REPORT OF TESTING AND ENGINEERING SERVICES
April 2-16, 1979

By:
K. R. Sandstrom

SwRI Project 14-5456-007

Submitted to:

Radio Shack
1100 One Tandy Center
Fort Worth, Texas 76102

SOUTHWEST RESEARCH INSTITUTE
SAN ANTONIO HOUSTON

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Product Tested: TRS-80 System

I. SUMMARY OF TESTS

The Radio Shack TRS-80 System tested included the following components:

a. TRS-80 16K CPU (Board Revision G) (26-1006) Keyboard

b. TRS-80 Video Display (26-1201)

c. CRT-80 Cassette Recorder

d. TRS-80 32K Expansion Interface (26-1142)

e. TRS-80 Level II Basic Kit (26-1120)

f. TRS-80 Mini-Disk Drive (26-1160)

The system was installed as shown in Figure 1.

Conducted power line emissions were measured over the frequency range 450 kHz to 30 MHz using the procedure specified in CBEMA/ESC5/77/29, Paragraph 10.6.7.2.

Radiated emissions were measured over the frequency range 30 MHz to 1 GHz using the procedure specified in CBEMA/ESC5/77/29, Paragraph 10.6.7.2. The measurement distance was 3m. The limit was adjusted for this distance using ESC5, Figure 10-4.

In addition, broadband radiated emissions were measured using a peak detector inside a shielded enclosure over the frequency range 30 MHz to 1 GHz. Broadband power line conducted emissions were measured using a peak detector and a conduction probe over the frequency range 30 MHz to 1 GHz. The purpose of these measurements was to assist in identifying the source and escape route of the emissions which were detected during the CBEMA/ESC5/77/29 testing.

The TRS-80 System was exercised to produce a maximum emission level during the tests. Table 1 lists the test point and exerciser for each test.

TABLE 1

TRS-80 System Tests

Test Point	Exerciser
CPU/Keyboard Power Lines	Keyboard to Display
Display Power Lines	Keyboard to Display
Cassette Power Lines	Write to Tape
Expansion Interface Power Lines	"BACKUP" Program
Mini-Disk Drive Power Lines	"BACKUP" Program
Radiated	"BACKUP" Program
Expansion Interface Power Lines	"COUNTDOWN" Memory Exerciser Program

II. SUMMARY OF RESULTS

A. Broadband Conducted Emissions

The CBEMA/ESC5/77/29 Broadband Limit-Peak Detector (CBEMA/ESC-5, Figure 8-1.c) is +123 dBμV/MHz for the frequency range .45 to 1.6 MHz and +133 dBμV/MHz for the range 1.6-30 MHz. No broadband conducted emissions exceeded this limit. The margin between emission level and limit was at least 20 dB. Appendix A contains the broadband-peak conducted emission data.

B. Narrowband Conducted Emissions

The CBEMA/ESC5/77/29 Narrowband Limit-Average Detector (CBEMA/ESC5 Figure 8-1.a) is 60 dBμV for the frequency range .45 to 1.6 MHz and 70 for the range 1.6 to 30 MHz.

No narrowband conducted emissions exceeded the CBEMA/ESC5 limit, however, numerous conducted emissions were detected within 20 dB of the limit. The highest level emissions were concentrated in the frequency range 3 to 30 MHz. The emissions appeared strongest on the CPU/keyboard and expansion interface power lines. The power supplies for these two devices are mounted adjacent to each other in the expansion interface cabinet. The highest level emission detected was +68 dBμV at 10.7 MHz on the CPU/keyboard power line.

C. Broadband Radiated Emissions

The CBEMA/ESC5/77/29 Broadband Limit-Peak Detector adjusted for a 3m measurement distance is +65 dBμV/MHz/m from 30 to 88 MHz, +70 dBμV/MHz/m from 88 to 216 MHz and +75 dBμV/MHz/m from 216 to 1000 MHz. No radiated emissions were detected which exceeded this limit. Numerous emissions in the 30 to 88 MHz range were within 20 dB of the limit. The minimum margin between limit and signal level occurred at 68 MHz where the emission was +55 dBμV/MHz/m and the limit +65 dBμV/MHz/m. Appendix C contains the broadband-peak radiate emission data.

D. Narrowband Radiated Emissions

The CBEMA/ESC5/77/29 Narrowband Limit-Average Detector adjusted for a 3m measurement distance is +50 dBμV from 30 to 88 MHz, +55 dBμV from 88 to 216 MHz and +60 dBμV from 216 to 1000 MHz.

A narrowband radiated emission exceeded the CBEMA limit 42.5 MHz. The level of this emission was +62 dBμV, 12 dB above the limit. Numerous emissions between 30 and 200 MHz were within 20 dB of the CBEMA/ESC5 limit.

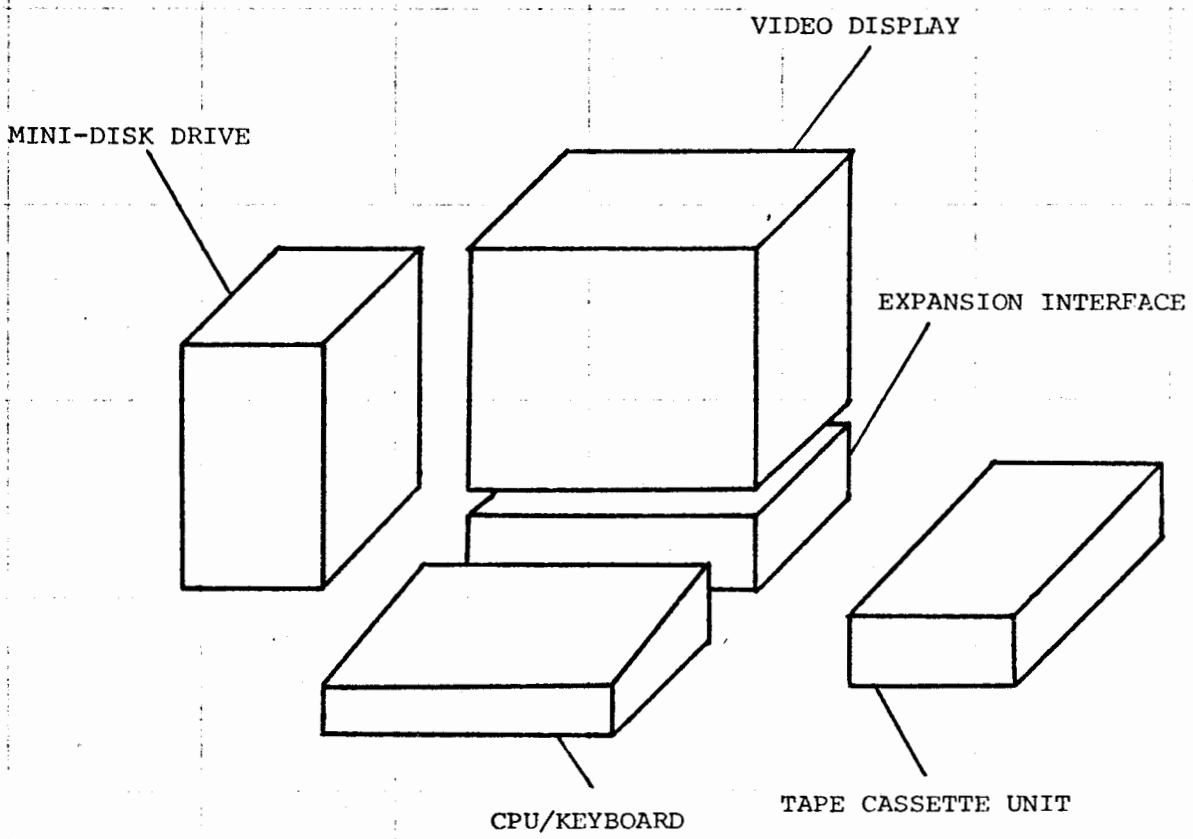


FIGURE 1. TRS-80 SYSTEM-PHYSICAL CONFIGURATION

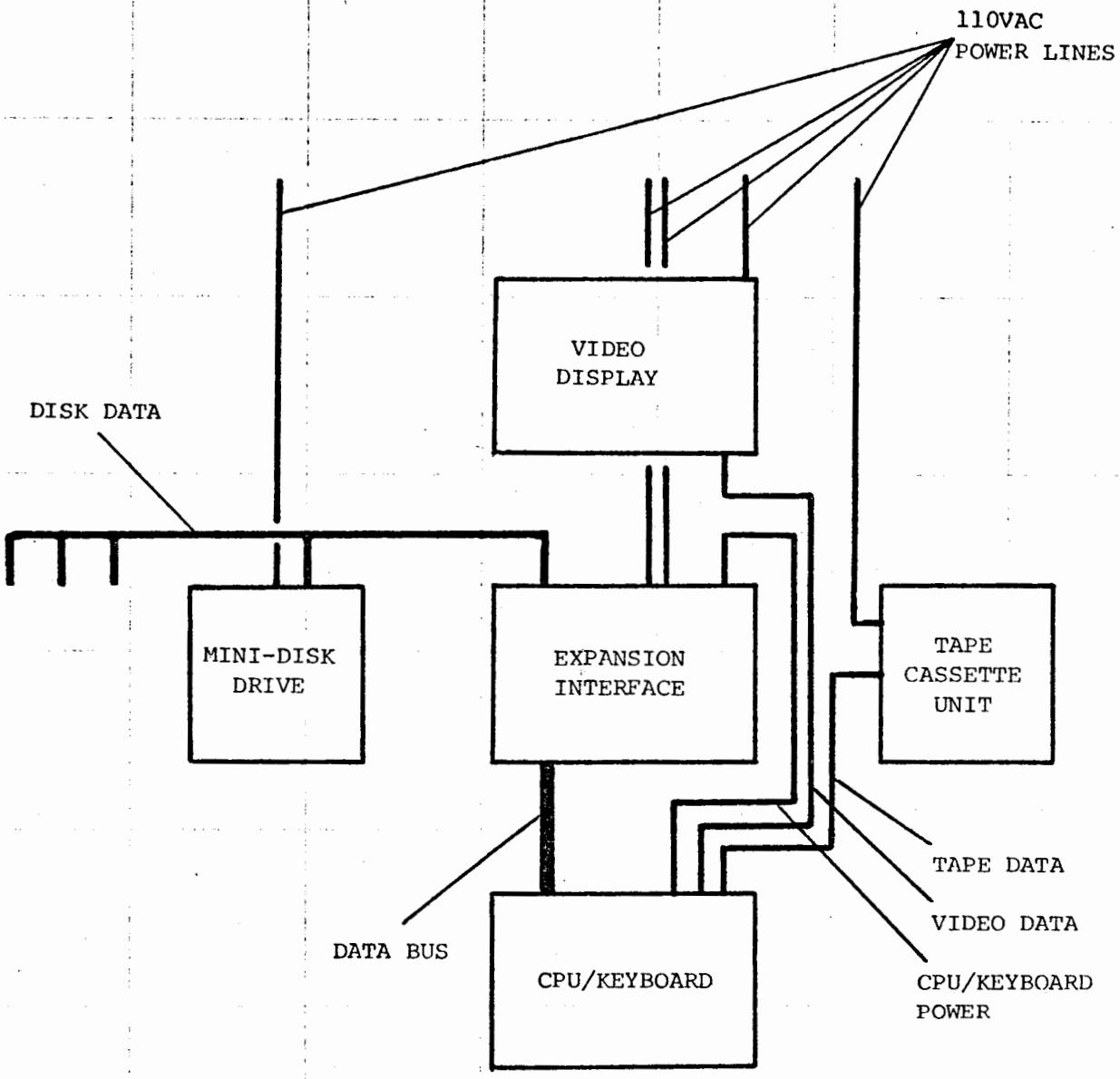


FIGURE 2. TRS-80 SYSTEM-BLOCK DIAGRAM

III. INVESTIGATION OF EMISSION SOURCES

The majority of the emissions detected were traced to the CPU/keyboard. This does not necessarily mean that the rest of the TRS-80 System does not have undesirable electromagnetic emissions, only that emissions from the other components in the system are sufficiently lower to be masked by the emissions from the CPU/keyboard.

The broadband conducted and radiated emissions were all at least 10 dB below the CBEMA/ESC5/77/29 limit and should not be a problem. No further action is warranted for these broadband emissions at this time.

The narrowband conducted emissions also were below the CBEMA/ESC5 limit, however, the margin was very low for some emissions. The highest level narrowband conducted emissions occurred at multiples or submultiples of the 10.6445 MHz clock frequency. Frequencies where particularly strong narrowband emissions were present included 3.5 MHz (clock x 1/3), 5.3 MHz (clock x 1/2), 7.2 MHz (clock x 2/3), and 21 MHz (clock x 2). The DC power bus was checked for clock signals. Clock and its harmonics were found throughout the CPU power bus including on the power cord going from the CPU/keyboard to the power transformer installed in the expansion interface. The primary problem appeared to be inadequate RF bypassing of the CPU power busses. At one point, a probe was attached to the hot side of a bypass capacitor, C40. Numerous signals were detected at this point including the 4th harmonic of the clock at 42.5 MHz. This is a good indication that the bypass capacitor is ineffective, particularly for the higher frequencies.

The narrowband emissions detected had modulation present. Generally the modulation was periodic but at frequencies which were not present in the clock divider chains. The 42.5 MHz emission had modulation at 120 Hz and 2.27 kHz. Another frequency found as modulation on clock frequency harmonics was 28 kHz (period of 35.7 µsec). This frequency appeared to be generated in the microprocessor IC, Z-40, and was designated $\overline{WR}$. This frequency was synchronous with the 2.27 kHz frequency.

The narrowband emission detected at 106 MHz, the 10th harmonic of the clock frequency, had modulation which consisted of the video sync pulses and the video information. Its source was the CPU/keyboard. Turning the video display off did not alter the display. The level of this emission was approximately 15 dB below the CBEMA/ESC5 limit, however, it was one of the strongest emissions in this band.

IV. RECOMMENDATIONS

The only emission detected above the CBEMA/ESC5 limit was the 4th harmonic of the 10.6445 MHz clock frequency at 42.5 MHz. This signal was present throughout the DC power bus system of the TRS-80 and was also present on the AC power line. Its escape mechanism appeared to be radiation from the DC power bus and the AC power line. A contributing factor to this emission problem appeared to be ineffective RF bypassing of the DC power busses in the TRS-80.

The recommendation for reducing the level of the 42.5 MHz narrowband radiated emission is to reduce its level on the DC power bus in the TRS-80 CPU/keyboard. The recommended technique is to install RF bypass capacitors at each integrated circuit which has a clock input or output. The capacitor should be installed between the DC supply pin and the ground pin as close to the IC socket as possible.

In addition to reducing the level of the clock and its harmonics on the busses, effective RF bypassing should also reduce the level of broadband noise on the busses.

An alternative technique is to use shielding and filtering to contain the emissions within the various system components. This technique is not recommended primarily because of the large numer of TRS-80 components in a system and the large number of interconnecting cables. Each cable leaving the CPU/keyboard would require filtering to prevent the conduction and subsequent radiation of emissions from the cables.

V. TEST FACILITIES AND INSTRUMENTATION

The following paragraphs describe the test facilities and instrumentation used for making conducted and radiated EME measurements.

Shielded Enclosure: The 20 ft. x 10 ft. x 8 ft. shielded enclosure constructed of galvannealed iron, manufactured by ACE Engineering Company provides attenuation to electric fields exceeding 100 dB for frequencies above 14 kHz. Three phase filtered 115VAC 60 Hz power is provided. Each phase and neutral is filtered both inside and outside the enclosure.

Outdoor Test Range: The outdoor test range, containing a rotating platform, is an open area free of reflecting objects within 30 meters of the rotating platform or measurement antenna location. Power, control, auxiliary twisted pairs and coaxial cables to the rotating platform are buried under ground. The control hut is located more than 30 meters from the platform.

EME Receiver: The EME Receiver used for calibrated measurements was a Fairchild Electro Metrics Interference Analyzer Model EMC-25. The receiver covers the frequency range 10 kHz to 100 MHz in 15 bands. Measurements of EME were made using the peak and average detector functions of the receiver.

Line Impedance Stabilization Network: A calibrated Line Impedance Stabilization Network (LISN) was used for measuring conducted EME. The LISN presents a nominal 50 ohms impedance to the product under test. An output is provided for connection to a 50 ohm EME receiver.

Antennas: Calibrated antennas were used for measuring radiated EME.

Accuracy: The accuracy with which EME measurements can be made is dependent upon the calibration accuracy of the transducer and EME measurement receiver. The accuracy of the EME receiver readings is within $\pm$2 dB within the top 40 dB of the meter range over the full frequency range of the receiver. The conversion loss of the line impedance stabilization network used for conducted EME measurements is accurate to within $\pm$0.2 dB. The factors for converting measurement antenna output voltage to electric field strength are accurate to within $\pm$1 dB. Therefore accuracy of conducted EME measurements is within $\pm$2.2 dB and the accuracy of radiated EME measurements is within $\pm$3 dB.

APPENDIX A

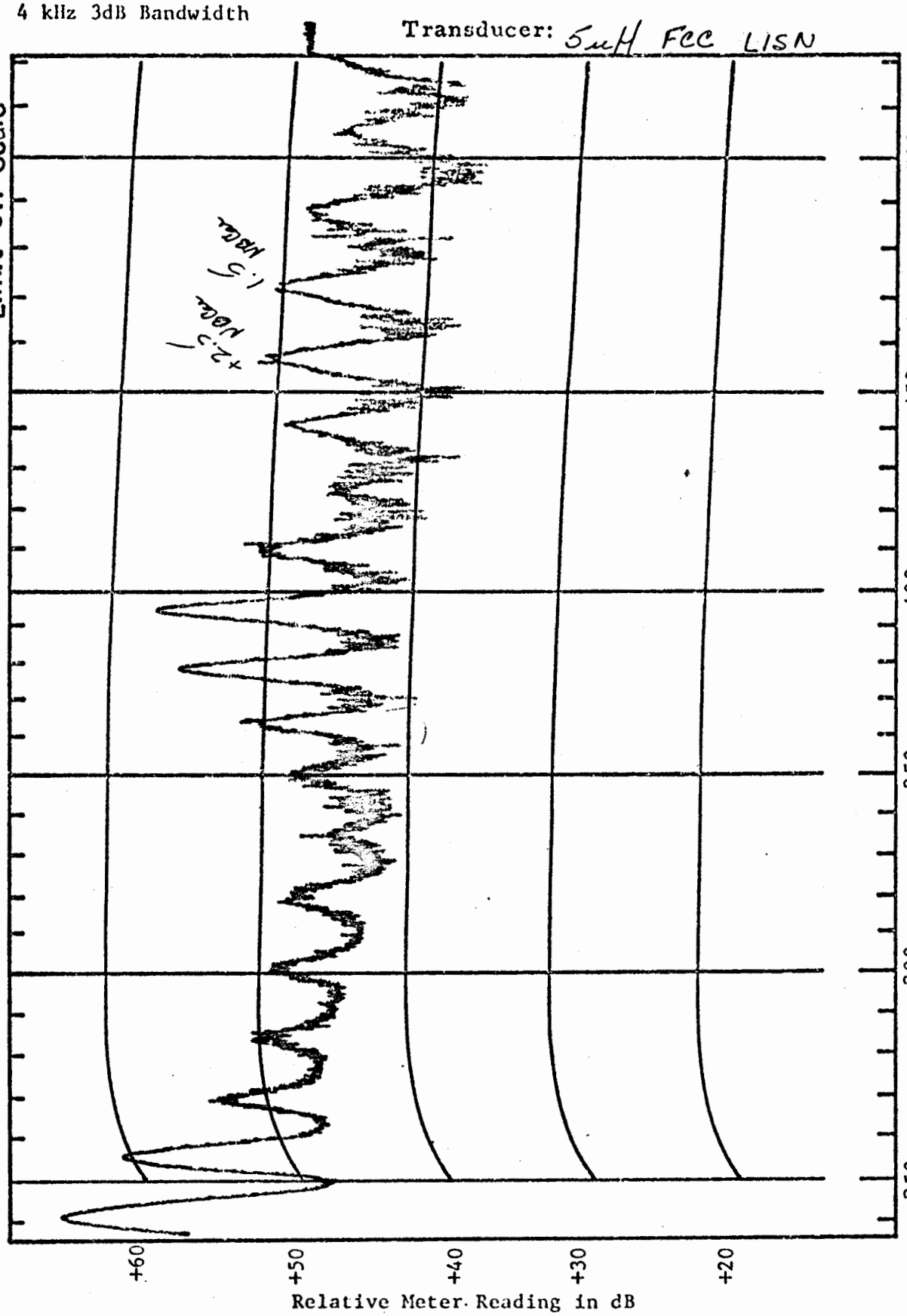
BROADBAND CONDUCTED EMISSIONS
(PEAK DETECTOR)

CPU/KEYBOARD

HOT POWER LINE

EMC-25 Band 5
Peak Detector (BB Signals)
4 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



Rcvr. Atten. 20 Ext. Atten. —

Line Tested Hot Ground ON/OFF

Equip. Under Test TRS-80 CPU

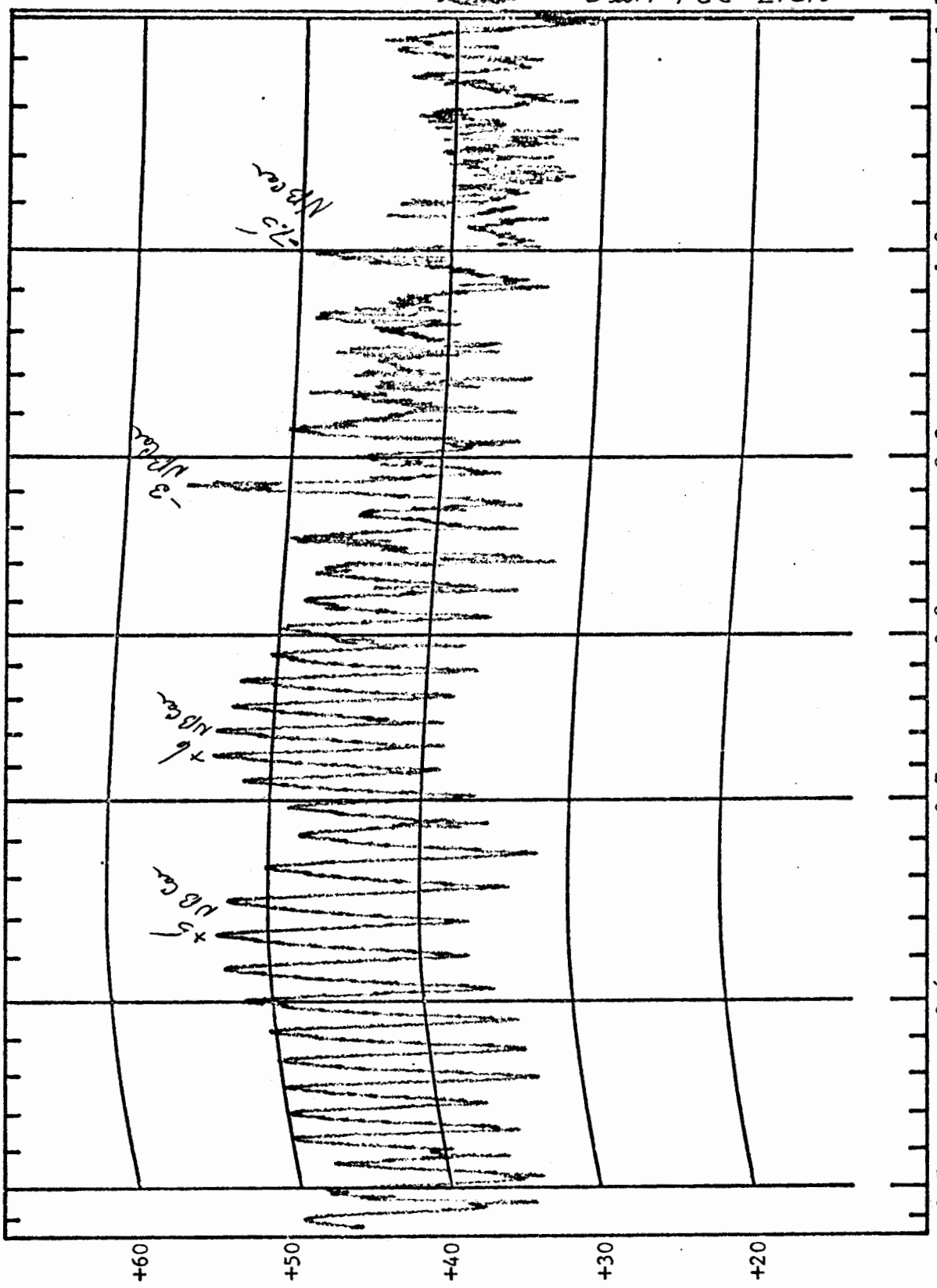
Equip. Oper. Mode Typing

Date 2 Apr 79 Operator [illegible]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 6
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN

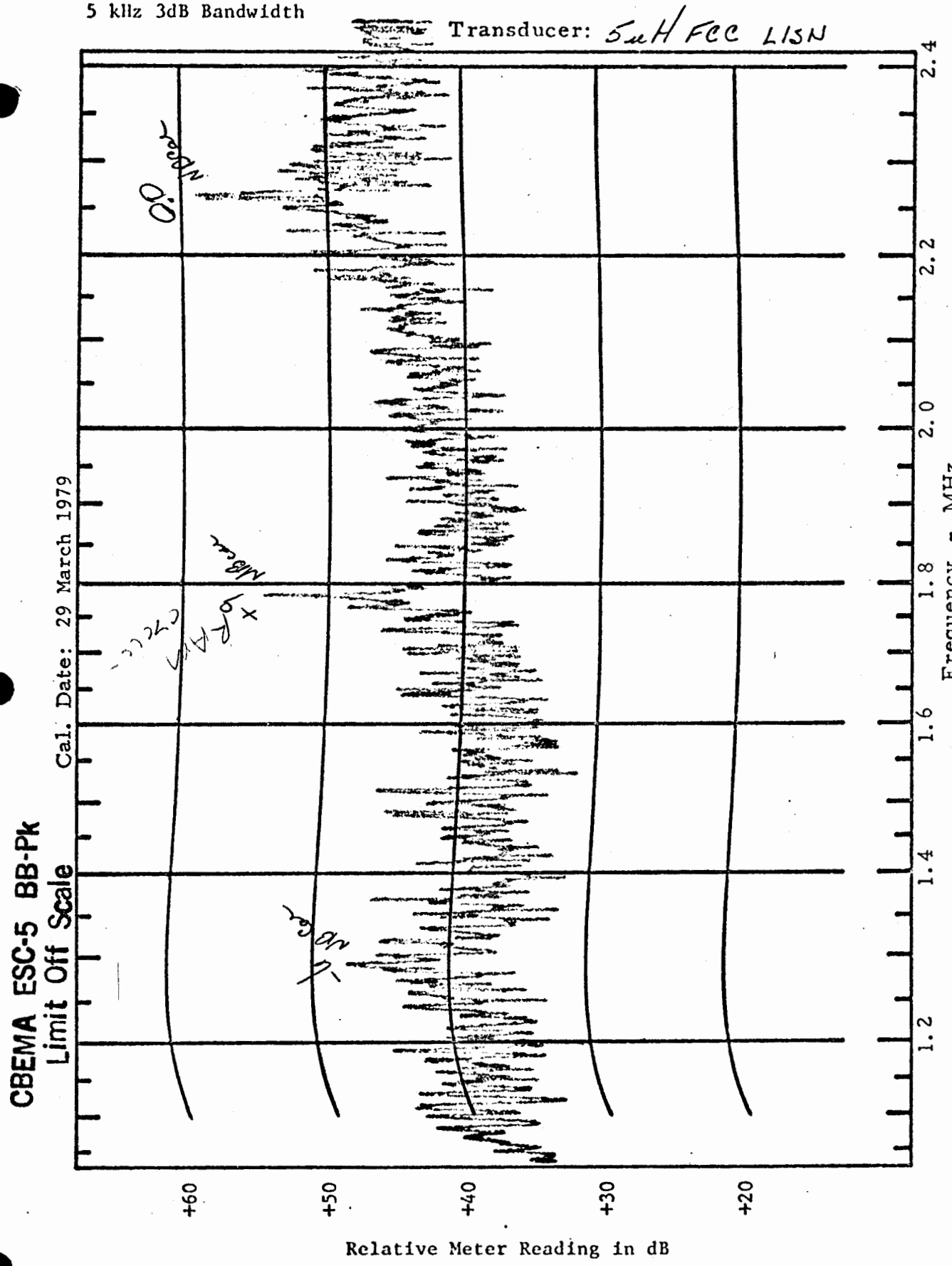


Relative Meter Reading in dB

Equip. Under Test TRS-80 CPU
Equip. Oper. Mode Typing
Date 3 Apr 79 Operator [illegible]
Rcvr. Atten. 20 Ext. Atten. —
Line Tested Hot Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 7
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth

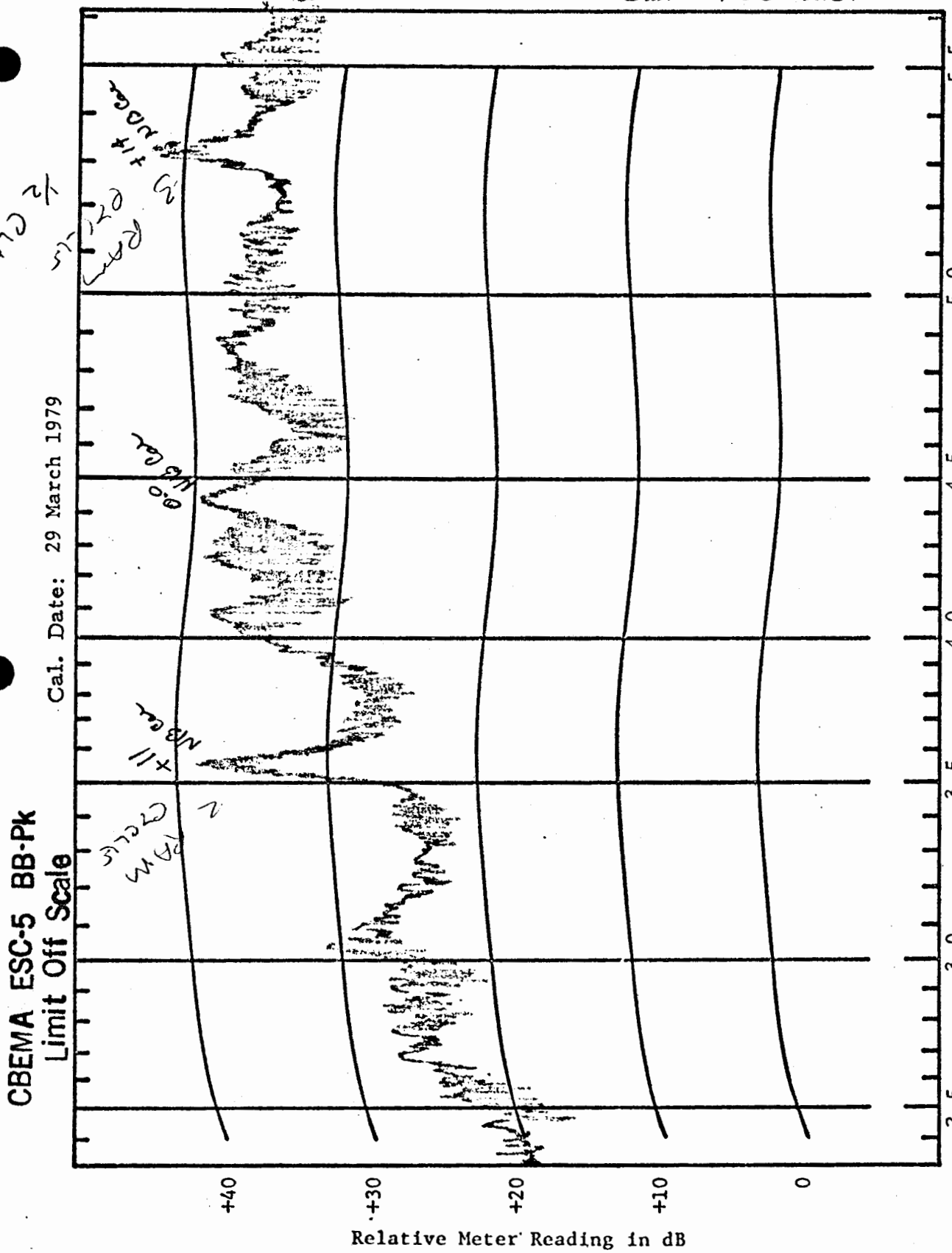


Equip. Under Test TRS-80, CPU
Rcvr. Atten. 20 Ext. Atten. —
Line Tested Hot Ground ON/OFF
Equip. Oper. Mode Typing
Date 3 Apr 79 Operator [illegible]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 8
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



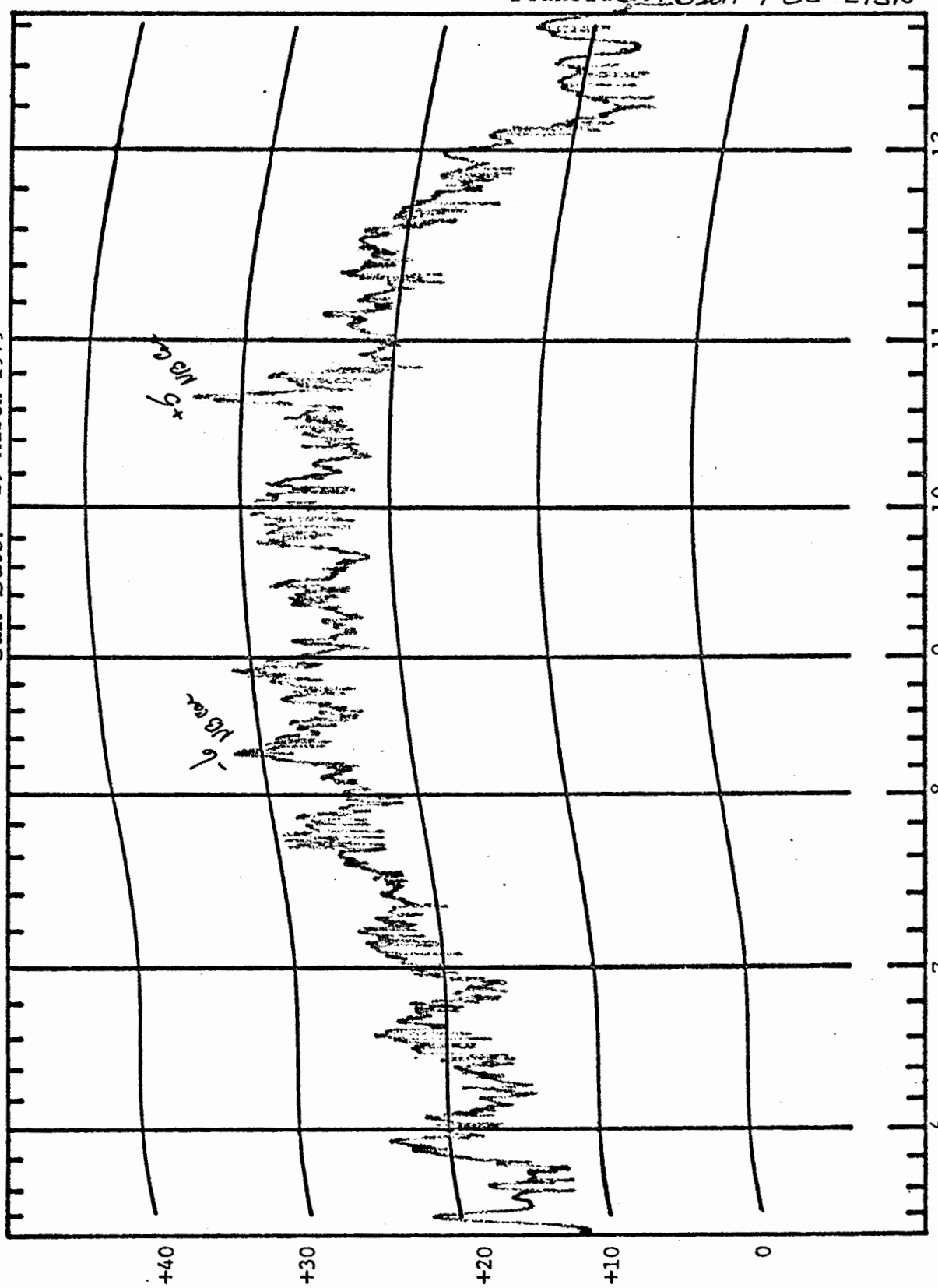
Equip. Under Test TRS-80 CPU
Equip. Oper. Mode Typing
Date 3 Apr 79 Operator ABSmith

Rcvr. Atten. 40 Ext. Atten. —
Line Tested Hot Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 9
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

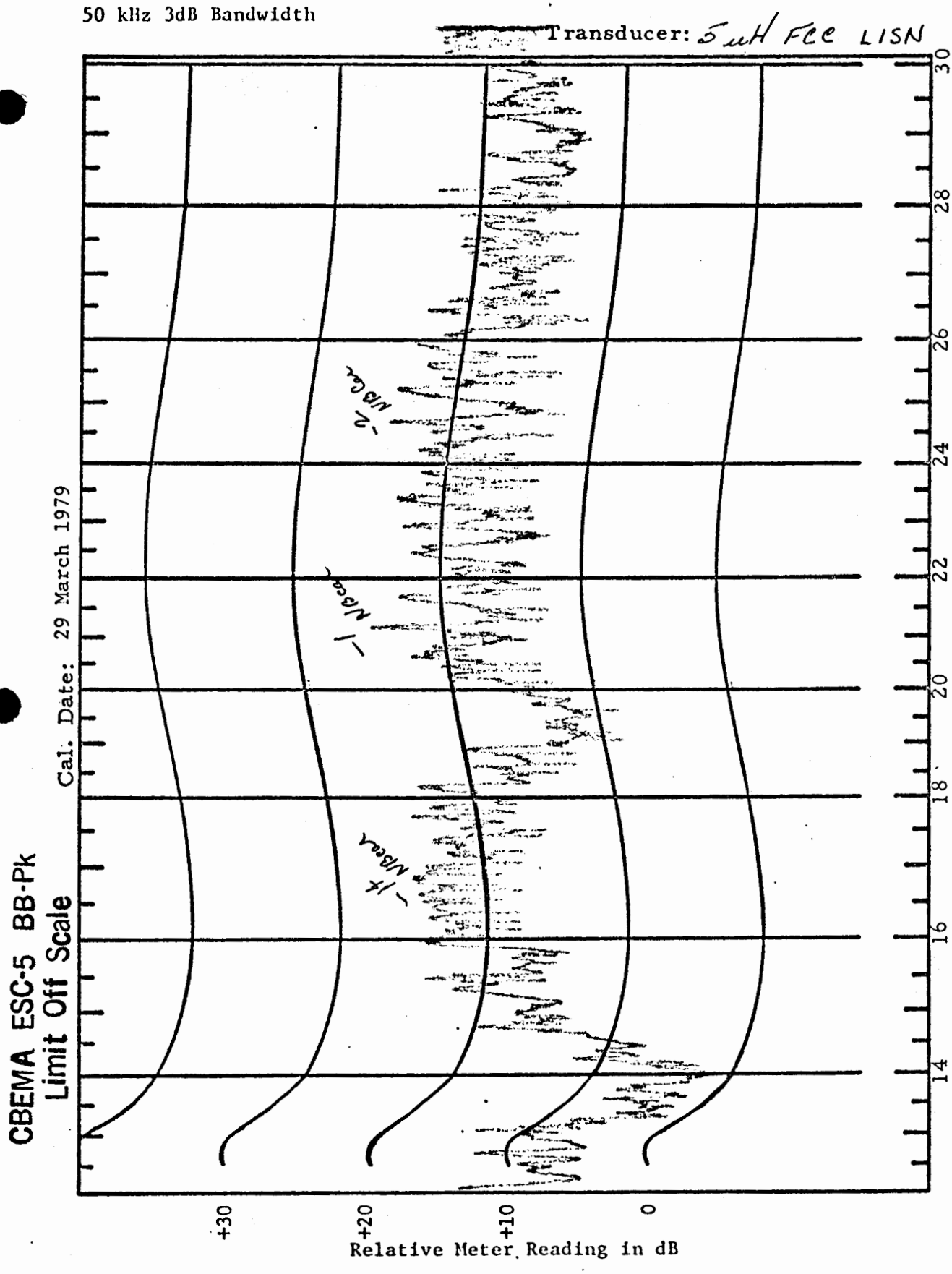
Transducer: 50uH FCC LISN



Equip. Under Test TRS-80 CPU
Rcvr. Atten. 60 Ext. Atten. —
Line Tested Hot Ground ON/OFF
Equip. Oper. Mode Typing
Date 3 Jan 79 Operator [illegible]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 10
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth



Equip. Under Test TRS-80 CPU
Equip. Oper. Mode Typing
Date 3 Apr 79 Operator Cliff Scotts
Rcvr. Atten. 60 Ext. Atten. —
Line Tested Hot Ground ON/OFF

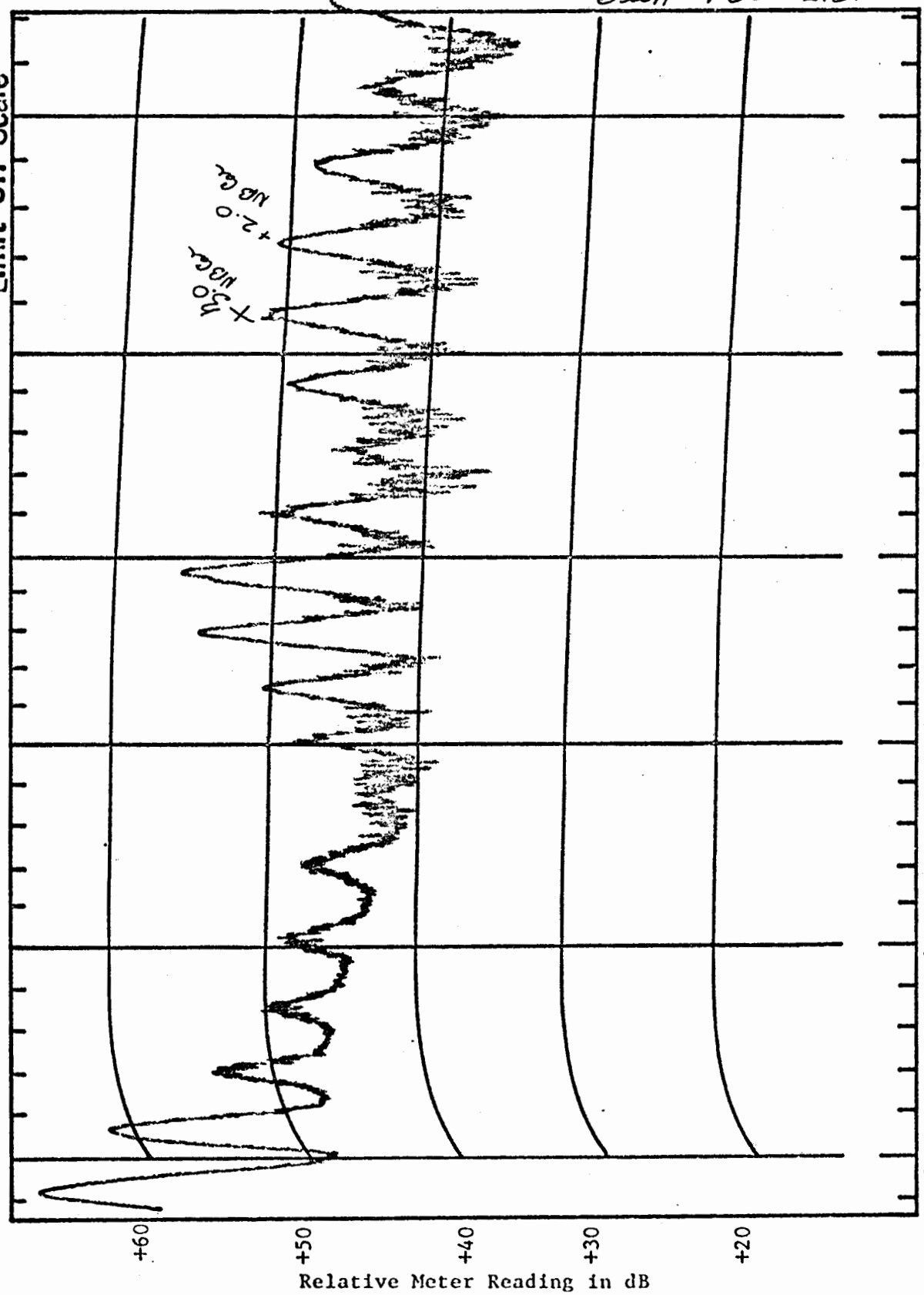
Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

CPU/KEYBOARD

NEUTRAL POWER LINE

EMC-25 Band 5
Peak Detector (BB Signals)
4 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



Rcvr. Atten. 20 Ext. Atten. —

Line Tested Neut Ground ON/OFF

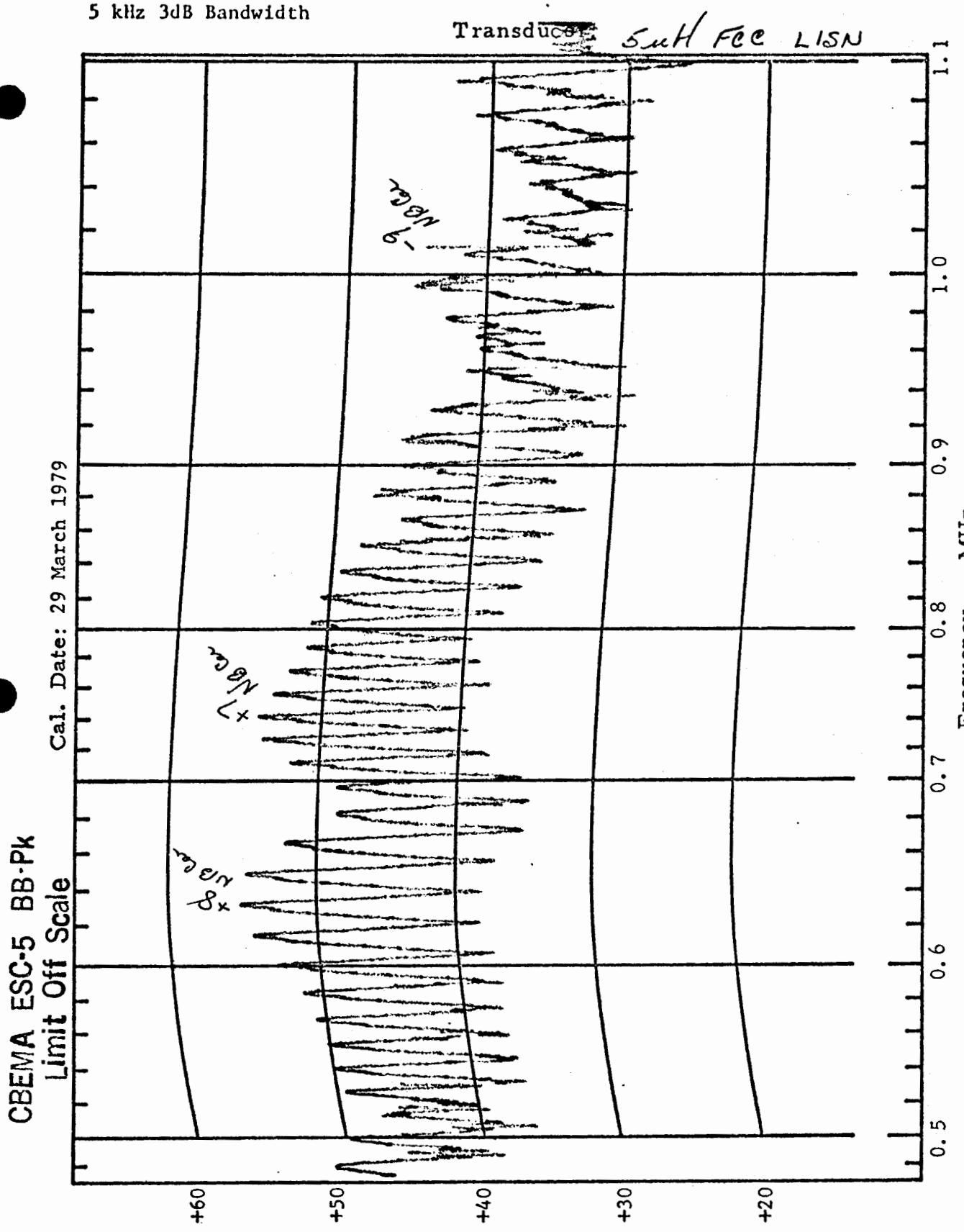
Equip. Under Test TRS-80 CPU

Equip. Oper. Mode Typing

Date 3 Apr 79 Operator [illegible]

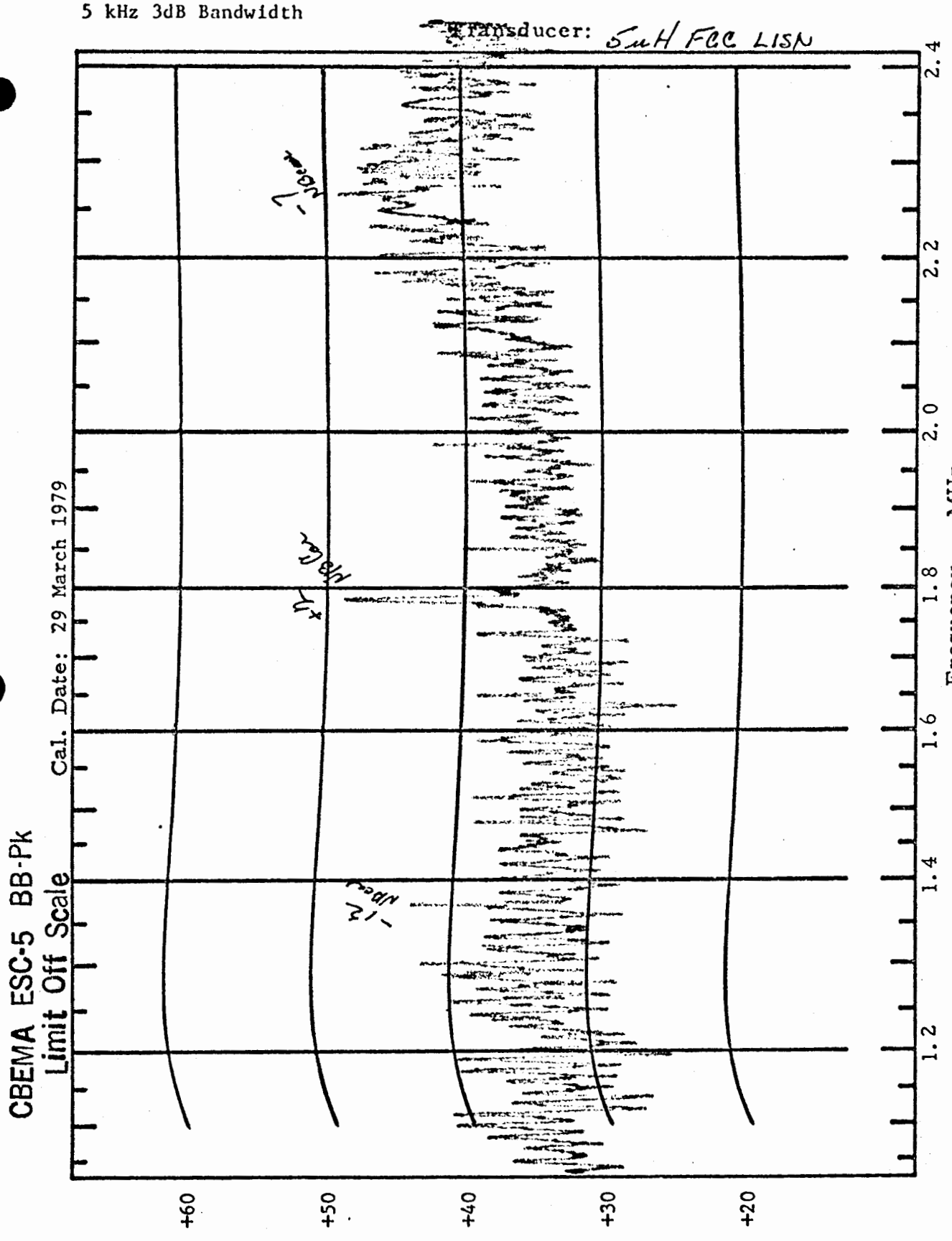
Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 6
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth



Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 7
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth



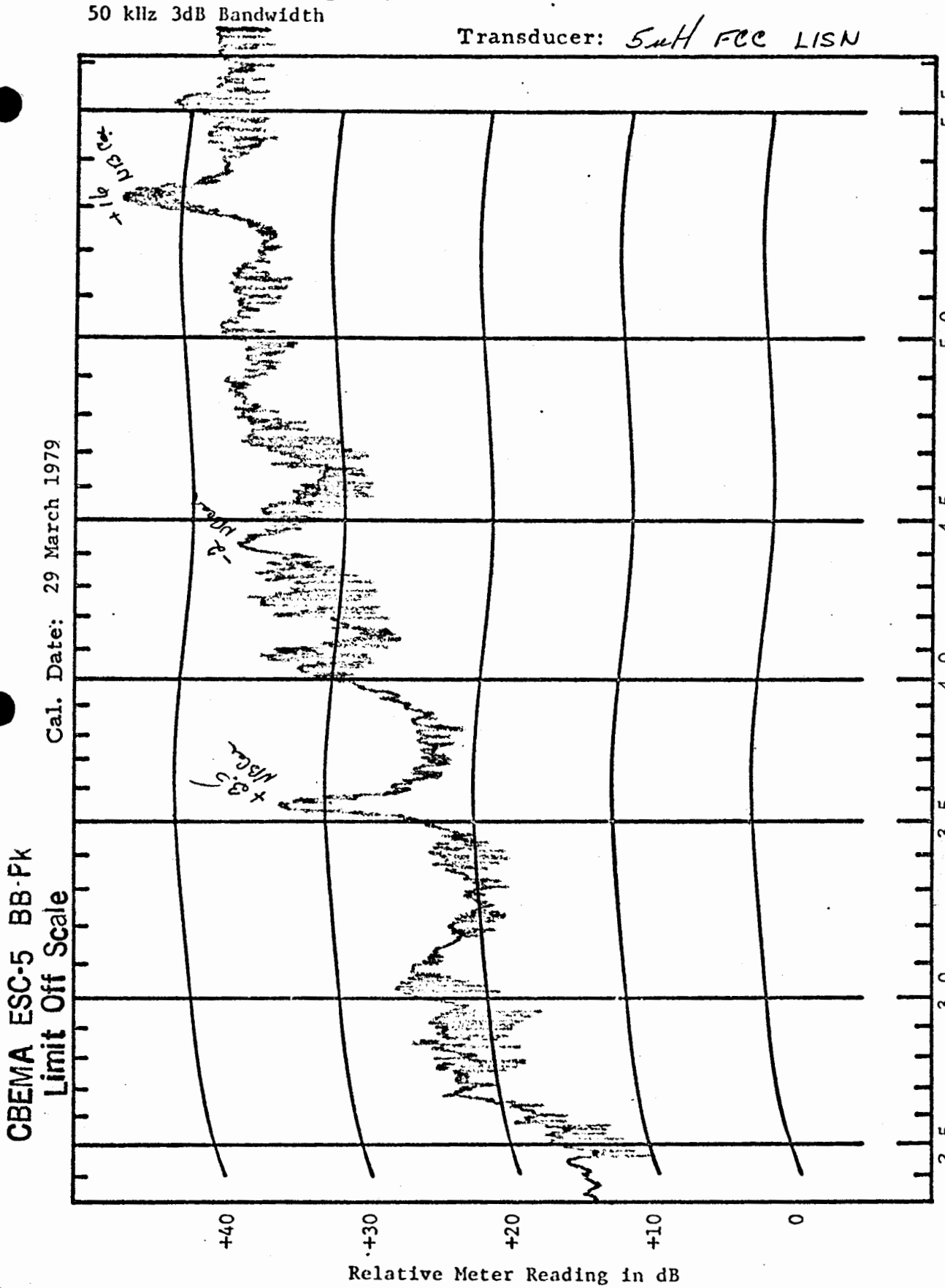
Equip. Under Test TRS-80 CPU
Equip. Oper. Mode Typing
Date 3 Apr 79 Operator Jeff Booth

Rcvr. Atten. 20 Ext. Atten. —
Line Tested Neut Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 8
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



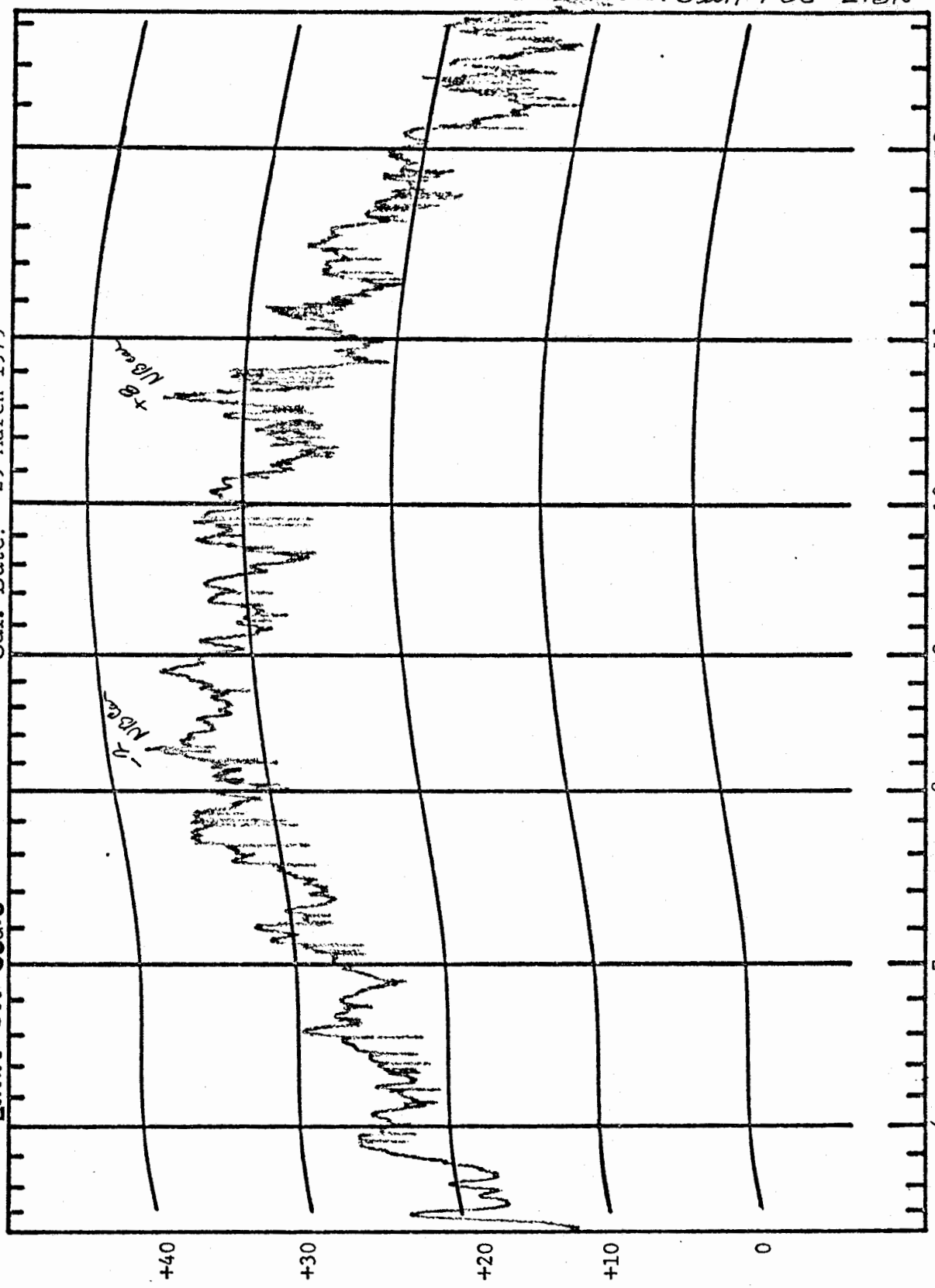
Equip. Under Test TRS-80 cpu
Equip. Oper. Mode Tapping
Date 3 Apr 79 Operator Cattson th

Rcvr. Atten. 40 Ext. Atten. —
Line Tested Neut Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 9
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN

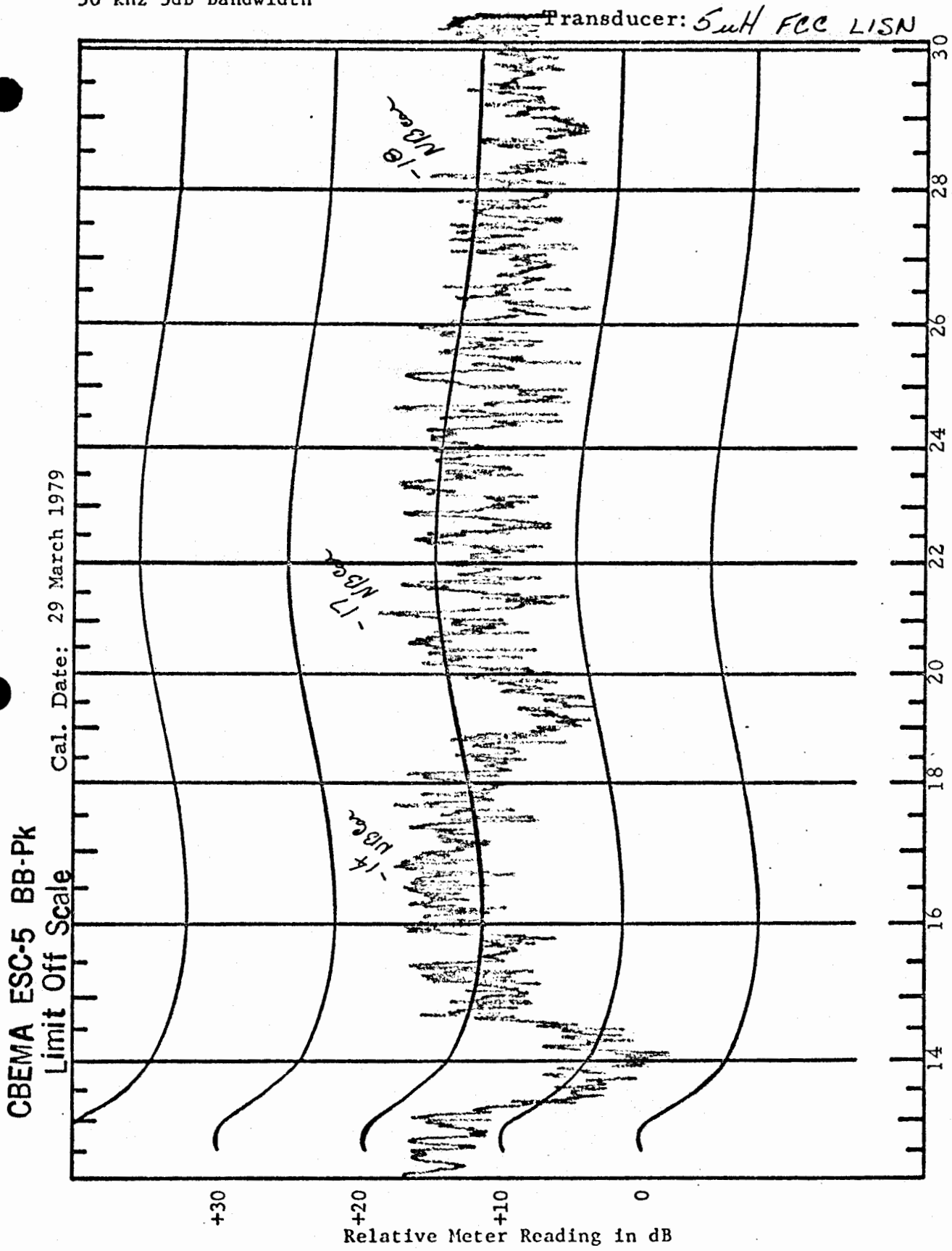


Equip. Under Test TRS-80 CPU
Equip. Oper. Mode Typing
Date 3 Apr 79 Operator A.D. Scott

Rcvr. Atten. 60 Ext. Atten. —
Line Tested Neut Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 10
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth



Equip. Under Test TRS-80 cpu
Equip. Oper. Mode Typing
Date 3 Apr 79 Operator CMS.tk

Rcvr. Atten. 60 Ext. Atten. —
Line Tested Neut Ground ON/OFF

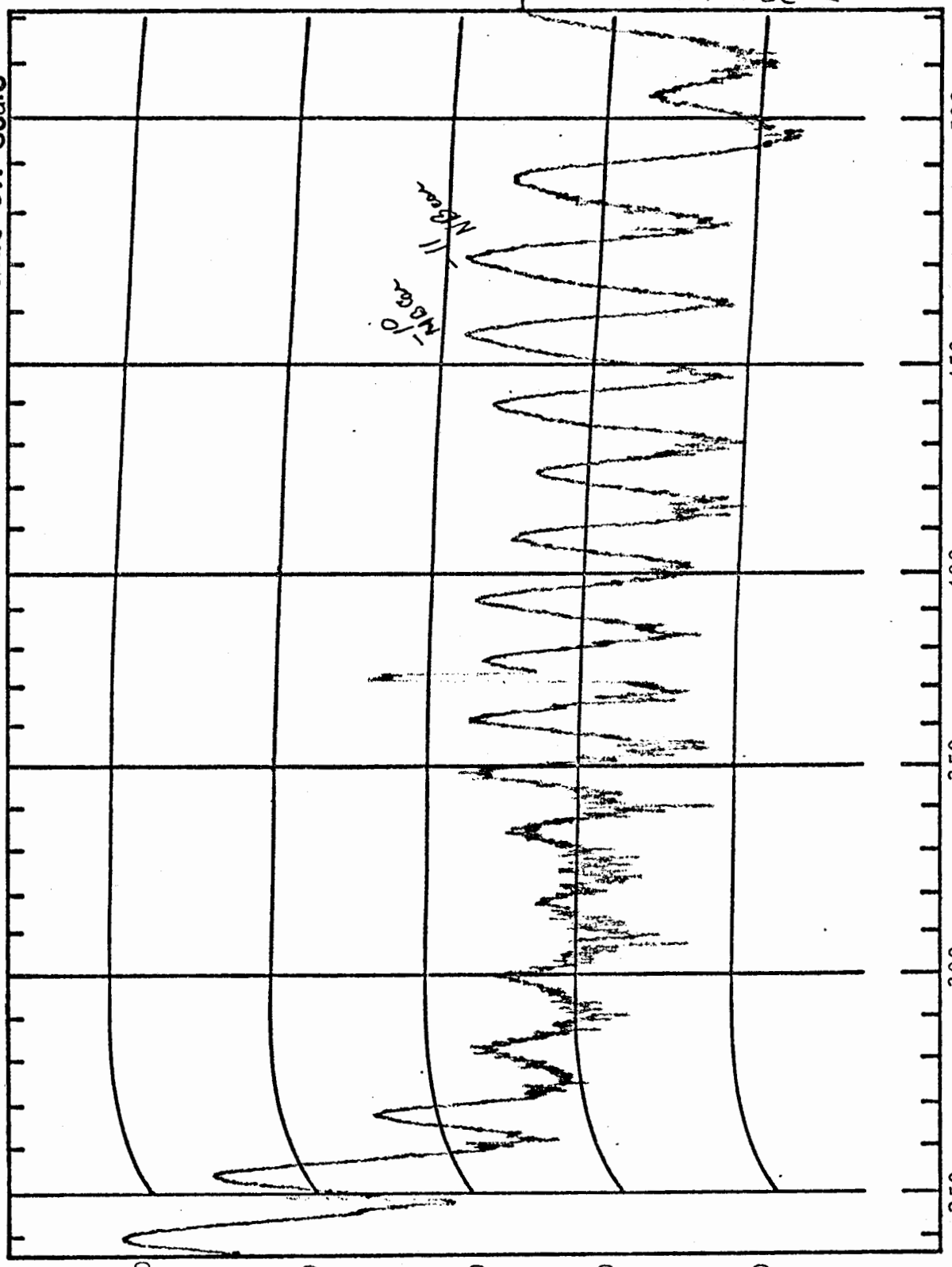
Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

VIDEO DISPLAY
HOT POWER LINE

EMC-25 Band 5
Peak Detector (BB Signals)
4 kHz 3dB Bandwidth

Transducer: 5uH/FCC LISN

CBEMA ESC-5 BB-Pk
limit Off Scale



Cal. Date: 29 March 1979

Frequency - kHz

Relative Meter Reading in dB

Equip. Under Test TRS-80 CRT

Equip. Oper. Mode Typing

Date 3 Apr 79 Operator [illegible]

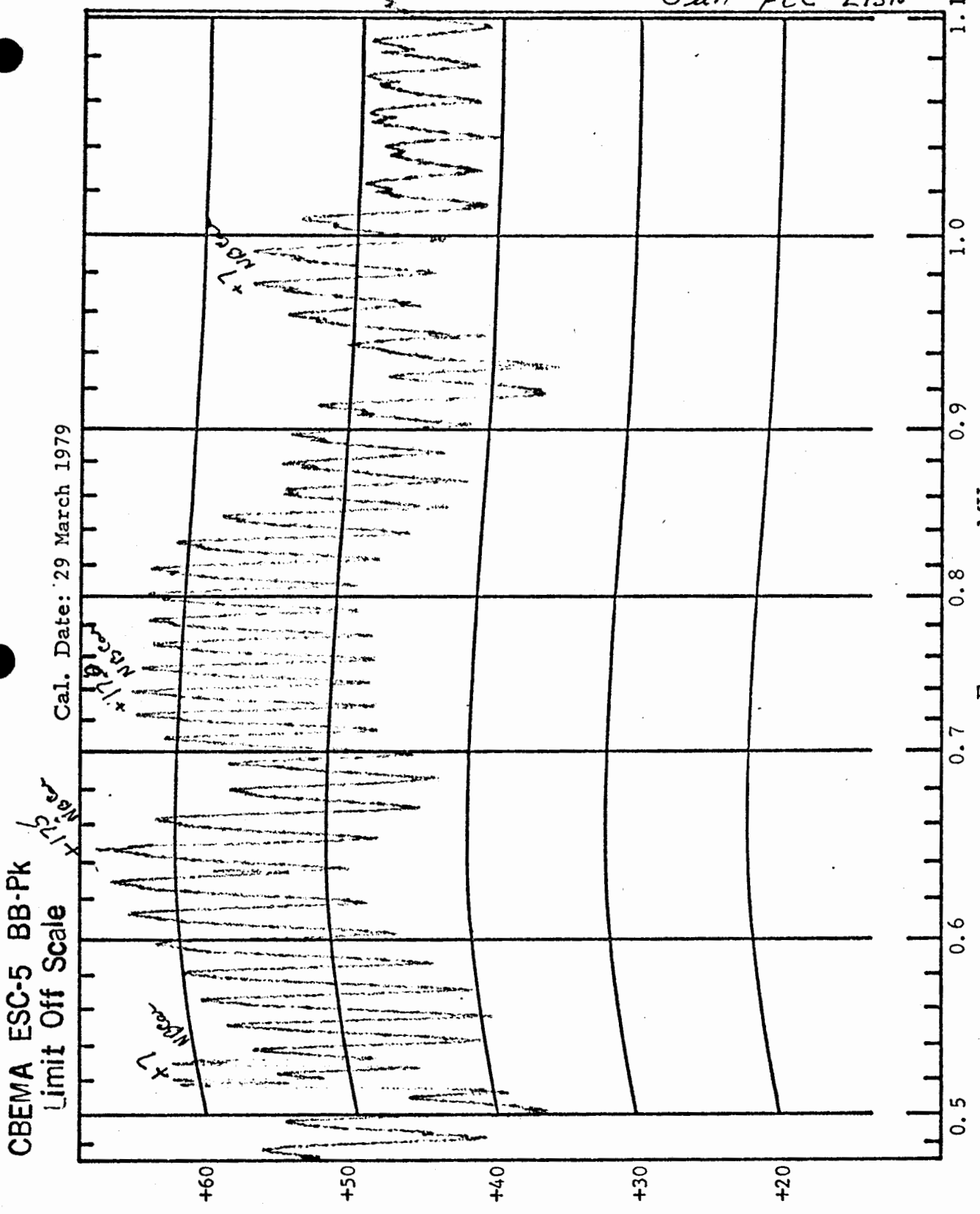
Rcvr. Atten. 40 Ext. Atten. —

Line Tested Hot Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 6
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



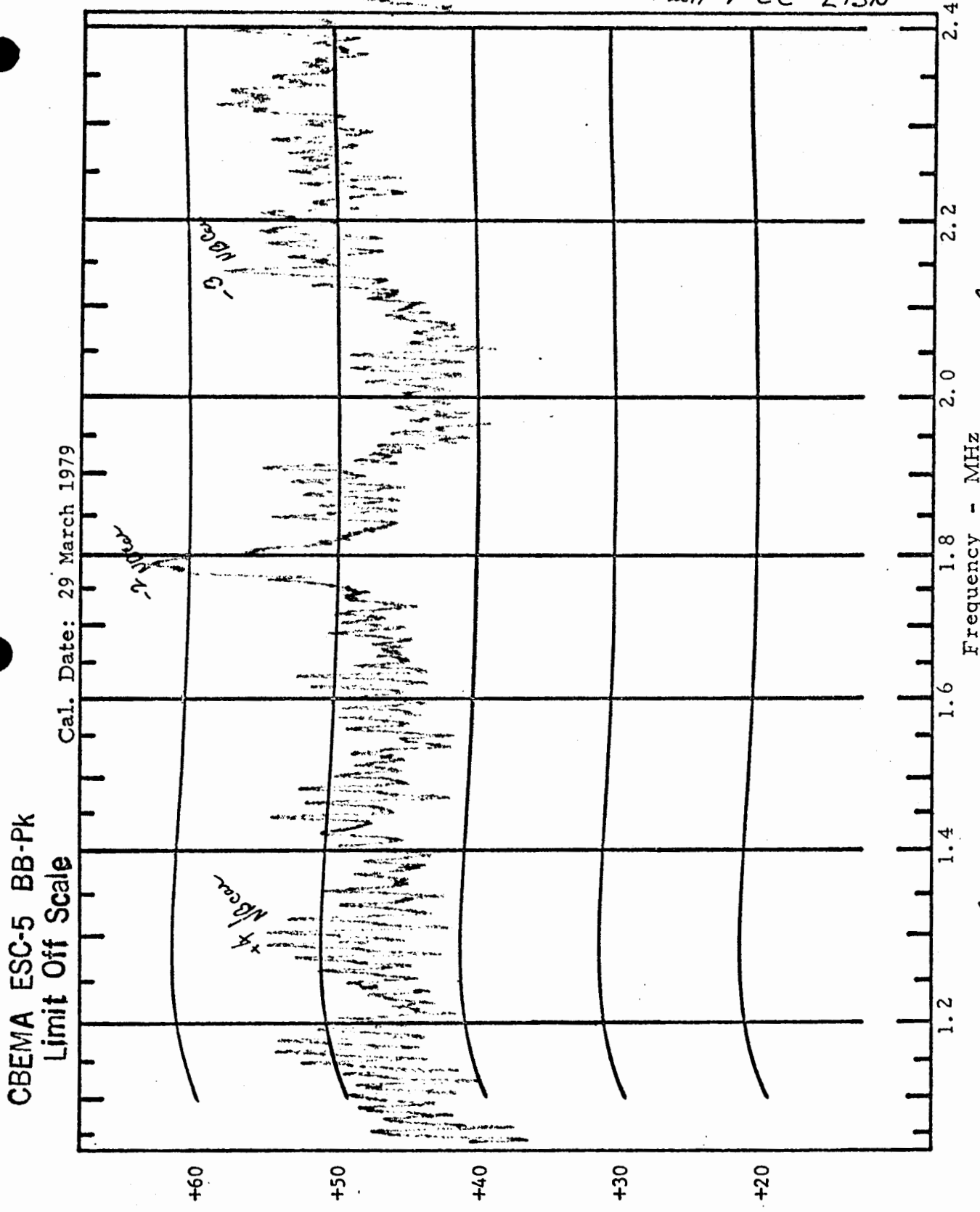
Relative Meter Reading in dB

Equip. Under Test TRS-80 CRT
Rcvr. Atten. 20 Ext. Atten. —
Equip. Oper. Mode Typing
Line Tested Hot Ground ON/OFF
Date 8 Jan 79 Operator [illegible]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 7
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



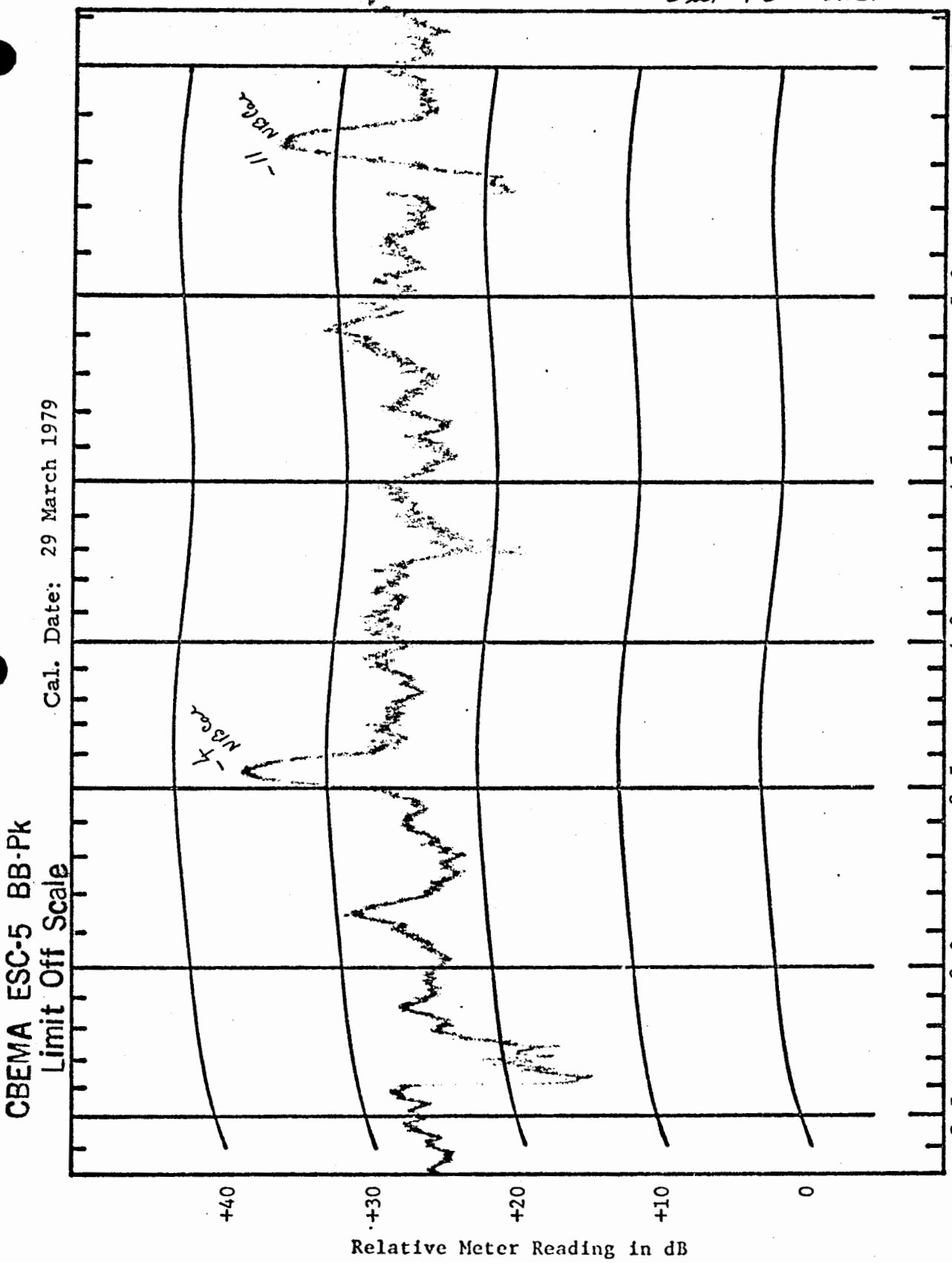
Equip. Under Test TRS-80 CRT
Equip. Oper. Mode Typing
Date 3 Apr 79 Operator [illegible]

Rcvr. Atten. 20 Ext. Atten. —
Line Tested Hot Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 8
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



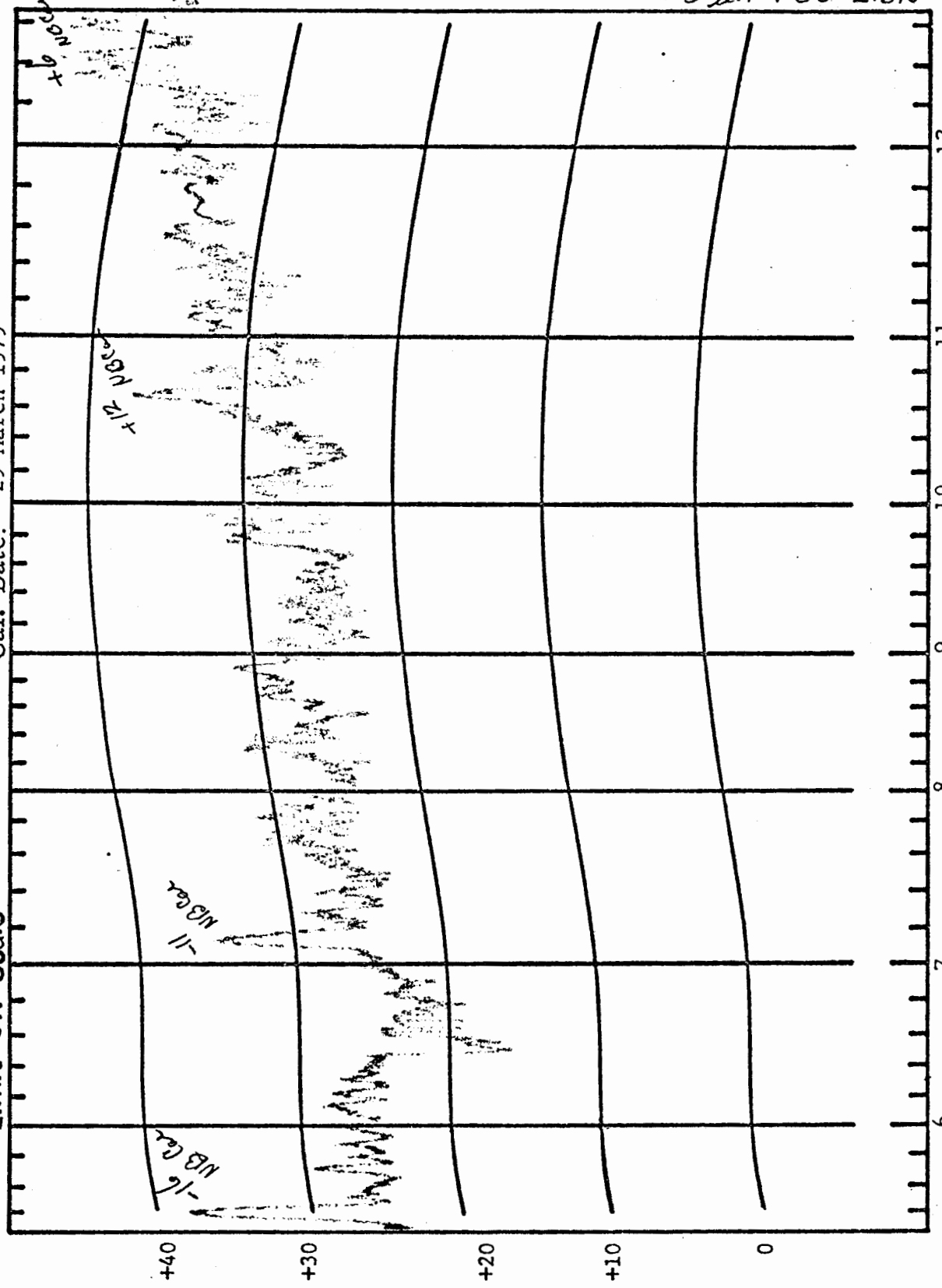
Equip. Under Test TRS-80 CRT
Equip. Oper. Mode Typing
Date 3 Apr 79 Operator [illegible]

Rcvr. Atten. 40 Ext. Atten. —
Line Tested Hot Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 9
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5 uH FCC LISN



CBEMA ESC-5 BB-Pk
Limit Off Scale

Cal. Date: 29 March 1979

Frequency - MHz

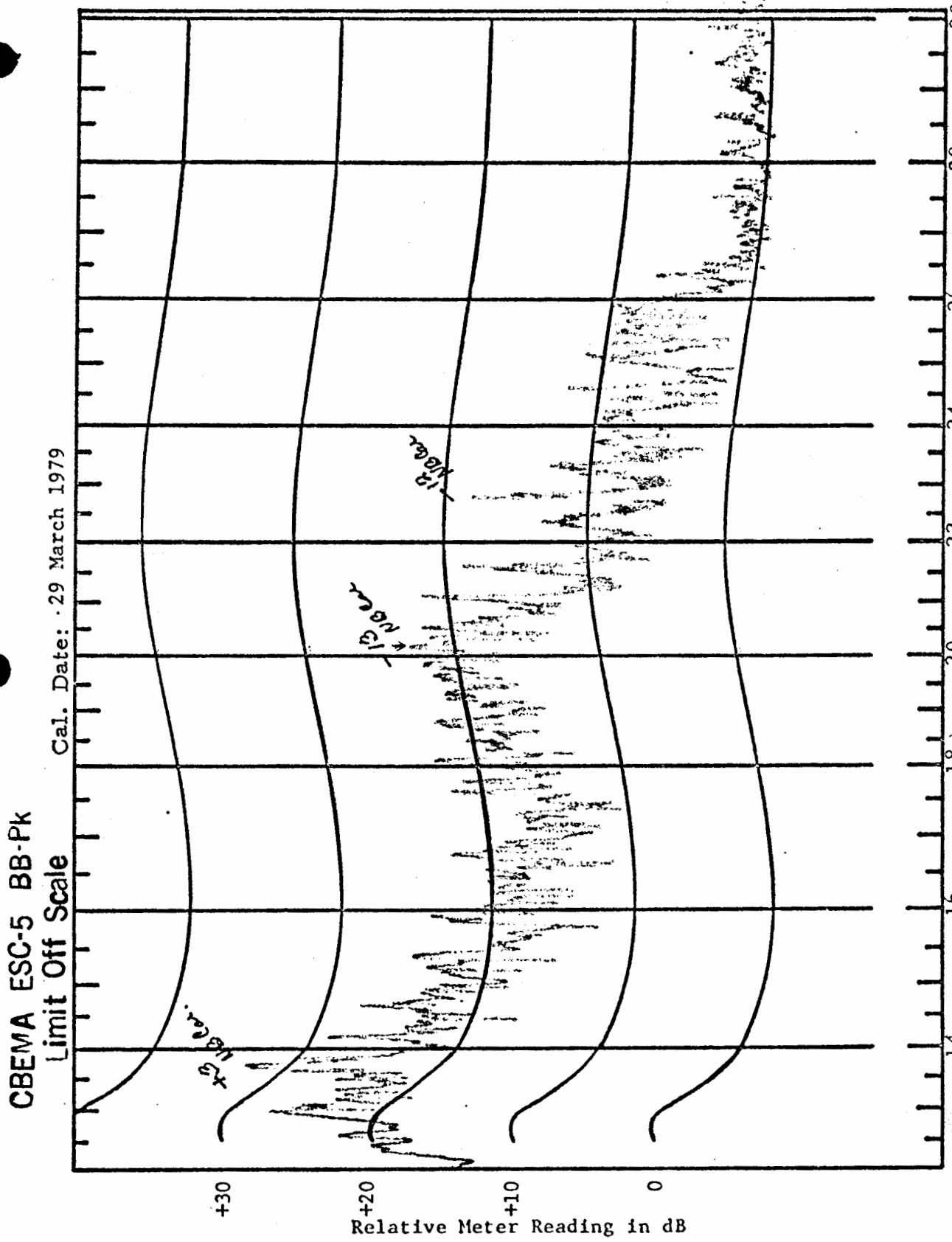
Equip. Under Test TRS-80 CRT
Rcvr. Atten. 40 Ext. Atten. —
Equip. Oper. Mode Typing Line Tested Hot Ground ON/OFF
Date 3 Apr 79 Operator Abbott

Relative Meter Reading in dB

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 10
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: ~~5uH~~ FCC LISN



Equip. Under Test TRS-80 ART
Equip. Oper. Mode Taping do
Date 3 Apr 79 Operator [illegible]
Rcvr. Atten. 60 Ext. Atten. —
Line Tested Hot Ground ON/OFF

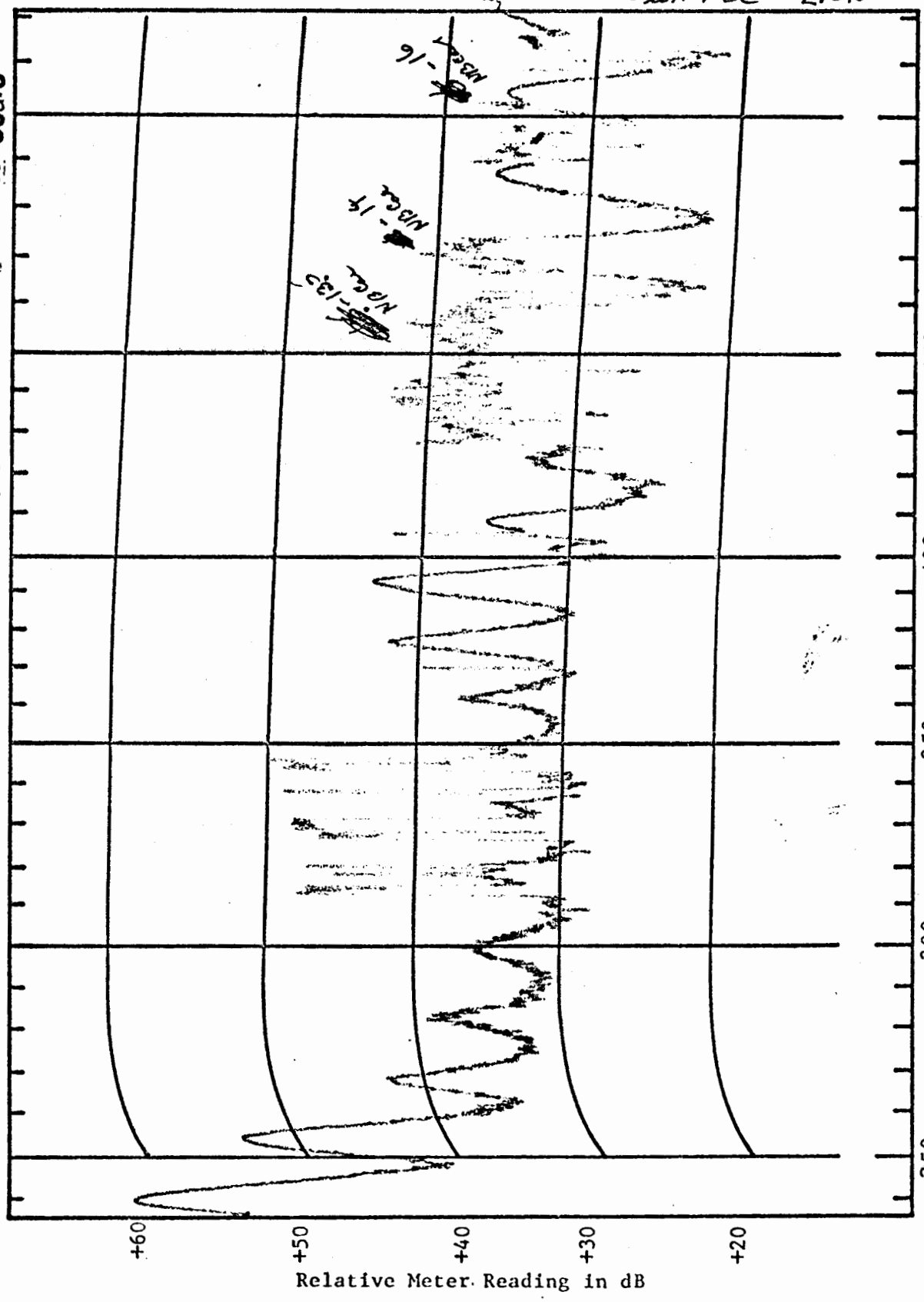
Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

VIDEO DISPLAY

NEUTRAL POWER LINE

EMC-25 Band 5
Peak Detector (BB Signals)
4 kHz 3dB Bandwidth

Transducer: 5uH/FCC LISN



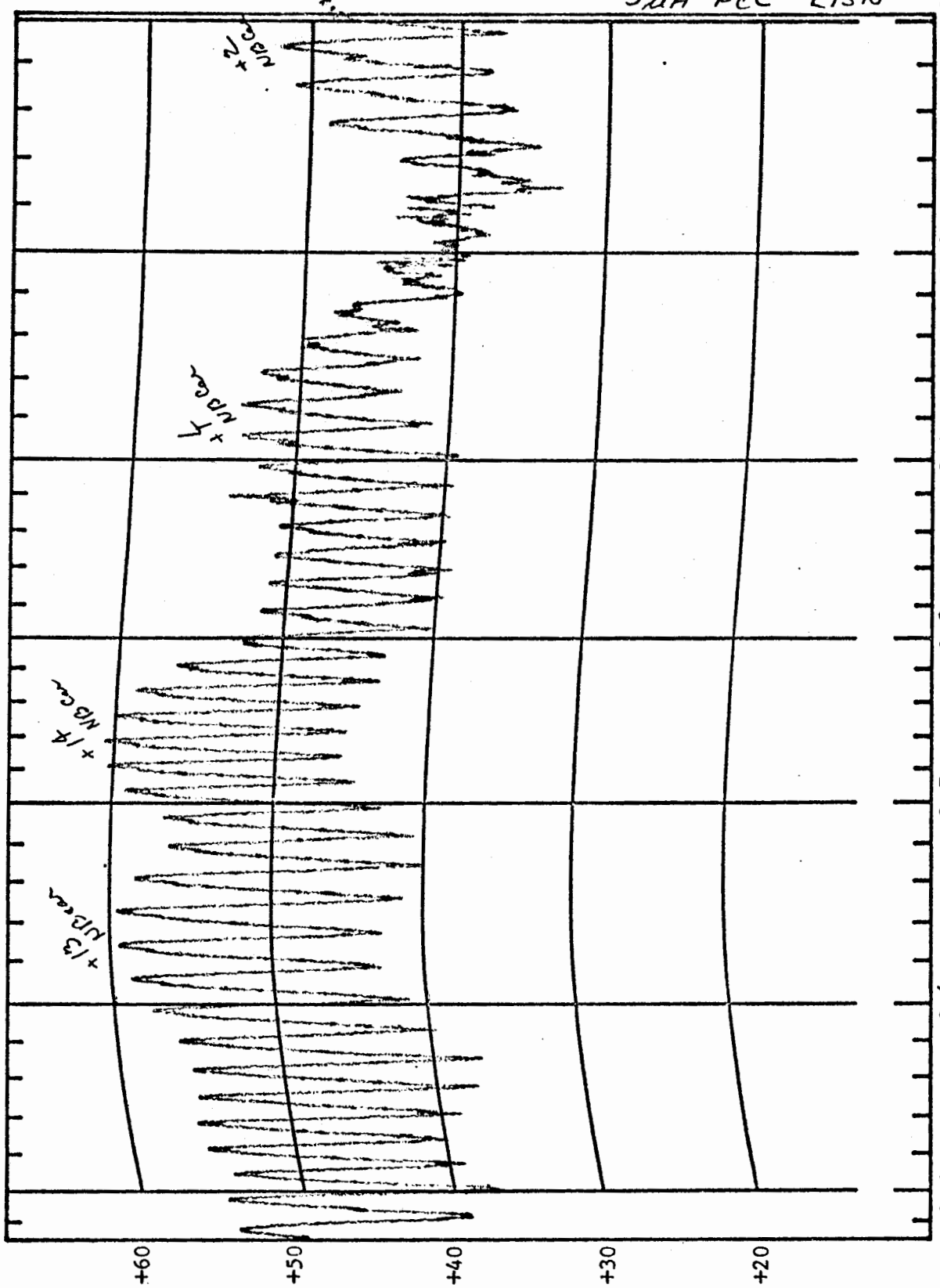
Equip. Under Test TRS-80 CRT
Equip. Oper. Mode Typing
Date 3 Jan 79 Operator Al Scott

Rcvr. Atten. Ao Ext. Atten. —
Line Tested Neut Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 6
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



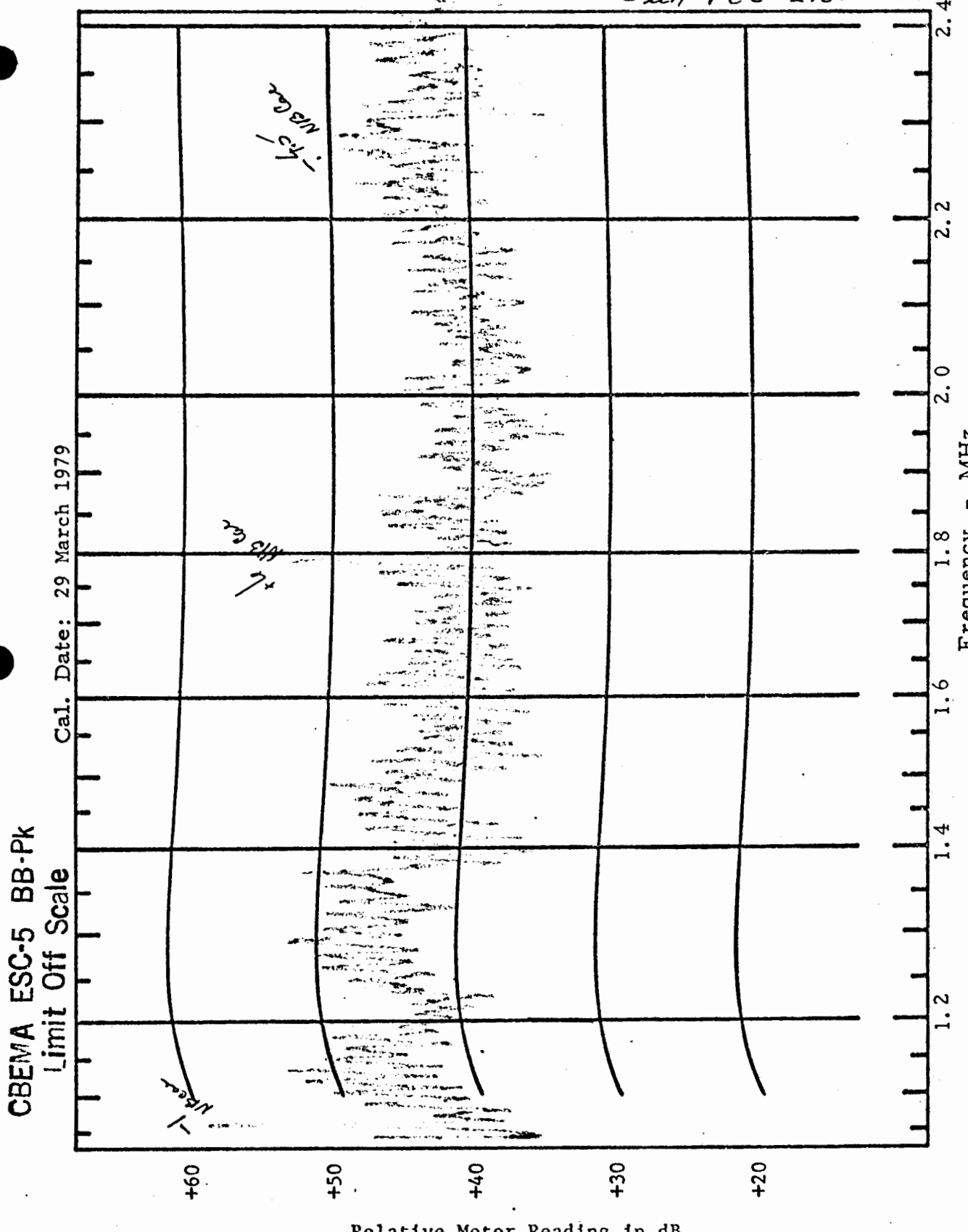
Relative Meter Reading in dB

Equip. Under Test TRS-80 CRT
Equip. Oper. Mode Typing
Date 3 Apr 79 Operator Bob Scott
Rcvr. Atten. 20 Ext. Atten. —
Line Tested Neut Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 7
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth

Transducer: 5uH/FCC LISN

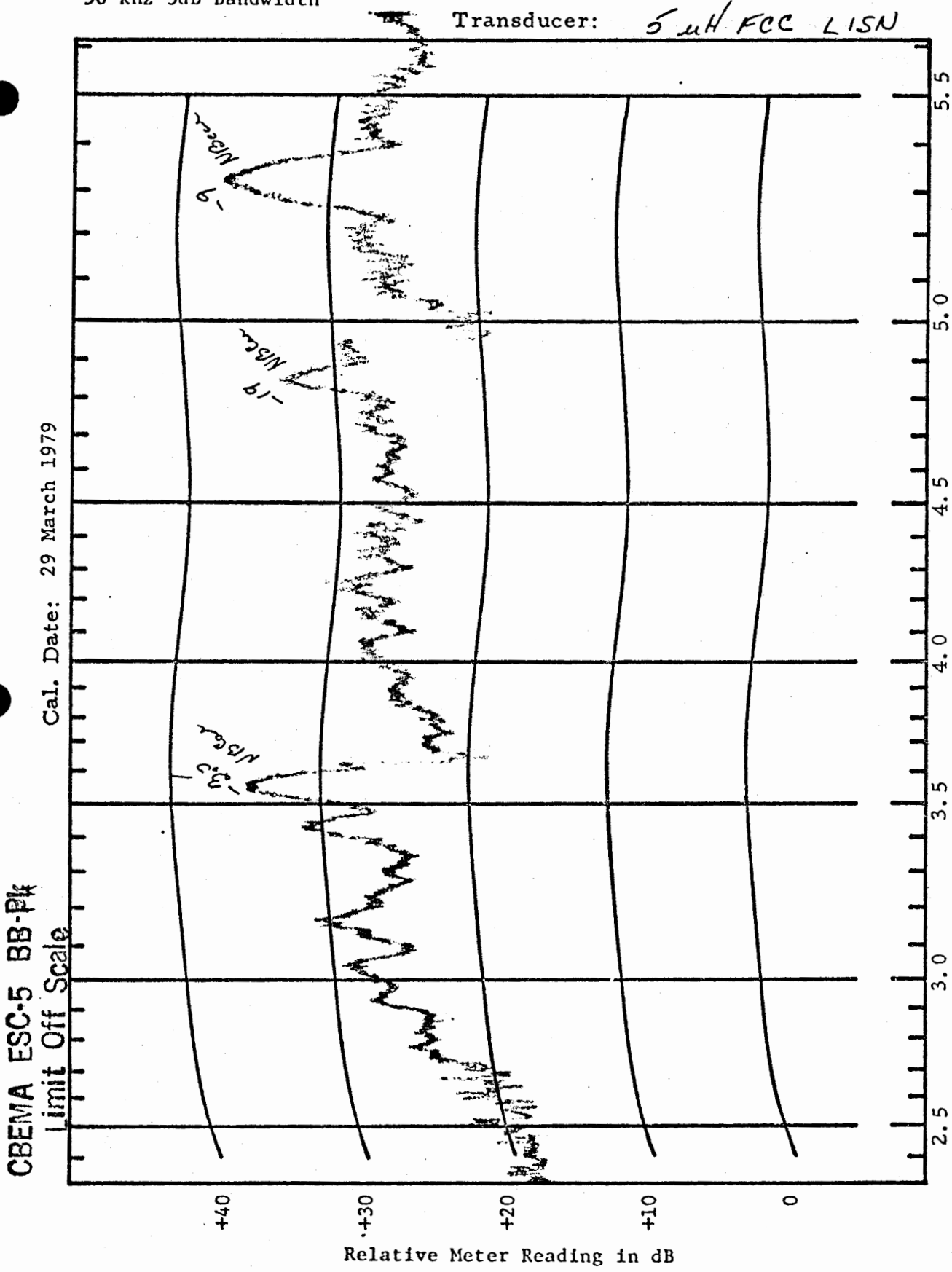


Equip. Under Test TRS-80 CRT
Equip. Oper. Mode Typing
Date 3 Apr 79 Operator [illegible]

Rcvr. Atten. 20 Ext. Atten. —
Line Tested Neut Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 8
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

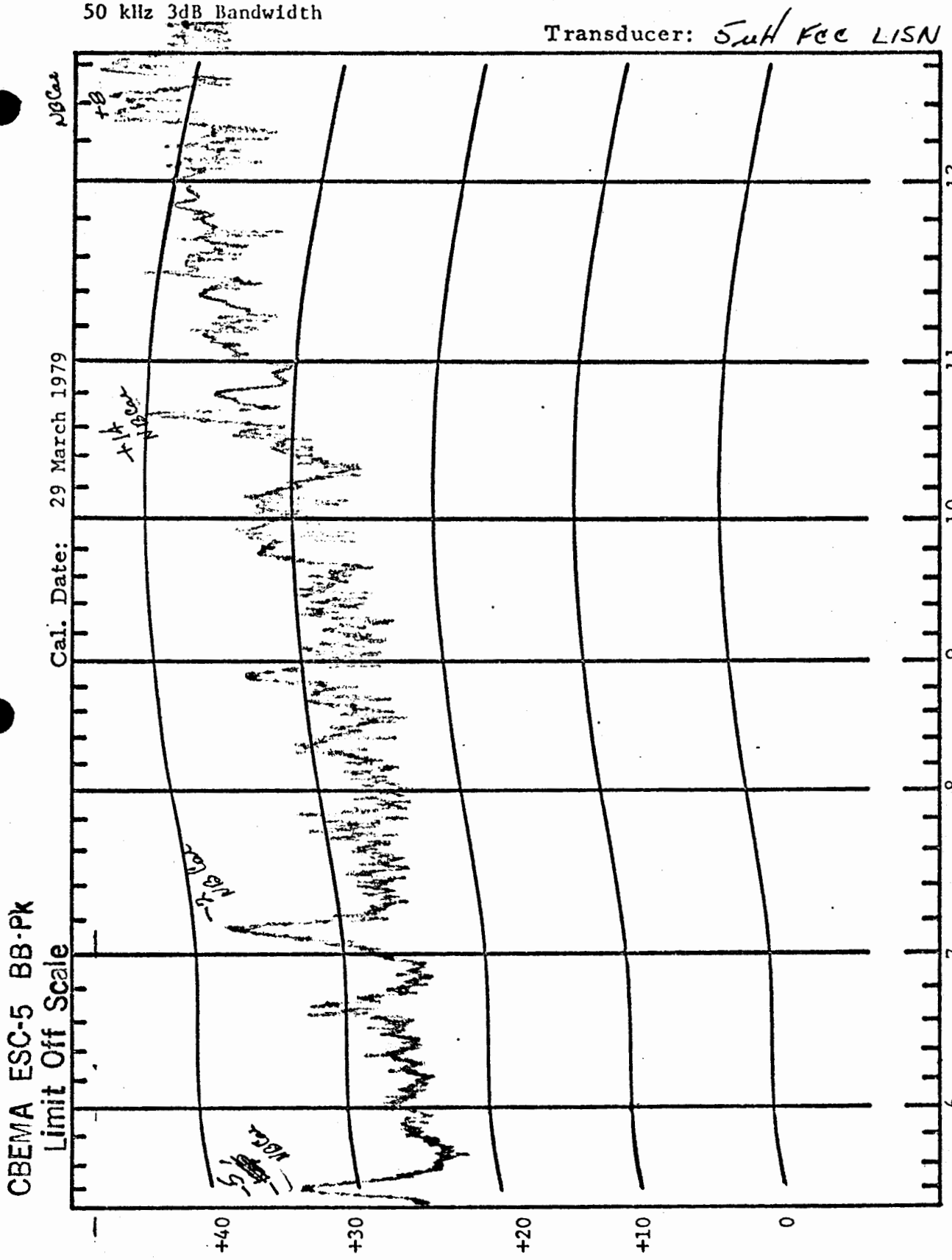


Equip. Under Test TRS-80 CRT
Equip. Oper. Mode Typing
Date 3 Apr 79 Operator

Rcvr. Atten. 40 Ext. Atten. —
Line Tested Neut Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 9
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth



Equip. Under Test TRS-80 CRT Rcvr. Atten. 40 Ext. Atten. —

Equip. Oper. Mode Typing Line Tested Neut Ground ON/OFF

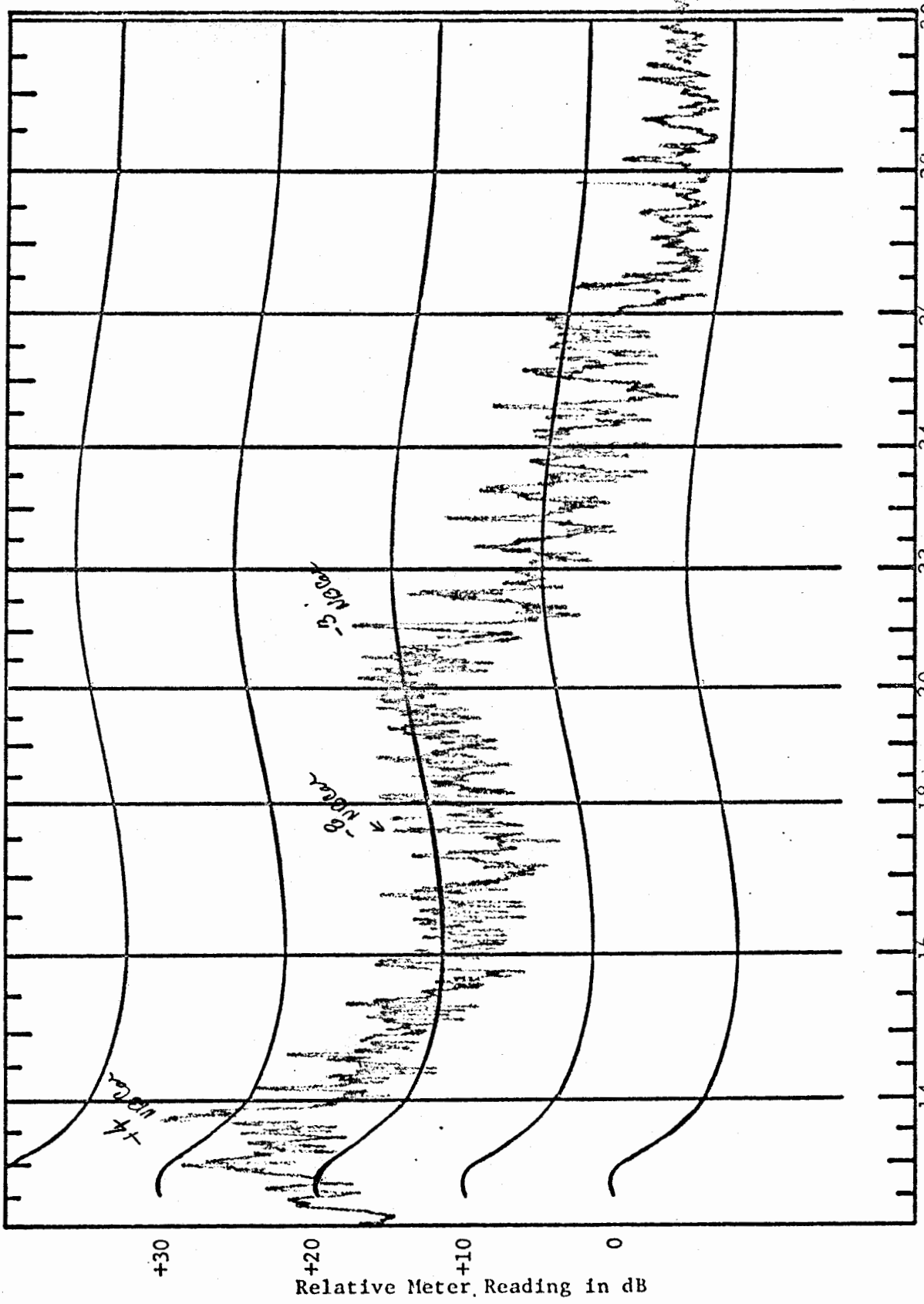
Date 3 Apr 79 Operator Elliott

Relative Meter Reading in dB

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 10
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: ~~CH~~ FCC LISN



Equip. Under Test TRS-80 CRT
Rcvr. Atten. 60 Ext. Atten. —
Line Tested Neut Ground ON/OFF

Equip. Oper. Mode Typing
Date 3 Apr 79 Operator CJ Scott

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

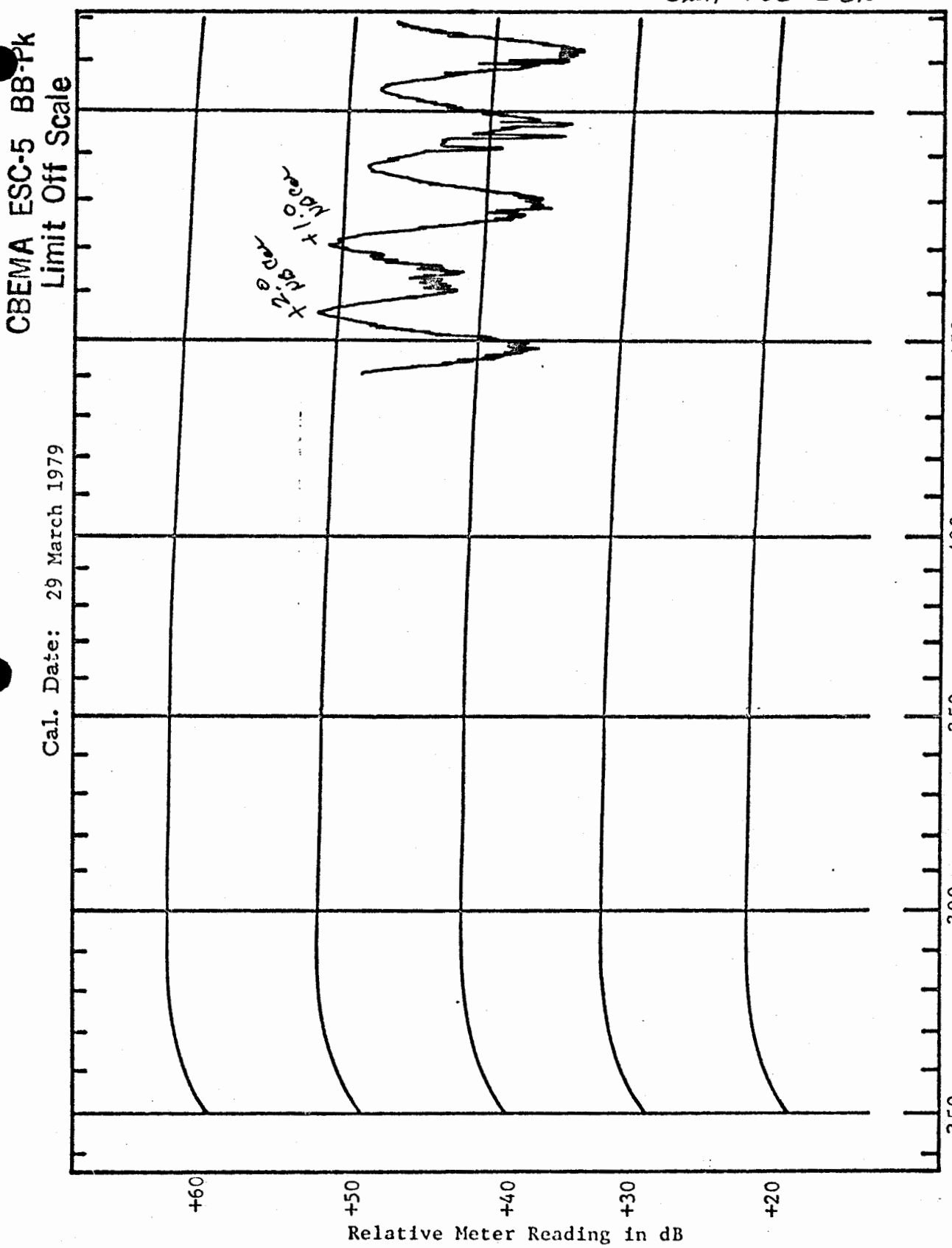
EXPANSION INTERFACE

HOT POWER LINE

NO MEMORY INSTALLED IN EI
"BACKUP" PROGRAM

EMC-25 Band 5
Peak Detector (BB Signals)
4 kHz 3dB Bandwidth

Transducer: 5uH/ FCC LISN

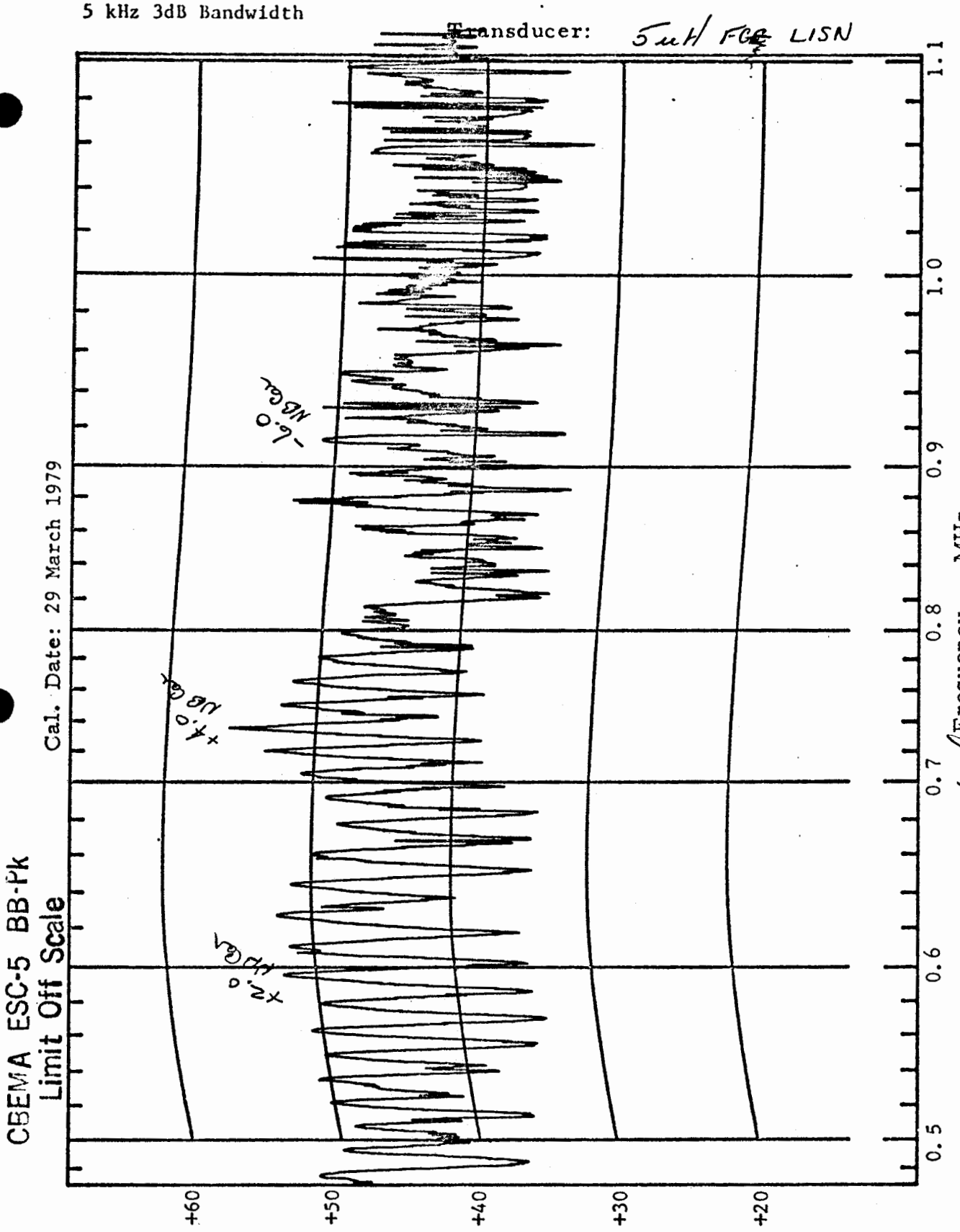


Equip. Under Test TRS-80 Interface
Equip. Oper. Mode Writing on Disc
Date 4 Apr 79 Operator [signature]

Rcvr. Atten. 20 Ext. Atten. —
Line Tested Hot Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 6
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth



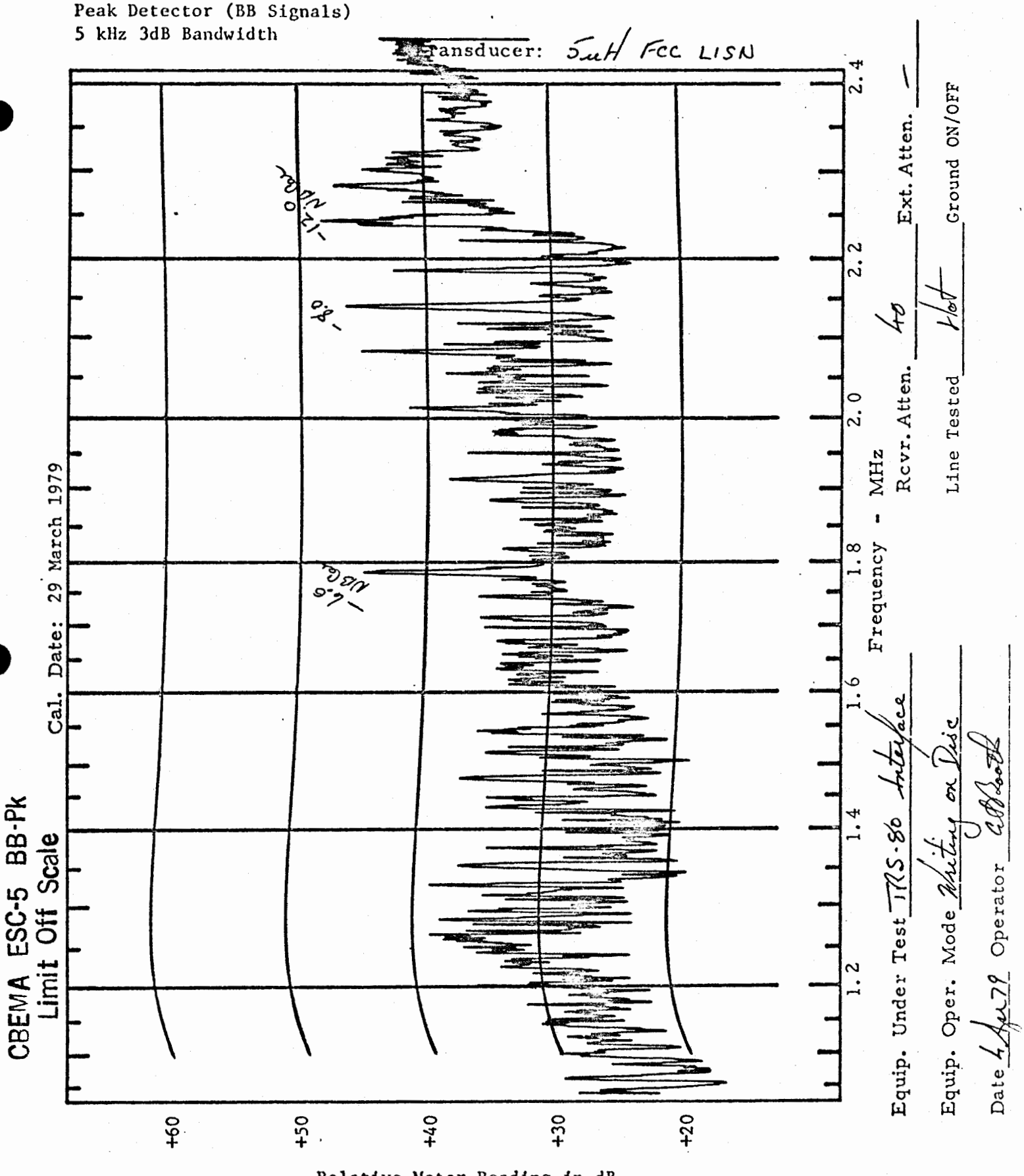
Equip. Under Test TRS-80 Interface Rcvr. Atten. 20 Ext. Atten. —

Equip. Oper. Mode Writing on Disc Line Tested Hot Ground ON/OFF

Date 4 Jan 79 Operator [signature]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

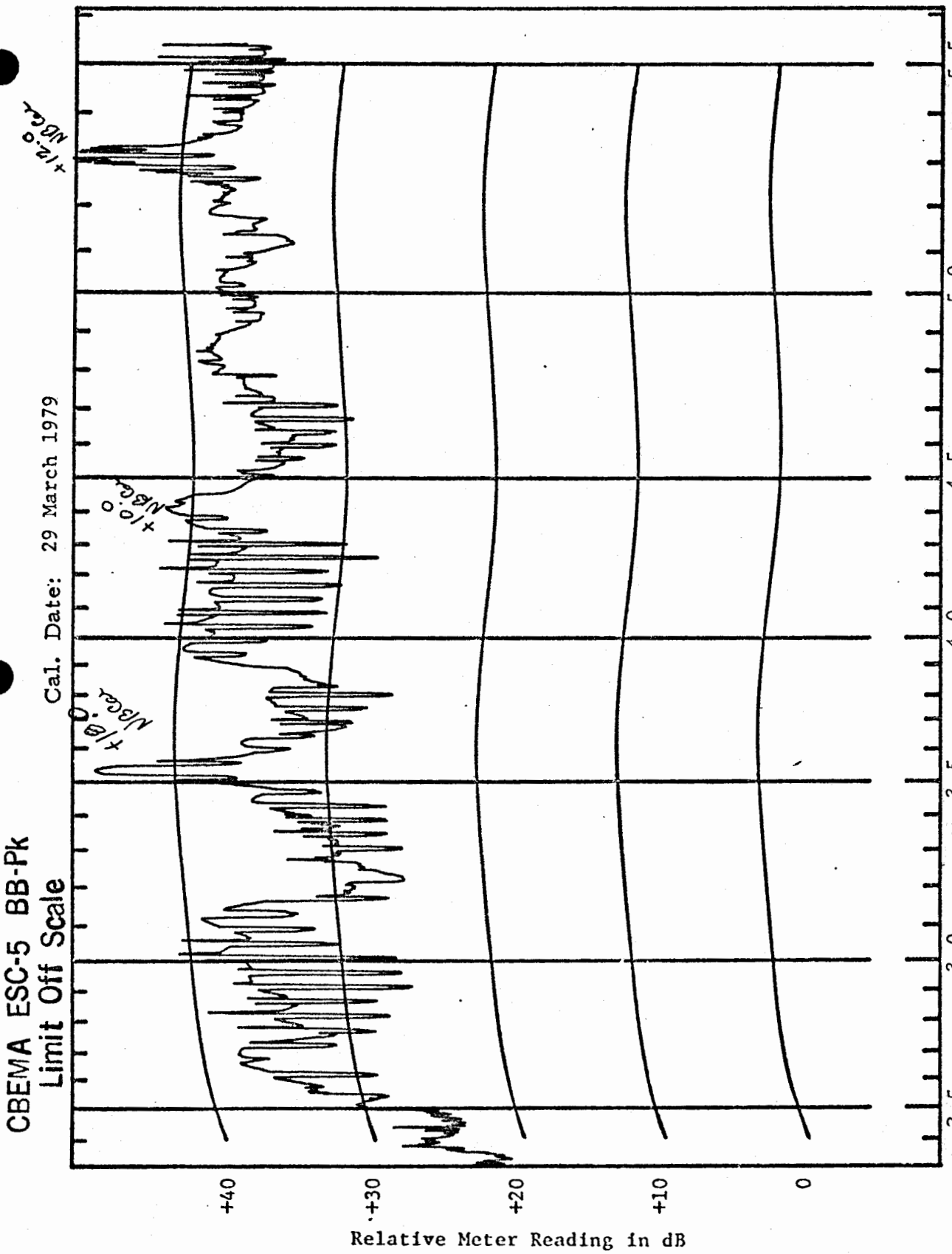
EMC-25 Band 7
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth



Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 8
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5uH/FCC LISN



Relative Meter Reading in dB

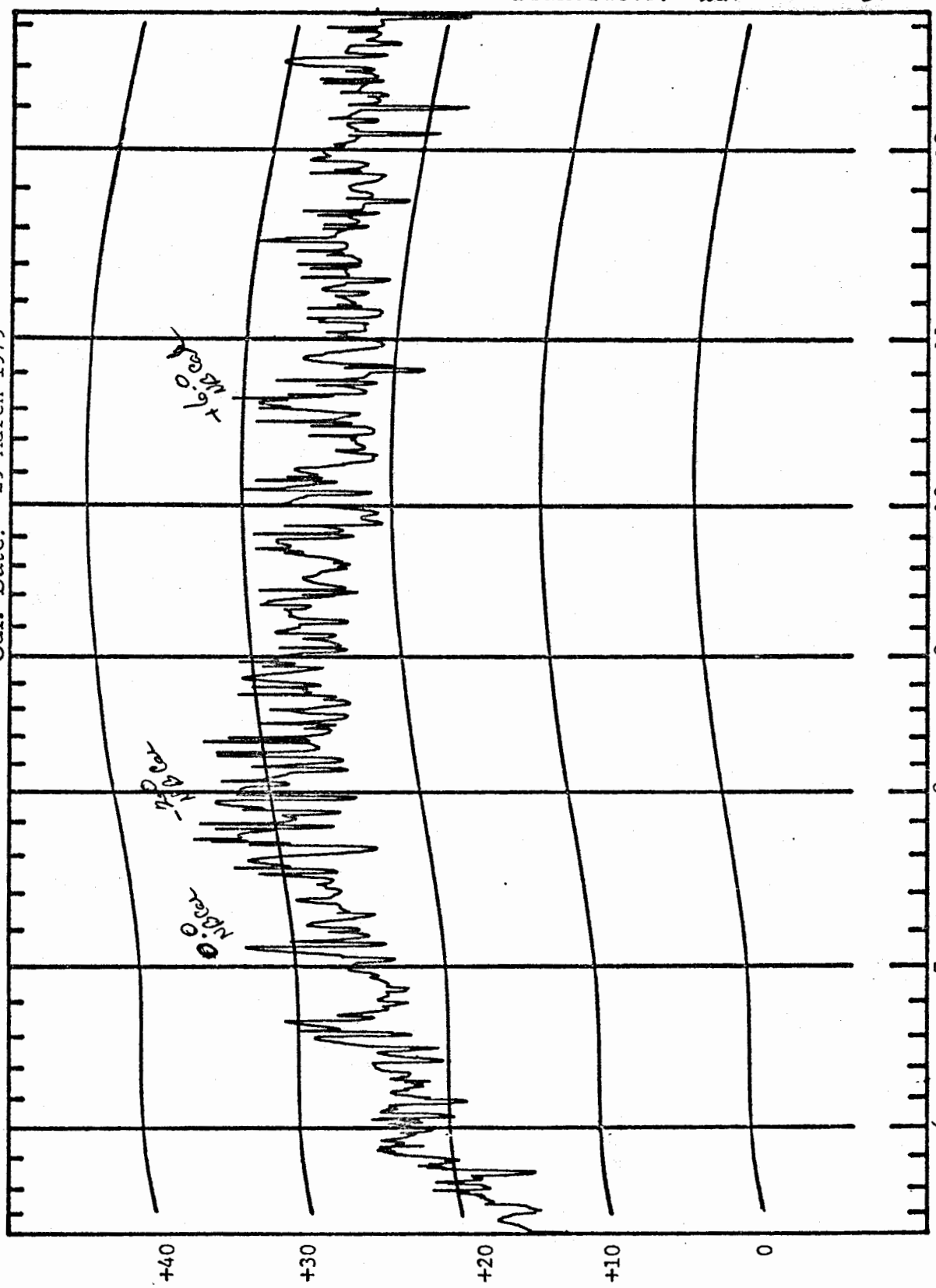
Equip. Under Test TRS-80 Interface
Equip. Oper. Mode Writing on Disc
Date 4 Apr 79 Operator [illegible]

Rcvr. Atten. 40 Ext. Atten. —
Line Tested Hot Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 9
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



Relative Meter Reading in dB

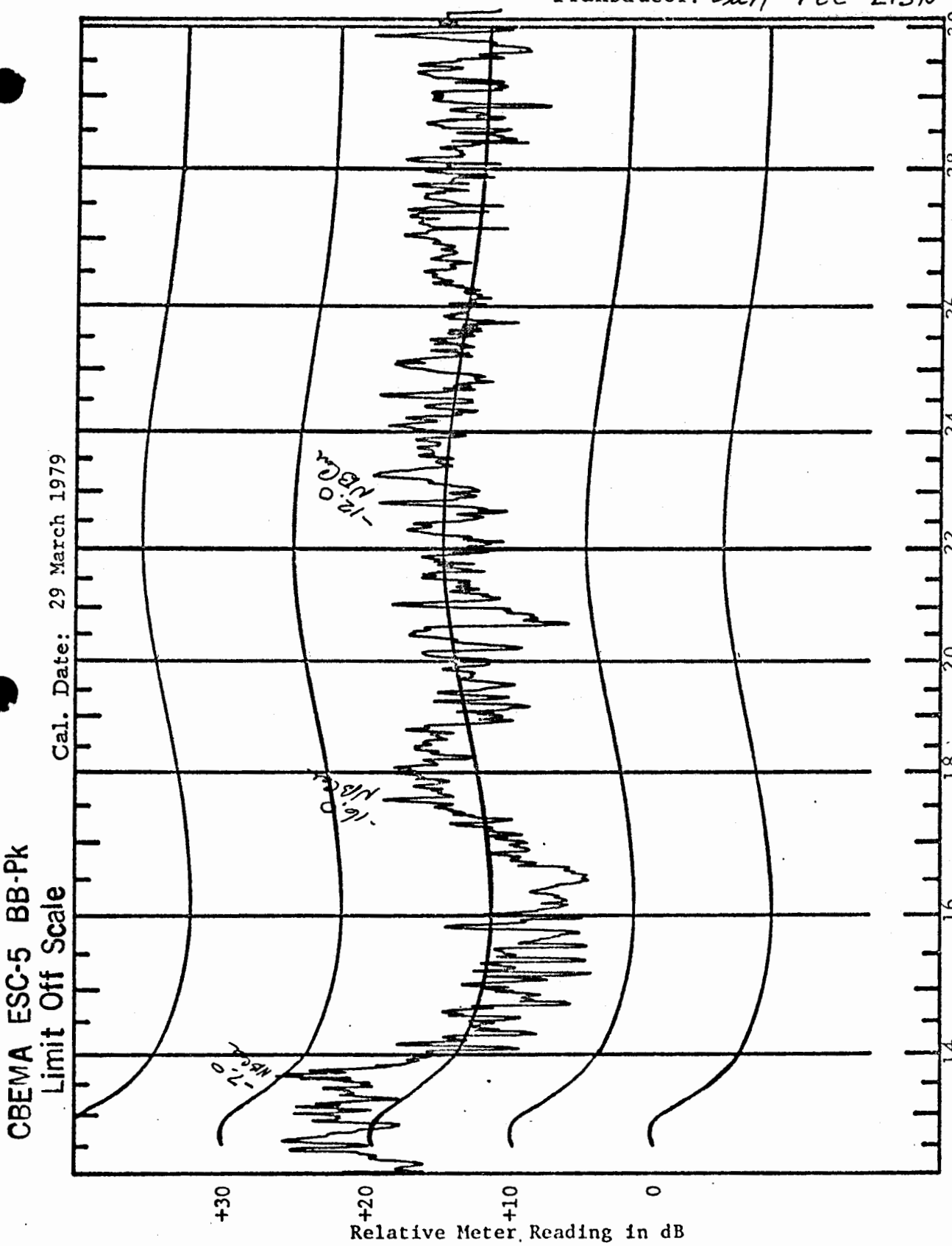
Equip. Under Test TRS-80 Interface
Equip. Oper. Mode Writing on Disc
Date 4 Apr 79 Operator [illegible]

Rcvr. Atten. 60 Ext. Atten. ____
Line Tested Hot Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 10
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5uH/ FCC LISN



Equip. Under Test TRS-80 Interface
Equip. Oper. Mode Writing on Disc
Date 4 Apr 79 Operator [signature]

Rcvr. Atten. 60 Ext. Atten. —
Line Tested Hot Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

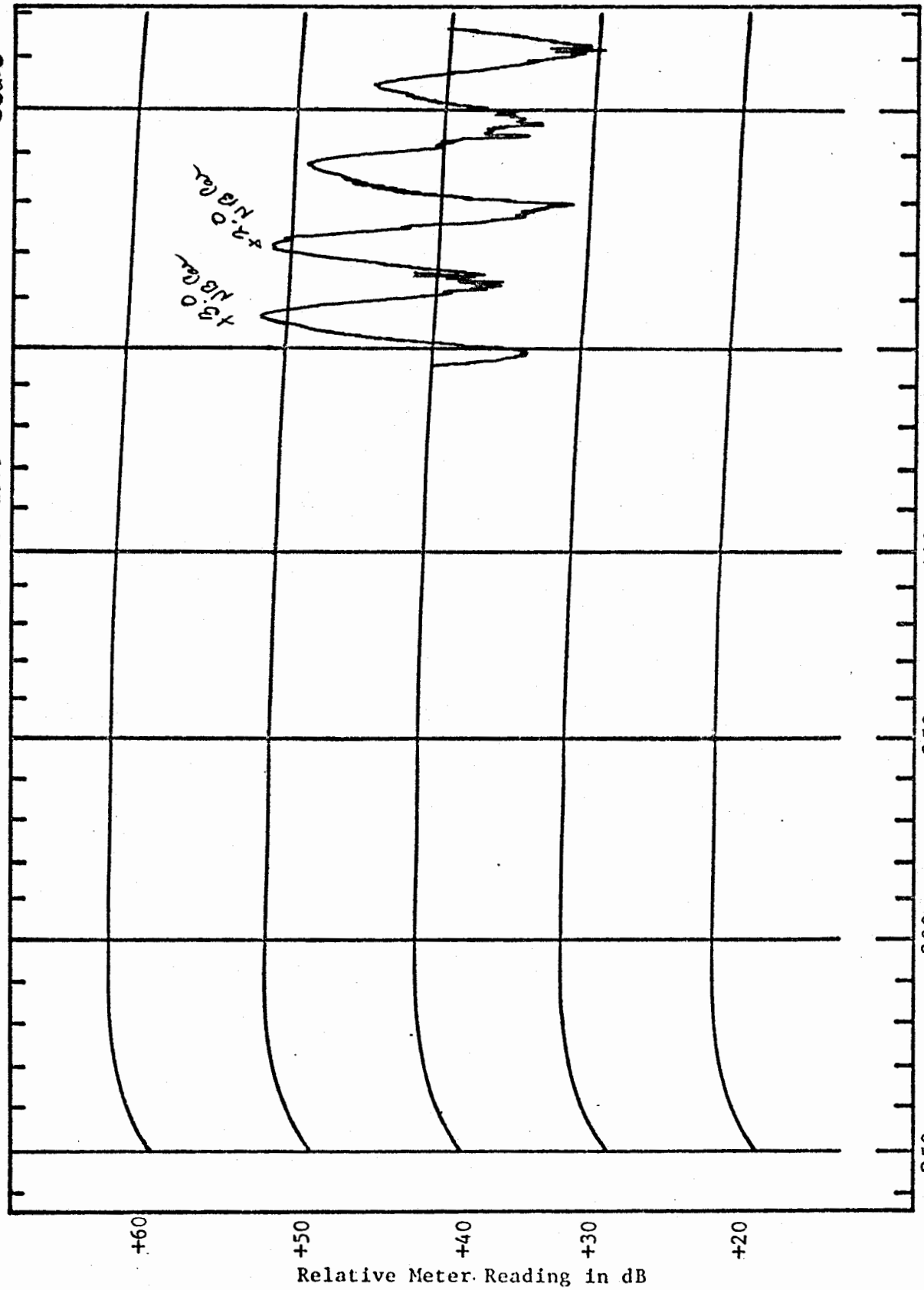
EXPANSION INTERFACE

NEUTRAL POWER LINE

NO MEMORY INSTALLED IN EI
"BACKUP" PROGRAM

EMC-25 Band 5
Peak Detector (BB Signals)
4 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



Rcvr. Atten. 20 Ext. Atten. —

Line Tested Neut Ground ON/OFF

Equip. Under Test TPS-80 Interface

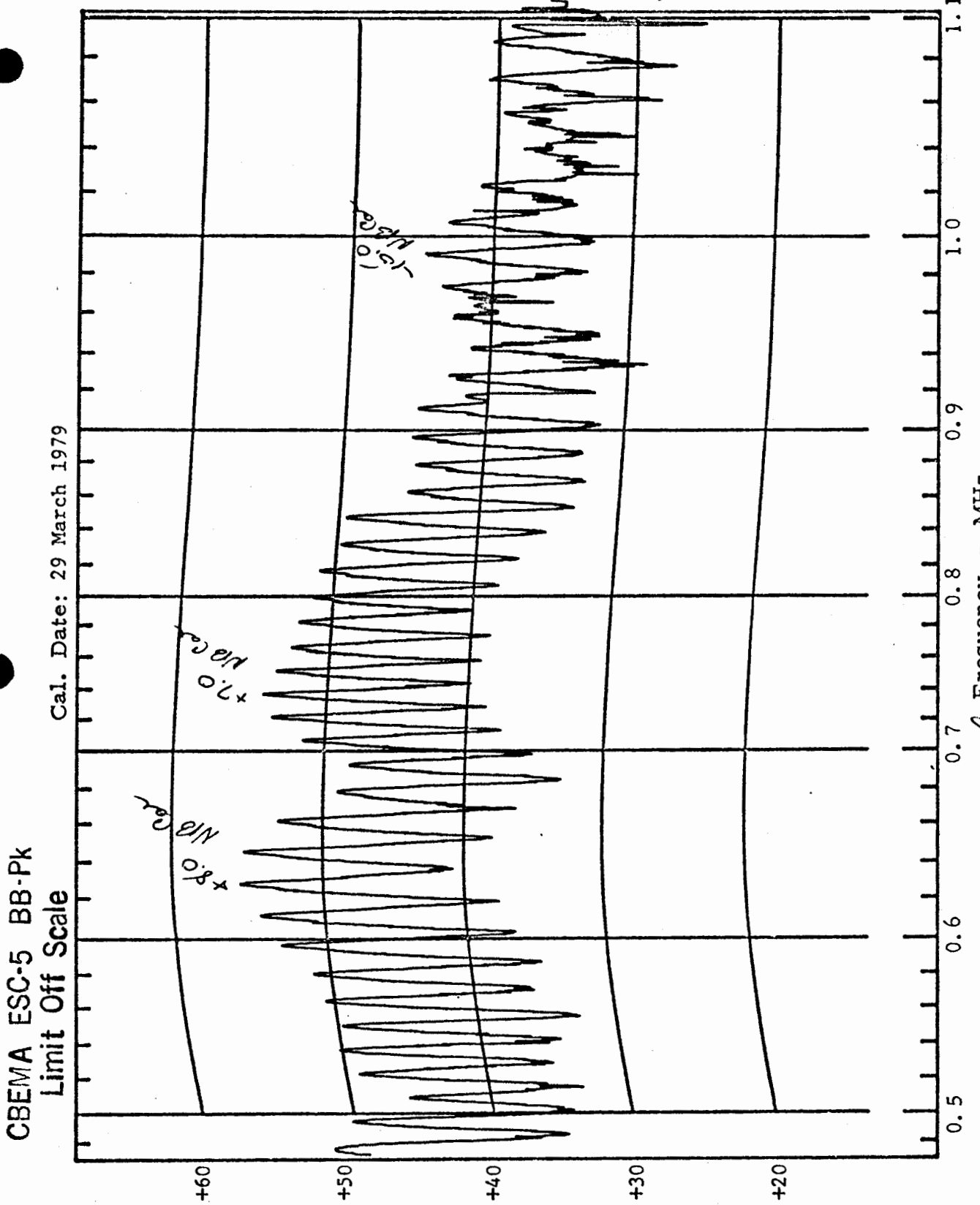
Equip. Oper. Mode Writing on Disc

Date 4 Jun 79 Operator [illegible]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 6
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth

Transducer: 5µH/FCC LISN



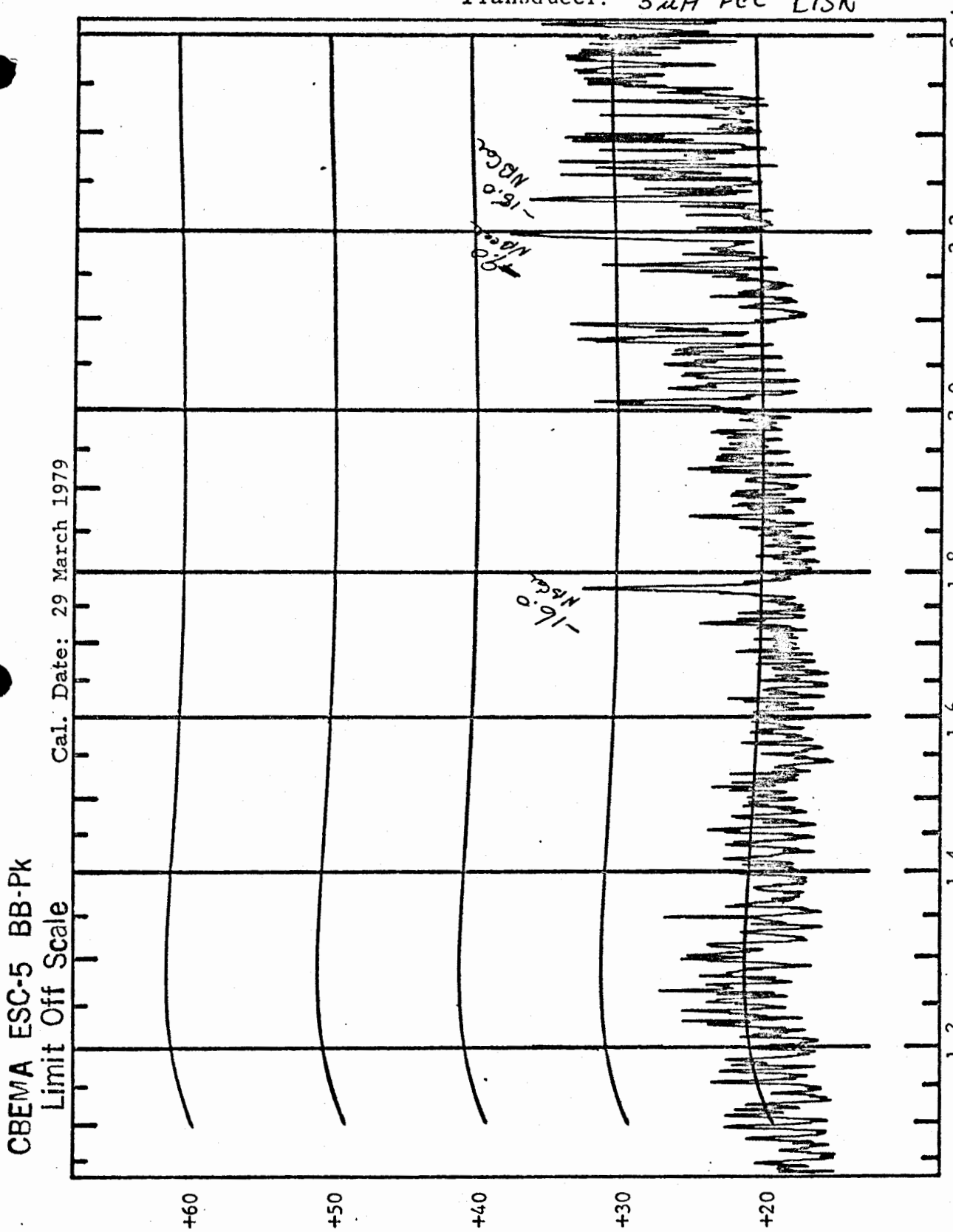
Relative Meter Reading in dB

Equip. Under Test TRS-80 Interface
Rcvr. Atten. 20 Ext. Atten. —
Line Tested Neut Ground ON/OFF
Equip. Oper. Mode Writing on Disc
Date 4 Apr 79 Operator [illegible]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB µV/MHz for conducted emissions and dB µV/m/MHz for radiated emissions.

EMC-25 Band 7
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth

Transducer: 5μH FCC LISN



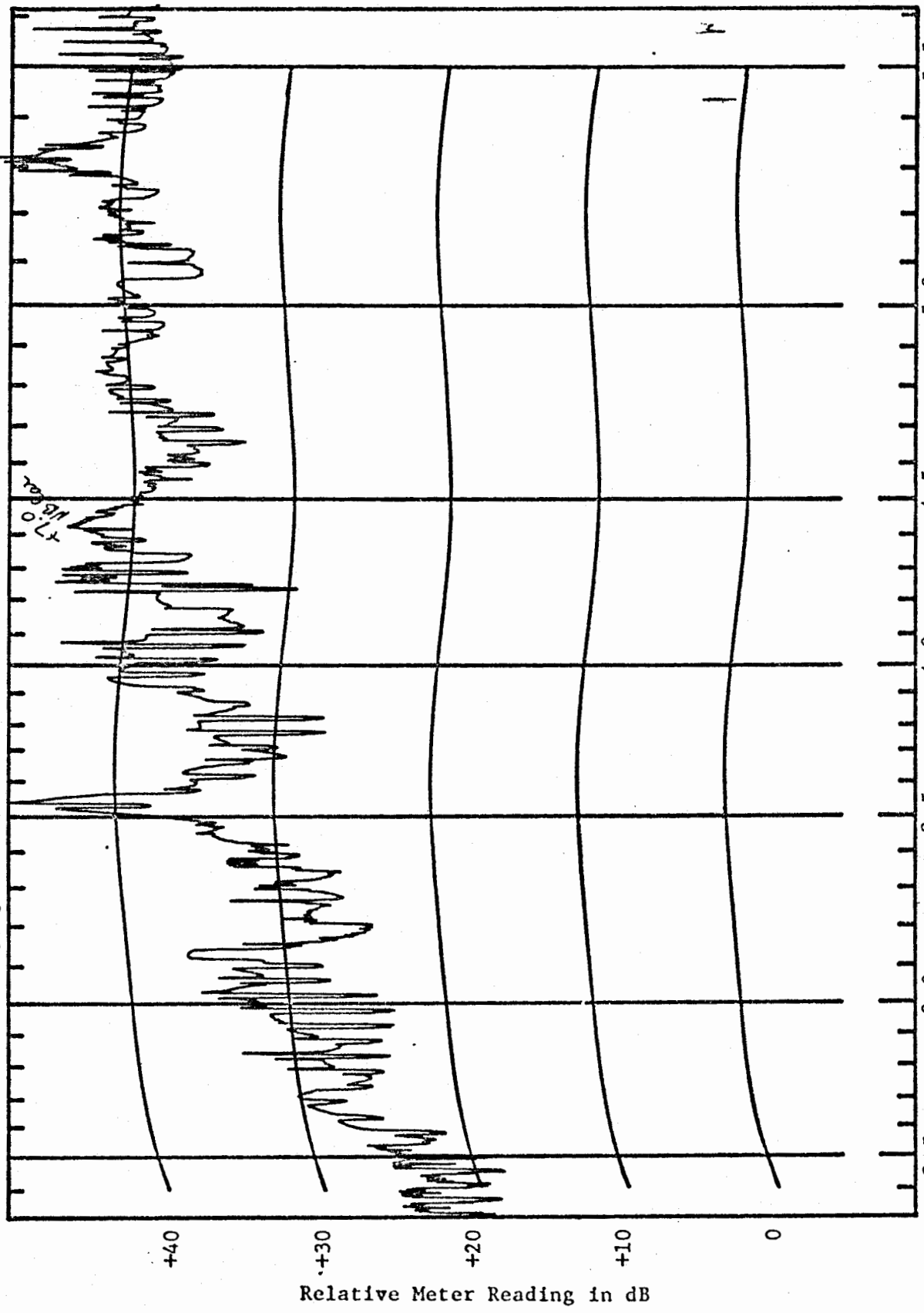
Equip. Under Test TRS-80 Interface
Equip. Oper. Mode Writing on Disc
Date 4 Apr 79 Operator [signature]

Rcvr. Atten. 40 Ext. Atten. —
Line Tested Neut Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 8
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5uH ~~EEC~~ LISN

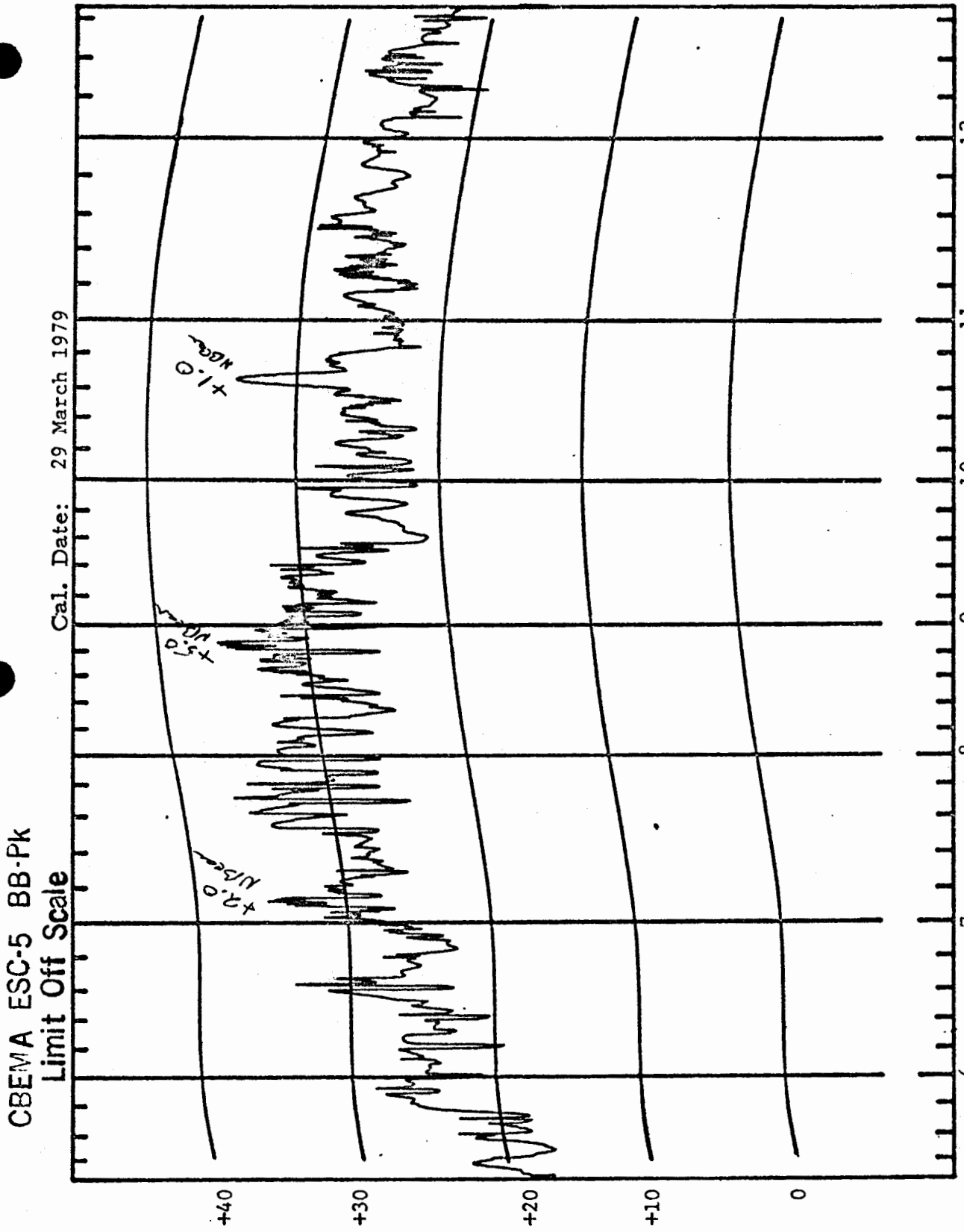


Equip. Under Test TRS-80 Interface
Rcvr. Atten. 40 Ext. Atten. —
Equip. Oper. Mode Writing on Disc
Line Tested Neut Ground ON/OFF
Date 4 Apr 79 Operator [signature]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 9
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



Relative Meter Reading in dB

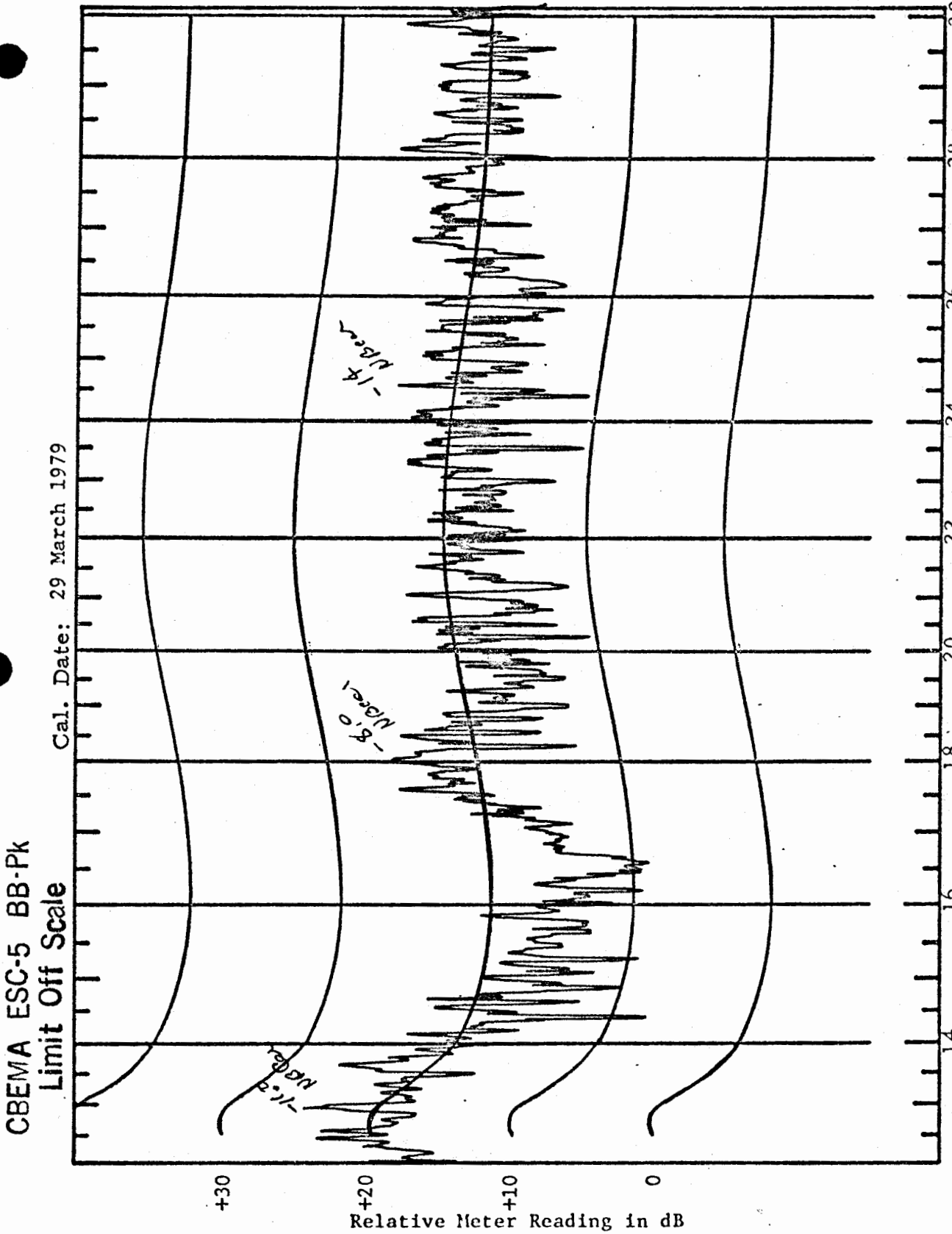
Equip. Under Test TRS-80 Interface
Equip. Oper. Mode Utility on Disc
Date 4 Apr 79 Operator A. D. Scott

Rcvr. Atten. 60 Ext. Atten. —
Line Tested Neut Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 10
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



Equip. Under Test TRS-80 Interface
Rcvr. Atten. 40 Ext. Atten. —
Equip. Oper. Mode Writing on Disc
Line Tested Neutral Ground ON/OFF
Date 4 Apr 79 Operator [illegible]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EXPANSION INTERFACE

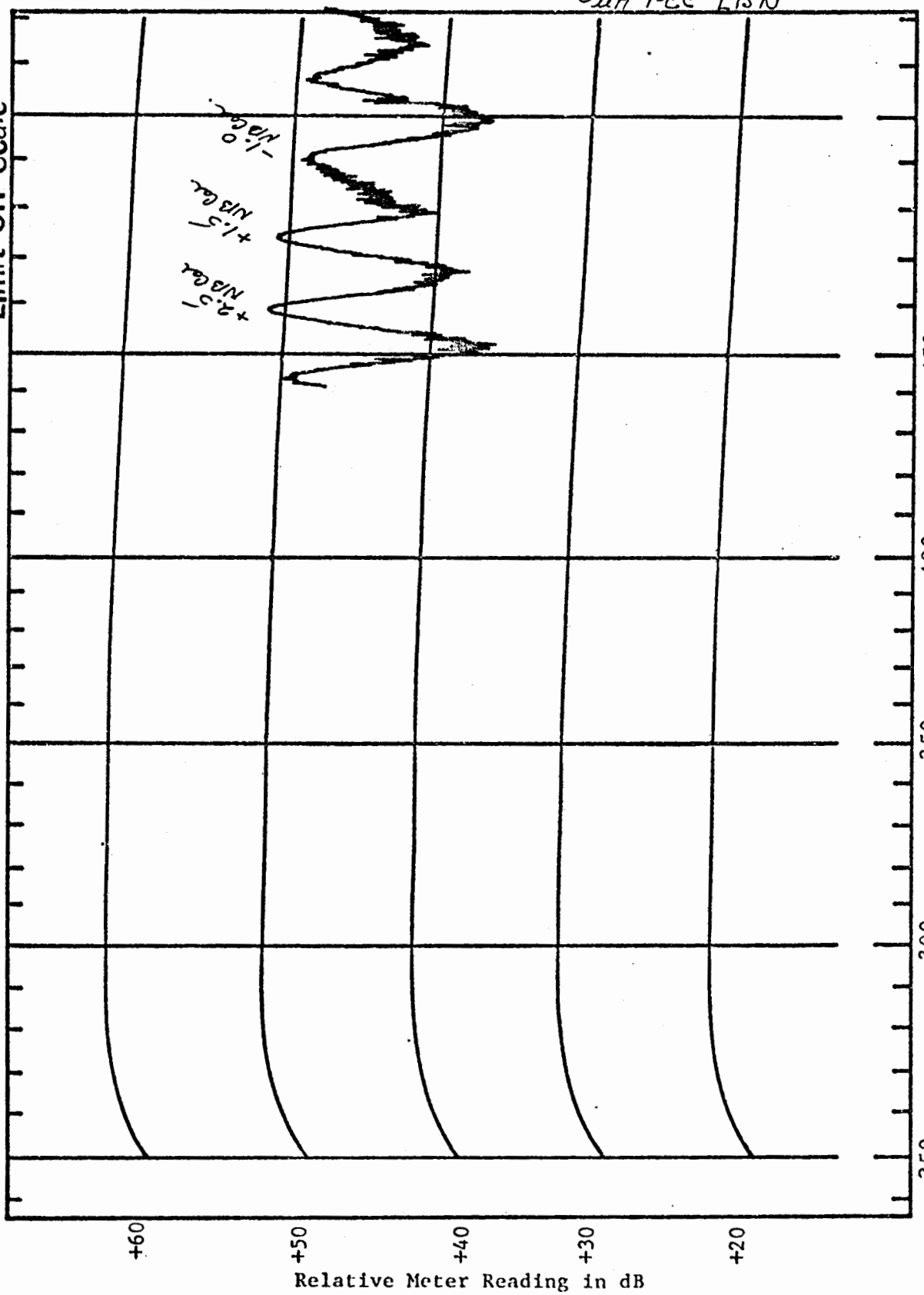
HOT POWER LINE

32K MEMORY INSTALLED IN EI
"COUNTDOWN" PROGRAM

(1 PRINT MEM;: GO SUB 1)

EMC-25 Band 5
Peak Detector (BB Signals)
4 kHz 3dB Bandwidth

Transducer: 5uH/FCC LISN



Equip. Under Test TRS-80 - Interface/32K Rcvr. Atten. 20 Ext. Atten. —

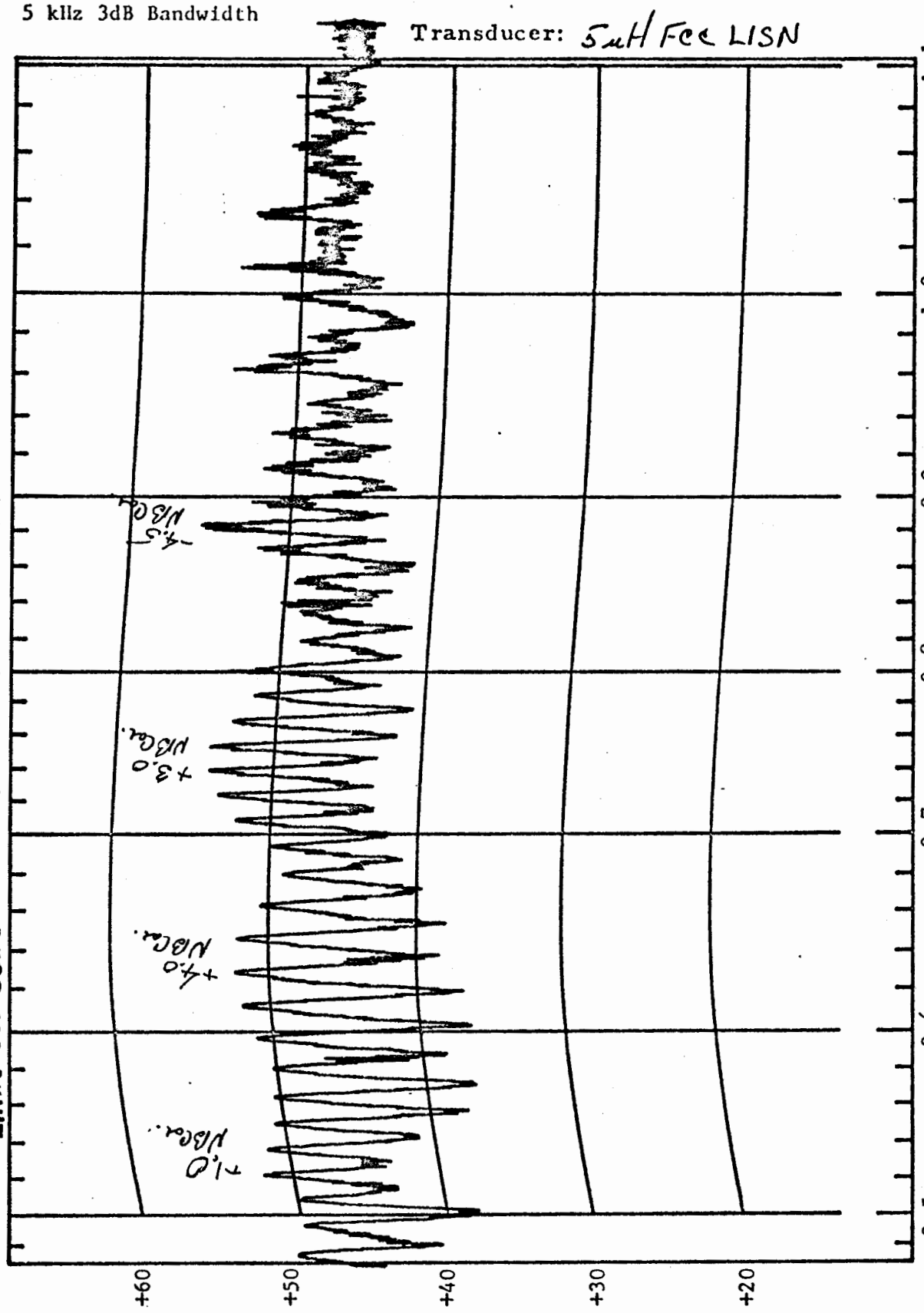
Equip. Oper. Mode Countdown Program - Running Line Tested Hot Ground ON/OFF

Date 11 Jun 79 Operator Cliff Scott

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 6
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



Relative Meter Reading in dB

Equip. Under Test TRS-80 - Interface / 32K Rcvr. Atten. 20 Ext. Atten. —

Equip. Oper. Mode Countdown Program - Running Line Tested Hot Ground ON/OFF

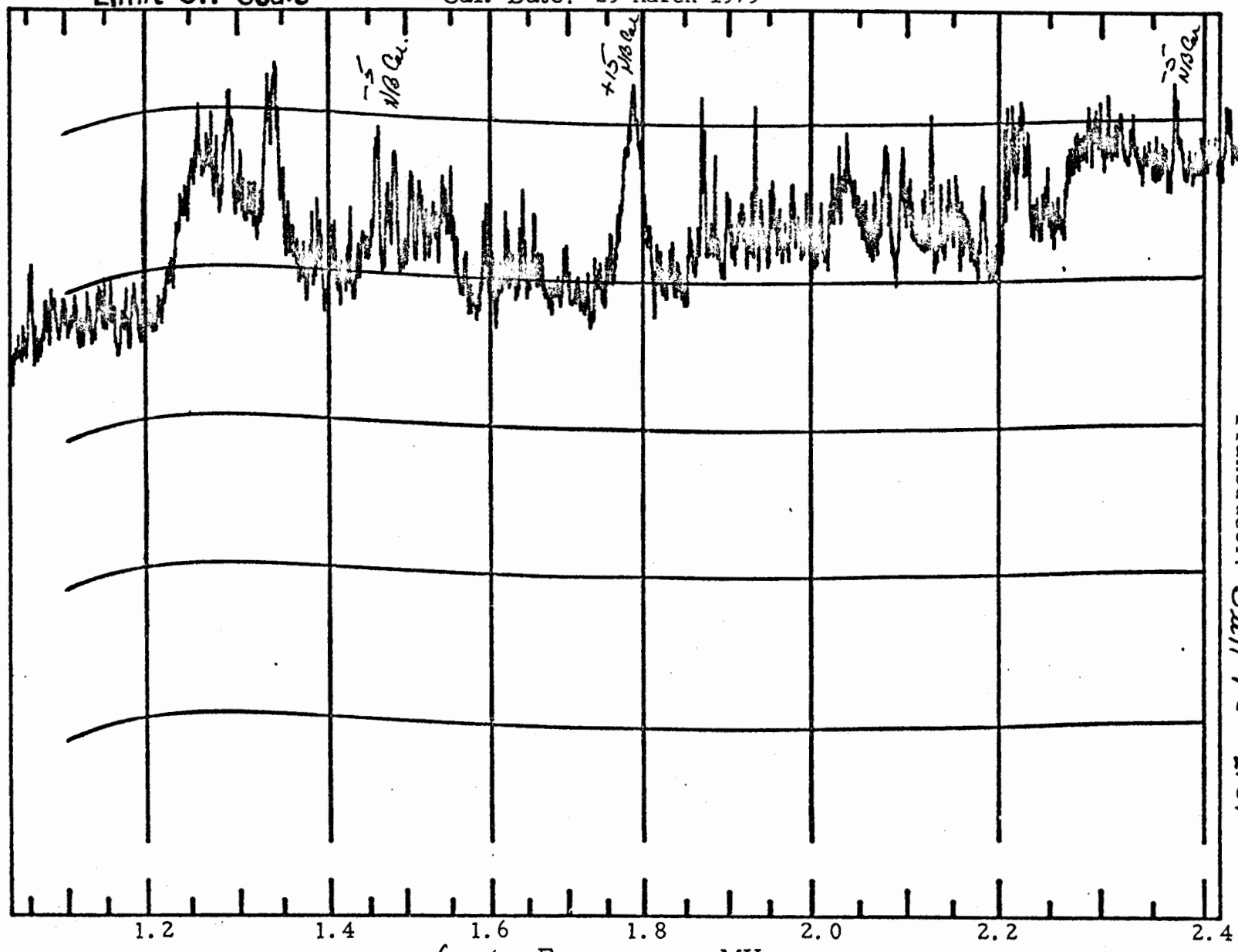
Date 16 Jul 79 Operator [illegible]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

CBEMA ESC-5 BB-Pk
Limit Off Scale

Cal. Date: 29 March 1979

EMC-25 Band 7
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth



Relative Meter Reading in dB

Transducer: 5uH/50Ω LISN

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

Equip. Under Test TRS-80 - Interface/82k

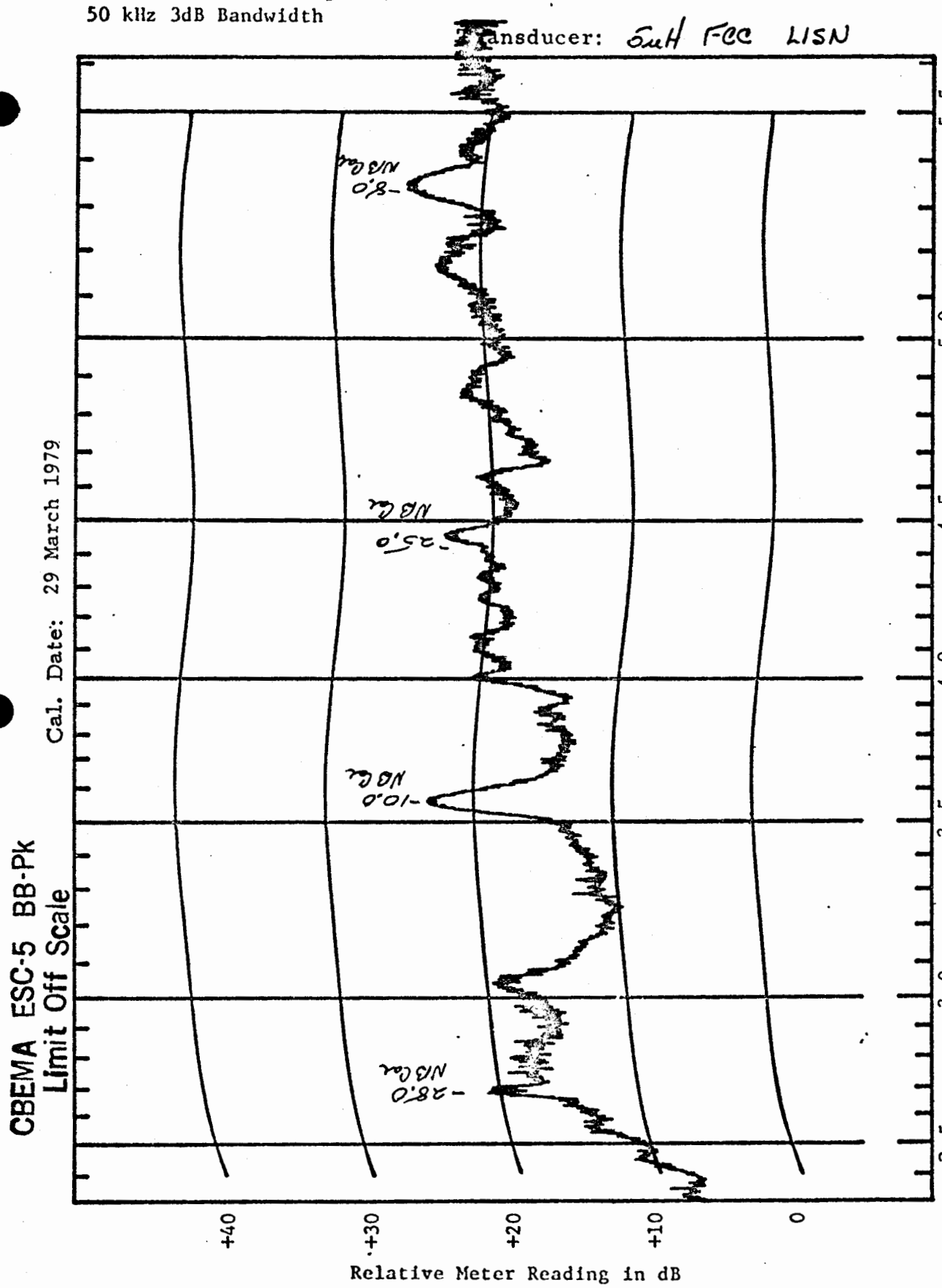
Rcvr. Atten. 20 Ext. Atten. —

Equip. Oper. Mode Countdown Program - Running

Line Tested Hot Ground ON/OFF

Date 16 Apr 79 Operator C.H. Booth

EMC-25 Band 8
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

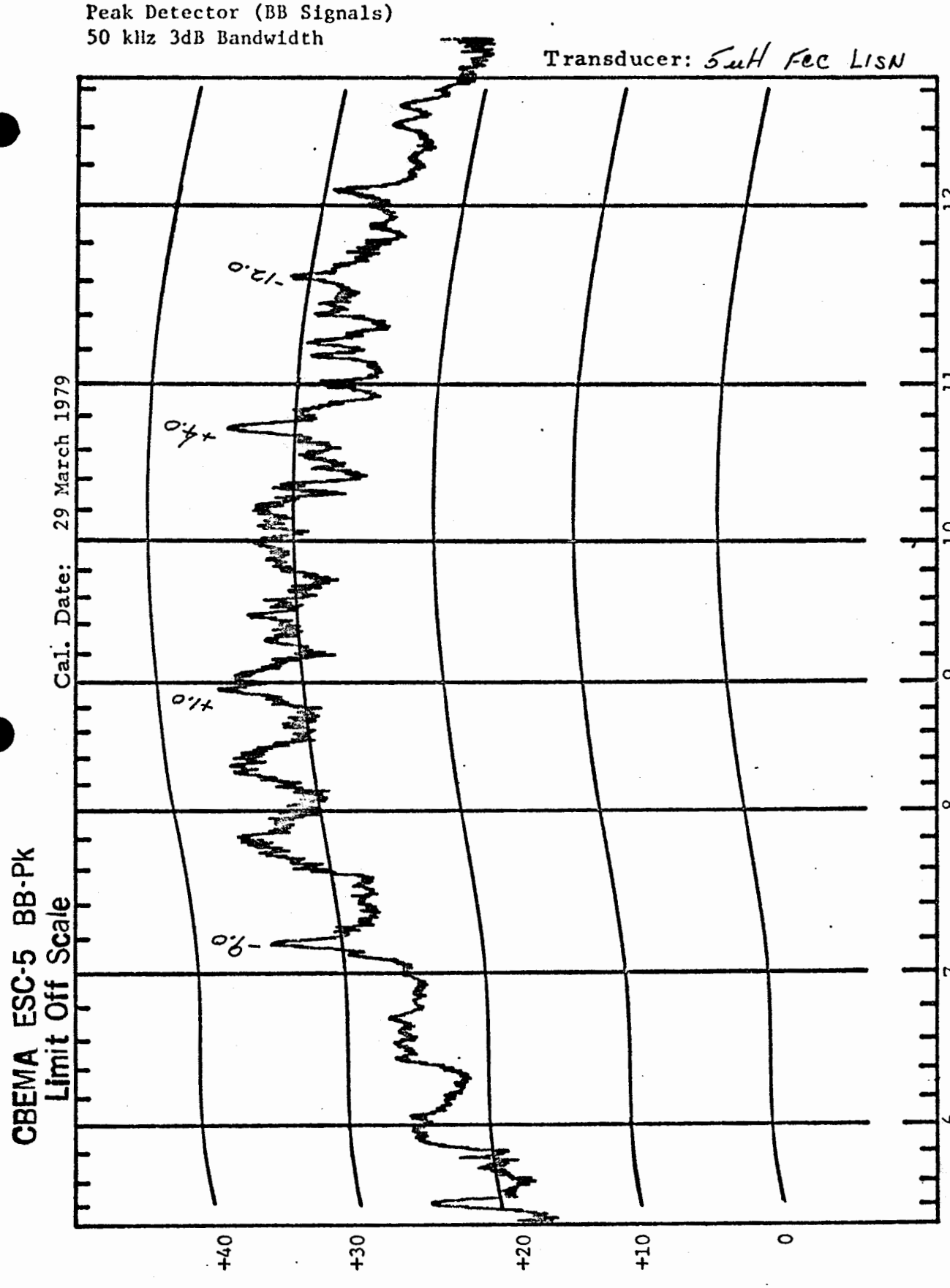


Equip. Under Test TRS-80 - Interface/32K
Equip. Oper. Mode Countdown Program - Running
Date 16 Apr 79 Operator C. Booth

Rcvr. Atten. 60 Ext. Atten. —
Line Tested Hot Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 9
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth



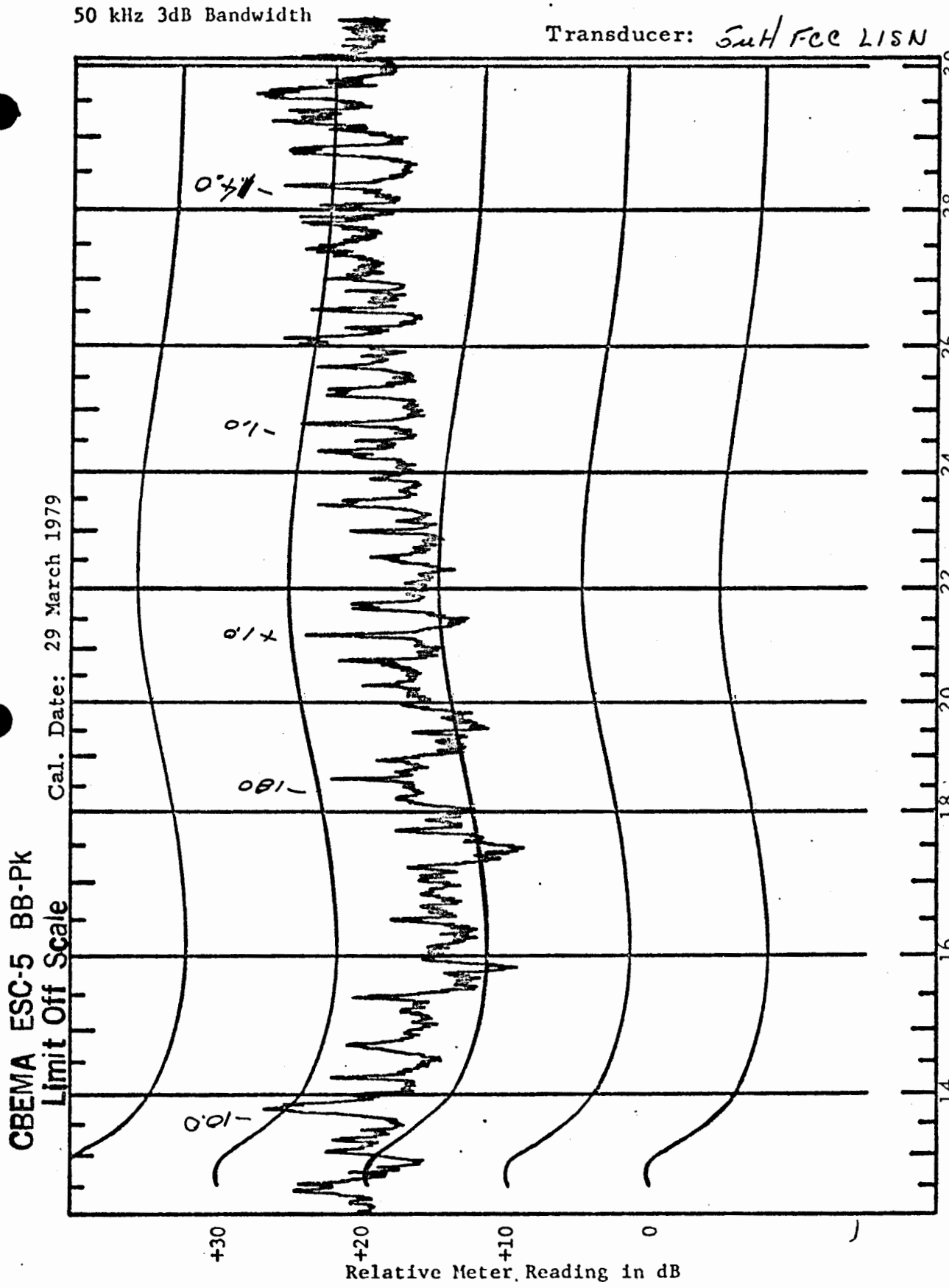
Equip. Under Test TRS-80 - Interface / 32K
Equip. Oper. Mode Countdown Program - Running
Date 16 Apr 79 Operator C.A. Booth

Rcvr. Atten. 60 Ext. Atten. —
Line Tested Hot Ground ON/OFF

Relative Meter Reading in dB

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 10
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth



Equip. Under Test TRS-80 - Interface 1/32K Rcvr. Atten. 40 Ext. Atten. —

Equip. Oper. Mode Countdown Program - Running Line Tested Hot Ground ON/OFF

Date 16 Jan 79 Operator Gilbreath

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

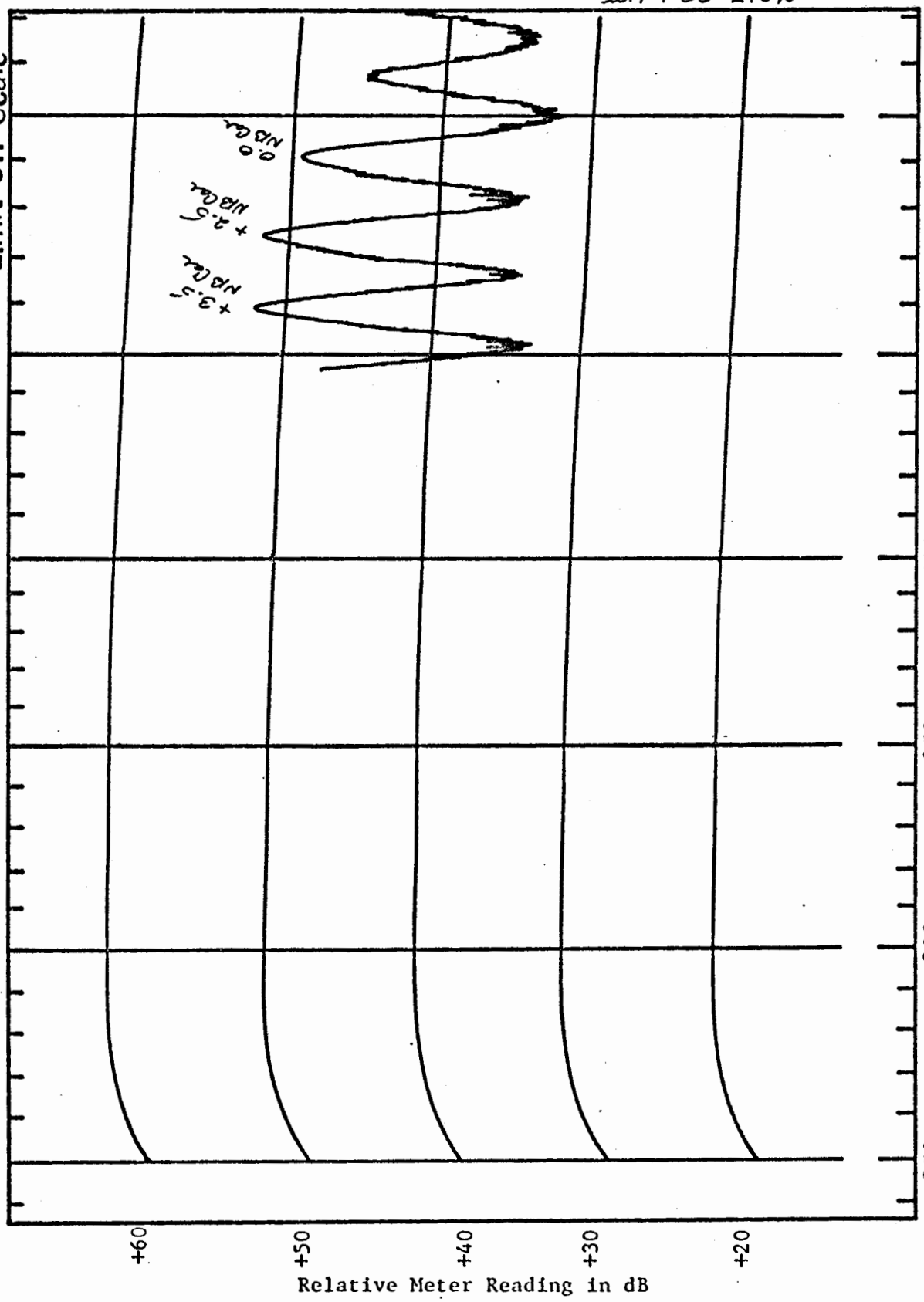
EXPANSION INTERFACE

NEUTRAL POWER LINE

32K MEMORY INSTALLED IN EI
"COUNTDOWN" PROGRAM

EMC-25 Band 5
Peak Detector (BB Signals)
4 kHz 3dB Bandwidth

Transducer: 5 μH/FCC LISN



Cal. Date: 29 March 1979

Frequency - kHz

Equip. Under Test TRS-80 - Interface/32K Rcvr. Atten. 20 Ext. Atten. —

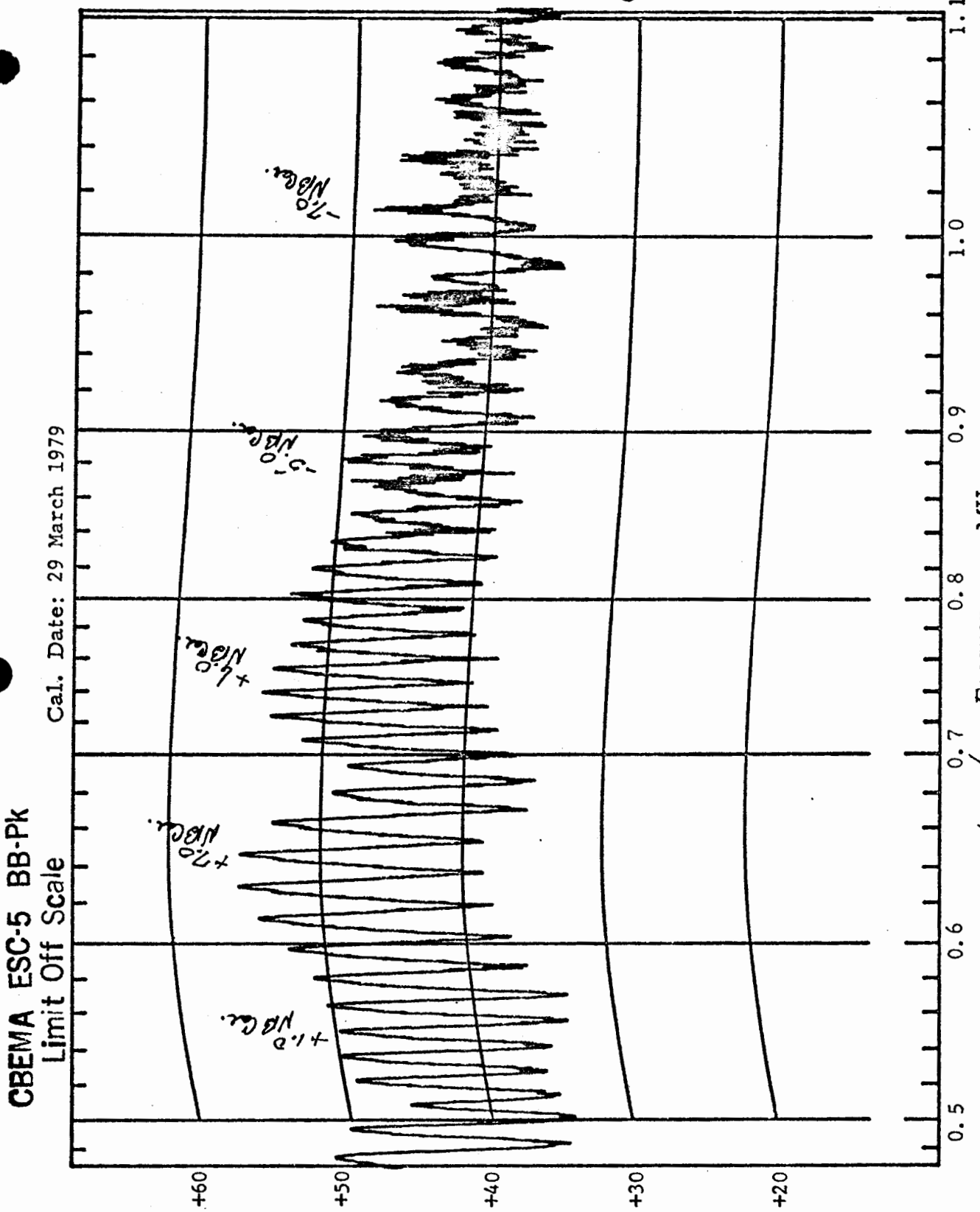
Equip. Oper. Mode Countdown Program - Running Line Tested Neut Ground ON/OFF

Date 16 Feb 79 Operator [illegible]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 6
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth

Transducer: 5uH HCC LISN



Relative Meter Reading in dB

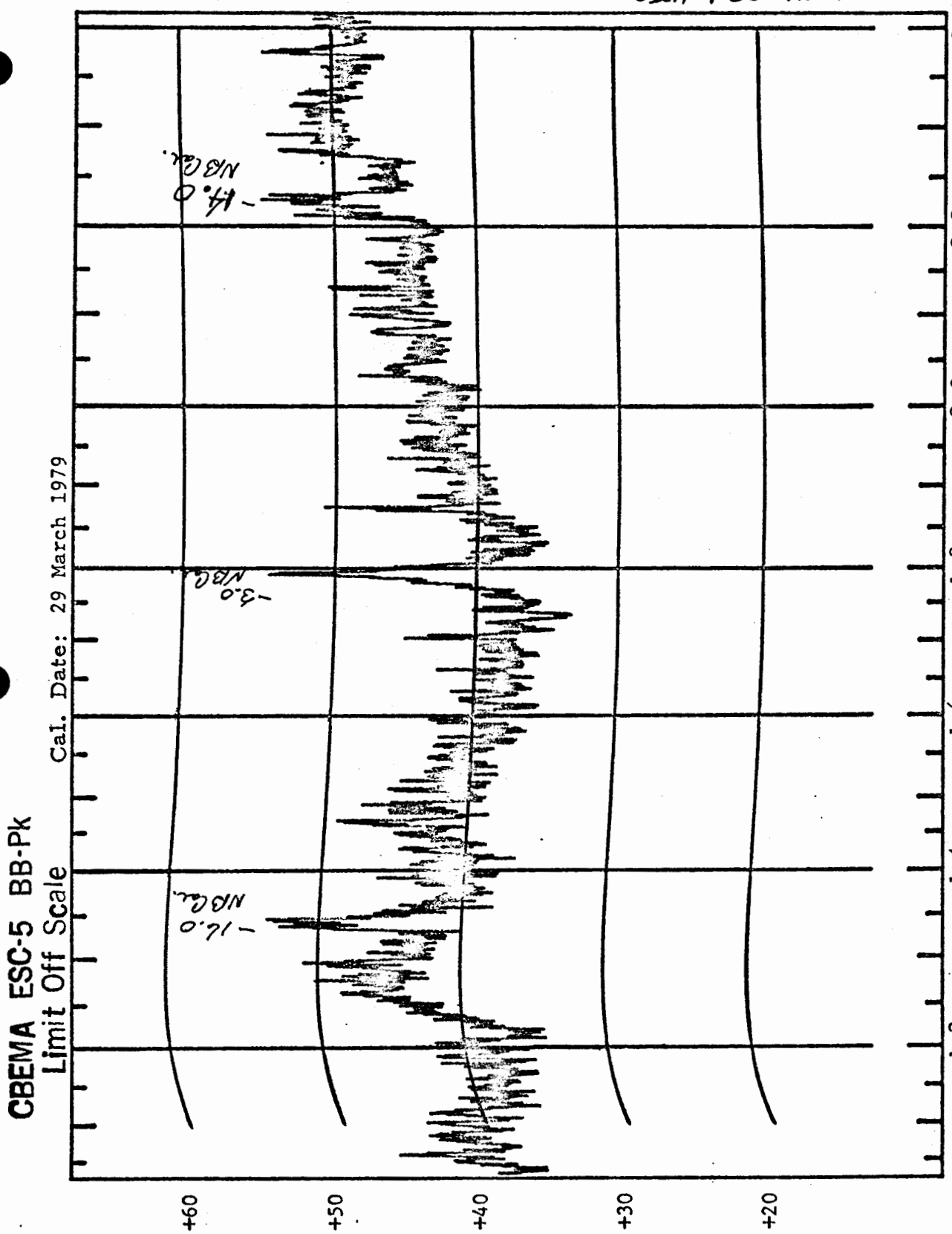
Equip. Under Test TRS-80 - Interface/82K
Equip. Oper. Mode Quotation Cogram - Running
Date 16 Apr 79 Operator [illegible]

Rcvr. Atten. 20 Ext. Atten. —
Line Tested Neut Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 7
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



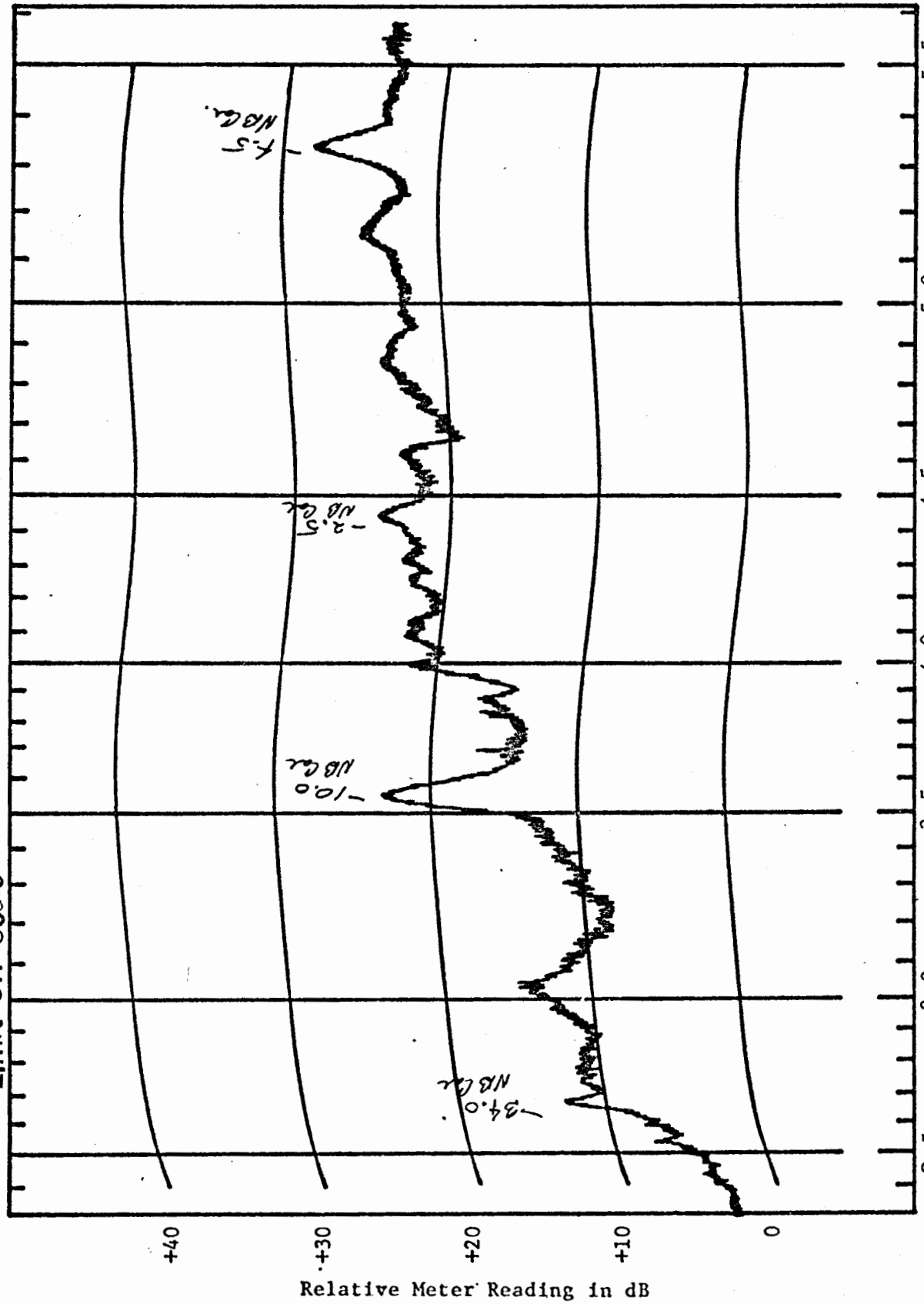
Equip. Under Test TRS-80 Interface/82K
Equip. Oper. Mode Countdown Program - Running
Date 16 Apr 79 Operator C. Booth

Rcvr. Atten. 20 Ext. Atten. —
Line Tested Neut Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 8
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5uH/FCC LISN



CBEMA ESC-5 BB-Pk
Limit Off Scale

Cal. Date: 29 March 1979

Equip. Under Test TRS-80 · Interface 32K

Equip. Oper. Mode Countdown Program - Running

Date 16 Apr 79 Operator Art Scott

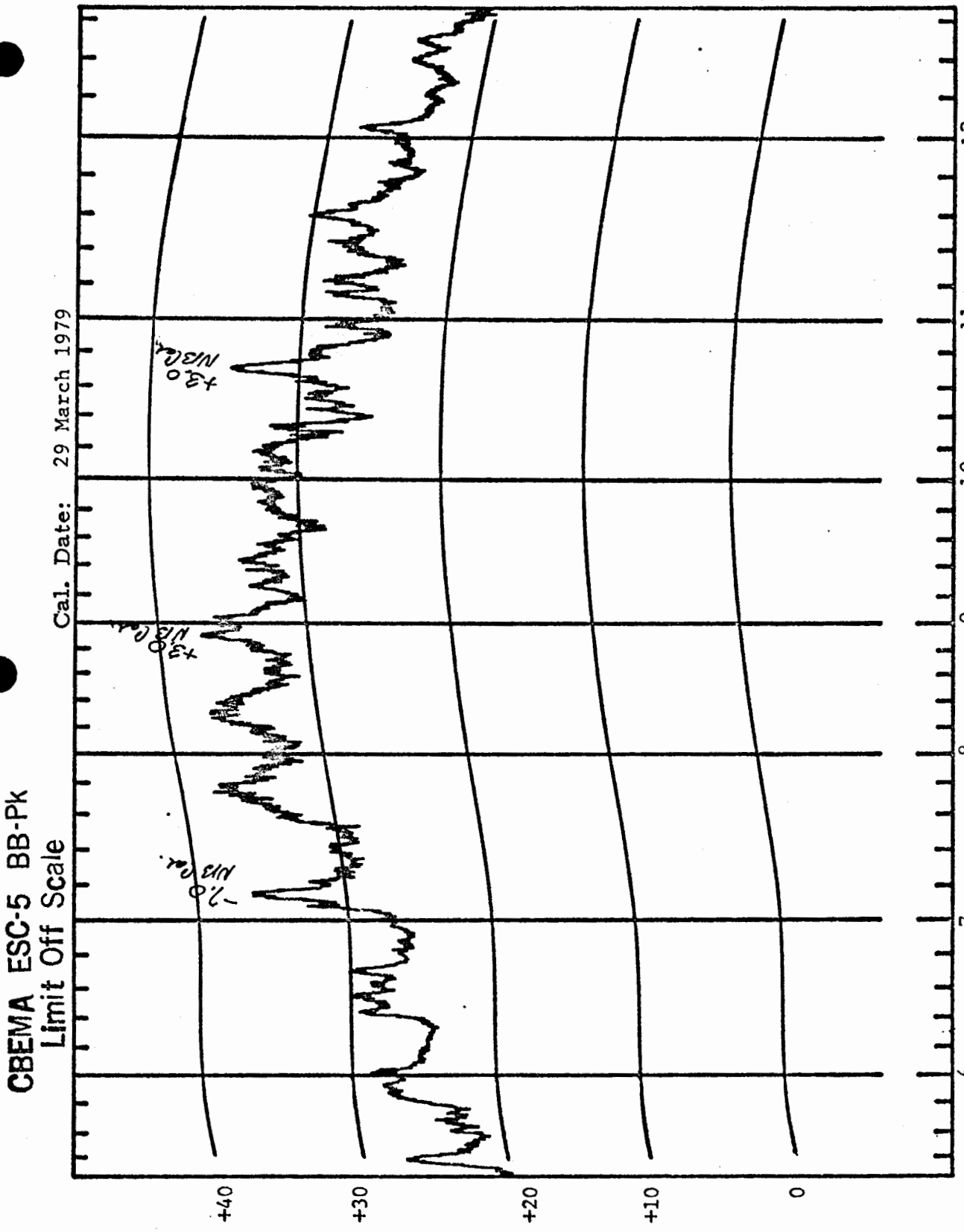
Rcvr. Atten. 60 Ext. Atten. —

Line Tested Neut Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 9
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



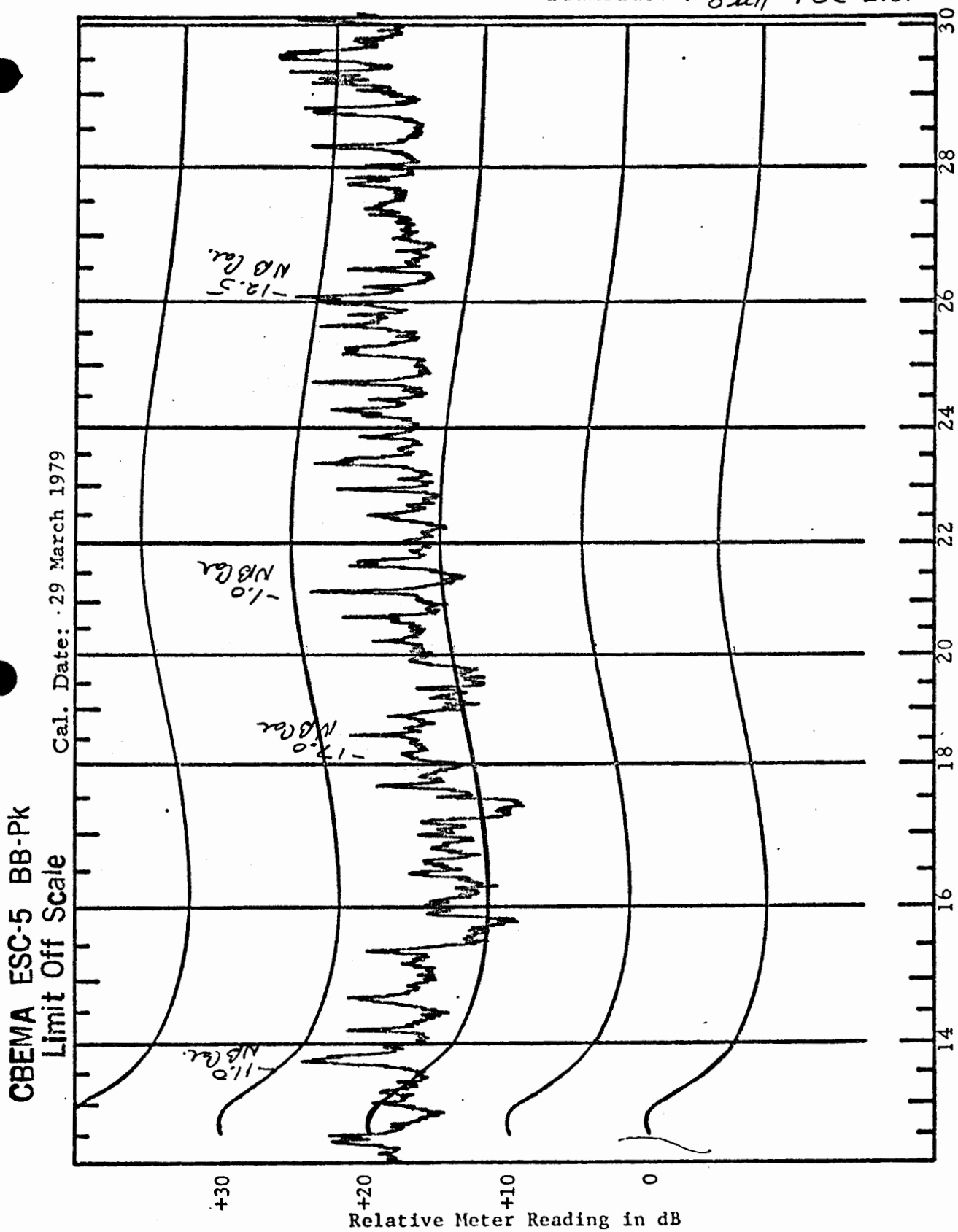
Relative Meter Reading in dB

Equip. Under Test TRS-80 - Interface/32K
Rcvr. Atten. 60 Ext. Atten. —
Equip. Oper. Mode Countdown Program - Running
Line Tested Neut Ground ON/OFF
Date 16 Jul 79 Operator [illegible]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 10
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 50uH FCC LISN



Equip. Under Test TRS-80 - Interface/32k
Rcvr. Atten. 60 Ext. Atten. ____
Equip. Oper. Mode Countdown Program - Running
Line Tested Neut Ground ON/OFF
Date 16 Aug 79 Operator A. Abbott

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

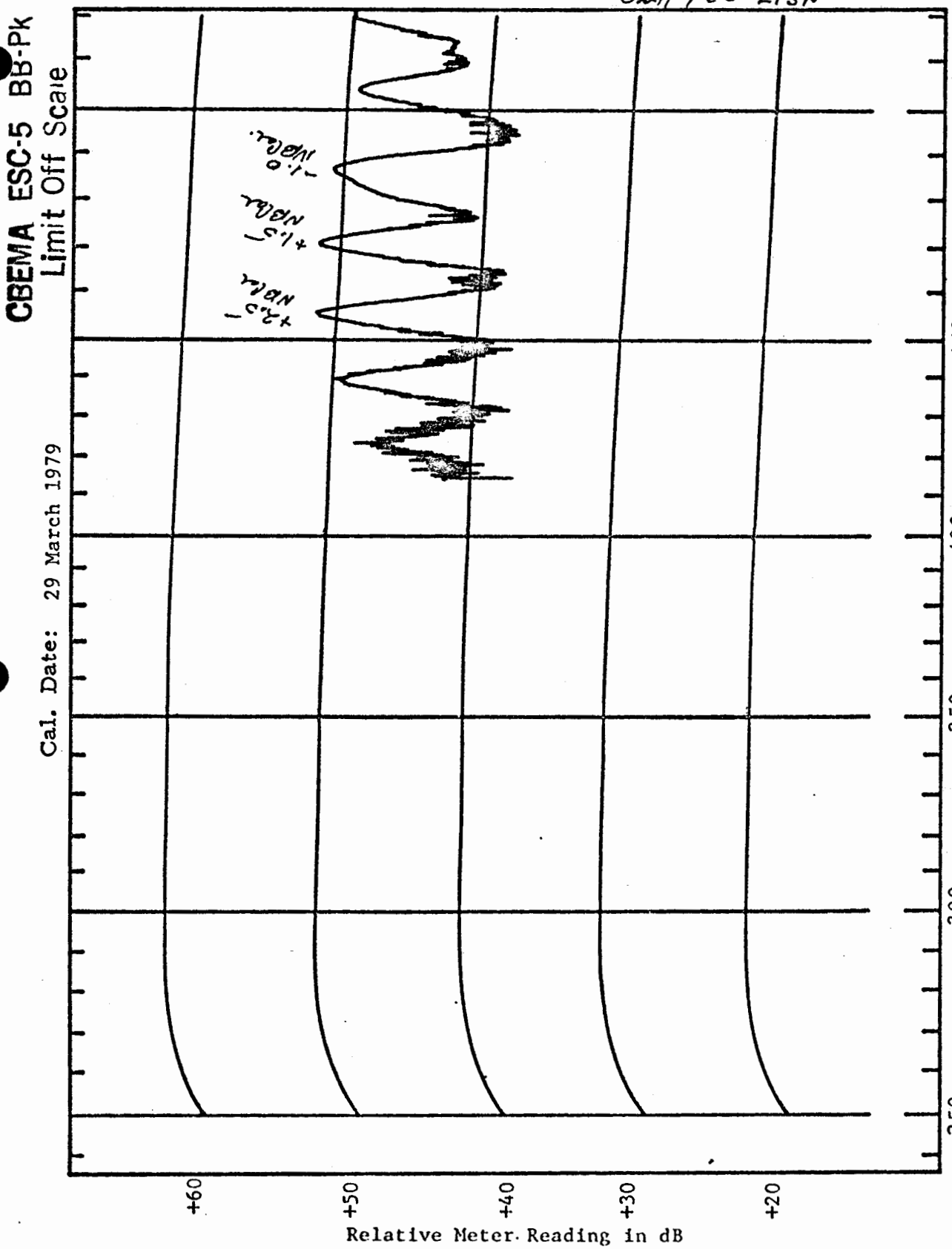
EXPANSION INTERFACE

HOT POWER LINE

32K MEMORY INSTALLED IN EI
NO PROGRAM OPERATION

EMC-25 Band 5
Peak Detector (BB Signals)
4 kHz 3dB Bandwidth

Transducer: 5uH/FCC LISN



Equip. Under Test TRS-80 - Interface #2K Rcvr. Atten. 20 Ext. Atten. —

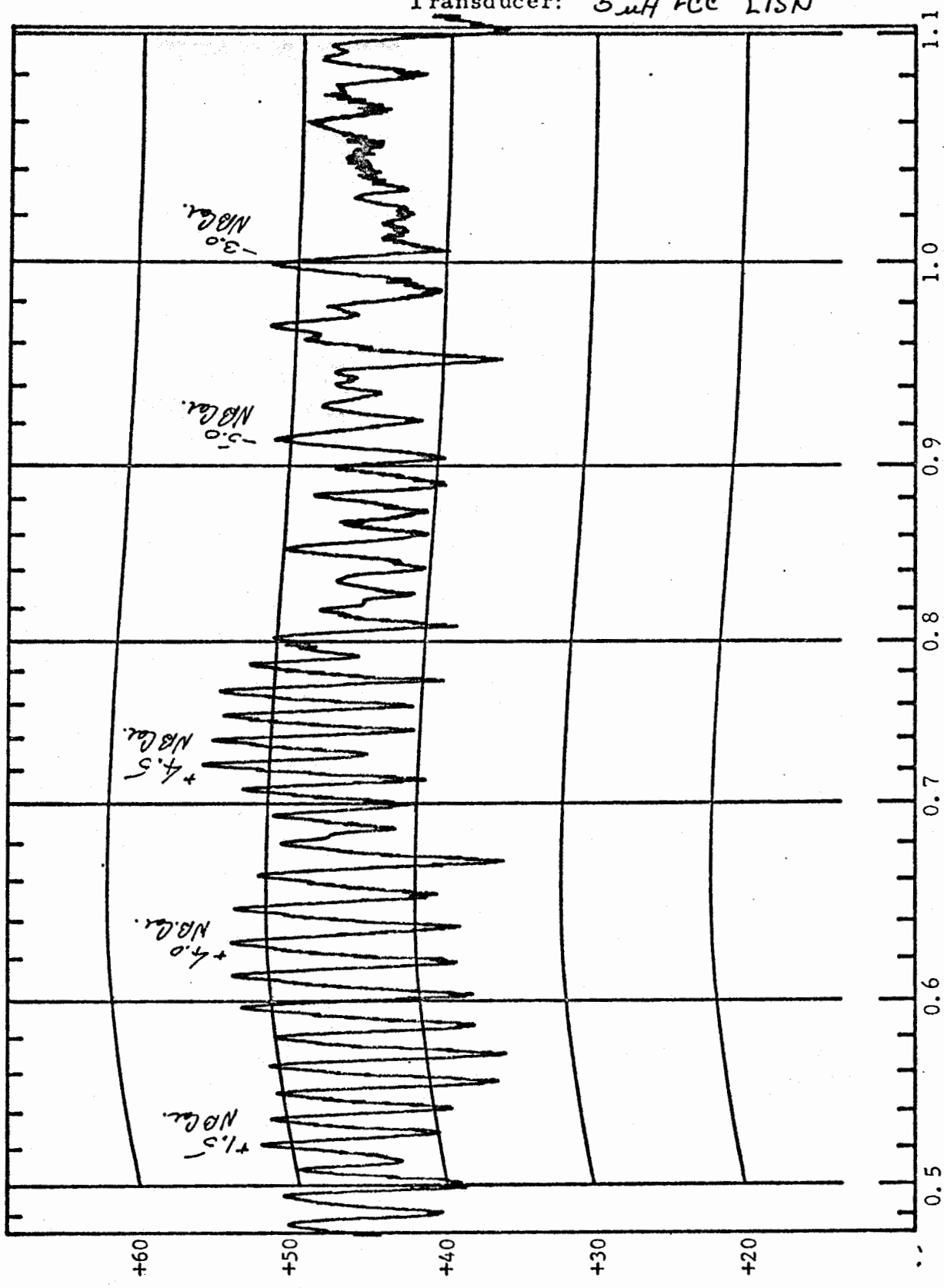
Equip. Oper. Mode Countdown Program-Standby after limit Line Tested Hot Ground ON/OFF

Date 16 Jan 79 Operator Abbott

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 6
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth

Transducer: 5uH/FCC LISN



Equip. Under Test TBS-80 - Interface/32K Rcvr. Atten. 20 Ext. Atten. —

Equip. Oper. Mode Continuous Program - Standby after finish Line Tested Hot Ground ON/OFF

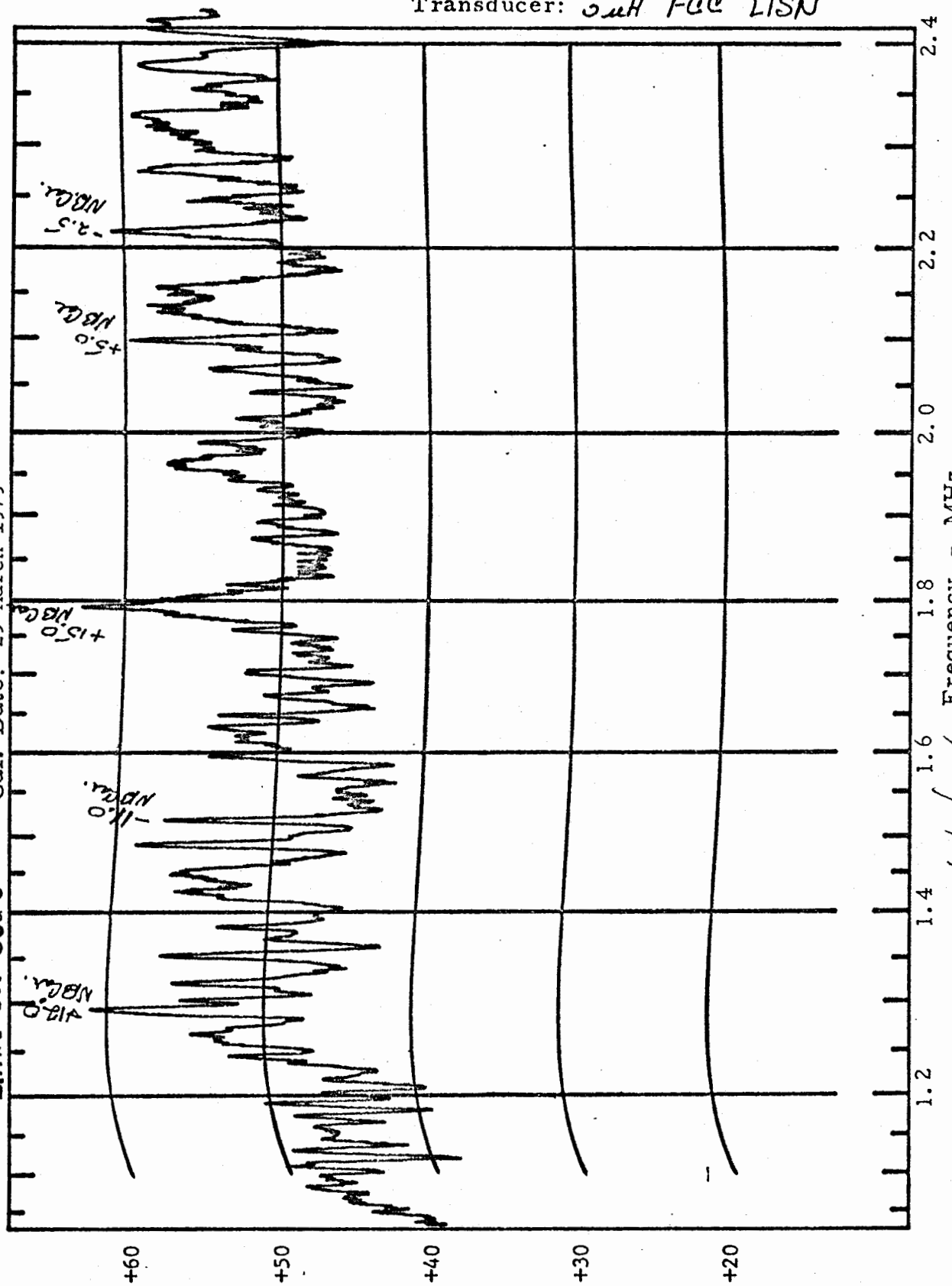
Date 16 Apr 79 Operator [signature]

Relative Meter Reading in dB

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 7
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



Equip. Under Test TRS-80 - Interface/32k Rcvr. Atten. 20 Ext. Atten. —

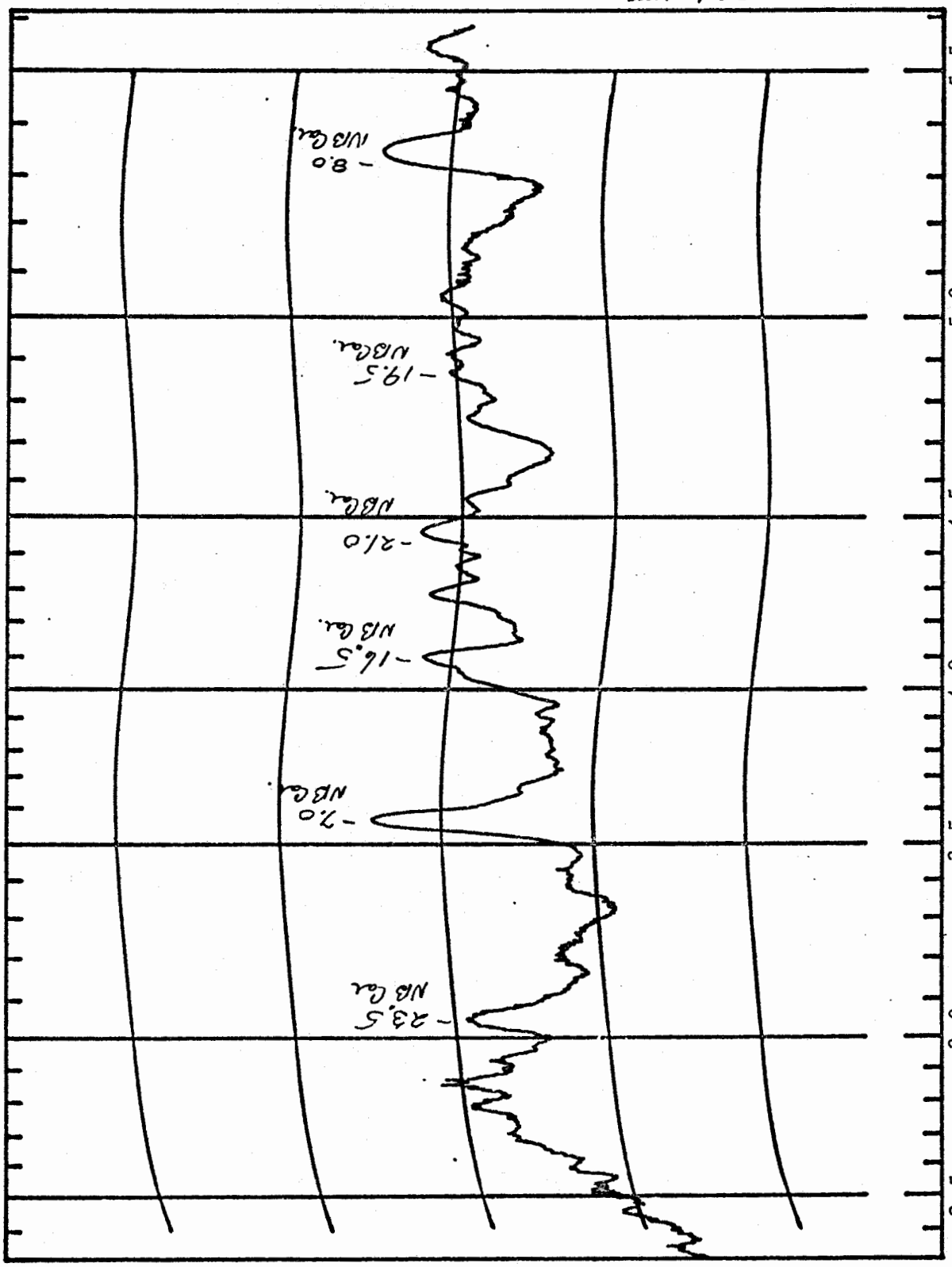
Equip. Oper. Mode Countdown Program - Standby of the Line Tested Hot Ground ON/OFF

Date 16 Apr 79 Operator [illegible]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 8
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5 μH FCC LISN



CBEMA ESC-5 BB-Pk
Limit Off Scale

Cal. Date: 29 March 1979

Equip. Under Test TRS-80 - Interface/32K

Equip. Oper. Mode Countdown Program - Standby of the Printer

Date 16 Apr 79 Operator [illegible]

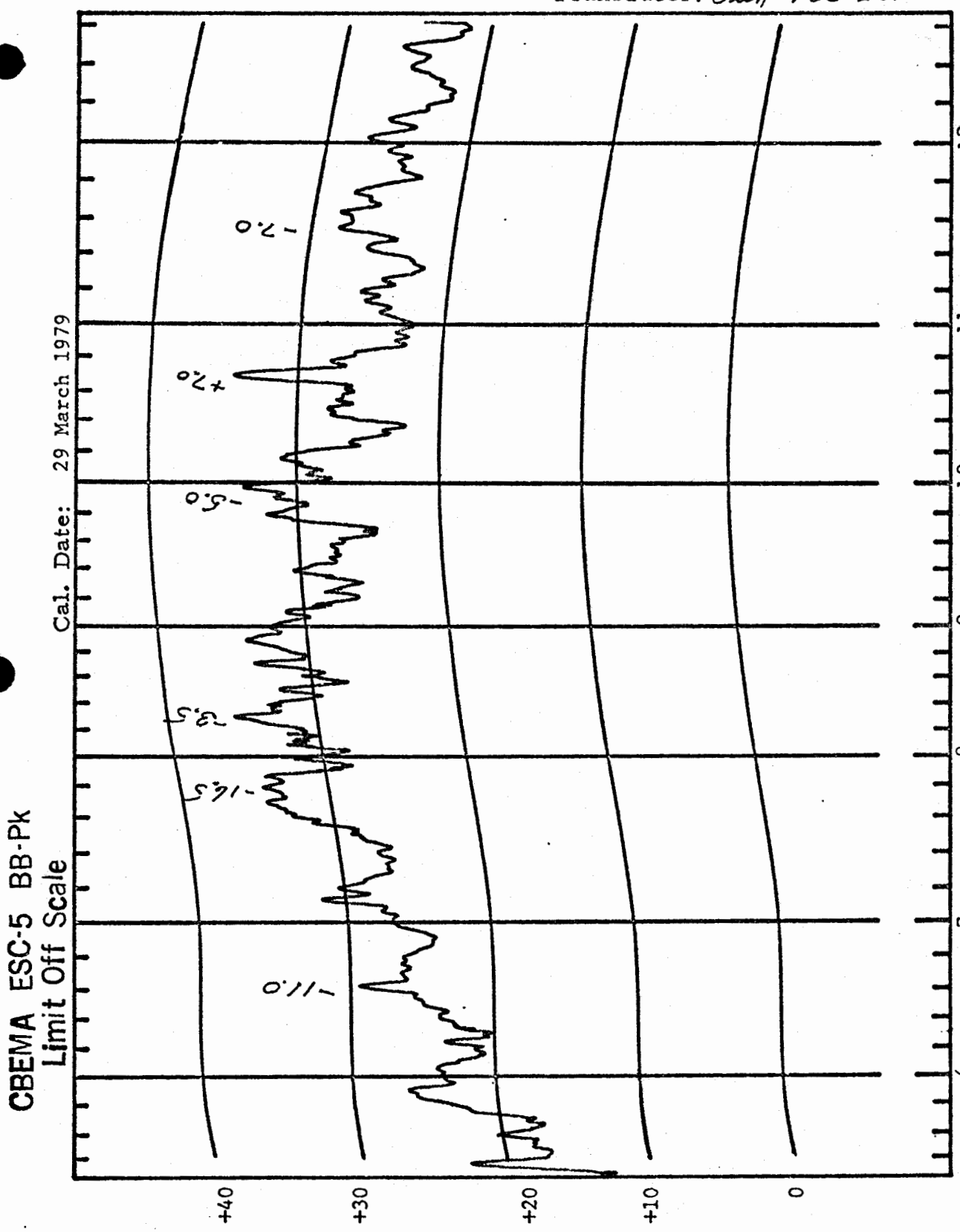
Rcvr. Atten. 60 Ext. Atten. —

Line Tested Hot Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 9
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5uH/ FCC LISN

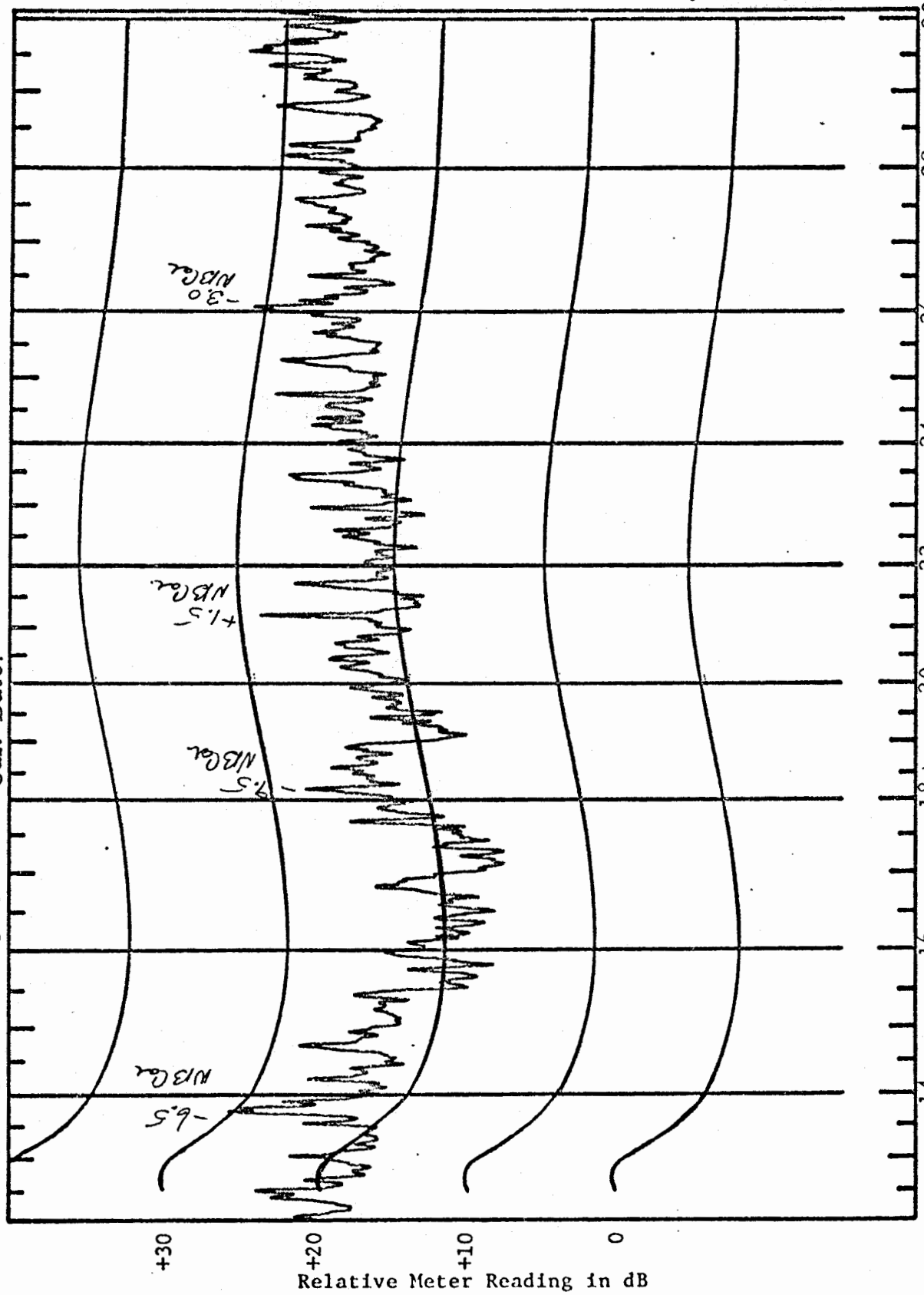


Equip. Under Test TICS-80 - Interface/32k
Rcvr. Atten. 10 Ext. Atten. —
Equip. Oper. Mode Gundown Program - Standby after limit Line Tested Hot Ground ON/OFF
Date 16 Jan 79 Operator CB Booth

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 10
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5 μH FCC LISN



CBEMA ESC-5 BB-Pk
Limit Off Scale

Cal. Date: 29 March 1979

Equip. Under Test TRS-80 Interface 32K Rcvr. Atten. 60 Ext. Atten. —

Equip. Oper. Mode Countdown Program - Standby after Launch Line Tested Hot Ground ON/OFF

Date 16 Apr 79 Operator [signature]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

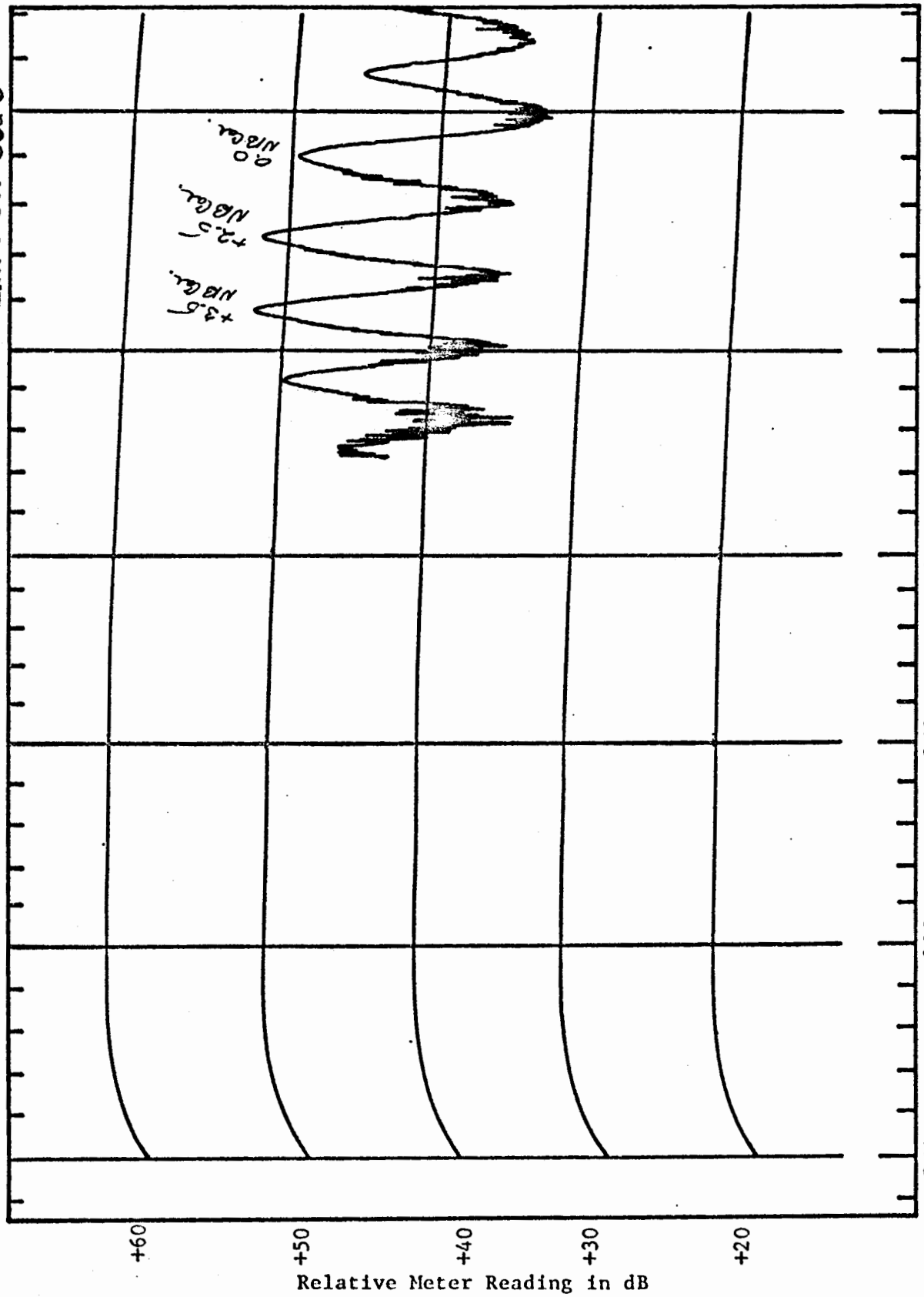
EXPANSION INTERFACE

NEUTRAL POWER LINE

32K MEMORY INSTALLED IN EI
NO PROGRAM OPERATION

EMC-25 Band 5
Peak Detector (BB Signals)
4 kHz 3dB Bandwidth

Transducer: 5uH/FCC LISN



Equip. Under Test TMS-80 - Interface/32K Rcvr. Atten. 20 Ext. Atten. —

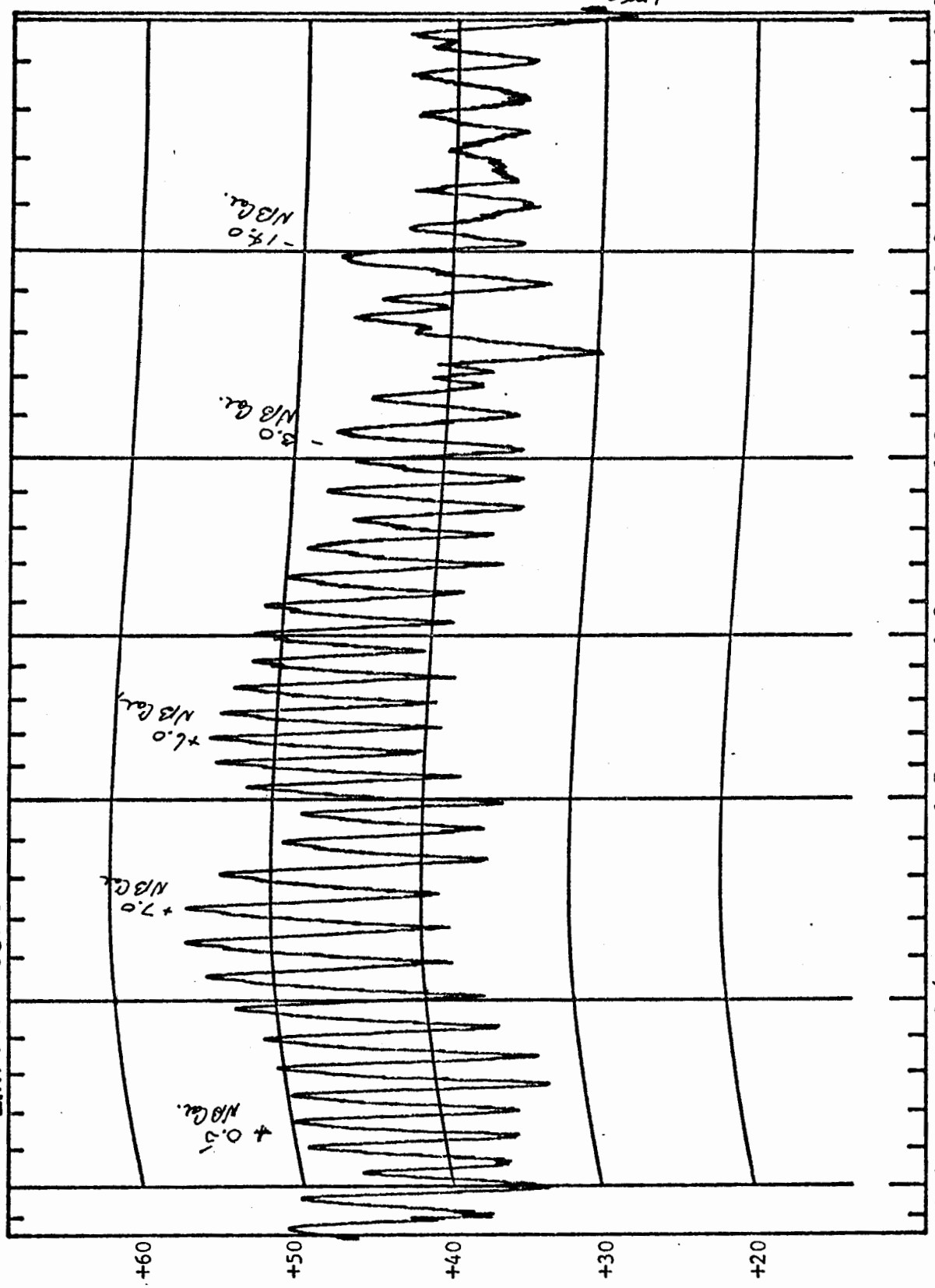
Equip. Oper. Mode Countdown Program - Standby after limit Line Tested Neut Ground ON/OFF

Date 16 Apr 79 Operator [illegible]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 6
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth

Transducer: 50uH/FCC LISN



Relative Meter Reading in dB

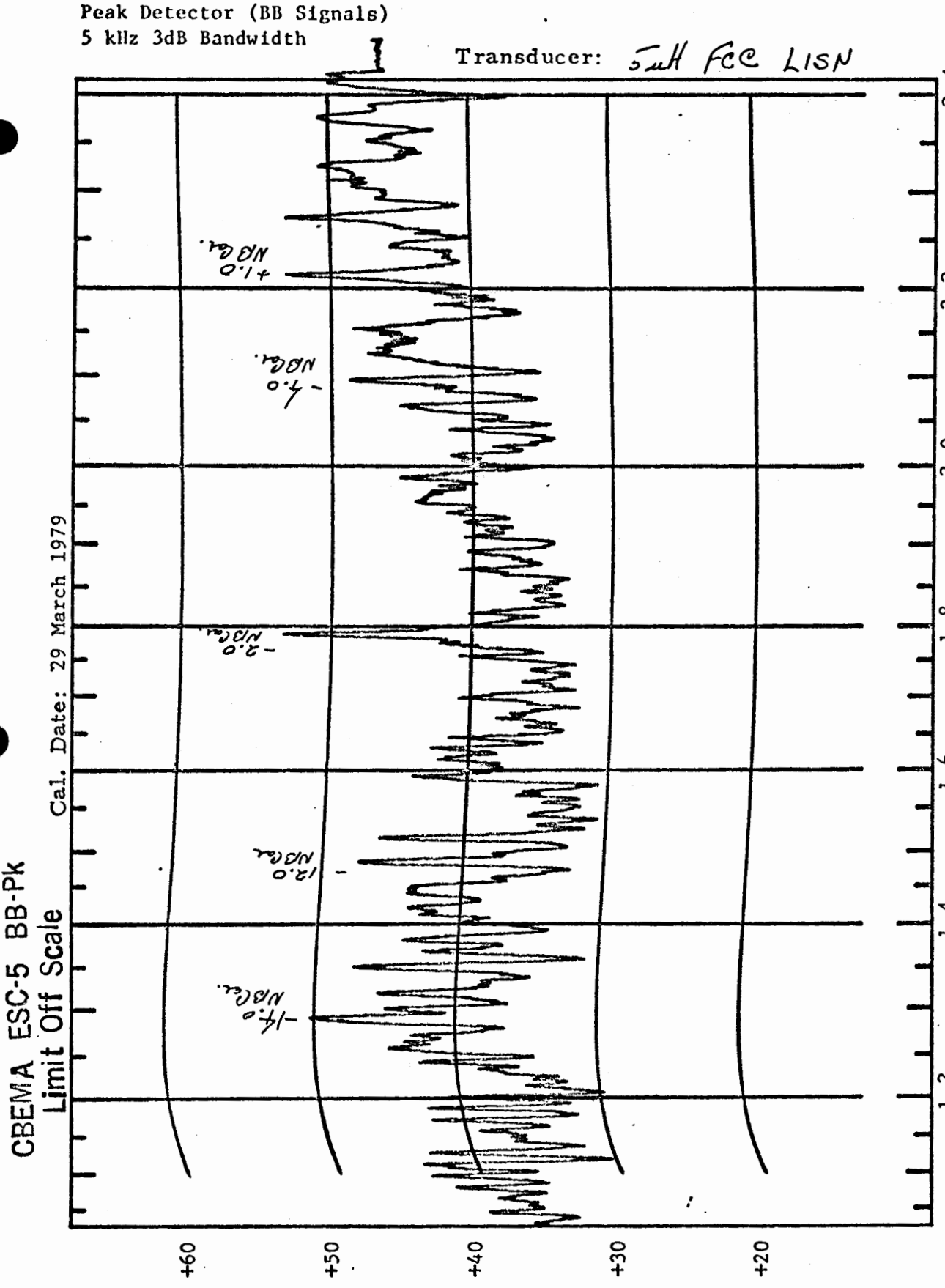
Equip. Under Test TMS-80 - Interface/32k Rcvr. Atten. 20 Ext. Atten. —

Equip. Oper. Mode Countdown Program - Standby after finish Line Tested Neut Ground ON/OFF

Date 11/21/79 Operator [illegible]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 7
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth



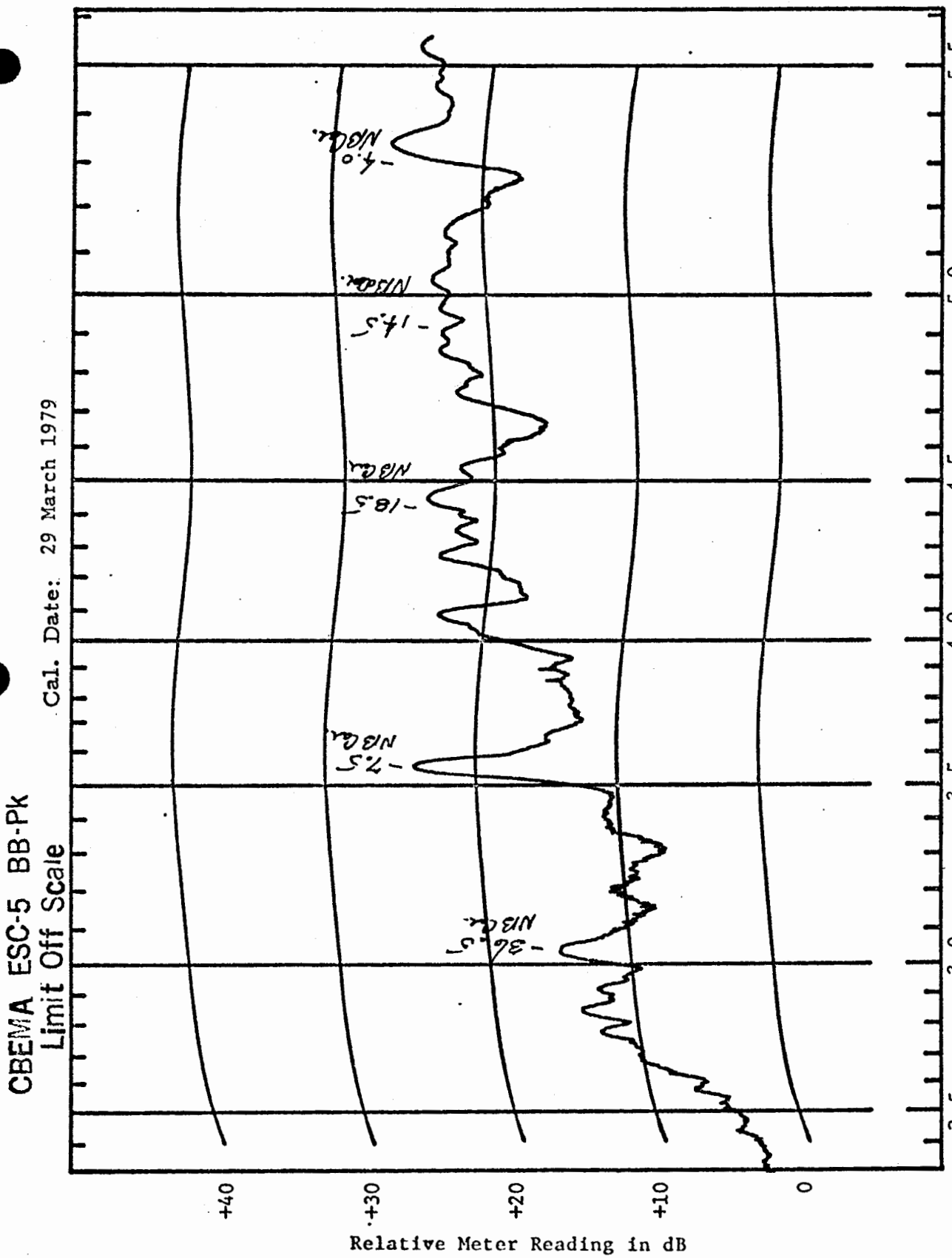
Equip. Under Test MS-80 Antifade/32K
Equip. Oper. Mode Countdown Program-Standby after finish
Date 16 Jan 79 Operator [illegible]

Rcvr. Atten. 20 Ext. Atten. —
Line Tested Neut Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 8
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 50uH FCC LISN



Equip. Under Test TRS-80 - Intyface/82K Rcvr. Atten. 60 Ext. Atten. —

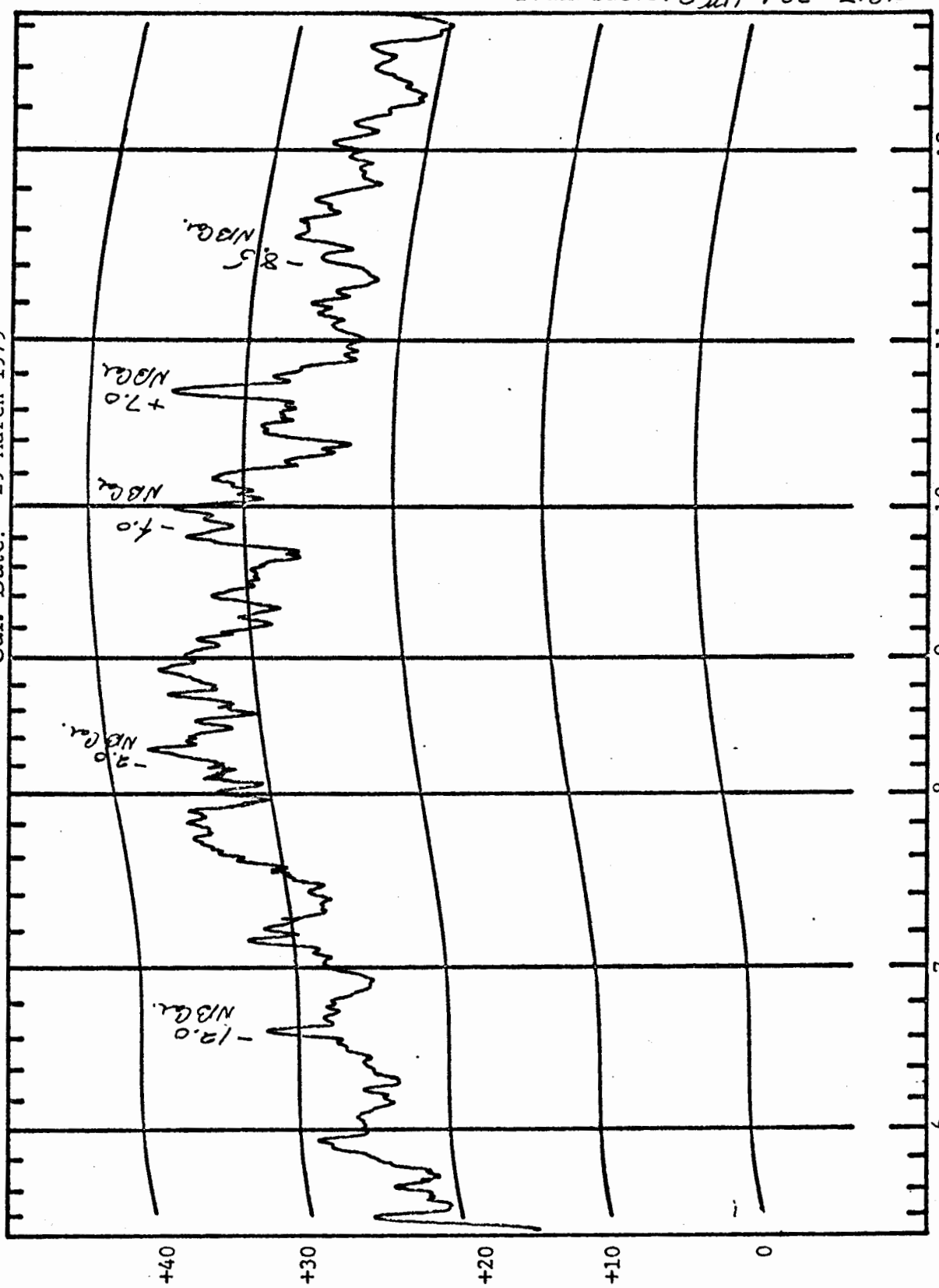
Equip. Oper. Mode Countdown Logram-Standby after finish Line Tested Neut Ground ON/OFF

Date 16 Jul 79 Operator CDS Scott

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 9
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



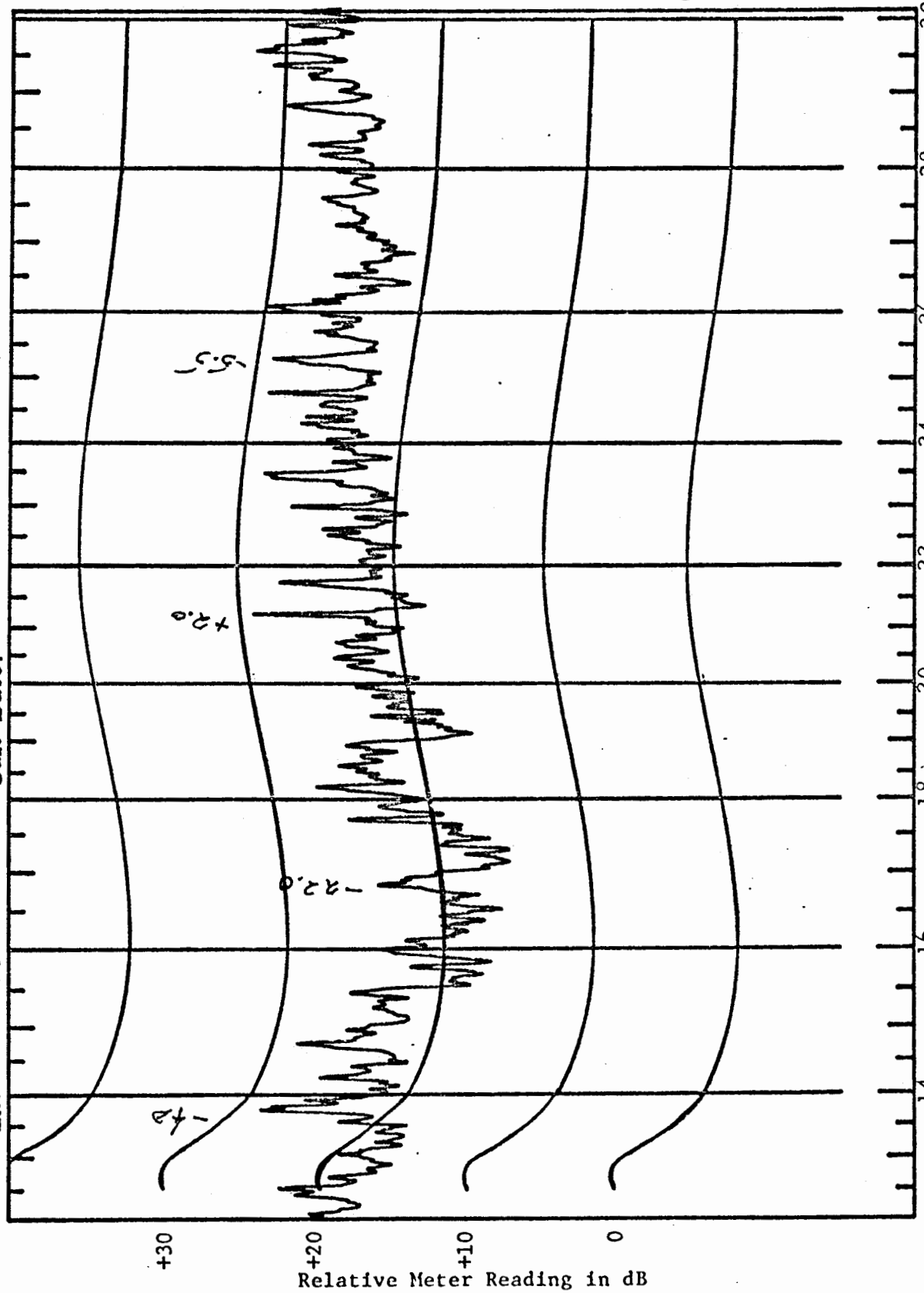
Relative Meter Reading in dB

Equip. Under Test TRS-80- Interface 432K
Rcvr. Atten. 60 Ext. Atten. —
Equip. Oper. Mode Countdown Program - Standby after finish Line Tested Must Ground ON/OFF
Date 6 Jul 79 Operator AB Botts

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 10
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



Equip. Under Test TTRS-80 - Interface / 32 K Rcvr. Atten. 60 Ext. Atten. —

Equip. Oper. Mode Countdown Program - Standby after finish Line Tested Neut Ground ON/OFF

Date 16 Jul 79 Operator [signature]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

CASSETTE TAPE UNIT

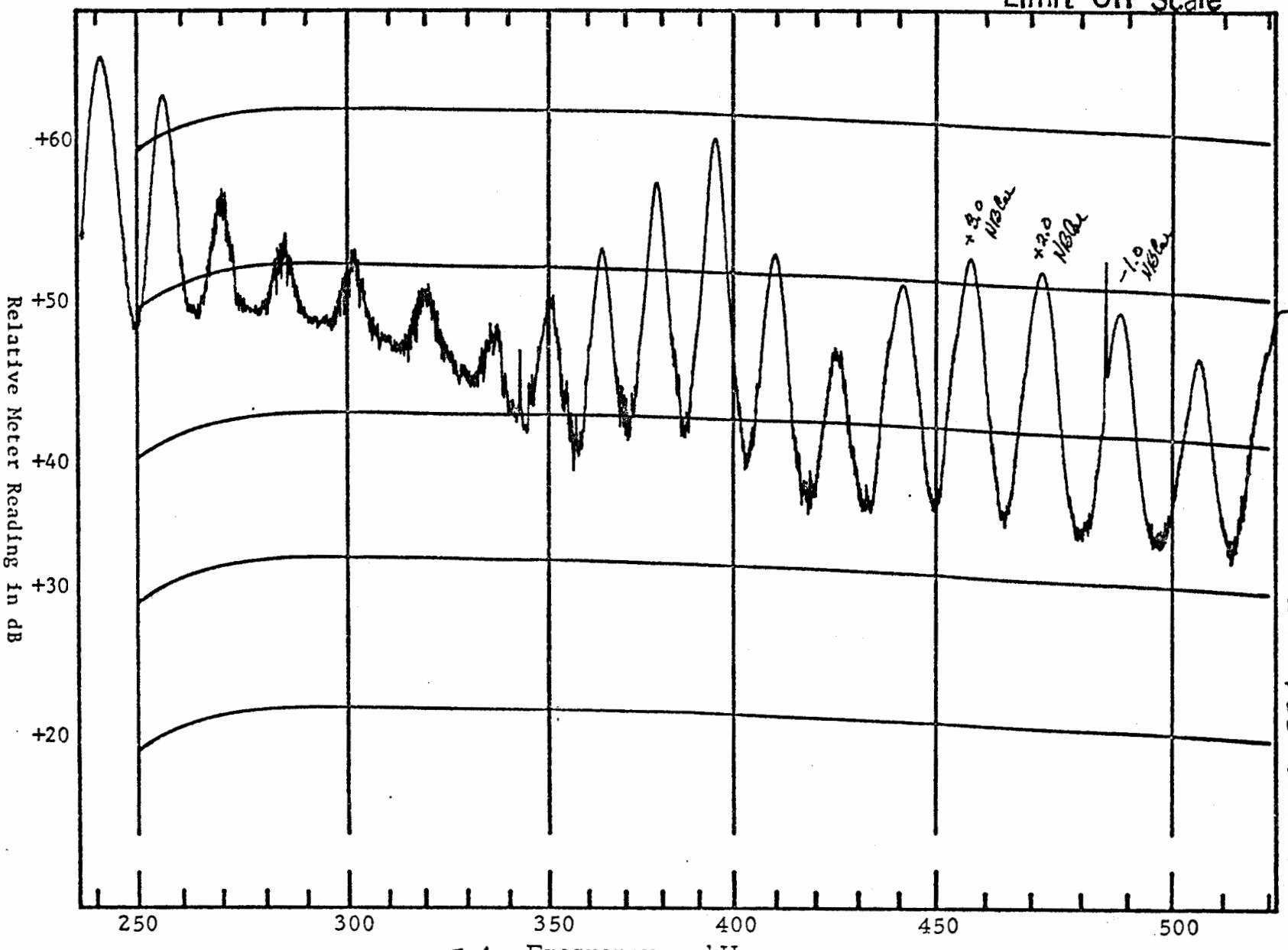
HOT POWER LINE

TAPE WRITE

EMC-25 Band 5
Peak Detector (BB Signals)
4 kHz 3dB Bandwidth

CBEMA ESC-5 BB-Pk
Limit Off Scale

Cal. Date: 29 March 1979



Transducer: 5uH Fee LISN

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

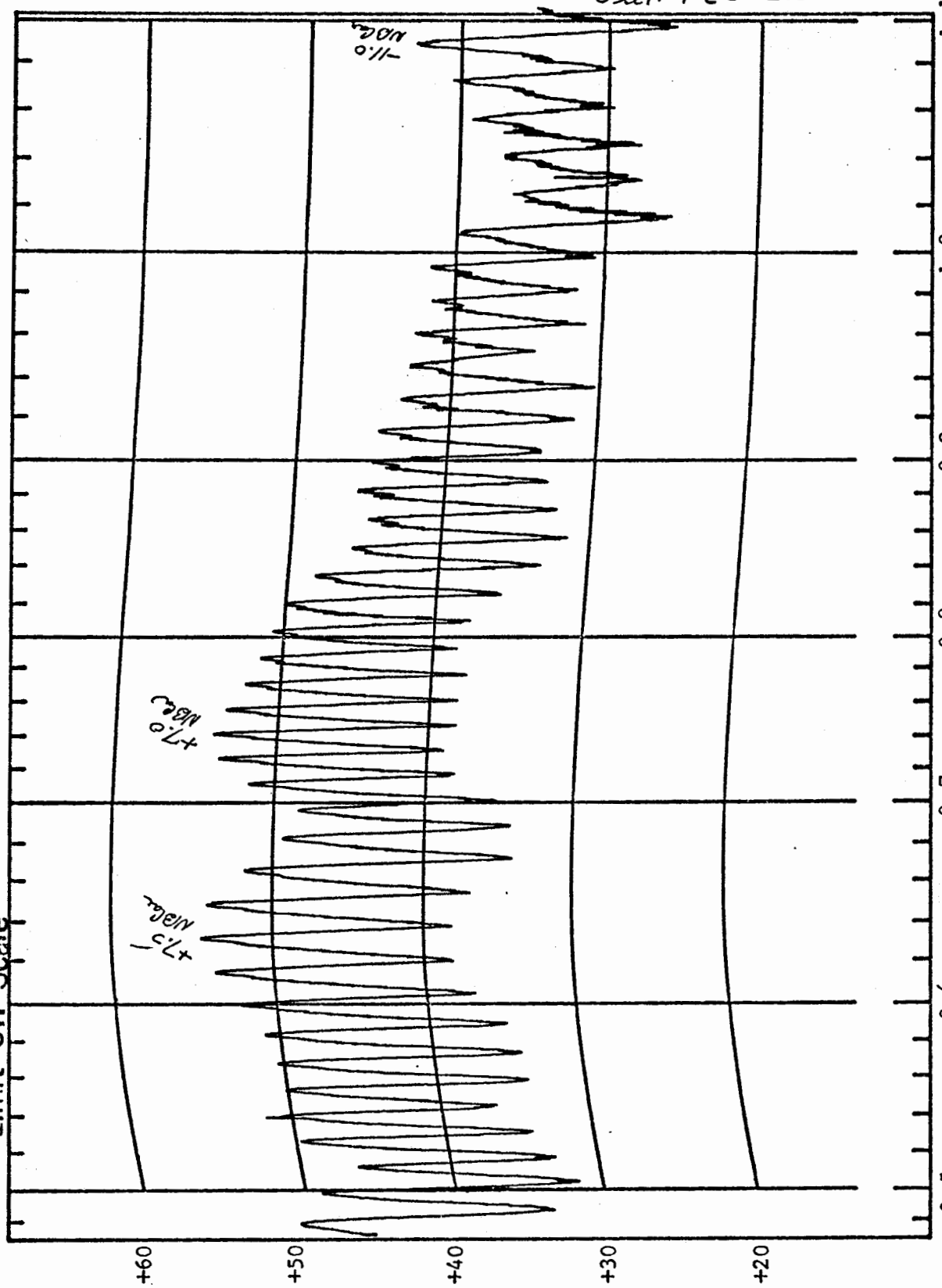
Equip. Under Test TR8-80 - Taping on Cassette Rcvr. Atten. 20 Ext. Atten. —

Equip. Oper. Mode Writing on Tape Line Tested Hot Ground ON/OFF

Date 4/Jan 79 Operator C. Booth

EMC-25 Band 6
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



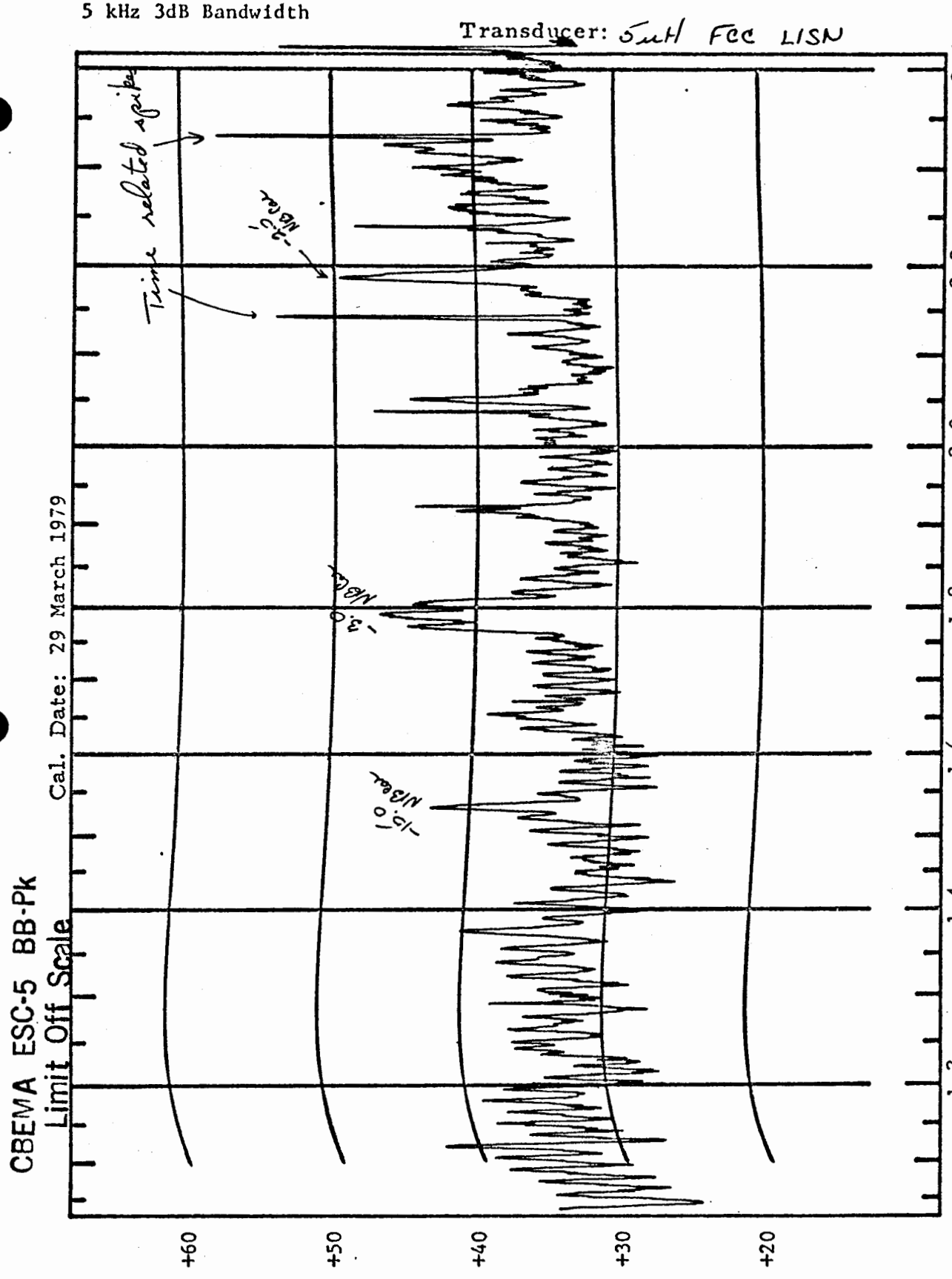
Relative Meter Reading in dB

Equip. Under Test TRS-80 Tape
Equip. Oper. Mode Writing on Tape
Date 4 Apr 79 Operator [illegible]

Rcvr. Atten. 20 Ext. Atten. —
Line Tested Hot Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 7
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth

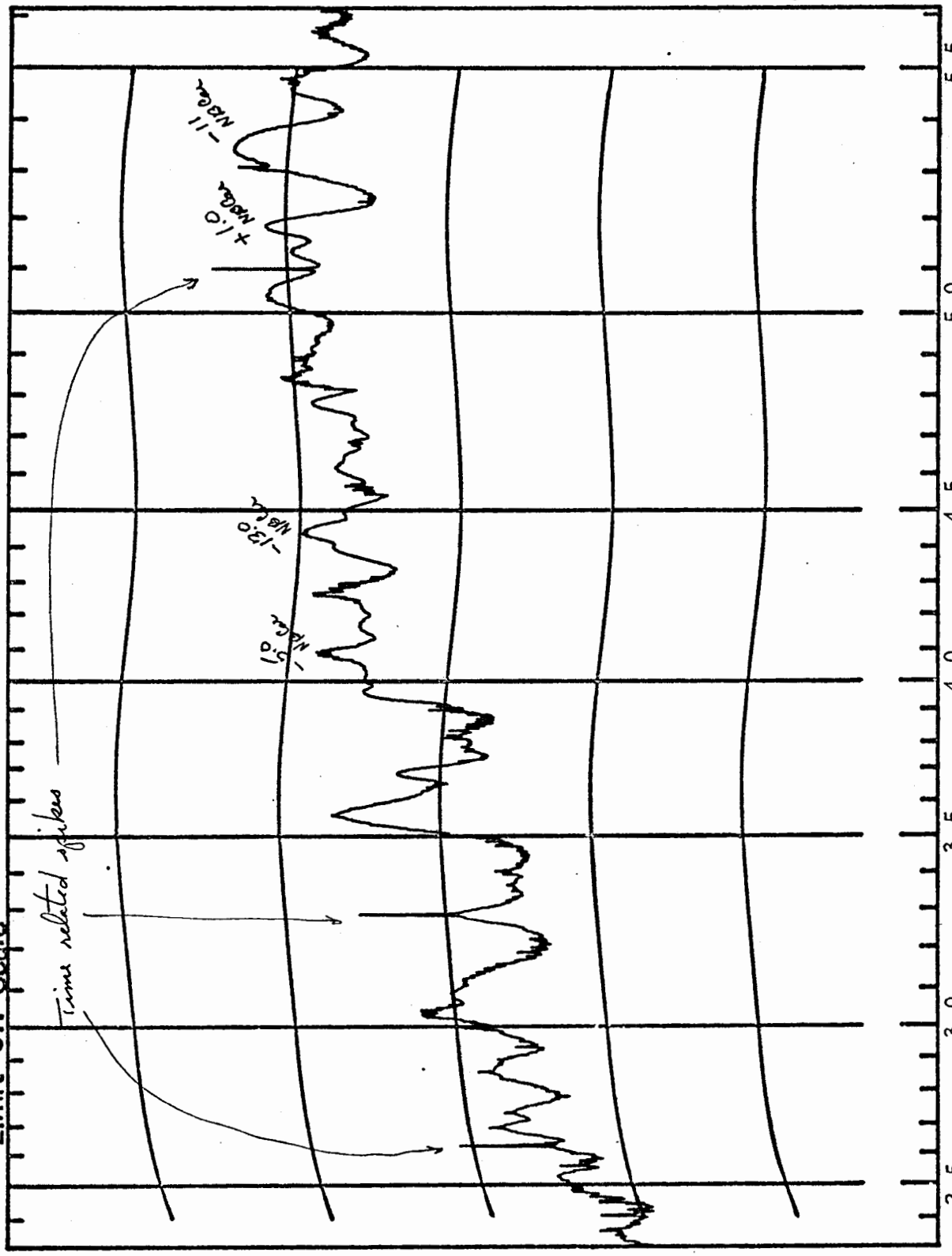


Equip. Under Test TRS-80 Tape
Equip. Oper. Mode Writing on Tape
Date 4 Apr 79 Operator
Rcvr. Atten. 20 Ext. Atten. —
Line Tested Hot Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 8
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5μH FCC LISN



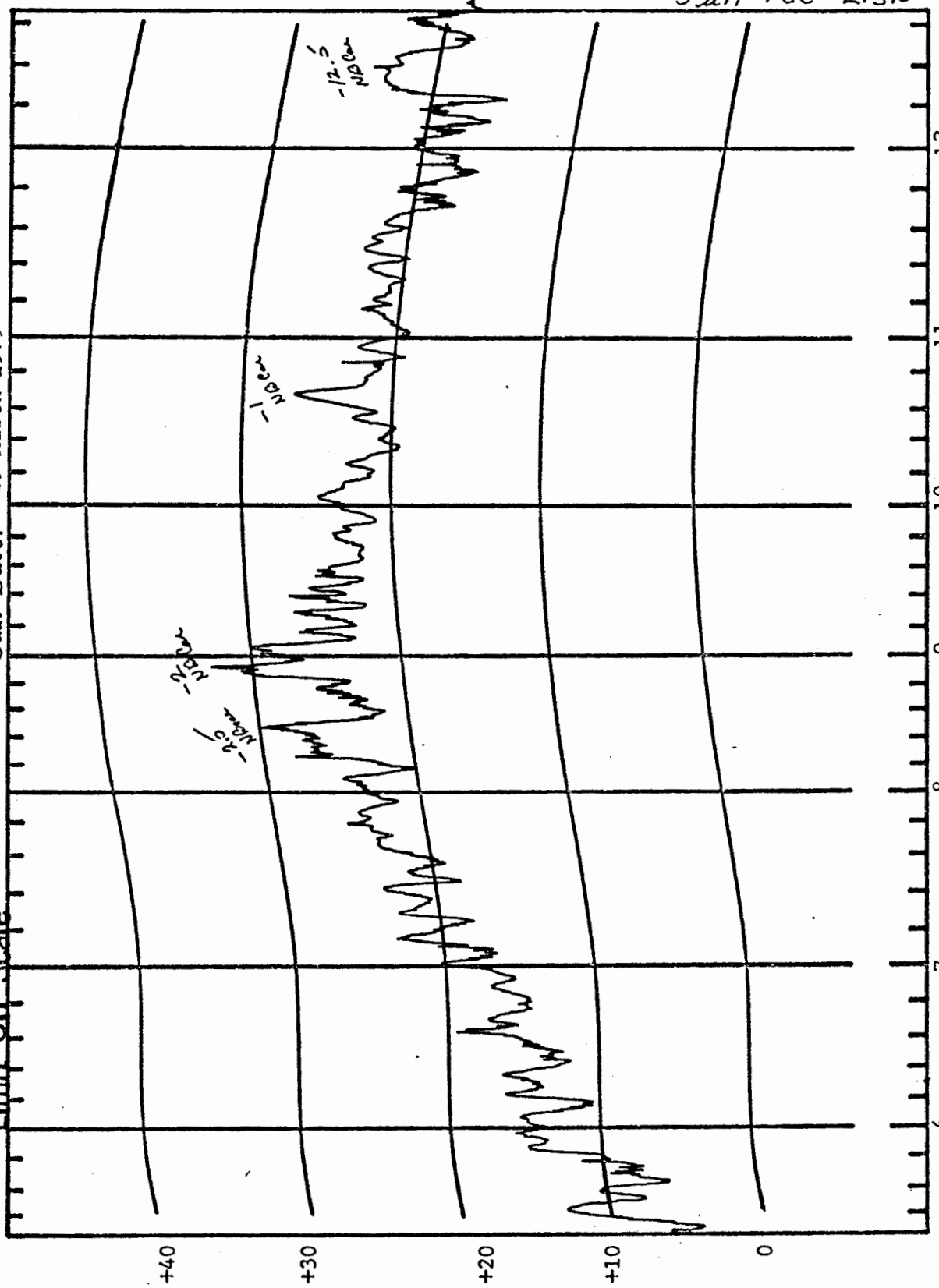
Equip. Under Test TRS-80 tape
Equip. Oper. Mode Muting on Tape
Date 4 Apr 79 Operator [illegible]

Rcvr. Atten. 40 Ext. Atten. —
Line Tested Hot Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 9
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



CBEMA ESC-5 BB-Pk
Limit Off Scale

Cal. Date: 29 March 1979

Frequency - MHz

Relative Meter Reading in dB

Rcvr. Atten. 60 Ext. Atten. —

Line Tested Hot Ground ON/OFF

Equip. Under Test TRS-80 Tape

Equip. Oper. Mode Writing on Tape

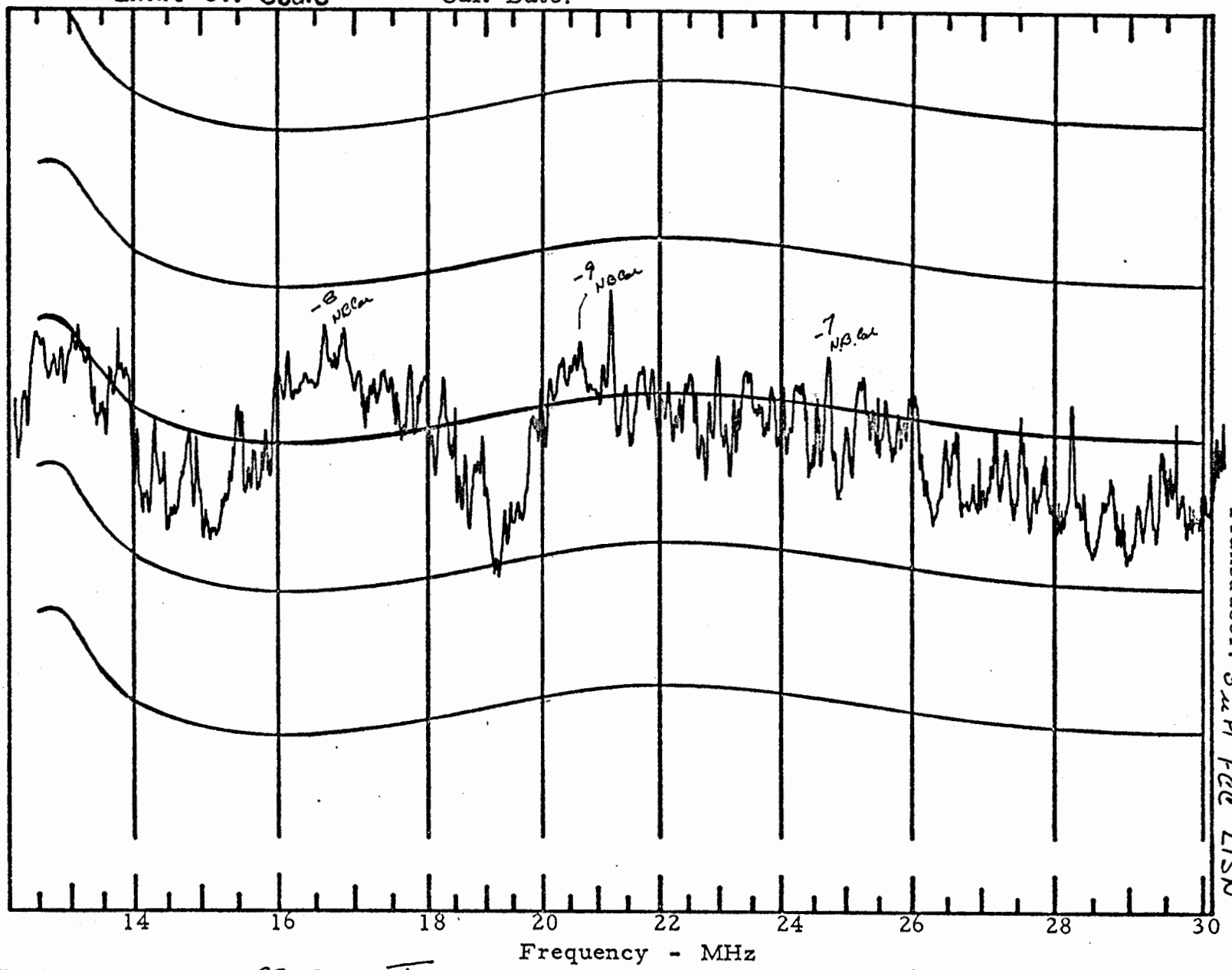
Date 4 Jan 79 Operator C. D. Bostick

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

CBEMA ESC-5 BB-Pk

Limit Off Scale

Cal. Date: 29 March 1979



EMC-25 Band 10
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5μH FCC LISN

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

Equip. Under Test TRS-80 Tape

Equip. Oper. Mode Writing on Tape

Date 4/5/79 Operator C.H. Booth

Rcvr. Atten. 60 Ext. Atten. —

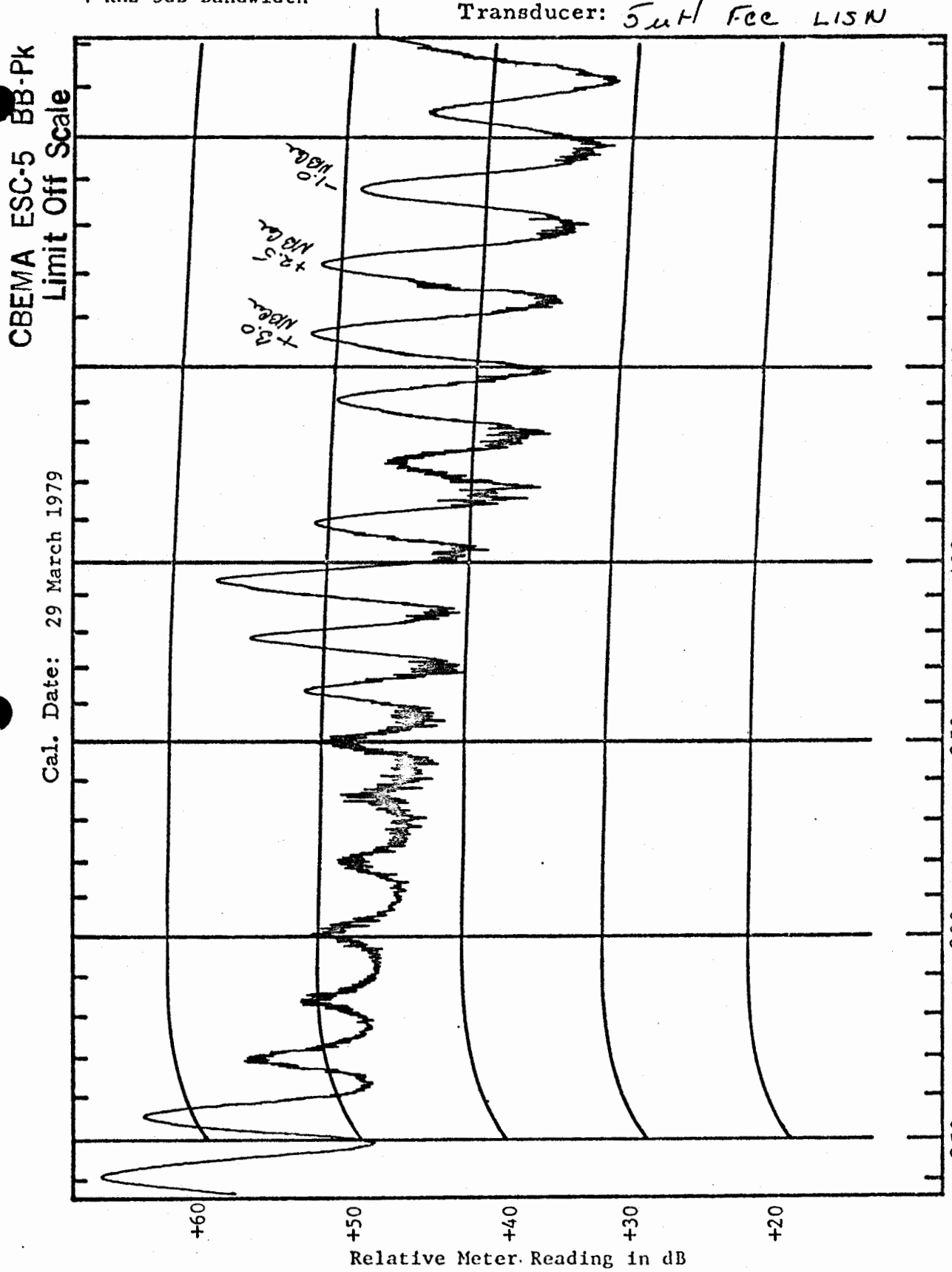
Line Tested Hot Ground ON/OFF

CASSETTE TAPE UNIT

NEUTRAL POWER LINE

TAPE WRITE

EMC-25 Band 5
Peak Detector (BB Signals)
4 kHz 3dB Bandwidth



Rcvr. Atten. 20 Ext. Atten. —

Line Tested Neut Ground ON/OFF

Equip. Under Test TRS-80 Tape

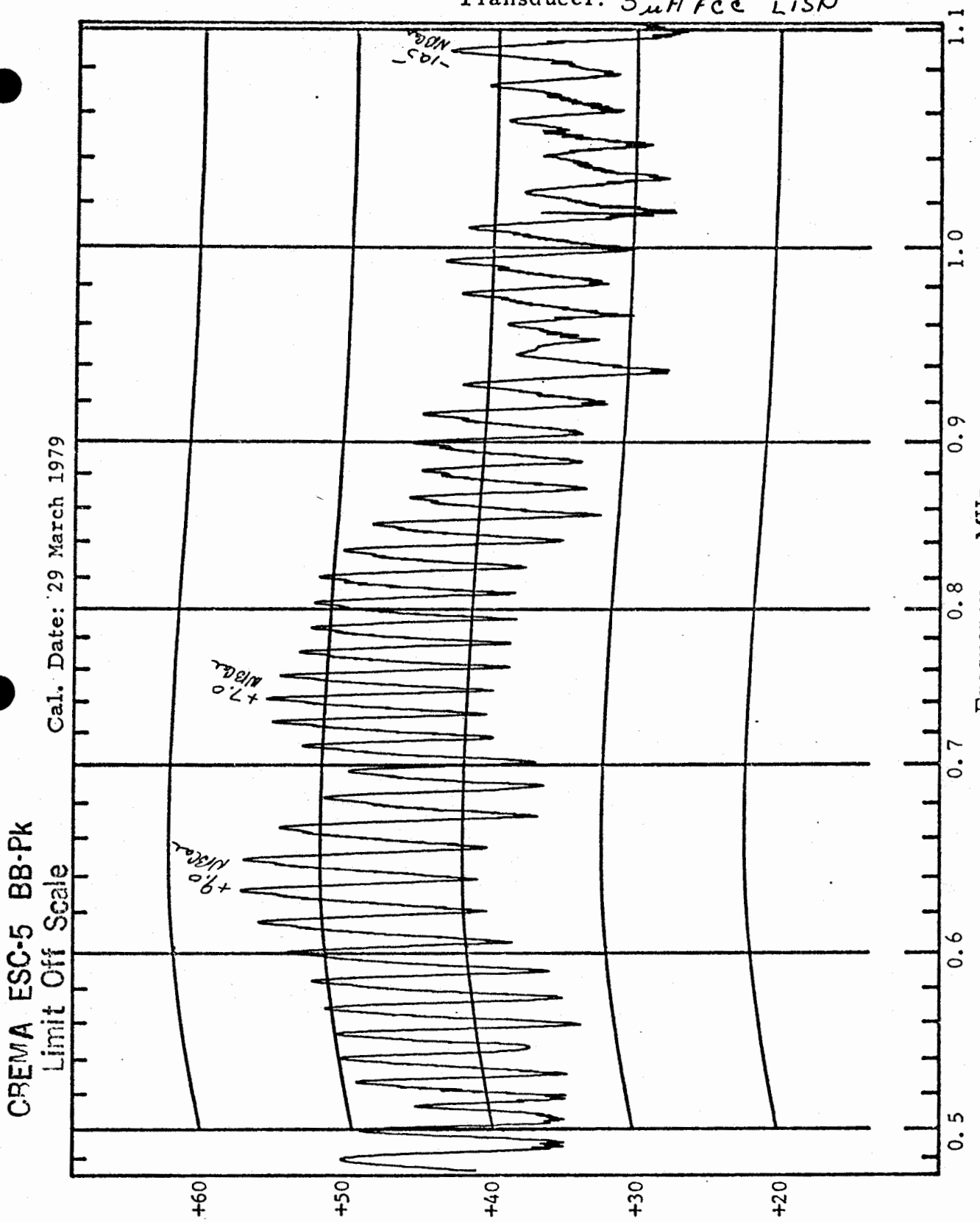
Equip. Oper. Mode Writing on Tape

Date 4 Jan 79 Operator [illegible]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 6
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth

Transducer: 5μH/FCC LISN



Relative Meter Reading in dB

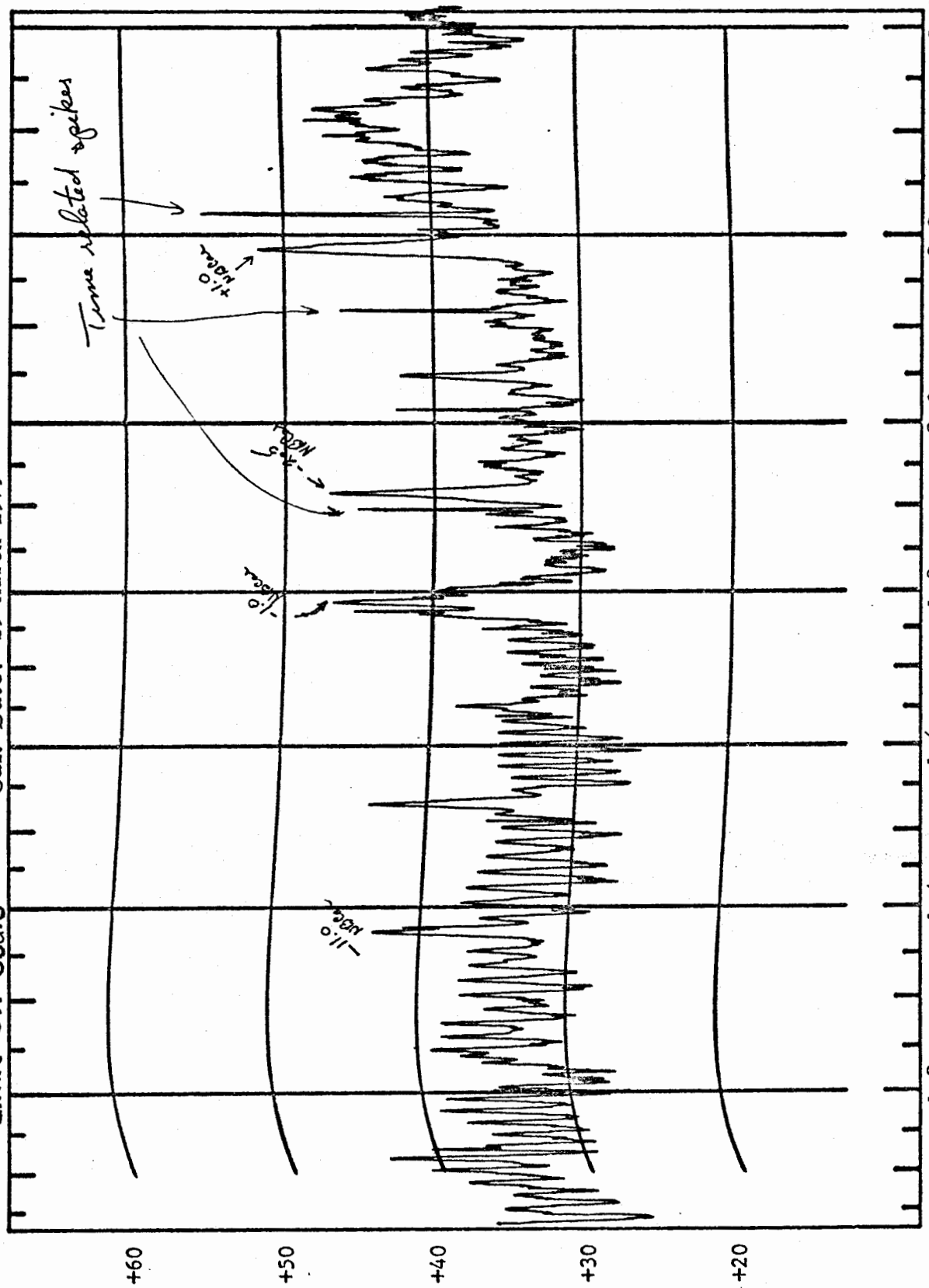
Equip. Under Test TRS-80 Tape
Equip. Oper. Mode Waiting on Tape
Date 4 Apr 79 Operator [illegible]

Rcvr. Atten. 20 Ext. Atten. —
Line Tested Neut Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 7
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



CBEMA ESC-5 BB-Pk
Limit Off Scale

Cal. Date: 29 March 1979

Frequency - MHz

Relative Meter Reading in dB

Equip. Under Test TRS-80 Tape

Equip. Oper. Mode Writing on Tape

Date 4 Apr 79 Operator C. Bott

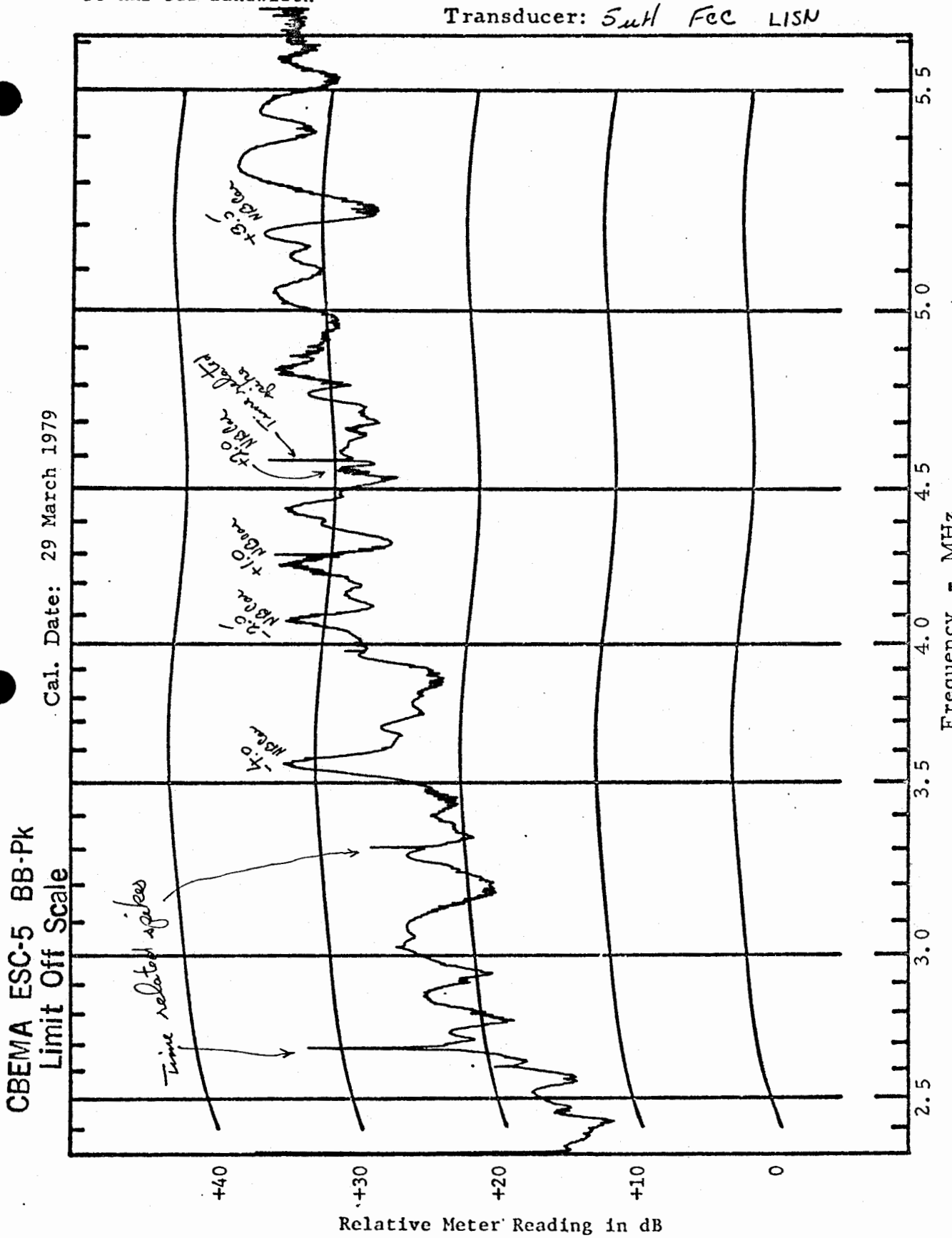
Rcvr. Atten. 20 Ext. Atten. —

Line Tested Neut Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 8
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



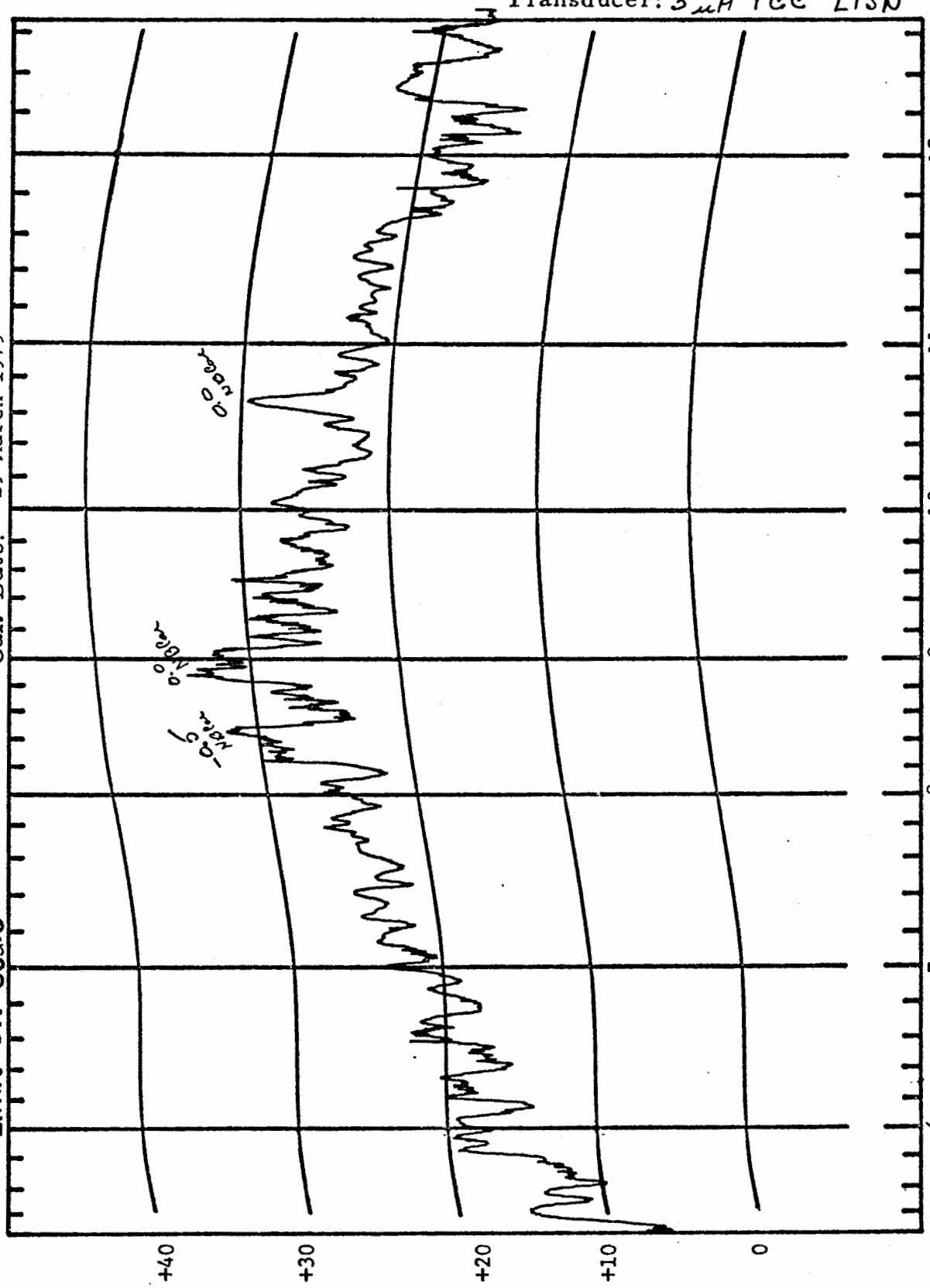
Equip. Under Test TRS-80 Tape
Equip. Oper. Mode Writing on Tape
Date 4 Apr 79 Operator [signature]

Rcvr. Atten. 40 Ext. Atten. —
Line Tested Neut Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 9
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5 uH FCC LISN



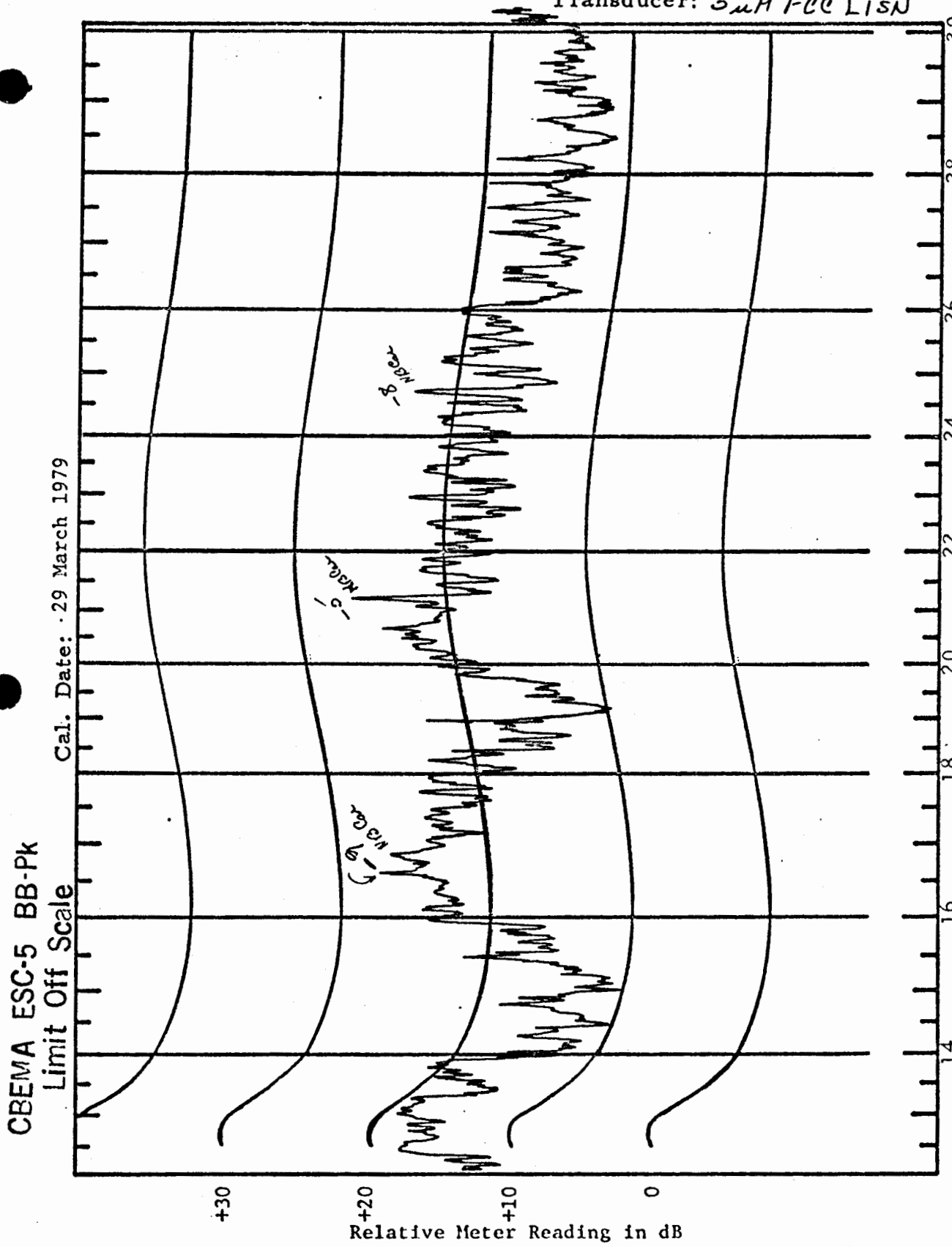
Relative Meter Reading in dB

Equip. Under Test TRS-80 Tape
Equip. Oper. Mode Muting on Tape
Date 4 Jan 79 Operator [signature]

Rcvr. Atten. 60 Ext. Atten. —
Line Tested Neut Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 10
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth



Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

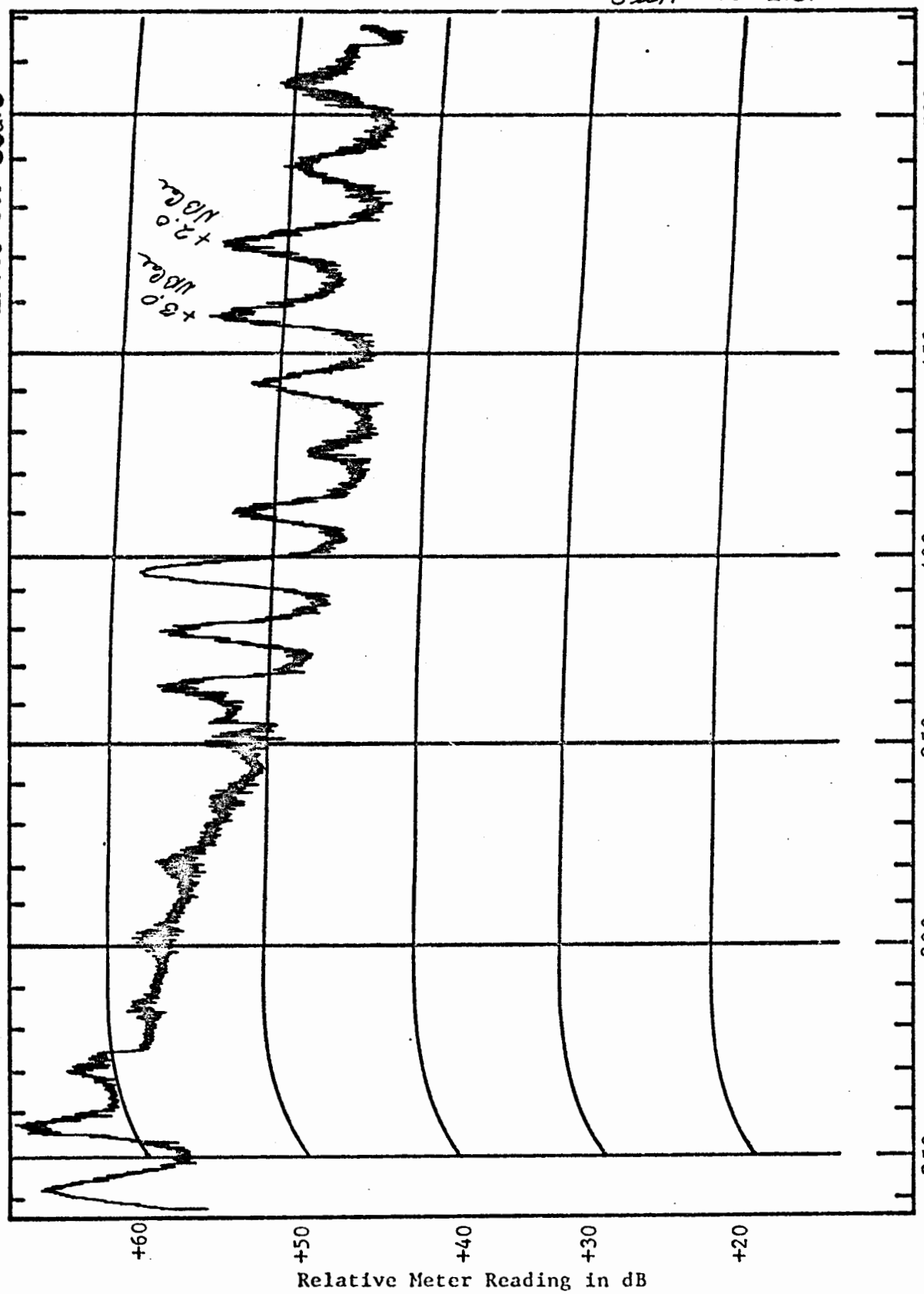
MINI-DISK DRIVE

HOT POWER LINE

"BACKUP" PROGRAM

EMC-25 Band 5
Peak Detector (BB Signals)
4 kHz 3dB Bandwidth

Transducer: 5uH/FCC LISN



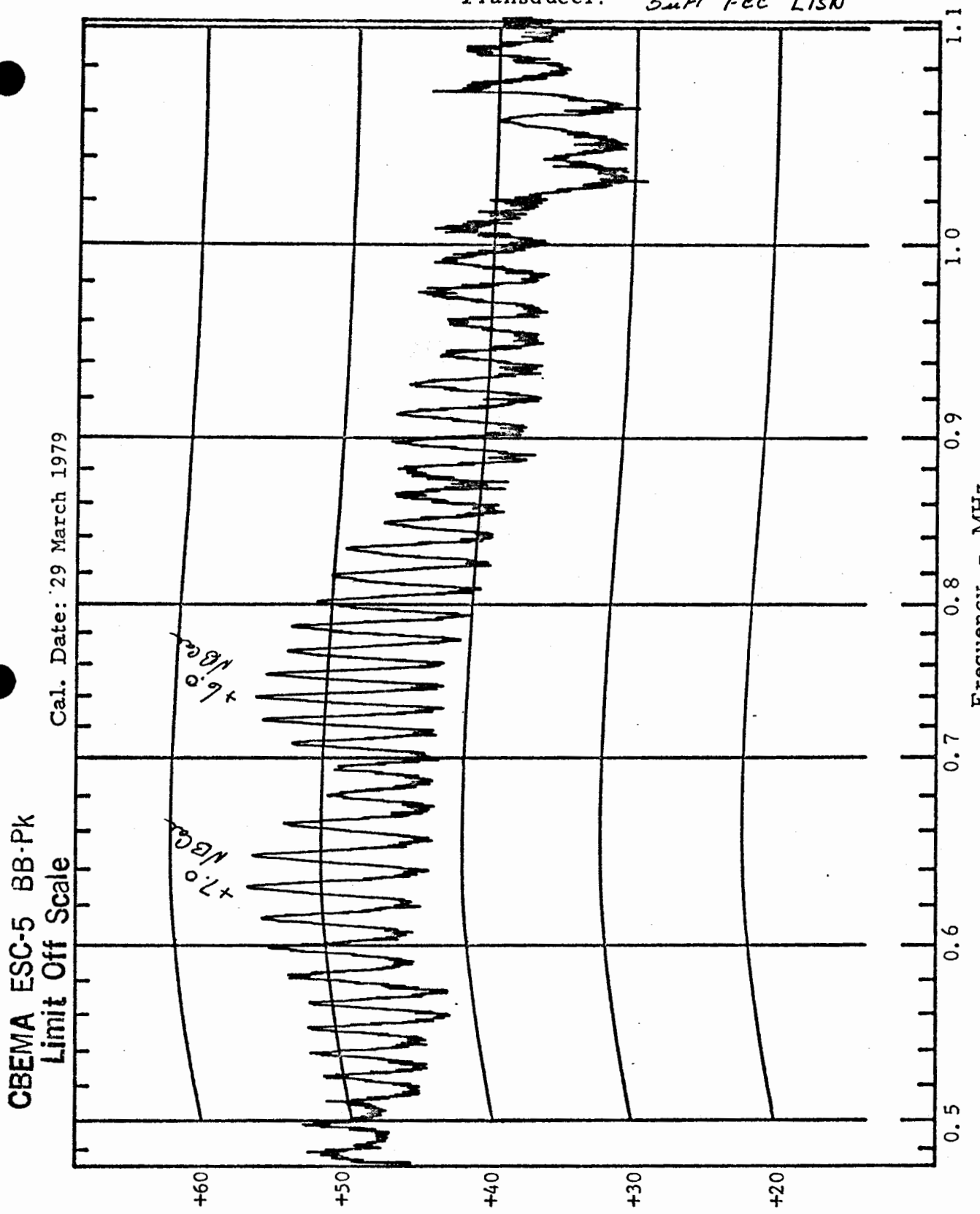
Equip. Under Test TRS-80 Die
Equip. Oper. Mode Writing on Disc
Date 4 Apr 79 Operator C. Brook

Rcvr. Atten. 20 Ext. Atten. -
Line Tested Hot Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 6
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth

Transducer: 5uH/ FCC LISN



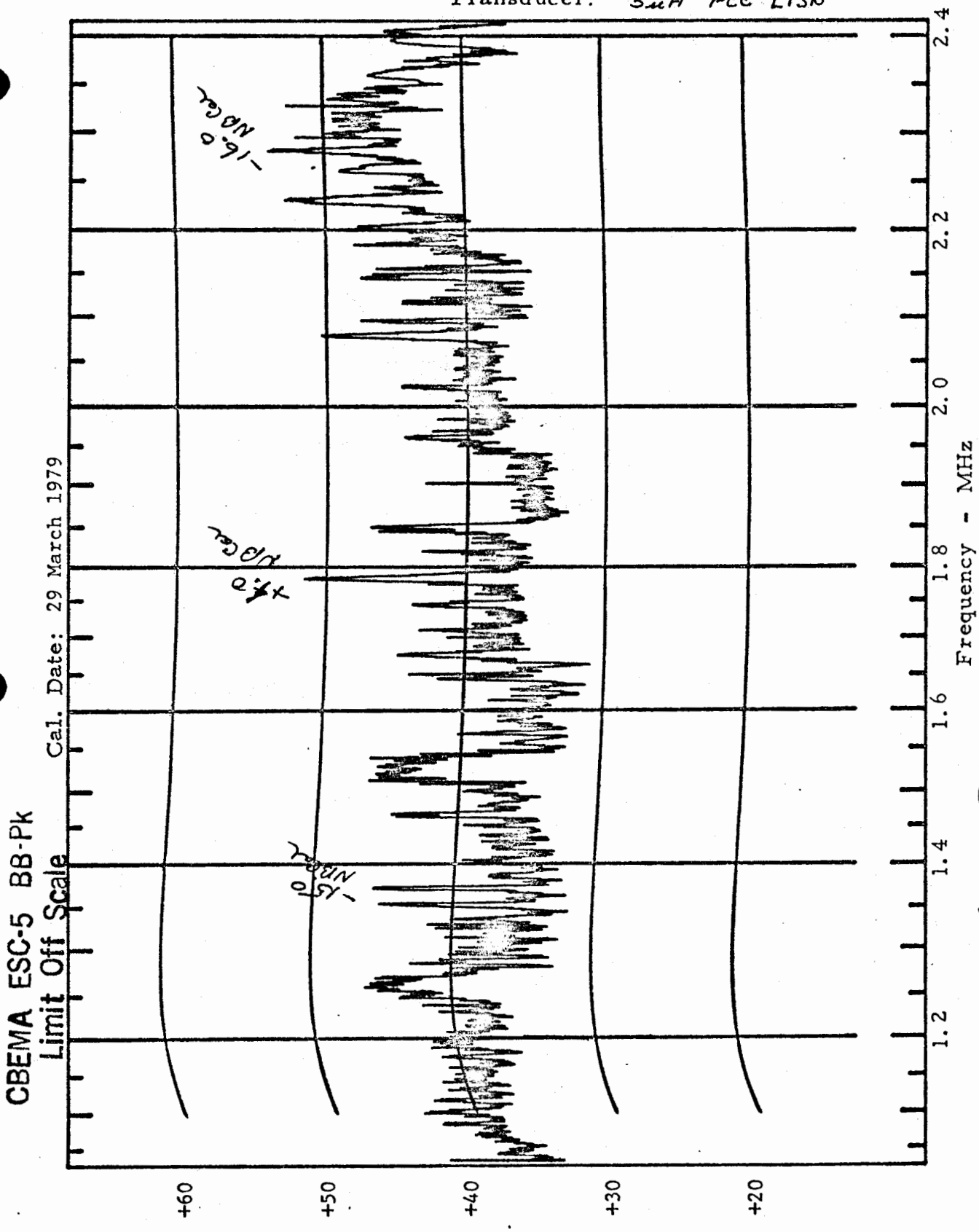
Relative Meter Reading in dB

Equip. Under Test TRS-80 Disc
Rcvr. Atten. 20 Ext. Atten. —
Equip. Oper. Mode Writing on Disc
Line Tested Hot Ground ON/OFF
Date 4 Jan 79 Operator GDS

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 7
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



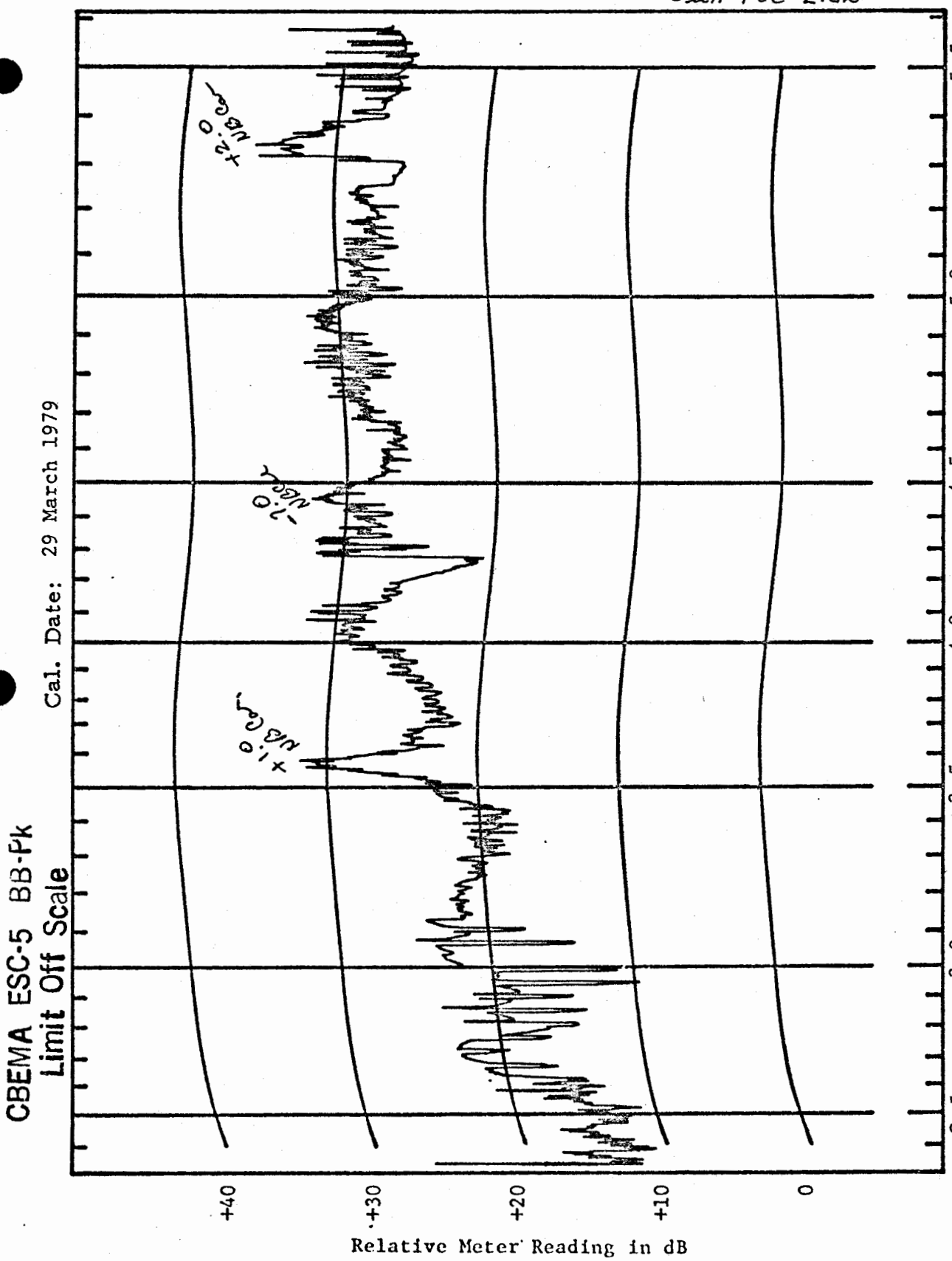
Equip. Under Test TRS-80 Disc
Equip. Oper. Mode Writing on Disc
Date 4 Apr 79 Operator [illegible]

Rcvr. Atten. 20 Ext. Atten. -
Line Tested Hot Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 8
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



Rcvr. Atten. 40 Ext. Atten. —

Line Tested Hot Ground ON/OFF

Equip. Under Test TRS-80 Disc

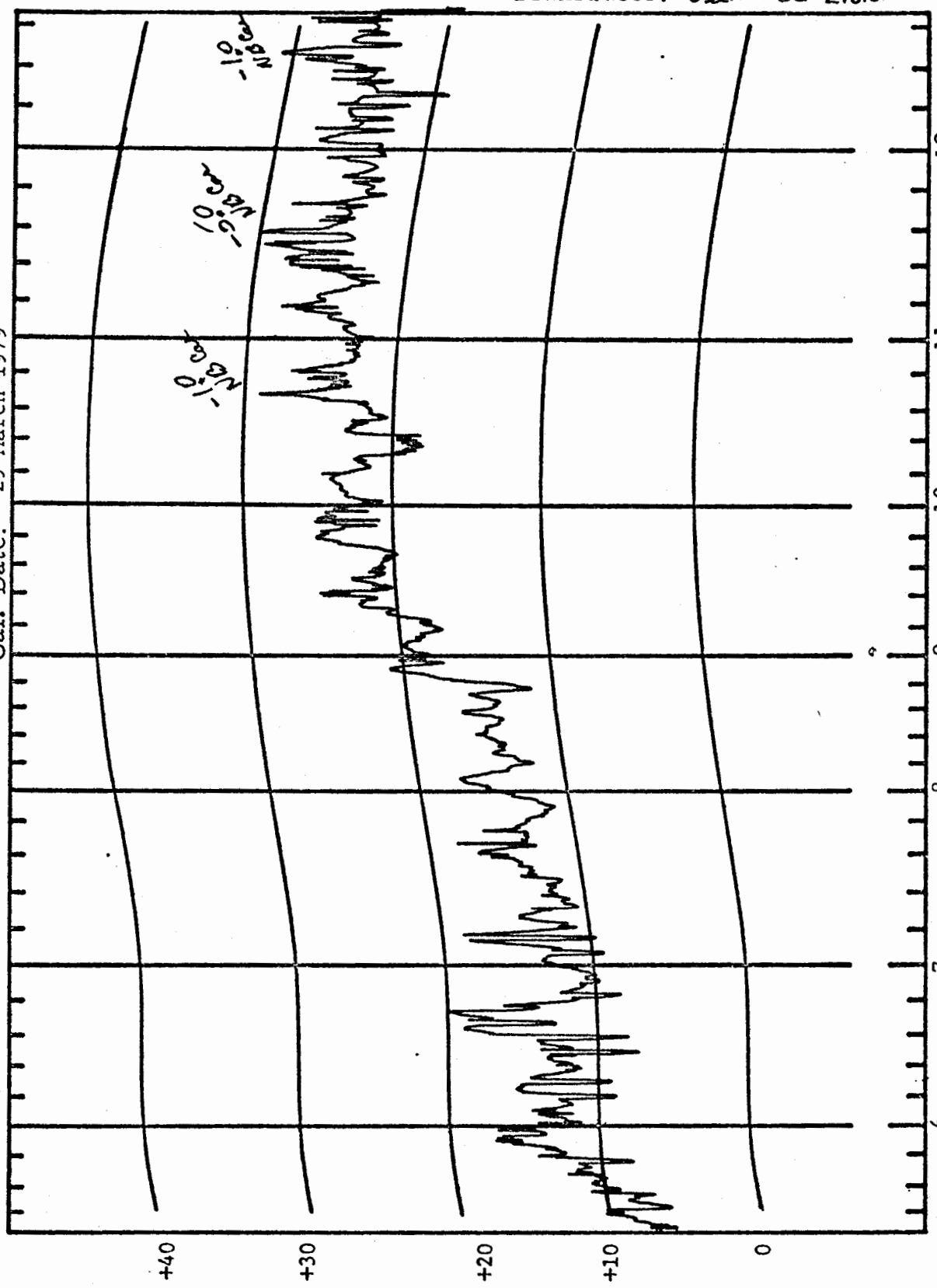
Equip. Oper. Mode Writing on Disc

Date 4 Apr 79 Operator CO Booth

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 9
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5uH/FCC LISN



CBEMA ESC-5 BB-Pk
Limit Off Scale

Cal. Date: 29 March 1979

Relative Meter Reading in dB

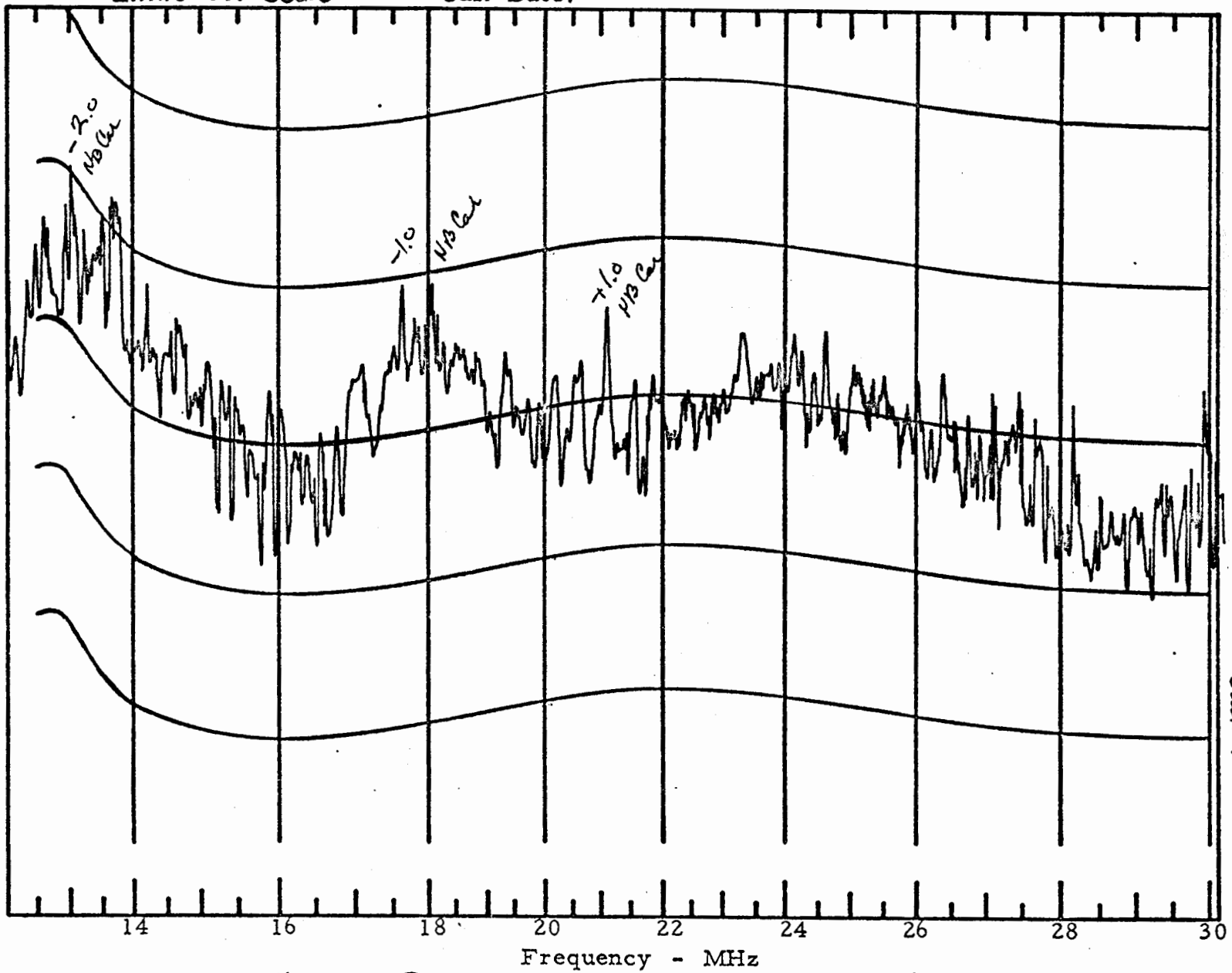
Frequency - MHz

Equip. Under Test TMS-80 Disc
Rcvr. Atten. 60 Ext. Atten. —
Equip. Oper. Mode Writing on Disc
Line Tested Hot Ground ON/OFF
Date 4 Apr 79 Operator [illegible]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

CBEMA ESC-5 BB-Pk
Limit Off Scale

Cal. Date: 29 March 1979



EMC-25 Band 10
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB µV/MHz for conducted emissions and dB µV/m/MHz for radiated emissions.

Equip. Under Test TRS-80 Disc

Rcvr. Atten. 60 Ext. Atten. —

Equip. Oper. Mode Writing on Disc

Line Tested Hot Ground ON/OFF

Date 4 Apr 79 Operator C Booth

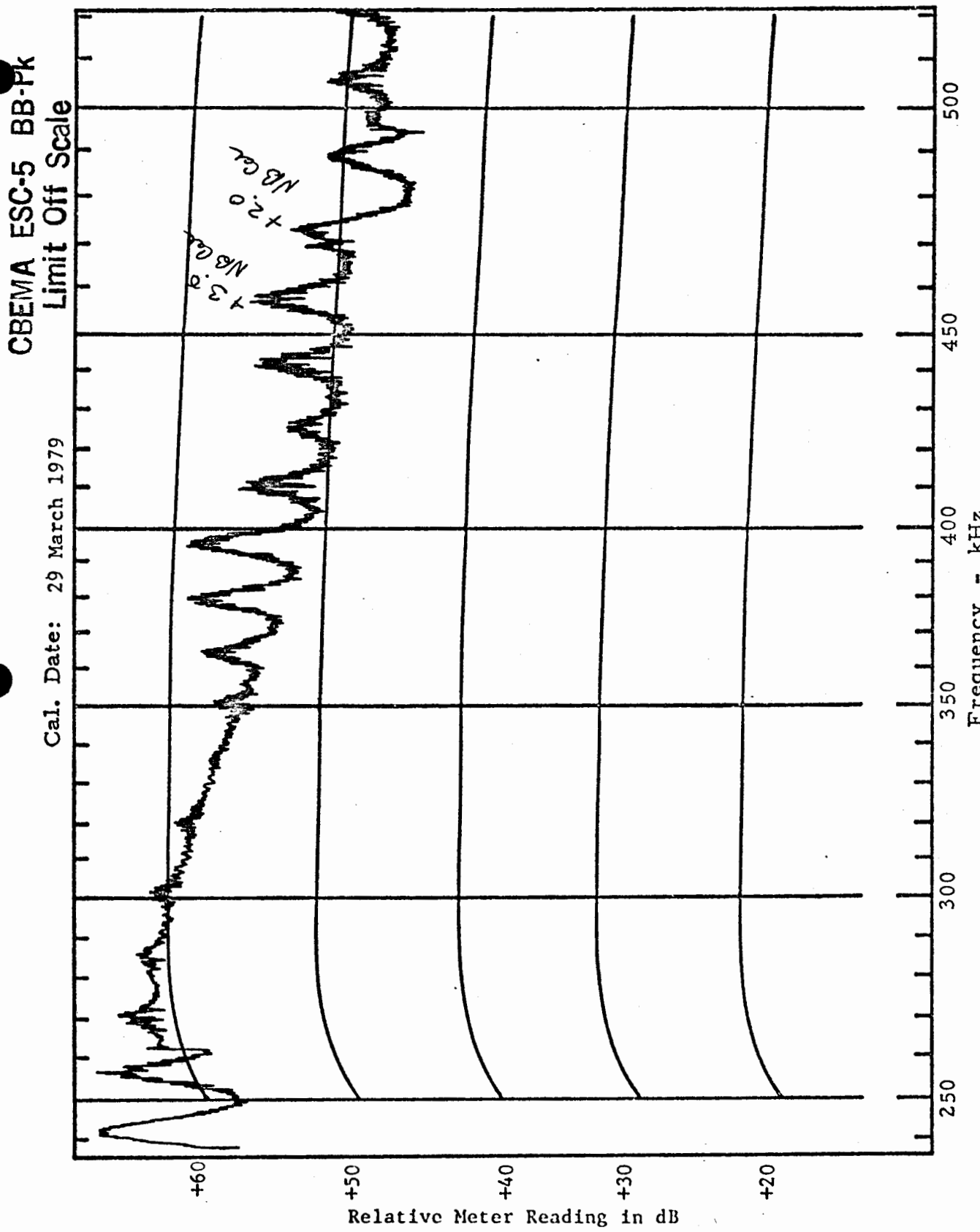
MINI-DISK DRIVE

NEUTRAL POWER LINE

"BACKUP" PROGRAM

EMC-25 Band 5
Peak Detector (BB Signals)
4 kHz 3dB Bandwidth

Transducer: 5uH/Fcc LISN



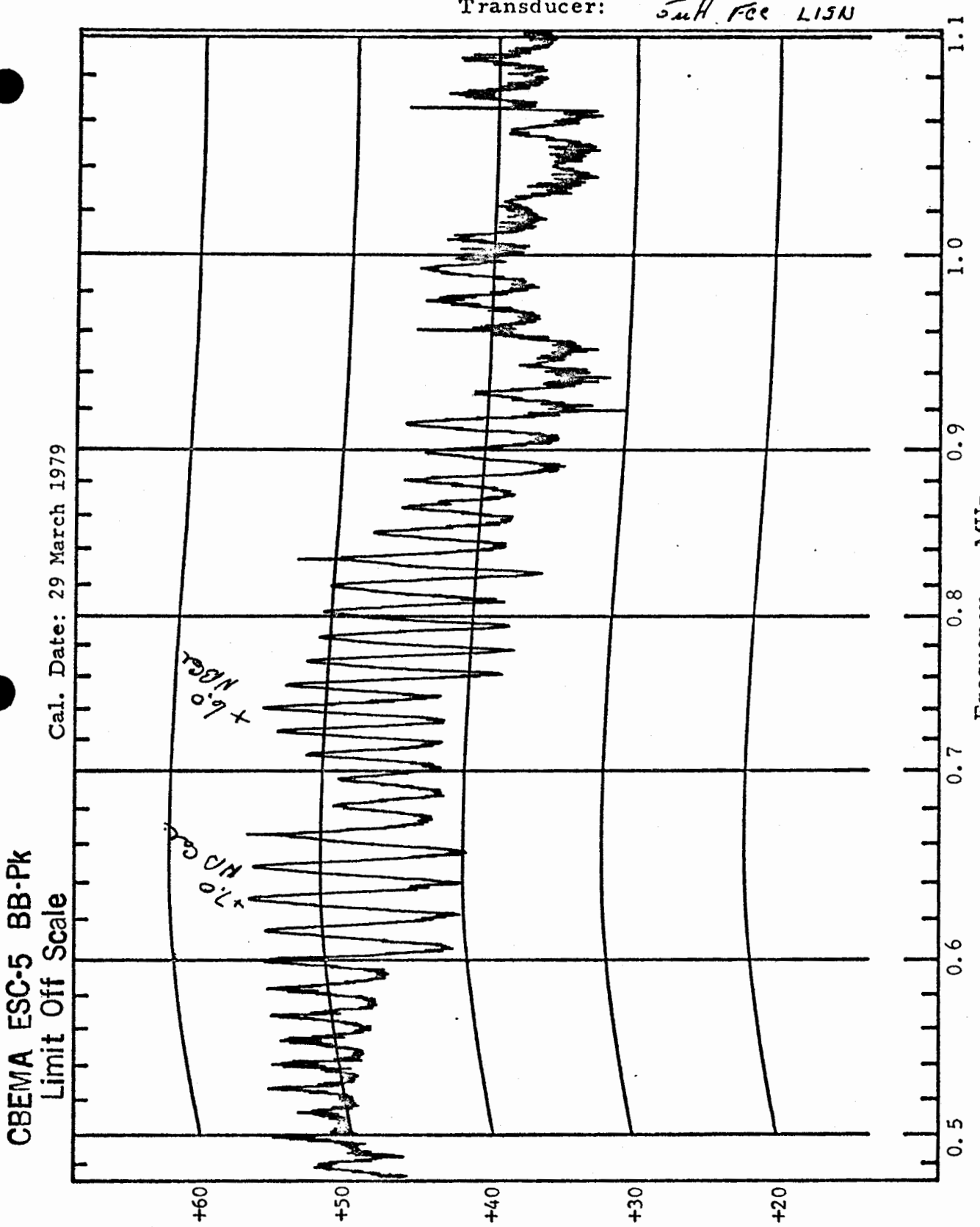
Equip. Under Test TRS-80 Disc
Equip. Oper. Mode Writing on Disc
Date 4 Jan 79 Operator CDS

Rcvr. Atten. 20 Ext. Atten. —
Line Tested Neut Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 6
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth

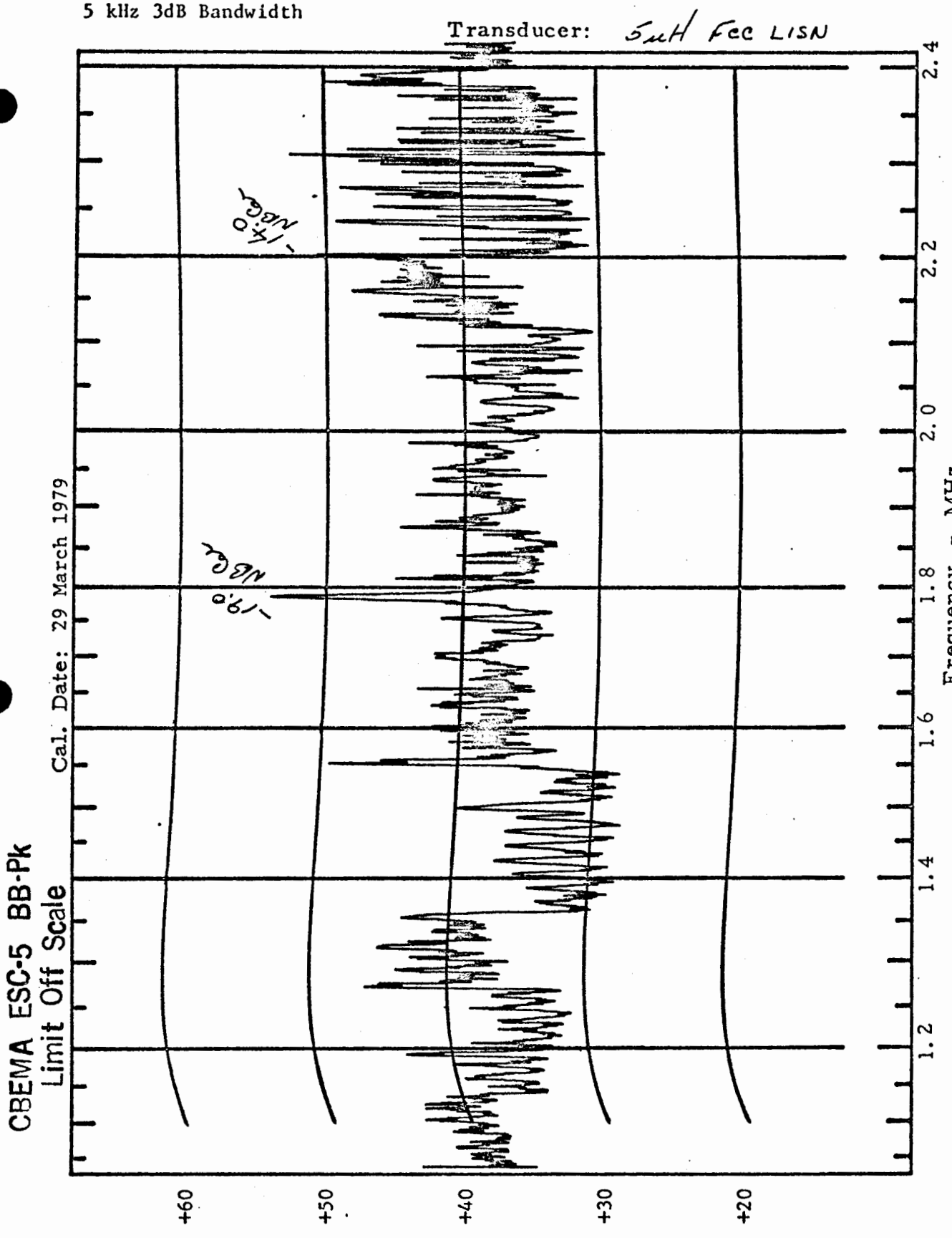
Transducer: 50uH FCC LISN



Equip. Under Test TRS-80 Disc
Rcvr. Atten. 20 Ext. Atten. —
Line Tested Neut Ground ON/OFF
Equip. Oper. Mode Writing on Disc
Date 4 Apr 79 Operator C. Scott

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 7
Peak Detector (BB Signals)
5 kHz 3dB Bandwidth

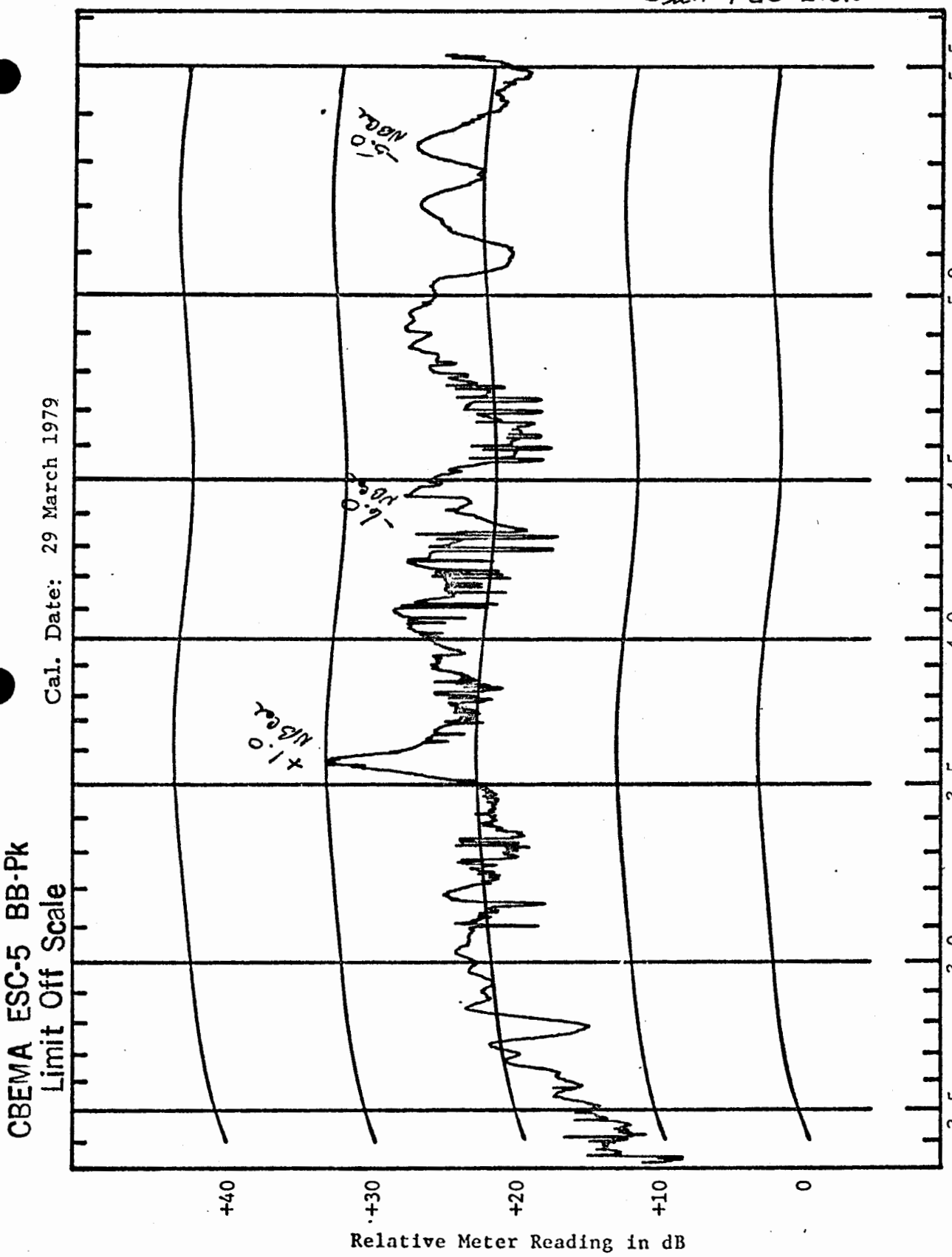


Equip. Under Test TRS-80 Disk
Rcvr. Atten. 20 Ext. Atten. —
Equip. Oper. Mode Waiting on Disk
Line Tested Neutral Ground ON/OFF
Date 4 Apr 79 Operator [illegible]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 8
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5uH/ FCC LISN



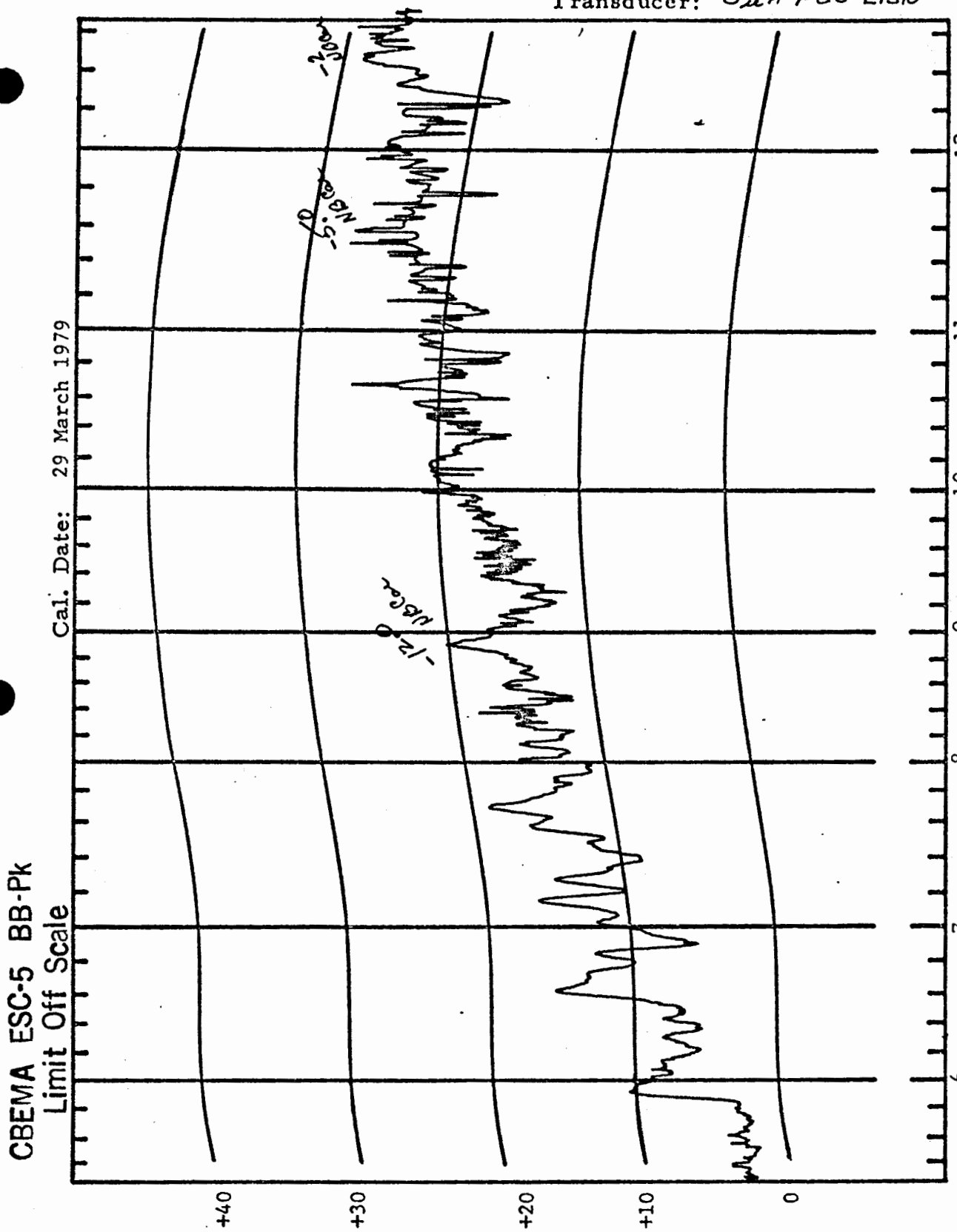
Equip. Under Test TRS-80 Disk
Equip. Oper. Mode Writing on Disk
Date 4 Apr 79 Operator [illegible]

Rcvr. Atten. 40 Ext. Atten. —
Line Tested Neut Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB µV/MHz for conducted emissions and dB µV/m/MHz for radiated emissions.

EMC-25 Band 9
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5uH FCC LISN



Relative Meter Reading in dB

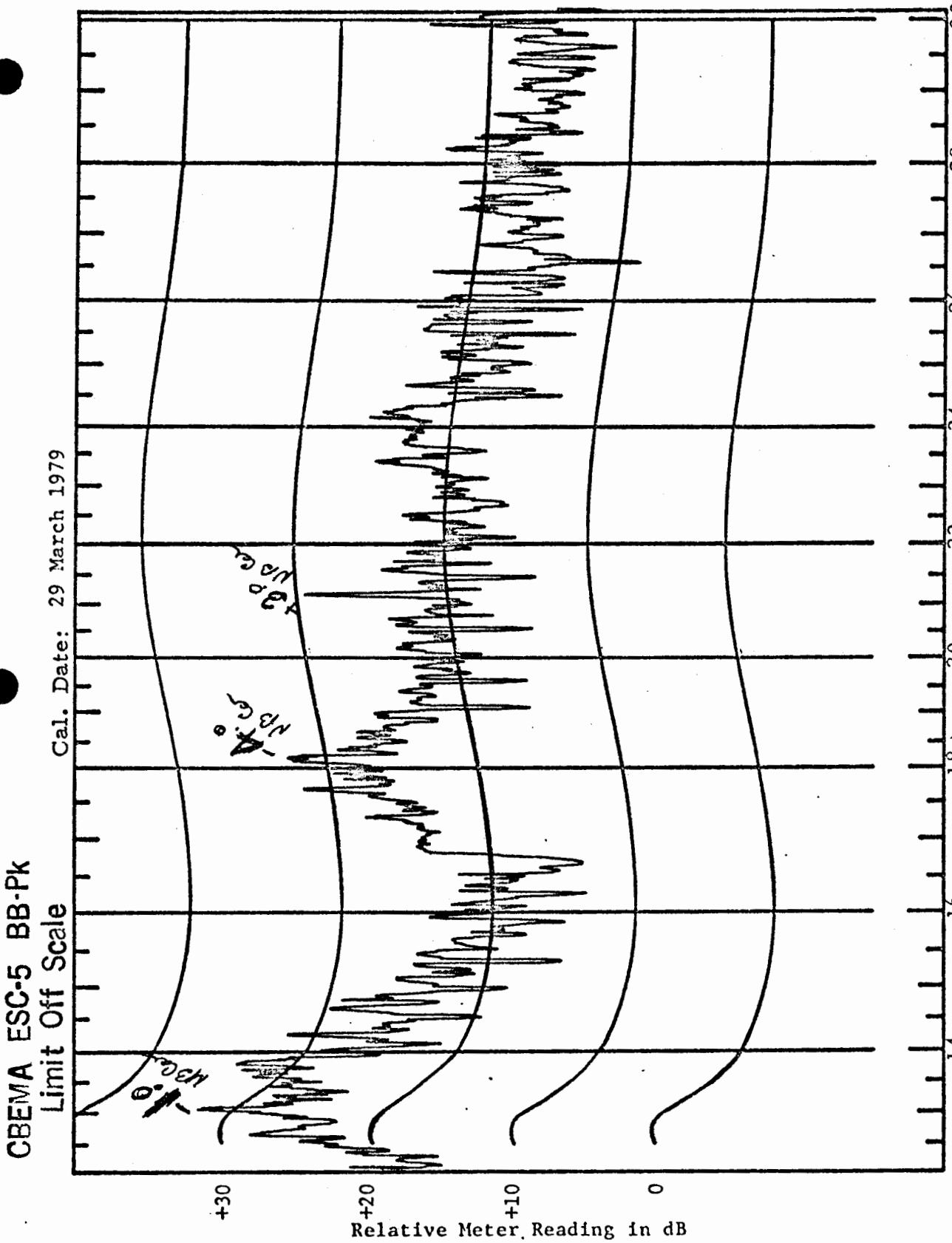
Equip. Under Test TRS-80 Disk
Equip. Oper. Mode Waiting on Disk
Date 4 Apr 79 Operator [illegible]

Rcvr. Atten. 60 Ext. Atten. —
Line Tested Neut Ground ON/OFF

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 10
Peak Detector (BB Signals)
50 kHz 3dB Bandwidth

Transducer: 5uH/FCC LISN



Equip. Under Test TRS-80 Disc
Equip. Oper. Mode Writing on Disc
Date 4 Apr 79 Operator G.D.Scott

Rcvr. Atten. 60 Ext. Atten. —
Line Tested Neut Ground ON/OFF

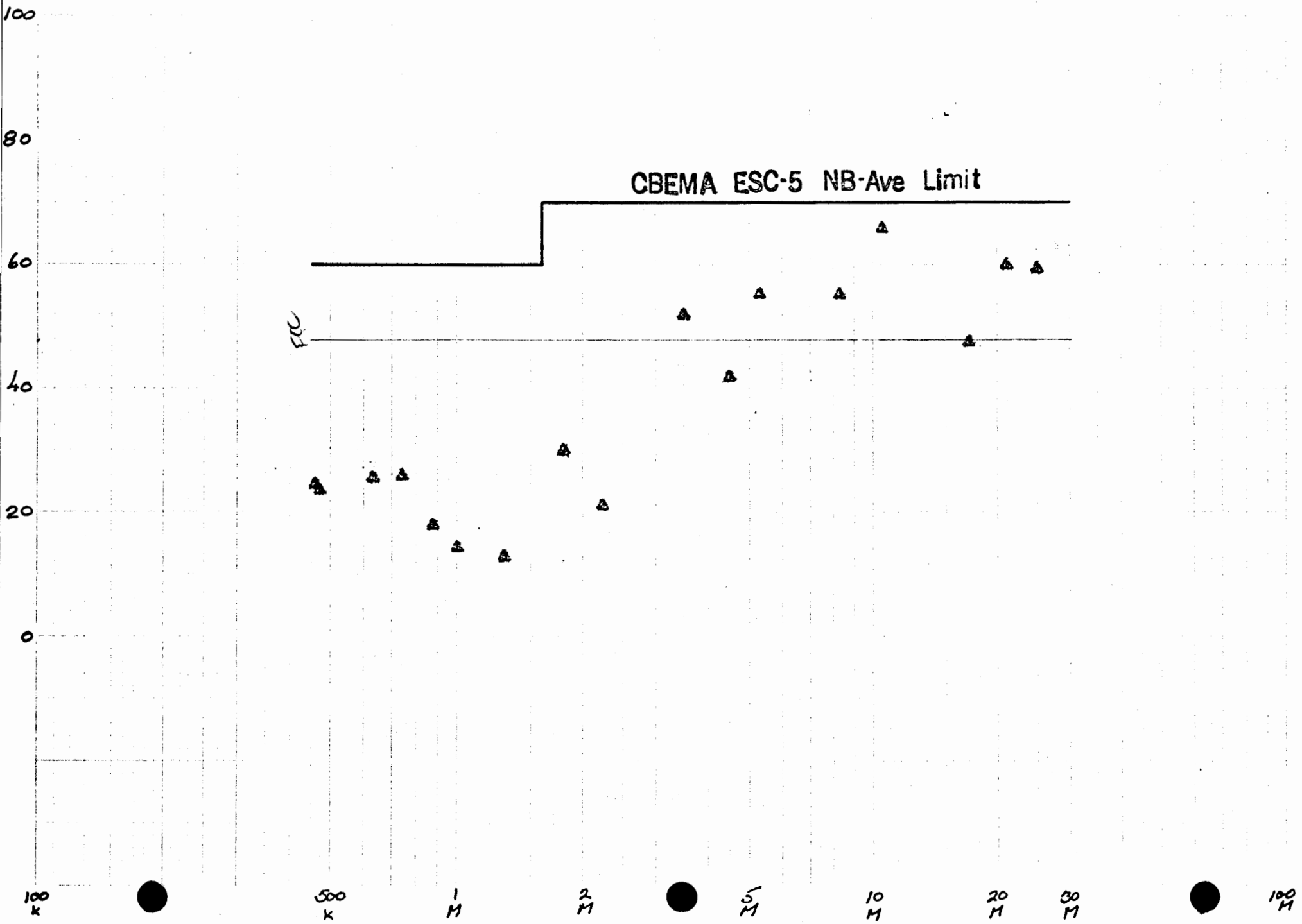
Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

APPENDIX B

NARROWBAND CONDUCTED EMISSIONS
(AVERAGE DETECTOR)

CPU/KEYBOARD
HOT POWER LINE

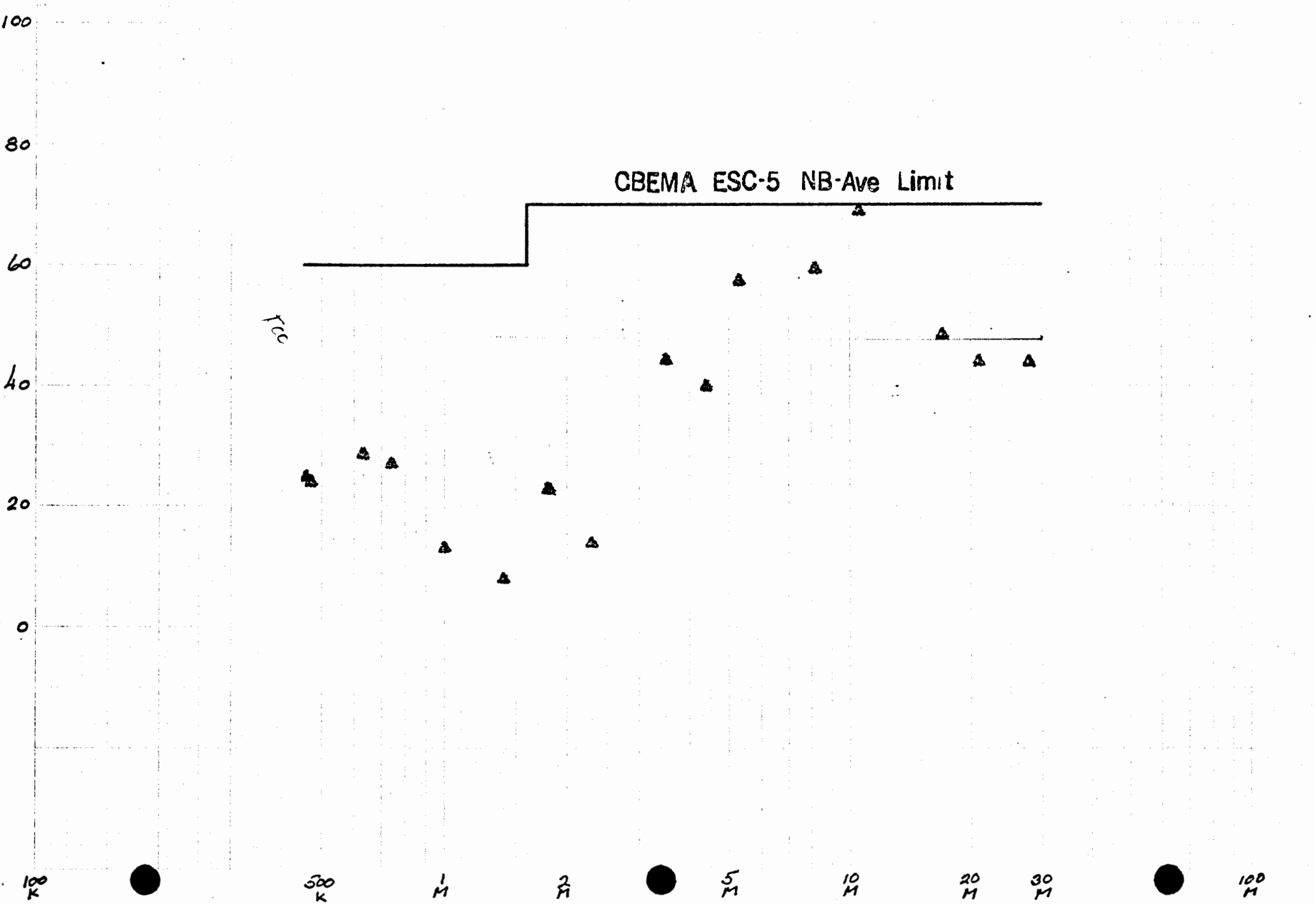
CPU-Hot Line
NB Cas - Cond.



CPU/KEYBOARD

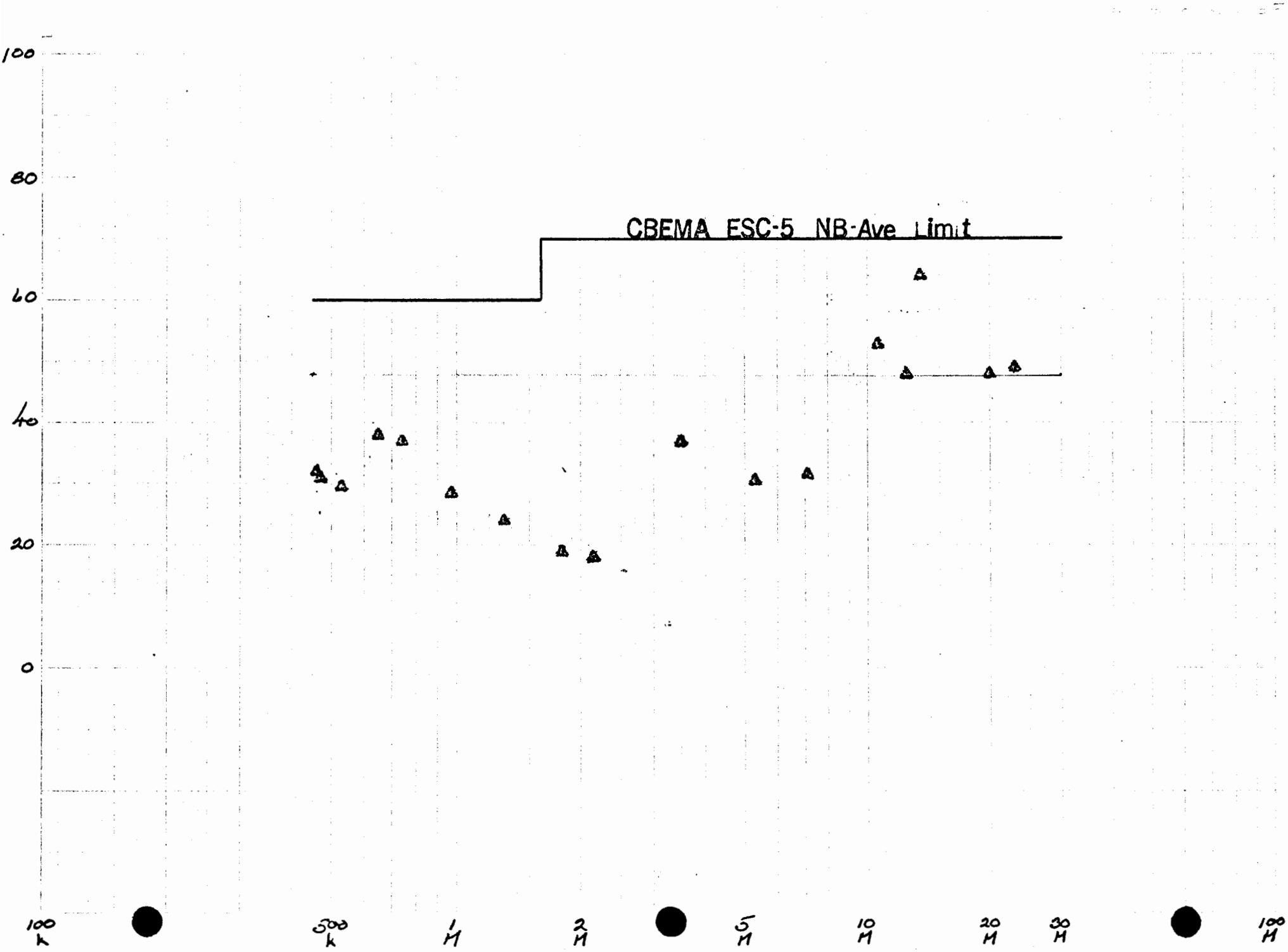
NEUTRAL POWER LINE

CPU - Neut Line
NB Cas - Cond



VIDEO DISPLAY
HOT POWER LINE

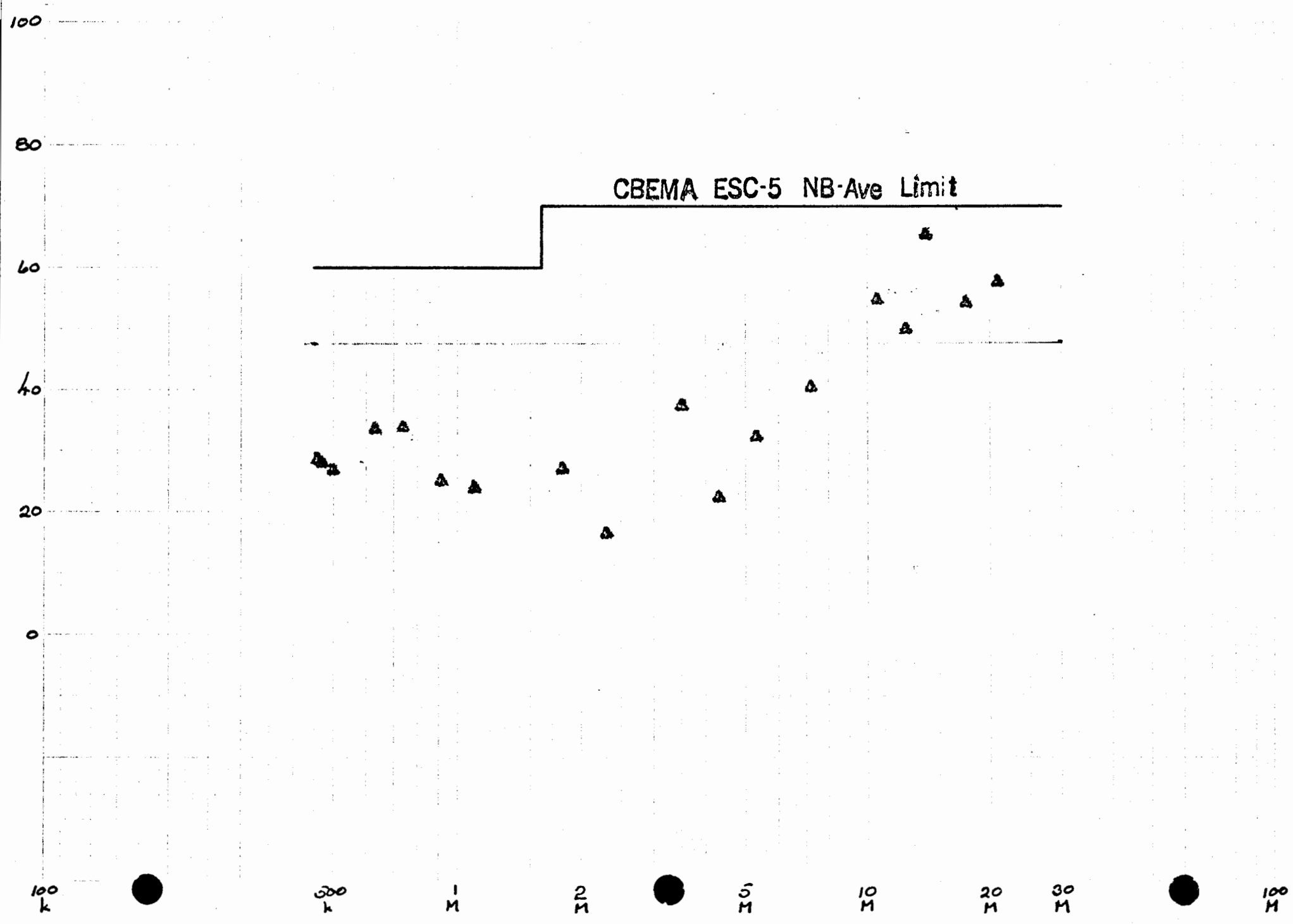
CRT_Hot Line
NB Cas. Cond.



VIDEO DISPLAY

NEUTRAL POWER LINE

CRT - Neutral Line
NB Corr. - Cond.

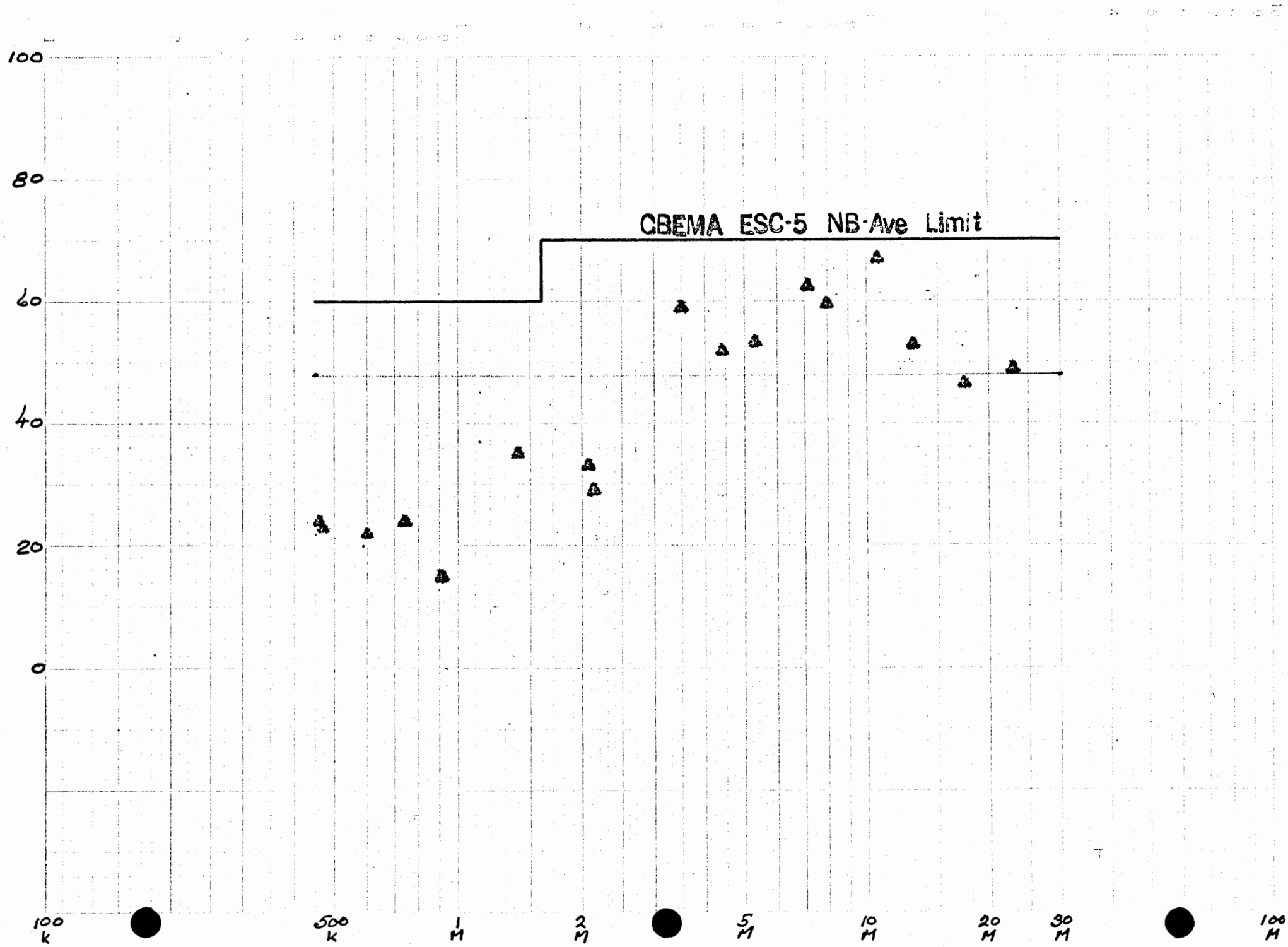


EXPANSION INTERFACE

HOT POWER LINE

NO MEMORY INSTALLED IN EI
"BACKUP" PROGRAM

Interface - Hot Line
NB Cap - Cond.

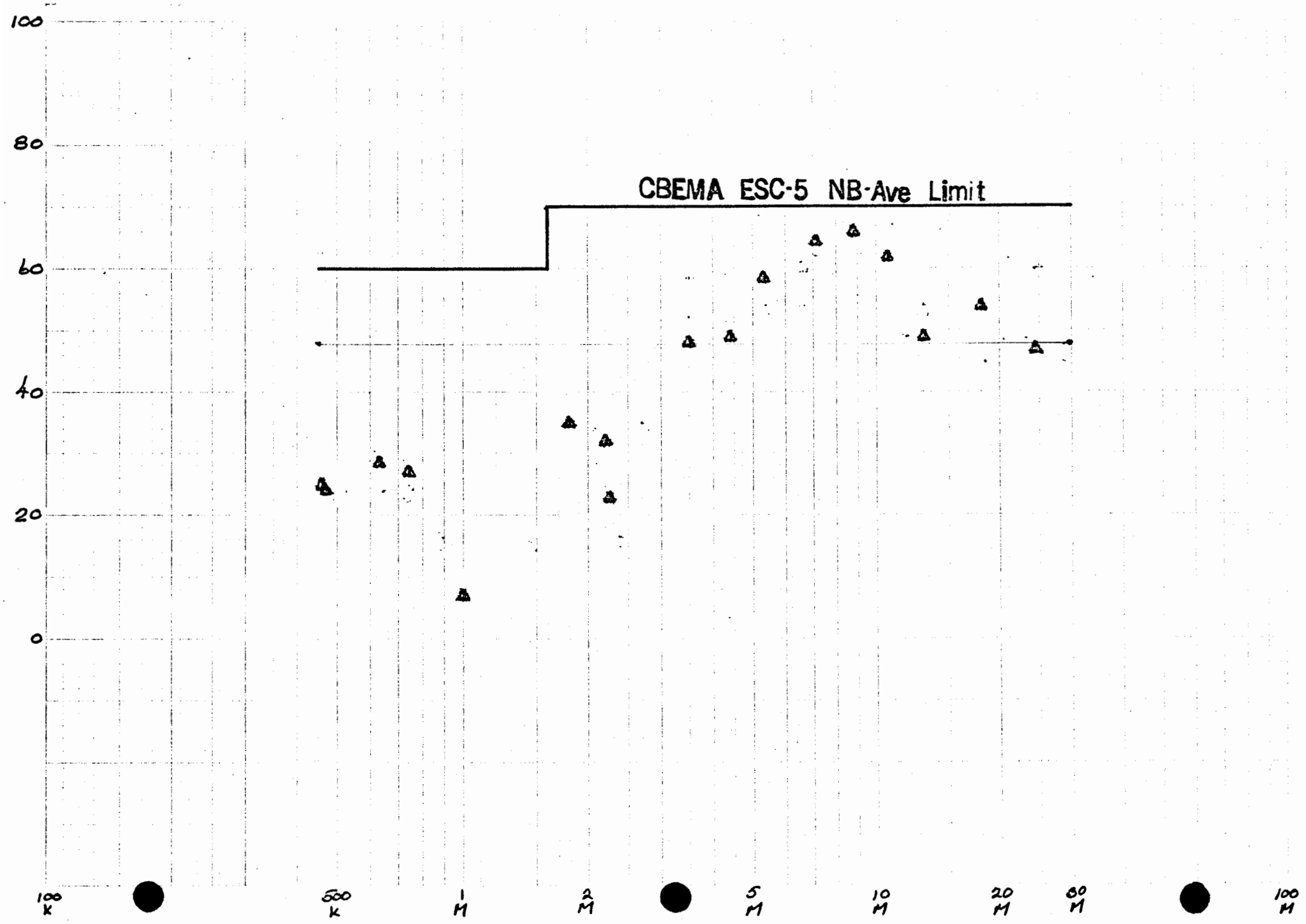


EXPANSION INTERFACE

NEUTRAL POWER LINE

NO MEMORY INSTALLED IN EI
"BACKUP" PROGRAM

Interface - Neut Line
NB Cars - Cond.

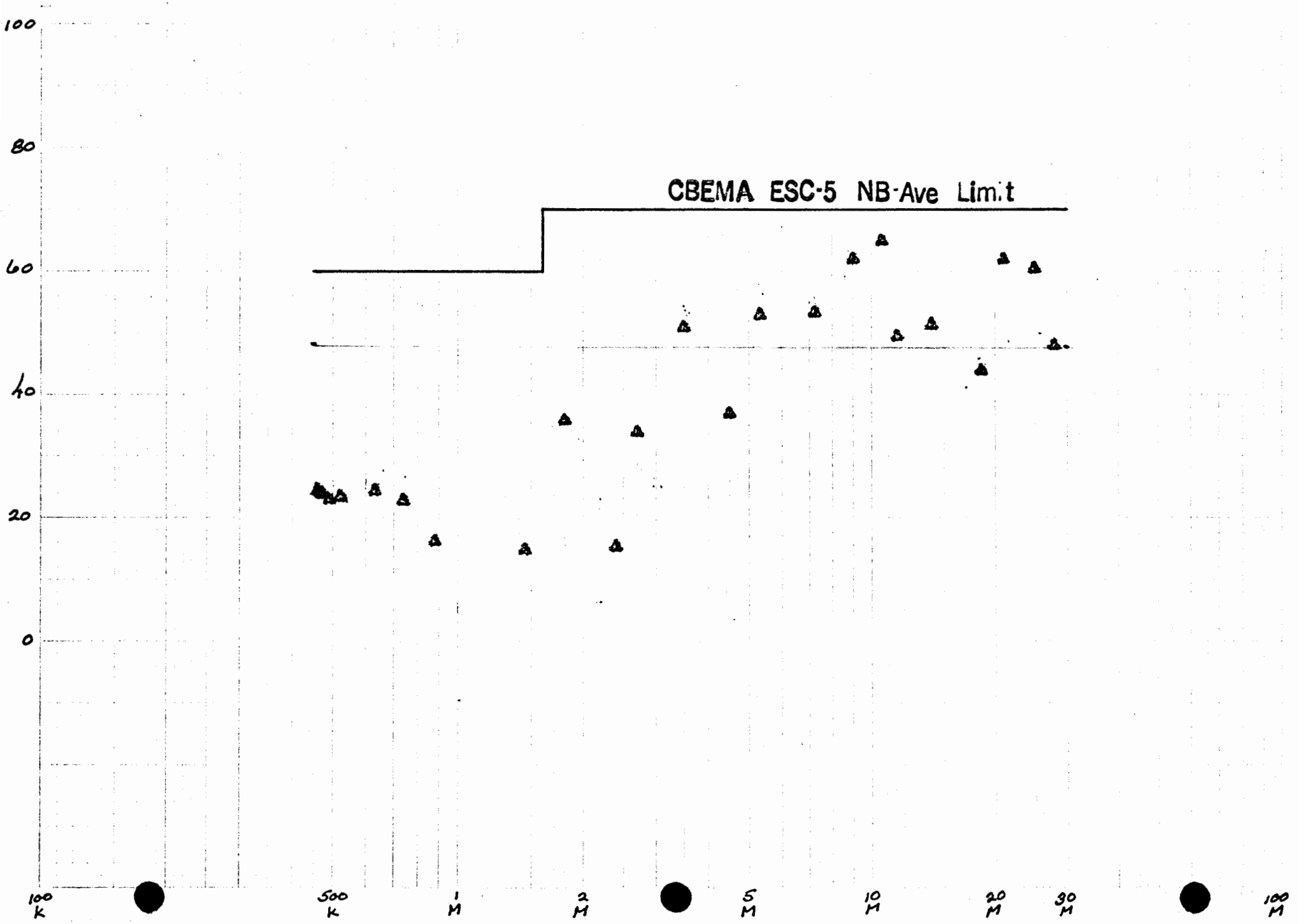


EXPANSION INTERFACE

HOT POWER LINE

32K MEMORY INSTALLED IN EI
"COUNTDOWN" PROGRAM

Interface/32k/Hot Line
NB Cars: Cond.
Countdown Program Running

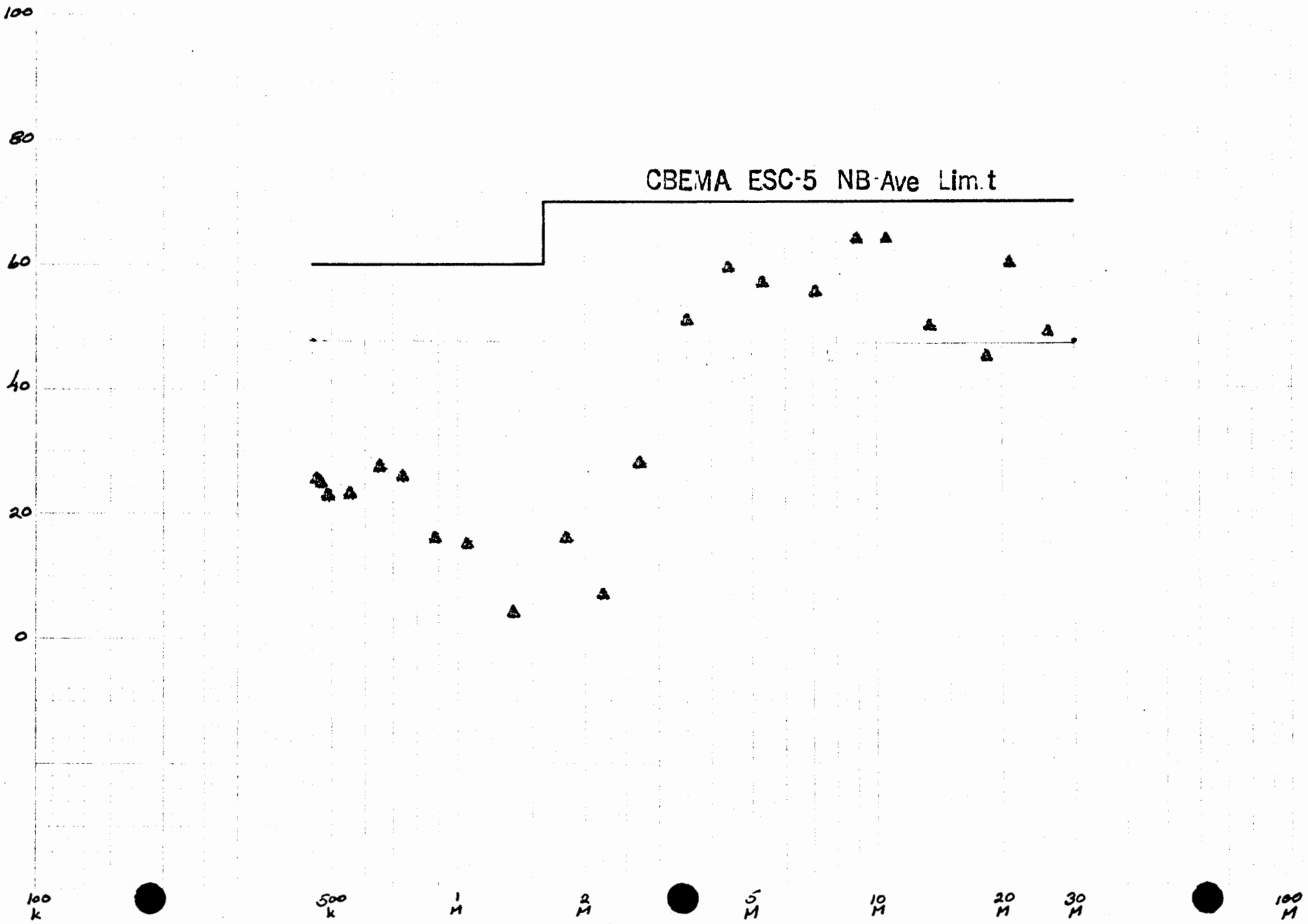


EXPANSION INTERFACE

NEUTRAL POWER LINE

32K MEMORY INSTALLED IN EI
"COUNTDOWN" PROGRAM

Interface/32k/Mcut Line
/NB Carr. - Cond.
Countdown Program Running

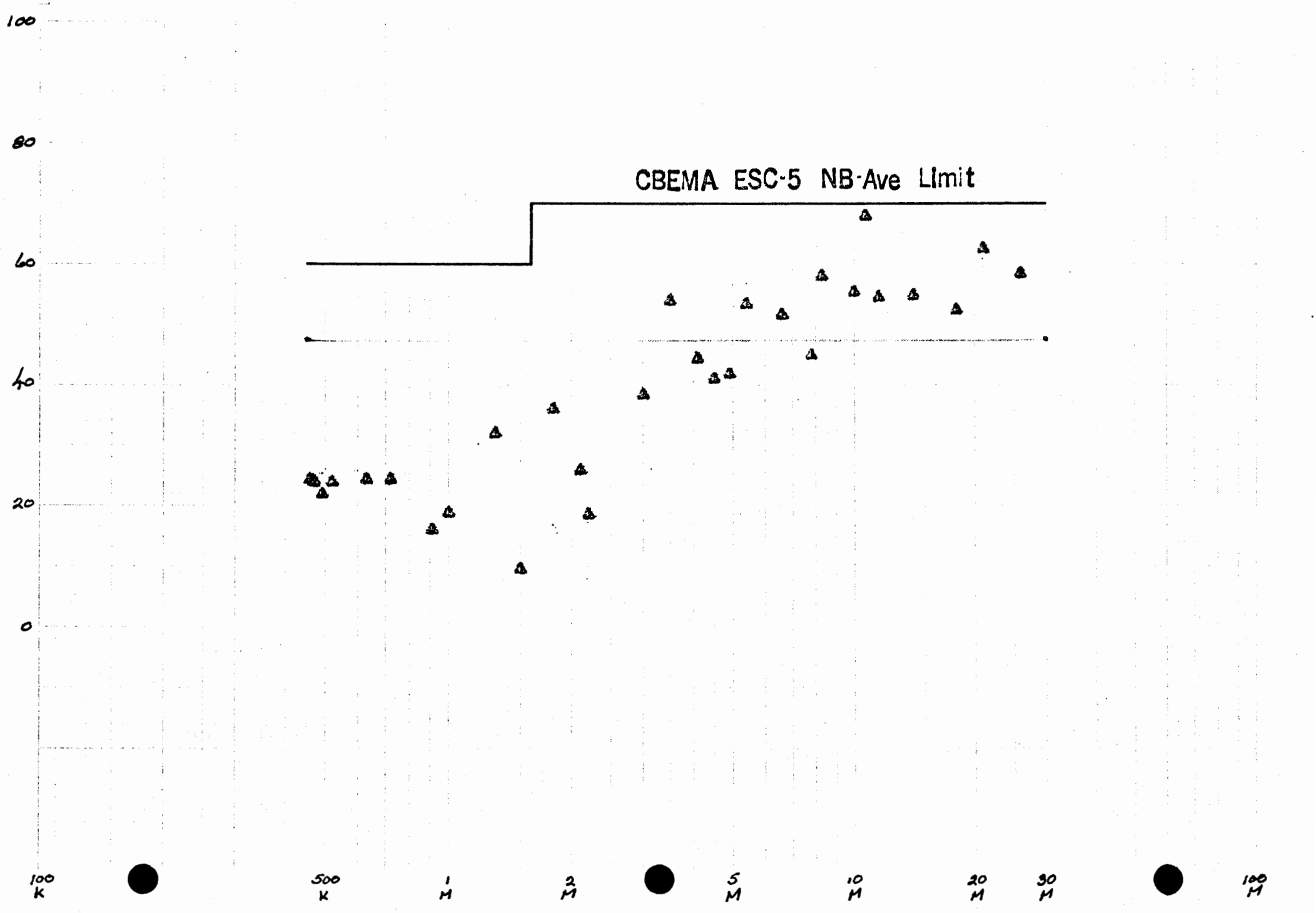


EXPANSION INTERFACE

HOT POWER LINE

32K MEMORY INSTALLED IN EI
NO PROGRAM OPERATION

Interface/Talk/Hot Line
NB Carr. - Cond.
standby after Countdown Program finished

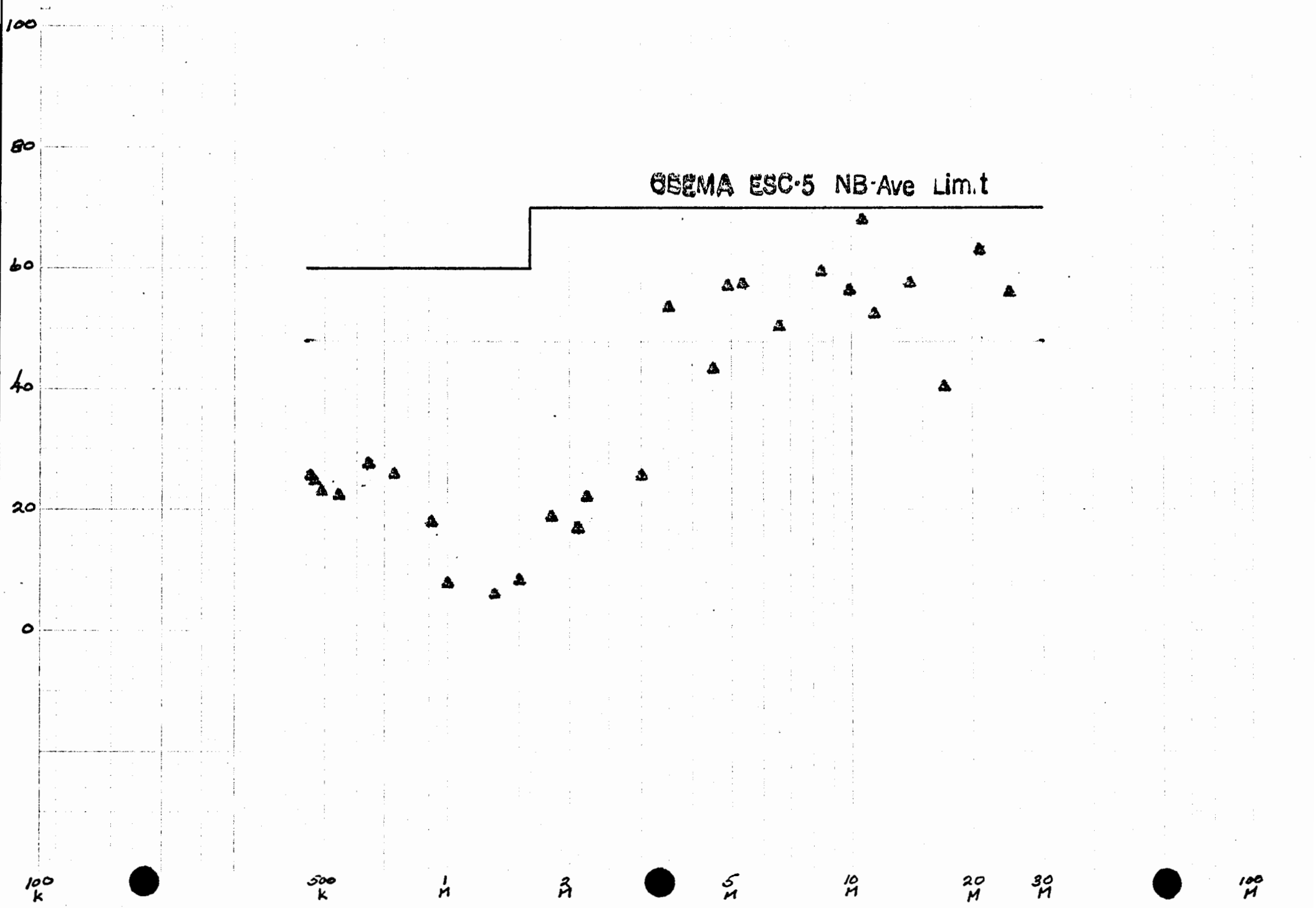


EXPANSION INTERFACE

NEUTRAL POWER LINE

32K MEMORY INSTALLED IN EI
NO PROGRAM OPERATION

Interface/32k/Neutline
V13 Curr. - Cond.
Standby after Countdown Program finished

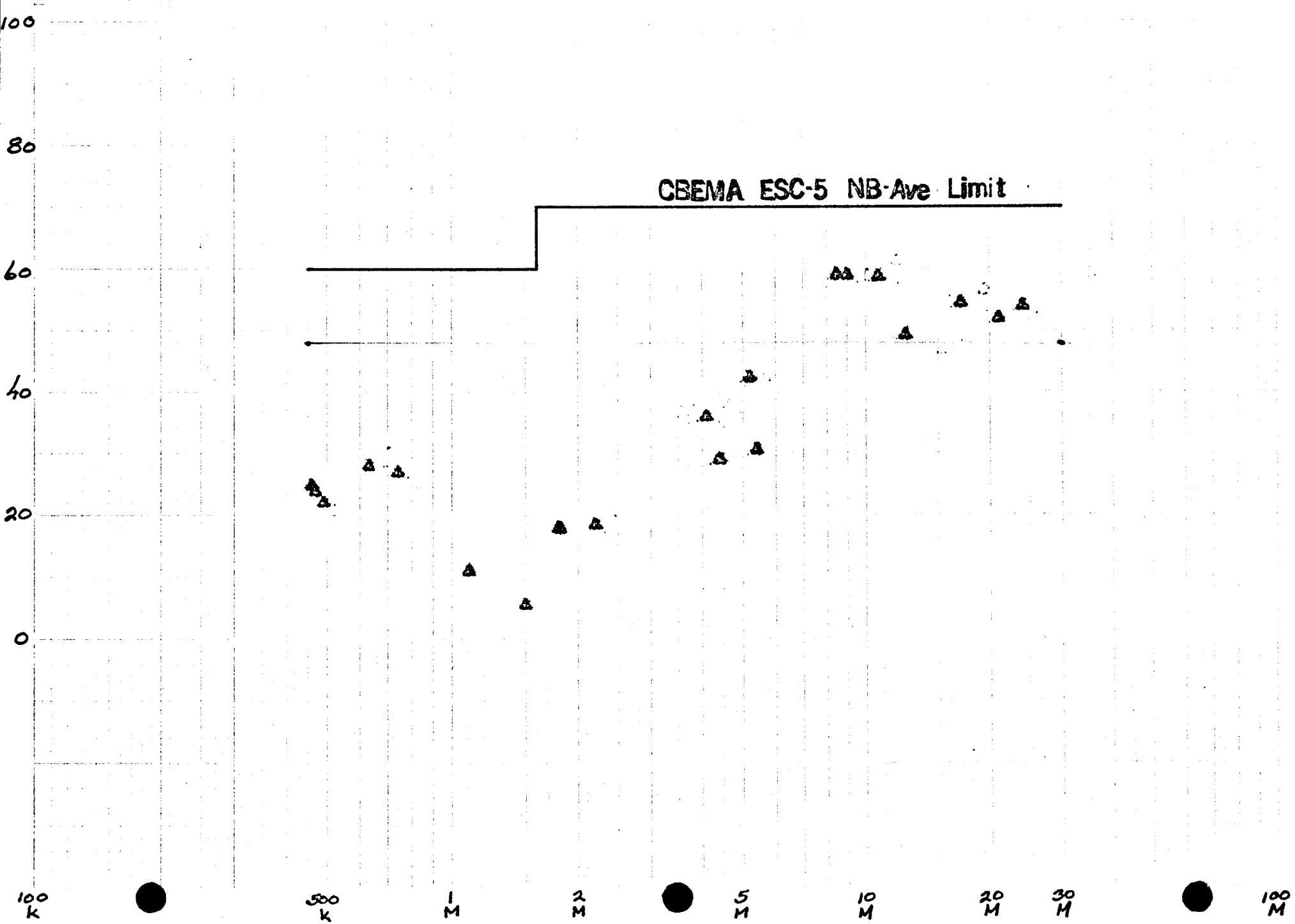


CASSETTE TAPE UNIT

HOT POWER LINE

TAPE WRITE

Tape - Hot Line
NB Calc. Cond.

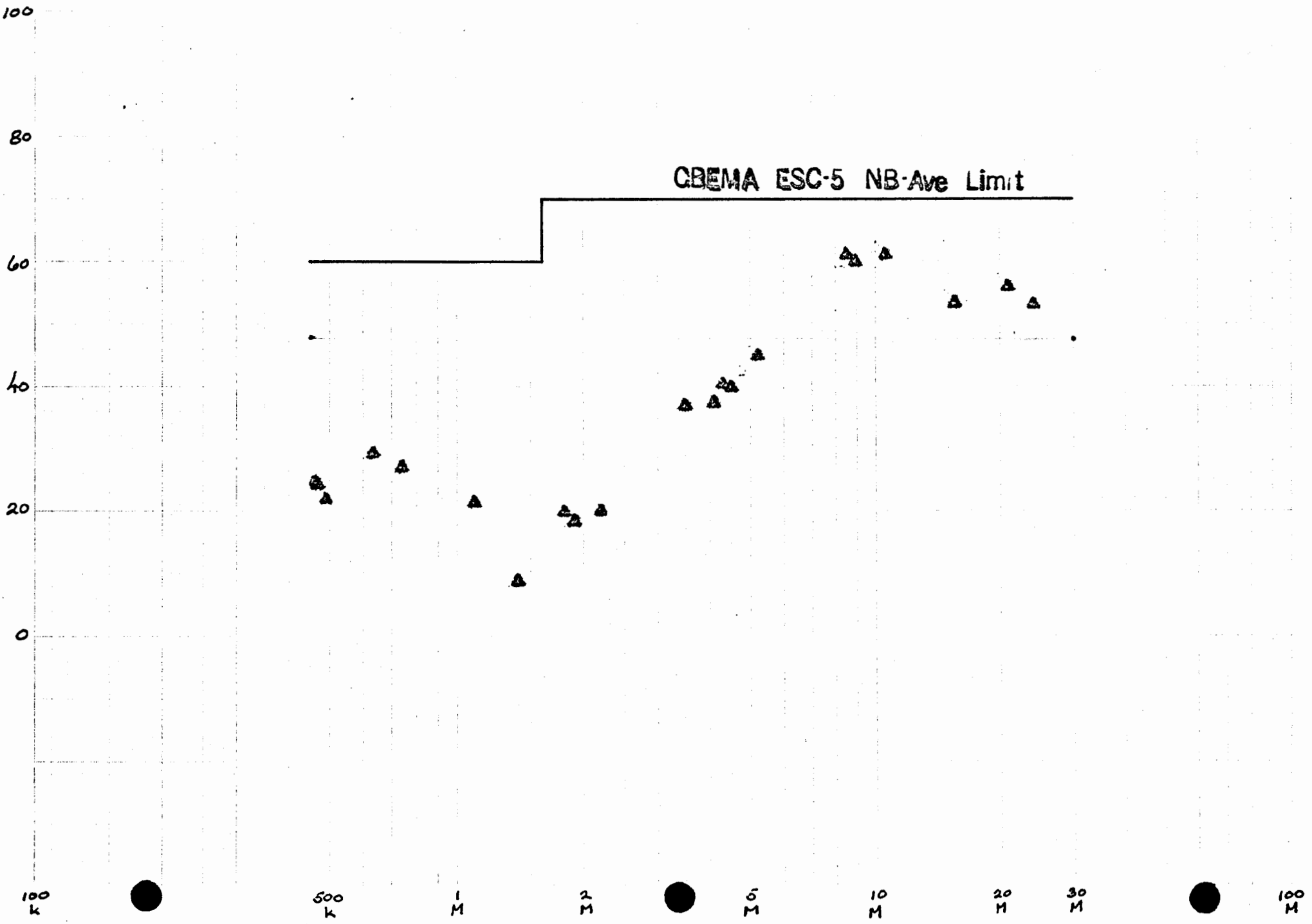


CASSETTE TAPE UNIT

NEUTRAL POWER LINE

TAPE WRITE

Tape - Next Line
NB Cen. Cond.

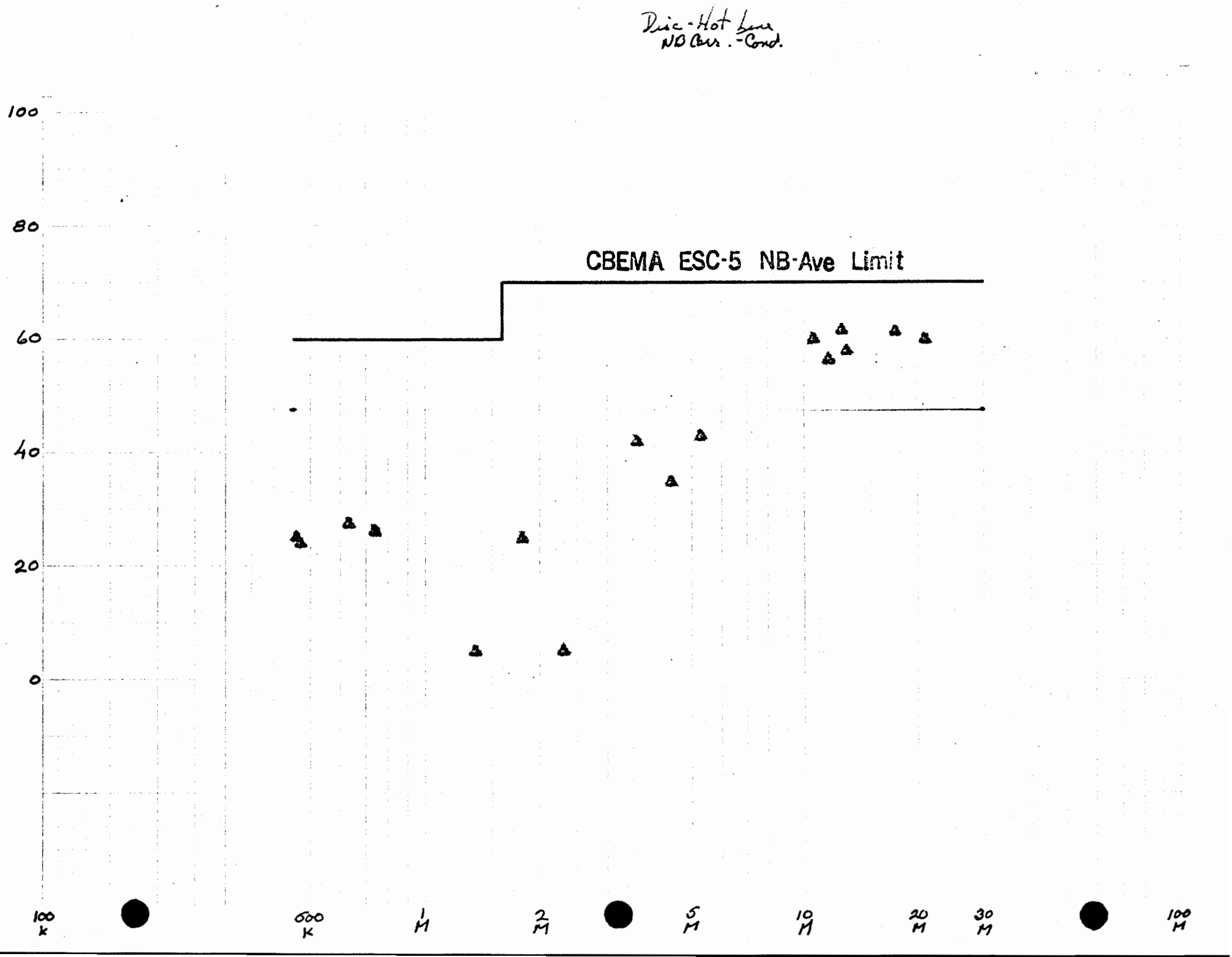


MINI-DISK DRIVE

HOT POWER LINE

"BACKUP" PROGRAM

Disc - Hot Line
NB Qua. - Cond.

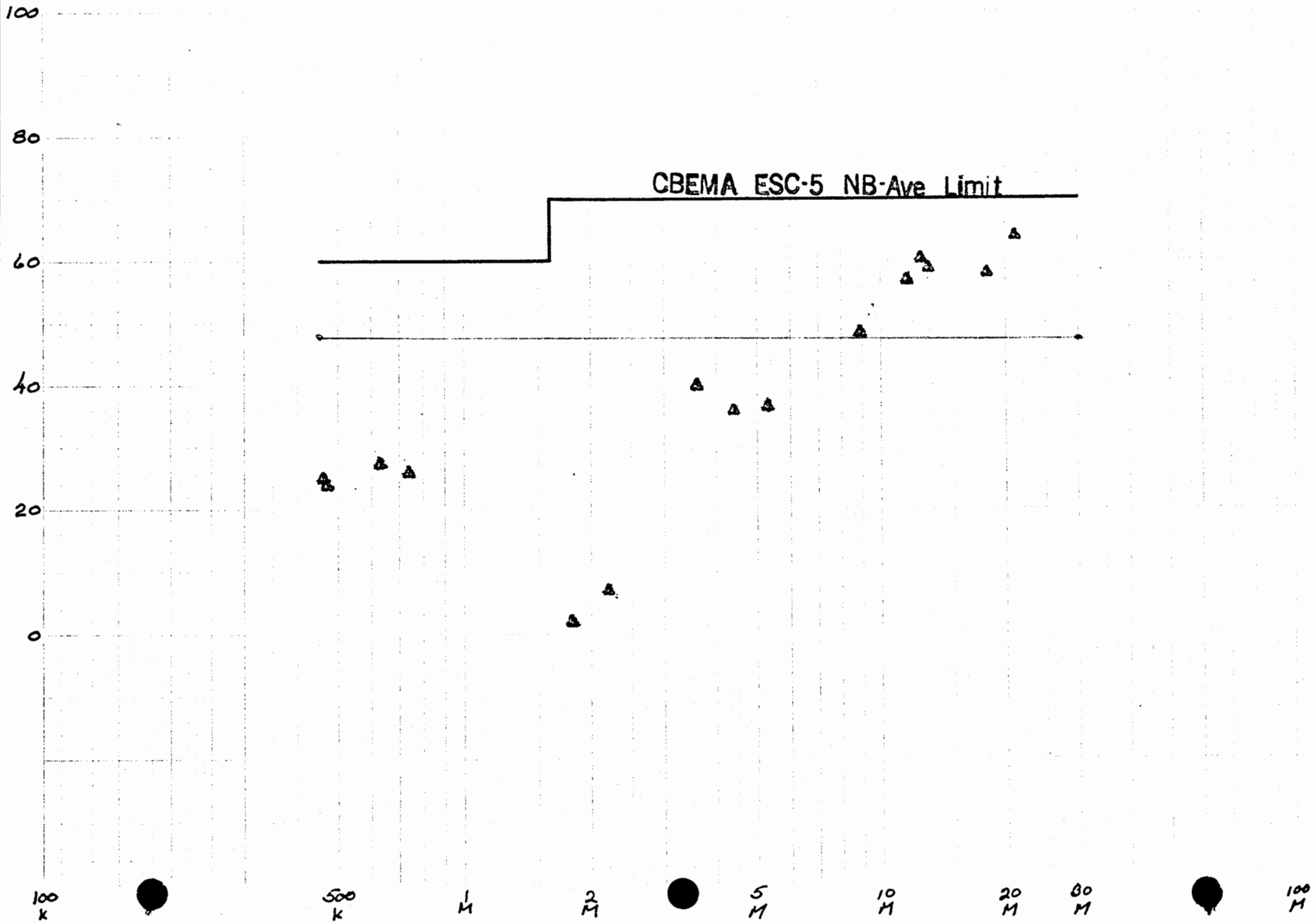


MINI-DISK DRIVE

NEUTRAL POWER LINE

"BACKUP" PROGRAM

Disc - Next Line
NB Curr - Cond.



APPENDIX C

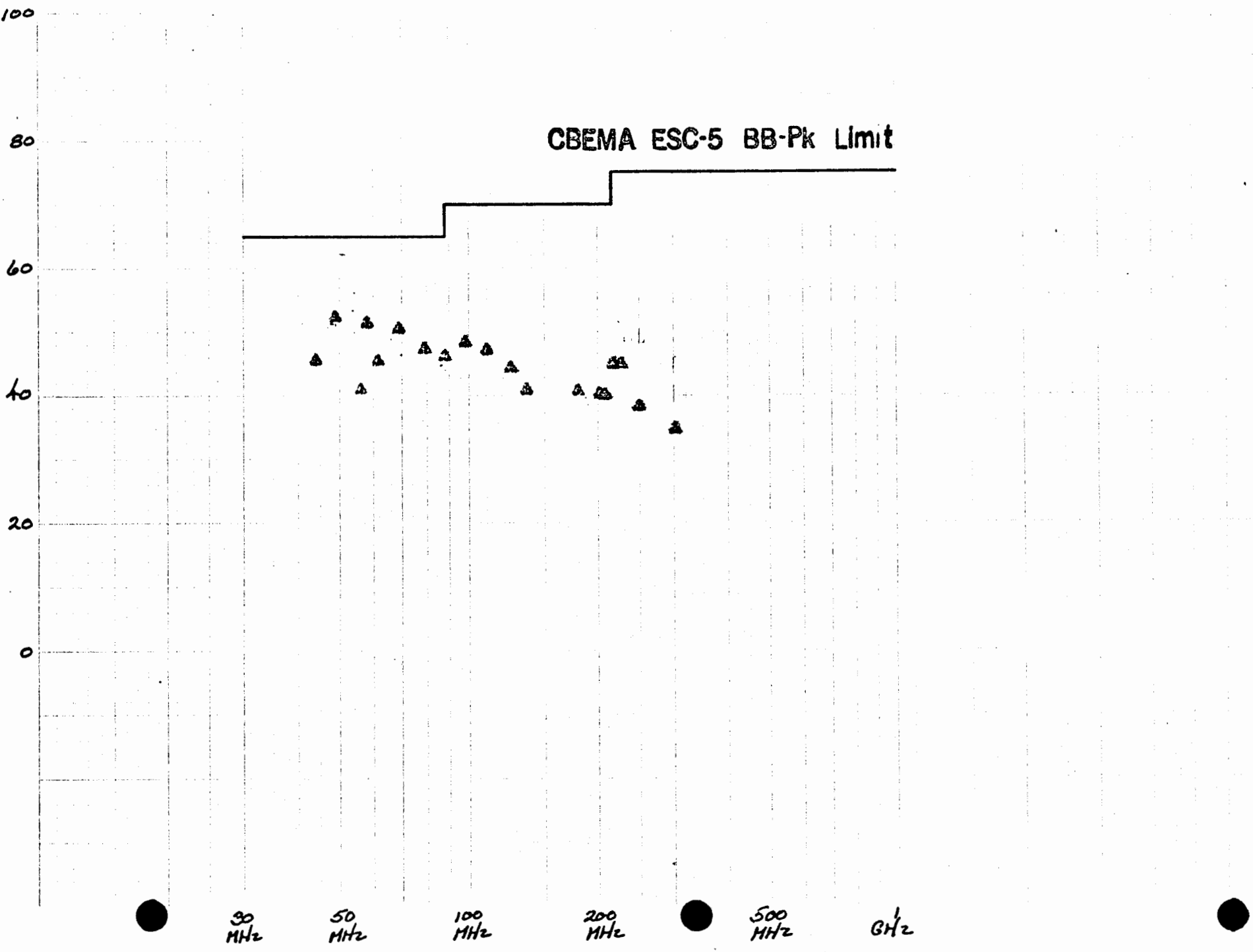
BROADBAND RADIATED EMISSIONS-OPEN FIELD SITE
(PEAK DETECTOR)

TRS-80 SYSTEM

HORIZONTAL POLARIZED ANTENNA

"BACKUP" PROGRAM

BB Radiated
Horiz

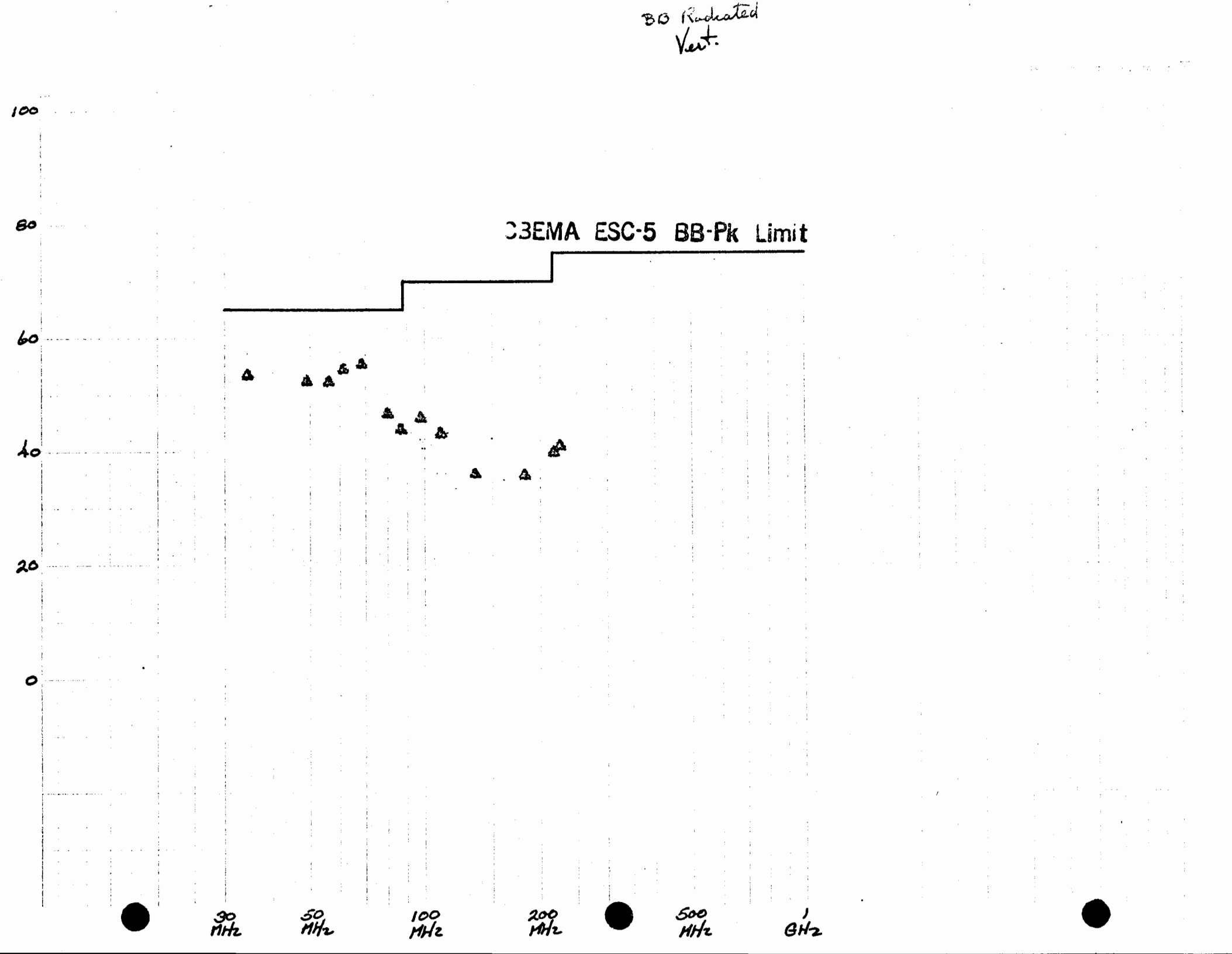


TRS-80 SYSTEM

VERTICAL POLARIZED ANTENNA

"BACKUP" PROGRAM

BB Radiated
Vert.



APPENDIX D

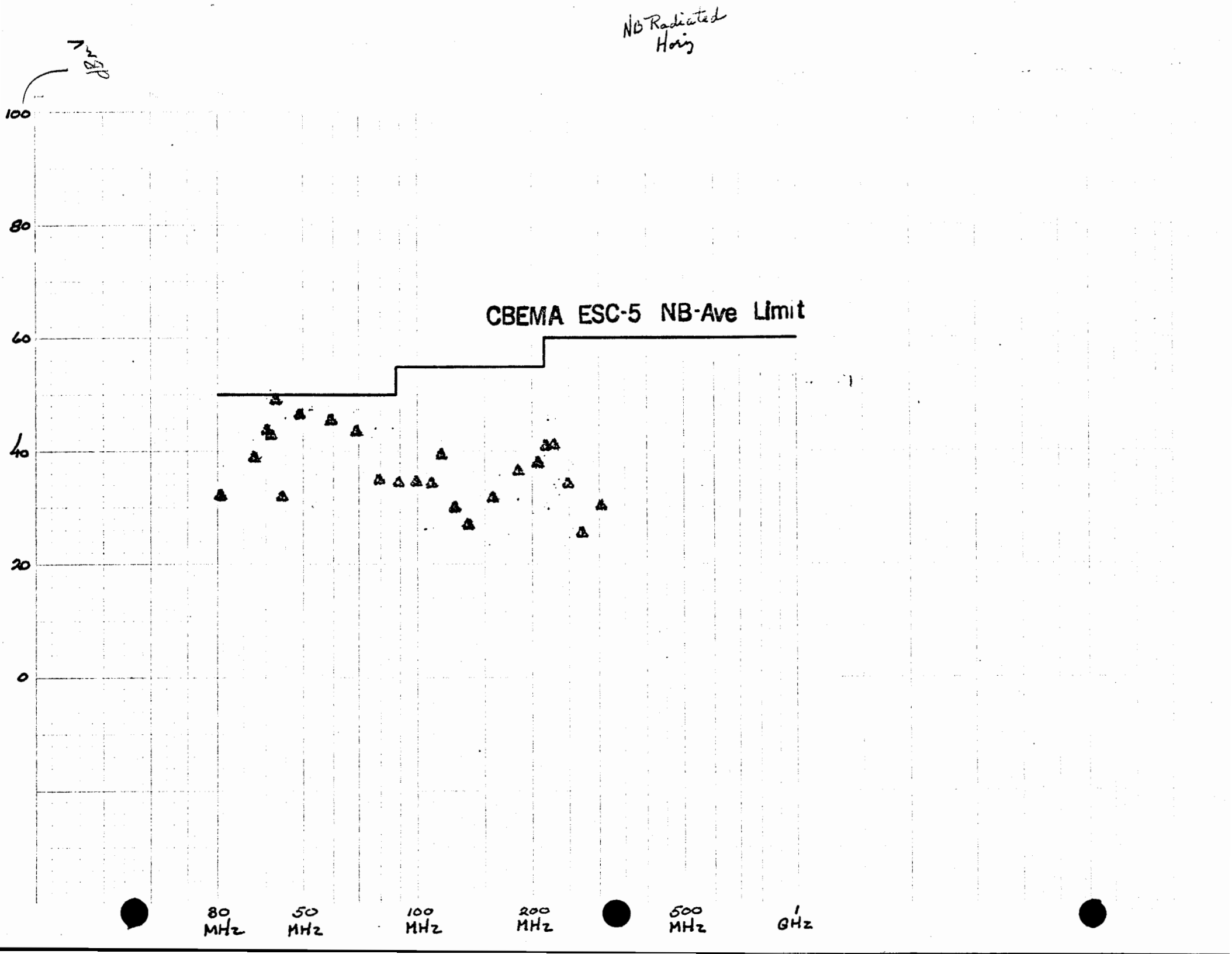
NARROWBAND RADIATED EMISSIONS
(AVERAGE DETECTOR)

TRS-80 SYSTEM

HORIZONTAL POLARIZED ANTENNA

"BACKUP" PROGRAM

NB Radiated
Horiz

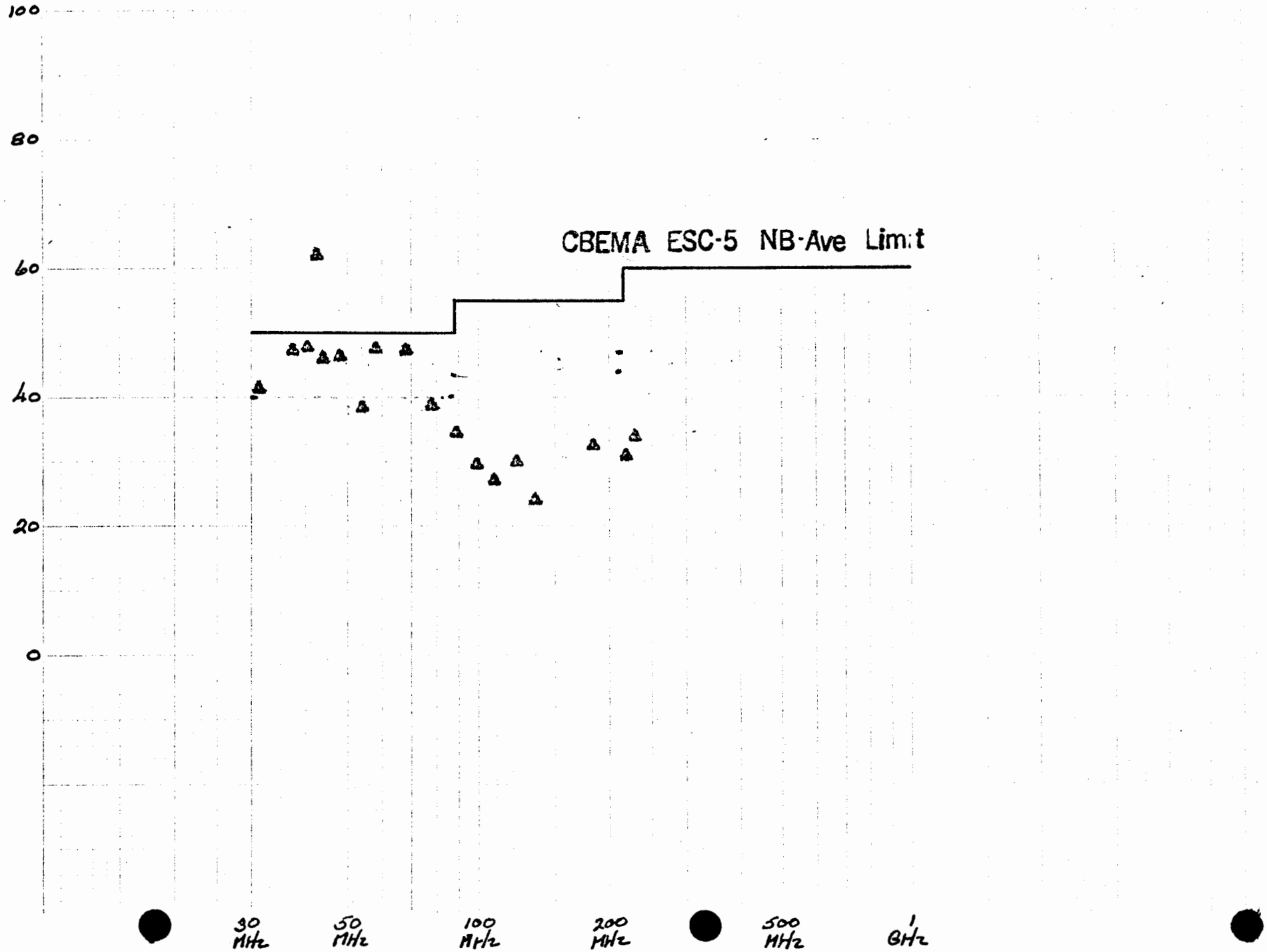


TRS-80 SYSTEM

VERTICAL POLARIZED ANTENNA

"BACKUP" PROGRAM

NB Radiated
Vert



APPENDIX E

BROADBAND RADIATED EMISSIONS-SHIELDED ENCLOSURE (PEAK DETECTOR)

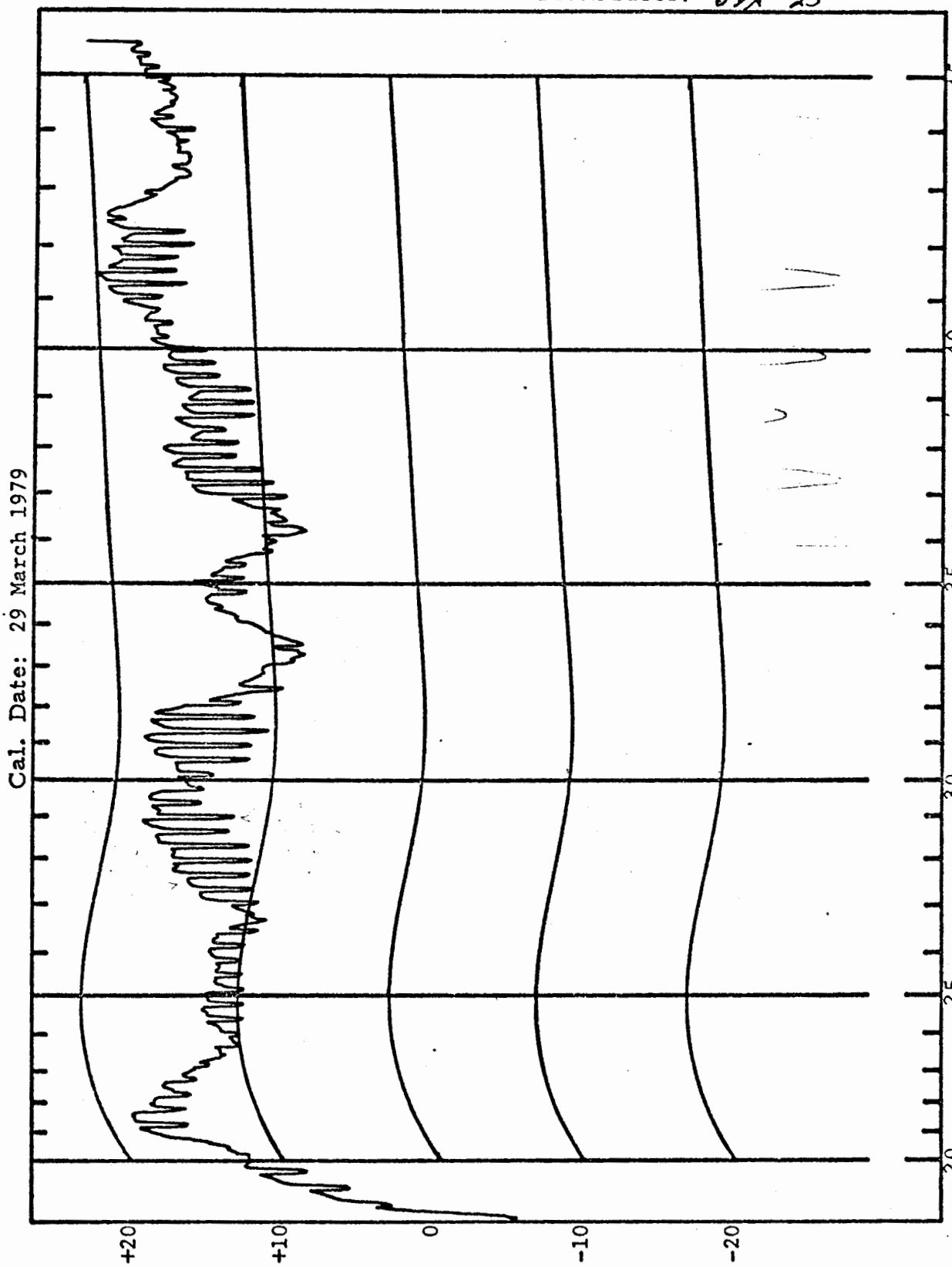
TRS-80 SYSTEM

HORIZONTAL POLARIZED ANTENNA

"BACKUP" PROGRAM

EMC-25 Band 11
Peak Detector (BB Signals)
500 kHz 3dB Bandwidth

Transducer: BDI-25 (No Ext)



Rcvr. Atten. 20 Ext. Atten. —

Polarization Horiz

Equip. Under Test TRS-80

Equip. Oper. Mode 4 lines on, 1 line flashing

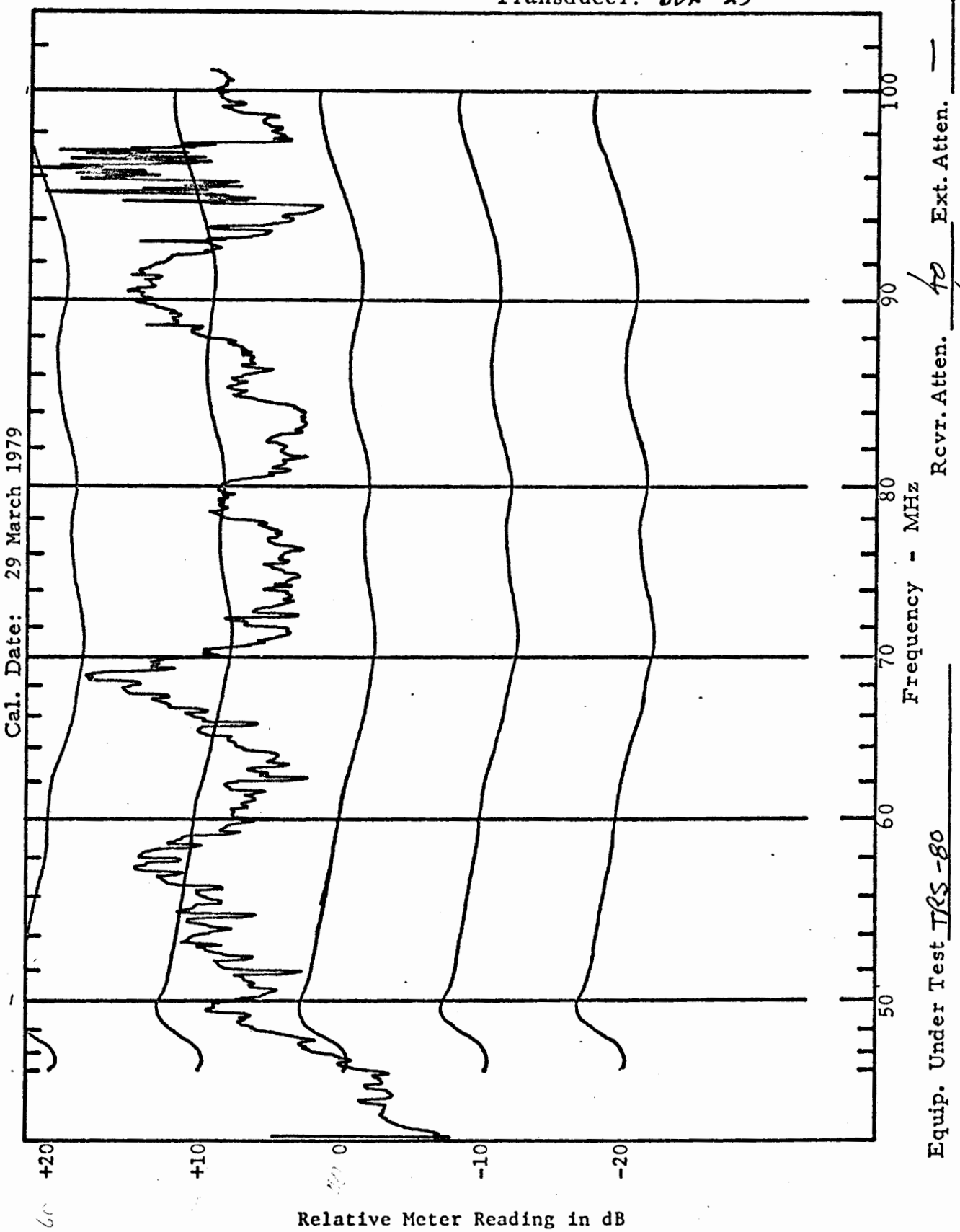
Date 4 Apr 79 Operator [illegible]

Relative Meter Reading in dB

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 12
Peak Detector (BB Signals)
500 kHz 3dB Bandwidth

Transducer: BDA-25 (No Ext)



Equip. Under Test TRS-80 Rcvr. Atten. 40 Ext. Atten. —

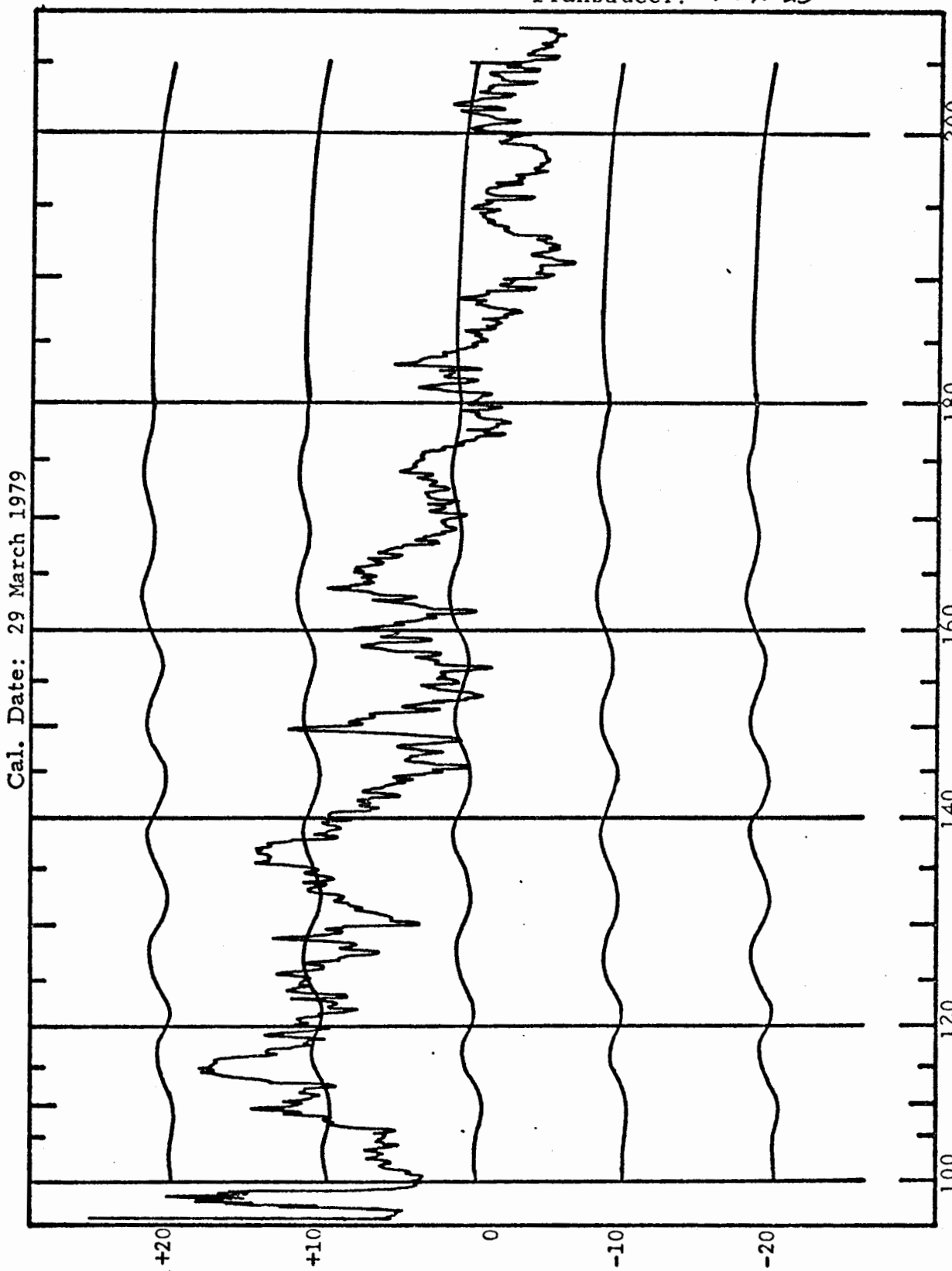
Equip. Oper. Mode 4 lines on, blue flashing Polarization Horz

Date 4 Apr 79 Operator [illegible]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 13
Peak Detector (BB Signals)
500 kHz 3dB Bandwidth

(No Ext)
Transducer: BDA-25



Equip. Under Test TRS-80 Rcvr. Atten. 40 Ext. Atten. —

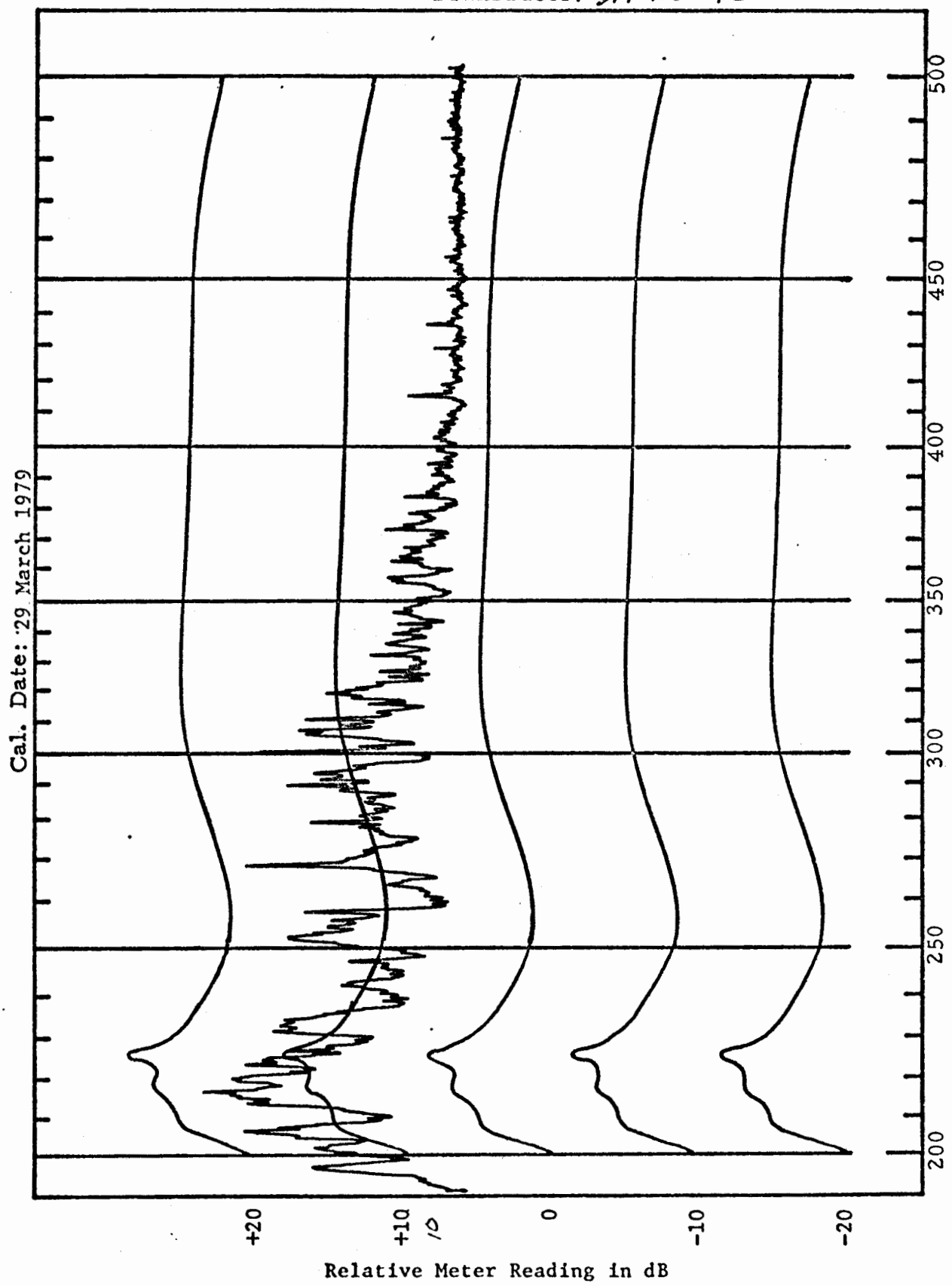
Equip. Oper. Mode 4 lines on, 1 line flashing Polarization Horiz

Date 4 Apr 79 Operator [illegible]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 14
Peak Detector (BB Signals)
500 kHz 3dB Bandwidth

Transducer: DM-105-T2 (300 MHz)



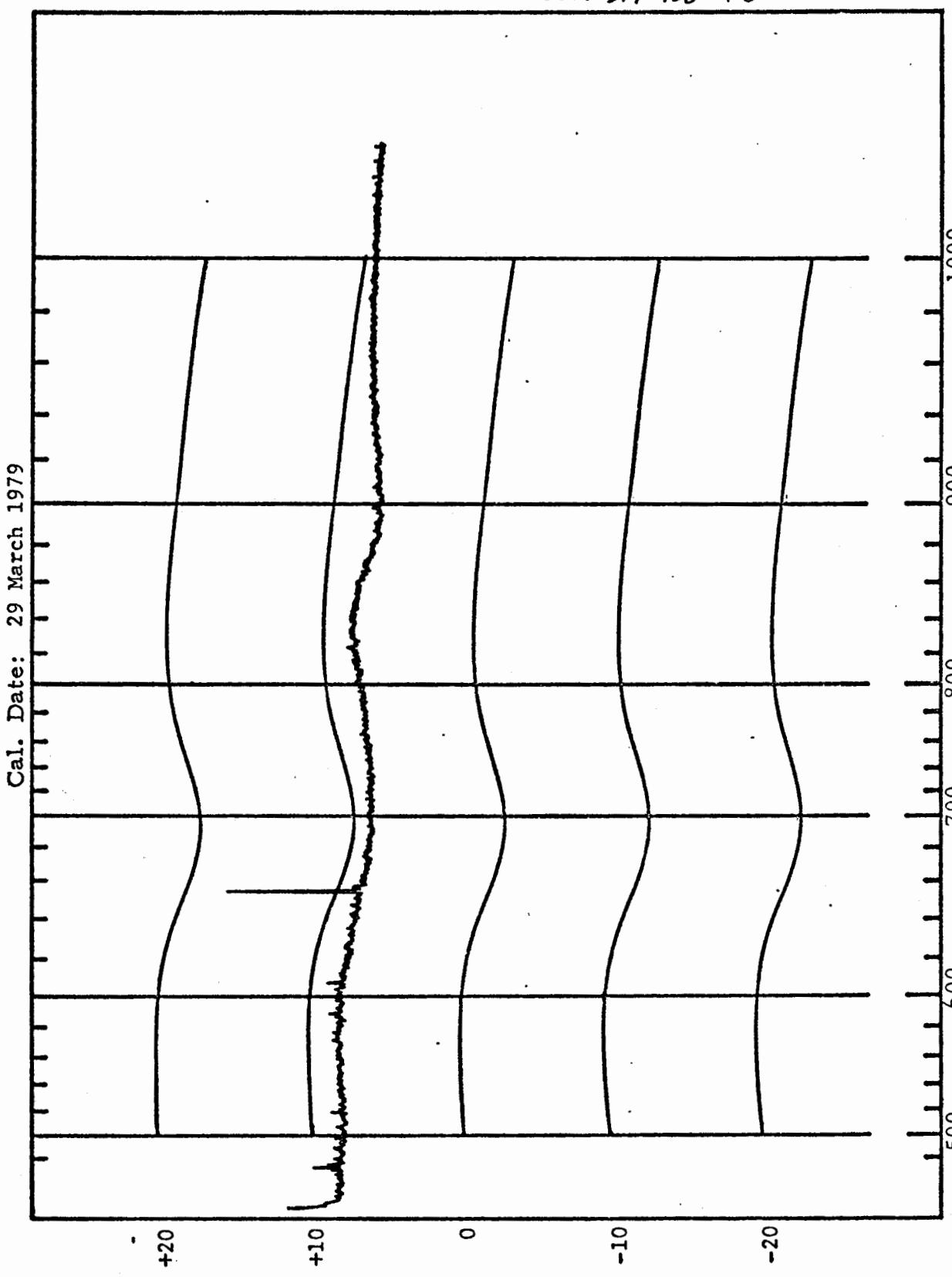
Equip. Under Test TRS-80
Equip. Oper. Mode 4 lines on, 1 line flashing
Date 4 Apr 79 Operator [illegible]

Rcvr. Atten. 20 Ext. Atten. —
Polarization Horiz

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 15
Peak Detector (BB Signals)
500 kHz 3dB Bandwidth

Transducer: DM-105-T3 (600MHz)



Relative Meter Reading in dB

Equip. Under Test TRS-80
Rcvr. Atten. 20 Ext. Atten. —
Equip. Oper. Mode 4 lines on, 1 line flashing
Polarization Horiz
Date 4 Jun 79 Operator [illegible]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

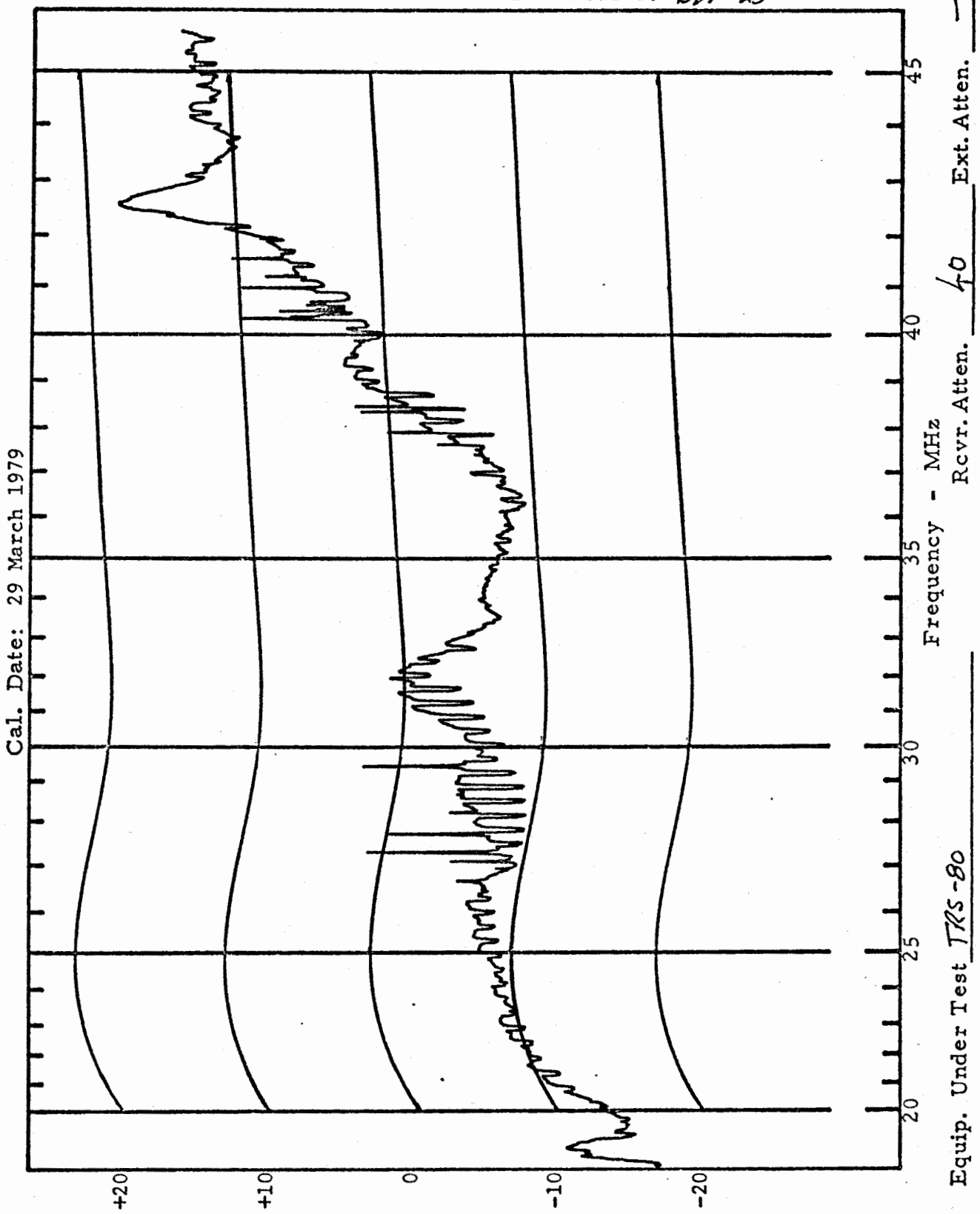
TRS-80 SYSTEM

VERTICAL POLARIZED ANTENNA

"BACKUP" PROGRAM

EMC-25 Band 11
Peak Detector (BB Signals)
500 kHz 3dB Bandwidth

Transducer: BDA-25 (No Ext)



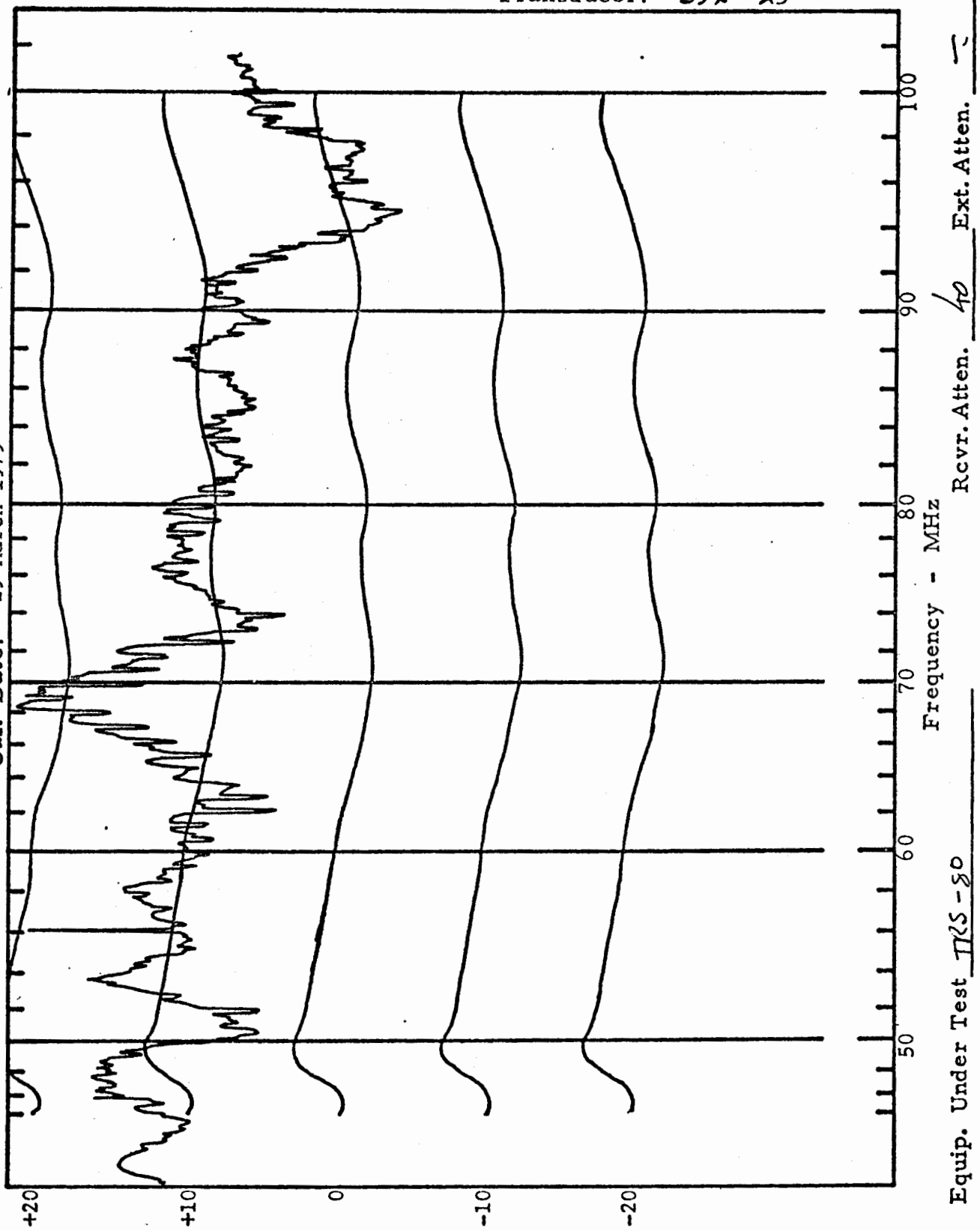
Relative Meter Reading in dB

Equip. Under Test TRS-80
Rcvr. Atten. 40 Ext. Atten. —
Polarization Vert
Equip. Oper. Mode 4 lines or, 1 line flashing
Date 4 Apr 79 Operator AD Scott

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 12
Peak Detector (BB Signals)
500 kHz 3dB Bandwidth

Transducer: BDA - 25 (No Ext)



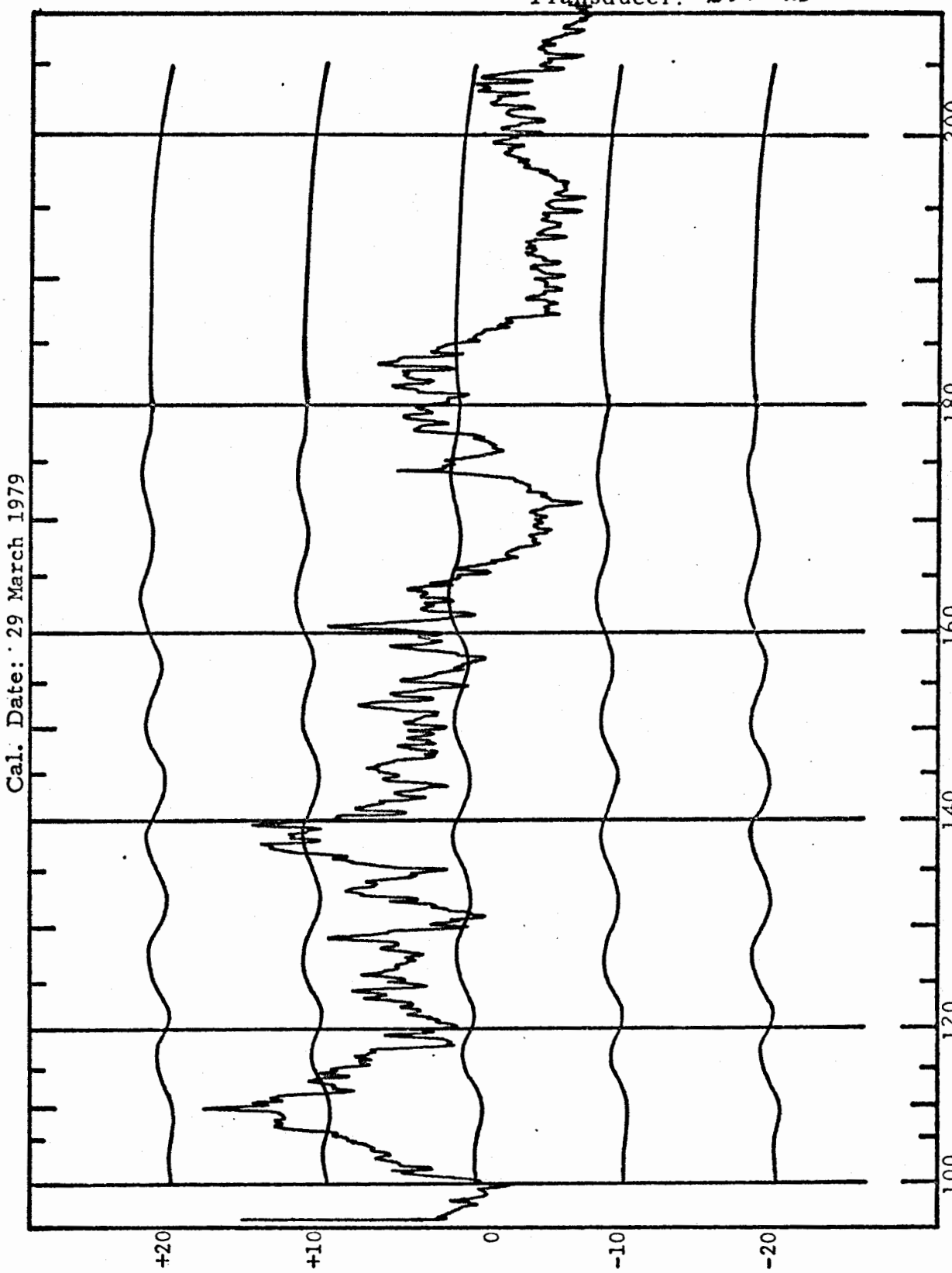
Relative Meter Reading in dB

Equip. Under Test TKS-50
Rcvr. Atten. 40 Ext. Atten. —
Polarization Vert
Equip. Oper. Mode 4 lines on 1 line flashing
Date 4 Apr 79 Operator [signature]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 13
Peak Detector (BB Signals)
500 kHz 3dB Bandwidth

Transducer: BDA-25 (No Ext)



Rcvr. Atten. 40 Ext. Atten. —

Polarization Vert

Equip. Under Test TRS-80

Equip. Oper. Mode 4 lines on, 1 line flashing

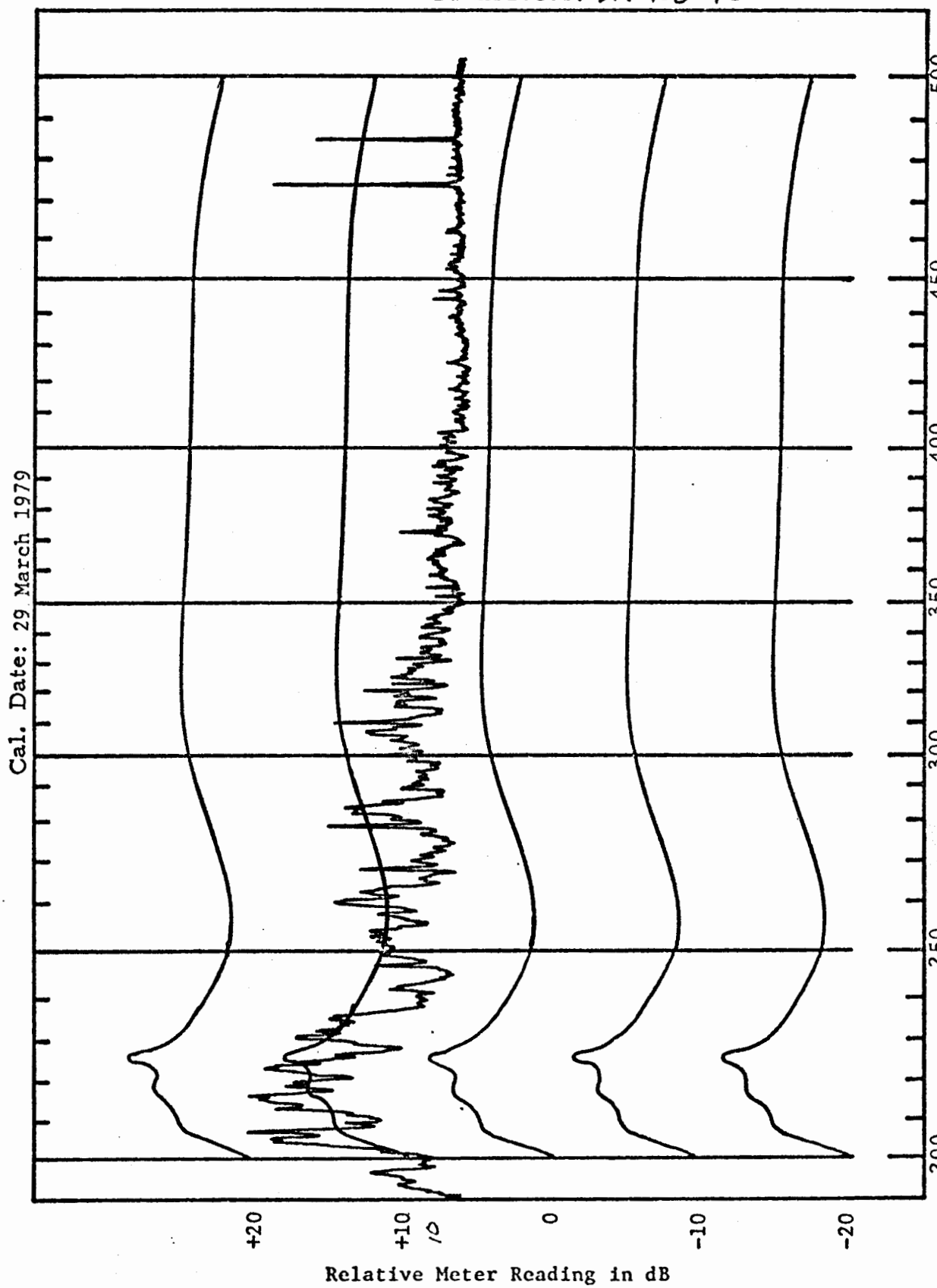
Date 4 Jan 79 Operator [illegible]

Relative Meter Reading in dB

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 14
Peak Detector (BB Signals)
500 kHz 3dB Bandwidth

Transducer: DM-105-T2 (300 MHz)



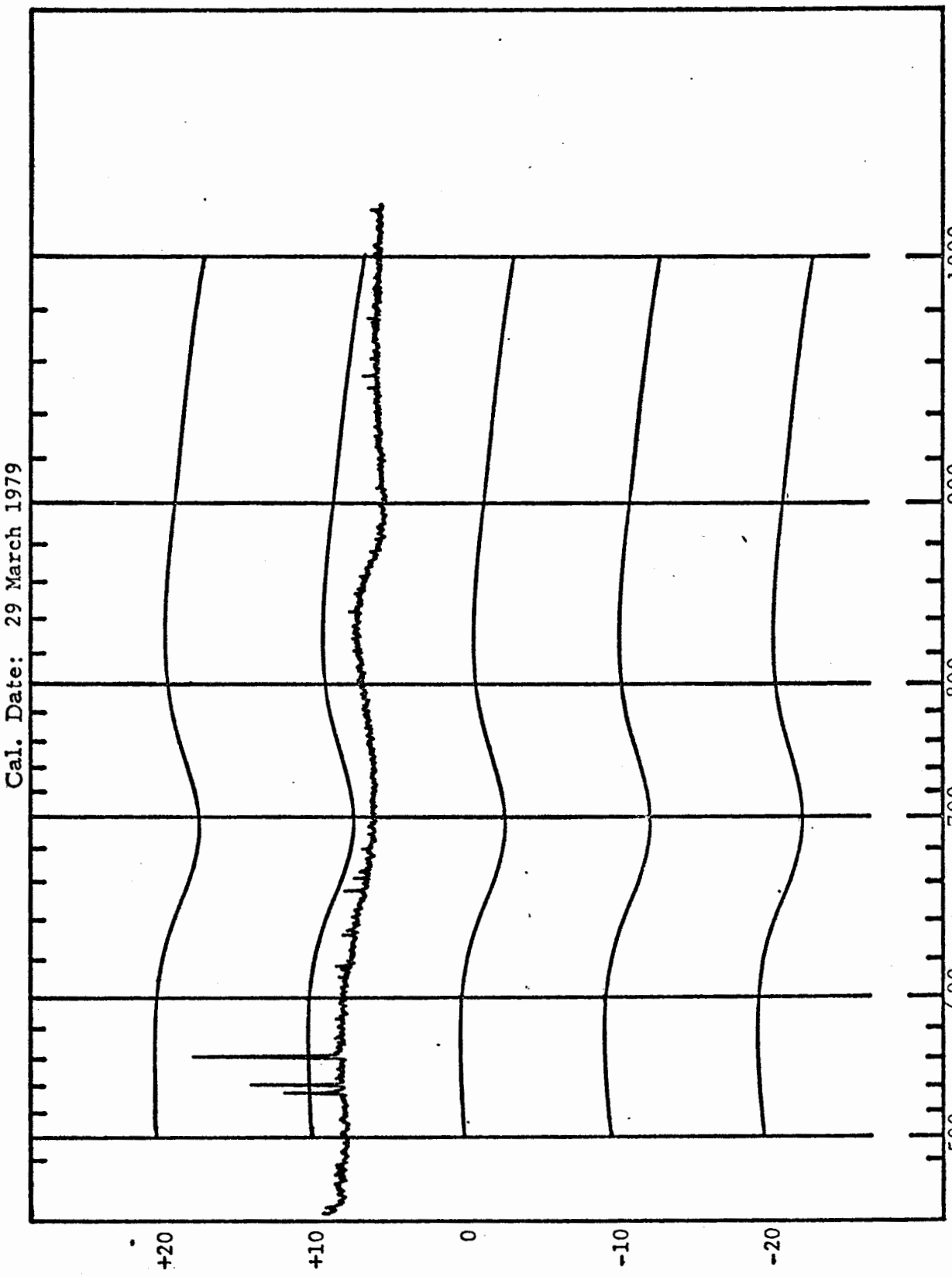
Equip. Under Test TRS-80
Equip. Oper. Mode 4 lines on, 1 line flashing
Date 4 Apr 79 Operator Bill Scott

Rcvr. Atten. 20 Ext. Atten. —
Polarization Vert

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

EMC-25 Band 15
Peak Detector (BB Signals)
500 kHz 3dB Bandwidth

Transducer: DM-105-TB (600 MHz)



Equip. Under Test TRS-80 Rcvr. Atten. 20 Ext. Atten. —

Equip. Oper. Mode 4 lines on 1 line flashing Polarization Vert

Date 4 Apr 79 Operator [illegible]

Add the attenuator setting and transducer factor to the relative meter reading to get signal levels in dB μV/MHz for conducted emissions and dB μV/m/MHz for radiated emissions.

APPENDIX F

BROADBAND CONDUCTED EMISSIONS - 30 to 500 MHz

CPU/KEYBOARD

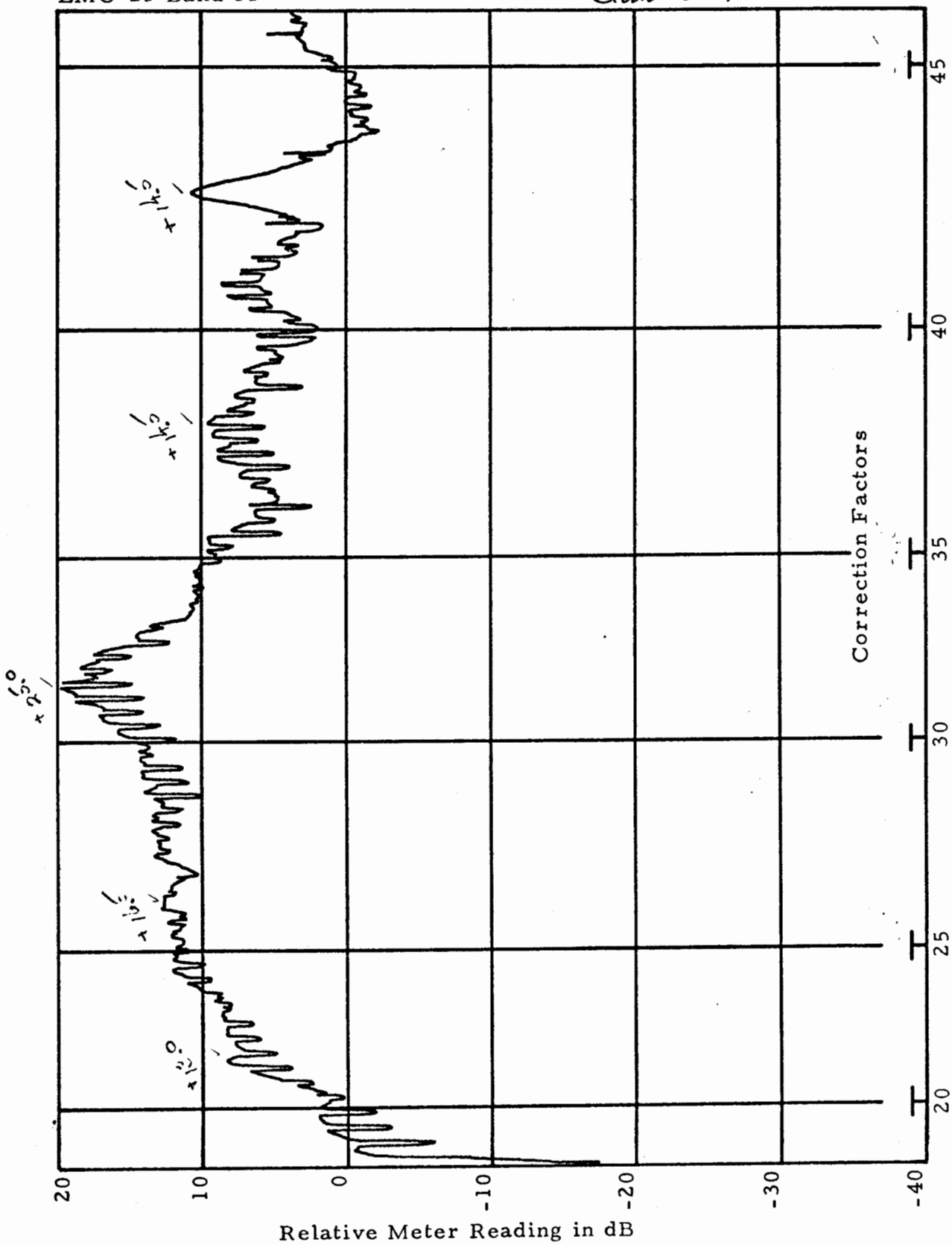
HOT POWER LINE

"BACKUP" PROGRAM

WB Peak

EMC-25 Band 11

Stoddart 94111-1



Atten = 40 dB
CW Power Line

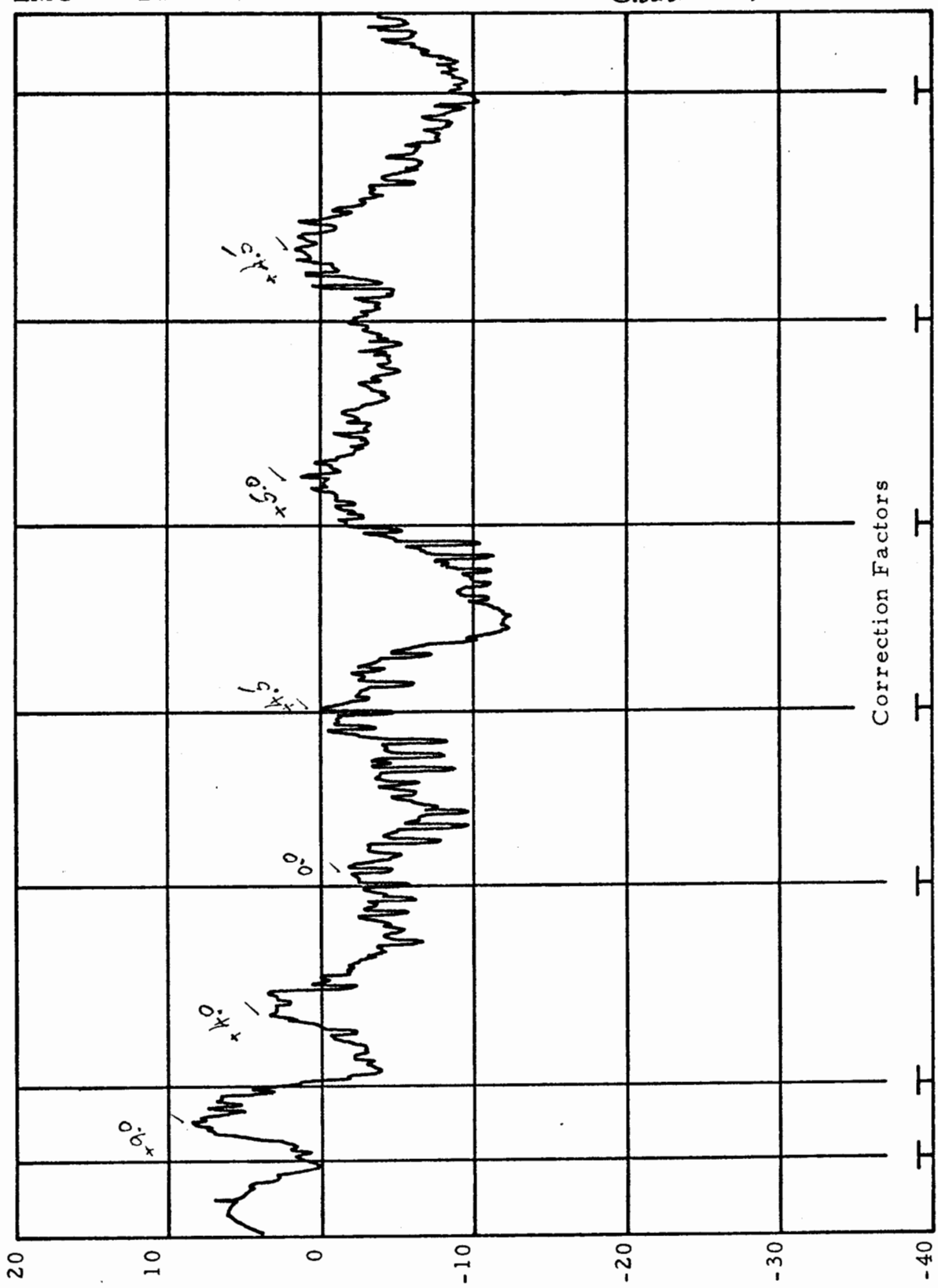
TRS-80
4 lines on, 1 line flashing
6 Jul 79 RBScott

Add the correction factor at each ordinate to the meter reading for calibrated signal levels in dB above 1μ.

WB Peak

EMC-25 Band 12

Stoddart 94111-1

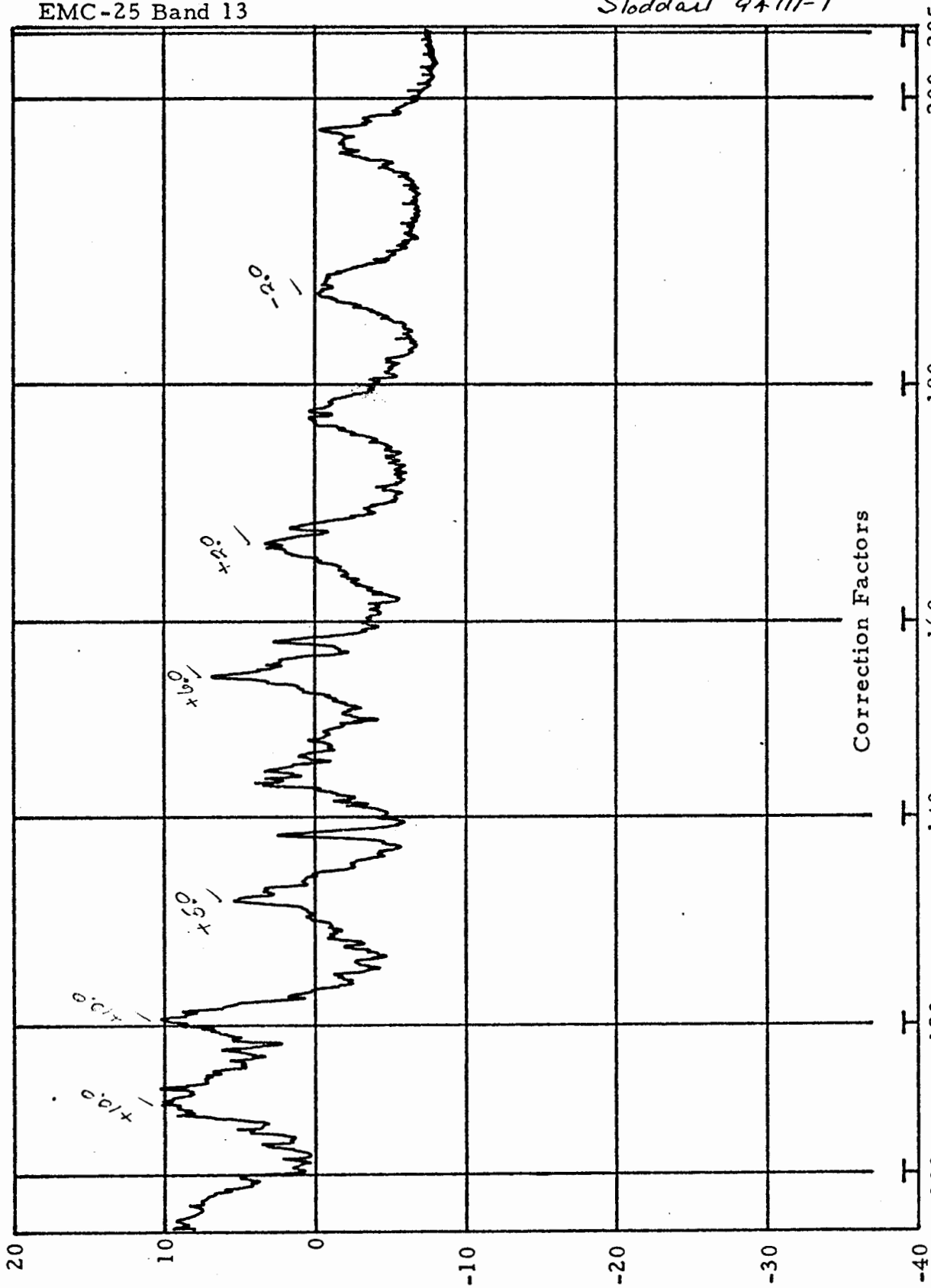


Add the correction factor at each ordinate to the meter reading for calibrated signal levels in dB above 1μ.

WB Peak

EMC-25 Band 13

Stoddart 94111-1



Atten = 20dB

CPU Power Line

TRS-80

4 lines on, 1 line flashing

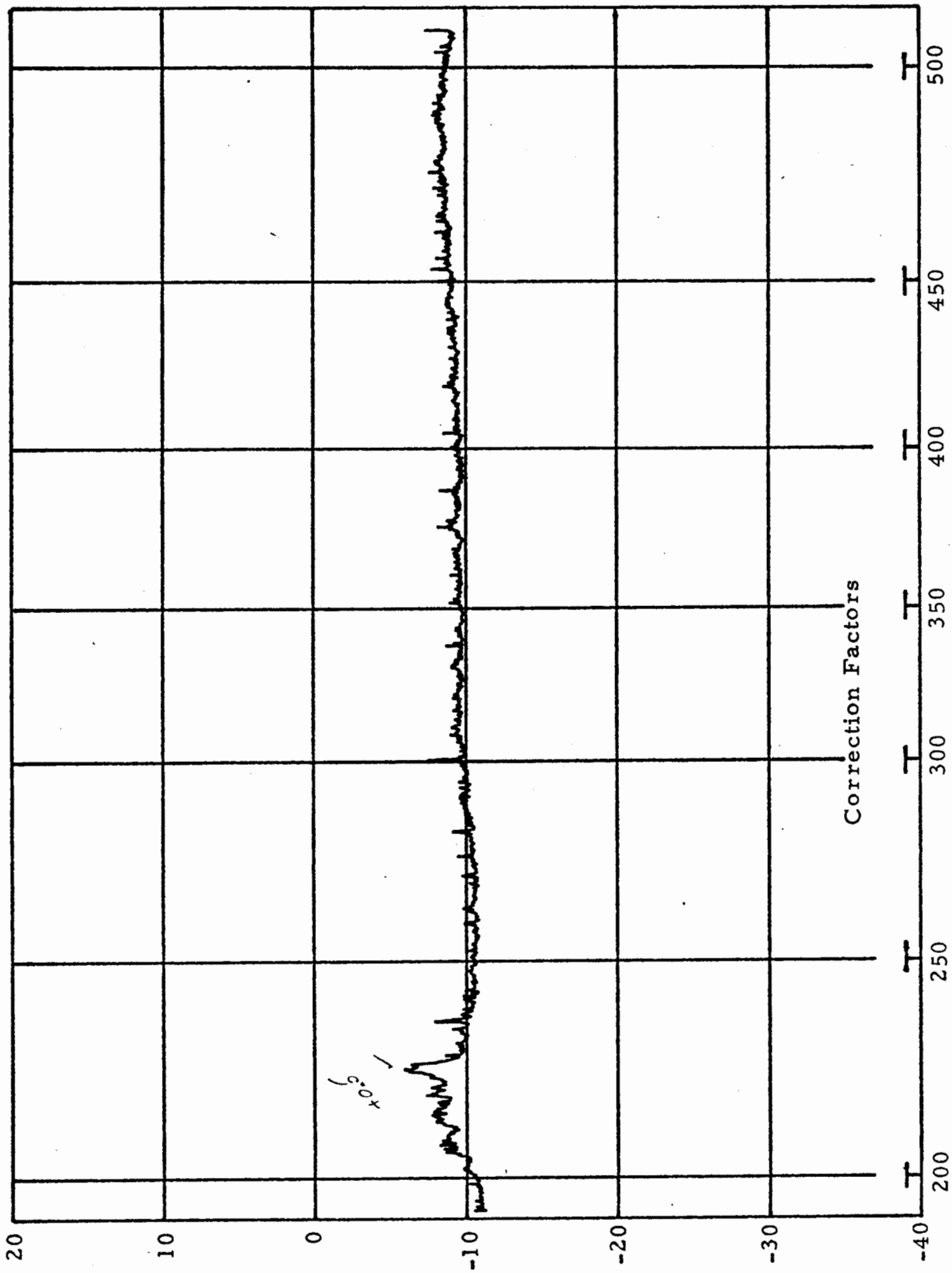
6 Jan 79 ABStoot

Add the correction factor at each ordinate to the meter reading for calibrated signal levels in dB above 1μ.

WB Peak

EMC-25 Band 14

Stoddart 94111-1



Atten = 20dB

CRT Power Line

TRS-80

4 lines on, 1 line flashing

6 Jul 79 CAPT Scott

Relative Meter Reading in dB

Add the correction factor at each ordinate to the meter reading for calibrated signal levels in dB above 1μ.

VIDEO DISPLAY

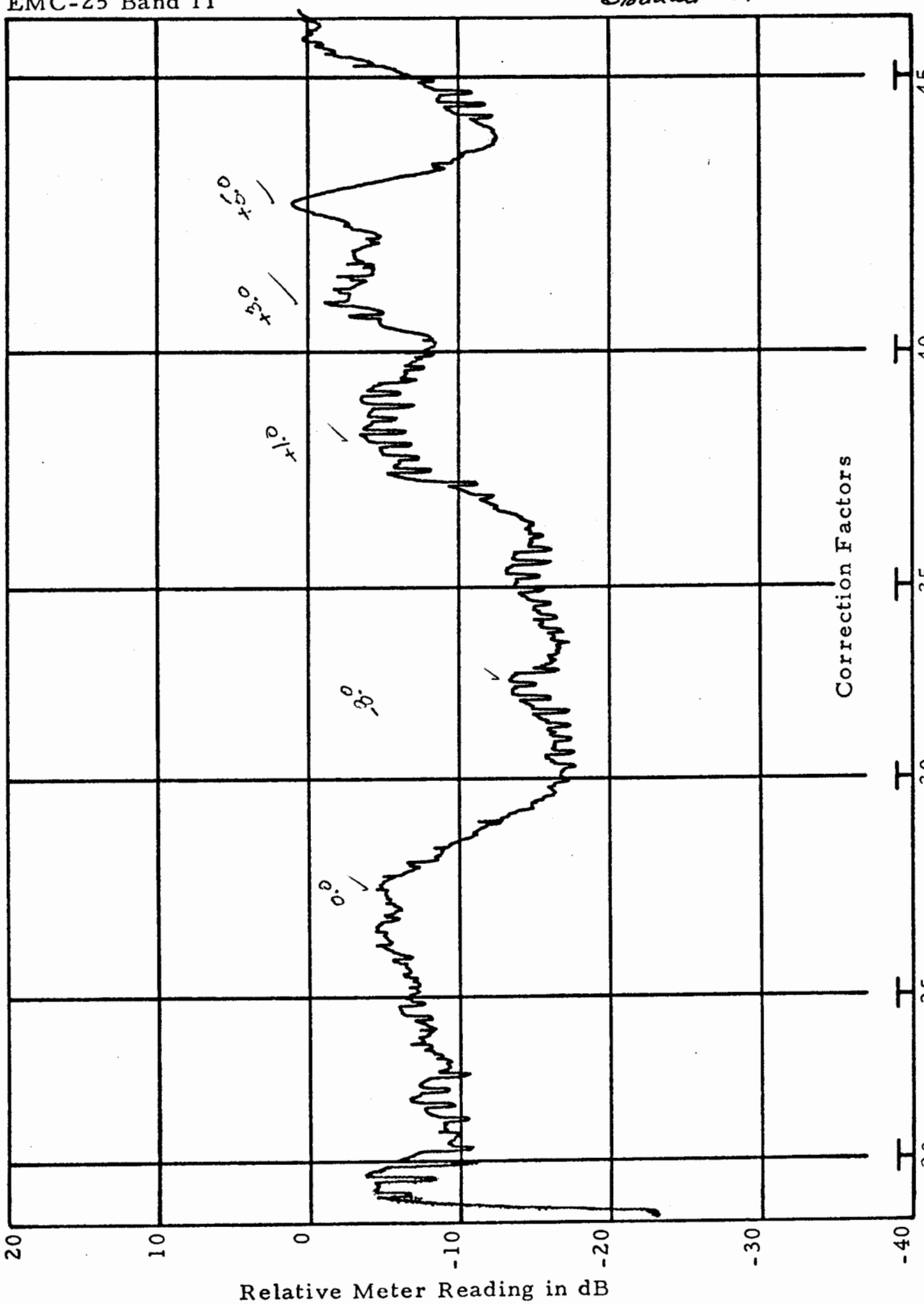
HOT POWER LINE

"BACKUP" PROGRAM

WB Peak

EMC-25 Band 11

Stoddart 94111-1



Atten = 40 dB

CRT Power Line

TR3-80

4 lines on, 1 line flashing

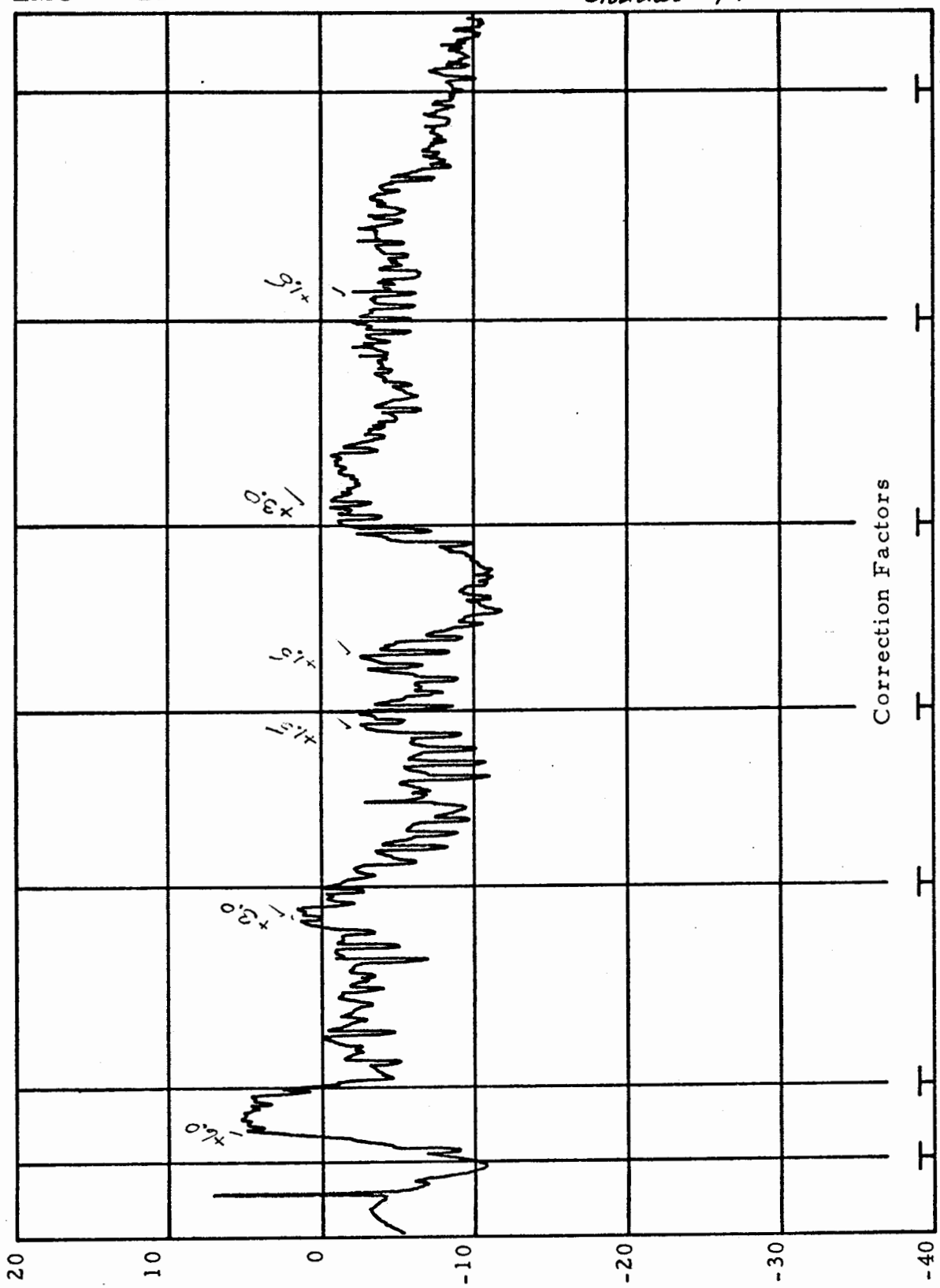
6 Apr 79 Abbott

Add the correction factor at each ordinate to the meter reading for calibrated signal levels in dB above 1μ.

WB Peak

EMC-25 Band 12

Stoddart 94111-1

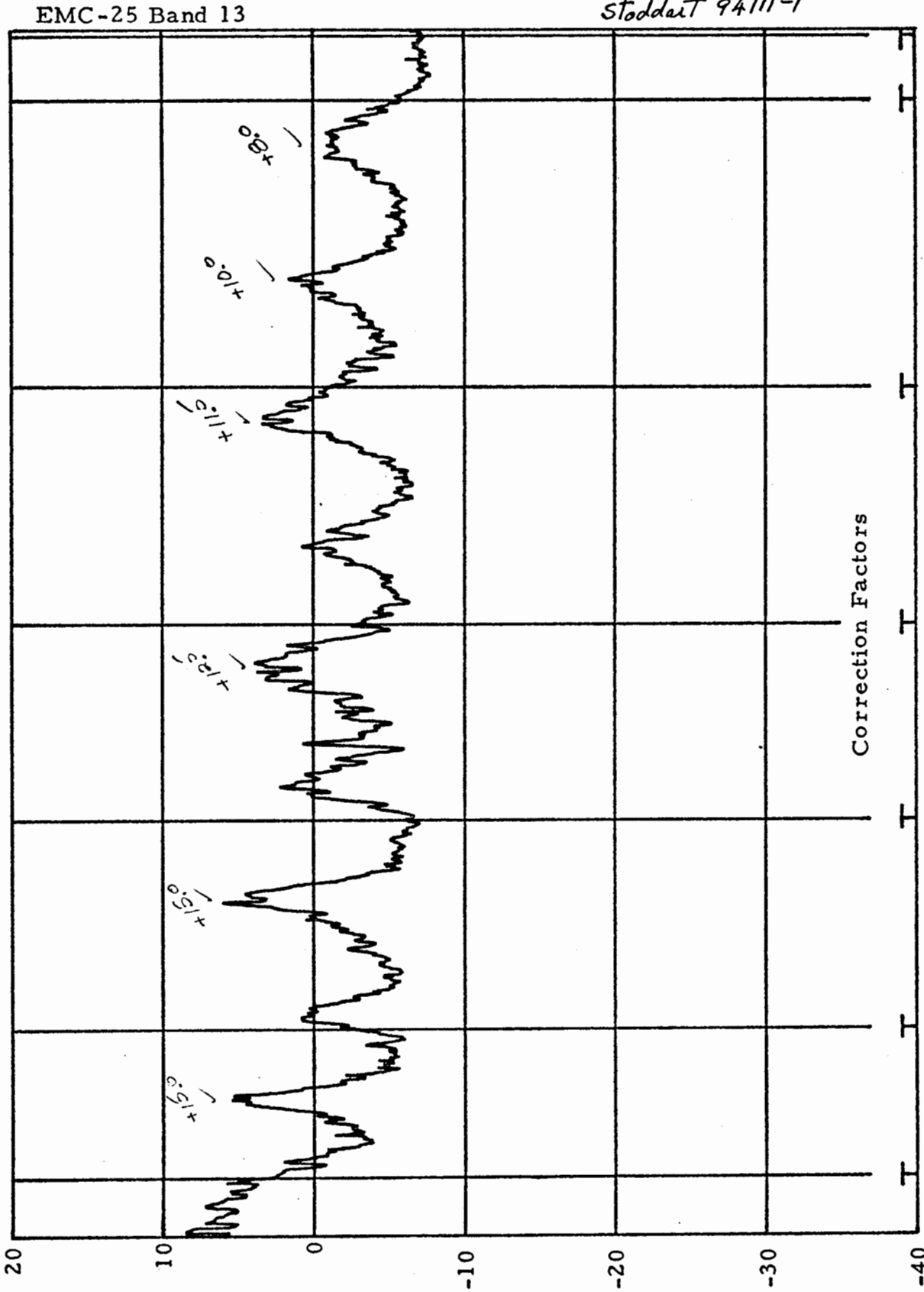


Add the correction factor at each ordinate to the meter reading for calibrated signal levels in dB above 1μ.

WB Peak

EMC-25 Band 13

Stoddart 94111-1



Atten - 40 dB

CRT Power Line

TR5-80

4 lines on, 1 line flashing

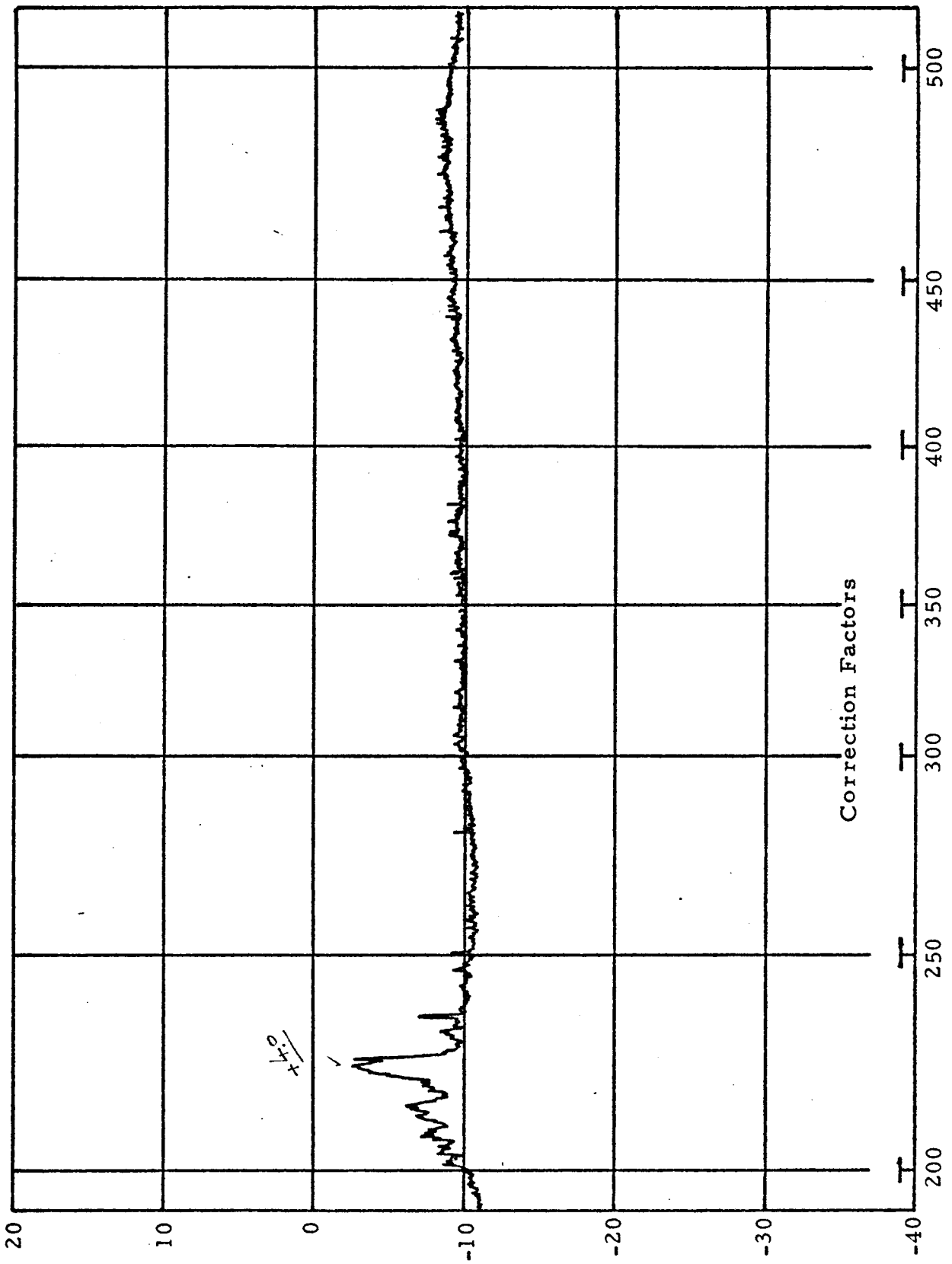
6 Apr 79 ABBrooks

Add the correction factor at each ordinate to the meter reading for calibrated signal levels in dB above 1μ.

WB Rak

EMC-25 Band 14

Stoddart 94111-1



Atten. = 20 dB
CRT Power Line

TRS-80
4 lines on, 1 line flashing
6 Apr 79 Clifford Ennis

Relative Meter Reading in dB

Add the correction factor at each ordinate to the meter reading for calibrated signal levels in dB above 1μ.