signal and note the amplitude.

c. Tune the receiver downward in frequency and note the frequency at which the response falls off by 3 dB.

d. Starting at the peak amplitude frequency, (step 6) tune the receiver upward in frequency, and note the frequency at which the response again falls off by 3dB.

e. Subtract the lower frequency (step c) from the upper frequency (step d). The signal is classified broadband if this frequency difference is greater than the frequency differences listed below:

Bands 1-7 (14 kHz to 2.4 MHz) greater than 20 kHz

Bands 8-10 (2.4 MHz to 30 MHz) greater than 200 kHz

Bands 11-15 (20 MHz to 1000 MHz) greater than 2 MHz

f. If the frequency difference is less than listed above, the response is narrowband in character.

## 3.9 ACCESSORIES

**3.9.1** GENERAL. A wide range of programming, pickup, and convenience accessories are available for the EMC-25. Programming accessories are those which utilize the inherent capability of the EMC-25 for remote control to provide an automated capability. Pick-up devices extend the EMC-25 capability from a two-terminal tunable voltmeter to a field and current measuring device. Convenience accessories extend the utility of the instrument by providing audible outputs, convenient junction points and remote meter indication, etc.

9.2 PROGRAMMING ACCESSORIES. The model ESC-125A Programmer utilizes the sweep, bandswitching, and X and Y output capability of the EMC-25 to provide completely automatic amplitude vs. frequency X-Y plotting of the spectrum from 10 kHz to 1 GHz. The rapid sweep capability of the EMC-25 is utilized by the SPD-125 Spectrum Display Module. The CRT of this accessory can display an entire EMC-25 octave band at one time, a band sector, or provide an amplitude vs. time display of modulation on a selected carrier.

### 3.9.3 CONVENIENCE ACCESSORIES RIM-25 REMOTE METER

This accessory item allows amplitude readings to be made at a location up to 25 feet from the EMC-25 receiver. It consists of an output meter in a small metal enclosure and a permanently attached 25 foot cable. In operation, the connector at the end of the cable is connected to the plotter connector at the rear of the EMC-25. This connects the remote meter in parallel with the front panel meter of the EMC-25. Because of the small loading effect, the EMC-25 should be amplitude calibrated following connection of the Remote Meter.

## 3.10 ANTENNAS AND PICKUP DEVICES

### 3.10.1 GENERAL

For the measurement of an electromagnetic field, various antennas are used with the EMC-25 Interference Analyzer. Each of the calibrated pickup devices requires a correction factor to be added to the indicated EMC-25 input level to determine the true field strength. Since the antenna factor normally varies with frequency, this correction factor is termed an "antenna factor" in the case of antennas and is presented in the form of a graph. Typical graphs for the various antennas/pickup devices are shown as Fig. 3.5 through 3.9. Actual correction factors accompany the respective pickup devices.

### 3.10.2 RVR-25 ANTENNA

This rod antenna measures the electric field component of an electromagnetic signal over the frequency range of 10 kHz to 30 MHz. To operate first connect the counterpoise (ground plane) GPA-25 to the top of the antenna base by means of four captive thumb-screws. Next, screw the telescopic rod into the socket in the center of the circular insulator of the base and extend it fully (41"). The antennas may be bench-mounted or mounted on the TRP-25 tripod. For screen room applications, where practical, the ground plan should be bonded to the screen room wall. Control cable, ACC-25, is connected between the multi-pen connector on the antenna base, and the rear-panel antenna control connector of the EMC-25, to band switch the antenna automatically according to the EMC-25 band setting. Next, connect RF cable, CAC-25, from the RF input connector on the antenna base to the RF input on the front panel of the EMC-25. The signal injection connector on the antenna base is not used. Since most signals in the frequency range of this antenna are vertically polarized, and since the antenna is omni-directional in the horizontal plane, it does not normally need to be oriented for best reception. Once the desired signal is tuned in on the EMC-25, and the input level to the EMC-25 determined, the antenna factor for the frequency used is determined by referring to the antenna factor graph for the actual RVR-25 being used. This factor is added to the measured input level. This results in the electric field measurement in terms of dBuv/m. (dB above one microvolt per meter).

### 3.10.3 ALR-25 ANTENNA

This loop antenna measures the magnetic field component of the electromagnetic field over the frequency range of 10 kHz to 30 MHz. However, its antenna factor converts into terms of the equivalent electric field. It is connected to the EMC-25 by means of a control cable (ACC-25) connected from the multi-pen connector on the antenna base to the rear panel EMC-25 antenna control connector and an RF cable CAC-25 connected from the RF output of the antenna base to the front panel RF input to the EMC-25. The ALR-25 may be either bench-mounted or mounted on the TRP-25 tripod. It is bi-directional in the plane of the loop, and must be oriented for best sensitivity. In use, the signal of interest is tuned in and the antenna is rotated for highest level. The input level to the EMC-25 is determined and the antenna factor obtained from the graph furnished with the ALR-25 being used. The resulting answer is the equivalent electric field expressed in dB uv/m (dB above one microvolt per meter). To determine the actual magnetic field, expressed in terms of dBuat (dB above one microamper turn) an additional correction factor of 51.5dB is subtracted.

### 3.10.4 BIA-25 BICONICAL DIPOLE ANTENNA (20 MHz – 200 MHz)

This broadband dipole antenna is normally stored disassembled. It consists of two "Egg-beater"-shaped dipole elements which are screwed into one end of the "Dumbbell-shaped" boom. An adjustable clamp on the boom is used for tripod mounting (TRP-25), using the AMT-25 antenna mount adapter and one or two of the MSA-25 mast sections. The antenna is connected to the EMC-25 RF input by means of the CAC-25 cable. The antenna is both bi-directional and polarized, so that it must be rotated and turned on its axis for maximum signal indication. The antenna factor for the frequency of measurements, taken from the chart furnished with the BIA-25, is added to the measured EMC-25 input to determine the incident field strength expressed in terms of dBuv/m. (dB above one microvolt per meter)

### 3.10.5 LCA-25 LOG CONICAL SPIRAL ANTENNA (200 – 1000 MHz)

This antenna is connected to the EMC-25 by means of the CAC-25 RF cable. It is mounted to the TRP-25 tripod using the AMT-25 antenna mount adapter and one or two MSA-25 mast sections. It is uni-directional and most sensitive when the apex of the cone is pointed toward the radiating source. It is circularly polarized so that it is not necessary to rotate the antenna on its axis, regardless of the direction of polarization of the received signal. Typical near field (1 meter spacing) antenna factors are given in Fig. 3.8. When the appropriate antenna factor, from data furnished with the respective LCA-25, is added to the EMC-25 input level the result is the field strength in terms of dBuv/m.

### 3.10.6 PCL-25 CURRENT PROBE (10 kHz to 110 MHz)

This hinged magnetic pickup device is made to enclose a single conductor, to measure the RF current traveling on it. In use, the donut-shaped probe is opened by loosening the thumb screw and swinging it open on its hinge. A single conductor is positioned in the center hole and the probe is closed and secured by the thumb screw. The probe is connected to the EMC-25 front panel RF input connector using the CAC-25 RF cable. The EMC-25 is tuned to the frequency of interest and an amplitude measurement made. The probe correction factor, obtained from the curve furnished with the probe, is added to this EMC-25 input level. The result is in terms of dB $\mu$a (dB above one microampere). If more than one conductor is positioned through the probe an error will result as the probe will measure the vector sum of the currents.

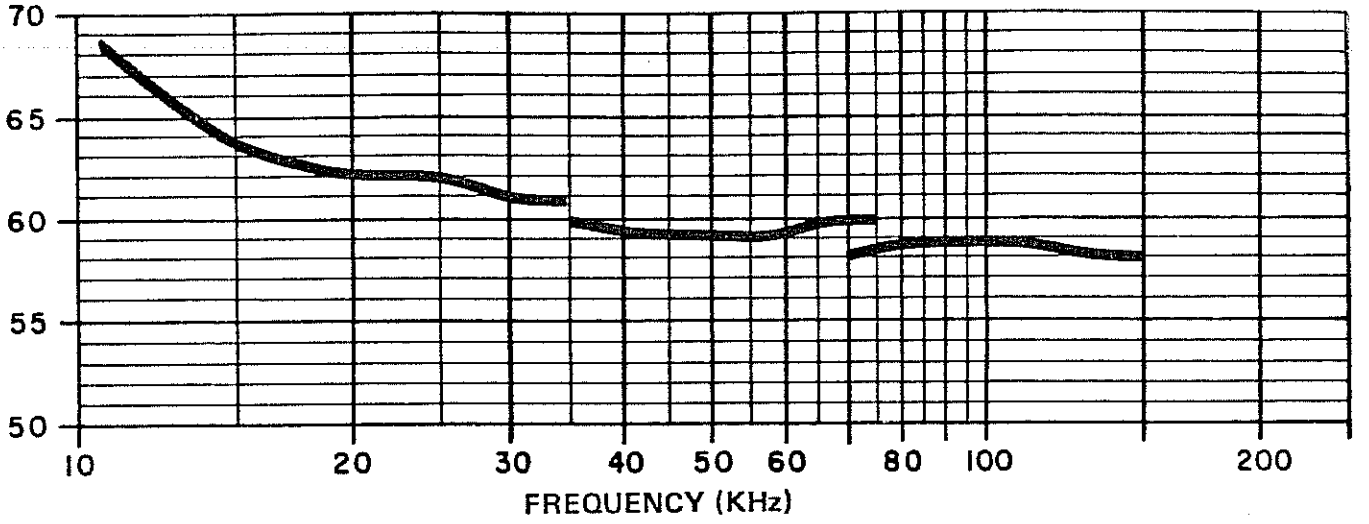
### 3.10.7 MFA-25 and MFB-25 AND MFC-25 MAGNETIC FIELD PROBES

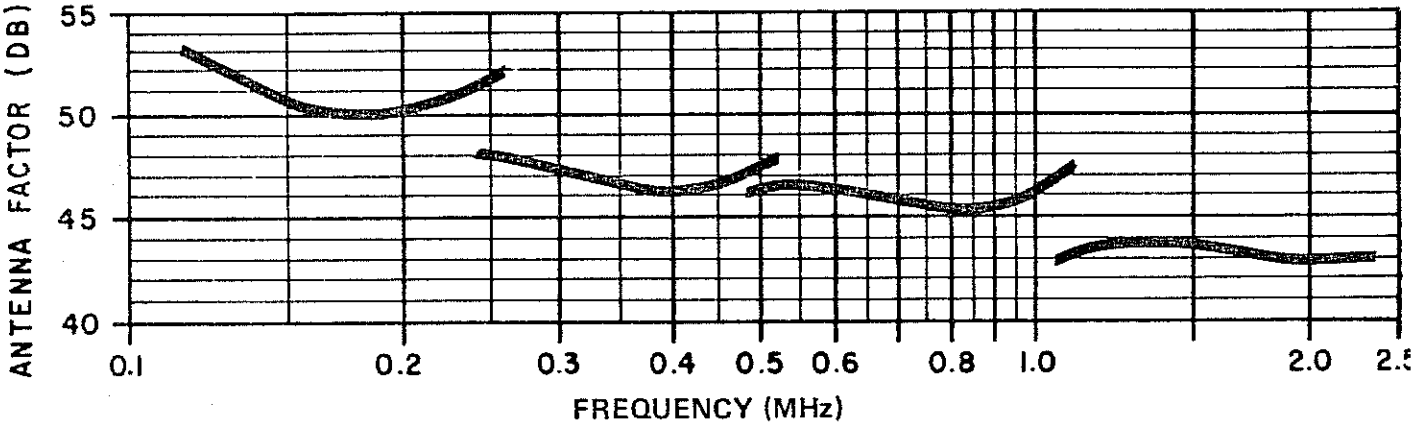
These small hand-held loops, color-coded by frequency range, are uncalibrated and are intended for use in locating the source of localized magnetic radiation. The red probe (MFA-25 is for use over the 10 kHz to 520 kHz frequency range. The white probe (MFB-25) is used from 0.48 MHz to 25 MHz. The blue probe (MFC-25) is used from 22 MHz to 230 MHz. These magnetic probes are not used above 230 MHz.

### 3.10.8 EFP-25 ELECTRO-STATIC FIELD PROBE (10 kHz – 1000 MHz)

This is a hand-held uncalibrated probe used to investigate the source of localized electric field radiation. It is useful over the entire 10 kHz to 1000 MHz frequency range of the EMC-25 Interference Analyzer.

ANTENNA FACTOR CHART
ALR-25
(TYPICAL)



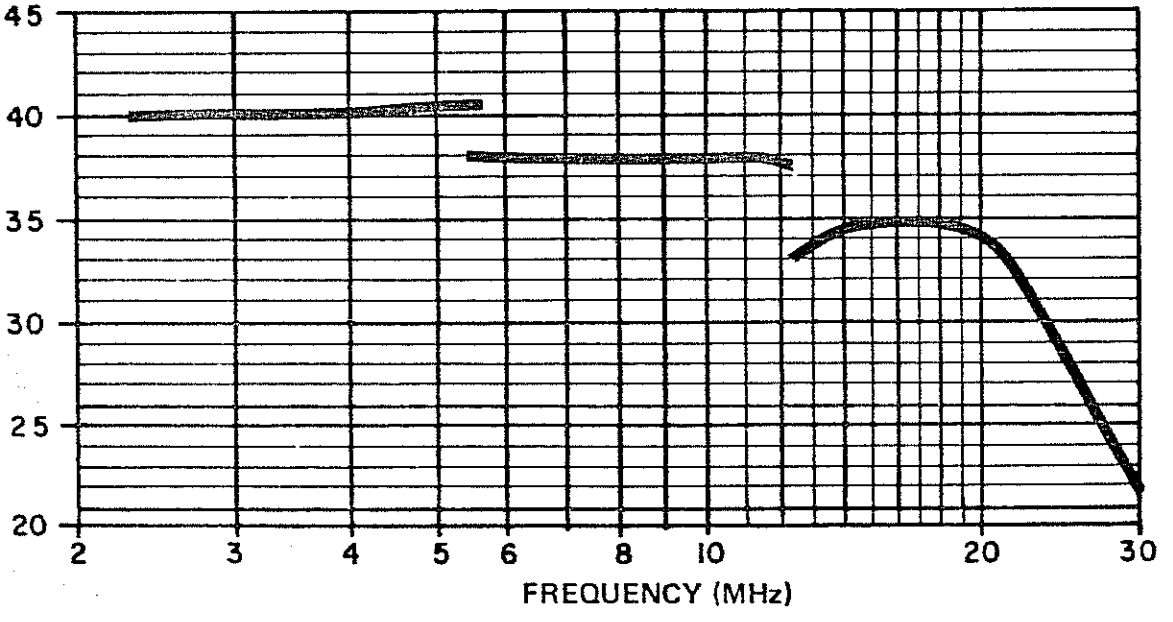
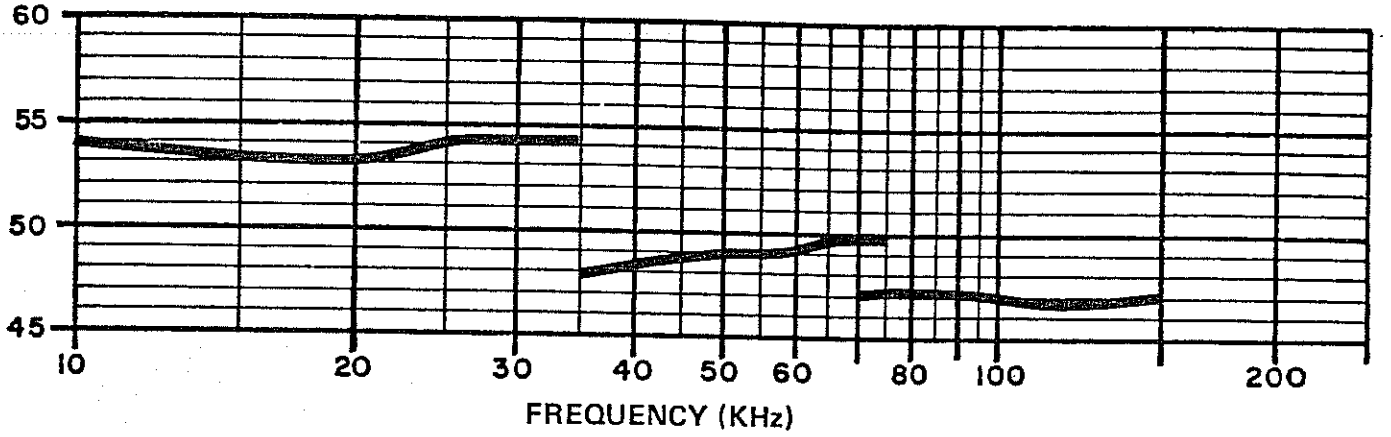
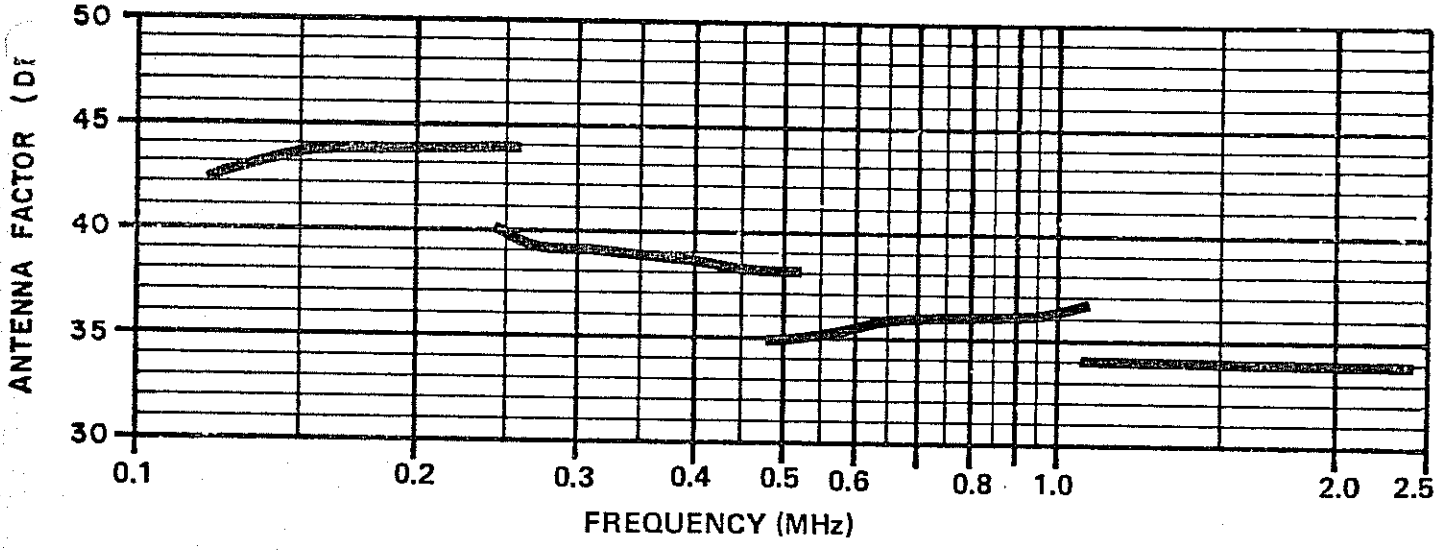




Fig. 3.6

ANTENNA FACTOR CHART
RVR-25
(TYPICAL)



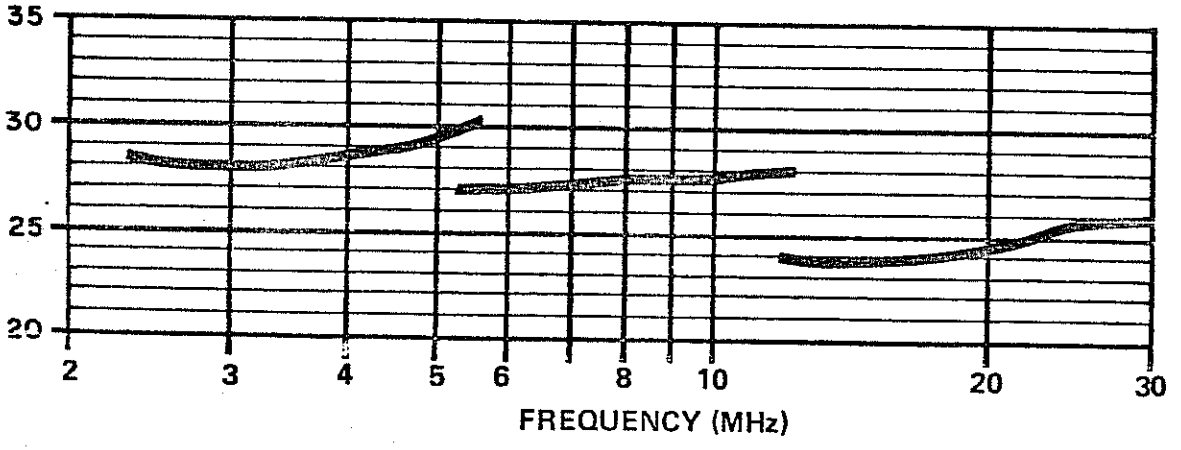




Fig. 3.5

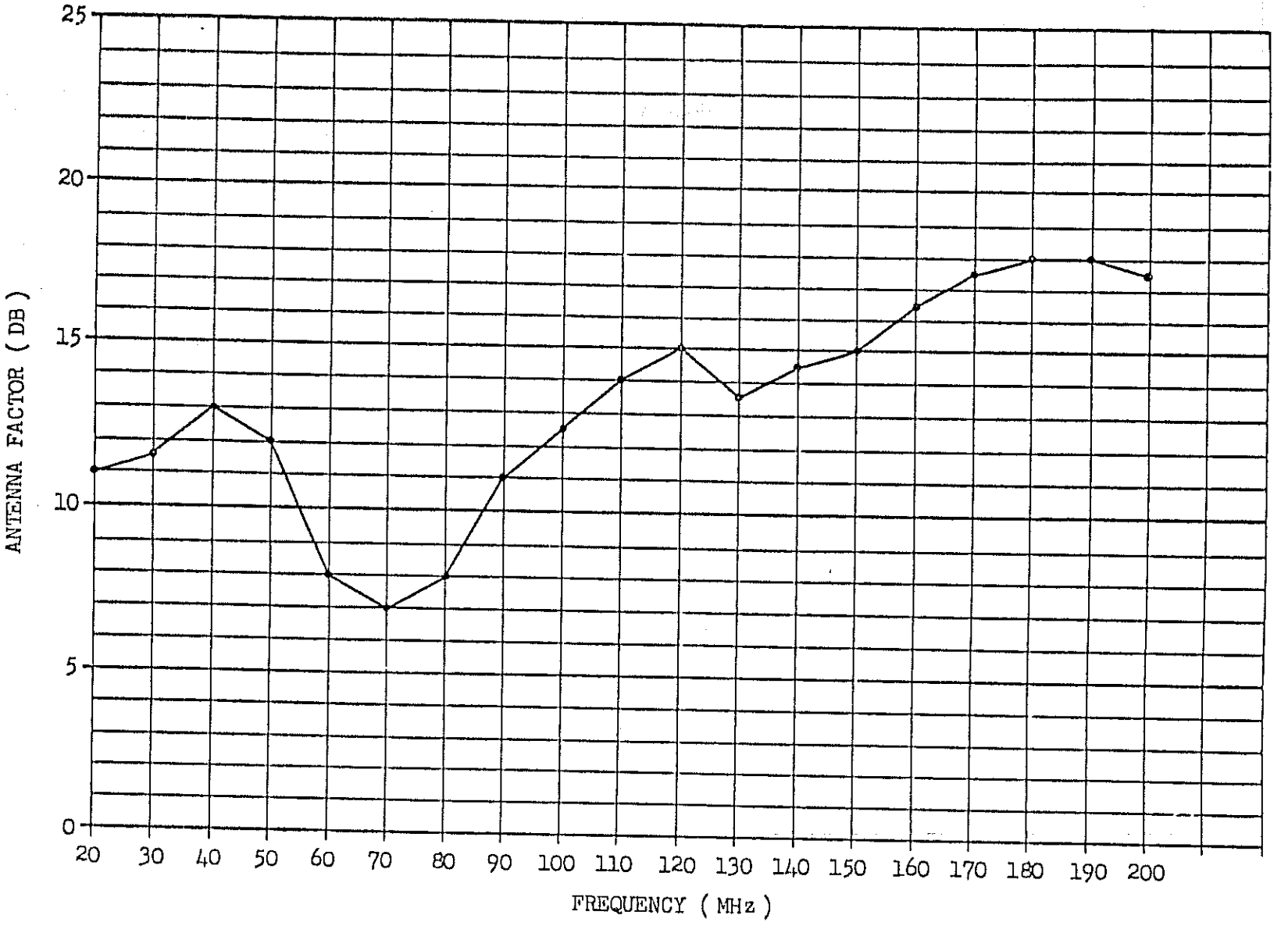



Fig. 3.7

Typical Antenna Factor vs Frequency for the Model BIA-25 Biconical Antenna

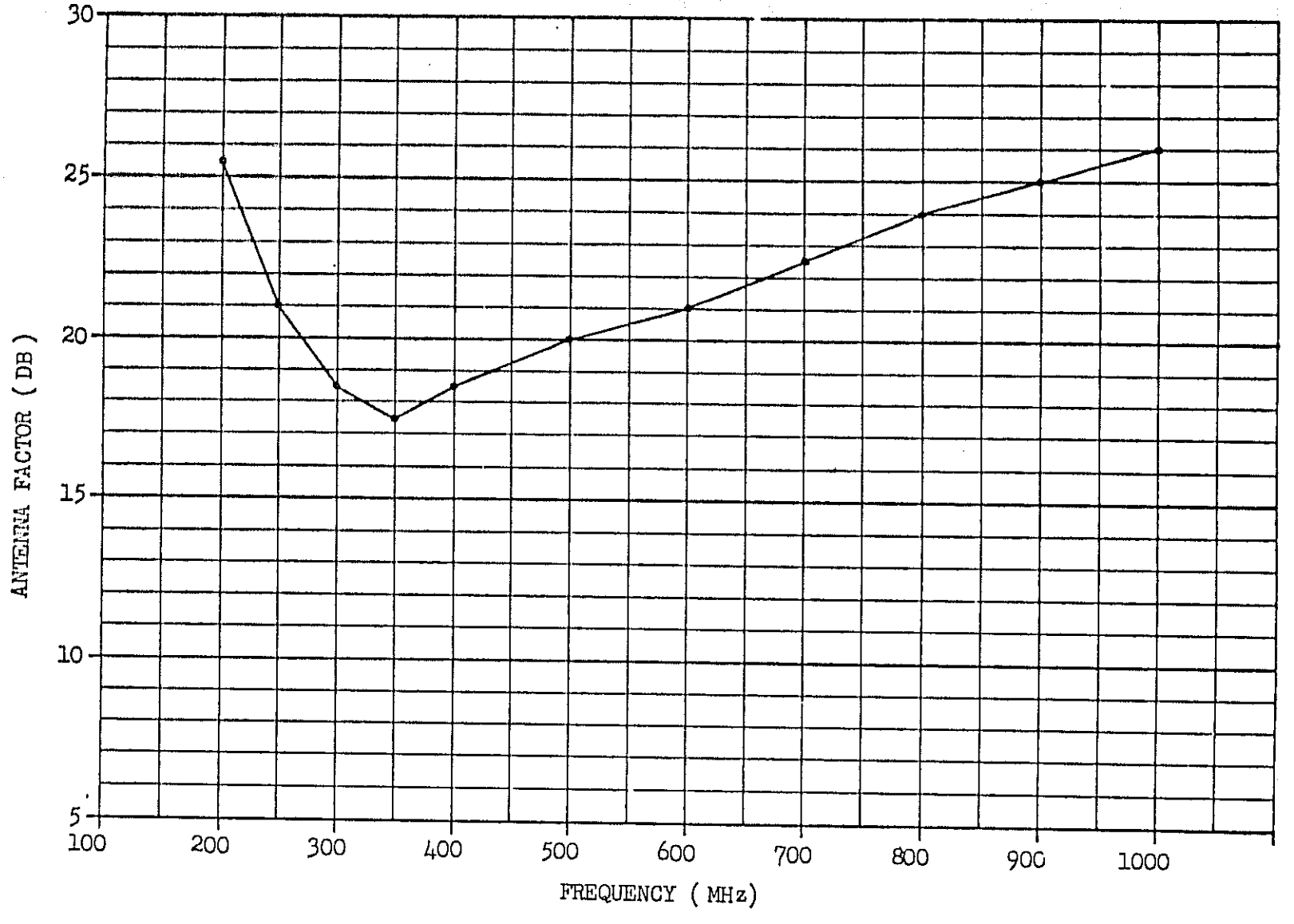
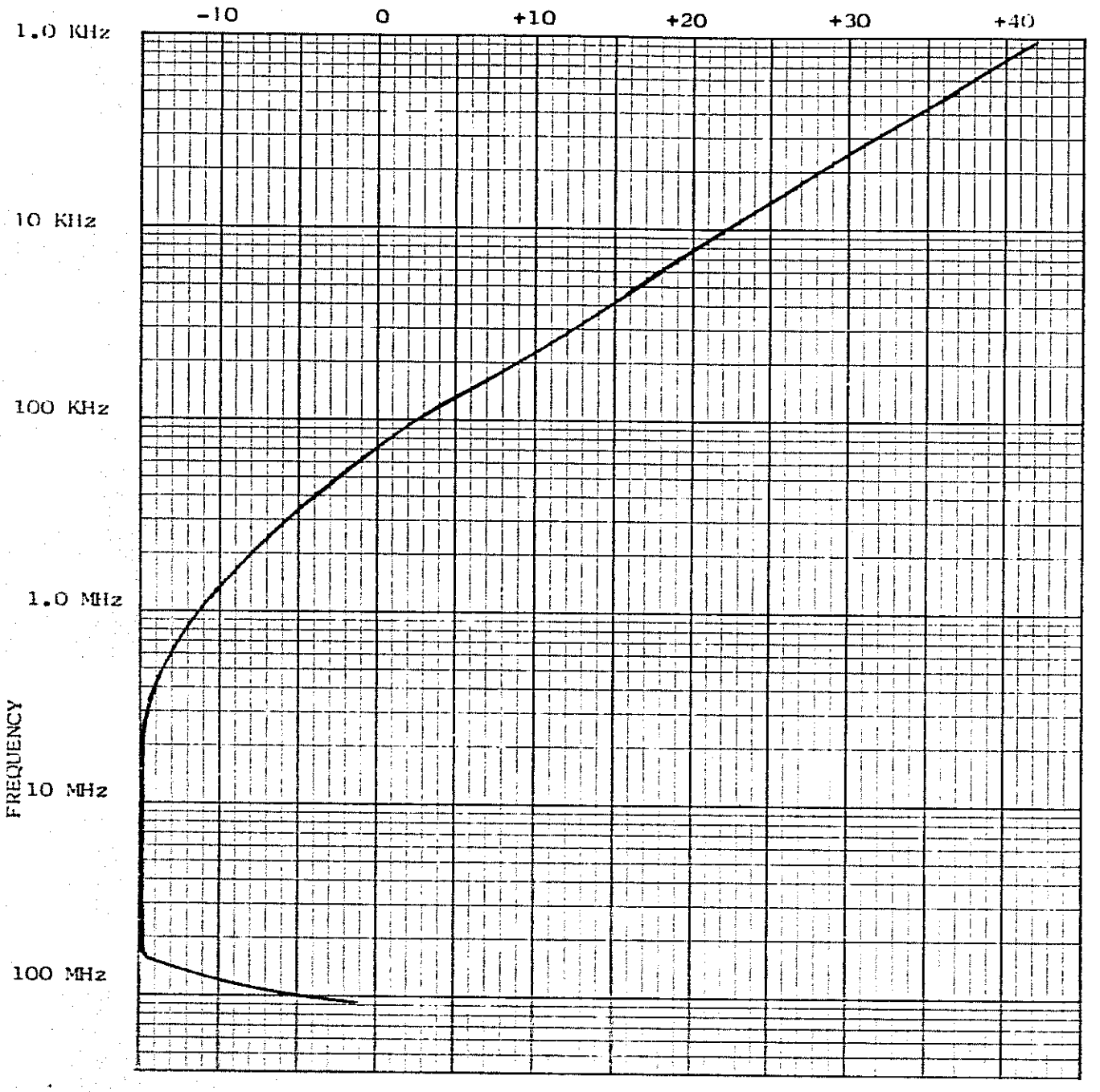



Fig. 3.8

Typical Specification Compliance Testing Antenna Factor, 1 Meter Spacing, Circular Polarization
Model LCA-25 Log-Conical Antenna

## TYPICAL CORRECTION FACTOR in DB




INSTRUCTIONS

ADD FACTOR (DB) SHOWN ABOVE TO CONVERT 2 TERMINAL EMC-25 READING TO CONDUCTED CURRENT.

PCL-25 CURRENT PROBE

Fig. 3.9