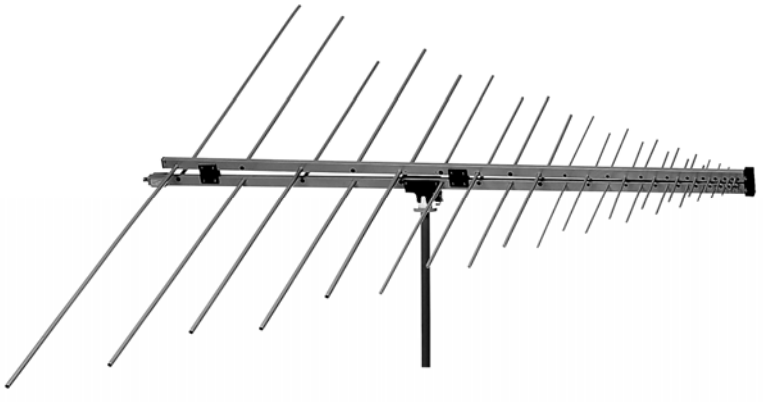
Model 3144

Log Periodic Dipole Array Antenna

User Manual



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Revision Record
MANUAL 3144 LOG PERIODIC ANTENNA | Part # 399171, Rev. E

Revision	Description	Date
A–C	Initial Release Updates/edits Updates/edits	January, 1997
D	Updates/edits	September, 2002
E	Rebrand	September, 2010

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Notes, Cautions, and Warnings

	**Note:** Denotes helpful information intended to provide tips for better use of the product.
CAUTION	**Caution**: Denotes a hazard. Failure to follow instructions could result in minor personal injury and/or property damage. Included text gives proper procedures.
WARNING	**Warning**: Denotes a hazard. Failure to follow instructions could result in SEVERE personal injury and/or property damage. Included text gives proper procedures.

 See the ETS-Lindgren *Product Information Bulletin* for safety, regulatory, and other product marking information.

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1.0 Introduction

The **ETS-Lindgren Model 3144 Log Periodic Dipole Array** is a linearly polarized, broadband antenna designed to operate over the frequency range of 80 MHz to 2 GHz.

The choice of scaling factors, the various diameters of each element, and the center-to-center spacing of the booms are such that excellent VSWR characteristics are obtained throughout the operating frequency range.

The precise design of the feed and the positioning of the elements on the boom yield optimum phase relationship. This causes the active region, at any given frequency, to propagate RF energy towards the smaller elements leaving the elements behind it electrically dead.

The constant gain of the antenna yields an antenna factor which varies linearly with frequency. The variation is smooth; therefore, accurate interpolation of performance between specified frequency points is simple.

The Model 3144 is provided with an integral mount and the necessary attachments to mount the antenna to either a tripod (with a 1/4–20 threaded mount) or an ETS-Lindgren antenna mast. For the variety of mounting options available for the Model 3144, see *Mounting & Assembly* on page 15.

Each Model 3144 is individually calibrated at one meter per SAE ARP 958 and at three and 10 meters per ANSI C63.5. Actual antenna factors and a signed *Certificate of Calibration Conformance* are included.

Optional Items

SUPPORT ROD

Antenna mount with insert drilled to accept ETS-Lindgren or other tripods with standard 1/4–20 threads.

TRIPOD

ETS-Lindgren offers the following non-metallic, non-reflective tripods for use at both indoor and outdoor EMC test sites.

- **4-TR Tripod—**Constructed of linen phenolic and delrin, designed with an adjustable center post for precise height adjustments. Maximum height is 2.0 m (80.0 in), and minimum height is 94 cm (37.0 in). This tripod can support up to an 11.8 kg (26.0 lb) load.

- **7-TR Tripod—**Constructed of PVC and fiberglass components, providing increased stability for physically large antennas. The unique design allows for quick assembly, disassembly, and convenient storage. Allows several different configurations, including options for manual or pneumatic polarization. Quick height adjustment and locking wheels provide ease of use during testing. Maximum height is 2.17 m (85.8 in), with a minimum height of 0.8 m (31.8 in). This tripod can support a 13.5 kg (30 lb) load.

ETS-Lindgren Product Information Bulletin

See the ETS-Lindgren *Product Information Bulletin* included with your shipment for the following:

- Warranty information
- Safety, regulatory, and other product marking information
- Steps to receive your shipment
- Steps to return a component for service
- ETS-Lindgren calibration service
- ETS-Lindgren contact information

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2.0 Maintenance

CAUTION

Before performing any maintenance, follow the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.

Maintenance of the Model 3144 is limited to external components such as cables or connectors.

If you have any questions concerning maintenance, contact ETS-Lindgren Customer Service.

Maintenance Recommendations

If the Model 3144 Log Periodic Dipole Array Antenna is used outdoors, periodic removal of the antenna cable connection and cleaning of any corrosion may be needed to maintain accuracy of the measurements. An inspection to determine the need for cleaning should be made at least every six months. More frequent inspection may be needed depending on the atmosphere and the environment in which the antenna is used.

Annual Calibration

See the *Product Information Bulletin* included with your shipment for information on ETS-Lindgren calibration services.

Service Procedures

For the steps to return a system or system component to ETS-Lindgren for service, see the *Product Information Bulletin* included with your shipment.

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3.0 Specifications

Electrical Specifications

Frequency Range:	80 MHz–2 GHz
Input Impedance:	50 Ohms
VSWR:	**Average:** 1.2:1 **Maximum:** 2.0:1
CW Power:	1000 W
Symmetry:	+/– 0.5 dB
Connector:	Type N Female

Physical Specifications

Height:	6.4 cm (2.5 in)
Width:	213.4 cm (84.0 in)
Depth:	167.6 cm (66.0 in)
Weight:	4.3 kg (9.5 lb)

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4.0 Mounting & Assembly

CAUTION **The Model 3144 antennas are precision measurement devices. Handle your antenna with care.**

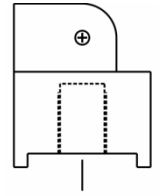
Mount the Model 3144 Log Periodic Dipole Array Antenna first, and then attach the elements to the antenna.

Mounting Instructions

USING INCLUDED MOUNTING ADAPTERS

The Model 3144 ships with these mounting adapters:

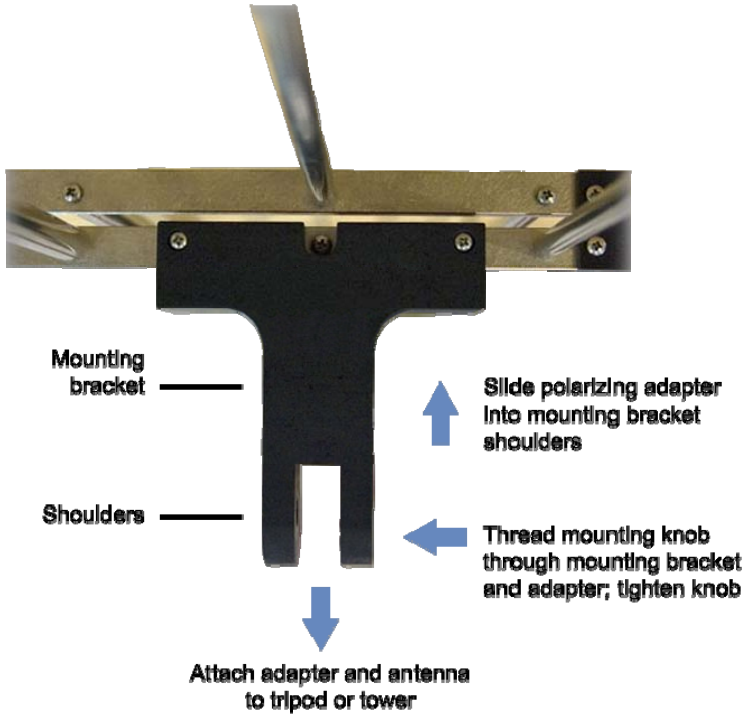
- **100989 Polarizing Mounting Adapter with 7/8–14 thread receptacle**



If you need to convert the polarizing adapter to a 1/4–20 receptacle, insert the 1/4–20 thread insert into the polarizing adapter

- **105861B 1/4–20 Thread Insert**

To attach the included adapters to the Model 3144:



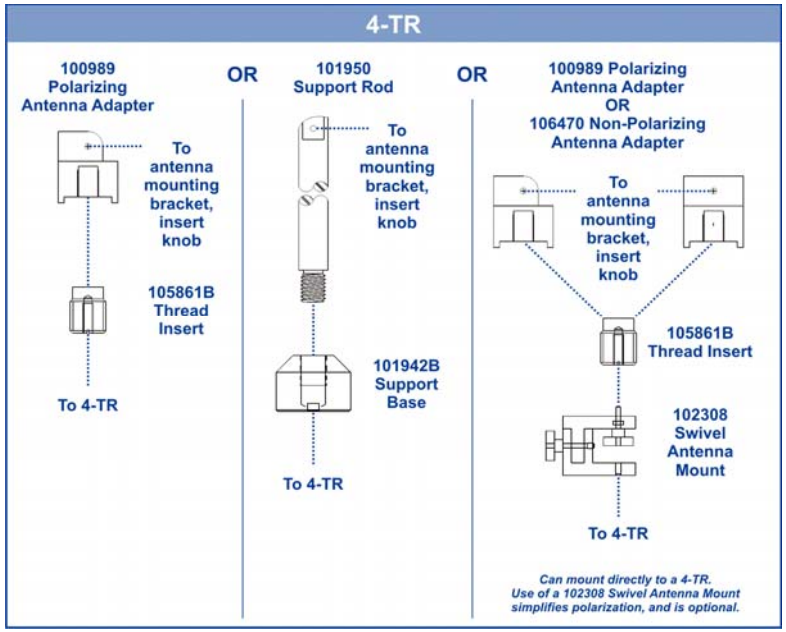
1. If required, insert the 1/4–20 thread insert into the polarizing adapter.
2. Remove the mounting knob from the mounting bracket on the antenna.
3. Slide the polarizing adapter into the mounting bracket by placing the polarizing adapter placed between the shoulders of the mounting bracket.

Do not cross thread or permanent damage to the adapter could occur.

4. Thread the mounting knob through the mounting bracket, then through the polarizing adapter, and finally through the hex nut.
5. Tighten the mounting knob to secure the antenna.
6. Attach the polarizing adapter and antenna to tripod or tower, as required.

ADDITIONAL 4-TR MOUNTING OPTIONS

Following are additional options for mounting the Model 3144 onto an ETS-Lindgren 4-TR tripod. Contact the ETS-Lindgren Sales Department for information on ordering optional mounting hardware.

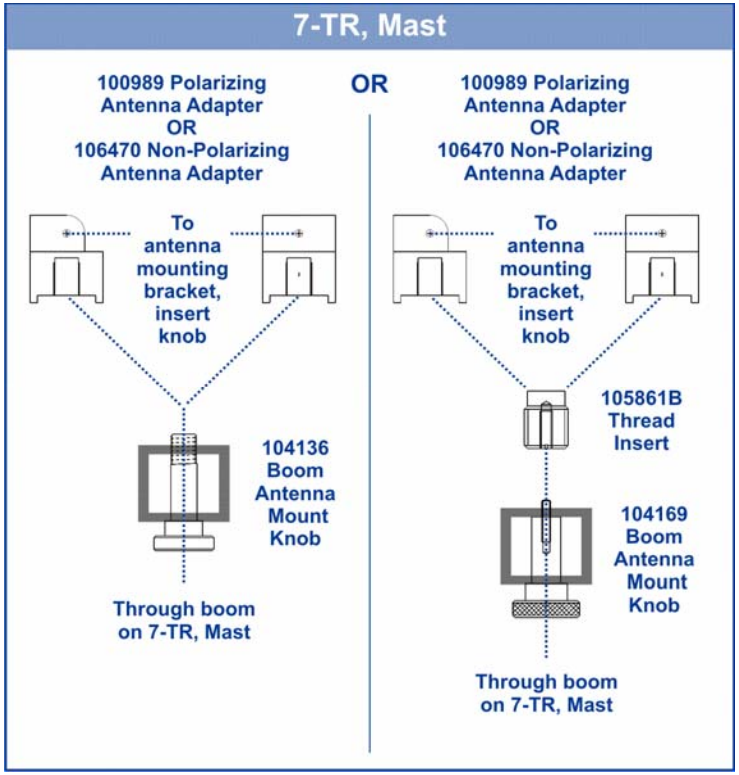


ADDITIONAL 7-TR AND MAST MOUNTING OPTIONS

Following are options for mounting the Model 3144 onto an ETS-Lindgren 7-TR Tripod or mast. Contact the ETS-Lindgren Sales Department for information on ordering optional mounting hardware.

Mast refers to 2070 Series, 2075, and 2175 Antenna Towers.
7-TR refers to 109042 and 108983 booms:

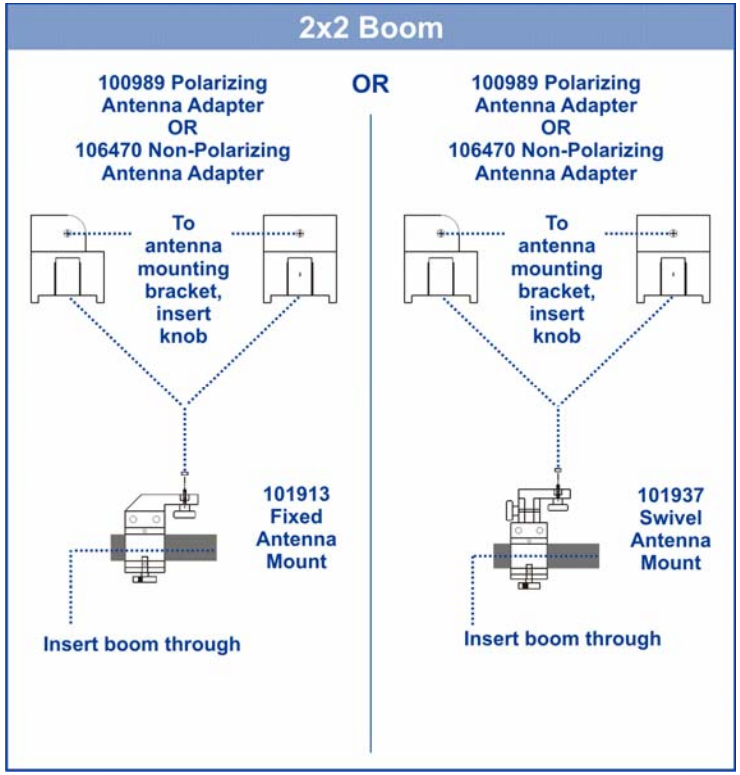
- *109042 boom*—Straight boom; for general antenna mounting on a 7-TR.
- *108983 boom*—Offset boom; for general antenna mounting on a 7-TR with pneumatic or manual polarization; can also be used to mount stinger-type antennas.



ADDITIONAL 2X2 BOOM MOUNTING OPTIONS

Following are additional options for mounting the Model 3144 onto a 2x2 boom. Contact the ETS-Lindgren Sales Department for information on ordering optional mounting hardware.

2x2 boom refers to a typical 2-inch by 2-inch boom.



Assembly Instructions

To facilitate transport, the Model 3144 is shipped with the five longest elements on each side removed. After you mount the antenna, follow these assembly steps:

- Do not cross thread or permanent damage to the antenna and element could occur.
- Do not overtighten or use excessive force or permanent damage to the antenna and element could occur.

1. Carefully thread one of the numbered elements into the corresponding numbered receptacle.
2. Thread the element until it is finger tight.
3. Repeat these steps until all of the numbered elements are mounted.

5.0 Application

CAUTION

Before connecting any components, follow the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.

After mounting the Model 3144 Log Periodic Dipole Array Antenna onto an ETS-Lindgren tripod or antenna mast adapter, connect an N-type coaxial cable from the antenna connector to a generator (immunity) or receiver (emissions). Both horizontal and vertical polarizations are easily accomplished when the Model 3144 is mounted onto a tower or tripod. Due to the length of the low frequency elements, verify element clearance prior to switching the antenna to vertical polarization. Contact with any metallic or non-metallic structure can capacitively load the antenna, which may cause inconsistent results. Therefore, care must be taken to ensure that no part of the dipole elements is in contact with the tripod or tower, particularly in vertically-polarized tests. Where possible, run the feed cable straight at least one meter or more back from the Model 3144 before dropping vertically.

For emissions measurements, electric field strength in *db[V/m]* is obtained from:

$$E(dB[V/m])=V(dB[V])+AF(dB[1/m])+\alpha(dB)$$

V = the receiver or spectrum analyzer voltage reading

AF = antenna factor

α = cable loss in dB, if cable losses are non-negligible

For immunity testing, the electric field strength generated at a distance *d* can be approximated by:

$$E\left(\mathrm{V}/\mathrm{m}\right) = \frac{\sqrt{30Pg}}{d}$$

d = distance, in meters

g = numeric gain ($10^{G[dB]/10}$)

P = antenna net input power, in watts

An estimate of the power required for any field strength *E* can be obtained from *Typical Data* on page 23. For any other field strength not shown, multiply the power in watts by the desired E-field squared, or:

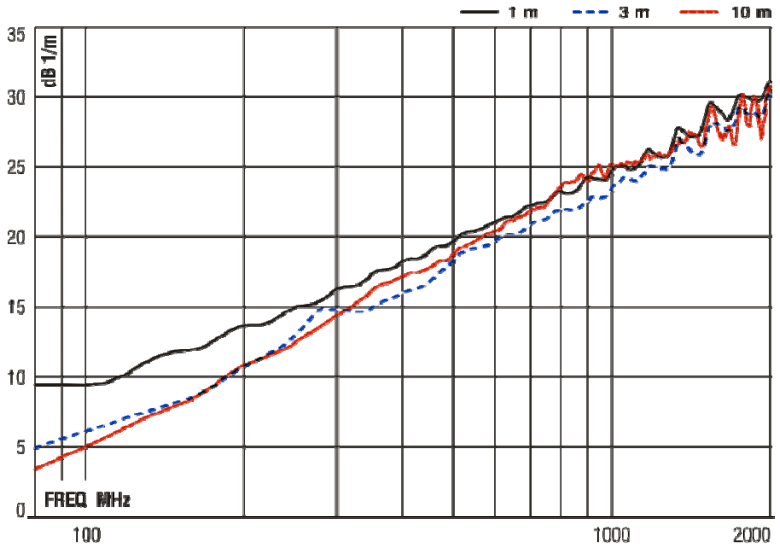
$$P(E\ \mathrm{V/m}) = E^2\ P(1\ \mathrm{V/m})$$

Actual transmitted field strength should be verified using an ETS-Lindgren electric field probe, or equivalent.

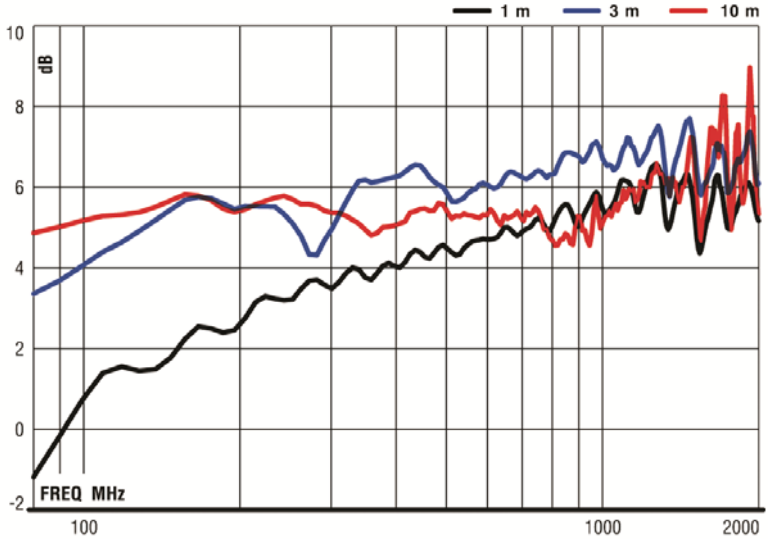
For IEC/EN 31000-4-3 type testing, the antenna tip can be placed at any distance between one and three meters from the EUT as long as the front face plane is illuminated according to the -0, +6 dB uniform field specification. In general, closer distances require less power to create a given field strength.

6.0 Typical Data

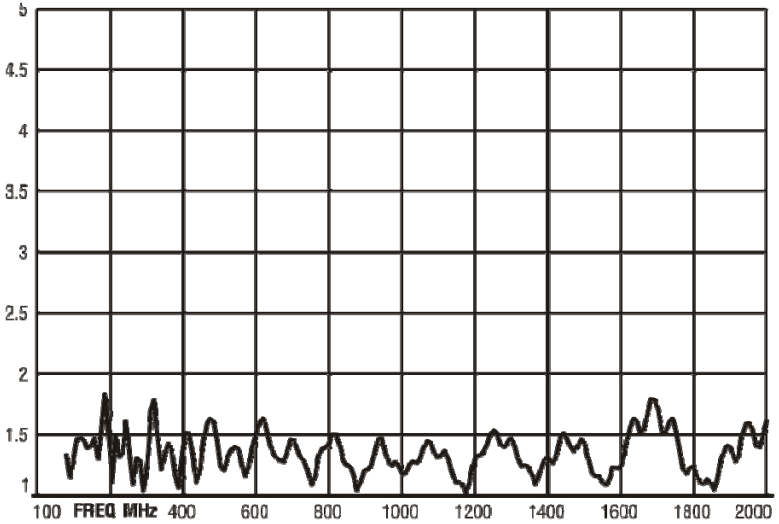
Model 3144 Antenna Factor



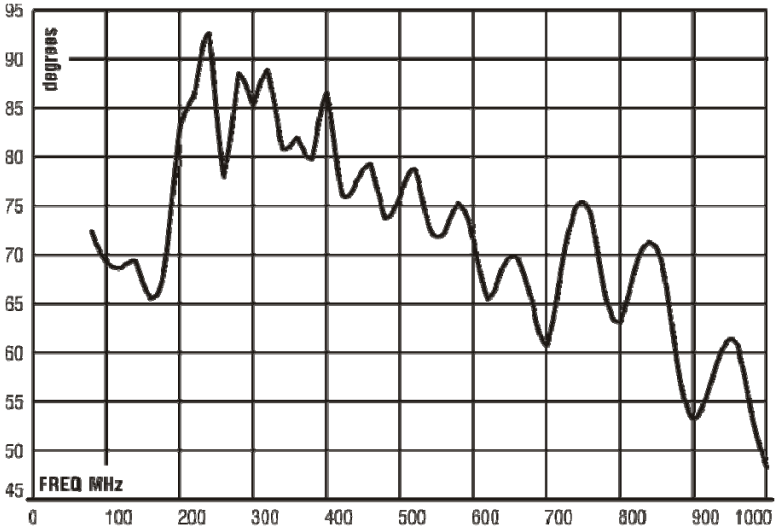
Model 3144 Gain



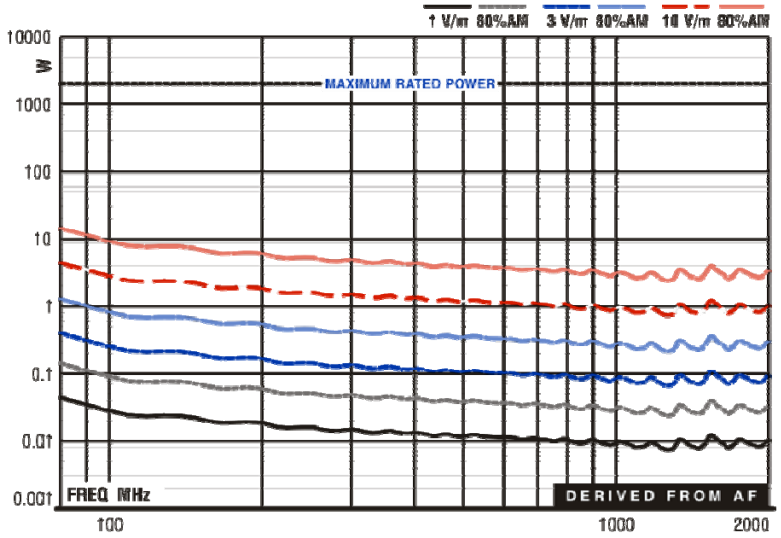
Model 3144 VSWR



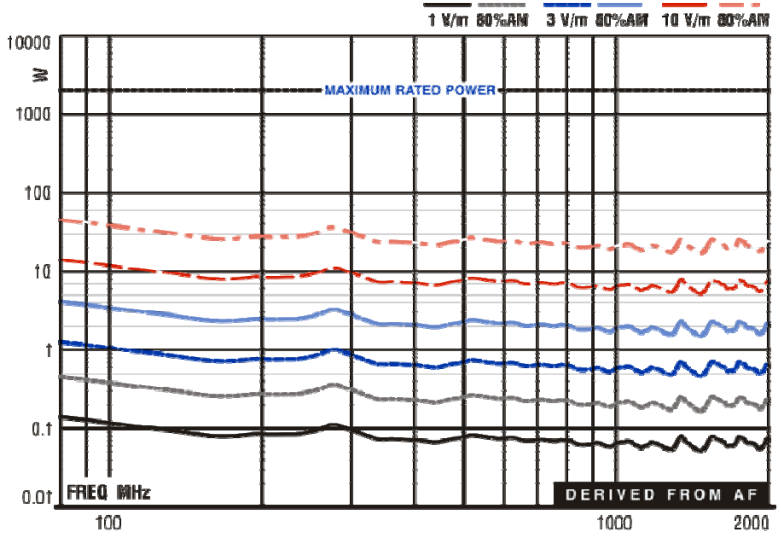
Model 3144 Half-Power Beamwidth



Model 3144 Forward Power 1M



Model 3144 Forward Power 3M



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Appendix A: Warranty

See the *Product Information Bulletin* included with your shipment for the complete ETS-Lindgren warranty for your Model 3144.

DURATION OF WARRANTIES FOR MODEL 3144

All product warranties, except the warranty of title, and all remedies for warranty failures are limited to two years.

Product Warranted	Duration of Warranty Period
Model 3144 Log Periodic Dipole Array Antenna	2 Years