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Ten Things You Should Consider

When Using the Avionics in Your
Malibu – Mirage – Meridian Aircraft

By Dick Rochfort, ATP, MCFI, CFII, MEI

If you are reading this article you are most likely a very fortunate person; priviledged to fly one of the finest personal airplanes available in the world today. Over the past 10 years, I too, have been fortunate to have been given the opportunity to fly and teach in these aircraft on a full-time basis.

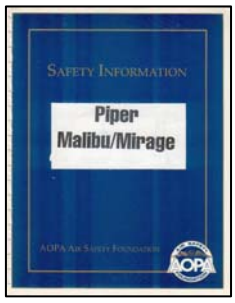
The PA46 Malibu, Mirage and Meridian aircraft are primarily owner flown, and owner-pilots are fundamentally different from professional pilots. They learn differently, and they are motivated differently; furthermore, the quantity and content of their training and experience is diverse.

Type of Operation

Type of Operation	Percent of Flying (2005)	Percent of Total Accidents (2005)	Percent of Fatal Accidents (2005)
Personal	49.4	70.7	81.2
Instructional	18.4	13.2	6.5
Aerial Application	5.1	5.3	3.4
Business	15.1	2.5	2.4
Positioning	*	1.7	0.7
Ferry	*	0.4	0.7
Other Work use	0.5	1.0	0.7
Aerial Observation	3.5	0.6	1.4
Executive/Corporate	4.3	0.1	0.0
Other/Unknown	3.7	4.5	3.0

The regulation, supervision and oversight of the Part 91 environment give us a lot of "rope" which does not exist in the other segments of flying. You might say that it's similar to driving to *get* to work instead of driving *for a living*. It is not better or worse, just different. In terms of accidents, however, the 2006 Nall Report (2005 Data) tells it differently. When we look at all Part 91 (general aviation) accidents by type of operation we see that personal flying is the most dangerous, by far.

Here is what the AOPA Air Safety Foundation had to say about the PA46 in their Safety Report:



The PA-46 is a complex airplane capable of routinely operating in instrument meteorological conditions and the "flight level" environment. To operate the airplane safely, it is essential that pilots receive comprehensive and rigorous transition and recurrent training commensurate with the airplane's complexity and performance capability.

Thorough knowledge of the airplane's systems and their application is a necessary prerequisite to operate the PA-46 safely to its maximum capability. This is especially true of the ice protection equipment and the flight control system of which the autopilot is an integral part. Failure to understand these systems and use them properly was the probable cause of four fatal accidents that led to the NTSB Special Investigation and FAA Certification Review.

In addition to a thorough knowledge of the aircraft's systems and their application, PA-46 pilots need to acquire and maintain a high level of piloting skill and instrument proficiency. These skills are essential to the safe and efficient operation of the PA-46.

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The words “knowledge” and “skill” are used often in this quotation. I would like to add one word to this list: “Procedure”. It is a word which defines a fundamental difference in the way owner pilots and professional pilots are typically trained. Professional pilots are trained to follow procedure. It is also true that professional pilots have significantly fewer accidents. When owner pilots formulate, adopt and consistently use proven procedures, the distractions associated with routine aircraft management are dramatically reduced. This allows the pilot to think ahead and stay ahead of the aircraft.

Some instructors lament the introduction of advanced avionics in general aviation aircraft. They are concerned about the distractions that they can cause. Did you know that William Lear had a small radio company before he began the Lear Jet project? He manufactured AM radios which he hoped to sell to automobile manufacturers. When he took the idea to General Motors the GM executives laughed at him. They believed no one would want such a distraction in their vehicle. The name of that small company was Motorola. Bill Lear also invented, among other things, the eight- track stereo tape system and the autopilot.

The new avionics are supposed to help, but that is not a forgone conclusion. Here are ten procedural things that you could be doing with your avionics package to avoid distraction, focus on the correct items in the correct order of importance, and thereby improve the quality and safety of your aviation experience:

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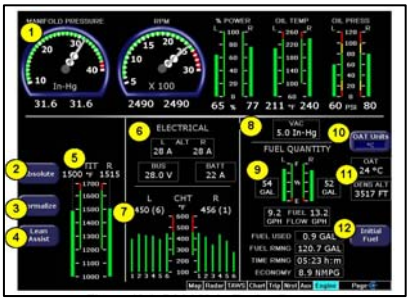
1 – Engine Start

After a competent preflight, note any deficiencies and compare them to the “Kinds List” in the POH, FAR 91.205, 91.213 and the aircraft MEL as appropriate. While this sounds like a lot, it really only takes a minute or two once you have developed the procedure. Verify that the area is clear, the chocks are pulled, the door is latched and the passengers are briefed.



The start checklist should be used with the understanding that some aspects of the sequence must be completed in a “real time” fashion without distraction. Consider now what information you need for the start. In piston aircraft, it is primarily fuel flow, and in turbines, it is voltage, Ng and ITT. Be sure to be on the right “page”, otherwise a major distraction is imminent. Remember, your insurance contract excludes “internal heat” from any claim, so anything you do incorrectly at this point will most assuredly involve your after-tax dollars.

Once the engine is running within limits consider repositioning the aircraft prior to turning on the avionics master switch. You may want to do so if hanger doors are open or there is what I call the “Nantucket Promenade” (dogs and hats and wind and leashes and romping children) on the ramp. Ensure that you are abiding by the “movement area” limits associated with controlled airports. Once the avionics master is on, let the gyros become fully erect before moving. This avoids premature failure of the gyros associated with excess bearing wear.

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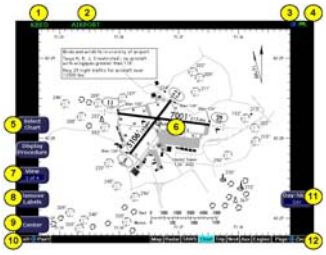
2 – Avionics and Instrument Set-up

After you copy and read back the clearance, put each item in the clearance somewhere in the panel in a way that allows you to fly the clearance with the least amount of button pushing. Generally this means having the first few waypoints (60 miles or so) in the GPS and the autopilot set to climb wings level at a rate consistent with Vy. Consider setting up the dual Garmin installation to maximize the information provided with the least amount of button pushing. There are many preset choices in the Garmins but very few good ways to set them up for the least amount of button pushing. A little CPT (cockpit procedures training) goes a long way toward making life easier in this category. We all need pretty much the same information but since each aircraft is slightly different, the setup is to some extent personal preference. You will know you have it right when you have all of the information you need and get the job done with the least amount of button pushing. The newer panels do this with a great deal of elegance but the older Malibus can perform as well if you take the time to set it up. This allows you to fly the clearance with the autopilot immediately, giving you the option to use the autopilot to avoid distraction. You have probably noticed that ATC will assign the same few typical routes out of and into your home airport or other airports you may frequent. If it includes a SID or a STAR so much the better, but many times, it does not. In this case, consider putting in the waypoints as usual, but before adding the unique elements to the flight plan, save the repetitive part first. It will create a mini flight plan which is stored on page two of the flight plan drawer. You can now load that portion of the plan whenever you like with the least amount of button pushing.

3 – Taxi and Run-up



The biggest threat to safety and enjoyment at this point is safe taxi. The best thing that ever happened to runway safety was the introduction of the Avidyne safe taxi diagram. This geosynchronous delight comes with the CMax chart subscription and appears as the default page after landing. If you fly in and out of class Bravo airspace with any regularity, this tool is essential. Be ready to copy and read back the taxi clearance just as you heard it, omitting anything that the controller said which is not part of the clearance limit such as "use caution for men and equipment …". Avoid routinely asking for progressive instruction. It is unprofessional and it is a distraction for the controller, but, ask if you must.

4 – Take-off

Count yourself lucky if you own a Magic 1500 equipped Meridian. This autopilot has a small, black spring-loaded button tucked into the left side of the throttle handle which is labeled "GA" for *go around*. It is affectionately known in the pro pilot world as the "TOGA" button (pronounced TOH' gah), for *take off/go around*. This should be used to fly the take off after the airplane is cleaned and

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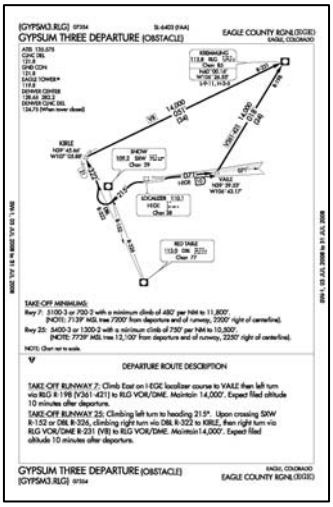
trimmed. It should also be used for the go around. The 1500 also has an IAS (indicated airspeed) button which can and should be used for climb. In the old days, it was called a "FILCH" for flight level change. If you have one of the other autopilots without a TOGA or a FILCH button, use 800 FPM and the heading mode on the runway heading. These operations require good procedural discipline, so find your favorite instructor and get some.

5 – Climb/Departure



There are many variations of departure clearances, all of which can be safely and easily flown with an approach certified GPS. Spend time with a qualified instructor on this topic. At the very least, it will make life easier, and it could possibly save you from encountering some cumulus granite.

Let's look at Vail, Colorado as a departure example. It is important that you are procedurally considering ODPs (obstacle departure procedures), even when you are sure they do not exist. If you are using NACO plates, you will have two places to look to verify the existence or absence of ODPs. Obstacle departure is your responsibility when the field is uncontrolled, and it certainly is not something I would delegate in any instance. The Gypsum 3 departure looks tricky to set up, but Garmin has a done a lot of the work. This departure can safely and confidently be flown in almost any weather with the correct buttonology. If you are more comfortable setting up the departure using the Red Table and Snow Hill VORs with the Nav radios, go ahead, but you are not getting your money's worth from your Garmin. In this case, learn the procedures from a qualified instructor and practice them in VFR conditions until you are confident.

6 – Cruise

Cruise is the time to kick back, relax and enjoy the ride, right? Yes, but first there is the top of the climb checklist. While we are on the subject, do you know the difference between a checklist, a flow and a memory item and when to use which? All three are important to know.

Once the TOC checklist is complete, consider reevaluating the fuel and weather issues and set up a VNAV descent based on your best guess as to what ATC might direct you to do. I like to get the NEXRAD METAR and make some decisions about which runway I want and load the approach. I use three miles from the FAF and the altitude depicted on the chart for my VNAV setup. If you do this early, you may have to do it twice, but you will encounter fewer surprises. Use a conservative VS profile, (say 500 FPM in the piston Malibu and Mirage) and begin the descent aggressively while still in smooth air. When you get to the undercast, you will

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undoubtedly have to slow down, and when done correctly, you will not be high on the approach. VNAV is a critical tool for avoiding the "slam-dunk".

7 – Descent/Arrival

Load the approach as early as possible. Do this even if the weather is VFR for two reasons. 1- You should always fly the *Same Way Each and Every Time* (SWEET). This helps to make flying in low weather no different from any other day. 2 – The weather situation could change and surprises for the pilot in command are bad.

Now, here is a trick that will help you do just that with the least amount of button pushing: Load the full approach and then find the FAF on the flight plan page. Cover it with the cursor, and press direct once. Notice the presence of a course box on the resulting page? You guessed it. Scroll down to that box and enter the final approach course from the DTK column on the Garmin flight plan page. This will give a *vectors to final* magenta line straight out from the FAF, and it will keep the initial and intermediate fixes in the plan in case you need them for reference.

8 – Approach

When you hear the "H" word (fly a heading) from the controller, there are five things that need to be *done or verified* to establish yourself on the approach:

1. FLIP the frequency for the ILS from standby to active.
2. FLOP the CDI on the Garmin from GPS to VLOC
3. SET the course in the HIS
4. ID (identify) the ILS frequency
5. ARM the autopilot

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6. ACTIVATE the approach when you hear the "C" word (CLEARED for the approach)

Your autopilot has three conditions for automatic activation of the glide slope: 1. The localizer must be centered. 2. The aircraft must be below the glideslope. (note: if the glideslope is not alive when it should be check items 1 through 6 above.) 3. The glide slope must be armed. Different autopilots behave differently during manual arming, so be sure you know what OTTO is doing and what he will do next. Also know what you will do if OTTO surprises you.

9 – Landing

Once you are inside the middle marker, it is important that you know in detail what you are about to see or not see, because the decision has to be made promptly. Some of you have seen my presentation on human factors, a series of images which slowly change. That presentation illustrates quite well this very concept. It is difficult to perceive change unless you know exactly what you are looking for. If you do not, it is far too easy to see the street lights and convince yourself they are something that they are not.

You should reach DH with the power set, 10 degrees of flaps and the autopilot engaged. This configuration will allow you to safely decide weather to go or continue. In order to make a timely and proper decision, you must focus your attention on the transition to the visual cues for landing. Use of the autopilot is the best strategy, but you must be trained and procedurally competent for this to be your safest choice.

In the first photograph, the lighting system is clearly visible including the sequencing flasher (the rabbit) and the 1,000 foot roll bar, but the runway is not in sight. The well prepared pilot knows that the visibility requirement is not yet met because this lighting system is a MALSR and it is 2,400 feet long from the approach end of the rabbit to the threshold. The second photograph shows the threshold lights and the displaced threshold. How many sets of markers must we see to continue if the visibility requirement is ½ mile?

View the video at this link for the full story:

http://www.rwrpilottraining.com/ILS_200-5_Avidyne_Mirage_RIC.wmv

10 - Taxi/Shut-down

Taxi carefully. Stay on the yellow lines, and avoid drain swales which tend to collect debris. Avoid taxiing over tie down areas, particularly ropes which can be pulled into the propeller. Get the electrical bus unloaded completely (except for Nav Lights) before disconnecting the Generator and/or alternators. Avoid

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running avionics with a GPU online unless the battery is online as well. The battery helps to stabilize voltage on the bus by providing inductance.

Don't forget to ask the line service personnel to move the aircraft right away if they need to, otherwise they should wait 20 minutes for the gyros to completely spool down. In later model aircraft, use the #2 com radio for best results on the ground because the antenna for the #2 is on the top of the fuselage.

If we fly because we enjoy flying and the personal freedom that PA46 ownership provides, then it stands to reason that anything we can consistently do to preserve and improve on the quality of that experience is worthwhile. It is also true that the very enjoyment we seek is only realized if the flight stays safe. Safe, enjoyable flight is a worthy goal, not a forgone conclusion. The PA46 is, for some of you, your first experience as pilot in command in flight levels dealing with high altitude weather and cabin pressurization. Some come to the PA46 with little or no experience with anti-ice and de-ice systems, 3 axis autopilots, HSI or EHSI, MFD, weather radar, etc.

There is a definite need for a paradigm shift for the PA46 pilot. That is, a willingness to look critically at skills, knowledge and procedures and realign them with this new environment by giving up some old habits and forming some new ones. This is what training is about. Schedule your approved training on a regular basis, at least twice per year.

Remember, "*Practice* does not make perfect. *Perfect practice* makes perfect" – Vince Lombardi

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Biography

Richard W Rochfort

A former corporate pilot and primary flight instructor, Dick is a full-time Master Certified Flight Instructor providing insurance approved initial and recurrent pilot training in the Piper PA46 Malibu, Mirage, and Meridian aircraft. He is currently flying over 450 hours per year and trains 60-80 pilots every year exclusively in these aircraft.

He holds multi-engine ATP and Gold Seal Flight Instructor Certificates with CFII, MEI and CE-525S ratings. He has been actively involved in flight training since 1991 and has trained pilots all over the US, Canada and Europe.

Dick is an Aviation Safety Counselor for the FAA Baltimore FSDO, a National Industry Member of the FAA Safety Team (FAAST) and has conducted hundreds of programs for the pilot community. He is an instructor for the M/MOPA Safety and Training Foundation and The National Association of Flight Instructors has designated him Master CFI. Less than 1% of all flight instructors have earned this designation.

Dick served as a Staff Sergeant E6 in the US Army Special Forces from 1970 until 1976 as an A team radio operator, training indigenous personnel in field communications. He worked from 1976 until 1991 as an industrial engineer training manufacturing personnel for the production of communication and navigation equipment for US military.

His education includes undergraduate degrees in Clinical Psychology and Engineering and a Masters Degree in Business Administration. Dick lives in Baltimore, Maryland with his wife and two daughters. He is a PADI Certified Scuba Diving Instructor, First Aid Instructor and an Eagle Scout.

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