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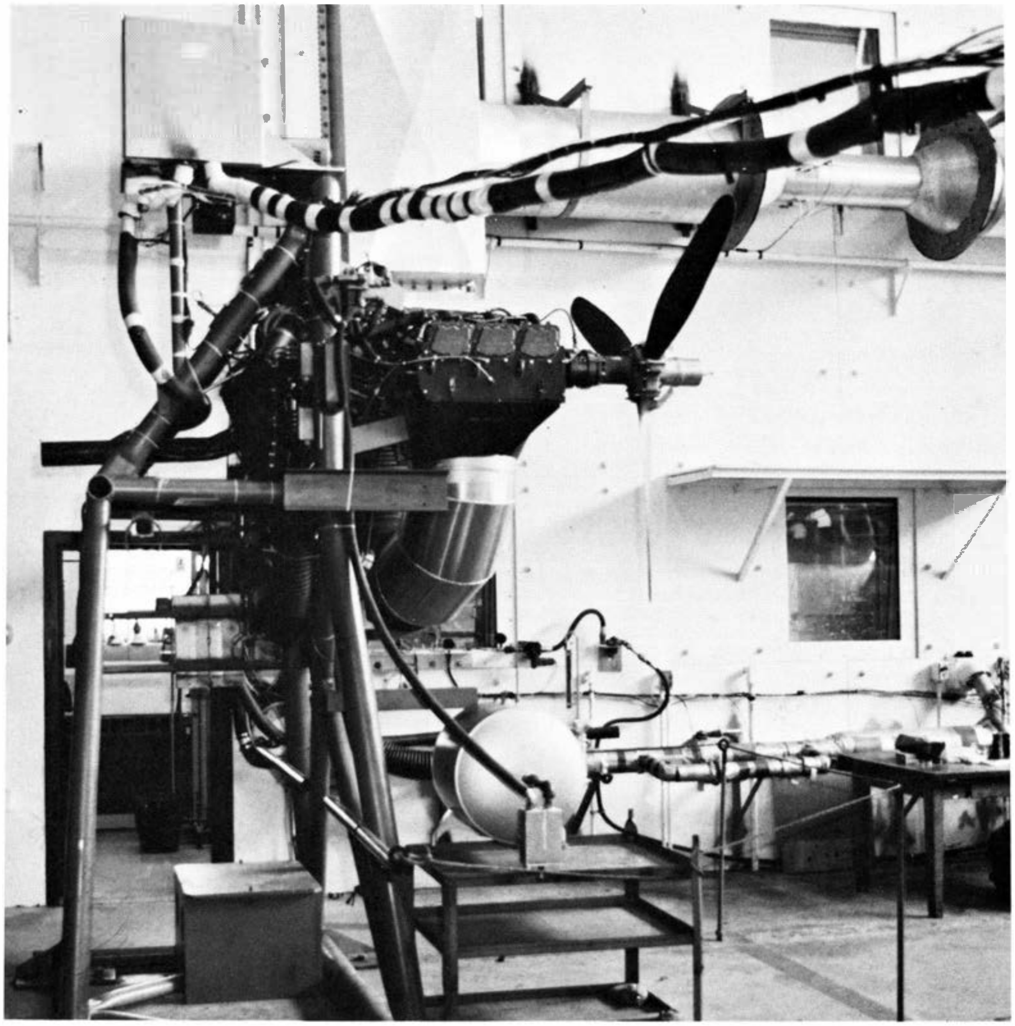

Research Highlights

The shortages of fuel and its skyrocketing price in recent years—particularly with aviation gas—has led some pilots to chance using automobile gasoline in airplanes with disastrous results.

The FAA Technical Center is investigating the problems of using automotive fuel for aircraft to see if they can be solved. Some problem areas are vapor lock, poor fuel distribution, pre-ignition and materials durability. For this purpose, the Tech Center is using the engine rig shown upon which different aircraft engines will undergo operational testing.

An initial report on the vapor-lock problem is expected in September; the entire study will be completed in 1982. ■

Front Cover: **The grand prize winner in the FAA Facilities/Equipment category of the Employee Photo Contest was this shot of an aircraft coming in over the V-ring localizer antenna on Runway 36 at the Burlington, Iowa, Municipal Airport. The photographer is William L. Bedford of the Burlington Airway Facilities Sector Field Office.**

Back cover: **The unique design of Los Angeles International Airport's theme building with its suspended restaurant is highlighted on the cover of a new full color FAA pamphlet, "A Study of Airports—Design, Art & Architecture. It will be available from the Superintendent of Documents for $5.00, Stock No. 050-007-00575-0.**

Photo by Don Bowman
Airports Programs

World

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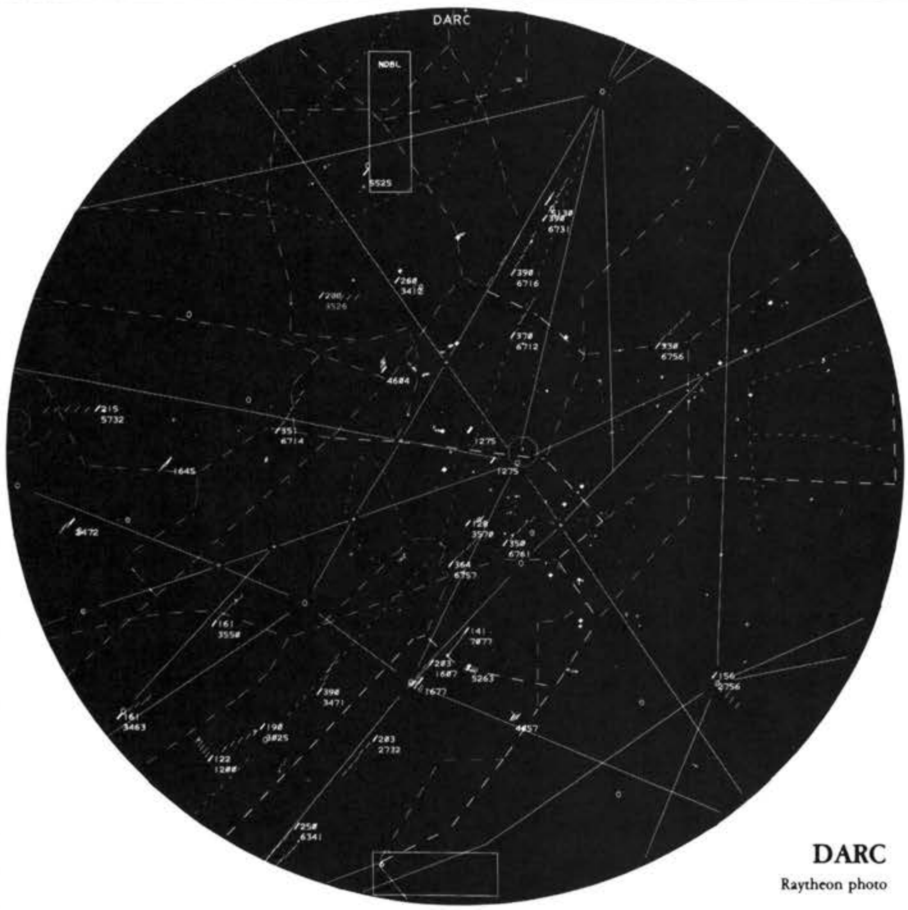

DARC
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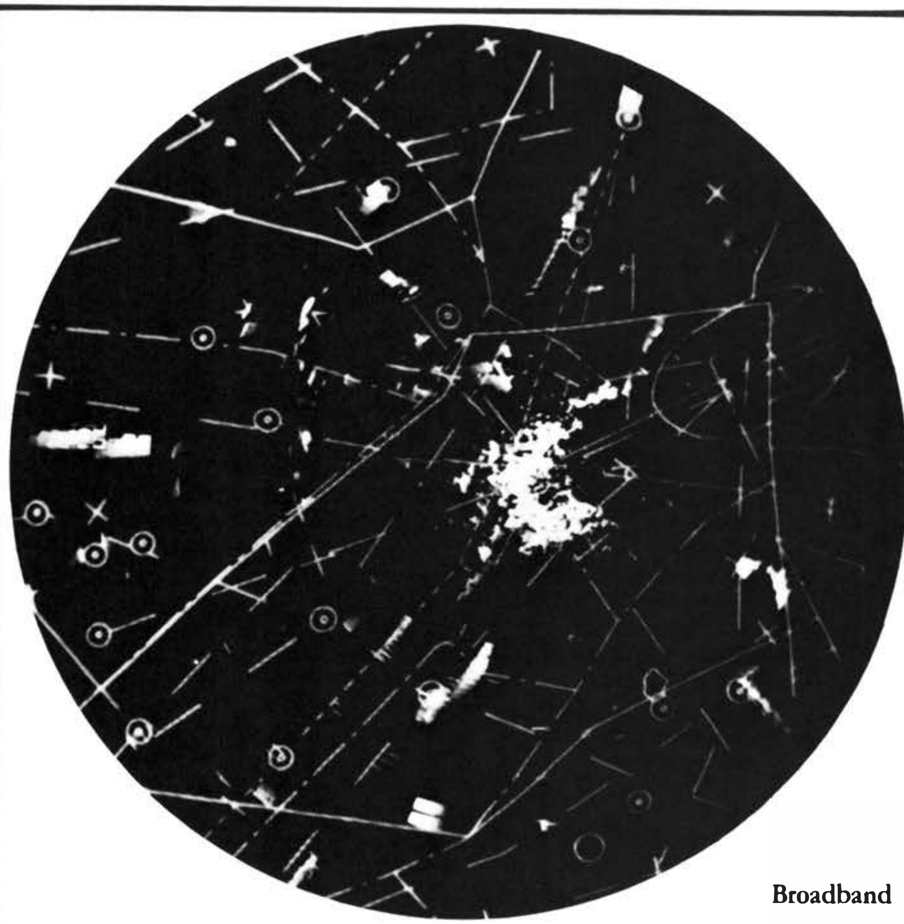


Broadband

Valid comparisons are not all that common. It's altogether too easy to get apples mixed up with oranges.

Take Direct Access Radar Channel (DARC) as an example. DARC is the new computerized radar backup system at FAA's en route centers. Compared with the old broadband radar system it's replacing, DARC wins hands down with the vast majority of controllers who have used it so far, especially the new breed of controllers who didn't grow up with broadband as the "old-timers" did.

On the other hand, when stacked up against NAS, the main computerized radar and flight data processing system a centers, DARC doesn't come off so well.

That's where the apples and oranges start getting mixed up, said Gerry Thompson, Director of the Airway Facilities Service. DARC was not designed to do all that the primary system does, and, therefore, the two really shouldn't be compared, he said. It's like—that's right, it's like comparing apples and oranges.

Said Thompson: "We started looking for a replacement for broadband in the late '60s. Like all of the vacuum-tube equipment, it was costing us an arm and a leg—and still does, by the way. We weren't looking for anything fancy at the time, just a cost-effective system that was capable of processing and displaying certain alphanumeric radar data. We eventually came up with DARC. It's a good system that does what it was designed to do."

However, says Thompson, a program is already underway to upgrade the basic DARC to include many of the features of the NAS system. A contract for the enhancement program will be awarded late

By Gerald E. Lavey
Asst. chief of the Public & Employee Communications Div., he previously worked for the Federal Railroad Administration and DOT's Denver Sec-Rep.

Shedding Light on DARC

New Radar Backup Goes Operational

Al Simmons, area specialist at the Washington ARTCC, observes controllers Skip Tapler (left) and Rich Freeman as they demonstrate the use of the Direct Access Radar Channel backup system.

Photo by Dennis Hughes

this summer or early fall, he said, and the program is scheduled to be implemented in 1983.

Meantime, the basic DARC already has been commissioned at the Washington, Chicago and Salt Lake City Centers after undergoing operational tests at those facilities and is scheduled to be commissioned at the remaining 17 centers in the conterminous U.S. by mid-summer.

The total cost of installing the basic DARC units systemwide will run slightly under $22 million, "which is exactly what we told Congress it would be," Thompson is pleased to point out. He says the enhancement program will cost another $40-50 million.

Basically, DARC is a series of interconnected minicomputers at each center that gather and process digitized data from the radar sites serving that particular center. When the primary radar processing system fails or is shut down for maintenance, DARC is then switched on so that controllers can continue to receive a readout of some of the same essential flight information they were getting from the primary system. They don't get as much information, but they get essential data, such as aircraft identity and altitude for aircraft equipped with altitude-reporting transponders.

DARC doesn't give controllers the actual flight identification number, or call sign, of aircraft, as the primary system does, but rather the aircraft's assigned beacon code. However, controllers can quickly determine the flight identification by checking the flight progress strips next to their consoles, which list both identification and beacon codes for all aircraft under center control.

Actually, DARC is capable of generating a full data tag—including flight identification, beacon code and both assigned and reported altitudes—for discrete beacon targets, but it cannot generate flight IDs or assigned altitude data for nondiscrete beacon targets. It also cannot generate data blocks for primary radar targets.

So, to avoid the confusing operational situation created by the different kinds of electronically-generated data blocks alongside the shrimp boats for primary targets, the Air Traffic Service made the decision to have DARC display only limited data tags and require shrimp boats for all targets.

With the broadband system, of course, there is no electronic data tag at all, just a target return, or blip, and controllers have to gather all the flight data on the aircraft they are working through radio communication with pilots.

That extra information provided by DARC is a big help when you're working 15 or 16 aircraft and suddenly have to go to the backup system, said Skip Tapler, who has been a controller at the Washington Center for about 10 years. When he started out as a controller, broadband was still being used as the primary system, so he had been through the transition to the NAS as the primary system in the mid-70s and now to DARC as the backup.

The major advantage of DARC, said Tapler, is that it provides ''a much cleaner presentation of traffic than broadband. It looks more like NAS, and it really cuts down on the workload during the changeover.''

When going to broadband, he explains, ''You have to radio each aircraft and have each one reidentify itself, one at a time. In the midst of all this, some of the aircraft may be approaching sector boundaries, ready for you to hand them off, and other aircraft may be climbing into your airspace. So, you've got your hands full.''

With DARC, on the other hand, he said, ''Most of the communication with pilots is eliminated, because you may have the discrete code and altitude for most of those aircraft. All you have to do is correlate the beacon codes with the flight identification numbers on the flight strips and turn your attention to reidentifying the nondiscrete and primary targets.''

Pat West, an 11-year veteran at the Chicago Center, agrees with Tapler on the clarity of the DARC presentation being a big advantage over broadband. West said that the broadband display is often ''not presentable'' for whatever reason, and controllers now trust DARC a lot more. He also said that talking with pilots when switching to DARC is not only dramatically reduced but virtually eliminated. ''Some 99-plus percent of the aircraft we work with in the Chicago Center have 4096-code transponders,'' he said, ''and at least 80 percent have altitude-reporting transponders.''

However, despite the advantages of DARC, said Tapler, ''there's still the problem of lowering the scopes and filling out the pips, which is my biggest disappointment with DARC.''

As with broadband, controllers working with DARC still have to swing the scopes down into a horizontal position, mark the aircraft identity and altitude on the pips— or shrimp boats, as some prefer to call them— and move these plastic markers across the scope by hand.

The reason for that, of course, is that DARC does not provide flight identification numbers, as noted earlier. Moreover, DARC, like broadband, does not have a tracking system, or an ability to predict where aircraft are headed. It displays only what it sees. If, for some reason, the radar does not pick up an aircraft target during an antenna sweep, that target return will disappear from the DARC display. With NAS, there is a warning flashed on the scope to alert controllers to contact the aircraft to reestablish its position.

There's an additional problem with the pips that cropped up during the operational testing of DARC. Actually, it's more of an annoyance than a problem. Richard Freeman, who, like Tapler, is a 10-year veteran at the Washington Center, explains: ''With the old broadband radar, light comes up through the transparent plastic pip so you can see what you've written on it. DARC, however, generates a very soft light, so you can't read the pip. Therefore, we have to use opaque, colored pips and turn on the overhead lights in the control room so we can read them. That, in turn, causes a glare on the scope. So, it looks like we may have created some problems trying to solve some.''

Chicago Center controller Pat West is poised with grease pencil for marking on "shrimp boats" aircraft identity obtained from the flight data strips on his right and altitude. DARC can generate full data tags, but only for discrete-beacon returns. For now, shrimp boats are used for all aircraft data tags. Photo by Warren Holtsberg, Jr.

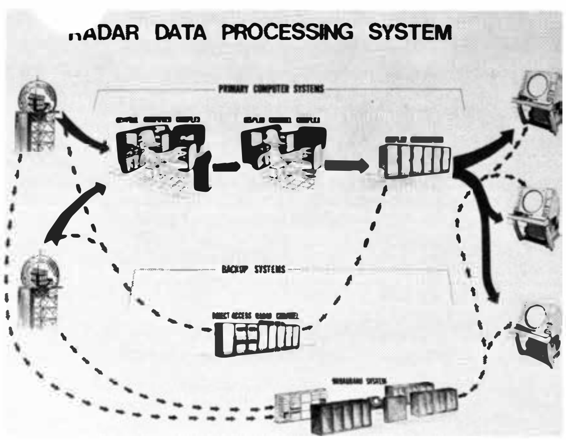
Gerry Thompson readily admits that the problem with the transparent pips was something that ''was not given a lot of thought beforehand. Initially,'' he explained, ''we didn't think we'd need shrimp boats, but then as we gradually got closer to implementation of DARC, the Air Traffic Service decided the mixed environment with alphanumeric data tags for some aircraft and not for others would be operationally unacceptable.

That problem and others will be taken care of, said Thompson, with the upcoming enhancement program.

Included in these enchancements will be the full data block, which will allow controllers to keep the scopes in the vertical position and eliminate the need for pips. Enhanced DARC also will include tracking, automatic handoff of traffic to other sectors and mosaic displays, a feature that takes returns from various radar sites and makes up the best composite picture of traffic for controllers. Right now, DARC gives them only the presentation from a single radar site at any one time.

Controllers will also have a "punch-in, punch-out" capability in the enhanced DARC. This means that each controller can switch to DARC and back again with a push of a button.

Currently, with the basic DARC, the changeover is handled by the Airway Facilities systems engineer and an Air Traffic assistant chief. Many controllers find that arrangement the major drawback to the basic DARC. Says Freeman: "We're the ones working the traffic, and we want to have the feeling we're more in control of the situation."



"Hot standby" is DARC's normal mode of operation. While the primary NAS is functioning, DARC parallels it, feeding digitized data through its minicomputers. Only when NAS is down is DARC switched on and its data displayed.

To track his target returns, Washington Center controller Rich Freeman must move plastic "shrimp boats" after them. Photo by Dennis Hughes

West agrees. The lack of a punch-in, punch-out capability "gives everybody here a tremendous amount of gas," he said.

Thompson says, "This is another one of those things we would have done differently if we had it to do over again, but we don't have that luxury.

"But you have to remember," he added, "that when NAS was first introduced, most controllers would have preferred to stay with broadband because they were familiar with it. It was during that same period that we were working on DARC, which is simply an improved version of broadband. Now, controllers depend so heavily on NAS that we need to shift gears and create a backup system that's closer and closer to NAS.

"It's too bad we didn't have the benefit of hindsight when we started out. Hindsight always beats foresight," he added.

Despite its limitations, however, "The basic DARC is a lot better than broadband," said West. "With all the talk about limitations and problems, we shouldn't lose sight of the fact that DARC has so many more pluses than minuses. We've taken surveys here in Chicago which show that controllers much prefer it to broadband. When it's upgraded, we'll like it even better." ■

People

Alaskan Region

■ **Leonard J. Canter, Jr.**, assistant chief at the McGrath Flight Service Station, from the Atlanta, Ga., FSS.

■ **Davie M. Elliston**, chief of the Material Management Branch, Logistics Division.

■ **Allan J. Patchett, Jr.**, assistant chief at the Anchorage ARTCC.

■ **Shari F. Stanfield**, team supervisor at the Anchorage FSS/IFSS, from the Kenai FSS.

■ **John David Twiggs**, unit chief in the Maintenance Projects Section, Maintenance Operations Branch, Airway Facilities Division, from the Planning/Establishment Branch.

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■ **James H. King**, chief of the Plans and Programs Branch, Air Traffic Division, from the Operations, Procedures and Airspace Branch.

Eastern Region

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■ **Hugh A. Harrison**, chief of the Dulles Tower, Chantilly, Va., from the Memphis, Tenn., Tower.

■ **James Edward Johnston**, chief of the Newark, N.J., Tower, from McGuire AFB, N.J.

■ **Hugh C. McGinley**, chief of the Employment Branch, Personnel Management Division, from the Training Branch.

■ **Frank T. Storr**, deputy chief of the Newark Tower.

■ **William R. Van Vliet**, team supervisor at the Albany, N.Y., Tower, from the Poughkeepsie, N.Y., Tower

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■ **Jerry L. Kincaid**, crew chief at the Indianapolis ARTCC AF Sector.

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■ **Eugene R. Post**, chief of the Grand Rapids AF Sector Field Office in Clinton County, Mich.

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■ **Emilio Samson,** team supervisor at the Hilo Combined Station/Tower.

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■ **Edmond R. Johnson,** chief of the Fort Worth, Tex., ARTCC

■ **Jesse R. Morris,** team supervisor at the El Paso, Tex., Tower, from the San Angelo, Tex., Tower.

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■ **Gary L. Richins,** team supervisor at the Albuquerque ARTCC.

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■ **Ray F. Terry,** chief of the Air Carrier Branch, Flight Standards Division.

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By Fred Farrar
A public information specialist in the Office of Public Affairs, he is a former Washington correspondent for the *Chicago Tribune*.

Where Did All The Rivets Go?

The Bell May Toll for Aluminum, Too

In a stretched Boeing 727, the rivets alone weigh approximately 20,000 pounds. In a Lockheed L-1011, they weigh about 50,000 pounds. In the new Lear Fan 2100, they don't.

This is because the Lear Fan is made almost entirely of composite materials—man-made fibers held together by epoxy resin. There are no rivets. The result is that the high strength-to-weight ratio of the composite material, combined with the fact that rivets are not needed to hold it together, made it possible for Lear to cut the weight of the airplane by almost 40 percent, compared to a conventionally built airplane.

It could have far-reaching implications for the entire aircraft industry as the price of aviation fuel remains high and perhaps goes even higher. For weight guzzles fuel, and anything that can curb this thirst can take at least some of the economic pressure off the airlines.

The bottom line is that, all other factors being equal, the manufacturer who can make the lightest airplanes is the manufacturer who is going to sell the most airplanes.

Thus, even though the Lear Fan will be a business aircraft—and not even jet powered—the manufacturers of the big passenger jets are keeping a close eye on it. These manufacturers, who are already using or planning to use composite materials for some parts of their aircraft, cannot ignore the potential weight savings inherent in an all-composite aircraft.

As Charles R. Foster, director of the FAA's Northwest Region and the man in charge of certificating all large passenger-carrying aircraft used in this country, said at a recent meeting of the American Institute of Aeronautics and Astronautics:

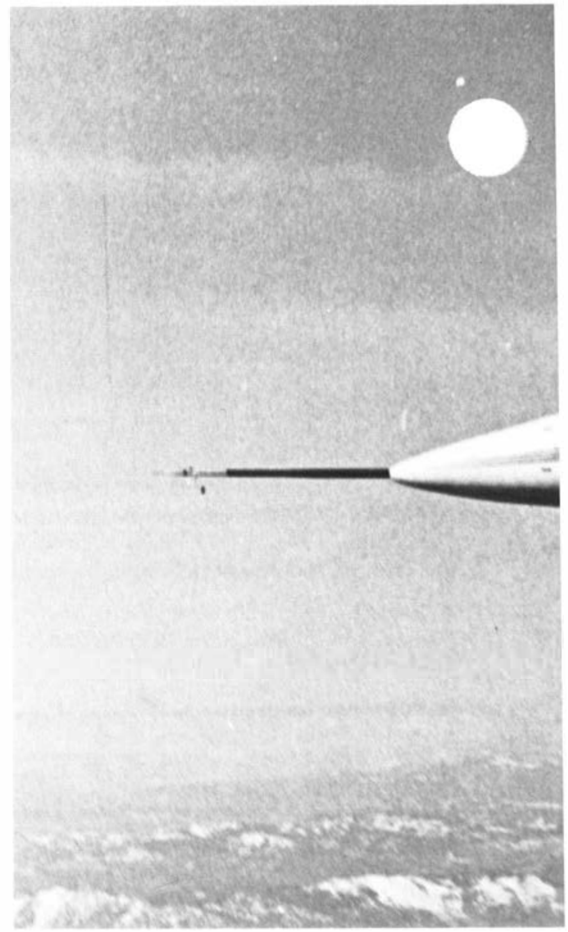
"Composites could give the new breed of aircraft an estimated fuel saving of up to 50 percent over the fuel consumption of our current fuel-efficient aircraft when combined with other improvements that are achievable. Certainly, this would be a major achievement and one that would assure continued U.S. leadership in aviation, if we are first with a successful program.

"The next question: Will that composite airplane be built in the United States, in Europe or in Japan."

Meanwhile, the manufacturers are learning to work with the composites, and they and the FAA are wrestling with the unique problems they pose. The foremost among these is how well will they hold together under the stresses and strains of flight; whether, if you will, they can indeed be built without rivets.

The composite materials are made up of cloth-like sheets of fibers—made from carbon, graphite or boron—that are held together by epoxy resins. These are shaped and structurally tailored for the job they have to do and are then cured by the application of high heat and intense atmospheric pressure to harden the epoxy resin.

It is the hardened resin that holds the whole thing together, and the FAA and the manufacturers are paying close attention to such factors as how high the temperature should be

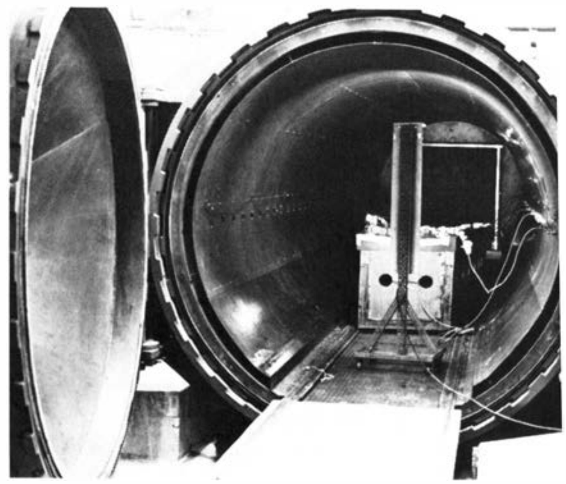


The composite-bonded Lear Fan prototype is undergoing flight testing.

and how intense the pressure. Generally speaking, it is agreed that a temperature of 350 degrees Fahrenheit and a pressure of 112 pounds per square inch are required for load-bearing parts. The heat and pressure is usually applied in an autoclave. In the case of the Lear Fan, a single, massive autoclave was used to cure the entire wing, which measures 40 feet from tip to tip.

Another concern is environmental influences. What effect, for example, would the heat that a plane would be subjected to while standing on a desert runway in the summer have on the bonds holding it together?

To help deal with this and other prob-

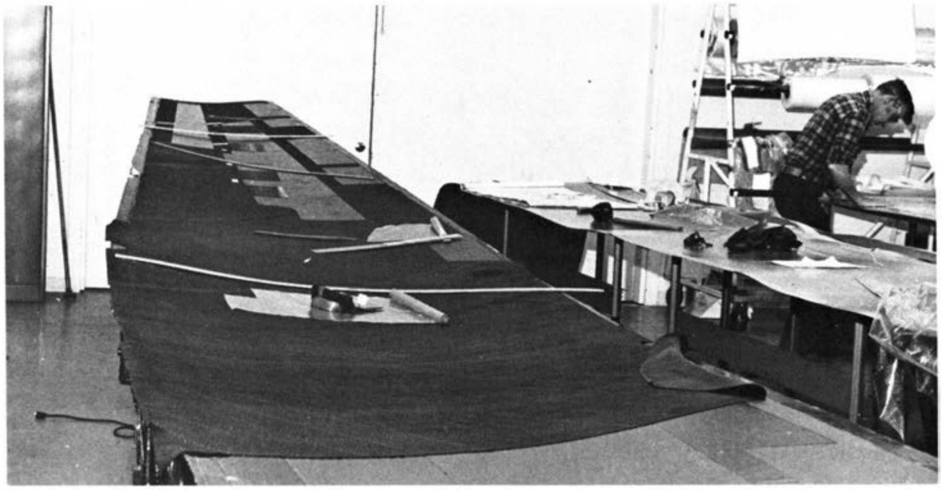


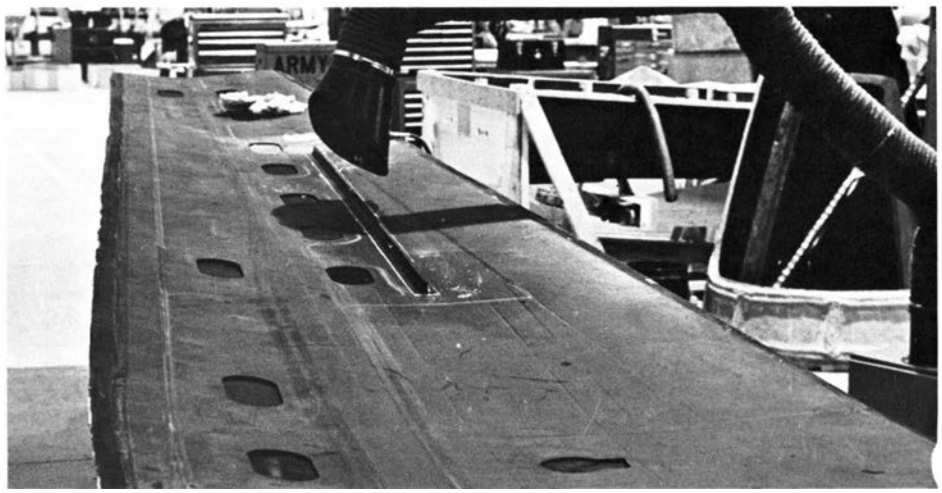
An epoxy-laminate part is ready to be cured in Lear Fan's giant autoclave under high heat and pressure.

A prototype for demonstration purposes is assembled with some riveting to hold the epoxy-bond panels in place while being cured, in lieu of the tooling needed for an :poxy-only bond. For certification, the prototype will only be bonded.

lems unique to an all-composite aircraft, the FAA has appointed a special certification review team for the Lear Fan. The team is headed by Joseph R. Soderquist, the agency's national resource specialist for composite materials, and includes representatives from the Air Force, the Navy, the National Aeronautics and Space Administration and FAA's Western Region, which will be the certificating region. The team recently completed its first task: the compilation of a list of testing and inspection procedures designed to verify the structural integrity of the aircraft.

The Lear Fan—a six- to eight-place aircraft in which two turbine engines drive one rear-mounted propeller—is not the first aircraft to be made of composite materials, although it is the largest so far. The Windecker Eagle, a single-engine light aircraft that was made of fiberglass, was certificated in 1969, and the VariEze, a home-built aircraft sold in kit form, has a fiberglass skin over a foam core.





This is the layup stage of a wing surface using a graphite-epoxy fabric. (top)

After being cured in one piece, a wing is set up for trimming operations. (above)

In addition, several passenger jets now in service have one or more components made of composite materials. On some DC-10s, for example, parts of the rudder, floor and vertical stabilizer are made of composite materials, and McDonnell-Douglas is planning to build and test a vertical stabilizer for the aircraft that is made entirely of composite material. Lockheed also is planning to build and test and all-composite vertical stabilizer for the L-1011, as well as composite ailerons and engine cowl panels. Boeing has composite floor panels on some of its 747s, composite lift spoilers on some of its 737s and composite elevators and engine cowl panels on some of its 727s.

The most composite of all the passenger jets, however, will be the upcoming Boeing 757s and 767s. They will have spoilers, ailerons, rudders, elevators, landing gear doors, engine cowl panels, wing fairings and wing trailing edges made of composite material, plus emergency escape systems, lavatories, closets, and partitions.

Aluminum's days may be numbered. ■

The Day That Never Was

The records of the Lear Fan Corp. (U.S.), the builder of the Lear Fan 2100, show that the aircraft made its first flight on Dec. 32, 1980, contrary testimony by the calendar notwithstanding.

They do this in support of a gentle fiction agreed to by Lear Fan and the British government, which is providing financial backing for the plane, which will be produced in Northern Ireland. The contract called for the first flight to be made before 1981. For a while, it appeared that Lear Fan would meet the deadline by making the first flight on December 31. But a last-minute problem came up, and it wasn't made until the next day.

Both sides agreed that it was close enough, and for the purpose of the Lear Fan, 1980 became the only Leap Year in history to have 367 days. ■

By Barbara Abels
A public information specialist in the Western Region, she also is editor of *Bear Facts*, the magazine of the California Wing of the Civil Air Patrol.

New Look In Accident Probes

At work on the remains of the Cherokee in the wrecking yard is the Western Region's all-woman accident investigation team: (from left) Wally Funk and Jean Pyatt of the NTSB and Sarah Rambo, from the Riverside, Calif., GADO.

Time was when a woman showing up at the scene of an accident meant authorities had a grieving relative on their hands.

Times have changed.

Now women have taken their place alongside men in the field as full-fledged accident investigators. And they're proving that they can do the job every bit as well.

Moreover, last fall, something unprecedented happened at the site of a light-plane accident in Southern California's San Bernardino Mountains. All three investigators dispatched to the scene were women.

Two of the women were former FAA nployees now working for the National ransportation Safety Board (NTSB). The third was Sarah Rambo, an FAA Operations Inspector at the Riverside, Calif., General Aviation District Office (GADO).

The accident occurred on October 14, 1980, as Southern California was experiencing its first winter blow of the season: Heavy thunderstorms and severe turbulence were moving through the San Bernardino Mountains, some 70 miles east of Los Angeles. A Piper Cherokee carrying four persons was on a flight from Las Vegas, Nev., to Long Beach. Calif, and there had been no contact with the aircraft after it left Las Vegas.

When the plane failed to show at Long Beach, a report was filed and a search initiated. But the weather held the searchers at bay until the next day when Civil Air Patrol pilots spotted the missing aircraft at the 5,700-foot level on Sugar Pine Mountain. The San Bernardino County Sheriff's Helicopter Division then began the arduous task of removing the four bodies from the wreckage and called for the crash investigation team.

Sarah Rambo was the FAA accident-standby officer, so she was tapped to represent the agency at the crash site. The NTSB picked Wally Funk and Jane Pyatt, both former FAAers. Funk had been the Western Region's first woman GADO inspector, and Pyatt had only recently transferred to NTSB from her old job as a flight service station specialist in Ontario, Calif.

The three met at Rialto Airport and boarded a Jet Ranger helicopter, provided by the Sheriff's Department, for transportation to the scene. Landing at the accident site proved a problem because of persistent cloud cover, so the helicopter doubled back and landed in the parking lot of a nearby fire station. Here the three transferred to a four-wheel drive truck that took them up the mountain on narrow, winding fire-access roads.

The investigation could be called routine. In fact, that's the way Rambo styled it. She noted that the final report on the accident had not yet been issued by NTSB but said weather certainly was a major factor. No evidence was found of any structural or mechanical failure prior to impact.

According to Rambo, the pilot apparently got caught in a thunderstorm, and the aircraft was buffetted by severe turbulence, heavy rain and large hailstones. He hit the mountain just 50 feet below the top. She added that it probably wouldn't have made any difference if the plane had cleared the mountain. "He probably was going straight down," she said.

When it comes to flying, Rambo speaks from experience. She holds an airline transport pilot's certificate with single and multi-engine ratings. She also has flight instructor and ground instructor certificates. Her log book shows more than 3,000 hours of flying time.

Before joining the agency in June 1979, Rambo was assistant chief pilot at a San Diego flight school, and before that, she operated her own flying club. She has no desire to go back.

"I love this job. It's more challenging and more satisfying," she said. "We get into everything—flight checks, certifying air taxis, supervising air shows and generally getting after the bad guys."

And, oh yes, she's also into accident investigation. ■

By Ben Lee
A public information specialist in the Office of Public Affairs, he has an extensive public affairs background in industry as well.

Better Than New

'Cadillac' Smith Recreates Antique Cars

''Cadillac'' Smith didn't pick his nickname. The Washington-based FAAer was stuck with it just like he was stuck with the brand new Cadillac that inspired it.

Yet the nickname seems particularly appropriate for the tall, lean, cigar-chewing Smith because he's had a lifelong affair with automobiles—in fact, with just about any machine that moves, including motorcycles and airplanes.

John C. Smith works in FAA's Office of Aviation Safety as a member of its Accident Investigation Staff, but it's automobiles that occupy his leisure hours. Smith likes to pick up old relics and restore them to mint condition.

Restoring cars may appear to be a glamorous hobby when the final result is viewed, but what's really involved is a lot of difficult, frustrating and exacting work, for which Smith had to build a three-car combination garage and machine shop beside his suburban Virginia home.

''Cadillac'' traces his fascination with restoring classic and antique autos to his youth in Atlanta in the '30s. ''Like most teenagers in those depression days, I didn't have the money to buy even a Model T Ford, but I was determined to have some wheels. I finally found a 1925 Lincoln that was a total wreck. I spent months scavenging for parts, rebuilding the engine and body, soldering, welding, straightening and refinishing. But, by golly, when I was through, it was the hottest thing in town,'' he said with a grin.

He was hooked. For a time, he turned to motorcycles, repairing and overhauling several and trying them out on a stretch of road that bordered Atlanta's Candler Field airport. The planes taking off and landing, the roar of their engines and the glint of sun on their wings fascinated him, he recalled. It wasn't long before he became enamored of aviation. ''Now, that's the way to travel,'' Cadillac had told himself.

He learned to fly there at Candler in 1936 and managed to put in a lot of hours in the air while he tried to figure out how to get a plane of his own. He did, in a manner of speaking, when World War II came along. He joined the Navy as a pilot, flying a Lockheed Ventura PV-1. ''Hell,'' he said, ''I spent so much time flying that bird, it might as well have been mine.''

Smith married, left the Navy in 1946 and joined the Civil Aeronautics Administration the following year as a supervising inspector in the Huron, S.D., Aviation Safety District Office—now called a General Aviation District Office.

It was in Huron that he got tagged with the nickname. He had never given up being a Pygmalion for cars and was known for it. An ASDO officer in another city asked Smith if he could pick up a new Cadillac at a reasonable price for him, while he negotiated a loan.

Smith did so and parked it in his garage, where it remained for months. His entreaties to the ASDO officer finally brought the response that the Caddy would be too big for his garage and that Smith should dispose of it. Smith's friends began ribbing him about it, usually starting the conversation with, ''Say, Cadillac . . .'' The name stuck. However, he found that he liked the Cadillac and has been driving one most of the time since.

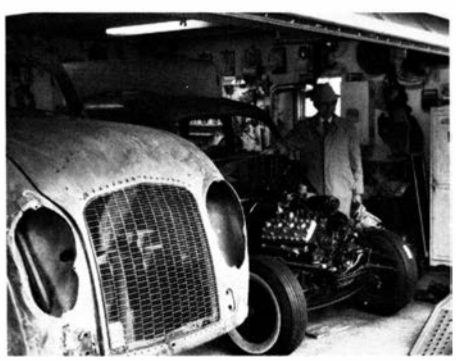
Smith moved on to the Lincoln, Neb., ASDO, to Bismarck, N.D., then to Wichita, Kan., and finally to Washington in 1963, first in the Air Carrier Operations Division and now in the Office of Aviation Safety.

His current projects on the ground are a 1934 Chrysler ''Airflow'' Imperial Coupe and a 1940 Ford. He likes to work them in tandem so that when he gets tired of one or has to wait for parts, he can switch to the other.

He acquired the Chrysler through an ad he placed in *Car & Parts* magazine in 1973. It took more than six months of negotiation and delays in transporting it from Rhode Island to Virginia before Smith had his rare prize, of which it is estimated only about 200 were made. He paid $1,500 for the machine and transportation and $500 for spare parts.

''Besides being an antique, it was a mess,'' Cadillac recalled. ''But it was worth it. In fact, I hadn't had it a month when someone offered me twice what I'd paid for it. I just laughed.''

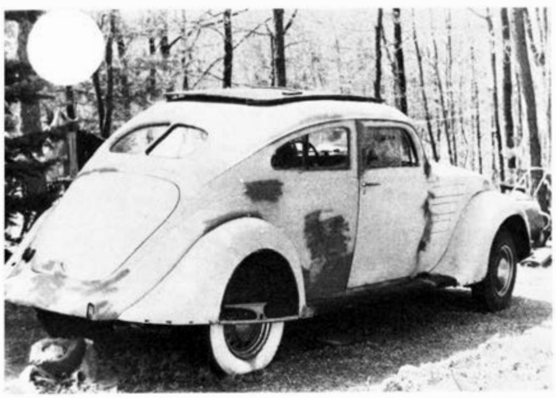
Smith figures he still has about two years of work left on the Chrysler. What work he isn't able to do himself he sends out to experts all over the country: car-



Cadillac Smith in mufti next to his driveable 1940 Ford; a few additions are still needed. In the foreground is the 1934 Chrysler "Airflow" Imperial.

Photos by Lance Strozier

John "Cadillac" Smith reassembles the rebuilt transmission for his 1940 Ford.



When Smith bought the Chrysler, the exterior wasn't very bad cosmetically, but the interior was a shambles and mechanically needed tender, loving surgery to regain its former glory.

buretor overhauling, having pitted chrome trim and parts duplicated in brass in Arkansas and plated in chrome locally, the wiring harness duplicated in Connecticut, engine parts balanced locally or in Kansas, machining of the engine, having the body dipped to prevent rust, etc. He's scrounged or bought parts, machined some in his own shop and ordered 10 yards of upholstery material from England at $31 a yard.

All told, Smith estimates he'll have $16,000 invested in the car by the time it's finished. "It'll be in mint condition—probably in even better condition than when it was new," he says. This is logical, considering the balancing operations and modern piston rings. However, he also figures the car will be worth $25-30,000 and that he wouldn't have the slightest difficulty in selling it, if he wanted to.

The Ford was just a well-worn car when he bought it in 1954. He's been driving it and rebuilding it ever since, but now it will become another mint-condition antique.

Among the half-dozen other cars he's rebuilt along with his sons, John and David, is a 1958 Chevrolet with a 327-cu. in. engine that is a "jewel." Thanks to his work, "it has as perfect an engine as possible," and he intends to keep it.

His wife, Bess, is very tolerant of this passion, Cadillac says. "To say endorse it, no." He gets his bills paid on time, despite the expenses of his hobby. One month, however, when the gas bill ran $246, "she said, 'You don't suppose that heater running in the garage all day and night is running the gas bill up,' and I said, 'I don't think so.' I don't think she believed it, but she didn't say so." ■

Q&A

I need some guidance and clarification on Handbook 7110.65, Para. 796C and its Note 1. In the note, the general application is that a visual approach will not be issued unless, in addition to the requirements of 796C, the destination airport is at or above VFR minimums (three miles visibility and 1,000 feet). The thinking is that this is to insure the aircraft remains in VFR conditions as specified in 796C. I think that the note authorizes control personnel to issue visual approaches when the weather at an airport is below VFR minimums and when such an approach would clearly not be prohibited by weather conditions. Also, am I wrong that the language here places the responsibility for the conduct of flight in VFR conditions on the pilot and that in conducting instrument approaches, some point is reached where the pilot must take over visually and land?

The intent of 7110.65B-796.c., Note 1 is to clarify that if an aircraft is being vectored for an instrument approach and reports the airport in sight, the weather criteria in 796.a. (Vectors for a Visual Approach) are not a factor in determining if the aircraft can be cleared for a visual approach. The applicable criteria in that situation is contained in 796.c. (Clearance for Visual Approach). The wording of the weather criteria in 796.c. as "the aircraft is and can remain in VFR conditions" has been misinterpreted by some as permitting visual approach clearances when the reported weather at the airport is less than VFR, provided certain weather phenomena are present or if the pilot reports that flight to the airport can be made in VFR conditions. The assumption in the wording was that VFR conditions at the airport were inherent in the weather criteria.

However, to remove any doubts, effective with Change 5 of 7110.65B, the weather criteria in 796.c. has been revised to read: "Weather conditions at the airport are reported VFR or, at airports with no weather reporting service, the pilot reports that descent and flight to the airport can be made in VFR conditions." For added rationale, see the Change 5 Handbook Change Briefing Guide available through your facility training department.

My facility had been approved for an upgrade from a Level I to a Level II. The FAA does its traffic evaluations on a monthly basis, but it's been two months since we had the numbers necessary for the upgrade and still no increase is shown on the paycheck. I can understand a delay in seeing the money, but the way I understand it, the increase will not be retroactive, and we will get it when they want to give it to us. What is the reason for all this, and do we have any recourse to remedy it?

Air Traffic grade level changes are currently processed in accordance with the Office of Personnel and Training document entitled "Procedures for Effecting Air Traffic Facility Grade Level Changes," effective Aug. 1, 1980. These procedures require a number of administrative steps that must be taken prior to a facility's grade-level change.

Among these procedures is the approval of the Air Traffic Service's Operations Research Branch, AAT-12. A facility cannot be upgraded until this approval is received. Under current procedures, after this approval is received and the facility actually reaches the qualifying criteria factor required to effect a facility level change, the regional Air Traffic Division notifies its servicing Personnel Management Division within five working days. The Personnel Management Division then makes the resulting promotion actions effective on the beginning of the following pay period.

Comptroller General decisions have held that promotions cannot be made retroactively if nothing in the record indicates that there was an administrative intention on the part of the agency to promote an employee on a specific date. In addition, their decisions have held that personnel actions, including promotions, cannot be retroactively effected unless clerical or administrative errors occurred that prevented the personnel action from taking effect after the administrative decision is made to effect it.

In the case of a facility upgrade, the agency does not make a decision to effect promotions on a specific date until all administrative steps required for the upgrade are completed. Therefore, your promotion cannot be made retroactive.

You've tried the normal channels—your supervisor, the personnel management specialist, the regional office—and can't resolve a problem or understand the answers you've gotten. Then ask FAA WORLD's Q&A column. We don't want your name unless you want to give it or it's needed for a personal problem, but we do need to know your region. All will be answered here and/or by mail if you provide an address.

By John Newell
The chief of the Richmond, Va., General Aviation District Office, he holds an Air Transport Pilot certificate with Jetstar and Lear type ratings.

FAA Certifies Floating Ground Schools

It might seem like carrying coals to Newcastle to teach the rudiments of flight and navigation aboard a U.S. Navy aircraft carrier, but the need was there, and FAA was only too happy to cooperate.

In March 1980, as the carrier *Dwight D. Eisenhower* was preparing to take its F-14 Tomcats of fighter squadron VF-143 on an eight-month cruise to the Indian Ocean from Norfolk, Va., pilot Lt. Hugh Knighton discovered that there were many maintenance personnel and radar intercept officers who wanted to earn a private pilot's license. Being at sea for an extended period would do nothing for that goal, despite idle moments.

Lieutenant Knighton proposed to set up a ground school course to help them prepare for FAA's written examination. Supported and encouraged by squadron Cdr. Steve Ramsdell, himself an FAA certified flight and ground instructor, Knighton carried his plan to chief John B. Newell and inspector R. A. Dolman of the Richmond, Va., General Aviation District Office. After coordination with FAA and Navy headquarters and textbooks and other training materials were supplied, Knighton was appointed an FAA written test examiner and Commander Ramsdell the head of ground school instruction.

Together, the officers organized the classes and prepared the lectures and training exercises. Commander Ramsdell authorized the use of the squadron ready room as a classroom, and a number of pilots were recruited to lecture.

Knighton was a good choice for carrying out this project, for he was not new to civil aviation. He first began flying a decade earlier, earned a flight instructor's rating and served three years as a corporate pilot before joining the Navy. He's also qualified as a PACE (Program for Afloat College Education) instructor.

In Ready Room Eight of the *USS Dwight D. Eisenhower*, Lt. Hugh Knighton explains aeronautical chart symbols to a ground school class. U.S. Navy photo

As the carrier sailed through Hampton Roads, Va., electronics technicians, radar intercept officers and even the squadron's air intelligence officer cracked the books, anxious to get started.

The environment for learning about flying was ideal, since the carrier is a floating airport, complete with control tower and approach control. Planes designed for different missions were continually launching and landing in all kinds of weather, day and night, under both VFR and IFR conditions. And who could better explain the dynamics of flight than the cadre of professionals whose safety in hot aircraft depends on very detailed knowledge and strict adherence to safety rules?

Scheduling a lecture period for a time and day when everyone could attend and not be interrupted by shipboard activities and drills became a challenge, but everyone was flexible enough to adapt to the sudden changes.

Knighton feels that the course was a huge success in more ways than one. "Not only have those men been able to use their spare time to complete a ground school course but they also have gained an appreciation and understanding of the flying portion of our mission," Knighton said. "Through our joint efforts with the FAA, this project has really worked."

The ball is rolling. Thirty-five prospective private pilots aboard the *Eisenhower* have taken the written exam, and more are expected to participate on future cruises. The *Eisenhower* was relieved by the *USS Independence*. Aboard the *Independence*, Cdr. David Graham now is an FAA written test examiner certified by the Richmond GADO.

As far as the GADO knows, these are the only floating FAA written test examiners. ■

By Betty Moschella
A public information specialist at the Technical Center, she was a free-lance writer and has been published in *Transportation USA*.

A Hard Look at Pilot Skills

Tech Center Studies General Aviation Training

Chuck Napolitano (in right seat), flight instructor with Embry-Riddle, explains Cessna 172 instruments to Technical Center employee-student Robert Marks, a participant in a pilot-training study.

The non-instrument-rated pilot is confidently tooling along when he stumbles into instrument conditions. Studies have shown that in less than two minutes after entering rain, fog or low ceiling, he will lose control of the airplane.

First, the pilot loses all visual references—everything is milky white outside. As he looks around, trying to figure how to get out of the situation, almost imperceptibly one of the plane's wings lowers. As that happens, the plane begins to descend in a turn.

As he becomes aware of an increase in sound, he checks the altimeter and sees a loss of altitude. The first reaction is to pull back on the controls, not realizing he is in a descending turn. Pulling back on the yoke only tightens the turn, and the plane goes into a "graveyard spiral."

This scenario happens often enough for the FAA Technical Center to have begun a program to develop training procedures that will improve pilot judgment and flight skills and bring about a reduction in general aviation accidents among the some 800,000 pilots and 190,000 general aviation aircraft in the United States.

Poor pilot judgment, combined with weather factors, is suspected of being a prime cause of the accidents, according to Douglas Harvey, manager of the Center's Airmen Research Program.

"The single biggest killer of general aviation pilots is weather," he said, "—not violent weather such as hurricanes and thunderstorms but rain, fog and low ceilings. These three weather factors are shown to be involved in 75–80 percent of all general aviation fatalities.

Pilot safety begins at the beginning with the walk-around. Embry-Riddle instructor Nigel Lemons and Tech Center employee and student pilot Roberta Crosson check a Cessna's oil level.

"There appears to be a gap in the training of general aviation pilots between the time they receive their private pilot certificates and the time they log the number of hours necessary to train for an instrument rating—200 hours," he continued. "Most fatal general aviation accidents occur when pilots run into weather they are not trained to cope with, usually when they have logged between 85 and 135 hours."

In July 1979, the Tech Center awarded a research contract to Embry-`iddle Aeronautical University, ıytona Beach, Fla., to study flight ɔkills and make training recommendations. A human-factors study was subcontracted to Seville Research Corp. of Pensacola, Fla.

Using data gathered by reviewing 3,000 government and industry reports, articles, etc., and interviewing people from the Aircraft Owners and Pilots Association (AOPA), the General Aviation Manufacturers Association (GAMA), the National Aeronautics and Space Administration, the National Transportation Safety Board (NTSB), the Naval Safety Center, the National Business Aircraft Association, the Tech Center and FAA headquarters, Seville reported that there may be many solutions to pilot performance problems in the areas of aircraft design, airports, aeronautical information systems, certification/rating requirements, training programs and evaluation tests and procedures.

Based on Seville's report, the FAA selected several specific areas for further study, including the 200 hours inimum flight time for an IFR rating ıd its possible reduction.

To discover whether different training schedules can help prevent weather-related accidents, Embry-Riddle tested three groups of students at the university who had recently obtained private pilot certificates—one receiving instrument training immediately, the second after logging 40 more hours and the third after logging 80 hours beyond the certificate.

The results of the test showed no statistically significant difference in the performance of instrument flight maneuvers among the three groups.

According to Harvey, however, the study used students whose ages were not representative of all general aviation instrument trainees, and only one type of plane—the Cessna 172—was used. As a result, the Tech Center has expanded the study.

The Center has begun instrument flight training for individuals in a wide range of ages, using Embry Riddle instructors and a single-engine Mooney as well as a Cessna 172. A report on this follow-up study is expected in October.

The Tech Center also is evaluating how well pilots retain their flight skills. "Flying skills, like any other motor skill, deteriorate with time," Harvey noted. "We want to know how rapidly they deteriorate and which particular flight maneuvers decline first."

Flight performance is being studied as a function of training time. What is critical may be not how long the training period is but how regularly instruction is received. With two groups of Tech Center employees receiving flight training over three and six months, respectively, preliminary results show that the three-month group took significantly more flight time to solo. A report is due in June. Both groups will be reexamined periodically for two years.

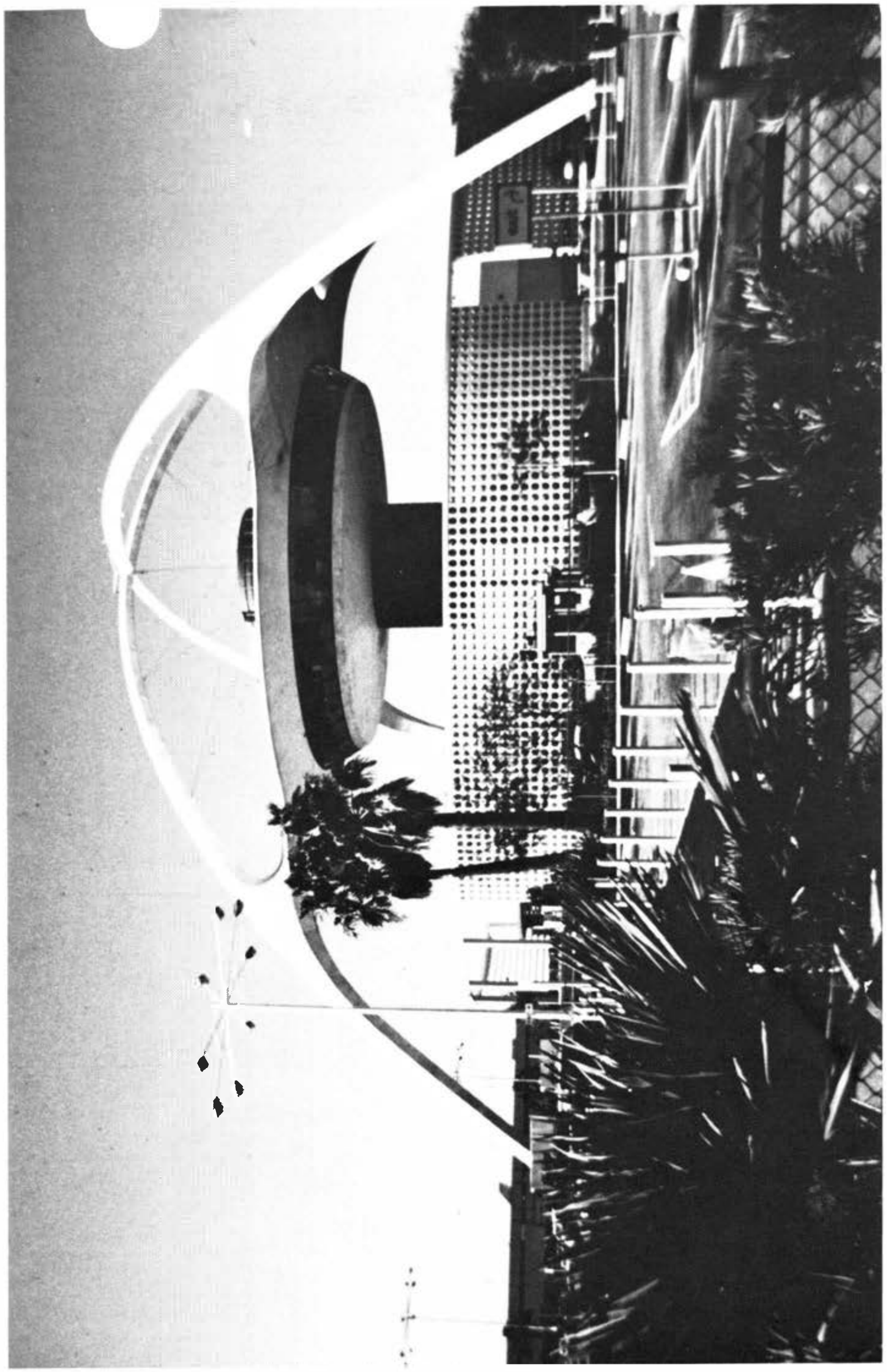
Still another phase of the general aviation study to be covered at the Tech Center is how effectively can pilots use electronic cockpit displays. Although such displays provide more flexibility than the current electromechanical displays, Harvey believes there is a danger of cluttering up the panel with so much information that it adds to the pilot's confusion.

Finally, the Center is looking into low-cost alternatives for the maintenance of flight proficiency, such as cockpit simulators. With the high-cost of fuel, there is the possibility of proficiency declining as pilots fly only for transportation and not for practice.

Last January, the Center held the Second General Aviation Safety Workshop with AOPA and GAMA. It was attended by representatives from trade groups, manufacturers, universities, aviation schools and the government.

Recommendations from this conference included making NTSB certification a requirement for all accident investigators, improving the biennial flight review by including a written exam, lowering insurance rates for pilots with demonstrated flight proficiency, requiring mandatory flight checks for flight instructor revalidation, developing a method to test pilot judgment and reviewing general aviation's overall needs and capabilities.

As the Seville report pointed out, there are many solutions still to be found to the problems of general-aviation pilot safety. ■



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