May-June 1994

FAA Aviation News

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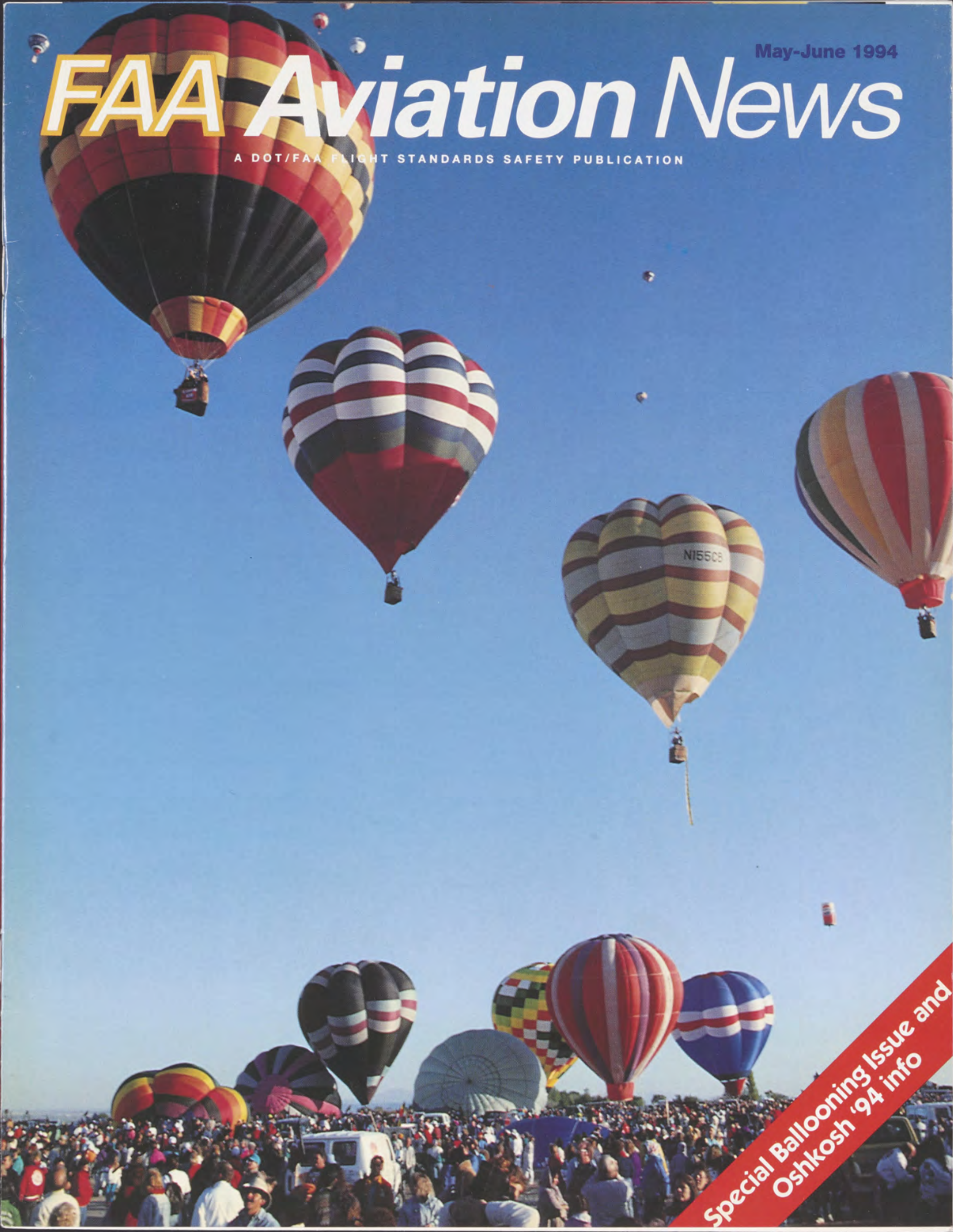

Special Ballooning Issue and Oshkosh '94 info

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May-June 1994

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FEATURES

DEPARTMENTS

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Oshkosh '94 is just around the corner. Better start planning now. See page 26.

Balloon Flight Training

by Tom Hamilton

Flight training is the most important phase of your ballooning career. It is here that you will learn good and bad habits. Although bad habits can be overcome through retraining, it is that first exposure to learning to which a pilot will often turn later.

This article takes a look at flight training and elements that it should include. As a balloonist your first exposure to safe flying is usually from your instructor. Today, the only requirement to give flight instruction in a hot air balloon is a commercial balloon certificate. Unfortunately, in some cases, a commercial balloon certificate does not an instructor make. The individual who gives instruction must be well-versed in a number of areas.

Since September 1985, a balloonist taking the commercial practical test is required to demonstrate the ability to instruct and develop a lesson plan. Commercial pilots receiving their certificate before that date were not necessarily tested in these areas.

Considered by many the most important phase of ballooning, training today in a hot air balloon follows no standard policy. The Private and Commercial Pilot Practical Test Standards (the requirements to pass a flight check) have at least set a standard to which students must be trained.

In the early days of ballooning, flight checks were often given without an examiner in the basket. Even into the mid-1980's it was possible to receive a flight check for a commercial certificate on a tether.

Resources

Written resources have often been scarce. For many years the only training publication available had been Will Hays' *Balloon Digest*. Recently, several new training manuals have been available. The Balloon Federation of America (BFA) Education Committee developed the *Flight Training Manual*, which gives a complete course of instruction. Amogene Norwood published *Taming the Gentle Giant*, a student resource book, and in 1989 Gene Tabbert came out with *Flight Training File*, a folder and checklist for recording and documenting all flight instruction.

Training Quality

Quality of training covers a wide range from FAR Part 141 schools—certificated by FAA and requiring, among other things, that the chief pilot have 400 hours of flight instruction and an approved syllabus for training—to the person who wants to sell you a balloon and will throw in the training.

The point of a good school or instruction having a syllabus or guide to use for training is to ensure that the trainee receives a *complete* course of instruction. This does not in itself ensure quality instruction but does demonstrate that the extra time for preparation has been taken.

Training encompasses two phases: ground and flight instruction. Ground school should consist of formal training time that covers at a minimum the following range of subjects:

- Theory of balloon flight
- Balloon components
- Crew duties
- Safety
- Regulations
- Weather
- Land owner relations
- Preflight and cold inflation
- Inflight safety
- Post-flight safety check
- Some first aid

Continued on page 9

Balloons: Takeoff and Cruise

by Bill Bird

Ballooning

Part 1

The Civil Rights Act forbids discrimination for a growing list of things, and, as good government representatives, we are not supposed to discriminate. But, alas, we on the FAA Aviation News *have been accused of airplane prejudice—that most of our articles are aimed at airplane pilots. Actually, there are only airplane pilots on the staff, and, to paraphrase a Tennessee Williams' heroine, we've had to rely upon the kindness of strangers to fill that gap. To alleviate our airplane prejudice, this and the following article are not about airplanes. As always, any pilot can find words of wisdom in any article about any aspect of flying.* ***—Editor.***

National Transportation Safety Board (NTSB) and insurance company reports continue to show that approximately 77% of all ballooning accidents and incidents occur during what is described as the "approach to and landing phase" of the balloon flight. Why is it that we continue to see the greatest number of balloon accident/incident injuries during the landing phase?

I think there are many contributing factors, including pilot experience, technique, high winds, low level wind shears, and landing site selection. Again, the reports show that more than half of all landing accidents occur on approach to and during the landing. Almost half of these were "hard landings," and more than half of the hard landings (55%) occurred in high winds. Of course, that means almost half of these hard landing accidents occur when winds are generally not a factor.

Bypassing technique for the moment, I think there are other contributing factors we should consider; namely, the physiological and psychological status of the pilot. The psychological factors are related to aeronautical decision making and personality types. The interesting thing about the five personality types (anti-authority, impulsive, invulnerable, macho, resignation) is that we each exhibit them to differing degrees and at different times. (See the July/August 1993 through March 1994 issues of *FAA Aviation News* for a seven-part series on decision-making.)

In other words, on one day or flight we will be macho; on another we might be indecisive, etc. Each of these attitudes could lead us to a hazardous situation. Much has been written on this topic, but one aspect that has received little attention is the mental/physical status of the pilot. Let's examine the stages of a typical early morning balloon flight in relation to the pilot.

Up, Up, and Away?

As we get up (stumble out of bed), we begin to build up anticipation and enthusiasm as we get a favorable weather briefing, meet the crew, and collect the passengers. Next comes the assembly, preflight, inflation, and pre-takeoff checks. We load the passengers, do a thorough briefing, and then away we go!

Physiologically we have gone from a very inactive sleep state to a very active physical and mental condition during which time our body has responded by increasing adrenaline output to meet these physiological demands. The more hectic, rushed, or crowded the launch area is, the more likely we will have built up those anxieties to an adrenaline high.

Now, as we enjoy the tranquillity of the flight, our body responds by decreasing the adrenaline. We relax and get the opposite physiological effect and are not as sharp and quick in our responses. Why should we be? This is such a beautiful, slow flight with soft winds, and we already know that the landing will be a "piece of cake" so we don't prepare for it with the same intensity as we did for the takeoff. I believe that a certain number of the "easy winds" accidents are because of this physical/mental letdown which can occur.

Prevention

What can we do to prevent this letdown from affecting us? Simple: Make every landing a challenge. See how accurate, how soft, etc., a landing can be, and follow a landing checklist. We must keep a high level of concentration to the task at hand both during the approach and the landing. Don't forget to do a prelanding briefing with the passengers.

Another thing which can help in our landing is to have an idea of what the options are going to be before we ever take off and to plan our flight path or track across the ground. Are there small or large landing areas available downwind? Are there crops, trees, water, congested areas, houses, tall or short buildings, hillsides, and, of course, powerlines. If not familiar with the area, get a good briefing from the locals or the rally organizer, or, better yet, drive around the area and visually get an idea of what you might encounter. At one rally I attended, the organizers had color aerial photos of the area with corresponding street and road maps depicting the red and green zones in the area. This really helped familiarize the pilots with what to expect. As we all know, it looks a lot different from up in the air, so the more we know about what to expect, the better prepared we will be to anticipate the landing options.

H. Dean Chamberlain

Example Situations

Let's now look at two flight situations with the same relative wind speed of 6 to 8 mph. These are 1) a flight over and landing in a congested area and 2) a flight over and landing in a non-congested area.

Congested Areas

When taking off and flying over a congested area, I like to go to 1,000 feet or higher fairly early in the flight to survey the potential landings areas visually from aloft and to plan the flight to those areas.

During the climb, I make a mental note of the varying wind directions, if any, to allow me some directional navigation. Ideally, I like to have at least two landing sites ahead of me and one or more on either side so I can navigate as the winds allow. Now, my entire flight is predetermined by those landing sites. Yes, I originally selected a takeoff site which was far enough upwind and in line with the wind direction for my expected target landing fields. At winds of six mph that would be approximately five to six miles distant for a planned one hour flight. Hopefully, there would be some alternative landing sites in between in case of an emergency or some larger ones downwind in case of an increase in wind speed. However, I terminate the flight when I have my landing field made, even if the flight time is of shorter duration than I planned. I think the idea of promising a flight of an exact duration—say, one hour—to passengers is a mistake and one which contributes to pilots pressing on into hazardous situations just to please the passengers.

Non-Congested Areas

The major difference between the congested and non-congested area flights is the height above obstacles that needs to be maintained during the entire flight to satisfy the FAR. I usually go up to about 1,000 feet or more even in non-congested areas very early in the flight to both be able to see all around and to survey the landing areas ahead. Again, I check wind directions at various altitudes during the climb. Even though I have released pibals (small balloons launched to check wind direction) before takeoff, it is easier to visualize those effects on my ground track relative to my intended flight path.

Now we are in the cruise portion of the flight. While enjoying the scenery and the tranquillity of the flight, we must be looking for all those "sign posts in the sky." These "sign posts" can give us assistance in determining what is happening to the wind direction and speed around and below us. Those signs familiar to many pilots are: other balloons, flags, smoke, water ripples, anchored boats pointed into the wind, ripples in the snow and drift directions, dust from vehicles on roads or from farm equipment in the fields, etc. There are also some signs which are very local in nature and will be familiar to local pilots. Find out about these as well. They might make the difference between a successful or disastrous ending.

By looking for these various "signs" it allows us to verify the wind direction and estimates of speed as we approach our intended landing. ■

We'll be continuing this topic of balloon approaches and landings is a series of articles over the next several issues.

H. Dean Chamberlain

The Accident Chain

by Dennis *from Canada*

The following item by a Canadian balloon pilot appeared in the May 7, 1993, New Zealand Flight Safety Supplement, *and it describes his close encounter with power lines. We have reproduced it here, not for balloon pilots only, but for all pilots because it demonstrates how aircraft accidents often occur through a build-up of links in a chain of accident causes. These "links" are common to any type of aircraft operation. The editorial comments are from the Editor of Canada's* Aviation Safety Ultralight and Balloon, *although I echo them wholeheartedly and have added a couple of my own. Dennis' story has literally been all over the world and holds a universal truth.—**Editor***

A practice I highly recommend and one which I nearly always follow [*But neglected to do so for this flight.—Editor*] is that of telling my passengers about power lines being the greatest hazard to flying balloons and that if they should see them across our flight path to point them out to me. This philosophy is based on the fact that it is better to have several sets of eyes on the alert for hazards. ***[Link #1]***

On this particular afternoon, weather conditions were ideal, with unlimited visibility and very light winds. The winds were so light that I elected not to do a cross-city flight but to launch from a large field in the country. Two passengers accompanied me on the flight.

After the launch, we drifted slowly northward toward transmission lines 90 degrees to our flight path and about three kilometers distant. The lines are massive and loom 200 feet high. However, at the rate we were moving, they were of no immediate concern. There would be ample time to do some landings and contour flying before having to climb. ***[Link #2]***

I continued the flight toward the power line with both passengers standing in front of me, cutting off my view ahead. I knew the lines were ahead and would plan to climb in plenty of time to avoid them. It was at this point that my passengers involved me in a spirited political conversation which temporarily diverted my attention from my flight duties. ***[Link #3]***

It was not until I turned my head during a break in the conversation that I suddenly noticed the large tower on my left—but still at a safe distance, leaving me the opportunity to climb above it. [*The chain is broken before final forging.—**Editor***]

I shudder to think what might have happened had I continued for another three or four minutes without being aware that action was necessary. I could hardly see the lines against the dark background of the fields. Only the towers were clearly visible.

The disturbing fact about this episode is that my attention was distracted for only a short period, and yet long enough to have exposed myself and passengers to the extreme hazard of a possible power-line strike.

In hindsight [*always the clearest vision—**Editor***] because the flight was over relatively flat country with sufficient altitude to avoid other obstacles, I did not anticipate an unusually high obstruction such as the power lines. I did not appreciate the lack of concentration attributable to the slow-moving flight. I had neglected to brief my passengers about power-line dangers, and I allowed them to involve me in a discussion which temporarily diverted my attention from flying the balloon. ■

Editor's Note: *Dennis has shared a humbling experience with us. Accidents happen all too often exactly as he has described. In his summary, Dennis uses phrases that are very familiar to accident investigators. For example, he states that the events leading up to this near accident were the result of complacency, lack of attentiveness, and distraction from flight duties. The safety message is clear: Always concentrate on the primary task—"Fly the aircraft!"*

"Break the accident chain." See next page.

Break a Link, Save a Life

by H. Dean Chamberlain, *Associate Editor*

Does time make a difference? One FAA safety inspector doesn't think so. He wrote to FAA Headquarters about an accident in which a non-instrument rated commercial pilot crashed into a mountain during cruise flight. According to the inspector, the pilot was flying without a flight plan, and instrument meteorological conditions existed along the intended route of flight. The pilot and two passengers died in the crash. What makes this accident somewhat unique is that the accident occurred in January 1972, but the aircraft was not found until September 1992.

Because pilots (both non-instrument rated and instrument rated) operating VFR still crash under IMC today, the inspector believes that we have made little progress in the last 20 years in educating non-instrument rated pilots on how to stay out of instrument conditions. It seems that in the years since this accident occurred, pilots are still doing the same things that caused this accident even though our ability to forecast such conditions has improved dramatically.

The inspector wants the FAA's Accident Prevention Program to help educate pilots about the dangers of flying VFR in IMC. As part of the Accident Prevention Program, *FAA Aviation News* decided to review some of the information available on non-instrument-rated pilot accidents in IMC to see if we could identify some of the common factors in the accidents.

Causes—Links in a Chain

At the risk of being over simplistic, we think the cause of VFR flight into IMC weather-related accidents is not one of weather or even a lack of accurate weather reporting. We think it is a problem involving the pilot and how he or she functions in the cockpit. If this sounds like some of the recent articles we have published describing pilot decision making and crew resource management, you're right. We think the buzzwords found in those articles are appropriate. After reading the narrative summaries of many of the NTSB accident reports about non-instrument rated pilots' continued VFR flight into IMC, it appears that many of the pilots did not realize the risks involved in such flights. Although we have published test results describing how fast spatial disorientation can result in loss of aircraft control, we think pilots who have not experienced the loss of control involved may feel it won't happen to them. They may not realize they have a problem until the accident.

As anyone who has studied accident reports will tell you, once you start reading the reports, and with the knowledge that there was an accident, it is easy to see the details of the chain of events that led up to the accident. Safety experts say accidents can be prevented if one of the links in an accident chain is broken. Simply stated, "Break a link, save a life." The following "links" were listed in some of the NTSB narratives. Do you recognize them?

". . . witness stated that the horizon was obscured from his location, and that the lights from the city were obscured by low stratus clouds and fog."

"Weather forecasts for locations W and E of the accident area were for marginal VFR conditions. The 0945 weather at——was 300 feet scattered, 1,000 feet overcast, and visibility 1½ miles in rain and fog."

"The pilot (a student pilot without an instructor endorsement) took off on a VFR X-country flight with no weather briefing and flew into an area of adverse weather conditions."

Words such as "reported low ceilings with overcast skies," "no moon," "no flight plan," "no weather briefing," "light fog and drizzle," "spatial disorientation," "lack of experience," "lack of natural horizon," "dark night," "snow covered ground," "poor visibility," "mountain pass," "no room to turn around," and "aircraft icing" are common terms used throughout the reports. If the pilots involved in the reports could have broken one of these "links," maybe they could have avoided the accidents.

Not a Chance

Since no one plans to have an accident, the question is how can we—the public, the FAA, and other pilots—con-

vince non-instrument rated and instrument rated pilots not to fly VFR in instrument meteorological conditions. What makes this educational process more difficult is the fact that other accident reports continue to show instrument-rated pilots (both single pilot and crews) being killed while flying VFR beneath a ceiling while waiting for their IFR clearance airborne. When experienced pros flying well-equipped aircraft get hurt, it makes one wonder what chance does a non-instrument rated single pilot flying with minimum equipment have in IMC. The answer is simple: They don't have a chance.

We know they know better. All student pilots are taught that when they cannot maintain VFR conditions, they must return to VFR conditions. Students are even required to learn basic survival instrument skills so that they will be able to make a 180 degree turn back toward VFR conditions in case they inadvertently enter IMC. We also know from FAA and NTSB accident reports not all VFR pilots follow their training. The accident statistics seem to prove that no one pilot or class of pilot is immune from the dangers of continued VFR flight in IMC.

The question is what can we all do about the situation. More importantly, if we cannot keep other pilots from flying into the face of danger, maybe the question should be, "How can we keep ourselves out of such conditions." Since accidents only happen to the "other guy," which one of us is the proverbial other guy. Which one of us will be next? What can we do to avoid being named in the next accident narrative?

Accident Information

A review of NTSB records for the period 1988 to 1993 shows the danger of being involved as a non-instrument rated pilot in an IMC accident. One important note is the number of fatalities involved in the accidents, which might dissuade pilots from thinking about flying VFR in IMC conditions

ACCIDENT SUMMARY

Year	Number Accidents	Fatal Accidents	Type of Injuries: Fatal	Ser	Minor	None	Tot
1988	63	49	104	11	12	12	**139**
1989	74	49	100	15	17	18	**150**
1990	56	41	8	1	11	8	**114**
1991	69	47	96	15	9	18	**138**
1992	62	47	95	16	12	11	**134**
1993	31	21	38	10	9	6	**63**

A general review of the accident data shows two types of continued VFR flight into IMC accidents. One involves the non-instrument rated pilot who flies into IMC, becomes disoriented, and loses control of the aircraft. The aircraft may or may not disintegrate in the air before crashing.

Solutions

The solution to this type of accident is not to fly into IMC without being instrument rated and proficient and in a properly equipped aircraft. Even instrument-rated pilots who are not proficient and current are vulnerable to vertigo and subsequent lose of aircraft control in such conditions. The key to this type of accident is proper instrument training and proficiency. Safety was one of the reasons the FAA reduced the instrument training requirements several years ago. The FAA realized that an instrument rating was one of the best life insurance policies any pilot could have. The premium is currency and proficiency.

The second and more dangerous scenario is continued VFR flight in lowering visibility conditions. This is the classic "scud running" type of accident that can kill both VFR and IFR pilots flying VFR. These types of accidents normally result in the aircraft hitting something or stalling and spinning while trying to avoid hitting something. In either case, the results are usually the same—aircraft destroyed and crew and passengers killed. Key phases for these types of accidents include, "Non-instrument rated pilot encountered IMC weather conditions in a mountain pass and the aircraft impacted terrain during a turn to reverse course." "The accident airplane was flying in an easterly direction at about 100 feet above the ground and was following an interstate highway... the airplane struck a static wire at about 127 feet above the ground. The airplane entered an uncontrolled descent and impacted the ground on the highway's median...." Other "link" terms include: aircraft collided with mountainous terrain; improper preflight and inflight planning/decisions; failure to initiate timely remedial actions; loss of aircraft control; and disregard of forecast adverse weather.

So what can we learn from these examples and the reported accidents. If you see yourself in one of the examples in this article, you might be the next accident. So what can you do to avoid being a "continued VFR flight into IMC" victim? The above accident and NTSB information identified several safety factors that we think many pilots take for granted.

In some cases no flight plan was filed for the flight. Although some will argue that a flight plan will not protect an aircraft from an accident, flight plans do several important things. They aid in starting searches for and in locating missing aircraft. In some cases, an aircraft has been missing for days before anyone realized the aircraft was missing. In rescue work, time may mean the difference between life and death. Flight plans also give a pilot a reason to contact Flight Service and ask for a weather briefing. And what is more important, it gives a pilot an opportunity to talk to a trained weather briefer. (Yes, we realize that in the 20 years since the reported accident, pilots can now check computerized weather services and file computerized flight plans, but when you have a question, nothing beats a real person.) And speaking of weather briefers, the National Weather Service (NWS) and the FAA have made great strides in improving the quality of their weather reports. The new Doppler weather radars and the remote weather reporting systems such as ASOS and AWOS operated by NWS, FAA, and local government agencies at small airports around the country now provide pilots with better and more timely weather reporting than when this accident occurred in 1972.

But the problem is not the accuracy or quantity of weather information, but how a VFR pilot operates when looking out of his or her aircraft and sees less than VFR conditions. Does the pilot turn to VFR conditions or does he or she try to sneak through under the weather? We have all heard someone say, "I've made it before, I can make it again." Or how many times have you heard someone say, "What's the matter, are you afraid of a little weather?" Then, there is the familiar, one-time plea that often gets repeated, "Dear '—,' I promise I'll never do this again if you will just get me safely on the ground."

My personal expression about flying in weather is a simple one. I believe that if it's too bad to drive to my favorite fast food place, it's too bad to fly. I can say that because I don't fly for a living, I never have a reason to go some place at all cost, and I have higher self-imposed minimums than the FAR. But the sad fact is pilots have and will continue to fly VFR in IMC conditions. Most will survive, but some will not. The fact that some lucky pilots will survive is not an endorsement to fly VFR in IMC. The fact is, pilots being

Emergency Flight by Reference to Instruments

The following information is taken in part from Chapter 13 of the FAA's *Flight Training Handbook*, AC 61-21A. As the title states, the chapter describes emergency procedures only. It is not designed or intended to make anyone an instrument pilot. Pilots should follow the guidance in their aircraft operating handbook or flight manual during any emergency including how to control their aircraft during loss of visual reference if not instrument rated. If emergency IMC procedures are not listed in your operating handbook or flight manual, then the information in Chapter 13 might help save your life.

Like any emergency, loss of visual reference requires a VFR pilot to first maintain control of his or her aircraft. The second is to be able to communicate to ATC that there is a problem and to follow ATC instructions. The third is to be able to safely navigate to VFR conditions.

Of the three elements, the most important one is maintaining control of the aircraft. What makes this difficult is every person's natural reaction of fear and possible panic to an emergency. Adding to the fear will be the various flight sensations a VFR pilot may feel when the visual horizon is lost in IMC.

The key to flying an aircraft in the clouds is trust and training. A pilot must learn to trust his or her instruments, because a pilot's natural sense of speed, turning, and other sensations cannot be trusted in IMC. Two important elements in maintaining aircraft control in IMC are a well-trimmed aircraft and a light touch on the controls. The importance of a well-trimmed aircraft cannot be over-stated because a trimmed aircraft is inherently stable. If you have an auto pilot or wing leveler system on board, turn it on. The idea is to remove or minimize the possibility of a pilot-induced loss of control. Some authors and instructors say that if you are out of control and you don't know how to recover, you should just let go of the flight controls and let the aircraft recover itself. Obviously, this idea won't work if you don't have enough altitude to recover, but you get the idea.

In IMC, all control inputs should be small and gentle. Pilots are reminded to use basic flying skills. Bank controls wings level and heading, pitch controls airspeed, and power is adjusted to control rate of climb or descent. The controls are used together to get the desired results. If your aircraft has one, the attitude instrument is your most important control instrument followed by the airspeed or rate of climb instrument and altimeter. Together, they will help you control your wings level, help you maintain your airspeed within limits, and indicate whether you are climbing or descending.

As we said in the article, the safest action is never to enter IMC while operating VFR. But in case that may not always be possible, the next safest course of action for a VFR pilot is to be prepared. You should practice the emergency procedures outlined in your operating handbook or flight manual, the *Flight Training Handbook*, or the *FAA Instrument Flying Handbook*, (AC 61-27C), with an appropriately rated safety pilot. You might want to take a flight with an instrument flight instructor in IMC to expose yourself to instrument flight. Of course, the safest solution is to become an instrument-rated pilot.

Aviation Terminology

Since we have been talking about VFR into IMC accidents, let's review some familiar aviation terms and references.

All information is taken from the *Airman's Information Manual* (AIM).

VFR—VISUAL FLIGHT RULES.

Rules that govern the procedures for conducting flight under visual conditions. The term "VFR" is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan.

VFR CONDITIONS.

Weather conditions equal to or better than the minimum for flight under visual flight rules. The term may be used as an ATC clearance/instruction only when:

1. An IFR aircraft requests a climb/descent in VFR conditions.

2. The clearance will result in noise abatement benefits where part of the IFR departure route does not conform to an FAA approved noise abatement route or altitude.

3. A pilot has requested a practice instrument approach and is not on an IFR flight plan. All pilots receiving this authorization must comply with the VFR visibility and distance from cloud criteria in Part 91. Use of the term does not relieve controllers of their responsibility to separate aircraft in Class B and Class C airspace or TRSA's as required by FAA Order 7110.65. When used as an ATC clearance/instruction, the term may be abbreviated "VFR;" e.g., "Maintain VFR," "Climb/Descend VFR," etc.

VFR NOT RECOMMENDED.

An advisory provided by a flight service station to a pilot during a preflight or inflight weather briefing that flight under visual flight rules is not recommended. To be given when the current and/or forecast weather conditions are at or below VFR minimums. It does not abrogate the pilot's authority to make his own decision.

BASIC VFR WEATHER MINIMUMS.

No person may operate an aircraft under basic VFR when the flight visibility is less, or at a distance from clouds that is less, than that prescribed for the corresponding altitude and class of airspace. (See table above.) Note: Student pilots must comply with Part 61.89(a)(6) and (7).

BASIC VFR WEATHER MINIMUMS

AIRSPACE	FLIGHT VISIBILITY	DISTANCE FROM CLOUDS
Class A	Not Applicable	Not Applicable
Class B	3 statue miles	Clear of Clouds
Class C	3 statue miles	500 feet below 1,000 feet above 2,000 feet horizontal
Class D	3 statue miles	500 feet below 1,000 feet above 2,000 feet horizontal
Class E		
Less than 10,000 feet MSL	3 statue miles	500 feet below 1,000 feet above 2,000 feet horizontal
At or above 10,000 feet MSL	5 statue miles	1,000 feet below 1,000 feet above 1 statue mile horizontal
Class G		
1,200 feet or less above the surface (regardless of MSL altitude)		
Day—except as provided in FAR § 91.155(b)	1 statue mile	Clear of Clouds
Night—except as provided in FAR § 91.155(b)	3 statue miles	500 feet below 1,000 feet above 2,000 feet horizontal
More than 1,200 feet above the surface but less than 10,000 feet MSL		
Day	1 statue mile	500 feet below 1,000 feet above 2,000 feet horizontal
Night	3 statue miles	500 feet below 1,000 feet above 2,000 feet horizontal
More than 1,200 feet above the surface and at or above 10,000 feet MSL		
	5 statue miles	1,000 feet below 1,000 feet above 1 statue mile horizontal

pilots, some will try and succeed while others will fail and die.

An important fact that every pilot operating VFR must remember is these are the minimum conditions required by the FAR. Pilots must make allowances for the speed of their aircraft and their own proficiency and skills when operating in minimum VFR conditions in hostile terrain. They should set higher operating standards. Hostile terrain includes any type of natural or man-made obstacle that can reach up and ruin a pilot's day such as hills, box canyons, mountains, and antennas. Every pilot must allow enough time and distance based upon his or her aircraft's speed and maneuverability and their own physical limitations to safely complete a turn back toward VFR conditions before hitting something. That safety turn must be completed before penetrating IMC conditions.

Conclusion

Although it is easy to sit in Washington and review an accident investigation and make recommendations based upon that investigation, the fact remains that it is not safe to fly in IMC without the proper training and qualifications, currency, and properly equipped and certificated aircraft. The basic rule should always be, "We do not fly where we cannot see unless we are properly trained and equipped."

With your help and willingness to obey the visual flight rules and to remind other pilots not to violate those rules, we can start to reduce this cause of many preventable accidents. Maybe if everyone works hard enough, someone 20 years from now will not be wondering why pilots are still crashing while trying to fly VFR in IMC.

If anyone has an idea on how we can help pilots avoid the temptation to fly VFR into IMC, please send your suggestions to us and we will print a sampling in *FlightFORUM*.

A final thought—as the FAA and the aviation community work on implementing a satellite-based navigation system in the United States that could conceivably provide an instrument approach into every airport in the nation, now might be the best time for non-instrument rated pilots to earn their instrument rating. The reason is simple. If every airport gets an FAA-approved instrument approach procedure, and every pilot gets an instrument rating there should be no reason for any accident to be labeled, "Continued VFR flight in IMC."

Think about the possibilities.

For additional information on weather for both VFR and IFR flight, contact the Accident Prevention Program Manager at your local FSDO and ask about his or her copy of the video tape titled, "On Weather." ■

Balloon Flight Training

Continued from page 1

A written test is used by competent instructors to address what is to be covered [now required for pre-solo students by FAR § 61.87(b)—Editor], when, and to what standards. This assures that all subjects are covered.

Syllabus and Lesson Plans

Flight instruction also should include detailed lesson plans. The syllabus will facilitate the student's association of the principles covered in each lesson and enable them to anticipate the goals or building blocks of learning toward which they are progressing. The syllabus assure adequate and uniform coverage of the student's instruction, especially when different instructors are involved.

In preparing a training syllabus, consideration should be given to making it flexible. It must be used primarily as a guide—not law. It must be adjustable to the rate and level of comprehension of each student. Sometimes this can be done by writing reminders and revisions in the basic syllabus.

Summary

Balloon flying is a gentle way to float through the skies. The preparation and execution of the skills we learn requires the simultaneous use of all our faculties. The ability to gain the maximum enjoyment from the sport starts with the training we receive.

New students should seek a competent instructor with a written training plan. Enjoyable flying for a long time requires greater knowledge.

Consequently, both instructors and students should build a library of books on the various aspects of the sport, from weather to theory and safety.

Good training is not only important to your safe flying but to the future of the sport as well. ■

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FlightINSTRUCTION

The Flight Instructor as a Professional

Part One of this article appeared in the April 1994 issue of FAA Aviation News *and was an introductory discussion on professionalism and how it relates to flight instructing. The second part provides specific suggestions for enhancing and improving the flight instructor's image.—**Editor***

PART TWO

©Patrick R. Veillette

Standards of Behavior

Our conduct speaks louder than words. The previously mentioned incidents (all of which are actual cases) all give the message to other pilots that it is okay to ignore normally prudent safety regulations. Flight instructors must remember that our conduct in the cockpit and on the ground is constantly being scrutinized by other pilots.

The military and many corporations have rules of conduct. Some rules are quite explicitly written; however, one rule always applies, no matter what. An employee's conduct should never give the impression that might reflect discredit on the company. In some cases, the mere impression can result in dismissals. The lesson applies to flight instructors in a limited sense; we need to be very careful in our conduct on the ground and in the air.

Professional Ethics

The medical, legal, and engineering professions all have a code of ethics by which its members are bound. Ethics serve as ground rules for our moral conduct and reflect our attitudes toward honesty, integrity, trust, and loyalty. It is unlikely that we can read a chapter on ethics and become ethical. Psychologists would argue whether we are born with a disposition toward ethical behavior or whether it is a product of our environment. The codes of ethics are generally not meant as inflexible rules but rather as a guide.

The National Society of Professional Engineers in 1978 reformed their Code of Ethics. Members of the National Association of Flight Instructors (NAFI) may be aware of their code of ethics; however, for comparison, the Engineer's Code of Ethics is cited below as food for thought. We have replaced "engineer" in the Code with "flight instructor."

I. Flight instructors, in the fulfillment of their professional duties shall:

1. *Hold paramount the safety of the public;*
2. *Perform flight instruction only in areas of their competence;*
   (That is, flight instructors should only give flight instruction for which they are truly qualified. For example, someone holding a CFI certificate is not automatically qualified to give aerobatic instruction. While the FAR do not require a CFI to possess an "aerobatic rating," without the specialized training and experience, a CFI should not advertise him or herself as an aerobatic instructor.)
3. *Issue public statements only in an objective and truthful manner;*
4. *Place the student's needs above his/her own.*
   (For example, a student might seek advanced training, and you happen to be a multi-engine CFI. If the student's best interest is served following the standard track of training from private to instrument rating to commercial in a single engine aircraft, it would be inappropriate for you to convince the student to get a multi-engine rating shortly after the private certificate just so you can grab some paid-for multi-engine time. Another example is that too often flight instructors will sit at the run-up area explaining some concept to the student, i.e., at the student's additional expense of a running airplane. Not only is this a poor practice in that the cockpit is a poor communication classroom, it is also unfair to the student's pocketbook. Another example would be a flight instructor taking students on longer trips to other airports just to help build the instructor's flight time.)

II. Professional Obligations

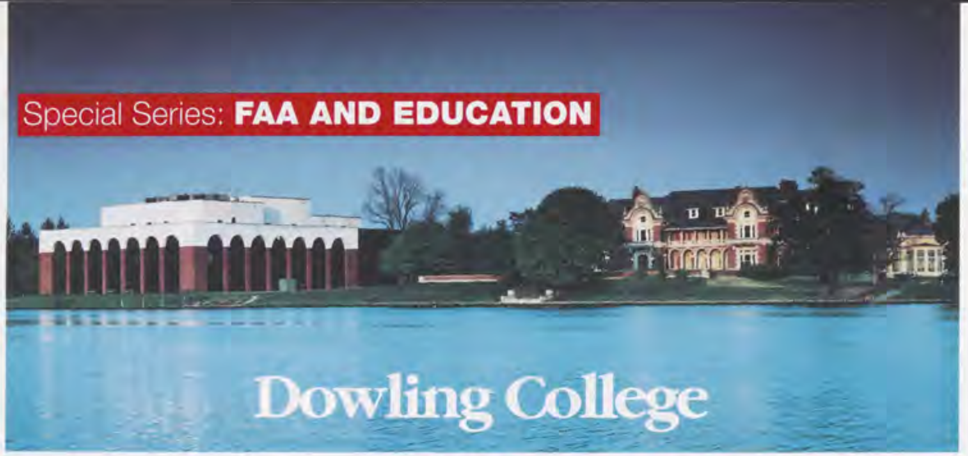
1. *Flight Instructors shall be guided in all their professional relations by the highest standards of integrity.*
   (Flight instructors should admit and accept errors when proven wrong; that we will give our full devotion to our main job as a flight instructor—which admittedly is hard when the FBO needs a copilot for a charter and you have a student showing up.)
2. *Flight instructors shall at all times strive to serve the public interest.*
   (Flight instructors need to seek opportunities to be of constructive service in civic affairs and work for the advancement of the safety of the community; it also means that we should seek to extend the public knowledge and appreciation of flight instruction and to protect the profession from misrepresentation and misunderstanding.)
3. *Flight instructors should avoid all conduct or practice which is likely to discredit the profession or deceive the public.*
   (For example, when recruiting students, remember there are a large number of unemployed ex-Eastern, Pan Am, etc., pilots who cannot get jobs. Recruiting students by telling them about a so-called pilot shortage, showing them pictures of flying an airliner, and how their flight instruction will lead right into the right seat is deceiving. Another example is the flight instructor buzzing the wind surfers on the beach—portraying general aviation pilots even worse in the public eye.)
4. *Flight instructors shall uphold the principle of appropriate and adequate compensation for those engaged in flight instruction work.*
   (That'll be the day!)
5. *Flight instructors should not accept positions in which their professional judgement may be compromised.*
   (For example, you want to teach for the local FBO but find out that the aircraft have not had annual inspections in several years, and critical AD's have been ignored. The owner tells you your job is to teach and to ignore the other things, and his job is to run the business. The professional should not accept this. In fact, having worked for a shady outfit can associate you and your reputation with that FBO. Wherever you go in the future, you will be associated with the reputation of that FBO, and that could be ruinous on an otherwise good reputation.)
6. *Flight instructors shall accept personal responsibility for all professional activities.*
   (This means being current, being registered with appropriate agencies, and not giving "good old boy (or girl)" sign-offs to buddies.)
7. *Flight instructors should cooperate in extending the effectiveness of the profession by becoming involved in ongoing research, interchanging information experience with others, and encouraging others to advance in their flight development.*
   (Most flight instructors are naturally inclined to encourage their students to seek additional training; however, how many of us encourage our colleagues to attend additional professional training? Being current and up to date with the latest developments in the field is important. How many of us would want to operated on by a doctor who gets his ideas on medicine from *Reader's Digest*? We expect doctors, as professionals, to get their working concepts from the highest quality peer-reviewed journals. If we want to claim to be professionals, we should follow this example. The popular literature found on magazine racks in not considered to be peer-reviewed. Did you know that NASA, aircraft manufacturers, the military, and the FAA have periodicals published that address the latest flight safety findings? [We all know which is the FAA publication, right?—***Editor***] Do you subscribe to them? You probably should at least have access to some of them and regularly read them. Chief flight instructors—whether formally holding that position for a FAR Part 141 school or designated as such for a FAR Part 61 school—have an important role in this area. Chief instructors should nurture and help develop the skills of their flight instructors, which means holding regular safety meetings with excellent, on-the-cutting edge presenters who will keep flight instructors up to date. It might also mean requiring that flight instructors attend regular professional training themselves and that you encourage their efforts to upgrade knowledge and skills as flight instructing professionals. All too often there is a rush to grab flight hours and ratings on the step up the ladder to the airline cockpit. In the process, however, quality and professionalism may be sacrificed.)

Law and Ethics

Non-compliance with the FAR can subject us to penalties from the government. Usually, a violation of ethics does not bring about punishment from the government, but rather it may come in formal or informal reproof from others in the profession. Sometimes the informal reproofs can be more deadly to one's career. A simple reputation earned earlier as a "hot-dog" or show-off can come back to haunt that person when applying for a new job. The aviation community is small, and reputations will follow someone a long time and for long distances.

Summary

Being a professional can be simply summed up as being completely dedicated to your field and devoting as much time, energy, and care into your endeavor as possible. Fulfilling a "checklist" of the items in this article does not automatically make anyone a professional, and the inability to complete one or two of them does not automatically disqualify someone as a professional. Most importantly, it is an attitude. ■



Special Series: **FAA AND EDUCATION**

Dowling College

by Mary Ann Turney

Dowling College, just 50 miles from New York City, offers a large choice of aviation degrees in the peaceful Idle Hour community of Oakdale, close to Long Island's south shore.

The campus provides students with an unusual blend of modern facilities and a historic setting. The 47-acre main campus, once the private estate of William D. Vanderbilt, overlooks the Connetquot River. The 110-room mansion houses administrative and faculty offices, as well as magnificent ceremonial rooms for college events.

Dowling College's School of Aviation and Transportation incorporates a unique combination of aeronautics and the humanities. In addition to its aviation courses, Dowling gives students a solid liberal arts education—preparation for living as well as making a living. Students develop abilities at problem solving, understanding the world in which they live, and mastering written and oral communications. In addition, they acquire the technical knowledge to carve out a successful career in aviation. In its role as "the personal college," Dowling focuses on the achievement of each student.

A student at Dowling may combine flight training with any of the six aviation bachelor of science degree options, which include three airway science degrees (Aircraft Systems Management, Airway Science Management, and Airway Computer Science) as well as Aeronautics, Aeronautics and Applied Mathematics, and Aeronautics and Management. In 1993, the School of Aviation and Transportation offered a new Transportation Planning and Management B.S. program—the only one in the nation. This degree also includes the option of flight training. Through these programs, students can receive the following certificates and ratings: Private Pilot, Instrument Rating, Commercial Pilot, Certificated Flight Instructor, Multi-Engine Rating, Instrument Flight Instructor, and Ground Instructor.

Experienced faculty, small classes, and personal teaching offer students more than pilot certificates, however. Students acquire the solid foundation in learning concepts, theory, and research skills needed for today's competitive world.

Dowling operates on a spring and fall semester calendar, with shorter intensive terms offered in winter and summer. Students may earn credits that are applicable toward degree programs during any term. Students can register at any point in a semester for flight training—called Flight Labs—and flight scheduling is individual and flexible to meet each student's needs. In addition, the latest flight simulation and computer training are important parts of the Dowling flight program.

The School of Aviation and Transportation houses state-of-the-art facilities in the new Kramer Science Center, which contains a wind tunnel, meteorology, human factors, and physics labs.

One hundred fifty Dowling students a year integrate classroom learning with work experience in business, industry, and government. Internships and cooperative program opportunities continue to increase in the New York area, where many corporate aviation facilities are located.

The School of Aviation and Transportation recently instituted the Women's Leadership Program, an active commitment of support for women in aviation, science, math, and technology as part of the college's mission to provide educational opportunities to all populations. This leadership program includes discussion group formation, mentoring, and special events to enhance women's career objectives in aviation.

In order to accommodate transfer students, Dowling has instituted a liberal and unencumbered transfer policy for those who have already earned college credit in aviation. Recently, a number of articulation agreements have opened the door for advanced placement in aviation for students with high school training in aviation.

Aviation students have extensive opportunities to participate in special after-hours enrichment programs with guest speakers, conferences, faculty mentoring, and partnership programs with local pilot associations. Aviation activities include the Lion Escadrille, Dowling's Precision Flight Team; the Aeronautics Club; and Alpha Eta Rho, the international aviation fraternity.

A unique partnership exists between Dowling College's aviation students and the FAA's Accident Prevention Program. Each year, three Dowling student organizations sponsor and organize "back to school" seminar days. The programs give Dowling students and faculty volunteers the opportunity to share their expertise with the local pilot community by holding a series of timely, informative workshops. In this way, Dowling students become very much a functional part of the aviation community.

During the summers, the FAA, in partnership with Dowling's School of Aviation and Transportation, jointly sponsors Aviation Career Education (ACE) Summer Camp programs for high school students. These programs, which have met with increasing success, offer Dowling students both summer employment and a valuable opportunity to share their enthusiasm for aviation with young people.

Based on Dowling President Victor Meskill's partnership vision and nearly a quarter century of aviation tradition, Dowling recently launched its National Aviation and Transportation Center to respond to the national need for intermodal transportation specialists who can fill the human resource needs of air, ground, rail, space, and maritime industries. This estimated $34 million project to create several state-of-the-art facilities is located on 105 acres at the Brookhaven Caliber Airport and will admit its first students this year. When it is completed in 2005, the NAT Center will include a learning resources center collection, a cooperative education and internship center, a conference and continuing education center, a simulation center, a research institute, and a cultural and language center.

At the heart of Dowling College's personalized approach to its students is an outstanding teaching faculty. Small class size and individual advisement support an environment in which student and faculty are able to develop close and lasting working relationships. Students have many opportunities to participate with faculty members in leading aviation workshops and aviation educational activities both at the college and in the active professional pilot community which surrounds the college. ■

Ms. Turney is a Senior Aviation Specialist at Dowling College. For additional information, contact her at Dowling College, Oakdale, Long Island, NY 11769–1999; 516 244–3320.

High school students building model airplanes during the Aviation Career Education (ACE) Summer Program (left); the 1993 members of the Lion Escadrille, Dowling's Precision flight Team (top); and NIFA national award winners Larry Cutler, Rich Brock, and Ken Neice (bottom)

G. S. Uvack

Descent to the MDA or DH and Beyond

adapted by John Hemmes, *APPM, Bedford, MA FSDO*

A common goal for all instrument approaches is to get the pilot into a position—the MDA or DH—from where he or she can make a normal landing, usually with visual references.

The *Airman's Information Manual* (AIM) defines ***minimum descent altitude*** (MDA) as: the lowest altitude, expressed in feet above mean sea level, to which descent is authorized on final approach or during circle-to-land maneuvering, in execution of a standard instrument approach procedure where no electronic glideslope is provided.

The AIM defines ***descent height*** (DH) as: the height at which a decision must be made during an ILS, MLS, or PAR instrument approach to either continue the approach or to execute a missed approach.

Now that we understand the terms a little better, let's talk about a few things to do to prepare to get to the MDA or DH before we go beyond it.

Before the Flight

If you are talking to a Flight Service Station (FSS) weather briefer, be sure to ask for "FDC published NOTAM's." If you are using DUATS, you must use a site specific airport identifier (three letters) in order to get FDC NOTAM's. NOTAM's give you invaluable information about NAVAID's along your route and conditions at your destination. "I didn't know" isn't really an excuse after trying to shoot an approach that's been NOTAM'ed "out of service."

During your weather briefing, find out where the nearest present or forecast VFR weather is, just in case you need it—such as in the event of radio failure. It's a good idea at this point to review the lost communications procedures in FAR § 91.185. (See the article, "Squawk 7600! in the March 1994 issue of *FAA Aviation News*.)

After obtaining a weather briefing and determining the probable landing runway at your destination, review all necessary approach charts. Note any obstructions and their relationship to the airport.

If possible, call ahead to the destination airport to see if there are any local "Letters to Airmen" that could affect your arrival. (The FAR require air carrier pilots to be familiar with the destination before departing. Should any less be expected of a general aviation pilot?)

Make sure you have current enroute, approach, and sectional charts on board. Try not to switch back and forth between formats. An aircraft cockpit is no place to be familiarizing yourself with a chart format you are not accustomed to.

From the approach charts and *Airport/Facility Directory*, determine if radar is available. You may also want to determine the ***minimum vectoring altitude***.

Determine the sources of weather reporting available at your destination. Determine your *personal* approach minimums before departing. Take into account how *current* and *proficient* you are, your experience level, and your familiarity with the aircraft and systems. If you are a relatively new instrument pilot set your minimums high, possibly even VFR, until you gain experience in the system. Also be aware that on any given day your personal minimums may change. You may not feel up to low approaches because of a lack of rest or other reasons.

Assure that all NAVAID's needed (VOR, ADF, etc.) are working properly in your aircraft.

While Enroute

Contact a FSS along your route or nearest your destination well in advance to determine if there are any changes in FDC NOTAM's or local NOTAM's that may affect your flight.

Monitor and write down the ATIS, if available, as soon as you can receive it. Be sure to verify that ATIS hasn't changed as you get closer to your destination. If ATIS is not available you may be able to get the needed information from the common traffic advisory frequency (CTAF). This will help determine which approach and runway is in use.

After getting the above information review the appropriate approach chart. If you are a two-pilot operation have the non-flying pilot brief you on the approach. Even if you are solo brief yourself on the approach. A sample approach briefing might go like this:

1. This will be a___________[type of approach] to runway___at______ airport.
2. Field elevation is_____feet.
3. The time from the FAF to the MAP will be____minutes_____seconds.
4. The MDA/DH for this approach will be_____feet.
5. The required rate of descent will be____FPM at____kias.
6. Approach notes are___________ ___________________________.
7. The missed approach procedure is ______________________.

(You might want to make up a bunch of "approach briefing cards" and fill in the blanks as part of your preparation. Keep the completed card with your approach plates so you can refer to it readily before final approach.)

While on the Approach

Complete as much of the landing checklist as you can before starting the approach. If you are flying a retractable gear aircraft it is a good idea to lower the gear when you are ½ dot above the glide slope or at glide slope intercept. On a nonprecision approach lower the gear at the FAF. You may consider using this checklist of the FAA:

1. Time
2. Turn (if required)
3. Throttle/Thrust (power)
4. Tune (tower/UNICOM)
5. Trim
6. Transmit

All the above is true unless you are going to circle to land in a multiengine aircraft with one engine out. Then, you should not extend the landing gear until abeam the point of intended landing on the runway you are landing on. (Follow any procedure reference in the aircraft flight manuals.)

Think about the wind and how you will have to correct for it. If you are on an ILS and you hear that there is a large aircraft ahead of you, beware of wake turbulence. Be sure to stay exactly on the GS—**do not go below it!** Listen up on the frequency, so you are aware of other traffic.

Call out to the flying pilot or yourself, if single pilot, 1,000, 500 and 100 feet above minimums.

After the Approach

When you have visual contact with the runway, fly the VASI if it is available.

If there is a Visual Descent Point (VDP) (Figure 1) available, it will be indicated by a v on the profile view. This is a defined point on a straight-in nonprecision approach from which you can descend below the MDA *if* you have the visual reference required by FAR § 91.175(c)(3). You may *not* descend below the MDA before the VDP.

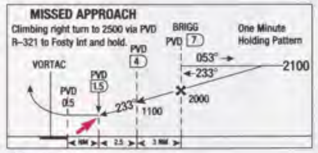
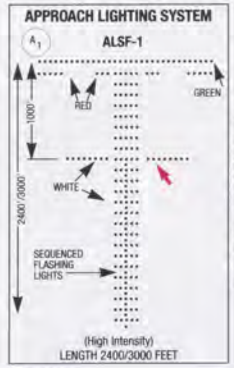


Figure 1

DO NOT deviate from the published approach procedure *unless you are in VFR conditions and you have cancelled IFR with ATC*. Remember you can descend below MDA or DH only if:

1. You are continuously in a position where you can land on the intended runway using a *normal rate of descent and normal maneuvers*. FAR Parts 121 and 135 operators must be able to land in the touchdown zone.
2. The flight visiblity must be at or above the visibilty required to complete the approach.
3. In order to clearly identify the runway of intended landing you should have *at least one* or a combination of the following in sight:
    a. The approach light system, except that you may not descend lower than 100 feet above the touchdown zone elevation unless the red terminating bars or the red side row bars are clearly visible.
    b. The runway threshold.
    c. The threshold markings.
    d. The threshold lights.
    e. The runway end identifier lights (REIL).
    f. The VASI.
    g. The touchdown zone or touchdown zone markings.
    h. The touchdown zone lights.
    i. The runway or runway markings.
    j. The runway lights.

The following is a rule of thumb to estimate "flight visibility" when coming out of the clouds on an approach that has an approach lighting system. Every approach lighting system should have a "decision bar" located 1,000 feet from the runway threshold (Figure 2). These lights or bar are perpendicular to the approach lighting system. Another 1,000-foot key is that if there are sequenced flashers or "rabbit" in the system; they stop at the decision bar. If you are at the middle marker and cannot see the runway threshold, look for the decision bar. Let's say you see the decision bar, and the MM is six tenths (.6) of a nautical mile (nm) from the threshold—approximately 3,600 feet. Then subtract the 1,000 feet from the threshold to the decision bar, and that leaves 2,600 feet or approximately ½ mile. Therefore, if the visibilty minimum for this approach is ½ mile you have it. Conversely, if the MM is five tenths (.5) of a mile (3,000 feet) from the threshold and you see the decision bar, visibilty is approximately 2,000 feet (3,000'—1,000'=2,000'). On this approach if the visibilty minimum is ½ mile, you do not have minimums. Be advised, though, that having the visibilty at MDA or DH is no guarantee that it won't change.



Note: The arrow in red points to the decision bar. Also note the 1,000 feet between the decision bar and the threshold.

Figure 2

Circling Approaches

So far, we've discussed mainly straight-in approaches. Now let's discuss circling approaches. A circling maneuver is initiated by the pilot, with ATC approval, to position the aircraft for landing on a runway when a straight-in landing from an instrument approach cannot be done. You must have visual contact with the runway of intended landing ***before*** doing this. Remember, complete as much of the landing checklist as possible before circling. If you are a two-pilot operation, the flying pilot should brief the non-flying pilot, before circling, on the direction to be flown after getting visual contact with the airport, the missed approach procedure, and as much else as possible without detracting from flying duties. Use the profile view when established on the approach. This will give you the best reference information.

Plan your approach to arrive at the MDA before the missed approach point. When maneuvering in a circling approach, use no more than a 30-degree bank in turns and stay at or above (no more than 50 feet above) the MDA while circling. Remember, you cannot descend from the MDA until you are in a position from which you can descend to the runway using normal maneuvers and a normal descent rate, and the airport must remain in view of the flying pilot. A word of caution: You will be circling well below pattern altitude, so you need to look out for VFR traffic descending from the regular traffic pattern altitude.

MANEUVERING TABLE

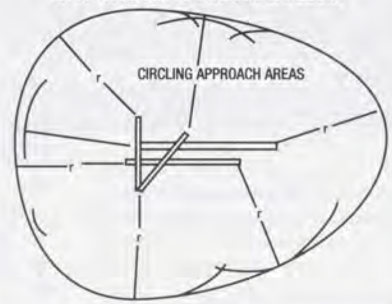
Approach Category	A	B	C	D	E
Speed (Knots)	0–90	91–120	121–140	141–165	Abv 165

Figures 3

CIRCLING APPROACH AREA RADII

APPROACH CATEGORY	RADIUS (Miles)
A	1.3
B	1.5
C	1.7
D	2.3
E	4.5

RADII (r) DEFINING SIZE OF AREAS, VARY WITH THE APPROACH CATEGORY



Figures 4

After doing the straight-in portion of the approach you may find it helpful to turn 30 degrees to the runway—if you are landing on the opposite end—then fly a parallel downwind until in proper base turn position. If at any point you lose visual contact with the airport, you *must* execute a missed approach. Make a climbing turn towards the landing runway until you are established on the missed approach course. *Remember, you must execute the published missed approach procedure for the approach you used to get to the circling point unless ATC gave you alternate instructions.* Tell ATC what your intentions are (hold, another approach, etc.).

Remember, circling approach protected airspace is affected by the approach category you are in. See Figures 3 and 4.

Plan your approach to arrive at the MDA before the missed approach point.

Remember, when being vectored for an approach, always know your position relative to the initial/final approach fix. Sometimes ATC may be very busy, and you may get a late turn which might require a steeper bank than you would like. You are the pilot in command and if things don't feel right, ask for vectors for another approach. If you cannot do what ATC asks you, tell them. If you accept their instructions, you as pilot in command will be expected to comply with their instructions.

Some Final Thoughts

Make sure before starting the approach you have your radios set up for the missed approach procedure.

Since the closer you get to the airport, with an on airport NAVAID, the narrower the course is, any course deviation will cause the needle to move farther. Make corrections smaller as you get closer.

You may wish to leave the power setting alone unless you have a 10 knot or larger airspeed change. ■

Mr. Hemmes prepared this article in collaboration with James Volner, Principal Operations Inspector, Bedford, MA FSDO; Kenneth Johnson, Principal Operations Inspector Boston-Logan Flight Standards Field Office; and Kenneth MacDonald and Allegra Osborne, Accident Prevention Counselors.

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Sunglasses in Aviation

Not all sunglasses are created equal

by Van B. Nakagawara, *O.D.* and Kathryn J. Wood, *Opt. T., R.*

Last year, an article in an aviation journal discussed the use of sunglasses by aviators. Several statements in that article were contradictory, and several issues on the use of sunglasses should be reinforced.

- Sunglasses with light transmittance less than 15% may reduce effective visual acuity. Target detection and resolution, especially for visual targets of medium to low contrast, may also be degraded.
- Sunglasses with photochromic lenses darken when exposed to ultraviolet light. Aircraft windscreens using polycarbonate materials may block ultraviolet light, reducing the protective quality of the lenses. Also, since a darkened photochromic lens requires time to lighten, aviators may experience visual performance loss when flying into clouds or darkened areas of mountain ranges.
- Polarized lenses eliminate reflected glare from a flat surface. However, looking through a laminated aircraft windscreen, while wearing polarized lenses, can result in a reduced retinal image.
- Color discrimination may be reduced while wearing dark lenses. The minimum transmittance for a red traffic signal light is 8% and 6% for a green and a yellow signal light. Tinted lenses with transmittances below these values may render traffic signals undetectable at a reasonably safe stopping distance and are not recommended for daylight driving. With sunglasses that reduce light transmission by 8% to 14%, mildly color-deficient aviators may have difficulty in recognizing color signals. Blue-blocking lenses have been found to produce mild color discrimination losses in normal color vision subjects and severely reduce color discrimination in severe color deficient subjects.
- Sunglasses should not be worn at night. Light levels at night are critical to good vision. Some photochromic lenses only lighten to 20% to 46% light transmission, and some non-photochromic lenses remain at 10%. At these light transmittances, reduced vision can occur at night or in low light levels.

Sunglasses are important protective devices for aviators. Studies have shown that reduced night vision can result from continued exposure to intensive glare. Sunglasses can reduce visual fatigue, thereby reducing the possibility of pilot error. However, pilots should be aware that certain lenses can reduce their visual performance in specific flight environments—and increase the potential for accidents.

If you are unsure of the parameters of a particular tinted lens, ask an optical dispenser or your eye doctor. ■

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Are You Ready for METAR?

(The Upcoming Meteorological Code Change)

by Dan Gudgel

The advent of flight in the United States at the turn of the century brought about a coinciding and incipient development of aviation meteorological services in the 1930's. The aeronautical meteorological codes in use today by the National Weather Service (NWS) for the domestic United States evolved because of limited transmission speed on teletype systems. However, different codes evolved for the remainder of the world, resulting in two sets of aeronautical meteorology codes.

The Aviation (Surface) Weather Observation (SAO) and Terminal Forecast (FT) products use the North American aviation meteorological codes while the remainder of the world uses the Aviation Routine Weather Report (METAR) and Terminal Aerodrome Forecast (TAF) formats, respectively. With the deregulation of the air transport industry, rapid expansion in the 1980's, and subsequent operational changes, air commerce dictated the standardization of aeronautical meteorological codes.

The North American codes used in the SAO and FT formats have long been a favorite airman test item for the Federal Aviation Administration (FAA) as the information they contain contributes to the assurance that airmen will be able to conduct a safe flight (FAR § 91.103, "Preflight Action").

Although the North American aeronautical meteorological codes have experienced only minor changes through the past 60 years, new codes will be implemented in the United States on January 1, 1996—resulting in major changes.

These code changes are not occurring overnight, and they are not limited to North America. On July 1, 1993, several changes were implemented:

1. Two hundred fifty landing rights airports in the United States had their Aviation Weather Observations converted by computer software to the new METAR code for international dissemination. The change is transparent within North America, but international air transport interests are able to receive the product using the new METAR code.

2. The world aviation community switched from the "old" METAR and TAF codes to the "new" METAR and TAF code.

3. The approximately 80 internationally-required TAF's issued by the NWS began to use the new TAF code format.

4. Other international aviation forecasts for part of the North Atlantic, Gulf of Mexico/Caribbean area, and Pacific routes were prepared in the new METAR and TAF code form, i.e., weather abbreviations and contractions.

So what has this all to do with aviation within the United States? The changes in aeronautical meteorological codes which only impact those in the international community currently will come to fruition for the "domestic" community on January 1, 1996! The weather information gathered by meteorologists, pilots, and other related interests will see the following occur at that time:

1. The United States will convert completely to the new METAR and TAF codes. The unique North American observation and forecast codes will no longer be used.

2. Other U.S. domestic aviation forecasts will convert to the new METAR and TAF code form, i.e., weather abbreviations and contractions found in TWEB's, Area Forecasts, etc.

The accompanying figures provide a comparison between the TAF/METAR codes as opposed to the North American FT/SAO codes for aviation forecast products and aviation weather observations. Providing you with the current codes format, Figures 1 and 2 depict updated information commonly seen on the venerable "key card" describing NWS Aviation Weather Forecasts and the Manual Aviation Weather Observation code. (Note: This card now specifies "Manual" Aviation Weather Observations differentiating from the automated surface observations coming on-line.) Figures 3 and 4 reflect the new TAF/METAR code format and associated decoding.

KEY TO AVIATION WEATHER FORECASTS

TERMINAL FORECASTS (FT) contain information for specific airports. They are issued 3 times a day, amended as needed, and are valid for a 24 hour period. The last six hours of each period is covered by a categorical forecast indicating that VFR, MVFR, IFR, or LIFR conditions are expected. Terminal forecasts are written in the following form:

Airport Identifier: 3 or 4 alphanumeric characters.
Date And Valid Time Period Of Forecast: Z or UTC.
Message Type: RTD (Delayed), COR (Corrected), or AMD (Amended).
Ceiling: Identified by the letter "C" prefix.
Cloud Heights: In hundreds of feet above the airport (AGL)
Cloud Amount: CLR (Clear), SCT (Scattered), BKN (Broken), OVC (Overcast), or X (Obscured).
Visibility: In statute miles (6+ indicates unrestricted).
Weather & Obstruction To Visibility: Standard weather / visibility symbols used.
Surface Wind: In tens of degrees and knots. Omitted when less than 6 knots. Gusts indicated by a G followed by maximum speed.
Ceiling And Visibility Categories:

Category	Ceiling (feet)		Visibility (miles)
LIFR	less than 500	and / or	less than 1
IFR	500 to 1000	and / or	1 to 3
MVFR	1000 thru 3000	and / or	3 thru 5
VFR	more than 3000	and	more than 5

Example Of Terminal Forecast:
DCA 221010 10 SCT C18 BKN 5SW— 3415G25 OCNL C8 X 1/2 SW.
12Z C50 BKN 3312G22.
04Z MVFR CIG..

Decoded Example: Washington National Airport for the 22nd of the month valid from 10Z to 10Z. Scattered clouds at 1000 feet, ceiling 1800 feet broken, visibility 5 miles in light snow showers, surface wind 340 degrees at 15 knots, gusts to 25 knots. Occasional ceiling 800 feet, sky obscured, visibility one-half mile in moderate snow showers. By 12Z becoming ceiling 5000 feet broken, surface wind 330 degrees at 12 knots, gusts to 22 knots. The categorical outlook for the last 6 hours beginning at 04Z calls for marginal VFR conditions due to ceiling.

AREA FORECASTS (FA) provide an 18-hour synopsis of expected weather patterns; a 12-hour forecast of VFR cloud cover, weather and visibility; and a 6-hour categorical outlook. FAs are prepared 3 times a day (4 times a day in Alaska and Hawaii) and are supplemented and updated by SIGMETs, AIRMETs, and by FA amendments. Heights in the FA are above mean sea level (MSL) unless stated as above ground level (AGL). Ceilings (CIG) are always AGL.

WIND and TEMPERATURE ALOFT FORECASTS (FD) are 6, 12, and 24-hour forecasts of wind direction, speed, and temperatures for selected altitudes to 53,000 feet MSL at specified locations. Direction is relative to true north rounded to the nearest 10 degrees. Speed is in knots. Temperatures aloft (in degrees Celsius) are included with wind data for all but the 3000-foot MSL level and those levels within 2500 feet of the ground. Temperatures above 24,000 feet MSL are always negative. Winds at other locations and intermediate altitudes can be obtained by interpolation.

Example of Winds Aloft Forecast:

FT	3000	6000	9000	etc.
ACY	2925	2833 + 02	2930 — 03	etc.

Decoded example: For Atlantic City, N.J., at 6000 feet MSL wind from 280 degrees true at 33 knots, temperature 2 degrees Celsius.

IN-FLIGHT ADVISORIES of potentially hazardous weather and include SIGMETs, CONVECTIVE SIGMETs, AIRMETs, and Center Weather Advisories (CWA). **SIGMETs** warn of hazardous conditions of importance to all aircraft i.e., severe icing or turbulence, duststorms, sandstorms, and volcanic ash. **AIRMETs** warn of less severe conditions which may be hazardous to some aircraft or pilots. SIGMETs are issued as needed. AIRMET bulletins are issued routinely and supplement the Area Forecast (FA). **CONVECTIVE SIGMETs** are issued hourly for thunderstorms in the conterminous U.S. **Center Weather Advisories**, issued as needed, are detailed advisories of conditions which meet or approach SIGMET or AIRMET criteria.

Example Of Sigmet:
SIGMET OSCAR 2 VALID UNTIL 052100
KS NE
FROM PWE TO OSW TO LBL TO PWE
SVR TURBC BLO 60 XPCD DUE TO STG NWLY FLOW BHD CDFNT.
CONDS CONTG BYD 2100Z.

Decoded Example: SIGMET OSCAR 2 is valid until 2100Z on the 5th day of the month. For Kansas and Nebraska from Pawnee City VORTAC to Oswego VORTAC to Liberal VORTAC to Pawnee City VORTAC. Severe turbulence below 6000 feet expected due to strong northwesterly flow behind a coldfront. Conditions continuing beyond 2100Z.

TRANSCRIBED WEATHER BROADCASTs (TWEB) are continuous broadcasts of recorded NOTAM and weather information prepared for a 50-nautical mile wide zone along a route and for selected terminal areas. TWEBs are broadcast over selected NDB and VOR facilities and generally contain a weather synopsis, in-flight advisories, route and/or local vicinity forecasts, Winds Aloft Forecasts, current weather reports, NOTAMs, and special notices.

U.S. DEPARTMENT OF COMMERCE — NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION — NATIONAL WEATHER SERVICE 4/14/93

Figure 1

KEY TO MANUAL AVIATION WEATHER OBSERVATIONS

LOCATION IDENTIFIER, TYPE AND TIME OF REPORT	SKY CONDITION AND CEILING	VISIBILITY, WEATHER, AND OBSTRUCTIONS TO VISION	SEA-LEVEL PRESSURE	TEMPERATURE AND DEW POINT	WIND DIRECTION, SPEED AND CHARACTER	ALTIMETER SETTING	REMARKS AND CODED DATA
MCI SA 0758	15 SCT M15 OVC	1R — F	132	/58/56	/1807	/993/	R01VR20V40

LOCATION IDENTIFIER:
3 or 4 alphanumeric characters (airport identifier).
TYPE OF REPORT:
SA = Scheduled record (hourly) observation.
SP = Special observation indicating a significant change in one or more of the observed elements.
RS = SA that also qualifies as an SP.
USP = Urgent special observation (tornado).
TIME OF REPORT:
Coordinated Universal Time (UTC or Z) using 24-hour clock. Example: 2255 = 10:55 pm.
SKY CONDITION AND CEILING:
Sky condition contractions are for each layer in ascending order. Numbers preceding contractions are base height in hundreds of feet above ground level (AGL). Sky condition contractions are: (— = Thin).
CLR = Clear: Less than 0.1 sky cover.
SCT = Scattered: 0.1 to 0.5 sky cover.
BKN = Broken: 0.6 to 0.9 sky cover.
OVC = Overcast: More than 0.9 sky cover.
— X = Partially obscured. 0.9 or less of sky hidden by precipitation or obstruction to vision (cloud bases at the surface).
X = Obscured: entire sky hidden.
A letter preceding height of a layer identifies a ceiling and indicates how ceiling was obtained.
E = Estimated. **M** = Measured.
W = Vertical visibility into obscured sky.
V following height = variable ceiling.

VISIBILITY:
Reported in **statute** miles and fractions.
V = Variable.
WEATHER & OBSTRUCTIONS TO VISION:

A	Hail	**GF**	Ground fog
D	Dust	**ZR**	Freezing rain
R	Rain	**BD**	Blowing dust
F	Fog	**SP**	Snow pellets
S	Snow	**BN**	Blowing sand
H	Haze	**SW**	Snow showers
K	Smoke	**BS**	Blowing snow
IF	Ice fog	**T**	Thunderstorm
L	Drizzle	**T+**	Severe thunderstorm
IP	Ice pellets	**RW**	Rain showers
IC	Ice crystals	**IPW**	Ice pellet showers
SG	Snow grains	**ZL**	Freezing drizzle

— = Light. (no sign) = Moderate. + = Heavy.
SEA-LEVEL PRESSURE:
Pressure in hectopascals (millibars): Shown as 3 digits. Leading 9 or 10 and decimal point is omitted. Examples: 150 = 1015.0 950 = 995.0
TEMPERATURE AND DEW POINT:
Reported in Degrees Fahrenheit (°F).
WIND DIRECTION SPEED & CHARACTER:
Direction in tens of degrees from **true** north, speed in knots. **0000** = calm. **G** = gusty. **Q** = squall. Peak speed of gusts in the past ten minutes follows G or Q. **WSHFT** in Remarks = windshift occurred at time indicated. Example: 3627G40 = 360° at 27 peak gusts 40 knots.

ALTIMETER SETTING:
Actual altimeter setting with first digit omitted. Examples: 005 = 30.05" 992 = 29.92"
RUNWAY VISUAL RANGE (RVR):
RVR is reported for some stations. Value(s) during 10 minutes prior to observation are given in hundreds of feet. Runway number precedes RVR report. **V** = Variable.
DECODED REPORT:
Kansas City Int'l Airport: Record observation completed at 0758Z. 1500 feet scattered clouds, measured ceiling 2500 feet overcast, visibility 1 mile, light rain, fog, sea level pressure 1013.2 hectopascals, temperature 58° F, dewpoint 56° F, wind 180°, 7 knots, altimeter setting 29.93". Runway 01 visual range varying from 2000 to 4000 feet in the past 10 minutes.
PILOT REPORTS (PIREPS):
A PIREP describes actual in-flight conditions. Pilots are encouraged to provide PIREPS to an FAA facility. **Example:** UA /OV FRR 275045 /TM 1745 /FL330 /TP B727 /SK 185 BKN 220 280 BKN 310 /TA-53 /WV 290120 /TB LGT-MDT CAT ABV 310. **Decoded:** Pilot report, Front Royal VORTAC, 275 radial 45nm, at 1745Z, flight level 330; Boeing 727; cloud base 18500 broken, tops 22000, second layer 28000 broken, tops 31000; air temperature minus 53 degrees Celsius; wind 290 degrees 120 knots; light to moderate clear air turbulence above 31000.

NOAA/PA 93055

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Figure 2

For example, the Manual Aviation Weather Observation for Pittsburgh, PA, is first listed in the North American SAO code, and then in METAR. For familiarity, practice reading the SAO and then check with the decode card. Take a brief look at the following codification in the METAR format for the same observation.

North American

PIT SA 1955 M10 OVC 3/4TRW 103/65/61/2215G25/992/R22LVR27

METAR

METAR KPIT 1955Z 22015G25KT 3/4SM R22L/2700FT TSRA OVC010CB 18/16 A2992

While not covering every nuance of the new METAR code, I make specific references to some of the more pronounced differences between it and the North American code:

- While the Station Identifier and Time groups are still listed first, subsequent weather observation parameters in the METAR have been altered in their presentation.
- Within the METAR the Wind Group utilizes five digits, with additional digits/alphanumeric characters for gusts. Rather than listing the wind direction as only two digits (rounded to the nearest 10 degrees), the METAR gives the full three-digit wind direction. The next two digits represent the wind speed with the units listed as "KT" for knots. For example, a wind from 220 degrees at 15 knots with gusts to 25 knots is encoded as "22015G25KT".
- The units of the observed weather parameter are listed in most cases in the METAR whereas none are given in the North American SAO, e.g., "3/4" denotes three-quarters statute mile visibility in the SAO while METAR lists it as "3/4SM". The reason for this is that the U.S. and Canada use English units of measure, whereas the rest of the world uses metric. Therefore, the unit of measure used is noted to avoid possible confusion.
- METAR Runway Visual Range (RVR) is listed next to the prevailing visibility rather than in Remarks.
- No longer will the Current Weather be limited to two characters. Four characters describe the type of precipitation and/or current weather along with a symbol for intensity, e.g., "TSRA" means a thunderstorm with moderate rain is occurring at the station.
- The Cloud Amount and Height is listed together within a six-character group, e.g., "OVC010CB" denotes that the sky condition is overcast, the base of the clouds is at 1,000 feet above the station, and the cloud type is cumulonimbus.
- The Temperature and Dew Point group is listed as 18/16, respectively, and it is in degrees **Celsius** rather than degrees Fahrenheit. Below zero temperatures will be preceded by the letter "M".
- Rather than encoded as only a three-digit group, the altimeter setting lists all four digits *and* is preceded by the letter "A", e.g., an altimeter setting of 29–92 inches of mercury is encoded as "A2992".
- Sea Level Pressure is *not* reported in the METAR.
- Any subsequent Remarks are designated by "RMK" preceding the information.

KEY to NEW INTERNATIONAL AERODROME FORECAST (TAF) and NEW AVIATION ROUTINE WEATHER REPORT (METAR)

TAF
KPIT 091720Z 1818 22020KT 3SM -SHRA BKN020 FM20 30015G25KT 3SM SHRA OVC015 PROB40 2022 1/2SM TSRA OVC008CB FM23 27008KT 5SM -SHRA BKN020 OVC040 TEMPO 0407 00000KT 1SM -RA FG FM10 22010KT 5SM -SHRA OVC020 BECMG 1315 20010KT P6SM NSW SKC

METAR
KPIT 1955Z 22015G25KT 3/4SM R22L/2700FT TSRA OVC010CB 18/16 A2992

Forecast	Explanation	Report
TAF	Message type: TAF-routine and TAF AMD-amended forecast, METAR-hourly and SPECI-special report	METAR
KPIT	ICAO location indicator	KPIT
091720Z	Issuance time: ALL times in UTC "Z", 2-digit date and 4-digit time for TAF, 4-digit time for METAR	1955Z
1818	Valid period: first 2 digits begins and last 2 ends forecast	
22020KT	Wind: first 3 digits mean true-north direction, nearest 10 degrees, (or VaRiaBle;) next 2 digits mean speed and unit, KT, (KMH or MPS); as needed, Gust and 2-digit maximum speed; 00000KT for calm; (for reports only, if direction varies 60 degrees or more, Variability appended, e.g., 180V260)	22015G25KT
3SM	Prevailing visibility: in U.S., Statute Miles & fractions; above 6 miles in TAF Plus6SM. (Or, 4-digit minimum visibility in meters and as required, lowest value with direction)	3/4SM
	Runway Visual Range: R; 2-digit runway designator Left, Center, or Right as needed; "/"; Minus or Plus in U.S., 4-digit value, FeeT in U.S., (usually meters elsewhere); Variability (and tendency Down, Up or No change)	R22L/2700FT
-SHRA	Significant present, forecast and recent weather: see table	TSRA
BKN020	Cloud amount, height and type: SKy Clear, SCaTtered, BroKeN, OVerCast; 3-digit height in hundreds of feet; and either Towering CUmulus or CumulonimBus. Or Vertical Visibility for obscured sky and height "VV004", or unknown height "VV///". More than one layer may be forecast or reported. CLeaR for "clear below 12 thousand feet" at automated observation sites.	OVC010CB
	Temperature: in degress Celsius; first 2 digits, temperature "/" last 2 digits, dew-point temperature; below zero reported with Minus, e.g., M06	18/16
	Altimeter setting: indicator and 4 digits; in U.S., A-inches and hundredths; (Q-hectoPascals, e.g., Q1013)	A2992

Figure 3

KEY to NEW INTERNATIONAL AERODROME FORECAST (TAF) and NEW AVIATION ROUTINE WEATHER REPORT (METAR)

	Supplementary information for report: (Wind Shear in lower layers, LanDinG or TaKeOFf, RunWaY, 2-digit designator; REcent weather of operational significance.) ReMarK: Automated Observation or AOAugmented; wind shear; recent weather and time; and TORNADO, FUNNEL CLOUD, WATERSPOUT.	
FM20	FroM and 2-digit hour: indicates significant change	
PROB40 2022	PROBability and 2-digit percent: probable condition during 2-digit beginning and 2-digit ending time period	
TEMPO 0407	TEMPOrary: changes expected for less than 1 hour and in total, less than half of 2-digit beginning and 2-digit ending time period	
BECMG 1315	BECoMinG: change expected during 2-digit beginning and 2-digit ending time period	

Table of Significant Present, Forecast and Recent Weather - Grouped in categories and used in the order listed below; or as needed in TAF, No Significant Weather.

QUALIFIER

Intensity or Proximity

- Light "no sign" Moderate + Heavy

VC Vicinity: but not at aerodrome; in U.S., 5-10SM from center of runway complex (elsewhere within 8000m)

Descriptor

MI Shallow	BC Patches	DR Drifting	TS Thunderstorm
BL Blowing	SH Showers	FZ Supercooled/freezing	

WEATHER PHENOMENA

Precipitation

DZ Drizzle	RA Rain	SN Snow	SG Snow grains
IC Diamond dust	PE Ice pellets	GR Hail	GS Small hail/snow pellets
UP Unknown precipitation in automated observations			

Obscuration

BR Mist	FG Fog	FU Smoke	VA Volcanic ash
SA Sand	HZ Haze	PY Spray	DU Widespread dust

Other

SQ Squall	SS Sandstorm	DS Duststorm	PO Well developed dust/sand whirls
FC Funnel cloud/tornado/waterspout			

Explanations in parentheses "( )" indicate different worldwide practices. Ceiling defined as the lowest broken or overcast layer, or the vertical visibility. Automated Observations may be Augmented manually for certain weather phenomena. TAFs exclude temperature, turbulence and icing forecasts and METARs exclude trend forecasts. Although not used in U.S., Ceiling And Visibility OK replaces visibility, weather and clouds if: visibility is 10 kilometers or more; no cloud below 1500 meters (5000 feet) or below the highest minimum sector altitude, whichever is greater and no cumulonimbus; and no precipitation, thunderstorm, duststorm, sandstorm, shallow fog, or low drifting dust, sand or snow.

March 1993
NOAA/PA 93054

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration—National Weather Service

Figure 4

In addition to the changes listed above in METAR, the TAF incorporates new "Change Groups" such as From (FM), Probability (PROB), Temporary (TEMPO), and Becoming (BECMG) rather than Occasional (OCNL), Chance (CHC), or Slight Chance (SLGT CHC) as currently used in the FT.

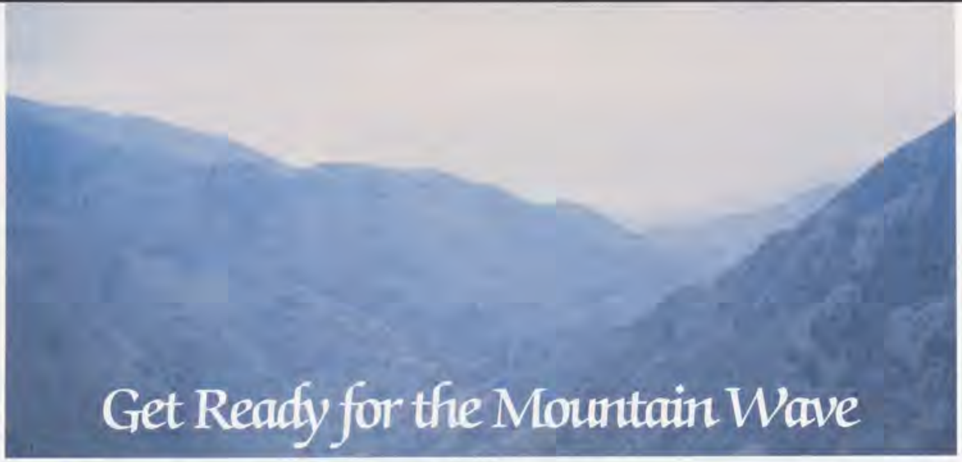
Keep in mind that change has already come to the world meteorological community regarding the new codes but the United States and the remainder of North America are being given another two-plus years to prepare. I encourage attendance at any FAA Accident Prevention Program where the TAF/METAR codes will be presented as well as studying the figures presented in this article.

Complete information regarding the TAF/METAR codes is published by the World Meteorological Organization in WMO Handbook No. 782, *Aerodrome Reports and Forecasts; A User's Handbook to the Codes*, dated 1992. It can be ordered for $16, plus $5 for shipping and handling from the American Meteorological Society, 45 Beacon Street, Boston, MA 02108; Attention: Publications Order.

Figures 3 and 4 are available as a free, informational key card. This card can be ordered through the Government Printing Office, Washington, DC 20402. Refer to NOAA/PA 93054, "Key to New International Aerodrome Forecast (TAF) and New Aviation Routine Weather Report (METAR)," dated March 1993. The card is also available from any NWS Office. In addition to the NWS, the FAA Accident Prevention Program will be printing these "TAF/METAR" cards for distribution. Airmen publications which will contain TAF/METAR codes in the near future are the *Airman's Information Manual* and the upcoming revision of *Aviation Weather Services*, AC–00–45D.

While agreeing that this change will cause transition difficulties because of the re-education it requires, the U.S. aviation community is already closely aligned with the international aviation community in several domestic aviation programs. The end result of the implementation of this "standard" meteorological code will be to continue to closely tie the United States aviation community to the world through this vehicle of common interest, the weather.■

Mr. Gudgel works for the National Weather Service in the Aviation Services Branch, NWS Headquarters, Silver Spring, MD. He has been an active participant in the FAA's Accident Prevention Program since 1979, where he began working with the program in the Fresno, CA FSDO. Most recently he works with the Baltimore, MD FSDO. A professional pilot and flight instructor with ASEL, AMEL, Instrument—Airplane, Rotorcraft—Helicopter, he is also a Designated Pilot Examiner (Gliders) and holds an agricultural pilot certificate from the state of California.



Get Ready for the Mountain Wave

by Ken Medley

A couple of years ago a friend of mine washed and waxed his airplane and got ready for a flight to Ohio. He had not made that trip before, but he had looked forward to it for a long time. Finally, with charts and a thorough preflight, he was ready to head west. Flying through clear skies at 6,500 feet, it was a magnificent trip. The air was smooth. Visibility was great.

Then the airplane began to descend, a little at first, then a lot. The pilot added power, raised the nose, then increased the pitch some more.

By now the pitch angle was very high, the engine at full throttle, and the stall warning horn buzzing. Yet, the airplane continued *descending* at an alarming rate. Needless to say, my friend was experiencing a high level of anxiety. Full throttle, stalling, descending. What next? Turbulence—rough air of the roughest kind.

All of a sudden, the air became smooth again. The descent stopped, but now the airplane began to rise. The pilot had not changed the pitch angle or the throttle setting, so the airplane was shooting up at a high rate of climb.

What was happening? Going up so very fast after going down so fast was equally scary. And that rough air was rough indeed!

For the pilot who has never heard of the mountain wave, this is an experience to remember. The *Airman's Information Manual* (AIM) states, "Many pilots go all their lives without understanding what a mountain wave is. Quite a few have lost their lives because of this lack of understanding."

But the mystery is not really so great. The surprise of encountering the wave with no previous understanding is enormous. No wonder my friend—or any pilot experiencing it for the first time—felt frightened.

On the other hand, glider pilots understand mountain waves and actually seek them out because they provide the energy for staying aloft for long distances and periods of time. Glider pilots in the area west of Washington, DC, have been able to remain flying for many hours, and some have used mountain waves to travel as far away as Tennessee and return.

Understanding Mountain Waves

To avoid this scary experience in an airplane, it is only necessary to understand the nature of mountain air. For the pilot who is knowledgeable, the signs are clear. You can anticipate where the wave is, you can deal with the problems it presents, and you can avoid the high anxiety that comes with experiencing it the first time. Some pilots think it can be fun.

The cause of mountain waves is simple. As stable air moves generally west to east at a speed of 15 knots or more, and as it encounters a mountain range either broadside at an angle of up to 30° and blows upslope, the air rises then drops off on the other side of the mountain. When the rising air reaches the top of the slope, it continues to rise above the height of the slope. This creates the updraft at the top of the range and beyond the ridge, where the air then begins to sink.

The air rising along the upslope is generally smooth, but it turns into a turbulent downdraft as the air passes over the crest of the ridge. For many miles downwind, the air undulates between updraft and downdraft. In the mid-Atlantic area, for example, the airplane flying east to west over the mountains generally experiences the downdraft pressures and turbulence first. Then, as the airplane passes over the ridge, it experiences the updraft motion. Going the other way, the pilot encounters smooth air first, then severe turbulence.

This encounter can be frightening because of the character and strength of the mountain wave. It may provide more downdraft and more updraft than many pilots have ever imagined or experienced.

The severity of the turbulence is intensified by an increase in wind speed. The wave will start to occur with the wind blowing up the slope about 15 knots, but the really big bumps occur with greater wind speed. With wind up to about 50 knots, the turbulence is tremendous, and the pilot gets a really *exciting* ride.

The rotary motion of the wave also creates great turbulence. As the wind starts down on the leeward side, a rotary motion occurs, the air tumbling forward, tucking under, and then back up and on its way again. This rotary motion is generally present underneath an altocumulus standing lenticular (lens-shaped) cloud.

On the downwind side of the mountain range, the wave extends for many miles. In the Rocky Mountains, satellite pictures have shown waves extending as far as 700 miles. In the east along the Appalachian chain, where the mountains are not so high as in the west, the wave has been measured for 100 miles or more.

It is less dangerous to approach the mountain wave from the upwind side, i.e., from the west in the northern hemisphere. First, you encounter the updraft and smooth air. Approaching from the leeward side, the pilot is wise to allow extra terrain clearance of at least 1,000 feet. As you approach the ridge from the east, you first experience the downdraft and bumpy air. At altitudes too close to the top of the ridge, you risk the possibility of being driven down into the terrain. The AIM warns, "Never expect an updraft when approaching a mountain chain from the leeward. Always be prepared to cope with a downdraft and turbulence." The AIM continues, "When approaching the mountain range from the downwind side, it is recommended that the ridge be approached at approximately a 45° to the horizontal direction of the ridge."

If severe turbulence is experienced, reduce to maneuvering speed, trim, and fly away from the downdraft or rough air. Above all, avoid flying too close to terrain.

How to Spot the Mountain Wave

There are often visible signs showing where the mountain wave exists. With sufficient moisture in the air, lenticular clouds form at the wave's crest. These clouds appear downwind from the crest of the range and appear not to move. Moisture laden air cools as it rises, forming clouds; the descending air warms again, and the cloud evaporates. Hence, the cloud appears stationary, but it is actually continuously forming, dissipating, and reforming.

Diagram (top) shows the rotary motion of the wave. Lenticular clouds form at the mountain wave's crest. They are also known as roll clouds.(bottom)

Lenticular clouds in very strong winds may form further downwind, and their spacing marks wave length. These clouds also show the stability that provides the best soaring opportunities. In very unstable air thunderstorms may also form in the area downwind from the mountain range.

Remember this: Turbulence in mountain waves can be violent. Watch for the signs. Always exercise caution. Remember, too, that standing lenticular clouds are not always present, but when they exist, they point out the turbulence. In dry air there may be no clouds, but the turbulence will be there anyway.

Finally, mountain wave is more common in the relatively stable air of fall and winter than it is during summer thunderstorm season.

For your next flight near mountain ridges, do some extra careful planning, noting the wind speed and direction so you can anticipate a mountain wave. The only "wave" you want to experience is in the football stadium. ■

You may read more about mountain waves in the AIM and in Advisory Circular (AC) 00-6A, "Aviation Weather." The AIM and AC 00-6A can be purchased from the Superintendent of Documents, Government Printing Office, Washington, DC 20402-9325; call 202 783-3238 to verify prices.

Mr. Medley is a Designated Pilot Examiner, a long-time Accident Prevention Counselor, and a teacher on the AOPA-Air Safety Foundation's Flight Instructor Refresher Program. He also edits Accident Prevention, a safety newsletter published by FSDO-27 for pilots in the Washington, DC, area. This article originally appeared in the newsletter's Fall 1992 issue.

Flying Over Niagara

by Rolfe Dinwoodie and Dave Fosdick

Niagara Falls is one of the scenic wonders of the world. The 182-foot waterfall is a magnificent sight to behold, and tourists from around the globe come en masse to view this natural wonder. To see the falls from perhaps the most spectacular perspective, sightseers often take to the air with the local helicopter or fixed-wing operators who offer tours of the area.

The general aviation pilot also has the unique opportunity to view this sight from the aerial perspective, which provides a look at the overwhelming beauty of the American Falls and the Canadian Horseshoe Falls. This perspective also offers a view of the huge hydroelectric generating facilities that provide power for most of the northeastern U.S. and Canada.

Scenic areas, such as Niagara Falls, attract many different types of aircraft operations requiring the pilot to prepare properly for the flight and to use extra vigilance when flying to assure the safety of his or her aircraft. A great potential for an accident exists when a pilot forgets his or her responsibilities to fly the aircraft and focuses, instead, more on the view!

On September 29, 1992, a tragic mid-air collision occurred over Niagara Falls between two experienced helicopter tour operators and resulted in four fatalities. This accident focused attention on the problems of operating aircraft over a scenic area where air traffic is concentrated over a small geographic area. Since the airspace above Niagara Falls is divided between Canada and the U.S., and the accident involved aircraft from both countries, FAA and Transport Canada established a Joint Commission to review the manner in which all operations were conducted in this area.

The Commission's goal was to establish operating procedures for the scenic tour operators, as well as transient aircraft, that would ensure safety while not restricting the view. The problems facing the Commission involved resolving the differences in operating regulations between the two countries and maintaining access for the tour operators who carried thousands of passengers monthly. The transient aircraft (general aviation, military, and air carrier) wishing to view the area also had to be accommodated within an area of approximately three square miles. The investigation revealed that while recommended procedures had been published for years both in Canada and the U.S., a great number of the users were not operating within these guidelines; therefore, a serious potential for an accident existed. As a result the Joint Commission developed a change in both the airspace and the operating rules over Niagara Falls.

As shown in Figure 1, the airspace is divided by an international border and, therefore, a uniform airspace definition is required. Transport Canada governs the majority of the airspace, and they have established a cylinder of airspace encompassing a two-mile radius from the surface to 3,500 feet MSL. Transport Canada has designated it as Class F airspace, which is similar to our Restricted Areas. This Class F designation prohibits aircraft from operating in that area without authorization from Transport Canada. Since Class F airspace does not exist in the U.S., the FAA established a Temporary Flight Restriction on the U.S. side of the border, pending the establishment of a permanent airspace restriction through the Federal rulemaking process.

The Scenic Tour Operators

Because the number of passengers carried by both U.S. and Canadian tour operators, tour operators have been given the authority to conduct flights within the Class F airspace, subject to the following restrictions:

- A tour route has been established with specific entry and exit procedures.
- The tour route requires limitations on the number of aircraft using the system at any one time to assure vertical and horizontal separation.
- Speed restrictions, weather limitations, communications procedures, and special aircraft markings have also been established.
- In addition, any U.S. operator must be certificated under FAR Part 135 to carry passengers for hire within the restricted airspace below 3,500 feet MSL.
- All operators must provide specific training and route checks to their pilots to ensure uniformity of safety.

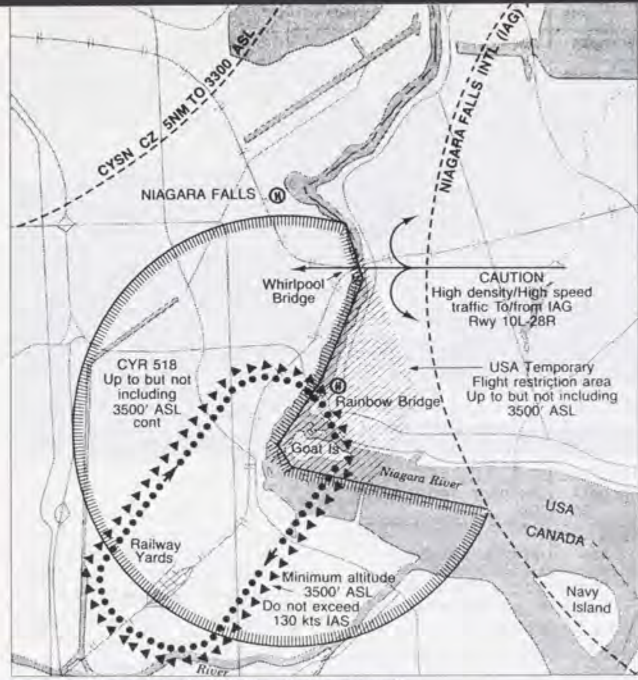


Figure 1—Enlargement of CYR 518 as shown in Figure 2.

The Transient Pilot

For the transient pilot, a racetrack pattern, different from the scenic tour operator's route, has been established at a minimum altitude of 3,500 feet MSL to provide a good view of the falls. This recommended pattern (Figure 1)—along with speed restrictions, altimeter setting procedures, and communication procedures—provides a standardized flow for general aviation, military, and air carrier aircraft in this area.

As you can see, the airspace over the scenic Niagara Falls area can be quite congested. With as many as six helicopters, as well as numerous transient aircraft, operating within a one square-mile area one can understand that altitude separation as well as established flight paths are a necessity. Pilots need to maintain their vigilance for other traffic and have a thorough knowledge about the area before they enter it.

The transient pilot should consider the following before operating at Niagara Falls to ensure that the flight is conducted safely:

- All scenic flight operations are conducted under visual meteorological conditions (VMC) and visual flight rules (VFR). There is no air traffic control in this area and the "see and avoid" rule applies to all aircraft in the area, whether you are operating in the scenic flight pattern or just flying through the area to another destination.
- Refer to the current ***VFR*** charts. The current Detroit Sectional Chart clearly indicates the location of the Class F airspace, designated as CYR 518 (Figures 2). IFR charts may not provide the pilot with adequate information about this airspace when operating VFR.
- Refer to the current *Airport/Facility Directory*, Northeast volume in the Special Notices Section which

Figure 2

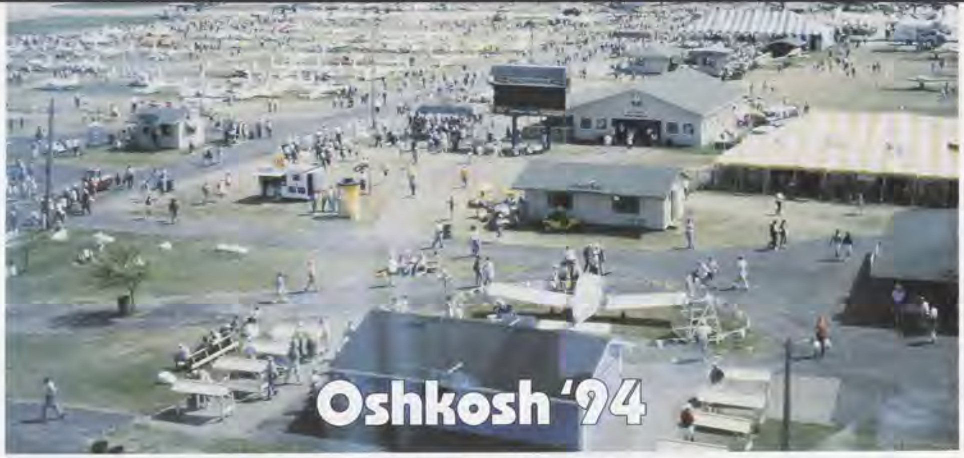
clearly depicts the CYR 518 area as well as the Temporary Flight Restriction in the U.S.

- During your preflight briefing for Buffalo/Niagara Falls, be sure to get current NOTAM's that may affect your flight in the area. Paragraph 5-3 of the *Airman's Information Manual* states that once NOTAM's are published in the biweekly Notice to Airmen Publication (NTAP), they are not provided during pilot weather briefings unless "specifically requested by the pilot."
- Be aware that with the potential for an accident/incident in this area because of the high density of air traffic, Transport Canada routinely monitors activity within CYR 518 and is aware of any violations of the restricted airspace. When viewing Niagara Falls by air, you will be flying in Canadian airspace, and you must be aware of Canadian regulations.
- When flying to the Niagara Falls area at or above 3,500 feet, you will be operating in Class E (U.S.) airspace and must maintain appropriate clearances from clouds. Niagara Falls Tower/ATIS is six miles away, and they can provide information on cloud heights and other weather in the area.

With proper preflight preparation and good scanning techniques when aloft, the pilot will be able to safely show his or her passengers one of the greatest natural wonders of the world.

Fly safely! ■

Mr. Dinwoodie is an Aviation Safety Inspector-Operations in the Rochester, NY FSDO, and Mr. Fosdick is the Accident Prevention Program Manager there. Our thanks to Rochester FSDO Manager James Siegman for suggesting the article and for Mr. Dinwoodie's and Mr. Fosdick's time in its preparation.



Oshkosh '94

by H. Dean Chamberlain, *Associate Editor*

The FAA NOTAM for the 1994 Experimental Aircraft Association (EAA) Convention and Fly-In has been released. The "Oshkosh '94" NOTAM outlines the special air traffic control (ATC) operating procedures for all aircraft flying to or from the Oshkosh area during the dates of the Convention. The special ATC procedures for the Oshkosh area are effective from July 26 through August 3, 1994. Pilots are urged to contact their local flight service station (FSS) for complete NOTAM information and to obtain a copy of the NOTAM. The following safety extracts provide an overview of the more common operating procedures and general safety procedures.

The NOTAM has specific instructions for various type aircraft such as Warbirds, ultralights, helicopters, seaplanes, and aircraft with and without radios. Due to the expected volume of air traffic in the Oshkosh area, all pilots planning on flying to the Convention need to review the NOTAM and become very familiar with its procedures before they enter the area.

Once at Oshkosh, pilots can visit the FSS office in the FAA Safety Center on the Convention grounds near the control tower for complete departure information when they stop to obtain their departure briefing and to file their flight plans.

The FAA's goal during the Convention is the safe arrival and departure of all airmen, aircraft, and visitors. The following safety procedures are some of those listed in the NOTAM that will help ensure the safety of all at Oshkosh.

En route safety alerts

Chicago O'Hare Class B airspace now extends up to 10,000 feet MSL. Aircraft operating below 14,000 feet MSL shall not file flight plans through Chicago Approach Control (ORD) airspace. An acceptable routing around ORD is JVL, V128, IKK, V144, MAPPS, V156, GIJ.

Wittman Regional Airport Director's Special Notice

1. Light aircraft (under 6,250 lbs.) will be required to exit runways onto turf areas as soon as practical. Be alert and use caution for hazards marked with cones and/or flags. All movement on other than paved runways and taxiways is at pilot's own risk. All mishaps, incidents, or accidents must be reported to the FAA's flight standards district office, NTSB, a sheriff's deputy, or Wittman Regional Airport personnel.

2. Be alert for taxiing aircraft in all aircraft parking areas.

3. For safety purposes, absolutely no running engines or taxiing will be permitted during hours of airport closures.

4. Pedestrians are strictly forbidden from paved runways, taxiways, and the air carrier ramp at all times. Do not walk across runways.

5. Observe all fire prevention rules. No campfires or stoves are permitted near aircraft.

6. Contact law enforcement or Wittman Regional Airport personnel with any airport safety related questions. Thank you for your cooperation.

7. Aircraft landing during peak saturation periods may be asked to depart if no parking spaces are available.

8. New taxiways have been constructed. Watch for white or orange runway threshold markings.

9. Bicycles and motorcycles are forbidden in the airport movement area.

10. Absolutely no alcoholic beverages are permitted outside the terminal building.

11. Contact the FBO for hard surface parking and fueling information. Basler's telephone number is 414 236-7827. Unicom 122.95.

Airport Closure

1. Wittman Regional Airport will be closed to all arriving aircraft from 8:30 PM CDT until 7:00 AM daily.

2. Wittman Regional Airport will be closed to all departing aircraft from 8:30 PM CDT until 5:30 AM daily.

3. The airport will be closed periodically due to parking saturation and aerobatic demonstrations.

4. Arrivals and departures are not permitted during periods of aerobatic demonstrations.

5. No aircraft movements are permitted during airport closures, unless prior permission has been granted by the Wittman Regional Airport management. For permission you can contact the Airport Director, Wittman Regional Airport, 525 20th Avenue, Oshkosh, WI 54901. Telephone 414 424-0092.

6. Runways 4/22 and 13/31 will be closed to landing and takeoffs at least seven (7) days before and during the EAA Convention. Do not takeoff or land on Runways 4/22 or 13/31.

Reduced arrival and departure separation standards

A waiver has been issued reducing arrival and departure separation standards for Category I and 2 aircraft (primarily single engine and light twin engine aircraft). Departing pilots are reminded to monitor FAA frequencies for departure instructions. Departures off Rwy 9/27 monitor frequency 121.75, Departure off Rwy 18L/R or Rwy 36L/R monitor 118.9.

If landing clearance appears unsafe because of spacing, speed of preceding aircraft, or any other reason, the pilot should advise the controller, or go around, then a new sequence will be issued.

VFR SPECIAL TRAFFIC MANAGEMENT PROGRAM

VFR crossing of Lake Michigan

Pilots planning to fly across Lake Michigan to or from Oshkosh VFR should plan on flying at least 4,000 feet AGL (approximately 4,800 MSL) to ensure adequate emergency radio reception on 121.5. At altitudes lower than 4,000 feet AGL there are significant areas of the lake without good radio reception. At or above 4,000 feet AGL reception is almost complete over the entire lake.

VFR arrival procedures for radio-equipped aircraft

1. All aircraft must use the VFR arrival procedures. Remain clear of all depicted high density traffic areas.

2. Obtain ATIS on 125.8, before 35 miles from Oshkosh.

3. Monitor Oshkosh approach on 120.7 before turning inbound over Ripon.

4. Enter transition over Ripon.

5. Proceed single file via the railroad tracks toward FISK.

6. All traffic shall maintain 90 knots and 1,800 feet MSL. If unable, maintain 135 knots and 2,300 feet MSL.

7. Listen for controller instruction as you approach FISK, "traffic to follow, etc." Controller will use color and type of aircraft at FISK. [FISK can be identified by railroad track/road intersection, large granary, white strobe lights, and controller staff at mobile trailer on hill north of town.]

8. Pilots should vigorously rock their wings to acknowledge ATC instructions, and refrain from verbal responses unless requested.

No-radio (NORDO) aircraft

Any pilots flying into Wittman Regional Airport during the convention period without an operating two-way radio are required to print/type the pilot's name and signature, aircraft type, aircraft color, identification number, address, and the word "NORDO" on a post card and mail it to:

E.A.A. Aviation Center
P.O. Box 3086
Oshkosh, WI 54903-3086
ATTN: NORDO Aircraft Procedures

Postcards must be received no later than July 14, 1994. You will receive an authorization and NORDO card. Place the NORDO card in the windshield of the aircraft when you land at Oshkosh to indicate to the EAA flagpersons or FAA controllers your intentions to taxi to parking or taxi for takeoff. The authorization returned to you will be your ATC authorization to arrive/depart Wittman Regional Airport without a radio. The postcard indicates that you have read and understand all the procedures contained in the "1994 Experimental Aircraft Association Convention and Fly-In" NOTAM. Pilots have the responsibility to pick up the NOTAM. You are required to carry your no radio authorization card with you. No-radio operations are strongly discouraged due to the heavy volume of traffic. Postcards will be returned with FAA approval. Call 414 426-4800 if your approval is not received in a reasonable time.

No-radio arrivals

No-radio aircraft must use Runways 18L/36R as the primary runways (or when traffic dictates, Runways 18R/36L). The use of any other runways due to extreme wind conditions requires prior approval by Oshkosh tower 414 424-8000. Be alert for glider, rotorcraft, and ultralight operations on the southwest corner of the airport (west of Runways 18R/36L) from sunrise to 0900 and 1830 to 2015. Use extreme caution if there has been any rain within the previous 24 hours.

No radio arrivals landing Runway 18L/36R, do not cross Runway 18R/36L, until receiving a clearance from an FAA controller wearing a pink shirt/ vest.

No radio arrivals are prohibited after 1100 (a.m.) Central Daylight Time daily from July 26 through August 3, 1994.

Note: Do not make an approach to, or land on any runway when strobe light flashers on top of control tower are operating. Remain well clear of all departure courses and final approach courses until strobe are turned off.

Display NORDO card in windshield after landing.

Conditions NORDO ATC authorization is based upon

1. Weather minimums of a ceiling of at least 1,500 feet and visibility of five miles (5) or better.

2. This authorization is NOT valid if the flashing white strobes or airport rotating beacon, located on top of the control tower is illuminated. These lights indicate an emergency, accident, or other traffic conditions exist which preclude no-radio operations. If these lights are on, remain clear of the Class D airspace. When the situation is resolved, the lights will be turned off and no-radio operations will resume in accordance with this authorization.

3. Pilots must exercise extreme caution and be alert for other no-radio aircraft landing and other aircraft making fly-bys (closed traffic), (fly-bys or low approaches will only be conducted on Runway 18L/36R by EAA pilots who have been briefed and authorized to conduct such operations). Absolutely NO fly-bys or low approaches will be conducted by any aircraft without an appropriate briefing.

4. Runway 18R/36L will be used for some inbound traffic from FISK.

5. No-radio aircraft must use Runway 18L/36R as the primary runway, or

Don't forget to stop by.

when traffic dictates Runway 36L/18R. When landing 18L/36R and parking in the area west of the runway, plan a midfield turnoff—hold short of 18R/36L. Look for the FAA controller wearing a pink shirt to wave you across. Expedite clearing the landing runway.

OSHKOSH AREA IFR SPECIAL TRAFFIC MANAGEMENT PROGRAM

Effective July 26 through August 3, 1994, a special traffic management program will be in effect daily, at Oshkosh from 0700–2030 CDT (1200–0130 UTC). At other reservation airports the time period is 0600–2030 CDT (1100–0130 UTC). Chicago ARTCC will assign arrival times for each IFR flight arriving the OSH area. Pilots will be issued a code that must be included in the remarks section of the flight plan. The OSH area is defined as a 30 nautical mile (nm) radius of the OSH VOR and includes the following airports: [OSH] Oshkosh, Wittman Field; [ATW] Appleton, Outagamie County; [FLD] Fond du Lac; and [8D1] New Holstein.

Reservations are not required for ATW arrivals filing the following routes: TVC V420 GRB ATW; HIC V26 GRB ATW; MKG V450 GRB ATW; RHI GRB ATW; DLH GRB ATW; or GEP GRB ATW.

IFR reservations

1. Beginning July 24 through August 3, 1994, arrival reservations may be obtained two calendar days in advance of arrival July 26 through August 3, 1994, by calling: 1–800–FAA–SAFE, in Canada call 708 897–5959. Calls will be accepted between 0500–2159 CDT (1000–0259 UTC). This number is only for reservations not information.

2. Adherence to arrival times shall be within 5 minutes before to 15 minutes after the assigned time of arrival in order to avoid substantial delays.

3. VFR (on top) will not be accepted to the OSH area. Air files and/or changes of destination to OSH or any other reservation airport (see above) will not be accepted.

4. Pilots/users will be required to give the following information to acquire a reservation:

- **A.** Destination airport.
- **B.** Date of arrival.
- **C.** Time of arrival at destination in UTC.
- **D.** Call sign of aircraft to be flown.
- **E.** Departure airport (fuel stop if last point).
- **F.** Estimated time en route

5. Flight plans shall be filed at least 4 hours in advance and shall include the reservation code in the remarks section. Use of the preferred routes listed in the NOTAM is encouraged.

6. A reservation does not reserve/-guarantee a landing or a parking spot if the destination airport is at capacity. It does allow IFR access into OSH.

Seaplane Operations

The Vette Seaplane Base, 5 miles southeast of Oshkosh on the west shore of Lake Winnebago will be operational July 26 through August 3, 1994, from 8:00 AM to 6:00 PM.

1. Seaplane arrivals are to follow the routes shown in the NOTAM. When over Lake Winnebago, pilots are to descend to a safe altitude to avoid the traffic pattern for Runway 27 at OSH.

2. Do not use the VFR arrival transition over Ripon and do not contact Oshkosh tower. During the afternoon airshows (see schedule on page 2 of the NOTAM) the Oshkosh airport is closed to inbound and outbound traffic, therefore, it will be necessary to land outside of the boundary of the OSH Class D airspace and taxi to the base.

3. To orient yourself, fly a pattern from north to south at 600 feet AGL with a left turn out. Landing and takeoff patterns will be at the discretion of the pilot. Avoid flying low over boats and cottages. Pilot briefings are mandatory prior to local flights or departures.

4. Operators are authorized to deviate from the two-way radio communication requirements specified in FAR § 91.129(C) for arriving and departing at the 1994 Experimental Aircraft Association Convention.

5. Radio frequency for the Vette Seaplane Base is 123.3, however, a radio is not required to operate into or out of the base. Boats are available to take you to and from your aircraft.

6. Larger aircraft may anchor in the bay next to the lagoon.

7. Amphibian aircraft have a special parking area at the convention site. It is located south of the Antique/Classic area west of Runway 18R/36L.

8. No flying under 600 feet AGL over the bay except to take off and land.

9. Taxi slow in bay near lagoon. Expect heavy traffic entering and leaving lagoon.

10. No take off or landing in the lagoon.

11. Contact Vette Seaplane Base on 123.3 for water conditions.

12. Be alert for warbirds operating from Fond du Lac to Oshkosh at 2,800 feet.

Ultralight approach and departure information

1. Ultralight operating hours are from sunrise to 0900 and 1830 to 2015. Operations from 0900 to 1800 require approval from Ultralight Headquarters.

2. Ultralights should remain clear of Runway 18/36.

3. Ultralight pattern is clockwise for landing to the southeast.

4. Departing traffic has the right of way.

5. Do not overfly houses, livestock, people, etc., closer than 500 feet vertically.

6. Be alert for aircraft inbound from FISK entering a left base for Runway 36. Be alert for aircraft arriving and departing the Oshkosh area.

7. Compliance with the ultralight procedures outlined in the Oshkosh 94 NOTAM waives the requirements of FAR § 103.17.

This is only some of the information listed in "Oshkosh '94" NOTAM. Pilots need to contact their local FSS for complete details including appropriate flight diagrams and charts. All pilots must use current and appropriate IFR and VFR charts. Have a safe and fun-filled fly-in. ■

AirspaceCORNER

As a follow-up to the letter and response in the FlightFORUM section in the January/February 1994 issue of the *FAA Aviation News* concerning Class E extensions to a Class C or D surface area, we wish to clear up a minor technical error.

The paragraph that started off with "what does all that legalese mean?" contained a typographical error and may have caused some confusion. What we meant to say, in plain English, is this:

The Class D airport, being the weather reporting point, may be IMC, but the Class E extension is not automatically IMC. Please don't confuse IMC with IFR! IMC is instrument meteorological conditions, meaning that the weather conditions are less than 1,000 foot ceiling or visibility is less than 3 miles—or both—at the reporting point, in this case, the primary airport. IFR refers to instrument flight rules, or simply put, the rules for operating your aircraft when certain conditions exist.

As you know, there is no communication requirement for VFR flight in Class E airspace. If you can fly through the Class E airspace at or above 1,000 feet AGL while still maintaining both the required cloud separation and visibility requirements, you can do so without communicating with the tower. The really important thing to remember is that FAR § 91.155(c) talks about operating VFR beneath the ceiling within the lateral boundaries . . . with the emphasis on the BENEATH THE CEILING.

For example, let's say the primary airport reporting the weather has a reported ceiling of less than 1,000 feet AGL, and you want to depart a satellite airport and leave the area VFR. The weather at the satellite airport (which just happens to be inside the Class E surface area, which is really just an extension of the Class D airspace) is clear and a million. Do you need a Special VFR (SVFR) clearance? Absolutely! Here's why. FAR § 91.155(c) talks about operating VFR beneath the ceiling within the lateral boundaries, etc., again with the emphasis on the BENEATH THE CEILING. The Class D airspace is IMC, requiring IFR operations, and the Class E extension, which is, in reality, just an extension of the Class D airspace, is there to support and protect IFR operations when the Class D airspace is IFR, thus logic dictates that you need a clearance inside of the Class E extension.

You would need a Special VFR (SVFR) clearance to operate into, through, or at the airport in the Class E surface area because the primary airport reporting the weather has a reported ceiling of less than 1,000 feet AGL. You can, however, operate over the top of the ceiling (with adequate cloud clearance) in the Class E extension without talking to the tower. But remember, with regards to the class D airspace, you would also need a SVFR to operate into, out of, or at the primary airport under VFR rules as long as the ceiling was at or below 1,000 feet AGL. You still need to talk to the tower within the lateral and vertical limits of the Class D airspace even if you fly over top of the ceiling.

G. S. Livack

FAA AVIATION NEWS welcomes comments from its readers. We may edit letters for style and/or length. We will select a representative letter from those on the same topic for publication, and because of our publishing schedule, responses may not appear for several issues. We will not print anonymous letters, but we will withhold names or send personal replies upon request. Address: Editor, FAA AVIATION NEWS, AFS–810, Washington, DC 20591. FAX 202 267–9463.

• Circadian Rhythms

"Flying Safely at Night" (FAA Aviation News, October 1993) contains a wealth of information for pilots planning night operations. However, one item of great importance that was not covered concerns proper rest and circadian rhythms.

Circadian rhythms relate to many functions within the human body in relation to the normal sleep/wake cycle. When these rhythms are disrupted by periods of night flying, at times when the pilot would normally be asleep, the consequences can be disastrous. Periods of inattention, or microsleeps, are likely to occur unknown to the pilot. Extended periods of night flying, or switching between day and night flights, can have a severe effect upon the pilot's body and his or her health in general.

The NASA-Ames Research Center has studied this area of pilot performance for many years and quantified the degradation of pilot performance in night operations. Their research has shown that pilots cannot even reliably report on how tired they really are during night operations. A pilot who reports being wide awake may be ready to fall into a microsleep at any moment.

All pilots should be aware of the probability of their own degraded performance when flying at night and take steps to address this issue. Proper rest, a gradual shift to night operations, and limiting duty and flight times at night are all important to flight safety in night operations.

Fleet K. Smith III
Independent Pilots Association

• Oops!

Editor's Note: We humbly apologize to John Hemmes for omitting his name on page 24 of the March 1994 issue. The last paragraph of the first column should have read, "For further clarification, see the copy of my article, 'Squawk 7600,' reprinted from the FSDO–1 *Communicator* [the newsletter of the Bedford, MA, Accident Prevention Program Manager, JOHN HEMMES." John was just referred to as "name."

By the way, John is the author of the article, "Descent to the MDA or DH and Beyond" on page 14.

InstrumentCorner

Seldom does a *FlightForum* question and answer generate the reader response as our answer in the November-December 1993 issue about IFR loss of communications procedures. Because of the interest in this issue, we are expanding *Instrument Corner* to publish the various letters and our response.—***Editor***

• IFR Loss of Communications Procedures

The Instrument Corner feature in the Nov./Dec. 1993 magazine provides an incorrect interpretation of FAR § 91.185(c)(3). As your own magazine correctly points out in the Sept./Oct. 1991 issue, if the clearance limit is the destination airport (which is the case 99.9% of the time) FAR § 91.185(c)(3) does not apply. Your most recent answer assumes the clearance limit is a fix from which the approach begins or a fix prior to that point. Again, this is rarely the case.

Stan Wolf
Hayward, CA

Your answer is incomplete. It assumed that the clearance limit was the IAF, which has rarely been my experience. I have almost always been cleared to the destination airport, in which case FAR § 91.185(c)(3), "Leave clearance limit," would not apply. I have asked several controllers about this, and every one replied something to the effect of, "(Expletive)! Don't hold! Get out of my airspace as quickly as you can!"

Mark A. Bennett
Salt Lake City, UT

The response regarding NORDO procedures is in error and should be corrected without delay because of the additional hazard it creates. The statement "In other words . . . touchdown at your ETA" does not comply with FAR § 91.185(c)(3) regarding when to leave the clearance limit, and commence descent or descent and approach.

In reviewing references, it appears that the information contained in the Airman's Information Manual (AIM) conflicts with that found in FAR §§ 91.153(a)(6), 91.169(a)(1), and 91.185 (c)(3). FAR §§ 91.153(a)(6) and 91.185(c)(3) require flight plan data to include "estimated elapsed time over the first point of intended landing." Block 10 of the FAA Flight Plan form is labeled "EST. TIME ENROUTE." The AIM's Pilot/Controller Glossary defines "Estimated Time Of Arrival" and "Estimated Time En Route" in terms of "touch down" and "gate" time, and not as "Over the Destination Time" as required by Part 91!

The response given in the "Instrument Corner" says "plan to touchdown at your ETA;" the FAR require a different procedure. Unless the conflict described above is expeditiously resolved, NORDO aircraft may commence descent or descent and approach much sooner or later than expected by ATC!

At one time, Air Force Regulation 60-16 and related manuals contained specific and expanded guidance regarding the definitions and applications of ETE's and ETA's under VFR and IFR operations. Current civil aviation guidance appears to be somewhat incomplete, conflicting and confusing regarding ETE's/ETA's.

F. Kent Carter
Greensboro, NC

Regarding the NORDO issue, we believe the reason that the issue has caused confusion for some is that the FAR and current ATC practices do not exactly match. The FAR addresses pilot actions in a no radio and non-radar environment. It also does not address the fact that ATC routinely clears an aircraft to an airport rather than to an approach fix. In effect, the airport becomes the clearance limit. Adding to the confusion is the fact the military requires more specific clearance limits and information than civil aviation, and many pilots were trained under that system.

Another factor is the current ATC radar environment. As one correspondent points out, in a radar environment ATC will be clearing aircraft that it is in contact with out of the NORDO aircraft's way. But pilots must always remember that ATC can only control aircraft it has communication with. In a NORDO situation ATC only wants to get the aircraft on the ground safely and out of the system.

The problem is an IFR NORDO pilot must have a procedure that will work under all circumstances, including a non-radar ATC environment. FAR § 91.185 provides that basic framework. That FAR, combined with FAR § 91.3, "Responsibility and authority of the pilot in command" which allows a pilot to deviate from any FAR to handle an emergency, and good pilot judgment will handle most situations.

The letters we have received on this subject provide additional insight into the situation and may provide many hours of discussion. The important issue is each IFR pilot must be knowledgeable of and prepared for loss of communications at anytime (but usually when you want and need that radio the most). The time to learn the procedures is before they are needed.

A final comment on the subject is Bill English's comments (see "Instrument Corner," March 1994) that many of the loss of communication situations may not be equipment problems as much as the pilot's lack of knowledge as to how to use the equipment. A good reminder is for all pilots to review their aircraft systems as well as the AIM's review of loss of communication procedures and possible alternative ways of receiving ATC guidance. Carrying a portable transceiver or a basic aircraft frequency receiver aboard an aircraft is a great idea.

Rule Change for Two-Way Radio Communications

The FAA reinstated the requirement for pilots to establish and maintain two-way radio communications with operating airport traffic control towers (ATCT) in Class E and Class G airspace on March 11, 1994. The final rule was published in the March 11 *Federal Register* (59FR11692). The reinstated procedures are similar to the communication requirements that were in effect before adoption of the airspace reclassification rule on September 16, 1993. When the airspace reclassification rule became effective, the only communication requirement to contact operating control towers was at those airports located in Class B, C, and D airspace. Since then, the need to reinstate the old requirement for pilots to contact all operating control towers was identified because there were instances of control towers in Class E and even Class G airspace. Specifically, the new rule adds FAR §§ 91.126(d) and 91.127(c) requiring all aircraft to establish and maintain two-way radio communications with an ATCT when operating an aircraft to, from, through, or on an airport having an operational control tower in Class E or G airspace. In-bound communications must be established before four nautical miles from the airport up to and including 2,500 feet AGL. Also included in this final rule is new paragraph (c) to FAR § 91.130, Operations in Class C airspace, that explains and simplifies ATC's authorization procedure for pilots requesting a deviation from FAR § 91.130.

This final rule provides for radio failure under VFR and IFR conditions as well as allowing the ATC facility that has operational control over the airspace to waive the rule. These changes allow ATC to provide safer service to those persons operating in Class E and G airspace.

All-Ethanol Airshow

Aerobatic and formation flying will take center stage when the nationally known Vanguard Squadron performs at the first-ever Ethanol Airfest '94. Held in Sioux Fall, SD on July 10, 1994, this will be the first airshow in the world to feature acts performing on 100% ethanol aviation fuel.

The Vanguard Squadron features six RV-3A kit aircraft that have been converted to fly on pure ethanol. The conversions were simple, according to Squadron Leader Marv Randall. Essentially," he said, "all we did was increase the fuel flow in the injection system and as a result we've noticed an increase in power and performance."

The Vanguard Squadron flew their highly visible bright yellow aircraft at airshows and events all over the U.S. last year, including Oshkosh. "We've seen tremendous interest by the public since we've converted our planes to run on pure ethanol," Randall added.

The South Dakota Corn Utilization Council (SDCUC) characterizes ethanol, which can be created from corn, as "the premier aviation fuel of the future, but here today." SDCUC claims the following advantages of ethanol: generates more power and burns cleaner and cooler than gasoline, costs less than avgas, less toxicity, and less explosivity. FAA research on ethanol and other alternatives to leaded gasoline is on-going.

Ethanol Airfest '94 will be held July 10 at the Sioux Falls Regional Airport. There will be a $1 admission fee for adults to cover the cost of the acts. Any profit will go toward next year's Ethanol Airfest and to environmental organizations that support ethanol.

Any additional sponsors or interested acts should contact SDCUC at 605 361-2242.

TCAS and Unnecessary Altitude Crossing RA'S

Over the past two years, 16 coordinated encounters have occurred where TCAS II displayed unnecessary resolution advisories (RA) that directed pilots to cross through each other's altitudes. Each encounter involved two aircraft transitioning an altitude. At least one of the aircraft was a high performance aircraft with an automated capture capability. While these encounters typically occur at altitudes between 6,000 and 13,000 feet and between arriving and departing aircraft flying toward the same fix, some have occurred at high altitudes. Two of the 16 encounters occurred during the first week of February.

The problem is that TCAS has no knowledge of the flight intentions of aircraft. When aircraft in close proximity converge rapidly in altitude, TCAS will generate RA's even though these aircraft are safely separated by air traffic control and intend to level off with 1,000 feet of altitude separation. In addition, when the vertical rates are high, it is likely that TCAS will generate altitude-crossing RA's since the TCAS computer predicts that these RA's will provide the best altitude separation. Unnecessary altitude-crossing RA's are disruptive to ATC and flight operations.

Based on the analysis of these encounters the FAA's TCAS Program Office recommends that TCAS operators and ATC facilities take the following into account:

1. Controllers should be aware of the potential for TCAS II to issue coordinated altitude-crossing RA's when two TCAS-equipped aircraft are flying towards the same fix and transitioning at high rates to altitudes separated by 1,000 feet.

2. Pilots should comply with the vertical speed limitations prescribed in the *Airman's Information Manual* (AIM) during the last 2,000 feet of a climb or descent. In particular pilots should limit vertical speeds to 1,500 feet per minute during the last 2,000 feet of a climb or descent, especially when they are aware of traffic that is converging in altitude and intending to level off 1,000 feet above or below the pilot's assigned altitude.

3. Pilots should follow RA's unless they believe it is unsafe to do so or they have definitive visual acquisition of the other aircraft. If a pilot makes the decision to not follow an RA, he or she should be aware that the other aircraft may also be TCAS-equipped and may be maneuvering toward his or her aircraft in response to a coordinated RA.

4. When responding to an RA that directs a deviation from the assigned altitude, the flight crew should communicate this information to ATC as soon as practical.

5. Version 6.04A of the TCAS logic eliminates unnecessary altitude-crossing RA's when aircraft level off within 1,000 feet vertically of one another. Operators are encouraged to implement Version 6.04A as soon as reasonably possible.

Version 6.04A of the TCAS logic will be implemented in all TCAS II avionics units by the end of this calendar year. While Version 6.04A is being implemented, close attention to the corrective actions recommended above is essential.

Glasnost Continues in Aviation

Every airman knows what the FAR are, but have you heard of the FARR? Everyone in aviation knows what the FAA is, but do you know what the DAT is?

This isn't a quiz; it's an example of just how much the international situation has changed in the past few years. FARR stands for the Federal Aviation Regulations of Russia, and DAT is the Russian Department of Air Transport. And for the first time since the founding of the new Russian state, DAT and FAA officials held a formal Civil Aviation Flight Safety Conference to discuss technical and policy safety issues affecting the operation of each country's aircraft.

The meeting was held this past February at the FAA's Center for Management Development (CMD) in Florida. DAT and FAA were joined by Russia's ROSAERONAVIGATSIYA—its Commission for Air Traffic Regulation.

During the meeting Mr. Victor Gorlov, a Deputy Director of the DAT and other DAT officials gave detailed briefings on DAT's structure and received similar briefings from Flight Standards' Service Director, Thomas Accardi, and from other FAA officials. Both sides discussed approaches for assuring the highest practicable safety in domestic and international civil aviation operations. The Russians visited the Orlando, FL, FSDO, FlightSafety International and Gulfstream Aviation in Savannah, GA, and Embry-Riddle Aeronautical University in Daytona Beach, FL. They also did what everyone does after a significant accomplishment—they went to Disney World! Florida Congressman John Mica hosted a dinner for them and arranged for a tour of the new facilities at Daytona International Airport.

The technical discussions and facility visits enabled DAT representatives to gain a better understanding of how FAA approaches safety regulation in an established free market economy. The discussions also allowed FAA representatives to learn how DAT is approaching aviation safety regulation as Russia's civil aviation transitions into a free market civil aviation system with competitive airlines, commercial aviation organizations, privatized airports, and an emerging general aviation sector. The Russians also decided to use the FAR as the structural basis for their civil aviation regulations—hence the FARR.

As a result of this meeting, DAT and FAA formed a safety working group to meet twice a year—once in the U.S. and once in Russia—and to continue discussion of and work on mutual aviation safety issues. The growth in air travel and in overall civil aviation relations between Russia and the U.S. necessitated not only the February meeting but are the greatest reason for the continued discussions. Also, during the recent summit meeting between Presidents Yeltsin and Clinton, representatives from DAT, FAA, and ROSAERONAVIGATSIA signed a technical side agreement to the 1994 U.S./Russian Air Transport Agreement that called for an increase in safety cooperation among the three organizations.

The co-chairmen of the new working group are FAA's Flight Standards Aircraft Maintenance Division Manager Fred Leonelli and Evgeny Lobachev, from DAT's Airline Certification Department. The working group's first meeting is tentatively scheduled for late summer 1994 in Russia.

DAT and FAA officials also proposed that a "multi-organizational" conference be held, expanding the scope of the discussions beyond Flight Standards and Air Traffic into Aircraft Certification. The meeting would provide a forum for the exchange of information and better understanding of each other's functional relationships and overall responsibilities.

The first Civil Aviation Flight Safety Conference between the U.S. FAA and the Russian DAT accomplished a great deal toward mutual understanding between two of the largest civil aviation organizations in the world. But in the hospitality shown to and the friendships developed with the Russians during their visit here and FAA's visits to Russia are the real foundation of any international relationship.

U.S. FAA and Russian DAT attendees of the first Civil Aviation Flight Safety Conference

The Puzzle Winners Are...

Mr. Ron Drake, the Cleveland (OH) FSDO Accident Prevention Program Manager, said the following were winners of the *Pilot Puzzle* published in our January/February issue. We want to thank everyone who entered and especially Tim Lett and Ron Drake of the Cleveland FSDO for providing us the puzzle. We hope everyone enjoyed it. The winners are: Bud Rector, San Angelo, TX; Andrew Tron, Princeton, NJ; Bill Cornell, Houston, TX; Al Schnur, Coatesville, PA; Tim D. Coble, Des Moines, IA; Dick Weinberg, Aspen, CO; Roger W. Wilson, Bangor, ME; Tom Stanton, Napa, CA; and Daniel J. Stierwalt, Beaumont, TX.

The Ten Commandments of Aviation

I.
Maintain thine airspeed lest the earth rise up and smite thee.

II.
Inspect the quality of thy craft's propellant for it is surely the staff of life.

III.
Be thou vigilant for carburetor ice or the earth shall inherit thine machine.

IV.
Venture not into the cumulonimbus collections of the heavens lest they vex thine guardian angels.

V.
Observe the birds of the kingdom: They let not ice be upon their wings.

VI.
Land not with the wind at thy back for thou shalt surely dash thy machine against a stone.

VII.
Check the radiance of thy gear light for you know not the hour disaster cometh.

VIII.
Comply with the incantations of the tower priests lest chaos and destruction reign in the traffic pattern.

IX.
Sample not the fruit of the grape unless thine sandals are firmly planted upon the earth or verily you will become planted firmly in the earth.

X.
Invoke not the wrath of the FAA, for ye shall surely walk the halls of remedial training.

Provided by Jim Cooney, *APPM, Helena, MT*

U.S. Department
of Transportation

**Federal Aviation
Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

DO NOT DELAY—CRITICAL TO FLIGHT SAFETY!