FAA Aviation NEWS
May–June 1992
A DOT/ FAA FLIGHT STANDARDS SAFETY PUBLICATION

U.S. Department
of Transportation

Federal Aviation Administration

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The FAA's Flight Standards Service, General Aviation and Commercial Division, Accident Prevention Program Branch, AFS–810, Washington, DC 20591, publishes FAA AVIATION NEWS in the interest of flight safety. The magazine promotes safety in the air by calling the attention of airmen to current technical, regulatory, and procedural matters affecting the safe operation of aircraft. Although based on current FAA policy and rule interpretations, all printed material herein are advisory or informational in nature and should not be construed to have regulatory effect. The FAA does not officially endorse any goods, services, materials, or products of manufacturers that may be mentioned. **Certain details of accidents described herein have been altered to protect the privacy of those involved.**

The Office of Management and Budget has approved the use of funds for the printing of FAA AVIATION NEWS.

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The Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402–9371, sells FAA AVIATION NEWS on subscription. Use the self-mailer form in the center of this magazine to subscribe. Cost: $6.50 ($8.15 foreign) for one year; $13.00 ($16.30 foreign) for two years. Prices are subject to change by the Government Printing Office without prior notice.

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FORESTVILLE, MD 20747

FAA Aviation NEWS

May–June 1992

Volume 31, Number 3

FEATURES

DEPARTMENTS

On the Cover:
A Maule on floats lets its occupants enjoy the scenery. The versatile Maule is enhanced by the addition of water landing capability. Photo courtesy of EDO Corporation.

Helping Pilots Exercise their Water Wings

by Dean Chamberlain, Associate Editor

Seaplane Pilots Association

It is not every day in doing your job that you have the opportunity to benefit personally. This article on the Seaplane Pilots Association (SPA) just happens to be one of those assignments. How did I draw the assignment of writing about SPA? Last summer while on vacation I earned my single-engine seaplane rating at the 77-year-old Philadelphia Seaplane Base (PSB) in Essington, PA, featured in a recent *AOPA Pilot* article. (The small facility is located just off the west end of Philadelphia International Airport.)

I think my reasons for wanting the added rating were probably very similar to those of other prospective seaplane pilots. It was something different. It was an interesting challenge. And it allowed me to combine my love of the water with my love of flying. I think the movies may have also contributed somewhat to the rating. Who can forget Indiana Jones in the movie *Raiders of the Lost Ark* running towards the river yelling to his seaplane pilot, who was awaiting Jones' return by leisurely fishing from a float, to "Start the engine!" so both could escape from the hostile natives chasing Jones? In my best Indiana Jones imitation, I too may have had visions of someday exploring remote beaches and backwater areas by seaplane to look for lost treasure. At the very least I wanted to be able to taxi up to my own beach-front home like some lucky people do in Alaska, Washington, Florida, and some other states.

Okay, so I will never be a Harrison Ford, but from a more practical view point it was a lot cooler on a hot summer day doing "splash 'n go's" on the Delaware River than doing "touch and go's" on a hot, sun-baked, concrete runway in Virginia. The fact that the rating checkride served as a biennial flight review was an added benefit, since by not having to take a biennial flight review this year my training costs were effectively reduced. More important than saving training costs, though, was the fun I had learning to fly a little classic yellow Piper J3 *Cub* that was equipped with floats. It also felt good flying down the Delaware River knowing I had a "runway" below me measured in tens of miles rather than in hundreds of feet. An interesting point about seaplane flying most land-based pilots seldom think about is if the body of water you are going to land the seaplane on is large enough, there is no such thing as a crosswind landing. You simply turn into the wind.

These are only some of the practical reasons why learning how to fly a seaplane is fun, easy to do, and affordable. And besides, you never know when you may want to land on some remote river in search of lost treasure. But I am getting behind in my story on SPA.

One of the first things I discovered after getting my rating was the difficulty in finding seaplanes to rent. Unless you live in an area where seaplanes are a primary means of transportation, there may or may not be a seaplane base near

"...a little classic yellow Piper J3 Cub..." beached on a Delaware River shoreline. Cubs are popular primary seaplane trainers. This one is from the Philadelphia Seaplane Base in Essington, PA.

Photo by Dean Chamberlain

you. Then, if you do find a seaplane, you may not be able to rent it although you are appropriately rated. I was permitted to solo the *Cub* at PSB, but many seaplane schools will not let their own newly-trained seaplane pilots fly solo. In many cases as soon as the new seaplane pilot steps out of the checkride aircraft, that is the first and last time the pilot is PIC in one of the school's aircraft.

Another thing I discovered was the lack of available seaplane information for new pilots. Although the FAA discusses safe seaplane operations in its various flight training manuals, including articles in this magazine, (March–April 1991, and the article on page 4 of this issue, for example), I wanted additional information on how to fly seaplanes safely. Surprisingly, the best source I found is the subject of this month's article in our continuing special series on the FAA and the aviation industry. The Seaplane Pilots Association, dedicated to serving the special needs of seaplane pilots everywhere, is a great source of information on seaplane operations and seaplane safety. Like the other membership groups we have profiled in past issues, SPA works closely with the FAA in support of its members' special interests and needs.

Founded in 1972, SPA has served the world-wide needs of seaplane pilots and operators for the past 20 years. Its first president, Mr. David Quam, SPA Member Number One, set the tone for the organization that continues today. As stated in its literature, the Seaplane Pilots Association exists, "...to protect the water flying rights of all seaplane pilots by minimizing restrictions and opening new waters."

Collocated with the Aircraft Owners and Pilots Association at the Frederick Airport in Maryland, the Association's two full-time employees, Executive Director Robert (Bob) A. Richardson and Administrative and Editorial Assistant Mary A. Helton serve the daily needs of the Association's almost 5,000 members from all over the world. Supporting and guiding them are the Association's seven-member Board of Directors, two of whom represent AOPA's interests in the Association; the Association's member-elected President and Director, Mr. Kenneth E. Fulton, M.D.; its Vice President, Mr. Walter Windus; and SPA's 21 Field Directors, a group of dedicated seaplane pilots and operators who represent SPA interests throughout the United States and parts of Canada.

Photo by Dean Chamberlain

SPA Executive Director Bob Richardson and Administrative/ Editorial Assistant Mary Helton work hard for SPA's 5,000 members. SPA is collocated with AOPA in Frederick, MD.

In discussing the Association's various benefits, Bob said one of the most important services SPA provides its members is its information networking support. If a member has a seaplane-related question, either he or Mary will answer the question or refer the person to someone else who can.

Another point he made was that SPA is open to everyone interested in seaplanes. He said, "A SPA member does not have to be a seaplane-rated person." The only membership requirement is a sincere interest in the unique capabilities of seaplane flying. From the newest operator of an ultralight vehicle on floats (like that shown in our last issue's feature on the ultralight industry) to the most experienced seaplane pilot flying supplies up a remote fjord in Norway, all are welcome to join SPA.

But why should anyone join SPA? After all, pilots can find seaplane information if they look hard enough. And there are various government publications that contain information about seaplane landing areas and other regulatory information. For example, the FAA's *Airport/Facility Directory* includes information on seaplane bases as well as land airports. So why should anyone pay the current $32 annual membership dues to join SPA?

When asked, Bob was quick to point out the Association's dues have not increased in four years. Then, he pointed out the value of SPA membership. One important benefit is SPA's publications. They are especially valuable for the new seaplane pilot looking for "how to" information as well as the seaplane pilot flying cross-country looking for landing areas and services. One of the publications is the *SPA Water Landing Directory* which provides a detailed listing of seaplane bases, water landing areas, Customs information, and state, federal, and provincial regulations concerning seaplane operations in both the United States and Canada. All this information is packaged in one handy, spiral-bound 8 1/4 by 5 1/2-inch book that fits easily into your flight bag. When an operator provides diagrams or charts of the base, the *Directory* also includes them with the narrative descriptions. Not surprisingly, the *Directory* is known as the seaplane pilot's bible. Both members and non-members can purchase the *Directory*, but SPA substantially discounts it for members.

Quarterly, SPA produces and distributes to its members the *Water Flying* magazine. It features articles on safe operating information and techniques; general comments and news on seaplane flying and operations; camping information; updates to the *SPA Water Landing Directory;* and other information of interest to seaplane operators. As an advertising supported magazine, *Water Flying's* product and service ads serve as a good source of information on seaplane flying schools, aircraft, and other products of interest to seaplane operators and pilots. A special SPA membership benefit is free, non-commercial, classified advertising in *Water Flying* for seaplane-related products. Another important service the magazine provides members is its reporting of the latest news concerning seaplane bases and landing areas, pending legislation affecting seaplanes and their access to landing areas, and listings of many locally-sponsored seaplane fly-in events.

SPA also publishes the *Water Flying Annual* which is a full-color, 60-to-70 page magazine similar in format to the quarterly *Water Flying* magazine. One important feature of the Annual is its listing of seaplane flight schools, aircraft rental rates, type of aircraft available, ratings offered, and instruction costs. The listings also tell whether or not solo flight time is available at the various schools. When asked why some flight schools do not permit solo use of their aircraft, Bob said a review of the 1991 Annual's flight school listings of 67 schools showed only 20 schools that offered solo flying. He said most schools do not allow solo flying because of both the higher insurance costs for renter pilots and the potential loss of income while the plane is so engaged. Many seaplane schools are small one- or two-plane operations, and they make more money training pilots than renting aircraft, and many small schools cannot afford the higher insurance costs they would have to pay to allow a new seaplane pilot to fly solo. Furthermore, in the unlikely event of a solo accident, a small school could lose its entire training fleet. As we said earlier, in many cases, the only PIC time an aspiring seaplane pilot may log during training may be on the checkride or during subsequent recurrent training. SPA is constantly seeking ways to remedy this situation.

Not only does the cost of aviation insurance determine whether or not a new seaplane pilot can find a seaplane to solo, the potential high cost of aviation liability also directly affects SPA. One important point Bob wanted to make concerning SPA is that although the Association is the largest membership group dedicated to supporting the needs of seaplane operators, SPA does not sponsor fly-ins like some of the other membership groups featured in past industry articles. He said all of the seaplane fly-ins are sponsored locally. Although SPA cannot assume the liability of sponsoring fly-ins, the Association supports them in many other ways. Its magazines publish fly-in schedules and stories about them, and the Association mails out news updates and schedules about the events to other media. In addition to its promotional activities, SPA is a familiar presence in many of the larger fly-ins as a result of its meetings and other social activities. SPA also conducts public forums on the safe and courteous operation of seaplanes, so-called "fly neighborly" sessions.

And safe and courteous seaplane operations are important.

Since the dawn of aviation, seaplanes have played a vital role in areas where there is a lot of water or in those remote areas near water that do not have access to hard-surfaced airports. Today, seaplanes still serve the personal, recreational, and travel needs of many people. But the change from water-based air travel of the past to today's land-based aircraft in many parts of the country and the increased population growth in urban areas over the years have created some unique problems for seaplane pilots and operators that SPA is working hard to solve.

Like their general aviation counterparts, seaplane operators are feeling the restrictions of continued suburban growth. Although in many areas of the United States and Canada, seaplanes continue to have an unrestricted right to public waters, that right is not universal. In many areas seaplane access is restricted or even denied. And as more and more people want to live near the water and as the number of boaters increase, the special interests of both groups start conflicting with what was once the exclusive purview of the seaplane pilot. As a result of the constant threat of restricted access or even exclusion of seaplanes from public waterways, SPA works closely with local, state, federal and provincial government officials to prevent or remove current access restrictions on public waterways or at least to reduce their impact on seaplane operators.

One way SPA is involved in the equal access issue is through its efforts to increase awareness of the question of public access and responsibility. Both items are particularly important when talking about seaplane operations and SPA. Continued public access for seaplane operators and SPA membership means being a good neighbor both in the air and on the water. Because seaplanes are both air and water vehicles, seaplane pilots are bound by more rules than the average land-based pilot. As noted in the FAA's *Airman's Information Manual* (AIM), paragraph 7–76, Seaplane Safety, both the Federal Aviation Regulations (FAR) such as FAR § 91.115, Right of Way Rules; Water Operations, and the U.S. Coast Guard's Inland Navigation Rules apply to seaplanes when they are on the water. On the water a seaplane is governed by the nautical rules of the road the same as other watercraft. For example, not only must seaplane pilots be aware of any local noise restrictions, whether airborne or on the water, they must also be responsible when on the water because as the AIM states, "...as is the case with all vessels, you may be held accountable for any damage caused by your wake while taxiing." So, being a seaplane pilot involves more than just knowing the rules of the air. Seaplane pilots must also be good seamen. SPA helps promote good citizenship both in the air and on the water by providing its members with the information they need through its various publications, seminars, and activities.

In addition to the SPA membership benefits and services discussed, the Association offers its special, highly-rated seaplane hull and liability group insurance (one of its most valuable services for seaplane owners); discount rental car rates; some special AOPA service discounts; a wide range of SPA products such as shirts, mugs, and other products; plus other items for sale which include "how to" books and other seaplane-related publications such as Fred Hirschmann's photobook *Bush Pilots of Alaska*. For a complete listing of SPA benefits or products call or write the Seaplane Pilots Association. Its telephone number is (301) 695–2083; its FAX number is (301) 695–2375. The address for the Seaplane Pilots Association is 421 Aviation Way, Frederick, MD 21701.

For an interesting challenge contact your nearest seaplane base operator and learn to fly a seaplane. You just may have the "splash" of your life. Who knows; the next time you go fishing off your floats, you may look up to see that Indiana Jones needs your help. ■

Selected Seaplane Events

JUN 19-21 19th Annual Seaplane Seminar, Camp of the Woods, Speculator, NY. For additional information call (518) 548–4311 or SPA at (301) 695–2083.

JUL 31-AUG 6 Oshkosh '92, Oshkosh, WI. Contact Karen Feldner at (414) 426–4840. Brennands Seaplane Base Activities contact is John Eckert at (815) 385–7071. Amphib parking at Wittman Field contact is Randy Rhodes at (313) 698–1237. SPA Annual Corn Roast information is available from SPA at (301) 695–2083.

SEP 12-13 Greenville, Maine Fly-In. Call Moosehead Lake Region Chamber of Commerce at (207) 695–2702 for details.

Water and Flying Do Mix Well When Pilots are Aware

by Phyllis Duncan, Editor *(and seaplane pilot)*

EDO Corporation

A seaplane can take you many places that a landplane cannot. Seaplane pilots combine a love of flying with an enjoyment of water activities.

For a long time the very words "floatplane" conjured the image of a lone bush pilot from the far north whose fragile floating airplane was the only link to the outside world for those in remote areas. For aspiring landplane pilots, it seemed a romantic, adventuresome type of flying, taking an aircraft into places without the assistance of NAVAID's, into places where no other plane—or for that matter any other vehicle—had been able to reach. In the United States the place that best embodies this type of flying is Alaska, which has more seaplanes than any other state. Just one look at Lake Hood in Anchorage, inarguably the largest seaplane base in the world, will make a "lower 48" seaplane pilot feel like he or she has died and gone to seaplane heaven: There are seaplanes as far as the eye can see, all kinds, sizes, and configurations, and the successors of bush pilots still provide ambulance, supply, and other services to Alaskans.

We can emulate the bush pilot only somewhat in the lower 48, not for the purpose of carrying supplies or the mail, but mostly for the fun of it. Flying a floatplane opens for a nature-seeking pilot literally hundreds of thousands of landing areas over and above "civilized" seaplane bases or the few tens of thousands of land plane airports.

Indeed, 20 or 30 years ago, floatplanes could be flown into any inland body of water, and its occupants would likely encounter no other living being other than the indigenous fauna. This made an idyllic setting for weekend floatplane pilots in search of an outdoor adventure. Small lakes, streams, and rivers allow a pilot in a floatplane to get into places where cars and boats—much less landplanes—cannot reach.

Seaplane-rated pilots become seaplane pilots, for the most part, to combine two loves—the water and flying.

Seaplane pilots are mostly the not-so-famous, but we can count writer Richard Bach *(Jonathan Livingston Seagull)* and singer Jimmy Buffet *(Margaritaville)* among our ranks. The allure of seaplane flying is that one can wile away pleasant hours fishing from the floats or wading ashore for a family picnic or a hike. The ability to get off by one's self plus, yes, the elitism of a unique kind of flying are attractive to many. And a seaplane rating is a relatively easy one to add to a single-engine land certificate. The plane generally flies the same, handles the same in the air, and most of the instruction time deals with learning water landings, how to handle the plane on the water, and waterway rules. Addition of floats decreases the cruise speed, may change the stall speed (increase or decrease, depending on the aircraft and float configuration), and, of course, affects the total weight and the CG limitations. Typically, a person can add the seaplane rating (no written test required if you are already a land pilot) in roughly 10 hours or less.

Sounds almost too good to be true, and in some cases it is, lest we get carried away with the fun and forget a number of problems that can be associated with this kind of flying escape. Notable are flying into *waters that may be restricted* by state, local, or federal jurisdictions; *encountering unexpected boat traffic;* or *experiencing an aircraft disabling accident* in an isolated area. The floatplane pilot also has to contend with a whole host of man-made hazards: power boats, sail boats, windsurfers, water skiers, swimmers, powerlines, etc. Even though the airborne and waterborne recreants may be superficially aware of each other, the situation warrants extra vigilance, possibly more so on the pilot's part since the surface-going boater may be more concerned with looking out for others on his or her level. It might not occur to the boater to look *up*.

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Seaplane facilities can range from the full-service metropolitan seaplane base to a shack on an out-of-the-way river. Careful preflight planning is necessary to assure the splash-down site has fuel, oil, or maintenance available.

Waterway Restrictions

Unlike a few decades ago, pilots may encounter some problems in their adventuring flights. The Wilderness Act of 1964 prohibited seaplane flights into bodies of water in wilderness areas unless there was a history of such activity. Permission to use such waterways is based on the discretion of the U.S. Forest Service, that is, the Forest Service is the entity that determines whether or not an area has a history of seaplane flying. Its decision is also based on the nature of the wilderness area itself, e.g., is it a preserve for endangered or protected species? Thus, some areas may allow or even welcome seaplanes, and some may have their status changed without much warning. Furthermore, other national parks and forests not designated as wilderness areas but which are administered by the Army Corps of Engineers or the Forest Service may ban seaplanes or seriously restrict their activity. Even state or local governments may have rules and regulations for floatplane flying a pilot may not be readily aware of. For example, seaplanes may be restricted to a particular area of a municipal reservoir away from boat traffic or from residential areas (for noise abatement) or may be allowed to operate only during certain hours of the day. In extreme cases certain holiday weekends may be considered off limits to seaplane operations when boat traffic is exceptionally heavy.

It may seem impossible to keep track of all this information, but one organization certainly does. The Seaplane Pilots Association (SPA) (see the article on the p. 1) manages to keep track of not only available seaplane bases but also the places where seaplanes may or may not be restricted. Their *Water Flying Annual* and *Water Landing Directory* are sought-after items by seaplane pilots.

Hopping into one's seaplane and flying off for a weekend among the flora and fauna of the forest may have been a great way to get away from it all some years ago, but now there are nearly 32,000 airmen with seaplane ratings flying nearly 5,000 seaplanes, flying boats, or amphibians that must share the waterways with millions of commercial and recreational boats. Availing oneself of the possible restrictions at an intended landing area will prevent inadvertent endangering of yourself, your plane, your passengers, or those in a boat or in the water. It is also a better alternative than claiming ignorance of the law to a stern-faced park ranger or local deputy sheriff. If you are unsure of the jurisdiction over a particular body of water, check with the local FSS, state aviation authority, nearby municipality or county government, or your trusty *Water Landing Directory* or telephone the SPA for up-to-date information.

Boat Traffic

Pilots should certainly expect boats on the water (even though many boaters may not expect airplanes there) when approaching an area where docks are obvious, but the absence of docking facilities does not necessarily mean the absence of boats. Small boats may be anchored in a favorite fishing cove or slowly trawling while the occupants sunbathe or fish. Since it is likely they may not be looking for you and since you cannot accurately predict their actions, *expect* a stopped or slowly moving boat to speed up; anticipate that a moving boat may suddenly change direction. Water skiers are particularly hard to spot if they are in the water waiting for the tow boat to take off. (The same holds true for divers.) Water skiers also mean long tow lines that may be nearly invisible to the pilot from the air. Jet skis are small, highly mobile "mini-boats" that can literally appear out of nowhere. On approach to land or on takeoff always be prepared to abort to avoid a collision. The implications of a speeding airplane and speeding boat on a collision course are serious indeed. One way to avoid the possibility of such harrowing encounters is to consider using really busy waterways at off-peak times for most boaters—early morning or late afternoon.

Bodies of water in remote areas do not necessarily mean the absence of boats, though. Chances are for every seaplane pilot looking to get away from it all in a floatplane, there will be several ground-based adventurers as well.

Disabling Accidents

From the time the first floatplane flew (piloted by Henry Fabre in March 1910), natural obstructions have always been a problem. Rocks, sandbars, and floating debris have taken their toll of floats and hulls. Floatplane pilots learn to "drag" (pass at low altitude) a landing area to inspect it for obvious hazards, but in darkness or with murky water, it may be difficult to determine whether the water is deep enough for a safe landing or to spot jagged rocks or logs just below the surface.

Change of season can not only bring hazardous debris into waterways but can also alter the physical appearance of bodies of water. Spring run-offs and heavy rains can make rivers and streams wider and faster, lakes deeper and larger. The converse is true in winter or during periods of drought. With seasonal changes, ponds and lakes may appear and disappear. So-called seasonal lakes, whose comings and goings are regular and predictable, are indicated on sectional aeronautical charts, but the pilot should take terrain and weather factors in mind when planning a flight to any body of water, especially one off the beaten track.

Well-travelled waterways are charted for known hazards, locations of obstructions, service facilities, and water depths. Many floatplane pilots carry nautical charts with their sectionals for an extra measure of safety. But because bodies of water are in constant flux, the nautical charts will not show every possible hazard. The pilot's alert eyes must supplement.

Flying into out-of-the-way places presents another hazard. In the event of a mishap such that the seaplane cannot take off again, the pilot may find help is not close by. A pilot who has planned for an afternoon or, at most, a weekend flight may be ill-prepared to deal with the survival aspects after an aircraft disabling accident. There may not be any food except for the picnic lunch packed for the afternoon. A pilot who has not considered the possibility of an emergency may not have blankets or sleeping bags on board, for even though most floatplane activity is found in the spring, summer, and early fall, nights near bodies of water or in mountainous areas can get chilly.

Once the plane is down, unless the water is a wide open area, it may not be possible for an ELT signal to travel except in a narrow cone over the site. If the plane sinks, the ELT may be useless. If the water is surrounded by mountains, you may not be able even to radio for help, VHF equipment being line-of-sight. Filing a flight plan or letting someone know where you are going and when you expect to return is one way of getting a search started. Flares and other signalling devices (as well as an extra, portable ELT) are good items to keep on board the aircraft also.

Canada and Alaska, for example, have requirements for very specific survival gear to be carried on board all aircraft flying over sparsely populated areas. Among the equipment required is not only some means of catching food but also a stove, fuel, and eating utensils; matches, a compass, and an axe; mosquito netting and insect repellent; sleeping bags, tents or wing covers, and a survival manual; snow shoes, signalling mirrors, flares, and a flexible sawblade. Before you start calculating the weight and balance, there are few areas in the U.S. where this extensive type of survival gear is warranted. A few select items, like insect repellent, extra lines, flares, etc., not to mention having your passengers wear FAA-approved inflatable life vests, make excellent survival sense for water flying excursions. Also consider carrying extra hull plugs for amphibious seaplanes, as well as emergency float repair kits and a bilge pump.

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At application of takeoff power, the seaplane begins to plough taxi until it gets up "on the step" where the plane can accelerate while just barely on the surface of the water.


EDO Corporation

Addition of floats changes flight characteristics very little. The greater part of seaplane pilot training involves learning to handle the airplane on the water. In windy conditions you can even "sail" a seaplane.

Still, in spite of all the precautions, you may have to spend a day or two waiting to be rescued. And since it is unlikely that an aircraft repair station is conveniently located around the bend, you will have to make provisions—usually expensive—for salvaging the aircraft.

Even in an inflight emergency, the seaplane is not limited to water for a forced or precautionary landing. Floatplane pilots have put their aircraft down on land with little or no damage to the floats and/or injury to persons. Some have even managed to take off again if the area is long enough and wet enough. Even in off-water landings where substantial damage has occurred to the aircraft, the pilot and passengers have emerged unscathed: Those floats are great shock absorbers. The hollow floats act as energy-absorbing devices during a crash.

For the most part seaplane flying does not account for a major proportion of total general aviation accidents. Over a recent 27-month period, there were 109 accidents involved float-equipped or flying boat configured aircraft. Seventeen (16%) of those accidents were fatal with 30 fatalities. Actually less than half (51) of the total accident occurred on the water; eight of them were fatal with 10 fatalities. When you examine the causal factors, you find that seaplanes crash for the same reasons that landplanes do: fuel exhaustion, mechanical problems, weather, and pilot error. What stands out more than the lack of uniqueness of the accidents is the cost in aircraft. Of the 110 aircraft involved (one midair), 22 were total losses and 86 sustained substantial damage; only two suffered little or no damage. It is understandable, then, why insurance costs for seaplanes are a major concern to owners. Most insurance companies lump all types of water flying aircraft into a single category and charge everybody the same rate, regardless of the safety record. Some insurance companies have recognized this discrepancy and are writing different policies for straight floats, amphibs, and flying boats. They are also charging more appropriate premiums. (Check with SPA; they have a group hull and liability policy for their members.)

Seaplane flying is no longer a one person and the airplane into the wilderness adventure. Why, seaplanes have shown up in Baltimore, Maryland's Inner Harbor to the delight and interest of the spectators on and out of the water. In parts of Alaska and Canada, some primitive areas are still only accessible by seaplane. By and large, the days of dropping in on the first lake or stream that strikes one's fancy are over, and devoted seaplane pilots recognize that in an era of environmental consciousness we bear the responsibility of assuring that our environment is disturbed as little as possible by our recreation. Common sense makes everything safer—and more fun—for everyone involved. ■

***Editor's Note:** FAA's Flight Standards Service has prepared an Advisory Circular on another aspect of seaplane flying—briefing passengers on how to exit a capsized seaplane. This advisory circular should soon be available at Flight Standards District Offices.*

Right of Way Rules:

- The primary reference is FAR § 91.115, Right-of-Way Rules: Water Operations. FAR § 91.209, Aircraft Lights, requires aircraft anchored to have lighted anchor lights or anchor where these lights are not required. Because nautical authorities, like the Coast Guard, considers a seaplane a vessel once it is on the water, the seaplane pilot should be aware of nautical rules concerning the movement of vessels on the water. *Inland Rules of the Road*, published by the U.S. Coast Guard, is the boater's "bible" but may be a good reference for water-flying pilots, too.

There are, however, some unwritten "rules" for seaplanes.

- Since a seaplane in the water is not as maneuverable as one in the air, the aircraft on the water should have the right of way over one in the air, and one taking off should have the right of way over one landing.
- A seaplane that is sailing (where the pilot uses momentum and the wind to maneuver on the water with or without power) is subject to different considerations depending on how the pilot sails. Sailing without power, a seaplane is considered a "vessel under sail" and is subject to specific nautical rules. Sailing with engine power constitutes a "vessel under power," and the seaplane must adhere to the rules appropriate for powered craft.

How to Pass Your Next FAA Flight Test

Flying Skill and Proper Paperwork Mean Success

by Ronald D. Drake
Accident Prevention Program Manager
Cleveland Flight Standards District Office

Cartoon courtesy of Ron Drake

This newly "winged" aviator has a whole career ahead if the lurking pitfalls are avoided.

All of us must take a flight check from time to time, either from an FAA inspector, a company check pilot, or a designated pilot examiner. My goal is to help you to pass that flight test without even flying.

Fear of failure is probably one of the biggest fears we have, and the fear of failing a flight test is certainly no exception. The reason that some fail is not because they have a lack of knowledge or ability but because they were not properly prepared. If one fails to learn, then someone has failed to teach. It is the instructor's fault if the student lacks the knowledge or skill to pass the test. All of us flight instructors are guilty of this to some extent. In some areas we have all failed to teach everything that is necessary to fly in today's complex system.

The FAA now requires all first-time flight instructor applicants to take their practical tests with an FAA inspector. The reason was that surveillance and spot checks showed the FAA that the quality of instruction was lacking. Even though FAA's resuming these tests was a temporary burden to inspectors and applicants alike, the FAA is now responsible for assuring that aviation's first line—those who teach others to fly—when certificated, not only have the knowledge and skill to fly, but also the knowledge and sensitivity to teach.

Once FAA began administering initial CFI practical tests, in our area we found that a high percentage of the new CFI applicants lacked both the knowledge and the ability to teach to the minimum standards. As a result, an FAA-certificated flight school asked me to teach prospective CFI's how to pass flight tests. Since then I have found the knowledge, skill, and overall professional attitude among instructors have improved. I am sure this scenario has been repeated across the country. The FAA will continue to administer the initial CFI flight test; it is a quality control measure that was implemented to benefit everyone—FAA, instructors, students, and the public. That initial flight instructor practical test may be the FAA's *only* direct look at those who teach in our industry.

It is incumbent upon you as an applicant for any rating or certificate to be properly prepared. Technology today is more complex, and aircraft use rate is higher. Therefore, today's private pilot must know more than the commercial pilot needed to know as little as 15 years ago.

Just look at what technology has brought to the aviation industry in just a short time. Twenty years ago DME was the rage. We had a way to compute our speed, time, and distance by just turning a knob. What an innovation! Since that time we have implemented changes to our airspace, equipment, and the way we fly which have necessitated changes to our regulations. Today we have LORAN and Global Positioning Systems (GPS). Our rules have changed to adapt pilots to this new technology, e.g., FAA reduced the amount of flight time required to receive an instrument rating and instituted a new type of pilot certificate, the recreational pilot.

The one thing that will hinder your flight test probably more than anything else is your paperwork—or lack of it. Many think that the FAA has generated such a substantial amount of paperwork that it has created an unmanageable maze, difficult to navigate through. I hope I can dispel that myth.

There are really only three major paperwork areas that could hinder you from becoming certificated (excluding the written test): Endorsements, forms, and records. The inspector or examiner has to look at these three areas before the start of the examination.

Endorsements

Applicants have shown up for flight tests sans certificates and logbooks. Before solo a student pilot must complete a written test administered by the CFI, and the CFI must endorse the student pilot's certificate and logbook. Later, the CFI must also issue a solo cross-country endorsement. Remember, solo flight endorsements are good for only 90 days. Furthermore, if you change the type of aircraft for solo flight, the CFI must endorse the student pilot's certificate for that type aircraft.

Since April 1991, changes to FAR Part 61 now require endorsements for flight in tailwheel aircraft, pressurized aircraft with the capability of flight above FL 250, and knowledge of spins, among others. Examples of those endorsements and others can be found in Advisory Circular (AC) 61-65C, "Certification: Pilot and Flight Instructors."

Forms

The one form the applicant must have complete and accurate is FAA Form 8710-1, Application for Certificate and/or Rating. Not only do all the appropriate blocks have to be filled in, but the form must include the correct amount of flight time required for the rating or certificate sought, and, in most cases, an instructor's endorsement is required.

Applicants must also bring appropriate identification with them. Inspectors and examiners are now required to assure positive identity of an applicant. Any type of photo ID with a physical description and a full address is acceptable. If you leave it at home, no test that day.

Post office box numbers cannot be accepted as full addresses unless you live in a rural area, on a house boat, or in a trailer where you cannot get postal service except by post office box. As part of the application process, you must attest to that fact on a separate sheet of paper.

Records

The one area that has applicants returning home before the flying even begins is aircraft records. This is one of the most important areas of aircraft ownership, but it is also one of the least understood and least taught by instructors. Instructors do a wonderful job of teaching people how to fly, but we are sometimes lax in teaching the regulations, especially ones that pertain to paperwork, namely maintenance and maintenance records. This may be because some of us do not like to teach something we ourselves know very little about.

FAR § 91.417 clearly states what maintenance records each registered owner or operator shall keep and have ready to present upon request to any authorized representative of the FAA Administrator or the National Transportation Safety Board. Although this regulation is not necessarily intended for the pilot, each pilot should know and understand its contents. You as pilot-in-command should know that you have the ultimate responsibility of assuring that the aircraft is airworthy (FAR § 91.3). That responsibility can only be accomplished by an inspection of the aircraft and its logbooks. It is the responsibility of the instructor to teach that fact and the responsibility of the PIC to learn what the aircraft records include and who has signature authority when an aircraft returns to service. The practical test applicant needs to ensure that the aircraft is airworthy *before* coming to the inspector or examiner. A substantial number of notices of disapproval have been issued to applicants because the aircraft's records were not in order.

We know that an aircraft must have a current annual inspection, but under what circumstances is a 100-hour inspection also required? Can any A&P mechanic sign the aircraft maintenance record for return to service or does the mechanic need special authorization from the FAA? What other inspections are necessary and need to be recorded if you fly into a TCA or in the TCA veil? Regardless, all inspection sign-offs need to be recorded in the aircraft's maintenance record.

One area often overlooked is the "current status" of all airworthiness directives (AD) applicable to a particular aircraft. A "current status" could mean a record attached to the aircraft maintenance record indicating the AD number, method of compliance, date of compliance, whether the AD was one-time or recurring, and who accomplished the AD. A simple statement that all AD's have been complied with is not acceptable.

Now that we have all the logbooks in order, how does the inspector or examiner find all the sign-offs? You could help him or her out a little by paperclipping the pertinent pages beforehand.

There is a bit more paperwork in the aircraft that must be on board before the aircraft is considered airworthy. Make sure the airworthiness certificate and registration are current, valid, and original. One sure sign of a professional pilot is the use of current charts and current weight and balance data. When the inspector or examiner asks (and you will be asked) for a weight and balance computation, use the current data, which could have been revised by a major alteration. If that is the case, there should be an FAA Form 337, Major Repair and Alteration, with appropriate sign-offs. Using the generic or sample weight and balance supplied by the manufacturer is not only embarrassing, but it could also lead to a "pink slip." If you remember the mnemonic, ARROW, what we have left is the radio station license for the aircraft and its operating limitations; these, too, must be on board. If the aircraft operates under the provisions of a minimum equipment list (MEL), that and the FAA letter of authorization must be on board the aircraft, also.

One of FAA's missions is to promote aviation. The FAA wants you to fly. We also want you to pass the practical test for the rating or certificate you seek. FAA provides study guides for written tests, but there is another publication which can be immensely helpful in assuring preparedness for the practical test. You can spend $15.00 and save yourself a lot of runaround. This document (actually a series of documents) is called the "Practical Test Standards" but is more commonly known as the PTS. The PTS contain not only the standards to which an applicant must perform for all categories and classes of aircraft for the particular certificate or rating, but also the maneuvers the applicant is expected to be able to perform. FAA inspectors and designated examiners must use the PTS when evaluating all applicants. Flight instructors and applicants will find the PTS helpful in practical test preparation. All the numbers are there, and no guesswork or bias is involved: Either you perform to the standard or you do not—simple. If your flight instructor does not have a copy or does not use the PTS in instruction, make a present of one to him or her—or find a new instructor. You can purchase the PTS from any Government Printing Office Bookstore near you or through the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402 (Order desk telephone number 202-783-3238).

You and your instructor determine when your aeronautical skill and knowledge are sufficient for you to pass your practical test, but ultimately it is up to you to get your paperwork in order before arriving for the practical test. If it is not, no test. Hopefully with the information in this article in hand, along with continued quality instruction, you should be able to receive that coveted certificate or rating with flying colors.

Good luck! ■

***Editor's Note:** This article is adapted from an audio-visual presentation Mr. Drake gives at FAA Accident Prevention Seminars.*

Can't Leave the Ground without Them

A irworthiness Certificate
R egistration (aircraft)
R adio Station License (if applicable)
O perating Limitations
W eight and Balance

Wire Strikes

by Jim Cooney
Accident Prevention Program Manager, Helena, MT FSDO

Ever have those recurring nightmares about flying under or into wires? Well, here is some information and advice that will hopefully keep you out of the wires during your waking hours.

Recent National Transportation Safety Board statistics indicate that wire strikes are the cause of roughly one in every 20 general aviation accidents. Worse, about one out of five wire strike accidents results in fatalities. There have been two incidents in recent years where wire strikes were reported at an airport in Montana. Fortunately, neither of these incidents resulted in an accident.

Most wire strike accidents occur in the general vicinity of an airport familiar to the pilot. Wires can be doubly hazardous at dusk or at night near an airport the pilot is unfamiliar with. During daylight hours, a pilot would have to be within 150 feet of the typical size powerline to see it, and then the pilot would have less than two seconds to avoid it. Needless to say, at night the same wires would be impossible to see. At night runway illusions (e.g., a runway sloping uphill from the approach end) can cause a pilot to fly a dangerously low approach when the visual cues from the runway lights make the approach normal. As a word of advice think twice, especially in mountainous terrain, before making a night landing at an unfamiliar airport that does not have a VASI or a PAPI but does have the notation of wires in the *Airport/Facility Directory.*

The pilot who loads an airplane over its gross takeoff weight and tries to climb out of a high-density altitude airport is a very good candidate for flying into wires off the end of the runway. Takeoffs from soft and wet sod airstrips over powerlines can also be extremely hazardous.

Failure to execute a go-around in time can also result in a wire strike. If a pilot becomes confused or momentarily flustered during a balked landing and go-around, the pilot may permit the plane to drift into the powerlines. Likewise, if the pilot attempts a go-around with full flaps and the carburetor heat still on or dumps all the flaps suddenly, there is the increased chance that the pilot will come in contact with something—maybe wires—at the end of the runway.

While not accounting for the greatest number of wire strike accidents, intentional low flying is the greatest killer of pilots and passengers who mix it up with wires. Nearly four out of 10 wire strike accidents involving low-altitude flying result in fatalities. Most of these involve pilots out sightseeing over lakes and rivers, flying low over houses or objects of interest on the ground, or "buzzing" objects on the ground. Flying low over a lake or river "for the thrill of it" is asking for disaster. And yet, that is exactly what many pilots apparently do. An unfortunate number of them fly low enough to snag lines or wires just 50 to 75 feet above the surface.

Interestingly, studies have shown that low flights over water are often conducted by persons possessing student or private licenses or none at all. Seasoned pilots, it seems, are less tempted to fly low over water and hit wires. On the other hand, pilots involved in wire strikes associated with buzzing are more likely to be experienced pilots. In fact, a majority of pilots hitting wires in a buzz job have a commercial license or better and an average of more than 3,800 hours of experience.

These findings would indicate that the pilot who flies low over a river does not perceive the danger while the flight into wires during a buzz job involved pilots who know of the danger but believe themselves capable of avoiding it. Unwarranted low flying is also the probable cause of those wire strike accidents that occur while in cruise over land. In most of those situations, the ill-fated aircraft were flown at altitudes of less than 200 feet above the ground!

A relatively large number of wire strikes also occur following engine failure. During a forced landing, pilots occasionally fly into unseen lines usually of the telephone or low-voltage electric wire variety. In general, these accidents are fatal less frequently than most other wire strike accidents.

Pilots can best avoid wire strike accidents by being alert to the conditions mentioned which account for most wire strike accidents. This means flying over rivers and lakes at safe altitudes and being especially alert to wire hazards during all airport operations. Wires are generally not marked as hazards on sectional charts. Rather, those transmission lines that are depicted are there more as an aid to navigation than as a hazard alert. Obstructions lower than 200 feet above ground level are generally not shown on sectional charts.

If any pilot is aware of a wire that is an obstruction at an airport, the pilot should notify the local Flight Standards District Office. It may be possible for the wire to be removed or buried or marked. At the least certain operating restrictions may be imposed, such as altering the standard traffic pattern or displacing thresholds. It may also be possible for the wires to be identified as a hazard in the *Airport/Facility Directory.*

Another remedy, at least for daylight hours is to mark the wires with bright orange balls placed along the uppermost wire to alert pilots to the presence of the wire.

And finally, it is clear that a discussion of wire strikes should be a part of every pilot training syllabus. Wire strikes are preventable for the most part and for that reason are more tragic when they occur. Almost all wire strike "gotchas" can be avoided, if pilots are aware of the dangers and operate their aircraft sensibly. ■

This article originally appeared in the March/April 1989 issue of "Sky Waves," the quarterly Accident Prevention Program newsletter published by Mr. Cooney. His point of not flying low over rivers and lakes is very important. We would like to add one additional "wire hazard," which is low flying between high terrain points. Pilots flying low between hilltops, through river valleys, down canyons, through mountain passes, or other areas where there is high terrain on either side of the route of flight must always be very careful. Frequently, power companies suspend powerlines across valleys, canyons, and passes from towers on the high ground on either side. Depending upon weather conditions, the towers could be obscured, which could make it virtually impossible for pilots to see the suspended cables until it is too late to avoid them. In some cases, such as with a mountain pass, pilots may not have the airspace necessary to turn to avoid the low-hung cables or the power to overfly them. **—Editor**

FAA Accident Prevention Program

This illustration cannot do the rapidly developing spin rotation justice, but this is what it might look like in slow motion. Fast or slow, this situation is to be avoided.

To Spin or not to Spin

Part 1
The Question is Whether You Can Benefit from Spin Training

Adapted by
Phyllis A. Duncan, Editor

Recent changes to FAR Part 61 require recreational, private, and commercial pilots applicants to have aeronautical knowledge of "...stall awareness, spin entry, spins, and spin recovery techniques in airplanes." The following article has been adapted from the October 1991 issue of the AOPA Air Safety Foundation's Flight Instructors' Safety Report, where it was adapted from the FAA/AOPA audiovisual "Back to Basics" program, "Stall/Spin Awareness." It contains some excellent information and diagrams for flight instructors who now have to teach about spins and for pilots who may some day find themselves "autorotating about the spin axis." **—Editor**

Avoiding the Stall/Spin Accident

The stall/spin accident has been with us since the days of the Wright Brothers. In the early days, the terrifying "tailspin" was shrouded in mystery, thus a high occurrence of this type of accident was understandable.

Today, however, the spin is well understood, but we are still plagued with stall/spin accidents. In fact, stall/spin accidents comprise about 8% of the total and, more significantly, account for about 25% of the fatalities and serious injuries in general aviation. If today's breed of pilot understands the spin, why do we still have so many stall/spin accidents? Perhaps the answer lies in stall/spin awareness training—or, rather, the lack thereof.

What is a Spin?

A spin is a maneuver during which the aircraft descends rapidly in helical movement about a "vertical" axis—the Spin Axis, which should not be confused with the vertical axis of the airplane. In some ways the spin resembles a steep spiral, but there is a fundamental difference. Throughout the spiral dive maneuver you have the aircraft under full aerodynamic control; you can fly out at any time. In a spin, on the other hand, the aerodynamic and inertial forces may be in a degree of balance which the pilot has to upset in order to regain control.

In an aircraft approved for spins, the spin is a recoverable maneuver, but the recovery does require altitude. If you have sufficient altitude at the start of the spin, fine, but if not...you could become a statistic. However, in aircraft placarded as not approved for spins, there is absolutely *no assurance* that recovery from a fully developed spin is possible.

Although spin research indicates that in straight wing aircraft there are many factors which may contribute to a spin, two things must occur: One, a wing drops after becoming fully stalled, and, two, there is sideslip or yaw acting toward the low wing at or beyond the actual stall point. If allowed to continue to its natural conclusion, the lowering wing has an increasingly greater angle of attack while on the rising wing the angle of attack actually decreases. This leads to a rolling moment or rotation about the airplane's longitudinal axis. The airplane is then in a spin and descends vertically, continuing to roll and yaw until the pilot does something to interrupt it.

A spin is divided into two phases—incipient and steady state. The first, an incipient phase, is that portion after stall when the aircraft commences a spin-like motion. In this phase the aerodynamic and inertial forces have not yet achieved the necessary balance. In the second phase, the steady state or fully developed spin, the aerodynamic and inertial forces are in balance, and the attitude, angles, and motions are repetitive from turn to turn.

In a spin the view looking out of the cockpit is generally a steep, nose-down attitude, with a yawing/rolling motion (Figure 1). The airspeed is near stall. An angle of attack indicator, if the aircraft has one, shows a fully stalled condition. The turn needle is fully deflected in the direction of the spin, and the rate of descent is significant.

Figure 1. The first two turns of a spin and recovery (incipient spin) as seen from above. (1) Clear the area, line the airplane up with the road, and reduce power. Raise the nose to stall attitude and, as the stall approaches, use left rudder and full up elevator. Some airplanes may require the opposite aileron at the entry; others may need a burst of power (then reduced to idle) at this point. (2) The airplane is in the transient condition; some airplanes may move over to a slightly inverted position during this phase. (3) The spin is developing. (4) Hold the rudder and elevators in the fully deflected position. (5) Note that the path of the airplane is quite different from the spiral in that the airplane is flying a helix angle and is also rolling and yawing about its center of gravity. (6) Start recovery here or at (7), depending upon the airplane used. (8) The opposite rudder and forward motion of the control wheel starts to "bite." (9) Rotation stops, and the angle of attack is back in the flying range. (10) The pull-out is started. (11) The airplane returns to straight and level cruising flight. Be sure that the recovery is complete at least 2,500 feet above the surface.

Understanding the Spin

Gravity (weight), lift, thrust, and drag are terms that are familiar, as are the three axes of flight: roll, pitch, and yaw. To understand a spin, there are some other terms to become familiar with:

- ***Relative Wind.*** This is the speed and direction of the air approaching the aircraft as it flies. The velocity of the relative wind and the airspeed of the aircraft are equal and opposite to each other.
- ***Angle of Attack.*** This is the angle formed by the relative wind and the chord line of the airfoil.
- ***Coefficient of Lift*** (C_L). This is a numerical representation of the lift generated by a particular airfoil at a given angle of attack at a specific airspeed.
- ***Coefficient of Drag*** (C_D). This is a number representing drag and derived from the same factors of the particular airfoil's configuration, relative wind, and angle of attack. (Figure 2)

Look at C_L in Figure 3. As the angle of attack increases, C_L also increases. When the angle of attack reaches a certain point, the airflow separates from the airfoil, and lift starts to decrease (Figure 4). As the angle of attack continues to increase, lift is still generated, but it decreases still more. The stall occurs at the peak. C_D also increases as the angle of attack increases. Beyond the stall point, however, drag increases even more.

When you are beyond stall angle of attack, if the aircraft experiences any rolling displacement, the upgoing or outboard wing will experience a decrease in the angle of attack. Conversely, the downgoing or inboard wing has an increased angle of attack (Figure 5).

The difference in the angle of attack of the two surfaces is because of the vertical component of the relative wind in the rolling condition. The difference in angles of attack result in differences of lift and drag for the two surfaces; the upgoing wing is less stalled, and the downgoing wing is more stalled (Figure 6). This differential condition causes a rolling and turning tendency at angles of attack beyond stall. The tendency is called "autorotation" and is self-feeding.

The roll at stall may be initiated by adverse yaw. Let us review what that is. If you are near stall angle of attack and a wing drops and you attempt to raise it by applying aileron alone, the aileron going down will increase the lift on that wing. But the increased lift also increases the induced drag, causing a yaw toward the down wing. The down wing, with an increase in total drag, becomes more stalled. This produces even more roll which contributes to the autorotation. To prevent this autorotation, you must eliminate any slipping or turning input at the point of stall. Coordination of aileron and rudder is the key.

Spin Recovery

An airplane's pilot operating handbook (POH) contains the manufacturer's recommended spin recovery sequence in the "Emergency Procedures" section. For aircraft without a POH, consult the aircraft flight manual (AFM), appropriate section of the owner's manual, or other operations and limitations data. Spin recovery generally follows these five classic steps. First, power: Reduce it to idle. Second, ailerons: Neutralize them; they could aggravate the spin. Third, rudder: Apply it fully, opposite to the direction of the spin to slow the rotation. If you are confused about the direction, check the turn indicator. It will be fully deflected in the direction of the spin. Do NOT use the ball since its position may conflict with that of the turn needle. Fourth, as the rotation slows, push the elevator briskly forward to reduce the angle of attack and break the stall. Hold the rudder and the elevator where they are until rotation stops. It may take a full turn or even more. Fifth, as rotation stops, neutralize the rudder,

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Coefficient of Drag

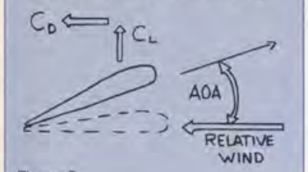
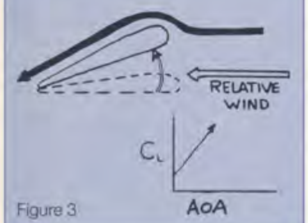


Figure 2



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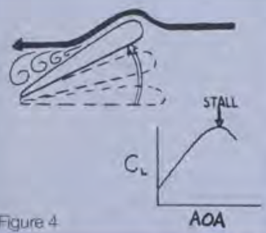

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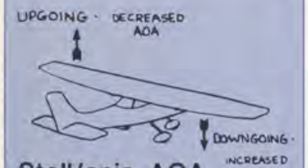
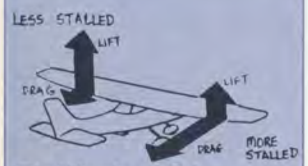


Stall/spin AOA

Figure 5



Stall/spin AOA

Figure 6

and recover from the ensuing dive in the normal manner, i.e., back pressure—but not an excessive amount, or you may induce a secondary stall and another spin that may be more violent than the first.

The best way to learn about spins and spin recovery is by practice. (Note: The FAR require in-flight spin training only for flight instructor applicants in either airplanes or gliders.) But you must use an aircraft that has been approved for intentional spins. Is yours? Your aircraft's flight manual and placards clearly spell it out. If your aircraft has a placard against intentional spinning—DON'T! Advisory Circular (AC) 61-21C, *Flight Training Handbook,* states that:

"The pilot of an airplane placarded against intentional spins should assume that the airplane may become uncontrollable in a spin."

Certification for a normal category aircraft requires recovery from only a one-turn spin, which is merely the incipient spin phase and not a fully developed spin. That is why you must practice spinning *only* in an aircraft approved for spins. If you intend to practice spins, first be sure that the aircraft is properly loaded, and that you have someone with you who is experienced in spinning that aircraft, preferrably a qualified instructor.

If you want to avoid inadvertent spins, keep them from developing in the first place. How do you do that?

Stall/Spin Awareness

The most effective prevention of spins is stall awareness. We know that a stall is the result of an excessively high angle of attack and that it can occur at any attitude and at any speed. There are three situations in which a pilot can easily exceed an airplane's critical angle of attack: low-speed flying, high-speed flying, and in turning flight. Since it is difficult to fly without flying slowly at some point or turning, the potential for a stall is with us more than we would like. (High-speed flight near MACH 1 and at altitude involves a situation where the difference between the low-speed stall buffet and the high-speed MACH buffet is only a few knots.) Through training and practice, pilots can become "stall aware." We learn to recognize the many indications of a stall and to react with proper control response before a stall becomes fully developed. We also learn what to do to recover from a full stall.

The following five cues may warn you of an impending stall.

Vision is one, but its usefulness is limited to watching for a change of attitude. If you see that the nose is higher than it should be for the power and speed being developed, you may be about to stall. Nose attitude, however, is not an absolutely sure sign because stalls can occur in any attitude.

Hearing can give you another cue. The sounds related to flight will increase as your speed increases, as you know, but if a stall is impending, the sounds may diminish.

The third sign is ***kinesthesis***—"muscle sense"—the response of your body to the aircraft's changes of direction and speed. You can feel it. If you have not already done so, you can develop the ability. Also, the onset of airframe buffet (less noticeable in power-off stalls) may indicate the approach of a stall.

The fourth cue is the feeling of ***control pressures*** and response. As speed is reduced, control resistance to pressure becomes less and less, and you can move the controls through a greater range of movement without a corresponding change in aircraft attitude.

Last, but not least, are your ***flight instruments.*** They warn you of impending stall, and they indicate the actual stall. An angle of attack indicator is a very accurate stall warning instrument; however, the airspeed indicator is the most common instrument.

Your senses and flight instruments are the means by which stall awareness should enable you to recognize an impending stall. But you can lose your awareness very quickly if your attention is diverted or lost by distraction—the major cause of inadvertent stalls. Anything that takes your attention away from your number one responsibility—**FLYING THE AIRCRAFT**—may lead to a stall. How do you prevent that kind of distraction? Develop a good scan pattern. It should—in fact, it must—keep your attention moving back and forth between flying the aircraft, the instruments, and outside references. Remember the cardinal rule of flying: Aviate (i.e., *fly the airplane*), navigate, and communicate, in that order. In any situation, if you become aware of an impending stall, how do you handle it? By coordinating these three steps:

- The first one is to reduce the angle of attack positively, generally by lowering the nose.
- The second step is to apply maximum allowable power as necessary.
- And third, coordinate your controls to regain straight and level flight and, thus, full aerodynamic control of the aircraft.

Do you know how your airplane reacts when near stall speed? To be sure, practice flying at minimum controllable airspeed at a safe altitude and find out about your airplane's attitude, power needed versus airspeed produced, trim required, effectiveness of controls, and the effects of flap extension and retraction. Practice at minimum controllable airspeed will sharpen your stall avoidance ability.

Where and How Stall/Spin Accidents Occur

Stalling and spinning is obviously more threatening under certain conditions, namely low altitude, but low altitudes are part of every flight you make. Another threatening condition is an improperly loaded airplane, either over gross and/or out of balance. During preflight, check that the loading does not exceed the center of gravity limits. If it does, your aircraft may lose stability. With the center of gravity moved aft of its proper location, you will find that a steep climb may produce a departure stall. Even at altitude an aft center of gravity loading may result in your not having enough forward stick available to lower the angle of attack sufficiently to ensure stall/spin recovery.

Takeoffs also have stall/spin potentials. Just after breaking ground, and during your initial climbout, an engine failure can be disturbing. Your instinct may be to try to turn back, but if you do, you may well set up a stall/spin entry. If this occurs at initial departure heights, recovery may be impossible. The solution is to lower the nose immediately to attain your best glide speed, thereby preventing a stall or loss of control. It may be better to make an unscheduled, off-airport landing under control than to stall, spin, and crash out of control.

Takeoff from a short field may also be a stall-prone maneuver. In order to clear obstructions, you may pull up at too steep an angle of attack too soon. Let the aircraft accelerate to the proper airspeed, then climb out under control.

Landings have their stall risks, too. For example, you may have trimmed nose-up to help maintain the correct approach speed. Then you may encounter a crosswind that makes you overshoot the turn onto final. If you steepen the bank and/or use excessive rudder pressure to turn the aircraft onto final, even a slight increase in back elevator pressure may cause an accelerated stall. The solution is to plan ahead—do not get trapped. If you find yourself in such a situation and recognize it, smoothly initiate a go-around! But go-arounds are not free from stall/spin possibilities, either. If you have set the flaps to full down and have set trim to a nose-up condition, you may induce a departure stall on go-around unless you manage the go-around using the correct procedures. Any uncoordinated rudder application may provide the sideslip leading to stall/spin entry. To avoid it, when you make the decision to go around, add sufficient power smoothly, even to the maximum allowable if necessary, start the climb, and reduce the nose-up trim to obtain a normal climb attitude. Use control forces as necessary to control pitch attitude and heading and bleed the flaps to a position that gives maximum lift and minimum drag. Retrim the aircraft to reduce control forces once you have the situation well in hand.

Finally, what do you do if you have a power loss on final? Again, instinctively you may want to apply back pressure to try to hold the airplane in the air. If you do that, you should know what can happen. The safe thing is to watch your angle of attack closely as you watch for a possible touchdown spot. Flying in the pattern or on short final, at 400–500 feet above the surface, is no place to enter a spin that requires 1,000–1,500 feet for recovery after you apply control inputs.

You may not be able to avoid all flight situations in which a stall/spin could occur, but you should be able to avoid the stall/spin by recognizing the situation before it becomes a problem.

The key to stall/spin avoidance is *Stall Awareness*. Know the warning signs, respond to them, and go ahead and do what you have to do. Become proficient in flight at minimum controllable airspeed and reacquaint yourself with how your aircraft reacts in stall recovery. To increase your confidence, take some spin instruction from a qualified instructor in an aircraft that has been approved for intentional spinning. (Besides, it is a great way to qualify for your wings in the Pilot Proficiency Award Program!)

And remember, it is a fact not a fantasy—no stall, no spin! ■

End of Part 1

Editor's Note: *In Part 2 of this article, which will appear in the July/August issue, we will discuss in-flight spin training in more detail, including some suggested maneuvers for flight instructors to do with their students to hone their stall/spin awareness.*

FAA Accident Prevention Program

Instruments tell the story: Airspeed at stall, altimeter winding down in this spin to the left. Note that the attitude indicator has tumbled and does not give an accurate picture of the direction of the spin—use the bank indicator on the turn coordinator.

FAMOUS **FLIGHTS**

The Vanishing Long Island Airports

Smithsonian

by Michael D. Piccola, Contract ATC Instructor

Today's small general aviation airports are an endangered species in many areas of the United States, but that is nothing new. In the last 20 years alone an estimated 1,500 airports have been transformed into shopping malls, industrial parks, or even housing developments, and the Long Island, New York area is no exception. In fact, I wonder how many people are aware of the number of airports that once existed, say some 20, 30, or even 80 years ago in just the Long Island area alone. This 120-mile long island in southeast New York has hosted some of aviation's more famous milestones, but these events did not save those airports. Here are some of the extinct airports which helped to earn this area the nickname "The Cradle of Aviation."

Belmont Park is now the location of the famous Belmont Race Track in Elmont. In May of 1918 civil aviation got its big boost when the first Air Mail flight left the infield of Belmont Park. Three and one half hours later the Curtiss *Jenny* JN-4 landed on the Polo Grounds in Washington, DC, successfully completing the first delivery. However, on the return flight the pilot was not as fortunate. First, he became lost soon after takeoff. When he finally decided to land, it was on the unfamiliar rugged hill terrain of Delaware, RI, where he broke the airplane's propeller. The bag of U.S. Mail was eventually delivered to New York—by train.

Roosevelt Field is probably the best known of all the airports on Long Island. This is where the "Lone Eagle," Charles Lindbergh, took off from on May 20, 1927, in "The Spirit of St. Louis." Thirty-three and a half hours later he arrived at LeBourget Airport, Paris, France, concluding the first solo non-stop flight across the Atlantic Ocean.

Curtiss Field was located on the east side of Roosevelt Field but was not as popular. It was named after the famous aviation pioneer, Glenn Curtiss, whose credits also include the famous Navy bomber, the *Helldiver* and the P-40, which the "Flying Tiger" units made popular before World War II. You can still see one of the airport's hangars east of Meadowbrook Parkway on Old Country Road, in Carle Place, Long Island.

Glenn Martin Field (not to be confused with Glenn Martin State Airport still east of Baltimore, MD) was close to where the Valley Stream Shopping Center is located today. Glenn Martin, like Glenn Curtiss, manufactured seaplanes and other water-type aircraft. His most famous was the *China Clipper*.

Mineola Plains is where Alfred Moisant established a flying school in 1911. The school offered a well-rounded circulum which promised that the pilot would not only be an expert at flying but would also be an expert with every phase of aircraft construction and maintenance. Unlike the Curtiss and Wright schools, women were welcome at this school. In fact, two of the school's star pupils were Harriet Quimby and Moisant's own sister, Matilde. Over the years many types of aircraft were tested and flown here to show the aircraft's performance and its pilot's aeronautical abilities.

Hempstead Plains was near the east end of the town of Mineola, closer to the town of Hempstead, and was a very large open plains area. During the 1920's and earlier, this area was the proving grounds for many types of experimental aircraft and the site of airshows and other aerobatic types of flying.

Mitchell Field was the famous World War II U.S. Army Base for bombers, fighters, and transport aircraft going to the European theater. It was at this field that Jimmy Doolittle made the first blind landing in aviation history on September 24, 1929. Doolittle's cockpit instruments consisted of a compass, an altimeter, and a stop-watch. There was a spotter pilot aboard (for safety purposes). Today the airfield is the location of Hofstra University. Some parts of the airfield, namely some old hangars, are still standing. These hangars, located near the Nassau Community College, now house many vintage aircraft as part of the Cradle of Aviation Museum.

Long Beach Seaplane Base was located near Long Beach, Long Island. It was primarily used for passenger service to Downtown Manhattan and to the places along the Hudson River near where the Tappanzee Bridge is located today.

Port Jefferson, Glen Cove, and ***Oyster Bay*** were also passenger seaplane bases or ports. Flying boats and seaplanes landed and departed, taking passengers to various locations around Long Island and to other water-edge towns.

Zahns Airport was a small general aviation airport located in the town of Amityville. It was almost directly opposite from today's ***Republic Airport*** (called ***Seversky Aerodrome*** until the Republic Aircraft Corporation took over the field before World War II). During the period that the Republic F-105 *Thunderchief* fighter was being produced, normal procedure was to send an alert to Zahns' warning that an F-105 was about to takeoff on runway 19 or 14. If an aircraft was about to depart Zahns', it would hold short until after the F-105 was airborne and out of range. The F-105's speed made the aircraft very difficult to see, and its wake turbulence was dangerous. The same advisory would hold true when the F-105 was approaching to land on runway 1 or 32.

One last airport worth mentioning is the ***Pan American Airways Seaplane Base.*** It was located at what is now the north end of LaGuardia Airport (which was originally named North Beach Airport). Back in the 1930's and 1940's, flying boats called clippers, prefixed by such names as "Yankee" or "China" were the way to travel. But alas, these flying boats have gone the same way as these airports, nothing more than a distant memory. ■

Chinese Aviation Officials Journey to the FAA for Aeronautical Enlightenment

EAST MEETS WEST

Delegates from the Civil Aviation Administration of China (CAAC) listen to FAA officials explain the intricacies of an American regulatory agency.

by Phyllis A. Duncan, Editor

During the Tang dynasty, in the 7th century A.D., a Buddhist monk named Xuan Zang felt that, owing to the lack of sufficient documents of Buddha's teaching, Buddhism was in disarray and stagnation. Therefore, he journeyed west to India, the land of Nirvana, to obtain Buddhist scriptures for enlightenment. It took him 18 years to accomplish the task, and he returned to China with more than 600 scriptures which he translated into 75 books for the Buddhist society in China. Subsequently, Buddhism flourished for more than a thousand years. Folklore deified Xuan Zang and his journey since making such a trip via the old Silk Road was still unimaginable and nearly impossible.

Centuries later people of China have again traveled west in search of enlightenment.

Early this year, a delegation from the Civil Aviation Administration of China (CAAC) met with FAA Flight Standards officials in a week-long series of meetings designed to provide the Chinese with ideas on how to structure its own regulatory body separate from its national airline. The Boeing Commercial Airplane Group sponsored the visit under the direction of Capt. Chester Ekstrand, Director of Flight Training. Boeing representatives Roger Chen and Philip Woo escorted the delegation to FAA Headquarters in Washington, DC, and pitched in to assist the delegation's interpreter Ma Tho.

Until recently, Air China was the country's only flag carrier. The airline set its own safety standards and made its own rules. As unusual as this may seem, it parallels somewhat the development of aviation in the United States. In the 1930's the U.S. airlines developed and ran their own air traffic control before the government standardized the system. China has recognized the need for a regulatory body independent of its airline to assure complete objectivity in the establishment of pilot and aircraft standards. The country now has eight regional airlines as well, and the Chinese realize that a single, standardized, oversight organization is necessary. Consequently, CAAC is on its way to becoming a regulatory body with a headquarters in Beijing and seven regional administrations: North-West, Urumqi, North China, Guang Zhuo, East-China, North-East, and South-West.

Thomas C. Accardi, Director of the Flight Standards Service, greeted the delegates by emphasizing the FAA's commitment to a worldwide partnership for safety. "We're reaching a point," he said, "where the world is recognizing the safety benefits of a system like the FAA's. We have the best safety record in the world, and everyone wants to emulate us. As part of our globalization effort, we are open to those contacts and will respond to them to the best of our ability." Mr. Accardi added, "FAA, and Flight Standards in particular, is going to become more and more involved with contacts like this from other countries. It's exciting not just for the FAA but also for the aviation community."

Headed by Captain Wu Shun Sheng, Deputy Director of Flight Standards and Air Safety Department, the delegation was comprised of 14 other CAAC representatives from the national and regional Flight Standards and Air Safety

Departments. Concerning the purpose of the visit, Capt. Wu said, "For the past 10 years air transportation in China has experienced rapid expansion. Because of this our regulatory efforts in the area of safety became cumbersome and difficult, and we lacked the experience to deal with the problems accompanying this large expansion. We want to learn from the FAA's experience, take what we learn back to China, and adopt it." Yue Yu Qin, the Deputy Director of CAAC's Policy and Law Department, was very interested in the FAR and their organization. Madame Tao Yi Yuan, an engineer from the Research Institute of CAAC, and Mr. Qu Xing Shan, CAAC Flight College, were interested in pilot training and also in how FAA trains its inspector work force.

Photo by Dean Chamberlain

Captain Wu Shun Sheng, a helicopter pilot who is CAAC's Deputy Director of Flight Standards and Air Safety Department, led the delegation.

FAA headquarters personnel briefed the delegation on Flight Standards' structure and the function of each Flight Standards' division in headquarters. The delegates also visited Central Flow Control, the Dulles Air Traffic Control Tower, and the Dulles Flight Standards District Office to get a feel for all levels of the FAA.

When asked about similarities between FAA and CAAC, Captain Wu said, "CAAC is under reconstruction much like FAA was in 1958. Our main similarity is that we both have the public safety and interest at heart." As to differences between the two organizations, Wu continued, "There are two major differences. First, FAA is strictly a regulatory body, but CAAC has two hats. We are a regulator, but we also run the national airline which is a business. During our restructuring we will separate the business from the regulatory responsibility so that we will be more like FAA. Second, FAA is a mature organization with an extensive background and experience in global aviation safety. CAAC is still very young and limited, and our impact on global safety is yet negligible."

Another significant difference is how aviation safety inspectors perform job functions. In China when "inspectors," who are actually Air China employees, find a problem, they fix it themselves. The process of how a government inspector finds a problem and then directs the operator to correct it is a concept CAAC needs to learn. One delegate asked, "If the inspector does not fix it himself, how does he know it gets fixed?" Robert A. Wright, Assistant Manager of the General Aviation and Commercial Division, and moderator of the briefings, responded by explaining FAA's national surveillance work program and its compliance and enforcement process. Mr. Wright also fielded the question, "Are you related to the Wright Brothers?" (The answer is no.)

A highlight of the delegation's visit was an obligatory trip to the National Air and Space Museum, where they took in some first-time (for them) sights of the Wright *Flyer*, *Voyager*, and other vintage aircraft as well as a viewing of the world-famous movie, "To Fly." After many briefings and innumerable but thoughtful questions, the delegates left for home with copies of the FA Act of 1958, the FAR, numerous advisory circulars, and handbooks FAA inspectors use.

In spite of the limited command of each other's languages, by the end of the visit Chinese and Americans alike were busily "hangar flying." With an aviator's enthusiasm Capt. Wu spoke of the many different types of helicopters he flew—American, Russian, German, and French. Others talked about the aircraft China has recently purchased from Boeing and Airbus and their training in them.

This informal gathering may not have been as newsworthy as a summit meeting between the two countries might, but it did accomplish something that formal meetings cannot always count on—friends were made. For a short time, two culturally and politically diverse peoples came together and reached agreements through a great leveler—the love of flying. ■

Photo by Dean Chamberlain

Mike Sacrey (right), FAA's Manager of General Aviation, explains general aviation to the CAAC delegates. Philip Woo of Boeing translates.

Photo by Dean Chamberlain

Bob Wright (standing) explains the U.S. regulatory process while Flight Standards Director Tom Accardi (seated, right) looks on.

REFUELING Considerations

by Dick Russell, Air Carrier Unit Supervisor
Reno, NV Flight Standards District Office

HOT REFUELING—WHILE ROTORS WHIRL

While I was assigned to FAA Headquarters in Washington, DC as the Air Carrier Rotorcraft Specialist, I had the opportunity to manage a project to review FAR Part 135 air tour operators who used helicopters. I was able to observe operations in the continental U.S. and in Alaska and Hawaii where air tour operators conducted so-called "hot refueling" operations—refueling helicopters with the engine running and the rotors turning. Such an operation has become accepted practice by helicopter air tour operators because it expedites movement of both the helicopters and the fare-paying passengers.

As a result of studying hot refueling operations, FAA published Air Carrier Operations Bulletin 9-90-1, "Refueling Operations for Turbine-Powered Helicopters." Bulletin 9-90-1 is binding on FAR Part 135 operators, but its substance and safety implications are pertinent to any other helicopter operator. (Bulletin 9-90-1 incorporates recommendations and procedures from Advisory Circulars 91-32A, *Safety In and Around Helicopters, and 91-42D, Hazards of Rotating Propeller and Helicopter Rotor Blades.*)

The dangers of rotating propeller or rotor blades are universally recognized; however, a review of propeller- and rotor-to-person accidents reveals the most impressive fact that nearly every one of these accidents was preventable. Propeller- and rotor-to-person accidents differ from other aircraft accidents in that a higher percentage of them result in fatal or serious injuries. Persons directly involved with aircraft servicing are the most vulnerable to injuries from turning propellers or rotors. We average about 18 such accidents per year, and the FAA and the National Transportation Safety Board (NTSB) believe that, with proper education and training, such accidents could be reduced to zero. Helicopter operators who conduct hot refueling operations may be increasing their risk—and subsequent liability—of incurring rotor-to-person accidents. Consequently, all helicopter operators who conduct hot refueling operations should establish standardized procedures for hot refueling operations. Such standardization, training of all personnel involved, and emphasis on safety by management will surely result in safe refueling of all aircraft, not just helicopters, in any flight department.

"Unsafe at Any Speed"

Regardless of training and standardization of refueling practices, FAA would like to discourage operators from refueling helicopters while their rotors are turning. For reciprocating-engine helicopters, hot refueling is proven UNSAFE regardless of the level of sophistication of the operation. This is because of the low flash-point of gasoline, the fact that gasoline fumes are heavier than air, and the location of the fuel tank to the hot, running engine (usually, the tank(s) are just above the engine). Any spillage, no matter how slight, could be disastrous. However, FAA recognizes that hot refueling may be practical for certain types of turbine-powered helicopter operations, e.g., air tour operators who live or die economically on how many people they can move quickly. The emphasis is on the "may be"—these operations may be safe if the operators follow the recommendations and procedures outlined in Bulletin 9-90-1.

Hot refueling operations can be extremely hazardous if not properly conducted with trained personnel. All refueling personnel should be knowledgeable with respect to proper and safe refueling procedures and properly trained before any hot refueling operations. That training should include the specific aircraft manufacturer's recommendations and/or procedures regarding checking fluid levels, cool-down times, etc.

Operator Training

Flight operations departments desiring to conduct hot refueling should include in their ground training programs procedures for all refueling operations. This should be part of initial and recurrent training, and there should be specific training for hot refueling. Flight and ground crews should receive such training, and the operator should specify the duties and responsibilities of each during the hot refueling operation.

The operator should include in the training and its company manual (if any) any aircraft manufacturer information on continuous operation of engines without shutdown, fluid level checks, or other safety or airworthiness checks. Aircraft oil and hydraulic systems do not contain enough fluid to operate continuously for many hours if a leak occurs. The training program should also indicate how training will be conducted as well as be based on an established, company training curriculum.

Logistics of Hot Refueling

Refueling units or trucks should be positioned to ensure adequate rotor blade clearance, and persons not directly involved with the refueling operations should be kept clear of the area. Refueling areas should be clearly marked on the airport ramp, and there should be appropriate fire protection apparatus stationed where it can be readily reached for immediate operation if the need arises. The refueling apparatus should be equipped with a fuel nozzle that has an automatic fuel cut-off device.

The operator MUST prohibit smoking and any source of ignition in and around the aircraft during ALL refueling operations. Except in emergencies, no passengers should be allowed in the helicopter or within 50 feet of it. Servicing personnel should have been instructed as to their specific duties and the proper methods of fulfilling them. Any ramp attendants or security personnel should be trained to keep passengers and unauthorized persons out of the helicopter landing and takeoff area and to brief any passengers on the best way to approach and board the helicopter while its rotors are turning. The aircraft should be stabilized at flat pitch and appropriate idle RPM in accordance with the operator's manual. Do not use aircraft lights to signal ground personnel. All communication, navigation, and radar equipment should be turned off. Do not toggle *any* aircraft electrical switches during the fueling operation. The pilot should remain at the controls with his or her door open. If a fueling facility will not provide servicing personnel to dispense the fuel, the operator should provide an additional crewmember to complete this function. If an additional crewmember is available and if servicing personnel are also on duty, the additional crewmember should supervise the fueling operation with fire suppression equipment readily available. Communications (prearranged, standardized hand signals) should be established between the pilot and the person supervising and/or dispensing the fuel.

The aircraft, dispensing nozzle, and fuel truck, if used, must be properly grounded. Ensure that the nozzle bonding wire is the first point of contact between the nozzle and the aircraft. Remove the fuel filler cap. Insert the nozzle as far as practical into the filler port. Before opening the nozzle, be sure both hands grip the nozzle and that both feet are on firm footing. Be prepared to resist nozzle blowback caused by fuel pressure surges. Be prepared to release the dispensing lever if control of the nozzle is lost. Avoid overflow. Stop dispensing fuel when notified by the pilot or when the fuel cell is filled to a safe limit. Remove the nozzle and point it toward the ground. Replace the nozzle cap. Replace the fuel filler cap. First remove nozzle bonding wire from the aircraft, then other aircraft grounding cables.

Fuel spills must be avoided. Any fuel spills on the aircraft or ground should immediately be flushed with water. Personnel who have had fuel contact should receive appropriate first aid treatment.

Regulatory Requirements

FAR Part 135 certificate holders who fail to comply with the measures recommended in Bulletin 9-90-1 are subject to an enforcement investigation. For non-FAR Part 135 operators, hot refueling without the appropriate precautions could be considered a careless or reckless operation (FAR § 91.13) if an accident or incident results from not taking appropriate precautions. The recommendations in Bulletin 9-90-1 would be an excellent starting point for non-FAR Part 135 operators. Any helicopter operator must be careful not to become complacent during the course of hot refueling in any helicopter operating environment.

Time Fuelishness

Safety conscious helicopter flightcrews should review FAA's and the operator's current operating procedures periodically, remembering that a rotating rotor is extremely dangerous and must be treated with all due caution. Expediting a refueling operation for the simple reason of not shutting down the engine to save a few scant minutes of time is "TIME FUELISHNESS." However, with proper training and strict safety procedures, hot refueling is feasible and viable for certain helicopter flight operations.

AIRCRAFT FUELING—CAUSE FOR GROUNDING

"Improper fueling procedures" has been cited by the NTSB as the probable cause of many aircraft accidents and in-flight incidents. This probable cause covers the gamut of unfortunate occurrences with the most serious occurrence being ignition of fuel vapors and fire during fueling operations. Again, this is an accident type that is largely preventable if operators of fueling facilities would establish procedures for safe and proper handling of aircraft and if fueling personnel follow these procedures.

Recent surveillance activities and inspections of airport fueling facilities have revealed that there apparently are pilots and airport operators of fueling concessions who are unaware of the significance of grounding the aircraft and the fueling apparatus. WHY DO WE NEED TO GROUND THEM BOTH?!

One need only consider the possibility of an errant electrical spark from any source or, perhaps, the worst case scenario, a lightning strike during a fueling operation. The possible result of either of the above incidents could prove disastrous for not only the aircraft but the fuel facility itself and any personnel in the immediate area—including the pilot overseeing the fueling operation.

The aircraft, by virtue of the fact that it has been moving through the air and creating friction between the air and the aircraft's surfaces, contains the potential for a strong static charge. That charge is merely "waiting" to ground itself. The shortest distance between an electrically charged aircraft and the "ground" could be the fueling apparatus, replete with ignitable fuel vapors!

Pilots in the high desert area of Nevada may be somewhat more conscious of the potential hazards of improper fueling because of low humidity, high atmospheric static electricity content, and an abundance of summer thunderstorms and the high electrical energy associated with them. This is not to say that any other area or climate or season is any less likely to produce errant electrical charges during fueling operations. Without adequate and appropriate static discharge devices installed near your fueling areas, you, too, could experience an attraction of unneeded and unwanted electrical energy which can "spark" an explosion or fire.

The simple installation and use of an already installed grounding rod near the fueling area could preclude an inadvertent fueling accident caused by errant electrical sparks or lightning strikes. FAA Advisory Circular 150/5230-4, *Aircraft Fuel Storage, Handling, and Dispensing on Airports,* is an excellent guide and reference for information on aviation fuel deliveries and the appropriate handling and dispensing of fuel into the aircraft.

The National Fire Protection Association (NFPA) also publishes several documents that address the proper methods for dispensing fuel into aircraft and procedures for reducing the hazards associated with fueling airplanes and helicopters. Another advisory circular, AC 00-34, *Aircraft Ground Handling and Servicing,* also provides recommendations and methods for the proper dispensing of aviation fuel and associated grounding procedures.

Continue to fly safely, and be cautious and observant the next time you have your aircraft fueled. ■

Editor's Note: *Readers may obtain copies of FAA Advisory Circulars 00-34, 91-32A, 91-42D, and 150/5230-4 free from DOT, M443.2, Washington, DC 20590 and Air Carrier Operations Bulletin 9-90-1 through the U.S. Government Printing Office, or your local Accident Prevention Program Manager may be able to provide you with copies of these documents. Contact the NFPA for copies of their material at 1110 North Glebe Road, Suite 560, Arlington, VA 22201; (703) 516-4346.*

*Periodically, the answer to an instrument question demands more space than we can spare on our "Flight FORUM" page. For this reason we have expanded our "Instrument Corner" to a page of its own in order to answer the following question. —**Editor***

INSTRUMENT CORNER

by Dean Chamberlain, Associate Editor

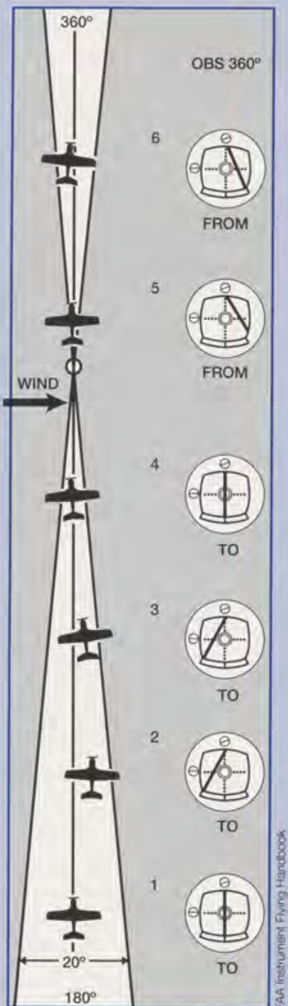
▪ An Established Meaning

Please define the term "established" for instrument flight. For example, is an aircraft established on a VOR or ILS localizer course when the course deviation indicator becomes "alive" or active? If an aircraft is flying a DME arc and turns inbound for an approach, when is the aircraft established on the inbound course? Air Force Manual AFM 51-37 states the aircraft is established on the next segment of the procedure when it begins its turn from the arc. Is this definition correct for civilian use? Finally, when flying an ADF procedure, within how many degrees of the desired course is the aircraft considered established on course?

Bill Pepin
Seattle, WA

You are established when you are established. Although one should not define a word by using the word, there is no better way to define this one except by its usage. Generally speaking, you are established on a particular segment of an IFR procedure when you are using course guidance provided for that particular segment and you are at the specified altitude for that particular segment. The generally accepted training rule for IFR flight is your navigation instruments are active when they are providing course information, and there are no warning flags, if applicable, indicating a lack of signal or a malfunction. In the case of a VOR receiver this is normally when the CDI needle is within its maximum scale display of 10° left or right of center. Although a VOR's full-scale deflection or an ADF showing a bearing to a beacon each provides information, being "established" in good IFR flying means being on course and on centerline with the needle centered.

There is an important reason to be on course with needles centered. The IFR system is designed for *no more than* plus or minus 2.5° of pilot induced error. In the case of VOR this means no more than a quarter-scale deflection of the CDI needle. This maximum pilot error rate, plus the design error rates for both the ground and airborne systems, gives an overall system error rate that the FAA uses in designing the various types of instrument procedures.



"...'established' in good IFR flying means being on course and on centerline with the needle centered."

There are several regulations and concepts that tell us how to fly IFR. Together, they define when we are "established" on course. First, FAR § 91.181 states we are to fly along the centerline of Federal airways or along the direct course between navigation aids or fixes defining the route. (The section does permit maneuvering to avoid other traffic, and in VFR conditions it permits normal maneuvering to clear your intended flight path when climbing and descending.) Then the FAA's *Airman's Information Manual* and *Instrument Flying Handbook* states we should lead turns when flying the airways and use various procedures to avoid flying through protected airspace. How much you lead turns depends upon the speed of your aircraft and the distance from the fix or facility. Finally, you must consider the amount of protected airspace you have for a given procedure when defining "established." As an example, an ILS' protected airspace is measured in feet or hundreds of feet, while the centerline of an airway gives you 4.2 nautical miles or more of protected airspace either side of centerline depending upon your distance from the VOR. Altitude then provides ground or obstacle clearance along the airway or procedure segment. Because of the differing types of protected airspace, a quarter-scale deflection of a VOR needle on an ILS approach is more significant and potentially more dangerous than a similar display en route 30 miles from a VOR. The same is true of any other type of instrument procedure. The important thing to remember in trying to define "established" is that you must comply with the intent of the FAR while staying within the protected airspace designated for each procedure.

Regarding your question about the Air Force's advice when flying a DME arc, it is good for civilian use also. When you turn to or from the arc, you are on a different segment of the procedure.

As for ADF procedures, one option is to fly your desired course and accept no pilot induced error. As stated above, determining when "established" on a ADF procedure depends upon your location, airspeed, and the procedure. ▪

• Proceeding Question

In the Sept-Oct. 1991 issue there was an interpretation of FAR § 91.185(c)(3) which I believe was in error. This appeared in the "Instrument Corner" section of page 18 entitled "To Proceed or Not to Proceed."

The scenario described a pilot who is en route (IFR) in IMC, who has been cleared to the destination airport, and experiences a complete communications failure and does not encounter VMC. The question was, "Should the pilot hold at the IAF until the calculated ETA or should the pilot proceed with the descent and approach immediately upon reaching the IAF."

The published response indicated that ATC will be expecting the flight to proceed with the approach, not hold at the IAF.

I have discussed this interpretation with several individuals, pilots, controllers, supervisors, and a regional air traffic procedures specialist. We all agreed that as described in the AIM para. 6–31 and FAR § 91.185(c)(3)(ii) the pilot would be expected to proceed to a fix from which an approach begins and commence descent or descend and approach as close as possible to the estimated time of arrival as calculated from the filed or amended (with ATC) estimated time en route.

I would like to thank the Aviation Staff at the Western Michigan University for bringing this to my attention.

Dennis D. Root
Air Traffic Manager
Kalamazoo ATCT
Kalamazoo, MI

The above letter was one of many sent to us regarding the question of when to proceed and when to hold. We thought our answer was very clear based upon the question asked but apparently some pilots were confused by our answer. One reader's letter noted that some answers tend to confuse the situation. Mr. Root is correct. But to eliminate any possible confusion of what pilots should do if they arrive before their ETA, we offer the following answer to a letter submitted by Mr. David K. Dye who is the FAA's liaison at Naval Air Station Pensacola, FL. On behalf of the student Naval aviators there who read and disagreed with our response, he wrote, "A pilot has received an airport clearance limit and experiences a complete radio failure in IMC conditions. He arrives at his destination 30 minutes early, still in IMC conditions. Does he begin an immediate descent upon arrival or does he proceed to a fix from which an approach begins and holds until his estimated time of arrival?"

The answer is if the pilot arrives at an IAF before his ETA, he holds. FAR § 91.185(c)(3) applies. If the pilot arrives at or after his ETA, he is expected to complete an approach as per Mr. Root's letter. We want to thank all of you who wrote regarding this question.

• Compensation or Hire

Please tell me the FAA's policy regarding private pilot privileges and limitations under FAR § 61.118(a).

Can a private pilot fly for hire as a fish spotter using a company owned aircraft? If so, can the private pilot fly for hire if the flight is "incidental" to employment with the fishing boat?

I do not think the private pilot can fly for hire. In my opinion, the flight is not incidental to employment with the fishing operation. If the fishing operation did not have an aircraft, I doubt the pilot would be employed on the fishing boat. Please clarify the rule for this situation.

George L. Shioura
San Diego, CA

FAA policy is clear. A private pilot must comply with FAR § 61.118(a) which states that private pilots may, for compensation or hire, act as pilot in command of an aircraft in connection with any business or employment if the flight is *only incidental to that business or employment and the aircraft does not carry passengers or property for compensation or hire.* The key to answering your question is whether or not the private pilot's flying is "incidental to the pilot's business or employment" which in this case is fishing. Your question cannot be answered because you did not provide enough information for us to determine if the pilot's flying is "incidental" to his or her employment. You do not say for example if the pilot was hired as a crewmember to fish and only flies part-time or if the pilot was hired to fly full-time as a spotter. Questions like what percent of the pilot's time is spent fishing and working on the boat and what percent is spent flying must be answered before a decision can be made. Is there a full-time company pilot who normally flies the aircraft? Do other people fly with the private pilot when he or she is spotting? These are only some of the questions that must be answered before we can determine if the pilot meets the requirements of FAR §61.118(a).

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

• 10 Hour Requirement

In preparation for the commercial aircraft certificate can the 10 hours of flight instruction and practice required by FAR §61.129(b)(1)(ii) (given by an authorized flight instructor in an airplane having a retractable landing gear, flaps, and a controllable pitch propeller) count towards the 10 hours required by FAR §61.129(b)(2)(ii) in preparation for the commercial pilot flight test, for 10 hours total, or is it necessary to accomplish 10 hours under each section for a total of 20 hours?

Joseph Bailargeon
APO AE

Both of these requirements can be met during the same combined 10 hours if you use an aircraft that meets the requirements of FAR § 61.129(b)(1)(ii) to accomplish the full 10 hours.

• VOT Test Question

This question deals with whether an airborne VOT check is allowed an error of plus or minus 4 or 6 degrees. We realize that FAR § 91.171(b)(3) states that an airborne check is allowed a plus or minus 6 degree error, but FAR § 91.171(b)(1) states that a VOT is allowed a maximum error of plus or minus 4 degrees. We believe that the main reason for the difference between airborne and ground checks is the lack of accuracy in positioning the aircraft over a given location while airborne. If this is correct, then the VOT airborne check would be plus or minus 4 degrees since the check is done with phased signals and the aircraft position is not specified (except in some cases a distance and/or altitude may be specified to limit overlap of frequencies).

David W. Card
Warrensburg, MO

The answer to your second question is plus or minus 4 degrees for an airborne VOT check. FAR § 91.171(b)(1) limits the maximum permissible indicated bearing error for an FAA-operated or approved test signal to plus or minus 4 degrees.

• Compensating CFI's

1. Can a CFI charge for flight instruction while he is also PIC using a third class medical? In this case, assume he is receiving compensation as PIC as well as compensation for flight instruction. Assume the flight time the CFI can log as PIC is compensation.

2. If he can fly as PIC and receive compensation for being PIC with a third class medical, then (since I have separated compensation as some for PIC and some for CFI) why does he not need a second class medical? What makes his PIC for hire different from corporate flying, especially since this person has separated flight for compensation from flight instruction for compensation.

3. Finally, is there any case in the world where any CFI receiving compensation ever needs any medical higher than a third class for aircraft that do not require type ratings?

Name withheld by request

1. In this specific case, negative.
2. In this specific case, the pilot must have a second class medical.
3. Affirmative.

The following guidelines explain the answers given. The type of flight determines whether or not a CFI needs a medical certificate, and if a medical certificate is needed, what type. Generally, a self-employed CFI does not need a medical certificate to give instruction or to receive compensation for instruction unless the instructor must perform duties as PIC, serve as a required crewmember, or comply with specific flight rules under which the flight is conducted that require a specific pilot or medical certificate.

For example, a CFI on the first instructional flight for a new primary student obviously must be PIC and must hold at least a third class medical to be PIC. Similarly, a CFII giving instrument instruction in IFR conditions to a non-IFR rated pilot must also have at least a third class medical certificate to serve as PIC if there is no other appropriately rated safety pilot aboard the aircraft who can serve as PIC. If the instructor is the required safety pilot crewmember on an IFR training flight in VFR conditions, he or she must have at least a third class medical certificate. If the CFI is performing duties as a required crewmember, in say an aircraft requiring two pilots or the flight rules require two pilots then the CFI must have an appropriate medical certificate. If the flight is a commercial operation, then the CFI must have a second class medical. Finally, if the CFI is an employee (commercial pilot) for a company offering flight instruction, then the CFI must have at least a second-class medical certificate because the instructor is employed as a professional (commercial) pilot and therefore must comply with all ofthe requirements for commercial pilots, including having at least a second-class medical. So as you can see, the type of flight and its applicable rules determine whether or not a CFI needs a medical and if so, which type.

• Flight Review vs "Wings"

My question concerns the Pilot Proficiency Award Program ("Wings") and the recent rule change concerning it and flight reviews.

In December 1992 I will have my private pilot license one year and have read that Annual Flight Reviews for pilots with less than 400 hours will not begin until August 31, 1993.

I am currently working on the first phase of the Wings program. If I continue with the next eight phases of this program when I become eligible to participate in these phases, is it possible for me to go nine years without a flight review?

Ricky Hamann
Columbia, IL

The simplest answer would be, "Affirmative," but that would be too simple. The recent change to FAR § 61.56(f) states that you need not accomplish the flight review requirements of FAR § 61.56(c) and (d) if you have completed one or more phases of an FAA-sponsored proficiency award program during the previous year (annual review) or two years (biennial review). When you meet the requirements for a phase of the "Wings" program, you have received a certain amount of dual instruction, practiced maneuvers, attended a safety meeting, etc. FAA's intent with the rule change was to recognize that that effort was similar enough to what you would do for a flight review. By virtue of the fact that you have to spend a certain amount of time with an instructor to qualify for each phase of your "Wings," you have already been "flight reviewed." Thus, you would not be going "without" a flight review.

• Logging Search Patterns

There is an FAA policy that allows military pilots flying military aircraft to count as cross-country time towards the ATP rating all the time flown outside their local area regardless of landing point. Some examples are B-52 bomber and KC-10 tanker pilots flying half-way around the world and returning to their home base without landing at any other point.

Civil Air Patrol pilots often fly similar, although shorter, missions without landing at any point other than their departure airport. They takeoff from a mission airport on an authorized search mission, fly to their designated search area, spend two or three hours flying some very precise search patterns using all of their navigational skills, and then return to the mission airport to land. In many cases, the mission airport is not their home airfield. By landing at the same mission airport they departed, the flight currently does not count as cross-country time (towards an ATP rating) although pilots use cross-country flight skills.

My question is can this type of flight time be counted towards the ATP rating like the current policy permits military pilots to log their flight time?

Larry J. Nemecek
Upper Marlboro, MD

Negative. Flight time needed to meet aeronautical experience requirements under the various sections of FAR Part 61 must meet the specific requirements of each rating. Although there is no specific cross-country distance requirement for the ATP rating, current policy, with the military exception you noted, requires a landing at a place other than the point of departure for the flight to be loggable as cross-country time toward the ATP certificate.

• Hangar Flying Question

I currently work at a large aviation school and during bad weather many of the instructors sit around and discuss flying. We have come up with a question that we disagree on the correct answer. If you can help us it would be appreciated.

The question deals with the logging of ground trainer time. We have a letter of authorization from our local FSDO to use our AST 300 ground trainer for recent instrument flight experience. The question that has arisen is whether or not the three hours and six approaches can be done solo or must it be instruction from an appropriately rated instructor (CFII or IGI).

David W. Card
Warrenburg, MO

Pilots solo aircraft. They do not solo ground trainers. Solo time in a ground training device is not countable towards the various pilot experience requirements for which a ground trainer can be used. Ground instrument training devices require an appropriately rated and certificated instructor certify the instruction given for the time to be loggable. FAR § 61.51(c)(5) applies.

Answers to quiz on inside back cover.
1. G, 2. A, 3. H, 4. B, 5. I, 6. C, 7. J, 8. D, 9. K, 10. E, 11. L, 12. F.

Defensive Flying: FLAPSENSE

It was gusting 15–20 knots, 30° to the runway, and the Cessna 152 was bouncing around. At 500 feet on final, the student lowered full flaps and immediately had to increase power to 1,850 rpm. We hit a downdraft at 100 feet and sank rapidly below our approach path. The sink rate was just held with full power and we crossed the threshold in an uncomfortable attitude and did a "dentist's job" landing [a "pranger" in our vernacular]. Taxiing back, I broke the silence and asked, "Why full flaps?" "Because I read it in a flying magazine in the club and the other instructors have always told me to land with full flap." I said, "I see."

Later, over coffee, I asked, "What is the rate of climb in the C152 with full flaps and full power?" "Hardly any," he said. "So," I went on, "if you're descending at 100 feet with full flaps and hit a 200 fpm downdraft, even full power won't stop your descent until you're through the downdraft." "Is a 200 fpm downdraft likely?" he said. "Well, glider pilots tell me 600 fpm (6 knots) updrafts are common and most have encountered 400 fpm (4 knots) downdrafts while attempting to soar." "Hmmm," said he. "With 20° flaps," I added, "the rate of climb in still air is about 500 fpm." "Oh," said he.

Another pause, then I asked, "Have you seen the effect of rudder on the C152 with full flap, at slow speed without power on?" He said he hadn't. "With power on," I continued, "the slipstream effect keeps the rudder responsive. With no power, at 50 knots, you can bang the rudder from side to side with little or no immediate yawing. The rudder response is poor in the absence of slipstream." "Oh," he said waking up, "so having to 'kick off drift' on a crosswind landing with full flaps and no power in the flare..." he trailed off. "Precisely," I said.

After another slurp. "Well, when should I use full flaps?" "You tell me," I said. "Think about it. Why would one use full flaps?" "To get into a short field, and to have the minimum landing run," he said thinking hard. "Well," said I, "will you need full flaps to land on a long runway, and will you ever plan to go into such a small field that you can only get in, even with full flaps, if there is a strong wind blowing? No, of course not, but you might need to use full flaps to get safely into a moderately short field in light or calm winds. But, in those circumstances, strong downdrafts are unlikely."

I said, "Let's have another coffee." Settling back again I added, "So in light winds use full flaps if you want to or need to, but think carefully before using full flaps in low-powered airplanes, such as the C152, in crosswinds or in strong wind conditions." "Sounds reasonable," said he, "Like a candybar?" "Good idea," I said.

Reprinted from the United Kingdom's July 1991 General Aviation Safety Information Leaflet (GASIL). FAA-approved procedures for landing in turbulent air are found in Advisory Circular 61-21A, "Flight Training Handbook." Pilots should also refer to, and abide by, manufacturer-recommended procedures.

The Economic Impact of General Aviation

We have excerpted this article from a news release from the Texas Association of General Aviation (P.O. Box 2013–218, Austin, TX 78768–2013; (512) 345–7286) because we feel it contains some interesting information about what general aviation does for our lives. Perhaps the next time people in your community complain about "that awful little airport down the street" you could show them this. **—Editor**

General aviation airports are those that do not have scheduled airline service. Though less visible to the general public, these general aviation airports make a significant contribution to the economy of the communities they serve.

First of all, general aviation represents jobs. Studies have identified over 500,000 jobs nationwide attributable to general aviation. This does not include people who are employed in aircraft manufacturing.

General aviation airports also bring $$$$$ to the communities they serve. Money spent on salaries, airport services, and the sale of aviation products works its way through the community. For example, a 1987 estimate of the statewide economic impact of general aviation in Texas alone was $2.8 billion. This impact can be compared to the average annual investment in Texas' general aviation airports by the federal, state, and local governments of about $28 million.

All communities encourage economic development in the form of new businesses or public works projects. The community's general aviation airport represents both forms of economic development. What urban area would pass up the chance of attracting a business that would provide 12,600 jobs with an annual economic impact on the area of $430 million? That was the economic impact of general aviation airports in the Dallas-Fort Worth Metroplex according to a 1988 study.

Another study done for a small, suburban Houston community discovered that the small, private airport the community and its neighbors were considering buying had an annual economic impact of $4 million and accounted for 53 jobs. What small-town Chamber of Commerce would not be happy to announce the arrival of a business of that magnitude to the community?

These are the measurable economic impacts. To a large part of any state, the local general aviation airport represents more than can be directly measured. Aviation represents access to those communities that are distant from major economic centers. Utility companies, banks, oil firms, and agri-businesses all make extensive use of the nation's smaller airports. Banks, for example, use general aviation airports to make daily collections of checks and other financial papers from correspondent rural branches.

General aviation airports also represent access to companies looking for decentralized manufacturing or distribution locations. Many companies have discovered that they can make use of the labor force in non-urban markets and maintain close contact with their central office if they have access to the community by air. Furthermore, local officials frequently contact their state aviation associations with the desire to improve their airports and thus improve their community's potential for attracting new economic development.

Jobs, dollars, development, and access—these are the economic benefits of general aviation to a state and its communities. For a relatively small public investment in general aviation facilities, the return on that investment can be significant.

ANDREW H. CARD, JR. Secretary of Transportation

After being sworn in March 11 as the new Secretary of Transportation Andrew H. Card, Jr. paid tribute to DOT employees and looked toward the future.

He said, "I know that I have the firm commitment of this department behind me. I'm deeply impressed with the dedicated men and women who work here... All of you accomplish so very much each day, year-in and year-out. I'm proud to be joining your team.

The Honorable Andrew H. Card, Jr., 11th Secretary of Transportation

"All of us at the Department of Transportation will face head-on the demanding challenges to ensure safety, accessibility, and efficiency in our transportation system in the coming years."

Before his appointment as the 11th Secretary of Transportation, Card was the Deputy Chief of Staff for President Bush. He previously served as deputy assistant to President Reagan, as director of the Intergovernmental Affairs Office, and in the Massachusetts House of Representatives from 1975 to 1983. He was also vice president of a Virginia computer software company.

Card holds a bachelor of science degree in engineering from the University of South Carolina and attended the U.S. Merchant Marine Academy and the John F. Kennedy School of Government at Harvard. He has received an honorary degree in public administration and two honorary doctor of law degrees. Card is married and has three children.

Where Do We Go Wrong?

Recently the FAA's Aviation Standards National Field Office had the occasion to do some research that was both interesting and revealing concerning an analysis of pilot incidents. As part of the background work, they contacted the National Aeronautics and Space Administration's (NASA) Aviation Safety Reporting System (ASRS) office to find out the top five anomalies that pilots report to ASRS.

The ASRS is described in Advisory Circular (AC) 00-6C. Every pilot should be familiar with the AC and the provisions of FAR §91.25, which prohibits the FAA from using the ASRS report for enforcement purposes. What is more important is that vital safety information gets into the system where FAA can get "at it" for analyses such as the one recently done by the National Field Office.

NASA takes all of the reports and compiles data from the material that pilots turn in. All of this information is voluntary and represents the areas in which the pilots indicate they are having difficulty. The fact that the information comes from those using the airspace (i.e., the "real world") makes this data especially relevant.

With regard to general aviation aircraft, for the period of January 1, 1983 to December 31, 1989, the ASRS data have revealed the following anomalies in order of occurrence:

1. Non-adherence to clearance, FAR, published procedures, or other—17,576 or 52%.
2. Erroneous penetration of airspace, i.e., TCA's, ARSA's, control zones, or other—4,709 or 14%.
3. Airborne conflict—4,266 or 13%.
4. Altitude deviation or overshoot—3,534 or 11%.
5. Aircraft equipment problem—critical or less severe—3,434 or 10%.

A lot of work still needs to be done.

Reprinted from "Plane Talk," a publication of the Lincoln, NB FSDO's Accident Prevention Program Manager, Larry Craig.

PIREP'S—Standardizing Turbulence?

Pilot reports (PIREP) of turbulence play a key role in analyzing and forecasting turbulent situations. They provide the only actual evidence that turbulence exists, its extent, and its intensity. At the same time the subjective nature of turbulence reporting and the variety of factors producing turbulence often make the forecaster's and weather briefer's job more difficult.

Often, pilots omit details concerning the conditions surrounding the turbulence report. For example, was the aircraft in clouds or in the clear? Near thunderstorms or rain showers? At full throttle or at a reduced setting? All of these factors affect the turbulence reaction of an aircraft, but they are often unreported.

While the pilot determines the degree of turbulence intensity, there appears to be little uniformity in training pilots in observing and reporting turbulence. The meteorologists and briefers using PIREP's must use their own judgement in determining the conditions reported. Pilots can find a guide for turbulence reporting in the Airman's Information Manual, para. 7-21, Table 7-21(1).

For example, many times pilots report "severe chop," but what exactly does that mean. Table 7-21(1) defines "Light Chop" as "turbulence that causes slight, rapid, and somewhat rhythmic bumpiness without appreciable changes in altitude or attitude." "Moderate Chop" is defined as "turbulence similar to light chop of greater intensity. It causes rapid bumps or jolts without appreciable changes in aircraft altitude or attitude." There is no definition of "Severe Chop." This lack of a definition appears reasonable, considering that "Severe Turbulence" is defined as "turbulence that causes large, abrupt changes in altitude and/or attitude. It usually causes large variations in indicated airspeed. Aircraft may be momentarily out of control." Since "Chop" does not cause appreciable changes in altitude or attitude, it would not be "severe."

Individual pilots and passengers may react differently to a given turbulence condition. One PIREP from the pilot of a light aircraft that was recently received indicated "Moderate turbulence. Spouse says Severe." Same aircraft, but two different opinions. If pilots subjectively determine the intensity of turbulence without following the guide in the AIM, then pilots, forecasters, and briefers will be talking about different things, and that negates the effectiveness of the PIREP.

Turbulence intensities are also a function of the aircraft model and its flight configuration. Studies done by the U.S. Air Force show the following conditions generally increase the effects of turbulence: decreased aircraft weight, decreased air density, increased wing surface area, decreased wing sweep angle, and increased airspeed. Airspeed plays a big part in turbulence intensity but is seldom included in PIREP's. Different aircraft models show varying reactions to turbulence.

Because there are no specific instruments on board the aircraft to assign a turbulence intensity, all of us—pilots, forecasters, briefers—depend on the pilot's description of the condition. The better and more standardized the information provided to the forecasters and briefers means more meaningful information passed on to fellow pilots. Turbulence PIREP's are vital in the NWS' work. The more detail that the pilot can provide the better. Aircraft type, flying conditions, and other information about the turbulence are useful in ultimately evaluating and using each report.

Reprinted from an article by Mr. Dick Kerr, NWS, which originally appeared in FAA's Air Traffic Bulletin, published by the Associate Administrator for Air Traffic.

Photo Courtesy of NOAA

TEST YOUR PILOTING IQ: Thunderstorms, Tornados, and Windshear

by Louise Oertly, Associate Editor

Summertime is usually the busiest and most pleasant season for general aviation flying, but for most of the country it can also be the most hazardous. June through October hosts a variety of severe and violent weather which is known to develop rapidly: thunderstorms, turbulence, hail, hurricanes, tornadoes. The trick in dealing with any kind of severe weather is to keep as much distance between it and you as possible.

Take the following quiz to check your summertime weather knowledge. The answers are on page 22.

Choices

A. Windshear
B. Cumulonimbus
C. Squall line
D. Cumulus stage
E. Dissipating stage
F. Anvil
G. Microburst
H. Thunderstorm
I. Lenticular
J. Tornado
K. Mature stage
L. Embedded thunderstorms

Match the Definitions below to the Choices on the left.

___1. This narrow column of rapidly descending air is usually only about one to three miles in diameter with high velocity downdrafts that can descend to ground level creating a high velocity outflow of air.

___2. This invisible atmospheric phenomenon can be present on all sides of the thunderstorm, in the downdraft under the cell, and in a gust frontwhich can precede a thunderstorm by 15 miles or more.

___3. The conditions necessary for its formation are lifting force, high humidity, and unstable conditions and it develops in three stages: Cumulus, mature, and dissipating.

___4. Known as the thunderstorm cloud, its symbol or abbreviation is Cb.

___5. In mountainous regions this almond or lens-shaped cloud indicates the possibility of severe turbulence on the leeward (or downwind) side of the mountain.

___6. A nonfrontal, narrow band of fast moving thunderstorms strung out-across the countryside, sometimes extending over a hundred miles.

___7. This funnel-shaped cloud extends downward from the base with an extremely concentrated vortex that sucks up dust and debris and causes extensive ground damage.

___8. During this stage there is usually no falling precipitation because rain is being carried upward, or is suspended by the rising air currents.

___9. During this stage precipitation begins to fall as a downdraft develops. All thunderstorms hazards reach maximum intensity during this stage as updrafts and downdrafts create vertical windshear and much turbulence.

___10. During this stage the entire thunderstorm will become an area of downdrafts as the updrafts continually weaken.

___11. Cumulonimbus clouds obscured by massive cloud layers.

___12. This horizontal cloud shape points in the direction of storm movement.

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