

Reuse of existing antenna in Swedish Weather Radar modernization.



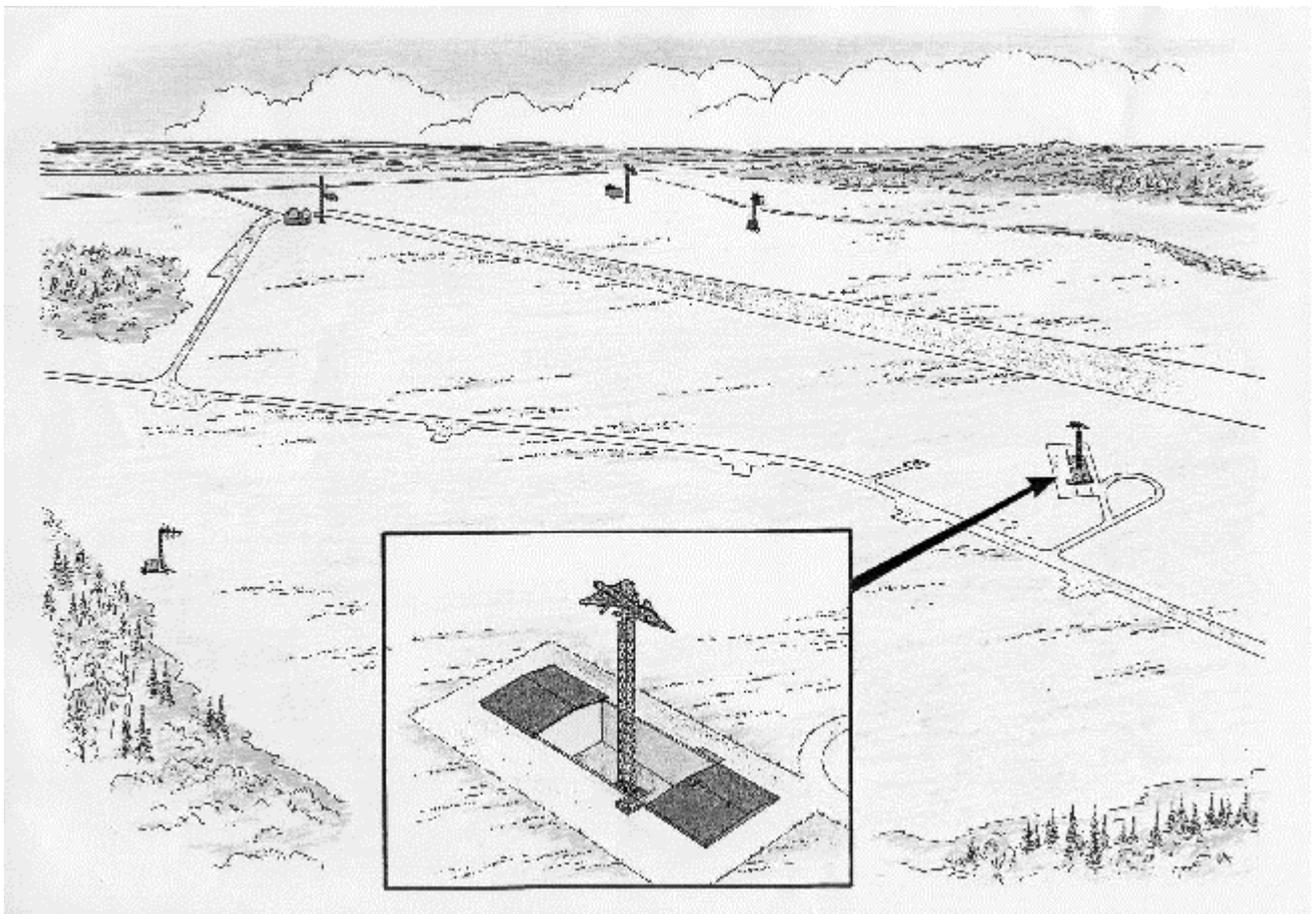
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The Swedish weather radar network with 12 Ericsson Weather Radar will be modernized during 2014-2016 to modern Dual Polarized radar. The software at the central site at SMHI in Norrköping will also be replaced. The modernization that will start during this fall will reuse the existing antenna, pedestal and transmitter. The modernization will be done by Saab AB with EEC as main sub-contractor.

We knew that the Ericsson antenna was rather good. The question was if it was good enough to fulfil the requirements in the AI. A cost effective modernization could be done if we could fulfil the requirement with a reused antenna.

I will present measurements of the performance of the antenna rebuild with an EEC Dual Polarized feed horn. The feed horn is specially designed to have a fixed OMT with interchangeable horn with different illumination tapers. This allows us to optimize the illumination taper to achieve the best performance without changing the fundamental design. Measurements have been done with two different antennas both at Combitech test site AMPA in Arboga and at EEC test site in Enterprise.



Restricted test area, artist impression

AMPA is an outdoor antenna range in Arboga, Sweden. The range is built according to IEEE standard 149-1979. The length of the range is 914 m and it works as an elevated range in the 5.6 GHz frequencies.

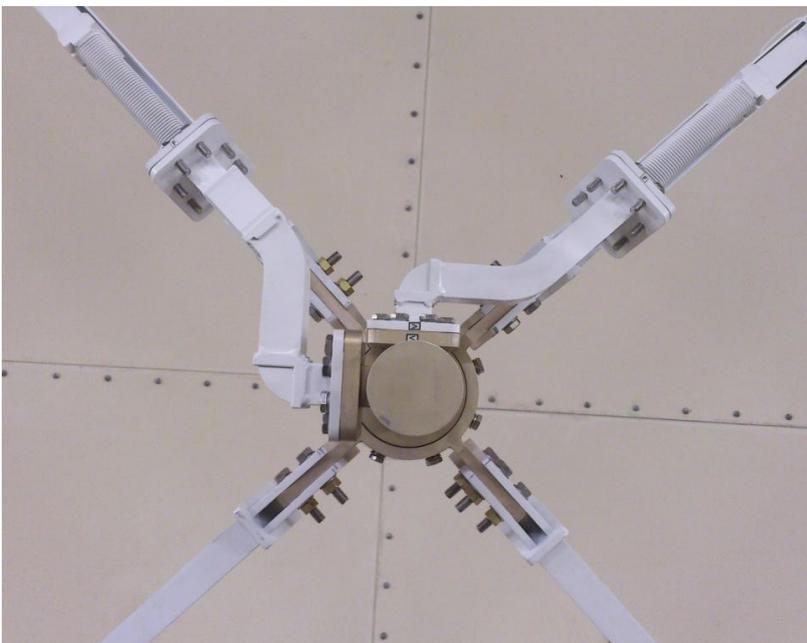
Antenna gain is measured and calculated with the two antenna method, a comparison with a known reference antenna (typical a Scientific-Atlanta Standard Gain Horn).

Measurements with a dual pol feed horn was done both before the tender and after the final solution was chosen. The first measurement indicated that even the should requirements in the AI could be full filled and that was confirmed with the measurements done after the final solution was chosen.

Different methods to install the feed horn and the wave guides were calculated. A quadropod where the wave guides was placed inside two u-shaped bars of the quadropod was chosen.



The antenna fulfil very demanding requirements concerning low side lobes, high antenna gain, similar antenna gain in H and V and very good cross polarization isolation



Feed Horn with wave guides



Antenna during performance measurements at AMPA

Summary of test result

Differences in antenna gain for H and V does not exceed 0.3 dB

5.61 GHz	Requirements	Horizontal polarized	Vertical polarized
Gain	≥ 43.5 dBi	44.3 dBi	44.6 dBi

Beam width

5.61 GHz	Requirements	Horizontal polarized	Vertical polarized
HPBW (3dB)	$\leq 1.0^\circ$	1.0°	1.0°

Side lobe levels and cross polarization discrimination

5.61 GHz	Requirements	Horizontal polarized	Vertical polarized
Sidelobe level	≥ 30 dB	>29.6 dB*	>30.9 dB
XPD	≥ 30 dB	>30.2 dB	>31.2 dB

* Worst case

Co-polar radiation patterns of the antenna for horizontally and vertically polarized pulses

5.61 GHz	Requirements	Horizontal cut	Vertical cut
Max deviation inside $\pm 1^\circ$ from bore sight	≤ 1.0 dB	< 0.4 dB	< 0.6 dB

The installation of the first modernized radar will be done this fall at radar site Ängelholm in southern Sweden

Thank You