July - August 1988

FAA Aviation NEWS

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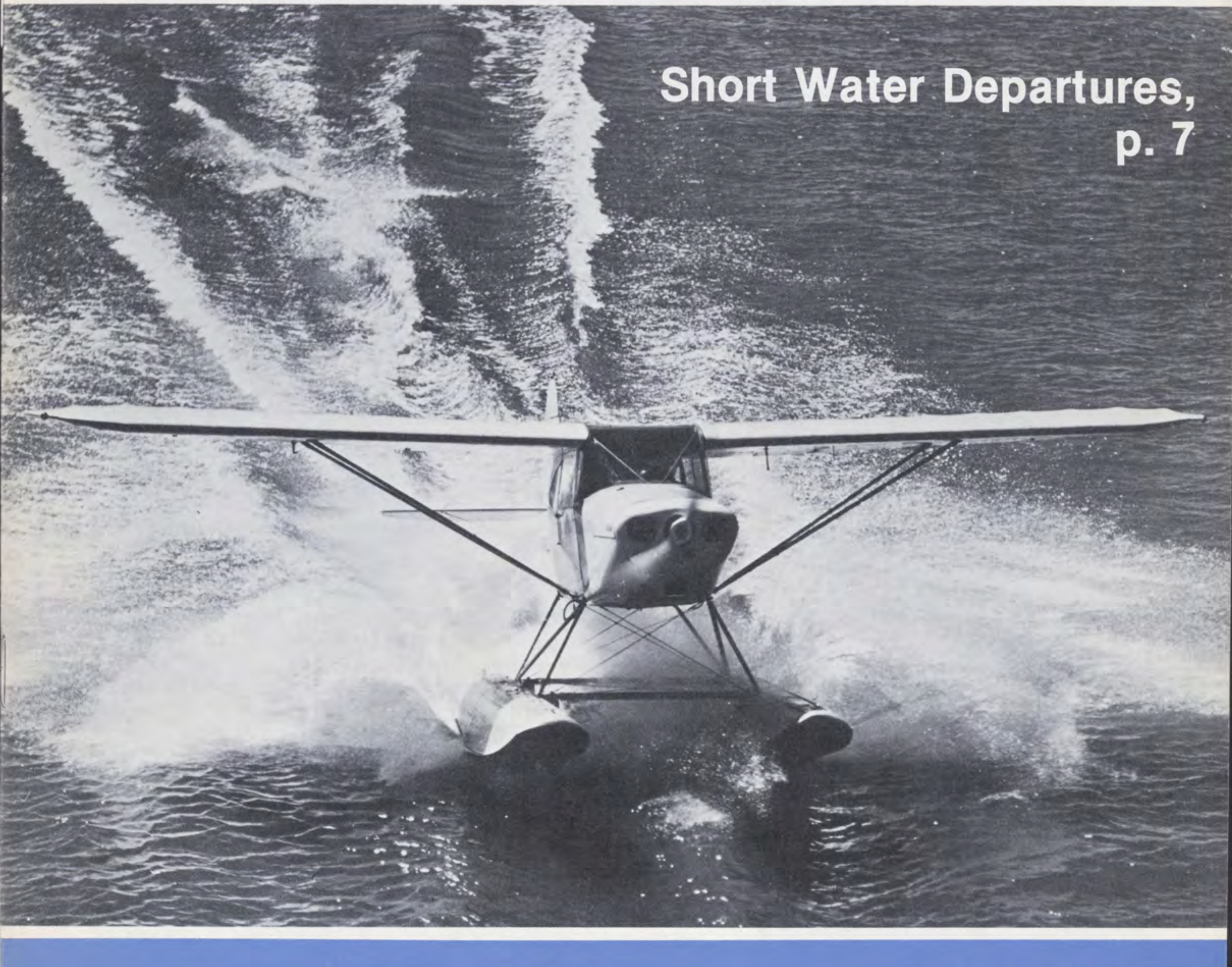

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FAA Aviation NEWS

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BRIEFS

OSHKOSH '88. The 36th Annual Experimental Aircraft Association Fly-In and Sport Aviation Convention at Oshkosh, WI, will unveil a new FAA Aviation Safety Center. Top FAA officials, including Administrator T. Allan McArtor, will lead discussions about FAA services and rules in a 400-seat auditorium. OSHKOSH'88 is scheduled for July 29 through August 5. Check NOTAMs for the special air traffic procedures.

WHEN IS A SAFETY BELT UNSAFE? Inability to activate the safety belt release mechanism cost the life of a C-185 floatplane passenger during an attempted takeoff from a rough and windy lake. Just after liftoff, the 185 caught the right wing tip in a wave and the airplane flipped over. The pilot and one passengers escaped from the cabin, but the second passenger was carried under by the sinking airplane and drowned.

An investigation disclosed that this passenger's seat belt was rotated 180° so that the release mechanism was facing inward against the body. Tests showed difficulty in releasing the clasp in this position. Proper use of seat restraints is PIC responsibility.

LAID TO REST. Aircraft owners are asked, in the interests of accurate FAA record keeping, to comply with FAR 47.41 concerning aircraft de-registration. When an aircraft is destroyed or abandoned, the owner should complete the form on the reverse side of the registration certificate and send it to FAA Aircraft Registry, AAC-250, P.O. Box 25082, Oklahoma City, OK 73125. Some certificates may not have this form; in this case, send in the certificate with a request for its cancellation. If the certificate has been lost provide a letter saying so and giving the make, model, serial number and registration number, and request cancellation.

SHORT AND NARROW. A Beech Travelair (light twin), on a sight-seeing trip in Alberta, Canada, took off from a 2,000' grass strip, became airborne, and settled down into a clump of poplars. Minor injures, no fire, but extensive damage. With the ambient density altitude of 4,300', the Travelair would have required 2,300' to take off from a paved runway. Even short grass will add about 10% to the required takeoff distance, as compared to taking off from a paved runway under the same conditions. The grass was mowed only 13' wide.

Secondary IMPACTS

Di-fusing Harmful Crash Forces

Robert R. McMeekin
Federal Air Surgeon

Nothing I know of in aviation has as much immediate potential for reducing the accidental loss of life, or suffering of severe injuries, as the proper installation and consistent use of an upper body restraint, or shoulder harness, *at each and every seat* in the aircraft.

The cost of installing such equipment is relatively low. The labor time is brief. Usage is simple and convenient. The additional degree of crash survivability afforded by a shoulder harness could easily mean the difference between life and death, between a crippling injury and a minor abrasion. Most pilots are in full agreement with this statement. Yet in an estimated 50,000 to 80,000 general aviation aircraft some or all of the seats offer only lap belt protection, which is far inferior.

Why? There is a curious apathy shown by many otherwise conscientious pilots and owners when it comes to taking the necessary steps to provide a shoulder harness at all seats. Some observers suggest that the harness symbolizes a loss of the freedom of movement which has always been associated with flying.

If true, this is a sorely misguided notion. The modern inertial reel harness provides virtually complete freedom of upper body movement—except for moments of extreme deceleration, when such freedom of movement could be deadly.

To help overcome this psychological resistance, which is making aviation less safe than it could be, I invite all pilots and owners to join us in the campaign we are currently launching to increase the use of shoulder harnesses in general aviation. If your present aircraft is not equipped with upper body restraints, make it so. If you know pilots with aircraft that are similarly negligent, talk to them about it. If you have passengers who are unfamiliar with fastening the harness, or not in the habit of using it, take time to explain its importance before you take off and land. If you instruct, or rent, insist that the aircraft seats in use all provide maximum safety. Your fellow flyers may live to thank you for the example you set and the advice you gave.

Moving Vehicle Living Space

In aircraft, as in automobiles, a small obstruction-free "living space" surrounds each occupant. In the event of an accident, as long as one remains within this space the probability of surviving and escaping serious injury is quite good. The initial impact of a crash against the ground or any other relatively immovable object *is less of a threat to occupants than the secondary impact(s) which occur when occupants are thrown against hard or sharp objects outside of the protected area.*

This medical fact has been known in this country for about half a century. In the early 1930's the U.S. Army Air Corps became concerned about the increasing number of fatal skull fractures that occurred during training accidents.

The immediate improvement in crash survival resulting from military use of the combined lap belt/shoulder harness equipment eventually led to its adoption in the cockpit of civilian air carriers. In 1977 a rule change (FAR §91.33) required crewmember seats of general aviation aircraft manufactured after July 18, 1978, to have approved shoulder harnesses. By 1985 this requirement was extended to all forward-facing seats in light airplanes manufactured after December 12, 1986. Additionally, FAR §91.14 made pilots in command responsible for crewmember and passenger usage of shoulder harnesses, wherever they are available, during takeoff and landing.

Nevertheless, compliance with the rule in general aviation has been far from complete, and enforcement is difficult. A study begun in 1982 by the National Transportation Safety Board examined some 535 selected accidents, in which at least one occupant was seriously or fatally injured on impact.

Accident Survival Studies

NTSB investigators made a careful study of each of these 445 occupants. Data collected included airspeed at impact, angle of impact, type of obstruction, deceleration rate, integrity of restraints and seats, etc., as well as personal recollections when available. Consequently they were able to project that in the event of 100 percent harness availability and usage, fatalities and serious injuries could have been reduced by *more then 75 percent.*

Insofar as the findings of this study could be projected upon general aviation as a whole, the following conclusions were drawn:

1. Approximately 60 percent of the fleet (or some 132,000 aircraft) were not equipped with shoulder harnesses.
2. Where shoulder harnesses were available, the use rate was only about 40 percent.
3. The appropriate installation and use of shoulder harnesses throughout the general aviation fleet would produce a dramatic reduction in fatalities and serious injuries in impact accidents.

It should be borne in mind that the NTSB study was undertaken six years ago. Because of the rule changes which took place in 1977 and 1985, requiring shoulder harness installation in recently built aircraft, the proportion of harness-equipped aircraft in the fleet may be considerably higher today. This surmise is supported by research carried out for FAA's Office of Aviation Medicine in 1987 by a consulting firm, which produced data suggesting the current rate of shoulder harness installations in general aviation was in the order of 61 percent.

The data was derived by a walk through observation of aircraft at the tie-down ramps of five small general aviation airports located near Washington, DC. Of 422 aircraft observed, shoulder harnesses were seen in 257 cockpits. (Noncrewmember seat restraints were not observed.) Even so, the 61 percent figure would suggest that in addition to compliance with the current rule on required equipment for recently built aircraft, to some extent voluntary retrofitting of older aircraft might be taking place.

To the extent possible, the 1987 research included observations of shoulder harness *use by crewmembers* during takeoff and landing at these same five airports. Through direct view or with the aid of binoculars it was possible to observe a harness use rate, among 173 crewmembers in 97 harness-equipped aircraft, of 76 percent. While not an ideal compliance with the rules, this is nevertheless an encouraging performance compared with the 1982 NTSB study data.

Indeed, the fact that the general aviation fatal accident rate reached an all-time low in 1987 may be more or less directly related to increased use of shoulder restraints.

However, some caution should be followed in interpreting the 1987 research data. Only a small number of crewmembers were observed (173), and no effort was made to compare activity in other areas of the country. Regional differences in retrofit activity as well as harness use compliance may exist. Airman attitudes toward the equipment may vary considerably if the observations were made in Texas, Alaska, or California, for example.

Equipment Availability

The Washington-based group did study one aspect that has general applications: the availability and cost of shoulder harness kits for pre-1978 aircraft. Inquiries were made to the four major manufacturers of general aviation aircraft—Beech, Cessna, Mooney, and Piper. Retrofit kits were available for the more popular light singles, with prices ranging from $150 to $500 per seat kit, and installation estimates running from 1.5 hours to as high as 12 hours per seat. Inertial reel harness types were readily available for many models. Kits for less popular models could usually be special-ordered.

Discussions with pilot groups have suggested that cost or availability are less significant factors in the adoption of shoulder harnesses than individual *attitudes*. On the whole pilots are more likely to consider investing in avionics equipment, as an added safety measure, than in occupant restraints. Many complain about the design of shoulder harnesses. They are said to be "restrictive," "uncomfortable," "irritating," "cause neck abrasions" etc.

The attitude of many pilots appears to parallel the resistance of automobile drivers to accept and use car seatbelts when these were first introduced by manufacturers— despite the escalating highway fatality figures and the proven safety advantages of seat restraints. Apparently it required a combination of regulatory action (state laws and police enforcement) and educational programs to overcome driver resistance.

By 1978, ten years after the Federally required installation of safety belts in car front seats, only an estimated 13 percent of the occupants used the belts; by 1984, only 14.3 percent. Since 1984, with the passage of state laws concerning seatbelt usage, and the broad distribution of educational material on automobile crash survival, usage of occupant restraints has become a regular practice by a majority of Americans.

Slow-motion films of automobile crash survival tests are probably the most effective form of education on this subject. Unrestrained lifelike mannequins are seen to be thrown violently around the car interior; heads bash into panel instruments windshields and other lethal obstructions. It does not take much imagination to visualize the kinds of injuries a real occupant would suffer under these conditions.

Cockpit Environment

But aircraft can provide an even more hostile environment than auto interiors, for many reasons. Impact speeds can be greater, and vertical as well as horizontal movement may be expected. As Sir Isaac Newton showed, some 300 years ago, doubling the speed of impact increases the severity of effects four-fold. Furthermore, for a light aircraft the deceleration time (the time required to come to a complete halt after encountering an obstruction such as a tree) is quite short, owing to the relatively small mass of a light plane. This rapid deceleration imparts a violent, whiplike motion to the trunk and head when the person is restrained only by a lap belt.

During a crash deceleration the unrestrained upper body will to flail around the lap belt, resulting in one or more secondary impacts against the control wheel, instrument panel or anything else within range—in the case of a backseat passenger this could include seatbacks, sidewalls, ceiling partitions, and other passengers.

Under most conditions—even if there is time for forewarning of an impending crash—the forces are so great that it is impossible to restrain the upper body's motion by bracing against any adjacent structure with one's arms. The head and torso injuries that result are not pretty.

Organizers of pilot safety meetings may learn about the availability of crash survival test films from FAA accident prevention specialists at local Flight Standards District Offices. Such films might be very effective in persuading pilots that freedom and survivability can go together. ■

Restraint Alterations

FAA Advisory Circular 43.13-2A, "Acceptable Methods, Techniques and Practices-Aircraft Alterations," contains a chapter devoted to aircraft shoulder harnesses, which must be installed by a certificated airframe mechanic. Such modifications should not be made without approval from the FAA aircraft certification office responsible for certification in your geographical area.

Any unapproved attachment or modification to seat structure could lead to failure of the seat at a lesser "G" load than required for certification. Possible hazardous alterations include drilling small holes to seat tubing to attach harness, fire extinguishers, approach plate holders, etc.

A copy of A C 43.13-2A could help your mechanic plan the job. it is available from FAA's Office of Public Affairs, APA-300, 800 Independence Avenue, S.W., Washington, DC 20591.

Hazards of Self-Fueling

The use of auto gas in low compression aircraft engines, by owners/operators holding a supplemental type certificate (STC), is expanding in this country. There are well over 11,000 general aviation aircraft operating with these STC's apparently without hazardous consequences as regards flight. On the other hand, the manual transferring of auto fuel from service stations to airports and into aircraft tanks, without suitable care, has led to some serious and fatal accidents.

Gasoline is such a familiar substance to most of us that we tend not to think of it as dangerous or uncontrollable. But gasoline or jet fuel vapor, in the presence of a given proportion of air, can be ignited by the smallest static spark imaginable.

A static charge is a buildup, or isolation, of an electrical charge on a given body or object, and it may jump or spark across to a lesser charged object when given the opportunity. The charge may build up whenever two dissimilar surfaces rub together. Simply walking across a synthetic rug on leather shoes can build up enough static electricity in a human being to produce a visible and audible spark when a metal door handle is touched.

The manual transferring of auto gas usually takes place in the open air, but a fire hazard is always present because the movement of the fuel from source to receptacle is in itself enough to generate a static charge. For maximum safety the entire operation must be grounded.

Grounding means providing a continuous electrical conduit through which electrons can flow from each of the fueling components to each other or directly to the ground. Electrical wire with attachment clips is used between the pump nozzle and the funnel, the funnel and the container, and the container and a ground bolt.

The most common mistake is the use of plastic components, particularly the portable container, funnel and strainer. Many persons select polyethelyne or similar plastics because they know this material is a poor conductor of electricity and wrongly assume this is a safety advantage. In fact, plastic is a ready accumulator of static charges and it is difficult to ground—which increases the likelihood of sparking. As regards a filter, a chamois cloth is much better than any solid strainer; it grounds fairly well and has the additional advantage of soaking up water.

When transporting fuel containers to an airport or landing strip, bear in mind that any sloshing of fuel or movement of the containers is likely to build up static. Never carry a gas can loose in a truck body or car trunk, where it can slide around or be knocked down. Keep your speed low, especially when you go off paved roads.

The same kind of grounding precautions should be observed in refueling the airplane: bond all components to a common ground, or ground each individually. Vehicles on tires, of course, are not grounded unless you take the precaution to provide the conduit.

Finally, avoid using gasoline to clean up greasy hands, tools, clothing, etc. Just rubbing your hands together afterwards, or tossing a fuel soaked rag near an electrical motor, could set the stage for a calamity. Gasoline is not the well-behaved substance its clear, benign appearance suggests. If you doubt this, read the accompanying true story by Mr. Frantz *(on the next page).*

Additional information on this subject may be found in FAA Advisory Circular 23.1521–1, "Approval of Autogas In Lieu of Avgas in Small Airplanes with Reciprocating Engines." The circular is available free from DOT, M–443.2, Washington D.C. 20590.

The Experimental Aircraft Association (P.O. Box 3086, Oshkosh, WI 54903) publishes a directory of airports, by state, where aircraft can be serviced with autogas by a fixed base operator.

A Day to Remember

By Woody Frantz

Recollections of a "routine" fueling operation that blew up in the pilot's face.

The story I'm about to relate to you needs to be published. Maybe someone's life can be saved if everyone is forewarned about the dangers of handling gasoline. Sure we all think we know how to safely handle gasoline, but how many people have washed airplane parts in gasoline? Or grimy hands? Or used it to clean some grease off your clothes? WHAT HAPPENED TO ME CAN HAPPEN TO YOU!

On May 26, 1986, after enjoying a nice long weekend with my family in Tulsa, I flew from Harvey Young Airport to Mangham Airport in Ft. Worth. It was Memorial Day and the flight in my Luscombe was a joy. The air was smooth and the visibility unlimited. I remember hating to put old number 1985B in the hangar because it seemed to be a perfect day for flying.

I had recently rejoined Bell Helicopter Corporation and was staying with my mother in-law in Ft. Worth until my wife and I could find a house and move back to Texas. I decided to get some fuel at the nearby service station and top off the Luscombe's tanks. I have an autogas STC from the Experimental Aircraft Association and had been using auto gas for several years. For the last year or so, I had been using a plastic (polyethelene) jug which would hold 16 gallons of gasoline.

The jug was rigged with a Schrader valve for applying air pressure to dispense the gas and pick-up near the bottom of the tank. The dispensing hose had a ball valve at the end so the fuel could be shut off when the tank was full.

An estimated 400+ gallons of gasoline had been transferred via this jug into the wing tanks of my Luscombe uneventfully. The jug was always filled by means of a large funnel which was fitted with a fine mesh screen for filtering. Although this set-up appeared to be perfectly safe, in effect it was an accident waiting to happen.

At 5:30 p.m. on Memorial Day, 1986, that accident happened. I was filling the jug and had just lifted the funnel to see if there was room for more gasoline. The jug was inside my Chevy Suburban, just behind the driver's seat (the rear seats were folded down) and I was standing at the rear passenger door on the left side.

Since the gasoline wasn't quite to the top, I added a little more to the funnel. While it was running out slowly, due to the fine mesh screen, I lightly touched the gas nozzle to the funnel to get the last few drops off and avoid spilling.

Suddenly the gasoline in the funnel burst into flames. Apparently all of the conditions for generating static electric sparks were perfect and the mixture of air and gasoline vapors at the spark was ideal for combustion. The static electricity was generated by the gasoline swirling inside the container, and was discharged through the funnel to the grounded hose at the service station.

My first reaction was get the burning funnel away from the jug containing all those gallons of gasoline. I grabbed the funnel and tried to throw it. Needless to say, this only made the situation worse. I realized quickly that the fire was out of control and that there were flames coming up all around me. All at once I was on fire too! I remember thinking not to inhale the flames as I ran from the concrete apron to an area of grass and dirt. I dove to the ground and rolled over and over.

The flames had engulfed my face, arms, chest, and back. They couldn't be put out by my rolling on the ground and I screamed for water. The service station attendant helped me get under the faucet on the side of the building. That put out the flames and was somewhat soothing to me. My polyester and cotton shirt had turned into burning plastic. I was conscious of all that was going around me, but had no idea how badly I was injured.

A Care-flight helicopter took me to Parkland Hospital in Dallas, where there is one of the best burn units in the country. Ironically I was taken in one of my company's *Jet Rangers*. During the flight I was given morphine for my pain, after which I passed out. The next thing I remember is waking up *nine weeks later*.

During that time my family wasn't given any hope for my survival. I had developed serious infections, pneumonia, heart problems, and other complications. On top of all that, my kidneys and liver failed and I was put on hemodialysis. The doctors had no hope because no burn victim had ever survived dialysis since they first started using it in the burn center in 1956. As far as I know, I'm still the only one. The doctors and nurses called me the miracle patient.

The final tally was that I had 2nd and 3rd degree burns on 52% of my body. The blue jeans I was wearing saved my lower body (because natural fibers are more protective against fire). My arms and hands have skin grafts from my legs and thighs. Leaving the hospital was only a beginning. I could not walk, stand up, lift anything or even turn over in bed. The 12 weeks in bed at Parkland Hospital had rendered my muscles useless. Atrophy had taken its toll.

Once I regained consciousness and my condition started improving, recovery proceeded at a fantastic rate. I am not a quitter. I worked hard with therapy, pushed myself mentally and physically and got back to work only 4½ months after the accident. I took another flight physical and have been flying the Luscombe again, including hand propping it. I soloed the Luscombe from Tulsa, where a friend had kept it for me, to its new home at Grand Prairie Airport the week after Thanksgiving. Mangham Airport had closed while I was ill.

That trip from Tulsa to Texas was extremely emotional for me.

I cried a little as I flew over all the familiar landmarks and took in all the beautiful countryside. I decided that everything was going to be all right and that I would be able to do all the things that I could do before that terrible day in May.

I would like to say to any pilots who in the interest of economy are transporting auto gas to their aircraft or contemplating doing so, that the few pennies saved cannot possibly offset the risk of severe injury or of losing your life. Please purchase your fuel at the airport where they have the proper facilities for handling it. I do now!

PLEASE BE CAREFUL!! ■

Short Water Departures

Eliminating Unnecessary Guesswork in Seaplane Takeoffs

Are seaplanes intrinsically more difficult to fly than land planes?

There are no comparable accident rates per 100,000 hours for land and seaplanes that would support such a contention. In fact with regard to the categories of accidents provided by the National Transportation Safety Board the ratio of accidents in each category is fairly similar for both types of aircraft.

The one exception is takeoff accidents. In general aviation there are almost four times as many landing accidents as takeoff accidents. But seaplane pilots have approximately *the same number* of takeoff accidents as landing accidents. *Why?*

A review of all seaplane accidents reported by NTSB for 1984–86, the latest years for which figures are available, shows that poor or inadequate planning, or overestimating the performance capability of the aircraft, are the prominent characteristic of these accidents. In other words, they are largely preventable.

The surface used by seaplanes for takeoff is apt to be far more extensive than land runways, but it is also far less stable, or predictable—particularly in comparison with paved runways. The surface of water can vary from glassy smooth to huge waves. The water level (especially at dammed lakes or manmade reservoirs) can go up and down with the season—consequently affecting the available takeoff distance as well as obstruction proximity. The wind speed and direction can change in accordance with a wooded or hilly shoreline.

Furthermore, bodies of water (even designated seaplane bases) used by aircraft do not normally have restrictions on the activities of other users, such as boaters and swimmers. They may also be strewn with possibly harmful flotsam and submerged debris. Consequently, the pilot has a great deal of personal responsibility for determining whether s/he can takeoff safely—in which direction, from which point on the water, at which hour of the day, etc. Pilots must be very familiar with the performance data and current capability of their aircraft and able to make accurate allowances for changes in load, altitude, temperature and water conditions. The relative isolation of many lakes used by seaplane operators, and the absence of crash rescue personnel or facilities, should result in an added measure of caution being exercised.

Departure stalls, leading to collision with trees, hillsides or the water, are also a common feature of seaplane takeoff accidents. Such accidents may be blamed by the pilot on poor engine performance, unexpected wind gusts, etc. However, a careful investigation usually discloses that adequate preparation was not made for the departure. Commonly the takeoff area selected was too short for a successful takeoff and clearance of shoreline obstacles, given the existing weather and water conditions, and the performance capability of the aircraft and pilot.

Your Pilot's Operating Manual will give you the water run distance and the total distance from start of takeoff required to clear a 50 foot obstacle, but that still leaves a number of questions unanswered. These include:

- *Available water run for takeoff*. Water distances are hard to estimate and very difficult to pace off, or otherwise measure. Guessing can be painful.
- *Windspeed and direction*. Almost always these will vary along the takeoff run, especially as you approach the shore.
- *Water conditions*. Glassy smooth? Gentle waves? Rough water?
- *Water lilies or other plant growth*? It all makes a difference.
- *Gross Weight*. Fishing or hunting trophies, as well as other local souvenirs you just cannot leave without, are likely to push your gross weight well over the weight of the airplane at the start of this flying trip.

Is there any way you can tell, basically from the performance of the airplane during takeoff, whether you are going to clear the obstacles on the shoreline with a normal straight-ahead climbout? And how can you know, before you lift off, at what point you must chop the throttle in order to assure a safe deceleration?

Many individual formulas have been devised by bush flyers for assuring takeoff clearance in land planes, but the first Go/No-Go system for seaplanes to come to our attention is the Delta (for distance) Ratio plan of Dr. Dale De Remer.

A professor of aviation at the University of North Dakota, Dr. De Remer has been flying and instructing in floats for over 30 years. The following condensation of his article on the Delta Ratio, which first appeared in the 1987 Water Flying Annual, is reprinted here with permission.

Editor's Note: The technique described hereafter has not been tested or officially evaluated by FAA, and is not endorsed by the agency. It is presented here as an example of a means by which a very experienced and knowledgeable seaplane pilot flies out of short lakes with confidence.

The Delta Ratio

Have you ever made a takeoff from a short lake when you were not absolutely sure you could make it? What would you have given then, to be reassured of the outcome? There is a way I know of you can make that next tight takeoff a sure thing. There is very little measuring, weighing, and figuring involved. You can probably do what needs to be done while warming up the engine. Here is the typical scenario: a heavy seaplane, short and narrow lake on a hot day (sound familiar?). Add tall pine trees, a rocky shore and 200 miles to civilization, just to make the problem interesting.

Let me stop here for just a moment to remind you that if you are over gross weight and/or have not determined that you are within the CG limits, you are definitely back in the realm of not being able to predict the outcome of the takeoff; *in short, you are a test pilot flying an untested bird.* Assuming you know that you are within the CG limits (loading toward the aft CG limit will improve the airborne portion of the takeoff performance) and weight limits, let's take a look at how this can be done.

There is one very interesting, very reliable fact that shows up in an analysis of any seaplane's takeoff performance figures given in the Pilot's Operating Handbook. If you divide the takeoff water run distance by the total distance over the 50-foot obstacle, you obtain *a ratio of water run distance to total distance.* Multiply this ratio by 100 and you have the percentage of total distance that will be water run.

To use the Delta Ratio I developed percentiles of water run to total distance required to clear a 50′ obstacle, at various weights and altitudes, from the handbook for my Cessna 180 (Figure 1). For example, at 2,600 lbs. and with a D.A. of 5,000 feet, the ratio will be just about 62 percent for my aircraft. If I place a marker at 62 percent of the available water run, then that marker becomes a go/no-go flag. (Figure 2.)

The interesting thing is that this ratio is nearly constant, regardless of minor variations in weight, wind and altitude—or surface conditions. However, exceeding the C.G. limitations will invalidate the ratio.

From Figure 1, you can see that it takes 62 percent of the total takeoff instance to get my Cessna 180 airborne. If we could place a marker at 62 percent of the total length of the available water run, then that marker becomes a go/no-go flag (see Figure 2).

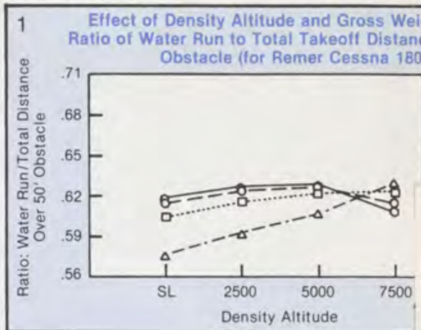
The concept is simply this. Regardless of any of the factors that affect performance, if the seaplane-pilot combination has enough performance to get off the water within 62 percent (in the case of the 180) of the available distance, you will also have the capability to make it over the obstacle, assuming the pilot displays a competence level for the rest of the takeoff that is equal to what has been done so far in the water run. If the aircraft is not off the water by the time it reaches the flag, then the combination of factors (altitude, temperature, wind, lake length, humidity and so on) present at that moment will not allow the successful completion of the takeoff. With this method, the pilot will know for certain, before leaving the water, if the takeoff can be made successfully.

Should the takeoff be attempted again? Perhaps. The aircraft is lighter now, by the amount of fuel used, and perhaps the pilot noticed part of the takeoff technique that could be improved next time. The pilot may also elect to wait until conditions improve, such as a better breeze or cooler temperatures. The option of returning for part of the load, or shuttling it to a nearby, longer lake should also be considered.

To reiterate, if we are airborne by the time we get to the flag, there will be sufficient distance left to climb over the obstacle. If the airplane is not airborne by the time it reaches the 62% marker, abort and decelerate because it is unlikely that the obstacle can be cleared. It is as simple as that. (In this discussion so far, we are

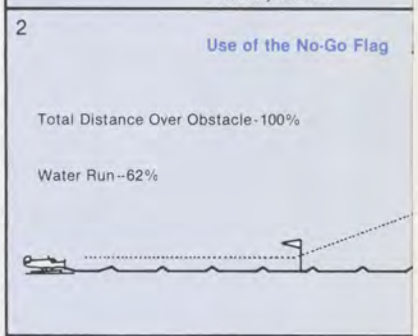
1

Effect of Density Altitude and Gross Wei
Ratio of Water Run to Total Takeoff Distan
Obstacle (for Remer Cessna 180



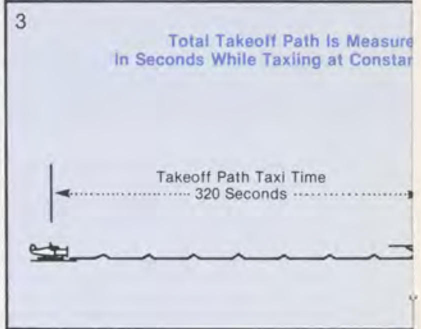
2

Use of the No-Go Flag



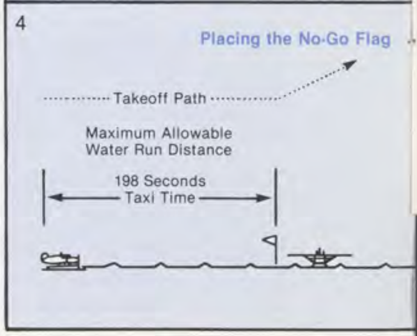
3

Total Takeoff Path Is Measure
In Seconds While Taxiing at Consta



4

Placing the No-Go Flag



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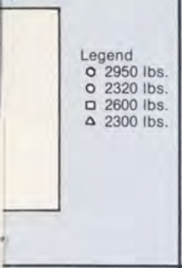

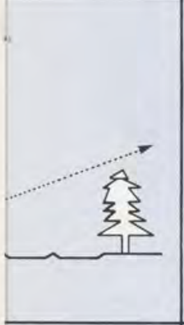

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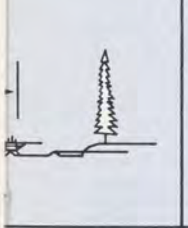


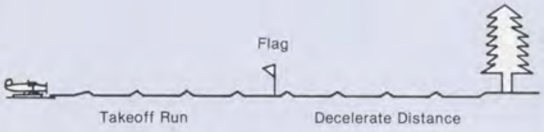
5

If Delta Ratio to Clear 50′ Obstacle is 62%, Then for a 75′ Obstacle I Multiply This Figure by 0.84, Giving a D.R. of 53%. For a 100′ Obstacle I Multiply the D.R. by 0.73, etc. Higher Obstacles Require Proportionately Longer Climb Out Distance-and Smaller D.R.'s.

Obstacle Height Feet	Multiplier
50	1.00
75	0.84
100	0.73
125	0.63
150	0.56
200	0.40

6

Deceleration Distance, as Measured by Constant Speed Taxiing, Must Not Exceed Distance From No-Go Flag to Limit of Usable Water Near Shore.



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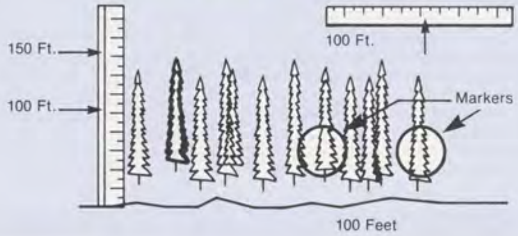
Estimating the Height of the Obstacle.



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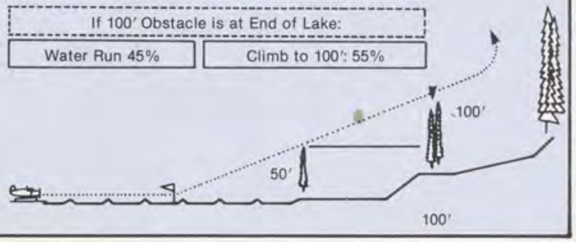
Distant Obstacles Seen From the No-Go Flag May Be Trouble. If Higher Obstacle Visible From No-Go Flag, Turn Before Reaching.



assuming that the obstacle at the end of the takeoff run is 50 feet high. How to deal with higher obstacles will be discussed shortly.)

Placing the marker. That's easy. Do it while warming the engine up. Just time how long it takes to taxi at constant rpm along the takeoff path, into the wind, from the beginning of the takeoff run to the other end (see Figure 3). Let's say for example, that it takes 5 minutes and 20 seconds (320 seconds). While taxiing back, multiply 320 seconds times 62 percent (for a Cessna 180), which equals 198 seconds. Now, start at the same takeoff point, taxiing into the wind again at the same constant rpm, for 198 seconds. When the time is up, throw the marker out the window (see Figure 4). Your peace-of-mind insurance is in place, 62 percent of the way down the takeoff run.

Making the no-go marker is easy. Obtain a few 3- to 4-ounce fishing sinkers, some cotton string and some large (16 inch) colorful balloons. The Canadian red weather balloon is perfect. That's all you need. The items are lightweight and take little space. I carry them in a small sack that's stuffed in the back of the pilot's seat. If the water is deep, 30 feet of string will keep the balloon stationary long enough to accomplish the takeoff if the water is not moving. Don't use the ready-made fish locator markers (float, string and weight) that are for sale at the tackle shop. You can't see them well enough from a distance and they are not biodegradable.

If you can't see the no-go balloon easily at the beginning of and all during the takeoff run, abort the takeoff. You need to be concentrating on making the perfect takeoff, not looking all over the lake for a marker you can't see.

A word of caution: one should never trust the location of a marker that was placed at an earlier time. Check its location with the taxi-time method.

Deceleration distance. The whole idea with the no-go flag method is to know for sure whether or not the takeoff can be made successfully over the given obstacle. The marker, or "flag," becomes the decision point. If the aircraft is not airborne at the flag, or has been pulled off before it's really ready to fly when it goes by the flag, the pilot must abort and decelerate.

The pilot has predetermined that there is sufficient distance, from the flag to the obstacle, to climb over the obstacle if he is airborne at the flag. *He must also be sure that there is sufficient distance from the flag to the windward shore* (where the obstacle is), to decelerate the aircraft and turn without contacting the shore.

The determination of deceleration distance for each aircraft need be done only once, and the results noted. Deceleration distance may be defined as the total distance needed to (1) decide that the takeoff in progress is a no-go, (2) throttle back to

idle power, (3) flare (pitch-up) and raise flaps (optional, depends on the aircraft), (4) walk the rudder to increase drag, and (5) when slowed, lower water rudders and make a 90-degree turn to parallel the near shore.

This distance is easy to determine. Place one of the newly made markers out in a lake. Enough distance is needed on the leeward (downwind) side of the flag to be able to accelerate, in takeoff mode, to liftoff speed. Be sure there is enough distance on the windward (upwind) side of the flag to be able to decelerate according to the five steps listed above, or your own technique. Load the aircraft to gross weight. Accelerate to near liftoff speed toward the flag. When passing the flag, decelerate, using your best technique. When slowed and turned 90 degrees, throw out a second marker.

Then, while taxiing into the wind (from the first flag) at a constant taxi rpm, note the number of seconds needed to taxi between the two markers. Write this number in your little black book, as it should be close enough to use in a reasonably wide variety of situations. The longest deceleration run will occur with minimum wind and other than glassy water conditions. It would be well to conduct your test under these conditions, if possible. My Cessna 180 decelerates in less than 650 feet, which is 90 seconds taxi time at 500 rpm. Caution: Use figures for your aircraft and your deceleration techniques, not someone else's.

The deceleration time (in seconds) must be equal to or less than the number of seconds it takes to taxi from the no-go flag location to the shore you plan to depart over (see Figure 6.) You may want to add a few seconds for a little extra safety margin.

There is one more thing. Just before starting the takeoff run, promise yourself that you will not violate that takeoff no-go marker, not even by one second.

Estimating obstacle heights. Most experienced pilots are pretty good at estimating heights up to 50 feet. What about greater heights?

If the obstacle is near the lake edge, you can quite accurately determine the height by the following method:

1 Go to the shore that you will depart over.

2 Mark a tree so you can see the mark out from on the lake (toilet paper works well and it is biodegradable).

3 Pace off 100 feet (about 34 paces) perpendicular to the takeoff run and mark a tree there.

4 Taxi back out into the lake until the marks can just be seen. With a straight-edge at arm's length, mark the distance between the marks on the straight-edge. For the straight-edge, a ruler works well or the scale on a chart.

5 While still the same distance out in the lake, compare the length of the 100-foot measurement on the rule to the distance from the shoreline to the top of the obstacle.

6/ That measurement, compared to the 100-foot measurement, will allow the pilot to closely estimate the obstacle height (see Figure 7).

Now taxi back to the location of the no-go flag. From the vantage point of the no-go flag, look at the obstacle. If higher obstacles appear in the background, behind the immediate obstacles, it is important to know that the aircraft may not be able to climb over those farther, higher obstacles particularly if on the takeoff run you aren't off the water until near the no-go flag. In that case, the pilot must plan a turn toward lower ground before reaching those further obstacles (see Figure 8).

Based on some simple geometry, Figure 5 shows the multipliers needed for various obstacle heights greater than 50 feet. For example, if the aircraft's water run is 62 percent of the total distance to clear a 50-foot obstacle, then its water run will be .73 times 62 percent, or 45 percent of the total distance to clear an obstacle at water's edge that is 100-feet tall. So, to be assured of being able to clear that 100-foot obstacle, set the no-go flag 45 percent of the available distance down the lake, along the takeoff run.

Author's note:

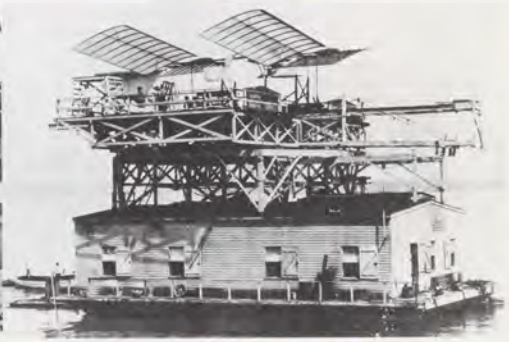
I believe this concept to be sound and have used it myself, but present it here only as a theory with hints on how to use it, with no guarantees or warranties. If you use it, you do so at your own risk. I welcome any inquiries on the subject and especially would appreciate hearing from anyone who has reason to suspect its reliability. Recent detailed research indicates the ratio of water run to total distance for takeoff is greatly decreased by using the flap-change technique for takeoffs (momentary use of greater flap angles than is recommended for normal takeoff in order to unstick aircraft from the water). Therefore do not use the flap-change technique to establish no-go locations.

For further details, see my articles in the Seaplane Pilot Association's Water Flying Annual, 1987 and 1988, or my book on "Water Flying Concepts," due out this fall.

Dale De Remer

Langley's Aerodome

Samuel Langley, right, and his pilot/mechanic Charles Manly at the launch site.



Nine Days Before Kitty Hawk

When Samuel Pierpont Langley died of a stroke on February 27, 1906, many said that he was a heartbroken and disappointed man. His impressive original achievements in astrophysics and other scientific fields lay buried under the public ridicule heaped upon him when what might have been America's first successful airplane plunged into the Potomac River. He was far closer than anyone realized to achieving what many considered the impossible dream: powered manned flight.

Langley was born in 1834 at Roxbury, MA, to a distinguished New England family whose roots went back to the earliest colonial days and included such members as Cotton Mather and President John Adams. The young Samuel Langley and his brother John were encouraged by their father, a wholesale merchant, to foster their inquiring natures and voracious reading habits.

Samuel was fascinated by the sky, but when he graduated from Boston High School in 1851, he concluded there were few opportunities to sustain himself by star-gazing. Having some talent in drafting, mathematics and mechanics, he started his career with an architectural firm in Boston, later moving to other firms in St. Louis and Chicago.

In 1866, Samuel Langley heard by chance that the Harvard College Observatory was expanding and arranged an interview. The observatory director was impressed by his extensive astronomical knowledge and original telescope work and he was hired on the spot. His career in astronomy had begun.

In 1867 he accepted a professorship at Western University of Pennsylvania (now University of Pittsburgh), which included responsibility for the Allegheny Observatory. Although there was opportunity for original astronomical research and investigation, Langley found himself limited by lack of adequate working conditions, equipment, and funding. Therefore he put his mind to a means of making money out of astronomy.

In the two decades Samuel Langley spent as Director of the Allegheny Observatory, his original research and experimentation achieved breakthroughs in astronomy that have been compared with such great scientists as Sir Isaac Newton. His specialty was the sun, with which he felt a special affinity, explaining that "we are all its products." His work in solar radiation so dominated the field that even when—as it infrequently happened—he made an error, other scientists were reluctant to disprove his findings.

A single, inauspicious event led Langley to abruptly turn away from the scientific endeavor he had virtually invented—astrophysics. In 1886 he attended a meeting of scientists in Buffalo, NY, where he listened to a paper that rekindled a long-slumbering interest. As a boy in New England, he had spent many warm afternoons lying out on a hillside marveling at the seemingly effortless maneuvering of hawks in flight. He had never ceased pondering about what made sustained flight possible and now he decided to satisfy his curiosity with some careful reading on this subject.

He was dismayed to find so much of the literature contradictory, which provoked him to "... determine the true facts myself, by my own experiments. carried out in my own way. I'll take nothing for granted."

Langley persuaded the Observatory to allow him to construct a gigantic test device to study the laws of aerodynamics. This included a huge whirling table with two 30' wooden arms. A powerful steam engine rotated the arms at a tip speed up to 70 mph.

After four years of concentrated work, Langley published a report, "Experiments in Aerodynamics," in which he stated that man-carrying flight at very great speeds "is not only possible, but within the reach of mechanical means which we now possess."

By this time Langley had become Secretary of the Smithsonian Institution, the prestigious quasi-government organization headquartered in Washington, DC, and devoted to fostering and displaying works of science, nature, art and industry. Langley slowly transferred his aerodynamic laboratory from Allegheny to Washington, DC, and worked on what he saw as the remaining problem: how to stabilize, steer, and otherwise manage a flying machine in the air.

His first step of discovery in this fledgling science was to build small scale models for gathering data. He started with rubber-band powered aircraft and progressed to more sophisticated (un-manned) machines powered by a small steam engine. Six steam "aerodrome" (from the Greek—air runner) models were tested—with Langley's friend, Alexander Graham Bell, acting as a witness on the later attempts. However, only No. 5, launched on May 6, 1896, succeeded. A 3,000' flight of one and a half minutes at an altitude of 70–100 feet was accomplished at 20–25 mph. A second successful flight of the same model showed this was not a fluke. The airplane, weighing about 100 lbs., was fitted with paired wings both fore and aft, and with a gasoline engine.

Aerodrome No. 5 was catapult-launched (Langley felt that propulsion was needed to achieve flight) from the top of a converted houseboat on the Potomac River, about 20 miles south of Washington, DC. Langley wrote in the memoir, "As I heard the cheering of a few spectators, I felt that something had been accomplished at last. Never in any part of the world ... had any machine of man's construction sustained itself in the air for even half of this brief time."

In November Langley resumed testing. This time the results on No. 6 were even more successful. To Langley, this proved his theory was correct and in an article in *McClure's Magazine* he wrote, "I have brought to a close the portion of the work which seemed specially mine. For the next stage, the commercial and practical development of the idea, it is probable that the world may look to others."

Langley was now 64 years old and his health somewhat frail. He was ready to go back to his first love, astronomy. However, President William McKinley became interested in manned flying machines to help the war effort (the Spanish American War of 1898). Langley cautiously committed himself to try further, knowing that the gasoline engine needed was not yet available

Langley's assistant, Charles Manly, eventually developed a 52.4 hp, five cylinder gasoline engine, capable of rotating two 7'6" propellers at 2,000 rpm. The engine weighed less than 125 pounds. By October 3, 1903, Langley was ready to test a full scale model, again employing the houseboat catapult launch. This time the aircraft, known as *Aerodrome A*, was to be full-sized and manned.

Due to lack of funding and time, this model was based on Langley's most successful designs, Nos. 5 and 6. The four cloth-covered wood ribbed wings were directly attached to the tubular steel fuselage. The overall size was 49' (wingtip to wingtip) by 65' (nose to tail).

The Pénaud tail incorporated elastic bracing for vertical stability, but the pilot could override this by means of a control wheel. A rudder located amidship for steering was similarly controlled. All control and lift surfaces were covered in percaline cotton, which cost ⅖ less than silk and does not flute or pocket like silk. The engine throttle and the control wheels for both steering and stability were located to the right of the aviator's "car" (or cockpit) for easy one handed operation.

On October 7, 1903, the press, by special invitation, were on the Potomac in boats and lined the shore to witness this historic event. Excitement built as the engine started and the catapult restraining cable was cut with an ax. The aircraft shot down the track, wavered and plunged into 17 feet of water—its tail assembly

(continued on back cover)

The Heat Is On

Why the Human Engine has to be Water-Cooled in Summer

Some cautionary notes on the dangers of dehydration in hot weather flying by Dr. Harry Rance, an Australian flying physician.

Recently I completed a trip to Australia's Northern Territory with four friends. We departed for Alice Springs via a lunch and refuelling stop at Leigh Creek. I assumed my excessive perspiring was due to the 86°F heat and two cups of tea.

A student pilot was flying the aircraft from the right hand seat and while I was explaining where we were, DME distance, etc., I realized my estimate for Finke was wrong. I then started recalculating and decided my watch must have stopped. After querying the time from the student and realizing the difference in GMT and South Australian time, I recalculated again. Finally it occurred to me that I had added the miles to the estimated time interval instead of the minutes, so I crossed it out for the second or third time, and added it again.

After a lot of effort I accomplished this task and Finke was overflown as flight planned. By this time my head was aching and I felt quite hot and as it was getting late in the afternoon, the turbulence had also increased.

I passed our ETA to Alice Springs after laboring over the very simple addition and we arrived at that time.

After the usual landing and tie-down chores were completed I felt very uncomfortable, with the headache becoming more severe. At this stage I started to drink the soft drink we had on the plane, and after reaching the hotel, I seemed to drink several gallons more.

Later that evening when I started to plan the next stage of the journey, I was absolutely amazed at the state of that day's flight plan.

Besides the numerous crossing-outs of the ETA's, the figures had become progressively harder to decipher. The errors I had made with the additions were so obvious that it was hard to believe the flight plan was mine. The ATIS information for Alice Springs was written out and I could hardly recognize my own writing or figures.

There is absolutely no doubt in my mind that I had allowed myself to become dehydrated, and the difficulty of the additions and the state of the flight plan were the direct result. The aircraft was on track at all times and navigation was not a problem, but it raises the question of how much more difficult it would have become if another problem had presented itself requiring quick, clear thinking, or difficult decision-making.

One could rightly assume that this could only happen to a first-time Territory "goer" with limited flying experience. Not so. I have been on numerous trips to the Australian outback, have over 2,000 hours experience and hold a commercial license with a class I instrument rating. On board the aircraft were ten gallons of water and packets of soft drink. It goes without saying that the fluid on the aircraft was taken in liberal doses by the pilot and crew for the remainder of the journey.

HEAT STRESS

An aircraft left in the sun will obviously "soak-up" heat—especially those aircraft with a large expanse of plexiglass. Gliders are prime examples of the potential for severe heat-soaking. The advantage of the good visibility from the "glass bubble" brings the disadvantage of high cockpit temperatures when left even for a short time in the sun. Temperatures within cockpits may rise to 15–25° above ambient temperatures and the surface temperatures of items within the cockpit may be even higher, in some instances high enough to cause true burning of the skin.

A principle of physics taught to most of us at school or learnt by experience was that black or dark objects are good absorbers of heat, so we should ensure that our clothing is light colored, preferably white, to reflect as much heat as possible. Headgear is useful and will help to keep the head cool, especially if there is a layer of air between the hat and head.

While you expect the heat to dissipate once you get airborne due to cooler ambient air, there is the risk of continued heat absorption in the cockpit from solar radiation. The "greenhouse" effect of the plexiglass "bubble" is very real, particularly if the flight is not to any great altitude and is extended more than a few hours.

The effect of getting into a hot cockpit and being exposed to solar radiation is akin to gentle cooking. Our bodies produce energy internally for us to live, to drive our internal engine, and heat is produced in the process. We take in fuel, food, and drink, and convert it into energy for life. The heat produced is usually lost to the environment by radiation, conduction and convection to the surrounding environment. In addition our bodies produce liquid on the surface of the skin—namely sweat, which is evaporated to provide additional cooling.

If we are in a hot environment we are unlikely to lose much, if any heat, by radiation, conduction or convection to the surrounding air or structures. Our only facility for cooling is this evaporative effect of losing fluid.

We have all experienced this phenomenon in hot weather. With no breeze and little activity, we are soon running with sweat because our bodies are trying to remain within the close limits of internal temperatures for optimum performance. Quite obviously to produce sweat we need a reserve of fluid within our bodies.

What happens if we cannot keep our temperature down? Our body's design specification calls for very narrow limits for the internal core temperature. To go outside those limits will produce a severe reduction of performance. Studies have shown that aircrew members make more control errors in hot environment, than in temperate ones. These errors are characterized by unpredictability.

Typically, errors were often made in speed, altitude and heading control movements. Attention was narrowed and learning ability impaired among student pilots. Newly acquired or little-used skills were affected first, as one would expect. Heat stress will add to other stressors such as fatigue, sleep deprivation and emergency situations and may influence the most vulnerable phase of flight, landing—especially after a long day of flying.

DEHYDRATION

Mention has already been made that in a hot environment cooling of the body may only occur through the evaporation of sweat. The formation of sweat is dependent upon fluid being available within the body to be brought to the skin surface to produce this cooling effect. The body contains a large quantity of water, about 60 percent of body weight. We maintain a balance of this fluid by drinking and eating and then excreting excess fluid through the kidneys.

We have all experienced the after-effects of drinking large quantities of fluid over a short time period. There is a need to rapidly lose the excess fluid through the kidneys. On the other hand if we deprive ourselves of an adequate water supply the body uses its own stores to produce sweat. If the inner store is not replaced, we lose more fluid than we can afford. This is dehydration. The extent of the dehydration is related to the amount of sweat lost and the amount of fluid we replace by drinking.

Once the ambient temperature rises over 90°F our only chance of keeping the body temperature down is by evaporating sweat. At that sort of temperature the body needs at least four quarts of water a day, even without any untoward exercise. The fluid replacement must be spread reasonably and uniformly throughout the day. If we exercise, we require more fluid. Climbing around an aircraft on preflights, manhandling aircraft and similar tasks require more fluid. At altitude the atmospheric pressure is reduced and increases the evaporation of sweat which compounds the problem.

As an aid to cooling, the drinking fluid should be cool (iced water is not always easy to drink). Tea and coffee are best avoided as they contain caffeine, which is a diuretic. (A diuretic is a substance which promotes excretion of urine from the kidneys, which is not what is required in this situation.) Alcohol, also a diuretic, is obviously not a suitable fluid replacement for many reasons, especially when flying.

When we sweat we also lose salt, but there is no need to concern ourselves on this count unless we are to be in the hot environment, working and sweating, for more than a couple of days. If we are in that position then salt should be added to meals as the most palatable means to that end. It has been suggested that your fluid intake should be spread throughout the day. *You cannot wait until you feel thirsty; it is too late by then, you are already dehydrated.*

A good indication is the color of your urine; once it is darker than a pale straw color you should drink at least one pint of fluid every 30 minutes, or more frequently if you are actively working.

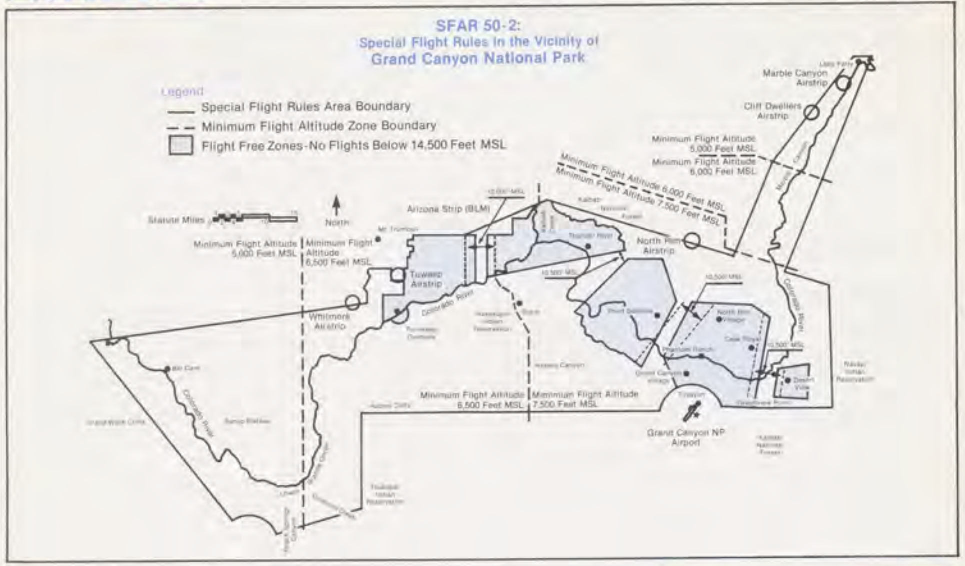
Symptoms of dehydration include headache, muscle weakness, drowsiness, nausea and impaired vision. All these symptoms appear vague and could be related to other conditions, but in a hot environment dehydration must be considered as the likely cause. The performance of a complex psychomotor task, such as flying, will be affected in an insidious manner and you may not be aware of your deficiencies until too late.

Flying in summer heat calls for proper maintenance of the human cooling system. Suggested precautions include:

1. On the ground have as much cockpit ventilation as possible, doors, windows, and "bubble" open.
2. Attempt to provide shade for at least the cockpit of the aircraft.
3. Ensure you have prepared yourself with adequate rest and fluid intake in the days beforehand.
4. Wear sensible clothing to reflect heat, and protect against solar radiation.
5. Have a sunscreen agent of your choice with a high blocking factor; 15+ is safest.
6. Drink plenty of fluid during the day, aim for at least one pint every 30 minutes or so, and take some on board your aircraft.

Preventing dehydration and sunburn will allow you to enjoy your summer flying and to get home safe and sound. ■

EDITOR'S NOTE: This article was reprinted with permission from the Safety Digest, *an official publication of the Australian Ministry of Transport.*



SFAR 50-2:
Special Flight Rules in the Vicinity of
Grand Canyon National Park

FLIGHT-FREE ZONES IN GRAND CANYON PARK

Rules covering aviation activity over Grand Canyon National Park have been amended by Special Federal Aviation Regulation 50-2, enacted by FAA in coordination with the National Park Service, and in accordance with Congressional legislation. The new rule will go into effect on September 22, 1988.

Grand Canyon flying is currently governed by a temporary rule, SFAR 50-1, designating a Special Flight Rules Area over the Park, within which specific procedures and minimum altitudes are required for all operations.

The primary changes in the new rule are a northeast extension of the Special Flight Rules Area to include Lee's Ferry; a higher ceiling and higher minimum altitudes for the Area, up to 14,500 feet MSL; establishment of "flight-free zones" over environmentally sensitive sections; and specified routes and altitudes for flight between the flight-free zones.

Existing prohibitions on flights closer than 500 feet from any terrain or structure in the canyon will be retained. Likewise continuing is the requirement to monitor the common radio frequency in each sector of the Area. Specially authorized operations, such as commercial air tours, will no longer have to make position reports, except as called for in their authorization.

The flight-free zones will exclude all aircraft, from the surface up to 14,500 feet MSL. They include airspace over the Colorado River around Desert View, Phantom Ranch, and Point Subline in the east; and over Toroweap Overlook and Thunder River in the central area of the Canyon. Corridors with a minimum altitude of 10,500 feet MSL will be defined between the zones.

Otherwise, the minimum flight altitude in the Special Park Rules Area will vary from 5,000 to 7,500 feet MSL.

Pilots are advised that none of the procedures within the Special Park Rules Area relieve them of the need to look out for and avoid other aircraft. A local FSS should be contacted for the latest information, prior to entering the Area.

A large-scale physical depiction of this region is shown on the current Las Vegas sectional chart. It will be updated with respect to the new rule when the September 1988 chart is issued.

Although SFAR 50-2 is a final rule, public comments may be considered if received by the agency on or before August 1, 1988. Send comments to Rules Docket Room 916, FAA Washington, DC 20591. Copies of the new rule may be requested from FAA's Office of Public Affairs, APA-300. For information, contact David L. Bennett, Office of the Chief Counsel, AGC-230. Telephone: (202) 267-3419.

AUTOMATIC ALTITUDE REPORTING

An important new rule on the use of altitude reporting transponders (Mode "C") was published in the Federal Register on June 21, 1988. Highlights of the rule change include the required use of this equipment as follows:

En Route. All aircraft operations in all airspace of the adjoining 48 states at and above 10,000 feet MSL, except in airspace at and below 2,500 feet AGL. (Effective 7/1/89)

Terminal Control Areas. All operations within a 30 NM radius of the primary airport from the surface up to 10,000 feet MSL. (Effective 7/1/89)

Airport Radar Service Areas (ARSA). All aircraft operations flown in and overlying ARSA's up to and including 10,000 feet MSL. (Effective 12/30/90)

Designated Airports (currently Fargo, ND, and Billings, MT). All operations within a 10 mile radius of the airport, from the surface to 10,000 feet MSL, excluding airspace below 1,200 feet AGL beyond the airport traffic area. (Effective 12/30/90)

Exceptions are provided for aircraft without electrical systems. Also, ATC may authorize exceptions on a case by case basis. Complete details on the rule will appear in the next issue of this publication. Copies of the rule may be requested from FAA Public Affairs, APA-220, 800 Independence Avenue, S.W., Washington, DC 20591.

• On the Stick

I appreciate your article "The Dipstick" in the January/February 1988 issue. I am an airframe instructor at an aviation school. We fly the C–172, C–210, B–36, B–55 and Bellanca Scouts in our program. We have used the dipstick method for many, many years. Recently we discovered a problem that I thought I'd pass on to you.

All of our dipsticks were originally calibrated with the aircraft level and using a ladder to dip the tanks. We then discovered that the typical way a pilot would dip the tanks was to stand on the wing strut fueling step. We conducted a test comparing the two methods and found as much as a five gallon error on the C–185 was created by standing on the wing strut to dip the tanks. This gave a total error of ten gallons for the two tanks.

Of course the error will vary depending upon pilot size, tank design, fuel tank level, and filler neck placement in the tank. A simple placard on the dipstick as to proper use is one answer.

Gary P. Robinson
Elizabeth, TN

Interesting fact. An error of five gallons per tank could land you well short of the airport.

• Amelia Questions

In the May/June issue your "Famous Flyers" article said that Amelia was a member of the Voluntary Air Detachment. I don't think that was part of the Red Cross during World War I.

Name Withheld

You are right. The statement should have said she was a member of the Voluntary Aid Detachment. Her contact with aviation at that time was watching the military pilots practicing at a nearby airfield.

• Full Motion Simulator

As a flight simulator instructor at Flight Safety International, I would like a definitive answer to two questions: first, may a pilot operating an approved full motion flight simulator log the time under appropriate categories, i.e. night, instrument, PIC, etc?

The second question is how and in what categories may the simulator instructor log time spent instructing (either from the front seat or the back instructor consul).

Thanks for your wonderful publication, keep up the good work.

Joel S. Harris
West Palm Beach, FL

Unfortunately, Section 61.51 of the Federal Aviation Regulations (FAR) does not specfically provide for the logging of pilot experience gained in a full motion simulator. No differentiation is made between a ground trainer and a simulator. However, we believe such experience may be logged under total time of flight and as simulated instrument conditions (simulator). Likewise, the simulator instructor may log instrument instruction given in a simulator as instrument instruction, simulated instrument conditions (simulator).

The agency is preparing a new rule which should clarify the logging of various kinds of pilot experience.

• Required Dipstick?

I agree with your two articles in the Jan/Feb issue of FAA Aviation News, "A Few Gallons More" and "The Dipstick." Since I have been working in aviation in south Florida there have been a number of preventable fuel starvation or exhaustion accidents.

The "Dipstick" article really got my attention: why doesn't the FAA require such a fuel measuring gauge on all newly manufactured aircraft? Did you know there are some aircraft that can't be "dipped" or otherwise externally inspected because of the filter being located beneath the filler cap? It's time we came up with a realistic solution to the fuel exhaustion problem.

Name Withheld
Ft. Lauderdale, FL

• LORAN–C Usage

Thank you for the excellent LORAN article. For me it raised two questions which I wonder if you would be kind enough to answer:

1. I have heard that the database LORANs are not approved for IFR because of questions related to the upkeep of the databases. Is there any reason why such a convenient LORAN could not be approved for VFR with the database and for IFR on manual use only? If the FAA is queasy about this approval, it could limit the IFR approval to radar environments.

2. If an IFR LORAN can be used to navigate to an initial approach fix, can it also be used in place of an ADF to locate that same point when the IAF and FAF are the same, as is often the case on an ILS?

Geoffrey D. Wyler
Winchester, MA

Provided that the equipment is installed and the aircraft returned to service in accordance with the provision of Advisory Circular 20–121, there is no FAA rule or policy that would prevent LORAN–C with a database from being used for VFR only operations. This usage would not eliminate the need for current aeronautical charts in the cockpit.

In reply to your second question, an IFR approved LORAN–C may be used to navigate to the initial approach fix, but not to descend to the final approach fix altitude. This is due to the reduced lateral and vertical protection from obstructions at the FAF altitude.

Thank you for your appreciation of our article. Please bear in mind that LORAN has not yet been approved for conducting instrument approaches.

FAA AVIATION NEWS welcomes comments from our readers. No anonymous letters will be used, but names will be withheld on request. Address: FAA AVIATION NEWS, AFS-810, Washington, D.C. 20591.

• Missing the Point

Your article on LORAN–C in the March/April issue speaks about establishing your initial position from the airport reference point and using the known coordinates to check on the accuracy of your instrument. I have not been able to find such a point on any airport or sectional chart. How is it determined, and how do you find it?

Name Withheld

The ARP for any airport is determined mathematically as an average of the latitude and longitude coordinates of a point centrally located on each runway. It is shown in the *FAA Airport/Facility Directory* opposite the name of the airport. It is not usually shown as a visual display on the airport.

Additionally, an airport may establish a "LORAN–C Checkpoint" which provides coordinates for such a point at a convenient location (taxiway, parking ramp) on the airfield. This type of installation, which may not coinicide precisely with the ARP, should be approved by your local FAA Airport District Office. At Houma-Terrebonne Airport in Houma, LA, such a LORAN–C checkpoint has been in use since 1985, with gratifying results according to the airport manager. A red diamond marks the point, and an accompanying sign gives the data.

INSTRUMENT CORNER

• IFR Currency in Trainers

I am writing concerning simulated instrument time attained with the use of an FAA accepted ground trainer. FAR 61.57(e) allows the use of a ground trainer to partially meet IFR currency requirements. Is time logged in this ground trainer allowable for IFR currency requirements if no active instruction has been given by a CFII? Does ground trainer plotting capability have an affect on such time? My questions assume a pilot who is still IFR current or is within the six month "grace period" allowed by 61.57(e)(2) and otherwise does not require a competency check by a CFII to regain currency.

Robert W. Helzer
Littleton, CO

Under FAR §61.57, time logged in any ground trainer used to satisfy the instrument currency requirement of Part 61 must be certified by the appropriately rated and certificated instructor from whom it was received. The ground trainer used must be one which is acceptable to the FAA for the purpose intended. It may or may not have plotting capability.

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Famous Flight

(continued from p. 11)

had caught in the launching mechanism. The pilot was unhurt, the aerodrome was salvaged, and Langley vowed to try again.

Two months later, on December 8, Langley was ready. The weather was perfect for the planned early morning launch but, unfortunately, a tugboat was not available until afternoon. By this time the wind had started blowing up to 18 mph, a very negative factor. Langley knew that if this flight failed, the availability of future funding would be nil; he had already spent $70,000 of War Department and Smithsonian funding, a sum equivalent to many millions of current dollars. But considering the local public pressure, he felt he could wait no longer.

It was late afternoon before the trial began. The engine started, the restraining cable was cut, and the aircraft shot down the track—only to again foul in the launcher mechanism and plunge into the Potomac.

The aftermath of this failure was an outpouring of newspaper and public ridicule of Samuel Langley. For a time Langley's international reputation and accomplishments in scientific fields were buried under an avalanche of coarse humor, broadly illustrated in newspaper cartoons. This shy, sensitive man, a lifelong bachelor who presented a formal, standoffish front to the world, found the derision hard to bear. The Government withdrew its support and the entire project was abandoned—despite some serious overtures to Langley from commercial interests.

Ironically, nine days later (December 17, 1903) the Wright brothers succeeded in claiming credit for the first man-carrying, powered, sustained flight at Kitty Hawk, NC. Their initial flight covered a distance of just 120 feet in about 12 seconds, but it officially marked the beginning of the aviation era.

For Langley, the Wright brothers accomplishment was a vindication of the scientific theories he had advanced—but in the outburst of enthusiasm over the Wright *Flyers*, Samuel Langley became the forgotten man. In the next two years his spirits sank, his health failed, and on February 27, 1906 he died.

No one knows for sure if Langley's machine would have flown. However, it is interesting to speculate how aviation history might have been rewritten if *Aerodrome A* had not fouled the launch mechanism during takeoff. Eight years after Langley's death, the succeeding Secretary of the Smithsonian, Dr. Charles D. Walcott, contracted with Glenn Curtiss to test-fly the model.

A successful aircraft building pioneer and competitor of the Wright brothers, Curtiss altered the original Langley design to convert it to a seaplane. Using the original Manly engine, a flight of 150 feet was achieved. Consequently, the Smithsonian put the *Aerodrome* model on prominent display with the label, "The first man-carrying aeroplane in the history of the world capable of sustained free flight."

This action, plus a dispute over the Curtiss alterations, resulted in a controversy with the Wright brothers that led to the original Wright *Flyer* being sent to England for the next 20 years. Even after Smithsonian Secretary Abbot publicly endorsed the Wrights' claim as pioneers of flight, it was many years before the *Flyer* found its way home to the U.S. and a place of honor in the Smithsonian (1948). Langley's *Aerodrome* remained as a Smithsonian display in a less prominent spot, labelled simply, "The original full-size Langley flying machines 1903." Today it is still on display, with the Curtiss modification removed, at the Paul Garber Facility in Suitland MD.

Langley knew that aviation would play an important role in the future. His papers show almost prophetic theories of what to expect in the commercial and military arena. His greatest love in life was the sky and aviation was simply an extension of it. It is ironic that this brilliant astronomer is remembered by the public not for his many accomplishments—but chiefly for his much publicized failure. In the words of his associate, Charles Manly, concerning the *Aerodrome*, "To such men as Mr. Langley an unsuccessful experiment is not a failure but a means of instruction, a necessary and often an invaluable stepping-stone to the desired end." ■