# World

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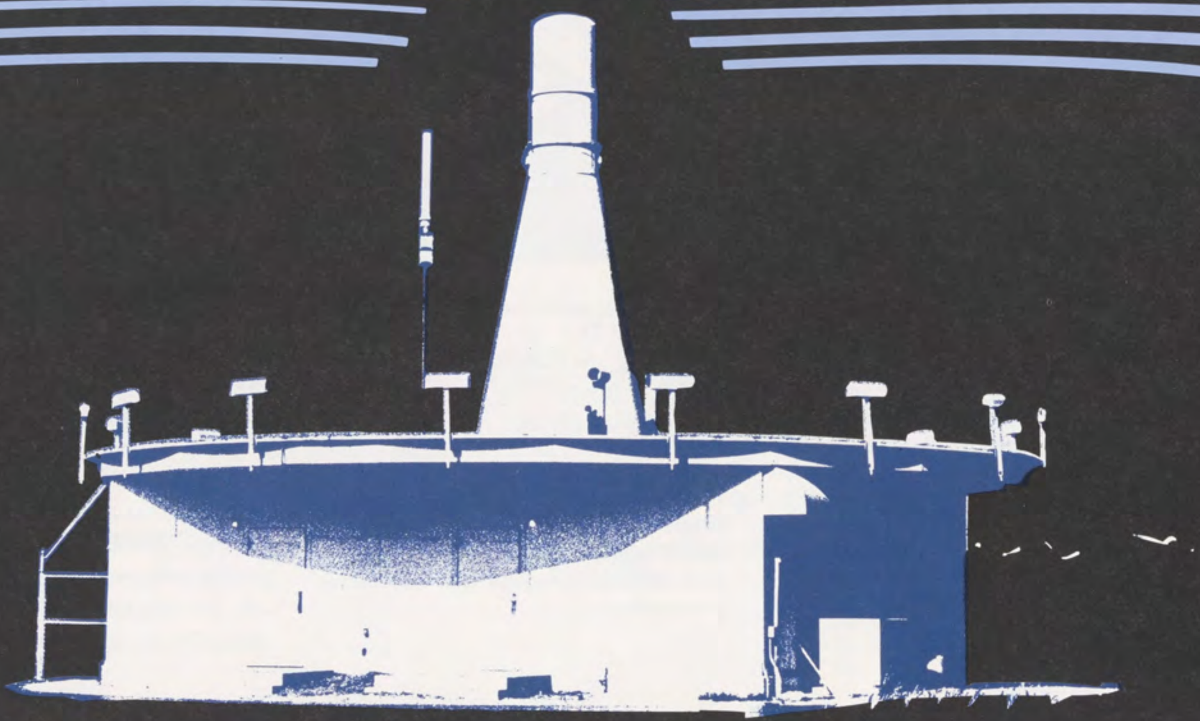

## Research Highlights

The agency is getting double duty out of that "flagpole sitter" up there. It's the FAA Technical Center's portable siting antenna atop a 100-foot tower at Ft. Lawton, Wash., near Seattle.

A part of an air traffic control radar beacon system capable of providing both narrow- and broad-band information, the antenna was loaned to the Seattle ARTCC while its own antenna was being overhauled. Radar beacon data was microwaved from the radar site to the center for about a week and a half.

The portable system was developed to determine the suitability of proposed radar beacon sites prior to installation by providing information on area antenna coverage and reflection phenomena.

*"FAA's mission is to promote the safe and efficient use of the nation's airspace, facilities and the vehicles that travel the airways. To achieve this objective, we should control but not constrain aviation; we should regulate but not interfere with free enterprise of competitive purpose; and we should recognize that most air travelers do so by means of scheduled air carriers. We have a responsibility to consider their priority but not to the extent that it excludes the single individual from enjoying man's greatest achievement—solo flight. Above all, we must remember that the airspace belongs to the users and not the FAA."*

—J. Lynn Helms

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By James Johnson
The aviation writer for *The Daily Oklahoman* and *The Oklahoma City Times*, his articles have previously appeared in FAA WORLD.

# The Mountain Comes to the Sector

## Technicians Learn About Solid-State and Remote Monitoring

An old VORTAC. All of the tube-type monitoring equipment in both the left and right equipment racks are contained behind the blank panel in the top section of the solid-state TACAN rack, at left in the photo at the right.

Electronics technicians are leaving the FAA Academy these days schooled in a new technology and anxious to move into the 21st Century.

They are the vanguard of technicians undergoing solid-state and microprocessor-controlled equipment training in preparation for the replacement of the agency's VORTAC-VOR/DME and VOR navigation aids over the next several years—vacuum-tube equipment that dates back many decades.

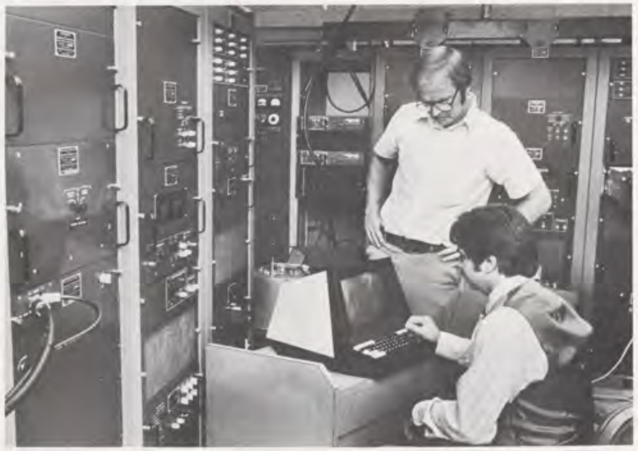
Changes in how things are done are often traumatic, and there were fears in the planning stages of this changeover that up to 40 percent of the students would be hostile to the transitional training or at least apathetic.

"It surprised me," said Kenneth C. Buikema, supervisor of the Navaid and Communications Section of the academy's Airway Facilities Branch. "We've had a high degree of acceptance. The students recognize that they are getting in step with the rest of the outside world, where electronics long has been into solid-state electronics and microprocessors. They're pleased to be expanding their individual knowledge and anxious to get on with bigger and better things."

Many of the first students were academy instructors who would later be teaching the course. Classes now generally are filled with facility technicians who will be working with the new equipment as it is installed.

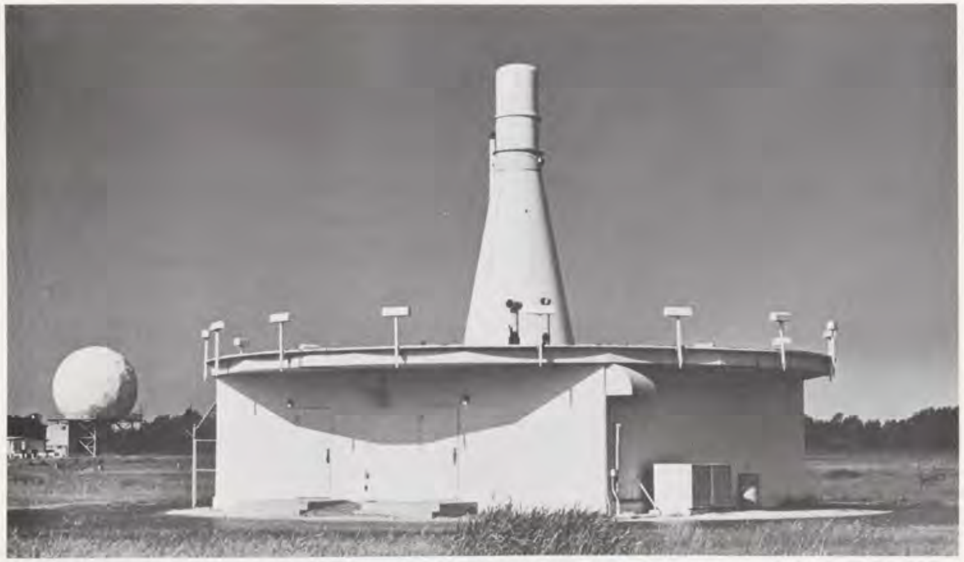
The first solid-state VORTAC was established at the Aeronautical Center five months ago to be used in instruction. It will remain at the academy after the present training effort ends, said Johnie Withers, manager of the academy's Airway Facilities Branch.

"We are going to keep a training capability at the academy," he said, "but it's possible some of the other equipment not set up as complete units will be taken out later." He was referring to the two additional VORTACs and one VOR/DME that were set up for laboratory training.



Photos by Paul B. Southerland

Academy instructor Don Torchio shows student/technician Larry Himli of Eau Claire, Wis., how to verify system performance after making repairs at the VORTAC site. The left rack in front of Torchio is the TACAN, the center is the power supply and control and the right rack is the VOR equipment.



The only discernible difference between this solid-state VORTAC at the Aeronautical Center and earlier VORTACs are the built-in ground check detectors around the edge of the building's roof.

The initial courses to train 160 experienced technicians—16 every four weeks and four days through October—was developed and taught by ITT Avionics and Wilcox Electric—A Joint Venture, the contractors producing the new VORTACs.

The FAA Academy began its own course of instruction on August 26. FAA field offices have requested training for 400 technicians in Fiscal Year 1983, in addition to those trained by the contractors. This high level of training should continue through 1984.

"I've had four or five people at work for over a year setting up this course," Withers pointed out. "The technical content is the same as the contractors', but the methodology is changed. We're doing it the FAA way. The contractors use a straight lecture and laboratory approach. In addition to that, we do on-the-job training and will use computer-based instruction."

Instructors on the scene say the academy-devised course also can be adjusted to suit differences among students, such as needing more or less instruction in certain phases.

The first 834 VORs, VOR/DMEs and VORTACs are planned to be installed by the contractors under the eyes of FAA technical representatives. Another 116 will be installed by FAA crews. The plan calls for checkerboard replacement of the old equipment one

### What's a VORTAC?

A VORTAC is composed of a very-high-frequency omnirange (VOR) system and a tactical air navigation (TACAN) system.

The VOR provides directional information to aircraft equipped with standard navigation radios and is primarily used by civil aircraft.

The TACAN provides both directional and distance information to those aircraft that are equipped with a TACAN transponder or distance measuring equipment (DME). The directional portion is used by the military, while the distance information is used by both military and civil aircraft.

After making a fault diagnosis, instructor Don Torchio shows student/technician Bob Teseny, Enfield, Conn., the simplicity of unplugging a defective circuit board in the goniometer drawer of a VOR unit.

by one to cause the least disruption of service. In addition, the main monitoring sites—303 flight service stations—will be receiving RMCF (remote monitor and control—FSS) voice and data distribution centers with video terminals and printers.

"It's really just the beginning of a new generation of solid-state equipment," Withers said. "It will be with us for 20 to 30 years. We think it's a very good system, with reliable equipment, that will require less-constant attention from our technicians."

Not only less-constant attention but also less time-consuming attention through the means of remote maintenance monitoring and control capability.

What this means can be seen through the eyes of student Billy Douglas. For 15 years an electronics technician in the El Paso, Tex., Airway Facilities Sector Office, Douglas said that from a student viewpoint, the training has been rigorous but interesting. "It's a new concept for all of us, and it's a little hard for all of us to get. But we are getting into the area of microprocessors and small computers, where electronics has been going all along."

Douglas' co-workers in the sector often range 150 miles from the office into Texas and New Mexico over little-used byways to inspect equipment that may not need immediate attention—despite bad weather, cantankerous snakes or, in some sectors, touchy moonshiners.

Douglas himself daily drives 10 miles to Mount Franklin, then takes a cable car to its 7,200-foot summit to check or adjust a variety of communications, navigation or air traffic control equipment.

The remote maintenance and monitoring-and-control features to which he referred will help reduce the technicians' time spent in travel and the number of fruitless visits to remote sites. Through the new technology, equipment can be monitored at long distances and even adjusted remotely.

It's light years away from what the system is replacing, says Buikema of Navaids and Communications. "Some of our VORs were installed in the late 1930s and early 1940s and the TACANs mostly in the early 1960s. All that equipment uses vacuum tubes, and such old-technology replacement parts are becoming harder to find.

A microprocesser integrated-circuit module containing a large silicon chip is compared to the size of a dime. The circuitry in the chip is perhaps equivalent to that found in about 50 TV sets.

"The heat generated by vacuum tubes degenerates them and is a major cause for tube replacement," Buikema went on. "With the new VORTACs, heat essentially won't be a factor."

Solid state refers to transistors instead of vacuum tubes, which are valves for the passage of electricity. Transistors may be discrete items wired into a circuit, or there may be hundreds or thousands on a one-eighth- to one-half-inch "chip" of material like silicon that are represented merely by chemical differences in its surface. This is called a microcircuit or integrated-circuit chip.

Academy instructor Don Torchio explained the differences from another vantage point. "Changing from teaching about vacuum tubes to teaching about solid-state electronics also means we have to change our approach to teaching. Instead of doing circuit analysis, students have to learn to follow signal flow through the equipment. Where we used to analyze voltage levels, with the new technology, we no longer have to do that.

"We already have remote monitoring of communications equipment," Torchio continued, "but microprocessing, made possible by integrated circuits, isn't something everyone in the FAA is familiar with. The system has great capabilities, and I think it's a welcome change myself."

Student Larry Himli plugs into the VORTAC's power supply as instructor Don Torchio demonstrates the use of a multimeter in checking the equipment's internal voltages.

El Paso's Douglas said he looks forward to the prospect of remote troubleshooting and the immense reduction it will make in his travels.

But he also voiced an apprehension he shares with other student technicians that automation "may cut down on some manpower."

However, in preparation for the transition for the past five years, the FAA regions have adjusted their technical staffs already and made plans for retraining technicians or for reductions through attrition.

"It makes you realize that things aren't static," Buikema noted. "It may move workers into an automation system, but in the future, the same technicians will be covering more equipment at more locations. As more National Airspace facilities are installed around the country, for example, the technician will have less time to devote to any single piece of equipment.

"They'll have to be better informed about the equipment as well as know how to use computers. Instead of spending a lot of time on site working his or her way through a complicated circuit to locate the source of a problem, the new generation technician will diagnose such problems with the aid of a computer.

"The computer may be capable of doing some analysis," Buikema said. "The technician will be able to ask the computer to identify the problem

A remote monitoring video terminal (at right in photo below) sits in the San Antonio, Tex., Flight Service Station, where a technician could service and certify a VORTAC miles away. In the FSS's equipment room (right photo) stands an RMCF voice and data distribution center that links the VORTAC and en route computers and lets computers talk to each other.

area or to confirm his own suspicion. Then, defects can be repaired by replacing a plug-in circuit board or individual microcircuits. The old modules could be disposable or may be repaired later in a central repair facility located at the sector office or elsewhere.

"But," Buikema added, "you can't just push a button that says 'Something is wrong. What is it?' Rational thinking, or systems analysis, is necessary and will continue to be so. This is the message we're giving the students all the way through this course." ■

## A City's Gratitude

The Oklahoma City Chamber of Commerce passed a resolution this past spring saluting local air traffic controllers, supervisors, other members of the facility staff, electronics technicians and flight service station personnel for staying at their posts following last year's controller strike.

Noting that 20 controllers remained at the Oklahoma City (Will Rogers) Tower and 12 at the Wiley Post Tower, that some took critical temporary assignments out of state and that temporary tower services continued to be provided at Westheimer Airport for the Oklahoma University football season, the chamber said the controllers exemplified courtesy, teamwork and interest in the pilots and crews.

Shown at the presentation ceremony are (from the left) Dean Schirf, director of government relations, C of C; Leroy Hansen, Oklahoma City Director of Airports; Ted Foster, chairman of the Aviation Committee, C of C; ATCS Ray Leonard, Wiley Post Tower; ATCS Roy Womack, Will Rogers Tower; ATCS Dick Willman, FSS; and electronics technician Ron Staley.




# Federal Employees

# Know the Rules On Political Activity

**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 represent a political party

**You may** contribute money to a political organization or attend a political fundraising 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

on
the
job

# The Scottsdale GADO

Arizona is one of the fastest growing states in the nation, but it still has plenty of wide open spaces, including one known as the Grand Canyon. It's not too surprising, then, that the Scottsdale General Aviation District Office is the only one in the state.

This GADO covers more than 113,400 square miles, ranging in environment from alpine in the San Francisco Mountains to the Sonora Desert in the south. At last count, there were some 6,000 aircraft of all types registered with the State Aeronautics Commission, along with 14,230 pilots and 1,200 flight instructors working out of more than 200 public airports.

The 19 people staffing the Scottsdale GADO are responsible for surveillance over six commuter air-carriers, 71 on-demand air taxis, 83 repair stations, 75 agricultural aircraft operators, 21 pilot schools and 14 external-load operators. Supplementing the GADO's complement are 200 authorized inspectors, 50 pilot examiners and 10 written test examiners.


John Noel, principal maintenance inspector, looks over an amphibian winter visitor from the other end of the country.

Principal operations inspector John Lynch fields a phone inquiry to the GADO about helicopters.

Checking over some administrative reports is Norma Milinski, acting supervisory aviation safety assistant.



Arrayed before GADO manager Eldon Gubler for a Monday morning staff meeting are (from the left) Lorene Schwab, secretary; Don Judd, accident prevention specialist; Len Levandowski, Operations Unit supervisor; and Ken Meyer, Maintenance Unit supervisor.

Larry Kephart, resident engineer, is the Engineering Manufacturing District Office inspector, also at the GADO.

Accident prevention specialist Don Judd reviews one of the many slide-tape programs available for safety clinics.

Vivian Fresquez, aviation clerk.

Principal maintenance inspector Lonnie Giles boards a Beech King Air twin for a ramp inspection.

Photos by Jim Polhamus
Principal Avionics Inspector

# Q&A

The previous administrator advocated that FAA employees who are directly associated with aviation activities should have pilot licenses. He believed that individuals who set aviation policies, control air traffic or maintain the necessary equipment would perform their jobs better and set more realistic policies if they themselves lived by those policies and used the airways.

With his personal encouragement, I and many others here in FAA headquarters took it upon ourselves to obtain pilot licenses. Now that I am ready to take my biennial physical for currency, I find that the headquarters clinic no longer performs this physical. Why has this been changed? In view of the purpose of these licenses, is the policy truly beneficial on a cost-benefit basis?

A Notice (WA 3940.1) has been circulated explaining the change of the headquarters clinic to a first-aid station. The clinic has been closed and the physial examination program discontinued because of the tightening budget. Examinations for employees who are required to undergo an annual examination as a job requirement, such as agency pilots, are being arranged for with local physicians or the assistant regional flight surgeon at the Washington ARTCC. As much as the program you described may be desirable, there simply aren't the funds in the medical program to pay for other than required physical exams.

Services that will continue to be offered are first aid, emergency treatment, allergy shots, blood pressure checks, visual acuity tests for drivers' licenses, emergency electro-cardiograms and travel immunizations.

I am a controller at a Level II radar facility and completed nonradar Academy training in 1973. I was taught that a systems error occurs when conflicting altitudes have been assigned to aircraft traveling opposite courses and there is less than 10 minutes until they are estimated to pass each other (Handbook 7110.65, Para. 272). When discussing these examples with my supervisors, the chief and people in the Air Traffic Evaluation Branch, I was told that a systems error does not occur until the aircraft are actually less than 1,000 feet apart vertically. I am an OJT instructor for a developmental and would like to have this matter cleared up.

In one example, aircraft "A" is eastbound at 35,000 feet and aircraft "B" is westbound at 6,000 feet. They are estimated to pass at 1400Z. At 1351Z, "A" is told to descend and maintain 5,000 feet. Does a systems error occur at 1351Z or when and if the two reach less than 1,000 feet of vertical separation?

In a second example, an airport is 20 miles north of another. Aircraft are cleared to take off to 35,000 feet south and northbound, respectively, at the same time. Based on their airspeeds, less than 10 minutes flying time separates the two aircraft. Although the aircraft are not yet off the ground, has a systems error occurred?

Also, when issuing a VFR-on-top clearance, must you comply with minimum enroute altitudes of routes that the aircraft will follow or overfly? What is the minimum altitude that can be assigned in an IFR-VFR-on-top clearance?

In example one, an error would occur only at the time the aircraft actually have less than 1,000 feet of separation below 29,000 feet. The Facility Operation and Administration Handbook (7210.3F), Para. 501.e., provides the definition of an operational error as "'an occurrence which results in less than the applicable separation minima between two or more aircraft." The Air Traffic Control Handbook (7110.65B), Para. 272, contains the appropriate separation minima.

In example two, an error would not occur until both aircraft departed the respective airports and actually had less than 1,000 feet of vertical separation.

Regarding VFR-on-top, a controller does not assign an altitude. FAR 91.109 requires a pilot to comply with the "appropriate altitude for direction of flight." FAR 91.119 requires a pilot operating in accordance with an IFR clearance to remain at or above the minimum enroute altitude or minimum obstruction-clearance altitude.



By George Burlage
The public affairs officer in the Southwest Region, he is a former career Marine and combat correspondent who was widely published.

# He Boats to Work

Bob Payne, an electronics technician at the Lakefront, La., AF Sector Field Office, drives a boat to work daily.

You expect many FAAers to fly on the job as pilots, check pilots or for flight inspection, but Bob Payne is "chief pilot" for the "FAA navy" in New Orleans—he drives a boat.

An electronics technician, Payne has been taking a boat to work for seven years to maintain a VORTAC located six miles out on Lake Pontchartrain. The VORTAC, a navigational aid that provides directional and distance information to pilots, is vital to the en route and terminal approach systems for the area.

The Pontchartrain VORTAC was installed in 1958, and the FAA purchased a 38-foot, steel-hulled, twin-engine boat to transport technicians and equipment to the site. Anticipating an obvious question, Payne says, "People don't understand why we need such a big boat, but, you know, with a good wind, this old lake gets pretty rough. It's almost hazardous duty," he added with a smile. In fact, safety concerns led to a policy that requires the technicians to traverse the lake in pairs.

The boat, appropriately named "VORTAC," cost $19,000, but it would cost about $125,000 to replace today. When it began to show its age around the beginning of 1980, the agency invested in new engines rather than a new boat.

The VORTAC itself is a combination of old and new, with tube-type components dating back to 1941 visible among the fully digitized solid-state parts. Payne keeps the system going, and on the infrequent occasions when something does go wrong, the FAA hears about it in a hurry. "We also hear about it when the floodlights illuminating the cone go out," Payne said, chuckling. "Those old fishermen call us up right away."

But the days of regular lake crossings and perhaps even of the boat may be numbered. With the VORTAC replacement program underway that will convert all of these facilities to solid-state and with the advent of remote maintenance monitoring, the Lake Pontchartrain VORTAC will almost take care of itself one day.

Almost but not quite. When the new equipment begins arriving in November 1983, according to Airway Facilities Sector Manager Daniel Gardner, in addition to occasional service calls, there will still be a need to batten the hatches in hurricane weather and fuel the generator.

Whether the "VORTAC" will still ply the waters is an open question. ■

The "VORTAC" at the VORTAC. Payne runs a taut ship, judging by the neatly coiled line on the foredeck.

# People

## Alaskan Region

■ **Donald G. Halloway,** chief of the Accounting Operations Branch, Financial Management Division, from the Planning and Programming Branch, Airports Division.

## Central Region

■ **Ricky W. Baird,** team supervisor at the St. Louis, Mo., Tower.

■ **Bernard P. Lockert,** chief of the Lincoln, Neb., General Aviation District Office, from the Rapid City, S. Dak., Flight Standards District Office.

■ **Patrick J. Mergen,** chief of the Fairfax Tower in Kansas City, Kan., from the Kansas City, Mo., Downtown Tower.

## Eastern Region

■ **Charlie N. Dudley,** data systems officer at the Baltimore, Md., Tower.

■ **George H. Endres,** watch supervisor at the New York TRACON Airway Facilities Sector.

■ **Robert P. Fishman,** deputy chief of the Teterboro, N.J., Flight Service Station, from the Millville, N.J., FSS.

■ **Burton L. Gifford,** chief of the Procedures Section, Airspace & Procedures Branch, Air Traffic Division, from the Operations Branch.

■ **Jamison Hurst, Jr.,** chief of the Buffalo, N.Y., Tower, from the Washington National Tower.

■ **Henry J. Lengel,** team supervisor at the Allentown, Pa., Tower.

■ **Henry L. Lewis,** proficiency development and evaluation officer at the Charleston, W. Va., Airway Facilities Sector.

■ **Richard C. Worrell,** systems performance officer at the New York ARTCC.

## Great Lakes Region

■ **Robert L. Altizer,** area officer at the Indianapolis, Ind., ARTCC, from the Air Traffic Operations Branch, Air Traffic Division.

■ **Pamela J. Batson,** team supervisor at the Saginaw, Mich., Flight Service Station, from the Wausau, Wis., FSS.

■ **Jay A. Baumann,** team supervisor at the West Chicago, Ill., Flight Service Station, from the Regional Communications Control Center.

■ **Raymond F. Bean, Jr.,** team supervisor at the Indianapolis Tower, from the Muncie, Ind., Tower.

■ **Theodore R. Brown,** chief of the East St. Louis, Ill., Tower, from the West Lafayette, Ind., Tower.

■ **William H. Conn,** team supervisor at the Indianapolis Tower.

■ **George H. Gunter,** supervisor of the En Route Flight Service Section, Air Traffic Operations Branch, Air Traffic Division, from the Chicago ARTCC.

■ **William B. Jones,** deputy chief of the Indianapolis Flight Service Station, from the Washington headquarters FSS Procedures Branch, Procedures Division, Air Traffic Service.

■ **William W. Kribble, Jr.,** chief of the Meigs Field Tower, Chicago, from the Flint, Mich., Tower.

■ **David M. Phillips,** team supervisor at the Milwaukee, Wis., Flight Service Station, from the West Chicago, Ill., FSS.

■ **Rae A. Seacrist,** team supervisor at Flying Cloud Airport Tower, Minneapolis, Minn., promotion made permanent.

■ **Frederick P. Walters,** assistant manager of the Cleveland, Ohio, ARTCC Airway Facilities Sector, from the Indianapolis ARTCC AF Sector.

## New England Region

■ **Robert W. Nichols,** chief of the New Haven, Conn., Tower, from the Lawrence, Mass., Tower.

■ **Anthony P. Torchia,** chief of the Brainard Tower, Hartford, Conn., from the New Haven Tower.

## Northwest Mountain Region

■ **Howard A. Frey,** unit supervisor in the NADIN (National Airspace Data Interchange Network) Airway Facilities Sector Field Office in Salt Lake City, Utah.

■ **Alvin L. Johnson,** team supervisor at the Denver, Colo., Flight Service Station, from the Rawlins, Wyo., FSS.

■ **Ray S. Lansbery,** area officer at the Denver ARTCC, from the Albuquerque, N.M., ARTCC.

■ **Brendan M. Moriarty,** program support officer at the Seattle, Wash., Airway Facilities Sector, from the Maintenance Operations Branch, Airway Facilities Division.

■ **Fred M. Paulson, Jr.,** team supervisor at the Salt Lake City ARTCC, from the Air Traffic Branch, FAA Academy.

■ **Charles A. Sears,** chief of the Portland, Ore., Tower, from the Central Region's Operations, Procedures & Airspace Branch, Air Traffic Division.

■ **Robert R. Svee,** systems performance officer at the Seattle ARTCC Airway Facilities Sector, from the Salt Lake City ARTCC AF Sector.



■ **Bette L. Vanmanen,** team supervisor at the Denver Flight Service Station, from the Cutbank, Mont., FSS.

## Southern Region

■ **Bob Bell,** chief of the Greer, S.C., Flight Service Station, from the FSS Procedures Branch, Procedures Division of the Washington headquarters Air Traffic Service.

■ **Earl R. Bonacker,** team supervisor at the San Juan, Puerto Rico, Center/RAPCON, from the Cleveland, Ohio, ARTCC.

■ **Richard L. Brewer,** team supervisor at the Jackson, Miss., Tower, promotion made permanent.

■ **Horace L. Cawthon,** systems engineer at the Atlanta, Ga., ARTCC Airway Facilities Sector.

■ **William E. Chase,** program support officer in the Covington, Ky., Airway Facilities Sector, from the St. Croix, Virgin Islands, Airway Facilities Sector Field Office, San Juan AF Sector.

■ **Manuel Hernandez,** chief of the St. Croix Airway Facilities Sector Field Office, from the Kodiak, Alaska, AF Sector Field Office, Anchorage AF Sector.

■ **Peter Jackson,** chief of the Kinston, N.C., Tower from the Macon, Ga., Tower.

■ **Clarence K. Moore,** team supervisor at the Lexington, Ky., Tower, promotion made permanent.

■ **John F. Tubbs,** deputy chief of the Jacksonville, Fla., Tower, from the Charleston, S.C., Tower.

## Southwest Region

■ **Ronald P. Aikens,** chief of the Brownsville, Tex., Tower.

■ **Eugene C. Higgins,** chief of the San Antonio, Tex., Flight Service Station, from the FSS Procedures Branch, Procedures Division of the Washington headquarters Air Traffic Service.

■ **George W. House,** chief of the Dallas-Fort Worth, Tex., Air Carrier District Office, from the Tulsa, Okla., Flight Standards District Office.

■ **James D. Howden,** chief of the Albuquerque, N.M., ARTCC, from the Houston, Tex., ARTCC.

■ **Robert J. McCormick,** team supervisor at the Love Field Tower in Dallas, Tex., from the Tulsa Tower.

■ **Martin Reyes,** chief of the Albuquerque Airway Facilities Sector Field Office.

■ **Michael R. Thompson,** deputy chief of the Houston ARTCC.

■ **Marion L. Ward,** deputy chief of the Fort Worth Flight Service Station, from the Air Traffic Operations Branch.

## Technical Center

■ **Francis A. Bakos,** chief of the Terminal Field Support Section, National Automation Support Branch, ATC Automation Division, promotion made permanent.

■ **Stephen W. Devlin,** chief of the Terminal Baseline/Design Section, National Program Maintenance Branch, ATC Automation Division, promotion made permanent.

■ **Maurice A. Neff,** chief of the Terminal Production Section, National Program Maintenance Branch, ATC Automation Division, promotion made permanent.

## Washington Headquarters

■ **John W. Baier,** assistant chief of the Airspace and Air Traffic Rules Division, Air Traffic Service, former chief of the Procedures Division.

■ **Karl D. Trautman,** chief of the Special Projects Staff, Air Traffic Service, from the En Route Procedures Branch, Procedures Division.

## Western-Pacific Region

■ **Angel Cervantes,** chief of the Prescott, Ariz., Flight Service Station, from the Salinas, Calif., FSS.

■ **La Verne M. Evans,** team supervisor at the Chino, Calif., Tower.

■ **Ronald R. Hayes,** team supervisor at the Coast TRACON at the Marine Corps Air Station, El Toro, Calif., from the Edwards AFB, Calif., RAPCON.

■ **Robert F. Hoffsetz, Jr.,** team supervisor at the Reno, Nev., Tower.

■ **Russell W. Kelsey,** section chief in the Air Traffic Operations Branch, Air Traffic Division, from the Edwards AFB RAPCON.

■ **Jon K. Miller,** assistant chief at the Las Vegas, Nev., Flight Service Station, from the Imperial, Calif., FSS.

■ **Joseph H. Parker,** team supervisor at the Ontario, Calif., Tower, from the Santa Rosa, Calif., Tower.

■ **Valentine J. Pisarski,** assistant chief at the Reno Flight Service Station, from the Los Angeles FSS.

■ **Gerald W. Ryser,** team supervisor at the North Las Vegas Tower, from the Las Vegas Tower.

■ **Ollie L. Spires,** deputy chief of the Edwards AFB RAPCON.

■ **Joan B. Thompson,** assistant chief at the Lancaster, Calif., Flight Service Station, from the Honolulu, Hawaii, FSS.

■ **Larry E. Wright,** team supervisor at the Hayward, Calif., Tower, from the San Francisco Tower.

By James H. Hamersley

A former Air New England captain, he has flown for Mohawk, Overseas National and commuter airlines and has written for magazines previously.

# The Ordeal of Flight 639

## Pilots Commended

For their consummate skill in landing their crippled airliner, Capt. Stan Bernstein and First Officer Tom Doherty were presented with the Daedalian Civilian Air Safety Award on June 5 by FAA Administrator J. Lynn Helms.

The trophy and award are presented annually to the pilot or crew of a certificated U.S. airline adjudged by an FAA committee to have demonstrated ability, judgment and heroism above and beyond normal operational requirements.

The Order of Daedalians is a fraternity of military pilots who were commissioned before Nov. 12, 1918, their descendants and the designates of such pilots. This award is one of 11 given annually and is the only civilian one.

It was First Officer Tom Doherty's turn to fly since Capt. Stan Bernstein had flown the leg into Waterville, Maine, the night before. Doherty advanced the power levers of the de Havilland Twin Otter, and the small airliner accelerated swiftly. At flying speed, he eased back on the control wheel. Air New England Flight 639 was airborne with seven passengers shortly after 9:00 a.m. last May 12.

As the Twin Otter climbed into a low overcast, Doherty quickly found himself flying by the gauges. A spring storm was advancing slowly from mountainous central New England toward the coast, bringing drizzle, fog and low ceilings. Awaiting the improved visibility required for takeoff, Flight 639 had been on the ground at Waterville for over an hour past its scheduled departure time. At Augusta, Maine, a scheduled stop 15 miles southwest of Waterville, the airport remained socked in, so Bernstein decided to overfly and head for Boston, the final destination of Flight 639.

Takeoff and initial climb were routine. But as the plane climbed through 2,000 feet, there was a loud bang, and Doherty immediately felt a strong vibration in the controls. He would later describe the sensation as being "like hanging on to a jackhammer." Concurrently, the plane began to oscillate about 30 degrees up and down, and the airframe vibrated so badly that the only readable instruments—barely so—were the artificial horizon and the airspeed indicator. Bernstein instinctively grabbed the controls. As he hung on, the band of his Rolex vibrated open, and the watch dangled uselessly from his wrist.

The captain's first thought was that one of the propeller blades had broken off. He told Doherty to glance back at the right engine while he scrutinized the left side. The prop and inboard nacelle areas were plainly visible from the cockpit, but neither pilot could see anything wrong. As a further engine check, Bernstein carefully eased the power levers back to idle on each engine, but the vibration continued.

The pilots were quite naturally alarmed, but most of all they were puzzled. Each had substantial experience in the Twin Otter, yet neither could recall a similar situation. It was apparent, however, that the plane couldn't fly for much longer in its current condition. Bernstein remembers thinking to himself, "I'm not going to let this bucket of bolts take me into the ground."

In the passenger compartment, a rather tense calm prevailed. Scottie Higgins, an educational consultant who frequently flew on Air New England, commented afterwards, "Initially, passengers assumed that the roughness stemmed from air turbulence. But the plane was shaking and sliding from side to side as well as going up and down, and you could tell it was not under control. We really knew something was wrong when the pilots announced we'd be landing in Bangor [Maine]." Serviceman Howard Downs, on his very first flight, said later that he "felt like screaming."

In the few minutes it had taken to try to isolate the problem, the crew noticed that the plane had climbed all by itself from 2,000 to 4,000 feet. To neutralize any pressure that might be on the controls, Bernstein rolled in forward elevator trim and was astonished to find that it had no effect. He also noticed that it took more and more forward pressure on the yoke just to keep the plane level.

Administrator J. Lynn Helms is flanked by First Officer Tom Doherty (left) and Capt. Stan Bernstein of Air New England at the presentation of the Daedalian Civilian Air Safety Award and Trophy.

The crew now guessed correctly that something was drastically amiss with the Twin Otter's elevators, but they wouldn't know the scope of the damage until later. A bolt connecting both elevators and attaching them to a long control rod that is fastened to the cockpit yoke had failed. The left elevator was bending the control rod so much that increasing pressure on the yoke was needed just to keep the plane level, as Bernstein was learning.

Additionally, the elevator trim tab had broken away from its control rod, which is why the captain had found the elevator trim ineffective. During the subsequent investigation, a National Transportation Safety Board inspector chillingly estimated that in about another five minutes Flight 639 would have experienced total elevator failure.

Early on, Doherty alerted Portland Approach Control to Flight 639's predicament and had asked for the latest weather sequences for nearby airports. On the company frequency, the crew learned that conditions at Waterville hadn't improved, so returning there was out of the question. Sensing the urgency, Portland quickly advised Flight 639 that only at Bangor, some 17 miles northwest of their position, were weather conditions suitable for an approach. Bernstein requested radar vectors to get there as soon as possible. As an afterthought, he instructed the first officer to declare an emergency.

Bernstein gingerly banked the Twin Otter towards Bangor. After only a few moments on the new heading, the yoke was hard against the instrument panel. There was no more forward elevator! Bernstein remem-

*This article is reprinted with permission from the May 1982 issue of* Air Line Pilot

bers, "Suddenly the plane pitched almost straight upwards. The only thing I could think of doing was to bring the power levers back to the stops and pray for positive results. It seemed like an eternity until the nose finally came down. Frankly, I've never been so scared in my life. It was our worst moment."

Innovating, with precious little margin for error, Bernstein was writing the book on flying the stricken airplane. He found that an approximation of level flight attitude could be maintained by alternating power: increasing power to raise the pitch and reducing power to lower it. Even so, it had become impossible to hold altitude. The decision to descend was pretty much forced upon him. Knowing little of the terrain below except that it was forested and hilly, he could only hope for the best.

As the plane started down, all that could be seen outside was ". . . an eerie, wet gray and rivulets of water streaking the windshield." Bernstein's artificial horizon had succumbed to the vibration soon after it began, forcing him to look across the panel to the first officer's instrument. But a few moments into the descent, Doherty's instrument also failed. Bernstein now had to make do with sketchy glimpses of the airspeed and turn and bank indicators. Fully expecting to slam into trees, he tried to maintain a landing attitude and slow airspeed.

Because the noise in Twin Otter cockpits makes conversation difficult, Air New England equipped its aircraft with an intercom that worked through the headsets. Suddenly, the crew realized it wasn't working. Doherty noticed that the twin master switches that control the radio had vibrated to "off." He held them on with his hand for the remainder of the flight.

As the plane got lower, they strained to see something outside. The first ground contact came at about 150 feet when Bernstein saw a tree go by the left wing. When they broke out they could see they were over forested terrain. The crew felt a wave of relief. For the first time, they dared to think they might get the plane and its occupants down safely. Bernstein says, "I no longer had to rely on instrumentation in the cockpit. Now I could devote my attention to finding a place to land. We went from the darkest of dark ages to the simple dark ages."

Searching for a place to land, Bernstein made a series of shallow turns and continued the rhythmic push on the throttle. He recalls, "Our tail was in the clouds and the wheels appeared to be touching the treetops. Our flight path must have resembled a yo-yo."

He spotted a pond and briefly considered a water landing until remembering two elderly passengers. Then he saw a field, but wasn't properly positioned for an approach. Quickly, he banked towards it, but the field had vanished in the fog. The pilots estimated the visibility to be about a mile. Bernstein says, "I gave myself a 50–50 chance of refinding the area and decided that if I couldn't, I'd move on and find the best place to set down in the trees."

At the completion of the turn, they found themselves flying between two hills, the tops of which were obscured by the low overcast. Then they saw it again! Appearing from the fog directly in front of them was the field. It was about 600 feet long and plenty wide; the crew agreed it looked better than any airport they had ever seen.

Nearing the end of his strength, Bernstein psyched himself for one last effort. He recalls, "I could see that we'd have to make a straight-in approach to the east over high trees, then drop her in and come to a stop before reaching the road and power lines at the far end." He adds, "I also remember thinking that if this thing goes in nobody will ever know what went wrong and that it wasn't our fault."

The Twin Otter is a STOL (short takeoff and landing) aircraft with one of the best high-lift wings ever devised. But landing in an area that small, especially with a crippled ship, wasn't something covered in Air New England's flight training. Again, writing the book as he went, Bernstein came in low over the trees, told Doherty to select full flaps, and placed the power levers in the beta, or flat-prop, position. Since the Twin Otter aircraft manual cautions that the position is to be used only on the ground for deceleration, he didn't know exactly what effect beta would have, but he hoped it would do no more than create enough drag to minimize the extreme pitch up caused by full flaps.

The gamble paid off. Bernstein says, "We cleared the wires and pitched down, heading for the ground. Lacking elevator control for the flare, I gave the engines full power and the nose came up enough so that when we hit the ground we were in a level attitude. I pulled the props into full reverse and stood on the brakes. We skidded to a stop about 100 feet from the end of the field." It was 9:30—the ordeal of Flight 639 had lasted for almost half an hour.

The tension snapped like a twig in the cabin, and the passengers broke into wild applause. Scottie Higgins recalls that it was one of the smoother landings she had experienced. The old adage of flight—the more firmer, the less terror—never seemed truer to passengers and crew alike, who felt that they had indeed returned unscathed from the brink.

Leaving Doherty to look after the passengers, Bernstein and a volunteer set off for a distant farmhouse. The house was empty, but they found its owner in an adjacent barn. The farmer, totally unaware that anything out of the ordinary had happened, commented that something must have disturbed the cows because they had all moved to one side of the field.

Amazed at the story Bernstein told, the farmer showed him to a phone in the house. Their location, he said was about two miles northeast of Unity, Maine. Stan Bernstein found it humorous, at least in retrospect, that it took several attempts to contact Air New England, where word on Flight 639 was anxiously awaited, because the airline's switchboard at first refused charges. He found it nothing short of miraculous to discover that they had come upon the only sizable field within several square miles. ■

# *Feeling Fit*

**Edited by Henry J. Christiansen**

Is it too hot to trot? Summer isn't quite over and Indian Summer is yet to come, so watch out for hyperthermia, or elevated body temperature; it can be deadly.

Several runners have died as a result of not heeding the body's warning signals and over-extending themselves in hot-weather races. Heat-related injuries can affect any sportsperson in any kind of shape during an everyday workout.

Heat injuries are often divided into two degrees of severity. The first stage is heat exhaustion, in which the athlete may actually collapse because of excessive fluid loss. The symptoms are pale, clammy skin and normal to subnormal skin temperature. The replenishment of body fluids is the recommended treatment.

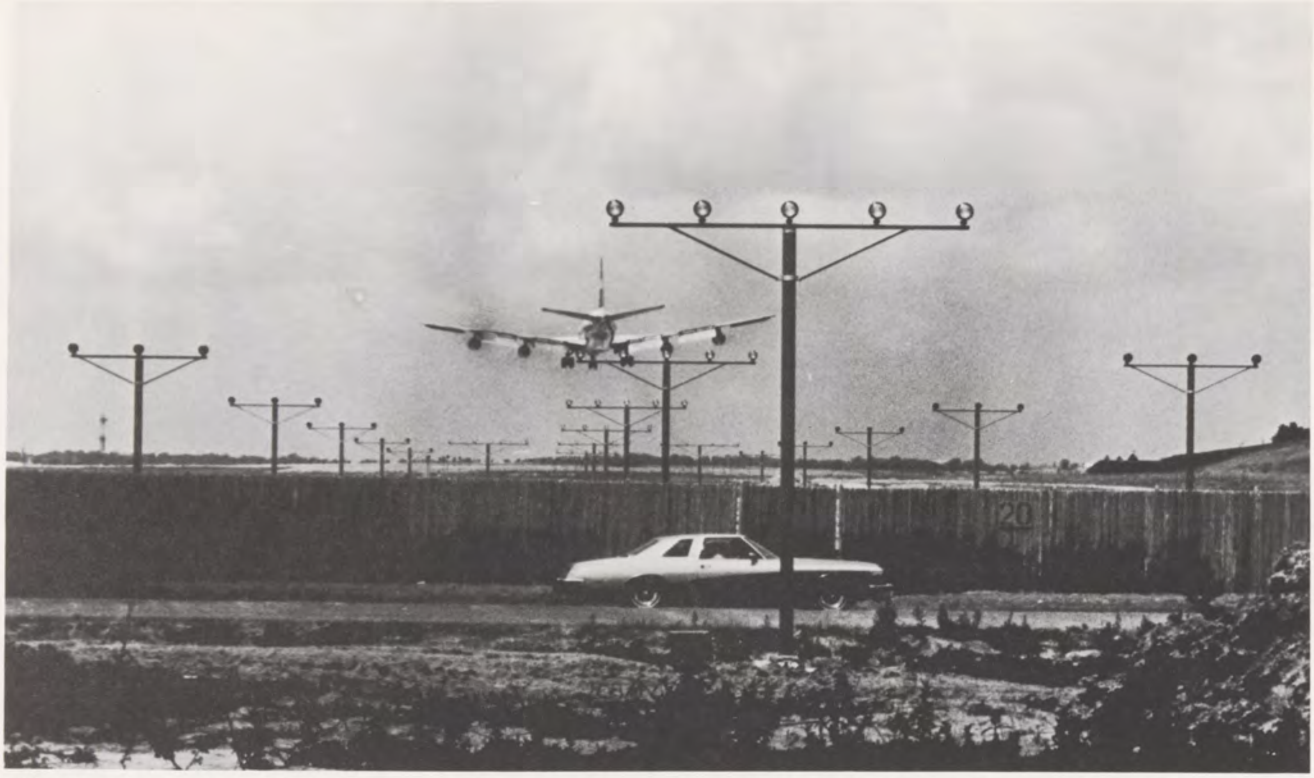
The problem can become life-threatening if it advances to a heat-stroke condition. In this second stage, the skin is dry and red and at an elevated temperature. Other symptoms of impending heat stroke are nausea, dizziness and difficulty in breathing. Speech is likely to be incoherent.

The treatment for heat-stroke victims should be the immediate lowering of the body temperature by immersion in cold water. If this is not done immediately, brain damage or death can result from the elevated body temperature.

Because of the extreme danger from heat stroke, it is important to recognize the symptoms at the onset of heat exhaustion and treat them promptly before it can graduate to the next stage. If you feel any of these symptoms during a workout, don't wait. Try to obtain fluids at once and find a cool, shaded spot to rest.

(Source: *Fitness Over Forty* by Hal Higdon)

*Mr. Christiansen is the Southwest Region's Special Projects Coordinator, as well as an inveterate runner (his third year in the Boston Marathon) and health buff. This column was coordinated with the Regional Air Surgeon.*




This 24-station approach lighting system (ALS) for St. Louis International's Runway 30R is the first high-intensity ALS built on frangible towers. Built for use with Category II and III instrument landing systems, the towers are made of fiberglass to carry the larger diameter lamps. MALSR systems have frangible towers built of aluminum.

Photo courtesy of Jaquith Industries, Syracuse, N.Y.

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