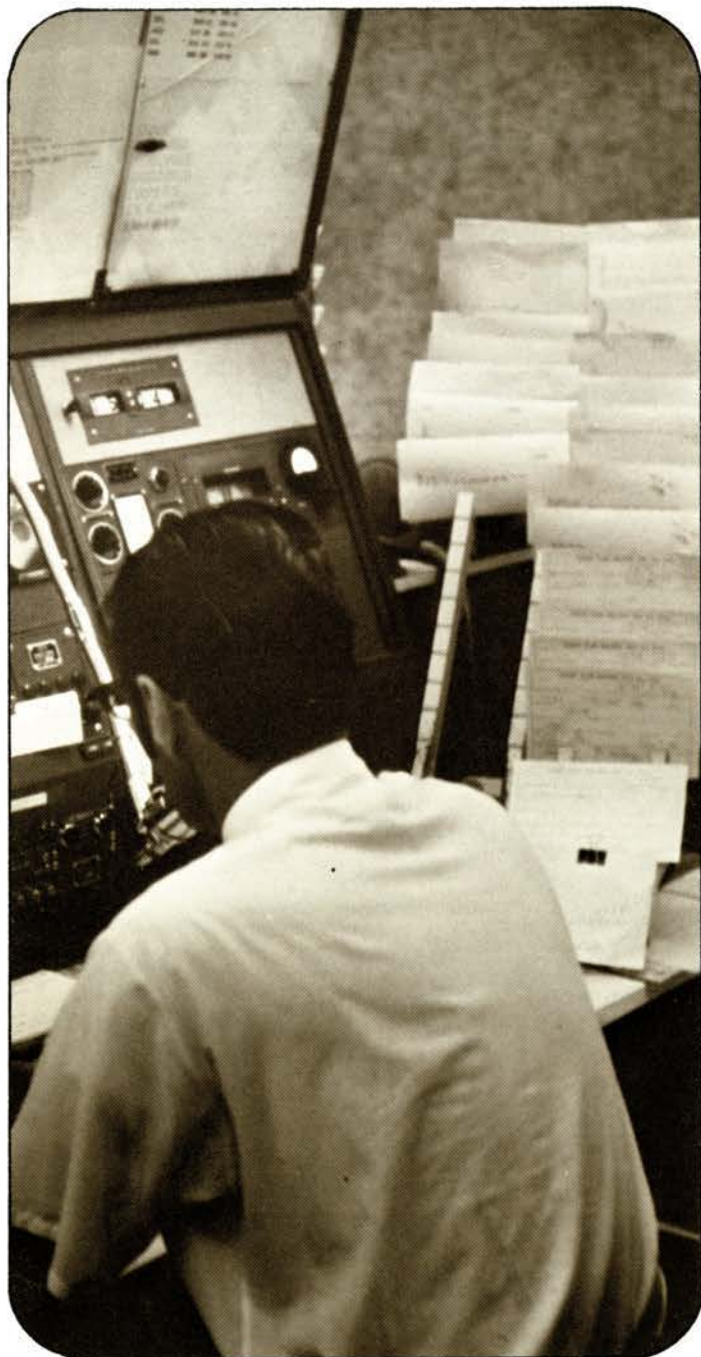


AUGUST 1973

FAA WORLD

Service to Man in Flight

FSS MODERNIZATION



FAA WORLD

AUGUST, 1973 VOL. 3, NO. 8

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The cover: The old and the new face of the FSS specialist's job. "Paper pollution" crowds the present-day work area, contrasted with the modern automated concept being tested that provides a neat TV display with a computer input keyboard.

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The New Face Of Service

In FAA's constant striving to meet tomorrow's needs in the National Aviation System, we have moved ahead full bore on the automating of terminal and ARTCC air traffic control. Now we are turning to the needs of the burgeoning general-aviation community and the vital services we provide through Flight Service Stations.

In the coming decade, general aviation will account for the greatest increases in the number of planes, pilots and hours flown. As our system is presently constituted, we would need many more people and much more money to meet that challenge. Ten years from now, the present FSS system would cost an estimated \$250 million per year to operate. The key is to use the tools of the electronics age as we have done elsewhere. We are not embarking on a modernization program that will drastically change the face of pilot services, but the computerized FSS plan with which we are proceeding will actually cost less to operate than the present system—\$60 million a year as against \$86 million.

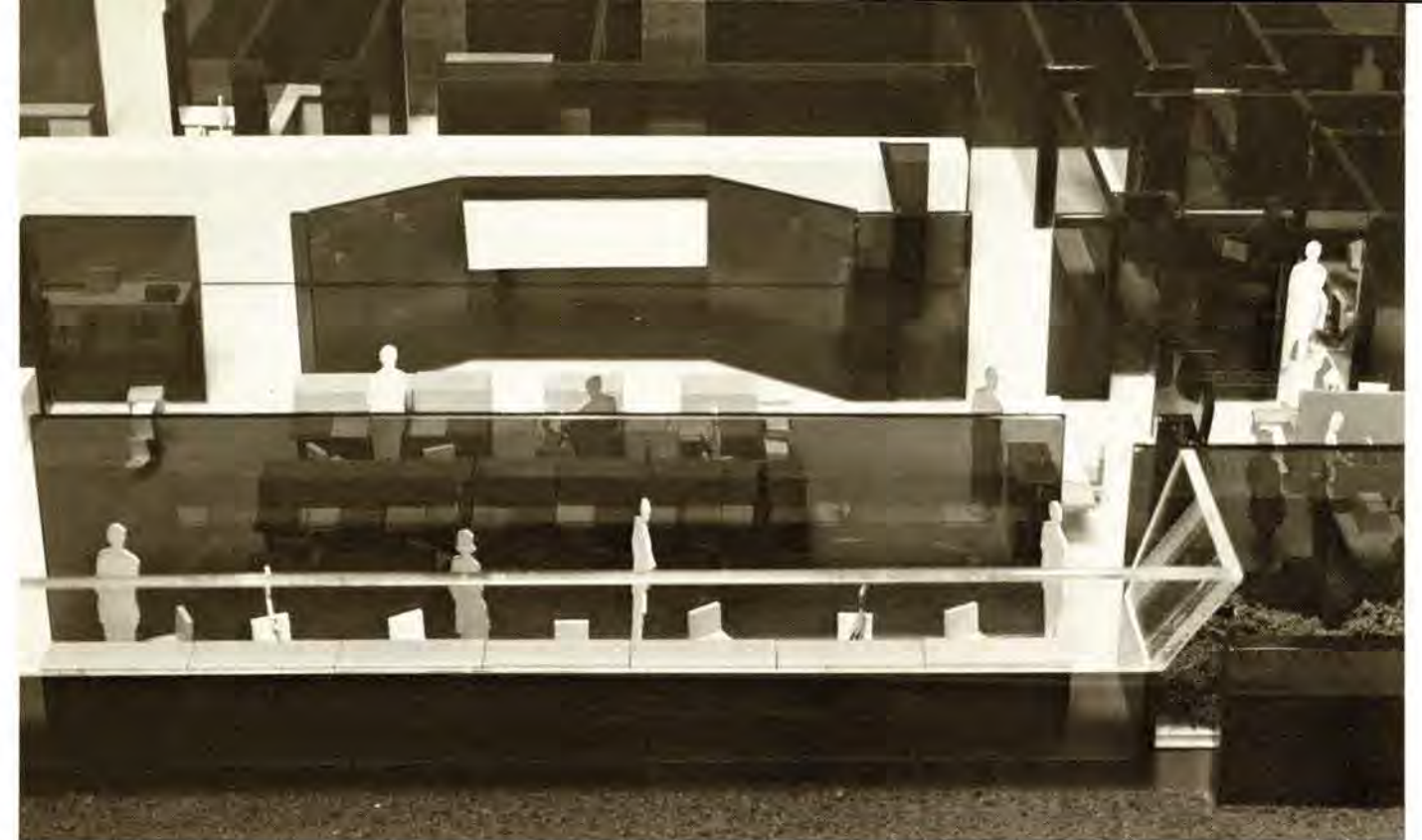
Right now, FAA operates about 325 Flight Service Stations across the country. We will phase out a number of facilities each year until about half remain, then take another look at the system's needs. The final goal will be 20 to 50 large Flight Service Stations feeding 3,500 pilot-briefing terminals located at about 2,500 airports.

Keep in mind that this plan will unfold over a period of 10 years, thereby minimizing the effect on the 3,900 FAAers presently working in FSSs. Many affected by the program could find their careers enhanced by moving within the system to higher activity posts, as well as enjoying the plus of working with up-to-the-minute equipment. Others, of course, will be reaching retirement age well before their present facilities are affected.

The overhaul of the FSS system is needed. Hopefully, by 1983 we will have a super-efficient system that will serve the flying public far better at far-lower cost.

Alexander P. Butterfield

ALEXANDER P. BUTTERFIELD
Administrator



A scale model of the FSS of the future shows individual specialists' consoles and a wall screen for weather charts.

TOMORROW'S FSS TODAY

With computer technology updating everything from parking tickets to dentist bills, it should be no surprise that its reliability and instant retrieval are now going to work for the flight service station specialist and the pilot.

The 10-year plan for FSS modernization will ultimately result in 20 to 50 large hub flight service stations feeding 3,500 pilot-briefing terminals at 2,500 airports around the country. The heart of these terminals will be cathode-ray-tube displays coupled to computer inputs that will permit automatic filing of flight plans and provide individually tailored weather reports and other data. But right now, FAA is on the verge of a trial wet run of the system that culminates a lot of planning.

"Ten years from now, the flight service station network will blend into the total National Aviation System, along with the automated ARTS terminals and NAS air route traffic control centers," said Dean Stromwall, of FAA's Office of General Aviation.

Since more than three-fourths of all aircraft flying in the nation today are general aviation, Stromwall was a good man to start with in contacting representatives from the team that is modernizing our "weather retailers" to meet the increasing demand for their services. Stromwall works as liaison to

Congress, constituents and the aviation community so that the modernization plans are understood and reflect input from the users.

"If we were to expand our present FSS system to meet the forecast demand for services to pilots in 1983, it would cost \$250 million a year to operate," Stromwall explained, "with most of it going for manpower. But if we install the automated system at a capital investment of \$60 million, we can meet that demand for only \$59 million yearly in manpower costs."

This vastly improved system will not only operate at one-fifth the cost of the present manned system, but will be seen by pilots in terms of improved, more-thorough briefings. In general, it will result in a more responsible use of federal resources as well as increased efficiency through automation, according to Stromwall.

Our next contact was Edmund Bromley, chief of the Weather and FSS Branch of the Systems Research and Development Service. He filled us in on the extensive planning that has been done across FAA disciplines to arrive at the point where the Atlanta FSS will kick-off a year's test of automation this October.

Bromley showed us five volumes that are the basis



Specialist Rico Cowan (left) briefs Atlanta FSS chief Douglas Rhodes using facsimile weather maps. In the fall, weather data will be called up on cathode-ray displays.

Automation is coming to flight service station functions. Data systems specialist Merrill Butler demonstrates a CRT console with computer-input keyboard designed for any position.



Telephone-filed pilot flight plans are relayed to the Atlanta ARTCC by FSS specialist John Curry (right). At left, specialist Glenn Brown reads the perforated tape on an incoming flight plan. Computers instead of teletypes will soon be the means for preparing and transmitting them.

for a new look in FSSs, titled: "A Proposal for the Future of Flight Service Stations." Proposal-development team participants included project managers Terry Schmidt of DOT and Charles Murray of the FAA Office of Plans. Other DOT participants were David Lawhead and Clifford Parker, both from the Office of Planning and Program Review, and George Webber, Office of Systems Development and Technology. Aiding Bromley significantly were Oscar T. Grann and Joseph Gamble, both of SRDS. Bill Boatright and Cy Femrite, Air Traffic Service; Walter Faison, of Aviation Policy and Plans; and Melvin Yoshikami, Airway Facilities Service, also were on the team.

"Our task in engineering and development has two phases," Bromley said. "First, we must devise the tools to get rid of the paper 'pollution' by developing and testing the new Aviation Weather and NOTAM System (AWANS) at the Atlanta FSS." Anyone who visits a present-day FSS can see the plethora of teletype paper from half a dozen circuits and the weather charts used for updating.

"Second, we'll move into the area of pilot self-briefing so that the FSS specialist will no longer be

the only link between the pilot and the data bank. The customer will get the products—weather information, NOTAMS (Notice to Airmen), flight planning—by operating a keyboard at one of some 3,500 unmanned pilot-briefing terminals at about 2,500 locations."

We talked next with Atlanta FSS chief Douglas (Dusty) Rhodes at Fulton County Airport, along with Paul Rosenwald, in Rhodes' office. Rosenwald was on hand to represent operational liaison from the Air Traffic Service in developing the automated AWANS program.

"This fall, we'll have our computer and 15 cathode-ray-tube (CRT) displays at Atlanta to test in an operational environment for a year. Six other CRTs will be remoted into the system, including three at the Macon, Ga., FSS," Rhodes said. "Under the old system, paper could get lost or weather transmissions delayed. To get the most current information as quickly as possible, our AWANS will be connected to the Kansas City Switching Center via a high-speed line."

When Rhodes came to head the Atlanta FSS in 1967, he felt that the facility was ill-arranged and

had more workload than people could tackle. Rhodes established eight sit-down briefing positions to improve the briefing area. He then had Sylvania Television Corp. look into the paper problem inherent in handling flight plans and the possibility of closed-circuit TV. Both Atlanta and the Houston FSS developed automation proposals, and Atlanta ultimately was selected to be the first test station.

By October 1973, the eight sit-down briefers will each use a 14-inch CRT and a keyboard. In place of the services of the present coordinator, who delivers reams of paper from which weather information is selected for pilot briefings, the specialist simply will talk to the computer by keyboard to obtain the printed and graphic data he or she needs. Commonly used weather charts and radar also will be shown, over larger 23-inch TV monitors.



Besides the eight CRT consoles at pre-flight, there will be two each at both the flight data and the in-flight positions. The assistant chief will have a console for master control, and there will be a console for training.

"In our face-to-face pilot-briefing room, there will be a CRT and keyboard manned part-time as needed," Rhodes explained. "Pilots will be encouraged to use the equipment themselves. If they need help, they can buzz us, but it will be simple: Hit the keys, giving departure and destination airports as instructed, then wait for the computer to give weather en route, take the flight plan, and so forth."

At present, FSSs have considerable record-keeping, according to the type of service rendered. Along with associated weather records, this information is retained for 15 days. The assistant chief must daily



A team of headquarters and region representatives completed a week-long measurement of productivity at Atlanta in preparation for this fall's automation. Assistant FSS chief Ernest Beard (right) accompanies analyst Charles T. Wright as he records sequenced movements in each position.

A pilot's eye view over the counter at the Atlanta FSS shows some of the eight sit-down briefing positions that will soon feature CRT displays and keyboards. Seated from the left are specialists Mayphine Hinesley, Al Dixon and Rico Cowan. Weather coordinator Bob Norris has just brought them updated teletype information.



count the number of flight plans, pilot briefings and aircraft contacted.

"Our new computer system, designed by E-Systems of Garland, Tex., will give a readout of services provided at any time, day or night, evaluate workload and give an indication where additional help is needed," Rhodes added.

"The computer will also store messages to alert specialists about overdue or stolen aircraft and pilots conducting suspicious operations. When an Atlanta or Macon specialist talks to the computer about aircraft N1234, he or she will get an alarm indication, if an alert is stored in AWANS. This will aid in search-and-rescue operations, stolen-plane recovery and the like."

"When you're handling 700-800 pilot briefs a day, it's cumbersome to refer constantly to the NOTAMS," Rosenwald said. "It's possible to miss a NOTAM by their sheer volume, or when they are not transmitted by summary. With the computer, we'll retrieve all NOTAMS pertinent to the route of flight."

"Until now, the briefer has had to thumb through a multitude of updated reports while talking to the pilot. Doing two things at once and keeping up with a complicated, changing weather system makes room for error," he continued.

Surface weather observations are collected on the

hour, and in the present system, reports for a particular route may not be available for an additional 20 minutes. With AWANS, some 500 hourly reports will be available to the Atlanta and Macon specialists, five minutes after the hour, according to Rosenwald.

David Hall heads the E-Systems group putting together the electronics packages for the Atlanta FSS. Two data-systems specialists from the station—Merrill (Mac) Butler and Terrell Wilson—represent the agency for the contractor, whose first console mock-up is now in place. The Tempo II computer system development is assisted by the presence of FAA's "Merrill and Terrell."

"We're providing and installing the automation equipment on schedule," said Hall. "Major elements are the computer complex to store data and operating programs, video storage of graphics—weather radar and charts—the cathode-ray-tube display and the keyboards."

Rather than cutting manpower, the system provided should extend the specialists' service, organizing their time better and reducing the data that a briefer has to examine.

A year from this October, the "after" story hopefully will indicate that the AWANS installation justifies the current enthusiasm and anticipation at the Atlanta test site for the entire FSS network.

—Text and photos by Thom Hook

There she is —

Bert Parks wasn't there to sing "There She Is" because it hadn't been written yet, but there they were—a bevy of 17 would-like-to-have-been Miss Americas. It was a mock "Miss America 1923 Pageant" honoring past presidents of the NAFEC Woman's Club.

With more than 100 members and guests in attendance, the title aspirants, who were the members of the club's executive board, paraded in men's tee-shirts, snuggie pants and mobcaps. Instead of state names, the ladies' banners identified them in more original terms; among them, Miss Conception, Miss Construe, Miss Informed, Miss Conduct, Miss Happened and Miss Chievious. Bertha Parks, otherwise known as Mrs. V. A. Crawford, wrote the script, designed the costumes and emceed.

The talent contest saw headline acts by "Shirley Temple's old dancing teacher," a bubble blower, a trio of danseuses from the Russian ballet, roller

Crowning their own Miss America 1923, the NAFEC Woman's Club pays homage to Miss Carriage (Mrs. John Steinmetz): (from left to right) Mrs. Charles Westfall, Mrs. Lyle Alverson, Mrs. Albert MacDonald, Mrs. Steinmetz, Mrs. Patrick Duggan (doing the honors), Mrs. Donald Schlots, Mrs. Edward Harms and Mrs. J. A. Muller.



The finalists in the pageant (the entire executive board) were (left to right, front) Mrs. George Mahnken, Mrs. J. A. Muller, Mrs. C. E. Baxter, Mrs. Charles Westfall, Mrs. John Allegra, Mrs. Edward Harms, Mrs. Donald Schlots, Mrs. Rodney Watson and Mrs. Ray Allensworth; (rear) Mrs. James Suann, Mrs. John Steinmetz, Mrs. J. J. Voisich, Mrs. Donald Bottomley, Mrs. Patrick Duggan, Mrs. W. J. Martin, Mrs. Albert MacDonald and Mrs. Lyle Alverson.

skaters, the Lemon Sisters Trio, the Dropsy Sisters presenting a juggling act, Miss Issippi singing an aria, a blindfolded pianist, a mock stripteaser and a dramatic reader.

Judging in the pageant—performed by Mrs. C. A. Commander, honorary president; Mrs. Addison Johnson; Mrs. Jesse Terry; Mrs. H. V. Hermansen; and Mrs. J. E. Martin—resulted in selecting Miss Carriage (nee Mrs. John Steinmetz) as Miss America 1923. (For the record, the real Miss America 1923 was Mary Campbell.)

Emcee Bertha Parks (Mrs. V. A. Crawford) tap-danced to the tune of "Let a Smile Be Your Umbrella," while "Tiptoe Through the Tulips" with a ukulele accompaniment was the specialty of club president Mrs. Ray Allensworth.





EQUAL RIGHTS CHAMPION—The agency's Equal Employment Opportunity Award went to Eastern Region Air Traffic Division chief Clay Hedges (left) for his vigorous support of the EEO program. Making the certificate presentation is Earl Ginyard of the headquarters Office of Civil Rights.



REMEMBER WHEN Angelita Rosal played the Chinese ping-pong team? Now, Angelita—the daughter of Monica, an ET with the AFSFO at Miramar Naval Air Station—has returned from a tour of Europe with the U.S. team. She plans to train still harder for future championship play.

—Photo, courtesy of The San Diego Union

FACES AND PLACES

BRIGHT IDEA—A modification to the Honolulu message switching system that permits single circuits to handle several subscribers through multipoint circuitry and will save FAA \$65,000 a year has netted a \$1,125 suggestion award for Jitsuo Sumida, an electronic technician in the AF Sector Data Processing Unit. Additional savings are expected, as well.



GETTING THE MESSAGE ACROSS—June Bonesteel, an accident prevention counselor, FBO and Girl Scout counselor in Phoenix has been training her girls in general aviation safety. Their posters so impressed the local accident prevention specialist that he had them placed in the Flight Standards District Office in Scottsdale.



BLAST NO MORE—With NAFEC test pilot Joseph Bailey at the controls, a Convair 880 runs up to full power at JFK Airport to test the effectiveness of a blast fence protecting another runway behind and perpendicular to it. The smoke is deliberate to outline the jet blast.



FAMILY OF PILOTS—Franz Schiffmann (right) beams as he receives congratulations on earning his glider pilot's license on his 16th birthday. His pilot father is Pat, General Aviation operations specialist at Western Region headquarters; his mother, Jean, a former CAA communicator, is a member of the 99s and a participant in Powder Puff Derbys. Franz itches to get his airplane ticket.



WE POINT WITH PRIDE—Teamwork between Seattle Center controllers (left to right) Dennis Harris, Gerald Busch and Carl Fullner and Eugene, Ore., CS/T controllers Leslie Darrah, Larry Lee and James Wright brought in safely a pilot, his wife and infant daughter on a dead-stick landing.

FLY ME—Rocky Mountain Logistics secretaries Mrs. Julie Wentz (left) and Mrs. Jan Kinney fly a DC-8 simulator at United Air Lines flight training school at Stapleton Airport during a courtesy tour of the facility by FAA personnel.



MAN OF THE YEAR—Prior to his retirement, Eastern Region Director George Gary (right) was presented with the "Man of the Year in Aviation Management" award by Dr. Armand Prusmack, Dean of the School of Business of C. W. Post College, Brookville, Long Island, for his outstanding work in aviation education and for a program at the college.

Everything from a hot-air balloon to a lunar rock was present for the open house of the Western Region's spanking new regional office building in Hawthorne, Calif. The open house was a great success with more than 10,000 visitors gawking at the displays and glass-and-stainless-steel building.

Following dedication ceremonies at the spring event, the regional office's guests were escorted around the building by 20 pretty hostesses from the Stewardess Training Program at nearby Cypress Community College, as well as FAA personnel, who could field questions from the visitors.

Among the more than 80 exhibits inside the building and on the parking lot were a portable control tower, jet engines, a helicopter, gliders, a homebuilt aircraft and operating two-way air/ground radio.



HOOPLA for Western's New Home



Popular with the younger set was this simulator display. General-aviation operations specialist Don Montgomery gave some 600 junior pilots simulated flight training, which qualified them for "Junior Jet Pilot Cards."

Computer equipment displayed in the new building's lobby proved popular with many open-house visitors.



Milt Ferris of the Air Transportation Security Division manned this display of explosives used in hijackings.

Western Region Director Arvin Basnight posed willingly with five of the stewardesses that served as hostesses. Left to right: Marcelle Zoerlein, Linda Marion, Debbie Romero, Mary Shields and Karen Sandoval.



... Like it is!

COMMUTER BALM

The Civil Service Commission has approved regulations that will compensate employees who have to commute to remote sites at a distance of 50 miles or more. It implements a law signed Jan. 8, 1971, and permits retroactive payments to that date to a maximum of \$10 per day. The cost of the commute must exceed that stood by employees commuting to work in metropolitan areas. ■ Rep. Dante Fascell (Fla) has introduced a bill to amend the Internal Revenue Code to provide for an itemized deduction on income tax returns for the use of a passenger car in a carpool. ■ Traveling for the job rather than to it may also be in for changes. The General Services Administration is looking into boosting the per diem allowance from \$25. It would take Congressional action.

LOST-PAY CRUSADE CONTINUES

The National Association of Internal Revenue Employees appealed its case for collecting the 5.14% pay raise retroactive to Oct. 1 from this past Jan. 1, following an adverse decision from the Federal District Court. The Court of Appeals has turned down a government motion for a summary judgment, which means the appellate court will hold a hearing on the suit. NAIRE is also seeking to prevent a similar delay in pay raise for this year.

HATCH INTACT

The Supreme Court upheld the constitutionality of the Hatch Act, which controls Federal employee participation in politics. Any changes now rest with Congress, which has before it Utah Sen. Frank Moss's bill to liberalize employee politicking.

UPS AND DOWNS OF LIFE

Following the reduction in premiums for optional government life insurance (Intercom, May 21), CSC is proposing to raise the minimum coverage of regular life insurance to \$13,000, which currently would benefit GS-8 and below. The Commission also proposes to provide \$5,000 policies on the spouses of employees and \$1,000 each on children. To top it off, CSC is looking into premium reductions.

BILLS IN THE HOPPER

Reps. Hugh Carey (NY), James Burke (Mass) and Frank Brasco (NY) have each introduced bills calling for optional Social Security coverage for Federal employees, adding to a number already in the mill on this subject. ■ A bill by Rep. Louis Frey Jr. (Fla) provides for continual application of current pay scales to annuities. ■ Rep. Donald Brozman (Colo) has introduced a bill to prohibit state inheritance taxes on civil service survivor annuities.

Getting a Line on WHAT'S WHERE

On the following pages is the second in FAA WORLD's series of maps of agency facilities and offices—the Air Route Traffic Control Centers and the boundaries of the areas they serve. The map is the center spread of the magazine to permit easy removal for those wishing to display it.

In the July issue, we featured the district offices in the Flight Standards Service. In succeeding issues, we will reproduce maps of Air Traffic Control Towers and Flight Service Stations. Since Airway Facilities Sector Offices are usually co-located with towers, a separate map will be unnecessary.

AIR ROUTE TRAFFIC CONTROL CENTERS

FEDERAL AVIATION ADMINISTRATION
Scale 500,000 Lambert Conformal Conic Projection



DIRECT LINE



Q. Funding for the Civil Aviation Assistance Group in Vietnam ran out at the end of the fiscal year. I returned to my parent organization and have exercised my re-employment rights. There is some question as to the moving benefits I should receive with a change in my permanent address within the region. I fully expect to receive the same real estate, household effects, per diem, etc., benefits that I received when I transferred regions before. The FAA Travel Handbook states that I am ineligible to receive real-estate expenses.

A. The situation is different from your previous regional move. An FAA employee returning from a foreign assignment is governed by provisions of the Foreign Affairs Manual, not the FAA Travel Handbook. Unfortunately, the employee is not entitled to allowances for expenses incurred in connection with real-estate transactions. Other benefits, depending upon the specific circumstances, are payable as provided in the FAM and authorized by the travel order. The FAA Travel Handbook, 1500.13A, states in Para. 4a that an employee traveling to or from a foreign area is governed by the provisions of the Foreign Service Act of 1946, as amended, or the Foreign Assistance Act of 1961, as amended, contained in Volume 6 of the Foreign Affairs Manual.

Q. I was selected from a bid list under MPP on August 30, 1972, for a GS-5 Secretary job. Since my previous classification was a GS-4 Clerk-Stenographer, I was told I had to serve in the GS-5 job for a period of six months before I would receive the GS-5 pay. Then, due to the freeze, I was told I couldn't be promoted. Washington telegraphic instructions state that if a commitment was made prior to the freeze date, promotions are allowed. In my opinion, the selection from the bid list was a commitment. Am I not entitled to my promotion at the end of my six months?

A. There aren't enough details provided for a specific answer, but we don't believe that the requested action can be processed as an exception to a freeze. Almost all GS-318-5 Secretary positions in your region are advertised to permit GS-312-4s to bid, al-

though 312 experience is not qualifying for the six months of secretarial experience required for the GS-318-5. We establish a bona fide GS-318-4 in lieu of the GS-5, reassign the successful bidder and advise her that she will be promoted to GS-5 when she meets the qualifications and is recommended by her supervisor for promotion. The APN-1 message of 12-15-72 (to which we assume you refer) set forth the conditions allowing promotion and stated, "Mere time-ingrade requirements are not pre-conditions for this purpose, inasmuch as the assignment or withholding of duties for the higher grade is discretionary with management." Although the issue here is not specifically time ingrade, the requirement for six months specialized experience is related, and the GS-4 job to which you are assigned is a bona fide position. Your supervisor should be assigning only those duties described in your present position description. Without a freeze, you must have completed the experience period, be assigned the higher grade duties and be recommended for the higher grade. Contact your personnel staffing specialist for review of your specific case.

Q. Is there any pending legislation that would permit payment of terminal leave for excess annual leave over that brought forward at the beginning of the leave year?

A. H.R. 1284 was introduced this session but is still pending. This bill proposes to permit lump-sum payment for the 240 hours of accumulated annual leave plus any accrued annual leave that an employee had to his credit at the time of separation. Until such legislation becomes law, the employee must use any leave in excess of the 240-hour ceiling before separation or forfeit it.

Q. The final results and satisfactory presentation of the 9020 computer system depend on the Common Digitizer, another computer, located at the Air Route Surveillance Radars. It would seem that there is non-standardized classification of electronic technicians and computer technicians. They were considered separate, but now a radar technician at an ARSR will be performing in both fields. What should these technicians be considered?

A. The Common Digitizer at the ARSR site adapts the output of the long-range radar to a form that can be transmitted over microwave-link systems or telephone lines. The digitizer's output can then be processed in the ARTCC 9020 computer. The agency is providing formal training at the FAA Academy for the radar technicians who work at ARSR sites. They will be expected to maintain the digitizer there and will be classified as electronic technicians (radar). This approach to staffing is not uncommon in the FAA. At most ARTS locations, the radar-maintenance functions are combined with the ARTS computer-maintenance functions to be performed by the same group of technicians who are trained in both skill areas. At the

centers, however, there is a sufficient concentration of computer-maintenance work to make those single-skill technicians practical. This is why we have established groups of technicians commonly known as computer technicians. It should be noted that these, like those called radar technicians, are in the GS-0856 electronic technician series.

Q. I have several questions concerning employee health.
1. In view of the recent announcement by the Surgeon General of the effects of smokers on non-smokers, does the FAA have a policy against smoking in vehicles and confined work quarters?

A. The FAA is at present studying the establishment of controlled areas in offices and facilities that would prohibit or restrict smoking in specified locations.

2. A substantial number of technicians work a rotating 24-hour watch schedule, with five technicians covering the 24-hour watch. Has the FAA sought a medical opinion on a watch schedule that has the least adverse effect on the watchstander's health?

A. The FAA has conducted studies on controllers to determine the physiological effects of alternative shift practices. The studies involved both "straight 5-day" and "2-2-1." The preliminary findings are being made available to agency managers for their use in decision-making involving shift-rotation schedules. The 2-2-1 was found to have certain stress advantages, and the results should apply to other shift workers as well.

3. There is a list of prescription drugs that disqualify a controller from working a watch during the period he is taking the prescription. Does the same list apply to Airway Facilities technicians?

A. There is no list of drugs disqualifying for technicians, but it is advisable for these persons to let their supervisors know when they are on sedative or tranquilizing medication.

4. How long should a technician abstain from alcohol before reporting for work?

A. It's recommended that technicians avoid alcoholic beverages for eight hours before work.

Q. Why aren't there any women on the roster of staff duty officers in Order 1770.1A, and when will the administration attempt to increase morale by just and adequate compensation for the standby time spent as staff duty officer, especially on weekends?

A. There are women listed on the cited roster. Persons employed in Airway Facilities at headquarters who are GS-13 and above, with few exceptions, are listed on the roster of AF staff duty officers. It's our understanding that serving as the staff duty officer involves telephone availability rather than standby duty as such. While the agency is authorized to pay an employee

for standby duty, it is not authorized to pay for telephone availability. Any change in this would require legislation.

Q. It's my understanding that my region has a policy that promotions to grades GS-14 and 15 will be made from outside the region, also that the agency as a whole encourages and promotes mobility in these and higher grades. As a result, I have bid on three GS-14 openings in the past few months outside my region. One of these was only advertised in its region. On this job, I submitted a voluntary application that did not get to first base. However, on the other two jobs, I made the best-qualified list, but men within the home regions were selected. Is my region the only region that enforces the policy of mobility? If so, it's unfair to the people in the region since the rest of the agency doesn't play the game.

A. There is no agency or regional policy that promotions to grades GS-14 and 15 must be made from outside the region. Although the agency as a whole encourages mobility for the acquisition of diversified experience, the concept of mobility does not necessarily imply a movement between regions—rather movement among facilities and types of positions within an occupation. Individuals are selected for promotion based on their qualifications for the position and from being among the best qualified.

Q. Medical statistics reveal that one person in seven needs some type of psychiatric help. What attempt, if any, does FAA make to ensure that unstable individuals are not selected for responsible positions, such as tower chiefs, etc.?

A. No effort is made to determine the psychological or psychiatric competency of personnel selected for key positions in FAA. With respect to air traffic chiefs, DOT Order 3330.1A, Appendix 13, provides for the establishment of promotion rating panels in headquarters, the regions, the Aeronautical Center and NAFEC, as well as an interview panel and a National Review Board in headquarters. There is no provision for the inclusion of medical personnel on the promotion rating panel.

Is there something bugging you? Something you don't understand? Tell it to "Direct Line." We don't want your name unless you want to give it, but we do need to know your region. We want your query, your comment, your idea—with specifics, so that a specific answer can be provided. All will be answered in this column, in the bulletin-board supplement and/or by mail if you provide a mailing address.

Better two-way communication in FAA WORLD's "Direct Line" is what it's all about.

THE LADY RETIRES



—Photo by Bill Pitchford

During World War II, women had more of an opportunity to do something unusual in aviation than they did for many years afterwards. Many of them are still talking about it, after "retiring" to other duties. One who didn't retire then but has now after 30 years in air traffic control is Marjorie Shupe Muir of the Detroit Metro Tower, who learned the ropes in a 10-week training course in Chicago during 1943.

Marjorie's efforts to stick with the fascinating life of a controller brought her more problems than most as her transfers did not always coincide with those of her husband, Keith, who retired from air traffic control before she did. Now, both

will do more of what they did less of before—walk out the back door of their suburban Detroit home and play golf. As they live on a golf course, there is no problem there. However, Detroit's winters are not conducive to daily golfing, so the Muirs will chase the sun to greener greens during the winter. They have already golfed in Spain, Portugal, Mexico and through the Caribbean, although the course at Palm Springs is their favorite.

Tall and with eyes the color of the sky on a beautiful VFR day, Marjorie worked as a trainee at the Battle Creek Tower after her training, then moved to Evansville, Ind., before going to the old Detroit Center in North Hangar, an area still undisturbed by airport expansion. She moved to the old Metro Tower in 1952.

The whole thing is very exciting, Marjorie says of her air traffic career and her life around airports and pilots. It all started when she was 12 and living in Howard City, Mich., where she heard a radio program relating the activities of early air traffic controllers. Then, she went up in a small plane and aviation got to her.

"I'll miss the activity and excitement of airport atmosphere," Marjorie says. However, she should be able to visit often, as husband Keith is a private consultant on airspace services, and there are all those golf courses to be reached by air.

Marjorie Muir may well have been in air traffic control longer than any woman. Her firm, quiet, knowledgeable voice will be missed on the airway bands.

—By Marjorie Kriz

THE BIG PICTURE ON OCEANIC CONTROL

Terminal and enroute traffic are being served by automation and flight service stations are slated to get theirs. Another in the works is an automated system to control oceanic air traffic.

One of the features of the experimental system that has been evaluated at the Oakland Center and at NAFEC is this big-screen display, which can show air traffic in any one of the four sectors covering the entire West Coast almost to Honolulu. Jim Dixon and another controller at Oakland watch the 5 x 7-foot screen during an evaluation. It presents the same picture as the monitor at their elbow—information from flight plans of all Trans-Pacific airplanes fed from computers. Aircraft equipped with data link can show up live on the display.

NAFEC and the Systems Research and Development Service are determining operational functions to be automated and designing a working console for controllers. Working with NAFEC's

program area leader Tony Spingola are test director Lt. Col. Bob Giordano, George Weimar, Donald Martin, William Crimbring and Errol Porter.



PLANES, PILOTS AND REGS

The Flight Standards Story

This is the second in a two-part history of the Flight Standards Service and its predecessors. Part I—The Beginnings—appeared in the July issue.

Part II—The Modern Era

The Second World War had drawn to a close, but its spinoffs had only begun. The stimulus to research, design and mass production, particularly in the aircraft industry, had produced a huge capability in manufacturing and a corps of trained pilots in search of a market in civil aviation. A deluge of pilots and planes spilled onto the peacetime scene, but CAA was ready, and far-reaching measures were soon taken to deal with them.

CAA granted manufacturers greater leeway in testing planes and engines before certification and appointed 2,000 industrial specialists to perform annual aircraft inspections and make checks after major repairs. Only days before the war ended, CAA had created the position of private-pilot examiner to handle the postwar flood of demands for examinations.

In January 1946, CAA took a major step toward present-day methods of surveillance by appointing a "designated manufacturing-inspection representative"—a highly knowledgeable member of each company—to act as the agency's eyes and ears in airplane factories to be certain that airworthiness standards were followed. In 1950, "designated engineering representatives" began similar jobs at the drawing-board stage of aircraft production.



New York's LaGuardia Airport is the scene of an engine maintenance check by an FAA inspector (left) in 1959.

Rather than rely on test pilots' seat-of-the-pants judgments only, manufacturers began static tests of construction in the early '30s, leading to the hydraulic wing-benders of the '40s. Here, sandbags are stacked on the tail surfaces of a prototype Waco UMF.



Where previously only CAA headquarters approved flying, ground and mechanic schools, repair stations and parachute lofts and issued type and production certificates, in 1946 and 1948 the agency delegated this authority to its regional offices.

In August 1947, CAA took still another giant step toward entrusting manufacturers with the chores of ensuring airworthiness by establishing the Technical Standard Order system, which today remains a mainstay of the Flight Standards surveillance system. TSOs specified standards for all kinds of aircraft components, accessories and equipment which were not explicitly covered in the regulations, and manufacturers were permitted to warranty these products as meeting CAA standards without submitting samples to the agency for inspection.

While decentralizing the job of certification to the regions and manufacturers, CAA began to rethink its approach to airworthiness standards and to pick up some of the priorities for new safety designs in civil airplanes it had dropped in the heat of the war. CAA also capitalized on its wartime experience to improve safety standards, particularly for fire protection.

In early efforts to protect against in-flight engine fires—which were “damn near always fatal,” according to a former CAA/FAA employee—the agency required manufacturers to wrap fuel lines in asbestos. Stainless steel barriers between the hot part of the engine and fuel and lubrication lines had been required just before the war. During the war, CAA and the military worked frantically on the problem of putting out fires from

gunfire, with CAA finally developing shut-off valves for oil, fuel and hydraulic lines. By the end of the war, manufacturers were putting such valves on their engines.

Fire-warning lights and fire-extinguishing bottles had come into use, but a disastrous experience with a fire-warning on an airliner led to a change in fire-protection methods for baggage compartments. Unable to deactivate a warning light, a flight crew released several bottles of fire extinguisher, inadvertently gassing themselves through a leak in the cockpit floor and causing a fatal crash. After that, baggage compartments were made fire-resistant and sealed off from possible fire-feeding air supplies. Baggage-compartment fire extinguishers were done away with.

Aircraft performance standards became the subject of a more rational, systematic approach by CAA after the war. The performance of planes was looked at in relation to airports, runway lengths and height obstacles. Takeoff, landing, stopping and vertical distances—not just speed—were carefully measured during the flight test and certification process. More thought was given to the use different kinds of aircraft would be put to, such as airliners and private planes. CAA wrote standards to require sufficient strength for certain maneuvers that could normally be expected for each kind of plane. Gust loads that must be borne in turbulence at various aircraft speeds were also specified.

Compelled by the size, expense and complexity of their aircraft and by the need to satisfy all CAA standards, manufacturers began making more criti-

cal tests of wings and fuselages on the ground instead of in the air with complete airplanes, starting the use of hydraulic wing twistors. (A dozen years earlier, builders were using sand bags on wing and tail assemblies to see if they could bear their design loads.) They dropped whole airplanes several feet to see if the landing gear could take it. Detailed data was gathered from sophisticated new instruments, such as stress and strain gauges, and from cameras and runway markings, which all came into use for exact measurement of the strength and performance of planes and components. Data from these elaborate tests were minutely reviewed by CAA engineers and inspectors.

These techniques began to supplant the test pilot's judgment of an airplane's performance, although even today, seat-of-the-pants judgment by FAA and company test pilots remains a factor in determining unfavorable flight characteristics.

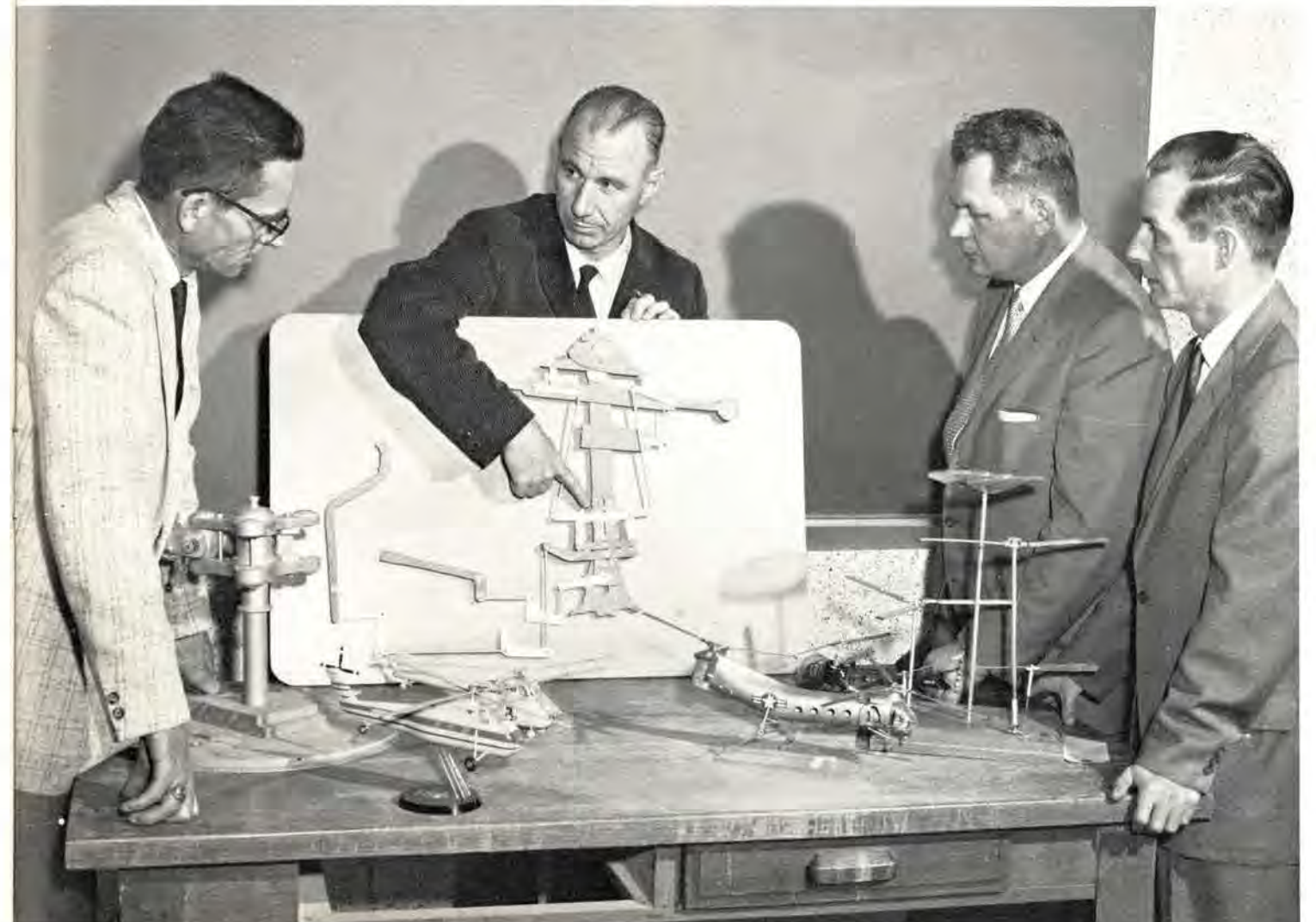
A complete set of fatigue requirements was written by CAA for aircraft materials. Fatigue—the weakening of metal when it bends back and forth repeatedly—had been the subject of only very elementary standards and testing before the war. The

DC-3 “fail-safe” philosophy was applied more consistently to aircraft design—meaning that when one part of a structure cracked, the whole wing or fuselage wouldn't come apart. Inspection schedules worked out by CAA, the manufacturer and the airlines would reveal such flaws before they became catastrophic.

Additional airworthiness rules required a multi-engine aircraft to be able to get airborne if an engine failed on takeoff. In-flight controllability of a plane with a failed engine came under intense study.

By 1947, homebuilt aircraft had come a long way from the powered box kite of the Wright Brothers. In an attempt to loosen the Civil Aeronautics Board's rules on homebuilts (CAB, not CAA, was given the authority to make aviation rules under the Civil Aeronautics Act), George Bogardus of Portland, Ore., flew his handmade “Little GB” to Washington to talk with government officials. The CAB was so impressed by the quality of the plane, it subsequently amended the regulations to allow backyard barnstormers to build just about anything they wanted “for education and recreation”

Inspectors study a movable model of a helicopter's transmission system at the Aeronautical Center in 1958. In the '60s, whirlybirds came into wide-spread use for intra-city and short-haul commuter trips.



without prior approval. When a builder was ready to fly, inspectors would check the plane, supervise flight tests and give the craft an experimental airworthiness certificate if it was OK. They also specified whatever flight limitations were necessary. Most homebuilders usually kept inspectors informed from start to finish to stay on the right track for safety and airworthiness.

Still hard-pressed to inspect everything, the agency received legislative relief in 1950 that allowed it to designate qualified private persons to take over still more duties relating to airmen exams and inspection, testing and certification of aircraft.

Designated pilot examiners took over part of the tremendous workload of giving flight tests to most private and many commercial and airline pilots. In fact, the agency later backtracked somewhat, reserving for its inspectors the crucial flight tests of airline pilots. Initial ratings of flight instructors and all civil jet pilots also remained the exclusive province of agency examiners.

From the mid-1950s onward, the agency allowed the airlines to give their pilots more "flight" experience in simulators during training. A portion of many airline pilots' initial and recurrent tests is now given in simulators, which are, like planes, certificated by FAA.

In 1951, CAA introduced a sweeping change to

streamline the certification of certain small aircraft. The manufacturers would do the whole thing. The system was, and still is, called the Delegation Option Authorization. Under it, qualified aircraft manufacturers build, test and certificate their own planes without direct inspection by the agency. Of course, they must follow all appropriate regulations, submit data to the agency and undergo periodic inspections. Any basically new design features also must be approved by the agency.

The DOA system has become so successful, it now covers the manufacture of about 93 percent of all general-aviation airplanes. When small executive-type jets were developed, however, they were not included under the DOA system. FAA kept the exclusive right to certificate all jet planes, as it did to test jet pilots. The agency felt such high-performance planes were just too hot not to come under the scrutiny of its inspectors throughout the design and certification process.

As the '50s got underway, so did preparations for the coming jet age. In December 1952, CAA established the "Turbine-Powered Transportation Evaluation Team." Drawn from CAA's Office of Aviation Safety (a forerunner of the Flight Standards Service), members of the team toured the country for months and visited over 400 manufacturers, airlines, military organizations and research laboratories to discuss proposed designs and



FAA air-carrier operations inspector (left) sits in the jumpseat of a 707 cockpit, making an in-flight check of crew operations during a flight in 1960.

new regulations that jet transports would require. The team also visited CAA regional offices to plan uniform methods of jet-aircraft certification.

The jets would introduce whole new areas for consideration in rule-making and certification: flight at high altitudes and high speeds; the need for better cabin-pressurization systems; more extensive electrical and hydraulic systems; radically different jet-engine performance at varying temperatures and altitudes; and unusual handling qualities, such as the tendency of sweptwing aircraft to go into a wallowing "dutch roll." CAA published a series of information manuals on the state of the art and offered the agency's thoughts on what areas would call for new regulations.

Inspectors were given flight training in small jets at the Aeronautical Center in the early '50s to familiarize them with jet flight and planes before the large transports came on the scene.

And coming they were. In 1954, Boeing's KC-135, a tanker built for the Air Force and later developed into the 707, first flew. In 1955, Douglas Aircraft announced plans to build the four-engine DC-8. In 1958, Pan American inaugurated the first 707 service, between New York and Paris. That was only two months after the Federal Aviation Act was signed.

Very soon after FAA was born, the agency ended the practice of allowing airline captains to be type-rated in turbojet aircraft by designated examiners. FAA leadership believed the responsibility and importance of the job of an airline pilot-in-command were just too great to allow anyone but FAA inspectors to give ground tests and the actual flight test—and that remains FAA's practice today.

In October 1959, disqualification from flight duty on medical grounds was extended to include diabetes, coronary disease, alcoholism, epilepsy or psychosis. In December, FAA announced rigorous in-flight inspections of airline crews, and in the fol-

lowing March, the "age 60 rule" went into effect, meaning that no one 60 or older could pilot a large aircraft in air-carrier operations.

Testing of co-pilots became stricter, and new rules called for more instrument and cross-country training for general-aviation pilots.

At first, many airline pilots objected to the more frequent cockpit visits of FAA air-carrier inspectors. There were even a couple of short-lived "sick-outs" by pilots. But the inspectors found several violations including the failure to use checklists, and friction between FAA and the airline pilots gradually eased.

A survivable crash in 1961 in which many people burned to death because they couldn't get out fast enough led the agency to write stricter rules for emergency-evacuation systems and procedures for transport aircraft. These included quick-opening doors and slides which automatically inflate and pop out to the ground, as well as better lighting of aircraft exits. In order to earn certificates for their aircraft, manufacturers had to demonstrate that they could get a full load of passengers out of the airplane in 90 seconds with only half the exits in use.

Aviation grew tremendously during the 1960s, leading the FAA to look more closely at two kinds of flying services which showed some of the most explosive growth: supplemental air carriers and air taxis. The past practices of the supplementals, or non-scheduled lines, were not always fully professional, as indicated on the occasion when a pilot had to pass the hat among his passengers to collect money to buy gasoline. A series of new regulations applied more of the air-carrier standards to these businesses, particularly since many supplementals were operating just as large aircraft as were the air carriers.

Seeking to complement the day-to-day surveillance of the Air Carrier District Offices (ACDOs),



Preparing to give a private-pilot's flight test in 1957, a general-aviation inspector handily shows a maneuver he will ask the pilot to make when they go up.

which were located at airline bases, FAA set up the Systems Worthiness Analysis Program (SWAP) in July 1966 for periodic in-depth inspections of an airline's entire operation. Teams of inspectors from regional offices made these inspections. The program was later extended to include air-taxi operators.

A similar idea was applied to manufacturers of aeronautical products in June 1971. This was the Quality Assurance Systems Analysis Review (QASAR). Inspection teams began periodic checks of these companies, looking at their operations from top to bottom, complementing the routine surveillance of local Engineering and Manufacturing District Offices (EMDOs).

The development of wide-bodied aircraft in the middle '60s introduced still more complex systems and equipment and, more importantly, some new concepts that received the utmost attention from FAA. For example, the 747 was the first passenger aircraft ever to depend entirely on hydraulic systems to move the flight-control surfaces. On all earlier planes with mechanized control systems, the ailerons, rudder and elevator could always be moved by hand controls if the power-assist failed. But the 747 was so huge and heavy as to make that impossible. So FAA Flight Standards people examined in greatest detail the manufacturer's hydraulic designs and hardware, even though the agency had long since stopped looking at "routine" matters of construction in such exhaustive detail. If the main hydraulic system failed, the back-up system must not fail. And if the back-up system failed, its back-up must not fail. These had to be considerations for Flight Standards in an age of highly automated planes that carry 350 people.

Private flying—for many years a source of numerous accidents which dismayed the agency—came under a concerted safety crusade in 1968 when FAA began a two-year trial of the Accident Prevention Program in the Central and Southwest Regions. Promising results in the form of lower accident rates led the agency to inaugurate the program nationally in late 1970 under the direction of the Flight Standards Service. An accident-prevention specialist was based at each of the agency's 85 General Aviation District Offices (GADOs) to conduct pilot education and counseling sessions. Traveling about the countryside, these men—experienced flight instructors all—drove home the safety message, using all kinds of audio-visual aids and flight demonstrations.

Although the late '60s was a time of increased environmental awareness, complaints against aircraft noise dated back at least to 1928 when the proprietor of the Cackle Corner Poultry Farm in Ohio accused an air-mail operator of disrupting egg production with low-flying planes. Forty-one years

later, FAA made allowable engine noise part of the criteria for certification of new aircraft.

In February of this year, FAA issued broad changes in the rules to further improve the qualifications of student, private and commercial pilots and of those applying for instrument and flight-instructor ratings. Overall proficiency and increased flight hours of pilots figured importantly in these rule changes. In the same month, the agency proposed higher standards for flight schools. One of the most important requirements here would be a proven record of success in training pilots, rather than mere compliance with the requirements for training equipment and facilities.

* * *

From two pilots and one aircraft in 1903—unlicensed and uncertificated—American civil aviation has grown to more than 750,000 pilots and 133,000 aircraft in 1973—all licensed and all certificated. Every plane, glider or balloon yet to roll off an assembly line or materialize in a backyard, and every person who decides to slip "the surly bonds of earth" as a pilot will always have to pass the test of Flight Standards. It's the safe thing to do.

—By Don Braun

faables



"We had a power failure and all the clocks stopped. They're mad because they worked overtime without knowing it."

—Reprinted from *The Federal Times*



A pair of Raincheckers plug in at the Tampa TRACON to hear live traffic on the fourth night. Jim Leslie (right), retired from Airway Facilities, was just another interested pilot-student.

HERE TO SERVE

No matter how you slice it, Operation Raincheck comes up a winner. In every section of the country that this program or others similar to it have been held, pilot enthusiasm and attendance has proved its need and informal surveys suggest its value in cutting accidents.

This winter-spring Raincheck by the Tampa, Fla., Tower was no different in receiving unrestrained pilot accolades.

Initiated by Tampa Tower controller Art Foster, the program got rolling through the efforts of several fellow controllers and FAAers from the St. Petersburg FSS and GADO. Participating were controllers Alan Maynard, Phil O'Berry, Jimmy Mills and Harold Warren; Don Haden of the St. Petersburg FSS; accident prevention specialist Ed Karvonen of the St. Petersburg GADO; and Jim Brown from the Jacksonville GADO, who filled in when Karvonen became ill.

The first terminal in the Southern Region to hold Operation Raincheck, Tampa spread the word with a saturation publicity campaign, starting with brochures mailed and hand-carried to all fixed-base operators on the Florida west coast between Gainesville and Ft. Myers. Foster used his own Mooney 21 to contact 20 fixed-base operators. Local television and radio stations were very receptive to spot broadcasts. Finally, applications were mailed to every instrument-rated pilot within a 100-mile radius. The responses—450 of them—came from as far as Michigan and Ohio, and there was even an inquiry from Germany.

The 12-hour course was broken into four nights of three hours each. The first night covered flight planning, weather briefings, NOTAMs and accident prevention, with a demonstration of the vertigo chair. The second and third nights dealt with radar, radar and non-radar separation standards, ARTS III, local area and satellite airports and how to operate in a typical terminal area. Radio failure was a popular subject. The fourth night was a recap and a simulated IFR flight from West Palm Beach to Tampa. Participants were also permitted to plug into tower/TRACON positions, to listen to and observe live traffic.

Critiques provided by the pilots were totally enthusiastic, most of them rating the course "just right." Those who thought otherwise said it was too short. Tampa Tower chief James Seale commented, "In all my experience, I cannot recall any single program in which we have gained such an invaluable amount of goodwill for the agency with the user-public."

But it's the "user-public" reactions that tell the story. Here are a few:

- I now feel that you are here to serve and not to police. It's nice to have a friend at 3,000'.
- This course gave me your side of the picture like I have never seen before. I can't believe your workload and related problems—I will think twice now before condemning the system.
- I wish I could have had this course when I had 40 hours in the log instead of over 200.
- The course should be mandatory for all pilots.

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CALIFORNIA

Rent my 1973 Landau Motorhome; 25 feet long, sleeps six, air conditioned, self-contained; luxurious unit is available with everything furnished except groceries—even has golf clubs and fishing gear; fly or drive to San Diego and use this motel on wheels to explore southern California; \$200 per week plus 6 cents a mile. Call 714-488-7933 or write Bix Bremermann, 1547 Loring St., San Diego 92109.

COLORADO

Rent on yearly lease brick rancher on fenced 1/2-acre lot in Arvada, see lights of Denver and mountains of Boulder, easy commute via freeway to Broomfield and Denver; 3 bedrooms, large country kitchen, separate dining room, finished basement with party-size rec room and 2 additional bedrooms and large storage room, 2-car garage; \$350 a month plus deposit. Call 907-344-8788 or write Albert J. Crook, 8107 Lloyd Drive, Anchorage, Alaska 99502.

FLORIDA

Corner lot, 1/3 acre, in ITT development near Daytona, Flagler County, to be ready within 5 years; total cost \$5,000, small monthly payments. Call 212-345-0067.

Two adjoining lots of 10,000 sq. ft. each in heart of retirement country at Port Charlotte on the Gulf Coast; all improvements now in or going in; \$2,600 per lot or \$4,750 for both. Call 206-243-1140 eves, or write A. W. Schilling, 18222 35th Ave. S., Seattle, Wash. 98188.

KANSAS

Ranch house in Overland Park, 10 minutes from Olathe ARTCC, 25 minutes from regional office in Kansas City; 3 bedrooms, 2 baths, large living room, dinette area, big kitchen

with electric range, dishwasher, disposal, family room with fireplace, central air conditioning, full basement, 2-car garage, fenced patio with gas grill, other extras; owner retiring, December occupancy; \$38,500. Call 913-888-3116, or write Andrew H. Speyerer, 9805 Bluejacket Drive, Overland Park 66214.

MARYLAND

New Swiss chalet cottage for summer rental on the lake at Deep Creek Lake, Oakland; 4 bedrooms, 1 1/2 baths, fireplace; available August and September; \$215 per week. Call G. Trainor, 703-461-7237 evenings.

Vacation home for rent at Ocean Pines, Ocean City, located on a canal; 4 bedrooms, air conditioned; pro golf course, boating, fishing, tennis, private Ocean City beach, beach club and swimming pools available; in-season rate \$295 per week, off-season \$200 per week. Call 301-384-4641.

MISSOURI

Retirement home for sale in beautiful Hollister-Branson Ozarks area near Table Rock Dam and state park, one lot from lake front near public access; lot size 75 x 140 ft., 6-room house, all electric, carpeted, screened-in porch overlooking lake, well, fireplace, separate furnished guest cottage; \$28,500. Call 417-862-8131 eves or write Floydine Punzell, 1335 E. Meadowmere, Springfield 65804.

NEW YORK

Hi-ranch house for sale in North Baldwin, Long Island, 12 miles from JFK International Airport; 4 bedrooms, 1 1/2 baths, recreation room, patio, built-in dishwasher, wall oven, 2-car garage with automatic opener; beautifully landscaped 6,000-sq.-ft. lot, first-rate school system; \$45,000. Call 212-995-3385 days, 516-223-2534 eves, or write M. R. Boles, 991 Wood Park Drive, Baldwin, N.Y. 11510.

NORTH CAROLINA

2 chalet lots of about 1/2 acre at Beech Mountain year-round resort at 4,000-ft. elevation; highest ski slopes and golf course in the East; both lots have water, sewer, electricity and frontage on roads; \$7,500 cash or \$8,500 terms. Call 703-280-5881.

OKLAHOMA

Beautiful, new Spanish-style home on 3/4 acre, 15 minutes from Aero Center; 1,569 sq. ft. living area, 3 bedrooms, 1-3/4 baths, den, formal living area, fireplace, central air and heat, utility room, shag carpet throughout, but kitchen carpet in dining area and kitchen, 2-car garage; one of best school systems; \$29,500. Call 405-376-2748, or write to 15504 Aqua Clear Circle, Mustang 73064.

VIRGINIA

Fully furnished rambler home for rent in North Arlington, 20 minutes from headquarters; 3 bedrooms, 1 bath, separate dining room, breakfast nook, carport, patio, air conditioned, nice back yard; rental by week or month, longer-term lease will be considered. Call 703-524-0011.