

The Navy Transmitter Communication Station 1946-1974



USNAVRADSTA (T) Beavertail 1974

Beavertail U.S. Coast Guard Light Station lower left. Hull Cove (Clarke's Village) mid right, Bayberry Road and Bonnet View Drive upper center.

Photo Courtesy of Anna Templeton-Cotill

The vast communications facility on Beavertail was an extension of U.S. Naval Communications Station Newport (USNAVCOMMSTA NPT). It went into service immediately after the war gradually expanding the old Spraycliff site and the grounds to the south of it into a massive antenna farm with a variety of antennas. The site served as the transmitter facility tied into the Newport Navy Base with its sister receiving station (USNAVRADSTA (R)) located on Sachuest Point, Middletown. The transmitting station at Beavertail and the receiving station at Sachuest Point were separated to reduce both overloading the receivers by adjacent channel high power RF transmitters and harmonic interference to the Navy receivers, which had sensitive low noise front end amplifiers enabling them to receive weak signals from world-wide stations.

Beavertail contained an extensive antenna farm of various types of antennas, primarily of "log periodic" and "discone" design. The log periodic antennas were essentially broadband antennas allowing high efficiency of radiated signals over a wide range of radio frequencies. Mounted on 130-ft poles and towers, they could be rotated. They provided directional gain, thereby increasing radiated signal strength toward the direction they were oriented. Almost all of the 186 acres of land, now Beavertail State Park, were utilized.

A multitude of transmitters were in use at the site including seventeen TMC AN/FRT-39 10KW, ten TMC URT-19 1 KW, two TMC AN/FRT-40 40 KW transmitters, and one Continental Electronics AN/FRT-72 100 KW Transmitter. The latter fed the NORD antenna described below and operated on 129.5 KHz sending multiplex broadcasts to the fleet on redundant channels.

TMC (Technical Material Corporation) was the prime supplier of HF (high frequency) transmitters and receivers to the Navy. Their reputation for quality and reliability was outstanding for both land-based and shipboard radio equipment. The Sachuest Point receiver station in Middletown was also equipped with TMC manufactured receivers.

Combat Operations Center (COC)

As a continuous upgrade to the earlier CIC (Combat Information Center) training facility conducted at Spraycliff during WWII, the Navy petitioned Congress for new funding to expand its re-named Combat Operations Center (COC) and provide fully integrated COC team training. Prior to the expansion, training facilities were limited and fully integrated team training non-existent. The Navy stated "Beavertail plays the vital part of air defense training leaving the Newport-Quonset-Boston area as the only station for critical training of COC crews". The electronic equipment expansion was authorized in May 1950 to provide both advanced and refresher training for aircraft carrier air groups, pilots and air crewmen in intercept tactics, air control procedures and air/sea rescue exercises. The advanced center replicated shipboard plotting rooms, employed synthetic target generators, radar displays, aircraft and surface ship plotting equipment.

The modern improvements allowed aircraft carrier, cruiser and destroyer radar-type crews full capacity training with as many as three COC teams, each numbering 65 students under the expansion program. The former 7200-sq. ft. Spraycliff Systems Research Operations Building No. 28 was used for this expanded operation. Nearly every CIC/COC crew of the Navy's aircraft carrier force, including the Midway, Enterprise, Kitty Hawk, Forrestal-class ships and the "escort carrier" (CVE) fleet were trained at this Beavertail facility.

Beavertail Antennas

The geographic siting of antennas with over 270 degrees of saltwater electrical counterpoise for radio communication surrounding the Beavertail peninsula was considered superb. COMMSTA at both Norfolk, Virginia and Washington, DC sent daily requests to Beavertail to relay communications to specific aircraft or ships that they could not communicate with due to poor atmospheric propagation or other anomalies.

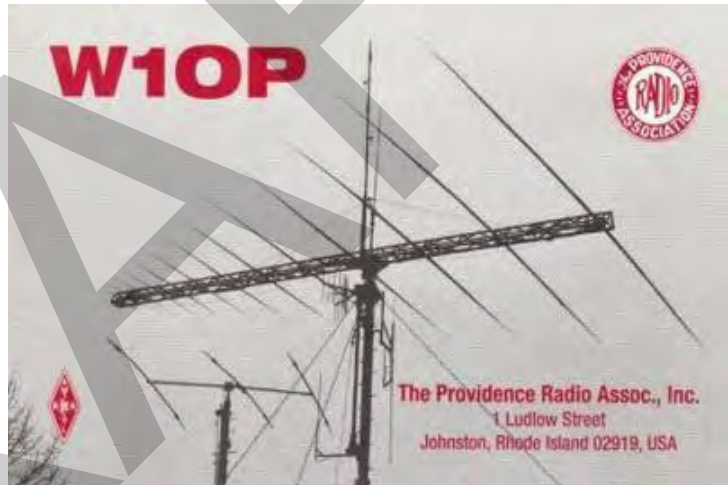
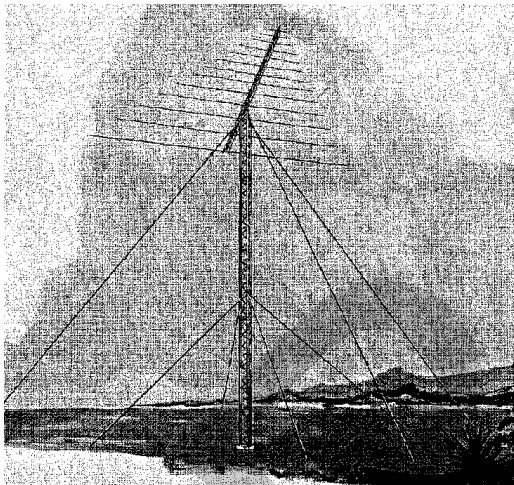
One description of Beavertail's antenna complex is the image it presented to a visiting envious ham radio operator.

"Wow..... I looked in awe over the acres of massive HF antennas. A row of 3 giant rotatable Collins 6-40MHz Log Periodic Dipole Arrays, half dozen huge 2-30 MHz inverted discones each supported by a circle of ten 100-ft telephone poles, dozens of "smaller" 6-30MHz conical

monopoles, an impressive 2-30MHz fixed wire log periodic supported by a pair of 130-ft towers was located on the west side of the peninsula, and on the east side was the massive 600-ft NORD vertical.”

Actually 25 antennas were in place on the Navy Communication Station complex and all were connected to one or more of the thirty or so transmitters.

Quantity	Antenna Type	Associated Transmitter Types
1	HLP (Fixed Horizontally Polarized Log Periodic)	URT-19
8	Conical Monopole	URT-19, FRT-39, FRT-40
4	RLPA (3 Rotatable Log Periodic) (1 wire)	URT-19, FRT-39, FRT-40,
11	Inverted Discone	URT-19, FRT-39, FRT-40
1	NORD	FRT-72



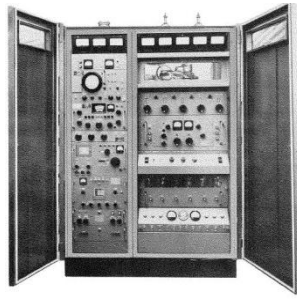
RLPA Collins 237B-1 Rotatable Log Periodic Antennas
 Left: Beavertail’s antennas were pole or tower mounted. Right: A RLP Antenna rebuilt from Beavertail scrap and refurbished by the Providence Radio Association (W1OP). The rear element is over 70 ft in length.
 Image courtesy of Rockwell-Collins history archive and W1OP’s QSL card

The geographical bearings used to train the rotatable log periodic antennas toward their respective receiver locations were classified. While the beam width of the antennas providing forward gain by design were narrow, they remained broad enough to cover vast territorial sectors of geography over their intended direction.

Transmitters were located in the Transmitter Building. Several wings of cinder/concrete block were added to the building in the 1960s. The west wing contained eight of the TMC ten-kilowatt transmitters.



AN/URT-19
1KW 2-32mc



AN/FRT 39
10 KW 4-28mc



AN/FRT-40
40 KW 2-28 mc

Radio Traffic

The radio traffic transmitted was initiated by telephone lines and teletype from a number of sources including NAVCOMMSTA Newport, NAS Quonset, Sub Base New London and Newport Harbor Control. Coordination was required between those stations and Sachuest Point, Middletown. Transmission modes included multi-channel encrypted RATT (radio teletype), RAZZY (aircraft relay), GCA, SSB, voice and CW (Morse code) to aircraft, ships and naval bases. CW drills were common with Newport Harbor Control operating on 2 mc frequencies. With Quonset Point operating airborne ASW (Anti Submarine Warfare) patrols off the Atlantic coast, separate frequencies were used for discreet communication with patrol aircraft. Fleet Broadcast Teletype via lines from Navy Norfolk was routinely patched through to Beavertail for retransmission since the Beavertail site was superior for long distance transmission.

SUBTAC a circuit used by submarines for ship to shore communication was kept open and relayed as needed.

One of the more strategic classified services delegated to Beavertail was the relay of “Emergency Action Messages” (EAMs) from the “National Command Authority” (NCA). EAMs required delegated land-based communication stations to maintain the highest level availability of communications across the radio spectrum for encrypted networks to communicate with U.S. strategic forces world-wide. NCA also directed the Navy’s airborne TACMAO (Take Charge and Move Out) fleet. During the Cold War TACMAO directed military commanders to undertake nuclear action against adversaries if authorized.

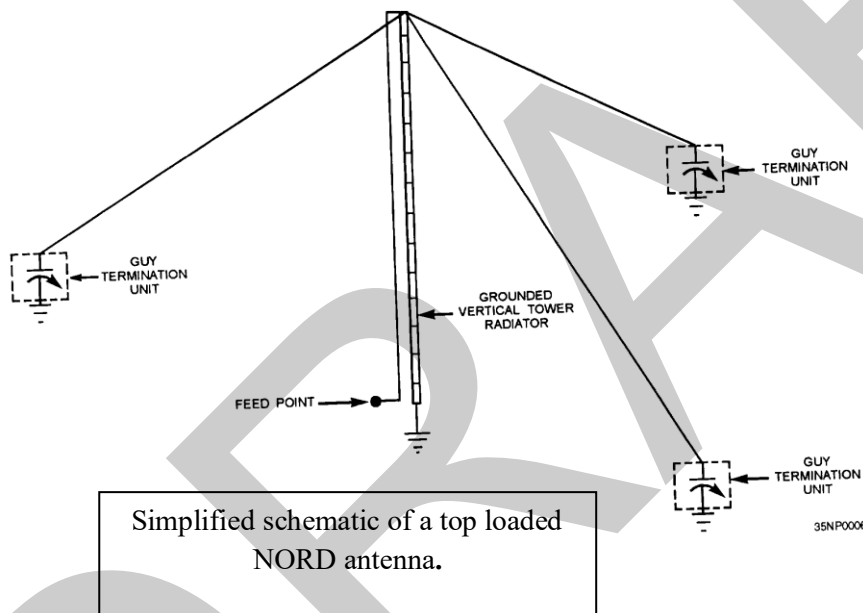
The NORD Antenna (1-Juliet) and FRT 72 Transmitter

By the 1960s the U.S. Navy’s communications needs exploded. With an effort to create a 600-ship combat fleet, newer vessels including nuclear submarines remaining at sea for months at a time, required constant communications. The best frequencies for their use were in the low band ranges (below 520 kHz–1,610 kHz) of the commercial broadcast frequencies. Both VLF (Very Low Frequency 3-30 kHz) and LF (Low Frequency 30- 300 kHz) were best suited for this use. Unfortunately very large antennas were required at these low frequencies and as a result a top loaded configuration called the NORD antenna was adapted. The origin of the name NORD has

been lost, but believed to be an antenna design from a pirate broadcast station on a German freighter with a call sign “NORD”

Beavertail’s NORD was an impressive antenna named “1-Juliet”. It comprised a 654-ft high steel triangular lattice tower and a top loaded LF (low frequency) wire antenna. This design had three umbrella wire radiators extending from the top of the antenna down to ground level extending in a radius from the tower. The wires served both as radio signal antenna radiators and as the guy wires holding up the tower. *(Radio antennas are designed as a function of their wavelength mostly as a sub-multiple (1/8, 1/4, 1/2, etc.) of their wavelength. The physical dimensions of Beavertail’s NORD antenna were miniscule compared to its radio frequency wavelength, which at the operating frequency of 128.65 kHz was 7,648 ft, almost 1½ miles in length.)*

The end of each umbrella wire was terminated at ground level into a “Guy Wire Termination Unit” which, if desired, could provide some directional characteristic to the antenna by controlling the phase angle, impedance and termination currents.



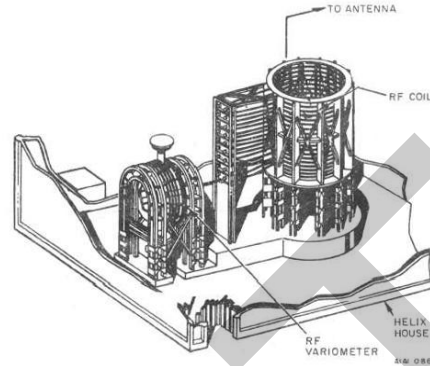
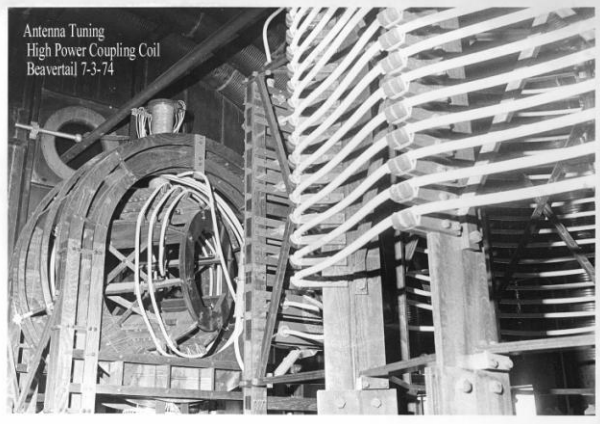


Beavertail NORD antenna with Beavertail Farm at top of image and HECP on west lower side of road. Helix hut is visible at the base of the antenna. Present Beavertail Road ends at the entrance of Beavertail State Park, now located half way between the farm house and HECP.

Photo courtesy of Anna Templeton-Cotill

Helix House

The antenna was fed through a large helix Variometer tuning coil located in a building at the base of the tower called the Helix House. The Variometer was used to tune the antenna and match the coaxial line (pipe) from the transmitter, which in turn was driven by two AN/FRT 50 kilowatt (combined output 100 kW) transmitters located in the transmitter building bearing approximately 345 degrees North of the Helix House. The coaxial feed line (7 inch diameter copper pipe with a insulated center conductor pressurized with nitrogen) from the transmitter building was run completely underground, including Beavertail Road to the Helix House. The Helix House building and the HECP are the only communication structures still standing at Beavertail.



Typical Helix House configuration

Images courtesy of NRL photo files



The Quonset hut-looking building (Helix House) housed the large coupling coil shown above. This shielded building, which housed the coil, stands empty today. The antenna base is located behind the building, less than 20 feet away.

Photo by author 2011



Left: Coaxial cable exiting coupler building. Right: triangular concrete base of the 654-ft antenna tower next to the Helix House.

Photos by author 2011

The Helix House is a Quonset hut-shaped building containing the large Variometer (two coils, a stator and a rotor). High Q air wound inductor coils several feet in diameter were used to fine tune the 654-ft NORD top-loaded tower and match it to the metal coaxial pipe that fed the low frequency signal to the tower. The coaxial pipe was copper, the grounded outer pipe about seven inches diameter, the “center conductor” inner pipe which carried the radio energy from transmitter to tower was perhaps an inch or two in diameter.

Two of the earth anchors for the NORD antenna guy wires are still visible at Beavertail. They are located in radius from the concrete base of the tower out to the circumference of the radial of the tower. The most obvious of these anchors is located alongside and west of the road of the fourth public parking lot exiting Beavertail State Park, and the other is in the cleared area southeast of the helix coupler building and the concrete base.



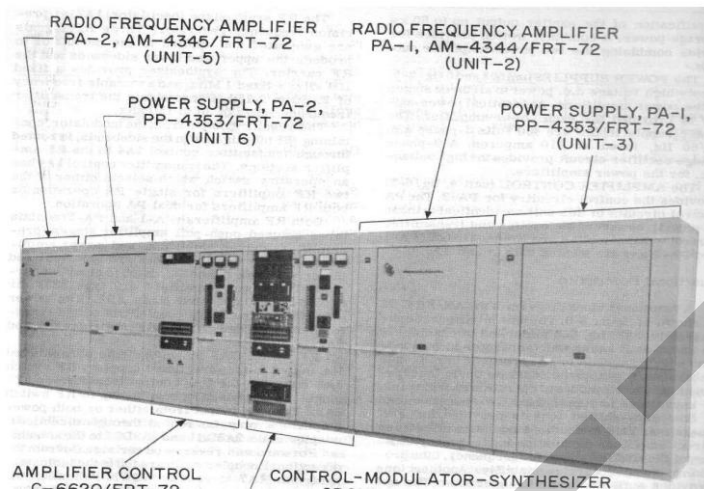
NORD antenna anchor base. The rod extending into the ground has either an earth screw or buried concrete block. The insulated radiator wire is shackled to the eye of the anchor.

Photo by author 2011

In the summer of 1968, on August 1, a day with low cloud cover and fog, a private Cessna 182H aircraft in route to Newport from Long Island, NY struck a guy wire of the tower and crashed. All three persons on board were killed. The aircraft came down north of the tower reportedly in a charred heap. The tower remained standing with only minor damage.

FRT 72 Transmitter

The AN/FRT-72 transmitter, a highly reliable low frequency transmitter, was fed to the NORD antenna via a low loss coaxial cable described above from its location in the South wing of the Transmitter Building. The cable ran underground to the helix coupler building, a distance over 2200 ft. The large diameter coaxial cable was actually a nonflexible copper pipe with an inner copper conductor supported by insulators in the center of the pipe to minimize RF losses. Each end of the pipe was terminated by a flexible section, this accommodated the adaptation necessary to exit and enter the building structures of the HECP and the helix coupler hut, and make the transition to the base of the tower.



Paul V. Zecchino worked at the Beavertail Communications site in 1972 as an engineer trainee and describes the following:

“The low frequency transmitter was an AN/FRT-72 built by Continental Electronics, still in business. (AN-FRT is military nomenclature meaning Army Navy specification, Fixed Radio Transmitter.)

The AN/FRT-72 consists of two identical fifty thousand watt transmitters combined to transmit one hundred thousand watts. Beavertail's FRT-72 transmitted on a frequency of 128.65 Kilohertz, below the AM broadcast and low frequency Beacon Band.

'72s remain in service today, as their typical robust Cold War design has no upward limit on service life, the thinking being entirely different during that not so long ago era. Two or three '72s today transmit continuous time signals which used to set millions of self-adjusting digital clocks, from the National Institute of Standards & Technology station WWVB located near Boulder, CO on a frequency of 60 Kilohertz.

Low frequency signals are less affected by atmospheric disturbances and reliably cover a radius of several hundred miles. John Robinson, station engineer and my boss, stated the Navy copied the 'Low Freq Broadcast' in California during daylight. Beavertail's ideal sited on elevated, albeit marshy, ground surrounded by the sea was ideal for long distance signal propagation.

The 128.65 KHz Low Freq Broadcast sounded like a 'buzz' on an AM radio. Navy de-multiplexers broke the buzzing down into component parts of eight teletype channels. Channels five thru eight usually duplicated channels one thru four, a redundancy known as channel diversity. It was employed to reduce if not eliminate transmission errors. Channels One and Five were said to be continuous weather text sent 'in the clear', i.e. unencrypted, while the other three were 'covered' (encrypted) messages broadcast to the fleet.

The low frequency NORD tower was 'top loaded', meaning its topmost 'capacity hat' guy wires were electrically connected to the top of the tower, from which they ran several hundred feet towards ground. Concrete insulators about six feet in length insulated them from the rest of the wire which connected to the ground. (Top Loading 'capacity hats' are used to electrically lengthen antennas to make them operate more efficiently at low frequencies.)”

Personnel

Limited information was found regarding personnel assigned to either Spraycliff or the Navy Communication Station. Local Jamestown residents and references by them added measurably to obtaining some first- hand information. A number of Jamestown residents either served or worked at the site. Names such as Jones, McGrath, Christman, Quattromani, McCarthy and Blair do show up in documentation and others most probably exist if not deceased. The 2003 visit to Jamestown by the four remaining members of World War II Navy Fight Squadron VN (N) 76 and their recorded experiences were enlightening and fortunately not lost.

James Osborne was assigned to the Navy Comm Station as a young RD3 from 1951 to 1953. He recalls that 36 personnel comprising radarmen, electronic technicians, radiomen, cooks and seaman guards were assigned to the station under the command of a Lieutenant. Civil Service employees staffed the power, water treatment/facilities and carpenter shop. Twenty four-hour Port and Starboard watch duty was the norm with one section getting a weekend on Thursday and Friday and the other section on Saturday and Sunday. Osborne also relates that the station's 36-inch carbon-arc searchlight was used to help lost pilots by pointing the light beam straight upward until spotted and then pointing it toward Quonset Point NAS.

The photographs below provide supplement to the scarce base of data found during the research for this paper.



Officers and Chief Petty Officers 1949

Front row: Anderson BMC, Ring RMC, Verding LT, Gillette
 LTCDR, Ring LT, Young BMC
 Second row: Purd ENS, Damn RELE, Jakes LT, Santos RELE
 Back row: Berg EMC, Kistan RMC, Mott RDC, Blair RMC, Cio
 RMC

Photo courtesy of Alcina Blair



**Navy Chief Petty Officers at Navy Communication
 Station Beavertail, Summer 1949**

Front row L to R: Anderson BMC, Blair RDC, Ring RMC, Jily
 EMC, Young BMC
 Back Row: Cio RMC, Mott RDC, Berg EMC, Kistan RMC

Photo courtesy of Alcina Blair



The Comm Station entrance gate was guarded by enlisted men. Date and names unknown.

Photo courtesy of James Osborne



Mess Hall

Photo courtesy of James Osborne

The last official military involvement of the Communications Station was in 1994. On 22 June 1994, members of the U.S. Corps of Engineers Site Investigation Team (SI) traveled to the former site. The primary purpose of the SI Team was to assess the presence and potential hazard of OEW (Ordinance and Explosive Waste) at the former Naval Communications Center. The inspection was limited to non-intrusive methods, e.g., subsurface sampling was not authorized or performed. No evidence of OEW was found.

Epilog

Although all military electronic operations were terminated in 1994, the Beavertail State Park from time to time is used for special Department of Defense military purposes such as short term test and evaluation of electronic systems. These activities require approval of the RI Department of Environmental Management. Most of these systems have portable data gathering components.

Today, the Department of Homeland Security operates a 24-hour surveillance surface search radar system and an optical adjunct on top of the tower adjacent to the HECF structure. The data collected are transmitted off site to a contractor for evaluation.

Ham radio operators frequently use Beavertail for various events. The Providence Radio Association (PRA) sets up operation every year during “Field Day” sponsored by the American Radio Relay League (ARRL). This is a competitive event held world wide during the fourth full weekend of June where radio operators demonstrate their emergency response capabilities by attempting to contact hams all over the world with portable equipment.

The Beavertail Lighthouse Museum Association, under the call sign W1BLMA, allows ham radio operators to broadcast from the light station grounds during the annual “International Lighthouse Weekend”.

The light station also houses a VHF packet receiving station covering lower Narragansett Bay, Rhode Island Sound and Block Island Sound as part of the worldwide AIS (Automatic Information System) used for the identification and tracking of vessels.