



DR AHEAD



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This Saudia L-1011 is in an airplane park in Jeddah, Saudi Arabia. Ron Barrett, AFNOA Historian, trained Saudi pilots on the inertial navigation systems on this particular airplane in the 1970s. See article on Page 3. Photo from Wikimedia Commons.

HISTORIAN'S REPORT: SAUDI ARABIAN FLIGHT NAVIGATOR No. 1

I'll attempt to recount my experiences even though it seems like the events took place a thousand years ago.

As Gary Olsen so correctly stated in his e-mail, taking the written exam was the more difficult challenge—more so than the actual flight examination. For in my situation, I had already accumulated 5,000+ hours of navigating MATS C-121s and MAC C-130-Es all over the globe, so satisfying the four-hour flight requirement was a walk-in-the-park. Once having passed the excruciating written examination, arrangements were made for an FAA Examiner to hop on board one of our C-130-Es.

With another fellow MAC navigator, Blair Stryker, who went through the aviation cadet program about the same time as I did in Class 61-06, we departed McGuire AFB for Ramey AFB (Puerto Rico) with a stop at Charleston AFB to board the FAA Examiner. On April 6, 1968, with

by Dike D. Artley, Harlingen 61-06

the flip of a coin, I elected to navigate the outbound leg from Charleston to Ramey while Blair brought us back to Charleston the following day. Each segment was approximately 4 hours (1141nm). As far as navigation goes, with our global world-wide navigational know-how, Blair and I could have navigated our respective legs of the flight with our eyes closed. We both successfully passed the flight check and proceeded to have a glass, or two, of Rosé Mateus upon our return. We were both issued our FAA Commercial Flight Navigator Ratings, dated 04-06-68.

Shortly thereafter, I accepted a job offer with TWA at their pilot training center in Kansas City, Missouri, and with the proverbial "grass being greener on the other side of the fence," I elected to sever my umbilical cord with

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DR AHEAD

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the Air Force to pursue the wonderful world of being employed with the airlines. As most of you may recall, there was a mad exodus to the airlines in the late 1960s and early 1970s. And for the reader of this yarn, coincidentally it was at TWA where Ron Barrett and I both met as Flight Crew/Flight Safety Instructors (fun days to say the least).

TWA had a contract to manage the day-to-day operations for Saudi Arabia Airline and in late 1969, a call went out for a few instructors to go to Jeddah, Saudi Arabia, to help nationalize their airline (Saudia). Shortly after arriving and knowing that I possessed an FAA navigator license, the folks at Saudia flight operations asked if I would be willing to get a Kingdom of Saudi Arabia Certificate (License) for the purpose of navigating their B-707s on international flights —mainly to Europe. So, based on the issuance of my USA FAA Flight Navigator certificate, I was then issued on 10-19-71, the Kingdom of Saudi Arabia Certificate FN 001.

Also sharing these occasional navigational responsibilities for Saudia was a fellow instructor, Rodion Rathbone. If the name Rathbone rings a bell with some of the older readers, his father, Basil Rathbone, was the famous British actor best known for his roles in the numerous Sherlock Holmes movies between 1939-1946. Ron and I both came to know Rodion and his family well during our tenure with TWA and Saudia. Rodion was truly one of the most interesting and informative people I have ever had the pleasure to know (another story for another time).

In closing, another tidbit to share in this narrative is that my older brother, John Artley, was a MAC pilot, so one can only imagine the stories that we shared as brothers about “navigators telling pilots where to go.”

From Ron Barrett: A few years later I followed Dike to Saudia to become the second ex-USAF navigator, and closed the rating down when the L-1011 came to Saudia, for it was triple Inertial Navigation Systems-equipped, it took us straight away to Rome from Jeddah, and no navigator was needed!

AN OFFICER AND GENTLEMAN

by Aubrey (Jim) Lynch, James Connally 64-06

I seriously doubt that there were many 2nd Lieutenants entering on active duty who were quite as naive as I. I arrived at James Connally AFB with two large trunks, both containing a lot of books. I did not know that I could have shipped my belongings courtesy of the Air Force. Welcome to the world. Fortunately, there was an Afro Sergeant on duty at the base gate when the bus unloaded me and my 2-ton bags. He had mercy on me and helped me haul the bags to the BOQ and might have offered to tuck me in, but thankfully he didn't go that far. I might have

accepted. A fellow trainee, the late Jim Dixon, two classes ahead of my 64-06 class, found me wandering the next day, took me under his wing and saved me further embarrassment.

I could have expected no less from the Afros. It was the Nordics who made me understand in a decidedly more profound way what it means to be an “Officer and a Gentleman.” Remember what it was like for Afros in 1962. That was the time between the 1955 lynching of Emmet Till and the 1967 riots with the assassination of Martin Luther King, Jr. thrown in for good measure. Having been the drill team commander, a pitiful rifle team member, and a two-letter foil fencer in college, I had experienced the support and camaraderie of Nordics as well as the more common ostracism and isolation of being in a small minority of Afros at the predominantly Nordic University of Detroit. Those experiences prepared me quite well for the navigator training class that I joined.

The instructors were uniformly excellent. It did not take long to recognize why. The subject matter was all devoted to the mastery of tools of the trade. Unlike college courses that were presented in a bundle requiring end of semester recall, each navigational tool had its own end of course test. Either you got it or not. My classmates proved themselves to be adept, eager and hard working. Also, unlike college, there was little chance for any individual to shine more than any other. That left physical fitness, meals, and play time to provide opportunities to get to know the individuals.

To a man, my classmates were dedicated professionals. All seemed to have been imbued with military ideals of duty, honor, and pride in membership. My father had been in the Army Air Corps. He had been a cook, as Afros were barred from combat. My brother enlisted in the Air Force at 17. As a boy my uncle had told me that Afros were not allowed to fly as one had to be an officer to fly. I joined the ROTC when I understood that the rules had changed. When I learned that an officer was also a gentleman by act of Congress, that sealed the deal. Did the others have such perceptions? I didn't ask. They comported themselves in every way as if they had and as I fully expected.

Most seemed eager to engage and share. Of course there were those who were reticent and distant, but even these were easy and without tension when engagement was inevitable. As always, some left a lasting impact. The late George Clarke, the only other Afro in our class, was a close friend—as one might guess. He washed back and did not finish with us. He died in combat in Viet Nam flying in the back seat of an F-4 after having flown the B-52. Eugene Young was the class comedian and inseparable from Roger turKuile. The spelling of Roger's name that I use here was his perpetual fight with the authorities. The initial “t” was to be lower case and the “K” was to be

capitalized. The class photo shows that he always lost the fight. Richard Wheatley always smiled and always engaged with warmth and charm. After six years in service, having flown with and known some great people, Richard Wheatley is the only person who is still a friend and confidante.

I leave one other classmate as the sine qua non of my thesis, the one who most profoundly affected my perceptions. My engagement with Travis Jackson was no more nor less than with the others. He was super bright and supremely confident. He, casually and without bragging, shared his approach to his use of navigational tools. That approach was always spot on. He was also very proud to describe his automotive skills. When he understood that I was having trouble with my recently purchased Piaggio motor scooter, he offered to repair it for me. Travis was an avowed racist and had no problem letting me know that. As he knelt on the ground with scooter parts all around, he quite calmly, and with the utmost sincerity, discussed his beliefs.

He could talk to me, he said, because I was willing to discuss the issues. George, on the other hand, was a "flag waver." Of the things he told me, one has stayed with me to this day. There is a difference between southern racists and the northern type. Southern racists hate all Afros, but can befriend and love an individual. Northern racists, on the other hand, purport to love all Afros, but are unwilling to live next door to one of them. We did not have another memorable discussion, but, when he walked away, my scooter worked perfectly and he refused any payment.

He was the best example of a true "officer and gentleman." I made no attempt to find him. But, when Jim Faulkner sent a list of members of class 64-06, I grieved when I found out that Travis Jackson had passed.

If my own experience is comparable to those of my classmates, my active duty introduced me to a world outside of the protected and special environment of a cohort of young, eager warriors. The world wears away at us. I am grateful that the memories of James Connally are still strong and sustaining. I am especially grateful that Jim Faulkner recently put me in touch with my favorite aircraft commander, Robert Ransom. I am also grateful that Richard Wheatley is still a friend after all of these years. Gentlemen all. Gentlemen forever.

Aubrey (Jim) Lynch (64-06 James Connally) served six years with the Air Force, finishing as Captain, Navigator, KC-135 with 64 combat missions in the Viet Nam conflict. He obtained a doctorate in Organizational Psychology. He is retired from a successful career practicing as an Organizational Psychologist at several institutions such as General Motors. He has three sons and three grandchildren.



Coral Gables

THE ARMY AIR CORPS' FIRST NAVIGATION SCHOOL

by Capt Michael Vriesenga

In the earliest days of aviation, the Army Air Corps had little need for aerial navigators because their planes had limited range and capability. Despite the dreams and prophecies of men like Billy Mitchell and Harold L. George, airpower and the need for the navigator did not exist until the advent of the B-17, which Hap Arnold called "Airpower that you could put your hand on." When Franklin Roosevelt's eyes were opened to the potential of airpower by the signing of the Munich Pact, he advocated building an air force second to none. Producing the planes was difficult, and obtaining crews for those planes was equally challenging. Producing navigators for those crews was a particularly thorny problem, since the Air Corps had only 30 qualified celestial navigators. These men were senior pilots needed for leadership positions, and couldn't be spared to train navigators for the new B-17s.

The Air Corps turned to civilians to produce planes and pilots as well as to produce navigators. In April 1940, General Delos C. Emmons was flying aboard a Pan Am Clipper to Lisbon, Portugal. He spent most of the flight watching the navigator, Charlie Lunn, carefully and accurately chart his course to the Azores. In the morning, upon sighting the island of Horta in the Azores, dead ahead, he turned to Lunn and expressed frank amazement. Lunn assured him it would be more amazing if a clipper missed its destination. The General was impressed, but casually asked, "How many men could you instruct in aerial navigation?" "As many as could hear my voice," Lunn answered confidently. Emmons convinced General Arnold to allow Pan Am to train Air Corps navigators, and Pan Am reluctantly agreed. After learning he would have to make good his boast to train navigators, Lunn frantically assembled a staff and created training materials. Capt Norris Harbold, the Air Corps supervisor of this project, assembled the necessary navigation instruments. Simultaneously, Capt Alexander met with President Ashe, of the University of Miami, to arrange for the new school. The University of

Miami was an ideal choice because it was only two miles from Pan Am's Dinner Key base where the students would train aboard 1930-vintage Commodore flying boats.

The days before the opening of the new navigation school were hectic. Lunn's staff had to scrounge pencils, paper, and typewriters. To provide classroom space, beaverboard had to be hastily erected inside the University of Miami's Anastasia building. Instruments had to be located since those Capt Harbold procured for the school were waylaid by the 2d Bomb Gp at the Miami airport.

Despite these obstacles, 50 students filed into class on 12 Aug 1940. Amid a tangle of reporters, photographers and four student instructors, they heard Charlie Lunn's booming voice confidently declare, "You are the future captains and majors of the Air Corps." The students laughed, and Lunn rewarded their skepticism with a four-hour lecture on spherical trigonometry.

Training proceeded much as it does today. Classroom instruction was supplemented by dry swims and hands-on training in the steamy Commodores, which took forever to rise above Biscayne Bay for their triangular trips to Cuba or out-and-backs to the Bahamas. Although the students received cursory training in pilotage and map reading, the training emphasized celestial navigation techniques derived from Lunn's nautical background.

Finally, on 12 Nov 1940, 46 cadets marched into the Biltmore Country Club while the U of M band played "The Stars and Stripes Forever." A teary eyed Lunn watched as each received his certificate. They marched off to their assignments only to find themselves shunned by pilots unaccustomed to this novel aviator. In time, they would prove their worth. The first class was decorated for fighting in the Philippines, and for navigating Arnold and Harriman on their missions. Later graduates were decorated for their role in Doolittle's raid on Tokyo. Capt Harbold gleaned six of the original class graduates to serve as the initial cadre for the Air Corps navigation school at Barksdale. Here Lunn's influence established itself in the Air Corps navigator training schools. In this sense, all modern Air Force navigators are the intellectual progeny of Charlie Lunn.

While they were pressed by the Germans during the Battle of Britain, the British trained many of their navigators at the Pan Am school. These cadets were joined by navigation students from China, Bolivia, and the U.S. Navy. One of the legacies of the British occupation of the Pan Am school was the "grope." This early navigation simulator projected pictures of the English countryside on the floor to improve the cadets map reading skills.

In time, the Air Corps navigation schools surpassed the Pan Am school. They had aircraft specifically designed for navigator training, better student-to-aircraft ratios, and veteran instructors recently returned from the front lines. The Air Corps also learned that it needed a navigator more proficient in map reading than celestial navigation. Be-



Instructor Charlie Lunn and three cadets.

cause the Commodore flying boats were essentially unsafe over land, the Pan Am school could not provide the kind of training the Air Corps needed. The 10 students crowded into the Commodore had to compete for space at the instruments or in the hatch to do their celestial readings. Finally, Lunn's maritime navigator instructors could not provide the quality of instruction that a veteran B-17 navigator could. The Air Corps closed the Pan Am navigation school on 31 Oct 1944. However, the spirit of Charlie Lunn and his school lives on in the Air Force today through the training techniques established.



Capt Vriesenga is a graduate of Florida Atlantic University and recently completed his master's degree in history. After UNT, he flew C-130s at Little Rock AFB before instructor duty at Mather from 1986 to Sep 1990. He now serves as an instructor at Squadron Officer School.

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Col Andy McElvaine presents Lt Col Michael Shields with the guidon at the 479 STUS Change of Command.
USAF photo by Capt Devin Vitt; used with permission.

GUIDONS CHANGE HANDS

by Capt Devin Vitt, USAF AETC 479 FTG/PAO
“In a ceremony steeped in tradition,” a phrase which many who have served are familiar with, not one but two squadrons in the 479 Flying Training Group underwent

changes of command in the early months of 2018. The separate ceremonies marked the successful command tours of Lt Col Brian Hobbins and Lt Col Christopher Plourde, of the 479 Operational Support Squadron and 479 Student Squadron respectively. Both ceremonies were held, in the

Col Andy McElvaine presents Lt Col Daniel Rueth with the guidon at the 479 OSS Change of Command.
USAF photo by Capt Devin Vitt; used with permission.



spirit of joint operations, within the atrium of the National Naval Aviation Museum.

The first ceremony, held on 12 January, saw the traditional handing of the guidon, from Lt Col Hobbins to Lt Col Daniel Rueth. Hobbins led the 479 OSS in its mission which includes the administration and support of the Group's intelligence, aircrew flight equipment, simulators, instructor training, and SPECTRA electronic warfare shops. Its new commander, Lt Col Rueth, just spent the last several years as the Director of Operations for the OSS sister squadron—the 451st Flying Training Squadron.

The second ceremony, held on 1 February, was historical in that it was the first change of command for the 479 STUS, it having been stood up only two years ago. During that time Lt Col Plourde undertook several major projects to establish the fledgling squadron, including the complete remodel of their WWII era building, and the creation of a student database now used as the model at all undergraduate flying units.

In a ceremony filled with family, students, and other well-wishers Lt Col Plourde passed command to Lt Col Michael Shields, a Master Weapons System Officer on the F-15E. Previous to this assignment Lt Col Shields deployed in support of both Operation IRAQI FREEDOM and Operation ENDURING FREEDOM and had previously instructed at NAS Pensacola in the Joint Undergraduate Navigator Training Program. His most recent assignment was as the Director of Operations of the 334th Fighter Squadron, the F-15E Formal Training Unit at Seymour Johnson AFB, North Carolina.

FLYING IN THE B-52

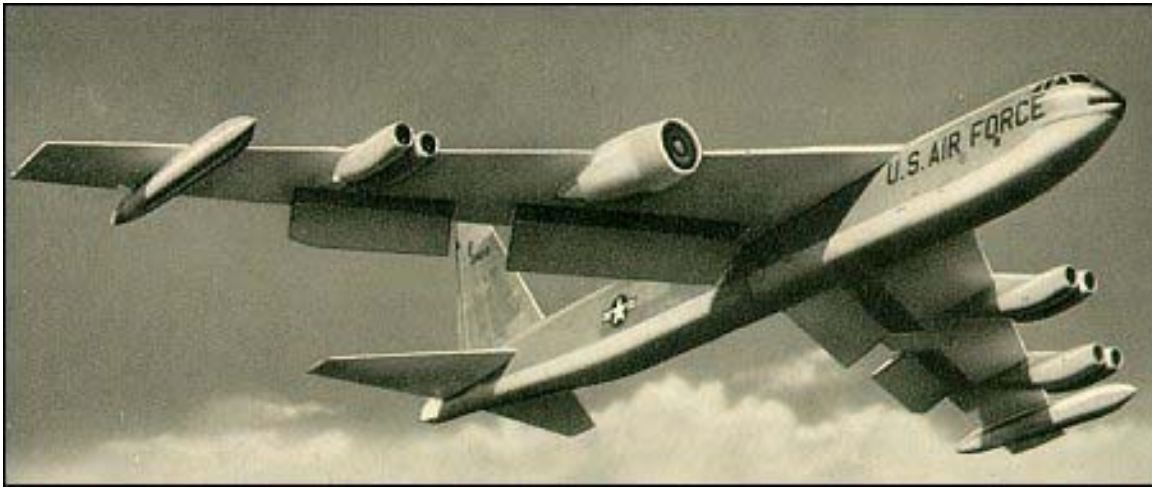
by Robert Jacobson, Harlingen 59-21N

B-52 models A thru F crews consisted of the aircraft commander, copilot, navigator, radar navigator, electronic warfare officer (EWO), and gunner. EWOs were called "Ravens" or "Crows," and to this day, there is the Association of "Old Crows." The gunner position was always considered to be useless as the plane was designed in the late forties, just after bombers fought in World War II and were attacked in formation by fighter aircraft shooting machine guns. The B-52 was designed in the days before air-to-air missiles to be a high-altitude penetrating aircraft. The gunner sat in the tail and controlled four 50-caliber machine guns. On the last two B-52 models, the G and H, the gunner was moved forward into the flight deck, sitting beside the EWO, and he tracked enemy aircraft with radar and controlled the guns remotely. Nonetheless, it was always recognized that even in the 1960s, no fighter in a tail chase would need to get close enough to be shot down with 50-caliber machine guns, and in later years on the H

model, the gunner position was removed.

There were eight B-52 models in all, the A through H. I flew on the D model at Castle, the F model at Columbus and later on the H model at Grand Forks. The difference between models A through F were mainly engines, engine driven alternators, fuel capacity, and other engineering changes. As far as the EWO was concerned, the only difference I can recall was the ejection seat harness and lap belt were easier to get into on the F and H. Although the B-52 was designed to be a nuclear weapon platform, the Fs and primarily Ds were used in Vietnam and carried "iron bombs" (non-nuclear) while the G and H models were used strictly for the nuclear airborne alert mission. At Columbus I recall flying a few low-level missions over the Gulf of Mexico carrying inert iron bombs and dropped them over some ocean target areas, probably as a test to evaluate the capabilities of the B-52 to be used in a conventional bombing environment. Here was a typical combat B-52 training mission, which were almost always night missions. Show time at the squadron was at least 2½ hours prior to take-off, which was around 7:00 p.m., give or take, and would be 12 to 14 hours in duration. The mission planning took five to six hours for all crew members except the gunner, but he was with us and helped, which was always done a day or two before. We were given our call sign, routes, events and times, and we then planned the mission around those parameters. In the early sixties, SAC decided to measure crew training by assigning points to each event on a mission. A navigation leg was worth so many points, as were bomb runs, air refuelings, electronic warfare events, and pilot instrument work such as instrument approaches, holding patterns and the like. Initially, we were told there was no pressure to attain points, but because there was always some commander who was trying to get promoted ahead of everyone else, we soon found that crew point totals were displayed prominently in the squadron, and woe be to the crew whose point total wasn't up near the top. This meant we crammed as much activity into each mission as possible.

Before the briefing, we went to our lockers to get our equipment bags and then to "PE," the Personal Equipment Section, to get our helmets and oxygen masks, and also, if it was an over-water flight, our "Mae Wests," or the inflatable "water wings." Next, each crew member briefed the mission to usually the Wing Deputy Commander for Operations, or DCO, a full colonel. This usually took about 30 minutes, and afterwards, the crew loaded into the crew van. The driver first stopped by the Command Post where the EWO picked up the "Secrets" (more about that later), and then out on the flight line to the aircraft, which had already had a pre-flight done by the crew chief. The Command Post filed the flight plan with Air Route Traffic Control, later changed to just ATC, so there was no need to stop by Base Operations. The pilot reviewed the mainte



nance forms, noting any equipment write-ups from the previous flight, and reviewing what corrective actions had been taken. Sometimes write-ups could not be duplicated on the ground, and Maintenance Control noted that in the forms and asked the crew to see if the symptoms came back again on this next flight. If this was an airborne alert mission, there would be actual nuclear weapons (bombs) in the bomb-bay; and the pilot, radar navigator, navigator and anyone else interested would walk into the bomb-bay (the airplane sat high enough off the ground so that one could duck his head under the bomb-bay doors and then stand upright inside the bay) and check to make sure that the weapons were in fact the correct ones that had been briefed, and that the proper locking pins etc. were correctly installed. One didn't want one of those puppies to come loose during take-off and bounce around on the bottom of the bomb-bay, or worse, crash through onto the runway.

The crew then climbed up the crew ladder, located just aft of the nose gear on the left side, stowed their gear, and got into their seats to start running checklists. If it was a hot muggy day, an air conditioning cart with a huge hose had already been shoved up into the crew compartment to make things a bit more bearable; like-wise on cold winter days a heater cart warmed the inside. There was also an MD-3 Power Cart running, providing external power so the interphones, radios and lights could be energized before engine start. The B-52 crew's compartment had an "upstairs" and "downstairs." The pilot and copilot sat side by side in front, and directly behind them was a "jump seat," where extra crewmembers or an instructor pilot could sit.

Behind this seat was a flat area, wide enough for two people to lie down and sleep, but not high enough to stand. Kneeling was about as high as you could get. There was a small window on each side, and in the middle of this

area in the ceiling was the sextant port. During certain navigation training legs, The EWO would insert the sextant and take star shots for the navigator. The idea was that if the navigation computers failed, the crew could still navigate with the sextant backup. In the back of the upper crew compartment was the ejection seat for the EWO, facing forward. In front of the EWO was his equipment panel. This had such things as the interphone and radio panel, oxygen panel, and various electronic signal receivers and jammers. On the G and H models, the EWO sat next to the gunner on the right side of the aircraft, and both faced backwards.

On the right side of the open area in front of the EWO was the crew ladder leading to the lower compartment. The radar navigator's ejection seat was on the left side, the navigator's on the right; the crew entrance hatch was behind them. The gunner had his own entrance in the rear of the plane. Behind the navigator was a door that led into the bomb bay. A crawlway ran along the right side of the bomb bay leading to the gunner's compartment. If the gunner was in trouble, a crew member could attach an oxygen walkaround bottle to his mask, and crawl back to the gunner to render assistance. In the B-52, upstairs crew positions ejected upward, and downstairs the navigators ejected downward.

The checklists ensured that safety pins were inserted in the ejection seats, equipment switches were in the proper positions, oxygen masks checked for proper flow and so forth. Everything was timed from this point forward. Engine start was initiated as the second hand came across the exact minute, after which point the crew chief disconnected the external power cord, and pulled the carts away. Then we all turned on our equipment, and waited for the taxi time, at which point we then rumbled down the taxiways, holding short of the active runway, where the pilots did the engine run-up. The parking brake was set and power

was applied to all eight engines to ensure they were putting out the proper thrust. Then the plane took the active runway to "position and hold" as directed from the tower.

At the exact take-off time, power was reapplied, and all eight engines rumbled and roared as the plane moved down the runway. On the F model, I could see around my equipment panel to look out the side window or the front windshield. On the H, facing backward, I could crank around and see out the copilot's windshield. The thousand-foot markers raced by until somewhere around the seventh or eighth thousand-foot marker, depending on the weight, field altitude and outside temperature, the copilot called "S-1 Speed," and then "Liftoff." All the vibration would suddenly stop as the huge plane lifted off and the pilot called for gear and flaps up. The copilot looked for green lights to come on as each of the five gears—nose gear, two mains and a tip gear on each outer wing—came up and locked. I would then call the Command Post and using our call sign for the mission, say for example, "Rider 25 is off on time and in the green," meaning all systems were functioning. Late takeoffs were about as bad a sin as a crew could make in SAC; the reason being that in an actual mission to bomb the Soviet Union, our airplane would be only one of hundreds of Air Force and Navy planes, ICBMs, Navy missiles, and planes from our allies, and everything had to be time coordinated so we all wouldn't run into each other.

Unless it was a maintenance delay, the aircraft commander suffered accordingly. It was always fun to watch a KC-135E tanker take off with a full fuel load on a really hot summer day in Columbus. Even with engine water injection, they took almost all the 11,000-foot runway, pouring plumes of black smoke from their four engines before they lifted off. Later in the seventies and eighties they were re-engined to provide more thrust and designated as the KC-135R. We then climbed to altitude, usually around 35,000 feet, and headed for our first event, usually a refueling. The copilot worked both UHF radios and I was responsible for the HF (high frequency) radio. The copilot called the tanker, and set up the rendezvous at the Air Refueling Control Point. The navigator on the tanker and our radar navigator coordinated the approach, and soon we were in visual range of each other.

Slowly our aircraft commander brought the plane up to the rear of the tanker, and the tanker boom operator extended the boom and stuck it in our fuel door, on top of the plane behind the pilots. We would hold that position for fifteen minutes or so until we had taken on twenty or thirty thousand pounds of fuel. Then we disconnected, descended and left the tanker. The boomer talked the pilot into position by saying things like "up 6, forward 4, back 2," unless it was an actual combat nuclear alert mission, on which radio silence was maintained, and at night the pilot held his position by watching colored position lights under the

tanker's fuselage.

Then it was off to an hour and a half navigation leg. It was here that sometimes I would shoot stars for the navigator, and also do what was called a GCI (Ground Control Intercept) run. I would call a radar site and ask for them to sweep us with their radar. Using a radar receiver scope, and knowing what frequency range they were operating in, I would find their signal and jam it. Every thirty minutes SAC broadcast a practice "Go message" on the HF. My job was to copy it and go to the "Secrets" booklet to decode it. On training missions, the exercise was to simply decode the numbers to make sure they matched the secrets, which were for hourly time groups, and changed daily. If we were on an Airborne Alert Mission however, and if it was an actual mission to go to war, the message would be much more complex. Both the copilot and I had to agree on what we decoded. These were called "Sky-king" messages and at any particular time they were broadcast from two of the three numbered Air Force headquarters. Their call signs were "Democrat" at Barksdale AFB, Louisiana (8th AF); "Outweigh" at Westover AFB, Massachusetts (2nd AF); and "Retail" from March AFB, California (15th AF). It would go like this, "Sky-king, Sky-king, this is Democrat, this is Democrat, do not answer, do not answer, break, break. Alpha November Sierra Tango. Authentication time is 2 3 2 0 Zulu, (Greenwich Mean Time) authentication is Delta Xray. I say again, Sky-king," etc., and then the message would be repeated and then ended with "Democrat out." The "Alpha November" stuff was the Air Force way of broadcasting the alphabet, in this case the letters A and N. This message was broadcast on the hour and every 20 minutes after, and each time you had to drop everything and decode.

After the navigation leg, we would drop down for a low-level route, on what was called an "Oil Burner route," usually flown at 300 to 500 feet during the day, and 700 feet at night. Oil burner routes ended with a bomb run and were about 45 minutes in length. When we got to the IP (Initial Point) I got on the UHF and called the RBS (Radar Bomb Scoring Site). The RBS was actually a set of radars that scored the simulated bomb impact and were housed on a railroad car. There were several RBS sites around the country; the ones I can remember were at Statesboro, Georgia; Sacramento, California; and the three we usually used were at Little Rock, Arkansas; Hastings, Nebraska; and Joplin, Missouri. I would call: "Hastings Bomb Plot, Hastings Bomb Plot, this is Rider 25 IP inbound for a Short Look Large Charge with a racetrack. Navigator's name is Wendt, I spell Whiskey Echo November Delta Tango, over." They always wanted the navigator's name—I forget why. You would think they would want the radar navigator's name since he was doing the bombing, but no, they wanted the navigator's name. Fred Wendt was one of my first Navigators at Columbus.

A "Large Charge" was the term for a simulated release of two parachuted weapons, a few seconds apart. Talk about inflicting damage. A race track meant that after release we would fly outbound, and once beyond the IP, swing around to come back over the IP and make a second run. When I first got to Columbus, we made what were called "Long Looks." We would come in at low level, and just before the simulated bomb release, we would climb to about 12,000 feet for bombs away, because the technology of nuclear weapons at the time was such that for maximum destruction, they had to be released at that altitude. But soon after, we switched to "Short Looks," where we only climbed to about 1,200 feet. After bomb release we would immediately dive back down to the inbound altitude. Part of the RN's mission planning was called "target study." He spent considerable time studying the radar picture of not only the target, but also the offset aiming point, or OAP. It was called such, because on the way in, he would lock his radar onto the OAP, which was small and identifiable, like a lake, compared to the radar clutter of a big city, and then the bomb release point was a bearing and distance from the OAP. As we were driving in from the IP, I was setting up to jam the fire control or missile guidance radar guarding the simulated target, both before the release and during the escape phase. The inbound jamming run was called an LDR, or Local Defense Run; the outbound was called a RDR or Radar Defense Run. By the time I got to Grand Forks, the RDR terminology had changed to BDR, Bomber Defense Run, though it actually was the same thing.

We had twenty- and ten- minute warnings to time over target, then a one-minute warning, then the RN would call "20 seconds, tone on." At that point we would broadcast a tone that would stop at the release point. He counted down the last 10 seconds over the interphone. At about one minute out, the RN also took over the steering of the aircraft so he could put the plane exactly over the release point. I could hear the radar signal start up from the audio warning receiver; when the fire control radar came on with a steady tone indicating a lock-on, I turned on my jammers in sweep mode, sweeping across the frequency range, until I found the signal on my scope, then I narrowed the sweep down to a blast on the exact frequency of the fire control, causing it to lose lock-on. You had 10 seconds to break his lock for a successful run; if you were too quick, you got scored as an early which was counted as a bad run. So we always counted to three after the lock-on before we turned on the jammers so we wouldn't get hit with an early score. Then we ran the BDR after the bomb release. They would come up at us on the outbound leg, and you had to counter the threat the same way. After the racetrack, we were pretty much through for the night and would fly home, arriving in the early morning. Then it was de-brief, put the gear away, go home and sleep for the rest of the day.

ALERTS

We pulled seven and ten-day alerts, living on the other end of the base in an underground building. When I first got to Columbus, we spent every day doing nothing but reading, watching television, eating four meals a day, playing pool and for some, hours-long poker games. I even brought a couple of golf clubs with me and practiced bunker shots out of a sand trap they had built outside. We were allowed to get in the crew truck and go back to the main part of the base to go to the BX, gym and so forth, and they had barbecue pits so our families could come out and visit with us and have picnics. But later on, and even more so at Grand Forks, they figured out that we needed something to do. We began mission planning the missions we were to fly after we got off alert, taking the countless tests they always gave us, doing a lot of the stuff that previously we had to do that forced us to come into the squadron on our days off, so actually keeping us busy gave us more free time later.

We flew at least one airborne alert mission between alert tours which came one to two times a month. We spent several hours on alert in mission planning target study. The navigators studied the route into the Soviet Union and the target area. I would study the known AAA and missile threats along the route and the local defenses in the target area. These were 25-hour flights with several refuelings. We would carry an extra pilot and navigator, but only one gunner and EWO. Instead of all the activity described on a training mission, we flew and flew and it seemed to go on forever.

Mission planning was different, in that we didn't have to draw up charts with our proposed routes, they were already drawn up for us and were "canned," meaning the routes changed very little over time, as they were part of the infamous SIOPI – Single Integrated Operations Plan, so-named because the SIOPI integrated all the B-52, B-47, and B-58 flights with our ICBMs and submarine ballistic missile launches, so if we did go to war with the Soviet Union, we wouldn't bump into each other on the way over. Of course, we knew there was never a guarantee that our plane could survive the damage from a Large Charge. They never told us the odds, and we never asked. We also knew that we probably wouldn't have enough fuel to get to our emergency landing field after the bomb run. That was assuming that we would ever get close to the target in the first place. Most targets were heavily defended by SAM missile sites, and unless some SAM killing fighters got in there first, I doubt that we would have made it to the target, let alone get out.

At Columbus, we flew the southern route over the Atlantic to the Mediterranean. Once we got there, starting at Gibraltar, we flew a counter-clockwise racetrack pattern, eastward along northern Africa till we were abeam Italy or Greece, then turn leftward and fly back to Gibraltar. We

would do several of these loops and hookup several times with KC-135 tankers from Torrejon AB, Spain. Looking down, we could see North Africa, Italy, Gibraltar and much more. I used to think that I'd seen half the world from seven miles up.

On the way back home, sometimes the aircraft commander would let me sit in the copilot's seat and hand-fly the airplane for a while, which always annoyed the navigator who expected the plane to fly a straight line via the autopilot while we tended to wander all over the place when I flew. On one such mission I saw one of the most spectacular sights I have ever seen. We had left Columbus in the early evening. By the time we coasted out over Georgia, we were approaching a hurricane. As we flew well above it, we saw violent lightning strikes from thunderstorms far below us for as far as the eye could see.

At Grand Forks, the missions were pretty much the same except we flew the northern route called "Chrome Dome." We flew over Northern Canada to Thule on northern Greenland, and then flew a racetrack from there to the coast of Baffin Island and back. The view was absolutely spectacular scenery. Once, however, on the way back we had some kind of problem. The closest SAC base that would have B-52 maintenance support was at Loring AFB, in Limestone, Maine, so we went there. It was in mid-April, and when we were driven off the flight line, I was amazed to see how huge the snow banks were. The van driver laughed and said, "You should have been here in February."

In the 1960s, the Air Force had developed a thing called "Terrain Following Radar" which meant that at low level, you could put the plane on autopilot, and the radar would steer the plane up and down, maintaining a constant altitude over the terrain. I remember one daylight summer mission over the hills of Arkansas, flying about 500 feet, training on this new system. The turbulence would have been rated as only moderate, but as far as I was concerned, sitting in the back of the crew compartment, the hammering and bouncing was about as bad as I wanted to see. I never threw up in an airplane in all my years, but that day I came as close as I would ever come.

On regular training missions, we were issued standard flight lunches. These were pretty grim affairs, consisting of a can of juice, two cartons of milk, one chocolate and one white, a sandwich made of two pieces of bread (no butter) with a slice of ham and a piece of American cheese, a bag of peanuts, a candy bar, and a package of salt, pepper, mustard and a napkin. I would take a thermos of soup that Judy put up for me which helped a lot, even though it was against regulations—the theory being that anything not provided by the flight lunch kitchen could be poisoned, and sabotage the mission. I felt that the flight lunches themselves did a pretty good job of that.

Early at Columbus, we had a chief of the EWO sec-

tion, who was a jerk to say the least, and I didn't particularly care for him. One day he caught me with the thermos and told me not to bring one on a mission again. I of course, ignored him and continued to do it. The second time he caught me, he was not a happy camper. I decided it would be prudent to lay low thermos-wise for a while. Fortunately, he was soon transferred to be chief of the Intelligence Section, and he was out of my hair. His successor was as good a guy as he was a jerk.

We had heating ovens on the planes, and on the 25-hour missions we were issued frozen TV dinners which were a lot better than flight lunches, although we had those also. We carried an extra navigator and pilot, so all of us got a chance to sack out on the upper flight deck at various times. The mission consumed two days, because the show time was two and a half hours prior, then there was two hours of de-briefing, then afterwards you crashed for eight to ten hours of sleep, and it took another day to get back to normal.

Annually, at every crew position we had check rides. You had to ride with a Stan/Eval (Standardization/Evaluation) guy who would watch your whole ride to see if you did your job according to the manuals and checklists. I usually did a pretty good job except for one mission at Columbus when at the last minute, I fell asleep and missed the 10,000-foot lanyard check on descent. Below 10,000 feet of altitude, you had to have this clip attached to your parachute, so if you bailed out at those low altitudes, the clip and lanyard automatically pulled the ripcord immediately upon ejection; above 10,000 feet the chute deployed automatically when you descended to 10,000 feet. The idea was that if you were unconscious and didn't have your oxygen mask attached, you wouldn't want to be slowly floating down in the thin air where you couldn't breathe. So at 10,000 feet on climb-out and descent, the co-pilot called "10,000 foot lanyard check" and each crewmember was to respond that he had clipped or unclipped it. It was a typical mission where we flew all night, and having flown a check ride and being all hyped up, by 5:00 a.m. I was exhausted. The mission was about over, and I knew I had really nailed it. So on descent back to the field, I finally could relax. Except I relaxed too much and fell asleep, missing the call. There were three grading criteria on a check ride—mild, medium and hot. Miss a safety of flight item like a lanyard check, and it was hot—automatically a failure. Well my evaluator had a bird, and said he had to fail me on the ride. In that unit, if you flunked a check ride, you had to go and see the DCO (Deputy Commander of Operations, one level below the Wing Commander). This guy was noted for being a real nasty colonel, and no one ever wanted to get near him for any reason. So as far as I knew, reporting to him meant my career was over.

So, a few mornings later, the evaluator and I trudged over to headquarters where I saluted smartly and awaited

the wrath of the Devil himself. But when my guy explained what happened, the Devil asked, "How did the rest of the ride go?" "Oh, really good, he did a terrific job!" my guy says. At that point, the Devil smiles and says, "Oh hell, I can remember one night I was a B-47 aircraft commander on an Oil Burner Route. We were down around 500' with the autopilot on, and I fell asleep. When I woke up, I found that not only was I asleep, but so were the co-pilot and navigator. All three of us were!" He went on to say he could understand how that could happen, and since I had a good record with nothing like that ever happening before, didn't my guy think the punishment was a bit severe? I couldn't believe my ears! So then my guy, reading the tea leaves, says well maybe I'll just give him a minor write-up, and give him a couple of instructional rides as corrective action. "Well, you can't do that either," the Devil says. "Missing a mandatory checklist response is an automatic failure." So, they finally decided that they would just forget the whole thing.

My guy wouldn't leave it alone though, so he put himself on a couple of my missions just to keep an eye on me. Which was fine with me, for in those days in SAC, every crew member had to get so many events in his crew position every three months, or he would go unqualified. This was to be avoided, because the squadron had to fly X number of missions, and if a crew member was unqualified, then he couldn't fly until he got requalified, which meant that the crew couldn't fly either, because there were no spare people to take their place. So at the end of every quarter, flights had to be generated for people needing events to stay current.

At one point, our crew had a navigator, a real nice kid, fresh out of navigation school, with an equally very nice young wife. One December, he was short a couple of navigation events, so late in the month he was scheduled to fly a local mission as an additional navigator, to get in the seat at some point to finish his requirements. It was a cold gray morning with a light freezing rain. The aircraft, with four extra crew aboard (the maximum a B-52 could carry), all there to get various required activities, took off around 7:00 a.m., and climbed into the overcast. At some point, they lost control of the airplane. It was speculated that either the plane had iced up too much (which was unlikely since the airplane had an excellent de-icing system) or the pilots lost all A/C power. When an airplane rolls gradually, the inner ear adjusts, so if done slowly enough, you can fly upside down and think you are in level flight. The overcast was low that day, so they could have descended in the clouds gradually rolling upside down and not realize it, although the basic instruments—altimeter, slip, and artificial horizon all had standby DC battery power, so that should not have happened. Whatever the reason, it fell through the overcast, crashing not many miles from the base. The B-52 is a huge aircraft, with a basic weight

of 250,000 pounds, and when full of fuel it weighs about 450,000 pounds and crashes like a very big bomb. The hole in the ground burned for several days because of the titanium in the fuselage. Harry's family came down and the other five of us on the crew tried to take care of them while they were there. We had a service for the crew, and it was a very sad time all around.

All told, in 28 years of Air Force flying totaling about 6,000 flying hours, I only came close to getting killed once, but that was as close as you can get. One Friday at Grand Forks, we had what we called a "lah-di-dah" mission, called a "pilot pro," meaning a pilot proficiency mission. Taking off late morning, we would fly around in the local area, making approaches and landings, giving the pilots their practice, getting down around 4:00 p.m. We had flown around the local area for a few hours, and in the middle of the afternoon, we made another "touch-and-go."

A touch-and-go in pilot speak means land; quickly go through "The After Landing" and "Before Take-off" checklists, and then, while rolling down the runway, advance the power and take off. Cliff the gunner, and I were sitting side-by-side (facing backwards), sort of half asleep during all this. But on this particular landing, we sensed something was wrong. On one of the touch-and-goes, the pilots had just finished the checklist and the power was advanced. Moments later, I felt a strange sensation, as though we were flying upside down.

On the F model, seated facing forward, I could lean around the control panel in front of me and look out the pilots' windshield. But on the H, I had to twist around in my seat to see what was in front. When I did, I saw something I had never seen before, at least in a B-52. The horizon was almost vertical, meaning we were flying almost 90 degrees to the ground, and we had just taken off. I made a hand motion to the gunner indicating our attitude, and said on the interphone, "Hey, will you guys quit screwing around?" I was sort of testing, because under normal conditions, they would have answered. But this time, they didn't. That told me that we were in serious trouble. My next thought was "I've got to get out of this airplane because in a few moments we are going to crash big time." I started to remove the ejection seat pins (inserted to prevent an accidental ejection) so I could rotate the handles, when it occurred to me that we were probably no more than fifty feet off the ground, going about 120 miles per hour, and since we were flying vertical, I would be ejected sideways. There was no way the chute could open under those conditions, so I abandoned that idea.

So we just sat there, waiting for the crash, which never came. The plane slowly righted itself, wallowing along, and slowly climbed. The right wing tip had hit the runway, so the pilots called the Command Post, who in turn called Boeing, and discussed what had happened and to see if there was anything that should be done to ensure a safe

landing. We flew around, burning off fuel, and landed safely.

Later, we heard what had happened. We had an instructor pilot sitting in the left seat, and a new guy from Walker AFB, New Mexico, where they flew F models, had climbed into the co-pilot seat to get checked out in the H model. What had happened was one in a million. The H model was (is) so over-powered, that the throttles have what is called a thrust gate in front of them. The thrust gate prevents the throttles from being advanced too far, when the aircraft is light. Too much power at low weights could literally damage the wings.

The pilots set the thrust gate to a certain position based on aircraft weight. The throttles have adjustments on them; the maintenance people set them to a certain setting, and they are allowed to be at a plus or minus setting, within limits. But it is impossible for the maintenance people to get the exact same thrust, so there is a tolerance allowed, so much plus or minus per cent of thrust. The law of averages would say that any plus or minus deviations should average out. In this case, when the throttles were advanced, all the engines on the right side put out the maximum allowed thrust, and all the engines on the left side put out the minimum allowed. Thus when the power was applied on the touch-and-go, the greater thrust came from the right side, so the airplane veered to the left.

Normally, a pilot would apply a right rudder and aileron correction, but with the aircraft light, it was hurtling down the runway like a fighter jet, and the plane got away from the new co-pilot. A B-52 is not stressed for anything but a concrete runway; if it landed on grass, the nose wheel, main gears and wing tip gears would all collapse. Were that to happen, the airplane would simply collapse and explode into flames. In this case, we were light and the outer wing tip tanks were empty, so the wings were not drooping down and the wing tip gears were high and off the ground. As the plane was about to depart the left side of the runway, the instructor pilot took control of the aircraft and jerked back on the wheel while turning it right.

Theoretically, we were not going fast enough to take-off, and the plane should have crashed; miraculously, the plane began to lift into the air but with a bank so far to the right that the right-wing tip struck the runway, breaking off the tip gear and damaging the fiberglass antenna housing on the end of the wing. Correcting back to the left, the plane staggered into the air and we cheated the grim reaper. Fully loaded with fuel, the plane weighed almost twice as much as it weighed empty. Even with a thrust gate, when the plane was light, advancing the power pushed everyone back in their seats as it took off like a fighter (The ejection seat shoulder harness prevented those of us facing backwards from being bent over double while accelerating). The brand-new co-pilot was making the take off, and wasn't used to such a powerful airplane. When the aircraft veered to the left of the runway during takeoff roll, he tried to cor-

rect with ailerons but to no avail. When the plane got to the left edge of the runway, he was in serious trouble, since the plane was not stressed for rolling on grass. The instructor pilot took the controls, and at that point, the only option he had left was to try to take off even though we were below takeoff speed. We found out later that the plane shouldn't have taken off at this slow speed, but it did. Then he over-corrected to the right, causing us to swerve up and over the horizontal. Somehow, he recovered enough to get the plane back under control. Needless to say, we all exited the aircraft on wobbly legs. We all repaired to our respective clubs and bellied up for more than a few stiff ones.

I had already put in my papers to get out, and was due to separate in a couple of weeks. Although I was scheduled to fly one more mission, a 14-hour mission up over the top of Canada, and down the Alaskan Coast, the Squadron people told me that I didn't have fly anymore if I didn't want to. I thought about that, and decided the best thing to do was to get right back into the airplane; otherwise I would be scared to fly the rest of my life.

So I flew the next and last mission. At about 39 thousand feet over the Great Bear Lake in northern Canada, I was sitting in the jump seat behind and between the pilots, eating a sandwich and watching the air refueling, flying just under a KC-135. The tanks were full, the probe disconnected, and the planes separated, with our pilot engaging the automatic pilot. Suddenly the plane lurched violently, and not stopping to think, I threw my sandwich in the air, jumped up, and grabbing my parachute, I stationed myself by the hatch leading to the lower flight deck, where I would jump out of the hole left by either one of the navigators who, presumably, would eject downward any moment now. When no one ejected, I turned around to see everyone laughing. The cause of the lurch was simply the autopilot kicking off as the B-52, now close to maximum gross weight, had trouble flying smoothly at that weight and altitude, and had to be flown by hand for a few minutes until enough fuel burned off to be able to use the autopilot.

NAVIGATORS

submitted by Jack Mudie, Ellington 50-D
Perhaps the greatest unsung success story of Army Air Force training was navigators.

The Army graduated some 50,000 during WWII. Many had never flown out of sight of land before leaving Uncle Sam for a war zone. Yet the huge majority found their way across oceans and continents without getting lost or running out of fuel, a stirring tribute to the Army Air Force's educational establishments.

LAST FLIGHTS

Jim Faulkner, James Connally 64-04

Thanks for keeping us advised when a navigator/observer/bombardier/EWO or combat system officer has made their last flight. Providing the DOB and DOD (if known) dates helps us to ID a possible class. Send to Jim Faulkner (e-mail/address/phone on back page). Keep their families in your prayers.

CHILDRESS

Weinstein, Ira P. Glencoe IL 43-12

ELLINGTON

Lacy, James W. Orlando FL 43-18
 Shapiro, Leon Columbia MD 44-02
 Muckerman, Donald J. St Louis MO 44-04
 Gordon, Forest Lauderhill FL 44-06
 Hamberg, Douglas H. Southwick MA 44-09
 Kakaska, George H. Farmersville TX 44-10
 Burkholder, Merton E. Scottsdale AZ 44-11
 Charlop, Bernard S. Great Neck NY 44-11
 Kenefake, David A. Beeville TX 44-12
 Olmstead, Cecil J. Westport CT 44-45
 Brannum, Leonard J. Las Vegas NV 44-49
 Noren, Carl R. Minneapolis MN 44-49
 Comninel, Constantine G. Dumont NJ 44-53
 Muirhead, Robert L. Austin TX 44-53
 O'Shea, Thomas M. Durham NC 44-53
 Lowry, Ronald C. Midland MI 45-04N
 Stanley, Oren A. Longmont CO 45-04N
 Bartholomay, Henry W. Richmond VA 45-4N
 Beaulieu, Joseph P. Los Angeles CA 50-D
 Tine Jr., Joseph J. Middleton CT 50-D
 Sinnett, Joseph V. Columbia SC 50-F
 Albinson, Ralph H. Minneapolis MN 51-20
 Van Horn, Gale D. Richardson TX 51-28
 Seitzer, George A. Orlando FL 51-A
 Stovall, Harvey C. Bellevue NE 52-15
 Jacobs, John P. Cedar Rapids IA 52-17
 Hickman, Gerald J. Spring TX 54-13
 Zochert, Leroy Plano TX 55-03

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Spencer, Oliver L. Danville CA 54-00
 Johnson Jr., Luther B. Dallas TX 54-10
 Dunlap, Francis E. Edmond OK 55-00
 Bouline, William C. Dover DE 55-06
 Billingsley, Allen K. Wheaton IL 55-11
 Addison, Colborn Columbus OH 55-15
 Archibald, John C. Austin TX 55-15
 Beckwith Jr., Charles A. Dunedin FL 55-15
 Bernhisel, Jay M. Logan UT 55-15
 Birmingham Jr., Daniel J. Toms River NJ 55-15
 Blanck, Harvey F. Clarksville TN 55-15
 Bond, Wayne C. Monroe GA 55-15

Bralley, Baxter F. Las Vegas NV 55-15
 Brown, Michael D. North Wilkesboro NC 55-15
 Dork, Kenneth J. Corinth MS 55-15
 Fair, Dave W. Simi Valley CA 55-15
 Friedman, Stanley A. Springfield VA 55-15
 Gilligan, Ray G. Tacoma WA 55-15
 Karp, Robert S. San Francisco CA 55-15
 Krippendorf, Richard L. Wichita Falls TX 55-15
 Lowry Jr., James A.D. Melbourne FL 55-15
 Martin, Arthur T. Olympia WA 55-15
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 Stricker, Richard J. San Antonio TX 55-15
 Moake, Milton D. Creal Springs IL 57-05
 Barber, Horton J. Everman TX 57-09
 Beasley, Johnnie B. Pearland TX 57-09
 Desobeau, Andre E.R. TX 57-09
 Giblin, Thomas A. Shawnee Mission KS 57-09
 Gober, James L. Amarillo TX 57-09
 Keene Jr., Marcus B. TX 57-09
 MaGuire, Walter N. Port Lavaca TX 57-09
 Noe, Charles G. Fredericksburg TX 57-09
 Overlock, John F. Springfield MA 57-09
 Stahl, Billy J. New Braunfels TX 57-09
 Strotheide, Norman E. Winchester TN 57-09
 Syracuse, Anthony S. Portsmouth NH 57-09
 Taylor Jr., John D. Myrtle Beach SC 57-09
 Vallar, Edgar J. Largo FL 57-09
 Wahl, William A. Fort Lauderdale FL 57-09
 Walton, Daylon L. Irving TX 57-09
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 Rivers Jr., Henry A. Chapel Hill NC 59-01
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 Chaney, Donald E. Auberry CA 59-13
 Slowey, Richard J. St. Louis MO 59-13
 Freeman, Paul J. Albany GA 59-14
 Wynia, Melvin E. San Jose CA 59-14
 Rohl, Arlen W. Eutawville SC 59-15
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 Allmann, Lee R. Kingston ID 59-18
 Driscoll, Richard G. Wakefield RI 60-04
 Vallery, Edmund H. Dunham NH 60-04
 Carter, Michael G. Avoca IA 60-06
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 Honeycutt, Rembert L. Albuquerque NM 60-21

Tuite, John R. Melbourne FL 60-22
 Grossman Jr., Darwin B. Parker AZ 61-02
 Mullen, Stephen F.T. Rotonda West FL 61-02
 VanNostrand, John I. Birmingham AL 61-12
 Thompson, James E. Bellevue NE 62-18

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Gordon, Robert Arcadia CA 43-00
 Pliskin, Robert Ossining NY 43-04
 Visanko, John L. Duluth MN 43-14
 Battali, Anthony P. Long Island City NY 43-15
 Book, Peter Perth Amboy NJ 43-16
 Stapley, Del E. Glendale AZ 43-16
 Weinberg, Robert L. Kerrville TX 43-16
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 Voorhees, John H. Phoenix AZ 59-11
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 Williamson Jr., John W. Hartwell GA 59-17
 Smith Jr., David L. Fort Worth TX 59-21
 Komenda, Robert A. Irving TX 61-02
 Meyer, Alton B. College Station TX 62-20
 Scibior, Richard S. Boise ID 63-18
 Halloran, Ronald P. Chesterfield VA 66-01
 Panzica, Richard V. Penn Valley CA 66-01
 Fogle, David H. Columbus OH 66-06
 Underhill, Greg L. Spring Hill TN 66-09
 Balch Jr., Henry J. Hendersonville NC 66-10

MATHER

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 Kiehn, James P. Fort Walton Beach FL 86-00

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 Rechin, F. James Waite Hill OH 45-325N
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 Windsor, Louis H. Parkville MD 44-03
 Ikle, Charles D. Adrian MI 44-07
 Jeffers, William W. Greenacres FL 44-42

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 Freeland, Bernard R. Bellaire TX 42-00
 Stout, Eldridge K. Rancho Cordova CA 42-00
 Goot, Irwin M. Houston TX 43-00
 Keck Jr., Charles H. Daytona Beach FL 43-00
 Leong, Andrew S. San Francisco CA 43-00
 Williams, Harold I. Ashville NC 43-06
 Ringo, Robert G. Bend OR 44-00
 Rostrom, C. Richard Sioux Falls SD 44-00
 Goeden, Ervin H. Omaha NE 45-00
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