

50th INTELLIGENCE SQUADRON

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EMBLEM

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The 45th Space Wing: Its Heritage, History & Honors 1950-2009

Development of the Eastern Range

As we noted earlier, the Eastern Range had three tracking sites in operation at Cape Canaveral, Jupiter Auxiliary Air Force Base and Grand Bahama Island by the end of 1954. Range stations were also being built on the islands of Eleuthera, San Salvador, Mayaguana and Grand Turk, and two more stations were

under construction in the Dominican Republic and Puerto Rico.

* Those nine stations constituted the first 1,000 miles of the Eastern Range. Under five separate government contracts, submarine cable was laid down the island chain to forge communications links between the Cape and its downrange stations.

The final stretch of submarine cable linking the Cape to Puerto Rico was laid in August 1954, and

submarine cable repeater stations were installed between Grand Turk and Mayaguez Auxiliary Air Force

Base in December 1954. Mayaguana was ready for operations on 18 July 1955, and Eleuthera, San

Salvador and Grand Turk became operational in August 1955. The stations in the Dominican Republic

and Puerto Rico became operational on 5 December 1956.

In October 1952, the Air Research and Development Command approved a plan to extend the Eastern

Range's length to 5,000 miles to meet SNARK and NAVAHO missile testing requirements. Antigua, St.

Lucia, Fernando de Noronha and Ascension were tentatively selected as host sites, and agree-ments

were negotiated with the governments of Britain, St. Lucia, Brazil and Ascension to authorize

construction. The St. Lucia and Ascension agree-ments were signed on 26 June 1956, and the Brazilian

Agreement was signed on 21 January 1957. Following an exchange of notes with the State Department,

Britain granted the U.S. access to Antigua on 15 January 1957. The St. Lucia site was activated on 5

December 1956, and Antigua and Ascension were ready for operations in October 1957. The Fernando

de Noronha station was activated off the coast of Brazil on 18 September 1958. Twelve small telemetry

ships were positioned downrange to fill in the gaps between Antigua and Ascension in 1957 and 1958.

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The Eastern Range supported its first 5,000-mile-long mission (a SNARK test flight) on 31 October 1957.

Air Force Missile Test Center

5000 Mile Range

The SNARK and NAVAHO prompted expansion of the Eastern Range to Ascension Island in the mid-1950s, but those winged missiles did not become the principal users of the range's most distant outposts.

After a slow start, ballistic missile and space programs took root at the Cape and quickly dominated the range after 1957. The MATADOR, BOMARC, SNARK and NAVAHO were eclipsed by the Army's

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JUPITER, the Navy's POLARIS and the Air Force's THOR, ATLAS, TITAN and MINUTEMAN

ballistic missile programs. The Army REDSTONE and the Air Force ATLAS were also adapted to

support NASA's MERCURY manned space program in the early 1960s.

With regard to the range's tracking systems, the Eastern Range was equipped with single-point radars

initially. Those radars were designated "MOD I" and "MOD II" radars because they were derived from

World War II vintage SCR-584 radar systems. The MOD I was the most economical solution for winged

missile requirements, and it was replaced by a MOD II version as winged missile flights continued.

By the end of 1957, the range's optical systems included long-range tracking telescopes, infrared

tracking equipment, cinetheodolites and ribbon-framed cameras. CZR-1 ribbon-framed cameras covered

the missile during the first 1,000 feet of flight, and cinetheodolites followed the vehicle out to a distance

of 20 miles. Wild BC-4 ballistic cameras captured optical data beyond the tracking radars' beamwidths,

and they obtained time-position data for ballistic missile staging events and reentry phenomena. Longrange

telescopes tracked vehicles as much as 200 miles downrange. Infrared cameras tracked missiles in

the dark.

To meet more stringent ballistic missile test requirements, several systems were designed, procured and

added to the Eastern Range's instrumentation in the 1950s and 1960s. The AZUSA continuous wave

tracking system was added to the Cape in the mid-1950s and Grand Bahama in the early 1960s. The AN/FPS-16 radar system was introduced at the Cape, Grand Bahama, San Salvador, Ascension and East Island

between 1958 and 1961. In the early 1960s, the MISTRAM (Missile Trajectory Measurement) system was installed at Valkaria, Florida and Eleuthera Island to support MINUTEMAN missile flights.

During the same period, the UDOP (Ultra-High Frequency Doppler) trajectory measuring system and an AN/MPS-25 radar were added to Grand Bahama's Cays and Carter Cay to track the Army's PERSHING ballistic missiles. In 1962 and 1963, the AN/FPQ-6 radar system (or its transportable version, the AN/TPQ-18) was installed at Patrick, Antigua, the Cape, Grand Bahama, Grand Turk, Ascension and a site acquired near Pretoria, South Africa in February 1961.

The Eastern Range's FS-type telemetry ships were retired in 1960, but two larger and more capable instrumentation ships, the *Twin Falls Victory* and the *American Mariner*, were added to the range's operations in November 1960 and July 1963. Two Advanced Range Instrumentation Ships (ARIS), the USNS *General H. H. Arnold* and the USNS *General Hoyt S. Vandenberg*, became operational in 1964.

Five APOLLO instrumentation ships were accepted by the Air Force in 1967 and 1968 for support operations in the Pacific. One of the ships (the USNS *Redstone*) was transferred to the Eastern Range at the end of 1969. The Eastern Range gave up its six C1-M-AV-1 telemetry ships in 1968 and 1969.

Together with its land and sea assets, the Eastern Range relied on specially instrumented aircraft for communications and telemetry support. The 6550th Operations Squadron used C-54 aircraft for range support in the 1950s, but the C-54s were replaced with eleven C-130s in 1961 and 1962 to provide

greater speed, longer range and higher altitudes for telemetry reception. As the APOLLO program got

underway in the 1960s, there was a requirement for more capable

Advanced Range Instrumentation

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Aircraft (ARIA). The ARIA were developed to support the APOLLO program initially, but they were

also used on Defense Department missions. The Air Force Eastern Test Range accepted the first of eight

C-135A aircraft for the ARIA program in January 1966. Those aircraft were modified by the Douglas

Aircraft Company in Tulsa, Oklahoma in 1967, and they were returned to Patrick later in the year. Each

ARIA carried a steerable telemetry antenna in a "droop snoot" housing at the front of the aircraft. The

6549th Consolidated Aircraft Maintenance Squadron maintained the ARIA at Patrick AFB until the

aircraft were transferred to the 4950th Test Wing at Wright-Patterson AFB, Ohio in December 1975.

The ARIA were reassigned to the 452nd Test Squadron at Edwards AFB, California in the early 1990s.

Despite those organizational changes, the ARIA continued to support Eastern Range missions

throughout the period.

When we look back on its development in the 1950s, we realize that the Eastern Range's growth had

been nothing short of spectacular: by January 1960, the Eastern Range included 13 major stations,

approximately 91 outlying sites, a fleet of ships and three marine support stations. By September 1963,

the Eastern Range extended around the tip of South Africa to the island of Mahe in the Indian Ocean.

The manned space program was well underway by the mid-1960s, and the Navy's POSEIDON missile

program was scheduled to begin flight testing in 1968.

Despite those obvious signs of prosperity, many of the Eastern Range's old missile and space programs

matured or disappeared by the late 1960s. Budget restrictions were increasingly tight, and there were

only a few viable space and missile programs in prospect for the 1970s. Under the circumstances, Air Force planners were compelled to downsize many range assets, and the Air Force began deactivating stations in the early 1960s. Following the last SNARK launch in December 1960 and the last MERCURY mission in May 1963, half a dozen range stations were retired. The Mayaguez station was deactivated in August 1961, and the East Island Annex was inactive after 1963. The range's annexes in the Dominican Republic were given to the Dominican Government on 6 November 1962. Project FRESH LOOK eliminated the MOD II radar network in 1965. The range station on San Salvador was placed in caretaker status in March 1965, and it was officially closed on 31 January 1970. Range property on St. Lucia was either transferred to the Government of St. Lucia or eliminated by early December 1967. Apart from the airfield, all Mayaguana facilities were abandoned on 16 June 1970. The Missile Guidance Annex on Fernando de Noronha was returned to Brazil on 14 January 1969. The APOLLO Lunar Landing program and the POSEIDON and MINUTEMAN III Research, Development, Test and Evaluation programs were completed in the early 1970s. Their termination prompted Project RESIZE. Under RESIZE, the AN-TPQ-18 radars on Grand Bahama Island and Ascension were transferred to the Pacific, and the range's MISTRAM and UDOP systems were deactivated. Grand Turk's command/destroy system was retired. The range's station on Eleuthera was transferred to the U.S. Navy on 1 July 1971. The radar and telemetry systems at Station 13 (Pretoria, South Africa) were mothballed in December 1969, and the property was returned to the Republic of South Africa on 8 January 1996.

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Finally, as a result of the Strategic Systems Test Support Study and the Eastern Test Range Facility

Utilization Study (ETRFUS) in the early 1980s, the USNS *Arnold* was decommissioned, the USNS *Vandenberg* was mothballed and the range station on Grand Turk was deactivated. Jonathan Dickinson Missile Tracking Annex was built near Jupiter, Florida to replace the range station on Grand Bahama Island with the Eastern Range's first modern consolidated instrumentation facility. The Grand Bahama station was placed in caretaker status on 30 June 1987, and the keys to the station were turned over to the Government of the Bahamas on 30 January 1988. Following the Shuttle *Challenger* disaster on 28 January 1986, the national space recovery effort included a revitalization of America's unmanned space vehicle industry. Altogether, contracts worth more than \$14 billion were signed for new launch vehicles including the TITAN IV, DELTA II and ATLAS II. Refurbishment of Cape Canaveral's launch pads followed in the late 1980s and early 1990s, and there was an on-going effort to modernize the Eastern Range with a new Range Operations Control Center (ROCC), fiber optics communications, consolidated instrumentation facilities on Antigua and Ascension and radar, telemetry and optics improvements. The USNS *Redstone* was deactivated on 6 August 1993, but a new range site was completed in Argentia, Newfoundland in June 1993 to support northbound flights of the TITAN IV from Cape Canaveral. Operational testing for the ROCC continued in 1993 and 1994, and the ROCC was declared operational on 1 March 1995. The capstone of the Eastern Range's revitalization program was the Range Contractor's relocation of radar, telemetry and command instrumentation at new consolidated instrumentation facilities on Antigua and Ascension and the introduction of new telemetry and flight safety system software in the early 2000s. On 3 November 2000, ITT Industries (Systems Division) was awarded the Spacelift Range

System Contract to carry out the Improvement and Modernization (I&M) program on the Eastern Range.

During the range's next "downtime period" (18 August through 20 September 2001), contractors installed switches that allowed the range to operate with either the old Range Safety/Range Control

System or the new Centralized Telemetry Processing System/Flight Operations Version 1 of the new

Flight Safety System. From August through October 2002, contractors conducted an Operational Test

Readiness Demonstration of recent improvements.

Based on the results of the demonstration, Headquarters Air Force Space Command granted permission

to conduct a Force Development Evaluation (FDE) from early December through 24 January 2003.

Additional efforts by the 45th Space Wing, the Space & Missile Systems Center, and both those agencies'

contractors yielded very positive results in 2003. The Integrated Satellite Communications/Centralized

Telemetry Processing System/Flight Operations Version 1 (ISCF) passed its Readiness Review Board

on 17 September 2003. Brigadier General J. Gregory Pavlovich (45 SW Commander) accepted the

ISCF on behalf of the Eastern Range on 18 September 2003.

In an unrelated effort, Eastern Range officials accepted the DOD's new worldwide HF Global Communications

System (HFGCS) and shut down the Wing's old legacy HF systems in July 2008. After almost

30 years of operations, the Cape's dual Cyber 860A computers in the Central Computer Complex at the

Cape were decommissioned in 2009. A replacement for the Central Command Remoting System in the

Morrell Operations Center was anticipated to be delivered in late 2010 or 2011.

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** All twelve ships were modified World War II cargo vessels. Six were FS-type ships, and six were C1-

M-AV-1 vessels. The FS ships were named Echo, Foxtrot, Golf, Hotel, India, and Kilo. The C1-M-AV-

1s were Timber Hitch, Coastal Sentry, Rose Knot, Coastal Crusader, Sword Knot, and Sampan Hitch.

In addition to telemetry systems, the Coastal Sentry and Rose Knot were equipped with command and control transmitters.

*** Station 9 at Mayaguez, Puerto Rico was deactivated in August 1961, but its submarine cable remained in operation to support the East Island Missile Tracking Annex, which was activated in April 1961. East Island's radar was deactivated in September 1963, and the range disposed of the East Island Annex on 16 February 1967.

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Sources