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TACTICAL HF FIELD EXPEDIENT ANTENNA PERFORMANCE
VOLUME II

by

Gurkan Turkes

March 1990

Thesis Advisor: Richard W. Adler

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19 Abstract (*continue on reverse if necessary and identify by block number*)

This thesis investigates the performance of various configurations of tactical High Frequency (HF) field deployable antennas in the presence of lossy earth. Antennas investigated include horizontal dipoles, short sloping wires, inverted vees, and monopoles with buried and elevated radials. Numerical models of the antennas are exercised via the Numerical Electromagnetics Code (NEC) for radiation pattern performance. Antennas are analyzed for applicability to (1) short-range Near Vertical Incident Skywave (NVIS), where high elevation radiation angles are required, (2) medium- and long-range low radiation angle use, and (3) vertically polarized low-angle radiation for ground wave communication. Good NVIS and ground wave performance occurs for horizontal dipoles. Sloping wires and sloping dipoles are similar to horizontal dipoles but exhibit a moderate amount of azimuth plane directivity. Vertical monopoles with at least 15 buried radials produce medium- and long-range skywave coverage and good ground wave performance. Four elevated radials for quarter-wavelength monopoles are shown to out-perform 15 buried radials and are much easier to erect. The larger and more difficult-to-erect inverted vee dipole slightly outperforms a monopole by virtue of modest azimuth plane directivity.

The results of this study can be included in an antenna engineering handbook and can be used to interface with existing ionospheric propagation codes in order to obtain optimum communication effectiveness.

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Tactical HF Field Expedient Antenna Performance Volume II

by

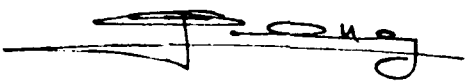
Gurkan Turkes
Lieutenant Junior Grade, Turkish Navy
B.S., Turkish Naval Academy, 1982

Submitted in partial fulfillment of the
requirements for the degree of

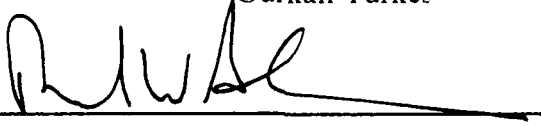
MASTER OF SCIENCE IN ELECTRICAL ENGINEERING

from the

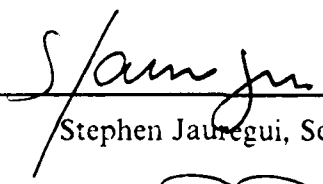
NAVAL POSTGRADUATE SCHOOL
March 1990

Author: 

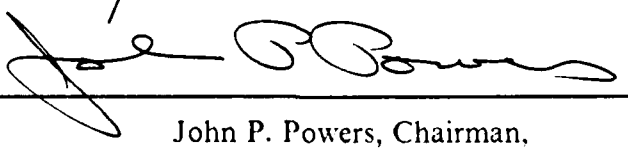
Gurkan Turkes

Approved by: 

Richard W. Adler, Thesis Advisor



Stephen Jauregui, Second Reader



John P. Powers, Chairman,
Department of Electrical and Computer Engineering

ABSTRACT

This thesis investigates the performance of various configurations of tactical High Frequency (HF) field deployable antennas in the presence of lossy earth. Antennas investigated include horizontal dipoles, short sloping wires, inverted vees, and monopoles with buried and elevated radials. Numerical models of the antennas are exercised via the Numerical Electromagnetics Code (NEC) for radiation pattern performance. Antennas are analyzed for applicability to (1) short-range Near Vertical Incident Skywave (NVIS), where high elevation radiation angles are required, (2) medium- and long-range low radiation angle use, and (3) vertically polarized low-angle radiation for ground wave communication. Good NVIS and ground wave performance occurs for horizontal dipoles. Sloping wires and sloping dipoles are similar to horizontal dipoles but exhibit a moderate amount of azimuth plane directivity. Vertical monopoles with at least 15 buried radials produce medium- and long-range skywave coverage and good ground wave performance. Four elevated radials for quarter-wavelength monopoles are shown to out-perform 15 buried radials and are much easier to erect. The larger and more difficult-to-erect inverted vee dipole slightly outperforms a monopole by virtue of modest azimuth plane directivity.

The results of this study can be included in an antenna engineering handbook and can be used to interface with existing ionospheric propagation codes in order to obtain optimum communication effectiveness.

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A. APPENDIX C.

1. Introduction

The Numerical Electromagnetics Code (NEC) input data sets are included for all configurations of the antennas at frequencies of 3.8, 7.2, 14.2, 21.3, and 28.5 MHz over fair (average) ground, with relative permittivity of 10 and conductivity of 0.003 mhos/m. The first two RP cards produce field strengths at one mile for handbook use. The remaining RP cards provide azimuth plane radiation patterns for every ten degrees of take-off angle.

2. NEC input data sets

```
CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 7.62M = 25'
CM FR=3.8 MHZ
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,19.7368,7.62, 0,-19.7368,7.62, .010265
GE 0
FR 0,0,0,0,3.8
GN 2,0,0,0,10,.003
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 10.668M = 35'
CM FR=3.8 MHZ
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,19.7368,10.668, 0,-19.7368,10.668, .010265
GE 0
FR 0,0,0,0,3.8
GN 2,0,0,0,10,.003
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
```

```
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 15.24M = 50'
CM FR=3.8 MHZ
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,19.7368,15.24, 0,-19.7368,15.24, .010265
GE 0
FR 0,0,0,0,3.8
GN 2,0,0,0,10,.003
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 27.432M = 90'
CM FR=3.8 MHZ
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,19.7368,27.432, 0,-19.7368,27.432, .010265
GE 0
FR 0,0,0,0,3.8
GN 2,0,0,0,10,.003
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
```

```
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN

CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 36.576 = 120'
CM FR=3.8 MHZ
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,19.7368,36.576, 0,-19.7368,36.576, .010265
GE 0
FR 0,0,0,0,3.8
GN 2,0,0,0,10,.003
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
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RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN

CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 7.62M = 25'
CM FR=7.2 MHZ
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,10.41665,7.62, 0,-10.41665,7.62, .010265
GE 0
FR 0,0,0,0,7.2
GN 2,0,0,0,10,.003
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
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RP0,1,121,1500,70,0.0,0,3,0
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```

```
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 10.668M = 35'
CM FR=7.2 MHZ
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,10.41665,10.668, 0,-10.41665,10.668, .010265
GE 0
FR 0,0,0,0,7.2
GN 2,0,0,0,10,.003
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 15.24M = 50'
CM FR=7.2 MHZ
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,10.41665,15.24, 0,-10.41665,15.24, .010265
GE 0
FR 0,0,0,0,7.2
GN 2,0,0,0,10,.003
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
```

```
RP0,1,121,1500,0,0.0,0,3,0
EN


CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 27.432M = 90'
CM FR=7.2 MHZ
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,10.41665,27.432, 0,-10.41665,27.432, .010265
GE 0
FR 0,0,0,0,7.2
GN 2,0,0,0,10,.003
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
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RP1,1,121,0,7.62,0.0,0,3,1609.3
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RP0,1,121,1500,0,0.0,0,3,0
EN


CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 36.576 = 120'
CM FR=7.2 MHZ
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,10.41665,36.576, 0,-10.41665,36.576, .010265
GE 0
FR 0,0,0,0,7.2
GN 2,0,0,0,10,.003
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN
```

```
CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 7.62M = 25'
CM FR=14.2 MHZ
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,5.2816,7.62, 0,-5.2816,7.62, .010265
GE 0
FR 0,0,0,0,14.2
GN 2,0,0,0,10,.003
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN
```

```
CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 10.668M=35'
CM FR=14.2 MHZ
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,5.2816,10.668, 0,-5.2816,10.668, .010265
GE 0
FR 0,0,0,0,14.2
GN 2,0,0,0,10,.003
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
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RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN
```

```
CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 15.24M=50'
CM FR=14.2 MHZ
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,5.2816,15.24, 0,-5.2816,15.24, .010265
GE 0
FR 0,0,0,0,14.2
GN 2,0,0,0,10,.003
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
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RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 27.432M=90'
CM FR=14.2 MHZ
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,5.2816,27.432, 0,-5.2816,27.432, .010265
GE 0
FR 0,0,0,0,14.2
GN 2,0,0,0,10,.003
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 36.576M=120'
CM FR=14.2 MHZ
```

```
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,5.2816,36.576, 0,-5.2816,36.576, .010265
GE 0
FR 0,0,0,0,14.2
GN 2,0,0,0,10,.003
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 7.62M=25'
CM FR=21.3 MHZ
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,3.5211,7.62, 0,-3.5211,7.62, .010265
GE 0
FR 0,0,0,0,21.3
GN 2,0,0,0,10,.003
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 10.668M=35'
CM FR=21.3 MHZ
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,3.5211,10.668, 0,-3.5211,10.668, .010265
```

```
GE 0
FR 0,0,0,0,21.3
GN 2,0,0,0,10,.003
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 15.24M=50'
CM FR=21.3 MHZ
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,3.5211,15.24, 0,-3.5211,15.24, .010265
GE 0
FR 0,0,0,0,21.3
GN 2,0,0,0,10,.003
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 27.432M=90'
CM FR=21.3 MHZ
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,3.5211,27.432, 0,-3.5211,27.432, .010265
GE 0
FR 0,0,0,0,21.3
GN 2,0,0,0,10,.003
```

```
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 36.576M=120'
CM FR=21.3 MHZ
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,3.5211,36.576, 0,-3.5211,36.576, .010265
GE 0
FR 0,0,0,0,21.3
GN 2,0,0,0,10,.003
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 7.62M=25'
CM FR=28.5 MHZ
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,2.6315,7.62, 0,-2.6315,7.62, .010265
GE 0
FR 0,0,0,0,28.5
GN 2,0,0,0,10,.003
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
```

```
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 10.668M=35'
CM FR=28.5 MHZ
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,2.6315,10.668, 0,-2.6315,10.668, .010265
GE 0
FR 0,0,0,0,28.5
GN 2,0,0,0,10,.003
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 15.24M=50'
CM FR=28.5 MHZ
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,2.6315,15.24, 0,-2.6315,15.24, .010265
GE 0
FR 0,0,0,0,28.5
GN 2,0,0,0,10,.003
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
```

```
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 27.432M=90'
CM FR=28.5 MHZ
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,2.6315,27.432, 0,-2.6315,27.432, .010265
GE 0
FR 0,0,0,0,28.5
GN 2,0,0,0,10,.003
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM HALF WAVELENGTH HORIZONTAL DIPOLE
CM H = 36.576M=120'
CM FR=28.5 MHZ
CM GROUND=0  EPSILON=10  SIGMA=.003
CE
GW 1,31, 0,2.6315,36.576, 0,-2.6315,36.576, .010265
GE 0
FR 0,0,0,0,28.5
GN 2,0,0,0,10,.003
EX 0,1,16,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
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```
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  QUARTER-WAVELENGTH SLOPING WIRE
CM               CONNECTED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 50' = 15.24M
CM               TOP ANGLE=45
CM FREQUENCY  :  3.8 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 78.9473M
CM               WAVELENGTH FOR GROUND WAVES = 18.939M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10   ,  SIGMA = .003
CE
GW 1,10, 0,0,15.24, 0,13.956,1.284, .010265
GW 2,10, 0,0,15.24, 0,0,0, .010265
GW 3,2, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,3.8
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  QUARTER-WAVELENGTH SLOPING WIRE
CM               CONNECTED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 90' = 27.432M
CM               TOP ANGLE=45
CM FREQUENCY  :  3.8 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 78.9473M
CM               WAVELENGTH FOR GROUND WAVES = 18.939M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10   ,  SIGMA = .003
CE
GW 1,10, 0,0,27.432, 0,13.956,13.476, .010265
GW 2,10, 0,0,27.432, 0,0,0, .010265
GW 3,2, 0,0,0, 0,0,-1.2192, .010265
GE 0
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```
FR 0,0,0,0,3.8
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  QUARTER-WAVELENGTH SLOPING WIRE
CM               CONNECTED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 50' = 15.24M
CM               TOP ANGLE=40 FEED AT TOP
CM FREQUENCY  :  3.8 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 78.9473M
CM               WAVELENGTH FOR GROUND WAVES = 18.939M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10   ,  SIGMA = .003
CE
GW 1,10, 0,0,15.24, 0,12.6866,.1209, .010265
GW 2,10, 0,0,15.24, 0,0,0, .010265
GW 3,2, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,3.8
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  QUARTER-WAVELENGTH SLOPING WIRE
CM               CONNECTED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 90' = 27.432M
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```
CM                TOP ANGLE=30  FEED AT TOP
CM FREQUENCY  :   3.8 MHZ
CM                WAVELENGTH FOR SKYWAVES     = 78.9473M
CM                WAVELENGTH FOR GROUND WAVES = 18.939M
CM WIRE       :   #12 ( R = .010265M )
CM GROUND (0) :   EPSILON = 10   ,  SIGMA = .003
CE
GW 1,10, 0,0,27.432, 0,9.8684,10.3395, .010265
GW 2,10, 0,0,27.432, 0,0,0, .010265
GW 3,2, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,3.8
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :   QUARTER-WAVELENGTH SLOPING WIRE
CM                CONNECTED TOWER WITH 4' GROUND ROD
CM                HEIGHT FROM TOP = 50' = 15.24M
CM                TOP ANGLE=45  FEED AT TOP
CM FREQUENCY  :   7.2 MHZ
CM                WAVELENGTH FOR SKYWAVES     = 41.66M
CM                WAVELENGTH FOR GROUND WAVES = 11.785M
CM WIRE       :   #12 ( R = .010265M )
CM GROUND (0) :   EPSILON = 10   ,  SIGMA = .003
CE
GW 1,10, 0,0,15.24, 0,7.3645,7.8755, .010265
GW 2,10, 0,0,15.24, 0,0,0, .010265
GW 3,2, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,7.2
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
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RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  QUARTER-WAVELENGTH SLOPING WIRE
CM               CONNECTED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 90' = 27.432M
CM               TOP ANGLE=45  FEED AT TOP
CM FREQUENCY  :  7.2 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 41.66M
CM               WAVELENGTH FOR GROUND WAVES = 11.785M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10   ,  SIGMA = .003
CE
GW 1,10, 0,0,27.432, 0,7.3645,20.0675, .010265
GW 2,10, 0,0,27.432, 0,0,0, .010265
GW 3,2, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,7.2
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  QUARTER-WAVELENGTH SLOPING WIRE
CM               CONNECTED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 50' = 15.24M
CM               TOP ANGLE=30 FEED AT TOP
CM FREQUENCY  :  7.2 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 41.66M
CM               WAVELENGTH FOR GROUND WAVES = 11.785M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10   ,  SIGMA = .003
CE
GW 1,10, 0,0,15.24, 0,5.2075,6.2203, .010265
GW 2,10, 0,0,15.24, 0,0,0, .010265
GW 3,2, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,7.2
```

```
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  QUARTER-WAVELENGTH SLOPING WIRE
CM               CONNECTED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 90' = 27.432M
CM               TOP ANGLE=30  FEED AT TOP
CM FREQUENCY  :  7.2 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 41.66M
CM               WAVELENGTH FOR GROUND WAVES = 11.785M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10  ,  SIGMA = .003
CE
GW 1,10, 0,0,27.432, 0,5.2075,18.4123, .010265
GW 2,10, 0,0,27.432, 0,0,0, .010265
GW 3,2, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,7.2
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  QUARTER-WAVELENGTH SLOPING WIRE
CM               CONNECTED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 50' = 15.24M
CM               TOP ANGLE=45 FEED AT TOP
```

```
CM FREQUENCY  :  14.2 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 21.1268M
CM               WAVELENGTH FOR GROUND WAVES = 6.459M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10  ,  SIGMA = .003
CE
GW 1,10, 0,0,15.24, 0,3.7347,11.5053, .010265
GW 2,10, 0,0,15.24, 0,0,0, .010265
GW 3,3, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,14.2
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN
```

```
CM GEOMETRY   :  QUARTER-WAVELENGTH SLOPING WIRE
CM               CONNECTED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 90' = 27.432M
CM               TOP ANGLE=45  FEED AT TOP
CM FREQUENCY  :  14.2 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 21.1268M
CM               WAVELENGTH FOR GROUND WAVES = 6.459M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10  ,  SIGMA = .003
CE
GW 1,10, 0,0,27.432, 0,3.7347,23.6973, .010265
GW 2,15, 0,0,27.432, 0,0,0, .010265
GW 3,3, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,14.2
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
```

```
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  QUARTER-WAVELENGTH SLOPING WIRE
CM               CONNECTED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 50' = 15.24M
CM               TOP ANGLE=30 FEED AT TOP
CM FREQUENCY  :  14.2 MHZ
CM               WAVELENGTH FOR SKYWAVES      = 21.1268M
CM               WAVELENGTH FOR GROUND WAVES = 6.459M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10   ,  SIGMA = .003
CE
GW 1,10, 0,0,15.24, 0,2.6409,10.6659, .010265
GW 2,10, 0,0,15.24, 0,0,0, .010265
GW 3,3, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,14.2
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  QUARTER-WAVELENGTH SLOPING WIRE
CM               CONNECTED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 90' = 27.432M
CM               TOP ANGLE=30  FEED AT TOP
CM FREQUENCY  :  14.2 MHZ
CM               WAVELENGTH FOR SKYWAVES      = 21.1268M
CM               WAVELENGTH FOR GROUND WAVES = 6.459M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10   ,  SIGMA = .003
CE
GW 1,10, 0,0,27.432, 0,2.6409,22.8579, .010265
GW 2,15, 0,0,27.432, 0,0,0, .010265
GW 3,3, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,14.2
GN 2,0,0,0,10,.003
```

```
EX 0,1,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  QUARTER-WAVELENGTH SLOPING WIRE
CM               CONNECTED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 50' = 15.24M
CM               TOP ANGLE=45 FEED AT TOP
CM FREQUENCY  :  21.3 MHZ
CM               WAVELENGTH FOR SKYWAVES      = 14.0845M
CM               WAVELENGTH FOR GROUND WAVES = 4.385M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10   ,  SIGMA = .003
CE
GW 1,10, 0,0,15.24, 0,2.4898,12.7502, .010265
GW 2,15, 0,0,15.24, 0,0,0, .010265
GW 3,4, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,21.3
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  QUARTER-WAVELENGTH SLOPING WIRE
CM               CONNECTED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 90' = 27.432M
CM               TOP ANGLE=45  FEED AT TOP
CM FREQUENCY  :  21.3 MHZ
```

```
CM                WAVELENGTH FOR SKYWAVES      = 14.0845M
CM                WAVELENGTH FOR GROUND WAVES = 4.385M
CM WIRE         :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10   ,  SIGMA = .003
CE
GW 1,10, 0,0,27.432, 0,2.4898,24.9422, .010265
GW 2,25, 0,0,27.432, 0,0,0, .010265
GW 3,4, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,21.3
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN
```

```
CM GEOMETRY    :  QUARTER-WAVELENGTH SLOPING WIRE
CM                CONNECTED TOWER WITH 4' GROUND ROD
CM                HEIGHT FROM TOP = 50' = 15.24M
CM                TOP ANGLE=30 FEED AT TOP
CM FREQUENCY   :  21.3 MHZ
CM                WAVELENGTH FOR SKYWAVES      = 14.0845M
CM                WAVELENGTH FOR GROUND WAVES = 4.385M
CM WIRE         :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10   ,  SIGMA = .003
CE
GW 1,10, 0,0,15.24, 0,1.7606,12.1906, .010265
GW 2,15, 0,0,15.24, 0,0,0, .010265
GW 3,4, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,21.3
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
```

```
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  QUARTER-WAVELENGTH SLOPING WIRE
CM               CONNECTED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 90' = 27.432M
CM               TOP ANGLE=30  FEED AT TOP
CM FREQUENCY  :  21.3 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 14.0845M
CM               WAVELENGTH FOR GROUND WAVES = 4.385M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10   ,  SIGMA = .003
CE
GW 1,10, 0,0,27.432, 0,1.7606,24.3826, .010265
GW 2,25, 0,0,27.432, 0,0,0, .010265
GW 3,4, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,21.3
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  QUARTER-WAVELENGTH SLOPING WIRE
CM               CONNECTED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 50' = 15.24M
CM               TOP ANGLE=45 FEED AT TOP
CM FREQUENCY  :  28.5 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 10.5263M
CM               WAVELENGTH FOR GROUND WAVES = 3.299M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10   ,  SIGMA = .003
CE
GW 1,10, 0,0,15.24, 0,1.8608,13.3792, .010265
GW 2,20, 0,0,15.24, 0,0,0, .010265
GW 3,5, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,28.5
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
```

```
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  QUARTER-WAVELENGTH SLOPING WIRE
CM               CONNECTED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 90' = 27.432M
CM               TOP ANGLE=45  FEED AT TOP
CM FREQUENCY  :  28.5 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 10.5263M
CM               WAVELENGTH FOR GROUND WAVES = 3.299M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10   ,  SIGMA = .003
CE
GW 1,10, 0,0,27.432, 0,1.8608,25.5712, .010265
GW 2,35, 0,0,27.432, 0,0,0, .010265
GW 3,5, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,28.5
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1 121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  QUARTER-WAVELENGTH SLOPING WIRE
CM               CONNECTED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 50' = 15.24M
CM               TOP ANGLE=30 FEED AT TOP
CM FREQUENCY  :  28.5 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 10.5263M
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CM                WAVELENGTH FOR GROUND WAVES = 3.299M
CM WIRE        :  #12 ( R = .010265M )
CM GROUND (0) :   EPSILON = 10   ,   SIGMA = .003
CE
GW 1,10, 0,0,15.24, 0,1.3158,12.9610, .010265
GW 2,20, 0,0,15.24, 0,0,0, .010265
GW 3,5, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,28.5
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY    :  QUARTER-WAVELENGTH SLOPING WIRE
CM                CONNECTED TOWER WITH 4' GROUND ROD
CM                HEIGHT FROM TOP = 90' = 27.432M
CM                TOP ANGLE=30  FEED AT TOP
CM FREQUENCY   :  28.5 MHZ
CM                WAVELENGTH FOR SKYWAVES      = 10.5263M
CM                WAVELENGTH FOR GROUND WAVES = 3.299M
CM WIRE        :  #12 ( R = .010265M )
CM GROUND (0) :   EPSILON = 10   ,   SIGMA = .003
CE
GW 1,10, 0,0,27.432, 0,1.3158,25.1530, .010265
GW 2,35, 0,0,27.432, 0,0,0, .010265
GW 3,5, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,28.5
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
```

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RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  HALF-WAVELENGTH SLOPING DIPOLE
CM               DETACHED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 50' = 15.24M
CM               TOP ANGLE=70
CM FREQUENCY  :  3.8 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 78.9473M
CM               WAVELENGTH FOR GROUND WAVES = 18.939M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10  ,  SIGMA = .003
CE
GW 1,11, 0,.1,15.24, 0,37.193,1.74, .010265
GW 2,10, 0,0,15.24, 0,0,0, .010265
GW 3,2, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,3.8
GN 2,0,0,0,10,.003
EX 0,1,6,01,1,0
PL 3,1,0,4
RP 0,181,1,1000,-90,90,1,0
EN


CM GEOMETRY   :  HALF-WAVELENGTH SLOPING DIPOLE
CM               DETACHED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 90' = 27.432M
CM               TOP ANGLE=50
CM FREQUENCY  :  3.8 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 78.9473M
CM               WAVELENGTH FOR GROUND WAVES = 18.939M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10  ,  SIGMA = .003
CE
GW 1,11, 0,.01,27.432, 0,30.2485,2.0589, .010265
GW 2,10, 0,0,27.432, 0,0,0, .010265
GW 3,2, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,3.8
GN 2,0,0,0,10,.003
EX 0,1,6,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
```

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RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  HALF-WAVELENGTH SLOPING DIPOLE
CM               DETACHED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 90' = 27.432M
CM               TOP ANGLE=30  CENTER FEED
CM FREQUENCY  :  7.2 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 41.66M
CM               WAVELENGTH FOR GROUND WAVES = 11.785M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10  ,  SIGMA = .003
CE
GW 1,11, 0,.01,27.432, 0,10.425,9.3927, .010265
GW 2,10, 0,0,27.432, 0,0,0, .010265
GW 3,2, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,7.2
GN 2,0,0,0,10,.003
EX 0,1,6,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  HALF-WAVELENGTH SLOPING DIPOLE
CM               DETACHED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 50' = 15.24M
CM               TOP ANGLE=45   CENTER FEED
CM FREQUENCY  :  7.2 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 41.66M
CM               WAVELENGTH FOR GROUND WAVES = 11.785M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10  ,  SIGMA = .003
CE
GW 1,11, 0,.01,15.24, 0,14.739,.511, .010265
GW 2,10, 0,0,15.24, 0,0,0, .010265
GW 3,2, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,7.2
GN 2,0,0,0,10,.003
EX 0,1,6,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
```

```
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  HALF-WAVELENGTH SLOPING DIPOLE
CM               DETACHED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 90' = 27.432M
CM               TOP ANGLE=45  CENTER FEED
CM FREQUENCY  :  7.2 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 41.66M
CM               WAVELENGTH FOR GROUND WAVES = 11.785M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10   ,  SIGMA = .003
CE
GW 1,11, 0,.01,27.432, 0,14.739,12.703, .010265
GW 2,10, 0,0,27.432, 0,0,0, .010265
GW 3,2, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,7.2
GN 2,0,0,0,10,.003
EX 0,1,6,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  HALF-WAVELENGTH SLOPING DIPOLE
CM               DETACHED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 50' = 15.24M
CM               TOP ANGLE=30
CM FREQUENCY  :  14.2 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 21.1268M
CM               WAVELENGTH FOR GROUND WAVES = 6.459M
CM WIRE       :  #12 ( R = .010265M )
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```
CM GROUND (0) :  EPSILON = 10  ,  SIGMA = .003
CE
GW 1,11, 0,.01,15.24, 0,5.2917,6.0918, .010265
GW 2,10, 0,0,15.24, 0,0,0, .010265
GW 3,3, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,14.2
GN 2,0,0,0,10,.003
EX 0,1,6,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN
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CM GEOMETRY   :  HALF-WAVELENGTH SLOPING DIPOLE
CM               DETACHED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 90' = 27.432M
CM               TOP ANGLE=30
CM FREQUENCY  :  14.2 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 21.1268M
CM               WAVELENGTH FOR GROUND WAVES = 6.459M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10  ,  SIGMA = .003
CE
GW 1,11, 0,.01,27.432, 0,5.2917,18.2838, .010265
GW 2,10, 0,0,27.432, 0,0,0, .010265
GW 3,3, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,14.2
GN 2,0,0,0,10,.003
EX 0,1,6,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
```

```
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  HALF-WAVELENGTH SLOPING DIPOLE
CM               DETACHED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 50' = 15.24M
CM               TOP ANGLE=45
CM FREQUENCY  :  14.2 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 21.1268M
CM               WAVELENGTH FOR GROUND WAVES = 6.459M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10  ,  SIGMA = .003
CE
GW 1,11, 0,.01,15.24, 0,7.4795,7.7705, .010265
GW 2,10, 0,0,15.24, 0,0,0, .010265
GW 3,3, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,14.2
GN 2,0,0,0,10,.003
EX 0,1,6,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  HALF-WAVELENGTH SLOPING DIPOLE
CM               DETACHED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 90' = 27.432M
CM               TOP ANGLE=45
CM FREQUENCY  :  14.2 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 21.1268M
CM               WAVELENGTH FOR GROUND WAVES = 6.459M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10  ,  SIGMA = .003
CE
GW 1,11, 0,.01,27.432, 0,7.4795,19.9625, .010265
GW 2,15, 0,0,27.432, 0,0,0, .010265
GW 3,3, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,14.2
GN 2,0,0,0,10,.003
EX 0,1,6,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
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```
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  HALF-WAVELENGTH SLOPING DIPOLE
CM               DETACHED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 50' = 15.24M
CM               TOP ANGLE=30
CM FREQUENCY  :  21.3 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 14.0845M
CM               WAVELENGTH FOR GROUND WAVES = 4.385M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10   ,  SIGMA = .003
CE
GW 1,11, 0,.01,15.24, 0,3.5312,9.1412, .010265
GW 2,15, 0,0,15.24, 0,0,0, .010265
GW 3,4, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,21.3
GN 2,0,0,0,10,.003
EX 0,1,6,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  HALF-WAVELENGTH SLOPING DIPOLE
CM               DETACHED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 90' = 27.432M
CM               TOP ANGLE=30
CM FREQUENCY  :  21.3 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 14.0845M
CM               WAVELENGTH FOR GROUND WAVES = 4.385M
CM WIRE       :  #12 ( R = .010265M )
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CM GROUND (0) :  EPSILON = 10  ,  SIGMA = .003
CE
GW 1,11, 0,.01,27.432, 0,3.5312,21.3332, .010265
GW 2,15, 0,0,27.432, 0,0,0, .010265
GW 3,4, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,21.3
GN 2,0,0,0,10,.003
EX 0,1,6,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  HALF-WAVELENGTH SLOPING DIPOLE
CM               DETACHED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 50' = 15.24M
CM               TOP ANGLE=45
CM FREQUENCY  :  21.3 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 14.0845M
CM               WAVELENGTH FOR GROUND WAVES = 4.385M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10  ,  SIGMA = .003
CE
GW 1,11, 0,.01,15.24, 0,4.9897,10.2603, .010265
GW 2,15, 0,0,15.24, 0,0,0, .010265
GW 3,4, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,21.3
GN 2,0,0,0,10,.003
EX 0,1,6,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
```

```
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  HALF-WAVELENGTH SLOPING DIPOLE
CM               DETACHED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 90' = 27.432M
CM               TOP ANGLE=45
CM FREQUENCY  :  21.3 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 14.0845M
CM               WAVELENGTH FOR GROUND WAVES = 4.385M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10  ,  SIGMA = .003
CE
GW 1,11, 0,.01,27.432, 0,4.9897,22.4523, .010265
GW 2,25, 0,0,27.432, 0,0,0, .010265
GW 3,4, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,21.3
GN 2,0,0,0,10,.003
EX 0,1,6,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN
EN


CM GEOMETRY   :  HALF-WAVELENGTH SLOPING DIPOLE
CM               DETACHED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 50' = 15.24M
CM               TOP ANGLE=30
CM FREQUENCY  :  28.5 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 10.5263M
CM               WAVELENGTH FOR GROUND WAVES = 3.299M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10  ,  SIGMA = .003
CE
GW 1,11, 0,.01,15.24, 0,2.6416,10.6819, .010265
GW 2,20, 0,0,15.24, 0,0,0, .010265
GW 3,5, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,28.5
GN 2,0,0,0,10,.003
EX 0,1,6,01,1,0
PL3,2,1,0
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```
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  HALF-WAVELENGTH SLOPING DIPOLE
CM               DETACHED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 90' = 27.432M
CM               TOP ANGLE=30
CM FREQUENCY  :  28.5 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 10.5263M
CM               WAVELENGTH FOR GROUND WAVES = 3.299M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10  ,  SIGMA = .003
CE
GW 1,11, 0,.01,27.432, 0,2.6416,22.8739, .010265
GW 2,30, 0,0,27.432, 0,0,0, .010265
GW 3,5, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,28.5
GN 2,0,0,0,10,.003
EX 0,1,6,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   :  HALF-WAVELENGTH SLOPING DIPOLE
CM               DETACHED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 50' = 15.24M
CM               TOP ANGLE=45
CM FREQUENCY  :  28.5 MHZ
CM               WAVELENGTH FOR SKYWAVES     = 10.5263M
CM               WAVELENGTH FOR GROUND WAVES = 3.299M
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CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10   ,  SIGMA = .003
CE
GW 1,11, 0,.01,15.24, 0,3.7316,11.5184, .010265
GW 2,20, 0,0,15.24, 0,0,0, .010265
GW 3,5, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,28.5
GN 2,0,0,0,10,.003
EX 0,1,6,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN
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CM GEOMETRY   :  HALF-WAVELENGTH SLOPING DIPOLE
CM               DETACHED TOWER WITH 4' GROUND ROD
CM               HEIGHT FROM TOP = 90' = 27.432M
CM               TOP ANGLE=45
CM FREQUENCY  :  28.5 MHZ
CM               WAVELENGTH FOR SKYWAVES      = 10.5263M
CM               WAVELENGTH FOR GROUND WAVES = 3.299M
CM WIRE       :  #12 ( R = .010265M )
CM GROUND (0) :  EPSILON = 10   ,  SIGMA = .003
CE
GW 1,11, 0,.01,27.432, 0,3.7316,23.7104, .010265
GW 2,30, 0,0,27.432, 0,0,0, .010265
GW 3,5, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,28.5
GN 2,0,0,0,10,.003
EX 0,1,6,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
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RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : QUARTER WAVELENGTH MONOPOLE
CM             4 FEET GROUND ROD
CM FREQUENCY : 3.8MHZ
CM WIRE      : #12 ( RADIUS R=.010265M )
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,0, 0,0,19.7368, .010265
GW 2,1, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,3.8
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : QUARTER WAVELENGTH MONOPOLE
CM             4 FEET GROUND ROD
CM FREQUENCY : 7.2MHZ
CM WIRE      : #12 ( RADIUS R=.010265M )
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,0, 0,0,10.4166, .010265
GW 2,2, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,7.2
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
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RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : QUARTER WAVELENGTH MONOPOLE
CM             4 FEET GROUND ROD
CM FREQUENCY : 14.2MHZ
CM WIRE      : #12 ( RADIUS R=.010265M )
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,0, 0,0,5.2816, .010265
GW 2,3, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,14.2
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : QUARTER WAVELENGTH MONOPOLE
CM             4 FEET GROUND ROD
CM FREQUENCY : 21.3MHZ
CM WIRE      : #12 ( RADIUS R=.010265M )
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,0, 0,0,3.5211, .010265
GW 2,4, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,21.3
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
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RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : QUARTER WAVELENGTH MONOPOLE
CM             4 FEET GROUND ROD
CM FREQUENCY : 28.5MHZ
CM WIRE      : #12 ( RADIUS R=.010265M )
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,0, 0,0,2.6315, .010265
GW 2,4, 0,0,0, 0,0,-1.2192, .010265
GE 0
FR 0,0,0,0,28.5
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND = 25'=7.62M
CM             BOTH ENDS AT HEIGHT = 10.43'=3.1802M
CM FREQUENCY : 3.8MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,7.62, 0,19.2309,3.1802, .010265
GW 2,10, 0,0,7.62, 0,-19.2309,3.1802, .010265
GE 0
FR 0,0,0,0,3.8
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
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PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND = 35'=10.668M
CM             BOTH ENDS AT HEIGHT = 14.59'=4.4512M
CM FREQUENCY : 3.8MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,10.668, 0,18.5465,3.9177, .010265
GW 2,10, 0,0,10.668, 0,-18.5465,3.9177, .010265
GE 0
FR 0,0,0,0,3.8
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND = 50'=15.24M
CM             BOTH ENDS AT HEIGHT = 10.13'=3.0889M
CM FREQUENCY : 3.8MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,15.24, 0,15.5528,3.0889, .010265
GW 2,10, 0,0,15.24, 0,-15.5528,3.0889, .010265
GE 0
FR 0,0,0,0,3.8
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
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RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND = 90'=27.432M
CM             BOTH ENDS AT HEIGHT = 12.3128M=40.3859'
CM FREQUENCY : 3.8MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,27.432, 0,12.6865,12.3128, .010265
GW 2,10, 0,0,27.432, 0,-12.6865,12.3128, .010265
GE 0
FR 0,0,0,0,3.8
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND =120'=36.576M
CM             BOTH ENDS AT HEIGHT = 70.37'=21.4567M
CM FREQUENCY : 3.8MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,36.576, 0,12.6865,21.4567, .010265
GW 2,10, 0,0,36.576, 0,-12.6865,21.4567, .010265
GE 0
FR 0,0,0,0,3.8
GN 2,0,0,0,10,.003
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EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND =25'=7.62M
CM             BOTH ENDS AT HEIGHT = 13.3'=4.0576M
CM FREQUENCY : 7.2MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,7.62, 0,9.7878,4.0576, .010265
GW 2,10, 0,0,7.62, 0,-9.7878,4.0576, .010265
GE 0
FR 0,0,0,0,7.2
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND = 35'=10.668M
CM             BOTH ENDS AT HEIGHT = 10.83'=3.3028M
CM FREQUENCY : 7.2MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,10.668, 0,7.3652,3.3028, .010265
GW 2,10, 0,0,10.668, 0,-7.3652,3.3028, .010265
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GE 0
FR 0,0,0,0,7.2
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND = 50'=15.24M
CM             BOTH ENDS AT HEIGHT = 23.8157'=7.2609M
CM FREQUENCY : 7.2MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,15.24, 0,6.6952,7.2609, .010265
GW 2,10, 0,0,15.24, 0,-6.6952,7.2609, .010265
GE 0
FR 0,0,0,0,7.2
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND = 90'=27.432M
CM             BOTH ENDS AT HEIGHT = 63.8055M=19.4529'
CM FREQUENCY : 7.2MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
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CE
GW 1,10, 0,0,27.432, 0,6.6952,19.4529, .010265
GW 2,10, 0,0,27.432, 0,-6.6952,19.4529, .010265
GE 0
FR 0,0,0,0,7.2
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND =120'=36.576M
CM             BOTH ENDS AT HEIGHT = 98.009'=29.8808M
CM FREQUENCY : 7.2MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,36.576, 0,6.6952,29.8808, .010265
GW 2,10, 0,0,36.576, 0,-6.6952,29.8808, .010265
GE 0
FR 0,0,0,0,7.2
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
RP 0,181,1,1000,-90,90,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN
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CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND =25'=7.62M
CM             BOTH ENDS AT HEIGHT = 11.72'=3.5741M
CM FREQUENCY : 14.2MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,7.62, 0,3.3949,3.5741, .010265
GW 2,10, 0,0,7.62, 0,-3.3949,3.5741, .010265
GE 0
FR 0,0,0,0,14.2
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN
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CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND = 35'=10.668M
CM             BOTH ENDS AT HEIGHT = 21.7204'=6.6221M
CM FREQUENCY : 14.2MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,10.668, 0,3.3949,6.6221, .010265
GW 2,10, 0,0,10.668, 0,-3.3949,6.6221, .010265
GE 0
FR 0,0,0,0,14.2
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
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RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND = 50'=15.24M
CM             BOTH ENDS AT HEIGHT = 38.85'=11.8451M
CM FREQUENCY : 14.2MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,15.24, 0,3.3949,11.8451, .010265
GW 2,10, 0,0,15.24, 0,-3.3949,11.8451, .010265
GE 0
FR 0,0,0,0,14.2
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121 1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND = 90'=27.432M
CM             BOTH ENDS AT HEIGHT = 76.7064M=23.3861'
CM FREQUENCY : 14.2MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,27.432, 0,3.3949,23.3861, .010265
GW 2,10, 0,0,27.432, 0,-3.3949,23.3861, .010265
GE 0
FR 0,0,0,0,14.2
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
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RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND =120'=36.576M
CM             BOTH ENDS AT HEIGHT = 106.69'=32.5301M
CM FREQUENCY : 14.2MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,36.576, 0,3.3949,32.5301, .010265
GW 2,10, 0,0,36.576, 0,-3.3949,32.5301, .010265
GE 0
FR 0,0,0,0,14.2
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND =25'=7.62M
CM             BOTH ENDS AT HEIGHT = 16.1464'=4.9227M
CM FREQUENCY : 21.3MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,7.62, 0,2.2633,4.9227, .010265
GW 2,10, 0,0,7.62, 0,-2.2633,4.9227, .010265
GE 0
FR 0,0,0,0,21.3
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
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RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND = 35'=10.668M
CM             BOTH ENDS AT HEIGHT = 26.1438'=7.9707M
CM FREQUENCY : 21.3MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,10.668, 0,2.2633,7.9707, .010265
GW 2,10, 0,0,10.668, 0,-2.2633,7.9707, .010265
GE 0
FR 0,0,0,0,21.3
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND = 50'=15.24M
CM             BOTH ENDS AT HEIGHT = 41.14'=12.5427M
CM FREQUENCY : 21.3MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,15.24, 0,2.2633,12.5427, .010265
GW 2,10, 0,0,15.24, 0,-2.2633,12.5427, .010265
GE 0
FR 0,0,0,0,21.3
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
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PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND = 90'=27.432M
CM             BOTH ENDS AT HEIGHT = 24.7347M=81.1298'
CM FREQUENCY : 21.3MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,27.432, 0,2.2633,24.7347, .010265
GW 2,10, 0,0,27.432, 0,-2.2633,24.7347, .010265
GE 0
FR 0,0,0,0,21.3
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND =120'=36.576M
CM             BOTH ENDS AT HEIGHT = 111.1221'=33.8787M
CM FREQUENCY : 21.3MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,36.576, 0,2.2633,33.8787, .010265
GW 2,10, 0,0,36.576, 0,-2.2633,33.8787, .010265
GE 0
FR 0,0,0,0,21.3
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
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RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND =25'=7.62M
CM             BOTH ENDS AT HEIGHT = 18.3814'=5.6041M
CM FREQUENCY : 28.5MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,7.62, 0,1.6914,5.6041, .010265
GW 2,10, 0,0,7.62, 0,-1.6914,5.6041, .010265
GE 0
FR 0,0,0,0,28.5
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND = 35'=10.668M
CM             BOTH ENDS AT HEIGHT = 28.3788'=8.6521M
CM FREQUENCY : 28.5MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,10.668, 0,1.6914,8.6521, .010265
GW 2,10, 0,0,10.668, 0,-1.6914,8.6521, .010265
GE 0
FR 0,0,0,0,28.5
GN 2,0,0,0,10,.003
```

```
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0.0,3,0
EN


CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND = 50'=15.24M
CM             BOTH ENDS AT HEIGHT = 43.3750'=13.2241M
CM FREQUENCY : 28.5MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,15.24, 0,1.6914,13.2241, .010265
GW 2,10, 0,0,15.24, 0,-1.6914,13.2241, .010265
GE 0
FR 0,0,0,0,28.5
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND = 90'=27.432M
CM             BOTH ENDS AT HEIGHT = 25.4161M=83.3648'
CM FREQUENCY : 28.5MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,27.432, 0,1.6914,25.4161, .010265
GW 2,10, 0,0,27.432, 0,-1.6914,25.4161, .010265
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GE 0
FR 0,0,0,0,28.5
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN

CM GEOMETRY  : HALF-WAVELENGTH INVERTED VEE DIPOLE
CM             APEX HEIGHT ABOVE GROUND =120'=36.576M
CM             BOTH ENDS AT HEIGHT = 113.3571'=34.5601M
CM FREQUENCY : 28.5MHZ
CM GROUND(0) : EPSILON = 10    SIGMA=.003
CE
GW 1,10, 0,0,36.576, 0,1.6914,34.5601, .010265
GW 2,10, 0,0,36.576, 0,-1.6914,34.5601, .010265
GE 0
FR 0,0.0,0,28.5
GN 2,0.0,0,0,10,.003
EX 0,1,1,01,1,0
EX 0,2,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121.1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN

CM GEOMETRY  : QUARTER WAVELENGTH MONOPOLE
CM             WITH QUARTER WAVELENGTH 4 RADIAL WIRES
CM             BURIED 2" =.0508M DEEP
CM FREQUENCY : 3.8MHZ
CM             WAVELENGTH (FOR SKY WAVES)    = 78.9473M
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CM              WAVELENGTH (FOR GROUND WAVES) = 18.939M
CM WIRE       : #12 ( RADIUS R=.010265M )
CM GROUND(0)  : EPSILON = 10     SIGMA=.003
CE
GW 2,1, 0,0,0, 1.5773,0,-.0508, .010265
GW 3,2, 1.5773,0,-.0508, 4.7337,0,-.0508, .010265
GR 0,4
GW 1,10, 0,0,0, 0,0,19.7368, .010265
GE 0
FR 0,0,0,0,3.8
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
RP0,1,121,1500,20,0.0,0,3,0
RP0,1,121,1500,10,0.0,0,3,0
RP0,1,121,1500,0,0.0,0,3,0
EN


CM GEOMETRY   : QUARTER WAVELENGTH MONOPOLE
CM              WITH QUARTER WAVELENGTH 15 RADIAL WIRES
CM              BURIED 2" =.0508M DEEP
CM FREQUENCY  : 3.8MHZ
CM              WAVELENGTH (FOR SKY WAVES)    = 78.9473M
CM              WAVELENGTH (FOR GROUND WAVES) = 18.939M
CM WIRE       : #12 ( RADIUS R=.010265M )
CM GROUND(0)  : EPSILON = 10     SIGMA=.003
CE
GW 2,1, 0,0,0, 1.5773,0,-.0508, .010265
GW 3,2, 1.5773,0,-.0508, 4.7337,0,-.0508, .010265
GR 0,15
GW 1,10, 0,0,0, 0,0,19.7368, .010265
GE 0
FR 0,0,0,0,3.8
GN 2,0,0,0,10,.003
EX 0,1,1,01,1,0
PL3,2,1,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL3,2,2,0
RP1,1,121,0,7.62,0.0,0,3,1609.3
PL0,0,0,0
RP0,1,121,1500,80,0.0,0,3,0
RP0,1,121,1500,70,0.0,0,3,0
RP0,1,121,1500,60,0.0,0,3,0
RP0,1,121,1500,50,0.0,0,3,0
RP0,1,121,1500,40,0.0,0,3,0
RP0,1,121,1500,30,0.0,0,3,0
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