NOVEMBER 1966

FAA AVIATION NEWS

COVER

Atlanta high school students mix practical knowledge with classroom theory during field trips to local airports and plane manufacturers. Here, instructor traces wing flap linkage. See page 6.

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William F. McKee, *Administrator*
David D. Thomas, *Deputy Administrator*

Charles G. Warnick, *Director*, Office of Information Services; Donald R. Foxvog, *Editor;* Abner B. Cohen, *Art Director*

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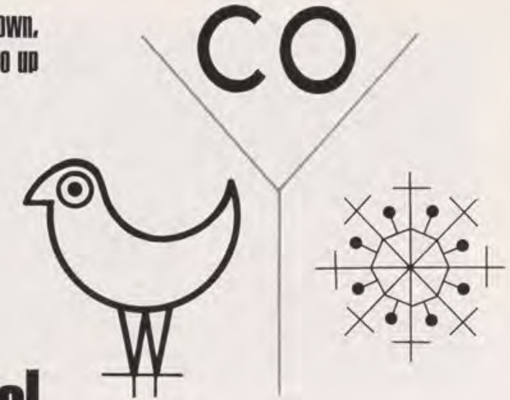
When temperatures go down, hazards needn't go up



Keep Your Cool

Earmuff and overcoat time is arriving in many parts of the country and airmen are faced with a new set of circumstances. The following words of advice might seem basic and even obvious, but there are always some who do not get the word. And most others don't mind an annual reminder.

Take plenty of time for a careful preflight. Don't hurry the job because you are cold.

Be Winter Wise—Winterize

In winter, more than during any other time of year, flight safety starts on the ground. Therefore, keep the following safety checks in mind during your pre-flight preparations:

Remove snow and ice from the wings and control surfaces before takeoff. Aerodynamic characteristics, including lift, are established by the shape of the airfoil. When snow, ice and frost collect on the flight surfaces, the shape of the airfoil changes. Remove wind blown snow. Soft snow can harden at altitudes and interfere with the movement of controls.

Pre-heat engine oil, if possible, to prevent oil sluggishness which could damage the engine. Use carburetor heat on the ground as circumstances require to richen the mixture and help vaporize the fuel.

Effective de-icing fluids are very helpful in removing ice. But a word of caution: Most of these fluids contain some toxic properties. Avoid getting de-icing fluid on your skin or in your eyes. Keep it out of your aircraft's heat and vent systems since it can produce poisonous fumes. Read the label on your can of de-icer.

Far more lethal than a little bit of misplaced de-icing solution is carbon monoxide—the product of incomplete combustion—which can seep into your cabin through cracks in the exhaust system. Since cold weather pilots close their windows and vents, and turn on their heaters, CO is a particular threat in winter. It doesn't take much CO to affect the judgment of a pilot. It would be well worth your while to check your complete exhaust system while you still have a chance to do something about it. (See story on carbon monoxide studies, pages 4-5.)

Fine Feathered Friends

Birds with long-range flight capability go south for the winter and bird strikes reach their peak in the fall. Many ducks and geese are now on their way; be on your guard. Of the estimated 800 in-flight bird strikes experienced each year in the United States by all types of aircraft, approximately 18 per cent result in substantial aircraft damage to engines, wings and windshields. Sixty-nine per cent of the strikes occur at altitudes below 4,000 feet during takeoffs and landings, although some have occurred as high as 14,000 feet.

New dimensions are added to aviation when the temperature begins to plummet—winter maintenance, carbon monoxide and migratory birds. The white, fluffy crystals may be lovely to look at—but they can add new problems. Recognizing the enemy is the first and most important step in winter flying. If proper precautions are taken, however, winter operations can be safely conducted down to temperatures as low as minus 50 degrees F.

A significant part of the Federal Aviation Agency's efforts in behalf of general aviation is carried on in the field of research and development—the connecting link between the present and the future. That link is being forged at FAA's National Aviation Facilities Experimental Center, Atlantic City.
Some of the R&D programs are very broad, such as the development of airport and navigation facilities for general aviation. Others are narrow, such as the development of training techniques for student pilots, stability devices for light aircraft and problems associated with aircraft cabin heaters. All programs have safety as their goal. Some programs are near completion.
Others, only just begun, will continue for years. Some have immediately recognizable benefits; the benefits of other programs can only be ascertained after considerable study. So it is with research.
Anxious to cooperate fully with the general aviation industry, FAA people throughout the country meet and talk with pilots, fixed base operators and others who have a special interest in aviation safety. High level FAA officials recently completed a series of meetings with manufacturers of general aviation aircraft. Earlier this year the Utility Aircraft Council of the Aerospace Industries Association reviewed first hand the research and development activities of NAFEC. From these contacts, new ideas come forth from the aviation community that will result in the NAFEC R&D programs of tomorrow. In this manner the aviation community makes its contribution and can expect continued improvement in both aircraft and airmen as a result of NAFEC studies, of which two are described in this issue. Subsequent issues of **FAA Aviation News** will report other research and development activities. Comments from readers are welcome.

NAFEC
Where 'Good Enough' IS NOT GOOD ENOUGH

Why the Engines Roar at NAFEC

A narrow blacktop road winds its way past the complex of buildings that house most of the FAA's National Aviation Facilities Experimental Center near Atlantic City. It continues leisurely for several miles toward a lone building nestled on the edge of a pine forest. An unsuspecting visitor would wonder where the roar of an aircraft engine was coming from. There's not a plane in view.

It becomes clear when he arrives and finds not one, but three engines mounted on test stands and all roaring simultaneously within a few feet of each other—all in the name of research for general aviation pilots.

The project involves engine exhaust systems and carbon monoxide—subjects that have been under study by the FAA's Aircraft Development Service since 1963. Further interest was sparked last year when the Civil Aeronautics Board told the FAA of 21 recent general aviation accidents, linked to the failure of exhaust systems. These failures resulted in a reduction of engine power—even engine stoppage, inflight fires and carbon monoxide poisoning of the pilot.

The FAA approached the problem with a two-phase program. The first step was to collect data on exhaust system failures covering a four-year period. The study turned up 38 reports of carbon monoxide in cockpits causing 19 illnesses and 12 fatalities from CO poisoning. In addition there were 70 incidents involving partial or complete power failure and 14 fires. This data was published in FAA Report ADS-29, "An Analysis of Engine Exhaust System Failure in General Aviation Aircraft."

Nine of the exhaust systems that failed were given a thorough metallurgical examination to determine the cause. That study showed that the failures were due to metal fatigue and a combination of local overheating, carbonization and contamination from the byproducts of combustion as a result of an uneven flow of gases. Also, some of the metals became marginal at high temperature—1600 degrees F. The report, ADS-28, "Metallurgical Evaluation of Failed Aircraft Stainless Steel Exhaust System Components," recommended (1) a material that was more resistant to oxidation and high temperature corrosion (an evaluation is now being made of an exhaust system fabricated from an improved metal—Incoloy Alloy 800); (2) changes in design, including the way the exhaust systems were assembled and mounted.

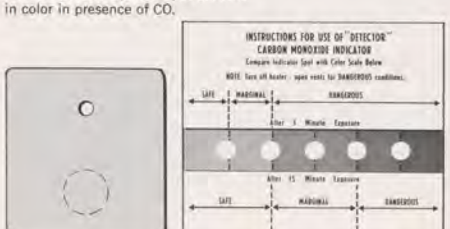
The second phase of the NAFEC study had several parts and included both flight testing and ground testing. Studies proved that exhaust system temperatures, pressure and vibration data taken on the ground were similar to that taken in the air and thus the findings of ground tests were valid.

FAA obtained the power plants of seven models of well known manufacturers and has been running the ground tests for more than a year and a half—sometimes as much as 80 hours a week. The plan was to run each engine 600 hours, but failures were experienced long before that period.

The engines are being run at take-off, high cruise and idling speeds according to accelerated schedules so that a limited number of ground test hours will be comparable to a larger number of flight hours. Modified cooling scoops and large oil coolers were devised to keep the engines cool enough to run at these speeds on the ground for long periods. The warm air from the heat exchanger—including any carbon monoxide that may be present—is collected in an outside tank mounted in front of the engines and recorded on a special control panel inside.

The ground test phase of this operation is now nearing completion with some 3,500 hours logged. But the studies will continue. Engineers, in their quest to improve safety, are more convinced than ever of the importance of a sound exhaust system in an aircraft.

Inexpensive CO detector—about $1 —is this plastic square. Spot darkens in color in presence of CO.



These engines at NAFEC, operating at takeoff, high cruise and idling powers, are prime research tools in studies of exhaust systems and CO.

To Trap a Deadly Ghost

The FAA isn't one to let anything go to waste—not even carbon monoxide, which FAA engineers are using to check the effectiveness of carbon monoxide detectors during the ground test of aircraft exhaust systems.

Carbon monoxide may be more of a problem than many pilots realize. While the extreme symptoms of CO poisoning—general weakness, dizziness, headaches, nausea—are fairly well known, a small, almost unnoticeable amount can affect a pilot's judgment. As little as .06 per cent can cause unconsciousness within two hours.

In a study made in the FAA Central Region in 1965, 20 per cent of the aircraft tested were found to have detectable amounts of CO. They averaged .002 per cent; more than one out of a hundred had more than .005 per cent—the FAA's allowable limit. A second test held this year indicated similar results—17.5 per cent with detectable amounts and 3 per cent more than .005, thereby exceeding the FAA safety limit.

Many aircraft are probably flying today with small amounts of carbon monoxide present in the cockpit.

When FAA inspectors test for CO they use a detector developed by the National Bureau of Standards and while this detector and other similar detectors can do the job well, they do not meet the need of pilots who want a *continuing* test. Therefore, NAFEC engineers began a study of low cost devices capable of making a continuing test of CO in the cockpit. The final report, "Evaluation of Low Cost Carbon Monoxide Detectors (ADS-80)," was just released this fall.

One detector failed the test, but this is of little concern because it is no longer on the market. Another low cost detector was found to be very useful. Manufactured in Denmark and sold in the United States, this device has the advantages of being both inexpensive—about $1—and reliable up to 30 days if there is no CO present.

The detector is a small square piece of tan plastic with a spot in the middle comparable in function to litmus paper. When there is no CO present, the spot is the same color as the detector.

As the spot soaks up carbon monoxide it begins to darken. NAFEC engineers developed a color chart that can be used with the Danish detector with the first color matching the color spot of the detector and labeled "safe." The next color indicates a "marginal" condition; others are labeled "dangerous."

FAA technicians envision pilots having two detectors in their cockpit; one would be hanging in a convenient spot and the other would be left in its cellophane wrapper. When the one in use begins to darken, the other would be taken out and a quick check could be made to determine if there is a dangerous accumulation of CO present, or whether the darkening was simply from the total accumulation. When a detector becomes dark, it generally is discarded, although in some cases it can be reused if there is only a moderate CO reaction that may be reversed if the detector is left out in the sunlight.

Not content with this successful study, next year NAFEC engineers intend to give special attention to detection devices operated by photoelectric cells which sound an alarm when there is too much CO present.

As a closing thought, NAFEC engineers note that CO is a colorless, tasteless, odorless gas. But, they point out, while this condition is true in the laboratory, it rarely is true in an aircraft. CO is almost always mixed with gases that do have noxious ordors. So be especially careful when you smell fumes. CO is probably present too.

(Information on the carbon monoxide studies and the ADS reports is available from the Federal Aviation Agency, DS-44, 800 Independence Ave., S.W., Washington, D. C. 20553.)

NAFEC technician at instrument console recording CO test data.

Ideas Taking Wing

Students at three Atlanta high schools are taking to a one credit course in aviation like eagles take to the air. But those enrolled in the one-year FAA-approved course must buckle down to the study of mathematics, geography, map reading, meteorology and other subjects taught as part of aviation to become eligible for flying lessons.

As a reward for diligence, school officials hope to provide means by which every student in the course can acquire a minimum of 10 hours of flying instruction by the close of the school year.

Now being repeated for the second time at Grady, Price and Dykes High Schools, classes are so popular that they can't accommodate all interested students.

The 40 students enrolled in classes at the three schools meet the last period of each day so field trips to airports, aircraft manufacturing plants, the weather bureau and other aviation-related facilities won't interfere with other work.

The aviation club idea was born when Frank Hazelwood, an energetic Atlanta insurance executive and former Navy pilot, began giving evening flying courses to encourage students to remain in school until they received diplomas.

Working with Dr. John Martin, assistant school superintendent for instruction, Hazelwood helped organize an aviation club and taught the ground school.

When school officials decided to expand the aviation project into an academic course, Mrs. George (Betty) Eidson, a high school history instructor, became enthused about the possibilities of encouraging youths to enter aviation. A former Women's Auxiliary Service Pilot (WASP), she began to teach ground school as well as serve as a flight instructor. She is certified for both by the FAA. Last spring she took all students enrolled in the three classes aloft for flight instruction in a Piper Cherokee 140 provided by the manufacturer.

Dr. Martin said the aviation project was started to offer students a chance to experience how mathematics and other subjects are put to practical use and to encourage an interest among students in various phases of aviation.

"There is a fine opportunity," he said, "for students in aviation in Atlanta where the airport ranks sixth in the nation in air carrier operations. Aircraft manufacturers provide many additional jobs."

Even now Atlanta school officials are looking ahead. They hope to offer aviation at several other city schools next year and are on the lookout for a Federal government surplus aircraft to use for flying instruction. They already have a government surplus Link trainer for ground instruction.

Dr. John Letson, school superintendent, is enthused over the interest shown by students in aviation.

"In the beginning, we hoped it would be a motivating program for students who were not showing an interest in school subjects," he said. "The general evaluation of the course shows that it has been tremendously effective in stimulating interest among all types of students."

Says FAA's chief of aviation education, Dr. Mervin K. Strickler: "This type of course changes the attitudes of youngsters toward excellence, precision and high standards. No pupil is satisfied with 70 per cent success when landing an airplane."

Today, students of all levels of academic achievement are enrolled in the course. But one indication of the program's special value can be judged from the high school dropout who begged to be readmitted when he heard about the aviation course. He began to carry his slide rule flight computer around school and proudly solved math problems for his friends. At 22 years of age, he received his high school diploma.

Mrs. George (Betty) Eidson reviews preflight procedures with a student enrolled in Atlanta's aviation training courses. Behind every hour of flight time are many hours of high school ground classes in flight theory.

Richard Clause, ready to battle the foe, is poised at the controls of the **Snipe**

Palen's Antique Antics

The cloud hopping impresario himself, Cole Palen, surrounds himself with a nonflyable 1912 Thomas.

This Passett ornithoper, with Walter Cederland at the levers, is another rare bird in Palen's nest.

A red Fokker and a Sopwith *Snipe* jockeyed for position during the dogfight. Then, with its twin Vickers machineguns hammering in staccato, the Sopwith lined up behind the red Fokker and riddled it with bullets.

Emitting plumes of black smoke, the Fokker plummeted earthward. At the last minute, though, the pilot was able to regain control and straighten out his plane, bringing it in for a safe landing on the dirt airstrip. Minutes later, the *Snipe* touched ground and its pilot, clad in his World War I flying regalia, scrambled from the cockpit waving victoriously to the crowd.

The scene was Old Rhinebeck Aerodrome—not in France in 1918, but in New York State in 1966. The pilot strutting off the field was Cole Palen, a 40-year-old showman who is the owner of one of the world's most extensive collections of flying vintage aircraft.

Palen conducts a monthly air show over his aerodrome from May to October. During the rest of the year he takes his airborne circus on the road.

"Once in a while I ground loop one and then the next day the show is always packed," Palen said. "People come back just to see if this crazy guy will break his neck or not."

Frequent onlookers with a more professional interest are the FAA's Teterboro GADO inspectors who closely monitor Palen's planes and activities. GADO chief Walter Cederlund explains, "We issue not only an FAA airworthiness certificate for each airplane that Palen maintains in flying condition, but also spell out the operational restrictions. These vary with each aircraft, but essentially the idea is to insure that safety is in no way derogated."

Palen can fly only under day VFR conditions. He cannot carry people or property for compensation or hire and his exhibition flights must be conducted only at air shows or other similar gatherings. His practice flights can be made only within a five-mile radius of Old Rhinebeck Aerodrome and the aerial stuntmen are required to stay clear of congested areas both in the air and on the ground.

Adds Cederlund reassuringly, "Palen is an excellent pilot and equally important, takes good care of his aircraft. They may look flimsy, but within their limitations they are good planes and should go on for many more years."

MAVERICKS of PLAIN FLYING

In the Plains States, the interaction of three or more air masses (warm tropical moist air from southern regions; cold, dry air from the north and cool, relatively dry air from the west or southwest) produces many types of weather, including quite severe convective weather. The section suffering the most exposure is from Texas through Oklahoma and Kansas—an area nicknamed "Tornado Alley."

Flying over the Great Plains is about the easiest kind of flying the VFR pilot will ever do, but with some notable exceptions. The land is flat, the visibility is good and section lines and secondary roads generally run north-south and east-west, providing the pilot with an easy, square-with-the-world reference tool. Orientation by the use of a chart is not difficult because there are enough distinguishing features, yet not too many so as to be confusing.

But let's get to those exceptions, because they are troublesome areas that get pilots into trouble, particularly pilots who have only a general acquaintance with the area.

Watch the Weather

Weather is perhaps the most surprising phenomenon on the Great Plains. Except for the Oklahoma, Arkansas and Missouri Ozarks, the plains are a vast, flat expanse from the Gulf of Mexico to the Canadian border and beyond. Since there is little to stop the movement of air masses, they barrel across the map at faster speeds than anywhere else in the country. Blizzards that move at 60 miles an hour are not uncommon in the northern section of the plains. With weather stations in the northern section few and far between, blizzards and thunderstorms can brew up quickly and a pilot may sometimes be surprised by meeting unexpected weather between stations.

When warm, moist air flows up from the Gulf it frequently collides with cooler air from the north, generating thunderstorm squall lines with low visibility, low ceilings, turbulence, icing conditions and hail. In spring and early summer this collision of air spawns so many destructive funnel clouds that a section of the Great Plains running from Texas through Oklahoma and Kansas has been nicknamed "Tornado Alley."

This thunderstorm activity is most common in spring and summer. In summer, however, there is a further air instability in the lower altitudes, usually up to about 6,000 feet and often higher, caused by uneven heating of the earth. Thus the pilot finds bumpy thermals and downdrafts, due to the uneven radiation, which can be quite tiring on long flights. This same Gulf stream air overrides colder air in the winter, causing vast areas of thick overcast, with snow, rain, low visibility and icing.

The flatness of the plains also accounts for the fact that there is probably more wind in this section of the country than any other. Pilots who learn to fly on the plains usually have the advantage of a stiff breeze. If they suddenly get to an airport where there is no wind, they may find themselves taking more runway than usual on landing or takeoff. This same wind whips up dust in the western part of the plains, interfering with visibility and causing difficulty in landings. In periods of drought dust from the desert southwest can be borne as high as 10,000 feet, reducing visibility over large sections of the plains.

Is Flat Flat?

A fallacy about the plains is that because they are flat to the eye, the pilot thinks they are actually flat. But, if he flies due west from the Mississippi River at 4,000 feet he would fly into the ground somewhere in eastern Colorado, still a long way from the mountains. Any pilot could see this coming, of course, but the point is that when he flies west on the plains the increase in elevation is so gradual that it is hardly noticeable. Here is where frequent reference to map and altimeter is elementary prudence. This gradual rise in elevation could lead to trouble in the case of limited visibility or tall towers and other obstructions.

This very gradual increase in elevation also means a correspondingly higher density altitude when flying toward the west on the Great Plains. Pilots can see the mountains which create the illusion that the flight is still "down on the plain." But actually the air has gradually become less dense by about 4,000 feet and a correspondingly longer takeoff run is necessary.

The fact that section lines run north-south and east-west throughout most of the Great Plains aids in map orientation. However, haze, blowing dust, smoke, high humidity or a combination of them can restrict visibility and obscure these otherwise helpful references. At a time like this a tall mountain peak protruding through the obscurity would provide a helpful reference point. Here again we turn to the chart for guidance.

Emergency landings are easier in the Great Plains region because of the flatness of the land, but a pilot should be wary of pastures and grazing lands because they are usually the rockiest and roughest part of any farm. Thus it would usually be safer to land on cultivated soil, unless it is wet. Again there is an exception to the rule—bean and corn fields. These should be avoided because the rows are tilled in high ridges, making a very uneven landing surface.

There are many sod fields in the Middle West, but these too can be dangerous because they are usually short fields, and density altitude takeoff problems can be encountered on hot, humid days.

Pilots should also be wary of landing at soft fields in spring in the northern part of the Middle West. Heat escaping from the earth melts the snow from underneath, leaving a landing surface that looks hard from above, but is actually soft underneath.

In winter, pilots who land on snow without skis show poor judgment because it is hard to judge depth of snow at airports where there is no snow removal. Avoid this hazard by finding out the snow depth before takeoff. Such landings can be dangerous with crosswinds because rudder correction misaligns the nosewheel, causing it to brake into the snow sideways and flip the aircraft over on its back, or collapse the landing gear.

Winter 'Whiteouts'

Another phenomenon of the northern Great Plains is the "whiteout," the snow-covered ground that in winter blends in with the horizon and causes spatial disorientation. Similar horizon-blurring conditions can occur in light snow or light rain, and instrument flight may be necessary until the pilot is able to land or fly out of the weather.

Flight planning is particularly important to pilots in some areas of the Great Plains because of the great distance between airports that provide adequate fuel and maintenance facilities.

—By Leo Welter.

famous

FLIGHTS

SAGA of the PN-9 No. 1

Photo credit: The Smithsonian Institution

Across the surface of San Francisco Bay, through the still unspanned Golden Gate and out over the blue Pacific they flew—two Navy PN-9 flying boats bound for Hawaii. Ahead lay 2,400 miles of open water over which no airplane had ever passed before. The date was Aug. 31, 1925.

At 5 p.m., approximately two hours after takeoff, the flying boats made radio contact with the destroyer *U.S.S. William Jones*, the first of 10 Navy ships which had been stationed at intervals of 200 nautical miles along the flight route. These vessels were to serve as check points for the seaplanes and provide refueling and rescue service if needed.

Cmdr. John Rogers, the Navy's senior aviator in charge of the flight, hoped neither service would be required. Each PN-9 carried a capacity load of more than 1,300 gallons of aviation gasoline—enough fuel for a nonstop flight provided the aircraft could catch a favorable tailwind.

But shortly after 7 p.m., the flying boat commanded by Lt. A. P. Snody (designated as PN-9 No. 3) suffered a broken oil line and was forced to land on the ocean only 300 miles from San Francisco. The *William Jones*, fulfilling its mission, sped to the rescue and picked up the five-man crew.

Commander Rogers' flying boat, the PN-9 No. 1, continued alone—its two Packard 500 h.p. engines running smoothly. At 8:50 p.m., it passed the second station ship, *U.S.S. McCawley*. Three hours later, it over-flew the *U.S.S. Corry*, the third ship in the line, 600 nautical miles from San Francisco.

It was at this point that Commander Rogers expected to encounter strong tailwinds, but they failed to materialize. His chance for a nonstop flight was greatly reduced.

By midmorning of the following day, Rogers knew for certain that he could not make Hawaii without refueling and decided to land alongside the seaplane tender *U.S.S. Aroostook* at the 1,800 mile point. He notified the *Aroostook* of his intentions and requested radio bearings to the ship.

The bearings Commander Rogers received, which later proved to be in error, indicated that he was south of the *Aroostook*. He, therefore, changed course to the north to approach the ship on these bearings. He was still looking for the ship when his aircraft ran out of fuel shortly after 4 p.m. Both engines cut out simultaneously, and the flying boat glided to a landing in heavy seas from an altitude of 800 feet. The fact that the PN-9 No. 1 had covered 1,870 nautical miles (2,155 statute miles) to set a new distance record for seaplanes offered little consolation.

Through the evening and into the night, Commander Rogers and his four-man crew waited for rescue vessels to arrive. But it was soon evident from radio reports of the search operation (the flying boat could receive radio messages, but not transmit them) that the rescue ships were moving away from the downed seaplane. Commander Rogers decided to sail the 50-foot metal-hulled PN-9 No. 1 to Hawaii.

Sails were improvised from wing fabric and stretched between the upper and lower wings of the biplane. This jury-rigged arrangement moved the flying boat before the wind at an average speed of just over two miles per hour or approximately 50 miles per day.

After three days, the emergency food rations aboard the seaplane gave out, but the water supply, about two canteens per man, stretched until the seventh day. Then, on the eighth day, a heavy rain squall passed over the flying boat and the crew managed to catch more than two gallons in the fabric which had been cut from the wings.

That night, there was more good news. The searchlights of Schofield Barracks on the Island of Oahu were sighted about 100 miles away. The following morning Oahu, itself, was clearly visible in the distance.

But the course of the PN-9 No. 1 was roughly parallel to the Oahu shoreline and could not be changed since the seaplane was moving with the wind. Using a hastily-improvised keel to help him control the drift, Commander Rogers steered a course for the Island of Kaui to the north of Oahu.

By midafternoon of the following day (Sept. 10), the flying boat had reached a point 15 miles from the harbor of Nawiliwili on the Island of Kaui where it was met by a Navy submarine. Rogers at first declined the submarine's offer of a tow, preferring to sail his craft in to the harbor himself in the best traditions of the U.S. Navy. Later, he relented, and a line was passed to the seaplane. The saga of the PN-9 No. 1 ended.

Commander Rogers had sailed his flying boat over 450 miles in nine days—a feat of seamanship which has few, if any, parallels in naval history. As a reward, he was named assistant chief of the Navy's Bureau of Aeronautics, a post he held until his death in an airplane crash near Philadelphia on Aug. 27, 1926. —*By John Leyden.*

Something Special

Ever fly with a *special* VFR clearance? Many pilots haven't. Some aren't even sure what is involved. In brief, a special VFR clearance authorizes flight to be conducted within a control zone with less than the basic VFR minimums.

Generally, a special VFR clearance is sought by a pilot who would otherwise be grounded because he does not have an instrument rating or because his plane is not equipped for IFR flying. Sometimes a pilot may simply wish to shoot touch-and-go landings. Or a dealer may wish to demonstrate an aircraft. Occasionally, clear VFR weather is just beyond the immediate IFR weather around the airport and a special VFR clearance can get a pilot on his way.

In effect, the pilot requesting special VFR clearance is asking for IFR separation even when he is not flying IFR.

Flight under the *special* VFR weather minimums may be conducted clear of clouds and in ground or flight visibility conditions as low as one mile. This special clearance and the separation from other aircraft afforded by it are effective only within the tower's control zone. It does not authorize deviation from Federal Aviation Regulation 91.79, which pertains to minimum safe altitudes, or any other provision of the FARs.

Generally, when a pilot thinks of basic VFR in a control zone, he thinks of a ceiling of at least 1,000 feet and visibility of at least three miles. A pilot operating on a special VFR clearance can use the additional altitude available to climb above obstructions or congested areas. For example, one California airport with an elevation of 46 feet, has terrain rising to 1,000 feet at its eastern side. If there is a ceiling at the airport of less than 2,000 feet, a pilot would be unable to operate over the high terrain on the east and still comply with the basic VFR minimum since the ceiling over that area would be less than 1,000 feet. A special VFR clearance would be warranted.

In some instance, of course, it is advisable to avoid the high terrain, congested areas and obstructions. Also, if there is a delay in waiting for a special VFR clearance, it might be more advantageous to fly around the area where special VFR would be required.

When operating under special VFR, a pilot should be certain that he actually has a special VFR clearance. Occasionally a controller will advise "maintain VFR," meaning that the aircraft is to proceed in accordance with the basic VFR minimums. But the pilot, knowing that special VFR operations are being conducted, may wrongly believe this to be a clearance to proceed in accordance with the special VFR minimums. A special VFR clearance will *always* contain the phrase "maintain *special* VFR conditions."

Aircraft operating under special VFR are not assigned a fixed altitude because of the clearance-from-clouds requirement. Instead, a clearance is issued to maintain special VFR conditions at or below a specified altitude. The altitude given will provide separation from IFR aircraft and at the same time provide terrain clearance. However, if a ceiling condition exists, a pilot may not be able to proceed at the specified altitude cited and still remain clear of clouds. In these circumstances the requirement to remain clear of clouds would prevail and the pilot would have to remain below the specified altitude.

A pilot must rely on his own good judgment in deciding whether or not to conduct special VFR operations.

How well does he know the area? Are there well-defined routes which can be followed when visibility is low? Will he have sufficient altitude to clear obstructions? Will he be able to see and avoid them? How fast is he going? Does he have a planned alternative if conditions are worse than anticipated? Based on answers to questions such as these, a pilot may decide not to make the flight until the weather is somewhat better than the prescribed minimums.

In VFR weather the three TV towers stand out clearly but when conditions deteriorate (**right**) and make normal VFR flight impossible, they blend into the background. This may be a situation when a **special** VFR clearance is appropriate.

FORECAST HAS GENERAL AVIATION FLYING HIGH, WIDE AND HANDSOME

The general aviation fleet will be 80 per cent larger and 90 per cent busier in 1975 than in 1964, according to the Federal Aviation Agency's first detailed forecast of general aviation flying.

The FAA report, "General Aviation, A Study and Forecast of the Fleet and Its Use in 1975," foresees 160,000 general aviation aircraft flying 30 million hours in 1975, as compared to 88,742 aircraft and 15.7 million hours in 1964. The forecast will be used by the FAA to plan aviation facilities and services during the next decade.

Turbines To Go Up 1,207%

The greatest change in the 1975 general aviation fleet will be a 1,207 per cent increase in turbine engine aircraft, from 306 in 1964 to 4,000 in 1975. Rotorcraft will increase by 129.7 per cent, from 1,306 to 3,000. A preference for larger capacity aircraft evident over the past several years will continue. In 1975 approximately 58 per cent of the general aviation fleet will be single engine aircraft accommodating four or more people, and 18.7 per cent of the fleet, 5,600, will be multi-engine piston aircraft.

Compared to 1964, the 1975 fleet will show the following increases: Aircraft in business use will increase from 21,127 to 32,000; personal aircraft, from 46,721 to 88,450; aerial application aircraft, from 4,901 to 6,550; air taxis, from 5,267 to 13,000; industrial-special aircraft, used for patrolling, advertising and photography, from 1,811 to 2,300; and flight instruction aircraft, from 6,855 to 14,550. Other aircraft, used for miscellaneous purposes, will increase from 2,060 to approximately 3,000.

Business Planes Busiest

Although personal aircraft make up the largest segment of the general aviation fleet, aircraft in business use log more hours in the air. The 5.9 million hours flown by aircraft in business use in 1964 will grow to 9.7 million in 1975. Personal flying hours will increase from 3.8 million to 7.6 million. Individual business airplanes will average 301 flying hours in 1975 as compared to 86 hours for personal planes. In 1964, they averaged 278 and 81 hours, respectively.

The greatest growth rates, both in numbers of aircraft and flying hours, are forecast for air taxi operations and flight instruction. Air taxis will increase by 146.8 per cent with a flight hour growth of 168 per cent.

Flight instruction aircraft will increase 112.3 per cent, while time aloft will grow by 120.2 per cent.

In flight instruction, airplane use will grow from an average of 378 hours in 1964 to 392 hours in 1975. Planes used for industrial-special purposes are second and air taxis are third in average annual use. Industrial-special airplanes, which averaged 342 flying hours in 1964, are expected to reach 365 hours. Air taxis will grow from 323 to 351 hours.

Piston Fleet Will Remain

The FAA report predicts that general aviation will remain essentially a piston-engine fleet, although supercharging and increases in aircraft speed, range and size will require more and better navigation and communications equipment for longer cross-country flights.

A limited number of free copies of FAA's "General Aviation, A Study and Forecast of the Fleet and Its Use in 1975" are available to the public. Written requests should be addressed to FAA, HQ-438, 800 Independence Ave., S.W., Washington, D. C. 20553. Requests should be accompanied by a self-addressed mailing label.

Industry-FAA Flying Safety Drive Cuts Labor Day Weekend Accident Rate

An intensive three-week air safety campaign to reduce general aviation accidents over the Labor Day weekend was hailed a success by the Federal Aviation Agency. Fewer plane accidents were reported this year than on any of the past four Labor Day weekends.

From midnight, Thursday, Sept. 1, to midnight, Tuesday, Sept. 6, there were 82 private plane accidents reported in the 50 states. In the past four years the number of accidents has ranged from 91 in 1963 to 110 in 1964.

First of Its Kind

The holiday air safety campaign—the first of its kind—featured local air safety meetings with pilots and such other information and educational efforts as posters, films and special letters from aviation and government officials urging pilots to fly safely, land safely and enjoy their flying holiday.

Commenting on the safety campaign, which was conducted by FAA with the cooperation of city and state government aviation agencies and national aviation organizations, FAA Administrator William F. McKee said, "We were most encouraged not only by the success of this joint industry-government campaign but also by the enthusiastic support which we received from industry groups. The number of accidents dropped substantially even though estimates show that general aviation planes will fly more than 500 million miles farther this year than in 1965 and more than one billion miles farther than in 1962."

Wide-Spread Support

Supporting the FAA-sponsored air safety campaign were the Aircraft Owners and Pilots Association, the National Pilots Association, the National Business Aircraft Association, the Aerospace Industries Association, the National Aviation Trades Association, the National Association of State Aviation Officials, the National Safety Council, the International Flying Farmers, the Flying Physicians Association, the U.S. Weather Bureau and many other organizations throughout the nation.

The Joseph Cserhat family pauses for a moment before taking off on the recent Labor Day weekend to listen to some safety recommendations from Federal Aviation Agency representatives, Richard F. Donnally, left, and Charles Waters. The scene is the Long Island-MacArthur Airport.

OUTSTANDING INSTRUCTORS TO RECEIVE GOLD SEALS

Active flight instructors with outstanding records are now being recognized by the Federal Aviation Agency with certificates bearing distinctive gold seals.

The certificates are being issued automatically upon request to each flight instructor who:

(1) Holds a commercial pilot certificate with an instrument rating.

(2) Holds a ground instructor certificate with a least an advanced ground school rating.

(3) Has attended a flight instructor clinic since the last time his flight instructor certificate was issued or reissued.

(4) Has trained and recommended at least 10 successful applicants for certificates or ratings within the previous 24 months.

The purpose of the gold seal rating is both to identify instructors who have outstanding qualifications and to motivate others to improve their qualifications.

To obtain the gold seal, qualified instructors must make application in person to FAA representatives at the general aviation district office where they reside or work, bringing documents with them.

FAA DC-3 Catches Eye of Dulles Airport Enthusiast

Four years ago, when Washington's Dulles International Airport was dedicated, Lawrence Armel was a most interested spectator. Not only because 52 acres of the airport formerly had been part of his dairy farm, but also because Armel was an aviation buff from 'way back. He had been an aircraft modeler since he was a youngster.

On the ramp that November day an FAA DC-3 used for flight checking the accuracy of navaids caught his eye. Armel went to work to build one like it—scaled down to 1/24th the actual size. With wood chisels and carving tools, Armel spent some 450 hours on the solid wood model. For guidance, he used a small plastic DC-3 and photographs obtained from the Douglas Aircraft Co.

Subsequently, the Armels, who live on their farm near the corner between runways 19R and 12L ("just one and a quarter miles visibility checkpoint from Dulles Tower," Mrs. Armel explains), have become the friendliest of airport neighbors. Mrs. Armel enthusiastically keeps track of the planes flying in and out and if a regularly scheduled aircraft is late, she phones the tower to find out why.

She used to keep a log of arriving and departing aircraft, but now she knows the schedules by memory. Three receiving sets in her kitchen are tuned to frequencies used by controllers and the pilots of arriving and departing aircraft.

One night recently, Mrs. Armel looked out her kitchen window and noticed some obstruction lights on the tower were out. She alerted the controllers by telephone. The tower log for the watch period includes the notation: "Tower lights reported out by Mrs. Armel. Replaced by electrician."

Lawrence Armel, center, proudly displays the model he built of an FAA DC-3 to L. G. Woodahl, watch supervisor from the Dulles tower, as Mrs. Armel shares pride in husband's workmanship.

Agency Reminds Amateur Rocket Launchers of FAR Limitations

Amateur rocket launchers were reminded by the FAA that rocket firings may violate the Federal Aviation Regulations.

The regulations prohibit rocket firings into the airspace where aircraft are controlled by the Agency. Firings also are prohibited within five miles of airport boundaries, into clouds, at night or within 1,500 feet of any person or property not associated with the launching.

Some Rockets Are Hazardous

High performance model rockets capable of reaching altitudes of several thousand feet are potential hazards to aircraft. The firing of such rockets, however, is permissible provided they are operated in a manner that does not create a hazard to aircraft as outlined in the Federal regulations.

The regulations provide that operators of certain rockets notify the nearest FAA air traffic facility 24 to 48 hours before beginning a rocket launch.

Ask at Any FAA Office

Assistance regarding this notification and other aspects of the regulation may be obtained from any one of the 21 air route traffic control centers, 300 airport traffic control towers or 333 flight service stations operated by FAA. Information and assistance may also be obtained from approximately 80 FAA general aviation district offices located at air traffic hubs throughout the 48 contiguous states.

Rocket firings in areas restricted for special uses such as military activity or NASA research are governed by the controlling authority for that area.

LATEST SCIENTIFIC, TECHNICAL REPORTS ANNOUNCED BY FAA

A list of 102 scientific and technical reports has been released by the Federal Aviation Agency.

The list (available from FAA, IS-10, Washington, D. C. 20553) contains reports issued from October 1965 through June 1966 and updates an earlier list announced in November 1965. Subject areas cover air traffic, airports, navigation, aircraft, weather, communications and miscellaneous reports.

Copies of the reports themselves may be ordered from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Va. 22151. Orders should include the publication "AD" or "PB" number, title and check or money order made payable to the clearinghouse.

news
BRIEFS

• DEADLINE FOR GENERAL AVIATION aircraft operating under IFR to have altimeter systems checked under FAA's new accuracy and performance standards has been extended to Aug. 1, 1967. Checks for aircraft under annual inspection begin July 31, 1967. The new standards, adopted last year with an original compliance date of Aug. 1, 1966, will affect civil aircraft not subject to air carrier maintenance and inspection rules. Guidelines are set out in AC 43-203 which may be obtained by writing FAA, HQ-438, Washington, D. C. 20553, and enclosing a self-addressed mailing label.

• NEW INTERAGENCY BIRD HAZARD COMMITTEE met in September and October to develop joint approach to reduce danger of collisions between birds and airplanes. Represented along with the FAA were the Air Force, NASA, CAB, Department of Interior and Department of Health, Education and Welfare. FAA has spent more than $500,000 since 1961 in research on bird habitats, migration and preventive and corrective measures to reduce bird strikes which cost millions of dollars each year.

• FAA's 300th AIRPORT TRAFFIC CONTROL TOWER recently was commissioned at Hillsboro, Ore., the eighth community to receive an FAA tower this year. To qualify for FAA air traffic control service, an airport must have at least 24,000 itinerant landings and takeoffs annually for three consecutive and overlapping fiscal and calendar years. Hillsboro had an estimated 100,000 general aviation operations in 1965.

• TWO OUT OF THREE READERS returned FAA Aviation News' readership questionnaire and the count is now on to see how many hold what kind of FAA certificates and ratings, how much flying experience they have, how much they've been flying lately, why they fly, etc. Editors express their thanks for the large return.

• MORE THAN ¼ OF ALL HOURS FLOWN last year by general aviation aircraft were flown under IFR and VFR flight plans filed at FAA flight service stations and combined station/towers. Preliminary data sets the 1965 figure at 29.4 per cent or 4.9 million hours. Based on a two per cent sample of all flight plans filed, IFR flight plans accounted for 1.2 million hours and VFR flight plans for 3.7 million hours.

• SHORT-HAUL AIR TRANSPORTATION NEEDS will be studied by The Boeing Co. under a contract awarded by the Ames Research Center of NASA. In a year-long study, the company will examine heavily traveled areas and will consider routes, application of various vertical and short takeoff and landing design concepts, expected air traffic, air traffic control and scheduling procedures, fare structures, passenger convenience, noise problems, the effect of advanced ground transportation, property values, and the number and types of airports needed.

Aviation Mechanics Study Called 'Must Reading' by FAA Experts

Judged by FAA experts as "must" reading for anyone connected with aviation mechanics and their training is a report prepared at the University of California titled *A National Study of Aviation Mechanics Occupation*.

The work is an unbiased study of what an aviation mechanic does, what he should know and what he should be capable of doing upon completion of his initial training at an FAA-certificated mechanic school. The data collected in the survey focuses upon specific tasks performed by mechanics employed by general aviation and the airlines, the frequency with which they perform these jobs, the present level of training now offered to them and recommendations on how this training should be altered to meet the needs of aviation now and in the foreseeable future.

Assembly and rigging, landing gear, hydraulic and pneumatic systems, auto pilots, approach controls and fuel metering are among the 52 areas examined. This kind of factual material is expected to prove extremely helpful to training institutions currently revising their mechanic curriculums.

One of the most critical manpower problems in the fast-growing aviation industry is a shortage of highly trained *young* mechanics; only 22 per cent of the total number of certificated mechanics are younger than 35. Accompanying this problem is the need for instructors to develop better ways to train budding mechanics including the expansion of in-service training for teachers themselves.

"A core curriculum must be developed that will guarantee depth of training where needed without over-training in areas that are becoming obsolete," the study observes.

One of the most important phases of the study was the formation of a National Advisory Committee consisting of representatives of private and public aviation mechanic training schools, small and large general aviation companies, airlines, the Department of Labor and FAA. This group provided technical guidance about the direction the study should take and the areas to be examined.

Copies of *Aviation Mechanics Occupation* may be obtained without charge from the Trade and Technical Teacher Education, Division of Vocational Education, University of California, Los Angeles, or from FAA, FS-345, Washington, D. C. 20553.

flight
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.

• Jet Jockey

I was deeply interested in the article entitled "Jet Jockeys in Grey Flannel Suits" (*FAA Aviation News*, July 1966). Presently, I am a captain in the Air Force with a total of over 4,000 hours—3,000 of which have been logged in the Boeing C-135. I would like to inquire about the possibilities of employment with industry as an executive pilot. Where would I find the best source of information pertaining to this type of employment?

Mount Holly, N. J.

The National Business Aircraft Association maintains a file of qualified pilots or pilot/mechanics for business aircraft as a service to its members. Pilots who wish to have their names listed should contact the NBAA at 401 Pennsylvania Building, Washington, D. C. 20004.

• Fuel Management

The cartoons on the back cover of FAA Aviation News hold a lot of truth mixed with humor. But I have some difficulty with the May cartoon rhyme: "Watch your fuel

gauge as time flies by . . . There are no gas pumps in the sky." During a flight earlier this year my engine quit. I made the usual checks for ice, fuel, etc. But I ran out of gas during the flight while the tank still read ¾ full. I attempted to make an emergency landing in a field but took out a telephone pole and landed across a highway into a bank on the opposite side. No one was hurt. After impact, my fuel gauge still read ¾ full. It was the same after we got the plane into the hangar. Investigation showed why: The float was hung up in ¾ full position on a loose baffle plate in the fuel tank. I did plan my flight on the readings of my fuel gauges. Even so, I ran out of gas.

Northeastern Pennsylvania

Your harrowing experience points to the possible fallibility of aircraft instruments. But the blame in this instance cannot be limited to the fuel gauge alone. Proper flight planning requires the pilot to determine the distance to be traveled, estimated elapsed time, and estimated fuel consumption. Generally, there should be a visual inspection of the fuel.

While, sometimes the load may not permit full tanks, a pilot should never attempt a flight unless he is assured that he has an adequate supply of fuel.

The article "Don't Let Your Engine Die of Thirst" from the May 1966 issue has been reprinted. Copies are available from FAA regional public affairs offices or from FAA HQ-438, Washington, D. C. 20553, with a self-addressed mailing label.

• He'll Watch for You

Flying safely is largely a matter of preparation. Trouble during actual flight, when no help is available, is the thing to avoid. And since safety cannot be a some time practice, it *must be made a habit*.

If you've performed a thousand drain tests on fuel systems without seeing a single trace of contaminant, just remember, the law of averages is still working. So keep looking. Any time may be the *wrong* time to "skip it."

A careful preflight inspection is essential even if the plane is in a secure private hangar. It's good insurance for you and excellent reassurance to those riding with you who do not necessarily share your confidence in the craft. It's *you* they're trusting.

Survival could confront any flyer at some time. Carry a few essential items and secure all the knowledge on survival you can. Some could survive indefinitely where others would quickly be in trouble. The difference: *Preparation*. The U.S. Army manual FM 21-76, *"Survival,"* sold for $1 by the Government Printing Office, is an excellent item to have-read-and-keep in your plane.

The most common and least excusable fault among flyers is failure to properly *plan a flight*.

Navigating by radio is so easy that dead reckoning is often not even considered. A cautious pilot doesn't gamble the safety of his flight on the assumption that his radio or some necessary navigation facility will always keep working. And don't pilots still tune the wrong facility—omni or ADF—and fly off course? The correct magnetic heading verified by your compass must never be neglected while you fly the needle.

Flying is moving at an ever accelerating pace. Keeping current requires regular study and occasional check rides.

And finally: Please be alert when flying. It is getting crowded up there. I promise to watch for you.

Art Stewart
Hayward, Calif.

• Pilot Now; Pay Later

I would like to be an airline pilot and I have been told that airlines have loan programs for young men who want to train for this job. How can I get such a loan? What about college?

Seattle

Some airlines do have loan programs for outstanding young men to take pilot training. A spokesman for one major airline told FAA Aviation News *that although his company's program for men between the ages of 20 and 25 requires a minimum of two years of college, in practice there are so many qualified applicants that most of the men selected are college graduates. Although applicants are not required to have any flying experience under this particular program, the airline spokesman said he thought it advisable for applicants to get in enough flight time to be sure they want to make flying their career. A second loan program offered by the same company requires men 20 to 29 to have a private pilot license, as well as two years of college.*

Other requirements of this company: Male, U.S. or Canadian citizen, height 5 feet 6 inches to 6 feet 4 inches, excellent physical condition, vision 20/70 correctable to 20/20 with glasses.

Loan programs differ and an interested person should contact the airline of his choice for details and application forms.

• Radios for All Aircraft?

The flight test for private pilots requires proficiency in radio and VOR navigation techniques. Yet, there is no requirement that *all* airplanes be equipped with such gear. It seems to me that there is an inconsistency. If, in your Agency's judgment, both radio techniques and instrument proficiency are mandatory for the safe operation of aircraft, then radios and instruments are equally mandatory for the aircraft itself.

Name withheld

As a Government agency, we cannot reasonably require the installation of radio equipment in older airplanes which may not, themselves, be worth the cost of such installation.

Many of the older airplanes do not have the electrical system, space or weight allowance necessary for installation. It would be especially difficult to require such equipment for airplanes which have flown safely for many years without radio and instrumentation. However, aircraft without radios are not allowed (under FAR Part 91) to fly IFR or operate in tower control zones without a special clearance. We consider it important to require private pilots to be able to use radios effectively because the airplanes they are most likely to fly will have them. More than 90 per cent of the airplanes built within the past 15 years are so equipped.

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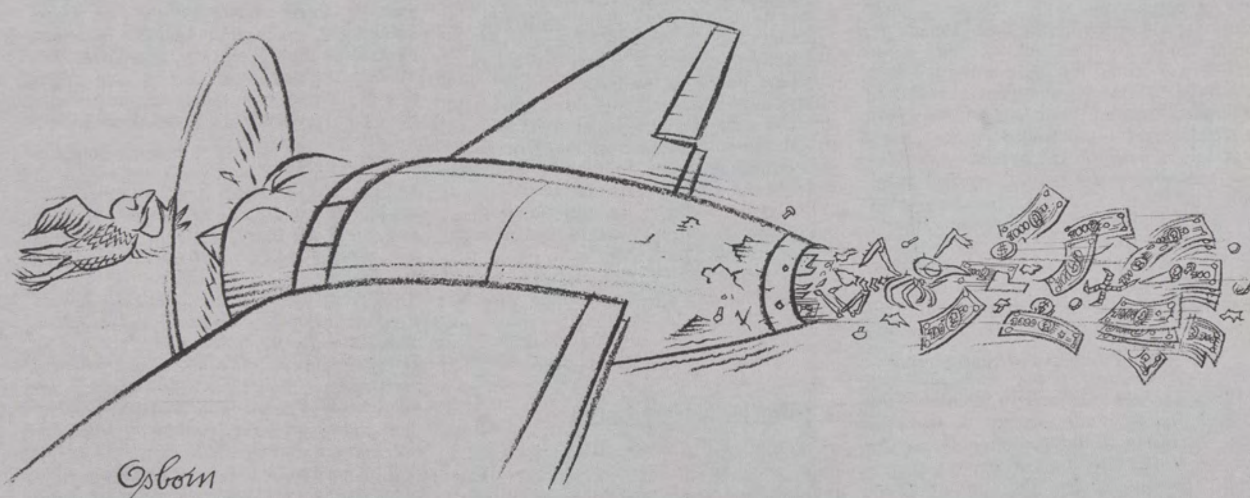
Bird strikes must go;



They wreck planes, cost dough.