

FCC CLASS B TEST REPORT

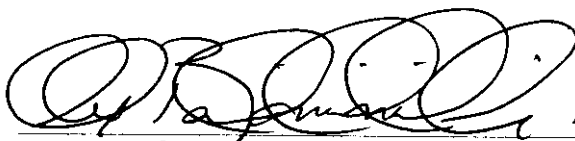
FOR THE

TRANSEND CORPORATION

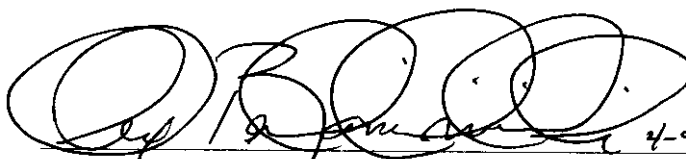
NR1100 NETROUTER

S/N: 222116

Prepared by:


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Performed by:

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Received: April 2, 1999

Completed: April 6, 1999

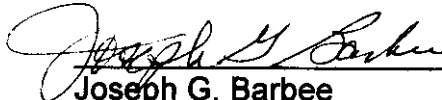
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CERTIFICATION

Rubicom Systems, Inc. certifies the information obtained in this report was performed consistent with the requirements of ANSI C63.4-1992. The Transend Corporation NR1100 NetRouter complies with the requirements of CFR 47 Part 15, Subpart B for Class B Digital devices.

This data was obtained while testing an NR1100 NetRouter furnished by Transend Corporation as described in Paragraph 1.3 of this document. Any modifications to the unit as tested may invalidate the data and void this certification.

 4/9/93

Joseph G. Barbee
President

ABSTRACT

This report presents test results of the emanations found emitting from a Transend NR1100 NetRouter (s/n: 222116) and the comparison of these emissions to the requirements of the FCC, Title 47, Part 15, Subpart B for Class B Digital devices. The NR1100 NetRouter is referenced in this document as the NetRouter.

This testing was performed on a 3-meter open field test site at Rubicom Systems, Inc. (RSI). The testing was performed for Transend Corporation under a verbal purchase order and is on file at RSI under JA Number 1637. The results of this test effort demonstrate compliance of the NetRouter to the FCC, Title 47, Part 15, Subpart B, Class B Digital devices. The NetRouter is an "add-on" device for installation with a host computer.

1.0 INTRODUCTION

1.1 Purpose

The purpose of this report is to show compliance of the NetRouter to the requirements for Class B digital devices.

1.2 Requirements

The test requirements for FCC Class B digital devices are as follows:

CONDUCTED

<u>Freq. (MHZ)</u>	<u>μVolts</u>	<u>dB>μV</u>
.450-30MHz	250	48

RADIATED

<u>Freq. (MHZ)</u>	<u>Distance Meters</u>	<u>Field Strength μV/M</u>	<u>20 Log 3 Meter dBμV/M</u>
30 - 88	3	100	40.0
88 - 216	3	150	43.5
216 - 960	3	200	46.0
960 - Above	3	500	54.0

1.3 Unit Under Test Description

The NetRouter NR1100 is a small Internet access router with a 10Mbps Ethernet LAN port and an RS-232 sync/async WAN port.

The WAN port in the NR1100 is a RS-232 interface with DTE personality that can operate in asynchronous mode or in synchronous mode (with external clock). This port can work with speeds up to 230 kbps in async. mode and speeds up to 128 kbits in sync. mode (in async. it will attend hardware flow control pins CTS/RTS).

This port can work in dial up async. lines through the dial out service or directly in sync. or async. dedicated lines.

1.4 Summary of Results

Power line conducted data is presented in Figures 6.1-1 and 6.1-2. No failures were experienced during the conducted testing. No modifications were required throughout this test effort. The conducted measurements were performed on the host computer power with the modem installed.

The electric field data presented in Figures 6.2.2-1 through 6.2.2-6 provide in graphic form, the levels of signals emanating from the EUT with respect to the appropriate limit. Each division of the amplitude scale (Y-Axis) of the data sheet is equal to 5dB. The EUT is compliant to the radiated requirements of FCC, Title 47, Part 15, Subpart B for Class B digital devices. All signals are below the Class B limit.

Paragraph 6.2 contains the tabular listing of frequencies where the levels are within 10dB of the requirements.

There was two modifications required for compliance. A signal at 442MHz exceeded the Class B limits. A ferrite block was installed on the power cord. In addition a 470pf disc capacitor was added from the positive side of the power connector to the chassis of the same connector. The level was reduced to 4dB below the requirement.

2.0 APPLICABLE DOCUMENTS

The following documents form a part of this report to the extent expressed herein:

FCC Code of Federal Regulations Title 47, Part 15,

FCC Procedure for Measuring RF Emissions from Computing
Devices FCC/OET MP-4, July 1987

ANSI C63.4-1992

FCC Characteristics of Open Field Test Sites Bulletin
OET 55, October 1989

3.0 TEST SITE DESCRIPTION

This testing was performed at Rubicom Systems, Inc. 3-meter test site. The description of the measurement facility was found to be compliant with the requirements of Section 2.948 of the FCC Rules. A copy of the compliance letter is attached to this report as Appendix A.

3.1 Environmental Conditions

Environmental conditions during testing of the EUT were as follows:

Date: April 5, 1999

Date: April 6, 1999

Temperature: 84°F

Temperature: 73°F

Barometer: 29.55 inches

Barometer: 29.40 inches

Humidity: 60%

Humidity: 68%

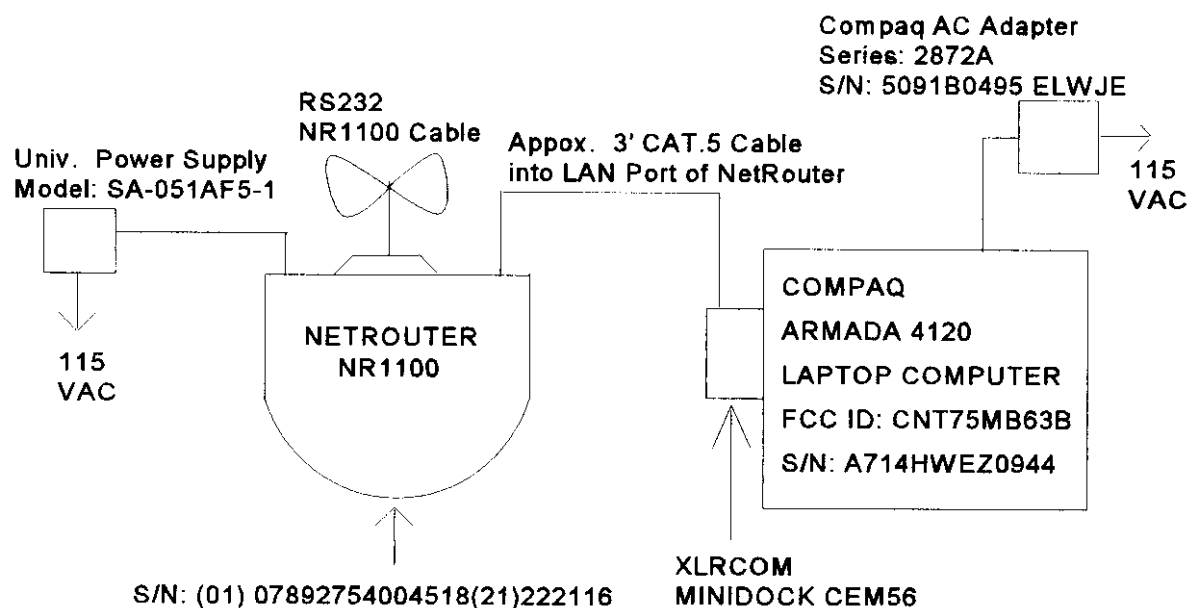
4.0 TEST INSTRUMENTATION

The following test equipment was used to perform this testing.

<u>Qty.</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Model No.</u>	<u>Last Cal.</u>	<u>Cal Cycle</u>
1	Spectrum Analyzer	Advantest	R3271	09/09/98	1 yr
1	Power Line Stab. Network	Solar Elect.	8012-50-5-24-BNC	NCR	
1	Plotter	Hewlett Packard	7440A	NCR	
1	BiLog Antenna	Chase	CLB6111B	07/24/98	1 yr

5.0 TEST SAMPLE SETUP AND CONFIGURATIONS

The EUT was placed on a nonconductive 80cm high manual turntable. The unit was configured in the following manner.



Testing was performed on a production unit supplied by Transend Corporation. Modifications were required on the power cord and input lead. The power cord connected to the NetRouter allowed radiation above the Class B limits. A ferrite block was added to the cable within 3 inches of the power cord connector. The ferrite block was a Fair-Rite p/n: 28A2025-OAO. A 470pf capacitor was added from the positive line to the connector chassis.

The test setup for conducted data is shown in Photo 1.

The test setup for radiated data is shown in Photo 2.

6.0 PROCEDURES AND RESULTS

6.1 Power Line Conducted

The unit was tested in the shielded enclosure using the Solar Model 8012-50-R-24-BNC PLISN (50 μ H/50ohm). Both the phase and neutral leads were tested as can be seen in the conducted data sheets Figures 6.1-1 and 6.1-2. Any signals measured within 10dB of the requirement are listed below.

Frequency MHZ	Line	Measured (dB μ V)	Limit (dB μ V)	Margin (dB)
790KHz	Phase	43	48	-5
790KHz	Neutral	46	48	-2

6.2 Radiated Emissions

The following procedures are used to the extent required to ensure that all significant signals emanating from the EUT are identified in frequency and amplitude. These procedures are used for electric field emissions due to the high ambients. The following is the tabular listing of signals emitting from the modem within 10dB of the requirement

Frequency (MHZ)	Antenna Pol.	Elevation	Azimuth	Measured (dB μ V/m)	Q.P. Limit (dB μ V/m @ 3 Meters)	Margin (dB)
75MHz	H	1.75M	180°	30.0	40.0	-10.0
80MHz	H	1.75M	180°	32.5	40.0	-7.5
442MHz	H	2.5M	247°	36.0	46.0	-10.0
442MHz	V	2.5M	247°	39.0	46.0	-7.0
553MHz	H	1.5M	225°	43.0	46.0	-3.0
553MHz	V	1.25M	247°	41.25	46.0	-4.75

6.2.1 Pretest

An initial pretest for electric field signals is performed inside a shielded room to identify frequencies emanating from the EUT without the test site ambient interference. This data is presented in Figures 6.2.1-1 through 6.2.1-6.

6.2.2 Official Quasi-Peak Scans

This testing involves maximizing the radiated emissions for peak amplitude levels in antenna height and equipment under test azimuth. This peaking is performed using the frequencies noted during pretest. The maximized height and azimuth are noted on each frequency band. The maximization is performed for each polarization and frequency band. This data is presented in Figures 6.2.2-1 through 6.2.2-6. If required, the following paragraphs are performed to assist in determining the true signals from the EUT. EUT signals are identified on the graph by circles and a number above the signal. Each signal identified as being from the EUT is maximized in elevation and azimuth. Example; a signal at 65MHz is 5dB below the specification and would be noted as: 65-5.

6.2.3 Peak Ambient (EUT Off/Support Equipment "On")

This paragraph is Quasi-peak plots of the ambient for the purpose of allowing for normalization and to allow viewing the emission without the ambients. Data is presented in Figures 6.2.3-1 through 6.2.3-6 of the environmental ambient.

6.2.4 Normalized Ambient (EUT Off/Support "On")

This data shows the normalized ambient with the EUT in the "off" state and support equipment (if applicable) turned on. The new signals are identified as being from

the support equipment.

6.2.5 Normalized EUT Scan (EUT and Support "On")

This data is performed to show the new signals generated above the environmental ambient. The delta signals found in these scans can be attributed to the EUT. This information is used to identify the signals in the plot of Paragraph 6.2.2.

6.2.6 High Ambient Investigation

In the 85MHz to 110MHz range the analyzer is used in the normalized mode to subtract out the ambient signals for a better resolution of the high ambient frequency band.



TEST: FCC CONDUCTED	EUT: TRANSEND NR1100 NETROUTER	S/N: 222116
FREQ: 450K-30MHz	SPEC: CFR 15.249	ANT.HT/POL: N/A
DETECTOR: PEAK	LINE UNDER TEST: PHASE	EUT POSITION: FRONT
DATE: 4-5-99	TEST SITE: ROOM 1	TESTER: <i>AB</i>

FCC ID: MZNNTR1100

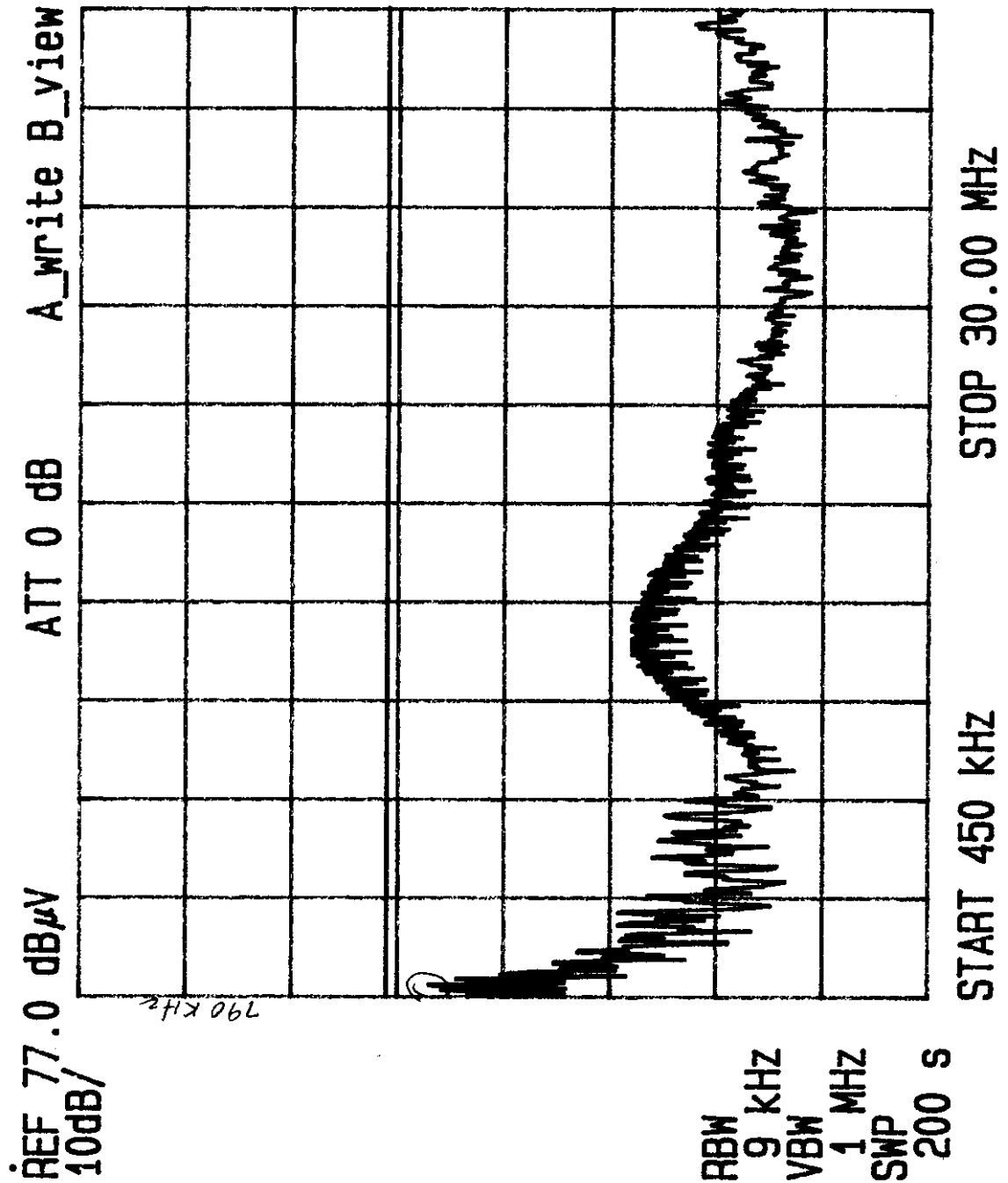


FIGURE 6.1-1



TEST: FCC CONDUCTED	EUT: TRANSEND NR1100 NETROUTER	S/N: 222116
FREQ: 450K-30MHZ	SPEC: CFR 15.249	ANT.HT/POL: N/A
DETECTOR: PEAK	LINE UNDER TEST: NEUTRAL	EUT POSITION: FRONT
DATE: 4-5-99	TEST SITE: ROOM 1	TESTER: [Signature]

FCC ID: MZNNTRTR1100

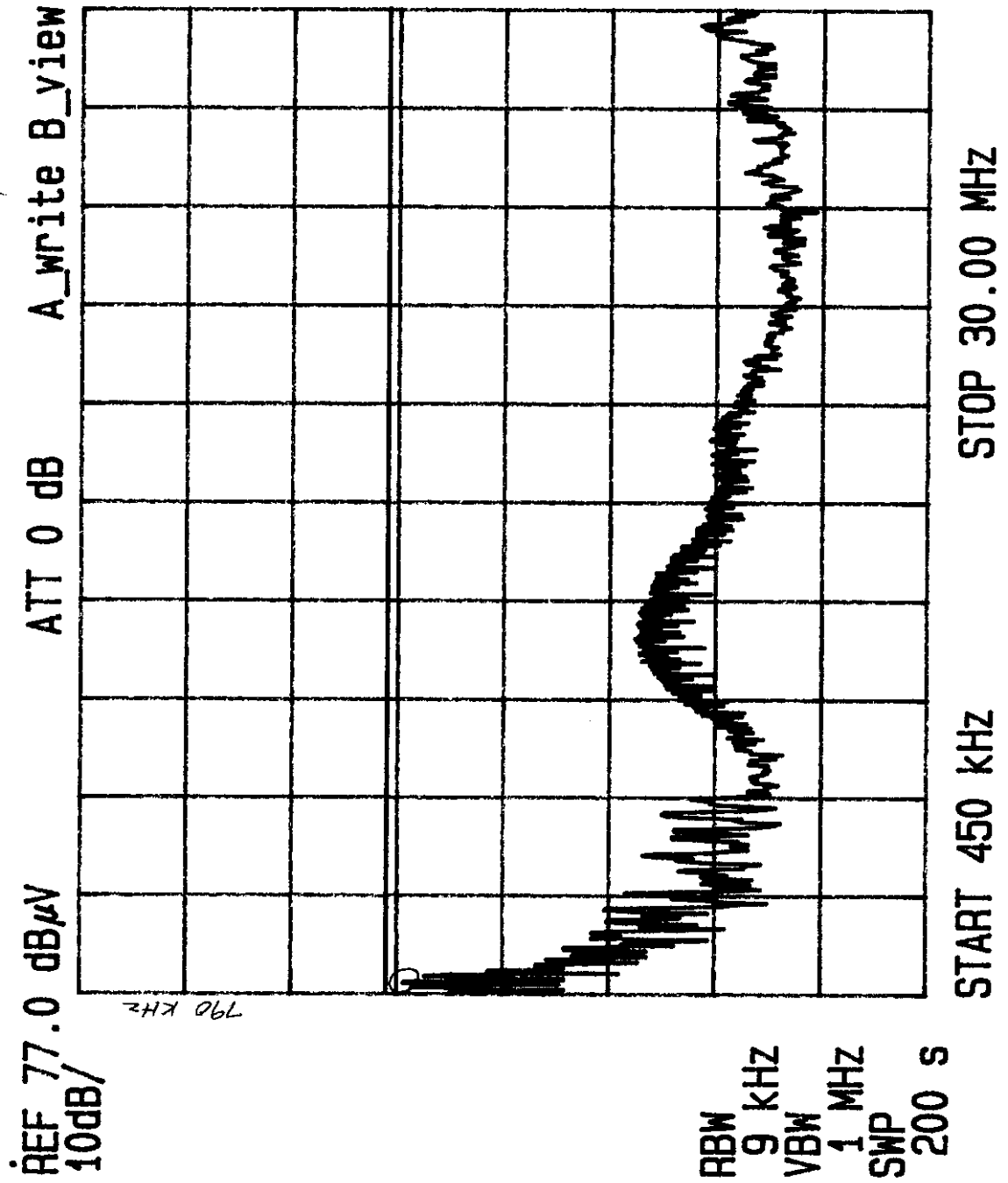


FIGURE 6.1-2



TEST: FCC RADIATED EUT: TRANSEND NR1100 NETROUTER S/N: 222116
FREQ: 30M-100MHz SPEC: CFR 15.249 ANT.HT/POL: 1M/ H
DETECTOR: PEAK LINE UNDER TEST: N/A EUT POSITION: FRONT
DATE: 4-5-99 TEST SITE: ROOM 1 TESTER: *AB*

FCC ID: MZNNTRTR1100

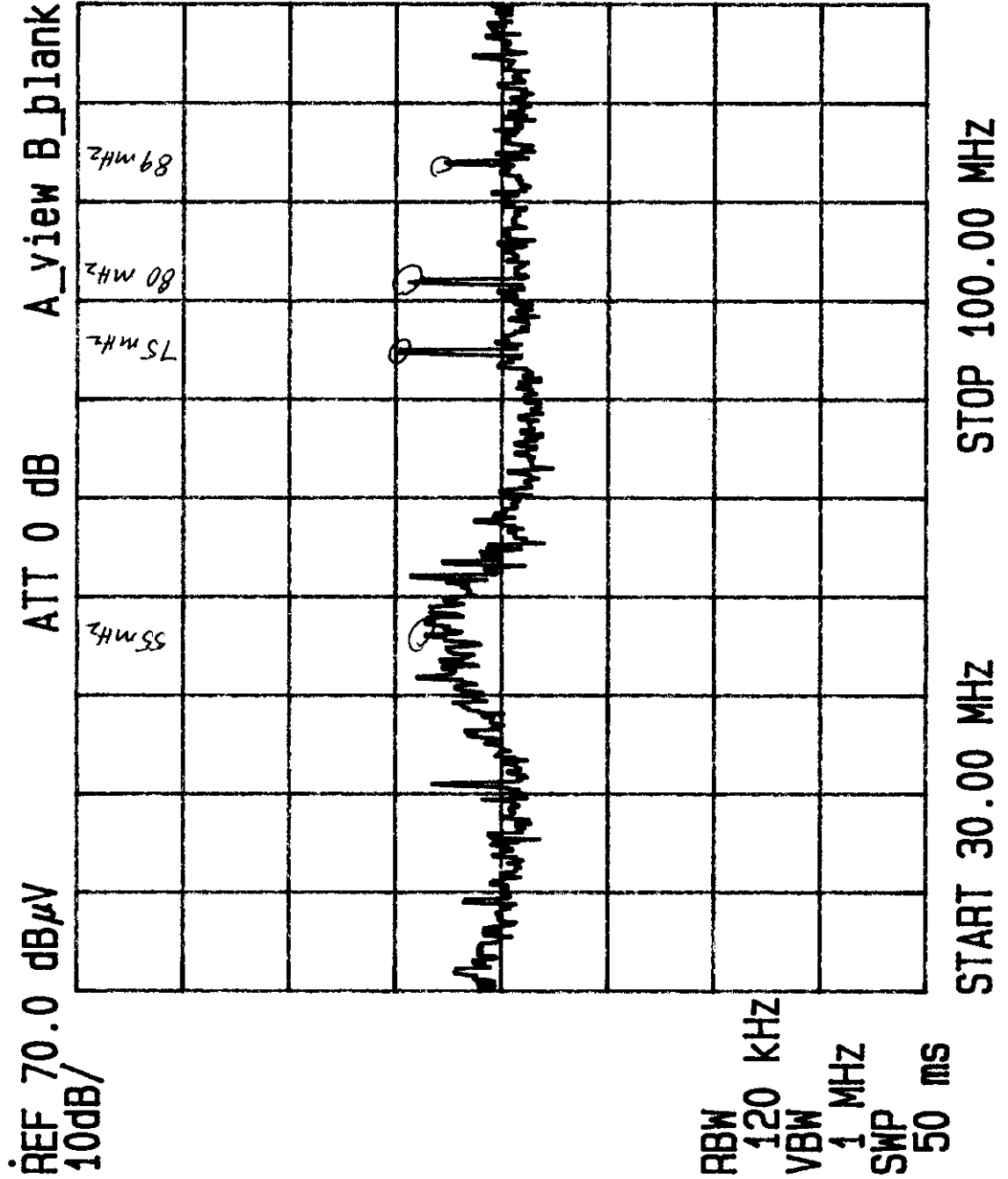


FIGURE 6.2.1-1



TEST: FCC RADIATED EUT: TRANSEND NR1100 NETROUTER S/N: 222116
 FREQ: 30M-100MHZ SPEC: CFR 15.249 ANT.HT/POL: 1M/ V
 DETECTOR: PEAK LINE UNDER TEST: N/A EUT POSITION: FRONT
 DATE: 4-5-99 TEST SITE: ROOM 1 TESTER: *AB*

FCC ID: MZNNTR1100

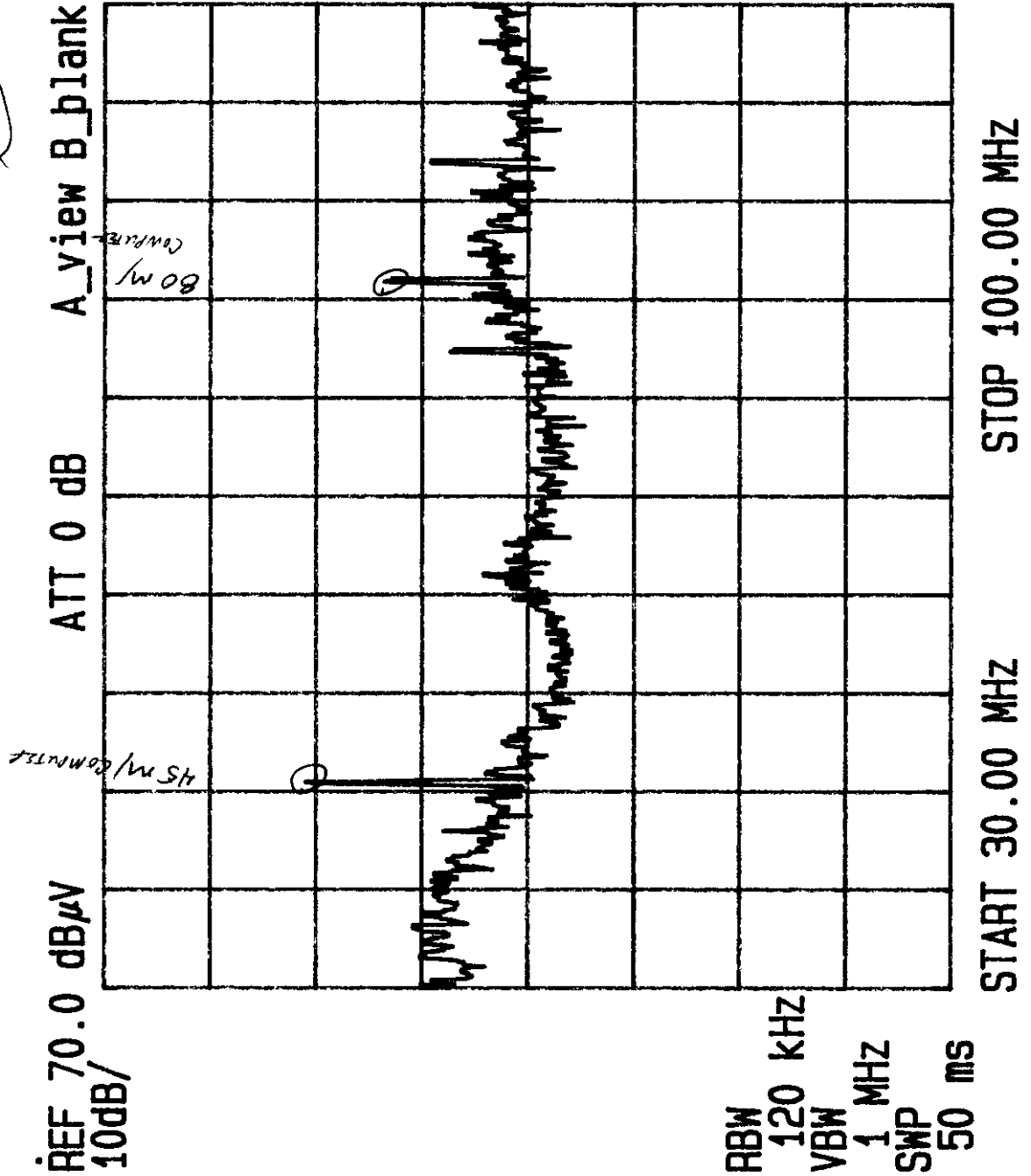


FIGURE 6.2.1-2



TEST: FCC RADIATED EUT: TRANSEND NR1100 NETROUTER S/N: 222116
FREQ: 100M-200MHZ SPEC: CFR 15.249 ANT.HT/POL: 1M/ H
DETECTOR: PEAK LINE UNDER TEST: N/A EUT POSITION: FRONT
DATE: 4-5-99 TEST SITE: ROOM 1 TESTER: *AB*

FCC ID: MZNNTRTR1100

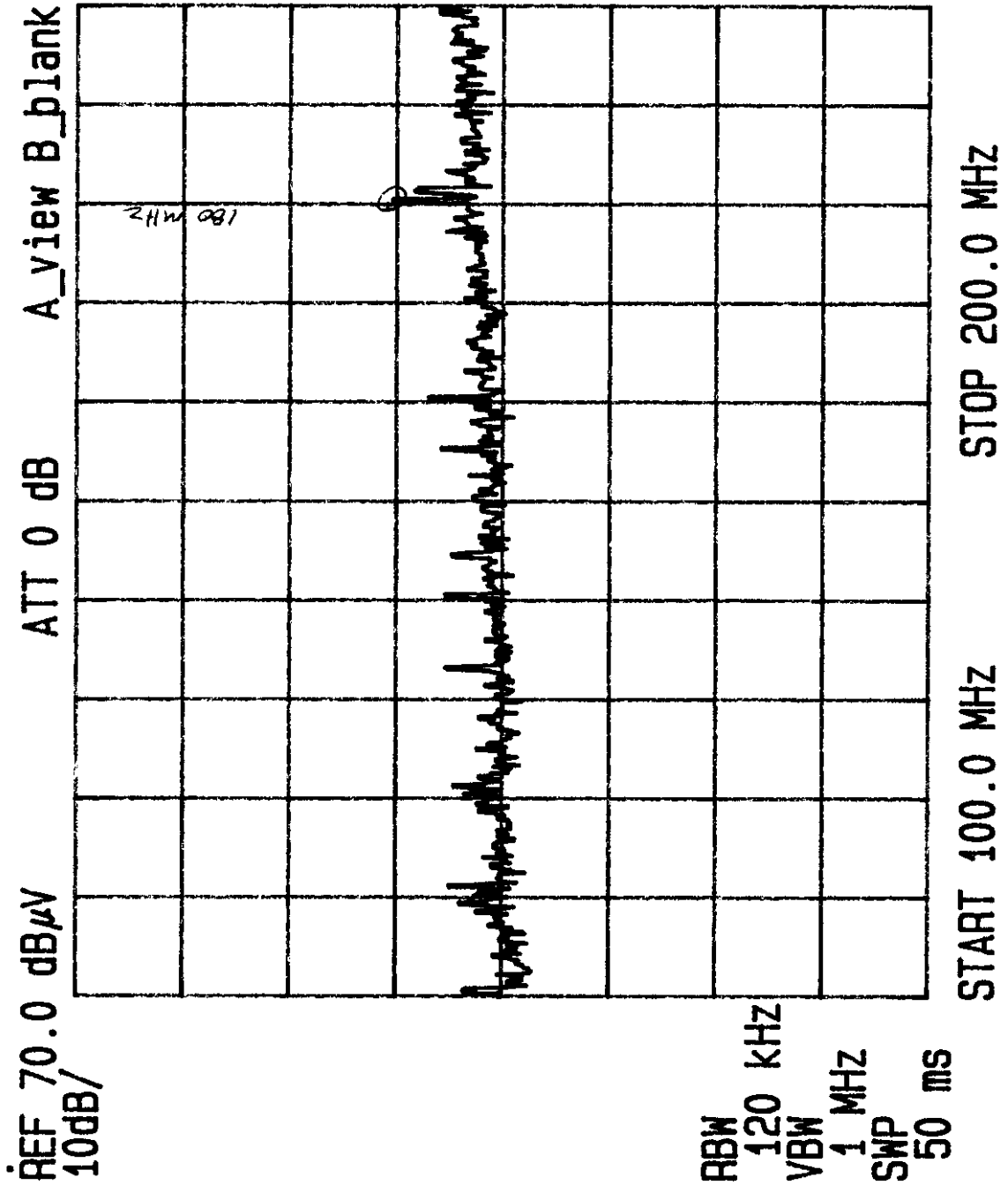


FIGURE 6.2.1-3



TEST: FCC RADIATED EUT: TRANSEND NR1100 NETROUTER S/N: 222116
FREQ: 100M-200MHZ SPEC: CFR 15.249 ANT.HT/POL: 1M/ V
DETECTOR: PEAK LINE UNDER TEST: N/A EUT POSITION: FRONT
DATE: 4-5-99 TEST SITE: ROOM 1 TESTER: *AB*

FCC ID: MZNNTR1100

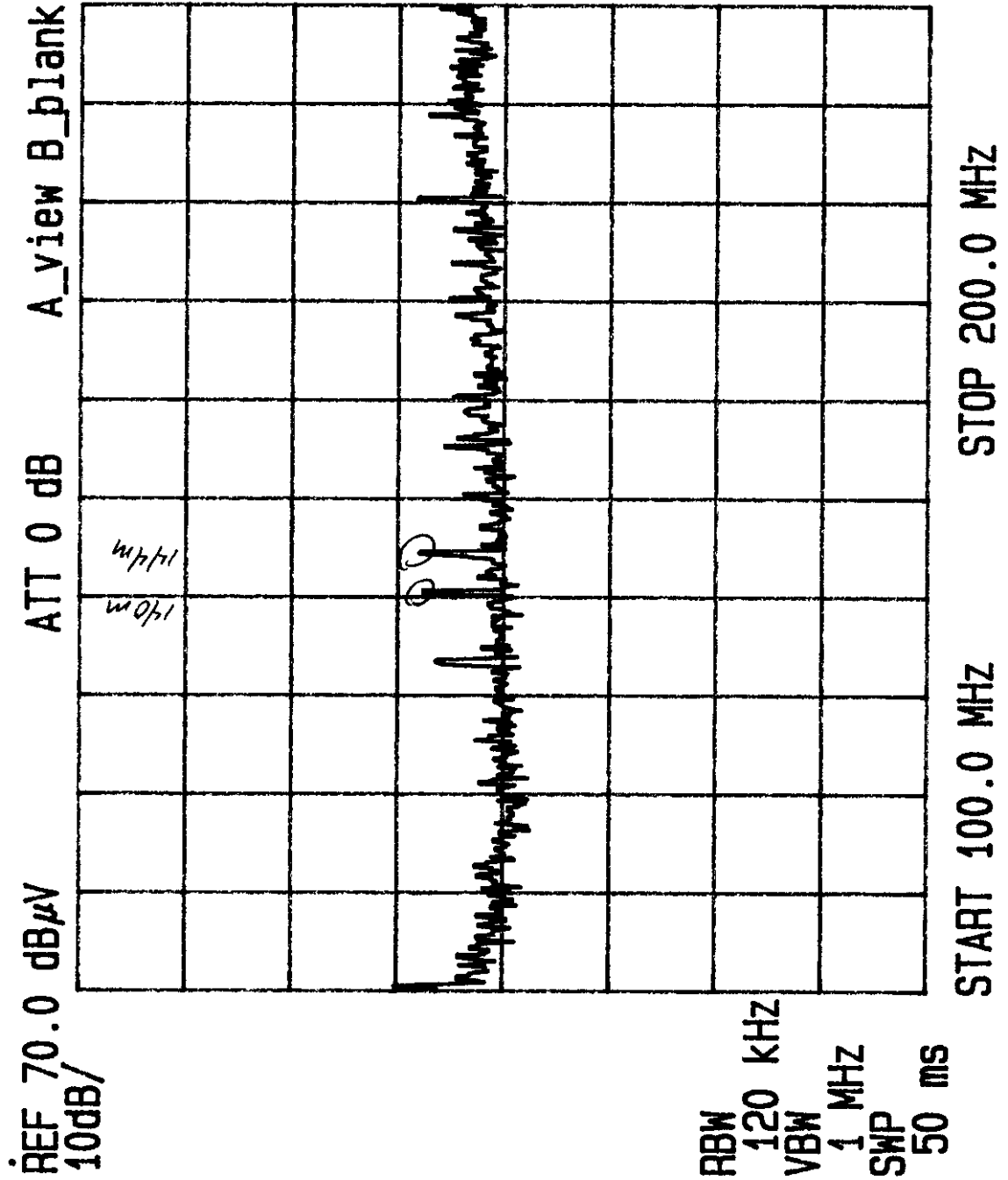


FIGURE 6.2.1-4



TEST: FCC RADIATED EUT: TRANSEND NR1100 NETROUTER S/N: 222116
FREQ: 200M-1GHZ SPEC: CFR 15.249 ANT.HT/POL: 1M/ H
DETECTOR: PEAK LINE UNDER TEST: N/A EUT POSITION: FRONT
DATE: 4-5-99 TEST SITE: ROOM 1 TESTER: *[Signature]*

FCC ID: MZNNTR1100

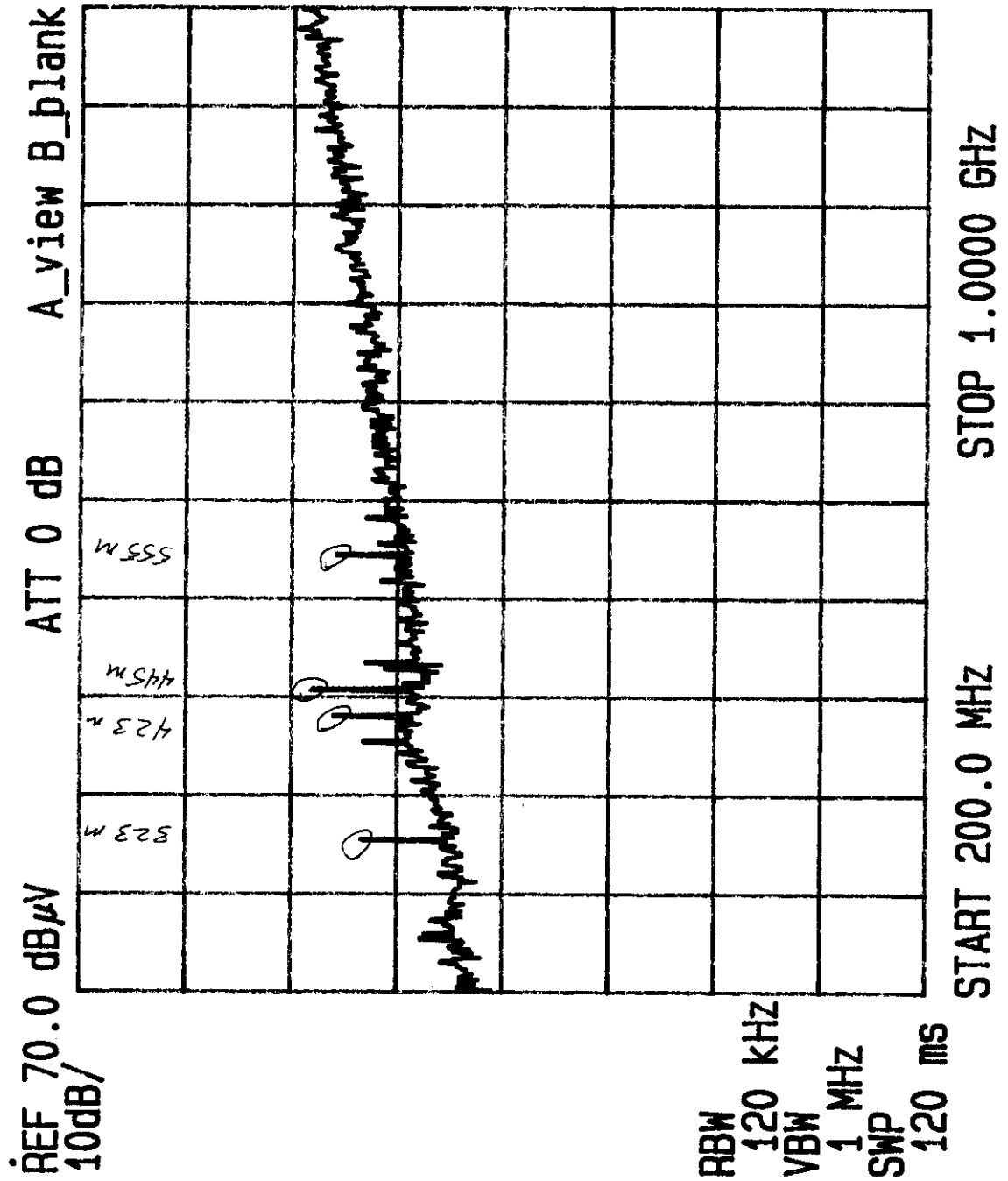


FIGURE 6.2.1-5



TEST: FCC RADIATED EUT: TRANSEND NR1100 NETROUTER S/N: 222116
FREQ: 200M-1GHZ SPEC: CFR 15.249 ANT.HT/POL: 1M/ V
DETECTOR: PEAK LINE UNDER TEST: N/A EUT POSITION: FRONT
DATE: 4-5-99 TEST SITE: ROOM 1 TESTER: *RB*

FCC ID: MZNNTR1100

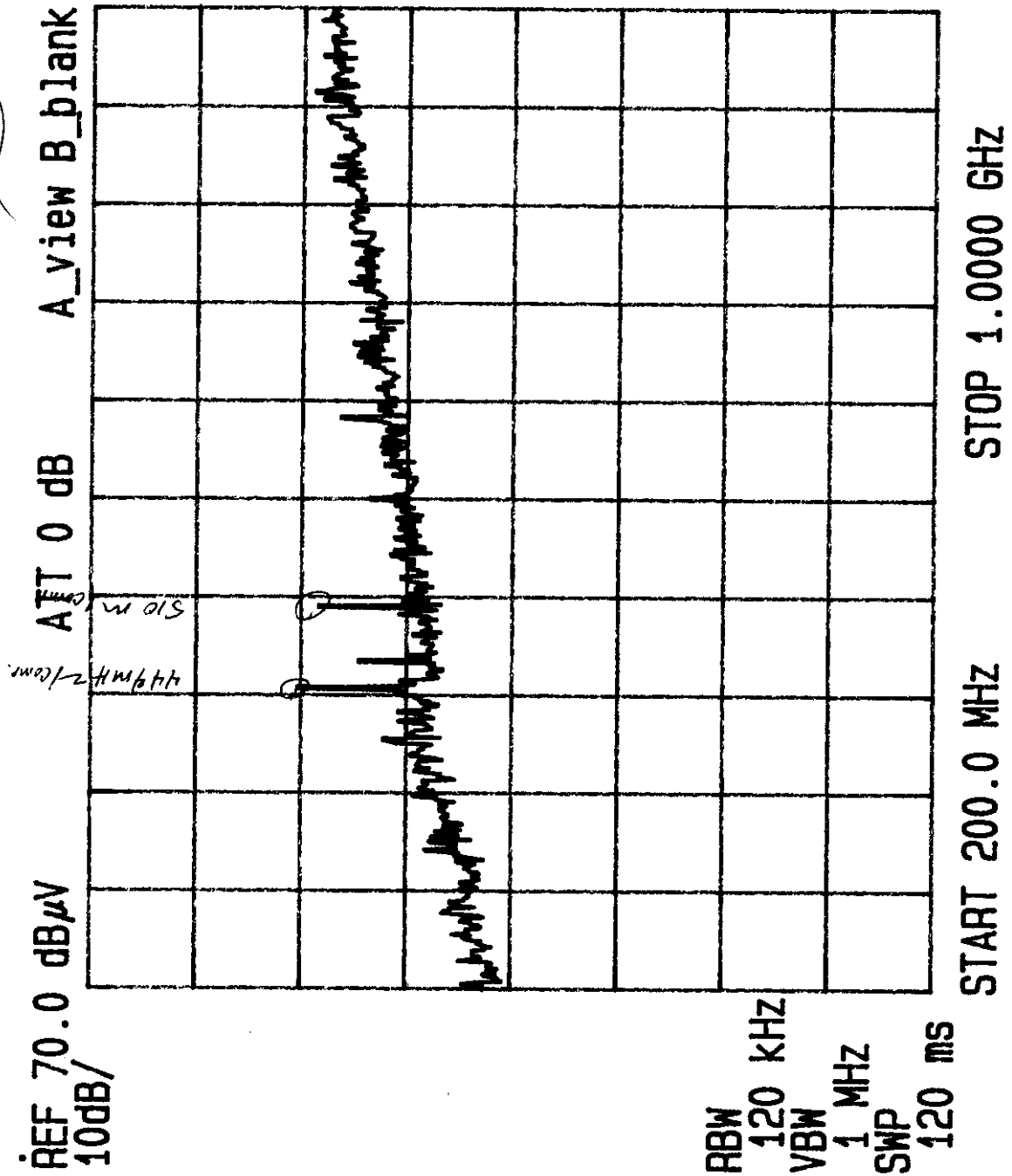


FIGURE 6.2.1-6



TEST: FCC RADIATED	EUT: TRANSEND NR1100 NETROUTER	S/N: 222116
FREQ: 30M-100MHz	SPEC: CFR 15.249	ANT.HT/POL: 1.75m \ H
DETECTOR: QUASI PEAK	LINE UNDER TEST: N/A	EUT POSITION: 180
DATE: 3-5-99	TEST SITE: 3 METER	TESTER: AB

FCC ID: MZNNTRTR1100

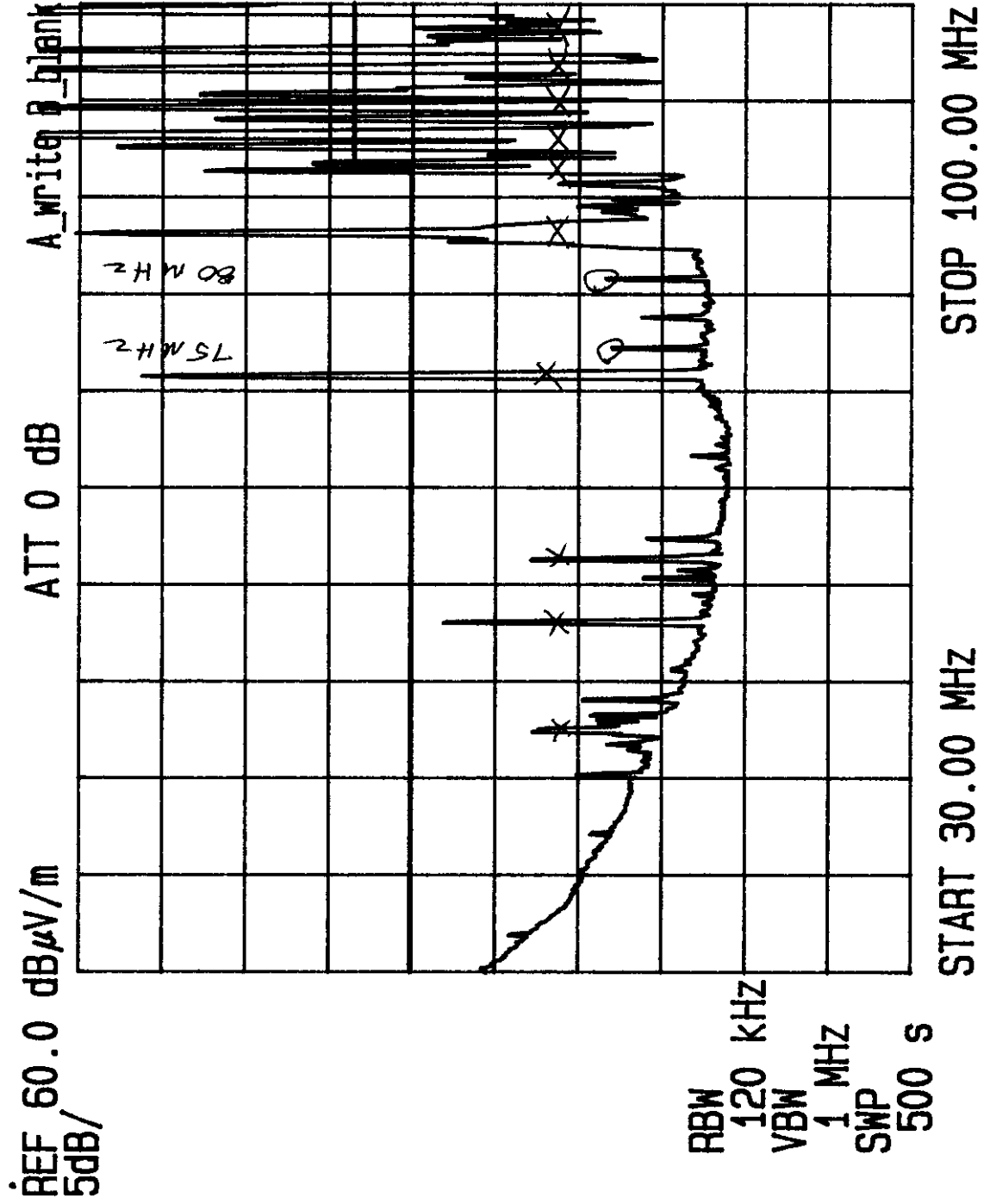


FIGURE 6.2.2-1



TEST: FCC RADIATED EUT: TRANSEND NR1100 NETROUTER S/N: 222116
FREQ: 30M-100MHz SPEC: CFR 15.249 ANT.HT/POL: 1.75m \ V
DETECTOR: QUASI PEAK LINE UNDER TEST: N/A EUT POSITION: 180°
DATE: 4-5-99 TEST SITE: 3 METER TESTER: AB

FCC ID: MZNNTRTR1100

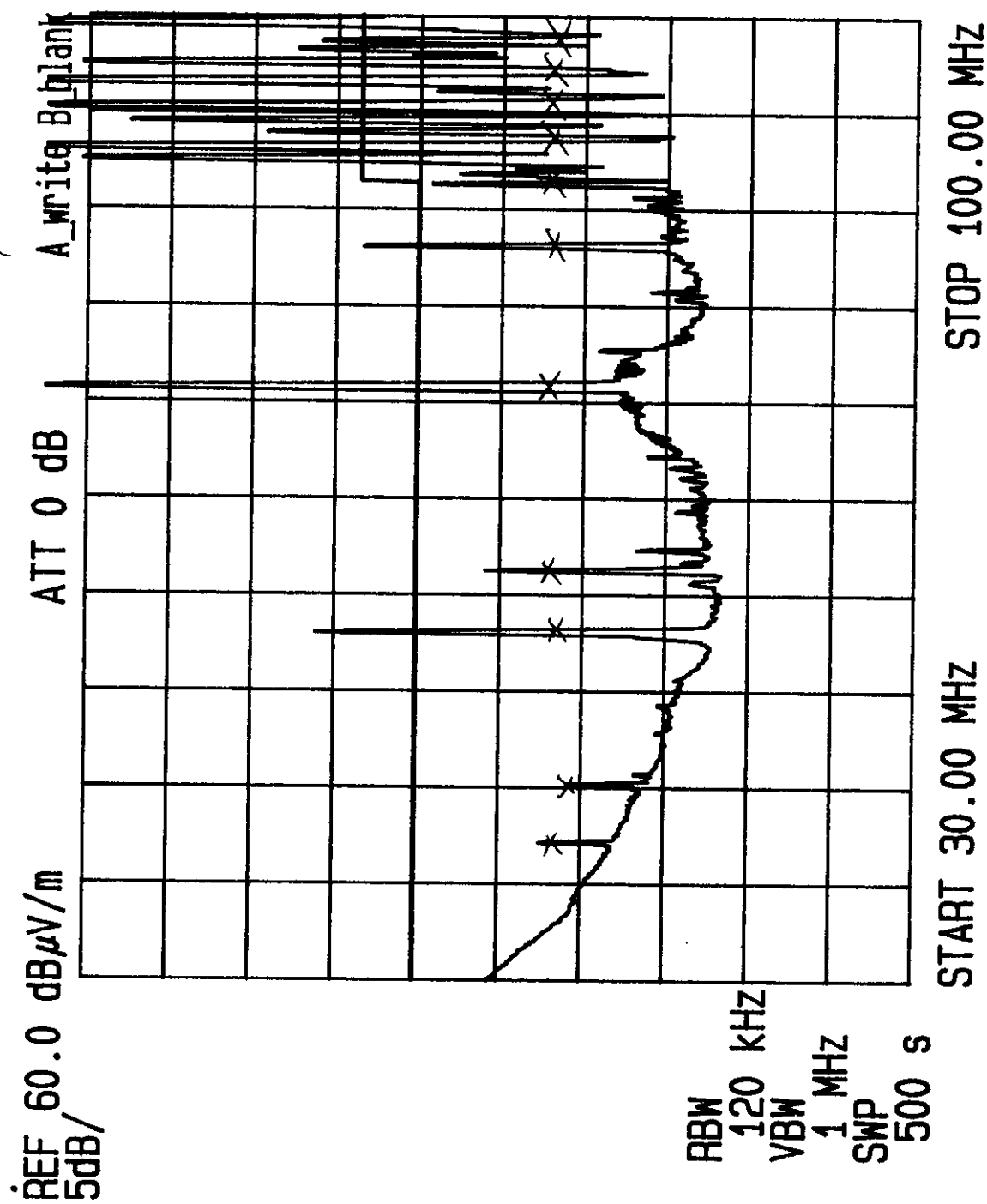


FIGURE 6.2.2-2



TEST: FCC RADIATED EUT: TRANSEND NR1100 NETROUTER S/N: 222116
FREQ: 100M-200MHZ SPEC: CFR 15.249 ANT. HT/POL: 1.5m \ H
DETECTOR: QUASI PEAK LINE UNDER TEST: N/A EUT POSITION: 180°
DATE: 4-5-99 TEST SITE: 3 METER TESTER: *AB*

FCC ID: MZNNTRTR1100

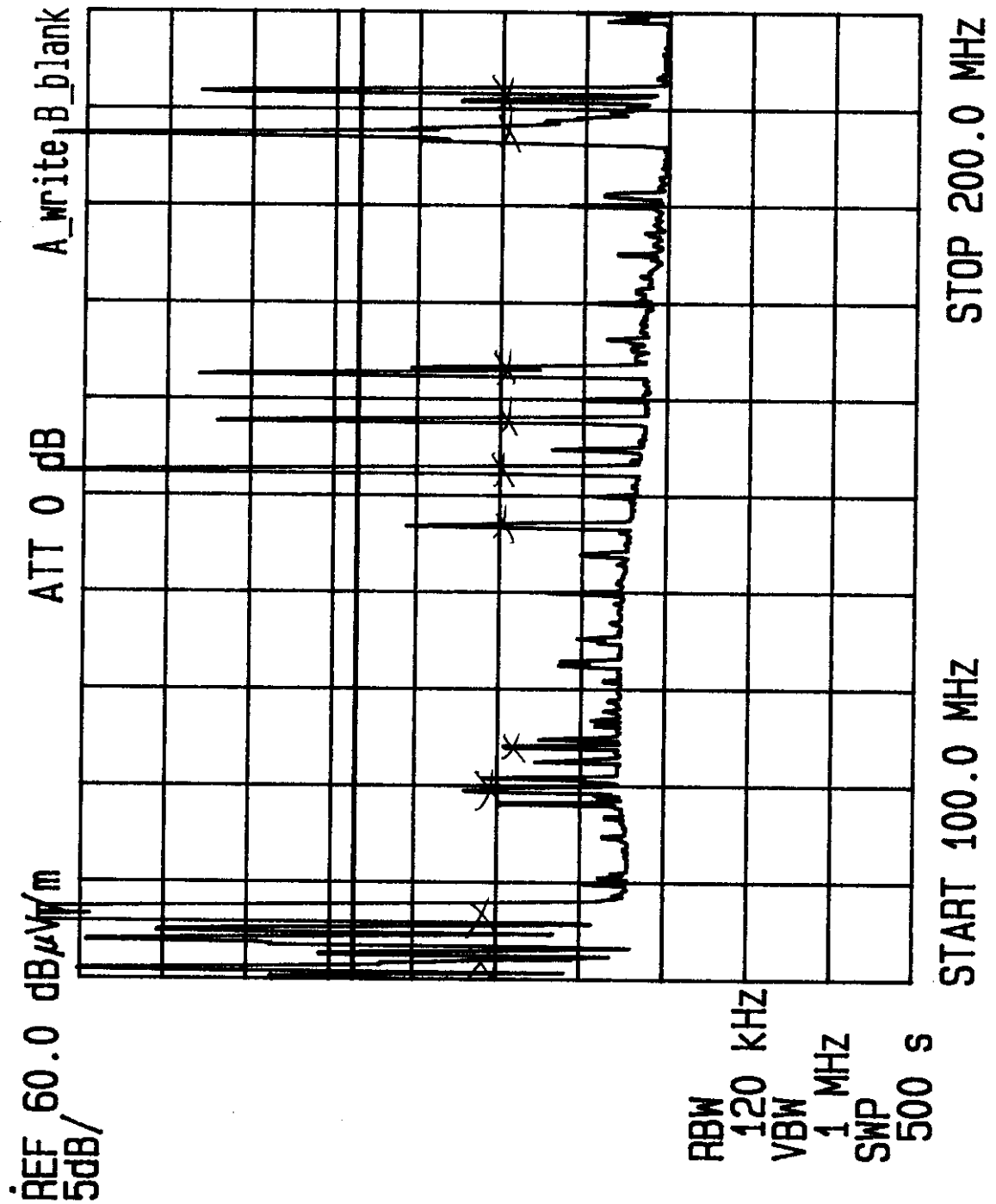


FIGURE 6.2.2-3



TEST: FCC RADIATED EUT: TRANSEND NR1100 NETROUTER S/N: 222116
FREQ: 100M-200MHz SPEC: CFR 15.249 ANT.HT/POL: 1.75m V
DETECTOR: QUASI PEAK LINE UNDER TEST: N/A EUT POSITION: 180
DATE: 4-5-99 TEST SITE: 3 METER TESTER: *AB*

FCC ID: MZNNTR1100

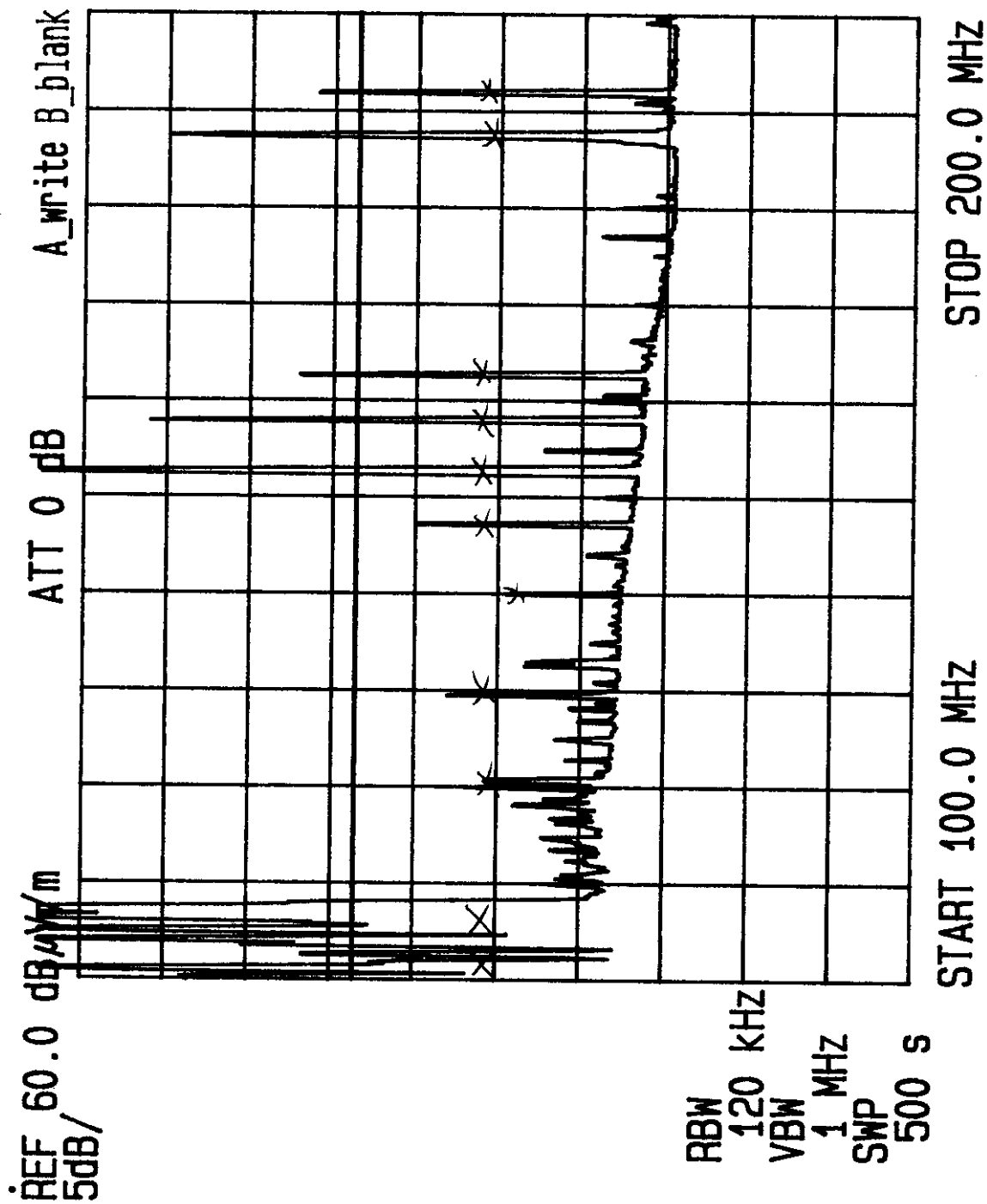


FIGURE 6.2.2-4



TEST: FCC RADIATED EUT: TRANSEND NR1100 NETROUTER S/N: 222116
FREQ: 200M-1GHZ SPEC: CFR 15.249 ANT. HT/POL: 1.75m H
DETECTOR: QUASI PEAK LINE UNDER TEST: N/A EUT POSITION: 180
DATE: 4-6-97 TEST SITE: 3 METER TESTER: *AB*

FCC ID: MZNNTRTR1100

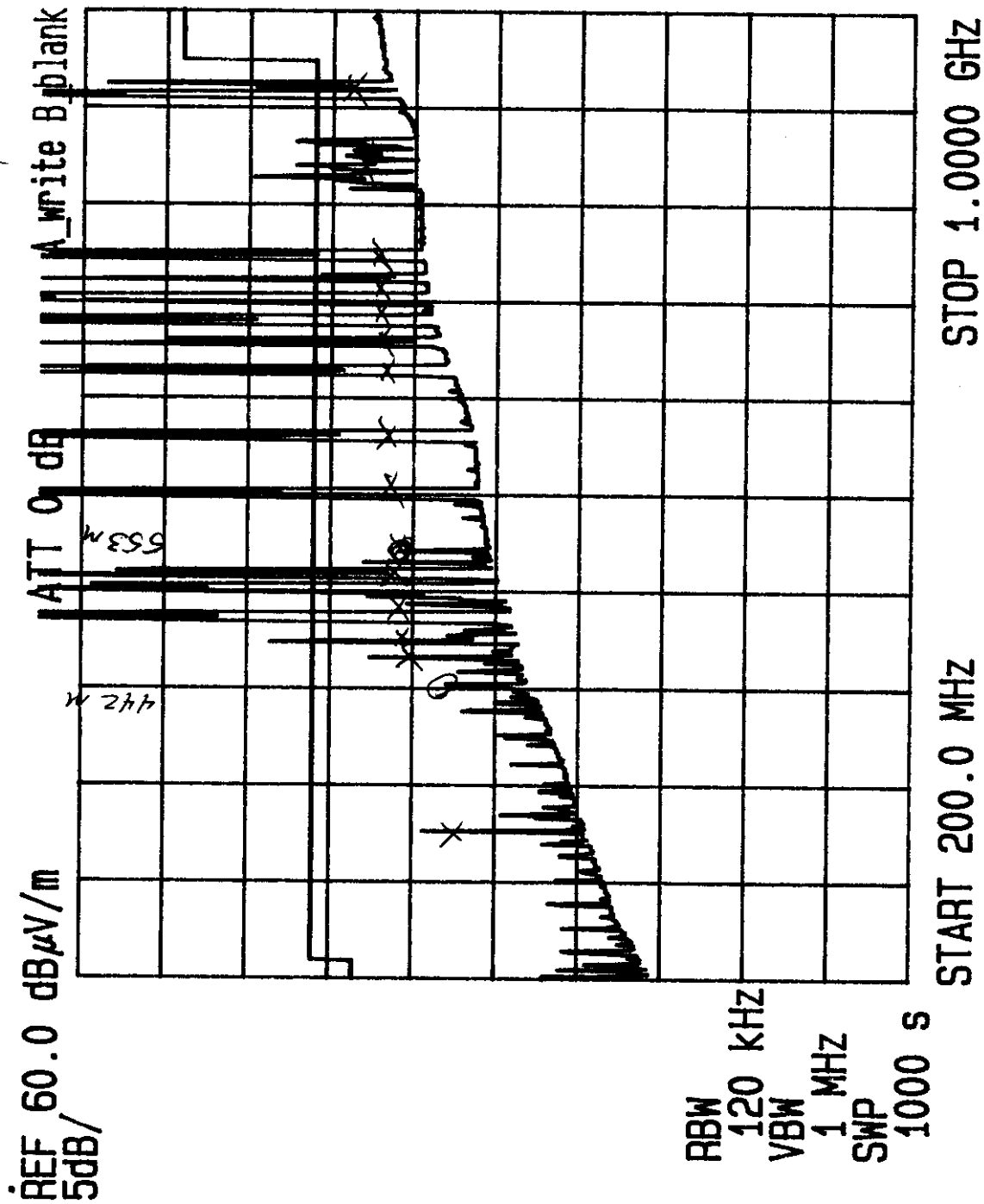


FIGURE 6.2.2-5



TEST: FCC RADIATED EUT: TRANSEND NR1100 NETROUTER S/N: 222116
FREQ: 200M-1GHz SPEC: CFR 15.249 ANT.HT/POL: 2.5m V
DETECTOR: QUASI PEAK LINE UNDER TEST: N/A EUT POSITION: 247°
DATE: 4-6-99 TEST SITE: 3 METER TESTER: *[Signature]*

FCC ID: MZNNTRTR1100

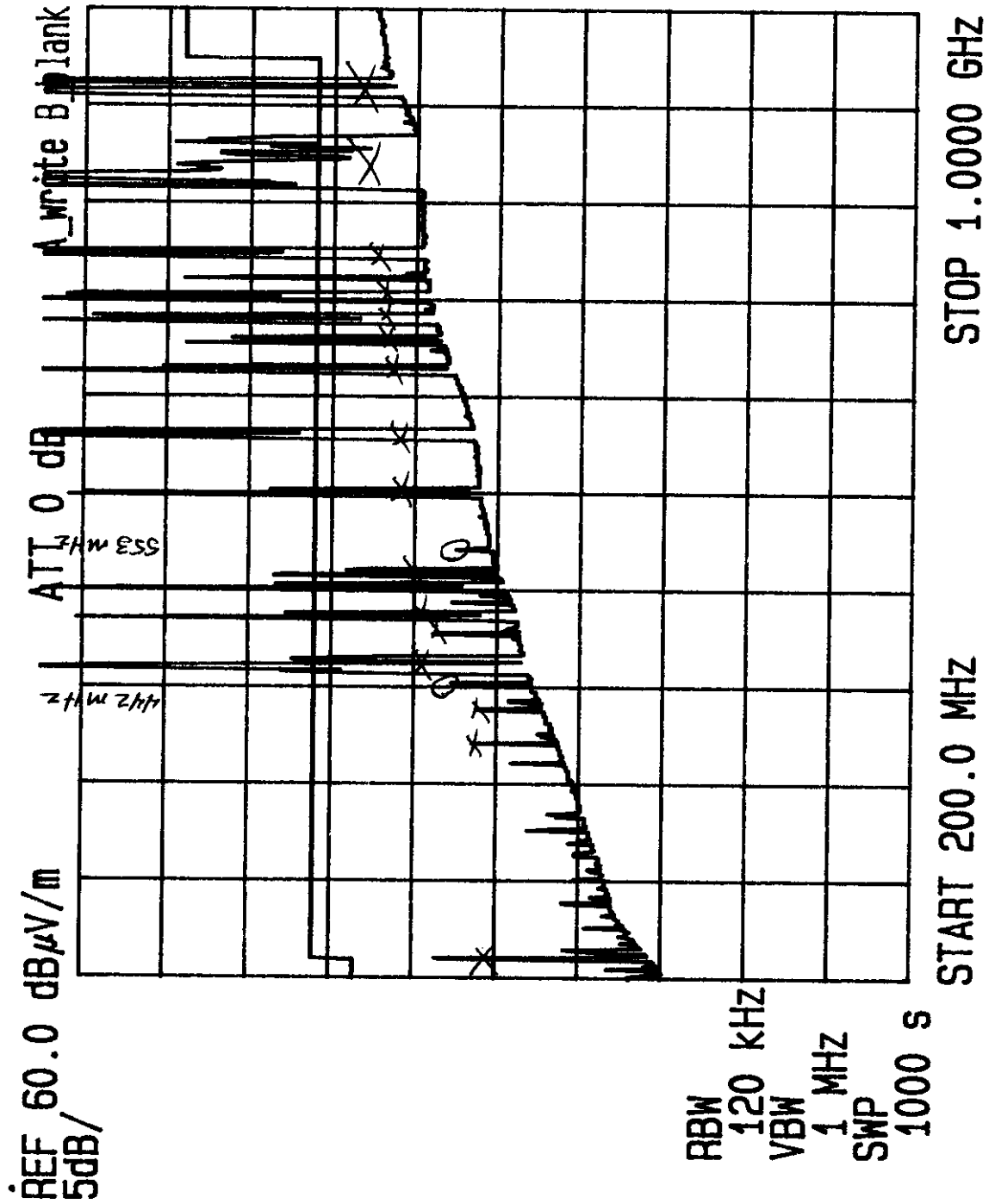


FIGURE 6.2.2-6



TEST: FCC RADIATED	EUT: TRANSEND NR1100 NETROUTER	S/N: 222116
FREQ: 30M-100MHZ	SPEC: CFR 15.249	ANT.HT/POL: 1.75m H
DETECTOR: Q P AMBIENT	LINE UNDER TEST: N/A	EUT POSITION: —
DATE: 4-5-99	TEST SITE: 3 METER	TESTER: <i>AB</i>

FCC ID: MZNNTR1100

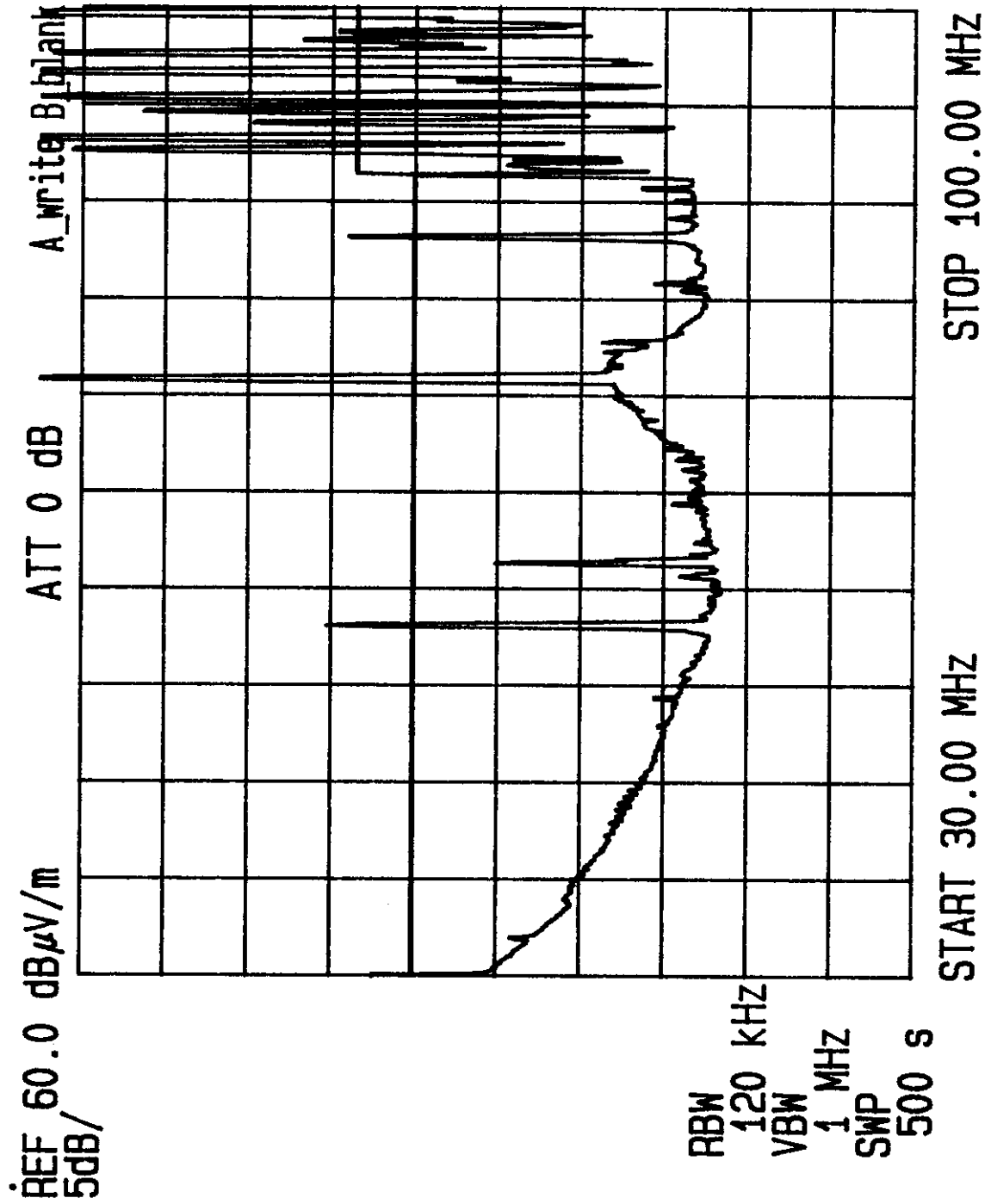


FIGURE 6.2.3-1



TEST: FCC RADIATED EUT: TRANSEND NR1100 NETROUTER S/N: 222116
FREQ: 30M-100MHZ SPEC: CFR 15.249 ANT. HT/POL: 1.5m V
DETECTOR: Q P AMBIENT LINE UNDER TEST: N/A EUT POSITION: -
DATE: 4-5-99 TEST SITE: 3 METER TESTER: *AD*

FCC ID: MZNNTR1100

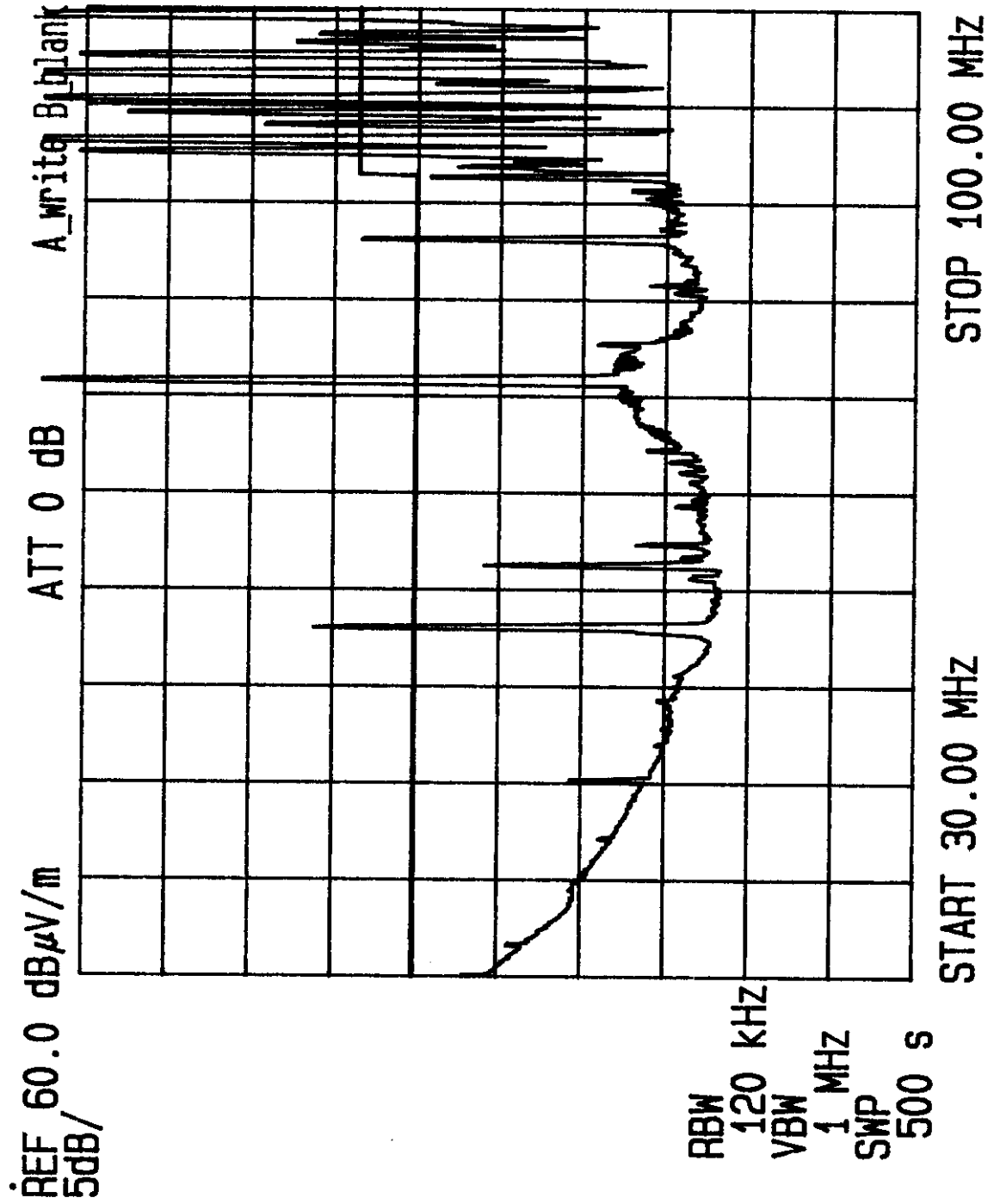


FIGURE 6.2.3-2



TEST: FCC RADIATED EUT: TRANSEND NR1100 NETROUTER S/N: 222116
FREQ: 100M-200MHz SPEC: CFR 15.249 ANT.HT/POL: 1.75m H
DETECTOR: Q P AMBIENT LINE UNDER TEST: N/A EUT POSITION: --
DATE: 4-8-99 TEST SITE: 3 METER TESTER: *[Signature]*

FCC ID: MZNNTR1100

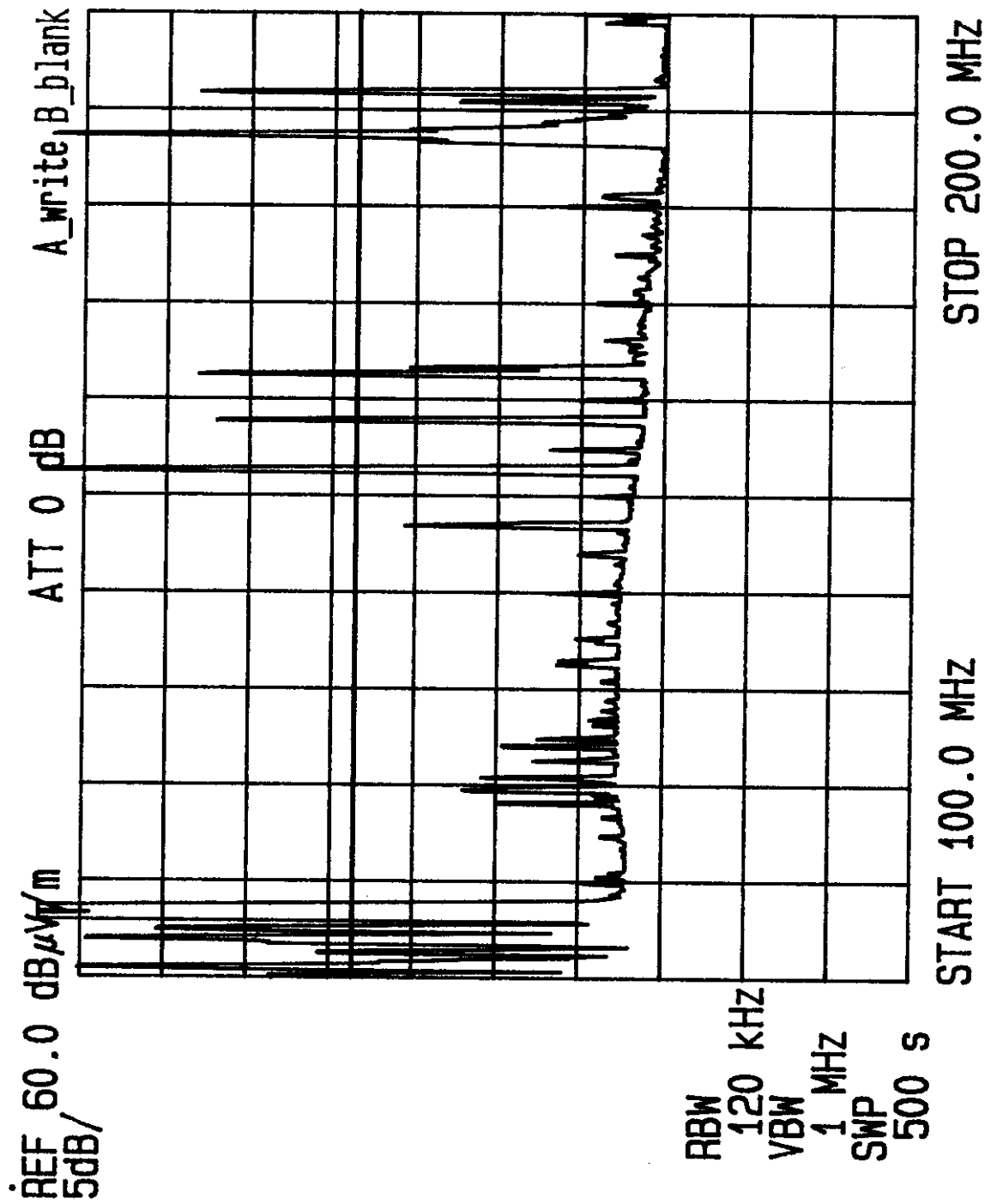


FIGURE 6.2.3-3



TEST: FCC RADIATED EUT: TRANSEND NR1100 NETROUTER S/N: 222116
FREQ: 100M-200MHz SPEC: CFR 15.249 ANT.HT/POL: 1.75m V
DETECTOR: Q P AMBIENT LINE UNDER TEST: N/A EUT POSITION: -
DATE: 4-5-77 TEST SITE: 3 METER TESTER: *JB*

FCC ID: MZNNTR1100

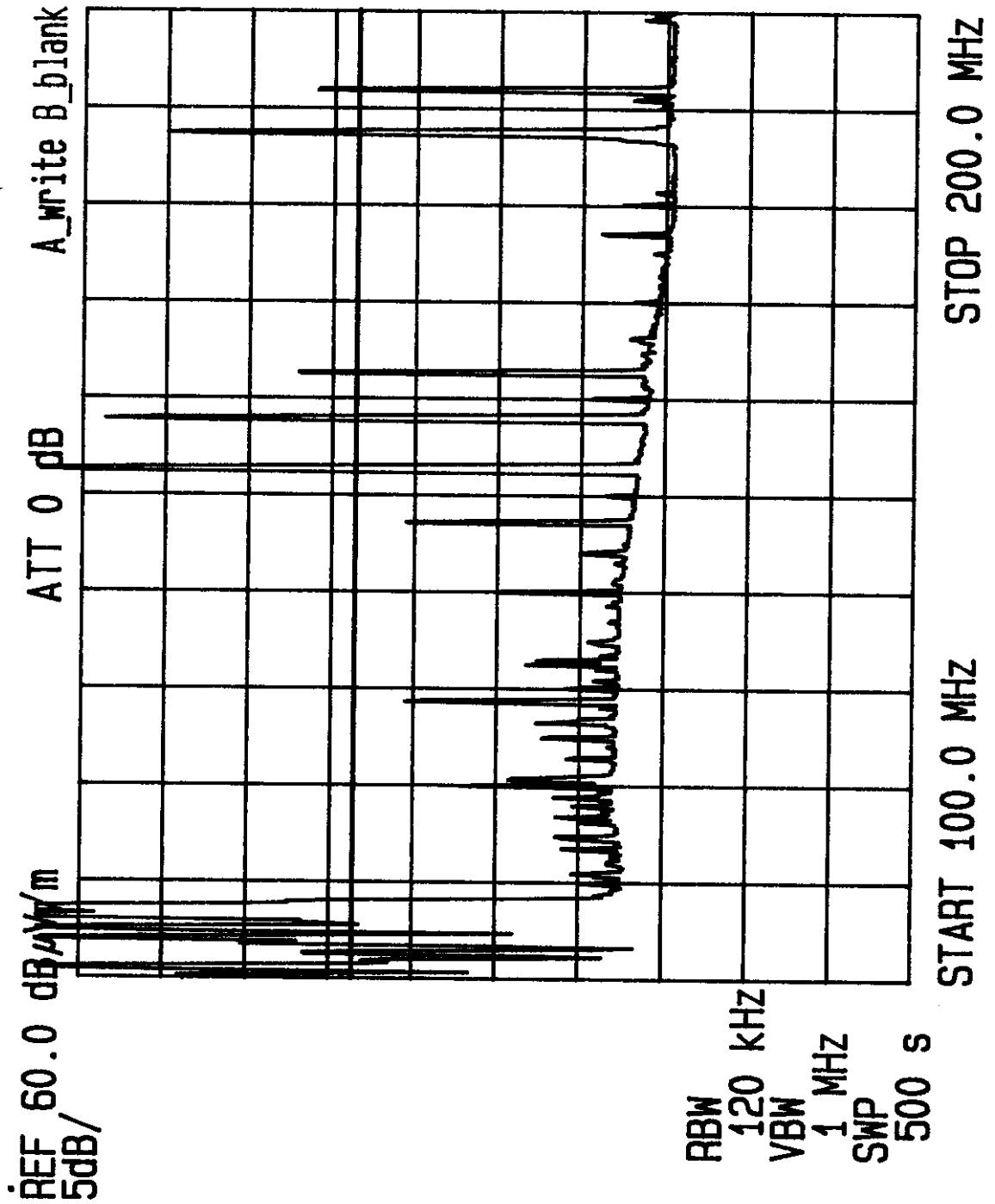


FIGURE 6.2.3-4



TEST: FCC RADIATED	EUT: TRANSEND NR1100 NETROUTER	S/N: 222116
FREQ: 200M-1GHz	SPEC: CFR 15.249	ANT. HT/POL: 1.75m H
DETECTOR: Q P AMBIENT	LINE UNDER TEST: N/A	EUT POSITION: —
DATE: 4-6-99	TEST SITE: 3 METER	TESTER: <i>[Signature]</i>

FCC ID: MZNNTRTR1100

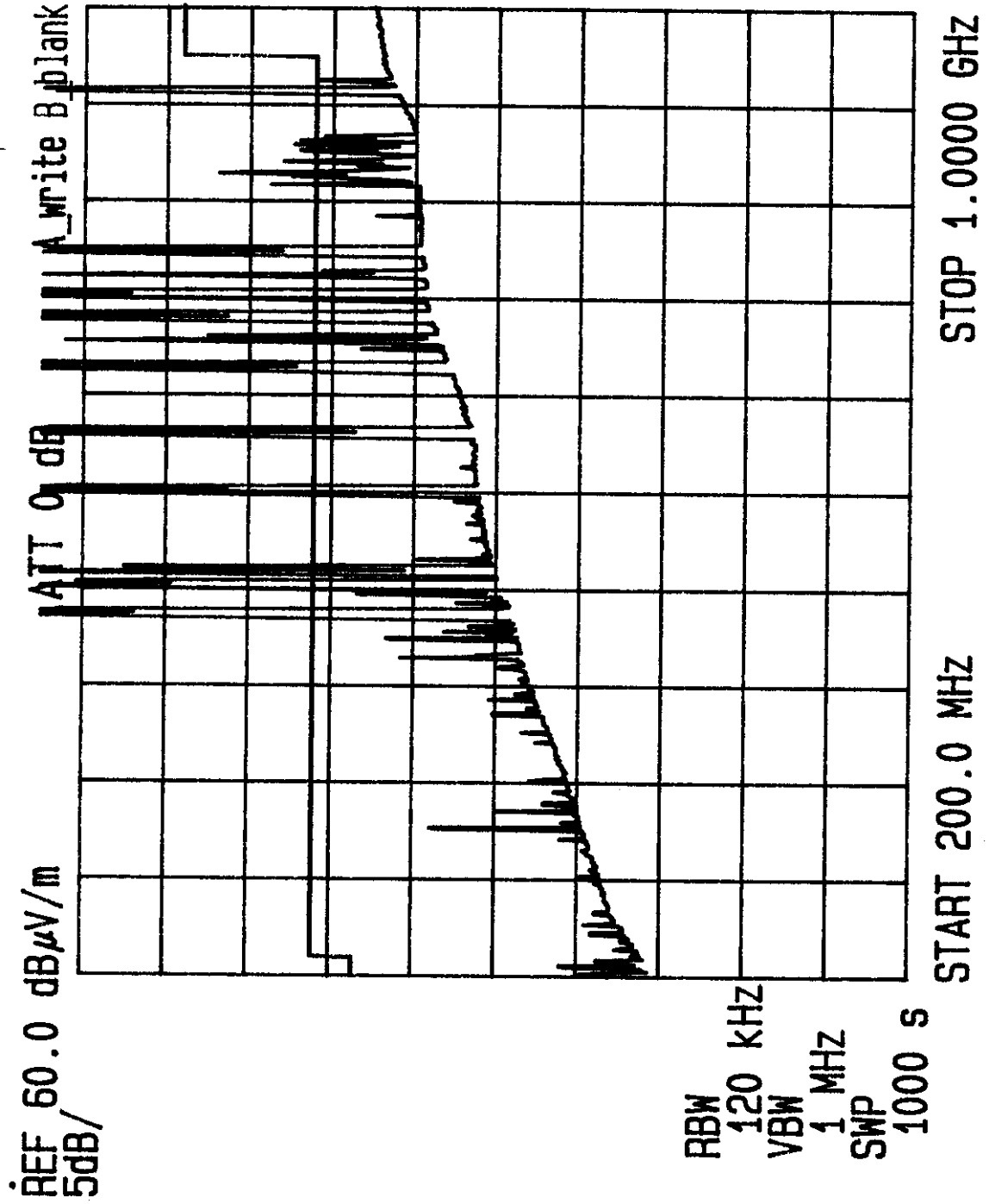


FIGURE 6.2.3-5



TEST: FCC RADIATED	EUT: TRANSEND NR1100 NETROUTER	S/N: 222116
FREQ: 200M-1GHz	SPEC: CFR 15.249	ANT. HT/POL: 1.75m V
DETECTOR: Q P AMBIENT	LINE UNDER TEST: N/A	EUT POSITION: -
DATE: 4-6-99	TEST SITE: 3 METER	TESTER: [Signature]

FCC ID: MZNNTR1100

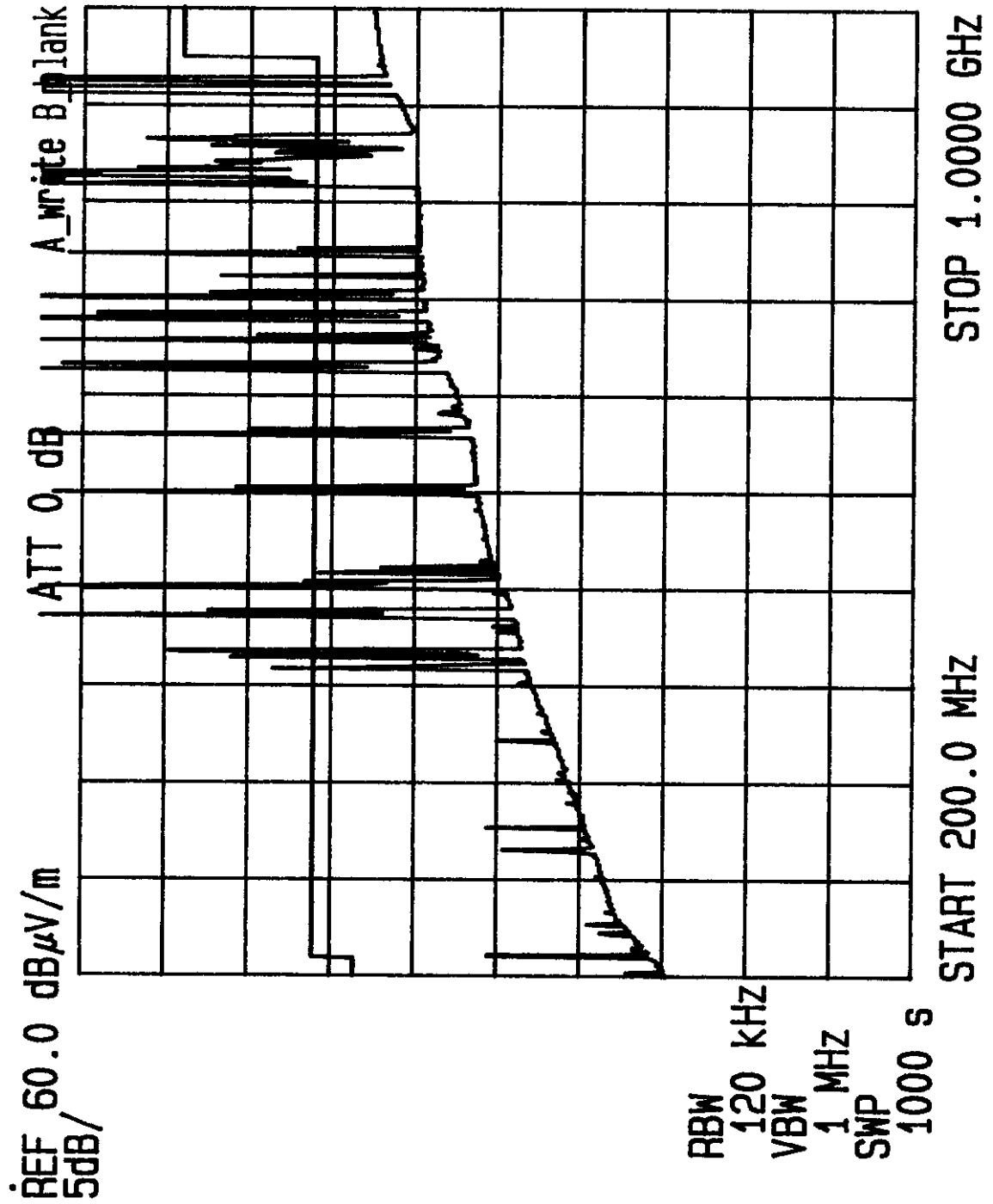


FIGURE 6.2.3-6

APPENDIX A
COMPLIANCE LETTER

FEDERAL COMMUNICATIONS COMMISSION

7435 Oakland Mills Road
Columbia, MD 21046
Telephone: 301-725-1585 (ext-218)
Facsimile: 301-344-2050

FCC ID: MZNNTRTR1100

December 5, 1996

IN REPLY REFER TO
31040/SIT
1300F2

Rubicom Systems, Inc.
284 West Drive, Suite B
Melbourne, FL 32904

Attention: Joseph G. Barbee

Re: Measurement facility located at above address
(3 meter site)

Gentlemen:

Your submission of the description of the subject measurement facility has been reviewed and found to be in compliance with the requirements of Section 2.948 of the FCC Rules. The description has, therefore, been placed on file and the name of your organization added to the Commission's list of facilities whose measurement data will be accepted in conjunction with applications for certification or notification under Parts 15 or 18 of the Commission's Rules. Our list will also indicate that the facility complies with the radiated and AC line conducted test site criteria in ANSI C63.4-1992. Please note that this filing must be updated for any changes made to the facility, and at least every three years the data on file must be certified as current.

Per your request, the above mentioned facility has been also added to our list of those who perform these measurement services for the public on a fee basis. This list is published periodically and is also available on the Laboratory's Public Access Link as described in the enclosed Public Notice.

Sincerely,



Thomas W. Phillips
Electronics Engineer
Customer Service Branch

Enclosure:
PAL PN