World

July 1982
Volume 12 Number 7

U.S. Department
of Transportation

**Federal Aviation
Administration**

Research Highlights

January was a bleak month for transportation, but one of the mishaps will spin off some good for aircraft safety.

The FAA Technical Center has acquired the fuselage of the World Airways DC-10 that skidded off a Logan International Airport runway into Boston Harbor. The hull was cut into two sections and floated on a barge to Cape May, N.J., where it was recut into three sections and airlifted by a U.S. Army Sikorsky CH-54 "Sky Crane" helicopter to the Tech Center.

In the Center's Aero Research and Development area, the forward sections of the hull will be tested for their crash characteristics and the effects on attached seat and dummy test specimens by the Crashworthiness Branch.

The Fire Safety Branch will use the aft portion for looking at cargo hold fires and how to contain them.

"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 or 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 Hel

The cover: **Boston is tight by Logan International Airport, but FAA, the port authority and the citizens of Boston communities have worked together to reduce noise pollution.** **See story on page 4.**

Photo courtesy of Massport

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

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A Model for Quiet

FAA, Port Authority Work With Community On Noise Abatement

It's early morning on Maverick Street in East Boston, Mass., in 1974. Several women, some with baby carriages and small children, step off the curb to block large dump trucks headed for Logan International Airport.

This incident is but one of a series of confrontations that year between residents of communities near Logan Airport and its operator, the Massachusetts Port Authority (Massport). Massport is extending two runways and building a new short runway for general aviation. The construction has been going on for some time, and the citizens have fought it every step of the way. They will be successful, as the Massachusetts Superior Court in August will bar further work on these runways. The injunction remains in effect today.

Now, it's the fall of 1981, but it's still East Boston. Massport is still there and so are many of the same citizen-activists. But today they have gathered on the steps of the East Boston High School to celebrate a joint achievement: The New England Region of the FAA has approved a substantial grant to Massport to help soundproof this high school near the airport.

Many people were instrumental in this change. Not the least of these is Robert E. Whittington, director of the New England Region, who recently won the agency's Award for Superior Achievement for his support of the noise-abatement efforts at Logan.

He sees the major change since he arrived in the region four years ago as "cooperation and understanding. Those are the keys to our success in working with Massport and the communities. Logan is a downtown airport and one of the 10 busiest commercial airports in the country," he continued. "It extends into Boston harbor but is also virtually surrounded by well-established communities: East Boston, South Boston, Revere, Winthrop, Chelsea and downtown Boston itself. Clearly, the activities at the airport have a major impact on the people who live and work in these communities."

The impact hits two ways. Logan is vital to the economic well-being not only of Boston and its suburbs but all of New England. It serves as the commercial hub for air transport to the area. A recent study concluded that Logan directly generated over 13,000

By David L. Rickard
A planning and appraisal specialist in the New England Region, he managed the environmental process for noise-abatement changes in departure procedures.

Photo courtesy of Massport

Discussing a fill area south of Logan's runways are prime noise-abatement movers (l–r): the author, Programs Branch Chief Vincent Scarano and Massachusetts Port Authority employees Richard Marchi and Claire Barrett.

jobs and $500,000,000 annually. In addition, visitors arriving by air add another three-fourths of a billion dollars a year.

Former Air Traffic Division Chief John D. Mattson, the subject of "Dump Mattson" posters at public anti-noise rallies in 1979, said, "Logan Airport is absolutely essential to the New England economy, and that's all the more reason to reduce the impacts of noise." Mattson, who became Western Region's director before retiring last year, added, "Bob Whittington clearly understands that and from the start had us direct our efforts in cooperative projects with Massport."

Vincent A. Scarano of the Airports Division has administered the Federal grants that have helped Massport in its successful drive to reduce the impact on communities. Scarano remembers clearly a change in attitude on the part of the Massport staff some years ago.

"They began to see the communities and their elected representatives not as adversaries, but as potential partners in a cooperative effort to maintain a safe and efficient airport. We worked closely with them in setting up advisory committees to help in a master plan and a preferential runway system. These efforts have paid off."

In 1976, the Massport board of directors expressly stated its policy not to increase the size of the airport. Beyond that, they stated their intention to return to the community certain parcels of land that had been acquired earlier.

That same year, at the request of the Logan Airport Noise Abatement Committee, a group representing Massport, the surrounding communities and airport users, the FAA began to experiment with different departure headings on Runway 22R.

"Little did the Air Traffic folks know at that time that they were embarking on the start of an extensive

FAA Administrator J. Lynn Helms (left) presents an Award for Superior Achievement in assisting in Massport's establishing a noise-abatement program to New England Regional Director Robert E. Whittington this past May.

and unique effort," said James I. Lucas, who has been New England's Air Traffic Division chief since August 1980.

"They viewed the initial experimentation as simply being responsive to the needs of residents in Squantum and Quincy, which were then under the 22R runway heading. They simply did it, and let it go at that; there was no thought of any formal environmental process."

Then on May 1, 1978, Massport requested that FAA evaluate headings to reduce noise in South Boston, right off the end of Runway 22R. Throughout the summer, Boston Tower personnel used various procedures. Noise measurements were taken in the communities. Analyses were completed, but the results were inconclusive.

The citizens' reaction was intense through the summer. Rallies and protests were held in Quincy, Squantum and South Boston, among other places. Massport and FAA were bombarded with letters and calls from elected officials at the town, city, state and national level. Lawsuits were filed by angry citizens and politicians.

FAA responded with a full study of all alternatives, a study that was to analyze noise impacts, economic effects, energy consumption and related issues. This study was the first-ever full environmental analysis of aircraft departure procedures.

"Constructive citizen involvement was essential if we were to find an acceptable solution," Whittington reflected recently. "Our answer was to set up a task force to help guide the study."

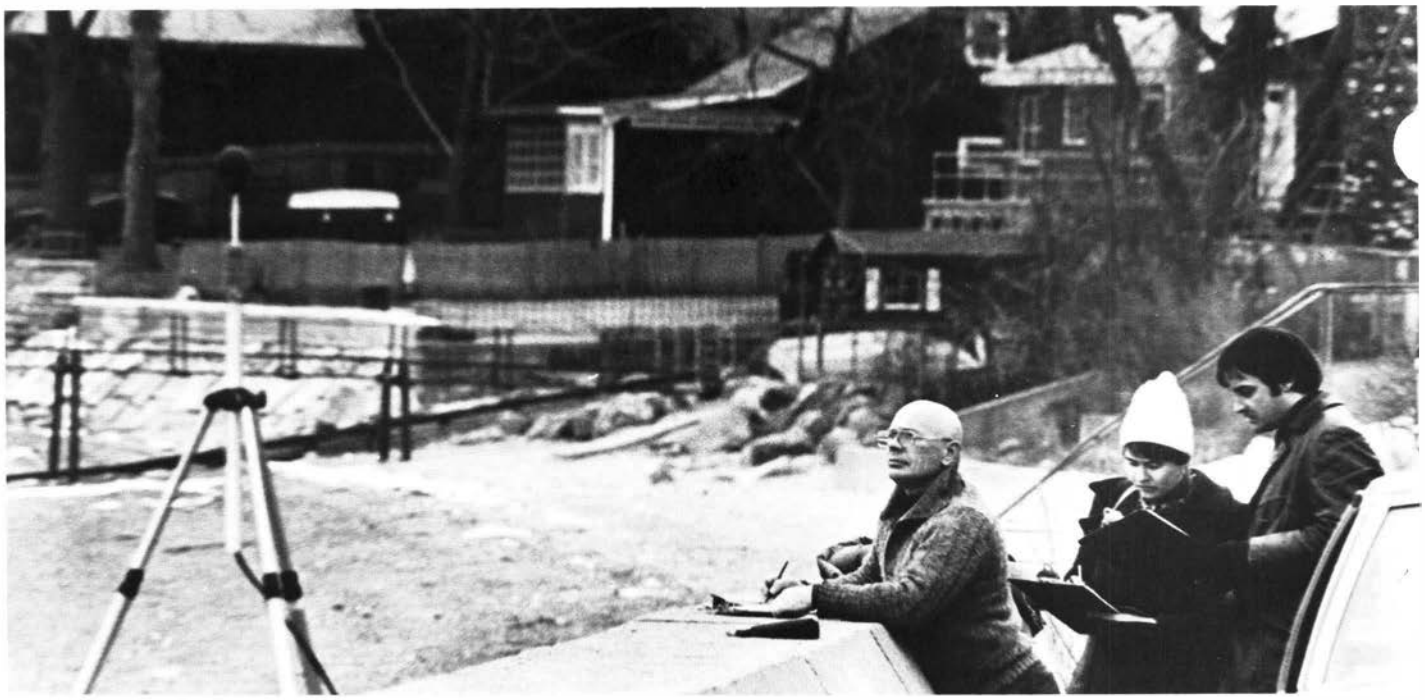
That task force, chaired by the FAA, included members from communities near the airport. It worked long and hard to assure understanding and cooperation. From this experience evolved Massport's Community Advi-

Soon after becoming regional director in 1978, Whittington participated in a governor's press conference on noise problems of Logan Airport communities.

Photo courtesy of *East Boston Community News*

sory Committee, which now meets once a month to consult with Massport's staff. Logan Tower Chief Gary Tucker or his deputy, Stan Matthews, still attend those evening sessions.

Many late nights were spent meeting with community representatives. In addition to committee and small group meetings, the director and his staff appeared at "town meetings" in Milton and Quincy. The public meetings were dominated by angry people (as many as 1,500 at a time) who had



Monitoring noise in Squantum for the new Runway 22R flight pattern.
Photo by Craig Murray

Noisy noise meeting of anti-noise community activists, Massport representatives and FAA personnel.

little understanding or interest in aviation's needs. They only wanted relief from what they felt was unnecessary and injurious noise.

It took almost two years, but new departure procedures were adopted on May 15, 1980, for Runway 22R, taking the aircraft out over the water to gain altitude. An estimated 88,500 people experienced significant noise reduction as a result. The changes also enabled the FAA to adopt revised departure procedures for Runways 4, 9, and 15R, which provided even more noise relief.

How did this come about?

It happened because FAA operational specialists and staff personnel worked closely with the Massport people. "We got to know what the communities wanted," said Mattson, "and we were able to make clear to them the limits within which we had to work. It took a long time, but it was worth it! The climate created then, still exists today."

Whittington echoes these sentiments. He noted that recently the staff has been responding to proposals dealing with departure procedures for two other runways at Logan.

"We will meet with any responsible group to outline the technical and operational issues involved in noise-abatement proposals. However, the communities now know that they need to work together through the Advisory Council to achieve their goal. We are working closely with Massport, as we always have, but now we feel there is a good community forum that should be used."

The work continues. A new preferential-runway advisory system will be completed this year. A variety of capacity improvements are being considered. Changes to the noise-monitoring system are being discussed. All of these projects are continuing in a spirit of cooperation and understanding . . . instead of confrontation. ■

A 'Well Done'

Departure procedures developed to alleviate the impact of noise around Boston's Logan International Airport resulted from the ingenuity and diligence of many FAAers, according to New England Regional Director Robert E. Whittington.

"Through FAA WORLD, I'd like to repeat my compliments to staff and operational employees at the Boston Tower and Center, people in the operating divisions in the regional headquarters and to members of my staff."

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

Freedom Is His J Bird

It's the pilot's dream. It's what backpacking is to camping; what sailing is to powerboating. It's elemental flying, and Chuck Jordan has found it.

An ASR-7 radar technician at the Dallas-Fort Worth Airport, Jordan has always been fascinated with flying and has stayed close to aviation. He was an aviation electronics technician with the Marines in Korea and flew in many types of aircraft. Since he joined the FAA in 1958, he has owned and flown small planes.

The day he saw a photo of the eezy aircraft, he said, "It was like .eaching back into yesteryear. I took one look at it and said 'that's for me.' "

The Breezy, half a dozen of which can be seen each year at the Experimental Aircraft Association's Fly-in in Oshkosh, is a fully FAA-certificated aircraft. The open cockpit offers a rare and magnificent view during flight. Its pusher parasol configuration, according to pilots, makes the Breezy a "fun machine" to fly.

Ahead for Jordan was six years of occasional hard work, amounting to about 3,000 hours and an expenditure of $5,000.

The basic plans he bought were used only for reference. Jordan installed a 115-hp engine, rather than the recommended 90 hp, and a different A-frame and engine mount. He also extended the forward part of the fuselage for more leg room, added a nose cone for instruments and VOR antennas (the instruments are normal- ly on the girder "fuselage" between e pilot's legs) and increased the ing span and tail section.

Chuck Jordan and his J Bird. The 895-pound plane files best at 500 feet and at less than its top speed of 90 mph.

Jordan spent many of his 3,000 hours in research, reading and talking to other Breezy owners. Except for the upholstery, he personally built every inch of the plane to "learn more about aviation."

The "J Bird," as he affectionately calls the plane, first lifted off for a 10-foot altitude flight down the runway for 1,000 feet. Recalling the ecstatic moment, Jordan said, "I believe I know to the nth degree how the Wright Brothers felt that day in 1903. I had the same feeling: I thought it should fly, but I didn't know."

Last summer, he flew the J Bird to the EAA Fly-in, which took 36 hours of flying time, with 16 stops at small airports along the route. Jordan says he felt like a barnstormer from half a century ago. He was greeted by enthusiastic people as he flew low over farmland and while resting at airports, and many visitors asked him into town to dine. His only real delay en route was when his support pick-up, driven by his wife and daughter, broke a fan belt.

Of his flying jaunts around Horseshoe Bend of the Brazos River, west of Fort Worth, Jordan says, "The feeling is great. There's nothing like it. Flying an airplane is just flying, but flying a Breezy is freedom." ■

on the job

The Bakersfield Tower/TRACON

The Bakersfield, Calif., Air Traffic Control Tower on Meadows Field, which lies in the sun-baked San Joaquin Valley halfway between Fresno and Los Angeles, last fall gained a TPX-42 radar to become a Level II Tower/Terminal Radar Approach Control facility. There are two displays in the TRACON and two CONRAC displays in the cab.

Hard hit by the controller strike, the tower is rebuilding its staff, with coverage enhanced by four Army controllers. The tower and radar, along with other facilities, are serviced by the Bakersfield Airway Facilities Sector Field Office headed by Fred Wyrick.

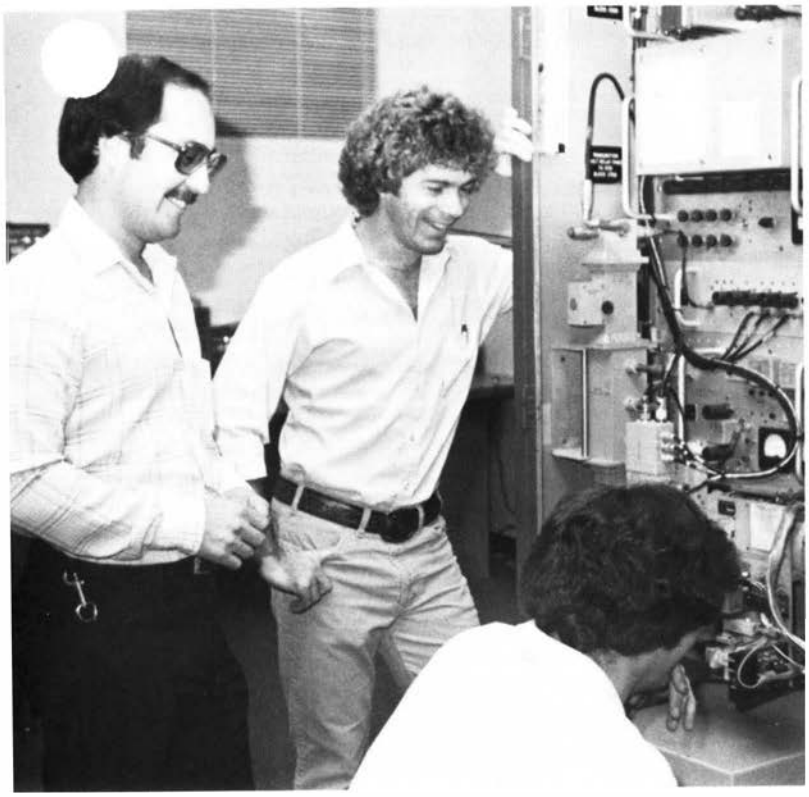
Controller Vangie Holcomb is a regular full-performance-level specalist.

Manning the cab are new controller Hugh Kennedy (standing) and Zeke Clark, temporarily asigned to Bakersfield as a team supervisor. Normally, he's the chief of Fox Airfield Tower in Lancaster, Calif.

Don Miller is chief of the Bakersfield Tower, which operates 17 hours a day (facing page). Photo by Barbara Abels

Team supervisor Matt Fletcher works the tower cab, which now sports a radar display remoted from the TRACON.

Tower secretary Joyce Graham has worked at Bakersfield for many years.



Maintaining the tower's communications equipment are (left to right) Airway Facilities electronics technicians Bill McGraw, Paul Johnson and Bob Bruns.

Richard Shine (foreground), a full-performance-level controller, works a position with team supervisor Matt Fletcher in the new Bakersfield TRACON.

Photos by U.S. Army ATCS Michael Motta

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*.

The Birth of the ILS

Army Pilots, Air Commerce Researchers Launched Blind Flights

Fifty years ago this past spring, a five-minute flight that combined daring and skillful piloting with new technology heralded a new era for aviation. The first instrument landing system to be adopted had been flown.

Capt. Albert F. Hegenberger, head of the Instrument Landing Branch at the U.S. Army Air Corps' Wright Field in Dayton, Ohio, had taken off alone and under a hood in a Douglas BT-2 (basic trainer) biplane, flown around the airport, landed and even taxied back to the hanger, all the while blind but for his cockpit instruments.

It wasn't the first blind landing by

any means. That distinction belongs to Lt. James H. Doolittle, who, as chief of the Guggenheim Full Flight Laboratory at Mitchel Field, Long Island, New York, did it nearly three years earlier in September 1929. Although he, too, was under the hood of his Consolidated NY-2 the entire time, he carried a safety pilot in the front seat whose hands, however, never left the cockpit cowling.

Doolittle's 15-mile flight culminated a year-long effort during which he recruited the talents of the Sperry and Kollsman instrument companies. This resulted in the development or adaptation of a direction-finding gyroscope, a gyroscopic artificial horizon and an improved barometric altimeter. Harry Diamond of the National Bureau of Standards (NBS) of the Department of Commerce had already developed a low-frequency marker beacon and a low-frequency localizer for lateral guidance to the runway centerline, which Doolittle used on his historic flight.

Doolittle had a predetermined course, which he flew with precision. A radio range with its course aligned with the runway, making it a localizer, was installed a couple of miles from the airport. Passing over its cone of silence told him his distance from the runway, which permitted him to set up an appropriate glide. A marker beacon at the airport boundary served as a further check on distance and glide altitude.

Ultimately—at the beginning of World War II—it was Doolittle's system rather than Hegenberger's that was the true precursor of the instrument landing system in use today. At the time, however, Hegenberger's had looked more promising.

Having demonstrated the feasibility of a blind landing and having worked out the logical grouping of nonradio instruments on the cockpit panel, Doolittle left the program and the field open to Hegenberger and to researchers at the Bureau of Standards, all of whom already had been working on the subject.

Hegenberger's approach was different. It was both simpler and a great deal more flexible for the pilot. He felt that the radio range was fine for in-flight guidance but too expensive for individual airport installations, not precise enough for landing when flying a back course from one and useless for landing when the wind shifted.

The centerpiece of his system was the refinement of the radio compass by one of his engineers—G.G. Kreusi. The Kreusi radio compass could be used to home in on any transmitter, even a commercial radio station if near enough to the airport. The ground equipment in the Wright Field test consisted of a pair of radio compass transmitters (locators), each augmented by a very high frequency (VHF) marker beacon.

One transmitter was placed 1,500 feet from the centerline of the runway and the outer one 1½ miles from the runway. They were mounted in motorcycle sidecars so they could be shifted to the active runway to jibe with the wind direction. For a permanent installation, the system would have required pairs of transmitters for each runway.

Led to the airport by his radio compass, Hegenberger tuned in the inner marker on his beacon receiver. When he crossed over it, a light flashed on his panel, and he tuned in and flew to the outer marker. After crossing over it, he made a turn to bring himself over it again and retuned to the inner

Lt. Jimmie Doolittle peers from the hooded rear cockpit of his Consolidated NY 2, the aircraft in which he made aviation's first safe blind landing in 1929.

Lt. Albert Hegenberger (left) poses with Lt. Lester Maitland after the first California to Hawaii flight, made five years before another Hegenberger first—a solo blind landing. Behind them is the Army three-engine Fokker monoplane that made the oceanic hop on June 29, 1927.

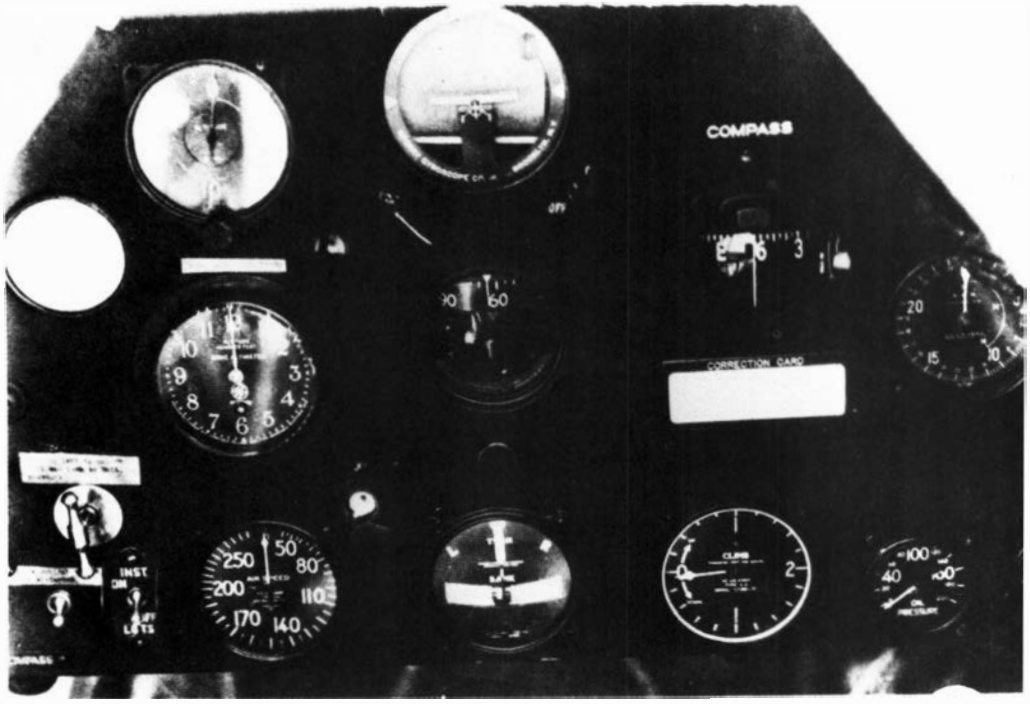
marker, thus lining himself up with the runway centerline. As in Doolittle's system, he set up a glide that took him over the inner marker at a chosen minimum altitude.

As F. Trubee Davison, Assistant Secretary of War for Aeronautics, said following the demonstration on May 9, 1932, ". . . Equipment required at the fields is simple and inexpensive, too. Captain Hegenberger, who, while an excellent pilot, is not a 'trick' pilot, feels he can teach the method to any Air Corps pilot in a comparatively short time. . . ."

Hegenberger had cause to boast of the system's simplicity. Once the pilot had reached the inner marker, he was all set for the landing. "Forget about the compass," he said, and hold direction with the directional gyro. Just sit there and don't pay any particular attention to the altimeter, because you are not depending upon it for the landing until you are 30 or 40 feet above the ground. Just set the throttle for 1,000 revolutions and let the ship settle. It will come down 300 feet per minute. There is no bouncing at all." He added, "I would like to start a graduate class in this type of flying in a month's time."

So, inordinate skill was not a requirement, and the system was adaptable to varying wind conditions.

Hegenberger's system did not go unnoticed by the aviation community. In 1934, it won him the prestigious Collier Trophy and was adopted as the standard instrument approach system by the Air Corps, following which the Bureau of Air Commerce adopted it and began installing the equipment at 36 airports around the country.



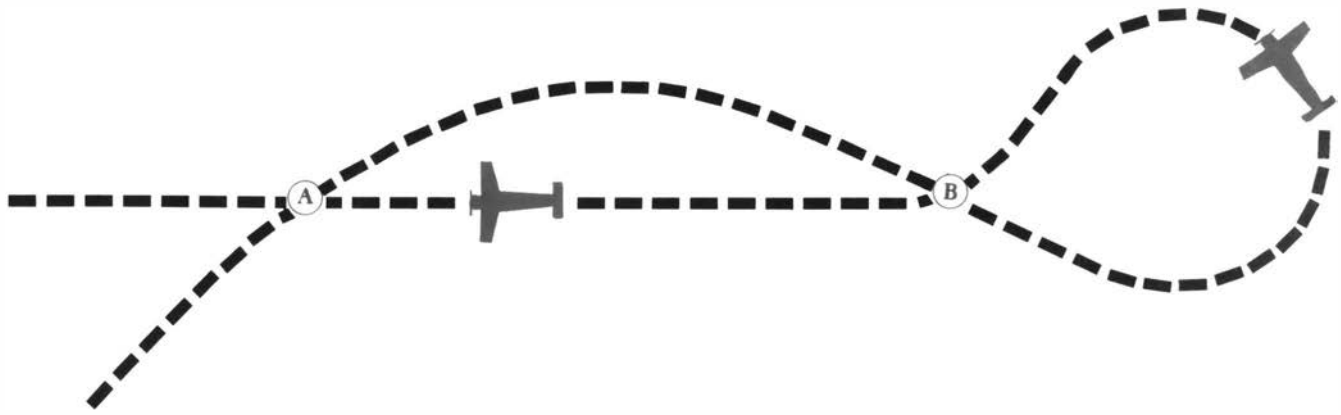
Capt. Hegenberger's state-of-the-art instrument panel in 1932. At top left is the Kreusi radio compass; top center, the artificial horizon; below is the directional gyro; far right, barometric altimeter; center bottom, turn-and-bank indicator.

The success of Hegenberger's system was short-lived. By 1937, the program was terminated, for the airlines were demanding more precision.

That altimeter that Hegenberger said to ignore until the last 30 or 40 feet in landing had an accuracy tolerance of only plus or minus 40 feet. In addition, the airlines felt that the radio compass not only did not provide a sufficiently well-defined lateral path but also could give an inaccurate reading in a cross-wind.

NBS hadn't rested on its laurels while Doolittle was making his blind landing. Having provided lateral and distance guidance for the pilot with the localizer and marker beacon, the Commerce labs developed the first glide slope in 1929, which operated in the VHF spectrum. The full three-dimensional system was installed at College Park, Md., in 1931, at Newark, N.J., in 1933 and at Oakland, Calif., in 1934. To simplify the pilot's job, the lateral and vertical course indications were provided on a single cross-pointer instrument.

Tests were flown by the airlines and the Bureau of Air Commerce. While the basic approach appeared practical, again the accuracy of the equipment was not. In addition to showing a need for approach lighting and a reduction in the costs of the ground equipment, the tests pointed up the



susceptibility of the localizer to interference from nearby objects, the inaccuracy of the barometric altimeter, the need to change the glide slope from a parabolic to a straight path and the marker beacons from LF to VHF to eliminate static and, finally, the desirability of using radio compass locators at the markers to serve as automatic direction finders.

In the years leading up to World War II, the Bureau of Air Commerce experimented with other equipment and made improvements, eventually settling in 1941 on a VHF localizer; VHF inner, middle and outer markers (the inner boundary marker is no longer installed); and a VHF-UHF (ultra high frequency) glide slope as its instrument landing system. Compass locators were added in 1945.

During World War II, two landing systems were particularly prominent: the one just described, which evolved from the NBS/Guggenheim-Doolittle system—with add-ons from the Hegenberger system—and a new controller-to-pilot system made possible by the advent of radar.

In the Ground Controlled Approach (GCA) system, as the latter was known, an air traffic controller "talked down" a pilot into a landing by reference to radar fixes. GCA worked and still does, but the airlines were looking for a more-precise electronic guidance system—one in which the pilot could guide himself.

In 1946, the instrument landing system was adopted by the newly formed International Civil Aviation Organization (ICAO) as the standard guidance system for international use.

The ILS has served a generation of aviation users but not without the interference problems that plagued even the first NBS localizer more than half a century ago. So, the next generation of aviation users will land to the cleaner signals of a microwave landing system (MLS) and its multiple-path capability.

But all must acknowledge a debt to Doolittle, Hegenberger and the other Air Corps and Bureau of Air Commerce pilots who zipped themselves into the dark so other pilots might see. ■

Feeling Fit

Edited by Henry J. Christiansen

Summer has arrived, and that means heat and humidity. Probably no single factor poses a greater threat to an athlete's health and performance than does overheating.

With the high rate of energy expenditure, heat production by working muscles may be 20 times greater than at rest. Attempts by the body to govern heat storage is the responsibility of the hypothalamus, located in the third ventricle of the brain. Functioning as a thermostat, the hypothalamus directs sweating and skin blood flow to facilitate heat loss. Although surprisingly effective, this system of cooling is not without limitations and often is no match for the high rate of heat production or the condition of the atmosphere around you.

One of the primary responsibilities of the circulatory system is to transport the heat generated by the muscles to the surface of the body where it can be transferred to the environment. Since the volume of blood available to carry on the duties of transport (heat, nutrients, waste, etc.) is limited, exercise poses a severe, complex problem for the circulatory system. A large part of the cardiac output must be shared between the skin and working muscles. Thus, any factor that tends to overload the cardiovascular system (e.g. environmental heat) or reduce the transfer of heat to the environment (e.g. high humidity) will drastically impair the athlete's performance and increase the risk of overheating.

Since exercising produces such large amounts of muscle heat, even moderate air temperatures or humidity can result in a critical accumulation of body heat. There is little we can do about environmental heat, but it is obvious that we can slow our pace in order to minimize the detrimental effects of a warm, sunny day.

So, whether you are jogging, playing golf, tennis or softball, or mowing the lawn—slow down as the temperature and humidity increase.

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

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

People

Aeronautical Center

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■ **Kenneth J. White,** manager of the Flight Inspection Field Office in Honolulu, Hawaii.

Alaskan Region

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■ **Billy W. Franklin,** chief of the Maintenance Operations Branch in the Airway Facilities Division, from the Anchorage ARTCC Airway Facilities Sector.

■ **Edward M. Kiss,** proficiency development and evaluation officer in the Fairbanks Airway Facilities Sector.

■ **Robert C. Mackey,** assistant chief at the Bethel Flight Service Station, from the Denver, Colo., FSS.

■ **Donald V. Schmidt,** area officer at the Anchorage ARTCC.

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■ **Ronald M. Pochman,** chief of the Marquette, Mich., Flight Service Station, from the Hibbing, Minn., FSS.

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■ **Charles P. Spada,** technical support officer in the Detroit, Mich., Airway Facilities Sector.

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■ **Wallace B. Cook,** manager of the Memphis, Tenn., ARTCC Airway Facilities Sector, from the Denver ARTCC AF Sector.

■ **Carl P. Dean,** area officer at the Miami ARTCC.

■ **Donald P. Doane,** deputy chief of the Miami International Airport Tower, from the Manpower Systems Branch, Executive Staff of the headquarters Air Traffic Service.

■ **David E. Graham,** program support officer in the Jackson, Miss., Airway Facilities Sector.

■ **Robert H. Mugge,** team supervisor at the Lexington, Ky., Tower, from the Indianapolis, Ind., ARTCC.

■ **Wayne R. Rives,** unit chief in the Atlanta ARTCC Airway Facilities Sector Field Office, from the San Juan AF Sector.

■ **Lyman R. Rowell, Jr.,** team supervisor at the Jacksonville, Fla., ARTCC.

■ **William R. Thomas,** assistant manager of the Memphis ARTCC Airway Facilities Sector, from the Memphis Hub AF Sector.

Southwest Region

■ **Reginald T. Avery,** team supervisor at the New Orleans, La., Lakefront tower, promotion made permanent.

■ **Patrick L. Booth,** team supervisor at the Palacios, Tex., Flight Service Station, promotion made permanent.

■ **Robert F. Briscoe,** unit supervisor in the Houston, Tex., Airway Facilities Sector, from the Albuquerque, N.M., AF Sector.

■ **Roy E. Harmon,** deputy chief of the Dallas-Fort Worth, Tex., Tower, from the Operations Branch, Air Traffic Division.

■ **George N. Masterson,** chief of the Houston General Aviation District Office, from the Houston Flight Standards District Office.

■ **Robert J. Rehagen,** chief of the Environmental Engineering Branch, Airway Facilities Division, promotion made permanent.

Washington Headquarters

■ **Timothy G. Fleming,** chief of the Terminal Systems Branch, Automation Division, Air Traffic Service, from the the National Automation Support Branch.

Western-Pacific Region

■ **Dale Z. Brown,** chief of the Modesto, Calif., Tower, from the Edwards AFB, Calif., RAPCON.

■ **Elmer R. Byrd,** chief of the Rancho Palos Verdes, Calif., Sector Field Office of the San Diego, Calif., Airway Facilities Sector, from the Long Beach, Calif., AF Sector.

■ **Terry L. Dobson,** team supervisor at the Scottsdale, Ariz., Tower, from the Phoenix, Ariz., TRACON.

■ **Thomas J. Flowers,** assistant chief at the Phoenix Flight Service Station.

■ **Raymundo C. Garcia,** unit supervisor at the Long Beach Airway Facilities Sector.

■ **Patricia M. Jones,** chief of the Tonopah, Nev., Flight Service Station, from the Denver, Colo., FSS.

■ **Joseph A. Palumbo,** deputy chief of the San Francisco, Calif., Tower, from the Plans and Programs Branch, Air Traffic Division.

■ **Ronald T. Wenstrom,** chief of the Paso Robles, Calif., Flight Service Station, from the Los Angeles, Calif., FSS.

By Barbara Abels
The public affairs officer in the Western-Pacific Region, she also edits *Bear Facts*, the magazine of the California Wing of the Civil Air Patrol.

Helping a Hospital Into the Air

Unique Modifications Turn DC-8 Into Flying Eye Hospital

Inspectors at the Van Nuys, Calif., General Aviation District Office had one of their more-unusual jobs this past winter—certifcating a certificated aircraft. Such an operation is otherwise known as repair and modification work, but this year-long project was to turn a DC-8-21 passenger aircraft into an eye hospital.

Called "Project Orbis," it is a unique program inspired by Dr. David Paton, an eye surgeon assocated with the Baylor School of Medicine in Houston, Tex. The idea is to provide a flying hospital and classroom for gathering and exchanging knowledge on eye diseases and treatment techniques around the world.

The magnitude of the problem being tackled by Orbis is that 500 million people are suffering from serious eye diseases, and 80 million are expected to be blind by the end of this century. According to Project Orbis, from one-half to two-thirds of such blindness could be prevented or cured if medical personel around the world had access to currently available information.

Half a dozen years in the making, Project Orbis is managed by a New York nonprofit organization and is funded by donations from major companies, foundations and individuals, plus a contribution from the Agency for International Development.

Among the more than $8 million in donations collected thus far to cover the $4-million for modifying and equipping the plane and $2.6 million annual operating costs were the aircraft itself, donated by United Airlines, a spare engine donated by United Technologies and a paint job by World Airways.

The modifications were done at TigerAir Services of Burbank, Calif., for which the Van Nuys GADO has certificate responsibility. The major responsibility for reviewing the data submitted by TigerAir and for approving each installation fell to inspectors Keith Thompson annd Bruce Stuart, with acting GADO chief Will Bedgar monitoring the project.

"As well may be appreciated," says Stuart, "the modification of an aircraft from a certified passenger configuration to a flying hospital involves considerable technical know-how. It was our job to ensure that it was modified in accordance with FAA-approved data and that the modifications didn't adversely affect the airworthiness of the plane."

FAA inspector Keith Thompson (right) and TigerAir maintenance supervisor Frank Dommelen discuss operating room installations in the DC–8 aircraft.

The reworked aircraft duplicates all of the normal facilities and equipment found in a conventional eye hospital and is believed to be the first airborne ophthalmological unit of its kind. Nevertheless, despite its complexity, when the aircraft is in the flight mode, there are only four minor changes that interface with previously type-certificated systems.

And when the aircraft is in the hc pital mode, which is when parked, the only aircraft system being used is the fuel system, which supplies fuel to a pair of auxiliary power units that provide power for electricity, air conditioning and water-filtration systems. The power units are lowered to the ground from compartments in the aircaft to eliminate vibrations during surgery.

In addition to some of the aircraft modifications and installations being unique, some of the equipment itself had to be redesigned. One such was laser surgical equipment that required prodigious amounts of water for cooling, which was impractical. It was converted to air cooling.

The aircraft is equipped with a patient examination area, an operating room, a scrub area, a sterilization and storage area, beds in a preoperative and postoperative recovery area, a classroom with 18 of the airliner's original seats plus lectern and TV monitors linked to the operating room, an audio-visual control cente and a library. Additional monitors

This area is for patient preparation and postoperative recovery.

Principal aviation safety inspector Bruce Stuart checks a water tank installation.

The eye examination and treatment area includes equipment for laser therapy.
Photo courtesy of *Aviation Week & Space Technology*

will be available for outside the aircraft when larger groups of doctors may be involved than can be accommodated in the classroom.

While treatment in itself is important, the learning process for ophthalmologists in the visited countries is still more important. Project Orbis officials expect to make 18 visits annually, beginning with Central and South America this past spring and North Africa this summer, with about 900 ophthalmologists participating each year. And videotapes from Orbis will be available for distribution to 981 medical schools.

Says Stuart, "The potential impact of Orbis is immeasurable. The knowledge gained and imparted through the use of this aircraft will have a ripple effect throughout the medical community. For that reason, working on this project was a pleasure for us." ■

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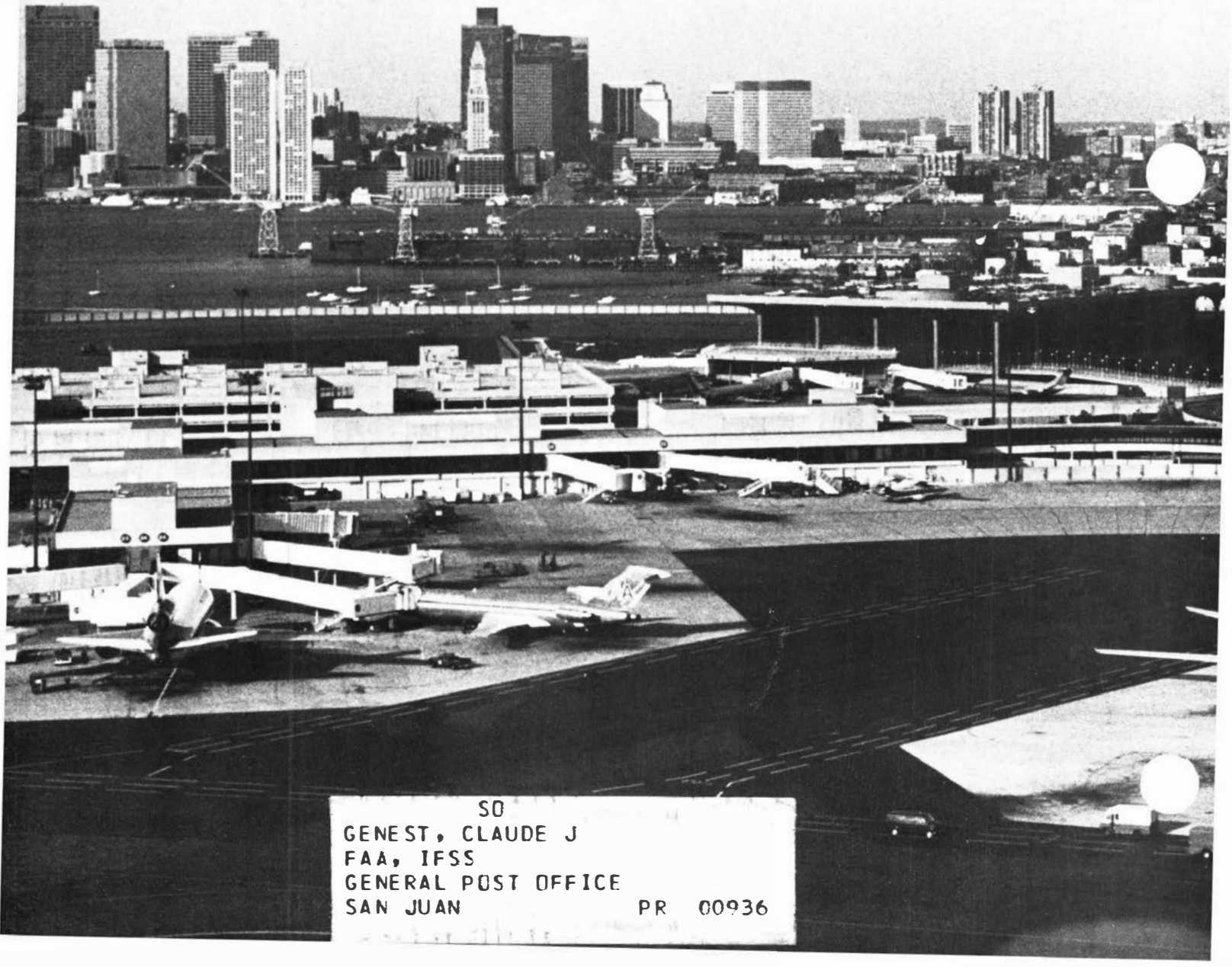

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