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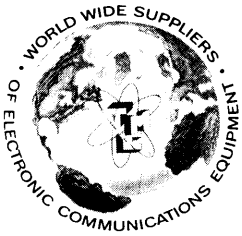
Issue Date: July 1989

TECHNICAL MANUAL

Antenna Terminator/Dummy Load (4KW)

Model TER-4K

The Technical Materiel Corporation
700 Fenimore Road
Mamaroneck, New York 10543-0142 U.S.A.



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Warranty

The Technical Materiel Corporation, hereinafter referred to as TMC, warrants the equipment - except electron tubes, semi-conductor devices, fuses, lamps, batteries, and articles made of glass or other fragile or expendable materials - purchased hereunder to be free from defect in workmanship and materials under normal use and service, when used for the purposes for which the same is designed, for a period of ONE YEAR from the date of delivery FOB factory. TMC further warrants that the equipment will perform in a manner equal to or better than published technical specifications as amended by any additions or corrections thereto accompanying the formal equipment offer.

TMC will replace or repair any such defective items, FOB factory, which may fail within the stated warranty period, provided:

- Any claim of defect under this warranty is made within sixty (60) days after discovery thereof and that inspection by TMC, if required, indicates the validity of such claim to TMC's satisfaction;
- The defect is not the result of damage incurred in shipment from or to the factory;
- The equipment has not been altered in any way either as to design or use whether by replacement parts not supplied or approved by TMC, or otherwise; and
- Any equipment or accessories furnished but not manufactured by TMC, or not of TMC design shall be subject only to such adjustments as TMC may obtain from the supplier thereof.

At TMC's option, any defective part or equipment which fails within the warranty period shall be returned to TMC's factory for inspection, properly packed with shipping charges prepaid and the TMC RETURN AUTHORIZATION number clearly marked on the package. Electron tube warranty claims should be made directly to the manufacturer of such tubes since tubes furnished by TMC bear only the manufacturer's warranty.

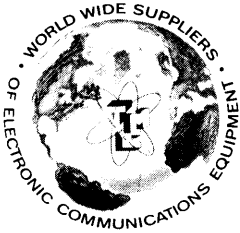
No warranties, expressed or implied, other than those specifically set forth herein shall be applicable to any equipment manufactured or furnished by TMC and the foregoing warranty shall constitute the purchaser's sole right and remedy. In no event does TMC assume any liability for consequential damages, or for loss, damage or expense directly or indirectly arising from the use of such equipment, or any inability to use them either separately or in combination with other equipment or materials or from any other cause.

All inquiries should be directed to the following:

THE TECHNICAL MATERIEL CORPORATION

Customer Service
700 Fenimore Road
Mamaroneck, New York 10543 U.S.A.

Telephone 914-698-4800
Facsimile (FAX) 914-698-4805
Telex 137-358 TECHMAT MECK



PLEASE READ THIS FIRST

Dear TMC product user:

Thank you for purchasing the TMC Model TER-4K Antenna Terminator/Dummy Load. This model is one of a series of eight different types that provide high-purity resistive terminations for either routine off-the-air testing of transmitters or for such antenna arrays as rhombics or sloping-Vs. The complete series operate in the DC to 30MHz frequency range at power ratings from 500 watts to 300,000 watts.

The antenna terminator, or dummy load as it is frequently called, is described in detail in the enclosed technical manual. This publication provides important information about using TMC equipment. Please read it.

If you need additional data or some specific technical information, please give our Customer Service a call at (914) 698-4800 or return the business reply form provided in this package. Our FAX (facsimilie) number is (914) 698-4805.

If you are missing any items, please contact TMC directly or through your local TMC sales office.

Thank you for selecting the TMC Model TER-4K antenna terminator/dummy load.

The Technical Materiel Corporation
Product Marketing

THE TECHNICAL MATERIEL CORPORATI N
COMMUNICATIONS ENGINEERS

Section 1 - General Description

1.1 Functional Description

1.1.1 Overview

The TER-4K Transmitting Antenna Coupler is a broadband, high-capacity dummy load used for routine off-the-air testing of a transmitter or as a purely resistive termination for rhombic or other antenna systems. The TER-4K provides a flat, resistive termination and is capable of dissipating RF energy in the order of 4,000 watts average or 8,000 watts PEP over the frequency range of DC to 30MHz. This power rating, however, is conservative since the TER-4K can be operated at higher levels on a limited duty cycle basis.

1.1.2 Major Assemblies

The TER-4K coupler consists of four low-reactance glass resistors housed in a re-inforced aluminum case for operation in any ambient environment from -50°C to +75°C. Spark gaps provide protection against static electricity on the antenna as well as lightning discharge. Mounts are provided for either pole or wall mounting. Since no maintenance is required, the dummy load may be placed in any isolated area, such as an antenna farm. Outline and mounting dimensions of the TER-4K are shown in Figure 2.2.

1.1.3 Input/Output Characteristics

Several models of the TER-4K are available: a 600-ohm balanced version; 300-ohm unbalanced version; 50-ohm unbalanced version; or 70-ohm unbalanced version. The models are differentiated by an option number added to the TER-4K designation. These options, listed in Section 1.4, reflect the type of internal resistor assembly used.

1.2 Physical Description

1.2.1 Equipment Mounting

The TER-4K is designed for either pole or bulkhead mounting. Two mounting plates with the necessary lag bolts welded on are provided. These plates bolt directly to the pole or bulkhead and mate directly with two horizontal brackets welded to the TER enclosure.

1.2.2 Balanced RF Connections (600-ohm model)

The balanced connectors consist of two Mycroy^R bowls mounted on the top of the dummy load case. Standard threaded rods with stainless steel nuts and flat washers are used to secure the feed lines. The center-tapped ground lug is positioned between the two bowls.

1.2.3 Unbalanced RF Connections

Several unbalanced connectors are available for the unbalanced TER units and are mounted at the top of the TER case. Although a standard 1-5/8 inch EIA flange assembly is normally provided, different choices are available depending on the installation. Refer to Section 1.4 or the TMC Connector Products Catalog for other connector assemblies.

1.3

Technical Specifications

Frequency Range

DC to 30MHz

RF Power Dissipation Rating

8KW PEP/4KW Average. 10KW PEP under a 20% duty cycle.

Terminating Impedance Ratings

600-ohm balanced, center-tapped is standard

300-ohm unbalanced, 50-ohm unbalanced or 70-ohm unbalanced optional.

Other ratings are available to suit specific applications.

RF Fittings - Unbalanced Coaxial

1-5/8 inch EIA Flange standard. Optional RG85/U, QDL or LC type assemblies with others available depending on application. (See chart Section 1.4)

RF Fittings - Balanced Bowls

Twin Mycroy^R bowls on 12-inch centers. Center-tapped lug to ground.

Mean-Time-Between-Failure

In excess of 100,000 hours.

Operating Features

Cooling

Convection, no fans or moving parts

Ambient Conditions

-50°C to +75°C; Up to 100% R.H. Storage -50°C to +80°C

Primary Power

Passive device. No external power is required.

Size and Weight

Main enclosure: 35W x 20D x 30H inches (88.9W x 50.8D x 76.2H cm)

Top hat: 40W x 23.5D x 4H inches (101.6W x 59.7D x 10.2H cm)

Bowls extend 6 inches off top hat; Mounting brackets extend 2 inches off back.

81 pounds (36.8 Kg); Shipping weight approximately 150 pounds

Shipping cube approximately 27.2 cu.ft. (41.5W x 27D x 42H inches)

Mounting

Rear brackets (2) bolted to angle, face plates (2)

Special Features

Safety

External spark gap for protection against static charges and lightning.

Components and Construction

Totally solid state resistor assembly, mounted internally to a reinforced aluminum case that is protected from the environment. External hardware is stainless steel.

THE CONTENTS AND INFORMATION CONTAINED IN THIS INSTRUCTION MANUAL IS PROPRIETARY TO THE TECHNICAL MATERIEL CORPORATION TO BE USED AS A GUIDE TO THE OPERATION AND MAINTENANCE OF THE EQUIPMENT FOR WHICH THE MANUAL IS ISSUED AND MAY NOT BE DUPLICATED EITHER IN WHOLE OR IN PART BY ANY MEANS WHATSOEVER WITHOUT THE WRITTEN CONSENT OF THE TECHNICAL MATERIEL CORPORATION.

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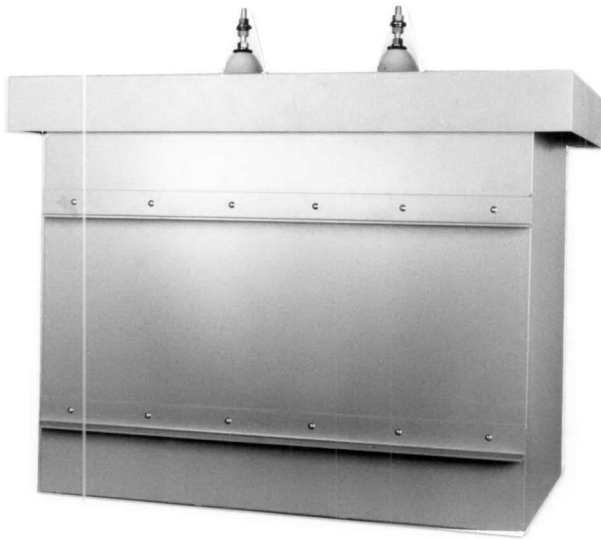
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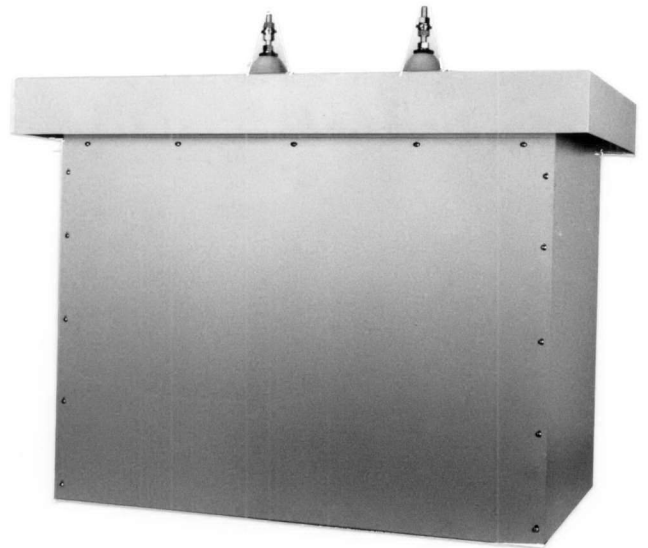
Overleaf	Photographic print of TER-4K
Figure 2.1	Schematic Diagram, Typical Rhombic Antenna System
Figure 2.2	Outline Drawing with Mounting Dimensions
Figure 5.1	Cutaway View, Model TER-4K

List of Tables

Table 2.1	Loose Items Supplied
Table 5.1	Replacement Spare Parts List



(Rear View)



(Front View)

Model TER-4K Antenna Terminator/Dummy Load

1.4 TER Product Group

TER-500	Antenna Terminator/Dummy Load, 500W Average
TER-1.8K	Antenna Terminator/Dummy Load, 1.8KW Average
TER-4K	Antenna Terminator/Dummy Load, 4KW Average
TER-5K	Antenna Terminator/Dummy Load, 5KW Average
TER-18K	Antenna Terminator/Dummy Load, 18KW Average
TER-25K	Antenna Terminator/Dummy Load, 25KW Average
TER-100K	Antenna Terminator/Dummy Load, 100KW Average
TER-300K	Antenna Terminator/Dummy Load, 300KW Average

Terminating Assembly Options:

Note: Unless options are specified, all models except the TER-100K and TER-300K are 600-ohm balanced and use twin Microy^R bowl assemblies. The TER-100K and TER-300K are 50-ohm unbalanced and are supplied with 6-1/8 inch EIA flange assemblies.

Unbalanced Operation:	300-ohm	50-ohm	70-ohm
● Microy ^R Bowl	/300U	N/A	N/A
● C connector	(Note 1)	/286-1	/286-3
● HN connector	(Note 1)	/285-1	/285-3
● QDS connector	(Note 1)	/289-1	/289-3
● UHF connector	(Note 1)	/281-1	/281-3
● 1-5/8 inch EIA flange	(Note 2)	/272-1	/271-1
● LC -type connector	(Note 2)	/287-1	/287-5
● QDL-type connector	(Note 2)	/273-1	/273-3
● 3-1/8 to 1-5/8 adapter	(Note 3)	/278	/279

Note 1 Model TER-500 only.

Note 2 Models TER-500, TER-1.8K and TER-5K

Note 3 Models TER-18K and TER-25K

To order, specify both model and option. Example: TER-5K/272-1.

Section 2 - Installation

2.1 Initial Inspection

2.1.1 General

The TER-4K is shipped in one container and is completely assembled at the time of delivery from the factory. Every TER-4K undergoes a thorough testing prior to shipment. Upon receipt of the unit, check the packing case and its contents for obvious damage. Unpack the equipment carefully to reduce the risk of damage and to avoid misplacing any parts shipped as loose items. See Table 2.1 for a list of the loose items.

2.1.2 Damage By Carrier

With respect to equipment damage for which the carrier is liable, TMC will assist in describing methods of repair as well as furnishing replacement parts.

2.2 Electrical Installation

2.2.1 General

Each unit has been factory tested and arrives ready for immediate installation and operation. No preliminary adjustments are necessary.

2.2.2 Mounting

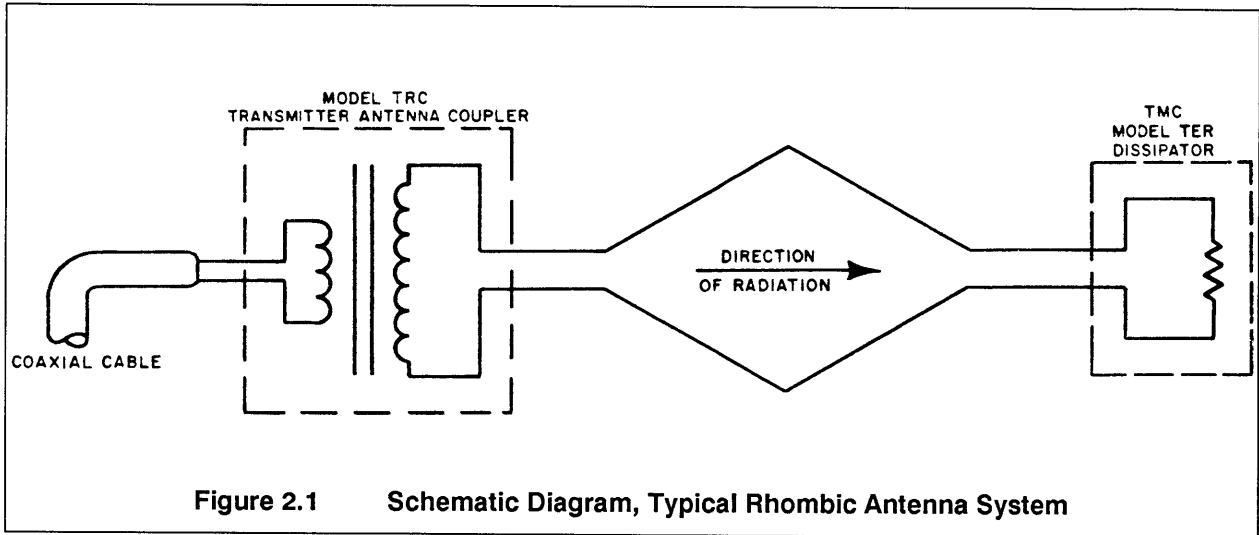
The TER-4K is designed for either pole or wall mounting. Two mounting brackets attached to the unit case are used with two angle face plates which mount to a pole or bulkhead with four lag bolts. Figure 2.2 illustrates the necessary outline and mounting dimensions of the TER-4K. Figure 2.1 is a schematic illustration of a typical rhombic antenna system in conjunction with the TER-4K.

2.2.3 External Balanced Connections

The two input leads are connected to the two insulator bowl terminal connectors of the TER-4K. These bowls are located on the top of the TER case.

2.2.4 External Unbalanced Connections

The coaxial lead-in cable is connected to the TER-4K RF connector assembly located on the top of the case.



2.3 Performance Check

2.3.1 General

When the appropriate RF connections to the antenna or the transmitter output have been made, the TER-4K is ready for use. No further steps are required.

Table 2.1 - Loose Items Supplied

(Refer to Figure 2.2 for a CALL-OUT of parts by item number.)

Item	TMC Part Number	Description	Quantity
1	SC111-3	Lag Bolt	8 each
2	MS7209	Mounting Plate	2 each
3	NTH5020BN10	Hexagonal Nut	2 each
4	FW50HBN	Flat Washer	2 each
5	LWS50LRN	Split Lock Washer	2 each

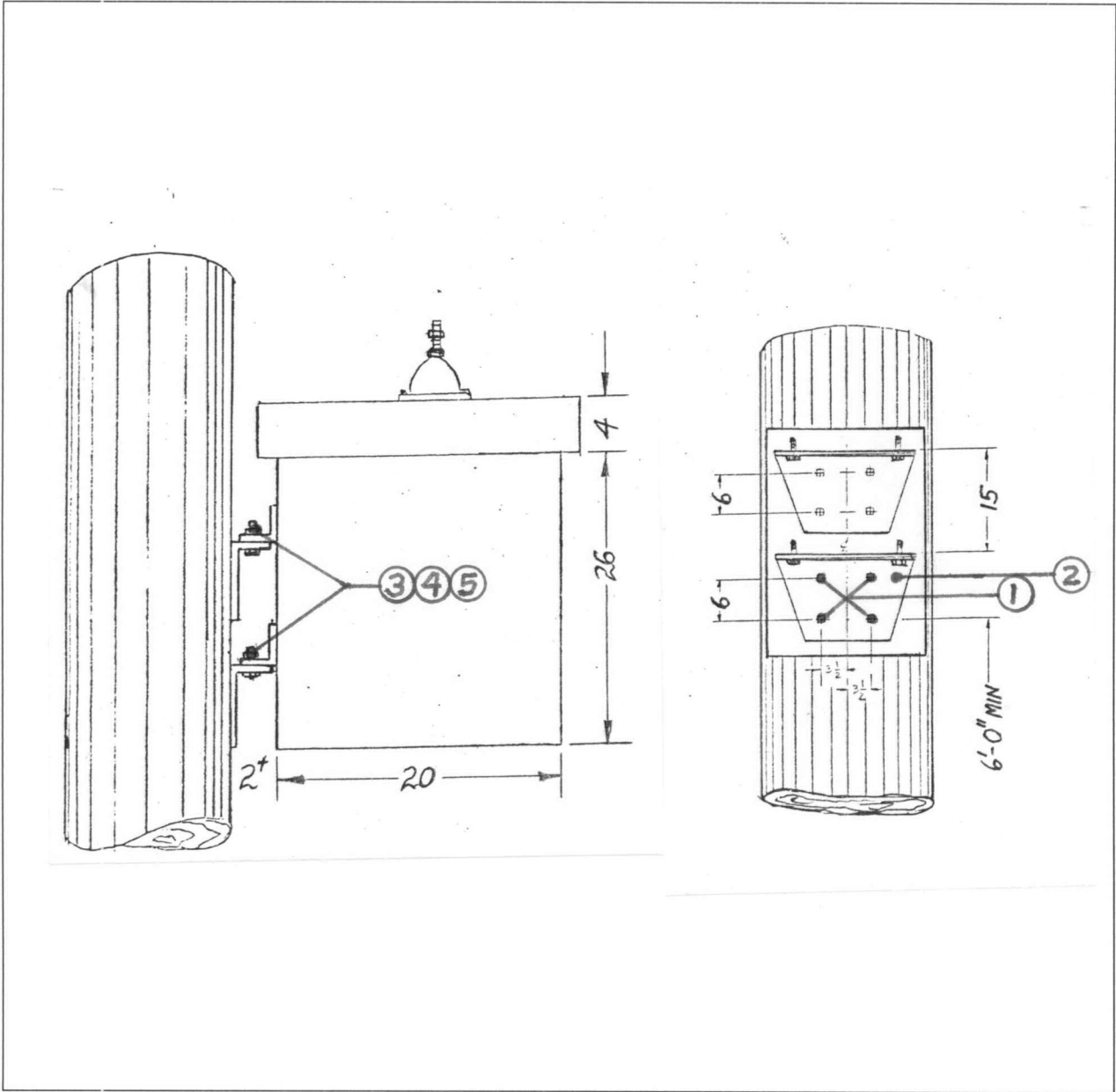


Figure 2.2 Outline Drawing with Mounting Dimensions

Section 3 - Operation

3.1 General

After connecting the balanced leads or coaxial lead-in cable, as described in **Section 2 - Installation**, no further operating procedures are required. The TER-4K is now fully operational without further adjustment.

Section 4 - Maintenance

4.1 General

Due to the simplicity of construction and design of the TER-4K, maintenance may simply consist of looking for secure connections and unit cleanliness.

4.2 Preventive Maintenance

4.2.1 General Cleaning Methods

Preventive maintenance for the TER consists of routine functions such as visual inspection and cleaning. Periodic cleaning is recommended as dust may build up on components, reducing the efficiency of the coupler unit and possibly causing circuit failure. To facilitate cleaning the unit, use a vacuum cleaner or a low-pressure filtered compressed-air supply.

4.2.2 Visual Check

A simple visual check of the unit when it is opened up for servicing or cleaning will often reveal potential trouble spots and thereby reduce downtime due to component failure. Signs of trouble may be found in discoloration, warped printed circuit boards and damaged wiring or cables. Any deteriorating component should be replaced immediately. All hardware should be checked for tightness during preventive maintenance inspections.

4.3 Troubleshooting

4.3.1 General Failure Symptoms

During operation of the TER, the following failure symptom may be observed:

- High VSWR at the transmitter

Possible Cause:	Transmitter failure (Output affected)
Remedial Action:	Refer to transmitter or transceiver manual

Possible Cause:	Interconnection, dummy load to transmitter
Remedial Action:	Check the RF coaxial cable between the transmitter and load.

Possible Cause:	Interconnection, antenna termination
Remedial Action:	Check the twin RF leads between the load and the antenna.

Possible Cause:	Antenna fault
Remedial Action:	Check for a fault in the antenna system. Make certain all of the RF connections are securely fastened.

5.4 Repair

Repair work generally consists of replacing the defective component. The following cautions should be observed:

- Make sure the replacement component is an exact duplicate of the defective one.
- Place any new component in the same location as the component it replaces.

The TER-4K is unique in that only one electrical assembly is used. Other than external components such as the spark gap protection assemblies and the hardware, repair is rarely needed. In the event the internal resistor bank fails - a direct lightning hit would do it - the case may be opened and the entire assembly replaced. Factory repair of the TER-4K is also available.

Section 5 - Parts Lists

Table 5.1 Replacement Spare Parts List

<u>Part Number</u>	<u>Description</u>	<u>Quantity</u>
NS123	Insulator Bowl	2 each
PM723-1NR	Spark Gap Contact, Round	2 each
GA126	Inner Gasket	2 each
GA1511	Shoulder Gasket	2 each
PM724-1NR	Spark Gap Contact, Rod	2 each



Figure 5.1 Cutaway View, Model TER-4K