TIA DOCUMENT

Terrestrial Land Mobile Radio --- Antenna Systems --- Standard Format for Digitized Antenna Patterns

TIA-804-A

(Revision of IS-804)

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TELECOMMUNICATIONS INDUSTRY ASSOCIATION

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DOCUMENT REVISION HISTORY

Version	Date	Description
IS-804 Issue O	August 2001	Original release
IS-804 Issue O-1	December 2002	Error Correction
TIA-804 Issue A		Removed “REVDAT”

FOREWORD

(This foreword is not part of this Standard.)

This Interim Standard was prepared by TIA Working Group TG-8.11.3 and has been approved by Subcommittee TR-8.11. Members of TR-45 have also reviewed and made comments on this document as it impacts antenna usage in the Cellular and PCS Industries. National Spectrum Managers Association (NSMA) contributed to the preparation of this document. Many of the requirements contained in this document are compatible with those of NSMA Recommendation WG16.99.050 dated 5/20/99. However, caution is advised because differences may exist between the two documents.

Annexes A and B are normative. Annex C is for information only.

This is Revision A of this Standard and supersedes TIA/EIA IS-804 (including addendum TIA/EIA IS-804-1).

PATENT IDENTIFICATION

The reader's attention is called to the possibility that compliance with this document may require the use of one or more inventions covered by patent rights. By publication of this document no position is taken with respect to the validity of those claims or any patent rights in connection therewith. The patent holders so far identified have, we believe, filed statements of willingness to grant licenses under those rights on reasonable and nondiscriminatory terms and conditions t applicants desiring to obtain such licenses.

The following patent holders and patents have been identified in accordance with the TIA intellectual property rights policy:

- None identified

TIA is not responsible for identifying patents for which licenses may be required by this document or for conducting inquiries into the legal validity or scope of those patents that are brought to its attention.

INTRODUCTION

This standard is intended to provide a standard format for manufacturers of antennas for the Terrestrial Land Mobile Radio industry to adhere to. It was motivated by the observation by propagation software providers (i.e. users of such patterns) that many manufacturer have proprietary formats and that a single standardized format would make software development simpler, assure consistent usage of antenna pattern data, and facilitate data accuracy through a robust, common data format. This format is year 2000 compliant.
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Terrestrial Land Mobile Radio ---
Antenna Systems ---
Standard Format for Digitized Antenna Patterns

1.0 Scope

This document is intended to standardize the presentation of digitized antenna patterns for antenna systems in the Terrestrial Land Mobile Radio Services.

2.0 References

The following documents should be consulted when applying this Standard:

[1] EIA/TIA-329-B, *Minimum Standards for Communication Antennas, Part 1: Base Station Antennas*

3.0 Requirements

3.1 *Overall Format*

Each file consists of data for one antenna operating at one or more frequencies. Each frequency consists of one or more pattern cuts. Each pattern cut consists of a number of data points. Only those fields marked with an "n", or "x" are required to be compliant to this standard; however, manufacturers are strongly encouraged to include all fields in their data files. Data shall be entered into the file in the order given in this standard. It is not necessary, however, to include “empty fields”.

3.2 *Fields*

3.2.1 Field Characteristics

The fields to be used in digitized antenna patterns for the Terrestrial Land Mobile Radio Services are defined in Table 1. They are described in detail in subclause 3.2.2.

All data positions up to and including the decimal point (if appropriate for the data type) must be filled. The comma (“,”) serves as a data item delimiter. Per-line comments may be added to any record. In any record, all data after a “!” character will be ignored.

The length of the field specified is the maximum allowable length of the record. If the format is free form, then the record may be shorter than the maximum length, and terminated with a carriage return and line feed characters.

Table 1

Field Characteristics

Req'd?	Field Name	Length (Char)	Abbreviated Name	Descriptive Clause
x	Revision Number	42	REVNUM:	3.2.2.1
	Comment1	80	COMNT1 :	3.2.2.3
	Comment2	80	COMNT2 :	3.2.2.4
x	Antenna Manufacturer	42	ANTMAN:	3.2.2.5
x	Model Number	42	MODNUM:	3.2.2.6
	Pattern File Number	13	FILNUM:	3.2.2.7
	Pattern ID Number	42	PATNUM:	3.2.2.8
	Feed Orientation	13	FEDORN:	3.2.2.9
	Description1	80	DESCR1:	3.2.2.10
	Description2	80	DESCR2:	3.2.2.11
	Description3	80	DESCR3:	3.2.2.12
	Description4	80	DESCR4:	3.2.2.13
	Description5	80	DESCR5:	3.2.2.14
	Date of Data	16	DTDATA:	3.2.2.15
x	Low Frequency (MHz)	21	LOWFRQ:	3.2.2.16
x	High Frequency (MHz)	21	HGHFRQ:	3.2.2.17
x	Gain Units	15	GUNITS:	3.2.2.18
	Low-band Gain	12	LWGAIN:	3.2.2.19
x	Mid-band Gain	16	MDGAIN:	3.2.2.20
	High-band Gain	12	HGGAIN:	3.2.2.21
x	Az Bmwdth	17	AZWIDT:	3.2.2.22
	El Bmwdth	16	ELWIDT:	3.2.2.23
	Connector Type	80	CONTYP:	3.2.2.24
	VSWR	13	ATVSWR:	3.2.2.25
	Front-to-back Ratio(dB)	13	FRTOBA:	3.2.2.26
x	Electrical Downtilt (deg)	16	ELTILT:	3.2.2.27
	Radiation Center (m)	13	RADCTR:	3.2.2.28
	Port-to-Port Iso (dB)	12	POTOPO:	3.2.2.29
	Max Input Power (W)	17	MAXPOW:	3.2.2.30
	Antenna Length (m)	14	ANTLEN:	3.2.2.31
	Antenna Width (m)	14	ANTWID:	3.2.2.32
	Antenna Depth (m)	14	ANTDEP:	3.2.2.33
	Antenna Weight (kg)	16	ANTWGT:	3.2.2.34
	Future Field	80	FIELD1:	3.2.2.35
	Future Field	80	FIELD2:	3.2.2.36
	Future Field	80	FIELD3:	3.2.2.37
	Future Field	80	FIELD4:	3.2.2.38
	Future Field	80	FIELD5:	3.2.2.39

Table 1 (concluded)

Req'd?	Field Name	Length (Char)	Abbreviated Name	Descriptive Clause
x	Pattern Type	16	PATTYP:	3.2.2.40
x	# Freq This File	10	NOFREQ:	3.2.2.41
x	Pattern Freq (MHz)	21	PATFRE:	3.2.2.42
x	# Pattern Cuts	11	NUMCUT:	3.2.2.43
n	Pattern Cut	12	PATCUT:	3.2.2.44
n	Polarization	15	POLARI:	3.2.2.45
n	# Data Points	13	NUPOIN:	3.2.2.46
n	First & Last Angle	25	FSTLST:	3.2.2.47
	X-axis Orientation	53	XORIEN:	3.2.2.48
	Y-axis Orientation	53	YORIEN:	3.2.2.49
	Z-axis Orientation	53	ZORIEN:	3.2.2.50
n	Pattern Cut Data	26/point		3.2.2.51
x	End of File	11	ENDFIL:	3.2.2.52

N = 1 required per pattern cut
X = 1 required per file

3.2.2 Field parameters described

The following are detailed explanations of each of the data lines. The length of data specified includes all characters except CRLF.

3.2.2.1 Revision Number

REVNUM:,XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXCRLF

This is the version of this standard to which the pattern conforms. It should include the complete standard number. For the original release, it should indicate revision "0". e.g. "TIA-804-A".

3.2.2.2 [Reserved]

3.2.2.3 Comments1

COMNT1:,XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXCRLF

This is a field for comments on the current revision.

3.2.2.4 Comments2

COMNT2:,XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXCRLF

This is a field for comments on the current revision.

3.2.2.5 Antenna Manufacturer

ANTMAN:,XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXCRLF

This is the name of the antenna manufacturer. There will be no abbreviations.

3.2.2.6 Full Model Number

MODNUM:,XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXCRLF

This is the full model number as used when the data was taken. Modifiers to the model number such as dashes or exceptions are to be included. This should uniquely identify the antenna and allow for revisions to the data.

3.2.2.7 Pattern File Number

FILNUM:,XX/XXCRLF

For cases where more than one file is associated with a specific model number this field will contain the particular file number and the total number of files associated with that model number.

3.2.2.8 Pattern ID Number

PATNUM:,XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXCRLF

This is the manufacturer assigned pattern ID number that may optionally be assigned to the pattern data. For USA sited terrestrial microwave antennas this is the NSMA ID number.

3.2.2.9 Feed Orientation

FEDORN:,XXXXXCRLF

For a terrestrial microwave antenna this is the orientation of the feed hook when look from the back of the antenna in the direction of the mechanical boresite. The standard orientations are “right” and “left”.

3.2.2.10 Description1

DESCR1:,XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXCRLF

This is used to describe the antenna and its characteristics.

3.2.2.11 Description2

DESCR2:,XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXCRLF

This is used to describe the antenna and its characteristics

3.2.2.12 Description3

DESCR3:,XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXCRLF

This is used to describe the antenna and its characteristics

3.2.2.13 Description4

DESCR4:,XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXCRLF

This is used to describe the antenna and its characteristics

3.2.2.14 Description 5

DESCR5:,XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXCRLF

This is used to describe the antenna and its characteristics.

3.2.2.15 Date of Data

DTDATA:,YYYYMMDDCRLF

This is the date the pattern data was taken.

3.2.2.16 Low Frequency

LOWFRQ:,999999.999999CRLF

This is to identify the lower frequency, in MHz, of the operating bandwidth of the antenna. If the antenna can be operated in more than one frequency band, then the performance of the antenna in each band should be described in separate files.

3.2.2.17 High Frequency

HGHFRQ;,999999.999999CRLF

This is to identify the upper frequency, in MHz, of the operating bandwidth of the antenna. If the antenna can be operated in more than one frequency band, then the performance of the antenna in each band should be described in separate files.

3.2.2.18 Gain Units

GUNITS:,XXX/YYYCRLF

The units that gain figures are to be expressed in. The characters before the slash represent the units for the “Low-Band Gain”, “Mid-Band Gain”, and “High-Band Gain”. The characters after the slash represent the units used in the pattern data. The characters used shall be the following:

Table 2

Gain Units

Characters	Explanation	Band Gain	Pattern Gain
DBI	Decibels relative to an isotropic radiator	x	x
DBD	Decibels relative to a half-wave dipole	x	x
DBR	Decibels relative to maximum gain (dB Off-Peak)		x
LIN	Ratio relative to maximum gain (Relative Field)		x

3.2.2.19 Low-Band Gain

LWGAIN:,99.9CRLF

This is the gain of the antenna, in GUNITS (see Table 2), at the low frequency of the frequency band.

3.2.2.20 Mid-Band Gain

MDGAIN:,99.9,9.9CRLF

This is the gain of the antenna, in GUNITS (see Table 2), at the mid frequency of the frequency band and may include a full bandwidth tolerance. Mid frequency is defined as the arithmetic mean of the low and high frequencies.

3.2.2.21 High-Band Gain

HGGAIN:,99.9CRLF

This is the gain of the antenna, in GUNITS (see Table 2), at high frequency of the frequency band.

3.2.2.22 Azimuth Beamwidth

AZWIDT:,999.9,9.9CRLF

This is the nominal total width of the main beam at the –3.0 dB points in the azimuth plane. This is a mid-band measurement expressed in degrees and may include a full bandwidth tolerance. An omnidirectional antenna’s beamwidth should be stated as 360.0.

3.2.2.23 Elevation Beamwidth

ELWIDT:,99.9,9.9CRLF

This is the nominal total width of the main beam, in degrees, at the –3.0 dB points in the elevation plane. This is a mid-band measurement expressed in degrees and may include a full bandwidth tolerance in degrees.

3.2.2.24 Connector Type

CONTYP:,XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXCRLF

This is a description of the antenna connector type.

3.2.2.25 VSWR

ATVSWR:,99.99CRLF

This is the worst case limit of the antennas VSWR over the operating bandwidth.

3.2.2.26 Front to Back Ratio

FRTOBA:,99,99CRLF

The first parameter is the front-to-back ratio. Front to back ratio is defined as the ratio of the maximum directivity of an antenna to its maximum directivity in a rearward facing angular region defined as a cone of a specified semi flare angle. The semi-flare angle is the second parameter. The cone axis is the rearward extension of the antenna mechanical boresight, with the tip of the cone being coincident with origin of the defined antenna coordinate system. This definition ensures that the worst-case front to back level will be specified over defined angular regions in the azimuth and elevation planes as well as any intermediate plane.

3.2.2.27 Electrical Downtilt

ELTILT:,99.9,9.9CRLF

This is the amount, in degrees, that the main beam peak of the antenna (electrical boresite) is dowtilted below the mechanical boresite of the antenna. This is a midband value and may include a tolerance.

3.2.2.28 Radiation Center

RADCTR:,999.9CRLF

This is the height of the center of the radiating aperture, in meters, above the mechanical bottom of the antenna. It is not necessarily the phase center of the antenna.

3.2.2.29 Port to Port Isolation

POTOPO:,99.9CRLF

This is a measurement made on dual polarization antennas. It is the maximum amount of power over the antennas operating bandwidth that is coupled between ports. It is the power ratio expressed in dB's between a reference signal injected into one port and the amount of coupled power returned back out of the other port.

3.2.2.30 Maximum Input Power

MAXPOW:,9999999.9CRLF

This is the maximum amount of average RF input power which can be applied to each of the antennas input ports in the antennas operating frequency range. The power is to be expressed in watts.

3.2.2.31 Antenna Length

ANTLEN:,999.99CRLF

This is the mechanical length of the antenna in meters. This does not include the antenna mount. For a circularly symmetric parabolic antenna this would be the diameter.

3.2.2.32 Antenna Width

ANTWID:,999.99CRLF

This is the mechanical width of the antenna in meters. This does not include the antenna mount. For a circularly symmetric parabolic antenna this would be the diameter.

3.2.2.33 Antenna Depth

ANTDEP:,999.99CRLF

This is the mechanical depth antenna in meters. This does not include the antenna mount.

3.2.2.34 Antenna Weight

ANTWGT:,999999.9CRLF

This is the weight of the antenna in kg. This includes the antenna mount.

3.2.2.35 Future Field

FIELD1:,XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXCRLF

3.2.2.36 Future Field

FIELD2:,XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXCRLF

3.2.2.37 Future Field

FIELD3:,XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXCRLF

3.2.2.38 Future Field

FIELD4:,XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXCRLF

3.2.2.39 Future Field

FIELD5:,XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXCRLF

3.2.2.40 Pattern Type

PATTYP:,XXXXXXXXCRLF

This is the pattern type, either “typical” or “envelope”.

A “typical” pattern being defined as an actual measured radiation pattern representing a typical pattern for an antenna model. A “typical” pattern will normally have a frequency associated with it.

A pattern “envelope” being defined as a composite representation of an antenna model’s full frequency band radiation pattern. The envelope is a linear piecewise representation of the worst–case maximum sidelobe level as a function of angle for all frequencies of specified operation.

3.2.2.41 Number of Frequencies This File

NOFREQ:,99CRLF

The number of pattern frequencies which comprise the full data set. All data below this subclause (3.2.2.42 through 3.2.2.51, however not 3.2.2.52– “end of file”) will be repeated for each frequency. Thus if there were two radiation patterns for each of three different frequencies in a file, NOFREQ would have a value of 3, NUMCUT would have a value of 2, and the data fields below (3.2.2.42 through 3.2.2.51) would be repeated 3 times, once for each frequency, for a total of 6 frequency / pattern cuts.

3.2.2.42 Pattern Frequency

PATFRE:,999999.999999CRLF

The frequency, in MHz, of the pattern data for a typical pattern.

3.2.2.43 Number of Pattern Cuts

NUMCUT:,999CRLF

The number of pattern cuts which comprise the data set for each frequency. All data below this subclause (3.2.2.44 through 3.2.2.51, however not 3.2.2.52– “end of file”) will be repeated for each pattern cut. Thus if there is a horizontal and vertical antenna cuts, NUMCUT would have a value of 2, and the data fields below would be repeated for each cut.

3.2.2.44 Pattern Cut

PATCUT:,XXXXCRLF

The geometry of a particular pattern cut. Each pattern cut is preceded by an indication of the type pattern cut. Pattern cut geometries and designators are defined in Annex A.

3.2.2.45 Polarization

POLARI:,XXX/XXXCRLF

The particular polarization of a pattern cut. The first polarization is the polarization of the antenna-under-test and the second the polarization of the illuminating source. The two polarizations are separated by a /.

Each pattern cut is preceded by an indication of the polarization of the data. Polarization designators are defined in Annex A.

3.2.2.46 Number of Data Points

NUPOIN:,99999CRLF

The number of data points in a particular pattern cut data set.

3.2.2.47 First and Last Angle of Pattern Data

FSTLST:,S999.999,S999.999CRLF

The first and last angle (in degrees) of the antenna pattern data. NOTE: Pattern data shall be expressed monotonically, with respect to angle. Azimuths shall be stated as either –180 to +180 or 0 to 360 degrees. Elevations shall be stated as –180 to +180.

Note that in general values should not be provided for both 0 and 360 degrees or for both –180 and +180 degrees. See §3.2.2.51.

3.2.2.48 X- Axis Orientation

XORIEN:,XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXCRLF

A verbal description of the physical orientation of the x-axis on the antenna.

3.2.2.49 Y- Axis Orientation

YORIEN:,XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXCRLF

A verbal description of the physical orientation of the y-axis on the antenna.

3.2.2.50 Z- Axis Orientation

ZORIEN:,XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXCRLF

A verbal description of the physical orientation of the z-axis on the antenna.

3.2.2.51 Pattern Cut Data

S999.999,S999.999,S999.999CRLF

The data is presented in three columns. The angle of observation is listed first followed by the antenna magnitude response and last by the antenna phase response. In most

cases the phase response will not be included in the data set. “S” designates the sign of the number. The phase value is optional.

The antenna power magnitude is listed in the units specified in the antenna units field (GUNITS).

The angle and phase data are expressed in units of degrees.

Although pattern data is allowed values that have up to three digits to the right of the decimal point this does not imply that the pattern data is to or can be measured to that accuracy. Typical accuracies for an antenna pattern measurement are 0.1 dB and 0.1 degree.

For “typical” type patterns azimuths values should not be repeated. For example, values should not be provided for both a “0.0” degree azimuth and a “360.0” value.

3.2.2.52 End of File

ENDFIL:,EOFCRLF

This field designates the end of the file with the text characters EOF.

4.0 Bibliography

[1] ANSI/IEEE Std 149, *IEEE Standard Test Procedures for Antennas*
[2] NSMA Recommendation 16.99.050, *Expanded Standard Format for Electronic Transfer of Antenna Pattern Data*, National Spectrum Managers Assn, 1998.
[3] J.S. Hollis, T.J. Lyon, L. Clayton, *Microwave Antenna Measurements*, Scientific-Atlanta Georgia, 1985.

Annex A (Normative)

Definition of Pattern Cut Geometries

A.1 General Definitions and Practices

The mechanical boresite of the antenna shall determine the 0 degree reference for all pattern cuts (except cuts defined by a spherical coordinate system). For most antennas, the mechanical boresite is the direction perpendicular to the plane or line defined by the radiating aperture. If the mechanical boresite is ambiguous, as in the case of an omni-directional antenna, the mechanical boresite needs to be defined on the antenna structure.

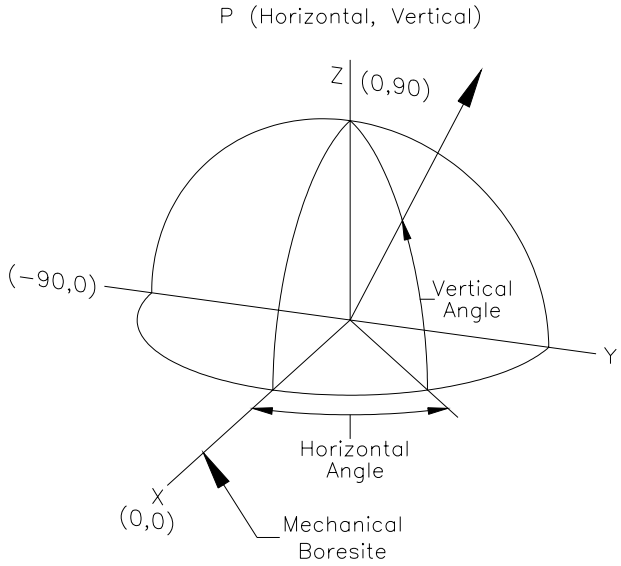
The electrical boresite of the antenna is the direction of maximum gain and consequently will be the direction of maximum received signal level when measuring a radiation pattern. This maximum level is to be assigned the reference value of 0 dB (1 linear), or a value equivalent to the antenna maximum gain relative to an isotropic radiator or a half-wave dipole. See section 3.2.2.18 for allowable radiation pattern units. For a non-steerable antenna, unless a mechanical tilt is specified it is assumed that in an operational situation an antenna's mechanical boresite is pointed in a direction parallel to the earth's horizon. In this case horizontal and vertical pattern cuts can be defined, which are referenced to the earth's horizon. The vertical cut being perpendicular to the horizon. Refer to the figures in A.2.

For an electrically or mechanically steerable antenna or an antenna which has a fixed electrical or mechanical tilt, azimuth and elevation pattern cuts are defined. These are pattern cuts which are orthogonal through the peak of the antennas main beam (electrical boresite). The azimuth cut is the cut which would be closest to the horizon in an operational situation. If the direction that the antenna is pointing is known, a horizontal cut can still be defined. The azimuth cut will be a conical cut in cases where the mainbeam of an antenna is electrically downtilted. Refer to the figures in A.3.

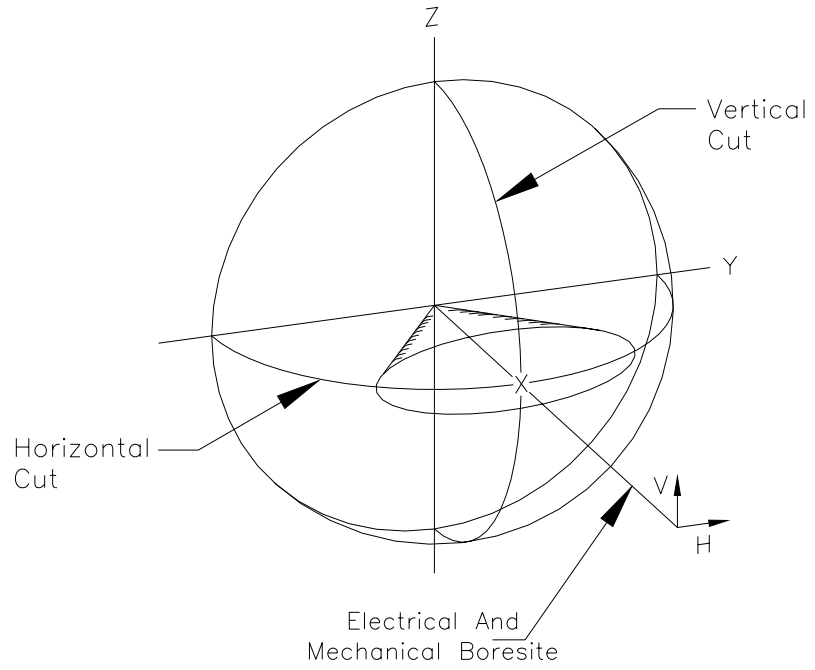
General pattern cuts can be defined by a spherical coordinate system. . In this geometry, the antenna electrical boresite (mainbeam peak) is typically oriented toward the radio horizon in the ϕ=0°, θ=90° direction. An additional measurement relating the mechanical and electrical boresite must be made to fully characterize the antenna. Also the orientation of the antenna to the spherical coordinate system must be defined.(example: top of the antenna oriented in the +z direction). Refer to the figure in A.4.

File names containing the data should be uniquely identified with an extension of ".adf" representing an "Antenna Data File". The name should be a concatenation of the antenna model number and the extension.

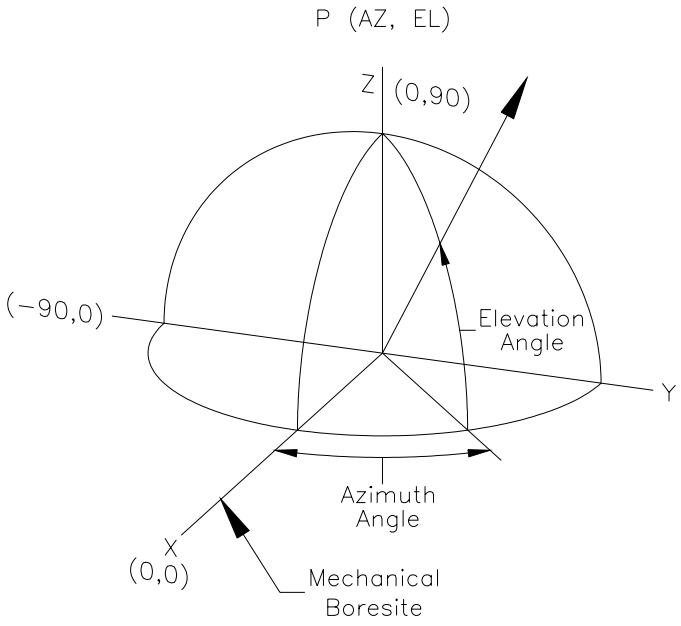
A.2 Horizontal/Vertical Pattern Geometry



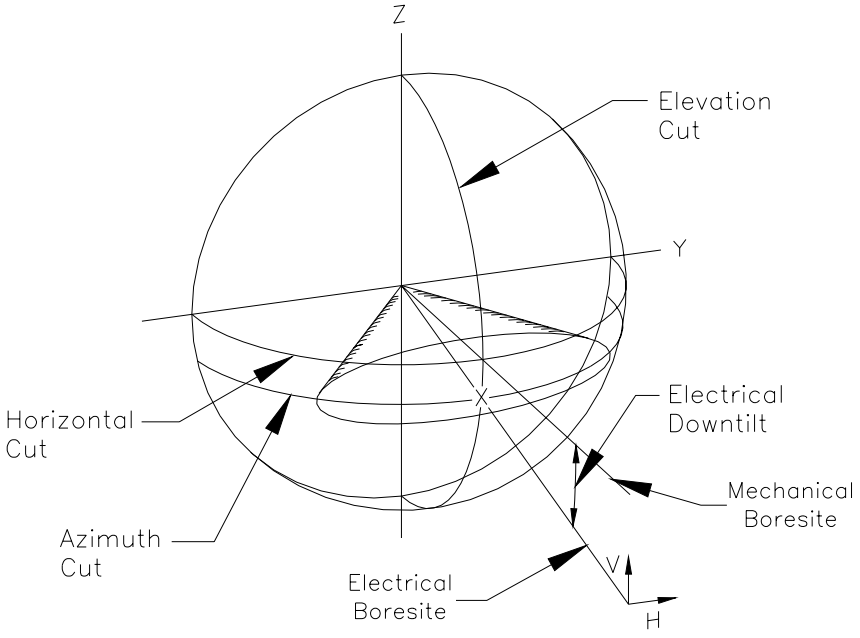
Example: Sector antenna (no electrical downtilt)



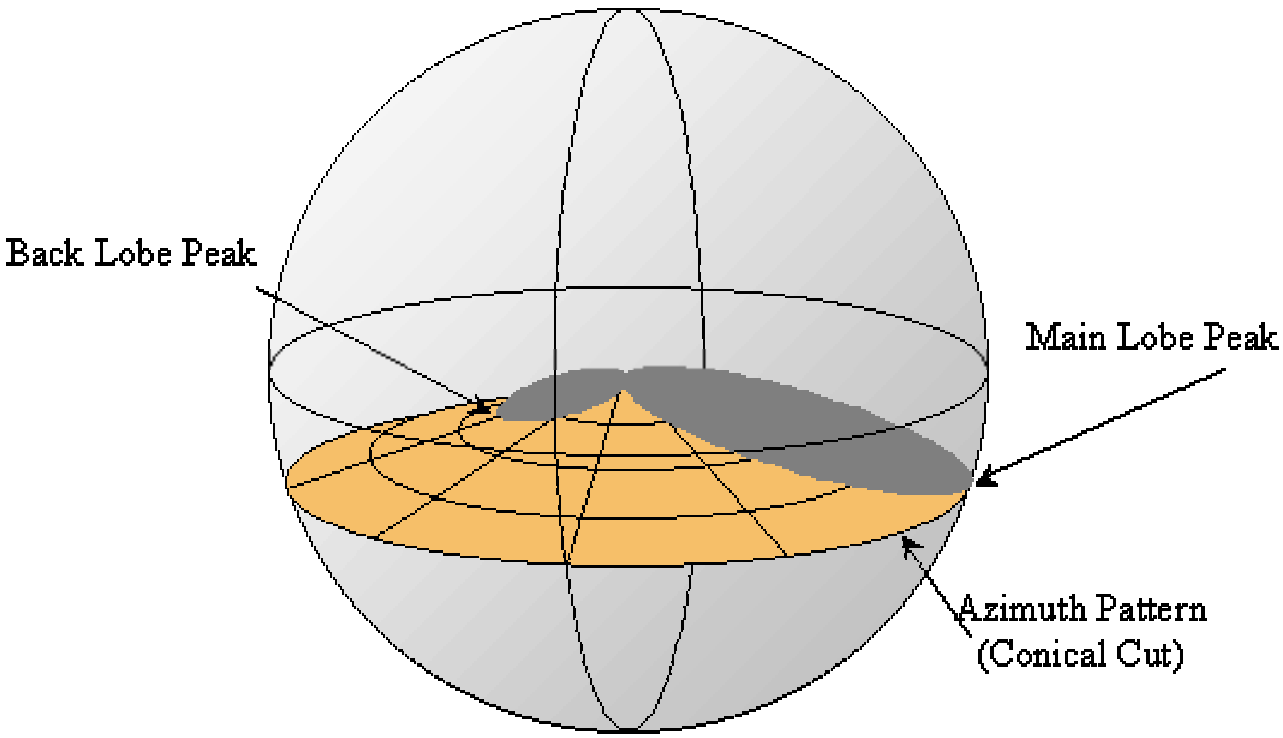
A.3 Azimuth/Elevation Pattern Geometry



Example: Sector antenna (electrically downtilted with conical azimuth cut)

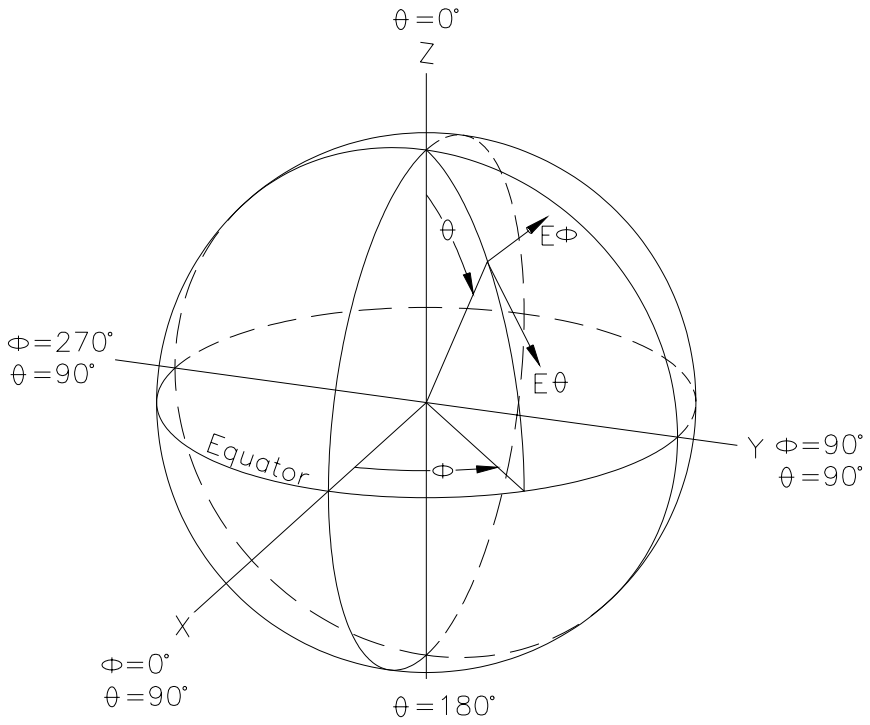


Conceptual view: Sector antenna, electrically downtilted, with conical azimuth cut



A.4 Spherical Pattern Geometry

The following graphic is used as a reference to define spherical geometry. In this geometry, the antenna electrical boresite (mainbeam peak) is typically oriented toward the radio horizon in the ϕ=0°, θ=90° direction.



A.5 Pattern Cut Designators (XXXX)

Horizontal Cut	H
Vertical Cut	V
Azimuth Cut	AZ
Elevation Cut	EL
Phi Cut	PXXX where XXX=Theta angle Example1: P090 when cut through the antenna main beam peak is equivalent to an H cut or an AZ cut with 0 degrees of electrical downtilt

	Example 2: P094 when cut through the main beam antenna peak is equivalent to an AZ cut on a 4 degree electrically downtilted antenna.
Theta Cut	TXXX where XXX=Phi angle Example: T000 when cut through the main beam antenna peak is equivalent to an EL cut.

4.0 Annex B (Normative)

Definition of Polarization Designators

The polarization designators for horizontal and vertical polarization cases are:

Horizontal: H
Vertical: V

The possible polarization cases for these designators are:

H/H Horizontal polarized port response to a horizontally polarized signal.
(Co-polarized pattern)

H/V Horizontal polarized port response to a vertically polarized signal.
(Cross-polarized pattern)

V/V Vertical polarized port response to a vertically polarized signal.
(Co-polarized pattern)

V/H Vertical polarized port response to a horizontally polarized signal.
(Cross-polarized pattern)

Polarization designators for other orthogonal polarization cases are:

Linear Slant 45
Slant right: SLR[1]
Slant left: SLL[1]

Circular
right hand: RCP[1]
left hand: LCP[1]

Spherical geometry
E theta ETH
E phi EPH

[1] Polarization is defined as viewed from behind the antenna under test, looking in the direction of the electrical boresight (i.e. main beam axis).

5.0 Annex C (Informative)

Example File[2]

REVNUM:,TIA-804-A
COMNT1:,This is a sample file for 1 frequency and 2 cuts
ANTMAN:,ABC Antenna Company
MODNUM:,800A-065-25-4N
DESCR1:,800 Mhz 65 deg AZ BW 2.5meter 4 deg E-tilt base station antenna
DTDATA:,19971216
LOWFRQ:,806
HGHFRQ:,896
GUNITS:,DBI/DBR
MDGAIN:,16.8,0.5
AZWIDT:,65.0
ELWIDT:,7.1
CONTYP:,n connector
ATVSWR:,1.40
FRTOBA:,30,10
ELTILT:,4.0,0.5
MAXPOW:,500
ANTLEN:,2.367
ANTWID:,0.366
ANTDEP:,0.178
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