



Adventures of a Radio Technician in Canada's Arctic "OSCAR" operation from Rea Point

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Shortly after starting to work for Panarctic Oils at Rea Point, I brought up some amateur radio equipment and operated out of Rea Point as VE6ANI/VE8. My main radio was a Yaesu FT101 hf transceiver.

Rea Point was very close to the North Magnetic Pole during the 1970s. At that time the magnetic pole was at the north end of Bathurst Island about 70 to 100 miles from Rea Point. During the summer months when it was daylight 24 hours a day, the hf bands were open almost continuously except for radio blackouts due to solar magnetic storms. I concentrated mostly on 20 meters. During the long arctic nights propagation was very bad and it became very difficult to work the bands. Sometimes I would be able to check into the Alaska Bush Net on 40 meters during the winter. It seemed like I was operating from the bottom of a very deep hole and my signals just wasn't able to climb out of the hole.

About 1983 I started putting together an OSCAR (Orbiting Satellite Carrying Amateur Radio) station for OSCAR 10 operation. I purchased two 2 meter Cushcraft Boomer antennas (13 element yagis) and a Cushcraft cross-polarized satellite antenna for 435 Mhz. I picked up 2 antenna rotators, one Astatic rotator that I purchased from a Calgary electronic shop (Smalley's Radio) and one Radio Shack rotator. I purchased some Hamtronics and some VHF Engineering kits to build a transverter for the uplink and a low noise FET pre-amp for the downlink. I used my FDK Multi-2000 2 meter multimode transceiver that I had been using for Oscar 6 operation in Calgary.

OSCAR 10 (AO-10) was the first PHASE 3 satellite. It was launched into a highly elliptical orbit with an apogee of about 35000 km and a perigee of about 4000 km. It was meant to be inserted into a Molniya orbit but a collision with the launch vehicle after separation caused it to be inserted into an orbit with a lower inclination. The satellite was a linear transponder as most OSCAR satellites of that era were. A linear transponder (also known as a linear translator) was somewhat like a broadband cross-band repeater. The transponder was inverting, that is if the uplink signal frequency was shifted, the downlink signal frequency shifted in the opposite direction. The uplink band was 435.180 – 435.0300 Mhz and the downlink band was 145.825 – 145.975 Mhz (known as Mode J). On AO10 the The transponder translated CW and SSB signals from the 435 Mhz band to

the 145 Mhz band.

Working the satellite was a bit like working DX on 20 meters with many CW and SSB stations across the 150 KHz wide band. It was normal practice to operate the satellite full-duplex using headphones to listen to the downlink signals. To confirm that I was into the satellite I would listen for my own signal on the downlink. To answer a station calling CQ I would shift my uplink transmitter frequency until my downlink signal was on top of the station I was calling for. Operating full-duplex permitted rapid exchanges in the conversations allowing for the small but noticeable path delay. I had pile-ups just like a DX station on 20 meters.

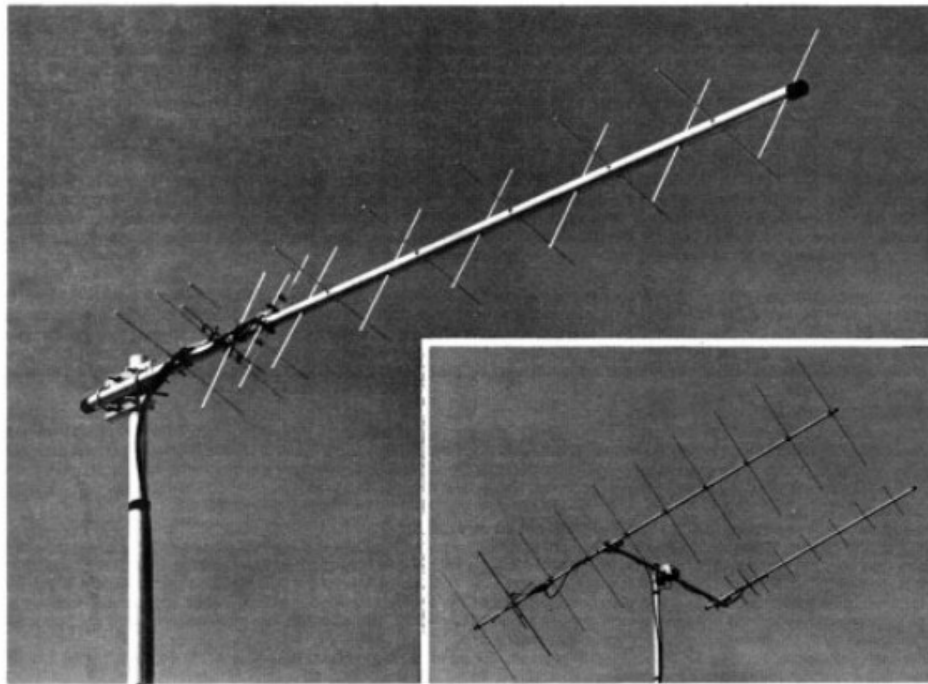
Etiquette on OSCAR 10 (and all linear transponders) called for restraint in running excess uplink power. Somebody running high power and big antennas would hog the transponder downlink and weaker uplink signals would not make it through the transponder. Normal practice was to run no more than 10 watts and a reasonable yagi antenna on the uplink. Also only SSB and CW was used, no AM or FM modes were used.

My uplink equipment was a Yaesu FT101 using the low level RF output tuning the 10 meter band driving a 10 meter to 435 Mhz transverter built from a Hamtronics kit. The uplink antenna was a 435 Mhz cross-polarized Cushcraft antenna (8 element horizontal and 8 elements vertical) on a single boom. My downlink equipment consisted of a pair of 13 element Cushcraft Boomer 2 meter yagis mounted on a cross boom about 6 feet long. One yagi was mounted 45 degrees to the boom at one end of the boom and the other yagi mounted at the opposite end of the boom turned 45 degrees to the boom such as the 2 yagis were oriented 90 degrees to each other. I had a low noise FET pre-amp mounted close to the antennas and my receiver was the Multi-2000 2 meter transceiver.

The 435 Mhz antenna was mounted on the same boom as the 2 Cushcraft Boomer. I had the Astatic rotator at the middle of the boom. This gave me elevation control on the antenna array. The boom was on a mast driven by the Radio Shack rotator. This rotator gave me azimuth or directional control. I mounted this antenna array on a tripod that was about 5t feet high (high enough that as the elevation control was rotated from horizon to overhead and past, the 2 meter antennas cleared the ground).

Panarctic Oils used Apple II computers with the Z80 language cards. The operating system was C/PM (Digital Research). I obtained a Basic program to calculate the tracking and orbital elements that I gleaned from the AMSAT newsletters. I had to type in about 150 lines of Basic. Panarctic used dot matrix Epson printers with the Apple computers. I would start the tracking program after supper in the radio workshop and let it run overnight. The next morning I would have print-outs of orbit passes covering the next few days.

My most memorable OSCAR 10 contact was to a Dxpedition to the Galapagos Islands.

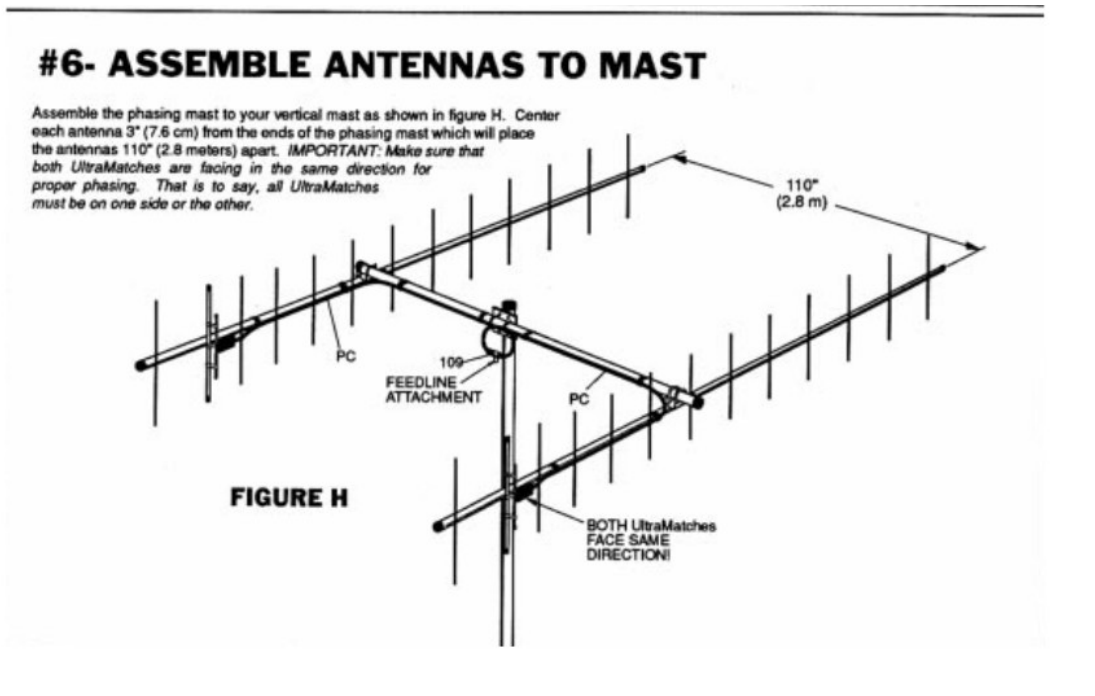


416-TB OSCAR Satellite Circular Polarization Boomer Antenna



This was my uplink antenna (image from the Cushcraft brochure). It was mounted on the same boom as the Boomer yagis were mounted on.

This was my 2 meter Cushcraft Boomer antennas that I used for my downlink.



This image is from the Cushcraft brochure. The 2 yagis were rotated 45 degrees, one one way and the other the other way such as the upper tips of the elements were closer to each other and the two yagis were 90 degrees to each other. I added a $\frac{1}{4}$ wave section of 50 ohm coax to one yagi feed point to achieve circular polarization. I tried the coax at one and then the other yagi to get either Right Hand Circular Polarization or Left Hand Circular Polarization. I also experimented with the 435 Mhz antenna with RHCP and LHCP. I forget which polarization I ended up with but it made a big difference in signal strength with the correct polarization. The 435 Mhz antenna (the 416TB circular polarized antenna) was mounted near the middle of the boom and pointed in the same direction as the Boomer yagis. The Astatic rotator was mounted in the middle of the boom for elevation control and the Radio Shack rotator was mounted below the Astatic rotator to give directional control.

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