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U.S. Department
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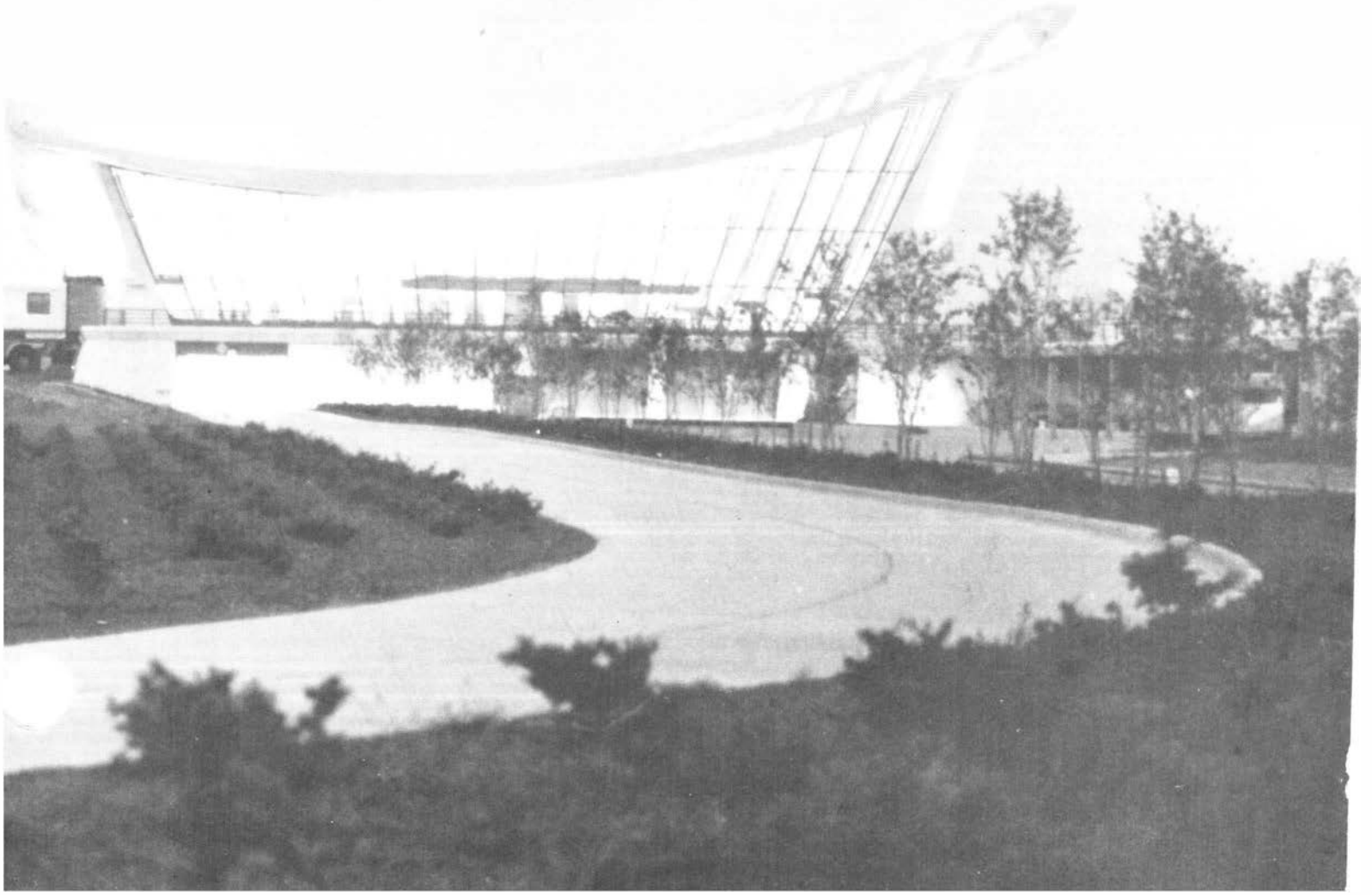
**Federal Aviation
Administration**



DOT Secretary Drew Lewis presents a Special Secretarial Citation to Administrator J. Lynn Helms on behalf of FAA employees. The silver plaque reads, "In recognition of all who participated significantly in the strike recovery effort." Presented at The Secretary's 15th Annual Awards Ceremony in September (see page 8), it marked the first time that a DOT modal agency was so honored.

"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

The cover: Dulles International Airport

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By John G. Leyden
Chief of the Public & Employee Communications Division, Office of Public Affairs, and a former reporter for the *Washington Star*.

We Will Fuel Our Aircraft!

Will It Be Old Fuel or a New Technology Derivative?

Petroleum should be available for aviation fuel at competitive prices for at least 20–30 years and probably 30–50 years.

That's the view of FAA engineer Charles L. Blake, who recently completed a 20-month study of the future civil aviation fuel situation for the agency.

But he cautions people not to be misled by this optimistic projection. It contains a very important qualifier. Blake says that "under stable world economic and political conditions," near-term fuel price increases should be less than two percent above the general inflation rate. In fact, he feels no increase above the general inflation rate is more probable than the two percent figure, given the same assumption of stable economic and political conditions.

The problem, he says, is that international affairs experts are unanimous in predicting that the world situation will *not* remain stable. "One severe fuel disruption is virtually certain within five years, and three such disruptions are expected in any 10-year period."

But there is no unanimity among the experts on the effect of these disruptions, he notes. The more pessimistic among them think the disruptions will be severe and could produce another doubling of oil prices.

To protect against these disruptions, he recommends that U.S. airlines obtain a reliable source of shale oil, pointing to its vast reserves and the fact that it converts into excellent jet fuel. As for general aviation, he suggests it investigate liquid methane (liquified natural gas) as a future alternative to aviation gasoline.

However, Blake points out that developing alternative fuels for use in aviation involves a broad range of problems, which vary with the method under consideration. "In the present world market and far into the future," he says, "alternative fuels and energy sources will be practical only where they can compete in price with petroleum, considering all the capital and recurring costs of extraction, conversion, shipping, storing, handling, using, waste disposal, taxes, regulations and so on."

The demand for aviation fuel will grow more slowly than will air traffic through the 1990s.

In addition, he believes aviation would benefit from some changes in national energy policy, such as "unshackling domestic energy production," particularly natural gas and enhanced oil recovery (EOR).

"The U.S. and individual states should consider whether it makes sense to encourage energy sources which can make only high-priced or limited contributions to the market," he says. "In contrast, domestic resources, such as natural gas and EOR, which could improve the U.S. economy and reduce oil imports, remain heavily burdened with obstacles. If unburdened at various jurisdictional levels, the U.S. and Free World situations could be significantly improved."

An FAA engineer since 1965, when he joined the agency as chief engineer on the supersonic transport development program, Blake began the fuel study in January 1980. The purpose was to evaluate the entire aviation fuel picture and identify areas of action or interest to FAA.

During the course of the study, he reviewed the voluminous literature on the subject and interviewed more than 100 experts in the field. His draft reports subsequently were circulated for comment to approximately 200 organizations and individuals.

Blake expects the demand for aviation fuel will grow more slowly than air traffic through the 1990s due to conservation, improvements in technology and other measures. The present consensus, he says, is for one to two percent annually, as compared with the five percent projection for air traffic.

Nevertheless, he adds, aviation fuel will increase its share of U.S. petroleum consumption above the present six percent figure because of the continued fall off in the demand for automotive fuel. But the gain will not be significant, and the total effect of aviation fuel on the national picture will remain small.

As for fuel prices, he believes they will rise slightly faster than inflatior

due to the increasing resource value of petroleum and higher production costs. However, he noted that "future fuel prices are likely to be determined more by international economics, politics and even military affairs than geology, engineering or production activities."

Blake points out that aviation fuel prices rose more than 1,000 percent in the 1972–1982 period and said that future quantitative increases could be triggered by the same type of events, such as instability or hostilities in oil production areas. Unfortunately, he adds, informed observers believe future turmoil in these areas is a virtual certainty, with the resulting disruptions in oil flow.

But he notes that analysts are split on the effects of the disruptions, with about half believing they will be moderate because of decreased world consumption and increased oil production. The more optimistic analysts look for a resulting price rise in the 10–30 percent range.

The other, pessimistic, half, he continues, anticipate more severe disruptions, essentially equal to cutting off the entire Middle East production. If this happens, the price increase could be another 100 percent or more.

Blake notes that the United States is in a better position from an energy standpoint than most other industrialized western nations because it possesses a vast resource of potential fuels and a variety of options for bringing them to market in different forms. He says the lowest cost U.S. option is shale oil, which, fortunately for aviation, converts into excellent synthetic jet fuel.

According to Blake, the production of shale oil was a thriving business in the United States until the middle of the last century, with 55 plants in operation. Then, in 1859, the first oil well was drilled in Pennsylvania; oil dropped from $60.00 to 10 cents a barrel and the shale plants were out of business.

But he points out that the resources for shale oil have been established with far more certainty than for oil and gas, probably even better than for coal. These resources are sufficient to supply the country's total energy needs for more than 100 years and would last much longer if limited strictly to transportation.

Blake's report doesn't minimize the problems associated with large-scale shale oil production. It says the start-up costs alone will be "staggering." Even so, he adds, "shale oil is conceptually competitive with petroleum at or near today's world marginal price." He noted that a viable shale oil industry in the United States "is still highly probable" and that several producers are proceeding "with the appearance of confidence that they can compete."

A major recommendation in the report is that U.S. airlines protect themselves against future oil disruptions by exploring fixed-floor purchase agreements with producers for a reliable supply of shale oil. It notes that the Department of Defense already has designated shale oil as the alternative fuel for its aviation activities and says the airlines should work closely with DOD on this project.

Charles L. Blake

Turning to aviation gasoline, or avgas, Blake points out that it represents only five percent of the total fuel consumed in aviation. That, in turn, translates to only 0.3 percent of all petroleum used in this country.

He expects the demand for avgas will continue to decline in the coming years as more new aircraft use turbine engines and as new reciprocating or other small engines are developed to operate on jet fuel. Consequently, the avgas market may become so thin in 20 or so years that it will assume the role of a specialty product and be priced accordingly.

Automotive gasoline might offer some relief to general aviation if it were produced to a controlled formula and properly distributed, he says. It could be substituted for the lowest grade of avgas, 80 octane, which is used by about 40 percent of the general aviation fleet. However, it could not be used as a substitute for 100 octane fuel.

(Earlier this year, FAA awarded a supplemental type certificate to the Experimental Aircraft Association for the use of automotive gasoline in certain models of the Cessna 150, which

is one of the most widely used private aircraft in the United States. It marked the first time the agency had approved automotive gasoline for regular use in a production airplane. Its use is restricted to non-commercial activities.)

As 100 octane avgas availability becomes less and prices rise, Blake believes aircraft operators should investigate the alternative of liquid methane or liquid natural gas. Liquid methane presently is being tested in a modified Beech Sundowner with encouraging results. Beech also has a contract with the Army to modify one of its training helicopters for liquid methane use. If successful, the project could lead to a large-scale conversion of the Army's helicopter training fleet.

The major problem with liquid methane is that it's a cryogenic fuel. That means it must be kept below −259 degrees Fahrenheit to remain liquid. That, in turn, involves special handling, shipping and storage problems.

It also means that aircraft would have to be specially designed or modified to use liquid methane. Cryogenic insulation is impractical in most wing tanks so special cylindrical tanks probably would have to be installed in the fuselage. And since the tanks would have to be larger to accommodate the required insulation and to carry the same amount of the low-density liquid methane fuel, the net effect would be to reduce aircraft range.

On the positive side, liquid methane offers distinct operational advantages in that it burns cleaner and develops more energy per pound. Also, its octane equivalent is 120, but it works just as well in 80-octane engines. And it sells for close to one-third the price of avgas.

Blake is not as optimistic about the future of another cryogenic, which often is represented as the ultimate answer to the world's energy problems—that is, liquid hydrogen. He does not see hydrogen as an aviation fuel for perhaps 50 years, noting that production costs are high and unlikely to be reduced drastically by technical improvements.

Aircraft operators should investigate the alternative of liquid methane or liquid natural gas.

He thinks other nations might be more interested than the U.S. in developing hydrogen as an aviation fuel. He notes that they lack the U.S. energy reserves and operate in a different political and economic climate.
end of page 16

For example, he says the use of nuclear power to produce hydrogen might be more feasible politically than it is in the U.S. at the present time. He notes that low-cost electricity may be the most important factor in producing low-cost hydrogen.

But even if hydrogen became extremely cheap and available overnight, he says, aviation still would be faced with the problems associated with the use of cryogenic fuels. He estimates the development of new aircraft for hydrogen fuels would take 10 years or more, whereas modifications of existing aircraft to use hydrogen would be expensive and perhaps impractical.

Also, he notes, any cryogenic fuel introduces the need for liquefaction, supply and reliquefaction of boil off at the airport. At a busy airport like Chicago O'Hare, the liquefaction system is estimated to cost over $1 billion, although some new techniques are under study that could reduce th figure up to 40 percent.

Still, he doesn't deny the attractiveness of hydrogen as an aviation fuel, assuming the major problems can be resolved. For example, it's the only fuel capable of providing an airplane with non-refueled, semi-global range with today's aircraft performance technology. It also burns much more cleanly than jet fuel and could be expected to reduce airline operational and maintenance costs. In addition, hydrogen is universally available and can be produced from water using virtually any source of energy.

Therefore, he recommends that the U.S. follow hydrogen's technical and economic potential very closely. But he does not believe a major effort in this area is warranted at the present time.

Blake's report is entitled "The Impact of Petroleum, Synthetic and Cryogenic Fuels in Civil Aviation." Those wanting additional information may contact Blake in the Office of Environment and Energy at Washingt Headquarters. ■

By Robert Fulton
The public affairs officer of the Eastern Region, he is a former technical information officer and scientific editor for the Office of Naval Research.

New Era for Navaids

The ribbon-cutting ceremony to dedicate the VOR involved (left to right) N. Philadelphia SFO supervisor Don Dunning; Regional Director Joseph Del Balzo; FSS manager Paul Scott; technical representative Bob Berselli; sector manager Bill Baxter; acting manager of the regional Maintenance Operations Branch, Herb Ross; acting assistant manager of the Flight Standards Division, Roland Jenkins; acting division manager, Tim Hartnett; and North Philadelphia Tower manager Joseph Brogan.

The second-generation has arrived, and "It's even better than we thought it would be," said Don Dunning, Airway Facilities Sector Field Office supervisor at the North Philadelphia, Pa., Airport.

He was commenting on FAA's first solid-state VOR, which had its official dedication in a history-making ceremony in September with Eastern Regional Director Joseph M. Del Balzo and regional Air Traffic and Airway Facilities officials.

Originally commissioned on August 3, the North Philadelphia VOR installation is the first operational system completed in FAA's far-reaching program to replace old vacuum-tube-type equipment at 950 locations in the U.S. and its territories with solid-state systems. *(See FAA WORLD, September 1982, p. 4.)*

The new equipment, according to Del Balzo, "will increase reliability for enroute and terminal flight operations. At the same time, the replacement program will result in a savings of more than $500 million over a 20-year lifespan."

Dunning had high praise for the equipment. "I've had the VOR for almost two months, and it hasn't had any real problem at all. Its accuracy is truly amazing." He noted that measurements on the old VOR were accurate to only one-tenth of a degree, but the new equipment can be measured to within one-hundredth of a degree.

The SFO chief also pointed out that technicians' visits and travel time to remote sites were cut dramatically by the remote maintenance and monitoring features of the new equipment. "Before we got it, a ground check might have taken three hours; now we've cut the time to two and a half minutes."

Navaids technician-in-depth Dick John of the Philadelphia Sector, has been deeply involved in the second-generation VOR program. In the event of a failure, he explains, a technician now knows exactly what the problem is and where it is in the equipment before he visits the facility. "The new system," John adds, "will even tell the technician what hardware is needed to correct the problem."

John noted that during the testing and checkout of the equipment, the building air conditioning failed. The equipment continued to operate flawlessly, even though the building's temperature rose to 96 degrees. "That's real reliability," he said.

Bill Baxter, the Philadelphia AF Sector manager, had nothing but praise for the SFO technicians, Facilities & Equipment installation crew and FSS specialists, noting that the education and efforts of all concerned had a significant impact on the smooth installation, tune-up and return to service of the VOR.

"The program is a winner," declared Director Del Balzo, summing up dedication day activities. "What I have witnessed here today in second-generation VOR capability and the enthusiasm expressed by those who use it convinces me that we've seen the introduction of a new technology that will result not only in improved service and safety to the airspace user but also in substantial savings to the American taxpayer." ■

Photos by Robert Fulton

Taming of Unruly Molecules And Other Successes

Posing with their respective wives and Administrator Helms and Secretary Lewis are Lyndel Wayne Long (left), AF sector manager in Fort Worth, Tex., recipient of an Award for Meritorious Achievement, and Jere Styer (second from right), management analyst in the headquarters Office of Management Systems, recipient of a Secretary's Cost Avoidance, Reduction and Efficiency Award.

Secretary's Awards for Meritorious Achievement

WILLIAM G. ALLEN
Technical Assistant to the Associate Administrator for Engineering and Development

BILL G. BAILEY
Manager, Materiel Management Division
Washington, D.C.

MELVIN CRAIG BEARD
Director of Airworthiness
Washington, D.C.

ALLEN C. BUSCH
Manager, Analysis Branch
Atlantic City, New Jersey

FRANK J. MONACO
FAA Representative
Program Evaluation and International Staff
Miami, Florida

DONALD H. MYERS
Electronics Technician
Palmdale, California

DONALD J. SCHNEIDER
Manager, Airway Facilities Division
Kansas City, Missouri

RAYMOND J. VAN VUREN
Director, Air Traffic Service

The Secretary's Cost Avoidance, Reduction and Efficiency Award

CAROL A. ASHBY
Electronics Engineer
Washington, D.C.

GLENDON E. BRAMMER
Air Traffic Control Specialist
Washington, D.C.

JEROME COHEN
Manager, Emergency Operations Staff
Washington, D.C.

WALLACE M. COOK, JR.
Air Traffic Control Specialist
Washington, D.C.

LOREN W. FUHRMAN
Air Traffic Control Specialist
Washington, D.C.

MARSHALL D. MUNRO
Air Traffic Control Specialist
Washington, D.C.

JOHN C. OWENS
Communications Manager
Washington, D.C.

FRANK BABIAK, JR.
Sector Manager/Area Coordinator
Anchorage, Alaska

WILLIAM D. KING, SR.
Supervisor, Quality Standards Section
Oklahoma City, Oklahoma

JOHN K. McGRATH
Manager, Certification Program Management Branch
Washington, D.C.

LINDA S. WALKER
Program Specialist
Office of Airworthiness

DOT Secretary Drew Lewis presents the gold medal—the Secretary's Award for Outstanding Achievement—to Walter S. Luffsey, the Associate Administrator for Aviation Standards, for his success in managing personnel and his organizing to further aviation safety. (Top photo)

For his work on legal strategy in the controllers' strike, James W. Whitlow of the Office of the Chief Counsel received the Lawrence R. Schneider Award. (Top)

Maria Marks of the Technical Center was one of 10 FAAers who received a Secretary's Award for Excellence.

Kenneth A. Wood received the Secretary's Award for Valor for aiding a woman being attacked by an armed man. He's a quality assurance specialist, Industrial Div., Logistics Svc., Ft. Lauderdale, Fla.

Secretary's Awards for Excellence

KIM MARIE BENTO
Burlington, Massachusetts

M. DENISE CASHMERE
Washington, D.C.

BARBARA V. FOOR
Washington, D.C.

PATRICIA A. HICKMAN
Kansas City, Missouri

J'NELL A. JOHNSON
Fort Worth, Texas

LOUISE BOSTWICK
East Point, Georgia

LINDA P. BRYLES
Oklahoma City, Oklahoma

Secretary's Awards for Outstanding Achievement in Equal Opportunity

ELIZABETH A. BUGAY
Washington, D.C.

JOAN CARMEL
Washington, D.C.

JOHN M. DEMPSEY
Manager, Airports District Office
Memphis, Tennessee

EARNEST JOYCE, JR.
Air Space Specialist
FAA Southern Regional Office

The solution to the mystery was the discovery that a group of unruly molecules was getting out of line.

The discovery ended a series of nagging outages in computers at en route centers throughout the country and brought Donald H. Myers to Washington in September to receive the Secretary's Award for Meritorious Achievement.

An electronics technician at the Los Angeles ARTCC, Myers was one of 36 FAA emloyees honored at the annual awards ceremony for achievements ranging from advances in aviation safety to cost reductions.

Myers, who describes himself as a "tenacious person who gets into a problem and sees it through to a finish," is an expert on the computer display channel, one of two main subsystems making up the air traffic control computer complex.

As such, he and his colleagues were baffled by short circuits that were causing the computer to shut itself down, as it is programmed to do when it senses something is wrong. The solution was to find out where and why and then fix them.

"We finally narrowed it down to a spot where a (flat) ribbon cable plugged into one of the components. But we couldn't figure out how the short was occurring or why.

"In one of our routine calls to our counterparts at the Technical Center, however, one of them commented that we might have run into 'silver migration.'

"And that was it," Myers continued. "We had to get NASA to confirm it by looking at the cable connections via electron microscope."

Myers explained that the wires at the end of the cable were plated with silver to improve their conductivity, but the silver wasn't staying put.

"With the difference in charge between the hot lead and the ground lead, silver molecules were being pulled—one by one—across the gap between the conductors, building a tiny metal bridge that was shorting out the circuit.

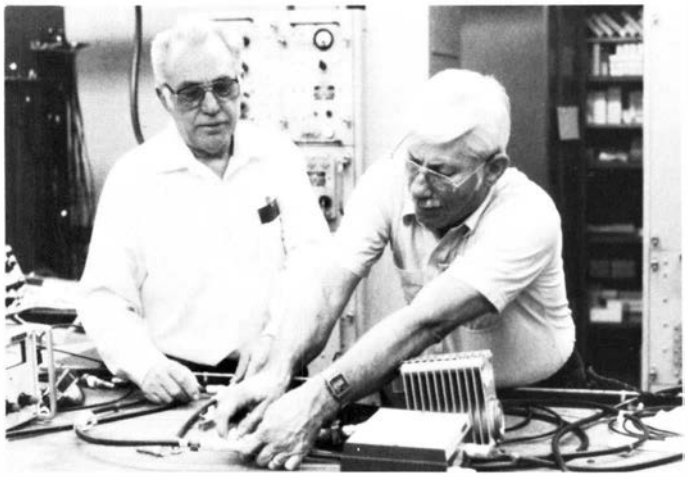
"And they were fragile things that would break of their own weight or from vibration and then build up again. That's what made them so hard to track down. But now that we know what's happening, all we have to do is keep the bridges cleaned out."

Simple, but it does the job. ■

—By Fred Farrar

on the job

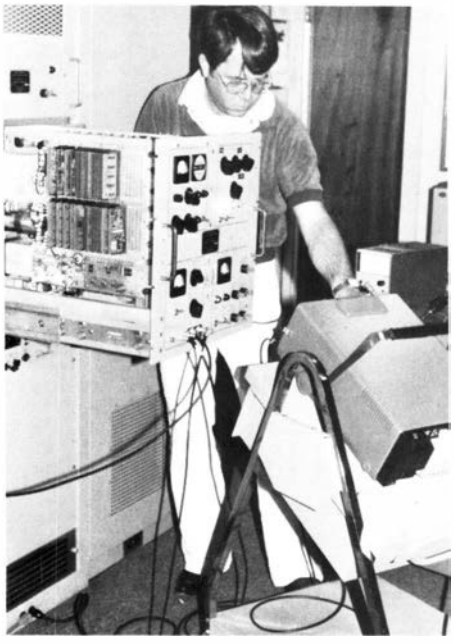
The Oakland Sector



Bob Chilcott (left) and Ted Miller, electronics technicians at the Oakland, Calif., Nav/Com Sector Field Office, build a new bridge circuit for the Oakland VOR.

It's a busy place, the Oakland Airway Facilities Sector. It may not cover a lot of territory, but it covers a lot of hardware—at Oakland International Airport, San Jose Municipal Airport, Buchanan Field in Concord, Reid-Hillview Airport in San Jose and Moffett Field Naval Air Station in Mountain View, Calif. The first four are ranked among the top 30 airports in activity around the nation.

To boot, Oakland's Bay TRACON handles more traffic than any other facility west of Chicago and is ranked fifth in the world.



Electronics technician Ron Oberlercher checks waveforms on an air traffic control beacon interrogator.

Looking over reports are (left to right) Jim Hansen, assistant sector manager; Lily Williams, administrative officer; and Jerry Long, sector manager.

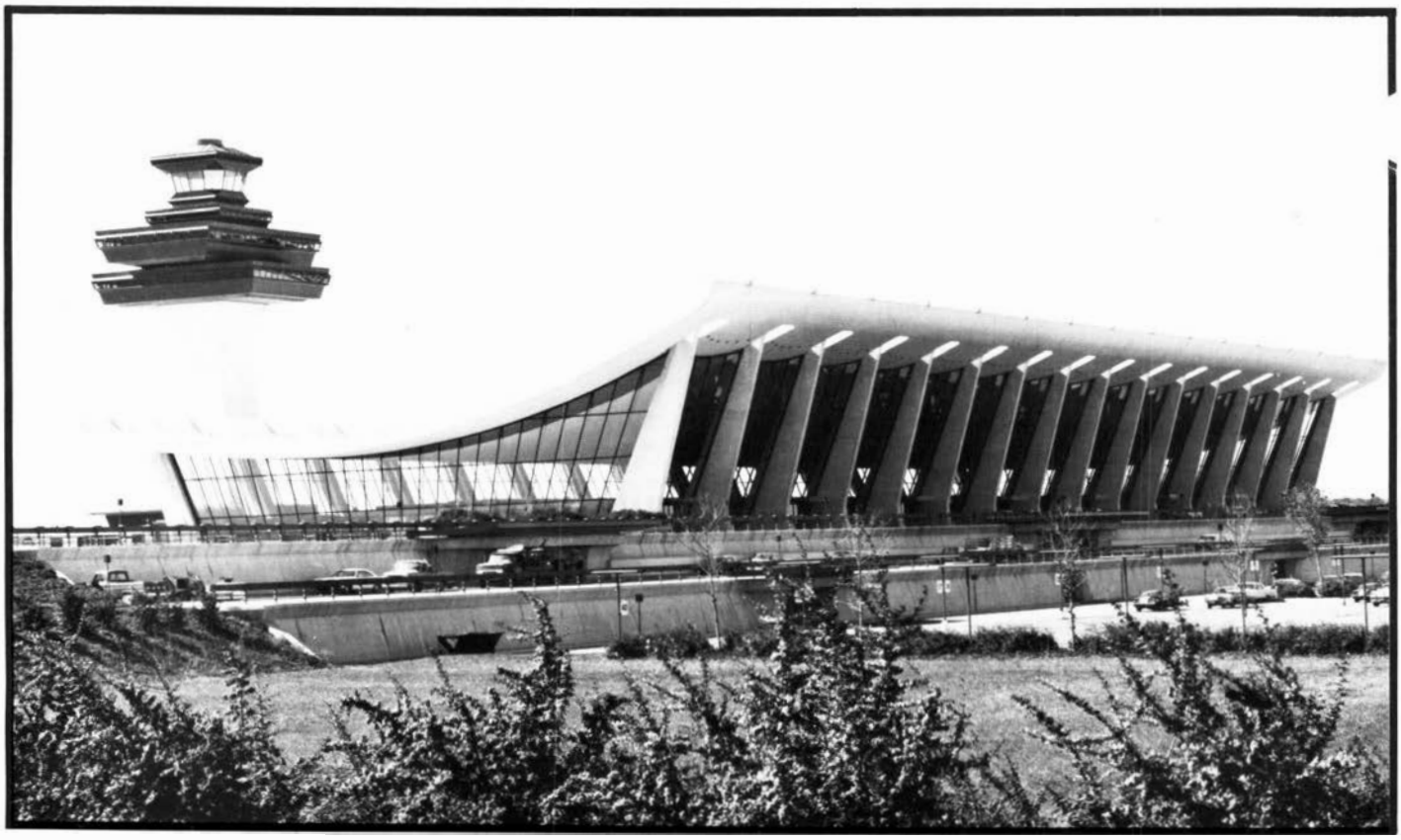
Glenn Cross, chief of the Moffett NAS Sector Field Office, coordinates an equipment check with technicians at the Oakland Bay TRACON.

Moving out an old tube-type transmitter to make way for new solid-state SSB transmitters at the Tracy International Flight Service Transmitter Station are (from left) Francis Osgood, environmental technician; Paul Maxwell, driver; Bob Nelson, environmental supervisor; Bob Leone, environmental technician; Vance San Filippo, electronics technician; George Wong, electrician; and electronics technician John Smith.

'ob Nelson (seated), supervisor of the environmental unit, discusses a cable project on Oakland Airport with Gene Cole, chief of the Oakland Nav/Com SFO.

Electronics technicians Dick Fong (left) and Arlie Williams of the Oakland ARTS Sector Field Office repair a maintenance console at the Oakland Bay TRACON.

Deloris Anderson is the Oakland Sector's general supply specialist.



On the rolling plain of Chantilly, Va., stands one of the great architectural masterpieces of our time— FAA's Dulles International Airport.

"Stands" perhaps is a poor description, for the terminal building looks more capable of flying than the aircraft it services.

A triumph both as a building and as the first airport in the country designed specifically for jet aircraft operations when it debuted in 1962, Dulles is a premier example of Louis Sullivan's dictum, "Form Follows Function." The design was indeed functional as well as beautiful.

Recognition came from the American Institute of Architects in 1976 when a survey of architects, historians and critics resulted in the Dulles terminal being selected as one of the "proudest achievements of American architecture" in the past 200 years. Dulles tied for third place with Frank Lloyd Wright's "Falling Water" house and behind Thomas Jefferson's design for the University of Virginia and second place Rockefeller Center. Architect Hugh Newell Jacobson called it "the best airport ever built in the world."

In addition, Dulles has been placed on the Register of Historic Places.

Said FAA Administrator Elwood Quesada as Dulles was being built, "We designed this airport for the requirements not only of this decade, but for the next decade as well. Not looking far enough ahead is one of the errors we've been making through the history of commercial aviation. . . . We are building for 10 years, 20 years, 50 years from now."

But with the foresight in design, with its beauty and its functionality, the airport languished underused. As Dulles celebrates its twentieth anniversary this month, it's clear that the next-door convenience of Washington National Airport will no longer be an adequate excuse for ignoring the functional superiority of Dulles for both passengers and airlines.

It was the fall of 1950 when Congress authorized a second airport for the metropolitan Washington area. Although Washington National had opened only nine years earlier, its limitations were already apparent. While National was the supreme convenience to its congressional and private citizen users—only about 2½ miles and 10 minutes from the city center—its size (680 acres surrounded on three sides by the Potomac River) precluded the first crop of jet aircraft without major runway expansion. Most jet aircraft operations that came to National use its longest runway of 6,870 feet, which is adequate for the safe operation of two- and three-engine jets only. Noise was not the problem then that it was to become later.

It was recognized, however, that National clearly would not be able to handle the first commercial jets then under development—heavy, four-engine types.

That same year, the Federal govern-

By Samuel Milner
A member of FAA's historical staff, he is the originator of the *FAA Publications Guide*. As a U.S. Army historian, he authored *Victory in Papua*.

A Soaring Achievement

Beautiful and Functional, at 20, Dulles Is Coming of Age

ment began to purchase a site in Burke, Va., 15 miles southwest of the capital. Local opposition was intense, and the project died. The government cast an eye at Andrews Air Force Base, southeast of the capital in Maryland, but the Air Force would not go along.

Congress appropriated $12.5 million for a site in 1957 but left the location up to President Eisenhower. The President and Quesada quickly chose the 9,800-acre site at Chantilly, 26 miles west of Washington.

In March 1958, the final days of the Civil Aeronautics Administration, agency officials were hearing presentations from potential contractors. They really wanted Finnish-born Eero Saarinen as the project's designer. He had earned a reputation with his designs for the St. Louis Memorial Arch, the U.S. Embassy in London and the TWA terminal at JFK International, among others. He was part of a team headed by the engineering firm of Ammann and Whitney.

First, Whitney talked about structural considerations. Another member of the team, McDonnell, spoke about power and communications. Then Saarinen said, "You have heard Mr. Whitney talk about the 'bones' of the airport; you have heard Mr. McDonnell talk about the 'heart' of the airport. Let us now talk about the 'soul' of the airport." Then he said how the agency should build a great entrance to the U.S., not just another airport. That was what CAA wanted to hear.

The team's analysis of airport design focused on the widespread practice of building branching covered walkways onto the terminal that created more parking space for aircraft, but forced passengers to walk immense distances to and from the planes. And architecturally, the design bred mediocrity.

Detail of the supporting piers.

Saarinen's solution was not entirely new. Many European airports provided a bus service from terminal to aircraft. But to require passengers to transfer to a bus as part of a flight was anomalous.

Saarinen had a better idea: design the buses as self-propelled waiting rooms capable of carrying 90 to 100 passengers. With engines at both ends, the mobile lounges, as he called them, could dock at the terminal and mate with the door of an aircraft via adjustable ramps. In this way, passengers would not have to descend from the vehicle or climb steps into an aircraft.

And now, the aircraft parking aprons could be out near the runways, keeping noise and exhaust away from the terminal and saving the expensive taxiing and jockeying for position at the fingers that was likely to be especially difficult for the more cumbersome four-engine jets about to make their debut.

As a result, the terminal's design was now freed from the constraints imposed on it by the aircraft.

With a plain to work with, Saarinen concluded that what was needed was a "strong form" on a monumental scale hovering between earth and sky that from a distance would have the look of flight about it. The "form" would consist of a roof of heroic proportions, supported front and rear by lofty piers, or columns, around a spacious central concourse. These would soar to an immense height on the approach side and to a somewhat lesser height on the field side.

Made up of concrete slabs weighing millions of pounds, the roof would be attached to steel suspension cables hung from the piers, which would be angled and sloped outward in a catenary curve, not only to enhance the drama of their appearance but to add to the roof's support by counteracting the pull of the cables.

And there were other touches characteristic of Saarinen at his best. Instead of having the piers grasp the roof slabs by their edges and mar the curve of the roof, he had them penetrate the slabs through openings near the edges and return to grasp the roof from above, like curved fingertips. The walls of the terminal had glass

A mobile lounge and a service vehicle make their way out to the parking apron.

everywhere it was possible to put it.

The terminal was a long rectangle. Entering passengers would be able to step right up to ticket counters and then walk only a couple of hundred feet or so to the appropriate mobile lounge gate.

The 193-foot control tower, described at the time as "sculptured elegance," was placed at the field side of the terminal, where, in Saarinen's words, "it could be seen in changing and good relationships to the terminal from the access and approach roads."

Aerial view of Dulles showing its parallel runways. The aircraft parking and service area is the horizontal light-colored strip beyond the tower and terminal.

The radar, equipment and training rooms were placed at the top of the stalk below the cab, as was the vogue then.

Before the terminal building was finished, Saarinen died at age 51. In early August 1961, only three weeks before his death, he visited the site. The concrete work on the terminal was finished, and the bold, soaring design was clearly apparent. "Boy, this time we've really got something," he said to the workmen. "I think the terminal is the best thing I have done."

But if the terminal building was a smash hit, the same could not be said of the mobile lounges, at least not at the outset. The CAA had accepted the concept, which was an inseparable part of Saarinen's design, but insisted that the airlines be sold on it first.

Most of the airlines could be convinced, but Eastern, Delta and Northwest were opposed because they would have to pay to operate the lounges, a charge that terminal fingers did not entail. But when Quesada became the FAA administrator in 1958, he authorized development of the lounges.

The contract went to Chrysler, which came up with an excellent production model before the end of 1960. Following the Presidential elections that year, the matter fell to a new administrator, Najeeb E. Halaby. When the airlines heard that the prototype lounge had cost $1.6 million instead of the authorized $750,000 and that the production models would cost close to $240,000 instead of the anticipated $100,000, they fought the lounge concept. But Halaby would brook no interference and ordered the full complement of 21 mobile lounges.

As this paragon of airports opened in November 1962, it seemed to be assured of a brilliant future. It was planned to handle the first jet airlines, which were all heavy, long-distance, four-engine types, including the Boeing 707, Boeing 720 and the DC-8, which could not use National's short runways.

One style of mobile lounge does not use adjusting ramps to mate with aircraft but jacks itself up instead.

With National's traffic running at about four million passengers a year as Dulles opened, FAA's planners envisioned that it would peak at about six million toward the end of the 1960s, while Dulles went on growing. But things did not work out that way. In early 1964, the Boeing 727 went into operation. This was a three-engine, medium-range jet capable of using runways even shorter than National's 6,800-footer. The following year, there was the two-engine DC-9 as a short-field jet carrier.

These planes were only the forerunners of a whole generation of jets tha

The field side of the Dulles terminal. At right are the departure gates—all of them—to the mobile lounges. The escalators service the baggage arrival area.

An attendant is provided for the commodious carpeted waiting room on wheels.

not only could use short runways but also could carry significantly more passengers at much less cost than any of the earlier prop airliners.

By 1965, National was handling seven million passengers in prop planes. Administrator Halaby would not allow jets to use National in an attempt to build up traffic at Dulles, as well as to keep jet noise away from the residential communities near National.

Finally, William F. McKee, Halaby's successor, ordered the opening of National to two- and three-engine jets in April 1966. From then on, National increasingly became a jet airport as prop planes were phased out of fleets. Except for international and other long-distance operations, the preference of the general public and members of Congress remained for National because of its matchless close-in convenience. The airlines flying short- and medium-range jets followed that preference and shunned Dulles almost from the start. Though noisy and congested, National continued to outstrip traffic at Dulles—a state of affairs that still exists.

Over the years, passenger traffic actually grew at all three area airports—which includes Baltimore-Washington International—but the biggest winner continued to be National, which passed 15 million passengers in 1979. Dulles, the largest and best-laid-out airport, was playing third fiddle to smaller airports.

The public admired Dulles but was willing to suffer National's discomforts when it was, so to speak, right on its doorstep and, for the last half dozen years, only a 65-cent rapid-transit fare away. Also, following the verse in Mark—that to him who hath shall be given and from him who hath not shall be taken away—those who would have preferred to use Dulles were unable to do so because only National had the flights they wanted.

The result was what might have been expected. Dulles' traffic peaked at 3.5 million in 1979 and then declined. With the enactment of the Airline Deregulation Act that year, airlines began pulling out of airports offering low load factors to serve more lucrative markets. This, the declining economy and high fuel and other operating costs spurred carriers such as Delta, Piedmont, Ozark and eventually Eastern to leave Dulles.

In 1980, the Dulles passenger count fell to 2.6 million. At the same time, contrary to everything that had been planned for, National continued to enjoy a manic growth and had so much traffic that its noise problem, despite flight pattern adjustments, was getting out of control.

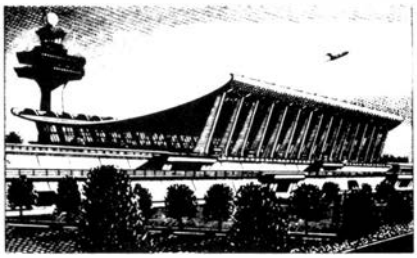
With that airline withdrawal from Dulles and the continuing noise complaints at National, the FAA accelerated the development of the Metropolitan Washington Airports Policy, which Administrator Helms signed last year. Designed to encourage greater use of Dulles, the policy set a cap on passenger volume for National at 16 million annually, established a nighttime curfew on the use of large and noisy jet aircraft and reduced scheduled hourly slots for large jets from 40 to 37 during its operating hours of 7:00 a.m. to 10:30 p.m. In addition, jets departing or arriving at National are limited to flying a maximum 1,000-mile leg.

Further, measures were taken to make Dulles more attractive to the flying community. Landing fees and mobile lounge user charges were waived for air carriers. Commuter airlines and regional airlines were permitted to continue to use the base of the control tower to board and deplane passengers so as to make a quick turnaround without going through the mobile lounge system. In addition, the busline between Dulles and Washington was improved.

Perhaps more significant for Dulles' future was work begun in October of 1981 for the completion of a 3.4-mile extension of the Dulles access road in-

Eero Saarinen

The final series of postage stamps honoring American architecture bowed in September. Appropriately for this year was one honoring Eero Saarinen and Dulles International Airport.



Eero Saarinen 1910 1961 Dulles Airport Washington DC
Architecture USA 20c

side the Capital Beltway. This would hook up with a highway—I-66—that would carry airport traffic directly from Washington. This is slated for completion in the fall of next year. The Dulles Master Plan also reserves the median strip of the airport access road for possible extension of the metropolitan area's rapid-transit rail system.

Upon taking office in 1981, Transportation Secretary Drew Lewis supported plans for limiting National Airport and boosting Dulles but opposed spending money for major rehabilitation of National. "We are throwing a firm, clear signal," he said, "that the Administration is committed to a lid on National and a conversion from National to Dulles." He acknowledged that the timetable was dependent on the access road.

Administrator Helms echoed that idea, saying that a shift in traffic would happen in "the next three or four years."

This year, there is evidence that the policy is working. Traffic at the Chantilly field was increasing substantially; airlines were adding service to new markets; the annual passenger count was on the upswing. After 20 years, it was about time. ■

Feeling Fit

Edited by Henry J. Christiansen

Strokes have been a major health problem in this country and around the world for many years and afflict thousands of people every year. The very thought of a stroke engenders fear and worry in many people because such an illness encroaches upon one of their most valued freedoms—mobility, both mentally and physically.

Strokes occur when the blood supply to the brain is interfered with by either a reduction in the amount of flow or by a complete cutoff of flow. This means that the part of the brain that is controlled by the damaged nerve cells in the brain will be unable to function. Such an event may be sudden and devastating or may be more insidious and slow.

We know a lot more about predisposing factors to stroke. Most of us could readily identify high blood pressure as a major predisposing risk to stroke but are unaware that other health problems, such as diabetes and coronary artery disease, are also great risks. The control of hypertension has been the greatest single contributing factor in the prevention of stroke, reducing stroke incidence from 500,000 each year to 300,000; this happy reduction in victims of stroke has been accomplished in less than a decade.

We are often surprised and concerned to find that our blood pressure is either high or in the borderline area. This pinpoints a matter for personal responsibility—each of us reading this article should know just what our blood pressure is and whether we should be following any preventive measures related to dietary cholesterol, smoking, alcohol, salt intake and exercise.

It is exciting that new research promises hope to stroke victims, perhaps particularly the use of prostacycline as a potent vasodilator and anti-aggregant of platelets. In the meantime, however, you and I must take charge of ourselves and look intently at the risk factors. By this awareness, we can then eliminate the risks from our habits one by one!

(Source: Federal Business Association Newsletter)

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 colum. was coordinated with the Regional Air Surgeon.

By Theodore Maher
The editor of *Intercom* and a frequent contributor to FAA WORLD, he is a former editor of *Our Navy* and associate editor of the *Navy Times*.

Flying Is Her Way of Life

And the Record Speaks Loudly for Her Skill

When Carol Rayburn graduated from high school, she may not have known exactly where she was going, but she knew how she was going to get there—in an airplane, of course.

Where she is going is appropriately "up," and she was recently promoted to manager of the Fresno, Calif., General Aviation District Office.

She is only the second woman to be appointed to such a position. Speaking of what it's like to compete in what is essentially a man's world, she said that she has been "generally well ·cepted." She pointed out that she .d a good flying background and felt that this was taken into account, but, she added, "A woman has to prove herself over and over, whereas men, after they get some experience and the grey hairs to go with it, are accepted automatically." She thinks this will probably continue throughout her career.

She says, however, that she's noticed a big change in the attitude toward women overall in aviation in the past 10 years. It's really been apparent since she joined the agency as an aviation safety inspector at the Salt Lake City Flight Standards District Office back in 1974. She felt then she really had to prove herself, but now she knows that her record speaks for itself to a large degree.

While at the FSDO, she qualified as an inspector for both general aviation and air carrier operations. During the six years she spent there, she worked in jobs of increasing responsibility.

One of her later assignments was as rincipal operations inspector for Key .irlines. A prerequisite for this job was checking out in the Convair 440.

She also checked out in a Lear Jet and is therefore qualified in multi-engine jet aircraft.

But the record she speaks of began to be built almost 10 years before she joined the agency. During that period, she was chief pilot for both air taxi companies and flight schools.

Flying itself began when she was in high school. While some of her friends' extra-curricular activities were practicing cheers for the cheerleader competition, she was practicing takeoffs and landings. She was a private pilot before graduation.

She earned her flight instructor's rating during her first semester in college. In fact, she put herself through college largely by teaching flying. This, of course, exacted a toll: She spent 60–80 hours a week at the airport, which meant she gave up much of her college life.

Still, it wasn't much of a scacrifice for Carol. Flying had been in her blood since she was in sixth grade. During that critical year, her father—a World War II P–38 jockey—decided to take up light plane flying. A farmer by profession, he made a section of his corn field into a landing strip, and the whole family was flying. Two of her three brothers became pilots.

Carol had to wait until she was 16 to get started, but once started in aviation, she's never looked back. ■

People

Aeronautical Center

■ **Clauddia J. Jackson,** chief of the Application Processing & Certification Branch, Special Examining Division.

■ **Devere A. Olson,** unit chief in the Avionics Maintenance Section, Aircraft Services Base, from the Operations and Scheduling Section.

■ **Barbara G. Ritz,** chief of the Compensation Branch, Personnel Management Division.

■ **Adri-Anne Trammell,** chief of the Inventory/Referral Management Branch, Special Examining Division, from the Special Programs Branch, Personnel Management Division.

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Central Region

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■ **Charles W. Cody,** team supervisor at the St. Louis FSS.

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■ **Quentin J. Gates,** deputy chief of the Kansas City International Airport Tower, from the Operations, Procedures & Airspace Branch, Air Traffic Div.

■ **Robert C. Larson,** supervisor in the Program Support Unit of the Des Moines Airway Facilities Sector.

■ **Robert H. Lindsey,** supervisor in the Technical Support Unit, St. Louis, Mo., AF Sector.

■ **Eugene D. Olsten,** evaluation & proficiency development officer at the St. Louis Tower.

■ **Vincent J. Vanloo,** chief of the Sioux City, Iowa, Tower, from the Dubuque, Iowa, Tower.

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■ **Chester M. Hayden,** unit supervisor in the Pittsburgh AF Sector.

■ **Phil Jones,** unit supervisor at the Clarksburg, W. Va., AF Sector Field Office of the Charleston, W. Va., Sector.

■ **Stephen Myak,** unit supervisor in the Pittsburgh AF Sector.

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■ **Leon W. Orr,** team supervisor at the Minneapolis ARTCC.

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■ **Arthur J. Gomez,** unit supervisor in the San Juan AF Sector.

■ **Warren R. Lane,** central computer complex supervisor in the Atlanta, Ga., ARTCC AF Sector.

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■ **Thomas J. Marshall,** computer specialist in the Houston, Tex., ARTCC Airway Facilities Sector, from the Los Angeles, Calif., ARTCC Sector.

■ **Charles A. McMillen,** chief of the Tulsa, Okla., Flight Standards District Office, from the San Antonio GADO.

Washington Headquarters

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■ **Charles R. Burwick,** assistant chief of the System Programs Division, Air Traffic Service.

■ **Lawrence E. Kotzker,** chief of the Plans Branch, System Programs Division, Air Traffic Service, from the Office of the Associate Administrator for Air Traffic and Airway Facilities.

■ **Elroy L. Nieweg,** chief of the Management Information Systems Branch, Data Systems Management Division, Office of Management Systems, from the Operational Applications Maintenance & Modifications Branch.

■ **John G. Richardson,** chief of the new Data Systems Branch, Operations Division, Air Traffic Service, from the ATC Automation Program, ATC Command Center at the Jacksonville, Fla., ARTCC.

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