BEATTY RADAR TRACKING STATION

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Prior to joining the EG&G Special Projects Team at Groom Lake, Barnes was one of a ten-member crew operating the Beatty tracking station of

the NASA High Rage approximately 65 miles from Groom Lake. Though their main objective supported flights of the X-15, they also participated in flights of the XB-70, the three Lifting Bodies, experimental Lunar Landing vehicles, and an occasional A-12/YF-12/SR-71 Blackbird flight. After President Johnson revealed the existence of the YF-12, and the project moved to Edwards, the YF-12 personnel moved in and shared control rooms with Barnes's counterparts at NASA Dryden.

Barnes was not the designated radar operator for the Beatty site. However, because of his recent Army security clearance, he was the only one at the site with the prerequisite level of security clearance to handle an "OXCART flight". That, factored with his being a competent savant in the operation and maintenance of almost any known radar system, made him the sole designated radar operator on the NASA High Range for secret flights of the CIA's A-12 at Groom Lake requiring special track data available only at the Beatty tracking station.

Though Barnes did not know and lacked a need to know at the time, in January 1962, an agreement with the Federal Aviation Agency expanded the restricted airspace around the Groom Lake. The CIA cleared certain FAA air traffic controllers for the OXCART Project, their function being to ensure that aircraft did not violate the order. The North American Air Defense Command established procedures to prevent their radar stations from reporting the appearance of high-performance aircraft on their radar scopes. Similar to posting Army ADA missile officers to Air Force units to coordinate activities and prevent inadvertent friendly fire, the FAA assigned personnel to Project OXCART at Groom Lake to prevent air controllers mentioning the occurrence of an A-12 flying Mach 3 through their sector at 90,000 feet.

Providing ground support for the Blackbird flights was a walk in the park for Barnes compared to the nail-biting, hypersonic flights of the X-15 where in July and August 1963, pilot Joe Walker crossed the 100 km altitude mark. In doing so, he joined the NASA astronauts and Soviet Cosmonauts as the only humans to have crossed the barrier into outer space. Soviet Yuri Gagarin was the first person in space, reaching 327 km in the apogee of his orbital flight. Alan Shepard, the first American in space, reached 187 km during suborbital flight. Joe Walker became the first to exceed this threshold twice. On Flight 90, 19 July 1963, he reached a speed of 3,710 mph (5,970 km/h) and an astronaut-making altitude of 65.8 miles (347,441 feet) On his Flight 91 on 22 August 1963; he reached a speed of 3,794 mph (6,106 km/h) and a record-breaking and his second astronaut-making altitude of 67.0 miles (353,674.5 feet). Pete Knight, during Flight 188 on 3 October 1967 reached a record-breaking speed of 4,519 mph (7,273 km/h) and an altitude of 36.3 miles; He earned the record of being the fastest man alive. It was from Barnes pioneering the radar track, telemetry, communications, and data transmission support for these types of flights that earned Barnes the rare job description at the time of hypersonic flight support specialist, a specialty that he later applied at Groom Lake during Mach 3 RCS recordings of the A-12 in overhead flight.

Typical of the CIA's modus of operation, very few knew about the Seven Sisters. With the FAA distinctly forbidden to track the ultra-secret A-12 flights and to ignore any traffic above 60,000 feet, the CIA needed support radar besides that of the Groom Lake control tower in case the A-12 got into trouble. A birdwatcher system monitored the health of the A-12, but not its precise location.

Using a typical X-15 mission as an example, many things occurred behind the scenes to support the flight that few ever knew about. Weather flights in the T-33 trainer and an F-104 flew up range to check the emergency landing sites on designated dry lakebeds to ensure weather conditions were favorable and that no obstacles such as campers were on the lakebeds. The X-15 always dropped from the B-52 over one of the designated dry lakes for the event the X-15 failed to launch. At the same time as the weather flight, someone at NASA routinely flew C-130s up range to position emergency equipment and personnel on the lakebed in case of an emergency landing. Very few in the program ever knew of this part of the flight activities.

Similar to the example above, someone unknown today within the agency arranged for security, communications, and support we may never know about before any extended range flight of the A-12. For each mission, someone in the chain arranged radar coverage for the event something went wrong during a flight of the A-12. Most likely, such arrangement was more of a heads up to ignore the flight showing up on the radar, but take note of it just in case. No one told Barnes anything about what he was tracking or the purpose, and this was probably the case with all the other support sites. We know today that pilot Form 5 records never recorded an A-12 flight, always showing the flight being another type of plane, usually an F-101 VooDoo, and occurring at another Air Force base. Thus, it stands to reason that no records exist of any radar support of an A-12 flight. This is typical of an ultra secret black operation.

Though the Beatty tracking station routinely tracked the YF-12, the site was like a black sheep amongst the other six radar sites known the Seven Sisters to only a few possessing OXCART level security authorization. Beatty was a NASA/Air Force facility whereas the remainder of the sites were SAGE sites of the United States Air Force Air Defense Command.

During the Cold War, the United States Air Force assumed a burden for the defense of the skies over the United States. To coordinate this defense, they put in place a detection and command and control system to guard against Soviet nuclear attack, One hundred forty-two primary radar stations and 96 gap-filler radar sites were built and operated throughout the United States and Canada from the late 1940s into the 1990s. In 1959 came the establishment of a Semi-Automatic Ground Environment (SAGE) Data Center (DC-16) at Reno AFB. The SAGE system network linked Air Force (and later FAA) General Surveillance Radar stations into a centralized center for Air Defense, intended to provide early warning and response for a Soviet nuclear attack.

To the best of our knowledge, CIA most likely cleared only the commander of each sector into the OXCART A-12 program. The commander instructed the surveillance section not to process any radar tracks traveling at around 2,000 knots. Thus, those in the controller Section did not see any of the A-12 flights. Likewise, the FAA's ultra-high controller group handled all U-2 and A-12 aircraft flights above 60,000 feet. However, only a handful of those controllers were aware of OXCART.

Most of the ADC sites operated the AN/FPS-27 search radar designed to succeed existing Semi-Automatic Ground Environment (SAGE) radar systems, which had served as the backbone of air defense of the CONUS. The Westinghouse-built SAGE system provided enhanced electronic counter-countermeasures (ECCM) capability in the S-band with a maximum range of 220 nautical miles and search to an altitude of 150,000 feet, an altitude far lower than the capability of the Beatty radar.

AN/FPS-16A height-finder radar, AN/FPS-27 Search Radar the SAGE Direction Center where it was analyzed to determine the range, direction altitude speed and whether or not aircraft were friendly or hostile.

AN/FPS-7C search radar, General Electric, the S-band AN/FPS-90 height-finder radar The FPS-6 radar is capable of height determination of targets flying between elevation angles of - 2 and +32 degrees for any azimuth throughout 360 deg. The transmitter develops a peak power of 5 Megawatts at a frequency range of 2.7 to 2.9 GHz. The pulse width is 2 usec at a PRF of 400 PPS. Maximum indication range is 200 nautical miles with height measurement capability to 75,000 feet.

Barnes places emphasis on the height measurement limitations of the ADC radar systems, and the fact that their primary function was searching for aircraft whereas his NASA radar was a tracking radar that routinely tracked the X-15 directly overhead at hypersonic speeds. With the Beatty radar lying only 65 miles from Groom Lake, most tracking of the A-12 leaving and approaching Groom Lake required this type tracking for another unique capability of the Beatty tracking station. A primary data requirement for the NASA flight missions was accurate velocity recording and documentation. As the OXCART project advanced, accurate recording of the speed of the A-12 became a primary function of his tracking the A-12.

The testing phase reached Mach 2 of the A-12 after six months of flying, achieving Mach 3 after 15 months. Two years after the first flight the aircraft had flown a total of 38 hours at Mach 2, three hours at Mach 2.6, and less than one hour at Mach 3. After three years, Mach 2 time had increased to 60 hours, Mach 2.6 time to 33 hours, and Mach 3 time to nine hours; all Mach 3 time, however, was by test aircraft with detachment aircraft still restricted to Mach 2.9.

Most A-12 flights were of short duration, averaging little more than an hour each. Primarily this was because longer flights were unnecessary at this stage of testing. It was also true, however, that the less seen of OXCART the better, and short flights helped to preserve the secrecy of the proceedings. Yet, it was virtually impossible for an aircraft of such dimensions and capabilities to remain inconspicuous. At its full speed, OXCART had a turning radius of no less than 86 miles and often extended up to 125 miles. (This created a problem during the overflights of North Vietnam where restricted by a lesser distance to the borders of China, Laos, and Cambodia.) There was no question of staying close to the airfield; its shortest possible flights took it over a very large expanse of territory.

The first long-range, high-speed flight occurred on 27 January 1965, when one of the test aircraft flew for an hour and forty minutes, with an hour and fifteen minutes above Mach 3.1. Its total range was 2,580 nautical miles, with altitudes between 75,600 and 80,000 feet.

Covering an OXCART flight never seemed to be a problem or conflict with NASA operations. Barnes does not recall his supporting any flight out of Groom Lake interfering with any NASA mission schedule. With the exception of the XB-70, almost all flights required transport by B-52, which required early morning flight to avoid the desert heat. NASA aborted any mission that failed to get airborne by 0900 hours. Anything later than that required the B-52 repeatedly circle the Edward area due to the heat making it difficult to ascend to 45,000 feet by the time the plane reached the launch lake up range. Once the B-52 (SN 0008 and affectingly referred to as "Balls Eight"), with the X-15 or lifting body tucked beneath its wing, passed Baker, California, they knew the mission was a go. Less than an hour later, the test vehicle dropped and if the mission went as planned, was on the ground at Dryden seven minutes later. Their day was done, so covering a Groom Lake flight was a welcome event for Barnes. On slow days at the tracking station, to maintain his radar proficiency, he often tracked the Groom Lake flights, mostly the chase planes, hoping to grab a brief skin track of the A-12.

Originally, the design of the Mod II radar on the NASA High Range allowed for tracking at a maximum range of roughly 40 miles. Thus, the two J-scopes displayed a baseline with a maximum of 40 miles. Modification of the Mod II system enabled beacon track of a target many times this distance, however, the display remained at 40 miles max. During a mission, as the range extended beyond the visual display on the scopes, the range gate locking the transponder return would disappear off the end of the scope and start over at the beginning, repeating this occurrence repeatedly as needed to maintain track of the plane. Only the range dial provided a true indication of range to the radar operator.

Seldom did Barnes have advance notice of an OXCART flight. NASA's station manager, Mr. Bill Houck, would usually motion him into the break room to inform him of a flight expected to lift off at Groom Lake or in some cases heading home to Groom Lake. (He referred to Groom Lake as Home Plate and the plane as an Article.) The event was always low key with Barnes merely informing the radar operator that he needed to borrow his radar for a while. Bill Houck casually maintained a position near the door to the radar room to restrict someone accidentally entering. The velocity recorder was situated in the control console area, so if a velocity recording was requested, he watched the recorder to secure it from being viewed. They made no mission plots on the DTS or data transmission to the rest of the range, which was another security concern of the NASA monitor, Bill Houck. The only physical evidence resulting from such a mission was the velocity strip chart, which Houck retrieved and shipped presumably to Dryden.

The one thing that Barnes remembers was his being required to guard the code to the A-12 transponder. From the start of this bit of covert activity, He knew to never interrogate the transponder unless invited to do so, knowing that the pilot and any other track radar operators tracking the A-12 transponder would see the transponder answering his radar interrogation of the transponder.

To explain this comment, during a routine mission on the High Range, the operators at Dryden, Beatty, and Ely ignored all pulses other than that of his radar, except to make adjustments of any pulse drifting close enough to his radar's range cursor to interfere. A count of the pulses or spikes indicated the number of radars tracking the transponder. Reverting back to a typical X-15 flight for an example, the radar systems at Dryden, Beatty, and Ely were all that showed on the radar scopes, and that was only if they were able to trigger the transponder. Once the transponder signal to the interrogating radar grew too weak, the pulse would become sporadic and eventually disappear. Had the Seven Sisters been tracking radar systems connected by data transmission as was the Dryden, Beatty, and Ely sites, any radar out of range of the transponder would have merely ganged their radar to the data from the others. This prevented the radar from having to search for the location of the beacon; instead, it just passively followed the track of the other radars until it too could communicate with the transponder. The ADC radars, however, were search radar, so the need to gang to a track radar did not apply. The search radars merely followed the target as a blip appearing when painted in the rotating sweep. (As indicated earlier, they saw, but did not process) The Mod-II radar locked onto the target and knew at all times its range, azimuth, elevation, and velocity. (Beatty did not process the data either except to extent requested and never processed it for transmission to the other sites)