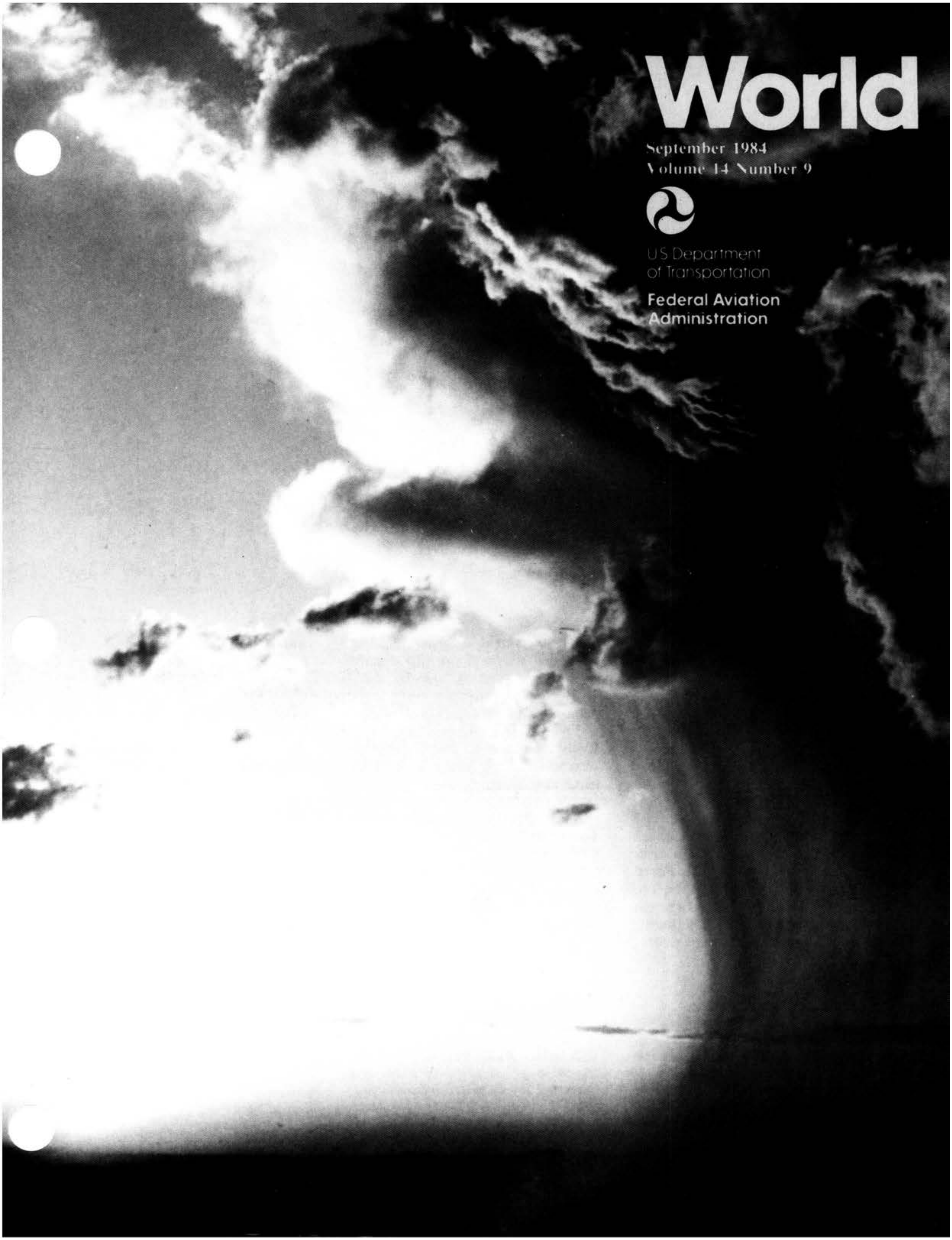
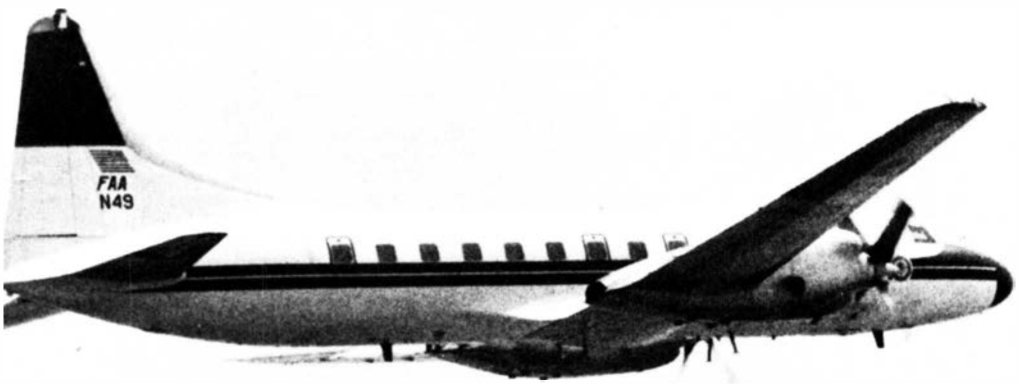
World

September 1984
Volume 14 Number 9

U.S. Department
of Transportation

**Federal Aviation
Administration**





Looking for Trouble

When N-49, the Technical Center's Convair 580, flies out of Patrick Air Force Base, Florida, it ignores a fundamental precept of flight: heading into thunderstorms, looking to be struck by lightning. The objective of the research effort is to investigate the hazards of lightning and static electricity in the atmosphere.

Airborne instrumentation and sensors were installed on the twin turboprop at Wright-Patterson Air Force Base, Dayton, Ohio, and at the Tech Center by members of the Airborne and Ground Based Facilities Branch.

Patrick AFB radar vectors pilots Jess Terry and Bob Powell and flight mechanic Wayne Scott into selected thunderstorms at altitudes from 2,000 to 20,000 feet to attract cloud-to-ground lightning.

The tests not only will determine lightning effects on an airplane but also will provide data to help determine how to protect new composite materials used on airframes. They will also show how electromagnetic fields affect avionics and microelectronic circuits.

Cooperating on the project, expected to end this month, are the U.S. Navy and the National Aeronautics and Space Administration. ■

"People fly because they believe it is safe to fly. And they believe that because decades ago the airline industry and the government convinced them of that fact by the way they set tough safety standards. In effect, safety became the industry's 'strong heart.'

"Nothing has changed that philosophy—we simply are not going to permit a degradation of air safety. We have not in the past, and we won't today or tomorrow.

"We—the government and the industry—must do what we have always done. We must stay alert to safety threats . . . we must search for the dangerous trends . . . we must educate our flight crews . . . and in doing so we will keep what we have now: the safest aviation system in the world."

—Donald D. Engen

Front cover: *A thunderstorm from Bennett Mountain Lookout, Idaho. Beautiful but dangerous, such hazardous weather at least will be much more predictable with the next-generation of weather radar now under development. See story on page 4.*

Photo by David McCoy courtesy of Raytheon Co.

Back cover: *A new 180-foot air traffic control tower graces the top of the newly renovated San Francisco International Airport terminal, replacing a 135-foot tower built 30 years ago. The $2.5 million facility will be staffed by 36 controllers and technicians.*

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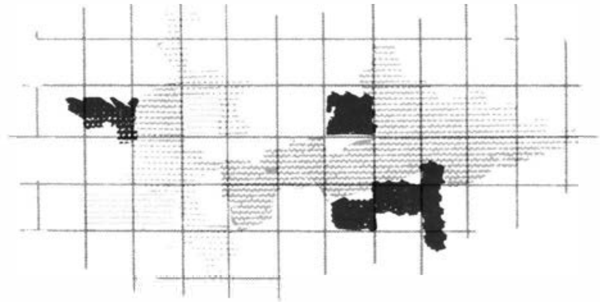
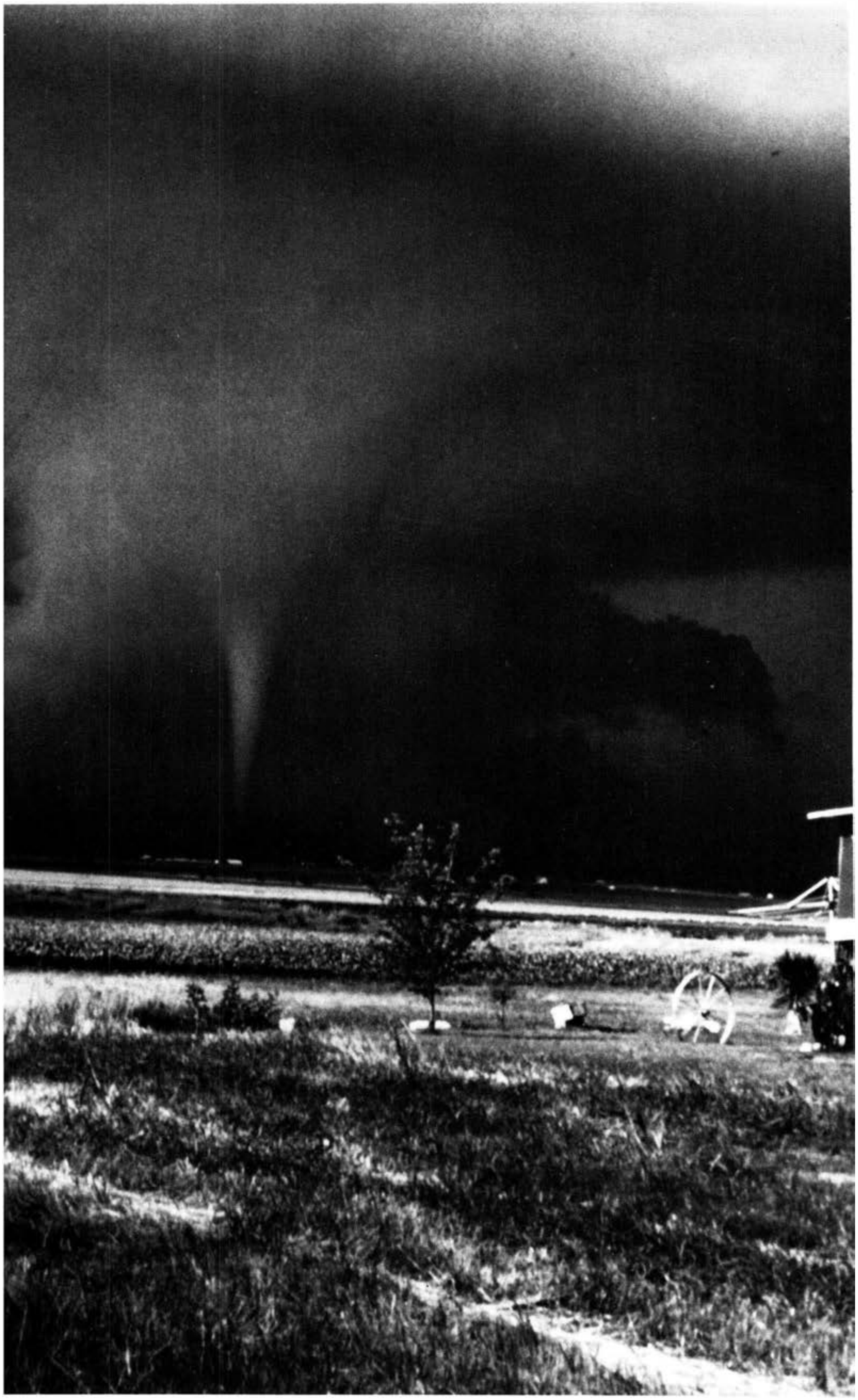


NEXRAD:

Future Weather Radars



On a June afternoon in 1928, Kansas farmer Will Keller noticed an umbrella-shaped cloud moving toward his farm. From its shape and the oppressiveness of the air, he suspected there was a tornado in it, but he was far from any shelter. Then he saw that it had three tornadoes.

"Two of the tornadoes were some distance away and looked like great ropes dangling from the parent cloud," he recounted. "The nearest one was shaped more like a funnel with ragged clouds surrounding it.

"Steadily the cloud came on, the end rising gradually above the ground. At last, the great shaggy end of the funnel hung directly overhead. Everything was still as death. There was a strong gassy odor, and it seemed as though I could not breathe.

"There was a screaming, hissing sound coming directly from the end of the funnel. I looked up and to my astonishment, I saw right into the heart of the tornado. There was a circular opening in the center of the funnel about 50–100 feet in diameter and extending straight upward for a distance of at least half a mile, as best as I could judge. The walls of the opening were rotating clouds, and the whole was brilliantly lighted with constant flashes of lightning which zig-zagged from side to side.

"Around the rim of the great vor-

Photo courtesy of the Sperry Corp.

The Coming Revolution

To Bring Unmatched Era of Safety

By Samuel Milner
A member of FAA's historical staff, he was historian of the Air Weather Service and wrote *Victory in Papua*, part of *The U.S. Army in WWII*.

tex, small tornadoes were continually forming. These looked like tails as they writhed their way around the funnel. It was these that made the hissing sound. I noticed that the rotation of the great whirl was counter-clockwise but some of the smaller tornadoes rotated clockwise.

"The tornado was not travelling at a great speed. I had plenty of time to get a good view of the whole thing—inside and out."

Few have seen what Keller saw and lived to tell the tale. By the early 1990s, however, meteorologists expect to use Doppler pulse radars (see box) in the NEXRAD system to routinely "see" tornadoes and other dangerous weather phenomena as clearly as if they were examining their internal systems by x-ray.

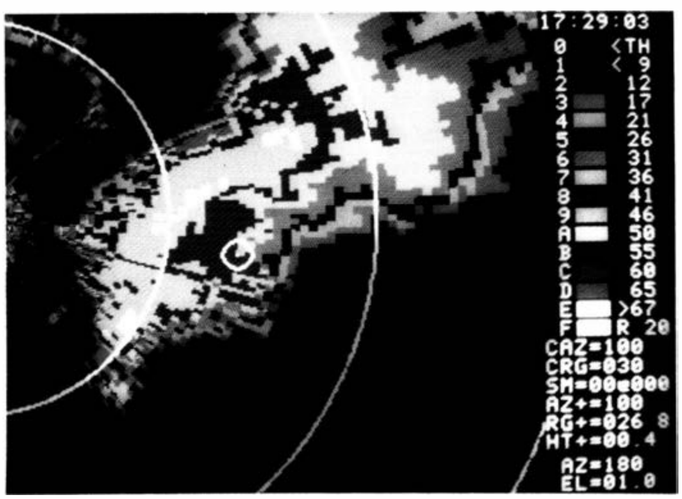
The range and clarity of their view will provide vastly improved severe weather warning and forecasting services for civil and military aviation and the country as a whole. It will permit ample time to sound a warning so that modern Will Kellers might not get caught in their fields and pilots can avoid dangerous storms.

NEXRAD, next-generation weather radar, is the designation for the Doppler weather radars that late in this decade will replace the conventional weather radars currently in use. Three government agencies are leading the way in the development: the National Weather Service (NWS) of the National Oceanic and Atmospheric Administration (NOAA), Department of Commerce; the U.S. Air Force's Air Weather Service (AWS); and the Federal Aviation Administration.

The National Weather Service has operated 10-centimeter (cm) wavelength WSR-57 weather surveillance radars since 1959; the Air Weather Service, 5-cm-wavelength AN/FPS-77s since 1964. Both are conventional pulsed radars, which locate distant objects by bouncing short, intense electromagnetic pulses off them, measuring the time lapse between the outgoing pulse and the returning echo.

As might be expected from the dates that they became operational, both radars operate on passé vacuum-tube technology. Because of their age, they are hard to supply with parts. While effective in their day, "inadequate and undependable" is the way a top AWS weather officer described them in September 1982.

FAA's National Airspace System Plan, published in 1982, echoed that sentiment, saying that weather information from existing weather radars was "inadequate" for air traffic control purposes. The plan added that the "unreliable data" resulted not only in "inaccurate weather forecasts," which contributed to weather-related aircraft accidents, but also in "the selection of non-fuel-efficient routes."

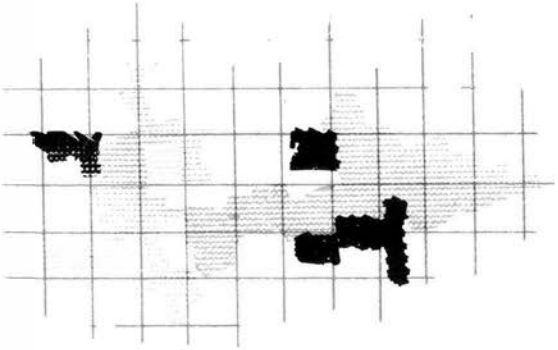


A segment of a Doppler radar display at the National Severe Storms Laboratory looking inside a weather front.
Photo courtesy of the Sperry Corp.

While the same type of conventional pulsed radar is in its element in tracking fast-moving, separated "hard" targets like aircraft, it is less successful with randomly distributed masses of moisture-laden particles suspended in the air, which have a velocity spectrum wholly beyond its capability to measure.

Interestingly enough, even as NWS's first WSR-57s went into operation in the late 1950s, an alternative weather radar system was already being considered.

Following the adaptation of conventional pulse radar to weather needs, research began on a Doppler



This summer, FAA briefed personnel from the General Accounting Office on the Aviation Weather System Plan. Weather radar project manager Don Turnbull of APM discusses the NEXRAD program. Listening are (clockwise from in front of flag) Bob Brown, Communications & Surveillance Div. assistant manager, APM; Gene Jensen, Weather Processors Program manager, APM; Mary Manatos, Program Review and Analysis Staff, ADL; Frank Munroe, Technical Center evaluation officer; Gene Chirillo, Program Review and Analysis Staff; Jim Dziuk (far upper right), Weather Program Staff acting manager, ADL; and Neal Blake (lower right), deputy associate administrator for engineering. Others are GAO representatives.

As part of the JDOP in 1979, both 5-cm and 10-cm Doppler radars were tested at Norman, Okla., producing digitized and computerized data on color displays.

weather radar alternative designed to give the forecaster the added capability of measuring the wind velocity of precipitation particles suspended in the air—a key element in the detection and measurement of atmospheric disturbances in real time.

In 1960, the British Royal Radar Establishment and the French National Meteorological Observatory reported separately that 3-cm pulsed Doppler radars they had developed had been extremely successful in measuring the velocity of precipitation particles in the upper air.

The U.S. Weather Bureau—NWS's predecessor—had by this time also been looking into the meteorological potential of Doppler radar. In 1956, the Bureau obtained a Navy 3-cm Doppler radar and mounted it on a van to locate and identify tornadoes in the Wichita, Kan., and Wichita Falls, Texas, areas during the 1957, 1958 and 1959 tornado seasons.

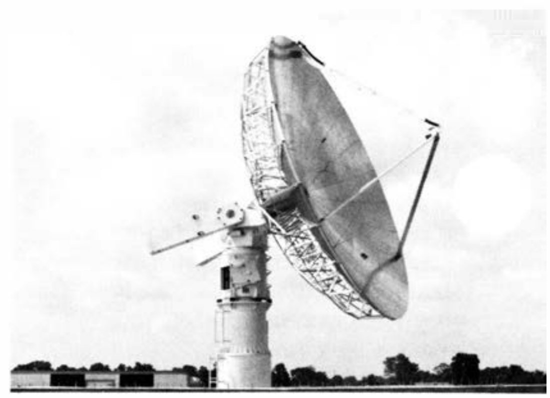
Even greater progress was reported in October 1961 by the Air Force's Cambridge Research Laboratory (AFCRL) at Hanscom Air Force Base, Massachusetts, based on its research with an experimental Doppler aircraft-tracking radar rebuilt into a 5-cm unit called the Porcupine.

A couple of years later, AFCRL developed a Velocity Azimuth Display Indicator for measuring wind velocity in precipitation areas. Then, in 1965, it developed a Coherent Memory Filter moving-target display technique that took advantage of the phases of the Doppler radar echo.

The next development was the Plan Shear Indicator, a real-time analog device capable of identifying and mapping wind shear in severe storms.

As the 1970s dawned, the Air Weather Service began giving serious thought to replacing its AN/FPS-77s with Doppler weather radar.

Meanwhile, in 1964, NOAA, the Weather Bureau's successor, had

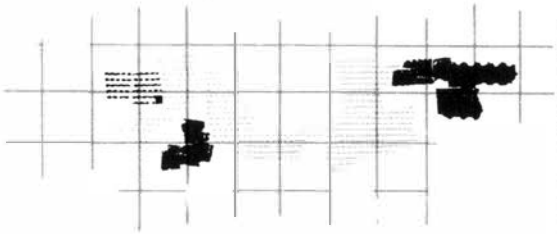


This 30-foot parabolic antenna is part of FAA's weather radar test bed for both terminal and enroute use. The installation is at Olive Branch Airport, 10 miles from Memphis, Tenn., International Airport.

established at Norman, Okla., the National Severe Storms Laboratory (NSSL). After experimenting with a 3-cm Doppler weather radar, NSSL's engineering staff in 1969 began putting together two 10-cm Doppler radars specially designed for meteorological use from AN/FPS-18 early-warning radars.

The first NSSL 10-cm unit was commissioned at Norman in 1971; the second one at Cimarron Field, 25 miles northwest of Norman, in 1973.

When the first 10-cm radar was commissioned, AFCRL had had its 5-cm Porcupine in operation a good 10



years, and in its Coherent Memory Filter and Plan Shear Indicator had experimental devices that NSSL sorely needed to get the best results from its newly rebuilt units. AFCRL delivered the devices to Norman in time for the 1973 tornado season.

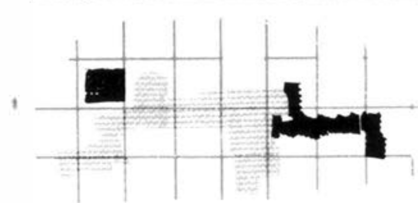
The results were all that could have been desired. In May 1973, Union City, Okla., was hit by a devastating tornado and, thanks largely to the Plan Shear Indicator, the mesocyclone with the very tornado in it that was to cause the damage was detected by the Norman Doppler 41 minutes before the tornado hit, compared to a two-minute warning from conventional weather radar. It was an astounding demonstration of what proper instrumentation could do.

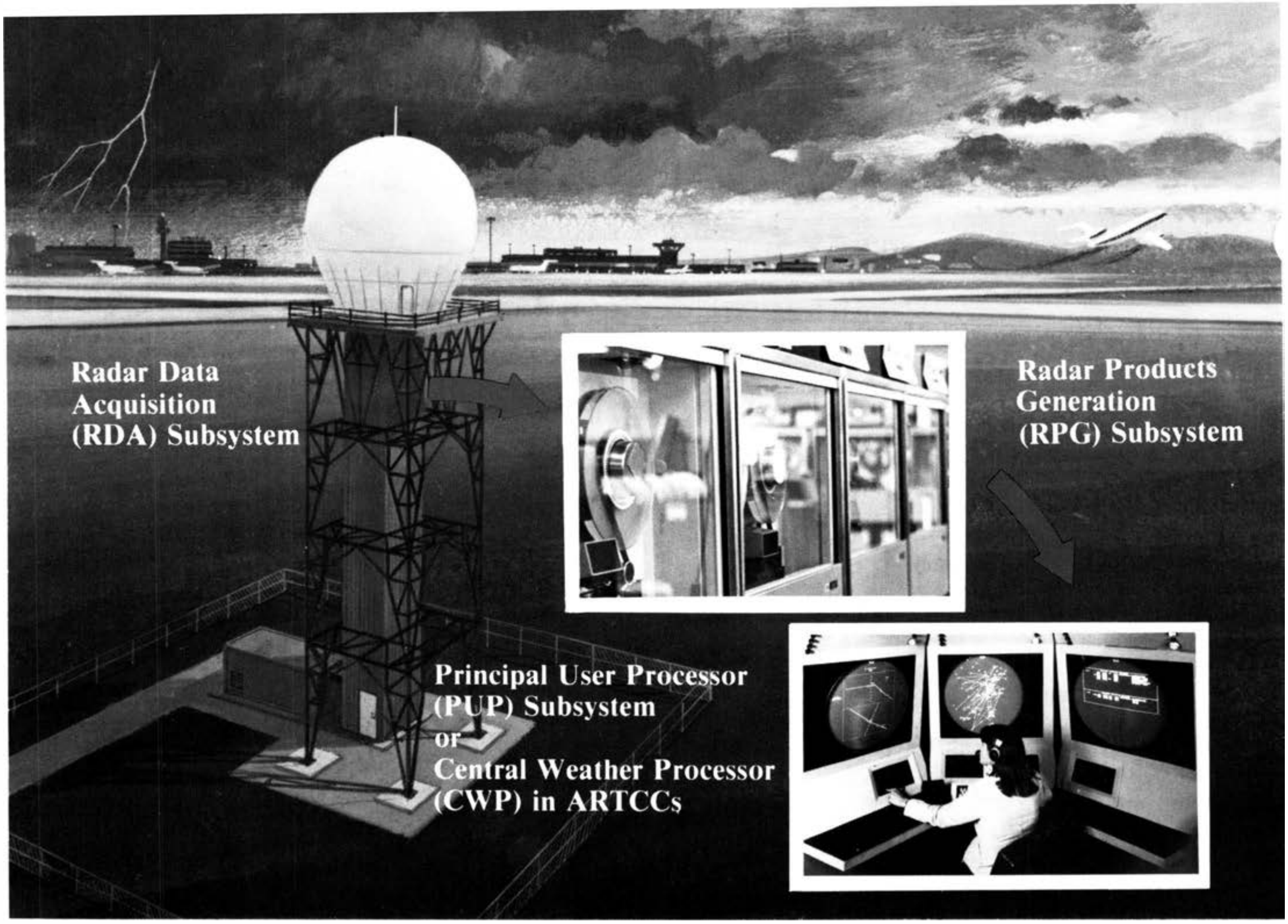
But even better instrumentation was on its way. This was the Pulse Pair Processor (PPP), which, instead of using analog methods, provided information by directly measuring the speed with which one pulse followed another. The PPP also permitted digital readings that could readily be adapted to computer processing.

At a conference in 1976, NOAA decided to hold a series of operational tests over the next few years at Norman and Cimarron Field. Called the Joint Doppler Operational Project (JDOP), it was intended to demonstrate in an operational setting what for the first time was called NEXRAD. The Air Force's AWS was invited to join the project along with the Air Force Geophysics Laboratory (AFGL)—the successor to the AFCRL.

Tornado near Enid, Okla., in 1966.

Photo courtesy of NOAA





Artists conception by Raytheon Co.

The JDOP test opened in April 1977 and ran through June. NWS and AWS provided the forecasters for Norman and Cimarron Field, and AFGL located its personnel and equipment at Cimarron Field.

To check out the accuracy of the Dopplers, a WSR-57 radar at the NWS office in Oklahoma City was tied-in by telephone with the Norman lab to permit immediate comparisons. In addition, radar advisories were telephoned to NWS offices and Air Force bases in Oklahoma, Kansas, Arkansas and Texas.

The forecasters at Norman had NWS color displays and NSSL white-on-black graphics. The AFGL system at Cimmaron Field was completely in color.

The resulting patterns presented what conventional radars could not—radar signatures of high wind shears, mesocyclones and tornadoes. In addition, the forecasters could see strong outflows below the bases of clouds that represented gust-front signatures and strong updrafts at cloud bases and tops that suggested an excellent chance of hail. The 1977 tests were very successful, as were those in 1978.

Indeed, JDOP did so well in the opening test that FAA, which had paid little heed to JDOP at the beginning, was impressed enough to formally join the project in December 1977.

But it wasn't the test alone that led FAA into the fold. On April 4, 1977, a Southern Airways DC-9 lost both engines in severe thunderstorms at New Hope, Ga., and crashed.

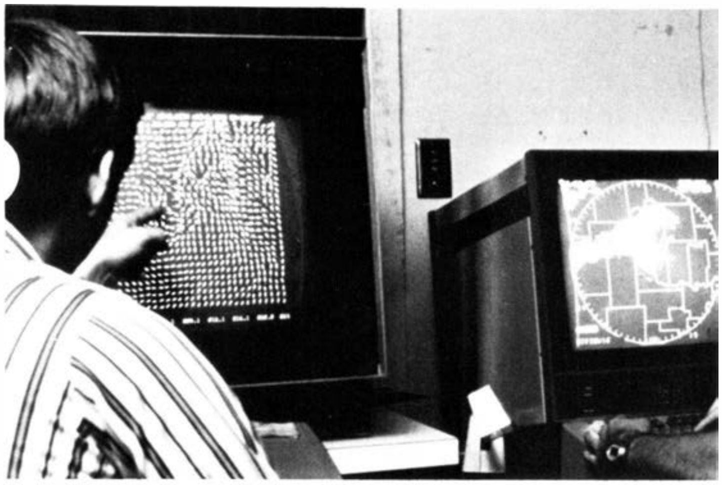
The National Transportation Safety Board later stated that a major reason for the crash had been the inability of FAA's air traffic control system—relying as it did on weather data from NWS's WSR-57s—to provide the DC-9's crew with reliable, real-time information on the presence of the killer thunderstorm.

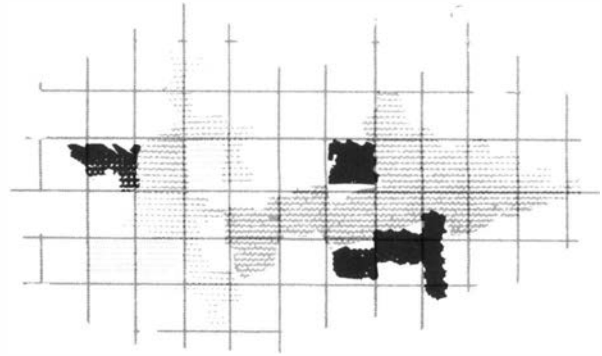
AFGL participated with NSSL in further tests, this time at Norman with AFGL's 5-cm and NSSL's 10-cm radars operating side by side. The radar products were digitized and computerized, and every six minutes advisories went out via narrow-band telephone lines to the NWS, Air Force and FAA operational sites, including the terminal radar approach control at Tinker Air Force Base, Oklahoma, and the air route traffic control center at Fort Worth, Texas, with excellent results.

This 1979 test proved both that a NEXRAD network with off-the-shelf components was practical and that the 10-cm Doppler radars were the NEXRAD radars of choice.

In May 1979, the JDOP proposed the establishment of a single national Doppler weather radar network to serve the needs of the Departments of Commerce, Defense and Transportation—a proposal echoed by the AWS/AFGL working group two months later.

In August 1979, a Joint System Program Office (JSPO) was established by the three Departments and,





National Weather Service and Air Weather Service forecasters in a 1977 test had black and white "multimoment" displays of arrows (left)—which varied according to intensity and speed of precipitation targets—and color displays.

Photo courtesy of NOAA

since it was clear that Commerce would buy and operate most of the Doppler radars in the network, that Department was given the lead role.

NEXRAD was designed in three separate subsystems:

■ *The Radar Data Acquisition (RDA) Subsystem.* This is unmanned and designed for remote operation. The 10-cm Doppler radar includes a transmitter, receiver/exciter, radar signal pre-processor, antenna and automated controller.

■ *The Radar Products Generation (RPG) Subsystem.* This is the primary data-processing part of the system.

■ *The Principal User Processor (PUP) Subsystem.* This will be used by all participants except FAA, which will receive the data through its air route traffic control center processors.

By late spring of 1981, JSPO was ready for system acquisition. Through the various steps, Raytheon Company and Sperry Corp. emerged in May 1983 with contracts to develop pre-production models by December 1985, following which, one of them will be given a limited production contract for 10 units to be delivered in March 1988. A full production contract would then be issued that summer.

By February 1984, JSPO had determined that the NEXRAD network would consist of 117 radars and processors and 157 PUPs and that FAA ould operate 11 Doppler radars only in Hawaii, Alaska and Puerto Rico. All the user subsystems and the rest of the radars would be operated by the National Weather Service, the Air Weather Service and Naval Oceanographic Command.

According to the plan, NEXRAD data from the Radar Products Generation Subsystems—the processors—will enter FAA's weather system via a telephone link at each ARTCC Central Weather Processor (CWP). Each RPG will provide coverage for a portion of an ARTCC's airspace.

The 61 automated flight service stations will receive the NEXRAD data directly from the Flight Service Data Processing Systems located in the ARTCCs, which receive their data from CWPs. In addition, the FSS computers will be able to supply NEXRAD products specifically tailored to pilot briefings. When the new Mode S radar beacon system is implemented—which should be about the same time as NEXRAD—pilots will be able to receive NEXRAD information automatically by data link.

As an offshoot of the NEXRAD network, there eventually should be Doppler weather radars in selected airport terminal areas to detect such weather phenomena peculiar to the terminal environment as low-level wind shear, microbursts and downdrafts.

It has been estimated that the full cost of the NEXRAD network will approach $1 billion, 20 percent of which will be FAA's share—not a trifling sum but a necessary one to maintain the safety of the National Airspace System.

Consider a poem that some of us learned as children:

Who has seen the wind?
Neither you nor I.
But when the trees bow low their heads,
The wind is passing by.

That no one had ever seen the wind was once the case, but no more.

Now for the first time in history, we can "see" the wind as it works its mischief in the clouds. When NEXRAD comes on the scene, we will be able to be forewarned and prevent that mischief from harming us to a degree not possible before. ■

In Other Words . . .

Doppler radar—an adaptation of an effect first described by the 19th Century Austrian physicist Christian Doppler, which is a perceived shift in frequency as an object moves to and from the observer; e.g., the pitch of a train whistle rises as the train approaches and falls as the train recedes.

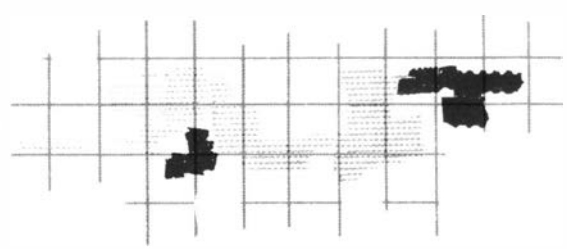
Mesocyclone—a large thunderstorm that has started rotating.

Microburst—a small downrush of air, can be one of the causes of wind shear.

Radar signature—an identifiable pattern on radar.

Radial wind velocity—the wind velocity with respect to the radar.

Velocity spectrum—the distribution of velocities acquired.



By Peter Demchuk
A writer-editor in the Office of Public Affairs, he came to FAA from the Urban Mass Transportation Administration.

Ich Bin Ein FAAer*

The American Presence in Berlin Isn't Just Military

Smith manages the only Department of State fire, crash and rescue department in the world. Here he talks to his fire chief, Mr. Hergesell, and deputy chief, Mr. Gärtner.

Robert F. Smith holds a unique job in the FAA. For the past two years, Smith has served as the United States Administrator for Aeronautics (USAA), a part of the U.S. Mission in Berlin.

His overseas post requires him to be a sort of jack-of-all-trades who needs the varied background he brings to the position: the managerial skills of an Air Traffic Division chief, the technical know-how of an engineer and the political savvy and cultural graces of a diplomat. He also wears 29 years of government service very well.

As aeronautics administrator, Smith works through the State Department in what is known as a "reimbursable agreement," whereby the FAA is repaid by State for his services.

Smith's primary duty is to serve as the technical aviation representative in West Berlin for the U.S. Civil Air Attache, who works out of the American Embassy in Bonn, the capital of the Federal Republic of Germany ("West Germany"). Smith remains on the FAA payroll during this assignment, reports to the director of the FAA Office for Europe, Africa and the Middle East and turns to that organization for technical advice and support.

That the USAA post is so challenging and multi-dimensional is due in large part to the fact that Berlin is a peculiarly complex city. After World War II, Berlin was divided by the Allies into British, French and American "occupation zones" (now West Berlin), as well as a Soviet sector (now East Berlin). The split was made painfully manifest with the construction of the Berlin Wall, which snakes for 29 miles along the line of partition. Today, West Berlin remains an enclave in the German Democratic Republic, or "East Germany."

Because of this chaotic post-war history, West Berlin's day-to-day municipal functions remain largely under the shared rule of the U.S., Great Britain and France.

Bob Smith's boss, the U.S. Civil Air Attache, has a British and French counterpart in Bonn, and together they form the Berlin Air Coordinating Committee. The committee sets the civil aviation rules for Berlin in accordance with FAA and International Civil Aviation Organization (ICAO) standards.

Given the labyrinthine nature of Berlin's shared rule, it is not surprising to find that Smith wears more hats in his present job than many FAAers do in an entire career. Perhaps the biggest hat he wears is in his role as the manager of the Berlin Aeronautics Unit (BAU), which is part of the U.S. Mission. The BAU has 126 staff members, all of whom are local hires. Smith notes that the organization is really "a mini FAA" with eight divisions: Administration; Airport Services; Air Noise Monitoring; Telecommunications and Aeronautical Information Services ("a sort of flight service station,"

* *"I am an FAAer," echoes President John F. Kennedy's famous statement in Berlin.*

U.S. Administrator for Aeronautics Robert Smith arrives at work at the Tempelhof Central Airport building, one of the world's largest buildings.

says Smith); Air Traffic Control; Aeronautical Technical Services (comparable to an FAA Airway Facilities sector office); Automation; and the Airport Fire, Crash and Rescue Unit.

Since all aviation matters are handled jointly, most of the BAU services support the tripartite Berlin aviation requirements. For instance, BAU operates the air noise monitoring system at Tegel Airport in the French sector, the primary air carrier airport, as well as the Flight Plan Processing and Coordinating System, which is the automation system for processing all of the Allies' information on flight plans, weather and Notices to Airmen (NOTAMs); it is also used for air traffic control. Still another service is performing maintenance for the three Doppler VOR navigation aids that serve the three air corridors to and from Berlin. The Aeronautical Technical Services Division also manages 13 other BAU navigation aids.

Although on the surface it appears that most of the burden falls on the United States, the costs of the tripartite administration are drawn from a German occupation fund, and there is an historical justification.

"In 1950, after the Berlin Airlift," Smith explains, "access to Berlin had become primarily by air and passenger traffic was increasing. Tempelhof was the major airport and it lay in the United States zone. So, the U.S. became the major organization to handle aviation matters, especially civil air.

"In 1976, passenger traffic—air carrier traffic—was switched to the new Tegel Airport, which was in the French zone. Since the functions performed by BAU had always been considered tripartite and affecting the whole of [West] Berlin, they were continued without change."

Another big title that follows Smith's name is Civilian Airport Manager for Tempelhof Central Airport, now a joint-use civilian/military airport. Tempelhof has been an alternative civilian airport for Berlin since the commercial airlines moved to Tegel Airport.

Smith has had a few brushes with international intrigue as the Tempelhof manager. Four Polish "diversion flights," or hijackings, to the West have chosen to land there since he came aboard. "My responsibility," Smith said, "was to make sure the aircraft were airworthy to take off and also to provide the fuel and papers to get them off the airport."

Smith also chairs all chief pilot meetings for the Allied air carriers—Pan American, British Airways and Air France. Because of

As Capt. Kramer of Tempelhof Airways does a preflight walkaround for his Cessna Conquest, Smith chats with him.

the sensitive and cramped airspace above Berlin, it is important to hold these meetings on a regular basis to discuss new procedures or the need for training flights directly—rather than issuing regulations or advisory circulars as in the United States. Smith also regularly assists the four U.S. carriers in Berlin—Pan Am, Air Berlin, Tempelhof Airways and Direct Air—on operational problems.

The aeronautics administrator is the civil aviation advisor to the U.S. Commandant and the U.S. Minister to Berlin, who are the ranking military and civilian government representatives in West Berlin.

The final hat on Smith's crowded rack is his chairmanship of the Berlin Air Coordinating Committee Working Group, which is rotated every four months with his British and French counterparts. This group has the last word on all technical aviation matters in West Berlin.

One of the more pleasant aspects of Smith's job is the occasional social event he is called upon to stage for various diplomatic and aviation-based groups in Berlin. These gatherings allow Smith and his wife, Renate, to experience the heady blend of European cultures in this truly international city.

While Smith insists his German is still spotty, his wife's is not, being a born Berliner. "The post is good," he said; "there are a lot of social aspects to it and responsibility, and then there are a lot of cultural things to do—Berlin is a very cultural city."

"I think my assignments in FAA have been interesting," he continued. "I think that was true when I was a specialist doing an ATC survey in Saudi Arabia. I was in the Air Traffic Service in headquarters at a time when minorities and women were not very visible in air traffic, and I was an air traffic supervisor early on. I was the first enroute center chief; I was the first air traffic assistant division chief in two regions; I was the first air traffic division chief.

USAF photos by Thomas Farr

Mr. Grzella, BAU chief of automation, explains the system to Carlisle Cook (second from left), manager of the Miami ARTCC, and Ralph Cooper (right), manager of the headquarters Air Traffic Plans Branch. USAF photo by Rami Harcsztark

Smith visits one of his FBOs: John Casey, vice president of operations for Air Berlin, in the company's operations room at Tempelhof Airport.

"I think I've earned this position. I think because it's a unique position, the Department of State had a strong interest in who filled the job. I even had to go over to Bonn to meet with the deputy chief of mission before I was totally approved for the job."

Recently, he learned that he will be staying in Berlin for a second tour. Its easy to understand his satisfaction. Given the immense challenges and the fascinating setting that go with the USAA post, one would be hard pressed to find an FAAer anywhere who would be quick to say "auf Wiedersehen" to such a job. ■

People

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

Aeronautical Center

■ **Stanley R. Adams,** supervisor of the Telecommunications Management Section, Systems and Technology Branch, Data Services Division.

■ **Dale E. Gerten,** staff officer, Program Support Staff, National Airway Engineering Field Support Sector, Maintenance Engineering Division.

■ **David F. Grogan,** group supervisor in the Warehouse Automation Staff, Storage and Transportation Branch, FAA Depot.

■ **Donald C. Martin,** unit supervisor in the Avionics Maintenance Section, Aircraft & Avionics Maintenance Branch, Aircraft Maintenance & Engineering Division, Aviation Standards National Field Office.

■ **Carol A. Wortham,** unit supervisor in the Training Systems Section, Logistics and Training Systems Branch, Data Services Division.

Alaskan Region

■ **Edmond L. Ashworth,** North Unit supervisor at the Anchorage Central Maintenance Facility, Anchorage Airway Facilities Sector.

Central Region

■ **Robert L. Anderson,** manager of the Omaha, Neb., Airway Facilities Sector Field Office, Grand Island, Neb., AF Sector.

■ **Patrick J. Callagy,** area supervisor at the Kansas City, Mo., Downtown Airport Tower.

■ **Richard L. Day,** area supervisor at the Kansas City ARTCC, from the FAA Academy.

■ **William M. Fleming,** manager of the Forbes Air Force Base Tower, Topeka, Kan., promotion made permanent.

■ **Robert D. Long, Jr.,** manager of the Lincoln, Neb., AF Sector Field Office, Grand Island AF Sector, promotion made permanent.

■ **Jack E. McCormick,** area supervisor at the Kansas City ARTCC.

■ **Frank R. Procopis,** area supervisor at the Kansas City ARTCC, from the FAA Academy.

Eastern Region

■ **Webster S. Ambush,** area supervisor at the Washington ARTCC.

■ **Herbert B. Armstrong,** area supervisor at the Newport News, Va., Tower, from the Corpus Christi, Tex., Tower.

■ **William J. Boettcher,** area supervisor at the Baltimore, Md., Tower, from the Westchester, N.Y., Tower.

■ **Glenn L. Broomell,** area supervisor at the Baltimore Tower, from the Lancaster, Pa., Tower.

■ **Ralph A. Cole,** area supervisor at the Allentown, Pa., Tower, from the Philadelphia, Pa., Tower.

■ **Raymond W. Duda,** area supervisor at the Baltimore Tower, promotion made permanent.

■ **Raymond William Fisher,** manager of the Oriskany, N.Y., Airway Facilities Sector Field Office, Albany, N.Y., AF Sector, from the Utica, N.Y., AFSFO.

■ **Mahlon R. Fuller,** area supervisor at the Greater Pittsburgh (Pa.) Tower.

■ **William F. Givens,** manager of the Wilkes-Barre, Pa., Tower, from the Parkersburg, W.Va., Tower.

■ **Albert E. Gomeringer,** unit supervisor in the Atlantic City, N.J., AF Sector Field Office, Tri-State AF Sector.

■ **Sheldon Gross,** manager of the JFK Airport AF Sector Field Office, Metro New York AF Sector, from the LaGuardia Airport AFSFO.

■ **Larry J. Jewell,** manager of the Binghamton, N.Y., Tower, from the Miami International Airport Tower.

■ **John V. Kelley,** area supervisor at the Washington ARTCC.

■ **Vincent A. Laurentino,** assistant manager of the Metro New York AF Sector.

■ **Donald B. Martin,** area supervisor at the Reading, Pa., Tower, from the Harrisburg, Pa., Tower.

■ **Paul Massanopoli,** assistant manager for automation at the Washington ARTCC.

■ **Thomas W. McGee,** area supervisor at the Washington ARTCC.

■ **Paul C. Mitchell,** assistant manager, airspace and procedures at the Washington ARTCC.

■ **Ralph C. Mitchell,** area manager at the Washington ARTCC.

■ **Robert G. Moore,** manager of the LaGuardia Airport AF Sector Field Office, Metro New York AF Sector, from the JFK Airport AFSFO.

■ **Bernard J. Onachila,** unit supervisor in the Philadelphia AF Sector Field Office, Tri-State AF Sector.

■ **Larry R. Penrose,** area manager at the Washington ARTCC.

■ **Herbert Ross,** manager of the Program and Planning Branch, Airway Facilities Division, from the Electronic Engineering Branch.

■ **Raymond L. Shannon,** traffic management coordinator at the Washington ARTCC.

■ **Vellow D. Smith,** area supervisor at the Danville, Va., Flight Service Station, from the Bluefield, W.Va., FSS.

■ **Otto N. Suriani,** airport planner, Planning & Environmental Section, Planning & Programming Branch, Airports Division, from the New York Airports District Office.

■ **Joseph E. Talley,** manager of the Lynchburg, Va., AF Sector Field Office, Norfolk, Va., AF Sector.

■ **Robert L. Walker,** unit supervisor in the Philadelphia AF Sector Field Office, Tri-State AF Sector.

■ **Floyd S. Woodward,** enroute automation supervisor at the Washington ARTCC.

■ **Robert J. Zoldos,** area manager at the Washington ARTCC.

Great Lakes Region

■ **Eugene C. Anderson,** watch supervisor in the Michigan Airway Facilities Sector, Romulus, Mich.

■ **Lyndon H. Bronniche,** manager of the Crystal Airport Tower, Minneapolis, Minn., promotion made permanent.

■ **John J. Cielinski,** area manager at the Cleveland, Ohio, ARTCC.

■ **Charles A. Cole,** manager of the Bismarck, N.D., Tower, from the Alton, Ill., Tower.

■ **Stephen C. Harless,** area supervisor at the Cleveland ARTCC, from the headquarters Special Projects Staff, Air Traffic Service.

■ **James L. Hevelone,** area supervisor at the Cleveland ARTCC, from the headquarters Requirements Branch, System Plans & Programs Div., Air Traffic Service.

■ **Bruce M. Jeckel,** manager of the Duluth, Minn., Tower, from the Cleveland Lakefront Airport Tower.

■ **James E. Kennedy,** supervisor of the Materiel Management Section, Logistics Services Branch, Logistics Division.

■ **Eugene W. Sherman,** unit supervisor in the Detroit, Mich., Flight Standards District Office, from the Mid-South FSDO, Birmingham, Ala.

■ **Randy S. Zemel,** area supervisor at the General Mitchell Field Tower, Milwaukee, Wis., promotion made permanent.

New England Region

■ **John Auchterlonie, Jr.,** area supervisor at the Brainard Tower, Hartford, Conn., from the Bradley Field Tower, Windsor Locks, Conn.

■ **Arthur J. Beatty,** unit supervisor in the Hyannis, Mass., Airway Facilities Sector Field Office, Boston, Mass., AF Sector.

■ **John J. Murphy,** area manager at the Boston ARTCC.

■ **Lewis E. Seay,** unit supervisor in the Nantucket, Mass., AF Sector Field Office, Boston AF Sector.

■ **Evangelos Tyros,** area manager at the Boston ARTCC, from the Evaluation Branch, Air Traffic Division.

Northwest Mountain Region

■ **Ralph L. Allen,** communications manager in the Salt Lake City, Utah, NADIN Sector Field Office, from the Kansas City, Mo., National Communications Center.

■ **Joel W. Bryant,** section supervisor in the Seattle, Wash., Airports District Office, from the Safety and Standards Branch, Airports Division.

■ **George L. Buley,** manager of the Seattle Airports District Office, from the Planning & Programming Branch, Airports Division.

■ **Robert D. Earl,** manager of the Colorado Springs, Colo., Tower, from the Yakima, Wash., Tower.

■ **David A. Field,** section supervisor at the Seattle Airports District Office, from the Safety and Standards Branch, Airports Division.

■ **David G. Hmiel,** manager of the Modification Branch, Seattle Aircraft Certification Office.

■ **Gene E. Lehto,** manager of the Lakeside, Mont., Airway Facilities Sector Field Office, Billings, Mont., AF Sector.

■ **Marvin E. Mahrt,** area supervisor at the Seattle ARTCC, from the Plans, Programs and Evaluation Branch, Air Traffic Div.

■ **James M. McMains,** area supervisor at the Billings Tower, from the FAA Academy.

■ **George C. Paul,** assistant manager of the Airports Division.

■ **Joe I. Segura,** assistant manager, plans and programs at the Seattle ARTCC.

■ **Peter C. Sweers,** assistant manager of the Denver, Colo., ARTCC, from the Central Region Air Traffic Division.

Administrator Engen presented a Group Superior Achievement Award to the Airways Science Curriculum team for its innovative accomplishments in developing the curriculum. From the left are Judith Branting, Personnel and Training Director Donald Rock, Mr. Engen, Michael Hill, David Carmichael and Richard Rice.

■ **Nabi Taskin**, supervisor of the Planning and Programming Section, Planning and Programming Branch, Airports Div.

■ **Edwin L. Trudgeon**, supervisory engineering draftsman in the Establishment Branch, Airway Facilities Division, promotion made permanent.

■ **James Ziemba**, manager of the Procurement Branch, Logistics Division.

Southern Region

■ **James O. Boone**, staff assistant in the Office of the Director, from headquarters, Office of the Administrator.

■ **Bryant M. Chestnutt**, unit supervisor in the South Florida Flight Standards District Office in Miami, Fla.

■ **Ernest J. Fontaine**, assistant manager of the Miami Hub Airway Facilities Sector, from the San Juan, Puerto Rico, AF Sector.

■ **Lawrence C. Howell**, unit supervisor in the Chattanooga, Tenn., AF Sector Field Office, Atlanta, Ga., Hub AF Sector.

■ **George E. Ivey**, manager of the Maiden, N.C., AF Sector Field Office, Charlotte, N.C., AF Sector, from the Raleigh, N.C., AF Sector.

■ **Ernest C. Lewis**, unit supervisor in the Tampa, Fla., AF Sector, promotion made permanent.

■ **David D. Mudd**, area manager at the Jacksonville, Fla., ARTCC.

■ **Robert Nunnelley**, assistant manager for technical support at the Montgomery, Ala., AF Sector, from the Maintenance Program Branch, AF Division.

■ **Richard A. Post**, manager of the Savannah, Ga., Flight Service Station, from the Crestview, Fla., FSS.

■ **William G. Ross**, manager of the Dothan, Ala., Tower, promotion made permanent.

■ **Gene E. Underwood**, manager of the Anderson, S.C., AF Sector Field Office, Charlotte AF Sector.

■ **Raleigh W. Whiteman, Jr.**, manager of the Key West, Fla., Tower, from the Opa Locka, Fla., Tower.

Southwest Region

■ **Alden Barilleaux, Jr.**, area supervisor at the Baton Rouge, La., Tower, from the Evaluation Staff, Air Traffic Division.

■ **Donald K. Blanchard**, manager of the New Orleans, La., Lakefront Tower, from the Little Rock, Ark., Tower.

■ **Charles T. Brion**, manager of the Lawton, Okla., Tower, from the FAA Academy.

■ **Frank L. Clausen**, area supervisor at the Houston, Tex., ARTCC.

■ **Osborne C. Davis, Jr.**, area officer at the Fort Worth, Tex., ARTCC.

■ **Lonam R. Fogleman, Jr.**, unit supervisor in the Andrews, Tex., Airway Facilities Sector Field Office, El Paso, Tex., AF Sector, from the Albuquerque, N.M., AF Sector.

Retirees

Carlley, Samuel F., Jr.—AC
Falvey, Donald A.—AC
Flinta, Elizabeth A.—AC
Howell, Rawleigh R.—AC
Mosier, Russell E.—AC

Collins, Mandle—AL
Costello, John G.—AL
Pannone, Michael L.—AL

Bjerkestrand, Lyle C.—CE
Burton, Bill—CE
Ford, Robert G.—CE
McNelly, Mahlon—CE
Whitney, Robert B.—CE

Bridges, Herbert L.—CT
Miller, William L.—CT
Monchak, John—CT

Crouse, John T.—EA
Fisher, Charles M.—EA
Hargwood, Harold, Jr.—EA
Holleran, Thomas P.—EA
Huller, Robert R.—EA
Klick, Richard J.—EA
Rogers, James M.—EA
Spooner, Franklin H.—EA
Turner, Charles G.—EA
Weiss, Murray A.—EA
Zicaro, Alfred—EA

Arneson, Harold L.—GL
Dankof, Danny D.—GL
Dempsey, Joseph J.—GL
Elliott, Jeremy S.—GL
Ellis, Duane D.—GL
Flowers, Albert—GL
Hart, Ralph D.—GL
Johnson, Russell C.—GL
Konrad, Earl G.—GL
Oxford, Ralph W.—GL
Sapienza, Alfio A.—GL
Thompson, Roger C.—GL
Tinsman, Jack F.—GL
Walswick, Lee W.—GL

Nolan, Clara E.—MA
Roach, Thelma N.—MA
Royston, Garfield C.—MA

Barnard, Richard I.—NE
Glenn, Thomas A.—NE
Moffitt, Ralph H.—NE
Thornhill, Wilford B.—NE

Baird, Earl D.—NM
Boatman, Lloyd R.—NM
Christesson, Billy J.—NM
Crosby, Clarence E., Jr.—NM
Daugherty, Raymond J.—NM
Dew, William L.—NM
Dobson, Gerald E.—NM
Herring, Dean F.—NM
Pine, Robert—NM
Scharf, Robert J.—NM
Schroeder, Charles C.—NM
Watson, Joyce D.—NM

Bennett, William R., Jr.—SO
Bodiford, William D.—SO
Bradshaw, John T.—SO
Cannady, Forrest R.—SO
Ernest, Lloyd C.—SO
McMillian, Hilary L.—SO
Miller, Donald E.—SO
Sherwood, Judith J.—SO

Cantu, Abelardo—SW
Davis, Neil L.—SW
Gruber, Errol G., Jr.—SW
Jones, Rufus M.—SW
Ochocki, Robert—SW
Riley, Ross B.—SW
Saulsberry, Dorothy C.—SW
Smith, Orlo G.—SW

Mulhearn, Rupert A.—WA
Weller, Marie W.—WA
Wrenn, Robert J.—WA

Amamoto, Tsugiyo R.—WP
Clair, Mark A.—WP
Crawford, Harriet E.—WP
Ford, Edwin D, Jr.—WP
Kerr, Robert J.—WP
Larson, Jennings O.—WP
Martin, Thomas J.—WP
Page, Winnifred O.—WP
Reynolds, Richard L.—WP
Risner, Nancy S.—WP
Thorpe, Gerald H.—WP
Waples, Jerry F.—WP

This year's outstanding handicapped employee is Juanita Otero, an information processing clerk in the Eastern Region's Logistics Div. Her consistently superior work in the word processing center and her dedication earned her the honor.

■ **John F. Hicks, Jr.**, assistant manager of the Fort Worth ARTCC.

■ **George S. Jones**, area supervisor at the Midland, Tex., Tower, from the Austin, Tex., Tower.

■ **Lee R. Pearcy**, area supervisor at the San Antonio, Tex., Flight Service Station, promotion made permanent.

■ **Dennis L. Rice**, assistant manager for technical support in the Oklahoma City AF Sector, promotion made permanent.

Technical Center

■ **Joseph J. Brady**, technical program manager in the Flight Information Systems Branch, Engineering Division.

■ **Richard Piech**, supervisor of the Hardware Engineering Section, Facility Engineering & Maintenance Branch, Facilities Division, promotion made permanent.

■ **Richard W. Shaw**, supervisor of the Telecommunications Section, Airborne & Ground Based Facilities Branch, Facilities Division.

Washington Headquarters

■ **Edward T. Harris**, staff chief in the Information Resources Management Program Office, Office of Management Systems.

■ **Lynn Ellsworth Jackson**, manager of the International Strategic Planning Branch, International Planning & Analysis Div., Office of International Aviation.

■ **James H. Loos**, manager of the Operations Liaison Branch, International Liaison & Policy Div., Office of International Aviation.

■ **Raymond E. Ramakis**, manager of the Aircraft Maintenance Division, Office of Airworthiness.

■ **Steven I. Rothschild**, manager of the Technical Assistance Division, Office of International Aviation.

Western-Pacific Region

■ **Sherrel D. Dowell**, manager of the American Samoa Airway Facilities Sector Field Office.

■ **Gordon T. Fujii**, manager of the Honolulu, Hawaii, AF Sector Field Office (Navcom), Honolulu AF Sector, from the American Samoa AFSFO.

■ **Martin A. Gallagher**, unit supervisor in the San Francisco, Calif., Air Carrier District Office.

■ **Charles D. Halterman**, area supervisor at the Montgomery Field Tower, San Diego, Calif., from the Oakland, Calif., Tower.

■ **Ralph A. Hiller**, area supervisor at the Ontario, Calif., Tower, from the Palm Springs, Calif., Tower.

■ **James R. Hussong**, manager of the Santa Barbara, Calif., AF Sector Field Office, from the Oxnard, Calif., AFSFO.

■ **William M. Millen**, manager of the Bakersfield, Calif., Flight Service Station, from the Salinas, Calif., FSS.

■ **Ock-Ju Noh**, manager of the Personnel Management Division, from the Great Lakes Management Systems Division.

■ **Wayne E. Olson**, unit supervisor in the ATC Automation & Flight Information Program Section, Establishment Engineering Branch, AF Div., promotion made permanent.

■ **Carol S. Rayburn**, assistant manager of the Flight Standards Div., from the Fresno, Calif., GADO.

■ **James R. Howland**, training specialist at the Los Angeles, Calif., ARTCC, from the Los Angeles FSS.

■ **Anna M. Rucker**, area supervisor at the Santa Rosa, Calif., Tower.

■ **Lawrence E. Samson**, assistant manager for training at the Phoenix, Ariz., Tower.

■ **Burleigh J. Stokes**, area manager at the Phoenix Tower, from the Northwest Mountain Air Traffic Division.

■ **Henry A. Sumida**, manager of the Honolulu Airports District Office, promotion made permanent.

■ **Ronald D. Tener**, area supervisor at the Red Bluff, Calif., FSS, from the Sacramento, Calif., FSS.

■ **Catherine M. Trujeque**, supervisory personnel staffing specialist, Employment Branch, Personnel Management Division, promotion made permanent.

■ **Ronald T. Wenstrom**, assistant manager of the Sacramento, Calif., FSS, from the Paso Robles, Calif., FSS.

■ **William C. Withycombe**, manager of the Situation Monitor Staff, Flight Standards Division.

By Cathy Zorr-Spiegel
The secretary of the Oshkosh, Wis., Tower, she's seen a lot of fly-ins come and go.

The Busiest Airport Isn't O'Hare

For 10 Days Oshkosh Has the Most Traffic and Oddest Mix

Oshkosh Tower isn't just another Level I VFR facility.

Ten days out of each year, the Oshkosh, Wis., Tower becomes the busiest control tower in the world. The annual Experimental Aircraft Association (EAA) Convention is responsible for this distinction.

Due to the large number of air traffic operations—64,136 in 1983—the Oshkosh staff is assisted by 24 support controllers from throughout the Great Lakes Region. It's not that the personnel can't handle the traf-fic—after all, even O'Hare has more than five FPLs on board.

The local staff at Oshkosh is the true backbone of the convention. For 50 weeks of the year, they quietly work all the traffic, including the ultralight convention, Sonarai and Bonanza conventions.

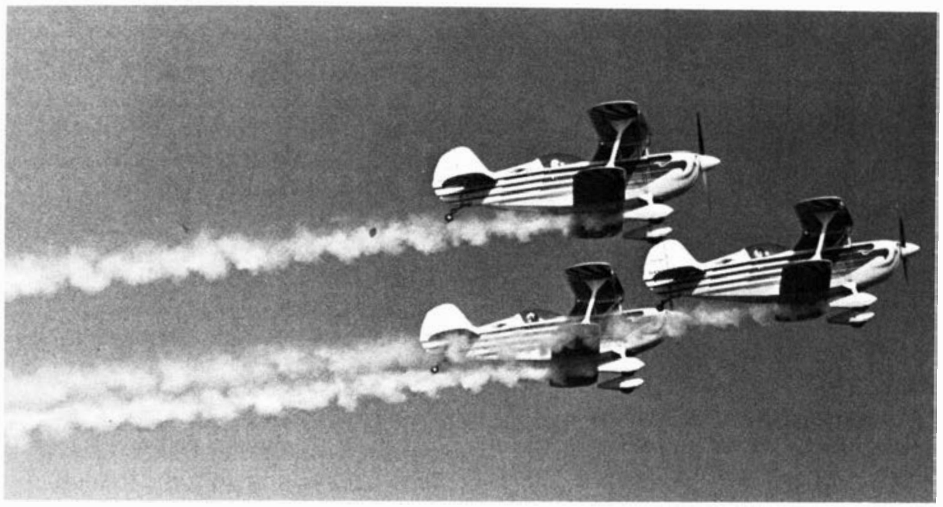
The staff includes Al Sabin, Gordon Haymen, Verne Wepner, Michelle Wrobleski, Russell Lincoln, Jim Conard, Terry O'Neill and Bob Hopkinson.

Since 1970, when Oshkosh Tower began hosting the annual event, the number of registered show aircraft has grown from approximately 700 to a high of over 1,800, a count reached in 1982. The gate count has increased from just above 700,000 to last year's total of 855,000 visitors.

The EAA organization moved its offices from Hales Corners, Wis., to the brand new Aviation Center & Museum on January 9 of this year and is now in the process of building an airport on an airport.

Behind the museum, the association plans to construct a 1,800-foot runway and a 1930s hangar system to complement its Aviation Center.

Oshkosh Tower's preparation for the EAA Convention has become almost a year-round project for Larry Barnes, air traffic manager, and myself. The 1983 convention ended on August 6. And the very next day the managerial staff began sifting

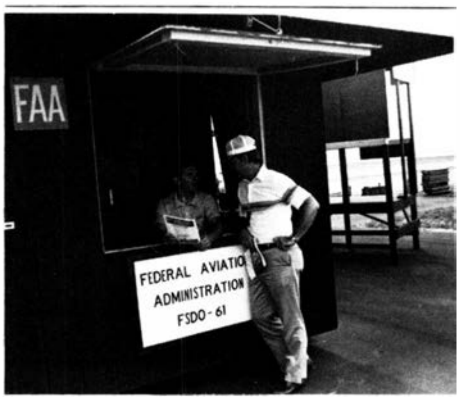


Three Christen Eagle aerobats fly in formation at the 1984 EAA Fly-In.

FAA mobile air traffic control cars maintain radio contact with the tower.

Some of the 1,400 visiting aircraft park near the EAA fairgrounds. The Oshkosh airport terminal is at upper left.

Fly-in pilots ready for takeoff are supposed to watch the red paddles wielded by controller Linda Brown of the Great Lakes Air Traffic Operations Branch.



The Milwaukee Flight Standards District Office opened a branch office at the fly-in. Here, accident prevention specialist Jim Szajkovics (left) briefs John Kern, deputy director of the Office of Flight Operations in Washington.

through the deluge of paper.

A two-inch ring binder is jammed with the proof of convention labor. Included are traffic counts, critiques, controller applications, controller package information, supplies and equipment, personnel and schedules, out/inbound correspondence, procedures and letters of agreement, accommodations, race information, EAA correspondence and waivers.

The Oshkosh Tower manager usually conducts two preconvention and two postconvention meetings. One of each is held jointly with the EAA and FAA personnel, and one with just the FAA people.

As tower manager, Barnes must coordinate with the Chicago Center, Green Bay FSS, Oshkosh Sector Field Office and surrounding towers which are affected by the great influx of air traffic. Some of the towers heavily affected are Milwaukee, Green Bay, Madison and Appleton, Wis., and Muskegon, Mich.

Critiques are received from convention controllers, coordinators, EAA personnel, pilots and spectators. Some require research and written replies. All are reviewed and pertinent ideas are taken to the post-convention meetings.

Corresponding to the increase in runway traffic is an increase in the tower secretary's duties. Besides day-to-day tasks, the blessings of hosting the convention bring with them a continuously ringing telephone, times three, what with one FTS and two outside lines.

Between phone calls, I type and distribute waiver requests, 36 temporary airman certificates, shift assignments, the Warbird arrival and umpteen no-radio waivers.

Another item is door detail—keeping track of visitors to the tower cab, trying to keep their number limited to five persons and graciously enforcing the five-minute time limit on visits. Several times we've wondered why we don't install a revolving door at the base of the tower, or maybe a turnstyle. Let's see . . . 500 visitors per day . . . at 10 cents per person . . .

As a warm-up to the big convention, Oshkosh also hosts the annual EAA Ultralight Convention. This year it was June 15-17 where we expected about 1,500 air vehicles during the three-day weekend.

We at Oshkosh Tower enjoy the annual excitement generated during the 10-day EAA Convention. However, we are all relieved when we hear the last home-built call in over the 118.5 frequency: "Clear of the Oshkosh control zone."

So long, 'till next year! ■

Not quite a modern TRACON, this was FAA's approach control facility for the EAA fly-in in a pasture a few miles from Wittman Field, Oshkosh.

Flight service specialist Paul Kasen of the Rapid City, S.D., FSS does a land-office business at the Green Bay, Wis., FSS's trailer at Wittman Field.

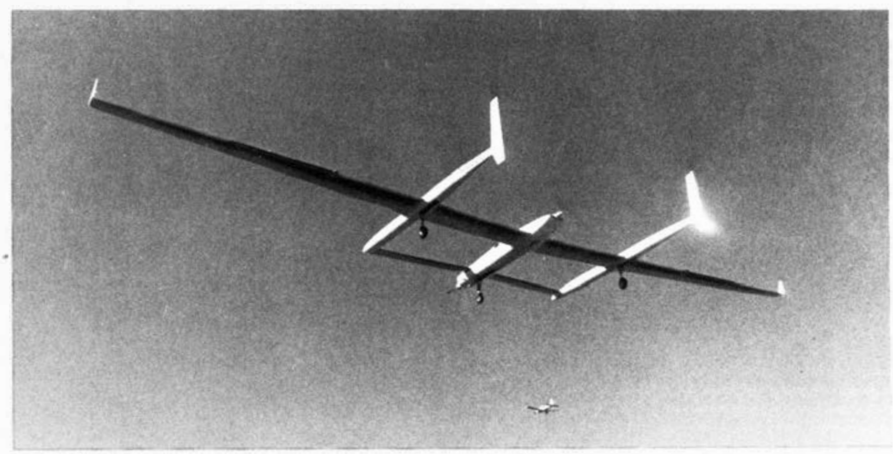
Photos by Dennis Hughes, Edmund Pinto and John Leyden

A good overall viewing area for the festivities was the only raised portion of ground at the airport—the base of the Wittman Field tower.

A new FAA exhibit tells EAA visitors about the agency's automated flight service station program.

Assistant Administrator for Public Affairs Edmund Pinto (left) takes a ride in a modern homebuilt that features a canard wing and drag-reducing winglets.

Controllers at the fly-in were drawn from many facilities in the Great Lakes Region. Left to right are Ed Wasik, South Bend, Ind., Tower; Verne Wepner and Bob Hopkinson, Oshkosh Tower; and Greg Depauw, Columbus, Ohio, Tower.

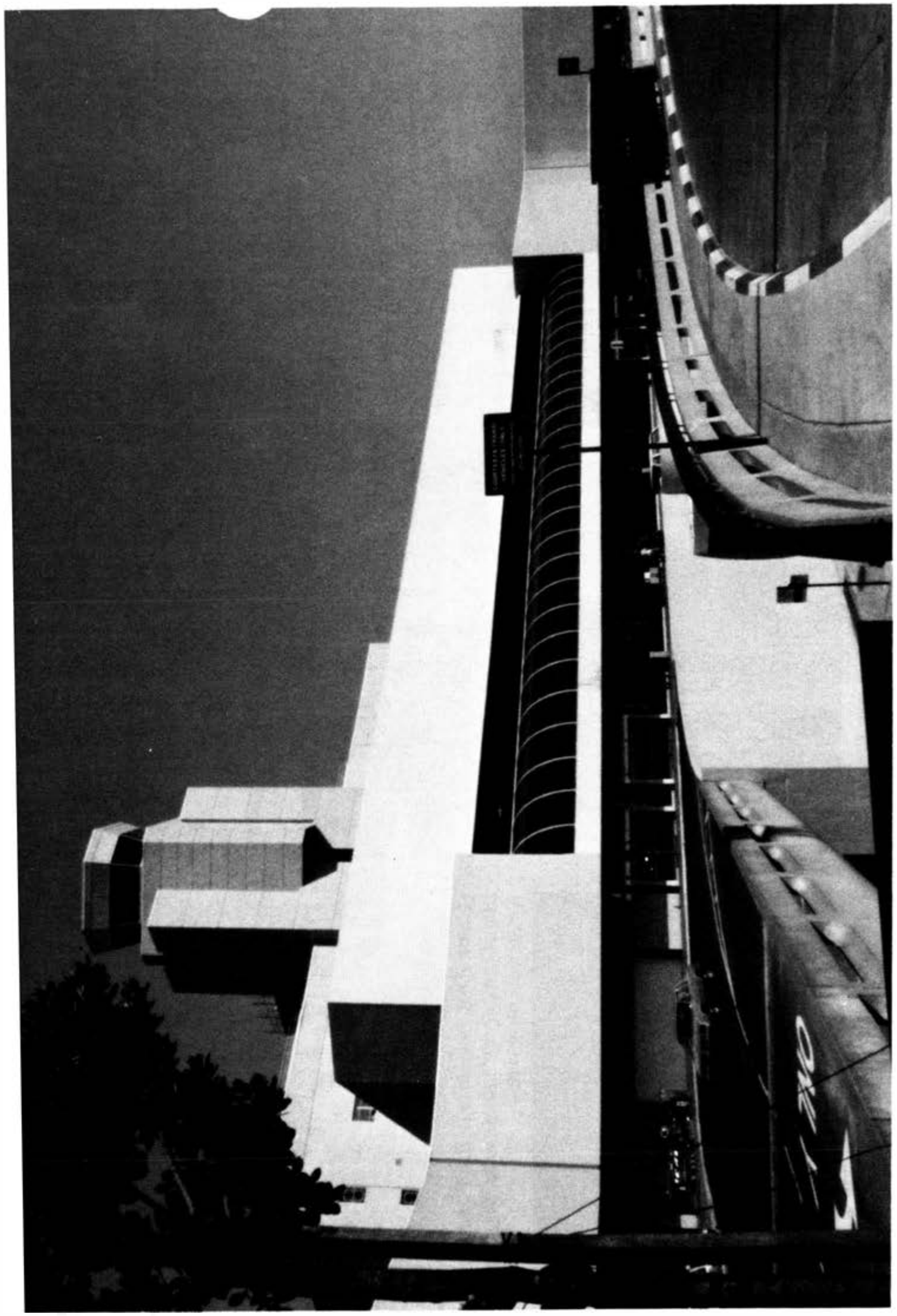


The most fascinating among hundreds of fascinating aircraft at the EAA Fly-In this year was a Burt Rutan design that is hoped will set a major aviation record before the next fly-in.

Flown by Dick Rutan and Jeana Yeager, the *Voyager* is a spindly aircraft that carries a canard; a 111-foot, high-aspect-ratio wing; and a push-pull twin engine that will attempt to circumnavigate the globe without refueling.

Built mainly of advanced composite materials—graphite, Kevlar and fiberglass over a Nomex paper honeycomb core—the *Voyager* weighs less than 1,000 pounds but will carry two pilots and more than 8,000 pounds of fuel. The trip next year is expected to take 10 to 12 days.

Certification of the plane is in the hands of the Van Nuys, Calif., Manufacturing Inspection District Office.



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