Building an Phased Array Antenna

FOR SHORT WAVE COMMUNICATION

THE 4-SQUARE ARRAY
Developing an 4-Square Array under unideal conditions:
- Widely used by Amateurs under poor ground conditions
- We try to get similar Results on top of BB-Building
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THE TOTO

Developing an 4 Square Array under uniform conditions:
- Widely used by Amateurs under good ground conditions
- We try to get similar Results on top of BB-Building
Developing an 4 Square Array under unideal conditions:
  - Widely used by Amateurs under good ground conditions
  - We try to get similar Results on top of BB-Building
PRINCIPAL IDEA OF THE 4-SQUARE ARRAY

- Array consists of 4 Monopoles
- Requires infinite, perfect conducting Ground
- Ideal Conditions:
  - Gain: 9.35dBi
  - F/B: 22.15dB
GOAL OF THIS ARRAY

- directional communication in the short wave amateur band
- easy way of Beamsteering
- low cost and easy realization
- Tx: high Gain
- Rx: high F/B-Ratio
BUILDING THE ANTENNAS

- Antenna is a resonant Wire
- resonance length of 10.4m is determined using EZNEC
- this wire is fixed at a mast
- Elevated Radials as Ground
- mutual coupling is important for antenna arrays
- influences impedances and used components
- is measured using NWA

\[
\begin{pmatrix}
S_{11} & S_{12} & S_{13} & S_{14} \\
S_{22} & S_{23} & S_{24} \\
S_{33} & S_{34} \\
S_{44}
\end{pmatrix}
\]
THE FEED NETWORK

Matching Circuit

Phase Shifter Network

Relay Network
Phase Shifter Network
Matching Circuit

C = 809.4 pF
C1

L = 407.6 nH
Relay Network
RESULTS
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