Model 3303

Rod Antenna

User Manual

Model 3303 Antenna Base

ETS·LINDGREN™
An ESCO Technologies Company

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Revision Record | MANUAL 3303 | Part #399047, Rev. D

Revision	Description	Date
A	Initial Release	October, 1993
B	Added Model 3305 Kit content	October, 2002
C	Rebrand	September, 2010
D	Updated monopole rod element information	July, 2011

Table of Contents

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.

1.0 Introduction

The **ETS-Lindgren Model 3303 Rod Antenna** is a passive broadband electric field monopole transmitting antenna, and may also be used as a passive receive antenna. The Model 3303 has a frequency range of 1 kHz to 30 MHz and features manual band switching between 0.001-5 MHz and 5-30 MHz. The maximum power handled by the Model 3303 is 1 kW.

The base of the Model 3303 is constructed of aluminum, providing strength and portability. The 1/4–20 threaded receptacle in the base is compatible with ETS-Lindgren tripods and most others. The housing contains the band-switching mechanism and a female Type N connector.

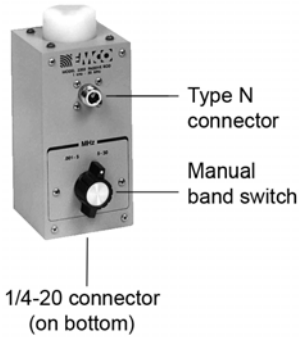
Each Model 3303 is individually calibrated per (ESCM) or IEEE Std 291 using NIST traceable equipment. Actual individual calibration factors and a signed *Certificate of Calibration Conformance* are included with each antenna. By knowing the actual antenna factors and performance characteristics instead of typical data, you can more accurately calculate the field strength in your tests.

Model 3303 Antenna Base and Monopole Element

Standard Configuration

ANTENNA BASE

- Type N connector
- Built-in manual band switch
- Drilled to accept ETS-Lindgren or other tripod mount with standard 1/4–20 threads



COUNTERPOISE

60 centimeters (not shown)

MONOPOLE ELEMENT

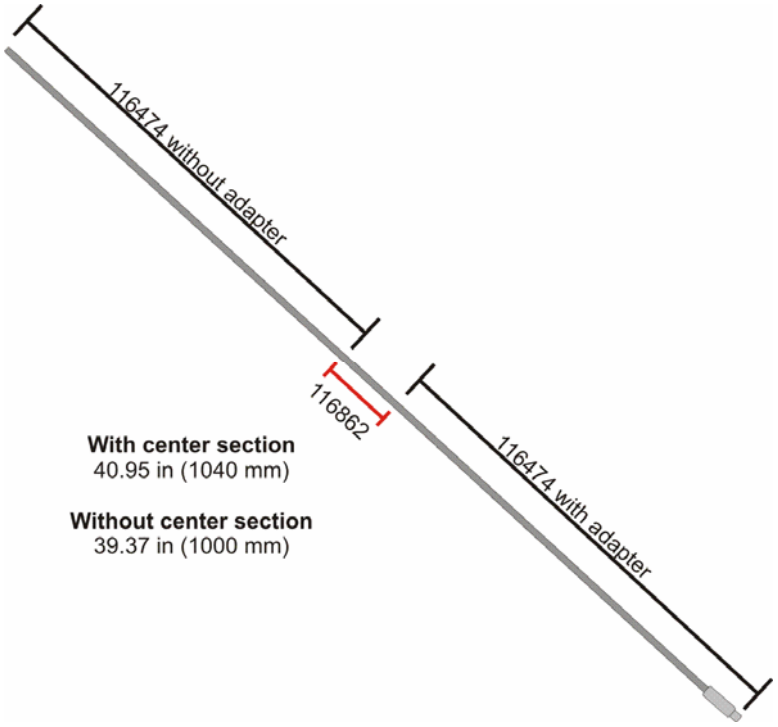
The monopole element includes these parts for assembly:

- (1) 116474 Rod section without antenna adapter
- (1) 116474 Rod section with antenna adapter
- (1) 116862 Center section

The monopole may be assembled as follows:

- **For a finished length of 40.95 in (1040 mm)—**Assemble all parts, including the 116862 center section.
- **For a finished length of 39.37 in (1000 mm)—**Assemble all parts except for the 116862 center section.

See page 17 for the steps to assemble the monopole.


116474 without adapter
116862
116474 with adapter
With center section
40.95 in (1040 mm)
Without center section
39.37 in (1000 mm)

Model 3305 E-Field Shielding Effectiveness Test Kit

The **ETS-Lindgren Model 3305 E-Field Shielding Effectiveness Test Kit** is a set that includes these antennas:

- Model 3303
- Model 3301C Active Monopole Antenna

Together these antennas are designed to measure shielding effectiveness per IEEE 299, MIL-STD-285, and NSA 65-6. The set operates from 1 kHz to 30 MHz. The maximum power required to measure the attenuation per NSA 65-6 is 80 watts.

Additional information about the Model 3301C can be found at www.ets-lindgren.com/3301C.

Model 3303 and Model 3301C are also sold separately.

Tripod Options

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

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 3303 is limited external components such as cables or connectors.

Clean the exterior of the cabinet using a damp cloth and mild cleaner. Always unplug the unit before cleaning.

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

Annual Calibration

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

Replacement and Optional Parts

Following are the part numbers for ordering replacement or optional parts for the Model 3303 Rod Antenna.

Part Description	Part Number
Counterpoise (60 cm)	100692C
Monopole Element	• 116476 Monopole, entire assembly • 116474 Rod section without antenna adapter • 116862 Center section

Note: 116474 Rod section with antenna adapter is not a replaceable part; if you need that section, you will need to order the entire monopole assembly, 116476.

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.

3.0 Specifications

Electrical Specifications

Frequency:	1 kHz—30 MHz
Maximum Continuous Power:	300 W
Peak Power:	1 kW
Impedance (Nominal):	Varies with frequency **Note:** Calibrated in a 50-ohm system.
Connector:	Type N female

Physical Specifications

Base Height:	15.2 cm (6.0 in)
Width:	7.6 cm (3.0 in)
Depth:	7.6 cm (3.0 in)
Monopole Element:	• **For a finished length of 40.95 in (1040 mm)—**Assemble (2) 116474 rod sections and (1) 116862. • **For a finished length of 39.37 in (1000 mm)—**Assemble (2) 116474 rod sections. Do not use the 116862 center section. See page 17 for the steps to assemble the monopole.
Weight:	1.3 kg (2.8 lb)

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4.0 Assembly, Mounting, and Operation

CAUTION

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

CAUTION

Antennas are precision measurement devices. Handle your antenna with care.

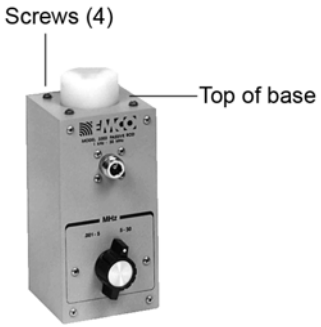
Do not cross thread any connections or permanent damage to the antenna could occur.

The 1/4–20 mount on the bottom of the Model 3303 is not a ground location.

ATTACH COUNTERPOISE

CAUTION **Do not lift the Model 3303 by the counterpoise.**

The counterpoise attaches on the top of the Model 3303 Rod Antenna base with the rod element passing through the opening in the counterpoise. Mounting the counterpoise between the housing and the rod antenna prevents the body of the antenna from intruding into the field being measured.

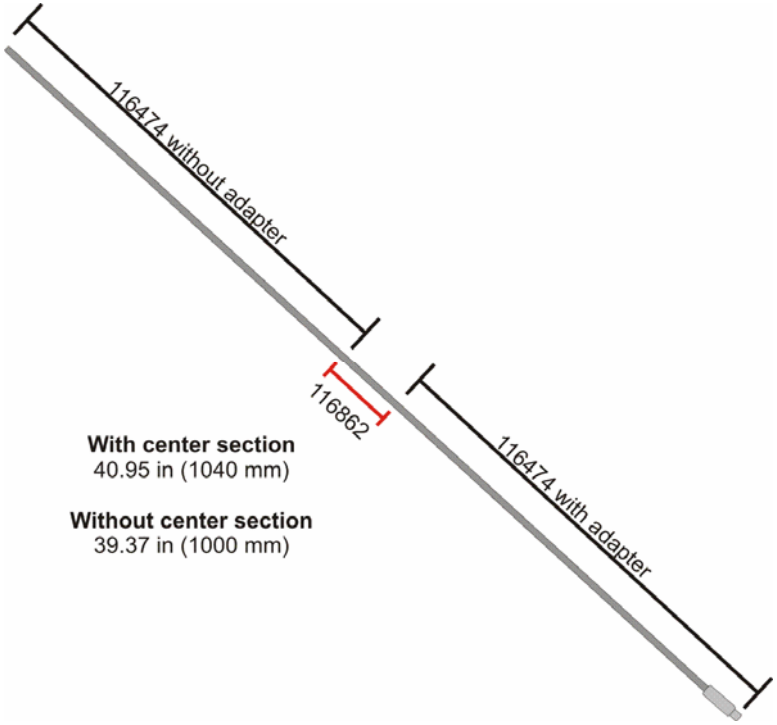


1. Unfold the counterpoise and place it on top of the base.
2. Attach the counterpoise to the base using the four screws on the top of the base.

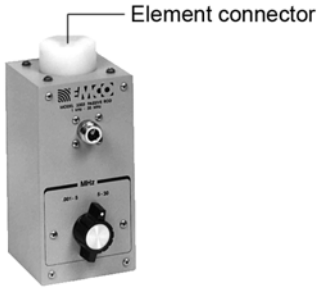
ASSEMBLE / ATTACH ROD ELEMENT

1. Assemble the rod element:

- **For a finished length of 40.95 in (1040 mm)—**Assemble (2) 116474 rod sections and (1) 116862 center section.
- **For a finished length of 39.37 in (1000 mm)—**Assemble (2) 116474 rod sections. Do not use the 116862 center section.



2. Attach the rod to the element connector, passing it through the hole in the counterpoise.

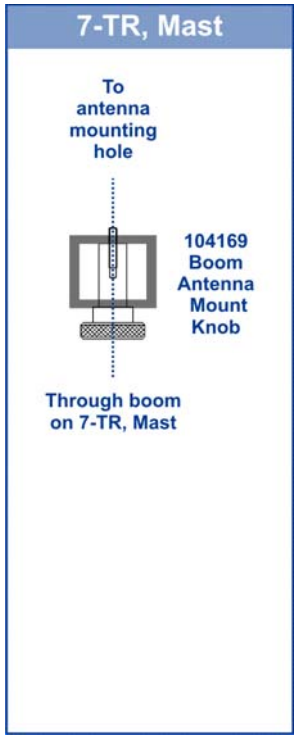


4-TR TRIPOD

Use the 1/4–20 mount on the bottom of the Model 3303 to mount directly onto an ETS-Lindgren 4-TR Tripod; no additional hardware is required.

7-TR AND MAST MOUNTING OPTIONS

Following are options for mounting the Model 3303 onto an ETS-Lindgren 7-TR Tripod or mast. Contact the ETS-Lindgren Sales Department for information on ordering optional mounting hardware.



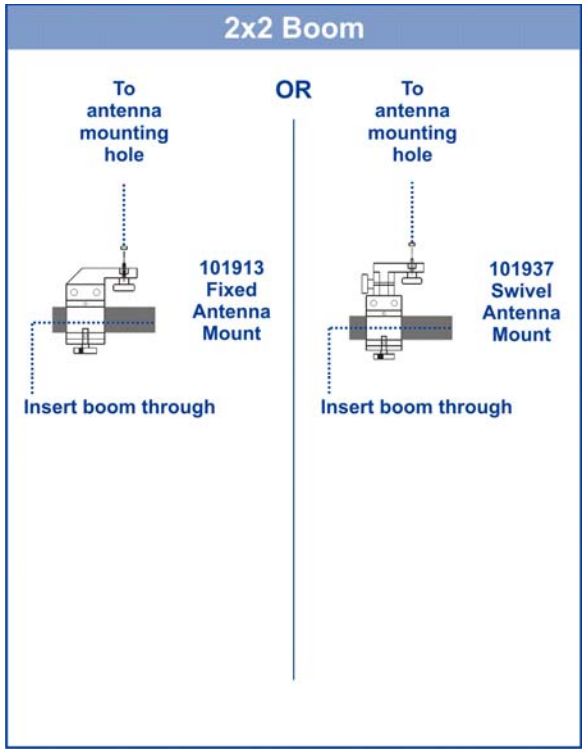
Mast refers to 2070 Series, 2075, and 2175 Antenna Towers. *7-TR* refers to 109042, 108983, and 108507 booms:

- *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
- *108507 boom*—For Model 3106 Series antennas only; when changing polarization, maintains centerline rotation

2X2 BOOM MOUNTING OPTIONS

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

Following are options for mounting the Model 3303 onto a 2x2 boom. Contact the ETS-Lindgren Sales Department for information on ordering optional mounting hardware.

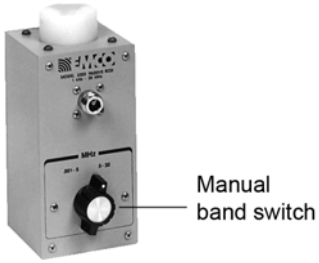


Operation

CAUTION

Reduce amplifier power to zero watts before band switching the Model 3303.

Select the desired frequency band by rotating the band switch.



5.0 Model 3305 Suggested Test Setup

CAUTION

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

Measuring Electronic Field Shielding Effectiveness

CAUTION

Reduce amplifier power to zero watts before band switching the Model 3303.

Reference:

- NSA 65-6
- MIL-STD-285

1. Place the transmitting and receiving antennas so that they are 24 inches plus the thickness of the screen room wall apart from each other.
2. Set up equipment as shown in *Suggested Test Setup Diagram* on page 22.
3. Turn generator to ON position.

   Disable RF output of generator.

   Turn amplifier to ON position.

   Turn receiver to ON position.

   Turn Model 3301C power on.

   Set receiver.

   Set the attenuator at maximum (100 dB–150 dB) attenuation.

   Enable RF output of the generator.
4. Adjust signal amplitude on signal generator to maximum allowed by amplifier input.

5. Establish a reference level by decreasing the attenuation level until the signal can be detected by the receiver. Note the attenuator setting.
6. Relocate antennas so that the screen room wall is between them.
7. Reduce attenuation further until signal is again seen at the same level as without shielding.

The difference in the two attenuator settings is the shielding effectiveness. If the signal cannot be seen with a zero setting, then the shielding effectiveness is greater than the attenuation range or the power amplifier does not have enough power. *Suggested Test Setup Diagram* on page 22.

The table on page 24 shows the maximum shielding effectiveness measuring capability of the Model 3305 E-Field Shielding Effectiveness Test Kit and the approximate wattage required for the Model 3303 Rod Antenna to meet the minimum shielding requirements of NSA 65-6.

These shielding effectiveness readings are valid only if the power amplifier is operating in the linear region. This can be verified by reducing (or increasing) attenuation and observing the receiver signal on the analyzer or receiver. If the receiving signal also decreases (or increases) by the same amount then the amplifier is operating in the linear region.

Suggested Test Setup Diagram

See next page for diagram.

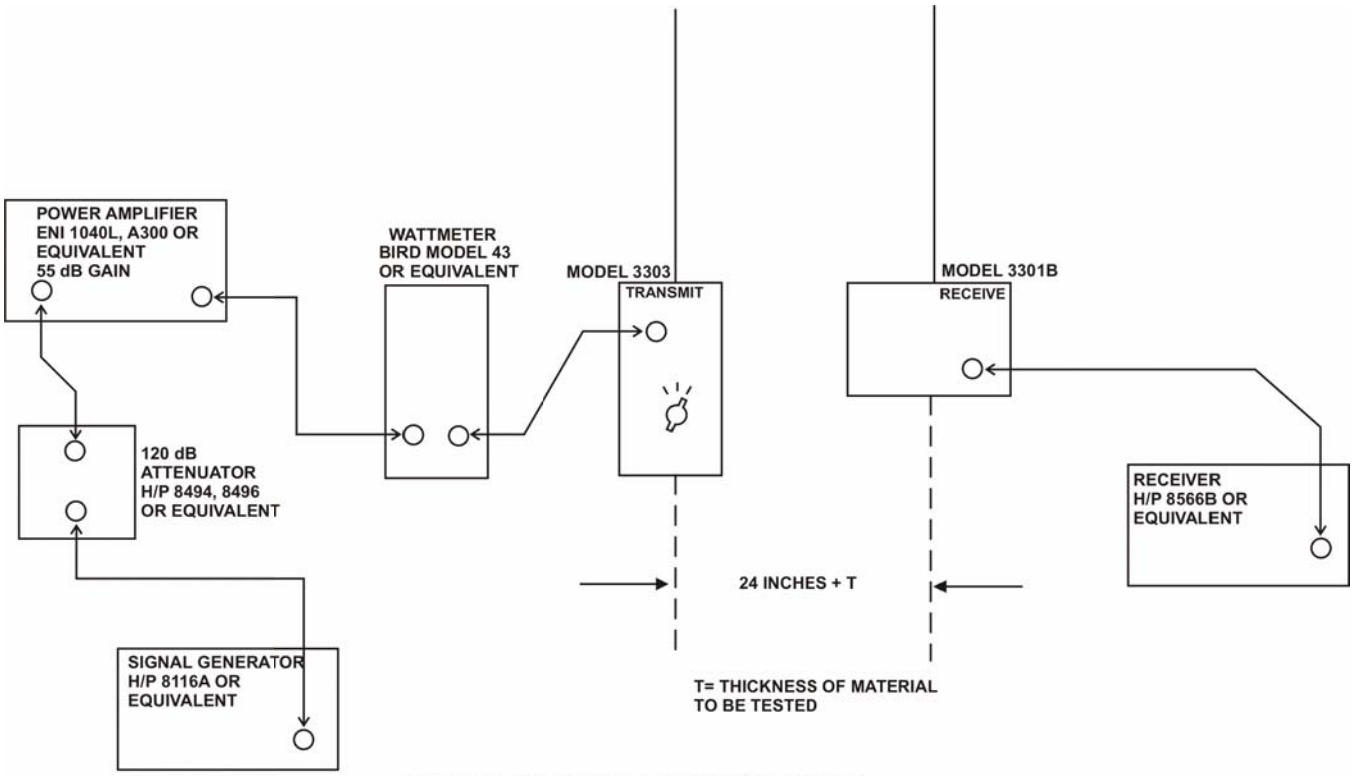


FIGURE 1. SUGGESTED TEST SET-UP FOR
ELECTRIC SHIELDING EFFECTIVENESS TESTING

Electric Field Shielding Effectiveness Measurement

Frequency	NSA 65-6 Minimum Attenuation for Electric Field	Approximate Wattage Required to Meet NSA 65-6 Attenuation Specifications	Maximum Shielding (Electric Field) That Can be Measured With This Setup
Band 1			
1 kHz	70 dB	80 Watts	100 dB
10 kHz	100 dB	80 Watts	120 dB
20 kHz	100 dB	80 Watts	115 dB
30 kHz	100 dB	70 Watts	110 dB
40 kHz	100 dB	75 Watts	112 dB
50 kHz	100 dB	40 Watts	110 dB
60 kHz	100 dB	35 Watts	110 dB
70 kHz	100 dB	40 Watts	110 dB
80 kHz	100 dB	25 Watts	110 dB
90 kHz	100 dB	30 Watts	110 dB
100 kHz	100 dB	30 Watts	110 dB
200 kHz	100 dB	25 Watts	117 dB
300 kHz	100 dB	25 Watts	120 dB
400 kHz	100 dB	25 Watts	125 dB
500 kHz	100 dB	25 Watts	125 dB
600 kHz	100 dB	30 Watts	125 dB
700 kHz	100 dB	30 Watts	125 dB
800 kHz	100 dB	30 Watts	125 dB
900 kHz	100 dB	30 Watts	125 dB

Frequency	NSA 65-6 Minimum Attenuation for Electric Field	Approximate Wattage Required to Meet NSA 65-6 Attenuation Specifications	Maximum Shielding (Electric Field) That Can be Measured With This Setup
Band 1, continued			
1 MHz	100 dB	30 Watts	125 dB
2 MHz	100 dB	30 Watts	125 dB
4 MHz	100 dB	30 Watts	125 dB
5 MHz	100 dB	30 Watts	125 dB

Frequency	NSA 65-6 Minimum Attenuation for Electric Field	Approximate Wattage Required to Meet NSA 65-6 Attenuation Specifications	Maximum Shielding (Electric Field) That Can be Measured With This Setup
Band 2			
5 MHz	100 dB	25 Watts	125 dB
6 MHz	100 dB	25 Watts	125 dB
8 MHz	100 dB	25 Watts	125 dB
10 MHz	100 dB	20 Watts	125 dB
15 MHz	100 dB	25 Watts	125 dB
20 MHz	100 dB	20 Watts	125 dB
25 MHz	100 dB	45 Watts	125 dB
30 MHz	100 dB	25 Watts	125 dB

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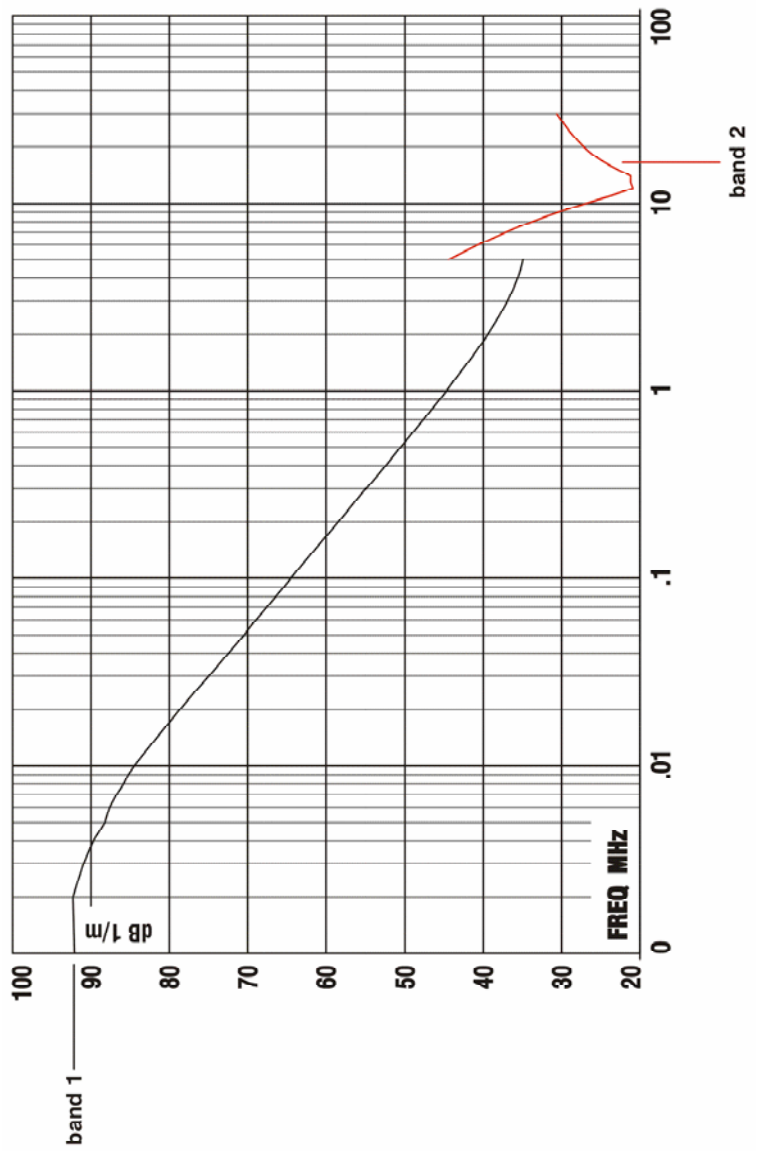
6.0 Typical Data



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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 3303 Rod Antenna.

DURATION OF WARRANTIES FOR MODEL 3303

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 3303 Rod Antenna	2 Years