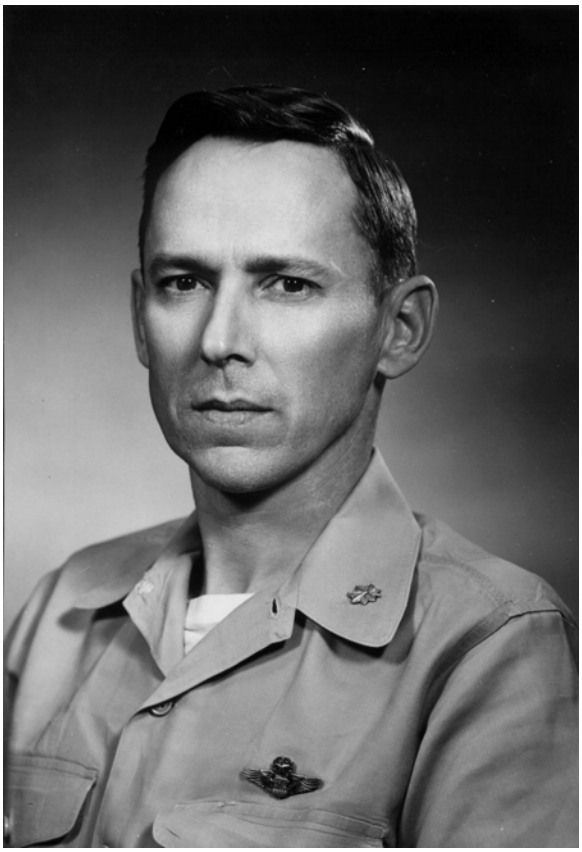
LIFE AND TIMES

OF

COLONEL CHARLES W. ABBITT

UNITED STATES AIR FORCE, RETIRED



March 1, 2001

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1. THE EARLY YEARS

Charles Webb Abbitt was born May 25, 1920 in the ancestral home on Gravel Knoll Farm in the Hollywood Community, 2 miles east of the Village of Vera in Appomattox County, Virginia. His parents were George Francis Abbitt Sr. and Otway Moorman Abbitt.

Brothers and sisters who survived beyond infancy were George (1906), Watkins (1908), Dora Conner (1912), Herbert (1916), and Eloise Snead (1918)

Charles attended the Vera Elementary School through grade 7. Attending next Appomattox Agriculture High School, he graduated 1936 as Salutatorian and Class Prophet. Because of his young age of 16 years he remained another year at Appomattox High School taking additional college preparatory classes and a course in shorthand and typing. (This training prepared him to work in his brothers' law office after school and during subsequent summers). He played second base on the High School baseball team for 2 years and on the "Town Team" under John Curtis Caldwell for several summers.

Charles entered the Virginia Military Institute on September 13,1937, and graduated in May 1941, with a Bachelor of Science degree in Electrical Engineering, and a Second Lieutenant commission in the US Infantry. With the threat of World War II on the horizon, he and most of his classmates (called Brother Rats} were called to active duty immediately after graduation. Charles was assigned as a Second Lieutenant in the Fourth Infantry Division at Fort Benning, Georgia.

During these first 21 years his home was with his parents in Vera, where the Mother and Father operated the general store and finally the Vera Post Office During his 22 years in the Army/Air Force, 20 years in the NASA man-in-space program in Houston and in later retirement in Central Texas, he and his family always considered the Vera/Appomattox area as home. Unfortunately, assignments in the Military and technology management did not offer nearby locations, except the 4 years at the Pentagon. After the passing of Daddy and Tot he kept in close contact with the family through Sister Dora, who always welcomed visits and communications, as did the other siblings. He is ever thankful for the great sacrifices made by the entire family to put him through VMI.

2. WORLD WAR II ERA

My appointment on May 31, 1941, as a Second Lieutenant in the Army (Infantry) resulted in a call to active duty on June 15, 1941. The assignment was to Fort Benning where I immediately joined in the training of the 22nd Infantry, B Company, 4th Division. This division was to participate in the Normandy Invasion at Utah Beach in 1944. But my career in the Infantry was short lived as in a few weeks I received orders to report to Harvard University for special classified technical training.

The tour at Harvard (Cambridge, MA) starting July 17, 1941, lasted 3 months and consisted of training in the principles of radar, a new and secret technology which was to play a key role in military operations of the future. Because of the tremendous scope of this technology many recent college graduates in electrical engineering were transferred to this field. I joined with, among others, 2 of my VMI Brother Rats: Durland Clark and Henry Holmes. I had traveled from Fort Benning to Cambridge with Bill Fraser, a 1937 graduate of Clemson. The 4 of us (all Second Lieutenants in civilian clothes) were to become close friends and roommates during our stay in Cambridge While all of us were electrical engineers we had never heard of radar. We were drilled in the basic principles, special circuitry, radiation and propagation that were used in this application. We lived in Harvard quarters for this 3 months period.

This same group of student officers was then assigned to a special Army Unit at MIT, also in Cambridge, to be trained further on radar principles by the famous MIT Radiation Laboratory. The Radiation Lab was a key developer in radar as our country entered this new field. We were introduced to a prototype radar system and given more data on components and circuits. While our instructors were not the famous types we were exposed to at Harvard, they all had had experience in radar as it applied to military applications. Stress was placed on wide band circuits and microwave frequencies (3-10 cm). This continued for 3 months, during which the 4 of us shared an apartment on Massachusetts Avenue and the Charles River.

Toward the close of this period the Japanese bombed Pearl Harbor (12/7/41). We each scrambled to get into uniform as directed. Unfortunately, my winter uniform was in Vera, and I was out of uniform for several days until my Mother got the pieces to me.

Following Christmas leave, Clark, Fraser and I, along with a large portion of the Harvard/MIT classes reported to the Signal Corps School at Fort Monmouth, N.J. There we received detailed instructions and experience with current radar systems. Upon completion of this training I was transferred to the 501 Aircraft Warning Regiment at Fort Dix, N.J.

The 501st was a National Guard Regiment from Indiana that had been called to active duty to receive training and action as directed around the globe. Until our group arrived there were no technical officers on board. Some of the non-commissioned officers had previous training and experience. We were put to work on a 3-shift basis, training enlisted men in the operation of the Signal Corps SCR-268 (mobile) and the SCR-270

(fixed) systems. We worked in 8 hour shifts in open fields, with 1 tent for each class, rotating shifts every 2 weeks. I was an instructor on the SCR-268. We lived on the base in tents and ate in a nearby mess hall. During the early part of 1942, the cold weather kept things at a lively pace at Fort Dix.

After several weeks at Fort Dix, the entire Regiment and training activity were moved by troop train to Drew Field, Tampa, Florida.. There weather conditions and training facilities were much improved. My duties were continued as an instructor on the 268. Students passing through the school upon completion were assigned to outfits preparing for overseas deployment. As a complete surprise in May 1942 I received orders promoting me to First Lieutenant, effective February 1, 1942.

During the summer I applied for pilot training, which Clark had already pursued. This was turned down because of my "critical skills". I then requested assignment to one of the special aircraft warning units training for overseas. That request was approved, and I moved to Bradenton, Florida, to join such an outfit. As the company was preparing for movement overseas, orders came through transferring me to Maxwell Field, Alabama, in November 1942, for pilot training in grade.

I completed pre-flight training at Maxwell, and was transferred to Lakeland, Florida, for primary flight training. After a few flights my instructor concluded that I was not adaptable to the pilot role, and recommended I train to become a navigator.

The change to navigation training required transfer back to Maxwell, then to Reassignment Center at Nashville, and then to pre-flight training at Ellington Field, Houston, Texas. By spring 1943 I joined a class of student officers to begin training at Hondo, Texas, one of Air Training Command's largest navigational school of World War II. This group of officers was very serious about the training, and we spent many extra hours studying and learning the use of the A-10 sexant for celestial navigation. (We were out every week- day evening "shooting the stars" to calibrate the sextant- and I still remember an item we would use in each computation: the location of Hondo-29 degrees 21 minutes north latitude, 99 degrees 10 minutes west longitude) The course consisted of 18 weeks of classroom work and 12 flights using the different methods of navigation- pilotage, dead reckoning and celestial navigation. We graduated in Class 43-11 on August 5, 1943, and then received our Navigator wings.

I must have made a good impression of the Hondo training staff as I was next assigned as an instructor there. (That was unusual, especially for a student officer, since my grade was earned in another field) . Each instructor was assigned several students and numerous subjects for lecture. Every 18 weeks we started over with a new group of cadets. A group of 6-7 instructors handled 35-40 students, called a Flight. The instructor would ride with each student on each of 12 flights, and post mission would go over the student's log and map in detail. I stayed in the same flight for the duration there, experiencing 2 significant events: First, marriage to Ann Boleyn Charles on December 26, l943, and second, promotion to captain June 1944.

I met Ann when she was Private Secretary to the Commander of the Army Meteorological Service in San Antonio (40 miles east of Hondo)., Colonel Aufston. She was the daughter of John Madison Charles and Pearl Boleyn Bauerfeind. She was born at home on September 7, 1923, in San Antonio. Her brother was John Charles (deceased) and her sister is Caroline Long of Austin. Ann graduated from Thomas Jefferson High School and the Droughton Business College, both in San Antonio. Upon graduation she was employed by the Office of Civil Defense, Office of Price Administration (Secretary to the Director), and the Office of Southwest District, Metro Service (Secretary to the Commander). We were married at the Randolph Field
Chapel on December 26, 1943.

Toward the end of my Hondo tour, I became concerned that I would remain for the duration in the Training Command, and never see real action in the war. So I applied for overseas duty. During the summer of 1944 I got word that I was to transfer to the European Theater (ETO). Orders directed me through Austin, Bear Field (Fort Wayne) and Dow Field in Bangor, Maine where I became a crew member of the Air Transport Command to deliver a C-47 aircraft to England, through Labrador, Greenland, Iceland and Scotland .

Arriving in England in August, 1944, I awaited orders in Oxford, a crew replacement pool. Orders came assigning me to the 440th Troop Carrier Group, then to its 96th Troop Carrier Squadron, stationed in Exeter, England. In a few weeks the Group moved to Le Mans, France and finally to Orleans, France. (I remained in the group here for the approximate one year I was in Europe and flew over 700 hours in the C-47 aircraft)

The 96th Troop Carrier Squadron was equipped with 2 dozen C-47 cargo planes. The primary mission was to transport Army airborne men (paratroopers) and their equipment into drop zones behind enemy lines as the first penetration of an invasion or to capture an isolated objective. The Group consisted of 4 squadrons, consisting also of pilots, navigators, crew chiefs, radio operators, glider pilots and supporting personnel and staff. A large group of gliders were also available as often they are towed into a drop zone carrying the paratroopers and heavy equipment. A glider pilot aboard guides the glider into the desired landing place.

Colonel Frank Krebs was Group Commander and was shot down with his crew during the Holland invasion, and remained underground until American forces recaptured the area. He just rejoined the Group when I came on board. Between airborne combat missions we ferried military equipment to the front lines, evacuated wounded to rear area medical facilities and at times made administrative flight to friendly countries.

The navigation task was unique and required some time to master. There were no aids to navigation (range stations, beacons, lights); and the nature of the missions required us to fly “contact” (ground visible). Neither celestial nor classic dead reckoning methods could be relied on. Map reading (pilotage) with a little dead reckoning was the only means. Since the navigation station in the C-47 did not permit ground visibility, the C-47Navigator stood up in the cockpit behind the Pilot and Copilot for the entire flight.

Railroad tracks and rivers were the most reliable checkpoints on maps on the continent. English maps were much superior, accurately showing roads, forest and many other features.

Soon after Colonel Krebs took over the Group again he requested me as Navigator on several non-combat flights. During the spring of 1945, I was transferred to Group Headquarters as Group Navigator, and remained in this position while in the ETO. In addition to the flight role, this position entailed the assignment of support mission coming down from the 50th Troop Carrier Wing to our squadrons. I continued to fly these support missions when Krebs or members of his staff were piloting the Headquarters plane. On combat missions involving the entire group, I would be the Navigator for the 90 some planes in the Commander's C-47. .

When I arrived in the Group it had just completed the Holland mission. Then I participated in the Rhineland, the Central Europe and the Ardennes campaigns. The largest mission for which I led the Group was the Rhineland invasion (crossing of the Rhine River). Other missions involved flight of less than a Squadron (dropping supplies to isolated units, or dropping paratroopers to smaller targets), On the Rhineland mission the entire European fleet of combat C-47 seemed to be involved. We had our entire fleet (about 90), each towing 2 gliders, carrying troops and battle equipment. I was the lead Navigator with assistance from a Gee Navigator (using an English type Loran system). The weather was favorable and navigation was straightforward except for one item - We departed Orleans base (A-50) using wind factors given by the 50th Wing. But we experienced much stronger tail winds than predicted, and my first estimated time of arrival (ETA) at the drop zone was 15 minutes early, possibly causing a jam-up of C-47's. We decided to use a technique learned in navigation school called a "double drift": fly 45degrees to the right, then 45 degrees to the left (90 degree turn) each for 2 minutes and you will end up on course but delayed 1 minute. I expanded that method out to lose 10 minutes (not 15 minutes because we didn't know what other groups would do). We came in about 5 minutes early and precisely over the assigned drop zone. The battle was a success as related by our Glider Pilots when they returned several days later.

During the non-combat missions at least one navigator per flight was required because of the lack of navigation aids. All of us flew 60-70 hours per month, year around. Most flights were over the continent to Germany, France, Belgium, and occasionally back to England. A typical C-47 support flight would consist of 3-8 planes, leaving from our base early in the morning, landing near a French port on the channel (near Cherbourg) in mid morning. There, we would be loaded with cargo (gasoline, runway matting, weapons, etc.). Our destination would be learned here, and we would depart for a temporary airfield near the front, arriving just before darkness (night landing was out). We could sleep in the airplane or we most likely would go in town for anything available in the way of quarters. For a considerable time we were hauling gasoline in jerry cans directly to the Third Army as Patton pushed for Berlin. Most of the time the crews (me included) would unload these 5-gallon cans ourselves, rather than waiting for the ground people who always seemed to be late. The next day we would return to base empty.

After V-E Day we began training and being equipped to deploy to the China-Burma-India (CBI) theatre, while still flying our share of support missions. During this period we flew many air evacuation missions, bringing wounded soldiers on stretchers from forward based hospitals to better-equipped medical facilities. We also flew many "displaced persons (DP's)" from Nazi prisons to their home countries. (With Colonel Krebs I visited one of the well-known prisons which had been cleaned up, but where the DP's were awaiting evacuation).

With Colonel Krebs (I flew as Co-Pilot while doing the navigation) we landed at Berlin (Templehauff), occupied by the Russian Army. We were sight seeing as the assigned mission did not call for this visit!! As we taxied to the far side of the terminal, we picked up a US Army Lt Col who advised us to depart immediately as the Russians' standard procedure was to take hostage any allied plane and crew landing at Templehauff. Krebs and I believed him so we didn't get off the aircraft, but departed then.

When V-J Day occurred, our transfer to the CBI theatre was cancelled, and subsequently we readied to return to the ZI. Departing from Orleans in August we were routed through Marrakech (Morocco), Dakar (French West Africa), Liberia (Roberts Field) Ascension Island, Brazil, Puerto Rico to Charleston, S.C. where we turned in the aircraft and its equipment. The crew (including Colonel Krebs and Lieutenant Colonel Cannon-later to be U.S. Senator Cannon) each took his own path "home", and the 440th Troop Carrier Group was no more!

I took the train from Charleston to San Antonio where Ann was living with her Mother. After an extended leave, we headed for Baer Field (Fort Wayne, Indiana) as I signed up to stay in the Service. Fort Wayne was a military Processing Center, and after several weeks of waiting, I was on October, 1945, assigned to Larenburg-Maxton Base in North Carolina as Training Aids Officer, again under Colonel Krebs, Base Commander This assignment turned out to be rather routine as compared to the last ones. We were able to get quarters on the base, and Ann had the convenience of cooking on a coal kitchen stove

Later, electing to leave the Army and having landed a job with Westinghouse in East Pittsburgh, I separated from the Service on May 10, 1946 at Greensboro, N.C., with the rank of Major (Reserve).

3. BETWEEN TOURS IN THE SERVICE

After separation from the U.S. Army in 1945 from Greensboro we immediately traveled to Pittsburgh, only to find Westinghouse on strike. There were 50 some of us on board, all electrical engineers, most of whom were just out of the Service also. Westinghouse set up and conducted in their Wilkinsburg Center an orientation and education training course, bringing in management and technical people from their product lines. Initially Ann and I lived in a rented room in town, and then found a 3 - room apartment on Popular Grove in Pittsburgh. As the strike dragged on we looked for larger accommodation closer to East Pittsburgh, where the plant was located.

I requested that I be assigned to the Switchgear Department and become a specialist in this line of product. These products involve the control of power plants, sub-stations, transmission lines and other such power facilities. When the strike was over, I was then employed at East Pittsburgh in Switchgear as liaison between the Atlanta District Office and East Pittsburgh. This was an ideal position for training as a Switchgear Specialist. And had some chance of eventually transferring to Atlanta.

Meanwhile we located and purchased a duplex in Munhall Gardens, overlooking the large steel mills in Homestead. With a shorter distance to work, and using fairly convenient public transportation, life became a little more pleasant. But the everlasting presence of coal dust in the air from the steel mills made life different from any place we had ever been.

Charles II was born on March 20, 1946, in a Pittsburgh hospital. Ann had some difficulties with the birth, and Mrs. Charles, her Mother, came to help and comfort, as she did many times before and after.

Before I was separated from the Air Corps, I had applied for a regular army commission. During my East Pittsburgh employment I was notified that I would receive a regular army commission, subject to the results of a physical exam. The 1 day exam was performed at an Army Post in Harrisburg, and I passed. My status was to be a temporary Captain and aircraft navigator. Official appointment was on June 19, 1947, serial number 0-46254, with temporary assignment to Bolling Field, pending final orders. On August 16th my assignment was made for duty at Greenville AFB, South Carolina as Navigator in the 313th Troop Carrier Group. It was not difficult to decide between a career in the military and the one in Pittsburgh. Besides the fairly low pay offered in the Westinghouse option, the environment in Pittsburgh then was not what 2 southern youngsters were satisfied with. Management at Westinghouse quite understood and wished us well.

The expansion of the Abbitt family was a notable accomplishment, but otherwise we considered this experience to be the low point in our careers.

4. BACK IN THE AIR FORCE

Troop Carrier.

The reporting date for my return to the Army Air Corps (later became US Air Force) was in September 1947. I was assigned as a Captain, Navigator to the 37th Troop Carrier Squadron of the 313th Troop Carrier Group, in Greenville, S.C. with similar peacetime missions as the support missions in Europe. We were equipped with C-82 aircraft and later with C-130's. The Navigator station was poorly equipped when main reliability was dependant on map reading and dead reckoning. We worked closely the Army forces at Fort Campbell, Fort Benning and Fort Bragg, where the 82nd and 101st Paratrooper Divisions were stationed. The missions involved a significant number of RON's (remain-over-night). We would arrive at the airfield adjacent to the location of the airborne troops which we were to drop or support in early afternoon. The drop would typically be the next afternoon, and we would return to Greenville on the third day. Most of the Navigators were recently commissioned in the regular army and had been recalled as Captains

Ann and Charles II had remained with her family in Austin, as Ann was too pregnant to undergo the stress of a household move at the time. Caroline Patricia was born October 26, 1947 in an Austin hospital after several false episodes. When Mother and Child were able to travel, I came to Austin and the 4 of us traveled to Greenville by auto. I had already found a house close to the base, which served the purpose though lacking in some conveniences.

During this period the USAF decided it needed more professionally trained officers to tackle the guided missile and other high technology weapons being developed. The opportunity to attend certain universities for a graduate degree was announced. I applied. In May 1948, I was ordered to the University of Michigan in Ann Arbor to pursue a master's degree in electrical engineering. I was to enter for the summer session, starting June 21.

Note: The family experienced good health during the Greenville stay except Ann experienced a serious case of prolapse of the uterus, which required an operation and considerable bed rest. Again, Mrs. Charles came to our rescue for nursing and house keeping.

University of Michigan.

Following the transfer to the University of Michigan , we found quarters in Willow Run Village, Ypsilanti, Michigan, about 10 miles from Ann Arbor, location of the University. Willow Run Village comprised of temporary multi-family, single story housing, plus a shopping center, nursery, theatre, etc. It had been constructed during World War II to house workers in a B-24 plant nearby. I commuted to Ann Arbor by special buses, as the community then consisted primarily of U of M students.

The first semester and part of the second encompassed review subjects since I had been out of school 6 years and technology had progressed significantly.

While subject matter at Michigan ran quite deep , and space at home for studying was very limited, I managed to complete my masters degree with an A average by February 25, l950. My best semester was my last at the University of Michigan:

Subject:	Hours	Grade:
Microwave Elect Tubes	2	A
Transients	2	A
Radiation & Propagation	3	A
Television	2	A
Complex Variables (math)	3	A plus

The degree was stated as Master of Science in Electrical Engineering and was awarded February 11, l950. The family of 4 had lots of friends, especially among the many families of other Air Force student officers. Our closest friends were the family of Major Sam Phillips (Sam, Betty Ann and 2 girls), the Jim McKensie family and the Paul Gallentine family. We would encounter all of these later. Several years later we entertained at Patrick AF Base Major General Sam Phillips and Betty Ann. Sam then was Program Director of the Apollo Program, and had taken over as a safety measure after the fire destroyed Apollo 1 and the 3 Astronauts.

Wright-Patterson Air Development Center..

After completing studies at Michigan, I was transferred to Wright-Patterson Air Force Base, near Dayton, Ohio, into the Radar Techniques Section of the Aircraft Radiation Laboratory on February 23, l950. Wright-Patterson was the primary Air Force development center for all aircraft and their components (not including ground launched missiles). .

The family (Ann, Charles II, Caroline and I) first found an apartment in Springfield, 20 miles north of the base, but subsequently moved to Fairborn, adjacent to the base

The assignment was in connection with Joint Task Force Three. I later learned that JTF-3 was the organization to test the effects of atomic bomb weapons in Eniwetok Atoll in the Marshall Islands in 1952, code named Operation Greenhouse.

The Radar Techniques Section consisted of highly qualified engineers at Wright Field, exploring the optimum use of airborne radar designs for bombing, reconnaissance and navigation. Key persons were Dr, Allison, Chief, and Russ Boario who had specialized in high resolution and target recognition techniques. I worked directly for Russ. My clearance (Top Secret and a special AEC category) was in process, and I couldn't participate fully for several weeks.

Russ was Manager and Chief Investigator of a classified project of JTF-3 called "Indirect Bomb Damage Assessment", or IBDA. He had assigned a B-50 aircraft, equipped with an AN/APQ-24 Bombing System, and a special set of receivers, scopes, circuits, etc. and film recorders to examine radar reception in the target area. (Experiment bombs would be located on a fixed tower, not dropped) This experiment along with dozens of others was carried out at Eniwetok. With the crew of our plane, including Russ and me, stationed at Kwajalein Island, 400 miles away. Both Russ and I participated in several tests on flights to Eniketok to observe effects of atomic explosions on radar reception.

Similar tests on atomic effects were subsequently conducted at Fenchman's Flat, Nevada, the AEC Proving Ground. I participated in 2 such operations, with the same aircraft and crew, operating out of Kirtland AFB, Albuquerque, N. M. On one set of tests Ann accompanied me to Albuquerque, and Charles II and Caroline were dropped off in Austin with their Grandmother and Aunt, on their farm on Onion Creek.

On one occasion during this assignment, I had the honor of briefing General Power, Commander-in-Chief, Strategic Air Command, on the results of our tests and how they could be employed for bomb damage assessment. He and his staff were highly interested, and could have been making plans to incorporate our finding into SAC's APQ-24 operating procedures. (Such things are top secret)

I was promoted to Major on April 15, l951. A great part of my work at Wright Field was spent on weapons effect tests- preparation, participation, and analyses. These were completed in June 1952, at which time I was transferred to Plans & Operations of the Aircraft Radiation Lab. as Navigation and Guidance Planning Officer, During the Korean War one of the ARL Sections developed and equipped the first airborne system to permit detection and location of enemy radars tracking the aircraft. I did not participate in this development, but did advance the use of such equipment when I was in this staff position. This resulted in a new and important weapon for future air to ground battles.

During this period the Air Force Systems Command (to which all Air Force R&D research organizations belonged) declared that all officers in R&D would remain in that field and not be assigned to combat roles. My career then remained in R&D assignments throughout.

While in the Dayton area the children were enrolled in local schools and progressed well. However Charles II experienced almost continued upper respiratory infections. and used strong prescribed medication for extended periods. One of the young Doctors at the Wright Field Hospital was strongly suspicious that his problem was allergy He urged us at our next station (the Pentagon) to get an immediate appointment with a well known allergist at Walter Reed.

The Pentagon.

On October 15, 1953, I was transferred from Wright Field to Headquarters USAF, Pentagon Building, in Arlington, Virginia. My assignment was in the Tactical Reconnaissance Branch, Directorate of Requirements My job here was to conceive methods and select equipment to provide reconnaissance data on tactical (battlefield) targets using electronic sensors. An additional duty was to configure tactical aircraft with applicable electronics countermeasures devices. These devices were mostly developed by Wright Field in the Lab I had just left.

The single biggest job on any action item was to get concurrence from the complex Pentagon staff to install in tactical planes the basic protection equipment already being used by the Strategic Air Command (B-47's, B-52's) . The items included the APS-54 Radar Warning Receiver and chaff dispenser which could detect and break-lock on an enemy radar tracking the plane. We were dealing primarily with fighter pilots who were often opposed to any equipment which might slow down the aircraft. My inputs were from the Tactical Air Command (Langley Field), USAF in Europe and the Far East Air Force (which used aircraft such as the F-84, RF-84, B-66 and Troop Carrier planes). Contacts at Wright Field provided technical backup, and the SAC electronic countermeasures staff in the Pentagon were solid backers of protective equipment (jammers, warning devices, chaff, etc).

I worked for Colonel Smiley and later Colonel Arthur Smith in a small office of 5-6 people. It was a pleasant setting except for the processing of official aircraft requirements (to change a given aircraft's configuration) which could need up to 35-40 signatures, half a dozen or more might be of general officer rank.

We found a house in Arlington on 23rd Street, a quarter of a mile from Highway 1 and a very short distance to work. I walked to work several times, but used the bus on most days. Later in the tour we found a more modern house on 20th Street in the same neighborhood. Both children could walk to school (Nellie Custis), and each had many friends.

Ann followed up on the allergy malady which Charles II had. Sure enough, his problem was an allergy. Treatment prescribed by Walter Reed was immediately effective. I had one unpleasant episode of a medical nature, which dragged on for quite a while. It involved an infection of my urethral canal. I was treated by the Bolling Field Hospital, but with little success. An extended hospital stay there provided no improvement or even attention as there was only one urologist, who proved to be inept (finally left the medical field). After many weeks off duty, several weeks in the hospital and loud complaints from Ann and Brother Watt's congressional office, I was transferred to Walter Reed Army Hospital. Dr. Schultz found a series of small stones embedded in the urinal tract, which caused the low level infection. Once removed by TUR I was ready for normal activity in 2 weeks.

Many friends were left behind when we were transferred: Colonels Smith and Smiley, Captains Lobdell and Harrington, Martha and "Halley" Halley, Peter Popageorge and family, the Sanfords and the Browns. Social life in the Pentagon Circle was very active. Our Requirements Directorate staff socialized quite often with cocktail parties given in individual homes Major General Price, our Director, and Brigadier General Holliday his assistant attended as did most of the officers and wives. Ann with the strong help of Mrs Charles hosted an outstanding cocktail buffet while we were on 20th Street. During the period we were able to visit my family in Appomattox frequently, which we had never been able to do before. We also made a strong effort to visit all the interesting places in Washington, usually on Sunday afternoons.

Ann was very active in Scouting here. She initiated the original charter for the Girl Scouts in that section of Arlington, and remained their leader for several years. Caroline became a Girl Scout and Charles II joined the Boy Scouts. Both attended faithfully.

One of the redeeming factors of an assignment in Washington was that an officer near the end of his tour could select his next station. The selection was honored, barring a critical shortage of his talent or a defense emergency. I selected Patrick Air Force Base, Florida, as my next base. The family loved Florida, and I wanted to shift into a missile career. Patrick being the owner of Cape Canaveral and the Atlantic Missile Range was the place to start. Most of my colleagues in the Pentagon thought this field was not logical, as they perceived the field as having little or no potential as a weapon of war!

Patrick Air Force Base (Headquarters for Cape Canaveral).

This assignment from July 1957 to August 1962 was the most satisfying one I experienced while in the military:

The family loved the Florida environment (climate, friendly people, excitement about the missile activity)

I was promoted twice: to Lieutenant Colonel and Colonel

: The work was most exciting and led to a prosperous and enjoyable career for the subsequent 20 years.

For the first several weeks the family (4 of us) lived in temporary quarters, such as motels and beach duplexes. Meanwhile, we bought a 3-bedroom concrete-block-stucco house in Sea Park Estates, just south of the base and a very short distance from the Atlantic Ocean.

I reported for duty on July 3, 1957, as a USAF Major, and was assigned to the Range Scheduling Office of the Air Force Missile Test Center, referred to as the Atlantic Missile Range, or AMR. My boss was Lt Col Dan Thompson, the top scheduler for the Range, consisting of Cape Canaveral and 12 down range tracking stations. My duties involved work at Patrick and the Scheduling Office at Cape Canaveral. Because of the vast

amount of AMR instrumentation and the numerous missiles, which were to be served during each countdown, the procedure for scheduling was very complex. There might be 20 type missiles on their pads in various stages of launch preparation. Each might want to test with the Range's radar, for example, most every day for perhaps 30 days before launch. Since only one radar exists, it must be scheduled for a precise time in advance, using the unique user's code. No other missile can transmit on radar frequency then. Other sensors such as telemetry have frequency characteristics requiring no conflict of transmissions on their frequency during test periods. Many other potential conflicts exist requiring strict control of all transmissions.

Dan had 4 Scheduling Officers who formulated the weekly schedule based on priorities assigned to the overall missile system. They would also rearrange schedules if "scrubs" occurred, and resolved conflicts in real time by manning the Scheduling Console in Central Control during all activities.

Just about the time I began to understand the variables in Range Scheduling, I was promoted to Lieutenant Colonel on March 17, 1958. The promotion was initiated by my record at the Pentagon as recorded by Colonel Smith. Upon this promotion I was reassigned as Chief, Range Development Plans and Programs. This office established support plans for future missile and space systems scheduled for the AMR. I then reported to the Director of Range Development, Colonel Wynne.

The Range was very active in support of many missiles then: In the aerodynamic class were Snark, Bomarc, Navajo; the ballistic missiles were Thor, Atlas, Jupiter, Redstone, Polaris and Vanguard. My office worked with the future customers: Managers of Titan, Minuteman, Polaris II, Mercury-Redstone and Mercury-Atlas. Programs. We had to understand the missile contractor or manager's needs for instrumentation and for other services (hangers, pads, power, water, office space). Once defined, the requirements were directed to agencies within AFMTC for action.

During the early part of this assignment one particular project was starting to demand more and more attention and effort: Project Mercury of the National Aeronautics and Space Administration, NASA., the priority national effort to put a man in space. AFMTC Commander, Major General Donald Yates was appointed as "DOD Representative of Project Mercury", responsible for providing Mercury support to NASA from the Army, Navy and the Air Force. Such support was to be given the highest priority short of compromising DOD's primary missions. This appointment had been requested by NASA as DOD would become most heavily involved in the project. This support effort would include launch, tracking (Atlantic Missile Range, Pacific Missile Range and White Sands Missile Range), and recovery (world wide). Some DOD-supported tasks would not be under General Yates' supervision but would evolve through direct control between NASA and the affected services: astronaut selection and control, booster development and operation and control of certain individuals assigned directly to NASA at Langley Field..

Without a specific staff to handle the vast range of activities, General Yates became the recipient of numerous high-level requests and problems. The documents were initially passed down the AFMTC channels to those who handled routine business. But not for long! Nobody knew for sure who had action on which request. And communications were coming from many high level positions in the Services.and NASA.

At that point the Mercury Support Planning Office was formed with Lt Col Charles Abbitt as Chief, reporting organizationally to Col Wynne on development matters and Col Kronaur on operational items, but reponsible for planning and acquiring DOD support for Project Mercury in the name of General Yates. General Yates appointed 3 deputies: USAF Col Cooper, Range; Navy Captain North, Recovery; and USAF Col Knauf, Medical. These were senior officers who established counterparts in DOD and NASA, reviewing policy matters, but not participating in day-to-day activities.

The DOD support to NASA was to become enormous: (1) In the range sector it included the entire Atlantic Missile Range and the Navy's Pacific Missile Range (PMR) as well as a tracking site at Eglin Field in Florida and one of the Army's White Sands' sites in New Mexico. Activities included participation in radar tracking, telemetry, command and communications instrumentation. (In addition to the 6 DOD sites NASA would later equip sites at Bermuda, Australia, Canton Island, Canary Island and Nigeria.) Two AMR ships became part of the Mercury Network during orbital flight, one in the mid-Atlantic and one in the Indian Ocean. (2) Recovery was primarily done by the Navy, with the Commander Destroyer Flotilla 4 at Norfolk in charge of mission recovery actions. The Air Rescue Service would provide aircraft and crews around the globe in the vicinity of the planned 3 orbital tracks. AFMTC formed a launch site recovery team, capable of getting immediately to an aborted capsule. (3) The medical function was accomplished by Flight Surgeons, primarily from the Air Force. These Flight Surgeons deployed to the remote sites to observe astronaut medical conditions as the capsule passed over the sites.

In the early days of Mercury tracking, communicating, and health monitoring had to be done on site. So a Sir John (surgeon) and a Cap Com (capsule communicator) were deployed to all remote sites, including the 2 ships, well ahead of the planned launch date

Our first big job for the DOD Representative was the formulation and approval of an overall plan, which had to be approved by DDR&E (Deputy DOD Director of Research & Development in the Pentagon). It would need the concurrence of the major participants. Several versions were drafted, but none seemed adequate to General Yates. Finally, Pan American Vice President Collins, a retired Lieutenant General, agreed to write the plan. In a short time he finished his approach, and Yates approved "An Overall Plan for Project Mercury Support by the Department of Defense". It spelled out organizational assignments and lines of authority during mission operations as well as pre-mission. It was approved as written, thereby authorizing Mercury support by the 3 Services as set forth. Because this document encompassed the whole worldwide DOD (European and Pacific Unified Commands included) many of us jokingly said its approval was as complicated as the capsule development itself.

Meanwhile our Mercury Support Planning Office had organized to develop plans with the help of participating units. The office consisted of:

Lt Col Abbitt, Chief
Commander Calhoun, Recovery Liaison
Lt Commander Graves, Pacific Missile Range Liaison
Major Kilpatrick, AMR Member
Captain Clements, AMR Representative to NASA Langley
Captain May, Recovery Techniques
Lt Jenkins, Eglin Field Liaison
Mr Douglas, Pan American Representative
Mr Hilliard, RCA Representative

Plans were initially down up by DOD units with priority efforts on Mercury-Redstone. AFMTC agreed to loan NASA Telemetry 3 Building on the Cape for Mission Control. NASA's contractor, Western Electric equipped the Control Center and interfaced it with the Cape's instrumentation.

Among the DOD positions in the Control Center were Network Commander, Network Support Coordinator, Recovery Commander and a Network Support Team, each requiring participation in planning, training, simulations and missions. (The NASA Flight Control team consisted of Operations Director Walt Williams, Flight Director Chris Kraft, Flight Dynamics Officer T. Roberts, Retrofire Officer Carl Huss, Recovery Coordinator Bob Thompson, and Procedures Gene Krantz) For the first manned flight, Mercury Redstone 1 (MR-1) only AMR instrumentation was used due to the short flight path.

While preparations for MR-1 were underway, our office developed a DOD Operations Plan 60-1, defining how the 3 National Ranges would support the global flights (Mercury-Atlas, MA). Walt Williams, NASA Operations Director, had asked DOD to operate the 6 new tracking stations. While plans were completed by AMR and PMR to accomplish this, NASA itself formed an organization at Langley to do this task. The Headquarters ended up at Greenbelt, Maryland, with Goddard Space Flight Center. That group implemented the new foreign sites and DOD continued with preparations at its own sites.

After a number of MR test flights (including some occupied with primates), the first manned Mercury mission was successfully completed in May 1961, with Allen Shepard on board. I served as Network Commander and Pete Clements as Network Support Coordinator. The flight was only minutes in duration, but was good training and operations in countdown procedures, communications, tracking, telemetry and range safety at the Cape and at the Grand Bahamas station. Recovery was provided in the splashdown area by the Navy's Destroyer Flotilla 4. A large launch site recovery team, under Harry Cannon operated out of the Cape in case of launch site abort or other emergency conditions.

As the MR flights were being completed, effort on the Mercury-Atlas (MA) flight s increased (all unmanned). Several unmanned flights were completed, testing further the Mercury capsule as well as the Atlas booster. During that period the Atlas was having serious reliability problems. In fact, MA-1 exploded and MA-3 was aborted. But progress was being made. Our (DOD) mission would become more complicated and increased in magnitude. Recovery support would involve the entire earth covered by the 3-orbit flight at 31 degrees inclination to be used. In addition to the planned splashdown areas, NASA asked for provisions for launch abort, non-insertion abort (west coast of Africa), one Pacific area and contingency areas. The latter requirement stated that recovery teams must be able to reach a capsule landing within 18 hours anywhere along the planned flight path I remember the toughest area was in the Indian Ocean between West Australia and Mauritius, there being no land between the two places. While the Navy took care of the planned areas, the Air Rescue Service was to be deployed to contingency areas (Africa, Australia, Mauritius, remote Pacific). Air Rescue came up with their own commercial HF radio to keep in touch with Unified Commands and Mission Control. (Several times after a flight was scrubbed, the deployed crews would call my house for information on the new schedule. Sometimes Ann would provide them answers if I were sleeping in after an all night watch at the Control Center)

Gradually the 3 National Ranges (AMR, PMR, WSMR) joined with WRE of Australia and the newly formed NASA organization to form a global network of telemetry, radar, command and communications. This was a must before the MA orbital flights could launch.. As the lead range AMR was expected to organize our resources. As mention previously, we in the Mercury Support Planning Office issued Operations Plan 60-1, describing how the ranges were to perform and setting up the network control scheme. The network during missions, simulations and other exercises would be under a Network Commander in the Mission Control Center. A Technical Assistance Group was formed for mission support, consisting of RCA instrumentation experts in telemetry, command, radar and communications A Network Support Controller would be the center point among Control Center activities and the remote sites.

Leading up to and including the John Glenn orbital flight MA-6, these were the key people in the network control function: Col Abbitt, Network Commander; Captain Clements, Network Support Coordinator; Vern Dauphan (RCA) Command Specialist; J. Brittingham (RCA), Radar Specialist; T. Samsel (RCA), Communications Specialist; and R. Snow (RCA) , Telemetry Specialist.

Much of the network came directly under the supervision of the Langley Research Center (later, GSFC)., who had hired Western Electric to implement the sites in Africa, Australia and Canton Island Mission reporting and capsule acquisition data flow were by teletype! While this mode seemed archaic to us at the ranges, the scheme worked. But Flight Controllers had to travel to these remote sites to talk to the Astronaut and to evaluate telemetry and command date (including health conditions of the Astronaut).

After numerous simulations and many, many "scrubs" (with forces deployed world-wide) MA-6, named Friendship 7, with John Glenn aboard, was launched on February 20, 1962. The AMR just about had to stop its regular mission of testing military missiles, as MA-6 required most of the range's facilities. All the rigid rules of operating the AMR based on military priorities set by Washington were cast aside as the honor and prestige of our country were at stake. The flight, once it was launched, was very successful The tracking stations operated well except for radar. This reception was intermittent as the capsule's antenna pattern on the C-band radar beacon was very irregular, and the least bit of spacecraft rotation would cause ground radar to "break lock". Also, the Flight Control team had a scare as one on board sensor indicated that the heat shield was out of place after retrofire. This caused Walt Williams, NASA Operations Director, to rush back to a McDonald (Spacecraft Designer) team for evaluation. Chris Kraft, Flight Director, coolly continued flight activity as if nothing had happened, thinking that nothing could be done anyway. Splashdown was as planned. With this high degree of success you might imagine the amount of Splashdown Partying that went on that night from Melbourne Beach to Cocoa Beach. Flights progressed in this order:

Freedom 7	MR-1	Shepard	5/5/61
Liberty Bell	MR-2	Grissom	7/21/61
Friendship 7	MA-6	Glenn	2/20/62
Aurora 7	MA-7	Carpenter	5/24/62

I stayed at Patrick as Chief of the Mercury Support Planning Office through Scott Carpenter's Aurora-7 flight. Due to some strange action by Carpenter (he drifted for 77 minutes to "conserve fuel and to evaluate the effects of drifting"), he overshot the landing point by 250 miles, but was picked up anyway in 3 hours. Needless to say Mission Control was not happy with his idea.

During slack periods in the orbital flight schedules Major General Davis, who had replaced Major General Yates as DOD Representative for Project Mercury, chartered a 707 jet transport, and with his immediate Mercury staff, me included, and NASA's Williams and Thompson visited most of the tracking stations and Headquarters of major recovery commands. We didn't visit the African sites for diplomatic reasons. This visit seemed to boost morale at these isolated places. Coincidentally, we were able to visit some exotic spots along the way: Honolulu, Fiji Islands, Sidney, Perth, Tahiti, Canary Islands, Madrid and Wiesbaden. .

On August 10, 1962. I was transferred to Electronics Systems Division, L.G. Hanscom Field, Bedford, Massachusetts, as Director of Aerospace Instrumentation

A particular satisfying part of the tour of duty in Florida was that I got 2 promotions. I came down as a Major in July 1957, was promoted to Lt. Col. On March 17, 1958 and then to Colonel on March 20, 1961. The first promotion as based on my service at the Pentagon and was anticipated. But the promotion to Colonel in only 3 years was a totally unbelievable surprise, especially in those years of slow promotions. I did not believe I was even eligible. But the rumors started, and I didn't give them a second thought. But

sure enough one day I was called to Colonel Maloney's office (my boss then) with Dan Thompson and Dick Hamby. Three pairs of eagle emblems were unwrapped, 1 pair for each of us. On that day (3/20/61) I became the youngest Colonel in the Air Force.

The job on Project Mercury was a high visibility position on the highest priority project involving Army, Navy, Air Force and NASA people working in daily contact. I was the lead DOD person on this joint job. And we produced successful results. I got some strong praise from NASA officials, particularly Walt Williams, NASA Operations Director. All of the Navy, Army and Air Force participants expressed opinions that the 3 Services had worked fairly and within respective charters. But a still bigger kicker was that General Yates, in whose name all this work was done, was President of the Promotion Board!

Ann was very active during this period. She worked on many charities and was a key in the activities of the Patrick Officers Wives Club, serving in many capacities, including its President. She was also a regular reporter for the highly popular Orlando Sentinel Newspaper, writing a weekly column entitled, "Beachcombing with Ann", which reported interesting items in the Beach Area. She became well known in the entire community and was among the most popular. The 2 kids, teenagers then, had advanced well, progressing at high school in Eau Gallie on the Mainland (over 1 hour bus ride each way). Caroline was also making good progress in piano lessons. Charles II, shaking all signs of allergy, and seemingly getting a new energy level, made many long-lasting friends. They each received a bit of social education by attending a local Cotillion Club which Ann co-sponsored for Patrick youngsters.

It was a sad day when the Abbitts departed there. "Those were the days, my friend, we wished they'd never end!"

Electronics Systems Division (ESD), L.G. Hanscom Field.

In late August 1962, the four of us left for Hanscom Field, Bedford, Massachusetts in the Boston area. We found the nights chilly, much different from what we were accustomed to. The base housed us for a few days in a house trailer. The kids got registered in Bedford, and I got my assignment as Director of Aerospace Instrumentation. We were shortly moved to Company grade housing, and finally to the Colonels quarters, which were very comfortable and convenient. The Base did a good job of taking care of us, which was much appreciated as living "on the economy" in that area was very expensive. Final address was 116 Offutt Road.

The Aerospace Instrumentation Office was staffed with a limited number of highly qualified Officers, one GS-15 Civil Servant and a technical staff at MITRE, a non-profit company which provided technical advice to ESD. The office was responsible for developing plans and projects for the National Ranges so they could support new weapon systems during their development and test phases (e.g. precise measurements of position, velocity, acceleration, altitude, flight parameters).

The major ongoing projects were (1) Range Planning Study by STL and IEC; (2) Evaluation of Instrumentation Ship at AMR (3) Development of Long Range Plans for National Ranges Instrumentation; (4) A set of R&D annual projects funded by the R&D Command.

The Group had done an excellent job with the 3 National Ranges. They had established an effective ad hoc committee from all the Services to consult on mutual problems, particularly with new development of instrumentation. Captain Pierce Hardnett, Captain Frank Harding, Major Frank Ramsey and Major Tom Summers were the spark plugs. Lt Col Glenn Larrimore had headed the group before my arrival, and did a good leadership job.

The AFSC and ESD staffs were strongly behind the work of this group, as they were anxious to have a dedicated professional group to oversee or replace R&D being done at the Ranges, especially at Patrick. They were counting on me as the leader with the necessary technical background and 5 successful years at Patrick. I felt very satisfied with the job, and the success this group was having.

But in May 1963 during my annual physical exam required of all aviators (I was by now rated a Master Navigator), I was discovered to experience glaucoma in both eyes (right eye, 23.8, left eye, 25.8). Later test confirmed this condition, and I was referred to a Navy Ophthalmologist at Chelsia Naval Station (Captain Stevens). He confirmed the Flight Surgeons diagnosis as glaucoma, chronic, simple, open angle type. He noted no degradation in vision or field and prescribed medication (eye drops, Pilocarpine, 1%)

With this firm diagnosis, the Air Force Flight Surgeon grounded me permanently. I decided then that I needed to retire, as the grounding would be a significant loss in pay. I had several offers of help: General Glosser, Deputy Commander of ESD, offered to fly me to Maxwell Field where he thought I could get a waiver for flying status. The Deputy Commander of Air Force Systems Command made a trip to Hanscom to encourage me to stick with the Air Force But I knew this was a losing game for me, and I applied for retirement. This request created quite a shock at ESD and AFSC. But what was normally a straightforward procedure involving 30 days, turned out to be a struggle. I must go to Westover AFB Hospital for evaluation as to the seriousness of my eye problem (2 weeks) where the Ophthalmologist ran several experiments. The Doctor advised that I should get a 100% disability retirement based on the glaucoma condition. As the system declared 30% disability, I went before a local and a USAF Medical Board, but the final decision was 30% as a part of a normal service retirement.

Through Bill Schoninberg, Philco Marketing, I contacted Philco Houston Operations (PHO) which had just won a large contract from NASA to build and operate the Integrated Mission Control Center at Houston, Texas, known as the IMCC-H While my application for retirement was being processed in the USAF and while continuing my position at ESD , I visited Dr. Walter LaBerge, General Manager Philco Houston Operations for a management position there. This resulted in a job offer in Houston as

Manager of Engineering, Office of Network Planning, subject to my Air Force retirement. I accepted.

My date of retirement at ESD was September 1, 1963, at which time I received my permanent promotion to Colonel. I had 22 years service credited, 3648 flying hours, with a rating of Master Navigator. A disability of 30% was determined by the Veterans Administration. Awards received were Air Metal, Presidential Unit Citation, Air Force Commendation Metal, European Theater Ribbon with 3 battle stars, other ribbons related to time and place served and the Missile Badge.

The last few weeks were very trying (1) The high ranking officers at Hanscom were upset that I left on such short notice leaving vacant one of the key positions they had hoped would be upgraded (2) Because of the short notice I would not receive a duly deserved commendation as merited by my 22 years service, (3) To capture the Philco job I took my 4 weeks terminal leave in Houston on the job, and returned only the last week before retirement for sign-out protocol and the formal retirement parade.

I have always felt some misgivings about this series of events, as I left the USAF job to start a new career without reasonable notice. Ann and Caroline flew to Houston in late August, 1963, to register the kids in school and to look for a place to live. Charles II and I made the trip to Houston by car.

5. AT HOUSTON WITH PHILCO (NASA Mission Control Center)

During the next 20 years at Houston starting in August 1963, my jobs with Philco were:

8/63 to 1/65, Manager, GOSS Unification Contract, called Premission Planning by Philco

1/65 to 2/67, Manager, Mission Control Center Operations Activity

2/67 to 2/75, Manager, Mission Control Center Programs

2/75 to 9/83, Manager, System Engineering Activity

During these 20 years the names and management of the organization were changed many times:

Philco Houston Operations (of Philco Ford), 8/63
Aeronutronic Ford Corporation, 1/76
Ford Aerospace & Communications (FACC), 4/78
Loral Corporation, 2/91 (after my retirement)
Lockheed-Martin Aerospace, 6/96

During all these management name changes the local operation was essentially autonomous, while fitting into the overall financial structure of the corporate staff. Little notice of these changes was required by NASA (our customer), at least during my tenure.

In 1963 Philco Western Development Lab (WDL) out of Palo Alto, had formed a small group in Houston to help NASA design and build an Integrated Mission Control Center at the Manned Spacecraft Center, itself only a skeletal steel outline above the prairie of Houston. The overall goal was to accomplish a manned lunar landing before the end of the 60's. The undertaking would require much more than an automated spacecraft and the site-to-site flight control methods used on Project Mercury. Toward the end of the Mercury series NASA chose Philco WDL as prime contractor for the design, development and implementation of the Integrated Mission Control Center (IMCC) at Houston. This was a large follow-on to WDL's study by the original Houston team. The new contract must provide for control of the many steps leading to the lunar landing (Gemini flights, rendezvous flights, translunar injection, docking, etc) using new concepts of centralized control technology; and it had to be completed in 2 years. Dr. Walter LaBerge was the original PHO Director and used assistance from the many divisions of Philco.

Ground Operations Support System (GOSS) Unification

My first assignment was Manager of the GOSS Unification Project, a part of the IMCC Contract. It did not involve work on the IMCC itself, but included the management of special items needed to interface the IMCC with the network, which was to provide the data and communication to and from the Control Center. The most important tasks were the GLDS (Gemini Launch Data System) which connected Cape Canaveral to Houston; an ORACT (Operational Readiness & Confidence Tests) computer controlled system used to check out the Center, and documentation of end-to-end data flow by a GOSS Data Book. These groups, already in place, consisted of 30 people, located initially with NASA at Site 5 (OST & Interstate 75) on the Gulf Freeway and 6 people at Cape Canaveral. Key people in the activity were Bill Wrigley, Tom Van Sant, Ed Brown, Ray Trout, Walt Williams, all at Site 5, and John Hulett and Bill Harris .at the Cape.

The work went well and about every week or two we would meet with Howard Kyle and Ed Odenwalder and other NASA engineers (most of whom I knew from AF days) to review progress and receive technical direction. I attended Dr La Berge's weekly staff meetings downtown Houston where the main contract was being worked.

All the while the family was settled in the Memorial Section of Houston at 13907 Perthshire in the Nottingham subdivision, built by Kickerello, one of the better builders in Houston. The area was one of the best sections, and was popular with Philco employees as the rumors had it that our main office would remain downtown. (NASA was on the opposite side of town.) Charles II and Caroline were fairly well established in Memorial High School. Then I got a prized benefit from Ford - a new leased Thunderbird! By this time I was in a car pool with Ray Trout and Tom Van Sant, so the whole family could sport the Thunderbird. Charles II was particularly pleased, and I'll not forget the look in his eyes when he first saw the T-bird.

Lo and behold, in early 1964 NASA gave up site 5 and my office was moved to Clear Lake City, just a small distance from the developing Johnson Space Center (new name). Now my driving distance was about 40 miles one way, and directly through the heart of Houston. So in September 1964, we sold the Perthshire home and moved to Clear Lake City in a Del Webb house at 2010 Huntress Lane. This move made my location for the job perfect. And just one block away was Major Pete Clements and family, close friends of ours, and now an important member of NASA's inside management team.

The job continued with steady progress, with the addition of an Apollo Launch Data System, as preparations of Gemini slights seemed successful. For the fall semester Charles II entered University of Texas and Caroline enrolled in Clear Creek High School.

Manager, Mission Control Center Operations

In January 1965 Dr. LaBerge, PHO Director, assigned me the job of Manager, MCC Operations Activity. This entailed the management of the MCC facility, its equipment and operations and maintenance people., with the objective of operational readiness by launch time of Gemini-Titan-4, June 1965. Note: Gemini's purpose was to define the onboard and ground control techniques that were needed for spacecraft-to-spacecraft maneuvering for rendezvous, docking, and extravehicular activities (EVA) as related to a lunar mission. In addition to the Gemini spacecraft (a 2-man Mercury) there were 2 larger vehicles: a Titan booster and an Agena target vehicle .

This new assignment meant a transfer within Philco from the Western Development Lab (WDL) to the Tech Rep Division. Although the prestige was normally with WDL assignments, this job in Tech Rep put me on the Private Salary Role of Ford, a much envied category, eligible for Ford bonuses, among other things.

It was in this job that I received much praise and prestige from NASA: Chris Kraft, Pete Clements, Sig Sjoberg, Jim Stokes, Gene Krantz, etc, It was an open door into NASA from then on for me. The task was to build up a 300 man crew of technicians who would man the Control Center, 3 shifts a day, and 7 days a week. I immediately moved on site (Building 30, the Control Center) into Astronaut Sleeping Quarters, which were not being used then. Then, I had a most unpleasant job of dismissing the previous manager, a retired AF Major General. Dr. LaBerge thought I could possibly use him at a lesser position, but I believed it was best for all parties that he be moved out. (Sadly, his daughter was a friend of Caroline, and his wife was a friend of Ann).

I also had to take control of 2 positions occupied by highly motivated field engineers, who together ran the Maintenance & Operations Department. One was Manager of Operations and one was Manager of Maintenance., giving each online supervisor 2 bosses. But I was Manager of Operations and Maintenance, a job which the previous manager did not exercise I took the job over, having the other line supervisors report to me, with these 2 managers on my staff..

The Tech Rep Division had an ongoing effort, which was successfully staffing up critical MCC positions in communications, telemetry, command and display. We were defining jobs, outlining training sessions, writing procedures for the required M&O positions, while Personnel continued to find technicians either from other Philco jobs or from the market

Meanwhile, NASA missions were being controlled by Mission Control at the Cape. For Gemini3 we were able at least participate in the mission by monitoring On Gemini 4 (GT-4) in June 1965 the Houston MCC was prime for control and the first Flight Control team remained in Houston, where they were then stationed. Operational readiness had been accomplished.

There had been much bickering among Univac (communications control contractor), IBM (main computer contractor) and PHO (lead contractor) over whether or not the MCC at Houston was ready for control of GT-4. Although the implementation was not contractually complete, both Univac and IBM said they were ready. PHO voiced loudly that NASA should await total checkout of the display, communications and data systems before committing the Center to a prime role while the Cape was still operational. This was not the answer Kraft wanted, and he decided to make MCC-H prime, with the Cape having a skeleton crew in a standby role. There were a few glitches, but overall the Control Center did a good job on GT-4 coverage.

The 12 Gemini missions ran through 11/66. Because the NASA schedule at times called for support for 2 missions simultaneously, we needed to bring up 2 Control Rooms. One flight was controlled from the 3rd floor and the other flight (or simulation)) from the 2nd floor. The MCC consisted of 4instrumentation systems (not counting IBM and Univac computers).:display, communications, telemetry and command. Whereas the communications, telemetry and command systems could easily accommodate 2 missions as installed, the display system's task of serving a second floor was severe to us. The digital-to-television (D/TV) display was a state of the art device and required unique preventive and on-line maintenance. (It used background static slides on which were digital spaces for the IBM computer to write numbers, letters, symbols, etc. revealing spacecraft. astronaut, booster and trajectory parameters). Also an eidophor (large projection TV) and a group projection plotter were to be activated in the Control Room. A new set of consoles and VIP viewing room were necessary.

My Display Supervisor was totally consumed with supporting Gemini flights controlled from the 3rd floor, and put insufficient time and attention on preparing the 2nd floor (primarily for upcoming Apollo tests) in spite of direction otherwise. After some disappointing milestones were missed, I directed a separation of the Display Section into 2 Sections, placing a very component additional person in charge of 2nd floor with his own crew. This put a different light on things, and we had little trouble in attaining readiness on both floors.

As the flight schedule became more challenging, NASA developed a need for a group of instrumentation specialists to assist in the control of the Network and Control Center . The job was handed to me. I appointed John Hatcher to head up this task. John was the RCA Network Support Coordinator at the Cape during early Mercury, and was hired by PHO, and was doing part of the jobs in question at Houston already. By using a combination of our best M&O technicians and some new hires, the effort became a successful department in record time.

During this period Chris Kraft gave a large degree of the credit for the successful operations of the MCC to John Hatcher and me. Also, when Kraft's Recovery Specialist, Bob Thompson, was to be transferred to NASA Headquarters, Kraft offered me a very critical position in Civil Service, encompassing the recovery function and manager of the Flight Support Division. It was a tempting offer which I declined primarily because of

the dual compensation law, resulting in my salary being lessened by my USAF retirement pay.

Not mentioned so far were 2 other departments in my MCC Operations Activity: (1) MCC Installations, responsible for cabling, equipment installation and design and implementation of mission-to-mission cross connects. (2) Tech Rep Flight Controllers, about 30-40 field engineers used by NASA to monitor and control spacecraft systems during mission preparations and in Staff Support Rooms for in- flight evaluation.

In total our Tech Rep Division had about 450 people working for NASA under the WDL contract. This work was divided into projects, and we were awarded a fee on incentive performance (cost and performance).. Our awards were so high that NASA elected during contract extension negotiations to revert to subjective award fees. These were set to lower our past fees. In my Activity were 90% of the Philco elements required to reconfigure the MCC from one mission to another of the same type. The cycle started by NASA's release of it's Mission Requirements Document. It stated on a console by console basis the requirements for communications, events displays, D/TV displays and group displays. Our Configuration Control Section would develop computer listings of the cross connects needed to effect these changes and provide console labels. Then, the ORACT group would design computer tests to confirm the configuration and provide daily checkouts. The Installation Section would makes the cable plant changes, and install any new equipment furnished by Engineering It became my duty to lay out a schedule so that the start of simulations could proceed on schedule. This became quite a task, especially when we started running parallel simulations, one on each floor. At that point I got an MPR (Management Payroll) position approved for a Mission Readiness Manager, reporting to me. This off loaded some real detailed work from my shoulders.

I had been filling 2 positions: one as Operations Activity Manager with 4 Departments reporting to me, and one as M&O Department Manager. At PHO Director Bob Benware 's (who had succeeded Dr LaBerge) suggestion, Jim Moore from Palo Alto was appointed M&O Department Manager. At that point I moved out of the position of directly supervising 300 technicians manning the Control Center

Twelve Gemini Missions ran through November of 1966, all the while PHO of WDL continued to provide MCC design and development, and our Tech Rep Activity continued the operations, maintenance and support services. NASA appeared to be well pleased, and contract extensions followed.

From the NASA view the Gemini program had produced the answers sought on rendezvous, docking, EVA and man's ability to survive in space.

Manager, Mission Control Center (MCC) Program

The MCC Program Manager was the person responsible for Philco's performance under the $20 million per year contract. The line organizations (Engineering,

Maintenance & Operations, Quality Control. Procurement, Finance, Manufacturing, Personnel) did the specific jobs assigned by him, but he stood responsible to the PHO Director and the customer for the overall results, both performance and cost. It's a somewhat uncomfortable position as this manager does not organizationally "boss" the line managers doing the various jobs for NASA, but he must answer for all results.

During the early 1967 the MCC Program Manager, Bob Cronhart, requested transfer back to Palo Alto where his family still lived. His replacement would get a desirable job because of ranking, prestige and visibility. After a short time, PHO Director Bob Benware gave me the job. I accepted but still felt a little out of place in being in charge but not having the hire and fire authority over the line managers..

The transfer moved me from the Tech Rep Division back to the Western Development Lab (WDL). Before actual transfer the Tech Rep managers and employees sponsored a going-away party for me (and Ann) at the Ellington Field's Officers Club on January 27, l967. In the middle of the party, John Hatcher got a call from our console in the MCC that Apollo Spacecraft 1 had experienced a fire on its pad and the 3 Astronauts (Grissom, White, Chaffee) were killed. It was a sad event for all.

Some background on the Apollo program as our job at this point was to configure and operate the Control Center from the present until l972 when the program would be completed.

President Kennedy has vowed to have an American on the surface of the moon by the end of the 60's. The booster Saturn 1B would be used for early earth orbital flights and a Saturn 5 would be used for the lunar launch. The plan called for the Apollo spacecraft to be launched from Canaveral into lunar orbit, and a landing craft to be detached to carry 2 men to the lunar surface. Later the 2 would launch their craft from the moon and dock with the orbiting craft. The lunar craft was the Lunar Module, called LEM. The craft that the crew used to dock with was the Command Module. Only the Command Module would return to earth. A third craft, the Service Module had rockets, water, and air to support the Command Module.

This program (Apollo) would cover the remainder of our contractual effort.. The spacecraft itself must be redesigned to avert such disasters as Apollo-1 experienced; and on November l967 Apollo-4 was launched into orbit by Saturn 5..

With the number of vehicles involved in the lunar flight and the greater complexity of the mission, together with evolving technology, the MCC data system was to experience a major upgrade. We initiated a new display system replacing the manual slide files with an electrical equivalent. IBM upgraded the 360/75's in the Real Time Computing Complex. PHO procured from Control Data a large computer for data storage and retrieval, and most other systems experienced an upgrade while continuing to support orbital flights.

The contract with NASA, over which I was manager, consisted of numerous individual tasks, each with a PHO Supervisor and a NASA Task Monitor. Tasks were such as system engineering, maintenance & operations, equipment installation, simulation, configuration control, display formats, network controllers. Each task was defined in terms of manpower and cost at the start of each contract extension. The manpower of the project was set at an agreed to level of effort. We reported monthly on progress and cost by individual task and by totals. My office put the report together, and on each issue I would write a summary of significant items and placed in the front of the report.

Every month or two Bob Benware and I would meet with Dr. Kraft, now Director of Johnson Space Center, and members of his staff for an open discussion of our performance and items of special interest to NASA. These were quite beneficial and prevented any big surprise from popping up between the parties.

The controversial part of the contract was, as could be expected, Engineering. Each engineering change of any of our systems was a contract change. We could do the overall design with the level of effort manpower originally negotiated, but the detailed design, parts procurement, manufacturing and testing were "out of scope". As many of the jobs evolved from NASA Monitor's inputs they would extend beyond expectations, and cost overruns and schedule delays would occur.. I had a special office, MCC Project Office, which ran these out of scope jobs (typically 20-40 at any time). The Project Office had schedules of each job, which we updated and reviewed weekly with the cognizant engineer, manufacturing, installation and scheduling. The schedule always showed the critical path, highlighting the string of actions which extended the completion beyond others. Such schedules were deliverables and reached the applicable NASA division chief.

On one occasion the NASA engineering counterpart. Jim Satterfield, wrote us up on our formal quarterly performance report as having 5 engineering orders in some degree of default, either cost or schedule. This created quite a stir, although Engineering had always received lower incentive grades than others.
This was expected as they involved new design, and Jim Satterfield was always rough on contractors. But this report was more negative than others. Benware took it upon himself to understand the details and finally briefed Chris Kraft on the situation. Chris didn't seem much interested, and one of his staff discovered that one of the overruns had been directed by NASA. This deflated the effort and was dismissed

Ray Trout who became head of the Project Office established a much better interface with Satterfield and relations improved. Ray came up with a procedure which opened the contract, resulting in more speedily starts for new jobs and increasing our contract value. Previously, any MCC equipment addition had to be manned by the original level of effort. Manpower and only the material dollars were added to the contract. Ray packaged the entire product as if were to be bought: labor, material, manufacturing, test, and submitted this value to the customer. We then went through a make or buy decision. The total cost was added to the contract, whether it was bought or made by Philco. This

method permitted us to man up to give priority delivery to the customer, while addition dollars to the contract. The Controlled Material List (CML) became a sizable increase to the contract,

That's not to say there were no controversies. By some we were accused of making items for which we were not qualified nor competitive. Within PHO there developed an Industrial Department to diversify our base. On some MCC items the Industrial people would bid. They felt we (MCC) should rule for them in most cases. To the best of our ability Trout (and later Bob Cutchen) and I did not go for the "PHO Make" unless it was in the best interest of NASA. NASA rarely questioned our make or buy decisions, but the Industrial Department often did..

The MCC configuration updates increased as Apollo orbital flights continued. We were using both Control Rooms and were manning 24 hours per day, 7 days per week during flights. Apollo-6 was launched in April 68 with the second redesigned craft (unmanned). Soon after Apollo 7 completed a 3-man, 11 days orbital mission, Apollo 8 in December made the famous trip to the moon, circling 10 times, with Frank Borman delivering his famous Christmas Eve message to earth while circling and returning safely. After 2 more flights, one more lunar mission and one exercising the LEM, we then all remember the Armstrong, Aldrin landing of the Eagle on the Sea of Tranquility on July 20,1969, while Collins circled the moon. Apollo extended through number 17 with completion in September 1972..

One special occasion I will remember is related to the Apollo-13 flight in April l970, the flight of Lovell, Haise, Swigert, which experienced a ruptured oxygen tank in the service module while in route to the moon. (The crew was forced to gain entry into the LEM as water, air, etc were stored in the service module which had been seriously damaged). Our practice during live missions was to have cognizant engineers standing by in MCC equipment areas at critical times in case M&O technicians needed their expertise. Such a roster had been selected by Ray Trout (now Equipment Engineering Manager) and approved. We did not view the Apollo 13 flight to be any reason to depart from this practice. On the late afternoon before launch Jim Satterfield called Trout and directed him not to use engineering manpower for this purpose. Ray quickly called me. I called Jim's office, but he had gone home and didn't usually like to be contacted after hours. I then tried to call his boss, Lyn Dunseith, but no answer (after 6 pm). I then called Kraft's office hoping Dunseith might be there. Sig Sjoberg answered. I gave him my story and he said to leave the scheduled as we planned and check it out the next day. So we continued as planned and of course the emergency in space made this a minor item. Much later I had to give a briefing on the scope of our mission support to Dunseith. While I made the logical decision, the NASA lower level managers could not get over a contractor type opposing their decision.

One other significant practice we used during my tour was to conduct a readiness review before each Apollo mission to insure all Philco elements were ready to perform their jobs. I called it the Flight Safety Review. It gained favor and on several occasions

our WDL Vice-President would attend. His trip to Houston would also give him an opportunity to meet with NASA Management.

After the 6 lunar landings NASA's next manned project was Skylab, the first US Space Station. It emphasized the evaluation of earth resources from space. Sensors would view crops, forest, oceans and mineral resources. Because of the wide variety of sensors and experiments MCC would use data rates 5 times that of Apollo and 100 times of Gemini. For the MCC configuration we added a Mass Data Storage Facility and a Mission Operations Planning System and several smaller items unique to the experiments on board. Our role on Skylab was similar to the Apollo one except flights were of longer duration (e.g. the 3rd visit to the Lab was for 59 days) requiring 24 hours, 7 days continuous support. In preparation for this mode, I made a trip to the Jet Propulsion Lab in Pasadena CA to review their methods for continuous tracking for extended times.,. Ann made the trip with me and visited her Brother John and Family and several movie studios. The experiments ended in February l974, and Spacelab was destroyed in 1979 during reentry.

The last of the Apollo-type missions was the Apollo Soyuz Test Project, when in 1975 3 American Astronauts and 2 Russian Cosmonauts docked the 2 spacecraft and conducted joint and separate experiments. It showed that international rescues in space are possible. On one occasion our Director Benware hosted the 2 crews at a cocktail party and Ann and I got to meet and talk briefly with the Cosmonauts, and, incidentally we also talked to Jim Lovell, the Apollo 13 Commander who lived next door to the Benware's.

During this period, Charles II had graduated from Memorial High School, attended University of Texas, and Lee Junior College, married Connie Hess, also from Houston, and in 1966 Charles Webb Abbitt III was born. Through a series of jobs, his family ended in Dallas where Charles II developed an outstanding ability in computer systems, especially IBM's programs and hardware.

Caroline graduated from Clear Creek High School and also attended University of Texas, and has not cared to leave Austin for extended periods even after she graduated. After marrying Dr. Charles Sauer, they moved to Ossining, N.Y., as Charles was employed by IBM nearby. Elizabeth was born later in 1980 before they moved back to IBM/Austin.

Ann as usual was very active in the Officers Wives Club at Ellington, serving on many committees as well as President. She had many close friends in the Bay Area, the closest one being Jane Beamer, wife of the Base Commander. Our family had developed many friend as NASA and visited frequently with them and their families: Chris Kraft, Sig Sjoberg, Bob Thompson, Jim Stokes, Chris Critos, Neil Sullivan, Phil Barnes, Sam Sanborn, Jim Miller and Bill Easter...During this extensive period we had seats in the Dome Stadium Sky Boxes with many of these for Oiler and University of Houston football games.

While still at Huntress Lane, we bought the 100-acre Gus Biels farm, outside of Bartlett. It is good farmland, and had a house located there in much need of repair. We visited the farm frequently on week ends and vacations and had lots of visitors

Manager, System Engineering Activity.

The Manager of the PHO System Engineering decided in 1975 to return to Palo Alto, and I was chosen to take that position. The organization consisted of professional departments of system engineering, equipment engineering, software engineering and test engineering. By the end of my assignment in 1983 we had some 400 professionals on board. This position in other Philco organizations was one step above the other Activity Managers, but PHO had never upgraded the position, and I never gave it a second thought

A large part of the work was in direct support of NASA's Johnson Space Center as before as the next manned space program was starting; the Space Transportation System (STS) or Space Shuttle. There were other contracts and proposals ongoing, resulting from PHO's diversification efforts: U S Department of Agriculture Data Processing related to wheat yields from space derived data, a Landsat Data Processing system for India, for NASA Goddard a front end for computers to process the Tracking and Data Relay Satellites (TDRS) traffic, a contract from IBM for shuttle avionics, and within the NASA contract a top level design of a future Air Force facility.

In 1975 the corporation changed its name to Aeronutronic Ford and in 1976 to Ford Aerospace & Communications Corporation (FACC). Philco Houston Operations (PHO) was transferred from WDL to the Engineering Services Division, and we became Space Information Systems Operations (SISO), replacing the PHO name but still belonging to Ford Motor Company!!

The Shuttle program was at a fast pace, and major redo of the Control Center was to result. The new concept involved a much greater flow of data. One major factor was NASA's plan to put into synchronous orbit 2 Tracking and Data Relay Satellites (TDRS), which would provide continuous wide band coverage of shuttle flights. Data rates of 1.5 megabytes per second streams would be flowing into the Center either from an updated network or directly from the TDRS,

The Shuttle was made up of 4 parts: an airplane-like orbiter, a large external liquid fuel tank, and 2 recoverable solid rockets. The tank and rockets were to put the orbiter in orbit. The orbiter would hold 7 people, a life support environment, and space for experiments and would eventually land at one of a few chosen fields. There were 4 Shuttles. Columbia, the first one, flew the first 5 flights (4/78-12/82). After flight 5 the Shuttle was declared ready for operations. One of its first missions, number 6 by Challenger, put the first TDRS into orbit in 4/83. .

With the quantity, diversity and complexity of the work upcoming, I was fully aware that I could not be competent in all technical disciplines involved. Sure, I had an

outstanding academic background, was well received by our customers, but my detailed technical knowledge dated back to the transistor/television era. I decided I must rely on my proven management skills and sound methodology practice.

One of our departments under Clint Denny had done a thorough job of researching and analyzing how to implement a complex system, consisting of both hardware and software designs- this primarily from a methodology standpoint. The results had been well documented, and described all the critical milestones of how and why first a top level design must be done to separate major technical disciplines: hardware versus software. An estimate of cost and schedule is also needed at this point. The document described all the critical milestones, how and when the customer should participate, scope of design reviews and when they should be done, and content and timing of documentation. The guidelines were in a document entitled EX-140 System Engineering Standards. After a review and great discussion, it became a guiding document for future design work. NASA was very appreciative at the approach, especially Jim Stokes, Division Chief. Each new design project first passed through an EX-140 Committee, of which I was chairman, and at which the cognizant engineer, programmer or analyst would show where his project fitted into the cycle. The hundreds of steps in EX-140 were rarely applicable to most projects, and we could weekly go through the agenda of perhaps 3-8 jobs in an hour or two.

At first there were lots of foot dragging, fear of too much red tape and fear of losing creativity, but once people understood EX-140's content, they would bother only with their applicable part. The practice would permit managers to enter a project's process (e.g. design review) , view progress, customer relations and personnel competence at key times, and then be less concerned about checking-up on everything ever so often.

Throughout the MCC's preparations for Shuttle flights, we featured this top down methodology, sketching out each overall system, dividing it into separate disciplines so the proper expertise could be brought in after the overall system was defined by the system engineer and agreed to by the customer.

The development of the Shuttle MCC configuration was a real challenge because of increased data rates and quantity, and the need for continuous coverage as the remote sites were being phased out. Meanwhile NASA spelled out the need of 2 Orbiter and 1 Science wideband downlinks (1.544 Mb/s each). A highly qualified set of system engineers was needed to redesign the MCC front end- to receive the mixed data from the network or TDRS, process it for validity, quality and reformat it into telemetry, trajectory, etc. and preprocess it for users (IBM 370's, strip chart recorders, event lights, dump data recorders, consoles). A new device was also implemented .to transmit (digitally) computer generated commands and voice data. Some of the MCC systems remained essentially in their Apollo configuration: consoles, D/TV display, voice recorders, group display, intercom, pneumatic tubes.

We were able to employ a young outstanding system engineer, George Nossaman, who quickly became our lead conceptual engineer. He understood the electronics state of

the art, and was an expert on mini-computer applications. He wasn't a great believer in our methodology, but between EX-140 converts and a good NASA Task Monitor, we kept him in line. At this point we started to employ off-the-shelf mini-computers to accomplish what we had been doing with our own new design devices.

George and his team, with the SISO Project Office, could be seen almost daily at NASA's Division Office, discussing the numerous designs underway. This joint effort kept progress moving fairly smoothly.

In retrospect I now believe that a large part of our success then was due to Marcia Hurst, who defined for us the proper engineering methodology, and George Nossaman who did most of the creative work on getting the new MCC configuration off to a good start. Either one alone might be trouble!

Around January 1983 Bob Benware had a serious heart problem taking him out of action for a few months. I was appointed Acting Director of SISO, not knowing when Bob could return to work. Then, SISO had 2 very large milestones approaching. The first was a potential new business target as the Air Force planned a Shuttle Operations & Planning Center (SOPC) of their own and the bidding was planned during 1983. The integrating contractor role would be very similar to ours at JSC. The second milestone upcoming was NASA's plan in 1984 to consolidate 4 of its Houston contractors into one major contract. Involved were IBM, Singer, Mc- Donald and SISO. We were at a point where we needed to start proposal plans.

On the SOPC item Mr. Hockheimer, President of FACC, suggested during a multiple party phone session, that we team with IBM. Thinking this was a strong approach, our Marketing Manager and I started meeting with the local IBM management on a regular basis. Both parties believed the 2 companies could make a winning team, since the Air Force would be flying the same type shuttles as NASA, with compatibility being mandatory.

At this time our NASA contract work was drawing us more and more in to the Air Force's plans, as NASA had committed to assist in the job. As we were nearing an IBM/SISO partnership, Mr. Hockheimer declared that we must bid to the Air Force separately. We never knew why, but I suspected that one of our own west coast Operations had lobbied against us at Headquarters, as we at Houston might sop us most of the work, leaving little for them.

The second job that I inherited temporarily was to start up a proposal on the Johnson Space Center consolidation. This would be a long-term high dollar contract with stiff competition. Mr. Hockheimer and his staff were eager for us to win. I made several trips to Detroit and Palo Alto for planning purposes. These trips and higher headquarters interest were giving me more trouble than I needed to add to my regular job. Fortunately, Bob Benware returned to work part time in mid April, and took over these efforts, and I was gradually relieved of the extra duties.

I recall one rather entertaining event during this time period (4/83). SISO was ready to move into a new most attractive office building in the middle of Clear Lake City, adjacent to the Johnson Space Center. Numerous company VIP's were coming for the opening, including Ford Vice President Paige and the FACC Presidnet Hockheimer. To escort the visitors around the area, SISO borrowed employees leased 4-door Lincolns, and had the wives of SISO Management chauffeur the party around several sites. Ann was one. During the tour of several cars, Ann could not get her Lincoln to move. After holding up the parade for a few minutes, one of her Ford passengers showed her how to operate the car. She was very embarrassed, and the more everyone laughed, the madder she got. She thought people would see her as a Hick, while the Detroit City Slicker showed her how to operate a modern car.

As these potential jobs and 2 other at Goddard began forming their organizantal concepts, it was clear that each wanted its own engineering shop, leaving serious doubt that an organization such as I managed would be around. And I had no desire to head up a new large venture. Bob Benware offered me the position of Deputy Director during the1983 summer. But I felt this was my time to depart, and submitted my resignation for a September 1983 retirement.

Our quarterly JSC contract award fee grade had risen over the years to the high 90's and both Bob Cutchen and I received Public Service Awards from the NASA Administrator (my second one). The NASA/SISO group put on a fine retirement party for Ann and me. During the party, Pete Clements, by then JSC Associate Director, presented me a JSC Commendation for all my help on the space program

At that point in September 1983 we "faded away" to a second retirement in Central Texas.

6. RETIREMENT IN CENTRAL TEXAS

The Farm in Bartlett.

In 1971 we bought a 100-acre farm near Bartlett, in Bell County. It is located 50 miles south of Waco and 50 miles north of Austin, off Texas Highway 95. The land is flat and heavy clay, 8 feet in depth and called "gumbo" or Houston Clay, great for farming. A frame house dating back to the mid-1800's was located there. The house by this time had been constructed from parts of several houses, consolidated into 1 structure, 1-½ stories. It was 1500 square feet and in 4 sections: a kitchen, dining room, closet section, a bedroom and bath section, a dog-trot section in between, and an unfinished loft. Before out retirement date had been set we had John White completely redo the inside: he opened up the kitchen/dining room area, adding 2 large picture windows facing a pond; installed a half bath inside a closet; completely redid the bath room; had new plumbing and wiring installed; added a central heating/air conditioning system and installed panels and wall insulation throughout. That made a huge difference.

We moved there in October l983. After we got settled we had storm windows and doors installed and I put in 3 closets (urgently needed). Our neighbor, Ernest Wuthrich and I redid the siding, replacing boards and batten with style 107 siding, added skirts around the house and built a front deck. Later, we had an Austin company lift the entire house and place 50 piers under the foundation, as it was not level, too low on the ground at one end, and heaved as the land's moisture varied.

We fixed everything to our complete satisfaction but one: the soil base was very unsatisfactory for a reliable septic system. On a number of occasions after a big rain the soil saturated, and the toilets would back up and become unusable. We could get the tank pumped out, use a chemical toilet or go visiting. We used all three.

We had a nice garden, as the land was very fertile. The 85 acres of crop land were rented out on shares at the accepted local rates between tenant and owner: cotton 3/1, milo, wheat, corn 2/1. Tenants were first Robert Steglich and then Larry and Gary Spiegelhauer. This shift sent us from probably the worst farmer in Bell County to the best. However, the transfer became very bitter as Robert hired a lawyer and contended he was already vested in the upcoming crops and wanted to leave the current year's milo crop in the field for a second harvest. We brought in Pat Long as the lawyer on our side, and finally it died down with no settlement required.

Ann and I developed a close friendship with our neighbor across the road: Irene and Ernest Wuthrich and spent many days and evenings together. Being centrally located between Austin and Dallas we also had regular visits from the Sauer's and the Charles II family.

In the Spring of 1986 we got the urge to move off the farm (as Eloise once predicted we would). The unsatisfactory septic system was certainly one reason. Also, it was a

lonesome setting, especially for Ann. We said many times that we'd see only 2 cars pass each day, the mailman going west, then the mailman going east.

Residence in Salado.

On May 26, 1988, we moved about 15 miles westward to our new Salado residence, 1213 Indian Trail Drive, in Mill Creek Subdivision. It's on Interstate 35 and as before, half way between Austin and Waco. Salado is an upbeat community, populated heavily with golf-playing retirees with numerous antique shops and specialty stores. As contrasted with Bartlett, the residents are very friendly and cheerful.

Our house is very comfortable and attractive. We are located on the fringe of the Texas Hill Country, and our yard has a fairly steep slope, well populated with attractive trees, in sharp contrast to the Bartlett landscapes, which is almost void of trees in the prairie areas I set about conquering the back yard as it was still in its native state, with no steps or clearing so as to be useful. I also used 6 raised beds for a garden as the soil over here is caliche (rocks, sand, little humus).

Ann moved into the Salado society quickly. She joined the Ladies Auxiliary to the Chamber of Commerce, and became their photographer. She served as acting Vice President for one term. (The Chamber of Commerce ran the village, as we were unincorporated until 2001) While shopping was rather marginal here, we were only 40 miles from Fort Hood, which has a huge Post Exchange and Commissary. We took advantage of both on a regular basis.. I joined the Lions Club, and we both joined the Mill Creek Community Association and the Salado Historical Society. I was volunteered for a Log Cabin Committee of the Historical Society, and chaired it for 10 years, including its restoration in 1990, its furnishing and overseeing public viewing through year 2000 (The cabin was built in 1852 and is the Boles-Aiken Cabin.) Ann was a steady assistant.

The Mill Creek Community Association is an organization of homeowners to protect property values and to promote fellowship and beautification., the usual homeowners associations objectives. I got involved in the beautification part and served as Chairman of that committee for several years and was President for 1 term. Meanwhile, I continued the farm upkeep, going over every day for several years, and of late, every 2 or 3 days to look after the house, yard and 15 acres that I care for and which has a pecan grove.

Everything was very pleasant here in Salado until 1996. Ann had several lengthy respiratory attacks, and finally we observed a definite shortness of breath and loss of stamina. We checked her condition at Scott & White Clinic in Temple with X-rays and MRI's. Results indicated possible lung cancer, later confirmed by biopsy diagnosis as small cell lung cancer. Neither surgery nor radiation would apply for this condition, only chemotherapy could help. She had 4 series of treatments, and initially the tumor (located at the base of the upper right lobe of the lungs) shrunk in size with each initial treatment, but eventually each series failed. We arranged to travel to M.D. Anderson Hospital in Houston for a second opinion. They confirmed Scott & White's diagnosis and treatment.

Our Doctor finally declined to use any more chemo treatments as it could do more damage than help. He referred us to a local Hospice. I learned during all this from the National Cancer Institute and some literature they sent me that this type of cancer is about the most deadly, with little chance of recession.

Ann died on Christmas Eve 1996, the same day the entire Texas Abbitt Clan was heading for Salado for Christmas together, as we had always done. Her service was conducted by the First Baptist Church of Salado, by Pastor Brain Dunks, with a ceremony as near to Tot's as I could remember, including renditions of the song "I Walk in the Garden Alone" and Tennyson's poem "Crossing the Bar". She is buried in the Salado Cemetery.

I continue to reside at 1213 Indian Trail in Salado, and continue to take care of the farm and the Salado residence. For an 80-year-old person, my complaints are few. I still am treated for glaucoma and have a minor case of bursitis. Most neighbors are old friends by this time, and we have a club, called the Indian Trailers, which meets monthly in different members' homes for fellowship, cocktails and snacks. I plan to keep busy and practice good health, safety and being neighborly.

3/01/01

1 - CWA as VMI Cadet. 1940

2 - CWA in Signal Corps at Tampa 1942

3 - CWA and Ann, 1943

4 - Family of 3 including Charles II

5 - Captains receiving Air Medals at Orleans, 1945

6 – CWA offloading gas for Patton at front, 1945

7 - Caroline, Ann, Charles II at Capitol, 1956

9 - Ann at home in Florida, 1956

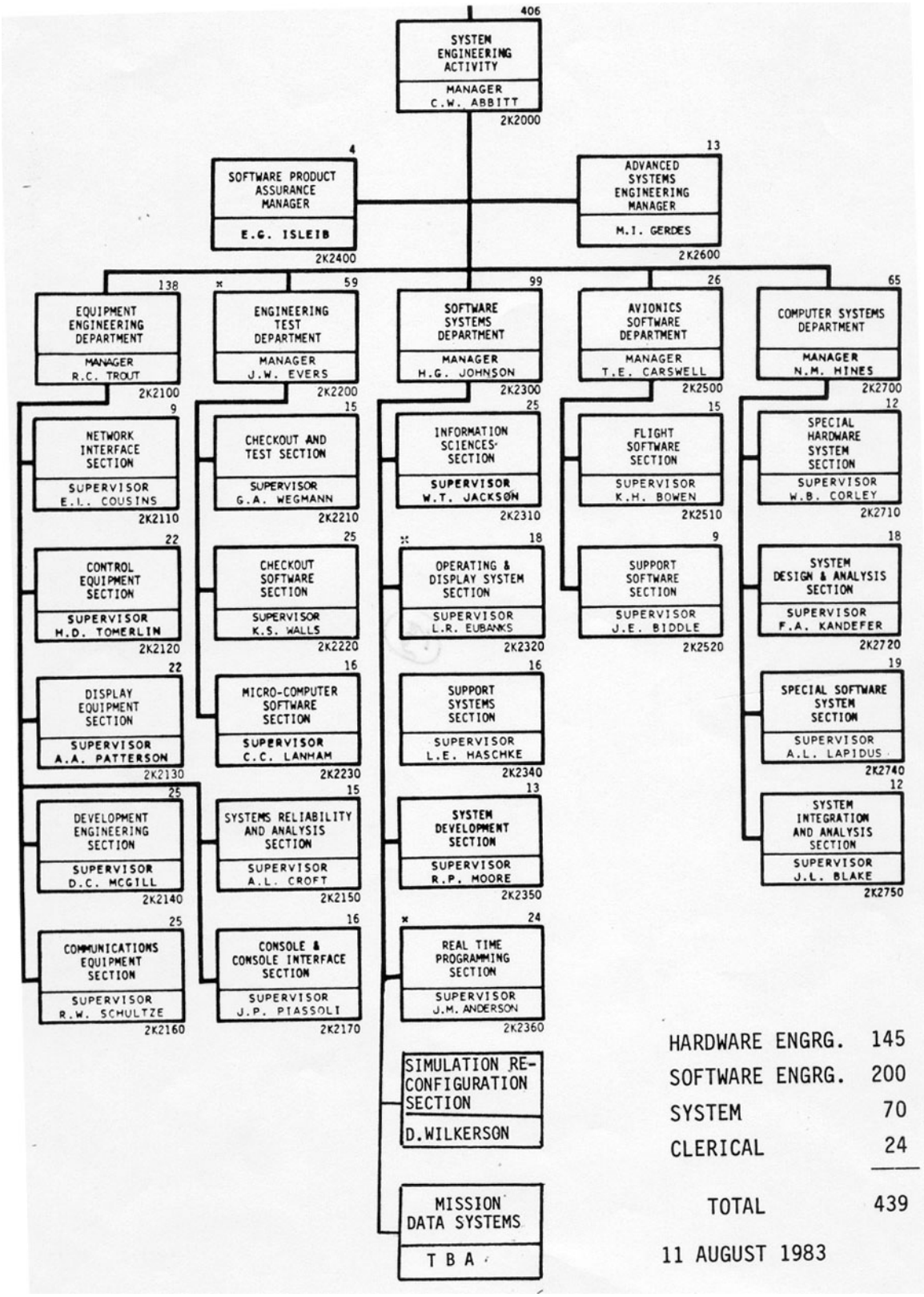
11 - CWA at Bedford before retirement, 1963

13 - CWA receiving NASA Public Service Award from
Administrator Fletcher, 1973

8 - George Abbitt Sr. and family at Appomattox, 1957

10 - Ann and Caroline ready for recital in Florida, 1960

12 - Family at Bedford, 1963



Organization Chart, System Engineering, CWA Manager

14 - CWA, Ann Charles II and Connie at farm,1983

16 - CWA and Ann in Austin, 1990

18 - Christmas at Salado, 1992

15 - Farm house and Lady,1989

17 - 50th Anniversary 1993

19 - Picture from Church Album, 1999