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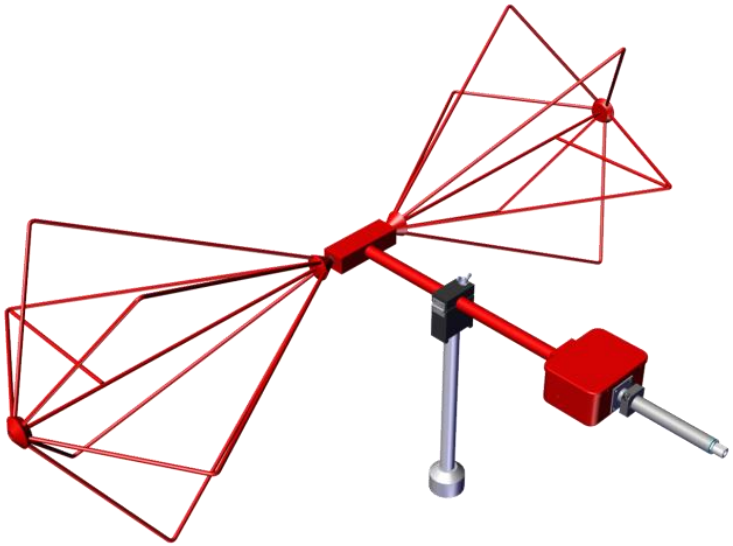
Model 3104D

Biconical Antenna

User Manual



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An ESCO Technologies Company

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Revision Record

MANUAL,3104D | Part #399398, Rev. A

Revision	Description	Date
A	Initial Release	November, 2015

Table of Contents

Notes, Cautions, and Warnings

Note: Denotes helpful information intended to provide tips for better use of the product.

Caution: Denotes a hazard. Failure to follow instructions could result in minor personal injury and/or property damage. Included text gives proper procedures.

Warning: Denotes a hazard. Failure to follow instructions could result in SEVERE personal injury and/or property damage. Included text gives proper procedures.

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

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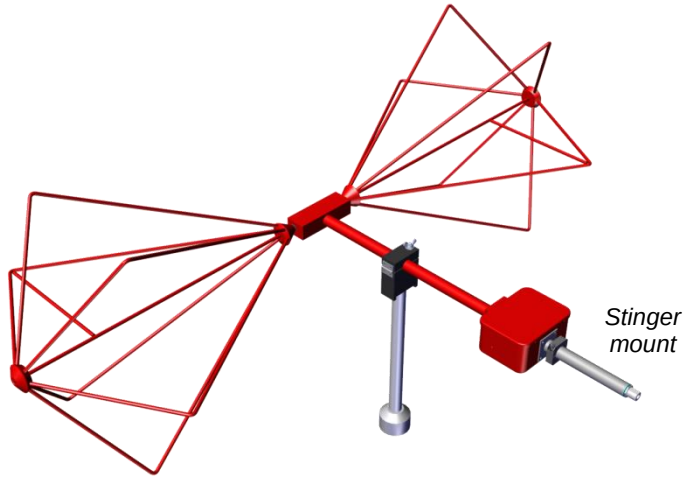
1.0 Introduction

The **ETS-Lindgren Model 3104D Biconical Antenna** is designed to operate over the 20 MHz to 200 MHz frequency range to meet Military and Department of Defense EMI specifications. The Model 3104D is designed and precisely manufactured to conform to the requirements of MIL-STD-461 and other Military Standards as reflected in Drawing ES-F-201286.

The Model 3104D includes a stinger mount, which permits on-axis rotation during polarization of the antenna.



The biconical elements are made from welded aluminum. The elements mount in a balun network fabricated of phenolic and equipped with the necessary impedance-matching components. The lightweight construction provides easy handling and storage.

Each antenna is individually calibrated during the manufacturing process. The results of these calibrations are included for use in specification compliance testing.

Optional Items

PORTABLE ELEMENTS (3104DP)

Collapsible folding elements are available, making the Model 3104D portable and ideal for field use. Both the standard rigid and optional folding elements attach to the balun using screw mounts. This makes changing between the two types of elements quick and easy.

EXTENDED PORTABLE ELEMENTS (3104DPX)

An extended version of the portable element is available. These folding elements are twice as long as the standard elements. The longer elements enable you to generate high fields at low frequencies with reduced applied power.

CARRYING CASES

Carrying cases for biconical antennas and portable elements are available.

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

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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.

WARNING: Maintenance of the Model 3104D is limited to external components such as cables or connectors.

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

Replacement and Optional Parts

Note: ETS-Lindgren may substitute a similar part or new part number with the same functionality for another part/part number. Contact ETS-Lindgren for questions about part numbers and ordering parts.

Following are the part numbers for ordering replacement or optional parts for the Model 3104D.

Part Description	Part Number
Belleville Washer, 5/16	910035
Set Screw, 5/16–18 x 3/4	910034

CONTACTING ETS-LINDGREN

Note: Please see www.ets-lindgren.com for a list of ETS-Lindgren offices, including phone and email contact information.

SENDING A COMPONENT FOR SERVICE

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

CALIBRATION SERVICES AND ANNUAL CALIBRATION

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

3.0 Specifications

Electrical Specifications

Frequency Range:	20 MHz–200 MHz
Impedance:	Matched to 50 Ω
VSWR Ratio (Average):	2.8:1
Power Input Capability:	• 50 Watts continuous power • 100 Watts short-term peak power
Connector:	Type N

Physical Specifications

Length:	134.6 cm (53.0 in)
Depth:	96.5 cm (38 in)
Diameter:	53.3 cm (21 in)
Weight:	2.7 kg (6.0 lb)

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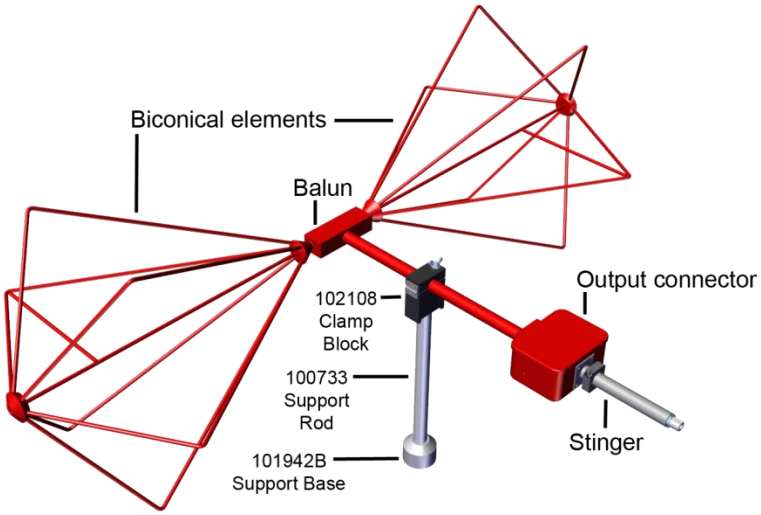
4.0 Assembly Instructions

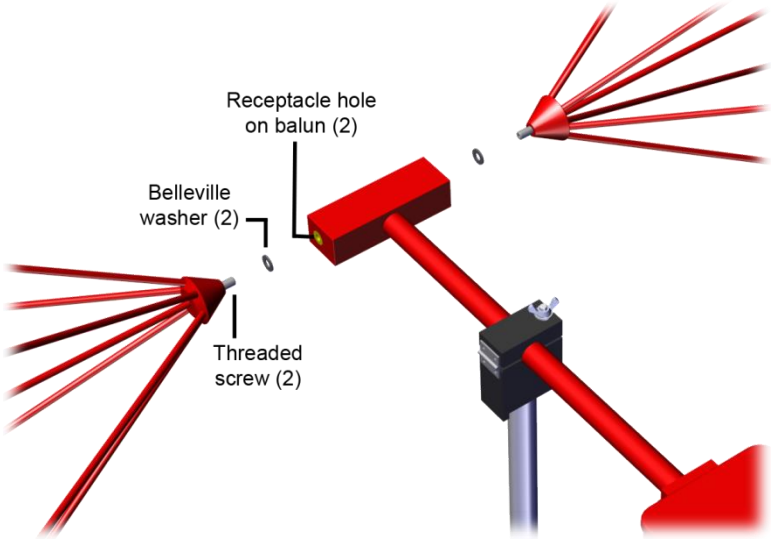
CAUTION: Before connecting any components, follow the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.



The Model 3104D Biconical Antenna is shipped unassembled, and includes these parts:

- Balun
- Biconical element (2)
- Belleville washer (2)
- 100733 Support Rod
- 101942B Support Base
- 102108 Clamp Block

To assemble the Model 3104D:



Note: To order replacement belleville washers or threaded screws, see *Replacement and Optional Parts* on page 11.

1. Slide a belleville washer onto the threaded screw end of one of the biconical elements.
2. Line up the screw threads with the receptacle hole on the balun and turn the biconical element until it is firmly secured in the balun.

Caution: Do not cross thread this connection or permanent damage to the joint could occur.

3. Repeat step 1 and step 2 using the remaining washer and biconical element.

5.0 Mounting Instructions

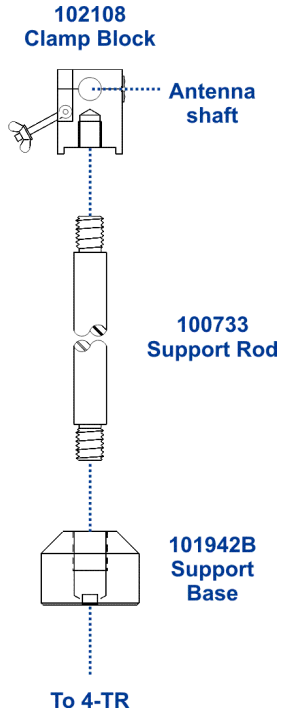
Caution: Before connecting any components, follow the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.

Caution: The Model 3104D is a precision measurement device. Handle with care.

Using Included Mounting Adapters on a 4-TR

The Model 3104D Biconical Antenna ships with the following adapters, used to mount the antenna to a 4-TR tripod:

- **102108 Clamp Block—**Uses standard 7/8–14 threads and comes with a 1/4–20 thread adapter for mounting to an ETS-Lindgren tripod or most other tripods.
- **100733 Support Rod**
- **101942B Support Base**

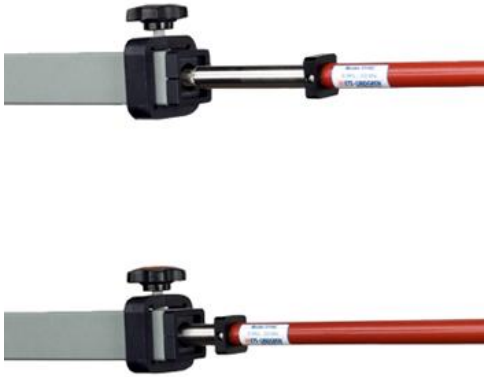


To use these adapters to mount the Model 3104D to a 4-TR tripod:

1. Assemble the clamp block, support base, and support rod.
2. Attach the support base to the 4-TR tripod.
3. Unscrew the clamp block latch and open the top.
4. Insert the shaft of the balun into the clamp block and close the top.
5. Move the latch to the closed position and tighten so the antenna is held securely.
6. Attach the cable to the output connector on the antenna.

Using the Stinger to Mount to a Model 2175 MiniMast

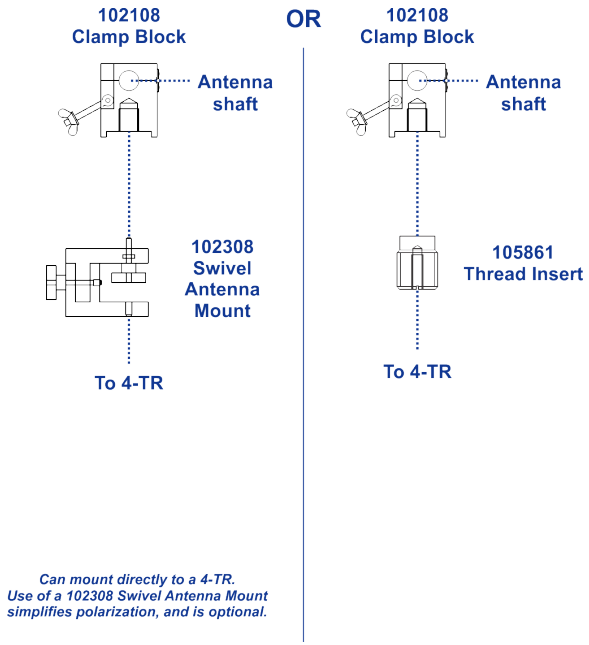
The stinger mount provides on-axis rotation during 90° horizontal or vertical polarization. The stinger enables you to mount the antenna directly to an ETS-Lindgren 7-TR Tripod or mast.



Shown stinger-mounted onto a 7-TR

4-TR Mounting Options

Following are additional options for mounting the Model 3104D onto an ETS-Lindgren 4-TR Tripod. Contact the ETS-Lindgren Sales Department for information on ordering optional mounting hardware.

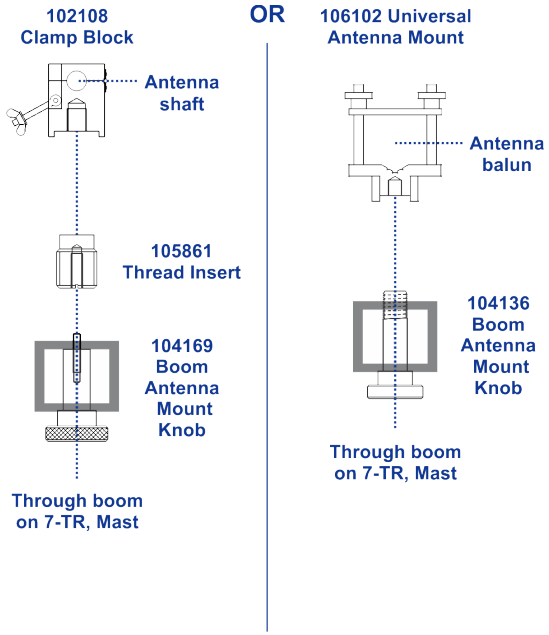


7-TR AND MAST MOUNTING OPTIONS

Following are options for mounting the Model 3104D onto an ETS-Lindgren 7-TR Tripod or mast. Contact the ETS-Lindgren Sales Department for information on ordering optional mounting hardware.

Note: *Mast* refers to 2070 Series, 2075, and 2175 Antenna Towers. *7-TR* refers to these booms:

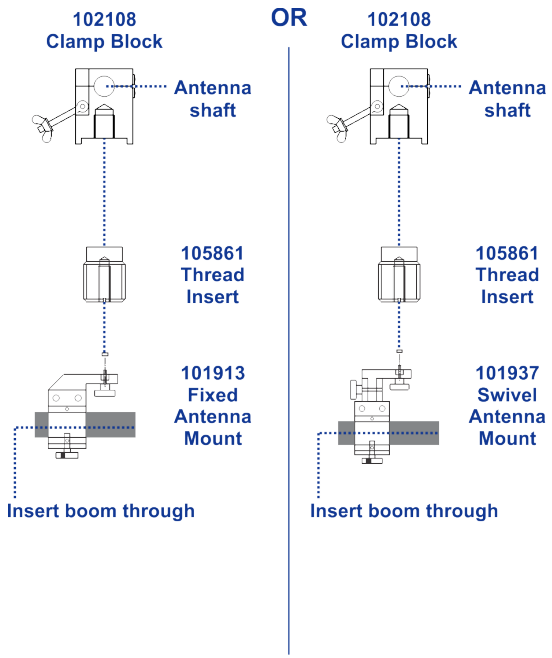
- *109042 boom*—Straight boom; for general antenna mounting on a 7-TR
- *108983 boom*—Offset boom; for general antenna mounting on a 7-TR with pneumatic or manual polarization; can also be used to mount stinger-type antennas
- *118947*—For stinger-type antennas only
- *108507 boom*—Centerline rotation boom for Model 3106 Series antennas only; when changing polarization, maintains centerline rotation



2x2 Boom Mounting Options

Note: *2x2 boom* refers to a typical 2-inch by 2-inch boom.

Following are additional options for mounting the Model 3104D onto a 2x2 boom. Contact the ETS-Lindgren Sales Department for information on ordering optional mounting hardware.



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6.0 Operation

CAUTION: Before placing into operation, follow the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.

The Model 3104D Biconical Antenna has a traditional coaxial wound balun that provides a broad frequency range and moderate gain for both transmitting and receiving. This antenna may be used for radiated immunity measurements provided that the peak input power is limited to no more than 100 W.

For enhanced measurement repeatability, it is recommended that when the Model 3104D is used vertically that the same element orientation be maintained from measurement to measurement. A white strip or dimples on the element block mark the coax shield side of the element. Keep this side towards ground when the antenna is used vertically to increase test repeatability, especially when the Model 3104D is used inside a shielded enclosure.

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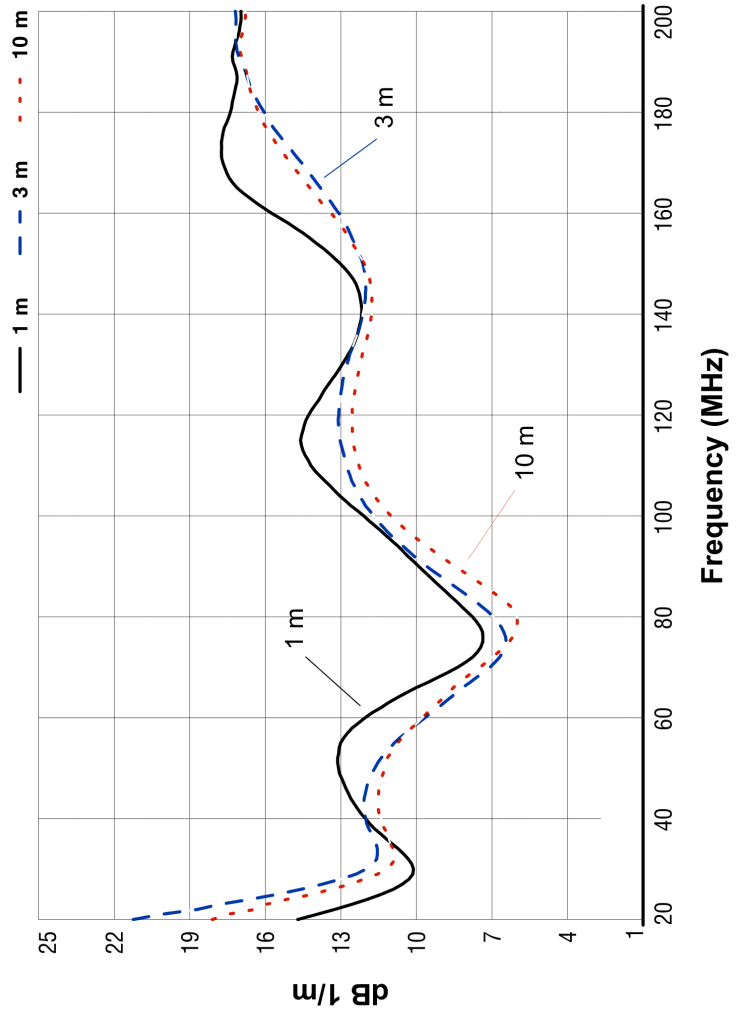
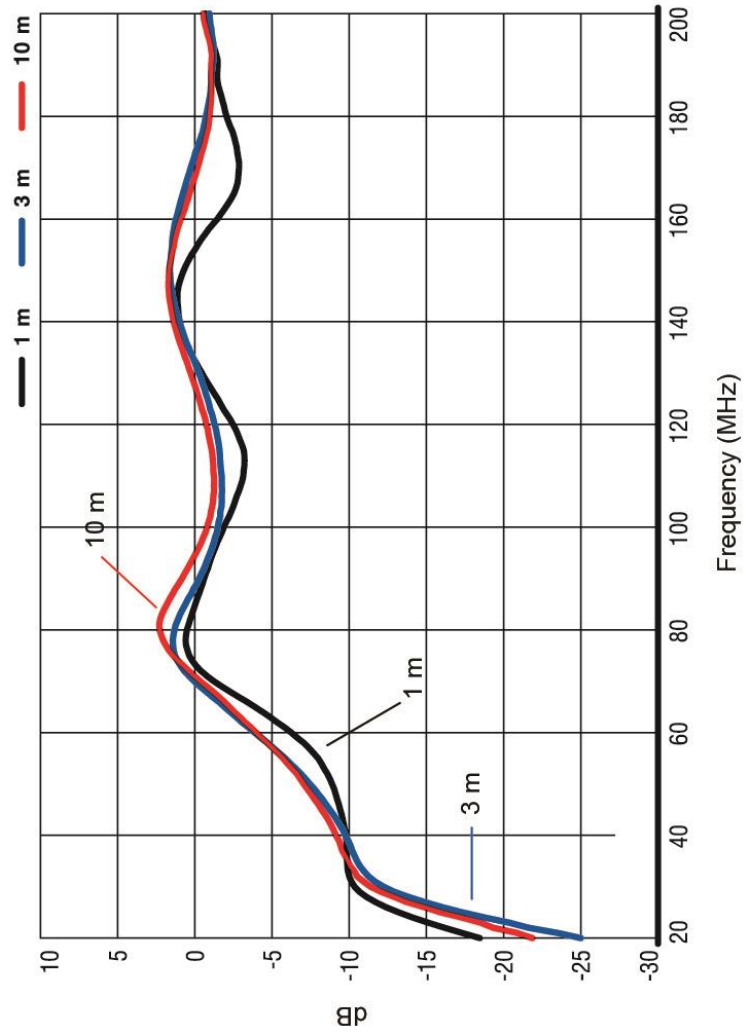
7.0 Typical Data

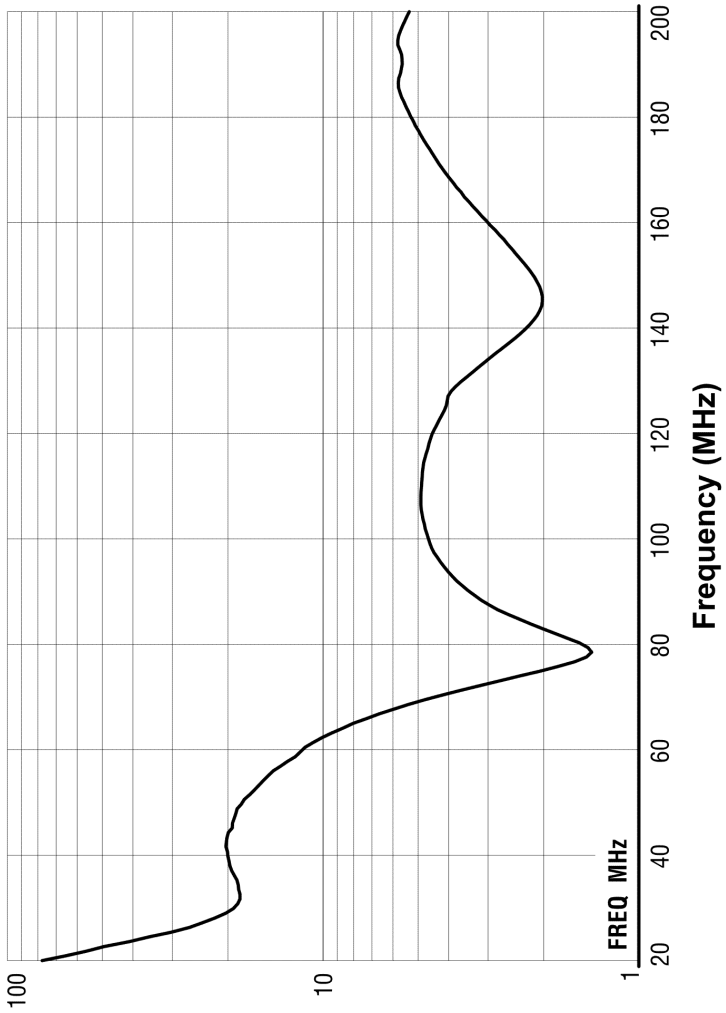
Model 3104D Antenna Factor



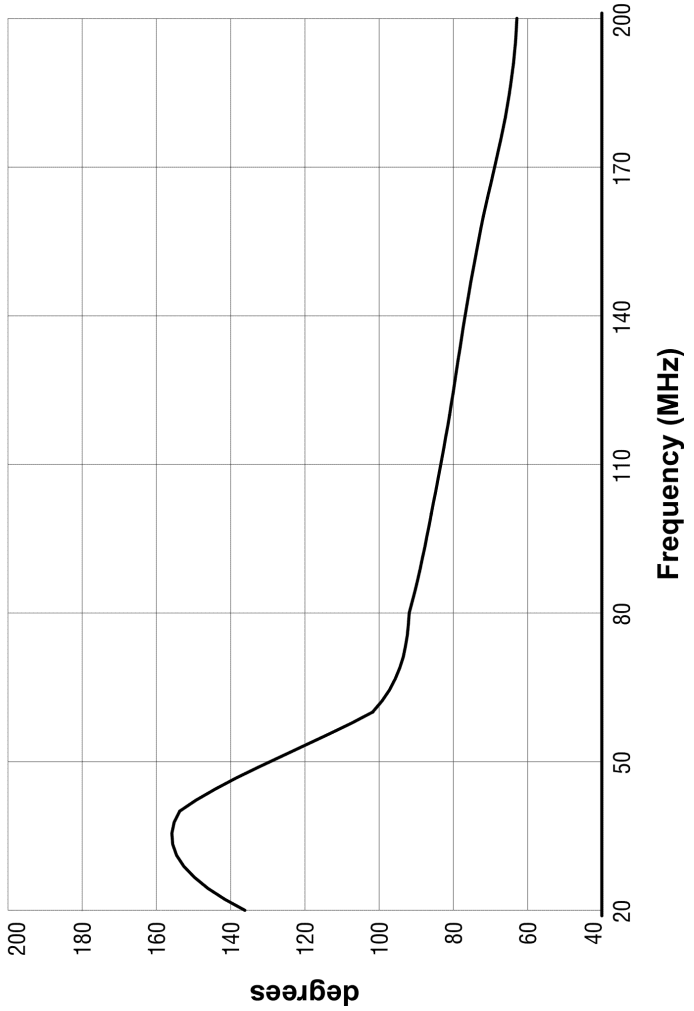
Model 3104D Gain



Model 3104D VSWR

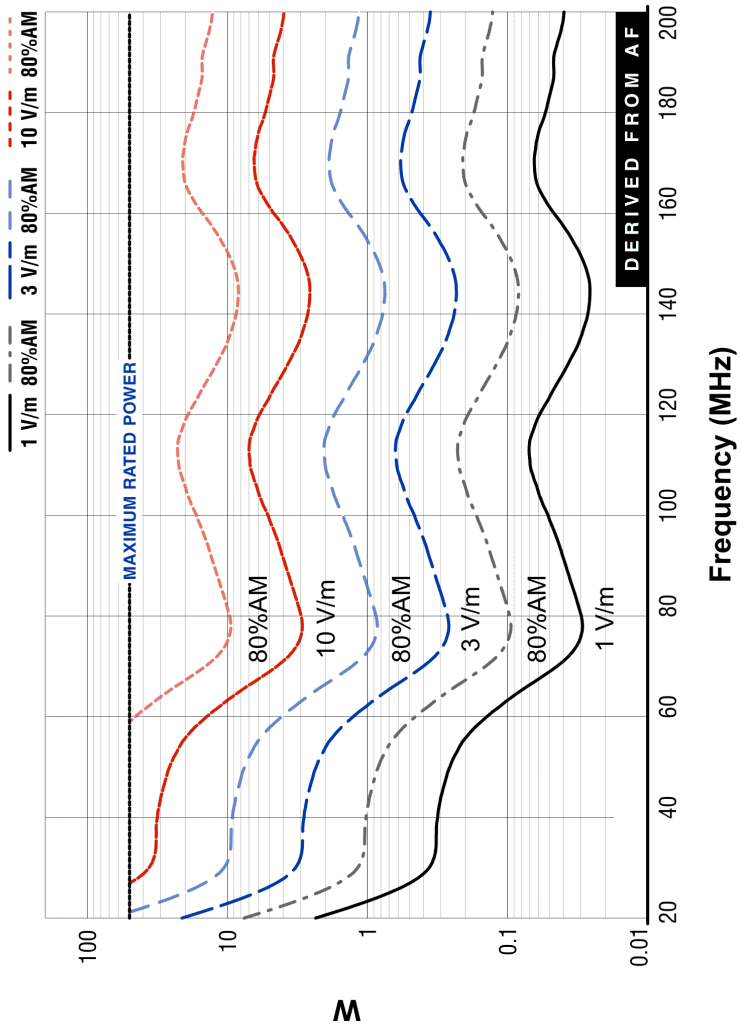


Model 3104D Half-Power Beamwidth

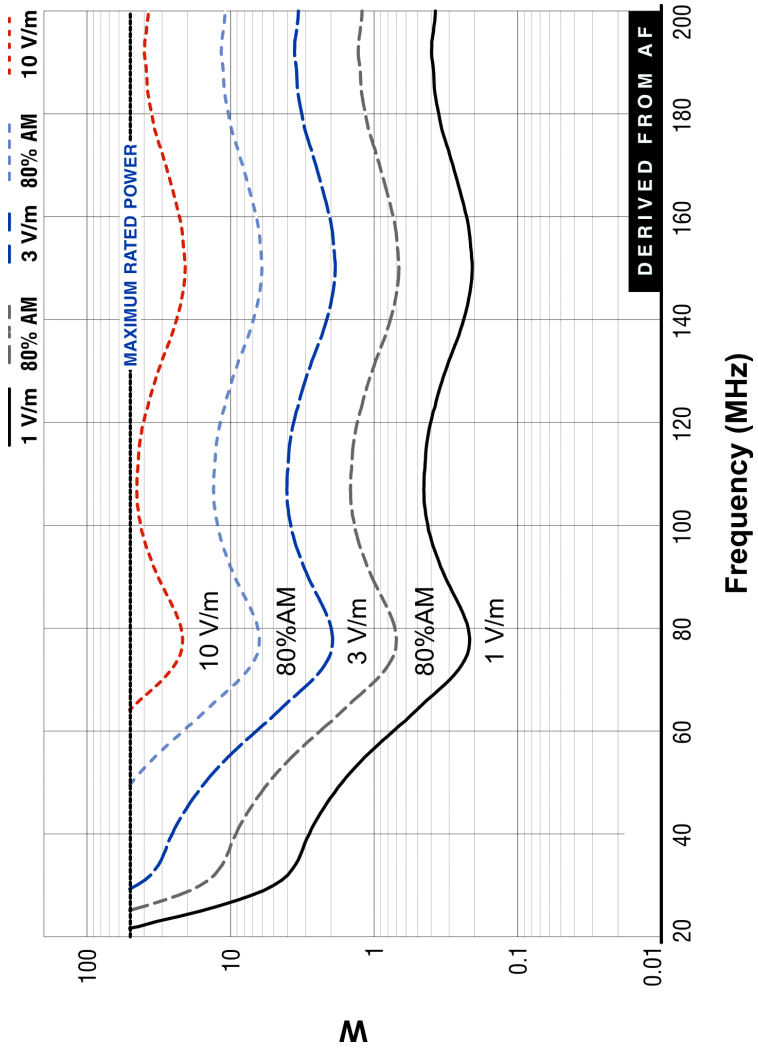


Model 3104D Forward Power

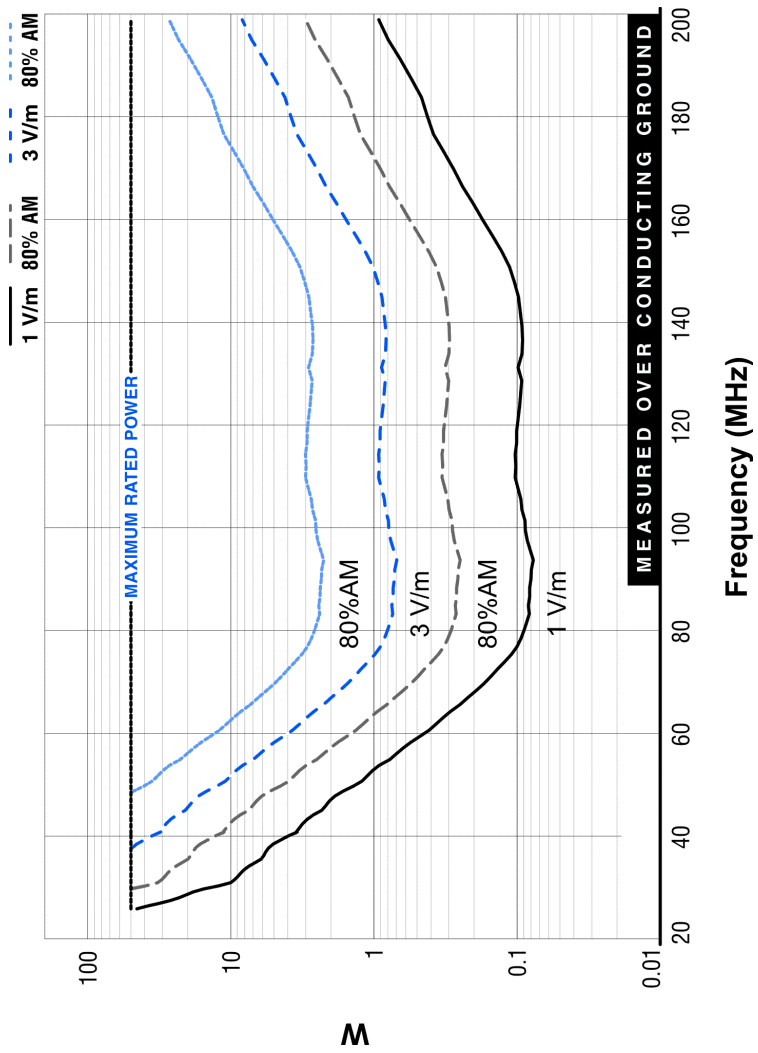
@ 1 M–Derived from AF



@ 3 M–Derived from AF



@ 3M–MEASURED OVER CONDUCTING GROUND



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Appendix A: Warranty

Note: See the *Product Information Bulletin* included with your shipment for the complete ETS-Lindgren warranty for your Model 3104D.

Duration of Warranties

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 3104D Biconical Antenna	2 Years