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The Addition of Bendix MLS Antenna Patterns to the MLS Mathematical Model

Jesse D. Jones



May 1989

DOT/FAA/CT-TN89/26

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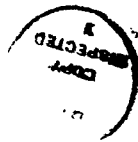
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16. Abstract Bendix Microwave Landing System (MLS) test bed antenna patterns were added to the MLS mathematical model. This report documents the method of installation, the required alterations of existing code to support the new patterns, and the results of testing of the new patterns with standard test scenario two. The tests yielded acceptable results.					
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EXECUTIVE SUMMARY

Bendix test bed antenna patterns were added to the Microwave Landing System (MLS) mathematical model. The resultant software code was tested with the standard test scenario 2 and provided acceptable results. The revised software code will be provided to the user's group at a future date. This report may be used as a guideline by anyone having a need to install their own antenna patterns into the model.

INTRODUCTION

PURPOSE.

Bendix antenna patterns were installed in the Microwave Landing System (MLS) mathematical model to permit modeling of scenarios with the Bendix MLS test bed antennas owned by the Federal Aviation Administration (FAA) Technical Center. These antenna patterns are also needed for model validation with data collected during flight tests and demonstrations using the Bendix antennas.

BACKGROUND.

Version 2.0 of the MLS mathematical model provided antenna patterns for several generic and production MLS antenna types. Although some of these patterns may be comparable to the Bendix antenna patterns, none of the patterns are similar enough to be used for the model validation. Since a significant amount of flight test and demonstration data are becoming available from flights utilizing Bendix antennas, it was considered necessary to add these antenna patterns to the model. This addition will improve the accuracy of model validation and the determination of potential problems for proposed MLS demonstration sites.

DISCUSSION

GENERAL.

The software coding changes made in MLS mathematical model version 2.0 to include a selection of antenna patterns has facilitated the addition of other antenna patterns which may be needed in the model. The addition of antenna patterns to the model requires, first, creation of a BLOCK DATA subroutine of data values describing the pattern. Second, model subroutine READ1, which reads the antenna type and loads the data from the BLOCK DATA, must be modified to recognize the new antenna pattern name and load the appropriate data. The BLOCK DATA for an antenna type consists of several data arrays of relative voltage for the pattern at specific angular locations. The required data arrays are as follows:

1. Azimuth scan direction (horizontal) amplitude array data: an amplitude array of 451 values for the antenna pattern from 0° to 90° in increments of 0.2°. Pattern is assumed symmetrical.
2. Azimuth orthogonal (vertical) amplitude array data: an amplitude array of 30 values corresponding to the angles specified in the azimuth orthogonal degrees array.
3. Azimuth orthogonal (vertical) degrees array data: an array of 30 degree values which correspond to the amplitude values stored in the orthogonal amplitude array.
4. Elevation scan direction (vertical) amplitude array data: an amplitude array of 201 values for the antenna pattern from -20° to 20° in increments of 0.2°.

5. Elevation element array (vertical) data: an amplitude array of 41 points for the elevation element pattern from -20° to 20° in increments of 1° .

6. Elevation orthogonal (horizontal) amplitude array data: an amplitude array of 20 values corresponding to the angles specified in the elevation orthogonal degrees array.

7. Elevation orthogonal (horizontal) degrees array data: an array of 20 degree values which correspond to the amplitude values stored in the orthogonal amplitude array.

(Note: The FORTRAN-77 standard limits the number of continuation lines to 19. Therefore, an array of 451 (or 201) values must be entered as smaller segments and equivalenced to the main array.)

Most of the required antenna pattern data were provided by Bendix on a magnetic tape so that the data had only to be copied from tape and reformatted into data statement segments. These data are based upon computations which have a significant contribution from the phase shifter residue and are, therefore, representative of a dynamic pattern. The actual measured patterns, however, are based on static test range data. Test range data are measured with the beam stopped at a particular scan angle (typically 0°) resulting in lower phase shifter residue (or side lobes). The remaining data were provided by Bendix in tables of decibel (dB) versus angle and had to be converted to voltage and normalized. The equation used for this conversion was: $\text{voltage} = \text{antilog}(\text{dB}/20.0)$.

BENDIX TEST BED 1° BEAMWIDTH AZIMUTH ANTENNA PATTERNS.

The horizontal radiation pattern measured by Bendix for the 1° beamwidth azimuth antenna is displayed by figure 1. The antenna pattern data provided by Bendix for this antenna (angle versus voltage) encompass the region from -90° to $+90^{\circ}$ in increments of 0.2° and are listed in appendix A. Since the MLS math model uses data from 0° to 90° to generate a symmetrical pattern about 0° , and since the dynamic Bendix pattern is not symmetrical, only one-half of the pattern can be used by the model for any given scenario. Therefore, the -90° to 0° (left half as viewed from the azimuth antenna looking towards threshold) and the 0° to 90° (right half) segments of the pattern are included as separate antenna patterns. The model will generate a symmetrical pattern based on either the left half or the right half of the pattern. If a left half 1° antenna pattern is desired for modeling, i.e., all obstacles are on the left side of the runway, then AZBL1060 is entered as the antenna type in the model input file. The antenna pattern generated by the model for this selection is displayed by figure 2. AZBR1060 is entered as the antenna type if a pattern representative of the right half (0° to 90°) is desired. Figure 3 shows the pattern generated by the model for this antenna specification.

A comparison of figure 1 with figures 2 and 3 will show some differences other than symmetry. One reason is that figure 1 is a static pattern, whereas, figures 2 and 3 originate from dynamic data as explained above. Also, during the addition of the generic and Hazeltine antenna patterns to the model, the lower value of the scan pattern was limited to -36 dB. This was done to minimize the possibility of neglecting significant multipath sources located in a pattern null. We cannot determine the spatial relationships among the objects in the

airport environment precisely enough to permit this to happen. Therefore, although the measured pattern of figure 1 has a lower limit of -40 dB, the patterns from the model, as displayed by figures 2 and 3, have a lower limit of -36 dB. Since this limiting is done in the model, however, the pattern data are entered exactly as computed.

The vertical radiation pattern for the azimuth antenna was provided by Bendix as a table of dB versus angle data in 2° increments. These data are listed in appendix B. The model permits only 30 values to be entered at selected angles for the vertical radiation pattern. Therefore, in an attempt to best match this pattern with linear segments, the 30 values marked with an * in appendix B were included in the model. Figure 4 shows the vertical pattern in graphical form when all the values are plotted. The vertical pattern generated in the model is displayed by figure 5 for comparison. Since the vertical radiation pattern of the MLS azimuth antennas is not a function of the number of elements in the array, this vertical radiation pattern is applicable to all of the Bendix azimuth antennas under consideration in this report.

BENDIX TEST BED 2° BEAMWIDTH AZIMUTH ANTENNA PATTERNS.

The horizontal radiation pattern measured by Bendix for the 2° beamwidth azimuth antenna is displayed by figure 6. The antenna pattern data provided by Bendix for this antenna (angle versus voltage) encompass the region from -90° to +90° in increments of 0.2° and are listed in appendix C. As shown above for symmetry considerations, the -90° to 0° (left half) and the 0° to 90° (right half) segments of the pattern were included in the model as separate antenna patterns. The model will generate a symmetrical pattern based on either the left half or the right half. If a left half 2° antenna pattern (-90° to 0°) is desired for modeling, AZBL2040 is entered as the antenna type in the model input file resulting in the antenna pattern displayed by figure 7. AZBR2040 is entered as the antenna type if a pattern representative of the right half (0° to 90°) is desired. Figure 8 shows the pattern generated by the model based on this antenna specification.

During the addition of the generic and Hazeltine antenna patterns to the model, the lower value of the antenna patterns in the scan plane were limited to -36 dB as explained above. Although the measured pattern of figure 6 has a lower limit of -40 dB, the patterns from the model, as displayed by figures 7 and 8, have a lower limit of -36 dB.

The vertical radiation pattern provided by Bendix for the 1° azimuth antenna is also appropriate for the 2° antenna as explained above. The data in appendix B and the plots of figures 4 and 5 also apply to the 2° azimuth antenna.

BENDIX TEST BED 1.5° BEAMWIDTH ELEVATION ANTENNA PATTERNS.

The measured vertical radiation pattern for the Bendix 1.5° beamwidth elevation antenna is displayed by figure 9. The antenna pattern data provided for this antenna (angle versus voltage) encompass the region from -30° to +60° in increments of 0.2° and are listed in appendix D. The model uses only the data between -20° to 20° to generate the elevation system vertical pattern. Therefore, only those data values were entered in the BLOCK DATA. Figure 10 shows the resultant pattern generated by the model. This pattern is selected by specifying ELB15 as the elevation antenna type in the model input file.

The model also requires a vertical element pattern for the elevation array. This pattern, as computed by Bendix, is displayed by figure 11. The angle versus voltage data for this pattern were computed according to the equation listed in appendix E encompassing the region from -20° to $+20^{\circ}$. The resultant data are also listed in appendix E. This pattern is applied to (multiplied by) the scan pattern resulting in more attenuation of the side lobes, particularly below the main beam.

The horizontal radiation pattern of the elevation antenna computed by Bendix is displayed in figure 12. The angle versus voltage data for this pattern were computed with the equation presented in appendix F. The model requires 20 values of angle-voltage pairs in separate data statements to describe the pattern from 0° to 90° . The model assumes the pattern is symmetrical about 0° covering the region from -90° to $+90^{\circ}$. The values selected to best represent this pattern in 20 linear segments in the model (figure 13) are marked with an * next to the angle in appendix F.

BLOCK DATA ANTBTB.

Antenna pattern data in the model are stored in BLOCK DATA subroutines. When a new antenna pattern is added, either the data are added to an existing BLOCK DATA or a new BLOCK DATA is created. A new BLOCK DATA named ANTBTB was created to store the Bendix test bed antenna pattern data. The resultant software code is provided as appendix G showing the data statements that pass the data to subroutine READ1. Subroutine READ1 loads the appropriate antenna pattern data into the model antenna data arrays based upon the antenna types selected for the azimuth, elevation, and DME/P systems.

The appropriate antenna pattern data are passed from BLOCK DATA's into READ1 through labeled common storage locations. Subroutine READ1 transfers the selected pattern into data array storage locations in the model reserved for pattern data. These storage locations constituting labeled common ANTS and their associated dimensions in bytes are as follows:

1. AZSA(451) - azimuth antenna scan amplitudes
2. AZOD(30) - azimuth antenna orthogonal pattern degrees
3. AZOA(30) - azimuth antenna orthogonal pattern amplitudes corresponding to the values in AZOD.
4. ELSA(201) - elevation antenna scan amplitudes
5. ELOD(20) - elevation antenna orthogonal pattern degrees
6. ELOA(20) - elevation antenna orthogonal pattern amplitudes corresponding to the values in ELOD.
7. ELEA(41) - elevation antenna element pattern (vertical)
8. DMEOD(20) - precision distance measuring equipment (dme/p) antenna orthogonal pattern degrees.

9. DMEOA(20) - dme/p antenna orthogonal pattern amplitudes corresponding to the values in DMEOA.

In order to pass the Bendix antenna pattern data from BLOCK DATA ANTBTB to subroutine READ1, a new labeled common storage area named BTBANT was defined. Data are stored in BTBANT as follows:

1. AZ1LSA - Bendix test bed 1.0° azimuth antenna scan pattern data (horizontal) for left half (-90° to 0°) using data statements AZ1L1, AZ1L2, AZ1L3, AZ1L4, and AZ1L5.
2. AZ1RSA - Bendix test bed 1.0° azimuth antenna scan pattern data (horizontal) for right half (0° to +90°) using data statements AZ1R1, AZ1R2, AZ1R3, AZ1R4, and AZ1R5.
3. AZ2LSA - Bendix test bed 2.0° azimuth antenna scan pattern data (horizontal) for left half (-90° to 0°) using data statements AZ2L1, AZ2L2, AZ2L3, AZ2L4, and AZ2L5.
4. AZ2RSA - Bendix test bed 2.0° azimuth antenna scan pattern (horizontal) for right half (0° to +90°) using data statements AZ2R1, AZ2R2, AZ2R3, AZ2R4, and AZ2R5.
5. AZTBOD - Bendix test bed azimuth antenna orthogonal (vertical) degrees data using data statement AZTBOD.
6. AZTBOA - Bendix test bed azimuth antenna orthogonal (vertical) amplitude data using data statement AZTBOA.
7. ELTBSA - Bendix test bed 1.5° elevation antenna scan (vertical) pattern data using data statements ELTB1 and ELTB2.
8. ELTBOD - Bendix test bed 1.5° elevation antenna orthogonal (horizontal) degrees data using data statement ELTBOD.
9. ELTBOA - Bendix test bed 1.5° elevation antenna orthogonal (horizontal) amplitude data using data statement ELTBOA.
10. ELTBEP - Bendix test bed 1.5° elevation antenna element pattern data using data statement ELTBEP.

Since a dme/p antenna was not provided as part of the Bendix MLS test bed, no dme/p pattern data were included or defined in the BLOCK DATA. If a dme/p antenna is added to the test bed later, the associated pattern data can be added with minimal effort.

SUBROUTINE READ1.

This subroutine reads section 1 of the model data input file which specifies the antenna type to be modeled for the azimuth, elevation, and dme/p systems. Subroutine READ1 reads the antenna types and loads the antenna pattern data into labeled common ANTS from the appropriate BLOCK DATA. In order to accommodate the Bendix test bed antenna types, software coding was added to enable READ1 to recognize these antennas and load the appropriate antenna patterns. The software

code for subroutine READ1 as it exists subsequent to the additions (version 3.2) is shown in appendix H.

New antenna types which may be specified due to the addition of the Bendix data are as follows:

1. AZBL1060 - Bendix test bed 1.0° beamwidth, 60° scan azimuth antenna pattern for left half (-90° to 0°).
2. AZBR1060 - Bendix test bed 1.0° beamwidth, 60° scan azimuth antenna pattern for right half (0° to +90°).
3. AZBL2040 - Bendix test bed 2.0° beamwidth, 40° scan azimuth antenna pattern for left half (-90° to 0°).
4. AZBR2040 - Bendix test bed 2.0° beamwidth, 40° scan azimuth antenna pattern for right half (0° to +90°).
5. ELB15 - Bendix test bed 1.5° beamwidth elevation antenna pattern.

A complete listing of all antenna types which may now be specified in the model input file is included as appendix I.

INSTALLATION IN THE MLS MATHEMATICAL MODEL.

Bendix test bed antenna patterns were installed in version 2.1 of the MLS mathematical model. This version is being used by the FAA Technical Center for validation purposes and will be distributed to the users group at a future date (as workload permits).

Installation consisted of replacing version 3.1 of subroutine READ1 with version 3.2 in the four model programs (BMLST, BPLOTT, BMLSR, AND BPLOTR) and adding block data ANBTB version 1.0 to the two system model programs (BMLSR and BPLOTR). After testing of the installation (described below), ANBTB was replaced with version 2.0 due to some necessary changes.

INSTALLATION TESTS.

The installation of the Bendix test bed antenna patterns was tested with the standard test scenario 1281. Initial tests revealed an unusually high bias in the elevation error plots. Further investigation identified the cause as a misalignment of the pattern, i.e., the pattern peak did not occur at 0°. Therefore, all scan direction pattern data were shifted to cause the pattern peak to occur at 0° and recoded into the block data.

After correcting the block data, the resultant path following error (PFE) plots for the azimuth antennas AZBL1060, AZBR1060, AZBL2040, and AZBR2040 are presented as figures 14 through 17, respectively. These results are as expected and are very similar to the results from this test scenario using antenna AZBN. The PFE error plot for the elevation antenna ELB15 is shown in figure 18. The elevation pattern data and plot were compared to the respective information for antenna ELBN and appear to be similar and reasonable. Therefore, the installation of the Bendix MLS test bed antenna patterns into the MLS mathematical model is considered complete. These patterns will be used for model validation when the flight test data are collected using the Bendix MLS system.

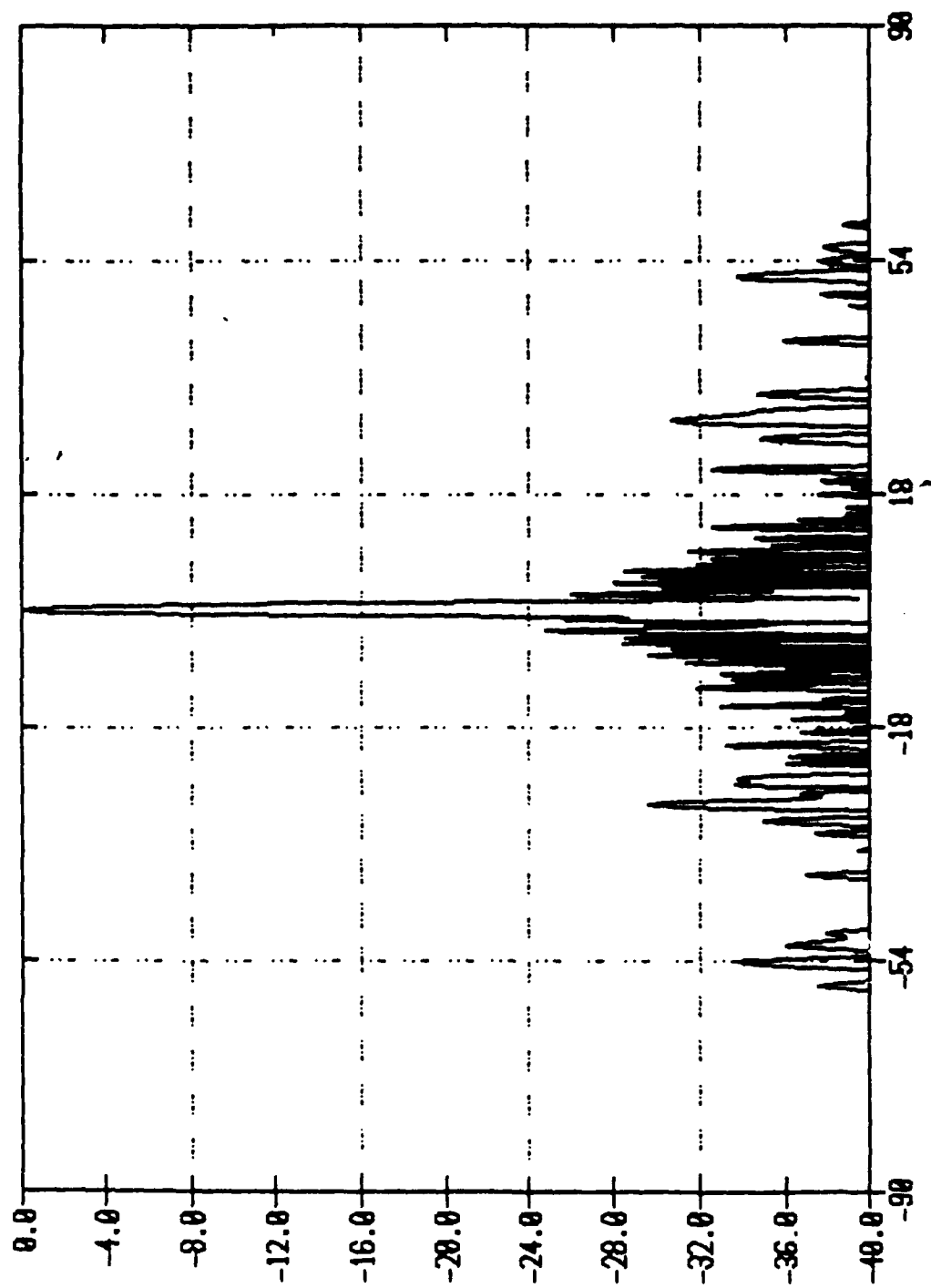


FIGURE 1. BENDIX 1 DEGREE AZIMUTH ANTENNA MEASURED HORIZONTAL RADIATION PATTERN

AZBL1060 (HORIZONTAL PATTERN)

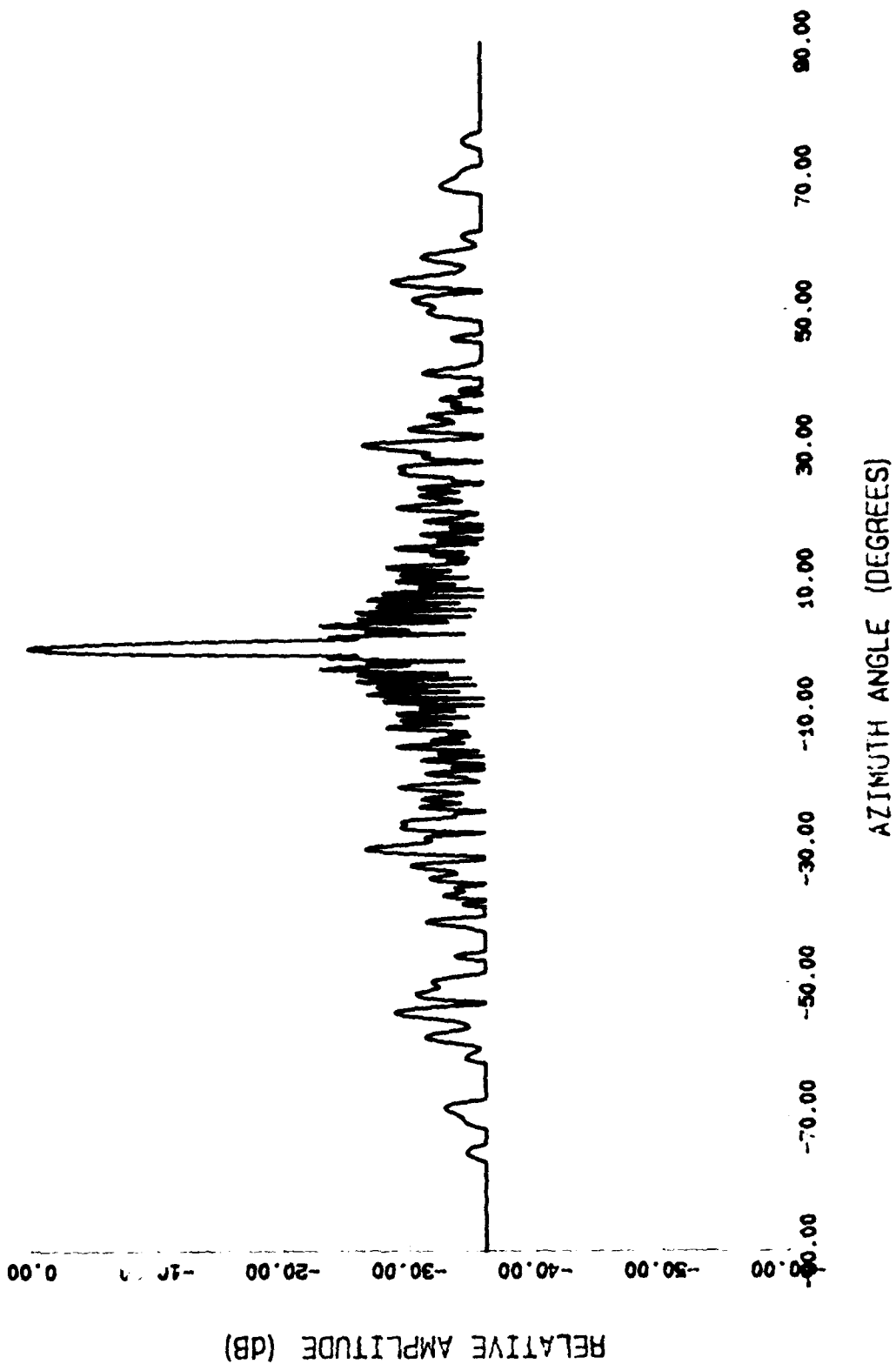


FIGURE 2. BENDIX 1 DEGREE AZIMUTH ANTENNA HORIZONTAL RADIATION PATTERN
(BASED ON LEFT HALF) - AZBL1060

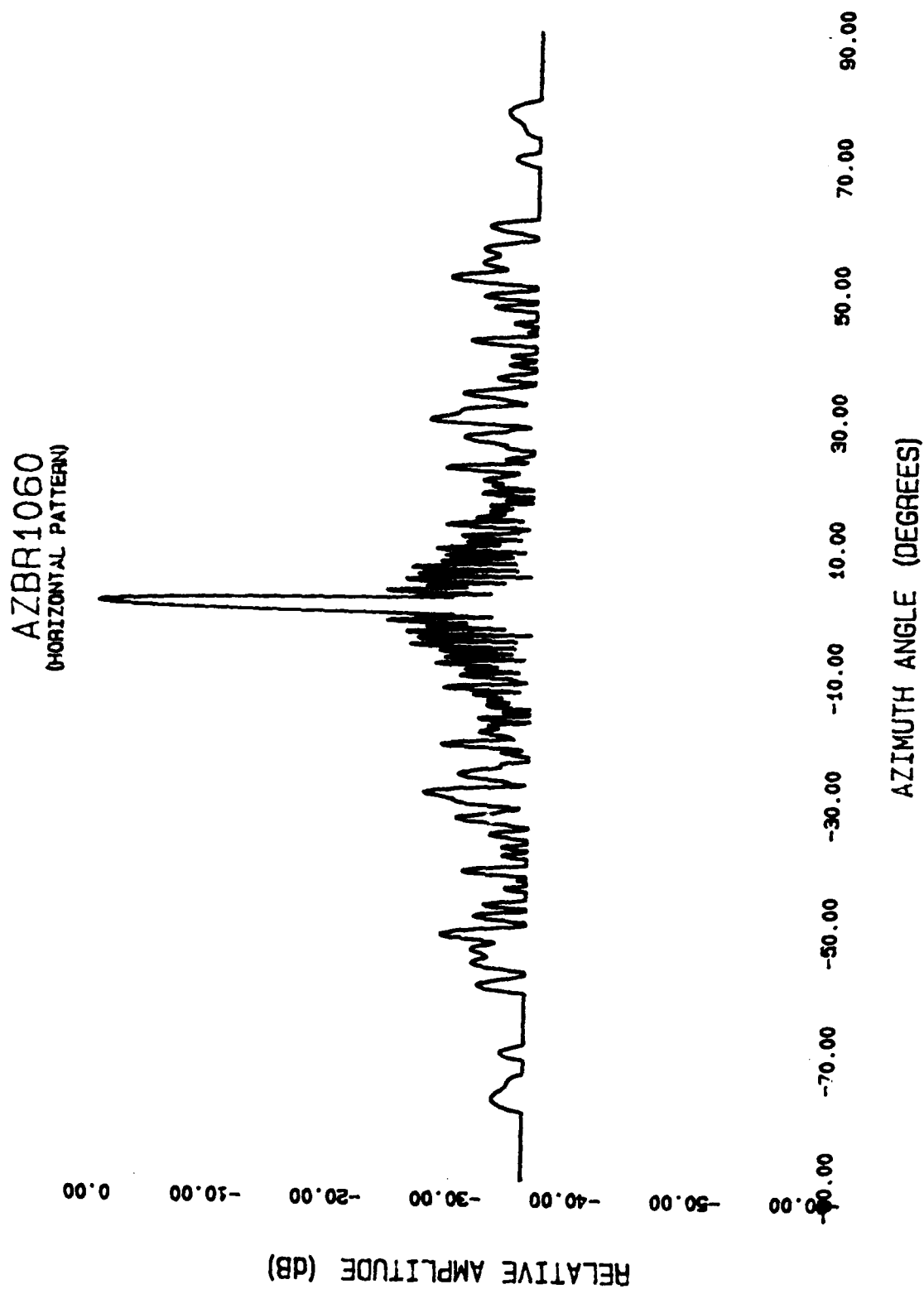


FIGURE 3. BENDIX 1 DEGREE AZIMUTH ANTENNA HORIZONTAL RADIATION PATTERN
(BASED ON RIGHT HALF) - AZBR1060

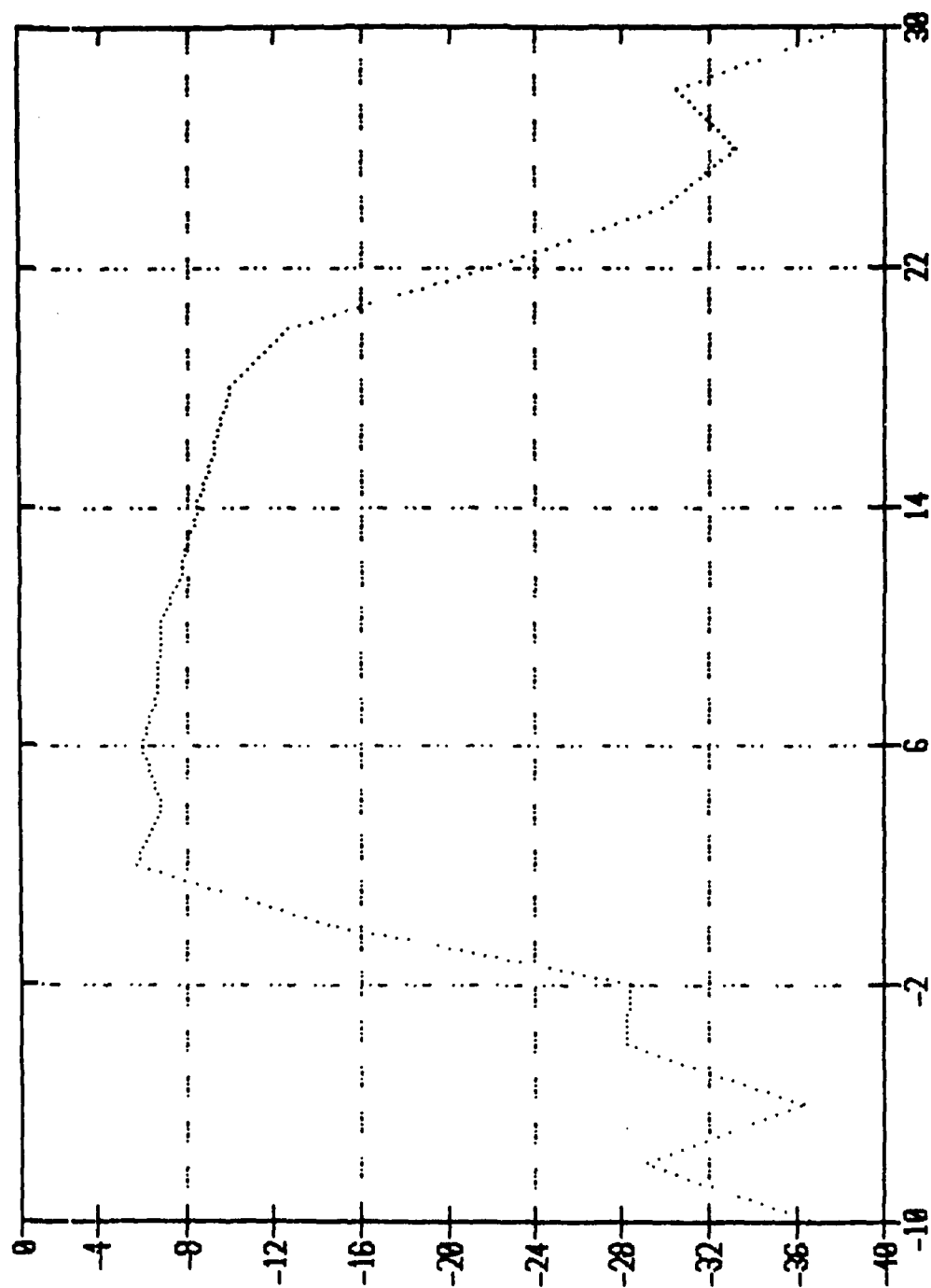
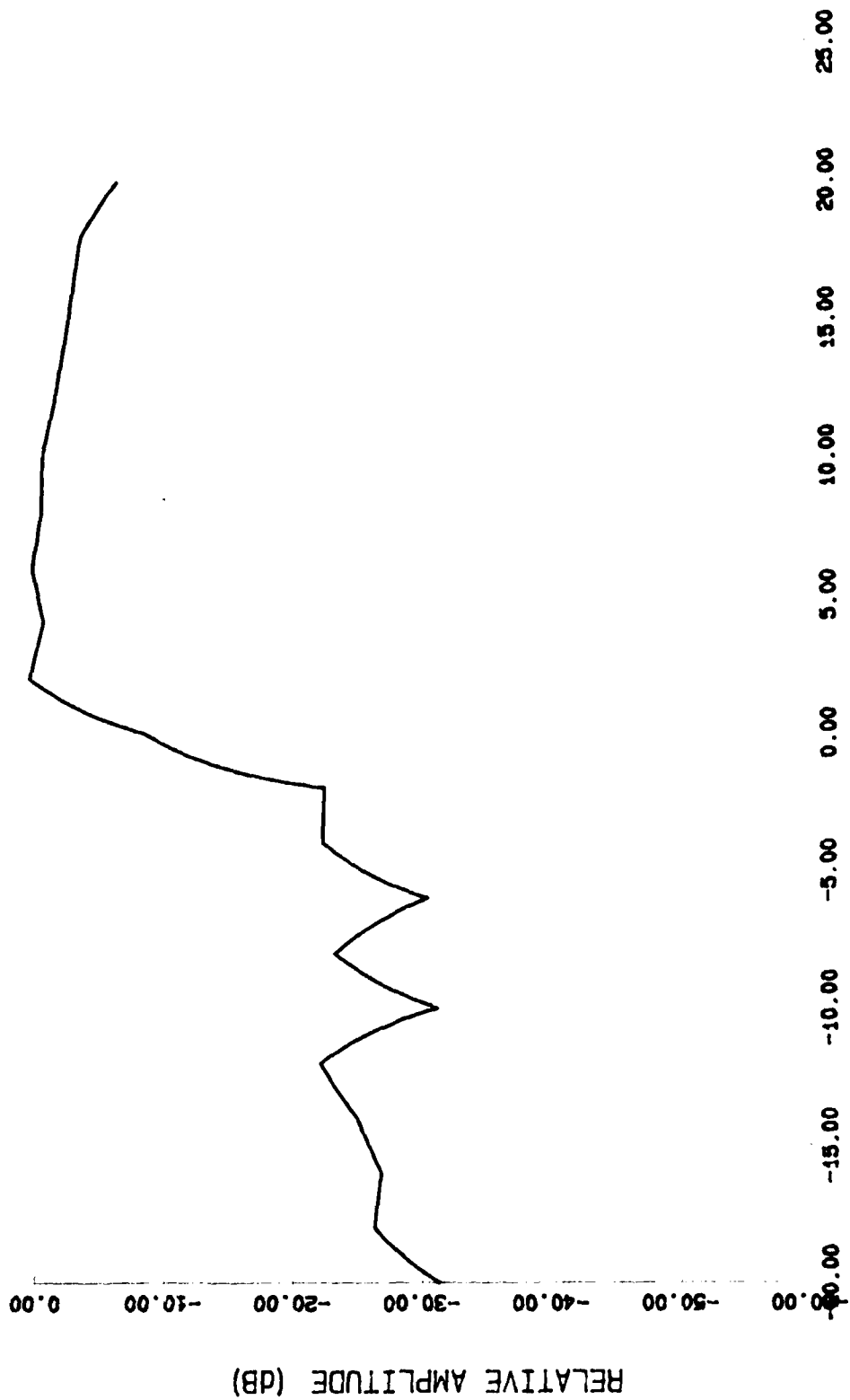


FIGURE 4. BENDIX AZIMUTH ANTENNA MEASURED VERTICAL RADIATION PATTERN

AZBL1060
(VERTICAL PATTERN)



ELEVATION ANGLE (DEGREES)

FIGURE 5. BENDIX AZBL1060 ANTENNA VERTICAL RADIATION PATTERN

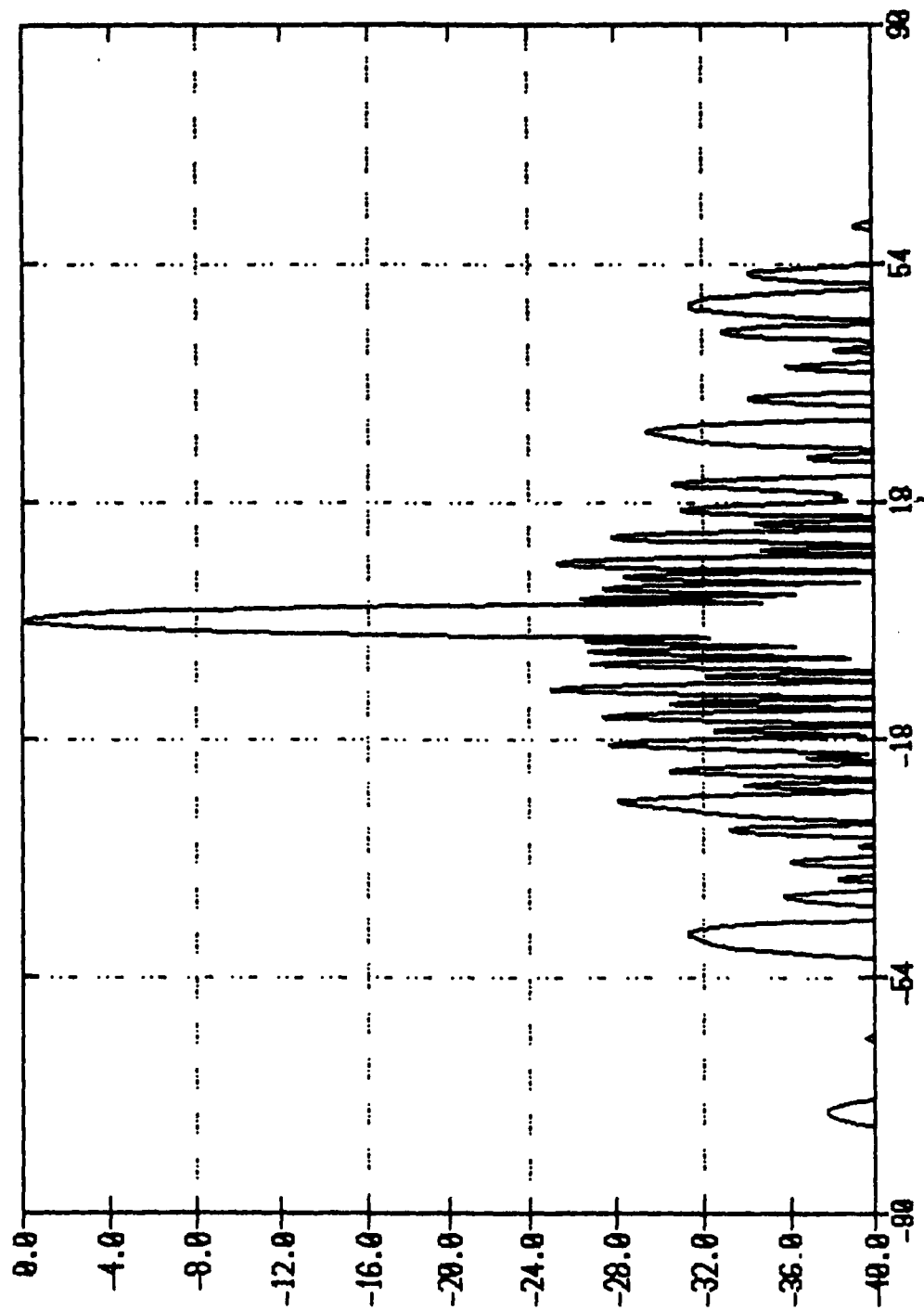


FIGURE 6. BENDIX 2 DEGREE AZIMUTH ANTENNA MEASURED HORIZONTAL RADIATION PATTERN

AZBL2040
(HORIZONTAL PATTERN)

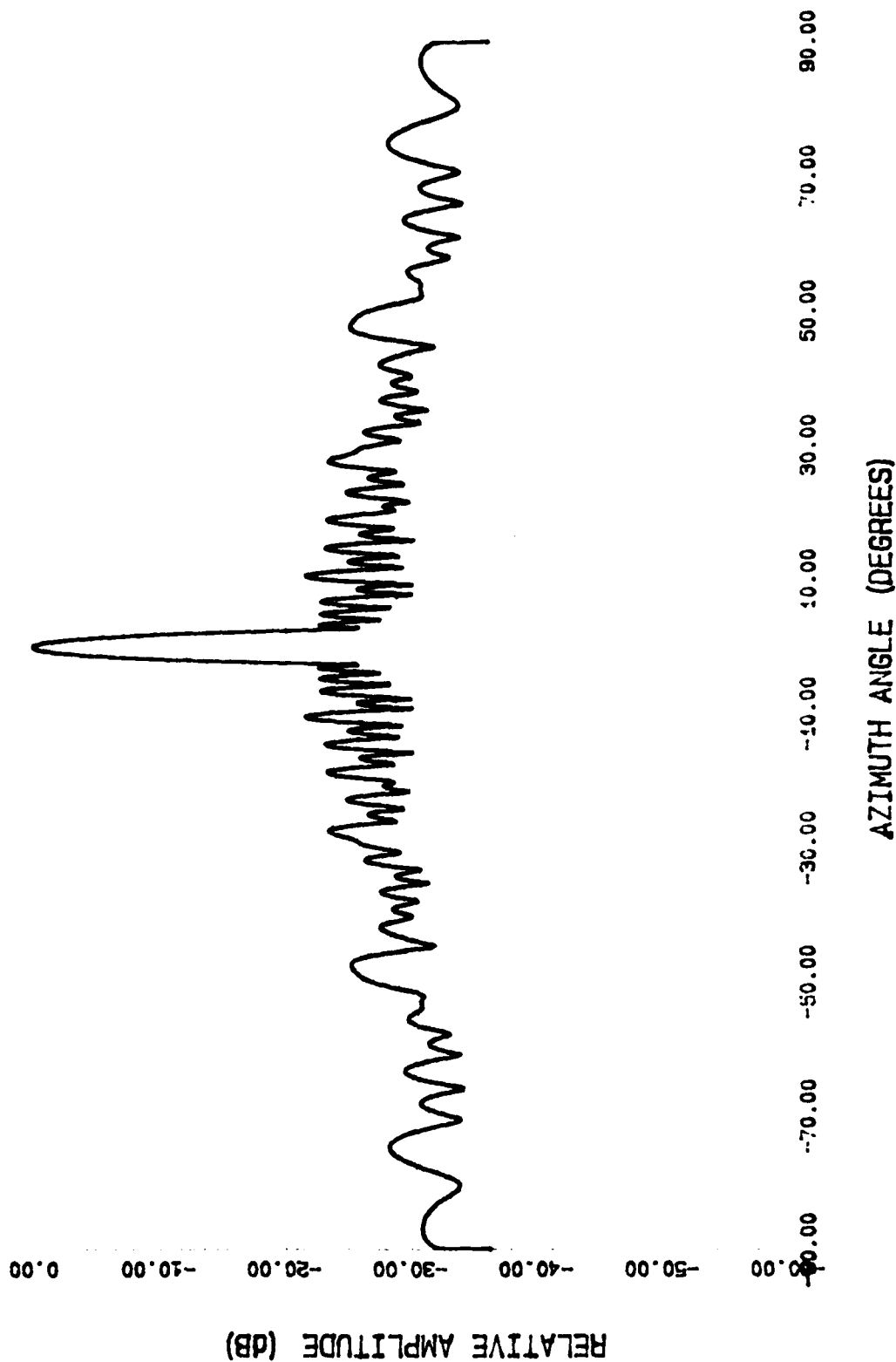
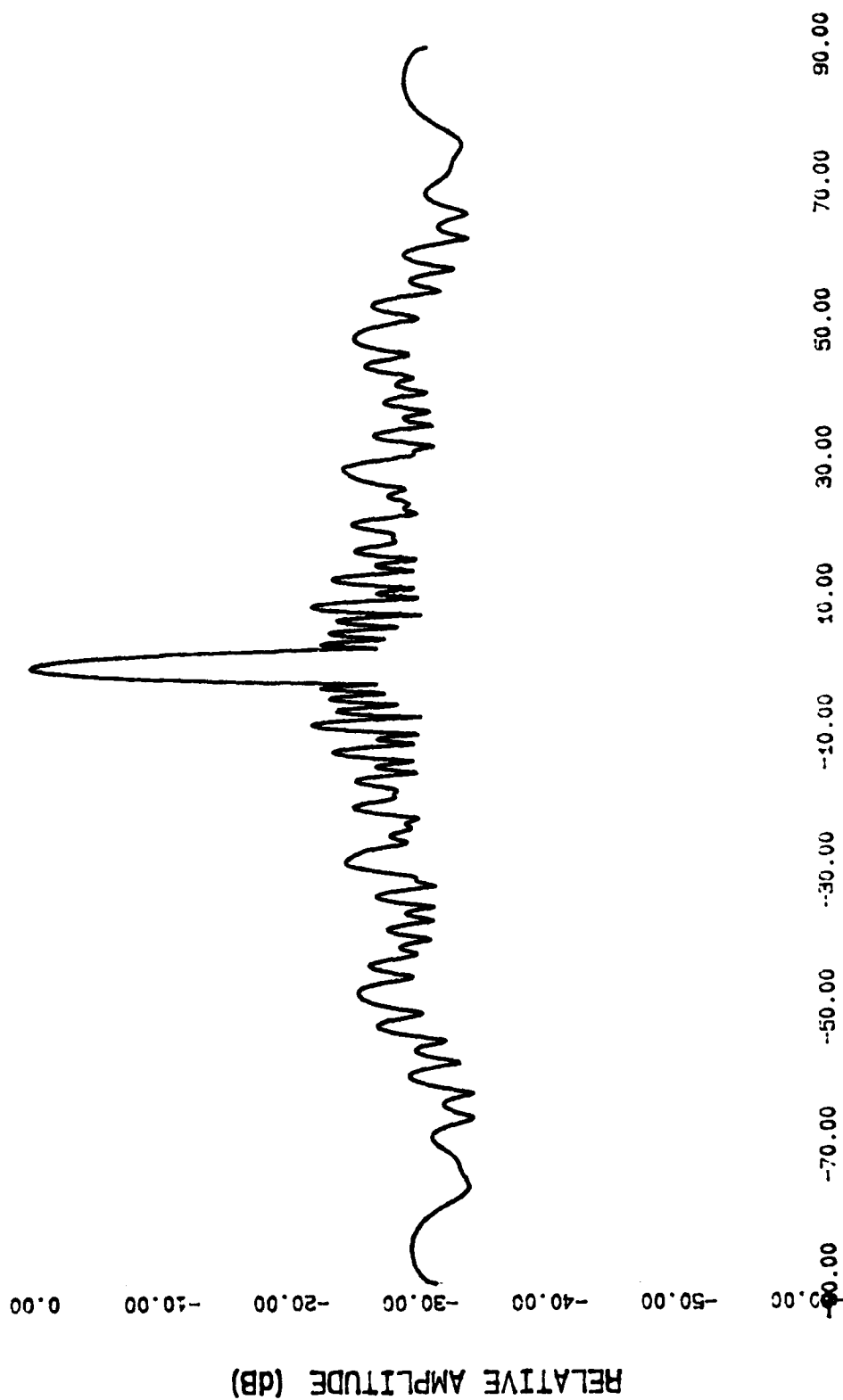


FIGURE 7. BENDIX 2 DEGREE AZIMUTH ANTENNA HORIZONTAL RADIATION PATTERN
(BASED ON LEFT HALF) - AZBL2040

AZBR2040
(HORIZONTAL PATTERN)



AZIMUTH ANGLE (DEGREES)

FIGURE 8. BENDIX 2 DEGREE AZIMUTH ANTENNA HORIZONTAL RADIATION PATTERN
(BASED ON RIGHT HALF) - AZBR2040

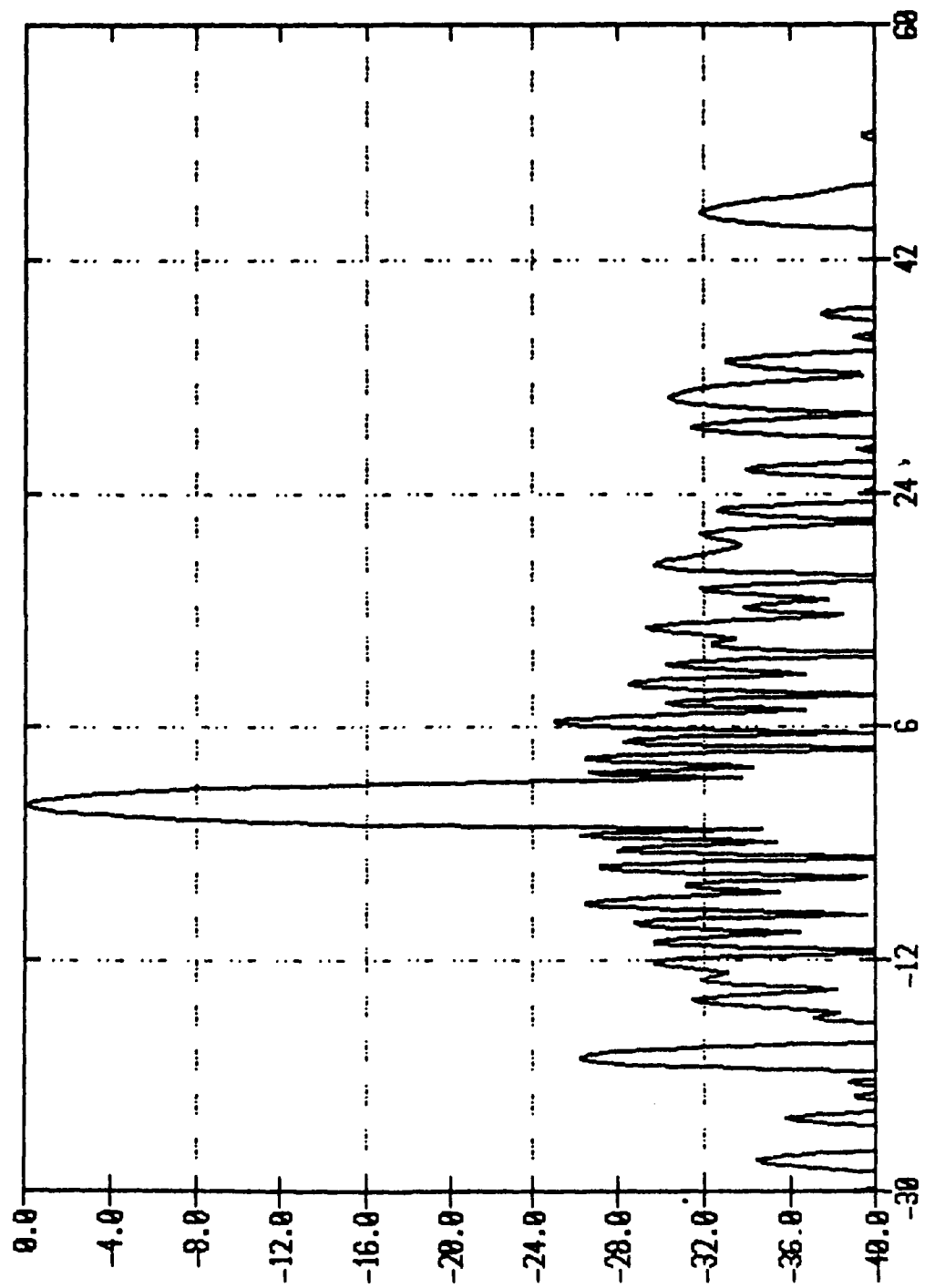
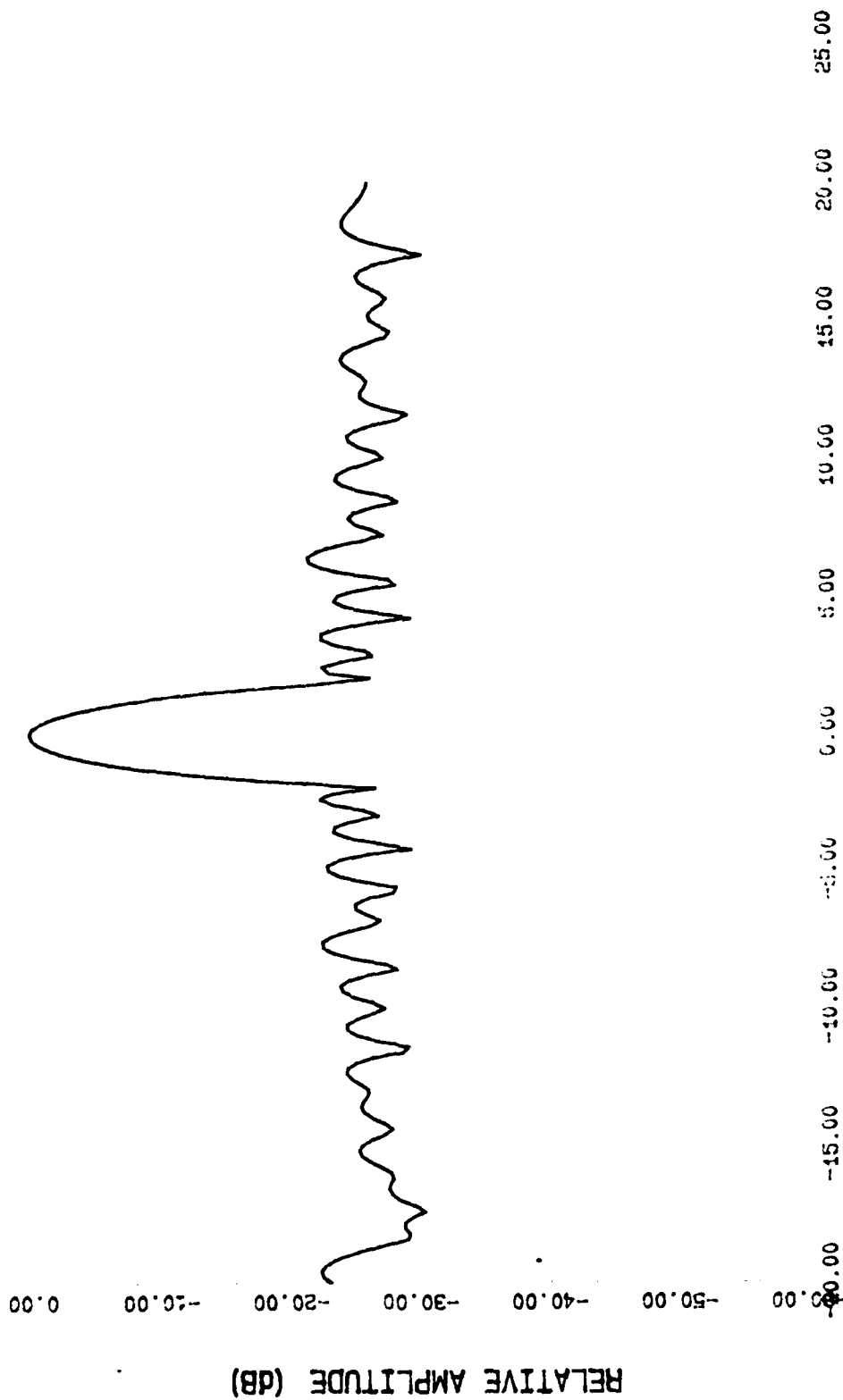


FIGURE 9. BENDIX 1.5 DEGREE ELEVATION ANTENNA MEASURED VERTICAL RADIATION PATTERN

ELB15
(VERTICAL PATTERN)



ELEVATION ANGLE (DEGREES)

FIGURE 10. BENDIX 1.5 DEGREE ELEVATION ANTENNA VERTICAL RADIATION PATTERN

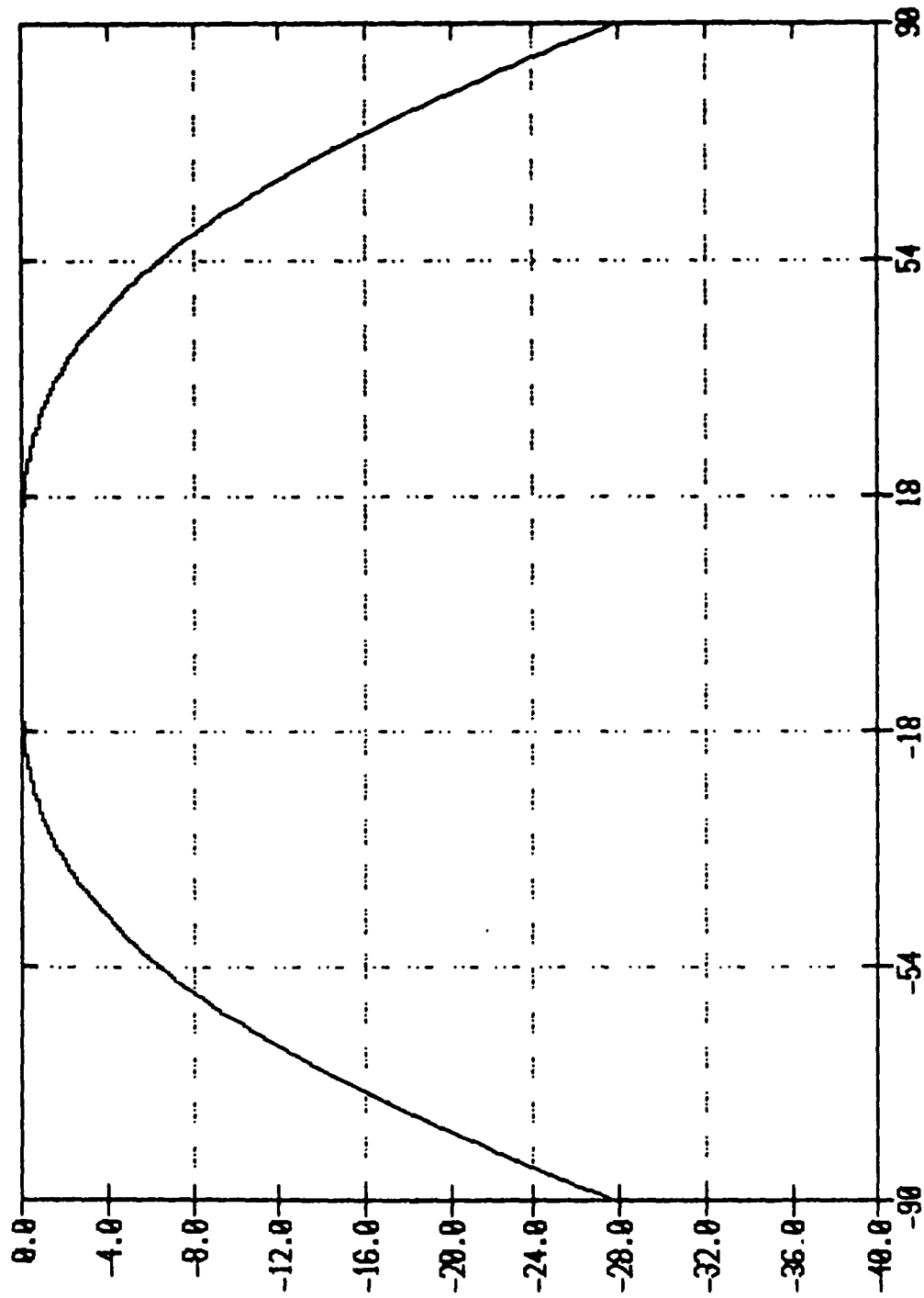


FIGURE 11. BENDIX 1.5 DEGREE ELEVATION ARRAY ELEMENT COMPUTED VERTICAL RADIATION PATTERN

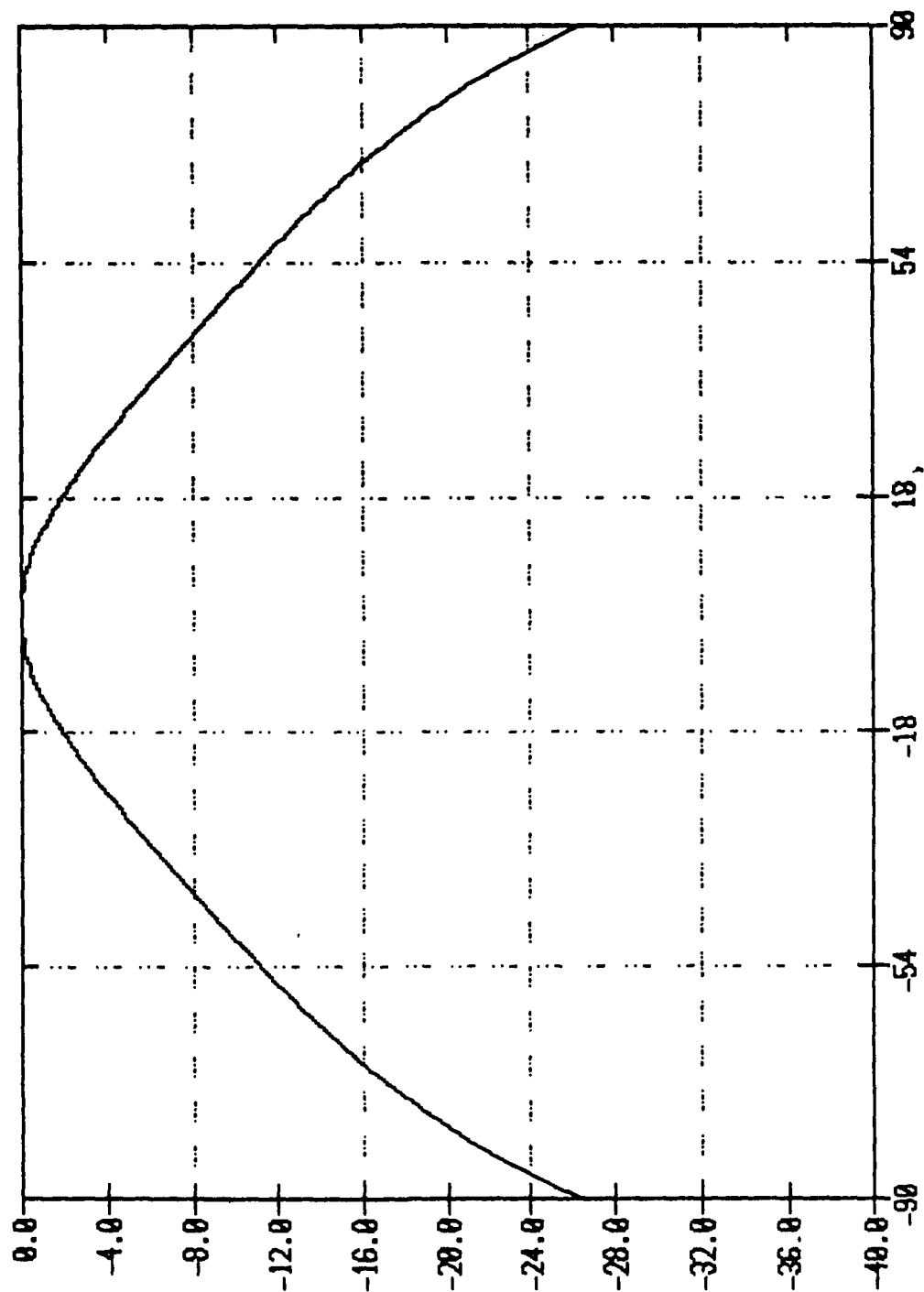


FIGURE 12. BENDIX 1.5 DEGREE ELEVATION ANTENNA COMPUTED HORIZONTAL RADIATION PATTERN

ELB15 (HORIZONTAL PATTERN)

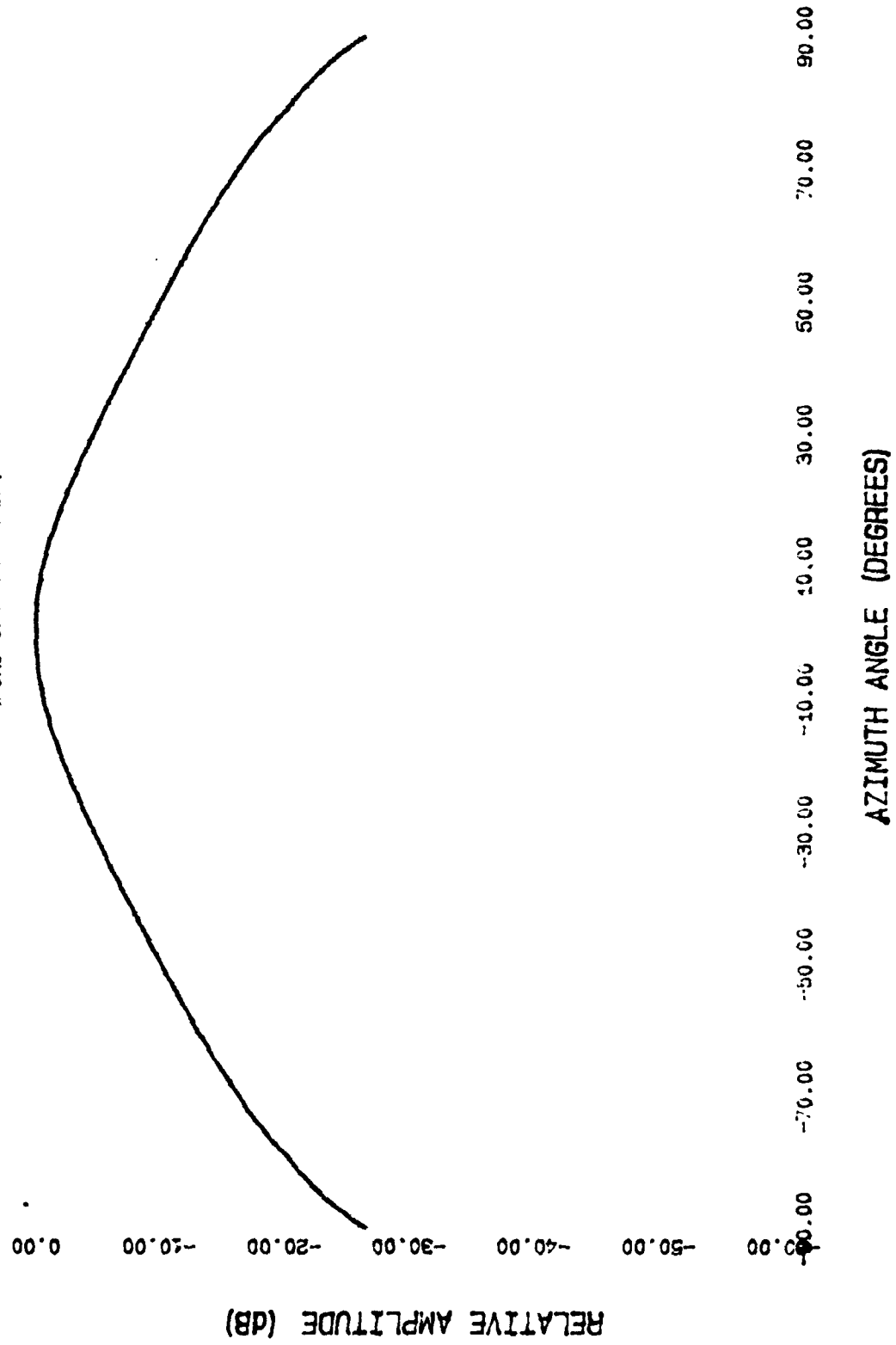


FIGURE 13. BENDIX 1.5 DEGREE ELEVATION ANTENNA HORIZONTAL RADIATION PATTERN

MLS MATHEMATICAL MODELING PERFORMED BY:
 FAA TECHNICAL CENTER, GUIDANCE BRANCH
 ATLANTIC CITY AIRPORT, NJ 08405
 TITLE: LAX WITHOUT SNOW, AZBL1060, ELB15
 RUN #: 1281 DATE: 1-FEB-89 16:17:15
 RUNWAY: 24R AIRPORT: LAX
 ANTENNA: AZBL1060 BEAMWIDTH: 1.00

AZ PFE SPLIT

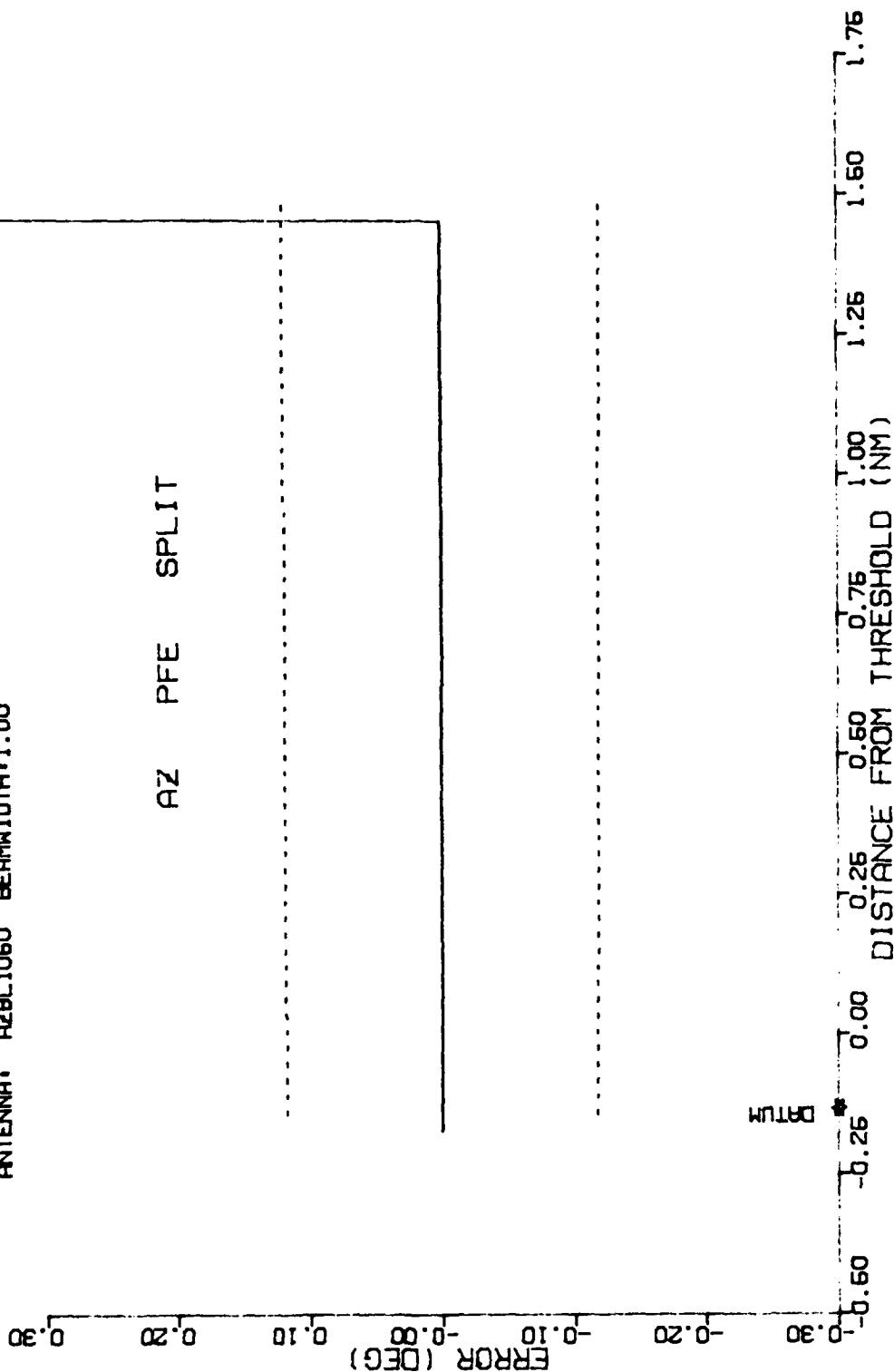


FIGURE 14. SCENARIO 2. AZIMUTH SUBSYSTEM, SPLIT GATE, AZBL1060 ANTENNA, PFE FILTERED PLOT

ML6 MATHEMATICAL MODELING PERFORMED BY:
 FAA TECHNICAL CENTER, GUIDANCE BRANCH
 ATLANTIC CITY AIRPORT, NJ 08405
 TITLE: LAX WITHOUT GNOM; AZBR1060
 RUN #: 1281 DATE: 1-FEB-89 16:46:33
 RUNWAY: 24R AIRPORT: LAX
 ANTENNA: AZBR1060 BEAMWIDTH: 1.00

AZ PFE SPLIT

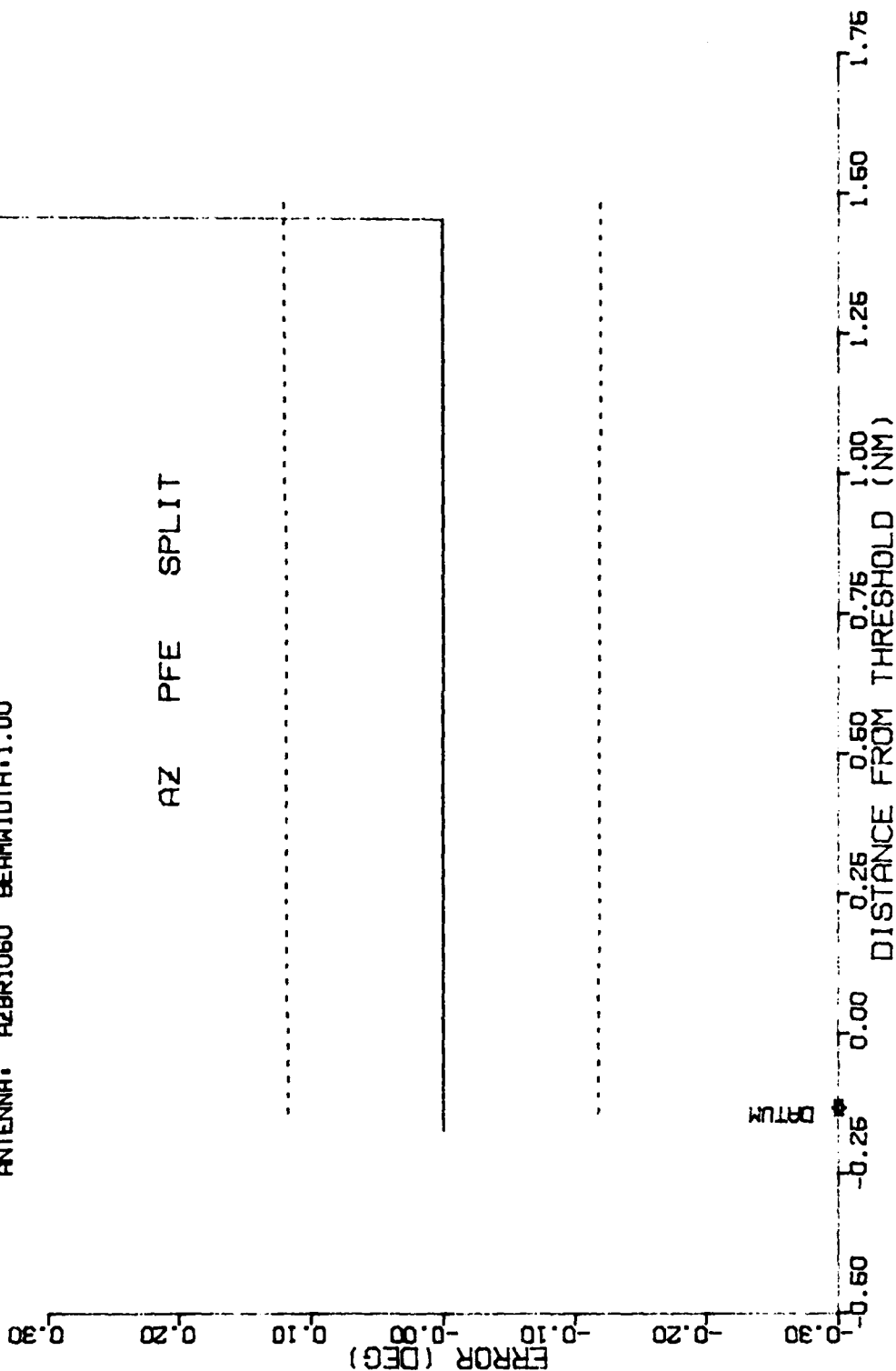


FIGURE 15. SCENARIO 2. AZIMUTH SUBSYSTEM, SPLIT GATE, AZBR1060 ANTENNA, PFE FILTERED PLOT

MLS MATHEMATICAL MODELING PERFORMED BY:
 FAA TECHNICAL CENTER, GUIDANCE BRANCH
 ATLANTIC CITY AIRPORT, NJ 08405

TITLE: LAX WITHOUT SNOW, AZBL2040
 RUN #: 1281 DATE: 1-FEB-89 17:09:00
 RUNWAY: 24R AIRPORT: LAX
 ANTENNA: AZBL2040 BEAMWIDTH: 2.00

AZ PFE SPLIT

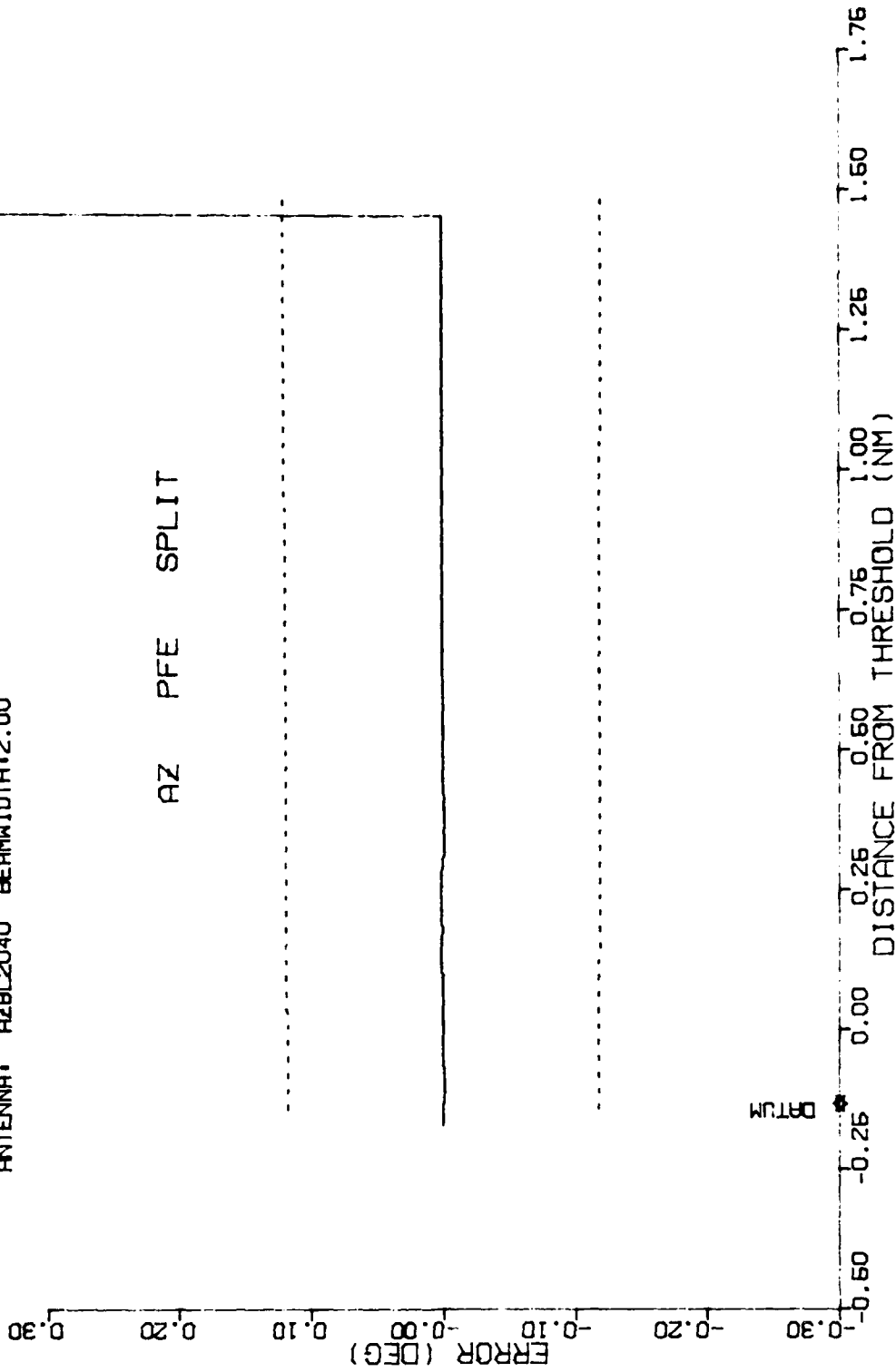


FIGURE 16. SCENARIO 2, AZIMUTH SUBSYSTEM, SPLIT GATE, AZBL2040 ANTENNA, PFE FILTERED PLOT

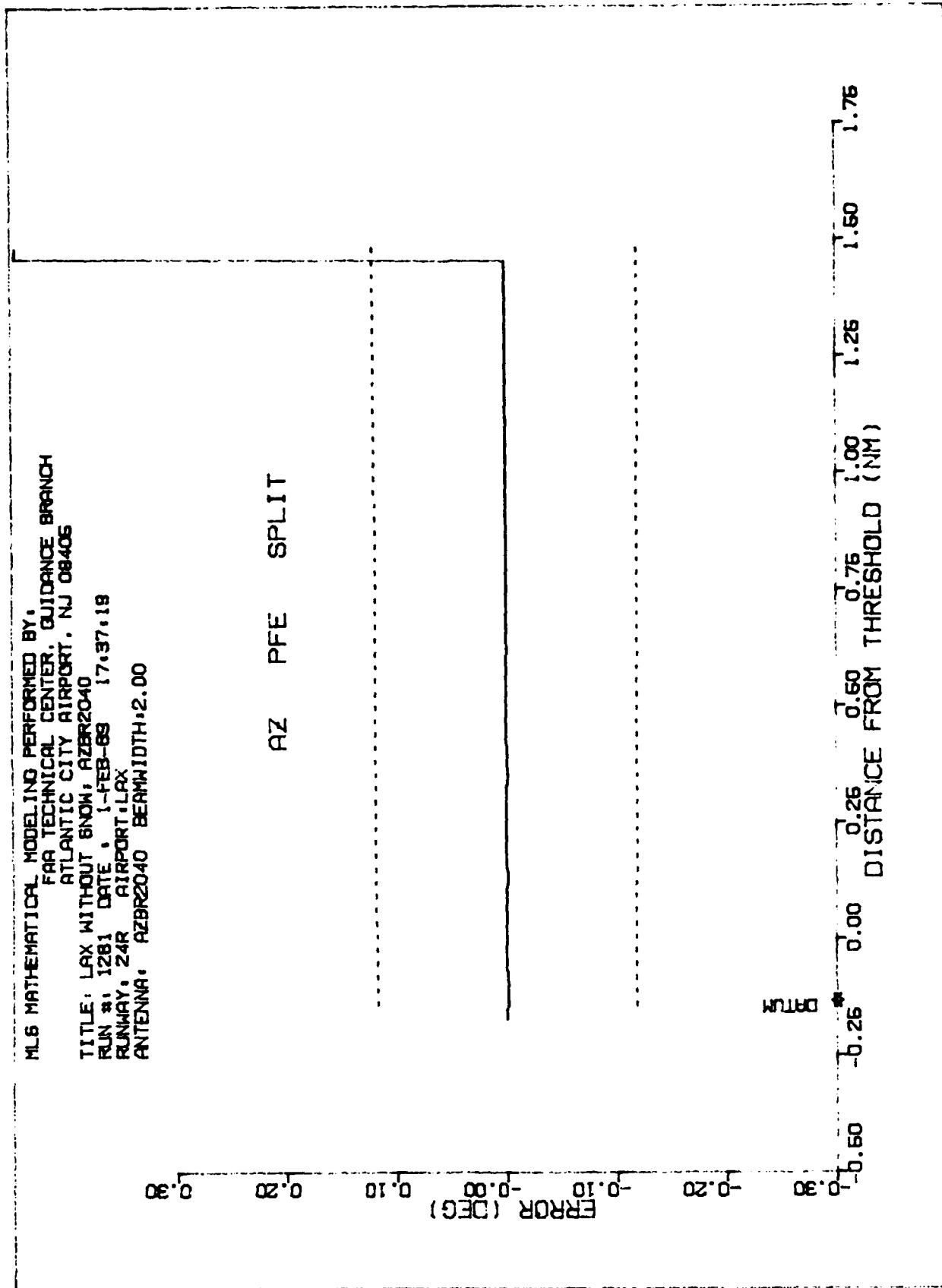


FIGURE 17. SCENARIO 2, AZIMUTH SUBSYSTEM, SPLIT GATE, AZBR2040 ANTENNA, PFE FILTERED PLOT

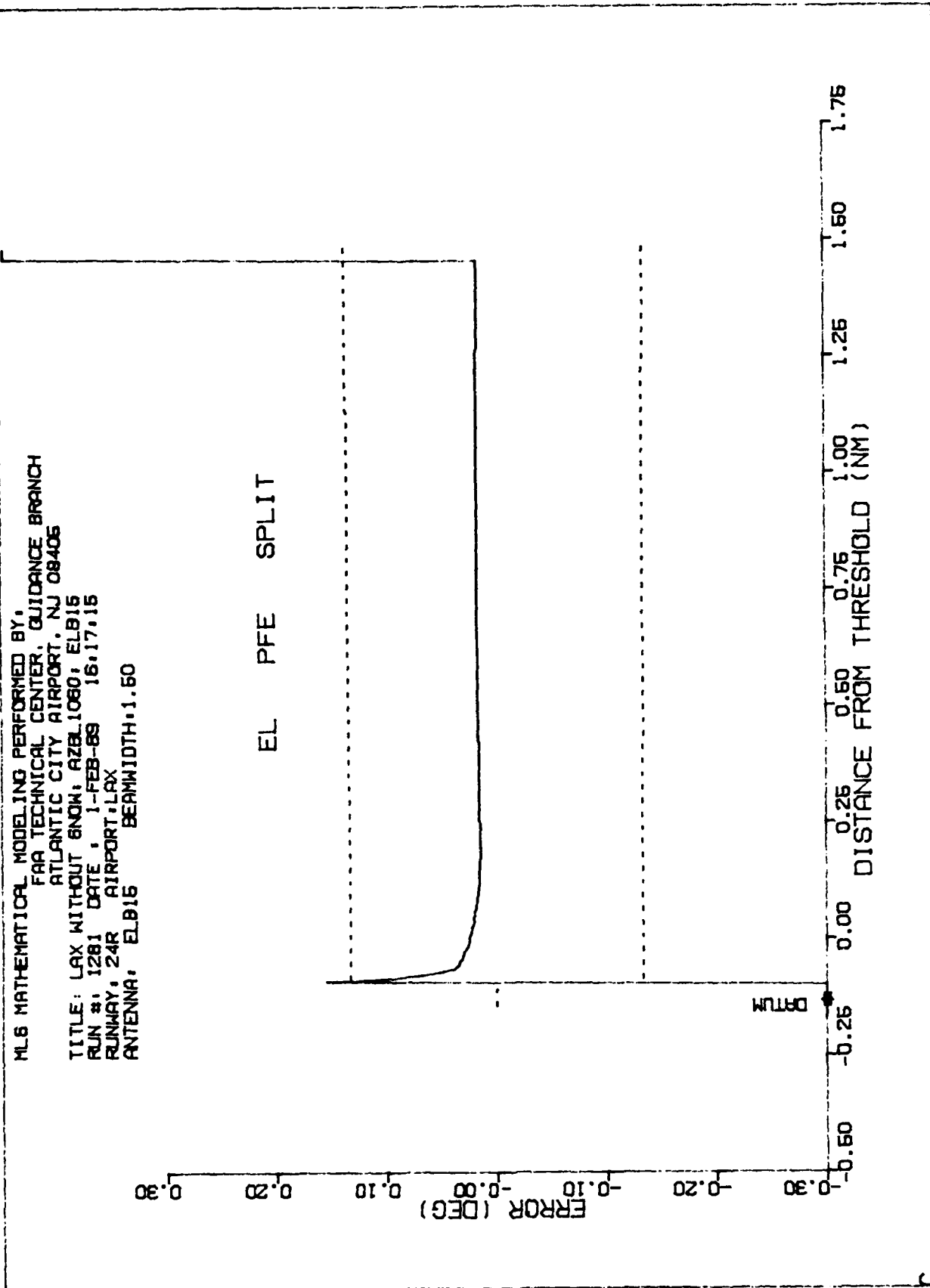


FIGURE 18. SCENARIO 2, ELEVATION SUBSYSTEM, SPLIT GATE, ELB15 ANTENNA, PFE FILTERED PLOT

APPENDIX A

BENDIX TEST BED 1° BEAMWIDTH AZIMUTH ANTENNA
SCAN PATTERN DATA

APPENDIX A
BENDIX TEST BED 1.0 DEGREE AZIMUTH ANTENNA SCAN PATTERN

15 September 1988

Azimuth pattern of MLZ AZ array from -90(.2)90 degrees

116 elements spaced 1.222"

Beamwidth = 1 degree

5061 MHz

4-bit phase shifters (calibration error of LSB/2 included)

Degrees	Voltage
-.900001E+02	0.578273E-02
-.898001E+02	0.609808E-02
-.896001E+02	0.634733E-02
-.894001E+02	0.656509E-02
-.892001E+02	0.676526E-02
-.890001E+02	0.695423E-02
-.888001E+02	0.713607E-02
-.886001E+02	0.731367E-02
-.884001E+02	0.748895E-02
-.882001E+02	0.766241E-02
-.880001E+02	0.783599E-02
-.878001E+02	0.800949E-02
-.876001E+02	0.818374E-02
-.874001E+02	0.835878E-02
-.872001E+02	0.853522E-02
-.870001E+02	0.871203E-02
-.868001E+02	0.888924E-02
-.866001E+02	0.906656E-02
-.864001E+02	0.924402E-02
-.862001E+02	0.941943E-02
-.860001E+02	0.959312E-02
-.858001E+02	0.976354E-02
-.856001E+02	0.993049E-02
-.854001E+02	0.100910E-01
-.852001E+02	0.102451E-01
-.850001E+02	0.103911E-01
-.848001E+02	0.105274E-01
-.846001E+02	0.106525E-01
-.844001E+02	0.107643E-01
-.842001E+02	0.108617E-01
-.840001E+02	0.109431E-01
-.838001E+02	0.110075E-01
-.836001E+02	0.110524E-01
-.834001E+02	0.110773E-01
-.832001E+02	0.110806E-01

-.830001E+02	0.110620E-01
-.828001E+02	0.110210E-01
-.826001E+02	0.109568E-01
-.824001E+02	0.108708E-01
-.822001E+02	0.107631E-01
-.820001E+02	0.106355E-01
-.818001E+02	0.104907E-01
-.816001E+02	0.103301E-01
-.814001E+02	0.101596E-01
-.812001E+02	0.998386E-02
-.810001E+02	0.980892E-02
-.808001E+02	0.964362E-02
-.806001E+02	0.949683E-02
-.804001E+02	0.937980E-02
-.802001E+02	0.930452E-02
-.800001E+02	0.928175E-02
-.798001E+02	0.932207E-02
-.796001E+02	0.943264E-02
-.794001E+02	0.961658E-02
-.792001E+02	0.987242E-02
-.790001E+02	0.101961E-01
-.788001E+02	0.105817E-01
-.786001E+02	0.110225E-01
-.784001E+02	0.115118E-01
-.782001E+02	0.120435E-01
-.780001E+02	0.126117E-01
-.778001E+02	0.132103E-01
-.776001E+02	0.138321E-01
-.774001E+02	0.144695E-01
-.772001E+02	0.151133E-01
-.770001E+02	0.157522E-01
-.768001E+02	0.163736E-01
-.766001E+02	0.169633E-01
-.764001E+02	0.175047E-01
-.762001E+02	0.179799E-01
-.760001E+02	0.183712E-01
-.758001E+02	0.186594E-01
-.756001E+02	0.188261E-01
-.754001E+02	0.188537E-01
-.752001E+02	0.187273E-01
-.750001E+02	0.184338E-01
-.748001E+02	0.179652E-01
-.746001E+02	0.173171E-01
-.744001E+02	0.164925E-01
-.742001E+02	0.155010E-01
-.740001E+02	0.143634E-01
-.738001E+02	0.131144E-01
-.736001E+02	0.118167E-01

-.734001E+02	0.105970E-01
-.732001E+02	0.974446E-02
-.730001E+02	0.973593E-02
-.728001E+02	0.106110E-01
-.726001E+02	0.118954E-01
-.724001E+02	0.132720E-01
-.722001E+02	0.145931E-01
-.720001E+02	0.157844E-01
-.718001E+02	0.168027E-01
-.716001E+02	0.176255E-01
-.714001E+02	0.182504E-01
-.712001E+02	0.186935E-01
-.710001E+02	0.189911E-01
-.708001E+02	0.191977E-01
-.706001E+02	0.193802E-01
-.704001E+02	0.196076E-01
-.702001E+02	0.199350E-01
-.700001E+02	0.203874E-01
-.698001E+02	0.209513E-01
-.696001E+02	0.215750E-01
-.694001E+02	0.221816E-01
-.692001E+02	0.226822E-01
-.690001E+02	0.229908E-01
-.688001E+02	0.230326E-01
-.686001E+02	0.227515E-01
-.684001E+02	0.221143E-01
-.682001E+02	0.211128E-01
-.680001E+02	0.197659E-01
-.678001E+02	0.181168E-01
-.676001E+02	0.162329E-01
-.674001E+02	0.142015E-01
-.672001E+02	0.121328E-01
-.670001E+02	0.101737E-01
-.668001E+02	0.883476E-02
-.666001E+02	0.966257E-02
-.664001E+02	0.109077E-01
-.662001E+02	0.118343E-01
-.660001E+02	0.123544E-01
-.658001E+02	0.124672E-01
-.656001E+02	0.122295E-01
-.654001E+02	0.117717E-01
-.652001E+02	0.113343E-01
-.650001E+02	0.112574E-01
-.648001E+02	0.117188E-01
-.646001E+02	0.125150E-01
-.644001E+02	0.133342E-01
-.642001E+02	0.139490E-01
-.640001E+02	0.142145E-01

-.638001E+02	0.140466E-01
-.636001E+02	0.134145E-01
-.634001E+02	0.123375E-01
-.632001E+02	0.108915E-01
-.630001E+02	0.934399E-02
-.628001E+02	0.100976E-01
-.626001E+02	0.120627E-01
-.624001E+02	0.139902E-01
-.622001E+02	0.157029E-01
-.620001E+02	0.170936E-01
-.618001E+02	0.181001E-01
-.616001E+02	0.187039E-01
-.614001E+02	0.189353E-01
-.612001E+02	0.188602E-01
-.610001E+02	0.185681E-01
-.608001E+02	0.181497E-01
-.606001E+02	0.176803E-01
-.604001E+02	0.172180E-01
-.602001E+02	0.168302E-01
-.600001E+02	0.166418E-01
-.598001E+02	0.168487E-01
-.596001E+02	0.176379E-01
-.594001E+02	0.190386E-01
-.592001E+02	0.208821E-01
-.590001E+02	0.228964E-01
-.588001E+02	0.247890E-01
-.586001E+02	0.262964E-01
-.584001E+02	0.272069E-01
-.582001E+02	0.273872E-01
-.580001E+02	0.267981E-01
-.578001E+02	0.255141E-01
-.576001E+02	0.237298E-01
-.574001E+02	0.217582E-01
-.572001E+02	0.200048E-01
-.570001E+02	0.188554E-01
-.568001E+02	0.184492E-01
-.566001E+02	0.185719E-01
-.564001E+02	0.189199E-01
-.562001E+02	0.194292E-01
-.560001E+02	0.203516E-01
-.558001E+02	0.220272E-01
-.556001E+02	0.245368E-01
-.554001E+02	0.276045E-01
-.552001E+02	0.307616E-01
-.550001E+02	0.335093E-01
-.548001E+02	0.354111E-01
-.546001E+02	0.361410E-01
-.544001E+02	0.355099E-01

-.542001E+02	0.334829E-01
-.540001E+02	0.301787E-01
-.538001E+02	0.258598E-01
-.536001E+02	0.209383E-01
-.534001E+02	0.161594E-01
-.532001E+02	0.140855E-01
-.530001E+02	0.170948E-01
-.528001E+02	0.211408E-01
-.526001E+02	0.246717E-01
-.524001E+02	0.273393E-01
-.522001E+02	0.290352E-01
-.520001E+02	0.297575E-01
-.518001E+02	0.295828E-01
-.516001E+02	0.286698E-01
-.514001E+02	0.272767E-01
-.512001E+02	0.257753E-01
-.510001E+02	0.246145E-01
-.508001E+02	0.241580E-01
-.506001E+02	0.244387E-01
-.504001E+02	0.251124E-01
-.502001E+02	0.256982E-01
-.500001E+02	0.258186E-01
-.498001E+02	0.252840E-01
-.496001E+02	0.240907E-01
-.494001E+02	0.223802E-01
-.492001E+02	0.203839E-01
-.490001E+02	0.183583E-01
-.488001E+02	0.165245E-01
-.486001E+02	0.150170E-01
-.484001E+02	0.138673E-01
-.482001E+02	0.130195E-01
-.480001E+02	0.123550E-01
-.478001E+02	0.116991E-01
-.476001E+02	0.108651E-01
-.474001E+02	0.111189E-01
-.472001E+02	0.128052E-01
-.470001E+02	0.148522E-01
-.468001E+02	0.170159E-01
-.466001E+02	0.189706E-01
-.464001E+02	0.203648E-01
-.462001E+02	0.208955E-01
-.460001E+02	0.203852E-01
-.458001E+02	0.188315E-01
-.456001E+02	0.164275E-01
-.454001E+02	0.135512E-01
-.452001E+02	0.112397E-01
-.450001E+02	0.132065E-01
-.448001E+02	0.149013E-01

-.446001E+02	0.155910E-01
-.444001E+02	0.152928E-01
-.442001E+02	0.143535E-01
-.440001E+02	0.135648E-01
-.438001E+02	0.138368E-01
-.436001E+02	0.147233E-01
-.434001E+02	0.153647E-01
-.432001E+02	0.155255E-01
-.430001E+02	0.154565E-01
-.428001E+02	0.156222E-01
-.426001E+02	0.161909E-01
-.424001E+02	0.168962E-01
-.422001E+02	0.175634E-01
-.420001E+02	0.184726E-01
-.418001E+02	0.201013E-01
-.416001E+02	0.224539E-01
-.414001E+02	0.249285E-01
-.412001E+02	0.267273E-01
-.410001E+02	0.271880E-01
-.408001E+02	0.259662E-01
-.406001E+02	0.231198E-01
-.404001E+02	0.191107E-01
-.402001E+02	0.147230E-01
-.400001E+02	0.117636E-01
-.398001E+02	0.140240E-01
-.396001E+02	0.148776E-01
-.394001E+02	0.138844E-01
-.392001E+02	0.118897E-01
-.390001E+02	0.143086E-01
-.388001E+02	0.173627E-01
-.386001E+02	0.193006E-01
-.384001E+02	0.194633E-01
-.382001E+02	0.177493E-01
-.380001E+02	0.150498E-01
-.378001E+02	0.152981E-01
-.376001E+02	0.188456E-01
-.374001E+02	0.218895E-01
-.372001E+02	0.232051E-01
-.370001E+02	0.225800E-01
-.368001E+02	0.206850E-01
-.366001E+02	0.191752E-01
-.364001E+02	0.195637E-01
-.362001E+02	0.207698E-01
-.360001E+02	0.208781E-01
-.358001E+02	0.191068E-01
-.356001E+02	0.160807E-01
-.354001E+02	0.158294E-01
-.352001E+02	0.198461E-01

-.350001E+02	0.237286E-01
-.348001E+02	0.259616E-01
-.346001E+02	0.262086E-01
-.344001E+02	0.248686E-01
-.342001E+02	0.228530E-01
-.340001E+02	0.211706E-01
-.338001E+02	0.204265E-01
-.336001E+02	0.208654E-01
-.334001E+02	0.227385E-01
-.332001E+02	0.257876E-01
-.330001E+02	0.289515E-01
-.328001E+02	0.309439E-01
-.326001E+02	0.308258E-01
-.324001E+02	0.283408E-01
-.322001E+02	0.240382E-01
-.320001E+02	0.191721E-01
-.318001E+02	0.154047E-01
-.316001E+02	0.139105E-01
-.314001E+02	0.146527E-01
-.312001E+02	0.190768E-01
-.310001E+02	0.261913E-01
-.308001E+02	0.342195E-01
-.306001E+02	0.413109E-01
-.304001E+02	0.458998E-01
-.302001E+02	0.471207E-01
-.300001E+02	0.450272E-01
-.298001E+02	0.405257E-01
-.296001E+02	0.350440E-01
-.294001E+02	0.300651E-01
-.292001E+02	0.267481E-01
-.290001E+02	0.256586E-01
-.288001E+02	0.263491E-01
-.286001E+02	0.273629E-01
-.284001E+02	0.270388E-01
-.282001E+02	0.242335E-01
-.280001E+02	0.187937E-01
-.278001E+02	0.146420E-01
-.276001E+02	0.216737E-01
-.274001E+02	0.285733E-01
-.272001E+02	0.328460E-01
-.270001E+02	0.339943E-01
-.268001E+02	0.330308E-01
-.266001E+02	0.321383E-01
-.264001E+02	0.327278E-01
-.262001E+02	0.336226E-01
-.260001E+02	0.327257E-01
-.258001E+02	0.292170E-01
-.256001E+02	0.241844E-01

-.254001E+02	0.206826E-01
-.252001E+02	0.208073E-01
-.250001E+02	0.209336E-01
-.248001E+02	0.181314E-01
-.246001E+02	0.126911E-01
-.244001E+02	0.188271E-01
-.242001E+02	0.251148E-01
-.240001E+02	0.284639E-01
-.238001E+02	0.278217E-01
-.236001E+02	0.237550E-01
-.234001E+02	0.195774E-01
-.232001E+02	0.215148E-01
-.230001E+02	0.259491E-01
-.228001E+02	0.281007E-01
-.226001E+02	0.271297E-01
-.224001E+02	0.240204E-01
-.222001E+02	0.207343E-01
-.220001E+02	0.192416E-01
-.218001E+02	0.202738E-01
-.216001E+02	0.235991E-01
-.214001E+02	0.283352E-01
-.212001E+02	0.326548E-01
-.210001E+02	0.346011E-01
-.208001E+02	0.330104E-01
-.206001E+02	0.280611E-01
-.204001E+02	0.213893E-01
-.202001E+02	0.165319E-01
-.200001E+02	0.175190E-01
-.198001E+02	0.185782E-01
-.196001E+02	0.187678E-01
-.194001E+02	0.212926E-01
-.192001E+02	0.251293E-01
-.190001E+02	0.270477E-01
-.188001E+02	0.253115E-01
-.186001E+02	0.200151E-01
-.184001E+02	0.129901E-01
-.182001E+02	0.180630E-01
-.180001E+02	0.213176E-01
-.178001E+02	0.200879E-01
-.176001E+02	0.152473E-01
-.174001E+02	0.181816E-01
-.172001E+02	0.247446E-01
-.170001E+02	0.279336E-01
-.168001E+02	0.262237E-01
-.166001E+02	0.202797E-01
-.164001E+02	0.155471E-01
-.162001E+02	0.210363E-01
-.160001E+02	0.239451E-01

-.158001E+02	0.215708E-01
-.156001E+02	0.166160E-01
-.154001E+02	0.227021E-01
-.152001E+02	0.310549E-01
-.150001E+02	0.351943E-01
-.148001E+02	0.333223E-01
-.146001E+02	0.263349E-01
-.144001E+02	0.188604E-01
-.142001E+02	0.214118E-01
-.140001E+02	0.254119E-01
-.138001E+02	0.245369E-01
-.136001E+02	0.198248E-01
-.134001E+02	0.180953E-01
-.132001E+02	0.216200E-01
-.130001E+02	0.219293E-01
-.128001E+02	0.185499E-01
-.126001E+02	0.224103E-01
-.124001E+02	0.318386E-01
-.122001E+02	0.381812E-01
-.120001E+02	0.378516E-01
-.118001E+02	0.305616E-01
-.116001E+02	0.212156E-01
-.114001E+02	0.253449E-01
-.112001E+02	0.328987E-01
-.110001E+02	0.335881E-01
-.108001E+02	0.265703E-01
-.106001E+02	0.181182E-01
-.104001E+02	0.266351E-01
-.102001E+02	0.345972E-01
-.100001E+02	0.350676E-01
-.980010E+01	0.282905E-01
-.960010E+01	0.205625E-01
-.940010E+01	0.244588E-01
-.920010E+01	0.282190E-01
-.900010E+01	0.241445E-01
-.880010E+01	0.134164E-01
-.860010E+01	0.264233E-01
-.840010E+01	0.372698E-01
-.820010E+01	0.395214E-01
-.800010E+01	0.311974E-01
-.780010E+01	0.146718E-01
-.760010E+01	0.290269E-01
-.740010E+01	0.426814E-01
-.720010E+01	0.456010E-01
-.700010E+01	0.363478E-01
-.680010E+01	0.197287E-01
-.660010E+01	0.283373E-01
-.640010E+01	0.411790E-01

-.620010E+01	0.418802E-01
-.600010E+01	0.292979E-01
-.580010E+01	0.169381E-01
-.560010E+01	0.382242E-01
-.540010E+01	0.506059E-01
-.520010E+01	0.484042E-01
-.500010E+01	0.318939E-01
-.480010E+01	0.177513E-01
-.460010E+01	0.398100E-01
-.440010E+01	0.499015E-01
-.420010E+01	0.427539E-01
-.400010E+01	0.218539E-01
-.380010E+01	0.368076E-01
-.360010E+01	0.612227E-01
-.340010E+01	0.704628E-01
-.320010E+01	0.602268E-01
-.300010E+01	0.366511E-01
-.280010E+01	0.312038E-01
-.260010E+01	0.462846E-01
-.240010E+01	0.433425E-01
-.220010E+01	0.187525E-01
-.200010E+01	0.417028E-01
-.180010E+01	0.648959E-01
-.160010E+01	0.497479E-01
-.140010E+01	0.507797E-01
-.120010E+01	0.192512E+00
-.100010E+01	0.389330E+00
-.800095E+00	0.610502E+00
-.600098E+00	0.813762E+00
-.400102E+00	0.956270E+00
-.200097E+00	0.100657E+01
0.100000E-03	0.953626E+00
0.200105E+00	0.809995E+00
0.400102E+00	0.608054E+00
0.600098E+00	0.390643E+00
0.800103E+00	0.199145E+00
0.100010E+01	0.627389E-01
0.120010E+01	0.335205E-01
0.140010E+01	0.465238E-01
0.160010E+01	0.232104E-01
0.180010E+01	0.360716E-01
0.200010E+01	0.600173E-01
0.220010E+01	0.632334E-01
0.240010E+01	0.477452E-01
0.260010E+01	0.295654E-01
0.280010E+01	0.368114E-01
0.300010E+01	0.433931E-01
0.320010E+01	0.349019E-01

0.340010E+01	0.203824E-01
0.360010E+01	0.373365E-01
0.380010E+01	0.521507E-01
0.400010E+01	0.525132E-01
0.420010E+01	0.379157E-01
0.440010E+01	0.153046E-01
0.460010E+01	0.337944E-01
0.480010E+01	0.468144E-01
0.500010E+01	0.450920E-01
0.520010E+01	0.296881E-01
0.540010E+01	0.180884E-01
0.560010E+01	0.389244E-01
0.580010E+01	0.501332E-01
0.600010E+01	0.479251E-01
0.620010E+01	0.341437E-01
0.640010E+01	0.183912E-01
0.660010E+01	0.297692E-01
0.680010E+01	0.378658E-01
0.700010E+01	0.346880E-01
0.720010E+01	0.221376E-01
0.740010E+01	0.189887E-01
0.760010E+01	0.318686E-01
0.780010E+01	0.361735E-01
0.800010E+01	0.303071E-01
0.820010E+01	0.168329E-01
0.840010E+01	0.238400E-01
0.860010E+01	0.356640E-01
0.880010E+01	0.394371E-01
0.900010E+01	0.344892E-01
0.920010E+01	0.245308E-01
0.940010E+01	0.217780E-01
0.960010E+01	0.281240E-01
0.980010E+01	0.296079E-01
0.100001E+02	0.243622E-01
0.102001E+02	0.176561E-01
0.104001E+02	0.239603E-01
0.106001E+02	0.303764E-01
0.108001E+02	0.311152E-01
0.110001E+02	0.264475E-01
0.112001E+02	0.198544E-01
0.114001E+02	0.181292E-01
0.116001E+02	0.190741E-01
0.118001E+02	0.163341E-01
0.120001E+02	0.186048E-01
0.122001E+02	0.274686E-01
0.124001E+02	0.344603E-01
0.126001E+02	0.363302E-01
0.128001E+02	0.321318E-01

0.130001E+02	0.235271E-01
0.132001E+02	0.174117E-01
0.134001E+02	0.232995E-01
0.136001E+02	0.272752E-01
0.138001E+02	0.264025E-01
0.140001E+02	0.225515E-01
0.142001E+02	0.208173E-01
0.144001E+02	0.229279E-01
0.146001E+02	0.237924E-01
0.148001E+02	0.216983E-01
0.150001E+02	0.193663E-01
0.152001E+02	0.212334E-01
0.154001E+02	0.238809E-01
0.156001E+02	0.235290E-01
0.158001E+02	0.196797E-01
0.160001E+02	0.146330E-01
0.162001E+02	0.175817E-01
0.164001E+02	0.205292E-01
0.166001E+02	0.196084E-01
0.168001E+02	0.149481E-01
0.170001E+02	0.162377E-01
0.172001E+02	0.224560E-01
0.174001E+02	0.258646E-01
0.176001E+02	0.251924E-01
0.178001E+02	0.207367E-01
0.180001E+02	0.149343E-01
0.182001E+02	0.180526E-01
0.184001E+02	0.223048E-01
0.186001E+02	0.234630E-01
0.188001E+02	0.221764E-01
0.190001E+02	0.213434E-01
0.192001E+02	0.231153E-01
0.194001E+02	0.252478E-01
0.196001E+02	0.255521E-01
0.198001E+02	0.239170E-01
0.200001E+02	0.216689E-01
0.202001E+02	0.200958E-01
0.204001E+02	0.188811E-01
0.206001E+02	0.182817E-01
0.208001E+02	0.215160E-01
0.210001E+02	0.276735E-01
0.212001E+02	0.334911E-01
0.214001E+02	0.366567E-01
0.216001E+02	0.359549E-01
0.218001E+02	0.314565E-01
0.220001E+02	0.244765E-01
0.222001E+02	0.175770E-01
0.224001E+02	0.168923E-01

0.226001E+02	0.198919E-01
0.228001E+02	0.207308E-01
0.230001E+02	0.195179E-01
0.232001E+02	0.176671E-01
0.234001E+02	0.164480E-01
0.236001E+02	0.154710E-01
0.238001E+02	0.138210E-01
0.240001E+02	0.142064E-01
0.242001E+02	0.171959E-01
0.244001E+02	0.196406E-01
0.246001E+02	0.207075E-01
0.248001E+02	0.206050E-01
0.250001E+02	0.206607E-01
0.252001E+02	0.222015E-01
0.254001E+02	0.247819E-01
0.256001E+02	0.272747E-01
0.258001E+02	0.291703E-01
0.260001E+02	0.304548E-01
0.262001E+02	0.310813E-01
0.264001E+02	0.307142E-01
0.266001E+02	0.289958E-01
0.268001E+02	0.260379E-01
0.270001E+02	0.227420E-01
0.272001E+02	0.205509E-01
0.274001E+02	0.197721E-01
0.276001E+02	0.186961E-01
0.278001E+02	0.163858E-01
0.280001E+02	0.171654E-01
0.282001E+02	0.234752E-01
0.284001E+02	0.308891E-01
0.286001E+02	0.373431E-01
0.288001E+02	0.416318E-01
0.290001E+02	0.432500E-01
0.292001E+02	0.424084E-01
0.294001E+02	0.399027E-01
0.296001E+02	0.368453E-01
0.298001E+02	0.343069E-01
0.300001E+02	0.328871E-01
0.302001E+02	0.324102E-01
0.304001E+02	0.320958E-01
0.306001E+02	0.310680E-01
0.308001E+02	0.287586E-01
0.310001E+02	0.251177E-01
0.312001E+02	0.207493E-01
0.314001E+02	0.172642E-01
0.316001E+02	0.171910E-01
0.318001E+02	0.190234E-01
0.320001E+02	0.203741E-01

0.322001E+02	0.214586E-01
0.324001E+02	0.234345E-01
0.326001E+02	0.264974E-01
0.328001E+02	0.295703E-01
0.330001E+02	0.314361E-01
0.332001E+02	0.314024E-01
0.334001E+02	0.294727E-01
0.336001E+02	0.262931E-01
0.338001E+02	0.229089E-01
0.340001E+02	0.202525E-01
0.342001E+02	0.184145E-01
0.344001E+02	0.166949E-01
0.346001E+02	0.150531E-01
0.348001E+02	0.155696E-01
0.350001E+02	0.182594E-01
0.352001E+02	0.209009E-01
0.354001E+02	0.224739E-01
0.356001E+02	0.226800E-01
0.358001E+02	0.217227E-01
0.360001E+02	0.201114E-01
0.362001E+02	0.183248E-01
0.364001E+02	0.164598E-01
0.366001E+02	0.142495E-01
0.368001E+02	0.117114E-01
0.370001E+02	0.141945E-01
0.372001E+02	0.172318E-01
0.374001E+02	0.194607E-01
0.376001E+02	0.202826E-01
0.378001E+02	0.194431E-01
0.380001E+02	0.172171E-01
0.382001E+02	0.148870E-01
0.384001E+02	0.155098E-01
0.386001E+02	0.180176E-01
0.388001E+02	0.197813E-01
0.390001E+02	0.200149E-01
0.392001E+02	0.186958E-01
0.394001E+02	0.162982E-01
0.396001E+02	0.136244E-01
0.398001E+02	0.117129E-01
0.400001E+02	0.115144E-01
0.402001E+02	0.114589E-01
0.404001E+02	0.141277E-01
0.406001E+02	0.180616E-01
0.408001E+02	0.224459E-01
0.410001E+02	0.263299E-01
0.412001E+02	0.288374E-01
0.414001E+02	0.293753E-01
0.416001E+02	0.277792E-01

0.418001E+02	0.243698E-01
0.420001E+02	0.199526E-01
0.422001E+02	0.159884E-01
0.424001E+02	0.151331E-01
0.426001E+02	0.166210E-01
0.428001E+02	0.172224E-01
0.430001E+02	0.161412E-01
0.432001E+02	0.136502E-01
0.434001E+02	0.121293E-01
0.436001E+02	0.151705E-01
0.438001E+02	0.179479E-01
0.440001E+02	0.194833E-01
0.442001E+02	0.194845E-01
0.444001E+02	0.180518E-01
0.446001E+02	0.156189E-01
0.448001E+02	0.128415E-01
0.450001E+Q2	0.106758E-01
0.452001E+02	0.119905E-01
0.454001E+02	0.120748E-01
0.456001E+02	0.116152E-01
0.458001E+02	0.136473E-01
0.460001E+02	0.168928E-01
0.462001E+02	0.201648E-01
0.464001E+02	0.226748E-01
0.466001E+02	0.238015E-01
0.468001E+02	0.231735E-01
0.470001E+02	0.207407E-01
0.472001E+02	0.167891E-01
0.474001E+02	0.121790E-01
0.476001E+02	0.144787E-01
0.478001E+02	0.192625E-01
0.480001E+02	0.230877E-01
0.482001E+02	0.254520E-01
0.484001E+02	0.261828E-01
0.486001E+02	0.254054E-01
0.488001E+02	0.234923E-01
0.490001E+02	0.209733E-01
0.492001E+02	0.184029E-01
0.494001E+02	0.162336E-01
0.496001E+02	0.148605E-01
0.498001E+02	0.149538E-01
0.500001E+02	0.169459E-01
0.502001E+02	0.203092E-01
0.504001E+02	0.243545E-01
0.506001E+02	0.284661E-01
0.508001E+02	0.320680E-01
0.510001E+02	0.346678E-01
0.512001E+02	0.359205E-01

0.514001E+02	0.356754E-01
0.516001E+02	0.340002E-01
0.518001E+02	0.311790E-01
0.520001E+02	0.277050E-01
0.522001E+02	0.242930E-01
0.524001E+02	0.218716E-01
0.526001E+02	0.212291E-01
0.528001E+02	0.221943E-01
0.530001E+02	0.238151E-01
0.532001E+02	0.253155E-01
0.534001E+02	0.263192E-01
0.536001E+02	0.267066E-01
0.538001E+02	0.264943E-01
0.540001E+02	0.257874E-01
0.542001E+02	0.247702E-01
0.544001E+02	0.237158E-01
0.546001E+02	0.229676E-01
0.548001E+02	0.228300E-01
0.550001E+02	0.233798E-01
0.552001E+02	0.243925E-01
0.554001E+02	0.254833E-01
0.556001E+02	0.262872E-01
0.558001E+02	0.265483E-01
0.560001E+02	0.261386E-01
0.562001E+02	0.250562E-01
0.564001E+02	0.234104E-01
0.566001E+02	0.213970E-01
0.568001E+02	0.192810E-01
0.570001E+02	0.173717E-01
0.572001E+02	0.159952E-01
0.574001E+02	0.153955E-01
0.576001E+02	0.155738E-01
0.578001E+02	0.163255E-01
0.580001E+02	0.174585E-01
0.582001E+02	0.188559E-01
0.584001E+02	0.204102E-01
0.586001E+02	0.219775E-01
0.588001E+02	0.233824E-01
0.590001E+02	0.244446E-01
0.592001E+02	0.250121E-01
0.594001E+02	0.249825E-01
0.596001E+02	0.243179E-01
0.598001E+02	0.230522E-01
0.600001E+02	0.212826E-01
0.602001E+02	0.191662E-01
0.604001E+02	0.169096E-01
0.606001E+02	0.147667E-01
0.608001E+02	0.130521E-01

0.610001E+02	0.121101E-01
0.612001E+02	0.119632E-01
0.614001E+02	0.121042E-01
0.616001E+02	0.120709E-01
0.618001E+02	0.116841E-01
0.620001E+02	0.109477E-01
0.622001E+02	0.100091E-01
0.624001E+02	0.949711E-02
0.626001E+02	0.102663E-01
0.628001E+02	0.113860E-01
0.630001E+02	0.124000E-01
0.632001E+02	0.131642E-01
0.634001E+02	0.136090E-01
0.636001E+02	0.137155E-01
0.638001E+02	0.135148E-01
0.640001E+02	0.130933E-01
0.642001E+02	0.125994E-01
0.644001E+02	0.122413E-01
0.646001E+02	0.122176E-01
0.648001E+02	0.125718E-01
0.650001E+02	0.131623E-01
0.652001E+02	0.137989E-01
0.654001E+02	0.143380E-01
0.656001E+02	0.146901E-01
0.658001E+02	0.148137E-01
0.660001E+02	0.147017E-01
0.662001E+02	0.143769E-01
0.664001E+02	0.138842E-01
0.666001E+02	0.132891E-01
0.668001E+02	0.126760E-01
0.670001E+02	0.121461E-01
0.672001E+02	0.118096E-01
0.674001E+02	0.117574E-01
0.676001E+02	0.120114E-01
0.678001E+02	0.125243E-01
0.680001E+02	0.132245E-01
0.682001E+02	0.140496E-01
0.684001E+02	0.149513E-01
0.686001E+02	0.158881E-01
0.688001E+02	0.168190E-01
0.690001E+02	0.176999E-01
0.692001E+02	0.184856E-01
0.694001E+02	0.191297E-01
0.696001E+02	0.195896E-01
0.698001E+02	0.198285E-01
0.700001E+02	0.198182E-01
0.702001E+02	0.195416E-01
0.704001E+02	0.189930E-01

0.706001E+02	0.181800E-01
0.708001E+02	0.171226E-01
0.710001E+02	0.158549E-01
0.712001E+02	0.144263E-01
0.714001E+02	0.129090E-01
0.716001E+02	0.114211E-01
0.718001E+02	0.102061E-01
0.720001E+02	0.974953E-02
0.722001E+02	0.103216E-01
0.724001E+02	0.114534E-01
0.726001E+02	0.127209E-01
0.728001E+02	0.139437E-01
0.730001E+02	0.150444E-01
0.732001E+02	0.159857E-01
0.734001E+02	0.167538E-01
0.736001E+02	0.173484E-01
0.738001E+02	0.177818E-01
0.740001E+02	0.180768E-01
0.742001E+02	0.182627E-01
0.744001E+02	0.183752E-01
0.746001E+02	0.184521E-01
0.748001E+02	0.185295E-01
0.750001E+02	0.186380E-01
0.752001E+02	0.187990E-01
0.754001E+02	0.190222E-01
0.756001E+02	0.193049E-01
0.758001E+02	0.196344E-01
0.760001E+02	0.199897E-01
0.762001E+02	0.203469E-01
0.764001E+02	0.206803E-01
0.766001E+02	0.209654E-01
0.768001E+02	0.211822E-01
0.770001E+02	0.213135E-01
0.772001E+02	0.213467E-01
0.774001E+02	0.212735E-01
0.776001E+02	0.210904E-01
0.778001E+02	0.207956E-01
0.780001E+02	0.203925E-01
0.782001E+02	0.198860E-01
0.784001E+02	0.192844E-01
0.786001E+02	0.185966E-01
0.788001E+02	0.178328E-01
0.790001E+02	0.170048E-01
0.792001E+02	0.161251E-01
0.794001E+02	0.152048E-01
0.796001E+02	0.142565E-01
0.798001E+02	0.132918E-01
0.800001E+02	0.123224E-01

0.802001E+02	0.113581E-01
0.804001E+02	0.104093E-01
0.806001E+02	0.948592E-02
0.808001E+02	0.859698E-02
0.810001E+02	0.775444E-02
0.812001E+02	0.697351E-02
0.814001E+02	0.628593E-02
0.816001E+02	0.577459E-02
0.818001E+02	0.560588E-02
0.820001E+02	0.579607E-02
0.822001E+02	0.613227E-02
0.824001E+02	0.648906E-02
0.826001E+02	0.682558E-02
0.828001E+02	0.712713E-02
0.830001E+02	0.738935E-02
0.832001E+02	0.761026E-02
0.834001E+02	0.779108E-02
0.836001E+02	0.793288E-02
0.838001E+02	0.803878E-02
0.840001E+02	0.811068E-02
0.842001E+02	0.815138E-02
0.844001E+02	0.816302E-02
0.846001E+02	0.814887E-02
0.848001E+02	0.811179E-02
0.850001E+02	0.805422E-02
0.852001E+02	0.797932E-02
0.854001E+02	0.788763E-02
0.856001E+02	0.778371E-02
0.858001E+02	0.766830E-02
0.860001E+02	0.754398E-02
0.862001E+02	0.741114E-02
0.864001E+02	0.727280E-02
0.866001E+02	0.712965E-02
0.868001E+02	0.698242E-02
0.870001E+02	0.683187E-02
0.872001E+02	0.667938E-02
0.874001E+02	0.652500E-02
0.876001E+02	0.636858E-02
0.878001E+02	0.620995E-02
0.880001E+02	0.604951E-02
0.882001E+02	0.588550E-02
0.884001E+02	0.571753E-02
0.886001E+02	0.554390E-02
0.888001E+02	0.536175E-02
0.890001E+02	0.516704E-02
0.892001E+02	0.495353E-02
0.894001E+02	0.470730E-02
0.896001E+02	0.439371E-02

0.898001E+02	0.365202E-02
0.900001E+02	0.275994E-01

APPENDIX B

BENDIX TEST BED AZIMUTH ANTENNA
VERTICAL PATTERN DATA

APPENDIX B
BENDIX TEST BED AZIMUTH ANTENNA VERTICAL PATTERN

	<u>Degrees</u>	<u>Voltage</u>	<u>dB</u>
*	-90.0	0.0195	-39.894
	-88.0		-40.212
	-86.0		-41.314
	-84.0		-43.736
	-82.0		-48.172
	-80.0		-46.153
	-78.0		-39.856
	-76.0		-36.269
	-74.0		-35.136
	-72.0		-37.126
	-70.0		-47.286
	-68.0		-41.106
	-66.0		-35.941
	-64.0		-38.589
	-62.0		-46.305
	-60.0		-37.980
	-58.0		-40.998
	-56.0		-39.323
	-54.0		-39.148
	-52.0		-41.405
	-50.0		-38.323
	-48.0		-42.151
	-46.0		-39.636
	-44.0		-38.436
	-42.0		-41.350
	-40.0		-36.062
	-38.0		-43.720
	-36.0		-34.985
	-34.0		-47.259
	-32.0		-34.115
	-30.0		-40.444
	-28.0		-38.777
	-26.0		-39.144
*	-24.0	0.0350	-34.854
*	-22.0	0.0302	-36.128
*	-20.0	0.0273	-37.041
*	-18.0	0.0483	-32.049
*	-16.0	0.0454	-32.562
*	-14.0	0.0559	-30.778
*	-12.0	0.0775	-27.938
*	-10.0	0.0271	-37.075
*	-8.0	0.0676	-29.129
*	-6.0	0.0296	-36.294
*	-4.0	0.0748	-28.240

*	-2.0	0.0736	-28.391
*	-0.0	0.3626	-14.535
*	2.0	1.0000	-5.723
*	4.0	0.8850	-6.783
*	6.0	0.9704	-5.984
*	8.0	0.8993	-6.645
*	10.0	0.8877	-6.757
*	12.0	0.7924	-7.744
*	14.0	0.7275	-8.485
*	16.0	0.6687	-9.217
*	18.0	0.6208	-9.864
*	20.0	0.4494	-12.669
*	22.0	0.1587	-21.711
*	24.0	0.0624	-29.819
*	26.0	0.0425	-33.165
*	28.0	0.0572	-30.581
*	30.0	0.0236	-38.254
	32.0		-32.019
	34.0		-33.373
	36.0		-36.650
	38.0		-33.570
	40.0		-43.201
	42.0		-33.966
	44.0		-43.083
	46.0		-35.315
	48.0		-40.774
	50.0		-37.701
	52.0		-39.760
	54.0		-36.040
	56.0		-48.617
	58.0		-35.179
	60.0		-37.158
	62.0		-47.068
	64.0		-36.639
	66.0		-37.124
	68.0		-41.612
	70.0		-41.121
	72.0		-40.267
	74.0		-40.989
	76.0		-39.916
	78.0		-38.036
	80.0		-37.131
	82.0		-37.209
	84.0		-37.908
	86.0		-38.833
	88.0		-39.598
*	90.0	0.0195	-39.894

* indicates value used in BLOCK DATA

APPENDIX C

BENDIX TEST BED 2° BEAMWIDTH AZIMUTH ANTENNA
SCAN PATTERN DATA

APPENDIX C
BENDIX TEST BED 2.0 DEGREE AZIMUTH ANTENNA SCAN PATTERN

15 September 1988

Azimuth pattern of MLS AZ array from -90(.2)90 degrees

52 elements spaced 1.326"

Beamwidth = 2 degrees

5061 MHz

4-bit phase shifters (calibration error of LSB/2 included)

Degrees	Voltage
-.900001E+02	0.259114E-01
-.898001E+02	0.265779E-01
-.896001E+02	0.270720E-01
-.894001E+02	0.274716E-01
-.892001E+02	0.278064E-01
-.890001E+02	0.280914E-01
-.888001E+02	0.283354E-01
-.886001E+02	0.285442E-01
-.884001E+02	0.287219E-01
-.882001E+02	0.288708E-01
-.880001E+02	0.289932E-01
-.878001E+02	0.290906E-01
-.876001E+02	0.291639E-01
-.874001E+02	0.292139E-01
-.872001E+02	0.292414E-01
-.870001E+02	0.292466E-01
-.868001E+02	0.292299E-01
-.866001E+02	0.291914E-01
-.864001E+02	0.291312E-01
-.862001E+02	0.290494E-01
-.860001E+02	0.289457E-01
-.858001E+02	0.288204E-01
-.856001E+02	0.286734E-01
-.854001E+02	0.285043E-01
-.852001E+02	0.283132E-01
-.850001E+02	0.281001E-01
-.848001E+02	0.278649E-01
-.846001E+02	0.276078E-01
-.844001E+02	0.273289E-01
-.842001E+02	0.270284E-01
-.840001E+02	0.267067E-01
-.838001E+02	0.263646E-01
-.836001E+02	0.260030E-01
-.834001E+02	0.256229E-01
-.832001E+02	0.252260E-01

-.830001E+02	0.248144E-01
-.828001E+02	0.243904E-01
-.826001E+02	0.239578E-01
-.824001E+02	0.235205E-01
-.822001E+02	0.230839E-01
-.820001E+02	0.226547E-01
-.818001E+02	0.222409E-01
-.816001E+02	0.218525E-01
-.814001E+02	0.215016E-01
-.812001E+02	0.212020E-01
-.810001E+02	0.209693E-01
-.808001E+02	0.208200E-01
-.806001E+02	0.207704E-01
-.804001E+02	0.208345E-01
-.802001E+02	0.210215E-01
-.800001E+02	0.213358E-01
-.798001E+02	0.217754E-01
-.796001E+02	0.223323E-01
-.794001E+02	0.229947E-01
-.792001E+02	0.237481E-01
-.790001E+02	0.245785E-01
-.788001E+02	0.254699E-01
-.786001E+02	0.264091E-01
-.784001E+02	0.273822E-01
-.782001E+02	0.283771E-01
-.780001E+02	0.293830E-01
-.778001E+02	0.303887E-01
-.776001E+02	0.313846E-01
-.774001E+02	0.323606E-01
-.772001E+02	0.333084E-01
-.770001E+02	0.342178E-01
-.768001E+02	0.350814E-01
-.766001E+02	0.358906E-01
-.764001E+02	0.366368E-01
-.762001E+02	0.373131E-01
-.760001E+02	0.379108E-01
-.758001E+02	0.384235E-01
-.756001E+02	0.388444E-01
-.754001E+02	0.391665E-01
-.752001E+02	0.393848E-01
-.750001E+02	0.394935E-01
-.748001E+02	0.394881E-01
-.746001E+02	0.393650E-01
-.744001E+02	0.391214E-01
-.742001E+02	0.387550E-01
-.740001E+02	0.382652E-01
-.738001E+02	0.376522E-01
-.736001E+02	0.369179E-01

-.734001E+02	0.360650E-01
-.732001E+02	0.350980E-01
-.730001E+02	0.340232E-01
-.728001E+02	0.328480E-01
-.726001E+02	0.315830E-01
-.724001E+02	0.302408E-01
-.722001E+02	0.288363E-01
-.720001E+02	0.273899E-01
-.718001E+02	0.259276E-01
-.716001E+02	0.244859E-01
-.714001E+02	0.231190E-01
-.712001E+02	0.219170E-01
-.710001E+02	0.210255E-01
-.708001E+02	0.206409E-01
-.706001E+02	0.208810E-01
-.704001E+02	0.216387E-01
-.702001E+02	0.226899E-01
-.700001E+02	0.238549E-01
-.698001E+02	0.250247E-01
-.696001E+02	0.261327E-01
-.694001E+02	0.271348E-01
-.692001E+02	0.280017E-01
-.690001E+02	0.287104E-01
-.688001E+02	0.292440E-01
-.686001E+02	0.295894E-01
-.684001E+02	0.297373E-01
-.682001E+02	0.296826E-01
-.680001E+02	0.294233E-01
-.678001E+02	0.289608E-01
-.676001E+02	0.283017E-01
-.674001E+02	0.274544E-01
-.672001E+02	0.264337E-01
-.670001E+02	0.252609E-01
-.668001E+02	0.239649E-01
-.666001E+02	0.225929E-01
-.664001E+02	0.212461E-01
-.662001E+02	0.202162E-01
-.660001E+02	0.202290E-01
-.658001E+02	0.213938E-01
-.656001E+02	0.229949E-01
-.654001E+02	0.246981E-01
-.652001E+02	0.263847E-01
-.650001E+02	0.279936E-01
-.648001E+02	0.294825E-01
-.646001E+02	0.308163E-01
-.644001E+02	0.319661E-01
-.642001E+02	0.329079E-01
-.640001E+02	0.336209E-01

-.638001E+02	0.340902E-01
-.636001E+02	0.343057E-01
-.634001E+02	0.342614E-01
-.632001E+02	0.339584E-01
-.630001E+02	0.334027E-01
-.628001E+02	0.326069E-01
-.626001E+02	0.315884E-01
-.624001E+02	0.303702E-01
-.622001E+02	0.289817E-01
-.620001E+02	0.274560E-01
-.618001E+02	0.258328E-01
-.616001E+02	0.241586E-01
-.614001E+02	0.224977E-01
-.612001E+02	0.210095E-01
-.610001E+02	0.206840E-01
-.608001E+02	0.219506E-01
-.606001E+02	0.233706E-01
-.604001E+02	0.246619E-01
-.602001E+02	0.257549E-01
-.600001E+02	0.266131E-01
-.598001E+02	0.272117E-01
-.596001E+02	0.275358E-01
-.594001E+02	0.275792E-01
-.592001E+02	0.273451E-01
-.590001E+02	0.268477E-01
-.588001E+02	0.261129E-01
-.586001E+02	0.251849E-01
-.584001E+02	0.241433E-01
-.582001E+02	0.231641E-01
-.580001E+02	0.226903E-01
-.578001E+02	0.232367E-01
-.576001E+02	0.244898E-01
-.574001E+02	0.259765E-01
-.572001E+02	0.274868E-01
-.570001E+02	0.289178E-01
-.568001E+02	0.302050E-01
-.566001E+02	0.313012E-01
-.564001E+02	0.321725E-01
-.562001E+02	0.327962E-01
-.560001E+02	0.331623E-01
-.558001E+02	0.332729E-01
-.556001E+02	0.331431E-01
-.554001E+02	0.328026E-01
-.552001E+02	0.322937E-01
-.550001E+02	0.316738E-01
-.548001E+02	0.310107E-01
-.546001E+02	0.303807E-01
-.544001E+02	0.298564E-01

-.542001E+02	0.294921E-01
-.540001E+02	0.293058E-01
-.538001E+02	0.292699E-01
-.536001E+02	0.293219E-01
-.534001E+02	0.293870E-01
-.532001E+02	0.294016E-01
-.530001E+02	0.293313E-01
-.528001E+02	0.291835E-01
-.526001E+02	0.290199E-01
-.524001E+02	0.289629E-01
-.522001E+02	0.291806E-01
-.520001E+02	0.298248E-01
-.518001E+02	0.309526E-01
-.516001E+02	0.325121E-01
-.514001E+02	0.343923E-01
-.512001E+02	0.364718E-01
-.510001E+02	0.386410E-01
-.508001E+02	0.408064E-01
-.506001E+02	0.428924E-01
-.504001E+02	0.448395E-01
-.502001E+02	0.466065E-01
-.500001E+02	0.481706E-01
-.498001E+02	0.495272E-01
-.496001E+02	0.506883E-01
-.494001E+02	0.516792E-01
-.492001E+02	0.525338E-01
-.490001E+02	0.532876E-01
-.488001E+02	0.539700E-01
-.486001E+02	0.545965E-01
-.484001E+02	0.551638E-01
-.482001E+02	0.556473E-01
-.480001E+02	0.560034E-01
-.478001E+02	0.561739E-01
-.476001E+02	0.560942E-01
-.474001E+02	0.557009E-01
-.472001E+02	0.549399E-01
-.470001E+02	0.537721E-01
-.468001E+02	0.521790E-01
-.466001E+02	0.501651E-01
-.464001E+02	0.477589E-01
-.462001E+02	0.450129E-01
-.460001E+02	0.420004E-01
-.458001E+02	0.388135E-01
-.456001E+02	0.355595E-01
-.454001E+02	0.323626E-01
-.452001E+02	0.293817E-01
-.450001E+02	0.269372E-01
-.448001E+02	0.260885E-01

-.446001E+02	0.273666E-01
-.444001E+02	0.291396E-01
-.442001E+02	0.308012E-01
-.440001E+02	0.322798E-01
-.438001E+02	0.336232E-01
-.436001E+02	0.349102E-01
-.434001E+02	0.362099E-01
-.432001E+02	0.375536E-01
-.430001E+02	0.389211E-01
-.428001E+02	0.402439E-01
-.426001E+02	0.414212E-01
-.424001E+02	0.423372E-01
-.422001E+02	0.428810E-01
-.420001E+02	0.429610E-01
-.418001E+02	0.425155E-01
-.416001E+02	0.415251E-01
-.414001E+02	0.400196E-01
-.412001E+02	0.380913E-01
-.410001E+02	0.359188E-01
-.408001E+02	0.338142E-01
-.406001E+02	0.322978E-01
-.404001E+02	0.319856E-01
-.402001E+02	0.329626E-01
-.400001E+02	0.346129E-01
-.398001E+02	0.362976E-01
-.396001E+02	0.376157E-01
-.394001E+02	0.383374E-01
-.392001E+02	0.383415E-01
-.390001E+02	0.375926E-01
-.388001E+02	0.361403E-01
-.386001E+02	0.341421E-01
-.384001E+02	0.319537E-01
-.382001E+02	0.304076E-01
-.380001E+02	0.308087E-01
-.378001E+02	0.330276E-01
-.376001E+02	0.358408E-01
-.374001E+02	0.385225E-01
-.372001E+02	0.406974E-01
-.370001E+02	0.421363E-01
-.368001E+02	0.426986E-01
-.366001E+02	0.423176E-01
-.364001E+02	0.409996E-01
-.362001E+02	0.388222E-01
-.360001E+02	0.359358E-01
-.358001E+02	0.325733E-01
-.356001E+02	0.291673E-01
-.354001E+02	0.276895E-01
-.352001E+02	0.301984E-01

-.350001E+02	0.331350E-01
-.348001E+02	0.354867E-01
-.346001E+02	0.369628E-01
-.344001E+02	0.374122E-01
-.342001E+02	0.367806E-01
-.340001E+02	0.351182E-01
-.338001E+02	0.326344E-01
-.336001E+02	0.300109E-01
-.334001E+02	0.298110E-01
-.332001E+02	0.330947E-01
-.330001E+02	0.372893E-01
-.328001E+02	0.413734E-01
-.326001E+02	0.448931E-01
-.324001E+02	0.475350E-01
-.322001E+02	0.490767E-01
-.320001E+02	0.493884E-01
-.318001E+02	0.484452E-01
-.316001E+02	0.463427E-01
-.314001E+02	0.433250E-01
-.312001E+02	0.398587E-01
-.310001E+02	0.368364E-01
-.308001E+02	0.357684E-01
-.306001E+02	0.374853E-01
-.304001E+02	0.407788E-01
-.302001E+02	0.443022E-01
-.300001E+02	0.473774E-01
-.298001E+02	0.497401E-01
-.296001E+02	0.513897E-01
-.294001E+02	0.525356E-01
-.292001E+02	0.535478E-01
-.290001E+02	0.548478E-01
-.288001E+02	0.567376E-01
-.286001E+02	0.592487E-01
-.284001E+02	0.621213E-01
-.282001E+02	0.649105E-01
-.280001E+02	0.671219E-01
-.278001E+02	0.683116E-01
-.276001E+02	0.681465E-01
-.274001E+02	0.664359E-01
-.272001E+02	0.631495E-01
-.270001E+02	0.584286E-01
-.268001E+02	0.526020E-01
-.266001E+02	0.462387E-01
-.264001E+02	0.403698E-01
-.262001E+02	0.370850E-01
-.260001E+02	0.383356E-01
-.258001E+02	0.419947E-01
-.256001E+02	0.454468E-01

-.254001E+02	0.475693E-01
-.252001E+02	0.479218E-01
-.250001E+02	0.464041E-01
-.248001E+02	0.431872E-01
-.246001E+02	0.388014E-01
-.244001E+02	0.347569E-01
-.242001E+02	0.350398E-01
-.240001E+02	0.400173E-01
-.238001E+02	0.459912E-01
-.236001E+02	0.513615E-01
-.234001E+02	0.553989E-01
-.232001E+02	0.576752E-01
-.230001E+02	0.579736E-01
-.228001E+02	0.562755E-01
-.226001E+02	0.527597E-01
-.224001E+02	0.477992E-01
-.222001E+02	0.419797E-01
-.220001E+02	0.362752E-01
-.218001E+02	0.330787E-01
-.216001E+02	0.350426E-01
-.214001E+02	0.385145E-01
-.212001E+02	0.409616E-01
-.210001E+02	0.417274E-01
-.208001E+02	0.407995E-01
-.206001E+02	0.388202E-01
-.204001E+02	0.376692E-01
-.202001E+02	0.399787E-01
-.200001E+02	0.455011E-01
-.198001E+02	0.522519E-01
-.196001E+02	0.588264E-01
-.194001E+02	0.642843E-01
-.192001E+02	0.679442E-01
-.190001E+02	0.693471E-01
-.188001E+02	0.682666E-01
-.186001E+02	0.647285E-01
-.184001E+02	0.590259E-01
-.182001E+02	0.517514E-01
-.180001E+02	0.439546E-01
-.178001E+02	0.380009E-01
-.176001E+02	0.384213E-01
-.174001E+02	0.434679E-01
-.172001E+02	0.483430E-01
-.170001E+02	0.512586E-01
-.168001E+02	0.515567E-01
-.166001E+02	0.490524E-01
-.164001E+02	0.439256E-01
-.162001E+02	0.368300E-01
-.160001E+02	0.317789E-01

-.158001E+02	0.391100E-01
-.156001E+02	0.487118E-01
-.154001E+02	0.575466E-01
-.152001E+02	0.645816E-01
-.150001E+02	0.690835E-01
-.148001E+02	0.705752E-01
-.146001E+02	0.688711E-01
-.144001E+02	0.641038E-01
-.142001E+02	0.567427E-01
-.140001E+02	0.476540E-01
-.138001E+02	0.386407E-01
-.136001E+02	0.362538E-01
-.134001E+02	0.431258E-01
-.132001E+02	0.504603E-01
-.130001E+02	0.555469E-01
-.128001E+02	0.574837E-01
-.126001E+02	0.559146E-01
-.124001E+02	0.509162E-01
-.122001E+02	0.431078E-01
-.120001E+02	0.351081E-01
-.118001E+02	0.392804E-01
-.116001E+02	0.509535E-01
-.114001E+02	0.627303E-01
-.112001E+02	0.728432E-01
-.110001E+02	0.802067E-01
-.108001E+02	0.840729E-01
-.106001E+02	0.840469E-01
-.104001E+02	0.801127E-01
-.102001E+02	0.726382E-01
-.100001E+02	0.623447E-01
-.980010E+01	0.502592E-01
-.960010E+01	0.377397E-01
-.940010E+01	0.319825E-01
-.920010E+01	0.413081E-01
-.900010E+01	0.487387E-01
-.880010E+01	0.526724E-01
-.860010E+01	0.526649E-01
-.840010E+01	0.487428E-01
-.820010E+01	0.414117E-01
-.800010E+01	0.322899E-01
-.780010E+01	0.371036E-01
-.760010E+01	0.487323E-01
-.740010E+01	0.594745E-01
-.720010E+01	0.678378E-01
-.700010E+01	0.727310E-01
-.680010E+01	0.734424E-01
-.660010E+01	0.697240E-01
-.640010E+01	0.618623E-01

-.620010E+01	0.508052E-01
-.600010E+01	0.392002E-01
-.580010E+01	0.397811E-01
-.560010E+01	0.518624E-01
-.540010E+01	0.632471E-01
-.520010E+01	0.711240E-01
-.500010E+01	0.741760E-01
-.480010E+01	0.718097E-01
-.460010E+01	0.642431E-01
-.440010E+01	0.529232E-01
-.420010E+01	0.430803E-01
-.400010E+01	0.478115E-01
-.380010E+01	0.607840E-01
-.360010E+01	0.713064E-01
-.340010E+01	0.748956E-01
-.320010E+01	0.686347E-01
-.300010E+01	0.523389E-01
-.280010E+01	0.542438E-01
-.260010E+01	0.100484E+00
-.240010E+01	0.166485E+00
-.220010E+01	0.247769E+00
-.200010E+01	0.341492E+00
-.180010E+01	0.444095E+00
-.160010E+01	0.551250E+00
-.140010E+01	0.658054E+00
-.120010E+01	0.759308E+00
-.100010E+01	0.849879E+00
-.800095E+00	0.925011E+00
-.600098E+00	0.980679E+00
-.400102E+00	0.101385E+01
-.200097E+00	0.102271E+01
0.100000E-03	0.100678E+01
0.200105E+00	0.966938E+00
0.400102E+00	0.905390E+00
0.600098E+00	0.825477E+00
0.800103E+00	0.731468E+00
0.100010E+01	0.628239E+00
0.120010E+01	0.520964E+00
0.140010E+01	0.414753E+00
0.160010E+01	0.314333E+00
0.180010E+01	0.223793E+00
0.200010E+01	0.146395E+00
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0.240010E+01	0.463733E-01
0.260010E+01	0.573607E-01
0.280010E+01	0.721876E-01
0.300010E+01	0.761960E-01
0.320010E+01	0.709757E-01

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0.360010E+01	0.468743E-01
0.380010E+01	0.432931E-01
0.400010E+01	0.528046E-01
0.420010E+01	0.629850E-01
0.440010E+01	0.693142E-01
0.460010E+01	0.706190E-01
0.480010E+01	0.668870E-01
0.500010E+01	0.588923E-01
0.520010E+01	0.482025E-01
0.540010E+01	0.386601E-01
0.560010E+01	0.413572E-01
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0.640010E+01	0.660842E-01
0.660010E+01	0.625487E-01
0.680010E+01	0.549072E-01
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0.860010E+01	0.808217E-01
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0.900001E+02	0.504044E-02

APPENDIX D

BENDIX TEST BED 1.5° BEAMWIDTH ELEVATION ANTENNA
SCAN PATTERN DATA

APPENDIX D
BENDIX TEST BED 1.5 DEGREE ELEVATION ANTENNA SCAN PATTERN

15 September 1988

Elevation pattern of MLS EL array from -30(.2)60 degrees

50 elements spaced 1.870"

Beamwidth = 1.5 degrees

5061 MHz

4-bit phase shifters (calibration error of LSB/2 included)

Dipole element vertical pattern defined by:

$$dB = C1*|Deg| + C2*|Deg|^2 + C3*|Deg|^3 + C4*|Deg|^4$$

$$C1 = -4.9838200E-03$$

$$C2 = 1.5812826E-03$$

$$C3 = -8.7635854E-05$$

$$C4 = 3.6140455E-07$$

Elevation array horizontal pattern defined by:

$$dB = C1*|Deg| + C2*|Deg|^2 + C3*|Deg|^3 + C4*|Deg|^4$$

$$C1 = 2.9469661E-02$$

$$C2 = -9.6517336E-03$$

$$C3 = 1.4380955E-04$$

$$C4 = -8.4803696E-07$$

Degrees	Voltage
-.300001E+02	0.375113E-01
-.298001E+02	0.352438E-01
-.296001E+02	0.333192E-01
-.294001E+02	0.320401E-01
-.292001E+02	0.317856E-01
-.290001E+02	0.329109E-01
-.288001E+02	0.352743E-01
-.286001E+02	0.383850E-01
-.284001E+02	0.416948E-01
-.282001E+02	0.446478E-01
-.280001E+02	0.467247E-01
-.278001E+02	0.475140E-01
-.276001E+02	0.467827E-01
-.274001E+02	0.445239E-01
-.272001E+02	0.409757E-01
-.270001E+02	0.366152E-01
-.268001E+02	0.322120E-01
-.266001E+02	0.299978E-01
-.264001E+02	0.320793E-01
-.262001E+02	0.338276E-01
-.260001E+02	0.340241E-01
-.258001E+02	0.326841E-01
-.256001E+02	0.309160E-01

-.254001E+02	0.324786E-01
-.252001E+02	0.364820E-01
-.250001E+02	0.404625E-01
-.248001E+02	0.434222E-01
-.246001E+02	0.447596E-01
-.244001E+02	0.441724E-01
-.242001E+02	0.416806E-01
-.240001E+02	0.375308E-01
-.238001E+02	0.327130E-01
-.236001E+02	0.301860E-01
-.234001E+02	0.343454E-01
-.232001E+02	0.378360E-01
-.230001E+02	0.396943E-01
-.228001E+02	0.398274E-01
-.226001E+02	0.387054E-01
-.224001E+02	0.374878E-01
-.222001E+02	0.376161E-01
-.220001E+02	0.390622E-01
-.218001E+02	0.402726E-01
-.216001E+02	0.398739E-01
-.214001E+02	0.372189E-01
-.212001E+02	0.332085E-01
-.210001E+02	0.361056E-01
-.208001E+02	0.451342E-01
-.206001E+02	0.552836E-01
-.204001E+02	0.648741E-01
-.202001E+02	0.725887E-01
-.200001E+02	0.773769E-01
-.198001E+02	0.785817E-01
-.196001E+02	0.760421E-01
-.194001E+02	0.701290E-01
-.192001E+02	0.617065E-01
-.190001E+02	0.520387E-01
-.188001E+02	0.427336E-01
-.186001E+02	0.361977E-01
-.184001E+02	0.357065E-01
-.182001E+02	0.374072E-01
-.180001E+02	0.371770E-01
-.178001E+02	0.346236E-01
-.176001E+02	0.312065E-01
-.174001E+02	0.338549E-01
-.172001E+02	0.384058E-01
-.170001E+02	0.416751E-01
-.168001E+02	0.429415E-01
-.166001E+02	0.423318E-01
-.164001E+02	0.411993E-01
-.162001E+02	0.421091E-01
-.160001E+02	0.459711E-01

-.158001E+02	0.508106E-01
-.156001E+02	0.545354E-01
-.154001E+02	0.558390E-01
-.152001E+02	0.541853E-01
-.150001E+02	0.498813E-01
-.148001E+02	0.444193E-01
-.146001E+02	0.414645E-01
-.144001E+02	0.443239E-01
-.142001E+02	0.495177E-01
-.140001E+02	0.533941E-01
-.138001E+02	0.546260E-01
-.136001E+02	0.533928E-01
-.134001E+02	0.513315E-01
-.132001E+02	0.511978E-01
-.130001E+02	0.543407E-01
-.128001E+02	0.588382E-01
-.126001E+02	0.618917E-01
-.124001E+02	0.615885E-01
-.122001E+02	0.571050E-01
-.120001E+02	0.486524E-01
-.118001E+02	0.376202E-01
-.116001E+02	0.357776E-01
-.114001E+02	0.471417E-01
-.112001E+02	0.564734E-01
-.110001E+02	0.616080E-01
-.108001E+02	0.616436E-01
-.106001E+02	0.568373E-01
-.104001E+02	0.491212E-01
-.102001E+02	0.442480E-01
-.100001E+02	0.492088E-01
-.980010E+01	0.579873E-01
-.960010E+01	0.642701E-01
-.940010E+01	0.654804E-01
-.920010E+01	0.608169E-01
-.900010E+01	0.509711E-01
-.880010E+01	0.396105E-01
-.860010E+01	0.436232E-01
-.840010E+01	0.575929E-01
-.820010E+01	0.694190E-01
-.800010E+01	0.761183E-01
-.780010E+01	0.764822E-01
-.760010E+01	0.706789E-01
-.740010E+01	0.603792E-01
-.720010E+01	0.494326E-01
-.700010E+01	0.458302E-01
-.680010E+01	0.514939E-01
-.660010E+01	0.567226E-01
-.640010E+01	0.567713E-01

-.620010E+01	0.507327E-01
-.600010E+01	0.404456E-01
-.580010E+01	0.395832E-01
-.560010E+01	0.531555E-01
-.540010E+01	0.656385E-01
-.520010E+01	0.728251E-01
-.500010E+01	0.727156E-01
-.480010E+01	0.648863E-01
-.460010E+01	0.506258E-01
-.440010E+01	0.346857E-01
-.420010E+01	0.461263E-01
-.400010E+01	0.609362E-01
-.380010E+01	0.689319E-01
-.360010E+01	0.678659E-01
-.340010E+01	0.581290E-01
-.320010E+01	0.462197E-01
-.300010E+01	0.529787E-01
-.280010E+01	0.694441E-01
-.260010E+01	0.779963E-01
-.240010E+01	0.701246E-01
-.220010E+01	0.474365E-01
-.200010E+01	0.884882E-01
-.180010E+01	0.176693E+00
-.160010E+01	0.292138E+00
-.140010E+01	0.427270E+00
-.120010E+01	0.572087E+00
-.100010E+01	0.714533E+00
-.800099E+00	0.841771E+00
-.600100E+00	0.941718E+00
-.400100E+00	0.100455E+01
-.200099E+00	0.102393E+01
0.100000E-03	0.997872E+00
0.200101E+00	0.928970E+00
0.400100E+00	0.824080E+00
0.600100E+00	0.693446E+00
0.800101E+00	0.549405E+00
0.100010E+01	0.404855E+00
0.120010E+01	0.271739E+00
0.140010E+01	0.159783E+00
0.160010E+01	0.764149E-01
0.180010E+01	0.496007E-01
0.200010E+01	0.719687E-01
0.220010E+01	0.758107E-01
0.240010E+01	0.642288E-01
0.260010E+01	0.483123E-01
0.280010E+01	0.518529E-01
0.300010E+01	0.672255E-01
0.320010E+01	0.766548E-01

0.340010E+01	0.763395E-01
0.360010E+01	0.665736E-01
0.380010E+01	0.500368E-01
0.400010E+01	0.344513E-01
0.420010E+01	0.484148E-01
0.440010E+01	0.619940E-01
0.460010E+01	0.681431E-01
0.480010E+01	0.655867E-01
0.500010E+01	0.549628E-01
0.520010E+01	0.391770E-01
0.540010E+01	0.420664E-01
0.560010E+01	0.605619E-01
0.580010E+01	0.757336E-01
0.600010E+01	0.845321E-01
0.620010E+01	0.856348E-01
0.640010E+01	0.792494E-01
0.660010E+01	0.671007E-01
0.680010E+01	0.526366E-01
0.700010E+01	0.436875E-01
0.720010E+01	0.489685E-01
0.740010E+01	0.566885E-01
0.760010E+01	0.596229E-01
0.780010E+01	0.564684E-01
0.800010E+01	0.481109E-01
0.820010E+01	0.383575E-01
0.840010E+01	0.419242E-01
0.860010E+01	0.533818E-01
0.880010E+01	0.624242E-01
0.900010E+01	0.666357E-01
0.920010E+01	0.653273E-01
0.940010E+01	0.591189E-01
0.960010E+01	0.501513E-01
0.980010E+01	0.436348E-01
0.100001E+02	0.466740E-01
0.102001E+02	0.539433E-01
0.104001E+02	0.589543E-01
0.106001E+02	0.595843E-01
0.108001E+02	0.555457E-01
0.110001E+02	0.476881E-01
0.112001E+02	0.379800E-01
0.114001E+02	0.351169E-01
0.116001E+02	0.432590E-01
0.118001E+02	0.498509E-01
0.120001E+02	0.530333E-01
0.122001E+02	0.529269E-01
0.124001E+02	0.510692E-01
0.126001E+02	0.503449E-01
0.128001E+02	0.529436E-01

0.130001E+02	0.576430E-01
0.132001E+02	0.617063E-01
0.134001E+02	0.631895E-01
0.136001E+02	0.612688E-01
0.138001E+02	0.561343E-01
0.140001E+02	0.489722E-01
0.142001E+02	0.424064E-01
0.144001E+02	0.410924E-01
0.146001E+02	0.448293E-01
0.148001E+02	0.483186E-01
0.150001E+02	0.492199E-01
0.152001E+02	0.472961E-01
0.154001E+02	0.438019E-01
0.156001E+02	0.419222E-01
0.158001E+02	0.445764E-01
0.160001E+02	0.495130E-01
0.162001E+02	0.534820E-01
0.164001E+02	0.547616E-01
0.166001E+02	0.526692E-01
0.168001E+02	0.472731E-01
0.170001E+02	0.392544E-01
0.172001E+02	0.307015E-01
0.174001E+02	0.385724E-01
0.176001E+02	0.476008E-01
0.178001E+02	0.547926E-01
0.180001E+02	0.595126E-01
0.182001E+02	0.616379E-01
0.184001E+02	0.615179E-01
0.186001E+02	0.598520E-01
0.188001E+02	0.574706E-01
0.190001E+02	0.550560E-01
0.192001E+02	0.529444E-01
0.194001E+02	0.511990E-01
0.196001E+02	0.499279E-01
0.198001E+02	0.494950E-01
0.200001E+02	0.502460E-01
0.202001E+02	0.519516E-01
0.204001E+02	0.537372E-01
0.206001E+02	0.545524E-01
0.208001E+02	0.535877E-01
0.210001E+02	0.504819E-01
0.212001E+02	0.454395E-01
0.214001E+02	0.395453E-01
0.216001E+02	0.364350E-01
0.218001E+02	0.401498E-01
0.220001E+02	0.458723E-01
0.222001E+02	0.503099E-01
0.224001E+02	0.523375E-01

0.226001E+02	0.515833E-01
0.228001E+02	0.481893E-01
0.230001E+02	0.427251E-01
0.232001E+02	0.360991E-01
0.234001E+02	0.299065E-01
0.236001E+02	0.332551E-01
0.238001E+02	0.372459E-01
0.240001E+02	0.389212E-01
0.242001E+02	0.380077E-01
0.244001E+02	0.347001E-01
0.246001E+02	0.298186E-01
0.248001E+02	0.327289E-01
0.250001E+02	0.388346E-01
0.252001E+02	0.440668E-01
0.254001E+02	0.475512E-01
0.256001E+02	0.487391E-01
0.258001E+02	0.474520E-01
0.260001E+02	0.439075E-01
0.262001E+02	0.387096E-01
0.264001E+02	0.329643E-01
0.266001E+02	0.309146E-01
0.268001E+02	0.348573E-01
0.270001E+02	0.379880E-01
0.272001E+02	0.389657E-01
0.274001E+02	0.375762E-01
0.276001E+02	0.343397E-01
0.278001E+02	0.322150E-01
0.280001E+02	0.362968E-01
0.282001E+02	0.427351E-01
0.284001E+02	0.488070E-01
0.286001E+02	0.533526E-01
0.288001E+02	0.556545E-01
0.290001E+02	0.553589E-01
0.292001E+02	0.525026E-01
0.294001E+02	0.475608E-01
0.296001E+02	0.416431E-01
0.298001E+02	0.373890E-01
0.300001E+02	0.388739E-01
0.302001E+02	0.443650E-01
0.304001E+02	0.501741E-01
0.306001E+02	0.548652E-01
0.308001E+02	0.579880E-01
0.310001E+02	0.595366E-01
0.312001E+02	0.597515E-01
0.314001E+02	0.589655E-01
0.316001E+02	0.574555E-01
0.318001E+02	0.553427E-01
0.320001E+02	0.525923E-01

0.322001E+02	0.491244E-01
0.324001E+02	0.450052E-01
0.326001E+02	0.407215E-01
0.328001E+02	0.376346E-01
0.330001E+02	0.377917E-01
0.332001E+02	0.410457E-01
0.334001E+02	0.451945E-01
0.336001E+02	0.486604E-01
0.338001E+02	0.506099E-01
0.340001E+02	0.506440E-01
0.342001E+02	0.486901E-01
0.344001E+02	0.449651E-01
0.346001E+02	0.399608E-01
0.348001E+02	0.345182E-01
0.350001E+02	0.304770E-01
0.352001E+02	0.311549E-01
0.354001E+02	0.342999E-01
0.356001E+02	0.367284E-01
0.358001E+02	0.375503E-01
0.360001E+02	0.365693E-01
0.362001E+02	0.339263E-01
0.364001E+02	0.300521E-01
0.366001E+02	0.263192E-01
0.368001E+02	0.285158E-01
0.370001E+02	0.328689E-01
0.372001E+02	0.365756E-01
0.374001E+02	0.390423E-01
0.376001E+02	0.399792E-01
0.378001E+02	0.393099E-01
0.380001E+02	0.371566E-01
0.382001E+02	0.338256E-01
0.384001E+02	0.298016E-01
0.386001E+02	0.260080E-01
0.388001E+02	0.259579E-01
0.390001E+02	0.287544E-01
0.392001E+02	0.309685E-01
0.394001E+02	0.319924E-01
0.396001E+02	0.316808E-01
0.398001E+02	0.300971E-01
0.400001E+02	0.274812E-01
0.402001E+02	0.243869E-01
0.404001E+02	0.242989E-01
0.406001E+02	0.274779E-01
0.408001E+02	0.305025E-01
0.410001E+02	0.328368E-01
0.412001E+02	0.342684E-01
0.414001E+02	0.347649E-01
0.416001E+02	0.344748E-01

0.418001E+02	0.337266E-01
0.420001E+02	0.329771E-01
0.422001E+02	0.326402E-01
0.424001E+02	0.328173E-01
0.426001E+02	0.332113E-01
0.428001E+02	0.333494E-01
0.430001E+02	0.328421E-01
0.432001E+02	0.315292E-01
0.434001E+02	0.296310E-01
0.436001E+02	0.281278E-01
0.438001E+02	0.288898E-01
0.440001E+02	0.323873E-01
0.442001E+02	0.373128E-01
0.444001E+02	0.426178E-01
0.446001E+02	0.476545E-01
0.448001E+02	0.519692E-01
0.450001E+02	0.552404E-01
0.452001E+02	0.572669E-01
0.454001E+02	0.579720E-01
0.456001E+02	0.574010E-01
0.458001E+02	0.557147E-01
0.460001E+02	0.531701E-01
0.462001E+02	0.500963E-01
0.464001E+02	0.468567E-01
0.466001E+02	0.437963E-01
0.468001E+02	0.411740E-01
0.470001E+02	0.390938E-01
0.472001E+02	0.374789E-01
0.474001E+02	0.361227E-01
0.476001E+02	0.347930E-01
0.478001E+02	0.333207E-01
0.480001E+02	0.316384E-01
0.482001E+02	0.297747E-01
0.484001E+02	0.278288E-01
0.486001E+02	0.259332E-01
0.488001E+02	0.242270E-01
0.490001E+02	0.228339E-01
0.492001E+02	0.218830E-01
0.494001E+02	0.215407E-01
0.496001E+02	0.219573E-01
0.498001E+02	0.231173E-01
0.500001E+02	0.248498E-01
0.502001E+02	0.269405E-01
0.504001E+02	0.291754E-01
0.506001E+02	0.313427E-01
0.508001E+02	0.332394E-01
0.510001E+02	0.346839E-01
0.512001E+02	0.355272E-01

0.514001E+02	0.356660E-01
0.516001E+02	0.350482E-01
0.518001E+02	0.336803E-01
0.520001E+02	0.316257E-01
0.522001E+02	0.290012E-01
0.524001E+02	0.259724E-01
0.526001E+02	0.227505E-01
0.528001E+02	0.196270E-01
0.530001E+02	0.172179E-01
0.532001E+02	0.170700E-01
0.534001E+02	0.184658E-01
0.536001E+02	0.196891E-01
0.538001E+02	0.203093E-01
0.540001E+02	0.202281E-01
0.542001E+02	0.194701E-01
0.544001E+02	0.181869E-01
0.546001E+02	0.168254E-01
0.548001E+02	0.165955E-01
0.550001E+02	0.181643E-01
0.552001E+02	0.205154E-01
0.554001E+02	0.229882E-01
0.556001E+02	0.252685E-01
0.558001E+02	0.271517E-01
0.560001E+02	0.284886E-01
0.562001E+02	0.291771E-01
0.564001E+02	0.291589E-01
0.566001E+02	0.284229E-01
0.568001E+02	0.270011E-01
0.570001E+02	0.249672E-01
0.572001E+02	0.224312E-01
0.574001E+02	0.195387E-01
0.576001E+02	0.164859E-01
0.578001E+02	0.137452E-01
0.580001E+02	0.138699E-01
0.582001E+02	0.161763E-01
0.584001E+02	0.184033E-01
0.586001E+02	0.202226E-01
0.588001E+02	0.215268E-01
0.590001E+02	0.222751E-01
0.592001E+02	0.224751E-01
0.594001E+02	0.221860E-01
0.596001E+02	0.215200E-01
0.598001E+02	0.206504E-01
0.600001E+02	0.198085E-01

APPENDIX E

BENDIX TEST BED 1.5° BEAMWIDTH ELEVATION
ANTENNA ELEMENT PATTERN DATA

APPENDIX E
BENDIX TEST BED 1.5 DEGREE ELEVATION ANTENNA ELEMENT PATTERN

15 September 1988

Elevation array dipole element vertical pattern

50 elements spaced 1.870"

Beamwidth = 1.5 degrees

5061 MHz

4-bit phase shifters (calibration error of LSB/2 included)

Dipole element vertical pattern defined by:

$$\text{dB} = C1*|\text{Deg}| + C2*|\text{Deg}|^2 + C3*|\text{Deg}|^3 + C4*|\text{Deg}|^4$$

$$C1 = -4.9838200\text{E}-03$$

$$C2 = 1.5812826\text{E}-03$$

$$C3 = -8.7635854\text{E}-05$$

$$C4 = 3.6140455\text{E}-07$$

Degrees	Voltage	dB
-20.00	0.9873673	-0.11
-19.00	0.9910778	-0.08
-18.00	0.9941998	-0.05
-17.00	0.9967696	-0.03
-16.00	0.9988259	-0.01
-15.00	1.0004095	0.00
-14.00	1.0015634	0.01
-13.00	1.0023321	0.02
-12.00	1.0027621	0.02
-11.00	1.0029010	0.03
-10.00	1.0027978	0.02
-9.00	1.0025030	0.02
-8.00	1.0020678	0.02
-7.00	1.0015445	0.01
-6.00	1.0009862	0.01
-5.00	1.0004473	0.00
-4.00	0.9999826	0.00
-3.00	0.9996482	0.00
-2.00	0.9995007	0.00
-1.00	0.9995983	0.00
0.00	1.0000000	0.00
1.00	0.9995983	0.00
2.00	0.9995007	0.00
3.00	0.9996482	0.00
4.00	0.9999826	0.00

5.00	1.0004473	0.00
6.00	1.0009862	0.01
7.00	1.0015445	0.01
8.00	1.0020678	0.02
9.00	1.0025030	0.02
10.00	1.0027978	0.02
11.00	1.0029010	0.03
12.00	1.0027621	0.02
13.00	1.0023321	0.02
14.00	1.0015634	0.01
15.00	1.0004095	0.00
16.00	0.9988259	-0.01
17.00	0.9967696	-0.03
18.00	0.9941998	-0.05
19.00	0.9910778	-0.08
20.00	0.9873673	-0.11

APPENDIX F

BENDIX TEST BED 1.5° BEAMWIDTH ELEVATION
ANTENNA HORIZONTAL PATTERN DATA

APPENDIX F
BENDIX TEST BED 1.5 DEGREE ELEVATION ANTENNA HORIZONTAL PATTERN

15 September 1988

Elevation array horizontal pattern

50 elements spaced 1.870"

Beamwidth = 1.5 degrees

5061 MHz

4-bit phase shifters (calibration error of LSB/2 included)

Elevation array horizontal pattern defined by:

$$\text{dB} = C1*|\text{Deg}| + C2*|\text{Deg}|^2 + C3*|\text{Deg}|^3 + C4*|\text{Deg}|^4$$

$$C1 = 2.9469661\text{E-}02$$

$$C2 = -9.6517336\text{E-}03$$

$$C3 = 1.4380955\text{E-}04$$

$$C4 = -8.4803696\text{E-}07$$

	degrees	voltage	dB
*	0.00	1.0000000	0.00
	1.00	1.0023007	0.02
*	2.00	1.0024748	0.02
*	3.00	1.0006170	0.01
*	4.00	0.9968318	-0.03
	5.00	0.9912314	-0.08
*	6.00	0.9839340	-0.14
	7.00	0.9750618	-0.22
	8.00	0.9647397	-0.31
*	9.00	0.9530935	-0.42
	10.00	0.9402484	-0.54
	11.00	0.9263285	-0.66
*	12.00	0.9114550	-0.81
	13.00	0.8957454	-0.96
	14.00	0.8793131	-1.12
*	15.00	0.8622665	-1.29
	16.00	0.8447086	-1.47
	17.00	0.8267363	-1.65
*	18.00	0.8084409	-1.85
	19.00	0.7899071	-2.05
	20.00	0.7712133	-2.26
	21.00	0.7524317	-2.47
	22.00	0.7336282	-2.69
	23.00	0.7148625	-2.92
*	24.00	0.6961886	-3.15

25.00	0.6776546	-3.38
26.00	0.6593032	-3.62
27.00	0.6411719	-3.86
28.00	0.6232932	-4.11
29.00	0.6056952	-4.35
30.00	0.5884016	-4.61
* 31.00	0.5714322	-4.86
32.00	0.5548029	-5.12
33.00	0.5385264	-5.38
34.00	0.5226123	-5.64
35.00	0.5070674	-5.90
36.00	0.4918958	-6.16
37.00	0.4770996	-6.43
38.00	0.4626786	-6.69
* 39.00	0.4486310	-6.96
40.00	0.4349531	-7.23
41.00	0.4216402	-7.50
42.00	0.4086860	-7.77
* 43.00	0.3960835	-8.04
44.00	0.3838246	-8.32
45.00	0.3719006	-8.59
46.00	0.3603020	-8.87
* 47.00	0.3490191	-9.14
48.00	0.3380415	-9.42
49.00	0.3273591	-9.70
50.00	0.3169608	-9.98
51.00	0.3068363	-10.26
* 52.00	0.2969747	-10.55
53.00	0.2873653	-10.83
54.00	0.2779978	-11.12
55.00	0.2688618	-11.41
56.00	0.2599474	-11.70
* 57.00	0.2512445	-12.00
58.00	0.2427440	-12.30
59.00	0.2344369	-12.60
60.00	0.2263144	-12.91
61.00	0.2183685	-13.22
* 62.00	0.2105915	-13.53
63.00	0.2029764	-13.85
64.00	0.1955165	-14.18
65.00	0.1882058	-14.51
66.00	0.1810389	-14.84
67.00	0.1740109	-15.19
* 68.00	0.1671177	-15.54
69.00	0.1603555	-15.90
70.00	0.1537215	-16.27
71.00	0.1472132	-16.64
72.00	0.1408288	-17.03

73.00	0.1345674	-17.42
74.00	0.1284283	-17.83
75.00	0.1224117	-18.24
76.00	0.1165180	-18.67
77.00	0.1107486	-19.11
78.00	0.1051049	-19.57
* 79.00	0.0995892	-20.04
80.00	0.0942039	-20.52
81.00	0.0889519	-21.02
82.00	0.0838363	-21.53
83.00	0.0788607	-22.06
84.00	0.0740285	-22.61
85.00	0.0693436	-23.18
86.00	0.0648096	-23.77
87.00	0.0604301	-24.37
88.00	0.0562089	-25.00
89.00	0.0521492	-25.66
* 90.00	0.0482541	-26.33

* indicates values used in BLOCK DATA

APPENDIX G

MLS MATHEMATICAL MODEL BLOCK DATA ANTBTB
VERSION 1.0 SOFTWARE LISTING

APPENDIX G
MLS MATHEMATICAL MODEL
BLOCK DATA ANTBTB VERSION 2.0
SOFTWARE LISTING

BLOCK DATA ANTBTB

VERSION 2.0

BLOCK DATA TO SIMULATE BENDIX TEST BED ANTENNA PATTERNS

DIMENSION AZ1L1(100),AZ1L2(100),AZ1L3(100),AZ1L4(100),AZ1L5(51)
DIMENSION AZ1R1(100),AZ1R2(100),AZ1R3(100),AZ1R4(100),AZ1R5(51)
DIMENSION AZ2L1(100),AZ2L2(100),AZ2L3(100),AZ2L4(100),AZ2L5(51)
DIMENSION AZ2R1(100),AZ2R2(100),AZ2R3(100),AZ2R4(100),AZ2R5(51)
DIMENSION ELTB1(100),ELTB2(101)

COMMON/BTBANT/AZ1LSA(451),AZ1RSA(451),AZ2LSA(451),AZ2RSA(451),
* AZTBOD(30),AZTBOA(30),ELTBSA(201),ELTBOD(20),ELTBOA(20),
* ELTBEP(41)

THE DATA ARRAYS FOR AZ AND EL SCAN AMPLITUDE ARE TOO
LARGE TO BE INITIALIZED WITH ONE DATA STATEMENT (ONLY
19 CONTINUATION LINES ALLOWED). SMALLER ARRAYS ARE
INITIALIZED AND EQUIVALENCED TO THE APPROPRIATE AZ AND
EL SCAN AMPLITUDE ARRAY.

EQUIVALENCE (AZ1LSA(1),AZ1L1(1)),(AZ1LSA(101),AZ1L2(1)),
* (AZ1LSA(201),AZ1L3(1)),(AZ1LSA(301),AZ1L4(1)),
* (AZ1LSA(401),AZ1L5(1))

EQUIVALENCE (AZ1RSA(1),AZ1R1(1)),(AZ1RSA(101),AZ1R2(1)),
* (AZ1RSA(201),AZ1R3(1)),(AZ1RSA(301),AZ1R4(1)),
* (AZ1RSA(401),AZ1R5(1))

EQUIVALENCE (AZ2LSA(1),AZ2L1(1)),(AZ2LSA(101),AZ2L2(1)),
* (AZ2LSA(201),AZ2L3(1)),(AZ2LSA(301),AZ2L4(1)),
* (AZ2LSA(401),AZ2L5(1))

EQUIVALENCE (AZ2RSA(1),AZ2R1(1)),(AZ2RSA(101),AZ2R2(1)),
* (AZ2RSA(201),AZ2R3(1)),(AZ2RSA(301),AZ2R4(1)),
* (AZ2RSA(401),AZ2R5(1))

EQUIVALENCE (ELTBSA(1),ELTB1(1)),(ELTBSA(101),ELTB2(1))

AZIMUTH ARRAYS FOR BENDIX TEST BED

1.0 DEG BY +- 90 DEG SCAN ANTENNA PATTERN (LEFT SIDE -)

C
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SCAN AMPLITUDE

DATA AZ1L1/ 1.0065700, 0.9562700, 0.8137620, 0.6105020, 0.3893300,
 * 0.1925120, 0.0507797, 0.0497479, 0.0648959, 0.0417028,
 * 0.0187525, 0.0433425, 0.0462846, 0.0312038, 0.0366511,
 * 0.0602268, 0.0704628, 0.0612227, 0.0368076, 0.0218539,
 * 0.0427539, 0.0499015, 0.0398100, 0.0177513, 0.0318939,
 * 0.0484042, 0.0506059, 0.0382242, 0.0169381, 0.0292979,
 * 0.0418802, 0.0411790, 0.0283373, 0.0197287, 0.0363478,
 * 0.0456010, 0.0426814, 0.0290269, 0.0146718, 0.0311974,
 * 0.0395214, 0.0372698, 0.0264233, 0.0134164, 0.0241445,
 * 0.0282190, 0.0244588, 0.0205625, 0.0282905, 0.0350676,
 * 0.0345972, 0.0266351, 0.0181182, 0.0265703, 0.0335881,
 * 0.0328987, 0.0253449, 0.0212156, 0.0305616, 0.0378516,
 * 0.0381812, 0.0318386, 0.0224103, 0.0185499, 0.0219293,
 * 0.0216200, 0.0180953, 0.0198248, 0.0245369, 0.0254119,
 * 0.0214118, 0.0188604, 0.0263349, 0.0333223, 0.0351943,
 * 0.0310549, 0.0227021, 0.0166160, 0.0215708, 0.0239451,
 * 0.0210363, 0.0155471, 0.0202797, 0.0262237, 0.0279336,
 * 0.0247446, 0.0181816, 0.0152473, 0.0200879, 0.0213176,
 * 0.0180630, 0.0129901, 0.0200151, 0.0253115, 0.0270477,
 * 0.0251293, 0.0212926, 0.0187678, 0.0185782, 0.0175190/

C

DATA AZ1L2/ 0.0165319, 0.0213893, 0.0280611, 0.0330104, 0.0346011,
 * 0.0326548, 0.0283352, 0.0235991, 0.0202738, 0.0192416,
 * 0.0207343, 0.0240204, 0.0271297, 0.0281007, 0.0259491,
 * 0.0215148, 0.0195774, 0.0237550, 0.0278217, 0.0284639,
 * 0.0251148, 0.0188271, 0.0126911, 0.0181314, 0.0209336,
 * 0.0208073, 0.0206826, 0.0241844, 0.0292170, 0.0327257,
 * 0.0336226, 0.0327278, 0.0321383, 0.0330308, 0.0339943,
 * 0.0328460, 0.0285733, 0.0216737, 0.0146420, 0.0187937,
 * 0.0242325, 0.0270388, 0.0273629, 0.0263491, 0.0256586,
 * 0.0267481, 0.0300651, 0.0350440, 0.0405257, 0.0450272,
 * 0.0471207, 0.0458998, 0.0413109, 0.0342195, 0.0261913,
 * 0.0190768, 0.0146527, 0.0139105, 0.0154047, 0.0191721,
 * 0.0240382, 0.0283408, 0.0308258, 0.0309439, 0.0289515,
 * 0.0257876, 0.0227385, 0.0208654, 0.0204265, 0.0211706,
 * 0.0228530, 0.0248686, 0.0262086, 0.0259616, 0.0237286,
 * 0.0198461, 0.0158294, 0.0160807, 0.0191068, 0.0208781,
 * 0.0207698, 0.0195637, 0.0191752, 0.0206850, 0.0225800,
 * 0.0232051, 0.0218895, 0.0188456, 0.0152981, 0.0150498,
 * 0.0177493, 0.0194633, 0.0193006, 0.0173627, 0.0143086,
 * 0.0118897, 0.0138844, 0.0148776, 0.0140240, 0.0117636/

C

DATA AZ1L3/ 0.0147230, 0.0191107, 0.0231198, 0.0259662, 0.0271880,
 * 0.0267273, 0.0249285, 0.0224539, 0.0201013, 0.0184726,
 * 0.0175634, 0.0168962, 0.0161909, 0.0156222, 0.0154565,
 * 0.0155255, 0.0153647, 0.0147233, 0.0138368, 0.0135648,
 * 0.0143535, 0.0152928, 0.0155910, 0.0149013, 0.0132065,
 * 0.0112397, 0.0135512, 0.0164275, 0.0188315, 0.0203852,
 * 0.0208955, 0.0203648, 0.0189706, 0.0170159, 0.0148522,

* 0.0128052, 0.0111189, 0.0108651, 0.0116991, 0.0123550,
 * 0.0130195, 0.0138673, 0.0150170, 0.0165245, 0.0183583,
 * 0.0203839, 0.0223802, 0.0240907, 0.0252840, 0.0258186,
 * 0.0256982, 0.0251124, 0.0244387, 0.0241580, 0.0246145,
 * 0.0257753, 0.0272767, 0.0286698, 0.0295828, 0.0297575,
 * 0.0290352, 0.0273393, 0.0246717, 0.0211408, 0.0170948,
 * 0.0140855, 0.0161594, 0.0209383, 0.0258598, 0.0301787,
 * 0.0334829, 0.0355099, 0.0361410, 0.0354111, 0.0335093,
 * 0.0307616, 0.0276045, 0.0245368, 0.0220272, 0.0203516,
 * 0.0194292, 0.0189199, 0.0185719, 0.0184492, 0.0188554,
 * 0.0200048, 0.0217582, 0.0237298, 0.0255141, 0.0267981,
 * 0.0273872, 0.0272069, 0.0262964, 0.0247890, 0.0228964,
 * 0.0208821, 0.0190386, 0.0176379, 0.0168487, 0.0166418/

C

DATA AZ1L4/ 0.0168302, 0.0172180, 0.0176803, 0.0181497, 0.0185681,
 * 0.0188602, 0.0189353, 0.0187039, 0.0181001, 0.0170936,
 * 0.0157029, 0.0139902, 0.0120627, 0.0100976, 0.0093440,
 * 0.0108915, 0.0123375, 0.0134145, 0.0140466, 0.0142145,
 * 0.0139490, 0.0133342, 0.0125150, 0.0117188, 0.0112574,
 * 0.0113343, 0.0117717, 0.0122295, 0.0124672, 0.0123544,
 * 0.0118343, 0.0109077, 0.0096626, 0.0088348, 0.0101737,
 * 0.0121328, 0.0142015, 0.0162329, 0.0181168, 0.0197659,
 * 0.0211128, 0.0221143, 0.0227515, 0.0230326, 0.0229908,
 * 0.0226822, 0.0221816, 0.0215750, 0.0209513, 0.0203874,
 * 0.0199350, 0.0196076, 0.0193802, 0.0191977, 0.0189911,
 * 0.0186935, 0.0182504, 0.0176255, 0.0168027, 0.0157844,
 * 0.0145931, 0.0132720, 0.0118954, 0.0106110, 0.0097359,
 * 0.0097445, 0.0105970, 0.0118167, 0.0131144, 0.0143634,
 * 0.0155010, 0.0164925, 0.0173171, 0.0179652, 0.0184338,
 * 0.0187273, 0.0188537, 0.0188261, 0.0186594, 0.0183712,
 * 0.0179799, 0.0175047, 0.0169633, 0.0163736, 0.0157522,
 * 0.0151133, 0.0144695, 0.0138321, 0.0132103, 0.0126117,
 * 0.0120435, 0.0115118, 0.0110225, 0.0105817, 0.0101961,
 * 0.0098724, 0.0096166, 0.0094326, 0.0093221, 0.0092817/

C

DATA AZ1L5/ 0.0093045, 0.0093798, 0.0094968, 0.0096436, 0.0098089,
 * 0.0099839, 0.0101596, 0.0103301, 0.0104907, 0.0106355,
 * 0.0107631, 0.0108708, 0.0109568, 0.0110210, 0.0110620,
 * 0.0110806, 0.0110773, 0.0110524, 0.0110075, 0.0109431,
 * 0.0108617, 0.0107643, 0.0106525, 0.0105274, 0.0103911,
 * 0.0102451, 0.0100910, 0.0099305, 0.0097635, 0.0095931,
 * 0.0094194, 0.0092440, 0.0090666, 0.0088392, 0.0087120,
 * 0.0085352, 0.0083588, 0.0081837, 0.0080095, 0.0078360,
 * 0.0076624, 0.0074890, 0.0073137, 0.0071361, 0.0069542,
 * 0.0067653, 0.0065651, 0.0063473, 0.0060981, 0.0057827, 0.0000000/

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AZIMUTH ARRAYS FOR BENDIX TEST BED
 1.0 DEG BY +- 90 DEG SCAN ANTENNA PATTERN (RIGHT SIDE +)
 SCAN AMPLITUDE

C

DATA AZ1R1/ 1.0065700, 0.9536260, 0.8099950, 0.6080540, 0.3906430,
 * 0.1991450, 0.0627389, 0.0335205, 0.0465238, 0.0232104,
 * 0.0360716, 0.0600173, 0.0632334, 0.0477452, 0.0295654,
 * 0.0368114, 0.0433931, 0.0349019, 0.0203824, 0.0373365,
 * 0.0521507, 0.0525132, 0.0379157, 0.0153046, 0.0337944,
 * 0.0468144, 0.0450920, 0.0296881, 0.0180884, 0.0389244,
 * 0.0501332, 0.0479251, 0.0341437, 0.0183912, 0.0297692,
 * 0.0378658, 0.0346880, 0.0221376, 0.0189887, 0.0318686,
 * 0.0361735, 0.0303071, 0.0168329, 0.0238400, 0.0356640,
 * 0.0394371, 0.0344892, 0.0245308, 0.0217780, 0.0281240,
 * 0.0296079, 0.0243622, 0.0176561, 0.0239603, 0.0303764,
 * 0.0311152, 0.0264475, 0.0198544, 0.0181292, 0.0190741,
 * 0.0163341, 0.0186048, 0.0274686, 0.0344603, 0.0363302,
 * 0.0321318, 0.0235271, 0.0174117, 0.0232995, 0.0272752,
 * 0.0264025, 0.0225515, 0.0208173, 0.0229279, 0.0237924,
 * 0.0216983, 0.0193663, 0.0212334, 0.0238809, 0.0235290,
 * 0.0196797, 0.0146330, 0.0175817, 0.0205292, 0.0196084,
 * 0.0149481, 0.0162377, 0.0224560, 0.0258646, 0.0251924,
 * 0.0207367, 0.0149343, 0.0180526, 0.0223048, 0.0234630,
 * 0.0221764, 0.0213434, 0.0231153, 0.0252478, 0.0255521/

C

DATA AZ1R2/ 0.0239170, 0.0216689, 0.0200958, 0.0188811, 0.0182817,
 * 0.0215160, 0.0276735, 0.0334911, 0.0366567, 0.0359549,
 * 0.0314565, 0.0244765, 0.0175770, 0.0168923, 0.0198919,
 * 0.0207308, 0.0195179, 0.0176671, 0.0164480, 0.0154710,
 * 0.0138210, 0.0142064, 0.0171959, 0.0196406, 0.0207075,
 * 0.0206050, 0.0206607, 0.0222015, 0.0247819, 0.0272747,
 * 0.0291703, 0.0304548, 0.0310813, 0.0307142, 0.0289958,
 * 0.0260379, 0.0227420, 0.0205509, 0.0197721, 0.0186961,
 * 0.0163858, 0.0171654, 0.0234752, 0.0308891, 0.0373431,
 * 0.0416318, 0.0432500, 0.0424084, 0.0399027, 0.0368453,
 * 0.0343069, 0.0328871, 0.0324102, 0.0320958, 0.0310680,
 * 0.0287586, 0.0251177, 0.0207493, 0.0172642, 0.0171910,
 * 0.0190234, 0.0203741, 0.0214586, 0.0234345, 0.0264974,
 * 0.0295703, 0.0314361, 0.0314024, 0.0294727, 0.0262931,
 * 0.0229089, 0.0202525, 0.0184145, 0.0166949, 0.0150531,
 * 0.0155696, 0.0182594, 0.0209009, 0.0224739, 0.0226800,
 * 0.0217227, 0.0201114, 0.0183248, 0.0164598, 0.0142495,
 * 0.0117114, 0.0141945, 0.0172318, 0.0194607, 0.0202826,
 * 0.0194431, 0.0172171, 0.0148870, 0.0155098, 0.0180176,
 * 0.0197813, 0.0200149, 0.0186958, 0.0162982, 0.0136244/

C

DATA AZ1R3/ 0.0117129, 0.0115144, 0.0114589, 0.0141277, 0.0180616,
 * 0.0224459, 0.0263299, 0.0288374, 0.0293753, 0.0277792,
 * 0.0243698, 0.0199526, 0.0159884, 0.0151331, 0.0166210,
 * 0.0172224, 0.0161412, 0.0136502, 0.0121293, 0.0151705,
 * 0.0179479, 0.0194833, 0.0194845, 0.0180518, 0.0156189,
 * 0.0128415, 0.0106758, 0.0119905, 0.0120748, 0.0116152,
 * 0.0136473, 0.0168928, 0.0201648, 0.0226748, 0.0238015,
 * 0.0231735, 0.0207407, 0.0167891, 0.0121790, 0.0144787,
 * 0.0192625, 0.0230877, 0.0254520, 0.0261828, 0.0254054,

* 0.0234923, 0.0209733, 0.0184029, 0.0162336, 0.0148605,
 * 0.0149538, 0.0169459, 0.0203092, 0.0243545, 0.0284661,
 * 0.0320680, 0.0346678, 0.0359205, 0.0356754, 0.0340002,
 * 0.0311790, 0.0277050, 0.0242930, 0.0218716, 0.0212291,
 * 0.0221943, 0.0238151, 0.0253155, 0.0263192, 0.0267066,
 * 0.0264943, 0.0257874, 0.0247702, 0.0237158, 0.0229676,
 * 0.0228300, 0.0233798, 0.0243925, 0.0254833, 0.0262872,
 * 0.0265483, 0.0261386, 0.0250562, 0.0234104, 0.0213970,
 * 0.0192810, 0.0173717, 0.0159952, 0.0153955, 0.0155738,
 * 0.0163255, 0.0174585, 0.0188559, 0.0204102, 0.0219775,
 * 0.0233824, 0.0244446, 0.0250121, 0.0249825, 0.0243179/

C

DATA AZ1R4/ 0.0230522, 0.0212826, 0.0191662, 0.0169096, 0.0147667,
 * 0.0130521, 0.0121101, 0.0119632, 0.0121042, 0.0120709,
 * 0.0116841, 0.0109477, 0.0100091, 0.0094971, 0.0102663,
 * 0.0113860, 0.0124000, 0.0131642, 0.0136090, 0.0137155,
 * 0.0135148, 0.0130933, 0.0125994, 0.0122413, 0.0122176,
 * 0.0125718, 0.0131623, 0.0137989, 0.0143380, 0.0146901,
 * 0.0148137, 0.0147017, 0.0143769, 0.0138842, 0.0132891,
 * 0.0126760, 0.0121461, 0.0118096, 0.0117574, 0.0120114,
 * 0.0125243, 0.0132245, 0.0140496, 0.0149513, 0.0158881,
 * 0.0168190, 0.0176999, 0.0184856, 0.0191297, 0.0195896,
 * 0.0198285, 0.0198182, 0.0195416, 0.0189930, 0.0181800,
 * 0.0171226, 0.0158549, 0.0144263, 0.0129090, 0.0114211,
 * 0.0102061, 0.0097495, 0.0103216, 0.0114534, 0.0127209,
 * 0.0139437, 0.0150444, 0.0159857, 0.0167538, 0.0173484,
 * 0.0177818, 0.0180768, 0.0182627, 0.0183752, 0.0184521,
 * 0.0185295, 0.0186380, 0.0187990, 0.0190222, 0.0193049,
 * 0.0196344, 0.0199897, 0.0203469, 0.0206803, 0.0209654,
 * 0.0211822, 0.0213135, 0.0213467, 0.0212735, 0.0210904,
 * 0.0207956, 0.0203925, 0.0198860, 0.0192844, 0.0185966,
 * 0.0178328, 0.0170048, 0.0161251, 0.0152048, 0.0142565/

C

DATA AZ1R5/ 0.0132918, 0.0123224, 0.0113581, 0.0104093, 0.0094859,
 * 0.0085970, 0.0077544, 0.0069735, 0.0062859, 0.0057746,
 * 0.0056059, 0.0057961, 0.0061323, 0.0064891, 0.0068256,
 * 0.0071271, 0.0073893, 0.0076103, 0.0077911, 0.0079329,
 * 0.0080388, 0.0081107, 0.0081514, 0.0081630, 0.0081489,
 * 0.0081118, 0.0080542, 0.0079793, 0.0078876, 0.0077837,
 * 0.0076683, 0.0075440, 0.0074111, 0.0072728, 0.0071297,
 * 0.0069824, 0.0068319, 0.0066794, 0.0065250, 0.0063686,
 * 0.0062099, 0.0060495, 0.0058855, 0.0057175, 0.0055439,
 * 0.0053617, 0.0051670, 0.0049535, 0.0047073, 0.0043937, 0.0036520/

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AZIMUTH ARRAYS FOR BENDIX TEST BED
 2.0 DEG BY +- 90 DEG SCAN ANTENNA PATTERN (LEFT SIDE -)

SCAN AMPLITUDE

DATA AZ2L1/ 1.0227100, 1.0138500, 0.9806790, 0.9250110, 0.8498790,

* 0.7593080, 0.6580540, 0.5512500, 0.4440950, 0.3414920,
 * 0.2477690, 0.1664850, 0.1004840, 0.0542438, 0.0523389,
 * 0.0686347, 0.0748956, 0.0713064, 0.0607840, 0.0478115,
 * 0.0430803, 0.0529232, 0.0642431, 0.0718097, 0.0741760,
 * 0.0711240, 0.0632471, 0.0518624, 0.0397811, 0.0392002,
 * 0.0508052, 0.0618623, 0.0697240, 0.0734424, 0.0727310,
 * 0.0678378, 0.0594745, 0.0487323, 0.0371036, 0.0322899,
 * 0.0414117, 0.0487428, 0.0526649, 0.0526724, 0.0487387,
 * 0.0413081, 0.0319825, 0.0377397, 0.0502592, 0.0623447,
 * 0.0726382, 0.0801127, 0.0840469, 0.0840729, 0.0802067,
 * 0.0728432, 0.0627303, 0.0509535, 0.0392804, 0.0351081,
 * 0.0431078, 0.0509162, 0.0559146, 0.0574837, 0.0555469,
 * 0.0504603, 0.0431258, 0.0362538, 0.0386407, 0.0476540,
 * 0.0567427, 0.0641038, 0.0688711, 0.0705752, 0.0690835,
 * 0.0645816, 0.0575466, 0.0487118, 0.0391100, 0.0317789,
 * 0.0368300, 0.0439256, 0.0490524, 0.0515567, 0.0512586,
 * 0.0483430, 0.0434679, 0.0384213, 0.0380009, 0.0439546,
 * 0.0517514, 0.0590259, 0.0647285, 0.0682666, 0.0693471,
 * 0.0679442, 0.0642843, 0.0588264, 0.0522519, 0.0455011/

C

DATA AZ2L2/ 0.0399787, 0.0376692, 0.0388202, 0.0407995, 0.0417274,
 * 0.0409616, 0.0385145, 0.0350426, 0.0330787, 0.0362752,
 * 0.0419797, 0.0477992, 0.0527597, 0.0562755, 0.0579736,
 * 0.0576752, 0.0553989, 0.0513615, 0.0459912, 0.0400173,
 * 0.0350398, 0.0347569, 0.0388014, 0.0431872, 0.0464041,
 * 0.0479218, 0.0475693, 0.0454468, 0.0419947, 0.0383356,
 * 0.0370850, 0.0403698, 0.0462387, 0.0526020, 0.0584286,
 * 0.0631495, 0.0664359, 0.0681465, 0.0683116, 0.0671219,
 * 0.0649105, 0.0621213, 0.0592487, 0.0567376, 0.0548478,
 * 0.0535478, 0.0525356, 0.0513897, 0.0497401, 0.0473774,
 * 0.0443022, 0.0407788, 0.0374853, 0.0357684, 0.0368364,
 * 0.0398587, 0.0433250, 0.0463427, 0.0484452, 0.0493884,
 * 0.0490767, 0.0475350, 0.0448931, 0.0413734, 0.0372893,
 * 0.0330947, 0.0298110, 0.0300109, 0.0326344, 0.0351182,
 * 0.0367806, 0.0374122, 0.0369628, 0.0354867, 0.0331350,
 * 0.0301984, 0.0276895, 0.0291673, 0.0325733, 0.0359358,
 * 0.0388222, 0.0409996, 0.0423176, 0.0426986, 0.0421363,
 * 0.0406974, 0.0385225, 0.0358408, 0.0330276, 0.0308087,
 * 0.0304076, 0.0319537, 0.0341421, 0.0361403, 0.0375926,
 * 0.0383415, 0.0383374, 0.0376157, 0.0362976, 0.0346129/

C

DATA AZ2L3/ 0.0329626, 0.0319856, 0.0322978, 0.0338142, 0.0359188,
 * 0.0380913, 0.0400196, 0.0415251, 0.0425155, 0.0429610,
 * 0.0428810, 0.0423372, 0.0414212, 0.0402439, 0.0389211,
 * 0.0375536, 0.0362099, 0.0349102, 0.0336232, 0.0322798,
 * 0.0308012, 0.0291396, 0.0273666, 0.0260885, 0.0269372,
 * 0.0293817, 0.0323626, 0.0355595, 0.0388135, 0.0420004,
 * 0.0450129, 0.0477589, 0.0501651, 0.0521790, 0.0537721,
 * 0.0549399, 0.0557009, 0.0560942, 0.0561739, 0.0560034,
 * 0.0556473, 0.0551638, 0.0545965, 0.0539700, 0.0532876,
 * 0.0525338, 0.0516792, 0.0506883, 0.0495272, 0.0481706,
 * 0.0466065, 0.0448395, 0.0428924, 0.0408064, 0.0386410,

* 0.0364718, 0.0343923, 0.0325121, 0.0309526, 0.0298248,
 * 0.0291806, 0.0289629, 0.0290199, 0.0291835, 0.0293313,
 * 0.0294016, 0.0293870, 0.0293219, 0.0292699, 0.0293058,
 * 0.0294921, 0.0298564, 0.0303807, 0.0310107, 0.0316738,
 * 0.0322937, 0.0328026, 0.0331431, 0.0332729, 0.0331623,
 * 0.0327962, 0.0321725, 0.0313012, 0.0302050, 0.0289178,
 * 0.0274868, 0.0259765, 0.0244898, 0.0232367, 0.0226903,
 * 0.0231641, 0.0241433, 0.0251849, 0.0261129, 0.0268477,
 * 0.0273451, 0.0275792, 0.0275358, 0.0272117, 0.0266131/

C

DATA AZ2L4/ 0.0257549, 0.0246619, 0.0233706, 0.0219506, 0.0206840,
 * 0.0210095, 0.0224977, 0.0241586, 0.0258328, 0.0274560,
 * 0.0289817, 0.0303702, 0.0315884, 0.0326069, 0.0334027,
 * 0.0339584, 0.0342614, 0.0343057, 0.0340902, 0.0336209,
 * 0.0329079, 0.0319661, 0.0308163, 0.0294825, 0.0279936,
 * 0.0263847, 0.0246981, 0.0229949, 0.0213938, 0.0202290,
 * 0.0202162, 0.0212461, 0.0225929, 0.0239649, 0.0252609,
 * 0.0264337, 0.0274544, 0.0283017, 0.0289608, 0.0294233,
 * 0.0296826, 0.0297373, 0.0295894, 0.0292440, 0.0287104,
 * 0.0280017, 0.0271348, 0.0261327, 0.0250247, 0.0238549,
 * 0.0226899, 0.0216387, 0.0208810, 0.0206409, 0.0210255,
 * 0.0219170, 0.0231190, 0.0244859, 0.0259276, 0.0273899,
 * 0.0288363, 0.0302408, 0.0315830, 0.0328480, 0.0340232,
 * 0.0350980, 0.0360650, 0.0369179, 0.0376522, 0.0382652,
 * 0.0387550, 0.0391214, 0.0393650, 0.0394881, 0.0394935,
 * 0.0393848, 0.0391665, 0.0388444, 0.0384235, 0.0379108,
 * 0.0373131, 0.0366368, 0.0358906, 0.0350814, 0.0342178,
 * 0.0333084, 0.0323606, 0.0313846, 0.0303887, 0.0293830,
 * 0.0283771, 0.0273822, 0.0264091, 0.0254699, 0.0245785,
 * 0.0237481, 0.0229947, 0.0223323, 0.0217754, 0.0213358/

C

DATA AZ2L5/ 0.0210215, 0.0208345, 0.0207704, 0.0208200, 0.0209693,
 * 0.0212020, 0.0215016, 0.0218525, 0.0222409, 0.0226547,
 * 0.0230839, 0.0235205, 0.0239578, 0.0243904, 0.0248144,
 * 0.0252260, 0.0256229, 0.0260030, 0.0263646, 0.0267067,
 * 0.0270284, 0.0273289, 0.0276078, 0.0278649, 0.0281001,
 * 0.0283132, 0.0285043, 0.0286734, 0.0288204, 0.0289457,
 * 0.0290494, 0.0291312, 0.0291914, 0.0292299, 0.0292466,
 * 0.0292414, 0.0292139, 0.0291639, 0.0290906, 0.0289932,
 * 0.0288708, 0.0287219, 0.0285442, 0.0283354, 0.0280914,
 * 0.0278064, 0.0274716, 0.0270720, 0.0265779, 0.0259114, 0.0000000/

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AZIMUTH ARRAYS FOR BENDIX TEST BED

2.0 DEG BY +/- 90 DEG SCAN ANTENNA PATTERN (RIGHT SIDE +)

SCAN AMPLITUDE

DATA AZ2R1/ 1.0227100, 1.0067800, 0.9669380, 0.9053900, 0.8254770,
 * 0.7314680, 0.6282390, 0.5209640, 0.4147530, 0.3143330,
 * 0.2237930, 0.1463950, 0.0848318, 0.0463733, 0.0573607,
 * 0.0721876, 0.0761960, 0.0709757, 0.0596575, 0.0468743,

* 0.0432931, 0.0528046, 0.0629850, 0.0693142, 0.0706190,
 * 0.0668870, 0.0588923, 0.0482025, 0.0386601, 0.0413572,
 * 0.0513372, 0.0599861, 0.0651716, 0.0660842, 0.0625487,
 * 0.0549072, 0.0439531, 0.0313214, 0.0395727, 0.0533192,
 * 0.0654885, 0.0749323, 0.0808534, 0.0828269, 0.0808217,
 * 0.0751891, 0.0666144, 0.0560403, 0.0445658, 0.0333503,
 * 0.0321089, 0.0397712, 0.0445896, 0.0461960, 0.0445843,
 * 0.0401244, 0.0338952, 0.0333261, 0.0415752, 0.0504416,
 * 0.0582977, 0.0642835, 0.0678171, 0.0685882, 0.0665684,
 * 0.0620062, 0.0554025, 0.0474928, 0.0393447, 0.0336454,
 * 0.0361177, 0.0412566, 0.0450195, 0.0466161, 0.0458827,
 * 0.0429738, 0.0383338, 0.0330457, 0.0325769, 0.0384103,
 * 0.0446141, 0.0498764, 0.0536588, 0.0556792, 0.0558683,
 * 0.0543639, 0.0514986, 0.0477913, 0.0439401, 0.0408013,
 * 0.0391473, 0.0390056, 0.0395238, 0.0398564, 0.0397069,
 * 0.0393674, 0.0396086, 0.0411854, 0.0441225, 0.0477943/

C

DATA AZ2R2/ 0.0514672, 0.0545401, 0.0565765, 0.0573017, 0.0565989,
 * 0.0545037, 0.0511922, 0.0469646, 0.0422318, 0.0375368,
 * 0.0337286, 0.0322990, 0.0334459, 0.0350504, 0.0359991,
 * 0.0360718, 0.0354428, 0.0346071, 0.0343390, 0.0352046,
 * 0.0369496, 0.0388992, 0.0404967, 0.0413900, 0.0414006,
 * 0.0405140, 0.0389016, 0.0370037, 0.0356821, 0.0360262,
 * 0.0382017, 0.0413593, 0.0447261, 0.0478649, 0.0505661,
 * 0.0527738, 0.0545439, 0.0560022, 0.0572932, 0.0585223,
 * 0.0597108, 0.0607803, 0.0615729, 0.0618939, 0.0615586,
 * 0.0604312, 0.0584506, 0.0556424, 0.0521224, 0.0480918,
 * 0.0438326, 0.0397086, 0.0361846, 0.0338120, 0.0329008,
 * 0.0329295, 0.0329656, 0.0324179, 0.0310836, 0.0290795,
 * 0.0276959, 0.0299470, 0.0334702, 0.0371349, 0.0405567,
 * 0.0434504, 0.0455869, 0.0467990, 0.0469893, 0.0461353,
 * 0.0442915, 0.0415846, 0.0382099, 0.0344320, 0.0306514,
 * 0.0280753, 0.0294087, 0.0320546, 0.0342478, 0.0356282,
 * 0.0360705, 0.0355561, 0.0341568, 0.0320568, 0.0296916,
 * 0.0284824, 0.0302049, 0.0332215, 0.0362996, 0.0389956,
 * 0.0410597, 0.0423309, 0.0427156, 0.0421875, 0.0407871,
 * 0.0386238, 0.0358835, 0.0328689, 0.0301905, 0.0292405/

C

DATA AZ2R3/ 0.0307616, 0.0331870, 0.0354593, 0.0371750, 0.0381537,
 * 0.0383263, 0.0377189, 0.0364661, 0.0348631, 0.0334705,
 * 0.0331329, 0.0344043, 0.0369323, 0.0400183, 0.0431332,
 * 0.0459271, 0.0481603, 0.0496686, 0.0503495, 0.0501583,
 * 0.0491049, 0.0472558, 0.0447386, 0.0417550, 0.0386219,
 * 0.0358596, 0.0342826, 0.0346297, 0.0366979, 0.0396465,
 * 0.0428187, 0.0458495, 0.0485467, 0.0508139, 0.0526159,
 * 0.0539584, 0.0548738, 0.0554106, 0.0556210, 0.0555520,
 * 0.0552362, 0.0546883, 0.0539037, 0.0528625, 0.0515365,
 * 0.0498976, 0.0479273, 0.0456268, 0.0430260, 0.0401975,
 * 0.0372801, 0.0345288, 0.0324027, 0.0315644, 0.0323729,
 * 0.0343974, 0.0369577, 0.0395861, 0.0420068, 0.0440496,
 * 0.0456045, 0.0466009, 0.0470000, 0.0467900, 0.0459835,
 * 0.0446158, 0.0427429, 0.0404395, 0.0377983, 0.0349309,

* 0.0319788, 0.0291471, 0.0268219, 0.0257841, 0.0265150,
 * 0.0281540, 0.0298995, 0.0314220, 0.0325823, 0.0333155,
 * 0.0335936, 0.0334130, 0.0327886, 0.0317528, 0.0303519,
 * 0.0286475, 0.0267222, 0.0247128, 0.0229952, 0.0228285,
 * 0.0243894, 0.0263703, 0.0283449, 0.0301775, 0.0317956,
 * 0.0331503, 0.0342077, 0.0349457, 0.0353517, 0.0354245/

C

DATA AZ2R4/ 0.0351710, 0.0346073, 0.0337568, 0.0326486, 0.0313187,
 * 0.0298063, 0.0281537, 0.0264069, 0.0246147, 0.0228355,
 * 0.0211698, 0.0201200, 0.0208321, 0.0220518, 0.0232045,
 * 0.0241999, 0.0250053, 0.0256048, 0.0259892, 0.0261572,
 * 0.0261120, 0.0258625, 0.0254228, 0.0248112, 0.0240523,
 * 0.0231781, 0.0222348, 0.0212988, 0.0205224, 0.0201844,
 * 0.0204818, 0.0212292, 0.0221708, 0.0231710, 0.0241612,
 * 0.0251039, 0.0259745, 0.0267549, 0.0274322, 0.0279990,
 * 0.0284494, 0.0287813, 0.0289954, 0.0290941, 0.0290833,
 * 0.0289701, 0.0287637, 0.0284754, 0.0281164, 0.0277010,
 * 0.0272441, 0.0267599, 0.0262640, 0.0257720, 0.0252982,
 * 0.0248558, 0.0244556, 0.0241052, 0.0238093, 0.0235674,
 * 0.0233759, 0.0232275, 0.0231131, 0.0230219, 0.0229432,
 * 0.0228672, 0.0227856, 0.0226917, 0.0225812, 0.0224514,
 * 0.0223024, 0.0221361, 0.0219564, 0.0217690, 0.0215821,
 * 0.0214047, 0.0212475, 0.0211213, 0.0210377, 0.0210062,
 * 0.0210346, 0.0211285, 0.0212891, 0.0215157, 0.0218039,
 * 0.0221479, 0.0225414, 0.0229759, 0.0234446, 0.0239395,
 * 0.0244545, 0.0249830, 0.0255195, 0.0260596, 0.0265987,
 * 0.0271335, 0.0276596, 0.0281754, 0.0286783, 0.0291661/

C

DATA AZ2R5/ 0.0296372, 0.0300901, 0.0305244, 0.0309386, 0.0313325,
 * 0.0317053, 0.0320572, 0.0323879, 0.0326971, 0.0329858,
 * 0.0332534, 0.0335006, 0.0337278, 0.0339356, 0.0341237,
 * 0.0342933, 0.0344448, 0.0345787, 0.0346953, 0.0347955,
 * 0.0348794, 0.0349476, 0.0350008, 0.0350388, 0.0350627,
 * 0.0350726, 0.0350687, 0.0350514, 0.0350205, 0.0349769,
 * 0.0349205, 0.0348509, 0.0347684, 0.0346730, 0.0345644,
 * 0.0344422, 0.0343062, 0.0341558, 0.0339903, 0.0338086,
 * 0.0336098, 0.0333922, 0.0331533, 0.0328908, 0.0326005,
 * 0.0322765, 0.0319099, 0.0314856, 0.0309739, 0.0302968, 0.0286500/

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AZIMUTH ORTHOGONAL DEGREES

DATA AZTBOD/-90.0,-24.0,-22.0,-20.0,-18.0,-16.0,-14.0,-12.0,-10.0,
 * -8.0,-6.0,-4.0,-2.0,0.0,2.0,4.0,6.0,8.0,10.0,12.0,14.0,16.0,18.0,
 * 20.0,22.0,24.0,26.0,28.0,30.0,90.0/

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AZIMUTH ORTHOGONAL AMPLITUDES

DATA AZTBOA/0.0195,0.0350,0.0302,0.0273,0.0483,0.0454,0.0559,
 * 0.0775,0.0271,0.0676,0.0296,0.0748,0.0736,0.3626,1.0000,0.8850,
 * 0.9704,0.8993,0.8877,0.7924,0.7275,0.6687,0.6208,0.4494,0.1587,
 * 0.0624,0.0425,0.0572,0.0236,0.0195/

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ELEVATION ARRAYS FOR BENDIX BASIC NARROW 1.5 DEG +- 60.0
DEGREE ANTENNA PATTERN

SCAN AMPLITUDE

DATA ELTB1/ 0.0725887, 0.0773769, 0.0785817, 0.0760421, 0.0701290,
* 0.0617065, 0.0520387, 0.0427336, 0.0361977, 0.0357065,
* 0.0374072, 0.0371770, 0.0346236, 0.0312065, 0.0338549,
* 0.0384058, 0.0416751, 0.0429415, 0.0423318, 0.0411993,
* 0.0421091, 0.0459711, 0.0508106, 0.0545354, 0.0558390,
* 0.0541853, 0.0498813, 0.0444193, 0.0414645, 0.0443239,
* 0.0495177, 0.0533941, 0.0546260, 0.0533928, 0.0513315,
* 0.0511978, 0.0543407, 0.0588382, 0.0618917, 0.0615885,
* 0.0571050, 0.0486524, 0.0376202, 0.0357776, 0.0471417,
* 0.0564785, 0.0616080, 0.0616436, 0.0568373, 0.0491212,
* 0.0442480, 0.0492088, 0.0579873, 0.0642701, 0.0654804,
* 0.0608169, 0.0509711, 0.0396105, 0.0436232, 0.0575929,
* 0.0694190, 0.0761183, 0.0764822, 0.0706789, 0.0603792,
* 0.0494326, 0.0458302, 0.0514939, 0.0567226, 0.0567713,
* 0.0507327, 0.0404456, 0.0395832, 0.0531555, 0.0656385,
* 0.0728251, 0.0727156, 0.0648863, 0.0506258, 0.0346857,
* 0.0461263, 0.0609362, 0.0689319, 0.0678659, 0.0581290,
* 0.0462197, 0.0529787, 0.0694441, 0.0779963, 0.0701246,
* 0.0474365, 0.0884882, 0.1766930, 0.2921380, 0.4272700,
* 0.5720870, 0.7145330, 0.8417710, 0.9417180, 1.0045500/

C

DATA ELTB2/ 1.0239300, 0.9978720, 0.9289700, 0.8240800, 0.6934460,
* 0.5494050, 0.4048550, 0.2717390, 0.1597830, 0.0764149,
* 0.0496007, 0.0719687, 0.0758107, 0.0642288, 0.0483123,
* 0.0518529, 0.0672255, 0.0766548, 0.0763395, 0.0665736,
* 0.0500368, 0.0344513, 0.0484148, 0.0619940, 0.0681431,
* 0.0655867, 0.0549628, 0.0391770, 0.0420664, 0.0605619,
* 0.0757336, 0.0845321, 0.0856348, 0.0792494, 0.0671007,
* 0.0526366, 0.0436875, 0.0489685, 0.0566885, 0.0596229,
* 0.0564684, 0.0481109, 0.0383575, 0.0419242, 0.0533818,
* 0.0624242, 0.0666357, 0.0653273, 0.0591189, 0.0501513,
* 0.0436348, 0.0466740, 0.0539433, 0.0589543, 0.0595843,
* 0.0555457, 0.0476881, 0.0379800, 0.0351169, 0.0432590,
* 0.0498509, 0.0530333, 0.0529269, 0.0510692, 0.0503449,
* 0.0529436, 0.0576430, 0.0617063, 0.0631895, 0.0612688,
* 0.0561343, 0.0489722, 0.0424064, 0.0410924, 0.0448293,
* 0.0483186, 0.0492199, 0.0472961, 0.0438019, 0.0419222,
* 0.0445764, 0.0495130, 0.0534820, 0.0547616, 0.0526692,
* 0.0472731, 0.0392544, 0.0307015, 0.0385724, 0.0476008,
* 0.0547926, 0.0595126, 0.0616379, 0.0615179, 0.0598520,
* 0.0574706, 0.0550560, 0.0529444, 0.0511990, 0.0499279, 0.0494950/

C
C
C

ELEVATION ORTHOGONAL DEGREES

DATA ELTBOD/0.0,2.0,3.0,4.0,6.0,9.0,13.0,15.0,18.0,24.0,31.0,
* 39.0,43.0,47.0,52.0,57.0,62.0,68.0,79.0,90.0/

C
C
C

ELEVATION ORTHOGONAL AMPLITUDES

DATA ELTBOA/1.0000000,1.0024748,1.0006170,0.9968318,0.9839340,
* 0.9530935,0.8957454,0.8622665,0.8084409,0.6961886,0.5714322,
* 0.4486310,0.3960835,0.3490191,0.2969747,0.2512445,0.2105915,
* 0.1671177,0.0995892,0.0482541/

C
C
C

ELEVATION ORTHOGONAL ELEMENT PATTERN

DATA ELTBEP/0.9873673, 0.9910778, 0.9941998, 0.9967696, 0.9988259,
* 1.0004095, 1.0015634, 1.0023321, 1.0027621, 1.0029010,
* 1.0027978, 1.0025030, 1.0020678, 1.0015445, 1.0009862,
* 1.0004473, 0.9999826, 0.9996482, 0.9995007, 0.9995983,
* 1.0000000, 0.9995983, 0.9995007, 0.9996482, 0.9999826,
* 1.0004473, 1.0009862, 1.0015445, 1.0020678, 1.0025030,
* 1.0027978, 1.0029010, 1.0027621, 1.0023321, 1.0015634,
* 1.0004095, 0.9988259, 0.9967696, 0.9941998, 0.9910778,
* 0.9873673/
END

APPENDIX H

MLS MATHEMATICAL MODEL SUBROUTINE READ ONE
VERSION 3.2 SOFTWARE LISTING

APPENDIX H

MLS MATHEMATICAL MODEL SUBROUTINE READ1 VERSION 3.2 SOFTWARE LISTING

SUBROUTINE READ1(PART,IU)

```
C
C*****
C                                     * PREAMBLE *
C*****
C*****
C
C Subroutine Name: READ1                      Version: 3.2
C                                           Source: FORTRAN 77
C
C Call Format: READ1 (PART, IU)
C           where
C           PART: character, string representing which
C                 portion of the model is being used.
C                 'MLST ': propagation portion
C                 'PLOT': propagation plotting portion
C                 'MLSR ': receiver (system) portion
C                 'PLOT': receiver (system) plotting portion
C           IU: integer, formatted input file unit number
C
C Purpose: to read section 1 of the formatted input file from unit
C           IU.
C
C Abstract (methodology) : reads azimuth, elevation, and dme/p antenna
C                           coordinates, frequencies and types for all
C                           portions of the model. Reads azimuth, dme/p
C                           and elevation upper and lower scan limits for
C                           the system portions of the model. Reads
C                           additional DME/P information for the system
C                           system portions of the model. Calculates
C                           azimuth, DME/P and elevation wavelengths from
C                           frequencies read in. Any data not needed for
C                           the propagation portions are skipped.
C
C Commons: ANTS, ANTSCO, AZSYS, BBNANT, BTBANT, CMTRS8, CNSTNT, DME, DMEP,
C           EL1, GENANT, HAZANT, ISOU, SCNLIM, SECTID, TYPE
C
C Input Arguments: PART, IU
C
C Output Arguments: NONE
C
C Common Elements Referenced: ANTS    -- AZSA, AZOD, AZOA, ELSA, EL0D,
C                                   ELOA, ELEA, DMEOD, DMEOA
C                                   ANTSCO -- AZGOA, AZGOD, ELGOA, ELGOD,
C                                   ELARR, DMBNOA, DMBNOD
C                                   AZSYS  -- AZXYZ, WLAZ
```

```

C      BBNANT -- AZBNSA, AZBNOA, AZBNOD,
C      ELBNSA, ELBNOA, ELBNOD
C      BTBANT -- AZ1LSA, AZ1RSA, AZ2LSA, AZ2RSA, AZTBOD,
C      AZTBOA, ELTBSA, ELTBOD, ELTBOA, ELTBEP
C      CMTRS8 -- ANTBW
C      CNSTNT -- RADIANT, SOL
C      DME     -- DMEXYZ, WLDME
C      DMEP    -- DMEUP, DMEDWN, DMETYP
C      EL1     -- ELXYZ, WLEL
C      GENANT -- AG16SA, AG24SA, AG34SA,
C      EG0CSA, EG5CSA, EG2CSA
C      HAZANT -- AH16SA, AH14SA, AH24SA,
C      EH0CSA, EH5CSA
C      IODEV  -- ISOU
C      SCNLIM -- SCANHI, SCANLO, COVEXT
C      SECTID -- SECT, NUMBER
C      TYPE   -- ATYPE, ETYPE, DTYPE

```

```

C Called Routines or Functions: NONE

```

```

C Intrinsic Functions: NONE

```

```

C Called by: BMLST  -- READIN
C            BPLOTT -- READIN
C            BMLSR  -- READIN
C            BPLOTR -- READIN

```

```

C Reference to Original Documentation: NONE

```

```

C Changes Made (history): 12/88 -- Bendix test bed antenna patterns added
C                          5/88 -- variable COVEXT added to COMMON
C                          SCNLIM for use in computing
C                          error tolerances
C                          11/87 -- modified for separate COMMON statements
C                          to split the various antenna types into
C                          separate BLOCK DATA files.
C                          8/87 -- modified to allow for specific antenna
C                          type to be chosen from input file.
C                          8/86 -- this routine was created by C. Honard,
C                          MSI Services, Inc.

```

```

C*****
C*****

```

DECLARATIONS

```

C      CHARACTER*8  SECT, DMEUP, DMEDWN, DMETYP
C      CHARACTER*8  ATYPE, ETYPE, DTYPE
C      CHARACTER*5  PART
C      CHARACTER*2  NUMBER
C      LOGICAL      AZPLZ, ELPLZ, DMEPLZ
C      LOGICAL      CNTPRT, IFCORR

```

C
C
C
C
COMMONS

C
COMMON/CMTRS8/CNTPRT, ANGHI(3), ANGLO(3), IFCORR, ANTBW(3)

C
COMMON/CNSTNT/PI, TWOPI, PI2, RADIANT, DEGREE, SOL, COS45, PI4, RPI2

C
COMMON/IODEV/ISIU, ISOU

C
COMMON/SCNLIM/SCANHI(3), SCANLO(3), COVEXT

C
COMMON/SECTID/SECT, NUMBER

C
COMMON/TYPE/ATYPE, ETYPE, DTYPE

C
C
C
C
SYSTEM PARAMETERS

C
AZIMUTH PARAMETERS

C
COMMON/AZSYS/AZXYZ(3), AZVEL(3), WLAZ, AZPLZ, AZWN, AZWN2

C
ELEVATION PARAMETERS

C
COMMON/EL1/ELXYZ(3), ELVEL(3), WLEL, ELPLZ, ELWN, ELWN2

C
DME/P PARAMETERS

C
COMMON/DME/DMEXYZ(3), DMEVEL(3), WLDME, DMEPLZ, DFLAG, DMEWN, DMEWN2,
* HTGRND

C
COMMON/DMEP/DMEUP, DMEDWN, DMETYP

C
C
C
C
ANTENNA PARAMETERS

C
COMMON/ANTS/AZSA(451), AZOD(30), AZOA(30), ELSA(201), ELOD(20),
* ELOA(20), ELEA(41), DMEOD(20), DMEOA(20)

C
COMMON/ANTSCO/AZGOD(30), AZGOA(30), ELGOD(20), ELGOA(20), ELARR(41),
* DMBNOD(20), DMBNOA(20)

C
BENDIX BASIC NARROW ANTENNA PATTERN DATA - PTRBN2

C
COMMON/BBNANT/AZBNSA(451), AZBNOD(30), AZBNOA(30),
* ELBNSA(201), ELBNOD(20), ELBNOA(20)

C
BENDIX TEST BED ANTENNA PATTERN DATA

C
COMMON INCLUDES ORTHOGONAL PATTERN ARRAYS; AZIMUTH SCAN AMPLITUDE
ARRAYS DISTINGUISH LEFT PATTERNS FROM RIGHT PATTERNS

C
COMMON/BTBANT/AZ1LSA(451), AZ1RSA(451), AZ2LSA(451), AZ2RSA(451),
* AZTBOD(30), AZTBOA(30), ELTBSA(201), ELTBOD(20), ELTBOA(20),
* ELTBEP(41)

C
C
GENERIC ANTENNA PATTERN DATA

```

COMMON/GENANT/AG16SA(451),AG24SA(451),AG34SA(451),
* EGOCSA(201),EG5CSA(201),EG2CSA(201)
C
C   HAZELTINE PRODUCTION ANTENNA PATTERN DATA
COMMON/HAZANT/AH16SA(451),AH14SA(451),AH24SA(451),
* EH0CSA(201),EH5CSA(201)
C
C   FORMATS
C
C   GENERAL
C
900  FORMAT(A8,A2)
9000 FORMAT(1X)
C
C   FORMATS
C
101  FORMAT(21X,3(1X,F8.0),1X,F9.0,2(1X,F5.0),1X,A8)
102  FORMAT(21X,2(1X,A8))
103  FORMAT(' INVALID ANTENNA TYPE ')
C
C   SKIP LINES CONTAINING HEADER INFO.
C
DO 100 I=1,3
  READ(IU,9000)
100  CONTINUE
C
C   IF (PART.EQ.'MLSR '.OR.PART.EQ.'PLOT') THEN
COVEXT=60.0
C
C   READ ONLY THE DATA NECESSARY FOR THE RECEIVER PORTIONS OF THE MODE
C
  READ(IU,101)(AZXYZ(I),I=1,3),AFREQ,SCANLO(1),SCANHI(1),
*   ATYPE
C
  IF (ATYPE.EQ.'AZBN ') THEN
C
C   ANTENNA IS BENDIX BASIC NARROW 1 DEGREE BW BY +- 90 DEGREE SCAN
C
    ANTBW(1) = 2.0
C
C   LOAD DATA INTO AZIMUTH SCAN AMPLITUDE ARRAY
C
    DO 108 I=1,451
      AZSA(I) = AZBNSA(I)
108  CONTINUE
C
C   LOAD DATA INTO AZIMUTH ORTHOGONAL DEGREE AND AMPLITUDE
C   ARRAYS
C

```

```

DO 109 I=1,30
  AZOD(I) = AZBNOD(I)
  AZOA(I) = AZBNOA(I)
109  CONTINUE
C
C
  ELSE IF (ATYPE.EQ.'AZG1X60 ') THEN
C
C  ANTENNA IS GENERIC 1 DEGREE BW BY +- 60 DEGREE SCAN
C
  ANTBW(1) = 1.0
C
C  LOAD DATA INTO AZIMUTH SCAN AMPLITUDE ARRAY
C
  DO 110 I=1,451
    AZSA(I) = AG16SA(I)
110  CONTINUE
C
C  LOAD DATA INTO AZIMUTH ORTHOGONAL DEGREE AND AMPLITUDE
C  ARRAYS
C
  DO 111 I=1,30
    AZOD(I) = AZGOD(I)
    AZOA(I) = AZGOA(I)
111  CONTINUE
C
  ELSE IF (ATYPE.EQ.'AZG2X40 ') THEN
C
C  ANTENNA IS GENERIC 2 DEGREE BW BY +- 40 DEGREE SCAN
C
  ANTBW(1) = 2.0
  COVEXT = 40.0
C
C  LOAD DATA INTO AZIMUTH SCAN AMPLITUDE ARRAY
C
  DO 112 I=1,451
    AZSA(I) = AG24SA(I)
112  CONTINUE
C
C  LOAD DATA INTO AZIMUTH ORTHOGONAL DEGREE AND AMPLITUDE
C  ARRAYS
C
  DO 113 I=1,30
    AZOD(I) = AZGOD(I)
    AZOA(I) = AZGOA(I)
113  CONTINUE
C
  ELSE IF (ATYPE.EQ.'AZG3X40 ') THEN
C
C  ANTENNA IS GENERIC 3 DEGREE BW BY +- 40 DEGREE SCAN
C
  ANTBW(1) = 3.0

```

```

      COVEXT = 40.0
C
C   LOAD DATA INTO AZIMUTH SCAN AMPLITUDE ARRAY
C
      DO 114 I=1,451
        AZSA(I) = AG34SA(I)
114    CONTINUE
C
C   LOAD DATA INTO AZIMUTH ORTHOGONAL DEGREE AND AMPLITUDE
C   ARRAYS
C
      DO 115 I=1,30
        AZOD(I) = AZGOD(I)
        AZOA(I) = AZGOA(I)
115    CONTINUE
C
      ELSE IF (ATYPE.EQ.'AZH1X40 ') THEN
C
C   ANTENNA IS HAZELTINE 1 DEGREE BW BY +- 40 DEGREE SCAN
C
        ANTBW(1) = 1.0
        COVEXT = 40.0
C
C   LOAD DATA INTO AZIMUTH SCAN AMPLITUDE ARRAY
C
        DO 116 I=1,451
          AZSA(I) = AH14SA(I)
116    CONTINUE
C
C   LOAD DATA INTO AZIMUTH ORTHOGONAL DEGREE AND AMPLITUDE
C   ARRAYS
C
        DO 117 I=1,30
          AZOD(I) = AZGOD(I)
          AZOA(I) = AZGOA(I)
117    CONTINUE
C
      ELSE IF (ATYPE.EQ.'AZH1X60 ') THEN
C
C   ANTENNA IS HAZELTINE 1 DEGREE BW BY +- 60 DEGREE SCAN
C
        ANTBW(1) = 1.0
C
C   LOAD DATA INTO AZIMUTH SCAN AMPLITUDE ARRAY
C
        DO 118 I=1,451
          AZSA(I) = AH16SA(I)
118    CONTINUE
C
C   LOAD DATA INTO AZIMUTH ORTHOGONAL DEGREE AND AMPLITUDE
C   ARRAYS
C

```

```

DO 119 I=1,30
    AZOD(I) = AZGOD(I)
    AZOA(I) = AZGOA(I)
119    CONTINUE
C
    ELSE IF (ATYPE.EQ.'AZH2X40 ') THEN
C
C    ANTENNA IS HAZELTINE 2 DEGREE BW BY +- 40 DEGREE SCAN
C
        ANTBW(1) = 2.0
        COVEXT = 40.0
C
C    LOAD DATA INTO AZIMUTH SCAN AMPLITUDE ARRAY
C
        DO 120 I=1,451
            AZSA(I) = AH24SA(I)
120        CONTINUE
C
C    LOAD DATA INTO AZIMUTH ORTHOGONAL DEGREE AND AMPLITUDE
C    ARRAYS
C
        DO 121 I=1,30
            AZOD(I) = AZGOD(I)
            AZOA(I) = AZGOA(I)
121        CONTINUE
C
C
        ELSE IF (ATYPE.EQ.'AZBL1060') THEN
C
C    ANTENNA IS BENDIX TEST BED 1 DEGREE BW BY +- 60 DEGREE SCAN - LEFT
C
        ANTBW(1) = 1.0
C
C    LOAD DATA INTO AZIMUTH SCAN AMPLITUDE ARRAY
C
        DO 150 I=1,451
            AZSA(I) = AZ1LSA(I)
150        CONTINUE
C
C    LOAD DATA INTO AZIMUTH ORTHOGONAL DEGREE AND AMPLITUDE
C    ARRAYS
C
        DO 151 I=1,30
            AZOD(I) = AZTBOD(I)
            AZOA(I) = AZTBOA(I)
151        CONTINUE
C
        ELSE IF (ATYPE.EQ.'AZBR1060') THEN
C
C    ANTENNA IS BENDIX TEST BED 1 DEGREE BW BY +- 60 DEGREE SCAN - RIGHT
C
        ANTBW(1) = 1.0

```

```

C
C      LOAD DATA INTO AZIMUTH SCAN AMPLITUDE ARRAY
C
      DO 152 I=1,451
      AZSA(I) = AZ1RSA(I)
152    CONTINUE
C
C      LOAD DATA INTO AZIMUTH ORTHOGONAL DEGREE AND AMPLITUDE
C      ARRAYS
C
      DO 153 I=1,30
      AZOD(I) = AZTBOD(I)
      AZOA(I) = AZTBOA(I)
153    CONTINUE
C
      ELSE IF (ATYPE.EQ.'AZBL2040') THEN
C
C      ANTENNA IS BENDIX TEST BED 2 DEGREE BW BY +- 40 DEGREE SCAN - LEFT
C
      ANTBW(1) = 2.0
      COVEXT = 40.0
C
C      LOAD DATA INTO AZIMUTH SCAN AMPLITUDE ARRAY
C
      DO 154 I=1,451
      AZSA(I) = AZ2LSA(I)
154    CONTINUE
C
C      LOAD DATA INTO AZIMUTH ORTHOGONAL DEGREE AND AMPLITUDE
C      ARRAYS
C
      DO 155 I=1,30
      AZOD(I) = AZTBOD(I)
      AZOA(I) = AZTBOA(I)
155    CONTINUE
C
      ELSE IF (ATYPE.EQ.'AZBR2040') THEN
C
C      ANTENNA IS BENDIX TEST BED 2 DEGREE BW BY +- 40 DEGREE SCAN - RIGHT
C
      ANTBW(1) = 2.0
      COVEXT = 40.0
C
C      LOAD DATA INTO AZIMUTH SCAN AMPLITUDE ARRAY
C
      DO 156 I=1,451
      AZSA(I) = AZ2RSA(I)
156    CONTINUE
C
C      LOAD DATA INTO AZIMUTH ORTHOGONAL DEGREE AND AMPLITUDE
C      ARRAYS
C

```

```

DO 157 I=1,30
    AZOD(I) = AZTBOD(I)
    AZOA(I) = AZTBOA(I)
157 CONTINUE
C
    ELSE
C
C     INVALID ANTENNA TYPE FOR AZIMUTH SYSTEM
C
        WRITE(ISO,102)
        STOP 'IN READ1 FOR INVALID AZIMUTH ANTENNA'
    END IF
C
    READ(IU,101) (ELXYZ(I), I=1,3), EFREQ, SCANLO(3), SCANHI(3),
*     ETYPE
C
    IF (ETYPE.EQ.'ELBN ') THEN
C
C     ANTENNA IS BENDIX BASIC NARROW 1.5 DEGREE BW COMPACT
C
        ANTBW(3) = 1.5
C
        LOAD ELEVATION ELEMENT ARRAY
C
        DO 122 I=1,41
            ELEA(I) = 1.0
122 CONTINUE
C
        LOAD DATA INTO ELEVATION SCAN AMPLITUDE ARRAY
C
        DO 123 I=1,201
            ELSA(I) = ELBNSA(I)
123 CONTINUE
C
        LOAD DATA INTO ELEVATIONS ORTHOGONAL DEGREE AND AMPLITUDE
        ARRAYS
C
        DO 124 I=1,20
            ELOD(I) = ELBNOD(I)
            ELOA(I) = ELBNOA(I)
124 CONTINUE
C
        ELSE IF (ETYPE.EQ.'ELG10C ') THEN
C
C     ANTENNA IS GENERIC 1.0 DEGREE BW COMPACT
C
        ANTBW(3) = 1.0
C
        LOAD ELEVATION ELEMENT ARRAY
C
        DO 125 I=1,41
            ELEA(I) = ELARR(I)

```

```

125          CONTINUE
C
C          LOAD DATA INTO ELEVATION SCAN AMPLITUDE ARRAY
C
          DO 126 I=1,201
            ELSA(I) = EG0CSA(I)
126          CONTINUE
C
C          LOAD DATA INTO ELEVATIONS ORTHOGONAL DEGREE AND AMPLITUDE
C          ARRAYS
C
          DO 127 I=1,20
            ELOD(I) = ELGOD(I)
            ELOA(I) = ELGOA(I)
127          CONTINUE
C
          ELSE IF (ETYPE.EQ.'ELG15C ') THEN
C
C          ANTENNA IS GENERIC 1.5 DEGREE BW COMPACT
C
          ANTBW(3) = 1.5
C
C          LOAD ELEVATION ELEMENT ARRAY
C
          DO 128 I=1,41
            ELEA(I) = ELARR(I)
128          CONTINUE
C
C          LOAD DATA INTO ELEVATION SCAN AMPLITUDE ARRAY
C
          DO 129 I=1,201
            ELSA(I) = EG5CSA(I)
129          CONTINUE
C
C          LOAD DATA INTO ELEVATION ORTHOGONAL DEGREE AND AMPLITUDE
C          ARRAYS
C
          DO 130 I=1,20
            ELOD(I) = ELGOD(I)
            ELOA(I) = ELGOA(I)
130          CONTINUE
C
          ELSE IF (ETYPE.EQ.'ELG20C ') THEN
C
C          ANTENNA IS GENERIC 2.0 DEGREE BW COMPACT
C
          ANTBW(3) = 2.0
C
C          LOAD ELEVATION ELEMENT ARRAY
C
          DO 131 I=1,41
            ELEA(I) = ELARR(I)

```

```

131          CONTINUE
C
C          LOAD DATA INTO ELEVATION SCAN AMPLITUDE ARRAY
C
C          DO 132 I=1,201
C             ELSA(I) = EG2CSA(I)
132          CONTINUE
C
C          LOAD DATA INTO ELEVATION ORTHOGONAL DEGREE AND AMPLITUDE
C          ARRAYS
C
C          DO 133 I=1,20
C             ELOD(I) = ELGOD(I)
C             ELOA(I) = ELGOA(I)
133          CONTINUE
C
C          ELSE IF (ETYPE.EQ.'ELH15C ') THEN
C
C          ANTENNA IS HAZELTINE 1.5 DEGREE BW COMPACT
C
C          ANTBW(3) = 1.5
C
C          LOAD ELEVATION ELEMENT ARRAY
C
C          DO 134 I=1,41
C             ELEA(I) = ELARR(I)
134          CONTINUE
C
C          LOAD DATA INTO ELEVATION SCAN AMPLITUDE ARRAY
C
C          DO 135 I=1,201
C             ELSA(I) = EH5CSA(I)
135          CONTINUE
C
C          LOAD DATA INTO ELEVATIONS ORTHOGONAL DEGREE AND AMPLITUDE
C          ARRAYS
C
C          DO 136 I=1,20
C             ELOD(I) = ELGOD(I)
C             ELOA(I) = ELGOA(I)
136          CONTINUE
C
C          ELSE IF (ETYPE.EQ.'ELH10C ') THEN
C
C          ANTENNA IS HAZELTINE 1 DEGREE BW COMPACT
C
C          ANTBW(3) = 1.0
C
C          LOAD ELEVATION ELEMENT ARRAY
C
C          DO 137 I=1,41
C             ELEA(I) = ELARR(I)

```

```

137          CONTINUE
C
C      LOAD DATA INTO ELEVATION SCAN AMPLITUDE ARRAY
C
          DO 138 I=1,201
              ELSA(I) = EHOCSA(I)
138          CONTINUE
C
C      LOAD DATA INTO ELEVATION ORTHOGONAL DEGREE AND AMPLITUDE
C      ARRAYS
C
          DO 139 I=1,20
              ELOD(I) = ELGOD(I)
              ELOA(I) = ELGOA(I)
139          CONTINUE
C
          ELSE IF (ETYPE.EQ.'ELB15  ') THEN
C
C      ANTENNA IS BENDIX TEST BED 1.5 DEGREE BW
C
          ANTBW(3) = 1.5
C
C      LOAD ELEVATION ELEMENT ARRAY
C
          DO 160 I=1,41
              ELEA(I) = ELTBEP(I)
160          CONTINUE
C
C      LOAD DATA INTO ELEVATION SCAN AMPLITUDE ARRAY
C
          DO 161 I=1,201
              ELSA(I) = ELTBSA(I)
161          CONTINUE
C
C      LOAD DATA INTO ELEVATION ORTHOGONAL DEGREE AND AMPLITUDE
C      ARRAYS
C
          DO 162 I=1,20
              ELOD(I) = ELTBOD(I)
              ELOA(I) = ELTBOA(I)
162          CONTINUE
C
          ELSE
C
C      INVALID ANTENNA TYPE FOR ELEVATION SYSTEM
C
          WRITE(ISO,102)
          STOP 'IN READ1 FOR INVALID ELEVATION ANTENNA'
          END IF
C
          READ(IU,101) (DMEXYZ(I),I=1,3),DFREQ,SCANLO(2),SCANHI(2),
*      DTYPE

```

```

C      IF (DTYPE.EQ.'DMBN      ') THEN
C
C      LOAD DATA INTO DME ORTHOGONAL DEGREE AND AMPLITUDE
C      ARRAYS
C
C      DO 140 I=1,20
C          DMEOD(I) = DMBNOD(I)
C          DMEOA(I) = DMBNOA(I)
140      CONTINUE
C
C      INVALID ANTENNA TYPE FOR DME SYSTEM
C
C      ELSE
C          WRITE(ISOU,103)
C          STOP 'IN READ1 FOR INVALID DME ANTENNA'
C      END IF
C
C      READ(IU,102)DMEUP,DMEDWN
C      READ(IU,102)DMETYP
C
C      DO 10 I=1,3
C          SCANLO(I)=SCANLO(I)*RADIAN
C          SCANHI(I)=SCANHI(I)*RADIAN
10      CONTINUE
C
C      ELSE
C
C      IF RUNNING THE PROPAGATION PORTIONS OF THE MODEL READ ONLY THE
C      DATA NECESSARY
C
C          READ(IU,101)(AZXYZ(I),I=1,3),AFREQ
C          READ(IU,101)(ELXYZ(I),I=1,3),EFREQ
C          READ(IU,101)(DMEXYZ(I),I=1,3),DFREQ
C      END IF
C
C      CALCULATE THE ANTENNA WAVELENGTH (IN FEET)
C
C      WLAZ=SOL/(AFREQ*1.E6)
C      WLEL=SOL/(EFREQ*1.E6)
C      WLDME=SOL/(DFREQ*1.E6)
C
C      READ AHEAD ONE RECORD FOR NEXT SECTION TO BE PROCESSED
C
C      READ(IU,900)SECT,NUMBER
C
C
C      RETURN
C      END
C

```

APPENDIX I

ANTENNA TYPES AVAILABLE IN THE MLS MATHEMATICAL MODEL

APPENDIX I

ANTENNAS AVAILABLE IN VERSION 2.1 OF THE MLS MATH MODEL

AZIMUTH ANTENNAS

AZBN	--	Bendix basic narrow 2 degree, 40 degree scan
AZG1X60	--	Generic 1 degree, 60 degree scan
AZG2X40	--	Generic 2 degree, 40 degree scan
AZG3X40	--	Generic 3 degree, 40 degree scan
AZH1X40	--	Hazeltine 1 degree, 40 degree scan
AZH1X60	--	Hazeltine 1 degree, 60 degree scan
AZH2X40	--	Hazeltine 2 degree, 40 degree scan
AZBL1060	--	Bendix test bed 1 degree, 60 degree scan (left half)
AZBR1060	--	Bendix test bed 1 degree, 60 degree scan (right half)
AZBL2040	--	Bendix test bed 2 degree, 40 degree scan (left half)
AZBR2040	--	Bendix test bed 2 degree, 40 degree scan (right half)

ELEVATION ANTENNAS

ELBN	--	Bendix basic narrow 1.5 degree
ELG10C	--	Generic 1 degree compact
ELG15C	--	Generic 1.5 degree compact
ELG20C	--	Generic 2 degree compact
ELH10C	--	Hazeltine 1.0 degree compact
ELH15C	--	Hazeltine 1.5 degree compact
ELB15	--	Bendix test bed 1.5 degree

DME ANTENNAS

DMBN	--	Generic DME
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