FAA AVIATION NEWS

SEPTEMBER 1967

COVER

You can't fly under them, through them, or over them, and they may extend 1,000 miles inland. For important data on hurricanes, see page 8.

FAA AVIATION NEWS

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The PREVAILING CAUSE

A beautiful summer day, clear skies, calm wind. The new four-place single engine aircraft glistened with morning dew as the pilot, with his wife and two children aboard, took off for Broad Mountain Lake and a long-awaited holiday in the woods. As he opened the throttle he could already see, in his imagination, his trout line disappearing into cool blue water and hear the kids shouting with excitement as he reeled in. His aircraft lifted off the runway smartly and he pressed forward gently on the yoke to lower the nose. But the yoke would not move—the aircraft continued a sharp climb—the engine labored—airspeed dropped—the inevitable signs of a stall appeared.

That family of four never lived to enjoy their vacation. An investigation showed that the external control locks had not been removed, immobilizing the elevator. The pilot, with 1,350 hours in his logbook, had failed to conduct an adequate preflight check and he had not tested the controls prior to take-off, as indicated in the checklist. Four fatalities.

How can a pilot with hundreds of hours of experience make such an obvious blunder? Why are pilots willing to risk the safety of their entire family unnecessarily? During the first six months of 1967 there were 546 fatalities in general aviation. Over the Fourth of July holiday an additional 64 fatalities were reported—why?

Many of the accidents occurred in calm air, VFR weather, with no apparent mechanical failure. Nevertheless, pilots with sound training and proven skill manage to stall out, run out of gas, run into mountains, or otherwise lose control of the aircraft with fatal results. Even where weather was a factor, investigations showed that pilots with insufficient instrument experience frequently continued a flight *despite* warnings of expected adverse weather.

A study of accidents in general aviation reported to FAA shows that fatalities are highest in pleasure flying, and that stalls head the list as a causal factor. Collision with the ground, water, trees, poles or other obstructions is also high on the list. Typical entries for probable cause of fatal accidents:

"Failed to maintain flying speed—density altitude, factor. Struck mountain."

"Inadequate preflight, maintenance inspection. Engine failed on take-off."

"Fuel mismanagement—neglected to switch tanks. Struck lake and sank."

"Continued VFR flight into adverse weather. Disoriented. Uncontrolled descent."

"Failure to assure gear was down and locked—did not use checklist. Burned on impact."

"Overload failure. Struck trees on departure."

"Incapacitation. Pilot had history of heart trouble—not reported to AME."

Regardless of the probable cause listed in each case, the prevailing cause of accidents appears to be a willingness on the part of the pilot to rely on luck instead of approved procedures. Federal Aviation Administration safety analysts have expressed a growing concern over the number of preventable general aviation accidents, especially during the summer months when pleasure and agricultural flying are at their peak.

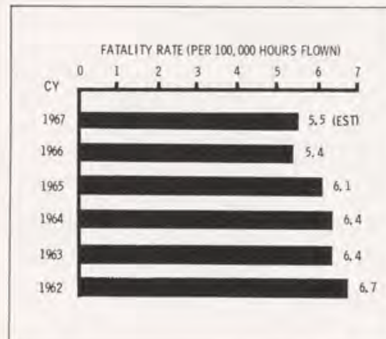
The aircraft and the airspace system we have today provide the pilot with the finest safety margin he has ever enjoyed since flight began. Nevertheless, the accident figures in general aviation are too high.

The individual pilot must realize that nothing FAA or the manufacturers can do for him will fully compensate for carelessness, overconfidence, or an overcommitment to fly the airplane when common sense or good judgment tells him to stay on the ground.

One result of the general aviation accident figures has been an increase in insurance rates. United States Aircraft Insurance Group (USAIG), a nationwide company organization handling a large share of the nation's aircraft insurance, recently raised its rates from 30 to 300 per cent. The cost of aircraft rentals is expected to rise accordingly.

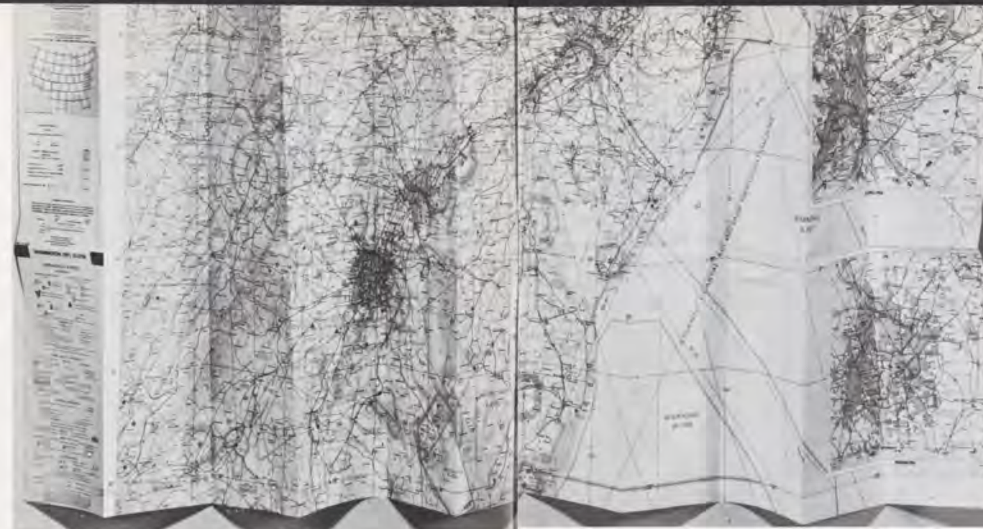
According to USAIG, "the heavy underwriting losses are due to a combination of complex factors, but the essential problem is that the general aviation accident rate has not improved enough to offset the steadily mounting costs of accidents and of the claims they generate."

At a hearing before the House Appropriations Subcommittee on the Department of Transportation, May 22, 1967, FAA representatives pointed out that during the first four months of the year general aviation fatal accidents were running much higher (180) than the average four-month figure during the 1962-1966 period (135). Fatalities were also higher (381) than the period average (276) for this date. An improvement was noted in 1966 in the *ratio of fatalities to flying hours*, which tapered off to approximately 5.4 per 100,000 hours. But the trend has apparently moved upward again in 1967.



NEW SECTIONAL CHARTS

will offer broader coverage, easier navigation



1. New chart folds down to 5 x 10 inches, instead of 7 x 12 inch size used currently.
2. When extended, new chart is not too large for cockpit use.
3. Flush-edge printing facilitates plotting from back to front or to adjoining charts.

1.

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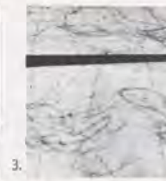

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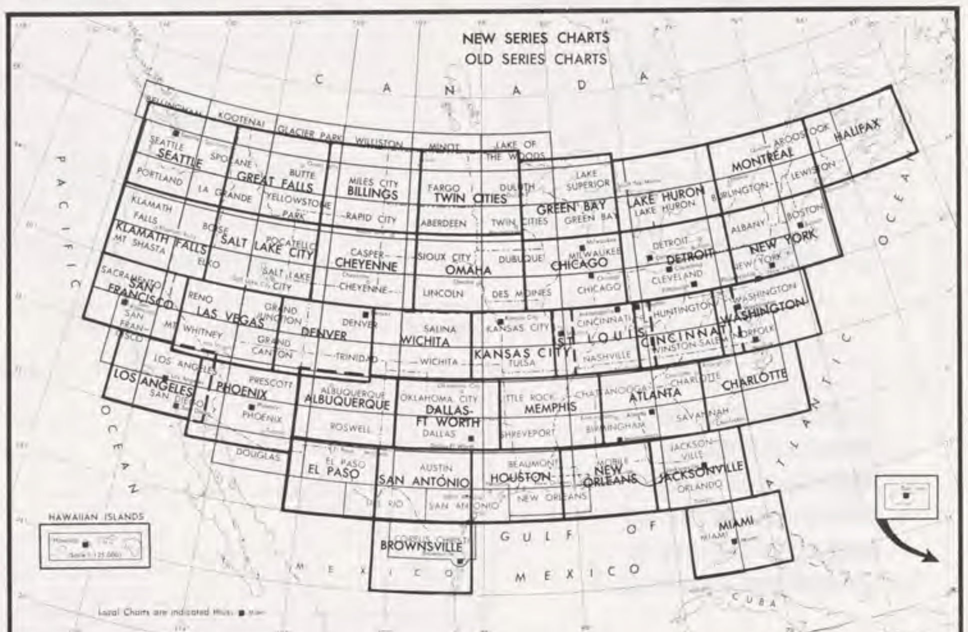
U.S. Government Sectional Aeronautical Charts/Chart Index—Conterminous United States 1:500,000



A new series of sectional charts now being prepared will greatly improve flying conditions in the United States by making it easier for pilots to plot a course and identify ground terrain.

Developed by the Federal Aviation Administration's Air Traffic Service after several years of planning, the series will cover 48 states with 37 charts, instead of the former 87, with 16 new charts for Alaska. The first of the new charts, covering parts of Alaska and the Atlantic Seaboard, are now available; the entire series will be published by 1969.

The same scale—1:500,000—will be used throughout. The saving in numbers of charts has been effected by printing charts back-to-back, eliminating much of the supplemental information, which is available in the *Airman's Information Manual.* The new charts measure only 20⅝ by 55 inches and are designed to fold so as to provide for easy handling in flight.

A "common edge" feature of the chart makes it possible to plot a continuous course from one side to the other. Plotting from one sheet to another is facilitated by printing to overlapping edges which do away with burdensome folding and creasing.

Exact portrayal of terrain is provided by relief shading, contour identification and a frequent depiction of spot elevations. The highest land point within each 30 minute rectangle of longitude and latitude is shown in large type.

Major terminal areas are clarified on each chart by means of large scale insets showing pictorialized checkpoints (prominent buildings, land forms, antennas, airports, etc.) associated with local FAA tower and approach control facilities.

The same basic aeronautical information contained in previous charts—including airports, radio navigation and communication data, controlled and special use airspace and obstructions—is presented. A common topographic base for both civil and military use has been developed by the Inter-Agency Air Cartographic Committee, representing FAA, DOD and the Department of Commerce.

New charts centered about Washington, D.C. and Charlotte, N.C. are now available. Next scheduled to appear are new charts for the states bordering the Gulf of Mexico, from Miami to Brownsville, Tex. The price is 50 cents per chart, representing a substantial savings over the previous cost of 30 cents for a chart covering less than half the area.

Existing charts will continue in service until replaced by the new charts; the new series will be revised semi-annually. When ordering charts (address: Distribution Division, (C-44), Coast and Geodetic Survey, Rockville, Md. 20852), it is important to consult C&GS's "Dates of Latest Editions of Aeronautical Charts" to determine which of the new charts are available and which old charts are discontinued.

On request to the Coast and Geodetic Survey, chart users may be placed on a mailing list to receive "Dates of Latest Editions" every four weeks.

The *Airman's Information Manual,* compiled by the Federal Aviation Administration, and containing supplemental information for chart users, consists of four parts:

Part I—Basic Flight Manual and ATC Procedures. Annual subscription, $2.00.

Part II—Airport Directory. Annual subscription, $2.00.

Part III—Operational Data and Notices to Airmen (NOTAM's), issued every 28 days with a supplement (Part IIIA) issued every 14 days. Annual subscription, $9.00.

The *Airman's Information Manual* (AIM) may be purchased from the U.S. Government Printing Office, Washington, D. C. 20402.

Alaska, which formerly had no sectional charts, requiring pilots to work with the bulky Operational Navigation Charts (ONCs) or World Aeronautical Charts (WACs), now will be served by 16 sectionals, including two for the Aleutian Islands. New charts covering the Fairbanks and Anchorage areas are already in use.

The entire Alaska series will be completed in the first half of 1968. Ten principal charts will be revised annually and the remaining six semi-annually. The charts are sold at all FAA flight service stations in Alaska. Supplemental information for airmen in Alaska is provided by the *Alaska Airman's Guide and Chart Supplement,* compiled by FAA and issued every 28 days. Annual subscription, at a cost of $10.00, for delivery by airmail in Alaska, is available from the Distribution Division of the U.S. Coast and Geodetic Survey, Rockville, Md. 20852. ■

The pilot was on a cross country flight from Los Angeles to Connecticut. Touching down at Winslow, Ariz., before noon, he decided to lay over half a day because of the heat. At 5:00 p.m. he took off again, with Clarke Field, Gallup, N.M., as his next stop, 120 miles to the east. He failed to raise Gallup Unicom as he approached the field, so he circled once and then attempted a landing. Strong cross winds blew him to the right of the runway; he decided to go around and gunned the engine. To his surprise he could not climb the aircraft high enough to make a proper second approach.

"I lost altitude turning on base and hit the dirt just south of the end of runway 24 and slid across it," he noted in his report to Civil Aeronautics Board investigators, following a crash from which he and his passenger luckily walked away.

CAB concluded ". . . that the limited performance of this model airplane, together with the *high density altitude*, (our italics) caused this accident. . . ."

Density Altitude Defined

Density altitude—what exactly is it? The term describes the weight of a given volume of air at the point of flight.

We are all familiar with the fact that airplanes have absolute ceilings, above which they cannot fly. We know that at higher elevations the air becomes lighter, less dense, and that each gulp of air contains less air, by weight, than at sea level. We know that most light aircraft engines begin to show a loss of power with altitude, and the climb rate is cut.

What we sometimes forget is that changes in the density of air occur without changes in elevation. Even at sea level, a change in the atmospheric pressure (or temperature) may bring about a "thinning" of the air, perhaps equivalent to the air found several thousand feet above sea level on an average or standard day (barometric pressure 29.92, temperature 59 degrees). A pilot who is operating under limited conditions of manueverability (as regards runway length, surrounding hills) must be able to compute the density altitude at the time and place of flight.

Supercharging an engine compensates for the reduced density by compressing more air into the carburetor. But density of the air affects more than engine performance. An airplane is able to fly because air has a quality of buoyancy, just as water has for the swimmer. But any swimmer who moves from the seashore to a fresh water lake soon realizes how much more effort is required to keep afloat in fresh water, because it is less dense, less bouyant. The pilot has a similar problem, except that the bodies of air through which he moves do not have a fixed density but vary from day to day and from place to place.

The pilot must remember that the performance listed in his owner's manual (take-off run, landing roll, rate of climb, etc.) are calculated for a standard day; and that the data will vary according to local atmospheric conditions. Most pilots learn how well their airplane will perform through the experience of everyday flying in a familiar region, plus a periodic review of the manual. It is when pilots fly over unfamiliar terrain that they run the greatest risk of getting into trouble, through ignorance of what density altitude will do to them.

In the case of our cross-country pilot who crash landed at Gallup, N.M., the density altitude of 9,000 feet—in contrast to the field elevation of 6,467 feet—meant that his rate of climb would have been only about *25 percent of the normal climb rate*. If he had been taking off, he would have required nearly *2½ times his normal take-off run at sea level*.

Effect of Temperature

The effect of temperature on the density or weight of air is obvious. Air is a gas which expands, becomes lighter on heating, contracts on cooling. At Gallup, N.M., if the temperature had been ten degrees higher, the density altitude would have been about 10,000 feet, and the rate of climb less than 20 percent of normal.

In the winter, on the other hand, with the temperature dipping below freezing, the density altitude at Gallup could be far *less* than the field elevation of 6,467 feet.

It Takes a Lot of HOT AIR to Keep You Up There

In fact, if the weather is unusually cold, a sea level airport could have a density altitude *lower* than sea level, with resultant *improved* aircraft performance, because a plane would be operating in denser air than under standard conditions. This often happens in winter in high mountains and in parts of Alaska.

The potential density range is considerable. At some airports in Alaska, when the winter temperature is 50 degrees F. below zero, density altitudes of approximately 8,100 feet *below* sea level have been calculated. With summer temperatures of 90 degrees, the density altitude at the same airport (Fairbanks, for example) may be 2,100 feet *above* sea level—a density altitude spread of 10,200 feet! Aircraft performance is drastically affected.

In mountainous areas, the daily summer temperature changes through a broad spectrum, from chilly in the morning to hot at mid day and cool at night. Such temperature shifts push density altitude to a point where safe operations can only be carried out in the early morning and late afternoon hours. Aspen, Colo., for example, often has a density altitude of 13,000 feet in the summer—nearly twice the field elevation.

Moisture, in addition to atmospheric pressure and temperature, affects air density. Contrary to prevailing opinion, moist air is less dense than dry air. (Water vapor weighs only 5/8 as much as dry air.) Therefore high humidity, most common in the summer, is associated with high density altitude. Pilots are well advised to make a mental allowance for decreased performance when the humidity is known to be unusually high.

Left: A single-engine aircraft soars easily over the Continental Divide in winter, when cold, dense air gives improved aircraft performance. Above: In the heat of summer, aircraft struggle harder to stay airborne. Once above ground effects, climb rate for non-supercharged Bonanza is cut severely by high density altitude.

Density altitude has no effect on stalling speed, since an aircraft stalls at the same *indicated* air speed regardless of altitude or temperature. However, the hotter the day, the greater the difference between the true air speed and the indicated air speed.

This last could lead to an unpleasant surprise. For example, if the indicated air speed on a hot day was 85 mph, the true air speed (zero wind) could easily be 90 mph. This means you have a mass—your airplane—moving at a faster-than-normal speed on the ground after it lands; and you will require more space than usual for this mass to decelerate.

Shorter Approach Time

Likewise, on your approach you will be moving over the ground more rapidly, and will have less time than usual to line up your aircraft and plan your landing, when the density altitude is high. Even more critical is the length of runway needed to take off safely, and the rate of climb over any obstacles in the area. How can the pilot protect himself?

There is no instrument in the panel which will read out density altitude. The pilot must do his own calculating, with the aid of his altimeter and air temperature gauge. Fortunately there are handy little computers available which he can carry in his shirt pocket, such as the FAA-developed DENALT (density-altitude) computer.

The DENALT is priced at 50 cents, and it is difficult to imagine a greater bargain in life and aircraft insurance. With a flick of his thumb, the pilot can determine his rate of climb and runway requirements. (Humidity data is not required for the computation, but the read-out is conservative enough to allow for it.)

Unfortunately, no instrument or computer has been developed for general aviation which will override bad judgment, or relieve the pilot of his responsibility to keep informed on local conditions and be guided by the wisdom of experience. Consider the following incident:

In the high country of Idaho there is a small tributary of the Salmon River, known for fine trout fishing, which has a landing strip along side the stream. The land configuration is such that the presence of downdrafts make it necessary to land upstream and take-off downstream, regardless of wind conditions. The rule has been worked out by experienced pilots, and is well known locally. Nevertheless, on a hot summer day at noon, a veteran pilot, virtually native to the area, ignored the rule, took off upstream, encountered a severe downdraft and crashed. He was badly injured and his airplane wrecked.

Elevation Versus Density

The pilot assumed that the fairly strong headwind (estimated at 30 knots) would enable him to climb out safely. The altitude was only 4,400 feet above sea level. But the density altitude, owing to high temperatures and humidity, was 6,260 feet—and the bouyancy of the air insufficient for his intended maneuver.

The CAB report noted that ". . . takeoff was attempted at high noon, which is the time of day when conditions can be expected to be most unfavorable for safe operation. . . ."

This incident underscores the occasional tendency of some pilots—even veteran fliers—to allow impatience to override good sense, and to fly under unflyable conditions. In this case, the fishing was poor, and the pilot in a hurry to get to better fishing grounds—not much of a reason for causing a serious crash. An airplane may have a forgiving nature, but the laws of nature are inexorable. Density altitude is one you should keep in mind.

The DENALT computer is sold for 50 cents by the Superintendent of Documents, Government Printing Office, Washington, D. C., 20402. Specify whether for use with a fixed pitch or variable pitch propeller.

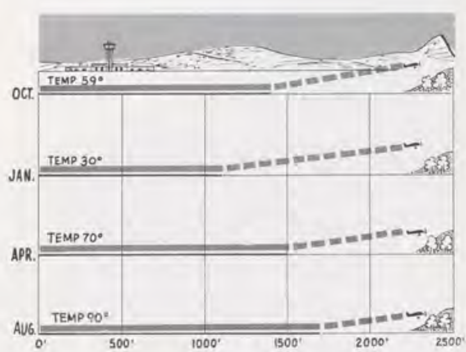
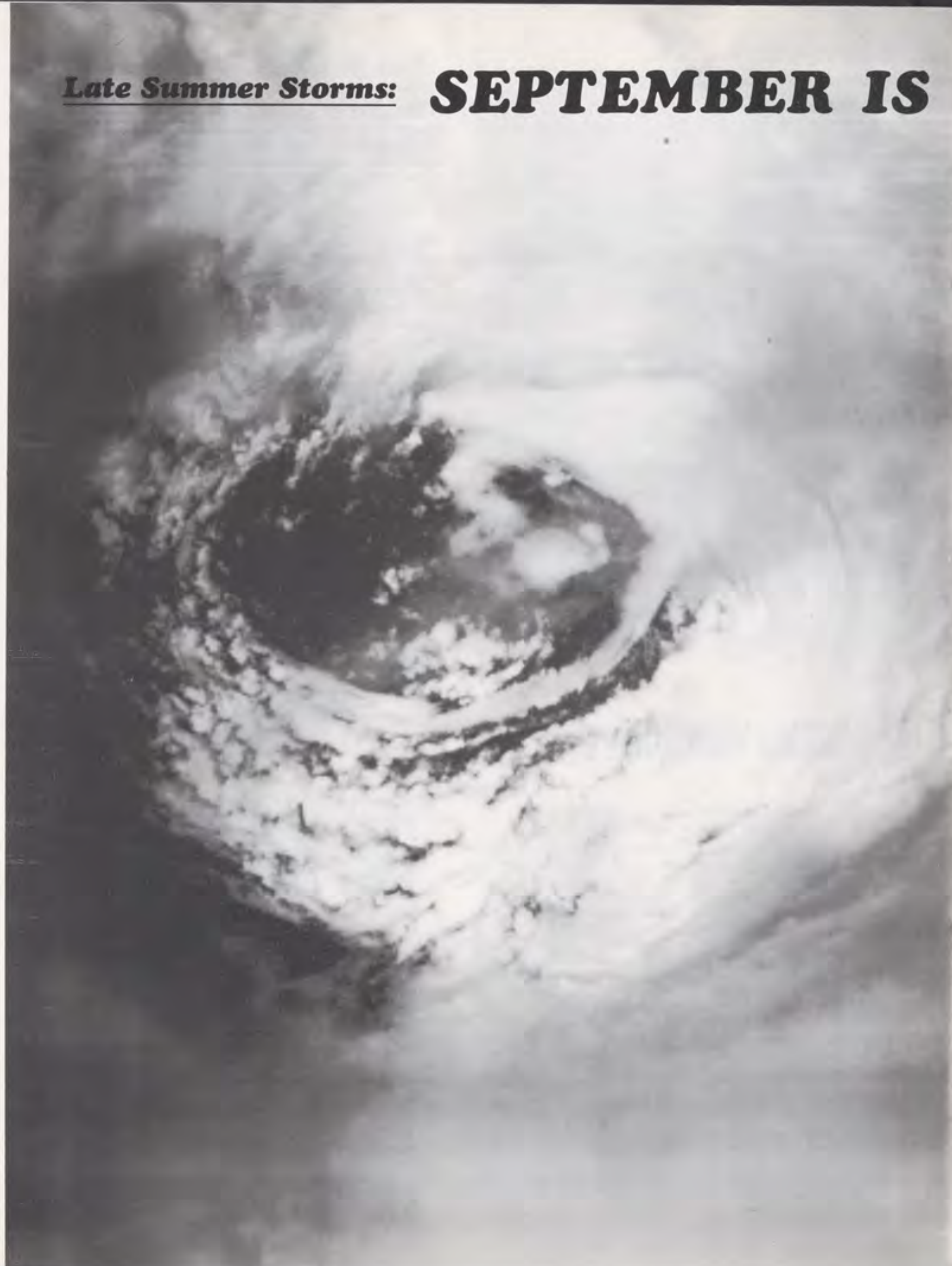


Chart shows different takeoff lengths at same airfield during different seasons of the year.



Late Summer Storms: SEPTEMBER IS HURRICANE SEASON

Storms come at any season of the year, but the late summer months are notorious for the arrival of hurricanes, those massive, water-born twisters that literally rain destruction over thousands of square miles of the eastern United States, from the Mississippi to the Atlantic, and from the Gulf of Mexico to the coast of Maine.

Modern weather reporting techniques give us early warning of hurricanes, which are observed and tracked from the moment they are hatched, in the tropical Atlantic ocean, until their final dissipation over North America. But no one can predict the exact course a hurricane will take, or how many hundreds of miles away its atmospheric effects will be felt. Light aircraft are particularly vulnerable, both in the air and on the ground. A basic understanding of hurricanes will help protect the pilot and his plane.

Last year seven hurricanes were born in the West Indies, although only two of these struck the United States. Ahead of the season came "Alma," born on June 4 and officially deceased on June 14. Alma ripped through Florida and Georgia, killing six persons and doing more than $10 million damage. More on schedule was "Inez," which rampaged from Sept. 21 until Oct. 11, and left three persons dead in Florida; 45 Cuban refugees also perished at sea en route to Florida. The destruction bill came to $5 million.

In the 40 years that the U.S. Weather Bureau has been recording West Indian hurricanes, a total of 66 occurred in September. August was the second busiest month, with 51, and October, with 35, was third. By comparison, November had only six and the remaining months had few or none. Clearly, the time of greatest peril is late summer.

The seasonal nature of hurricanes is associated with the heating up of the Caribbean Sea, the cradle of North American hurricanes. By late summer the water temperature in the equatorial Atlantic will exceed 80 degrees—the highest water temperature generally found anywhere at this time of year. Air passing over these waters, heated and loaded with moisture, rises rapidly and creates a low pressure area.

Round and Round It Goes

Under certain conditions, not altogether understood, the movement of air becomes circular in a counter-clockwise direction. The hot moist air condenses as it rises and heat is thrown off (in the process of condensation), providing the energy for rapid rotation of air around the low or "eye" of what is soon a full-fledged hurricane, moving uncertainly to the north.

As it moves northward, the hurricane seeks a continuing supply of warm moist air; it may follow the Gulf Stream, and it has even been known to move up the Mississippi River as far as Memphis. But many atmospheric factors affect its "flight path," and no two hurricanes follow exactly the same track. Exactly why the storm moves northward is not clear. However, if the earth is to maintain the essential stability of its atmosphere, the tremendous energy of the hurricane must be dissipated in some manner, and the cooler airs originating from the polar region serve to produce an eventual "flame-out."

A second, weaker hurricane spawning ground can be found along the west coast of Mexico. However, the storms generated here move out to sea and rarely reach as far north even as California. Hawaii has been threatened by hurricanes, but never actually hit. Hurricanes formed on the Asian side of the Pacific Ocean are called typhoons. These never reach the American mainland.

The northerly speed of a hurricane is usually no more than 15 mph. at the outset, but it will pick up to about 50 mph. as it moves up the American mainland. It is not the forward speed, however, which wreaks destruction, but the winds which blow furiously in a counterclockwise motion around the eye of the hurricane—which is relatively calm. When the rotating winds reach 75 mph., the storm is officially labeled a hurricane. At the peak of intensity, wind velocity may be over 150 mph.

Tornados and Waterspouts

A tornado hidden in a hurricane is not rare. It leaves a characteristic trail of pinpoint destruction, as it erratically dips down and touches the ground, or the water (causing a waterspout). Tornado winds have been estimated at higher than 300 mph.

Massive hurricane destruction is usually limited to coastal areas; these storms quickly lose their violence over land. Moisture needed to fuel the condensation cycle is shut off, and ground friction slows down the winds.

But a dying hurricane is still a dangerous beast. It may contain tremendous amounts of moisture, which will be precipitated out rapidly as the air cools, especially when the winds pass over mountain ranges, such as the Appalachians. Torrential rains and violent hail may travel as far inland as the Mississippi Valley.

Wind damage from hurricanes has occurred all along the Atlantic seaboard, and throughout New England. The usual point of entry to the U.S. for a hurricane is along the Gulf Coast or the south Atlantic coast, but hurricanes have entered as far north as Massachusetts.

Detection and observation of hurricanes has become a closely integrated effort that includes not only the U.S. Weather Bureau,

Eye of hurricane (opposite page) is calm, varies in size up to 60 miles in diameter. Tornadoes (right) sometime are concealed in hurricanes and leave evidence of their presence by trail of pinpoint destruction. Weather Bureau DC-6 on hurricane patrol (below) teams up with Air Force and Navy planes to track the storm's path and development. Chain of ground based radars can pick up hurricanes as far as 200 miles out to sea.

Late Summer Storms . . .

the Air Force and the Navy, but also merchant ships at sea, commercial aircraft over the ocean and remote island weather stations. A constant watch for hurricanes is set up in the summer and fall in Weather Bureau forecast offices in Puerto Rico, Miami, New Orleans, Washington, D. C., Boston, San Francisco and Honolulu. The new weather satellites help enormously by relaying accurate photos of hurricanes as seen from above.

Hurricane Hunters

Air Force and Navy "hunter" planes investigate suspected hurricane formations, taking temperature, pressure and wind readings. They report on the cloud structure and measure the storm area. A string of Weather Bureau radars, extending along Gulf coasts and the Atlantic from Brownsville, Texas, to Nantucket, Mass., can pick up a hurricane's spiral bands of precipitation as far as 200 miles from the United States. When a circular movement is spotted, the Weather Bureau issues a Tropical Depression Bulletin. If the winds reach 39 mph., or higher, the circulation is called a tropical storm and given a female name. For 1967, 21 girls' names are available, beginning with "Arlene" and ending with "Wallis." Once named, the tropical storm's progress is reported every six hours through Tropical Storm Bulletins and Advisories.

After the first advisory, forecasters at the hurricane centers prepare an Abbreviated Hurricane Advisory for transmission on Service A. This is a teletype network which carries aviation weather and notices to airmen (NOTAMS) to airports, flight service stations and other points where pilots gather.

When a hurricane is expected to move within 300 miles of the coast during the following 24 hours, a more detailed Marine-Aviation advisory is transmitted on Service A in place of the abbreviated advisory. Specific conditions affecting aircraft operations are noted.

The light plane pilot is well-advised to give hurricanes a wide berth. Even if his plane were structurally sound enough to absorb the buffeting and pounding dealt out by a hurricane, his own strength and ability would hardly be equal to the task of flying through it.

"Betsy" did almost $1 billion damage before dying 75 miles inland.

There is no room to squeeze under it, and he can scarcely hope to top it, unless he is prepared to fly well over 40,000 feet. If he tries to skirt around it, he may have a long way to go, as hurricane with 1,000 foot diameters are not rare. If he ventures too close, horizontal winds in the 100-200 mph range could blow him far off course, perhaps with disastrous results.

Disorientation is a major hurricane hazard to the pilot who ventures within the storm mass. The constant gyration of his aircraft may make navigation impossible. The quick and extensive changes in pressure can overwhelm the routine pressure altimeter. Continuous sheets of water may engulf his plane. (Hurricane hunting pilots have described the experience as flying in a massive ball of water.)

Jet engines are vulnerable to flame-out because of this large quantity of water.

Protecting Parked Airplanes

Even when safely parked on land, the light plane needs special protection against the possible onslaught of a hurricane. Every year high winds cause hundreds of thousands of dollars of damage to light planes believed to be safely parked.

Given enough advance warning, the best protection is to fly the plane out of the danger zone. If this is impossible, the next best choice is a secure hangar or other suitable shelter.

Hangar space unexpectedly becomes available when air carriers fly their large craft to safe areas. If no such luck, then careful attention should be given to the tie-down.

It's a good idea to anticipate the worst—pouring rain, gusty winds from all quarters, hail, flooding, falling trees and buildings.

First of all, check your aircraft owner's manual to learn what the manufacturer recommends as tie-down procedure. Head nose-wheel aircraft into the wind with the elevators in the "up" position by securing the stick; tail-wheel planes are "tailed" into the wind with the elevators held "down," by securing the cabin control.

Next, secure all doors and windows and stop up openings, such as engine intakes and pilot tubes. Apply control surface locks to prevent rudder and ailerons from banging against their stops. When using external locks—padded wedges—it is important that these have a red streamer, weights, or a line fastened to the tie-down to call attention to them to prevent anyone attempting flight with the locks on.

Observe Thy Neighbor

Just as important as tying down *your* plane is observing how well tied down are *its neighbors*. It is small consolation to discover that your properly secured airplane has been rammed by a runaway or storm-tossed plane from down the line or even across the field.

Helicopters present only one special problem as far as tie-down is concerned. Unless the rotors are secured, the possibility exists that winds could cause autorotation strong enough to break the ground mooring.

During one severe storm at a southern training base, the Army lost more than 50 helicopters on the ground because of high winds.

(Complete information of recommended tie-down procedures may be had free by sending a self-addressed mailing label to: Federal Aviation Administration, HQ-438, Washington, D. C. 20590. Ask for AC 20-35 "Tie-Down Sense.") ■

1ST MAN IN THE SKY!

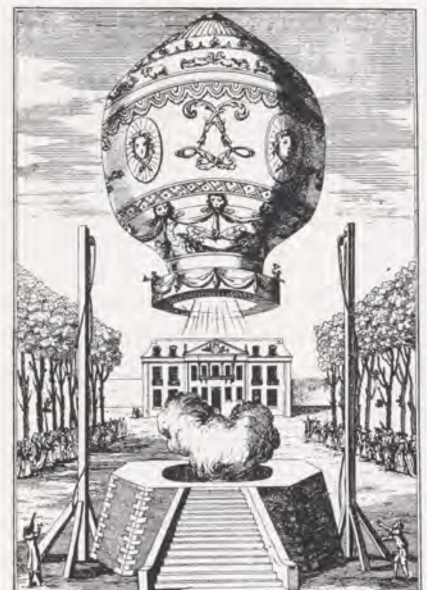
Nothing could have been more exciting than the life of an astronaut—unless it was that of his predecessor, the aeronaut. The first daring young men to actually fly through the air in man-made craft were called *aeronauts*—sailors of the sky—and the most famous of all was a young Frenchman named Jean-Francois Pilatre de Rozier, the first man to pilot an aircraft, in 1783, over 100 years before the Wright brothers.

The aeronauts were balloonists. The great age of ballooning, in the late 18th Century, was the pioneering phase of flight. For the first time men actually got off the ground and made free flights, more or less purposefully directed. Many of the major problems of aerial navigation were first identified in this age of soaring spirits and scientific enlightenment, and they were attacked with great intellectual gusto and ingenuity.

The first to make a name in balloon-making were the brothers Montgolfier, Joseph and Etienne, well-to-do French papermill owners. Legend has it that their observations began with the sight of a woman's chemise, hung near the fireplace mantel, rising mysteriously to the ceiling. At any rate, the Montgolfiers "discovered" hot air (which they believed to be a special kind of gas) and became impassioned balloon-makers. "Montgolfieres" dominated the soaring scene, until hydrogen (and much later non-flammable helium) supplanted hot air as the lifting agent.

The first balloon demonstrated in public by the Montgolfier brothers was a cloth sphere enclosing a paper bag, with a circumference of 110 feet. The brothers started a fire, placed the neck of the balloon over it, and slowly the big bag began to fill.

Then came the signal, "Hands off!" As the crowd gasped in



wonder, the huge unmanned balloon soared into the air, reaching an estimated height of 6,000 feet, and drifted about a mile before falling to earth. The flight lasted about ten minutes.

Soon ballooning became the craze of all France, especially of Paris, where King Louis XVI and Queen Marie Antoinette attended the "scientific demonstrations."

After a ten minute flight from which three "passengers"—a rooster, a duck and a sheep—emerged unscathed, the Montgolfiers announced dramatically that their next balloon would carry human beings! In view of the expected peril, King Louis humanely decreed that only condemned criminals be taken aloft.

The possibility of a crash landing was not the only danger in view. The atmosphere was still an unknown region, possibly populated with ghosts, weird creatures of flight, countless unknown terrors which matched, in the popular mind, any of the lethal threats that outer space holds for our 20th century astronauts. The thought of actually becoming detached from the earth and floating in space was almost incredible.

"Eh bien, vile criminals will have the glory of being first to ascend into the air! Bah!" The speaker was a daring young French scientist, Francois de Rozier, already famous in Paris for his stunt of inhaling hydrogen and then igniting it with a cigar as he exhaled. De Rozier contacted a young nobleman, Marquis d'Arlandes, who had friends in the court. Louis relented and the two were permitted to fly.

The first man-carrying balloon measured over 75 feet from neck to top. Its diameter at its widest part was 49 feet. A wicker gondola for the passengers surrounded a metal fire basket into which, during flight, the aeronauts dumped fuel to provide additional "gas".

The actual date of the historic ascent was not given in advance but Paris was watching and news of the preparation spread throughout the city. On the chosen day, November 21, 1783, crowds jammed the Bois de Boulogne. There, with masts and pulleys, the "aerostatic machine" was raised in place over its "pad". "Fueling" the bag with hot air was a delicate operation, as hot sparks threatened the inflammable envelope.

When all preparations were complete, de Rozier and the Marquis d'Arlandes climbed into the gondola. The boom of cannons marked the count-down. At 1:45 pm, Joseph Montgolfier signaled "release" and the balloon began its majestic ascent.

The great blue and gold balloon reportedly reached an altitude of 3,000 feet. With the Marquis half-dazed with wonder, de Rozier calmly directed "operations"—placing fuel into the metal fire basket and dashing water on the many small fires caused by sparks getting caught on the fabric of the balloon.

After a flight of 25 minutes, the balloon came down in a field near Paris. The two men crawled out from the collapsing fabric unhurt and congratulated each other. They had actually left the earth, and returned alive!

Soon other manned balloons were soaring all over Paris and the other capitals of Europe. As the ranks of the aeronauts swelled, the Marquis went back to the salons of society and de Rozier returned to his laboratory. But the lure of flight drew the latter back again and again. Over what appeared to be his own best judgment, and despite the supplications of his fiancee, he insisted on going through with an attempt to cross the English Channel in a hydrogen balloon. On June 15, 1785, as his anguished friends watched, a fouled valve line generated enough static electricity to set off a spark and the craft burst into flames.

Although hundreds of balloon flights had been made since Pilatre de Rozier rode into history on the first manned flight, this first aeronaut was also the first to perish for his audacity.

H. Richard Shea

T. CLAUDE RYAN

inspired the Spirit of St. Louis

T. Claude Ryan and (1927 photo). Cutaway shows "Spirit's" extensive tankage and cramped cockpit.

The telegram was terse, and was sent in a desperate race against the calendar after the sender had been turned down by three prominent aircraft manufacturers—Fokker, Bellanca and Travel Air.

Western Union
Ryan Airlines Inc.
San Diego, California
Can you construct Whirlwind engine plane capable of flying nonstop between New York and Paris stop? If so please state cost and delivery date

Robertson Aircraft Corp.
Anglum, Mo.

The object of all this haste was the Raymond B. Orteig prize of $25,000 for the first non-stop flight from New York to Paris. While the sender of the telegram was totally unknown, the names of others vying for the prize frequently adorned the news pages, including Adm. Richard E. Byrd. All were well financed and had aircraft ready or near ready for the long flight.

An exchange of wires settled on a delivery time of two months, and Charles A. Lindbergh's date with destiny was established—Ryan Airlines, Inc., had agreed to build the *Spirit of St. Louis*.

T. Claude Ryan, founder of Ryan Airlines, Inc., was already a seasoned airman with 10 years of flying and plane making experience behind him when Lindbergh's historic order landed on his desk. Essentially a business man—one of the earliest and canniest in what was characteristically a helter-skelter business—Ryan was also a practical engineer. He had started out in business in 1922 as the Ryan Flying Co.

The idea was to sell air transportation, by the ride or the trip. Aside from Ryan's considerable skill as a pilot, acquired in the Army Air Corps, the company's assets consisted of one Army surplus *Jenny*, in rheumatic condition, and boundless confidence in the future. Ryan was 24 at the time.

Industry and sound management soon began to pay off. Passenger "hopping" picked up—sometimes as many as 100 sightseers a day would pay $5 for a ride—and so did flight instruction. Eventually, Ryan's school became the first in the U.S. to get a Department of Commerce license to train transport pilots.

A satisfied pilot trainee, B. F. Mahoney, a moneyed youth, suggested that Ryan and he team up and establish the first scheduled, year-round airline passenger service in the U.S.—the "Los Angeles-San Diego Air Lines." Service commenced on March 1, 1925, under the name, Ryan Airlines, Inc. A nostalgic poster advertising the service shows passengers snug in the cabin of the *Standard* while the pilot, sitting aft in an open cockpit, is exposed to the elements.

Ryan pioneered V/STOL field with XV-5A Vertifan for U.S. Army.

Knowing that the Government would soon turn operation of air mail service over to private contractors, Ryan designed and built a clean-lined, high-wing monoplane, the Ryan M-1.

The M-1, fitted with the Wright J-4 *Whirlwind*, was soon breaking records. To convince customers, Ryan flew an M-1 and 100 pounds of cargo non-stop from Los Angeles to Seattle, most of it at 10,000 feet. It was the M-1 that attracted the attention of Lindbergh, a seasoned air mail pilot.

Lindbergh was not overly impressed when on Feb. 23, 1927, he arrived at the Ryan factory in San Diego, an old dilapidated building near the waterfront. The smell of dead fish mingled with the banana oil aroma of airplane dope. Missing were the sounds of engines running up or flying activity of any kind. But Claude Ryan assured him that the craft would be built on time.

The designer of the Spirit of St. Louis was Donald Hall, hired only a few weeks before, and Ryan's first full-time engineer. Handling production was Hawley Bowlus (later famous for his Bowlus sailplanes). Ryan's total staff numbered only 35 men and women.

All hands plunged in to meet the two-month deadline. Sixteen and 18-hour days were not rare. Lindbergh darted from one corner of the shop to another, checking everything personally.

Spurring Ryan on was the knowledge that others were rushing completion of planes for the trans-Atlantic flight. Some of them crashed—Rene' Fonck's *Sikorski;* Admiral Byrd's *Fokker;* Lt. Cmdr. Noel Davis' *Keystone*. Already four men had been killed and three injured preparing for the Paris hop.

The first test flight came on April 28. Lindbergh was the only test pilot. Engineer

"Lucky Lindy" the newspapers called him but he placed his trust in skill.

Hall rode along, sitting on the right hand arm of the wicker chair. He noted—"It was not a very stable airplane . . . Lindbergh wanted it that way to stay awake."

Twelve days were allotted for testing, and only minor changes were made to the airplane before Ryan's crew turned the *Spirit of St. Louis* over to Lindbergh. On May 10, 1927, he flew to St. Louis in 14 hours and 25 minutes, a record. Ten days later the *Spirit of St. Louis* flew to Paris.

Ryan Airlines, creator of the *Spirit*, was sold in 1928 and the factory operation moved to St. Louis, where it went out of business in 1930, a victim of the Depression. A year later Claude Ryan was back in business as the Ryan Aeronautical Co., Inc., located at Lindbergh Field, San Diego. In late 1933 Ryan introduced the S-T (Sport-Trainer), a low-wing, metal fuselage monoplane—first of its kind in the U.S. for the general aviation pilot. Hundreds lined up to buy the racy craft.

The S-T was followed in 1938 by the S-C, the first private-owner cabin aircraft to take full advantage of all metal construction and full cantilever, low-wing efficiency. World War II saw production of more than a thousand Ryan Primary Trainers—the PT-16, PT-20, PT-21 and PT-22.

When the war opened the door to jet power, Ryan was quickly on the scene in 1944 with the FR-1 *Fireball*, which had a jet engine aft and a piston-propeller engine in the nose. *Dark Shark*, a turbo-prop fighter, followed in 1946.

In 1957 the Ryan X-13 Vertijet was unveiled, the product of 10 years of exhaustive engineering. The Ryan Aeronautical Co. was now the recognized leader in STOL technology.

In the field of space, it was a Ryan landing radar system that led to design and construction of the landing radar for Surveyor I and III. The same genius that designed an aircraft to carry Lindbergh safely from New York to Paris in 33½ hours—in 1927—enabled Surveyor III, in 1967, after traveling more than a million miles on a curved trajectory from Cape Kennedy, to achieve a soft landing on the moon.

T. Claude Ryan, born in Parsons, Kan., in the waning years of the 19th century (Jan. 3, 1898) and still going strong, is a living example of the spirit of flight, which has dominated the 20th century.

Frank J. Clifford

news

BRIEFS

• FAA CONTROLLERS AND FLIGHT SERVICE STATION SPECIALISTS did a brisk business in "saves" last year when they logged 3,353 assists to pilots in trouble in one degree or another. Flight service specialists were the busiest. They handled 1,745 flight assists, 1,654 involving civilian pilots flying single-engine planes. They also lent a helping hand to 76 multi-engine pilots, one jet pilot and 14 military flyers.
More than half of the flight assists—1,379—were made to pilots lost or disoriented. Low fuel supply, caught on top of an overcast or trapped by weather, navigation gear, engine or other mechanical failure accounted for the rest.

• CASH PRIZES totalling more than $1,000 and a variety of trophies will be awarded to the winners of the 12th annual Michigan Small Aircraft Race to be held October 6-8 at the Kent County Airport in Grand Rapids. The 200-mile cross-country proficiency event, conducted on the handicap system, is being sponsored by the Michigan Chapter of the Ninety-Nines in cooperation with the Michigan Aeronautics Commission and the Grand Rapids Chamber of Commerce.
Open to all American women pilots, the race will be limited to 60 airplanes this year. The planes must be stock model, unsupercharged, fixed-wing, with a maximum of 420 total horsepower, whether single or multi-engine. All planes must have been manufactured before January 1, 1954. Applications and information may be obtained from Mrs. Alyce Lodge, 101 Edge Lake Drive, Union Lake, Michigan 48085. Closing date for entries is September 18.

• TRIBUTE TO THE NATION'S AIRCRAFT MECHANICS was paid by FAA Administrator William F. McKee at a ceremony in Washington, D.C., honoring the national winners of the FAA Aviation Mechanic Safety Program. Forrest L. Stolzer, Little Rock, Ark., winner in the general aviation division, received an honorary plaque, a check for $500 and a VIP tour of Washington.

• ALL GENERAL AVIATION AIRCRAFT, including air taxis, which fly IFR in controlled airspace must have their altimeters and static pressure systems checked no later than the first annual inspection due after July 31, 1967.
The new, more stringent regulations went into effect on August 1.,The date and maximum altitude to which the altimeter has been tested must be recorded on the back of the instrument and in the airplane's logbook. The altimeter and static system, henceforth, must be checked for accuracy and performance at least once every two years.
About 35,000 out of the more than 105,000 planes in the general aviation fleet are equipped for IFR operations.

SUBSTANTIAL SAVINGS IN NEW FAA TOWERS

New medium density tower

A new standard design for control towers at medium activity airports has been chosen by FAA. Similar in appearance to recently-built FAA towers, the new buildings will cost about $200,000 less.

The new standard tower has a free-standing shaft of concrete topped off with a prefabricated control cab with 300 square feet of operating space.

Base buildings are entirely above ground, unlike those in the original standard tower concept, and connected to the tower by an enclosed passageway. The base is expandable to accommodate radar control equipment, as well as administrative offices.

Tower height will range from 60 to 120 feet.

The first of the new towers is expected to be commissioned at White Plains, N.Y., in December 1967. The FAA has scheduled approximately 26 additional towers for medium density airports over the next five years.

Shortcut to IFR Rating Sought in FAA Study

Weather-caused accidents are the target of the new experimental pilot course.

An experimental course in pilot training designed to reduce weather-associated accidents in general aviation will be given in the 1967-68 academic year at Ohio State University, under a $40,749 contract with the Federal Aviation Administration.

The test program will help FAA determine whether including an instrument flying course in the private pilot training will enable a pilot to qualify as instrument-rated with less than the 200 hours now required for such a rating.

Poor weather has been a contributing factor in accidents resulting in about one-half of the fatalities in general aviation. Since few instrument-rated pilots are ever involved in weather-caused accidents, FAA believes that speeding up the process of instrument rating pilots will increase safety.

The contract calls for the University to develop a combined private pilot and complete instrument course leading to both a Private Pilot Certificate and an Instrument Rating for an experimental group of 15 students.

The performance of this group will be measured against control groups of 15 students applying for Private Pilot Certificates and 15 applying for Instrument Ratings under current FAA regulations. Current regulations require a minimum of 40 flight hours for a Private Pilot Certificate and 200 hours for an Instrument Rating. No flight hour minimum has been set for the experimental group, although it will clearly be more than 40 hours and less than 200 hours.

Various capability tests will be given to the experimental group and the Instrument Rating control group to indicate the advantages or disadvantages of integrated VFR-IFR training as compared to present methods.

Accuracy in Navigation on North Atlantic Route Now Under Study

How well turbojet aircraft navigate the heavily-traveled North Atlantic routes is the object of a nine-month study, sponsored by the International Civil Aviation Organization (ICAO), which got under way in July.

The study has an eye cocked to the future when increasing numbers of high altitude, over-ocean jet flights will demand accurate separation standards and navigation systems.

Ground radars at Gander, Newfoundland, and Kilkee, Ireland will monitor the flights. At sea, three U.S. Coast Guard vessels specially equipped with radar monitoring equipment will scan a 400-mile-wide mid-ocean swath of the east- and west-bound North Atlantic routes. Planners expect data on approximately 80 per cent of all jet flights crossing the North Atlantic will be automatically recorded by data processors during the radar collection periods.

Data on the navigating accuracy of flights using all available air navigation sources will be collected during the program. Radar observations of some 6,000 flights will be recorded. In addition, data from flight crews' logs showing their calculations of the plane's flight path will be correlated.

Future 1,000-Foot-Plus Antennas Restricted By FAA Rule to "Farms"

Antenna towers higher than 1,000 feet will be restricted in the future to "antenna farm" areas designated by the Federal Communications Commission. Grouping television and radio towers in a given area is expected to enhance the safety of flight operations over urban centers.

Each antenna farm will have to be established by specific FCC rulemaking. Once the farm has been established, FCC will not permit towers over 1,000 feet to be located elsewhere in the area. Exceptions may be granted on the basis of statements from FAA that the proposed tower locations will not menace air navigation.

The farm concept is expected to make possible the erection of taller antenna towers than are now in existence, without creating an air safety hazard.

FORUM

FAA Aviation News welcomes comments from the aviation community. We will reserve this page for an exchange of views. No anonymous letters will be used, but names will be withheld on request.

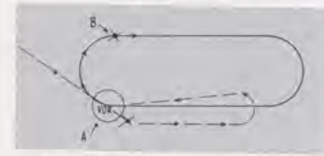
• Holding Pattern Terms

A recent discussion among several IFR pilots revolved around the correct meaning of *commencing to hold* and being *established in a holding pattern.* Some were of the opinion that in the case of a parallel entry, as shown in the attached diagram, you are *commencing* the hold on initially crossing the fix at point "A," but that you are not *established* in the hold until reaching point "B." Others said you are established in the hold upon initially crossing the fix, and still others feel that you are not established until crossing the fix inbound.

Your clarification of this point would be most appreciated and a benefit to many.

Philadelphia, Pa.

It is important for air traffic controllers to know when an aircraft is actually established "in the pattern" because the envelope of protected airspace surrounding a holding pattern is enlarged to accommodate prescribed entry maneuvers from any direction.



A portion of this protected airspace may be subtracted from the total holding area once an aircraft is in the racetrack pattern, thus releasing valuable airspace for use by other aircraft. The answer to your diagrammed question, then, is that the aircraft is approaching or entering the holding pattern when it first crosses the VOR, but it is not reported as "holding" until the second crossing, when it starts the turn over the 'racetrack.'

• Career Minded

I have very recently become a private pilot. I have always wanted to be a professional pilot but until now I could not afford flying lessons. I have to be satisfied being an A&P mechanic.

I would go on to an instrument and commercial license if someone would kindly tell me who hires 37 to 40 year old pilots.

Long Beach, Calif.

The airlines usually fix a limit on hiring age in the low 30s. Regulations require considerable experience above a private ticket to enter air taxi or commercial flying.

However, business and corporate users of aircraft often seek the type of experience you have. We would suggest you contact executive aircraft operators in your area.

• Film Fare

We are members of a small flying club which does considerable flying in the Rocky Mountains. In the interest of safety in flight, we would like a list of films available through your film library. How do we go about it?

Aspen, Colo.

All correspondence relating to FAA film should be sent to the Federal Aviation Administration Film Library, AC-921, P.O. Box 25082, Oklahoma City, Okla. 73125. They will provide you with a catalog and the procedure for borrowing film.

• Youth Data Request

The June 1967 *Aviation News* carried an interesting item in the "News Briefs," telling of the large number of youths between 16 and 24 who are taking flight training or who are licensed pilots.

Could you direct me to the source of this information, and also to the FAA office which deals with youth, young adults, high schools, colleges and universities, and flying?

New York City.

The statistical information was extracted from page 83 of the "FAA Statistical Handbook" (1966 edition—latest available) which can be obtained for $1 from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

A letter directed to Mr. Robert F. O'Neil, Federal Aviation Administration, GA-20, 800 Independence Ave., S.W., Washington, D.C. 20590, will place you in touch with the Office of General Aviation Affairs, which is most familiar with aviation education.

• The Date's The Thing

The May 1967 *Aviation News* said that an instrument rating issued prior to Oct. 17, 1966, on the basis of IFR qualification in a helicopter is valid for IFR operations in all categories of aircraft in which the holder is rated.

My commercial certificate indicates "INSTRUMENT, HELICOPTER ONLY." From the above may I assume that I am not legally rated for IFR in "AIRPLANES SINGLE ENGINE LAND" which is also on my certificate, which was issued Dec. 19, 1966.

USCGR, Michigan.

If the Dec. 19, 1966, date on your certificate was the original (not a reissuance) date you obtained your instrument rating, the limitation on it is as stated—HELICOPTER ONLY. If you were issued your helicopter rating before Oct. 17, 1966, the limitation is not correct, and you may exchange the certificate for one with privileges "INSTRUMENT INCLUDING HELICOPTER" on it. Check with your local general aviation district office, Flight Standards Building, Willow Run Airport, Ypsilanti, Mich. 48197.

• Experimentals—All Systems Go

I am contemplating building a small two-place aircraft which would perform as a hovercraft and also be able to sustain wing supported forward flight. The occupants and fuel would be housed in a pod inboard of four wings with ducted rotors at their tips. Atop each rotor would be a small engine. The engine and rotor assemblies would be coupled to rotate in the roll and pitch axes to provide forward and lateral motion.

The reason for this letter is that I am unsure as to the requirements for engines powering experimental home-built aircraft. I have selected as a tentative powerplant the Briggs and Stratton 10-horsepower, 4-cycle lawnmower engine. If provided with a dual magneto ignition system, would this engine meet FAA requirements?

Riverside, Conn.

FAA has no requirement pertaining to powerplants for amateur-built aircraft. Any make or type of engine may be used that is suitable and safe.

We suggest that you contact your local FAA Engineering and Manufacturing District Office before you start your project so that an inspection schedule may be arranged.

• Ceiling Sought

What is the highest altitude of flight level that a qualified pilot without an instrument rating could fly VFR and be legal?

I. J. Calvin, Jr.
Memphis, Tenn.

The highest altitude at which a VFR pilot may fly at present is 23,000 feet (flight level 230). Only IFR qualified pilots, in IFR-equipped planes, may fly in area positive control (APC) airspace, which extends from 24,000 feet upward to infinity.

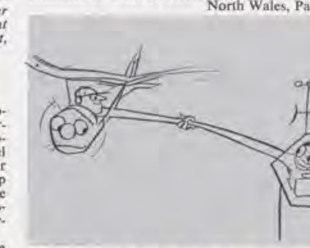
However, a recent FAA rule change proposal would lower the floor of APC from the present 24,000 feet to 18,000 in the northeastern and north central area of the U.S. Pilots without an instrument rating could still operate up to 23,000, provided that the aircraft was properly instrumented and was given an air traffic control clearance.

• Art With A Message

I have spotted the back cover of your magazine appearing as an aviation safety poster at airport lounges. The punchy rhymes and cartoons by the inimitable Osborn teach a valuable lesson you don't easily forget.

My question is, do you have to own an airport to get these cartoons. How about the president of a newly formed flying club?

North Wales, Pa.



Airports and flying clubs may receive the posters, and other aviation material suitable for bulletin board display by writing to Federal Aviation Administration, Distribution Unit, HQ-438, Washington, D.C. 20590.

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