

## ZS6SSC BULLETIN 10DECEMBER 2017

Good morning, this is the Monthly Bulletin for ZS6SSC the Southern Suburbs Amateur Radio Club, today – 10 December 2017, presented by ZR6AUI – Christo Greyling and compiled by ZS6WC – Willie Wright

This bulletin is transmitted on 145.7875 MHz, with the kind permission of ZS6HVB, The Highveld Club.

There is also a relay on 439.125 MHz with a 88.5 tone, Please be aware that a time out timer is active,

### **In the Bulletin today:**

Basic Tower and antenna grounding some protection from static and indirect lightning strikes -Not RF ground

Compiled, researched and written by William Wright ZS6WC

### **Part one**

What is a tower and what is an antenna support pole

Actually, the same basic idea but structurally different.

A tower is envisaged by most people is a structural construction and an antenna support pole is just that, a piece of pipe to hold a simple antenna system up at the required or desired height.

But no matter how we would like to explain what we use to support antennas one thing is in common to both support systems:

They must be earthed/grounded.

The higher the tower, the better the earthing required

Let us use as an example. A 25 meter tall tower that has two cubic meters of concrete as its foundation.

Putting aside the mechanical components of the tower in question, let us envisage the electrical circuit.

The tower is a fairly efficient electrical conductor which sees the concrete base as a large capacitor/resistor to ground.

Now, what happens to a capacitor/resistor when massive high voltage/high amperage is passed through a capacitor /resistor in a circuit?

BECAUSE OF THE MASSIVE HEAT GENERATED BY THE HIGH VOLTAGE AND CURRENT PASSING THROUGH THE CONCRETE -IT CAN BLOWS UP AND BASICALLY DISINTERGRATE

Or if it does not HAPPEN, damage can be and usually is caused to everything mounted to and onto the tower. E.g. antenna rotator, control boxes, antenna etc.

### **So what should we do about this?**

ELECTRICALLY DC GROUND THE MAST.

Remember we are considering smaller lightning strikes and static.

While the foundation hole for the tower is being excavated go a little deeper into the ground and place a good electrical conductor at the bottom of the hole and cover with about 200mm of soil and compact the soil firmly

The conductor from the earth plate should be insulated and routed that it is not cast into the concrete foundation but rather in the corner of the hole where it won't be encapsulated in concrete. Welding machine terminal cable is a good cable to use 12 mm diameter is a good size.

After the tower base metal structure has been positioned into the foundation hole and the earthing cable placed so that it does not become encapsulated in the cast concrete

Once the concrete has dried and the tower is erected this earthing cable must be securely to the tower structure.

The preferred method is to crimp and solder the connecting lug to the cable and solidly bolt the cable to the tower using stainless steel hardware,

Use a liberal amount of copper grease to protect the connection from corrosion.

x3 Additional earthing spikes must be driven into the ground 3m away from each tower leg

Using the same type of cable and termination/connection method.

In some cases the soil above the bed rock is less than a meter. In the case of ZS6WC where the only reasonable method was to dig trenches for the earth rods to lay horizontally in the trenches surrounded by of the soil,

Bed rock / ou klip has a very high ground resistance so should be considered to be of very little, or no use as a ground conductor. But by having the earthing rods lying horizontally in a better conducting surface will improve the ground conductivity.

Additional bare copper wire can be attached to the tower base and earth spikes then stretched out radially away from the tower so as to enlarge the ground foot print,

The thicker the conductor used for these conductors the better.

You have been listening to the official bulletin of the Southern Suburbs Amateur Radio Club,

transmitted on the second Sunday of each month. This bulletin is also available for download on our website.

If you require any information regarding the Southern Suburbs Amateur Radio Club or if there is any

news or content you would like to be included in the next bulletin please sent this to

The Secretary: [zs6wc@vodamail.co.za](mailto:zs6wc@vodamail.co.za)

Also visit our website for membership application form and Club information [www.zs6ssc.co.za](http://www.zs6ssc.co.za)

This brings our bulletin to an end and we hope you enjoyed good reception and thank you for listening

2. Call-in on 2m and 70cm

2m Call-ins

.ZS6LT, ZS6WC, ZS6KDL, ZS6KED, ZR6JC, ZS6JCL, ZS6REX

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70cm Call-ins

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This brings an end to the post bulletin net, thank you for joining us

We release these frequencies now for general use

Good bye

## **Part two.**

### Antenna installation

#### 1 Rotators

Most antenna towers have a rotator fitted to the top of the tower in order to rotate directional antenna

A good electrical connection should exist between the pipe fitted to the top of the rotator and the tower itself

Once again use the same type of cable mentioned earlier the cable will offer a path of least resistance for the high voltage follow therefor bypassing the rotator.

Multi terminal male female plugs are available from electrical wholesalers and should be fitted in circuit with the rotator control cable.

This enables the rotator control box to be completely removed from the circuit.

#### 2 Antenna Choice and installation

Wherever possible make use of, build or buy DC grounded antenna.

These type of antennas are by design supposed to be electrically "neutral" (no potential difference) but this all depends on the connection to ground.

It is essential that the antenna is grounded properly.

Do not rely solely on the mechanical connection of the antenna mounting bracket and the mast above a rotator.

Make solid and sound mechanical connections that do not loosen because of wind vibration.

I prefer to use self-locking nuts (NY lock stainless steel) good dc connections are essential in order to maintain good conductivity.

#### 3 Coaxial cable and plugs

Coaxial cable screens should be grounded at the point of entry into the operating room.

This is done by removing a pane of glass and replacing it with a aluminium plate which is connected to the existing tower ground system.

Holes are drilled to accommodate barrel connectors.

The nuts that hold the barrel connectors must have lock washers and nuts to hold them in place as well as ensure good conductivity between coaxial screen and ground.

This also allows the coaxial cables to be disconnected before an electrical storm, or, if required, when the tower is lowered for maintenance.

### Part 3

Tower and station earthing maintained.

Towers are bought or built then installed and forgotten, and one day things go wrong and in severe circumstances collapse and cause damage.

e.g. commercial tower installed at the "silver ball" area where the ZS6HVB repeater antenna was installed.

So yes it can happen.

Firstly mechanical inspection and maintained.

If the tower can be lowered and tilted over, the maintenance is made easier.

All bolts and nuts should be checked and coated with a preservative- oil based is always better

The integrity of the nuts and bolts must be checked, if any doubt exists replace the components.

Loose bolts and fasteners can cause high resistance joints,

While the tower is lowered all antenna connections must be checked

Coaxial cable plugs must be checked and replaced if corroded.

Check antenna outer covering for damage which will allow water or humidity in and damage the copper screen of the coaxial cable

Antenna mounting brackets must be checked and tightened for structural and electrical conductivity integrity.

To put in a nut shell

INSTALL A PROPER EARTHING SYSTEM USING SPIKES THAT MAKE GOOD ELECTRICAL CONNECTION WITH THE EARTHING MEDIUM.

MAKE GOOD, SOLID GROUND CONNECTIONS USING GOOD TERMINALS (CRIMP AND SOLDER)..

ROUTINELY CHECK THE EARTHING SYSTEM.

DISCONNECT EVERYTHING IN THE SHACK WHEN THE STATION IS NOT IN USE.

THIS INCLUDES :

ANTENNA COAXIAL CABLES.

DC AND AC CONNECTIONS

RATHER USE A FLOATING EARTH /GROUND SYSTEM SO THAT WHEN THE EQUIPMENT IS DISCONNECTED FROM THE ANTENNA SYSTEM AND THE AC SUPPLY, THERE IS NO ELECTRICAL, LIGHTENING OR STATIC RETURN PATH WHATSOEVER.

I PREFER TO HAVE NO SEPARATE CONNECTION BETWEEN THE RADIO EQUIPMENT AND EARTH ,

EVERYTHING IS EARTHED OUTSIDE OF THE RADIO ROOM VIA THE BULK HEAD PANEL.

THE EQUIPMENT OUTER CASE AND SCREEN SERVE AS A EARTH RETURN TO THE MAIN OUTSIDE TOWER AND STATION EARTH. NO LOOPS ARE FORMED

MY AC TO DC POWER SUPPLY EARTH IS ALSO NOT CONNECTED TO THE HOUSE AC MAINS AT ALL

ALSO NO LOOP FORMED

GOOD INSTALLATION AND MAINTAINING A WELL PLANNED AND INSTALLED ONE POINT SYSTEM WILL HELP TO PROTECT ANTENNAS AND EQUIPMENT AS WELL AS REDUCEING NOISE.

REMEMBER THER IS NO FOOL PROOF GAURANTEED,LIGHTENING PROTECTION.

Thank you for listening..... etc. etc. etc.