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Authorized by:
Professional Engineers
Ontario



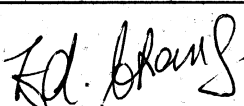
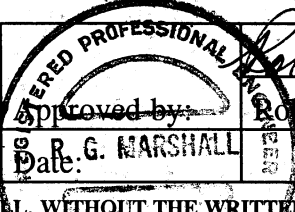
Engineering &
Administrative



Testing For FCC
Submissions/Verifications

Approved Test Facility



TEST REPORT		
REPORT DATE:	10 May 2001	
	REPORT NO: 21117D	
CONTENTS:	See Table of Contents	
SUBMITTOR:	TT Systems LLC 7 Odell Plaza Yonkers, NY 10701 USA	
SUBJECT:	Model No: IBM-3900 and IBM-3900XX	
	FCC ID: OVQIBM3900	
TEST SPECIFICATION	CFR 47 FCC Part 15 Sections: 15.35, 15.109, 15.209 and 15.249 NOTE: Tests Conducted Are "Type" Tests.	
DATE SAMPLE RECEIVED:	12 April and May 8 2001	DATE TESTED: 16 April and 8 May 2001
RESULTS:	Equipment tested complies with referenced specification.	
ALTERATIONS	None	
Tested by:	 Edward Chang	 Approved by: Robert G. Marshall, P. Eng. Date: May 10/01
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TECHNICAL REPORT - FCC 2.1033(b)

Applicant

TT Systems LLC
7 Odell Plaza
Yonker, NY
10701 USA

FCC Identifier

OVQIBM3900

Manufacturer

Sonus Telecom Inc.
456-4, Geumgok-li, Iryu-myun
Choong-ju, Choongcheongbuk-Do
KOREA

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EXHIBIT D

[FCC Ref. 2.1033(b)(6)]

"Report of Measurements"

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TEST REPORT CONTAINING:

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TEST FACILITY AND EQUIPMENT LIST

FACILITIES

- Radiated ANSI C63.4 (FCC OET/55) open field 3 metre test range. This test range is protected from the cold and moisture by a non-conductive enclosure.
- Conducted 2.5m Anechoic Chamber

EQUIPMENT

Anritsu 2601A Spectrum Analyzer
Advantest R3261A Spectrum Analyzer
Hewlett-Packard RF generator # 8640 B with an 002 doubler
A.H. Systems biconical antenna; 20 MHz to 330 MHz
A.H. Systems log periodic antenna; 300 MHz to 1.8 GHz
Eaton dipole antennas; T1, T2, T3 25 MHz to 1.0 GHz
Roberts dipole antennas; T1, T2, T3 & T4 25 MHz to 1.0 GHz
Compliance Design P950 Preamp (16 dB) ... 25 MHz to 1.0 GHz

NOTE:

The Anritsu 2601A Spectrum Analyzer and the Advantest R3261A Spectrum Analyzer are calibrated annually, and that calibration is directly traceable to the National Research Council of Canada. (NRC)
This equipment is only used by qualified technicians and only for the purpose of EMI measurements.
The three metre test range has been carefully evaluated to the ANSI document C63.4 and will be remeasured for reflections and losses every three years.

ADDITIONAL TEST EQUIPMENT LIST - MARSTECH

- 1 Spectrum Analyzer: HP 8591EM, S/N 3639A00995, Calibrated April 2001
- 2 Spectrum Analyzer: ANISTRU 2601A, S/N MT64544, Calibrated May 2000
- 3 Spectrum Analyzer: IFR AN940, S/N 635001039, Calibrated March 2001
- 4 Preamp: HP 8449B, S/N 3008A00378, Calibrated August 2000
- 5 Horn Antenna: Q-PAR 6878/24, S/N 1721, 1.5-18GHz.
- 6 Line Impedance Stabilization Network.: Marstech

TEST PROCEDURE

GENERAL:

Shielded interface cables were used in all cases except for cables connecting to the telephone line and the power cords. A test program was run which simulated a normal transmission.

POWER LINE CONDUCTED INTERFERENCE:

The procedure used was ANSI STANDARD C63.4 1992 using a 50 μ H LISN. Both lines were observed with the EUT transmitting. The bandwidth of the spectrum analyzer was 9KHz QP with an appropriate sweep speed. The ambient temperature of the EUT was 24°F with a humidity of 60%.

BANDWIDTH 20dB:

The measurements were made with the spectrum analyzer's resolution bandwidth (RBW)=100KHz and the video bandwidth (VBW)=1.0MHz and the span set as shown on plot.

POWER OUTPUT:

The radiated output power was measured with the spectrum analyzer and Bilog Antenna.

RADIATION INTERFERENCE:

The test procedure used was ANSI STANDARD C63.4-1992 using an appropriate spectrum analyzer, as listed in the Test Equipment List. The bandwidth (RBW) of the spectrum analyzer was 100KHz/120KHz up to 1GHz with an appropriate sweep speed. The RBW above 1.0GHz was = 1MHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The ambient temperature of the EUT was 24°F with a humidity of 60%.

PRODUCT DESCRIPTION

The Models IBM-3900 and IBM-3900XX are 2.4GHz digital call waiting caller ID cordless telephones that operate in the 2402.2 to 2477.8MHz band. The Model IBM-3900 is identical to the IBM-3900XX except for colour. Both these models will bear the same FCC ID: OVQIBM3900. The antenna used for the base and the handset is permanently attached to the EUT. Its actual frequency range is:

Base: 2402.25 to 2406.04

Handset: 2474.04 to 2477.86

A complete frequency list is shown on the next page.

LMX1602

Frequency Table for ADPCM 2.4GHz
 1st IF Freq.: 10.7 MHz
 2nd IF Freq.: 0.45 MHz
 TX/RX difference Freq.: 71.8 MHz
 Channel Spacing : 0.2 MHz

NO	BASE unit (RX + 10.7MHz)			HANDSET (RX - 10.7MHz)		
	TX Freq.	RX VCO	RX Freq.	TX Freq.	RX VCO	RX Freq.
1	2402.200	1201.100	2484.700	1242.350	1237.000	2391.500
2	2402.400	1201.200	2484.900	1242.450	1237.100	2391.700
3	2402.600	1201.300	2485.100	1242.550	1237.200	2391.900
4	2402.800	1201.400	2485.300	1242.650	1237.300	2392.100
5	2403.000	1201.500	2485.500	1242.750	1237.400	2392.300
6	2403.200	1201.600	2485.700	1242.850	1237.500	2392.500
7	2403.400	1201.700	2485.900	1242.950	1237.600	2392.700
8	2403.600	1201.800	2486.100	1243.050	1237.700	2392.900
9	2403.800	1201.900	2486.300	1243.150	1237.800	2393.100
10	2404.000	1202.000	2486.500	1243.250	1237.900	2393.300
11	2404.200	1202.100	2486.700	1243.350	1238.000	2393.500
12	2404.400	1202.200	2486.900	1243.450	1238.100	2393.700
13	2404.600	1202.300	2487.100	1243.550	1238.200	2393.900
14	2404.800	1202.400	2487.300	1243.650	1238.300	2394.100
15	2405.000	1202.500	2487.500	1243.750	1238.400	2394.300
16	2405.200	1202.600	2487.700	1243.850	1238.500	2394.500
17	2405.400	1202.700	2487.900	1243.950	1238.600	2394.700
18	2405.600	1202.800	2488.100	1244.050	1238.700	2394.900
19	2405.800	1202.900	2488.300	1244.150	1238.800	2395.100
20	2406.000	1203.000	2488.500	1244.250	1238.900	2395.300

1)Fvco=[(32*B)+A]*Fref
 2)Fosc= 11.15 MHz
 3)r_cnt=446(d) = 1BE(H) = 0001 1011 1110(B)
 Fref = 0.025 MHz
 Fosc/Fref = 446

NO	BASE unit (TX)			BASE unit (RX + 10.7MHz)		
	TX Freq.	TX VCO	TX N_cnt.	RX Freq.	RX VCO	RX N_cnt.
1	2402.200	1201.100	48044	2484.700	1242.350	49694
2	2402.400	1201.200	48048	2484.900	1242.450	49698

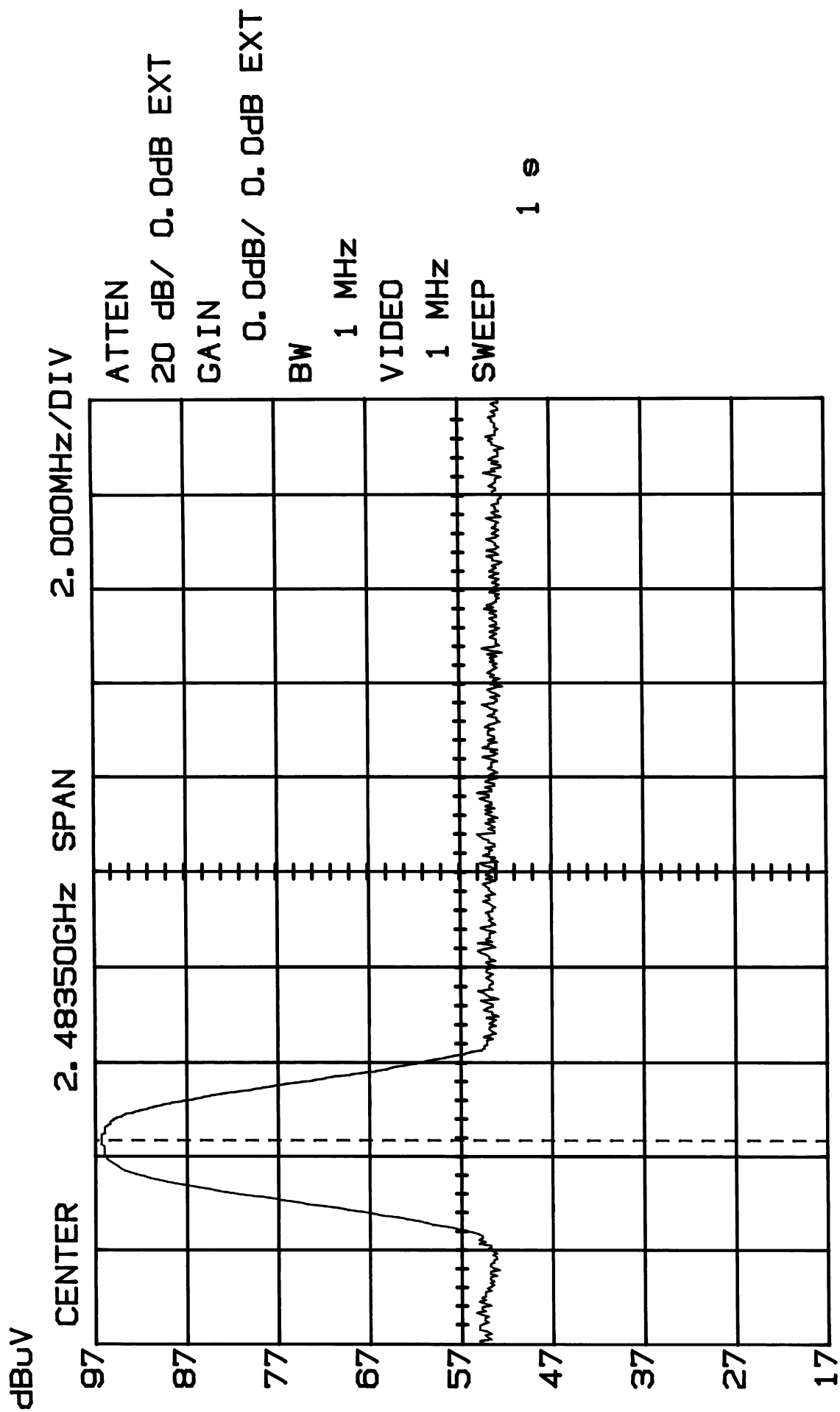
3	2402.600	1201.300	48052	2485.100	1242.550	49702
4	2402.800	1201.400	48056	2485.300	1242.650	49706
5	2403.000	1201.500	48060	2485.500	1242.750	49710
6	2403.200	1201.600	48064	2485.700	1242.850	49714
7	2403.400	1201.700	48068	2485.900	1242.950	49718
8	2403.600	1201.800	48072	2486.100	1243.050	49722
9	2403.800	1201.900	48076	2486.300	1243.150	49726
10	2404.000	1202.000	48080	2486.500	1243.250	49730
11	2404.200	1202.100	48084	2486.700	1243.350	49734
12	2404.400	1202.200	48088	2486.900	1243.450	49738
13	2404.600	1202.300	48092	2487.100	1243.550	49742
14	2404.800	1202.400	48096	2487.300	1243.650	49746
15	2405.000	1202.500	48100	2487.500	1243.750	49750
16	2405.200	1202.600	48104	2487.700	1243.850	49754
17	2405.400	1202.700	48108	2487.900	1243.950	49758
18	2405.600	1202.800	48112	2488.100	1244.050	49762
19	2405.800	1202.900	48116	2488.300	1244.150	49766
20	2406.000	1203.000	48120	2488.500	1244.250	49770

NO	HANDSET unit (TX)			N=N+1	HANDSET unit (RX + 10.7MHz)		
	TX Freq.	TX VCO	TX N cnt.		RX Freq.	RX VCO	RX N cnt.
1	2474.000	1237.000	49480		2391.500	1195.750	47830
2	2474.200	1237.100	49484		2391.700	1195.850	47834
3	2474.400	1237.200	49488		2391.900	1195.950	47838
4	2474.600	1237.300	49492		2392.100	1196.050	47842
5	2474.800	1237.400	49496		2392.300	1196.150	47846
6	2475.000	1237.500	49500		2392.500	1196.250	47850
7	2475.200	1237.600	49504		2392.700	1196.350	47854
8	2475.400	1237.700	49508		2392.900	1196.450	47858
9	2475.600	1237.800	49512		2393.100	1196.550	47862
10	2475.800	1237.900	49516		2393.300	1196.650	47866
11	2476.000	1238.000	49520		2393.500	1196.750	47870
12	2476.200	1238.100	49524		2393.700	1196.850	47874
13	2476.400	1238.200	49528		2393.900	1196.950	47878
14	2476.600	1238.300	49532		2394.100	1197.050	47882
15	2476.800	1238.400	49536		2394.300	1197.150	47886
16	2477.000	1238.500	49540		2394.500	1197.250	47890
17	2477.200	1238.600	49544		2394.700	1197.350	47894
18	2477.400	1238.700	49548		2394.900	1197.450	47898
19	2477.600	1238.800	49552		2395.100	1197.550	47902
20	2477.800	1238.900	49556		2395.300	1197.650	47906

15.249 (c) BAND EDGES

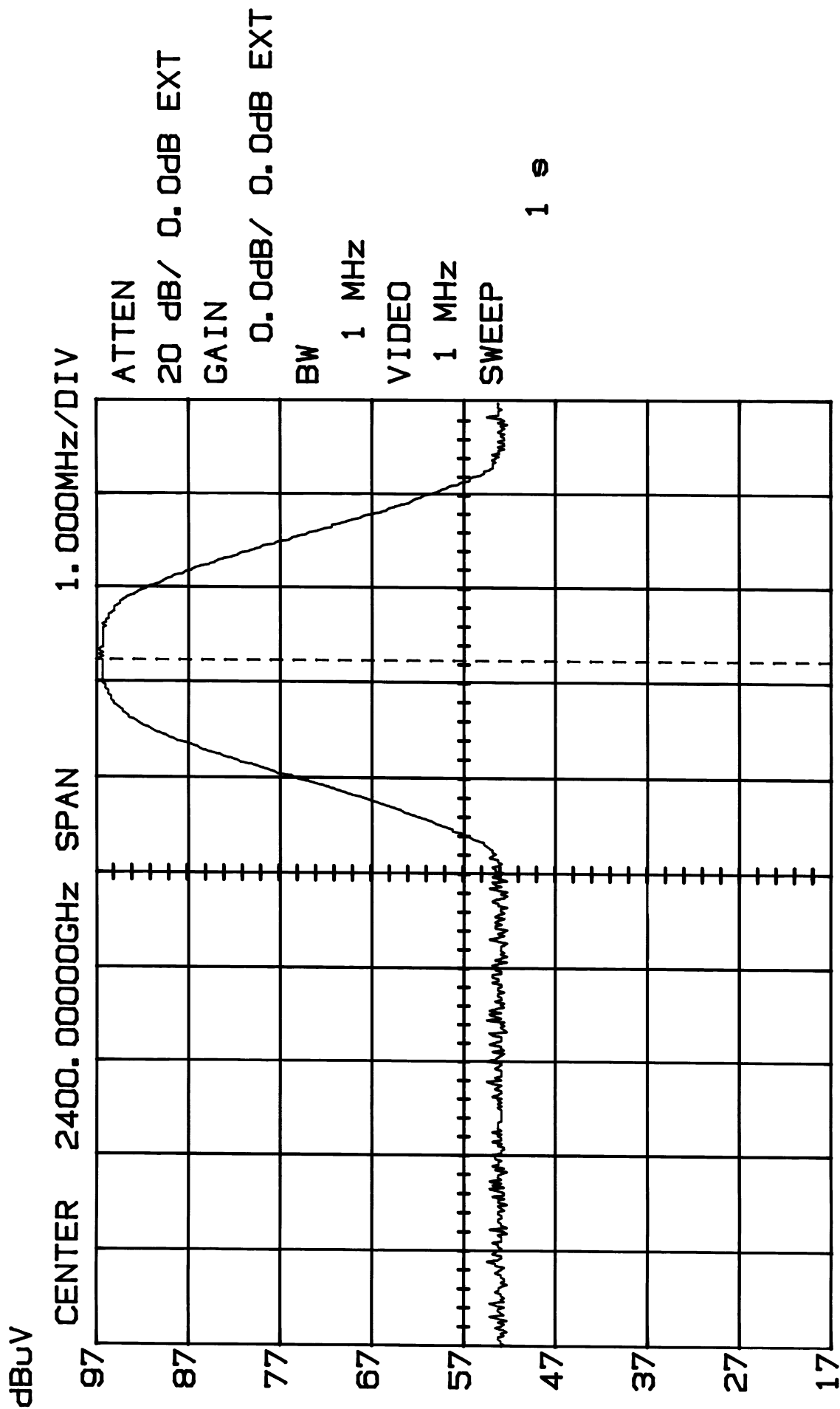
- Requirements:** Emissions outside of the frequency band 2402.2 to 2477.8MHz must be attenuated 50dB below the fundamental.
- Measurement:** The base was attenuated by 50 dB. The headset was attenuated by 50 dB.
- Measurement Data:** The Bandedge was measured at the Low end of the band for the base, and the High end of the band for the handset. See Plots in Exhibits D(1)-9 and D(1)-10.

BAND EDGE ATTENUATION MODEL IBM-3900; (HANDSET)



M1 96.37dB2.47786GHz

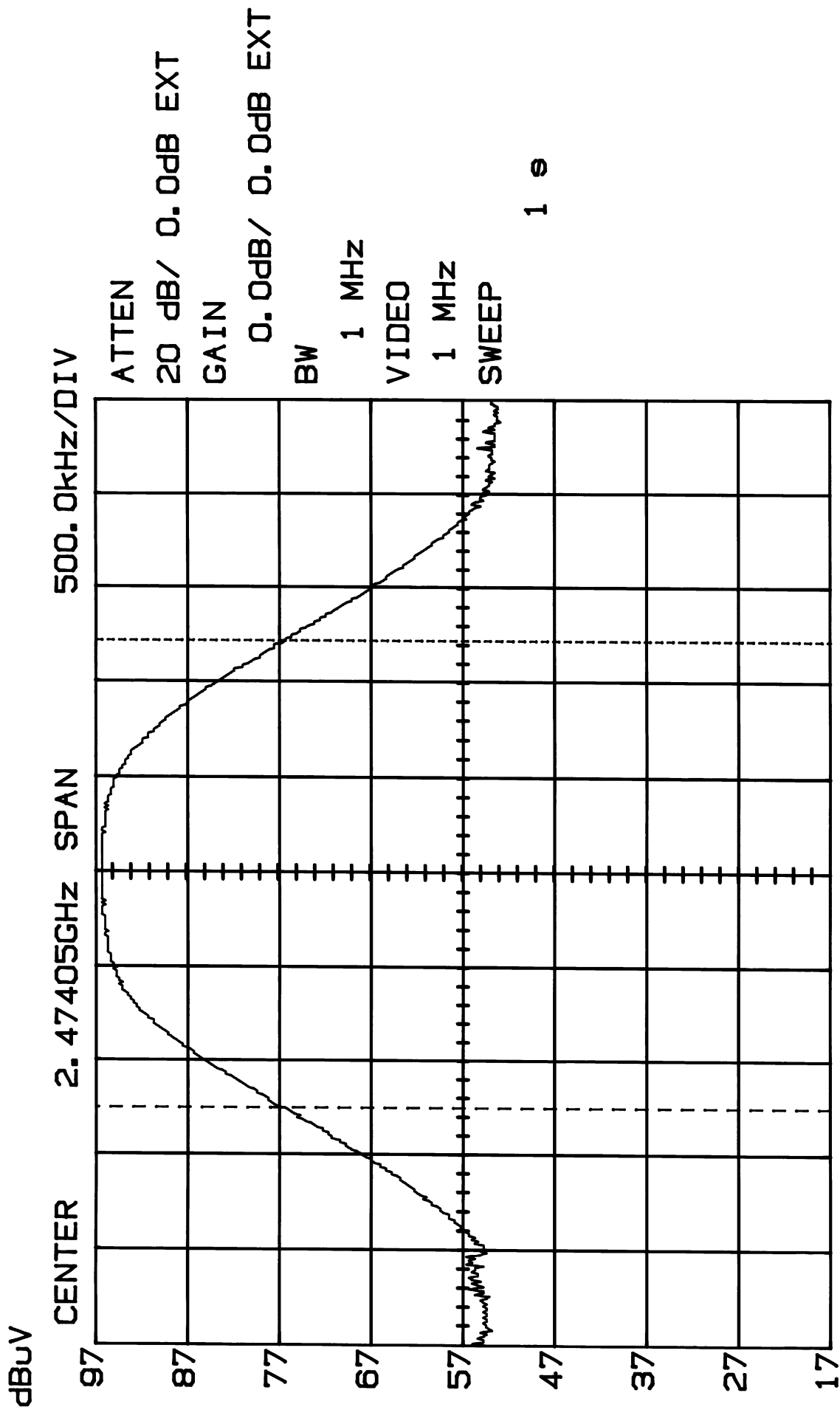
BAND EDGE ATTENUATION
MODEL IBM-3900; (BASE)



M1 96.37dBZ. 40225GHz

11:34:05 04-17-2001

BANDWIDTH (Channel 1)
MODEL IBM-3900; (HANDSET)



M2 76.37dB Δ 0.00dB/ 2.47MHz

13:47:20 04-17-2001

dBuV

CENTER 2.47786GHz SPAN 500.0kHz/DIV

ATTN 20 dB/ 0.0dB EXT

GAIN 0.0dB/ 0.0dB EXT

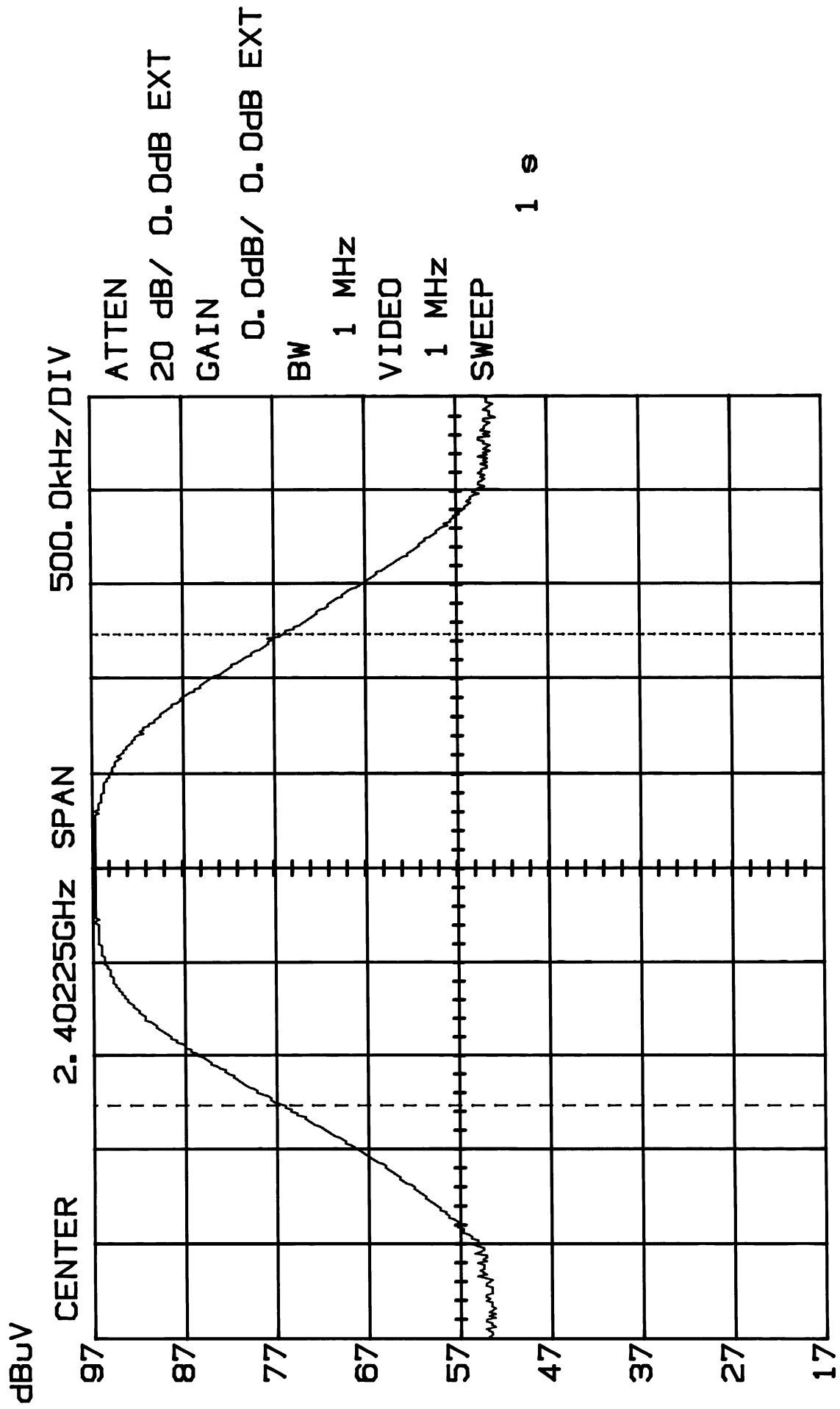
BW 1 MHz

VIDEO 1 MHz

SWEEP 1 s

M1	76.06dBZ	47658GHZ	Δ 0.00dB/	2.51MHz	13:52:56	04-17-2001
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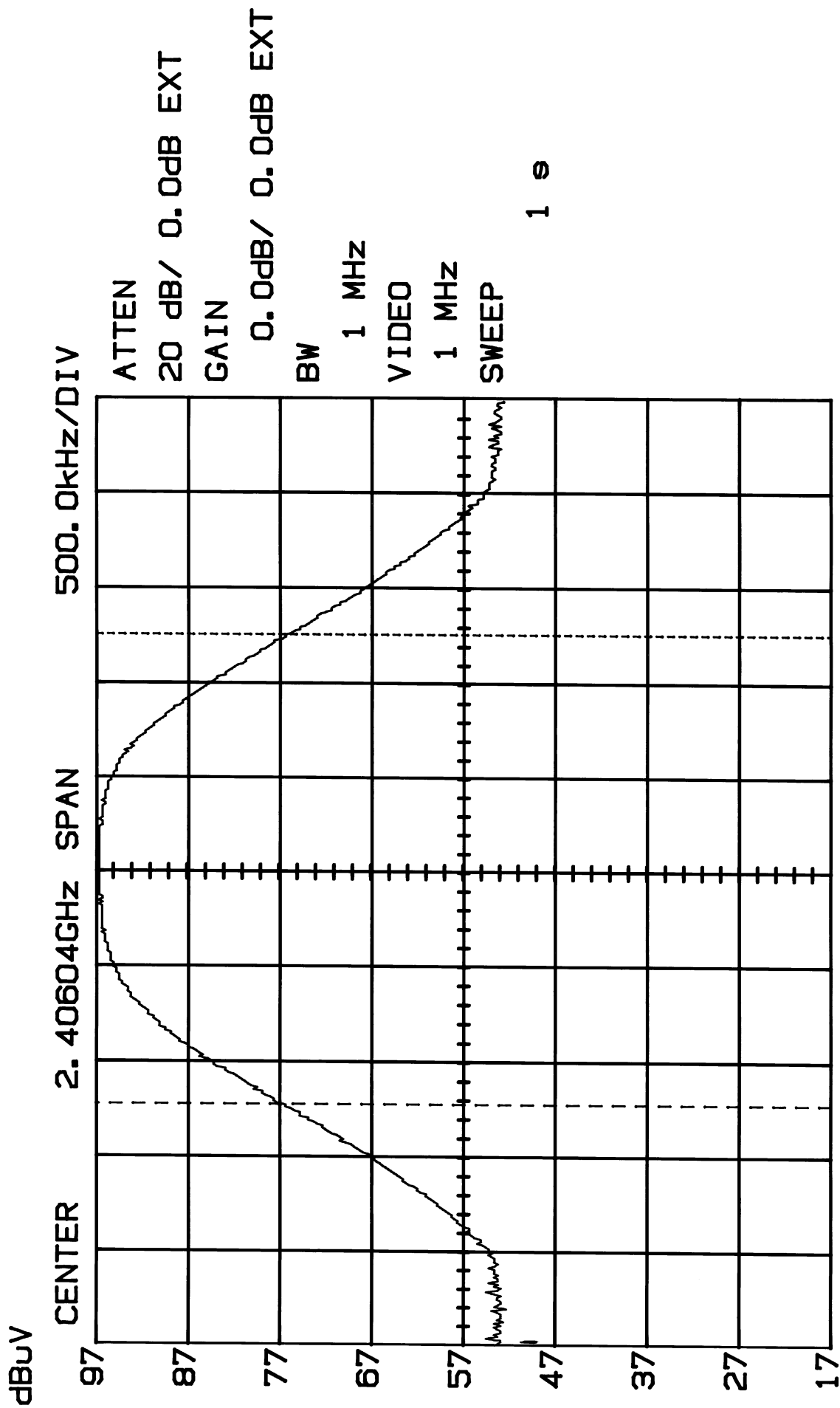
BANDWIDTH (Channel 1)
MODEL IBM-3900; (BASE)



M2 76.06dBZ. 40348GHz Δ 0.00dB/ 2.50MHz

13:59:20 04-17-2001

BANDWIDTH (Channel 20)
MODEL IBM-3900; (BASE)



M2 76. 37dB~~2~~. 40730GHz Δ 0. 00dB/ 2. 48MHz

14: 07: 14 04-17-2001

15.107 (a) POWER LINE CONDUCTED INTERFERENCE

Requirements: 0.45 - 30MHz 250 μ V or 47.96dB μ V

Test Procedure: ANSI STANDARD C63.4-1992.
The spectrum was scanned from 0.45 to 30MHz.

Test Data:

THE HIGHEST EMISSION READ FOR LINE 1 WAS 18.55 dB μ V@7.20 MHz.

THE HIGHEST EMISSION READ FOR LINE 2 WAS 20.75 dB μ V@7.20 MHz

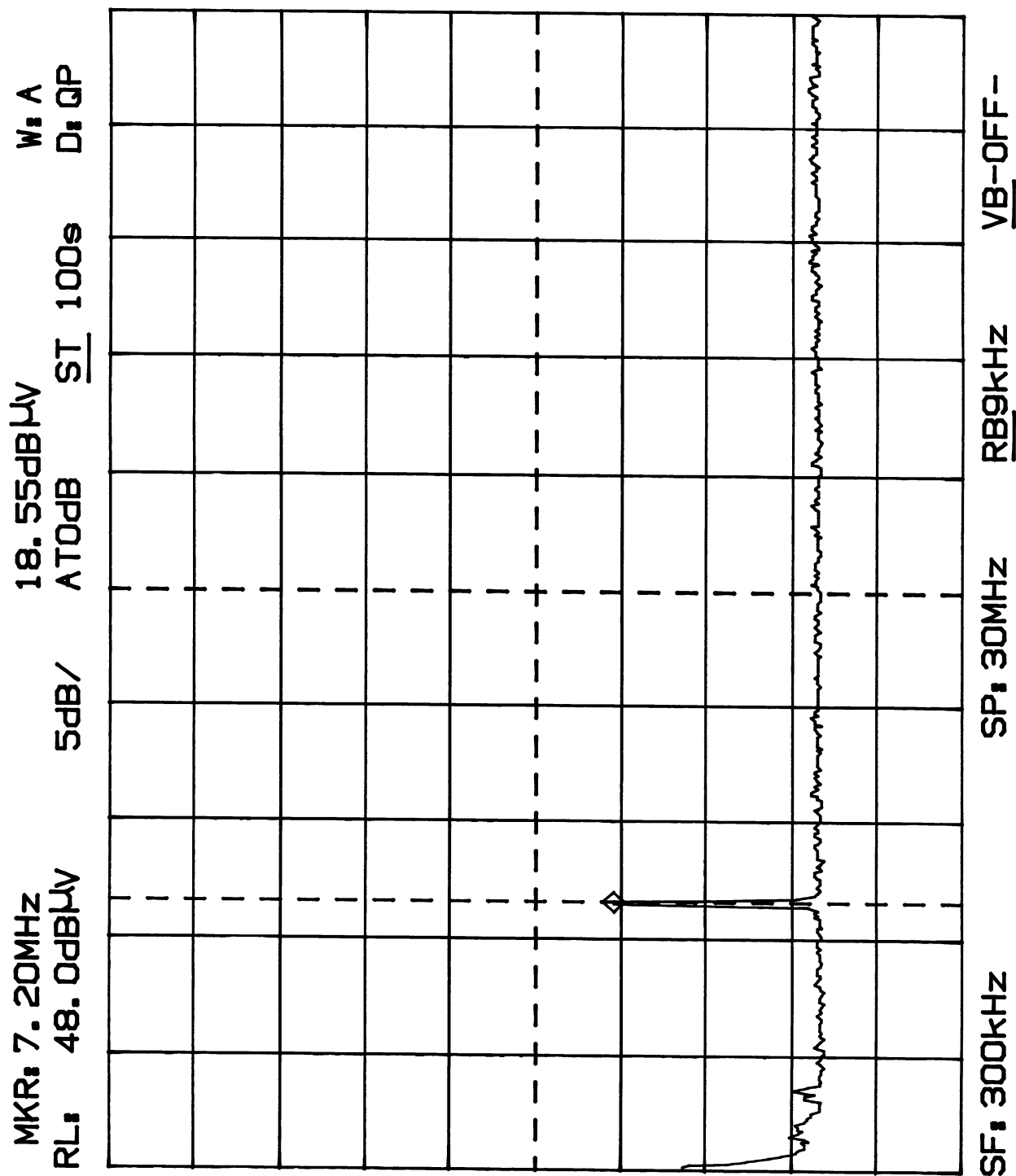
The graphs on Exhibits D(1)-16 and D(1)-17 represent the emissions taken for this device.

Test Results:

Both lines were observed. The measurements indicate that the unit DOES appear to meet the FCC requirements for this class of equipment.

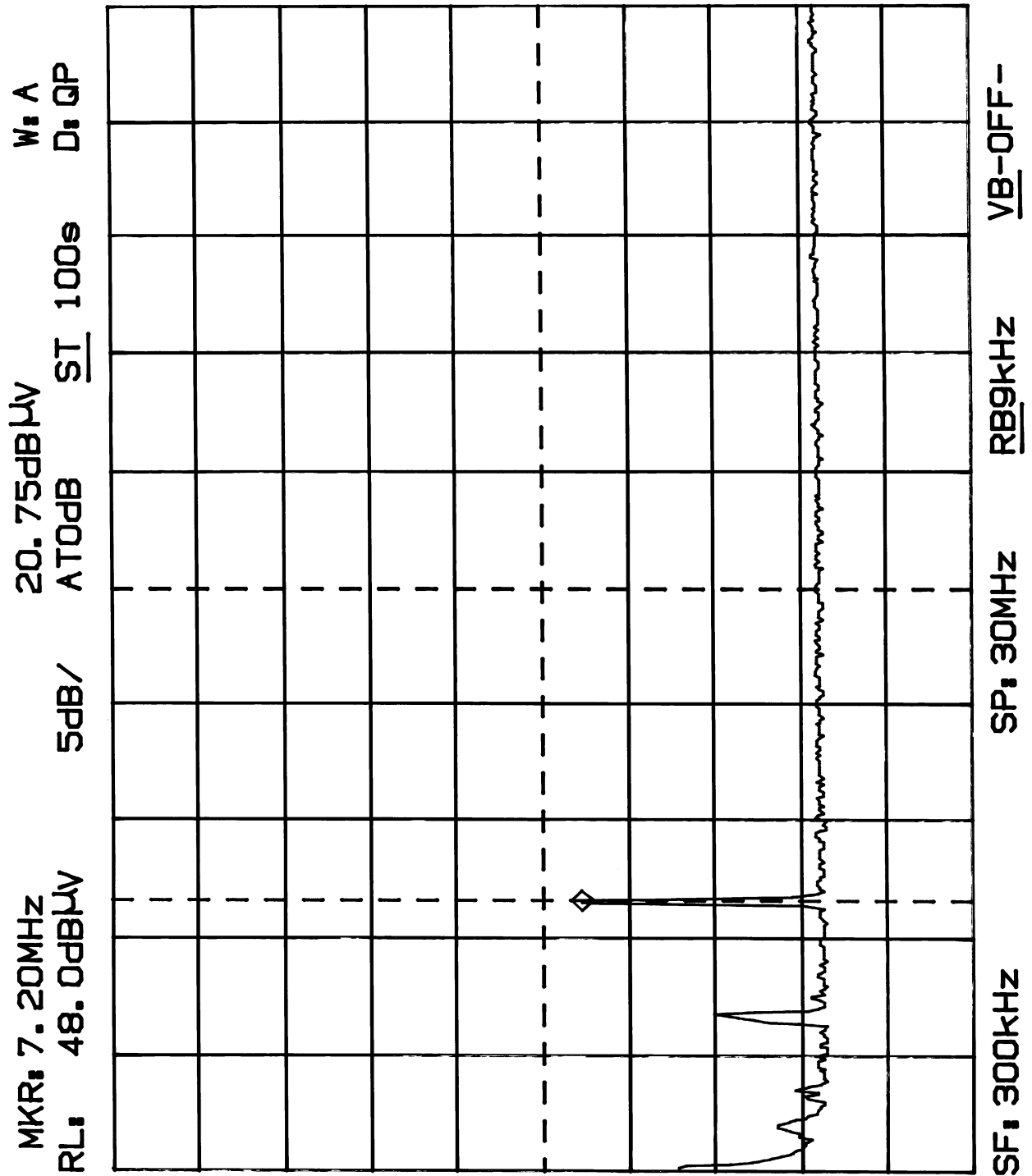
POWER LINE CONDUCTED EMISSIONS

MODEL IBM-3900; LINE 1



POWER LINE CONDUCTED EMISSIONS

MODEL IBM-3900; LINE 2



15.249 (a) and 15.249 (b)
FIELD STRENGTH OF EMISSIONS

Requirements:

Field Strength of Fundamental	Field Strength of Harmonics	15.209
		30-88 MHz 40 dB μ V/m@ 3m
2.4023-2.4806 GHz 94dB μ V	54 dB μ V/m@ 3m	88-216 MHz 43.5
		216-960 MHz 46
		Above 960 MHz 54

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in 15.209, whichever is the lesser attenuation.

Emissions that fall in the restricted bands (15.205) must be less than 54dB μ V/m

FIELD STRENGTH OF EMISSIONS**Test Data:**

Emission Frequency MHz	Meter Reading @3m dBμV	Antenna	Cable and ACF dB	Field Strength dBμV/M	FCC Limit dBμV/M	Margin dB	Detector & BW KHz
<u>HANDSET</u>							
<u>Channel 1</u>							
2474.04	57.50	Horn V	33.50	91.00	94	-3.00	PK 1000
4948.08	13.78	Horn V	38.26	52.04	54	-1.96	PK 1000
7422.12	---						
9896.16	---						
12370.20	---						
<u>Channel 20</u>							
2477.86	58.00	Horn V	33.51	91.51	94	-2.49	PK 1000
4955.72	13.78	Horn V	38.27	52.05	54	-1.95	PK 1000
7433.58	---						
9911.44	---						
12389.30	---						

FIELD STRENGTH OF EMISSIONS**Test Data:**

Emission Frequency MHz	Meter Reading @3m dBμV	Antenna	Cable and ACF dB	Field Strength dBμV/M	FCC Limit dBμV/M	Margin dB	Detector & BW KHz
<u>BASE</u>							
<u>Channel 1</u>							
2402.25	54.00	Horn V	33.38	87.38	94	-6.62	PK 1000
4804.50	14.76	Horn V	37.90	52.66	54	-1.34	PK 1000
7206.75	---						
9609.00	---						
12011.25	---						
14413.50	---						
<u>Channel 20</u>							
2406.04	55.00	Horn V	33.38	88.38	94	-5.62	PK 1000
4812.08	13.76	Horn V	37.90	51.66	54	-2.34	PK 1000
7218.12	---						
9624.16	---						
12030.20	---						
14436.24	---						