



INSTRUCTION MANUAL

ELECTRIC FIELD

PROBE ANTENNA

MODEL PEF-10A

20 Hz – 1 MHz

INSTRUCTION MANUAL

THIS INSTRUCTION MANUAL AND ITS ASSOCIATED INFORMATION IS PROPRIETARY. UNAUTHORIZED REPRODUCTION IS FORBIDDEN.

© 1996 ELECTRO-METRICS CORP.

ELECTRIC FIELD PROBE ANTENNA

20 Hz – 1 MHz

ELECTRO-METRICS

MODEL PEF-10A

SERIAL NO: N/A

ELECTRO-METRICS CORPORATION

231 Enterprise Road, Johnstown, New York 12095
Phone: (518) 762-2600 Fax: (518) 762-2812

EMAIL: info@emihq.com

WEB: <http://www.electro-metrics.com>

MANUAL REV. NO: PEF10A-1196

ISSUE DATE: NOVEMBER 01 1996

WARRANTY

This Model PEF-10A Electric Field Probe Antenna is warranted for a period of 12 months (USA only) from date of shipment against defective materials and workmanship. This warranty is limited to the repair of or replacement of defective parts and is void if unauthorized repair or modification is attempted. Repairs for damage due to misuse or abnormal operating conditions will be performed at the factory and will be billed at our commercial hourly rates. Our estimate will be provided before the work is started.

DESCRIPTION AND USE ELECTRO-METRICS PEF-10A ELECTRIC FIELD PROBE ANTENNA

1.0 Introduction

The PEF-10A Electric Field Probe Antenna performs electric field strength measurements from 20 Hz to 1 MHz. Since the PEF-10A is designed specifically for use with the Electro-Metrics Model EMC-11 Interference Analyzer, a PCS-51 Power Control Substitution Unit or a JB-51-11 PEF-10A Interconnection Unit is required for use with the NTR-51C or other 50-ohm instruments.

The probe is a half-meter capacitive dipole connected to a high impedance differential amplifier. The low impedance output of the amplifier is applied to the EMC-11 via a 7.6 m (25 foot) multi-conductor cable. The EMC-11 supplies the power, grounding, and calibration signal inputs to the PEF-10A. Whenever the EMC-11 is not used, the PCS-11 or JB-51-11 performs this function.

Included with the PEF-10A are a TMT-11 Tripod Mount for mounting the antenna plus two calibration cables for antenna calibration with the EMC-11, NTR-51C, or similar 50-ohm instruments.

The PEF-10A is suited for use in TEMPEST testing to comply with NACSIM 5100A. It can also be used for tests in accordance with MIL-E-8884, NSA 65-6, and other standards. In addition, the PEF-10A can be calibrated for use at 1 MHz with the NTR-51C or any other 50-ohm instrument that can be tuned to 1 MHz. Normal measurement range with the EMC-11 is 20 Hz to 50 kHz.

2.0 Specifications

2.1 Electrical

Frequency Range (calibrated):	20 Hz-1 MHz.
Impedance:	Calibrated in a 50 Ω system.
Antenna Factor:	23 dB(m ⁻¹), constant up to 200 kHz. (Refer to Figure 1.)
Output:	Multi-conductor cable with 11-pin male connector.
	Cable also provides the power, grounding, and calibration signal inputs to the PEF-10A from the PCS-51 (Power Control Substitution Unit)

or JB-51-11 PEF-10A Interconnection Unit (required for use with the NTR-51C).

Power: +12 VDC to +15 VDC @ 12 mA nominal.

2.2 Mechanical

Length, Antenna Assembly: 89.4 cm (35.2").

Width, Dipole (Tip-Tip): 91.4 cm (36").

Multi-conductor Cable Length: 7.6 m (25 feet).

Weight: 2.7 kg (6 lbs).

3.0 Electric Field Strength Measurement

Electric field strength measurements may be made from 20 Hz to 1 MHz when using the PEF-10A Electric Field Probe Antenna with the NTR-51C or any other 50-ohm instrument which can be tuned from 20 Hz to 1 MHz. Normal measurement range with EMC-11 is 20 Hz to 50 kHz.

Section 3.1 describes how to make electric field measurements using the PEF-10A, while Section 3.2 describes the procedure used to calibrate the antenna. The antenna should be calibrated before initial use and once a week thereafter, or as required in a MIL-STD-45662 calibration program.

3.1 PEF-10A Operational Use

Two-terminal voltage measurements with the EMC-11, NTR-51C or other 50-ohm instrument are made using bandwidths, detector/demodulation, and data display as required by the standard governing the measurement.

3.1.1 Interconnections

a. If the EMC-11 is used:

1) Connect the PEF-10A to the 11-pin probe connector (J1) on the EMC-11 front panel.

b. If the JB-51-11 is used:

1) Connect the PEF-10A to the 11-pin probe connector (J1) on the junction box.

2) Connect the instrument to the the BNC connector (J2).

3) Using an external DC power supply, apply +12 VDC to +15 VDC to the power connector (J4). If plug P4 is supplied:

Connect +12 VDC to Red wire (P4-9), -12 VDC to White wire (P4-10), ground to Black wire (P4-8).

- c. If the PCS-51 is used: Refer to the interconnection instructions in the instruction manual for the PCS-51.

CAUTION

THE PEF-10A IS NOT INTENDED FOR MAKING MEASUREMENTS IN ULTRA-HIGH STRENGTH ELECTRIC FIELDS. DO NOT SUBJECT IT TO ELECTRIC FIELD STRENGTHS HAVING PEAK VALUES GREATER THAN 67 V/m (156 dB(μ V)/m).

NOTE: The PEF-10A will measure correctly electric field strengths having PEAK values of 18 V/m (145 dB(μ V)/m) or less. At these levels, the antenna will draw between 50 mA and 60 mA from its external DC power supply.

3.1.2 Data Reduction

Add the antenna factor (dB/m) from Figure 1 (Upper curve, right-hand scale) to the measured two-terminal voltage (meter reading or substitution signal level) in dB(μ V) or dB(μ V/kHz) to obtain the electric field strength in dB(μ V/m) or dB(μ V/m/kHz), respectively.

3.2 PEF-10A Calibration Procedures

This procedure covers the calibration of the PEF-10A with a 50-ohm instrument having an output indication calibrated in dB. If the NTR-51C is used, an RF voltmeter to indicate the output level will ease performance of the procedure.

NOTE: Refer to the EMC-11 Instruction Manual, Appendix D, for calibration of the PEF-10A with the EMC-11.

This procedure assumes the use of the JB-51-11 for interconnections between the PEF-10A, 50-ohm instrument, and calibration signal source. If a PCS-51 is used, refer to the interconnection instructions in its instruction manual. In either case follow the procedure outlined below.

a. Connect the PEF-10A to the 11-pin **Probe Connector** (J1) on the JB-51-11. Connect the 50-ohm instrument to the **Receiver BNC Connector** (J2) and connect the calibrating Signal Generator to the **CAL BNC Connector** (J3).

b. Set the 50-instrument controls as follows:

IMPEDANCE:	50 ohms
BANDWIDTH:	100 Hz to 500 Hz (Use a convenient bandwidth)
FREQUENCY:	10 kHz
ATTENUATION	Use a setting to produce a +50 dB(μ V) full scale indication.

OTHER CONTROLS should be set as required to complement or not interfere with the cw signal measurements.

c. Turn on the 50-ohm instrument and allow a minimum warm-up period of 30 minutes before proceeding to Step d.

d. Unscrew the dipole elements from the probe assembly. Connect the calibration cables provided between the dipole element sockets (J2, J4) and the calibration banana jacks (J1, J5).

e. Set the Signal Generator to a frequency of 10 kHz at an output level of +60 dB(μ V). Adjust the ATTENUATION Setting of the 50-ohm instrument to obtain the highest on-scale (no overload indication present) meter indication.

f. Adjust the PEF-10A BALANCE Control until a null is obtained on the meter. Readjust the ATTENUATION Setting, if necessary, to verify that a null has been reached.

g. Disconnect one calibration cable from the calibration jack and connect it to the ground jack.

h. Reset the ATTENUATION to permit a +60 dB(μ V) full scale indication. Adjust the PEF-10A GAIN Control for a reading on the meter of 58 dB(μ V).

i. Repeat Steps d thru h until no further adjustments are necessary. The depth of the null should be at least 40 dB.

j. Disconnect the calibration cables and screw on the dipole elements. The PEF-10A is now calibrated with the 50-ohm instrument being used.