U.S. Department of Transportation
Federal Aviation Administration

FAA World

March 1988
Volume 18 Number 3

The flight data recorder and the cockpit voice recorder are mounted in the tail section of aircraft to minimize any damage to them on impact. Photo courtesy of the Sundstrand Corp.

Orange Black Boxes Tell Tales

By Fred Farrar

The nagging unknown that haunted investigators following the crash of a Northwest Air Lines MD–80 at Detroit last August 16 was: Why didn't the alarm sound and warn the pilots that they were about to takeoff with their wing flaps and slats retracted?

For without the lift-producing devices extended, the outcome was never in doubt. The aircraft struggled for altitude—never getting more than 60 feet off the ground—stalled, clipped a flagpole and crashed onto a freeway. All but one of the 155 people aboard were killed, as were two on the ground.

There is little doubt that the flaps and slats were retracted. The digital flight data recorder (FDR) readout showed that they were, and this was confirmed by physical examination of the wreckage.

The cockpit voice recorder (CVR) showed that the stall-warning alarm, which is part of the aircraft's Central Aural Warning System, did go off. Why, then, didn't the flap alarm, which also is part of the Central Aural Warning System, do its job?

Even more disturbing: Was there a basic flaw in the Central Aural Warning System that could be present in other MD–80s and lead to similar accidents in the future, or was it a flaw unique to this aircraft?

To get at least a partial answer, the National Transportation Safety Board (NTSB) investigators turned—as they have in the past—to subtle clues preserved by one or both of the recorders.

To improve the tales told by these black boxes, by May of next year, all air carriers must have replaced their aluminum foil FDRs with sophisticated digital types. And on February 12 this year, FAA published a notice of proposed rulemaking that would require increased carriage of FDRs and CVRs on commuters, air taxis and helicopters (see box).

In the Detroit case, investigators took advantage of a difference in pitch between the primary stall-warning system and the backup stall-warning system and the fact that the primary system is on the electrical circuit controlled by the same circuit breaker that controls the flap warning.

By measuring the frequency of the stall warning that was captured by the CVR, they found it was the backup system that sounded, whereas both are supposed to go off at the same time.

(Continued on page 6)

The assistant manager of the Public & Employee Communications Division, Mr. Farrar is a former Washington correspondent for the Chicago Tribune.

Feeling Fit

Potpourri: Running and Drinking

Ever since its origin in the early Olympic Games (490 B.C. and re-introduced in Athens in 1896), the marathon has been exclusively a male preserve. It was generally believed that women should not be subjected to so much psycho-physical stress for physiologic, biochemical and orthopedic reasons, but most of all, for ethical considerations.

It wasn't until 1973 that the first national women's marathon was held in Germany. In 1974, a women's marathon was first held in the United States. The Boston Marathon, which dates back to 1897, did not officially permit female entrants until 1972.

Women's capacity for endurance activities was called into question by athletic associations as well as by scientists, until the 1970–1973 work of Dr. E. van Aaken of West Germany proved otherwise.

Given optimum training, medical and orthopedic supervision and the right attitude to long-distance running and performance, female marathon runners show the same stress adaptation of various organ systems as men. With increasing number of women running

(Continued on page 10)

In This Issue

1 Black Boxes Tell Tales
2 Know the Hatch Act
3 She's Open to Challenges
4 A 'Positive Obligation'
8 Women Attorneys Make Mark
10 The Resourceful Technician
13 Brave Bessie's Short Dance
14 The Crash of Flight 514

1 Feeling Fit
7 Q & A
11 People
12 Retirees

FAA World
March 1988

Secretary of Transportation
Jim Burnley
FAA Administrator
T. Allan McArtor
Assistant Administrator—
Public Affairs
James C. Jamerie
Manager—Public & Employee
Communications Div.
John G. Leyden
Editor
Leonard Santacrose
Art Director
Eleanor M. Maginnis

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 and Employee Communications Division, Office of Public Affairs, FAA, 800 Independence Ave., S.W., Washington, D.C. 20591. Articles and photos for FAA WORLD should be submitted directly to regional FAA public affairs officers.

John Clabes—Aeronautical Center
Paul Stracke, Sr.—Alaskan Region
Robert Raynesford—Central Region
Kathleen B. Bergen—Eastern Region
Morton Edelstein—Great Lakes Region
Mike Ciccarelli—New England Region
Richard Meyer—Northwest Mountain Region
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Geraldine Cook—Southwest Region
Anthony Willett—Technical Center
Barbara Abels—Western-Pacific Region

Federal Employees:

Know the Rules on Political Activity

You can't help but know that it's an election year. As federal employees, you need to know which political activities you may engage in and which are proscribed. Congress is considering the liberalization of the Hatch Act, which defines these activities, but for the time being, the existing law applies to the do's and don'ts.

You may register and vote as you choose

You may assist in voter registration drives

You may express your opinion about candidates and issues

You may participate in campaigns where none of the candidates represents a political party

You may contribute money to a political organization or attend a political fund-raising function

You may wear or display political badges, buttons, or stickers

You may attend political rallies and meetings

You may join a political club or party

You may sign nominating petitions

You may campaign for or against referendum questions, constitutional amendments, municipal ordinances, etc.

You may not campaign for partisan candidates or political parties

You may not work to register voters for one party only

You may not make campaign speeches or engage in other activity to elect a partisan candidate

You may not be a candidate or work in a campaign if any candidate represents a national or state political party

You may not collect contributions or sell tickets to political fundraising functions

You may not distribute campaign material in a partisan election

You may not organize or manage political rallies or meetings

You may not hold office in a political club or party

You may not circulate nominating petitions

You may not campaign for or against a candidate or slate of candidates in a partisan election

She's Open to Challenges

By Blake S. Williams

Helen M. Parke's road back to an en route center was a growing experience, as it should be. The fruition of that growth is that she is the new manager of the Seattle ARTCC.

She started at the Cleveland Center in 1968, then transferred to a position with the Systems Programs Division of the Air Traffic Service in Washington Headquarters in December 1976. In 1978, she moved into the first of several positions at the Seattle Center. Her next assignment was to the Northwest Mountain Regional Office in 1983 as a facility management specialist in the Air Traffic Division.

Then, in keeping with her own philosophy of being flexible when opportunities present themselves, Parke crossed over to the terminal option as manager of the Boeing Field Tower in Seattle in 1986. She felt this diversification was a definite plus in her career development. She found the transition easy because "everyone at Boeing Tower made me feel comfortable and accepted."

Managing a tower has increased her awareness of the demands on tower controllers and the impact that tower operations can have on other air traffic facilities and the surrounding community.

Looking to the challenges in her new job, Parke says it will take time to learn how the facility ticks, but already underway are modifications to the center for the upcoming voice switching communications system and initial sector suite system that will concern her.

"We're committed to a program of continual change and upgrading of the equipment, which will mean interruptions and physical change within the building," she notes. "We will have to get our people involved in thinking in terms of change and of becoming more receptive to change."

One area she sees an increased emphasis on is traffic management. "It's a national requirement, but because of our location, we haven't been as involved as other parts of the country. But area traffic has been increasing greatly," she notes, "and the center itself has had a 12 percent increase in the past year."

Although Parke has advanced through career mobility, her job philosophy hasn't changed through the years. "I try to do the very best I can with whatever I'm doing. I tend to believe that you have to put a lot of effort into where you are and not worry about where you can go. If you spend all your time concentrating on the next step, perhaps you aren't doing such a good job in the one you're at. Then, there won't be as many places to go.

"You have to allow yourself time to grow and mature in a position," she says, "at the same time being flexible and open to new challenges." ■

A Portland, Ore., Tower controller, Mr. Williams is currently on detail to the Public Affairs Office.

The new manager of the Seattle Air Route Traffic Control Center, Helen Parke confers with her assistant facility manager, Charles E. Davis.

New Heliport Coordinators

Coincident with the signing of an Advisory Circular on heliport design and the debut of the revised Heliport Design Guide, the first orientation of newly designated regional heliport development coordinators was held at Washington Headquarters in January. The meeting included a visit to New York's Downtown Manhattan Heliport and the Port Authority of N.Y. and N.J. Shown at the orientation are (left to right) Southwest Region coordinator Hugh Lyon; Anthony Spera (rear), Eastern Airports Div.; Al McDonough, Eastern Region coordinator; Lt. Col. Lawrence "Pete Peduzzi" (rear), special assistant to the Associate Administrator for Airports; Northwest Mountain coordinator Cecil Wagner; and Western-Pacific coordinator Thomas Conley. Coordinators not shown are Weedon Parris, New England; Arthur Weathers, Southern; Roland Elder, Central; Prescott Snyder, Great Lakes; and Floyd Pattison, Alaska.

Administrator Allan McArtor (left) presents an EEO Award for Excellence to H.C. McClure, director of the Western-Pacific Region.

Associate Administrator for Administration Brooks C. Goldman (left) and Daniel J. McGrath, manager, Materiel Systems Branch, Materiel Management Div., Acquisition and Materiel Service (ALG), garnered EEO awards. They are separated by Carolyn C. Blum (second from left), deputy director, ALG, and Mrs. Mary Ellen McGrath.

Meeting 'the Positive Obligation'

Anthony J. Broderick (left), Associate Administrator for Aviation Standards, and Dr. Lyle O. Malotky (second from right), Research and Development Program manager, Dangerous Goods/Explosives Security Branch, Domestic Civil Aviation Security Division, Office of Civil Aviation Security, were EEO award winners. With them are Mrs. Susan Malotky and Raymond A. Salazar, director of the Office of Civil Aviation Security at Washington Headquarters.

Anthony Broderick congratulates another awardee, Janice L. Sledge, program analyst at the Aviation Standards National Field Office in the Aeronautical Center.

Offering congratulatory support to Pamela J. Whitaker, procurement assistant, and Jack A. Sain (right), manager, Certification Division, is New England Region Acting Director Timothy P. Forte'.

Recognition of excellence in EEO is for "those who have excelled in contributing actively to EEO goals, rather than for those who passively do what is 'expected' and 'decent'," said Administrator Allan McArtor in his remarks at the Eleventh Annual Administrator's Equal Employment Opportunity Awards ceremony in January.

That recognition drew an unprecedented 63 nominations and resulted in 19 individuals being selected to receive the Award for Superior Achievement, which may be granted only by the Administrator.

The Administrator pointed to those who have met what he calls "the positive obligation" to perform their responsibilities with fairness and compassion by providing a climate that encourages all employees to develop to their full potential.

"The recipients exemplified the sensitive and caring attitudes of involved people both on and off the job," said awards program coordinator Al Mendez. "This is what the EEO program is all about."

Springfield, Ill., tower controller Dan Koch, for example, has taken the bit and run with a multi-faceted program for recruiting women and minorities through aviation education.

On his own initiative, Koch convinced the Lincoln Land Community College to offer an FAA airway science program, and he developed and taught the air traffic portion. He also got an agreement with the college to participate in a co-op education program.

He and his facility manager convinced a fixed-base operator to double an aviation scholarship it established at the college and earmarked the addition for qualified women and minorities. He's also working with a bottling company to fund an additional scholarship for women and minorities.

Among other things, Koch helped the region's Civil Rights Staff in developing an Aviation Sponsorship Program and developed a brochure to explain it. This "mentoring" program, which matches FAA professionals with students interested in FAA careers in their disciplines, has received nationwide attention. What it does, Koch says, is "allow our work force to become personally involved in the recruitment of women and minorities."

He's also worked on an aviation coloring book for pre-school children, serves on aviation advisory groups at Southern Illinois University and Lincon Land and helped get a film on "Women in Aviation" shot locally using Springfield Tower women controllers.

In his spare time, he's a single parent with three children.

The Southern Region lays claim to the largest cooperative education program in the agency due largely to the efforts of William Wynn, the manager of the Special Program Recruitment Staff. His commitment to EEO in carrying out his job resulted in 133 active co-op students, 89 percent of whom are minorities.

He also voluntarily led a task group to develop a recruitment strategy for electronics technicians, the first such effort in over a decade. Because of his design of the plan, 24 minority and four women technicians were brought aboard.

Mixing her devotion to EEO on and off the job is Janice Sledge, a program analyst in the Aviation Standards National Field Office in Oklahoma City. In addition to being an FAA EEO counselor and having served as vice-chairperson of a human relations committee, Ms. Sledge has repeatedly addressed students on the advantages of higher education and the employment opportunities in FAA. She is first vice-president of a business and professional women's sorority that aids retarded citizens and helps minority students—primarily women—obtain scholarships. She also is a charter member of a privately owned and operated emergency service center that provides assistance to the disadvantaged.

Another important EEO activity is in assisting minority business enterprise, as William McGill and Clarke Sharpe of the Southern Region have done in the airports sphere and Dr. Lyle Malotky of Washington Headquarters has done with research contracts under the Historically Black Colleges and Universities Program.

Although often seen as remote from the trenches, executives can often show an unmistakable commitment to EEO through positive actions. Former General Counsel Ted Ellett, for example, established a recruiting committee within his bailiwick to go out to law schools for qualified minority and women candidates. During his tenure, the office more than doubled its complement of black staff members and increased the number of women. Largely attributable to his urging of regional counsels, the number of minority and women attorneys in regional offices has grown dramatically.

As Administrator McArtor said, referring to the three categories of people—those who make things happen, those who watch things happen and those who wonder what happened, "It's easy to see which group I'm among. ■

William H. Wynn (right), manager of Southern Region's Special Program Recruitment Staff, receives an EEO Award for Excellence from Administrator McArtor.

E. Tazewell Ellett (right), former Chief Counsel, was an award recipient. Here, he poses with (from the left) Anthony Broderick, Brooks Goldman and Robert E. Whittington, Executive Director.

On hand for the EEO award presentations to Calvin F. Fields (left), manager of Central Region's Resource Management Division, and Clarence A. Hill (third from left), Kansas City ARTCC controller, are Region Director Paul K. Bohr (left) and Stewart R. Morris, Kansas City ARTCC area manager.

All from the Great Lakes Region, award winners are (from the left) Daniel E. Koch, Springfield, Ill., Tower controller; Barbara A. Williams, Cleveland ARTCC area supervisor; Manuel Torres, Minneapolis ARTCC controller; and Susan M. Greco, manager, Management Systems Div. At right is Deputy Region Director Monte Belger.

Southern Region Director Garland P. Castleberry (second from left) visits with his region's winners (from the left) Clark D. Sharpe, Civil Rights officer; William T. Abernathy, manager, Miami ARTCC; and William J. McGill, manager, Airports Div.

Black Boxes

continued from page 1

This strongly indicates that since neither the primary stall-warning system nor the flap-warning system sounded, they were not getting electrical power. Since the two alarms are controlled by the same circuit breaker, it was either malfunctioning (closed but with no power going through) or open.

The NTSB investigators refuse to go beyond this because there is no way to tell which was the case. But it is, nevertheless, a strong indication that there is no basic flaw in the Central Aural Warning System and that the failure was unique to this aircraft.

It's also an example of what invaluable tools the FDR and CVR have become to accident investigators.

Another clue to another crash was an almost inaudible hum on the CVR tape. It really shouldn't have been there at all, and it could easily have been squelched.

But Paul Turner, who recently retired as the person in charge of "reading" the tapes for the NTSB, didn't want it suppressed. He even asked that the harmless technical problem that generates the sound not be corrected. The hum had helped him before in his work and could help him again.

The hum and the way it dipped and then jumped on a cathode ray tube that portrays sound waves visually was the clue that enabled Turner not only to identify a lightning strike and the resulting fuel-tank explosion as the most likely cause of the crash of an Iranian 747 in Spain in 1976 but also to pinpoint where the lightning hit the aircraft.

The hum was preserved on magnetic tape by the aircraft's cockpit voice recorder. It, along with the companion flight data recorder, are equipment that the FAA and its many foreign counterparts require on most large passenger-carrying aircraft as accident-investigation tools.

The CVR records the voices of the crew members and the other sounds heard on the flight deck so that investigators from NTSB, the FAA and other interested parties can play the tapes back for clues as to what caused an accident. The FDR plays a similar role by recording vital information on the aircraft's altitude, air speed, heading and, in the case of the more sophisticated models, attitude, power settings and many other measurements.

NTSB is the government agency that has the official responsibility for the custody of the two devices following an accident and for interpretation of the information recorded on them.

In the case of the Iranian 747, the Board assisted the Iranian government in its investigation of the accident. As part of this assistance, the CVR tape—which had survived the accident inside a crash-proof box where it is surrounded by containers of water that boil off to dissipate the heat from a fire—was flown to Washington where Turner began the search for clues.

Checking a printout of the flight data recorder from Delta Flight 191, which crashed at Dallas-Fort Worth on August 2, 1985, are (clockwise from the left) Dennis Grossi, FDR specialist from the NTSB; Garth Hess, an engineer from Lockheed Air Systems, Ontario; Lockheed engineer Robert Rhodes; and Delta Captain Douglas Tritum.

One of his first moves was to play the tape through the cathode-ray tube, paying close attention to the extra and very regular line of light above the irregular one representing the sounds in the cockpit. The line was caused by a hum resulting from a tiny leak from the aircraft's electrical generating system, which is found on most air-carrier aircraft.

He noticed that the line dipped and then jumped shortly after a crew member was heard to say, "We're in the soup." Six thousandths of a second later, a noise that sounded like lightning hitting the aircraft was heard in the cockpit.

With this in mind, Turner studied CVR tapes from other aircraft that had been struck by lightning and found that each had the same dip and jump in the extra line.

Making use of the fact that sound travels at a speed of approximately one foot every one-thousandth of a second, Turner calculated that the lightning had hit the 747 six feet from the cockpit.

Using this and other evidence, the Board then came up with the hypothesis that the aircraft crashed because the lightning, after hitting the fuselage, coursed through the left wing where it ignited fuel fumes in a wing-tip tank. The explosion led to a series of events that eventually tore the wing off.

As a result of the finding, changes were made in the 747 to improve the shielding on the wires in the wing to reduce the possibility of a similar accident in the future.

But much of his work was not as dramatic. A lot of it involved listening to a CVR tape with other experts and making a transcript of what was said and of the other sounds in the cockpit. The other experts include pilots who are familiar with sounds peculiar to the type of aircraft involved—such as the sounds of the landing gear or flaps going down or an altitude alert going off. Others will be friends of the crew members involved in the accident who can identify their voices and help determine who said what.

When an American Airlines DC–10 crashed at Chicago on May 25, 1979, its flight data recorder was recovered from the wreckage. The first job was to splice the metal tape, which had been broken in several places by the force of the impact. Then the tape was fed into a computer—an electronic presence that tends to dominate the lab—for translating the information on the tape into numbers on a printout.

This printout—to those trained to read it—tells the story of what the aircraft was doing in the final moments before the accident. By indicating a sudden loss of power from the left engine, it showed clearly exactly when it broke away from the wing at takeoff and started the sequence of events that culminated in the crash.

Because pieces of information were missing at each of the places where the tape had broken, it was necessary to go back over the printout to determine from the sequence of key bits of information before and after the breaks what the missing information probably was. This took about two weeks. When it was done, the Board had a full record of what the airplane did during the approximately 30 seconds between the time the aircraft left the ground and the recorder stopped working because of the crash.

The DC–10 FDR was one of the new, digital types that are now required on all new aircraft. Under the FAA rule, they must record at least 17 types of information, but some record as many as 100.

However, many older aircraft still are equipped with "first generation" FDRs that monitor only altitude, airspeed, heading, vertical acceleration and microphone keying. The information is traced on a piece of metal foil and read with a precision microscope that notes each turn and dip and curve in the lines and plots the information on a chart. These older FDRs will be phased out of service within about a year.

A good example of the value of the FDR was Trans World Airlines Flight 841, which was cruising at an altitude of 39,000 feet over Michigan on the night of April 4, 1979, when it went out of control into a high-speed dive.

The trace on the metal foil showed that the Boeing 727 went from 39,000 feet to between 5,000 and 6,000 feet in just 65 seconds before the pilot pulled out of the dive by extending the landing gear. The tape also showed that the big jet hit a top speed of 529 miles an hour during the dive.

Later, by feeding this information into a simulator belonging to the Boeing Company, the Board's investigators also were able to determine that the aircraft made two complete spirals during the dive. They also determined that the angle of the dive was at least 60 degrees relative to the horizon.

Fortunately, the flight did not end in tragedy, and the passengers and the flight crew were able to tell the investigators what happened. It was a harrowing experience, and they probably missed or forgot a lot of the details.

But the flight-data recorder didn't. ■

NPRM Issued for Commuters

On February 12, 1988, FAA published a notice of proposed rulemaking that would expand the requirements for FDRs and CVRs on commuter or regional airlines, as well as some large air carrier aircraft and some general aviation aircraft two years after the effective date of the rule.

FDRs would be required on multi-engine, turbine-powered commuter airplanes and helicopters that can carry 20–30 passengers. The same would be true for those carrying 10–19 passengers first entering service at that time.

CVRs would be required on all multi-engine, turbine-powered commuter and air-taxi airplanes and helicopters that seat more than six persons and must have a two-pilot crew.

FDRs and CVRs also would be required on multi-engine turbine-powered airplanes and helicopters used by corporations and other general aviation operators. Those with six or more seats would have to be retrofitted with CVRs; those new aircraft with 10 or more seats would have to have FDRs.

Q & A

Where the active runway has no instrument approach and the current weather is below circling minimums, what is the responsibility of the approach controller in issuing an approach clearance?

I realize that the responsibility for compliance with the Federal Aviation Regulations (FARs) rests with the pilot, but how can the approach controller properly issue an approach clearance to circle when, say, the weather is measured ceiling at 200 feet overcast, two miles visibility in light rain and snow and the wind is from the northwest at eight knots?

This has been a burning issue at my facility for three years, with an array of solutions, all in conflict.

We must assume that the pilot is rated and operating on an IFR flight plan and that the aircraft is certified and properly equipped. In the example, an approach clearance to circle is an authorization by air traffic control for the pilot to execute the published procedure to that airport. As you point out, the pilot has been issued the weather and the clearance; it is now up to the pilot to comply with the provisions of the appropriate FARs and with the published approach. The regulations assign responsibility to the pilot, not to the controller, to assure that the procedure is flown in compliance with applicable rules and standards.

The issue of propriety in this scenario implies that the controller is leading the pilot "down the path" by issuing a clearance for an approach that the controller believes cannot be flown due to the weather. The pilot is the final authority for the operation of the aircraft; he has been issued the weather, and he has been given the approach clearance.

In the case of a Part 91 operator, the weather requirement is that the *flight visibility* not be less than the visibility prescribed in the standard instrument approach procedure being used. With the very real possibility that the reported weather differs from the weather encountered by the aircraft, the pilot may be able to execute the approach in compliance with the FARs despite the *reported* weather being less than that required by the published approach.

Remember, the Part 91 operator may initiate an instrument approach without regard to the weather. If the pilot in this example is operating under Part 91, his only restriction is that he not descend below the authorized decision height unless he meets the parameters of Part 91.116(c)—i.e., flight visibility not less than the visibility prescribed in the approach procedure being flown.

There are instances where the controller is unaware of the applicable minima. This is the case where the aircraft owner or parent company of the aircraft has increased the minima. Also, the minima may be decreased when the pilot is flying a CAT II or CAT III approach. The obligation of the controller is to provide the best information available to the pilot. The pilot then has the responsibility to determine whether or not he can fly the approach.

I recently attended a Facility Advisory Board (FAB) meeting of the approach control that services our airport. The supervisor of the approach control said that a VFR tower controller has no airspace and cannot refuse to allow an aircraft initially on approach frequency to enter the ATA.

I believe, however, that the tower controller is the appropriate agent for operations within the airport traffic area (ATA) and that, if traffic required, the tower controller could, for example, advise approach that he could not accept a visual approach and could dictate where and how the aircraft was to enter the ATA.

Paragraph 2-16b of Handbook 7110.65 requires the approach control to coordinate with the tower for transit authorization. I feel that if the aircraft must gain authorization to transit, then we surely have the authority to deny the request. I also assume that we can deny entrance into the ATA to an aircraft wishing to land if traffic conditions warrant it.

The control tower has jurisdiction over the ATA unless either the ATA airspace has been delegated to the approach control or ARTCC or procedures have been developed that allow the approach control or ARTCC to exercise jurisdiction over certain operations within the ATA airspace. Airspace delegation and procedural issues must be covered in a Letter of Agreement between the respective facilities. Otherwise, the facilities must comply with the applicable paragraphs of FAA Handbook 7110.65.

You were correct in the interpretation of the handbook; however, the supervisor may have been correct from the standpoint that, at that location, local procedures may allow the approach control to enter the ATA without transferring communications with the aircraft to the tower.

Women Attorneys Make Their Mark

The Southern Region boasts a quintet of women attorneys. They are (from the left) Gayle Fuller, Juliana M. Winters, Mardi Ruth Thompson, Viola M. Pando and (seated) Autumn Newson.

When Associate Justice of the Supreme Court Sandra Day O'Connor graduated from Stanford University Law School in 1952, she couldn't find a job in her profession. She interviewed for positions in several law firms and found that none had ever hired a woman and weren't prepared to do so. One firm in Los Angeles did offer her a job as a legal secretary.

Over the next 20 years, acceptance grew, although at a snail's pace. When Irene Mields was hired as an attorney at FAA in 1976, there were three female colleagues in a complement of around 60 attorneys. None of the women had senior status.

Mields, now a senior attorney in charge of civil rights, says that when she first came into the agency, she felt like an oddity. She says real change began in 1978 and has accelerated since.

Today there are still 60 attorneys, but 23 are women, and the Office of the Chief Counsel has the largest number of high-ranking females in headquarters.

Irene Howie became the first woman assistant chief counsel—promoted to Assistant Chief Counsel for the International Affairs and Legal Policy Staff in 1983. Her duties include representing FAA and, on occasion, the U.S. government, on aviation safety legal issues at ICAO conferences and during negotiations with foreign governments.

Howie feels things have become a lot easier for the women attorneys since she came to FAA in 1979. "The offices now take women more for granted as professionals," she says.

The second female assistant chief counsel is Emily Trapnell, who was promoted to the position of Assistant Chief Counsel for the General Legal Services Division last June. Prior to that, she spent three years as Special Assistant to the Chief Counsel.

When she came to FAA in 1978, she began to take flying lessons and got her pilot's license. "That became a real ice breaker," she says, "in being accepted as really knowing something about aviation."

Trapnell indicated that when she began at the University of Richmond Law School 10 years ago, women enrolling in law school accounted for about 20 percent of the total. Today, women account for nearly 50 percent of law school enrollments nationally.

Kaye D. Jackson is half of the Technical Center's counsel office, as well as of her home office. Her husband is a lawyer, too. Her specialty is contracts.

In 1978 when she was hired by FAA in Washington headquarters, Loretta Alkalay recalls that there wasn't a single female attorney in the regional offices. The first was hired in 1979, and when she transferred to the Eastern Region the following year, there were only two or three others.

"There was tremendous resistance when I first went to the region," Alkalay said. "Since then, there has been a radical change in the way men deal with you." For the past six months, Alkalay has been Acting Regional Counsel, only the second woman to hold that position.

The first female regional counsel was Darlene Freeman, who was appointed to the Eastern Region post in 1985. Administrator McArtor asked her to serve on his IMPACT '88 team last summer, and she moved to Washington. In December, she became Special Counsel to the Administrator.

"One big change I have seen since I came to FAA in 1977 is that there are more women in management positions," Freeman says. "It was a big step for FAA to have a woman as regional counsel, but I always felt women were accepted. I never felt I wasn't," she added.

Among Washington Headquarters' 23 female attorneys is this contingent from the Regulations and Enforcement Division (from the left): Sheryl Israel, Kathleen Yodice, Karen Bury, Angela Nash, Patricia Lane, Denise Daniels Ross (seated) and Vivian Wiesner.

Today there are 20 women attorneys in the field, with the biggest concentration in the Southern Region, where there are five. Nearly half of them came on board last year.

Barbara Boyle is one of the "old timers," having been hired by the Central Region's regional counsel's office in 1979. One of two female attorneys in the region, she believes there "always have been good opportunities for women in the field I'm in." ■

Not shown are Eastern Region's Acting Regional Counsel Loretta Alkalay and Alaskan Region attorney Delinda Wall.

Amy Lind Corbett, a private pilot and an attorney in the New England Region, was a law clerk in the regional counsel's office during law school in the summer of 1980.

More female attorneys from the Chief Counsel's office include (from the left) LeAnne Faulkner, Mary N.W. Jones, Peggy Gilligan, Joan Vance Johnson, Valerie Dorsett, Emily Trapnell, Frances Recio and Daphne Fuller. Not shown are Peggy Price and Pat McNall.

Rena M. Price (left) had been in active practice in New Orleans before joining FAA. Lynette Word practices in Texas. Both of these Southwest Region attorneys are members of the NTSB Bar Association.

Central Region attorneys Barbara Boyle (left) and Mary Ellen Loftus believe that there are good opportunities for women in law.

From various Chief Counsel divisions are (from the left) Irene Howie, Nancy LoBue, Irene Mields, Louise Maillett and (seated) Janis Rodriguez and Vicki Leemon.

The attorney trio of (from the left) Cynthia W. Elkins, Jeanne Perrion and Suzie Coane joined the Western-Pacific Regional Counsel's office in 1987.

Photo by Elly Brekke

General attorneys in the Great Lakes Region include Jeanette B. Daubaras (left) and Eileen Weikel Johnson.

Before joining the Northwest Mountain Regional Counsel's staff, Gina R. Belt was a trial attorney for the Dept. of Justice.

Darlene Freeman, who was the first woman regional counsel—in the Eastern Region—is now Special Counsel to the Administrator.

The Resourceful Technician

By James Johnson

Flying machines and bicycles have a relationship going back to the Wright Brothers. Now Gene Brawner has crossed the former with a go-cart.

Brawner, a technician working on the Boeing 727 simulator at the FAA's Mike Monroney Aeronautical Center, was faced with a crisis.

The $7.5 million machine imported from Canada three years ago, which operates 14 hours a day, five days a week, quit working two hours before students were due to use it.

Brawner opened the service cover and found that a gear in the horizontal stabilizer had stripped its teeth. The incidental costs of a breakdown were potentially expensive if it meant sending students home until it could be repaired.

Brawner thought about his son Brent's old go-cart and its parts. Brent, 17, had given up on his go-cart when he graduated to his 1969 Oldsmobile, but Brawner kept the parts, thinking they might come in handy. "I told the others that I had some gears at home that might fit," he said.

In his garage in Mustang, Okla., Brawner found two new, 12-tooth gears he had bought a few years ago for the go-cart. They were supposed to fit on an idler shaft used to tighten the go-cart chain.

"They were 1½ inches across and fit on a five-eighths-inch shaft, and they were identical to the piece we took out of the simulator," he said.

It took 45 minutes to put the gear in place, and the simulator was ready to go when the students walked in.

Brawner's exploit was reported by Morris Friloux, FAA Academy superintendent, at the next meeting of the FAA center's top brass. "This is typical of the folks who work at our simulator unit," he said. "They are very resourceful."

Brawner donated both go-cart gears—which he said cost him $5 to $10—to the FAA simulator shop so they'd have a spare.

Friloux added what might be the highest praise possible in the federal bureaucracy:

He got it fixed and back in operation fast, without even having to write a procurement order. ■

A staff writer for The Daily Oklahoman, *Mr. Johnson has been published in* FAA World *a number of times.*

For want of a little gear, the Aeronautical Center's Boeing 727 simulator was out of commission until technician Gene Brawner thought of a go-cart part to repair it.
Daily Oklahoman photo by Roger Klock

Feeling Fit

continued from page 1

long distances—from the marathon to 100 kilometer (62-mile) races—performances can be expected to improve, perhaps approaching or exceeding that of male runners, particularly over ultra-long distances.

It can be concluded that long-distance running is no more detrimental to health for women than for men, that damage caused by excessive strain can be avoided by the proper training and a sensible attitude to the sport and that other ill effects are not anticipated.

On the other hand, the positive effects of endurance training for women, as for men, are particularly seen in the physical, psychological and social spheres and can contribute to the maintenance or recovery of health.

So, lace on those shoes and get out there.

Source: "Women in Long Distance Running," Institute of Sports Medicine, Federal Republic of Germany.

* * *

The more you drink, the quicker you die. Ten-year mortality rates were studied in comparison to alcohol habits among 2,015 people matched for age, sex, race and cigarette smoking in Oakland, California.

People reporting daily use of two drinks or fewer fared best; the heaviest drinkers (six or more per day) had doubled mortality. Users of 3.5 drinks per day registered deaths approximately 50 percent higher than the lesser drinkers. Cancer, cirrhosis, accidents and non-cancer respiratory tract conditions contributed to the higher mortality of the heavier drinkers.

Smoking intensity was a possible factor in the increased deaths of heavier drinkers, but the data were also compatible with the idea that smoking and drinking are synergistic (the combination intensifies the effect) in the production of certain cancers and noncancer respiratory illness.

The message is insistently repetitious: moderation in drinking, eating and exercise will keep you healthier.

Source: Journal of the American Medical Association.

People

Aeronautical Center

■ **Jose M. Arguello, Jr.,** unit supervisor, Automation Section, Airway Facilities Branch, FAA Academy.

■ **Leo T. Epperson,** chief, Logistics & Inventory System Program Staff, FAA Depot.

■ **Charles K. Guy,** supervisor, Standards and Criteria Section, Standards Development Branch, Flight Programs Division, Aviation Standards National Field Office (ASNFO), promotion made permanent.

■ **David A. Lindsey,** supervisor, Special Equipment Maintenance Section, Facility Maintenance & Operations Branch, Facility Support Division.

■ **Nicholas A. Richards,** supervisor, Technical Operations Section, Airway Facilities Branch, FAA Academy.

■ **Robert E. Runyon,** manager, Facility Maintenance & Operations Branch, Facility Support Division.

■ **Thomas J. Taylor,** supervisor, Procedures Section, Atlantic City, N.J., Flight Inspection Field Office, ASNFO.

Alaskan Region

■ **Kent Curtis Adams,** unit supervisor, Anchorage Flight Standards District Office.

■ **John H. Groeneveld,** unit supervisor, Quality Assurance Staff, Air Traffic Div.

■ **Wendell J. Wassmann,** manager, Nome Flight Service Station.

Central Region

■ **Craig A. Bennington,** area supervisor, Lambert Field Tower, St. Louis, Mo.

■ **Russell A. Leonard,** area supervisor, Lincoln, Neb., Tower.

■ **Robert D. Long, Jr.,** assistant manager, Grand Island, Neb., Airway Facilities Sector, promotion made permanent.

■ **Thomas R. Martin,** area supervisor, Lambert Field Tower, St. Louis.

■ **Max D. Payne,** chief, Operations, Civil Aviation Security Division.

■ **Samuel J. Smith,** manager, Lambert Field Tower, St. Louis.

Eastern Region

■ **Michael P. Cataruzolo,** unit supervisor, Communications/Interfacility Section, Electronics Engineering Branch, Airway Facilities Division.

■ **Susan D. Cornell,** area manager, Washington ARTCC, from the Salt Lake City, Utah, ARTCC.

■ **Daniel J. Costello,** area supervisor, Buffalo, N.Y., Tower, from Philadelphia.

■ **John D. Depew,** manager, Charleston, W.Va., Tower, from Huntington, W.Va.

■ **William T. Dixon,** manager, Chantilly, Va., AF Sector Field Office, Capital AF Sector, promotion made permanent.

■ **David P. Leffas,** area supervisor, Washington Dulles International Airport Tower.

■ **Gregory McGuirk,** area supervisor, Washington ARTCC, promotion made permanent.

■ **Eugene R. Orlando,** manager, Real Estate & Utilities Branch, Logistics Division.

■ **George A. Tracy,** manager, New York Automated Flight Service Station, Islip, N.Y., from the Air Traffic Division.

Great Lakes Region

■ **James F. Bruner,** assistant manager for system performance, Aurora, Ill., Airway Facilities Sector, promotion made permanent.

■ **Merlin R. Grinager,** unit supervisor, Minnesota AF Sector.

■ **Mark A. Meuwissen,** area supervisor, Pontiac, Mich., Tower.

■ **Walter J. Moor,** manager, Grand Rapids, Mich., General Aviation District Office.

■ **Michael J. Pattin,** area supervisor, Minneapolis-St. Paul (Minn.) International Airport Tower, from Detroit, Mich.

■ **Darrel L. Pittman,** area supervisor, Minneapolis-St. Paul International Airport Tower, from the Denver ARTCC.

■ **Clyde D. Rinkinen,** area supervisor, Flint, Mich., Tower, from Detroit Metro.

■ **Richard J. Shaftic,** area manager, Chicago O'Hare Tower.

New England Region

■ **Herschel C. Jones,** chief, Burlington, Mass., Manufacturing Inspection Office, Aircraft Certification Office.

■ **Dimitrios J. Merageas,** manager, Bedford, Mass., Tower.

Northwest Mountain Region

■ **Charles C. Abnet,** area manager, Seattle-Tacoma, Wash., Tower.

■ **Townsend Annes,** manager, Trinidad, Colo., Airway Facilities Sector Field Office, Denver AF Sector.

■ **Patricia A. Cates,** manager, Walla Walla, Wash., Flight Service Station, from the Great Falls, Mont., FSS.

■ **Trent S. Cummings,** manager, Boeing Field Tower, Seattle, from Cedar City, Utah, Automated FSS.

■ **Michael P. Hipsher,** assistant manager, plans and programs, Denver ARTCC.

■ **Eugene L. Homer,** manager, Cedar City, Utah, AFSS.

■ **Marvel Keckhut,** area manager, Denver ARTCC.

■ **Brock L. Laffoon,** unit supervisor, Seattle ARTCC AF Sector.

■ **Benny A. Notti,** manager, McMinnville, Ore., Automated FSS.

■ **Ronald K. Perkes,** assistant manager for training, Denver ARTCC AF Sector.

■ **Michael G. Reilly,** unit supervisor, Pasco, Wash., AF Sector Field Office, Seattle AF Sector.

■ **Jere A. Sheppard,** unit supervisor, Billings, Mont., AF Sector, promotion made permanent.

■ **Brian J. Sinon,** unit supervisor, Casper, Wyo., AF Sector Field Office, Billings AF Sector, promotion made permanent.

■ **Leroy R. Skaug,** assistant manager, Seattle AFSS, from the Air Traffic Div.

■ **Patrick A. Terry,** manager, Idaho Falls, Idaho, FSS, from the McMinnville AFSS.

■ **Charles R. Torres,** area supervisor, Grand Junction, Colo., FSS, from Denver.

■ **Bette L. VanManen,** area manager, Denver AFSS.

■ **Johannes Walls, Jr.,** area supervisor, Spokane, Wash., FSS, from Seattle AFSS.

■ **Robert L. Wheeler,** area supervisor, Denver Tower, promotion made permanent.

Southern Region

■ **Phillip A. Ammons,** area supervisor, Atlanta, Ga., ARTCC, promotion made permanent.

■ **Thomas G. Christian,** area manager, Memphis, Tenn., ARTCC.

■ **Grady J. Davis, Jr.,** manager, Huntsville, Ala., Airway Facilities Sector Field Office, Memphis Hub AF Sector, promotion made permanent.

■ **Hollis Fowler,** area supervisor, St. Petersburg, Fla., Automated Flight Service Station, promotion made permanent.

■ **Isaac O. Grant,** area supervisor, Jackson, Miss., FSS, from Macon, Ga., AFSS.

■ **Lamon Grier, Jr.,** assistant manager for program support, Jacksonville, Fla., Hub AF Sector, from the FAA Academy.

■ **William A. Gronvold,** area supervisor, Mobile, Ala., FSS, from Orlando, Fla., FSS.

■ **James C. Harber,** manager, Melbourne, Fla., AF Sector Field Office, Tampa, Fla., AF Sector.

■ **Leonard E. Jankowski,** assistant manager, plans and programs, Memphis ARTCC.

■ **Marion A. Jennings,** area supervisor, Miami International Airport Tower, from Ft. Lauderdale, Fla., Executive Airport Tower.

■ **Marvel K. Kruse,** area supervisor, Miami ARTCC, from the San Juan, P.R., CERAP.

■ **John E. Lacey,** area supervisor, Atlanta ARTCC, from the Memphis ARTCC.

■ **Robert C. Lagen, Jr.,** assistant manager for automation, Memphis ARTCC.

■ **James W. Lane,** area supervisor, Atlanta ARTCC, promotion made permanent.

■ **James J. O'Brien,** area supervisor, Memphis ARTCC.

■ **Joseph F. Petrucci,** area supervisor, Miami Tower, promotion made permanent.

■ **John B. Plate,** area supervisor, Miami Tower, promotion made permanent.

■ **George R. Richardson,** area supervisor, Knoxville, Tenn., Tower.

■ **John C. Riggs,** area supervisor, West Columbia, S.C., Tower, from Atlanta Tower.

■ **Walter A. Schade, Jr.,** area supervisor, Miami ARTCC.

■ **Charles H. Smith,** section supervisor, South Florida Flight Standards District Office, Miami.

■ **Howard Turner, Jr.,** principal operations inspector, South Florida FSDO.

■ **Kenneth R. Vanauken,** assistant manager, traffic management, Miami ARTCC.

■ **Robert L. Williams,** area supervisor, Atlanta ARTCC, promotion made permanent.

Southwest Region

■ **James R. Asbury,** assistant manager, Conroe, Texas, Automated Flight Service Station.

■ **Oscar D. Brown,** manager, Houston, Texas, Flight Standards District Office.

■ **Thomas C. Brown,** assistant manager, Lubbock, Texas, Tower, from the Los Angeles ARTCC.

■ **Arlen L. Byrd,** area supervisor, San Angelo, Texas, AFSS, from De Ridder, La.

■ **Rocco Cangelosi,** manager, Houma, La., Tower, from Moisant Tower, New Orleans.

■ **Thomas P. Germino, Jr.,** team supervisor, Dallas-Fort Worth FSDO.

■ **Charles A. Hemphill,** manager, Fort Smith, Ark., Airway Facilities Sector Field Office, Little Rock, Ark., AF Sector.

■ **Charles Hensarling,** unit supervisor, Lubbock FSDO.

■ **Mary F. King,** manager, Management Systems & Appraisal Branch, Resource Management Div., promotion made permanent.

■ **John C. Konecny,** area supervisor, San Angelo AFSS, from the Conroe AFSS.

Technical Center

■ **Richard W. Battaglia,** staff officer, Operations Center, promotion made permanent.

■ **Theodore J. Bolich,** unit supervisor, Technical Program Support Section, Plant

The information in this feature is extracted from the Personnel Management Information System (PMIS) computer. Space permitting, all actions of a change of position and/or facility at the first supervisory level and to branch manager in offices are published. Other changes usually cannot be accommodated because there are thousands each month.

Services Branch, Plant Engineering & Services Division.

■ **Anthony J. Willett,** manager, Public Affairs Staff.

Washington Headquarters

■ **Ronald E. Coffey,** manager, Systems/Programs Integration & Planning Branch, Systems Requirements & Design Division, Systems Engineering Service, from the Harrisburg, Pa., AF Sector.

■ **William C. Davis,** manager, Airspace & Air Traffic Rules Branch, Airspace-Rules & Aeronautical Information Division, Air Traffic Operations Service.

■ **Billy W. Franklin,** program director, Technical Standards Program, Maintenance Engineering Division, Systems Maintenance Service, from the Alaskan AF Division.

■ **James S. Kemp,** supervisor, Formulation Team, Capital Division, Office of Budget.

■ **Bonnie C. Pankalla,** manager, General Aviation Operations Branch, General Aviation & Commercial Division, Office of Flight Operations.

■ **Walter J. Price,** chief, Frankfurt, Germany, International Field Office, Europe, Africa & Middle East Office, from the Houston, Texas, Flight Standards District Office.

■ **Mark J. Rosenthal,** manager, Aviation Standards Data Division, Office of Program & Regulations Management, promotion made permanent.

Western-Pacific Region

■ **Stanley E. Albright,** assistant manager, Oakland, Calif., ARTCC.

■ **Gene R. Burgandine,** manager, El Toro MCAS Airway Facilities Sector Field Office, Santa Ana, Calif., from Wshington Headquarters Automation Service.

■ **Charles J. Burge,** assistant manager for training, Riverside, Calif., Automated Flight Service Station, from Daggett, Calif.

■ **Lewis A. Butler,** manager, Phoenix, Ariz., Tower, from Tampa, Fla.

■ **Douglas J. Cahill,** manager, Honolulu AF Sector Field Office, from Finegayan, Guam.

■ **Michael D. Corbett,** area supervisor, Oakland ARTCC.

■ **Robert W. Dean,** area supervisor, Lancaster, Calif., FSS, from Riverside AFSS.

■ **Arlen C. Conner,** manager, Lindbergh Field Tower, San Diego, Calif.

■ **Frank B. Garcia,** assistant manager for training, Riverside AFSS.

■ **James W. Greenwood,** assistant manager for training, Hawthorne, Calif., AFSS.

■ **Charles H. Hall,** manager, Oakland ARTCC.

■ **Roland W. Kersting,** area supervisor, Honolulu ARTCC.

■ **Terry T. Lankford,** area supervisor, Oakland FSS.

■ **Sandra Gillin Libby,** manager, Contracting & Acquisition Management Branch, Logistics Division, promotion made permanent.

■ **Gearold W. Martin,** area manager, McClellan Air Force Base TRACON, Sacramento, Calif., from Stockton Tower.

■ **Karen D. Rodriguez,** unit supervisor, Accounts Payable Section, Accounting Branch, Financial & Management Resources Division.

■ **Lawrence E. Samson,** area manager, Phoenix TRACON.

■ **Ronnie V. Simpson,** supervisor, Safety Section, Safety and Standards Branch, Airports Div., promotion made permanent.

■ **George J. Slade, Jr.,** assistant manager, programs, Burbank, Calif., Tower.

■ **Thomas T. Watanabe,** area supervisor, Fresno, Calif., FSS, from Oakland FSS.

■ **Frank B. Wilcoxen,** area manager, Oakland ARTCC.

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Raymond R. Dotson
Richard N. Gabel
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Wily W. Knighten
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Deverie A. Olson
James E. Pannell
I. Carl Perry
Ernest J. Pittman
Juan J. Rivera
Richard M. Rodgers
Willie B. Romisville
Donald H. Spaulding
Elsie A. Suzuki
Katsuhiko Tamayori
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Harry Hubbard
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Henry C. Jones
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Raymond Lentz
Ralph Main
Edward R. Marvin
Ansel H. McAllaster
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Eugene J. Monahan
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Wallace W. Rose
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Ralph E. Stallcup
Mary J. Suskvich
Glenn H. Thomson
Melvin E. Toland
Wayne E. Vickrey
Camilla Vogt
Albert M. Wallup
Max K. Winter
Karl S. Wuthrich
Joseph A. Yannello

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John W. Allison
Boal V. Anderson
James R. Beatty, Jr.
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Russell W. Crosby
Geraldine J. Crowther
Daryl J. Davenport
Jack B. Davis
Orren B. Delamar
John C. Delsman
Allan J. Depoe
Jesse T. Elders, Jr.
Edward W. Embry
James H. Estes
Clyde W. Fincher
Charles E. Funderburk
Daniel P. Gurley, Jr.
Edward W. Griffith III
Pearl W. Grigsby
Alvin W. Hall
Nina G. Harbour

Brave Bessie's Short Dance in the Skies

Bessie Coleman visited aircraft builder and designer Anthony Fokker in the Netherlands during her 1921 trip to Europe.

There are many women who took to the air early in the history of aviation, but other than the renowned Amelia Earhart and Jacqueline Cochran of the middle years, only aviation buffs could name names.

There was Blanche Scott, who is considered to have been the first woman to learn to fly, having been taught by Glenn Curtiss in 1910. Like most pilots of the era, however, she never obtained a license, which was being offered by the Federation Aeronautique Internationale (FAI) in France through the Aero Club of America. The first American woman to do so was Harriet Quimby, who earned license number 37 in 1911.

The first black woman pilot to earn a license and possibly the first black person to do so was Bessie Coleman, who received her certificate in France in 1921.

Like Quimby, she had a short, tragic career in aviation. Unlike Quimby, she had to try harder in seeking her wings.

Brave Bessie—a nickname she was later to earn—was born into a poor Texas family in 1896, according to the date she gave on her license. (Other sources list 1892 and 1893.) She was a voracious reader and wanted to go to college, but hers and her mother's meager earnings permitted her to attend only a single semester at Langston Industrial College—now Langston University.

She moved to Chicago, where her brother lived, and worked as a manicurist and manager of a chili parlor. All the while, she continued reading, gaining an interest in aviation. By the end of World War I, she had made up her mind to fly.

Throughout the country, her applications to flight schools were rejected as quickly as they were submitted, not only because she was black, which many of them probably did not know, but because she was female. Women were heavily discriminated against in traditionally male fields, and aviation was a new, macho field.

Coleman was persistent, however, saying "If I can create the minimum of my desires, there shall be no regrets." She approached the editor of the *Chicago Weekly Defender* for assistance. He advised her to learn French and save her money, that the answer lay in training in France, where attitudes were more liberal toward women and blacks in aviation. Indeed, Eugene Bullard, an American black, learned to fly there and flew in combat with the Lafayette Escadrille in World War I.

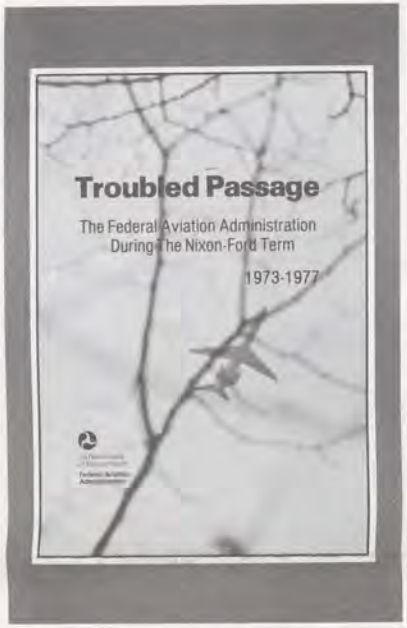
She followed that advice, making two trips to France and taking instruction from some of the best European pilots, including the chief pilot of Germany's Fokker Aircraft Co. She returned to the United States with FAI license 18,310 in hand.

Wanting to share her achievement, Coleman set her goal of opening a flying school to "give a little coloring" to aviation. That would take money, however, so she began giving exhibitions over Checkerboard Field in Chicago in 1922. In Boston, Brave Bessie, as she was then known, did loops over the spot in the Charles River where Harriet Quimby was killed. Between exhibitions, she lectured on aviation in churches and movie theaters. She made her barnstorming headquarters in Houston, Texas.

Her first accident occurred in 1924 while doing advertising for the Firestone Rubber Company in California. It took her a year to fully recover.

She was close to realizing her goal when she began barnstorming in Orlando, Fla. On April 30, 1926, during a show for the Jacksonville Negro Welfare League, Coleman was killed when she fell from her plane following mechanical trouble.

Though her flying career was short, she succeeded in giving a little coloring and powder to aviation by her inspiration to blacks and women to follow in her footsteps. ■



The Crash of Flight 514

By Edmund Preston

Fourteen years ago, the destruction of an airliner on approach to Dulles International Airport embroiled FAA in controversy, changed air traffic control procedures and hastened implementation of the Ground Proximity Warning System. The following description of the accident is excerpted from Troubled Passage, The Federal Aviation Administration During the Nixon-Ford Term, *the recently published fifth volume of the agency's narrative history series.*

For Washingtonians, December 1974 began with a day so windy that National Airport was closed by mid-morning. Snow was predicted, and many citizens doubtless chose to linger over their Sunday *Post* rather than venture outdoors. Those interested in aviation noted that the troubled Lockheed Aircraft Corporation had resisted a takeover bid by oil-rich Arabs.

The front page also showed a smiling picture of the affable former congressman who had now occupied the White House for almost four months. An old Navy man, Gerald Ford had enjoyed watching the midshipmen trounce Army in Saturday's game. The *Post*'s editorial section included an indignant attack on Secretary of Agriculture Earl Butz, who had regaled reporters with an ethnic joke about the Pope. This was only a minor embarrassment to a President whose initial honeymoon period had lasted less than five weeks. To many, Ford's pardon of Richard Nixon proved that his administration was no more than an extension of the previous one.

Alexander Butterfield was among those for whom the new regime was a disappointment, yet he could look forward to the formal opening of one of the major projects through which he hoped to revitalize FAA. Members of the world's aviation community were assembling in the city to attend the first Biennial Airworthiness Review, scheduled to begin the next day.

News of the shutdown at National was relayed to TWA Flight 514, a Boeing 727 en route to the capital from the Midwest. After consulting his dispatcher, the captain decided to change his destination to Dulles International. He had never flown into Dulles before, but had qualified to land there by watching films of the approach.

His new course would take him over a range of Virginia mountains northwest of the airport. The crew's approach plate did not depict the contours of this range, but it did show the position of several individual peaks. The route assigned to the 727 was represented by an arrow drawn between the two highest points and marked with a minimum altitude of 3,400 feet. The arrow pointed to Round Hill intersection, where aircraft might drop as low as 1,800 feet on their way to the final approach fix.

Flight 514 was still on the other side of the mountains from Dulles when it received clearance for approach. The controller mentioned no altitude restriction, and the captain assumed that he could descend immediately to the height from which the final section of the approach would begin.

"Eighteen hundred is the bottom," he announced, and the co-pilot guided the aircraft down into the turbulent clouds. Doubt crossed the captain's mind a few minutes later. He remarked that "this dumb sheet" showed a minimum altitude of 3,400 feet to Round Hill. "Where do you see that?" asked the flight engineer, and the three men discussed the question. They decided that the controller's clearance overrode their chart and allowed them to descend at once. In fact, they dropped even below 1,800 feet as their blind, bumpy flight continued.

The crew caught brief glimpses of the ground as they neared the mountains, but their first perception of danger apparently came from the altimeter horn. For a few crucial seconds, the 727 began to climb. "Get some power on," ordered the captain as the terrain warning sounded again. Impact came an instant later. The aircraft struck the crest of a ridge near the town of Berryville, killing all aboard.

The key to the TWA disaster lay in the term "cleared for approach." FAA's position was that the crew was simply wrong in taking their unqualified clearance to mean that they could descend immediately. It was true that controllers sometimes gave altitude restrictions when clearing in-bound traffic, but their manual directed them to do this only for those aircraft classed as "radar arrivals." Although Flight 514 had been monitored on the Dulles controller's scope, the agency did not regard it as a radar arrival because the pilot was not receiving radar navigational service. Instead, he had been merely directed to a radial and later cleared to proceed under his own navigation.

The Airline Pilots Association (ALPA) rejected this, arguing that the TWA crew's fatal interpretation had been shared by a majority of pilots before the accident. This claim may have been exaggerated, but the National Transportation Safety Board (NTSB) gathered evidence that uncertainty on the point existed within the aviation community. In the years before the accident, organizations that included the Air Force and commercial carriers had pointed out the potential for confusion.

The NTSB report on the accident suggested that many pilots did not understand such distinctions as the one between radar and nonradar arrivals. While increasingly reliant on assistance from control facilities, they often did not realize the exact nature of the service received. The report also noted that controllers possessed certain altitude data not found on the pilots' charts and often used this knowledge to clear flights to descend below published minimums.

Another factor that helped to explain the TWA pilots' action was the poor design of their particular approach plate. Despite its defects, however, the chart contained enough information to show that 1,800 feet was not a safe altitude. The crew's failure to draw this conclusion—or seek clarification—was clearly an error of judgment. The Board's majority ruled that this mistake was the probable cause of the accident, and listed FAA's failure to prevent such misunderstandings as a contributory factor. Two members dissented, dividing the blame equally between the pilots and the agency.

Public debate on the Berryville crash did not wait for the Safety Board's hearings. The fact that the disaster had occurred so near the capital magnified both its news appeal and political impact. The victims included a cross-section of the Washington establishment: civil servants, military officers, an FBI agent, three congressional aides. The media supplied photographs of the wreckage and other sad and shocking details that gave immediacy to the statistic of 92 fatalities.

Unions representing both pilots and controllers used the occasion to charge that FAA had ignored their appeals for additional safety equipment. The NTSB itself did not entirely preserve its image as a deliberate investigator. Three days after the crash, the Board's chairman, John H. Reed, was quoted as saying that the cause had been either instrument failure or pilot error. ALPA's John O'Donnell immediately asked the President to remove Reed for his "irresponsible speculations" about this and other recent accidents.

Butterfield, too, released a statement that deplored premature judgments from any source. Concerned about reports that Flight 514 had received misleading instructions, however, he included an interpretation of his own. The Administrator said that the tapes of the TWA jet's communications showed that the controllers had followed correct and well-established procedures.

Like many other FAA officials, Butterfield continued to regard the crash as a pure case of pilot error. He told one audience that controllers should properly be called "spacers" because their function was to separate aircraft from other traffic, not from the ground. But the Administrator said that the crash revealed "room for improvements" that would prevent "this kind of accident or fuzzy instructions" from recurring.

To make changes meant climbing "out on the limb of potential liability," he explained, but "we don't give a damn about that." ■

Dr. Preston is a member of the FAA history staff, Office of Public Affairs. He is the author of Troubled Passage.

Retirees

continued from page 12

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Federal Notebook

READING THE FINE PRINT

If you're retiring this year, under the new rules for withdrawing a lump sum equal to your contributions to your annuity, only 60 percent of it may be taken during 1988, the balance collectible in 1989. What you may not be aware of is that the 40 percent to be held by the government will earn interest--8.375 percent this year.

The split lump-sum arrangement is slated to expire Sept. 30, 1989, unless Congress reauthorizes it.

You may also be surprised to learn that the continuing resolution spending bill provided for the payment of interest on back pay awards to federal employees who are victims of improper personnel actions. The interest is the same charged by the Internal Revenue Service for delinquent tax payments.

THE STATUS OF LEAVE SHARING

Following on the three-employee "leave sharing" test and with the blessing of Congress in the omnibus funding bill, the Office of Personnel Management is publishing regulations in the Federal Register that will lift the ceiling on the number of participants in the program, but will limit donations to annual leave, as the Administration prefers. Individual agencies will set the rules.

At the same time, the House Post Office and Civil Service Committee has passed HR-3757, The Leave Transfer Act, which would permanently require agencies to permit employees to donate annual leave to co-workers facing personal emergencies. It would also setup three pilot projects in which both annual and sick leave could be donated.

A glitch is that federal employees are barred from giving gifts to superiors, which the leave donation could be considered if the recipient is a higher grade. HR-3757 and the earler three-person test have a "notwithstanding clause" to exempt the program, but OPM's expanded program for this spring doesn't.

The House committee also approved HR-925, which would permit federal employees and employees of large private-sector firms to take extended unpaid leave for personal or family medical crises.

NARROWED LEGAL PROTECTION

The Supreme Court has ruled in Westfall vs. Erwin that federal employees are immune from damage suits only when their conduct is within the scope of their duties and they are exercising decision-making discretion --that is, involving policy or planning decisions.

A CARPOOL IS NOT AN OFFICE

Did you ever feel like the shoptalk engaged in during commuting was an extension of your workday? One federal employee who regularly rode with his bosses did and filed a claim for overtime, contending that one of his performance ratings was partially based on the discussions held during the two hours of carpooling each day.

The Comptroller General disallowed the claim, saying that discussion of official business in that setting did not place the employee in duty status nor qualify him for overtime.

TRUTH VS. BAD PR

The Congressional Budget Office has put the lie to public perceptions that federal employees are under-productive. The CBO told Congress that government productivity has grown at a rate close to double that of the private sector over the past 10 years.

Federal productivity gains averaged 1.4 percent a year, compared to the private sector's gain of 0.8 percent. Not counting Department of Defense and Postal Service employees, civilian agencies actually recorded a two percent per year increased output.

JUST A LITTLE RESPECT

Maryland Rep. Steny Hoyer and Sen. Paul Sarbanes have introduced legislation to designate May 2-8 as "Public Service Recognition Week." Says Senator Sarbanes: "Public servants lead a noble calling to serve others." You knew that, didn't you?

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