

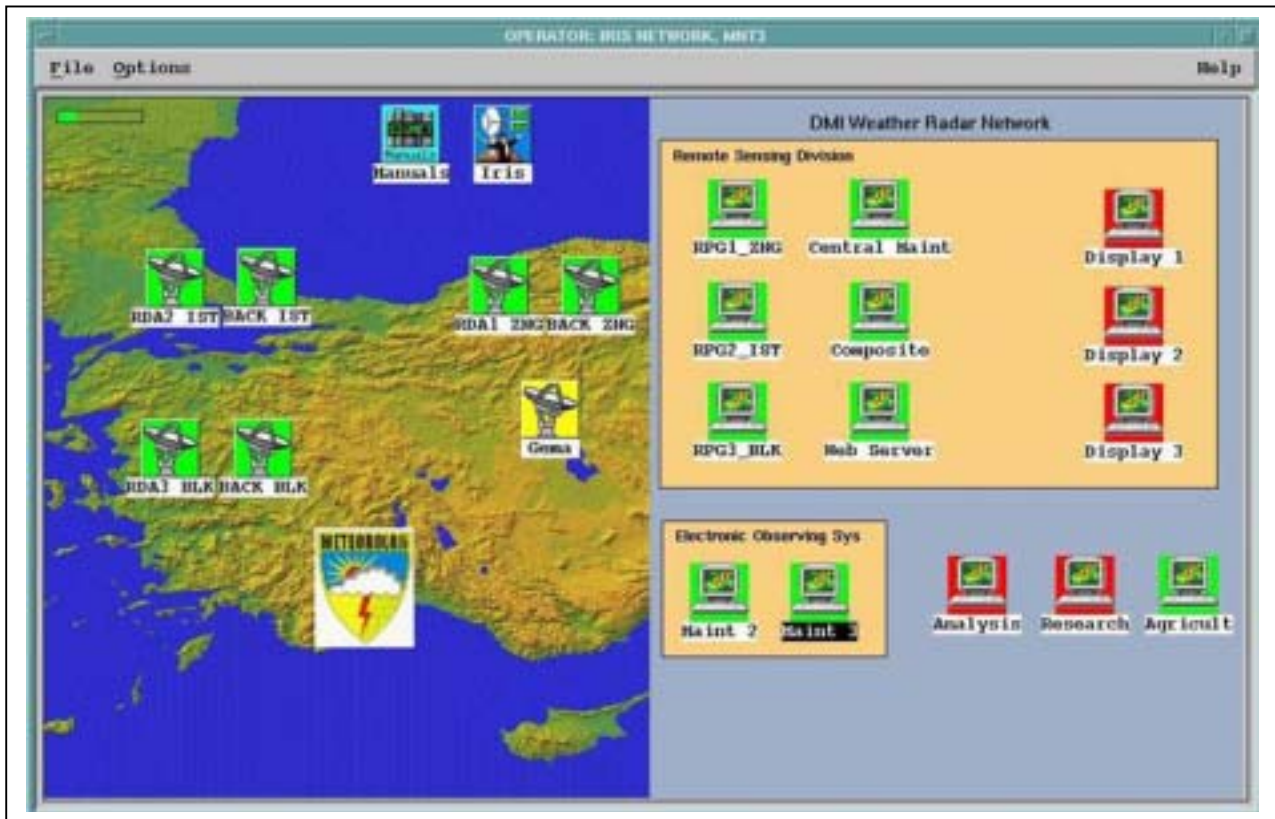
IMPROVEMENT OF LIGHTNING PROTECTION SYSTEMS IN TURKISH RADAR NETWORK

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Turkish State Meteorological Service (TSMS) has been operating a weather radar network of 4 Doppler radars. Three of them are single polarization radars installed in 2003 while the other one is polarimetric (dual polarization) radar installed in 1999.

The figure below shows TSMS' Radar Network. It is planned to expand the radar network to cover whole country in a near future.



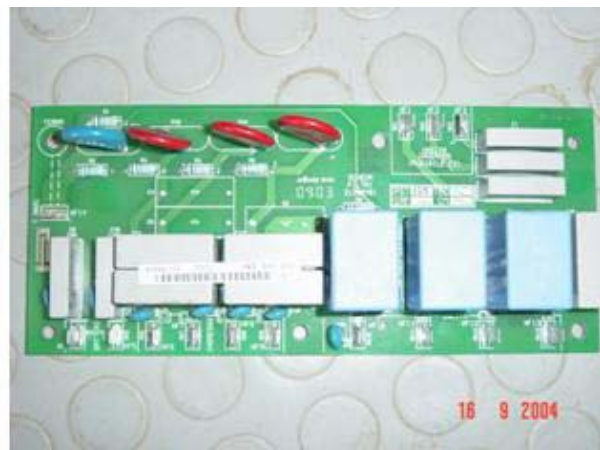
As every radar user knows, lightning is very important, dangerous and vital subject for radars. Because the lightning is very huge and has very big electrical energy, effects of lightnings, sometimes, can be considerably big trouble. In the past, our radars were suffered from lightnings several times.

Some examples of lightning effects shown in below pictures.

Effects of Lightning on the Lines



Some parts of radome damaged by lightning strikes



Lightning effects on the PCBs (Printed Circuit Boards)

WHAT TO DO TO FOR A MORE EFFECTIVE LIGHTNING PROTECTION SYSTEM:

- 1) Active Lightning Rods will be replaced with catching rods (air rods). (Because Active Lightning Rods draw all lightning their own bodies).
- 2) Grounding system will be improved by providing ground resistance to be under 2 Ω s.
- 3) At the bottom of the radome and tower, some equivalent potential rings will be done.
- 4) There will be three lines which go from top of radome to bottom of the radome and two lines which go from top of tower (bottom of radome) to bottom of tower (ground) to share lightning current.
- 5) On the top of radome, there will be one main catching rod and 3 auxiliary catching rods on the radome as illustrated in the figure in red colour. These 3 auxiliary catching rods will be mounted to 3 meter points on the radome with 120° difference.
- 6) There will be 4 auxiliary rods on the corners of the top of the tower.
- 7) One auxiliary catching rod will be installed on every facility (like generator room, oil tank, personnel building, system room etc.)
- 8) The line coming from radome to down, facility's grounds and system room's grounds will be connected main ground ring outside of the fence.

One surge protector will be installed to every equipment input (data or power lines).

There are so many items and steps to implement the improvement of the lightning protection and grounding system project. Some steps are more important than the others. One of the most important purpose of this project is that grounding resistance must be under 2Ω and second most important subject is not to have active lightning rod(for radars) but to have catching rods. Addition to these major two items, some small improvements (like surge protectors to be installed at input of devices or catching rod at the every facility's roof etc.) strengthens the robustness of this project.

Figure below shows electrical connections including catching rods, auxiliary rods, lines etc.)

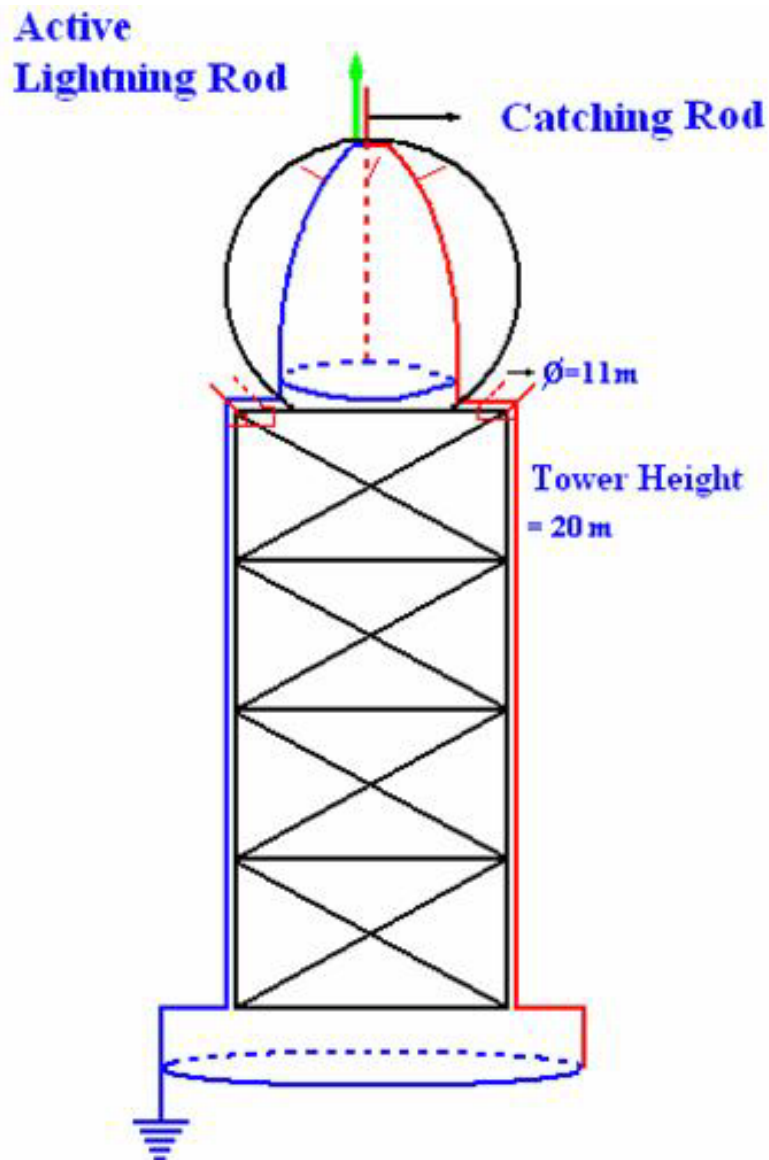
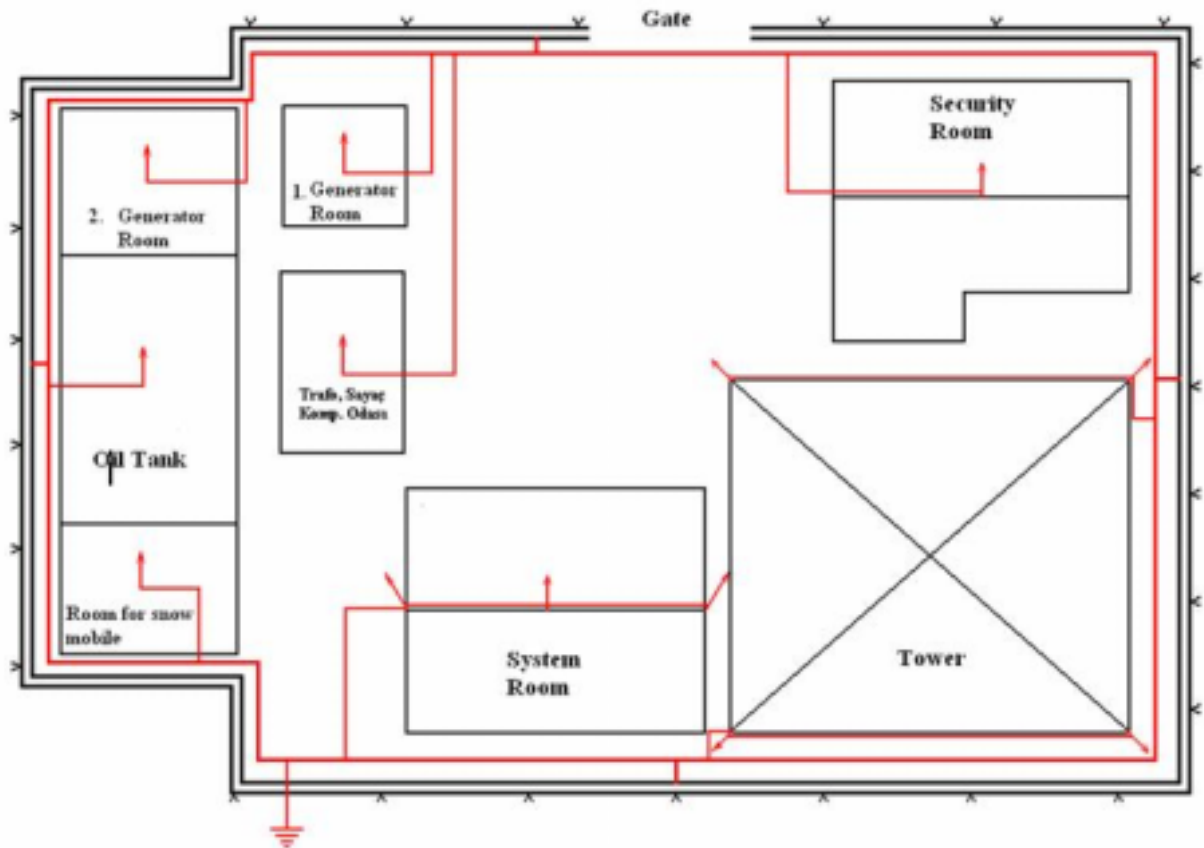


Figure below shows us one radar site allocation and electrical connection of grounding.



CONCLUSION:

Most important purpose of this project is to minimize lightning's bad, fatal and destructive effects, to understand how to protect our radar from lightning. To minimize the effects of lightning, the grounding must be excellent, in other words, grounding resistance must be under 2Ω .

Not to draw the lightnings on to the radar sites, we will not use active lightning rods. Instead of these active lightning rods, we will use catching rods in case any lightning strike goes to the radar.