A visit to DECCA

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Photo 1: The Woodbrook antenna and station.

The DECCA Navigational System

What was DECCA? The DECCA Navigator System was a VLF hyperbolic navigational system which allowed ships and aircraft to accurately determine their position by receiving radio signals from fixed VLF radio beacon transmitters. These transmitters operated in the VLF portion of the spectrum from 70 kHz to 130 kHz. Each navigational VLF system was known as a "chain" and normally consisted of one master transmitting station and three slave transmitting stations. Occasionally two slave stations were used to form a complete chain. A specialized Decca receiver on-board a vessel or aircraft would be required to make use of these VLF signals.

Early days

This VLF system was invented in the US, but developed by Decca in the UK. It was first deployed by the Royal Navy during World War II when allied forces required a system which could achieve accurate landings but was unknown to the Germans forces, thus free of jamming. After the war, this system was further developed and deployed around the world including transmitting stations in England, Ireland, Scotland, South Africa, Nigeria, India, Bangladesh, Australia, Canada, Bahamas, Iran, Japan, Vietnam just to name a few. Decca's primary use was ship navigation in coastal waters, offering much better accuracy than the competing LORAN system.

Later days

Possibly with the advent of GPS or other more accurate technologies than DECCA, the Port Hedland and Dampier Australian "chains" shut down around 1988-1989. Many DECCA stations around the world continued to transmit well into the late 1990's with the last DECCA navigational transmitting chain shutting down in Japan around March of 2001.

Photo 2: The porcelain insulators at the tower base, together with a spark gap for static discharge and lightning protection.

Australian transmitting sites

From online research and personal site visits, it appears there were five VLF Decca transmitting sites along the North West Pilbara coast to service the ports of Dampier, Cape Lambert and Port Hedland. The Port Hedland chain consisted of a VLF master station at Turner River and VLF slave transmitting stations at Mundabullangana Station and De Grey River. The Dampier chain consisted of a VLF master station at Woodbrook (Roebourne) and VLF slave stations at Mardie Station and Mundabullangana Station. Hence the Mundabullangana Station was a shared station between both "chains".

According to a few web sites, the North West of Australia was the only location in Australia where this type of VLF navigational system was installed. Other chains at Wallaw Downs, Derby and Gladstone were proposed but never built.

The Woodbrook VLF site

20°53'S 117°08'E TX on 85.635 kHz

This VLF site is located about 12 kilometres inland from Roebourne on a dirt road servicing Harding Dam. The security fence around the whole site, antenna, coil house, transmitter building and original office buildings are still there. It appears a few other

out buildings have been added to the site by the prison authority and aboriginal corporation who currently occupy this site.

There was an odd and interesting feeling about our first site visit back in 1999. It appears when the official word was issued to close this station down, the technicians literally just walked out. It was like they shut the transmitters off, turned the lights off, locked the door and walked out leaving everything behind. Even a 1980s vintage oscilloscope was still on the technician's workbench in what appeared to be a "clean room". The transmitters were all still in place along with trays full of spare electronic parts and a shed with a backup generator.

Photo 3: The feeder exiting the transmitter hut.

The Woodbrook Antenna

As you can see in Photo 1, the antenna is quite large at 288 feet (87.8 m) and sits on three large porcelain insulators with a simple lightning protection spark gap as seen in Photo 2. Lead length does not appear to be critical at such low frequencies as the feed line from the coil house goes through the window and connects to the base of the tower was literally 1" (25.4 mm) copper pipe as seen in Photos 3 and 4. The antenna seems to be extremely short for the transmitter's very low frequency; hence the guy wires appear to form an extremely large capacitance hat.

Photo 4: The Woodbrook antenna base and feed arrangement.

The Woodbrook Coil House

As seen in Photo 5, there are five coils that occupy a large wood rack. It appears the coils are moved to and from each other along the rack for tuning purposes. This coil rack is professionally constructed and appears to be made of varnished mahogany wood as seen in Photo 6. Also in Photo 7, the RF watt meters and large mica transmitting capacitors. Unfortunately most of the gear in the coil house has been vandalised.

The De Grey VLF Site

20°21'S 118°59'E TX on 127.230 kHz

This site is located about 60 km to the east of Port Hedland and adjacent to what we believe is the old BHP Shay Gap train rail. There are numerous remnants at this VLF DECCA site.

The long security fence still mostly surrounds the whole property. The antenna sitting on top of three porcelain insulators is still standing at 240 feet (73 m) as seen in Photos 8 and 9 with all guy wires still attached. An extra set of three additional guys attached to the top of the antenna and spread out at odd angles probably helped form a massive capacitance hat for this antenna.

The old transmitting shed can be seen in Photo 10 with two large air ducts protruding from the side of the shed.

Photo 5: Inside the Woodbrook Coil House showing the impressive tuning coils in their timber mounting rack.

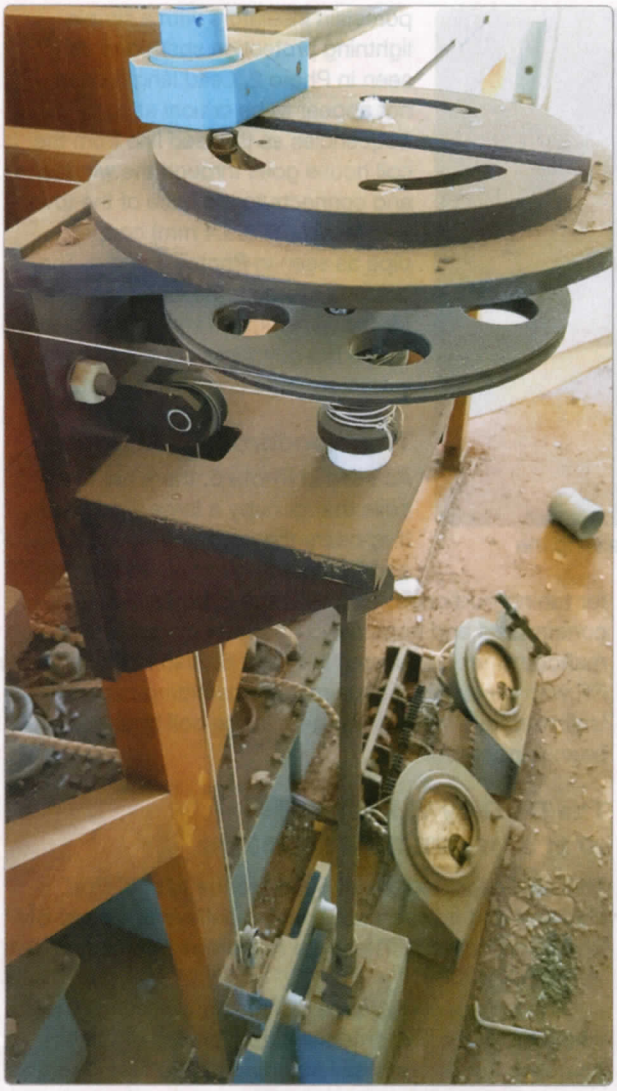

Photo 6: Part of the Woodbrook Coil House tuning mechanism on the side of the coil mounting rack.

Numerous connected lengths of 8" (203 mm) diameter pipe was still on the ground which appear to have formed a wire way or duct to house the feedline between the transmitter shed and coil house.

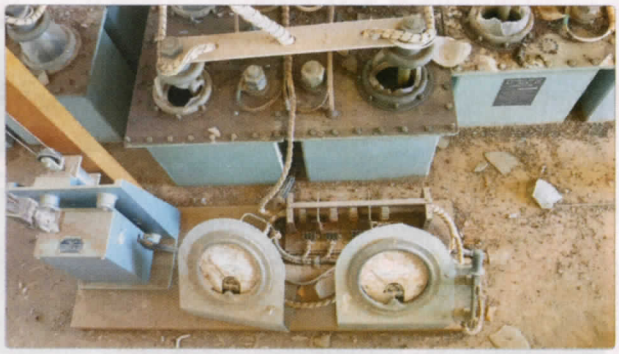

Photo 7: The RF meters and transmitting capacitors, showing damage from age and vandals.

Also, the emergency wind generator triangular tower was lying out in the back paddock of this property. When talking to the current occupants of this site, they stated they were the third family to occupy this property since the station shut down and were unsure as to what happened to the DECCA transmitting equipment for this site. One thing we noticed during our site visit was the coil house at the base of the tower and an out building which appears to have been a repair shop or offices were permanent brick buildings on concrete foundations, whereas the outbuildings at the Woodbrook site were all transportable buildings. At both VLF sites the transmitters were in metal sheds. Our guess was possibly for RF shielding requirements?

The Turner River VLF Site

20°33'S 118°29'E TX on 84.820 kHz

The exit off the Great Northern Highway for this site is on the east side of the highway approximately 20 kilometres south of South Hedland. This decommissioned transmitting site is now subdivided private property with blocks approximately 1 acre each. During a recent site visit, no obvious antenna, transmitting equipment or structures from the previous DECCA installation could be found. Although some transportable buildings on a few different properties could have been remnants of DECCA as their appearance was similar to those buildings at the Woodbrook VLF site. This site can be easily seen on Google Maps or Google Earth.

Photo 8: The antenna at the De Grey site.

Photo 9: View of the antenna mounting at the De Grey site.

The Mundabullangana VLF Site

20°25'S 118°04'E TX on 113.0933 kHz and 128.435 kHz

According to the Lat. and Long. coordinates, this site was almost on the beach well west of the Great Northern Highway and south of Port Hedland. With an expert eye, this site can vaguely be seen on Google Earth. Correspondence with the current owners of this cattle station stated that they were not owners of the station back in the 70s and 80s and don't know much of the history of this old VLF transmitting site but believe there is a generator on their station that was probably from the old Decca station.

The Mardie VLF Site

20°59'S 116°21'E TX on 114.118 kHz

This VLF site appears to have straddled the North West Coastal Highway proximately 60 kilometres south of Karratha. It has been professionally rehabilitated in the past as there is almost nothing recognisable except some ground disturbances from the original vertical antenna radial system as viewed by Google Maps or Google Earth. When visiting this site many years ago, all that could be found were a couple small cement pads with cut off 50 mm steel pipes as if they were corner posts for the security fence around the antenna. Also found was a rusted out Peugeot model 404 automobile in a small rubbish pit on the opposite side of the North West Coastal Highway where some transportable buildings may have once been installed.

Additional Information

Additional information about DECCA and other navigational systems can be found at the excellent website of Jerry VE3FAB: *http://jproc.ca/hyperbolic/*

The web site of G4FTC: *http://www.qsl.net/g4ftc/decca/home.htm*

Wikipedia

Photo 10: The rear of the transmitter hut at the De Grey site.