

6.0 Conducted Emissions Data

6.1 Conducted emissions testing was performed with the EUT connected to 115 VAC, 60 Hz mains. The hot (high) and neutral (low) AC power leads of the EUT, were scanned with a spectrum analyzer utilizing a peak detector from 450 kHz to 30 MHz. The results were plotted in graphical form with the peak emission levels compared to the specification limits. All peak signals that are within 3 dB of the limit are re-measured using a quasipeak detector. Minimum margins are listed below. Complete graphs and data sheets may be referenced on the following pages.

FCC Part 15 Specifications:

EUT Mounted in SpaceLabs Medical Model 90309:

Frequency (MHz)	Measured Level (dBuV)	Limit (dBuV)	Margin (dB)*	Lead
28.831	32.1	48.0	15.9	High
29.745	34.0	48.0	14.0	High
29.973	33.5	48.0	14.5	High
28.908	34.8	48.0	13.2	Low
29.964	34.3	48.0	13.7	Low
29.973	35.3	48.0	12.7	Low

EUT Mounted in SpaceLabs Medical Model 90310:

Frequency (MHz)	Measured Level (dBuV)	Limit (dBuV)	Margin (dB)*	Lead
0.915	32.2	48.0	15.8	Low
0.995	33.2	48.0	14.8	Low
1.289	33.9	48.0	14.1	Low
0.916	32.5	48.0	15.5	High
0.995	33.2	48.0	14.8	High
1.176	32.5	48.0	15.5	High

Judgment: Passed, minimum margin of 12.7 dB.

* Positive (+) Margins = measured levels less than specification limit.

* Negative (-) Margins = measured levels greater than specification limit.

All readings are Peak unless otherwise stated, using an IF Bandwidth of 10 kHz, a video filter was not used.

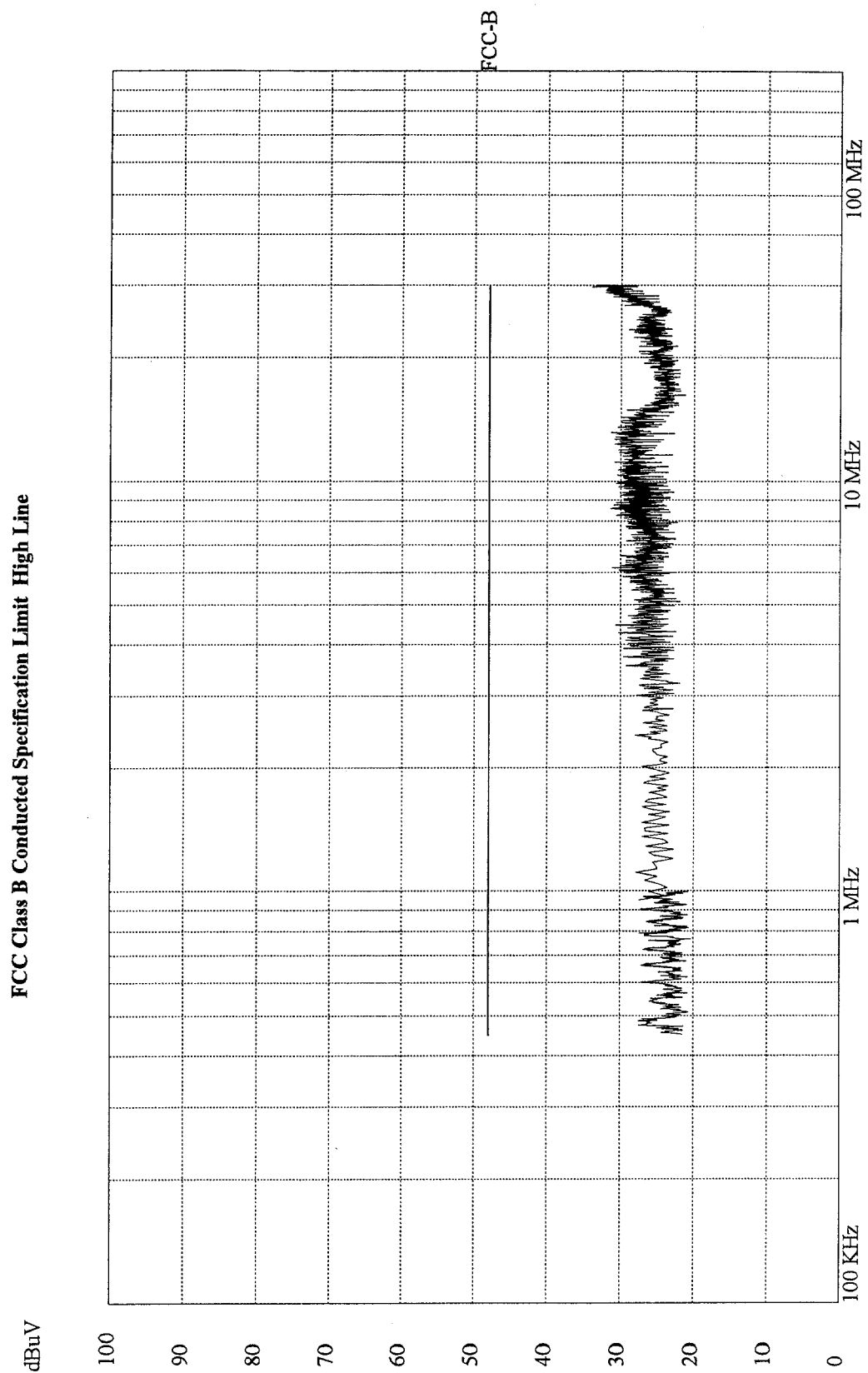
Test Personnel:

Tester Signature: Dean Ghizzone Date: 02/17/95

Typed/Printed Name: Dean Ghizzone

EUT Name: Wireless Transmitter S/N: PAR319-5
Manufacturer: SpaceLabs Medical
Test Date: 01-21-1995 19:49:30
Tested By: Northwest EMC, Inc., Newberg
Comments: Frequency Hopping - Transmitting Mode, Tested in 90309

Peak data.



EUT Name: Wireless Transmitter S/N: PAR319-5
Manufacturer: SpaceLabs Medical
Test Date: 01-21-1995 19:49:30
Tested By: Northwest EMC, Inc., Newberg
Comments: Frequency Hopping - Transmitting Mode, Tested in 90309

Peak data frequency sort.

FCC Class B Conducted Specification Limit High Line

Frequency (MHz)	Ampl. (dBuV)	Line	Preamplifier (dB)	Cable + Attenuation (dB)	Adjusted (dBuV)	Spec (dBuV)	Margin (dB)
28.831	11.4	High	0.0	20.7	32.1	48.0	15.9
29.263	11.4	High	0.0	20.7	32.1	48.0	15.9
29.491	11.3	High	0.0	20.7	32.0	48.0	16.0
29.745	13.3	High	0.0	20.7	34.0	48.0	14.0
29.973	12.8	High	0.0	20.7	33.5	48.0	14.5

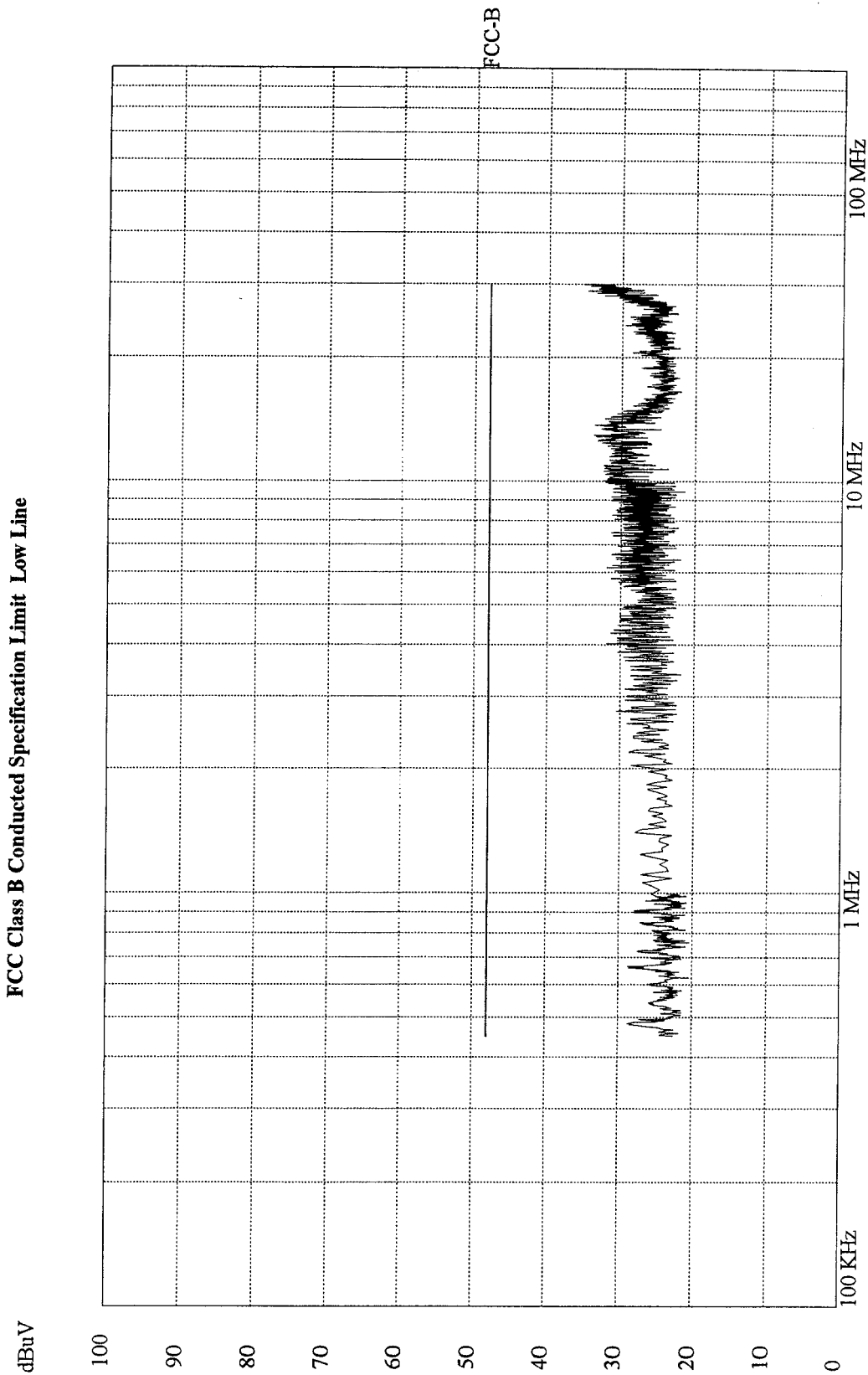
EUT Name: Wireless Transmitter S/N: PAR319-5
Manufacturer: SpaceLabs Medical
Test Date: 01-21-1995 19:49:30
Tested By: Northwest EMC, Inc., Newberg
Comments: Frequency Hopping - Transmitting Mode, Tested in 90309

Peak data frequency sort.

FCC Class B Conducted Specification Limit Low line

Frequency (MHz)	Ampl. (dBuV)	Line	Preamplifier (dB)	Attenuation (dB)	Adjusted (dBuV)	Spec (dBuV)	Margin (dB)
12.513	13.1	Low	0.0	20.1	33.2	48.0	14.8
12.940	13.6	Low	0.0	20.2	33.8	48.0	14.2
13.668	13.5	Low	0.0	20.2	33.7	48.0	14.3
28.603	12.8	Low	0.0	20.7	33.5	48.0	14.5
28.908	14.1	Low	0.0	20.7	34.8	48.0	13.2
29.161	12.6	Low	0.0	20.7	33.3	48.0	14.7
29.517	12.3	Low	0.0	20.7	33.0	48.0	15.0
29.694	13.6	Low	0.0	20.7	34.3	48.0	13.7
29.973	14.6	Low	0.0	20.7	35.3	48.0	12.7

EUT Name: Wireless Transmitter S/N: PAR319-5
Peak data.
Manufacturer: SpaceLabs Medical
Test Date: 01-21-1995 19:49:30
Tested By: Northwest EMC, Inc., Newberg
Comments: Frequency Hopping - Transmitting Mode, Tested in 90309



EUT Name: Wireless Transmitter S/N: PAR327-1
Manufacturer: SpaceLabs Medical
Test Date: 02-03-1995 17:14:14
Tested By: Northwest EMC, Inc., Newberg
Comments: Frequency Hopping - Transmitting Mode

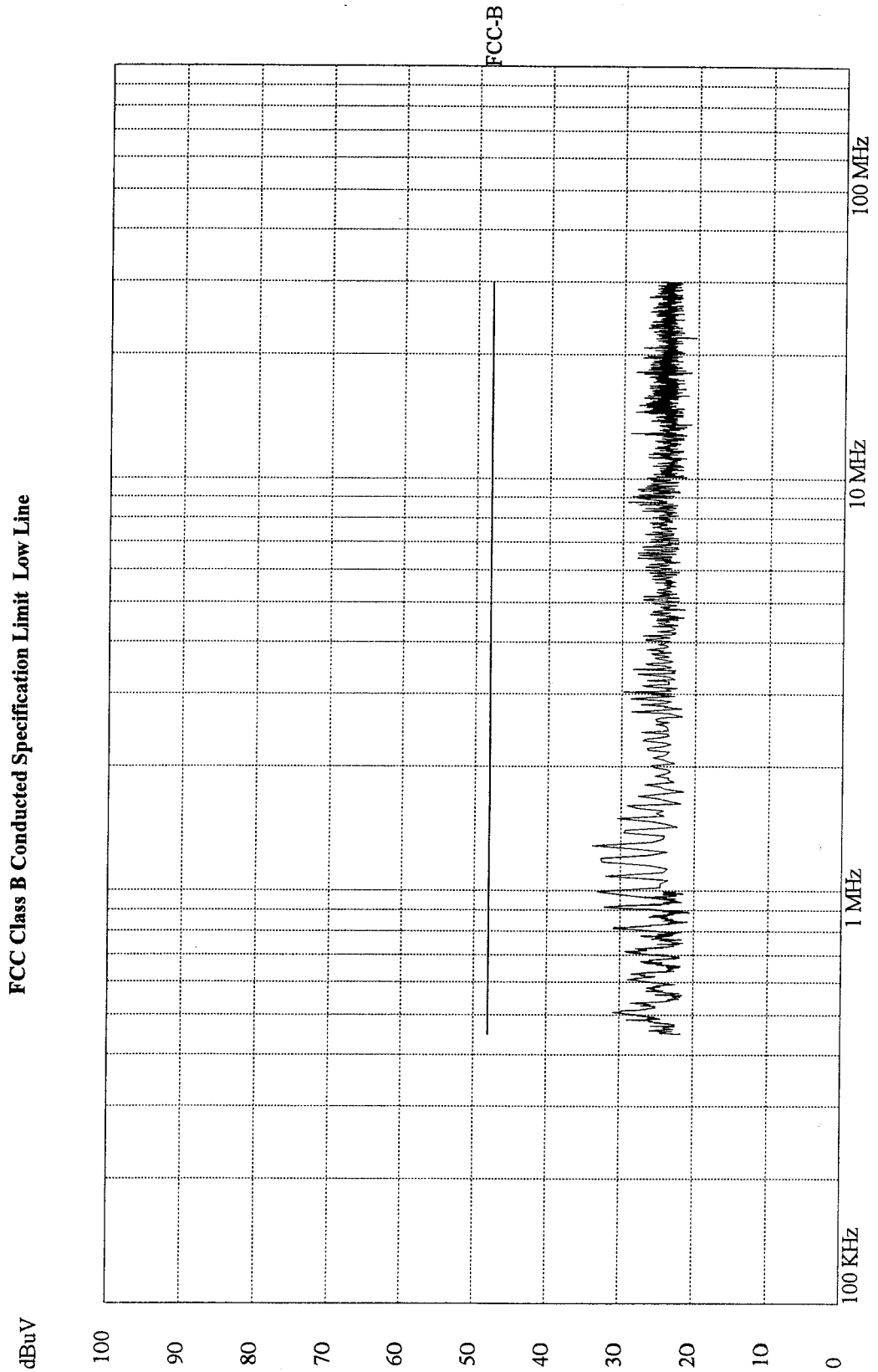
Peak data frequency sort.

FCC Class B Conducted Specification Limit Low line

Frequency (MHz)	Ampl. (dBuV)	Line	Preampl. Cab.+Atten (dB)	Adjusted (dBuV)	Spec (dBuV)	Margin (dB)
0.486	9.0	Low	0.0	29.0	48.0	19.0
0.502	9.3	Low	0.0	29.3	48.0	18.7
0.506	10.9	Low	0.0	30.9	48.0	17.1
0.710	9.0	Low	0.0	29.0	48.0	19.0
0.714	9.4	Low	0.0	29.4	48.0	18.6
0.810	11.0	Low	0.0	31.0	48.0	17.0
0.915	12.2	Low	0.0	32.2	48.0	15.8
0.995	13.2	Low	0.0	33.2	48.0	14.8
1.289	13.9	Low	0.0	33.9	48.0	14.1
1.493	10.5	Low	0.0	30.5	48.0	17.5
3.031	9.8	Low	0.0	29.8	48.0	18.2
8.756	9.4	Low	0.0	29.4	48.0	18.6
12.890	8.9	Low	0.0	29.1	48.0	18.9

EUT Name: Wireless Transmitter S/N: PAR327-1
 Manufacturer: SpaceLabs Medical
 Test Date: 02-03-1995 17:14:14
 Tested By: Northwest EMC, Inc., Newberg
 Comments: Frequency Hopping - Transmitting Mode

Peak data.



EUT Name: Wireless Transmitter S/N: PAR327-1
Manufacturer: SpaceLabs Medical
Test Date: 02-03-1995 17:14:14
Tested By: Northwest EMC, Inc., Newberg
Comments: Frequency Hopping - Transmitting Mode

Peak data frequency sort.

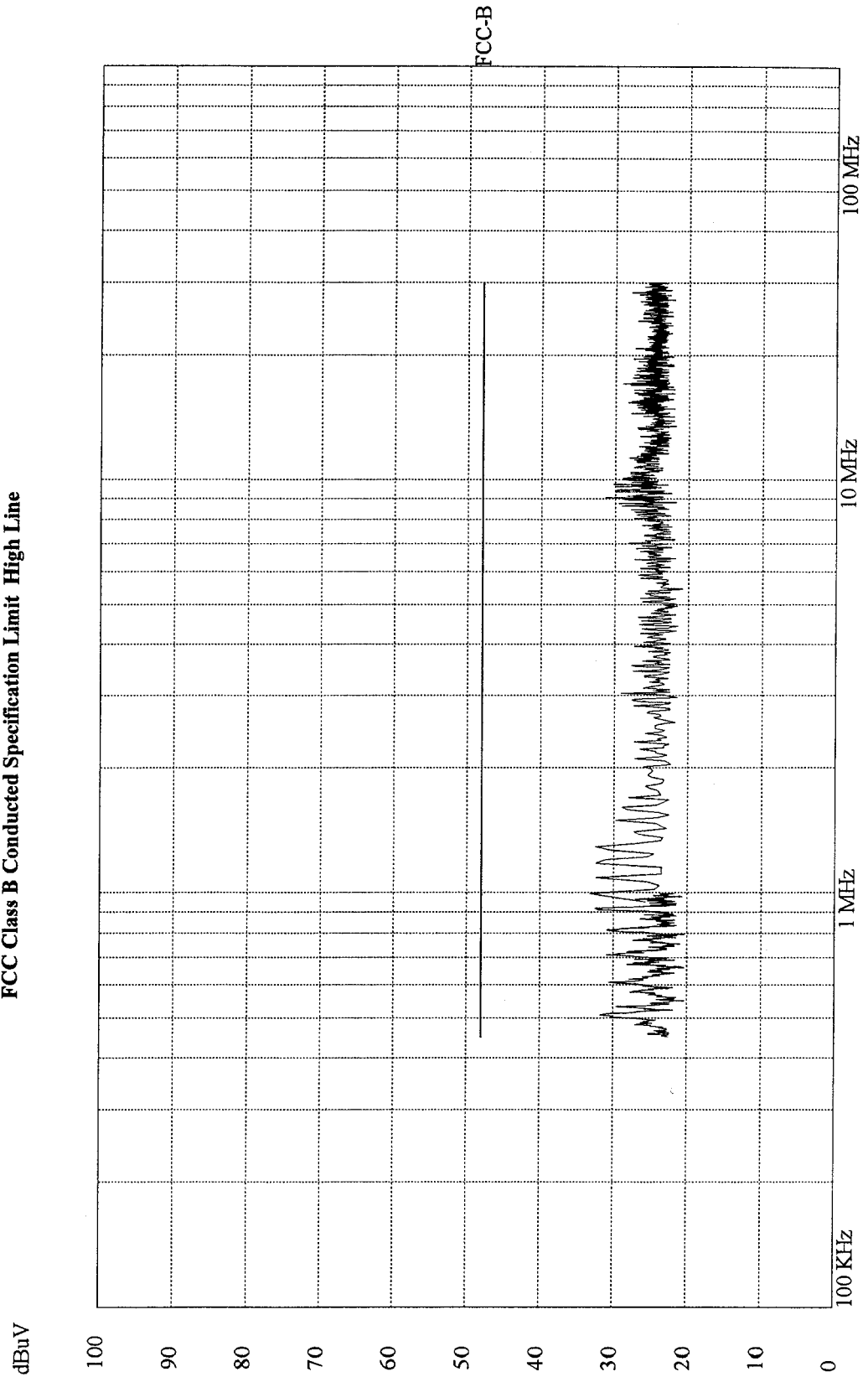
FCC Class B Conducted Specification Limit High Line

Frequency (MHz)	Ampl. (dBuV)	Line	Preampl. Cab.+Atten (dB)	Adjusted (dBuV)	Spec (dBuV)	Margin (dB)
0.501	10.5	High	0.0	30.5	48.0	17.5
0.506	11.8	High	0.0	31.8	48.0	16.2
0.610	10.6	High	0.0	30.6	48.0	17.4
0.709	10.9	High	0.0	30.9	48.0	17.1
0.813	10.9	High	0.0	30.9	48.0	17.1
0.916	12.5	High	0.0	32.5	48.0	15.5
0.995	13.2	High	0.0	33.2	48.0	14.8
1.176	12.5	High	0.0	32.5	48.0	15.5
9.050	11.3	High	0.0	31.3	48.0	16.7
9.728	10.2	High	0.0	30.2	48.0	17.8

EUT Name: Wireless Transmitter S/N: PAR327-1
Manufacturer: SpaceLabs Medical
Test Date: 02-03-1995 17:14:14
Tested By: Northwest EMC, Inc., Newberg
Comments: Frequency Hopping - Transmitting Mode

Peak data.

FCC Class B Conducted Specification Limit High Line



7.0 Radiated Emissions Data

7.1 The following data lists the significant emission frequencies, total (corrected) levels, and specification margins. Correction factors, antenna height, table azimuth, etc., are contained in the data sheets immediately following. Explanation of the correction factors is given in paragraph 7.2 of this report. Data includes emissions from the 90309 and 90310 as well. Complete graphs and data sheets may be referenced on the following pages. Minimum margins are listed below:

FCC Part 15 (3 meter Specifications):

90309:

Frequency (MHz)	Total Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)*	Polarization
67.701	27.7	40.0	12.3	Horizontal
70.201	26.4	40.0	13.6	Vertical
70.021	34.3	40.0	5.7	Horizontal
117.328	38.0	43.5	5.5	Horizontal
216.368	41.9	46.0	4.1	Horizontal
216.368	37.3	46.0	8.7	Vertical

90310:

Frequency (MHz)	Total Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)*	Polarization
40.000	35.1	40.0	4.9	Vertical
34.069	35.0	40.0	5.0	Vertical
123.428	38.0	43.5	5.5	Vertical
175.999	37.8	43.5	5.7	Horizontal
130.025	37.8	43.5	5.7	Vertical
140.000	37.4	43.5	6.1	Horizontal
4945.0	56.6	58.3**	1.7	Horizontal
4819.0	56.6	58.3**	1.7	Horizontal
7229.0	55.9	58.3**	2.4	Horizontal
7418.0	55.2	58.3**	3.1	Horizontal
4819.0	54.6	58.3**	3.7	Vertical
4874.0	54.4	58.3**	3.9	Vertical

* Positive (+) Margins = measured levels less than specification limit.

* Negative (-) Margins = measured levels greater than specification limit.

** Average Specification limit corrected for peak readings.

All readings are Quasi-Peak unless otherwise stated, using an IF Bandwidth of 120 kHz, a video filter was not used.

Judgment: Passed, minimum margin of 1.7 dB.

Test Personnel:

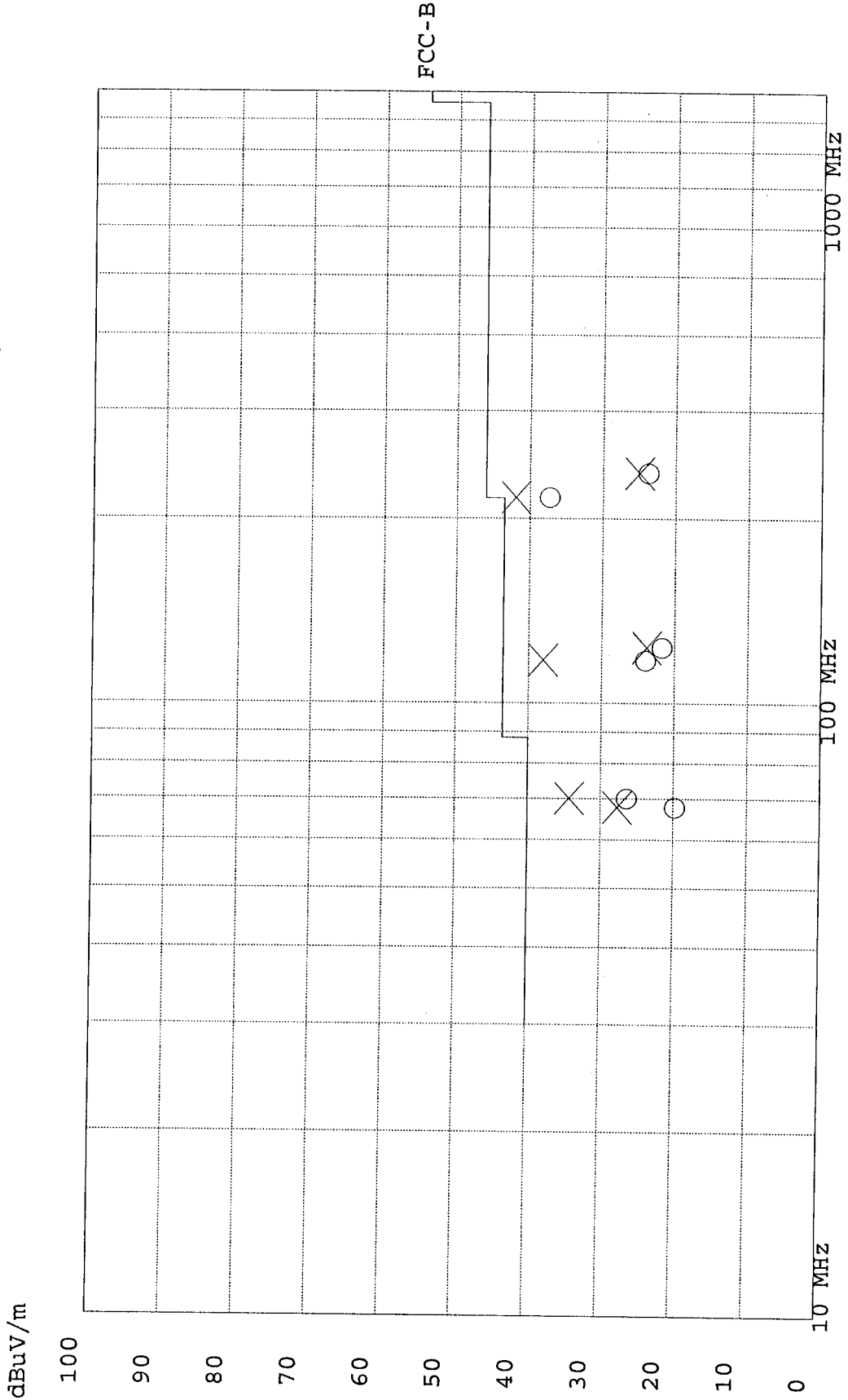
Tester Signature: Dean Ghizzone Date: 02/17/95

Typed/Printed Name: Dean Ghizzone

Horizontal = X
Vertical = O

EUT Name: 90309 w/ Wireless Ethernet Network
 Serial Number: PAR319-5
 Test Date: 01-19-1995 23:28:21
 Tested By: Northwest EMC, Inc., Newberg
 Comments: EUT in 90309

FCC Class B (3 Meter Specification Limit)



Version 3.1, Feb. 6, 1995 Freq. Sort

Northwest EMC

Equipment Tested: 90309 w/ Wireless Ethernet
 Serial Number: PAR319-5
 Manufacturer: Spacelabs, Inc.
 Test Date: 01-19-1995 23:28:21
 Tested By: Northwest EMC, Inc., Newberg
 Comments: EUT in 90309

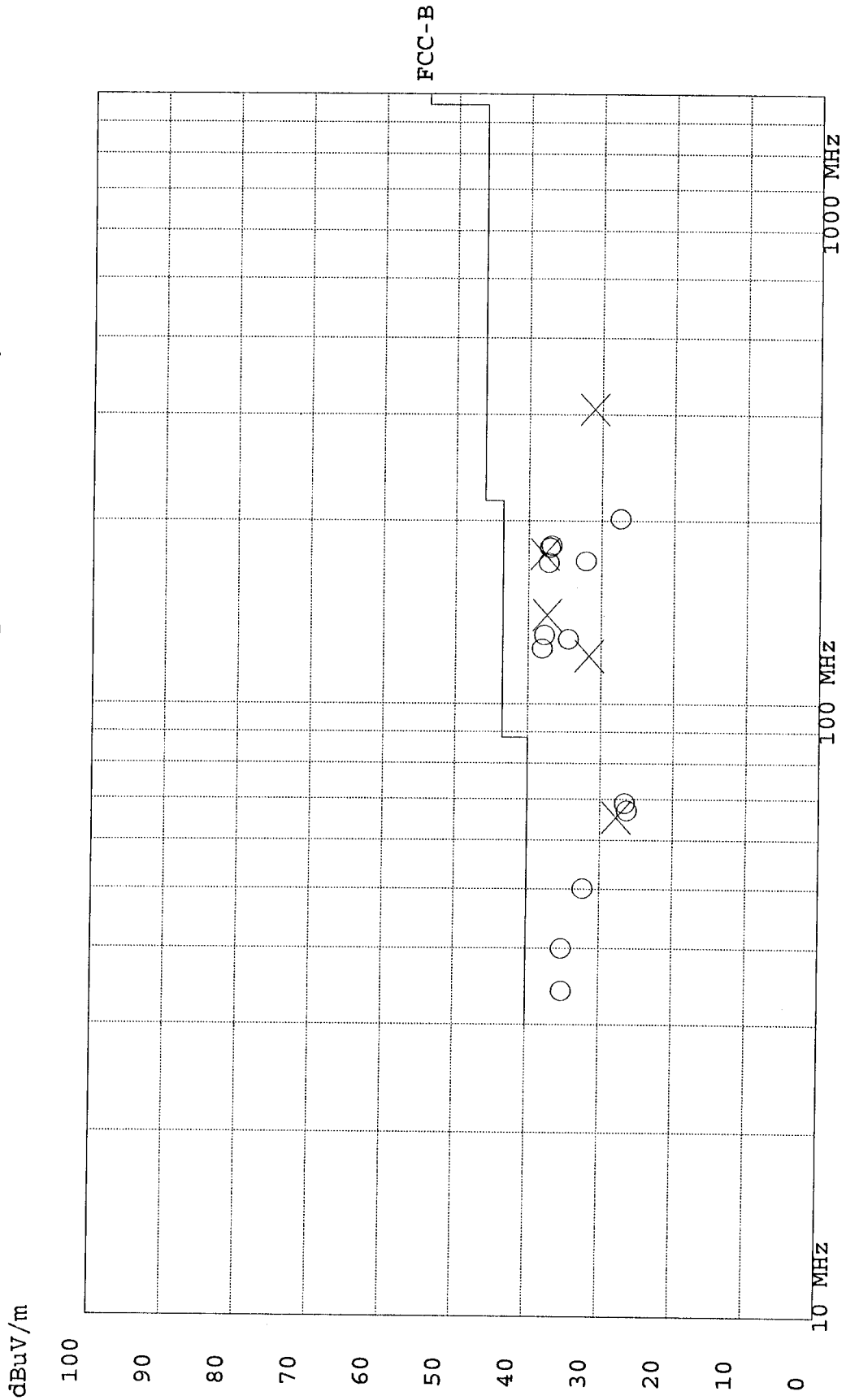
FCC Class B (3 Meter Specification Limit)

Frequency (MHz)	Ampl. (dBuV)	Detect.	AntFact (dB)	Ant. Pol.	Preamp (dB)	Cable Loss (dBuV/m)	Adjusted (dBuV/m)	Spec (dBuV/m)	Margin (dB)	Table degree	Antenna height
67.701	46.7	QP	5.7	HBIC	26.2	1.5	27.7	40.0	12.3	0.0	300.0
67.701	38.8	QP	5.7	VBIC	26.2	1.5	19.8	40.0	20.2	0.0	100.0
70.021	45.8	QP	5.2	VBIC	26.2	1.6	26.4	40.0	13.6	0.0	150.0
70.021	53.7	QP	5.2	HBIC	26.2	1.6	34.3	40.0	5.7	0.0	400.0
117.328	49.9	QP	11.6	HBIC	26.0	2.5	38.0	43.5	5.5	0.0	200.0
117.328	35.9	QP	11.6	VBIC	26.0	2.5	24.0	43.5	19.5	0.0	200.0
123.005	35.1	QP	12.2	HBIC	26.0	2.5	23.8	43.5	19.7	0.0	150.0
123.005	33.0	QP	12.2	VBIC	26.0	2.5	21.8	43.5	21.8	0.0	100.0
216.368	52.1	QP	11.4	HLPA	25.5	3.9	41.9	46.0	4.1	0.0	150.0
216.368	47.5	QP	11.4	VLPA	25.5	3.9	37.3	46.0	8.7	0.0	150.0
237.530	34.5	QP	11.8	HLPA	25.5	4.2	25.0	46.0	21.0	0.0	100.0
237.530	33.2	QP	11.8	VLPA	25.5	4.2	23.7	46.0	22.3	0.0	250.0

EUT Name: 90310 Wireless Ethernet
 Serial Number: PAR327-1
 Test Date: 01-20-1995 16:40:25
 Tested By: Northwest EMC, Inc., Newberg
 Comments: Individually shielded receiver boards. EUT in 90310

Horizontal= X
 Vertical = O

FCC Class B (3 Meter Specification Limit)



Version 3.1, Feb. 6, 1995

Northwest EMC

Equipment Tested: 90310 Wireless Ethernet
 Serial Number: PAR327-1
 Manufacturer: Spacelabs, Inc.
 Test Date: 01-20-1995 16:40:25
 Tested By: Northwest EMC, Inc., Newberg
 Comments: Individually shielded receiver boards. EUT in 90310

FCC Class B (3 Meter Specification Limit)

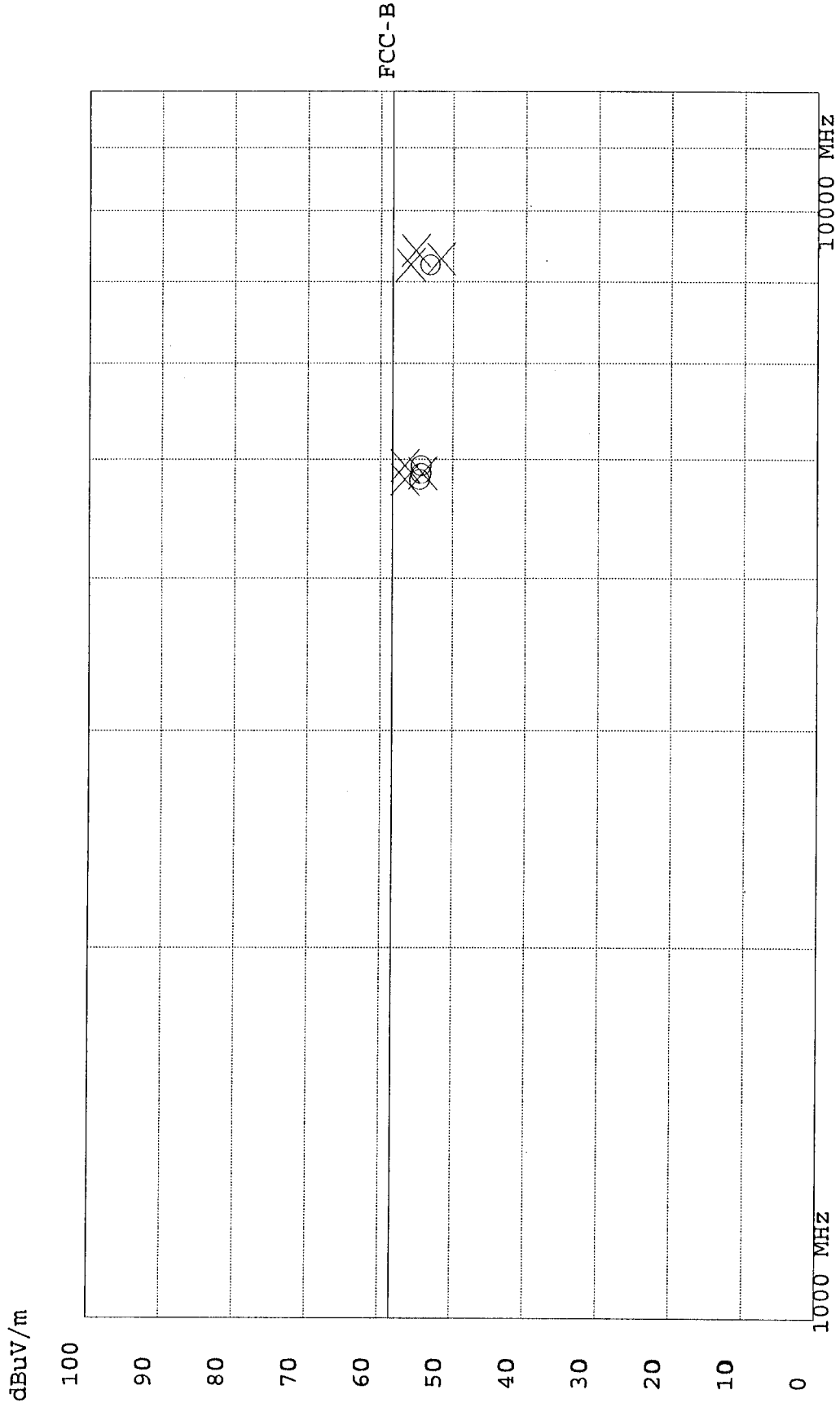
Frequency (MHz)	Ampl. (dBuV)	Detect.	AntFact (dB)	Ant. Pol.	Preamp (dB)	Cable Loss	Adjusted (dBuV/m)	Spec (dBuV/m)	Margin (dB)	Table degree	Antenna height
34.069	43.9	QP	16.3		VBIC	26.3	1.1	35.0	40.0	5.0	100.0
40.000	46.3	QP	14.0		VBIC	26.3	1.1	35.1	40.0	4.9	100.0
50.116	46.7	QP	10.8		VBIC	26.3	1.1	32.3	40.0	7.7	100.0
65.329	46.3	QP	6.2		HBIC	26.2	1.5	27.8	40.0	12.2	400.0
67.119	45.2	QP	5.8		VBIC	26.2	1.5	26.3	40.0	13.7	100.0
68.909	45.8	QP	5.4		VBIC	26.2	1.6	26.6	40.0	13.4	100.0
120.000	43.2	QP	11.9		HBIC	26.0	2.5	31.6	43.5	11.9	350.0
123.428	49.2	QP	12.3		VBIC	26.0	2.5	38.0	43.5	5.5	100.0
127.999	45.3	QP	12.7		VBIC	26.0	2.5	34.5	43.5	9.0	100.0
130.025	48.4	QP	12.9		VBIC	26.0	2.5	37.8	43.5	5.7	100.0
140.000	47.1	QP	13.7		HBIC	26.0	2.6	37.4	43.5	6.1	400.0
170.435	44.3	QP	15.7		VBIC	25.8	3.0	37.2	43.5	6.3	400.0
171.428	39.0	QP	15.8		VBIC	25.8	3.1	32.1	43.5	11.4	250.0
175.999	44.2	QP	16.1		HBIC	25.7	3.2	37.8	43.5	5.7	200.0
180.570	43.3	QP	16.3		VBIC	25.7	3.2	37.1	43.5	6.4	100.0
181.996	42.9	QP	16.4		VBIC	25.7	3.3	36.9	43.5	6.6	100.0
201.496	38.4	QP	11.0		VLPA	25.6	3.6	27.4	43.5	16.1	100.0
306.150	37.0	QP	14.4		HLPA	25.4	5.1	31.1	46.0	14.9	400.0

EUT Name: Wireless Ethernet Transmitter
Serial Number: PAR327-1
Test Date: 02-03-1995 00:05:34 17:44:50
Tested By: Horn
Comments: Antenna Attached, Placed in 90310
Peak Readings, Frequency Hopping Stopped, (Fixed Frequency)

Northwest EMC

Horizontal = X
Vertical = O

FCC Class B (3 Meter Specification Limit)



Version 3.1, Feb. 6, 1995 Freq. Sort

Northwest EMC

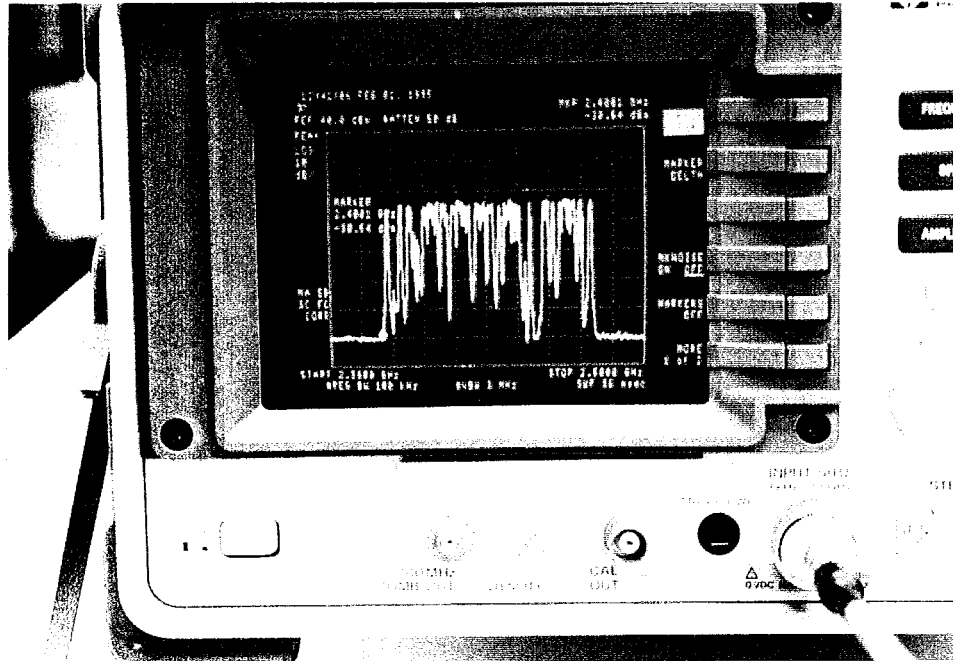
Equipment Tested: Wireless Ethernet Transmitter
 Serial Number: PAR327-1
 Manufacturer: SpaceLabs Medical
 Test Date: 02-03-1995 00:05:34 17:44:50
 Tested By: Horn
 Comments: Antenna Attached, Placed in 90310
 Peak Readings, Frequency Hopping Stopped, (Fixed Frequency)

FCC Class B (3 Meter Specification Limit)

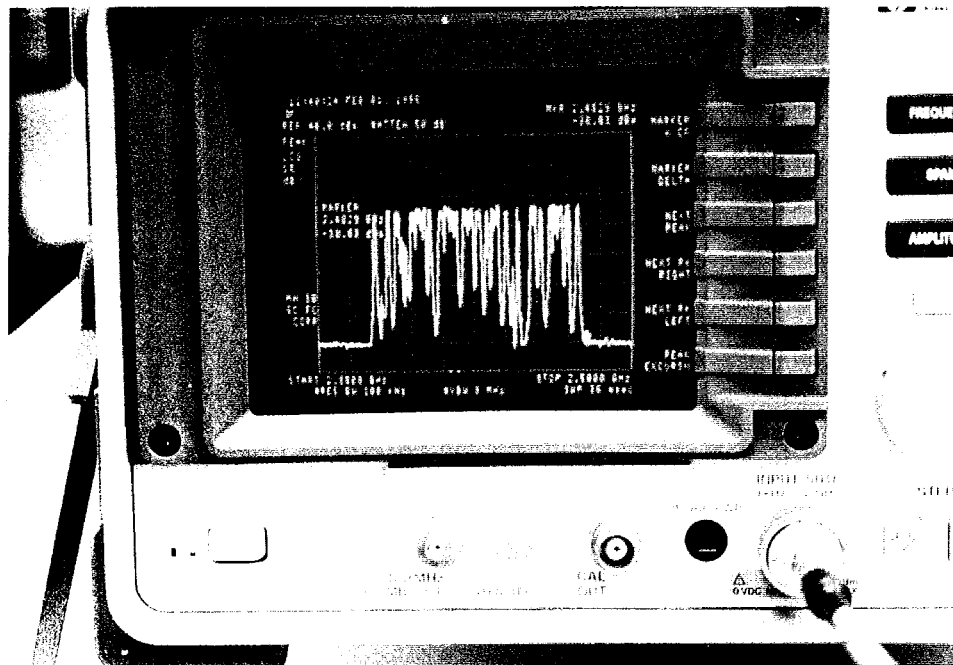
Frequency (MHz)	Ampl. (dBuV)	Detect.	AntFact (dB)	Ant. Pol.	Preamp (dB)	Cable Loss (dBuV/m)	Adjusted Spec (dBuV/m)	Margin (dB)	Table degree	Antenna height
4819.000	44.7	PK	34.6		HHRN30.0	7.3	56.6	58.3	1.7	154.0
4819.000	42.7	PK	34.6		VHRN30.0	7.3	54.6	58.3	3.7	138.0
4874.000	42.4	PK	34.7		VHRN30.0	7.3	54.4	58.3	3.9	63.0
4874.000	42.2	PK	34.7		HHRN30.0	7.3	54.2	58.3	4.1	255.0
4945.000	44.3	PK	34.9		HHRN30.0	7.4	56.6	58.3	1.7	277.0
4945.000	42.1	PK	34.9		VHRN30.0	7.4	54.4	58.3	3.9	157.0
7229.000	37.8	PK	37.1		HHRN30.0	11.0	55.9	58.3	2.4	147.0
7229.000	35.1	PK	37.1		VHRN30.0	11.0	53.2	58.3	5.1	226.0
7311.000	33.3	PK	37.3		HHRN30.0	11.1	51.7	58.3	6.6	151.0
7418.000	36.4	PK	37.6		HHRN30.0	11.2	55.2	58.3	3.1	165.0

Test Data

Occupied Band, Antenna connected directly to Spectrum Analyzer,
Operating in a frequency hopping mode.



Occupied Band, Antenna connected directly to Spectrum Analyzer,
Operating in a frequency hopping mode.



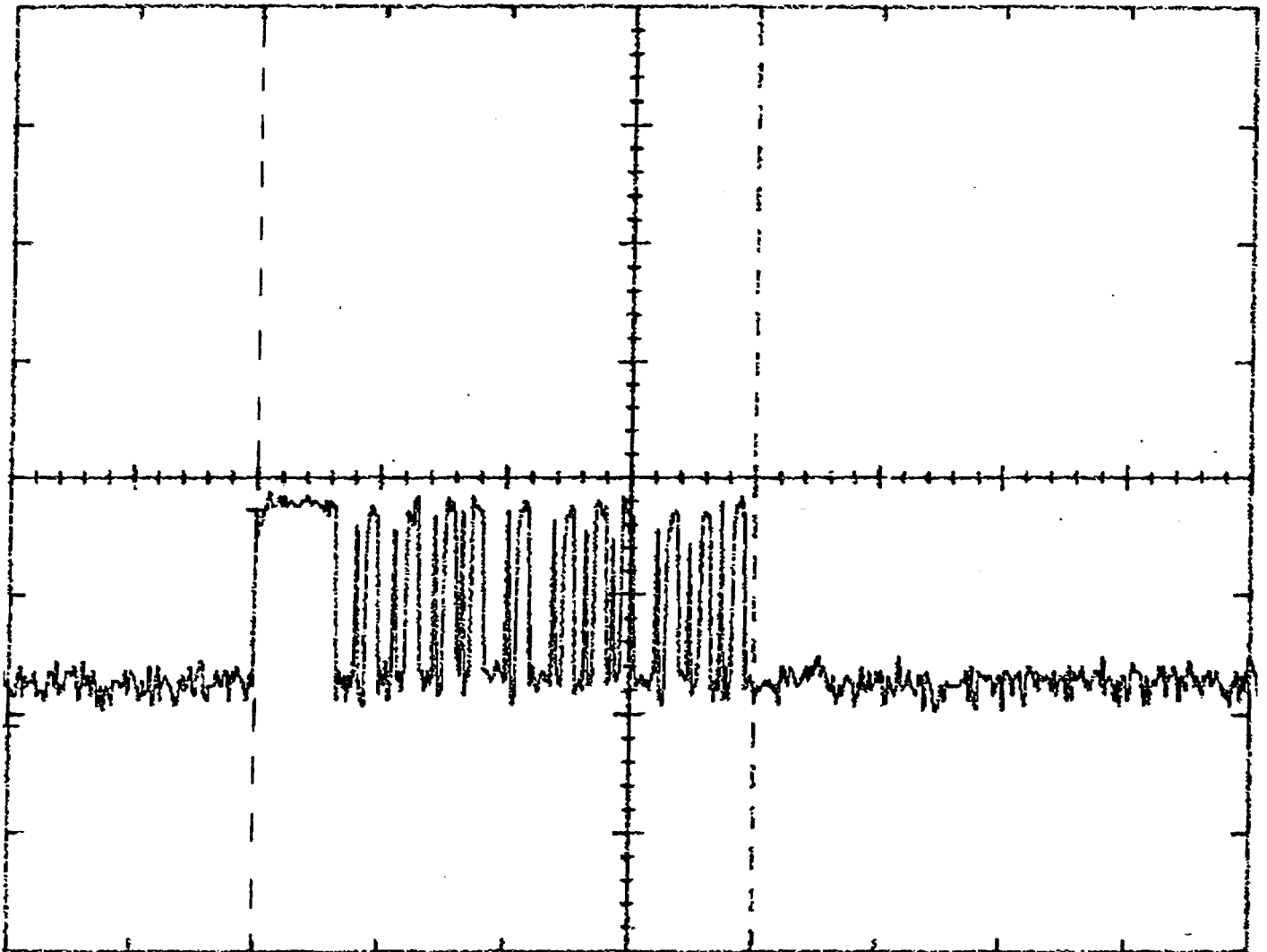
Test Data

Channel Dwell Time.

CHANNEL DWELL TIME

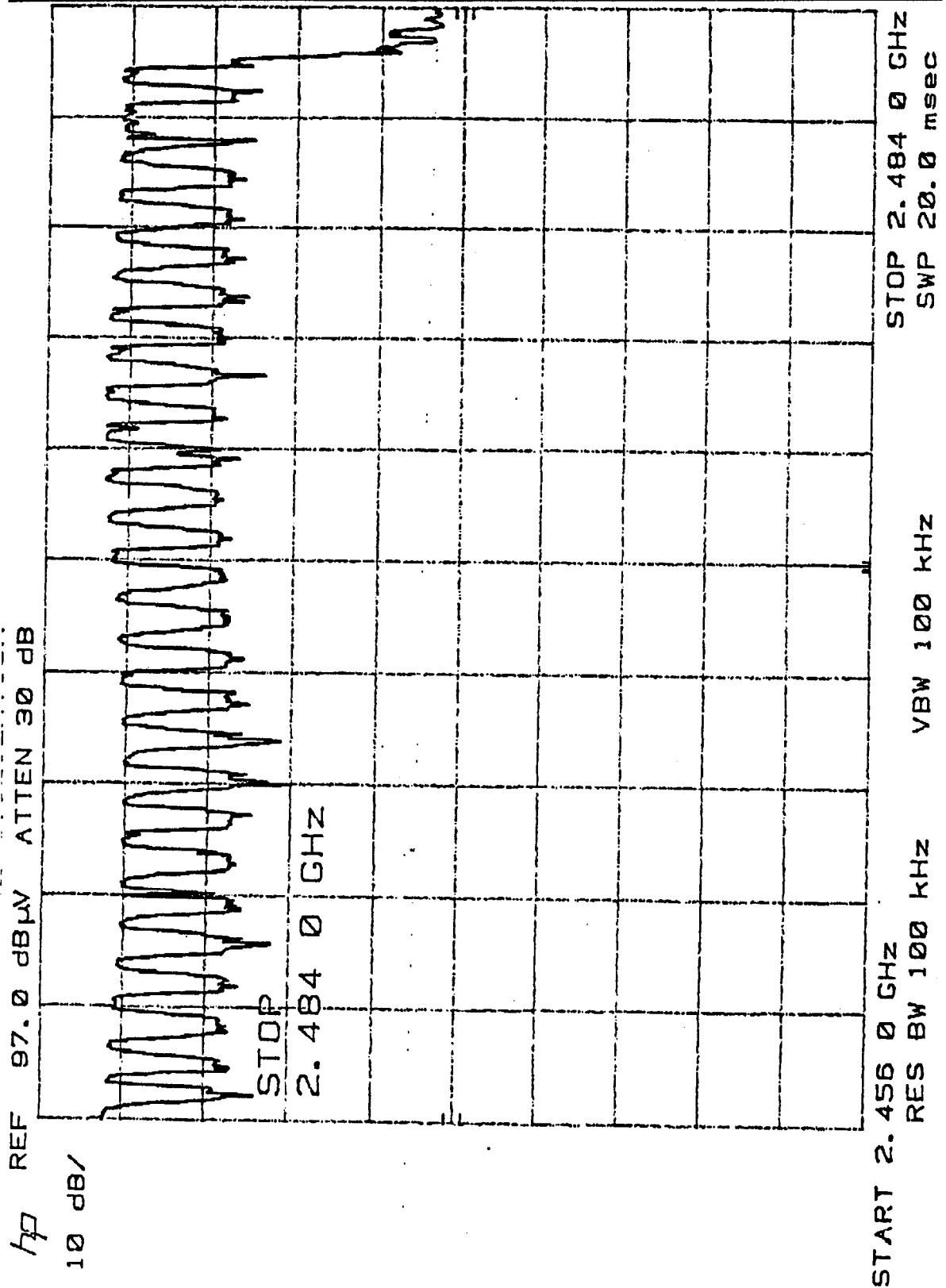
CH1 500mV A 100ms 797mV VERT

400.00ms



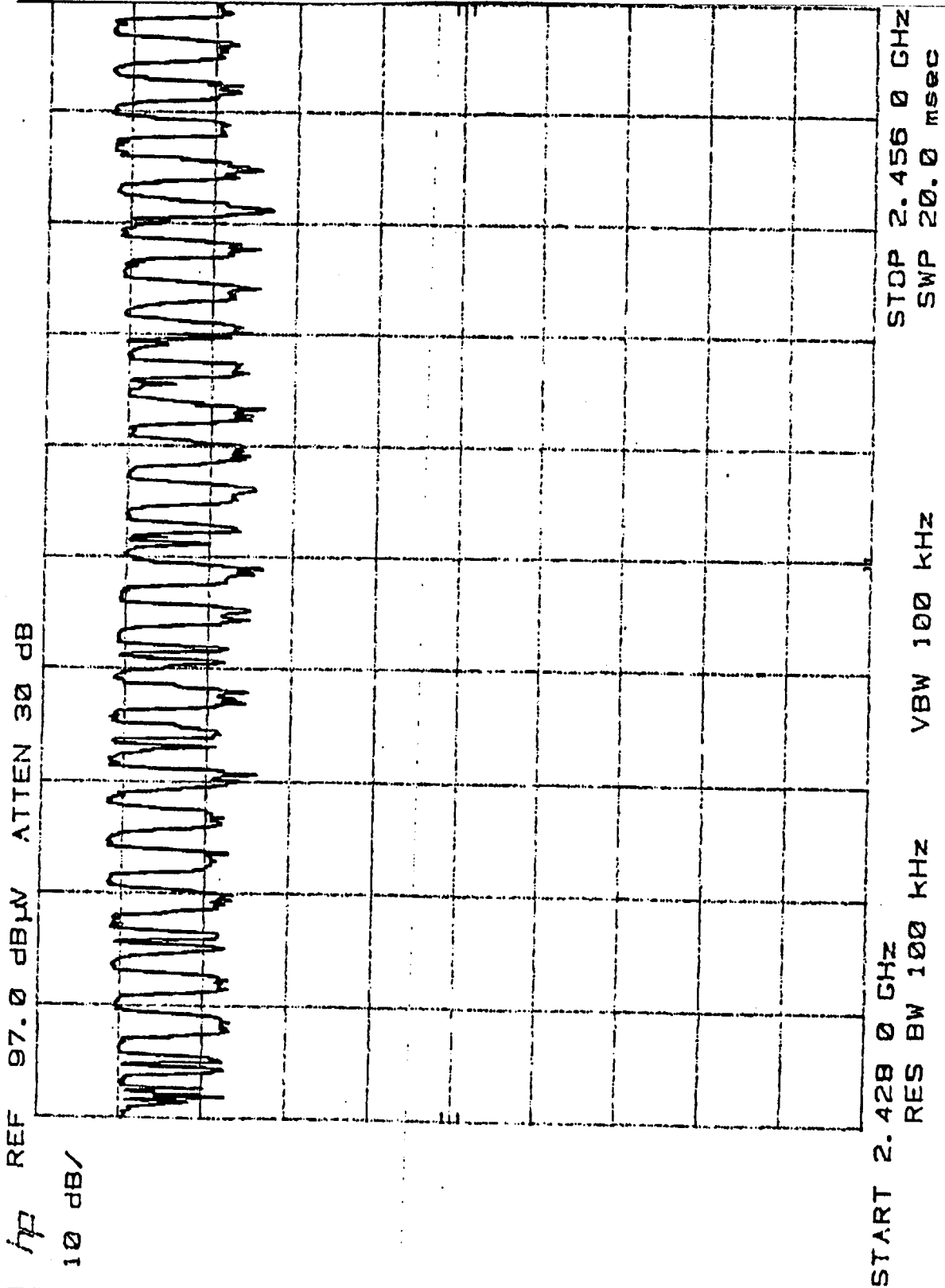
Test Data

Channel Utilization.



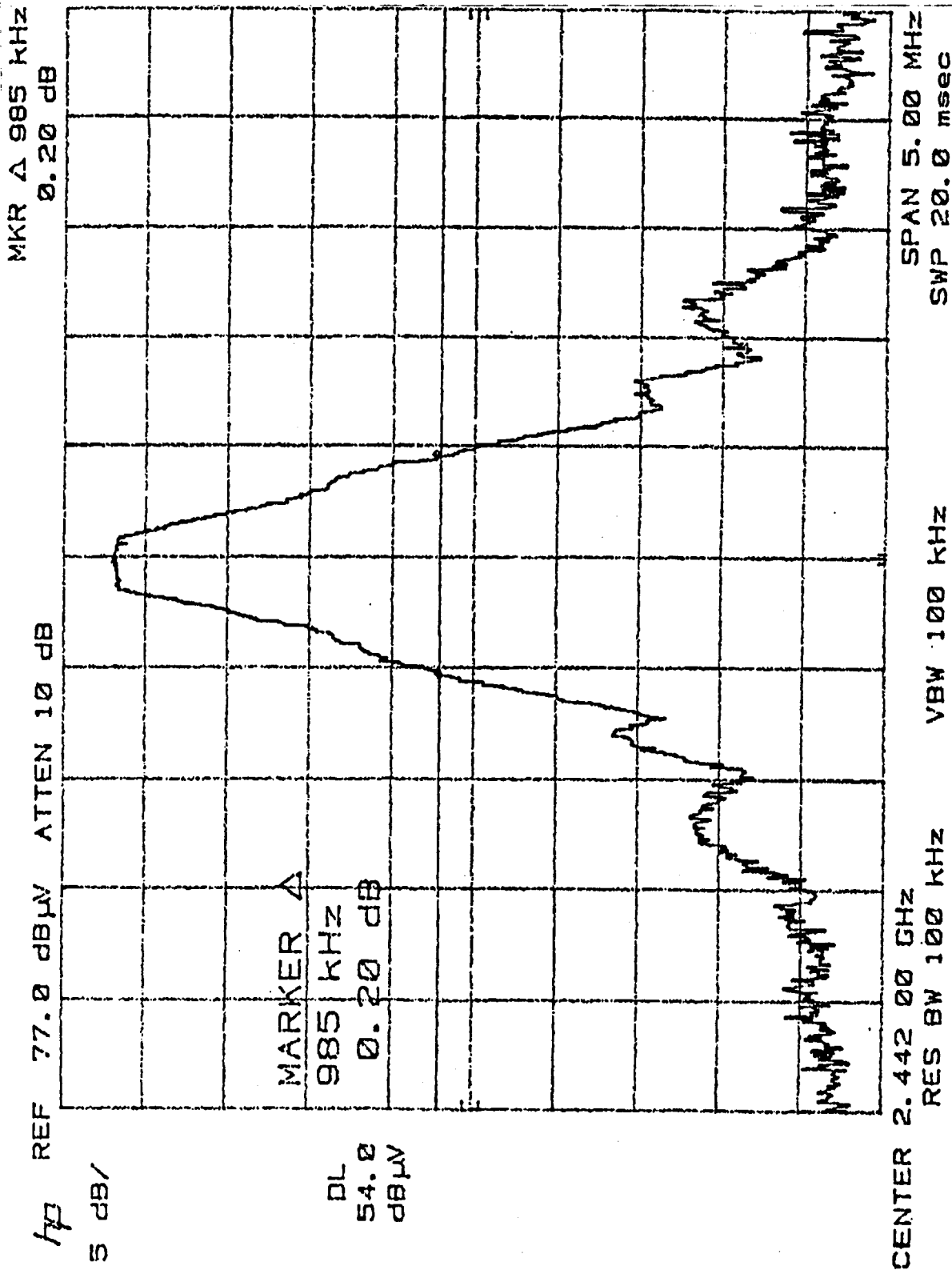
Test Data

Channel Utilization.



Test Data

Emission Bandwidth.



7.2 Field Strength Calculations

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured level. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

where :

- FS = Field Strength
- RA = Measured Level
- AF = Antenna Factor
- CF = Cable Attenuation Factor
- AG = Amplifier Gain

Assume a receiver reading of 52.5 dBuV is obtained. The Antenna Factor of 7.4 and a Cable Factor of 1.1 is added. The Amplifier Gain of 29 dB is subtracted, giving a field strength of 32 dBuV/meter.

$$FS = 52.5 + 7.4 + 1.1 - 29 = 32 \text{ dBuV/meter}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(32 \text{ dBuV/m})/20] = 39.8 \text{ } \mu\text{V/m}$$

7.3 Measurement Bandwidths

Peak Data

150 kHz - 30 MHz.....	10 kHz
30 MHz - 1000 MHz.....	100 kHz
Greater than 1000 MHz	1000 kHz

Quasi-peak Data

150 kHz - 30 MHz.....	9 kHz
30 MHz - 1000 MHz.....	120 kHz

All radiated measurements are quasi-peak unless otherwise stated. A video filter was not used.
All conducted measurements are peak unless otherwise stated. A video filter was not used.

8.0 Power Output Data

8.1 The EUT antenna port was connected directly to the spectrum analyzer input, via a 3 foot section of semi-rigid coaxial cable. The EUT was operated in a test mode, such that the frequency was fixed. The Resolution Bandwidth was set to 3 MHz. Measurements were made with the EUT fixed at the low, mid-range, and high end of the frequency band.

Frequency (MHz)	Total Level (dBm)	Limit (dBm)	Margin (dB)*	Comments
2409.65	16.7	30.0	13.3	"Low"
2437.0	17.8	30.0	12.2	"Mid-Range"
2472.0	18.3	30.0	11.7	"High"

* Positive (+) Margins = measured levels less than specification limit.

* Negative (-) Margins = measured levels greater than specification limit.

All readings are Peak unless otherwise stated, using an IF Bandwidth of 3 MHz, a video filter was not used.

Judgment: Passed, minimum margin of 11.7 dB.

Test Personnel:

Tester Signature: Dean Ghizzone Date: 02/17/95

Typed/Printed Name: Dean Ghizzone

9.0 Spurious Emissions Data

9.1 The EUT antenna port was connected directly to the spectrum analyzer input, via a 3 foot section of semi-rigid coaxial cable. The Resolution Bandwidth was set to 100 kHz. Measurements were made with the EUT fixed at the low, mid-range, and high end of the frequency band.

Frequency (GHz)	Total Level (dBm)	Fundamental Level (dBm)	Comments
4.819	-64.8	16.7	"Low"
7.229	-62.6	16.7	"Low"
9.639	-69.7	16.7	"Low"
12.048	-67.3	16.7	"Low"
14.458	<-65.9	16.7	"Low"
16.868	<-65.0	16.7	"Low"
19.277	<-66.4	16.7	"Low"
21.687	<-59.7	16.7	"Low"
24.097	<-60.7	16.7	"Low"

Frequency (GHz)	Total Level (dBm)	Fundamental Level (dBm)	Comments
4.874	-63.7	17.8	"Mid-Range"
7.311	-70.3	17.8	"Mid-Range"
9.748	<-69.9	17.8	"Mid-Range"
12.185	<-69.5	17.8	"Mid-Range"
14.621	<-65.4	17.8	"Mid-Range"
17.059	<-65.4	17.8	"Mid-Range"
19.495	<-62.1	17.8	"Mid-Range"
21.931	<-59.4	17.8	"Mid-Range"
24.368	<-59.8	17.8	"Mid-Range"

Frequency (GHz)	Total Level (dBm)	Fundamental Level (dBm)	Comments
4.945	-60.3	18.3	"High"
7.418	-60.7	18.3	"High"
9.892	<-71.3	18.3	"High"
12.365	<-66.9	18.3	"High"
14.837	<-66.8	18.3	"High"
17.309	<-63.9	18.3	"High"
19.782	<-61.5	18.3	"High"
22.255	<-60.4	18.3	"High"
24.728	<-59.9	18.3	"High"

All readings are Peak unless otherwise stated, using an IF Bandwidth of 100 kHz, a video filter was not used.

Judgment: All spurs and harmonic emissions are greater than 20 dB below the fundamental level..

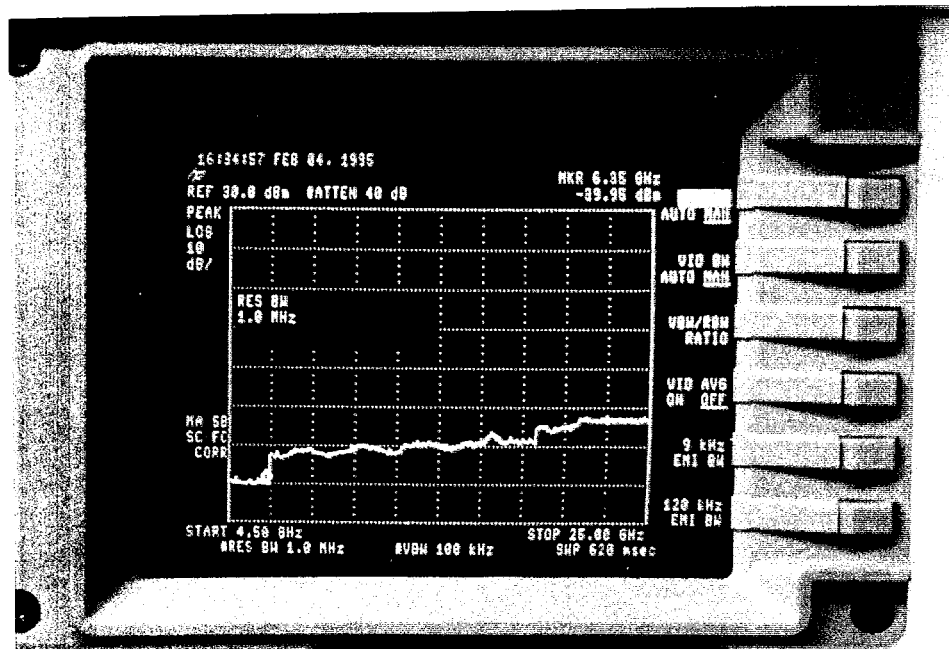
Test Personnel:

Tester Signature: Dean Ghizzone Date: 02/17/95

Typed/Printed Name: Dean Ghizzone

Test Data

Antenna connected directly to Spectrum Analyzer,
Operating in a frequency hopping mode.
Spectrum analyzer was placed in a Max Hold mode for approximately 10 minutes.



10.4 Measurement Equipment

Instrument	Model	Serial No.	Freq Range	Last Cal	Cal Due
Spectrum Analyzer	HP 8568B	2601A02125	100 Hz - 1.5 GHz	06/15/94	06/15/95
Q-peak Adapter	HP 85650A	2043A00214	10 kHz - 1000 MHz	06/22/94	06/22/95
Spectrum Analyzer	HP 8591A	2943400519	10 kHz - 1.8 GHz	12/28/94	12/28/95
Spectrum Analyzer	HP 8592B	40160	9 kHz - 22 GHz	01/25/95	01/25/96
Amplifier	HP 8447D	1937A02446	100 kHz-1300 MHz	12/01/94	12/01/95
Amplifier	HP 8449B	3008A00232	1 GHz - 26.5 GHz	01/16/95	01/16/96
Dipole Antenna	EMCO 3121C	866	28 MHz - 1000 MHz	05/30/94	05/30/95
Horn Antenna	EMCO 3115	4074	1 GHz - 18 GHz	07/24/94	07/24/95
Log Periodic Ant	EMCO 3146	3486	200 MHz - 1 GHz	01/02/95	01/02/96
Log Periodic Ant	EMCO 3146	2809	200 MHz - 1 GHz	01/02/95	01/02/96
LISN	EMCO 3825/2	1705	10 kHz - 30 MHz	02/01/94	02/01/95
LISN	Solar 9252-50-R	927103	10 kHz - 30 MHz	02/10/94	02/10/95
Bicon Antenna	EMCO 3104C	4306	20 MHz - 200 MHz	01/02/95	01/02/96
Bicon Antenna	EMCO 3110	1240	20 MHz - 200 MHz	01/02/95	01/02/96