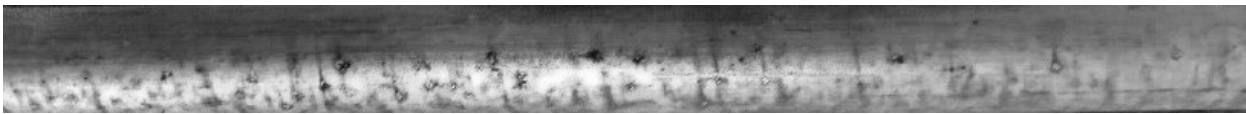


Mount Climie 730 antenna pole RF Earth install and testing
by John M. Wysocki ZL2TWS

An independent RF earth has been commissioned for the 730 north antenna aluminium pole. Two sets of commercially manufactured 4 dipole stacks have all failed resulting in crackle and noise on 730.

The manufacturer of the antenna is SkyMast UK. The model is an SM-4. When these dipoles were removed from site and taken to a professional antenna supplier for assessment, the answer to our problems were not what we expected. It was caused by what is similar to lightning damage by way of voltage discharges. This was seen as spark pitting on the dipoles. Picture-1.



Picture-1: Spark discharge damage.

Electrolysis corrosion is also seen at dipole joints. This indicates current flowing at the RF neutral potential connection to the horizontal mounting boom seen in Picture-2.



Picture-2: Dipole to boom corrosion pitting.

The antenna was then stripped down to find that the epoxy filled balun connection used a mounting through bolt to earth the coax braid to the antenna horizontal boom.

The method is used commercially to ensure a good ground for unbalanced feeder cables. Unfortunately in our case discharge current used this path as a better earth all the way back to the south hut main AC earth.

When a low impedance RF station earth is used any static build up is discharged locally.

Antenna rebuild

The dipoles have been stripped and cleaned.

New traditional 4:1 coaxial baluns have been made and epoxy filled connections boxes without braid grounding were made as seen in Picture-3. Braid grounding is now done via a lightning arrester and individual earth stake. Picture-5.



Picture-3: Rebuilt dipole set.

The idea now is to use a new RF Station earth connected to the aluminium dipole mast pole and have the coax cable braids isolated from carrying the discharge current via the coax and duplexer to south hut AC station earth.

The earth leakage tester used is the Aegis CZ20500.

An earth current is sent via the Phase “Live” connection to the main switchboard and star connected supply transformer earth connection.

Testing between the new station earth stakes across the earth to the switchboard is known as a “IT System Loop back Impedance test”

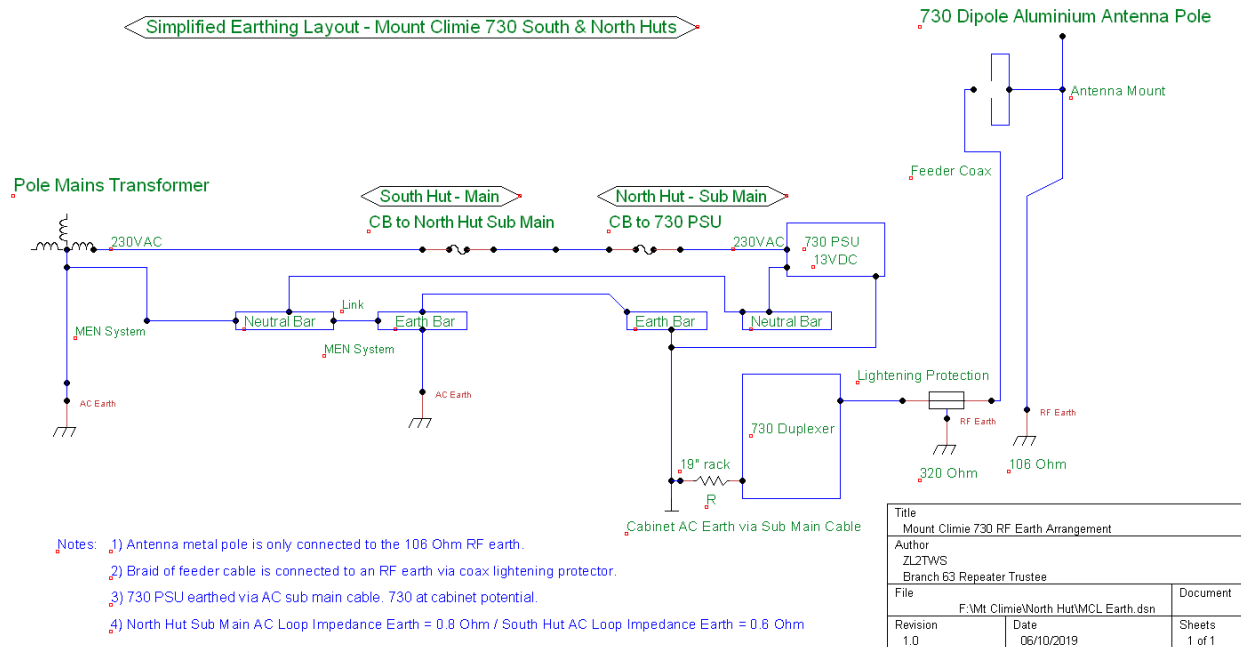
IT earthing system

In an IT earthing arrangement, there is either no earthing at the supply, or it is done via a high impedance connection. This type of earthing is not used for distribution networks but is frequently used in substations and for independent generator-supplied systems. These systems are able to offer good continuity of supply during operation. In our case an RF station earth consisting of two parallel connected earth stakes seen in Picture-4.



The earth loop impedance should read better than 200 ohms as an internationally accepted value. Our test is 106 ohms when the stakes were driven. This is expected to go lower in wet conditions and be high during the summer. The south hut AC earth is 0.6 ohms and North hut sub main is 0.8 ohms.

Picture-4: Earth stakes in parallel 29th September 2019.



Picture-5: Shows the test arrangement at Climie.

New dipoles are now in service with an omni directional pattern of 5.7dbD and gaining increases of up to 8.7dbD resulting in the reflector effect from the mounting pole. (SkyMast Specifications)
 A gain increase was measured in Lower Hutt between the single folded dipole and the four dipole stack of 8db.



Branch 63 NZART has spent many years maintaining the 730 antenna. Mount Climie repeater site is at 867 metres altitude and experiences extremes of weather including, lightning, cloud static and snow cover during winter months.

RF coverage is around 160 kms with many DX contacts being made within NZ and across to Australia at times. 730 repeater also has IRLP node 6713 available.

Picture-6: New 730 antenna stack 6th October 2019.