view of the lights, signs and markings. Familiarity is a lot of help on the dark and dreary nights. After a couple of complex taxi instructions, we ended up on the de-ice pad for the 21C departure back to GRR. Which set us up for a tailwind approach — with a crosswind full stop at home to finish the job.

Jarad worked diligently putting the data into the Apple, and at 0830 we were back in the conference room. The Leadership

Decision Model (LDM) includes discussion on known performance levels and how to do it better. We built the mission for the two-pilot concept and practiced the pilot flying-pilot monitoring procedures.

Ken was in the left seat first, and BK on the right. Ken picked it up quickly, and we moved right along. He would do his flows and then call for that checklist. BK would challenge, and Ken would respond. Ken called for the "climb checks," for example, after he got out through the flaps-up stage, and BK would silently confirm and call, "Climb checks complete to 10,000."

By accident, I left out the ram dump, and we got the Cabin Alt warning and dealt with that. It's memory item fun time! Cabin alt above 10,000: oxygen masks on 100 percent, establish communications. It was frustrating till Ryan squared us old guys up on the inter-phone knob positions for comfort. A make-believe radio call for the emergency and simulate at 25,000 for descent procedures. We briefed for the approach to FKS, which was at minimums, went down and had to go missed-approach. Then we headed to the published hold.

I'm not sure what happened, but Capt. Ken's PFD failed. He gave BK the aircraft and went about the checklist to get ATC back on board. All ready again for the approach, and the snow showers took it below minimums. TVC was the alternate, so it was time to divert. Work, work, work and with right seat Big BK flying, we headed over to do the visual. Big Bill briefed that it could go ugly early from the right seat so we coached him down to the craziest thing I've ever seen! Looked liked he and the TBM were "dancing with the stars" on that approach! So, we went around, and he got it right the next time. If you guys get bored, try a right seat landing with help.

We had lunch and swapped seats to head over to FFX for some short fields. I think Steve Walenz holds the record, but Frank McKee wants to see the replay. They have both put it down gently and stopped in just short of 1000 feet. We did the no-obstruction 1.5 degree glide slope and the 6 degree obstruction approach. BK and Ken battled it out. By the end, young blood Ryan had beaten us all.

While the boss was busy working, we could have fun the first few days and nights. Now, Ray was going to jump into the training mode. We had worked the two-pilot CRM checklists with three days of input from the pre-flight briefs and flight training. We went out in the afternoon with a broken cloud layer hovering over the area. We had planned on radar training, and the showers started moving into town. Four of us gathered around for Ray to get briefed because "it's gonna be one of those days."

We planned an instrument departure with the synthetic vision for the zero-zero takeoff with foggles. Temp of 0 Celsius with visible moisture so let's test the boots and use the equipment for takeoff. Ray briefed that, if anything goes wrong before 85 knots, we would abort the takeoff; if we lost the engine after T.O., we would do the Chipman one arrival back to the runway. Other than that it would be a boring 8L runway heading to 4,000 feet and vectors to the first fix.

Power set, rotate, positive rate, gear up, but something's not right. TBM 8UT contact departure 124.6. "Grand Rapids Approach TBM 898UT, 090 heading, climbing 1,200 to 4,000."

"Hey, Ray, what do you have going on?"

"Bill, the airspeed is bleeding off, and I FLCed 130, and the Flight Director is telling me to descend! I shouldn't have to descend with 100 percent TRQ!"

"Looks like a pitch-and-power scenario. Look at the right side PFD and the standby — none of them are agreeing on airspeed or altitude, and vertical speed is zero in the climb! Let's climb at seven and a half degrees of pitch to altitude and get the Climb Checks done with the Flight Director OFF!"

"Flaps are still out"

"Good catch! What do you want to do, Cappy?"

"I would have called in sick if I knew this was going to happen! Bill, tell approach we have an emergency, and we want vectors back to the ILS at GRR."

"Good call ,Ray. Set up level at 160 knots. AUX Status page will give you altitude. Use your fancy synthetic vision Flight Path marker to hold the altitude, and it will be a good Angle of Attack indicator on approach. With the ice, 10-degree AOA would be a good max.

"TBM 8UT is declaring an emergency and wishes to return to GRR."

"Roger, TBM 8UT; turn left heading 270 and maintain 4,000 feet. Let me know when you want a turn."

"Hey, Ray, the Emergency Check list in Misc for "airspeed Indicating System Failure says check the pitot heat and pull thoroughly the alternate static air. Still not working, right?"

"Yeah, Bill, still no good."

"Ray, I will set you up for the ILS 8L and then you can brief. Hey, Ray, we got some light icing so we better use the ice speeds for landing. Without a reliable airspeed indicator, review the pitch-and-power settings on the back of the Radar Checklist."

"Hey, Bill, tell approach I want 8R for the extra runway."

"Good call, Ray."

Ice speeds plugged in, 10,000 feet of asphalt, and the car parked here. It doesn't get much more fun than that. We landed, and I did some miracle maintenance. Off we went. Pitch and power was Ray's best friend on the climb to FL250.

The Leadership Decision Module debrief looks at what happened and what we could have done better. Jarad wrapped it up in the conference room, going over the exercises, explaining techniques and answering questions. We signed the logs and headed home.

So there it is. We did our best to torture these guys and couldn't break 'em. I have done many training events, and these guys all did a great job.

Thank you, Ray and all at UTS.

From Jarad, Walt and Bill, the crew at TBM Pro Training, keep the blue side up and the ball centered. TBM

# REVERSE WITH CARE

Reverse thrust can be a convenient tool in a variety of circumstances, but handle it with care.

BY BILL COX

I was flying a Socata TBM 700 on location at Bermuda Dunes, Calif., 20 years ago for the ABC-TV series, "Wide World of Flying." We'd knocked out most of the air-to-air and ground shots on the production list, but the Socata pilot riding right-seat was concerned about the last one.

I'd written the script to include a short sequence showing the airplane backing into a parking space using reverse thrust. Before we fired up for the final shot, the French pilot and I had borrowed a broom from the FBO and meticulously swept the ramp to assure there were no loose stones or any other debris that might be sucked into the airplane's intake.

Finally, as the light was fading and our director was getting progressively more antsy, we positioned the airplane. I started the big Pratt & Whitney turbine and backed the TBM into its appointed spot. Fortunately, the result was a total anticlimax. We got the shot in one take. The airplane was no worse for wear, and our director could finally relax.

The point is, while reverse thrust is standard equipment on many aircraft, injudicious use of reverse under the wrong circumstances can be expensive. No matter who the manufacturer, turbine aircraft engines are intolerant of reverse thrust at the wrong time and place. The consequence of reversing on a dirt or gravel runway can be debris sucked into the intake and a FOD-ed engine. Some manufacturers caution against using reverse on any surface other than smooth and hard.

Or very wet. The first uses of reverse were on early, piston-powered seaplanes that would otherwise have had no way of braking on water. Twin-engine water birds found reverse especially beneficial, not only to reduce water run-out on landing but for maneuvering in tight spaces. An experienced pilot could sometimes ease his airplane right up to a dock by using differential forward and reverse thrust.


Revising the prop pitch to a negative angle on piston-engine aircraft had some interesting — and often unfavorable — side effects. Piston aircraft are generally air-cooled, and reversing the flow of air for braking results in an instantaneous reduction in cooling air across the cylinders. That's about as extreme an example of shock cooling as you'll find.

For better or worse, reverse pitch is rarely employed on piston aircraft these days. Most land-based turboprop and jet airlines make it a practice to use reverse on nearly every landing, regardless of runway length. They do this for several reasons. First, the high-speed airfoil(s) often demand high approach speeds, as much as 150 knots on a heavily loaded Boeing 747. Second, on pure jet aircraft, flight idle is still significant power, often as much as 55 percent, and that means any braking action is partially offset by the engines themselves.

In airline service, both turboprops and jets may sometimes use reverse to power back from a gate, though that's not a common practice because of the possibility of damage to a terminal building.

Reverse can also come in handy during a rejected takeoff. I was once a passenger in the back of a 737 when the pilot aborted a takeoff from Houston Hobby airport. The captain's side window had come open right at rotation. The pilot slammed the nose gear back onto the runway, went to full reverse thrust and max braking and roared to a stop roughly 50 feet from the runway's end.

Reverse is a great tool for operation into short strips, but the airlines more often use it to minimize time on an active runway and reduce wear on the tires and brakes, which are almost universally more expensive than the sequencing mechanism and thrust reverse "buckets" themselves.

Propellor-driven single and twin turboprops are governed by a slightly different set of rules than pure jets, but the same set of priorities makes perfect sense. Tires and brakes are still more expensive than simply reversing thrust, and the economics can work well for corporate or private operators.

There are even some jets and turboprops that are approved for reverse in flight, though only with care. The Boeing C-17 heavy-lift cargo aircraft sometimes use in-flight reverse for high-rate tactical descents into combat zones. NASA's Shuttle Training Aircraft, a highly modified Gulfstream II, used in-flight thrust reversers to simulate the Space Shuttle's steep, landing profile (a 4.5-1 glide ratio) when approaching Cape Canaveral. Many Russian turboprop aircraft can reverse in flight, as can several of the Swiss Pilatus propjets.

The de Havilland Twin Otter is another of those airplanes that can employ reverse thrust to steepen a descent. The DHC-6 is often used as a heavy-freight hauler for the backwoods of Canada and Alaska, and reverse thrust makes it easier to sandwich the Twin Otter into miniature, unimproved non-airports, especially in situations where tall trees or terrain surround the landing area.

An old friend, Bob "Moose" Krebs, used to fly Twin Otters for Catalina Airlines, back and forth between Long Beach and Catalina Airport. Bob once let me sneak aboard a Twin Otter and fly co-pilot on a non-rev flight, and he demonstrated what the airplane could do in a descent configuration with both props reversed. Moose pushed

the nose over to peg the VSI off the bottom of the scale with everything hanging out and the props in max reverse. The pitch attitude looked like something you might see from a Stuka dive bomber.

Bob was so good with the airplane that he could fly it practically to the ground in reverse, but he was emphatic that you needed to begin your recovery early by first returning to forward thrust. Otherwise, you could misjudge the flare and wipe out the airplane.

Even in more conventional modes, reverse thrust provides an impressive assist when it's necessary to plant the airplane and stop it short. Reverse is far more effective at high speed because the prop(s) provide a mechanism to project air forward. Jets can only redirect exhaust gases forward (usually at a less efficient, 45-degree angle). That's not nearly as effective as propeller blades re-pitched to push air against the direction of travel.

In landing mode, normal practice is to engage reverse as early as possible after touchdown and hold it as long as there's no risk of FOD damage. If you fly the airlines regularly, you'll notice they enter reverse as soon as the main gear struts are depressed. (Many aircraft have micro switches that inhibit engaging reverse until the weight of the aircraft is firmly on the main gear.) The airlines generally make it a practice to be out of reverse by the time the aircraft slows to 60 knots. Use of reverse below that speed is likely to blow ground debris out in front of the intakes where it can be channeled through the engines.

Reverse can be invaluable on slick runways where braking action may be limited or nonexistent. If the airplane begins to lose traction on a wet or ice-covered runway, a pilot may choose to engage reverse and decelerate to taxi speed with no risk of locking up wheels and losing directional control.

Perhaps the most unusual application of reverse thrust occurred on an airplane that wasn't even fitted with reversible props. The story goes that a TWA captain was landing a Lockheed Constellation in a fierce snowstorm at Wichita Mid-Continent Airport back in the mid-1950s. The runway was covered with snow and ice, and shortly after touchdown, the Connie began to veer toward the left runway lights in the gusting winds. In an amazing stroke of airmanship, the captain added power on both starboard engines to increase the rate of left rotation. The big Lockheed's nose swung 90 degrees left and continued around until the airplane was sliding backwards, still tracking down the runway. When the Connie had completed a full 180-degree turn, the captain added power on both port engines to stop the rotation. Then, he went to full power on all four engines, effectively converting forward thrust to reverse thrust and stopped the airplane on the runway.

Reverse thrust can offer single-engine propjets a major advantage over twin-engine models. Just as loss of thrust on one side of a King Air, Cheyenne or Conquest causes major directional control issues in flight, loss of any form of asymmetrical braking action introduces the same problems on the ground. Several accidents have been attributed to uncommanded deployment of thrust reversers on one side of a jet or twin turboprop. Conversely, if thrust reverse fails on a single, the only consequence is reduced braking action with no loss of steering control.

Reverse thrust is just one more benefit of jetprops such as the TBM series, the fastest single-engine turboprop in the world. With the help of prop reverse, it can also be one of the slowest. TBM

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# RICE LAKE AIR CENTER KEEPS GOOD COMPANY WITH MT PROPELLERS

The Cameron, Wis., Socata Service Center's kinship with the high-tech composite blades

BY LYN FREEMAN

In the early 1980s, the world barely noticed the birth of a new propeller manufacturer in Germany. MT-Propellers began installing composite props on a variety of aircraft, claiming a liturgy of advantages over their metal counterparts. Composite props were not a new idea. The Germans used them extensively in World War II on both bombers and fighters. MT Propellers founder, Gerd Muehlbauer, had himself been engineering composite prop blades since the late 1960s. But it was nearly 40 years later that Muehlbauer stuck a new CAD/CAM manufactured five-bladed composite propeller on a TBM 700. And the world took notice.



"MT advanced the basic propeller design with technology," said Joe Robbins, a vice president at Rice Lake Air Center in Cameron, Wis. "By using a computer, they could design and cut identical propeller blades, which makes a much more reliable airfoil and also makes replacements pretty simple."

Robbins was introduced to MT's composite propeller by a friend on the U.S. Aerobatic Team, flying an Extra 260. He admitted to being rather intrigued at how well the composite blades tolerated high G loads and how they seemed to improve overall performance when compared to the traditional metal props. He also said he was rather astounded to learn that MT propellers had absolutely no ADs in the past twenty years, and after 120,000,000 flight hours, there have been zero inflight failures. Pretty impressive.

But Robbin's bread and butter was the TBM. He began working on the French, single-engine turboprop in 1993, and in 1995 his Rice Lake facility became a Socata Service Center. Rice Lake Air Center now handles about 120 TBMs a year, with customers coming from as far away as France and Mexico to take advantage of the company's unusual level of expertise. Rice Lake Air Center is generally booked solidly eight months in advance, purely from word-of-mouth recommendations from TBM owners.

Rice Lake Air Center customers point to any number of reasons why they bring their aircraft there, again and again. The biggest reason is that Rice Lake works on as many, if not more, TBMs than anyone else, and it is standard practice for a TBM to leave the service facility with zero remaining squawks.

Lots of smaller reasons also seem to make a mark on customers. They can log on to the company's website and update their aircraft's hours and cycles, plus get an instant aircraft status update or make online requests, which are viewed by multiple personnel at Robbin's facility. Rice Lake annuals even return a TBM with newly washed carpets, and the aircraft is professionally detailed inside and out. It doesn't hurt that customers are all given Joe Robbins cell phone number, which he answers 24/7/365.

By the mid-2000s, Rice Lake got word that MT Propellers had a new prop to hang on the TBM. Robbins began researching the German propeller company, and the more he learned, the more interested he became in starting a business relationship. After several installs, Robbins even had some ideas on how to improve MT's TBM prop,

suggesting enhancements to the spinner and the blade's leading edge. To Robbin's pleasant surprise, the company took his recommendations seriously and immediately plugged his ideas into their product line. Then he begin to hear from his customers who had traded in their metal props for the new composite wunderkind.

"It's a head-turning difference," Robbins said. "Customers literally turn their head right to you and say 'Wow'."

The first thing they seemed to notice is the difference in their first climb out, about 250-350 feet better than their old propeller. And then they notice how much quieter the MT propeller is (about 4-6 db) and how much less vibration it creates. The experience is nothing short of transformative.

"We had one customer who complained, however, that his new MT prop made an obnoxious whine," Robbins remembered. His mechanics chased the noise down and found FOD damage in the compressor. Turned out the new MT prop was so quiet, it unmasked the noise, quietness of the new MT propeller unmasked the noise "The new MT was enough quieter that now he could hear the compressor whine."


His customers also reported about a 3-4 knot increase in speed, depending on the cruise level. The composite propeller blades eliminated a lot of high-speed drag. That allowed the TBM to fly faster. The reduced diameter blades also reduced stress on the engine, which went directly to the cost of the aircraft's operating bottom line.

"There's even a big difference in taxi operations," Robbins pointed out. There is no RPM limit on the prop, so TBM pilots can taxi at whatever power setting is appropriate. They are no longer required — as they are with the original metal prop — to operate at high idle speeds. Operating at lower RPMs translated into immediate fuel savings and reduced wear and tear on the brakes. Slower idle speeds, plus the fact the MT propeller blades are about two inches shorter than their metal counterparts, means there is a significant reduction in the risk of FOD damage.

And should there be FOD damage, or worse, a prop strike, the blade can likely be repaired instead of replaced. The MT can lose up to 5" without having to remove the power section for repair, according to the manufacturer, and there is much less potential for damaging the engine because the composite blades literally absorb the effects of a prop strike impact. The MT prop is exponentially easier to service, Robbins points out. Often the blades can be repaired instead of replaced. And when it comes time for an overhaul,

composite propeller blades can actually be returned to their original dimensions by adding or replacing composite material. Metal props are overhauled by shaving and filing down the blade, a process which will eventually wear them down enough that they can no longer meet minimum tolerances. Not so with MT prop blades. At the end of an overhaul, the blade has been returned to its original factory specs. With no life limit on the composite blades, it can translate into substantial savings over time. Metal props will eventually need to be replaced; not so with an MT propeller.

A close examination of the TBM's MT propeller belies its high-tech pedigree. The root section of the propeller blade begins with a highly compressed core of thinly layered laminated beech wood, which curiously has about the same tensile strength as steel. The remaining part of the blade is a lightweight laminated spruce. This wooden core is reinforced by layers of epoxy fiberglass, Kevlar, then sealed by acrylic-polyurethane. The finishing touch comes in the form of a nickel alloy leading edge, which is about five times harder than an aluminum blade. The tough nickel alloy leading edge virtually eliminates blade erosion during reverse and ground operation.

The whole process provides a propeller that weighs in about 10 pounds less than the original factory OEM metal propeller. And the MT prop is "all weather operable." It can also be painted.

So it's not hard to understand why the MT prop has turned so many heads, including of course, the competition.

"In fact, one day the competition came to us and wanted to buy an MT propeller," Joe Robbins said. The MT factory was perfectly okay with selling its product to its leading competitor. "In fact," Robbins said, "the factory suggested they wait about three months before they bought, since MT was coming out with a newer, improved model. That way the competition would get MT's most advanced, state-of-the-art product."

Robbins says he and MT Propellers firmly believe that competition benefits everyone.

Cost of a new MT five-bladed composite propeller is about $49,000, installed. That includes engine/ airframe rigging and some training. The big smile on a new Rice Lake Air Center customer's face — well that comes at no additional charge. TBM

## WHAT A DRAG

Joe Robbins is an ex-Marine and a pilot with both IA and A&P certificates. In his spare time, Robbins attends to his other true love — drag-racing motorcycles. His big black bike is a world-record holder on the naked B-king Texas Mile at 201 mph. He's currently ranked No. 3 in the NHDRO (No Hatin' Drag Racin' Organization) standings.

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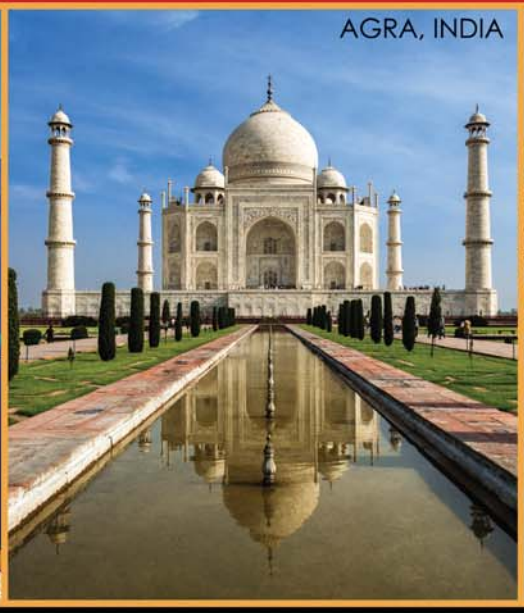




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# FALSE GLIDESLOPE

BY THOMAS P. TURNER

Shortly before Oshkosh 2014, Dutch aviation authorities released a very interesting report. Although the report addressed airline operations and did not get much press in the U.S., it provided a warning and answered common questions about the way an autopilot intercepts and couples to glideslopes during an ILS approach, including why most autopilots will only couple when intercepting the glideslope from below.

"The Dutch government's safety board wants to publicize the existence of false glideslope indications that could cause the aircraft, when coupled to the autopilot, to pitch up rather than down," the report stated. "The insights were gathered during an investigation into a pitch-up incident on a Boeing 737 in which the incident 'digressed' until the aircraft's stick shaker activated (a stall warning indication). The board wants pilots to understand the dangerous information these false glideslope signals can send to an aircraft's autopilot that might cause the system to operate in a manner opposite to what the cockpit crew expects."

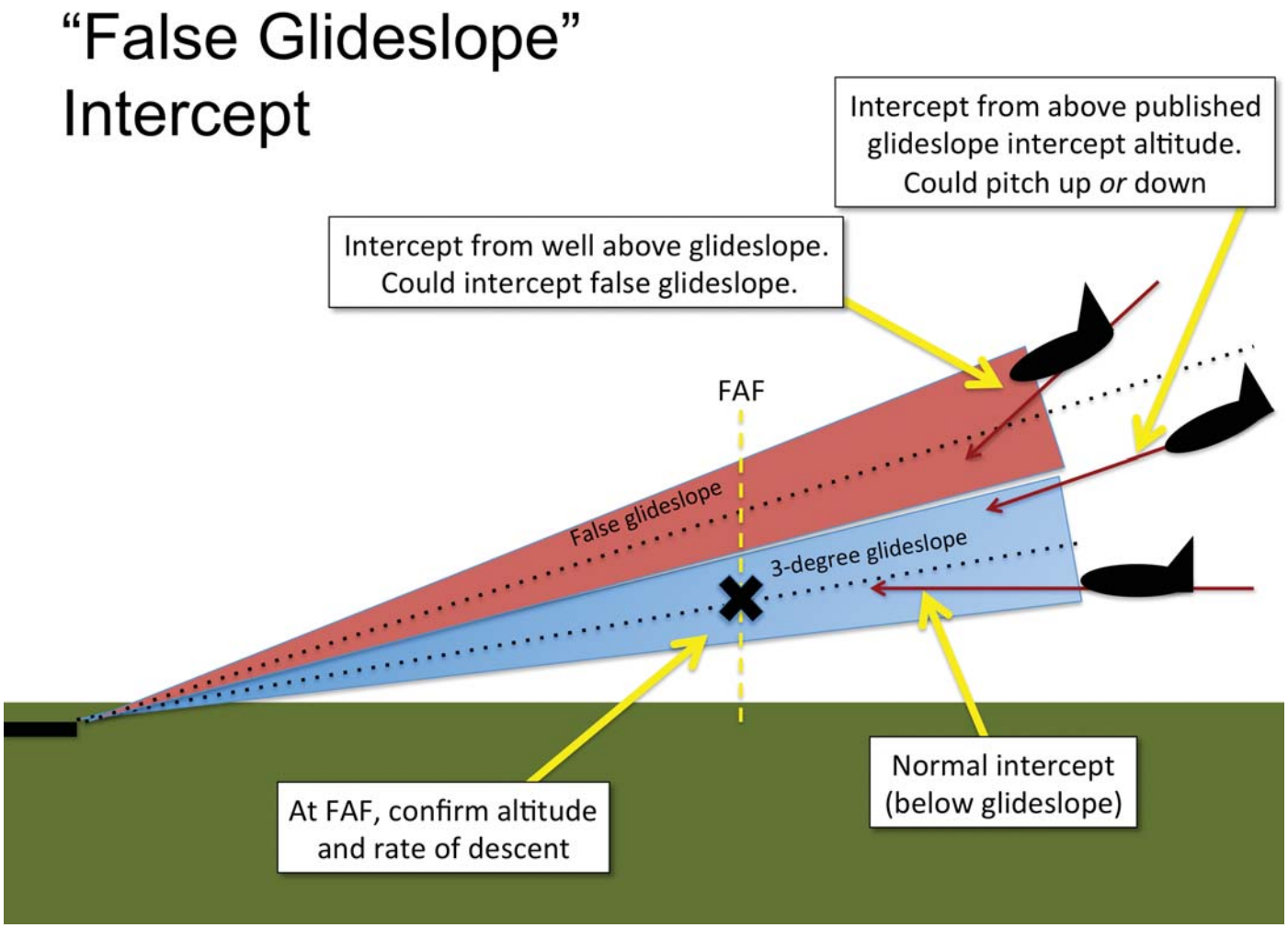
The report, published (in June 2014), focused too on the result of the unexpected pitch up. "The resulting loss of airspeed may cause the aircraft to stall," the report said. The Dutch authorities said that while false glideslope indications are not new, until recently it was believed that even false signals would head the aircraft in the proper direction, down and toward the runway, just at a higher rate of descent. Further investigations revealed that four similar incidents have occurred in Europe, while 19 were found in a U.S. database, all at different airports and involving different operators.

The Dutch report is available at CFMediaview.com/lp1.aspx?v=8_83625797_3001_14.

We discussed this effect of the Instrument Landing System with students 20 years ago while I was teaching at an international flight-training corporation in Wichita, Kan. This FAA diagram points out the hazard of false glideslope generation by ILS transmitters and how an airplane might encounter a much steeper, higher false glideslope if intercepting from above instead of below the correct signal.

A few years later, while flying in corporate operations in the southeastern United States, I recall experiencing a false glideslope intercept while flying a coupled ILS approach. Flying into busy terminal airspace and arriving from a direction with relatively high terrain, I was higher than the published glideslope intercept altitude, and the nav radio apparently homed in on the glidepath above me instead of below. The aircraft pitched up when I was expecting it to hold altitude for the intercept, sensing, as best I could tell, the false 9-degree glideslope instead of waiting to intercept the true 3-degree path. Having taught this anomalous indication to others, after a brief moment of confusion, I recognized the problem and disengaged the autopilot. Luckily, I was in visual conditions at the time and simply continued for a visual landing. Had I been in IMC (instrument meteorological conditions), I would have missed the approach and asked for vectors for another intercept.

This is why, I presume, most autopilots are designed to couple to a glideslope only when intercepted from below. It is possible that an intercept from above could begin from above the false glideslope as well, and the autopilot might couple to this erroneous, very steep and screaming descent



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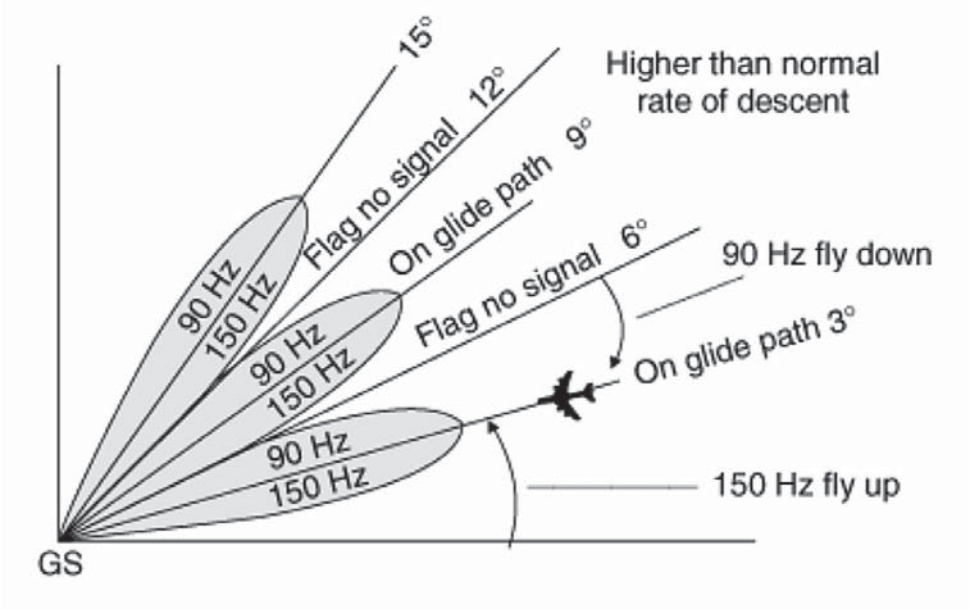
toward the ground.

It's also why it's vital to compare your height and rate of descent when crossing the final approach fix inbound on an ILS approach. Your altitude when crossing the FAF tells you that you (or your autopilot) are sensing the glideslope and not some anomalous signal. Your rate of descent shortly afterward tells you whether you are following the proper glidepath. If you're flying the steeper, 6-degree to 9-degree (and maybe even as much as a 15-degree) false glideslope, your rate of descent will be excessive if you (or the autopilot) keeps the glideslope indicator centered.

If your autopilot pitches upward when you've armed the ILS approach and are inbound toward the glideslope, disengage the autopilot immediately, hand-fly the airplane and assess the situation. If you have any doubt at all about what's happening, descend no further, report the situation to Air Traffic Control and obtain an amended clearance to divert or try another intercept to the approach.




If operational reality or ATC direction puts you in a position where you are descending into the glidepath from above:

First, realize that your autopilot will most likely fail to intercept the glideslope. Its operating logic prevents an intercept from anything other than below the glideslope.

Second, hand-fly the airplane until you are established on glideslope. You may then engage the autopilot and couple it to the glideslope. But be ready in case it does not sense the glideslope long enough to couple for the approach. If you're forced to intercept the glideslope from above, you may be required to hand-fly the entire procedure.

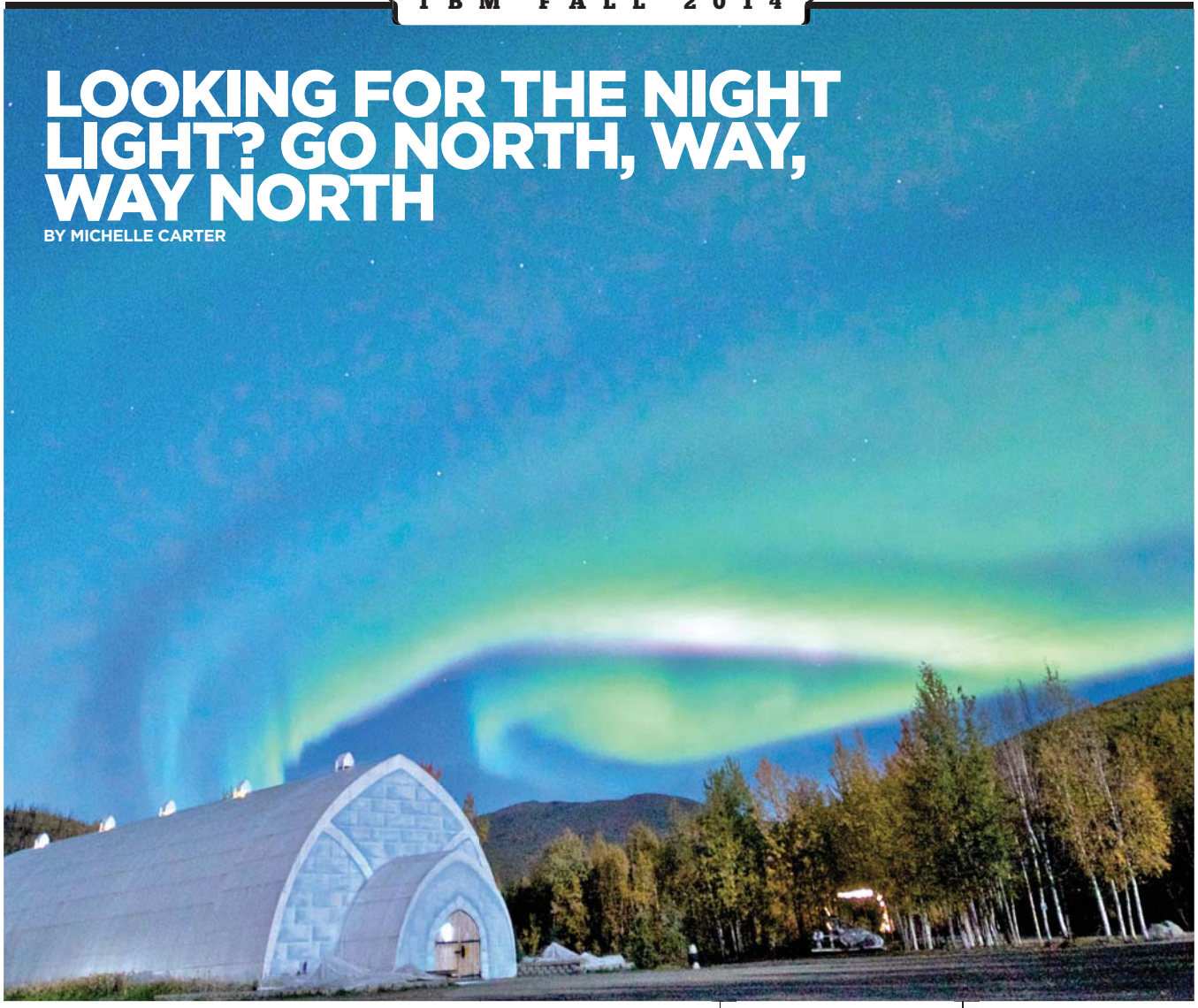
Cockpit automation is a tremendous boon to flying a single-pilot turboprop like the TBM safely. Automation, however, requires you think ahead of what the airplane might do and be ready to take over immediately if it begins to take the aircraft somewhere other than where you expect. Luckily, the false glideslope phenomenon is known, so it's easy for us to anticipate. TBM

# WEEKENDERS

TBM FALL 2014

## LOOKING FOR THE NIGHT LIGHT? GO NORTH, WAY, WAY NORTH

BY MICHELLE CARTER



Crazy about the brilliant lights and bright nights? Does your day begin when the sun goes down? Is dark your least favorite color?

Then set your Garmin for the private 3,000-foot airstrip at Chena Hot Springs, Alaska, about 60 super-scenic miles from Fairbanks. If uncontrolled gravel strips aren't your cup of tea, fly into Fairbanks International (FIA) and catch the shuttle to the Chena Hot Springs Resort. You'll know you're there when you pull up to a super-sized ice blue igloo made, appropriately, of ice!

The luminescent ice building houses the Aurora Ice Museum and Gallery, the largest year-round ice environment in the world. More than 1,000 tons of ice and snow (all harvested at the resort) went into the creation of the museum, which remains a cool 25 degrees F inside. Something called an absorption chiller keeps the museum chilly enough, even in the summer, to provide a gallery for ice sculptures such as a life-sized polar bear and medieval jousters on horseback.

But about those lights, the ones that keep the visitors trekking to Chena Hot Springs year-round. They are the celebrated aurora borealis, the Northern Lights, which can be viewed from almost any night-time perch from late August through early April — "solar activity, weather/clouds, and luck permitting," the resort website says. The resort suggests a nap after dinner so visitors can stay awake from 10



## IF YOU GO...

**CHENA HOT SPRINGS RESORT**
P.O.Box 58740
Fairbanks AK 99711
907.451.8104

**CHENA HOT SPRINGS AIRSTRIP**
N65°3.11' / W146°2.85'
Elevation 1195 feet MSL
Runway 3,000 feet
907.451.8104

**FAIRBANKS INTERNATIONAL AIRPORT**
6450 Airport Way
Fairbanks AK 99709
907.474.2500

p.m. to 3 a.m. to watch the show. Just walk outside and look up!

But if the winter (or summer) chill is a bit much, you can also book a ride on the Aurora Coach — a heated van that will take you to some of the best viewing sites that benefit from the absence of light pollution in this remote corner of the 49th state.

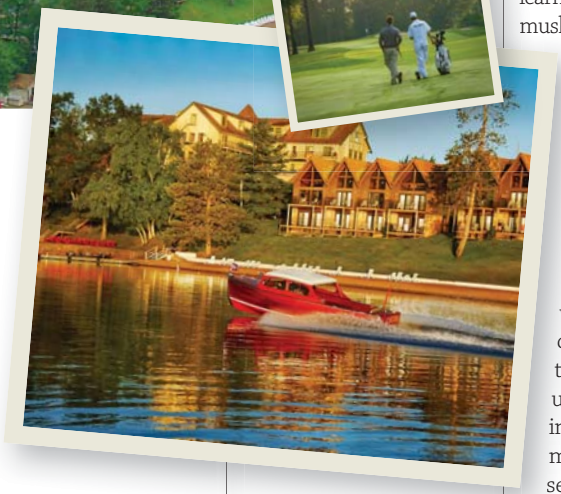
While you're spending your nights looking up, your days are open for long soaks in the natural Rock Lake, which is heated to a toasty 107 degrees F by those hot springs. "The waters are timeless, but the resort began when weary gold miners discovered that soaking in the 'oh-so-warm' waters helped their aching bodies," the website says.

Today Rock Lake is reserved for adults because it is not chlorinated. Although it naturally drains and replenishes itself two or three times a day (and gets a power-wash once a week), the state of Alaska doesn't allow children in untreated waters. But it's the waters in their untreated state that draw throngs of visitors each year who believe in the healing powers of the sulphur hot springs.

And for excitement, how about dog-sled racing? Chena maintains a kennel of 100 Alaskan huskies acquired from sled-dog rescue organizations and animal shelters and, within two hours, instructors will have you running a sled with six mushers. You can work with the dogs even in summer when carts replace the sleds. As an added bonus, in the spring months, the kennel often has puppies whom they are hoping you will help socialize!

Chena offers seasonal four-day, three-night packages that celebrate the Northern Lights or dog-sledding with lots of time for relaxing soaks, horseback riding and those naps in your suite at Moose Lodge.

Be sure to call ahead about 48 hours before you plan to fly in to their airstrip so they can update you and know when to expect you.

# TWO AIRPORTS TO PICK FROM AT MADDEN'S IN MINNESOTA'S NORTH WOODS

BY MICHELLE CARTER

Yearning for the perfect $100 hamburger? Consider Madden's on Gull Lake — one of Minnesota's 10,000 lakes with more than 9,000 acres of water — which offers every possible water sport as well as four highly rated golf courses carved through the north woods.

Best of all, you can fly into one of two General Aviation airports, East Gull Lake (9Y2), with its 2,600-foot grass airstrip, or Brainerd Lakes Regional (KBRD), with its 7,100-foot concrete runway. Madden's will pick you up at either one after you've experienced some of the most beautiful lake country flying in the world. Check in ahead of time with Ben Thuringer, Madden's man-in-the-know on flying in; he can be reached at 800.642.5363 or ben@maddens.com.

While you're there, you can pick up your seaplane certification at Wings Over Water and check that particular item off your bucket list. You will train with Mary Alverson, one of the top seaplane pilots in the Upper Midwest, a commercial pilot and a flight instructor in both single- and multi-engine land and single-engine seaplanes. Wings Over Water will provide you with the opportunity to earn your certification in a Super Cub 160, and six hours of flying time is included, the average time necessary to complete the program.

Views of the golf courses, lush gardens or Gull Lake are promised in all the guest rooms at Madden's, whether you choose a cabin or hotel accommodation. And if personal rejuvenation is part of the vacation plan, don't miss The Spa at Madden's. After an individual water ski school or trap-shooting session, you can relax while you watch the sun set over Wilson Bay on Gull Lake and indulge yourself with a hot stone massage.

For at least one meal, make reservations at the Dining Room at Madden Lodge, an upscale restaurant that sits on Mission Point at the entrance to Steamboat Bay. Surrounded by water on three sides, you aren't like to miss out on a view of the lake. For casual dining, head for the Classic Grill on the Classic Golf Course where you can sit outside under broad umbrellas while you watch the action across the green.

Be sure to scan the upcoming events on the Madden's website for special events like the Food and Wine Weekend when the resort hosts celebrity guest chefs to work with its own chefs to offer activities, demonstrations and educational sessions — as well as delights for your palette such as Smoke It! (which has nothing to do with tobacco), Jamaican food Stations and the Whole Animal Bash on the Beach.

One of the last events on the calendar each year is the Orvis Muskie School in the fall where guests learn to fly fish for the muskellunge, the ultimate predator that swims in North American freshwater.

Since this is the north woods and snow comes early and often, Madden's throws a Closing Party in October when the season comes to an end, and the resort shuts down until the first week in April. Because so much is packed into seven months, reservations for 2015 are already in order. TBM

## IF YOU GO...

**EAST GULL LAKE AIRPORT (9Y2)**
10790 Squaw Point Road
East Gull Lake MN 56401
218.828.9279

**BRAINERD LAKES REGIONAL AIRPORT KBRD**
16384 Airport Road, Suite 5
Brainerd, MN 56401
218.825.2166

**MADDEN'S AT GULL LAKE**
11266 Pine Beach Peninsula
Brainerd MN 56401
800.642.5363
Maddens.com

**WINGS OVER WATER**
800.642.5363
WingsOverWaterSeaplanes.com

**ORVIS MUSKIE SCHOOL**
866.531.6213
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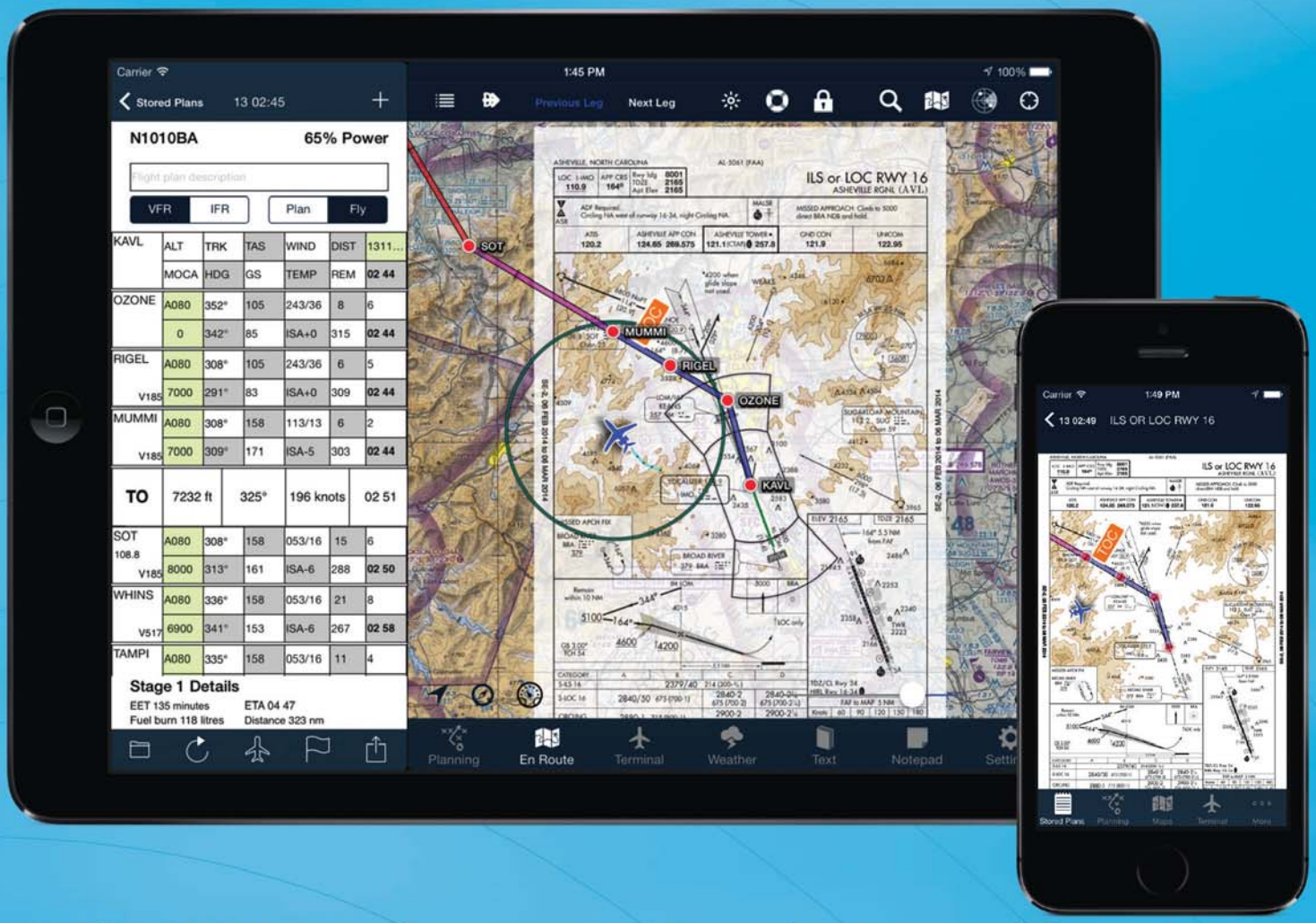


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# READING BETWEEN THE LINES OF TAFS

## Steering clear of low-level wind shear

BY SCOTT C. DENNSTAEDT

There's no doubt that terminal aerodrome forecasts, simply known to pilots as TAFs, are perhaps the most detailed aviation forecasts available. If you call Lockheed Martin Flight Services for a standard briefing or get an automated DUATS briefing, you can bet the farm that any TAFs along your proposed route and at your departure and destination airports will be a part of this briefing. There are, however, some finer details about TAFs that instructors fail to pass along to their students. The top one on the list includes a forecast for non-convective low-level wind shear (LLWS).

Probably the most misunderstood aviation forecast among pilots and instructors is one for non-convective LLWS. In a TAF, this forecast appears in coded form with a WS code such as WS020/15035KT. Such a forecast for non-convective LLWS can also appear in AIRMET Tango. I will discuss this a bit later. In a preflight briefing, pilots hear the term "wind shear" and immediately equate this with thunderstorms and severe turbulence. It's a common misconception, but non-convective LLWS, as it appears in a TAF, is not ordinarily a forecast for turbulence. In fact, in most cases when this is forecast, the air is glassy smooth.

This form of wind shear is typically found in the warm sector ahead of the cold front and south of the warm front. But it's also quite prevalent in the overnight hours during fair weather conditions coupled with clear skies and calm wind at or near the surface. Even though wind seems to be the common denominator, atmospheric stability is the catalyst behind most non-convective LLWS occurrences.

By definition, wind shear is a marked change in wind speed and/or wind direction over a given distance. Wind can change direction as you are flying along at a particular altitude. This is referred to as horizontal wind shear. If the marked change in direction and/or speed occurs over a layer of altitudes, it's referred to as vertical wind shear. When the wind shear occurs near the surface, it is referred to as low-level wind shear and abbreviated LLWS.

We know that wind naturally tends to increase in speed with increasing height, but it normally does so fairly gradually. But what if the winds are nearly calm at the surface and increase to 45 knots just 2,000 feet above the ground? That's an example of vertical speed shear, also known as non-convective LLWS.

When the winds are expected to increase rapidly with height within 2,000 feet of the airport's surface, a forecast for non-convective LLWS will likely be issued in a TAF for that airport. The forecast for non-convective LLWS found in a TAF tells the pilot about the potential for the wind speed to increase quickly with height above the ground within a shallow layer. That is, faster air at the top of the wind shear layer is moving over slower air near the bottom of that layer. There also may be an accompanying shift in wind direction with height in this layer as well.

Keep in mind that it's not the same horizontal and vertical wind shear that may be experienced in the vicinity of deep, moist convection or thunderstorms, hence the name non-convective LLWS. Forecasts for convective and non-convective LLWS have very distinct differences. In a TAF, convective LLWS will typically contain a reference to thunderstorms (TS or VCTS) and will contain CB, which stands for cumulonimbus, in the cloud group.

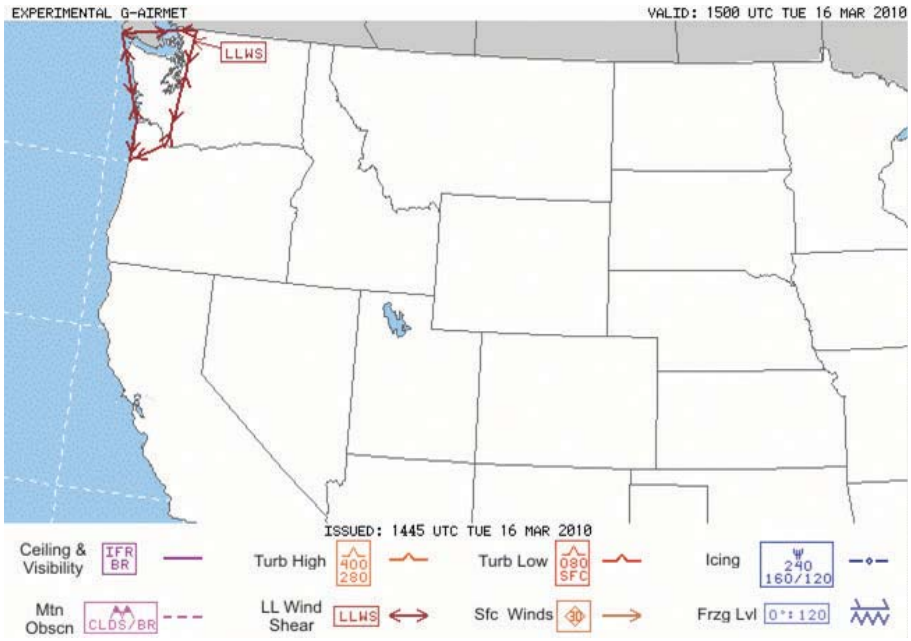
Also, the surface winds are typically forecast to be strong and gusty. While convective LLWS can occur at any time of the day or night, most convective LLWS occurs in the afternoon and early evening when thunderstorms are the most prevalent. Here are three examples of forecasts for convective LLWS.

1. **FM132200 33010G20KT P6SM VCTS SCT015 BKN040CB**
2. **FM131600 22013G35KT 3SM TSRA BR BKN035CB**
3. **FM140000 VRB20G55KT 1/2SM +TSRA FG BKN015CB**

As mentioned earlier, non-convective LLWS can occur in the warm sector of an area of low pressure, but it can frequently occur in the presence of a strong nocturnal temperature inversion. Frontal non-convective LLWS can occur any time of the day or night and normally has the characteristics of light winds at the surface and cloudy skies but can be strong and gusty when the weather system is associated with an intense area of low pressure. Here are three examples of TAFs non-convective LLWS when associated with a frontal system.

1. **FM111600 13010KT 5SM -RA OVC015 WS020/27055KT**
2. **FM120100 VRB03KT 4SM BR OVC008 WS015/25045KT**
3. **FM120900 19018G30KT 3SM +SHRA BR OVC005 WS020/17075KT**

On the other hand, nocturnal non-convective LLWS occurs in the overnight or early morning hours, often with light winds and clear skies. This is a manifestation of radiational cooling and likely occurs in the region under an area of high pressure. Here are three examples of the nocturnal version of non-convective LLWS you might see in a TAF.




**Non-convective LLWS will usually occur in what is referred to as the warm sector of an area of low pressure. This is usually located to the south of the warm front and to the east of the cold front.**

1. **FM221100 19004KT P6SM SKC WS015/17040KT**
2. **FM230800 VRB03KT P6SM SCT010 WS010/22035KT**
3. **FM230400 00000KT P6SM SKC WS020/23055KT**

In both cases of non-convective LLWS, the LLWS code "WS" will be included in the TAF immediately after the cloud group. Let's take a closer look at this misunderstood forecast group. Assume the following snippet from a TAF.

**FM130300 17005KT P6SM SKC WS020/23055KT**

The first element to the immediate right of the WS code is a height above the airport, in this case 020 or 2,000 feet. This represents the top of the wind shear layer. This altitude is typically one of three values: 010 for 1,000 feet AGL, 015 for 1,500 feet AGL or 020 for 2,000 feet AGL. Even if the WS layer extends higher, the maximum height that is forecast is 2,000 feet.

After the forward slash, the next group contains the true wind direction followed by the wind speed in knots at the indicated height or 230 degrees at 55 knots in this example. This implies indirectly that the wind is rapidly increasing from the surface through the indicated height although this says nothing about the wind direction throughout this shear layer.

Effectively this forecast translates into "the wind at 2,000 feet is 230 degrees at 55 knots." But it does not imply there will be turbulence at 2,000 feet AGL or below. In most cases, you'll find smooth conditions in this wind shear layer, especially for the nocturnal instance of non-convective LLWS.

The catalyst for the development of all non-convective LLWS is atmospheric stability. We also know that temperature normally decreases with increasing altitude. This is generically referred to as a lapse rate. A lapse rate is simply a change of temperature over a change of increasing altitude. Anytime the temperature decreases with increasing altitude, it's referred to as a positive lapse rate. If the temperature increases with altitude, that's referred to as a negative lapse rate or more commonly labelled a temperature inversion.

The larger the lapse rate is, the greater the atmospheric instability. An unstable environment (large lapse rate) promotes vertical mixing and provides for a more turbulent air-flow potential. On the other hand, a stable atmosphere (small or negative lapse rate) inhibits vertical mixing and provides for a laminar and non-turbulent flow.

One might suspect that vertical speed shear (faster air flowing over slower air) could cause the air to overturn and produce turbulent eddies within this wind-shear layer. However, just about all non-convective LLWS occurrences feature a strong temperature inversion. Any kind of overturning or vertical mixing introduces the potential for turbulence; however, an extremely stable layer such as this tends to dampen or resist vertical mixing. Simply put, any air that is forced to ascend within this stable layer will expand and cool and immediately finds itself in warmer temperatures aloft, due to the inversion. The air is forced to return back to its original altitude almost immediately. In other words, this air has neutral

buoyancy and doesn't want to rise or sink.

So why does the air accelerate rapidly with height? The extreme stability, courtesy of the temperature inversion, eliminates upward and downward motion or vertical mixing (neutral buoyancy). This promotes a laminar flow, and the effects of surface friction are no longer "felt" at heights a few hundred feet above the surface. This allows the flow of air just above the tree tops to accelerate uninhibited and insulated from surface friction below through the depth of the wind-shear layer. You can think of this as a faster-flowing river of air (called a low-level jet) located just above the surface. The stronger and deeper the inversion, the less likely there will be any kind of turbulence.

TAFs are one way to identify the potential for non-convective LLWS. However, not all airports are served by a TAF. Meteorologists at the Aviation Weather Center also issue a forecast for widespread non-convective LLWS that is expected to cover an area of at least 3,000 square miles. You'll see this issued as part of AIRMET Tango. AIRMET Tango can be issued for one of three different reasons, namely, non-convective moderate turbulence, sustained winds over 30 knots and non-convective LLWS below 2,000 feet AGL. It's unfortunate that this is issued under the auspices of AIRMET Tango, suggesting to the pilot the potential for turbulence. As explained earlier, the air is normally smooth in most situations where this is forecast.

So if non-convective LLWS isn't a forecast for turbulence, why is it forecast at all? When the sky is clear and surface winds are light, the nocturnal version of this phenomenon is just as common as low-level thermal turbulence is during the afternoon in the summer. Unless you were fixated on your groundspeed approaching an airport late at night or in the early morning hours, you probably flew right through it without even noticing that it existed. In most cases, nocturnal non-convective LLWS isn't usually forecast.

Nevertheless, there are several situations where you should pay close attention. First, if you are departing from an airport with a high density altitude, non-convective LLWS can make for a difficult climb if the low-level jet is off your tail. It's not uncommon for the winds to be light or calm at the surface although they may be 30 knots or more just above the tree tops. With light or calm winds at the surface, you may not realize that, during the initial climb to pattern altitude, the prevailing wind is at your back.

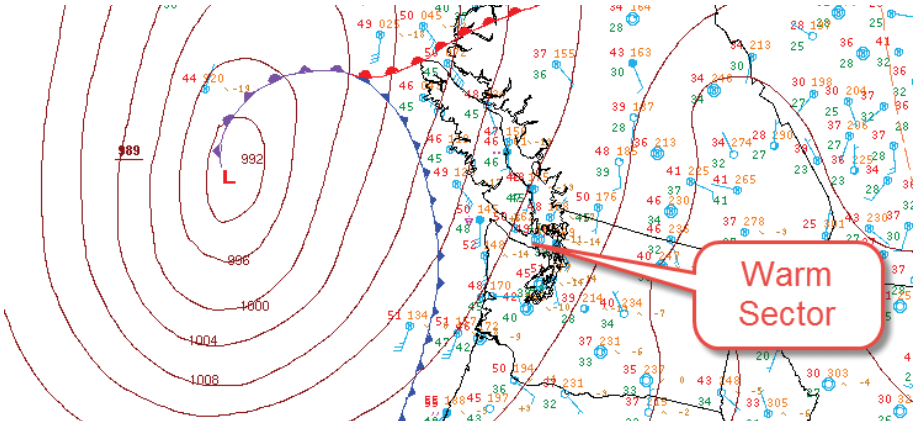
The most important one to watch out for is when non-convective LLWS of 50 knots or greater is coupled with the potential for moderate to heavy rain showers (SHRA or +SHRA) or thunderstorms (TSRA or +TSRA) as shown in the snippet below.

**FM120900 19018G30KT 3SM +SHRA BR OVC005 WS020/17075KT**

As the moderate to heavy rain falls through the low-level jet, some of the momentum of the jet gets directed downward toward the surface of the earth. This is like taking a fire hose and deflecting it downward toward the ground. The downward momentum of that low-level jet creates the potential for wet microbursts or downbursts. In this case, the magnitude of the non-convective LLWS event and convective outflow can make for a real interesting approach to land.

In the end, I don't get too excited when I see a forecast for non-convective LLWS, especially when it occurs in the overnight hours. It's not a forecast that should instill fear in a pilot. In most cases, it's a non-event that you may not even notice was there. ***TBM***

**Scott C. Dennstaedt is an instrument flight instructor and former NWS meteorologist. He also teaches aviation weather to pilots online and in person throughout the U.S. To learn more about aviation weather, you can visit his website at AvWxWorkshops.com.**




**Meteorologists at the Aviation Weather Center issue a forecast for widespread areas of non-convective LLWS as seen here for western Washington. This is actually a graphical AIRMET (G-AIRMET), which is the successor to the legacy AIRMET. In a G-AIRMET, LLWS is separated from other adverse weather, such as widespread non-convective moderate turbulence and sustained surface winds greater than 30 knots.**

ForeFlight Mobile version 6.3.1

# Upgrades and Legalities

The Best iPad Apps, Fall 2014

**By John D. Ruley**

This month we feature major upgrades to two of the most popular iPad electronic flight bag (EFB) apps for propjet pilots – but first, some questions and answers about the legality of using an iPad on the flight deck.

Ever since the first EFBs appeared back in the 1990s, there have been fundamental questions about using portable devices on the flight deck. In a nutshell, these can be reduced to two: First, is it legal to use an EFB in flight? Second, can an EFB (with appropriate software) legally replace paper charts (and other documents)?

The broad answer for most Part 91 operators has been "yes, provided you secure it during critical phases of flight (think takeoff and landing) and confirm it doesn't interfere with any of the installed equipment," for the first question. Over time the second question has basically moved from "yes, but keep the paper charts as a backup" to "yes, with a separate backup" which may be paper or another form of electronic charts (a chart subscription on the MFD in your panel, for instance – or a second EFB).

The rules are more restrictive for air carrier or air taxi pilots operating under Part 121 or 135, Part 91 subpart K fractional owners, and operators of large (over 12,500 pounds gross weight) and/or turbojet aircraft, who may require formal authorization to use an EFB (or any other portable electronic device) when operating below 10,000 feet MSL.

The details for all of this are covered in Federal Air Regulation 91.21 and no less than three Advisory Circulars: 91-21b, 91-78 and 120-76.

The folks who write the iPad Pilot News email newsletter for Sporty's Pilot Shop have performed a real service by compiling this information and explaining it on one of their web pages. While I'm already familiar with the material, this is the first time I've seen it all collected in one place and competently explained in plain language: iPadPilotNews.com/2013/09/ipad-legal-briefing-for-pilots/.

## ForeFlight Mobile version 6.3.1

Now for the updates: ForeFlight Mobile has been a runaway success, used very widely by pilots of all types of aircraft (including some turbojet operators). It offers a simple to use but powerful combination of pre-flight planning and in-flight navigation.

I last covered version 4.7 over a year ago. Since then, the developers have added a slew of new features, including an in-app weight-and-balance function; cloud-based track logging and synchronization of recent and favorite airports, routes, user waypoints and procedures between iPad and iPhone; approach-plate annotations; geo-referenced airport diagrams for high-use airports that don't have an FAA airport diagram; and a Pack feature that automatically identifies which updates are required for a route, filling a need I've personally run into on long, cross-country legs.

Three new features I particularly appreciate are the profile view, hazard advisor and split screen attitude/moving map display. The first two of these work together. The profile view graphically shows terrain along your route of flight, which I find most useful in preflight planning; if there's a terrain conflict, you can see it and adjust your filed altitude request accordingly.

As you fly, the hazard advisor dynamically colors terrain that would present a conflict, much like a panel-mount terrain awareness and warning system. The split-screen

Jeppesen Mobile Flight Deck Update

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Jeppesen Mobile Flight Deck

display is available only if you have a Stratus II ADS-B/GPS-WAAS/AHARS device. As you can see from the screenshot on this page, it turns your iPad into what amounts to a glass panel, with Stratus-based attitude, altitude, airspeed and heading on one side and moving map on the other.

There's also a new version of ForeFlight for U.S. military and government operators with access to Department of Defense Flight Information Publications, and limited chart coverage (airport thumbnail diagrams and, in some cases, IFR en-route charts) is now available for Asia, Australia, the Caribbean, Central America and Mexico.

Incidentally, it can be hard to keep up on all the changes – and while ForeFlight remains easy to use, some features are more obvious than others. A good place to check is ForeFlight's bulletin at http://blog.foreflight.com/, which you can simply browse or sign up for regular email updates.

## Jeppesen Mobile Flight Deck 2.6

While ForeFlight is popular, it's based on FAA chart data, and many pilots (especially commercial operators) continue to prefer Jeppesen. Their iPad Mobile Flight Deck went through a major revision earlier this year, with new features that display additional navigation elements (change-over points, signal gaps, waypoint formations, distance between navaids), user-defined waypoints, SID and STAR transitions shown when associated with a runway, flight-sharing of data between two iPads (or two apps on the same iPad), radial DME support and a redesigned user interface that combines the functions of the former route drawer and saved flights pop-over into a single flight info drawer. The new interface also does a better job of indicating what updates are current. And the new features are available not only for individual pilots using Mobile Flight Deck, but also for commercial and military operators using the similar Flight Deck Pro app, which runs on both

iOS 7 and Windows 8 devices.

Now for the bad news: I've seen a lot of complaints about performance problems with the latest Mobile FlightDeck update, particularly on older hardware. As an iPad 2 user myself, I can confirm that it's noticeably slower than earlier versions – but still usable. Based on my own experience and what I've read from others, in many cases it may be necessary to reset app data or reinstall when upgrading. Both can be done from the JeppFD section of the iPad Settings app. Scroll to the bottom and you'll find two slider buttons for Reset User Settings and De-activate. Try the reset first – it restores the app to its default state, but does not release the site key required for activation. If that fails, de-activating will let you completely remove the app and reinstall it from scratch.

According to the version 2.6 release notes, performance also improves if you shut down other apps running in the background and disable terrain display when it's not required. You can find the release notes, along with video training and a user guide in PDF format, in the Training and Documentation section of Jeppesen's Mobile Flight Deck web page at ww1.Jeppesen.com/aviation/products/mobile-flitedeck/resources.jsp.

I highly recommend viewing the video training, as it helps to explain some features of the revised user interface. And if you have trouble upgrading to the new version, pick up the phone and call Jeppesen customer support (800.732.2800 in the U.S.). I can say from personal experience that they are very helpful! TBM

# IRS Passive-Activity Rules

## Proving the time dedicated to your business

**By Jonathan Levy**

All tax practitioners are aware how unyielding the tax code can be to those who lack sufficient planning and learn of the law's arcane requirements only after the fact. One recent tax court case re-affirming this lesson is Williams v. Commissioner, TC Memo 2014-158 (August 2014), where a taxpayer lost out on deductions from his aircraft business due to his failure to provide the court with sufficient proof of his day-to-day work.

Although the Williams case involved a piston aircraft marketed through a flight school, its lessons are also relevant to aircraft owners engaged in charter or short-term rentals. The taxpayer, Scott Williams, had decades of aviation experience although his primary profession was providing other companies with telephone-skills training. In the mid-2000s, Williams, through a company he owned, purchased a Cirrus aircraft and enlisted the help of several flight schools in selling short-term rental and instruction to members of the public.

Unsurprisingly, this aircraft-rental business generated losses on his tax return. This is usually the case because the tax-depreciation schedule for most General Aviation aircraft last only five years, allowing the company to fully write off the cost of the aircraft over this time (or even faster, if certain congressional incentives, such as bonus depreciation, happen to be available). This accelerated-depreciation schedule creates the false appearance, for tax purposes, that the aircraft is losing value very rapidly. When that mostly fictional plunge in value is reflected on the tax return, it usually results in the aircraft business showing a tax loss, even if, in economic reality, the business is profitable. In such cases, aircraft owners typically desire to lessen their tax bill by netting the tax losses generated by their aircraft activity against the taxable income they receive from other sources — which is exactly what Williams sought to do.

The IRS challenge to Williams's netting of the aircraft losses against his other income involved parsing out his items of income and expenses into two categories defined in the tax code: active items versus passive items. In this taxonomy, each item of income or

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expense must be associated with an "activity" of the taxpayer (roughly, identifying which of the taxpayer's business undertakings the item is associated with) and then determining for each activity whether that activity is "active" or "passive." The significance of the active/passive distinction is that losses from passive activities cannot be netted against income from active activities — in other words, losses from passive activities cannot reduce the liability for taxes on income from active activities.

## WILLIAMS' TWO ACTIVITIES

In Williams, the taxpayer was found to be engaged in at least two distinct activities: the aircraft business and the telephone-training business. It then fell to the tax court to determine whether each activity was active or passive, and the key test in that regard was how much time per year Williams worked in each business.

The tax code states that any business is passive, with respect to all individual taxpayers who cannot show "material participation" in it, a test that involves counting up the hours that the individual dedicated to working in that business during the given year. An individual is considered to materially participate if he or she meets any of seven tests articulated in the tax regulations, with the two most relevant of those tests being, (1) Does the taxpayer devote more than 500 hours per year to the activity, and (2) Does the taxpayer both (a) devote more than 100 hours per year to the activity, and (b) devote more time to it per year than any other individual.

In Williams, it was never in doubt that the taxpayer materially participated in the telephone-skills training business, where he worked full-time. The tax court easily held that he materially participated by dedicating more than 500 hours per year and found him to be "active" in that business. What lost the case for him, however, was his inability to show material participation in the aircraft business.

## BURDEN OF PROOF MATTERS

Williams argued that, he materially participated in the aircraft business by devoting more than 100 hours per year and devoting more time than any other individual. Unfortunately, the law places the burden of proving material participation squarely upon the taxpayer. The IRS needs to prove nothing. The government is presumed correct, and lack of clear evidence is interpreted in its favor. Williams was in the position of needing to prove, at a trial taking place years after the fact, how many hours he had devoted to the aircraft business back in 2007, the year at issue. If he had written contemporaneous notes of the time he spent, he would have stood a better chance, but he had no such records.

After emphasizing that Williams had the burden of proof stacked against him, the tax court noted that it would not accept "a ball-park guestimate" of the hours he worked, and, without the aid of any written records such as time logs or day-planner entries, Williams was unable to persuade the court of his material participation and, therefore, unable to net his losses from the aircraft business against his income from telephone-skills training, thus resulting in a significantly higher tax bill.

His experience may serve as a lesson to other aircraft owners seeking to use tax losses from aircraft rental or charter structures: A few moments spent jotting down the time you work, notes sufficient to credibly jog your memory years later and corroborate your descriptions, may save your deductions upon audit.

## 'INVESTMENT' HOURS WEREN'T HELPFUL

Another noteworthy issue discussed in Williams is that the tax court did not allow him to count the time he spent reviewing bills as part of his material-participation hours. These hours were considered to be of an "investor" nature and were therefore excluded. This conclusion stands as an interesting contrast with another tax court case decided this year, Tolin v. Commissioner,

TC Memo 2014-65 (April 2014), where, unlike Williams, the taxpayer was allowed to count investor-type hours towards material participation. The key distinction is that, in Tolin, the court was satisfied that the individual was involved in the day-to-day management/operations of the business.

In recent years, there has been a debatable trend for the tax court to carve out more and more different types of work hours and consider them "investment" in nature. Those who are involved on a day-to-day basis in the activities claimed as active are protected from the dangers of this trend because the hours they work count towards the material-participation hours thresholds, whether or not the hours are considered investment time. In contrast, those not involved day-to-day could see their eligible hours eroded to the point where they may be surprised to discover that they fail the material-participation tests and their activities have become passive.

**In Williams, the taxpayer was found to be engaged in at least two distinct activities: the aircraft business and the telephone-training business. It then fell to the tax court to determine whether each activity was active or passive, and the key test in that regard was how much time per year Williams worked in each business.**

## CONCLUSION

This article is a brief introduction to a complex area and does not raise or discuss all of the relevant issues, but instead attempts to single out a certain issue to provide some depth of coverage. Aircraft ownership should always be carefully evaluated with the aid of qualified advisers. TBM

**Jonathan Levy is a board-certified expert aviation-law practitioner and legal director. Advocate Consulting Legal Group, PLLC is a law firm whose practice is limited to serving the needs of aircraft owners and operators relating to issues of income tax, sales tax, federal aviation regulations, and other related organizational and operational issues.** 

# Put that smart phone to work while you fly

Your phone could be your most valuable travel companion with the right applications. Here are our suggestions of useful apps for the modern General Aviation traveler. These apps cover everything from planning an overnight at a last-minute stop to providing entertainment during the long hauls. You can learn new skills, cook a meal, and track workouts, all on that little device we can't seem to live without.

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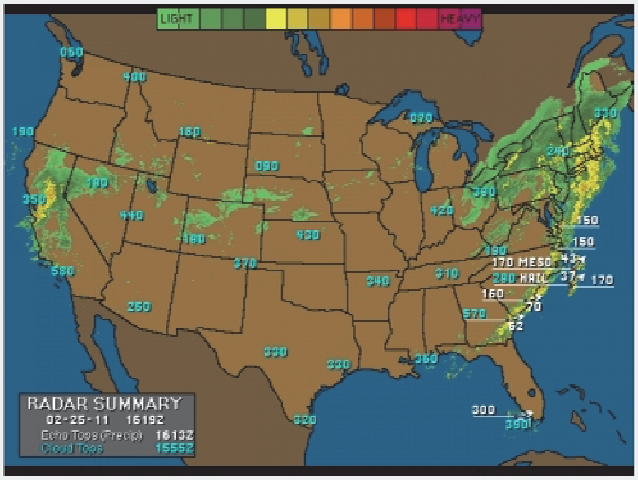


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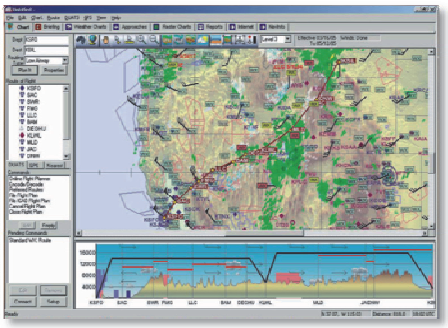

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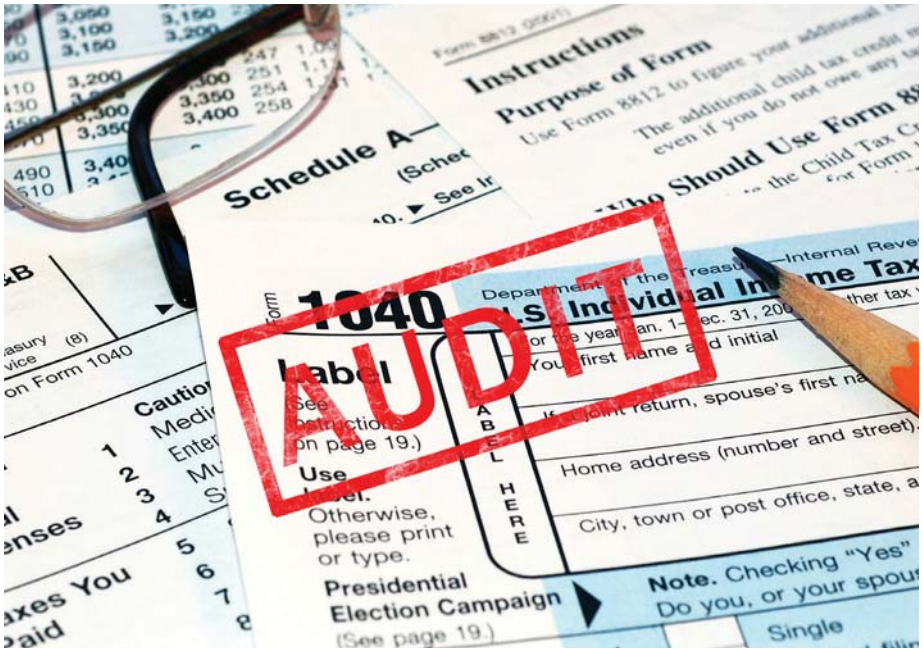
# Sending Less to the IRS




## If you're going to make a claim, provide the evidence to support your cause

**By Harry Daniels, CPA, CFP®, PFS, CVA**

When you go to a dance, be sure to take your partner. In a recent tax court case, Mr. and Mrs. Williams learned this all too well. They were involved in a typical IRS audit involving their airplane and Code Section 469, the infamous passive-activity loss rule.

First of all, if you are in the business of renting out your property or equipment, then in the majority of cases, that is the end of the conversation. It is a rental operation and rental activities are passive — case settled.

Sometimes, even though you are in a rental operation, you do so much work attributable to the property that you are providing more than just the use of your equipment or in this case your plane. If so, you may find yourself conducting a trade or business operation instead of a rental operation. And if that is the case, you avoid Section 469 altogether.

The tax nightmare of passive-activity rental losses is that they can only be used to reduce passive-activity rental income. If you have a passive-activity rental loss, you can't use it to reduce business income or offset your W-2 salary. If you have a passive-activity rental loss but no passive-activity rental income for that year, all is not lost. The loss is held in abeyance until a future year when you have passive-activity rental income to use the loss against or you sell the asset that generated the passive loss. Then you get your deduction in whatever year the sale occurs.

Without a dance partner (his logs), Williams was fighting an uphill battle. He presented to the court incomplete flight logs for the airplane's use. With airplanes, there are pilot logs, power plant logs and airframe logs. In the tax world, there are Section 274 travel logs which require a description of who, what, where, when and, most importantly, why the flight occurred, and there are Section 469 logs to prove your activity participation.

Taxpayers try to use a couple of popular tests to escape Section 469. There is the test for spending more than 500 hours per year of service in the venture. Or you could use the 100-hours-of-service test per year, assuming that nobody else, owners or non-owners, spends more time than that.

Williams did not provide any log or other description of his time and efforts of service to the court. Williams was an attorney. He drafted his agreements with the flight schools to include a statement that limited the work of others to less than 100 hours so he could avoid the Section 469 restrictions. The judge noted that as an attorney, he should have a basic idea of tracking his time. The judge was not impressed that he provided no evidence as to the amount of time he spent drafting the agreements. The court tried to look at the contracts to see how much time and effort were involved with the contracts but was not able to come up with any estimate of time for drafting the contracts.

Williams rented the plane to a flight school, and he was paid based on the hours of use by the flight school. The flight school was required by its agreement to provide this information to Williams. This information was not given to the court as evidence. Instead he only gave the court the incomplete flight log for the plane showing only the use of the plane by Williams himself.

Whatever could go wrong continued to go wrong for Williams. He stated that he was involved in the day-to-day activities but could not produce any records that supported his position. He stated that he questioned and debated charges on invoices but did not produce any of the invoices that were questioned. He said he worked on a marketing plan for the plane but he did not specify how he participated in the airplane marketing.

The judge reminded us in his opinion that any income-tax deductions are a "matter of legislative grace," and it is up to the taxpayer to prove that they are entitled to claim a tax deduction for the expense. Without logs or other supporting evidence, Williams failed to convince the court that he materially participated in the airplane activity. Therefore, Williams was not able to deduct the current-year airplane loss against his other business income and had to just stick the airplane passive loss in his back pocket for a later year.

Don't go dancing without a partner or, in this case, your tax logs. Without them, you are in for a fight that you are very likely to lose. ***TBM***

**O. H. "Harry" Daniels Jr. is a CPA, a CFP certificant, and a certified valuation analyst. He is a partner with the firm of Duggan, Joiner & Co., Certified Public Accountants, and can be reached at 334 N.W. 3rd Ave., Ocala, FL 34479, telephone (352) 732-0171, fax (352) 816-1370, email OHD@DJCoCPA.com. Daniels has held his license as a private pilot since 1991. This article is available for reprint upon request.**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