ENCLOSURE

ANALYSIS FOR EMI/RFI MAPPING OF AUXILIARY ELECTRIC EQUIPMENT ROOM FOR TENNESSEE VALLEY AUTHORITY'S WATTS BAR NUCLEAR PLANT UNIT 1

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EMI/RFI MAPPING DATA ANALYSIS OF THE AUXILIARY EQUIPMENT ROOM FOR TENNESSEE VALLEY AUTHORITY'S WATTS BAR NUCLEAR PLANT-UNIT 1

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ABSTRACT

The following report provides data concerning current EMI/RFI fields that exist in the Auxiliary Electric Equipment Room at Watts Bar Unit 1 and compares these fields to those generated during EMI/RFI type testing of the Eagle-21 Process Protection System.

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SECTION 1: INTRODUCTION

1.0 INTRODUCTION

This report, used in conjunction with the National Technical System (NTS) Report (Appendix B), forms the basis for the as installed EMI/RFI conditions for the Eagle-21 Process Protection System at the Watts Bar Nuclear Plant Unit 1.

Data provided by the National Technical Systems tests, along with special theoretical analysis, and initial Eagle-21 EMI/RFI test data is used to provide a margin of operation between detected EMI/RFI fields at Watts Bar and injected EMI/RFI fields that may cause the system to fail trip actuation conditions.

This report uses data obtained by National Technical Systems tests performed at the Watts Bar site from May 3 - 6, 1994. All the tests were performed in accordance with NTS procedure 31590-95M, Revision 0. The EMI test points were jointly established by NTS and TVA. At each point detectors were rotated to ensure that worst case field strengths were detected. The test equipment used to gather this data was capable of detecting emissions from 0 to 1 GHz.

The references used to evaluate the data are listed in Appendix A. The actual EMI/RFI Test Report from NTS is included in Appendix B.

SECTION 2: EAGLE-21 PROCESS PROTECTION SYSTEM INITIAL RFI TESTING

2.0 EAGLE-21 PROCESS PROTECTION SYSTEM INITIAL RFI TESTS

The Eagle-21 Process Protection System Radio Frequency Tests were performed in an anechoic chamber at the University of Michigan in 1988. The testing was done to demonstrate system operability before, during, and after the adverse noise conditions were applied.

The description of the tests and the test results are contained in WCAP-11733 Noise, Fault, Surge, and Radio Frequency Interference Test Report for Westinghouse Eagle-21 Process Protection Upgrade System dated June 1988. This WCAP was approved by TVA Watts Bar in letter number W-6643 dated September 12, 1988.

2.1 INITIAL TEST RESULTS

The initial tests performed on the Eagle-21 Process Protection System injected radiated fields into the cabinet under test. The fields were radiated using both vertical and horizontal polarized antennas. The system was subjected to RFI fields of 3 V/M and 10 V/M from 20 MHz to 1 GHz.

Radiated emissions for the tests at Watts Bar are measured in dBuV/m, dBpT, and dBuA units. The dBuV/m must be converted to the injected field strength of Volts/meter which was used during the initial tests of the Eagle-21 Process Protection System. The following formula was used to convert between the two units of measure:

$$dBuV/m = 20 \log (Volts/meter) / (1 uv)$$

Using the injected field strengths, the following dBuV/m values are determined from the formula:

$$129.54\ dBuV/m = 20 \log (3\ V/m) / (1\ uV)$$

$$140\ dBuV/m = 20 \log (10\ V/m) / (1\ uV)$$

At 129.54 dBuV/m, five frequencies caused Trip Output Failures (TOF). All of these frequencies are in the 160 to 200 Mhz range. At 140 dBuv, numerous frequencies caused TOF conditions. Figure 1 shows a simplified plot of the injected fields and the areas where TOF conditions occurred.

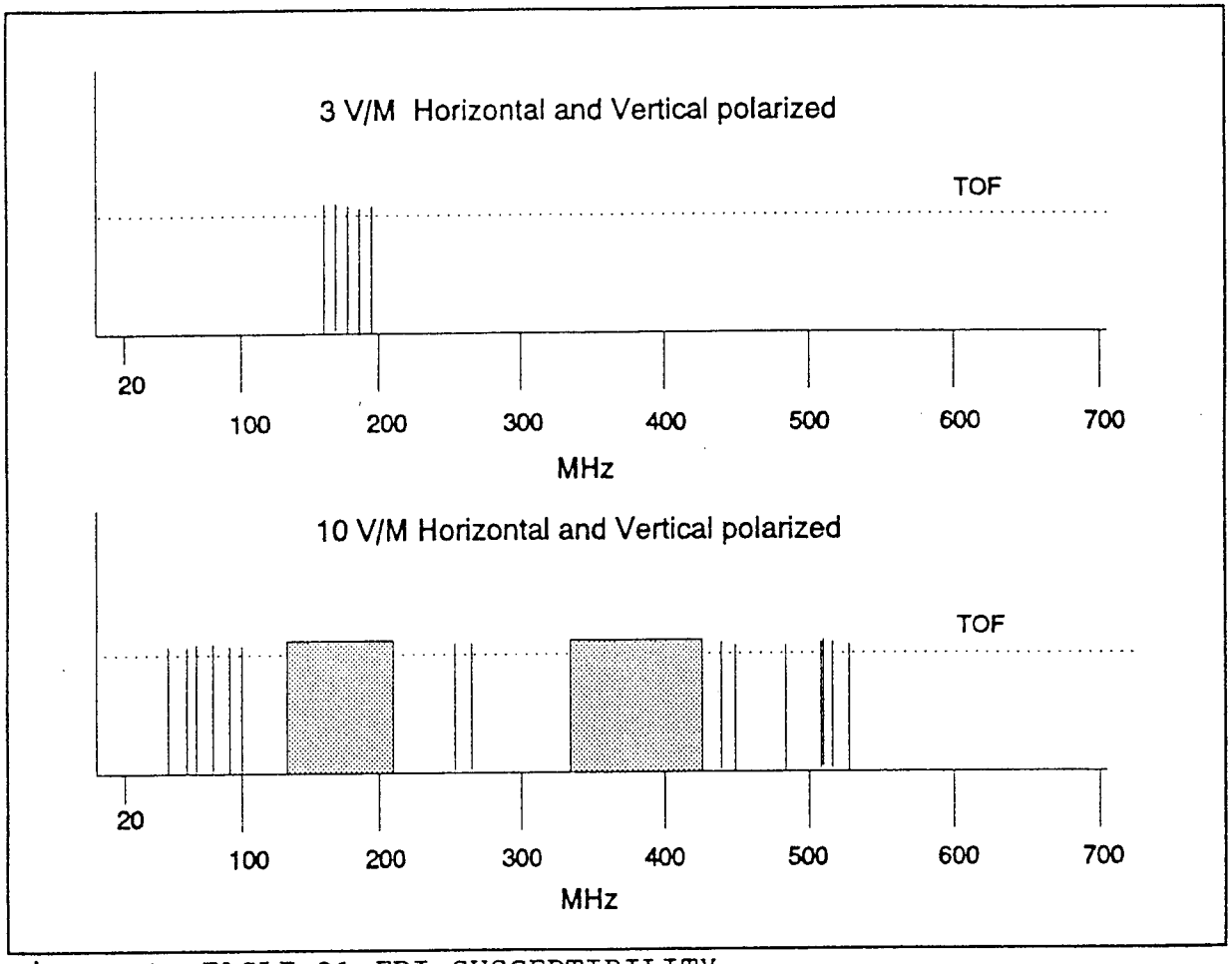

Figure 1: EAGLE-21 ERI SUSCEPTIBILITY

In light of the above data, it is critical that attention be given to the frequency spectrum and dBuv/m levels when comparing measured fields and tested fields. For example, a measured 139 dBuV/m field is a high level. However, when that field occurs at 600 Mhz it can be dismissed as not affecting the operation of the Eagle-21 Process Protection System, because no trip outputs failed when subjected to a 140 dBuV field at 600 Mhz.

Although it appears from Figure 1 that many failures can occur in the Eagle-21 Process Protection System over a fairly broad band of frequencies, it should be noted that none of the fields measured at Watts Bar are above the TOF threshold within the susceptible frequencies for the Eagle-21 Process Protection System.

Each Section of this report details a composite of the worst case frequencies and their amplitude and the worst case conditions.

The RFI Tests on the Eagle-21 Process Protection System were performed in accordance with SAMA Standard PMC 33.1-1978. The entire frequency range from 20 MHz to 1 GHz was radiated at 3 V/M and 10 V/M field strengths.

Two types of tests were performed. The first test was a modulation test where a computer controlled the sweep of a frequency generator through 40 data points per octave and 10 seconds at each point. The second test was a keying test where the frequency generator is keyed on and off to simulate a transmitter being keyed on and off. The generator was cycled on and off at a one second interval.

SECTION 3: WATTS BAR AUXILIARY ELECTRIC EQUIPMENT ROOM EMI/RFI MAPPING OVERVIEW

3.0 EMI/RFI MAPPING OVERVIEW

The Eagle-21 Process Protection System is located within cabinets installed in the Auxiliary Electric Equipment Room at the Unit 1 Watts Bar Nuclear Plant.

The purpose of the EMI/RFI Map is to determine the electromagnetic fields that equipment will be exposed to, as installed. At Watts Bar, the Eagle-21 Process Protection System was already installed and operational at the time the mapping tests were performed.

This is the first time that EMI/RFI mapping was completed while the Eagle-21 Process Protection System was installed. Other site locations have mapped their equipment rooms with the old protection system racks before the Eagle-21 installation. Thus, the Watts Bar EMI/RFI data includes radiations that may be caused by the Eagle-21 Process Protection System (e.g. switching power supplies, oscillators from clocks on computer cards, etc.).

The EMI/RFI mapping data at Watts Bar was collected during Hot Functional testing of the plant. Although the plant was not at power (Mode 0), the operating conditions of the room and equipment were as close to operating conditions as reasonably obtainable.

3.1 TEST PROCEDURES

NTS procedures and testing methods are in accordance with NTS/Northeast's Quality Manual and NTS/Northeast's Standard Operating Procedure N-4. These ensure that the program complies with the applicable provisions of 10CFR, Part 21 and Part 50, Appendix B.

The tests performed at Watts Bar are two general categories. The first category is conducted emissions as defined in MIL-STD-462. The second category is radiated emissions as defined in MIL-STD-462.

The following tests were performed at the Watts Bar Site:

Conducted Emissions, Method CE01, Power and Signal Leads, 30 Hz to 15 KHz, Common and Differential Mode

Conducted Emissions, Method CE03, Power and Signal Leads, 15 KHz to 50 MHz, Common and Differential Mode

Conducted Emissions, Method CE07, Power and Signal Leads, Switching Transients, Time Domain, Common and Differential Mode

Radiated Emissions, Method REXX, DC Magnetic Field

Radiated Emissions, Method RE01, 30 Hz to 50 KHz

Radiated Emissions, Method RE02, 14 KHz to 1 GHz

Radiated Emissions, Method RE02.1, Hand-Held Radio Profile

SECTION 4: CE01 TEST RESULTS

4.0 CE01 OVERVIEW

Test CE01 is a measure of conducted radiation on both power leads and signal leads. Several data points are measured in selected cabinets. The cabinets selected were determined by NTS and TVA personnel.

The first test utilizes a current probe connected around the power feed to the cabinet and measures the relative field strengths from 30 Hz to 15 KHz in dBuA. The selected cabinets are detailed in Section 4 of the NTS Test Report in Appendix B.

The field strength in dBuA can be converted to Peak Current by the following formula:

$$dBuA = 20 \log (\text{peak current})/(1\ uA)$$

$$.707\ \text{Peak Current} = \text{RMS Current}$$

Because of the relationship between field strength and current, it is expected that the cabinet with the highest measured current flow will have the highest CE01 emissions. It is also expected that 60 Hz (Supply frequency) and the third and fifth harmonics of 60 Hz will be fields detected in the test.

The second set of CE01 tests has the current probe connected on selected signal leads in the cabinet and measures the conducted emissions from 30 to 15 KHz in dBuA. The actual signal leads tested are detailed in section 4 of the NTS test report in Appendix B.

4.1 CE01 TEST RESULTS

The first CE01 tests were conducted on power leads in eight of the fourteen racks installed at Watts Bar. The worst case conditions were detected in rack 1-R-5. Because different racks have different levels at different frequencies, Figure 2 was developed to show a relative plot of worst case field strengths. This figure does not show variances (valleys between peaks), but assumes a worst case smooth transition between all the peaks.

Figure 3 shows the actual detected plots for Rack 1-R-5. From the plot it can be determined, by using the above formula, that the RMS value for current in the power lead is about 7 Amps RMS.

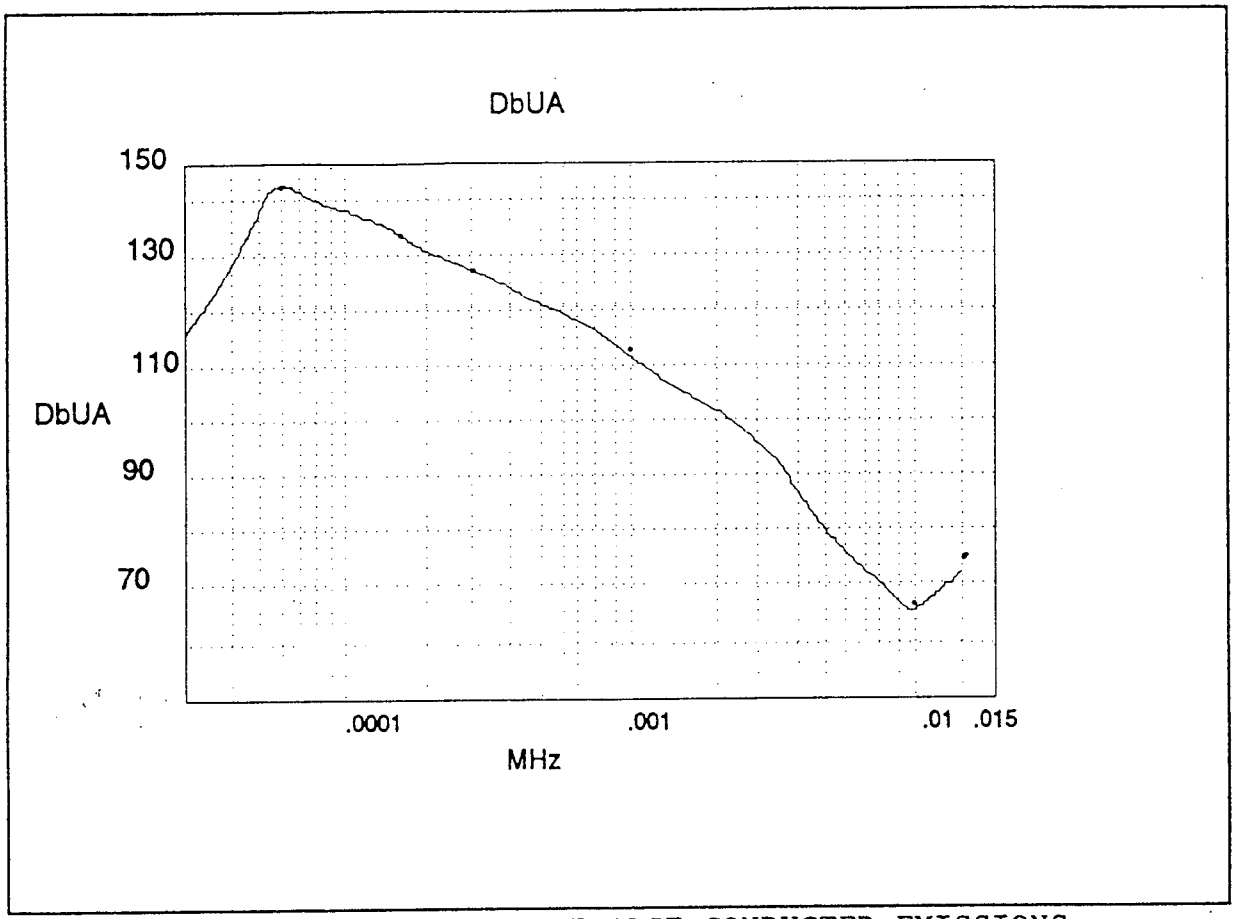

Figure 2: CE01 COMPOSITE WORST CASE CONDUCTED EMISSIONS

Figure 2 was generated from data taken from a current probe on the ac input power leads for the designated cubicles. The data is from on a narrow band measurement.

Figure 3 is a plot from measurements of the ac power leads for Rack 1-R-5. This plot differs from the composite in Figure 2 because figure 2 is a plot of the peaks of Figure 3. This figure only shows a continuous plot of peak points along the detected spectrum, while Figure 3 shows the complete spectrum.

The CE01 test measures the field strengths between 30 Hz and 15 KHz. These levels can be compared to the susceptibility of the circuit boards, cables, and digital circuitry to these low frequency fields.

Section 10 of this report shows the susceptibility of the Eagle-21 System to the low frequency spectrum as demonstrated by the theoretical analysis referenced there.

All the detected fields at Watts Bar are well below the calculated threshold where outputs may be affected.

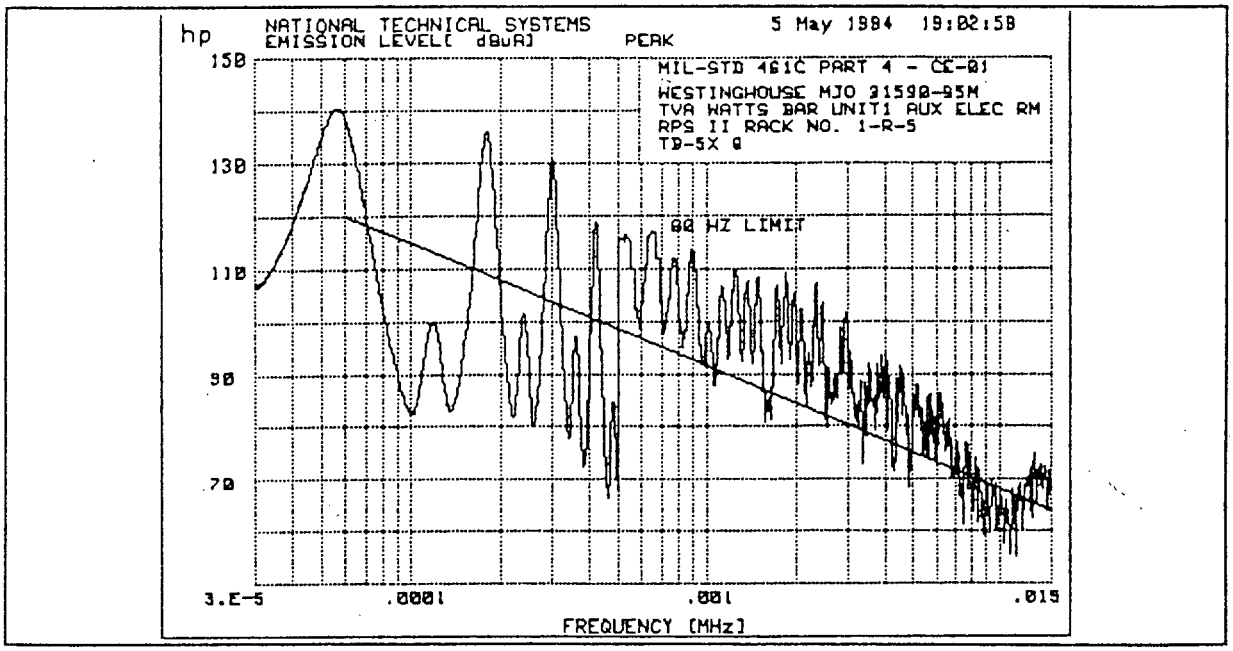

Figure 3: RACK 1-R-5 ACTUAL CE01 DETECTED EMISSIONS

4.2 CE01 CONDUCTED EMISSIONS - SIGNAL LEADS

The second part of the CE01 test is to measure the conducted field strengths on predetermined signal leads. Section 4 of the NTS report (Appendix B) details those signal leads tested. Twelve of the fourteen racks had at least one set of signal leads tested.

All of the measured signal lead emissions are well below the susceptibility threshold as measured in the power line test from the first part of CE01.

Because the power line measurements are acceptable and are at higher measured levels, the signal line tested emissions are also acceptable.

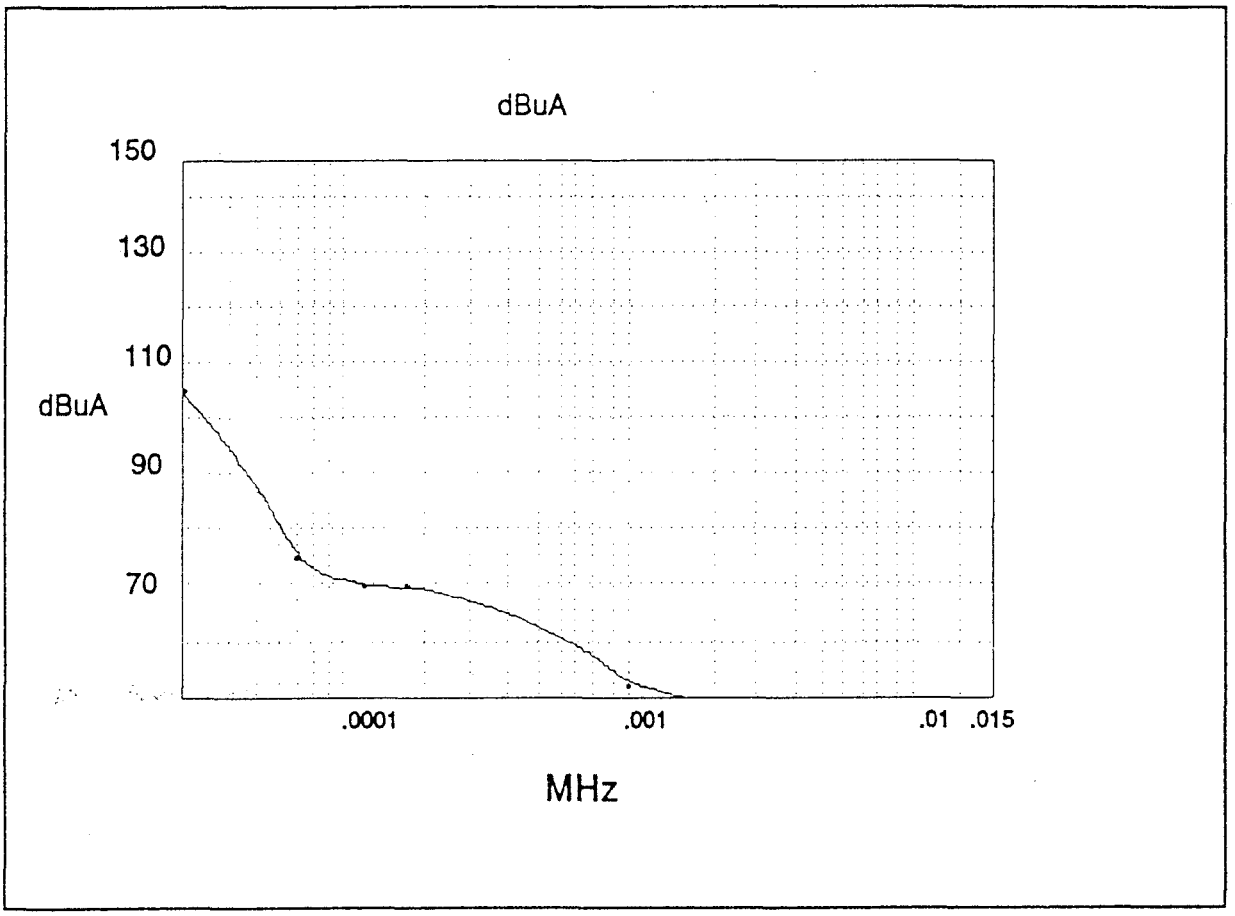

Figure 4: CE01 SIGNAL LEAD WORST CASE EMISSIONS

SECTION 5: CE03 TEST RESULTS

5.0 CE03 TEST OVERVIEW

The CE03 tests measured the same points as the CE01. The difference is the frequency spectrum of the tested emissions.

The frequency spectrum is 15 KHz to 50 MHz. Both narrowband and broadband measurements were made.

When comparing CE01 to CE03, it appears that CE03 measurements shift. CE01 15 KHz emissions are in the 70 dBuA range. For CE03 tests, the 15 Khz measurements for narrowband is from 15 to 90 dBuA and the broadband measurements are in the 100 to 150 dBuA range. This apparent shift at 15 Khz is due to the actual bandwidth being measured. The CE01 uses 1.5 Khz as a narrowband bandwidth. The CE03 test uses 3 KHz as the narrowband bandwidth. This difference in bandwidth causes the apparent shift in the measured signal. If the actual field being measured contained only a continuous wave (CW) transmission, there would be no shift in the measured field strength. As installed in the plant, the measured fields contain many frequencies causing the apparent shift in signal strength.

5.1 CE03 TEST RESULTS

The broadband data show the strongest detected fields in Racks 1-R-5, 1-R-9, 1-R-11 and 1-R-12. These four racks are virtually equal in measured field strengths.

Figure 5 is a composite of all the worst case peak detected emissions. As before, this plot assumes a continuous level between plotted points.

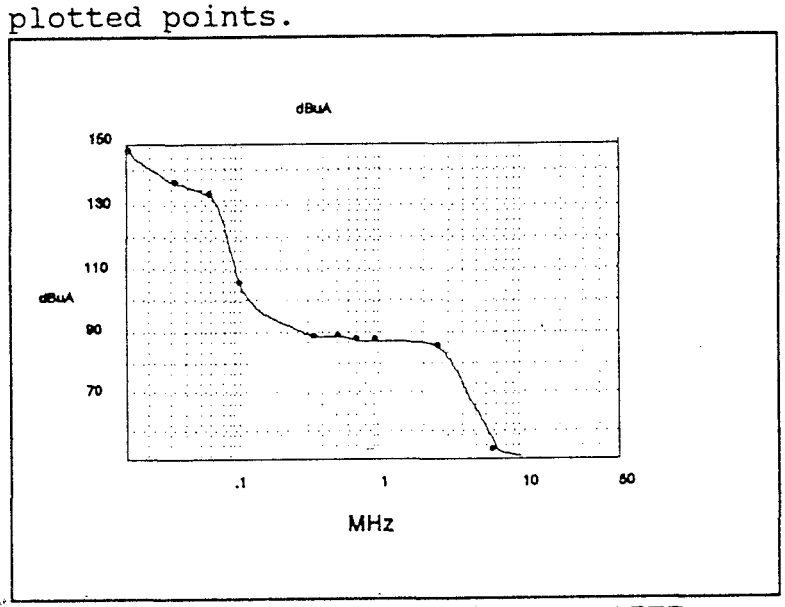

Figure 5: CE03 WORST CASE COMPOSITE SIGNALS

Using the results of the theoretical analysis from section 10, the worst case detected signals are all well within acceptable margins.

There should be no effect of conducted emissions in the 15 KHz to 50 MHz range.

Figure 6 shows the actual measured plot for 1-R-5 power lead connections.

Rack 5 was chosen because this plot shows the one anomaly detected in the test data.

A transient of 152 dBuA at about 1.8 MHz occurred 3.5 minutes after the start of the measurement on this rack. The origin of this transient was not determined. This transient does not appear on any of the radiated emission tests or CE03 signal cable tests. It appears only one time on the power lead test for Rack 5.

This transient of 152 dBuA results in approximately 28.15 Amps RMS current. From the analysis of section 10, the lowest digital circuitry susceptibility at 1.8 Mhz is about 157 dBuA. Although less than the worst case expected susceptibility, it is not more than 6 dBuA less.

However, the expected susceptibility points were determined by assuming the cable was adjacent to the circuit boards, no shielding was used, and board design had no effect on transient limitation. In the actual system, shielding on cables is used, no signal cables are within their own conductor radius of the board, and inherent board design does limit the effect of transients because of filters installed on the board with a 3dB point of 0.5 Hz. Due to these design factors, the extra 1 dBuA can be obtained to meet the 6 dBuA margin.

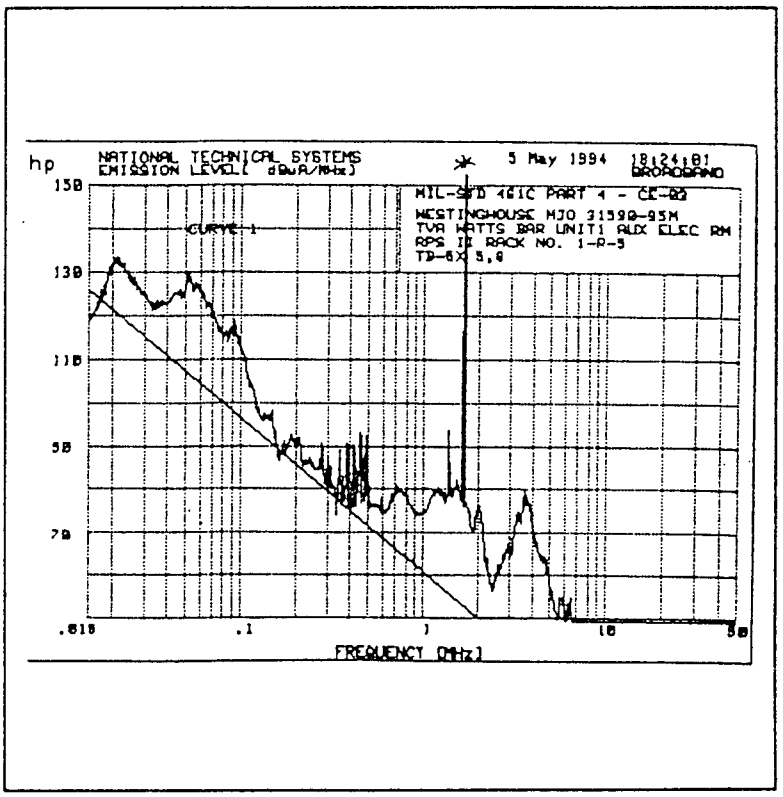

Figure 6: CE03 Rack 1-R-5 ACTUAL

5.2 CE03 SIGNAL LEAD TEST RESULTS

Like CE01, CE03 also measures the conducted field emissions on selected signal leads in various racks. All of these detected fields are measured for narrowband and broadband emissions.

All of the measured emissions are well below the detected power lead test levels. Therefore, these emissions will not effect operation of the Eagle-21 Process Protection System at Watts Bar.

SECTION 6: CE07 TEST RESULTS

6.0 CE07 TEST OVERVIEW

Test CE07 measures the time that transients from equipment cycles affect the power feeds. A current probe is connected to the ac power feed in selected cabinets. All of the measurements taken at Watts Bar were done at a Steady State condition. No outputs or switching devices sharing the instrumentation bus were switched during this test.

6.1 CE07 TEST RESULTS

All of the measured results are shown in the NTS Test Report located in Appendix B. The graphical results shown in the report were obtained with a storage oscilloscope connected to a current probe on the power leads.

The major contributors to the measured levels shown on this display are the switching power supplies used in the Eagle-21 Process Protection System. The wave shape and frequency are within expected levels as measured in the Qualification Units located at the Westinghouse Process Control Division.

SECTION 7: REXX TEST RESULTS

7.0 REXX TEST OVERVIEW

The RE01 test is the first of the Radiated Emissions tests. The purpose of RE01 is to measure the DC Magnetic Fields around the racks in the Auxiliary Electric Equipment Room. Measurements are in Gauss as detected by a Magnetic Instrumentation Gaussmeter. All of these tests are in accordance with MIL-STD-1399, Section 070, Part 1.

7.1 REXX TEST RESULTS

The maximum detected DC field was located in the Right Rear of Rack 1-R-9. This level was 4.0 Gauss. As a point of reference the highest levels were measured at the front and rear of Racks 1-R-9, 1-R-10, and 1-R-11. These three racks are mounted adjacent to each other.

All of the measured levels dropped to less than 0.5 Gauss within 2.0 inches of the Racks being tested.

SECTION 8: RE01 TEST RESULTS

8.0 RE01 TEST OVERVIEW

The RE01 Test is a measurement of the radiated field between 30 Hz and 50 KHz. A loop antenna was utilized and rotated through its axis until the worst case levels were detected. The test data acquisition system did a sweep between 30 Hz and 50 KHz to record the radiated emissions.

8.1 RE01 TEST RESULTS

The results of the tests are graphically displayed in the NTS Test Report in Appendix B and are recorded in dBpT (dB PicoTesla). This provides a measurement of the detected magnetic fields around the Eagle-21 Process Protection System equipment. Figure 7 shows a plot of the composite worst case field strengths.

The worst case Racks were Racks 1-R-9 Rear and 1-R-28 Side. The highest emission was 110 dBpT at 180 Hz. Using data from Section 10 and converting to picoTeslas, this point is about 3.1 X 10E5 picoTeslas. At the 180 Hz location, this provides approximately six decades of margin from the worst case predicted levels.

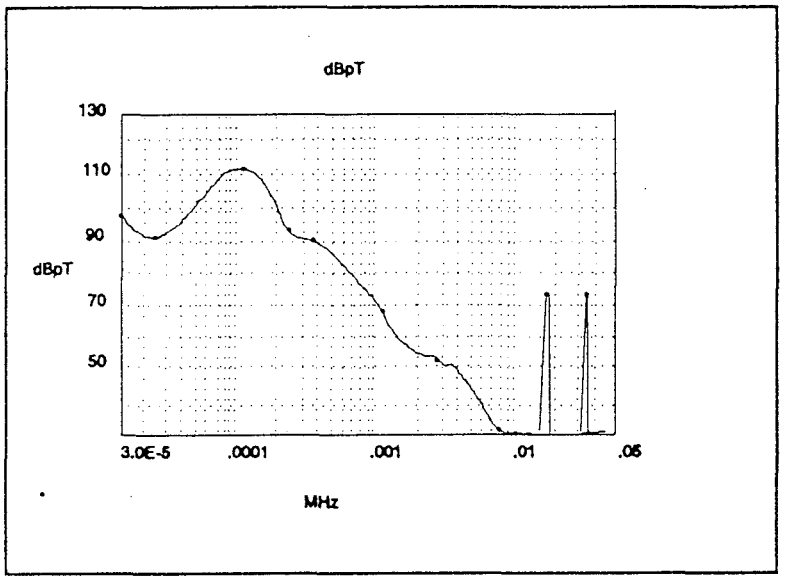

Figure 7: RE01 COMPOSITE WORST CASE EMISSIONS

The two spikes at 18 KHz and 36 kHz are being radiated from the MMI Cart when the CRT is energized. Even at these levels, there is between three and four decades margin between the measured levels and the worst case expected levels. It should be noted that the MMI CRT is energized only during system testing. In fact, if the plant changes conditions during testing, (e.g. Bistables trip for reasons other than testing actuation) testing is administratively terminated and the system returned to normal operations.

Ac Radiated Magnetic Fields will not effect operation of the Eagle-21 System at Watts Bar.

SECTION 9: RE02/RE02.1 TEST RESULTS

9.0 RE02/RE02.1 TEST OVERVIEW

The RE02 tests are a measure of the radiated fields between 14 KHz and 1 GHz. The field strengths are measured in dBuV/m and show the relative field strength of the entire frequency spectrum in the area under test. The fields are measured in both narrowband and broadband modes.

The RE02.1 portion of the test is specific to the hand-held radio transmitters and repeater stations used at the Watts Bar Plant. The Nuclear Regulatory Commission issued Information notice IE-83-83 concerning the use of portable radio transmitters inside nuclear power plants. This notice recommends that portable radio use be restricted for use in Instrumentation Rooms due to reported cases of interference caused by their use.

At Watts Bar the Auxiliary Electric Equipment Room is designated as a restricted area for radio use. However, radios are permitted just outside the room. The RE02.1 test keys these radios and measures the field strength of the signal inside the Auxiliary Electric Equipment Room with the door closed.

9.1 RE02 TEST RESULTS

The broadband spectrum measurements provide the largest field strength. Figure 8 shows a composite of the worst case emissions.

All of the worst case conditions are well within the 6 dB margin for acceptable operation.

The spikes in the 100 to 200 MHz range are the radio repeater transmitters on the turbine deck and other hand-held radios being used in the plant. These signals were detected in the Auxiliary Electric Equipment Room.

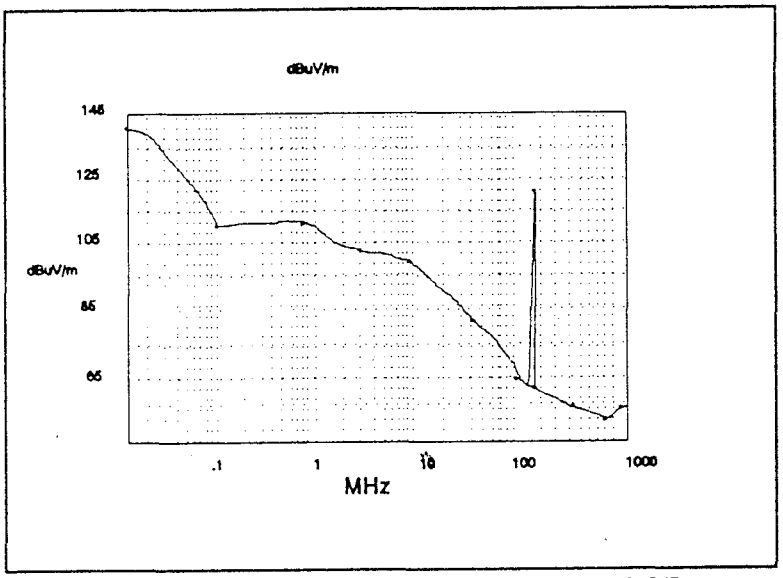

Figure 8: RE02 COMPOSITE WORST CASE EMISSIONS

Even at the worst case level of 110 dBuV/m, there is nearly 20 dB margin between where injected levels caused Trip failures, as defined in WCAP-11733, and the detected levels at Watts Bar.

The 130 dBuV/m injected levels caused trips at only specific frequencies (See Figure 1). None of the frequencies used at Watts Bar are in the range that caused trip output failures in the Qualification test referenced in WCAP-11733.

9.2 RE02.1 TEST RESULTS

Four different hand-held radio transmitter frequencies were keyed at various locations outside the Auxiliary Electric Equipment Room. The field strengths for these specific carrier frequencies were measured within the room. The receiving antenna was rotated through the X, Y, and Z axis to detect the worst case conditions.

The worst case conditions were 1 m from the stairway door when a HT-1000 portable radio at 172.1 MHz was keyed. This test condition was detected at about 117 dBuV/m field strength within the room.

This detected field strength still allows a 13 dB margin between potential frequency disruption and actual detected field strength. Only six frequencies caused trip failures at the 130 dB injection level. The actual Watts Bar frequency detected at this high level is not one of the six Trip Output Failure frequencies.

SECTION 10: THEORETICAL ANALYSIS OF EAGLE-21 SUSCEPTIBILITY TO 0 TO 30 MHZ EMI/RFI

10.0 ANALYSIS OVERVIEW

In 1992, in response to inquiries regarding the Eagle-21 Process Protection System's ability to withstand EMI/RFI fields between 0 and 30 KHz, an analysis was performed delineating susceptibility margins in this frequency range. A report, STC REPORT 92-1SVO-EMIRFI-R1 was developed showing the results of this analysis.

This report concluded that Eagle-21 was not susceptible to 0 to 30 Mhz EMI/RFI fields. The report assumed worst case conditions. Some of the conditions assumed were:

* No shielding to limit interference.
* Maximum conductor lengths and loop areas
* No common mode signal rejection
* No filtering on system circuits
* No design practices that would limit interference

10.1 TEST REPORT DATA

The report focused three potential areas of susceptibility. The first was the digital electronic circuits. It was assumed that a conductor causing interference was located such that the maximum field was coupled into the circuits. The second was susceptibility of the circuit board to magnetic interference. The third was the cabinet cables susceptibility to magnetic interference.

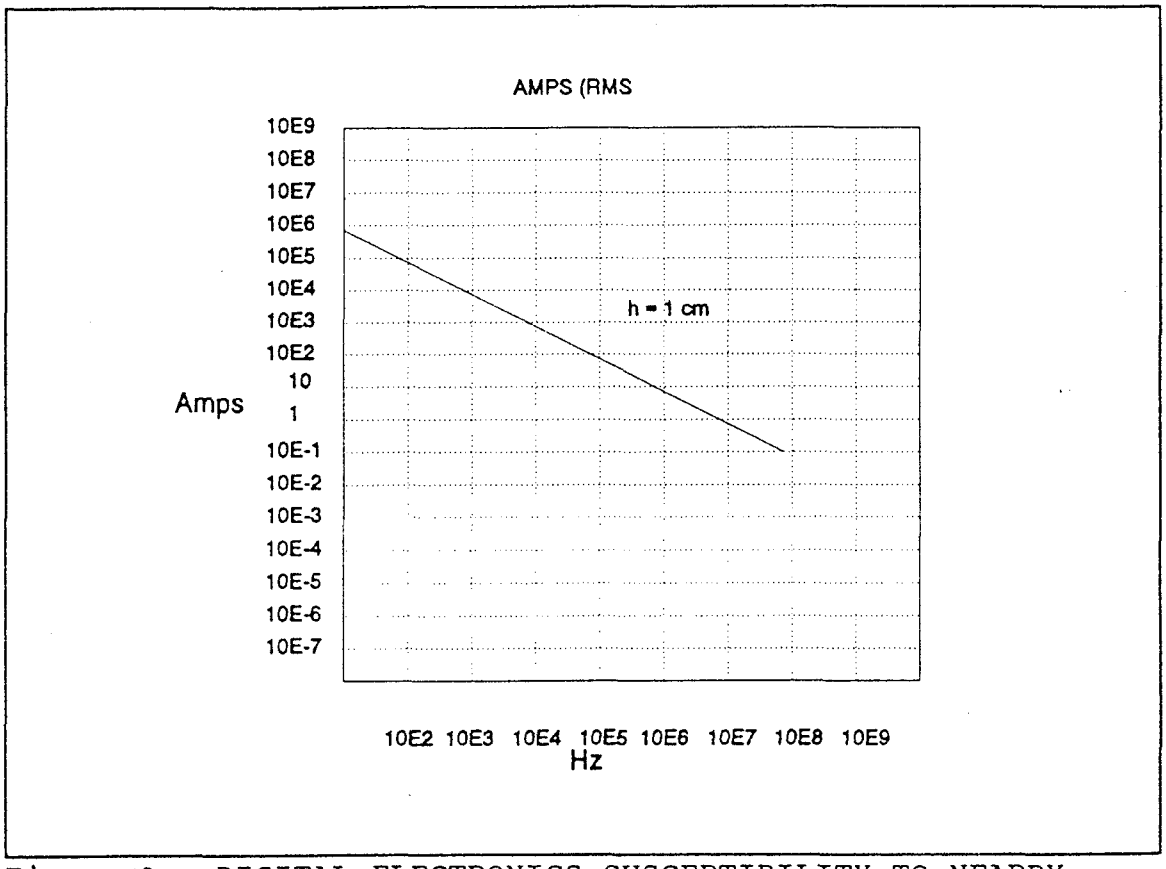

Figure 9: DIGITAL ELECTRONICS SUSCEPTIBILITY TO NEARBY CURRENT CONDUCTOR.

Figure 9 shows the relationship of conductor current in RMS Amps to the height of the conductor. Although four heights were used only the 1 cm height is plotted. Since it is the closest conductor, it provides the worst case most limiting conditions.

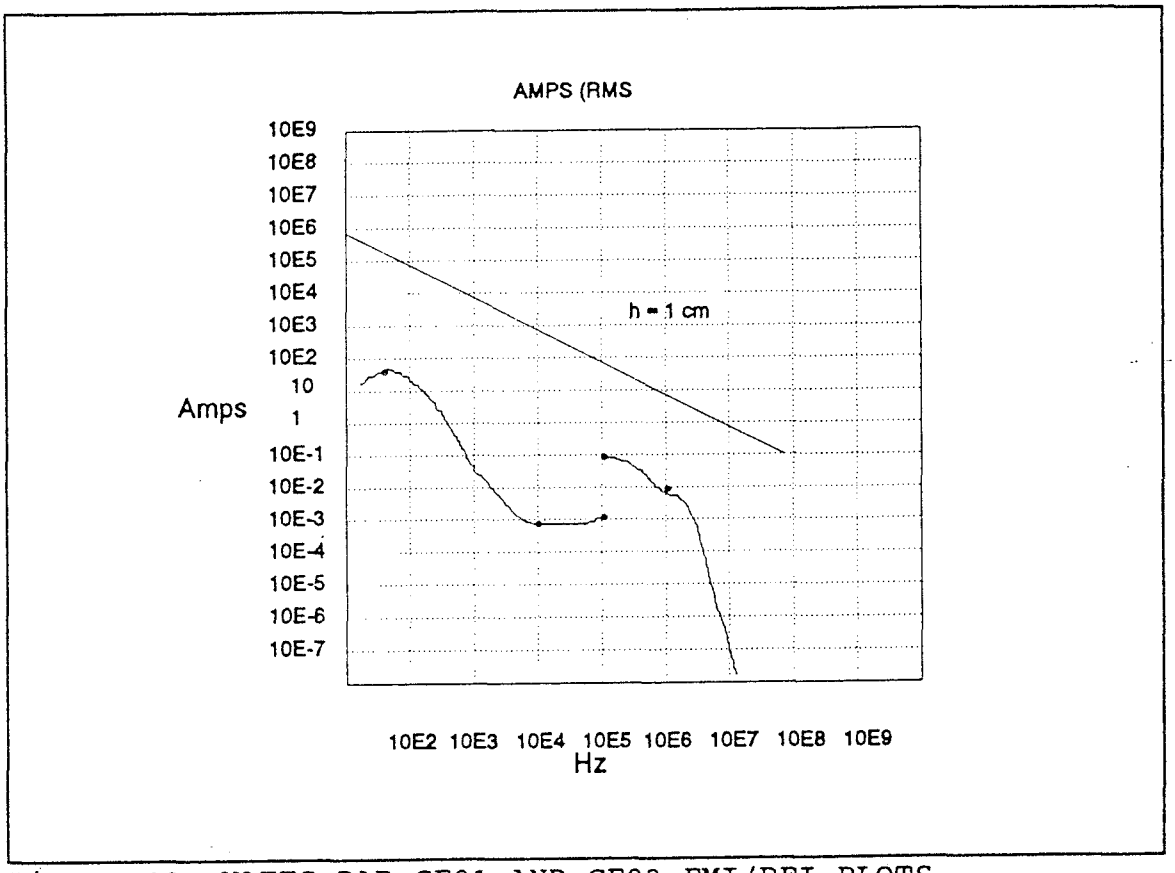

Figure 10: WATTS BAR CE01 AND CE03 EMI/RFI PLOTS

Figure 10 places the measured fields from CE01 and CE03 onto the susceptibility plot. It can be seen from the plot that even the worst case plots are well within the predicted worst case failure conditions.

It should be recalled that the apparent shift in amplitude at the 15 KHz is the result of a change in the bandwidth being measured between the CE01 and the CE03 test.

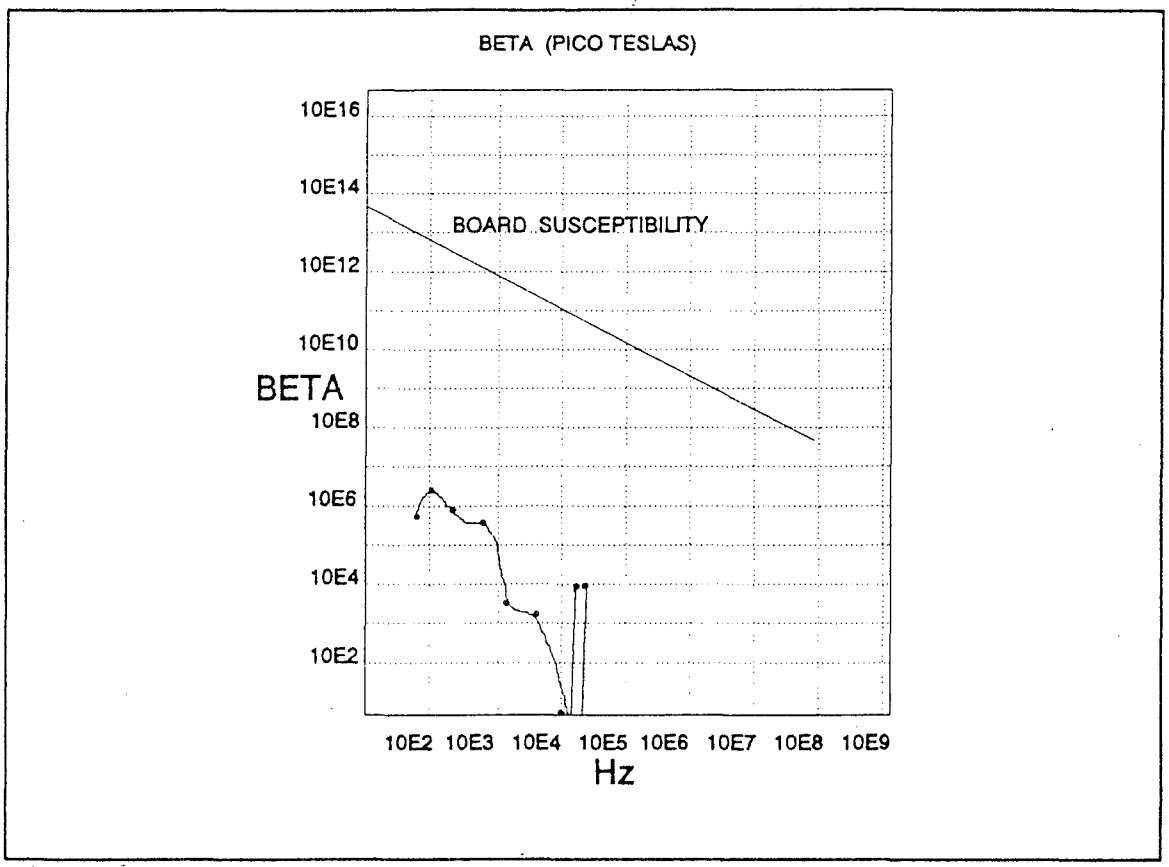

Figure 11: CIRCUIT BOARD SUSCEPTIBILITY

Figure 11 shows the Board Susceptibility to magnetic interference and the detected fields at the Watts Bar Auxiliary Equipment Room.

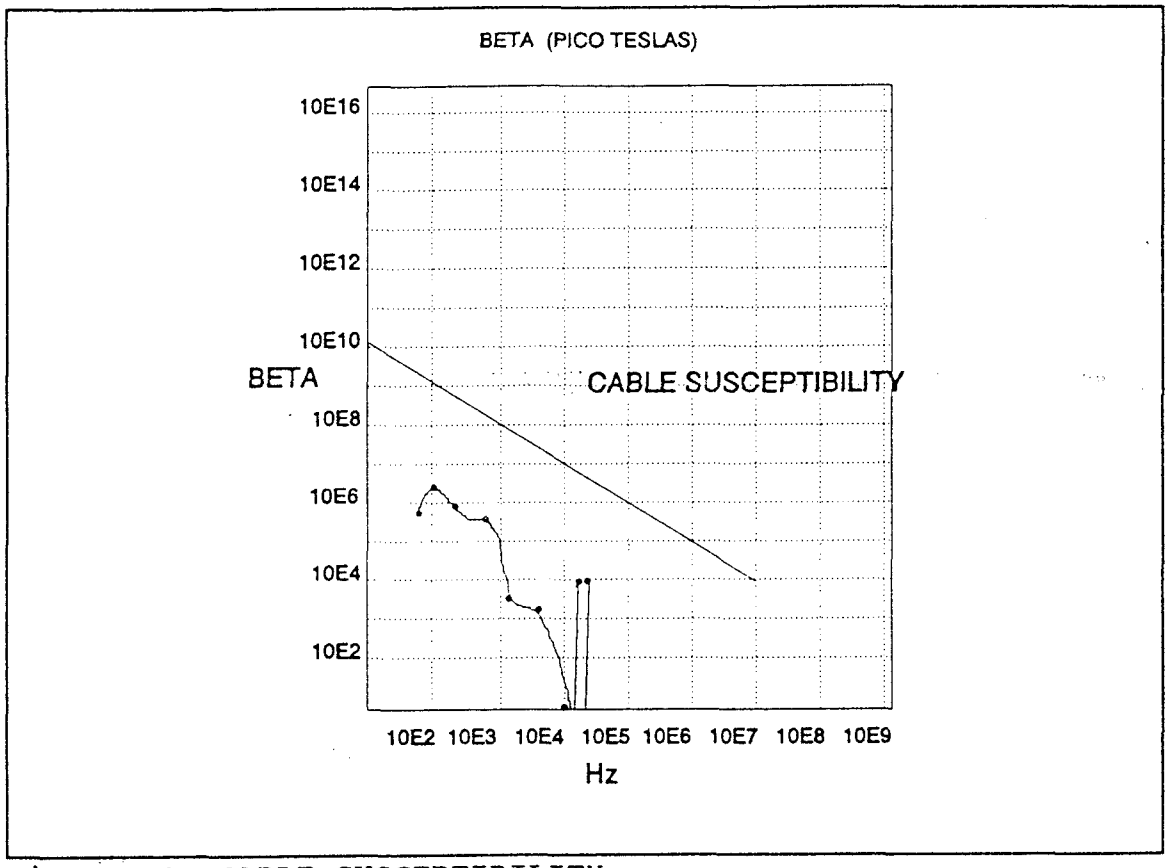

Figure 12: CABLE SUSCEPTIBILITY

Figure 12 shows the Cable Susceptibility and the fields detected at the Watts Bar Auxiliary Electric Equipment Room.

SECTION 11: CONCLUSIONS

11.0 CONCLUSIONS

Based on the data from the NTS Report and STC REPORT 92-1SVO-EMIRFI-R1STC, it is the conclusion of Westinghouse Electric Corporation, Process Control Division that the Eagle-21 Process Protection System in Watts Bar Nuclear Plant Unit 1 meets current EMI/RFI standards and will not be adversely effected by EMI/RFI as installed.

APPENDIX A: REFERENCES

STC REPORT 92-1SVO-EMIRFI-R1STC, *Theoretical Analysis of EMI/RFI Susceptibility of the Digital Electronics of the Eagle-21 Equipment to be Installed at Zion Unit #1.* Westinghouse Electric Corporation, March 12, 1992.

Test Report 31590-95M, Revision 0. Test Report For Point Of Installation Electromagnetic Interference (EMI) Mapping Of Auxiliary Electric Equipment Room For TVA's Watts Bar Station For Westinghouse Electric Corporation Process Control Division, 200 Beta Drive Pittsburgh, PA 15238, National Technical Services, May 5, 1994.

Test Report 60012-93M, Test Report For Electromagnetic Interference (EMI) Mapping Of Auxiliary Electric Equipment Room, Zion Station, Unit #1, National Technical Services, March 9, 1992.

Fundamentals Of Electric Circuits. David A. Bell. Reston Publishing Company. 1984.

WCAP-11733 Noise, Fault, Surge, and Radio Frequency Interference Test Report for Westinghouse Eagle-21 Process Protection Upgrade System. Westinghouse Power Systems. June 1988.

APPENDIX B: National Technical Systems (NTS) Test Report of Installation Electromagnetic Interference (EMI) Mapping of Auxiliary Electric Equipment Room For TVA's Watts Bar Station For Westinghouse Electric Corporation, Process Control Division, 200 Beta Drive, Pittsburgh, PA 15238

NATIONAL TECHNICAL SYSTEMS
TRANSDUCER TABLE
Transducer Title : LOG PERIODIC S/N 714
Sign of Trans. : PLUS
Freq Interpolat. : LOG
Number of Points : 37

Point	Frequency (MHz)	Trans Factor
1	290	16.5
2	325	17
3	350	17
4	375	17.3
5	400	17
6	425	17.4
7	450	18.4
8	475	18.5
9	500	18.9
10	525	19.1
11	550	19.8
12	575	20.4
13	600	20.9
14	625	20.9
15	650	21.4
16	675	21
17	700	20.8
18	725	21.2
19	750	21.2
20	775	22.2
21	800	22.7
22	825	23.4
23	850	24.1
24	875	23.7
25	900	23.5
26	925	23.4
27	950	24
28	975	24
29	1000	24.6
30	1100	25.9
31	1200	25.8
32	1300	27.5
33	1400	27.3
34	1500	29.9
35	1600	31.2
36	1700	30.1
37	1800	32.8

National Technical Systems

TEST REPORT FOR POINT OF INSTALLATION ELECTROMAGNETIC INTERFERENCE (EMI) MAPPING OF AUXILIARY ELECTRIC EQUIPMENT ROOM FOR TVA'S WATTS BAR STATION FOR

WESTINGHOUSE ELECTRIC CORPORATION
PROCESS CONTROL DIVISION

Test Report 31590-95M
Revision 0

TEST REPORT FOR POINT OF INSTALLATION ELECTROMAGNETIC INTERFERENCE (EMI) MAPPING OF AUXILIARY ELECTRIC EQUIPMENT ROOM FOR TVA'S WATTS BAR STATION FOR

WESTINGHOUSE ELECTRIC CORPORATION
PROCESS CONTROL DIVISION
200 BETA DRIVE
PITTSBURGH, PA 15238

Purchase Order No. PA19288
Interdivision MJO No. 60429-95N

Prepared by: Martin J. Metcalf — Date 5-31-94
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533 Main Street, Acton, MA 01720

Independent Reviewer: Christopher T. Burn — Date 5-31-94
Christopher T. Burr, EMC Test Engineer
NTS/Northeast

Reviewed and Approved by: James E. Dozier — Date 5/31/94
James E. Dozier, Quality Manager, Nuclear Services
NTS/Northeast

MJM/sml/3159095M.WES

NTS

TABLE OF CONTENTS

1.0 PROGRAM SCOPE

This test report presents the data collected and describes the methods used for point of installation electromagnetic interference mapping of the Auxiliary Electric Equipment Room at TVA's Watts Bar Nuclear Power Plant. Testing was performed in accordance with NTS Test Procedure No. 31590-95M, Revision 0.

1.1 Mapping - Point of Installation

The Westinghouse Eagle 21 Reactor Protection System (RPS) has had susceptibility testing performed on it. The EMI point of installation mapping presents the actual EMI profile the RPS system is exposed to, as installed, and will be used to determine whether the susceptibility testing was performed at the appropriate levels.

The EMI point of installation mapping consisted of test points whose locations were determined by agreement between NTS and TVA personnel to insure that the actual Worst Case EMI Noise Profile for electric and magnetic field emissions was mapped. At each test point, the field strengths were measured in the X, Y, and Z axes and recorded in the orientation that presented the worst case emissions level. The frequency range for this testing was from DC to 1 GHZ.

After test completion, verification of a 6 db margin (minimum) between the RPS System susceptibility test levels and the Auxiliary Electric Equipment Rooms' Point of Installation Emissions Noise Profile should be performed. If a determination is made that the 6 db (minimum) margin does not exist, further susceptibility testing should be performed on the RPS System, at adequate levels to insure that a 6 db margin exists.

2.0 APPLICABLE DOCUMENTS

IEC Standard 801-3	International Electrotechnical Commission IEC Standard, Edition 1, dated 1984
SAMA PMC33.1-1978	Electromagnetic Susceptibility of Process Control Instrumentation, Scientific Apparatus Makers Association
MIL-STD-461C	Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference, dated 4 August 1986
MIL-STD-462	Electromagnetic Interference Characteristics Measurement of, dated 31 July 1967
MIL-STD-463	Definitions and System of Units, Electromagnetic Interference and Electromagnetic Compatibility Technology.
MIL-STD-45662A	Calibration Systems Requirements dated 1 August 1988
DI-EMCS-80201	Electromagnetic Interference Test Report
MIL-STD-1399 Section 070, Part 1	Interface Standard for Shipboard Systems, DC Magnetic Field Environment, dated 26 February 1979
	Code of Federal Regulations, Title 10, Part 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants
	Code of Federal Regulations, Title 10, Part 21, Reporting of Defects and Noncompliance
	NTS/Northeast Quality Manual, Revision 3, dated 14 July 1992
IE Information No. 83-83	Use of Portable Radio Transmitters Inside Nuclear Plants
	NTS Interdivision Form, dated 08 March 1994
Westinghouse Document No. PA19288	Purchase Order, EMI Mapping, dated 07 February 1994

2.0 APPLICABLE DOCUMENTS (continued)

NTS Procedure No. 31590-95M	Test Procedure for Point of Installation (EMI) Mapping of Auxiliary Electric Equipment Room for TVA's Watts Bar Station, Revision 0, dated 25 April 1994

3.0 GENERAL TEST REQUIREMENTS

3.1 Test Subcontractors

All testing was performed by NTS personnel.

3.2 Plant Operations Interface and Site Work Controls

Manipulation or operation of plant equipment was performed in accordance with TVA approved procedures by TVA personnel. All connections of test equipment probes to operable plant components or wiring were made by TVA personnel. The TVA test coordinator obtained plant operation permission prior to connection of test equipment probes.

4.0 APPLICABLE FIGURES

4.1 Description

The Auxiliary Electric Equipment Room is located at TVA's Watts Bar Nuclear Plant, in Spring City, Tennessee. The equipment room's physical layout is depicted in Figure 4-1 and shows all permanent equipment. The use of hand-held radios is prohibited within the equipment room, but their use is allowed outside the equipment room and some amount of this energy penetrates into the equipment room and is considered as part of the Auxiliary Electric Equipment Room environment.

4.2 Identification

The Auxiliary Electric Equipment room equipment is listed in Figure 4-2.

4.3 Operation

The Auxiliary Electric Equipment Room was in operation on the test dates of May 3 through 6, 1994 during Hot Functional Testing (HFT) which was occurring during this period.

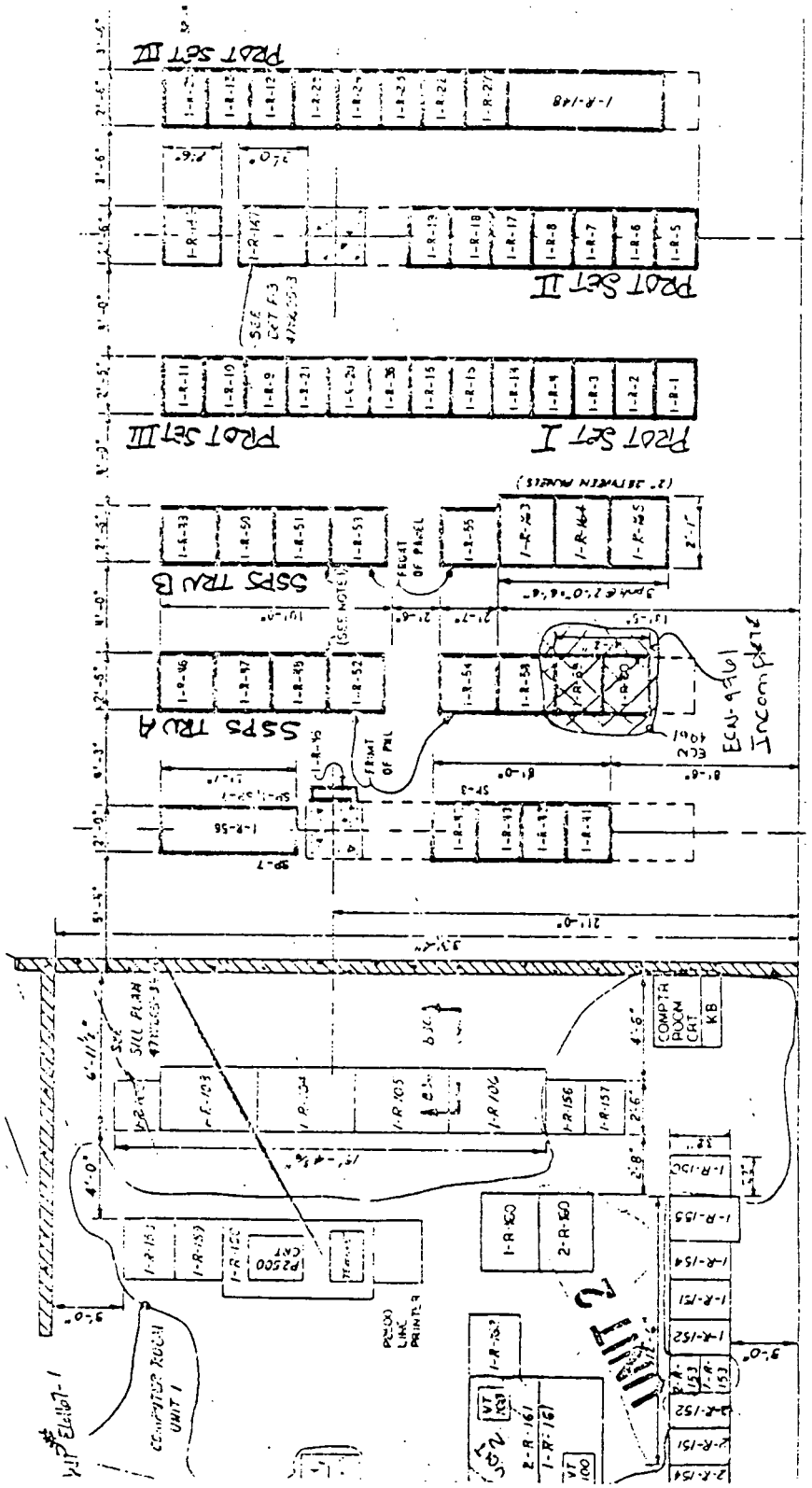


FIGURE 4-1: AUXILIARY ELECTRIC EQUIPMENT ROOM PHYSICAL LAYOUT

FIGURE 4-2: AUXILIARY ELECTRIC EQUIPMENT ROOM EQUIPMENT LIST IDENTIFICATION

The following EMI noise sources were tested for their impact on the Auxiliary Electric Equipment Room environment:

A) Radios

Frequency (MHz)	Output Power (Watts)	Antenna Location
172.025	50	Repeater on Turbine Floor*
173.050	50	Repeater on Turbine Floor*
171.3875	50	Repeater on Turbine Floor*
173.7625	50	Repeater on Turbine Floor*
164.25(F1)	6	Motorola HT1000 Hand Held
172.1(F2)	6	Motorola HT1000 Hand Held
162.025(F1)	6	Midland 70-150B Hand Held
164.25(F2)	6	Midland 70-150B Hand Held

*These repeaters were evaluated during RE02 and during RE02.1 when hand held radios were intentionally keyed.

FIGURE 4-2: AUXILIARY ELECTRIC EQUIPMENT ROOM EQUIPMENT LIST IDENTIFICATION

B) Equipment within the Point-of-Installation cabinets:

Protection Set I	1-R-1 thru 1-R-4
Protection Set II	1-R-5 thru 1-R-8
Protection Set III	1-R-9 thru 1-R-11
Protection Set IV	1-R-12, 1-R-13, and 1-R-28

FIGURE 4-2: AUXILIARY ELECTRIC EQUIPMENT ROOM EQUIPMENT LIST IDENTIFICATION

C) The following power leads/cables were measured during the conducted emissions (CE01/CE03/CE07) portion of the test program:

CABINET NO.	TERMINAL POINTS TVA DWG. NO. w DWG. NO.	TVA CABLE NO.	VITAL INVERTER VITAL AC BOARD TVA DWG. NO.
1-R-1	TB-1X, 5 & 6 45N1661-1 5D63347 SHT. 3	1PV16D	1-I 1-BD-235-1-D 1-45W706-1
1-R-3	TB-3X,5 & 6 45N1661-3 5D63347 SHT. 7	1PV825D	1-I 1-BD-235-1-D 1-45W706-1
1-R-5	TB-5X, 5 & 6 45N1662-1 5D63347 SH. 11	1PV135E	1-II 1-BD-235-2-E 1-45W706-2
1-R-7	TB-7X, 5 & 6 45N1662-3 5D63347 SHT. 15	1PV826E	1-II 1-BD-235-2-E 1-45W706-2
1-R-9	TB-9X, 5 & 6 45N1663-1 5D63347 SHT.19	1PV255F	1-III 1-BD-235-3-F 1-45W706-3
1-R-11	TB-11X, 5 & 6 45N1663-3 5D63347 SHT.23	1PV827F	1-III 1-BD-235-3-F 1-45W706-4
1-R-12	TB-12X, 5 & 6 45N1664-1 5D63347 SHT.25	1PV374G	1-IV 1-BD-235-4-G 1-45W706-4
1-R-28	TB-28X, 5 & 6 45N1664-3 5D63347 SHT.29	1PV828G	1-IV 1-BD-235-4-G 1-45W706-4

D) The following signal leads/cables were during the conducted emissions (CE03/CE07) portion of the test program (see next page):

E) The largest loads in the area are the Plant Air Compressors, which are immediately adjacent to the Auxiliary Electric Equipment Room. The compressors were cycling normally during all testing.

CABINET NO.	TERMINAL POINTS	IDENTIFICATION
1-R-1	TB"A" 10 & 11	Flow Sensor (containment)
	TB"A" 4 & 5	Pressure Sensor (containment)
	TB"A" 1 & 2	Pressurizer Pressure Sensor (containment)
1-R-2	TB"C" 7 & 8	Pressure Transducer (aux. bldg.)
	TB"B" 1 - 4	RTD Loop 1 (containment)
	TB"E" 1 - 4	RTD Loop 2 (containment)
	TB"C" 4 & 5	NIS (control room)
1-R-3	TB"D" 1 & 2	RWST Est. Tank
	TB"C" 1 & 2	Boric Acid Tank Lvl.
	TB"B" 10 & 11	Anulus - containment pressure
	TB"A" 4 & 5	Steam Pressure Flow (vault)
	TB"B" 1 & 2	Feedwater Flow Loop 4 (aux. bldg.)
	TB"A" 10 & 11	Steam Pressure (vault)
1-R-4	TB"A" 10 & 11	Steam Pressure (containment)
	TB"B" 7 & 8	Turbine Impulse Pressure
	TB"A" 7 & 8	Steam Pressure
	TB"B" 1 & 2	FW Flow (aux. bldg.)
	TB"A" 1 & 2	FW Flow (aux. bldg.)
	TB"A" 4 & 5	Steam Flow (containment)
	TB"C" 1 & 2	Sump Lvl. (containment)
1-R-5	TB"B" 1 & 2	RCF
	TB"C" 1 & 2	WR Pressure (containment)
1-R-6	TB"B" 1 - 4	RTD Loop 3 (containment)
	TB"E" 1 - 4	RTD Loop 4 (containment)
	TB "G" 10 & 11	RCS Pressure
1-R-7	TB"A" 1 & 2	Feedwater Flow Loop 1 (aux. bldg.)
	TB"B" 1 & 2	Feedwater Flow Loop 3 (aux. bldg.)
	TB"A" 10 & 11	Steam Pressure (vault)
	TB"A" 4 & 5	Steam Flow
1-R-8	TB"A" 1 & 2	Feedwater Flow Loop 2 (aux. bldg.)
	TB"A" 7 & 8	Steam Pressure (containment)
	TB"B" 7 & 8	Turbine Impulse Pressure
1-R-9	TB"A" 7 & 8	RCS Flow
1-R-10	TB"D" 8 - 11	RHR Pump RTD
	TB"D" 1 -4	Pressurizer RTD
1-R-11	TB"A" 7 & 8	Steam Generator Level Loop 1
	TB"A" 10 & 11	Steam Generator Level Loop 2
	TB"A" 1 & 2	Steam Generator Level Loop 3
	TB"A" 4 & 5	Steam Generator Level Loop 4
1-R-13	TB"D" 1 - 4	Pressure Vapor Temp. RTD
	TB"D" 8 - 11	RHR Pump Discharge Temp. RTD
1-R-28	TB"A" 7 & 8	Boric Acid Tank

5.0 TEST REQUIREMENTS

5.1 Quality Assurance

All work conducted for this program was performed in accordance with the requirements of NTS/Northeast's Quality Manual, Revision 3, dated July 14, 1992, and NTS/Northeast Standard Operating Procedure N-4, Revision 0, dated March 19, 1990, ensuring the program's compliance to the applicable provisions of 10 CFR, Part 21 and Part 50, Appendix B.

5.2 Testing

NTS performs a majority of its EMI testing for the military in accordance with MIL-STD-461 and MIL-STD-462. NTS is accredited by the National Institute of Standards and Technology (NIST) under the NVLAP program, to perform testing to these specifications (NVLAP Lab Code #0347). Full details of the accreditation are available upon request. The following tests was performed at TVA's Watts Bar Nuclear Plant.

5.2.1 Conducted

- Conducted Emissions, Method CE01, Power and Signal Leads, 30 Hz to 15 KHz, Common and Differential Mode
- Conducted Emissions, Method CE03, Power and Signal Leads, 15 KHz to 50 MHz, Common and Differential Mode
- Conducted Emissions, Method CE07, Power and Signal Leads, Switching Transients, Time Domain, Common and Differential Mode

5.0 TEST REQUIREMENTS (continued)

5.2 Testing (continued)

5.2.1 Conducted (continued)

When performing common mode conducted emissions measurements on signal cables, the current probe was placed around as many conductors as possible in the cable bundle. Similarly, when performing common mode measurements on power leads, the probe was placed around as many conductors as possible including the ground wire (where applicable).

When performing differential mode conducted emissions measurements on signal leads, the current probe was placed around the conductors in the cable bundle that are most exposed to electric and magnetic fields. These are typically the conductors that break out of the bundle and run the greatest distance to the point of termination, and or signal leads in close proximity to power leads within the cabinet.

5.2.2 Radiated

- Radiated Emissions, Method REXX, DC Magnetic Field
- Radiated Emissions, Method RE01, 30 Hz to 50 KHz
- Radiated Emissions, Method RE02, 14 KHz to 1 GHz
- Radiated Emissions, Method RE02.1, Hand-Held Radio Profile

When performing radiated emissions testing, the field strengths were measured in the X, Y and Z axis and recorded in the orientation that presents the worst case emissions level.

5.0 TEST REQUIREMENTS (continued)

5.3 Post Measurement Data Analysis (Emission Tests)

The Hewlett Packard (HP) 8566S Automated Microwave Measurement System is software controlled and is used for making automated commercial and military emissions measurements. The EMI measurement system is comprised of a spectrum analyzer, RF preselector, CPU, display unit, printer/plotter, disk drive, keyboard and control knob as listed in Section 7.0.

The HP310 CPU controls the bandwidth and scanning speed of the spectrum analyzer and ensures a continuous scan of all frequencies in the desired range.

The basic scheme of the measurement is that the CPU processes the trace data from the spectrum analyzer at the end of a sweep, initiates the next sweep, and processes the data from the previous sweep while the current sweep is occurring. Processing of trace data involves corrections for transducer correction factor, preamplifier gain and external attenuation and then plotting it on the display unit for visual feedback of the tests' progress. Test results are displayed in log frequency format. Test results can be stored in the library disc for future reference or creating a hard copy.

When measuring radiated emissions, the program will automatically signal the spectrum analyzer to halt the measurement process when the upper frequency range limit of the current antenna is reached. A message is then displayed on the Display unit instructing the operator to change the antenna and/or amplifier for the next frequency sweep range.

5.0 TEST REQUIREMENTS (continued)

5.3 Post Measurement Data Analysis (Emission Tests) (continued)

The system program consists of four major sections: the Test Library, the Data Library, the Measurement section and the Test Setup table. The Test Setup table includes the Transducer and Limit Libraries which are used for storing transducer factor values and commonly used emission limits.

5.4 Narrowband/Broadband Discernment

The Narrowband/Broadband emissions determination is made by manually tuning to the frequency of interest (center frequency) and recording the frequency and amplitude.

The analyzer or receiver will then be tuned over a range of +/- 2 Impulse Bandwidths (IBW) around the center frequency.

A change in peak response of 3 db or less indicates a Broadband emission. Any change of greater than 3 db indicates a Narrowband emission.

5.5 Measurement Accuracy

All measurements will be made in accordance with MIL-STD-462 and have the following accuracies (Reference Section 7.0 - Test Equipment List).

A. Frequency Accuracy: Where specified limits are exceeded, the frequency accuracy of the measurements shall be accurate to within $\pm 0.1\%$. Verification with a frequency counter or other measuring device will be required.

B. Amplitude Accuracy: Amplitude accuracy shall be ± 2 db.

6.0 TEST PROCEDURE

6.1 Conducted Emissions, Method CE01, Power and Signal Leads, 30 Hz to 15 KHz

Requirements

Conducted emission measurements, from 30 Hz to 15 KHz, will be made in accordance with the applicable portions of Test Method CE01 of MIL-STD-462. Reference Section 6.1, Test Setup.

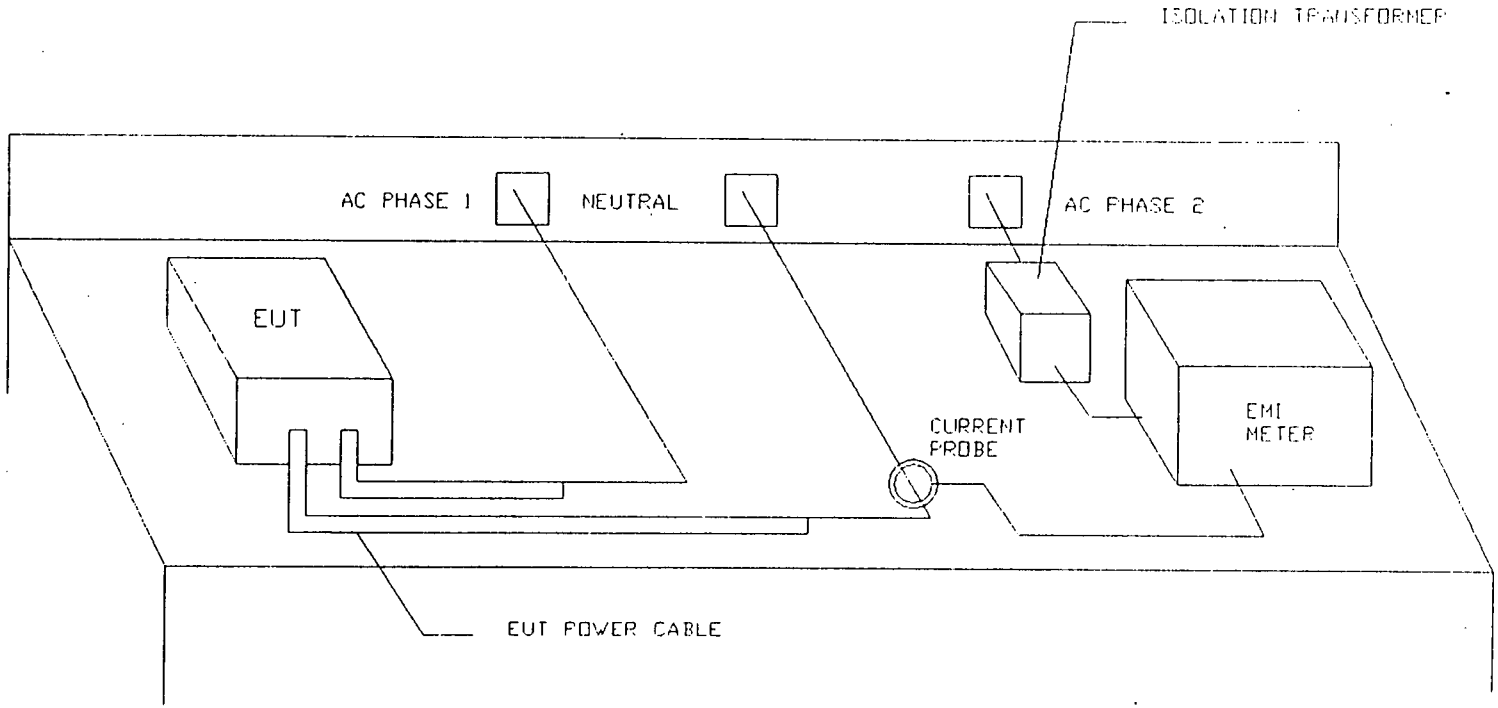
Procedures

The Auxiliary Electric Equipment Room Environment was set up and operated as specified in Section 4.0 of this report. An A.H. Systems Clamp-on Current Probe, Model BCP-200/510, was connected to a Hewlett Packard Automated Microwave Measurement System, Model 8566S through a 50-foot length of RG-214/U coaxial cable. The probe was clamped around a selected power lead, within the RPS cabinet designated as "Phase" and the frequency range was slowly swept from 30 Hz to 15 KHz, and plots were generated for narrow band measurements.

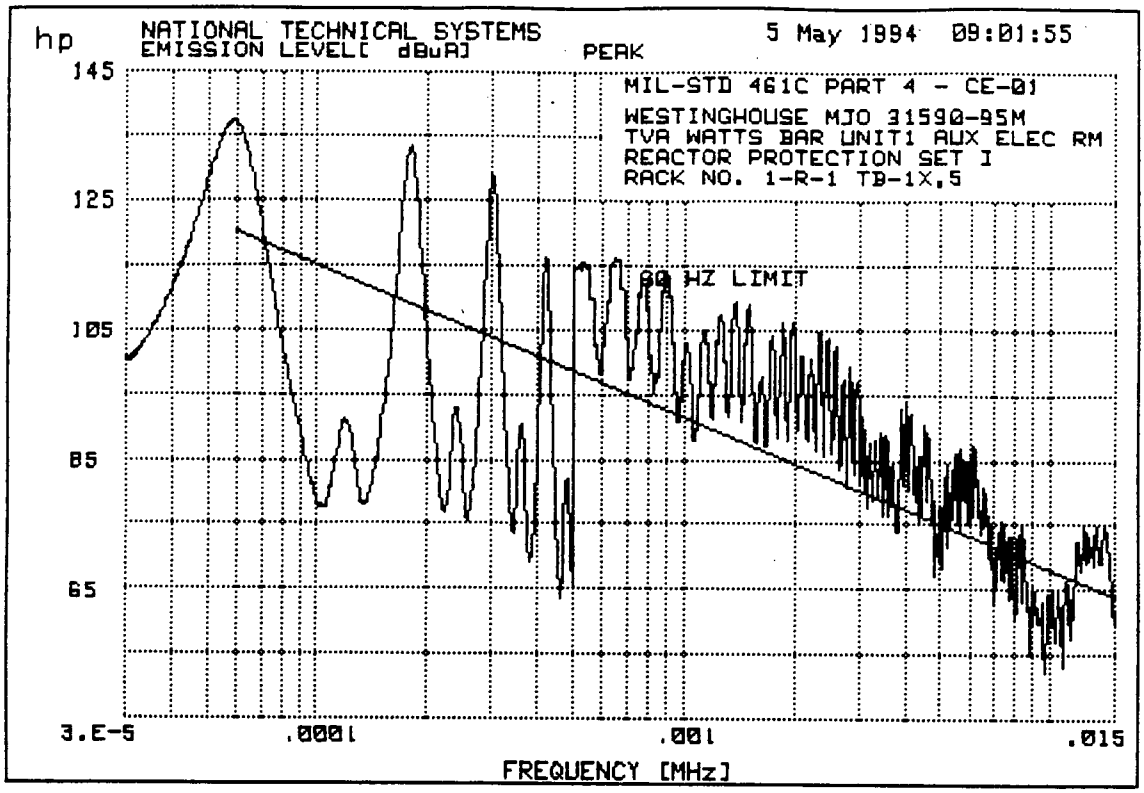
The preceding procedure was then performed on the remaining power lead designated as "Neutral", "Phase/Neutral Bundle" (including ground where accessible), and the appropriate signal lead bundles (Reference Figure 4-2).

Sample Test Results

Test	Results
CEO1 Conducted Emissions, 30 Hz - 15 KHz	Westinghouse Electric Corporation will perform analysis for all tests.



CONDUCTED EMISSIONS, METHOD CE01, TYPICAL TEST SETUP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105
85
65
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.015
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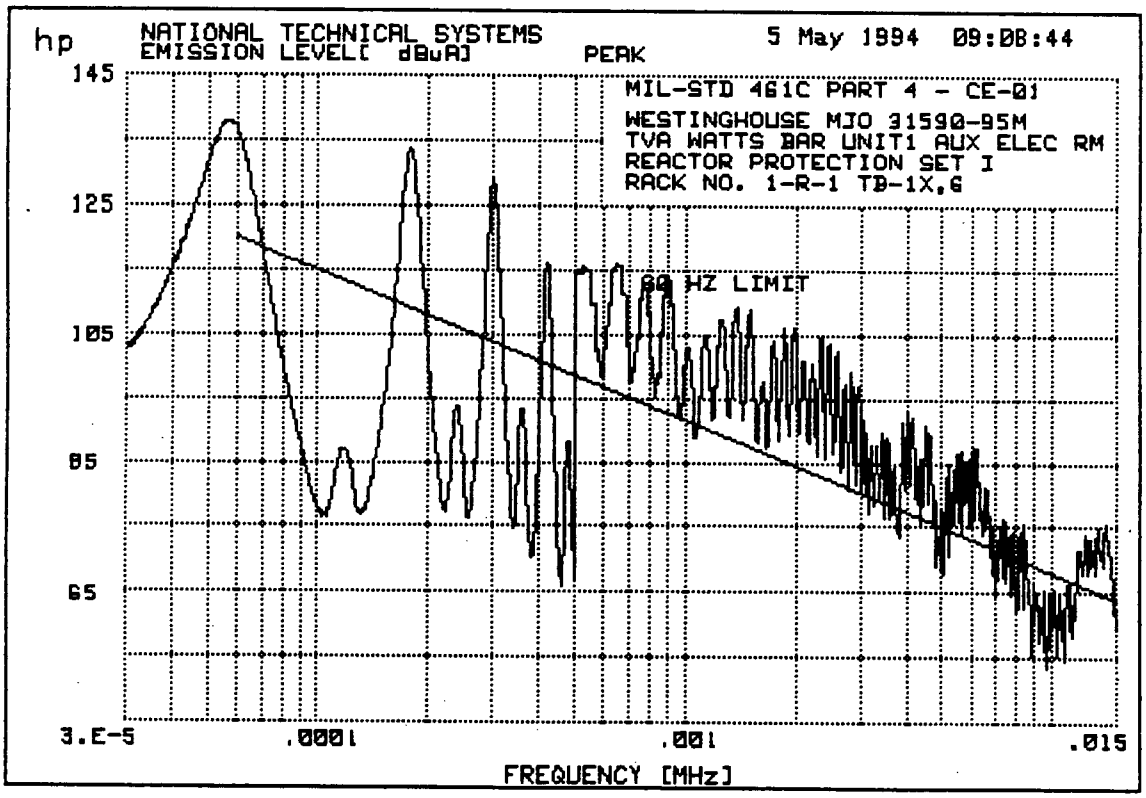
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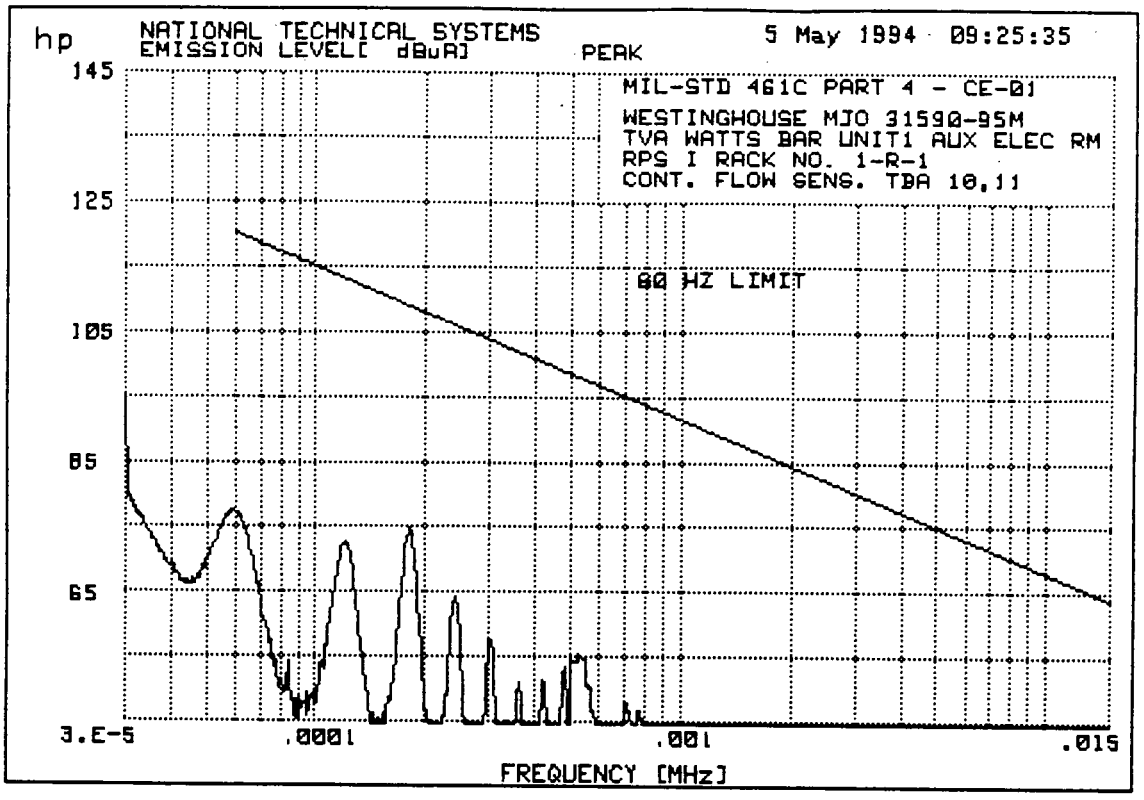
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85
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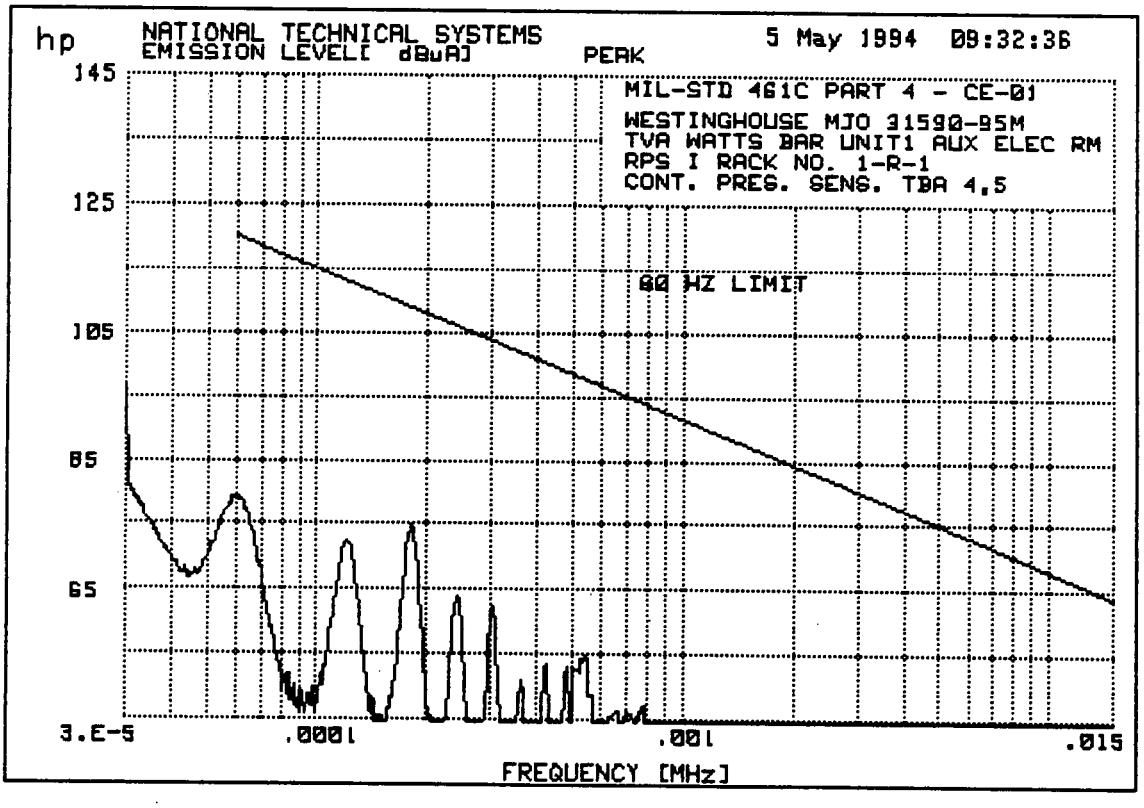
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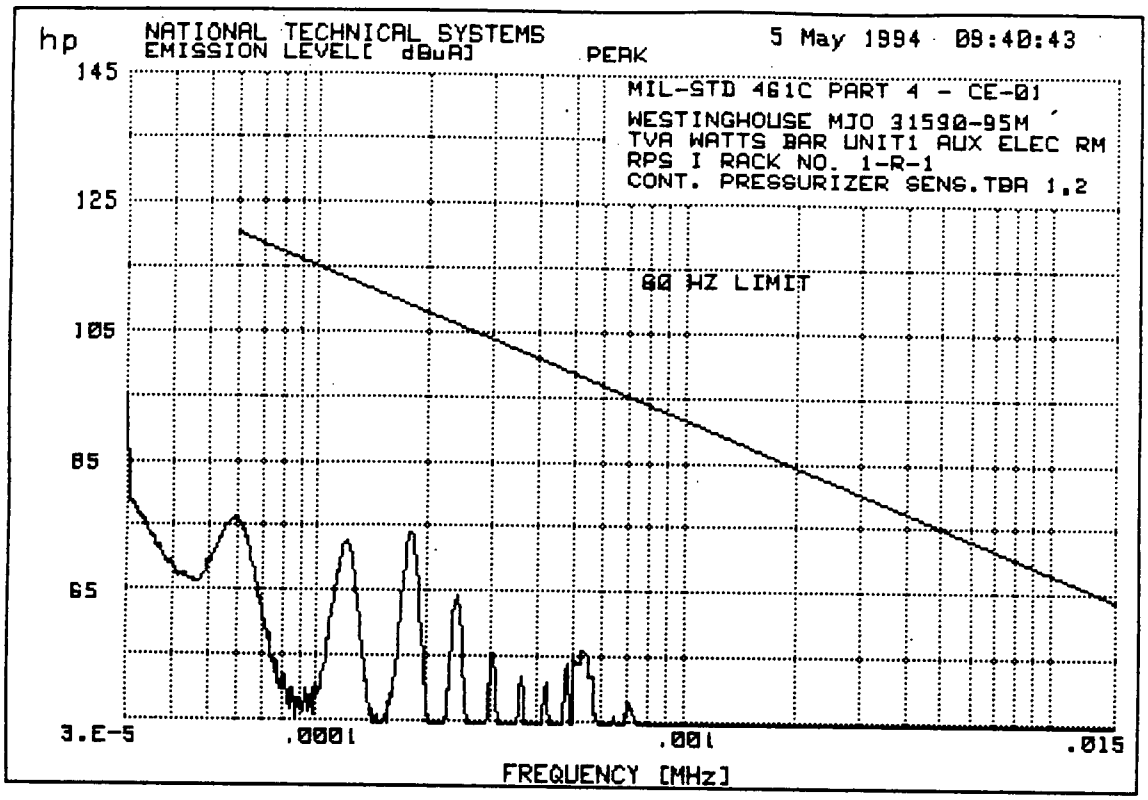
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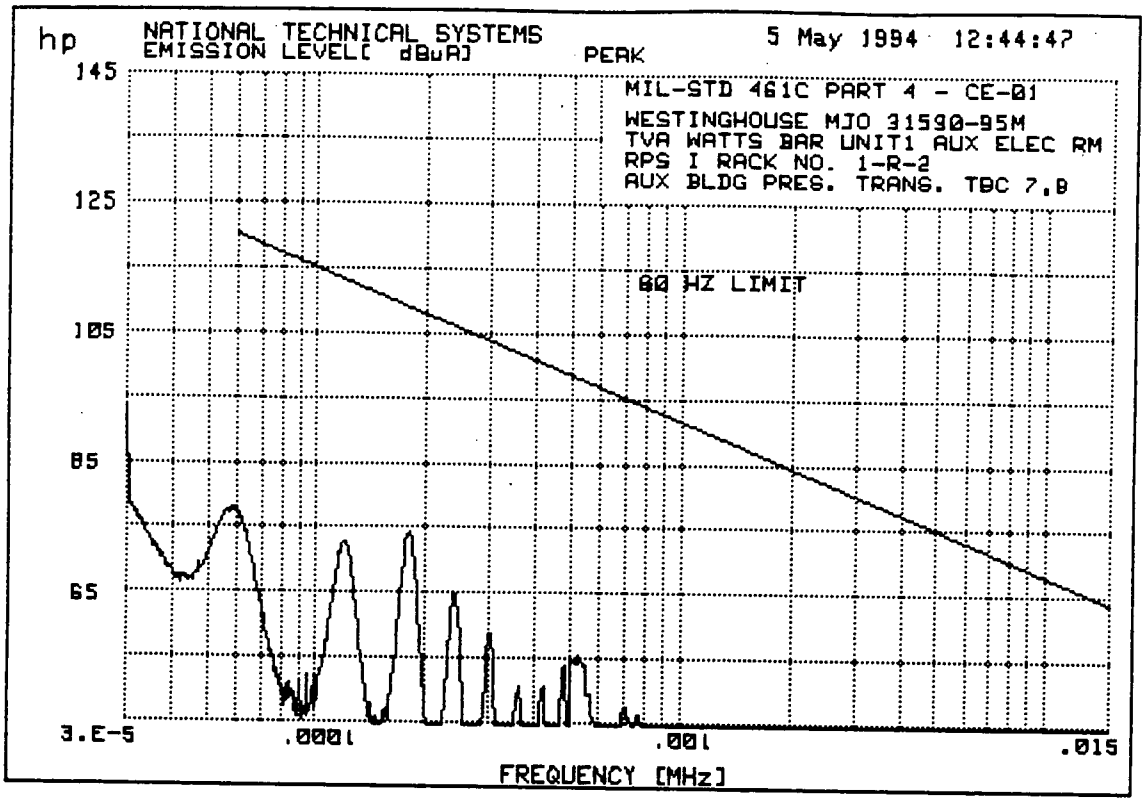
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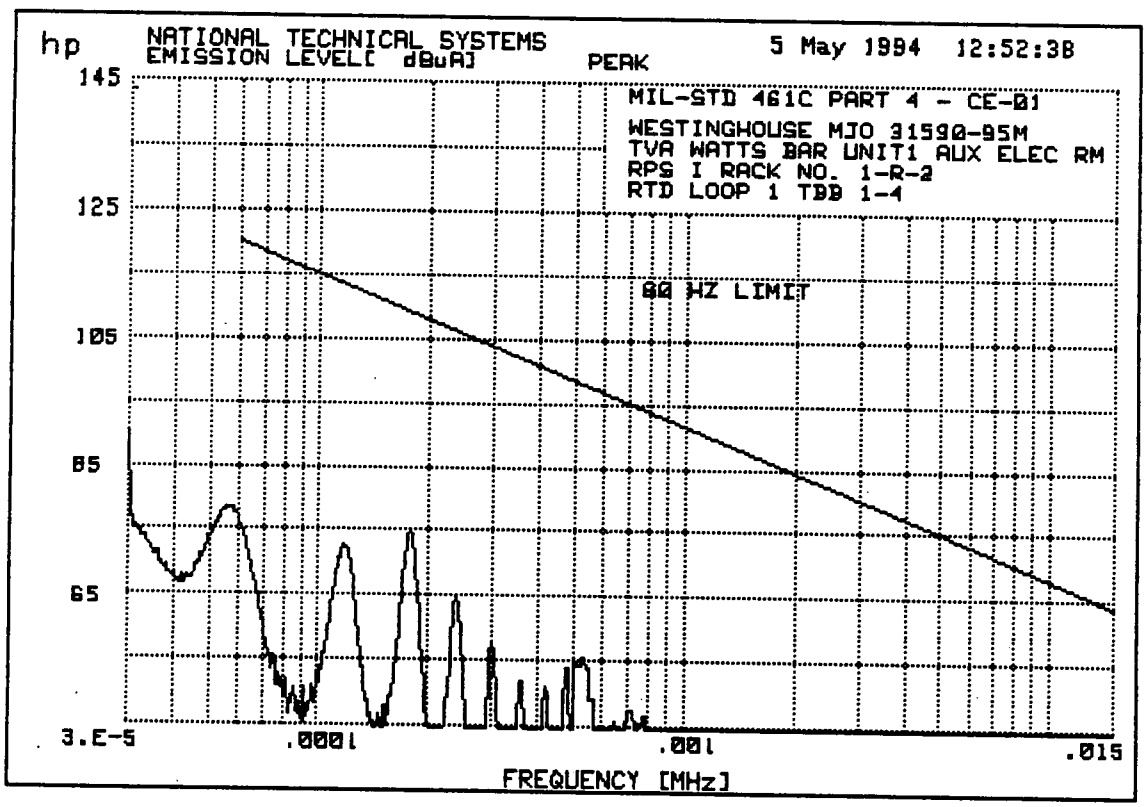
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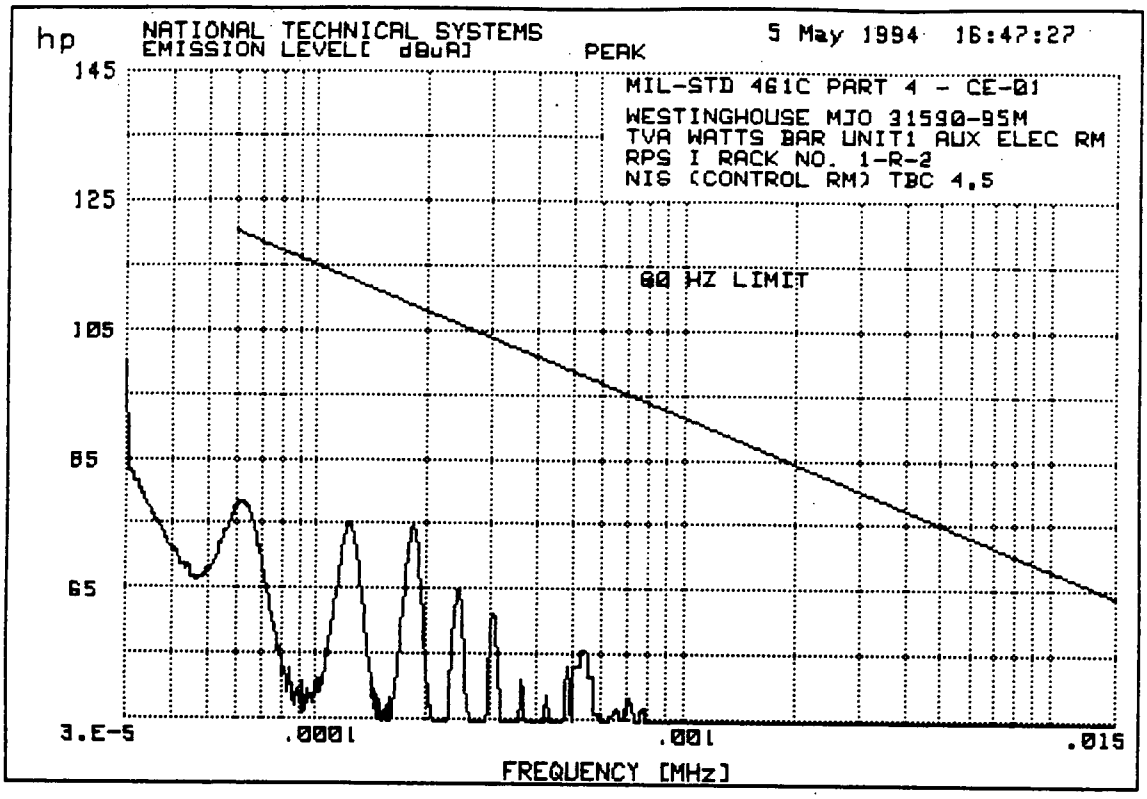
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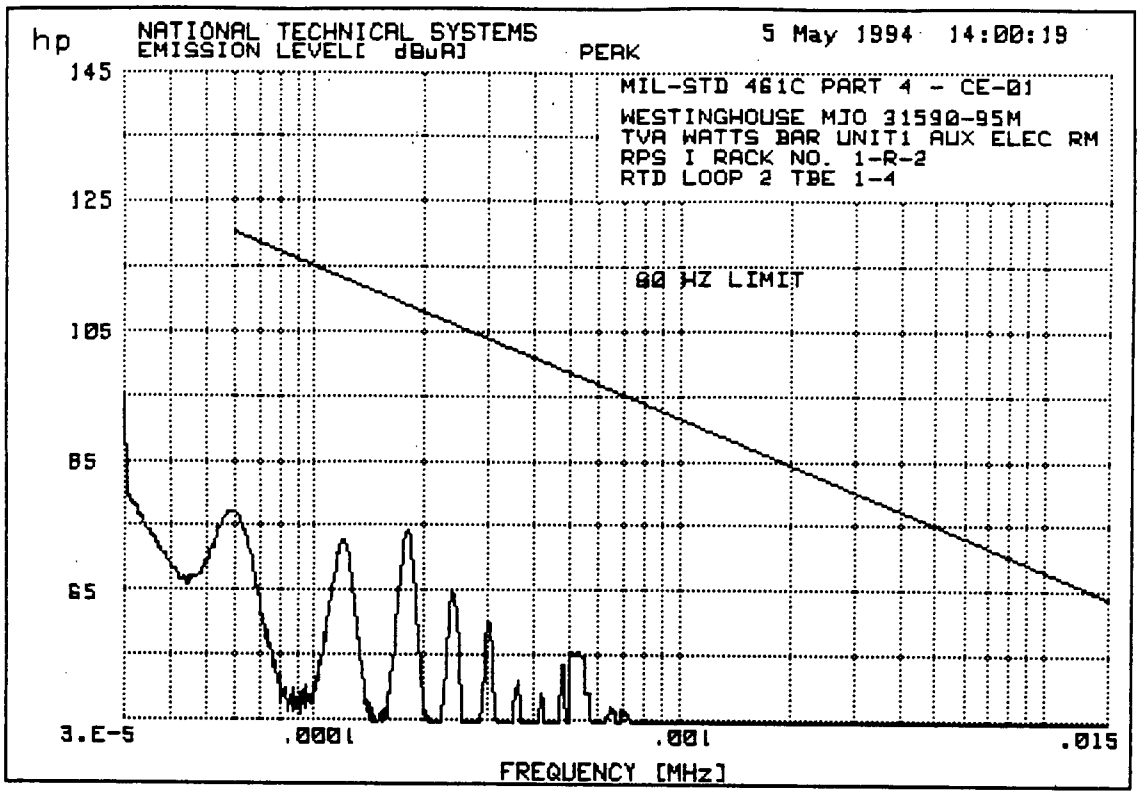
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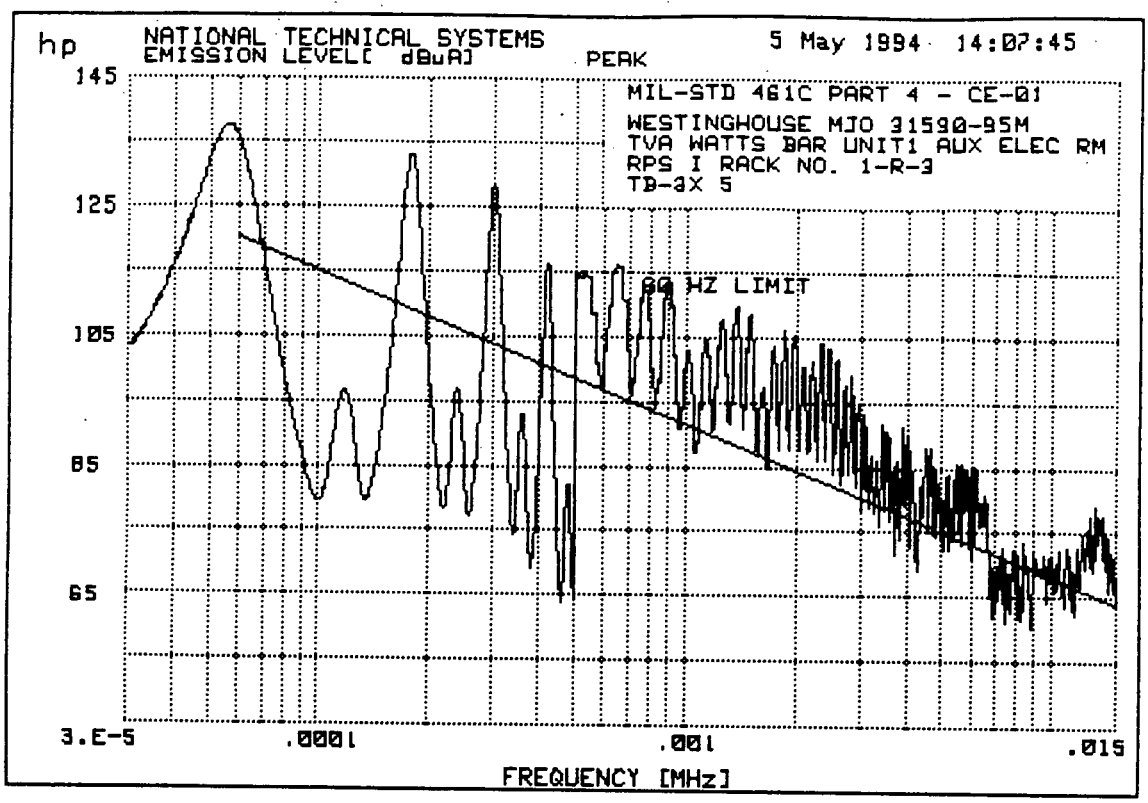
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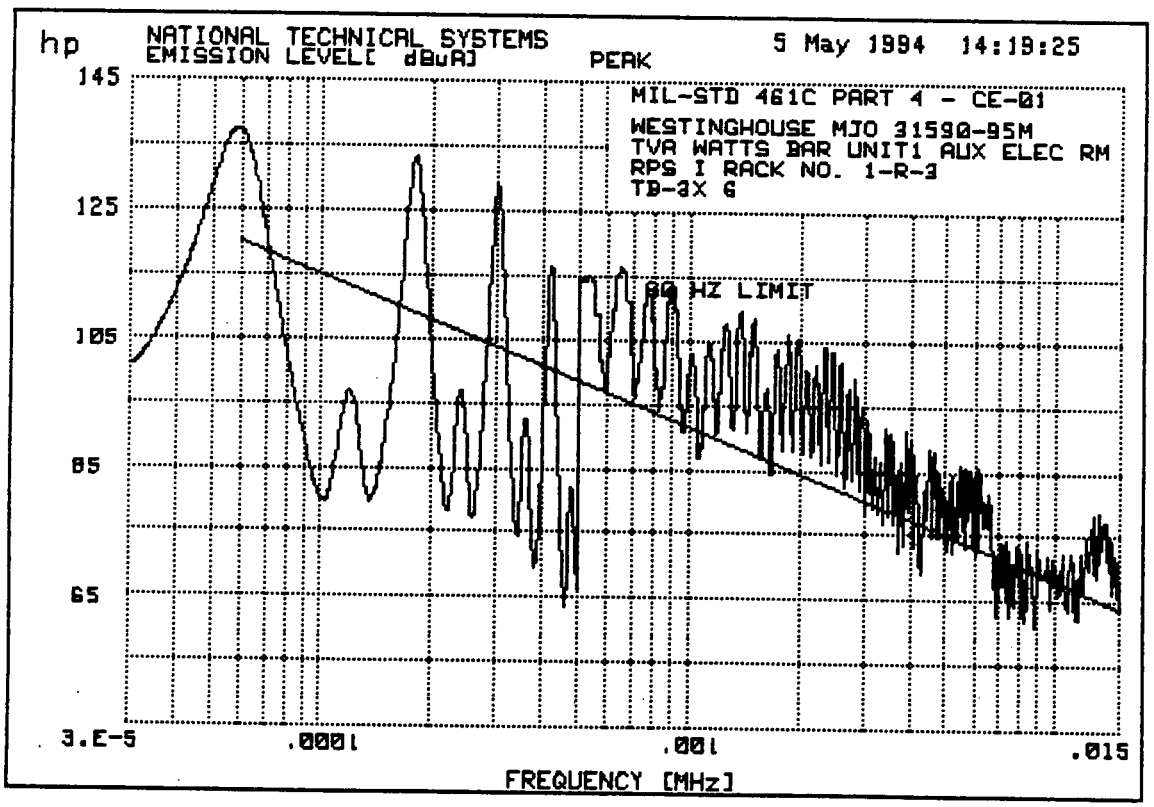
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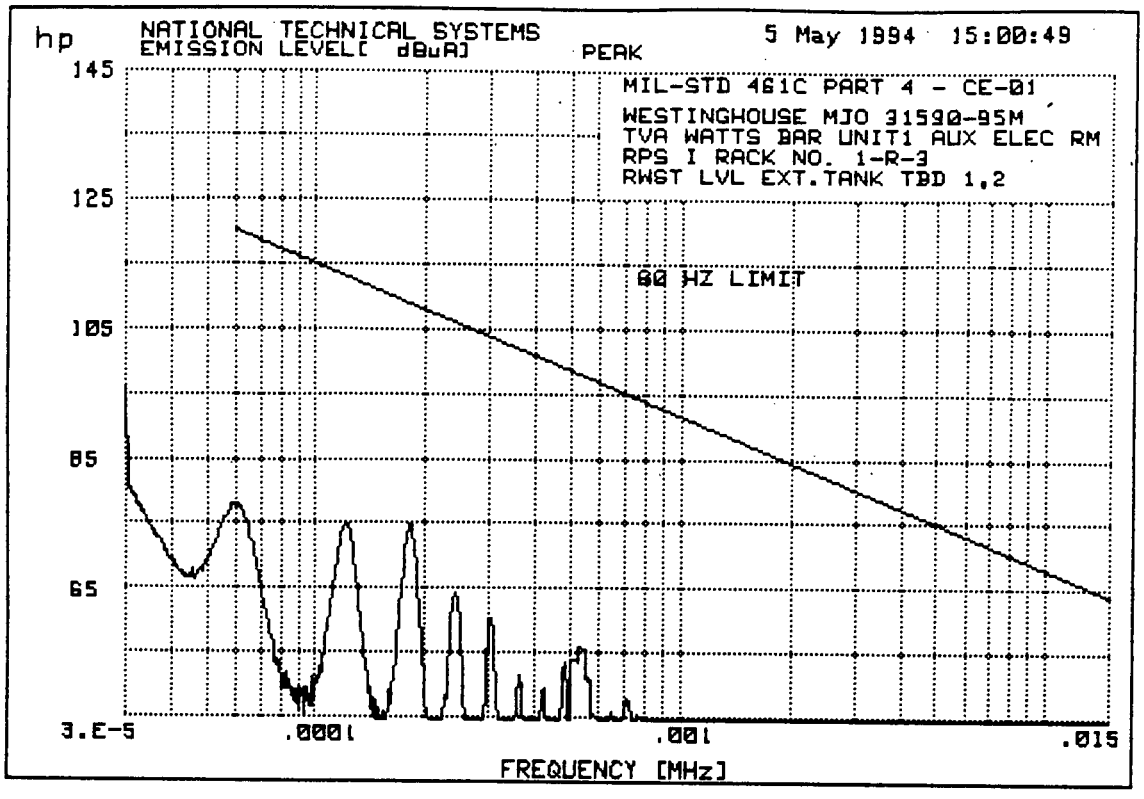
FREQUENCY [MHz]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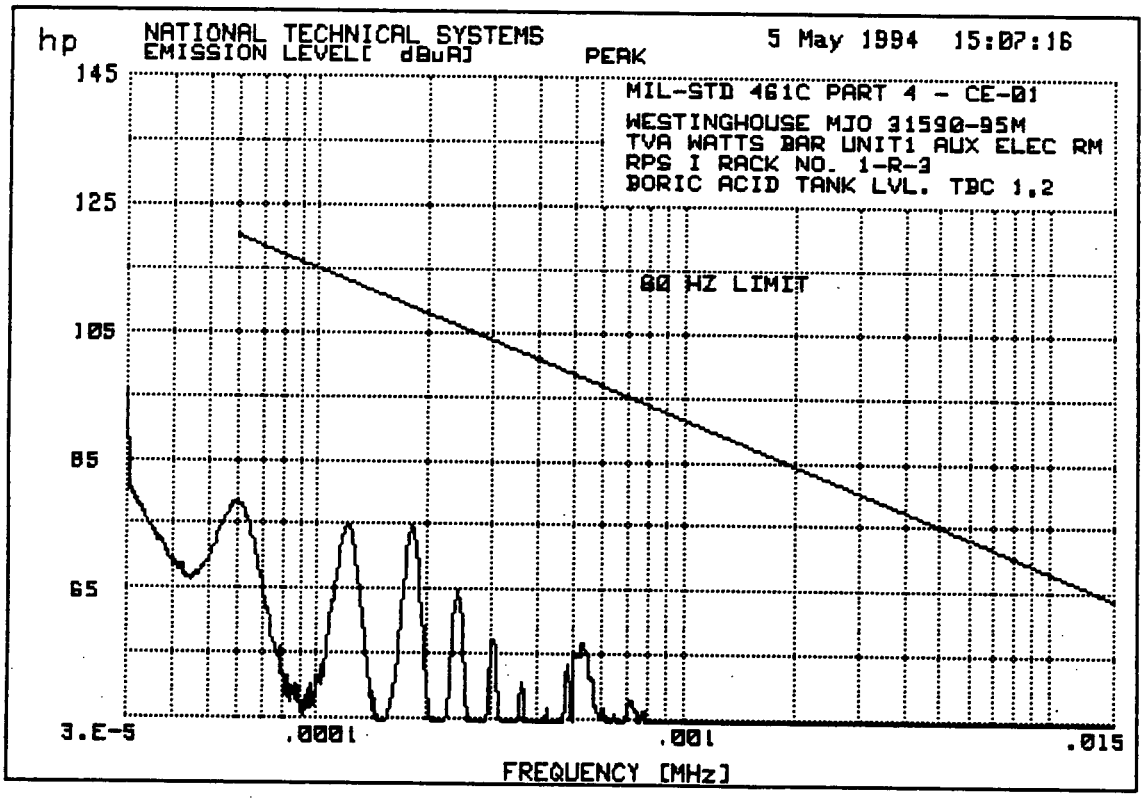
PEAK
5 May 1994 15:00:49
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-3
RWST LVL EXT.TANK TBD 1,2
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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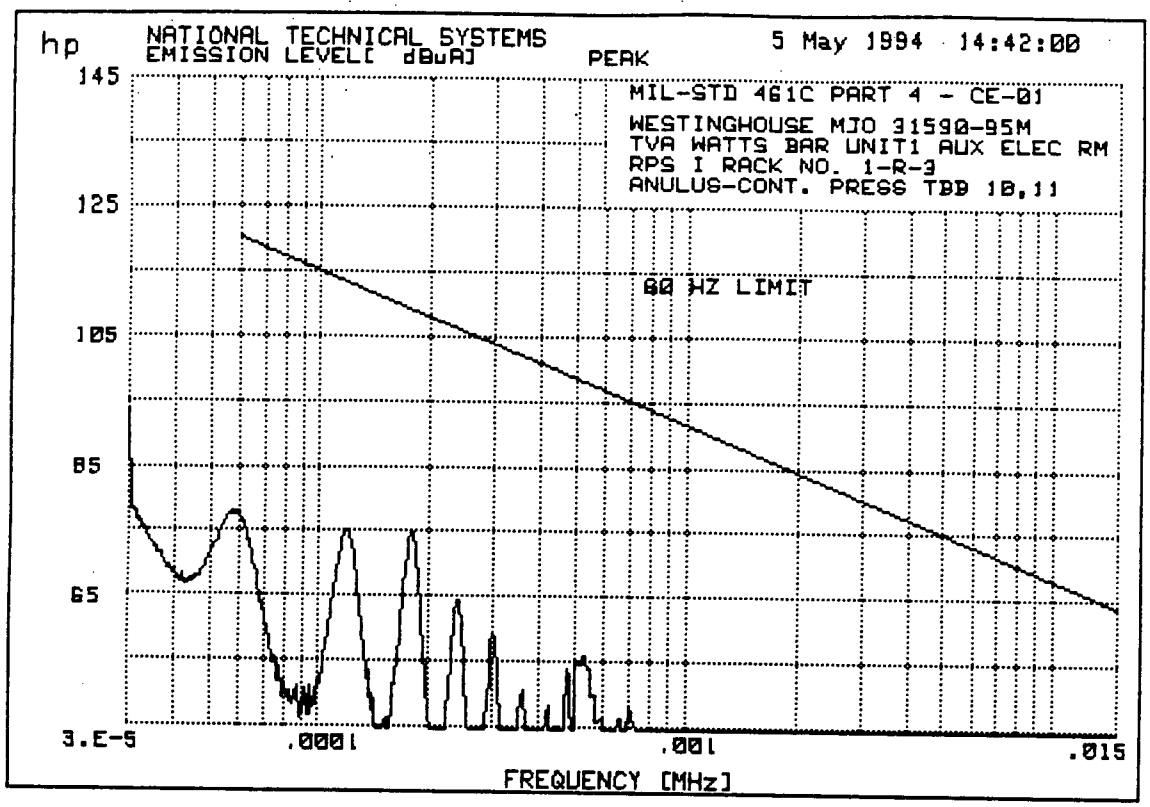
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
5 May 1994 15:07:16
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-3
BORIC ACID TANK LVL. TBC 1,2
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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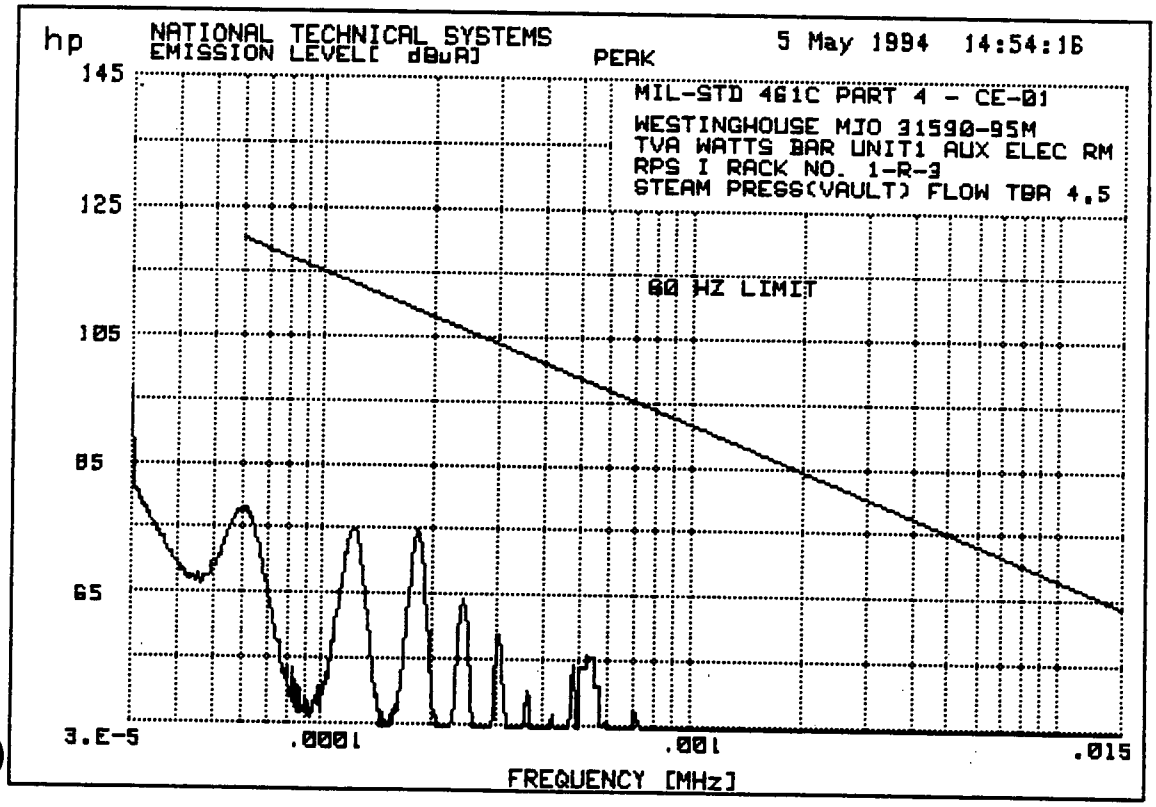
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
5 May 1994 14:42:00
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-3
ANULUS-CONT. PRESS TBD 10,11
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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EMISSION LEVEL[dBuA]
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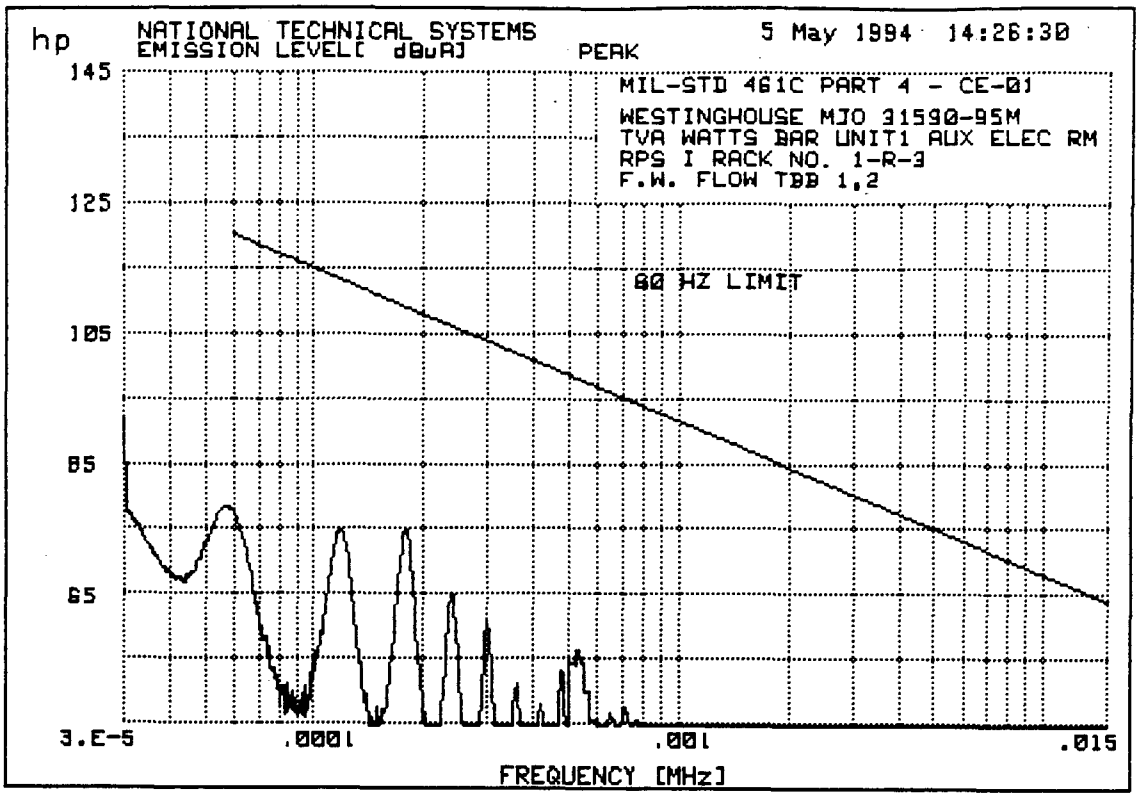
5 May 1994 14:54:16
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-3
STEAM PRESS(VAULT) FLOW TBR 4.5
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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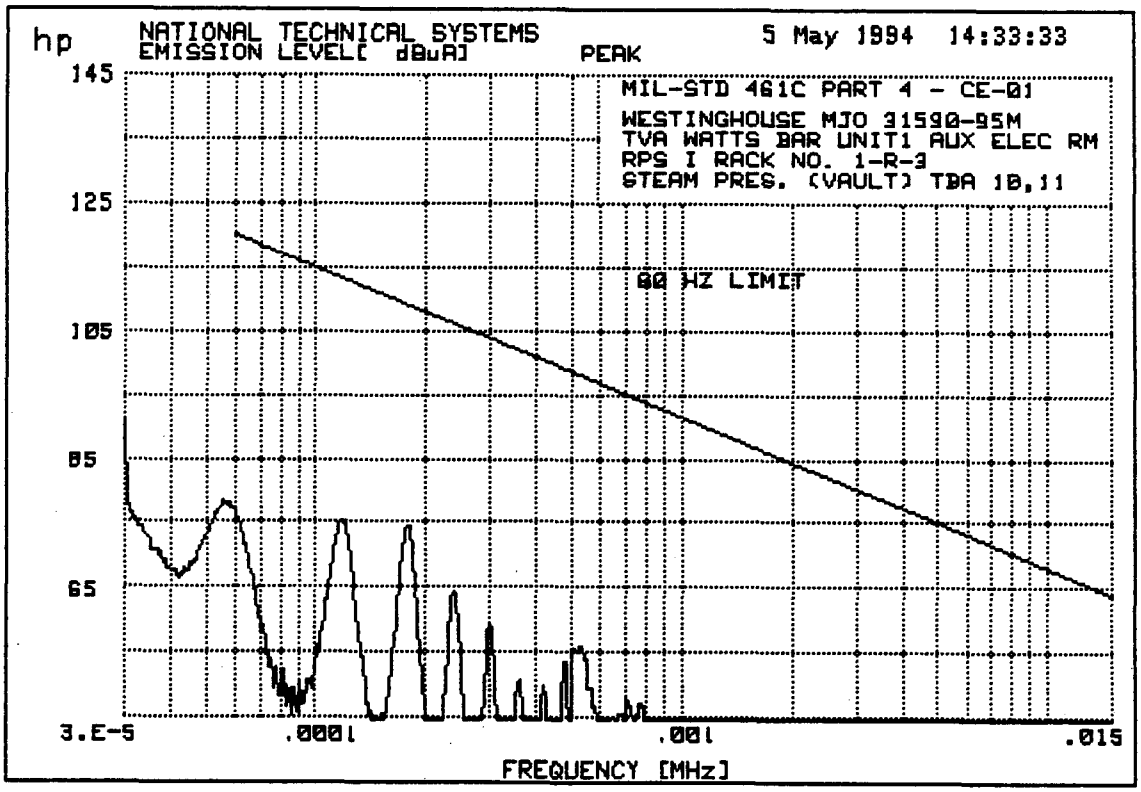
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
5 May 1994 14:26:30
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-3
F.W. FLOW TBB 1,2
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
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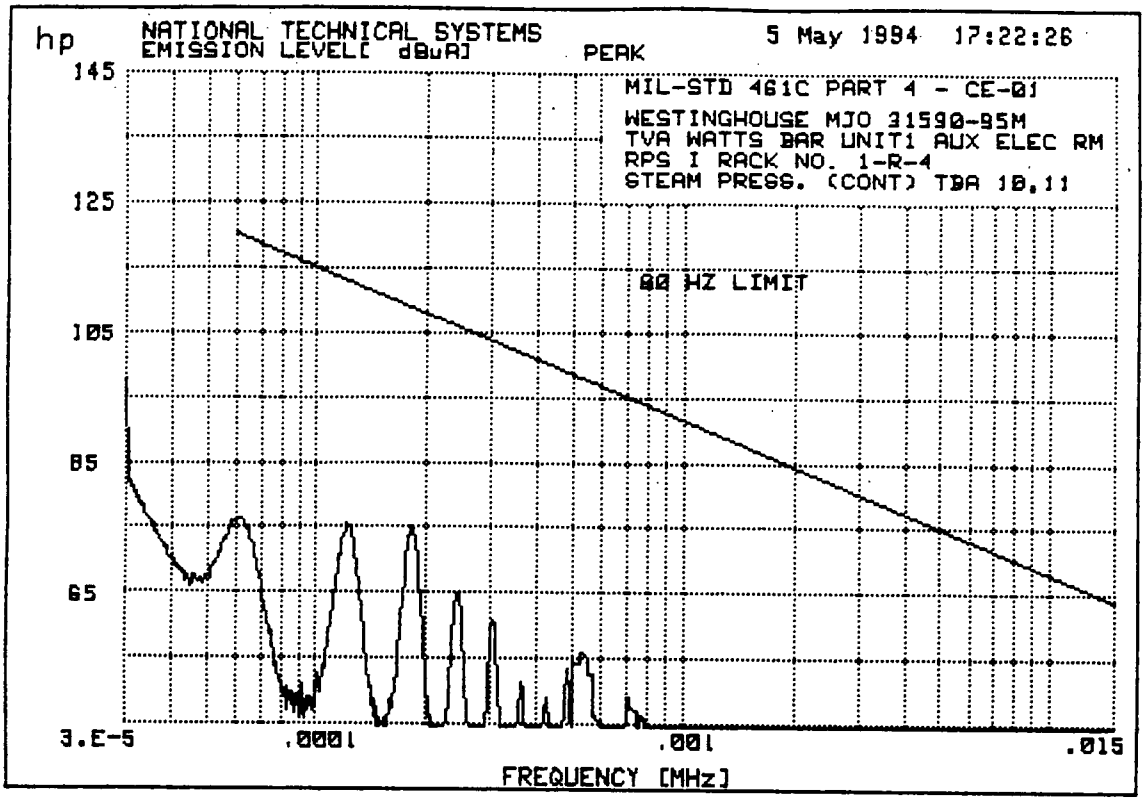
5 May 1994 14:33:33
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-3
STEAM PRES. (VAULT) TBA 10,11
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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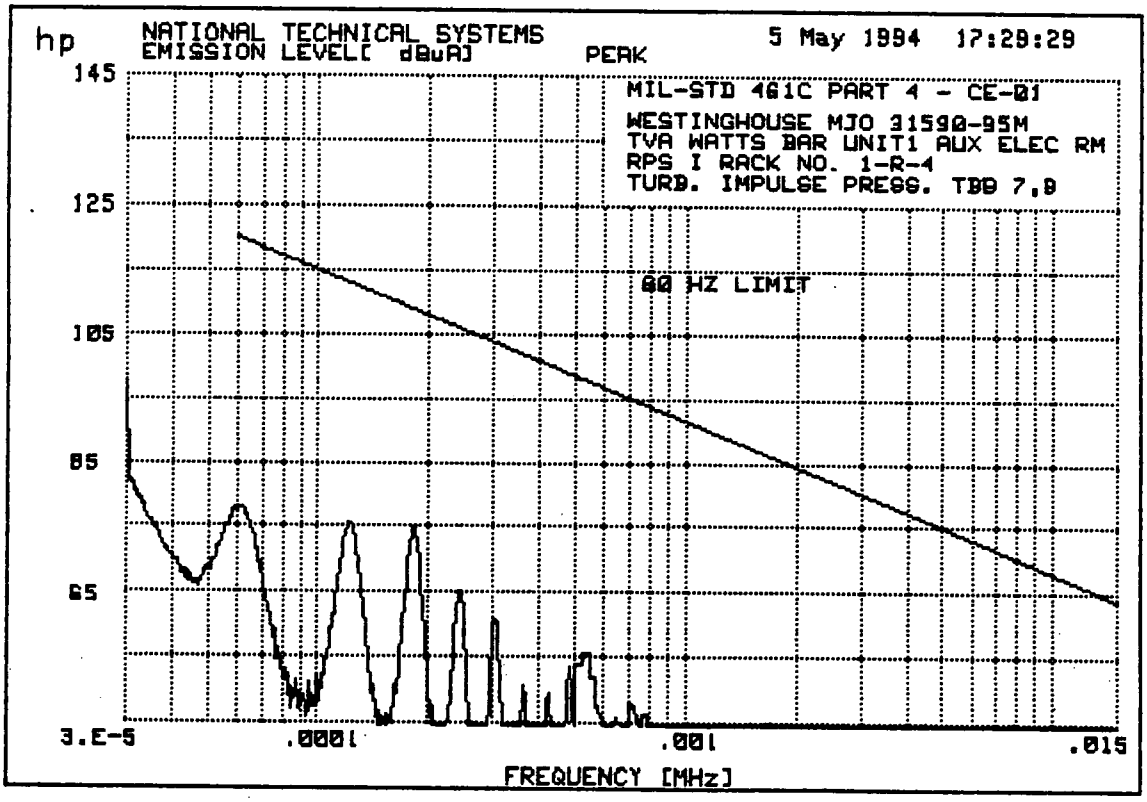
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
5 May 1994 17:22:26
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-4
STEAM PRESS. (CONT) TBA 10,11
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
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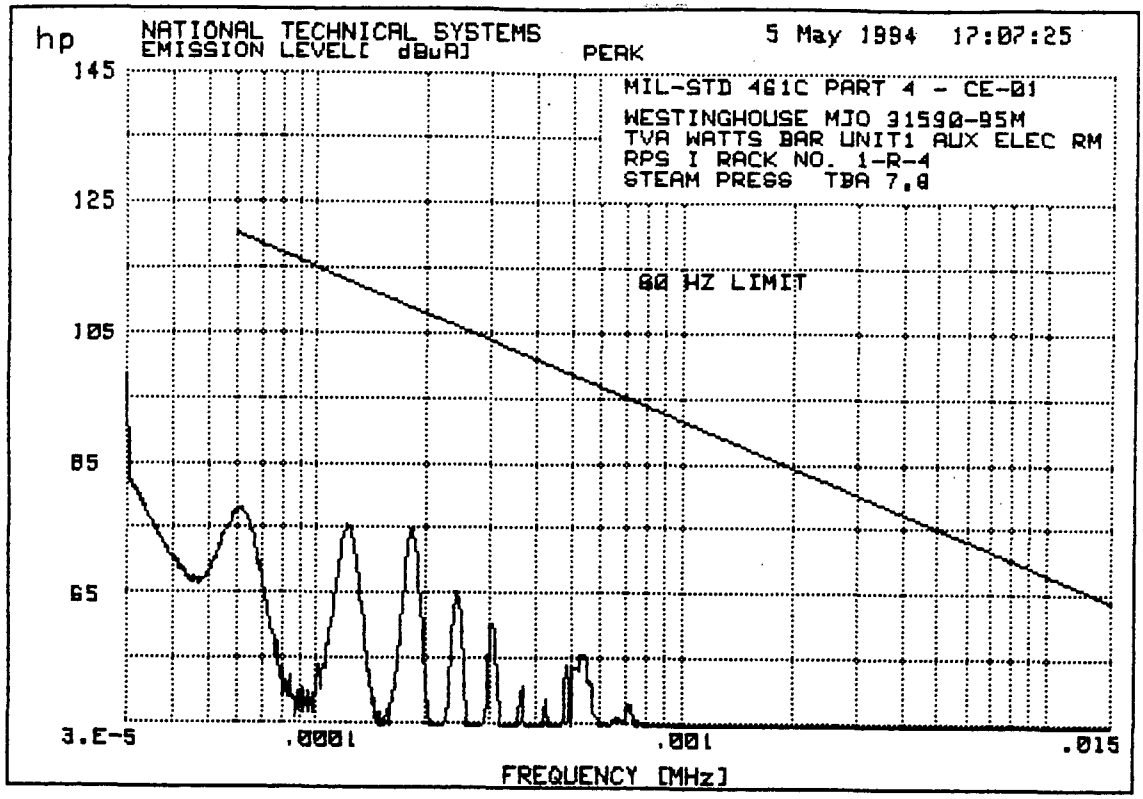
5 May 1994 17:28:29
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-4
TURB. IMPULSE PRESS. TBD 7,8
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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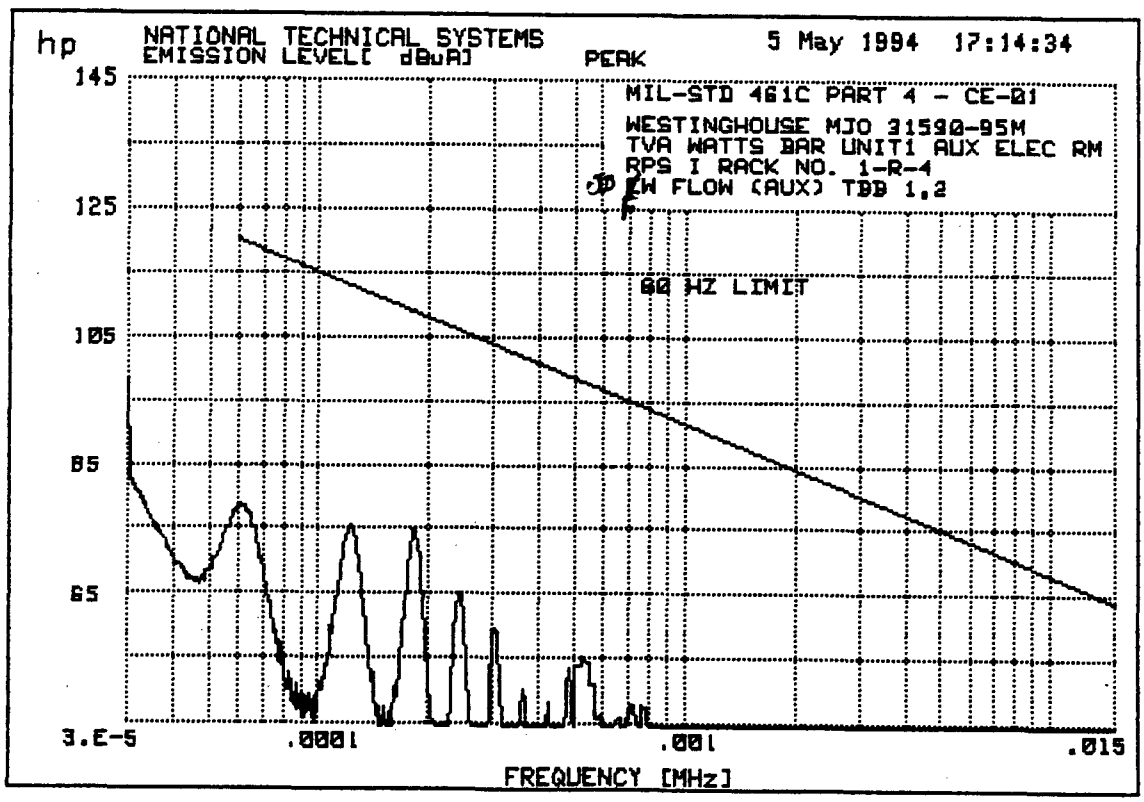
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
5 May 1994 17:07:25
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-4
STEAM PRESS TBA 7.8
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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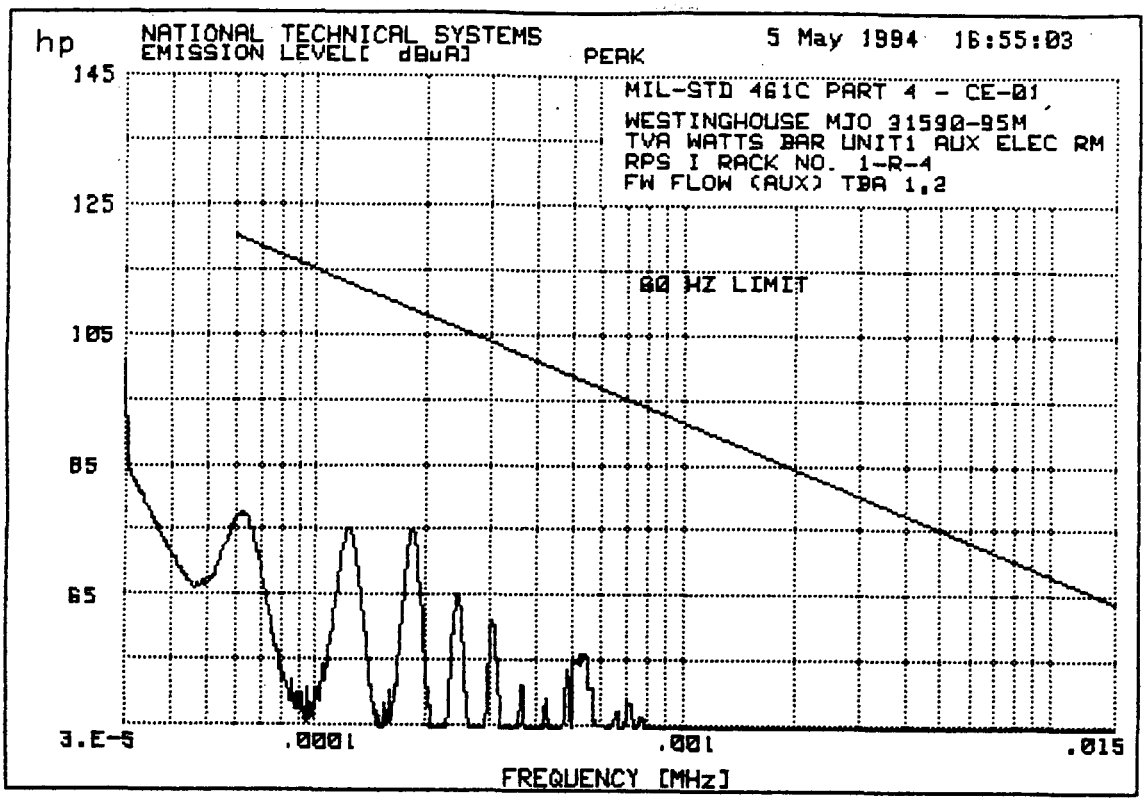
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
5 May 1994 17:14:34
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-4
CW FLOW (AUX) TBD 1.2
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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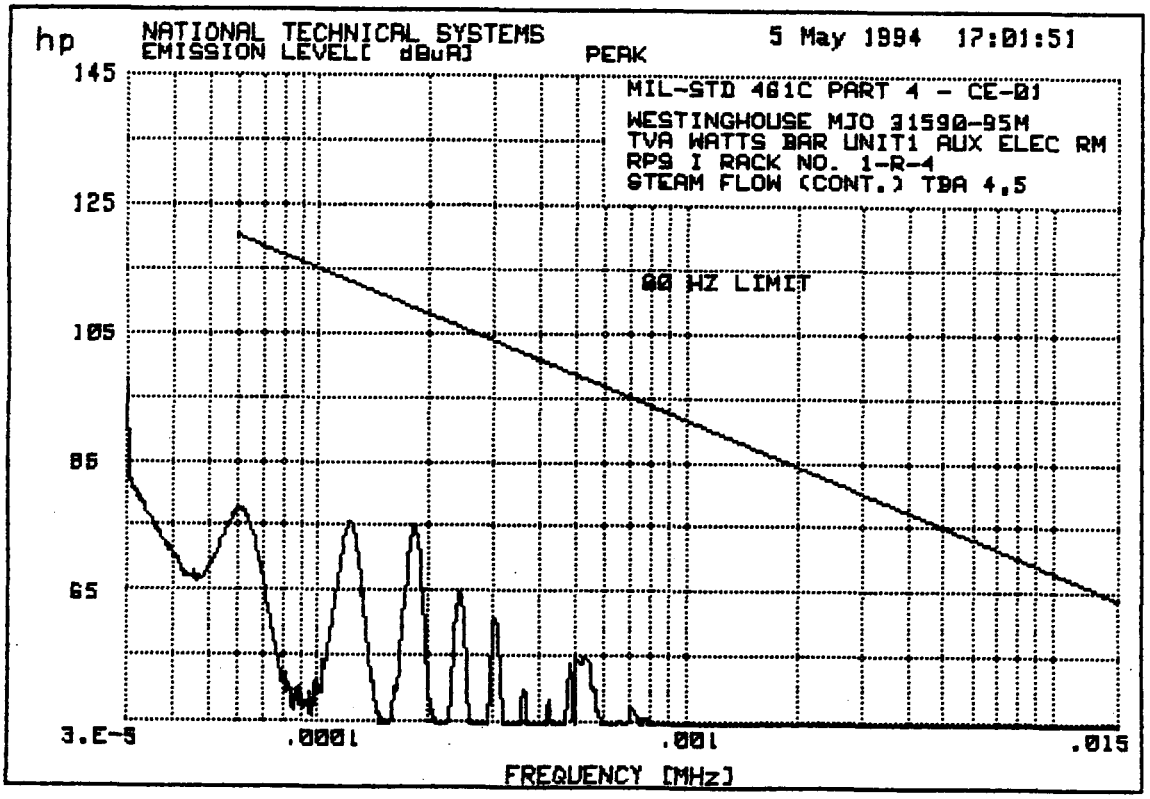
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
5 May 1994 16:55:03
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-4
FW FLOW (AUX) TBA 1,2
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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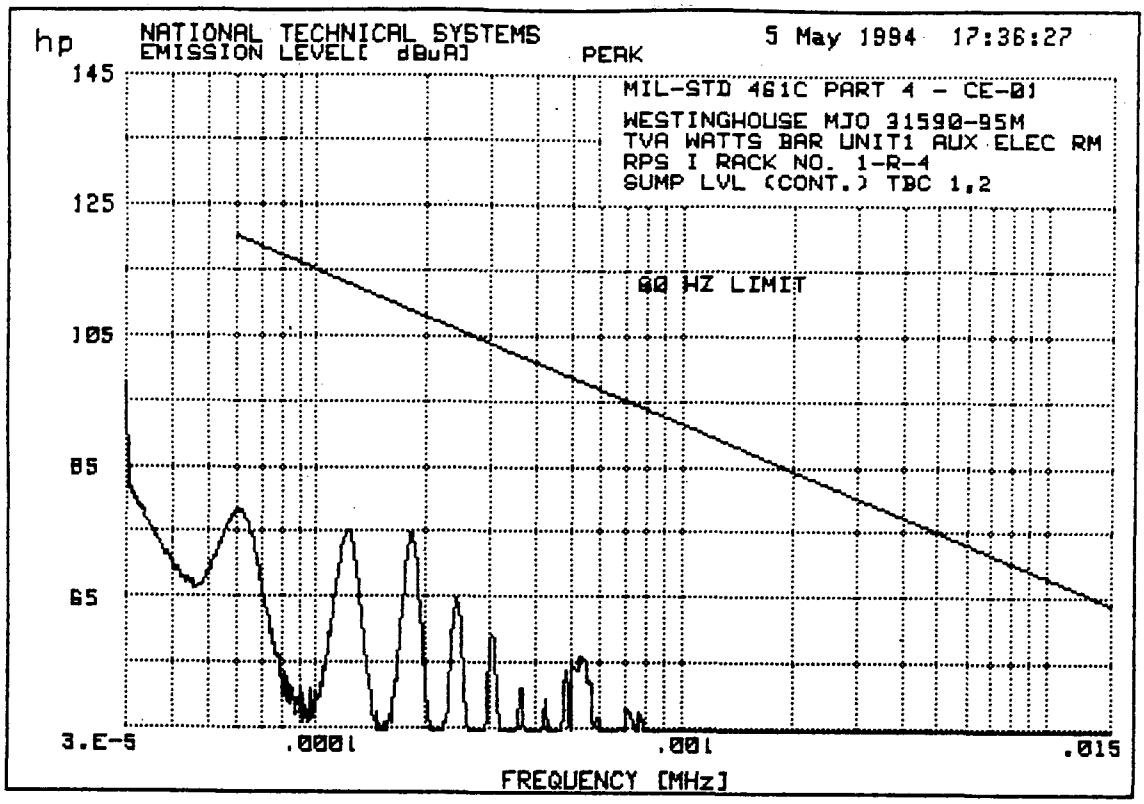
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
5 May 1994 17:01:51
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-4
STEAM FLOW (CONT.) TBA 4,5
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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EMISSION LEVEL[dBuA]
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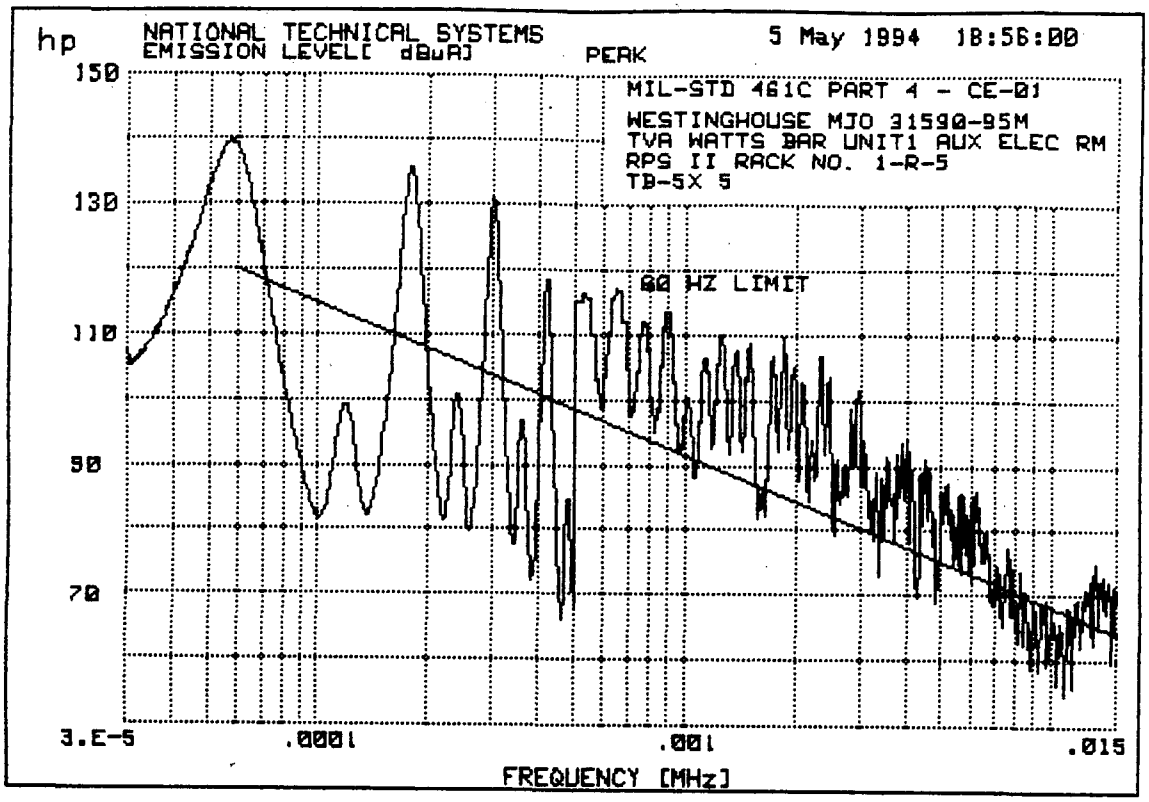
5 May 1994 17:36:27
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-4
SUMP LVL (CONT.) TBC 1,2
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
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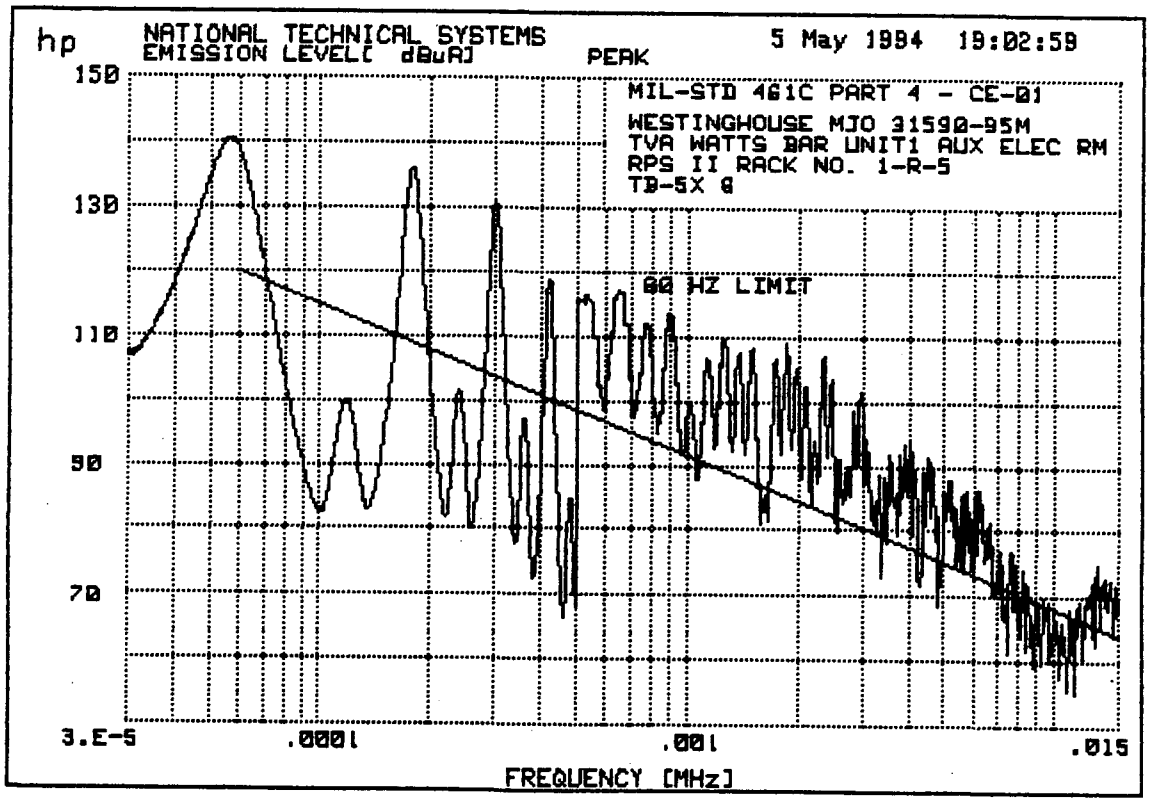
5 May 1994 18:56:00
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-5
TB-5X 5
60 HZ LIMIT
150
130
110
90
70
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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EMISSION LEVEL[dBuA]
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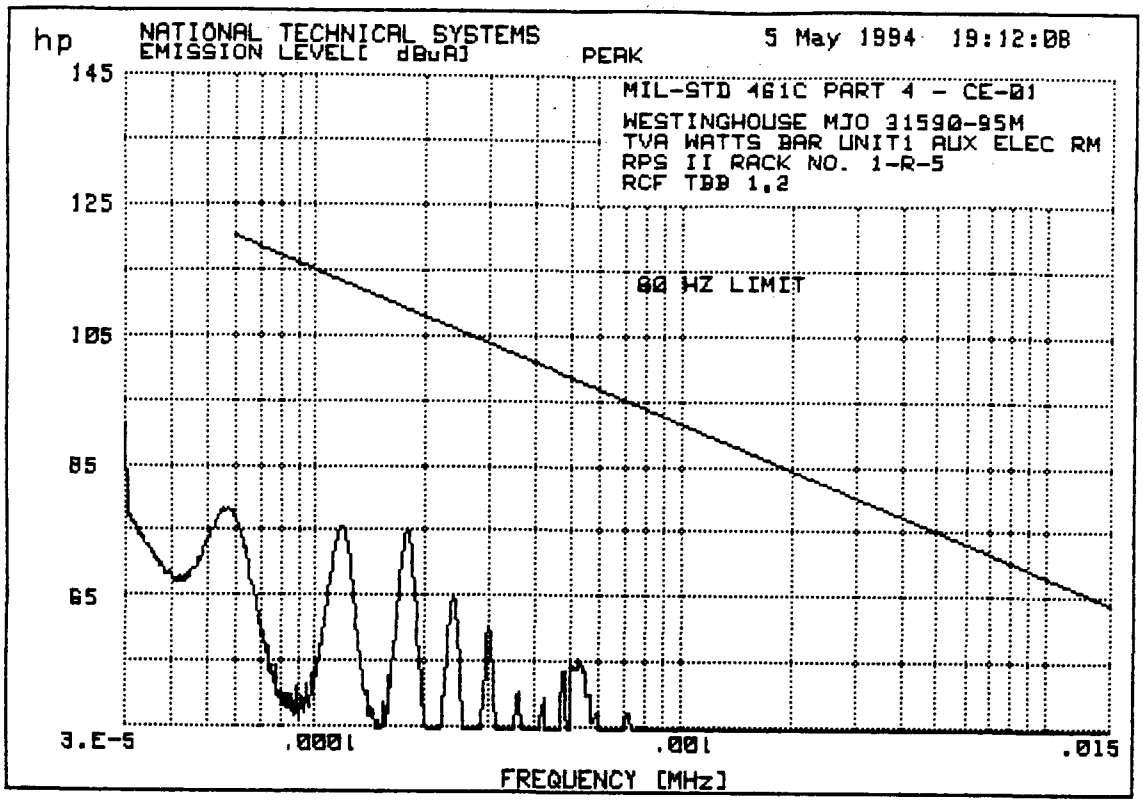
5 May 1994 19:02:59
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-5
TB-5X 6
60 HZ LIMIT
150
130
110
90
70
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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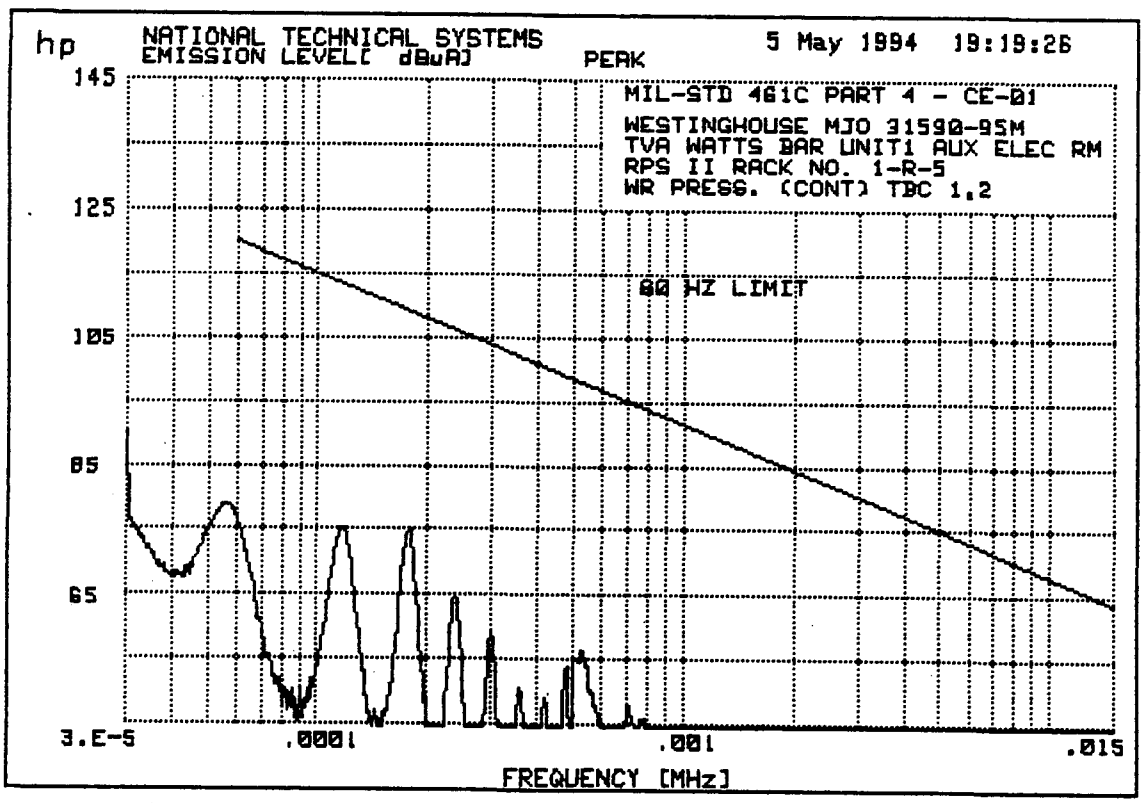
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
5 May 1994 19:12:08
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-5
RCF TBD 1.2
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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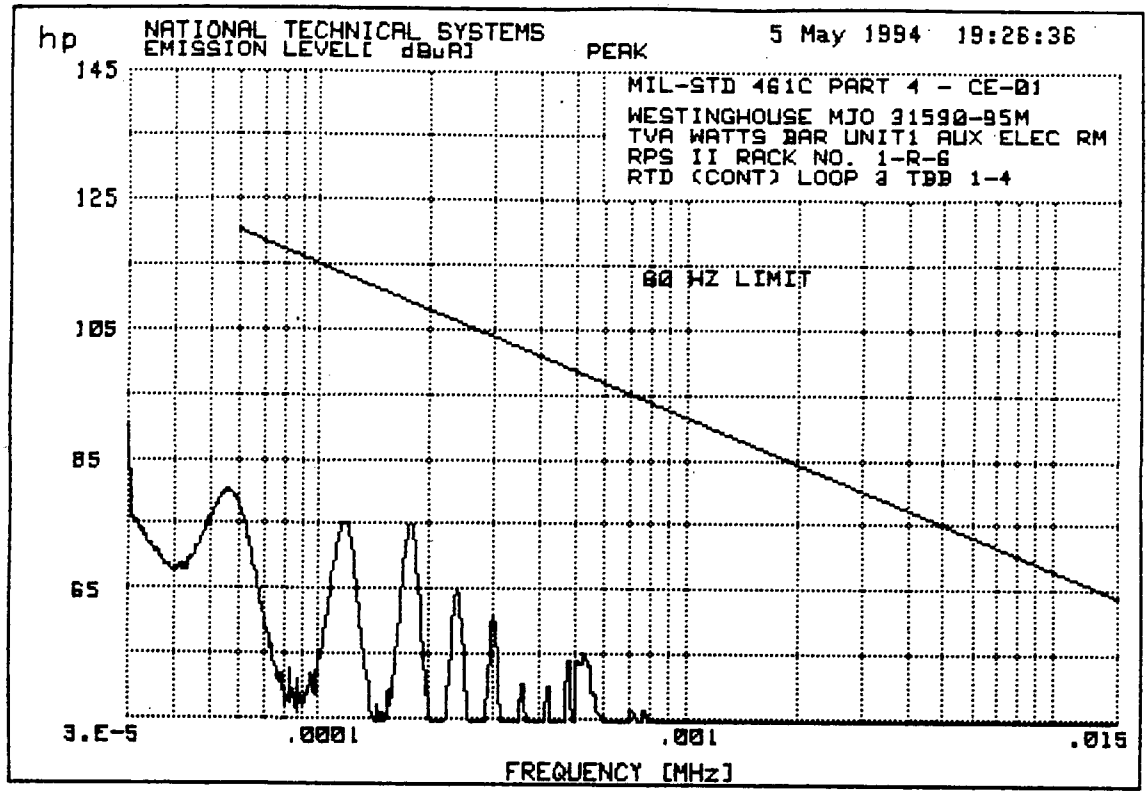
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
5 May 1994 19:19:26
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-5
WR PRESS. (CONT) TBC 1.2
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
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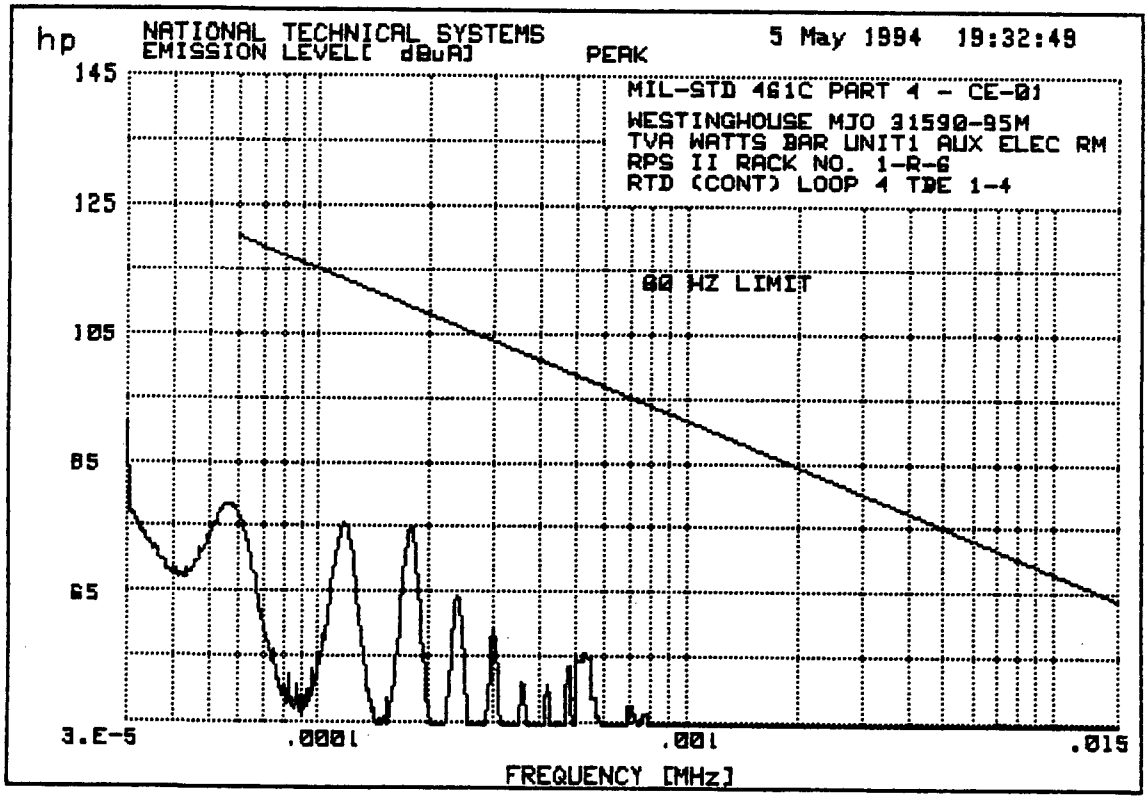
5 May 1994 19:26:36
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-6
RTD (CONT) LOOP 3 TBB 1-4
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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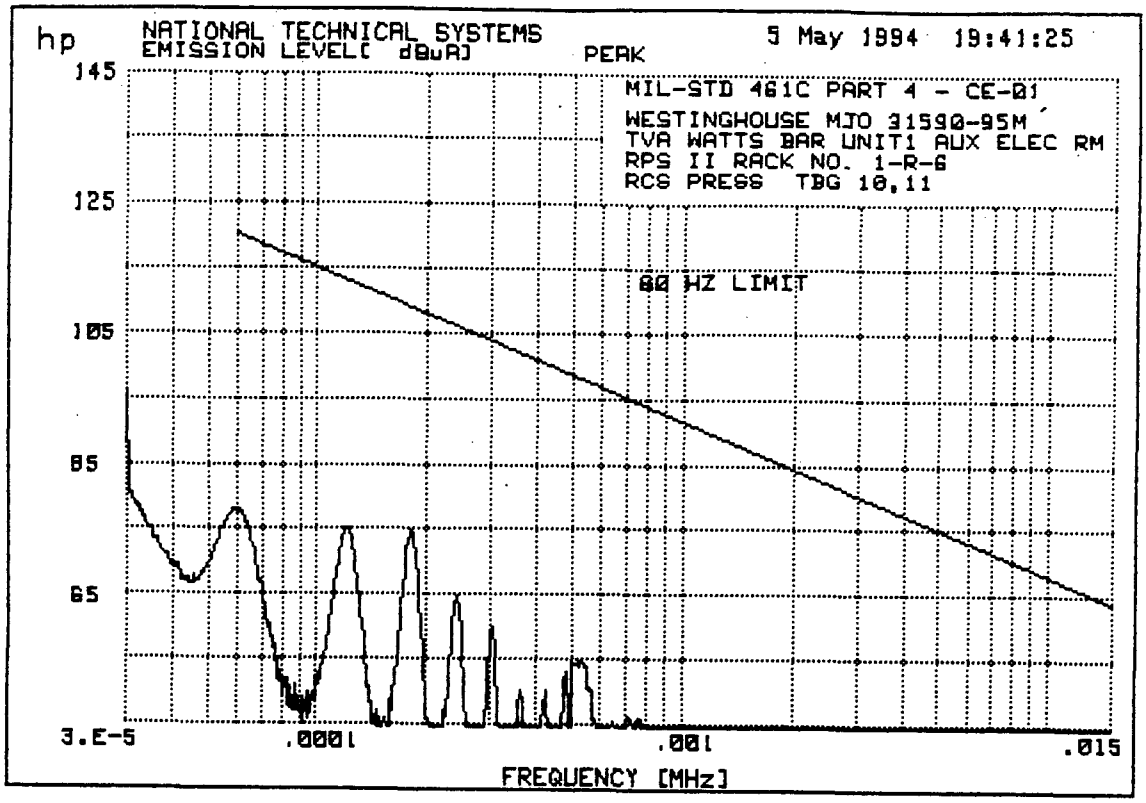
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
5 May 1994 19:32:49
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-6
RTD (CONT) LOOP 4 TBE 1-4
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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EMISSION LEVEL[dBuA]
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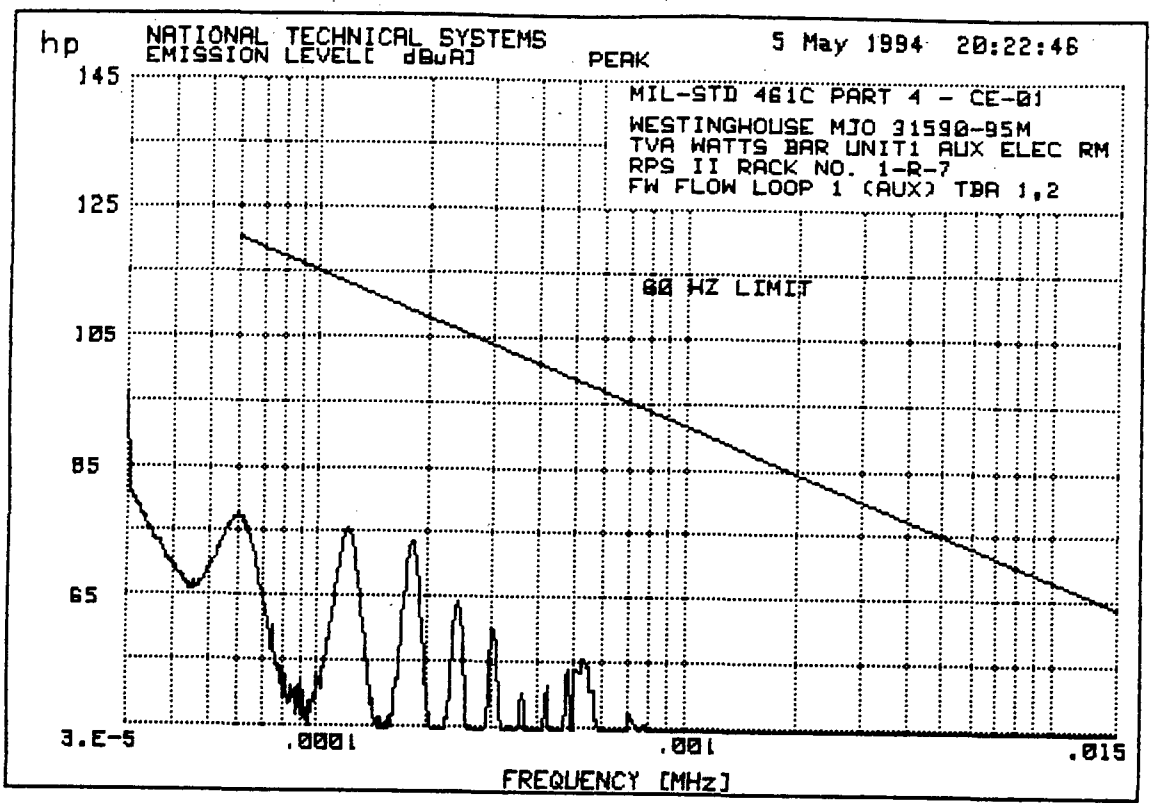
5 May 1994 19:41:25
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-6
RCS PRESS TBG 10,11
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
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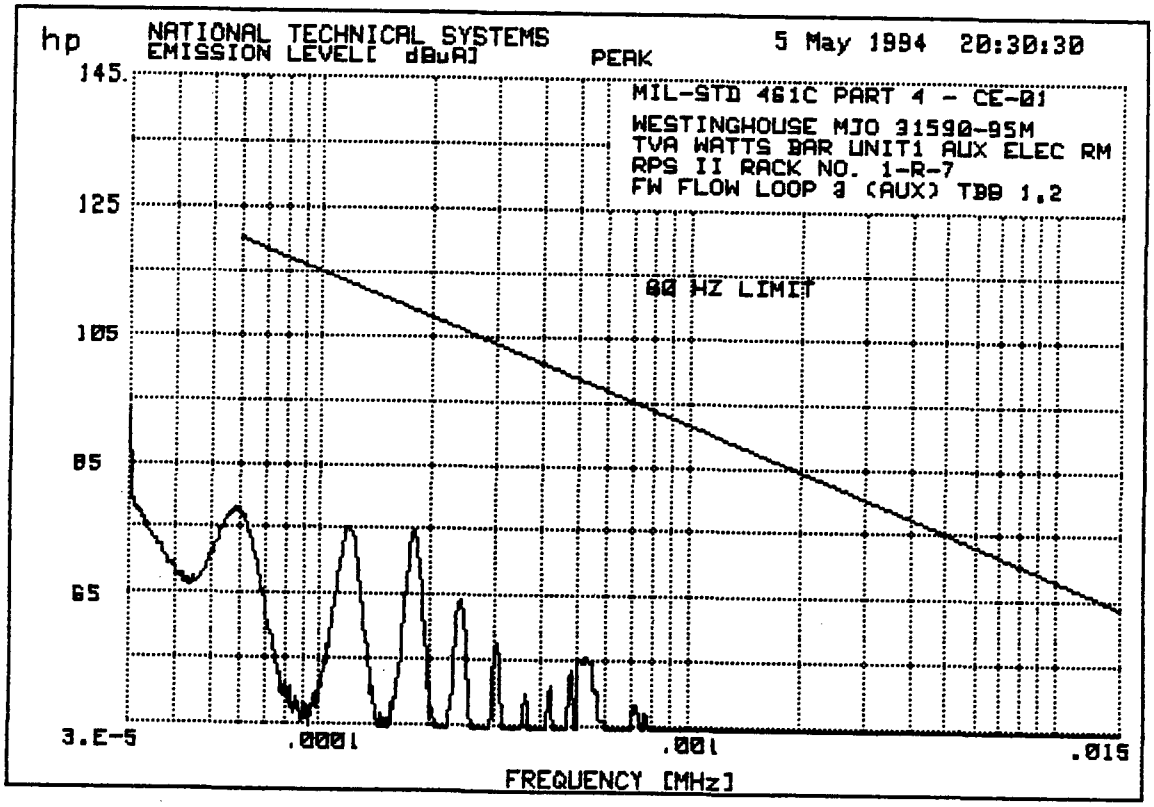
5 May 1994 20:22:46
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-7
FW FLOW LOOP 1 (AUX) TBA 1,2
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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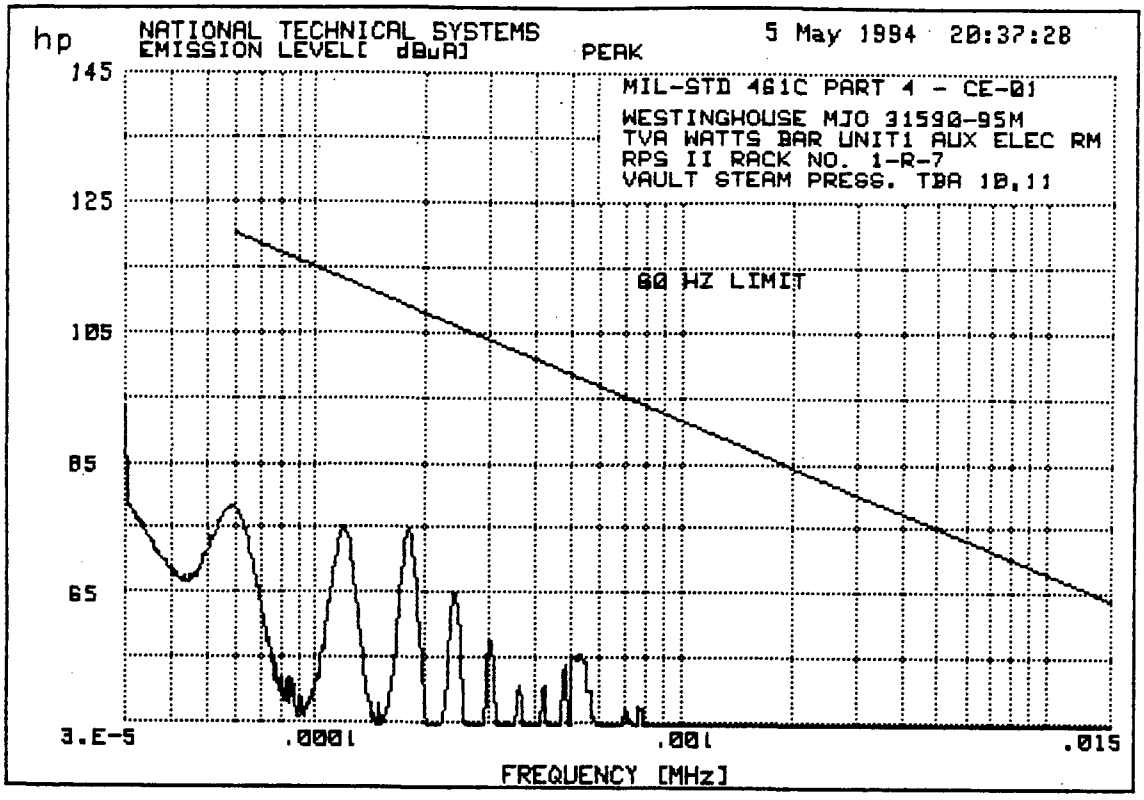
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
5 May 1994 20:30:30
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-7
FW FLOW LOOP 3 (AUX) TBB 1,2
60 HZ LIMIT
145.
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
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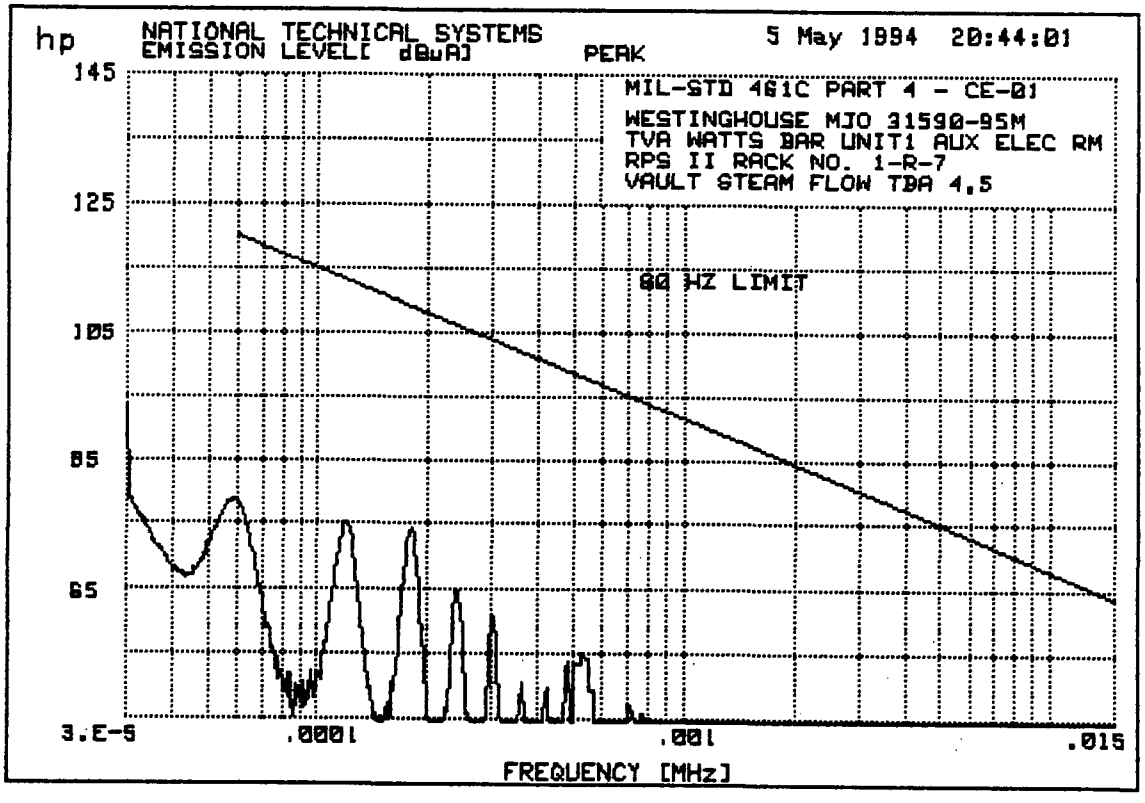
5 May 1994 20:37:28
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-7
VAULT STEAM PRESS. TBA 10,11
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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EMISSION LEVEL[dBuA]
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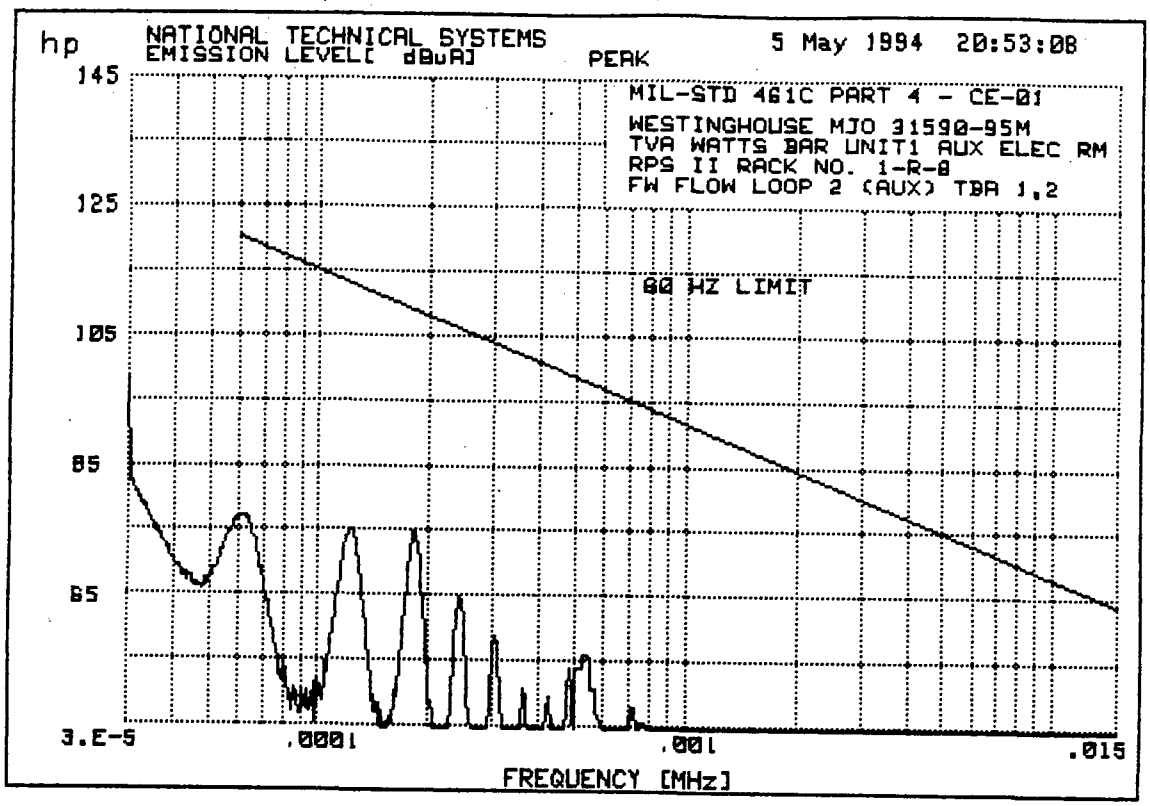
5 May 1994 20:44:01
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-7
VAULT STEAM FLOW TBA 4,5
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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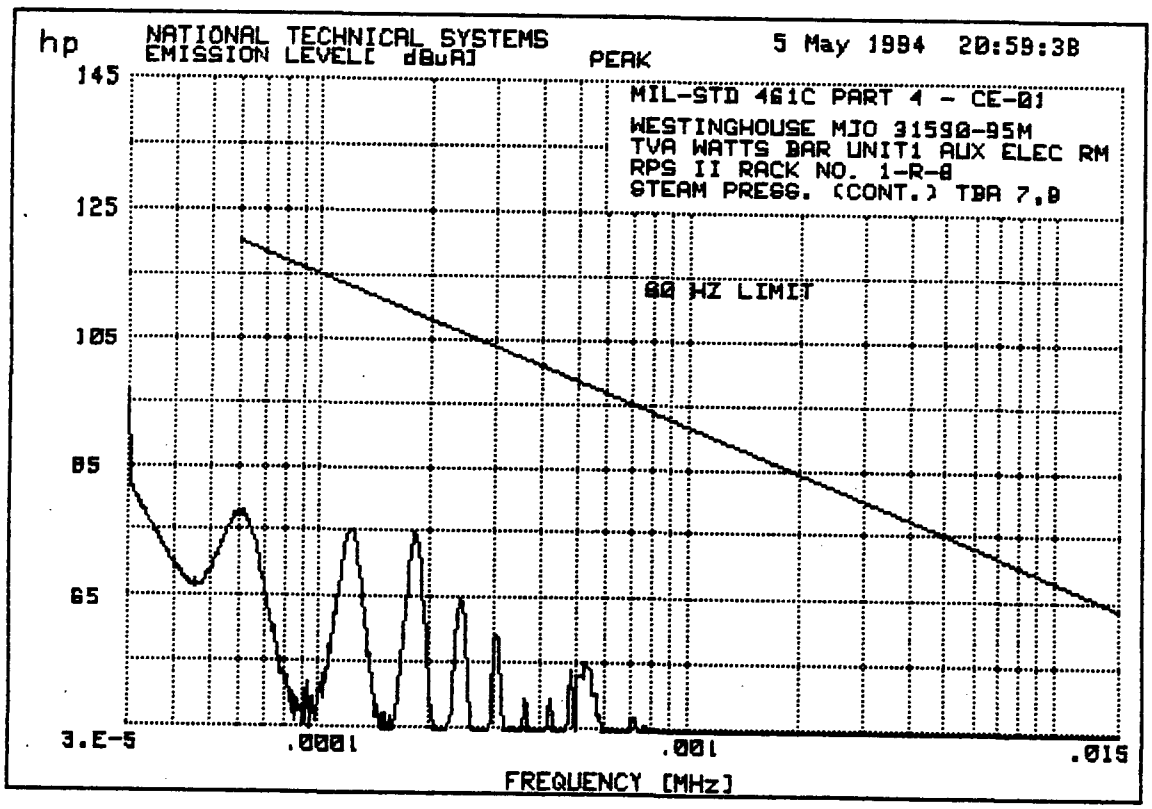
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
5 May 1994 20:53:08
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-8
FW FLOW LOOP 2 (AUX) TBA 1,2
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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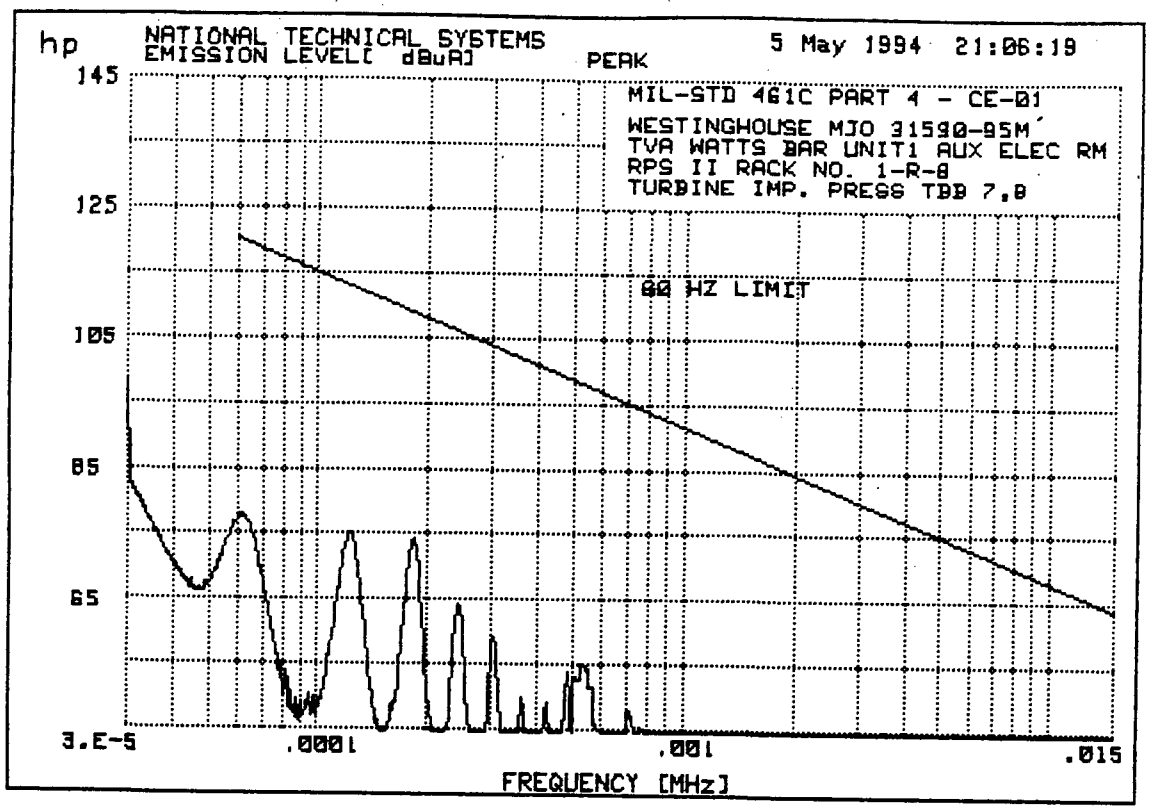
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
5 May 1994 20:59:38
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-8
STEAM PRESS. (CONT.) TBA 7,8
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]

CB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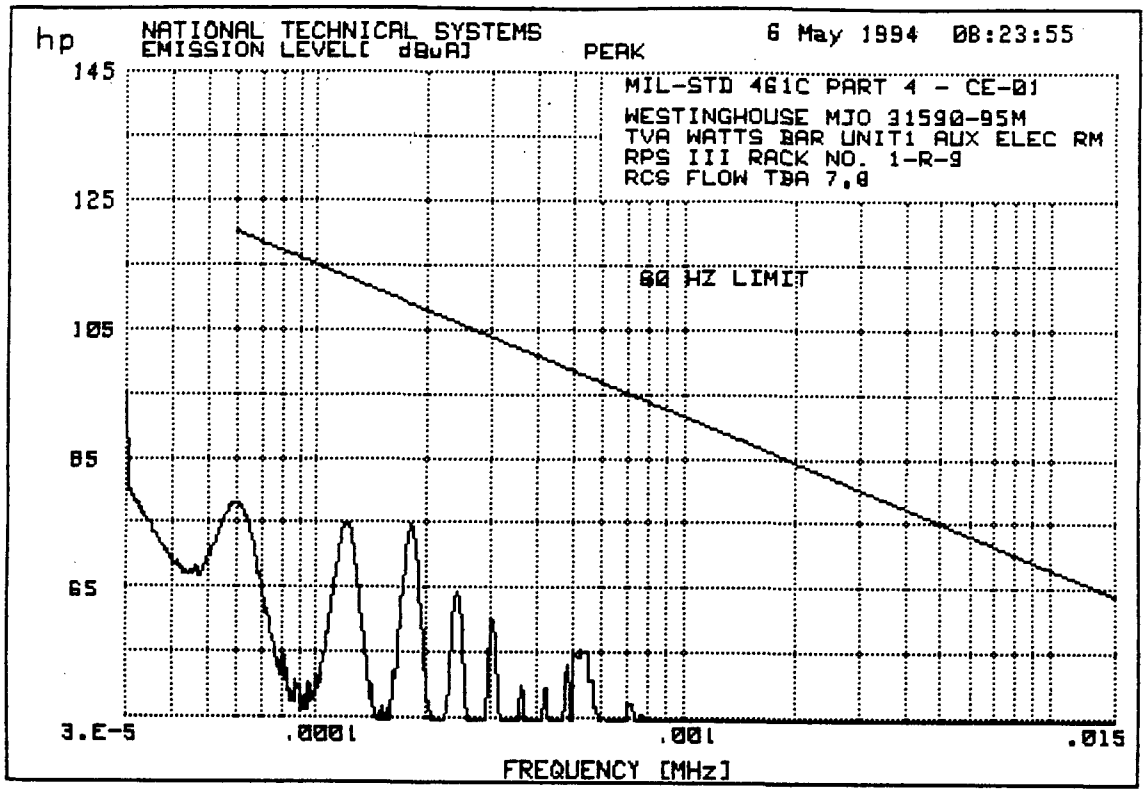
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVELS dBuA]
PEAK
5 May 1994 21:06:19
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-8
TURBINE IMP. PRESS TBB 7,8
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]

CB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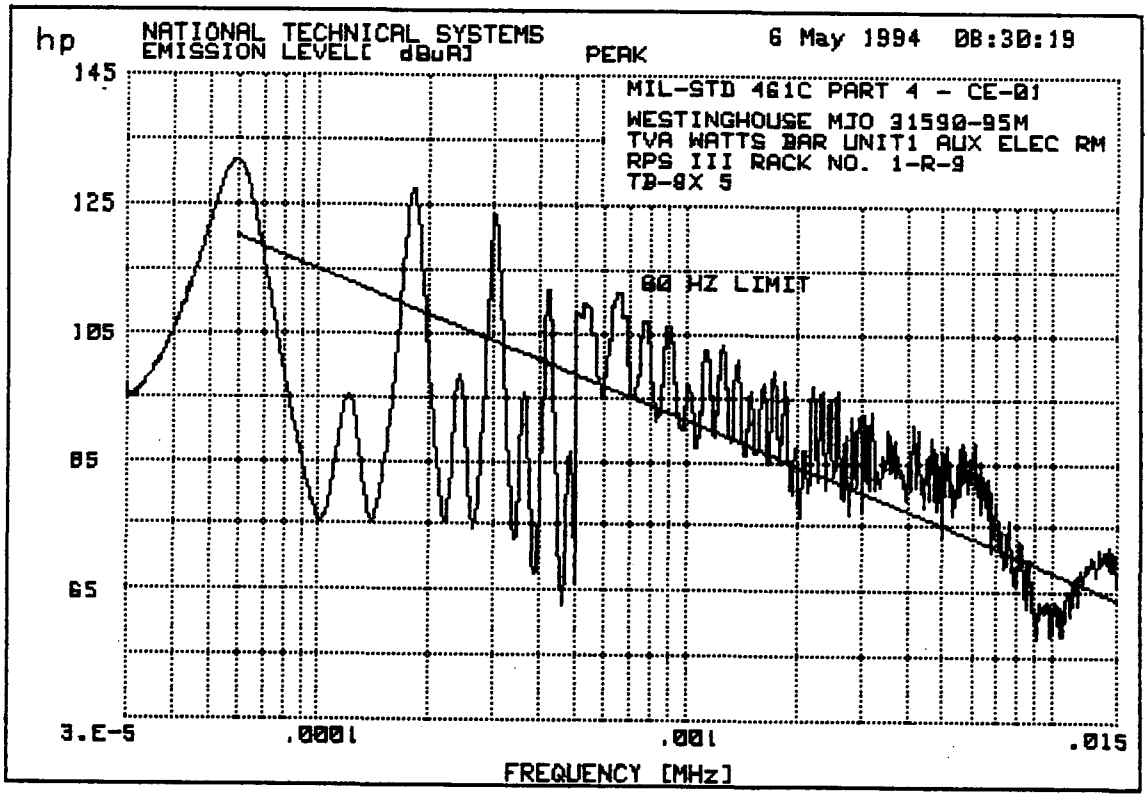
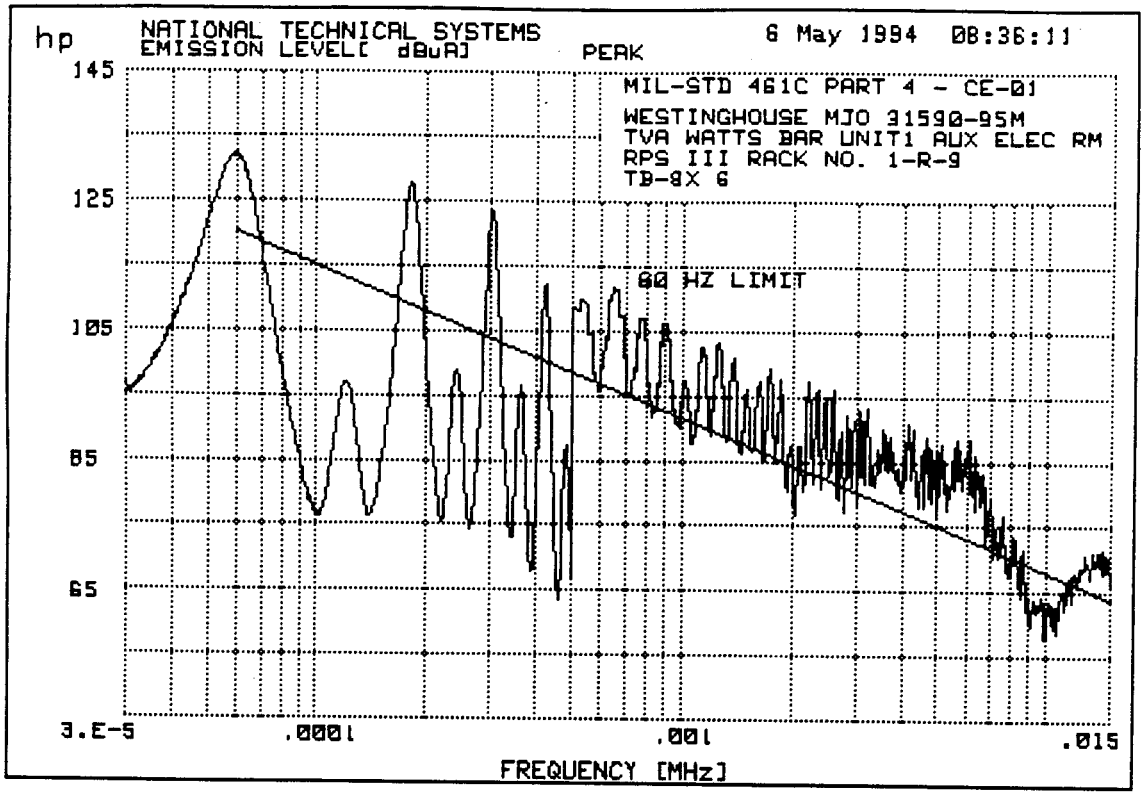
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
6 May 1994 08:23:55
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-9
RCS FLOW TBA 7.8
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
6 May 1994 08:30:19
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-9
TB-9X 5
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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EMISSION LEVEL[dBuA]
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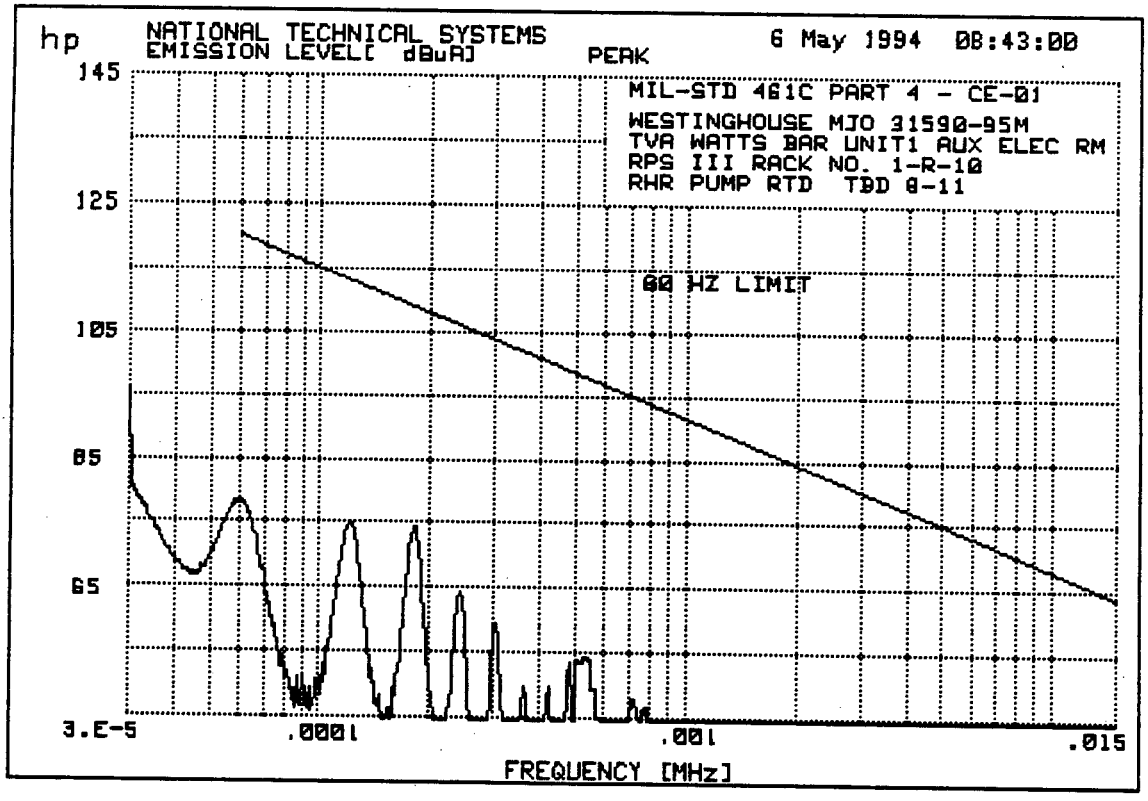
6 May 1994 08:36:11
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-9
TB-9X 6
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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EMISSION LEVEL[dBuA]
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6 May 1994 08:43:00
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-10
RHR PUMP RTD TBD 8-11
60 HZ LIMIT
145
125
105
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65
3.E-5
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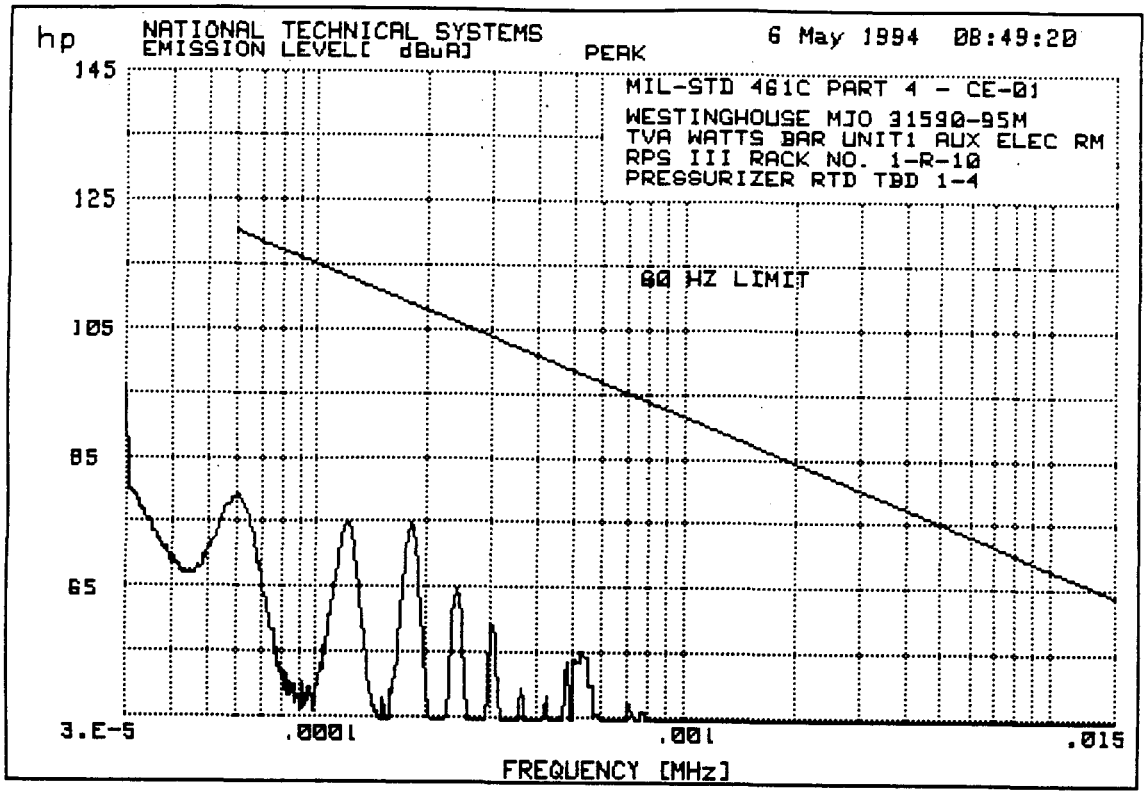
.001
.015
FREQUENCY [MHz]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EMISSION LEVEL[dBuA]
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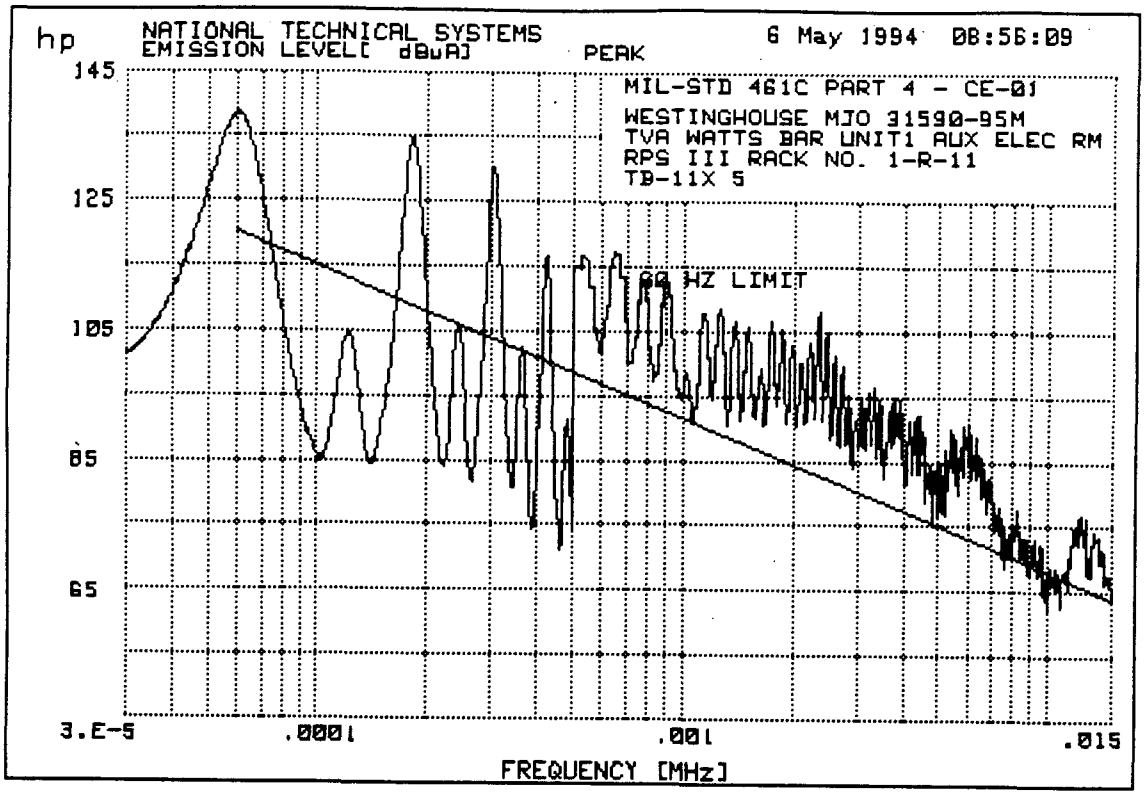
6 May 1994 08:49:20
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-10
PRESSURIZER RTD TBD 1-4
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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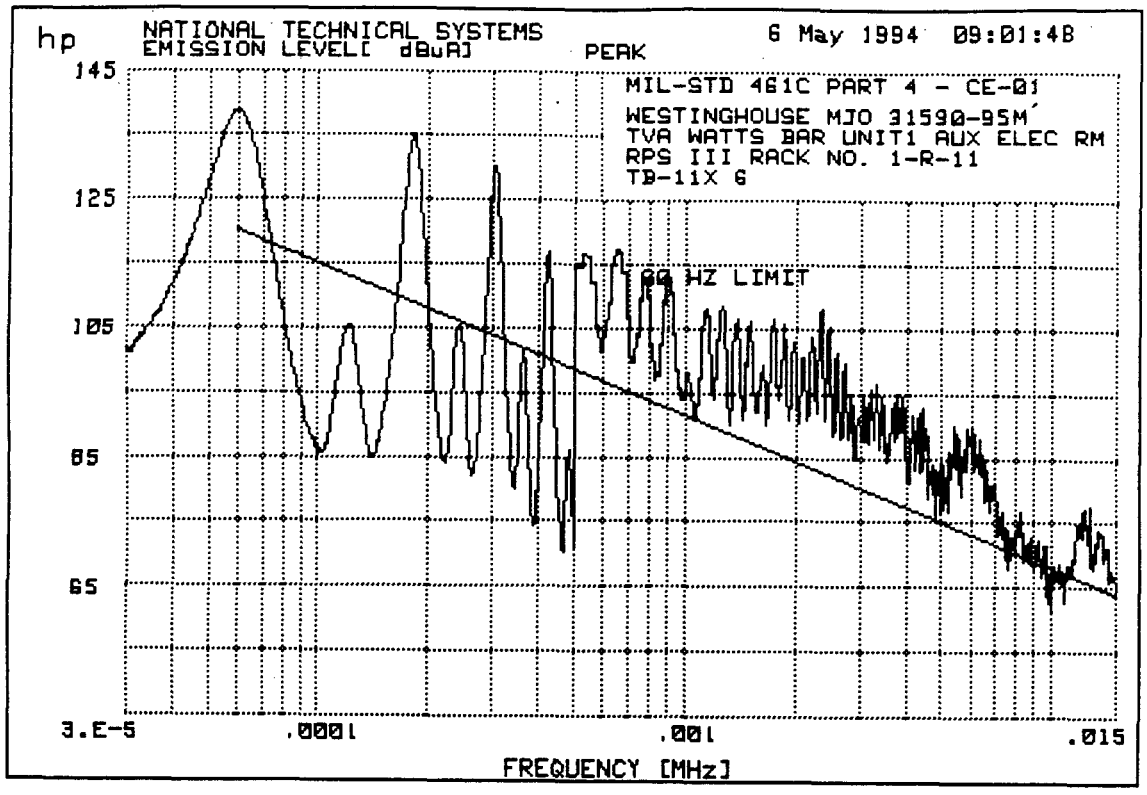
EMISSION LEVEL[dBuA]
PEAK
6 May 1994 08:56:09
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-11
TB-11X 5
145
125
105
85
65
HZ LIMIT
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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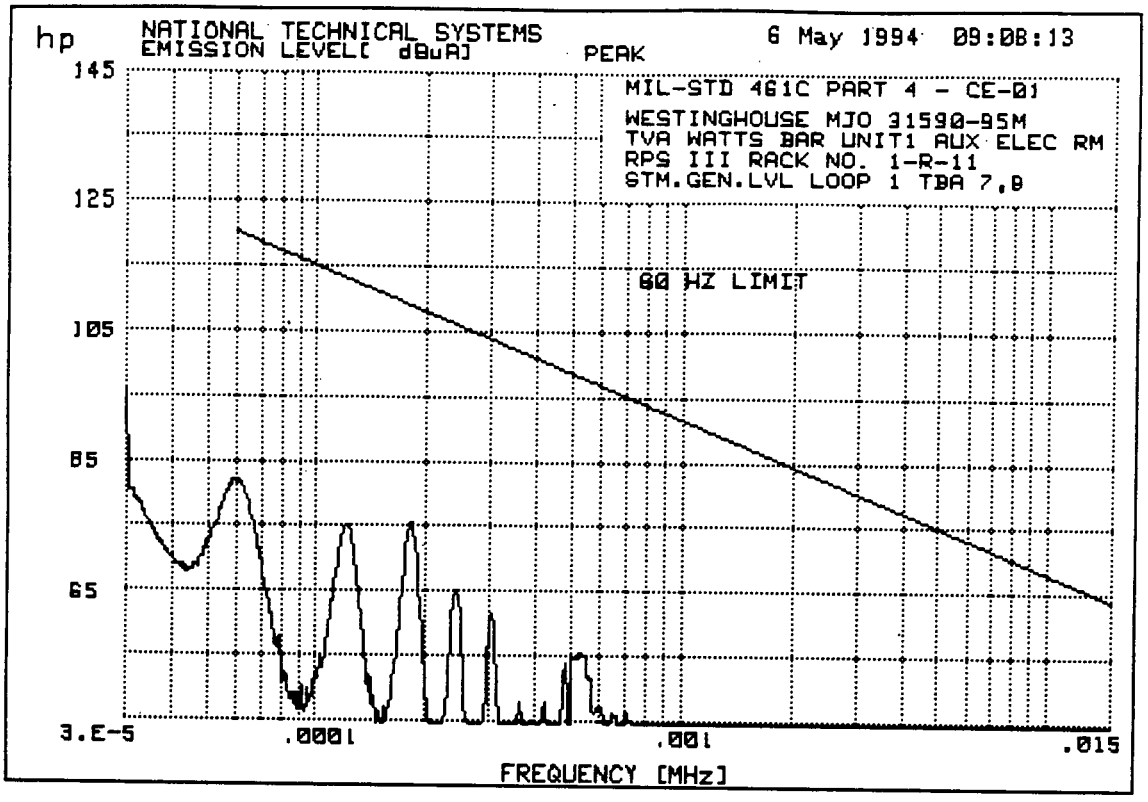
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
6 May 1994 09:01:48
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-11
TB-11X 6
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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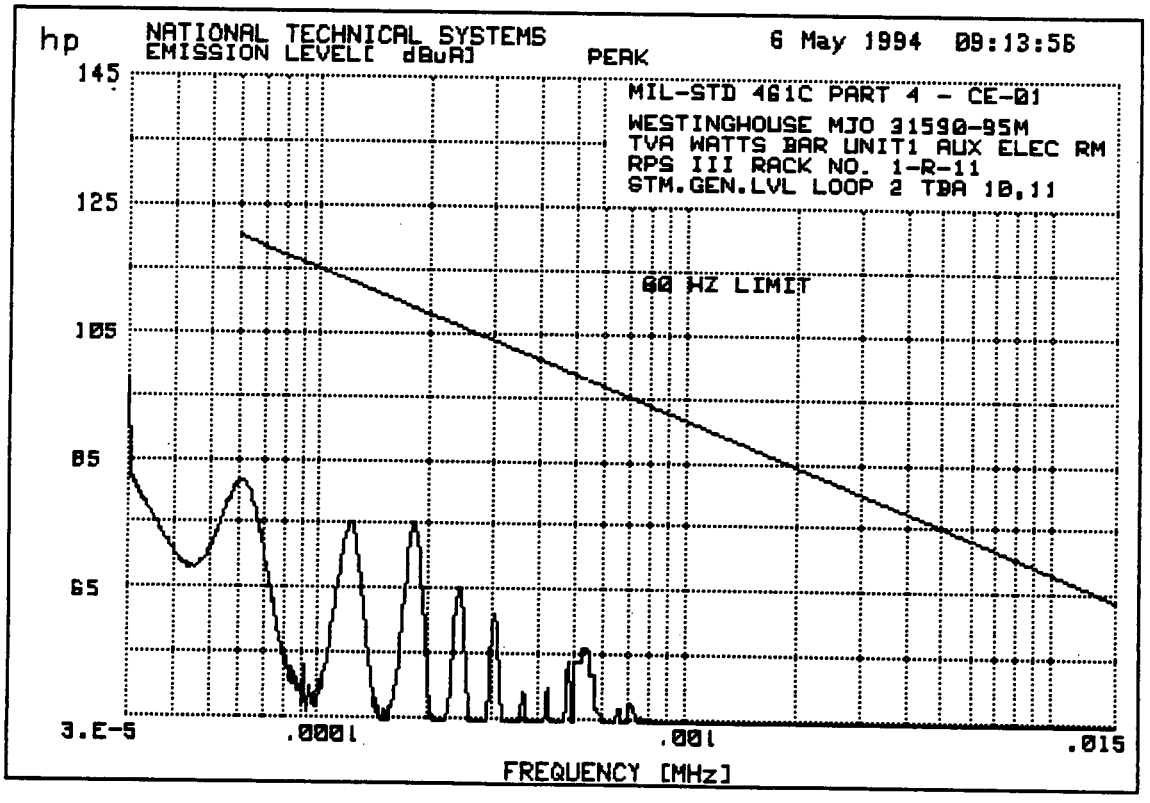
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
6 May 1994 09:08:13
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-11
STM.GEN.LVL LOOP 1 TBA 7,8
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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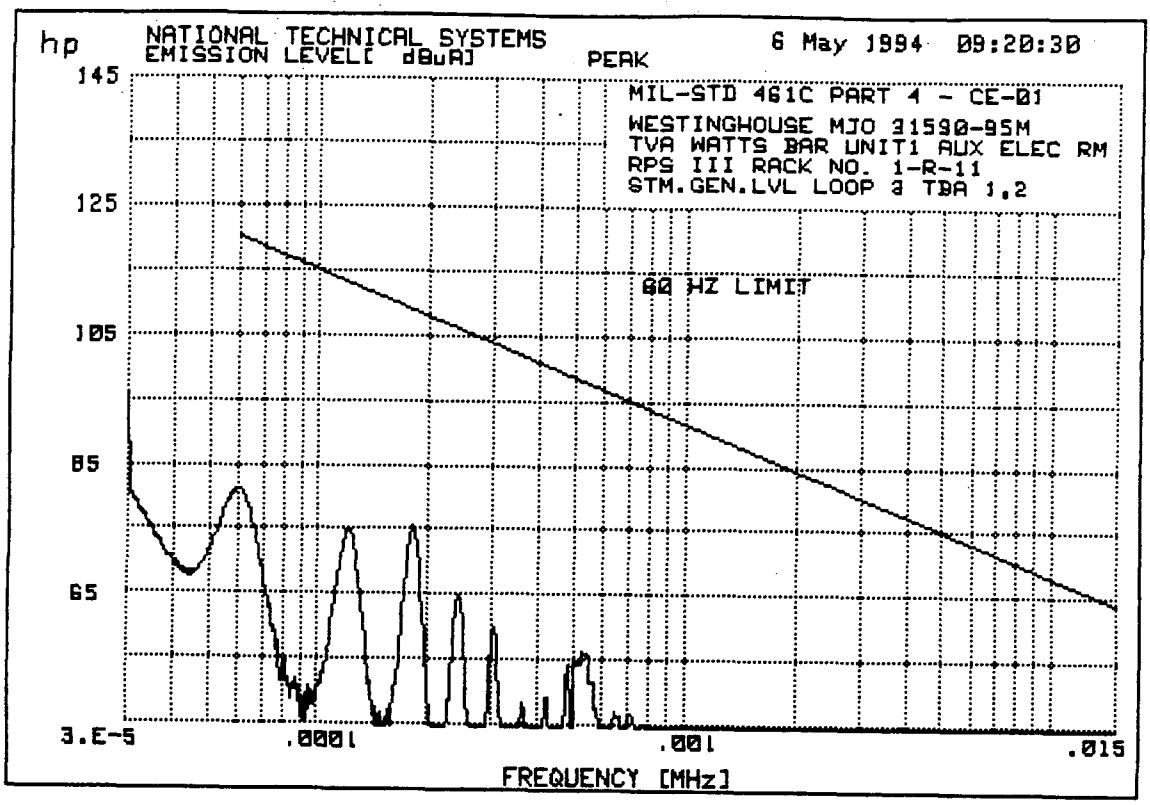
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
6 May 1994 09:13:56
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-11
STM.GEN.LVL LOOP 2 TBA 10,11
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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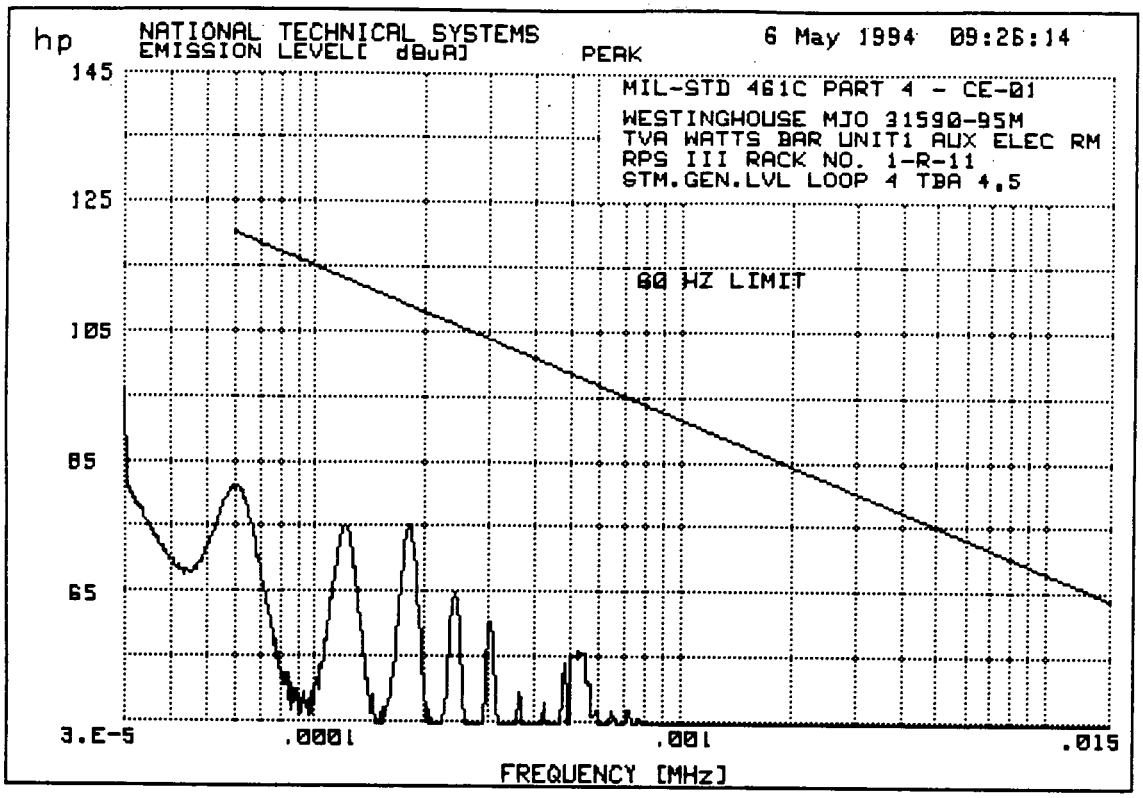
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
6 May 1994 09:20:30
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-11
STM.GEN.LVL LOOP 3 TDA 1,2
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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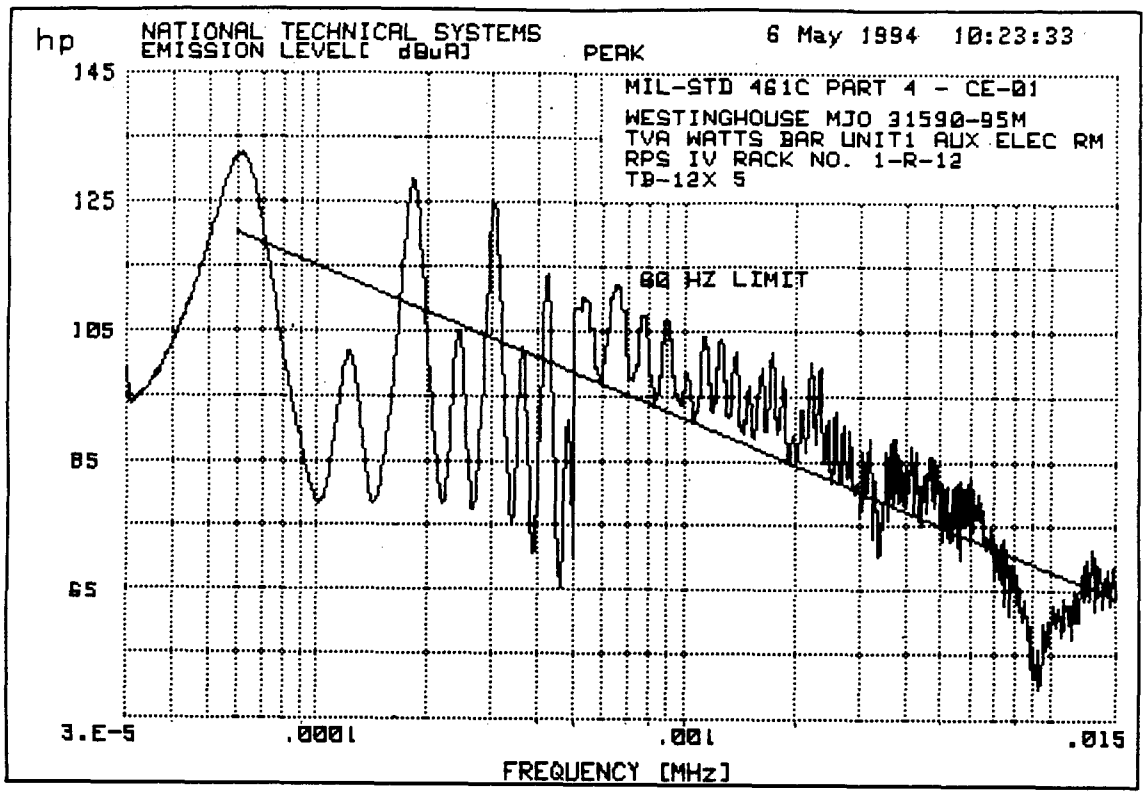
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
6 May 1994 09:26:14
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-11
STM.GEN.LVL LOOP 4 TBA 4,5
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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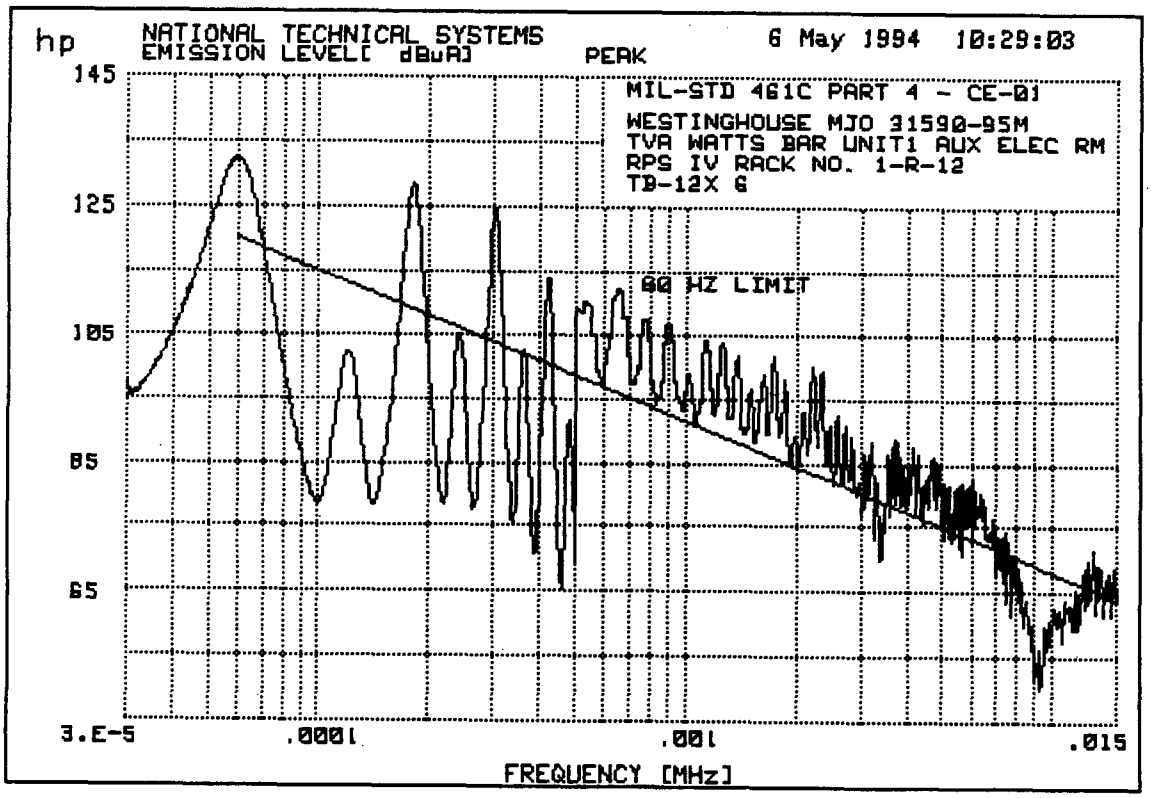
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
6 May 1994 10:23:33
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-12
TB-12X 5
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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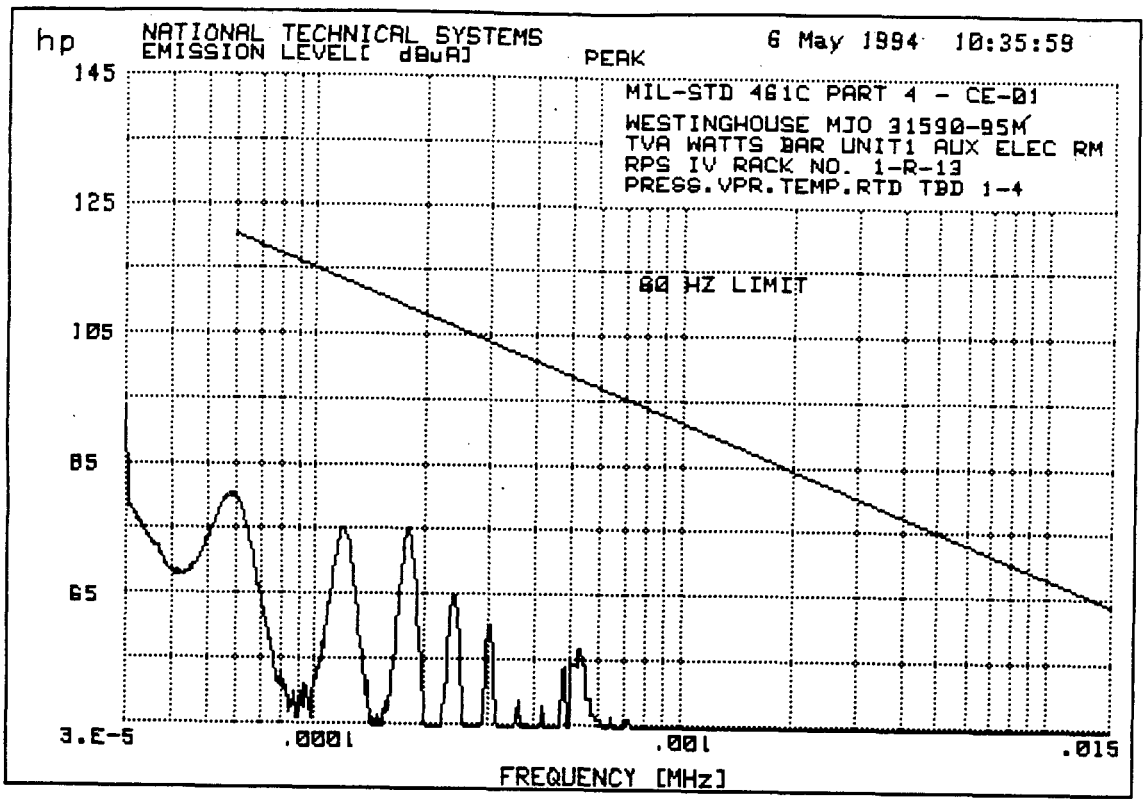
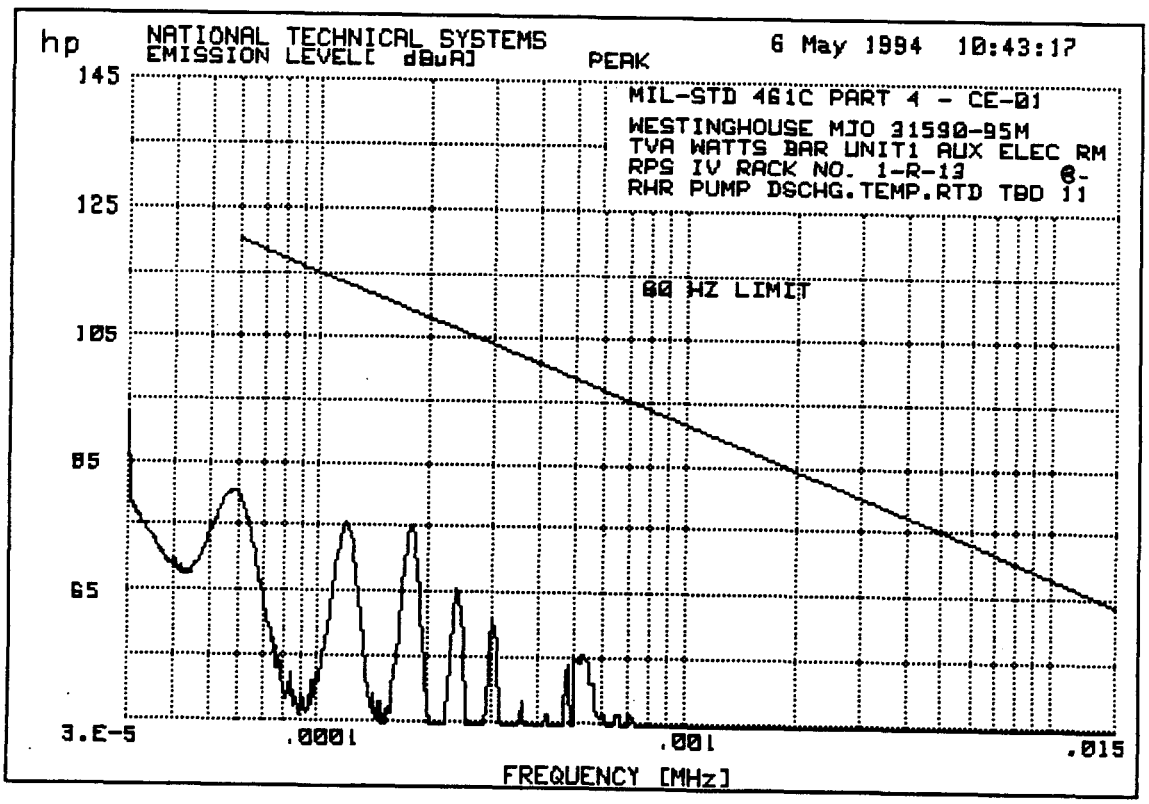
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
6 May 1994 10:29:03
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-12
TB-12X 6
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
6 May 1994 10:35:59
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-13
PRESS.VPR.TEMP.RTD TBD 1-4
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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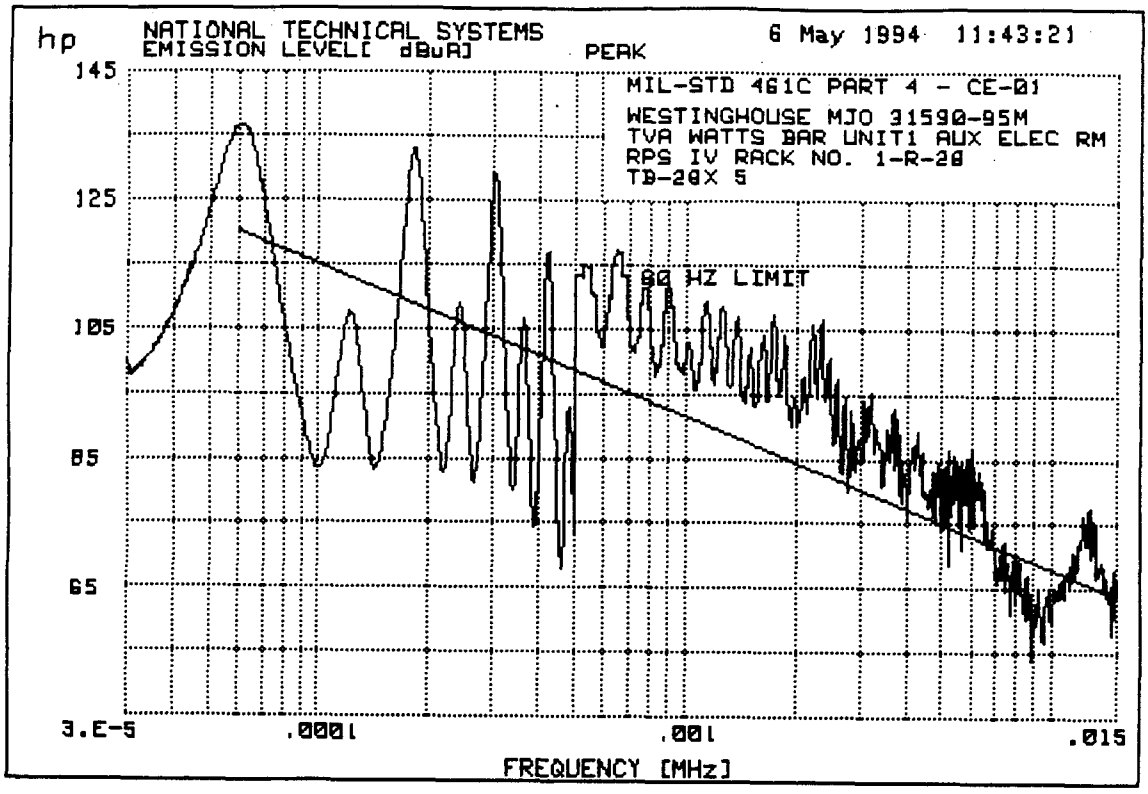
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
6 May 1994 10:43:17
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-13
RHR PUMP DSCHG.TEMP.RTD TBD 11
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]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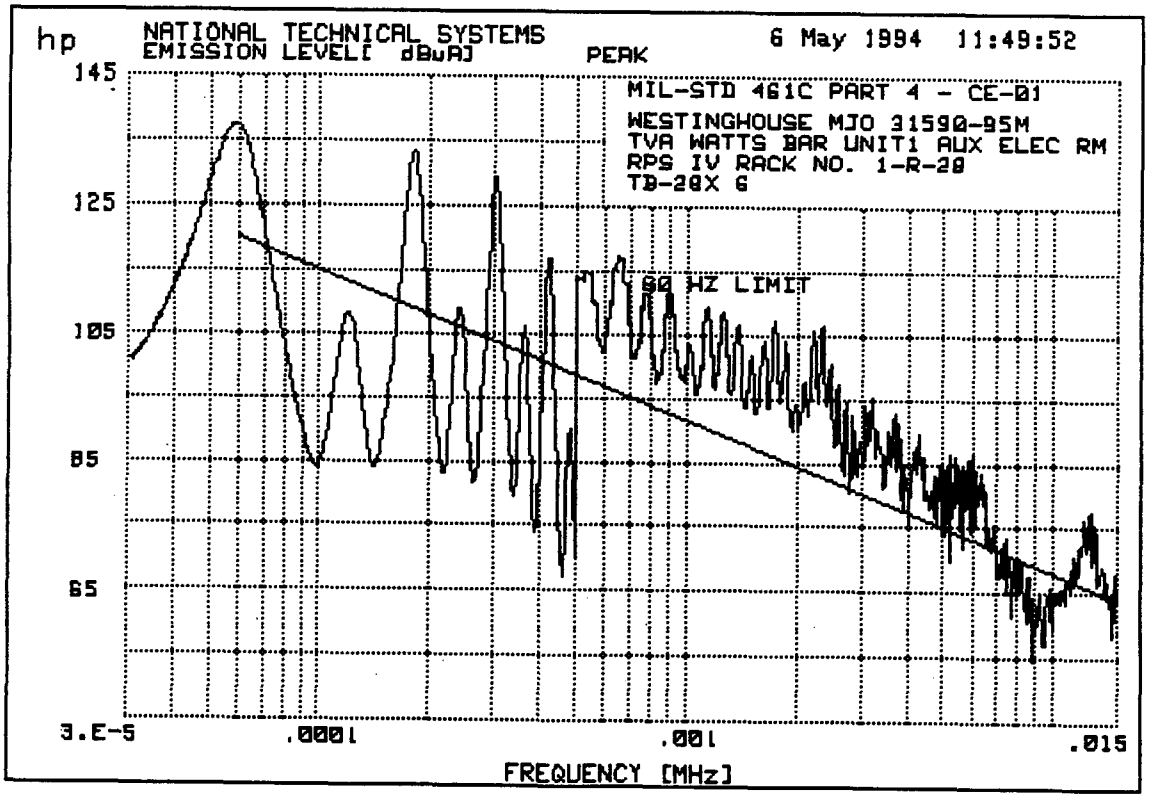
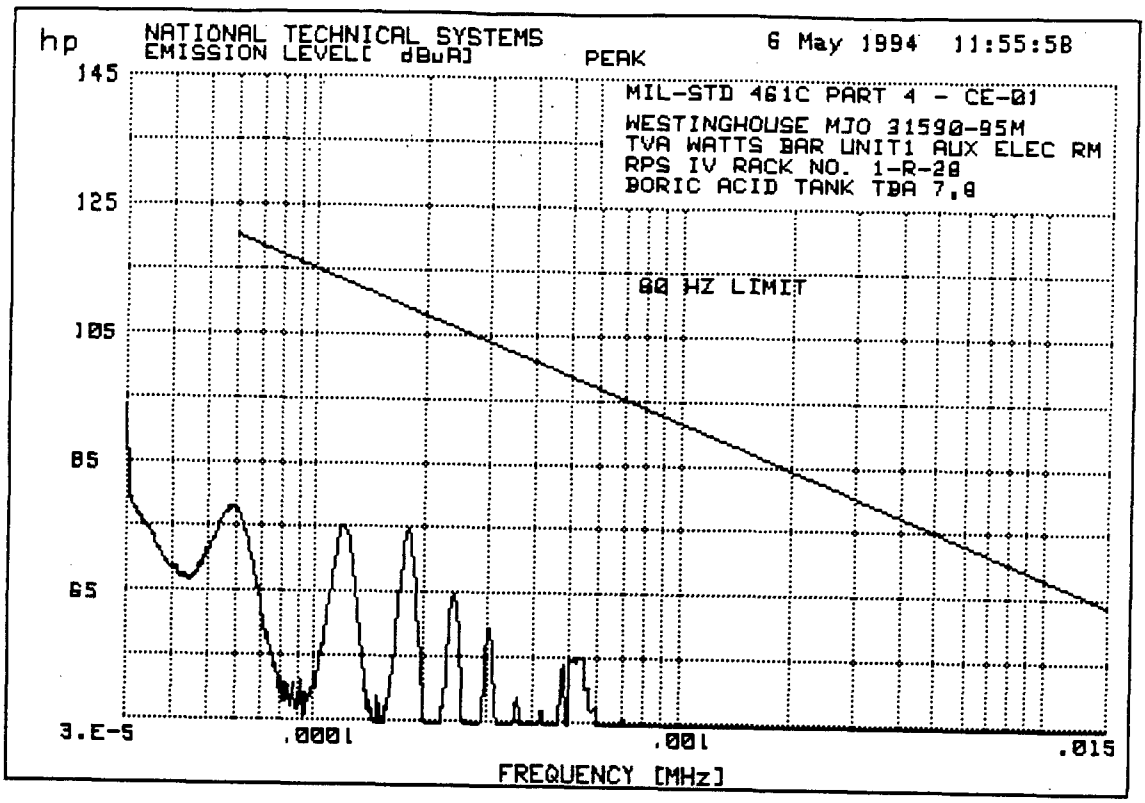
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
6 May 1994 11:43:21
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-20
TB-20X 5
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
6 May 1994 11:49:52
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-20
TB-20X 6
60 HZ LIMIT
145
125
105
85
65
3.E-5
.0001
.001
.015
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
PEAK
6 May 1994 11:55:58
MIL-STD 461C PART 4 - CE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-28
BORIC ACID TANK TBA 7,8
145
125
105
85
65
60 HZ LIMIT
3.E-5
.0001
.001
.015
FREQUENCY [MHz]

6.0 TEST PROCEDURE (continued)

6.2 Conducted Emissions, Method CE03, Power and Signal Leads, 15 KHz to 50 MHz

Requirements

Conducted emission measurements, from 15 KHz to 50 MHz, will be made in accordance with the applicable portions of Test Method CE03 of MIL-STD-462. Reference Section 6.2, Test Setup.

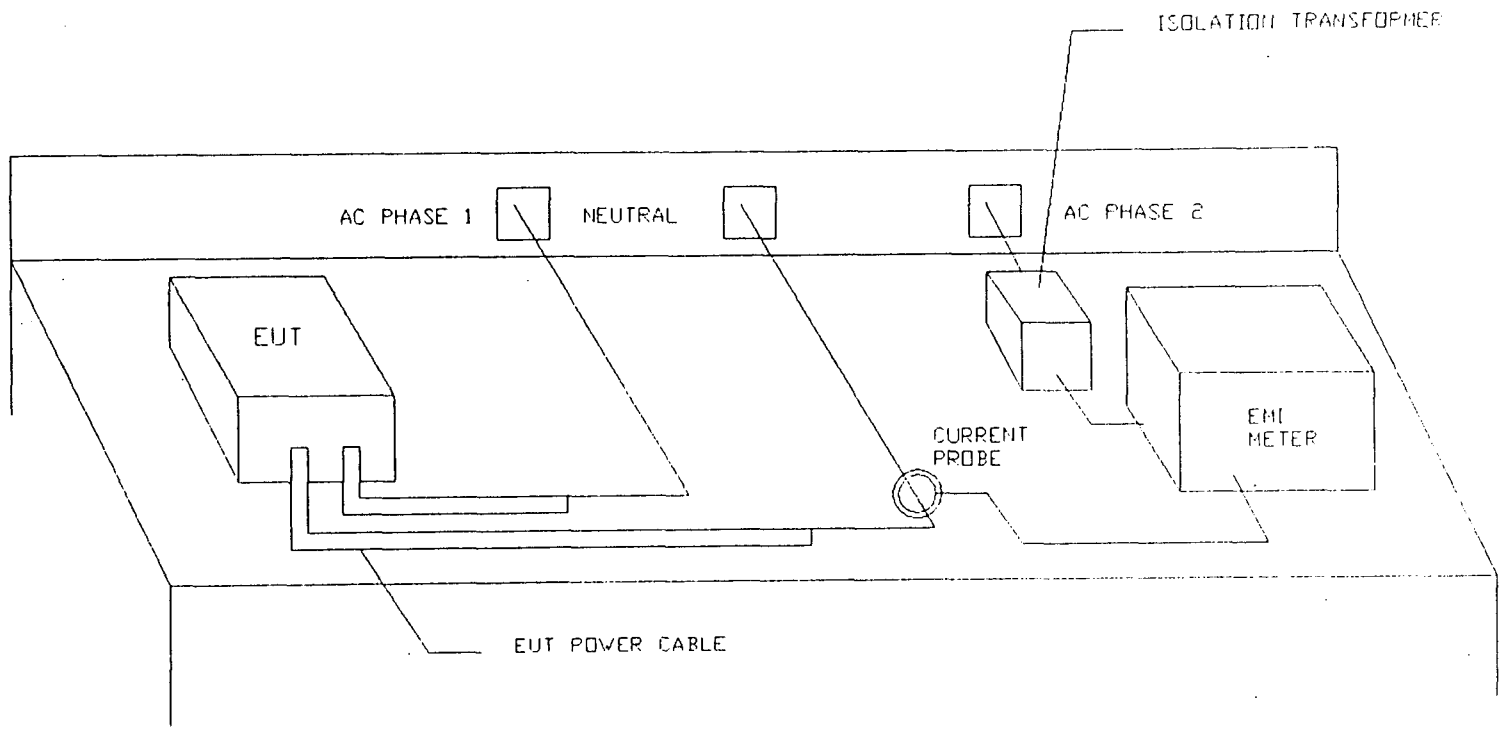
Procedures

The Auxiliary Electric Equipment Room Environment was set up and operated as specified in Section 4.0 of this report. An A. H. Systems Clamp-on Current Probe, Model BCP-200/511, was connected to a Hewlett-Packard Automated Microwave Measurement System, Model 8566S, through a 50' length of RG214/U coaxial cable. The current probe was clamped around a selected power lead, within the RPS cabinet designated as "Phase", and the analyzer swept over the frequency range from 15 KHz to 50 MHz, and plots were generated for both Narrow and Broad Band measurements.

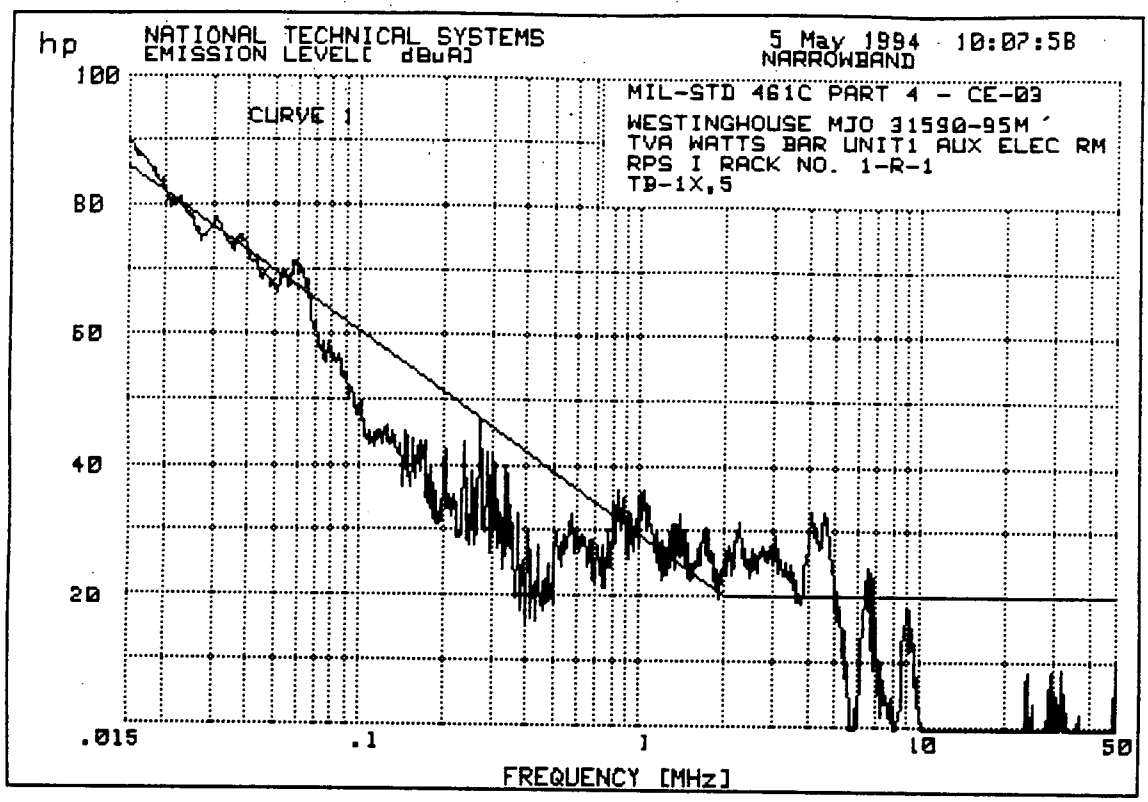
The preceding procedure was repeated with the current probe clamped around the remaining leads designated as "Neutral", "Phase/Neutral Bundle" (including ground where accessible), and the appropriate signal lead bundles (Reference Figure 4-2).

Sample Test Results

Test	Results
CEO3 Conducted Emissions, 15KHz - 50 MHz	Westinghouse Electric Corporation will perform analysis for all tests.



CONDUCTED EMISSIONS, METHOD CE03, TYPICAL TEST SETUP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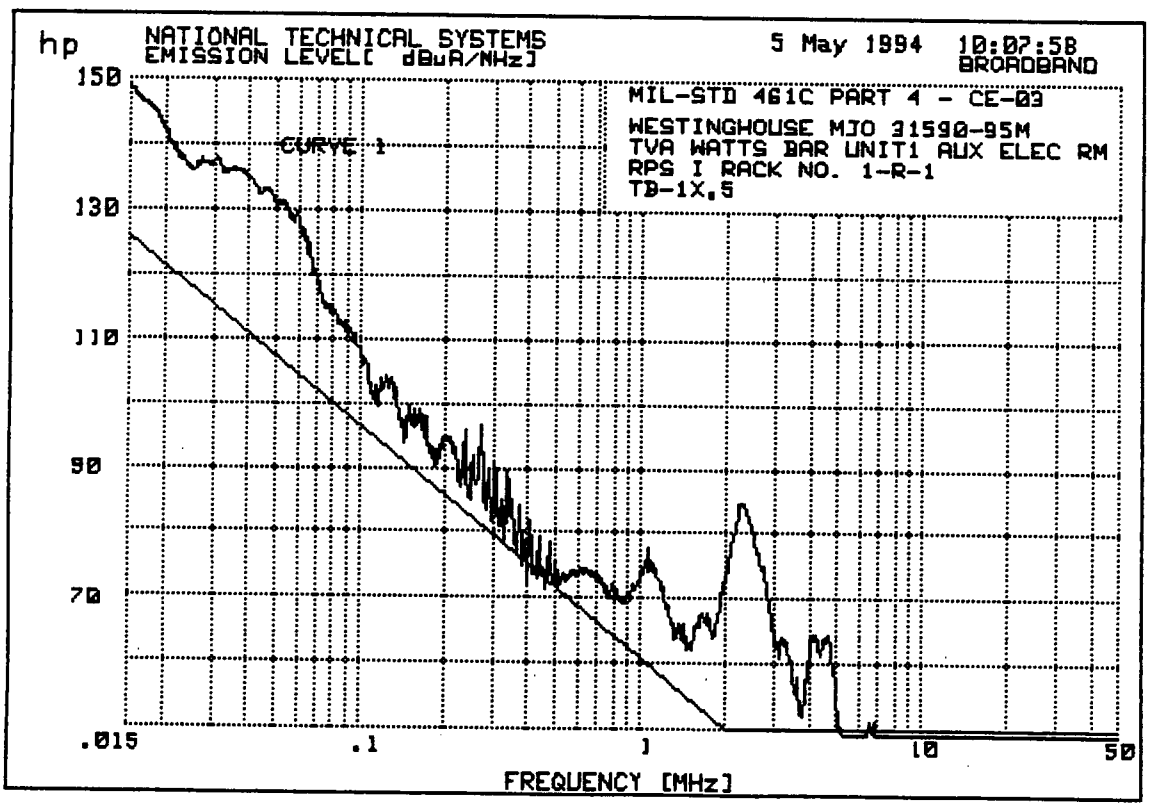
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 10:07:58
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-1
TB-1X,5
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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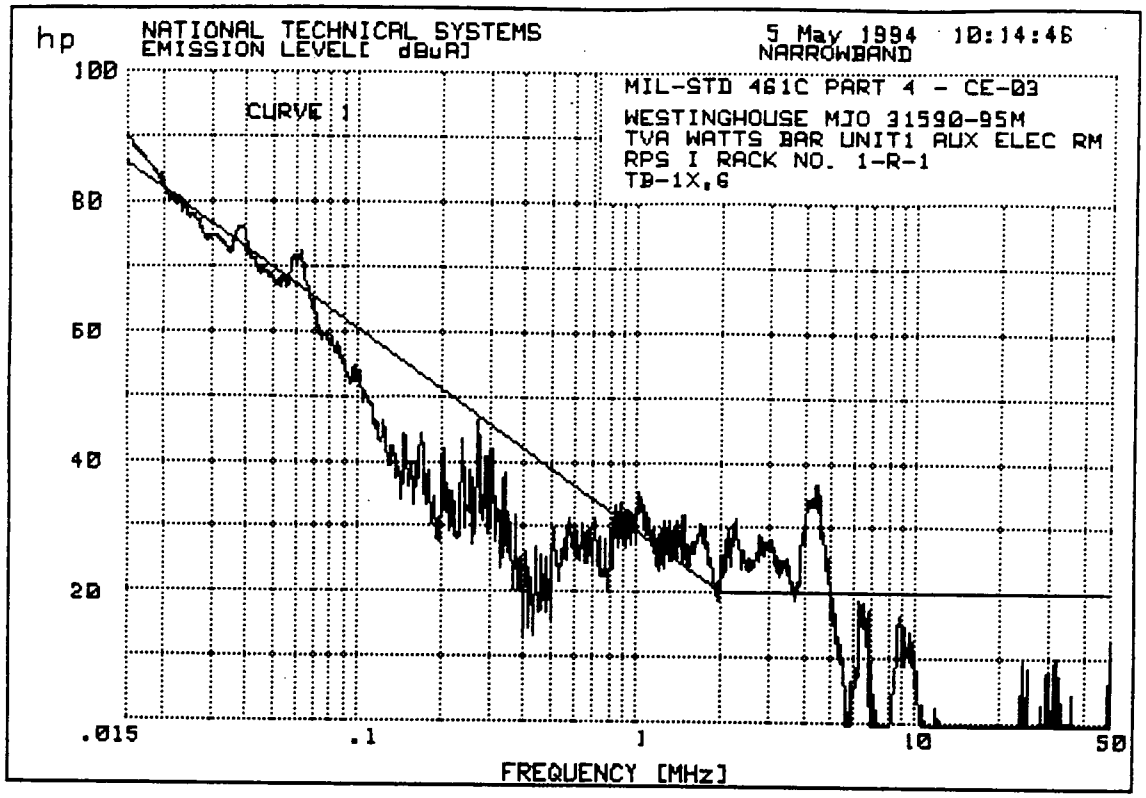
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 10:07:58
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-1
TB-1X,5
CURVE 1
150
130
110
90
70
.015
.1
1
10
50
FREQUENCY [MHz]

GE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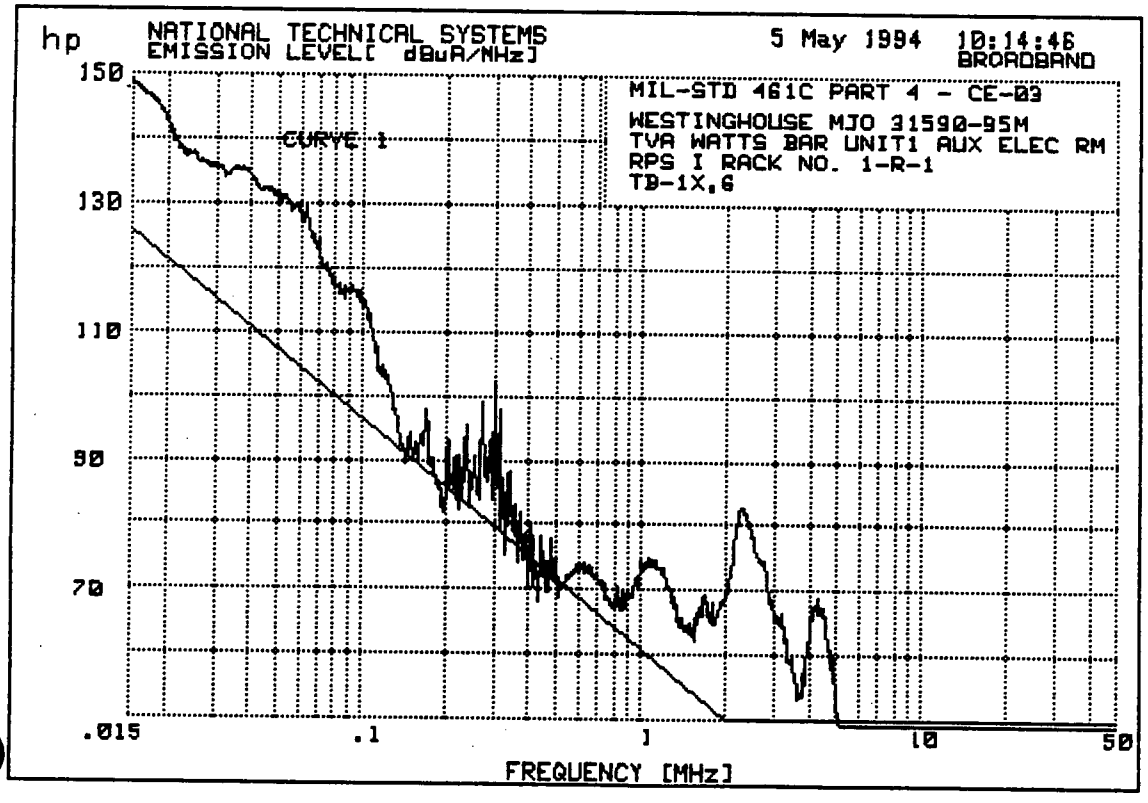
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 10:14:46
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-1
TB-1X,6
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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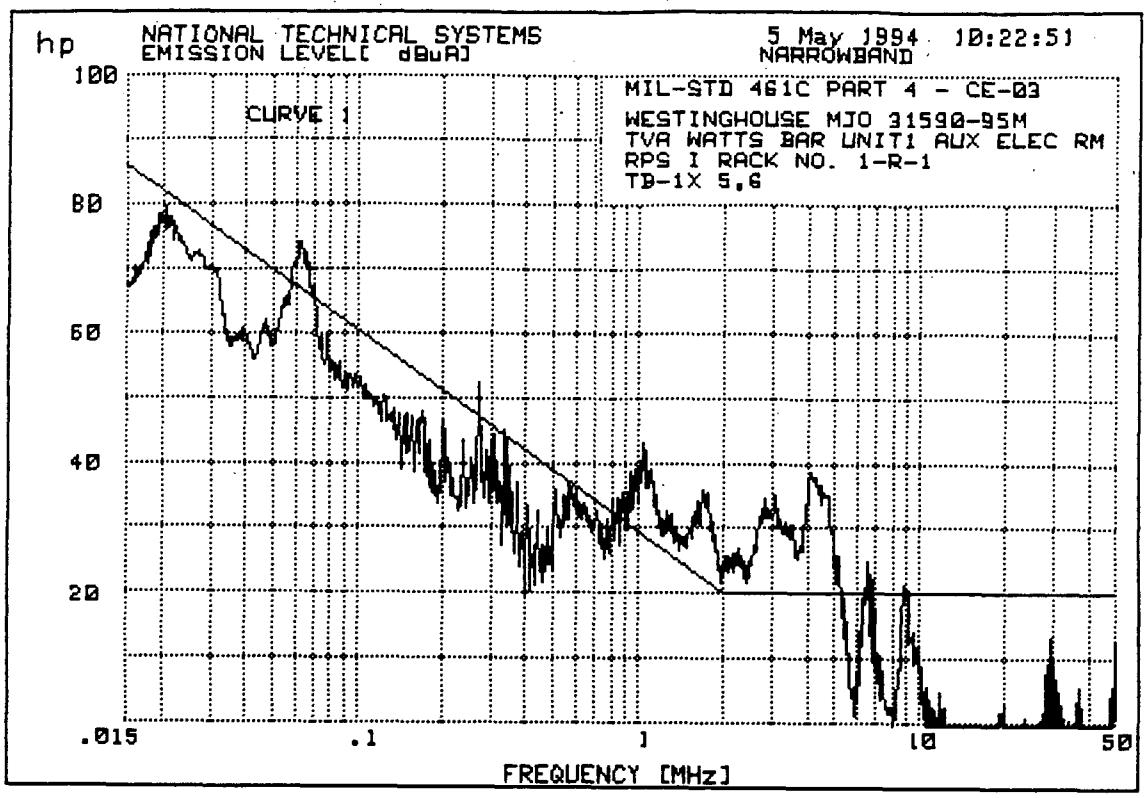
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 10:14:46
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-1
TB-1X,6
CURVE 1
150
130
110
90
70
.015
.1
1
10
50
FREQUENCY [MHz]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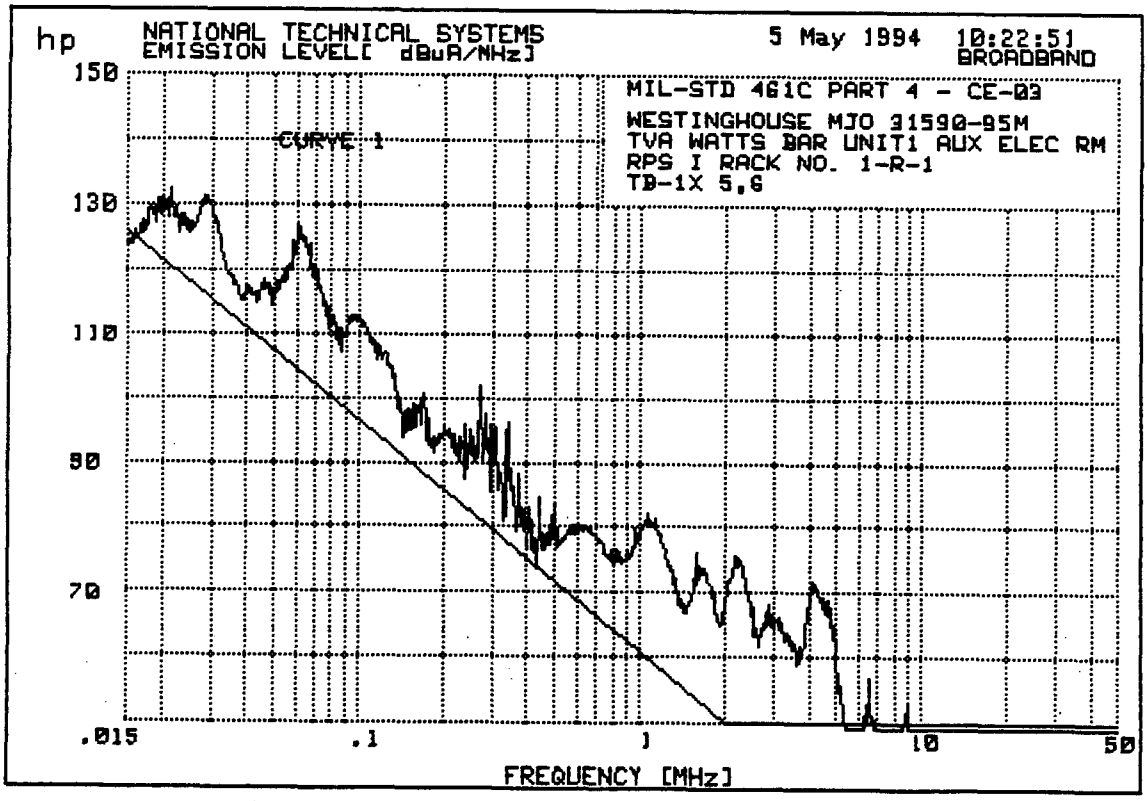
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 10:22:51
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-1
TB-1X 5,6
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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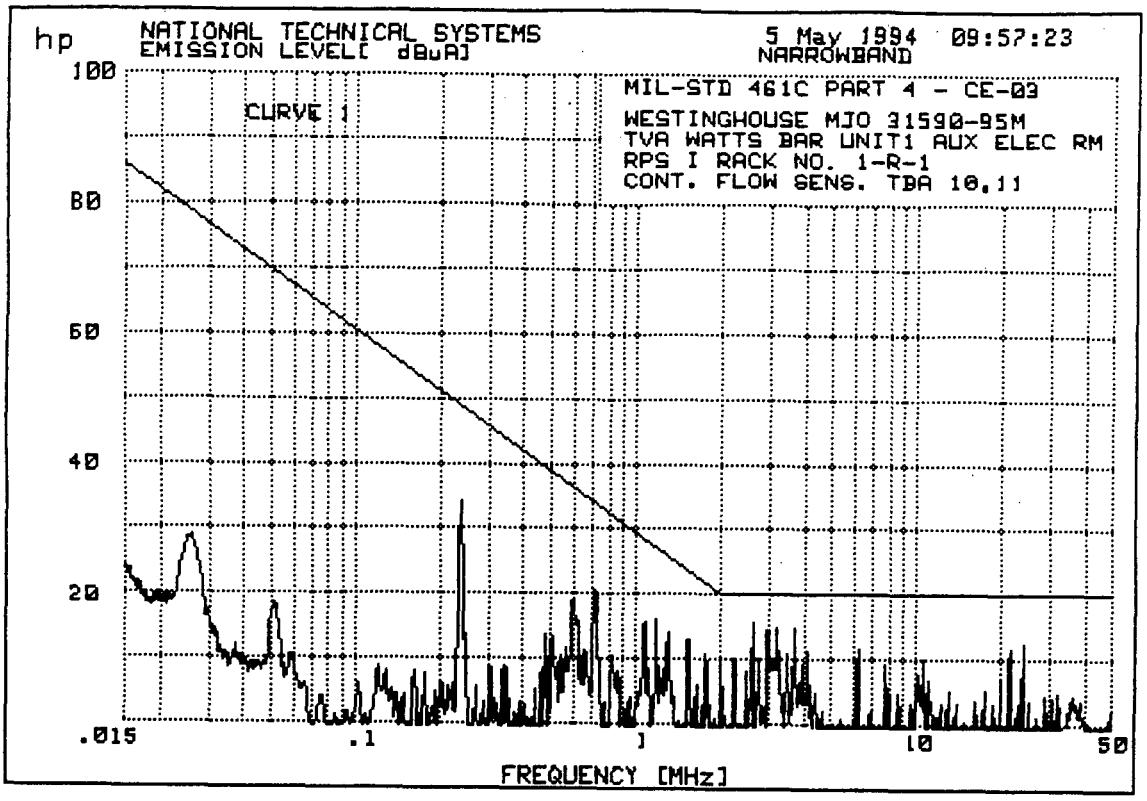
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 10:22:51
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-1
TB-1X 5,6
CURVE 1
150
130
110
90
70
.015
.1
1
10
50
FREQUENCY [MHz]

CB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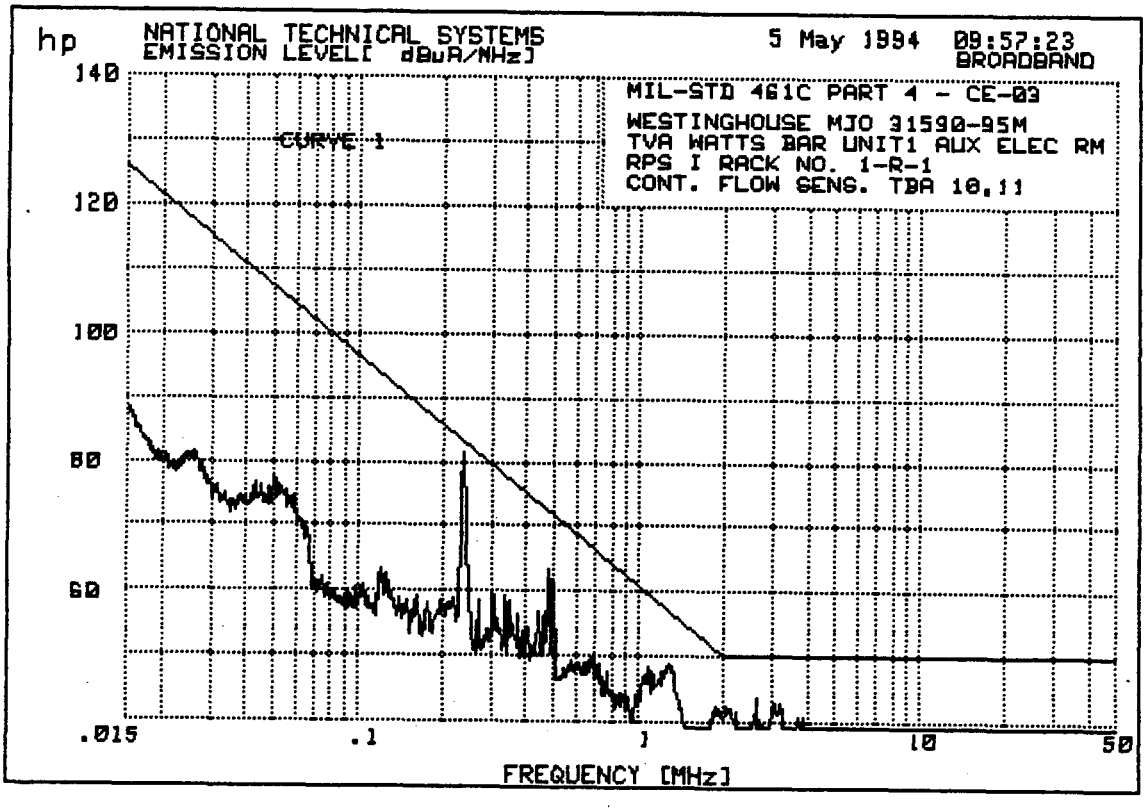
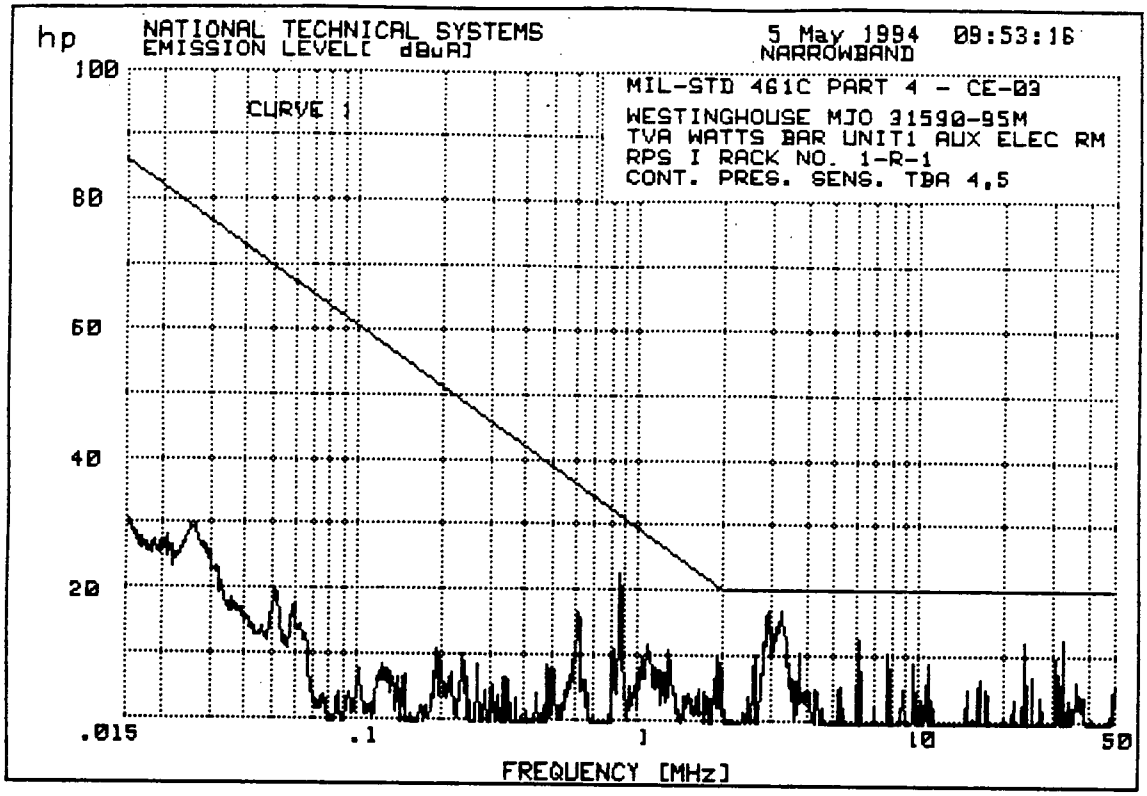
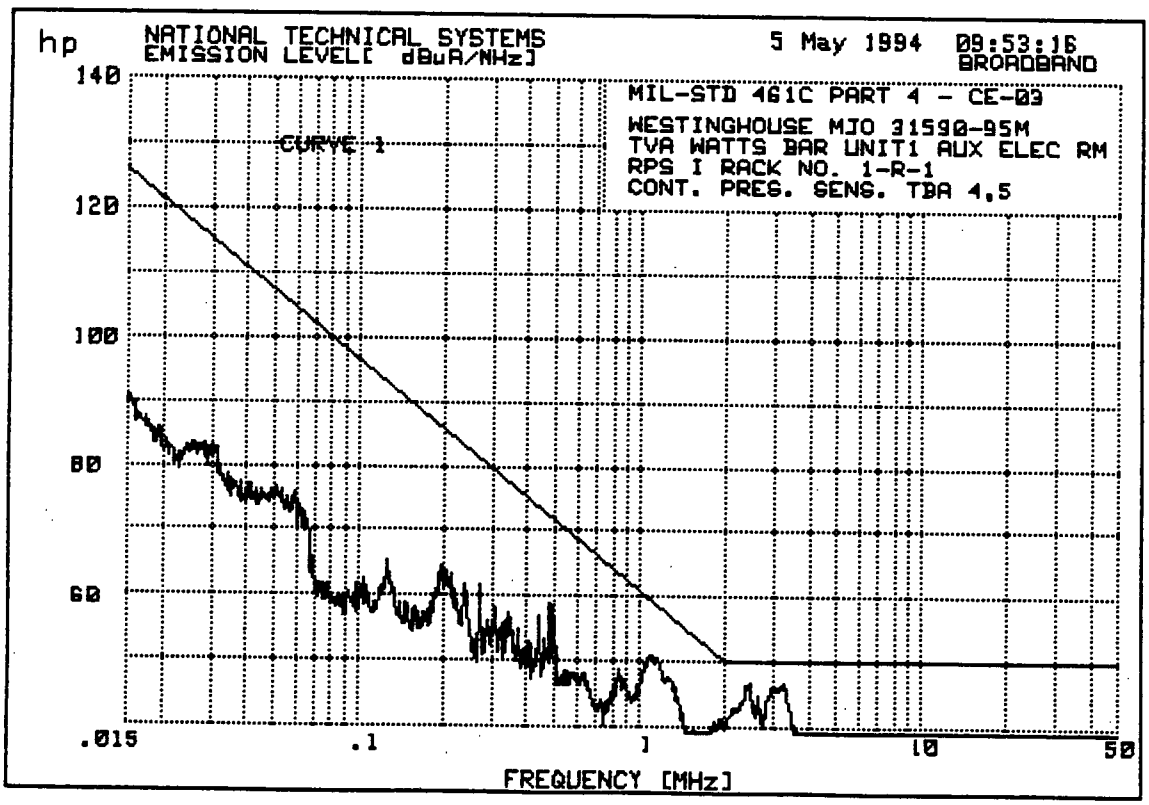
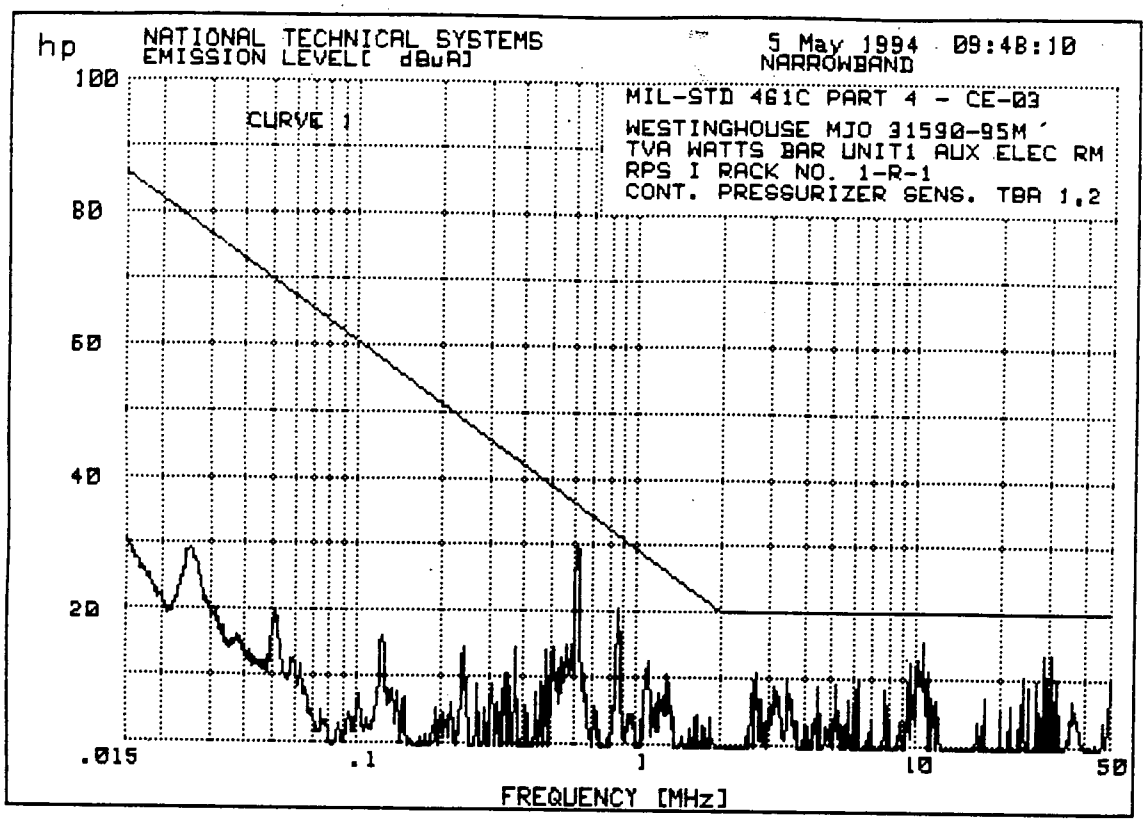
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 09:57:23
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-1
CONT. FLOW SENS. TBA 10,11
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 09:57:23
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-1
CONT. FLOW SENS. TBA 10,11
CURVE 1
140
120
100
80
60
.015
.1
1
10
50
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 09:53:16
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-1
CONT. PRES. SENS. TBA 4,5
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 09:53:16
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-1
CONT. PRES. SENS. TBA 4,5
CURVE 1
140
120
100
80
60
.015
.1
1
10
50
FREQUENCY [MHz]

CNB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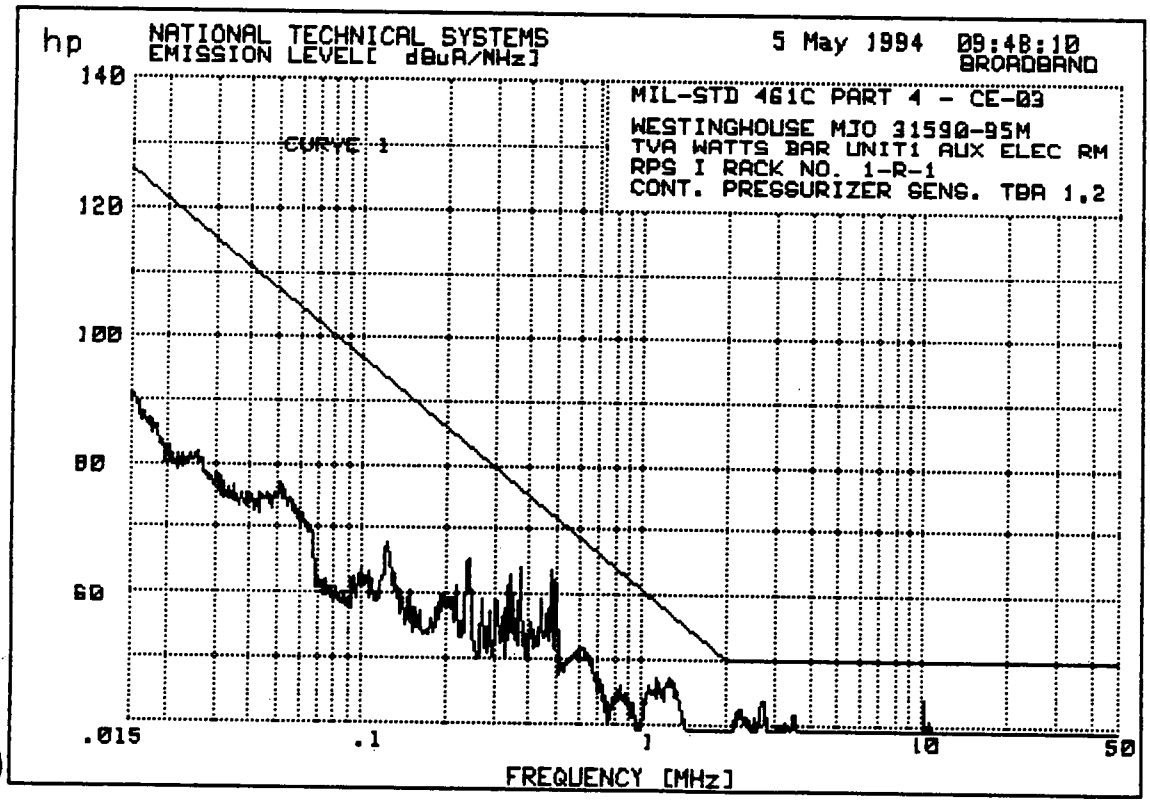
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 09:48:10
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-1
CONT. PRESSURIZER SENS. TBA 1,2
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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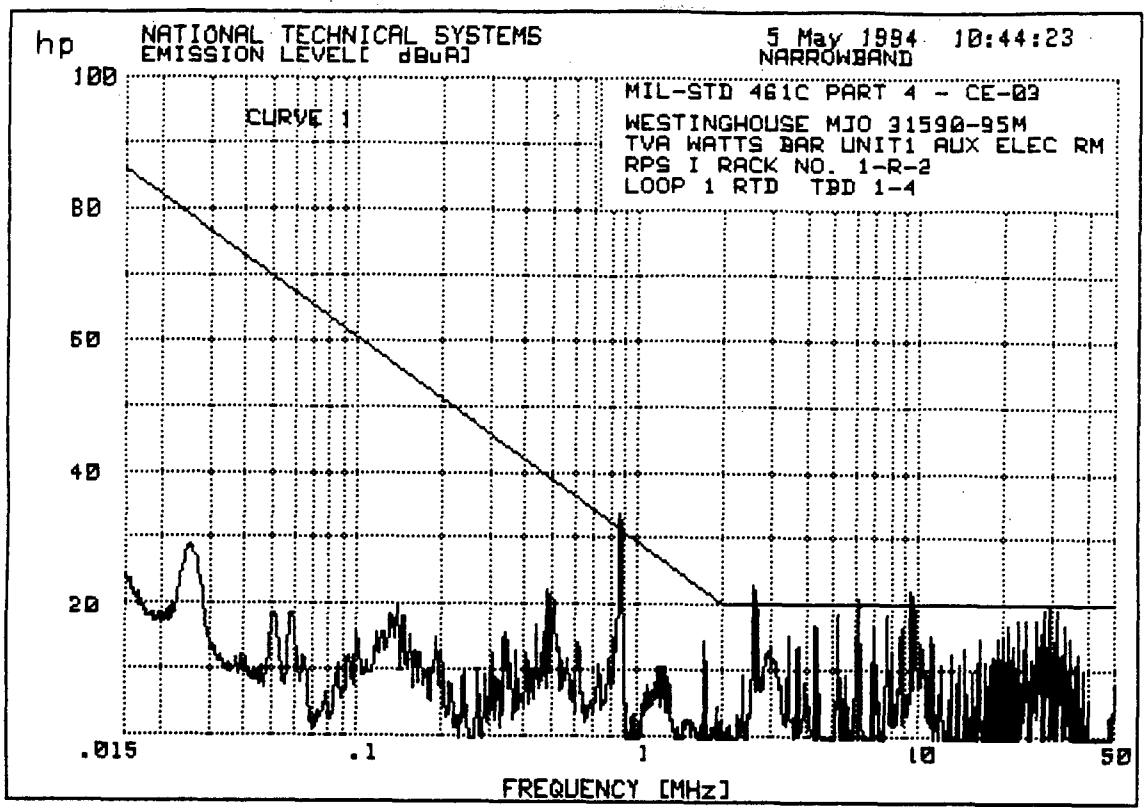
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 09:48:10
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-1
CONT. PRESSURIZER SENS. TBA 1,2
CURVE 1
140
120
100
80
60
.015
.1
1
10
50
FREQUENCY [MHz]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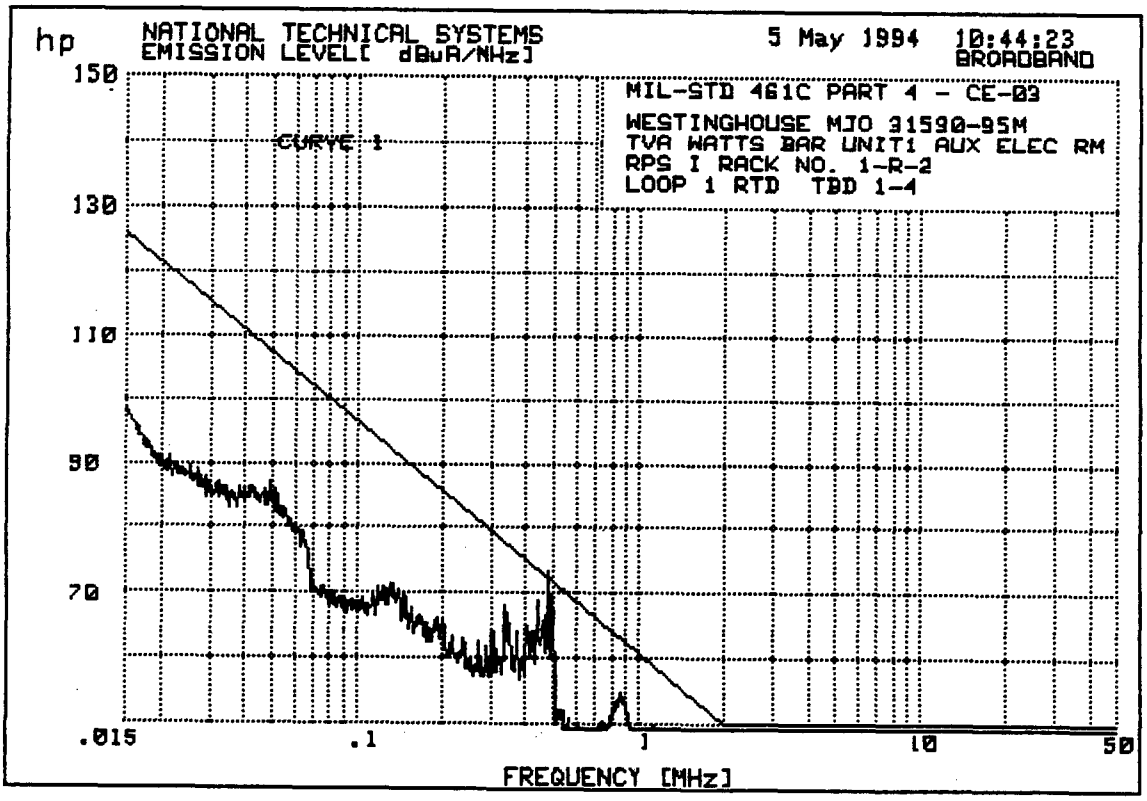
EMISSION LEVEL[dBuA]
5 May 1994 10:44:23
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-2
LOOP 1 RTD TBD 1-4
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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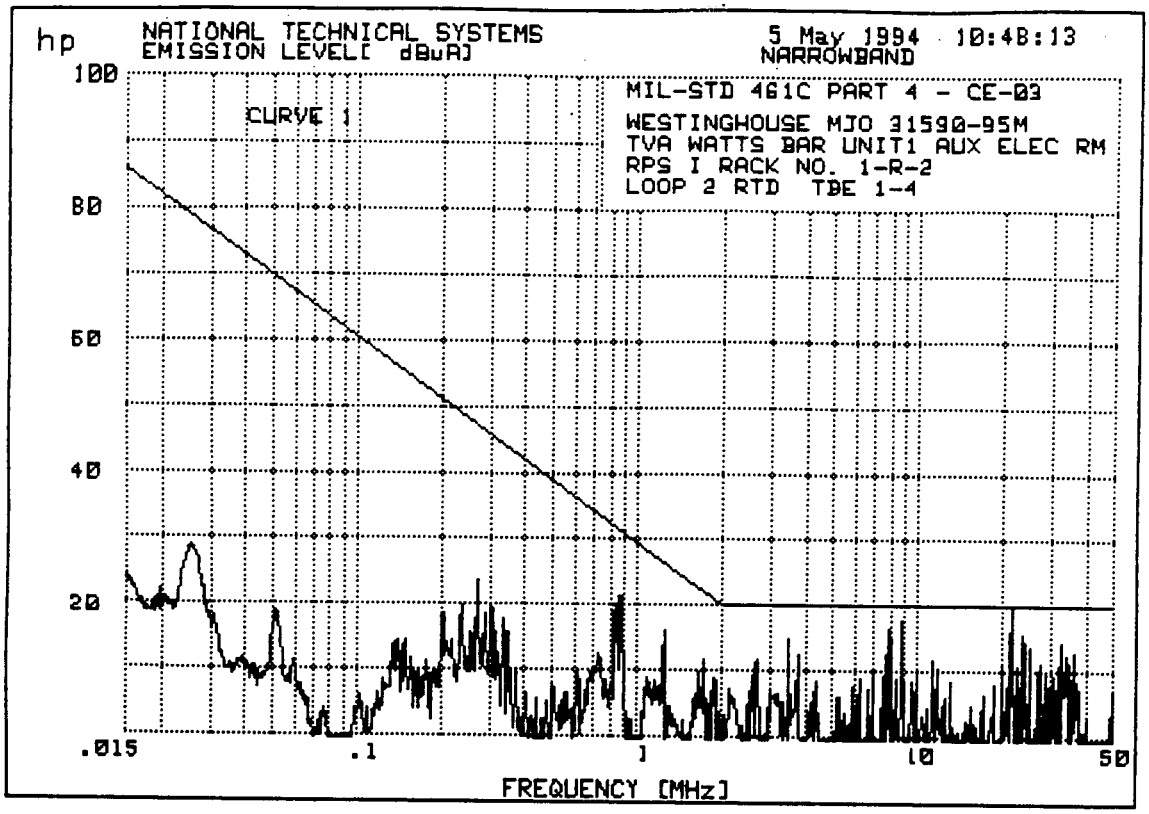
EMISSION LEVEL[dBuA/MHz]
5 May 1994 10:44:23
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-2
LOOP 1 RTD TBD 1-4
CURVE 1
150
130
110
90
70
.015
.1
1
10
50
FREQUENCY [MHz]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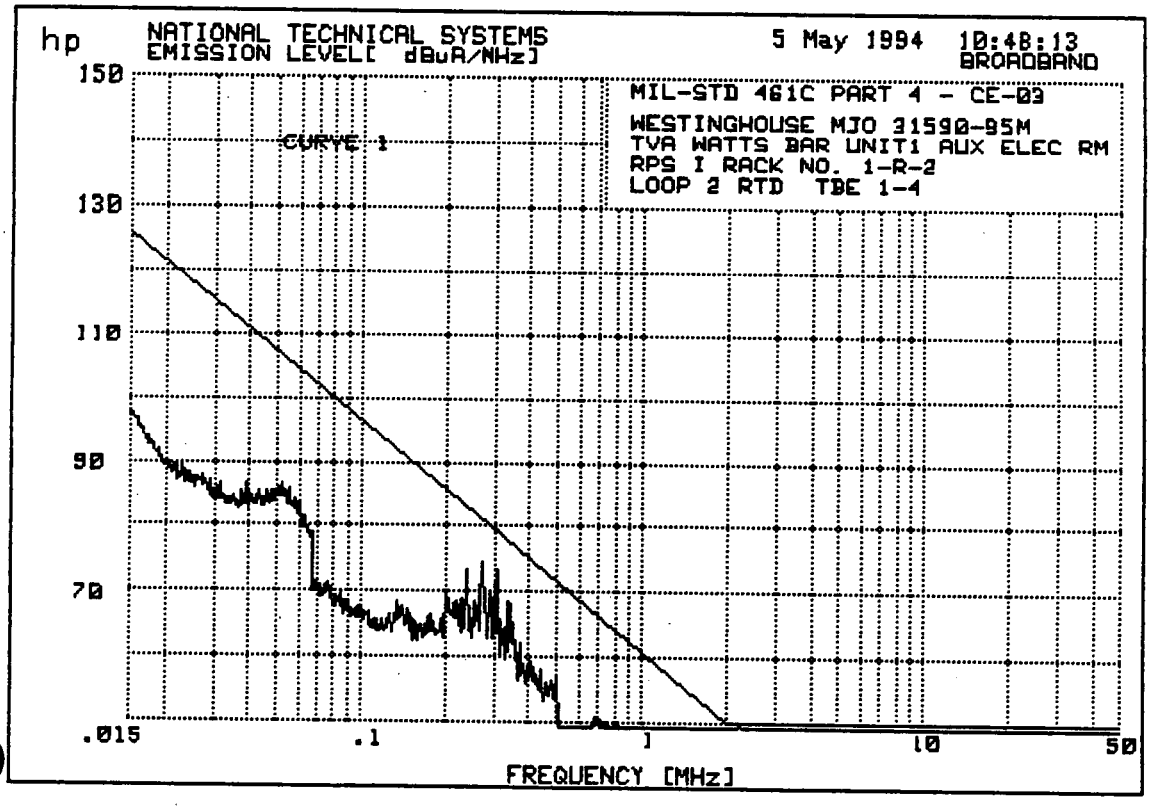
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 10:48:13
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-2
LOOP 2 RTD TBE 1-4
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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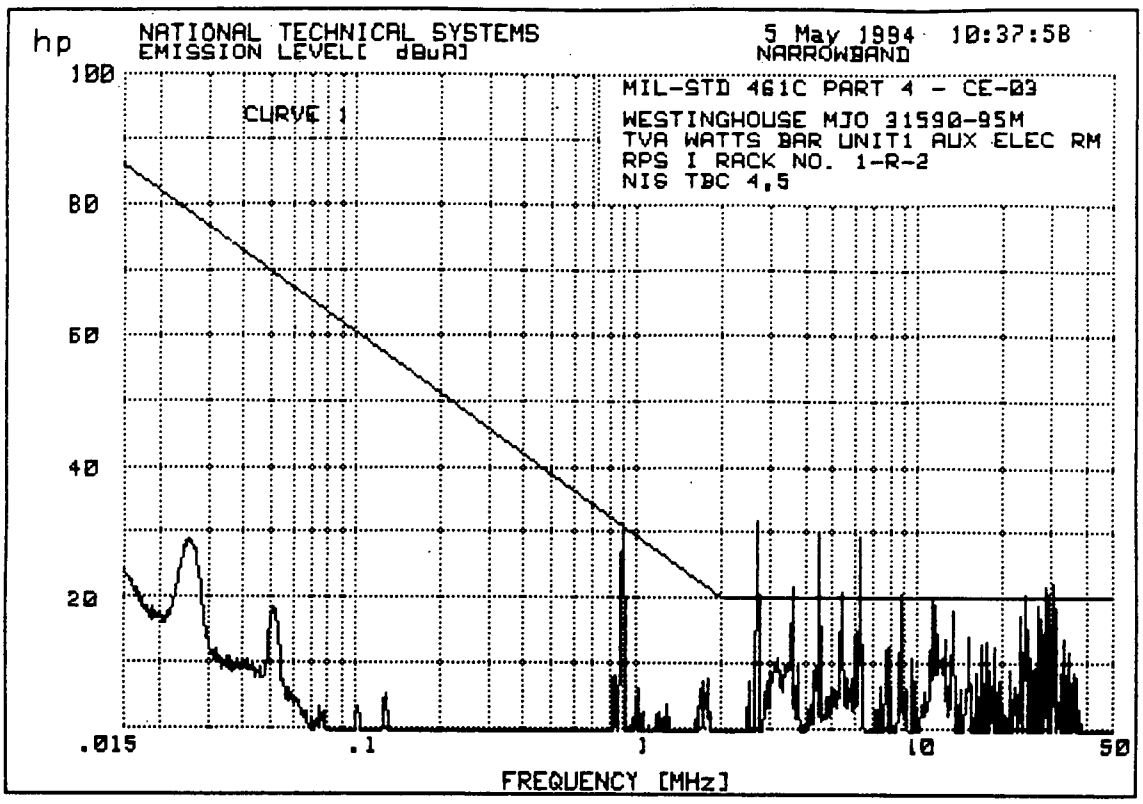
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 10:48:13
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-2
LOOP 2 RTD TBE 1-4
CURVE 1
150
130
110
90
70
.015
.1
1
10
50
FREQUENCY [MHz]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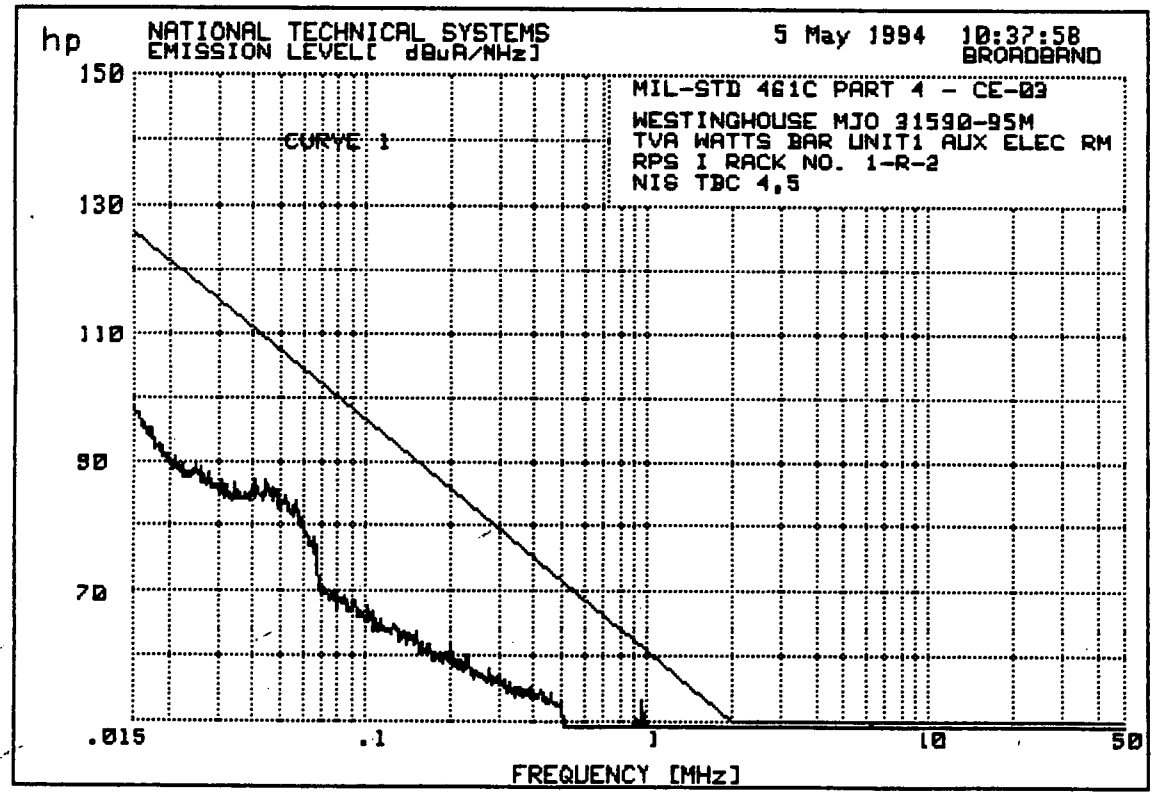
EMISSION LEVEL[dBuA]
5 May 1994 10:37:58
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-2
NIS TBC 4.5
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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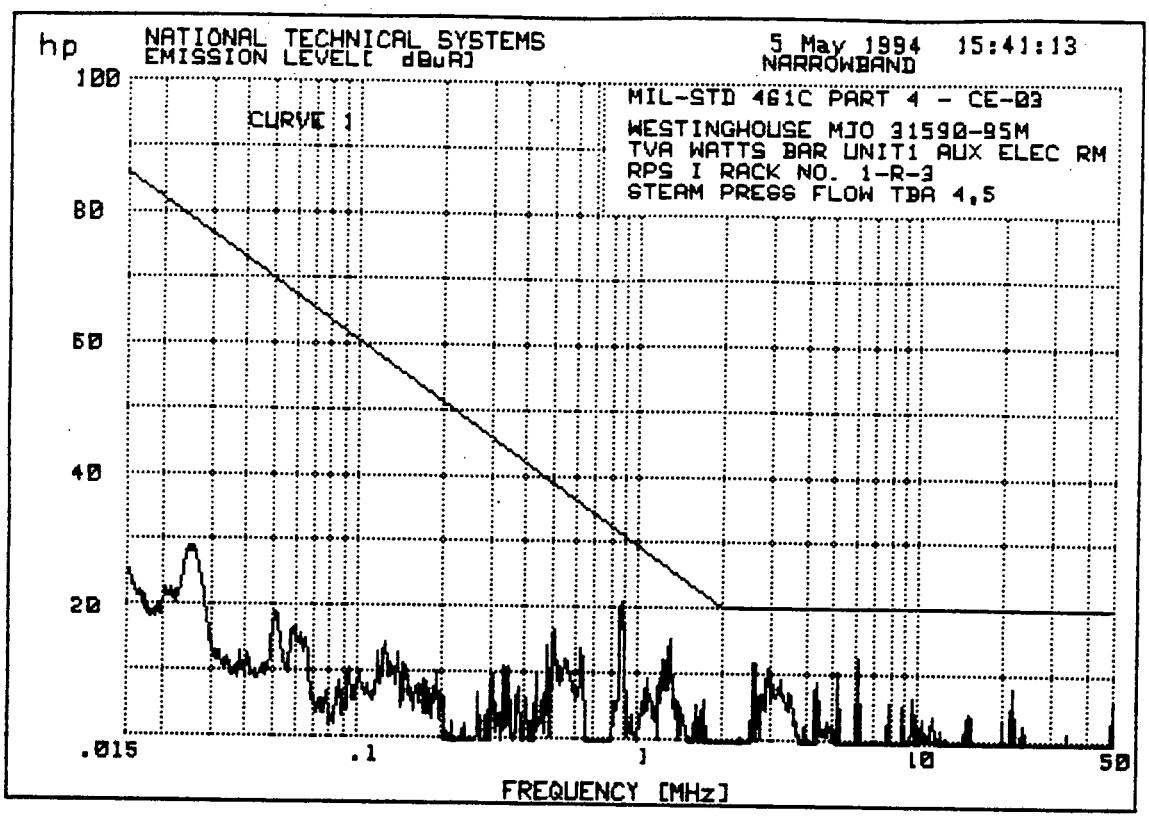
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 10:37:58
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-2
NIS TBC 4.5
CURVE 1
150
130
110
90
70
.015
.1
1
10
50
FREQUENCY [MHz]

CB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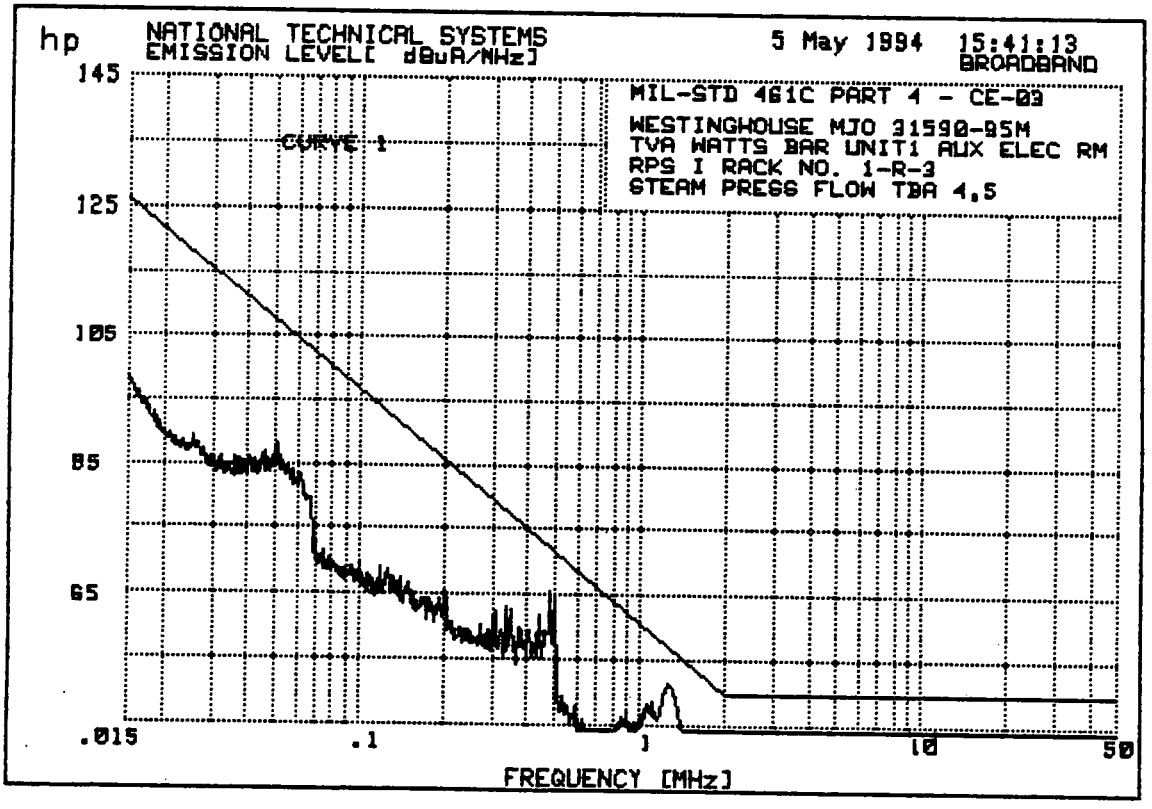
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 15:41:13
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-3
STEAM PRESS FLOW TBA 4,5
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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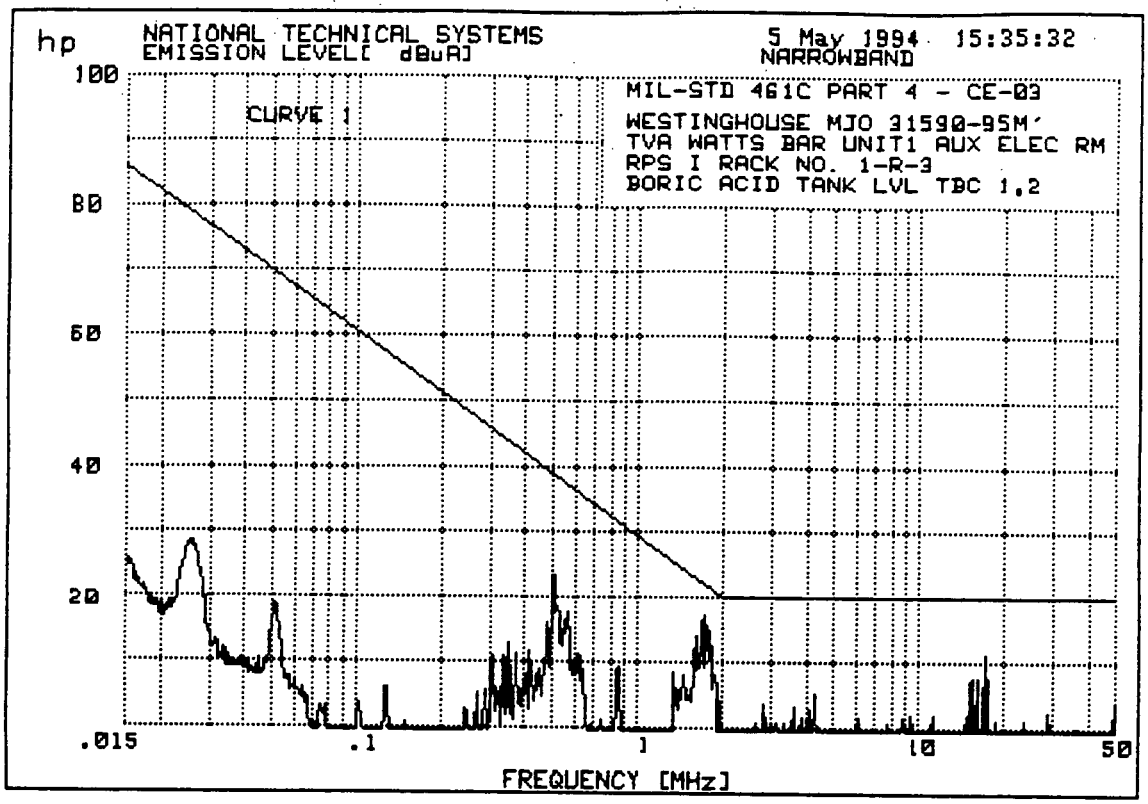
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 15:41:13
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-3
STEAM PRESS FLOW TBA 4,5
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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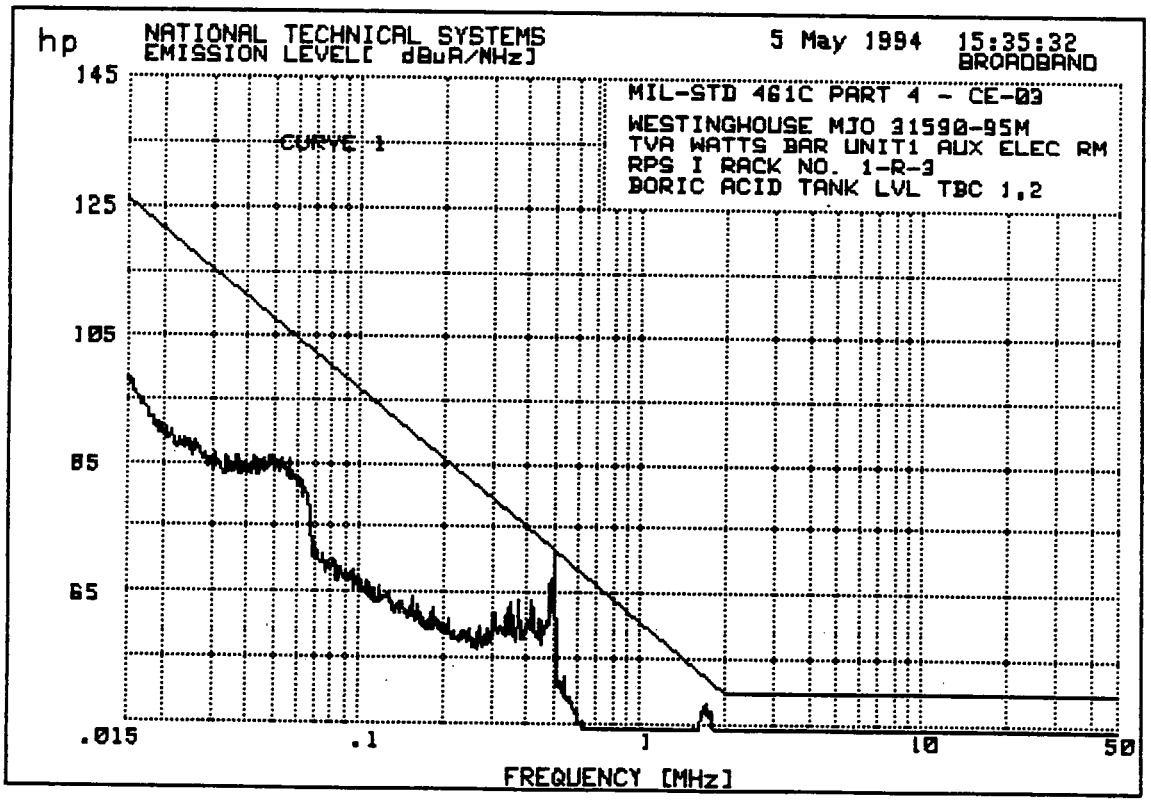
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 15:35:32
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-3
BORIC ACID TANK LVL TBC 1,2
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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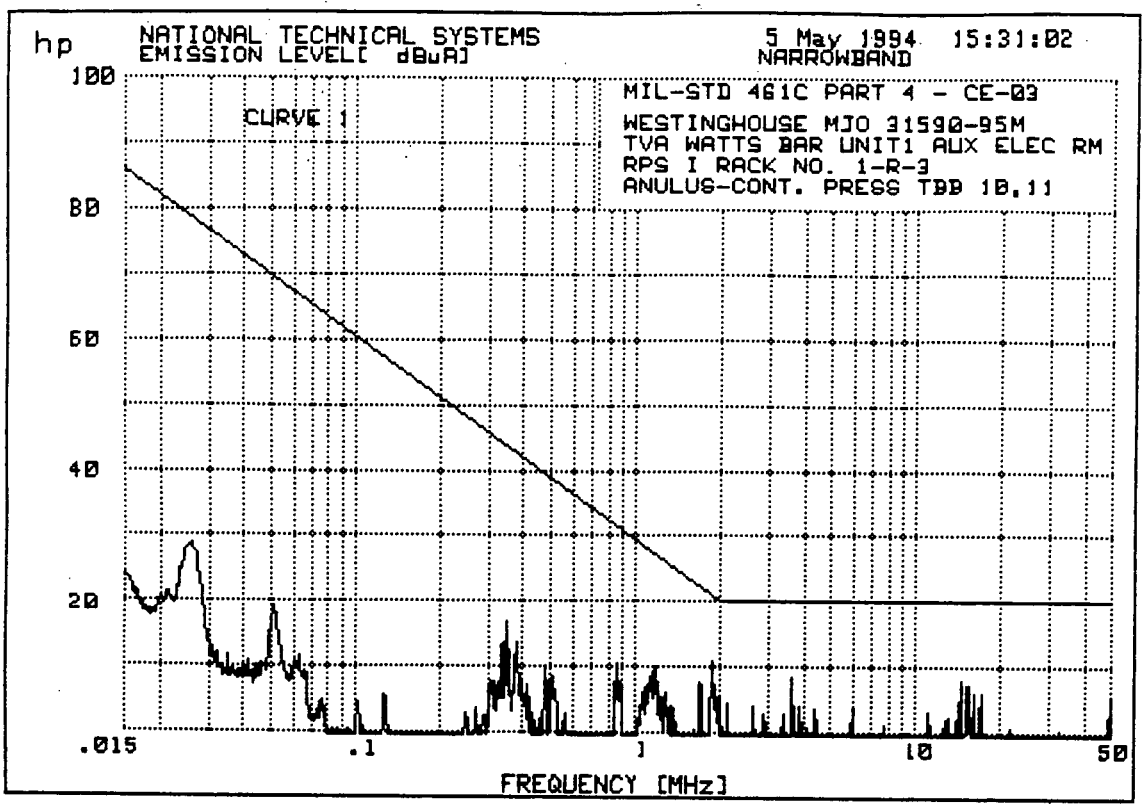
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 15:35:32
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-3
BORIC ACID TANK LVL TBC 1,2
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]

48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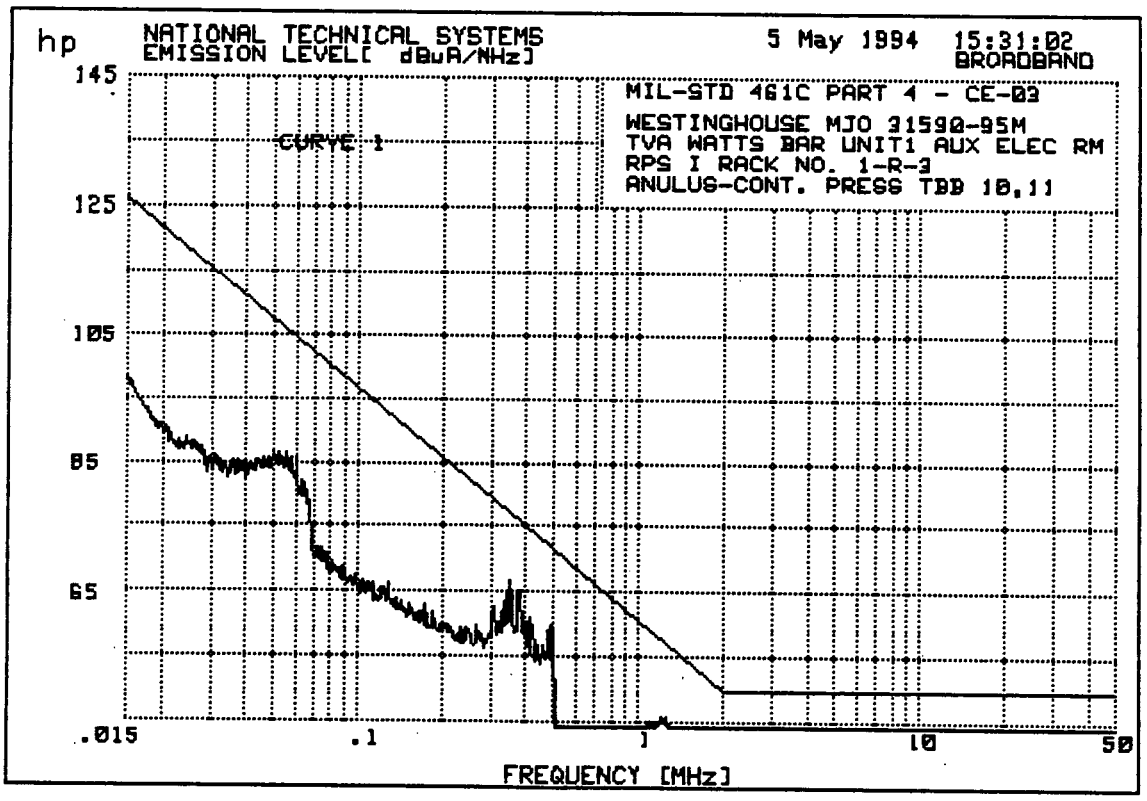
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 15:31:02
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-3
ANULUS-CONT. PRESS TBD 10,11
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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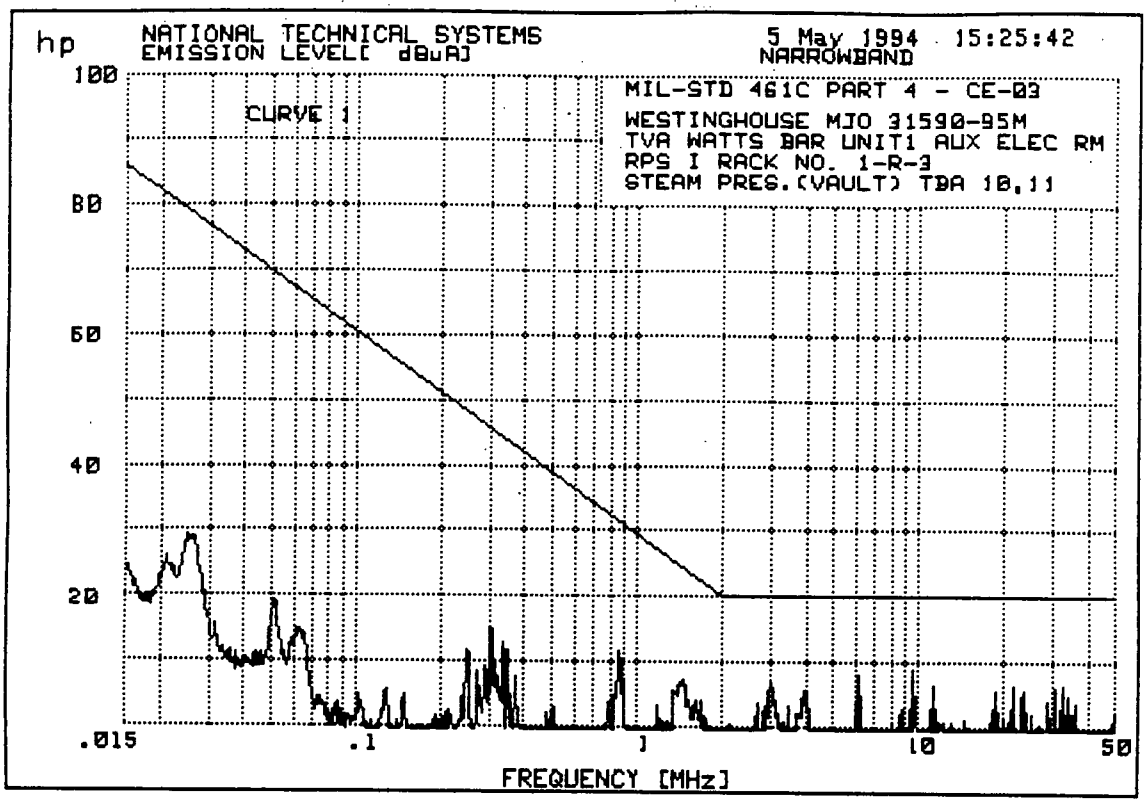
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 15:31:02
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-3
ANULUS-CONT. PRESS TBD 10,11
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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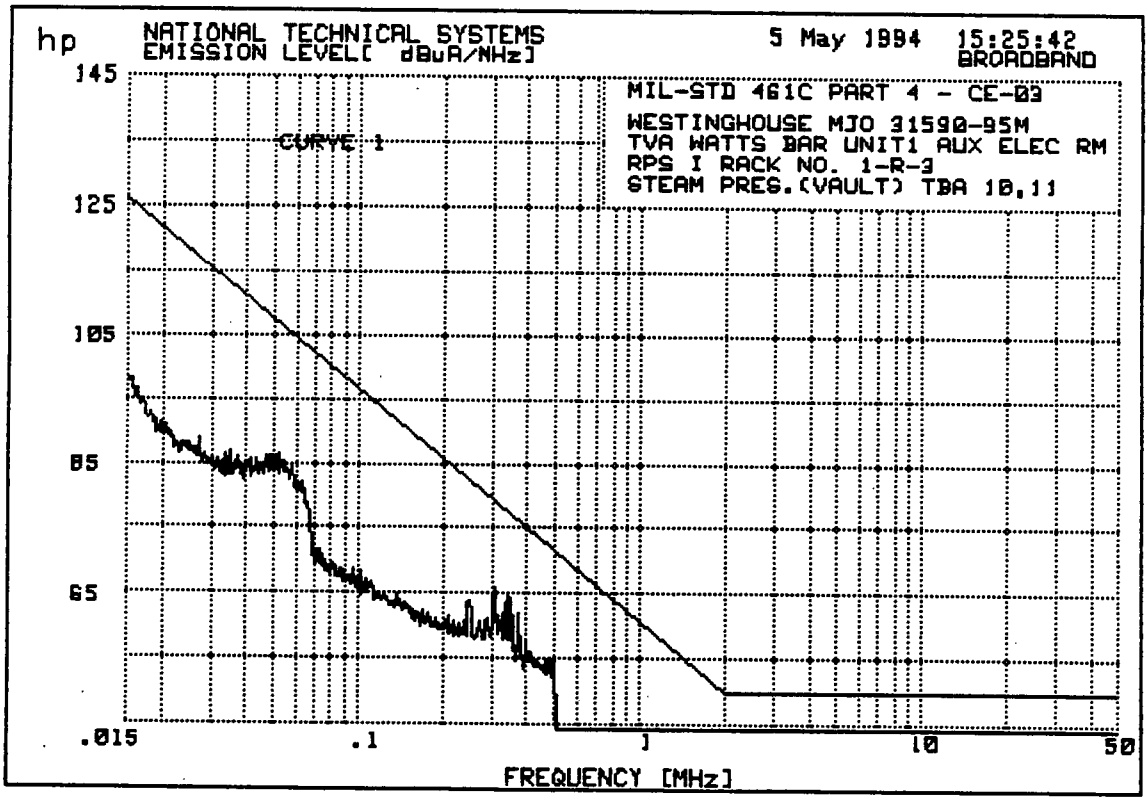
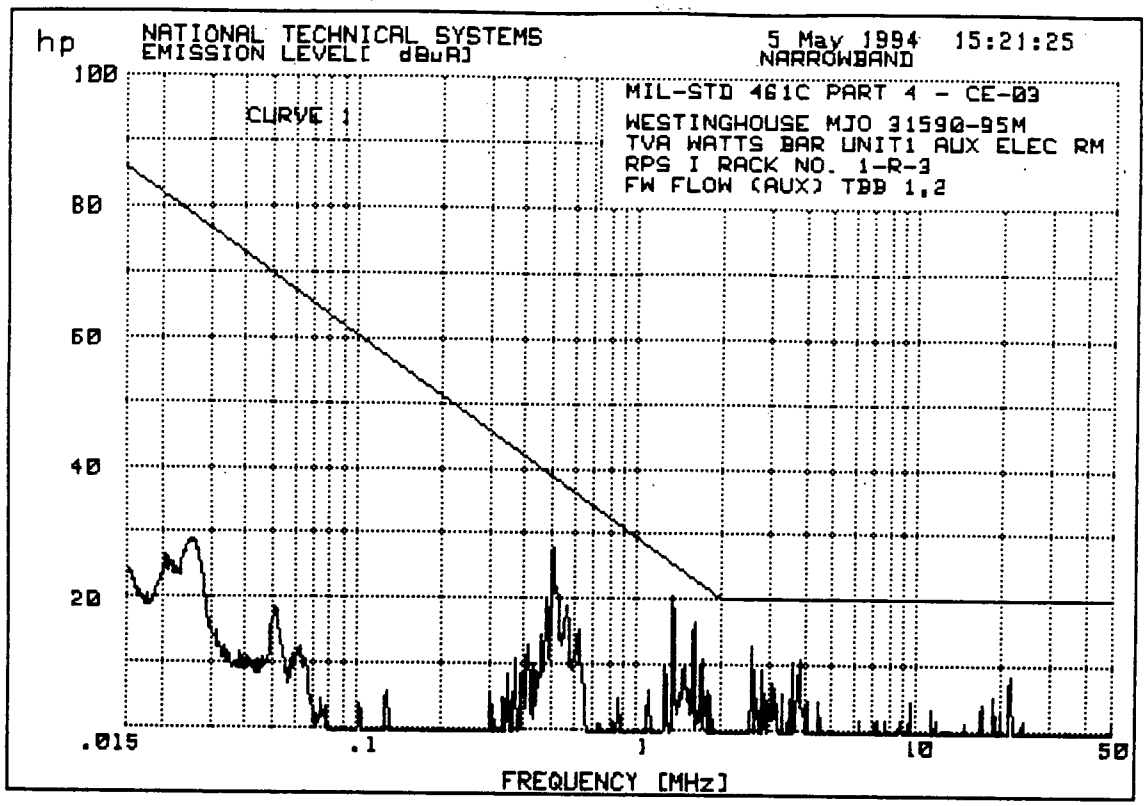
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 15:25:42
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-3
STEAM PRES.(VAULT) TBA 10,11
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 15:25:42
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-3
STEAM PRES.(VAULT) TBA 10,11
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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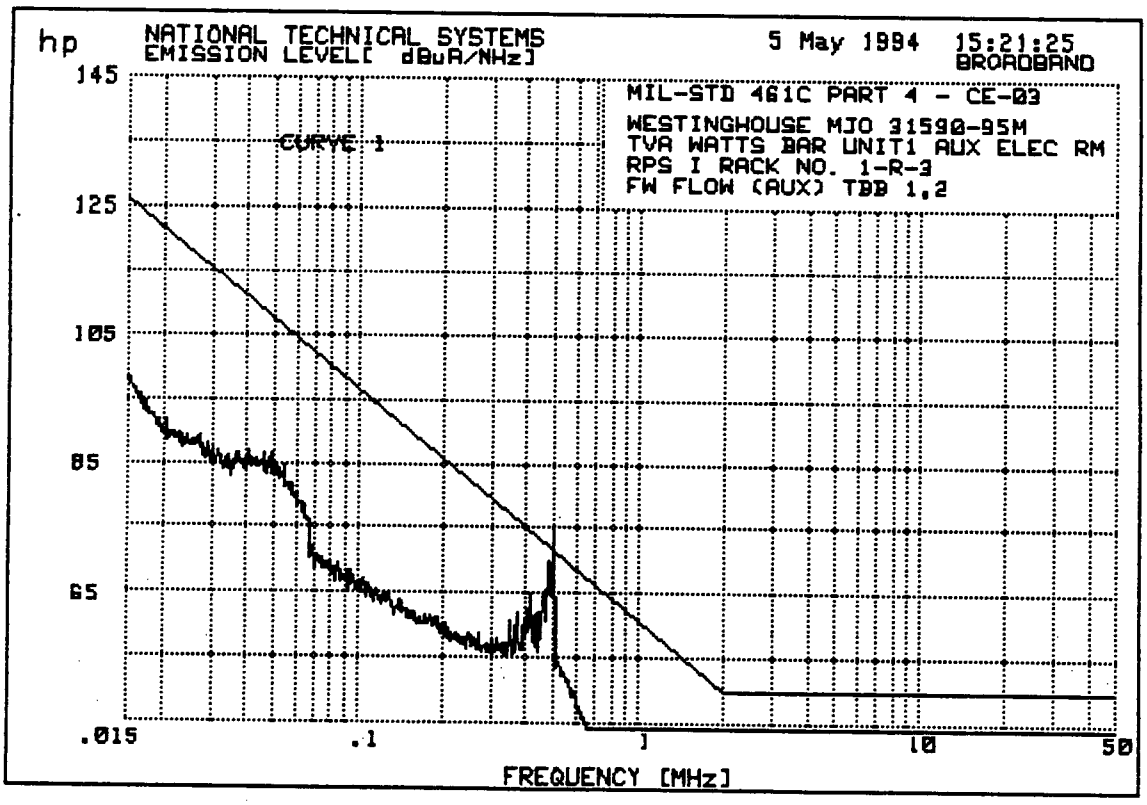
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 15:21:25
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-3
FW FLOW (AUX) TBB 1,2
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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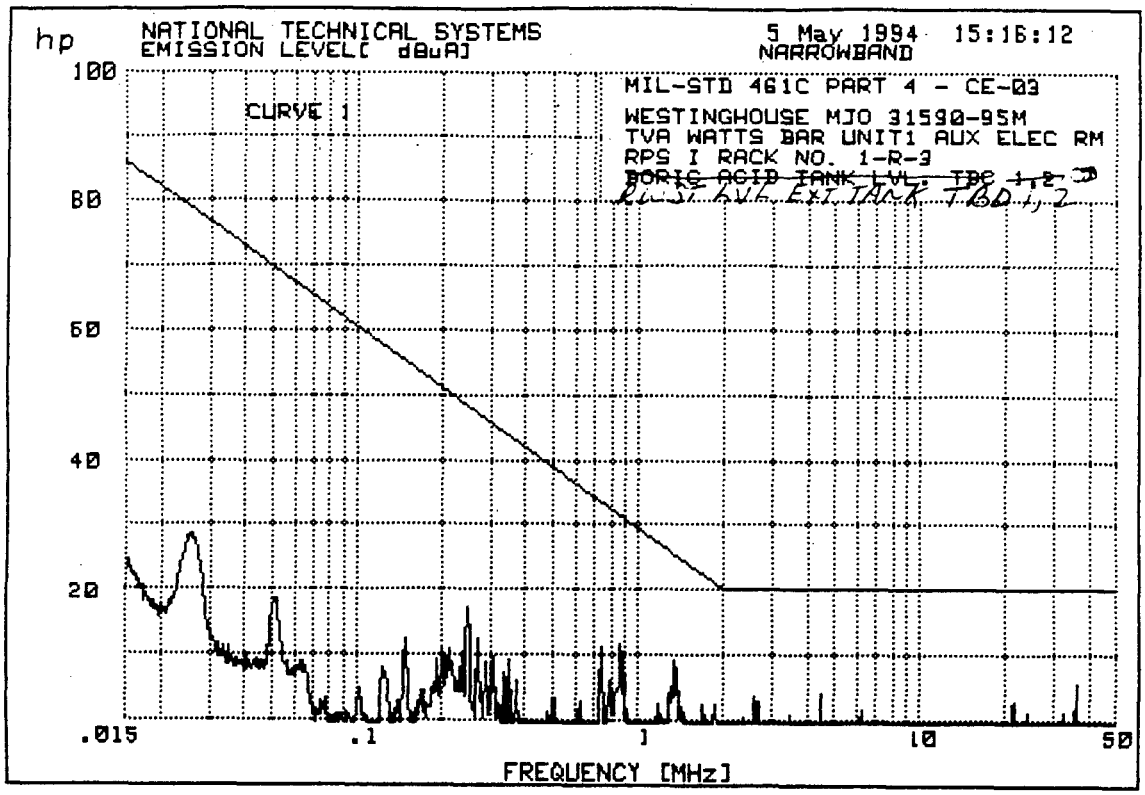
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 15:21:25
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-3
FW FLOW (AUX) TBB 1,2
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]

CB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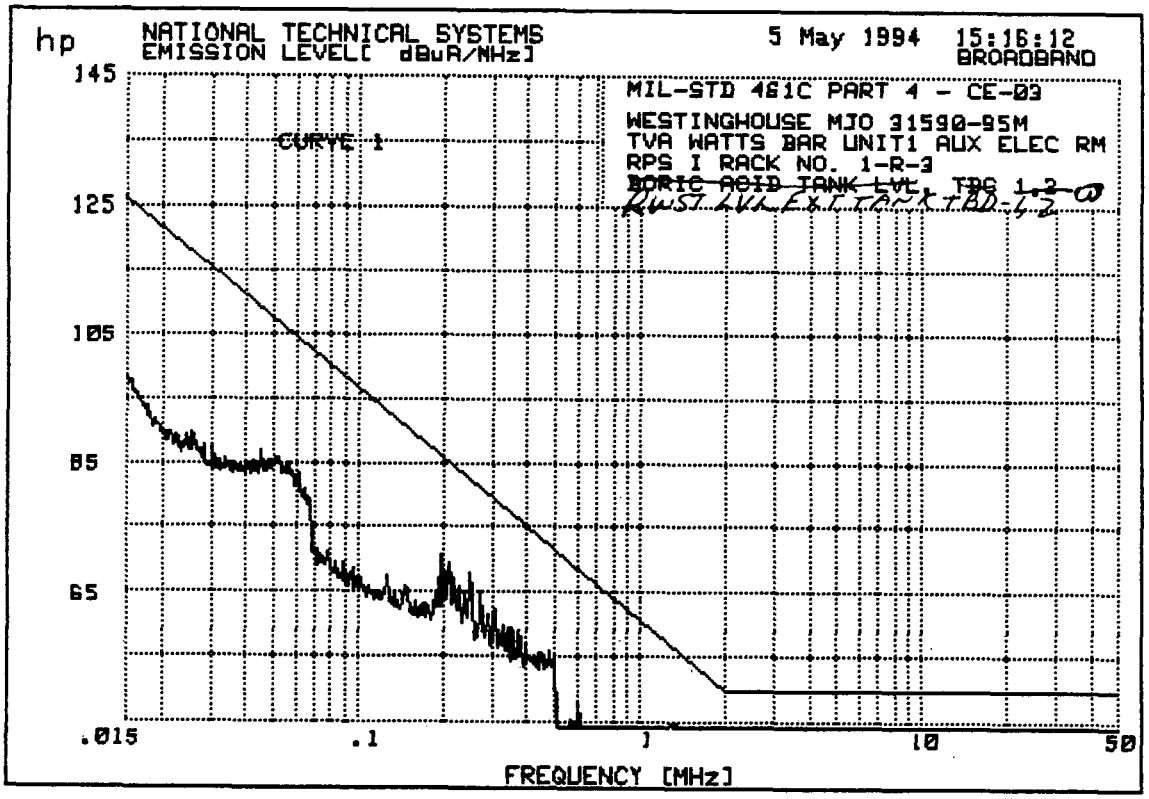
EMISSION LEVEL[dBuA]
5 May 1994 15:16:12
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-3
~~BORIC ACID TANK LVL~~ TBC 1,2
RWST LVL EXT TANK TBD 1,2
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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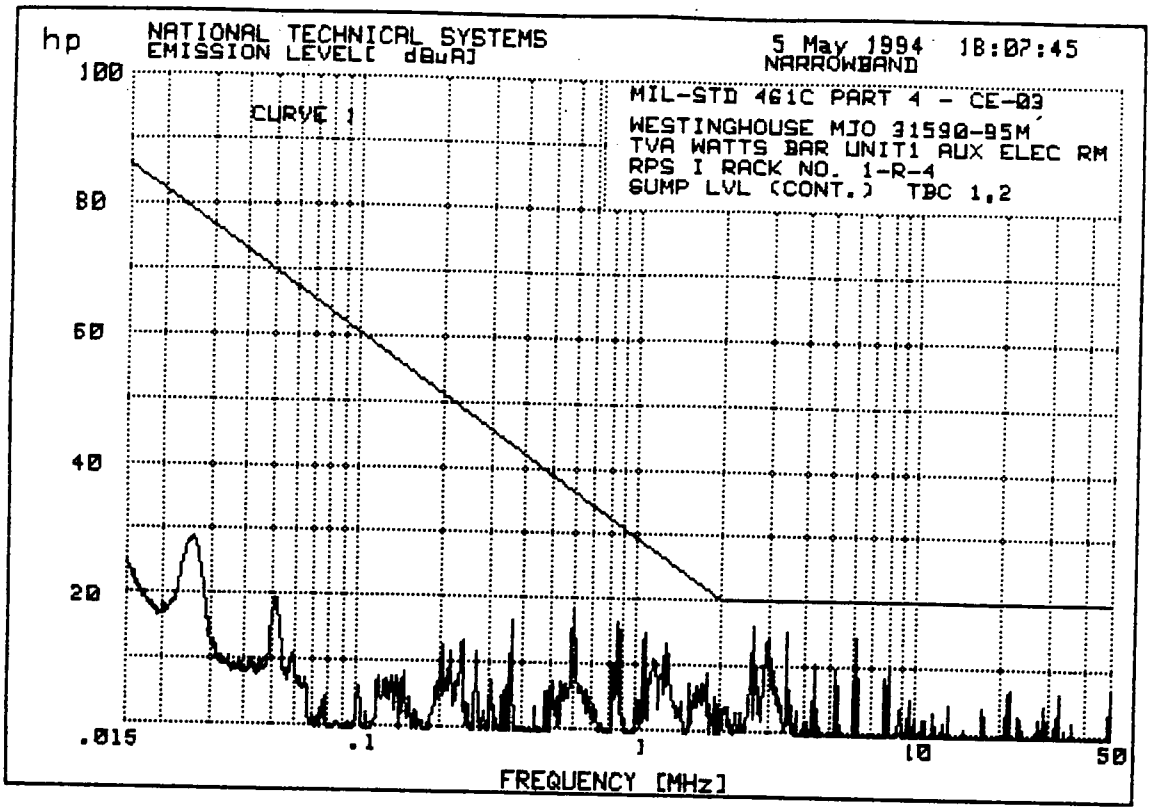
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 15:16:12
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-3
~~BORIC ACID TANK LVL~~ TBC 1,2
RWST LVL EXT TANK TBD 1,2
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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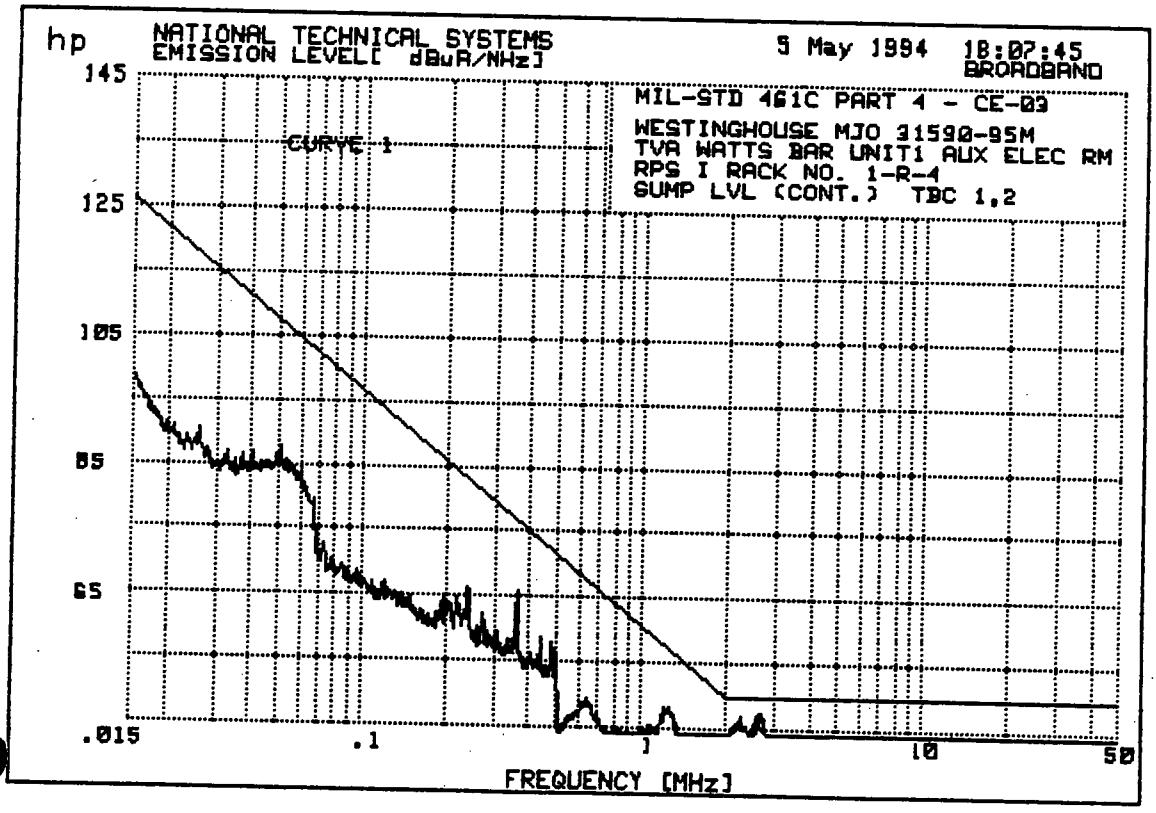
5 May 1994 18:07:45
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-4
SUMP LVL (CONT.) TBC 1,2
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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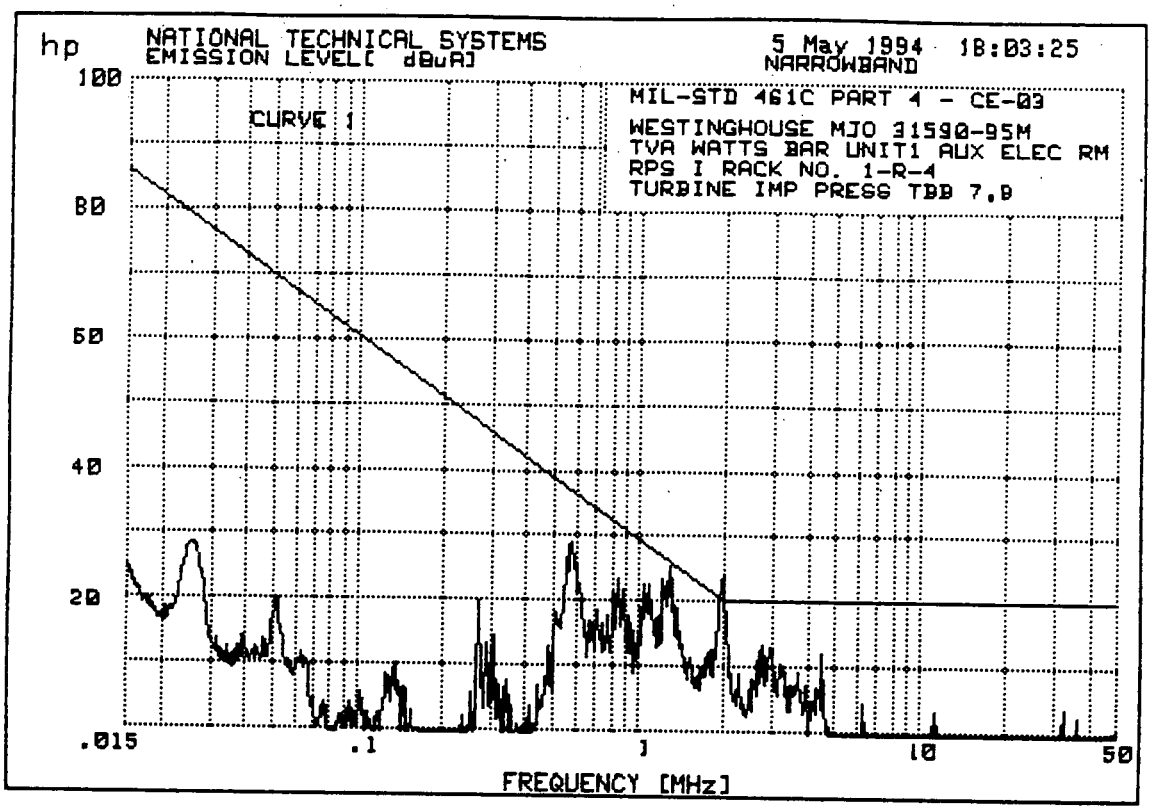
EMISSION LEVEL[dBuA/MHz]
5 May 1994 18:07:45
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-4
SUMP LVL (CONT.) TBC 1,2
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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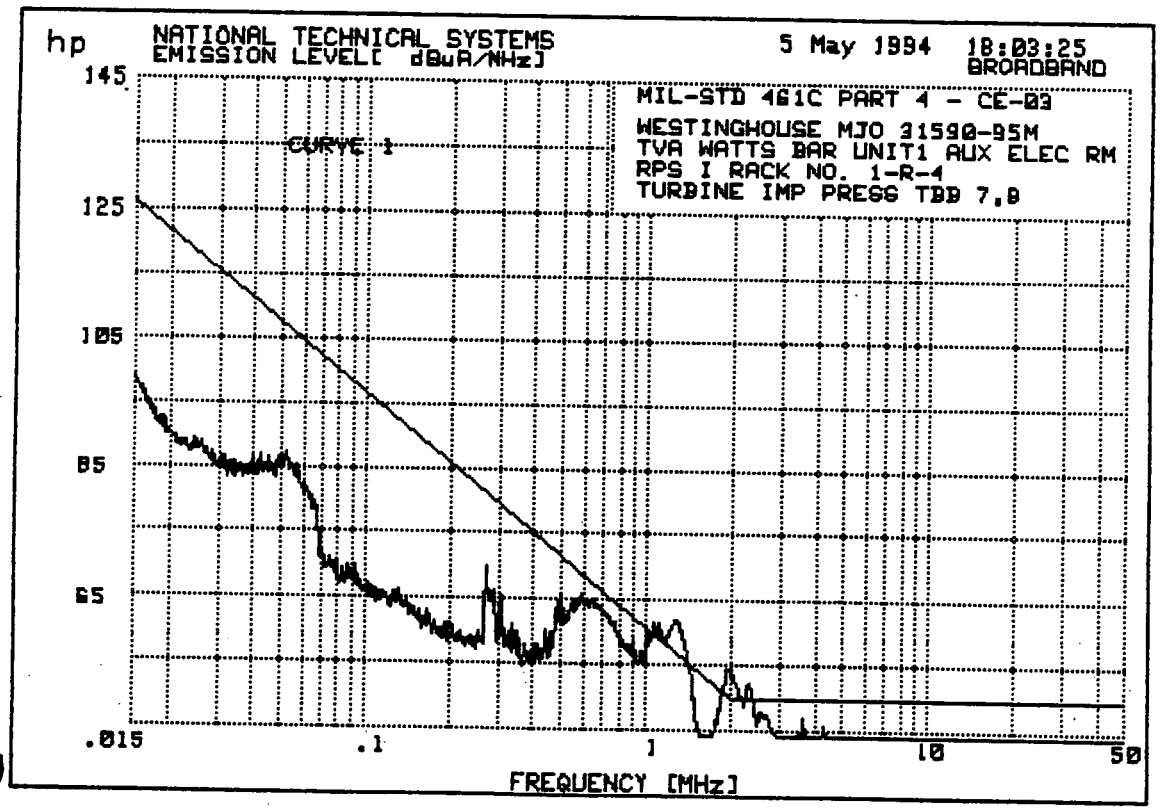
EMISSION LEVEL[dBuA]
5 May 1994 18:03:25
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-4
TURBINE IMP PRESS TBB 7,8
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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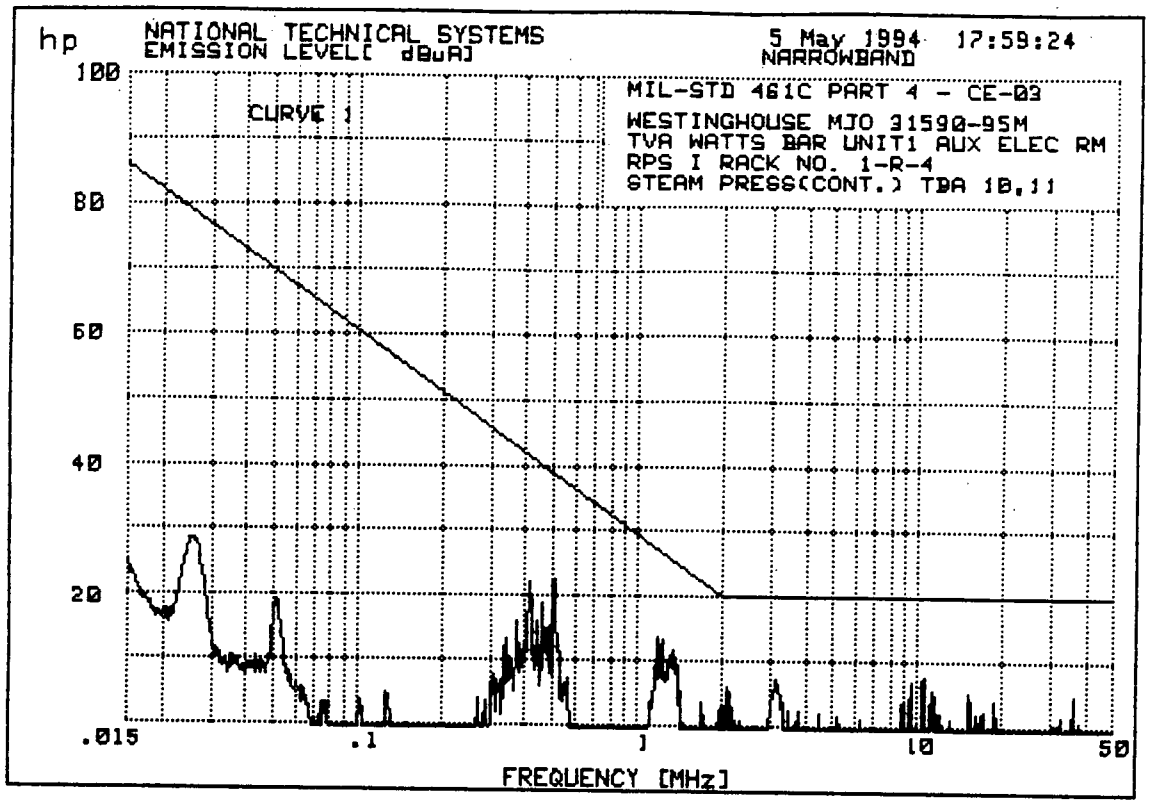
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 18:03:25
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-4
TURBINE IMP PRESS TBB 7,8
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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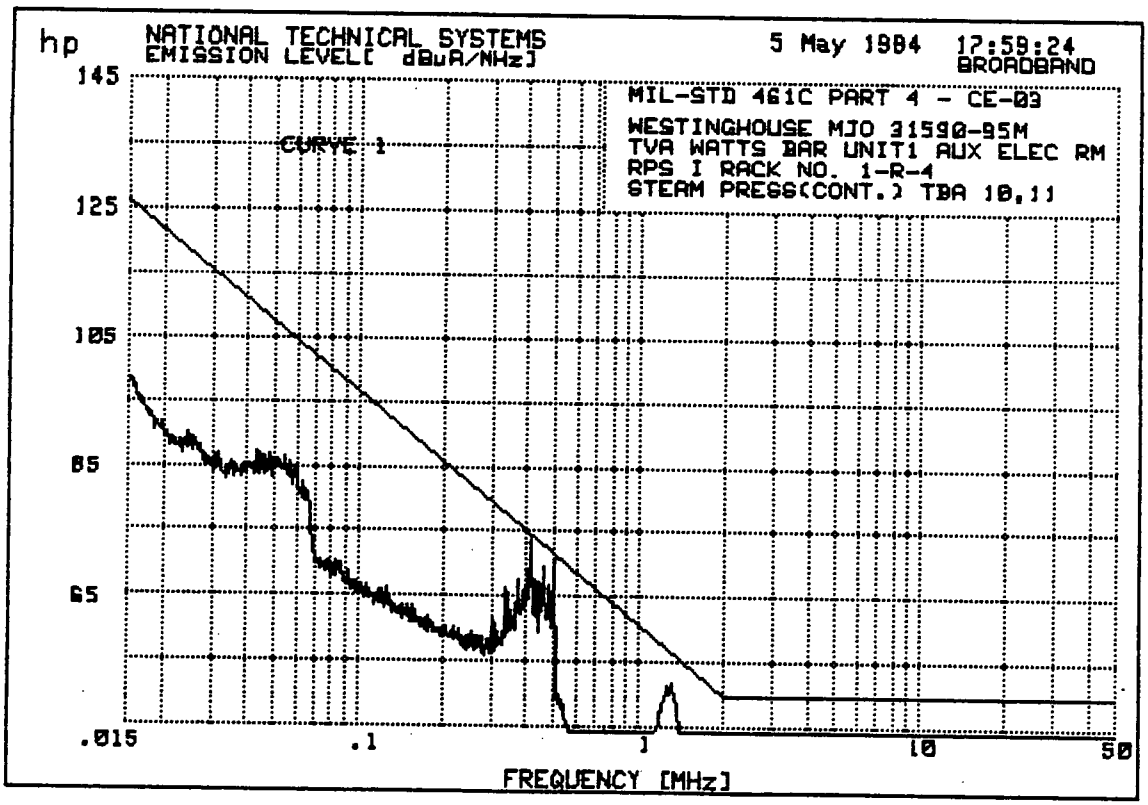
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 17:59:24
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-4
STEAM PRESS(CONT.) TBA 10,11
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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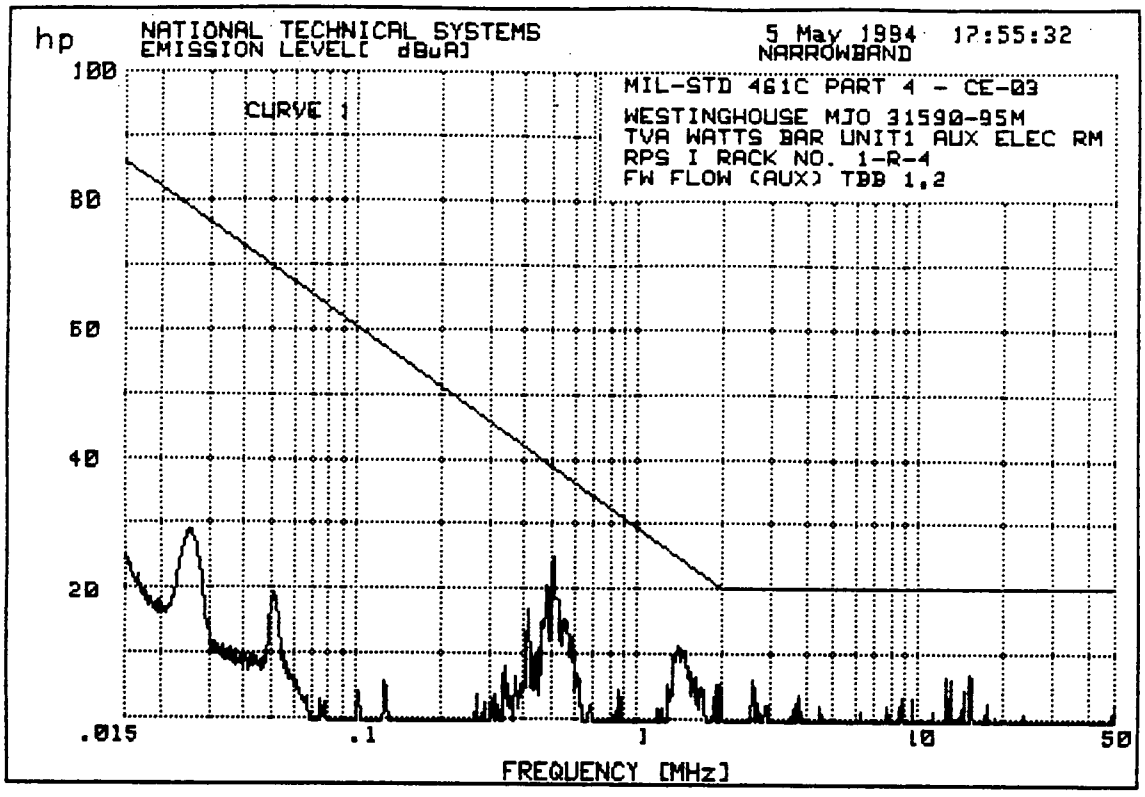
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 17:59:24
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-4
STEAM PRESS(CONT.) TBA 10,11
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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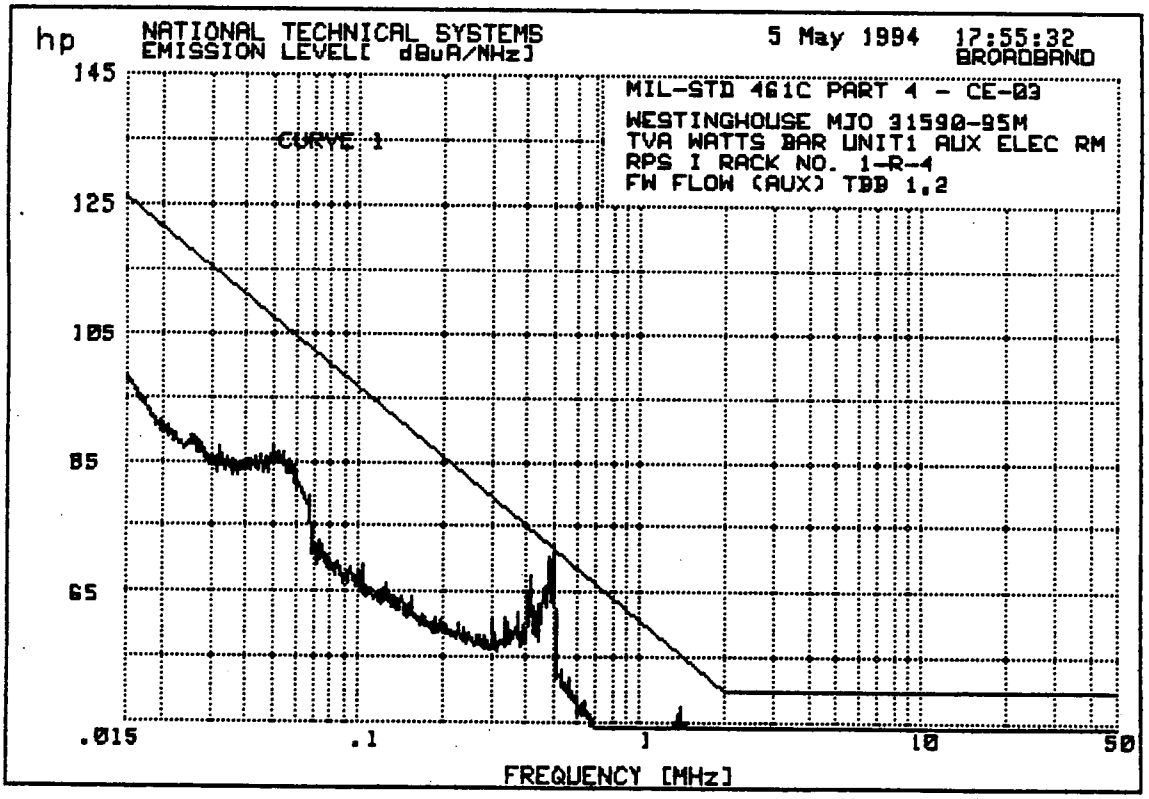
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 17:55:32
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-4
FW FLOW (AUX) TBB 1,2
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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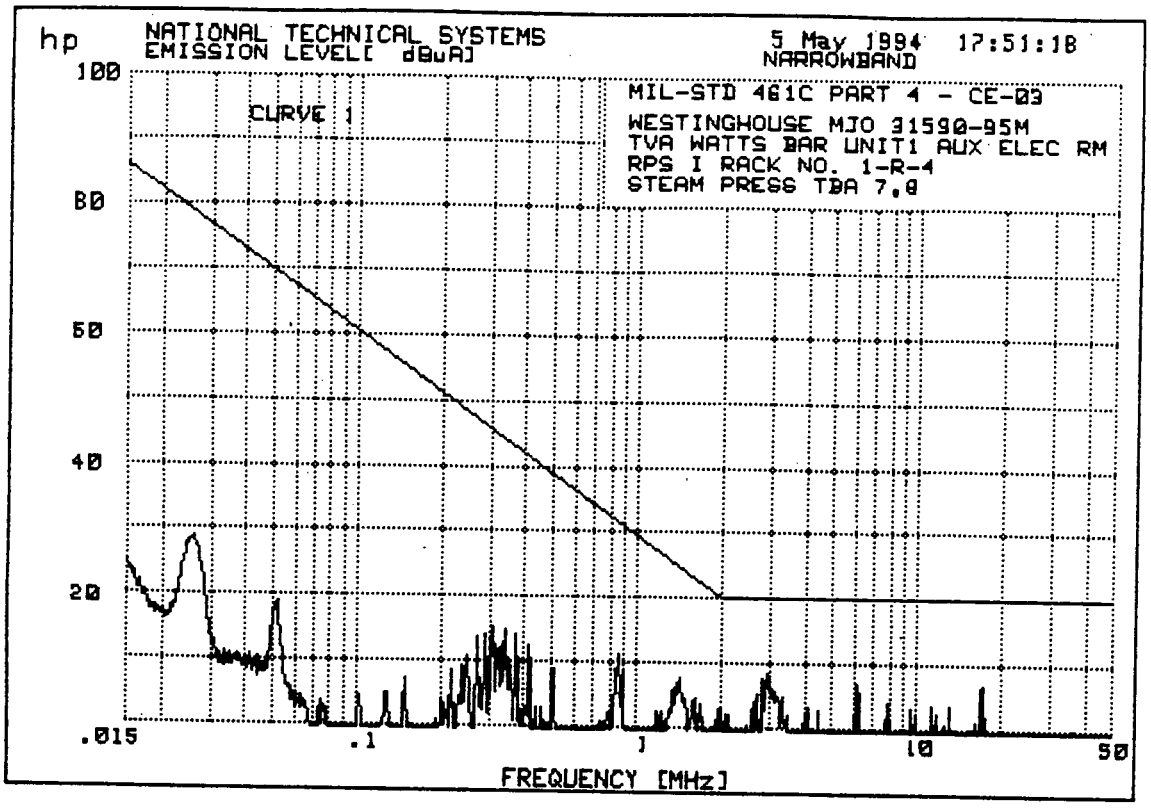
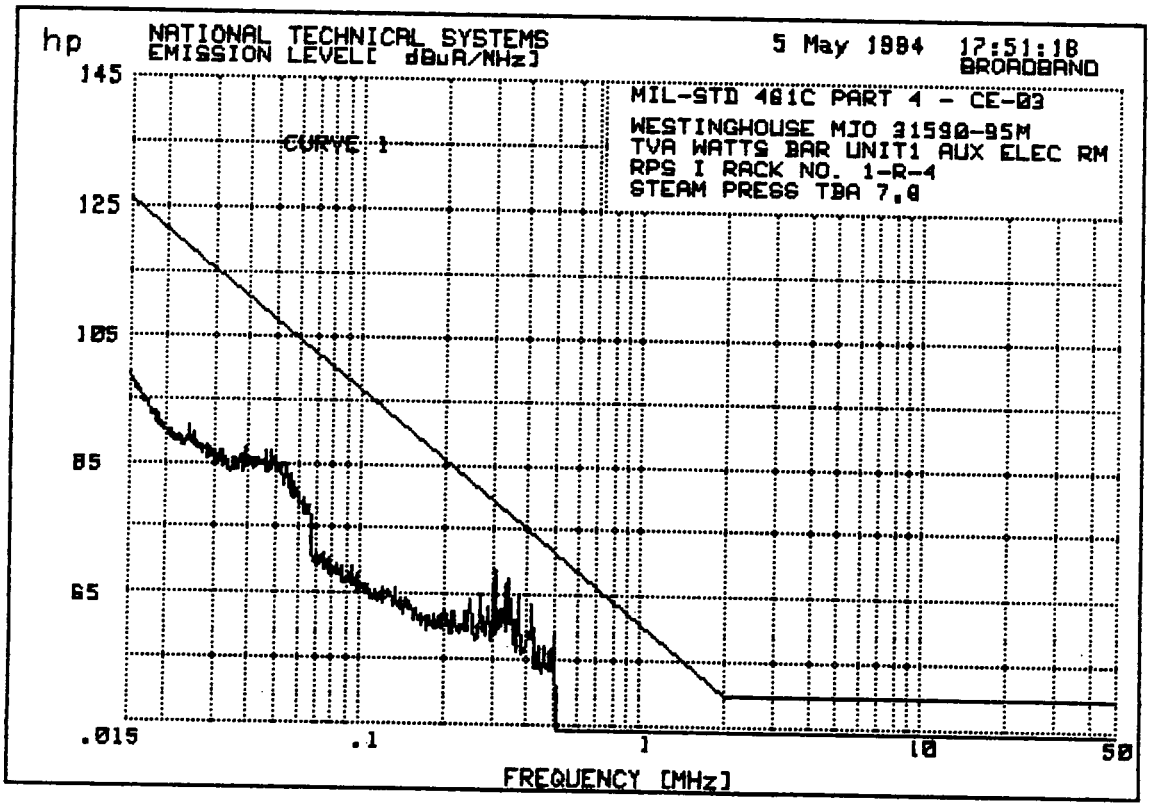
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 17:55:32
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-4
FW FLOW (AUX) TBB 1,2
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 17:51:18
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-4
STEAM PRESS TBA 7.0
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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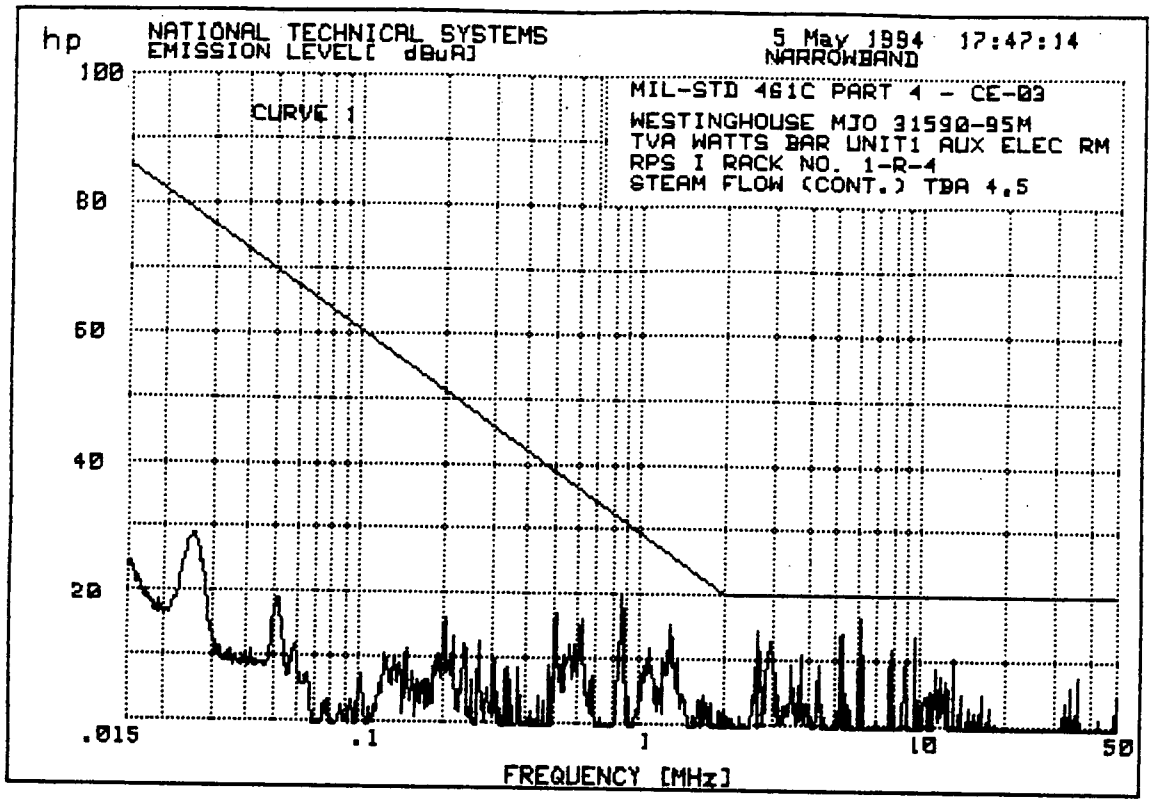
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 17:51:18
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-4
STEAM PRESS TBA 7.0
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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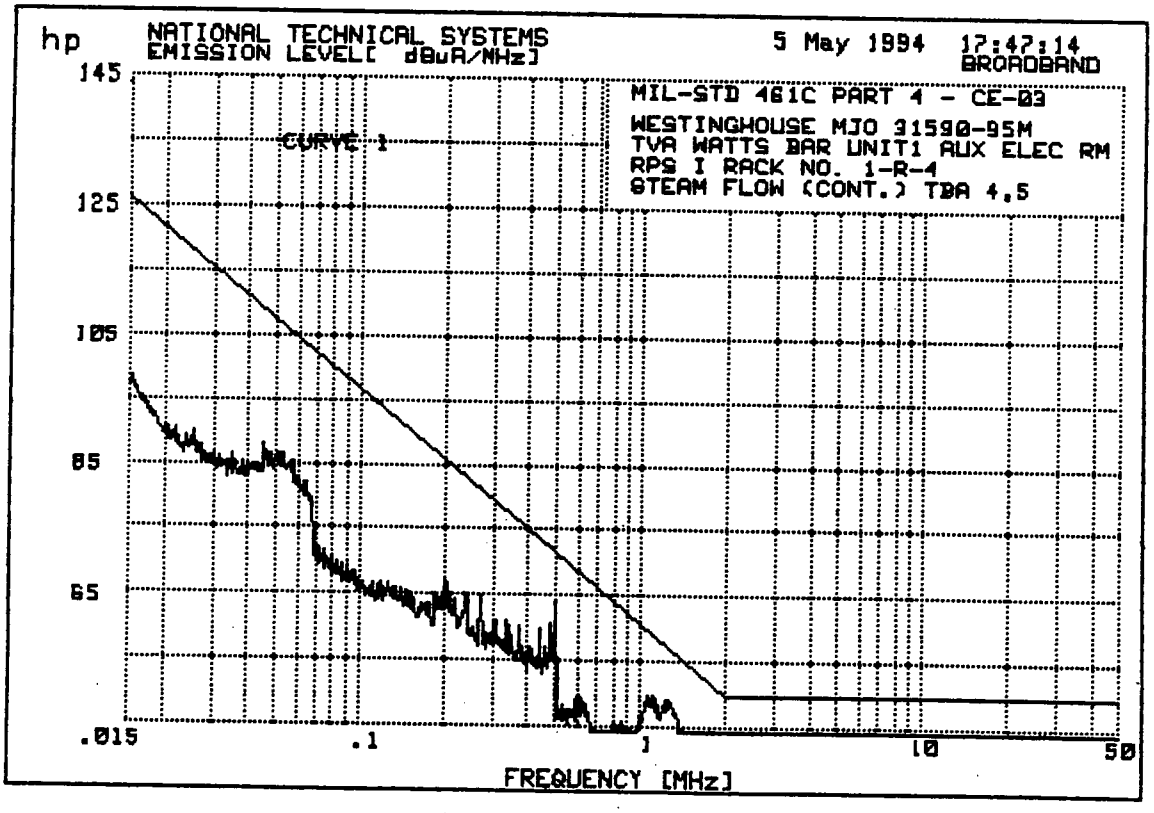
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 17:47:14
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-4
STEAM FLOW (CONT.) TBA 4.5
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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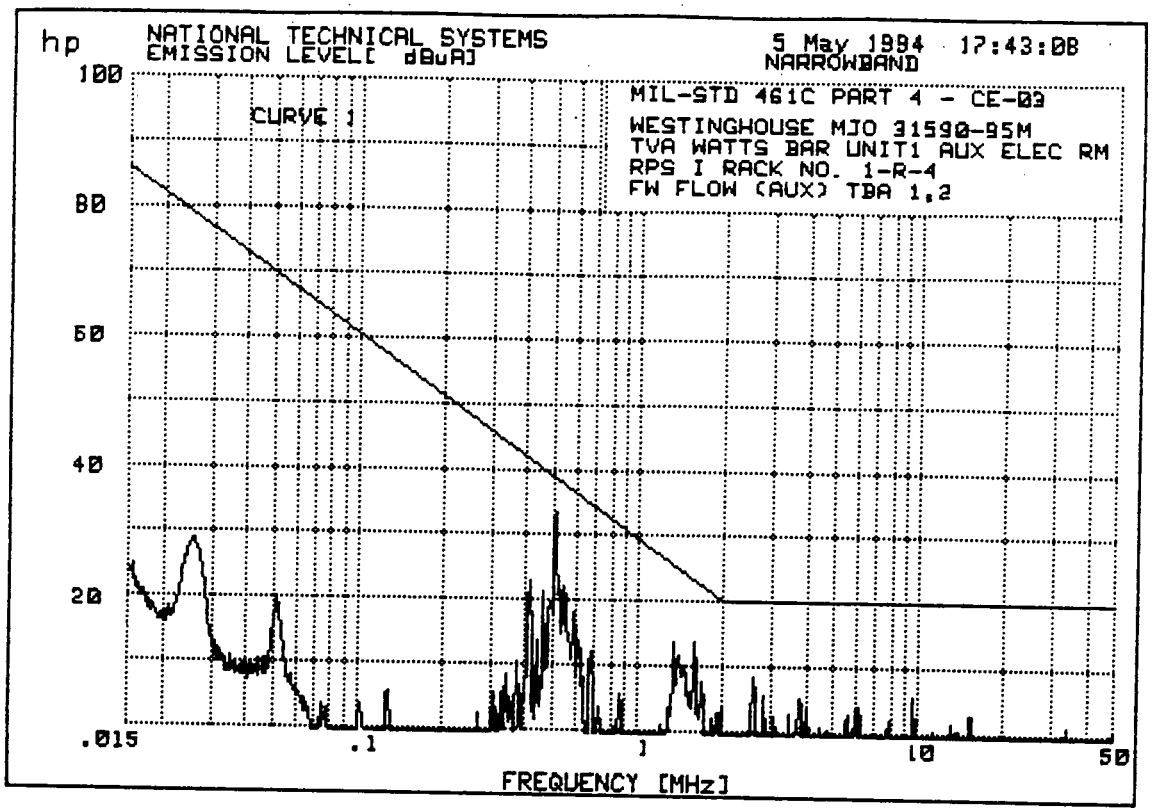
EMISSION LEVEL[dBuA/MHz]
5 May 1994 17:47:14
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-4
STEAM FLOW (CONT.) TBA 4.5
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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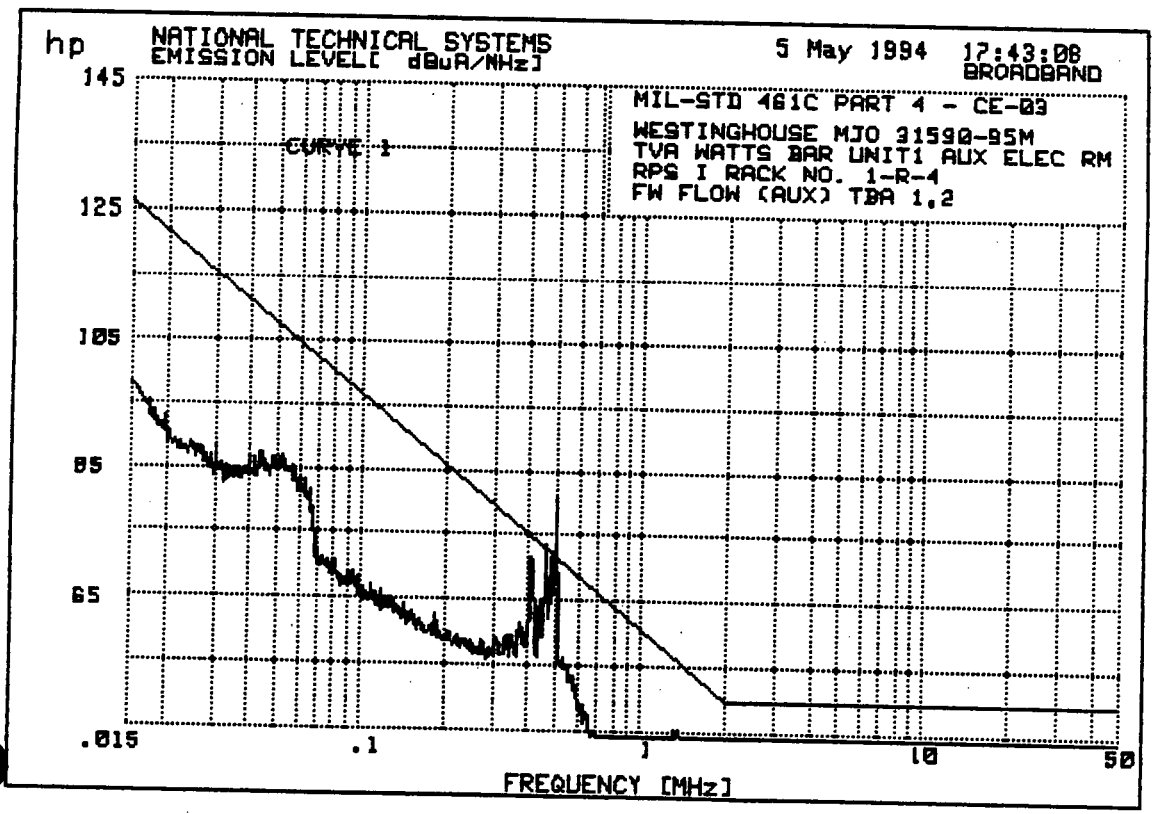
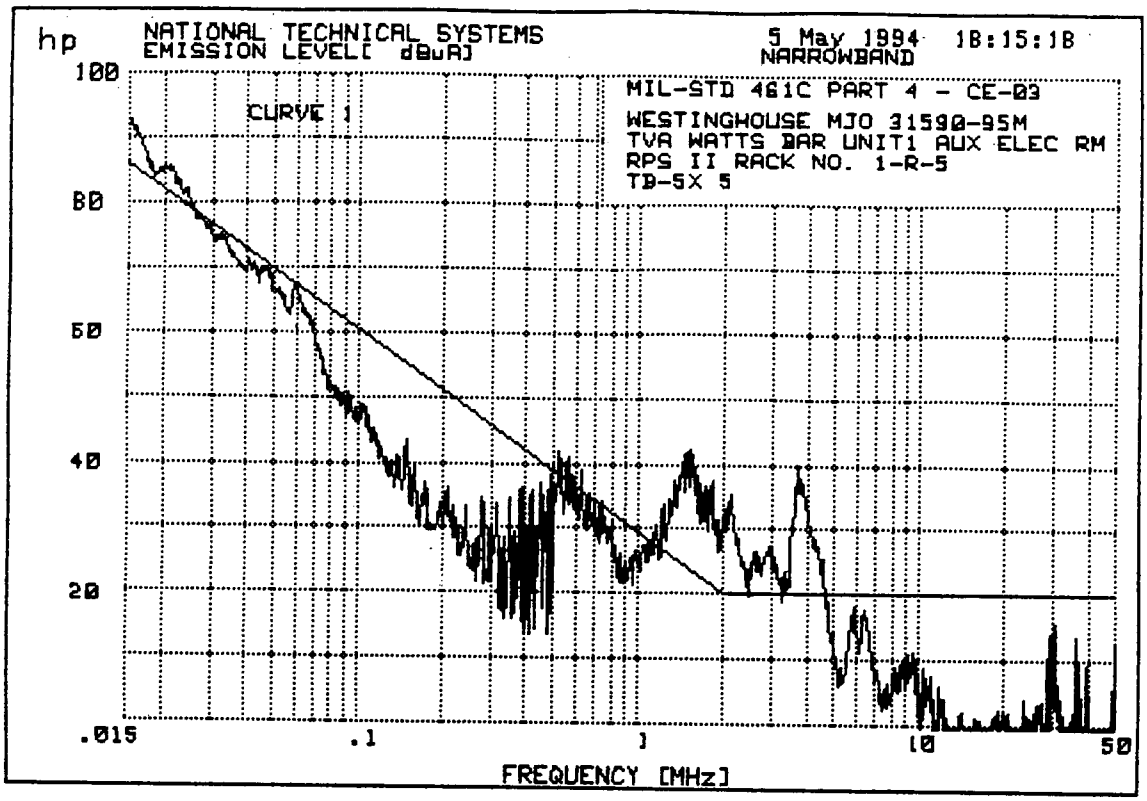
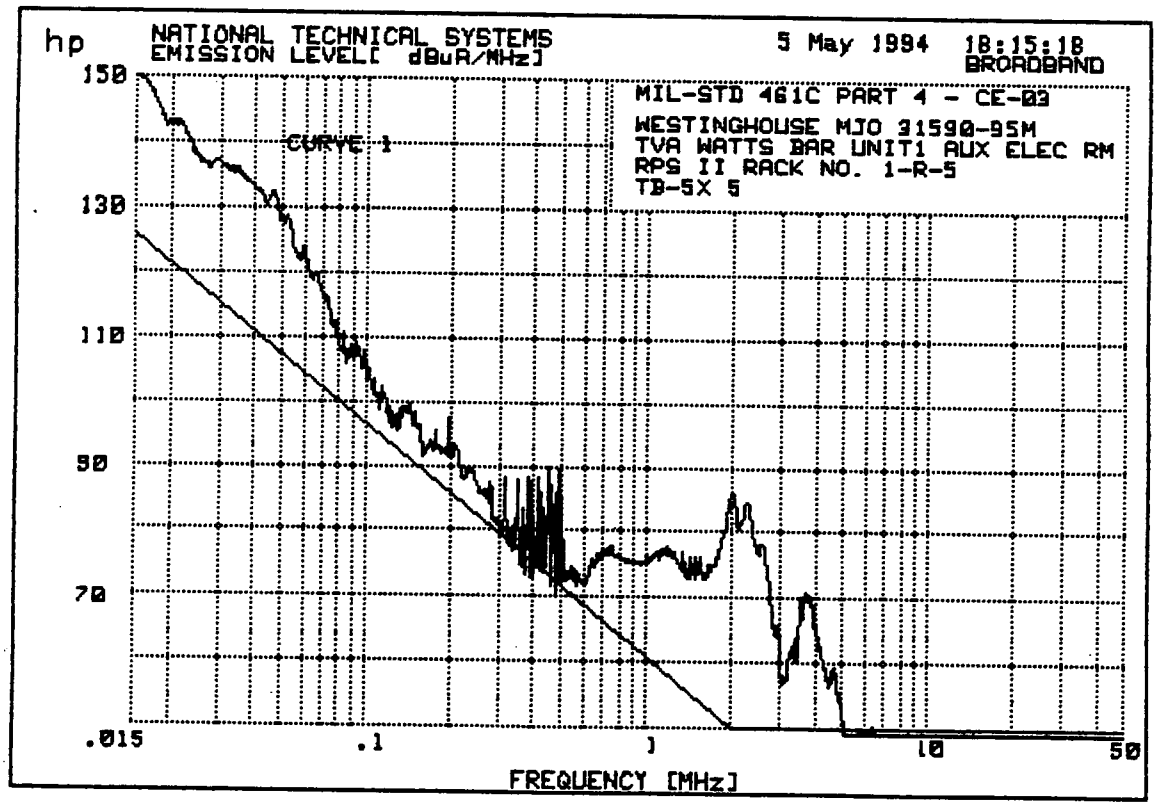
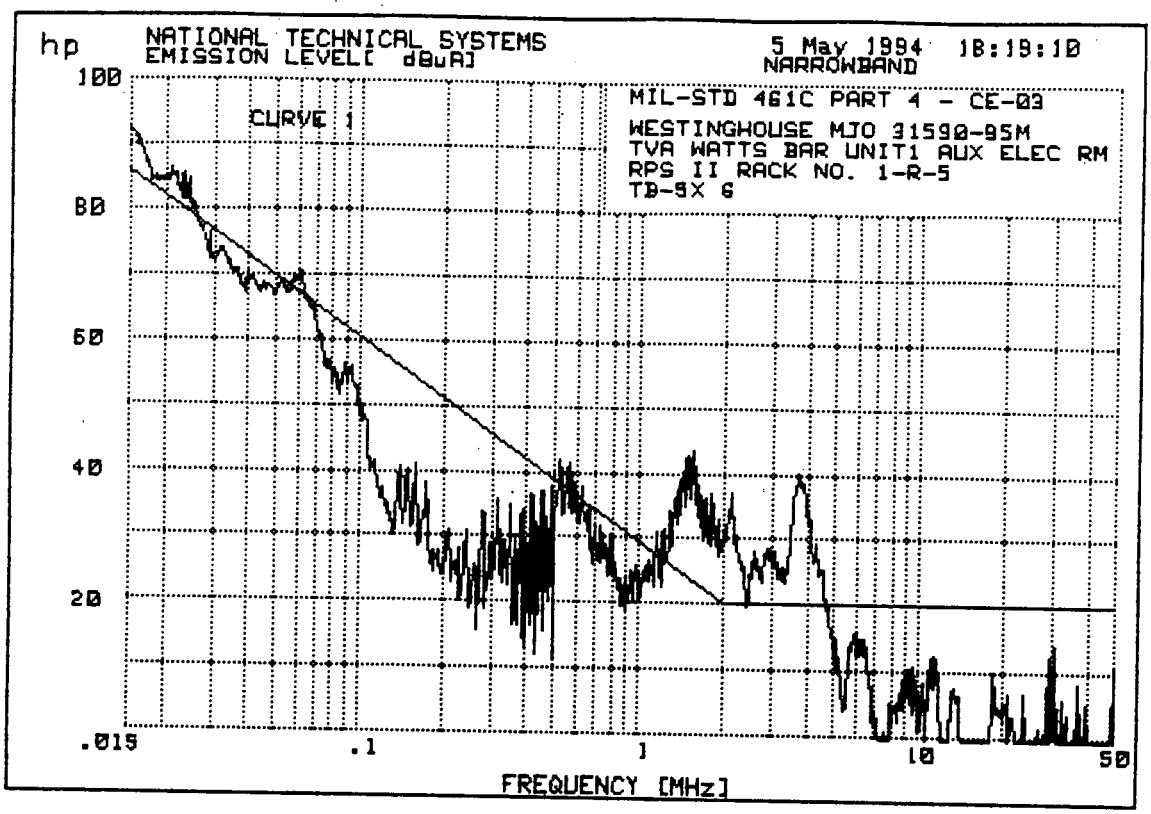
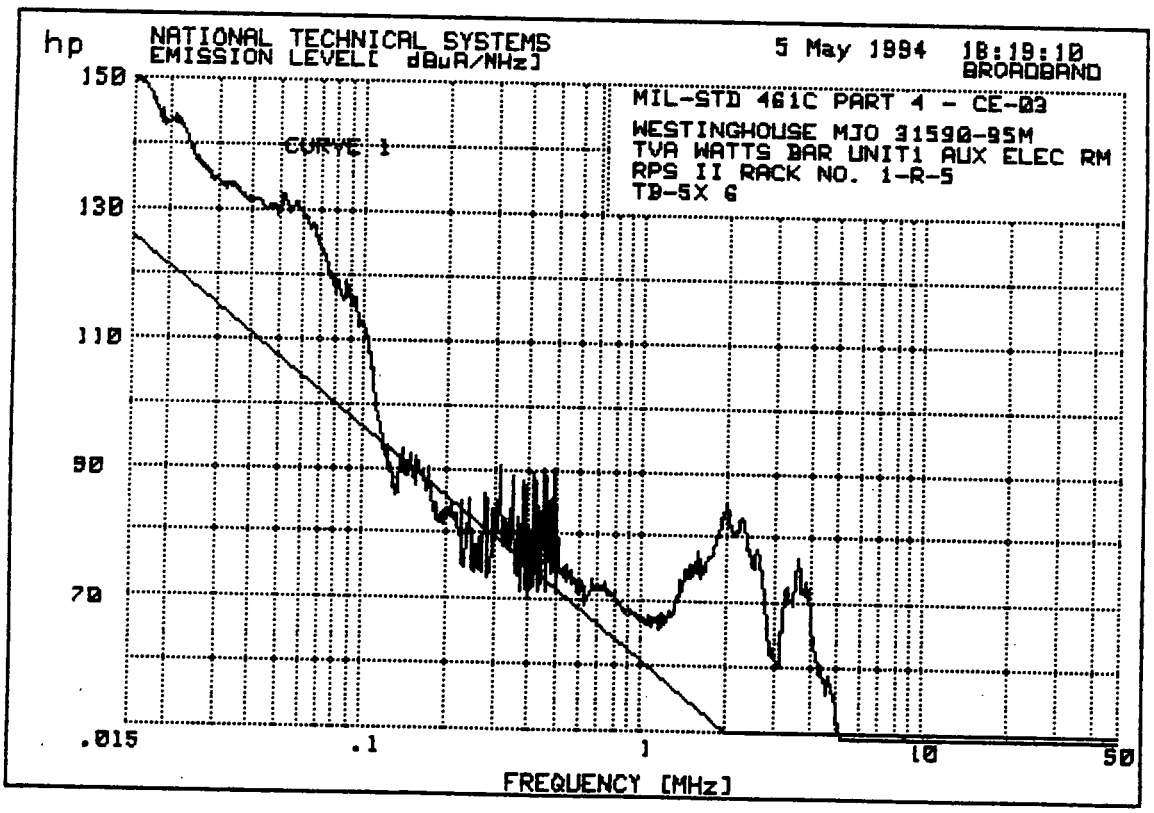
EMISSION LEVEL[dBuA]
5 May 1994 17:43:08
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-4
FW FLOW (AUX) TBA 1,2
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]

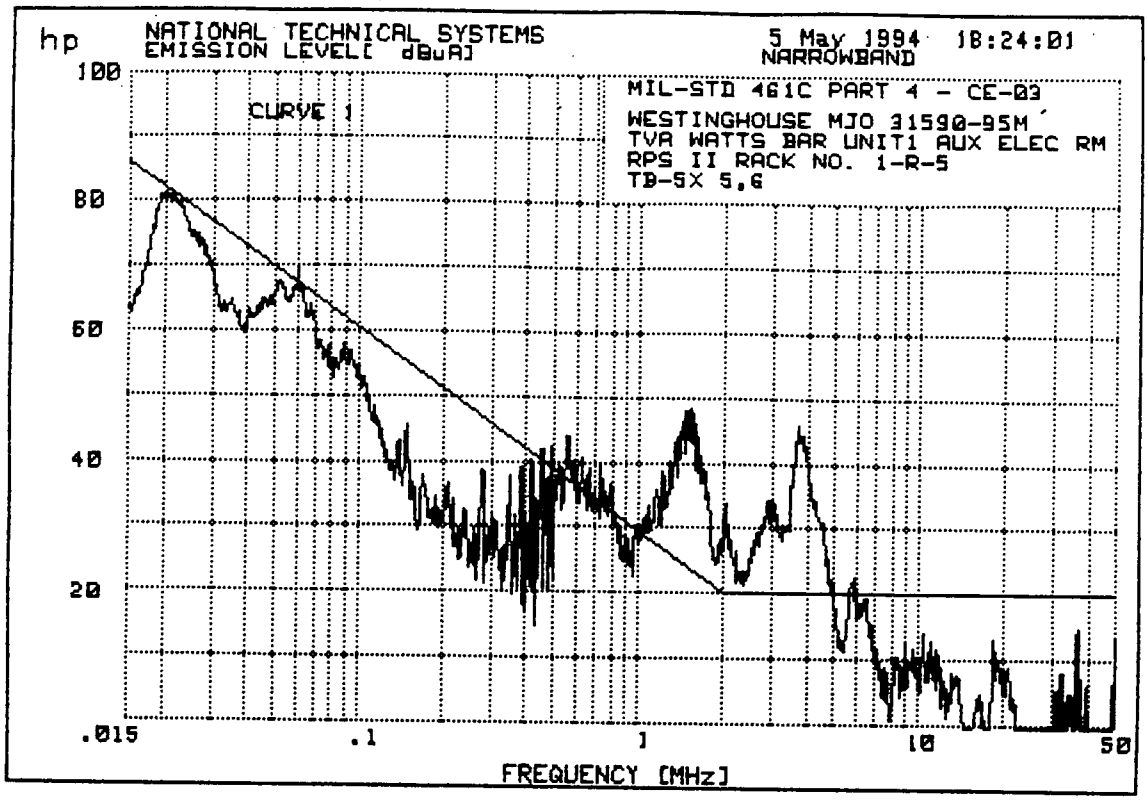

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 17:43:08
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS I RACK NO. 1-R-4
FW FLOW (AUX) TBA 1,2
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]

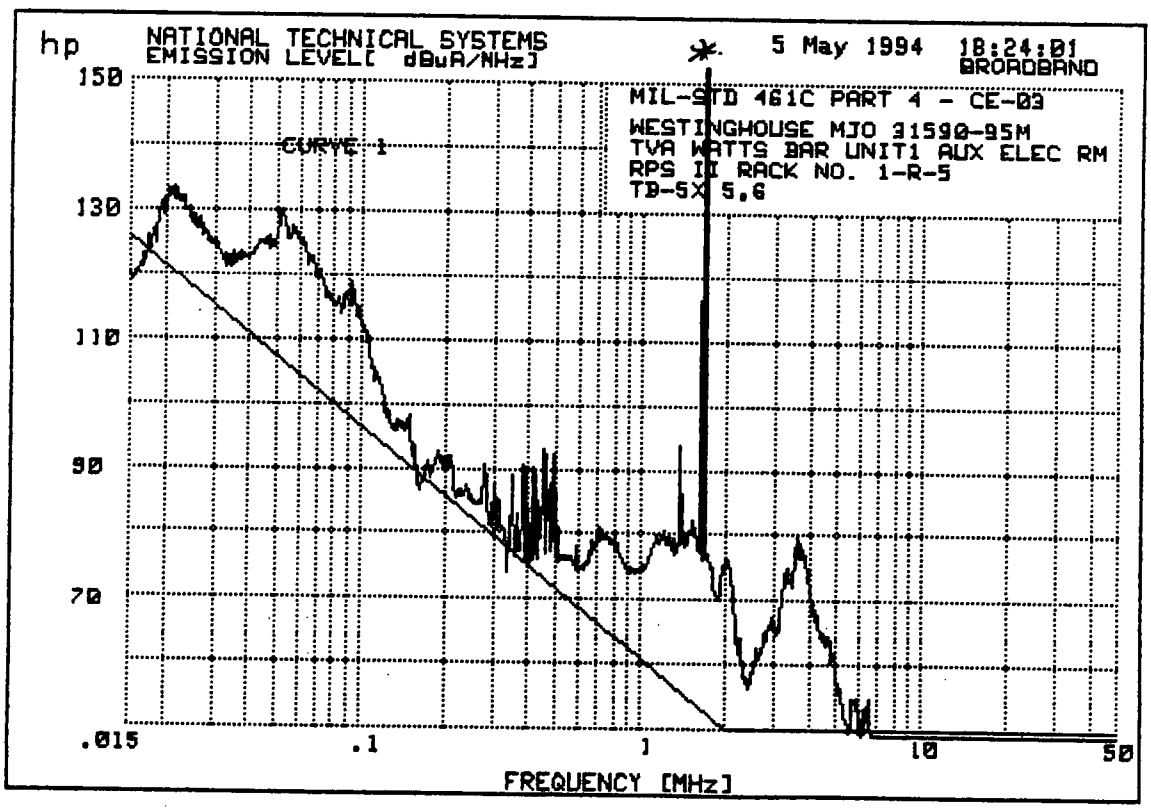

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 18:15:18
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-5
TB-5X 5
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 18:15:18
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-5
TB-5X 5
CURVE 1
150
130
110
90
70
.015
.1
1
10
50
FREQUENCY [MHz]

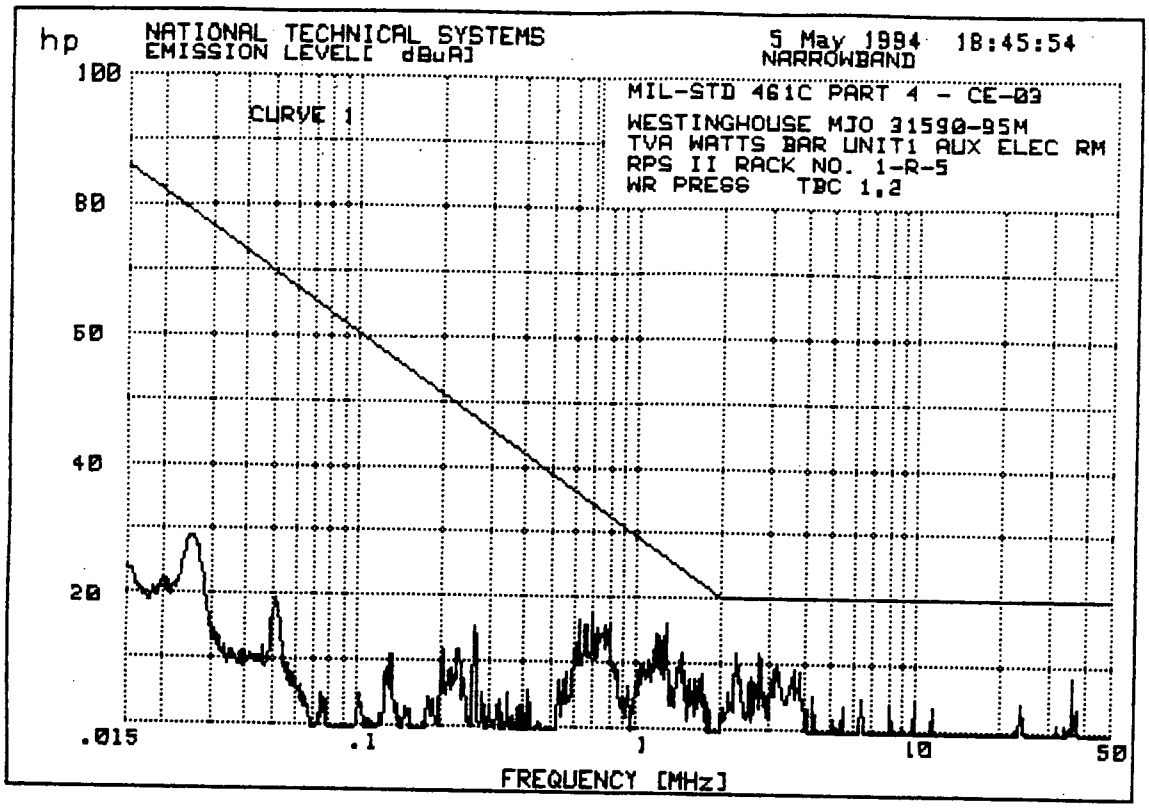

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 18:19:10
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-5
TB-5X 6
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]

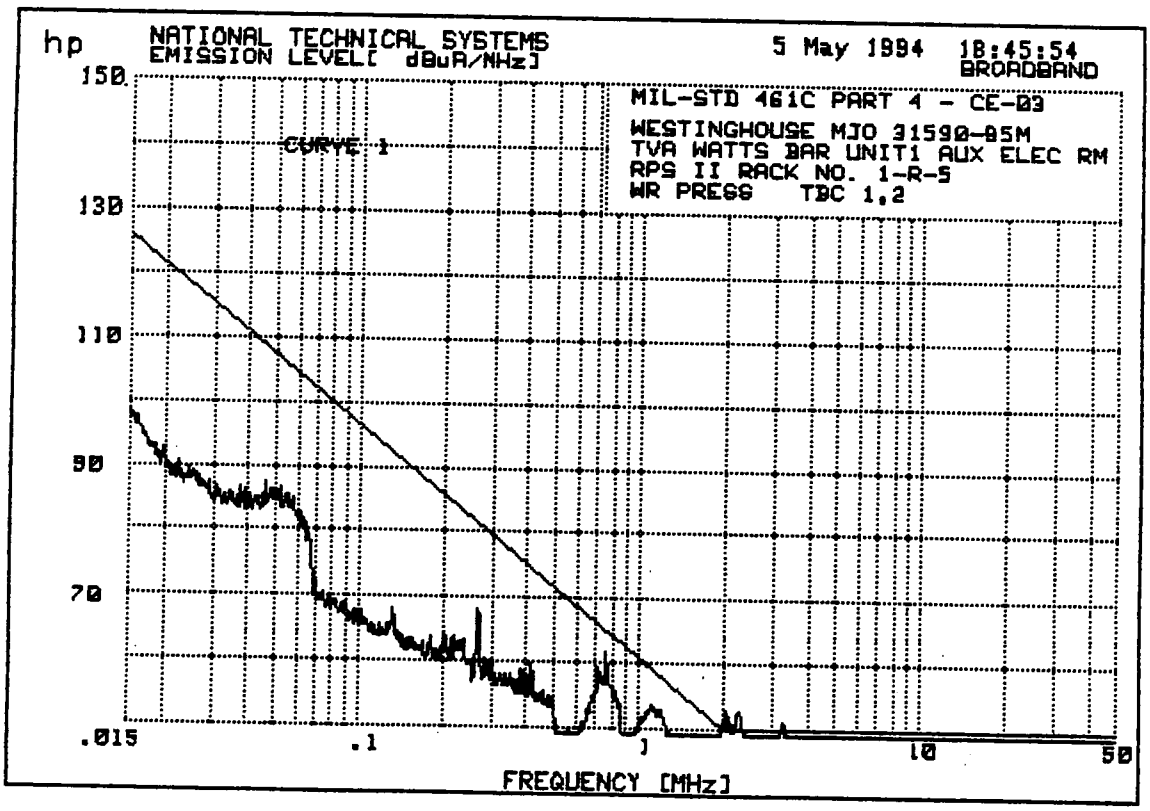

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 18:19:10
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-5
TB-5X 6
CURVE 1
150
130
110
90
70
.015
.1
1
10
50
FREQUENCY [MHz]

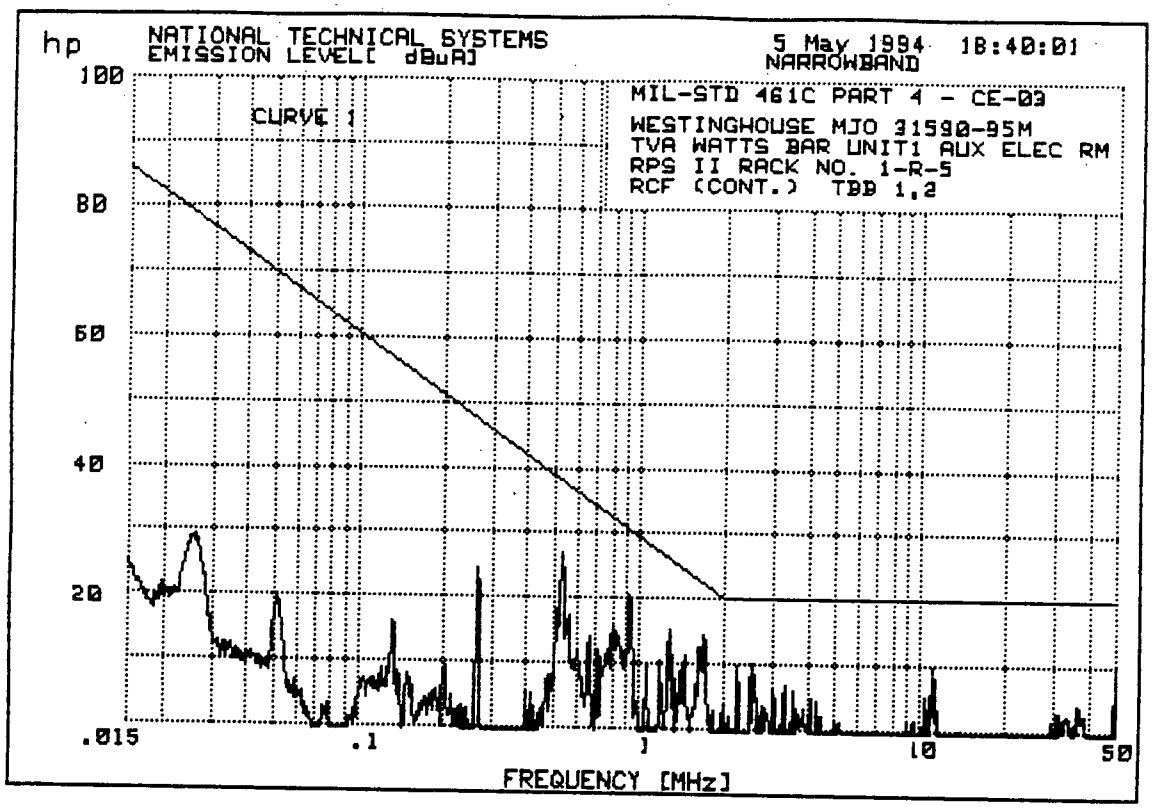




*This transient occured during testing approximately 3½ minutes after date/time as stated above.


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 18:45:54
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-85M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-5
WR PRESS TBC 1,2
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 18:45:54
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-85M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-5
WR PRESS TBC 1,2
CURVE 1
150
130
110
90
70
.015
.1
1
10
50
FREQUENCY [MHz]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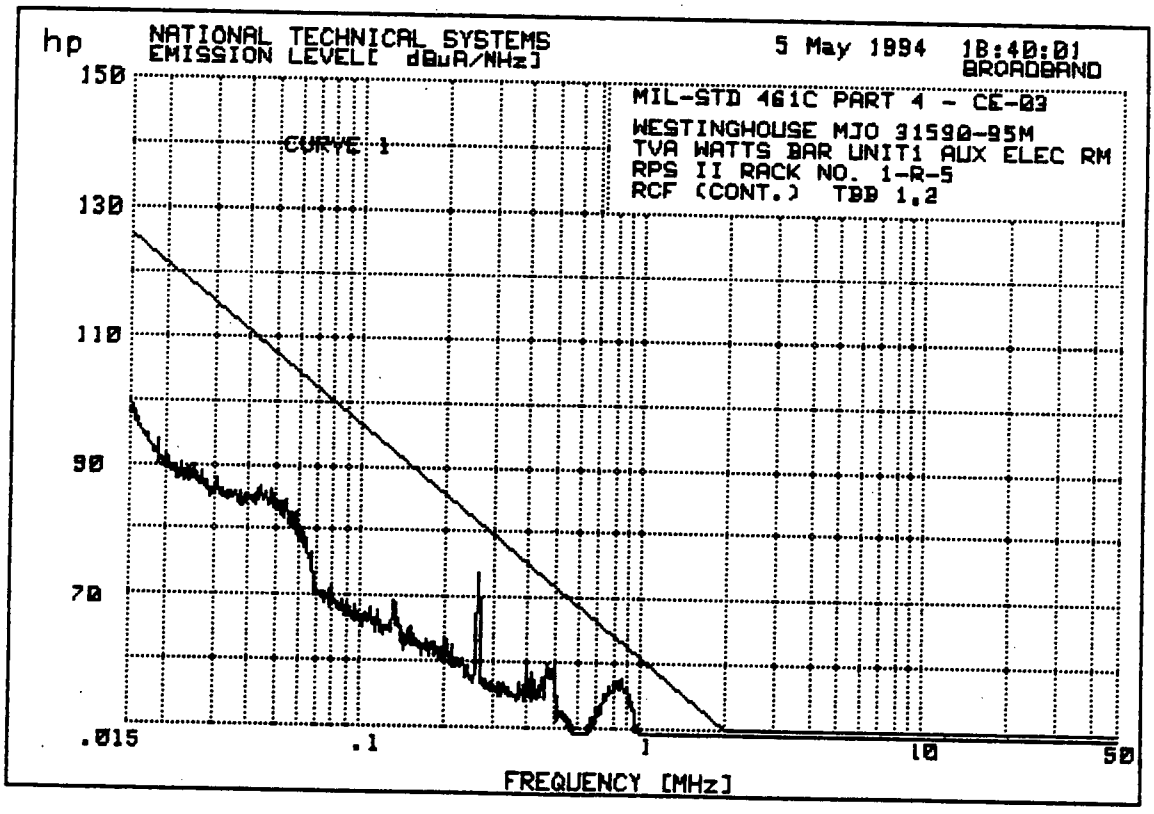
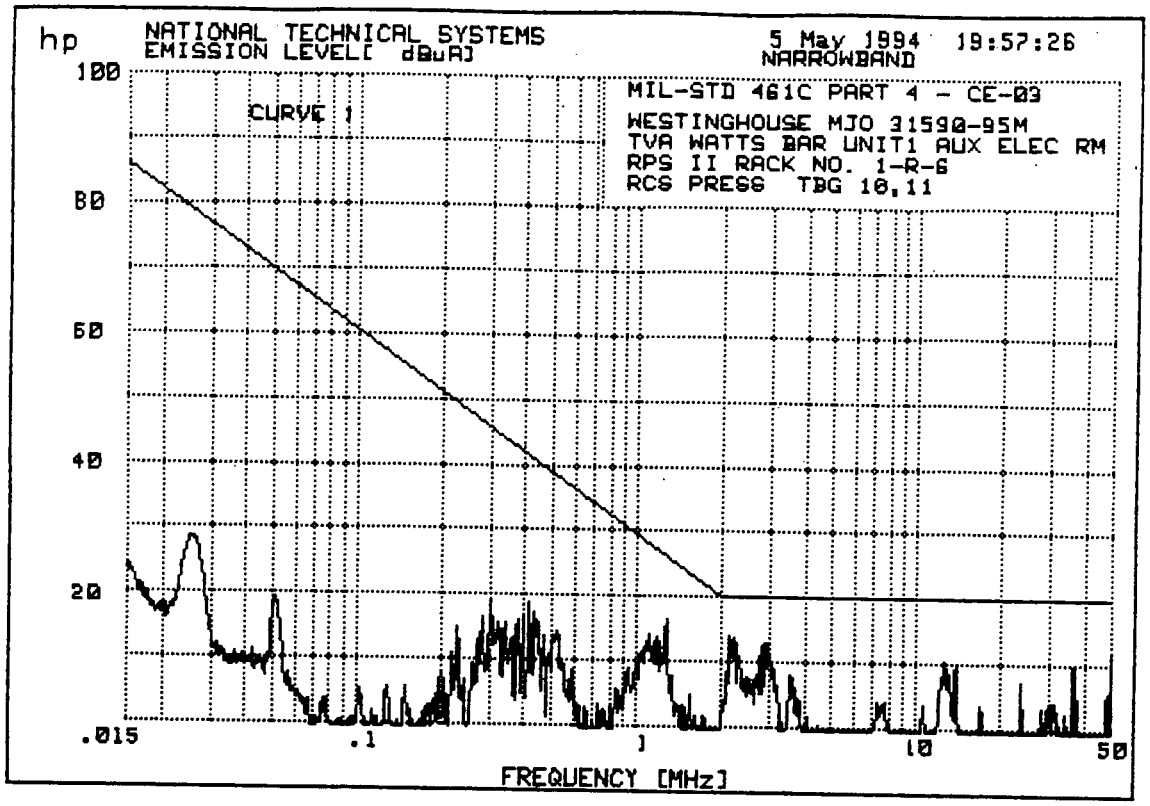
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 18:40:01
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-5
RCF (CONT.) TBD 1,2
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 18:40:01
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-5
RCF (CONT.) TBD 1,2
CURVE 1
150
130
110
90
70
.015
.1
1
10
50
FREQUENCY [MHz]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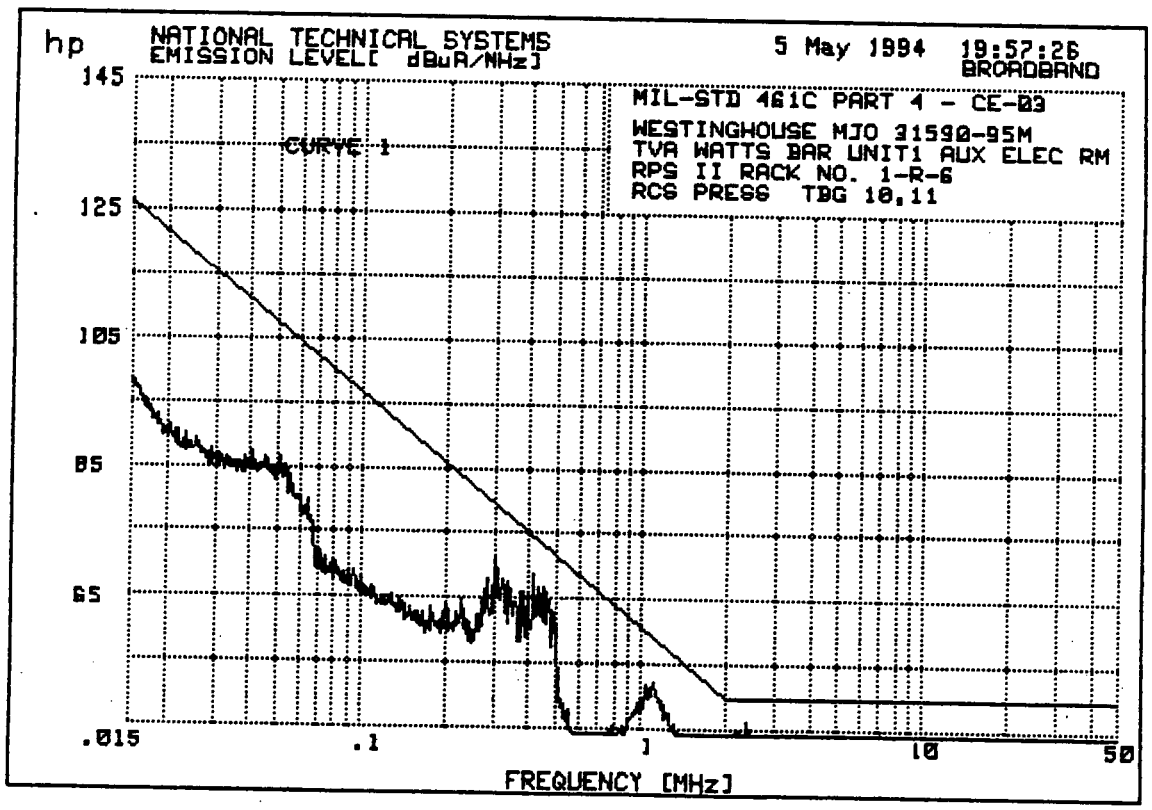
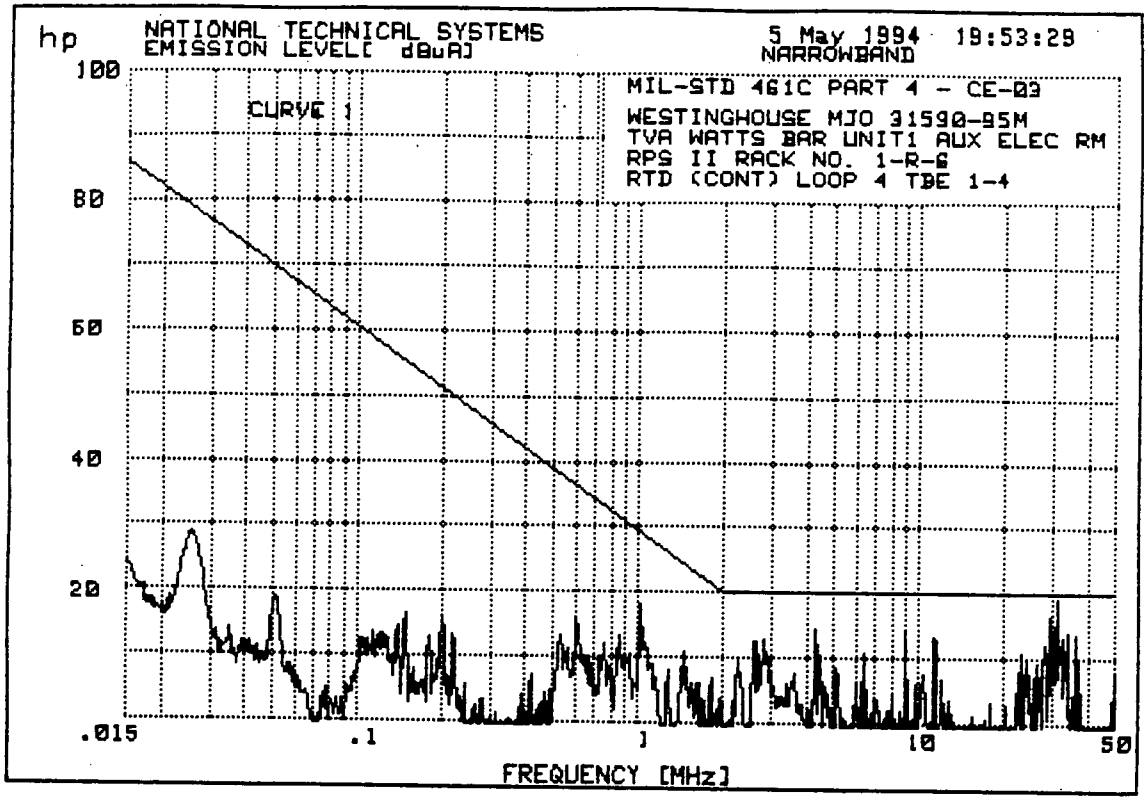
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 19:57:26
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-6
RCS PRESS TBG 10,11
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 19:57:26
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-6
RCS PRESS TBG 10,11
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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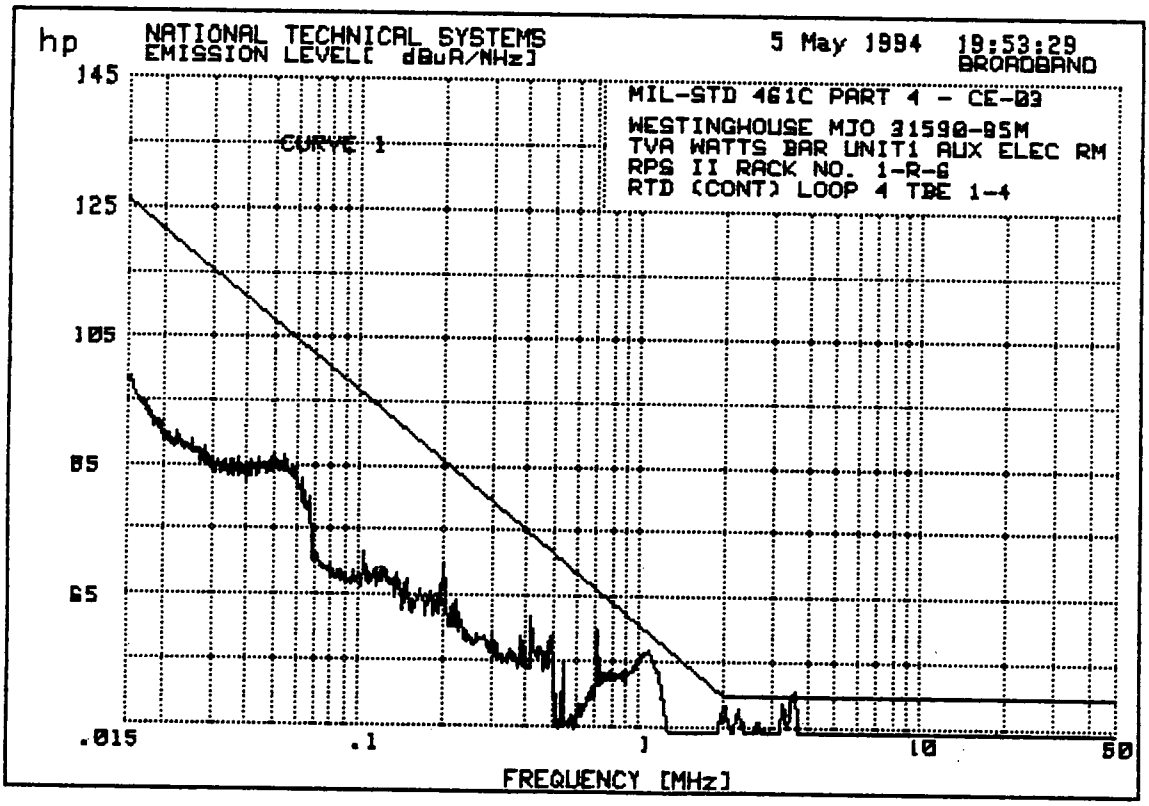
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 19:53:28
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-6
RTD (CONT) LOOP 4 TBE 1-4
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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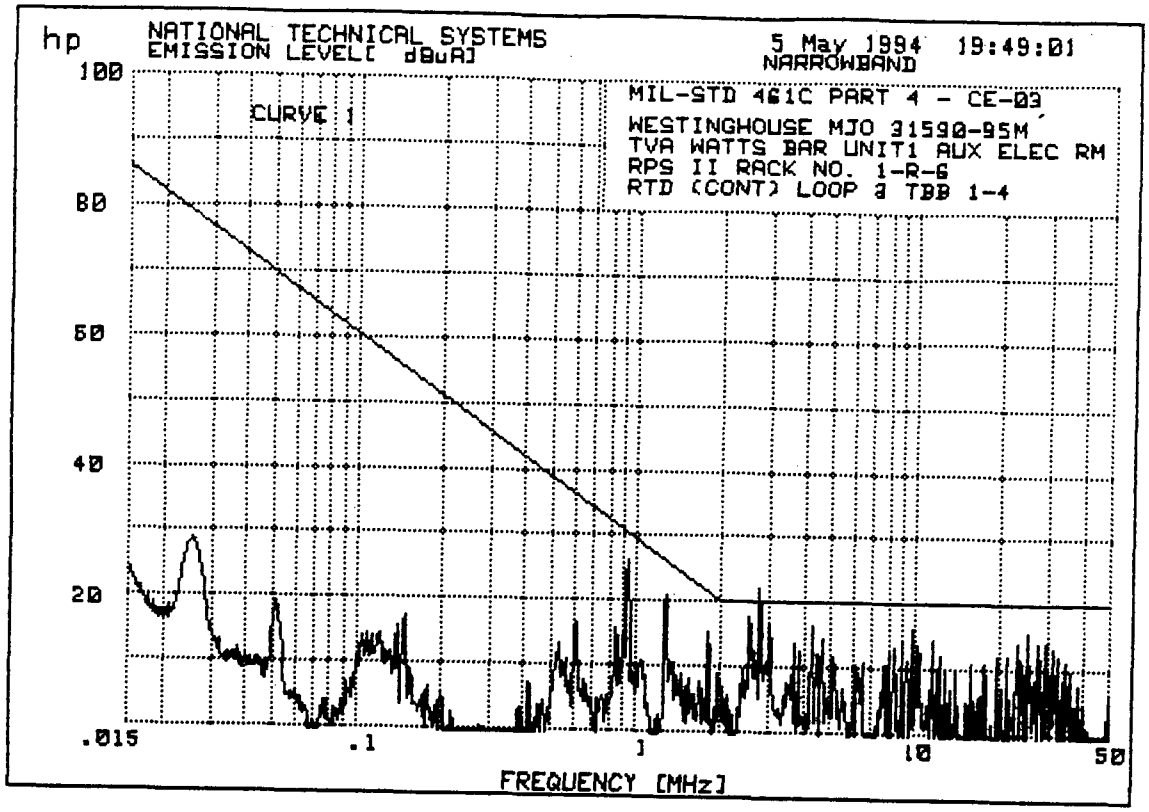
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 19:53:29
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-6
RTD (CONT) LOOP 4 TBE 1-4
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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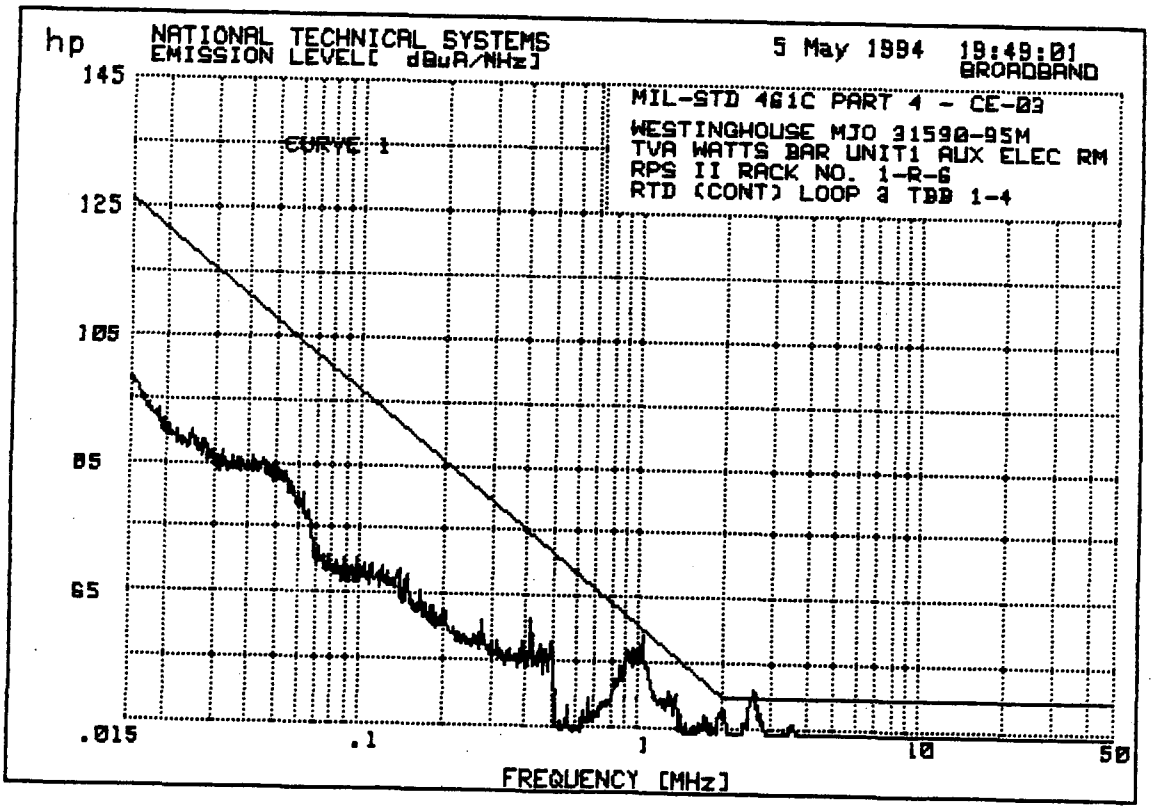
EMISSION LEVEL[dBuA]
5 May 1994 19:49:01
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-6
RTD (CONT) LOOP 3 TBB 1-4
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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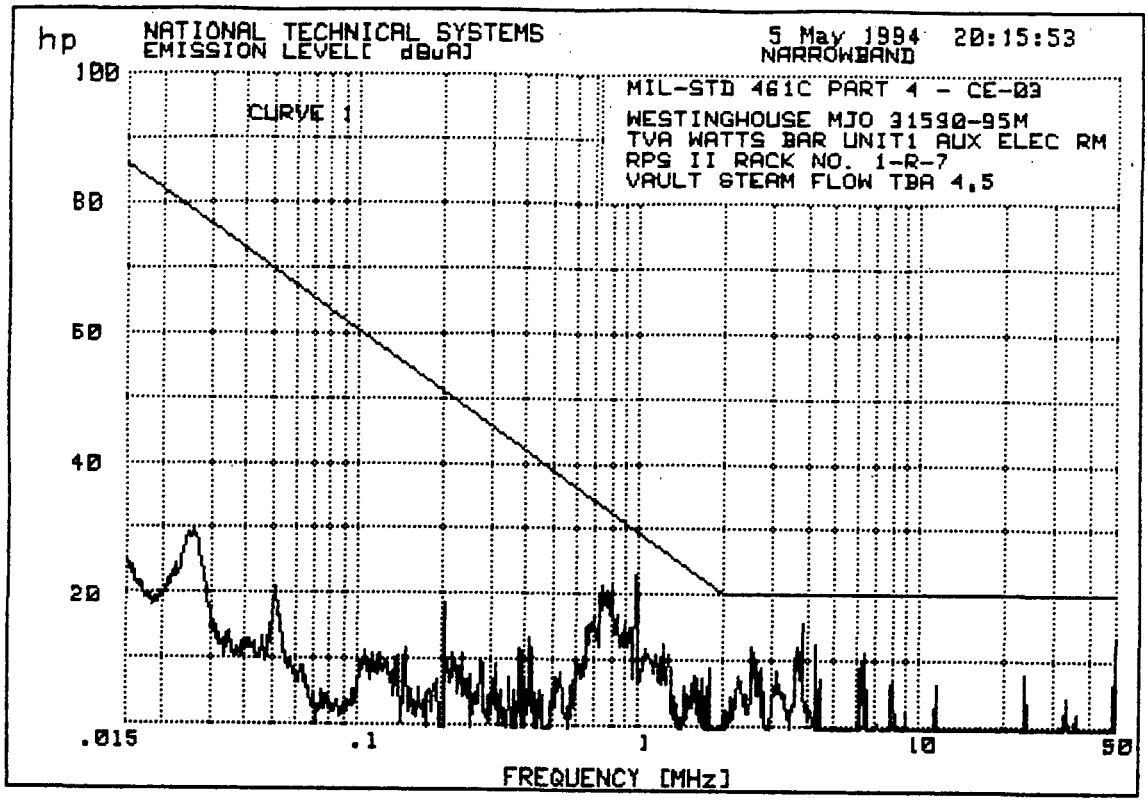
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 19:49:01
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-6
RTD (CONT) LOOP 3 TBB 1-4
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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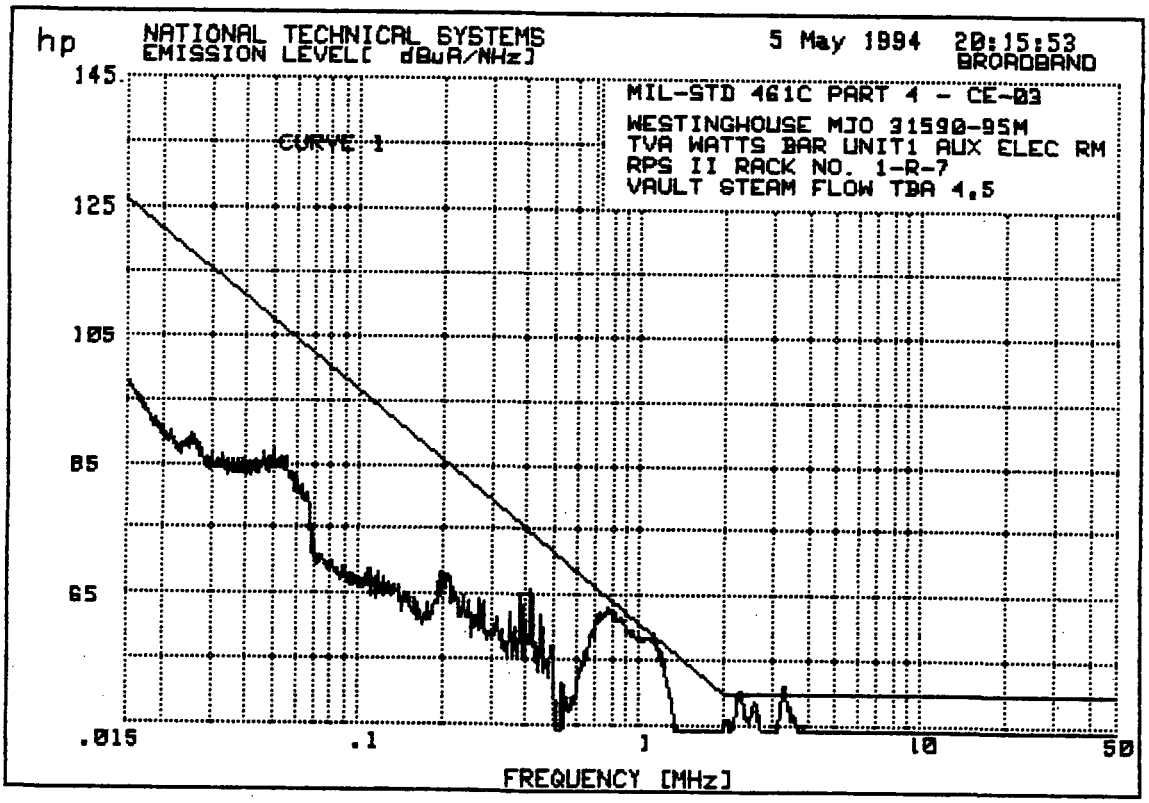
EMISSION LEVEL[dBuA]
5 May 1994 20:15:53
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-7
VAULT STEAM FLOW TBA 4.5
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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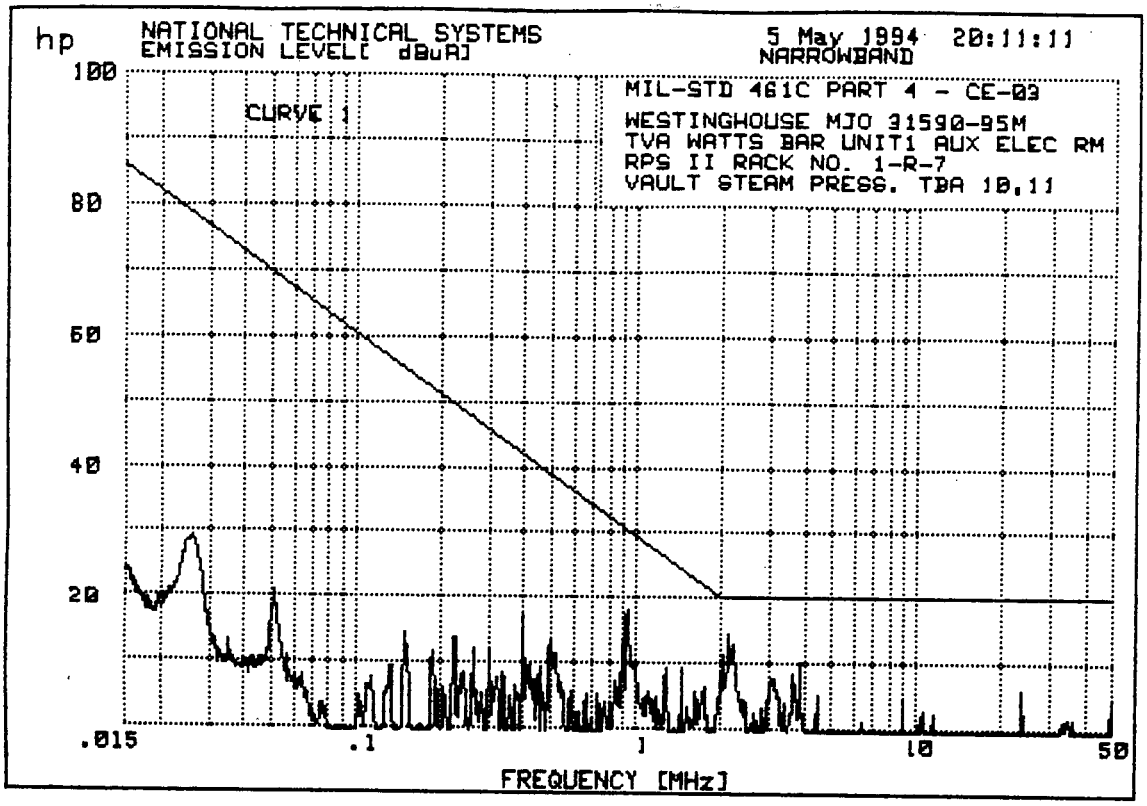
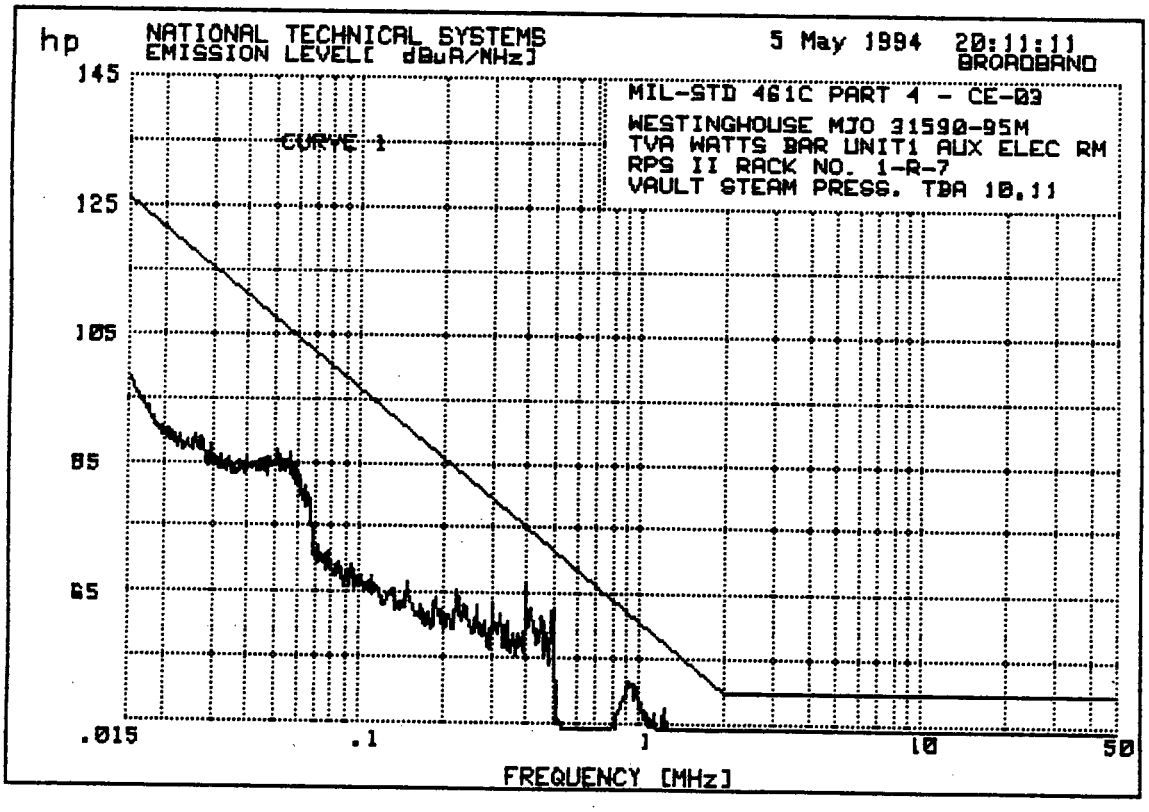
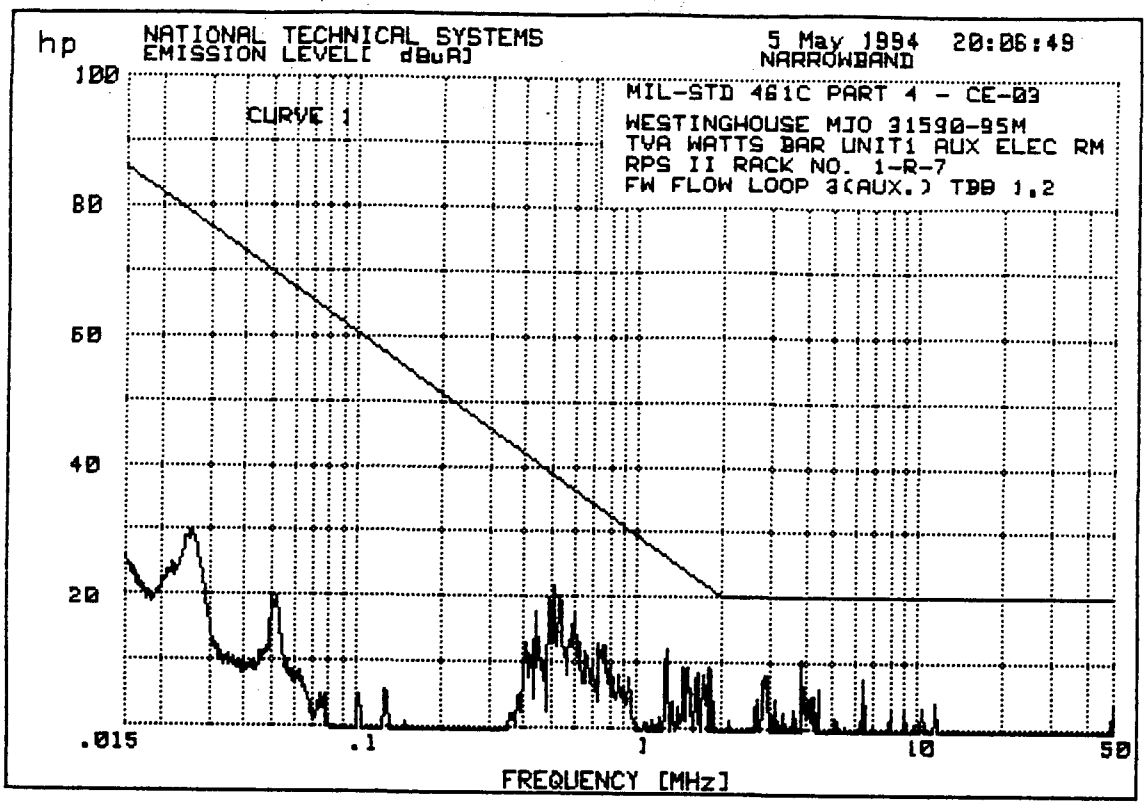
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 20:15:53
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-7
VAULT STEAM FLOW TBA 4.5
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 20:11:11
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-7
VAULT STEAM PRESS. TBA 10,11
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 20:11:11
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-7
VAULT STEAM PRESS. TBA 10,11
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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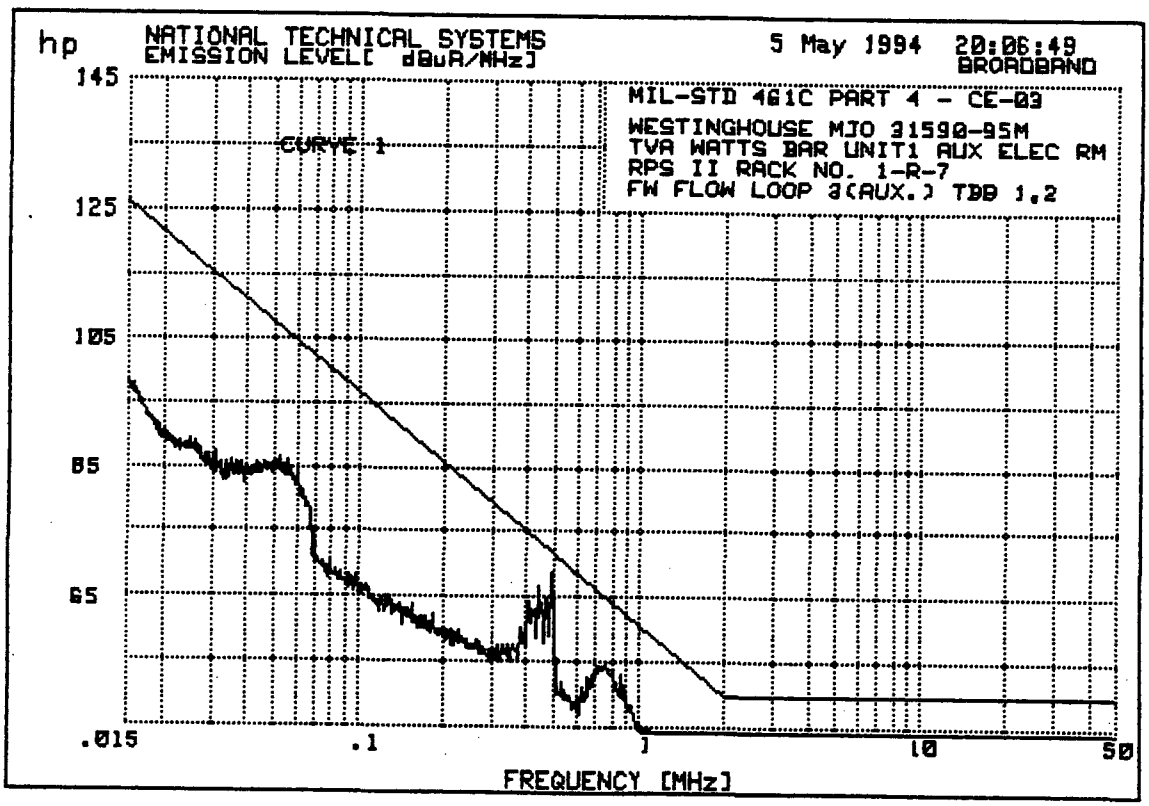
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 20:06:49
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-7
FW FLOW LOOP 3(AUX.) TDD 1,2
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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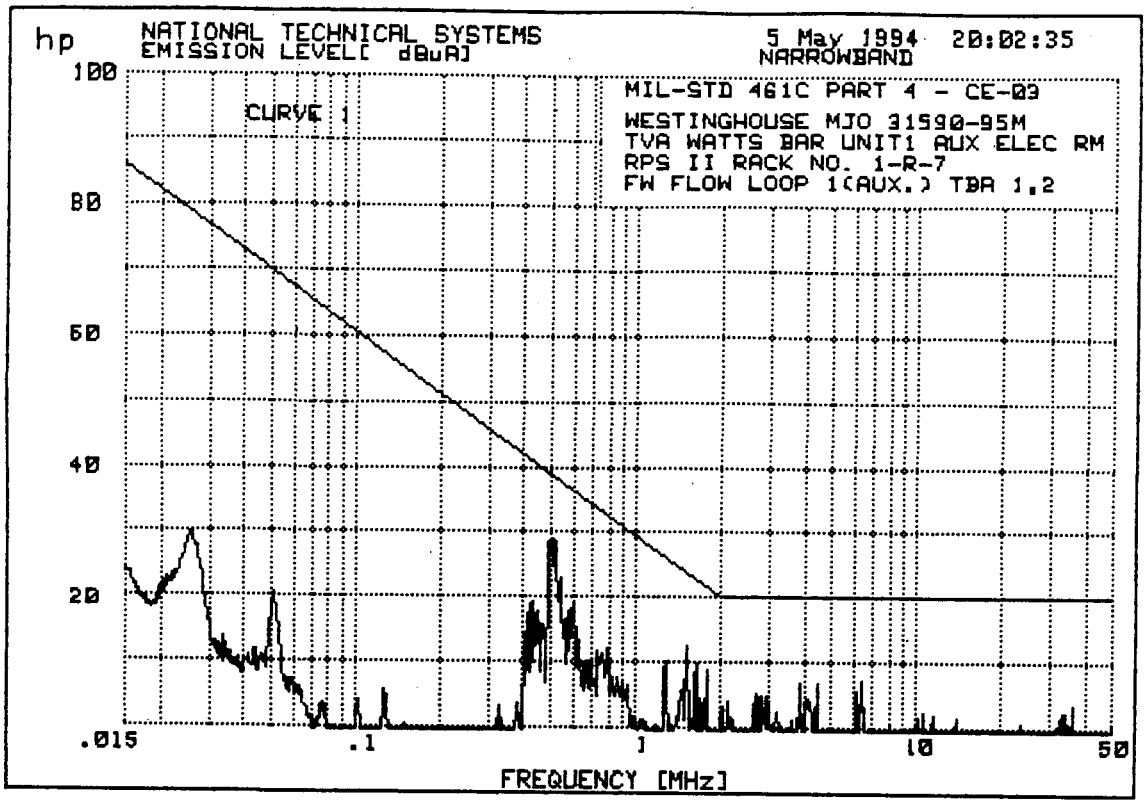
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 20:06:49
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-7
FW FLOW LOOP 3(AUX.) TDD 1,2
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 20:02:35
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-7
FW FLOW LOOP 1(AUX.) TBA 1.2
CURVE 1
100
80
60
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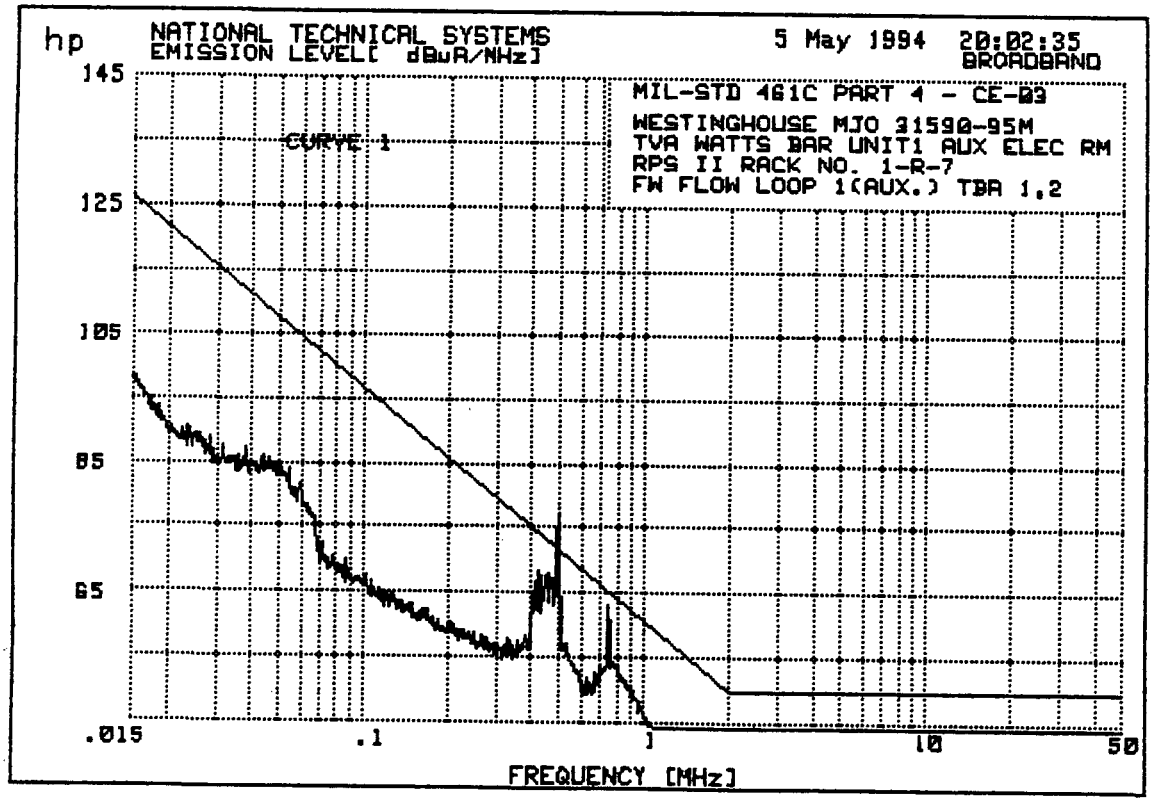
1
10
50
FREQUENCY [MHz]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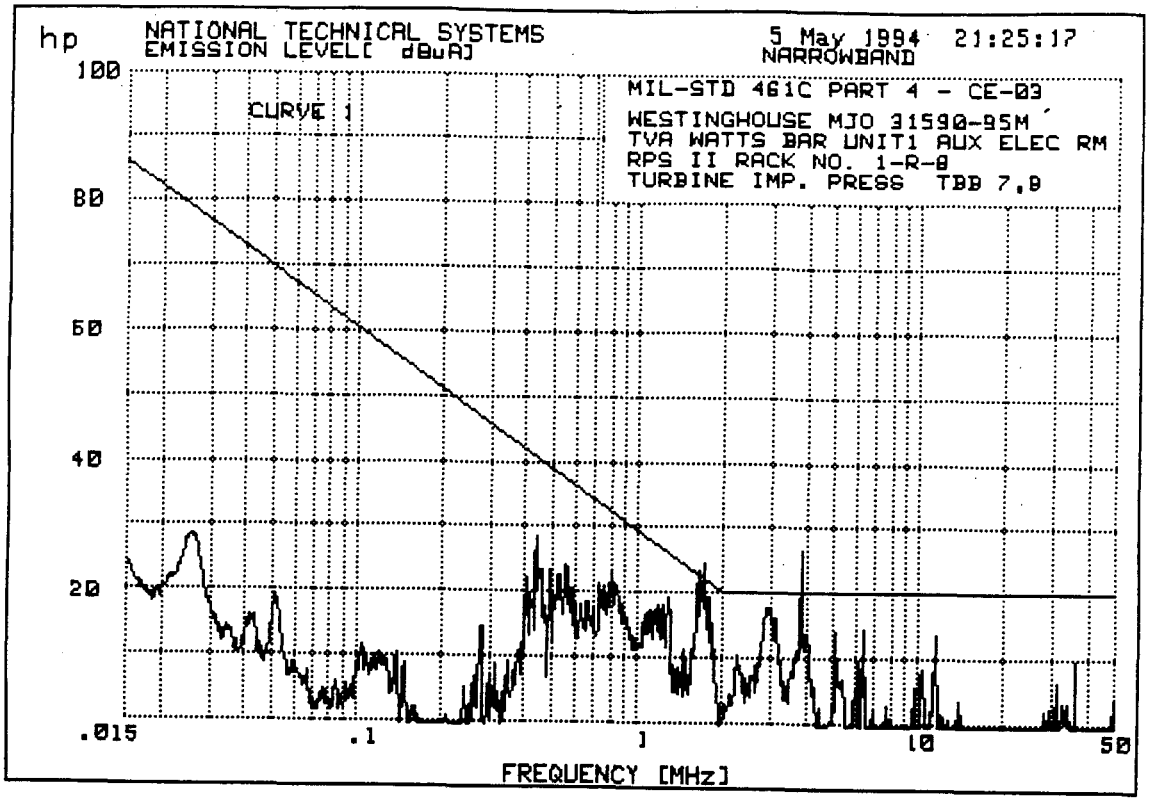
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 20:02:35
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-7
FW FLOW LOOP 1(AUX.) TBA 1.2
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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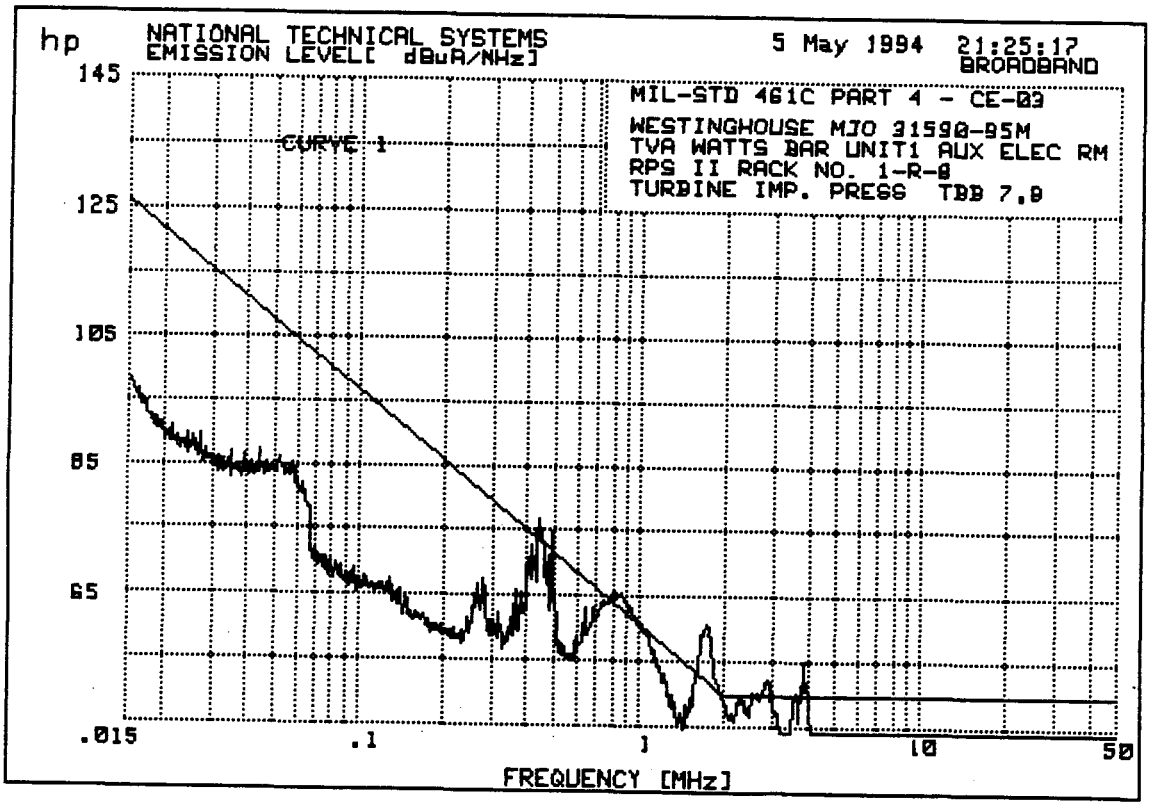
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 21:25:17
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-8
TURBINE IMP. PRESS TBB 7.8
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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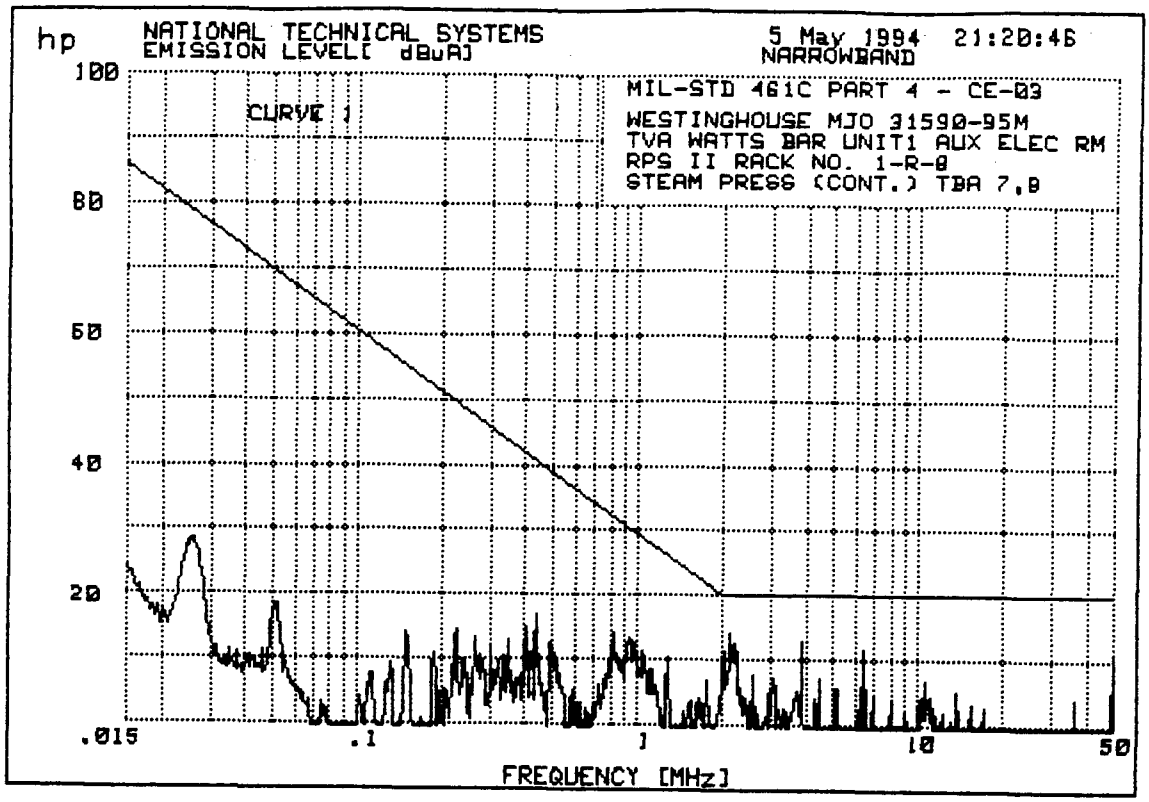
EMISSION LEVEL[dBuA/MHz]
5 May 1994 21:25:17
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-8
TURBINE IMP. PRESS TBB 7.8
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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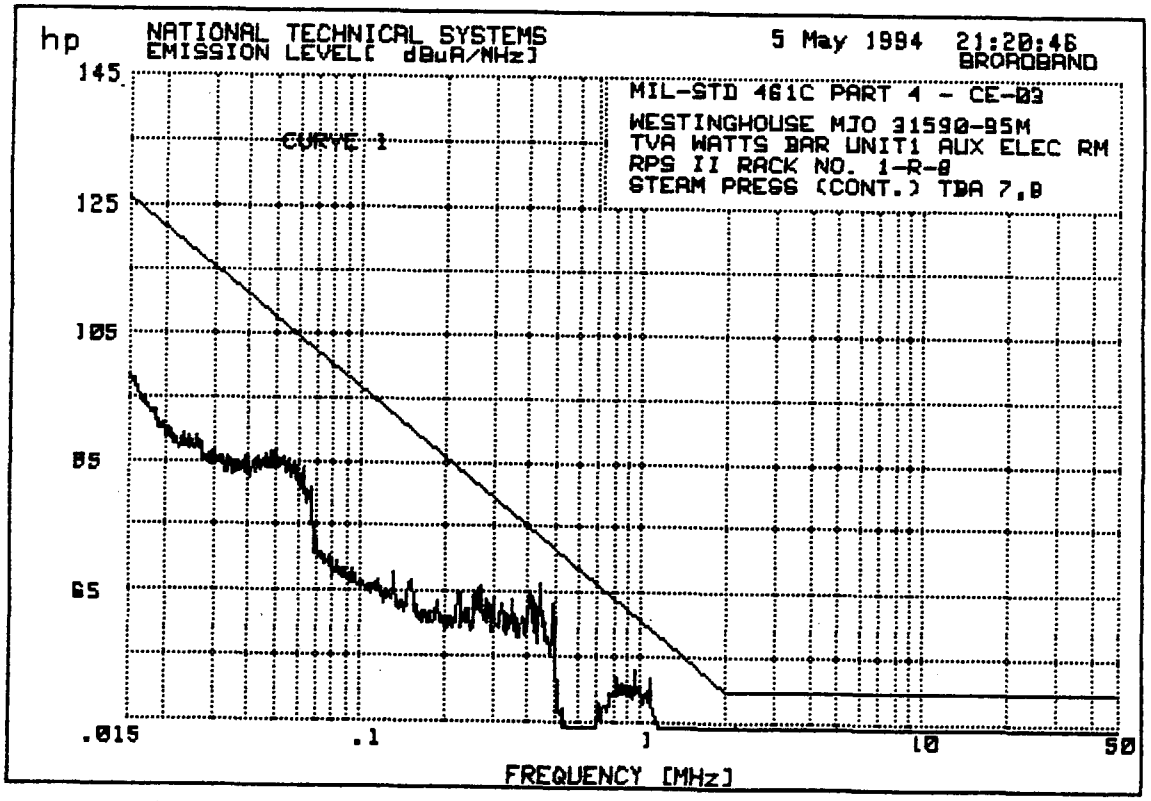
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 21:20:46
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-8
STEAM PRESS (CONT.) TBA 7,8
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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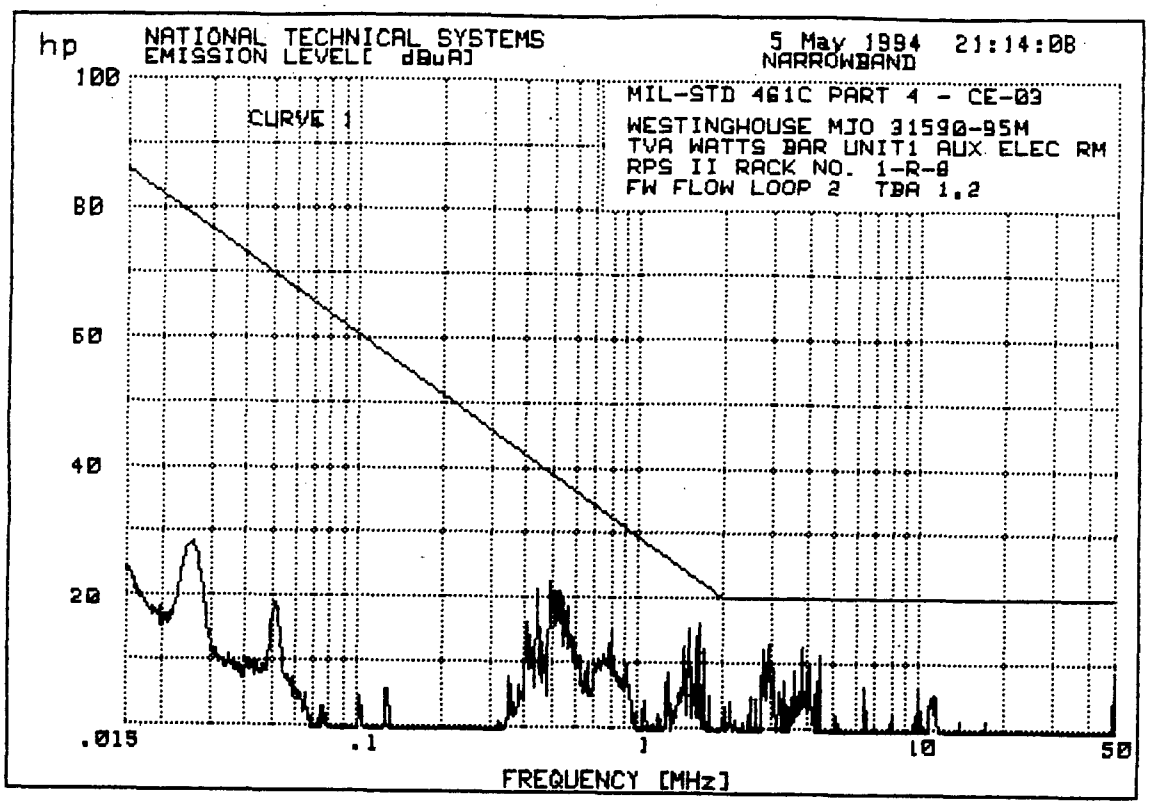
EMISSION LEVEL[dBuA/MHz]
5 May 1994 21:20:46
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-8
STEAM PRESS (CONT.) TBA 7,8
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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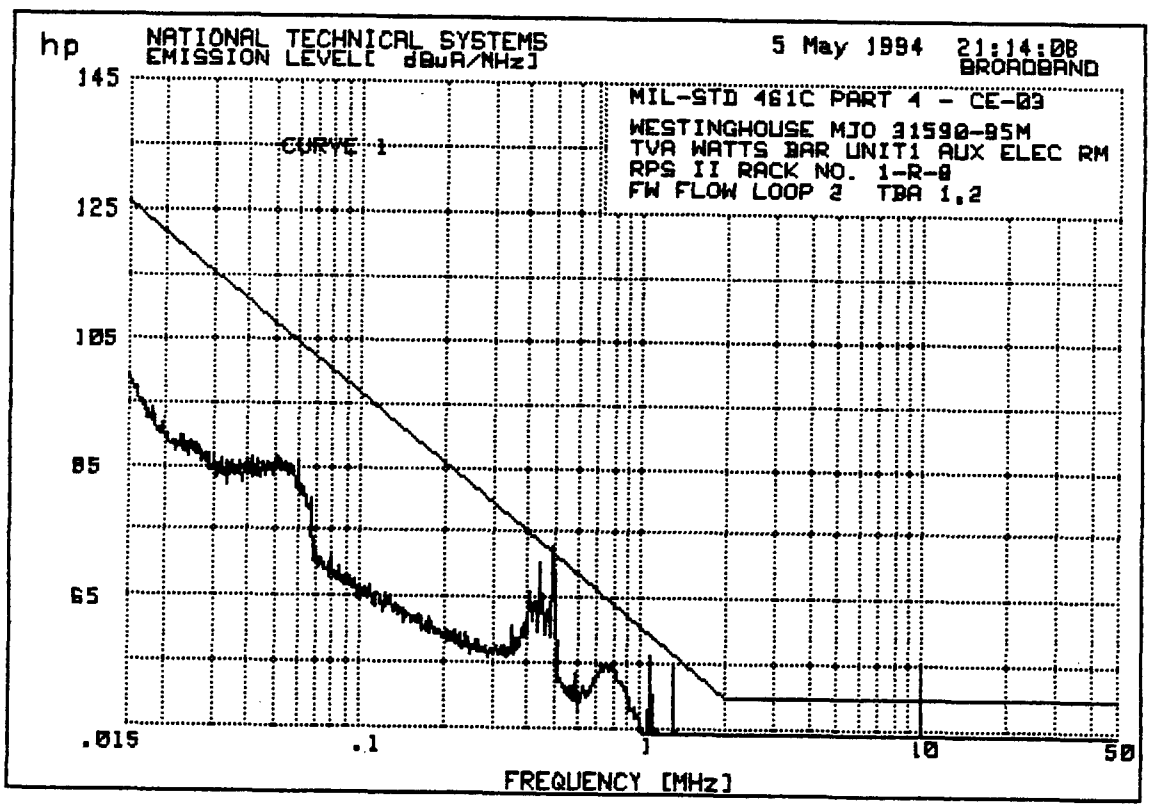
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 21:14:08
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-8
FW FLOW LOOP 2 TBA 1.2
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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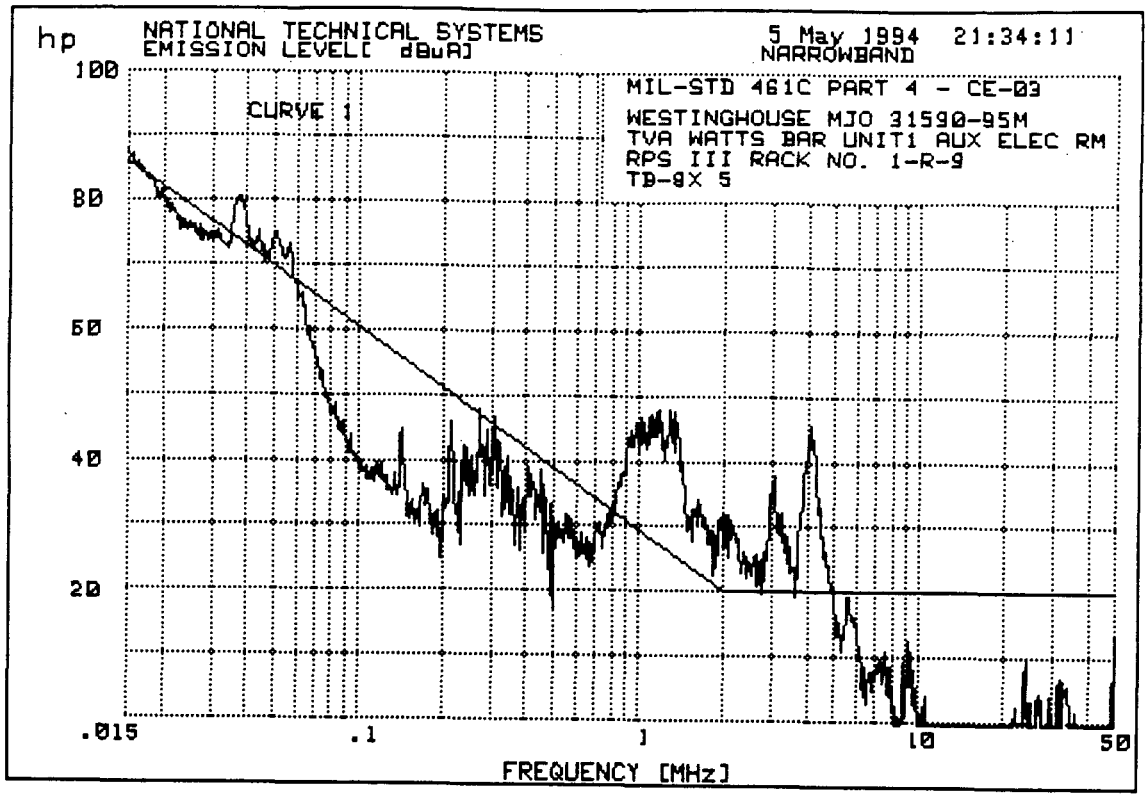
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 21:14:08
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS II RACK NO. 1-R-8
FW FLOW LOOP 2 TBA 1.2
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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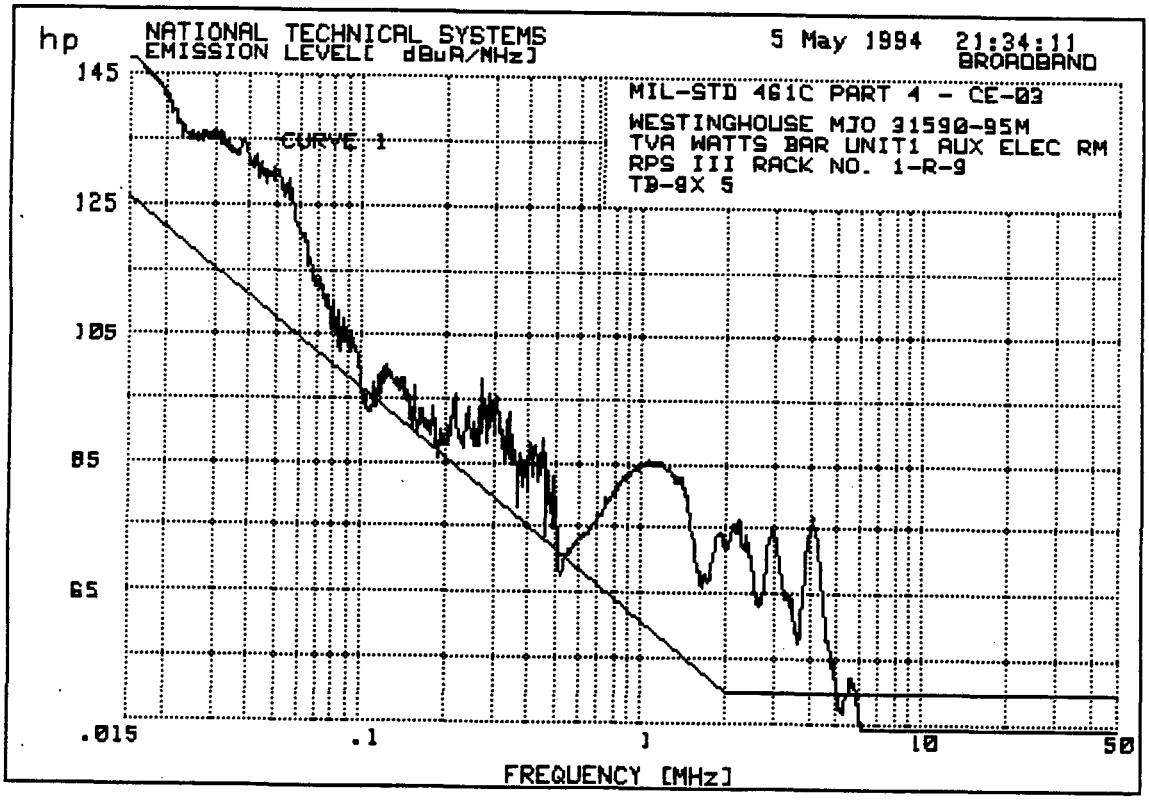
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 21:34:11
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-9
TB-9X 5
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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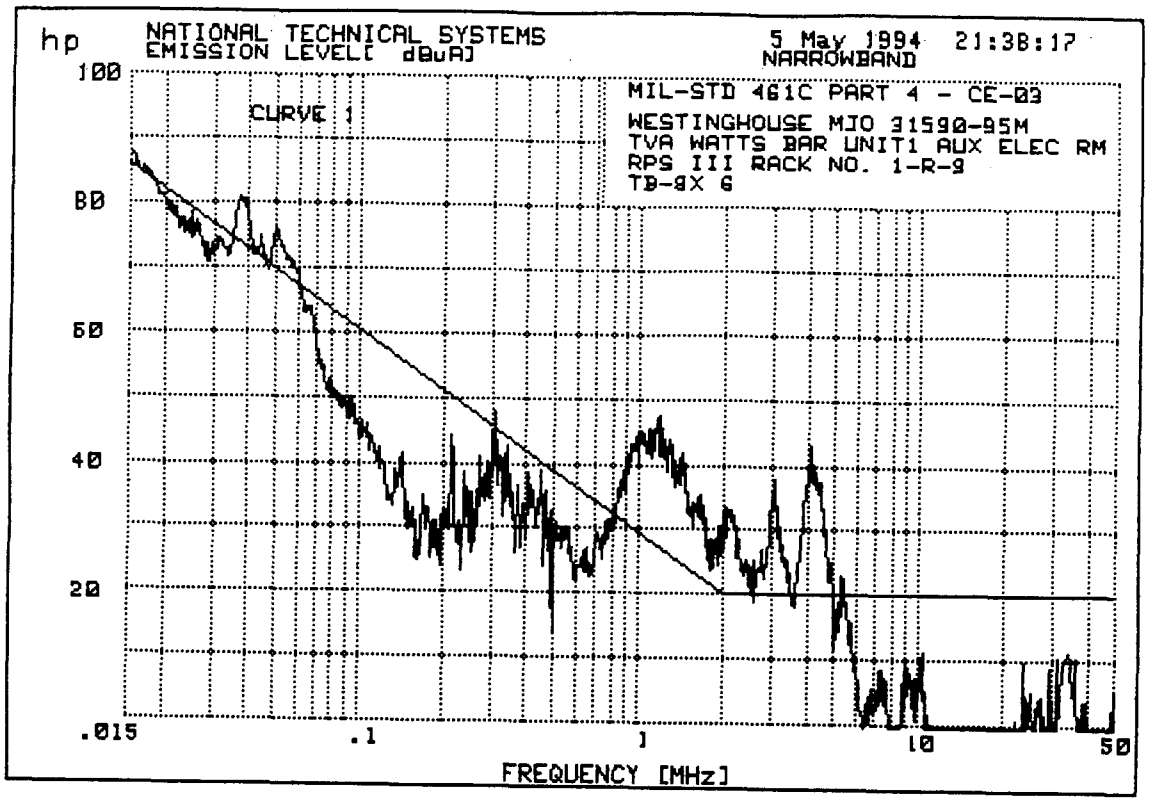
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 21:34:11
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-9
TB-9X 5
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]

CE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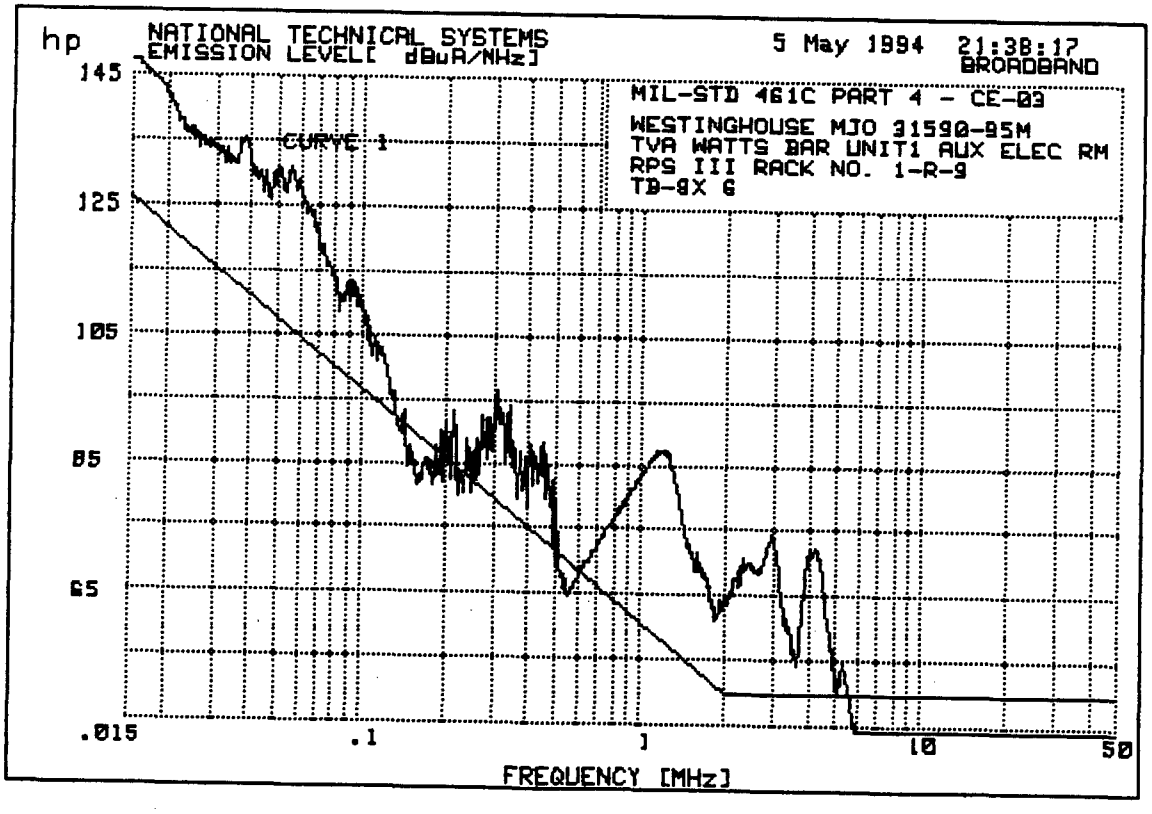
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 21:38:17
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-9
TB-9X 6
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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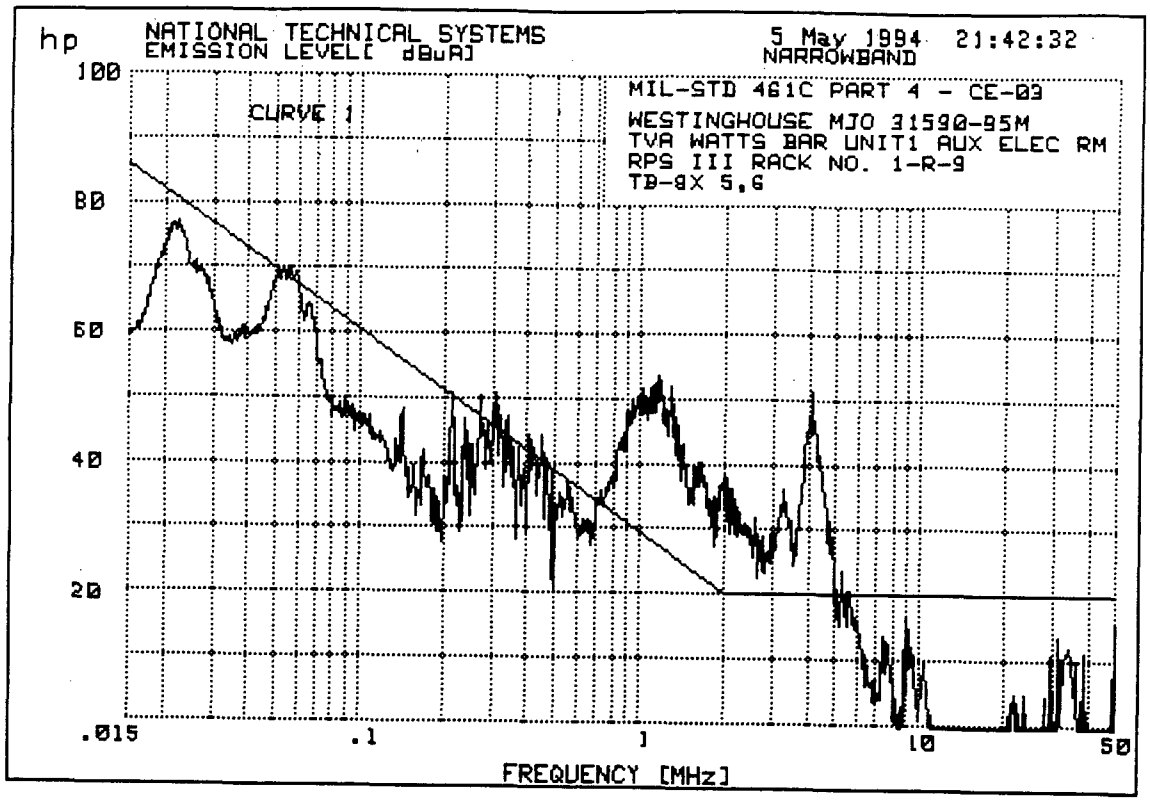
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 21:38:17
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-9
TB-9X 6
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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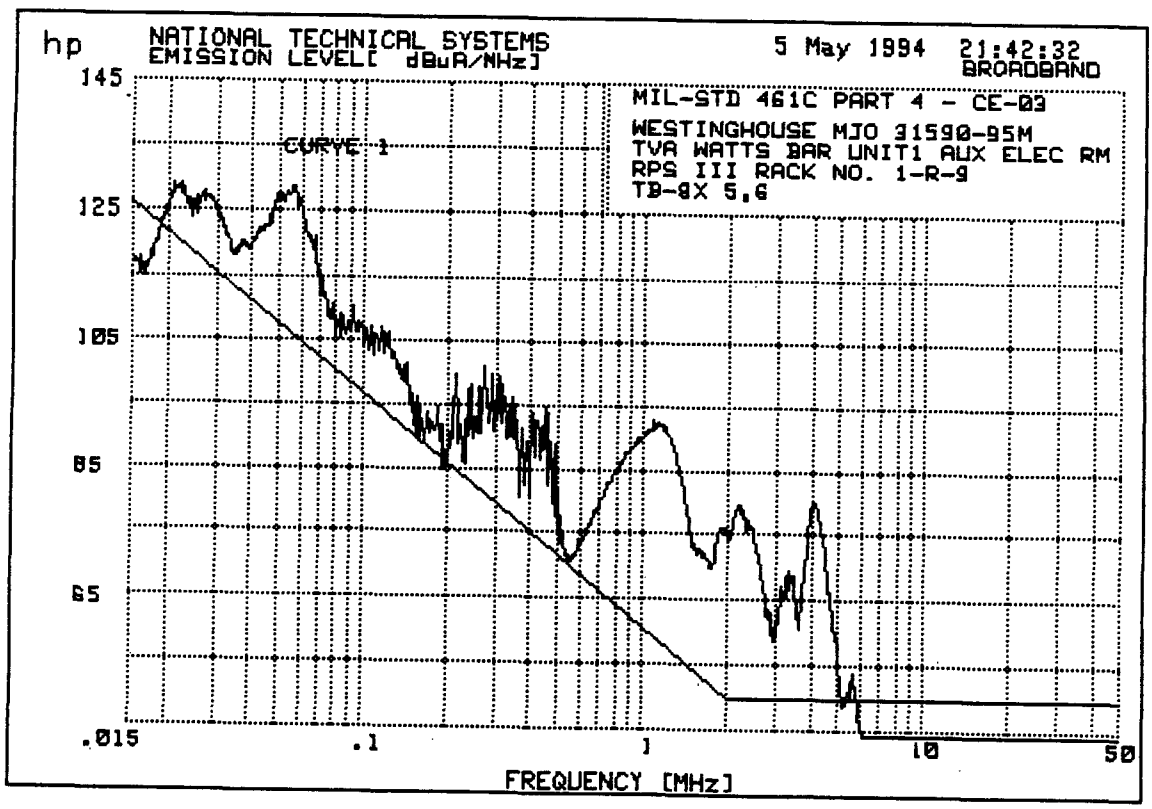
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
5 May 1994 21:42:32
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-9
TB-9X 5,6
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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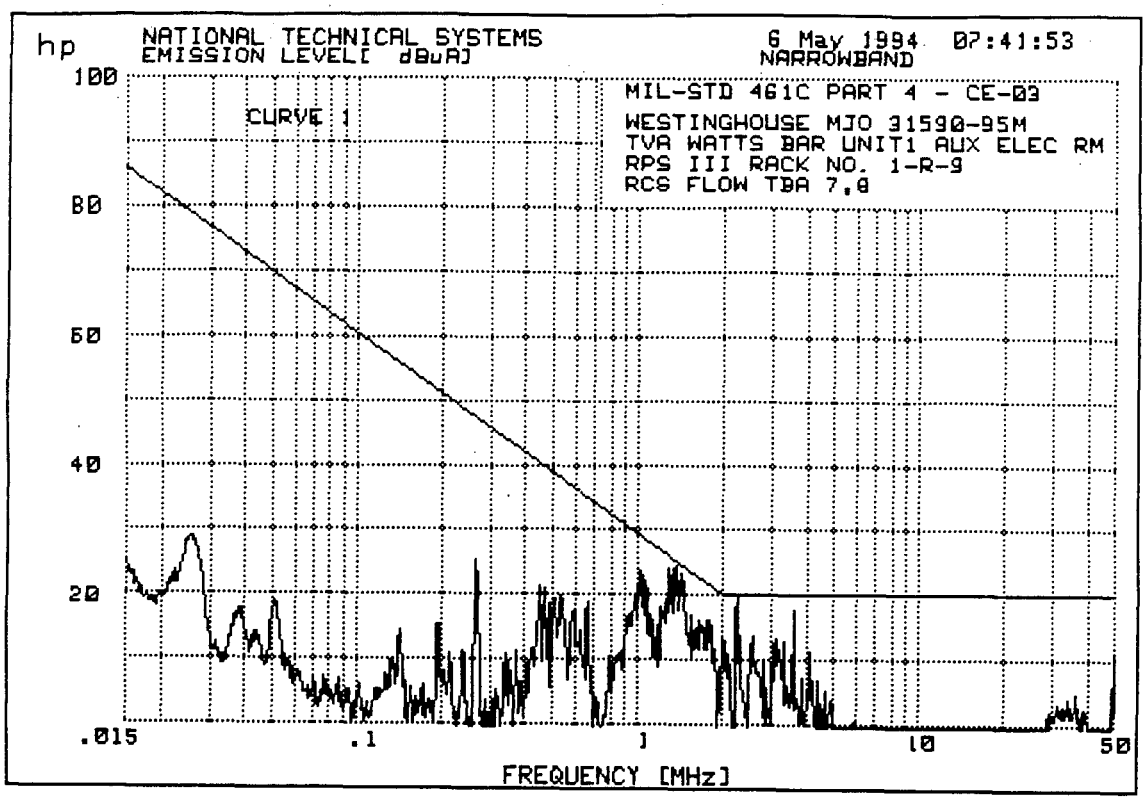
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
5 May 1994 21:42:32
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-9
TB-9X 5,6
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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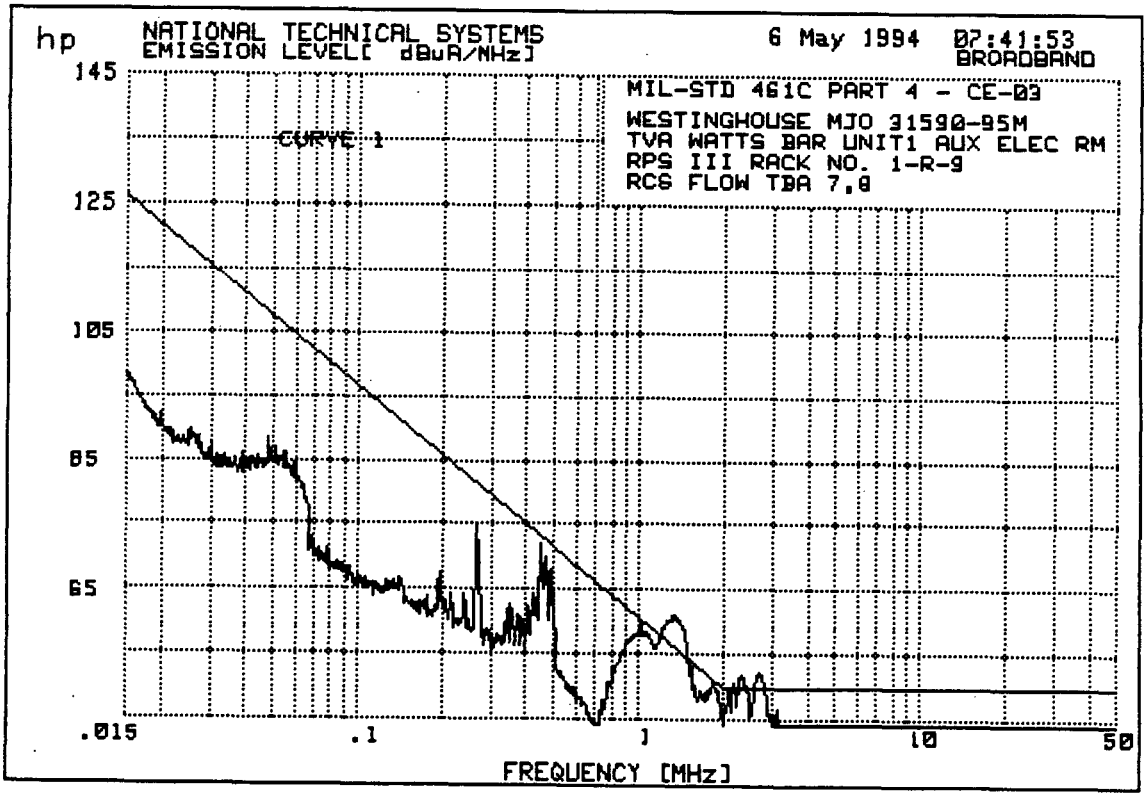
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVELS dBuA
6 May 1994 07:41:53
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-9
RCS FLOW TBA 7,8
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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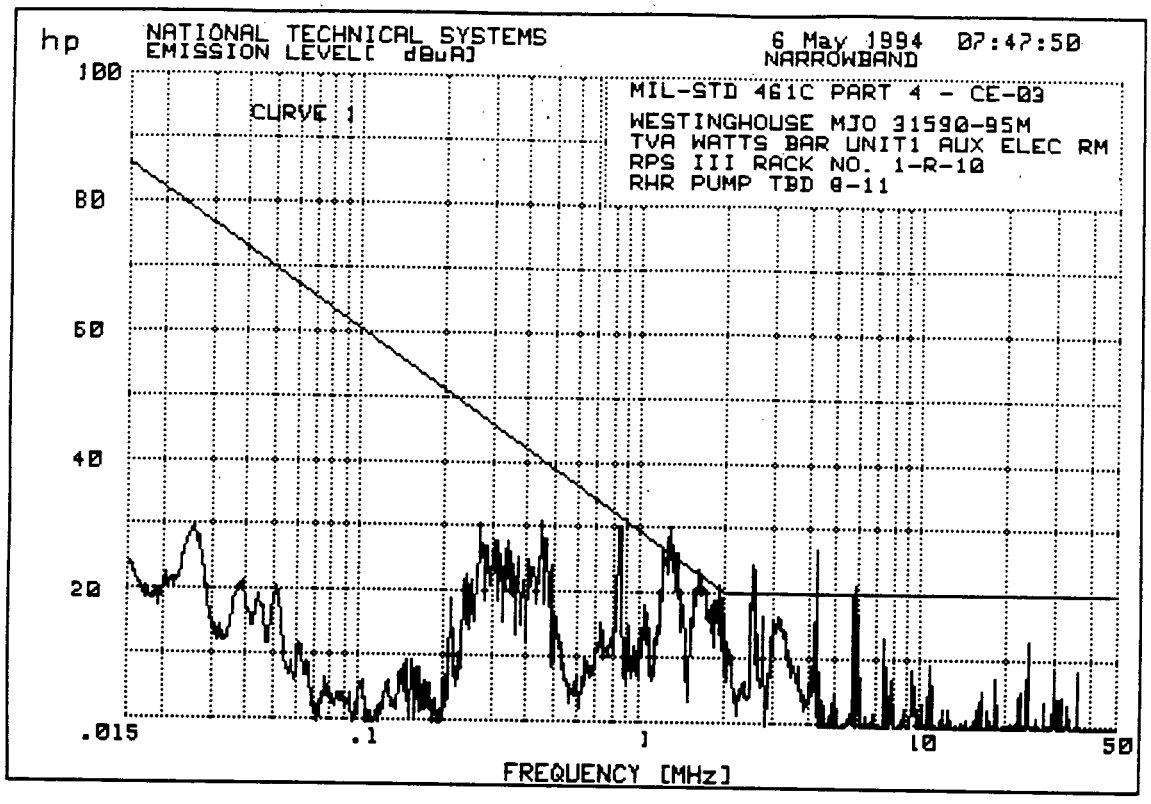
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVELS dBuA/MHz
6 May 1994 07:41:53
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-9
RCS FLOW TBA 7,8
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
6 May 1994 07:47:50
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-10
RHR PUMP TBD 0-11
CURVE 1
100
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60
40
20
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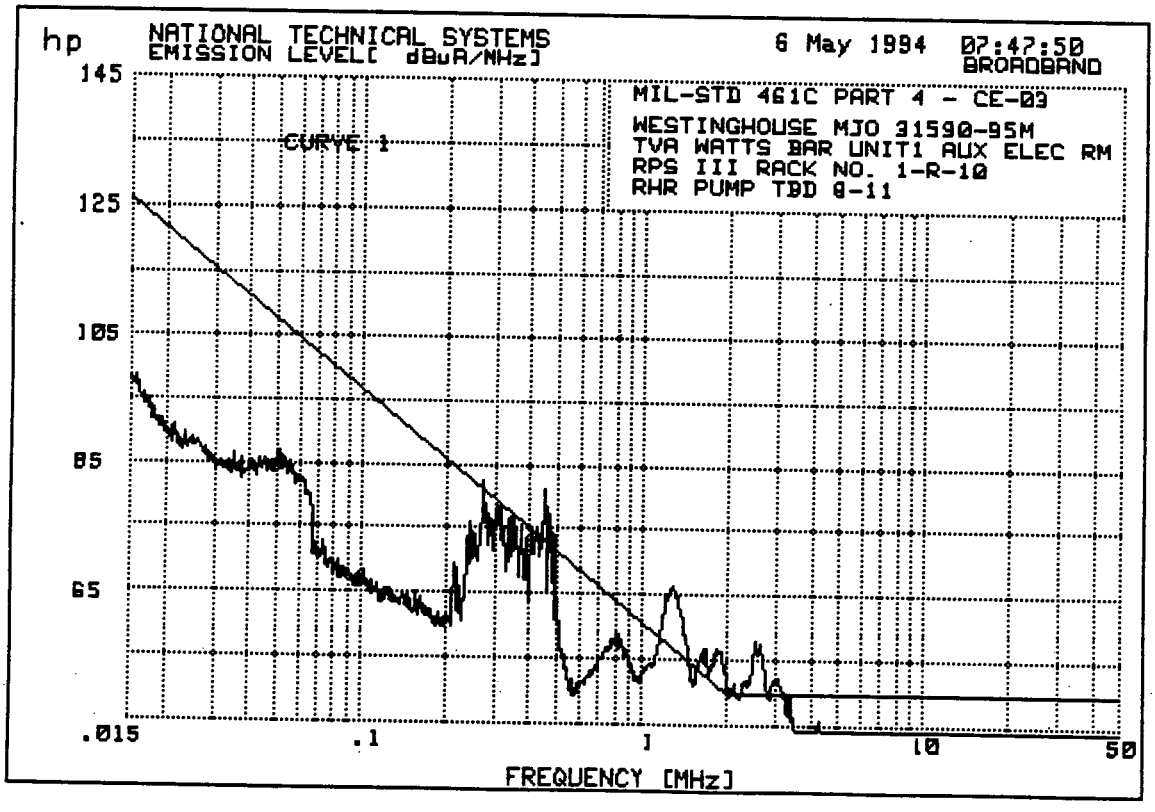
.1
1
10
50
FREQUENCY [MHz]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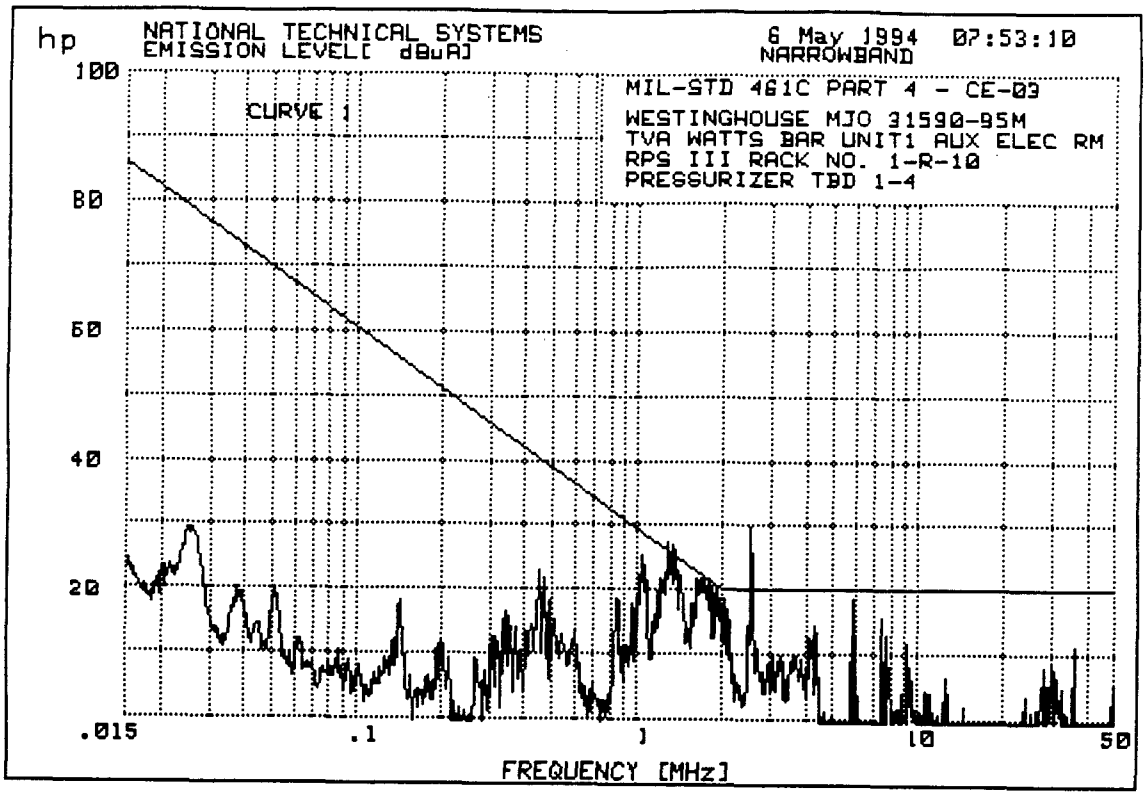
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
6 May 1994 07:47:50
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-10
RHR PUMP TBD 0-11
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]

6 80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EMISSION LEVEL[dBuA]
6 May 1994 07:53:10
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-10
PRESSURIZER TBD 1-4
CURVE 1
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60
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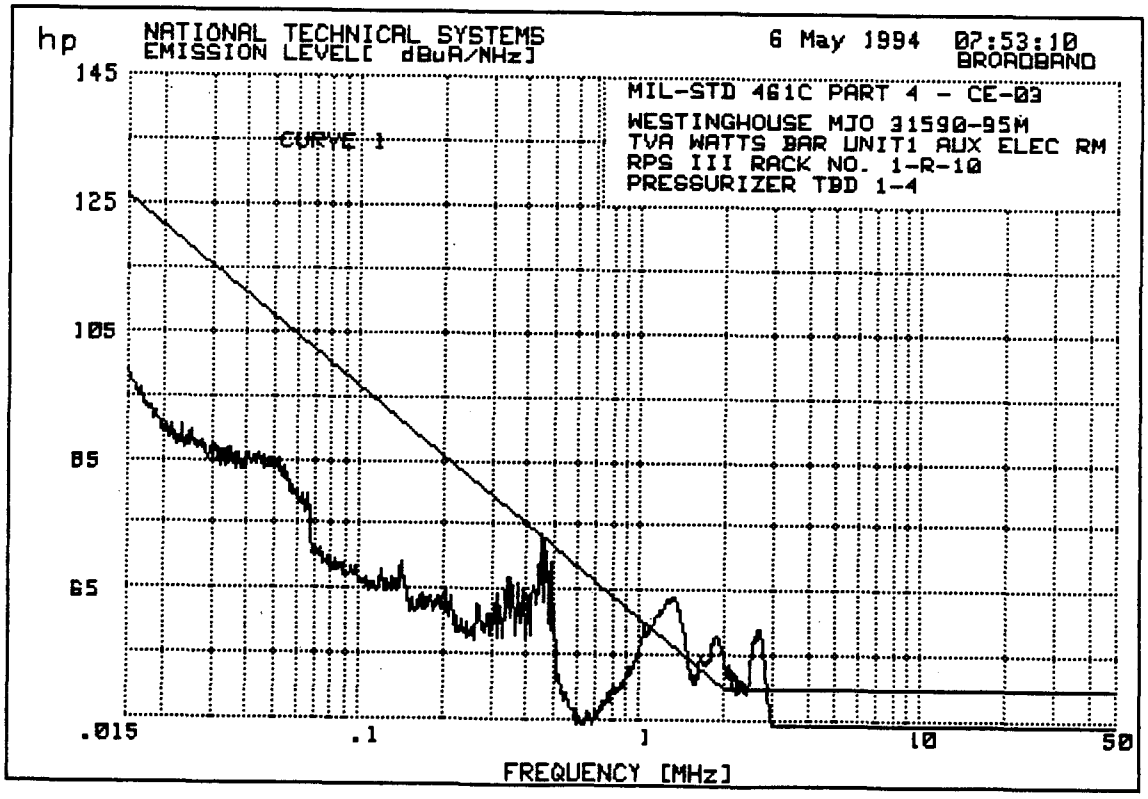
1
10
50
FREQUENCY [MHz]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EMISSION LEVEL[dBuA/MHz]
6 May 1994 07:53:10
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-10
PRESSURIZER TBD 1-4
CURVE 1
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105
85
65
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.1
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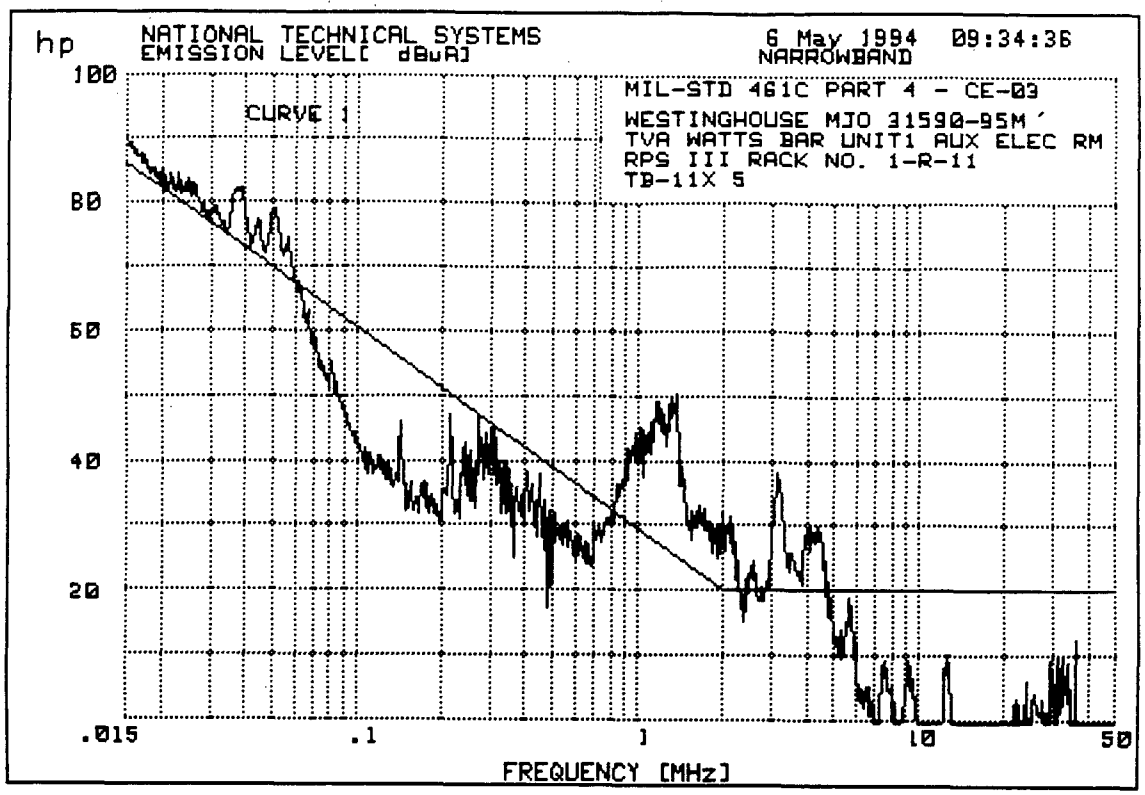
50
FREQUENCY [MHz]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NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
6 May 1994 09:34:36
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-11
TB-11X 5
CURVE 1
100
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60
40
20
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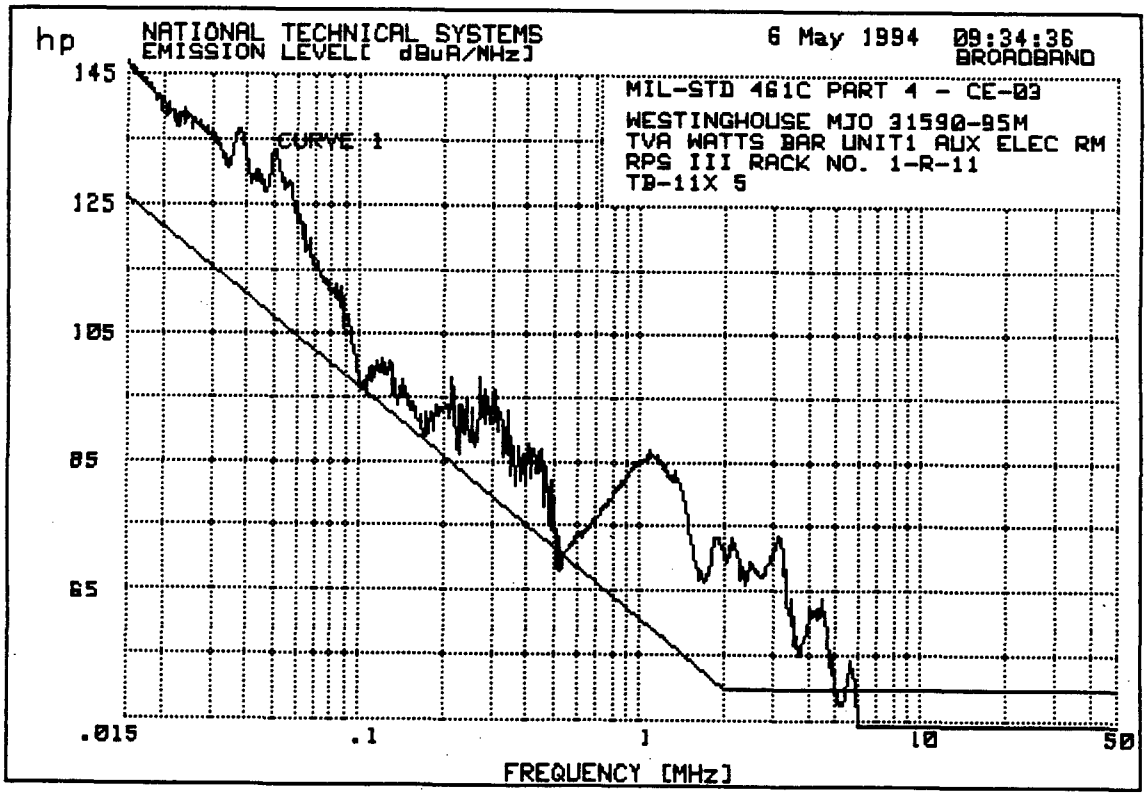
.1
1
10
50
FREQUENCY [MHz]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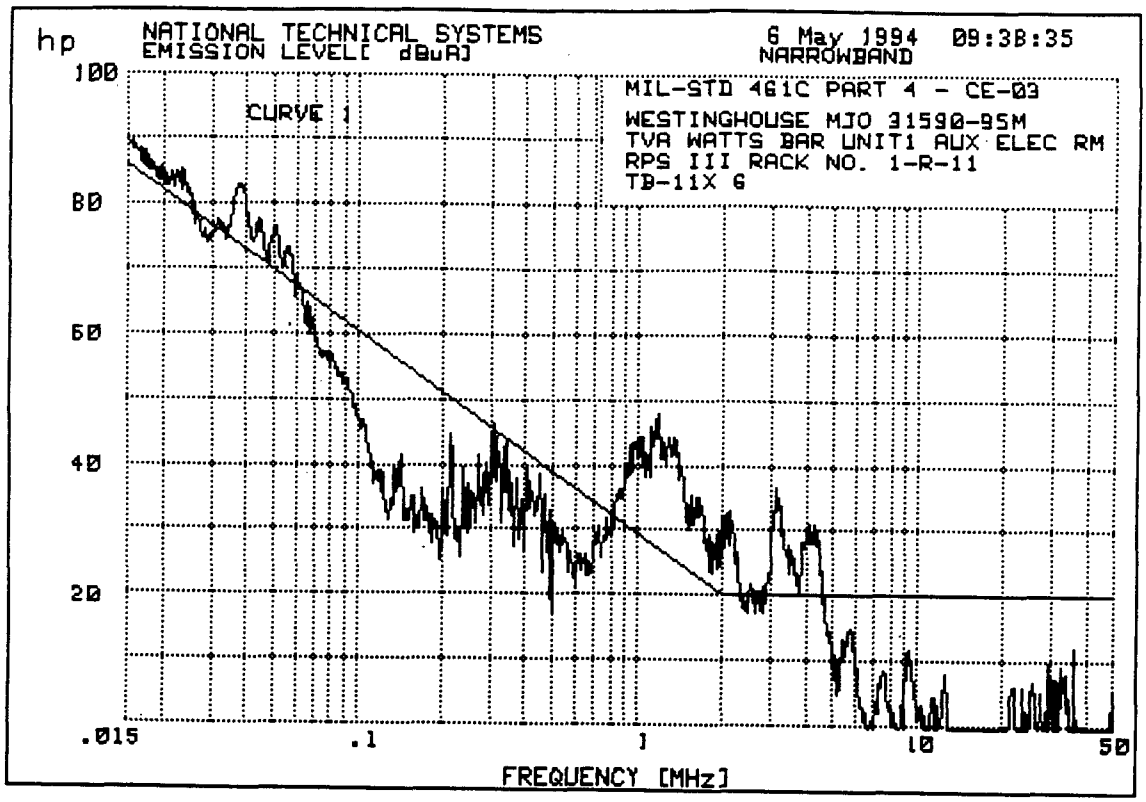
EMISSION LEVEL[dBuA/MHz]
6 May 1994 09:34:36
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-11
TB-11X 5
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
6 May 1994 09:38:35
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-11
TB-11X 6
CURVE 1
100
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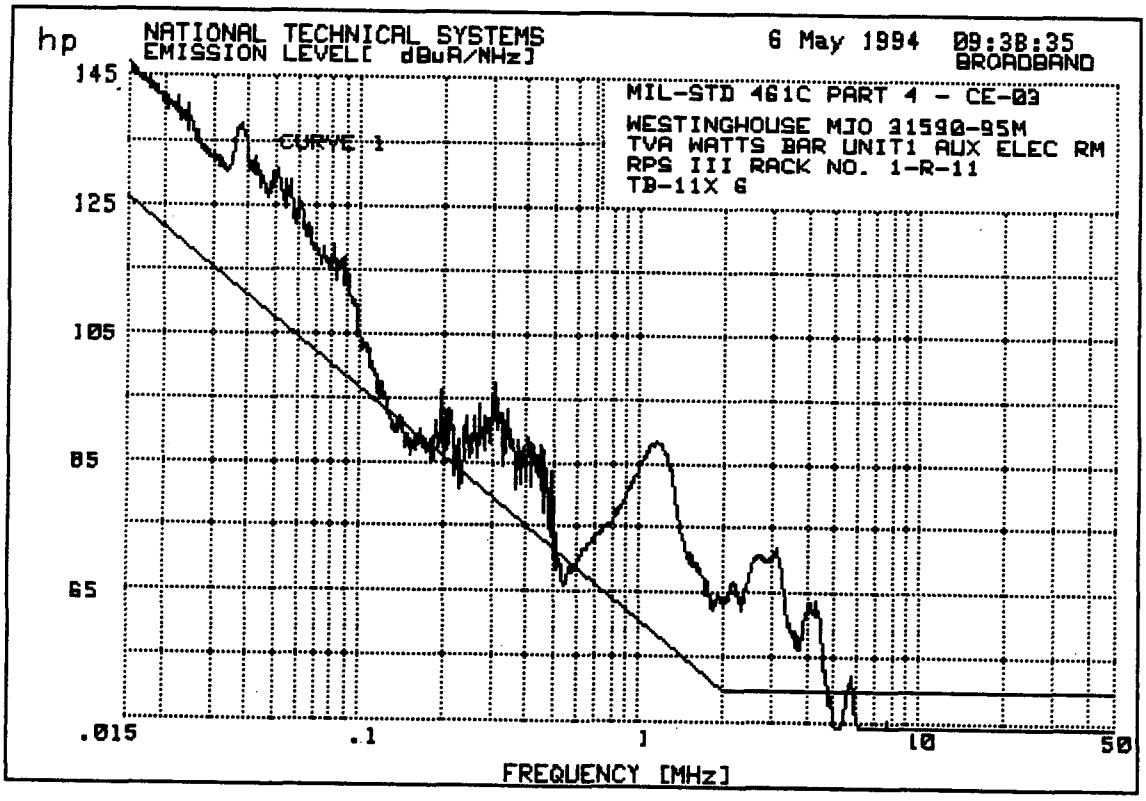
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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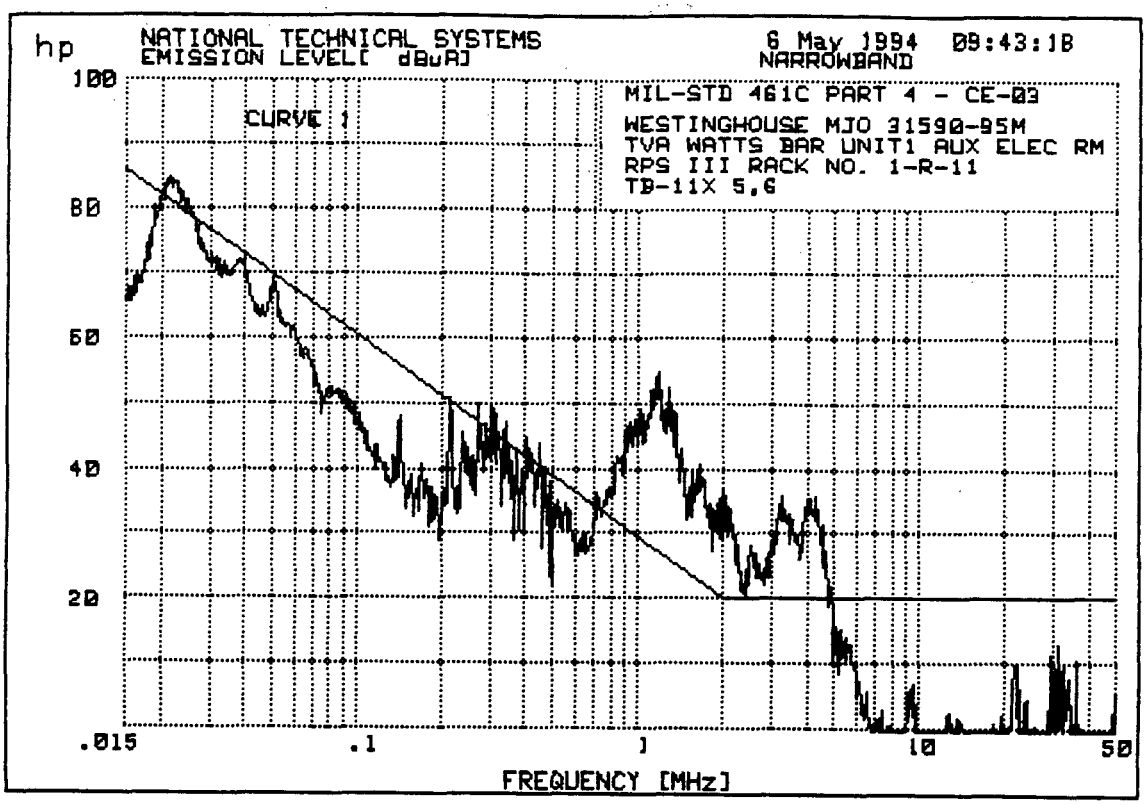
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
6 May 1994 09:38:35
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-11
TB-11X 6
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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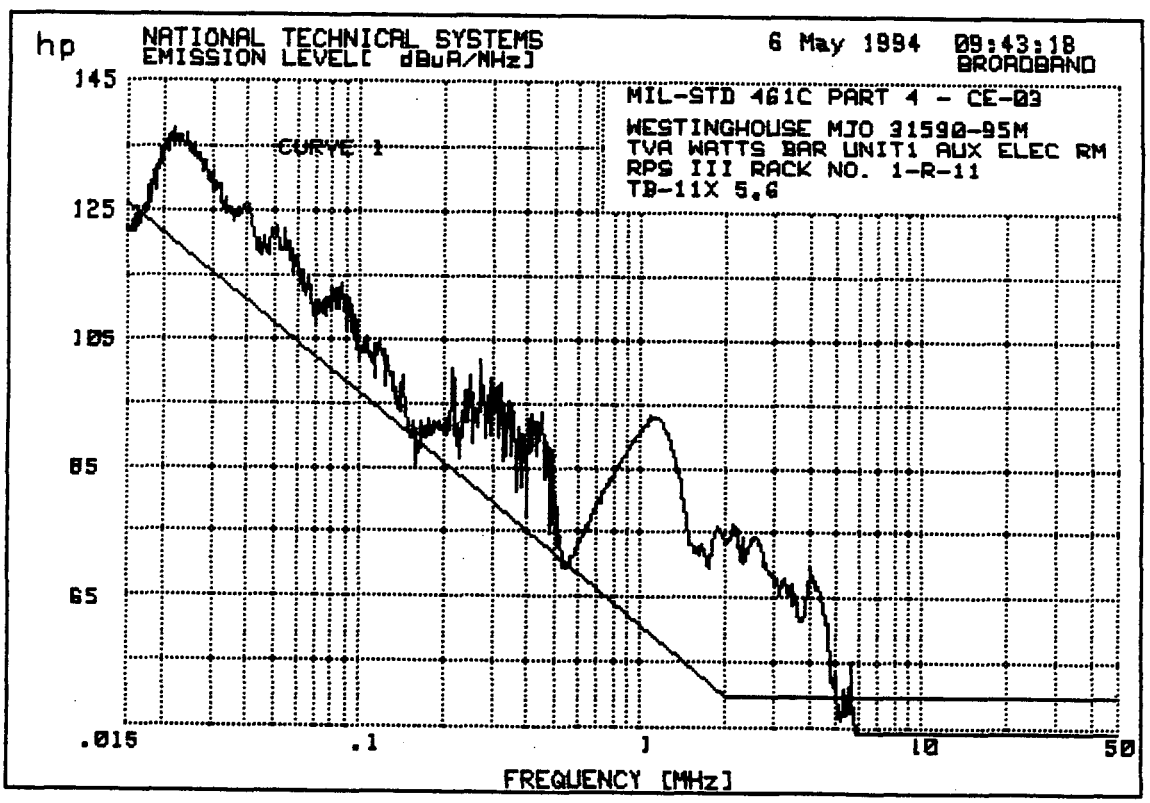
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
6 May 1994 09:43:18
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-11
TB-11X 5,6
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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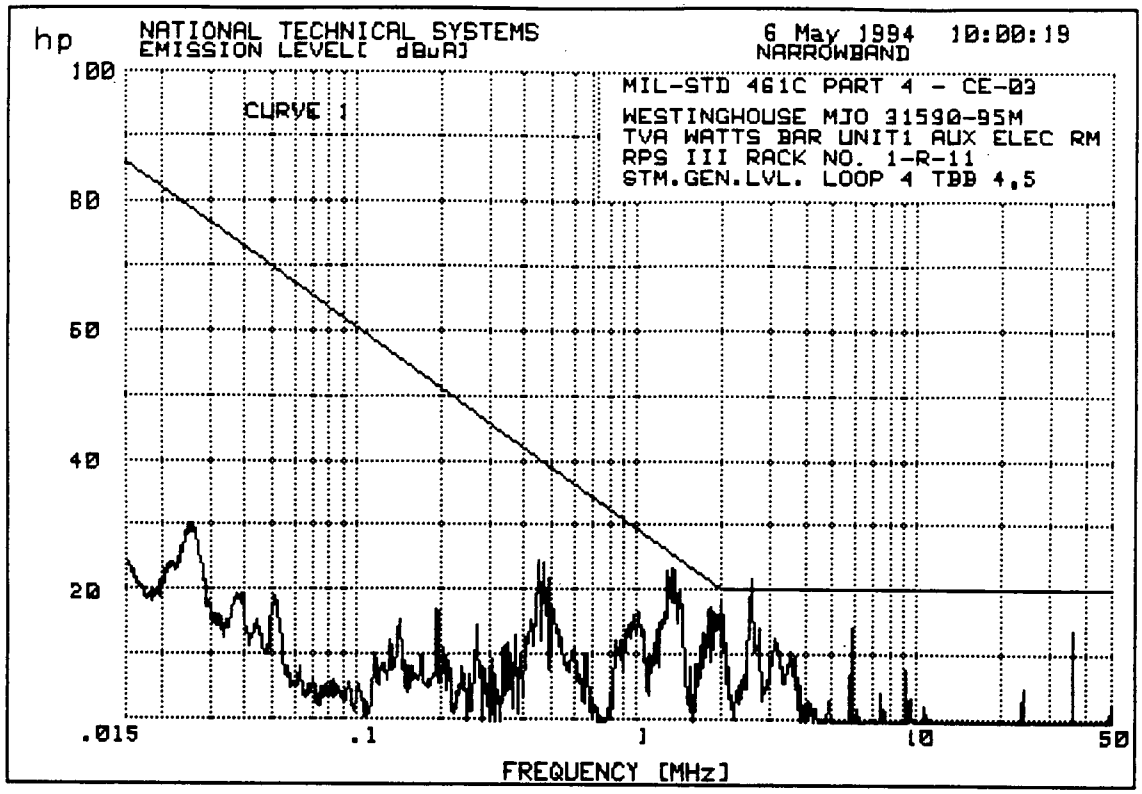
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
6 May 1994 09:43:18
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-11
TB-11X 5,6
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]

6 84

CS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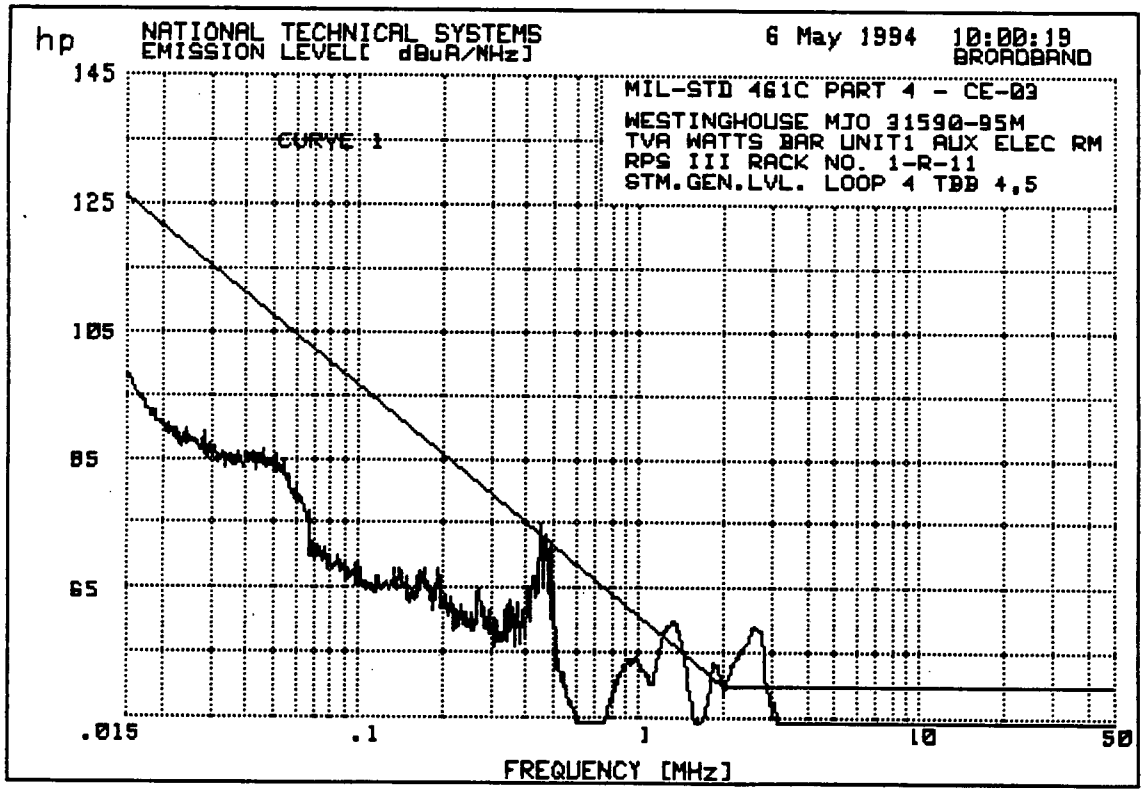
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
6 May 1994 10:00:19
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-11
STM.GEN.LVL. LOOP 4 TBB 4,5
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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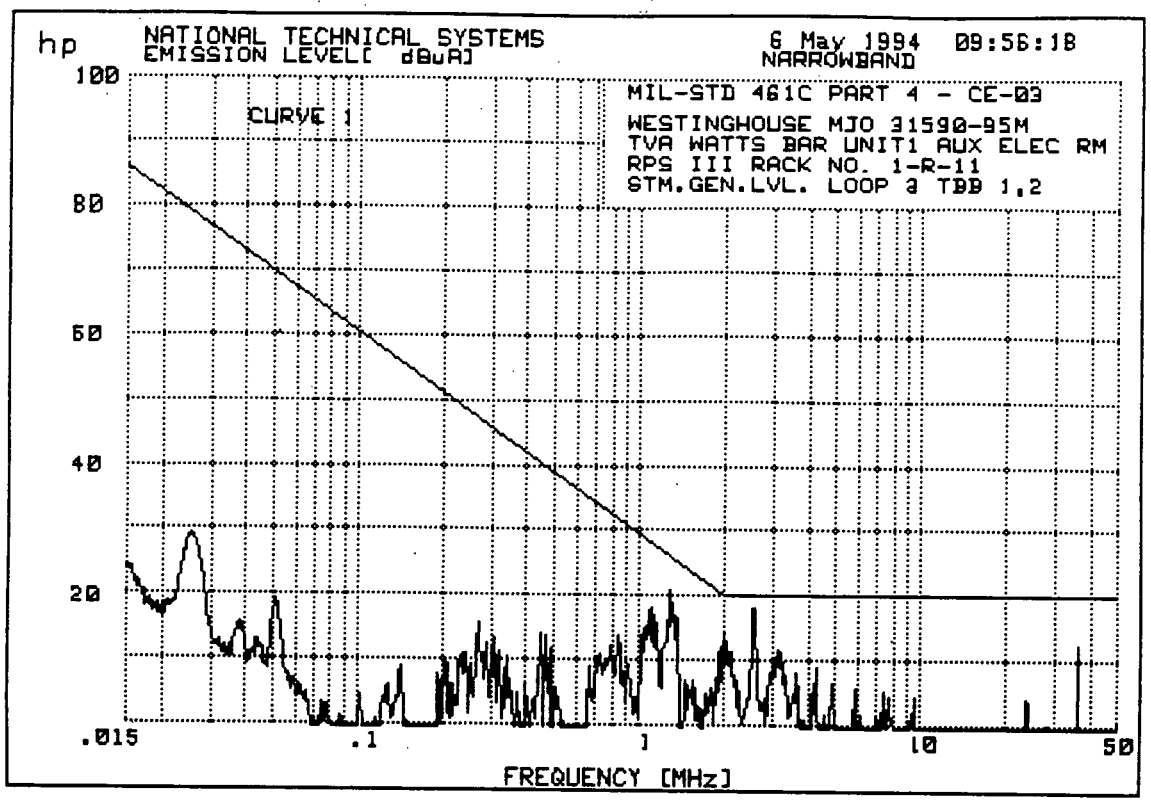
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
6 May 1994 10:00:19
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-11
STM.GEN.LVL. LOOP 4 TBB 4,5
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]

6 85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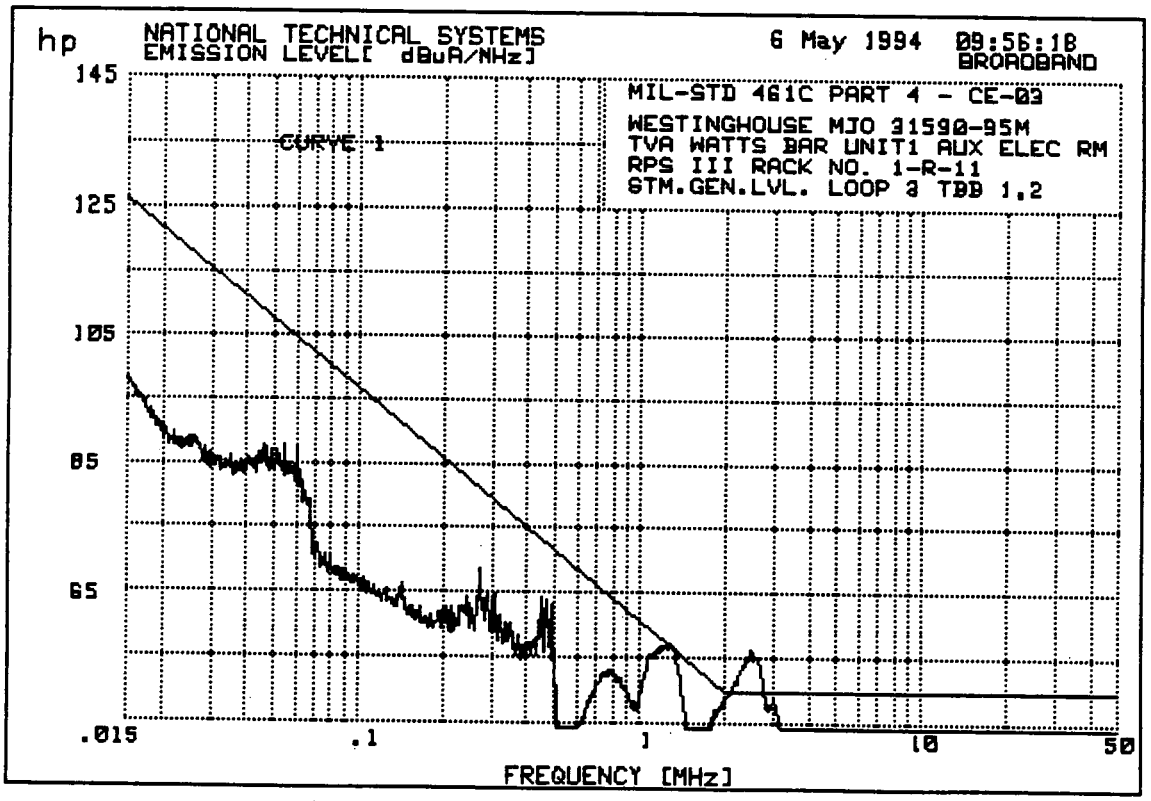
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
6 May 1994 09:56:18
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-11
STM.GEN.LVL. LOOP 3 TBB 1,2
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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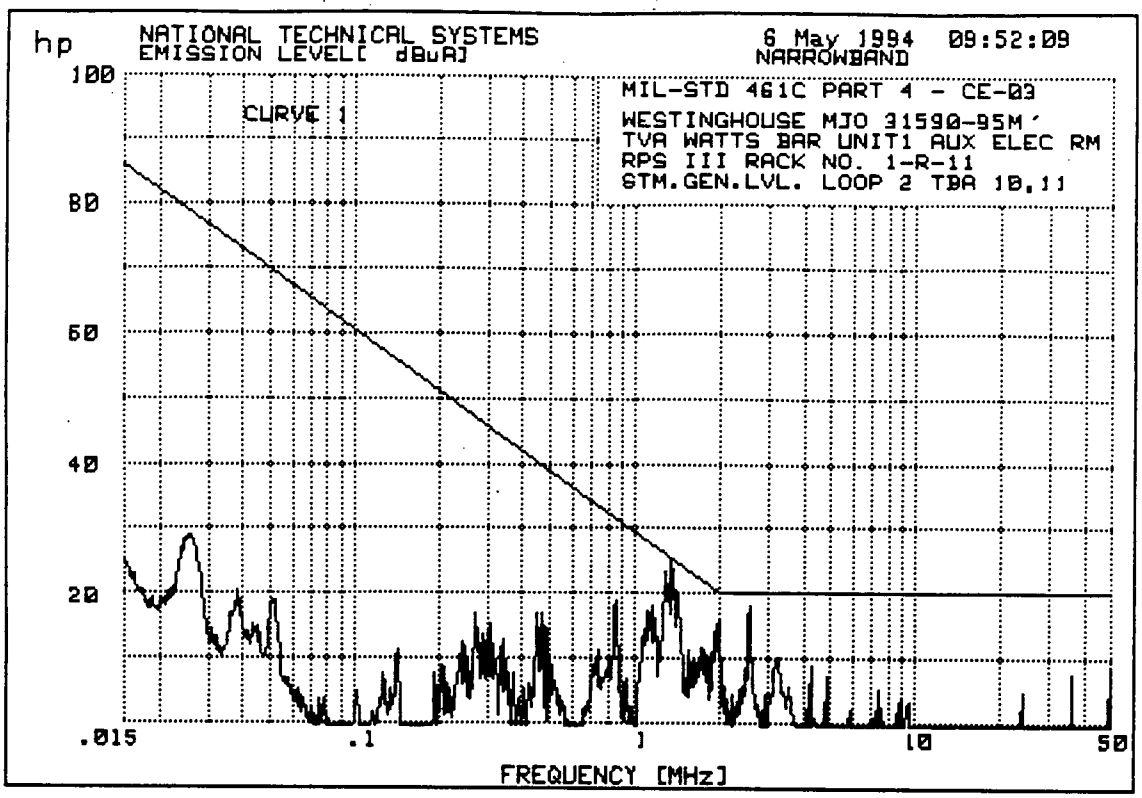
EMISSION LEVEL[dBuA/MHz]
6 May 1994 09:56:18
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-11
STM.GEN.LVL. LOOP 3 TBB 1,2
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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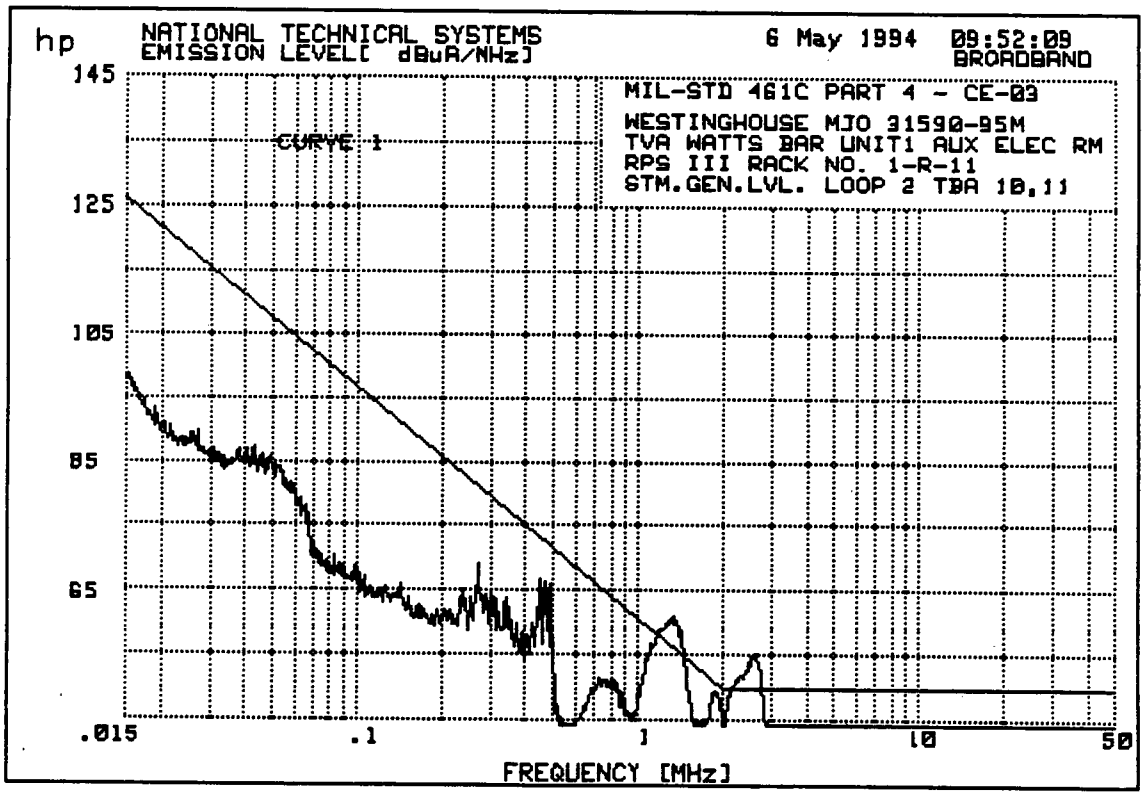
EMISSION LEVEL[dBuA]
6 May 1994 09:52:09
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-11
STM.GEN.LVL. LOOP 2 TBA 10,11
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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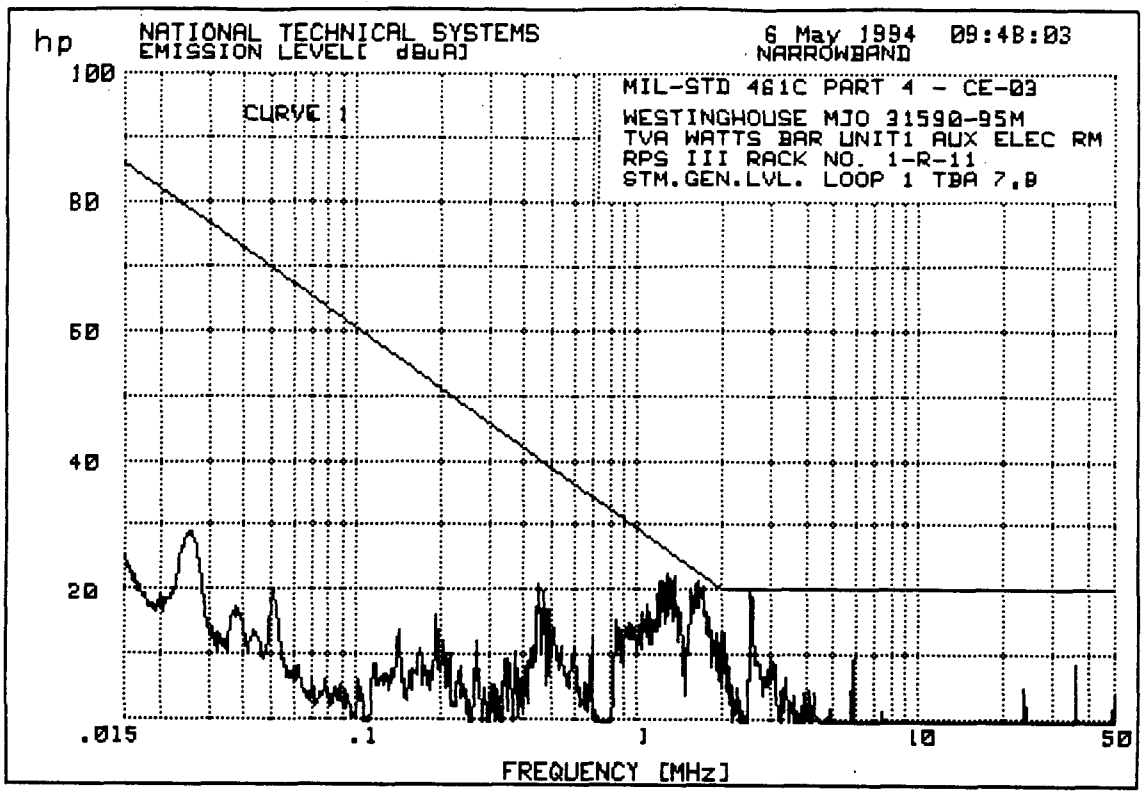
EMISSION LEVEL[dBuA/MHz]
6 May 1994 09:52:09
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-11
STM.GEN.LVL. LOOP 2 TBA 10,11
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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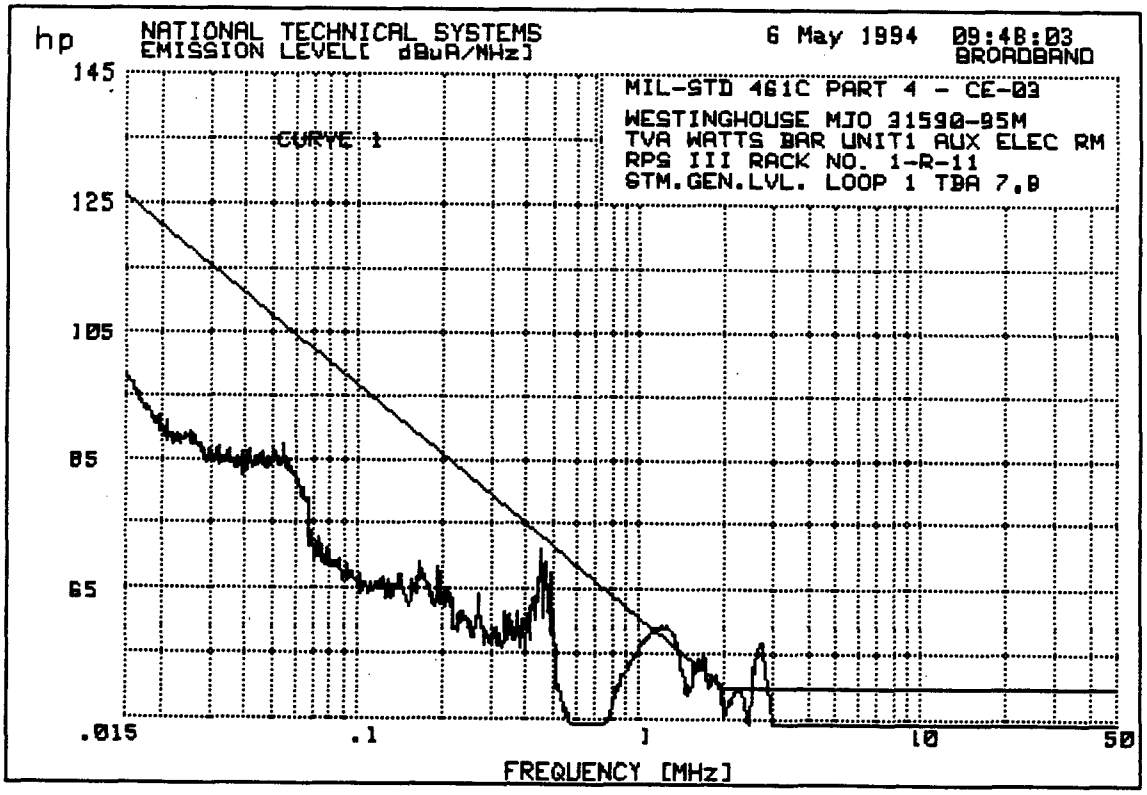
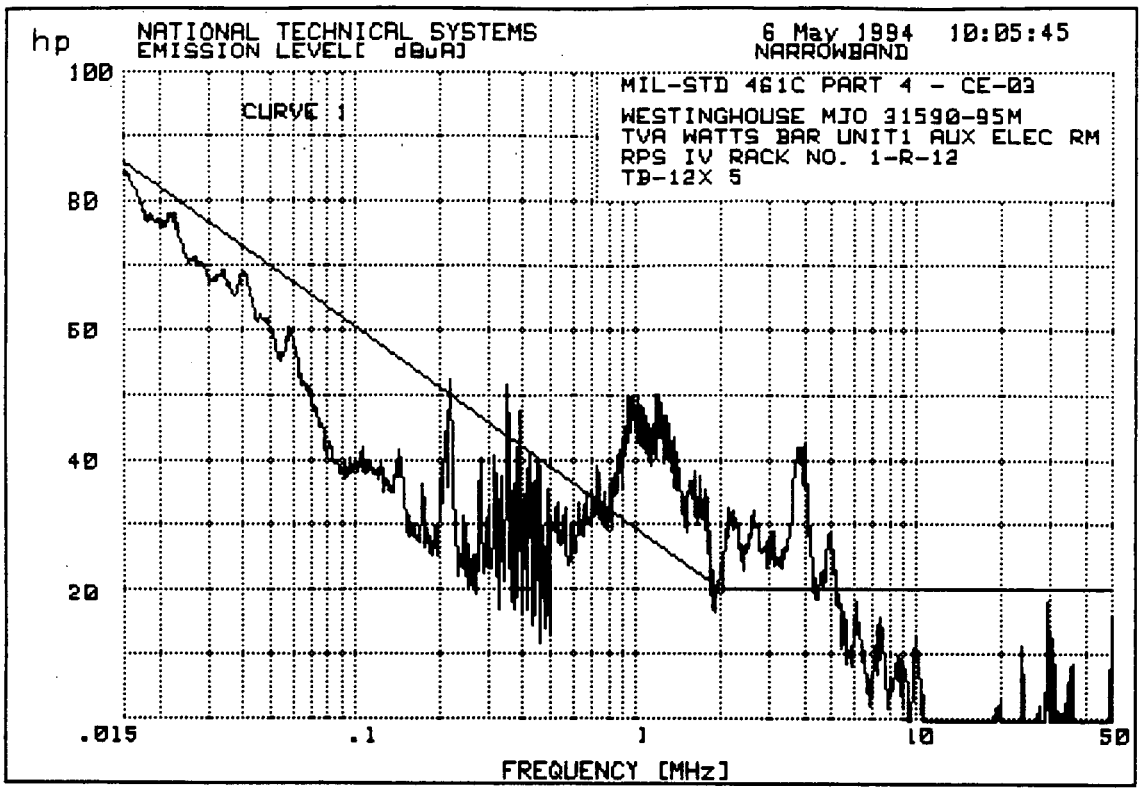
EMISSION LEVEL[dBuA]
6 May 1994 09:48:03
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-11
STM.GEN.LVL. LOOP 1 TBA 7,8
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
6 May 1994 09:48:03
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS III RACK NO. 1-R-11
STM.GEN.LVL. LOOP 1 TBA 7,8
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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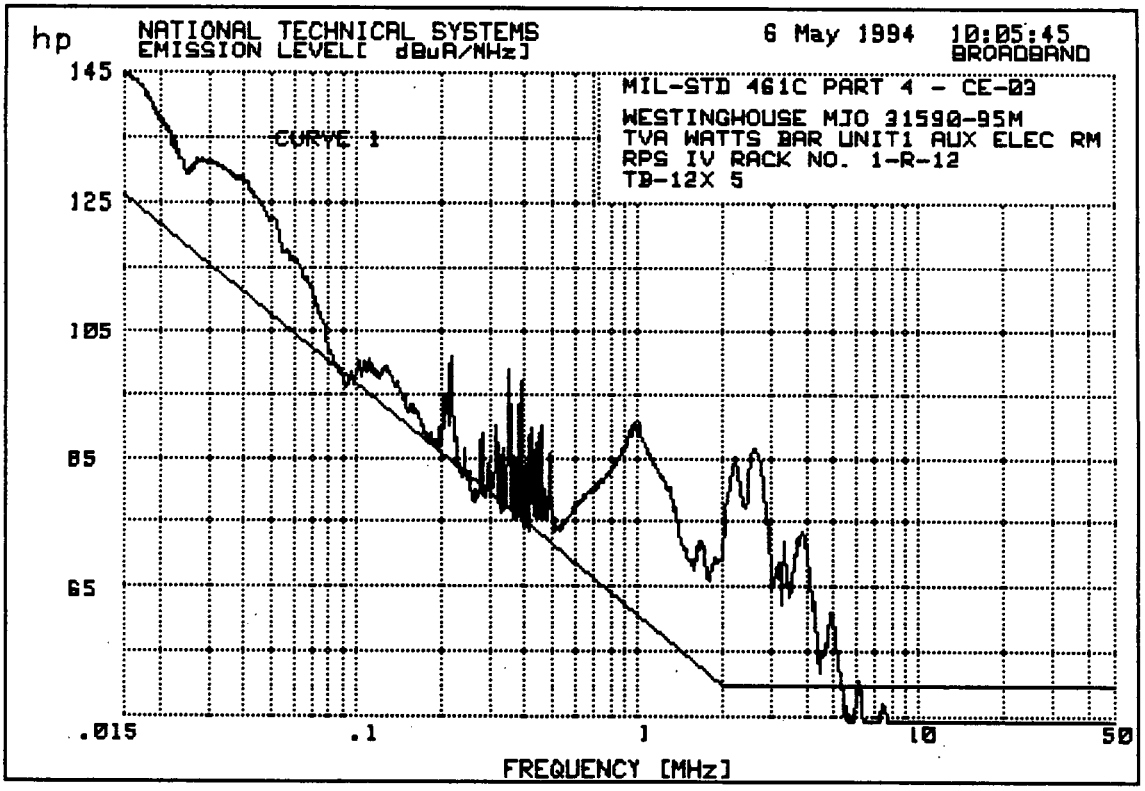
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
6 May 1994 10:05:45
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-12
TB-12X 5
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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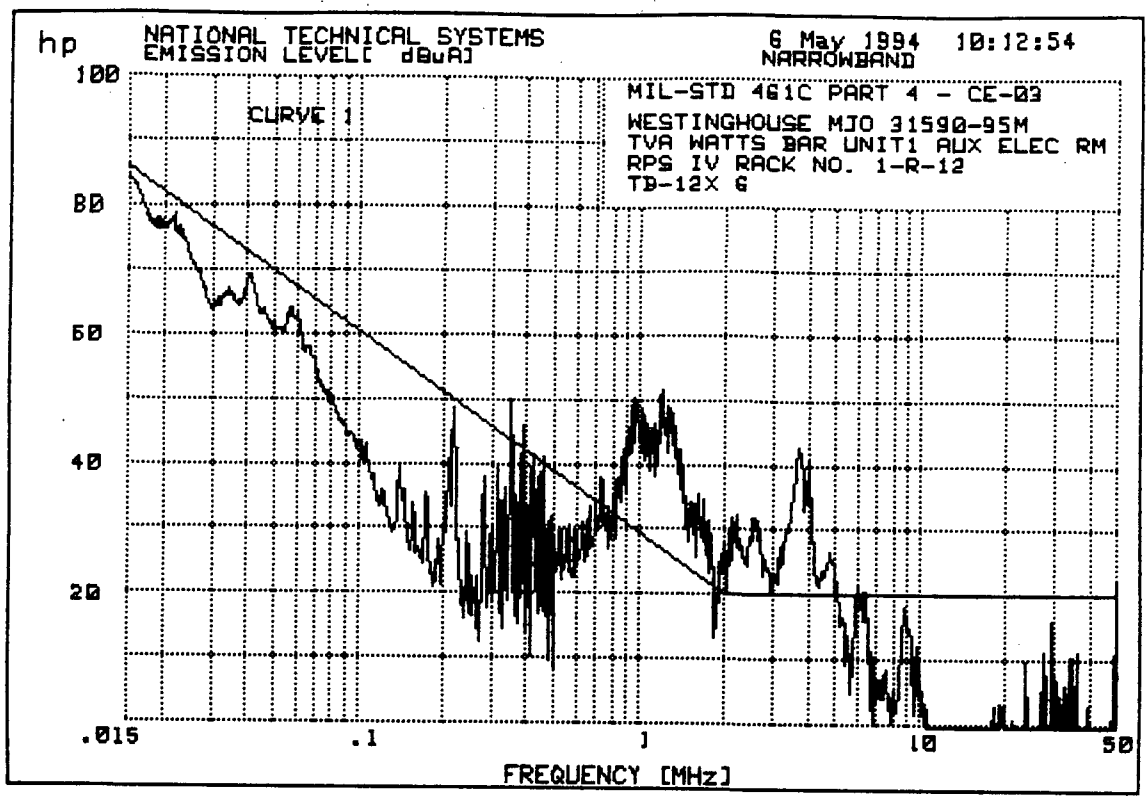
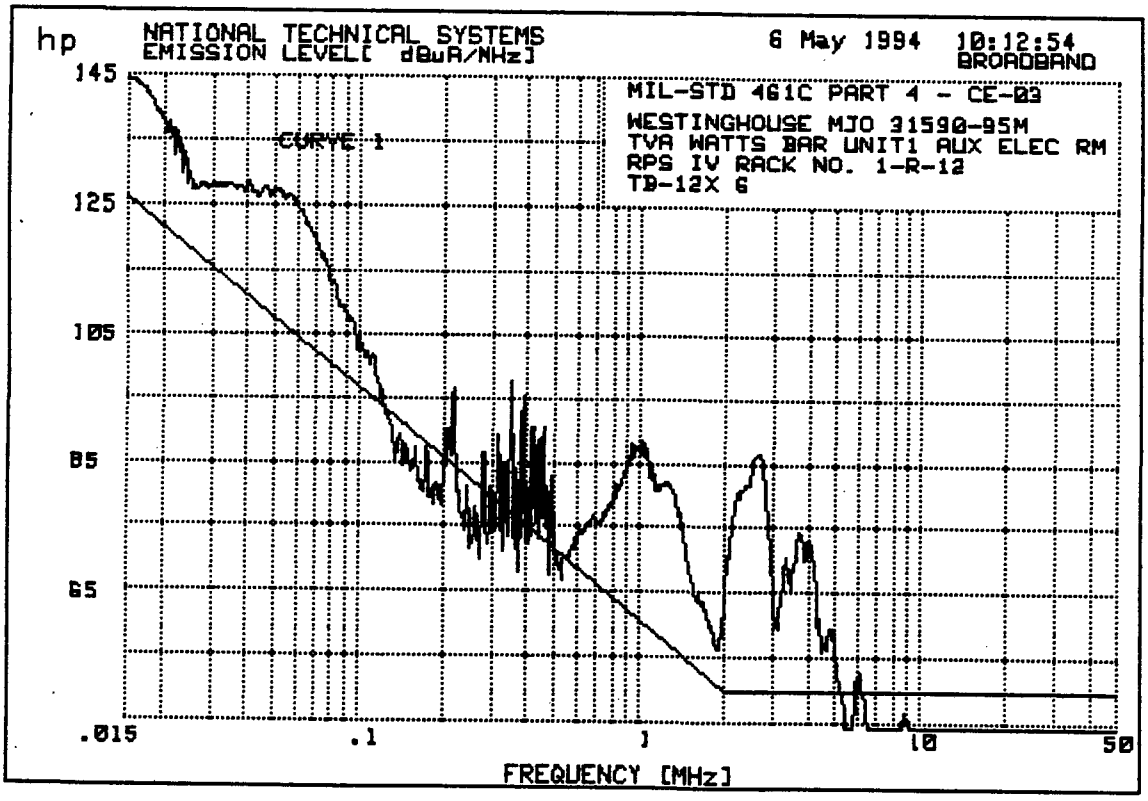
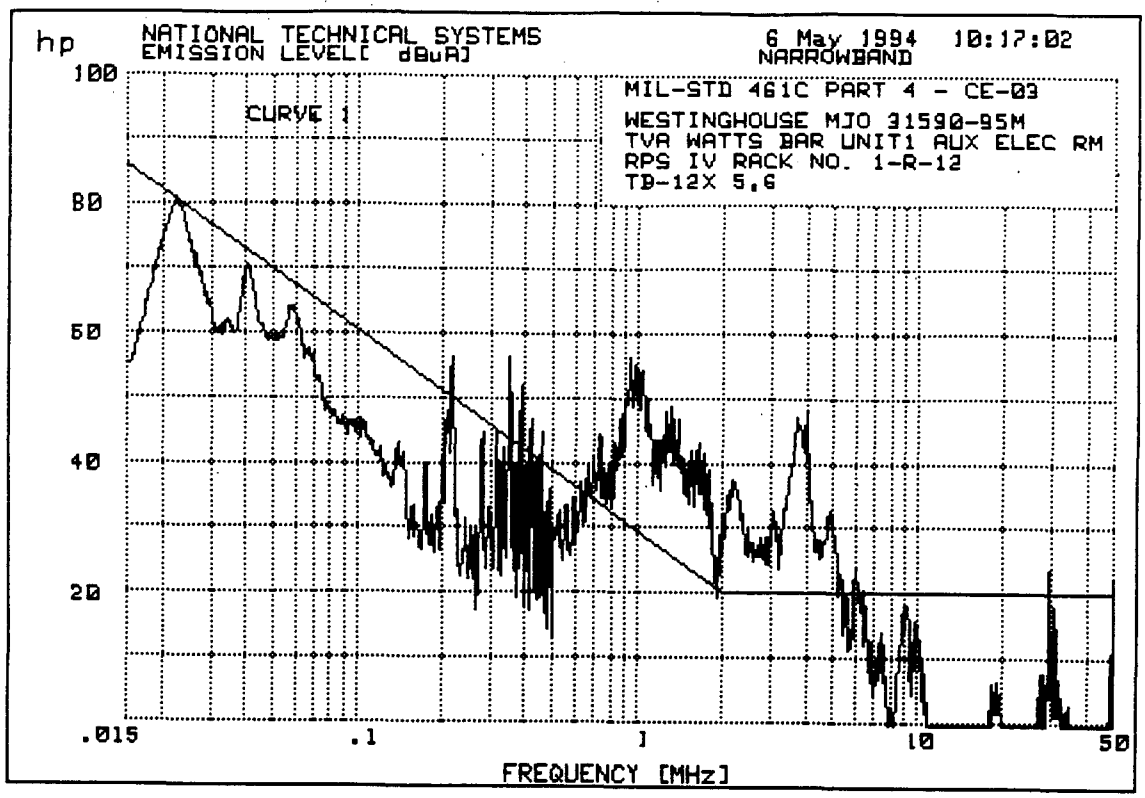
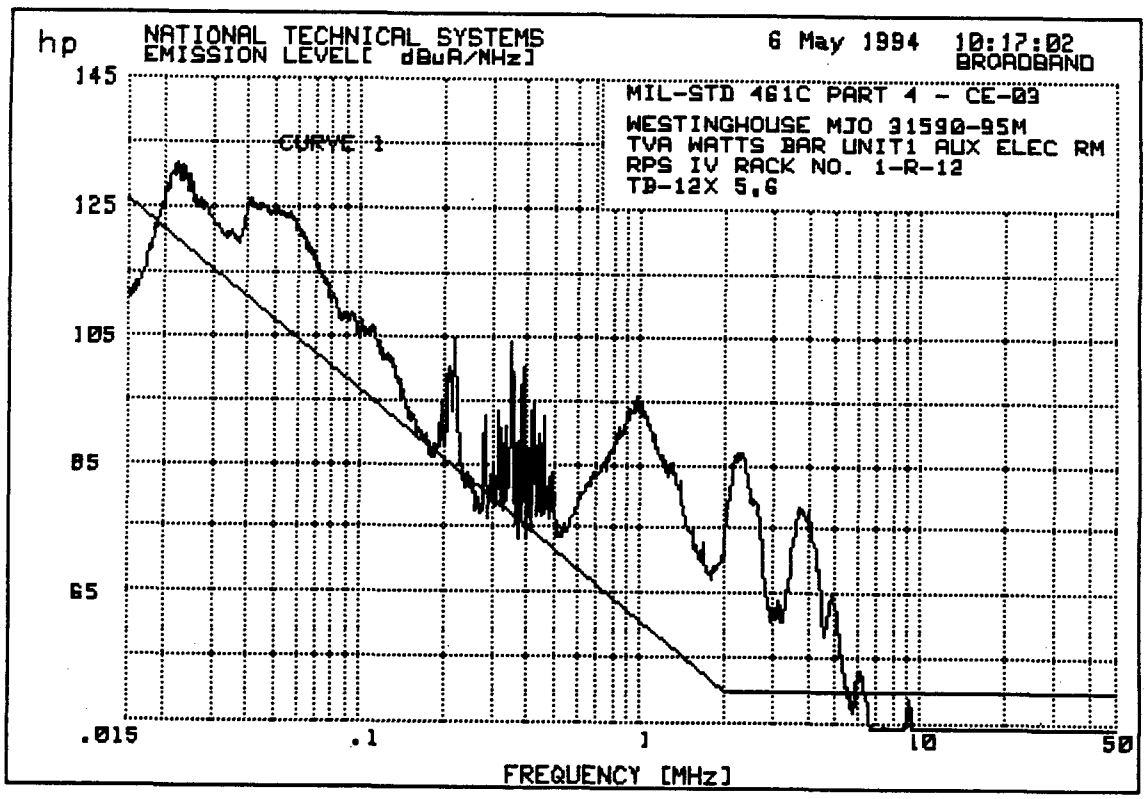
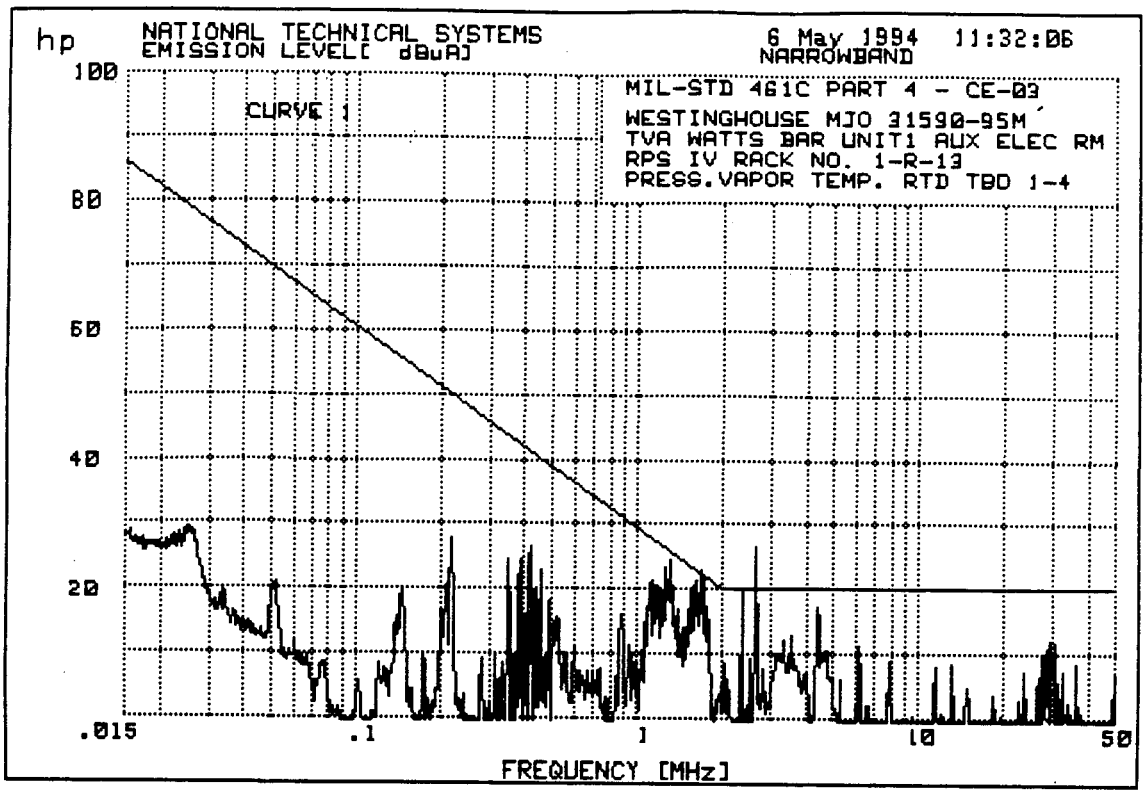
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
6 May 1994 10:05:45
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-12
TB-12X 5
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
6 May 1994 10:12:54
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-12
TB-12X 6
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
6 May 1994 10:12:54
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-12
TB-12X 6
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
6 May 1994 10:17:02
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-12
TB-12X 5,6
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
6 May 1994 10:17:02
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-12
TB-12X 5,6
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]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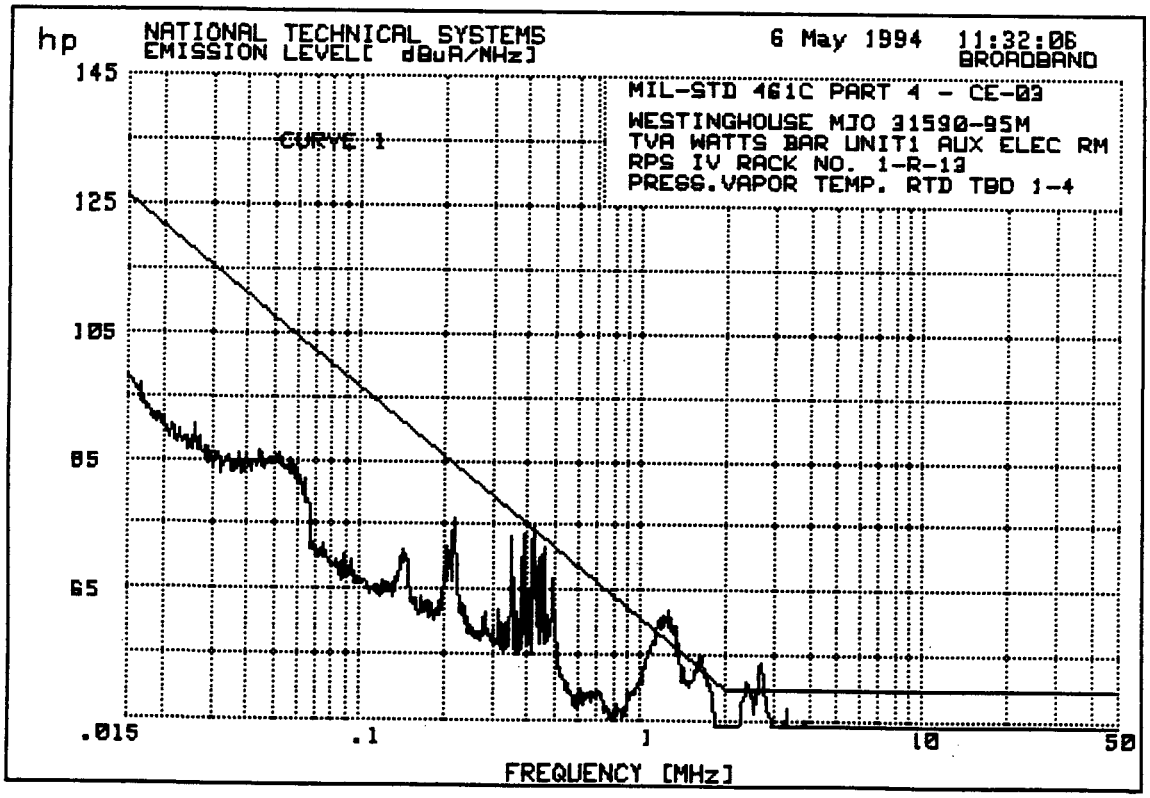
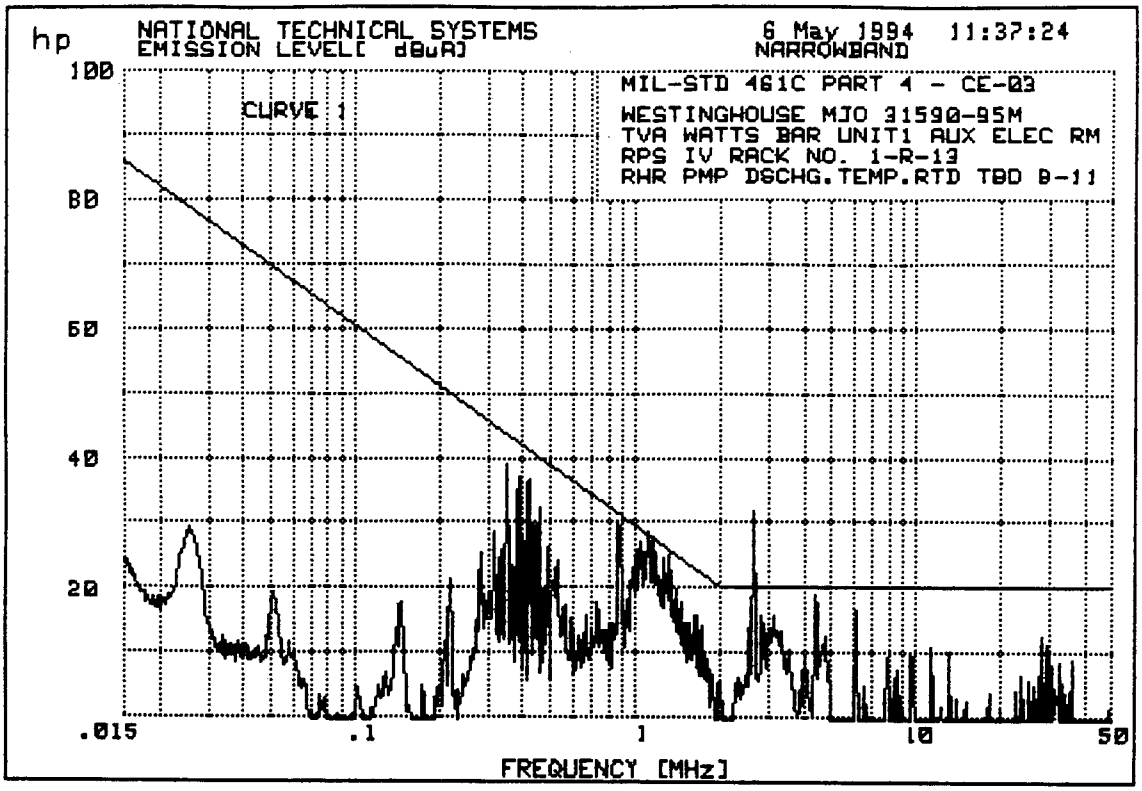
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
6 May 1994 11:32:06
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-13
PRESS.VAPOR TEMP. RTD TBD 1-4
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
6 May 1994 11:32:06
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-13
PRESS.VAPOR TEMP. RTD TBD 1-4
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]

6 92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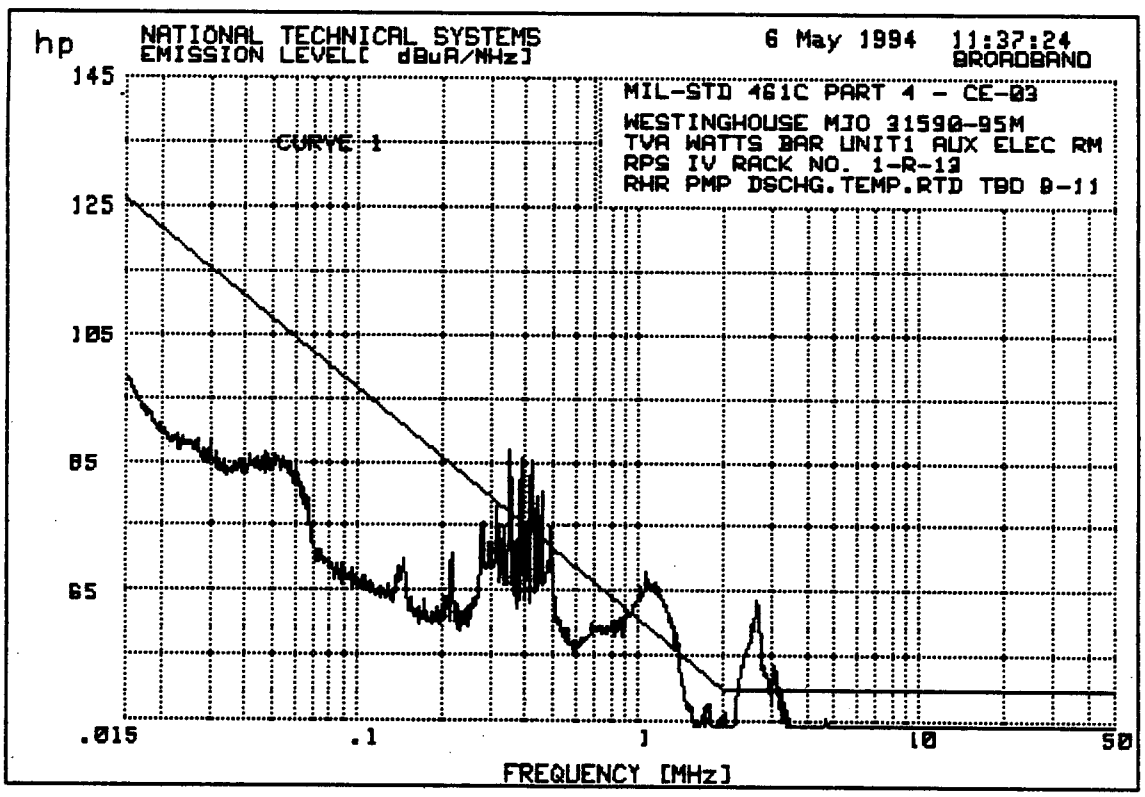
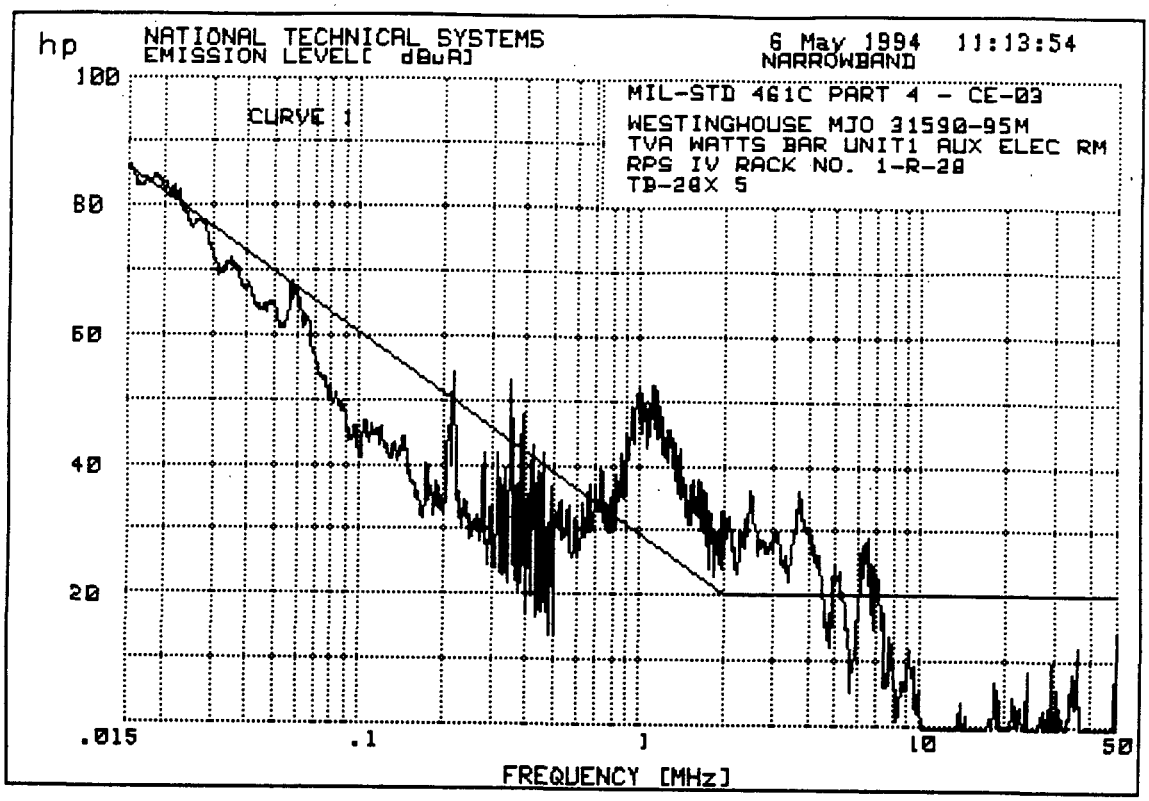
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
6 May 1994 11:37:24
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-13
RHR PMP DSCHG.TEMP.RTD TBD B-11
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
6 May 1994 11:37:24
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-13
RHR PMP DSCHG.TEMP.RTD TBD B-11
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]

6 93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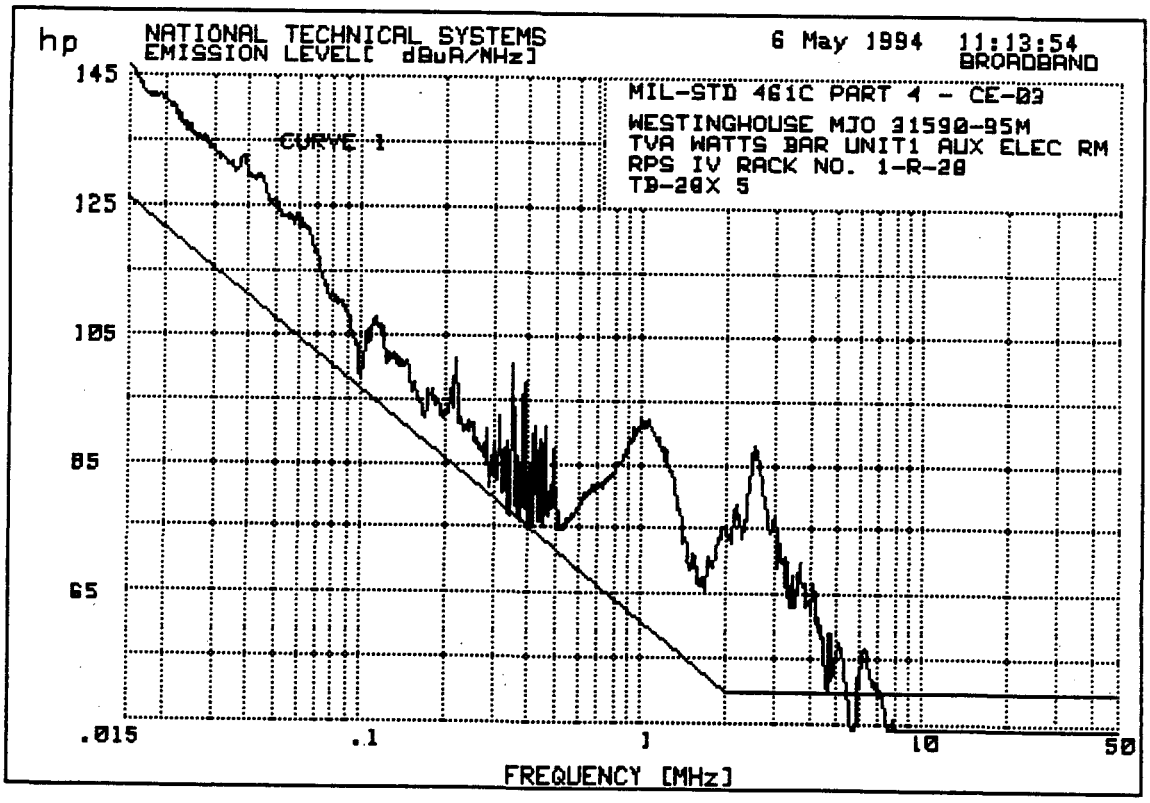
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
6 May 1994 11:13:54
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-28
TB-28X 5
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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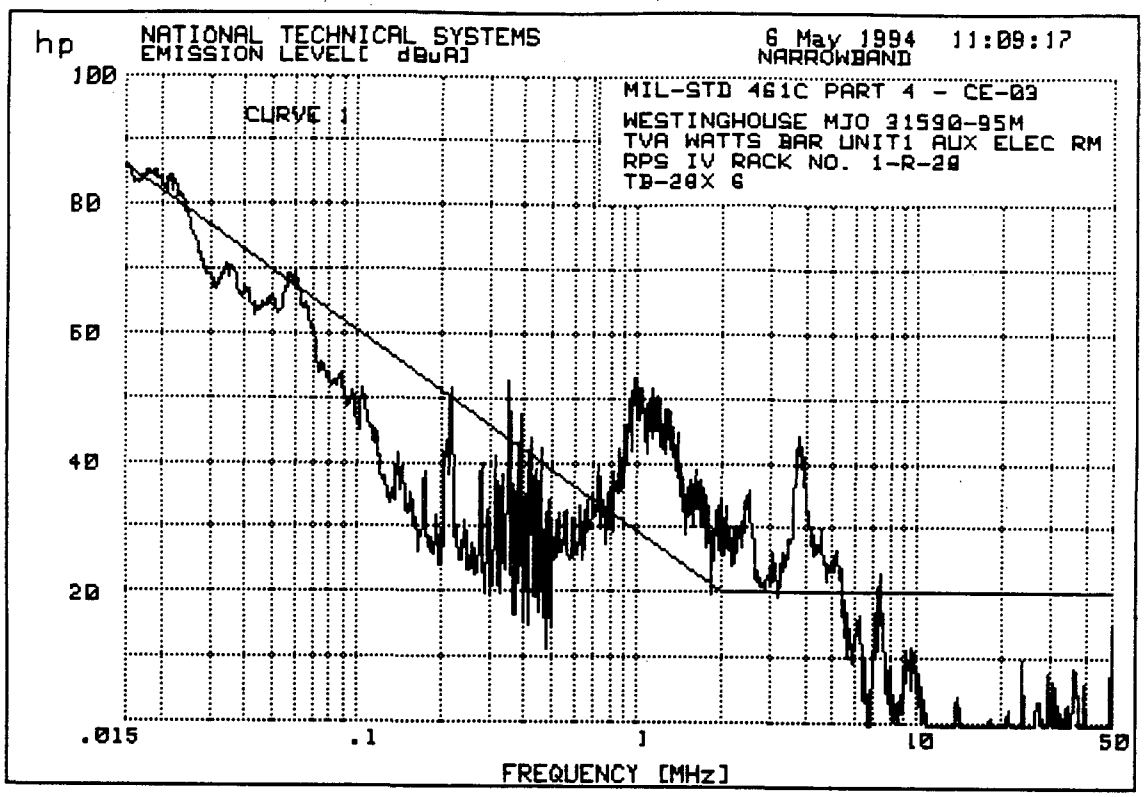
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
6 May 1994 11:13:54
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-28
TB-28X 5
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]

6 94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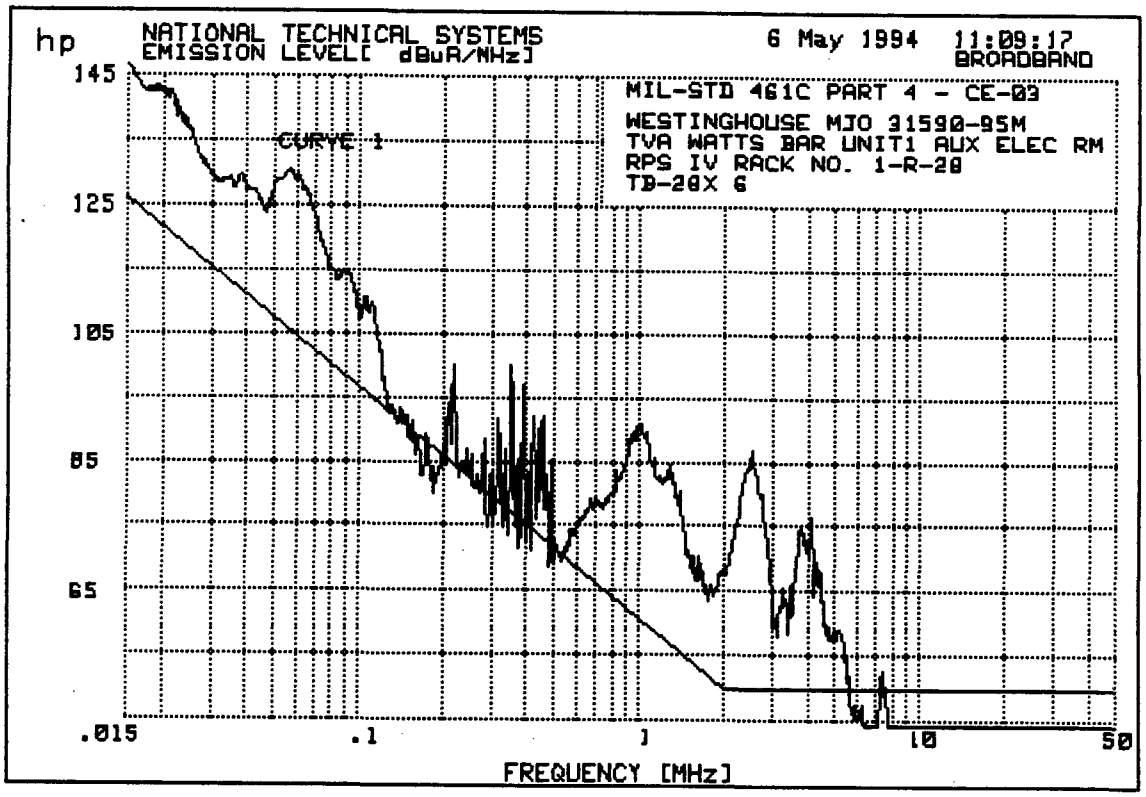
EMISSION LEVEL[dBuA]
6 May 1994 11:09:17
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-28
TB-28X 6
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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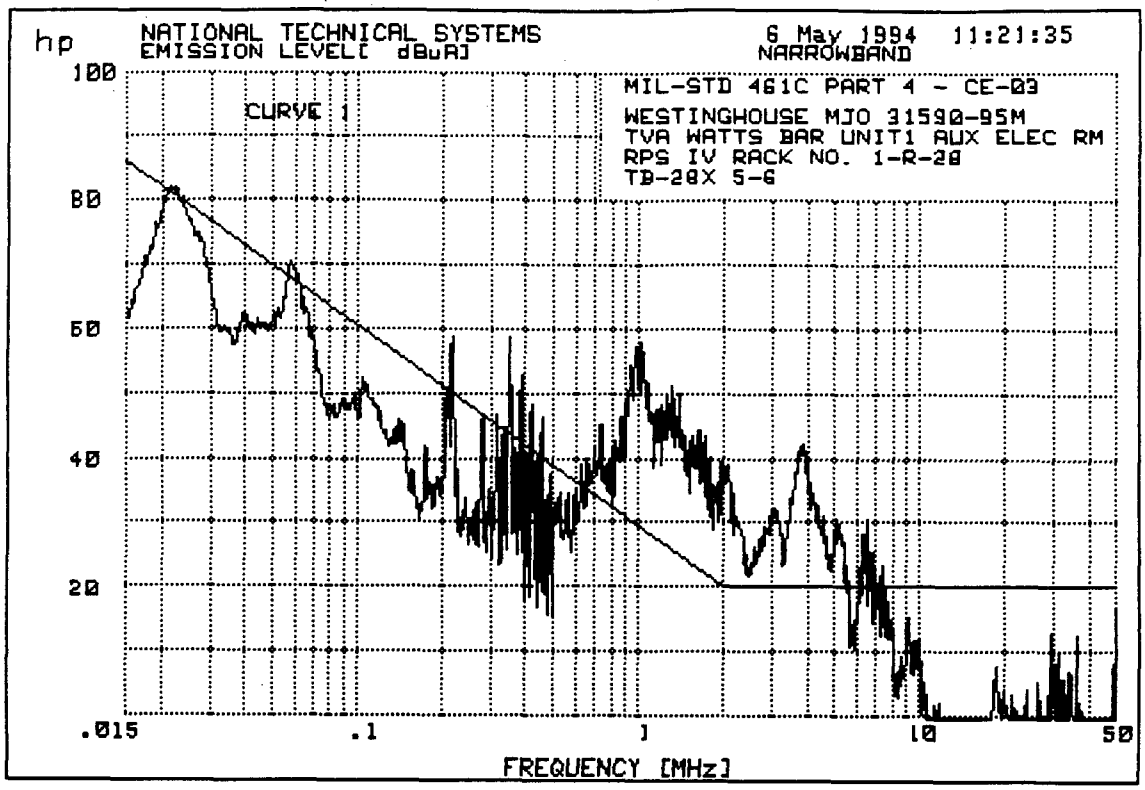
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
6 May 1994 11:09:17
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-28
TB-28X 6
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]

6 95

CJB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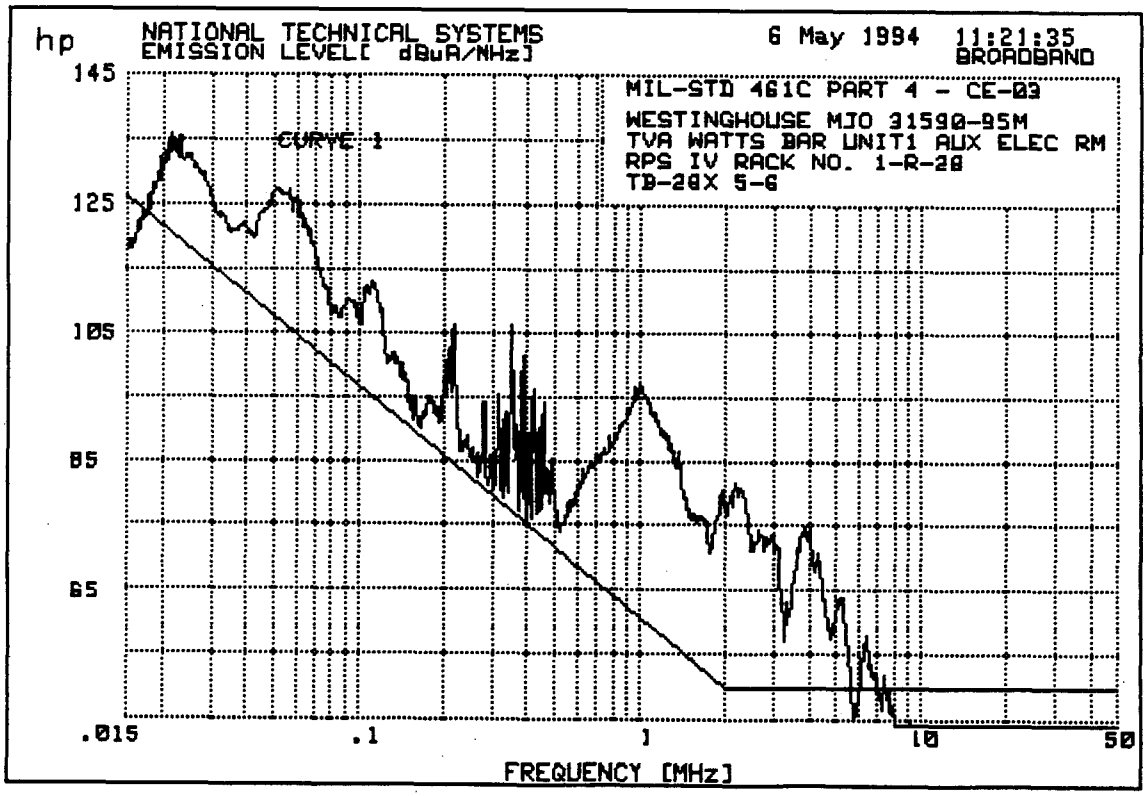
EMISSION LEVEL[dBuA]
6 May 1994 11:21:35
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-28
TB-28X 5-6
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]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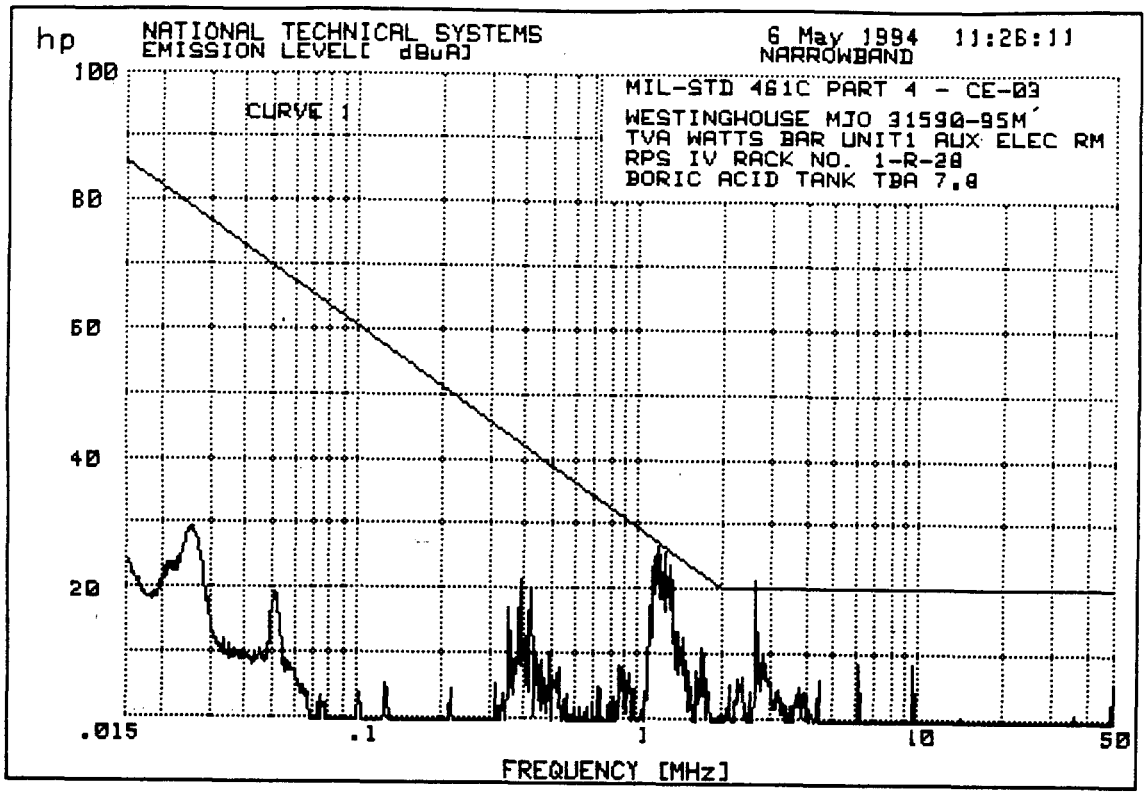
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
6 May 1994 11:21:35
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-28
TB-28X 5-6
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]

6 96

CD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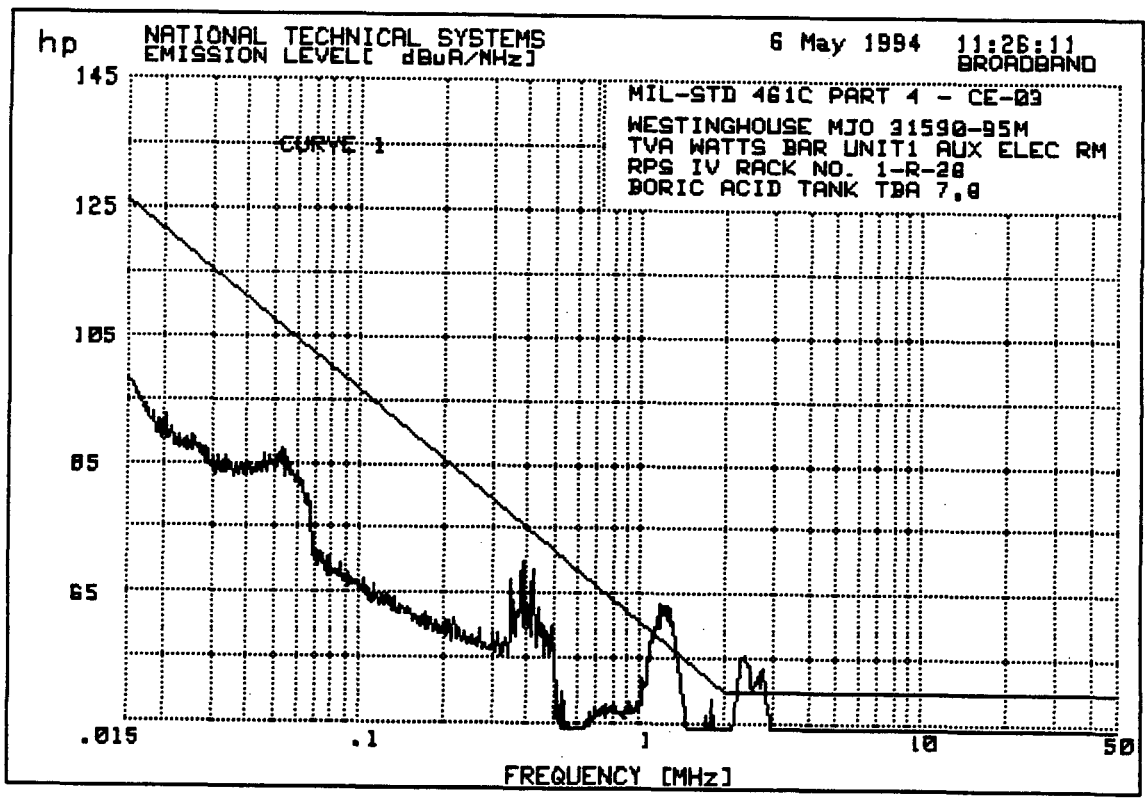
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA]
6 May 1994 11:26:11
NARROWBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-28
BORIC ACID TANK TBA 7.8
CURVE 1
100
80
60
40
20
.015
.1
1
10
50
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuA/MHz]
6 May 1994 11:26:11
BROADBAND
MIL-STD 461C PART 4 - CE-03
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
RPS IV RACK NO. 1-R-28
BORIC ACID TANK TBA 7.8
CURVE 1
145
125
105
85
65
.015
.1
1
10
50
FREQUENCY [MHz]

6 97

6.3 Conducted Emissions, Method CE07, Switching Transients, Time Domain

Requirements

Conducted emissions switching transients, time domain, will be measured in accordance with the applicable portions of Test Method CE07 of MIL-STD-462, Reference Section 6.3, Test Setup.

Procedures

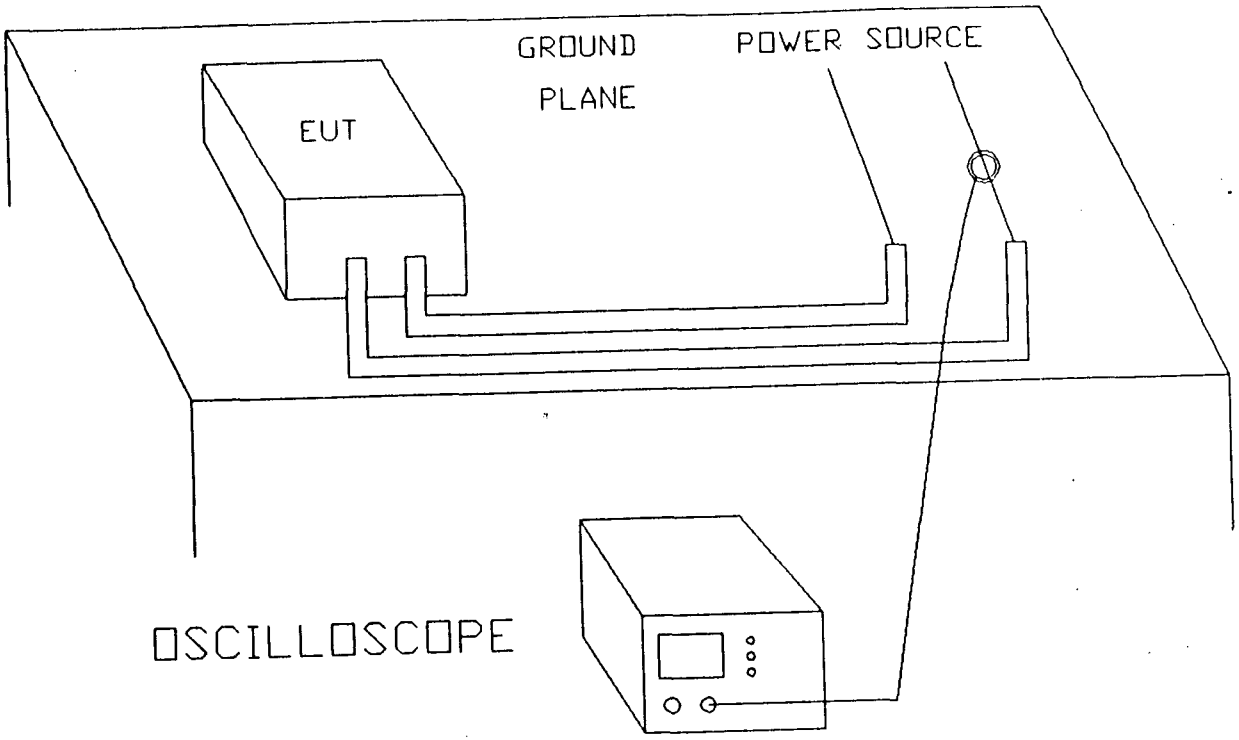
The Auxiliary Electric Equipment Room Environment was set up and operated as specified in Section 4.0 of this report. A Tektronix oscilloscope, Model TDS 520, and a Stoddart Model 91550-1 current probe was connected to a selected power lead, designated as "Phase". The time domain current measurement results were printed and stored on electronic media.

The preceding procedure was repeated with the current probe connected to the remaining lead designated as "Neutral". (Reference Figure 4-2).

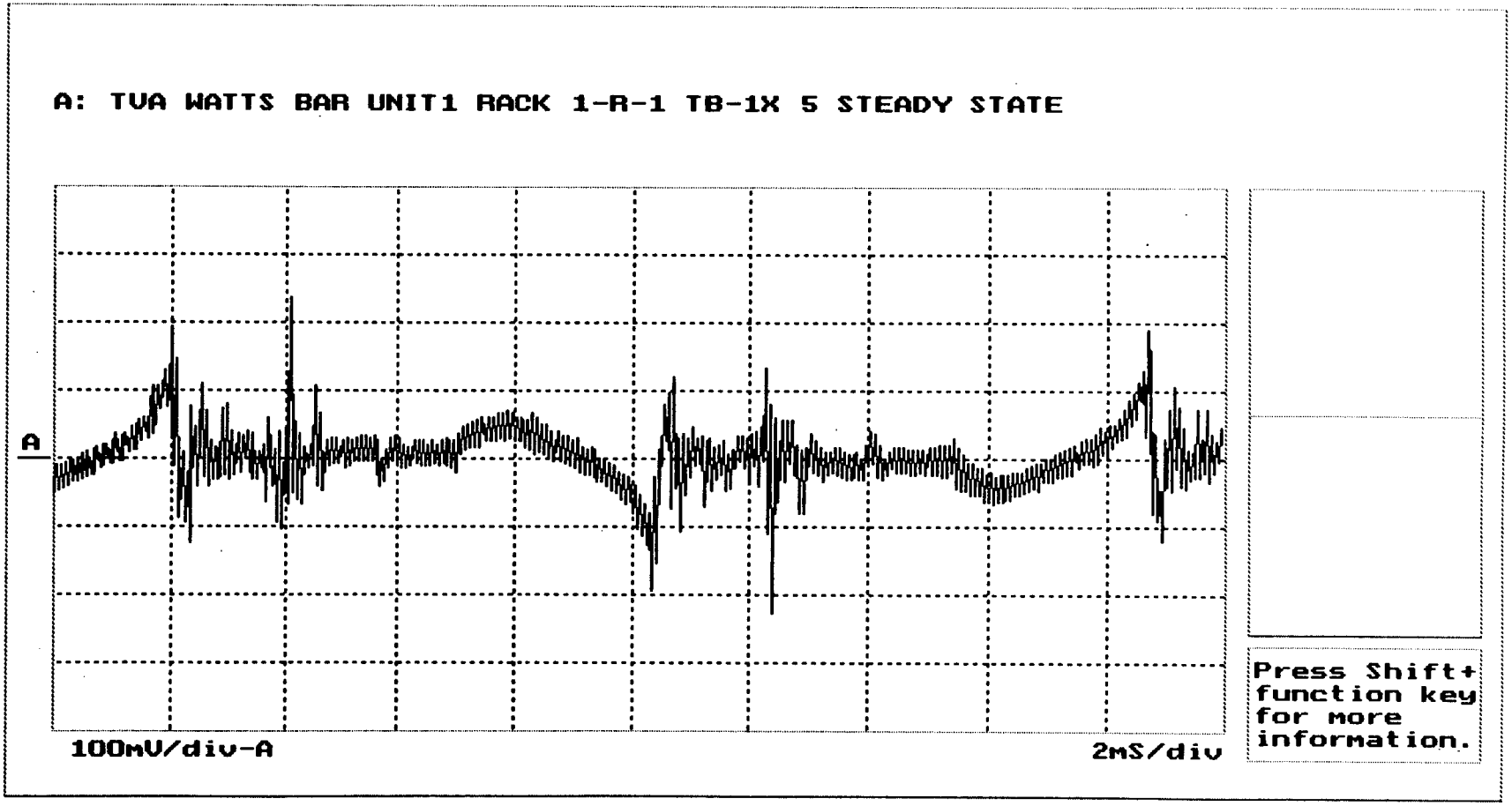
6.3 Conducted Emissions, Method CE07, Switching Transients, Time Domain (continued)

Sample Test Results

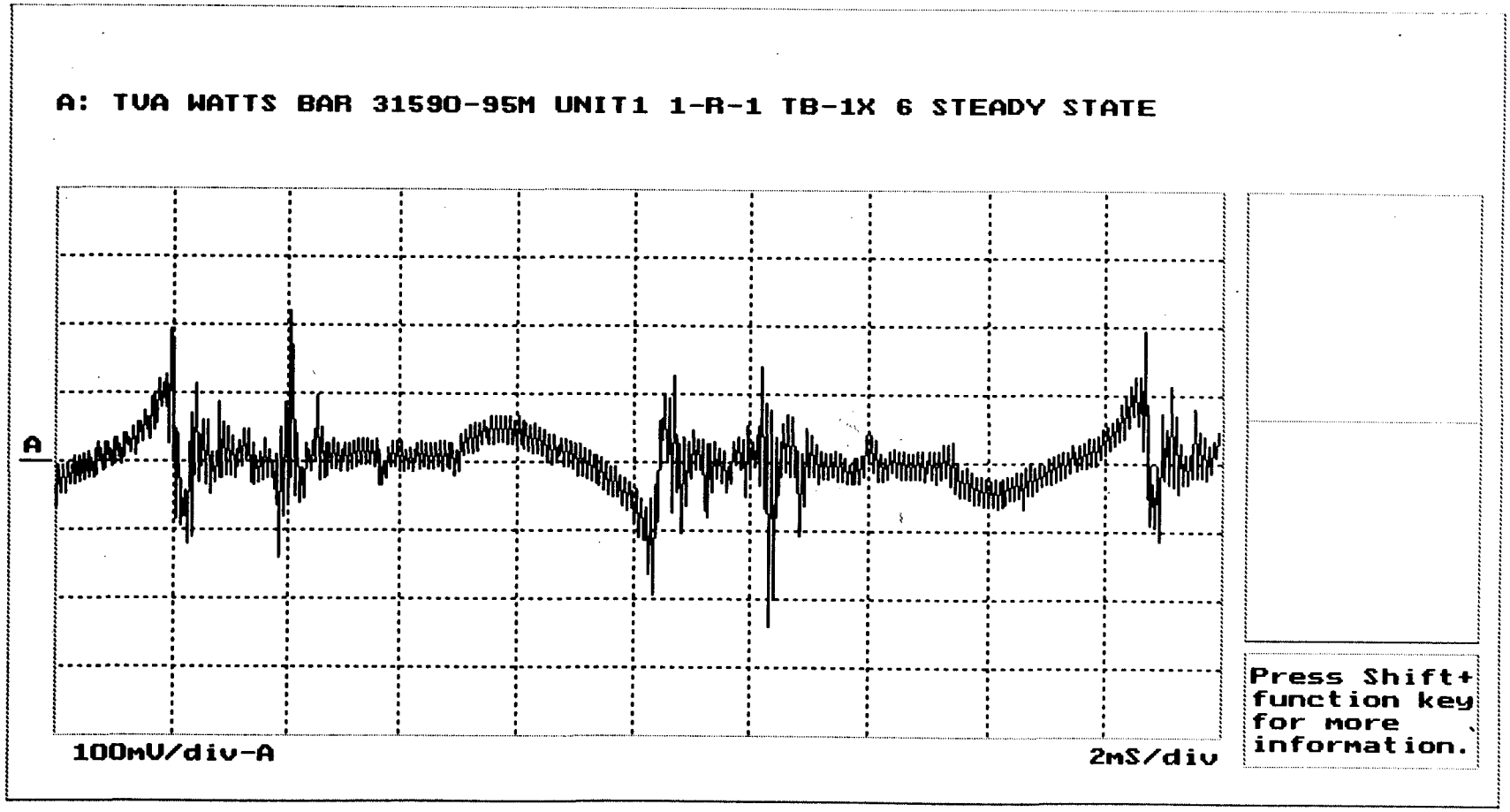
Test	Results
CEO7 Conducted Emissions, Switching Transients, Time Domain	Westinghouse Electric Corporation will perform analysis for all tests.



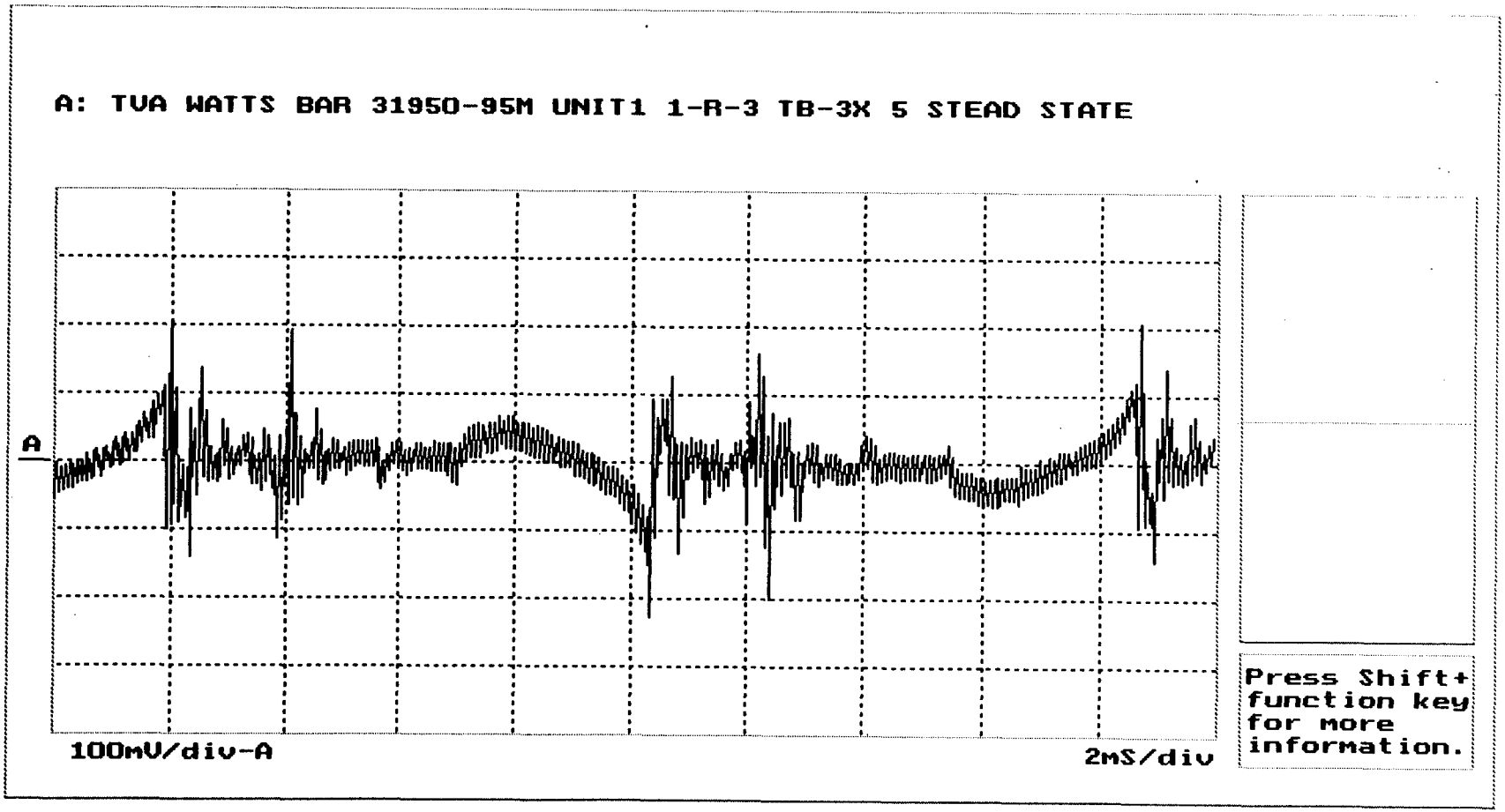
CONDUCTED EMISSIONS, METHOD CE07, TYPICAL TEST SETUP


A: TVA WATTS BAR UNIT1 RACK 1-R-1 TB-1X 5 STEADY STATE
A
100mV/div-A
2mS/div
Press Shift+ function key for more information.

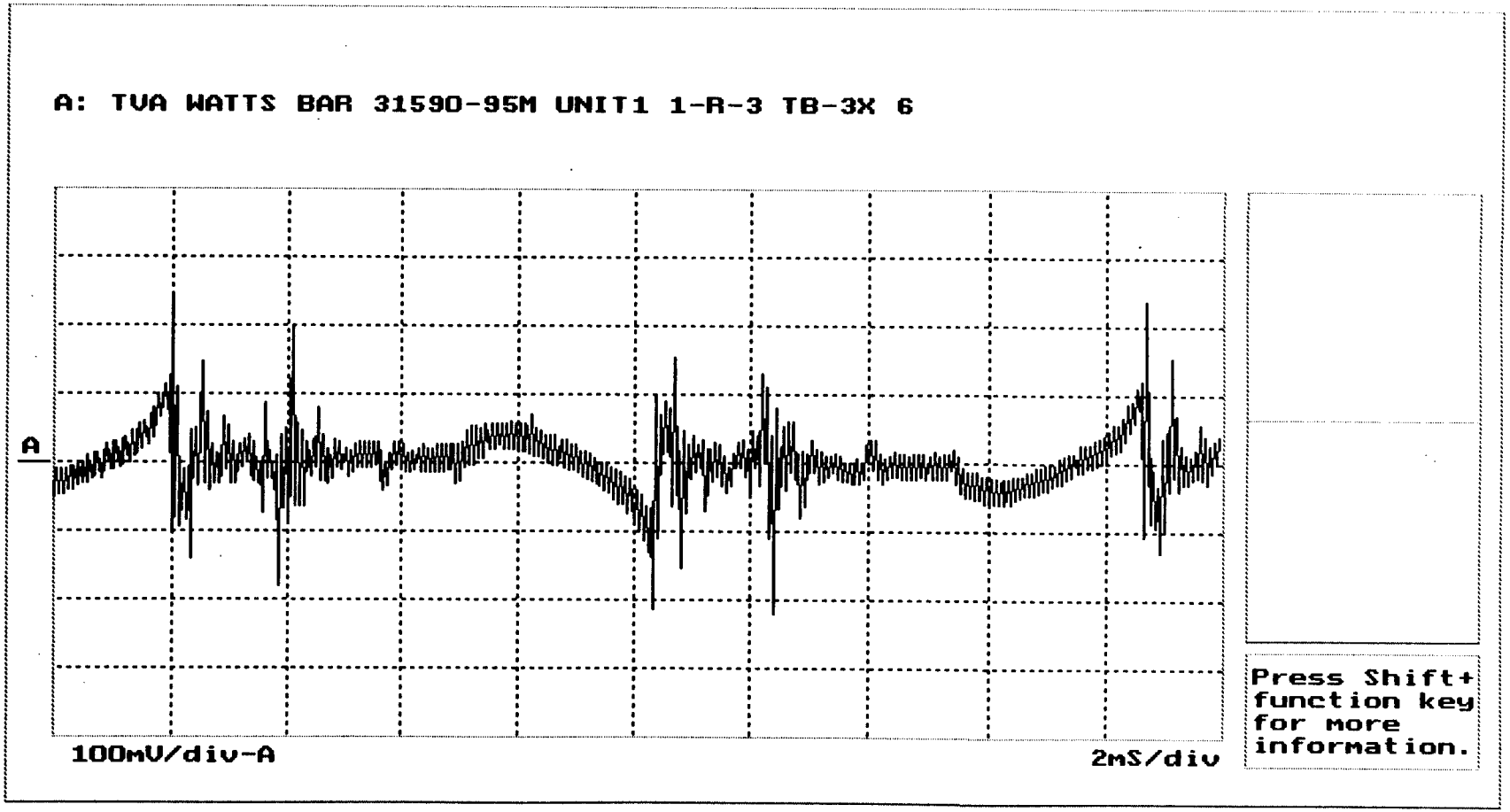
6 101

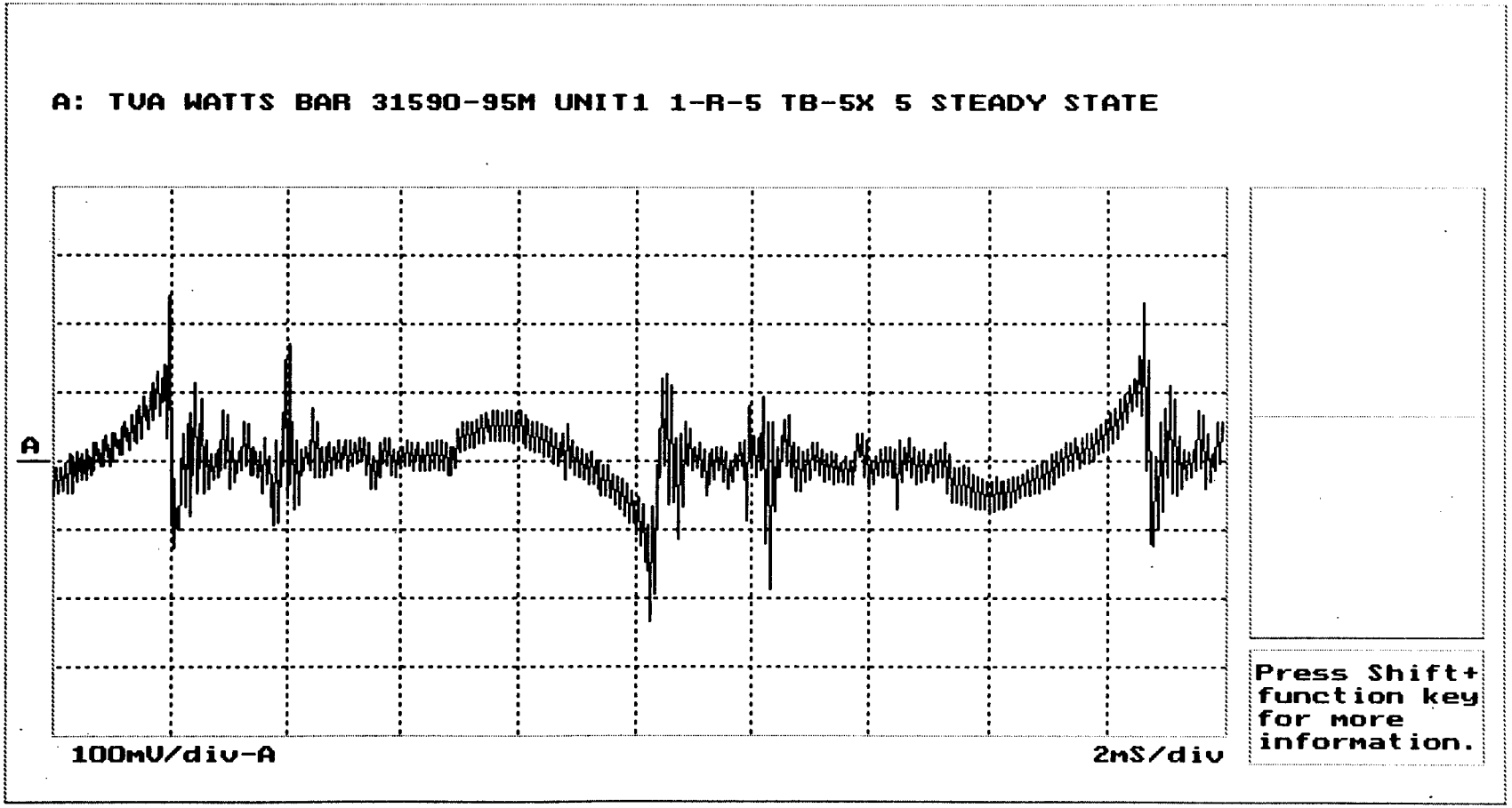

A: TVA WATTS BAR 3159O-95M UNIT1 1-R-1 TB-1X 6 STEADY STATE
A
100mV/div-A
2mS/div
Press Shift+ function key for more information.

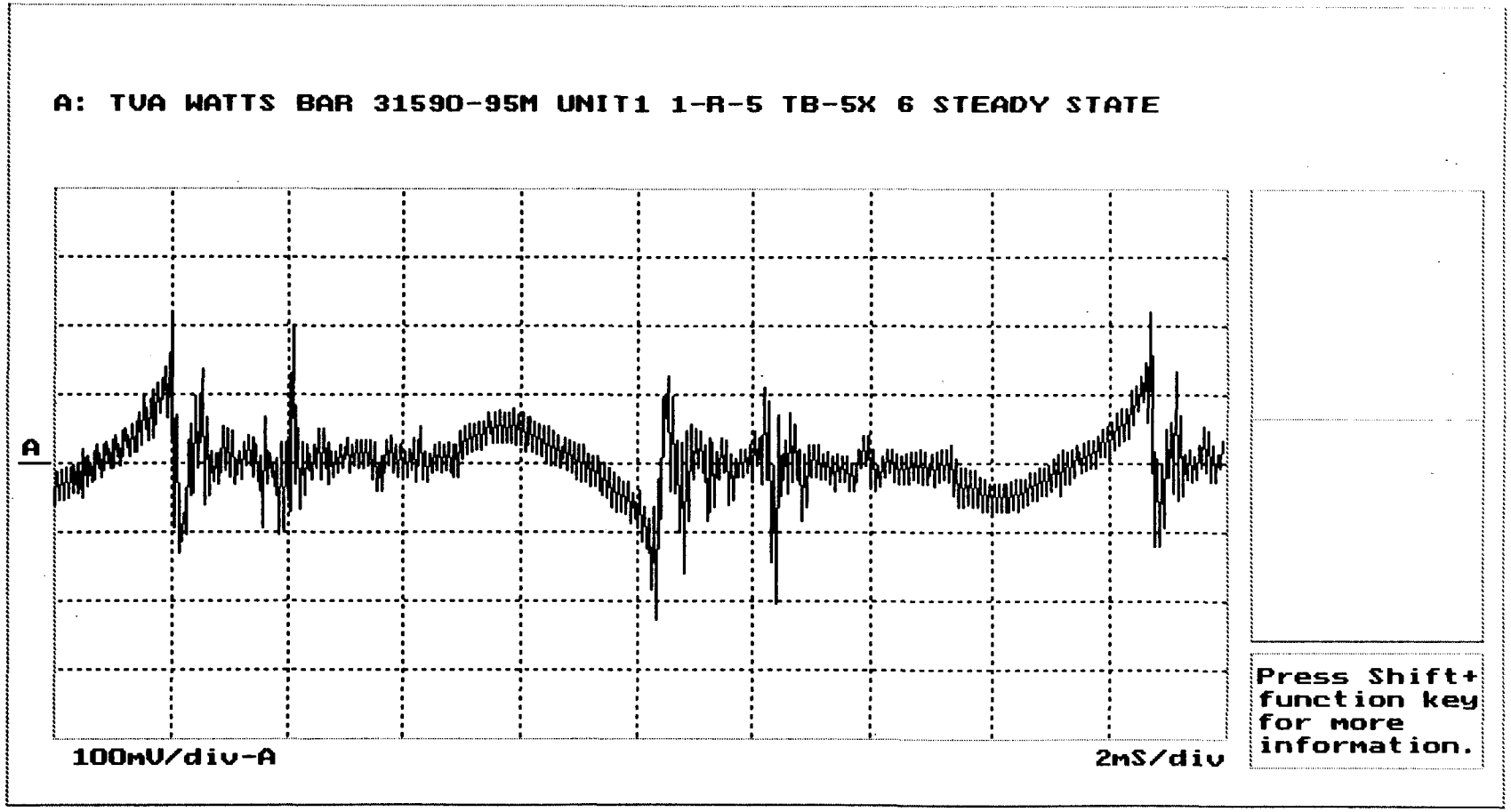
6 102

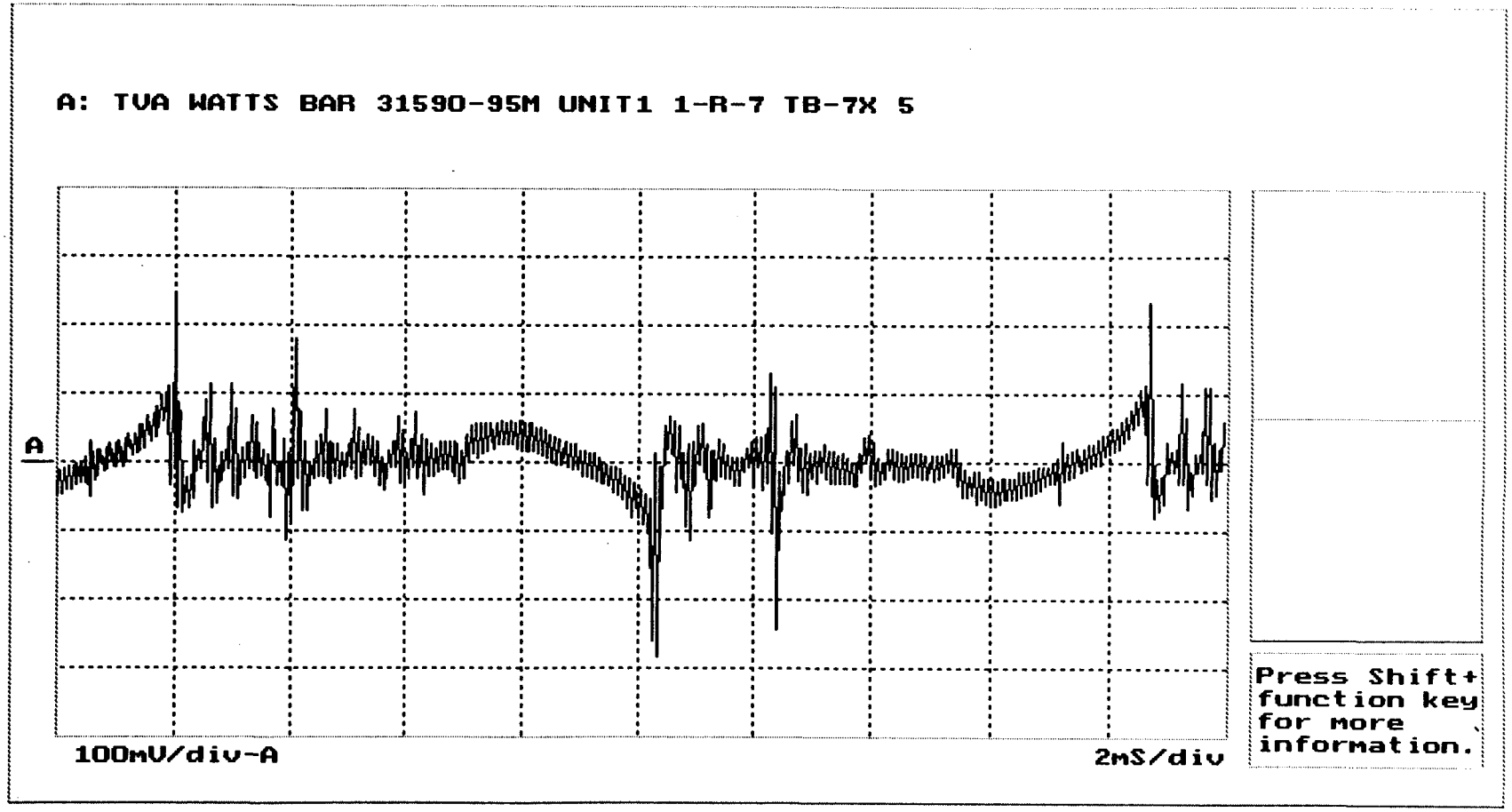

A: TVA WATTS BAR 31950-95M UNIT1 1-R-3 TB-3X 5 STEAD STATE
A
100mV/div-A
2mS/div
Press Shift+ function key for more information.

6 103

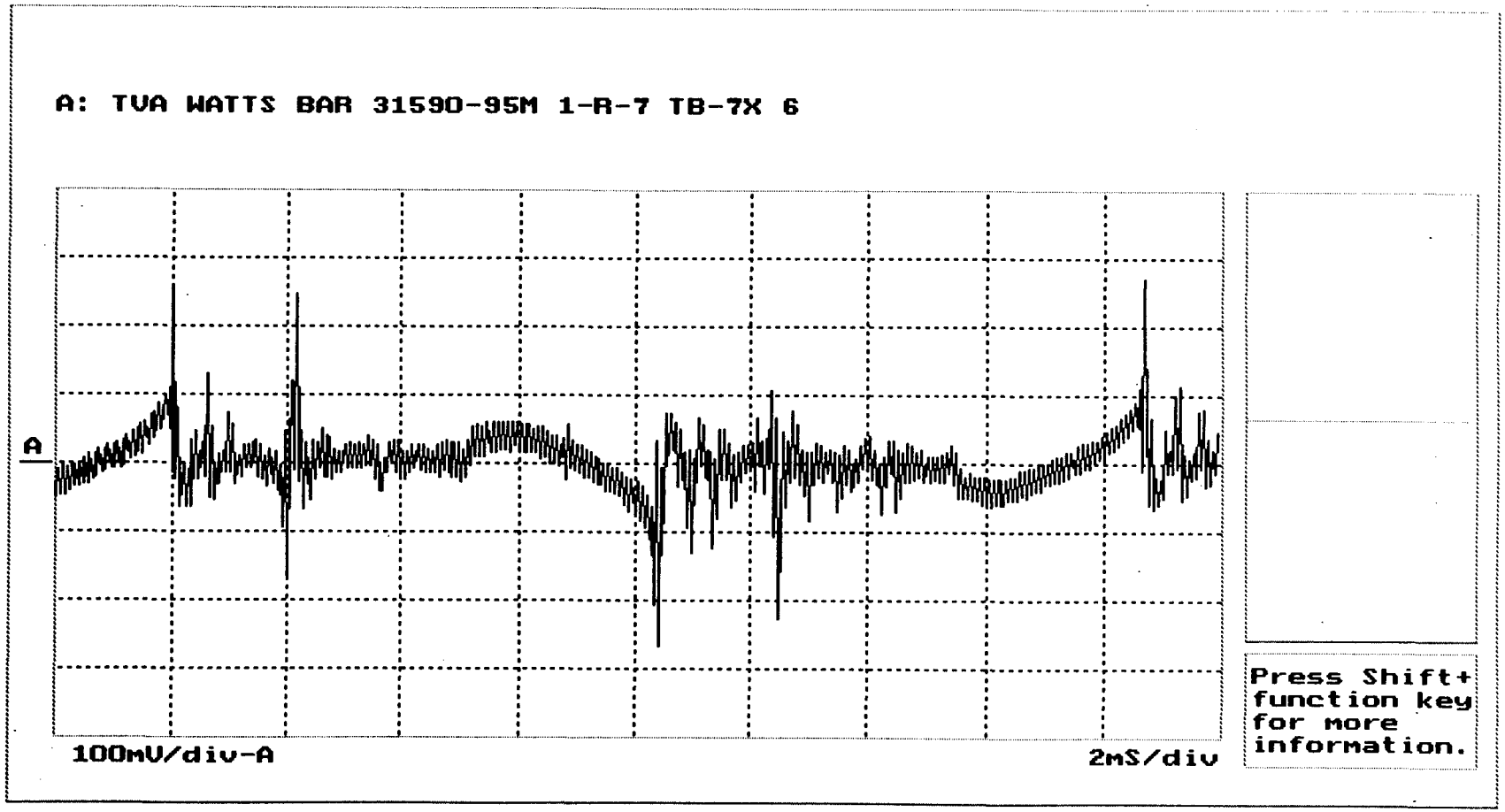

A: TVA WATTS BAR 31590-95M UNIT1 1-R-3 TB-3X 6
A
100mV/div-A
2mS/div
Press Shift+ function key for more information.

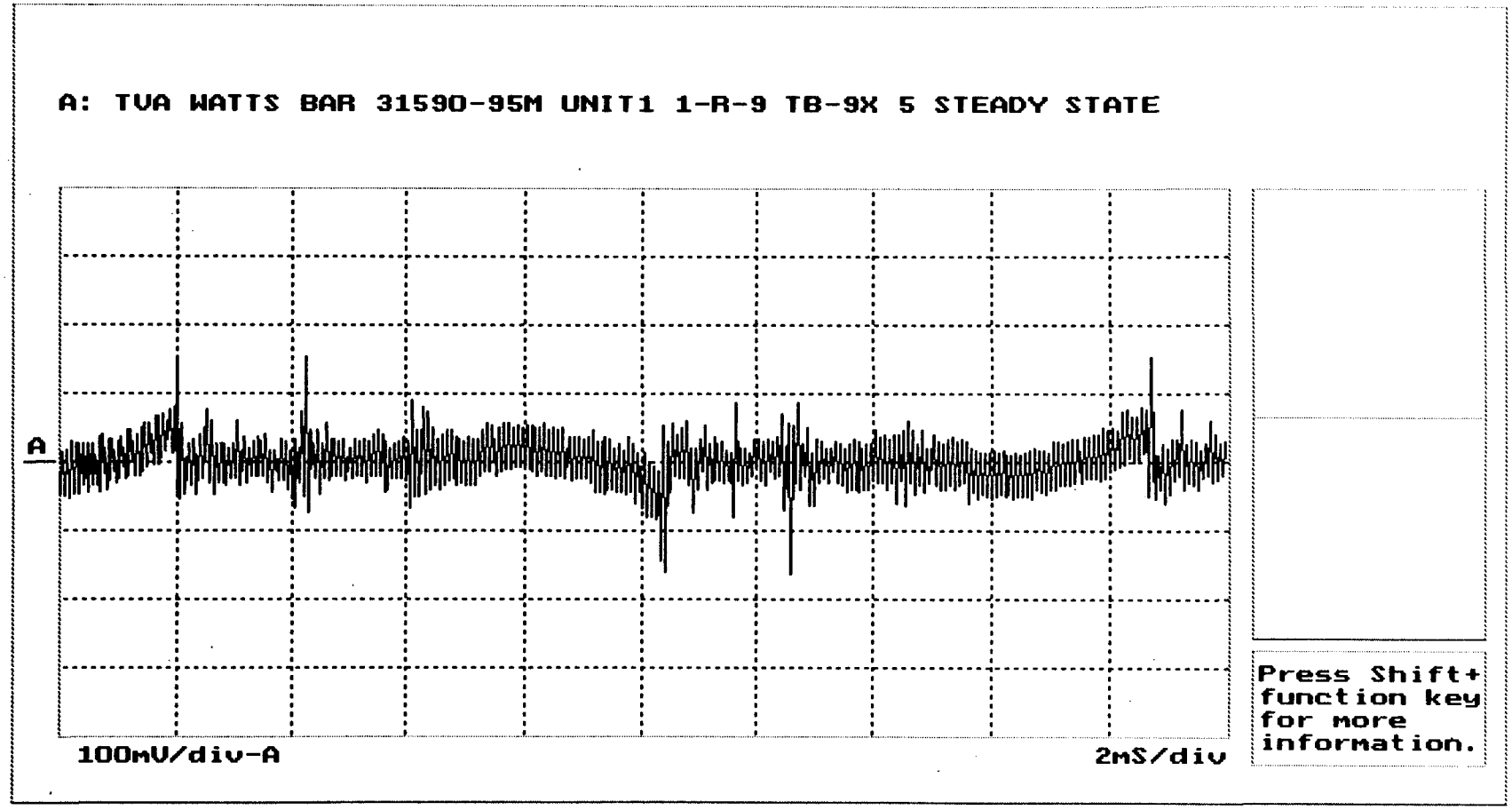

A: TVA WATTS BAR 31590-95M UNIT1 1-R-5 TB-5X 5 STEADY STATE
A
100mV/div-A
2mS/div
Press Shift+ function key for more information.

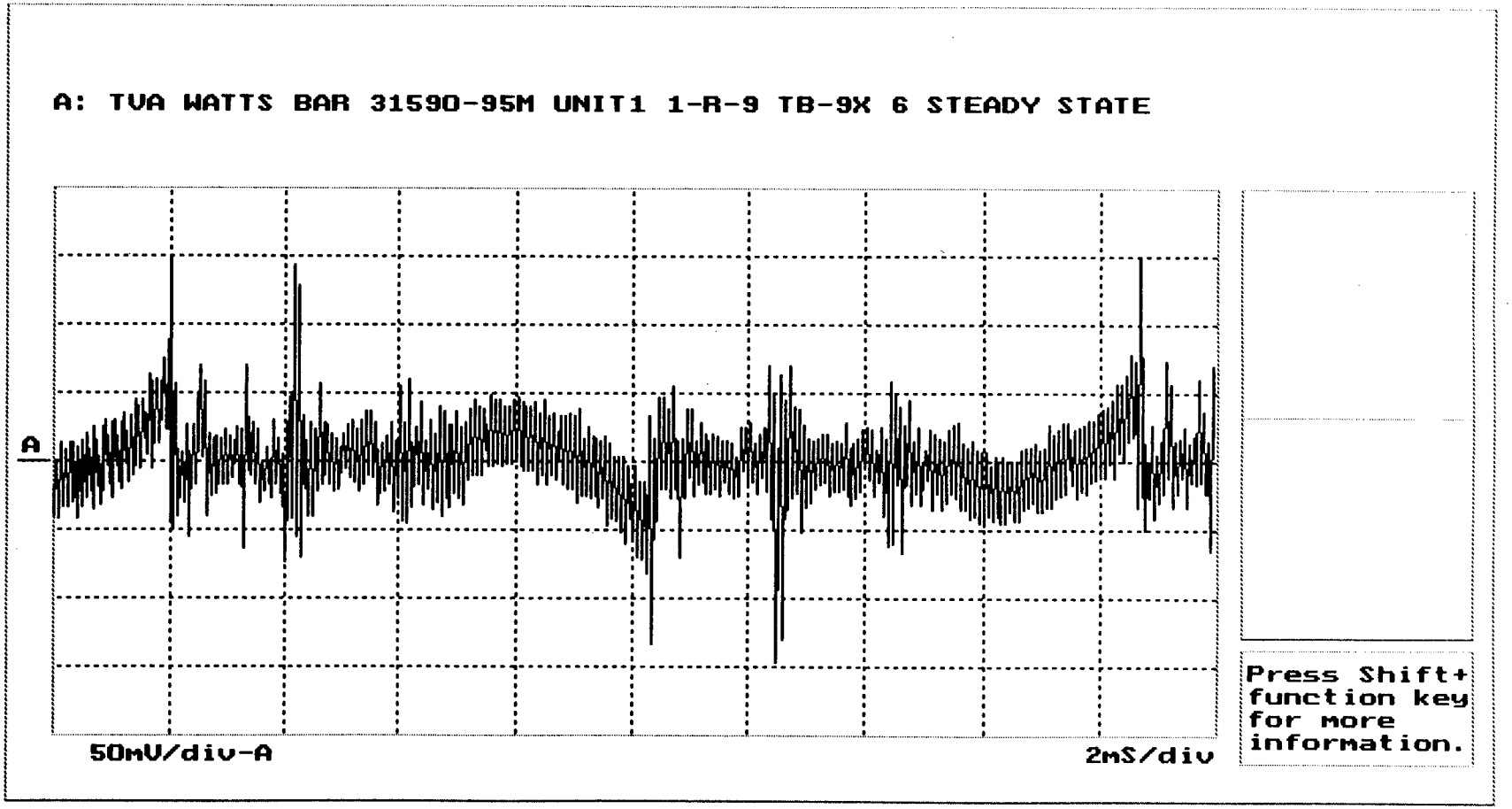

A: TVA WATTS BAR 31590-95M UNIT1 1-R-5 TB-5X 6 STEADY STATE
A
100mV/div-A
2mS/div
Press Shift+ function key for more information.


A: TVA WATTS BAR 31590-95M UNIT1 1-R-7 TB-7X 5
A
100mV/div-A
2mS/div
Press Shift+ function key for more information.

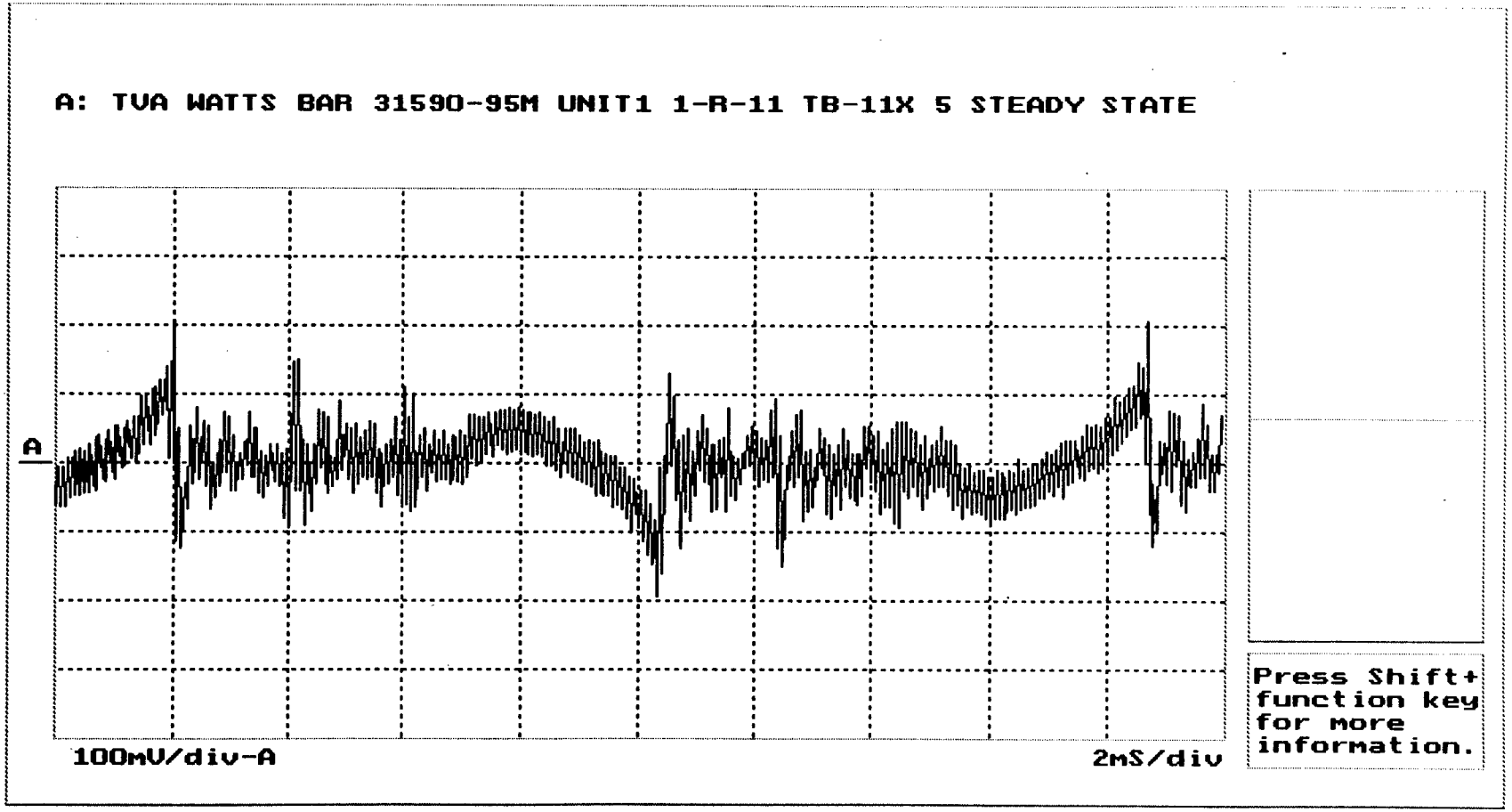
6 107


A: TVA WATTS BAR 31590-95M 1-R-7 TB-7X 6
A
100mV/div-A
2mS/div
Press Shift+ function key for more information.

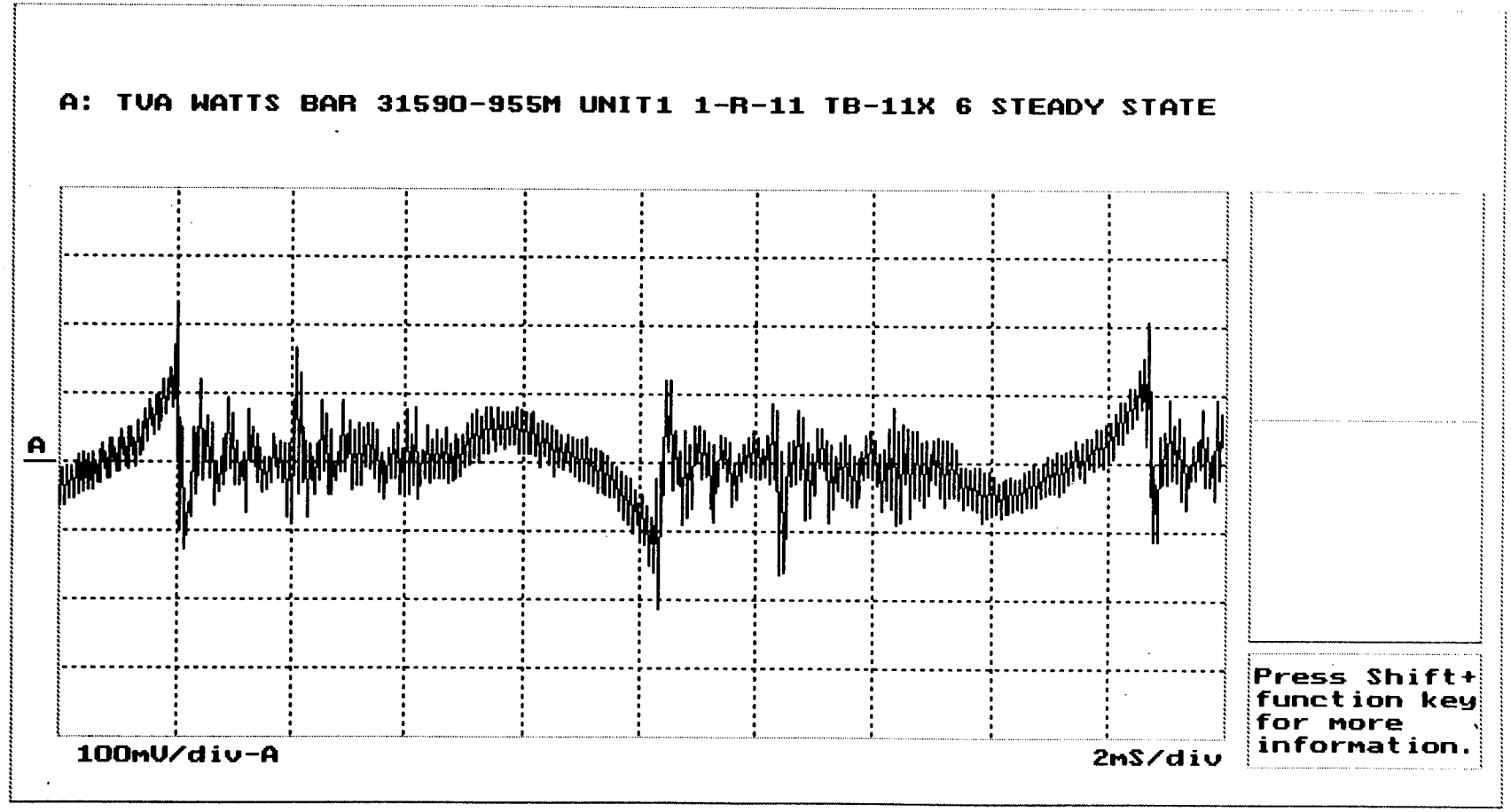

A: TVA WATTS BAR 31590-95M UNIT1 1-R-9 TB-9X 5 STEADY STATE
A
100mV/div-A
2mS/div
Press Shift+ function key for more information.


A: TVA WATTS BAR 31590-95M UNIT1 1-R-9 TB-9X 6 STEADY STATE
A
50mV/div-A
2mS/div
Press Shift+ function key for more information.

6 110

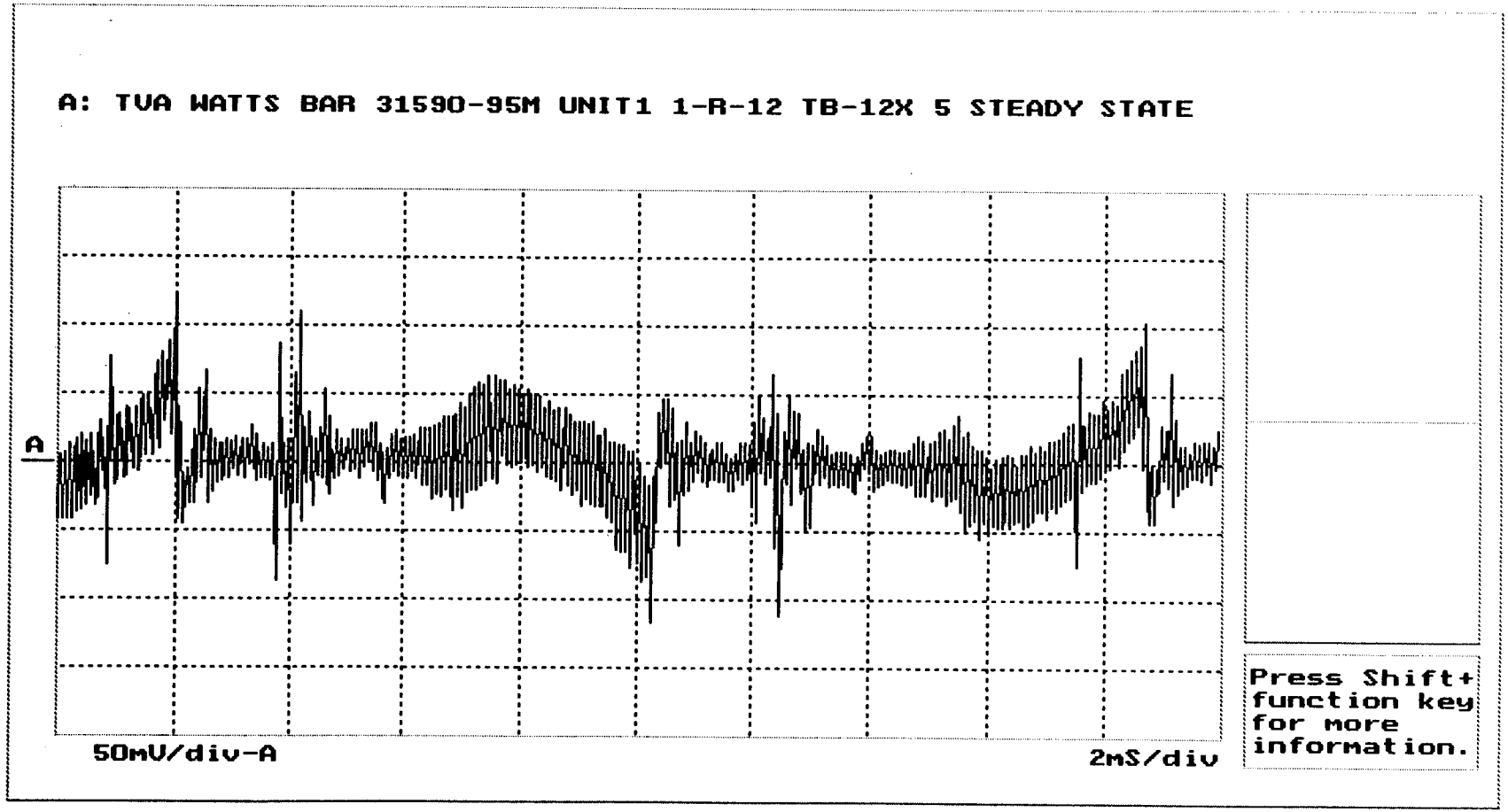

A: TVA WATTS BAR 31590-95M UNIT1 1-R-11 TB-11X 5 STEADY STATE
A
100mV/div-A
2mS/div
Press Shift+ function key for more information.

6 1111


A: TVA WATTS BAR 31590-955M UNIT1 1-R-11 TB-11X 6 STEADY STATE
A
100mV/div-A
2mS/div
Press Shift+ function key for more information.

6 112

EAB


A: TVA WATTS BAR 31590-95M UNIT1 1-R-12 TB-12X 5 STEADY STATE
A
50mV/div-A
2mS/div
Press Shift+ function key for more information.

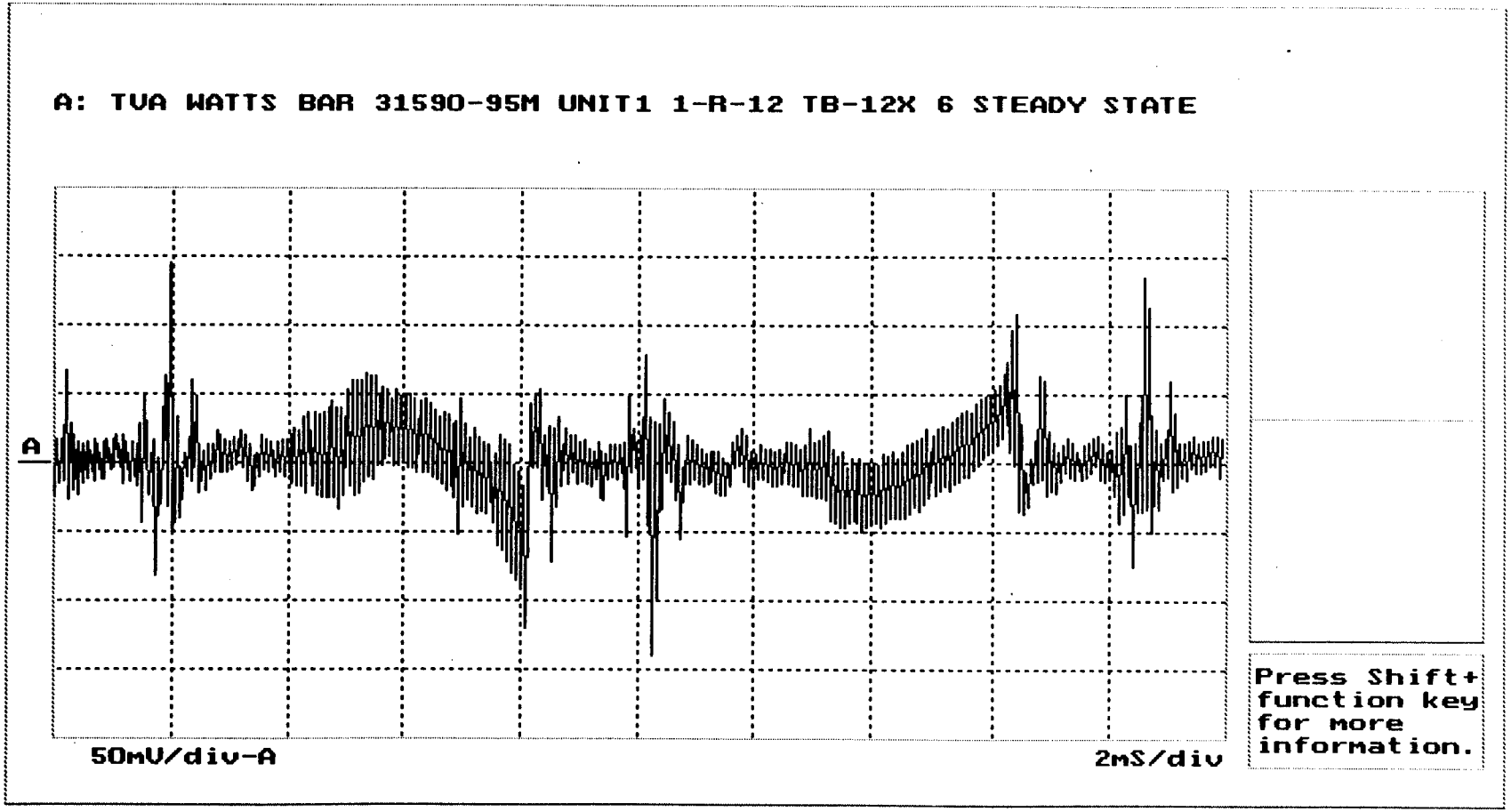
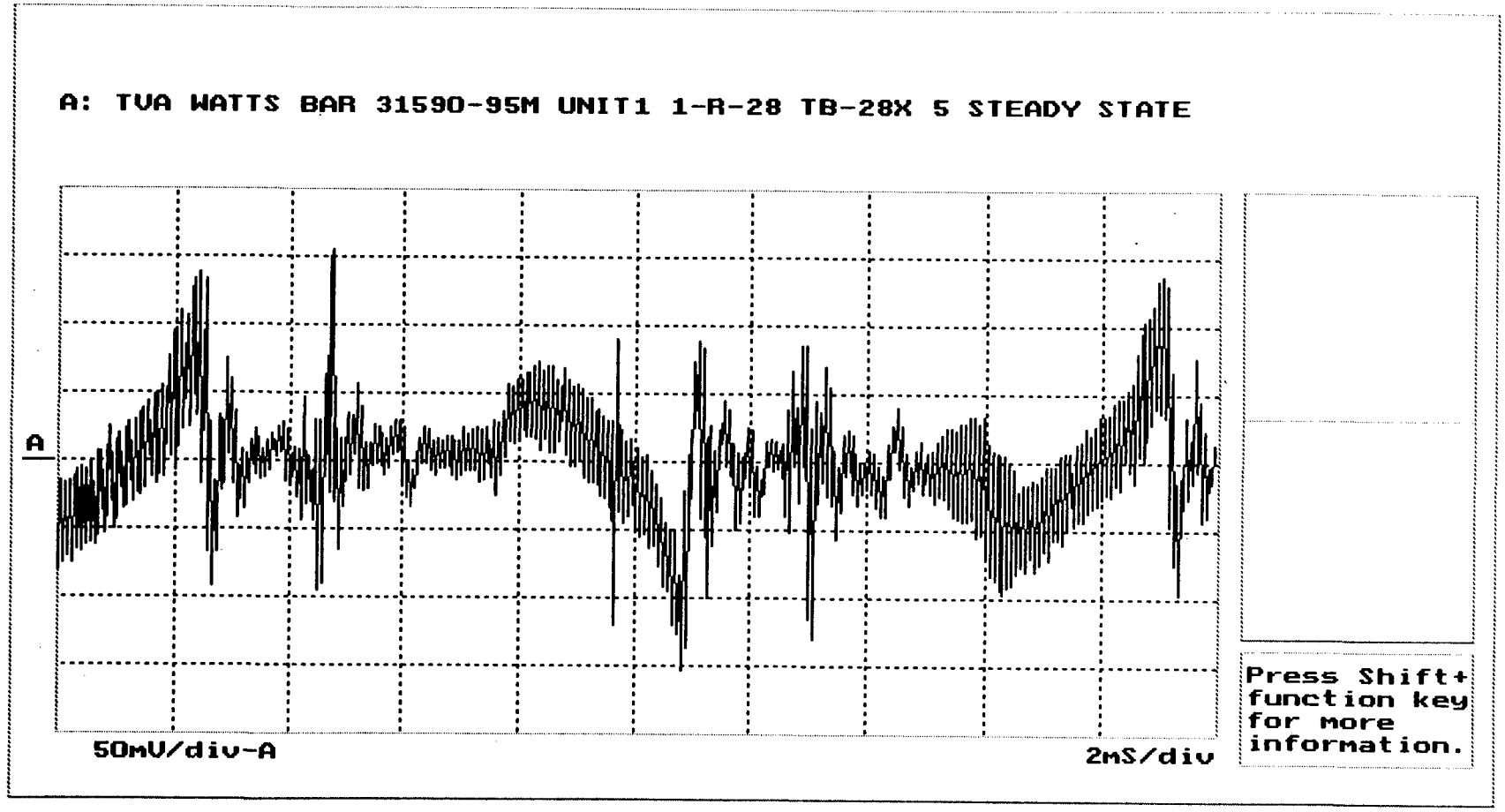
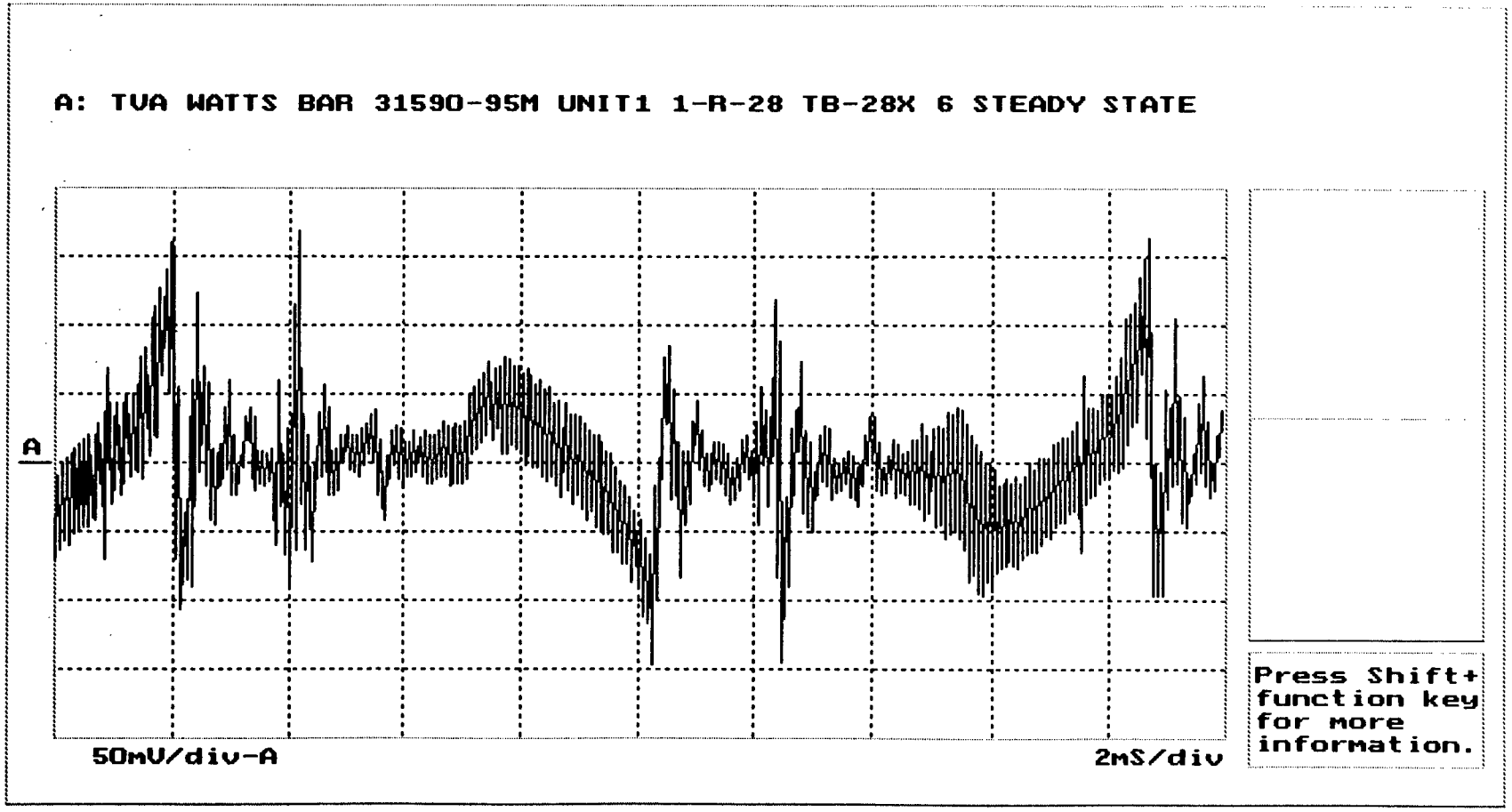

A: TVA WATTS BAR 31590-95M UNIT1 1-R-12 TB-12X 6 STEADY STATE
A
50mV/div-A
2mS/div
Press Shift+ function key for more information.

FIG 9


A: TVA WATTS BAR 31590-95M UNIT1 1-R-28 TB-28X 5 STEADY STATE
A
50mV/div-A
2mS/div
Press Shift+ function key for more information.


A: TVA WATTS BAR 31590-95M UNIT1 1-R-28 TB-28X 6 STEADY STATE
A
50mV/div-A
2mS/div
Press Shift+ function key for more information.

6 116

6.0 TEST PROCEDURE (continued)

6.4 Radiated Emissions, Method REXX, DC Magnetic Field

Requirements

Radiated emissions, DC Magnetic Field, will be measured in accordance with the applicable portions of MIL-STD-1399, Section 070, Part 1. Reference Section 6.4, Test Setup.

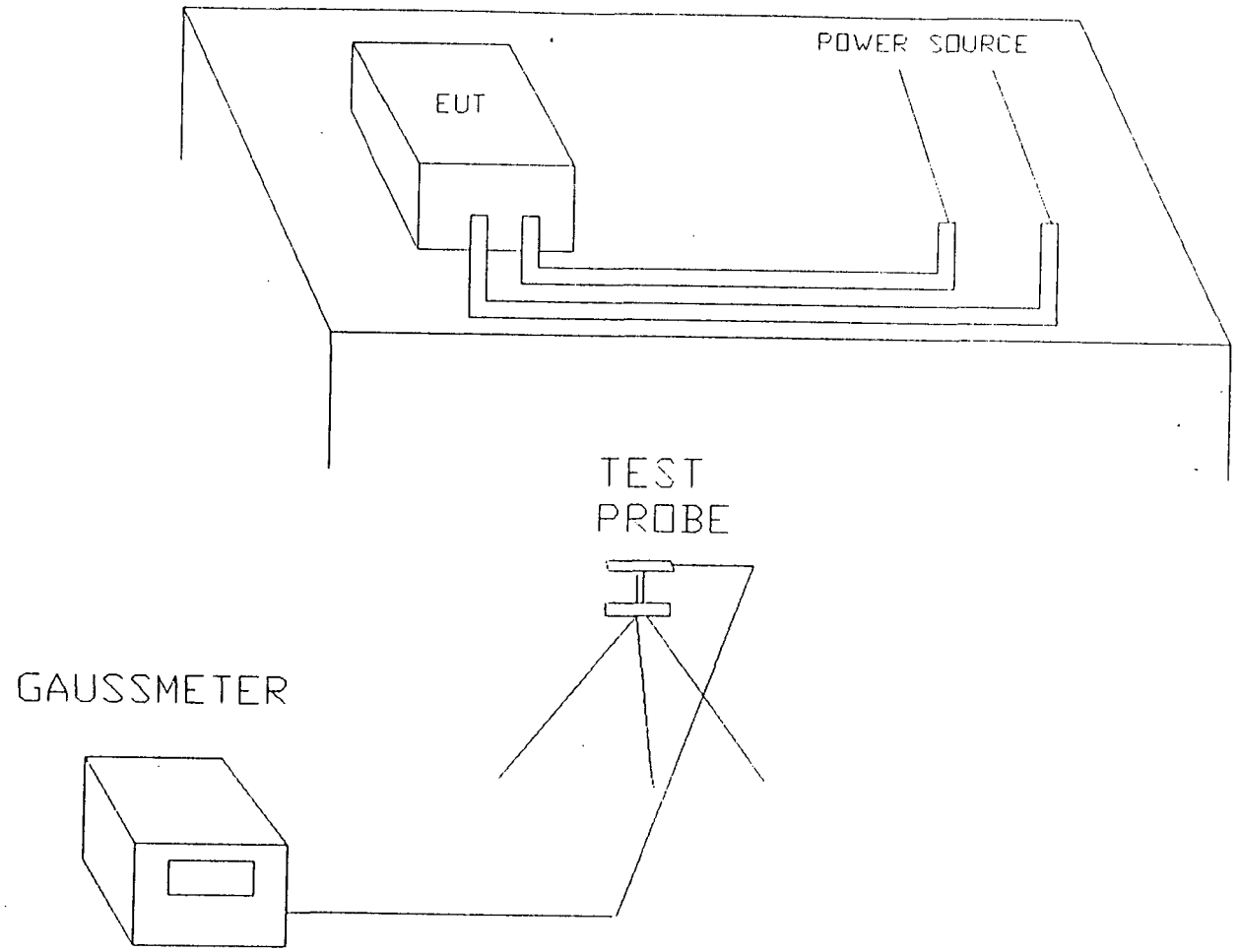
Procedures

The Auxiliary Electric Equipment Room Environment was set up and operated as specified in Section 4.0 of this report. A Magnetic Instrumentation Gaussmeter, Model 912, was set up with its measurement probe located in the "X axis" location of the units' probe fixture. The measurement probe orientation was then changed through multiple axes until a worst case level was detected. Measurements of the DC magnetic field were taken and recorded on data sheets.

The remaining mapping locations were measured following the preceding procedure. (Reference Figure 4-2).

Sample Test Results

Test		Results
REXX	Radiated Emissions, DC Magnetic Field	Westinghouse Electric Corporation will perform analysis for all tests.



RADIATED EMISSIONS, METHOD REXX, TYPICAL TEST SETUP

National
Technical
Systems

Acton Division
533 Main Street
Acton, MA 01720

DATA SHEET

Job Number 31590-95M

Date 5/6/94 Page 1 of 2

Customer TVA - WATTS BAR NUCLEAR

Specification NTS TP No. 31590-95M Revision 0

Test Sample UNIT #1 AUX ELECTRIC ROOM

Model/Serial Number see below

Test REXX-DC Magnetic Field Emissions

Mode of Operation Plant Under Construction
Electronics Operational

Purchase Order PA19283

Remarks Drop-off <.5= distance in inches to where source guass level is less than 0.5 guass.

Location		Level (guass)	Drop-off <.5	Remarks		
1-R-12 RR		0.5	N/A	Cabinet Frame		
1-R-13 RR		0.5	N/A	Cabinet Frame		
1-R-28RR		0.5	N/A	Cabinet Frame		
1-R-12 F		1.6	<2"	CABINET FRAME		
1-R-13F		1.5	<2"	CABINET FRAME		
1-R-28F		1.5	<2"	CABINET FRAME		
1-R-9 F		2.5	<2"	CABINET FRAME		
1-R-10F		2.6	<2"	CABINET FRAME		
1-R-11 F		2.7	<2"	CABINET FRAME		
1-R-11RR		3.0	<2"	CABINET FRAME		
1-R-10RR		0.8	<2"	CABINET FRAME		
1-R-9RR		4.0	<2"	CABINET FRAME		
1-R-8 F		0.8	<2"	CABINET FRAME		
1-R-7F		1.6	<2"	CABINET FRAME		
1-R-6F		1.4	<2"	CABINET FRAME		
1-R-5F		0.9	<2"	CABINET FRAME		

Test Technician N/A

Test Engineer CT Bu

National
Technical
Systems

Acton Division
533 Main Street
Acton, MA 01720

DATA SHEET

Job Number 31590-95M

Date 5/6/94 Page 2 of 2

Customer TVA - WATTS BAR NUCLEAR

Specification NTS TP No. 31590-95M Revision 0

Test Sample UNIT #1 AUX ELECTRIC ROOM

Model/Serial Number see below

Test REXX-DC Magnetic Field Emissions

Mode of Operation Plant Under Construction
Electronics Operational

Purchase Order PA19283

Remarks Drop-off <.5= distance in inches to where source guass level is less than 0.5 guass.

Location		Level(guass)	Drop-off <.5	Remarks		
1-R-5 RR		0.5	N/A	Cabinet Frame		
1-R-6 RR		0.8	<2"	CABINET FRAME		
1-R-7 RR		0.5	N/A	Cabinet Frame		
1-R-8 RR		0.6	N/A	Cabinet Frame		
1-R-4 F		0.9	<2"	CABINET FRAME		
1-R-3 F		1.9	<2"	CABINET FRAME		
1-R-2 F		0.9	<2"	CABINET FRAME		
1-R-1 F		1.7	<2"	CABINET FRAME		
1-R-1 RR		1.1	<2"	CABINET FRAME		
1-R-2 RR		1.1	<2"	CABINET FRAME		
1-R-3 RR		1.3	<2"	CABINET FRAME		
1-R-4 RR		0.8	<2"	CABINET FRAME		

Test Technician N/A

Test Engineer G B

6.0 TEST PROCEDURE (continued)

6.5 Radiated Emissions, Method RE01, AC Magnetic Field, 30 Hz to 50 KHz

Requirements

Radiated emissions, magnetic field, from 30 Hz to 50 KHz will be measured in accordance with the applicable portions of Test Method RE01 of MIL-STD-462. Reference Section 6.5, Test Setup.

Procedures

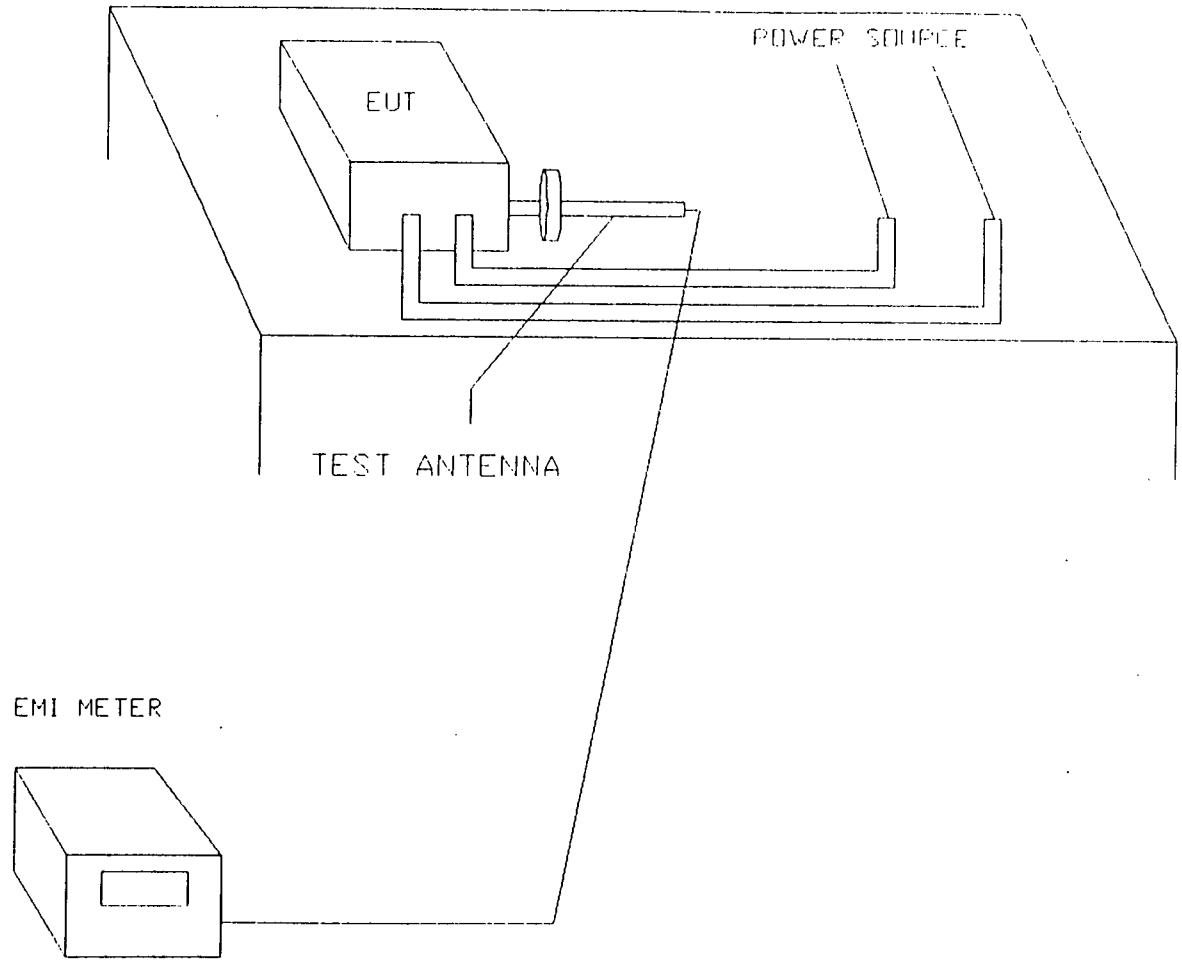
The Auxiliary Electric Equipment Room Environment was set up and operated as specified in Section 4.0 of this report. An A. H. Systems Loop Sensor Antenna, Model SAS-200/560, was placed in the "X axis" location of its antenna fixture. The output of the loop antenna was connected to an HP Model 8566S, Automated Microwave Measurement System, through a 50-foot length of RG214/U coaxial cable. The antenna orientation was then changed through multiple axes until a worst case level was detected.

The spectrum analyzer swept over the frequency range from 30 Hz to 50 KHz and plots were generated for the frequencies of maximum radiation.

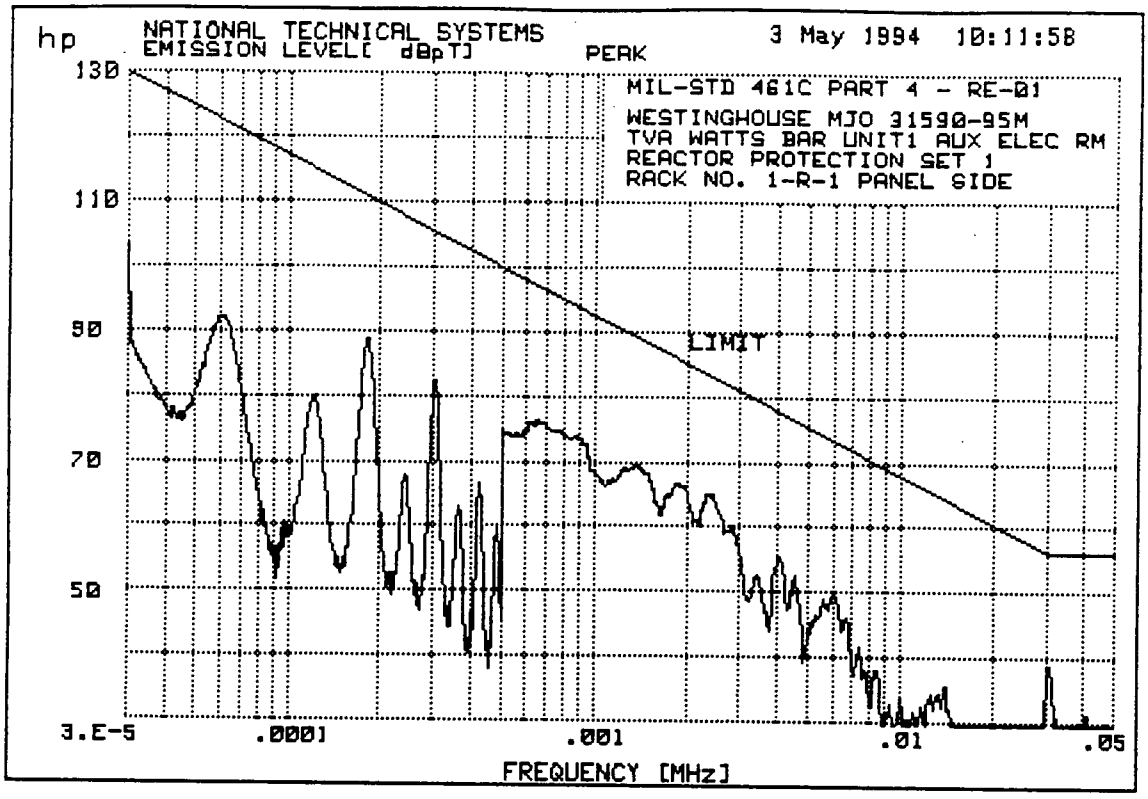
The remaining mapping locations were measured following the preceding procedure. (Reference Figure 4-2).

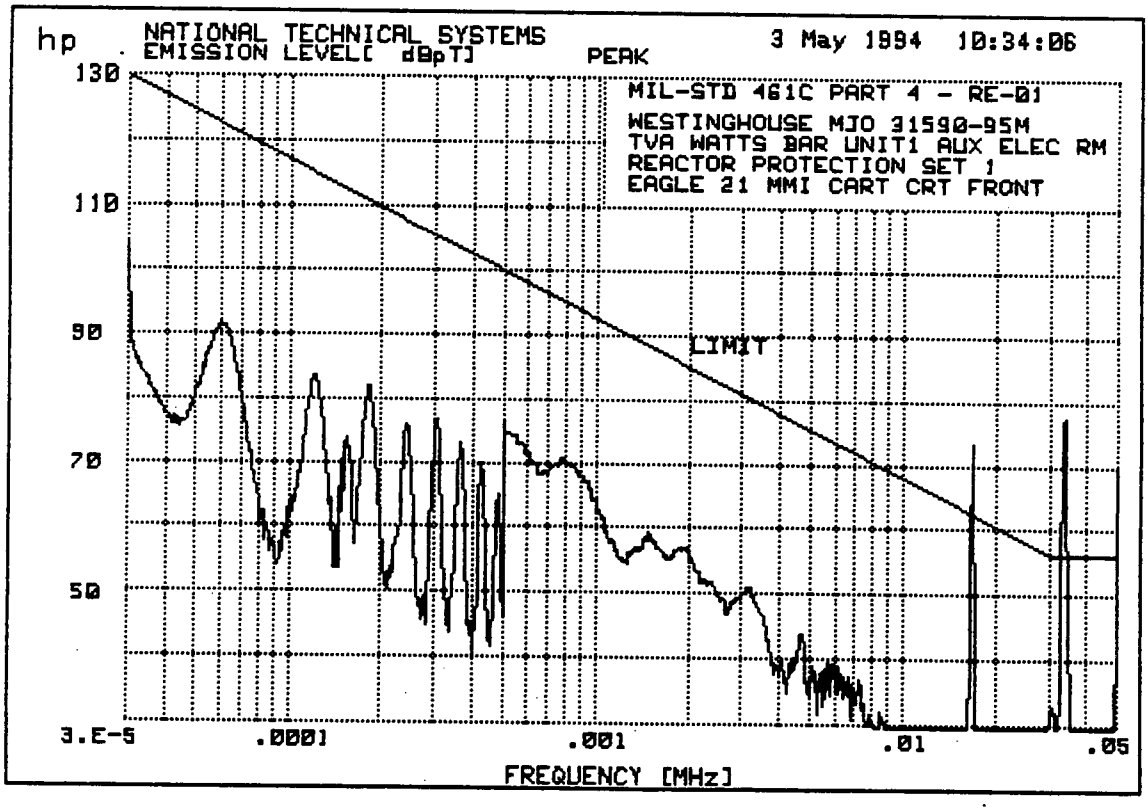
Sample Test Results

Test	Results
RE01 Radiated Emissions, AC Magnetic Field, 30 Hz - 50 KHz	Westinghouse Electric Corporation will perform analysis for all tests.



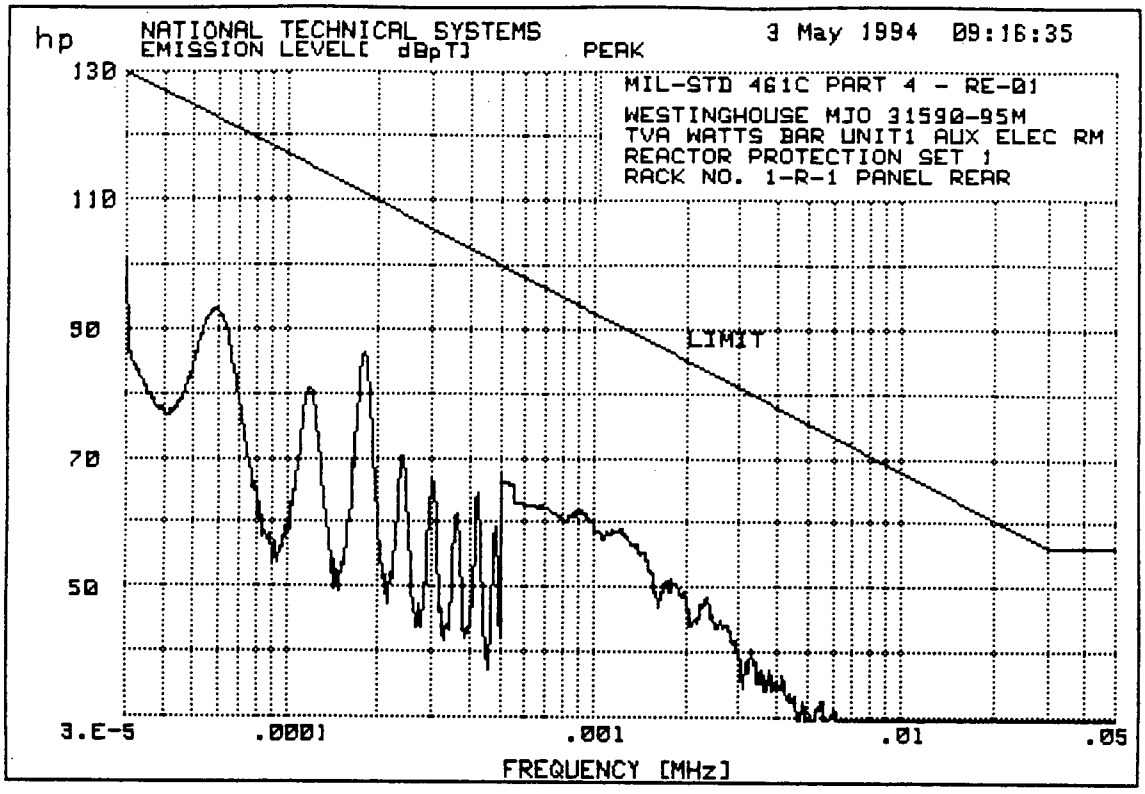
RADIATED EMISSIONS, METHOD RE01, TYPICAL TEST SETUP

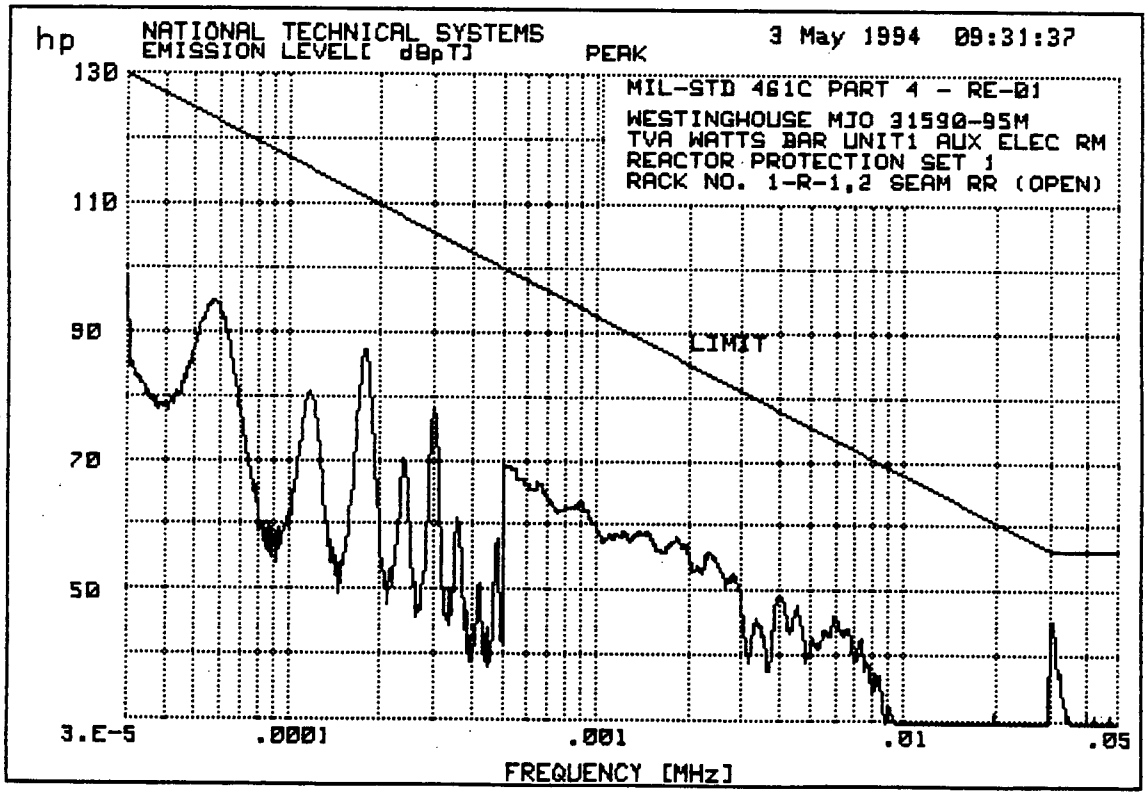




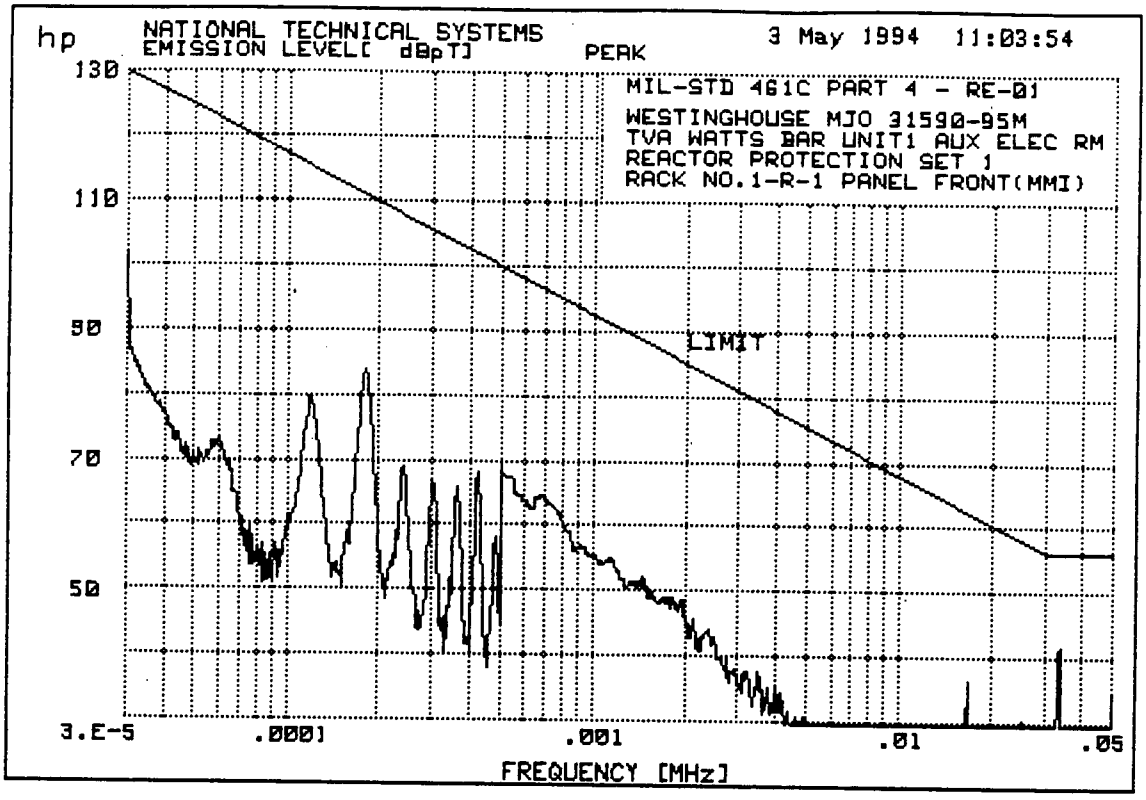
CRT ENERGIZED

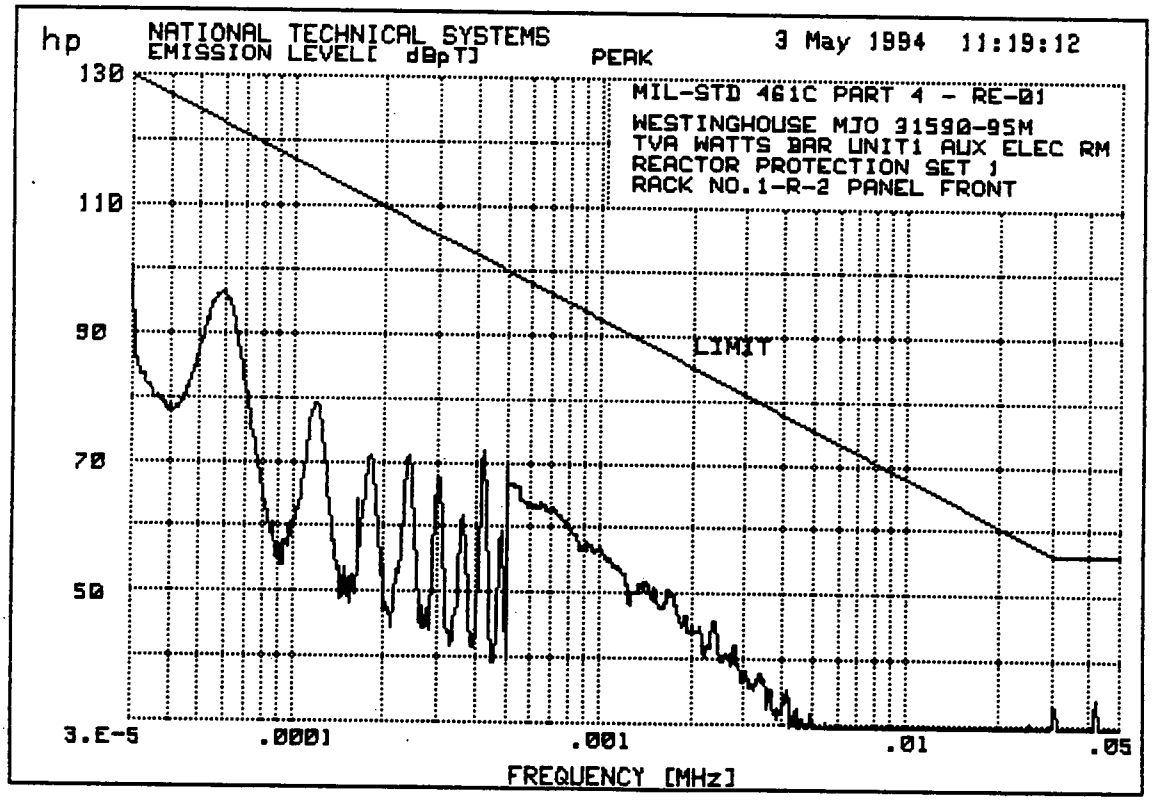
CE


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 09:16:35
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET 1
RACK NO. 1-R-1 PANEL REAR
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]

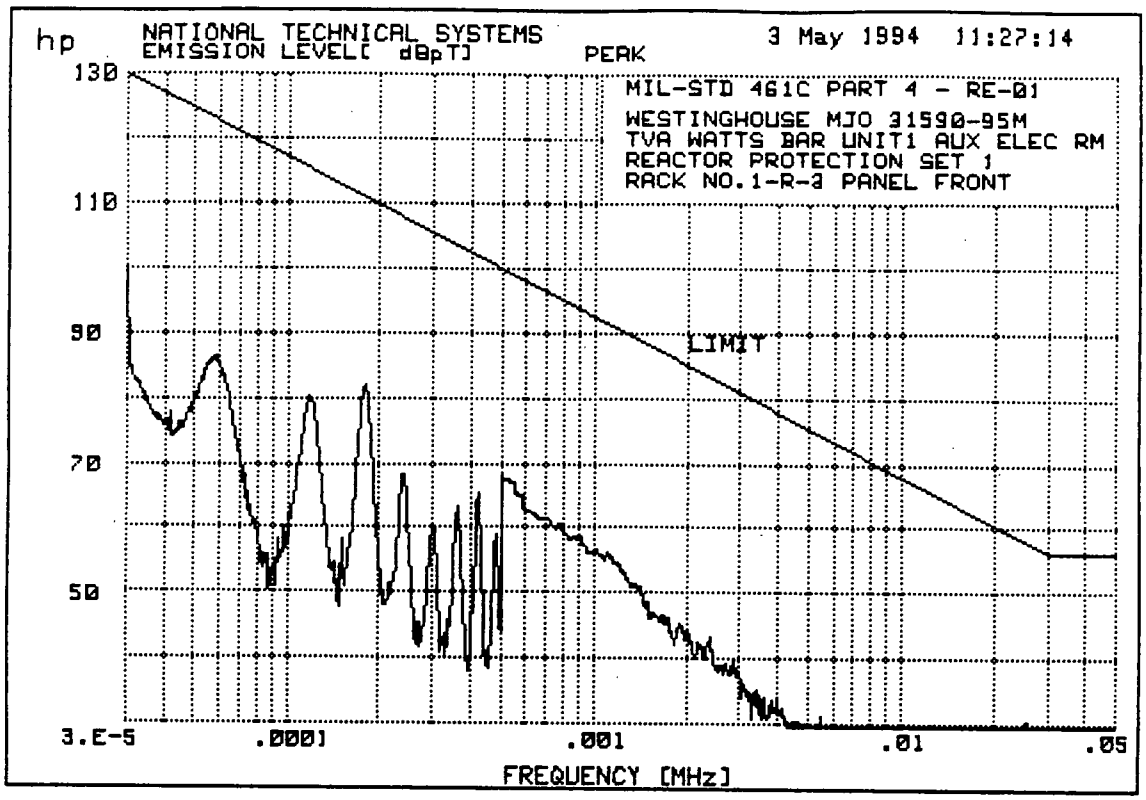

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 09:31:37
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET 1
RACK NO. 1-R-1,2 SEAM RR (OPEN)
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]

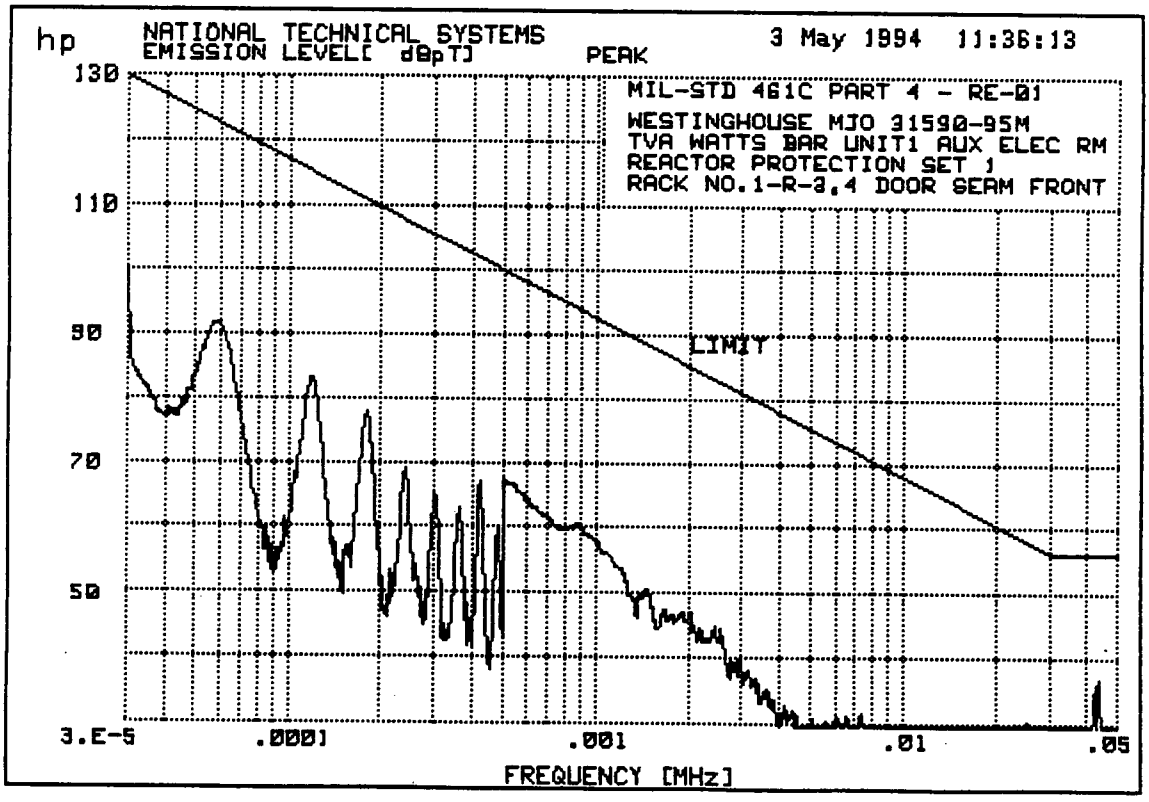
WB

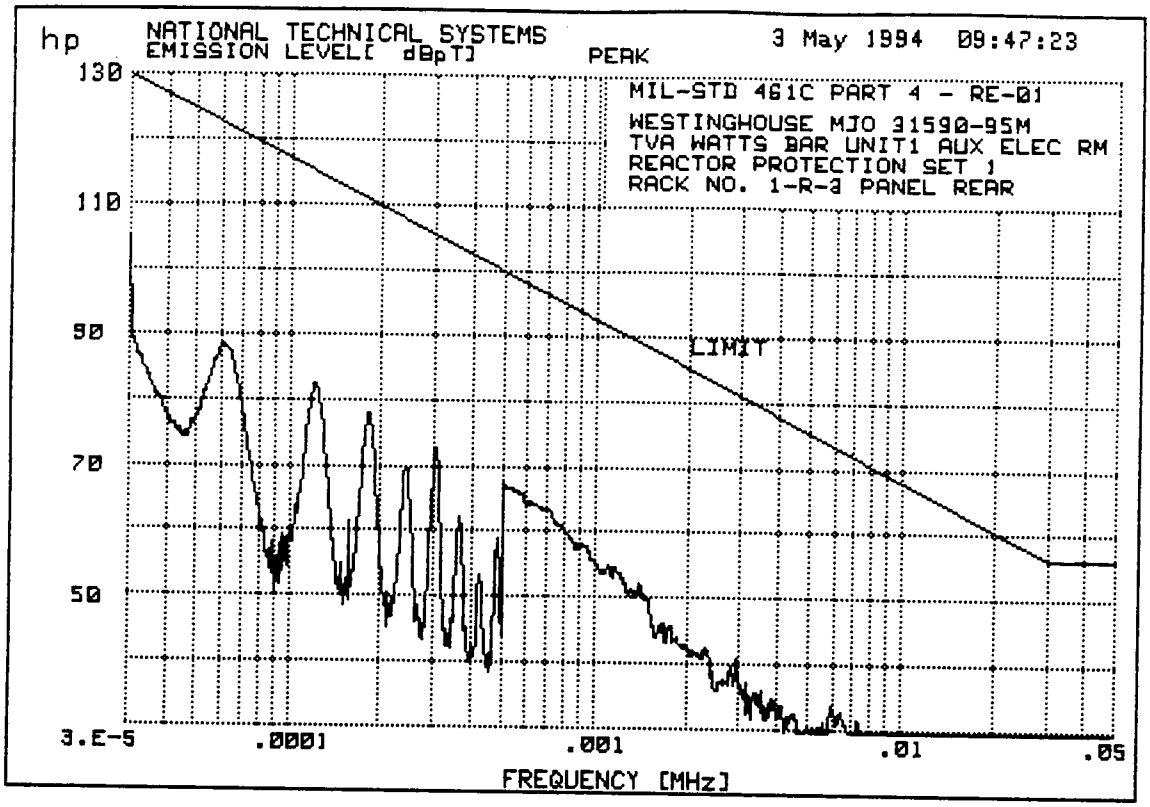

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 11:03:54
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET 1
RACK NO.1-R-1 PANEL FRONT(MMI)
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]

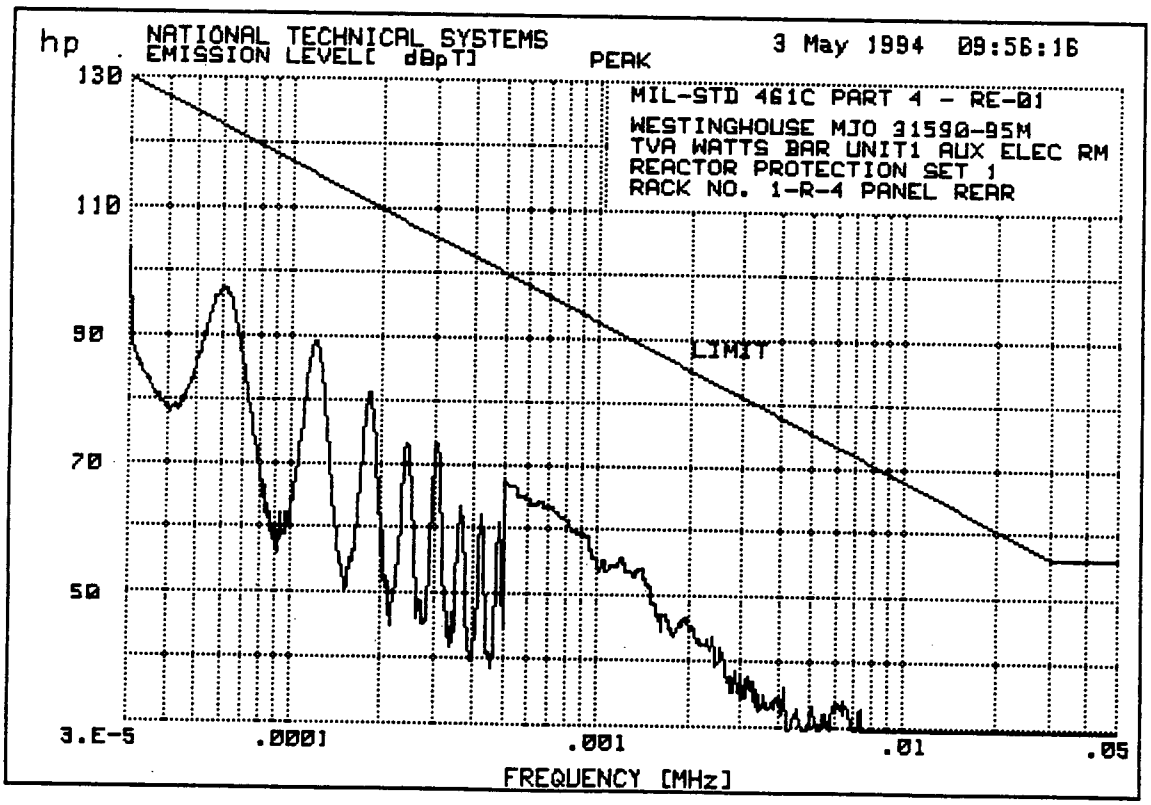

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 11:19:12
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET 1
RACK NO.1-R-2 PANEL FRONT
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]

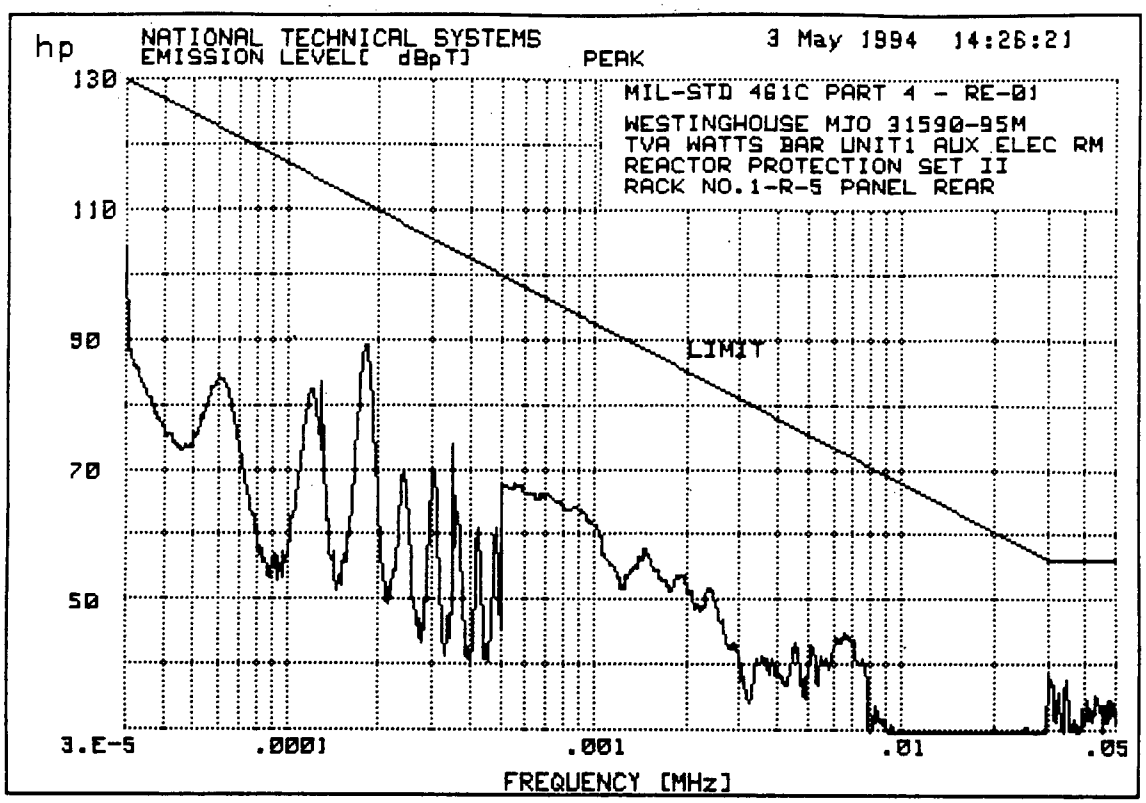
EB

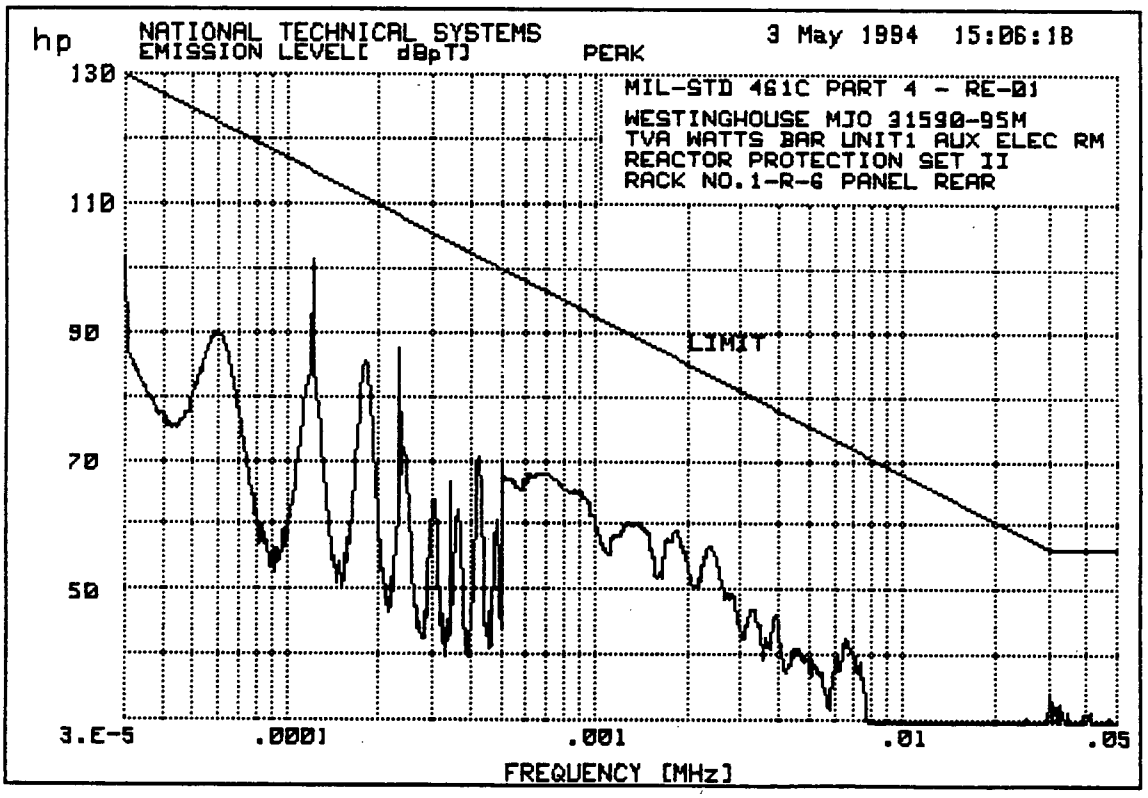

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 11:27:14
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET 1
RACK NO.1-R-3 PANEL FRONT
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 11:36:13
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET 1
RACK NO.1-R-3,4 DOOR SEAM FRONT
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]

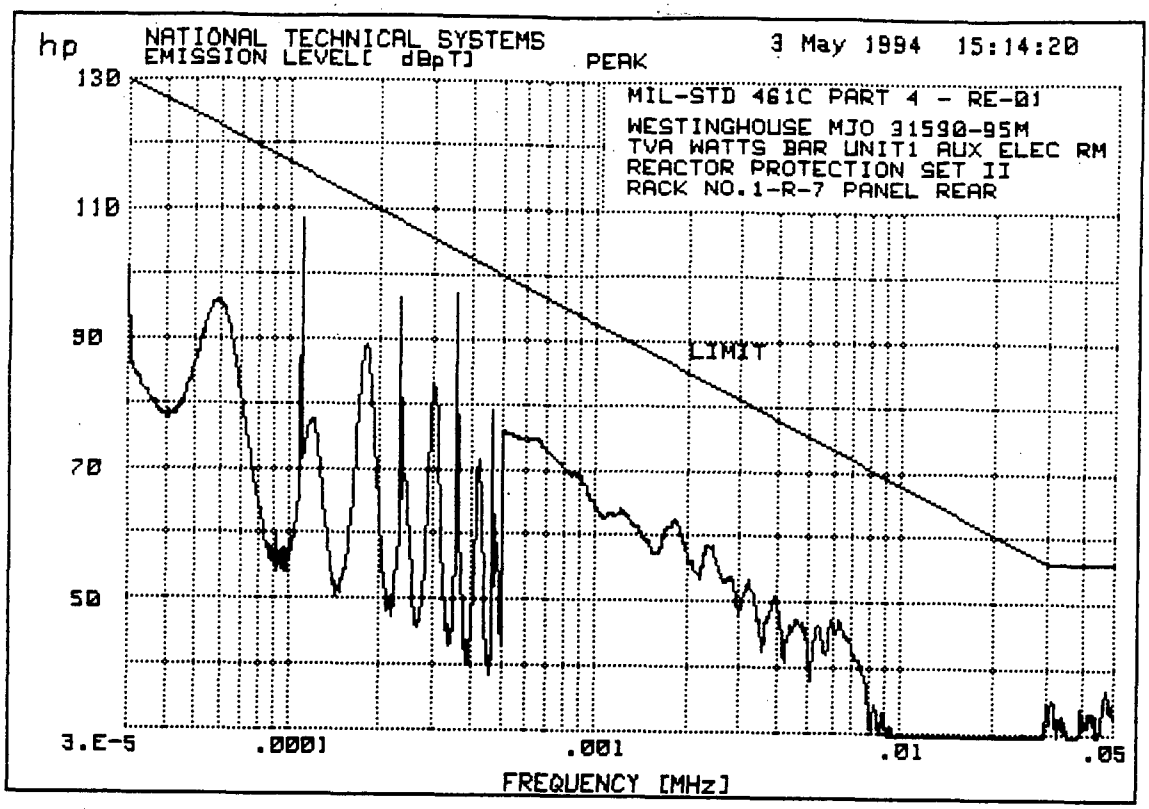

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 09:47:23
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET 1
RACK NO. 1-R-3 PANEL REAR
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]

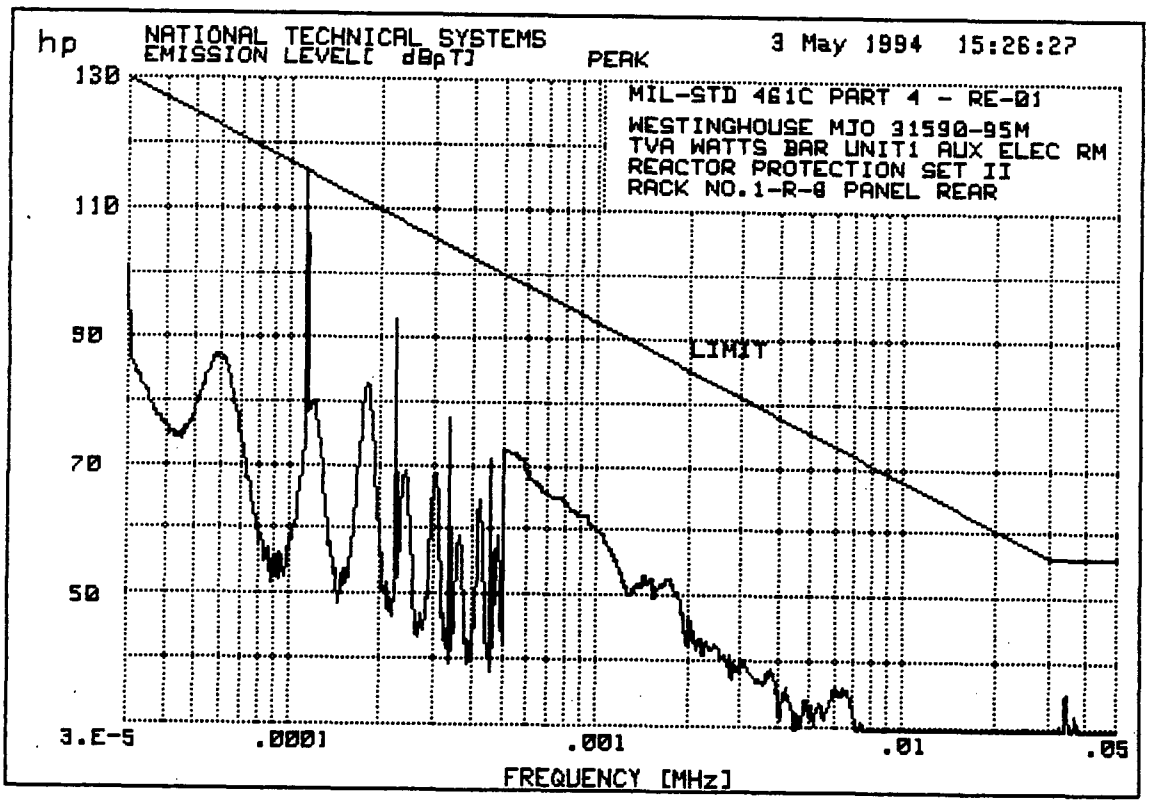

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 09:56:16
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET 1
RACK NO. 1-R-4 PANEL REAR
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]

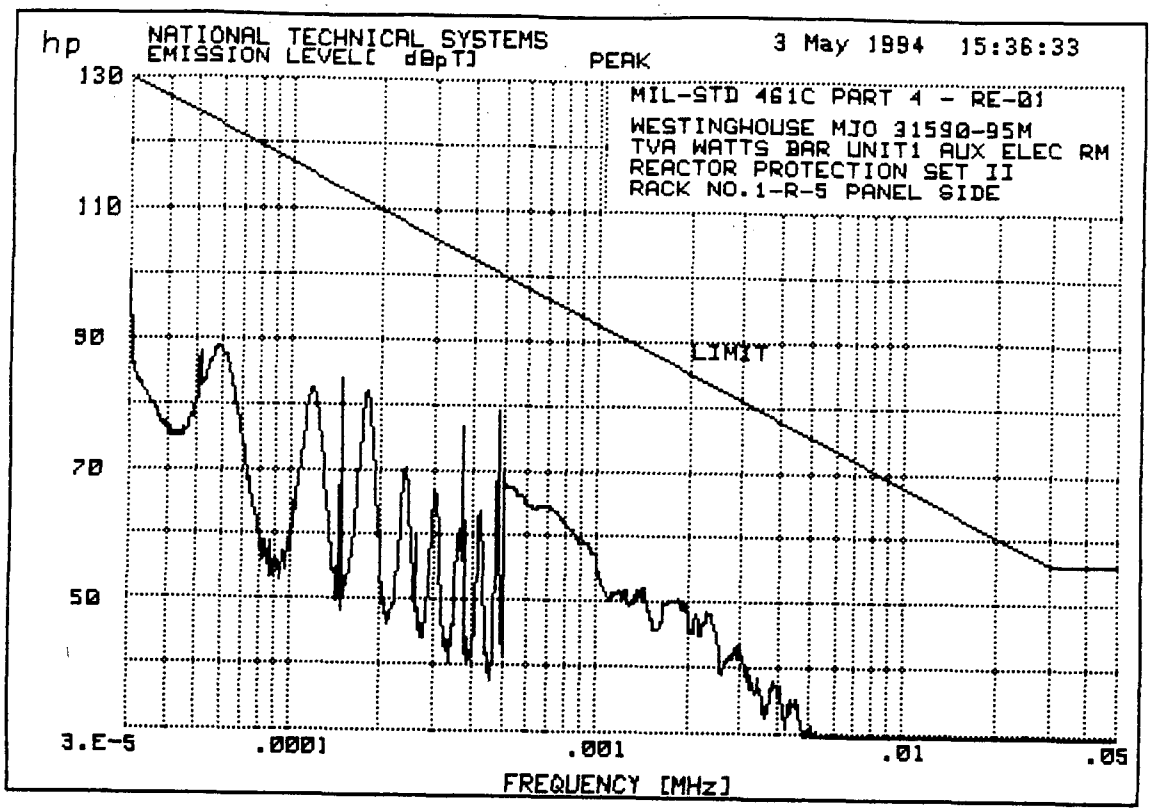


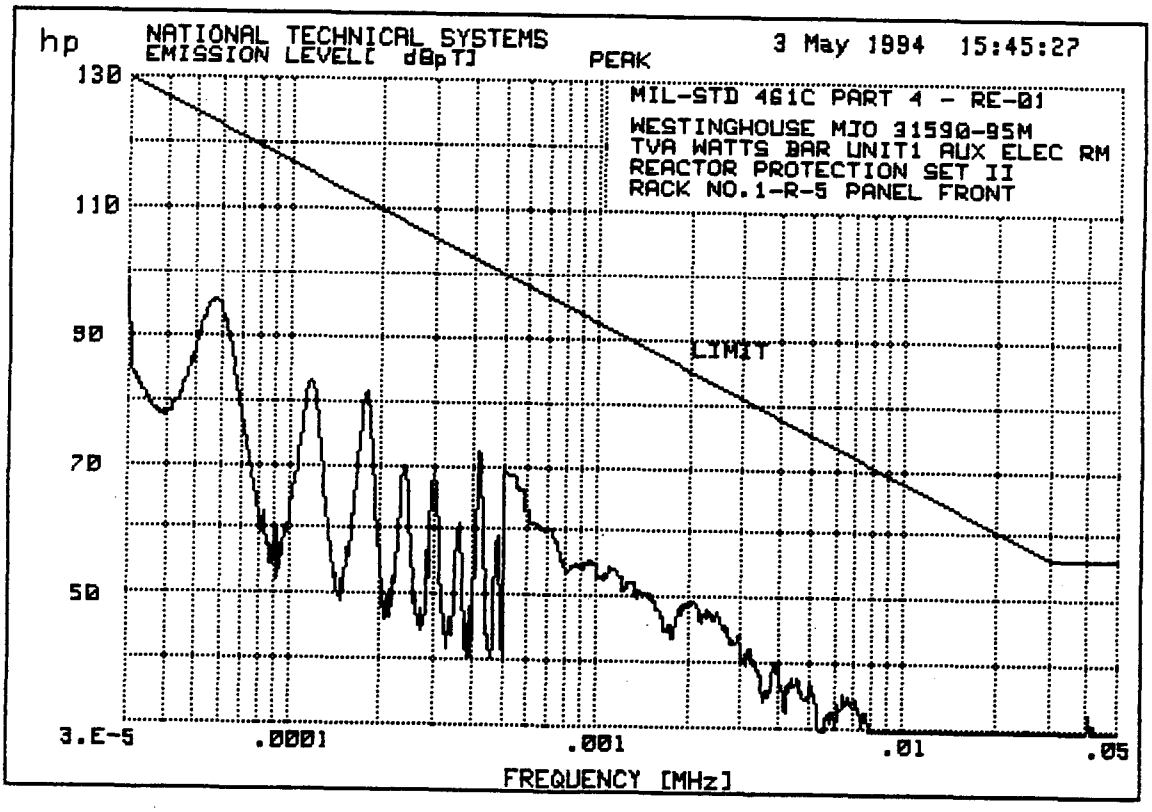


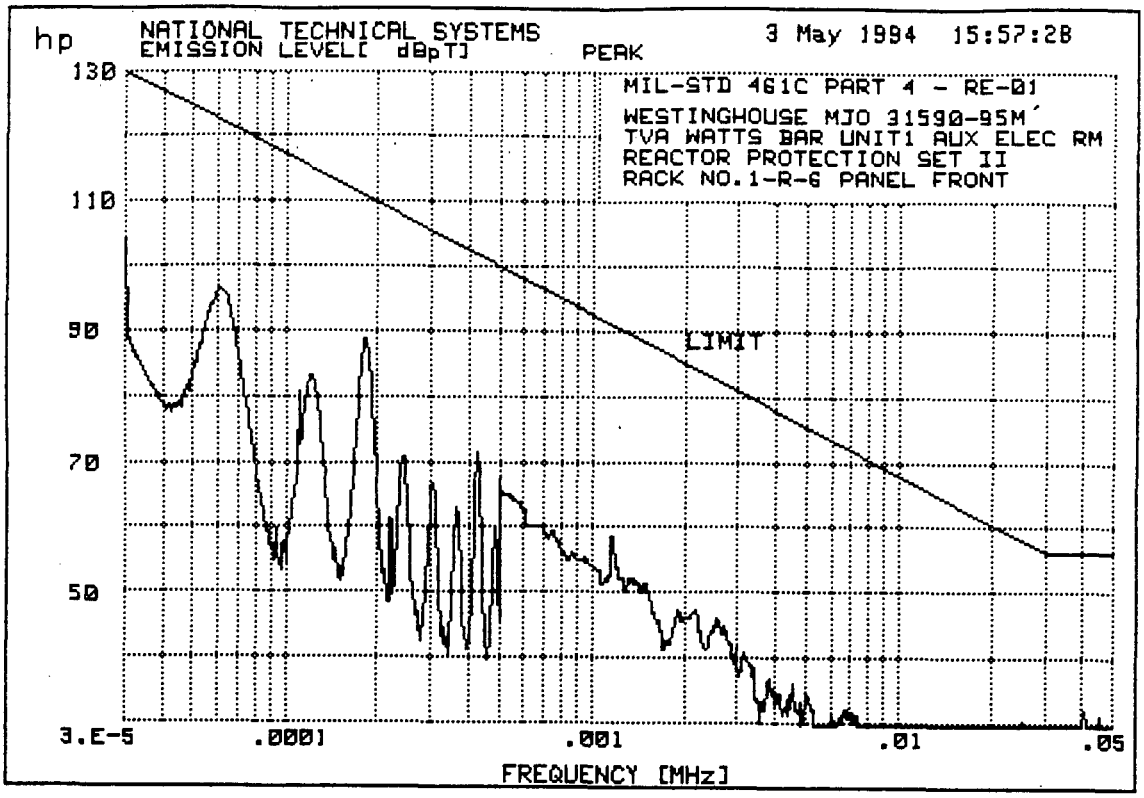
NOTE: THE ABOVE AND FOLLOWING PLOTS FOR RE01 SHOW TRANSIENT EMISSIONS OCCURING EVERY 26 SECONDS. THE SOURCE OF THESE EMISSIONS UNKNOWN, BUT ARE NOT NOTED DURING CE01 TESTS.

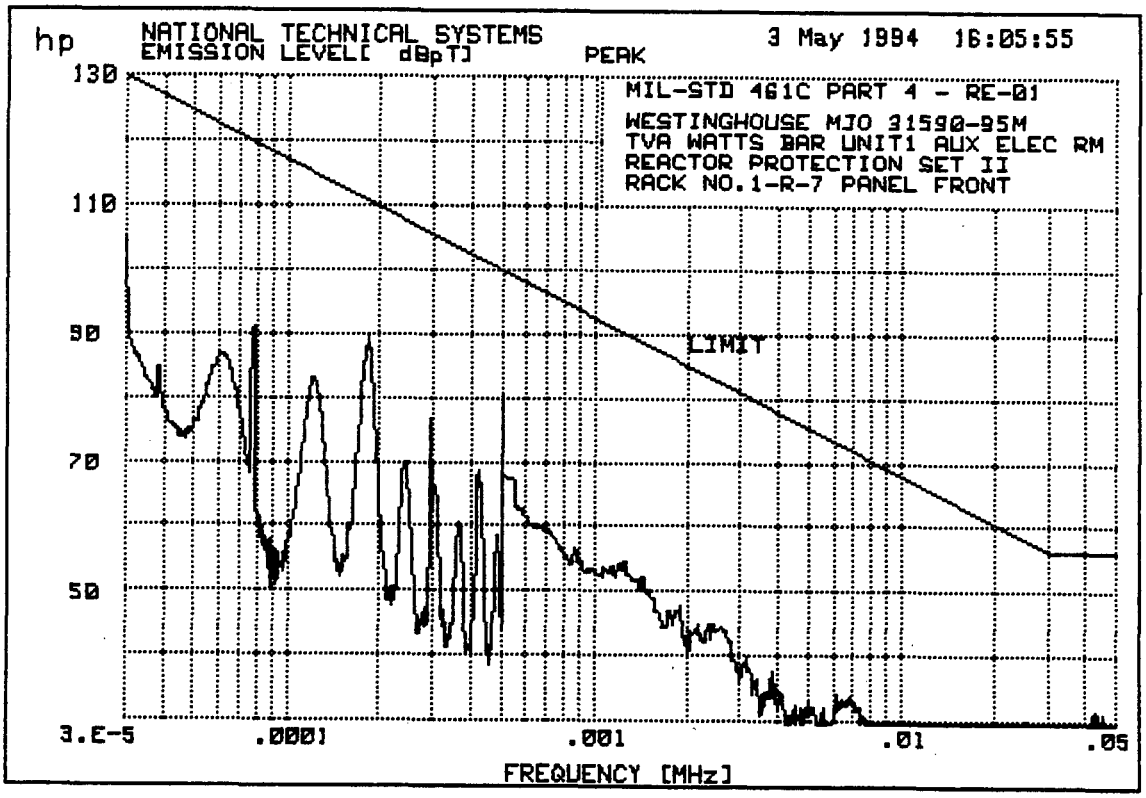

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 15:14:20
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET II
RACK NO.1-R-7 PANEL REAR
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 15:26:27
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET II
RACK NO.1-R-8 PANEL REAR
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]

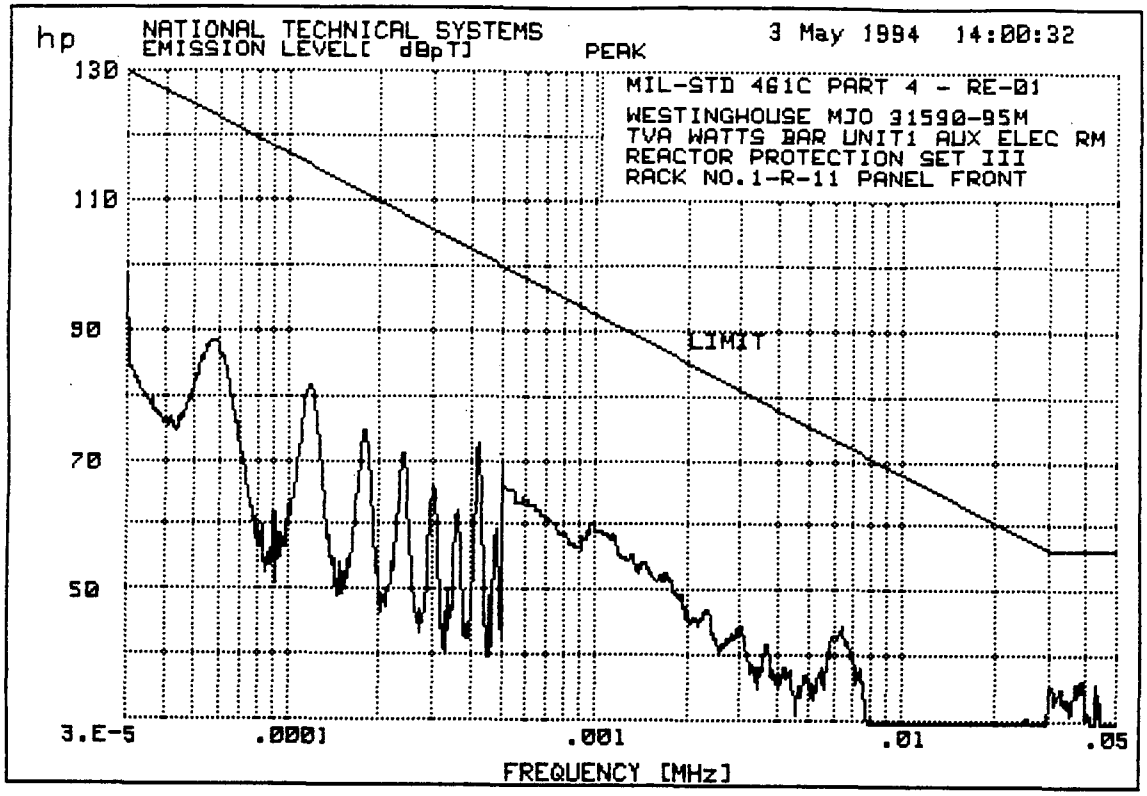

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 15:36:33
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET II
RACK NO.1-R-5 PANEL SIDE
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]

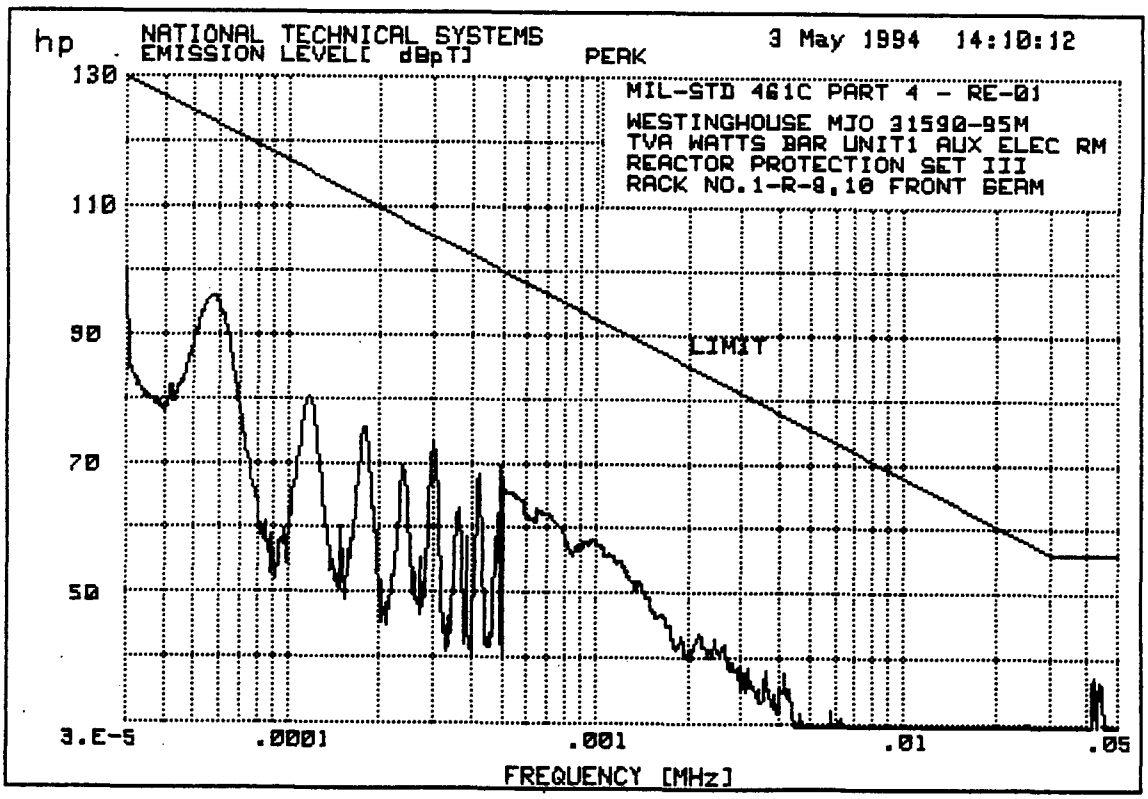

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 15:45:27
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET II
RACK NO.1-R-5 PANEL FRONT
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]

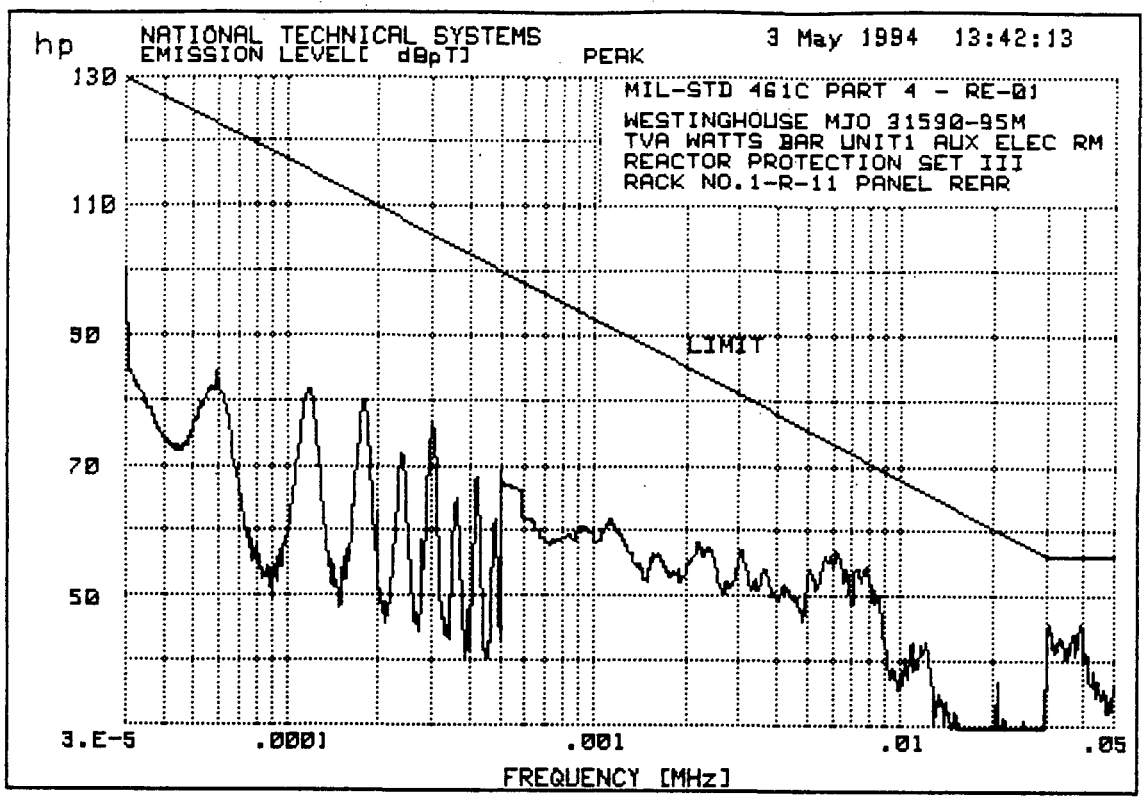

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 15:57:28
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET II
RACK NO.1-R-6 PANEL FRONT
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]

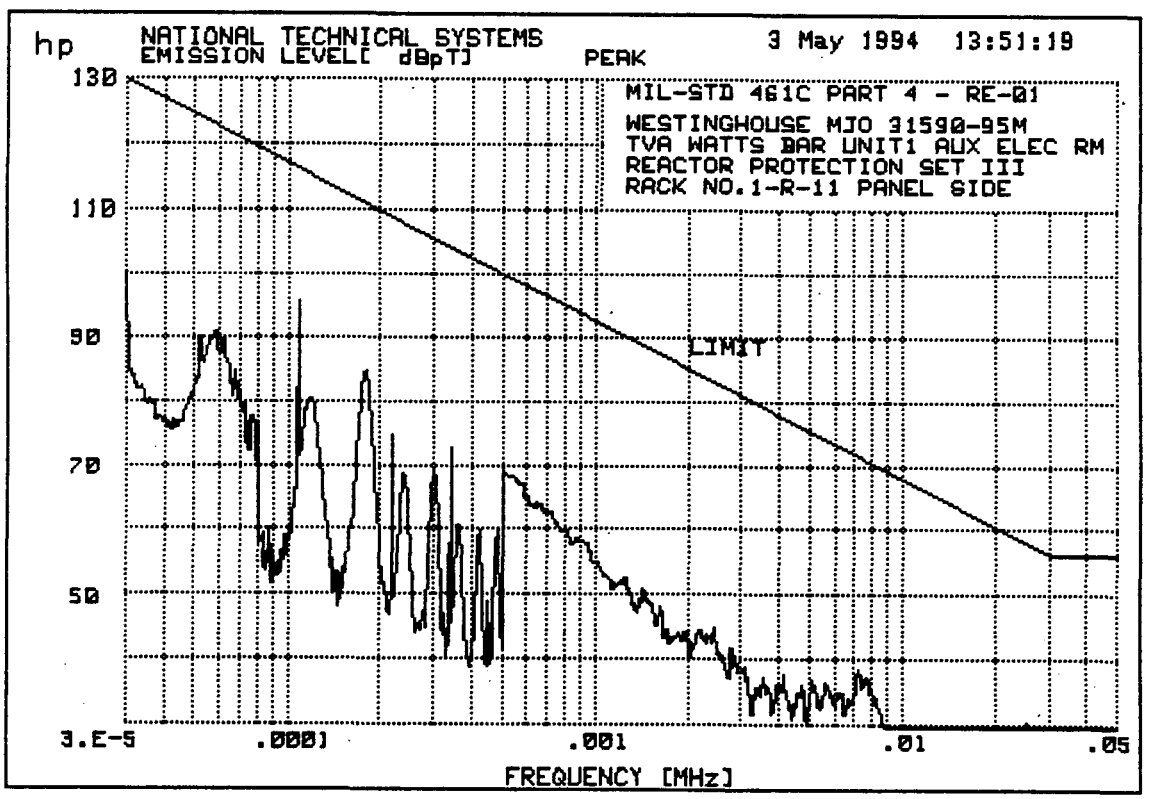

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 16:05:55
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET II
RACK NO.1-R-7 PANEL FRONT
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]

VB


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 14:00:32
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET III
RACK NO.1-R-11 PANEL FRONT
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 14:10:12
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET III
RACK NO.1-R-9,10 FRONT BEAM
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 13:42:13
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET III
RACK NO.1-R-11 PANEL REAR
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]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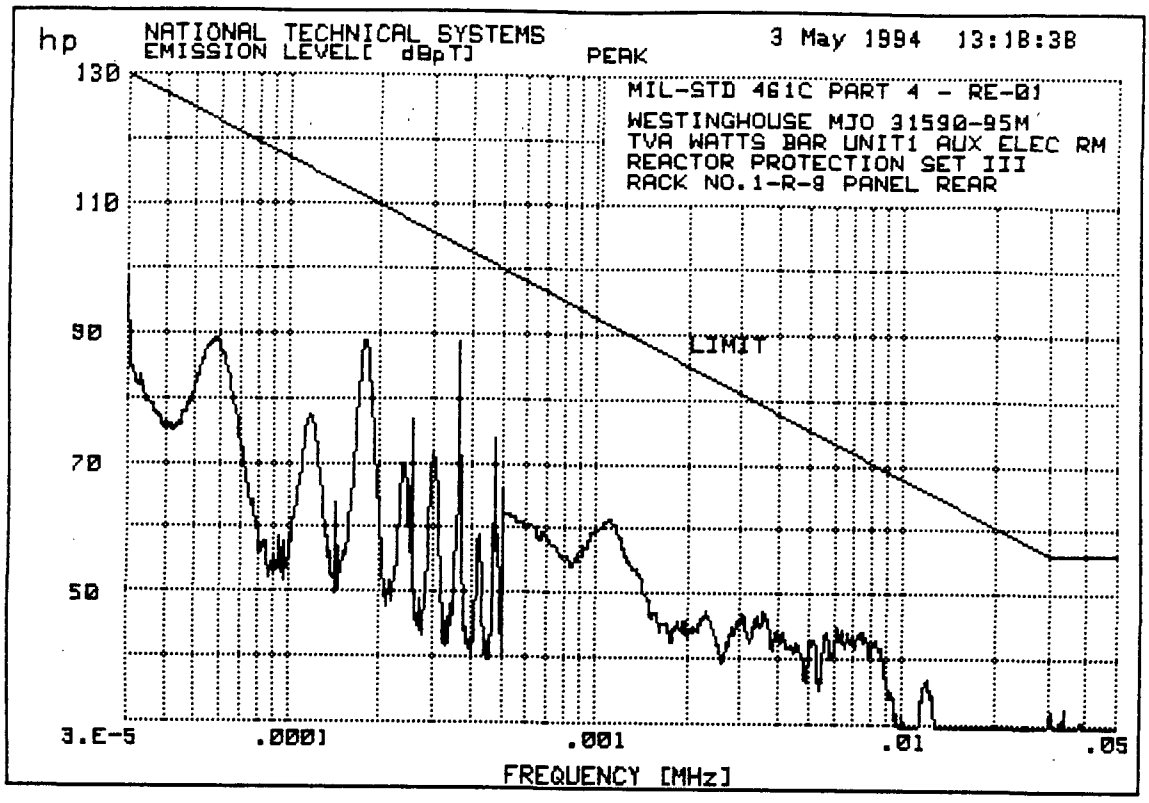
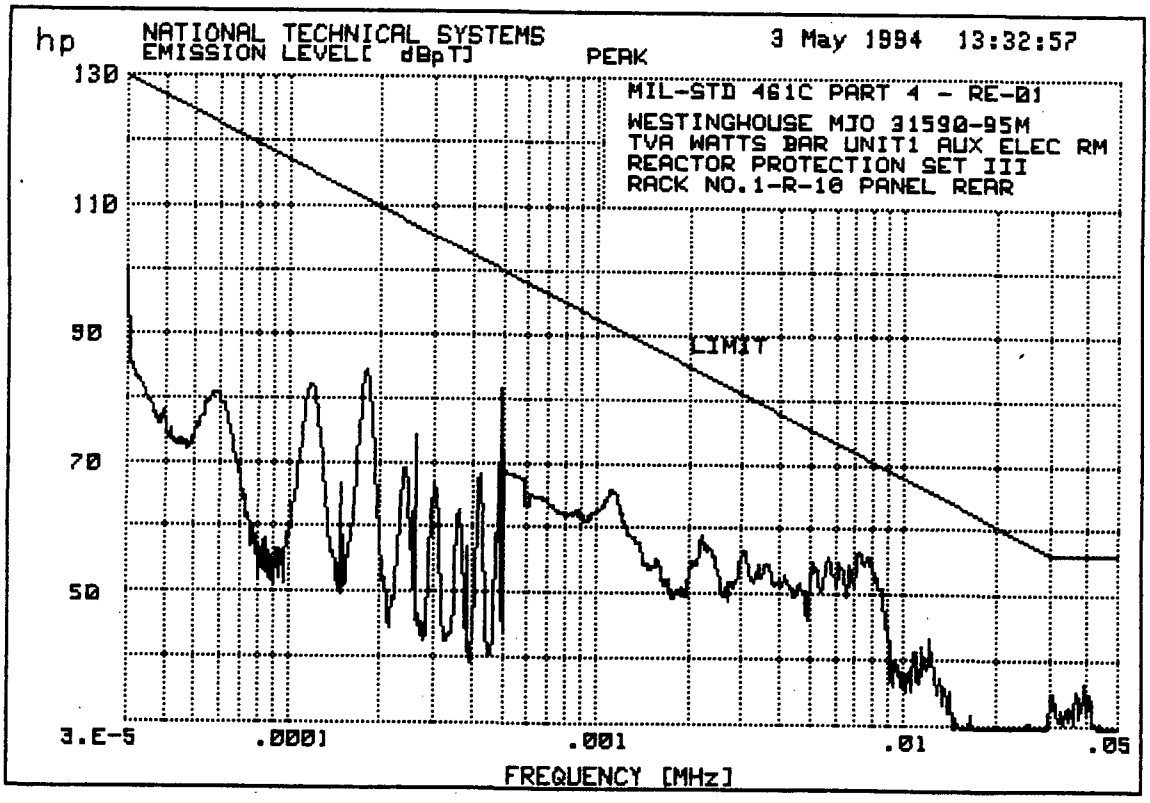
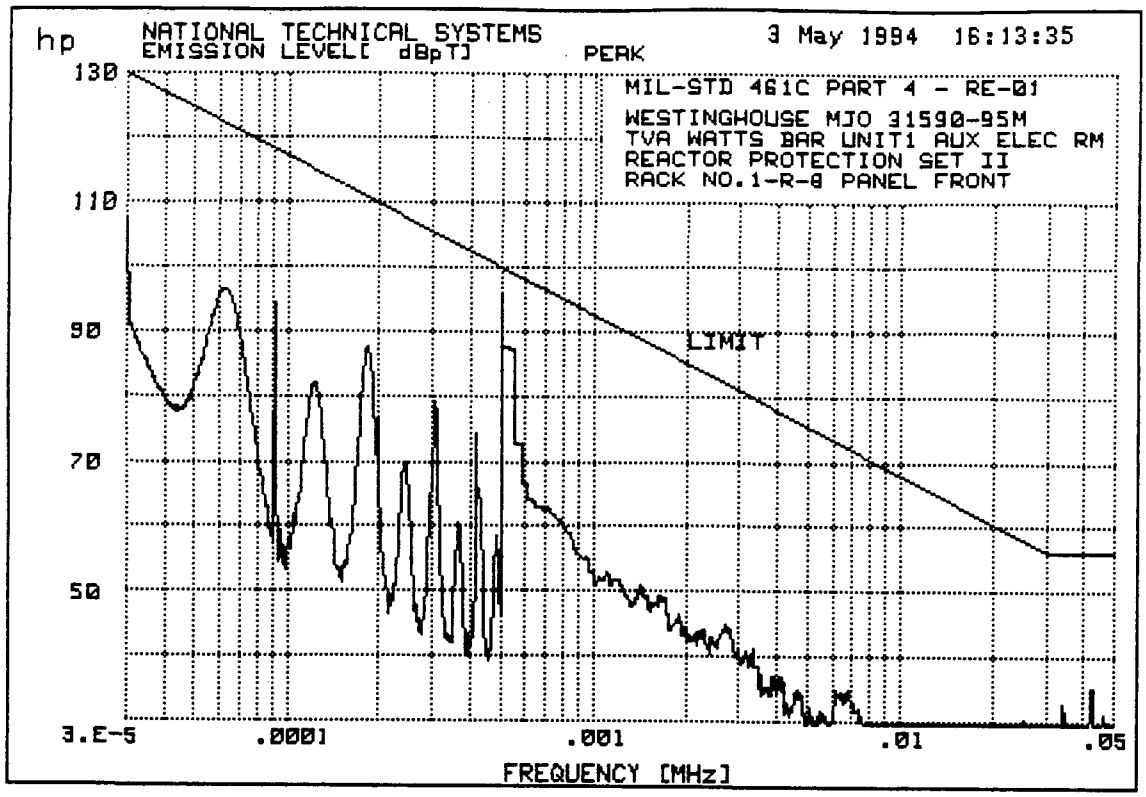
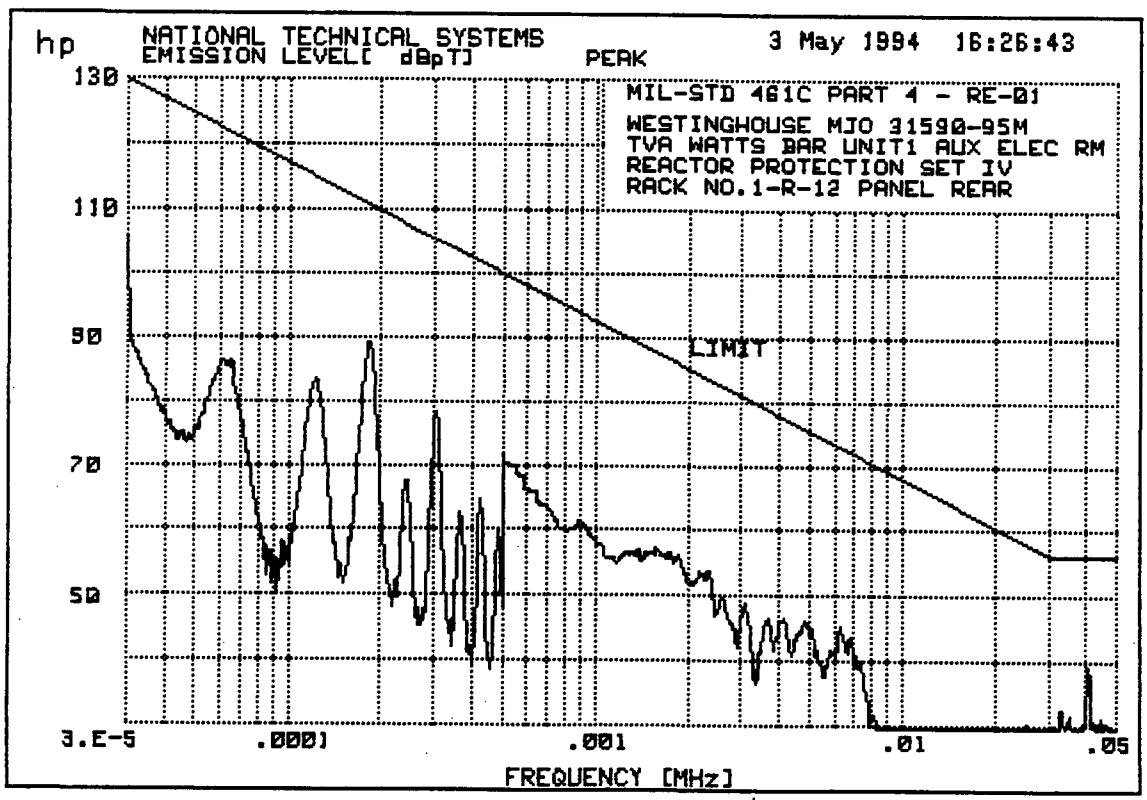
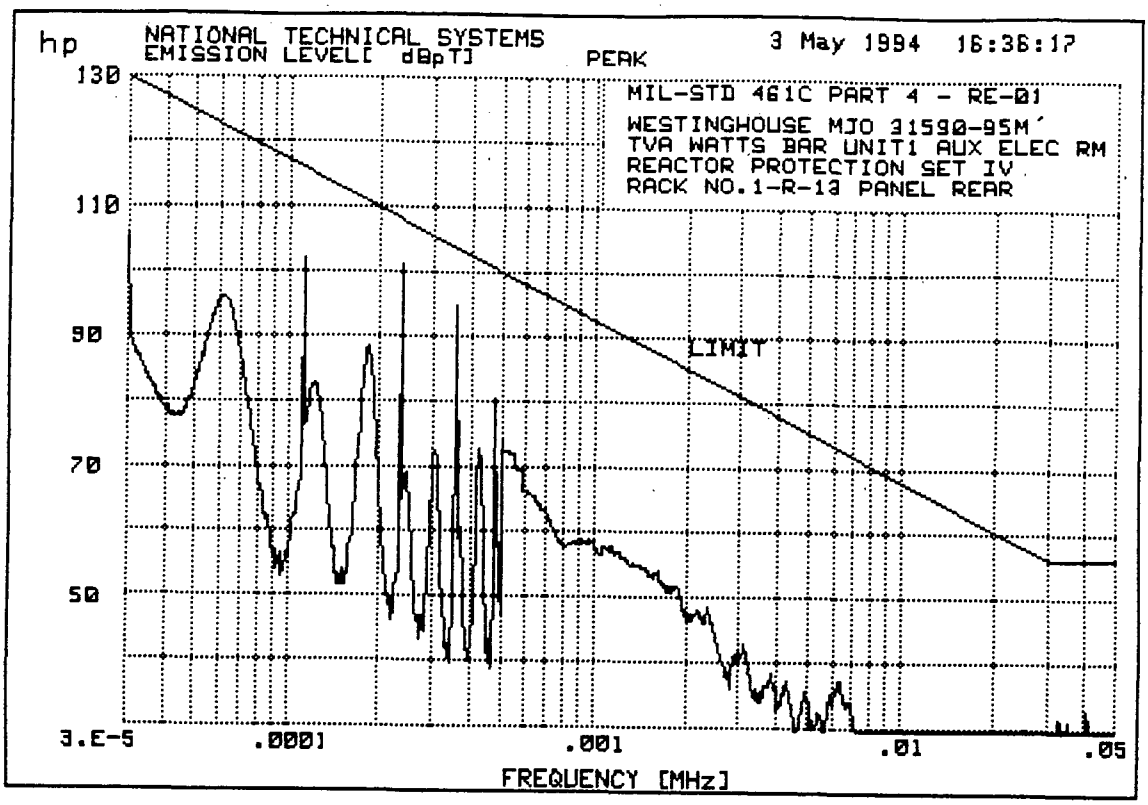
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 13:51:19
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET III
RACK NO.1-R-11 PANEL SIDE
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]

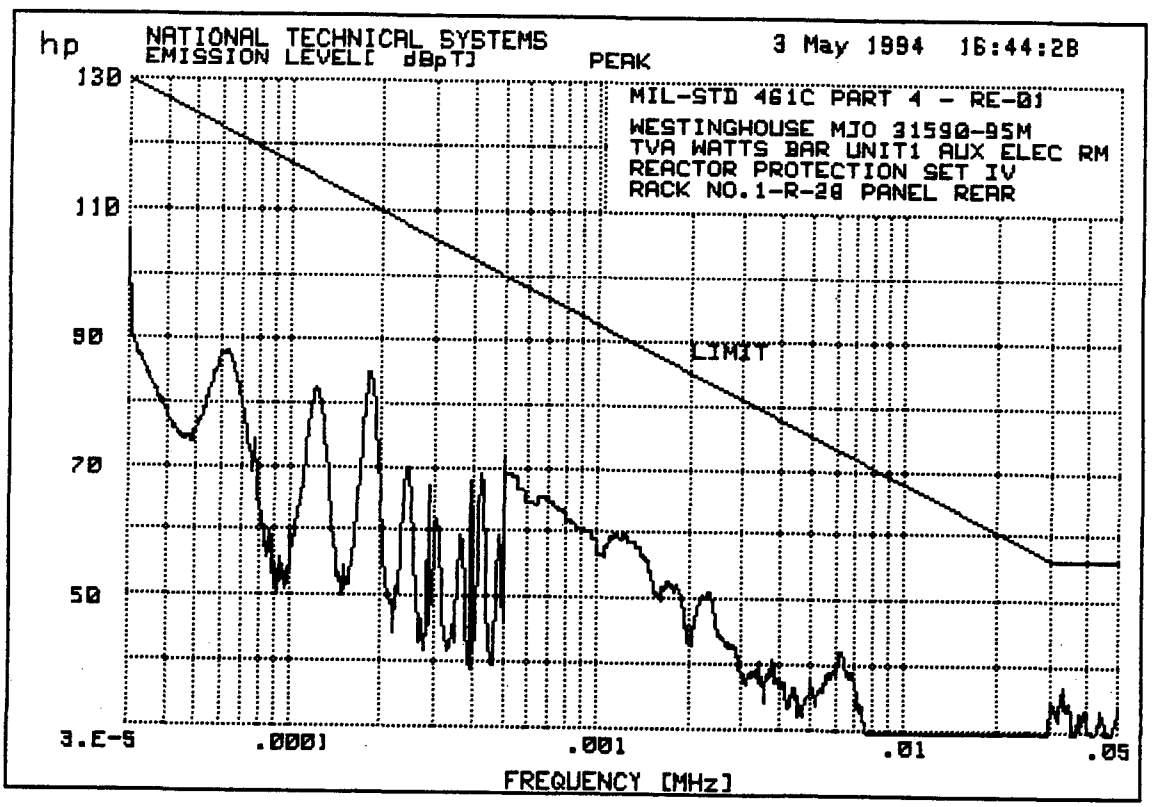

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 13:18:38
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET III
RACK NO.1-R-9 PANEL REAR
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]

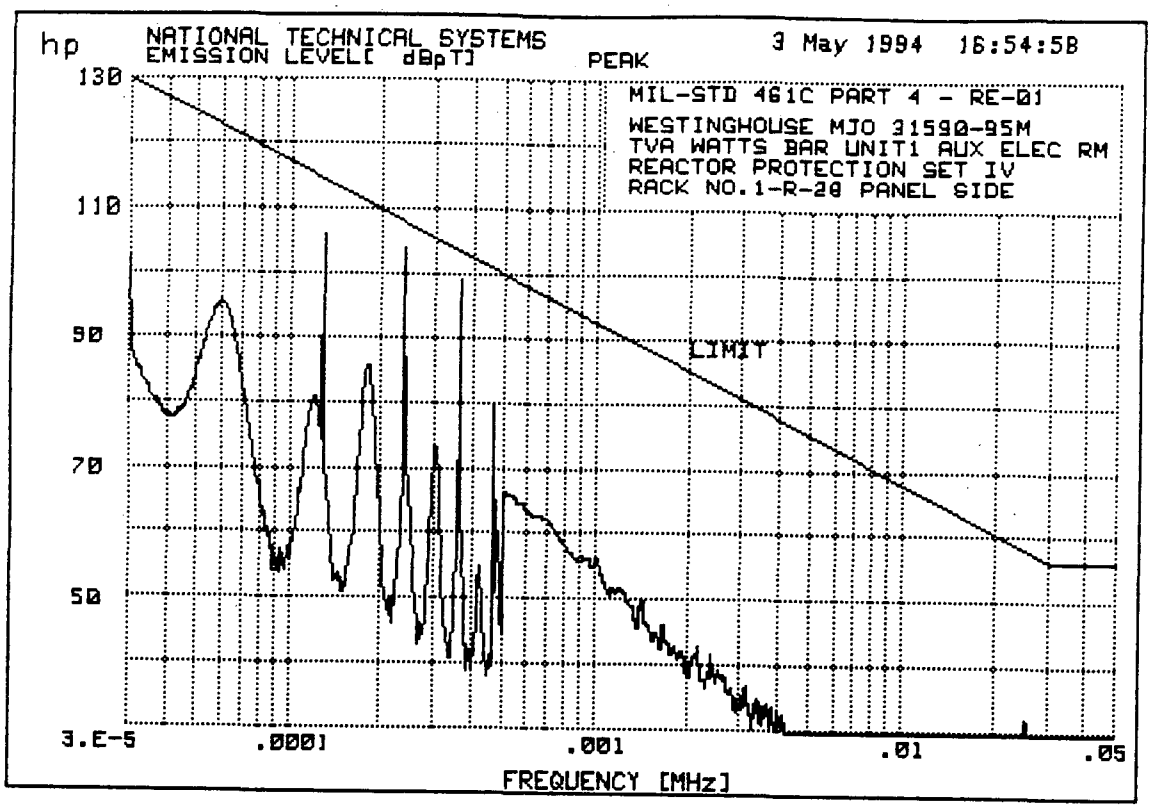

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 13:32:57
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET III
RACK NO.1-R-10 PANEL REAR
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]

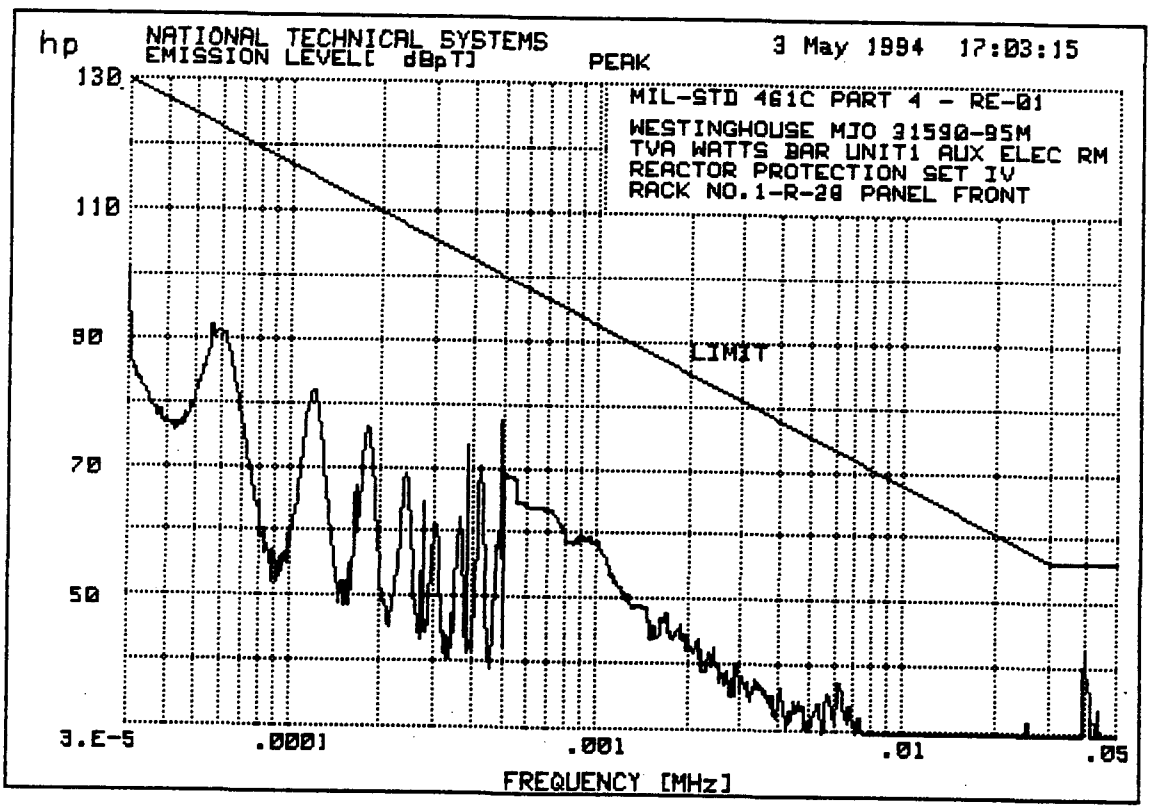

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 16:13:35
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET II
RACK NO.1-R-8 PANEL FRONT
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]

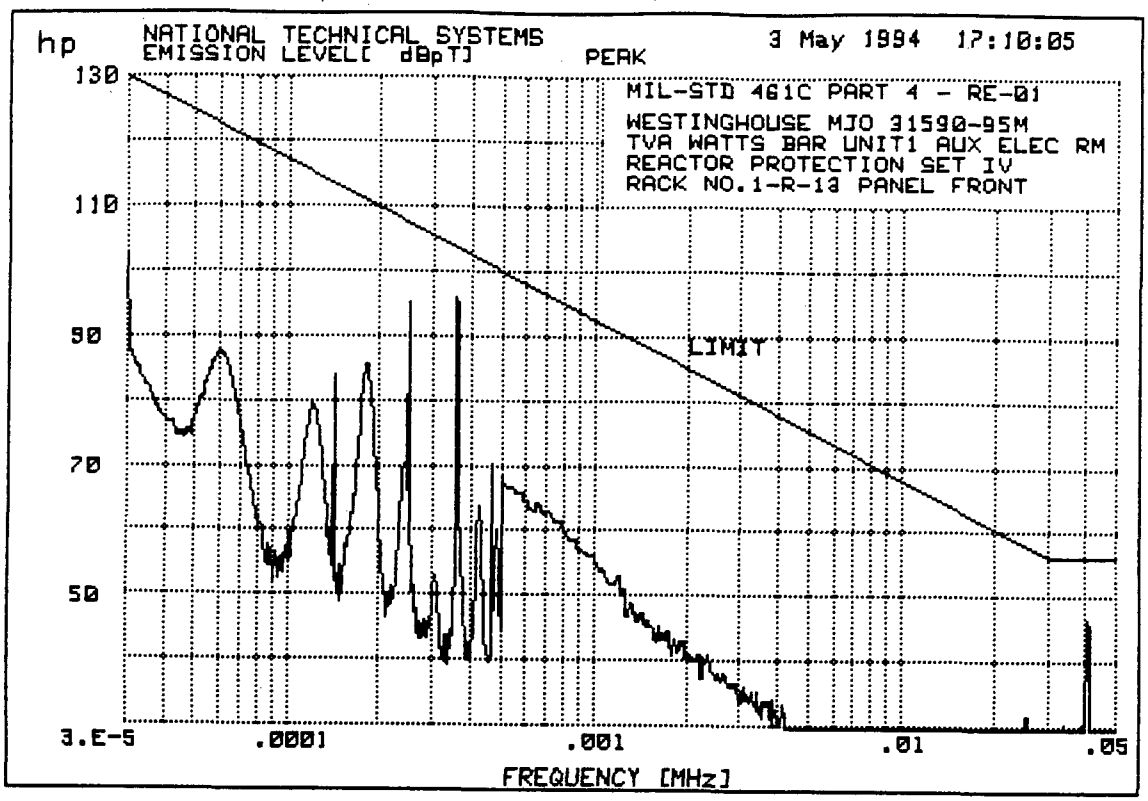

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 16:26:43
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET IV
RACK NO.1-R-12 PANEL REAR
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]

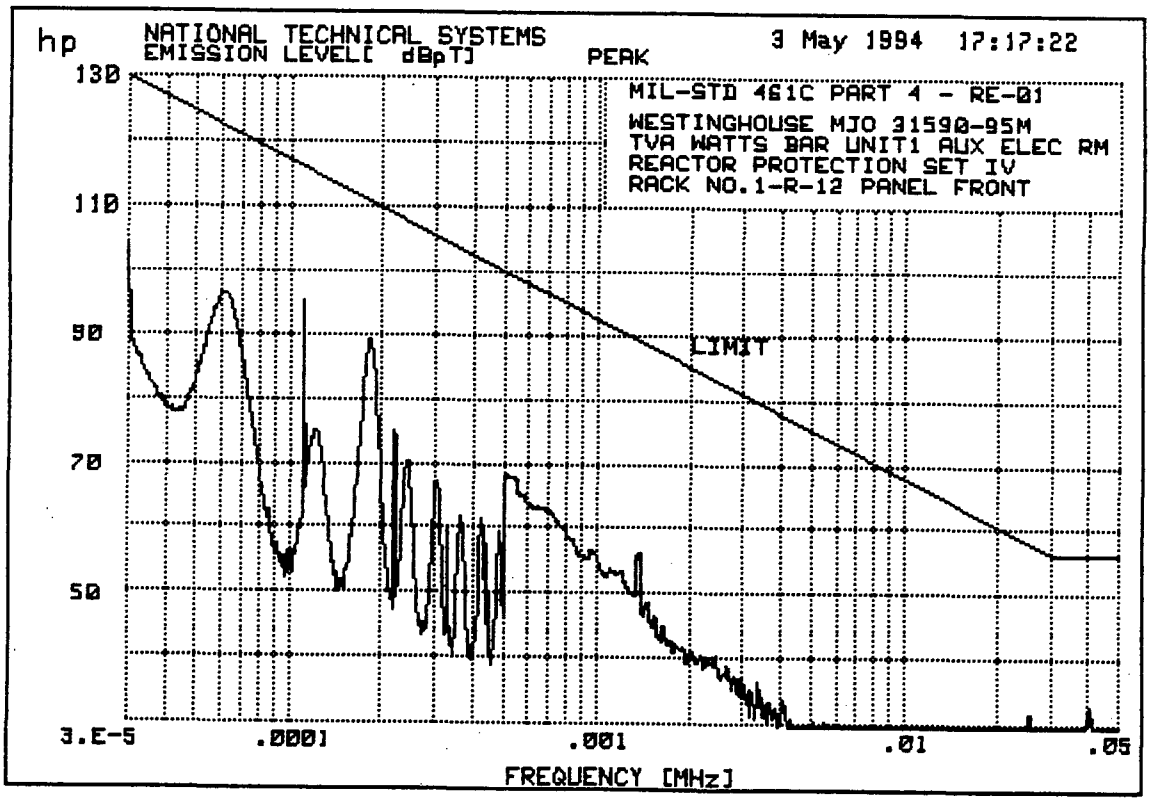

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 16:38:17
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET IV
RACK NO.1-R-13 PANEL REAR
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 16:44:28
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET IV
RACK NO.1-R-28 PANEL REAR
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 16:54:58
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET IV
RACK NO.1-R-20 PANEL SIDE
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 17:03:15
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET IV
RACK NO.1-R-20 PANEL FRONT
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 17:10:05
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET IV
RACK NO.1-R-13 PANEL FRONT
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBpT]
PEAK
3 May 1994 17:17:22
MIL-STD 461C PART 4 - RE-01
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET IV
RACK NO.1-R-12 PANEL FRONT
LIMIT
130
110
90
70
50
3.E-5
.0001
.001
.01
.05
FREQUENCY [MHz]

6.0 TEST PROCEDURE (continued)

6.6 Radiated Emissions, Method RE02, Electric Field, 14 KHz to 1 GHz

Requirements

Radiated emissions, from 14 KHz to 1 GHz, will be measured in accordance with the applicable portions of Test Method RE02 of MIL-STD-462. Reference Section 6.6, Test Setup.

Procedures

The Auxiliary Electric Equipment Room Environment was set up and operated as specified in Section 4.0 of this report. The antennas used during the performance of this test were as follows:

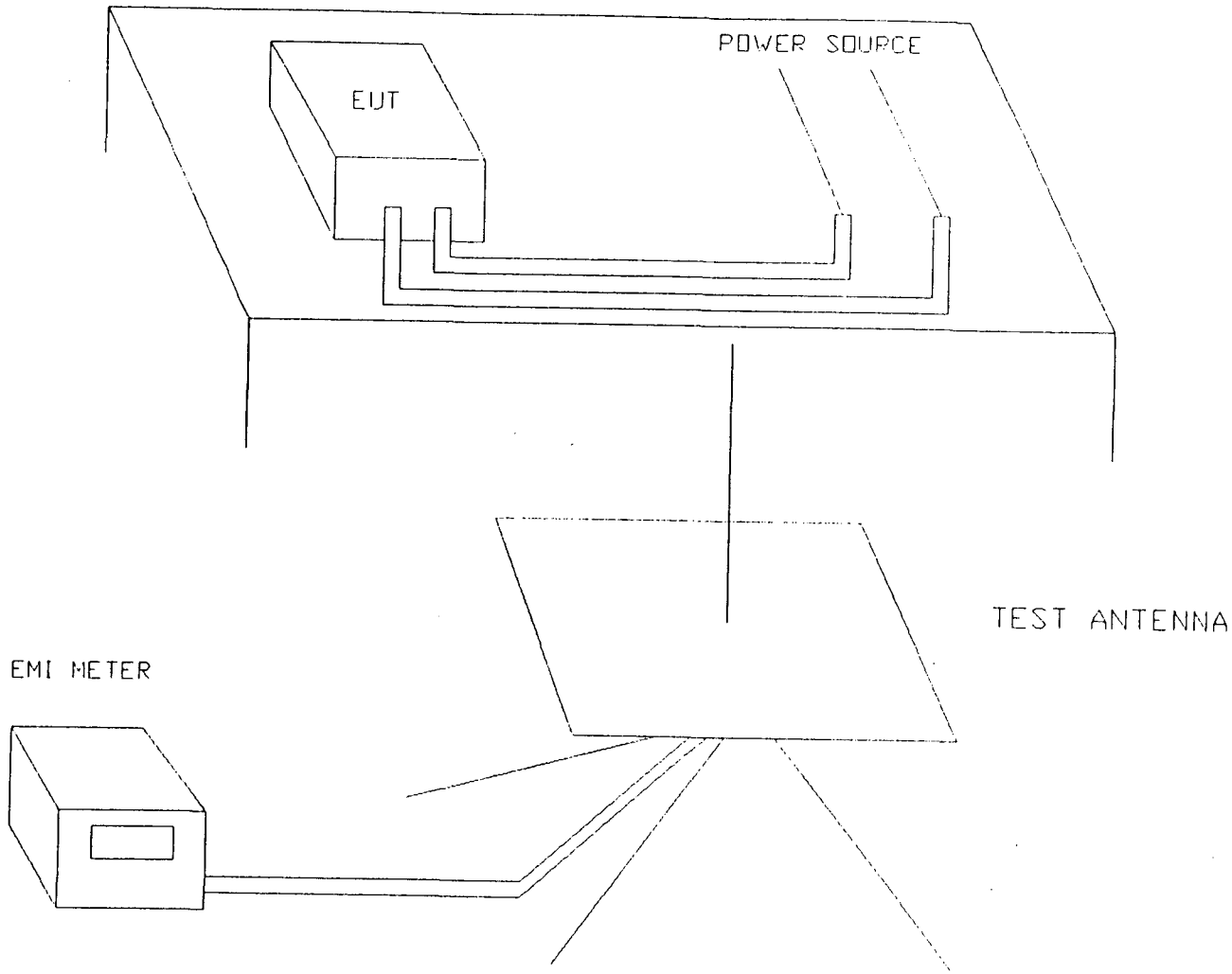
Frequency	Antenna	Coaxial Cable	Polarization
.014-30 MHz	Active Rod	25' of RG214/U	Omni-Directional
30 - 300 MHz	Biconical	25' of RG214/U	Vertical/Horiz.
300 - 1000 MHz	Log Periodic	25' of RG214/U	Vertical/Horiz.

Measurements from 14 KHz to 1.0 GHz were performed using the appropriate antenna with the corresponding coaxial cable connected to a Hewlett Packard Automated Microwave Measurement System, Model 8566S. The antenna axis orientation was changed until a worst case level was detected. Plots were generated for both narrow and broad band measurements.

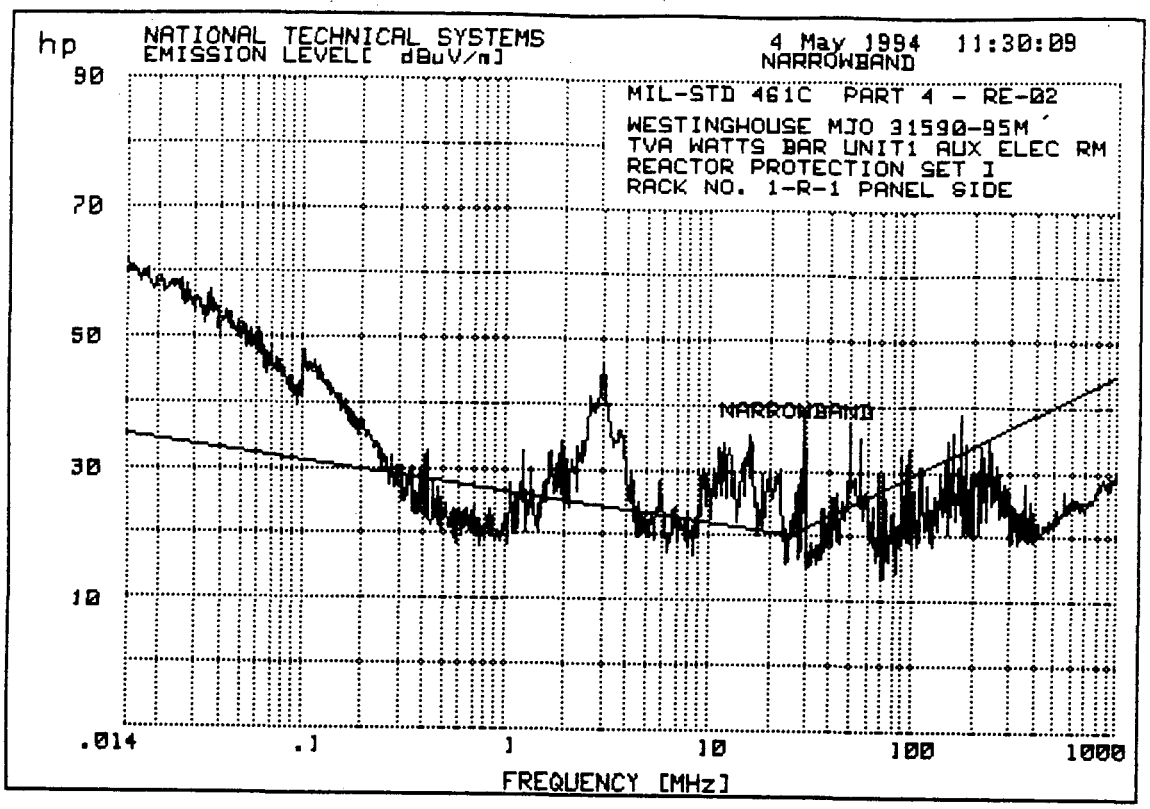
The remaining mapping locations were measured following the preceding procedure. (Reference Figure 4-2).

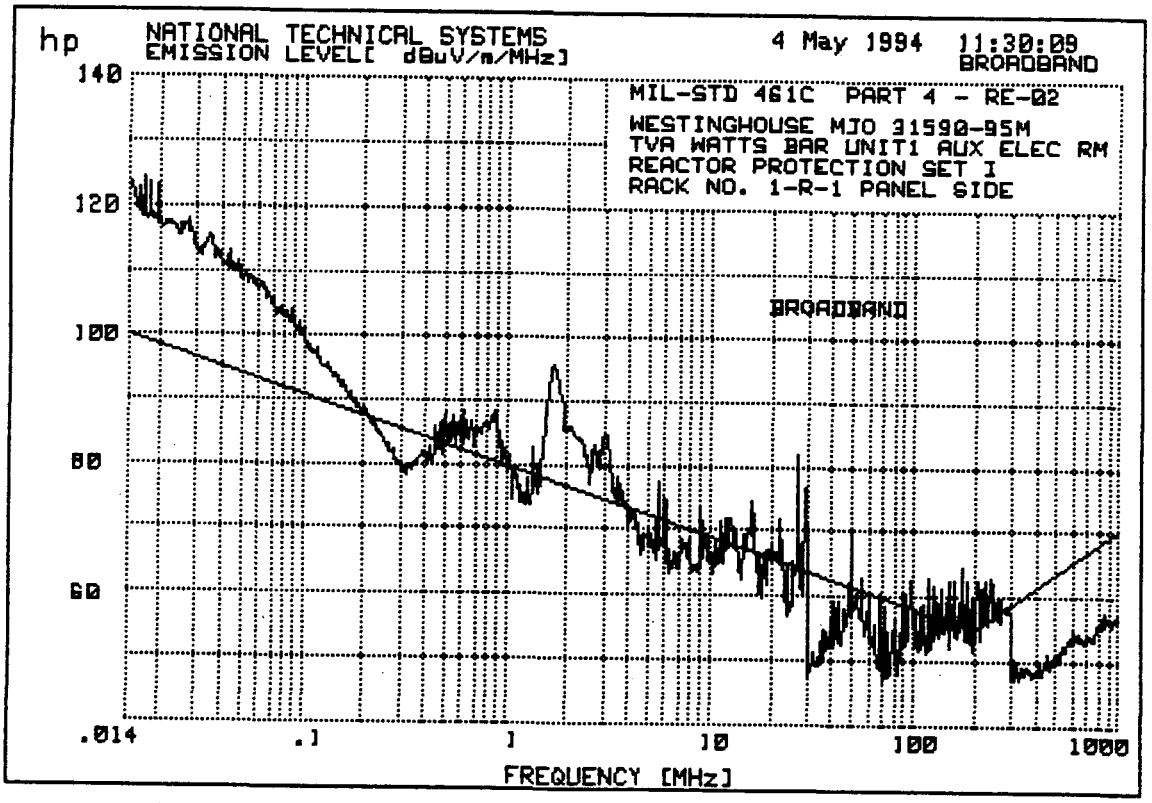
Sample Test Results

Test	Results
RE02 Radiated Emissions, 14KHz - 1 GHz	Westinghouse Electric Corporation will perform analysis for all tests.

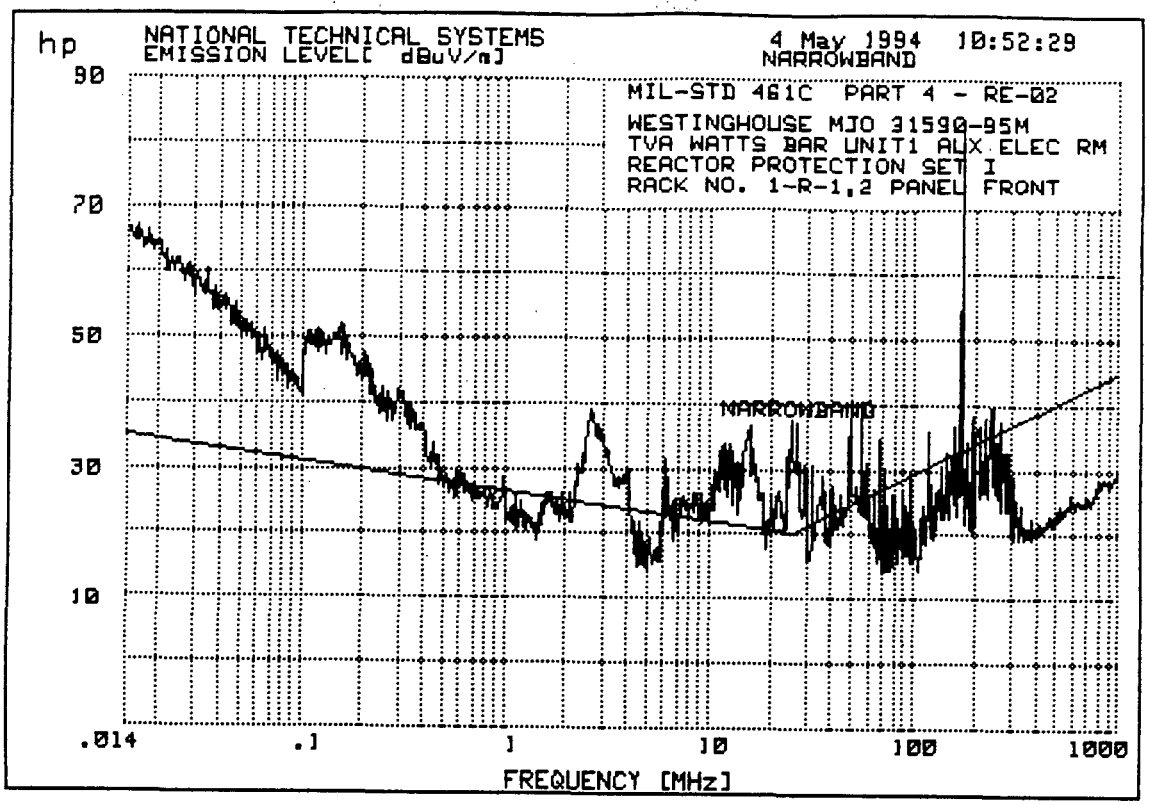


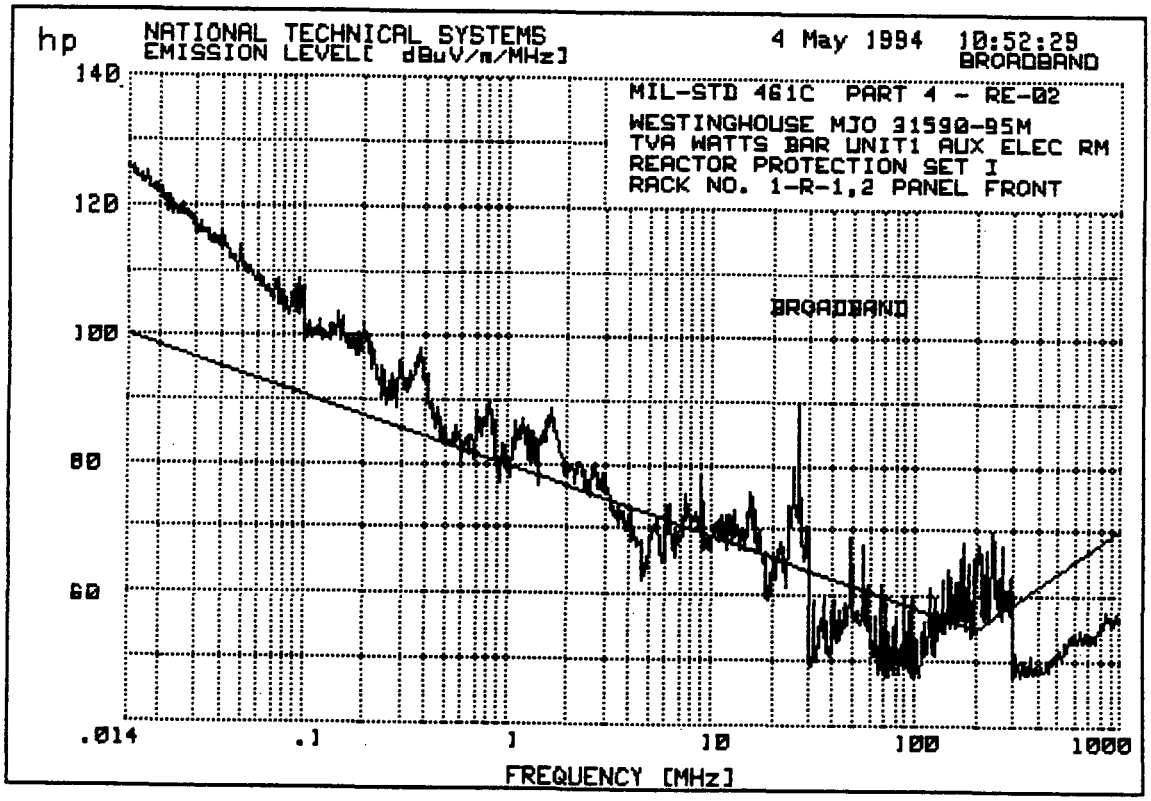
RADIATED EMISSIONS, METHOD RE02, TYPICAL TEST SETUP

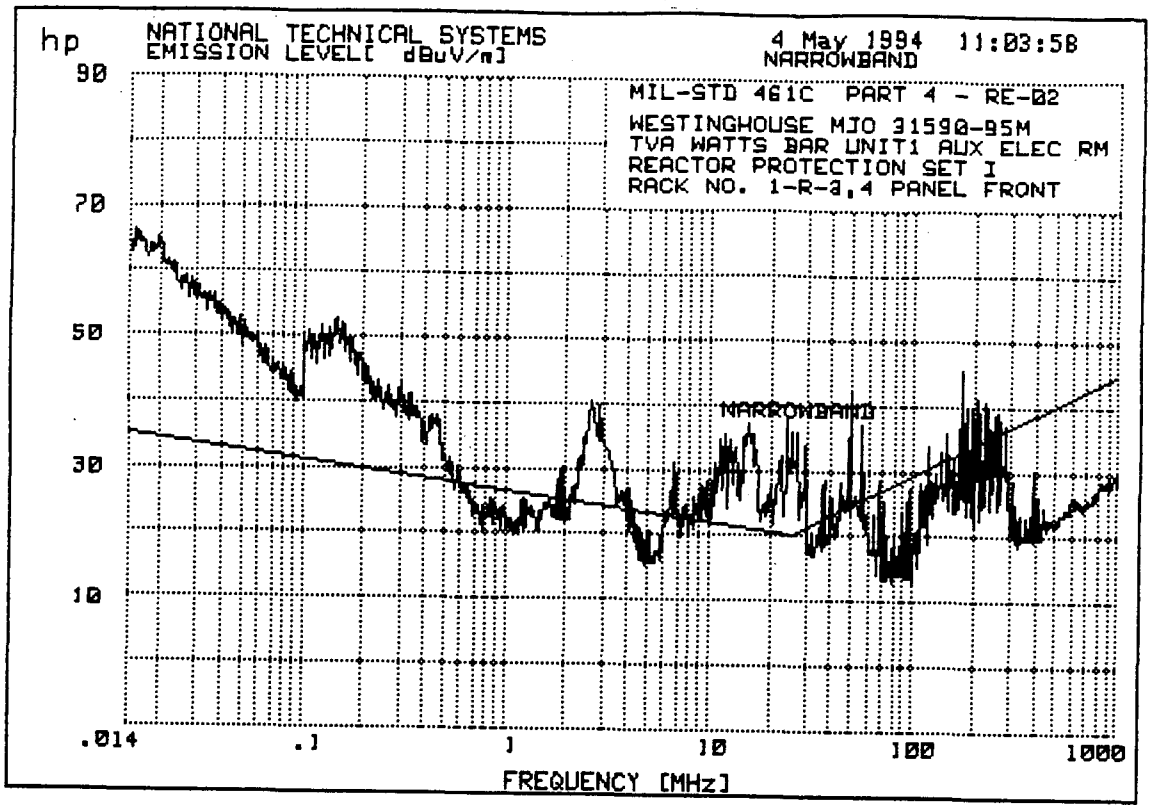

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m]
4 May 1994 11:30:09
NARROWBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET I
RACK NO. 1-R-1 PANEL SIDE
NARROWBAND
90
70
50
30
10
.014
.1
1
10
100
1000
FREQUENCY [MHz]

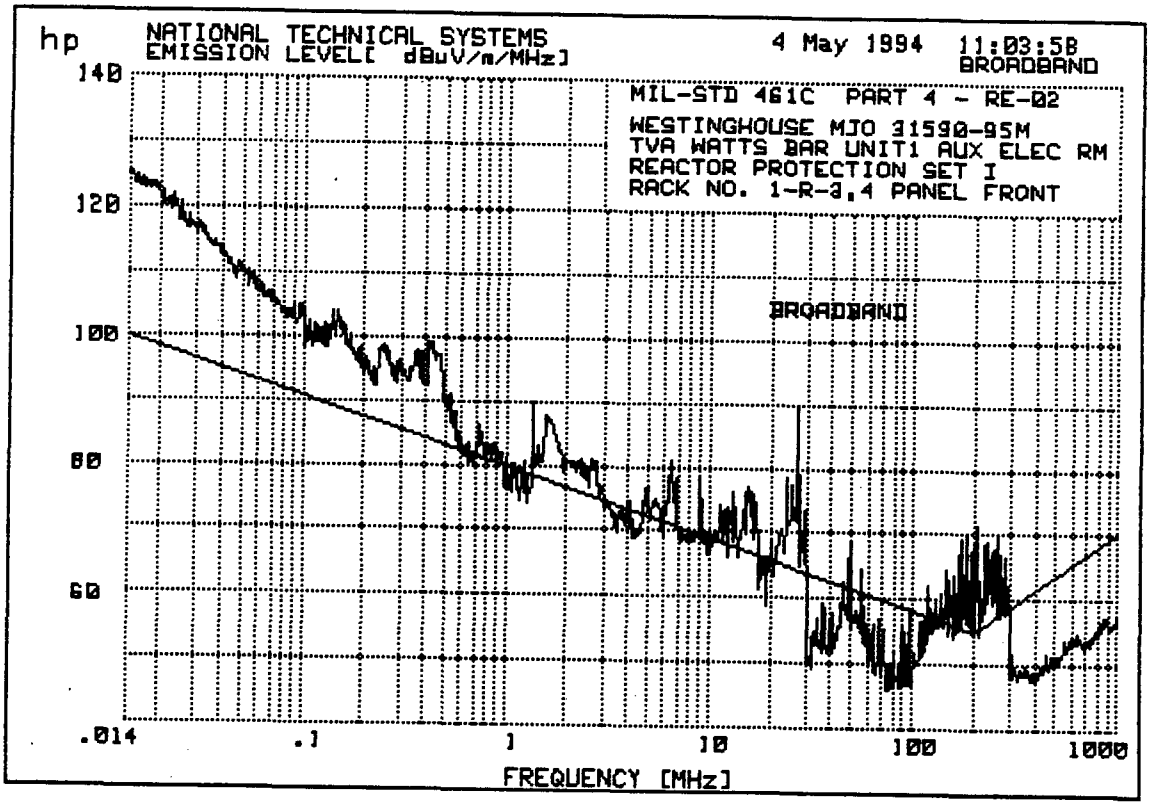

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m/MHz]
4 May 1994 11:30:09
BROADBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET I
RACK NO. 1-R-1 PANEL SIDE
BROADBAND
140
120
100
80
60
.014
.1
1
10
100
1000
FREQUENCY [MHz]

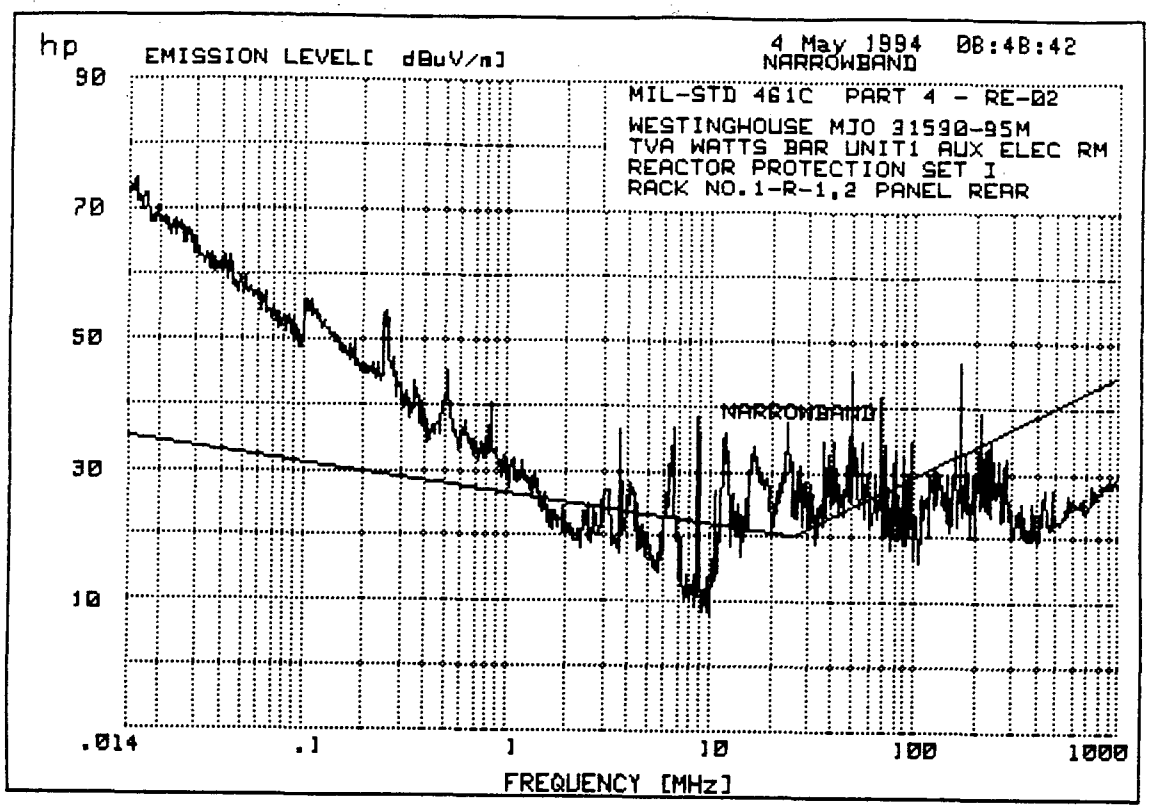
EJB

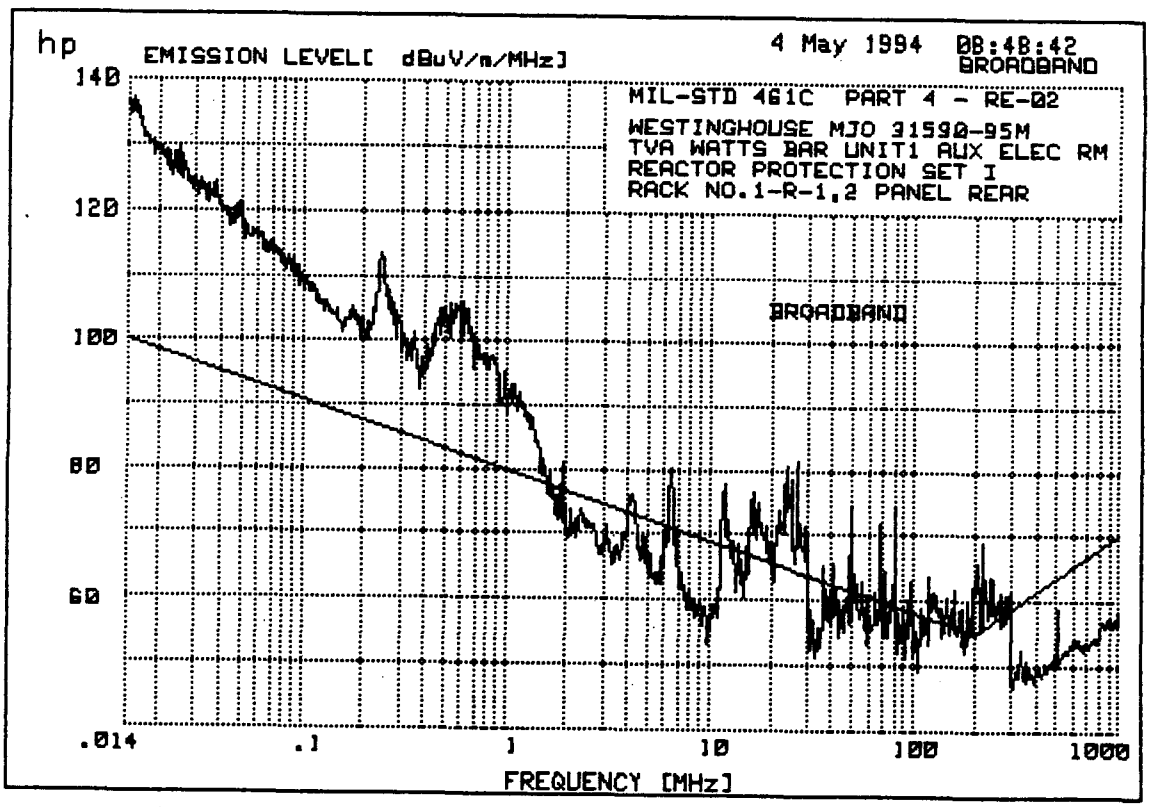

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m]
4 May 1994 10:52:29
NARROWBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET I
RACK NO. 1-R-1,2 PANEL FRONT
NARROWBAND
90
70
50
30
10
.014
.1
1
10
100
1000
FREQUENCY [MHz]

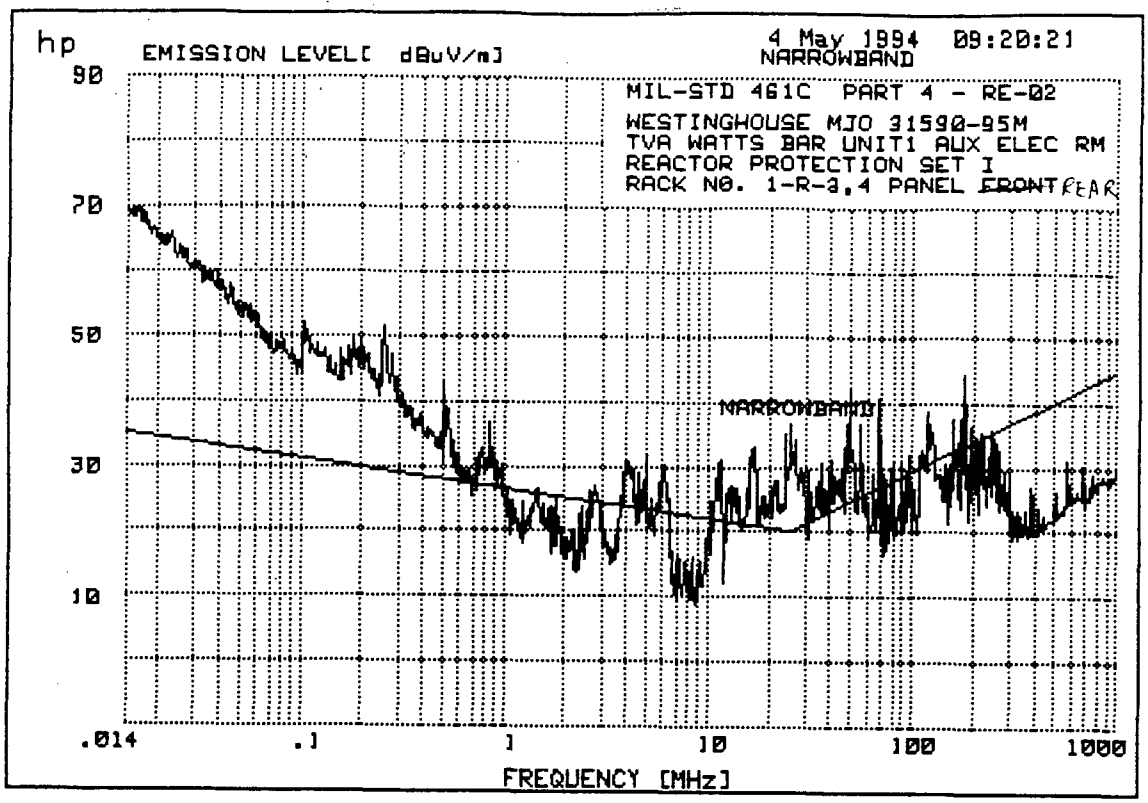

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m/MHz]
4 May 1994 10:52:29
BROADBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET I
RACK NO. 1-R-1,2 PANEL FRONT
BROADBAND
140
120
100
80
60
.014
.1
1
10
100
1000
FREQUENCY [MHz]

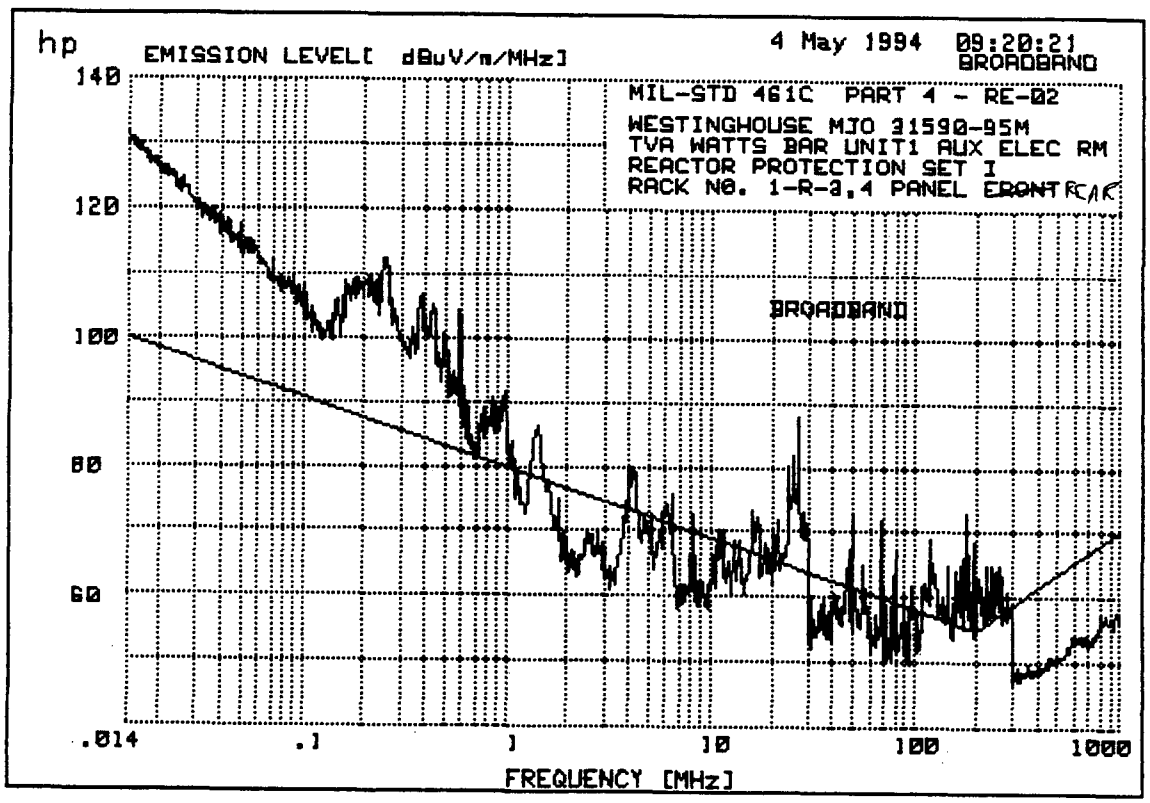

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m]
4 May 1994 11:03:58
NARROWBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET I
RACK NO. 1-R-3,4 PANEL FRONT
NARROWBAND
90
70
50
30
10
.014
.1
1
10
100
1000
FREQUENCY [MHz]

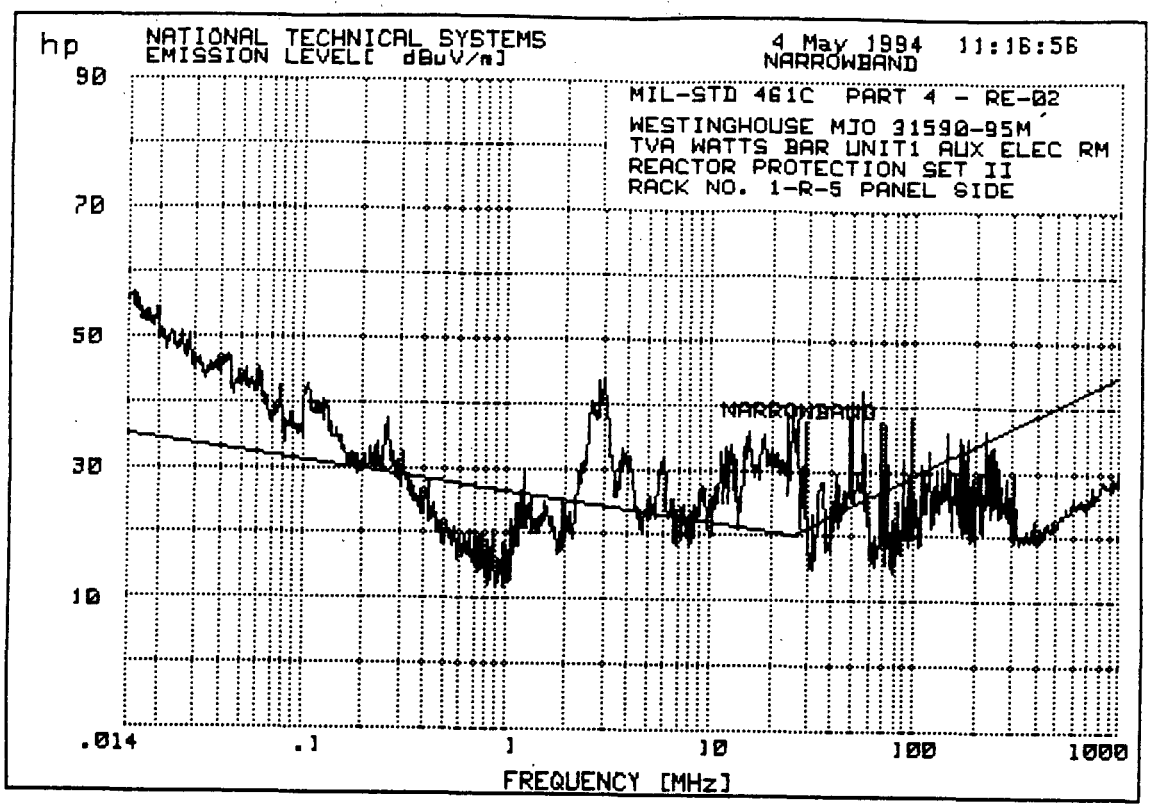

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m/MHz]
4 May 1994 11:03:58
BROADBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET I
RACK NO. 1-R-3,4 PANEL FRONT
BROADBAND
140
120
100
80
60
.014
.1
1
10
100
1000
FREQUENCY [MHz]


hp
EMISSION LEVEL[dBuV/m]
4 May 1994 08:48:42
NARROWBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET I
RACK NO.1-R-1,2 PANEL REAR
NARROWBAND
90
70
50
30
10
.014
.1
1
10
100
1000
FREQUENCY [MHz]


hp
EMISSION LEVEL[dBuV/m/MHz]
4 May 1994 08:48:42
BROADBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET I
RACK NO.1-R-1,2 PANEL REAR
BROADBAND
140
120
100
80
60
.014
.1
1
10
100
1000
FREQUENCY [MHz]


hp
EMISSION LEVEL[dBuV/m]
4 May 1994 09:20:21
NARROWBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET I
RACK NO. 1-R-3,4 PANEL FRONT REAR
NARROWBAND
90
70
50
30
10
.014
.1
1
10
100
1000
FREQUENCY [MHz]


hp
EMISSION LEVEL[dBuV/m/MHz]
4 May 1994 09:20:21
BROADBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET I
RACK NO. 1-R-3,4 PANEL FRONT REAR
BROADBAND
140
120
100
80
60
.014
.1
1
10
100
1000
FREQUENCY [MHz]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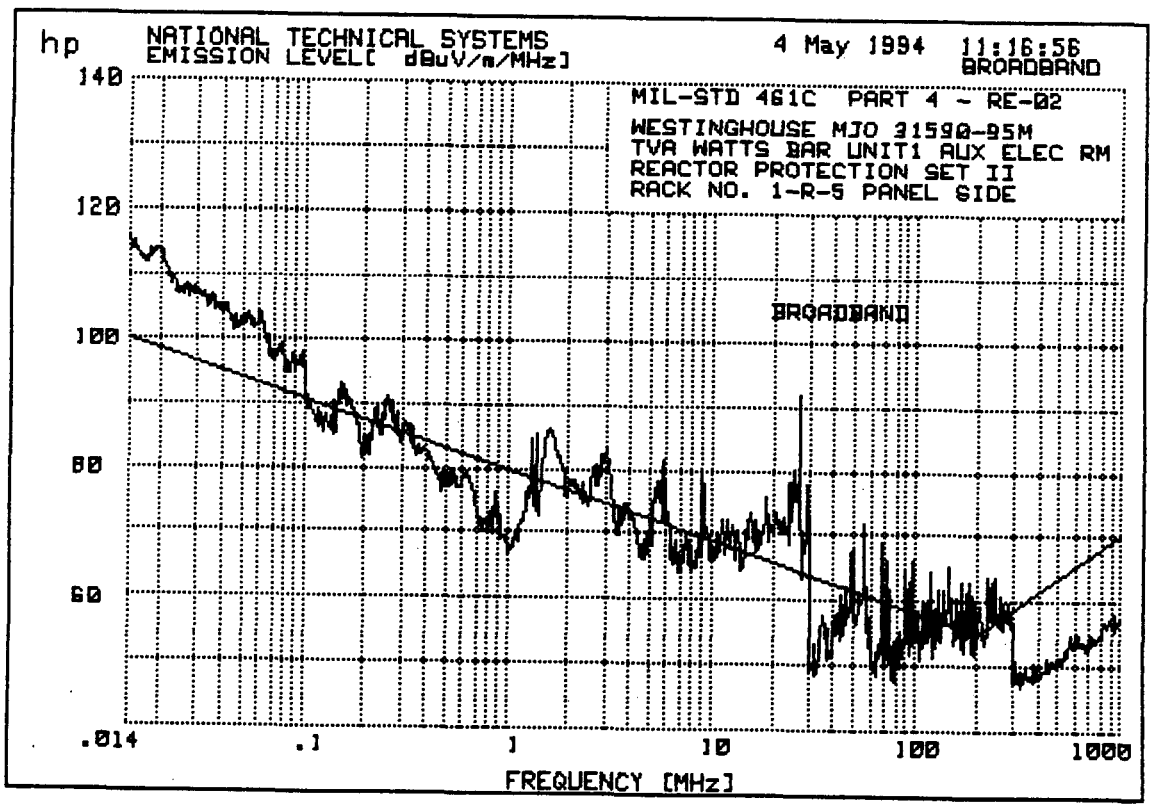
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m]
4 May 1994 11:16:56
NARROWBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET II
RACK NO. 1-R-5 PANEL SIDE
NARROWBAND
90
70
50
30
10
.014
.1
1
10
100
1000
FREQUENCY [MHz]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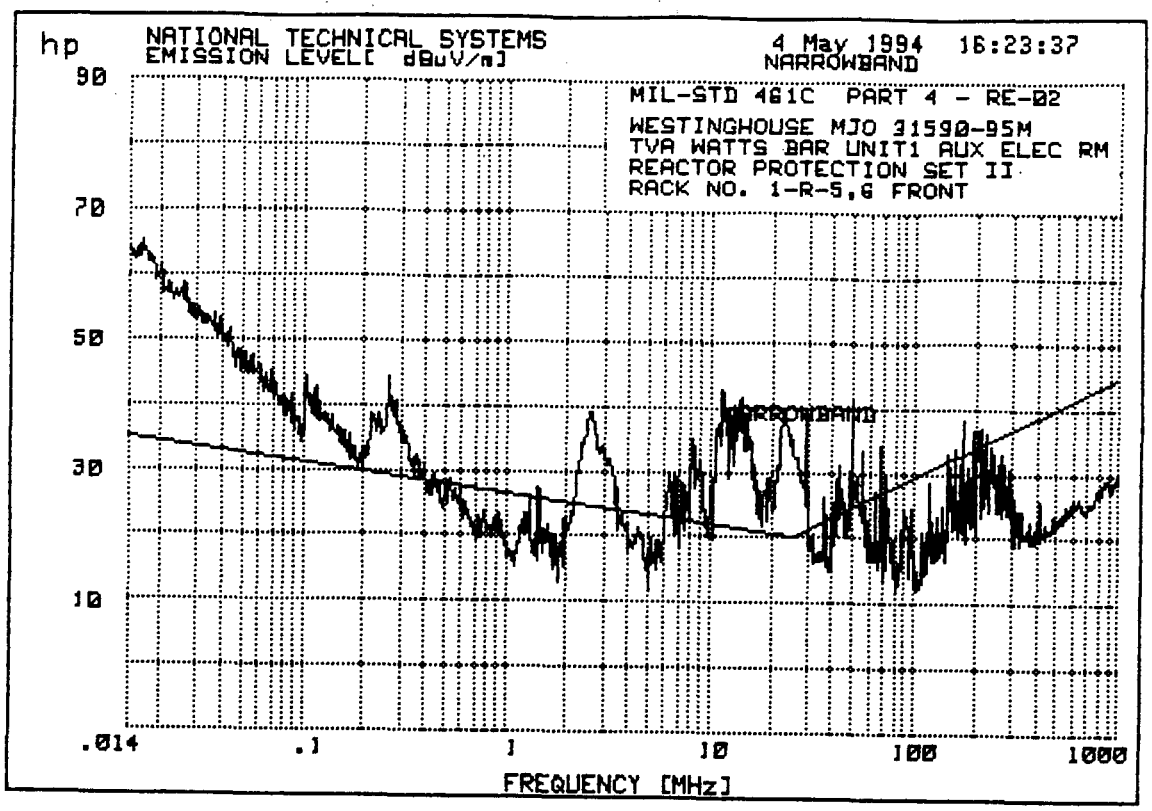
EMISSION LEVEL[dBuV/m/MHz]
4 May 1994 11:16:56
BROADBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET II
RACK NO. 1-R-5 PANEL SIDE
BROADBAND
140
120
100
80
60
.014
.1
1
10
100
1000
FREQUENCY [MHz]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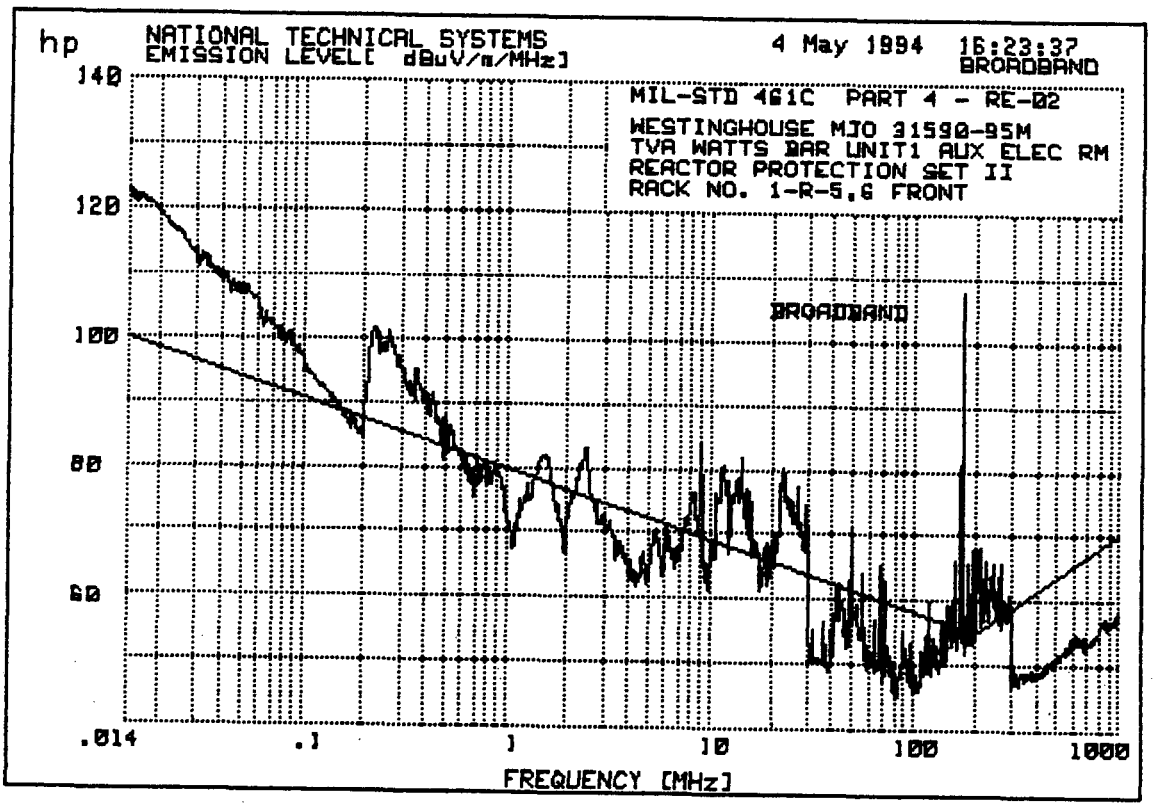
4 May 1994 16:23:37
NARROWBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET II
RACK NO. 1-R-5,6 FRONT
90
70
50
30
10
.014
.1
1
10
100
1000
FREQUENCY [MHz]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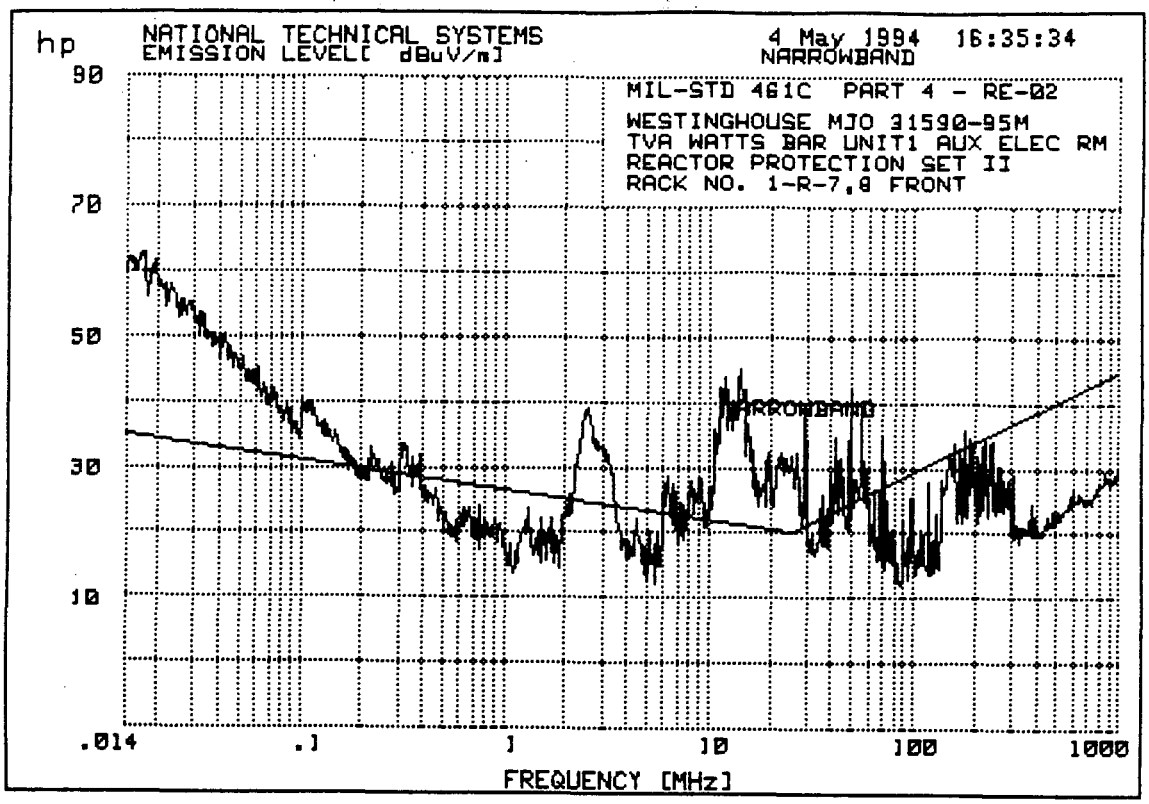
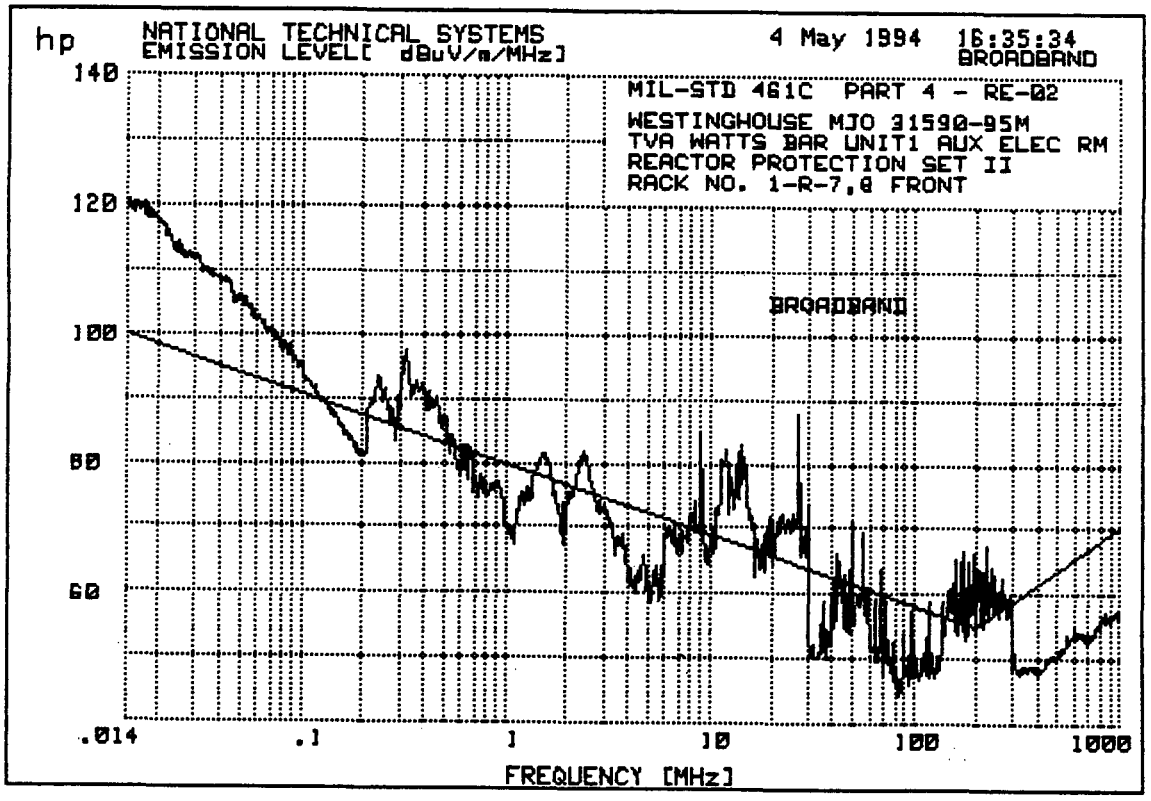
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m/MHz]
4 May 1994 16:23:37
BRORDBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET II
RACK NO. 1-R-5,6 FRONT
140
120
100
80
60
.014
.1
1
10
100
1000
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m]
4 May 1994 16:35:34
NARROWBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET II
RACK NO. 1-R-7,8 FRONT
NARROWBAND
90
70
50
30
10
.014
.1
1
10
100
1000
FREQUENCY [MHz]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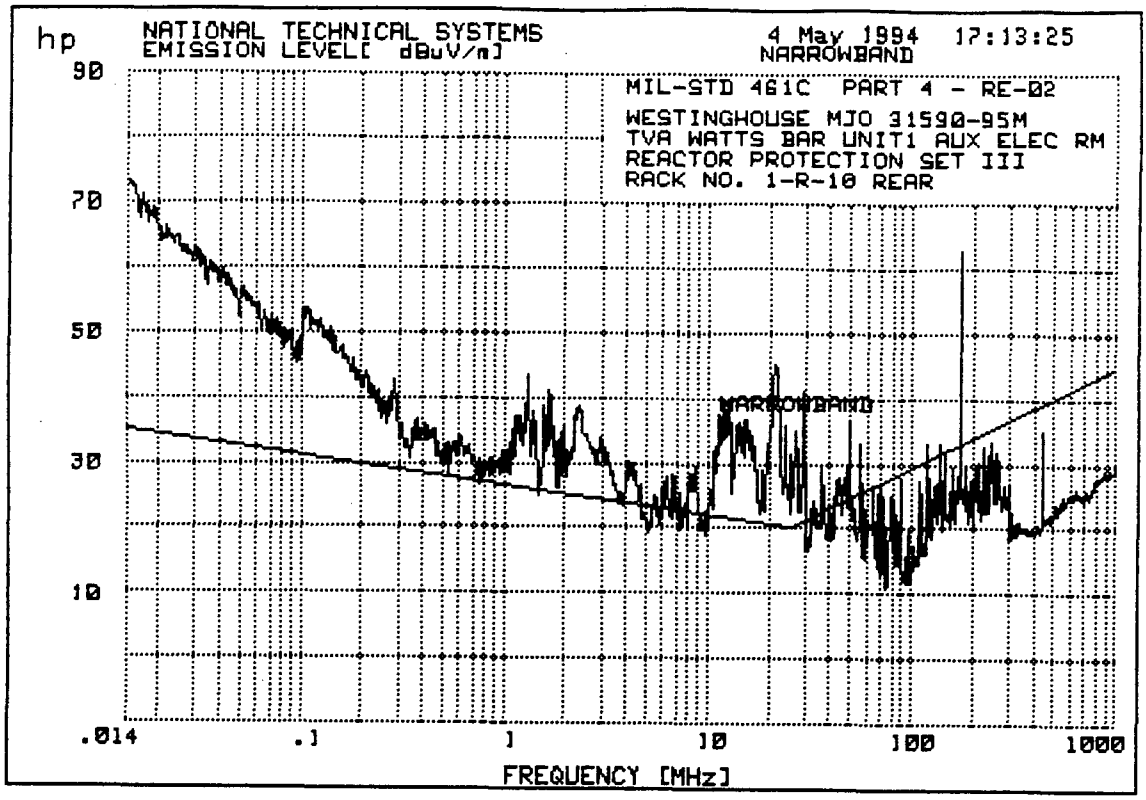
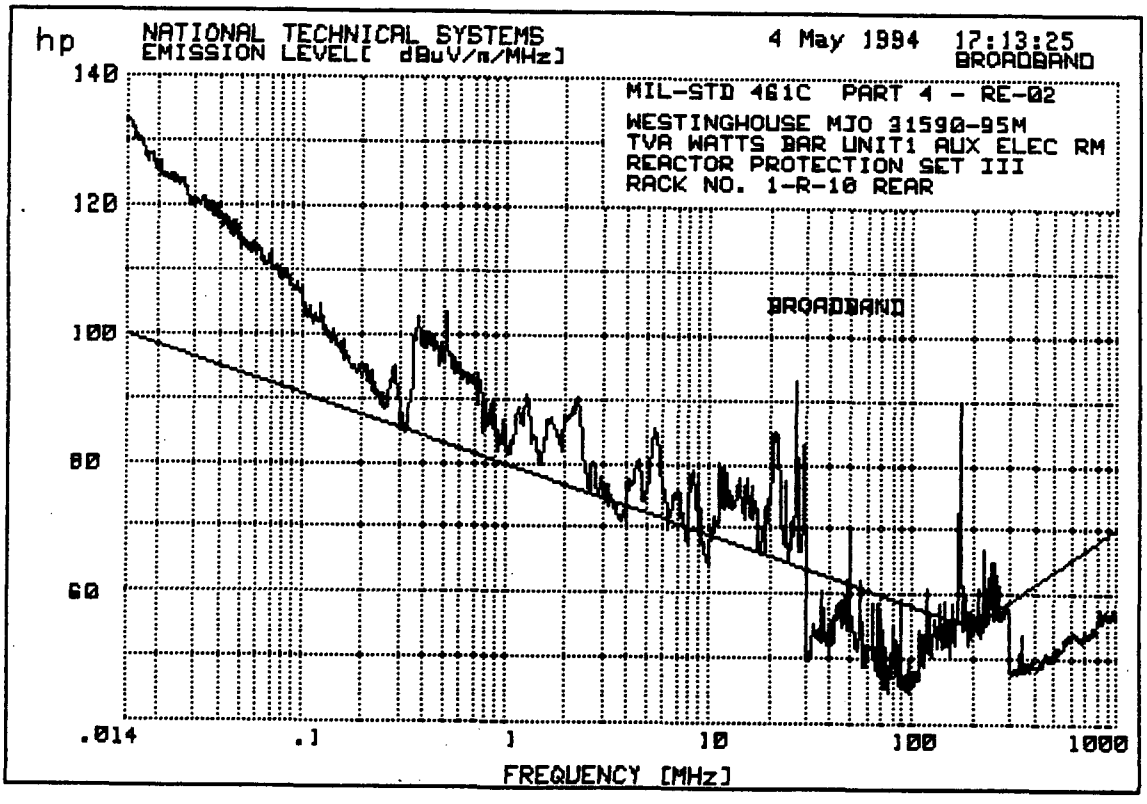
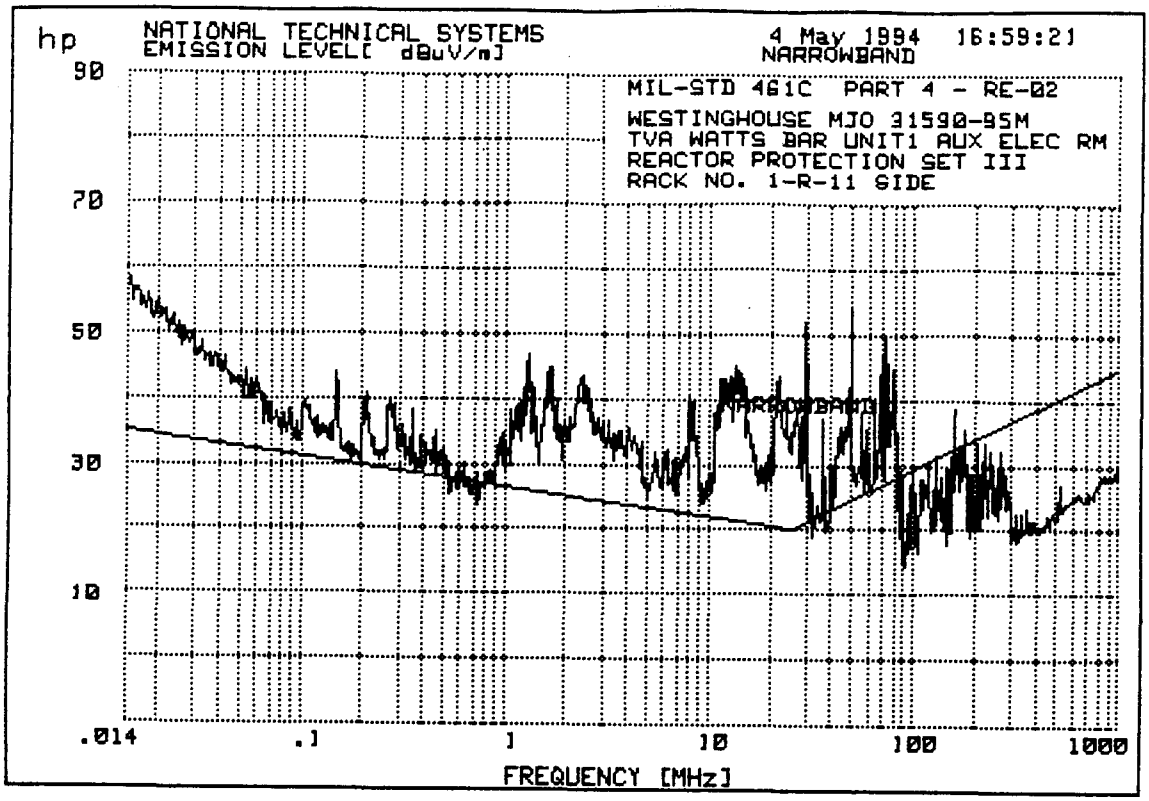
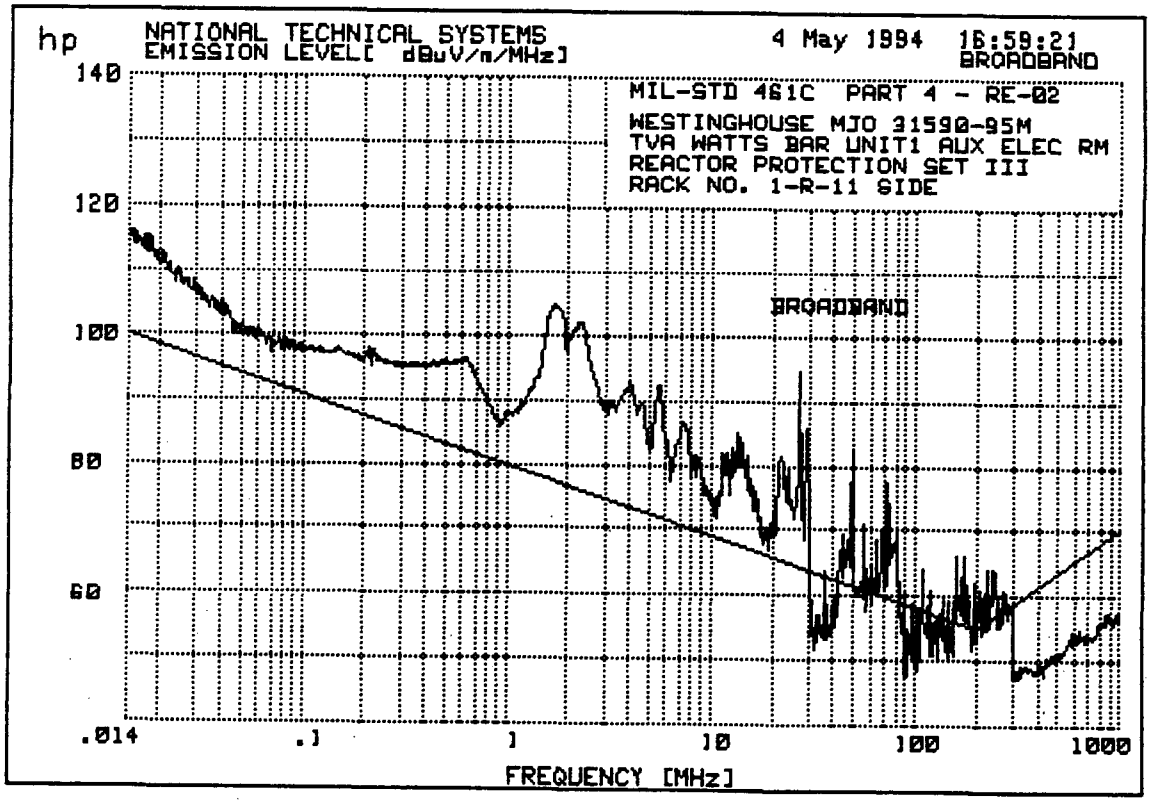
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m/MHz]
4 May 1994 16:35:34
BROADBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET II
RACK NO. 1-R-7,8 FRONT
BROADBAND
140
120
100
80
60
.014
.1
1
10
100
1000
FREQUENCY [MHz]

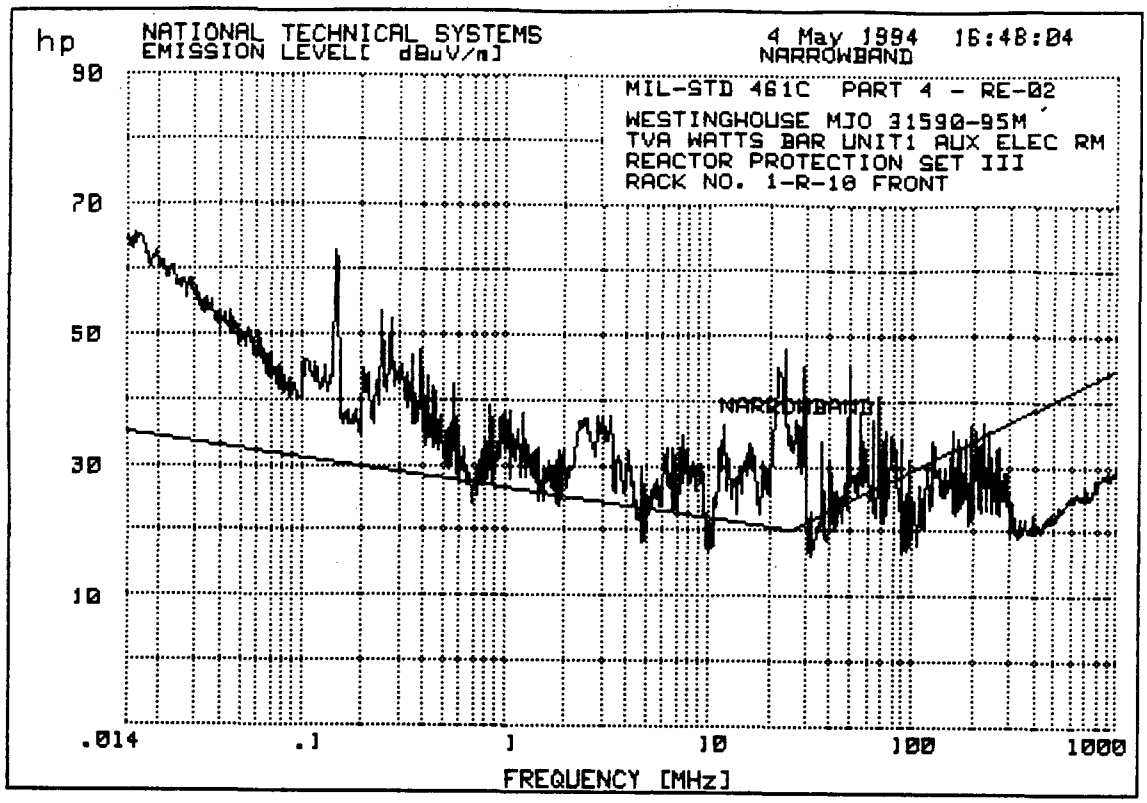

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m]
4 May 1994 17:13:25
NARROWBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET III
RACK NO. 1-R-10 REAR
NARROWBAND
90
70
50
30
10
.014
.1
1
10
100
1000
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m/MHz]
4 May 1994 17:13:25
BROADBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET III
RACK NO. 1-R-10 REAR
BROADBAND
140
120
100
80
60
.014
.1
1
10
100
1000
FREQUENCY [MHz]

EB


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m]
4 May 1994 16:59:21
NARROWBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET III
RACK NO. 1-R-11 SIDE
90
70
50
30
10
.014
.1
1
10
100
1000
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m/MHz]
4 May 1994 16:59:21
BROADBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET III
RACK NO. 1-R-11 SIDE
140
120
100
80
60
.014
.1
1
10
100
1000
FREQUENCY [MHz]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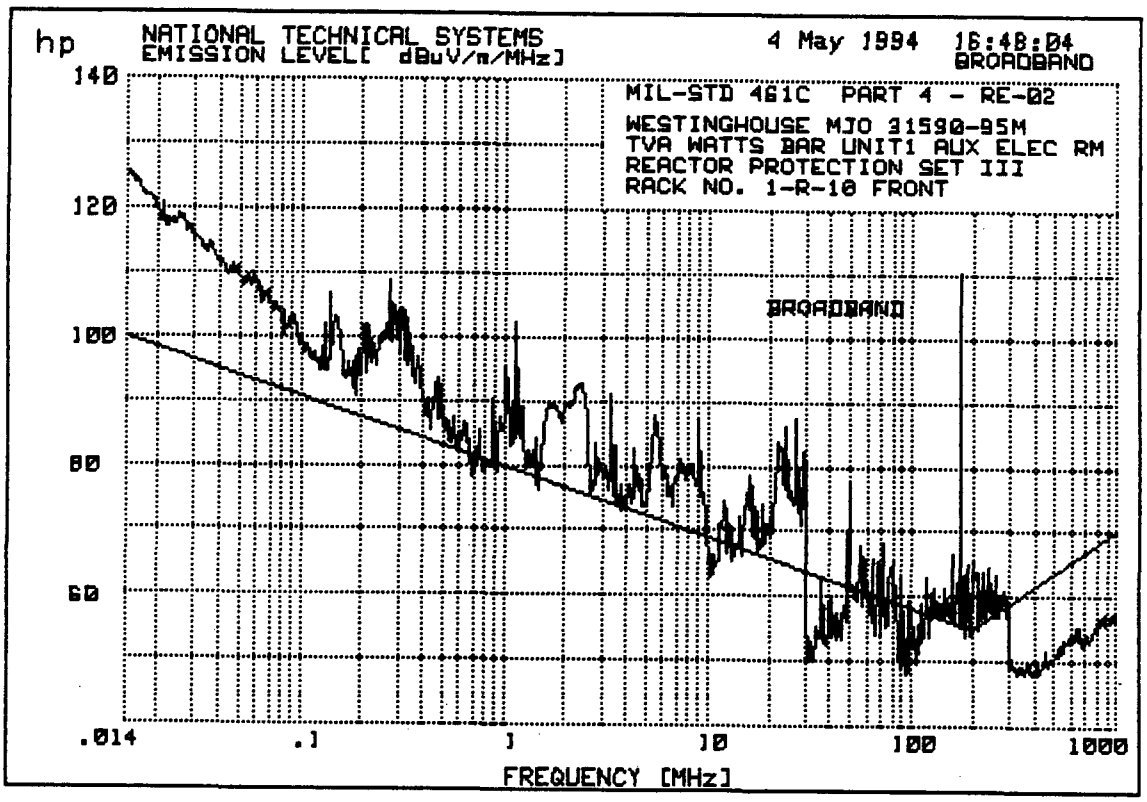
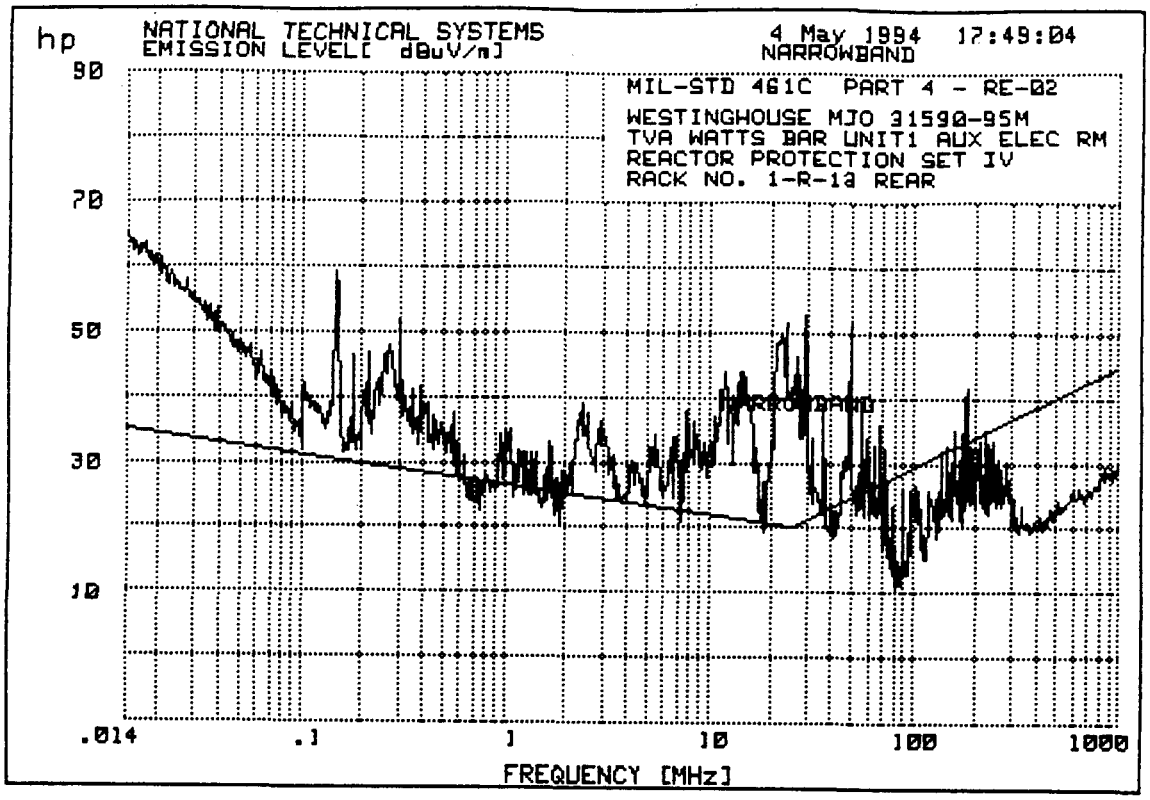
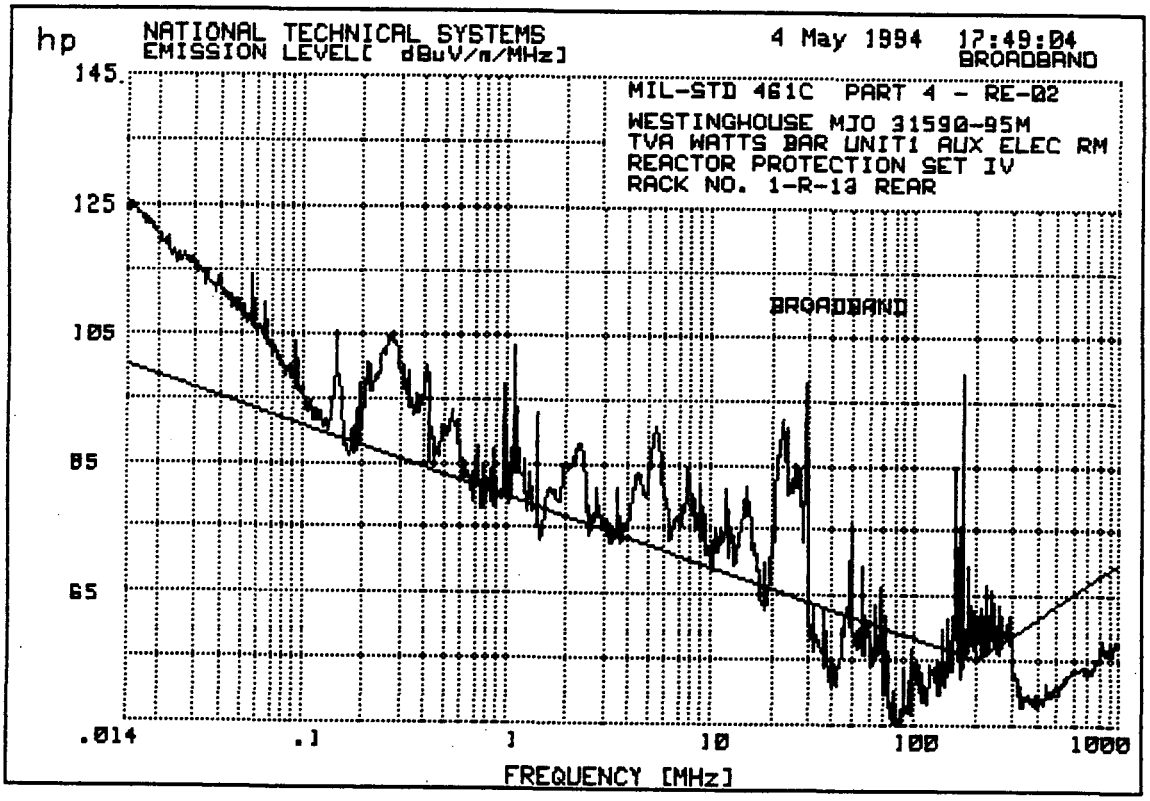
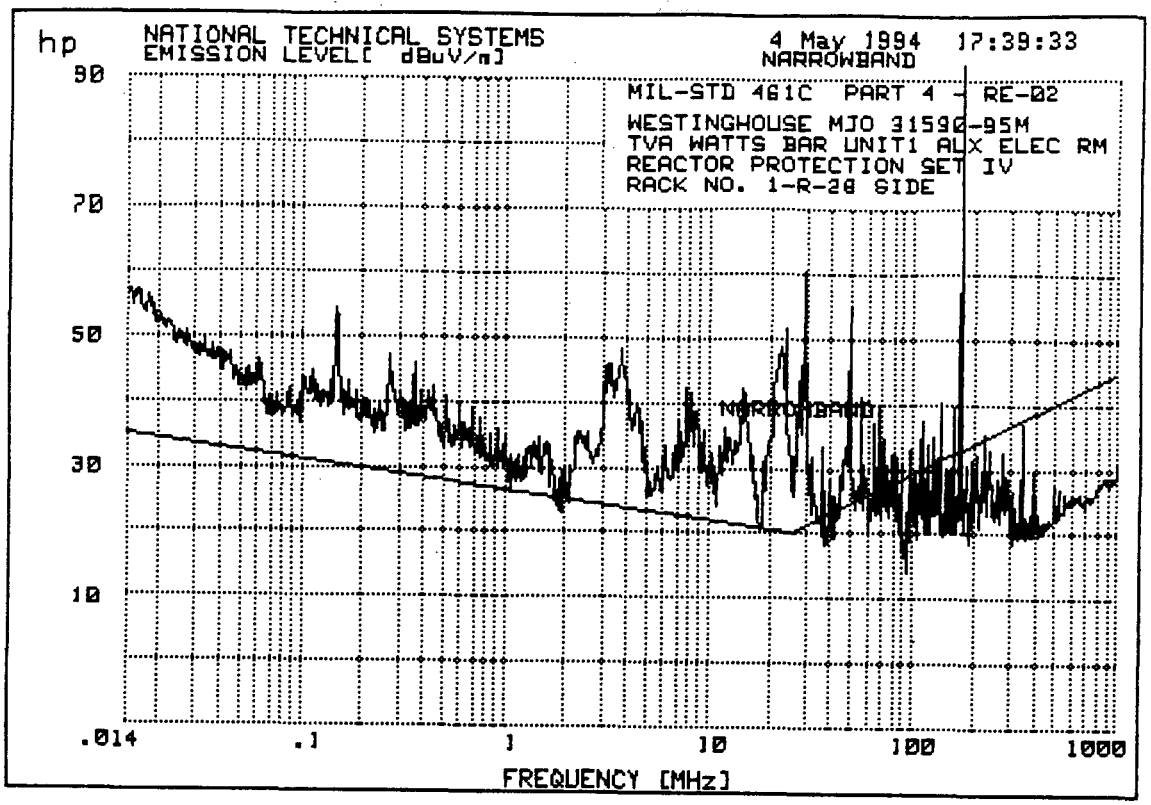
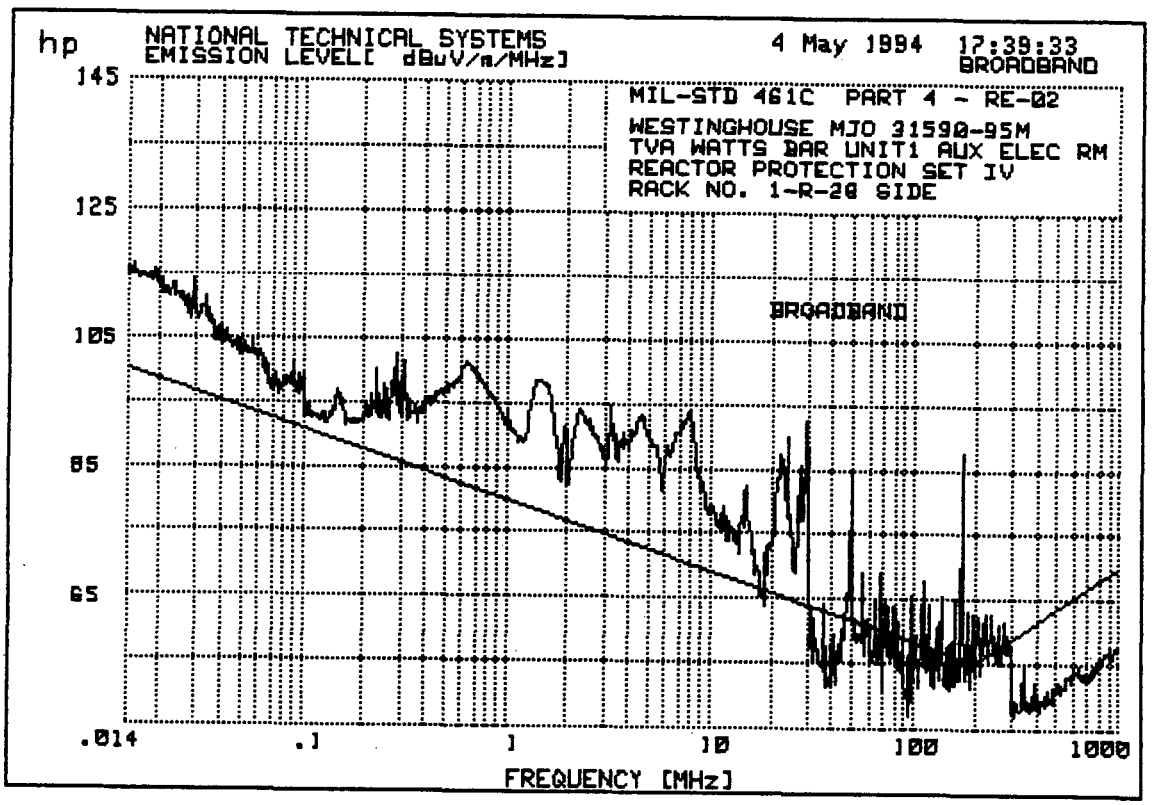
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m]
4 May 1994 16:48:04
NARROWBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET III
RACK NO. 1-R-10 FRONT
NARROWBAND
90
70
50
30
10
.014
.1
1
10
100
1000
FREQUENCY [MHz]

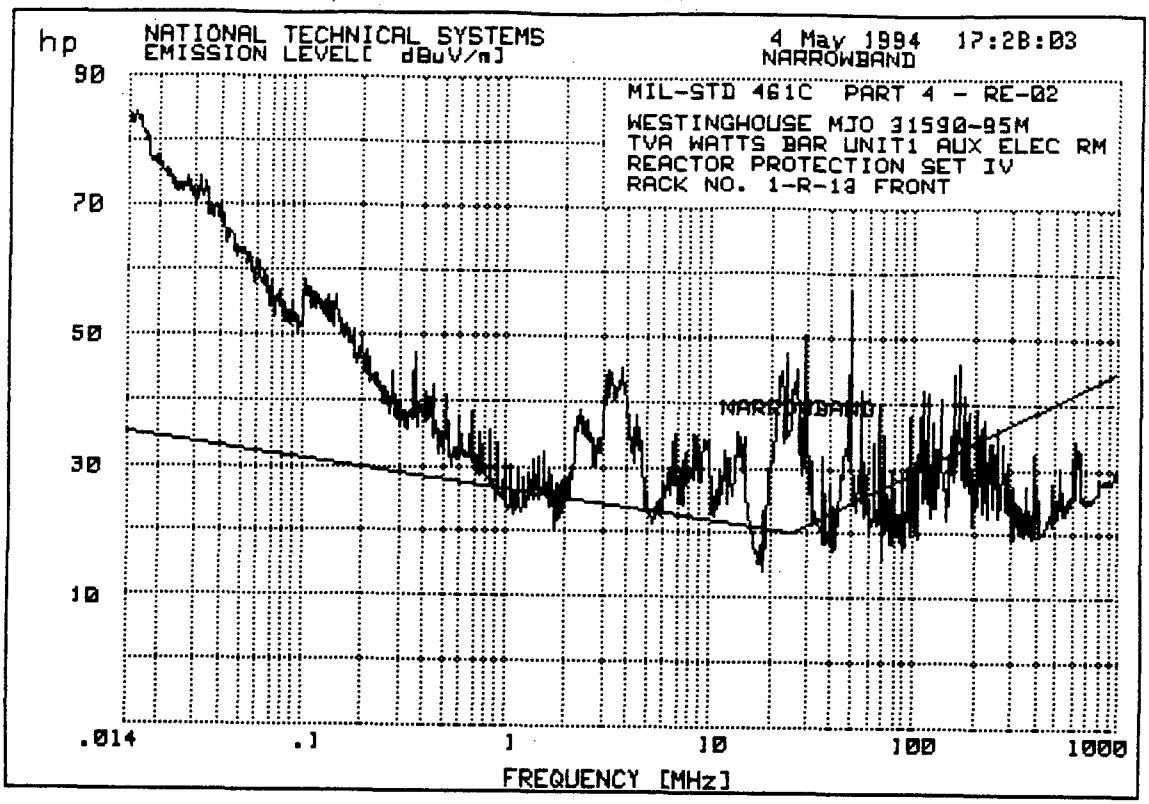

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m/MHz]
4 May 1994 16:48:04
BROADBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET III
RACK NO. 1-R-10 FRONT
BROADBAND
140
120
100
80
60
.014
.1
1
10
100
1000
FREQUENCY [MHz]

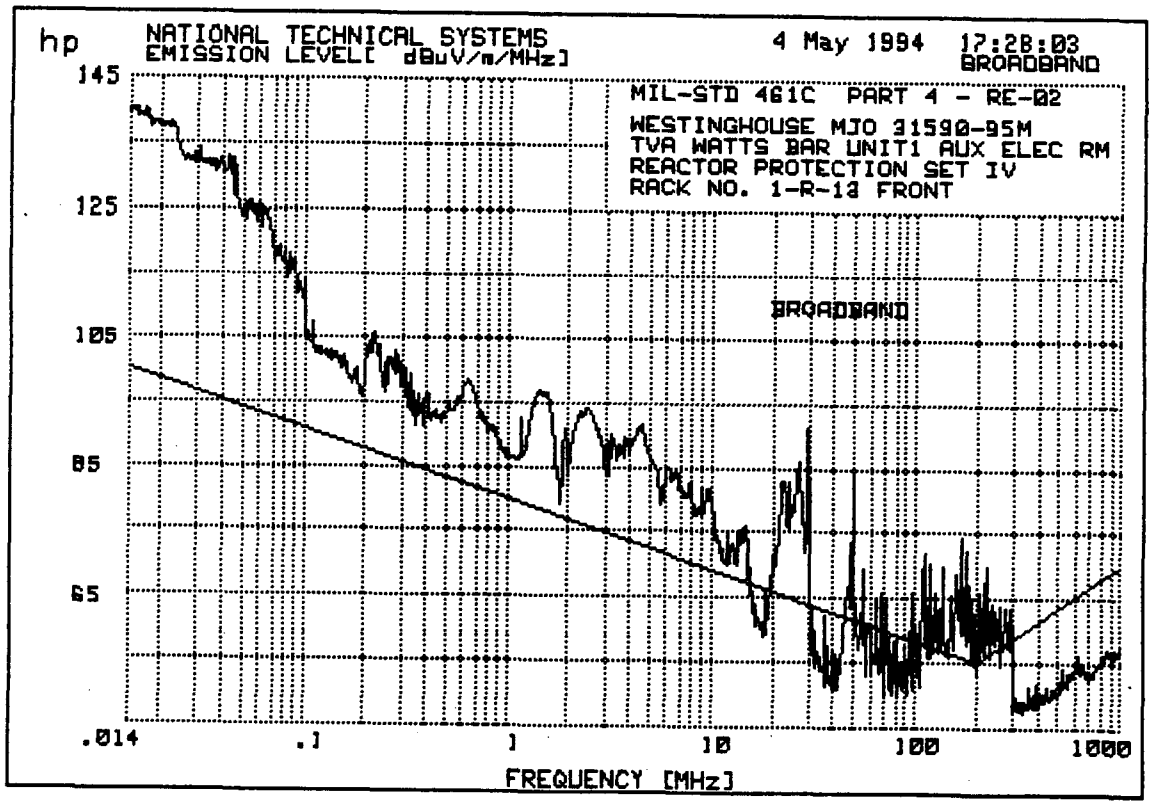

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m]
4 May 1994 17:49:04
NARROWBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET IV
RACK NO. 1-R-13 REAR
90
70
50
30
10
.014
.1
1
10
100
1000
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m/MHz]
4 May 1994 17:49:04
BROADBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET IV
RACK NO. 1-R-13 REAR
145
125
105
85
65
BROADBAND
.014
.1
1
10
100
1000
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m]
4 May 1994 17:39:33
NARROWBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET IV
RACK NO. 1-R-28 SIDE
90
70
50
30
10
.014
.1
1
10
100
1000
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m/MHz]
4 May 1994 17:39:33
BROADBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET IV
RACK NO. 1-R-28 SIDE
145
125
105
85
65
.014
.1
1
10
100
1000
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m]
4 May 1994 17:28:03
NARROWBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET IV
RACK NO. 1-R-13 FRONT
90
70
50
30
10
.014
.1
1
10
100
1000
FREQUENCY [MHz]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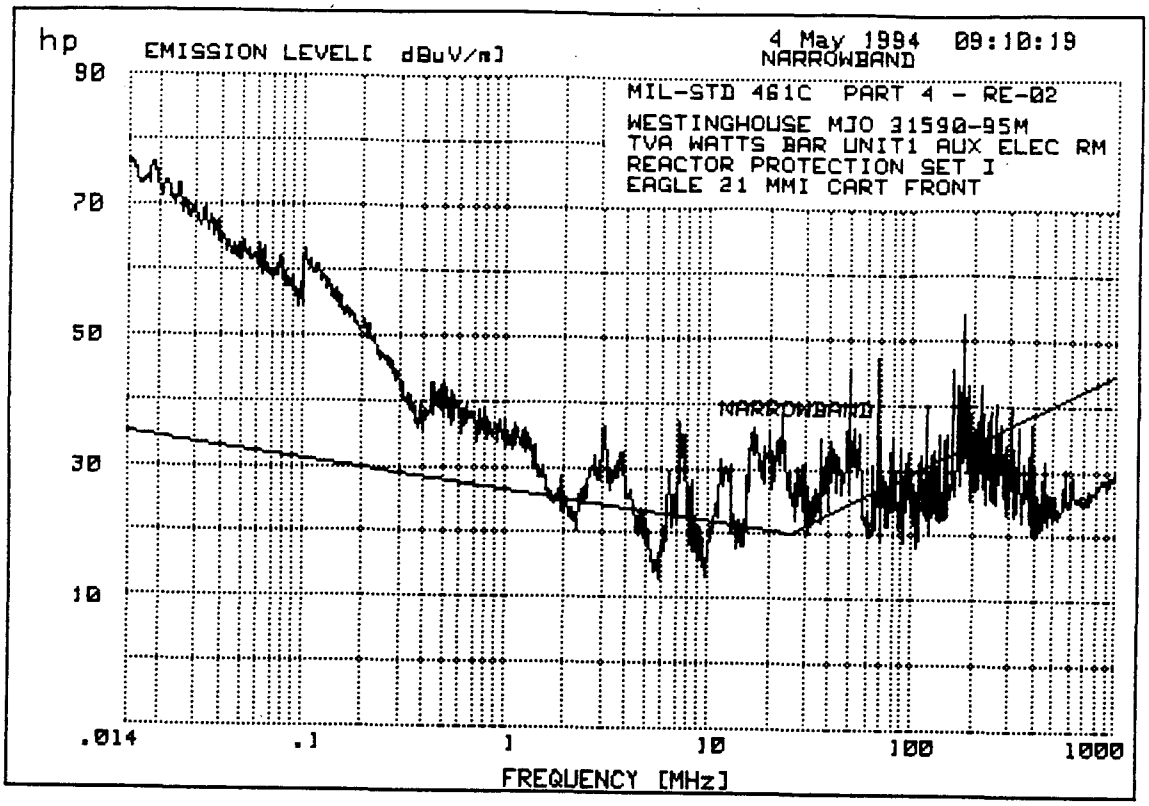
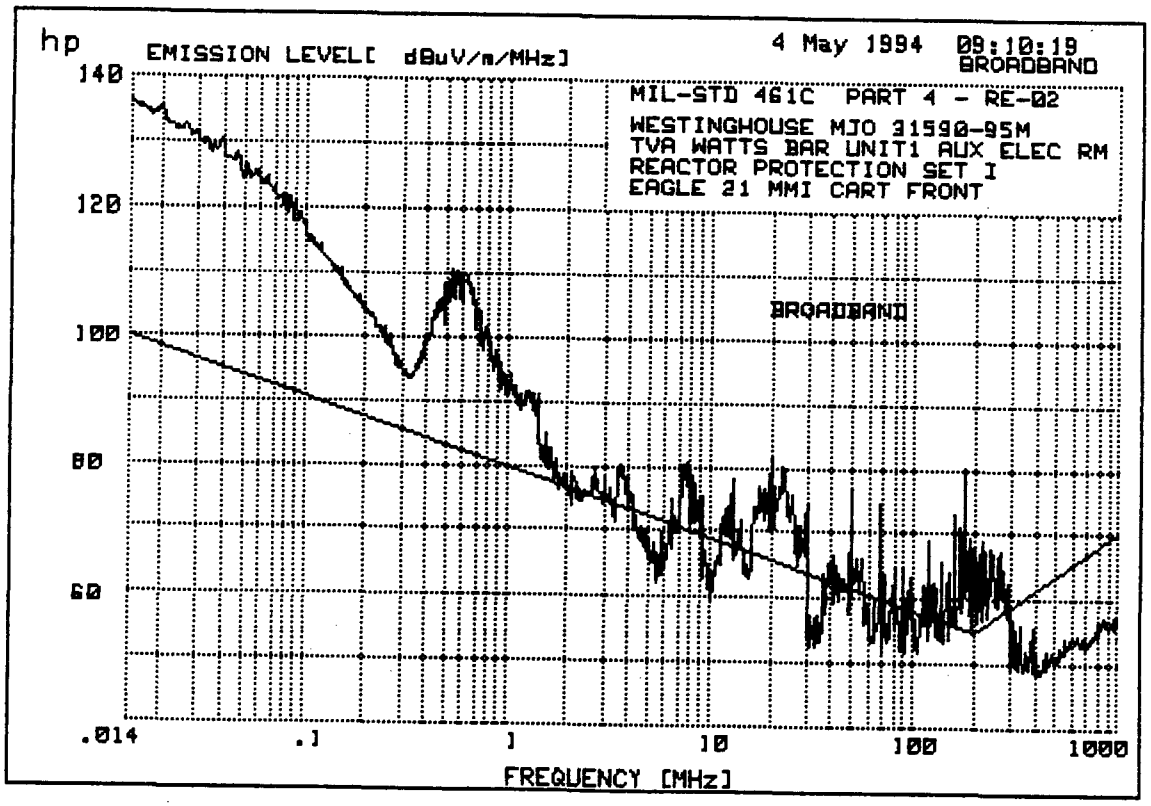
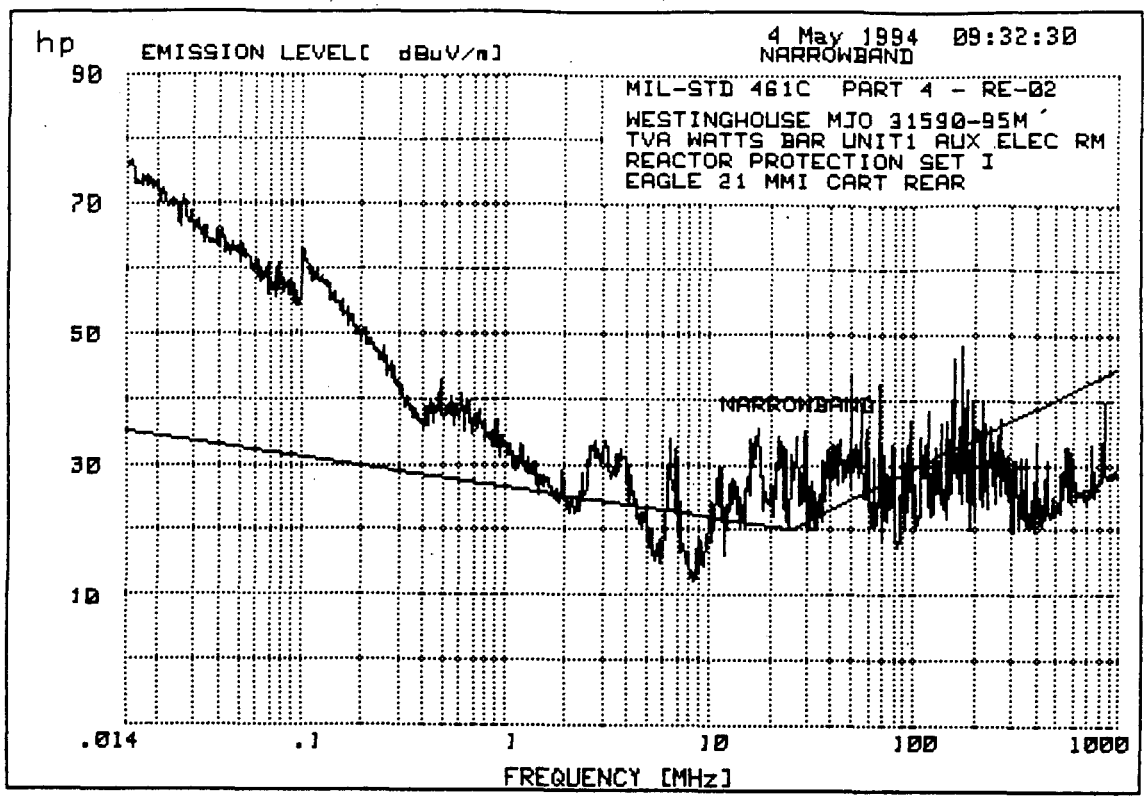
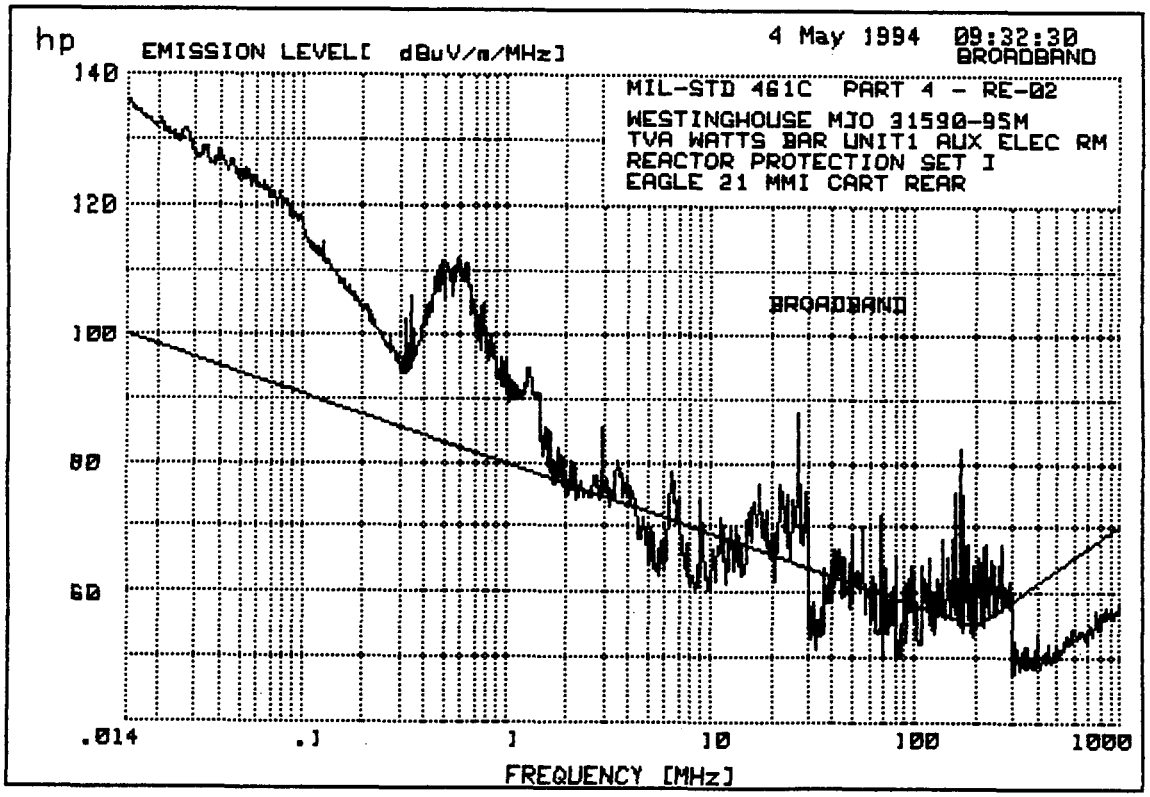
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m/MHz]
4 May 1994 17:28:03
BROADBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET IV
RACK NO. 1-R-13 FRONT
145
125
105
85
65
.014
.1
1
10
100
1000
FREQUENCY [MHz]


hp
EMISSION LEVEL[dBuV/m]
4 May 1994 09:10:19
NARROWBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET I
EAGLE 21 MMI CART FRONT
90
70
50
30
10
NARROWBAND
.014
.1
1
10
100
1000
FREQUENCY [MHz]


hp
EMISSION LEVEL[dBuV/m/MHz]
4 May 1994 09:10:19
BROADBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET I
EAGLE 21 MMI CART FRONT
140
120
100
80
60
BROADBAND
.014
.1
1
10
100
1000
FREQUENCY [MHz]


hp
EMISSION LEVEL[dBuV/m]
4 May 1994 09:32:30
NARROWBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET I
EAGLE 21 MMI CART REAR
NARROWBAND
90
70
50
30
10
.014
.1
1
10
100
1000
FREQUENCY [MHz]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EMISSION LEVEL[dBuV/m/MHz]
4 May 1994 09:32:30
BROADBAND
MIL-STD 461C PART 4 - RE-02
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
REACTOR PROTECTION SET I
EAGLE 21 MMI CART REAR
BROADBAND
140
120
100
80
60
.014
.1
1
10
100
1000
FREQUENCY [MHz]

6.0 TEST PROCEDURE (continued)

6.7 Radiated Emissions, Method RE02.1, Electric Field, Hand-held Radio Profile Requirements

Radiated emissions, from 162.025 to 173.7625 MHz, will be measured in accordance with the applicable portions of Test Method RE02 of MIL-STD-462. Reference Section 6.6, Test Setup.

Procedures

The Auxiliary Electric Equipment Room Environment was set up and operated as specified in Section 4.0 of this report. The radios were tested outside the Auxiliary Electric Equipment room, at each of their operating frequencies, in a continuous communication and keying communication mode of operation. The antennas used during the performance of this test were as follows:

Frequency	Antenna	Coaxial Cable
30 - 300 MHz	Biconical	25' of RG214/U

Measurements from 162.025 to 173.7625 MHz, were performed using the appropriate antenna with the corresponding coaxial cable connected to a Hewlett Packard Automated Microwave Measurement System, Model 8566S. The transmitting antenna axis orientation (hand-held radio) was changed through multiple axes with the radio outside the equipment room until a worst case level was detected. Other site specific radios and known sources of noise were "keyed" or activated as much as feasible. Plots were generated for narrow band measurements.

During testing for Protection Set III, the hand held radios were keyed from the opposite side of the closed double doors.

6.0 TEST PROCEDURE (continued)

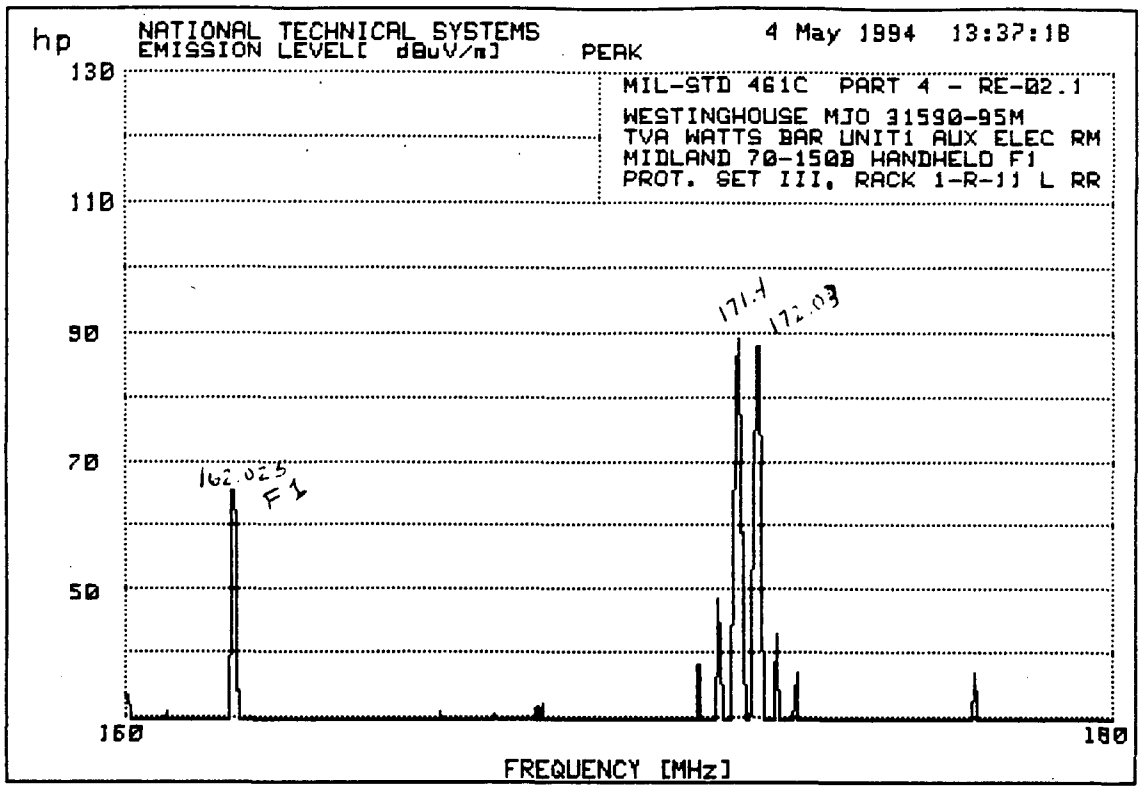
6.7 Radiated Emissions, Method RE02.1, Electric Field, Hand-held Radio Profile

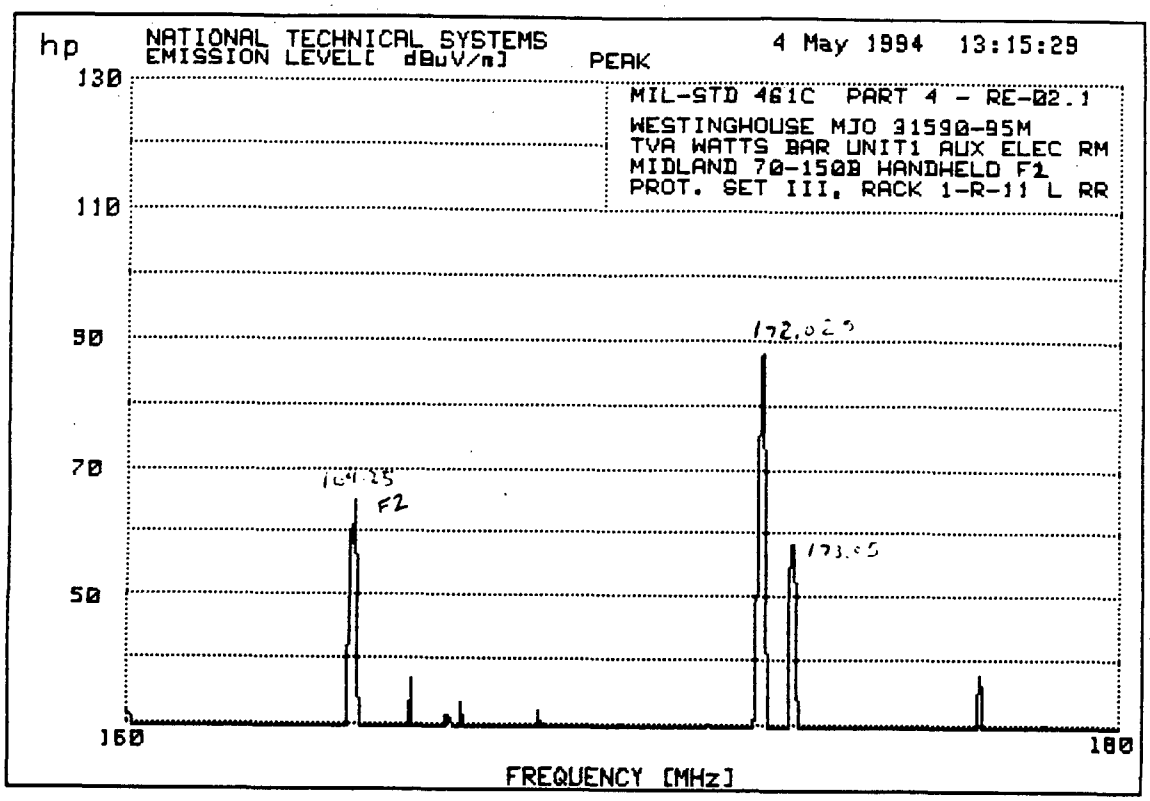
Requirements (continued)

During testing for Protection Set IV, the hand held radios were keyed from the opposite side of the stairwell door.

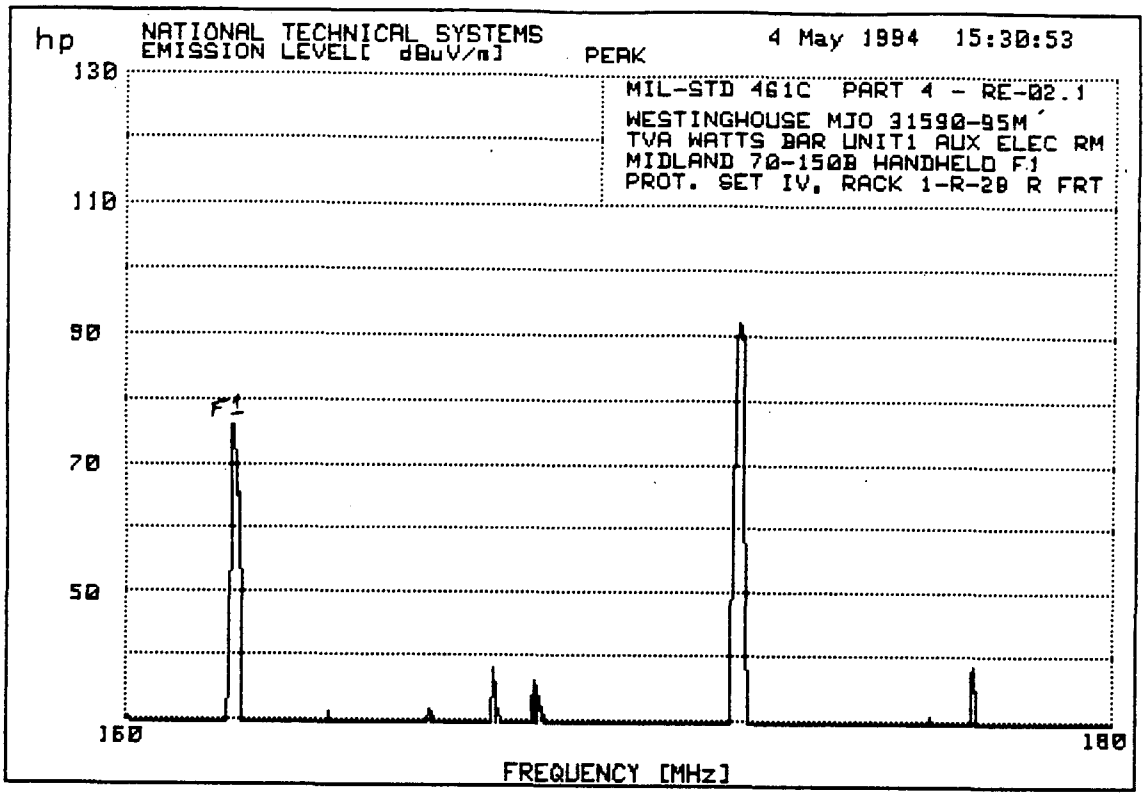
Sample Test Results

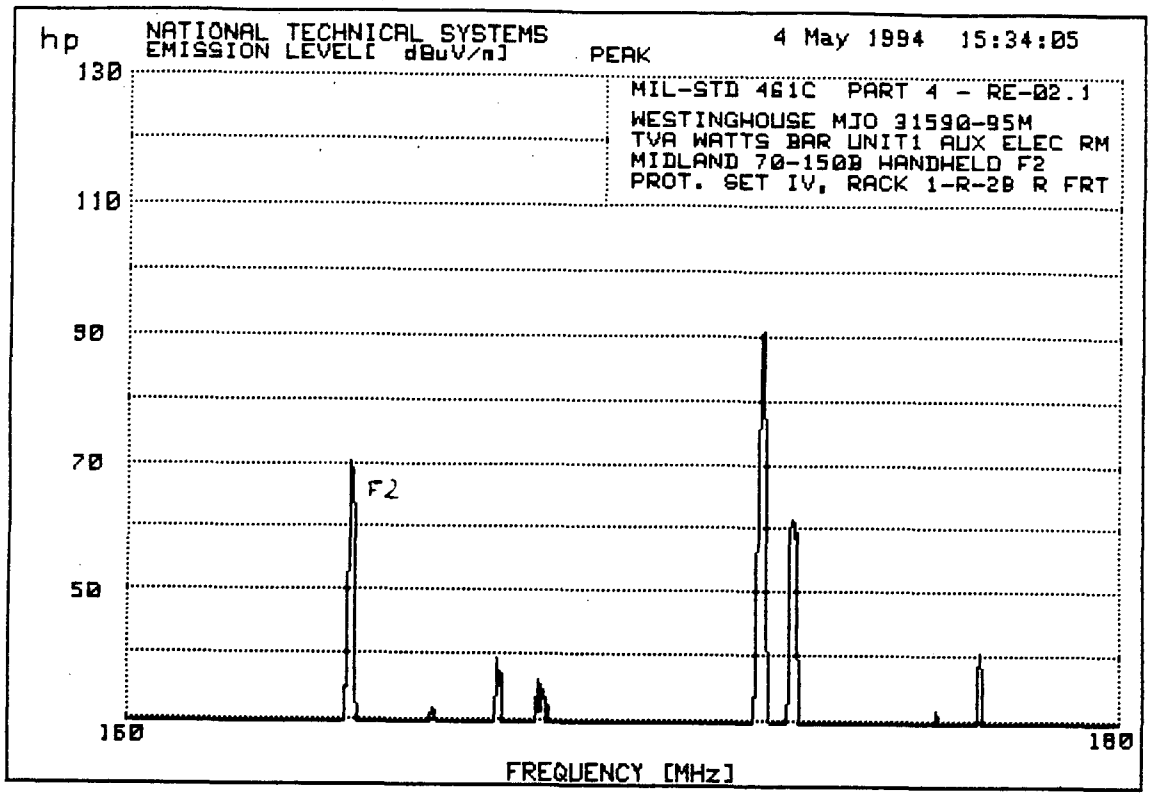
Test		Results
RE02.1	Radiated Emissions, Hand-Held Radio Profile	Westinghouse Electric Corporation will perform analysis for all tests.

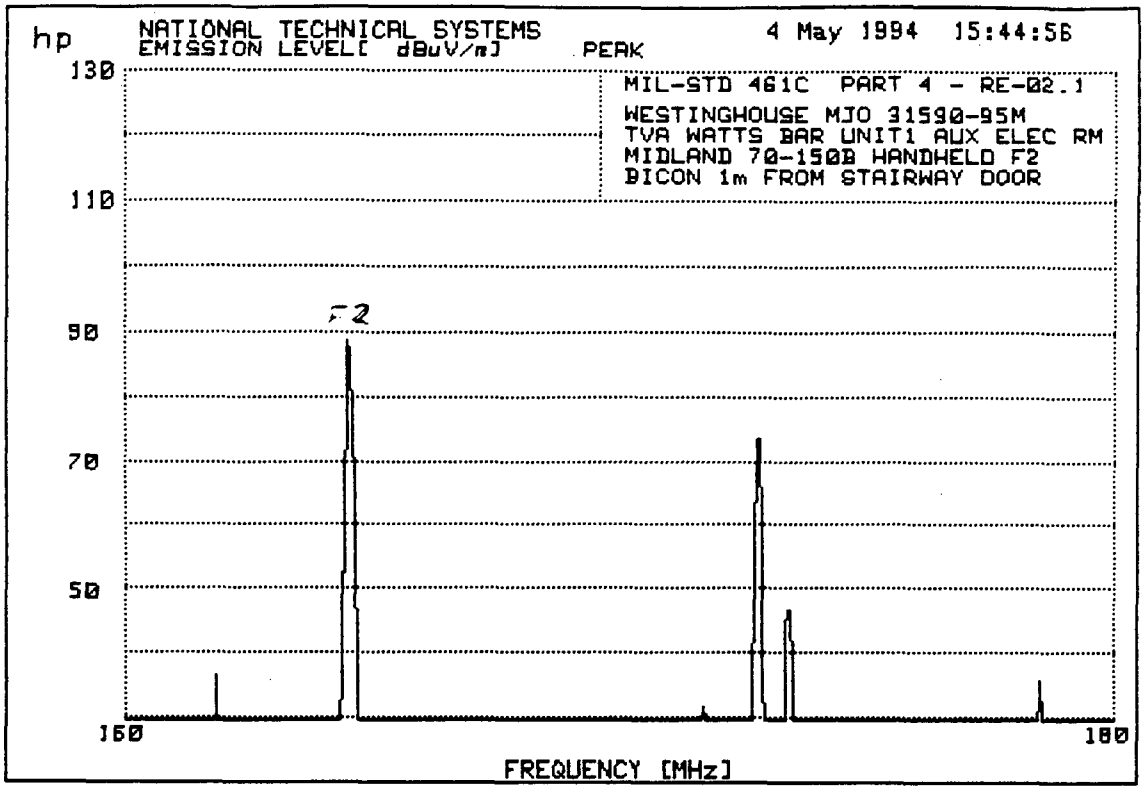

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m]
PEAK
4 May 1994 13:37:18
MIL-STD 461C PART 4 - RE-02.1
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
MIDLAND 70-150B HANDHELD F1
PROT. SET III, RACK 1-R-11 L RR
130
110
90
70
50
160
180
171.4
172.03
162.025
F1
FREQUENCY [MHz]

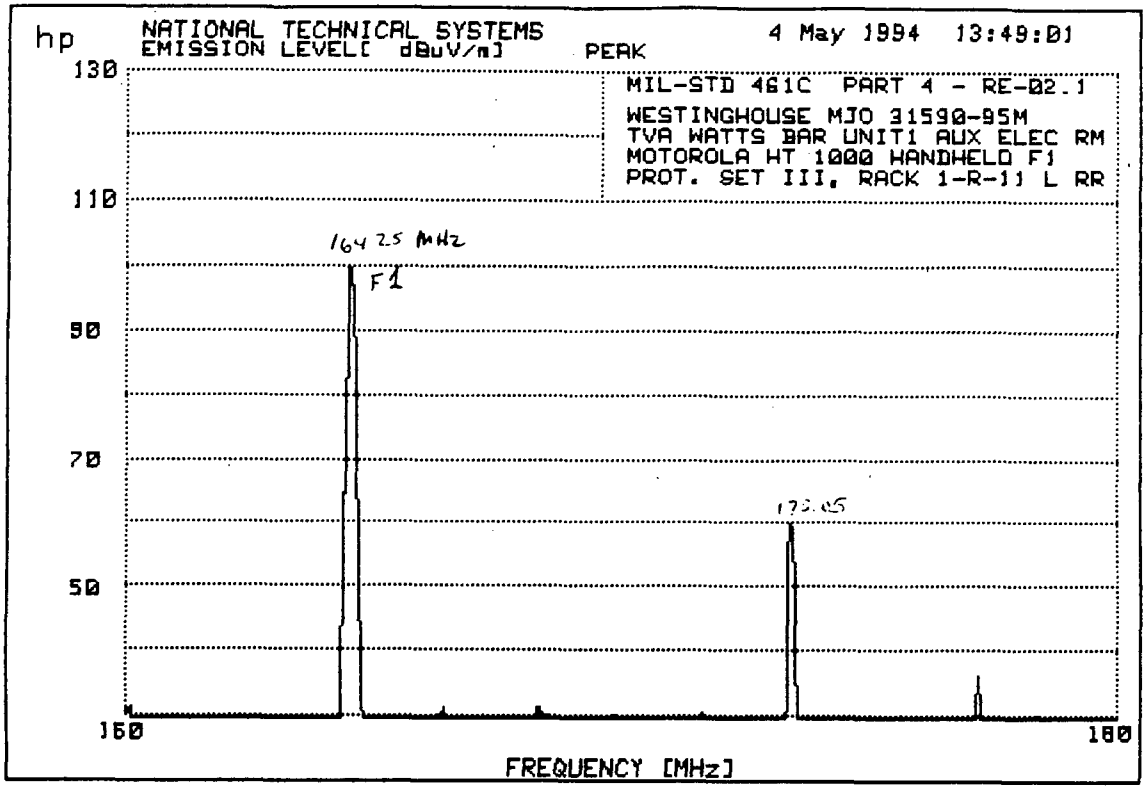

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m]
PEAK
4 May 1994 13:15:29
MIL-STD 461C PART 4 - RE-02.1
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
MIDLAND 70-150B HANDHELD F1
PROT. SET III, RACK 1-R-11 L RR
130
110
90
70
50
160
180
172.025
169.25
F2
173.05
FREQUENCY [MHz]

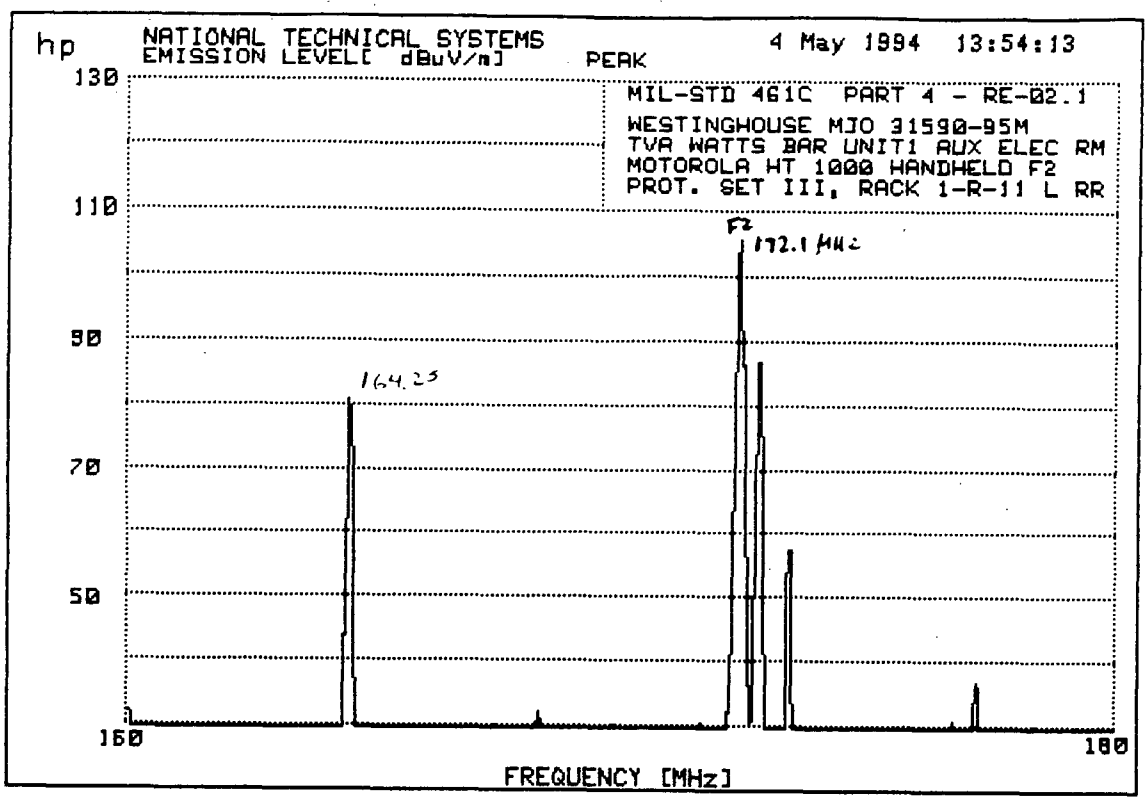
6 160

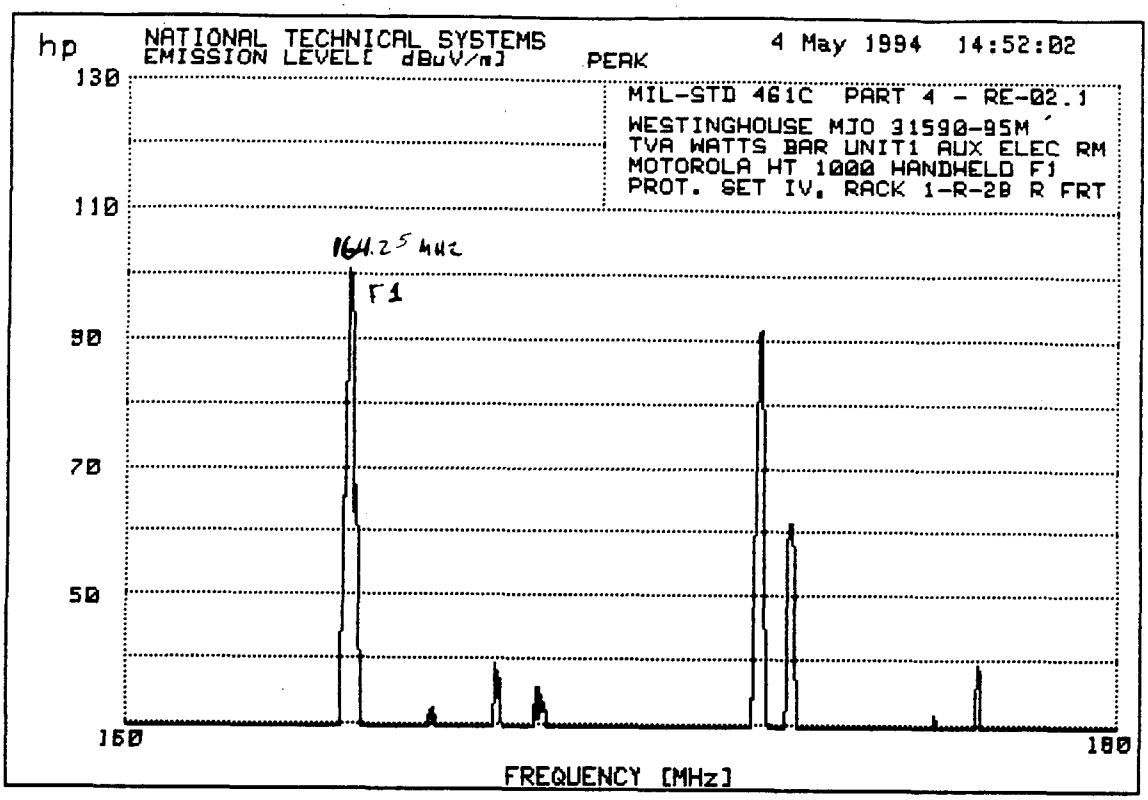

hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m]
PEAK
4 May 1994 15:30:53
MIL-STD 461C PART 4 - RE-02.1
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
MIDLAND 70-150B HANDHELD F1
PROT. SET IV, RACK 1-R-2B R FRT
130
110
90
70
50
F1
150
180
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m]
PEAK
4 May 1994 15:34:05
MIL-STD 461C PART 4 - RE-02.1
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
MIDLAND 70-150B HANDHELD F2
PROT. SET IV, RACK 1-R-2B R FRT
130
110
90
70
50
150
F2
180
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m]
PEAK
4 May 1994 15:44:56
MIL-STD 461C PART 4 - RE-02.1
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
MIDLAND 70-150B HANDHELD F2
BICON 1m FROM STAIRWAY DOOR
130
110
90
70
50
F2
150
180
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m]
PEAK
4 May 1994 13:49:01
MIL-STD 461C PART 4 - RE-02.1
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
MOTOROLA HT 1000 HANDHELD F1
PROT. SET III, RACK 1-R-11 L RR
130
110
90
70
50
164.25 MHz
F1
175.05
150
180
FREQUENCY [MHz]


hp
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m]
PEAK
4 May 1994 13:54:13
MIL-STD 461C PART 4 - RE-02.1
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
MOTOROLA HT 1000 HANDHELD F2
PROT. SET III, RACK 1-R-11 L RR
130
110
90
70
50
F2
172.1 MHz
164.25
160
180
FREQUENCY [MHz]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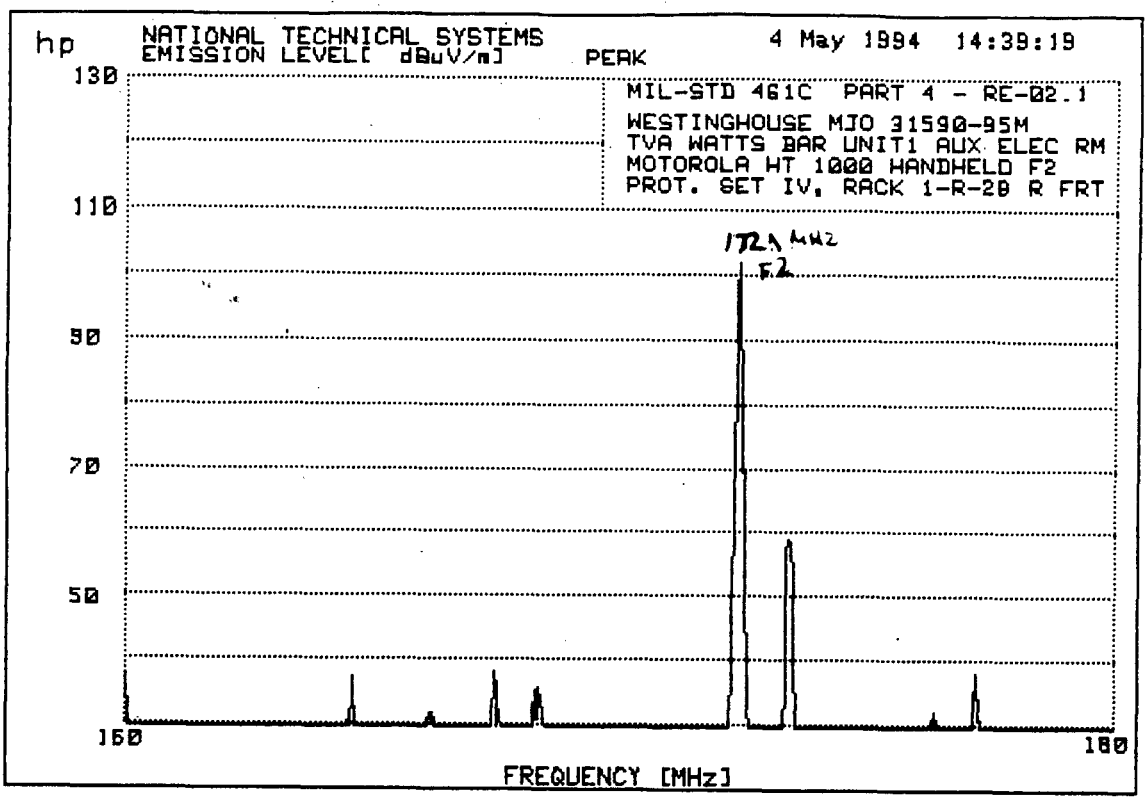
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m]
PEAK
4 May 1994 14:52:02
MIL-STD 461C PART 4 - RE-02.1
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
MOTOROLA HT 1000 HANDHELD F1
PROT. SET IV, RACK 1-R-28 R FRT
130
110
90
70
50
150
164.25 MHz
F1
180
FREQUENCY [MHz]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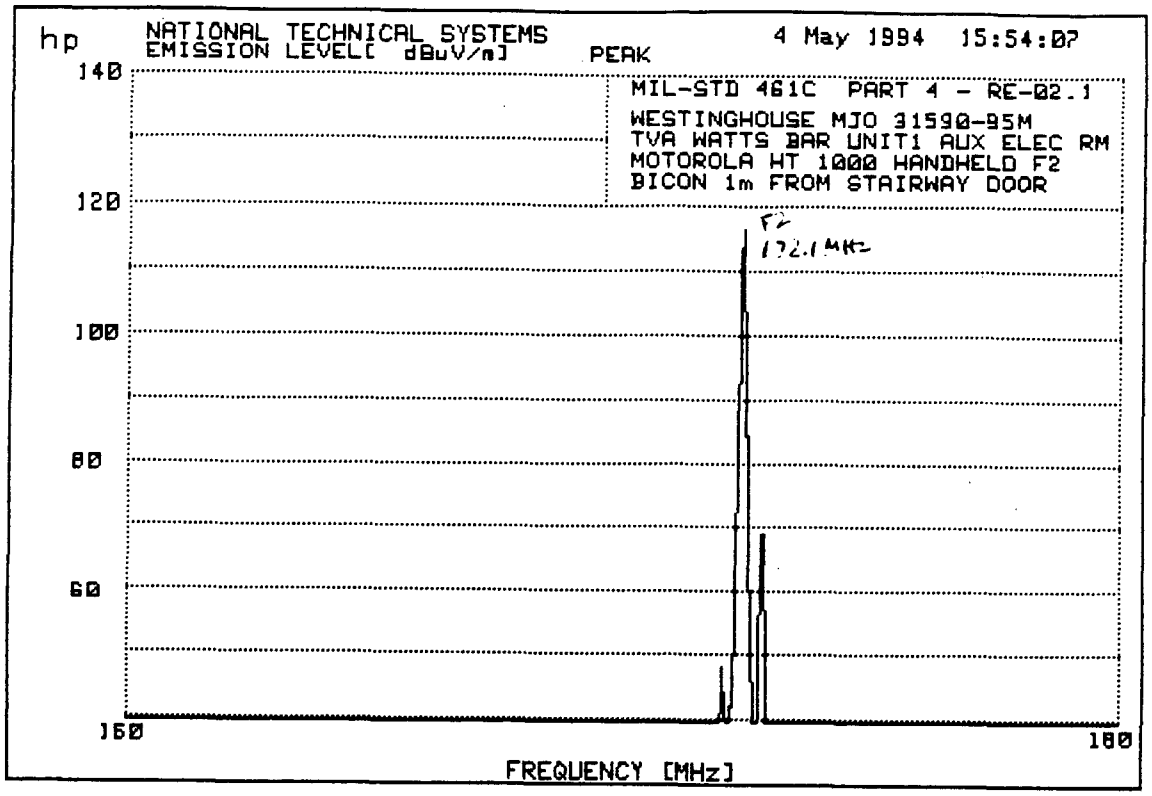
NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m]
PEAK
4 May 1994 14:39:19
MIL-STD 461C PART 4 - RE-02.1
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
MOTOROLA HT 1000 HANDHELD F2
PROT. SET IV, RACK 1-R-28 R FRT
130
110
90
70
50
150
172.1 MHz
F2
180
FREQUENCY [MHz]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NATIONAL TECHNICAL SYSTEMS
EMISSION LEVEL[dBuV/m]
PEAK
4 May 1994 15:54:07
MIL-STD 461C PART 4 - RE-02.1
WESTINGHOUSE MJO 31590-95M
TVA WATTS BAR UNIT1 AUX ELEC RM
MOTOROLA HT 1000 HANDHELD F2
BICON 1m FROM STAIRWAY DOOR
F2
172.1 MHz
140
120
100
80
60
160
180
FREQUENCY [MHz]

6 168
tnb

7.0 TEST EQUIPMENT LIST

The test equipment listed in Section 7.0 of this test report is the actual test equipment that was used during this test program. All test equipment was checked prior to testing to assure that it is within calibration, and it was allowed sufficient warm-up time to guarantee measurement accuracy.

Calibration is performed and checked on a routine basis in accordance with MIL-STD-45662A, using standards traceable to the National Institute of Standards and Technology (NIST).

LIST GENERATED ON : 05/31/94

NTS Equipment List
FOR MJO # 31590 -95M

INV #	DESCRIPTION	MANUFACTURER	MODEL #	SERIAL #	RANGE	ACCURACY	CAL FREQ (months)	CAL DUE DATE	CAL STATUS
ML371	DIGITAL MULTIMETER	FLUKE	75	34851569	0-1000VDC,0-750VAC,0-10A,	DCV:+/-(.5%RDG+	12	10/08/94	CAL
ML390	GAUSSMETER	MAGNETIC INST.	912	24525	10 mG TO 100 KG	DC:+/-(.4%RDG+	12	08/25/94	CAL
ML565	AC-DC CURRENT PROBE	FLUKE	Y8100	4165116	0-200 AMP	0-200 Hz:+/-2%	12	09/23/94	CAL
MW397	ATTENUATOR SET	WEINSCHEL	AS-6	4975	DC to 18 GHZ, 3,6,10,20,	3,6DB:+/-.3DB	6	08/25/94	CAL
WA331	CURRENT PROBE	STODDARD AIRCRAF	91550-1	785-103	10 KHZ TO 100 MHZ	N/A	12	06/17/94	CAL
WA453	CURRENT PROBE	ELECTROMETRICS	PCL-30	1460	9KHZ TO 110MHZ	N/A	12	11/30/94	CAL
WA454	CURRENT PROBE	ELECTROMETRICS	PCL-11	1123	20HZ TO 50KHZ	N/A	12	11/30/94	CAL
RENTAL EQUIPMENT USED									
RENTAL	S/A, E/R INV #400723A		HP8566B					02/10/95	CAL
RENTAL	RF P/S, E/R INV #502843D		HP85685A					01/05/95	CAL
RENTAL	DSO, GE INV. #01617794	TEK	TDS 520		500 MHZ			03/29/95	CAL
RENTAL	BICONICAL ANTENNA	A.H. SYSTEMS	456						
RENTAL	LOG PERIODIC ANTENNA	A.H. SYSTEMS	380						

CALIBRATION ABBREVIATIONS

UWCE - USE WITH CALIBRATED EQUIPMENT
CBU - CALIBRATE BEFORE USE
NQM - NOT USED FOR QUANTITATIVE MEASUREMENTS
CAL - CALIBRATED

8.0 ANTENNA/PROBE CORRECTION FACTORS

NATIONAL TECHNICAL SYSTEMS
TRANSDUCER TABLE
Transducer Title : EMC PCL-11 SN 1123/DUE 11/30/94
Sign of Trans. : PLUS
Freq Interpolat. : LOG
Number of Points : 9

Point	Frequency (MHz)	Trans Factor
1	2.E-5	55
2	.0001	43.2
3	.0005	32.5
4	.001	27
5	.005	13.8
6	.01	8.5
7	.02	4.3
8	.035	2.3
9	.05	1.5

NATIONAL TECHNICAL SYSTEMS
TRANSDUCER TABLE
Transducer Title : EMC PCL-30 SN 1460/DUE 11/30/94
Sign of Trans. : PLUS
Freq Interpolat. : LOG
Number of Points : 13

Point	Frequency (MHz)	Trans Factor
1	.01	23.1
2	.05	9.1
3	.1	2.7
4	.2	-2.7
5	.3	-5.3
6	.4	-7
7	.6	-9.2
8	1	-10.9
9	3	-12.4
10	10	-12.9
11	20	-13.7
12	50	-6.5
13	100	-5.6

NATIONAL TECHNICAL SYSTEMS
TRANSDUCER TABLE
Transducer Title : STODDARD 91550-1 DUE 6/21/94
Sign of Trans. : PLUS
Freq Interpolat. : LOG
Number of Points : 11

Point	Frequency (MHz)	Trans Factor
1	.01	17
2	.05	3.4
3	.1	-2.6
4	.2	-7.6
5	.3	-10.2
6	.4	-11.6
7	.6	-13
8	1	-14
9	3	-14.9
10	10	-15.9
11	100	-11.6

NATIONAL TECHNICAL SYSTEMS
TRANSDUCER TABLE
Transducer Title : RENTAL LOOP ANT S/N 587
Sign of Trans. : PLUS
Freq Interpolat. : LOG
Number of Points : 12

Point	Frequency (MHz)	Trans Factor
1	2.E-5	78.9
2	5.E-5	71.9
3	.0001	66.6
4	.0002	61.9
5	.0005	54.5
6	.001	49.4
7	.002	43.8
8	.005	36.6
9	.01	31.6
10	.02	26.7
11	.05	23.3
12	.1	22.9

NATIONAL TECHNICAL SYSTEMS
TRANSDUCER TABLE
Transducer Title : RENTAL ACTIVE ROD S/N 610
Sign of Trans. : PLUS
Freq Interpolat. : LOG
Number of Points : 8

Point	Frequency (MHz)	Trans Factor
1	.01	-.7
2	.02	-1.9
3	.05	-2.2
4	.5	-2.4
5	30	-2.3
6	40	-1.8
7	50	-1.2
8	60	-.6

NATIONAL TECHNICAL SYSTEMS
TRANSDUCER TABLE
Transducer Title : BICONICAL S/N 463
Sign of Trans. : PLUS
Freq Interpolat. : LOG
Number of Points : 35

Point	Frequency (MHz)	Trans Factor
1	20	13.6
2	25	14
3	30	13.9
4	35	14.4
5	40	13.7
6	45	13.6
7	50	12.9
8	60	10.7
9	70	10.1
10	80	9.8
11	90	10.3
12	100	10.2
13	110	10.9
14	120	11.4
15	130	11.5
16	140	12.1
17	150	12.5
18	160	12.9
19	170	13.7
20	180	14.2
21	190	15.2
22	200	15.8
23	210	17
24	220	17.7
25	230	18.4
26	240	19.2
27	250	19.6
28	260	19.5
29	270	20
30	280	20.8
31	290	20.6
32	300	22
33	310	22.6
34	320	23.5
35	330	25.2