

BEACON

MARCH 1960



FEDERAL AVIATION AGENCY

AERONAUTICAL CENTER

OKLAHOMA CITY

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LOOKING AHEAD

The editor of the BEACON is pleased to report that the magazine's circulation takes a jump this month. The outside demand, from private business, state and federal agencies, congressmen and just plain people, caused a one-third jump in circulation.

Again this month we're running---courtesy of the Employees Association---a color calandar. This one shows the facade of the Center's headquarters building.

As you have noticed, we've switched the color motif on the cover. Since this is the March issue, heralding the advent of Spring, that color is appropriate. In the next issue we plan to bring you a complete picture story of the new home of the Examination and Records Division, just recently removed from Washington.

... The Editor

Magazine cover photograph of Will Rogers Field from the Tower, showing air traffic on a snowy March day. Photograph by Bob Newkirk and Ray Martindale.

Inside back cover: This indicates the industrial development and potential in the Oklahoma City area. Purpose of this and the other maps and pictures ---- a selling job, of course, for Oklahoma and Oklahoma City.

Sponsored by:

FAA Aeronautical Center
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POINT OF VIEW

This is an astounding age! It's an era when distance has telescoped almost to the quickening of a breath---- and time has expanded far beyond our understanding.

I can remember when a twenty-five mile trip was a full day's toil. Now a fast airline jet can squeeze a month of grandfather's journeying into the seconds or minutes it takes to read a magazine article. With this fury of speed and air-borne eating of distance has come the complexity of machinery and---with this machinery---the justaposed problem of safety for "humans in a hurry."

All the elements of safe transporting of this "precious cargo" can be found in the FAA's Aeronautical Center. Air traffic controlling, the teaching of tower operations, use of air navigational aids and proper use of equipment used by our air lines are taught at this "University of the Air" in Oklahoma City.

Fit this piece into the mosaic of private, airline and other segments of this jet-age. It makes a complete picture of orderly and safe aerial transportation.

It brings a quiet feeling of confidence to know that whenever I fly, by airline or privately, I'm being "watched over" by some of the thousands who are part of aviation, both here and abroad.

A handwritten signature in cursive script that reads "Robert S. Kerr". The signature is written in dark ink on a light background.

Robert S. Kerr
United States Senator



Mexican Twin Bonanza ready for return flight.

Worm's Eye View of Recorder Console on XC-DAC.



L to r: Hector Malvido, Philip M. Wilcox, Capt. Manuel Vasques del Mercado and Alberto Nunez Lopez.

MEXICAN BEECHCRAFT XC-DAC VISITS AERONAUTICAL CENTER

XC-DAC, a Beech Twin Bonanza, is the first Flight Inspection aircraft for the Direction de Aeronautica Civil de Mexico. Built in Mexico from designs engineered at the Aeronautical Center, it carries a new dual VOR console fabricated especially for installation in small, twin-engined aircraft. A pair of Collins 51R3 VOR receivers feed a two-channel Texas Instruments recorder to supply all the information needed for flight checking the VHF Omni-directional ranges marking Mexico's airplanes. Not a bit of "excess baggage," in the form of unneeded equipment, is carried.

Being a prototype aircraft, representatives of the Federal Aviation Agency were on hand in Mexico City for its initial trial flights. Norman R. Hodkinson, Chief, Facilities Flight Inspection Branch, and Alfonso Arambula of the Branch's Engineering Section represented the Aeronautical Center, and Robert Owens the Washington Office. It is not unusual for prototypes to exhibit some undesired characteristics . . . and the XC-DAC was no exception. An invitation was extended to the Direction de Aeronautica Civil to avail itself of the facilities of the FAA Aeronautical Center . . . and that is how it came about that the pretty little blue and white aircraft appeared at Hanger 9.

Piloted by Capt. Manuel Vasques del Mercado, a Reserve Officer of the Mexican Air Force now serving as pilot to the Chief, Aeronautical Civil, XC-DAC touched down at the Aeronautical Center on February 16. Capt. Mercado was accompanied by Sr. Hector Malvido, an electronic technician employed by C.M.A. Airlines (who will maintain the avionics equipment) and Sr. Alberto Nunez Lopez, who is a specialist on the operation of the Flight Inspection Console. It was a return visit for Capt. Mercado and Sr. Lopez, for they both had been at the Center as students in Indoc-trination Class No. 1-60-2, which ran from October 12, 1959, to December 18, 1959, in the Flight Inspection School.

Under the direction of Philip M. Wilcox and Alfonso Arambula, both of AC-680.3, capable crews of technicians began "Operation Debug." A total of 82 minor modifications were accomplished in fast tempo, and on February 25 XC-DAC was chalked up as back in action, a fully flight-tested VOR Flight Inspection aircraft.

An entirely new type of calibration voltage

supply was designed for XC-DAC by Philip M. Wilcox and Charles Carter. Based upon the application of Zener diodes as voltage regulators, the supply delivers a steady reference voltage for calibrating indicators. Of interest to cost-conscious supervisors is the fact that it cost only \$68 to fabricate vs. \$350 to purchase its equivalent.

The entire console was designed as a portable device, being adapted to quick removal from XC-DAC for conversion to other service.

Time spent at the Aeronautical Center was not time wasted by the visiting personnel. Sr. Malvido and Sr. Lopez received five days of One-the-Job training in the Major Inspection and Overhaul Section on VOR Mock-Ups, AF and RF Signal Generators, DS Amplifiers, Texas Instrument Graphic Recorders, and removal and installation of the Flight Inspection package (console plus related equipment).



TWO SOURDOUGHS MUSH ON

From the far north several years ago two "sourdoughs" from Region 5 checked in at the Center — Somber Ken Persson and smiling Herb Jackson.

Mushing on in their careers, they'd want to give a "plug" to the organization they've served. Both are former Alaskans, Ken from Talkeetna and Herb was at Homer. Both came to the Center and began their careers in the training business as Directed Study instructors. Both joined the Will Rogers Toastmasters

Club to develop speech and leadership abilities. The picture was made recently when Toastmasters Past President Herb presented Past President Ken with the symbolic pin.

Both transferred to Resident Training to broaden their experience. Ken went to ILS/VOR and then last month became Training Officer in the Region 1 office, while Herb became a supervisor in the Communication Equipment school. The success story of two sourdoughs . . .



Brotherhood week, observed from February 21 through 28, is a continuous effort at the FAA Aeronautical Center. International students absorb much of the freedom of thinking that is America while taking training at the Center. Pointing out their homes on the globe are (l to r) Eden Soleiman, Indonesia; Sukru Baysal of Turkey; Darwin Maurer, the Center's International Liaison Officer, and Ionis Mihalopoulos of Greece.

Statistics show that most accidents happen in the home, so play it safe—don't go home!!!



In the studio of KETA-TV and gathered around social studies instructor, Mrs. Guy Arnold are (l to r) Sjafei Souib, Indonesia; Alamrew Wolde-Mariam, Ethiopia; Mohammad Nader Malyer, Afghanistan; Montri Chartiburus, Thailand, and Nyugen Ich Diem, Vietnam.

CENTER STUDENTS ON EDUCATIONAL TV

The Aeronautical Center's "community spirit" is being reflected on an international scale these days. Foreign students taking courses at the Center have long considered Oklahoma City as their "home away from home." They visit with host families while in Oklahoma and leave with a part of this land firmly within them.

Now Oklahoma's Educational television station, KETA-TV, is helping with the understanding of foreign countries. A series of twelve television programs is being presented by the FAA international students under the directorship of Mrs. Guy Arnold.

The two presented so far revolved around these subjects: "Schools Around the World" and "Foods Around the World." Each student, representing a different country, explains the customs, schooling, and economics of his own nation.

The international students also have been on the Oklahoma City public schools radio station, KOKH-FM.



Drs. Dalke and Hauty talk over some research problems facing them in their new positions with CARI.

CARI GETS TWO MORE TOP MEN

The Civil Aeromedical Research Institute, headed by Doctor Robert Clark, gained two more top men this month.

CARI, part of the Aeronautical Center, but located temporarily at Norman, will pursue research into age and nerve factor in jet age flying, among other research studies.

Added to the staff . . . Doctor George T. Hauty and Doctor Bruno Dalke.

Doctor Hauty is noted for his psychophysiological research while at the School of Aviation Medicine in Texas. His studies covered the broad areas of fatigue, drugs and human performance under simulated conditions of space travel. His pioneering efforts on the problem of the space travel environment have established him as an authority on human factors in space.

Doctor Hauty was nominated this winter for the Raymond F. Longacre Award. He is a Fellow in the American Psychological Association . . . a member of the Aerospace Medical Association, American Rocket Society.

His colleague, Doctor Bruno Dalke, M.D. and physiologist, served as chief of the Biodynamics Branch, Department of Space Medicine at the Aerospace Medical Center, Brooks AFB, Texas.

Doctor Dalke's efforts in the research field have been man's adaptability to extraordinary stresses . . . such as extreme exertion, extreme high altitudes, temperature extremes, etc. He

has experimented in the human tolerance limits to such stresses and their dependency upon various levels of training and conditioning.

A great part of his research efforts at CARI will be directed toward obtaining and maintaining a high degree of physical and mental stability and overall efficiency despite progress age.



Laurence Reid, Director, Research Park at the University of Oklahoma; Aeronautical Center deputy director Enar Olson, and Japanese political reporter Hitoshi Yamamoto look over an organizational chart of the Center.

JAPANESE NEWSMAN VISITS CENTER

A renowned writer in the political field, Hitoshi Yamamoto, is making a whirlwind tour of the United States. The political reporter and commentator on international affairs for Mainichi Shimbun and Mainichi Radio is interviewing American leaders in the fields of politics, government, finance, industry, business, labor and journalism.

He also will write a feature story for his newspaper, Mainichi Shimbun, on the visit of Prime Minister Kishi in Washington.

Journalist Yamamoto was greatly impressed with the Oklahoma feeling of international cooperativeness as expressed at the Aeronautical Center. He expressed interest in the training of foreign students for FAA facilities overseas.

ANF UP-DATES TRAINING

Modification of resident training courses is underway to provide more flexibility for assignment of field personnel and to incorporate new equipment for instruction in training classes.

C. E. SCHOOL PROVIDES OPTIONAL COURSES

Tone Channeling equipment and Multichannel Recorders are being installed in ANF #1 laboratories in preparation for a change in curriculum of the Communications Equipment Course which is scheduled to begin in April, 1960.

Only a limited number of special classes on Tone Channeling equipment have been taught in the past. Scheduled to begin with Communications Equipment Class 154, which convenes on April 18, Tone Channeling equipment will be taught as a regular two-week subject in the Communications Equipment Course.

No teletype subjects will be taught in C. E. Class 154 because teletype becomes an option beginning with Teletype Class 1, which convenes on May 16.

The regular four weeks of teletype are replaced in C. E. Class 154 by Tone Channeling and Multichannel Recorders. Therefore, this class will include the subjects of Remote Control, Tone Channeling, Audio and Recorders (dictaphone belt recorder), Multichannel Recorders, Receivers, Transmitters, and UHF Equipment. C. E. Class 155 will be identical to C. E. 154 and these are the last of the fourteen-week Communications Equipment Classes.

If it is desired that any of the students in C. E. Classes 154 and 155 receive Model 28 Printer and Model 28 ASR training, these students would have to be assigned to one of the Teletype option classes. These classes are four weeks long.

Any Communications Equipment Class after C. E. Class 155 will be only twelve weeks long. The subjects taught will be Remote Control, Tone Channeling, Audio and Recorders (dictaphone belt recorder), Receivers, Transmitters, and UHF Equipment.

After Multichannel Recorders are taught in C.E. Classes 154 and 155, this equipment will no longer be taught as a regular part of the Communications Equipment Course, but it will be taught as a two-week option beginning with Multichannel Recorders Class 1 on September 6, 1960.

While these changes will provide training on new types of equipment, the Communications Equipment Course will not necessarily be lengthened. Currently, the time required to complete the course is fourteen weeks, after the curriculum change a student could complete the standard course in twelve weeks if he didn't take any options.

ILS COURSE HAS NEW TRANSMITTERS

Latest types of equipment for the Glide Slope and Localizer facilities of the Instrument Landing System have been received and installed for ILS training. The new Glide Slope transmitter is designated TU-1 and in the ILS laboratory will be used in conjunction with the older TUS unit. Each of the transmitters will have its own antenna system. The localizer equipment consists of TV-10 transmitters with all the new series of auxiliary components excepting the CA-661B sideband generators.

Switching panels, designed by ILS instructors and constructed by Technical Services, will provide utilization of all Glide Slope equipments simultaneously whether operating into dummy loads or their respective antenna systems.

A switching device and dummy load systems will also be provided for the localizer equipment to allow the operation of all transmitters and auxiliary equipment simultaneously. This device will provide a means for selecting the equipment that will operate into the normal termination while placing the other equipment on dummy load.

The new glide slope equipment will include the new steel antenna tower and will be a normally radiating system. The new localizer equipment will operate into a unique dummy load system that will provide both phasing and monitoring applications.

OPTIONAL COURSES SPICE RADAR TRAINING

A new scheduling procedure is now being set up to give more flexibility for training in the various Radar Option Specialty (R.O.S.) courses that are normally made available for students completing the general Radar Course.

The old procedure offered option combinations, i.e., a student could be assigned to two or more equipments in Option 1, or two or more different equipments in Option 2, etc. Two equipments were always taught simultaneously with the student receiving lectures and laboratories on both equipments during the same day.

The new procedure provides for training on *individual* equipments rather than combinations of equipments. Three to five options are offered at the end of each Basic Radar Class. Each option deals with a *single* equipment, and is studied by itself—full time, until completed. When this option is completed, a second may be begun, etc. As an example, a student could be assigned to ASR-3 for three weeks, then to CPN-18 for one week, then to GPX-9 for two weeks.

One advantage of the new system is that a student is studying only one equipment at a time which leads to less confusion on his part and thus increases the efficiency of training. A second advantage is that former graduates may return to study new equipments that have been added to the course since he graduated. A third advantage is that the Regions have considerably more flexibility in option assignments.

ANF DIRECTED STUDY HITS A JACKPOT

When February records of Directed Study activity were tallied it became clear that, more than ever before, thousands of ambitious FAA electronic technicians and engineers had spent long winter evenings studying on their own time to improve their technical knowledge.

There were almost 2,500 examinations received at ANF Branch during the 20 work days of February (2,472 to be exact). The January total of 2,077 had been the previous all-time high record. Taking care of an increase of 395 in a single month taxed instructors to the limit.

There were 240 graduates who were mailed completion certificates, an increase of 77 over any previous one month total. In addition, more than 479 new enrollments in Directed Study courses were processed during February.

Another jackpot in March may be in the making.

MACEDA LEAVES FOR SPAIN

Friday, February 5, 1960 marked the end of four years service in the ILS/VOR Section for John Maceda. John is taking an overseas assignment in Madrid, Spain, with the International Cooperation Administration. He will spend approximately three weeks in Washington, D.C., for indoctrination and then proceed immediately to Madrid. John's previous knowledge of Spanish permitted a waiver of the language requirement and minimum delay in effecting the transfer.



During his time here at the Aeronautical Center, John first served as an instructor in the VOR, Transmission Lines, and AC Circuits subjects. Later, he held the position of Localizer-Radiation and Patterns Group Supervisor and immediately prior to his departure was the Pre-VOR and Establishment Unit Supervisor. His well rounded experience both at the Center and in his previous field background in Region 1 should serve him well in his new assignment.

The following AC-756 employees received monetary awards during February: Sidney J. Blailock, Wesley L. Chesnut, Donald L. Lowery, Raymond A. Parish and Mitchell A. Tucker. Wesley Chesnut and Donald Lowery each received two awards. Mr. Chesnut's suggestion concerned the modification of the THV Series Transmitters for increased ventilation and the protection of the wooden-cased Daven Model OP-182 Power Output Meter. Mr. Lowery's suggestions revolved around a card file system for CA and FA serial numbers and safety markings on the floor adjacent to doors entering into traffic lanes from individual shops in the Electronics Engineering Section general shop area.

Mr. Blailock's and Mr. Tucker's suggestions were pertinent to the modification of the THV Series Transmitters for increased ventilation.

The suggestion by Mr. Parrish was related to an alignment tool for IF Transformers on type T-217A/GR Transmitters and R-278B/GR Receivers.

FEDERAL HEALTH INSURANCE PLAN GIVEN TO CSC

Full details of the plans submitted by Blue Cross-Blue Shield and the insurance indemnity companies were recently disclosed to the Civil Service Commission. This is in connection with the upcoming Government employee health benefits program.

Center personnel involved in handling the details of this new health benefits program recently attended a CSC seminar on the new program—one held in Oklahoma City.

The Civil Service Commission has not yet signed contracts on the plans submitted and may ask for some changes. Employees will have the choice of enrolling under either of the major plans or under a group prepayment plan or an employee group plan.

Simply explained . . . under the Blue Cross-Blue Shield plan, employees and their families will receive service-type benefits, while under the indemnity type program they will receive cash benefits. Each plan has two options—the so-called standard program (option one) and the “richer” program of benefits (option two).

How much will the Government pay? It's the same amount regardless of which plan you join. If you enroll for yourself only, the Government will pay \$2.80 a month toward the cost of your membership. You pay the rest. If you enroll for yourself and your family, the Government will in most cases pay \$6.75 a month. You pay the rest.

As submitted to the CSC, tentatively, Blue Cross-Blue Shield members would make these payments: Single employees would pay \$1.30 biweekly for the standard plan, \$2.27 for the richer plan. Married employees would pay \$3.48 biweekly for the standard plan, \$6.33 for the richer plan. This would be deducted every pay period from your check. Understand—these are still tentative fees and could change.

Under the indemnity type plan—in which the employee is given the cash to pay the medical bills—Single employees would pay \$1.30 biweekly; married employees, \$3.12 for standard coverage. Under the “richer” plan—single employees would pay \$2.34 out of each pay check; married employees, \$5.62. In all instances the government contributions remain exactly the same. If your benefits plan costs more than others are paying, you pay the difference.

During the next three months, prior to the effective date of actual enrollment, each employee at the Aeronautical Center will be given information about the various options; will have an opportunity to see a film explaining the proper steps and the benefits of each plan; will be counselled as to the steps needed for proper enrollment.

This must be kept in mind. Each eligible employee, whether or not he wishes to be enrolled, must register before July 1, 1960. After that, if the employee decides he or she would like to have the government coverage on part of his health benefits plan—with the exception of new employees—the employee may use the so-called “open season” of October 1st to 15th of the following year. This is a one-time chance only to enroll after the employee has once refused. New employees have 32 days after reaching pay status to enroll. Then, they must also wait until the October “open season” to enroll.

Now, let's summarize. If you enroll in a plan with about the same benefits you have now, you will pay less, because the Government will pay part of the bill. If you enroll in a plan that offers better benefits, the benefits will cost you only a little more. The program makes it easier to pay for health care because of automatic payroll deductions—made every payday. Most plans now formulating will have a catastrophic expense benefit, i.e., any medical expense which could not be readily met out of a family's resources; large and unexpected expenditure. It also can cover long periods of illness. The program can give you continued health protection after retirement—with the same benefits and at the same rates given active employees.

Enrollment will be easy. There will be no physical examination or medical questions asked of you, or your family. You will not be excluded or charged more because of your age, sex, race, or physical condition, or the hazards of the jobs some of you have.

There are many questions most of you have that we cannot answer in this magazine article. But all this will be thoroughly explained to you during the pre-insurance period by those who have been thoroughly briefed in all facts of this new health benefits program. And, any new information will be given you immediately.



Working on IBM 704 is Carl Whitaker, in foreground at the Central Processing Unit. In background, at magnetic tape table, is Burnis Wells, and working with the tape unit is Stanley Adams. The 704 is located in Hangar 9.

THE 704 — WHAT IS IT?

The IBM 704 is a large-scale electronic data processing system. It belongs in a category of machines frequently referred to as "Electronic Brains." A more accurate description is "Electronic Computer." While these machines are generally considered to be applicable only to scientific-technical work, it should be emphasized that they are equally talented with commercial-business type jobs. Its assigned workload throughout government and industry ranges from payroll to nuclear reactor problems, from accounting applications to airplane design, and from supply processing to missile tracking. The 704 then is an extremely versatile tool in man's fight for more effective handling of information and in reducing extremely complex and lengthy mathematical processes to workable size.

THE 704 — ITS CURRENT ASSIGNMENT

Computer processing of data is necessary with the growing complexity of air navigation. As an example, in the United States there are presently more than 700 vhf omnidirectional range (VOR) stations, 200 distance measuring equipment (DME) stations and 200 tactical air navigation (TACAN) stations. By 1965, there will be 1200 co-located VOR and TACAN stations which will be designated VORTAC. The accuracy of these facilities must be maintained at all times to assure air safety, and this requires continuous monitoring both by ground monitors and by aircraft in flight. The 704 is

an integral part of this monitoring system.

Five Convair aircraft will be equipped with digital data encoders with magnetic tape storage to gather data when flying over each ground station. The tape will be subsequently sent to the Aeronautical Center for processing by the 704. The processed information will be analyzed and the corrective action taken.

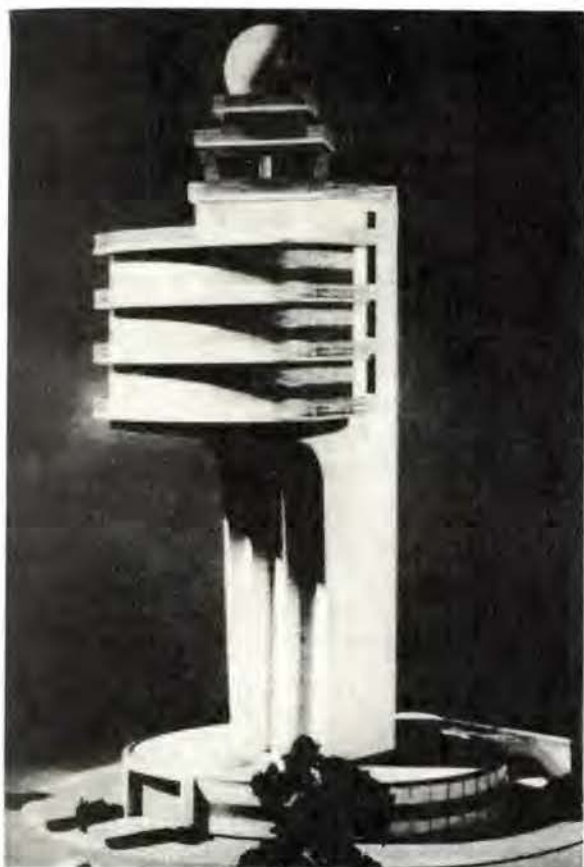
Here's how it works. Each Convair Inspection Flight is predetermined and preprogrammed on the 704. This will include navigational instructions and station frequency data for each point over which the aircraft will fly. Recording will be in digital form on magnetic tape. The tape will be employed in the aircraft to supply input data for automatic navigation and automatic calibration and tuning of measuring equipment. Specifically, the preprogrammed magnetic tape results in the following functions in the aircraft:

1. Navigating the aircraft along a preplanned track.
2. Tuning the VOR, DME, and TACAN receivers and initiating calibration.
3. Assisting the DME and TACAN receivers to lock-on at the proper distance.
4. Comparing VOR and TACAN bearing with precomputed bearing at way-points.
5. Switching the VOR and TACAN from the normal antenna to a special antenna at appropriate way-points.
6. Displaying a sequentially changing number.

In addition to its normal radio equipment, each aircraft will initially carry 11 VOR, and 11 TACAN sets. Provision has been made to expand the system to include 20 VOR and 23 TACAN sets. (DME to be replaced by TACAN.) The outputs of each of these radio equipments will be sampled at predetermined intervals, converted to digital form, and recorded on magnetic tape for subsequent reduction and analysis.

Computations performed by the IBM 704 include a series of programs to develop four basic reports. These are: Bearing Error, Supplemental Bearing Error, Distance Error, and Track Deviation.

Preparation of each magnetic tape for automatic navigation and calibration and tuning will require about one hour on the 704. There will be one for each flight per day. Reduction of the data recorded in flight on the magnetic tapes will also require about one hour per tape. In total time the computer will be used in excess of one eight hour shift per day when the system is fully implemented.



TOWER IS ARCHITECT'S DREAM

Now in operation at the Newark, New Jersey, airport is a one-and-a-half million dollar control tower. The first seven stories of the 150-foot tall structure consists of a concrete shaft containing an elevator and power and communication lines. Above this is a three-story oval section which juts out from the upper part of the shaft through cantilever suspension.

Atop this is the all-window control room and above it a square structure containing the ground detection equipment. The structure is to be topped by a round radome. The three floors in the cantilevered section will house radar and communications equipment, a center for directing planes in bad weather and a ready room for the 89 electronic and air traffic control specialists who will man the tower around the clock in bad weather.

FAA is installing a million dollars worth of air traffic control electronic equipment in the Newark tower. The tower will have the latest in surveillance radar,

The new tower looks like a gigantic musical note standing alone in the center of the airport.



Representatives of Computing Devices of Canada discuss the engineering aspects of the FMD Goniometer Overhaul and Repair Program. Seated left to right are Mr. Taylor, FMD; Mr. O'Brien and Mr. Warner from CDC.

FMD HOSTS CANADIAN MANUFACTURING TEAM

FMD recently was visited by Mr. O'Brien and Mr. Warner from Computing Devices of Canada, Limited. Their company has a contract with the Canadian government for the overhaul of VHF goniometers. They were interested in the FMD goniometer program and overhaul.

The facilities and equipment in the FMD shop make it the only shop of its kind throughout the FAA for the complete overhaul, repair and testing of these instruments. The Canadians obtained in detail the exact testing procedure, drawings, spare parts procedures and the general rundown of goniometer overhaul.

Computing Devices Limited started in 1948 with a handful of employees. An important contract from the Royal Canadian Navy gave the company its first big expansion. By 1951, aircraft instruments became a major field of development to the new company.

In 1955 they established Canada's first privately-owned Data Processing Center, giving them a strong foothold in the computer field. Bendix Aviation Corporation stepped into the picture in 1956. Arrangements were made with Bendix wherein they acquired an interest in CDC.



'High Altitude Inspection of B-57 Aircraft' left to right: Daniel Heideke, AC-132; Herbert L. Jackson, AC-680; Marion W. Williams, AC-132 and Robert L. Darrall, AC-132.

B-57 HIGH ALTITUDE INSPECTION

The High Altitude Inspection Program for B-57 Aircraft is supervised by Monroe A. Ebner, Chief of Aircraft Maintenance Branch. The B-57's are taken from flight status each one-hundred hours for a high altitude inspection which consists of opening the airplane inspection plates and viewing the areas where fatigue and wear are most likely to occur.

When the inspection has been accomplished the aircraft is scheduled to several locations, including Washington, Los Angeles, Las Vegas, Reno, Seattle, Denver, New Orleans, or wherever there is a radio range to be checked at high altitude.

The pilots check marker beacon ranges and navigational aids for accuracy at a very high altitude, usually around 40,000 feet.

Special permission was granted by the New York Port Authority to the Federal Aviation Agency to operate one of FAA's B-57 jet aircraft on Idlewild International Airport. Normally, this airport is closed to all transient jet operations with the exception of the air-carrier jets which must be operated under strict regulations in accordance with a noise-abatement program conducted by the Port Authority.

During the period that the B-57 was based at Idlewild Airport, Mr. Roy W. Johnson and Mr. Morris A. McBride (Flight Inspection—

Washington) piloted the aircraft in making numerous flight checks of the FPS-8 Radar used by the New York Traffic Control Center in controlling air traffic in the congested New York terminal area. Facility adequacy and accuracy were checked in conjunction with the radar-coverage checks along various departure routes utilized in expediting the movement of departing air-carrier jet aircraft.

Additional checks were made of a remote radar site some eighty miles away which is used by the Center for enroute airway traffic control. The radar picture is micro-waved from this site to the Center and displayed to the Controllers on scan-conversion displays (TV tube) as well as the standard radar scopes.



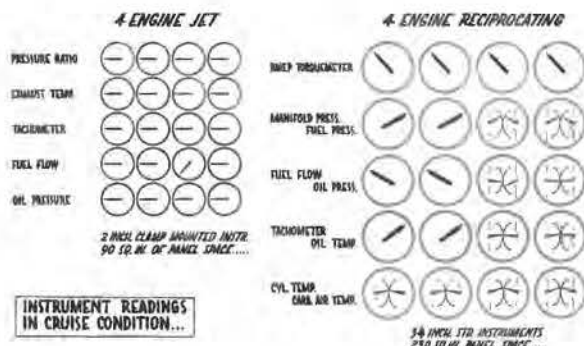
Tail Maintenance Dock (Convair)

CONVAIR 440 TAIL MAINTENANCE DOCK

This is a tail maintenance dock for the 440 Convair. It is an all-purpose piece of equipment for working at all levels around the tail of an aircraft. Each level is connected by a ladder from the bottom of the horizontal stabilizer to tip of the tail.

This dock was designed by Mr. Roland C. Hasn of AC-132. The parts were manufactured by an outside contractor and the men in AC-132 completed the assembling of those parts plus some modifications of their own; such as, installation of electric leads and plug-ins on the stand. The men installed air hose connectors in very convenient locations which are time saving and convenient for use at all times. (Mr. Ebner proudly expresses his thanks to the personnel who accomplished this item)

ENGINE INSTRUMENT COMPARISON



Guys and Dials

The Engine Instrument Comparison is a Boeing artists conception of the simplification of the jet engine instrument panel on the KC-135 aerial refueling tanker (similar to the 707), as compared to the piston engine instrument panel on the Model 377 Stratocruiser recently discontinued by Northwest, Pan American and United Airlines. Close observation will disclose that the use of 2" instruments instead of the previously normal 3 1/4" instruments allows closer grouping, thus reducing the area from 230 square inches to 90 square inches. The needles all point in the same general direction under normal operating conditions. This is to enable rapid scanning by the pilots and quick identification of those reflecting malfunctioning of the engines. The third fuel flow needle pointing downward is an artist's trick to identify his drawing and does not represent actual conditions. An appreciable drop in fuel flow would also lower the indications of the instruments above it. The situation does indicate the feasibility of the display relative to the ready identification of a malfunctioning engine or engines. The total number of display items including warning lights, instruments, gauges, etc., has been reduced from 195 to 100 (49%). The number of controls has been reduced from 370 to 204 (44%).

The power levels (throttles) on the jet transport are handled exclusively by the pilots and the throttles on the 377 Stratocruiser were handled by the pilots and the flight engineer.

The long power levels with the front thrust reverser "fingers" on the jet airplane must be intended to save the pilot's ego because they are connected to an automatic fuel controller

which precisely meters the fuel to the jet engines under a wide variety of conditions. On the piston engine airplane the pilot's earned their high salary by watchfully controlling manifold pressure, torque, carburetor air temperature, mixture ratio, etc. The point is that the jet powerplants are loaded with automatic controls so that the pilots and the flight engineer can earn their higher salaries by staying at least 200 miles ahead of the gleaming 600 MPH 100 + passenger monster.

Opening the "go valves" under the lower speed conditions in the piston engine airplanes gives an early reaction due to the propellers changing from a drag situation at low throttle opening to creating a "rowing" effect and a tremendous air blast over the adjacent wing areas at open throttle conditions. Since the propulsive efficiency of the turbojet engine is somewhat relative to airplane speed and the large diameter four bladed propellers are not available for rowing and increased airflow effects, there is a noticeably slower reaction to opening the "kerosene" valves on the turbojet powered aircraft.

Seats Again!

A recent issue of Fortune Magazine gives considerable credit to the airlines for developing the "energy-absorption" seats used in the jet transports. However, the "knot-head" factor is still with us—have you noticed a deplaning passenger leaving with the seat back reclined and the passenger behind receiving a terrific "belt" in chest in trying to quickly rise from a sitting position? Confucius say—"always erect seats before deplaning—may get belt in nose someday!"

The same article vividly points out the necessity for automation of the presently out-moded traffic control system. It states that current traffic delays at \$30 per minute operation costs of the jets, costs the industry at least \$400,000 a day!

Rarefield Reporter

A Comet IV (English) carrying 53 passengers was cruising at Mach .72 (500 mph) a few thousand feet above a Boeing 707 over the Atlantic. The Comet pilot intending to "needle" the Boeing pilot said "I say old boy how are you coming down there?" Quick as a flash, the Boeing pilot came back with "Mach .82 (560 mph) 100 passengers and six tons of cargo—are you on a pleasure cruise old boy?"

VERSATILE VOR BACKBONE OF FEDERAL AIRWAYS SYSTEM

Washington, D.C.—In the first 30 days of 1960 the Federal Aviation Agency activated 6 VORs (very high frequency omniranges) bringing the total now in commission in the United States to 668, with a goal of 882 to be achieved by 1965.

The VOR is a ground station, a static-free, short range navigational aid, and it is the backbone of the 164,836 mile Federal Airways System. Based on the principle, patented in 1906 by the late Dr. Lee deForest, of a rotating radio beam that identifies the sectors formed by the 360 degrees of a circle, each VOR has its own

civil aircraft; with distance measuring equipment (DME) it will give that also. By adding another device, a pictorial display using this basic information, the position of the aircraft can be shown on a chart in the cockpit.

In areas where trees, wires, or buildings might interfere with signals, the FAA applies the "Doppler" principle to the VOR. The word "Doppler" refers to the phenomenon whereby the pitch or frequency of sound appears to get higher on approach and lower on departure, the degree of increase or decrease depending upon the speed of the moving object. Whereas an ordinary VOR has but one loop in the center and around it 50 loops placed in a 44' circle.



Putting science to work thwarting nature. A 19th century Austrian physicist, Christian Johann Doppler, discovered that sound frequencies coming from a moving source vary in pitch. As applied by the FAA, Dr. Doppler's principle improves VOR (very high frequency omnirange) performance at sites where trees, buildings, wires or other obstructions could interfere with signal reception.

frequency and Morse code letters. When these are picked up by an aircraft in flight, identification is positive and immediate.

The VOR actually sends out two simultaneous signals, one carrying information as to bearing, and the other acting as a reference for the bearing. The aircraft received is so designed that the two are kept apart until they reflect as one on the instrument panel. If the dial reads zero the pilot is on course. If it reads to the left or right of zero, he is off course, and can tell at a glance how far and in which direction.

The VOR has proved a most adaptable facility. Alone it provides directional guidance to

These work one at a time around the ring, in effect producing a moving antenna, and creating doppler, or frequency modulation (FM) effect which gets the signal through to the aircraft without distortion. Difficult sites that respond to no other treatment bow meekly to the Doppler VOR.

Structurally the VOR is an impressive sight and easily recognizable. The plastic cone is eight feet high and mounted on a circular base which, in turn, is the roof of a building housing the transmitting equipment. As a VORTAC it is topped by the TACAN unit which gives it the look of a smokestack, and surrounded by the Doppler antennas it seems fenced in by an array of steel helmets.



Left to Right - Standing

L. E. Shedenhelm - Chief, Aircraft Branch
 Hope Biggers - Airworthiness Specialist
 Clarence Supplee - Electronics Technician
 Reedy Rogers - Electronics Specialist
 Robert Thomas - Airworthiness Specialist
 Bob Hightower - Laboratory Mechanic

Left to Right - Seated

Jack Ferguson - Chief, Contract & Orders Section
 Dean Anderson - Chief, Procurement Branch
 Earl Colburn - Burton Rodgers Inc.
 Harold Brown - Burton Rodgers Inc.
 Harold Heier - Senior Planning & Evaluation Officer
 Warren Smith - Chief, Flt. Oper. & Airworth. Div.
 Clyde Daniels - Supv. Electronics Engineer

FLIGHT OPERATIONS AND AIRWORTHINESS DIVISION CONDUCTS ACCEPTANCE INSPECTIONS ON JET AIRCRAFT SYSTEMS SIMULATORS

On February 16-17 acceptance inspections were conducted on the Cabin Pressurization and Air Conditioning (Left Rear) and AC Electrical Power Supply (Right Rear) Systems Simulators shown in the accompanying photograph. These simulators display the arrangement and functioning of the systems as they are in the jet aircraft. They are animated and back-lighted to depict normal and emergency conditions and the controls, instruments, warning lights, etc., are the same as on the flight engineers panels in the cockpit. The training concepts of these panels is similar to the Jet Aircraft Powerplant Control System and Fuel System Simulators previously received and four additional systems simulators on order. The objectives of procuring these

training aids is to insure thorough visualization and understanding of highly complex and entirely different jet aircraft systems in a comparatively minimum course time.

The coordination of the project from the development of specifications through manufacture and acceptance inspections was coordinated by L. E. Shedenhelm, Chief Aircraft Branch, through cooperation of Division personnel. The detailed comparisons of the simulator displays, normal and emergency functioning and the flight engineer control panels with the aircraft systems were conducted on the "Cabin Conditioning" Simulator by Messrs. Biggers, Robert Thomas and Bob Hightower. The above conditions on the entirely new and highly complex AC Power Supply Simulator

were conducted by Messrs. Clyde Daniels, Supervising Electronics Engineer, Reedy Rogers and Junius Winston.

The above panels were designed to be utilized in separate and combined systems courses; flight engineer and pilot courses in conjunction with the Division's Jet Aircraft Flight Simulator. Following a detailed inspection, Messrs. Hope Biggers and Robert Thomas conducted tests on the functioning of the simulators in relation to cockpit check lists used by flight engineers on turbojet aircraft.

Demonstrations of the functioning and operation of the simulators were conducted for Messrs. Harold Heier, Warren Smith, Norman Anderson and Jack Ferguson to enable evaluation from both training and procurement viewpoints.

YOUR EMPLOYEES ASSOCIATION REPORTS!

The 1960 membership drive closed Friday, February 12th. We won't quote statistics. We've never really figured them out, but we are proud of the enthusiasm shown during the drive.

The Employees Association sponsored a Valentine Dance Saturday, February 13th which marked the close of the membership drive. Word got around very quickly after the dance that Blossom Heath was beautifully decorated, the music was good and there was plenty of room to dance. We hope that you new members . . . and you old members, too . . . will realize that this was just the first dance of the year. There's more to come!

AVIONICS TRANSCEIVER MOCK-UP

The first 618S Transceiver Course, consisting of nine students, convened January 25, 1960, and was completed February 5, 1960. Two of the students of this special equipment class, Frank Day, Anchorage, Alaska, and Phillip Dixon (left), Washington, D.C., are shown in the picture on the left, using a 618S mock-up to align the 618S Transceiver. The 618S Mock-up was designed by the A.C.E.S. (Avionics Communications) staff and constructed by Technical Services Branch.

The Transceiver Course is an option intended primarily for training on Region 5 and overseas aircraft.

The photograph, at right, shows a close-up of 618S Transceiver Mock-up designed by A.C.E.S. This mock-up will be used by students in the 618S Transceiver Course.



Fred M. Lanter, Director of the Federal Aviation Agency's new \$20 million Aeronautical Center at Will Rogers Field, Oklahoma City, addressed the Central Oklahoma Chapter of the Oklahoma Society of Professional Engineers at their regular meeting, February 9.

Lanter's presentation of his subject, "Civil Aviation—Past, Present, and Future," provided a program that was both interesting and informative.

The lively question and answer session following Lanter's talk, and an unusually large attendance of more than 80 professional engineers, is perhaps indicative of the considerable interest in both aviation and the Aeronautical Center in this area. Mr. Lanter was introduced by Don K. Andrews, a member of O.S.P.E.'s State Publicity and Public Relations Committee.



TRAINING CORNER

Some Thoughts on non-Government or Out-Service Training.

Public Law 85-507 effective July 7, 1958, makes us extremely conscious of the importance of the training of Government employees and the various means of training at our disposal. In an earlier issue, we emphasized the importance of self improvement at your own expense. The Law does, however, provide for training at Government expense when certain conditions are met. This aspect of the Law is quite important because it carries so much further the authorization for Out-Service training. Defined in simple terms it means training received other than through any agency of the Government.

The purpose behind Out-Service training is to supplement and extend self-education, and within-Agency, and Inter-Agency programs for the training of employees in the performance of official duties and for the development of skills, knowledge, and abilities which will best qualify them for performance of official duties.

Obviously, in order to prevent wholesale misuse of a program of this nature and scope, many factors must be carefully considered in justifying payment for Out-Service training. What are some of these factors that must be considered before approval can be given? If suitable answers can be given to the following questions probably the Out-Service training requested is justifiable:

1. Is the training needed reasonably available within the Agency or on an Inter-Agency basis?
2. Is the training fully justified by the needs of the activity?
3. Will the training promote efficiency and economy in fulfilling the requirements of a job?
4. Have you considered the availability and utilization of a fully trained employee?
5. Is there sufficient funds to cover the cost of the training requested?
6. Are there other needs for training that should take precedence?
7. Are all employees being treated fairly as regards selection for and assignment to training?
8. Will the training help build and retain a permanent cadre of skilled and efficient employees?
9. Is the training so significant as to justify the loss of manhours from the job?

Careful use of the Out-Service training privilege of this Law will undoubtedly contribute considerably to the overall efficiency of the Agency. Continued use and additional guidelines will help in making more effective use of this valuable contribution toward the development of Government employees.

One word of caution—The intent is to consider the *needs* of the Agency—not the wishes of the individual.



FACILITIES INSTRUCTOR RECEIVES AWARD

Charles Biberstine, of the Air Navigation Facilities ILS/VOR Section, was recently presented with a Cash Award and Incentive Awards Certificate by Mr. F. M. Lanter, Director of the Aeronautical Center. Mr. Biberstine's award winning suggestion, which has been forwarded to Washington for possible use throughout field facilities of the FAA, concerns circuit changes to the CA-1616 VOR Monitor to eliminate the interaction between the Input Level and Contact Potential Balance Control adjustments.

Mr. Biberstine joined the facilities ILS/VOR staff in 1958, from Region 4. He has instructed primarily in the VOR facility course.

A part of a recent graduation at the Center was to ask each out-of-state student what he liked best about Oklahoma. A Texan replied: "Darrell Royal."

PERSONNEL-LY SPEAKING

Promotion! This word probably excites as much interest as most any word . . . having to do with official business. There are a few people who really are not interested in getting ahead in their jobs, but they're pretty rare. Yet, in spite of most of us being really interested in promotion I frequently run across some rather odd ideas about promotion.

From the viewpoint of the guy who doesn't get promoted, some of the things about how promotions come about seem pretty unfair. From the viewpoint of the fellow who gets promoted, it's a pretty good system. From the viewpoint of the supervisor who has to decide who gets the job, it is about the roughest decision he has to make.

Now, let's take a look at what promotions really mean to management. In the first place . . . the fact that we have higher grades and rates of pay on some jobs . . . means that, in the judgment of management, the higher job requires the person to know more about his job, to have a higher level of skill, make more difficult decisions and take more responsibility for what he does. If these reasons were not there . . . there would be no reason for the higher grade and pay. So . . . when we fill a higher graded job, it isn't enough that the employee-candidate has been a satisfactory worker at the lower level. There should be some really good reason to believe he can and will do the work of the higher job competently.

Management also tells the man who must pick out his new employee: "You are to give first consideration to the promotion of employees to fill higher grade jobs, *but* if there is a candidate with superior qualifications available from another source, we expect you to fill the job with the best qualified person available."

It is not too unusual for a supervisor to go outside the Agency to get the best candidate. If this is true he must recommend hiring the outsider. This is a tough decision because most supervisors really want to see their people get ahead; prefer to select an employee for promotion when they can.

If a person wants to get ahead, he must recognize that basically it is his responsibility to show his supervisors that he is the best person

available. Then, the next time a higher job is open he will be selected. This involves more than just doing his assigned job and "keeping his nose clean."

How much do you know about the work of your organization and how it fits into the overall job to be done? What do you know about the policies, procedures and regulations and why they are there? Have you devoted any of your off-duty time and effort to improving your knowledge and skill? Have you ready any books about your work? Do you keep up with trade publications and periodicals? Activities of this kind are your responsibility.

What ideas have you had lately about how to get a better job done . . . and does anyone know about them except you? Some ideas may be the kind that should be sent in as "suggestions," some are just things you suggest to the boss. If he thinks they are good he'll let you know. People who select employees for promotion like to know the man they pick will think about doing a better job. It's difficult to know that a man is thinking when he does what he's told . . . and that's all.

Finally, are you sure you're "on the team"? There aren't many jobs filled by promotion for which we want a "lone wolf." Nearly every job at the Center involves working with other people. If you're having more trouble than others in getting along with the people around you, maybe you had better have a long look in the mirror. No supervisor wants to pick a person for promotion who has not shown him that he gets along with his fellow employees.

Now . . . let's face up to the fact that our promotion policy assures any employee that he will be considered when a promotion comes along . . . BUT it's up to him to prove he's the best for the job. No one . . . but no one has a *right* to be promoted.

There can be no doubt that there will be opportunities to get ahead at the Aeronautical Center and in FAA in the years just ahead. How's your personal advertising campaign coming along? Do you have a really salable product?

W. M. JACKSON, AC-90



Looking at the "sky"! Chicken wire and lights show actual constellations in Center's Celestial Dome.

CELESTIAL NAVIGATION

At the Aeronautical Center you can go inside to get a look at the stars. There's a hexagonal, dome-tipped building located near the hangars where the stars can shine any hour of the day—rain or shine.

That building houses the celestial navigation trainer. The trainer, procured from Air Force surplus in late 1948, can simulate conditions during the day or night for a crew in flight. The crew can consist of pilot, navigator, bombardier, and radio operator.

The dome itself is movable; does so on a rotating axis. Two motors drive the dome. One gives it a rotating motion which simulates the speed and rotation of the earth; gives the easterly or minus westerly movement of the flight path. The other motor moves the dome on a curved rail in a north-south direction at a rate corresponding to the change of latitude.

Flights can be simulated in latitudes from 35 degrees north to the North Pole, and in any longitude. Speeds of all commercial aircraft now in use—including jet airliners—can be simulated.

The flight is controlled from an operator's booth, which is connected to the cockpit by an intercom system. The control desk contains controls and indicators necessary for the operation of the celestial dome, terrain mechanism, ground radio stations, wind direction and speed, etc.

For simulated flights during daylight hours, a print of the terrain over which the plane supposedly is moving, is projected onto a screen. The screen is visible from the cockpit. For night flights, a spherical dome containing about 290 stars provides a simulation of the northern celestial hemisphere. Sextant observations can be taken on twelve of these stars for position finding.

Four students can receive training simultaneously by individually taking observations in the trainer, then by making the calculations and performing other navigation duties at a table in an adjoining room. The trainer has been used at the Center only for the training of navigators.

In conjunction with the celestial trainer, flights are made in specially equipped aircraft. This training is given to inspectors who supervise the certification of flight navigators and the flight operations of overseas air carriers.



Federal Aviation Agency, Aircraft Standardization Division, uses latest X-ray method, under contract, to examine highly stressed areas such as wing attach fittings. The airplane being inspected is the Fifth Region's C-123 (N-123) now at the Aeronautical Center for major inspection and modifications. Mr. A. C. Sweeny, Jr. of Tulsa, Oklahoma, is the owner and operator of the X-ray equipment.



Seated, l to r: Paul Shively, Bob Duns-
more, Bob Lee, Monroe Ebner, Claude
Gardner, Henry Shaw. Standing, l to r:
Jack Huntress, Morris Fowler, Bob

Bridges, Jay Jones, Instructors Mon-
roe, Werner, Myers, Jackson, Shel-
ton, and participant Art Schmitt.

MANAGEMENT FOR SUPERVISORS

The presentation of certificates of comple-
tion and congratulations were given by Mr. J.
B. Mitchell, Acting Superintendent, Federal
Aviation Agency School.

The next class, MSAC-2-60, is scheduled to
convene on February 29. The conferences for
this course are conducted using the Directed-
Discussion Method and cover six broad areas
of management with discussion on: (1) The
supervisory job, (2) How to improve the work
situation, (3) How to get the work out, (4)
How to train employees, (5) How to work
with people, (6) and Areas of self-improve-
ment.

Three work shops are also included on: (1)
Instruction techniques, (2) Problem solving,
(3) and Interviewing.

This class was conducted by the Manage-
ment Training Staff here at the Center. The
principal instructors were Mr. Bill Werner,
Chief, and Mr. Clair Monroe. They were as-
sisted by Mr. Russ Myers, Mr. Bill Shelton,
and Mr. Charles Head of AC-90.

One of the long standing dreams of the Cen-
ter's Personnel Officer materialized with the
advent of the new year when the first class
of "Management for Supervisors of the Aero-
nautical Center" (MSA-1-60) convened on
January 18. This course is an important part
of the official FAA Management Development
Program. This over-all program is being de-
veloped and has been endorsed by the FAA
Administrator. It is intended to provide de-
velopmental activities for all levels of FAA
supervisors and prospective supervisors.



Domestic tranquility is not the keynote in "Visit to a Small Planet," current Mummies' Play in Oklahoma City. The play is now in its third week. In the scene above the general's aide (really Charles Murray) is being dressed down by Major General Tom Powers (Glenn Fowler) for fighting with Conrad (Jac Alder), being comforted on the sofa by Ellen (Jane Woods). TV commentator and Ellen's father, Roger Spelding (Mark Weaver) glowers. The mop and pail? Those two had just cleaned up the bathroom after the man from outer space mis-used the shower.

AC MAN TURNS ACTOR

Playing a part that is not too far out of character is the Center's Personnel Relations Chief, Mark Weaver. Mark was in television news for nearly a decade. He is appearing in Gore Vidal's "Visit To A Small Planet." The play, a hit on Broadway two years ago, has proved to be a howling success in the Oklahoma City area.

Mark plays the part of a television commentator whose rating is slipping. It's at his house that the sophisticated Kreton, the man from

another planet and another time, lands his space ship. Earth security measures prevent the commentator from even mentioning his guest. His mounting frustration is one of the funnier elements in the play. Kreton is played by Jack Blatt, who has been in innumerable other plays.

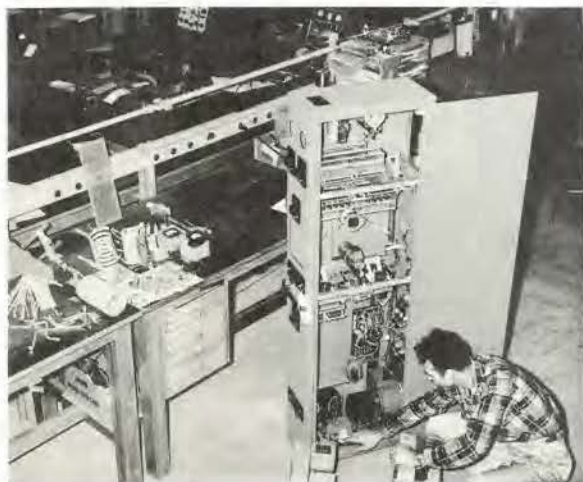
The bumbling antics of the military man, Glenn Fowler, who is more interested in his laundry corps than UFOs, the flutter-brained comments of the commentator's wife, played by Florene Garner, add to the hilarity.



Another electronic technician (the author) makes last minute adjustment to FAA multi-purpose aircraft transmitter. This completely 'modernized' transmitter will provide a navigation path and communications between the tower and its aircraft.



This is only a very small portion of the thousands of parts which must be removed, refinished, and installed on every piece of equipment going through the FAA Center's Electronics shop.



FAA technician Mitchell Tucker finds a loose wire on partially re-assembled overseas communications transmitter.



Sidney Blailock, electronic technician, helps Mitchell Tucker check out FAA transmitter, completely rebuilt in the electronics shop at the Center.

Supervisory Committee: 1 to r:
Robert Bridges, Doris Nichols,
and H. T. Swenson.



Credit Committee: 1 to r:
Emory C. Williams, Harvey
Westmoreland, Russell Flem-
ing, Ed Milton, and Guy Arnold.

Board of Directors: 1 to r,
front row: T. K. Archer,
Shirley Pfrehm, Ralph Gamel.
Back row: Rex Merilatt, Roy
Olinghouse, Richard Wenzel,
and Fred Purcell.



The FAA Employees Credit Union held its 14th Annual Meeting on January 28, 1960, in the Green Room of the Student Union Building at Oklahoma City University. A fine dinner was served to the members and the Choral Aires furnished a musical program.

Mr. Rex P. Merilatt and Mrs. Shirley F. Pfrehm were elected to the Board of Directors; Mr. Harvey Westmoreland and Mr. Russell Fleming were elected to the Credit Committee; Mrs. Doris Nichols and Mr. Robert Bridges were elected to the Supervisory Committee. Reports were given by the Board, the Supervisory Committee, and the Credit Committee. Your Credit Union has grown tremendously in the past years and the personnel on the Board and Committees will attempt to foster continuous growth and service during the coming year.

Below is a chart which reflects the growth of your Credit Union:

December 31	1 9 4 9	1 9 5 1	1 9 5 7	1 9 5 9
No. of Members	205	257	957	1,968
Loans	25,050	35,170	328,400	691,860
Deposits	25,850	31,530	319,680	642,030
Reserve	1,560	2,260	13,820	25,880
Assets	29,240	44,290	342,505	719,530
Dividend	0	3.5%	4%	4.8%



APRIL 1960

<i>Sun</i>	<i>Mon</i>	<i>Tue</i>	<i>Wed</i>	<i>Thu</i>	<i>Fri</i>	<i>Sat</i>
					1 92	2 93
3 94	4 95	5 96	6 97	7 98	8 99	9 100
10 101	11 102	12 103	13 104	14 105	15 106	16 107
17 108	18 109	19 110	20 111	21 112	22 113	23 114
24 115	25 116	26 117	27 118	28 119	29 120	30 121

COMMUNICATIONS EQUIPMENT CLASS 147 CONVENED JAN. 11, TO APR. 15, 1960

NAME	REG.	STATION	NAME	REG.	STATION
Kierckmeier, Herbert	1	New York, N.Y.	Kirby, Coy	2	Ft. Worth, Texas
Anderson, Peder A.	2	Miami, Fla.	MaGhee, Bruce F.	2	LaGrange, Ga.
Anderson, Wayne A.	4	Great Falls, Mont.	Maachak, Louis	1	Cleveland, Ohio
Bickertaff, R. G.	5	Anchorage, Alaska	Mason, Fred W.	4	Eugene, Oregon
Bierbraten, P. R.	4	Long Beach, Calif.	Majia, Rafael	2	Laredo, Texas
Broberg, John S.	4	Denver, Colo.	Olds, Donald J.	3	Vichy, Mo.
Carroll, F. N.	3	Wichita, Kansas	Patterson, Ocie L.	2	Ft. Worth, Texas
Cassidy, H. F., Jr.	1	Danville, Va.	Pechirer, L. T.	1	Pittsburgh, Pa.
Crane, R. K.	4	Bellingham, Wash.	Rizzo, Carl C.	1	Boston, Mass.
Davis, Robert H.	4	Focatello, Idaho	Shurtliff, Jack L.	4	Dubois, Idaho
Evans, Stanley	3	Houston, Texas	Specher, Seymour	5	Anchorage, Alaska
Graves, Jerry E.	3	Springfield, Mo.	Stoffer, M. D.	1	Louisville, Ky.
Hendon, Edward R.	3	Peoria, Ill.	Travis, K. E.	3	Wichita, Kansas
Hartman, J. D.	3	Chicago, Ill.	Travigno, C. F.	2	St. Petersburg, Fla.
Kempton, K. F.	4	Billings, Mont.	Wilkins, J. D., Jr.	4	Toledo, Wash.
King, Rayo D.	3	Vandalia, Ill.	Wright, Robert	1	No. Philadelphia, Pa.

COMMUNICATIONS EQUIPMENT CLASS 148 CONVENED JAN. 25, TO APR. 29, 1960

Andrie, Dan F.	2	Houston, Tex.	Kemp, Marvin H.	2	Vero Beach, Fla.
Auker, Donald A.	1	Chilpanburg, Pa.	Litchfield, K. R.	4	Walla Walla, Wash.
Benson, R. R.	4	Malad City, Idaho	Lively, James A.	3	Chicago, Ill.
Buchanan, Hugh R.	2	Columbus, Ga.	Lowless, K. E.	2	Atlanta, Ga.
Call, Robert M.	4	Carlsbad, N.M.	McKee, Larry E.	3	Huron, S. Dakota
Cassidy, T. S.	2	Atlanta, Ga.	Murillo, Mateo	4	Boise, Idaho
Dukes, Walter P.	2	Columbus, Ga.	Nourse, Harry V.	4	Redmond, Oregon
Eremita, Mike	1	Cleveland, Ohio	Powers, W. D.	4	Portland, Oregon
Flabryka, John L.	1	New Castle, Del.	Qualls, Jerry L.	2	Oklahoma City, Okla.
Fenster, H. E.	5	Unalakleet, Alaska	Tupman, M. E.	1	Louisville, Ky.
Fox, Richard W.	1	Utica, N. Y.	Varano, Juan	OIC	Argentina
Gallagher, P. F.	1	Montoursville, Pa.	Villanino, Rodolfo	OIC	Argentina
Hartman, Leo D.	5	Belhel, Alaska	Wilson, Jack W.	2	Augusta, Ga.
Huffman, C. R.	4	Great Falls, Mont.	Volny, S. E.	OIC	Argentina
Johnson, R. A.	3	Chicago 38, Ill.			

VOR CLASS 170-A CONVENED JANUARY 11, TO APRIL 1, 1960

Arnett, Louis M.	3	Bradford, Ill.	Morris, Robert E.	2	Beaumont, Tex.
Beers, George V.	1	Teterboro, N.J.	Prieto, Jose M.	OIC	Spain
Bradstreet, G. J.	3	Sioux Falls, S.D.	Proctor, H. C.	4	Cedar City, Utah
Chambers, W. E.	4	Portland, Oregon	Robinson, John A.	3	Detroit, Mich.
Chandler, James W.	2	Ft. Worth, Tex.	Ronco, Phillip D.	4	Pocatello, Idaho
Hein, Edward R.	1	Burlington, Vt.	Sanver, John H.	2	San Antonio, Tex.
Hren, Anton J.	3	Rochester, Minn.	Scay, Lewis E.	1	Nantucket, Mass.
James, George A.	1	Neward, N.J.	Vordran, Richard	3	Fort Wayne, Ind.
Kitley, Irving E.	3	Lansing, Mich.	Wong, F. A.	6	Honolulu
Laukaitie, Paul B.	1	Wilkes-Barre, Pa.			

VOR CLASS 170-B CONVENED JANUARY 11, TO MARCH 4, 1960

Bryha, Kenneth E.	4	Farmington, N.M.	Petrisin, Andrew M.	2	Montgomery, Ala.
Henry, M.	2	Anderson, S.C.	Pomeroy, D. E.	4	Tucson, Ariz.
er, R. H.	4	Fort Bridger, Wyo.	Raess, Edward	2	San Antonio, Tex.
James G.	1	Bradford, Pa.	Roberson, F. E.	5	Anchorage, Alaska
Hunter, Dorrie G.	2	Monroe, La.	Sawn, W.M., Jr.	1	Millville, N.J.
Lanford, H. A.	2	Spartanburg, S.C.	Tarrel, R. O.	4	Portland, Oregon
Lidley, Marvin E.	1	Morgantown, W. Va.			

VOR CLASS 171-A CONVENED JANUARY 25, TO APRIL 15, 1960

Bonello, A. R.	1	Atlantic City, N.J.	Lammer, W. J.	3	Kansas City, Mo.
Bonner, Laurence Jr.	4	Boise, Idaho	Littleton, D. A.	4	Casper, Wyo.
Forstner, Palmer B.	5	Anchorage, Alaska	Lopez, Julio A.	OIC	Managua, Nicaragua
Hawkins, Roy G.	2	Amarillo, Tex.	McKelvey, J. W.	4	Boise, Idaho
Hrehlik, Robert	1	New Cumberland, Pa.	Radi, Charles	1	Charleston, W. Va.
Johnson, H. E.	4	Albuquerque, N.M.	Richards, N. A.	1	Atlantic City, N.J.
Krenk, Antone J.	3	Lincoln, Nebr.	Tompkins, J. B.	4	Ontario, Calif.

VOR CLASS 171-B CONVENED JANUARY 25, TO MARCH 16, 1960

Cann, Thomas F.	3	Joliet, Ill.	Maysonet, A. M.	2	San Juan, Puerto Rico
Gulbertson, W. S.	2	Junction, Tex.	Perkinson, W. K.	4	Ephrata, Wash.
Eller, E. D.	2	Raleigh, N. C.	Ricketts, W. A.	6	Wake Island
Gulna, Robert W.	3	Terre Haute, Ind.	Woelke, H. E.	4	Phoenix, Ariz.
Kifer, Francis L.	3	Scottsbluff, Nebr.			

MAINTENANCE SUPERVISION CLASS 24 CONVENED JAN. 4, TO JAN. 8, 1960

Eastwood, W. C.	4	Pas Robles, Calif.	Parks, J. D.	2	Little Rock, Ark.
Elliott, A. E.	2	Memphis, Tenn.	Ragge, W. D.	3	Watertown, S. Dak.
Fairbanks, H. M.	3	Coahen, Ind.	Scay, Lewis	1	Nantucket, Mass.
Isaac, W. O.	5	Anchorage, Alaska	Zubillaga, Alfred	4	Alamosa, Colo.

MAINTENANCE SUPERVISION CLASS 25 CONVENED JAN. 11, TO JAN. 15, 1960

Angier, John R.	AC	Oklahoma City, Okla.	Maxvold, Donald	5	Anchorage, Alaska
Biehoff, Dale H.	3	Mpls., Minn.	Merta, V. E.	3	Russell, Kansas
Coon, Stanley	1	Glen Falls, N.Y.	Pidek, John	3	Romulus, Mich.
Gibbs, Call E.	2	Columbus, Miss.	Richards, R. C.	AC	Oklahoma City, Okla.
Jennings, J. M.	3	Vichy, Mo.	Switzer, Marvin	1	Lynchburg, Va.
Johnson, Darold L.	3	Sioux Falls, S.D.	Van Hoose, Robert	3	Chicago, Ill.

MAINTENANCE SUPERVISION CLASS 26 CONVENED FEB. 1, TO FEB. 5, 1960

Baker, Ben	3	Rapid City, S. D.	James, J. L.	3	Columbia, Mo.
Bethel, W. O.	AC	Oklahoma City, Okla.	Jedlicka, Stanley	3	Duluth, Minn.
Cattett, Jack L.	3	Inkster, Mich.	Logan, R. W.	4	Oakland, Calif.
Decelles, J. H.	Spec.	Ft. Worth, Tex.	Quintal, George	2	Orlando, Fla.
Fisher, Loren H.	5	Fairbanks, Alaska	Stegall, R. A.	4	Fresno, Calif.
Fulton, James W.	1	Wheeling, W. Va.	Stewart, R. L., Jr.	3	Chicago, Ill.
Harping, Ira	1	Dayton, Ohio			

MAINTENANCE SUPERVISION CLASS 27 CONVENED FEB. 8, TO FEB. 12, 1960

eman, R. E.	AC	Oklahoma City, Okla.	Jones, Robert E.	3	Des Moines, Iowa
an, Steve	WO	Washington, D.C.	King, N. S.	2	Childress, Texas
ker, C. N.	2	Nashville, Tenn.	Paquette, Leo J.	3	N. Platte, Nebr.
wer, Carl E.	1	Boston, Mass.	Shaklee, D. C.	3	Indianapolis, Ind.
Cavalo, R. V.	1	Boston, Mass.	Sheatsley, N. G.	4	Spokane, Wash.
Clark, B. M.	1	Pittsburgh, Pa.	Skinner, Charles	WO	Washington, D. C.
Gillespie, James	4	Carlsbad, N.Mex.	Woode, Jack	5	Juneau, Alaska

SHORT TACAN CLASS 14 CONVENED JANUARY 25, TO MARCH 4, 1960

NAME	REG.	STATION	NAME	REG.	STATION
Artimovich, A. A.	3	Minneapolis, Minn.	Hunt, Thomas F.	1	Philadelphia, Pa.
Baker, Harry A.	4	Great Falls, Mont.	Kilpatrick, Lyle V.	6	Wake Island
Begley, Thomas S.	2	Memphis, Tenn.	Larabee, Jack W.	4	Yakima, Wash.
Begley, Dennis R.	3	Wichita, Kans.	Latimer, Ellison A.	1	Louisville, Ky.
Biesenzer, F. C., Jr.	3	Sault Ste. Marie, Mich.	Marek, George W.	3	Vandalia, Ill.
Cagle, Harold	2	Nashville, Tenn.	McMullen, W. A.	3	Topeka, Kansas
Crow, Robert W.	3	Kansas City, Mo.	Post, Eugene R.	3	LaGrange, Ind.
Gummings, F. B., Jr.	1	Rome, New York	Rich, Clarence T.	2	Waco, Texas
Demko, T. J.	1	Erie, Pa.	Shaw, W. S.	3	Indianapolis, Ind.
Fogelsanger, R. S.	4	San Rafael, Calif.	Shuff, Fred	4	Las Vegas, Nevada
Fox, John D.	2	Charlotte, N. C.	Terry, Charles F.	3	Springfield, Ill.
Grebe, E. C.	3	Bradford, Ill.	Townsend, Carl E.	4	Roswell, N. Mex.
Haggard, L. B.	2	Oklahoma City, Okla.	Watkins, Paul E.	4	Billings, Mont.
Hinson, Frederic S.	1	Morgantown, W. Va.			

TACAN CLASS 18 CONVENED JANUARY 11, TO APRIL 1, 1960

NAME	REG.	STATION	NAME	REG.	STATION
Berndt, A. A.	3	St. Louis, Mo.	Kolen, Oleg G.	5	Anchorage, Alaska
Bossoletti, Paul M.	3	Grand Forks, N.D.	Meiser, Karl E.	3	Huron, Michigan
Burkart, L. E., Jr.	1	Baltimore, Md.	Meisel, D. T.	3	Sioux Falls, S. D.
Dewar, Dale B.	3	Romulus, Mich.	Morgan, W. G.	4	Grand Junction, Colo.
Eastwood, W. C.	4	Paso Robles, Calif.	Palmer, W. D.	4	Daggett, Calif.
Elliott, R. R.	2	Gage, Okla.	Perry, J. D.	2	Cross City, Fla.
Foster, H. L.	6	Kahului, Hawaii	Robins, W. W.	1	Louisville, Ky.
Grabau, A. W.	4	Fresno, Calif.	Russell, D. E.	3	Emporia, Kansas
Jarvi, Terho A.	4	Sherridan, Wyo.	Weatherby, Thor Jr.	4	Boise, Idaho
Kammer, P. R.	2	College Sta., Tex.	Wilson, Earl A.	3	Springfield, Mo.
Kephart, P. A.	3	LoCrosse, Wisc.	Zubillaga, Alfred	4	Alamosa, Colo.

TACAN CLASS 19 CONVENED FEBRUARY 8, TO APRIL 27, 1960

Baker, Ben	3	Rapid City, S.D.	Jedlicka, Stanley	3	Duluth, Minn.
Beckham, G. R.	6	Honolulu, Hawaii	Leavell, D. E.	4	Roswell, N.M.
Berdahl, L. S.	4	Portland, Ore.	Logan, R. W.	4	Oakland, Calif.
Booster, Texas L.	2	Houston, Texas	Loft, Delmer L.	2	Midland, Texas
Brasil, Herb D.	5	Anchorage, Alaska	Neary, R. D.	1	Washington, D.C.
Christiansen, A.M.	3	Lincoln, N.D.	Pousont, J.E., Jr.	1	New York, N.Y.
Chrobak, R. D.	1	Philipsburg, Pa.	Richardson, E.J.	4	Blythe, Calif.
Cornelison, C.A.	4	Yuma, Ariz.	Sack, Leo G.	1	Concord, N.H.
Deibert, John J.	3	Aberdeen, S.D.	Stegall, Raleigh A.	4	Fresno, Calif.
Donahue, John C.	1	Boston, Mass.	Stewart, R.L., Jr.	3	Millwaukee, Wisc.
Duello, N. A.	3	Kansas City, Mo.	Sullivan, C. L.	2	Ft. Worth, Texas
Fisher, L. H.	5	Fairbanks, Alaska	Takenaka, Hideo	4	Lovelock, Nev.
Freeman, M.D.	AC	Oklahoma City, Okla.	Troyer, Leon S.	5	Anchorage, Alaska
Hall, Francis E.	5	Kenai, Alaska	Vamvalis, D.N.	1	Hudson Falls, N.Y.
Hoekins, R. E.	4	Daggett, Calif.	Vance, Edward H.	2	Ft. Worth, Texas
Huckabay, J.L., Jr.	2	Jackson, Miss.	White, Donald	1	Erie, Pa.
Hunt, G. G.	1	Rosnoke, Va.	White, Loyal	AC	Oklahoma City, Okla.
James, J. L.	3	Columbia, Mo.	Whittier, M.G.	4	Eugene, Ore.

ELECTRO-MECHANICS CLASS 12 CONVENED DEC. 28, 1959 TO APR. 1, 1960

Anderson, J. L.	4	Fresno, Calif.	Ponikvar, J. J.	4	Great Falls, Mont.
Boien, L.A., Sr.	2	Memphis, Tenn.	Rue, Robert R.	4	Dubois, Idaho
Buckley, T. R.	1	Pittsburgh, Pa.	Santorelli, J. A.	1	Harrisburg, Pa.
Cook, George E.	6	Wake Island	Snyder, Roy W.	5	Nome, Alaska
Cogrove, Dell E.	1	Louisville, Ky.	Veit, Max S.	AC	Oklahoma City, Okla.
Dulin, Bedford	2	Wichita Falls, Tex.	Wichita, J. B.	3	Topeka, Kansas
Gabriel, L. R.	3	Battle Creek, Mich.			

ELECTRO-MECHANICS CLASS 12 CONVENED FEB. 1, TO FEB. 19, 1960

Anderson, J. L.	4	Fresno, Calif.	Ponikvar, John J.	4	Great Falls, Mont.
Boien, L.A., Sr.	2	Memphis, Tenn.	Rue, Robert R.	4	Dubois, Idaho
Cook, George E.	6	Wake Island	Santorelli, J. A.	1	Harrisburg, Pa.
Cogrove, D. E.	1	Louisville, Ky.	Snyder, R. W.	5	Nome, Alaska
Dulin, Bedford	2	Wichita Falls, Tex.	Veit, Max S.	AC	Oklahoma City, Okla.
Gabriel, L. R.	3	Battle Creek, Mich.	Wichita, James B.	3	Topeka, Kansas
Orrick, Edwin G.	1	Washington, D.C.			

ELECTRO-MECHANICS CLASS 13 CONVENED FEB. 1, TO MAR. 4, 1960

Anderson, E. A.	3	Mpls., Minn.	Montayre, Alfred	6	Wake Island
Burnham, Albert	5	Sitka, Alaska	Richardse, W. E.	1	Bedford, Mass.
Curry, B. E.	2	Armadillo, Tex.	Schneider, R. A.	3	Detroit, Mich.
Fisher, J. E.	4	Eugene, Oregon	Tacke, B. A.	2	New Orleans, La.
Kastle, A. P.	1	Columbus, Ohio	Wall, Roy L.	5	Anchorage, Alaska
McCormick, J. D.	2	Houston, Texas	Wise, F. N.	4	Pendleton, Oregon

RADAR CLASS 143 CONVENED JANUARY 11, TO MARCH 25, 1960

NAME	REG.	STATION	NAME	REG.	STATION
Ames, E. E., Jr.	4	San Francisco, Calif.	Krempasky, C. P.	1	Washington, D. C.
Canady, C. D.	3	Lincoln, Nebr.	Landon, Fred E.	3	Kansas City, Mo.
Cartier, R. N.	1	Burlington, Vt.	Larson, R. C.	3	Kansas City, Mo.
Cerrito, T. J.	1	Queneset Pt., R.I.	Lindquist, A. S.	4	Oakland, Calif.
Cottle, E. C.	3	Molden, Mo.	Minchew, S. S.	2	Oklahoma City, Okla.
Crane, F. E.	4	March AFB, Calif.	Morgan, W. G.	2	Corpus Christi, Tex.
Deadrick, E. L.	3	Ypsilanti, Mich.	Moulton, R. A., Jr.	2	Tampa, Fla.
Donaldson, U. L.	2	Tinker AFB, Okla.	Neal, T. R.	3	Indianapolis, Ind.
Dorony, G. J.	1	Cleveland, Ohio	O'Neil, H. B.	3	Indianapolis, Ind.
Dozier, D. W.	5	Fairbanks, Alaska	Parks, J.D., Jr.	2	Little Rock, Ark.
Edwards, S. D.	4	Palmdale, Calif.	Schroeder, Richard	1	N. Y. NT Air
Ehrhart, T. M.	3	Kansas City, Mo.	Sherwood, W.H., Jr.	4	Davis-Monthan AFB
Elkins, J. A.	2	Ft. Worth, Tex.	Smith, W. J.	3	Hutchinson, Kansas
Elliott, A. E.	2	Memphis, Tenn.	Spofford, E. A.	4	McChord AFB
Fairbanks, H. M.	3	Grand Rapids, Mich.	Stanton, D. E.	4	March AFB, Calif.
Giangiordano, R. A.	1	Youngstown, Ohio	Shill, Dick F.	2	El Paso, Texas
Go, Harry W. C.	6	Honolulu, Hawaii	Tarbell, David W.	3	Kansas City, Mo.
Hall, Graham D.	2	Ft. Worth, Tex.	Townsend, J. L.	4	Bellingham, Wash.
Hardcastle, E. R.	2	Flippin, Ark.	Usery, E.F., Jr.	2	Oklahoma City, Okla.
Hunter, Robert S.	3	Moline, Ill.	Walker, Tom A.	2	El Paso, Texas
Hunter, R. J.	4	Davis-Monthan AFB	Walter, C. W.	3	Mpls., Minn.
Isaac, William O.	5	Anchorage, Alaska	Yanker, Daniel J.	1	Cleveland, Ohio
Jacobs, James B.	2	Knoxville, Tenn.	Zoelner, V. A.	3	Indianapolis, Ind.

SEAN CONVERSION TI CLASS 440 CONVENED JAN. 4, TO JAN. 15, 1960

NAME	REG.	STATION	NAME	REG.	STATION
Garmel, Richard A.	1	Washington, D.C.	Lester, Edgar B.	2	Atlanta, Ga.
Cook, W. B.	4	Denver, Colo.	Nelson, Robert L.	4	Salt Lake City, Utah
Dunne, Matthew F.	1	Idelwild, N.Y.	Olsen, Clyde O.	4	Seattle, Wash.
Federico, Arturo, Jr.	1	Oakland, Calif.	Pillow, Robert W.	2	San Antonio, Texas
Fincher, Norman W.	2	Atlanta, Ga.	Richards, Robert R.	3	Detroit, Mich.
Flukey, James R.	1	Idelwild, N.Y.	Spada, Charles P.	3	Detroit, Mich.
Fleetwood, Glen R.	4	L. A., Calif.	Waldrep, Lloyd A.	2	San Antonio, Texas
Gordon, C. F.	1	Idelwild, N.Y.	Williams, C. A.	4	Albuquerque, N.M.

RADAR OPTION SPECIALTY CLASS 140 OPTION 1 CONVENED JAN. 4, TO JAN. 29, 1960

Baker, Richard T.	4	L.A., Calif.	London, H. D.	1	Washington, D.C.
Berklund, Walter E.	6	Honolulu, Hawaii	McCormick, C. T.	2	Memphis, Tenn.
Blanchard, C. R.	4	Denver, Colo.	Parks, Clayton A.	4	Dallas, Oregon
Casey, John W.	3	Chicago, Ill.	Pierce, Emmitt C.	3	LaGrange, Ind.
Church, Robert D.	2	Memphis, Tenn.	Pille, Wilfred	3	Chicago, Ill.
Clark, Morle E.	4	Salt Lake City, Utah	Pound, Budd F.	4	Seattle, Wash.
Elgunes, Robert F.	4	Phoenix, Arizona	Ramsey, John R.	3	LaGrange, Ind.
Goodrich, R. G.	2	Pensacola, Fla.	Thoreson, D. E.	3	Mpls., Minn.
Hankins, Lloyd E.	3	Kansas City, Mo.	Tynan, William B.	4	Albuquerque, N.M.
Ishenower, H. W.	4	Albuquerque, N.M.	Van Emmerik, P. A.	4	Salt Lake City, Utah
Landers, Harry E.	4	Albuquerque, N.M.	Williams, D. H.	2	Jackson, Miss.

RADAR OPTION SPECIALTY CLASS 140 OPTION 3 CONVENED JAN. 4, TO JAN. 22, 1960

Barbour, C. E.	1	Rome, N. Y.	Mehner, R. D.	4	Seattle, Wash.
Boulter, W. V.	2	Charleston, S.C.	Mundt, Ernest E.	5	Fairbanks, Alaska
Bower, Carl E.	1	Boston, Mass.	Nardi, Camillo S.	1	Buffalo, N. Y.
Burke, T. W.	3	Kansas City, Mo.	Nichols, James S.	4	Portland, Oregon
Cavallo, R. V.	1	Boston, Mass.	Schmitz, Lee Roy J.	2	Barksdale AFB, La.
Graham, W. E.	2	Little Rock, Ark.	Shaw, A. V., Jr.	2	Bergstrom AFB, Tex.
Lamar, Walter K.	1	Louisville, Ky.	Shell, Hubert	AC	Oklahoma City, Okla.
Mason, R. E.	5	Anchorage, Alaska	Waldron, W. L.	3	Ypsilanti, Mich.
Mast, Roger E.	3	Kansas City, Mo.	Zigo, Thomas J.	1	Columbus, Ohio

ROS RML/R140 CONVENED JANUARY 4, TO JANUARY 29, 1960

Blades, C. E.	2	Houston, Tex.	Hasle, Thomas C.	2	Ft. Worth, Texas
Berkow, C. W.	4	Denver, Colo.	Heala, J. E.	4	L. A., Calif.
Busey, Norman C.	3	Omaha, Nebr.	Holt, Orval R.	3	Kansas City, Mo.
Greene, Joe B.	3	Omaha, Nebr.	Lee, D. W.	4	Oakland, Calif.
Davis, C. E.	2	Omaha, Nebr.	Marke, Cecil	2	Ft. Worth, Texas
Dougherty, D. F.	3	Omaha, Nebr.	Martin, J. W.	3	Kansas City, Mo.
Dunlap, Alton W.	2	El Paso, Tex.	Moon, A. M.	2	Montgomery, Ala.
Easley, B. D., Jr.	2	Raleigh, N. C.	Simkins, V. B.	3	Omaha, Nebr.
Ester, J. W.	4	Sta. Margarita, Calif.	Treweat, H. T.	4	Denver, Colo.
Evanston, R. E.	11	Raleigh, N. C.	Wiggins, W. M.	2	Charleston, S. C.
Hargrove, Fay D.	4	Denver, Colo.			

ROS RML/6 REPEATERS CLASS CONVENED JANUARY 4, TO JANUARY 15, 1960

Cobb, Max E.	4	Sacramento, Calif.	Mason, R. D.	4	Albuquerque, N.M.
Cowles, L. W.	4	Salinas, Calif.	McCurdy, D. R.	4	Medford, Oregon
Culp, Hal R.	2	Ft. Worth, Tex.	Montgomery, W. D.	2	Montgomery, Ala.
Hite, Henry A.	4	Burbank, Calif.	Moore, C. L.	3	Hutchinson, Kansas
Keite, Carl L.	4	Seattle, Wash.	Shiraga, R. T.	4	L. A., Calif.
Lawson, T. E.	4	Portland, Oregon	Spivey, Joe R.	4	San Jose, Calif.

ROS 141 - TI-440 CONVENED FEBRUARY 1, TO FEBRUARY 12, 1960

Frederick, R. E.	3	Indianapolis, Ind.	Martin, J. W.	3	Kansas City, Mo.
Hankins, L. E.	3	Kansas City, Mo.	Pills, W. U.	3	Chicago, Ill.
Johnson, T. D.	1	Washington, D.C.	Stephens, D. E.	3	Mpls., Minn.
Kouns, D. C., Jr.	3	Indianapolis, Ind.			

ROS 141 - ARSR-1 CONVENED FEBRUARY 1, TO FEBRUARY 19, 1960

Bruesack, R. W.	3	St. Louis, Mo.	Hasle, Thomas C.	2	Ft. Worth, Texas
Dunlap, A. W.	2	El Paso, Texas	Heala, John E.	4	L. A., Calif.
Easley, B. D., Jr.	2	Raleigh, N. C.	Marke, Cecil	2	Ft. Worth, Texas
Evanston, R. E.	1	Cleveland, Ohio	Neary, Marion R.	4	San Jose, Calif.
Grady, Michael R.	1	Boston, Mass.			

ROS 141 - RML (T/R) CONVENED FEBRUARY 1, TO FEBRUARY 26, 1960

Abbott, W. A.	4	L. A., Calif.	Fultz, Ronald C.	3	Hutchinson, Kans.
Avant, V. E.	2	Atlanta, Ga.	Galloway, L. G.	4	Fresno, Calif.
Batchelor, E. A.	4	Great Falls, Mont.	Greenamyer, G. T., Jr.	2	Miami, Fla.
Booth, Edwin	2	San Antonio, Texas	Harrington, J. E.	2	Montgomery, Ala.
Bryant, J. G.	2	Valdosta, Ga.	Hellwig, R. B.	3	St. Louis, Mo.
Chang, Dia Chin	6	Honolulu	Ishenower, H. W.	4	Albuquerque, N.M.
Clark, M. E.	4	Salt Lake City, Utah	Kralich, R. J., Jr.	2	Shreveport, La.
Davis, A. L.	2	Charleston, S.C.	Landers, H. E.	4	Albuquerque, N.M.
Duggan, W. F.	2	Atlanta, Ga.	Lee, Kenneth L.	3	Clatsop, Kansas
Edwards, J. F.	2	Shreveport, La.	Saenz, J. A., Jr.	2	San Antonio, Texas
Field, J. A.	2	Miami, Fla.	Shanahan, P. F.	1	Boston, Mass.
Fleetwood, G. R.	4	L. A., Calif.	Van Emmerik, P. A.	4	Salt Lake City, Utah

ROS 141 - ARS-3 CONVENED FEBRUARY 1, TO FEBRUARY 19, 1960

Aiken, D. G.	3	Wichita, Kans.	Lyons, David A.	4	Tucson, Ariz.
Arnold, Fred W.	1	Windsor-Locke, Conn.	McKenzie, R. D.	2	Mobile, Ala.
Barnett, J. C.	2	Ponca City, Okla.	Miller, Q. M.	1	Mansfield, Ohio
Caldwell, H. E.	2	Perrin, RAPCON	Pitts, C. L.	5	Anchorage, Alaska
DeMerritt, L. G.	4	Portland, Oregon	Slavik, F. D.	5	Anchorage, Alaska
Foster, K. G.	2	Hunter AFB, Ga.	Tenney, R. D.	4	Hill AFB
Gardner, D. C.	2	New Orleans, La.	Toland, L. B.	2	Ft. Worth, Texas
Halderson, O. A.	4	Malmstrom AFB	Turnquist, C. N.	3	Chicago, Ill.
Kukish, Steve	4	McChord, Wash.	Weick, L. E.	3	Lincoln, Nebr.

RML/R CLASS 7 CONVENED FEBRUARY 1, TO FEBRUARY 19, 1960

Brown, A. L.	1	New York, N.Y.	Lowell, G. C.	4	Salinas, Calif.
Goetner, R. J., Jr.	3	Wichita, Kans.	Mock, J. A.	4	Denver, Colo.
Daigle, W. T.	4	Medford, Ore.	Nick, A. J.	2	Savannah, Ga.
Eason, Sidney, Jr.	4	San Jose, Calif.	Preeton, W. H.	4	Denver, Colo.
Freampton, Edward	2	St. Simons Island	Seibel, D. G.	3	Garden City, Kans.
Harrison, Cecil P.	2	Atlanta, Ga.	Thurber, J. C.	2	W. Palm Beach, Fla.
Hayes, Vincent S.	4	L. A., Calif.	Wasmundt, H. F.	4	Eugene, Oregon
Henney, F. W.	4	L. A., Calif.	Williams, R. V.	2	Vero Beach, Fla.

JANUARY GRADUATES IN DIRECTED STUDY COURSE 90

NAME	REG.	STATION	NAME	REG.	STATION
Anderson, R. F.	3	Green Bay, Wisc.	Glaser, O. R.	4	Great Falls, Mont.
Barkema, H. W.	2	Balboa, C. Z.	Greaser, E. R. T.	AC	Oklahoma City, Okla.
Barnett, W. R.	1	Cincinnati, Ohio	Guthrie, D. C.	4	Spokane, Wash.
Bartholomew, Richard	1	Allentown, Pa.	Harris, C. R.	2	Decatur, Ga.
Baner, Jos. J.	1	New York	Harris, J. D., Jr.	2	Jackson, Tenn.
Beich, W. H.	2	Waco, Texas	Heffern, W. J., Jr.	1	Corapolis, Pa.
Bisshel, P. W.	EST-LA	L. A., Calif.	Ice, Elden	1	Canonburg, Pa.
Blair, C. W., Jr.	5	Gustavus, Alaska	James, Robt. U.	4	Colo. Spgs., Colo.
Boudreau, D. J.	3	Evansville, Ind.	Johnson, Elton	EST-4	L. A., Calif.
Boydston, Jack	4	Van Nuys, Calif.	Joyce, John A.	4	Dallas, Oregon
Brackett, P. Z.	2	Alma, Ga.	King, Urcal A.	EST	Ft. Worth, Tex.
Buettner, P. V.	AC	Oklahoma City, Okla.	LaPlante, Albert	4	Aburn, Wash.
Cazilis, V. L., Jr.	1	Baltimore, Md.	Marques, Joe F.	4	Columbus, N.M.
Cook, Robt. J.	4	Lakewood, Calif.	Nelson, J. M.	4	Pasadena, Calif.
Cooke, S. E., Jr.	2	Hollywood, Fla.	Nodine, Harvey	3	Moline, Ill.
Costello, E. E.	3	S. Bend, Ind.	Paladine, James	1	Buffalo, N.Y.
Donnalley, R. F.	1	St. James, N.Y.	Pearson, C. M.	2	New Orleans, La.
Dunaway, A. L.	2	Waco, Tex.	Rowden, Theodore AC		Edmond, Okla.
Easterwood, L. D.	4	Torrance, Calif.	Smith, Willard D.	2	Lake Charles, La.
Ellis, J. C.	2	Miami, Fla.	Sweat, I. T.	4	Great Falls, Mont.
Ernst, C. J.	AC	Oklahoma City, Okla.	Thompson, R. E.	AC	Chickasha, Okla.
Ford, D. G.	5	Yakutat, Alaska	Travis, K. E.	3	Wichita, Kansas
Faul, J. A.	3	Overland, Mo.	Van Loon, W. J.	1	Plymouth, Pa.
Frost, H. P.	2	Columbus, Ga.	Wagg, E. R.	AC	Norman, Okla.
Gehrige, K. C.	5	King Salmon, Alaska	Weber, Kenneth	1	Corapolis, Pa.

JANUARY GRADUATES IN DIRECTED STUDY COURSE 100

Andreasen, W. B.	4	Phoenix, Ariz.	Maupin, C. E.	AC	Oklahoma City, Okla.
Baker, R. R.	2	Columbus, Ga.	Micrel, C. J.	6	Canton Island
Barnum, R. E.	4	Medford, Ore.	Miller, S. E., Jr.	2	Wink, Texas
Bugg, R. W.	3	Inkster, Mich.	Mooring, Aubrey	2	Tecumseh, Ark.
Carson, C. T.	5	Fairbanks, Alaska	Olmsstead, Thomas	1	Syracuse, N.Y.
Ciprian, Paul	1	Danaville, N.Y.	Pasey, Russell	4	Ogden, Utah
Clements, D. E.	EST-2	Ft. Worth, Tex.	Ramos, John	4	Lae Vegas, N.M.
Cole, R. A.	AC	Oklahoma City, Okla.	Ronco, Phillip	4	Pocatello, Idaho
Deadrick, E. L.	3	Detroit, Mich.	Ryessa, W. E.	5	Anchorage, Alaska
DeLema, J. G.	OIC	Brazil	Schenck, Charles	4	Bellflower, Calif.
Donahue, J. C.	1	Danvers, Mass.	Schmidt, E. S.	4	Bakersfield, Calif.
Emerich, G. A.	4	Denver, Colo.	Schwertfeger, A. W.	3	Hutchinson, Kansas
Franklin, F. E.	4	Chico, Calif.	Scrivner, L. E.	3	Omaha, Nebr.
Glowka, K. R.	2	Van Ormy, Tex.	Smith, W. R.	2	Washington, D. C.
Husa, Joseph F.	5	Anchorage, Alaska	Stambul-Sheik, L. WO		Washington, D. C.
Johnston, R. M.	1	Morgantown, W. Va.	Walker, L. F., Jr.	AC	Oklahoma City, Okla.
Krudson, R. M.	4	Lake Grove, Ore.	Wright, C. R.	2	Little Rock, Ark.
Magula, J. J.	1	Reading, Pa.			

JANUARY GRADUATES IN DIRECTED STUDY COURSES IN 200 SERIES

DS-201					
Carr, James A.	EST-4	Niles, Calif.	Rosman, Benjamin	4	Oakland, Calif.
Deegan, G. M.	1	Corning, N.Y.	Slate, Curtis J.	4	Arcata, Calif.
Hill, R. E.	1	Jamestown, N.Y.	Willmore, T. J.	EST-4	L. A., Calif.
Hilscher, LeRoy	4	Hayward, Calif.	Woolke, H. E.	4	Glendale, Ariz.
McGloakley, E. F., Jr.	1	Atlantic City, N.Y.	Zittle, W. K.	1	E. Aurora, N.Y.
DS-202					
Cook, Robt. L.	AC	Norman, Okla.	Lee, J. E.	4	Kearns, Utah
DuBois, D. H.	2	Brownsville, Tex.	Myers, C. H.	1	Syracuse, N.Y.
Frazier, H. M.	4	Albuquerque, N.M.	Nhieu, Huynh-Van	OIC	Viet Nam
Halley, G. W.	2	Oklahoma City, Okla.	Waldrep, L. A.	2	San Antonio, Texas
DS-204					
Allison, J. E.	4	Riverside, Calif.	Lake, R. J.	2	W. Palm Beach, Fla.
Cullers, W. E.	4	Half Moon Bay, Calif.	Price, Stanley	EST-5	Anchorage, Alaska
Higbee, K. G.	AC	Oklahoma City, Okla.	Smith, H. H.	4	Eugene, Ore.
Hoops, L. B.	6	Honolulu, T.H.			
DS-208					
Giberson, J. D.	4	Fresno, Calif.	Orton, G. G.	AC	Oklahoma City, Okla.
Guiberg, D. P.	4	Seattle, Wash.	Scarf, A. J.	1	Alexandria, Va.
Lake, R. J.	2	W. Palm Beach, Fla.	Zientarski, B. E.	1	Swanton, Ohio

JANUARY GRADUATES IN DIRECTED STUDY COURSES IN 300 SERIES

DS-301					
Kerschner, W. J.	AC	Norman, Okla.	Pickavet, George	4	Santa Barbara, Calif.
Klein, F. H.	4	Medford, Ore.	Story, C. R.	5	N. Nenana, Alaska
Lau, N. Y. T.	6	Wake Island	Valmalle, Demetrius	1	Hudson Falls, N.Y.
DS-302					
Chas, F. C.	4	Flagstaff, Ariz.	Whitehouse, W. M.	5	Anchorage, Alaska
Newton, N. M.	2	Dallas, Texas	Williams, F. M.	4	Denver, Colo.
Paquette, L. J.	3	N. Platte, Nebr.			
DS-303					
Frazier, H. M.	4	Albuquerque, N.M.	Leabo, D. C.	3	Fargo, N. Dak.
Jones, R. E.	3	Des Moines, Ia.	Yee, Kim Kee	6	Agana, Guam, M.I.
DS-305					
Carson, R. G.	AC	Oklahoma City, Okla.			

JANUARY GRADUATES IN DIRECTED STUDY COURSE 401

Biapo, J. L.	AC	Oklahoma City, Okla.	Schenk, C. W.	4	Bellflower, Calif.
Gopalakrishnan, K. M.	OIC	India	Stein, Myron	1	Brooklyn, N. Y.
Pattabiraman, J.	OIC	India	Welch, W. A.	4	Phoenix, Ariz.

JANUARY GRADUATES IN DIRECTED STUDY COURSE 901

Polsinelli, Vincent	1	Newark, N. J.
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JANUARY GRADUATES IN DIRECTED STUDY COURSE 1

Carson, R. G.	AC	Oklahoma City, Okla.	Robinson, R. B.	2	Ft. Smith, Ark.
Meiligo, A. S.		Spec. Oahu, T. H.			

JANUARY GRADUATES IN DIRECTED STUDY COURSE 2

Dix, F. L.	WB	Saniston, Va.	Kinball, Reginald	1	Millinocket, Me.
Fitzgerald, E. A.	AC	Camarrillo, Calif.	Leubart, A. N.	4	Aptos, Calif.
Gorby, E. W.	AC	Oklahoma City, Okla.	Platts, W. T., Jr.	4	Great Falls, Mont.
Hill, R. J.	3	Freeland, Mich.	Shaffer, B. S.	3	Goshen, Ind.

FLIGHT TEST BRANCH GRADUATES

GO-7-23 Aircraft Characteristics and Performance (General) 2/8/60 thru 2/19/60

Name	Region	Station
Abram, Billie L.	3	Grand Rapids, Michigan
Frost, Donald A.	4	Long Beach, California
Peterson, D. F.	4	Los Angeles, California
South, Carl A.	AC	Oklahoma City, Oklahoma

ACQ-7-32 Aircraft Characteristics and Performance (Carrier) 2/23/60 thru 3/4/60

Name	Region	Station
Alkire, Ted J.	AC	Oklahoma City, Oklahoma
Danowski, F. L.	Wash	Washington, D. C.
Woonan, J. F., Jr.	4	Burbank, California
Shaffer, John H.	Wash	Washington, D. C.
Heier, R. S.	Observers	Washington, D. C.
Williams, M. B.	USCG	Washington, D. C.

AIR CARRIER OPERATIONS BRANCH GRADUATES

ACQ-J1-18 Jet Flight Indoctrination 1/11 thru 2/5/60

Name	Region	Station
Hill, F. T. (Major)	Wash	Washington, D. C.
Ruid, Murtley F.	Wash	San Francisco, California

ACQ-6-34 Type Rating on Four-Engine Transport Category 1/18 thru 1/29/60

Name	Region	Station
Gibson, Paul A.	4	Los Angeles, California
Teixeira, J.	1	La Guardia, New York

ACQ-16-1 Flight Testing of Aircraft Simulators 1/18 thru 1/29/60

Name	Region	Station
Burke, William E.	1	New York, New York
Butler, A. L.	4	Denver, Colorado
Ward, A. S.	Wash	Washington, D. C.
Kawata, Yukiaki	Observer	Tokyo, Japan

ACQ-5-18 Airline Transport Pilot Proficiency Check Procedures 2/8 thru 2/19/60

Name	Region	Station
Alkire, Ted J.	AC	Oklahoma City, Oklahoma
Andree, Paul H.	5	Anchorage, Alaska
McGahay, T. W.	AC	Oklahoma City, Oklahoma
Thetford, Russell	1	Utica, New York
Araos, Roberto	Observers	Santiago, Chile
Kawata, Yukiaki		Tokyo, Japan

ACQ-6-35 Type Rating on Four Engine Transport Category 2/29 thru 3/11/60

Name	Region	Station
Jacobson, C. H.	4	Los Angeles, California
Stephenson, J. A. (Lt. Col.)	Wash	Washington, D. C.

GENERAL OPERATIONS BRANCH GRADUATES

GO-13-10 Executive Aircraft Operation - Instrument and Performance Refresher 1/25 thru 2/5/60

Name	Region	Station
Prendergast, J. H.	4	Denver, Colorado
Pring, Philip	2	Saleigh, N. Carolina
Skinner, C. G.	1	Rochester, New York
West, David H.	Wash	Washington, D. C.

GO-4-5 Airline Transport Pilot Certification 2/15 thru 3/11/60

Name	Region	Station
Barefield, T. B.	2	Shreveport, Louisiana
Cantwell, William J.	2	Atlanta, Georgia
Thompson, B. L.	3	Minneapolis, Minnesota
Turner, Robert J.	2	Atlanta, Georgia

GO-15-7 Instrument Rating Refresher 2/15 thru 3/4/60

Name	Region	Station
Bugbee, J. M.	4	Los Angeles, California
Davis, Kent G.	4	Oakland, California
Hixson, Ralph D.	3	South Bend, Indiana
McCausland, J. A.	Wash	Washington, D. C.

GO-J1-3 Jet Flight Indoctrination 2/23 thru 3/18/60

Name	Region	Station
Ropp, Dale, Jr.	1	Harrisburg, Pennsylvania
Shine, Fred S.	Wash	Washington, D. C.

AIRCRAFT BRANCH GRADUATES

PF-3 (39) Gas Turbine Engine Development 1/25 thru 2/4/60

Name	Region	Station
Benben, E. F.	3	St. Louis, Missouri
Berd, Harry S.	Wash	Miami, IDO
Bistran, Stephen J.	1	Westfield, Massachusetts
Bollinger, Ted A.	4	Palo Alto, California
DeWitt, Ed T.	Wash	San Francisco, California
Kinyoun, Jack H.	4	Santa Monica, California
McBride, Daniel J.	Wash	Washington, D. C.
Seymour, Joseph P.	2	Tulsa, Oklahoma

PE-1 (8) Airborne Power Plant Operation 2/8/60 thru 2/19/60

Name	Region	Station
Bondor, F. M.	3	Kansas City, Missouri
Caviness, A. C.	2	Fort Worth, Texas
Kulewics, H. R.	4	Los Angeles, California
Ness, A. K.	Wash	Washington, D. C.

EE-5 (1) Pulse Techniques 1/25 thru 2/12/60

Name	Region	Station
Bjorkman, Emil A.	3	Minneapolis, Minnesota
Cymmer, T. J.	1	Idlewild, New York
Love, Robert O.	2	Atlanta, Georgia
Odnal, H. D.	2	Ft. Worth, Texas
Pierce, Maxwell C.	4	San Francisco, California
Pratt, Fred W.	1	New York, New York
Rogers, W. E.	SFO IDQ	San Francisco, California
Watt, Everett M.	3	Kansas City, Kansas

EE-3 (11) Basic Jet Transport AC Electrical 2/15 thru 3/4/60

Name	Region	Station
Anderson, Gordon H.	5	Anchorage, Alaska
Beckelman, Ray K.	2	Dallas, Texas
Clark, James C.	2	Atlanta, Georgia
Sharp, Thomas J.	2	Miami, Florida
Yarbrough, John C.	Wash	Miami, Florida IDO
Zellmer, Fred W.	3	Kansas City, Missouri
Heier, Harold S.	Observer	Washington, D. C.

GM-5 (1) Modern Business Aircraft Instrument and Automatic Flight Control Systems 1/25 thru 2/5/60

Name	Region	Station
Boas, Lawrence N.	2	Ft. Worth, Texas
Christopher, James E.	3	Kansas City, Missouri
D'Estout, Henry G.	4	Oakland, California
Decrescens, Jules	1	Teterboro, New York
Fancey, Roger L.	2	Midland, Texas
Ford, William D.	4	Los Angeles, California
Hart, H. A.	Wash	Washington, D. C.
Lyle, Quay	2	Little Rock, Arkansas
Manning, Joseph J.	3	Detroit, Michigan
Tavetian, H.	1	LaGuardia Field, New York
Temte, John N.	AC-262	Aeronautical Center

MF-1 (4) Manufacturing Inspection Aircraft Operation 2/22 thru 3/4/60

Name	Region	Station
Bauer, R. E., Jr.	1	Wood Ridge, New Jersey
Berrier, G. C.	Wash	Washington, D. C.
Dilbeck, L. R.	4	Los Angeles, California
Moser, V. G.	3	Indianapolis, Indiana

Flight Inspection Training Students

FB-60-7
Completing Jan. 22, 1960

ALDRICH, Ralph E.	US Army
BATCHELDER, S.	Battle Creek, Mich.
BESCH, William L.	Los Angeles, Calif.
CARLSON, Richard G.	Bedford, Mass.
DAVIS, James G.	Atlanta, Ga.
DUNCAN, J. D.	Los Angeles, Calif.
HANSEN, E. D.	Minneapolis, Minn.
HELFFION, Harold W.	Agost R.O., New York
MCCORMICK, John F.	R.O., Los Angeles
MOORE, Wilford	Okla. City, Okla.
REINMUND, W. S.	Ft. Worth, Texas
SUTER, Leo J.	Okla. City, Okla.

FB-60-8
Completing Feb. 12, 1960

AGEE, Victor C.	Okla. City, Okla.
BEETON, W. A.	Washington, D.C.
DAUM, Gordon A.	Columbus, Ohio
FARRIS, James W.	Seattle, Wash.
FOX, George S.	Los Angeles, Calif.
GRAHAM, Charles E.	Spokane, Wash.
LEVE, Francis H.	Minneapolis, Minn.
MCCABE, Maurice	Ft. Worth, Texas
MATHEWS, Henry H. H.	Richmond, Va.
PATRICK, John H.	Washington, D.C.
ROSE, Charles C.	Atlanta, Ga.
RYAN, Maurice, Jr.	Kansas City, Kan.
SMITH, Harold L.	Kansas City, Kan.

FB-60-9
Completing March 11, 1960

ALLEN, Edw. M.	Washington, D.C.
BOWEN, J. H.	U.S. Army
BUNEL, L. E.	Okla. City, Okla.
CHAPMAN, C. D.	Ft. Worth, Texas
HOLLINGER, M. W.	Battle Creek, Mich.
JOHNSON, Roy W.	Okla. City, Okla.
KINZLY, L. F.	Columbus, Ohio
MALONEY, Jack A.	Minneapolis, Minn.
MORGAN, James S.	Ft. Worth, Texas
PARSON, W. M.	Denver, Colo.
ROCKER, H. J.	New York, New York
SKINNER, R. W.	Phoenix, Ariz.

This map illustrates the industrial layout of Tulsa, Oklahoma, overlaid on a grid of latitude and longitude coordinates. Key features include:

- Industrial Districts:** North Side Industrial District, Central Business District, Oklahoma Industrial Park Area, and others.
- Major Highways:** I-44, I-75, I-24, and various state routes.
- Geographical Features:** Lake Hefner, Lake Tuliash, and the proposed Elm Creek Terminal Reservoir.
- Landmarks:** Tulsa Airport, Will Rogers Airport, and various educational and research facilities.
- Scale and Orientation:** A scale bar indicating approximately 10 miles and a north arrow pointing towards the top of the map.

PREPARED BY THE INDUSTRIAL DIVISION — OKLAHOMA CITY CHAMBER OF COMMERCE

