World

April 1981
Volume 11 Number 4

U.S. Department
of Transportation

**Federal Aviation
Administration**

Research Highlights

Beginning this month, the FAA Technical Center is testing a new method for cutting grooves in runways that could prove to be 50 percent less expensive than the conventional saw-cut process.

Called a reflex percussive technique, the process uses a series of pneumatically driven hammers that strike the runway at an angle and produce a slanted groove that is more effective for braking on concrete surfaces than the current rectangular saw-cut groove. Now, Technical Center engineers want to find out if the process works as well on asphalt.

Experiments are being conducted at the Naval Air Engineering Center in Lakehurst, N.J., using a jet-powered vehicle (above). Grooves will be cut at varying angles and intervals, with tire speeds varying from 40 to 150 knots.

The tests are expected to be completed by the end of the year. ■

Front cover: A half-century of aviation progress flashes before spectators' eyes at the Experimental Aircraft Association's annual convention in 1980 at Oshkosh, Wis. A stretched DC-8 passes over a replica of Lindbergh's Ryan monoplane that flew the Atlantic in 1927. The photo is a grand prize winner in the "Any Facet of Civil Aviation" category of the Employee Photo Contest and was taken by Thomas S. Hook, Office of Public Affairs.

Back cover: Last year, the Brackett Field Tower, LaVerne, Calif., had to make way for a new runway and taxiway. So, they picked it up and moved it 400 feet. The 260-ton "O"-type tower was moved on a 100-ton I-beam frame on 12 hydraulic-jack dollies in five hours, but it took five days to assemble the transport.

Photo by Ronnie Simpson
Western Region Airports Division

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FAA WORLD is published monthly for the employees of the Department of Transportation/Federal Aviation Administration and is the official FAA employee publication. It is prepared by the Public & Employee Communications Division, Office of Public Affairs, FAA, 800 Independence Ave. SW, Washington, D.C. 20591. Articles and photos for FAA World should be submitted directly to regional FAA public affairs officers:

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By S/Sgt. Jim Katzaman
The editor of the *Rescue Review* and *Air Weather Service* newspapers, he also has been published in *Airman* magazine.

Tracers of Missing Aircraft

FAA and Air Force Join in Life-Saving Partnership

The aircraft carrying Louisiana State University football coach Bo Rein took off at 10:30 p.m. from Shreveport, La., on a short hop to Baton Rouge. It headed on a northeast course to avoid a cell of thunderstorms, and the pilot acknowledged a clearance to climb to his assigned 25,000-foot altitude.

That was the last anyone heard from the Cessna Conquest on Jan. 10, 1980. The aircraft passed through its assigned altitude and kept on climbing. Fort Worth Center controllers tried to raise the pilot, but there was no reply.

At 11:38 p.m., the FAA called the Air Force Rescue Coordination Center (AFRCC) at Scott Air Force Base, Ill. There, Maj. Ronnie D. Lanier, an AFRCC senior controller, began to fill out an incident sheet on the "rogue aircraft" that was set on a steadily climbing northeast course. It was already at 31,000 feet.

Within 10 minutes, Major Lanier called Seymour-Johnson Air Force Base, N.C., and requested that Air Force jets scramble to intercept the aircraft. Just 37 minutes after the AFRCC took the FAA call, two Seymour-Johnson F-4s were on their way. Washington Center controllers vectored the jets to the intercept just south of Charleston, S.C.

They flew alongside the Cessna as it continued eastward. The aircraft climbed to 41,000 feet, stalled, dropped a few thousand feet and climbed again and again. Although the F-4 crews could see the aircraft's lighting, there was no sign of life.

Col. James W. McElhaney (center), director, and his deputy, Lt. Col. George Eldridge (right), plot a rescue mission at the Air Force Rescue Coordination Center at Scott Air Force Base, Ill.

St. Louis *Post-Dispatch* photo by Robert C. Holt, Jr.

At midnight, Maj. Robert L. Walton came on duty to relieve Major Lanier. He requested additional aircraft out of Langley Air Force Base, Va., as the F-4s ran low on fuel. An F-106 was vectored by Washington Center controllers to a rendezvous with the Cessna.

"The FAA was the link between us and the chase aircraft," said Major Walton. "We couldn't have done anything without them."

The F-106 followed the Cessna beyond the East Coast. At this point, the Coast Guard assumed control of the mission, but the FAA assists continued.

Ninety miles east of Cape Charles, Va., the Cessna apparently ran out of fuel and began a 41,000-foot spiral to the ocean. The aircraft hit the water and sank more than three hours after its odyssey began nearly 1,200 miles away in Louisiana.

Two Air National Guard F-4s were scrambled to the area, but nothing was found. The mystery of Bo Rein's last flight may never be solved.

This tale is a more well-known example of how the FAA and AFRCC work together on a mission. Yet, many times a day "on an hourly basis, if not minute-by-minute," according to Major Walton, the two agencies work hand in hand on suspected and actual aircraft incidents.

The AFRCC is part of the Military

Airlift Command's Aerospace Rescue and Recovery Service headquartered at Scott. Its charter makes it the single Federal agency responsible for coordinating search and rescue activities in the 48 contiguous states. When an aircraft incident begins, it is usually the FAA that makes the first notification to the AFRCC.

A more typical mission begins with an overdue aircraft. The FAA issues an information request (INREQ), and communications checks begin at flight service stations along the projected flight path. The AFRCC is informed when an INREQ is issued. If nothing turns up within an hour, FAA issues an alert notification. From there on, the AFRCC takes action to locate the overdue aircraft.

Air Force search and rescue controllers leave no stone unturned as they attempt to find the plane. They call FAA facilities where the aircraft may have landed, as well as friends and business contacts of the pilot. They have even called motels.

They gather information on the pilot, his passengers and the aircraft itself: Is an emergency locator transmitter on board? Was the pilot experienced? Was he in good health? What is the aircraft's maintenance history? Where might it have been flown?

"During these operations, the flight service station and AFRCC become partners in a detective agency, piecing together bits of information to track down a pilot's location," explained Capt. Jeff Lauffer, another AFRCC senior controller.

Part of the "detective" search puts the AFRCC in close contact with any of the 20 air route traffic control centers in the 48 states that can provide more information about the missing aircraft. A primary tool here is the Interim Track Analysis Program (ITAP). With a last known position and time for the missing aircraft, an ARTCC data systems specialist at 15 of the 20 centers can run a computer program that will generate a printout of an aircraft track based on its radar return. This is a projection based on information retrieved from computer tape recordings of all radar data of the time in question.

As more complete information on the overdue aircraft's initial movements

T/Sgt. Middelhoff posts a mission marker on a wall map of the United States.

Photo by T/Sgt. Byron Gittens

becomes available, the easier it is for the data systems analyst to select the aircraft from the many objects tracked. He can then project a probable crash site depending on where the aircraft left the radar. This new information is relayed to the AFRCC controllers who dispatch searchers to the area. ITAP-correlated crashes have proven accurate within one-half to five miles from the actual accident site.

"All of us here have a high respect for the FAA data systems analysts," said Major Walton. "Through their time, expense and effort they save us a lot of time, expense and effort."

In action at the AFRCC are T/Sgt. Paul Middelhoff (foreground) making an entry into a mission log and Airman Brian Barth talking directly to an FAA enroute center about a signalling ELT.

Photo by T/Sgt. Byron Gittens

One such mission involved a student pilot en route from Tucson, Ariz., to Pueblo, Colo. After a 24-hour computer search, an ITAP provided by the Albuquerque and Denver Centers showed the pilot had overflown his destination by 70 miles. Searchers north of Pueblo located the pilot still alive, but trapped in the aircraft wreckage after he ran out of fuel and made a forced landing. That particular area might not have been searched for several days had it not been for the ITAP information.

FAA and AFRCC also cooperate on in-flight emergencies. When an aircraft declares an emergency, the controlling agency (normally an ARTCC) calls the rescue center with the aircraft's call sign, the nature of the emergency, its destination and its estimated time of arrival.

These situations are monitored by the AFRCC so a quick response can be made if the aircraft fails to make its destination. Bomb threats and hijackings receive similar treatment.

Once notified of a distress, a search and rescue coordinator turns to the nationwide directory of rescue resources to find the best unit able to do the job.

A summons could go to any federal, state or local resource, from a military rescue unit to a volunteer team. A bank of phone lines can put the controller in touch with the needed unit any time of the day or night. AFRCC controller-coordinated rescues include downed aircrews, lost hikers and people missing after disasters, such as the eruption of Mount St. Helens.

The AFRCC does more with the FAA than locate overdue aircraft. Much time is devoted to tracking down signals put out by ELTs. These have led to many downed aircraft and saved lives in the process.

In 1980 alone, FAA forwarded 2,720 ELT reports to the Air Force controllers. However, about 98 percent of these proved to be false. Based on these reports, the AFRCC opened 507 missions, which included locating 23 actual distressed aircraft. Some of the incidents were resolved when aircraft were located on airports with ELTs activated on hard landings. Other ELTs began signalling for no apparent reason.

Out-of-aircraft ELT incidents are numerous. One aircraft owner removed his ELT, put it in the back of his pick-up truck and forgot about it. One day, the truck hit a pothole and jarred the ELT awake. Controllers and aircraft spent a busy afternoon trying to track down the signal that kept moving from town to farm.

Framed by a mirror bearing the symbol of the Aerospace Rescue and Recovery Service are AFRCC controllers on the job.

Photo by T/Sgt. Byron Gittens

One sheriff wondered if an aircraft had crashed in a neighbor's closet. That was where he found the ELT that had lain buried and forgotten for weeks. Actual or false, serious or funny, all missions are followed through to a conclusion by the FAA-AFRCC partnership.

Despite their excellent working relationship, problems do develop sometimes. Every year, a few searches are opened unnecessarily due to incomplete ramp checks, and an ELT or overdue aircraft will be located on a ramp supposedly checked. This causes come nagging delay in searches, but these occasions are few and far between.

AFRCC controllers unanimously agree that they and the FAA have to, and do, work closely together to do their jobs right.

This cohesive partnership directly contributes to saving lives throughout the country and epitomizes the Aerospace Rescue and Recovery Service motto—"These Things We Do—That Others May Live." ■

Q&A

According to Order 6350.13, September 1974, Appendix 1, Certification Requirements, the radar microwave link (RML) should be certified as a system by the radar and indicator site personnel. Most of the people I talk to tell me that the RML repeater, which I believe to be a subsystem, should be certified by a technician who is performing maintenance on that subsystem. I cannot find any certification parameters for an RML repeater; all of the certification parameters listed are for a radar or indicator site. I would like to know if an RML repeater should be certified and by whom and what parameters are used.

An RML repeater is not certified as a subsystem but as a part of the complete RML system by the electronics technicians at RML terminal sites (radar and indicator sites) jointly. After maintenance is performed at the RML repeater site, the RML system shall be certified by the terminal site technicians who will make the appropriate certification entries in the terminal logs. RML-1 A, -2, -3 and -4 system certification procedures are contained in Order 6350.13, Change 7, Appendix 1, Page 1. RML-6 system certification procedures are contained in Order 6350.15, Change 3, Appendix 1, Page 1.

I am a supervisor in a field office in the Southern Region. For years, I have supported the agency's suggestion program and have encouraged my people to take advantage of their ideas. Over the years, I have submitted a few suggestions, but none has ever been used; I expected this, but I have always received a letter of explanation telling why the suggestion wasn't adopted.

About three years ago, I submitted a suggestion and never heard anything about it, and I forgot about it. About a year ago, I submitted two more suggestions and resubmitted the first one. I still have heard nothing. Is the agency required at least to acknowledge the suggestion? Shouldn't it tell you one way or the other its status?

The FAA has guidelines to be used for employee suggestions. Throughout your region, there are recognition and awards coordinators who handle these suggestions. Some of them are located in the field offices and facilities; others are located in the program areas at the regional office. Coordinators are supposed to acknowledge suggestions and advise the employee of the action that is being taken. It is sometimes necessary to have the suggestion evaluated outside the program area in which it originates, depending on the subject matter.

The region is unable to be specific as to what happened to the suggestions in question, not knowing the field office in which they originated. Guidelines for handling suggestions are in Order 3450.7C, Chapter 6. According to them, your suggestions should have been acknowledged and you should have been advised if they were still under consideration. If they were rejected, you should have been so advised. Your region suggests that you contact your local coordinator or your program division and ask for a follow-up.

We are currently required to provide Stage III separation between participating aircraft in the pattern versus arrivals. This was a verbal ruling from the FAA, but the guidelines in ATP 7110.65B make the application difficult to apply. Paragraph 1282, Note 2, states that "Stage III separation and sequencing for VFR aircraft is dependent on radar," while Paragraph 652.b.(4) states that "radar service is automatically terminated when an arriving aircraft is advised to contact the tower." In addition, Paragraphs 906.a. and 906.a.(3), Note, state that tower displays cannot be used for separation or "other associated radar services." Please clarify.

The guidelines on Stage III separation within the airport traffic area are explicit in the context of the Stage III program as a whole. Stage III is the radar sequencing and accepted in lieu of radar separation in the traffic pattern. Naturally, if visual III service is "dependent on radar." However, visual separation is common and accepted in lieu of radar separation in the traffic pattern. Naturally, if visual separation cannot be applied, radar separation must be maintained. Paragraph 906.a. addresses those radar-equipped towers that have not been authorized any radar functions beyond basic radar identification and/or pilot advisories. The associated note states that these basic functions are defined as *not* being radar services. Therefore, when an aircraft is instructed to contact the tower, radar services are, in fact, terminated. Only at those towers having specific authorization (7210.3E) to perform additional radar functions are radar services not automatically terminated. A revision to 7110.65B, Para. 652, is being developed to address this situation.

By Hollis Walker
A public information specialist in the Southwest Region, she has been a radio news director and in public relations at North Texas State University.

A Feeling of Security

FAAer Is People-Oriented and Professional

For most people, aviation security begins and ends at the X-ray inspection checkpoints in airport terminals, but aviation security is much broader in scope than the public is aware.

Marion Hein is one of those behind the boarding-gate scenes whose efficiency guarantees the safety of the flying public.

A civil aviation security specialist, she oversees the security programs of airlines operating at Houston, Texas, Intercontinental and Hobby Airports. Her daily duties include monitoring terminal inspection checkpoints operated by the carriers, ensuring that the X-ray machines are functioning properly, that certain inspection employees are adequately trained and giving advice to airline security personnel.

Hein also is responsible for checking that hazardous materials—radioactive and controlled chemical substances—are transported safely and in accordance with FAA regulations. She checks their documentation and methods of packaging and labeling and again offers technical assistance to the airlines and shippers.

Although her job is a technical one and frequently involves sensitive information, it's still a "people-oriented" one, Hein says. "That's what I like: the people I work with." During the typical day, Hein talks with FAA personnel at a number of locations, airlines and airport employees and members of the public.

"It's a very high-pressure, busy job, but I love what I do," Hein says. "The people I work with reek of professionalism, and I believe we've got a very consistent, strong program.

"I'm very pro-agency. I went to work at the Pentagon straight out of high school and have worked for various Federal agencies. I know that FAA has one of the most effective, professional and necessary systems around."

Hein joined the agency in 1969 as a secretary in the Southwest Region's Flight Standards office in Fort Worth. She moved to Security in 1971. "An opening in New Orleans came up," she explains, "and I told my boss I wanted to bid on it. To his credit, he encouraged me to do so." She was offered the job and became the first woman security inspector in a field office in the region. A year later, she moved on to Houston.

"FAA really spearheaded opportunities for women in the Federal Government, especially in the security field," she says. "I'm really grateful that the agency offers women the responsibility that this kind of job entails."

Some men she has met on the job have been a little put off by a female security inspector at first, she says, "but after they get used to me and deal with me on a professional basis, they relax and realize I'm just there to help them do their jobs better."

Sometimes, being a woman works to her advantage. "I think people open up to me better than to a man. I get to the bottom of a problem quicker because they trust me more than a man."

Coincidentally, Hein has a female superior—Joyce Moody, who is chief of her security field office. "She's one of the best, I'll have you know."

Did Hein ever imagine that she would end up in a security-related field? She responds with a chuckle, "Well, I really liked Nancy Drew books as a kid. Maybe that's one of the reasons." ■

Standard aviation fuel spilled from a wing section and ignited at the FAA Technical Center's Wing Spillage Test Facility goes up in a huge fireball. (top)

The same test set up for fuel with 0.3 percent of FM-9 antimisting additive is a fizzling success—no fireball. (above)

By Anthony Willett
A public information specialist at the FAA Technical Center, he was editor of the undergraduate newspaper at Seton Hall University.

Small Solution to Big Problem

Half a Jigger of AMK Cuts Post-Crash Fires

Just one small spark can transform an aircraft into an inferno.

When fuel tanks rupture from the impact of a crash, fuel gushing from the tanks into the onrushing wind can form a highly flammable mist. It takes just a single ignition source—from intense engine heat to a spark caused by tearing metal—to transform this mist into an immense fireball.

At this point, an impact-survivable accident frequently becomes a tragedy. In impact-survivable crashes, some 30 percent of the fatalities are caused by fire or the resulting heat, smoke and toxic gases.

Fortunately, according to researchers at the FAA Technical Center, a comparatively small amount of a special fuel additive, called an antimisting compound, might prevent such a disaster.

As early as 1964, the FAA had listed four goals for increasing aircraft crash-survivability.

- Restricting spillage from fuel tanks. The danger of several thousand gallons of spilled aviation fuel surrounding a wrecked aircraft with 250 passengers on board was obvious.
- Decreasing the probability of ignition. Fuel tank crashworthiness studies addressed this factor.
- Reducing the speed at which the fire spreads throughout an aircraft. Smoke and gas from burning interior materials can be as injurious as fire in an airplane crash.
- Eliminating the highly flammable mist of combustible vapors that emanates from ruptured fuel tanks. Clearly, this was no small task; in fact, it was the toughest hurdle.

Despite the early definition of that goal, the solution was not an easy one to find. For one thing, developing rupture-proof fuel tanks proved to be a near impossibility, and ignition sources were uncontrollable.

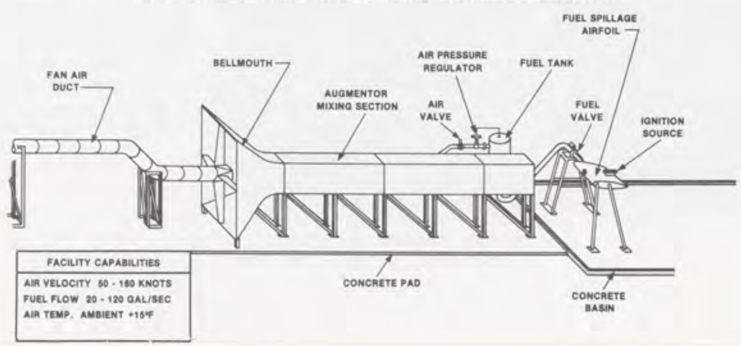
So, the focus turned to modified fuels. Initial research conducted by scientists resulted in gelled fuels to combat the misting problem. Gelled fuels did not form a fine mist when subjected to high-speed airflow after impact. Huge droplets formed in post-crash situations when fuel was sheared by onrushing air, thereby impeding fire.

The fire-reduction characteristics of these fuels were promising, but the gelled fuel's compatibility with the aircraft was another story. The viscous fuel traveled sluggishly through fuel lines, and it didn't flow smoothly within engines, either. Ground refueling stations also were plagued by its viscosity. A short storage life added to the growing list of shortcomings that soon eliminated gelled fuels as a workable solution.

In 1972, a standard-viscosity fuel appeared to be a candidate to prevent the fireball-causing mist. But hopes were dashed after a controlled-crash test failed one year later. The setback slowed research.

Then in the mid-1970s, public hearings on aircraft accidents and safety spurred new interest in antimisting technology. One tragedy in particular

MODIFIED FUEL-WING SPILLAGE TEST FACILITY



contributed to the resurgence. At a small airport in the Canary Islands, a runway collision between two Boeing 747s caused an international uproar. As the fuel-laden jets collided, metal ripped as if it were paper. The ensuing explosions and fire led to nearly 600 deaths.

Following that crash, an agreement was signed by the United Kingdom and the United States calling for cooperation in the development of antimisting fuel technology. Soon thereafter, a primary fuel additive, which FAA researchers felt might be the solution to the misting problem, was developed by researchers at Imperial Chemical Industries of England, under the sponsorship of the Royal Aircraft Establishment. Called FM-9, it is a high molecular weight hydrocarbon polymer.

The large-scale effort to test the prototype additive in America was brought to the FAA's Technical Center. In late 1978, a unique wing-spillage test facility was erected within the center's aerosafety research complex to test FM-9 and other "safe fuel" candidates.

The facility resembles a giant wind tunnel through which a TF33 turbofan engine blows air at speeds of up to 160 knots (about 185 mph) across an aircraft wing shape. This wing is filled with aviation fuel, which is forced through a hole in the wing to simulate a ruptured fuel tank. Using the wing-spillage facility enables researchers to simulate typical plane-crash situations. The Technical Center's technicians can then apply an ignition source, usually a single spark, to test the flammability of the aviation fuel.

Tests with untreated fuel have produced fireballs larger than a two-story building. Positive results from testing the FM-9 additive, which constitutes just three tenths of one percent by weight of the total fuel used for the wing, have been attained at the center's spray rig since 1979. During tests, wind speeds of 133 knots (about 153 mph) caused only a momentary, self-extinguishing ignition.

In addition to antimisting testing and research conducted at the Technical Center, several other tests involving full-scale aircraft were conducted at the U.S. Naval Air Engineering Center in Lakehurst, N.J. In comparing standard fuel with specially-treated FM-9 fuel, tests on obsolete Navy planes corroborated the wing-spillage facility experiments: only a mild propagation of fire with FM-9, compared to immense fireballs and explosions from untreated fuel.

At a Nov. 24-26, 1980, conference at the Technical Center, an antimisting fuel technology management committee noted that FM-9 was a viable candidate and that minor drawbacks with it were not unsolvable.

Another meeting to discuss antimisting technology, held Feb. 18-19 at the Technical Center, drew some 175 oil, chemical and aviation representatives from industry and government. The conference was hosted by Walter S. Luffsey, Associate Administrator for Aviation Standards, and Technical Center Director Joseph M. Del Balzo, who sought a forum for international interests in antimisting technology. The first major phase of fuel safety had approached "a significant milestone in the effort designed to improve aircraft-crash fire survivability by controlling the misting characteristics" with this additive, acknowledged Luffsey and Del Balzo in a letter of invitation to the conference.

"The conference's principal goal was to inform aerospace industry about the findings of our research," said Eugene P. Klueg, manager of the Technical Center's antimisting projects for its Engine/Fuel Safety Branch. "We received a general endorsement from U.S. chemical and petroleum industries for the research conducted to date," he added.

"Our research has demonstrated that FM-9 added to aviation fuel will prevent mist ignitions, or, at the very worst, produce only local flames at the ignition source and small, self-extinguishing fireballs in the mist," Klueg said.

An important factor with the fuel additive, according to Klueg, is that even when a fireball ignites in the mist, the flame does not follow the stream of fuel back into the airplane.

Future plans to test the special additive also are in the offing. Perhaps the most spectacular of these is the remote-controlled crash of a Boeing 720 jetliner in 1984. The crash will be monitored by personnel from the Technical Center with instruments installed aboard the four-engine jet.

Additional alternate fuels and fuel additives still are being researched and developed, according to Klueg, which will continue to be studied along with FM-9 until a definite solution to the post-crash survivability problem has been reached.

FAA researchers like Klueg now are convinced that even the smallest solution can have very big consequences. ■

A repeat test in a more realistic environment was conducted at the Naval Air Engineering Center in Lakehurst, N.J. A complete airplane driven along the ground disappears in a ball of fire from spilled untreated aviation fuel. Virtually no fire resulted in the same test with treated fuel.

People

Aeronautical Center

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■ **Manuel Hernandez**, chief of the Kodiak Airway Facilities Sector Field Office, from the Big Delta SFO.

■ **Robert W. Labelle**, chief of the Anchorage Aircraft Maintenance Base, from the Aircraft Management Branch.

Central Region

■ **David W. Cannady**, team supervisor at the Kansas City ARTCC.

■ **George C. Welton**, team supervisor at the Lincoln, Neb., Tower, from the Eppley Tower, Omaha, Neb.

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■ **Larry H. Cole**, chief of the Lynchburg, Va., Tower, from the Air Traffic Branch, FAA Academy.

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■ **James F. Miller**, deputy chief of the Andrews AFB Tower, Camp Springs, Md., from the Planning Branch, Air Traffic Division.

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■ **George A. Tracy**, chief of the Bradford, Pa., FSS, from the Albany, N.Y., FSS.

■ **William H. Vogel**, team supervisor at the Allentown, Pa., Tower.

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Great Lakes Region

■ **Wilbur J. Edds**, chief of the Flint, Mich., Tower, from the Airspace and Procedures Branch, Air Traffic Division.

■ **Ronald E. Funk**, chief of the Indianapolis Flight Service Station, from the West Chicago, Ill., FSS.

■ **Lawrence W. Holben**, deputy chief of the Port Columbus, Ohio, Tower, from the Airspace and Procedures Branch, Air Traffic Division.

■ **Albert J. Hoss**, systems performance officer in the Chicago ARTCC AF Sector.

■ **Clayton A. Lowe**, manager of the Chicago O'Hare Tower AF Sector, now permanent.

■ **Kenneth J. Melotte**, manager of the Detroit, Mich., AF Sector, from the AF Evaluation Branch.

■ **Jack T. Parrish**, chief of the West Chicago, Ill., General Aviation District Office, from the General Aviation Branch, Flight Standards Division.

■ **Joseph F. Petrucci**, team supervisor at the Dayton, Ohio, Tower, from the Bloomington, Ind., Tower.

■ **James A. Tucciarone**, team supervisor at the Akron-Canton, Ohio, Tower, from the Akron Municipal Tower.

New England Region

■ **Joseph F. Maaser**, team supervisor at the Boston Logan Tower.

Northwest Region

■ **Joseph P. Grieco**, chief of the Technical Support Staff of the Los Angeles Area Aircraft Certification Office, now permanent.

■ **Michael B. Kearney**, team supervisor at the Boise, Idaho, Tower, from the Seattle-Tacoma, Wash., Tower.

■ **William M. Perrella, Jr.**, chief of the Airframe Branch of the Seattle Area Aircraft Certification Office.

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■ **Reuben Powell**, manager of the Seattle ARTCC AF Sector, from the Seattle AF Sector.

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■ **James E. Carroll**, team supervisor at the Charlotte, N.C., Tower, from the Raleigh, N.C., Tower.

■ **James H. Mayne**, assistant chief at the Miami ARTCC.

■ **Andrew A. Miller**, chief of the Memphis, Tenn., Hub Airway Facilities Sector, from the Pico Del Este, Puerto Rico, AF Sector.

■ **Phillip D. Morris**, team supervisor at the Greensboro, N.C., Tower, from the Opa Locka, Fla., Tower.

■ **Jerry N. Poole**, team supervisor at the Montgomery Tower, from the Birmingham, Ala., Tower.

■ **James D. Reilly**, area officer at the Miami ARTCC.

■ **Burt L. Willis**, chief of the Mobile, Ala., Tower.

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■ **Benny D. Allen**, team supervisor at the Moisant Tower in New Orleans, La., from the Houston, Tex., Intercontinental Tower.

■ **Jimmy C. Clay**, team supervisor at the Houston Flight Service Station.

■ **Calmore N. Hedgpeth**, team supervisor at the Fort Worth ARTCC.

■ **Donald A. Hochschulz**, team supervisor at the Corpus Christi, Tex., Tower.

■ **Edwin D. Knight**, team supervisor at the Fort Worth ARTCC.

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■ **James L. Ramirez**, team supervisor at the Lafayette Tower, from the Corpus Christi Tower.

■ **Guillermo Tafoya**, team supervisor at the El Paso , Tex., FSS, from the Houston FSS.

■ **Charles S. Tuberville**, team supervisor at the Albuquerque, N.M., ARTCC.

■ **David E. Woodard**, team supervisor at the Fort Worth ARTCC.

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■ **Ronald J. Kroeger**, chief of the Property and Services Branch, Material Management Division, Logistics Service, from the Eastern Region Logistics Division.

Western Region

■ **Sabin C. Barainca**, assistant chief at the Los Angeles ARTCC.

■ **Jon E. Flippen**, team supervisor at the Los Angeles TRACON, from the Torrance, Calif., Tower.

■ **Michael L. Iacoucci**, team supervisor at the Long Beach, Calif., Tower from the Coast TRACON at the El Toro MCAS, Calif.

■ **Dene P. Jones**, team supervisor at the Edwards AFB, Calif., RAPCON, from the Los Angeles ARTCC.

■ **Stephen A. Karovic**, team supervisor at the Palm Springs, Calif., Tower, from the Montgomery Field Tower, San Diego.

■ **James S. Kayser**, team supervisor at the Tucson, Ariz., Tower, from the Santa Monica, Calif., Tower.

■ **Leonard L. Levandowski**, chief of the Van Nuys, Calif., General Aviation District Office, from the Santa Monica GADO.

■ **Frederick R. Mauck**, team supervisor at the Orange County Airport Tower, Santa Ana, Calif., from the Coast TRACON, El Toro MCAS.

■ **Gerald L. Reinitz**, team supervisor at the Burbank, Calif., Tower, from the Oxnard, Calif., Tower.

■ **Earl J. Ryan**, chief of the San Francisco Tower, from the Air Traffic Operations Branch, Air Traffic Division.

■ **James B. Small**, team supervisor at the Fresno, Calif., Tower, from the Hawthorne, Calif., Tower.

■ **Ronald T. Syens**, team supervisor at the Phoenix, Ariz., TRACON.

■ **Bruce E. Troyer**, chief of the Oxnard Tower, from the Air Traffic Operations Branch, Air Traffic Division.

■ **Robert A. Vaughn III**, chief of the San Diego TRACON, from the Air Traffic Operations Branch.

■ **Irvin Vodovoz**, assistant chief at the Coast TRACON, El Toro MCAS, from the Military Activities Staff, Air Traffic Division.

■ **Gerald C. Walton**, chief of the Los Angeles ARTCC.

■ **James L. Webb**, manager of the Las Vegas, Nev., Airway Facilities Sector, from the Riverside, Calif., AF Sector.

■ **Thomas P. Woehl**, team supervisor at the Los Angeles TRACON.

A Matter of Record

Title Searchers Know Where To Go

Clay Crook, lead file clerk at the Aeronautical Center's Aircraft Registration Branch, conducts a title search requested by a company. The titles to all civil U.S.-registered aircraft are on file in Oklahoma City, even though an aircraft may have been built in Kansas, owned by an Ohio corporation and is being sold to a Montana rancher.

Photo by Paul Southerland, *The Sunday Oklahoman*

Charles Lindbergh's Spirit of St. Louis is there. So are Wiley Post's Winnie Mae and Howard Hughes' Spruce Goose.

Thousands of other airplanes, balloons and dirigibles are there also—not the actual aircraft, of course, but the official records of every one. They're collected together in one room, stacked on top of each other and crammed side by side.

By Linda Miller
Reprinted from *The Sunday Oklahoman*, November 23, 1980. Copyright 1980, The Oklahoma Publishing Company.

Instead of being stored inside a hangar, this "paper fleet" is maintained by the Federal Aviation Administration at the Mike Monroney Aeronautical Center.

At last count, 275,000 titles of U.S.-registered civil aircraft are on file. Anything that moves in the air is supposed to be registered with the FAA.

It's because these files are in Oklahoma City that aircraft title-search companies are also located there.

There are 16 title-search companies in the world—all located in Oklahoma City. Only five or six, however, are considered as active and aggressive.

The companies share a small office near the Aircraft Registration Branch. The FAA furnishes the office, but the companies provide their own telephones and office equipment. Most companies also have separate offices elsewhere in the city.

Neal Snowden of Aero-Space Report, Inc., said anyone who buys, sells or finances an aircraft is interested in a title search.

Many times all three—the buyer, the seller and the lender—will request a title search, he said. "A title search is important to make sure there are no liens or mortgages against the aircraft," he added.

"Aircraft are so mobile. A plane might be manufactured in Pennsylvania and sold in Arizona. It's then sold to someone in Florida. Each transaction is recorded with the FAA and put into the file."

Snowden said the files also contain any structural changes to the aircraft, the bill of sale and registration.

Snowden's customers are scattered throughout the United States, as are most of the clients of the other title companies.

The files are available to the public at no charge, but Snowden said most people don't know how to read the information. The fee charged by Aero-Space depends on several factors—whether it's a habitual customer (such as a corporation) or a one-timer, the amount of detail work to be done, etc.

Snowden has had his own business since 1975, but he and his wife, Polly, have been involved in title searches for more than 10 years.

"Our business is a good barometer of how the aircraft business is, and interest rates affect our business."

Snowden works primarily out of his home, while his wife is at the FAA office. When a client wants a title search, Mrs. Snowden submits a request for that file.

The files are arranged by N numbers (aircraft tail numbers). An FAA employee makes five runs a day from the file room to the title-search office, delivering files and picking up new requests.

Jim Henderson, chief of the Aircraft Registration Branch, said his office moves 3,000 files a day. Only active files are kept at the branch. Inactive files are retired to a storeroom.

The original titles to many historic aircraft have been sent to the Smithsonian Institution, but Henderson's office retains photocopies of all registrations. U.S. military aircraft titles are not on file in Oklahoma City. They are kept at the Pentagon in Washington, D.C. ■

Engineer Michele Owsley examines the new static-test article and landing gear on an M-20 at Mooney's Kerrville, Tex., plant.

Photo by Bill Simmons

Shooting for the Moon

Astronaut Dreams Produce FAA Career

As a young girl in the 1960s, Michele Malek dreamed of being an astronaut—one of the first women to explore space and walk on the moon. By high school graduation, she had decided the best method to reach her goal was to obtain a degree in aeronautical engineering. "I thought that engineers were likely to be more useful in space than pure scientists," she said.

When Michele graduated from Rensselaer Polytechnic Institute in Troy, N.Y., however, "the space program was almost kaput, and they weren't hiring." Ironically, when NASA finally did begin hiring women as potential astronauts, it hired pure scientists, not engineers as Michele had anticipated.

Now 30, Michele is not too disappointed in the way her career is turning out. She works in the Airframe Section of the Engineering and Manufacturing Branch in the Southwest Regional Office. "At least I don't have to live in Houston for this job," she joked.

When she realized that jobs as astronauts weren't being awarded to engineers, Michele went to Texas A&M to get a master's degree in aerospace engineering. There she met her future husband, Bob Owsley, who was studying for a bachelor's degree in the same field. After graduation, the two trekked to jobs at Boeing's Commercial Airplane Company in Seattle, stopping along the way in Colorado to get married.

At Boeing, Michele worked in stress analysis on the 707 and 737, determining whether design improvements and modifications met structural strength requirements. When the industry began to suffer economically, and layoffs increased, a friend told Michele that the FAA was looking for female engineers, and Michele began looking for a job with the agency.

Bob had applied for entry to dental school. He had been accepted and decided to attend Baylor University in Dallas. In July of 1977, Michele was hired at the regional office, and the couple moved to the Dallas suburb of Duncanville.

Michele was assigned as project engineer for the Mooney Aircraft Corporation of Kerrville, Tex. She oversees the work of engineers from various Engineering and Manufacturing sections who analyze and certify new Mooney aircraft designs and modifications. "I have the responsibility to make sure the project goes all right, but I have no actual authority over the engineers from the other sections. It's pretty challenging to coordinate," she says.

She also is the project engineer for a Little Rock, Ark., company that does modifications on the Falcon Jet. "I like the variety of my work," she says. "I like working with the public, manufacturers and operators, and I get to travel a little and have had some additional training." The agency has sent her to the FAA Academy at Oklahoma City for courses in reliability, probability and safety analyses, accident investigation, loads and composite materials—new metals that are being created for aircraft manufacturing.

During leisure time, Michele and Bob (who graduated from dental school) fly or work on their two taildraggers—a 1943 Aeronca L3B and a 1949 Cessna 170. Michele has her private license and has completed 2½ years of nighttime studies to obtain her airframe and powerplant mechanic's license so she can perform repairs on their planes. Her husband is airline transport-rated and now works only part-time as a dentist. At night he flies for Mid-America Airways, a scheduled cargo carrier.

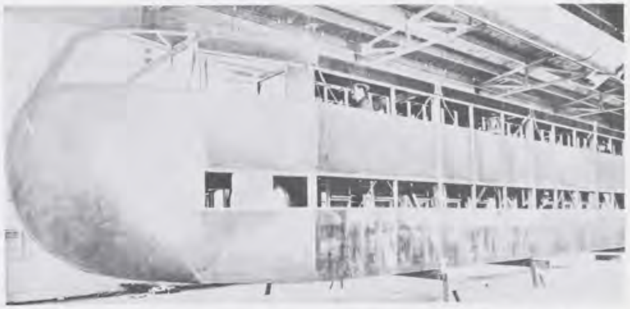
On working with nearly all-male engineering groups, Michele says, "Oh, it's been interesting. They were not too sure how to react to me, so it's been a learning experience both for me and the men. So far as getting equal pay for equal work, I've probably had it better than some women with nonscience jobs, because my work is very specific and can be easily compared to a man's work. "Being a woman, however, turned out to be a definite asset in getting into the FAA." ■

Forgotten Pioneer

Alfred Lawson Always Thought Big

Alfred Lawson (left) is congratulated on the success of his giant airliner, which flew with passengers to a number of large eastern cities from Milwaukee, Wis., to Washington, D.C.

Lawson's final project was a double-decker airliner with 125 seats for which he actually built the fuselage in 1926.



Mention the name of Alfred W. Lawson and even the best aviation historians reach for the reference books.

"Is that L-A-W-S-O-N?" they ask.

Poor Alfred Lawson! He deserves better.

This is not to say that he should be ranked with the Wright Brothers or Glenn Curtiss or Louis Bleriot or Glenn L. Martin, to mention just a few of his contemporaries. But one might argue that he was the father of the modern jumbo jet if only to prove the point that he was a man of vision. He was thinking big when most of those around him in aviation were thinking small.

Lawson began his aviation career in 1908, publishing what had to be one of the first flying magazines in the country. The fact that he had never even ridden in an airplane at that point in his life seemed of little consequence.

He learned to fly in 1913 and, characteristically, almost immediately set out to line up support for a solo trans-Atlantic flight. Not surprisingly, he found no backers. Next, he shifted his attention to aircraft manufacturing, first as a licensee for the production of a French airplane and, then, as vice president and general manager of the Lawson Aircraft Company of Green Bay, Wis. That was 1913 also, but the company didn't turn out its first airplane, an advanced mililtary trainer, until 1918.

Meanwhile, Lawson was dreaming bigger dreams and moving to make them a reality. On August 27, 1919, he flight tested a 26-passenger airliner, which the *Chicago Tribune* quickly dubbed the "Leviathan of the Skies." It was the largest civil airplane of its time and Lawson took it on tour to Chicago, Toledo, Cleveland, Buffalo, Syracuse, New York City and Washington.

Lawson and his plane were greeted by enthusiastic crowds at every stop. In Washington, for example, he took up Congressmen, Cabinet members and a future President, Warren G. Harding. But the plane was damaged in a landing accident as it was returning to its home airfield in Milwaukee and had to finish the trip on a railroad flatcar. It was a small matter. Lawson already had something bigger in mind.

In 1920, Lawson moved his factory to South Milwaukee and began construction of his innovative "Midnight Liner," which had sleeping berths, a toilet and shower, as well as a mail chute for dropping off mail en route. On December 9, the new airliner was rolled out for display to stockholders.

As might be expected, the stockholders were duly impressed but they also wanted to know if the airplane would fly. They had to wait five months for their answer, because Lawson didn't want to chance a takeoff from his 300-foot strip during the harsh Wisconsin winter or mushy spring.

The big day came on May 21, 1921. Despite adverse wind and thawing ground, Lawson and his co-pilot began their take off roll down the short sod strip. They never made it. The plane ran off the end of the runway into a ploughed field, got airborne for a few brief moments and then crashed when the wingtip hit a tree and telephone pole.

Lawson and his fellow pilot walked away from the crash, but the "Midnight Liner" was almost a complete write-off. Damage totalled $10,000 and the stockholders weren't about to throw good money after bad. The Lawson Aircraft Company passed into history.

Still, Lawson's dreams of giant airliners had not been dimmed. In 1926, he patented a design for a double-decker aircraft and actually built the fuselage. He also was thinking big in other modes of transportation, because that same year he obtained a patent on a double-decker bus and, later, a double-decker railroad car.

Lawson's final years were spent proselytizing something called "Lawsonomy," which he described as the "base of absolute knowledge." It did little to enhance his reputation and he died in 1954 at the age of 85, already something of a forgotten man. ■

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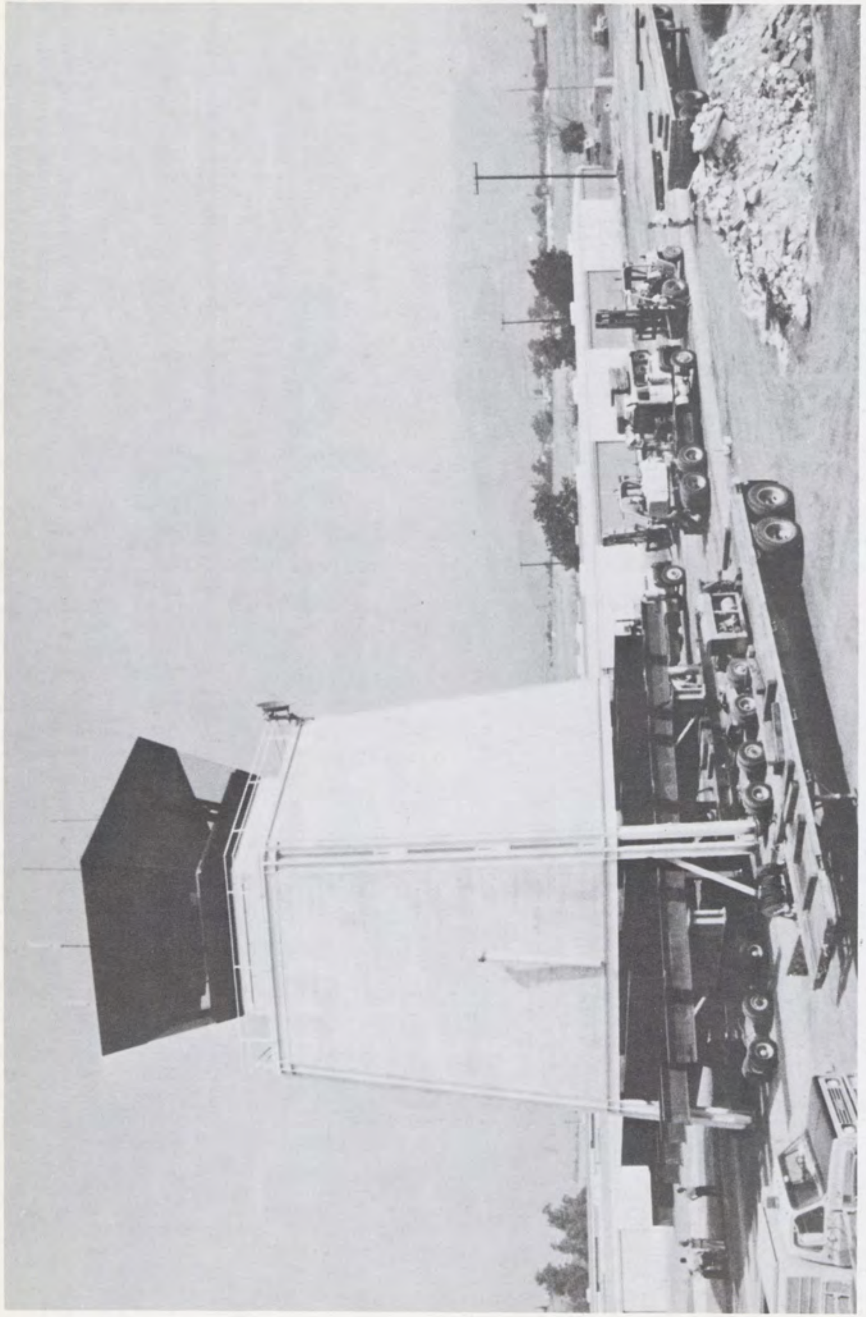

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