

FAA SOUTHWEST REGION

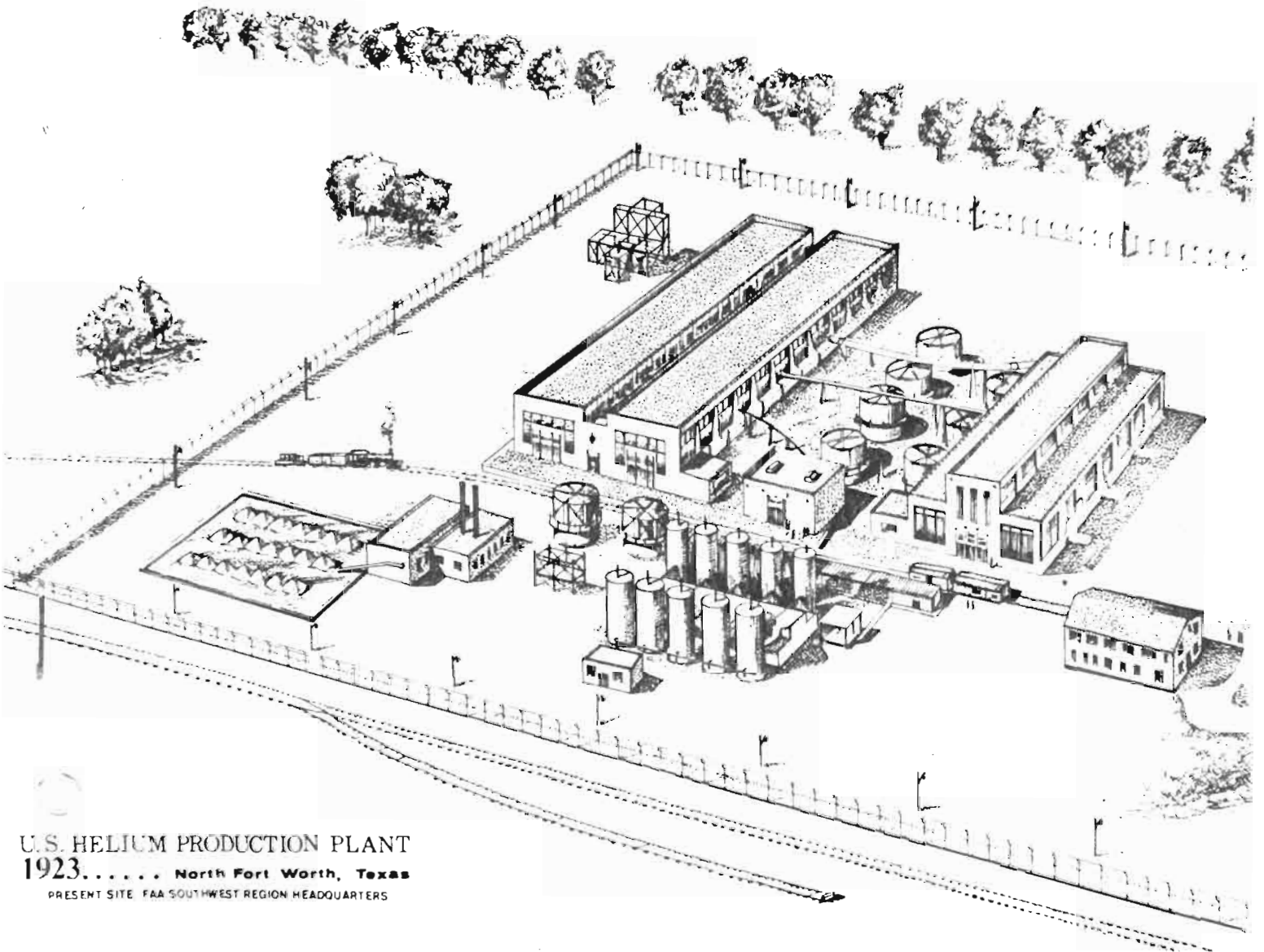


RECOLLECTIONS AND REFLECTIONS



A Bicentennial History Project

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U.S. HELIUM PRODUCTION PLANT
1923 North Fort Worth, Texas
PRESENT SITE FAA SOUTHWEST REGION HEADQUARTERS

INTRODUCTION

A history of the Southwest Region office or "reservation" and the early Airways Division has long been needed and desired. In this Bicentennial Year, it is appropriate that such a project be undertaken. However, this is not a complete history; it is only a start. It is hoped that others will take up future research projects to add to this endeavor.

The Southwest Region Office has a unique history in aviation. First, it was the site for the initial experiments to separate helium from natural gas, leading to its production here for a period of eight years. Secondly, it has served as the regional administrative center for aviation agencies since 1929, beginning with the Lighthouse Service and continuing to the present. Even the mailing address of P.O. Box 1689, Fort Worth, Texas, is moving into its place in history. It has been the regional office address for 40 years, having been assigned to the Bureau of Air Commerce office here in 1936.

There is much to be told about these men and women and their accomplishments following the passage of the Air Commerce Act of 1926. Omitted from this presentation are many interesting undertakings. The transactions with the Indians in New Mexico, especially those involving the Zuni Mountain or Blackrock beacon location, would be a story in itself. It was truly a pioneering spirit on the part of the mechanics (predecessors to today's electronic technicians) to climb mountains with the aid of rope hand rails and rope ladders to serve this equipment. Also, the story of the early general aviation inspector is missing, as are details of airport construction which was accelerated by World War II and grants-in-aid programs. Another interesting story would be the building of the airways in the Caribbean. Time limits and the inability to locate persons involved in this work necessitated the omission.

Much of the research is from interviews. The ranks of these airways pioneers and early aviators are thinning and their memories are fading. Official records, if they exist, were not located at this time, and persons interviewed had little documentation of their employment activities. Attempts were made to glean the factual from faded memories.

This document, then, attempts to make the present FAA employee aware of an earlier generation that has given this organization a history and a heritage. May we continue to build on the dedication and hard work of these pioneers who made it possible for them and for those who followed to plan, construct and operate the world's best and safest air navigation and air traffic control systems. The growth, prosperity and popularity of aviation today are the direct results of the services performed by these men and women of dedication and vision.

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IT'S COMMONLY CALLED THE "RO"

The cluster of white stucco and cement block buildings appear much the same today as they did when constructed 58 years ago. Only a few exterior modifications, the construction of additional buildings and the conversion of shops to office spaces have taken place at the old North Fort Worth Helium Plant during its gradual transition from the nation's -- and the world's -- first helium producing plant to the Southwest Region headquarters of the Federal Aviation Administration.

Today, in the buildings where the first large scale experiments to separate helium from natural gas took place, and later, where the first production plant was established, professionals in various specialties of civil aviation administer to aviation affairs in a five-state region. Nearly 700 FAA employees direct these activities from today's regional office street address of 4400 Blue Mound Road, more commonly referred to by employees as the "reservation" or the "RO."

The Navy came in 1918 for the experiments and subsequent production of helium and remained for a decade. In 1929, the Airways Division, formed within the Lighthouse Service of the Department of Commerce by the Air Commerce Act of 1926, started to occupy the 22.6 acre reservation, eventually bringing the use of the site from the lighter-than-air craft age to the jet age.

The British in World War I provided the spur which caused the U.S. War and Navy Departments, in conjunction with the Bureau of Mines, to set up two experimental separation plants at Fort Worth. After a survey of gas fields by the Bureau of Mines, it was decided to exploit the Petrolia natural gas fields near Wichita Falls for helium. The gas had a high content of helium and was being sent by pipeline to a collection station in Fort Worth by the lessee, Lone Star Gas Co. The two experimental plants located adjacent to the collection station took the gas from Lone Star's lines, extracted the helium, and returned the natural gas for consumers use.

The two experimental plants were established in buildings which now house part of the Regional Office, using the gas from the next-door, still-in-use Lone Star Gas Co. plant. Linde Air Products and the Air Reduction Company, officially designated as Experimental Helium Plants No. 1 and No. 2, were operating in the spring of 1918. For security reasons, the two helium plants were surrounded with an eight-foot high fence of knot-free lumber. A military guard, assigned from nearby Camp Bowie, gave the area the appearance of an armed camp.¹

After the experiments, the military decided to construct the helium production plant utilizing the process developed by the Linde Air Products Co., and funds were allotted by the War and Navy Departments for the

purpose. The Navy constructed the plant and had cognizance of its operation under its Bureau of Engineering. The Fort Worth location was chosen for economic reasons, Fort Worth had good railroads, good highways, an adequate labor supply and abundant water. A contract was entered into with the Long Star Gas to supply the gas for helium production, with all discarded gas to be returned to the Lone Star lines for delivery to consumers. The first helium produced by the two experimental plants was destined for war use, and this small amount made it as far as New Orleans docks for shipment overseas before the war ended. Linde Air Products Co.'s process was chosen for use and the company began its Fort Worth production plant in March 1921. Linde Air operated the plant as a supervising engineering organization under the general supervisions of the Navy Department until 1925. On July 1 of that year jurisdiction, as legislated by Congress (H.R. 5722), was transferred from the Navy Department to the Bureau of Mines, Department of Commerce. Production continued in Fort Worth until 1929.

WAR ACTIVITIES OF BUREAU OF YARDS AND DOCKS²

SITE

The helium production plant is located at North Fort Worth, in Tarrant County, Tex., about 1 mile north of the city limits of Fort Worth and about 3 miles north of the Tarrant County courthouse in Fort Worth. The site comprises 19.4 acres of fairly level land and is entirely cleared. The purchase price of the land was \$409 per acre. A draw, draining about 270 acres, crosses the western portion of the site in a south by southeasterly direction. The various buildings comprising the plant were located on the higher ground toward the east side of the site to avoid this draw. The site consisted of grazing land entirely turfed. The top soil is a loam to a depth of 1 to 6 feet, underlain by a bedrock of hard and unfaulted limestone.

BUILDINGS

The locations of the buildings with reference to each other were governed by the cycles of gases through the process, so as to require minimum lengths of piping, especially high-pressure piping, between buildings. Inasmuch as the War Industries Board requested that all buildings be constructed of materials other than structural steel, the principal buildings were designed of a light concrete construction. A large sash area was required for lighting the large buildings and allowing the escape of leakage gases, and this type of construction was very well

adapted to such features. Several buildings were advantageously designed of frame and stucco. The only structural steel included in the design of the plant was for transformer towers and small miscellaneous items.

Compression building. All of the compressors and carbon dioxide refrigerating units are installed in the compression building. This is a one-story building 97 feet wide, 290 feet long, and 32 feet high. A door is provided in each of the longitudinal bays in each side of the building to facilitate egress in case of combustion of escaping gases. A 20-foot concrete platform is provided at the end of the building adjacent to the railroad siding for the handling of cylinders and equipment. The building is provided with a concrete floor throughout, except in several panels adjacent to the loading platform, which are laid with wood block, so as to be nonsparking under trucking of cylinders.

Separation building. The Linde separation apparatus is installed in the separation building, which is one story in height with a clear-story central portion to admit the high three-stage stills. This building is 68 feet wide and 199 feet long, with a height from grade to the top of the parapet walls of 42 feet and 27 feet, respectively, for the central and outer portions.

Boiler and pump house. The boiler and pump house, adjacent to the cooling pond, is one story in height, 49 feet long, 45 feet wide, and 18 feet and 15 feet high, respectively, from grade to the tops of the parapets of the pump house and boiler room, with concrete walls, floor, and roof, steel sash, and metal bifolding and hinged doors.

Pressure-reducer house. The pressure-reducing valves are installed in a concrete building with steel sash, 17 feet wide, 27 feet long, and 14 feet 6 inches high to top of parapet wall.

Nitrogen cylinder house. The nitrogen cylinders to provide an equalizing supply to the nitrogen compressors are housed in a one-story concrete building 14 feet by 11 feet 6 inches by 18 feet high.

Office and laboratory building. The office and laboratory building is occupied jointly by the Government and Linde personnel. The building is a two-story frame stucco building with concrete foundations and steps, 40 feet wide, 62 feet long, and 26 feet high from grade to the second-story ceiling. This building provides two office rooms, one toilet, and a laboratory on the first floor, and eight office rooms and one toilet on the second floor.

As it was, William (Heavy) Murdock came to work for the Navy Department in 1923 at the old "helium plant" and stayed during the years

to retire from the FAA in 1968. "I started as a laborer and did machine shop work and truck driving as well," he said of his early employment. "The reservation was under heavy guard and was busy. There were a few Navy people stationed here to care for dirigible mooring masts which were located a few hundred yards north of the present main gate on Blue Mound Road."³

Murdock recalls the mooring of two of the Navy's giant lighter-than-air craft, the Shenadoah and the Los Angeles. "I remember the Los Angeles coming in to dock to take on helium," he said, "We nearly pulled it in two." The art of docking the giant ship, according to Murdock, was to latch on the nose with a cable and wrench it in as ropes were dropped from the ship to anchor to "deadmen" in a parameter. "We pulled in two directions," Murdock recalled, "and the big thing groaned and stretched, but we recognized what we were doing and let off before causing any damage."

Records show only the Los Angeles and Shenadoah of the big air ships docked here, but smaller ships make stops. There were two masts, a 184-foot-high one for the larger craft and a much shorter one for the smaller ships. Normally resupply of helium was accomplished at Lakehurst, N. J., and Sunnyvale, Calif., the east and west coast lighter-than-air craft stations.

The separation equipment for the extraction of helium was in what is now Bldg. 2, and the compression, or bottling equipment, was in Bldg. 3. As the natural gas entered Building 2, it was subjected to freezing temperatures of 350°F or lower which froze the natural gas and other ingredients, permitting helium to be extracted. After bottling, helium was transported by railroad, being loaded on freight cars at the docks. The railroad tracks were covered over in the early 1960's, but the loading docks are still used today.

"Seven of us remained when the helium plant closed," Murdock said. "Commander George Carter Miller of the Navy came in with the Lighthouse Service as the Airway Engineer⁴ and asked me to stay." Murdock went to work as an office boy, which included several different jobs. The most important was that of driver of the Model T truck which was the official means of transportation.

In late 1929 and during 1930, personnel were being assigned to the Airways Division office being established here. Among these was Cy Martin, who retired in 1969. "On January 1 (1931) I came to Fort Worth," Martin said of his reporting for duty. "Heavy Murdock met me at the Old Red Stone Post Office located on the spot where the Fort Worth City Hall and other offices now stand. Heavy drove the beatup Ford to pick up mail and often employees who were reporting at the Regional Office. When I arrived the whole force numbered nine, including myself, and four or five time-sheet employees."⁴

An airways mechanic, Martin further described the reservation. "The maintenance shop was located in a corrugated building north of the tracks from the office (Bldg. 1). The residence of the Airways Engineer (Miller), the chief clerk and servants quarters were in the fenced area with the shop and garage (north of present railroad tracks).⁵ The large concrete buildings in the office compound (2 and 3) were used as storage for airways material and equipment that required protection from the weather."

Martin said material was shipped by train to the reservation and unloaded. The Fort Worth headquarters not only administered to activities in Texas, Oklahoma, New Mexico, Arizona, Louisiana and Kansas, but served as the regional depot for the entire United States. Ironically, often material would be shipped from eastern markets, unloaded and indexed, inventoried and in a few days or weeks reloaded and shipped back to the state from which it came.

The Airways Branch wasn't a rich organization during the mid-1930s. What technicians called "junk" was used almost exclusively to keep the radio beacons and lights operational. As the need for material and supplies grew, the old helium plant, due to its abundant space, railroad location and highway access, grew as a supply depot.

CENTRAL DEPOT

When Roy Taylor came to the Regional Office in 1938 as a radio mechanic (he was later to head the FAA Depot in Oklahoma City) the move to make Fort Worth the center of this activity was long underway. W. G. Edwards, supervisor, and Frank A. Howe, a mechanic, were operating the Airways Division warehouse in Oakland, California, and decided to move it to Fort Worth because it would offer a central location. This was in the early 1930s. At about the same time "Si" Richie brought the Chicago Radio Lab, a function of the old Lighthouse Service to Fort Worth. The Lab worked on time switches and small items used for the airways equipment.⁷

Most transmitting equipment at this time was factory-made (GE, Westinghouse, etc.) but it did not have crystal control, according to Taylor. As all the old equipment was in this category, it was decided to initiate a modification program to overhaul and modify this equipment, bringing it up to date.

By this time, the activities of the Depot had grown to include machine shops for the repair of generators, generator engines, beacon lights and torque clocks (time clocks used on airways equipment.) In the late 1930s, with the war beginning in Europe, the Central Depot began to build transmitters for overseas. Remote control equipment to switch on transmitters were manufactured. Equipment was part factory built, part CAA built, but

totally Central Depot assembled. Central Depot had become one big warehouse for the CAA. For the growing war effort, it was a source of transmitters for the airways in the Caribbean, Alaska, many points in the Pacific, and the North Atlantic route to Shannon, Ireland, and on to England.

The CAA's Central Depot, located in Fort Worth, Texas, filled emergency requisitions entailing the engineering and actual fabrication of many special pieces of equipment, even to the extent of a complete system of low-frequency transmitters required for the Alaska program, with efficiency and dispatch. The crystal grinding laboratory, located in the Central Depot, supplied carefully matched low-frequency crystals to equip the foreign range stations all over the world...."CAA Worldwide Activities in Communications" by C. C. Richelieu, Chief, Foreign Unit, Signals Division, CAA, Communications magazine, Vol. 24, No. 10, October 1944, p. 34.

Tom Atherton reported for duty at the Central Depot in late 1945 when the bulk of the activities occupied Buildings 3, 5, and the "bowling alley."⁸ Administrative offices were in Building 5, with the downstairs space used for a drafting room. Small electrical items and electronic parts were stored in the west side part of Building 3; the north end was for shipping and receiving with a small area there used for a crystal lab. An engine generator repair shop was in the south end of the building, with a carpenter shop near the center. The remainder of the building was used for storage of large racks, transmitters, transformers, sheet metal and other large items, and an overhead crane was available for use operating on metal tracks extending through the building from the north to south ends. The "bowling alley" housed electronic, machine, sheet metal and welding shops. Restroom facilities numbered but one, located in the northwest corner of the building.

Except for three small buildings, the area to the east of Building 3 was open. One of these buildings was a concrete structure about 10 feet by 10 feet which was used to store the "fire truck." This piece of equipment was a metal wheeled vehicle which was pulled to the fire location by hand. Another was a sheet metal building used for the paint shop and a frame building about 20 feet by 50 feet, commonly called the "goat shed" which was used to store prefabricated buildings. The goat shed was later the nucleus for the large building No. 4 now used for offices of the Airway

Facilities and Logistics Divisions. The remaining area was used as outside storage for beacons, course lights, boundary cones, steel towers, cable, etc.

About 1946-47, the bowling alley was extended to the east -- this extension is now 3B -- for the relocation of the crystal lab, storeroom, shipping room, carpentry shop, and engine overhaul. Building 6 was made a permanent two-story structure with paint shop, transformer repair shop, and test lab downstairs and prefabrication of cable harnesses and small electrical instruments on the second floor. The "pit" to the north of Building 3 was used for large cable storage.

The Central Depot was moved to Oklahoma City in the late 40s to become the Project Materiel Division. What was left at the Regional Office became the Airways Facility Shop. The bulk of this office moved to Oklahoma City in 1956 and the spaces gradually were transformed to various other uses. Today this one building (Bldg. 3, 3B and Bowling Alley) houses administrative offices of the Regional Counsel, Aviation Medical Division, Regional Library, portions of Personnel Management Division, Audit Division, Civil Rights Staff, Management Systems Division, Military Liaison Offices, Print Shop, Mail and Distribution, Air Transportation Security Division and Flight Standards Division. A small shop to support F&E activities is located in the south end of the building. From 1948 to 1962 a large part of the upper levels of the building housed the Fort Worth Center.

Elbert Adams came to work with the FAA as a junior clerk-stenographer in 1937. Now retired, he remembers that the reservation was chosen for the Central Depot because of the availability of space at the old helium plant facilities at no cost to the government.⁹ The Central Depot was directly under the Washington Office Air Navigation Facilities Service (and predecessor organizations). As time passed and more and more supplies and equipment were received from regions, the Depot's functions expanded. It grew from storage for other regions and as the need for overhaul, modification and repair became a necessity, various shops were established to perform this service. These shops included Crystal Grinding Laboratory, Machine Shop, Sheet Metal Shop, Electronic Shop, Cabinet Shop, and Paint Shop.

A drink of water. When Adams entered on duty his office was located in Building 3 approximately where the mail room is now. Most of the building was used as a warehouse. Drinking water for employees in this four-man office was obtained from a large, metal, ice-filled can nearby. They used a dipper.

Recreation. There was no Building 4. That entire area was a grassy field where employees played softball and touch football during the lunch hour and sometimes after work. They also pitched horseshoes and

washers. There were no break periods, but one could get a Coke at the machine and drink it at his desk. Radios furnished music, news flashes, and world series games; also important speeches by President Roosevelt and Winston Churchill, among others.

Oath of office. New employees were taken to the regional office where the oath of office was given with the appointee standing and repeating the oath with his right hand raised, much the same as in the armed forces. Working for the government was truly a coveted honor and privilege then. There was more pride shown then than now.

All in one room. Personnel functions for the entire region were conducted in one room (Building 1), northwest corner, first floor, near where the switchboard is now located. When Adams started to work, there was one employee in that room. He typed and processed all the personnel actions and forms and operated a teletype machine. At that time, personnel action authority had not been delegated by Washington to the regions.

The whistle. The Central Depot used a whistle for beginning and quitting work. It was loud and shrill.

Salary checks. The employees used to get their salary checks from the Washington office by mail. Adams often went to the Post Office on Saturday mornings (the day the checks usually arrived) and distributed them to employees who met him there. After a new employee entered on duty, he could expect to wait six weeks or longer before he received his first check. Adams first check amounted to \$46.79 each half month.

Transportation. Back during the leaner days, one employee rode a horse to work and tethered it to a tree near the lake. Several employees met the mail truck at the Main Post Office and rode to and from work in it. Many of the employees lived in the Riverside-Oakhurst area of Fort Worth, a distance of about six miles from the reservation.

The lake*. The reservation lake underwent many changes during the years. For a time it was subject to heavy flooding. Silt would empty into it from drainage areas north and west of the reservation and cause the flood waters to overflow. Once it held bass, catfish and sunfish and employees frequently fished in it. Then there were turtles that would sometimes catch the baby ducks.

*The lake was built early in the life of the reservation as a source of water to cool the generating equipment in Building 2. When generators were no longer needed for power, the lake remained. First, it was a ready reservoir of water for fire-fighting when the reservation was outside the city limits; in more recent years became a part of the landscaping. Its tree-lined banks add much to the beauty of the well-cared for grounds and buildings.

Painted tools. So far as Adams knows, the Airways Facilities Shop hired the first woman electronic technician. She worked in the electronic shop and naturally became the victim of a lot of kidding and pranks. Once some of her male co-workers painted all her work tools pink. Back then there wasn't a grievance counselor, even if she wanted one. She took all the teasing good naturedly and made a good employee.

Recruitment problems. During World War II it was often hard to find and keep an employee. Some disliked the remoteness of the location, while others found higher paying jobs. An employee would come to work in the morning and resign at the end of the day.

Out of the city. One reason those who stayed enjoyed working on the reservation was its location away from the city. Animals and birds of various species frequented the premises. There were rabbits, snakes, coons, possums, rats, and mice. Hawks used to be in abundance. A skunk would occasionally get into an office. Changing seasons like the return of the blackbirds, high-flying geese and even blue "northers" in the distance could be detected.

George Rand,¹⁰ who later moved into the position of Superintendent, Airways Operations Branch, after a long apprenticeship in the field, said "Lean years spawned all kinds of economy measures." A few examples cited: oiling wornout teletype ribbons and rewinding them on the spools, typing business letters on both sides of the paper. "There was no such thing as overtime pay, night differential, or unions," he continued. "Most of us were grateful for a job and showed it by working as many hours as necessary to get the job done. Airways keepers at weather stations with a staff of two men maintained a 24-hour service seven days a week and then kept the field and beacon in their spare time. Per diem was \$4.00 and you could rent a room at the Settles Hotel in Big Spring for \$1.50."

Procurement was handled locally, all major items were purchased from the lowest bidder after circulating detailed proposals. GSA had not yet entered the picture. Automobiles for traveling personnel were about as primitive as they could be, but most did have heaters. Several cars in the fleet were equipped with 20 gallons auxiliary tanks due to the isolation of many facilities and scarcity of "contract" filling stations in the region.

And Martin had his share of work experiences. He said that when he returned from the field to the regional office his duties were so numerous that it was hard to visualize them all. There was the maintenance of the Stearman biplane and any other government owned plane that might land, maintenance of the offices, reservation plumbing, sewage problems to correct, navigation equipment, unloading freight cars and truck maintenance. This was done without any help available and "at times the whole available force was called out."

GROWTH

As the duties of the region changed, so did the regional offices. In the early 1940's, Building 1 got the first of two additions. This first addition extended the building to the east by 75 feet, almost doubling its size. The next addition of 36 feet was completed in the late 1940's and included most of the space now occupied by the regional directors office and the Management Information Center on the top floor and several Manpower offices on the lower floor. At this time the adjacent Building 2 was joined to Building 1 addition by its second-story passageway.

George VanNatta, now Chief of the Procurement Branch, Logistics Division, began his CAA/FAA career more than 35 years ago at the Reservation. Much of his early work was in the supply field and the old Central Depot. He tells of a comment he made about 1948-49 when office spaces were beginning to crowd into the shop areas, and this included Building 2 where he worked. During a lunch break he remarked to his friends about the invading offices as he surveyed the emptiness of the upper areas of the building: "I suppose that one of these days there will be offices way up there where those birds are nesting." Progress rather than prophecy: VanNatta's comment, made in jest, soon became a reality. Today, offices of the Accounting Division occupy all of the third floor of the former separation building and share parts of the second story with Airports, Budget and Air Traffic Divisions. The bulk of Air Traffic and all of ADP Branch occupy the ground floor.

Also of importance was the construction of Building 4 and the cafeteria. The 20 by 50 foot building used for prefabricated building storage formed the nucleus for Building 4. Regulations at that time stated that additions could be built but that no new buildings could be started. So Building 4 became a "do-it-yourself" addition of concrete blocks, plumbed and wired by FAA employees. The original 1000-square-foot "sheep shed" became a needed and functional office building within these regulations -- part of it on a concrete slab, but with a greater portion of it on an asphalt floor hidden by tile veneer. It was completed in 1953 as a warehouse and later converted totally to office spaces.

The cafeteria came into existence in 1960 in a similar manner. A concrete wall of the then existing "goat shed," used for a paint shop, records storage area and surplus property awaiting disposal was salvaged during demolition. This wall is now the main wall at the cafeteria entrance -- the only original part of the "renovated" building.

The reference of "goat shed" and "sheep shed" was given to these two buildings due to their habitation by these two breeds of animals during rainy and otherwise inclement weather. A few goats and sheep roamed the reservation, possibly for two reasons: they were the property of Regional Manager and Mrs. L. C. Elliott and they served to keep vegetation on the grounds in close trim.

REGIONAL LEADERS

Although there were several directors officed at the "Old Helium Plant" during the 1930's, their names failed to become legend as did that of L. C. Elliott who was the first CAA regional director. Many of his predecessors in the pre-CAA organizations were of short tenure and also the fragmentation of activities at the regional office site failed to single out personalities. Elliott was named regional manager with headquarters in Fort Worth in 1938 when the newly-organized CAA came into being and set up uniform regions of the various CAA activities.

Elliott was a native Texan, born in Greenville, and a 1924 graduate of Texas A&M. From 1923 to 1928 he was in the Army Air Corps stationed at Brooks Field, first in Primary Flying from which he graduated with a Junior Airplane Rating and then in Advanced Flying. He became an airways extension superintendent for the Bureau of Light-houses' Airways Division in 1928 and served in Washington until 1933. This position required surveying both by air and on the ground to locate appropriate sites for the erection of beacons and the construction of intermediate fields 30 to 50 miles apart. His status changed in 1933 to Senior Airplane Pilot which required him to flight check all aids to air navigation, both day and night, throughout the United States. For the three years prior to assuming the regional manager's job, he was stationed in Fort Worth, managing the over-all program and maintaining aids to air navigation in the Fourth Air Navigation District. After his appointment in 1938, he remained as regional manager until the field reorganization of 1960 sent him to Region 1, New York, as regional manager.

Archie W. League was named in April 1960 to replace Elliott as Region 2 manager in Fort Worth. A native of Poplar Bluff, Mo., League studied aeronautical engineering in St. Louis and in the late 1920's became the nation's first airport traffic controller. By then he had learned to fly, operated his own flying circus, barnstormed Missouri and Illinois, and became one of the nation's first licensed airplane and engine mechanics (License No. 356).

League served 10 years as a petty officer in the Naval Reserve Aviation, then shifted to the Army Air Corps as a second lieutenant. He served during World War II in the Pacific, leaving the Army as a colonel. He returned to the CAA as Chief of the Regional Operations Inspection Staff in Kansas City. This was followed as Chief of Planning and Evaluation Division, Deputy Regional Administrator, Chief of the Airports Division and then as Assistant Regional Administrator.

Transferred from Kansas City to Washington when the CAA became FAA, League assumed duties as Chief of the Agency's Analysis Division in the Office of the Assistant Administrator for Plans and Requirements. In October 1959, he became the Assistant Director of the newly-formed Bureau of National Capital Airports, remaining in this position until his transfer to Fort Worth in early 1960. He stayed in Fort Worth until mid-1965 when he returned to Washington for several more years of duty before retirement.

League, a jet pilot graduate of the Air Force Senior Officers Jet Instrument Course, was qualified in more than 50 different types of aircraft.

Henry L. Newman became Southwest Region Director on June 1, 1965, and still heads the region. A veteran of 30 years of service with the FAA and its predecessor CAA, Newman held a succession of key management posts in both agencies. After joining the CAA in 1946, Newman worked briefly in Washington and subsequently served in Alaska, New York and Kansas before coming to Fort Worth. He had previously served six years in the Interior Department, working in Indian Affairs in New Mexico, and four years in the Army Air Corps. Part of his four years of military service was spent in England as a control tower operator with the Fourth Fighter Group of the Eighth Air Force.

A native of Akron, N. Y., Newman holds a BS degree from Middlebury College in Vermont and an MBA degree from the Harvard Graduate School of Business Administration. An active pilot with a commercial rating, he learned to fly and obtained his private pilot's license in San Antonio, Texas, in 1943. He is the recipient of several citations for outstanding federal service, particularly for his work in program coordination and inter-governmental relations. He was a recipient of one of the top ten "Civil Servants of the Year" awards in 1970.

Newman's tenure as Southwest Region's director covered a period of growth and expansion of facilities, including the construction and expansion of the large center complexes, the automation of air traffic facilities, and greatly accelerated airport building under provision of an expanded airports aid program.

YESTERDAY, TODAY, TOMORROW

Today the FAA and the Southwest Region are keeping pace with the jet age aviation's needs with providing sophisticated equipment to monitor and separate air traffic. From the simple beginning in Fort Worth in 1929, the agency has grown beyond the comprehension of these early technicians who climbed mountains and crossed plains to keep the airways beacons and lights burning...burning for an infant industry readying itself to herald the growth of aviation and to set the world's highest standards for aviation safety. Undreamed of by these airways pioneers is the modern air traffic control system. The Fort Worth Air Route Traffic Control Center (established in 1938) uses a system of computerization and automation for many of its functions. With radar information microwaved to the center from parts of four states and through the use of elaborate air/ground communications network, air traffic controllers provide separation for en route aircraft over north and west Texas, the northern portion of Louisiana, Oklahoma, and a major part of Arkansas. An automated radar terminal system at the Dallas-Fort Worth Airport Tower/Terminal Radar Approach Control facility provides a digital readout of each aircraft's identity, speed and altitude on the face of the controller's radar scope. These alphanumeric readouts are used to control traffic arriving in and departing the Dallas-Fort Worth metroplex (40 miles radius). Also new is the prototype coaxial cable communications system, planned and built for the Dallas-Fort Worth facility, which is used for internal and area air/ground communications.

None of these were among the wildest plans of the early technicians who faithfully established the first airways. Nor was a 17,000- acre airport, Dallas-Fort Worth -- a part of the future as visualized by these men. Other growth is reflected by the number of offices, employing approximately 1,600 persons, established in the Fort Worth area. In addition to the Regional Office staff, the Air Route Traffic Control Center and the Dallas-Fort Worth Tower, there are these facilities: Tower, Flight Service Station, General Aviation District Office, Engineering and Manufacturing District Office, Field Maintenance Part Systems and Equipment Field Project Group and the Maintenance Engineering Field Office, all at Meacham Field, and the Airports District Office, at the nearby regional office. An Air Carrier District Office and the Air Transportation Security Office are in suburban Euless, while Airway Facilities Sector Offices are at Meacham Field, Dallas-Fort Worth Airport and the Air Route Traffic Control Center.

THE REGIONAL OFFICE

In 1929 it was an abandoned helium plant in "North Fort Worth." Today, it is the hub of aviation activities in a five state area administered by more than 6,400 employees, skilled in every facet of today's expanding aviation industry and operations. That is the progress of aviation activities begun in Fort Worth nearly a quarter of a Bicentennial ago.

What are the functions of the Southwest Region headquarters today. From the Fort Worth office, the Southwest Region administers FAA activities in the five states of Arkansas, Louisiana, New Mexico, Oklahoma, and Texas and is responsible for FAA liaison in civil aviation matters with the Republic of Mexico. There are approximately 6,400 employees in all facets of work.

The Southwest Region is unique in several ways due to geography and climate which favor the use of aviation. Military aviation came to the region shortly after the U. S. Army brought its first aircraft and many Army pilots, training for World War I combat, got their wings at Texas military training fields. World War II training bases blanketed the Southwest and during training for the Vietnam fighting, 70 per cent of the undergraduate flight training was conducted here. Civilian pilot training is concentrated in several locations in the southwest, with Fort Worth being a large center of flight training for foreign students, especially those from the Mid-East. Tulsa boasts of one of the largest general aviation mechanics schools in the country as well as being the home of two of the largest air mail and air taxi operators.

The Gulf of Mexico, with its offshore oil fields, has seen the versatile helicopter put to use in the profitable exploration and production of oil. In 1976 there are more than 250 helicopters operating along the Gulf, mostly from southern Louisiana bases, in oil exploration and production. Petroleum Helicopters, Inc., which pioneered in this field has grown into the world's largest civil helicopter operator, using no less than 200 of its large copter fleet along the Louisiana coast. Working with Petroleum, the Southwest Region established experimental IFR routes up to 200 miles offshore and certified the use of VOR/VLF navigation as a primary navigational system in the Gulf. This system is now being used in other offshore operations, principally off the New England coast and in the North Sea. Using statistics of the past few years, it is estimated that one-third of all helicopter flying, measured in flight hours, is accomplished in and along the Louisiana Gulf coast.

Agricultural flying is still another of the Southwest Region's uses of the airplane. From planting rice in the Mississippi River areas to tending cattle on the arid plains, with spraying crops on the Texas high plains, the aircraft has become a necessary tool of the farmer/rancher.

The Southwest Region is the home of the nation's newest and largest airport, as well as the most imaginative and innovative. Dallas-Fort Worth Airport, designed for use well into the 21st Century, began operations in early 1974. And beyond traditional flight, this region is the home of the Johnson Space Center. Located in Houston, this facility was the nerve and control center for the successful satellite and moon shots.

FOOTNOTED REFERENCES

1. Activities of the Bureau of Yards and Docks, Navy Department, World War 1917-1918, Government Printing Office, Washington, 1921, United States Helium Production Plant, Fort Worth, Texas, Chapter XIX, p. 437.
2. Ibid, pp. 443-445.
3. Interview with William Murdock, retired FAA employee, FAA Reservation, Fort Worth, Texas, February 1976.
4. Airway Engineer was the title of the chief or senior officer in the Airways Division organization.
5. Interview with Cy Martin, retired FAA employee, FAA Reservation, Fort Worth, Texas, February 1976.
6. See photos of FAA Reservation for better understanding of housing.
7. Interview with Roy Taylor, retired FAA employee, at his home, Fort Worth, Texas, March 1976.
8. Interview with Tom Atherton, FAA employee, FAA Reservation, April 1976, Fort Worth, Texas
9. Written statement by Elbert Adams, retired FAA employee, Fort Worth, Texas, December 1975.
10. Written comments by George Rand, retired FAA employee, Fort Worth, Texas, February 1976.

UNITED STATES
DEPARTMENT OF COMMERCE
Bureau of Mines

WASHINGTON

Office of the Director

July 8, 1929

MEMORANDUM FROM: O. P. Hood, Acting Director
Bureau of Mines.

TO: M. Kerlin, Administrative Asst.
to the Secretary.

SUBJECT: Ft. Worth Helium Plant.

This memorandum is prepared to inform the Department concerning the Ft. Worth Helium Plant and to request the Department's instructions and suggestions as to its disposal.

The plant site lies about 7 miles north of the center of the city of Ft. Worth, Texas, and is near the municipal airport. A supply of natural gas is available for heating and other purposes.

A map of the plant site, on which the two tracts owned by the Government are indicated by red borders, is inclosed. The plant site proper comprises about 20 acres lying south of the Ft. Worth and Denver City R. R. industrial spur. The principal buildings on this tract are:

Building 1: This is a 40 foot by 60 foot, two story, office building constructed in 1920 at a cost of about \$15,000. C. E. Earle, of the Navy Department now has an office in this building and the Bureau of Mines is occupying a part of the space. Some space will be needed by the Bureau until the plant and equipment are disposed of. Otherwise, the building has been vacated.

Building 9: This is an excellent reinforced concrete building about 195 feet long by 75 feet wide, built in 1920 at a cost of about \$90,000. It contained the Linde separation equipment, which is now being removed.

Building 6: This is an excellent building about 290 feet long by 100 feet wide of the same type as building 9. It still contains several large compressors and other heavy machinery, disposal of which will require some time.

Building 10: This is a shed that covers nearly two acres of ground built for storing cylinders. It was constructed in 1920 at a cost of \$83,000. The greater number of the cylinders (owned by the Army and Navy) which this building contained are being removed. However, it will be some time before the building can be entirely cleared.

Building 25: This is a power house of light steel framing sheeted with corrugated iron. The building itself is not of much value. It still contains five, 500 h.p. gas engine-generator units, disposal of which will require some time.

Buildings 9 and 10 are well suited for many kinds of manufacturing purposes and building 10 could be used for many kinds of bulk storage.

The tract north of the Ft. W. & D.C.R.R. industrial spur comprises about 3 acres. The value of the buildings on this tract is small compared with the value of buildings 9, 6 and 10. The principal buildings on this tract are:

Cottages A, B, C & D. Cottage A is now occupied by E. P. Hayes of the Bureau of Mines and will probably be needed by the Bureau until the plant and equipment are disposed of. Cottage B is now occupied by C. E. Earle of the Navy Department. The others are vacant.

Building 19: This is a steel framed, corrugated iron building in good condition which we have used as a machine shop.

Building 16: This is a similar building which we have used as a garage.

Building 17: This is a steel framed, corrugated iron, building in poor condition. Arrangements have already been made to sell it under bids, the buyer to remove it from the site.

The Bureau's desire is to be relieved of the care of the plant and responsibility for it as soon as possible. However, in disposing of the plant and equipment we want the Government to get all possible return or use out of it.

-3-

There is still some plant equipment at Ft. Worth which will be moved to Amarillo. It would seem advisable to offer the equipment that is not to be moved to Amarillo to other governmental agencies. It is not likely, however, that much of it will be useful in other governmental activities. Our idea is that the equipment which cannot be disposed of in this way should be sold by bids. Since most of the equipment is large and of a special nature some time may be required to find purchasers who will offer fair prices.

The plant site and the buildings should, we believe, be turned over to some other governmental agency that can make good use of them or should be sold. We understand that Congressional authority is required to sell real property owned by the Government.

Contacts we have had during the past six months with reference to the disposal of the plant are outlined in the following:

A memorandum dated January 15, 1929, from Director Turner to the Secretary of Commerce, concerning the closing of the plant, suggested that the site and buildings might be useful to some other governmental agency. It also mentioned an inquiry received from the Commanding Officer of Troop G, 112th Cavalry, Texas National Guard, asking whether it would be possible for that organization to use a part of the grounds and buildings as an armory.

On February 19, 1929, a letter was received from Senator Morris Sheppard transmitting a telegram from General Jacob F. Wolters requesting favorable action on a request from Troop G for use of the plant. Apparently at that time such a request had been forwarded to the Militia Bureau of the War Department but had not yet been transmitted to the Department of Commerce.

A letter dated March 5, 1929, from the Secretary of War, recommending favorable action on the request of the Texas National Guard, was received by the Department and transmitted to the Bureau of Mines. This letter was returned to you with my memorandum of March 20 in which I stated that as the Bureau had received no reply to Mr. Turner's memorandum of Jan. 15, and was not advised as to whether the Department had any use for the plant, it was unable to draft a reply. The Bureau has not been advised as to the action, if any, that has been taken by the Department on the letter from the Secretary of War.

In January the Bureau had some informal contact with representatives of the Bureau of Fisheries who were considering the

possibility of using the plant for a fish hatchery. Apparently, however, the Bureau of Fisheries has reached the conclusion that it is not adapted to that purpose.

In March local representatives of the Airways Division of the Department expressed an interest in the tract lying north of the Ft. W. & D.C.R.R. spur for their activities. The matter was discussed with Capt. Hinsberg in May but at that time he apparently was under a false impression as to its location and did not consider it suitable. In June, however, after receiving more information concerning it, he reconsidered the matter and visited the plant on June 20. He now seems to consider the site to be desirable from their standpoint but wishes to include an area south of the spur, about as indicated by the yellow border, with the tract north of the spur. This area includes the office building, a water well and pump, and the elevated water tank.

The Bureau has had some contacts with commercial concerns who have expressed an interest in buying or leasing the plant but nothing very definite has developed.

The transfer of the land and buildings north of the industrial spur to the Airways Division would be satisfactory to the Bureau of Mines. It would also be satisfactory to transfer the entire property if the Airways, or the Airways combined with some other service, could make use of it. However, to transfer the part north of the spur with a part of the tract south of the spur as indicated, and leave the remainder in the hands of the Bureau, does not seem desirable from our standpoint. The separation of the area indicated in yellow, including the office building and the well and water tank (which are a part of the water system of the entire plant), would, in our opinion, reduce the value of main body of the plant site by an amount that is out of proportion to the value of the property the Airways desires. It might make the main body of the plant difficult to dispose of.

The Texas National Guard wants to use a part of the cylinder storage shed as a stable and to construct a corral between the cylinder storage shed and the east fence. They also want building #4 for storage and space for office and sleeping quarters in the office building.

A revocable license to the National Guard for use of the plant would have the advantage of reducing expense of upkeep. This is,

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the National Guard would have men at the plant to aid in protecting it. However, occupancy of the plant by the National Guard under a revocable license might be embarrassing to both parties, when the time came to dispose of the plant. It will be noted, too, that the National Guard and the Airways both want the office building. In view of the circumstances it may be desirable to defer action on the National Guard's request until more definite conclusions can be reached.

The 10" pipe line from Petrolia Field to the plant has been let to the Lone Star Gas Company, under a revocable license, for \$1250 a month. The sale of this pipe line should be considered and, if found desirable, appropriate recommendations should be made to Congress.

The Bureau will be glad to receive the Department's suggestions or instructions.

O.P. Hood, Acting Director
for SCOTT TURNER, Director.

HELIUM -- ITS DISCOVERY AND USE

Helium is one of the world's most important elements, being put to uses undreamed of when the old "North Fort Worth" Helium Plant began experiments in 1918. From its original use in lighter-than-air craft, helium has grown into many other uses -- in the space program, health, medicine, science, and industry.

Helium has been known to scientists for just a little more than 100 years. A line indicative of a previously unknown element was first observed in the spectrum of the sun's rays in 1868, which was attributed to a hypothetical element called "helium." In 1895, British Scientists Lord Rayleigh and Sir William Ramsay first identified helium as an actuality and while only minute in the world's atmosphere it was found in certain pools of natural gas in appreciable quantities.¹

The use of helium as a buoyant agent in lighter-than-air craft was conceived by British scientists early in World War I. Helium was lighter than any other known substance other than hydrogen, but unlike hydrogen, it is inflammable. In addition to having a high lifting power and being inflammable, helium has a much lower rate of diffusion with elements of the atmosphere through the balloon fabric.

The British, unable to ascertain a feasible source of supply, requested the United States authorities to investigate and determine the feasibility of obtaining helium from natural gas. Gas from the Petrolia fields near Wichita Falls was being transmitted by the Lone Star Gas Co. to Fort Worth by pipeline, with termination north of Fort Worth. Laboratories were set up next to the Lone Star receiving plant, permitting natural gas to be used for the separation experiment and then returned to the consumer lines. Production began in Fort Worth in 1920. This was the world's first extraction plant, with production continuing through most of the 1920's.

Produced too late in any quantity to affect the outcome of World War I, helium did play a major role in World War II. Building on experience gained from the large lighter-than-air craft of the 1920s and 30s in its air arsenal, the Navy developed a great fleet of smaller dirigibles. Operating in the Atlantic, the Pacific, the Caribbean, and the Mediterranean -- an area of three million square miles -- helium filled Navy patrol blimps safely convoyed more than 89,000 ocean going vessels, transporting

¹ Activities of the Bureau of Yards and Docks, Navy Department, World War 1917-1918, Government Printing Office, Washington, 1921, United States Helium-Production Plant, Fort Worth, Texas. Chapter XIX, p. 437.

troops and war supplies, without the loss of a single ship to enemy submarines. Equipped with sensitive listening devices, the "Little Zeppelins," as the German Navy called them, were feared and given a wide berth by German U-boats.²

The only place on earth where helium was being produced in the 1930's was near Amarillo, Texas, but this has changed drastically now. With the advent of the U.S. intercontinental ballistic missile program, helium orders rose sharply. Rockets became dependent on helium in a variety of ways. Stainless steel tubing, liquid oxygen containers, instruments, and even the thin outer skin of the missiles were welded in a protective atmosphere of helium to shield the weld metal from oxidation and other damaging effects of the air. Missile control systems used helium to actuate instruments and valves, making the systems smaller and lighter because helium flows faster and responds quicker than any other inert gas. Helium provided the force to push fuel and liquid oxygen to the pumps feeding the rocket engines and to replace these liquids as they are consumed, providing pressure inside the paper thin walls to maintain structural rigidity in flight.

And, still in space, the voice of the first astronaut, Colonel John Glenn, came back from outer space by means of a small ruby crystal in a bath of liquid helium. Telstar, the early communications satellite, not only was boosted into orbit by a rocket that received help from helium, but needed helium for its signals. The signals we receive today from satellites reach us after being amplified by a MASER (microwave amplification by stimulated emission of radiation) which contains a ruby crystal operating in liquid helium at a temperature near absolute zero. Without the liquid, the faint signal from a satellite would be lost in a jumble of noise.

Helium also performs a role in underwater exploration. Sea lab projects conducted by the U.S. Navy have shown that with a mixture of helium and oxygen, men can live and work under the sea for days. With the help of such a mixture, Astronaut Scott Carpenter spent 30 consecutive days at a depth of more than 200 feet. Others have proved, and are continuing to prove, that a helium mixture prevents the carefree, drowsy feeling often associated with deep diving and that divers are now going to formerly undreamed of depths.

This large scale use of helium is continuing and is being expanded. Helium's combinations of inertness, light weight, compatibility with other

² SEIBEL, Clifford W., Helium, Child of the Sun, The University Press of Kansas, Lawrence/London

materials, and low temperatures of liquification have proved the element to be an ideal material in space technology. Its diversity of uses makes it equally as important in industry, especially in arc welding and other metallurgical and chemical processes as an inert gaseous shield.

Still further uses of helium include:

Preserving valuable documents. The Declaration of Independence, the Constitution, and the Bill of Rights are preserved by being sealed in an atmosphere of helium.

Minimizing space requirements. In electronic computers, the use of a closed-circuit liquid helium bath shrinks memory elements to shoe box size with power requirements of less than one watt. Without the help of helium, the most elaborate computers would need as much as 40,000 watts of electrical energy, the space of a small house and air conditioning.

The increased demand for helium and the need for its wise and efficient use came to the attention of Congress, which in 1962, passed legislation affecting its production, storage, and use. Five Government plants, administered by the Bureau of Mines, were designed to produce helium needed for Government projects. Private helium production also got underway at this time to meet the demand from the private sector. Excess production is sent through pipelines to the underground storage reservoir at Cliffside Field near Amarillo.

It is a lot of progress -- and a far cry -- from the early experiment conducted at the "North Fort Worth" Helium Plant, now daily referred to as the "RO" by FAA employees.

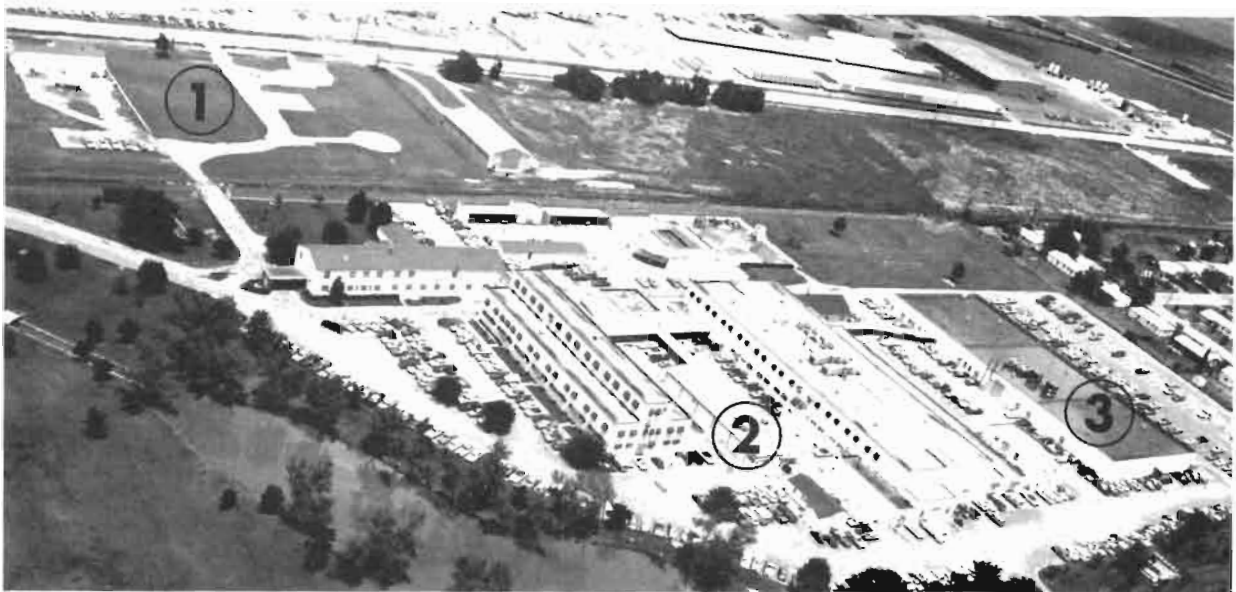


REGIONAL DIRECTORS, PAST AND PRESENT

Regional directors gather at the 1968 dedication of a new terminal building at Fort Worth Meacham Field. From left to right: L. C. Elliott, 1938-1960; Archie W. League, 1960-1965; John M. Beardslee, retired from Central Region; and Henry L. Newman, 1965 to present.



1976 AERIAL OF THE SOUTHWEST REGION OFFICE



SOUTHWEST REGION OFFICE, 1976

These two photographs show the changes in facilities at the Regional Office during a span of almost 30 years. In the 1948 photo the old shop buildings and living quarters north of the railroad tracks predominate that area (1), the shed between buildings 2 and 3 is clearly seen (2) and a vacant area awaits the construction of building 4 (3). The 1976 photo shows a helicopter pad occupies the area north of the tracks (1). a modern cafeteria replaces the shed (2) and building 4 covers a large area (3).



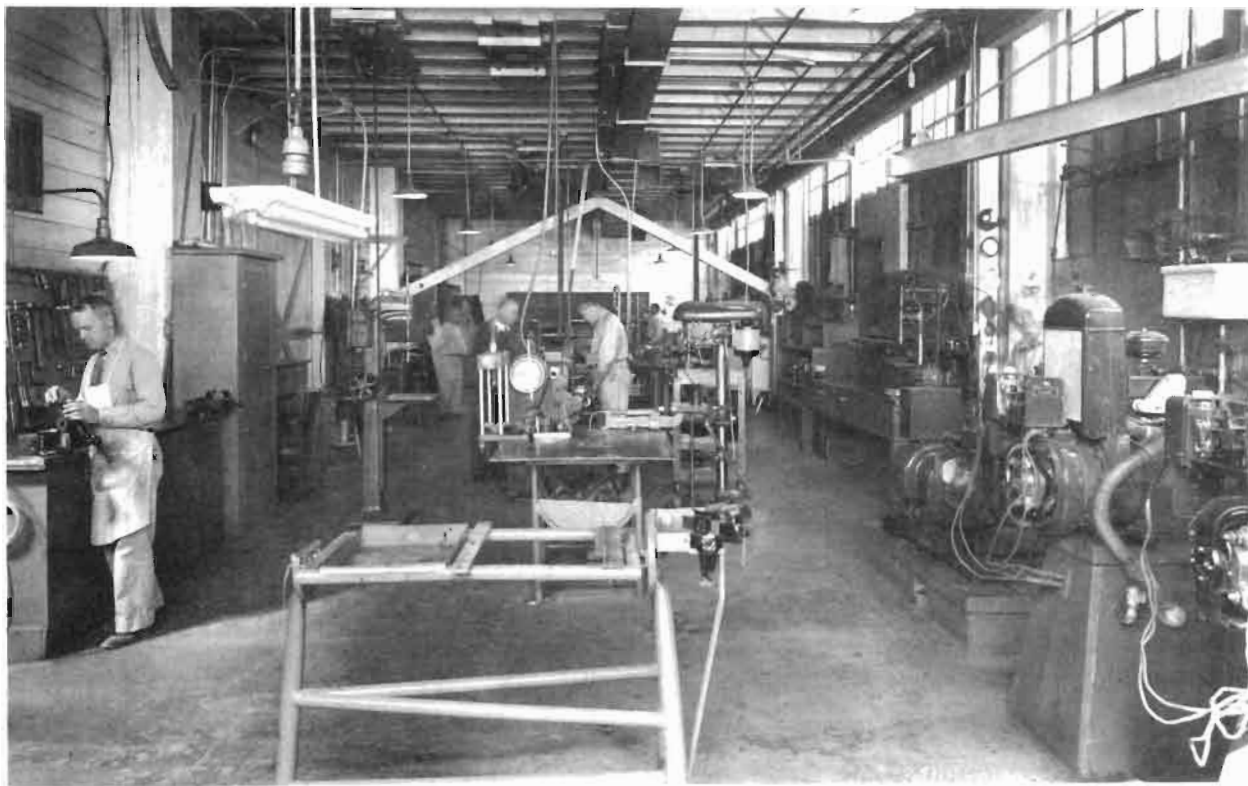
SOUTHWEST REGION OFFICE, 1948



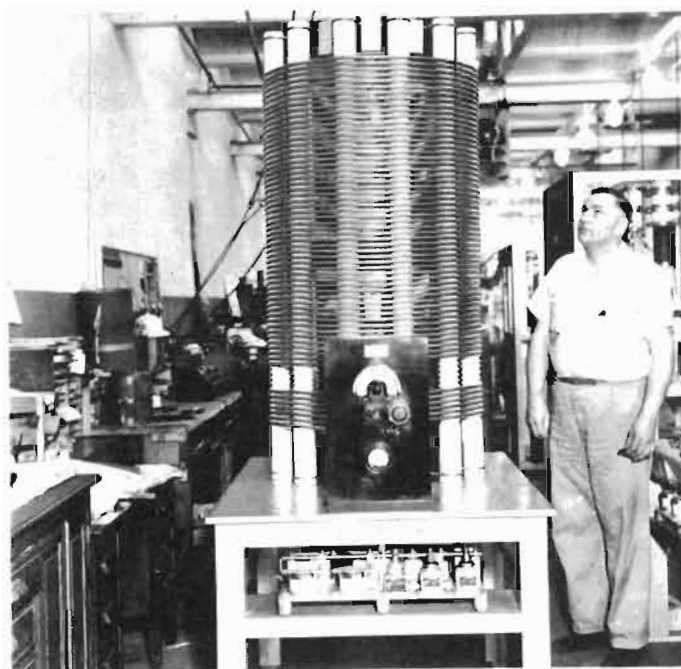
STEEL YARD AND PAINT SHOP, CENTRAL DEPOT
Shipping and Receiving Point, Early 1940s.



SOUTH END, BUILDING 2 (1948)
Soon to be office spaces.



Shops take up most of Building 2



Roy Taylor stands beside a tuning unit for a 10 KW, low-frequency transmitter which is typical of ones built by the Central Depot for use in Alaska.

AIRWAYS DIVISION

PROLOGUE

In the early 1920s the Post Office Department built one string of airways communication stations across the United States at these locations: New York; Washington; Belfonte, Pa.; Cleveland; Toledo; Chicago; Iowa City, Iowa; Omaha and North Platte, Nebr.; Cheyenne; Salt Lake City; Elko and Reno, Nev.; and Oakland and Burbank, Calif. These were in buildings about 12 feet by 12 feet, sited near the flying field but often in the corner of an adjacent farm. Each was equipped with a 5kw and 1/2kw tube transmitter and two receivers.

In the spring of 1927 these stations became the operational responsibility of the Airways Division, Lighthouse Service, after the Air Commerce Act of 1926 had given the Department of Commerce new duties in regulating civil aviation. A large expansion program was started and hit a fast pace during the fall of 1928 and winter of 1928-29. Equipment included a combined CW and voice 2kw transmitter, a 1/4kw high frequency CW transmitter and one or two receivers. Air-ground voice was on the way, but was not available at this time. Some longline and local teletype circuits were being established during 1930. In 1929 Transcontinental Air Transport (TAT) was attempting air-ground voice communications from their Tri-motor aircraft. (Passengers flew during the day and rode the train at night).

The first airways radio station for Fort Worth was installed in a small building on Meacham Field in October 1928 and was manned by one operator, Pete Mashburn. The equipment was simply one radio telegraph transmitter and one receiver. It stayed on the field until the winter of 1929 when it was moved to the Lighthouse District Office (now the Regional Office). An electrician took down the equipment, moved it and installed a 100 watt voice transmitter along with the relocated telegraph transmitter. A voice watch was started on 3105kc. Mashburn stayed in charge and a 24-hour watch was established.

C. I. Carpenter came to Fort Worth as an electrician in July 1930 and rearranged the equipment in the station and installed a two kilowatt combined voice and CW transmitter on 365kc. To get maximum power, he cranked the two KW job wide open and the day time transmissions were heard by a pilot at the Washington Airport. An order was received to cut power immediately.

When Mashburn moved to Houston in 1931 to open a new station there, Carpenter took over the Fort Worth station. During the fall and winter

of 1935 the station was moved back to Meacham. A new tower range had been established at nearby Saginaw in 1934, so the old range building was moved up close to the hangar line and the station installed in it. Another move came in 1937 with the station being installed in the new terminal-administration building. Fort Worth became a major teletype relay station coast to coast in 1939, with Carpenter installing all the equipment and training six new operators. A dual watch was set up, one for radio and one for teletype.

Carpenter retired from the FAA in 1965. He came into the Lighthouse Service on October 3, 1928, at Iowa City and except for a brief period of time served with the Airways Division and succeeding organizations until his retirement. His experiences parallel the growth of aviation and airways communications. The following is his account of the establishment of the airways communications stations and, particularly, activities in Fort Worth up to World War II.¹

AIRWAYS COMMUNICATION STATIONS

In 1928 the airlines were flying a Boeing 90, a single engine, open cockpit airplane with a maximum load of 1800 pounds of mail and one pilot. The purpose of the airways communication stations was to gather weather information just ahead of the flight and by long distance telephone from cities surrounding each station. This information was available for the airport manager and the pilot when he landed. The stations also transmitted messages carrying the name of the pilot, the flight, his time of landing and takeoff, the number of pounds of mail on and the number of pounds off. Each of these progress report messages, in addition to going to one or two stations ahead, also went to the Washington station.

Radio stations were equipped with what was known in those days as a 5 kilowatt arc and one 1/4kw CW transmitter and, of course, receivers for each frequency. The arc was on a very, very low frequency and the 1/4kw transmitter was somewhere around 5 megacycles.

These arc transmitters had a large metal circular framework for body about 18 inches in diameter and about two feet high. It had a big heavy lid. Denatured alcohol was kept in this cavity. One evening the operator had mistakenly poured engine oil in the arc and when I struck the arc, it blew up in my face....scared the daylights out of me, but didn't injure me.

During the winter of 1928-29 the mail load was so heavy that at Christmas there were six sections -- that is, there were six airplanes loaded with mail going from the west to east coast -- and the airplanes

got scattered. At that time there were no beacon lights of any kind with the exception of some acetylene blinkers. At times the farmers would build brush fires in the pastures to light and guide these pilots in bad weather.

Those pilots had a rough time -- real cold that winter, in fact, the winter of 1928-29 was one of the coldest in Iowa in 50 years. The pilots, flying those open cockpit planes, even had their helmets and clothes packed with newspapers. I helped the boys lift "Million Hour" Lee (well -known air mail pilot) out of the cockpit and down to the ground and then help him back in the plane when he got ready to take off. He had on so many clothes he couldn't climb in and out of his airplane.

Expansion southward was begun during the winter of 1928-29 to add more airways communication stations. First, in Moline, then Kansas City, and on to Tulsa, Oklahoma City and Fort Worth. The station was established in Fort Worth in October 1928 as a CW station, handling messages on plane movements, cargo and the weather.

I entered the Lighthouse Service on a temporary assignment at Iowa City and was terminated the next spring. I then went to work with Transcontinental Air Transport, which at that time was establishing an airway across the U.S., using Trimotor Fords. The passengers and cargo traveled by plane during daylight hours and by train at night. My first assignment with TAT was Clovis, N. M., where I built the station and all equipment with the exception of what was known as a radio compass. When this assignment was completed, I went to Albuquerque and supervised the finishing of that building and the installation of the equipment which consisted of a 2kw CW and voice transmitter and the radio compass receiver with its loop antenna placed in the attic of the building.

In September 1929 I received a message offering me reemployment with the Lighthouse Service and I reported to St. Louis. The supervisor was C. M. Smith, whom I had known on the radio circuit between Iowa City and Moline. I stayed in St. Louis during the winter, doing a lot of technical work which built my personal reputation as a good technician. My work with TAT also helped my reputation as a good technician when I pulled them out of some trouble with their compass receivers at Albuquerque and some more difficulties after coming to St. Louis. TAT had installed their receivers in the airways communication station and we worked their Trimotor Fords out of St. Louis with our transmitter and their receiver. At the time, TAT was considering the four course loop range which had just been developed by the Lighthouse Service and tested at Belfonte.

Plans for low frequency ranges at St. Louis, Columbia, Kansas City, Tulsa, Wichita and Fort Worth were underway. The operator in charge of these stations handled the supervision of the building, the installation,

and let contracts for purchase of remote control cable, its installation, and that of the transmitter equipment when it arrived. Capt. Hingsburg* wired St. Louis to inquire when the range stations in the St. Louis district would be ready for flight check. Mr. Burchfield was the only electrician in the district and he was busy with repair work and couldn't find time to install ranges. Additional help was requested and Capt. Hingsburg said, "Select an operator."

I was selected, and Burchfield and I went to Kansas City to install the loop range. The only instructions we had was one blueprint schematic diagram of the loop range wiring. I saw the necessity of developing a practical wiring diagram from the schematic. I lay on the floor and took pencil and paper and drew the station wiring layout. It showed the power panel, control panel, motor generator, transmitter, the keyer unit, goniometer and the two loop tuning. About the time I finished, Burchfield walked in and asked, "What do you have, there?" When I replied, "I drew a practical wiring diagram from the schematic because I have to know where all the terminals go just by a quick look." "That is just what I need" Burchfield replied. He reached down, snatched it off the floor and that was the last I saw of Burchfield for many years.

I was assigned to take care of installations from Kansas City south, and I came to Fort Worth in July 1930 to install the low frequency range which was located on what is now the parking lot at Meacham Field. The station that was established there was moved to the regional office and assigned to three rooms in what is now Building 1. My job was to revamp this station and install a 2kw transmitter and rearrange the other transmitters, receivers, etc. I had asked for another electrician to help while in Tulsa -- rather than hiring temporary labor, as was the practice, who needed training -- and I was sent a Mr. Robert E. Lee. I will never forget his face when he opened the door of the Tulsa station, stuck his head in, with ears sticking almost straight out, and said, "I am Robert E. Lee, junior electrician, reporting for duty." Lee and I put in the range station in Fort Worth and revamped the communications station at the old helium plant, completing it in October 1930. In 1931 I was put in charge of the Fort Worth station -- I had built it and knew every wire in it.

I was always making suggestions. When I revamped the station here in 1930, the practice was to put the operating desk up against the wall. I wasn't going to do that because I needed that wall space for transmitters.

*F. C. Hingsburg, Chief Engineer, Airways Division, Aeronautics Branch, Department of Commerce

So I moved the desk out into the middle of the room, put the receivers and control box on them and lined the transmitters up around the wall. The chief engineer heard about this and made a rush trip to Fort Worth to look over the new idea (it just hadn't been done before). I had gone to Tulsa for that installation, but I heard reports he was highly pleased.

The Lighthouse district office was set up at the helium plant in 1929, with airway technicians (called airway mechanics) engaged in establishing immediate landing fields, lighting and beacons up and down the airways in Arizona, New Mexico, Texas, Oklahoma, Arkansas, Louisiana and a part of Tennessee. The staff was small. To verify this I will tell of the time I sent a message to the Washington office, giving names of all employees in the Lighthouse district and their salaries (given in figures). The number of words came to 535. Compare that figure with what it would be in 1976!

In 1932 the four course vertical tower range was coming into being. Instead of transmitting signals over two crossed loops, they were transmitted from four towers set on about a 300-foot square. A civil engineer surveyed a site east of Saginaw which was in line with the N/S runway at Meacham Field. Capt. Hingsburg looked over the site and approved it and a contract was let for the building and putting in the antenna ground system. The job of letting these contracts fell to the operator in charge -- myself. I bid the contract and made the selection of the low bidder for both the building and the ground system, wired Washington the information for approval and got the go-ahead, notified the contractors, and then supervised the construction of the building and the ground system installation.

A national contractor had the tower erection contract. This contractor inquired as to the type of ground he would be working with -- rock, dirt, etc.? I wrote him that it looked to me as if it were some loose rock. When the contractor arrived to put in the Saginaw towers he had to shoot three holes with dynamite; the other was so soggy he had to build a coffer dam to keep the earth from caving in around it. As the contractor's bid was based on earth digging (vs. solid rock), the contractor entered a lawsuit against the Lighthouse Service and myself. I went on the witness stand and my notes to the contractor, which were 10 years old by now, were flashed before me. I testified that I had written this information to the contractor. He ultimately won his case, and the Lighthouse Service had to pay him for rock digging. This trial, and several others, took about 10 years to bring to court....but in most of them the Lighthouse Service had to pay.

In the winter of 1933-34 we moved the equipment from the Meacham Field loop range station to the new one at Saginaw. The communication

station was moved from the Lighthouse office back to Meacham Field where we established remote control to Saginaw. We had the range station there and had voice communications and radio telegraph. Fort Worth became a major collection and relay station for aeronautical weather information and air traffic movements. At this time air traffic information merely told time of takeoff of the plane, its number and company and destination.

The new administration building was completed at Meacham Field in 1937 and we relocated from the little range building to the second floor just under the tower structure. We set up remote control of facilities at Saginaw with radio range, voice communications and radio telegraph. We had one teletype circuit, with one type 15 page printer. Later, a second circuit was added, and during the winter of 1937-38 Fort Worth communication station was established as a major relay station in the U.S. with four teletypewriter circuits and all the types of equipment for cutting and transmitting five coded type.

Then we had transmitter distributors and there was quite a good sized chart that came out of the Washington office showing all the schedules....they almost went around the clock, hour-by-hour, but there was some deviation. They shipped me receiving distributors, reperforators, transmitter distributors, teletypewriter printers from all over the U.S. I had to unpack them, clean them, get the straw and excelsior out of them, tune them up, get them going...do the entire installation myself. I also had to design a relay system so that we could receive on one circuit and then, according to the schedule, transmit on three other circuits. This placed a burden on the operators. At that time the station had five operators.

When the time came for the main cutover to the new station in the terminal building, I worked a steady 24 hours...12 hours to get the equipment going and 12 to train the operators. None of these operators had ever worked this type of equipment. After a short rest, I put in another 18 hours to keep the four-circuit teletypewriter system running and the relays required by the Washington office schedule operating properly. Additional installations were made later and when this was completed it was virtually impossible for one operator to handle both the teletype and radio. As a result, five more operators were assigned to the station. A message went out to the "boondocks" to recruit new operators for training in Fort Worth. The workload got so heavy that it was split between operational and technical duties. I retained the technical responsibilities.

The 1938 modernization program called for the installation of another tower -- or a fifth tower -- in the center of the plot at the Saginaw station.

Operators and electricians were called in to form installation crews to handle the work involved in the modernization. Also, some new loop ranges were being installed. Training was conducted at the Saginaw station for these people. In this mass training, I took the new men, divided them into compatible groupings and taught them team work in installation. After this training, the crews were broken into groups of two, three or four technicians and assigned to the various stations throughout the region to put in these ranges and communication stations.

The workload in the regional office phase of engineering was growing equally and I was requested to transfer to the regional office. I did on September 1, 1938. It had been decided to establish the position of maintenance electrician because the ordinary operator in charge of the various stations then springing up around the country could not keep up with the operational load and technical complexity growing out of the modernization program.

GEORGE RAND LOOKS BACK*

When the "4th District Office" was established at the "Old Helium Plant," George Carter Miller was the first Superintendent, assisted by John Bonforte and his Secretary Ruby Jilek. Harry Curry was chief clerk and disbursing officer. Dick Preusser was personnel officer and switchboard operator. Lyle Bugbee was purchasing agent. Al Bass supervised the warehouse. Field and lighting was supervised by Merle North, John Withers and Tom Claxton. Total staffing was less than 25 people. "Jack" Miller moved on in the early 1930s and was followed by several "Short Term Tyrants" until the appointment of Lawrence C. Elliott, who survived many changes of administration each accompanied by a reorganization, until the 1960s.²

Prior to July 1933, the operation and maintenance of the radio stations was supervised from Washington through 11 Assistant Airway Traffic Supervisors (AATS) directed by Eugene Sibley. The Airways District Office's main thrust was in the area of establishing and maintaining airway beacons and intermediate fields, and handling erection of buildings and towers used by the communications system. Much of this construction was supervised by such oldtimers as Joe Boyd, W. H. Burkeholder, Sr., and Barney O'fiel (Charles Gladston O'fiel).

Airways Mechanics in the Fort Worth District wore khaki uniforms and field boots and exercised neo-military discipline over the "airway

*George Rand's career began in the early 1930s, leading eventually to that of Chief, Airways Operations Division, Washington. He now lives in retirement in Fort Worth. This is his account of his early employment. All persons furnishing information in succeeding accounts are listed in footnoted appendix.

keepers" who maintained the intermediate fields where weather observations were made and transmitted on the teletype network. The weather and communication activities were supervised by the AATS and it was difficult to maintain a proper priority between cutting the weeds and polishing the beacon, as opposed to making and transmitting accurate and timely weather reports. At other intermediate fields a caretaker had only the field and beacon to think of and there was no conflict.

In July 1933, the responsibility for the communication system was transferred to the respective District Offices and AATS Elmer C. Butler moved his office from Dallas Love Field to Fort Worth. His headquarters staff consisted of Radio Electricians Ralph Adams and a young male secretary named William T. Clark.

About that same time aviation safety functions were added to the district office chores. This brought in such pioneers as Jack Jaynes, McKinley F. Clark, Bill Berry, Bill Cunningham, Buck Rowe, and others. Jack Jaynes later assumed the post of Deputy Regional Administrator and served with distinction until his retirement. (More on Jaynes in a later section.)

On April 1, 1935, a separate Communications Maintenance Branch was established in each regional office. This change was made after a similar change in the Washington office organization with the new group headed by Jay Mount. An elaborate system of inspections and inventory control was set up and "hi-level" supervisors found themselves counting spare fuse links and filling out endless forms. This lasted less than a year. In February 1936, the maintenance and operation functions were again combined and the staff reduced accordingly. After two years of this belt tightening, May 10, 1938, a separate Maintenance Branch was reestablished and has managed to flourish in the face of adversity.

As the skies became more crowded the air traffic control organization was born in 1936 starting in the East and Midwest, spreading to the Southwest a year or two later. An Air Traffic Control Branch, co-equal with the Communications Branch, was established in each region. The Field and Lighting organization steadily lost ground as the air traffic control mission became more important, until today air traffic control is the largest segment of the organization.

As an example of work load per man, the 4th Region at one point in time encompassed the states of Texas, Oklahoma, Louisiana, Arkansas, New Mexico, Arizona and Kansas, with over 50 stations to maintain with a staff of two radio electricians, to inspect, modify, repair, answer trouble calls, and perform installation of all new facilities added to the program. A typical new facility work order was issued to a radio electrician to "proceed from Fort Worth to Tucson and install the Adcock

range station, tune up the equipment and set the courses preparatory to flight check." The maximum expenditure for per diem, mileage allowance, local purchases and local time-sheet labor was \$200. He didn't make it; had to wire in for an additional \$32.00.

We were less formal and more effective in those days. When a call for help came from Lebo, Kansas, one Saturday morning (the transmitter was out) Art Blomgren and a radio electrician loaded a tool box in the old Stinson at noon, had the transmitter back on the air by 10:00 p.m., slept on the ground under the wing, and returned home Sunday.

NEW PERSONNEL

O. E. Hailey was among those hired by the Lighthouse Service for the construction of the airways south of Fort Worth.³ During his summer vacation from college, Hailey first heard of such an undertaking when he was asked if he would like to work on the project. Hailey asked more about the work and the supervisor of the project told him that an airway was being constructed between Fort Worth and San Antonio and that there was need for four temporary employees. The entire system would be lights and airfields. Hailey took the offer and went to work on the first beacon which was to be located in his home town of Burleson, a Fort Worth suburb.

"I believe we got into the airways business because the airline companies could not operate their own beacons," he said. "The airlines had already established a string of beacons in the U.S., but they were expanding their business and couldn't afford to operate the airways too."

Cy Martin had watched the aviation business grow.⁴ He had an interest in the Fort Smith Aircraft Company in Fort Smith, Ark., with the airport located on the Oklahoma side of the river. He remembered that TAT (soon to become TWA) was operating a transcontinental flight with a major field at Waynoka, Okla. Passengers would leave New York by train for an overnight trip to Columbus, Ohio, continuing the next day by plane to Waynoka. Another overnight train ride -- to Clovis, N. M. --- followed from where they flew the last leg of the trip to Los Angeles, completing the trip in the then phenomenal time of 48 hours. Braniff was beginning its first flights into Dallas and American was coming to Fort Worth and then heading into West Texas.

Jean Jipp said he remembered the same situation when he first came to work for the Airways Division.⁵ This is when he met W. H. Burkeholder who was going through the area "lighting up the beacons." Air routes were apparently expanding; the gaps where the trains had been carrying passengers at night were being added to the airways and beacons and airfields had to

be established. "In some places," Jipp said, "the airlines had established beacons but couldn't keep them going -- they had no one to care for them." An associate engineer would fly the route to pick out the spot -- usually by dropping a sack of flour -- for the location of a beacon.

When these men, and others, started work with the Lighthouse Service, pay was 48 cents an hour and per diem was \$1.80. It was then a common occurrence for an employee to be laid off for a few days every once in a while when the budget got a little tight. This was done out of Washington by name. It often took a discharged person six months to get his record straightened out and receive the last pay check.

Added to the worry of a regular pay check and the possibility of lay offs was the fear that the checks could not be cashed. Many employees did not trust banks and after the Bank Holiday of the early Roosevelt Administration, employees avoided banks, preferring to get the check cashed quickly and have the cash in pocket. "Checks were mailed from Washington and everyone tried immediately to get cash," William Murdock said.⁶ "No one trusted banks and most employees cashed their checks at the Post Office. I remember being in Douglas, Ariz., and no one would cash my check so I bought a couple of pairs of underwear at the J.C. Penney store and got mine cashed at the store."

Martin still has many first impressions of his early employment..... the long drag from air route beacons to the present state of perfection with computer data processing equipment. One thing he remembered vividly was that the offices had to use up the Lighthouse stationary on hand before any of the Bureau of Air Commerce was printed.

The first communications along the airways laid out through the larger cities (Galveston-Fort Worth, Fort Worth-Atlanta, etc.) were in Morse Code. The airways were marked by electric revolving beacons, first 24 inches and later 36 inches in diameter of the double-end type. Some airways were marked with acetylene beacons similar to those on harbor buoys. These rotating beacons were spaced 10 to 15 miles apart, depending on terrain. Sod emergency fields were located 15 to 20 miles apart with the air route from one to the other slightly doglegged at times due to the location of suitable airfield sites. The fields were often odd-shaped and contained 10-20 acres. Day fields were not lighted; the lighted fields were boundary lighted with clear lamps 100 feet apart; ends of runway were marked with two green lights. All obstructions were marked with red lights and often mountain peaks were marked with acetylene beacons with red lens inside. Where commercial power was not available, a common occurrence before REA, farm lighting plants were used. These were usually Westinghouse, single cylinder air-cooled and used kerosene. Later these were

replaced with Kohler 2kw automatic plants. All of the engine-driven facilities had a local caretaker to check the oil and fuel or to hand crank the stiff-ankle plants not equipped with batteries.

Air route beacons and engine driven facilities were started and stopped with astronomic clocks that lengthened or shortened the day according to the season. The acetylene beacons used a tiny pilot light that burned all the time to ignite the gas when the light of day faded. A device called a "sun valve" turned the gas on or off. This device consisted of two metal rods of equal material and mass, being of equal mass and material, temperature effected them equally. The difference was their exterior finish, one was highly polished, the other was darkened as if by soot. As daylight approached, the dark rod absorbed light which was changed to heat energy and its expansion closed the gas valve. At night the rods were of equal length and the gas valve was open. These devices were of stop-watch precision when properly adjusted and were often used on electrical equipment by replacing the valve with a micro-switch.

Martin's field duty began when he was sent to Ponca City to relieve a Virgil Hawk, an airways mechanic, who had been promoted to chief mechanic (inspector). His sector covered the air route, between Oklahoma City and Wichita, Kans., and a shorter route, the Tulsa-Ponca City airways. His headquarters was in Ponca City.

The Tulsa-Ponca City airway was lighted with 72 acetylene beacons spaced three miles apart. These were mounted on 20-foot-high towers with six acetylene cylinders enclosed in a corrogated iron storage space at the base of the tower. There were two electrically lighted emergency fields, one located at Fairfax and the other at Hominy.

"We were graced with trail roads on all air routes in those days" Martin said. "For instance, there were times that I drove 25 miles over creek bottoms, rocky craigs or swollen streams during parts of the year to get to a beacon three miles away from the paved road." Mechanics were furnished a Model A Ford panel truck, which, according to Martin, was akin to a burro. Under many conditions, he recalled, he would drop the truck's wheels in the deep rutts, get out and push until the truck started moving.

Martin's storeroom was a two-story garage on an alley. He said that he was often visited by small boys who came to see the man in a "solger" suit. "For some insane reason we were required to wear a uniform," Martin said, "including field boots, riding britches, an army type tunic and a garrison cap with the Airways Division insignia made of brass and nearly four inches long. In many places I was mistaken for a Western Union messenger, bus driver and Pullman porter. And one was never to be caught out of uniform. I was caught in khaki slacks once and was

asked, 'Don't you like your job?' Can you picture a man in a well-fitting uniform ratting up a tower, wading through mud, working on a greasy engine? Some of the picturesque boys even wore Sam Brown belts and some looked as if they carried a window weight in the seats of their pants."

Martin said it always took a good story or funny event to relieve tensions and to take the edge off drudges in those days. Here's one of his from Oklahoma: "An old Sooner named Ed, who had ridden the Cherokee Strip owned a one-ton truck and had a contract to haul acetylene cylinders on my Ponca City-Tulsa air route. He had ridden with the 101 Ranch Shows and told me many interesting frontier tales...that is, when I pried them out of him. We were cutting across the Osage with a load of cylinders on one of the hottest dry days. It was much too hot to talk. We passed where men were drilling a water well and I asked Ed 'how far do they have to drive for water?' We drove on for a mile or so and I had forgotten the question until he finally drawled, 'It is just as nigh to haul it.'"

Martin remembers the weather more than anything else. One day he claims, he experienced four weather changes on a drive from Canadian to Childress: snow, rain, sandstorm and finally sunshine. He said he went to Canadian to do some work on the low frequency range facility and checked on the facility late in the evening. Posts of the barbed wire fence were barely sticking out of the ground. He went into town, stayed that night and returned to the facility the next morning. When he arrived, the scene had changed; the posts were hanging on the wires. The wind had changed direction during the night and blew all the sand away.

When Shattuck VOR was built a wood fence was erected around it. Within days the wind had blown sand against the fence and the technicians never had to use the gate -- just walked over the top of the fence.

And then when he got to Raton Mesa to do some work, the weather had changed to extreme cold. A thermometer was hanging on the window of the station and it went down as far as it could go and pulled the window down with it.

In the early days a local person would be hired as caretaker at a major airways location, with his main chores that of checking the generator and lights. El Morro had such a caretaker by the name of Fred Jones, who was quite parochial but also a good "shade tree" mechanic. One day

when Martin, now an inspector, turned off the highway at Grants to start the trip to El Morro he passed a box factory where short pieces of baling wire were discarded and disposed of by first being wadded up in large balls. Martin knew Jones, who had never strayed too far from El Morro, liked to be "remembered" so he stopped and loaded a large ball of discarded wire. He arrived at the site late, unloaded his wire behind the generator house and then slept until Jones arrived early next morning. Martin told Jones he had a present for him, a gesture which pleased him, and he asked what it was. When he saw all the baling wire, he was momentarily overcome. Turning to Martin, he thanked him and said, "If I'd knowed I was getting all them 'parts' I could have made that old car last another year."

A FEW MORE MEMORIES

It is the consensus of the retired airways mechanics that field travel would start the day before a holiday, especially Thanksgiving and Christmas, so that management could gain an extra day. Employees on field assignment wouldn't get their holiday. "We would be sent north in winter and south in summers" Murdock said. He said that he was away from the regional office for more than a year at one time, working every day and long hours each day. There was no extra pay for either holidays or long hours. Mechanics were required to sleep in the building at the beacon sites when they were working there. There was no driving to town to stay and the only time one could get a decent bath and meal was when they moved up to another site. "I've slept many nights in the generator building. One learned to sleep quite well with the noise, but if the engine missed, you'd be up and running."

The mechanics and inspectors unanimously agree that another big sore spot was the looks of the panel trucks they drove on their trips. An example is the experience of Jipp who was driving through northeastern Oklahoma. He decided to try a short cut to a site and got lost and started down a very isolated road. Seeing a man beside the roadway cutting weeds he stopped to ask directions. The local man, mistaking the sedan delivery truck for a hearse emotionally asked, "What happened -- someone out here die?"

Hubert Cross said this was a true story of his working companion.⁷ The Model A panel truck he drove had a large emblem on the side and this particular morning he stopped at a general store in South Texas. The storekeeper, thinking the airways engineer was a coffee salesman, without looking up, said "I don't want to buy any of your damn coffee." Cross said the engineer had a lot of pride and he was "torn up" for about a month because of the storekeeper's disrespect.

In the early days a mechanic usually was assigned 200 miles of airways in mountainous country and as much as 500 where travel conditions were good. At one time, for example, the Fort Worth-Brownsville airways was the responsibility of one man. As there were usually caretakers assigned to major sites, the mechanic was required to check each site once a month, and assignment took distance and terrain in consideration. Equipment was designed to run a month without maintenance. There was much diversity from the mountainous terrain of New Mexico to the bayou country, with a dust bowl and some good areas between them.

Murdock thought Barillo Mesa (Raton) was one of the worst sites to get to in winter. Usually he could make it to a mining camp three miles below the site the first day -- this was traveling on snow shoes. Supplies of food were always kept at the isolated sites just in case a mechanic became snow-bound. One trip he made to Barillo Mesa followed this routine, with a return to his truck at the foot of the mesa late the next night. He was accompanied by another mechanic who was driving as they headed toward the town of Wagon Mound. As the driver was crossing a frozen stream, he shifted into low, jamming the gears and breaking an axle. The pair walked the 14 miles to Wagon Mound where they could telephone Las Vegas, the nearest manned station, to request a replacement part. The Las Vegas mechanic arrived later that night and drove Murdock and his companion to their disabled truck. A bright moon had replaced the snow clouds and Murdock was able to make repairs immediately and continue on schedule.

Summer in the mountainous areas was short and busy, with contractors hauling in fuel for the generators. The year's supplies were brought in after the snows melted. Sometimes horse drawn sleds were used to haul drums of gasoline. In some locations the generators were set up in an accessible valley and the generated power remoted to a beacon on a nearby peak.

Cross had it better in the bayou country, but barely. Without modern transportation equipment Cross moved drums of gasoline by barge through the bayous. He did it with luck and a tow boat powered by an old Ford engine with a faulty carburetor. Cross said he was taking 20 drums of gasoline into Bayou Chene in such a manner when the tow ropes broke and it became a drama of rescuing the drifting barge in the backwaters of the Mississippi. With a successful chase behind him, he brought the barge near the site but he was 20 feet below the usual landing. At high water the drums could be rolled off, but with the water at low mark he finally rigged up an old cistern pump to get the gasoline unloaded. The fuel was slowly pumped to containers and then carried to and poured into the storage tanks.

But even those mechanics who tended the airways in the flat country encountered problems. Murdock related how Tom Claxton, one of the early mechanics then on the Brownsville-Fort Worth airways, had to spend the night on top his truck in the wilds of the King Ranch in South Texas. He had forgotten how ferocious the javelina (wild hog) could be. Hailey and Cross both testified that they learned early in their careers in the field to never get between a sow and her javelinas. Of course, a snakebite kit was part of every mechanic's field equipment.

Hailey said of those early days "things never got better, we just got used to them. We did get better roads and we could drive a little farther before getting out and walking to a site."

BIG BEND DUTY*

During the latter months of 1947 and through the spring of 1948 I was in charge of maintenance of the VAR which was located near Hot Springs, Texas, near the bottom of Big Bend National Park. The duty there required daily visits to the facility and since there were no living quarters anywhere near, it was necessary to drive 81 miles, 42 of which were rough, rocky mountain roads which often were cut off by flooding arroyos. It was often necessary to wait several hours for the water to go down enough to permit crossing the unbridged valleys. The nearest place livable was the little town of Marathon, Texas, a little village of approximately 900 souls, more than half of which were Mexicans. There was only one apartment available in the town and it later was revealed that the landlady, who lived in the same house, was a lunatic. After several months of tolerating her ridiculous antics and often dangerous attempts to harm me and my wife, the Sheriff asked us to move. There was no place to move to in Marathon so I appealed to our Regional Office to permit me to move to Alpine, Texas. This permission was granted and I found living quarters just as hard to find there, however, we did find a small ranch bunkhouse on a ranch some five miles west of Alpine. This made my daily drive to the facility a total of 236 miles round trip. My average day was just under 16 hours seven days per week. Overtime was unheard of those days.

At the facility, it was always warm even though the temperature 50 miles to the north may be near zero and the ground covered with snow. The temperature often reached 120 degrees at the facility. I spent many days at the facility when not a single person or vehicle passed on the nearby road. Very few days passed that I did not see a wide variety of wildlife including mountain lion, peccary, deer, antelope, coyote, and wolves.

* Written by Harry C. Wilson, who is now retired and living in McAlester, Oklahoma.

I often threw meat scraps from my lunch over the facility fence which was soon discovered by one ragged old coyote who became almost a pet and took up residence just outside the fence. On one occasion I neglected to lock the gate as I came in; shortly afterward while working with my back to the building door I noticed a shadow from the door and turning saw there in the building with me one of the largest buck deer that I had ever seen, He calmly turned and strolled out into the enclosure where he remained for several minutes.

There was an outlaw and contraband runner who operated on the Rio Grande river just south of my facility who was feared by many people in the area. His truck battery failed one day in the wildest part of the rough road and he flagged me down and asked me to bring him a battery the next day. This I gladly did and from then on we were good friends. Often when I was working late at night he would come by and see that everything was all right. He would always stay for a brief chat and then leave, usually on horseback.

On one occasion the so-called outlaw stopped me on the way to the facility and told me that he had seen a man walking near an old Army camel training grounds some nine miles across the rough from my station. I had been told by the Park rangers that a young University of Michigan student had been missing in the mountains for three days so I knew in reason that he was the man who had been sighted. As I started down the camel trail leading to the training grounds, two Park employees fell in with me and together we spotted the missing student in less than five minutes of travel. He was nearly starved and his lips were white as snow. He had begun to lose his senses and I immediately gave him a quart of milk from my lunch box. We forced him to drink it slowly and after that he finished the balance of my lunch. Needless to say that was a hungry trip for me.

In March 1948 I received the very welcome news that I could change my work schedule to two round trips to the station per week remaining overnight on each trip. This seemed a bit more like living. Soon after this came more welcome news that the Region was going to build us an excellent dwelling in Marathon. Soon after the building was started the builders started using dynamite to level the rocky ground. Several light charges had gone off and my lunatic former landlady who lived some 300 yards behind the new structure was observed to come to her front door after each blast. Soon after noon a very large charge was set off and it did shake up the neighborhood. Immediately the old lady came running through her front door without bothering to open it. She ran hard toward the railway station carrying only a paper bag for luggage. She was seen to board a westbound train that evening. Some two months later she was found wandering in a daze in a small town in the state of Washington. We never learned what happened to her after that.

Soon the new home was completed and we moved in and really began to enjoy life. A good portion of my spare time was devoted to ham radio contacts with the "Outside World." On March 2, 1949, a once in a life-time opportunity came to me because of this activity. On the previous day an Air Force transport plane had been declared missing somewhere east of El Paso, Texas. The departing time from El Paso led me to believe that a plane I had sighted that morning may be the same plane. I checked along a path that would normally be flown from El Paso to the point of sighting and found that several persons had seen or heard such a plane and the times indicated that it was the same craft that each had reported. This investigation occupied the balance of that day. The following day I learned that the search was still centered in northwest Texas near the Panhandle. I got on the air and called a San Antonio station and told the operator what I had learned and that I thought the lost plane was in our territory and that I wished this information relayed to the Air Force in San Antonio. No doubt it was done promptly for in about two hours Marfa Radio (INSAC) called me by radio and told me to listen for the Air Search planes on 9710 KC and that they would listen for me on 3860 KC our emergency net frequency. This I did promptly. Upon hearing this communication, other hams got in touch with the FCC at Kingsville, Texas, and my frequency was cleared of all stations except mine. During the next three hours we had uninterrupted communications, possibly the first ever between a ham and the Air Force. During this time I was able to guide searchers over the path that I had thought the plane flew, many times identifying mountains and land marks for them that did not appear on their charts. Almost exactly on the course I suggested, they located the wreckage of the plane, a C-47 with crew and ten passengers, all Air Force officers, smashed into a mountain at about 9000 feet elevation some 20 miles south of the border in Mexico. Involved in this search were several B-29s and C-47s, the biggest air display ever seen in Marathon. By the time the search was well underway, my house was filled with spectators who had heard of the activity. Many of them were natives and helped a great deal in identifying land marks noted by the searchers.

FOOTNOTED REFERENCES

1. Taped interview with C. I. Carpenter, retired FAA employee, FAA Reservation, Fort Worth, Texas, December 1975.
2. Written comments by George Rand, retired FAA employee, Fort Worth, Texas, February 1976.
3. Interview with O. E. Hailey, retired FAA employee, FAA Reservation, Fort Worth, Texas, February 1976.
4. Interview with Cy Martin, retired FAA employee, FAA Reservation, Fort Worth, Texas, February 1976.
5. Interview with Jean Jipp, retired FAA employee, FAA Reservation, Fort Worth, Texas, February 1976.
6. Interview with William M. Murdock, retired FAA employee, FAA Reservation, Fort Worth, Texas, February 1976.
7. Interview with Hubert Cross, retired FAA employee, FAA Reservation, Fort Worth, Texas, February 1976.
8. Written comments by Harry C. Wilson, retired FAA employee, McAlester, Oklahoma, December 1976.

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Site 50, Millsap, Texas: From the Court House in Weatherford, Texas, go N on U. S. 80-A (brick) 5.2 mi. Turn left on old macadam road towards Millsap and go 2.6 mi. to site. OR from Mineral Wells, go out E. Sixth Ave., follow old highway 14 mi. to site.

El Paso-Pueblo Airway

Site 1, Anthony, N. M.: From Post Office at Anthony go N on U. S. Hwys. 80 and 85 2.7 mi., turn right (E) on dirt road and follow 0.4 mi. to forks just E of wooden bridge, take right fork, known as the pipe line road, and continue along the pipe line SE 7.6 mi., thence S 0.5 mi. to power shed.

Site 2, Vado, N. M.: From Post Office at Vado go E from U. S. Hwys. 80 and 85 on dirt road 0.3 mi., turn right (E) at school house and continue E 2.1 mi. on dirt and sand road to gate and forks, pass through gate and follow S fork, which shortly turns E and winds along ridge, 2.3 mi. to fork; continue straight ahead 0.4 mi. to house at road junction, turn left (N) 0.5 mi. to gate; pass through gate and continue N toward mountain along E side of fence 0.5 mi. to gate (near corral); pass through gate and continue E 1.1 mi.; turn left (N) on trail 2.2 mi. toward mountain to power shed.

Site 4, Las Cruces, N. M., Field: Site is on U. S. Hwy. 70 11 mi. ENE of Las Cruces.

Site 6, Jornada, N. M.: From the junction of U. S. Hwys. 80 and 70 on N edge of Las Cruces, go NE on U. S. 70 5.8 mi., thence left on gravel road (N) 10.5 mi. to Y road at windmill, keep to right on gravel 6.1 mi. to Jornada Range Headquarters, where engine-generators are installed. Follow power line 1.8 mi. to beacon.

Site 8, Aleman, N. M.: From the RR crossing on State Hwy. 52 at Engle, N. M., turn right (S) on dirt road, go 12.8 mi. to gate near E side of corral at Aleman Ranch; thence through gate, keeping to left, 0.4 mi. to Y intersection; thence take right fork (SE), passing through gate at 0.2 mi. and reaching X intersection at 4.4 mi. from Y fork; thence go straight ahead on left arm of X (SE), passing through gate at 4.8 mi. and reaching site at 5.9 mi. from X intersection.

Site 10, Engle, N. M., Field: Field is 3 mi. E of Engle on State Hwy. 52.

Site 12, Lava, N. M.: From the RR crossing on State Hwy. 52 at Engle, N. M., go N on dirt road, passing cattle guard at 0.4 mi., passing through 2 corral gates at ranch house at 9.8 mi., keep to right at Y intersection at 18.0 mi., turn sharply to right (SE) at Casa Grande Ranch house, 20.8 mi., take left fork (E) on new trail at Y intersection at 21.7 mi., reach site at 23.35 mi.

El Paso-Pueblo Airway (CONTINUED)

Site 14, Val Verde, N. M.: From San Antonio, N. M., proceed E on U. S. Hwy. 380 about 8.5 mi. (to end of black top road and cattle guard), turn S 1.8 mi., turn ESE, follow improved road 5.9 mi., turn right, follow road past one windmill, continue to second windmill and water tanks 4.9 mi. Turn right follow road to corral and ranch 3.2 mi. Go through corral, continue 5.9 mi. to fork in road, turn right, at 1.4 mi. turn left 1.8 mi. to power shed.

Site 15, Bosquecito, N. M.: From the Highway bridge over the Rio Grande at San Antonio, N. M., proceed E on U. S. Hwy. 380 0.9 mi. to trail leading N. Proceed in a general N direction on trail. At 4.2 mi. from bridge, pass through gate at ranch and continue 1.6 mi. to power shed.

Site 16, Socorro, N. M., Field: Field is on U.S. Hwy. 85, 2.6 mi. S of Socorro.

Site 17, Mesa del Yeso, N. M.: From intersection of Manzaneros Ave. and U.S. Hwy. 85 in Socorro, N. M., proceed N on U.S. 85 2.5 mi. and turn right off Hwy. 85 onto gravel road and proceed N 1.25 mi., turn right (E) to gravel road crossing wooden bridge over irrigation ditch and RR track; continue E across Rio Grande bridge and at 0.8 mi. from the RR turn left (N); at 1.3 mi. from RR cross cattle guard; at 1.45 mi. from RR turn left and cross the arroyo; at 1.75 mi. from RR take the right fork and follow N side of arroyo as road begins to wind up hill and follow winding gravel road along ridge of hill; at 9.2 mi. from RR pass through gate, continue straight ahead on old road 1.25 mi.; take trail to right (E) 0.4 mi. to power shed.

Site 19, Bernardo, N. M.: From the intersection of U.S. Hwys. 85 and 60 just W of Bernardo, go E on Hwy. 60 5.6 mi. to site.

Site 20, Belen, N. M.: From the Post Office at Belen go E on Dalies St. (gravel) 0.4 mi.; turn left (N) along irrigation ditch 0.1 mi.; turn right (E) across RR tracks and follow oiled road (N.M. State Road 52) 1.9 mi. to highway junction at E end of bridge over Rio Grande; take fork to SE, continue on gravel road SE 3.75 mi. to site.

Site 21, Peralta, N. M.: From intersection of U.S. Hwy. 85 and State Hwy. 47 at Los Lunas, N. M., go E on State Hwy. 47 crossing Rio Grande bridge at 1.1 mi., keep to left at Y intersection at 1.7 mi., pass Valencia Church at 2.4 mi. and at 2.9 mi. turn right (E) on gravel road, and go E 2.3 mi. to site.

Site 32, Bernal Hill, N. M.: Leave U.S. Hwy. 85 at Serafina, N. M., and proceed S on State Hwy. 3 (gravelod). Cross RR and proceed 1.8 mi., turn in gate to right and follow unimproved road 0.7 mi. to W, turn right, follow road 0.3 mi. to power shed.

Site 34, Las Vegas, N. M.: From Post Office at Las Vegas proceed ^{NE} on U.S. Hwy. 85 about 8.2 mi. to Airport sign, turn right about 2.3 mi. to field and site.

Site 37, Turkey Mtn., N. M.: From Wagon Mound, N. M., proceed S on Hwy. 85 0.8 mi. Turn W on graded road 1.5 mi., cross cattle guard and continue W on unimproved road 1.0 mi., take left fork, continue W 2.0 mi., cross cattle guard, continue W 4.6 mi., cross cattle guard, continue W 1.3 mi., take left fork and follow road S 2.1 mi., follow road into canyon 0.6 mi., turn right and follow trail 0.4 mi. SW to power shed.

El Paso-Pueblo Airway (Continued)

Site 39, Colmar, N. M.: Starting at Springer, N. M., proceed SW along U. S. Hwy. 85 7.6 mi. Turn W and follow graded road 6.3 mi. Turn N and proceed along graded road 1.8 mi. to fence and cattle guard. Turn W and follow trail along N side of fence 2200 feet to power shed.

Site 41, Maxwell, N. M.: From highway intersections at Maxwell proceed N on paved U.S. Hwy. 85 0.3 mi., turn W on graded road, proceed 4.9 mi. to site.

Site 42, Raton, N. M., Field: Field is on U. S. Hwy. 85, about 11 mi. S of Raton and 14 mi. N of Maxwell.

Site 45, Raton Mesa, Colo.: From center of business section of Raton, N. M., proceed E on gravel State Hwy. 72 about 8 mi. to Yankos, take first left-hand road up mesa, from top of mesa go N and W about 9 mi. to site. Note: Local residents call this Barolla Mesa, rather than Raton Mesa.

Fort Worth-Atlanta Airway

Site 1, Euless, Texas: From Euless, go S about 200 yds., then W through private drive about 300 yds. to site.

Site 4, Mosquito, Texas: From U. S. Hwy. 80, about 1 mi. NW of Mosquito, turn N 1.1 mi. to site.

Site 6, Terrell, Texas: From Terrell go N on Rockwall St. to Griffith Ave. turn left to city limits, continue straight ahead 3.5 mi. (NW) to site. OR from a point on U. S. Hwy. 80 about 3.6 mi. W of Terrell and 7.4 mi. E of Forney, turn N 4.4 mi. to site.

Site 7, Wills Point, Texas, Field: From RR station at Wills Point go N 2 blocks, turn W one block, turn N 2 blocks, turn left and follow main graded dirt road 1.5 mi., then take right fork 0.6 mi., then left-hand road 1.4 mi., then left 0.7 mi., then right .9 mi., turn left .4 mi., turn right and go 1.7 mi. to site.

Site 9, Fruitvale, Texas: From U. S. Hwy. 80 at Fruitvale turn N 2.8 mi. to site.

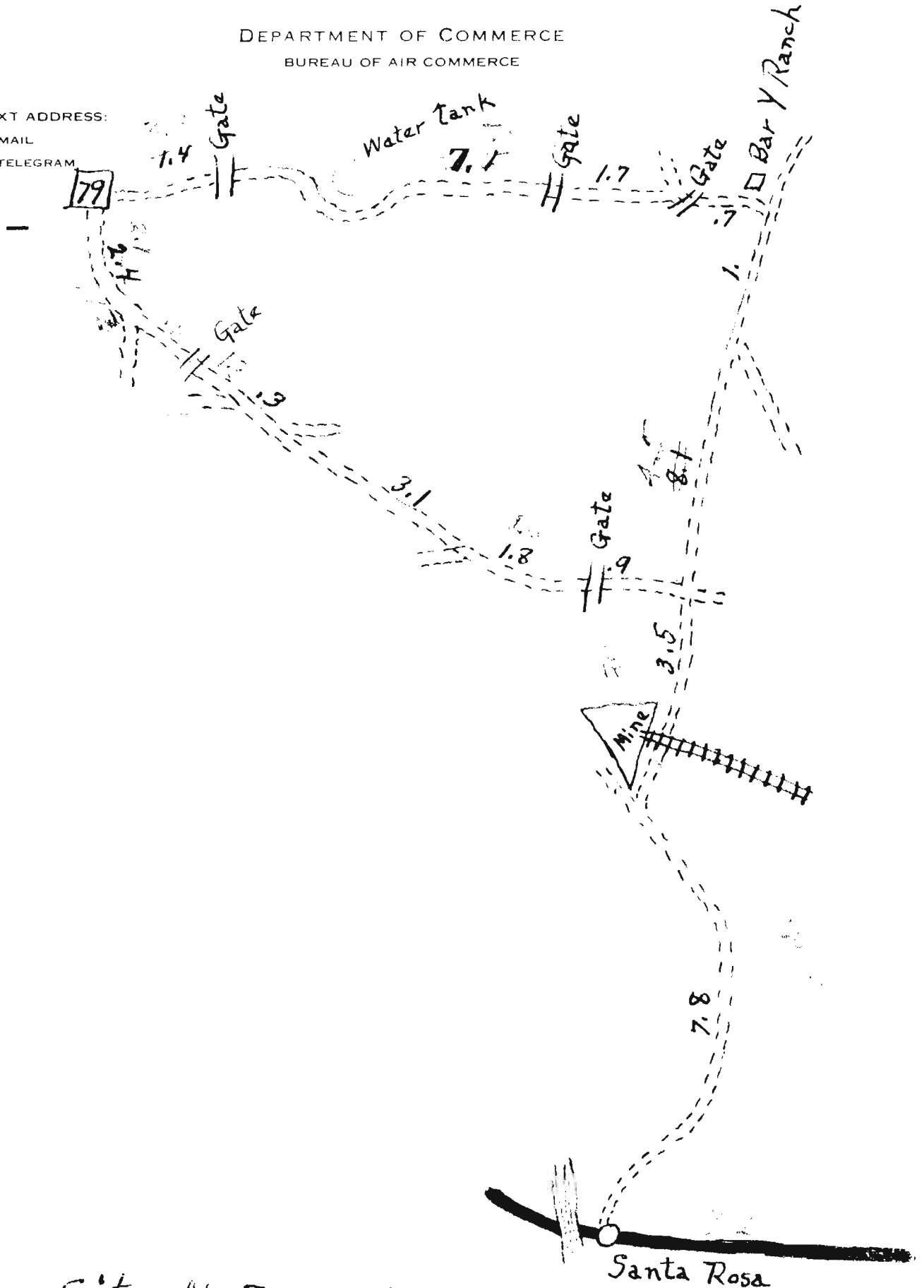
Site 10, Mincola, Texas: Site is about 3 mi. NW of Mincola, on the Sand Springs road.

Site 12, Hawkins, Texas, Field: From U. S. Hwy. 80 at Hawkins, turn N, go 6.7 mi., turn left 0.3 mi., then right 0.3 mi. to field.

Site 13, Pritchett, Texas: From U. S. Hwy. 80 at Big Sandy go N on main road to Pritchett, about 8 mi. Site is on hill to left.

DEPARTMENT OF COMMERCE
BUREAU OF AIR COMMERCE

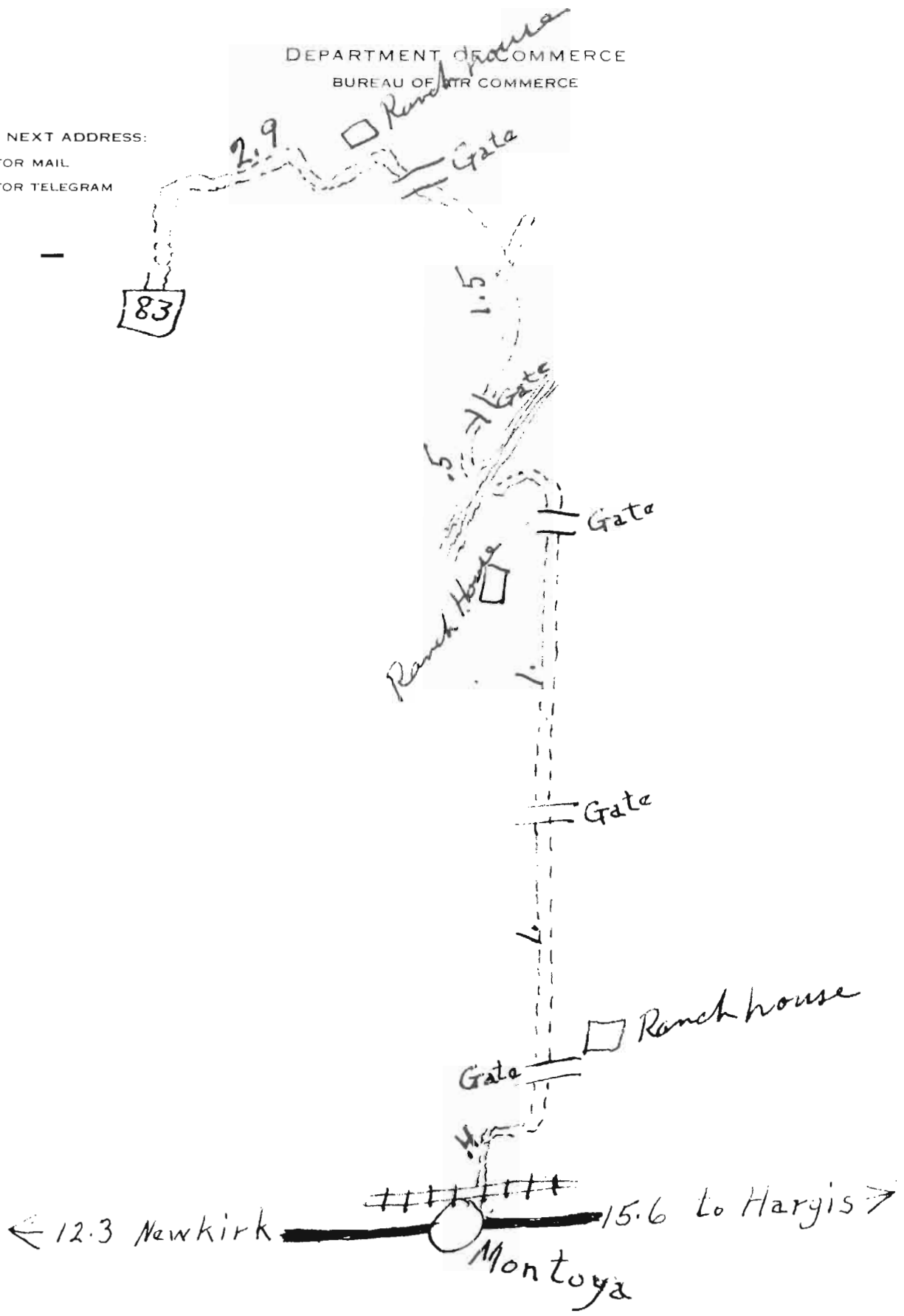
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FOR MAIL
FOR TELEGRAM



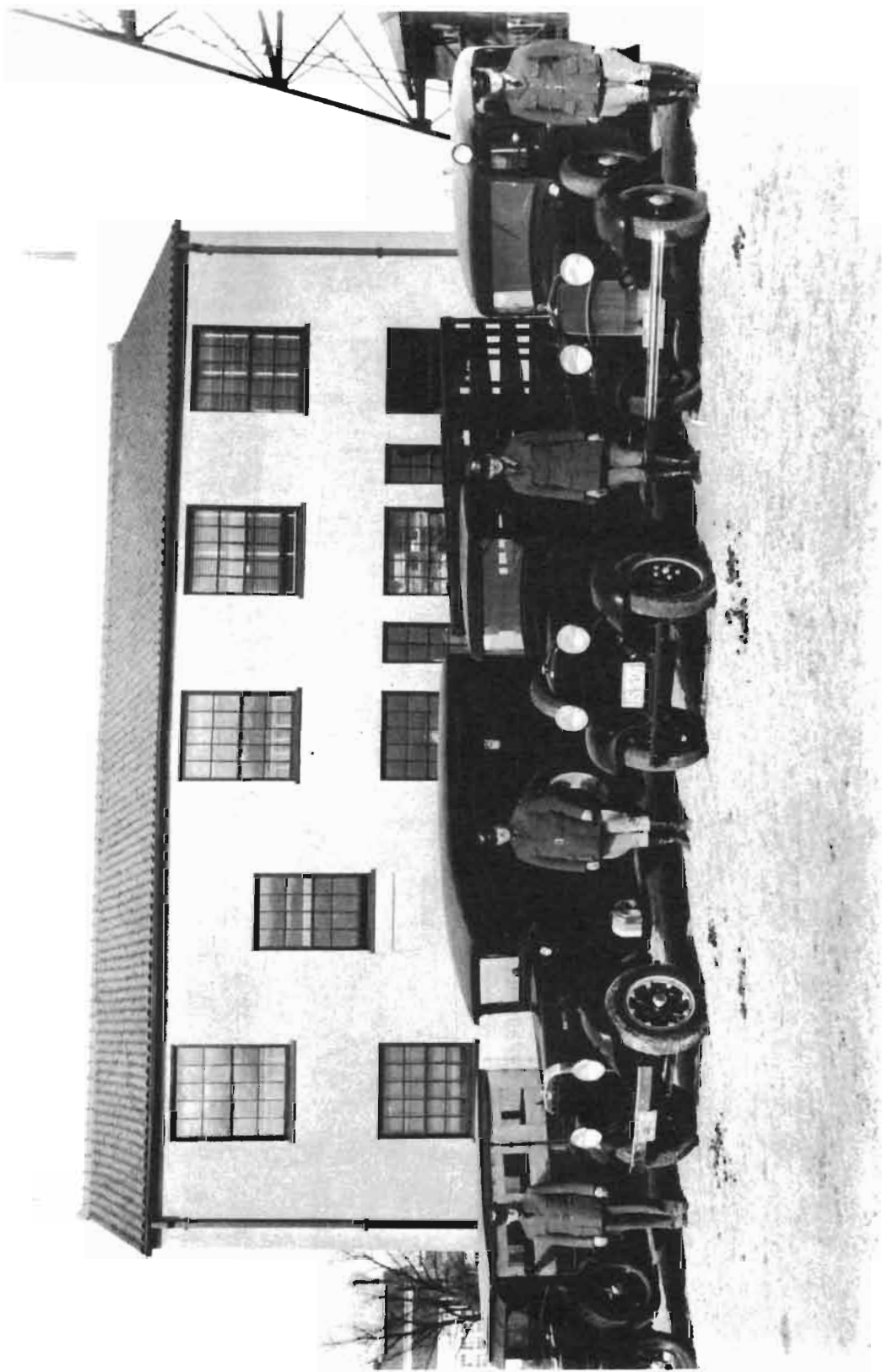
Site No. 79, Colonias

DEPARTMENT OF COMMERCE
BUREAU OF AIR COMMERCE

GIVE NEXT ADDRESS:
FOR MAIL
FOR TELEGRAM



Site No. 83. Montoya



AIRWAY MECHANICIANS READY TO TRAVEL

From left to right: W. E. Murdock, Art Steilow, Charlie Geise and Doyle Phelps. Airway mechanics wore military type uniforms during the Lighthouse Service administration. Building 1, still the administrative center but greatly expanded during the years, is in the immediate background. In the distance are shop buildings north of the railroad tracks.



Unidentified airway beacon



Tom Claxton at a communications station



Cassody, Kans., station then under the supervision of the Fort Worth office



John Withers at communication station



El Morro site

El Morro road in
winter



Digging out -- a
common occurrence





Beacon located at Harrington Ranch Field between El Paso and Columbus, N. M., on Los Angeles-El Paso Airway. Fan marker is also installed here.



Cy Martin adjusts wiring in a 24-inch airway beacon.



Blinker Light near Rodeo,
N. M., airfield



Oso Ridge, N. M., beacon and generator site

AIR TRAFFIC CONTROL

If it could be termed as such, the early Airway Radio Station was a form of air traffic control. At these stations the communicator made his own weather observations and forecasts, including estimates of ceiling, temperature, visibility, windspeed and direction, as well as field conditions. Additional nearby weather observations were phoned to him by part-time weather observers and pilots would pass on their inflight weather observations after landing. At best, the weather maps produced consisted of a narrow swath from one station to the next, with little information on adjacent storm systems. The communicator's conversations with pilots were strictly on a person-to-person basis as the only air-to-ground radio communications in the early days were for experimental work.¹

Usually the communicator worked split shifts to accommodate the airline's arrival and departure. When the radio was not being used to transmit aeronautical information, the lines were open for other government business. Department of Agriculture reports showed market conditions in various major marketing cities. Even party line gossip and neighborly messages found their way into the system, linking all participants into a kind of family relationship.

Conditions were changing in the 1930s. In 1938 the Airway Radio Station was redesignated "Airway Communications Station" under the newly created Civil Aeronautics Authority (later the Civil Aeronautics Administration of the Department of Commerce). They were commonly called INSACs for Interstate Airway Communications. By this time, thanks to air-to-ground capability, station operators could actively participate in the control of flights in progress, giving the latest weather reports and helping lost pilots identify local landmarks and find their bearings. The term "flight service station" came much later with the creation of the Federal Aviation Agency in 1958 and has continued since.

The importance of air traffic control became apparent in 1936 when the Air Traffic Control Branch was set up in each region as a co-equal to the Communications Branch. The first three air route traffic control centers had been established by the airlines and they were soon to be taken over by the Bureau of Air Commerce and eventually grow to a total of 29. By this time at least 20 cities had set up airport traffic control towers with light guns and low powered radio transmitters. Locally determined procedures and common sense were the only rules that governed the controllers in those days. After the Civil Aeronautics Act of 1938, municipal controllers were certified by CAA for theoretical knowledge, physical qualifications and experience. Shortly thereafter regulations requiring pilots to comply with the controller's instructions were passed. The CAA started taking over the tower in late 1941 and continued into the early war years.²

The following accounts concern the communications at some of the more isolated stations:

WE SOLD GASOLINE IN ANTON CHICO*

My first assignment with the FAA, then the CAA, was at Santo, Texas, 50 miles west of Fort Worth back in February 1939. We were about a three-man operation, and our main jobs were weather observations and keeping the lights and beacon burning on the emergency landing field. The field was seldom used by aircraft. I do remember one time when for some reason a Tri-motor Ford aircraft landed there, and I flew over to Mineral Wells and back with the pilot. On another occasion we had a twin Beech land which had hit a large bird in flight and knocked quite a hole in the leading edge of the wing. The airport was an emergency dirt strip, and there were quite a number of armadillos and jack rabbits in the area. One of the diversions in our leisure time was hunting armadillos and jack rabbits. This helped reduce the population of armadillos and cut down on the number of burrows they dug in the airport.

I moved on to Raton, N. M., in June of 1940. The Raton facility was similar to the Santo facility except that we felt like we were in the big city. Santo only had about 200 or 300 people. Raton is a small coal mining city in Northern New Mexico and has a population of about 7,000. In those days, the Station was located south of Raton about 12 miles. We had no commercial electricity. We had an engine generator at the site that provided us with 24-hour power service. You had to be a jack-of-all-trades then in case the generator failed, leaving you without power with the nearest maintenance man at Las Vegas. Las Vegas was about 150 miles away, and you had to keep the shop going.

After a stay at Las Vegas and then to Fort Worth at the old Communications Center, I was transferred in 1942, to Anton Chico, N. M., and placed in charge of an all-bachelor life in the Station. We had three men working at the facility. It was an isolated facility, more so than Santo, Texas, as we were the only persons within about ten miles. Our power service was also provided by engine generators. We had a low frequency homing beacon along the old Kansas City-Albuquerque route, Green Airway 4, I believe. TWA flew the route regularly in DC-3 aircraft, and they would drop us newspapers when they flew over our facility. We were able to find almost all the papers and magazines they dropped. Unlike Santo, we sold aviation gas. It came in five-gallon containers. If a pilot wanted any, he had to buy five gallons. We would even put it in the plane for him. Anton Chico

*Submitted by Carl Fry, Chief of the Fayetteville FSS and Tower. ³

experienced rather severe winters with quite a lot of snow. It was not unusual to be snowed in during the winter months sometimes for as long as four or five days at a time. We kept a good supply of food on hand just in case. There being no television in those days, our entertainment was a bit different. We mostly read, listened to the radio, and explored the countryside. A transfer in 1945 sent me to Alice, Texas, and I spent the rest of my FAA career at more populated locations.

THE FAMILY WAS ALSO INVOLVED*

I made six moves during my FAA career, all but one TAWOG (travel without expense to the government). To get to my first assignment in 1938 at Anton Chico, N.M., I bought the front end of a 1934 Plymouth, took the wheels and springs, \$25 worth of lumber and bolts, an inordinate amount of muscle and sweat and built a trailer. It was so heavy when loaded with all my worldly goods that my family and I had to drive through the night, because the car overheated during the day. Sleeping at a motel enroute was at my expense.

We first lived in a one-room adobe house seven miles from the airport. It had one door and one window to our room and a dirt floor covered with a small linoleum. Typical for the area, the adjoining room was a stable for cows, burros and chickens.

After a few weeks in this combination stable and house, we returned home to build the trailer I mentioned above. First, I had to build a house near the airport which, on my salary of \$1,200 a year, was a 16 by 16 adobe room with a sheet-iron roof. A window box on one side was our refrigerator. Few of you have ever come across this, so I'll explain. The box hanging outside the window was surrounded by a cloth suspended in a tray of water. The evaporation reduced the temperature inside and kept milk and butter surprisingly cool.

We had no plumbing of any sort, inside or outside. For water, I had to drag a 20-gallon GI can from nearly waist-deep water in one of the small lakes, sometimes called buffalo wallows, and sterilize the water at home. Sometimes, we'd do the same with water from the nearby Pecos River. There was water at the Station, but it had such a high mineral content that we were afraid to drink it because of the cathartic effects. Actually, after a week's use of water boiled in the tea kettle, there was such an accumulation of calcium inside the spout that it would close the spout so you could no longer pour from it.

*An account by Charles M. Martin, retired Flight Specialist (last station, Wichita Falls, Texas.) He now lives in Wichita Falls. ⁴

I have ever since been grateful to the agency--called the CAA in those days--for arranging for me to transfer from Anton Chico to Santo, Tex., after 10 months, because of a severe hardship with two sick children. Then I got a big promotion to \$1,600 with a move to Abilene, Tex., again at my expense.

In 1941 came another move to Oklahoma City at my expense and also not without trouble. I borrowed a four-wheel cotton trailer from a friend to haul the family and furniture to the new assignment. Three days and two trips later, including two flat tires, we arrived in Oklahoma City, and it began to pour, without our having any place to move into. We arranged to buy a three-room (not three-bedroom) house near Will Rogers Airport. The furniture took a soaking while we negotiated the purchase.

After a short time in Oklahoma City, we transferred to Fort Worth, again at my expense, but this move really came high. I rented a big tandem stock trailer for \$5.90, took a load to Fort Worth, returned, hooked up my old trailer and moved the rest of our belongings. The total cost, including gas came to less than \$15.

THOSE RANCH PEOPLE HELPED US ⁵

After Dave Finnell came into the CAA in 1944 and finished the aircraft communicator school he was told that if he went to Guadalupe Pass, Texas, for six months he could then transfer to any place he wanted in the Southwest Region. But he liked Guadalupe and stayed for four and a half years and then served nearby at Carlsbad and Salt Flat. Now manager of the Fort Worth Airway Facilities Sector, Finnell moved into airway maintenance in 1952 and subsequently served throughout West Texas, including an assignment as manager of the El Paso Sector. He is very fond of the ranch people with whom he came into contact during his early career.

In those days the CAA maintained an INSAC at Guadalupe Pass. Hourly weather observations were taken and all weather data were transmitted to El Paso in international code on the CW circuit. Weather information from this mountainous area was important as the weather could deteriorate rapidly and El Capitan, the highest peak in Texas, jutted to a height of 8,760 feet just seven miles away. Finnell remembered being "socked in" for 40 consecutive days by a series of fronts while Salt Flat, just 18 miles west, was clear most of the time.

There was a crew of six -- all bachelors -- who lived at the facility located seven miles off U. S. Highway 180. The chief and senior communicator had private rooms, but the four other communicators shared attic quarters with bunks and possessions arranged in military fashion. During his tenure at Guadalupe, Finnell moved up in seniority, progressing to the

private room and ownership of the station dog, part greyhound and part coyote who answered to the name of "Alcatraz Guadalupe."

A communicator sometimes liked the duty, especially when he got seniority. Finnell said that the senior man, Gus Rosser, would sit each morning, staring out the window at the terrain. His comment would be, "I'll leave this place when that mountain moves." And Finnell said it was "good duty, but you had to be in the right frame of mind."

The communicators stood a three-hour watch on a 24-hour rotating shift. Pilots were grateful to the communicators and showed special thanks in many ways. A Navy squadron flew regularly from Florida to California and returned and the pilots would dive low over the station and drop newspapers. "We never knew what edition or from what city, but we had newspapers," Finnell said.

Carlsbad was the closest town and once a month one of the men would make the trip to buy supplies. Buying groceries was a big event and the duty was rotated. Sometimes it would turn into a day's trip to El Paso and back. Grocery costs were shared and the CAA took out an amount for the government-furnished "attic" quarters. Finnell said he went almost a year at one time without this deduction from his pay. Then a letter arrived from the regional office, informing him that he owed for 10 months back deductions and the entire amount would be taken out of his next check. He wrote back that it had taken 10 months for them to find the error and he wished to pay it back in 10 months. The regional office agreed and the overpayment was eventually corrected.

Guadalupe Pass was still far from comfort, but it had both good and bad points. Water had to be hauled from a spring several miles away by a 400 gallon water truck. On the other hand, game was plentiful and the communicators "forgot" whether the season was open or closed. Border patrol agents and the game warden often ate with them and enjoyed their beef (antelope or deer) and chicken dishes (dove or quail). Out of season procurement was limited to needs, and when the CAA finally bought the men a deep freezer they were able to keep regularly purchased meats.

Finnell said that every communicator felt a part of the family of Mr. and Mrs. Walter Glover who ran the post office and cafe at Pine Springs Camp, seven miles from the Guadalupe Pass station. They picked up their mail there after the Glovers picked it up in Carlsbad. Also every new man reporting to the station met the Glovers first -- when he got off the bus after the 185-mile trip from El Paso to inquire how to get to the station. The Glovers were friends, messengers, provider of a home away from home and match-maker -- Mrs. Glover introduced Finnell to the young lady who has been his wife of 30 years.

After his marriage, Finnell eventually put in for his transfer and went to Carlsbad, which was then a new station. After a short tour there he moved to Salt Flat. "There was always a kinship between Guadalupe Pass and Salt Flat, just 14 miles away," Finnell said. "You were really getting up in the world to move to Salt Flat....they had teletype there." Salt Flat also had an emergency intermediate landing strip which could become busy when weather closed in over Guadalupe.

Salt Flat had been an INSAC for some time and due to its isolation, housing was provided for married communicators.* Initially there were three homes, but this number was later increased by seven more. Finnell spent four years here, leaving when he transferred into facilities. It was here that he met another ranch family, Mr. and Mrs. Ed Hammack, whom Finnell described as parents, babysitters, advisors, moneylenders and nurse to all the federal employees.

In those days the only source of electrical power was from the CAA's engine generator plants, a means of supply that continued until about 1960 when rural electrification was brought into the remote areas. When the Salt Flat engine generator failed, the Hammacks, whose property was adjacent to the Salt Flat reservation would share their power distribution with reservation personnel. The same was true with water supply; when the old CAA water pump's sucker rods broke, a trip of 110 miles to El Paso for parts was necessary. The Hammacks were there with water and assistance. "A man's word and the shake of a hand" were basic to the ranch people and their help and friendship meant much to the FAA personnel and their families in the remote parts of Texas.

* Salt Flat was decommissioned in the mid-1960s. One other isolated station with family housing was at Zuni, N. M. Zuni was closed in the early 1970s with its functions and those of Grants being combined in a new station at Gallup.

8 JUN 1971

Mr. and Mrs. Ed Hammack
Salt Flat, Texas 79847

Dear Friends:

Permit me to add my congratulations and best wishes to those of your many other FAA friends on the occasion of your Golden Wedding Anniversary which you will observe this Sunday.

Although I have not had the pleasure of meeting either of you personally, the high praise and warm regard the former FAA employees at Salt Flat have of you both serve as an excellent introduction. The interest you showed and the accommodations you offered these FAA employees, from the time the first FAA resident arrived in 1929 until the facility's recent closing, are legendary in the Southwest Region.

When former FAA residents of Salt Flat talk of this duty, the name of Mr. and Mrs. Hammack always enters the conversation. They praise their good neighbors who "took us in and shared with us and became a part of the FAA community." As times changed -- from your being "Mom and Dad" to the single man in the early days to looking after the children of another FAA generation -- you both maintained a personal interest in all FAA people. For this you will always be remembered and loved by your former neighbors.

I know that your day, this Golden Wedding Anniversary, will be full of personal memories, too. Speaking for myself and all your FAA friends, may it be one of the best days of your lives.

Sincerely,

HENRY L. NEWMAN

THE CENTERS ARE ESTABLISHED ⁶

Clarence Tolpo, who had been in military and commercial aviation since the early 1920s, went to Cleveland, Ohio in June 1936 to become the assistant manager of the Cleveland Center. (Two other centers were established at this time: Chicago and Newark, N. J.). The following month, July 1936, the centers were taken over by the Bureau of Air Commerce and Tolpo began his long federal service career. He said it took "16 men and a 2 1/2 page directive" to get the centers into business.

In 1938 Tolpo transferred to Fort Worth to establish the Fort Worth Center in 1939 and to become its first manager. The center was located in the old terminal building at Meacham Field, later being moved to the downtown Majestic Building. Later, from 1948 to 1962, it occupied space in Building 3 at the regional office, moving in 1962 to its present location near the then-Greater Southwest Airport. Nine people made up the original controller complement of the Fort Worth Center.

Tolpo then became chief of the Air Traffic Control Branch and directed the establishment of the Albuquerque and San Antonio Centers. El Paso and New Orleans were added near the end of World War II. (In 1962 El Paso was deactivated and its duties transferred to Albuquerque and in 1965 the San Antonio and New Orleans Centers were deactivated and duties taken over by the newly-established Houston Center). During Tolpo's tenure as branch chief, the region assumed control of airport traffic control towers (or established towers) at Dallas, Fort Worth, Shreveport, Little Rock, Oklahoma City, Tulsa, Austin, San Antonio, Houston, Corpus Christi, Albuquerque, El Paso, Big Springs, Abilene, Amarillo and Brownsville. Also, an extensive training program which produced approximately 900 controllers for the Navy and Marines was conducted in Fort Worth by the CAA.

Ray C. Swafford, a controller at the San Antonio Center and, later, the Houston Center kept a log of the growth and progress of the San Antonio Center. The first two years of his historical and statistical document are presented for information on the center's establishment and growth toward maturity. This is followed by a story of the New Orleans Centers, its beginning and its end, by S. M. Kauffroth, retired Houston Center controller who made the move from New Orleans when that center was deactivated.

SAN ANTONIO CENTER

The CAA began an extensive program in 1941 to expand its Air Traffic Control service and exercise control of IFR traffic which operated along designated airways. Control of IFR traffic was still in its infancy and only fourteen Air Traffic Control Centers provided this service: New York, Cleveland, and Chicago that were commissioned in July 1936; Pittsburgh, Detroit, Washington, Burbank, and Oakland that were commissioned in FY-1937; Fort Worth, Salt Lake City, and St. Louis that were commissioned in FY-1939; Atlanta that was commissioned in FY-1940; Seattle and Cincinnati that were commissioned in FY-1941. Appropriations for FY-1942 (July 1, 1941, through June 30, 1942) provided for establishing nine additional ATC Centers which were to be located at Jacksonville, Boston, Memphis, San Antonio, Minneapolis, Kansas City, Albuquerque, Great Falls, and Denver.

Stinson Field was selected as the site for the San Antonio Center. Modification of a steel hangar, the first building east of the Administration Building, began in late summer of 1941. Mr. C. T. Tolpo, Chief of the Air Traffic Control Branch in the Fourth Region, visited the site frequently to supervise the installation of equipment and determine progress being made. Mr. Archie DeLatte, Chief of the Stinson Communications Station, handled the paper work on property shipments and acted in the capacity of coordinator for Mr. Tolpo.

The physical layout of the Center included two flight progress stands, each being seven feet long and containing six bays of clip-on type strip holders for removable paper strips which were about fourteen inches long. One "B-stand" with two operating positions for receiving and delivering CFR flight plans of military aircraft to military Operations Offices. Seven interphone positions were installed: two on each of the two sectors, one on each of the two "B-stand" positions, and one on the "E" position. Each position contained two 102A 5-key units with identical circuit termination. Conference circuits served five local facilities at Stinson Field: Tower, Stinson Radio, Braniff, Eastern, and Weather Bureau. Longline circuits served Houston, Corpus Christi, Brownsville, Austin, Kelly-Duncan Tower, Brooks Tower, and Randolph Tower.

There were four voice recorders to record the four positions on the flight progress stands. Three low frequency tunable receivers were installed which permitted the controller to monitor radio transmissions from local facilities or from aircraft in the vicinity of San Antonio. These receivers were wired to permit recording when desirable. A pneumatic tube system connected the Center's "B-stands" with Stinson

Communications Station located on the second floor of the Administration Building. The Center was not equipped with teletype or interphone to the adjacent control centers. Flight plans of aircraft destined to airports not on the Center's interphone system or flights proceeding outside the Center's control area were forwarded via pneumatic tube to the Stinson Communication Station who placed the data on teletype and addressed it to all stations over which the flight would pass and to the destination airport as well as the ATC Centers concerned. The Center accepted all CFR and IFR flight plans and was responsible for delivering military flight plans to military Base Operations Offices by either interphone or teletype.

The San Antonio Control Area was comprised of Amber Airway 4 from 25 miles northeast of Austin to Brownsville, Green Airway 6 from Corpus Christi to 25 miles west of Lake Charles, Blue Airway 5 from 25 miles northwest of Navasota to Galveston, and Red Airway 32 from San Antonio to Houston via Losoya, Yoakum, and Arcola.

The Center's initial complement of twelve personnel began to arrive on October 31, 1941. CAF-10 (\$3,300 per annum) Chief Controller George E. Percefull came from the New York Center; CAF-9 (\$3,100 per annum) Senior Controller Leonard G. Porteous came from the St. Louis Center; CAF-8 (\$2,900 per annum) Controllers Hugh E. Shaw and Harry O. Gray came from the Burbank Center, Otto H. Richardson and Roland W. Bush came from the Fort Worth Center; CAF-5 (\$2,800 per annum) Operators were Ray C. Swofford from Braniff Airways at San Antonio, J. W. Burnham from Eastern Airlines at Houston, Wayne M. Cox from Houston Radio, Francis L. Oster from Dallas Radio, and James O. Sanders from Stinson Radio; CAF-3 Secretary Lucy Griffin transferred from the Civilian Pilot Training Office at Stinson Field.

In late November and early December, several liaison trips were conducted to the air carrier, military, and CAA facilities within the area to explain the Center's service and familiarize Center personnel with field facilities. The December 7, bombing of Pearl Harbor caused the Chief to recall personnel and commission the "B-stands" for handling military flight plans. The Center was not fully staffed and procedures for the control of IFR traffic had not been completed, therefore, only partial service was commissioned. It was expected that a two week period of "practice control" would commence on or about January 15, 1942. A city wide blackout test was conducted on December 12 and the Center performed its flight plan handling service behind blackout curtains with candles and flashlights.

Effective January 1, 1942, CAF-5 (\$2,000 per annum) Operators were reclassified to CAF-6 (\$2,300 per annum) Assistant Controllers.

The Center began a two week "practice control" period on February 1, 1942. ATC clearances were issued to IFR flights, but it was not compulsory for the pilots to comply with them. The San Antonio Airways Traffic Control Center was officially commissioned to control IFR traffic on February 15. The primary airspace users under IFR weather conditions were the scheduled air carrier flights. Most military flights that operated under IFR confined their operation to "at least 500 feet on top" and entered the clouds only when absolutely necessary. Air carrier pilots preferred altitudes in the clouds so as to avoid numerous training flights being conducted CFR or on top.

Civil Air Regulations were revised February 10, 1942, and established a vertical boundary to the control area and it was considered as being to infinity even though only a few aircraft were capable of flying above 17,000 feet.

Two and three letter location identifiers were authorized such as: JI Brownsville, CR Corpus Christi, ZN San Antonio, HU Houston, GS Galveston, NT Navasota, XN Austin, WC Waco, DL Dallas, and FW Fort Worth. The Centers were prefixed with a "C" such as: CZN San Antonio and CPS Memphis. Some of the military fields were assigned three letter identifiers such as: WBR Brooks Field and WDF Duncan Field.

The San Antonio Center was joined on the north by the Fort Worth Center and on the east by the Memphis Center. There were no designated airways or control area west of the San Antonio to Fort Worth segment of Amber 4 or south of the Fort Worth to El Paso segment of Green 5. Centers operated independently from each other and clearances issued by a center were applicable only to that area. IFR flights were cleared to cross airways at specified points and to or from the control area boundary such as 25 miles west of Lake Charles. It was the pilot's responsibility to obtain ATC clearance from each Center before entering their area. Teletype flight plans were prepared on flights proceeding outside the area but it was the responsibility of each Center to provide estimates pertinent to their own area. Some of the Communications Stations were not on our interphone system and it was necessary to forward clearances via teletype with appropriate "Q" codes to indicate "attempt delivery time" and various other information. Under these conditions, it was difficult to estimate when a flight from the east or west coast would enter the San Antonio Area and provide ATC clearance at a time appropriate for delivery to the pilot. Estimates were based on the departure indicated in the original flight plan and occasionally a teletype position report was received which helped to improve the entry estimate.

Military pilots were partial to CTC/(altitude) as an instrument altitude. It permitted the pilot to operate contact as long as ceilings remained at least 500 feet above the terrain. When contact flight could no longer be accomplished or was not considered practical by the pilot, he would climb to the assigned minimum altitude and remain at that altitude. This practice made it possible to operate over short distances without having to execute an instrument approach at destination and yet have straight altitude protection in the event ceiling or visibility became too poor for contact flight.

Assistant Controllers prepared clearances on a printed form which provided multiple choice of many commonly used phrases. Controllers approved these clearances prior to issuance to the aircraft.

Randolph Field was situated outside the control area, but its proximity to the airway necessitated a mutual agreement between Randolph and the Center to control their IFR traffic as though they were within the control area.

It was announced early in 1942 that Brooks Field would take over Stinson Field as soon as possible for their expanded training program. Alamo Field on the north side of the city was under construction but far from completion. Nevertheless, Stinson Field tenants were advised they must move by July.

Stepped-up war time training programs of the AAF created additional work load on the Center and more personnel were needed to handle the increase. Recruiting qualified personnel was severely limited due to Selective Service draft requirements. It was necessary to recruit women to fill Trainee and Assistant Controller positions.

Increased IFR activity demanded additional Controller and Senior Controller personnel and promotions were made after unusually short periods of training and experience. Assistant Controllers were promoted to Controllers after eight to twelve months of experience. One Controller was promoted to Senior Controller after being in-grade for less than four months.

The first women Trainees, Crawford, Sandifer, and Roberds were not processed through the Trainee School because its preparations were still incomplete. After a short familiarization tour in the Fort Worth Center, they arrived at the San Antonio Center in April 1942. Mr. Paul Boatman was selected to direct the Trainee School. Mr. Hugh Shaw, a San Antonio Controller, was selected in May 1942, as one of his instructors. Other women Trainees were employed who possessed experience as airline hostesses, school teachers, or had achieved certain college education. Trainees were graduated from the school after a six weeks course in air traffic control procedures and transferred to field facilities. Fourth

Region Facility Chiefs were directed to select Assistant Controllers who were potentially controller material and send them to the school for a two weeks course especially designed to prepare them for promotion. Fort Worth, San Antonio, and Albuquerque Centers were limited to sending not more than three Assistants from each Center. Eight men from centers and approximately twelve men from towers attended this course. It was expected that they would be recommended for promotion to Controller upon completion of the course. Cox, Oster, and Swofford attended from the San Antonio Center. Among the tower men were George Winship, John Blair, Jack Odle, Clifford Slack, Glen Compton, and Ray Sherfy. Although the course was scheduled to run from June 25 until July 6, the San Antonio men were directed to return on July 4 to assist in the Center's move from Stinson Field to 509 Bedell Building. The Center's control area was decommissioned from July 5 through July 15 to simplify the moving and to allow time for the interphone circuits to be disconnected at Stinson Field and routed to the Bedell Building. Other Stinson Field tenants moved to Alamo Field and were provided temporary quarters in lean-to additions of their wooden hangars.

A retirement deduction increase from 3 1/2% to 5% of base pay became effective July 5, 1942. The forty hour work week was also increased to forty-eight hours. Compensation for the additional eight hours was one and one half times the regular pay scale.

Interceptor Command Filter Centers were established at Houston and San Antonio in the summer of 1942. The CAA had agreed to provide one Controller and two Assistants for each site to assist in identifying targets sighted and reported by the Ground Observer Corps' posts. Filter Centers were operated by civilian volunteers except for a small staff of Signal Corps officers and men who supervised and directed them. It was necessary to receive three GOC reports before placing a pip on the plotting board as a target. The Raid Clerk would then record the coded coordinates of the target and relay it to the CAA position located on the balcony for identification. The CAA position relayed the target's location to the San Antonio Center who compared it with that of known traffic. The Center used a regional map which was mounted on sheetmetal and magnetized pips representing known traffic were moved along at regular intervals. This was not a positive system for identification because CFR training flights were not required to fly exact courses. However, the Interceptor Command people were satisfied with the degree of accuracy.

Cox and Oster were promoted to Controllers in August; Burnham, Dudley, and Swofford were promoted in September and October; Rosengren was promoted in December 1942. All promotions were handled directly by

the Washington Personnel Office. Appointment and promotion papers suffered extensive delay and even became lost while being processed. Regional Offices did not possess authority to handle these matters.

The CAA promoted a program to extend its Air Traffic Control service to include airport tower control. Most of the city employed tower operators were absorbed into the CAA when the towers were taken over. Houston Tower was taken over by the CAA in June 1942, Corpus Christi on October 1, 1942; San Antonio on November 20, 1942.

NEW ORLEANS CENTER

The end came at 10 p. m., June 26, 1965. Created October 1, 1946, the New Orleans Air Traffic Control Center existed for a period just short of twenty years. During its life span, it was a teaming, active entity which affected the lives and the families of its people. This is the story of the New Orleans Center and of people who were a part of it. No written page can fully document the hard work, the heartaches, the humor, and the accomplishments which took place during that score of years. Nor will it be possible to record the names of all the personnel who contributed so much during that time.

New Orleans Center was pieced together from airspace sliced from overworked traffic control centers -- it was designed to relieve the pressure on Memphis, Atlanta, and Jacksonville Centers. Memphis contributed the area containing Alexandria, Lake Charles, Baton Rouge and New Orleans -- all in Louisiana -- and McComb, Mississippi; Atlanta released that area containing Gulfport and Biloxi in Mississippi, Mobile and Evergreen in Alabama; while Jacksonville handed over Eglin, Crestview, and Pensacola in Florida. Thus, the New Orleans Center was formed.

Under the firm guiding hand of its first chief, Charles A. Clift, the New Orleans Center was fashioned into a smooth-functioning operation and there was assembled a nucleus of skilled personnel brought in from other facilities. Mr. Clift, a veteran of nine years with the CAA, came to New Orleans after a tour in Brazil as Liaison Officer between U. S. Navy and Brazil. The personnel complement on the opening date consisted of Senior Controller Ralph M. Kiser, of controllers Chandler, Jim Brown, Mullens, and Eichenlaub, and of assistant controllers Caswell, Farier, Anderson, Dutch Hoffman, and Sarah Winkler. Mr. Clift was assisted in the routine office work by his secretary, Elenore Hoffman, who turned out to be a capable and effective girl Friday. This small group launched the new facility and laid a firm foundation for those who followed.

The New Orleans Center was located on the second floor of the Federal Land Bank Building, 860 St. Charles St., one-half block on the down-town

side from famed Lee Circle. A limited area of the office space of the Land Bank was cleared to make space for the center's control board and the associated Stand and FAWS. There, amid the desks piled with Federal Land Bank documents, this small group of controllers handled the traffic during the waning months of 1945 and early 1946. It was common to see the chief controller or the senior controller working the board during traffic build-ups, or when shifts were not covered adequately.

Many happy memories are stirred in the hearts of the old Land Bank Controllers when their experiences are recalled. There was one controller who possessed an excellent Irish tenor voice and, when there was no traffic on the midnight shift, oft-times serenaded the local populace by singing from an open window. His ballads of old Erin were generally well received except for one time when an unappreciative soul tossed an old shoe from a nearby apartment window. The ability of this fine controller for memorizing poems and ballads was fabulous -- the midnight shift with him aboard was a pleasure indeed.

Directly across from the Federal Land Bank Building was an establishment named "Cal's Bar & Grill," where the best po-boy sandwiches in town were served and where the coldest draft beer could be purchased. It was here that a few daring controllers assembled after work; it was here that many complicated traffic situations were rehashed; and it was here that the vast flow of traffic on Green 6, or on Amber 5, or on Red 30 was relived. Assistants oft-times claimed that they had performed remarkable calculations of estimates during the previous watch -- even though estimates at that time were computed when the flight plan was received on teletype and, likely as not, was hours away from the New Orleans area.

In August of 1947 the move to New Orleans Municipal Airport (now Lakefront) was accomplished by the Center. By this time, the personnel complement had grown to approximately twenty -- all concerned were excited about the move and were geared up for the new type control board, the "Pittsburg" type. New Orleans Center was the first center in the country where this board was used operationally.

With the introduction of the Pittsburg type control board, the assistant controller worked side-by-side with the controller. Working together in this manner enabled the assistants to gain valuable experience controlling traffic and it also supplied the controller with help by his side when needed. The previous Pittsburg type board made no provisions for this side-by-side operation. The assistants worked on the opposite side of the control board and was expected to monitor interphone calls

of the controller, and in this manner, copy departure times, restrictions issued by the controller, and any changes to the original flight plan. Pessimists were sure that it would not work, but as usual they were wrong, and the Pittsburg board became a proven success at the New Orleans Center. The key to success was the development of team work between the controllers and assistants.

Associated with the implementation of the Pittsburg board was the program of passing flight information from center via Service F. without relying on a teletype flight plan sent out from the originating Center. Both innovations were proved to be successful at the New Orleans Center and soon the Pittsburg type board was placed into operation at many other Centers and the Service F. relay of flight plans came into national usage.

Some controllers initials became well known through the system. It has been said that the initials "SU" were very reliable and accurate, that when a clearance was signed with those initials it was guaranteed to be a "good" one, detailed, and easy to copy. The initials "AL" were noted for their apt smoothness, issued without any strain of effort. Deliberate, factual clearances were signed by "BC." Some of the most cleverly planned clearances were signed by "UX" who could move as many B-25s out of Keesler as any controller alive. Those clearances issued by "CW" always reflected the experience of a controller who had handled heavy traffic without a breakdown. There was "JD," and "JH," "DR," and "DN" and the list is vast of those who accepted the responsibilities for air traffic by the issuance of effective, safe clearances. There was "FG" who always revealed strength and conviction to the individual on the copying end of the clearance. There were Senior Controllers "RM" and "LL" who enjoyed the challenge of heavy traffic and waded in when the going got rough.

In those days, the Airport Restaurant was owned and operated by Johnny McQueen. Food was good -- there was an exciting atmosphere around the airport for one knew but that one of Johnny's famous parties was being planned. There was the "balcony" incident in which a CAAer almost tumbled from the second floor into a group of revellers. Later, Nick Caridas served up food that was good, and his walnut room was the scene of many pleasant times.

The New Orleans Oceanic Control Area was established in late 1948. The city of New Orleans was set like the hub of a wheel and oceanic routes radiated south through the Gulf like spoke. The New Orleans Overseas Radio, known as WEK, was kept busy working traffic, both on CW and on Voice. Air Carriers were beginning to expand their overseas routes to Mexico, Guatamala, San Salvador and across the Gulf to Florida. Two oceanic pioneers, Hasling and Normand, were the first acting controllers of New Orleans OAC Sector.

In 1957 the teletypists became a vital part of the Center operations. At first the men were somewhat concerned about the manner in which the females would fit in the all-male organization, but any fears were rapidly dispelled. Over the years there was assembled in the New Orleans Center a group of intelligent and charming women. Those who will be especially remembered by their fellow workers are: Adele Rousselle, ("the Sarge"), Shirley Dolbaer, Julie Clew, Dorothy Bassin, Arelene Holleschau, Juanita Bridges, Elaine Folse, Helen Saxton, Rosarie Pinto, Hazel Quatrevaux, Gail Jennings, Peggy Tabor, and Mildred Hanna.

One hectic afternoon in 1964, a busy controller spotted a flight with an unusual identification of "Goo" 478. The pilot acknowledged each transmission of the controller but several times he attempted to advise the controller that the flight's call-sign was different than that being used. The controller was too involved with traffic to answer the pilot's calls; however, when the flight was changed to a less congested frequency at another sector he said, "control, will you please advise that other controller that this is Guard zero, zero, four seven eight and Not Goo four seven eight!"

The pilot who was climbing out of New Orleans rather slowly was asked his altitude by an anxious controller. The pilot replied, giving his altitude and also saying that if the controller wanted the plane to climb faster, the controller would have to do it himself. Thereupon, the controller entered into the spirit of the moment by issuing the following clearance, "Roger, reverse course, clear to the New Orleans VOR, descend to and maintain five thousand." The pilot said, "But control, I'm going to Memphis, I don't want to return to New Orleans." "If you want me to fly it," the controller replied, "You'll have to come back here." The pilot thought it was funny too.

But time marched on, and in February and March of 1965, twenty-two personnel were moved to Jacksonville Center and with them the jurisdiction of the airspace at Pensacola, Crestview, and Eglin AFB was transferred to that facility. This had been the beginning of the New Orleans Center!

All of those individuals who have ever worked in the New Orleans Center will remember the crowded operating conditions. Like Topsy, the Center "just grew" from a complement of twenty-odd until well over two hundred. With the implementation of radar and the associated "Islands," less and less space was available. Even with the crowded conditions, a wholesome comradeship existed and, when toes were tramped on, the discomfort was usually laughed away.

AIRPORT TRAFFIC CONTROL TOWERS

The tower is the "baby" of the air traffic control system although the tower houses much sophisticated equipment. A modern terminal radar control facility is "generations" away from the first tower provided by Cleveland in 1930.⁷ Ten other cities followed during the decade, establishing municipally-owned and operated airport traffic control towers. With the increased airport activity brought on by military training, the CAA, which had earlier standardized professional requirements and procedures, began to take over the municipal towers and to establish others. In the Southwest Region at the start of World War II, the only tower operated by the CAA was at Albuquerque, with CAA assuming this control in September 1941.

Walt Plummer, who retired last year, was among the first tower controllers hired and trained by the CAA.⁸ The class of 60 students started in a red school house on North Main Street in Fort Worth. Qualifications were two years of college and a private pilot's license. Most had been through the Civilian Pilot Training Program. The training lasted for six weeks after which the new controllers -- all had passed the course -- took their Civil Service exams.

Tulsa Tower was the first to be opened by the Southwest Region. This was on February 15, 1942, with Plummer being one of its four controllers. With the exception of a short tour of Navy duty and a short assignment at Amarillo, Plummer spent his tower career in Tulsa.

Radios were full of static and very noisy, with one transmitter and three receivers in use. The transmitter was "home built" by a Tulsa firm and, as Plummer remarked, "there wasn't a thing fancy in the tower." Aircraft usually operated under 12,000 feet and at less than 200 miles an hour. If a plane flew above 15,000 feet, which was a rare occasion, the pilot was cleared out of the control zone. There was no ground control position.

Lew Stepter, also retired, had controller seniority by virtue of working for the city of Dallas as an airport traffic controller at Love Field.⁹ However, city pay was less. The most fully certified controllers, including the chief at Dallas Love Field and Fort Worth Meacham Field, drew \$135 a month compared to the \$150 salary of a CAA trainee. There was no holiday, night differential or overtime pay.

Love Tower was operated by six controllers, using one transmitting frequency and three receivers, plus a light gun. One unusual bit of authority at Love Field was that if a pilot did not pay his monthly operating fees by the tenth of the month, the controllers denied him take-off

clearance. If he took off, anyway, it was a good idea to stay away and escape the wrath of the airport manager. Another odd aspect at the time was the grounding by the controllers of student pilots of a local flying school when they violated local rules.

Arthur (Buddy) Koon is one of the persons who saw the start of the airport traffic control towers and stayed to see the ultimate in equipment.¹⁰ His career of 34 years (1942-1976) as a chief controller parallels his experience as an aircraft passenger. At the age of 5 he took his first airplane ride, in an OX-5 Jenny; near the end of his career, in 1973, he was among the Dallas-Fort Worth dignitaries who flew in the Concorde Supersonic aircraft when it made its first visit to the United States.

Koon began working at New Orleans' Shushan Airport (later to be renamed Lakefront) in 1937 in the aircraft repair shop, progressing through tractor driving to the airport traffic control tower in 1939. The airport was built in 1933 and included a control tower, but this facility was used initially as the control center for airport lighting. When Koon moved to the tower in 1939 the controllers used light guns, finally getting radios late that year. "In those days," Koon said, "the airport manager was all-powerful. He could let them fly or not fly."

In April 1941 he moved to Birmingham, Ala., to help the city set up a tower there. Restrictions on the airport were tight; pilots had to have a permit to fly off the airport. During his short tenure there he started the first air traffic control school in the United States, working with the University of Alabama Extension Service. As he explained it, "There was a demand for air traffic controllers but there was no place to train them."

Later that year, Koon moved to Savannah, Ga., as a controller in the CAA-operated tower there. The next April, the CAA transferred him to Lakefront Airport as the chief -- one of the youngest chiefs in the business at less than 25 years of age.

In May 1946 Moisant Airport was completed by the City of New Orleans and he moved to the new tower as chief, remaining there until 1968 when he became chief of the Dallas-Fort Worth TRACON and later the Dallas-Fort Worth Airport Tower.

"When I started working as a controller, you didn't need a certificate," Koon recalled. "However, during 1939-40 you were encouraged to obtain a certificate; later it became compulsory. I got the books, did some self study, and took my exam. They were all oral exams in those days, with the airport manager, a chief airlines pilot and a base operator sitting on the board -- sort of an inquisition rather than a test with any one of them having the power to refuse you." His original certificate, No. 624, was signed by Clarence Tolpo .

FOOTNOTED REFERENCES

1. FAA Fact Sheet "Flight Service Station 50th Anniversary Historical Background," 1970.
2. "ATC -- And How It Used To Be," FAA World, March 1973.
3. Written comments by Carl Fry, Fayetteville, Arkansas, April 1976.
4. Written account by Charles M. Martin, Wichita Falls, Texas, originally submitted to the Public Affairs Office and subsequently published in FAA World, May 1974.
5. Interview with Dave Finnell, Chief, Fort Worth, Texas, Airway Facilities Sector, Meacham Field, May 1976.
6. Telephone interview with Clarence Tolpo, retired, Beaumont, Texas, April 1976. Documents furnished by Ray C. Swafford and S. M. Kauffroth, retired, Houston.
7. Op cit., FAA World, March 1973.
8. Interview with Walter Plummer, retired, Fort Worth, Texas, April 1976.
9. Written submission by Lou Stepter, retired, Cave City, Arkansas, February 1976.
10. Telephone interview with Arthur W. (Buddy) Koon, retired, Fort Worth, Texas, May 1976.

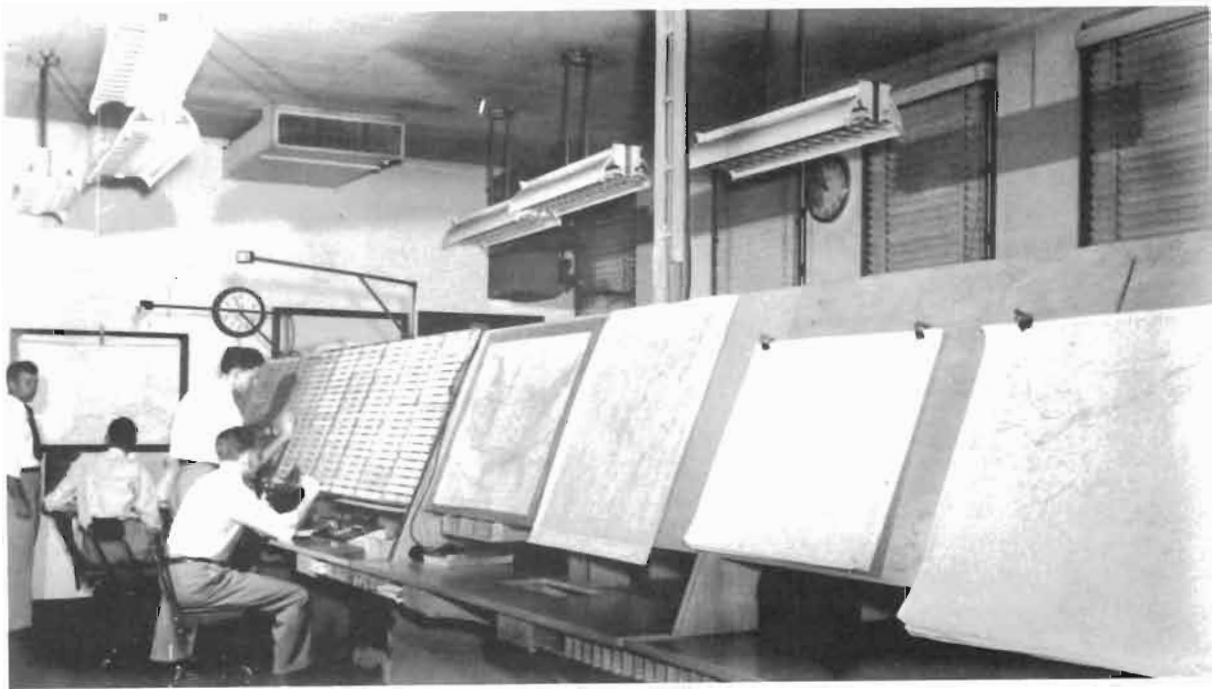


In 1945 the stations still used two-letter identifiers. The chiefs are listed by their last names with this identification. How many do you remember? Left to right, front row: Twyeffort, EM; Estes, LL; Rogers, VM; Richards, LI; Guynes, UX; Kendrick, YK; Cathey, EO; Van Hook, LC; McCormick, OL; Igo, PC - second row: Falcon, UG; Barclay, WC; Williams, OT; Land, DN; Hurst, CP; Christenson, AC; Metcalf, TR; John, NT, Robbins, BZ; O'Neil, JI; Leflore, ZO - third row: Bussey, AT; Ditmore, VH; Bettis, WF; Rosser, KY; Fohn, XN; Jones, ZH; Donahoe, AQ; Lawson, GS; C. E. Carroll, WP; J. L. A. Carroll, KS; Goldberg, AB; Loving, GE; Parmley, RH; Riefenberg, CR; Fry, EZ; Braden, DL; Selby, FV; Swint, EX - back row: Rand, TS; Jordan, HV; Connally, AK; Lanman, JR; Shadden, OS; Norton, HU; Martin, AP; Hover, UO; Guillott, JU; Regional Manager L. C. Elliott; G. L. Rand, Washington Office; Pittius, SJ; Logan, TC. See back of this page for identification.

Front row: El Morro, Laredo, Gage, Little Rock, Palacios, Yokum, El Paso, Lake Charles, Oklahoma City, Ponca City - second row: Lafayette, Waco, Otto, Salt Flat, Childress, Anton Chico, Texarkana, Navasota, Big Springs, Brownsville, Sulphur Springs - third row: Ardmore, Las Vegas, Wichita Falls, Guadalupe Pass, Austin, Shreveport, Amarillo, Galveston, Wink, Columbus, Albuquerque, Gainesville, Rodeo, Corpus Christi, Alice, Dallas, Fort Worth, Hot Springs (Truth or Consequences), - back row: Tulsa, Harpersville, Acomita, Baton Rouge, Socorro, Houston, Abilene, Monroe, Beaumont, Regional Office, Washington, Santa Fe, Tucumcari.



NEW ORLEANS CENTER - the bottom photo was taken in 1946 shortly after the operations began in the Federal Land Bank Building. Three years later, in the photo taken in 1949, improvements in the control boards can be seen. Radar was still several years away.





RADIOTELEGRAPH INSTRUCTION. - COMMUNICATION TRAINING CENTER,
FOURTH REGION. - FORT WORTH, TEXAS.

FLIGHT STANDARDS

Much akin to the airways mechanic, the early airline and general aviation inspector was devoted to making aviation a safe mode of transportation. Our present flight standards activities grew out of the work of these early inspectors, patrol pilots and others. Jack B. Jaynes learned to fly in Fort Worth in World War I and in 1929 began a long career as an airlines inspector and administrator. He moved from airlines inspector in the mid-1930s to Chief, Airlines Inspection (Domestic) in Washington. During World War II he served as a colonel with the U. S. Army Air Corps and closed out his civilian career at Fort Worth as Deputy Regional Administrator. He lives in Fort Worth.

Jaynes has written an autobiography of his aviation experiences, spanning more than 40 years from Pre-World War I to his FAA retirement. The following excerpts from his (unpublished) autobiography provide rich and colorful accounts in several areas of Flight Standards in the 1930s.

I departed Chicago on March 1, 1932, on Boeing Air Transport with Pilot Cy Coppin flying a Boeing "80," a tri-motor aircraft, with ten passengers and the U.S. mail. The weather, at time of take-off, was good with a light snow falling. We had a ceiling of approximately 1800 feet and 3 miles of visibility. We, of course, had to fly underneath the ceiling. By the time we reached Iowa City the weather had deteriorated and continued to do so as we proceeded on to Des Moines. Before reaching Omaha, we were down on the deck and I marveled at the skill of Pilot Coppin in bending this big tri-motored aircraft around the obstructions along our course to Omaha. Truly we were flying below authorized minimums, but it is sometimes better to continue than to try to return in deteriorating weather conditions. This is for the professionals only. The amateur pilot should never stick his nose into bad weather. The weather is very unforgiving to those who are ill prepared to take its fury -- and it can get very furious at times.

The next leg of this flight from Omaha to Cheyenne is a great example of the skill, confidence and execution of flight of a real professional pilot. The weather, upon reaching Omaha, had deteriorated to less than a 500 foot ceiling with heavy blowing snow and I had concluded the flight westward would be canceled or at least delayed for better flying conditions -- not so at all. A Boeing 40-B-2 was warming up on the ramp and I saw them transferring the mail from the tri-motor to the 40-B-2 which is a single engine with the pilot sitting outside and back near the tail section. I went into the operations office and found Ham Lee all dressed in helmet

and goggles, with a heavy flying suit on, looking over the weather reports. I had met Ham on a previous trip and I asked if he was taking the mail on to Cheyenne. He answered in the affirmative. I stated my need to get to Cheyenne and said if there was room, I would like to go with him, and to just consider me another bag of mail. Ham said "Welcome aboard" -- that we'd have a little snow to contend with, but he thought we would make it.

Our take-off was a lulu. Just as we had gained flying speed, Ham rolled over on a wing and took down, no doubt, his favorite street of Omaha. He was sliding in and out between buildings and I had a feeling he was already lost. I took a note book out of my pocket and jotted down to the best of my ability the description of our maneuvers and prevailing weather conditions. The Washington office had, some time ago, requested the Inspectors to find out why so many airmail accidents, and since I was unable to be of assistance to Ham and being just a bag of mail, I might just as well tell what the story would be in case we didn't make it. My thoughts also drifted not only on this flight but many others. I hoped the aircraft didn't burn -- then the accident investigators might find out the exact cause of our demise. I was comforted only in the fact that Ham had been flying this route for some ten or twelve years and I was confident he knew what he was doing.

I was thrown around quite a bit by his almost constant "S" turning and only after gluing my face to the small window did I realize what he was doing. He was banking around haystacks, barns, houses, windmills, trees, etc. We had practically no forward visibility and he was down on the bottom shelf and still hunting for a lower one. The snow was very heavy and the temperature registered 27 degrees below zero at Cheyenne. Ham was able to get some relief, when reaching the Platte River. I estimated the river bed to be some 10 to 20 feet below the banks of the river and this increased his ceiling approximately that amount. We stayed down in the river bed practically the entire distance, making stops at Lincoln and North Platte. Ceiling and visibility improved as we approached Cheyenne, but the air was much more choppy than we had encountered further east. It was a relief to me and I really sympathized with poor old Ham, sitting outside in the raw cold air fighting this weather fury for the past four or five hours.

To me, this flight was one to be remembered, but it was just another routine flight to Ham Lee. He is one of the really true pioneers of the airmail in the great midwest. He had to be great to survive for more than thirty years of carrying Uncle Sam's mail, and later passengers.

On July 4, I departed Fort Worth for Kansas City to participate in an intensified instrument training course with the other airline Inspectors. We had three aircraft -- a J-6 Bellanca, J-5 Travelaire and a Stinson equipped with the special instrument panel and blind flying hoods that were to be standard equipment for training and certificating all airline pilots. Each Inspector had, by this time, considerable instrument training on various aircraft in our respective districts. For the next ten days we were to really concentrate and refine all phases of instrument flying and to undergo a thorough test to determine our own qualifications to hold a scheduled Airline Transport Rating. We then dispersed to our various airline operators to advise them in equipping their aircraft for training their pilots for instrument ratings. Later, we trained their designated instrument pilots and gave them a copy of the maneuvers required and the proficiency expected of each pilot to qualify.

After obtaining my Scheduled Airline Transport Rating at Kansas City, I reported to Hensley Field, Grand Prairie, Texas, for two weeks of Air Corps Reserve Training. I was, at the time, a Captain in the Air Corps Reserve. My first day assignment was to fly in a three-plane formation of A-3's with Lts. Thurlow and Kennedy to intercept a train some 30 miles east of Dallas in which Vice-President John Nance Garner was a passenger and escort this train to Dallas.

A part of my two weeks training was utilized in indoctrinating the regular Air Corps pilots in how the radio ranges operated. We had only one Air Corps aircraft -- an O-19 equipped with a radio receiver, but no transmitter. The Air Corps at the time were doing very little instrument training and were not sold on radio-range flying. In answer to my inquiries as to why such training was not emphasized, I was informed they did not want to rely on a method of navigation that, in the event of war, might be possible for the enemy to destroy the usefulness of this navigation system. It seemed ironical for the Air Corps to be slow in accepting instrument training, when we ourselves had obtained some very valuable advice and aid from two of their own very able officers, Major Ocker and Lt. Carl Crane, in devising our instrument training program.

After my two weeks reserve training was completed, I concentrated for several days on the inspection of Bowen Airlines. Bowen Airlines was owned by Temple Bowen, a very able and reliable operator. Headquartered at Meacham Field, Fort Worth, Bowen operated Lockheed Vega Wasp powered aircraft over routes Tulsa-Oklahoma City-Fort Worth; Tulsa-Dallas (direct); Fort Worth-Dallas and Houston. Pilots at the time were Hatch, Maurice Kay, Stein Lee, Virgil Turnbull, Bill Moors, Emery Hunt, Pop Hitchkiss and Dale Francis.

In August 1932, American Airways informed me that their first pilot was ready to take his test for a Scheduled Airline Transport Rating. Pilot Andrew Burke was my first applicant to take the test. I found Andy generally proficient in handling his aircraft in air-work, but he needed additional training in radio range orientation and on low approach procedures. Andy and I discussed this with his instructor, when I again outlined the standard of performance that would be required of each applicant and requested that Andy be given five additional hours of training on radio range procedures. This was accomplished in the next few days and on his second test Andy became the first airline pilot to get his Scheduled Airline Transport Rating from me.

A J-6-300 (Razorback) Fairchild was utilized for this test. The Fairchild, a cabin type aircraft with the pilot up front and the applicant sitting in the rear of the cabin which had been sealed off to prevent any outside light or view of the outside. Dual flight controls, instruments and radio receiver were installed in this portion of the aircraft. An inter-com system was provided to permit communication between myself and the applicant.

September 9, C. R. Smith, President of American Airways, General Inspector M. F. Clark, Pete Taylor, Superintendent of Maintenance for American, Jim Flynn, Superintendent of Communications for American and I proceeded to Guadalupe Pass, Texas, to investigate the crash of an American Airways eastbound flight out of El Paso. The pilot, Bryan Robbins, encountered low ceilings in the vicinity of Guadalupe Pass. Some two miles south of El Capitan peak, pilot Robbins attempted to negotiate the lower ridge pass, but flew into the ridge near the top. Had he had another 100 feet altitude he would have made it. We landed our own aircraft at the Salt Flat emergency field, approximately 15 miles west of Guadalupe Pass and drove in a car to within two or three miles of the accident site, from where we had to hoof it over very rough and rattlesnake infested territory to the site of the crash. In fact, one rattler challenged C. R. Smith, who met the challenge and clubbed it to death. We spotted several more on our way but did not take time to give battle. It was very difficult, climbing to the crash site and it was getting dusk when we finished our site inspection and scaled down the mountain side and then the long trek in darkness back to our car. I was very uncomfortable, stumbling in the darkness on the way back, and expecting momentarily to have fangs thrust into my legs. It was quite a relief to get back to our car without any casualties. We returned to Fort Worth the next day to complete our investigation and report to Washington on this accident.

The Secretary of Commerce had announced a deadline date of January 1, 1933, for all airlines to qualify their pilots in order to inaugurate authorized instrument operations. The operators had therefore placed emphasis on their training programs to meet this date. From September 13 to October 17, I conducted fifty-five Scheduled Airline Transport Ratings, flight and written, for American Airways and Bowen Airline pilots at Fort Worth.

I departed Los Angeles in a government aircraft (Kinner Fleet NS-46) to inspect emergency fields between Los Angeles and Fort Worth. For historical purposes, these fields are listed: Ontario, Beaumont, Banning, Indio, Desert Center, Blythe, Calif.; Quarzite, Harqua Desert, Hassayampa, Red Rock, Benson, Tombstone, Ariz.; Rodeo, Hachita, Mt. Riley, N. M.; Guadalupe, Wink, Odessa, Thurber, Weatherford, Texas.

After checking dispatching and other company ground operations and conferring with airline officials at Fort Worth and Dallas, I departed in the above mentioned Fleet aircraft and checked ground operations at Austin and San Antonio, Texas, thence to Laredo and checked the dispatch and ground operations of Wedell-Williams Airlines, returning to San Antonio the same day. The next day, as a passenger with Mr. L. C. Elliott, then the area patrol pilot for the Bureau of Lighthouses, we departed San Antonio in a U.S. government Bellanca NS-2Y aircraft to check the radio ranges at San Antonio and Houston, Texas. The following day we checked radio ranges between Houston and New Orleans.

I left Mr. Elliott at New Orleans and proceeded with Walter Wedell, of Wedell-Williams, to Patterson, Louisiana. The same date, I accompanied Jimmy Wedell in a J-6 powered Aristocrat aircraft, inspecting emergency fields and intermediate stops that Wedell-Williams Airlines had proposed in their application for an airline certificate. We landed in and inspected airports at Salt Mine, Guerdon and Lake Charles, Louisiana, and Beaumont and Houston, Texas, that day.

The next day we continued our inspections at Orchard, Rock Island, Gonzales, Leesville and San Antonio. We continued our inspections of airports at Pearsall, Cotulla, Cactus and Laredo, returning to San Antonio that night. It was necessary that I submit a detailed sketch and survey report of each airport to my Washington office for record.

After completion of this survey and my reports, I departed San Antonio on the 19th to route check Captain C. C. Scott, of Bowen Airlines, from San Antonio to Houston, thence to Dallas and Fort Worth, utilizing a Lockheed Vega.

I departed Fort Worth on American Airlines to route check Captain Ted Kincannon in a Pilgrim aircraft, landing at Waco, Austin, and San Antonio.

I picked up my U. S. government Fleet aircraft at San Antonio and inspected airways from San Antonio to New Orleans, landing at Houston, Beaumont, Lake Charles and Patterson while en route to New Orleans.

I route checked Captain Leo Cloney in a Lockheed Vega on a Wedell-Williams trip from New Orleans to Houston, Texas, thence to Fort Worth with Captain Jerry Marshall, of American Airlines, in a Stinson and that night flew a route check of Captain Dick Dobia in a National tri-motored Ford to Kansas City, landing at Oklahoma City, Ponca City and Wichita, Kansas.

Possibly the reader looks upon these almost daily trips as dull and routine. These assumptions are far from the truth. Each day was different for me, and each day offered a new challenge. It is impossible to remember in detail the exact duties I performed each day, but no day in which I was available could I idle away -- this I enjoyed to the utmost. If not working with the cities (mayors, commissioners, Chambers of Commerce, etc.) on airport improvement, I was busy with the various U.S. Government agencies giving service to the airways, airline officials or their operating personnel, lecturing on safety standards, or I was investigating aircraft accidents, violations of infractions of regulations, qualifying airmen, approving new airports for certain types of operations, investigating mal-functions of airway aids and effecting corrections, flight checking and establishing instrument approach procedure minimums for all new radio ranges and instrument landing systems and preparing data for national publication, and even counseling airmen.

At this time the entire nation was in an era of depression and government economy was in full swing. In spite of the fact that we Airline Inspectors were only hitting the high spots of our supervisory responsibilities, we were saddled with an additional duty known as "Airway Patrol Pilot." This duty was formerly performed by pilots of the Bureau of Lighthouses.

The Patrol Pilot duties involved patrolling the airways to insure that all airway facilities (beacon lights) were operating; the emergency fields were kept free of tall vegetation such as tree sprouts, tall Johnson grass, and that the ground was free of chuck holes, gopher holes, live stock, etc; to flight check and commission new electronic airway facilities such as the aural four-course ranges; to record and publicize all multiple and bent courses, false cones, fade-outs; to periodically check all airways for

drifting of range courses; check the adequacy and fidelity of all government airway ground communication facilities; and to check all pilot reports of airway discrepancies. In addition, it was the responsibility of the Airline Inspector to establish by flight checking and drafting for publication all instrument approach procedures for each airport including the government authorized weather minimums for both general aviation and the airlines.

My territory for this particular assignment covered all Federal Airways from Nashville, Tennessee, to the Arizona border, including airway facilities in all the states of Tennessee, Arkansas, Mississippi, Louisiana, Texas, Oklahoma, New Mexico and parts of Arizona.

My aircraft was a single engine Curtis-Wright Sedan with a Wright J6-7 engine. The cruising speed was about 120 miles with a 3-hour fuel supply. With the additional electronic gear necessary for the duty it was to perform, it was indeed a marginal tool for this job, especially at high altitudes.

In the case of a new radio range, I had to flight check all predetermined courses, check the adequacy and fidelity of communications frequencies and finally establish and authorize publishing weather minimums instrument approach procedures for a particular airport or airports.

I was duly notified that the Big Spring radio range was ready for commissioning and requested a flight check. The Electronics Engineer in charge was George L. Rand of the Fort Worth Regional Office. His counterpart from the Washington Office, Walter Plett, was also present for the final tune-up. I do not recall the other electronic personnel being present. Shortly after my arrival and prior to take-off for flight checking, a very severe sandstorm blew in from the southwest. We watched it coming in. It looked like a dark, huge tidal wave rolling toward us. My work commitments required that I be in San Antonio the next morning. I realized from my previous experiences in sandstorms that I would have little if any forward visibility from the aircraft, but should see prominent objects directly below me. I had great confidence in George Rand's evaluation of where the predetermined four courses should fall on the airway. These were depicted on my flight map from which I could pick out landmarks to check for alignment.

The airport had two runways, neither of which I could safely use because the winds were above the 40 mile range with gusts up to 15 miles greater. I studied the flight map and selected check points on the ground that I had hoped to pick up when in the air. Before take-off I jokingly remarked, "Would anyone like to take a ride?" I really didn't

expect any volunteers. To my surprise Walt Plett said he would like to go. I explained the best I could what to expect, and that we would be unable to get to the runway because of the strong cross wind and would have to take off from the hangar ramp. Huge sand hummocks covered all but the runways, which made other parts of the field unusable and hazardous. Walt was a huge man, weighing something like 230 pounds. We moved the airplane to get the maximum possible take-off distance on the hangar ramp, and were in the air in about 100 feet due to the high velocity winds. We were in the air about two hours and did not have too much trouble in locating my landmarks necessary to check the courses.


On completion of the flight check, the direction and velocity of wind would not permit my landing on either runway, so I elected to land at the intersection of both runways. Actually, while flying at about 15 miles per hour above stalling speed, my ground speed was only 10 to 15 miles per hour. I landed with about half throttle, with the tail up in flight position. When I reduced throttle and dropped the tail slightly to test the wind gusts, there was a tendency to turn us over. I returned to approximately half throttle and kept tail up. I asked Walt to get out and hang onto the right wing strut. He started getting up out of his seat and I reached back behind him to open the door. Unconsciously I let off on the brakes and the aircraft began rolling backwards. Immediately the thought struck me that maybe the wind would move us back. I asked Walt to sit still as I wanted to try something. There was a dirt road from the runway intersection to the hangar. This road was beat out by maintenance trucks. Believe it or not, with the decrease of throttle and use of brakes and the good wind, we backed up to the hangar ramp. The road and the field itself sloped from south to north which helped to accomplish a Ripley "Believe it or not" episode. We had taken off from the hangar and returned to the hangar without turning the aircraft around.

On May 2, 1936, the birth of the greatest workhorse of all airplanes to date (the DC-3) was initiated in a proving run for airline service. It was off the production line of the Douglas factory in Los Angeles and was to prove itself for 100 hours of scheduled flight between Los Angeles and Fort Worth for American Airlines. The passengers, on this initial flight, were restricted to concerned technical experts of the industry, American Airlines, and Inspector James L. Kinney and myself. The aircraft was designated a Douglas Sleeper Transport (DST).

The DST had fourteen sleeping berths, when made up. Later it became famously known as the DC-3 and the military version, in World War II, was known as the C-47 - C-53 and in the Southeast Asian conflict, the Gooney Bird.

The first flight of the 100-hour proving run from Los Angeles to Fort Worth was made at night. This initial flight convinced me and others aboard that it was a rugged and dependable aircraft. It appeared that the Good Man Upstairs, aware of our mission, was to prove this aircraft to be safe and suitable for scheduled airline passenger operation, provided the proper elements to convince all of us aboard. We flew through a terrific storm over the mountainous terrain between Los Angeles and El Paso. We had very heavy turbulence, with sleet, snow and freezing rain, so that the propellers, wings, radio antenna and control surfaces took on a heavy load of ice. This took away our radio antenna causing loss of all radio communications, compelling us to fly "dead reckoning" and luckily enough, after some three or four hours in and above the overcast, we picked up an airways light beacon east of El Paso, then followed the lighted airway on into Fort Worth.

The 100-hour proving run pointed out scores of deficiencies that had to be corrected before placing it into regular passenger service. Most of them, of course, were of a minor variety which did not affect actual safety of flight.


DEPARTMENT OF COMMERCE
AERONAUTICS BRANCH
WASHINGTON

*c/o Army Airways,
Love Field,
Dallas, Texas*

May 15, 1929.

H. B. PENTLAND,
Supervising Inspector. MECHANIC'S EXAMINATION.

1. Airplane and Engine Mechanics answer all enclosed sets of questions.
2. Airplane Mechanics answer only the list on airplanes and list on Regulations.
3. Engine Mechanics answer only the list on engines and the list on Regulations.
4. Upon completion of examination, return these questions to the Inspector.
5. A passing grade of 70 per cent must be attained on each subject.

IMPORTANT.

On a blank piece of paper, answer the following questions and attach to your examination papers.

1. Your name, and address.
2. Class of license for which you have applied.
3. Are you dependent on aviation mechanics as your principal means of livelihood?
4. Where are you employed, and in what capacity?
5. Number of this examination. (M-7)

Maximum time allowed for examinations:

Airplane, Engine and Air Regulations,	4 hrs.
Airplanes and Air Regulations,	2 hrs.
Engines and Air Regulations,	2 hrs.

MECHANIC'S EXAMINATION ON ENGINES.

Name.
Address.
Date.

Head your examination paper as above. Answer all ten questions.

1. Give eight causes of ignition trouble and describe how you would remedy each.
2. How do you determine the firing order of an engine with which you are not familiar?
3. After how many hours of operation should the following be attended to: (a) Oil drained, (b) Gas strainer cleaned, (c) Oil strainer cleaned, (d) Magneto oiled, (e) Breaker points checked, (f) Valve clearances checked, (g) Engine bed bolts tightened.
4. (a) Give the valve clearances for two aircraft engines. (Name engines).
(b) How would you check and adjust the clearances on these engines?
5. Describe how you would remove a cylinder from an engine with which you are familiar. Describe how to replace the cylinder. (Name the engine)
6. If in cold weather an engine runs irregularly at cruising speed, but operates smoothly at wide open throttle, what must be done to remedy the trouble.
7. Describe the process of installing new rings in an engine.
8. (a) Why do airplane engines have greater bearing clearances than other types of engines? How do you check this clearance?
(b) How is excessive oil pressure relieved?
9. (a) How will a leaky carburetor float affect the running of an engine?
(b) How would you repair a leaky float?
10. Draw the wiring diagram of a magneto ignition system.

MECHANIC'S EXAMINATION ON AIRPLANES.

Name.
Address.
Date.

Head your examination paper as above. Answer all ten questions.

1. Explain fully how to set up and align an airplane with which you are familiar. (Name the ship)
2. Describe how you would correct tail heaviness. Wing heaviness.
3. Define (a) Drag bracing, (b) Compression member, (c) Gusset, (d) Cap strip, (e) Spar, (f) Grommet.
4. (a) What is meant by dope blushing?
(b) What causes blushing?
(c) Name two kinds of dope.
5. Describe in detail the complete process of recovering a wing panel.
6. Describe in detail the complete process of aligning a fuselage.
7. Give three causes for an airplane ground looping and explain how to correct for each.
8. What precautions must be used when running gas lines, oil lines, and wiring through the fire wall of an airplane?
9. (a) Where is the point of Zero bending moment in a spar? (Single bay wing)
(b) Describe how to make a scarf joint splice.
10. (a) What kind of oil is used in hydraulic shock absorbers?
(b) What is a split type landing gear? What are the advantages of this type of landing gear?

MECHANIC'S EXAMINATION ON AIR COMMERCE REGULATIONS.

Name.
Address.
Date.

Read your examination paper as above. Answer all ten questions.

1. (a) What is the duration of a mechanic's license?
(b) What are the requirements for renewal?
2. (a) Describe how you would make a line inspection on an airplane.
(b) How often is this type of inspection required?
3. What engine instruments are required on a licensed airplane?
4. What safety equipment is required on licensed aircraft carrying passengers for hire?
5. Who signs the log book of an airplane? Where should this log book be kept?
6. Give as many reasons as you know for suspension or revocation of a mechanic's license.
7. What civil penalty may be imposed for a violation of the Air Commerce Regulations?
8. (a) What are the markings for licensed aircraft?
(b) Where do these markings appear?
9. What requirements must be met before carrying passengers for hire in an airplane which has been ~~seriously~~ damaged?
10. How long do the Regulations require that an overhauled engine be run at full throttle before using it in an airplane to carry passengers for hire?



Art Blomgren (r) and friends with Bureau of Aeronautics Stinson Reliant. Blomgren began his career in the mid-1930s as a patrol pilot in the Southwest Region. He formerly headed the Idaho Aeronautics Department.

Blomgren (r) and friend in flight clothing of early era of open cockpit planes.

Jack Jaynes, airlines inspector and administrator, as he appeared at the time of his retirement.



DEVELOPMENT OF THE CIVIL

AVIATION AGENCIES

To help the reader understand the operations of the Federal Aviation Administration and its predecessor organizations, the history of American aviation and the successive development of public policy will be outlined in this chapter. Wars brought many developments to airplanes which emphasized their potential practicable use in the transportation field. Following World War I, wartime aircraft manufacturing industries initiated a program to promote the commercial use of the airplane to provide continuing markets for their aircraft. To a great extent, a similar condition existed following World War II.

Commercial aviation history has been marked by two important characteristics as far as Government regulation is concerned: first, our non-military tradition was kept with regulations being carried out by civilian departments of government rather than by the military services as in many countries. Secondly, a less constructive characteristic of our regulatory policy has been an unusual number of changes, both in the identity of the agencies chosen to do the regulating and in the basic legislation under which they worked. Changes have been much more numerous in the field of economic regulation than in the field of technical regulation.

POST OFFICE DEPARTMENT - 1918

The first experiment in air transportation was begun by the United States Post Office Department on May 15, 1918, with regular air mail service being initiated between New York and Washington. Army pilots flew the planes, but within a short time the Post Office Department took over the job with its own civilian pilots. The system expanded rapidly and, by September 1920, a transcontinental route was operating.

The government-operated air mail service can be claimed as the foundation of the present day air transportation system. In this laboratory of practical experience, the techniques which first made scheduled flying feasible were developed. The matter of piloting airplanes in all kinds of weather was important, but more important was the development of airway aids, lighting, radio ranges, adequate weather reporting services, and emergency landing fields which were essential to safe, regular commercial service.

The air mail service pioneered many developments, including the necessity of night flying as the airplane competed successfully with other

existing fast and highly reliable transport systems. The first night trans-continental mail flight was made as early as 1921 without benefit of airway aids, the pilots being guided along part of the route by bonfires set by obliging farmers. Regular overnight air mail service was authorized between New York and Chicago in 1925. This was six years ahead of the achievements of rival Europeans in regular night operations.

KELLY AIR MAIL ACT - 1925

With the ground work laid for establishing the practicability of regular scheduled flying, Congress took the next step and passed the Kelly Air Mail Act of 1925. The Act provided for private operation of the federal air mail system, and by the end of 1926, 12 mail contracts had been granted to private companies. These and later contracts provided the financial base upon which the great trunk airlines were built.

Increased public interest and participation in aviation made it necessary for the federal government to face the problem of promoting aeronautical development and assuring safe operation of privately-owned commercial aviation. The aviation industry, almost unique among private enterprises, had been anxious for federal regulation since 1921, probably because it feared that uncoordinated regulations by 48 state governments could restrict aviation growth and popularity.

AIR COMMERCE ACT - 1926

Prior to 1926, the federal government did not have any special machinery to assist civil flying. There were no safety or economic regulations, nor were there any aids for navigation except those provided by the Post Office Department for its own operation. Recognizing the need for some special bureau or agency to handle the responsibilities of aviation, an aircraft board was appointed in 1925 to study the problem. After extensive hearings, recommendations were made which were largely incorporated in the Air Commerce Act passed by Congress on May 20, 1926.

The Air Commerce Act of 1926 was "to encourage and regulate the use of aircraft in commerce and for other purposes." The Act provided for the promotion of air commerce, regulation of air commerce in the interest of safety, provision of aids to air navigation, assertion of the sovereignty of the United States of the airspace over its lands and waters, and the definition of applicability of national custom and immigration laws to aircraft. The Act was amended later to include the rating of instructors, both flight and ground, and the examination and rating of flight schools.

The establishment of aeronautical activities as part of the Department of Commerce, in accordance with the Air Commerce Act of 1926, became the first federal legislation for aviation. The Act was passed just in time, the dramatic Trans-Atlantic flights of the summer of 1926 set imaginations aflame as nothing in aviation had ever done before. Within a year, applicants for pilot licenses jumped from 1,800 to 5,500 and the number of licensed planes from 1,100 to 4,700--a boom which unfortunately was built more on emotional excitement and the extraordinary prosperity of the times, rather than on any real use of the airplane. In the commercial field, this period saw the merging of many smaller companies into the great airlines we have today. American, United, TWA, Eastern, Northwest, and other important systems emerged. At this time, the airlines were almost exclusively concerned with the mail business and were not too eager to carry passengers, making only small provision for them. In 1927, for example, all of the airlines carried approximately 8,700 people.

ORGANIZATION

The Air Commerce Act failed to provide for the creation of any bureau to perform these new aviation functions. It was intended, in so far as possible, that the duties composed in the Act should be distributed among and carried out by already existing agencies of the Department of Commerce. Assignments were made as follows:

- *The establishment and maintenance of airways along air routes to the Lighthouse Service.

- *The mapping of air routes to the Coast and Geodetic Service.

- *The scientific research for the improvement of air navigation aids to the Bureau of Standards.

As the Department had no facilities for the examining and licensing of aircraft and airmen, for the enforcement of safety rules, or for the collection and dissemination of aeronautical information, it was necessary to establish new instrumentalities to handle these responsibilities. Two special divisions, Air Regulations and Air Information, were established. All these various responsibilities, even though distributed to various agencies of the Department, were collectively referred to as the Aeronautics Branch of the Department of Commerce.

FUNCTIONS

The original organization was comprised of five divisions charged with the licensing of pilots, making flying safe, developing new air navigation facilities, mapping the airways, and furnishing flying information. These five divisions and their functional responsibilities were the following:

Airways Division. The work, including field work, pertaining to airways called for in the Air Commerce Act of 1926, was carried out under the laws, rules, and regulations applicable to the Lighthouse establishment which had been assigned this responsibility. The work involved surveys for laying out airways, the location of intermediate landing fields, lighting for the installation of lighted aids, and radio construction for the installation of radio beacons, radio-telegraph and telephone stations. The Maintenance Section was responsible for the maintenance and operation of navigation facilities along air routes. The Weather and Communication Section was responsible for the coordination of Weather Bureau forecasts, for meteorological service on civil airways, and for the maintenance of the communications system designated to insure safety of flights. At that time, there were approximately 2,600 miles of lighted airways.

Air Regulation Division. The work of this Division included inspecting aircraft for airworthiness and their registration as aircraft of the United States, examining and licensing airmen, identifying by letter and number all aircraft including those not licensed, investigating accidents, enforcing air traffic rules, and rating air navigation facilities.

Air Information Division. This Division was responsible for collecting and disseminating information on civil aviation, domestic and foreign, charting and publishing information on airways, airports, meteorological and other aids to flying. There were numerous other responsibilities with respect to the development of air communication and the general promotion of civil flying. It was also the main point of contact between the activities of the Department and the industries and all other interested parties.

Airways Mapping Division. The Coast and Geodetic Survey was responsible for the production of maps of civil air routes as an adjunct to its function of producing Marine Charts.

Aeronautics Research Division. All research and experimental work was carried out by the Bureau of Standards, with two problems being undertaken during Fiscal Year 1927. These were the (1) Development of radio aids to air navigation and (2) Improvement of lighting facilities.

REORGANIZATION OF AERONAUTICS BRANCH - 1929

The original organization had been coordinated under the supervision of an Assistant Secretary of Commerce for Aeronautics, with a Director of

Aeronautics being in charge. The branch, organized into five divisions in 1926, was reorganized in 1929 by creating new divisions and sections essential in carrying out the various provisions of the Act. Under the reorganization, the Assistant Secretary of Commerce for Aeronautics was provided three additional executives: Director of Air Regulation, Chief Engineer of the Airways Division, and Director of Aeronautic Development. An executive board was established, composed of the Assistant Secretary as chairman and these three executives as members. They formulated all policies affecting the plans and activities of the branch. There were no major changes in the functions although certain expansions, particularly in connection with airways and the licensing of pilots and aircraft, were made.

REORGANIZATION OF AERONAUTICS BRANCH - 1934

During 1934, the Aeronautics Branch was reorganized, involving major changes. The name was changed to the Bureau of Air Commerce, and it was put under the supervision of a Director of Air Commerce who was responsible to an Assistant Secretary of Commerce whose responsibilities included a number of other important activities in the Department in addition to aeronautics. There were two major divisions formed under the Bureau of Air Commerce: the Air Navigation and the Air Regulations Divisions. The duties of the former Aeronautic Development Service were transferred to the new division, and each of these divisions was headed by an Assistant Director of Air Commerce. In addition to the general supervision of these two main divisions, the Director directly supervised the activities of the Aeronautic Information Section and the Administrative Section. It was during this year that the activities previously handled by various other agencies of the Department of Commerce were transferred to the Bureau of Air Commerce and organizational units were established for their handling. This applied both in Washington and in the field. Airways district offices were established, and flight inspection offices continued, reporting directly to appropriate divisions of the Bureau of Air Commerce.

REORGANIZATION OF BUREAU OF AIR COMMERCE - 1937 - 38

In April 1937, all activities of the Bureau of Air Commerce were placed under a Director aided by an Assistant Director. Seven principal divisions were established: (1) Airways Engineering, (2) Airways Operation, (3) Safety and Planning, (4) Administrative, (5) Information and Statistics, (6) Certificate and Inspection, and (7) Regulation and Enforcement. The Director and Assistant Director had supervision of all seven principal divisions, and a policy board was formed composed of these two officers

and heads of the seven divisions with the technical assistant to the Director acting as secretary. This board was formed for the purpose of dealing with organizational matters, procedures, and policies within the Bureau. In addition to this Board, an advisory board, consisting of civilian and other representatives of all aviation interests, was appointed to serve in an advisory capacity.

During Fiscal Year 1938, in addition to the creation of an Assistant Director position, a new group was organized, known as the Airways Operation Advisory Committee, for the purpose of formulating proper policies and regulations for the operation of the civil airways. A similar advisory committee was established to consider private flying problems in connection with the revision of the Civil Air Regulations. The major change during this period was the reorganization of all field activities of the Bureau into seven regions, each under the supervision of a regional supervisor. These new regions were made up of the nine General Inspection and the six Airways Districts under which the Bureau's field work had previously been accomplished. This reorganization was the forerunner of our present regional setup which made it possible for more efficient coordination of all functions and expeditious handling of aviation matters in the field which had previously been referred to the Washington Office.

The growth of aviation dictated a policy of decentralized service to the aviation public to be rendered as required. The majority of personnel was assigned to the field. Of course, each regional setup had district inspection offices, communications stations, et cetera, which further decentralized CAA work and made it possible to render immediate and direct service to the flying public.

BLACK-McKELLAR ACT - 1934

Serving two masters was bad enough, but on June 12, 1934, Congress passed the Black-McKellar Bill, which made air mail carriers responsible to three separate agencies. The Post Office Department was to award air mail contracts and determine routes and schedules, the Bureau of Air Commerce was to continue to operate the airways and regulate the licensing of pilots and plans, and the Interstate Commerce Commission was brought into the picture for the first time with the duty of fixing the rate of air mail payments to the carriers. This was the first recognition in legislation that the payment of air transport subsidies through air mail rates was not purely a postal matter and that the sums to be paid for carrying the mail should be carefully determined by transportation economists with an eye to developing a sound and well-organized air transport system.

The Black-McKellar Act also authorized a thorough study of the commercial aviation problem as a whole, the first study since the Morrow report of 1925. This study was undertaken by the Federal Aviation Commission appointed by the President and composed of a number of outstanding aeronautical experts. Its report made 102 specific recommendations, the majority of them very constructive. The most important of these recommendations were eventually incorporated in the Civil Aeronautics Act of 1938

AVIATION DEVELOPMENTS

From the middle thirties until our entrance into World War II, civilian aviation in this country advanced steadily. It developed the sound economic and technical structure which enabled it to do its gigantic war task so well. It was not surprising that these years should have been a period of growth. The general economic condition of the country was improving, the tensions which preceded the uncertainty following the air mail investigation and cancellations were disappearing. Between 1932 and 1938, average cruising speeds increased from 120 to 180 miles per hour, and costs decreased from 8 to 3.5 cents per seat-mile. Noise and vibration were greatly reduced, to the marked relief of travelers. Occasional accidents always received much more publicity than the millions of miles flown without mishap as the safety record of the airlines continued to improve.

CIVIL AERONAUTICS ACT OF 1938

The Civil Aeronautics Act of 1938 created the Civil Aeronautics Authority which was independent of any existing departments of the government. This body combined activities and functions previously performed by the Department of Commerce, the Interstate Commerce Commission, and some of those related to the Air Mail Service by the Post Office Department. In combining these activities, all the personnel and property of these various activities were transferred to the new agency. The Civil Aeronautics Authority (CAA) was charged with the following powers:

*The encouragement and development of an air-transportation system properly adapted to the present and future needs of the foreign and domestic commerce of the United States, of the Postal Service, and of the national defense.

*The regulation of air transportation in such manner as to recognize and preserve the inherent advantages of, assure the highest degree of

safety in, and foster sound economic conditions in, such transportation, and to improve the relations between, and coordinate transportation by, air carriers.

*The promotion of adequate, economical, and efficient service by air carriers at reasonable charges, without unjust discriminations, undue preferences or advantages, or unfair or destructive competitive practices.

*Competition to the extent necessary to assure the sound development of an air-transportation system properly adapted to the needs of the foreign and domestic commerce of the United States, of the Postal Service, and of the national defense.

*The regulation of air commerce in such manner as to best promote its development and safety.

*The encouragement and development of civil aeronautics.

ORGANIZATION

The administration of the Civil Aeronautics Act of 1938 was carried out by these three major divisions of responsibilities: Civil Aeronautics Authority, composed of five members, with functions to grant air mail rates and formulate policies for civil aviation development. Administrator, with responsibility for all operating activities. Air Safety Board, with responsibilities for the investigation of all accidents and for the establishment of safety standards.

Unique in government was the fact that all these divisions of responsibilities operated independently, although each was required by the Act to cooperate with the others in the administration of the Act.

In the summer of 1940, under Reorganization Plans III and IV, the Civil Aeronautics Authority underwent an organization change, but not a functional one. Under the 1938 bill, the Civil Aeronautics Authority was really three authorities--the quasi-judicial five-man board, the Administrator, and the Safety Board--each independent of the other and with no clear definition of action among them. The Air Safety Board, for example, investigated accidents, but it had no power to enact remedial measures or enforce safety regulations already on the books--nor was the Administrator specifically empowered to carry out the decisions and regulations laid down by the five-man board. Apparently, the latter was to make its regulations and then enforce them when it had no administrative machinery for the purpose. Consequently, there were over-lappings of function and authority in some areas, including whole areas which virtually had no clearcut responsibility.

The reorganization plans were designed to remedy this inherently unsound administrative setup. The five-man board retained its complete independence of action and became the Civil Aeronautics Board. The

three-man Air Safety Board was abolished and its functions were given to a Bureau of Air Safety under the five-man board. The Administrator's functions were more sharply defined and incorporated in the Civil Aeronautics Administration. To give it Cabinet representation, the CAA was made a bureau of the Department of Commerce directly under an Assistant Secretary of Commerce. It operated through four main divisions: Federal Airways, Airports, Safety Regulation, and CAA War Training Service. It had at that time approximately 10,000 employees, more than 8,000 of whom were in the field engaged in operating the airways and other technical services.

CIVILIAN PILOT TRAINING ACT - 1939

During these years, too, there was a boom in private flying, and the Civilian Pilot Training Program (CPT) was initiated late in 1938. This program made high standard flight and ground instruction available to the college boys and girls of the nation at federal government expense. Uniformity of instruction was assured by CAA supervision of both flight and ground courses. CPT soon became the CAA War Training Service and was exclusively devoted to giving preliminary ground and flight training to men who would fly for the military services. In 1938 there were less than 23,000 licensed pilots in the country and about 10,000 certificated aircraft. At the time of the Pearl Harbor attack, when the program was modified to gear it directly to the war, the number of pilots had increased almost five-fold, to a total of more than 100,000 certificated pilots. More than three-fifths of these were CPT graduates. Tens of thousands of these flyers had already volunteered for the Army and Navy air services before the U.S. war involvement. During the same 1939 - 1941 period, the number of planes more than doubled, rising from 10,000 to almost 25,000, and most of these did yeoman service in the Civil Air Patrol and in the hundreds of war training centers throughout the country. These increases continued during the war years.

FUNCTIONS

The Civil Aeronautics Administration became the administrative agency within the framework of the Department of Commerce to carry out the safety regulations promulgated by the CAB along with other specific duties outlined within the 1938 Act as amended in 1940. The following is a brief description of the functions of the four main divisions including extracurricular units. There were also the administrative functions which included Budget, Personnel, Purchasing, and other activities normal to most organizations.

*The Federal Airways Service was charged with the planning, building, maintenance, and day-by-day operations of a network of aerial highways

blanketing the entire country, as well as the airways in Alaska and other outlying possessions. The airways consisted of an integrated pattern of radio signals stations, beacons, continuous weather-reporting service for airmen, emergency landing fields, instrument approach ("blind landing") systems, and traffic control towers along the airways and at the major civilian airports in the country. The Airways Service functioned through five divisions -- Air Traffic Control, Airways Engineering, Communications, Signals, and Technical Development.

*The Federal Airport Service was charged with establishing standards for civilian airport construction and directing the expenditure of Federal funds appropriated for such construction. The Airport Service functioned through two units: Engineering and Construction and Planning and Survey.

*The Safety Regulation Service was responsible for carrying out the Civil Air Regulations established by the Civil Aeronautics Board. It certified the competency of all civilian airmen and aircraft, both commercial and private, in the interest of public safety. It functioned through the following units: Certification, Air Carrier, Aircraft Engineering, Flight Engineering and Factory Inspection, Aviation Medical, and General Inspection.

*The Civilian Pilot Training Service was responsible for carrying out the Act of 1939 and later for providing flight and ground instruction for Army and Navy cadets in conjunction with the college program for the armed services. They supervised and directed the training program throughout the United States which provided thousands of trained pilots, many of whom later entered the armed service.

In addition, the CAA was delegated other functions which were carried out through appropriate units: Research, Pre-flight Aeronautics Education (designed for optional use in the secondary and primary schools), Legal Office, Information and Statistics, and Washington National Airport. In addition to current information and statistics on civil air operations, the CAA prepared and issued all air navigation charts, weekly notices to airmen on current flying conditions, and technical bulletins and publications on all phases of aviation.

BASIC POST-WAR ORGANIZATION OF CAA - 1946

Policy determinations were made in Washington and standards which were to govern field activities were established. It then became a job of personnel located in the regions to carry out these policies and standards in their dealings with the public, whether an individual, a manufacturing company, or an airline. Thus, customer contact, administrative action, and program execution were the responsibilities of the regions, following the broad outlines of policy and of standards established in Washington. The

subdivisions into which the CAA was divided in Washington and in the regions were roughly parallel. The officer in charge of each region was known as a Regional Administrator, who had the authority and responsibility for administering CAA programs in the states and districts coming under his jurisdiction.

As the war was drawing to a close, the CAA began plans for extensive reorganization intended "to meet urgent problems, domestic and foreign, of postwar expansion of civil aviation." Several offices were reorganized or established at headquarters and in the nine regions. Based on a concept of decentralized administration, the new pattern of organization placed responsibility upon the regional administrators (title changed from regional managers) for the executive direction of CAA programs in their respective regions. The role of the Washington office involved "establishing" the broad over-all plans, general policies, and standardization of equipment and procedures. This trend continued and, in 1949, a number of organizational realignments became effective, beginning a trend toward giving directors of major program offices in Washington greater authority over the execution of their programs in the field. A sharper delineation was made of the responsibilities of the Administrator's "special" and "program" staff officers.

Extensive changes in the field organization became effective on October 1, 1953,¹ when the number of continental regions, excluding Alaska, was reduced from seven to four. This was followed on August 17, 1954, by several major changes in the CAA organization structure. Under this new scheme of operations, the line of authority was officially defined as running through the program directors to the regional administrators. Two years later (July 1, 1956), CAA functions were realigned under six major program offices. CAA's Office of Federal Airways was abolished and its functions transferred to two new organizations, the Office of Air Traffic Control and the Office of Air Navigation. The Air Traffic Office was created, according to the Administrator "to reverse completely the approach of having the operations of the air traffic control system governed by the kinds of tools the engineers give the operators. It seems....more logical that the men who have to operate the system should develop broad performance specifications for the equipment they need, and that then the engineers should apply their ingenuity and skill to devising and perfecting such equipment."

FEDERAL AVIATION ACT

In a message to Congress on April 11, 1957, President Eisenhower transmitted an interim report prepared by Edward P. Curtis, Special

¹ Southwest Region assumed administrative control of Southern Region at this time.

Assistant for Aviation Facilities Planning, setting forth the gravity of present and anticipated air traffic problems and proposing the establishment of an Airways Modernization Board. Stating that the Director of the Budget was transmitting to the Congress draft legislation to establish such a Board, the President urged its early enactment in the interest of expediting improvements of air traffic control and air navigation. Other events followed in quick succession (1957):

May 10. Curtis submitted to the President his report "Aviation Facilities Planning" in which he warned of "a crisis in the making" due to the inability of the CAA airspace management system to cope with the complex patterns of civil and military traffic that filled the sky. The growing congestion of airspace was inhibiting defense and retarding the progress of air commerce. The report concluded that many excellent plans for improving the Nation's aviation facilities had failed to mature in the past because of the inability of our governmental organization to keep pace with aviation's dynamic growth. Curtis recommended the establishment of an independent Federal Aviation Agency "into which are consolidated all the essential management functions necessary to support the common needs of the military and civil aviation of the United States." Until such a permanent organization could be created, Curtis recommended the creation of an Airways Modernization Board as an independent agency responsible for developing and consolidating the requirements for future systems of communications, navigation, and traffic control needed to accommodate U.S. air traffic. In its recommendations for national requirements for aviation facilities, 1956-75, the report drew heavily on special studies conducted on aircraft characteristics by the Airborne Instruments Laboratory and on air traffic volume by the Cornell Aeronautical Laboratory. The Aeronautical Research Foundation contributed a forecast of aviation activity. A program for modernizing the national system of aviation facilities was developed by Curtis' Systems Engineering Team.

July 17. President Eisenhower appointed E. R. Quesada as his Special Assistant for Aviation Matters and charged him with "taking the leadership in securing the implementation of the Curtis plan of action."

August 14. The Airways Modernization Act (Public Law 85-133) was approved, establishing the Airways Modernization Board, ". . .to provide for the development and modernization of the national system of navigation and traffic control facilities to serve present and future needs of civil and military aviation." The Act provided for a three-member board consisting of a chairman, appointed by the President with advice and consent of the Senate, the Secretary of Defense, and the Secretary of Commerce. The Act further provided for its own expiration on June 30, 1960.

Since the AMB was an interim organization, the Act also contained the provision: "It is the sense of Congress that on or before January 15, 1959,

a program of reorganization establishing an independent aviation authority, following the objectives and conclusions of the Curtis report, entitled, 'Aviation Facilities Planning,' be submitted to the Congress."

October 29. The President approved actions of the Airways Modernization Board, taken in accordance with provisions of its basic statute, which transferred to the AMB certain funds and all functions of the Air Navigation Development Board along with several research and development programs of the Departments of Defense and Commerce relating to air traffic control. Subsequent presidentially approved orders transferred funds and additional ATC projects from the Department of Defense.

November 26. The board of directors of the Air Transport Association passed a resolution favoring the creation of an independent agency of government to develop a common civil-military system of control over airspace and airspace use and to make safety rules.

January 9, (1958). The Secretaries of Commerce and Defense concluded a joint-use agreement having as its object the "avoidance of duplicating facilities, equipment, and overlapping functions, increased capability of each (Defense and Commerce) function, and, an air traffic control system functionally compatible with the nation's defense facilities in peace and war." To this end it was mutually agreed that each department would "make its respective surveillance, data processing, situation display, communications, identification processes and facilities mutually and fully available for the early attainment of the objective above." It was also agreed that the Airways Modernization Board would develop criteria for the practical application of this national policy.

May 21. Senator Mike Monroney of Oklahoma, introduced S. 3880, a bill "to create an independent Federal Aviation Agency, to provide for the safe and efficient use of the airspace by both civil and military operations and to provide for the regulation and promotion of civil aviation in such a manner as to best foster its development and safety." By the next day, 33 Senators were listed as co-sponsors of the bill, and Representative Oren Harris of Arkansas, introduced the same bill as H.R. 12616.

August 23. The President signed into law the Federal Aviation Act. Treating comprehensively the Federal Government's role in fostering and regulating civil aeronautics and air commerce, the new statute repealed the Air Commerce Act of 1926, the Civil Aeronautics Act of 1938, the Airways Modernization Act of 1956, and those portions of the various Presidential reorganization plans dealing with civil aviation. The Act assigned the functions exercised under these repealed laws, which had been dispersed within the Federal structure, to two independent agencies: the FAA, which was created by the Act, and the CAB, which was freed of its administrative ties with the Department of Commerce.

The FAA inherited the organization and functions of the CAA as its nucleus. Pursuant to the Act, it also took over the responsibilities and personnel of the Airways Modernization Board, which were transferred to it by Executive Order 10786, of November 1. And later (on August 11, 1960), Executive Order 10883 terminated the Air Coordinating Committee, transferring its functions for liquidation to FAA. Section 103 of the Act concisely stated the Administrator's major powers and responsibilities as follows:

*The regulation of air commerce in such manner as to best promote its development and safety and fulfill the requirements of national defense.

*The promotion, encouragement, and development of civil aeronautics.

*The control of the use of the navigable airspace of the United States and the regulation of both civil and military operations in such airspace in the interest of the safety and efficiency of both.

*The consolidation of research and development with respect to air navigation facilities, as well as the installation and operation thereof.

*The development and operation of a common system of air traffic control and navigation for both military and civil aircraft.

The CAB, though retaining responsibility for economic regulation of the air carriers and for accident investigation, lost under the Act most of its former authority in the safety regulation and enforcement field to FAA. But the law provided that any FAA order involving suspension or revocation of a certificate might be appealed to the CAB for hearing, after which the CAB could affirm, amend, modify, or reverse the FAA order. Provision was made for FAA participation in accident investigation, but determination of probable cause was to be the function of the CAB alone. When the FAA assumed full operational status on December 31, 1958, it absorbed certain CAB personnel associated with the safety rulemaking function.

November 1. Executive Order No. 10786 transferred all functions of the Airways Modernization Board to the Federal Aviation Administrator. This action was taken in accordance with the Federal Aviation Act of 1958, which authorized the President to transfer to the Administrator "any functions of the executive departments or agencies of the government or of any office or organizational entity thereof which are related to establishing, operating and maintaining systems and facilities, for safe and efficient air navigation and air traffic control."

REALIGNMENT OF FIELD OPERATIONS

A major realignment of responsibilities for FAA field operations became effective on January 1, 1960. The Washington Bureau of Air Traffic, Facilities and Material, and Flight Standards, as well as the Office of the Civil Air Surgeon, received authority to exercise direct supervision over all program activities in the field except in Alaska, Hawaii,

the Aeronautical Center, and NAFEC. The position of Regional Administrator was abolished, and the post of Regional Manager was established to carry out the administrative and support functions required by the program division in the field. A new standard organization for regional headquarters became effective in March. Later in the year, field reorganization of the FAA in accordance with Project Straight-Line recommendations was approved with a time phasing to permit completion by June 30, 1961. The new pattern of organization was intended to decentralize many regional responsibilities to a new and lower echelon, the area office. At the same time, it would establish a "straight line" of command between FAA bureau headquarters in Washington and the field facilities. The field operations of the Bureau of Air Traffic Management, the facility maintenance and field supply functions of the Bureau of Facilities and Materiel, and the flight inspection and procedures activities and services of the Bureau of Flight Standards were to be involved in the reorganization. The area organization was to be based on the geographic boundaries of air traffic flight advisory areas and located physically near the air route control centers within the then 27 flight advisory areas in FAA's four domestic regions.

MORE DECENTRALIZATION

One of the first announcements by Administrator Halaby after taking office in 1961 was that of decentralizing agency operational responsibilities and the broadening of the authority of regional executives. This was immediately followed with the announcement of the establishment of an additional regional office for the southeastern states with headquarters in Atlanta.² At the same time, it was disclosed that FAA regions would be identified by geographical rather than numerical designations. Thus, the new region became the Southern Region and Region 1 became the Eastern Region; Region 2, Southwest Region; Region 3, Central Region; Region 4, Western Region; Region 5, Alaskan Region; and Region 6, Hawaiian Region.

An extensive reorganization of the FAA began in July 1961. Termed "evolutionary" and keyed to a revised concept of Washington-field relations, reorganization was intended to strengthen agency management by centralizing development of programs, policies, and standards in Washington and delegating broad operational responsibilities to regional offices. The seven regional offices would be headed by assistant administrators responsible for the executive direction of all FAA programs in the field within the framework of the national guidelines established by Washington. Several new posts were created to assist the Administrator in the overall management of specific functional areas.

² These states and territories had been under the administrative control of Region 2, Fort Worth, since October 1953.

An announcement was made in May 1965 of a plan to establish 18 area offices in the contiguous 48 states. Elements of the decentralization plan had been tested in a field organization configuration study (Project FOCUS) and was a further step in the decentralization of the FAA which had begun in 1961. Air Traffic, Flight Standards, Airway Facilities and Airport Programs were established in area offices to bring these programs "as close as possible to the point of customer service....and thus, create faster, more knowledgeable and therefore, more responsive agency action to localized aeronautical needs and problems." In 1968, the regional-area administrative relationships were realigned to give area managers more time for day-to-day operations functions and collocated regional and area offices were consolidated with the Regional Office in 1969.

DEPARTMENT OF TRANSPORTATION

The Department of Transportation Act (Public Law 89-670) was signed by the President, on October 15, 1967, bringing 31 previously scattered federal elements, including FAA, under the wing of one cabinet department. The new Department was necessary in the public interest, the Act said "to assure the coordinated, effective administration of the transportation programs of the federal government; to facilitate the development and improvement of coordinated transportation service, to be provided by private enterprise to the maximum extent feasible; to encourage cooperation of federal, state, and local governments, carriers, labor, and other interested parties toward the achievement of national transportation objectives; to stimulate technological advances in transportation problems; and to develop and recommend to the President and the Congress for approval national transportation policies and programs to accomplish these objectives with full and appropriate consideration of the needs of the public, users, carriers, industry, labor, and the national defense."

The legislation provided for five initial major operating elements within the Department. Three of these were administrations that Congress had previously created: the Federal Aviation Administration, the Federal Highway Administration, and the Federal Railroad Administration (headed, respectively, by administrators.) To these administrations it added the U.S. Coast Guard (transferred from the U.S. Treasury Department) and the Saint Lawrence Seaway Development Corporation (which had been established by the Act of May 13, 1954, and placed under the general supervision of the Secretary of Commerce by Executive Order 10771 of June 20, 1958). (In the Department of Transportation, as previously, the Coast Guard was to be headed by a Commandant, the Saint Lawrence Seaway Development Corporation by an Administrator.)

The Transportation Act also created within the new Department a five-member National Transportation Safety Board. The Act charged the NTSB with determining the cause or probable cause of transportation accidents and reporting the facts, conditions, and circumstances relating to such accidents and with reviewing on appeal the suspension, amendment, modification, revocation, or denial of any certificate or license issued by the Secretary or by an Administrator. In the exercise of its functions, powers, and duties, the Board was made independent of the Secretary and the other offices and officers of the Department.

Two important differences between the President's proposal of the previous March and the DOT Act were that the Maritime Administration was left out and that the ultimate responsibility for aviation safety was vested in the Federal Aviation Administrator rather than the Secretary of Transportation. The Department began full operations on April 1, 1967.

REALIGNMENT AND NEW REGIONS

In March 1969, the President announced a plan calling for 10 standard Federal regions encompassing all 50 states to simplify and facilitate the process of serving the public in matters across departmental or agency lines. In conforming with this plan, the FAA established four new regions: New England, Great Lakes, Rocky Mountain, and Northwest and realigned the boundaries of four of its five pre-existing regions in the contiguous 48 states. The result was nine regions in the contiguous United States. The Philadelphia Region was combined with New York, eliminating the standard tenth region. The Alaskan, Asia-Pacific, and European Region were retained.

At the same time that FAA's regional realignment went into force, FAA's area offices in the 48 states were abolished, and the duties and responsibilities of the area managers were transferred to the appropriate regional directors. Area coordinators without line authority were stationed at seven locations formerly having area offices (Albuquerque, Houston, Memphis, Miami, Salt Lake City, San Francisco, and Washington, D. C.). In addition, Cleveland and Minneapolis each had a local coordinator with responsibility limited to the city's metropolitan jurisdiction. These coordinators serve as a point of contact for visitors on FAA business who are not concerned solely with a single program area, represent the regional director on nonprogram matters in relationships with the community, and advise and assist program elements of the FAA on activities that cross program lines.