FCC CERTIFICATION REPORT

prepared for

Nomadic Communications PTY. LTD.
Unit 6, 27-33 Thornton Crescent
Mitcham, Victoria, Australia 3132

FCC ID: OKKNMX910

May 17, 1999

WLL PROJECT #: 5133X

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STATEMENT OF QUALIFICATIONS

for

Gregory M. Snyder

Washington Laboratories, Ltd.

I hold a Bachelor of Science in Electronics Engineering Technology and have over ten years of EMI testing experience. I am qualified to perform EMC testing to the methods described in this test report. The measurements taken within this report are accurate within my ability to perform the tests and within the tolerance of the measuring instrumentation.

By: [signature]
Gregory M. Snyder
Chief EMC Engineer

Date: May 17, 1999

NOMADIC COMMUNICATIONS PTY. LTD.
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16th April, 1999

Chief Authorizations Branch
Federal Communications Commission
7435 Oakland Mills Road
Columbia, MD 21046

RE: LETTER OF AGENCY

This letter is to serve notice that Washington Laboratories Ltd is hereby authorized to act on our behalf in connection with the Application for Equipment Authorization attached herewith.

We certify that we are not subject to denial of federal benefits, that includes FCC benefits, pursuant to Section 5301 of the Anti-Drug Abuse ACT of 1988, U.S.C. 862. Further, no party, as defined in 47 CFR 1.2002(b), to the application is subject to denial of federal benefits, that includes FCC benefits.

Signed,

Michael G Hamilton
Managing Director

FCC CERTIFICATION REPORT

for

Nomadic Communications PTY. LTD.

1.0 Introduction

This report has been prepared on behalf of Nomadic Communications PTY. LTD. in support of their application for FCC Certification under Part 90 of the FCC Rules and Regulations.

The Equipment Under Test was a Mobitex RF Modem (Model: NMX910).

All measurements were performed at Washington Laboratories, Ltd. test center in Gaithersburg, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories has been accepted by the FCC and approved by NIST NVLAP (NVLAP Lab Code 200066-0) as an independent FCC test laboratory.

Measurements were made on the Equipment Under Test in accordance with FCC Rule Part 2, specifically the requirements stipulated in:

2.985 RF Power Output
2.987 Modulation Characteristics
2.989 Occupied Bandwidth
2.991 Spurious Emissions at Antenna Terminals
2.993 Field Strength of Spurious Radiation
2.995 Frequency Stability

All results reported herein relate only to the item tested. This report shall not be used to claim product endorsement by NVLAP or any agency of the US Government. The measurement uncertainty of the data contained herein is ±2.3 dB. Refer to Appendix D for Statement of Measurement Uncertainty.

1.1 Summary

The Nomadic Communications PTY. LTD. NMX910 complies with the technical requirements of Part 90 of the FCC Rules and Regulations.

2.0 Description of Equipment Under Test (EUT)

The Nomadic Communications PTY. Ltd. NMX910 is a 900 MHz Mobitex® Radio Packet Modem designed for integration into third party OEM equipment. The EUT contains a MCX antenna connector and power/data interface connector. The 2 watt radio uses GMSK modulation on 12.5 kHz channels. The frequency range of operation is from 896.0125 MHz to 900.875 MHz with 800 channels. Testing was performed at the low channel (896.0125 MHz), middle channel (898.375 MHz), and high channel (900.875 MHz).

Frequency Range:	896.0125 MHz -900.875 MHz
Modulation:	GMSK
Number of Channels:	800
Maximum Output Power:	2.24 watts

3.0 Test Configuration

3.1 RF Output Power (FCC Rule Part 2.985)

Testing was performed on a low, middle and high transmit channel and in all three orthogonal planes. Power to the EUT was supplied via a 7V AC/DC adapter through the interface board.

During testing, the EUT was connected to a DK2 Modem Regulator and Interface Board via the modem cable. The RS-232 port of the DK2 was connected to the PC serial port for software control. Specific Nomadic software program (NMXTOOL.EXE) was used to program the test frequency, power level, modulation (on/off), transmit time, and transmit control (on/off).

I/O Ports	I/O Cables
RS-232 Port/Modem Port	2 meter shielded/foil, Modem to Interface Board
RF Antenna Port	2 ft., shielded/ braided, Modem to 50Ω Load

The output from the transmitter was connected to a 20dB attenuator and then to the input of an HP 8564E RF Spectrum Analyzer. The analyzer offset was adjusted to compensate for the 20dB attenuator. The RF output power across a 50 ohm load termination was measured directly by the analyzer.

RESULTS: The measured RF output power at 896.0125MHz was 33.5dBm, or 2.24 W.

RESULTS: The measured RF output power at 898.375MHz was 33.5dBm, or 2.24 W.

RESULTS: The measured RF output power at 900.875MHz was 33.5dBm, or 2.24 W.

3.2 Modulation Characteristics (FCC Rule Part 2.987)

The transmitter module contains a gaussian filter and fixed component values to limit the modulation level.

In order to confirm the modulation characteristics of the sample unit, the RF output from the EUT was connected to a Boonton Modulation Meter (M/N:82AD/01A/S10/S13).

RESULTS: The maximum deviation was 3.57 kHz.

3.3 Occupied Bandwidth (FCC Rule Part 2.989)

The occupied bandwidth was measured by supplying the EUT with a maximum 8000 Hz data rate modulation signal. The RF output of the EUT was connected to the Hewlett Packard Spectrum Analyzer (M/N: HP 8564E) via a 20dB attenuator. The spectrum analyzer measurement resolution bandwidth and video bandwidth were set to 300 Hz.

Results of the testing are displayed in Appendix A of this report.

RESULTS: At 896.0125 MHz, OBW = 8.27 kHz

RESULTS: At 898.375 MHz, OBW = 8.5 kHz

RESULTS: At 900.875 MHz, OBW = 8.3 kHz

3.4 Spurious Emissions at Antenna Terminals (FCC Rule Part 2.991)

Spurious emissions were measured by connecting the antenna terminals to the input of an HP 8564E spectrum analyzer via a 20dB attenuator. The unit was supplied with the maximum 8000 Hz pseudo-random data modulation signal. Per Section 90.210(j) of the FCC Rules, any emission shall be attenuated below the unmodulated carrier power by the following:

1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 2.5kHz, but no more than 6.25kHz: At least 53 log (f_d/2.5) dB.

2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 6.25kHz, but no more than 9.5kHz: At least 103 log (f_d/3.9) dB.

3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 9.5kHz: At least 157 log (f_d/5.3) dB or 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

For the EUT:

50 + 10 Log (2.14) W = 53.3 dB
(Unmodulated power = 33.3 dBm)

The emissions were checked up to the tenth harmonic of the carrier frequency (9.9 GHz); all emissions above 1GHz were suppressed at least 55 dB below the unmodulated carrier level. Appendix B shows plots of the spurious emissions up to a frequency of 9.9 GHz.

RESULTS: The EUT complies with the emission mask requirements of Section 90.210(j) of the FCC Rules for the three channels tested. Plots in Appendix B depict the emission mask, unmodulated signal power, and spurious emission level. The following table lists discrete data points of peak emissions.

Table 1

FCC CONDUCTED SPURIOUS EMISSIONS DATA
FCC PART 90.210(j)

CLIENT: Nomadic Communications PTY, Ltd.
MODEL NO: NMX910
DATE: 4/27/99
BY: Greg Snyder
JOB #: 5133X

Tx Frequency:	896.0125MHz
Channel:	LOW

Frequency MHz	Level dBm	Limit dBm	Margin uV/m
378.00	-34.1	-20.0	-14.1
518.40	-33.4	-20.0	-13.4
1018.00	-31.2	-20.0	-11.2
1787.00	-28.0	-20.0	-8.0
2680.00	-24.5	-20.0	-4.5
4475.00	-31.5	-20.0	-11.5

Tx Frequency:	898.375MHz
Channel:	MID

Frequency MHz	Level dBm	Limit dBm	Margin uV/m
370.40	-33.6	-20.0	-13.6
528.40	-35.1	-20.0	-15.1
1006.00	-31.7	-20.0	-11.7
1789.00	-27.8	-20.0	-7.8
2680.00	-24.7	-20.0	-4.7
4490.00	-30.0	-20.0	-10.0

Table 1 (Cont'd.)

FCC CONDUCTED SPURIOUS EMISSIONS DATA
FCC PART 90.210(j)

Tx Frequency:	900.875MHz
Channel:	HIGH

Frequency MHz	Level dBm	Limit dBm	Margin uV/m
362.70	-33.5	-20.0	-13.5
538.60	-33.8	-20.0	-13.8
780.70	-36.1	-20.0	-16.1
1009.00	-31.8	-20.0	-11.8
1793.00	-28.3	-20.0	-8.3
2685.00	-24.5	-20.0	-4.5
4509.00	-29.7	-20.0	-9.7

3.5 Radiated Emissions Testing (FCC Rule Part 2.993)

The EUT was placed on an 80 cm high, 1 X 1.5 meters non-conductive motorized turntable for radiated testing on a 3 meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Broadband antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. Horizontal and vertical field components were measured.

The output from the antenna was connected, via a preselector or preamplifier, to the input of the spectrum analyzer. The detector function was set to peak. The measurement bandwidth of the spectrum analyzer system was set to at least 120 kHz, with all post-detector filtering no less than 10 times the measurement bandwidth.

3.5.1 Radiated Data Reduction and Reporting

To convert the raw spectrum analyzer radiated data into a form that can be compared with the FCC limit, it is necessary to account for various calibration factors that are supplied with the antennas and other measurement accessories. These factors are grouped into a composite antenna factor (AFc) and are supplied in the AFc column of Table 2. The AFc in dB/m is algebraically added to the Spectrum Analyzer Voltage in dBμV to obtain the Radiated Electric Field in dBμV/m. This level is then compared with the FCC limit.

Example:

Spectrum Analyzer Voltage: VdBμV

Composite Antenna Factor: AFcdB/m

Electric Field: EdBuV/m = VdBμV + AFcdB/m

To convert to linear units: EμV/m=antilog (EdBμV/m/20)

RESULTS: The EUT complies with the requirements. Data is recorded in Table 2.
LIMIT: 84.4 dBμV/m (16595.90 uV/m)

Table 2

FCC Part 90 3M Radiated Emissions Data - Site 2

CLIENT: Nomadic Communications PTY. LTD.
FCC ID: OKKNMX910
DATE: 4/26/99
BY: Greg Snyder
JOB #: 5133X

Frequency MHz	Polarity H/V	Azimuth Degree	Antenna Height m	SA Level (QP) dBuV	AFc dB/m	E-Field dBuV/m	E-Field uV/m	Limit uV/m	Margin dB
Hi Channel 900.875 MHz									
33.43	V	0.00	1.0	14.3	18.0	32.3	41.3	16595.9	-52.1
47.50	V	0.00	1.0	18.6	15.3	33.9	49.6	16595.9	-50.5
110.58	H	0.00	2.0	20.6	12.5	33.1	45.4	16595.9	-51.3
110.59	V	180.00	1.0	15.2	12.5	27.7	24.4	16595.9	-56.7
1801.86	H	180.00	1.0	72.2	-5.2	67.0	2244.1	16595.9	-17.4
1801.86	V	0.00	1.0	71.3	-5.2	66.1	2023.2	16595.9	-18.3
2702.49	H	225.00	1.0	68.2	-2.2	66.0	1987.2	16595.9	-18.4
2702.49	V	0.00	1.0	62.2	-2.2	60.0	996.0	16595.9	-24.4
3603.47	H	180.00	1.0	54.2	-1.6	52.6	426.6	16595.9	-31.8
3603.47	V	225.00	1.0	60.7	-1.6	59.1	901.6	16595.9	-25.3
4504.27	H	225.00	1.0	48.7	-0.5	48.2	258.1	16595.9	-36.2
4504.27	V	225.00	1.0	51.2	-0.5	50.7	344.1	16595.9	-33.7
5405.14	H	180.00	1.0	51.7	1.3	53.0	445.5	16595.9	-31.4
5405.14	V	225.00	1.0	59.8	1.3	61.1	1135.9	16595.9	-23.3
6306.66	H	180.00	1.0	42.0	3.7	45.7	192.4	16595.9	-38.7
6306.66	V	180.00	1.0	43.7	3.7	47.4	234.0	16595.9	-37.0
Mid Channel 898.375 MHz									
1796.72	V	45.00	1.0	69.5	-5.2	64.3	1638.6	16595.9	-20.1
1796.72	H	45.00	1.0	74.5	-5.2	69.3	2913.8	16595.9	-15.1
2695.20	V	180.00	1.0	67.2	-2.3	64.9	1767.9	16595.9	-19.5
2695.20	H	180.00	1.0	73.0	-2.3	70.7	3447.1	16595.9	-13.7
3593.40	V	180.00	1.0	58.7	-1.6	57.1	716.1	16595.9	-27.3
3593.40	H	180.00	1.0	55.2	-1.6	53.6	478.6	16595.9	-30.8
4491.70	V	180.00	1.0	47.8	-0.5	47.3	231.9	16595.9	-37.1
4491.70	H	180.00	1.0	50.3	-0.5	49.8	309.3	16595.9	-34.6
5390.12	V	180.00	1.0	57.0	1.2	58.2	817.5	16595.9	-26.2
5390.12	H	180.00	1.0	51.5	1.2	52.7	434.0	16595.9	-31.7
6288.12	V	180.00	1.0	46.0	3.6	49.6	302.1	16595.9	-34.8
6288.12	H	180.00	1.0	42.3	3.6	45.9	197.3	16595.9	-38.5
7187.08	V	180.00	1.0	45.0	6.7	51.7	382.7	16595.9	-32.7
7187.08	H	180.00	1.0	45.0	6.7	51.7	382.7	16595.9	-32.7

Table 2 (Cont.)

FCC Part 90 3M Radiated Emissions Data - Site 2

Frequency MHz	Polarity H/V	Azimuth Degree	Antenna Height m	SA Level (QP) dBuV	AFc dB/m	E-Field dBuV/m	E-Field uV/m	Limit uV/m	Margin dB
Low Channel 896.0125 MHz									
1792.02	V	45.00	1.0	69.3	-5.2	64.1	1595.9	16595.9	-20.3
1792.02	H	225.00	1.0	73.0	-5.2	67.8	2443.5	16595.9	-16.6
2687.89	V	180.00	1.0	69.0	-2.3	66.7	2171.0	16595.9	-17.7
2687.89	H	180.00	1.0	65.0	-2.3	62.7	1369.8	16595.9	-21.7
3583.60	V	180.00	1.0	60.3	-1.6	58.7	864.0	16595.9	-25.7
3583.60	H	180.00	1.0	55.5	-1.6	53.9	495.5	16595.9	-30.5
4480.60	V	180.00	1.0	47.5	-0.5	47.0	223.5	16595.9	-37.4
4480.60	H	180.00	1.0	46.8	-0.5	46.3	206.9	16595.9	-38.1
5376.00	V	180.00	1.0	54.7	1.2	55.9	625.5	16595.9	-28.5
5376.00	H	180.00	1.0	48.3	1.2	49.6	300.4	16595.9	-34.8
6272.00	V	180.00	1.0	49.0	3.5	52.5	423.3	16595.9	-31.9
6272.00	H	180.00	1.0	43.3	3.5	46.8	219.6	16595.9	-37.6
7168.02	V	180.00	1.0	48.3	6.7	55.0	559.2	16595.9	-29.4
7168.02	H	180.00	1.0	42.0	6.7	48.7	270.8	16595.9	-35.7

3.6 Frequency Stability (FCC Rule Part 2.995)

The requirements of Part 90 of the FCC Rules and Regulations call for the carrier frequency to be stable under different power supply voltages and over a wide temperature extreme.

The EUT is powered by DC voltage supplied via the DK2 Modem Regulator and Interface Board. The manufacturers power requirements for the EUT include the following:

Low DC Voltage of 6.5 VDC (manufacturer's specification)
High DC Voltage of 7.5 VDC (manufacturer's specifications)

The frequency stability of the transmitter was examined at the voltage extremes and for the temperature range of -30°C to +50°C. The carrier frequency was measured with the Racal-Dana Model 1992 Frequency Counter while the EUT was in the temperature chamber. The reference frequency of the EUT was measured at the ambient room temperature with the frequency counter. The following are the reference frequencies at ambient for the Low, Middle, and High channels.

Low Channel: 896.01180 MHz

Mid Channel: 898.37412 MHz

High Channel: 900.87412 MHz

The limit is 1.5 ppm or

Limit = (896.01180×10^6 Hz) x (1.5×10^{-6}) = 1.344 kHz (Low Channel)

Limit = (898.37412×10^6 Hz) x (1.5×10^{-6}) = 1.347 kHz (Mid Channel)

Limit = (900.87412×10^6 Hz) x (1.5×10^{-6}) = 1.351 kHz (High Channel)

3.6.1 Frequency Stability for Voltage Variation

The carrier was measured while the transmitter was powered by 6.5 VDC and then 7.5 VDC. The unit was allowed to stabilize before the carrier frequency was taken.

The results are as follows:

Voltage (Volts DC)	Frequency (MHz)	Deviation (kHz)	Limit (1.5ppm) (kHz)
Low Channel			
6.5	896.01167	0.13	1.344
7.5	896.01185	-0.05	1.344
Mid Channel			
6.5	898.37421	-0.09	1.347
7.5	898.37425	-0.13	1.347
High Channel			
6.5	900.87432	-0.20	1.351
7.5	900.87440	-0.28	1.351

3.6.2 Frequency Stability for Temperature Variation

The carrier frequency was measured at 10 degree intervals as the temperature was increased from -30°C to +50°C over the course of 8 hours. The unit was brought to temperature and allowed to stabilize before the carrier frequency was taken.

The results are as follows:

Temperature (Celsius)	Frequency (MHz)	Deviation (kHz)	Limit (kHz) 1.5 ppm
Low Channel			
Ambient	896.01180	0.00	1.344
50	896.01076	1.04	1.344
40	896.01145	0.35	1.344
30	896.01158	0.22	1.344
20	896.01197	-0.17	1.344
10	896.01230	-0.50	1.344
0	896.01241	-0.61	1.344
-10	896.01233	-0.53	1.344
-20	896.01227	-0.47	1.344
-30	896.01293	-1.13	1.344

Temperature (Celsius)	Frequency (MHz)	Deviation (kHz)	Limit (kHz) 1.5 ppm
Mid Channel			
Ambient	898.37412	0.00	1.347
50	898.37401	0.11	1.347
40	898.37415	-0.03	1.347
30	898.37428	-0.16	1.347
20	898.37446	-0.34	1.347
10	898.37479	-0.67	1.347
0	898.37492	-0.80	1.347
-10	898.37482	-0.70	1.347
-20	898.37486	-0.74	1.347
-30	898.37546	-1.34	1.347

Temperature (Celsius)	Frequency (MHz)	Deviation (kHz)	Limit (kHz) 1.5 ppm
High Channel			
Ambient	900.87412	0.00	1.351
50	900.87325	0.87	1.351
40	900.87394	0.18	1.351
30	900.87421	-0.09	1.351
20	900.87445	-0.33	1.351
10	900.87482	-0.70	1.351
0	900.87491	-0.79	1.351
-10	900.87483	-0.71	1.351
-20	900.87486	-0.74	1.351
-30	900.87545	-1.33	1.351

Table 3

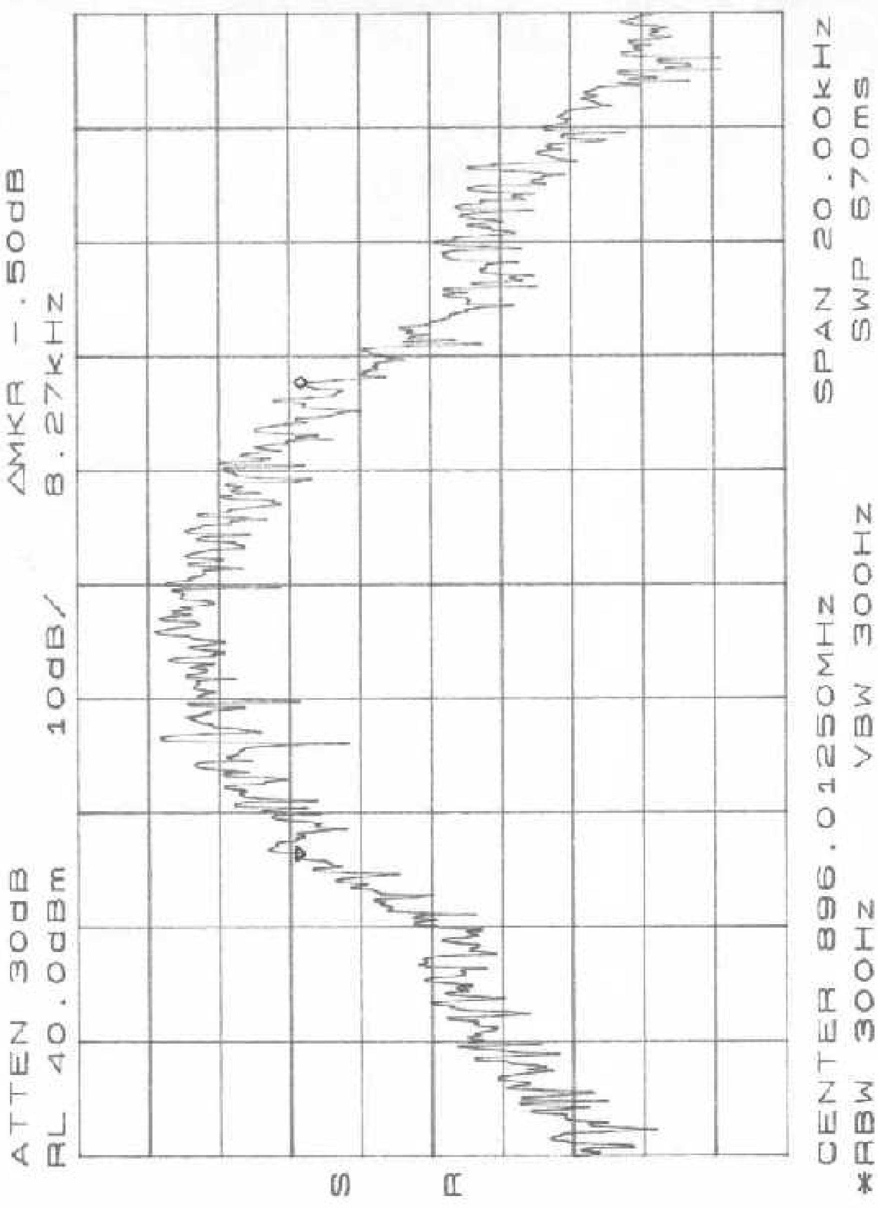
EMC Test Equipment Calibration

Equipment	Serial Number	Date Calibrated	Calibration Due
Antenna Research Associates, Inc. Biconical Log Periodic Antenna LPB-2520 (Site 1)	044	6/5/98	6/5/99
Antenna Research Associates, Inc. Biconical Log Periodic Antenna LPB-2520A (Site 2)	1118	5/13/99	5/13/00
Antenna Research Associates, Inc. Horn Antenna DRG-118/A	1010	9/9/98	9/9/99
Boonton Modulation Meter 82AD/01A/S10/S13	167219	4/22/98	4/22/00
Dressler Coupling/Decoupling Network CDN-T2	9607004B	12/15/98	12/15/99
Dressler Coupling/Decoupling Network CDN-M2	9606003B	5/19/98	5/19/99
Dressler Coupling/Decoupling Network CDN-M3	9607013B	3/16/99	3/16/00
Dressler Coupling/Decoupling Network CDN-S1	9609002B	3/25/99	3/25/00
Dressler Coupling/Decoupling Network CDN-S9	9610003C	3/16/99	3/16/00
Dressler Coupling/Decoupling Network CDN-S25	9612001C	3/25/99	3/25/00
Electromechanics Company Model 3301B Active Rod Antenna	2428	4/15/99	4/15/00
Electromechanics Company Model 3104P Biconical Antenna	3192	6/5/98	6/5/99
Electromechanics Company Biconical Antenna Model 3110B	1078	6/5/98	6/5/99
Electromechanics Company Biconilog Antenna Model 3143	1184	11/9/95	N/A
Electromechanics Company Biconilog Antenna Model 3141	9807-1108	7/6/98	7/6/99
Electromechanics Company Log Periodic Antenna Model 3146A	1129	6/5/98	6/5/99
Electromechanics Company Log Periodic Antenna Model 3146	1709	6/5/98	6/5/99
Electromechanics Company Field Probe Set Model 7122	9202-1094	10/6/98	10/6/99
Electromechanics Company 8116-50-TS-100-N	962509	9/4/98	9/4/99
Electromechanics Company 8116-50-TS-100-N	962510	9/4/98	9/4/99
Electromechanics Company 8116-50-TS-100-N	962507	9/4/98	9/4/99
Electromechanics Company 8116-50-TS-100-N	962508	9/4/98	9/4/99
ENI 50 Watt Power Amplifier: 550LA	9306311	N/A	N/A
Fischer Custom Communications EM Injection Clamp F-203I	266	3/15/99	3/15/00
Haefely PEFT Generator Model PEFT.1	081 979-10	7/01/98	7/01/99
Haefely PSD 25B Electrostatic Discharge Simulator	082597-35	9/29/98	9/29/99
Haefely PSURGE 6.1 Surge Generator with Haefely PHV 30.2 Hybrid Network. With 16.1 Coupling/Decoupling Network	083295-08	10/5/98	10/5/99
Hewlett-Packard Preamplifier: HP 8447D	2727A06203	4/09/99	4/09/00
Hewlett-Packard Preamplifier: HP 8449B	3008A00729	9/9/98	9/9/99
Hewlett-Packard Quasi-Peak Adapter: HP 85650A (Site 1)	2811A01283	8/5/98	8/5/99
Hewlett-Packard Quasi-Peak Adapter: HP 85650A (Site 2)	3303A01786	6/24/98	6/24/99
Hewlett-Packard RF Preselector: HP 85685A (Site 1)	2817A00744	8/5/98	8/5/99
Hewlett-Packard RF Preselector: HP 85685A (Site 2)	3221A01395	6/24/99	6/24/99
Hewlett-Packard Function Generator: 3312A	1432A12339	5/13/96	N/A
Hewlett-Packard Spectrum Analyzer: HP 8564E	3643A00657	7/21/98	7/21/99
Hewlett-Packard Spectrum Analyzer: HP 8568B (Site 2)	2926U07140	6/24/98	6/24/99
Hewlett-Packard Spectrum Analyzer: HP 8568B (Site 1)	2928A04750	8/5/98	8/5/99
Hewlett-Packard Spectrum Analyzer: HP 8593A	3009A00739	6/15/98	6/15/99
Hewlett-Packard Signal Generator: HP 8656B	2926U8140	9/9/98	9/9/99
Hewlett-Packard Signal Generator: HP 8648C	3347A00242	5/12/99	5/12/00
Instruments for Industry 100 Watt Amplifier: SMX100	2095-0896	N/A	N/A
Kalmus 100 Watt Amplifier: 757LCB-CE	8256-1	N/A	N/A
KeyTek ECAT System w/E411, E4552 and E501 Modules	9305232	2/12/99	2/12/00
KeyTek ESD Simulator: MZ-15/EC	9604310	4/22/99	4/22/00
Kikusui PCR 2000L AC Power Supply	15030820	7/8/98	7/8/99
Racal Dana Frequency Counter 1992	2806	2/18/99	2/18/00
Solar Electronics Current Probe 9215-1N	935005	1/25/99	1/25/00
Solar Electronics LISN 8012-50-R-24-BNC	8379493	8/13/98	8/13/99
Solar Electronics LISN 8028-50-TS-24-BNC	N/A	8/13/98	8/13/99
Solar Electronics LISN 8028-50-TS-24-BNC	N/A	8/13/98	8/13/99
Tektronix Oscilloscope TDS-540	B0101162	4/29/99	4/29/00
Wandel & Goltermann E-Field Probe Model EMR-200	K-0024	6/15/98	6/15/99
WLL S1 Coupling Network	CN01	3/25/99	3/25/00

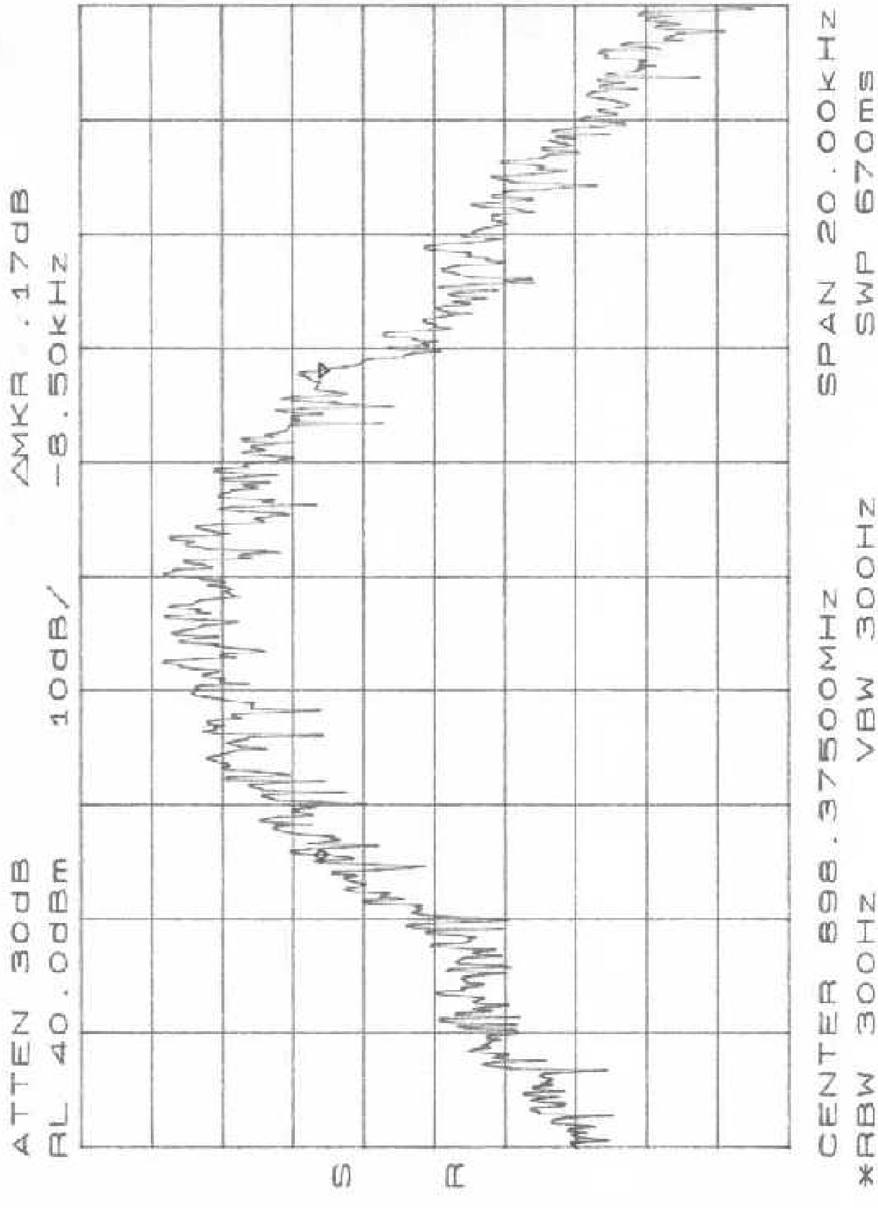
APPENDIX A

OCCUPIED BANDWIDTH PLOT

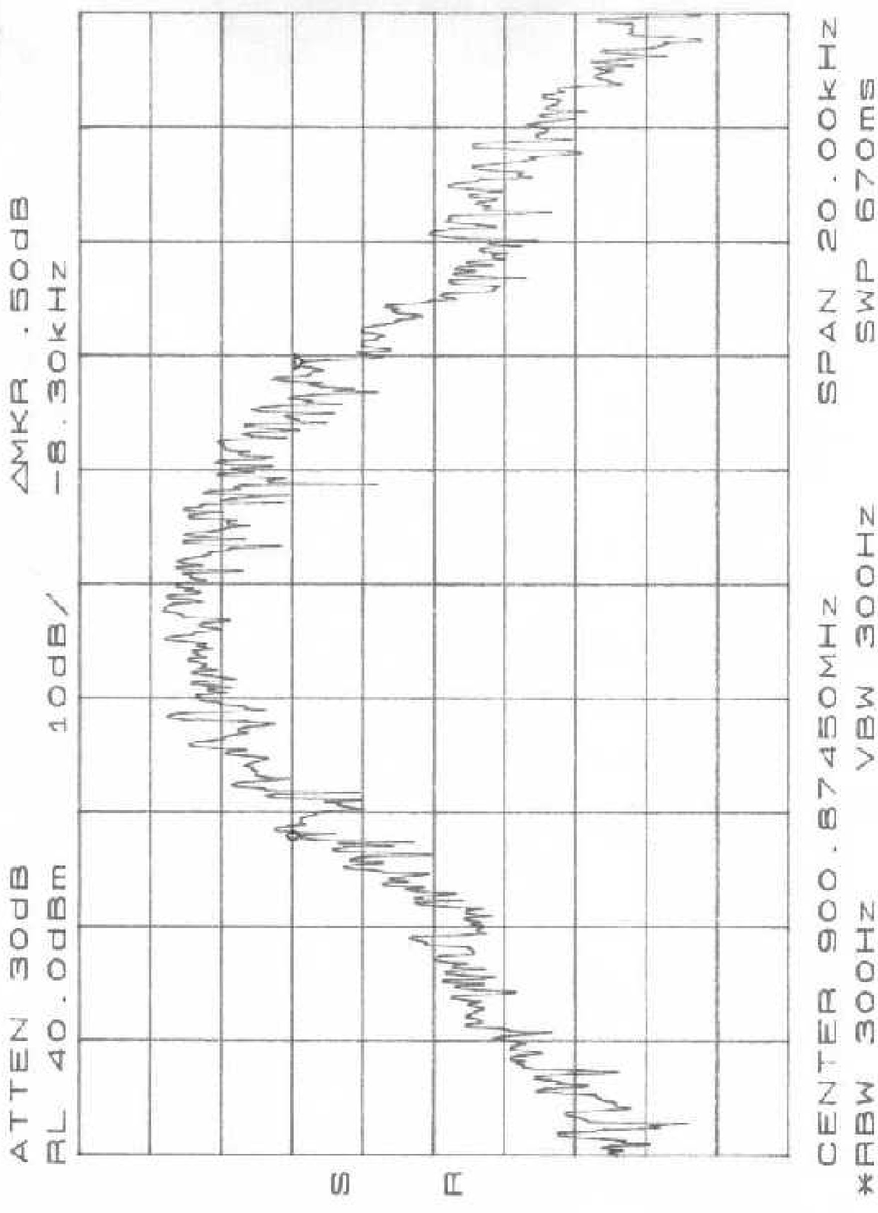
Appendix A - 1


ATTEN 30dB
RL 40.0dBm
10dB/
ΔMKR -.50dB
8.27kHz
S
R
CENTER 896.01250MHz
*RBW 300Hz
VBW 300Hz
SPAN 20.00kHz
SWP 670ms

Appendix A -2

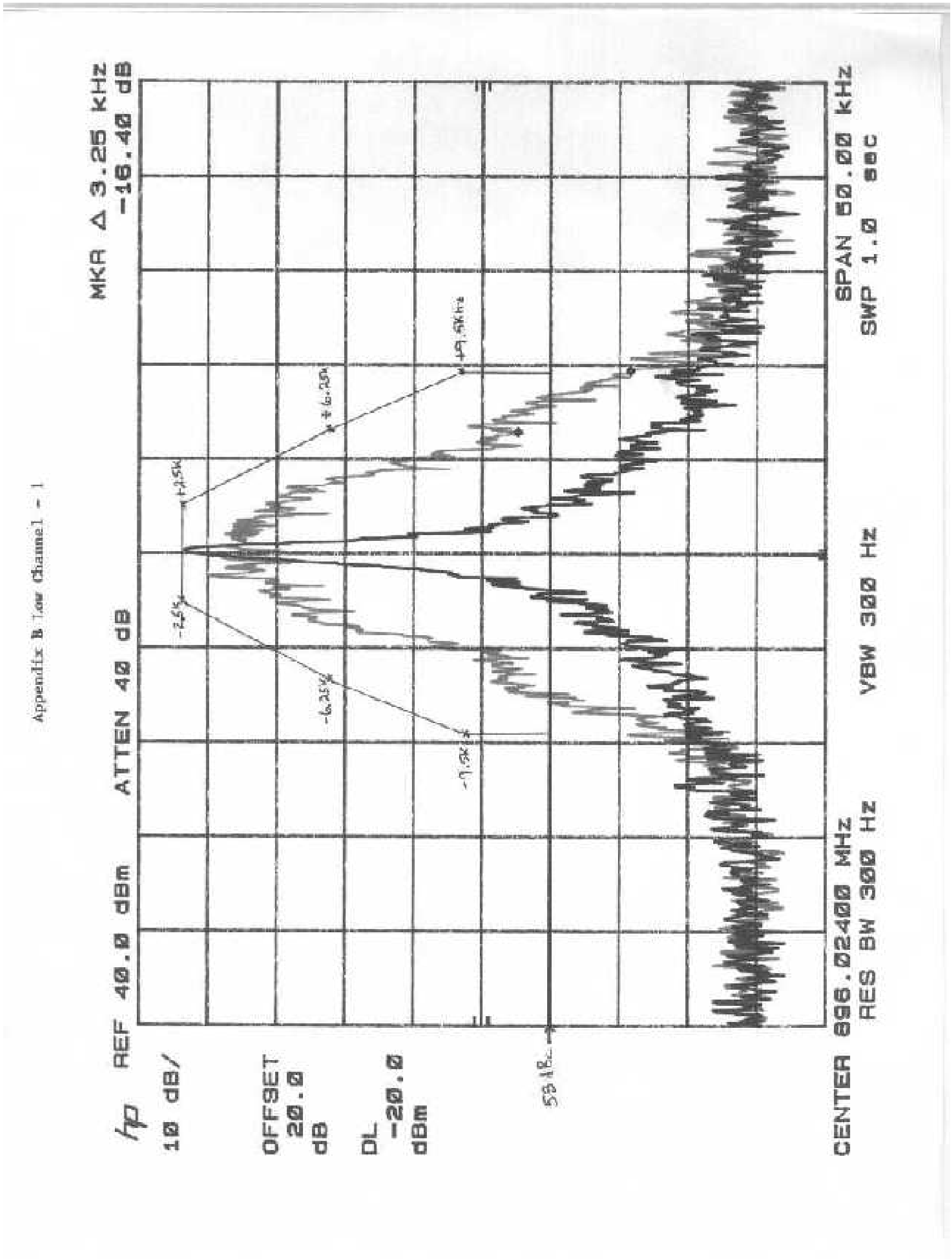

ATTEN 30dB
RL 40.0dBm
10dB/
ΔMKR .17dB
-8.50kHz
S
R
CENTER 898.37500MHz
SPAN 20.00kHz
*RBW 300Hz
VBW 300Hz
SWP 670ms

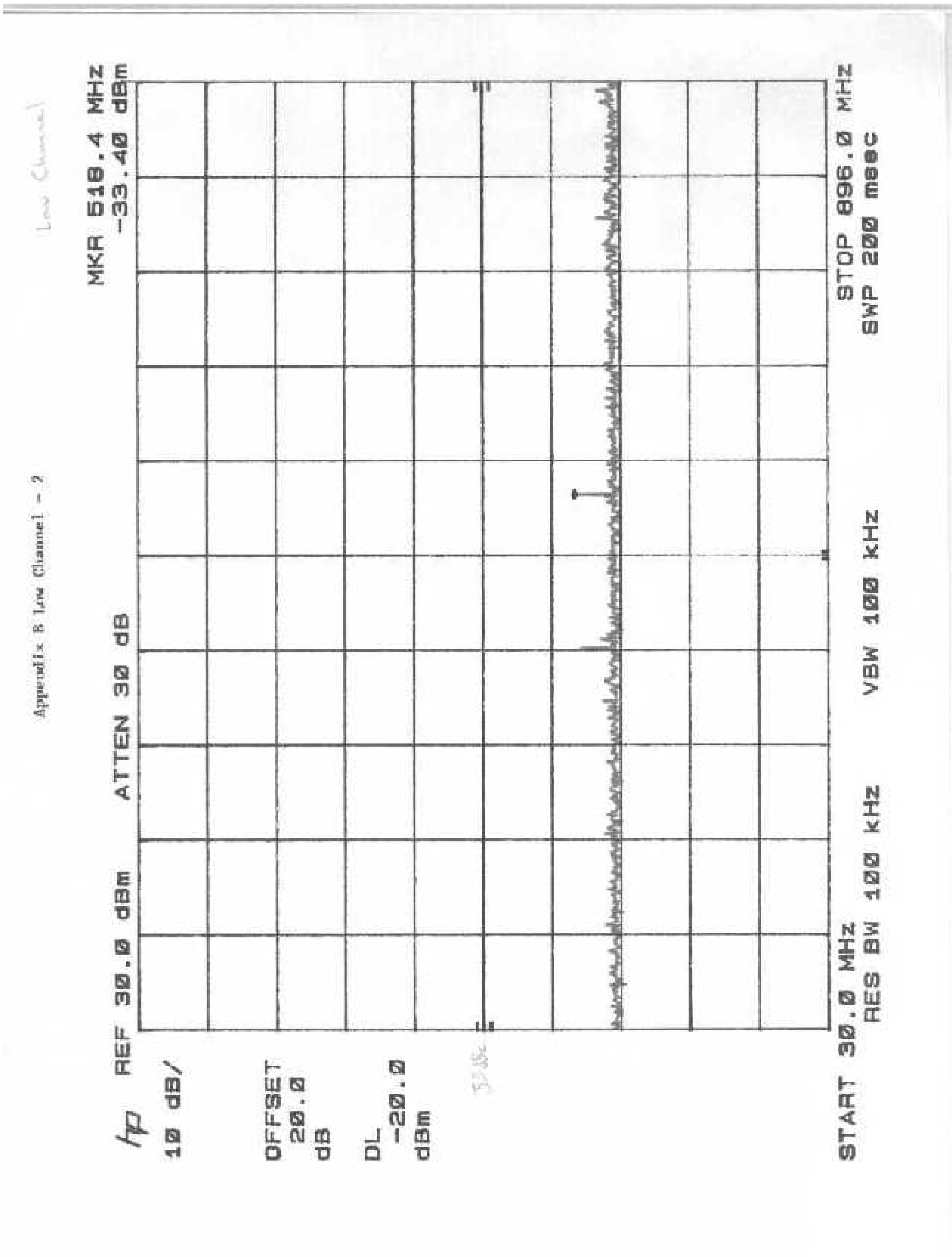
Appendix A - 3


ATTEN 30dB
RL 40.0dBm
10dB/
ΔMKR .50dB
-8.30kHz
S
R
CENTER 900.87450MHz
SPAN 20.00kHz
*RBW 300Hz
VBW 300Hz
SWP 670ms

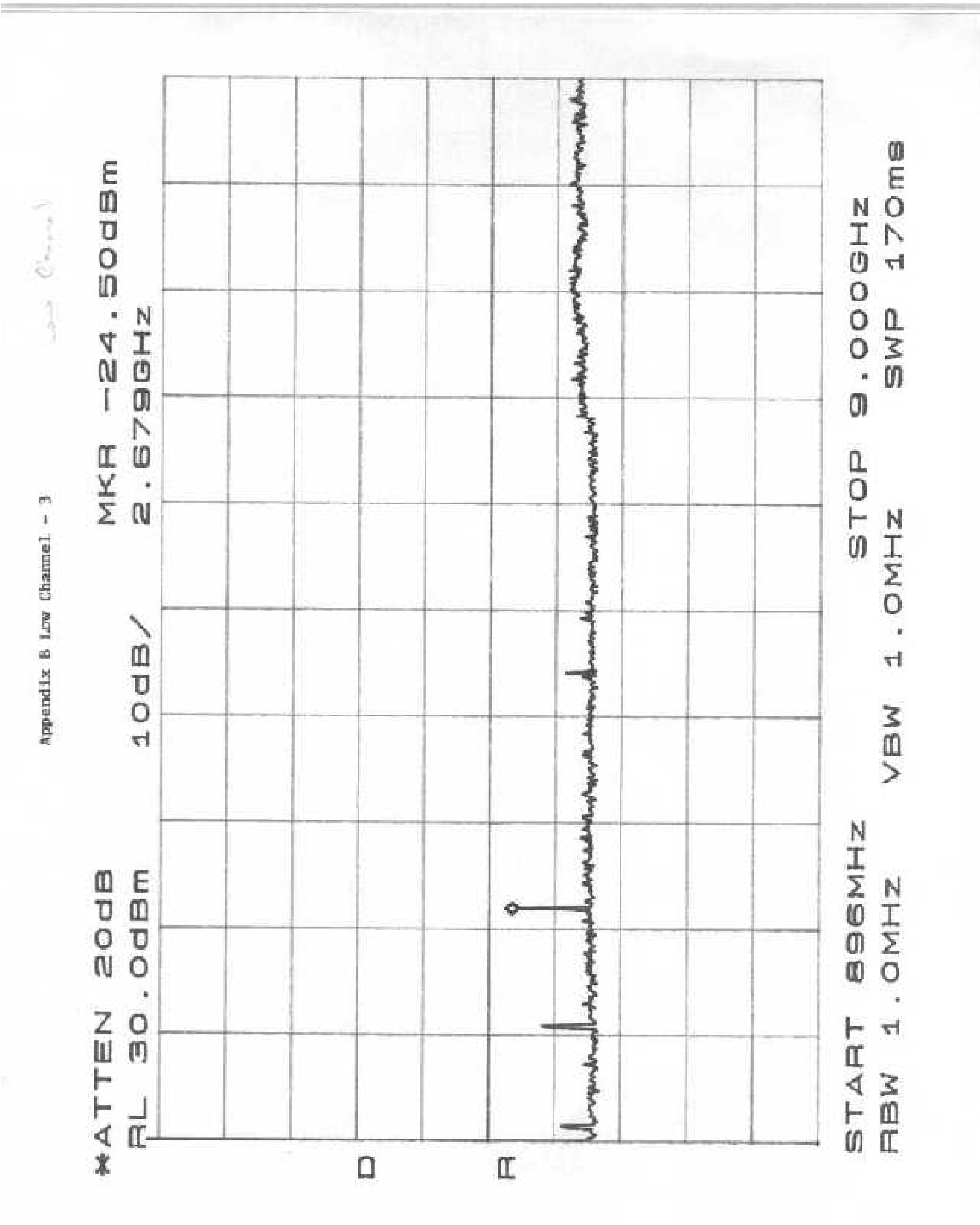
APPENDIX B

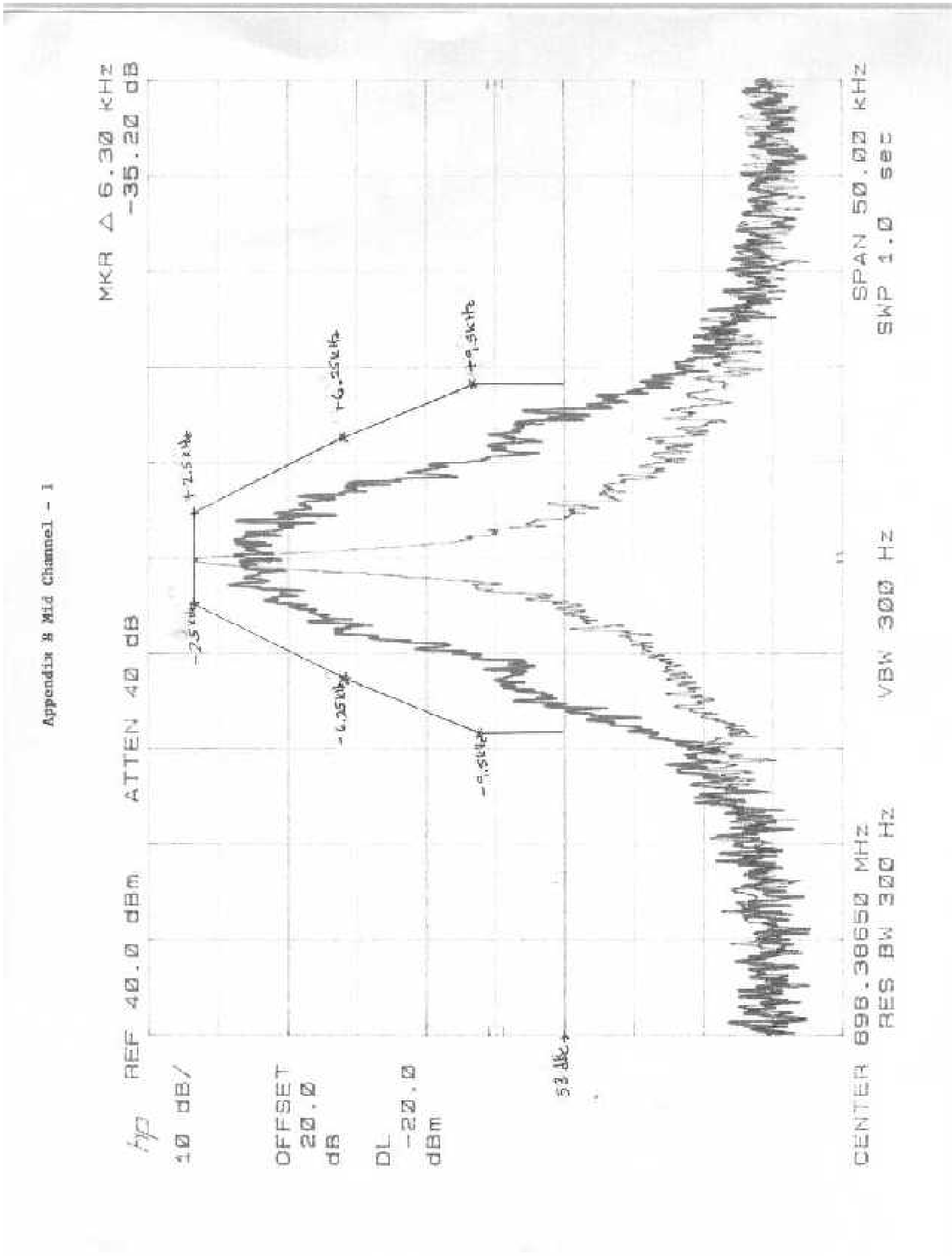
SPURIOUS EMISSIONS AT ANTENNA TERMINALS PLOT

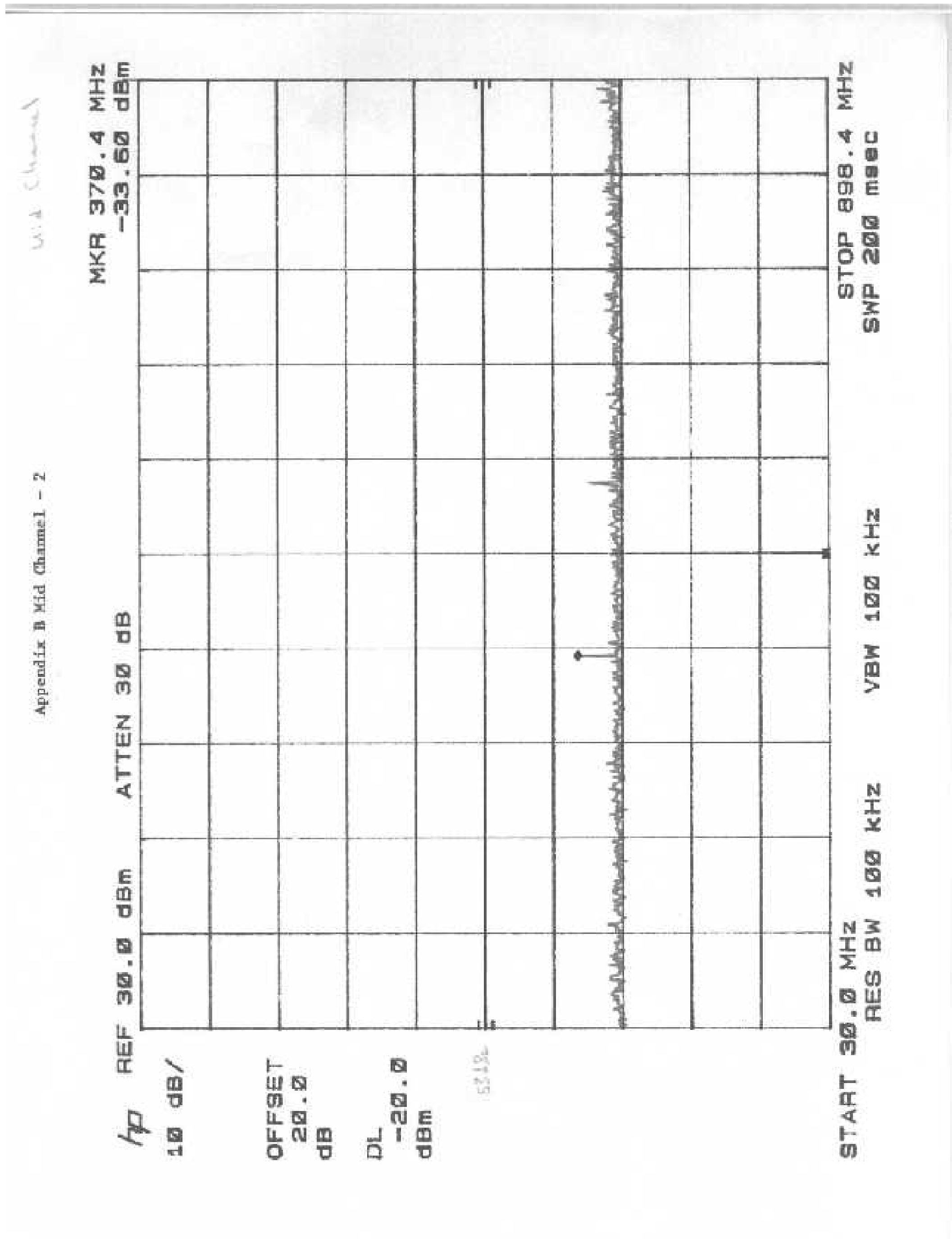

Appendix B Low Channel - 1
REF 40.0 dBm
ATTEN 40 dB
MKR Δ 3.25 kHz
-16.40 dB
10 dB/
OFFSET
20.0
dB
DL
-20.0
dBm
CENTER 896.02400 MHz
RES BW 300 Hz
VBW 300 Hz
SPAN 50.00 kHz
SWP 1.0 sec

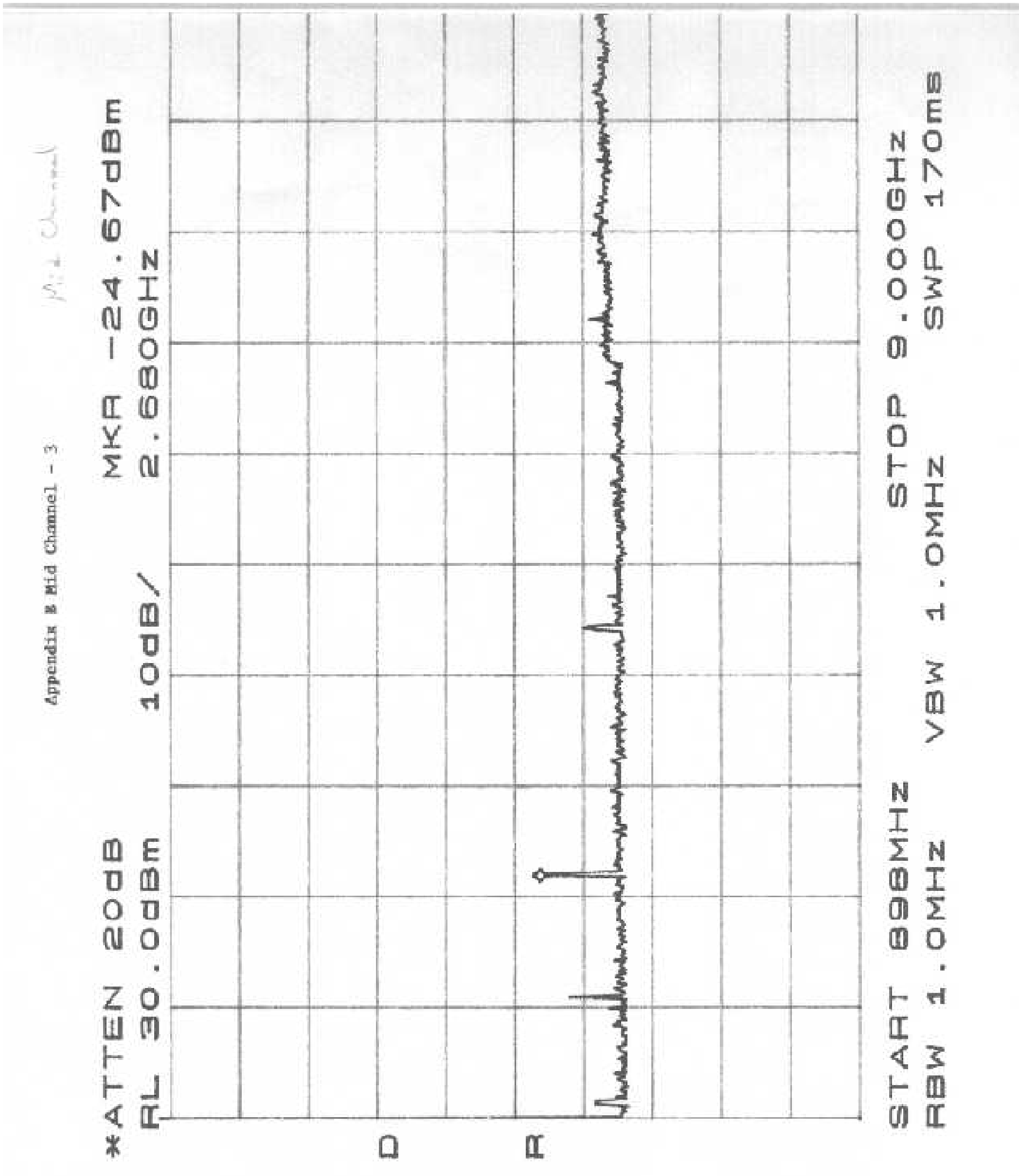


Appendix B Low Channel - 2
Low Channel
MKR 518.4 MHz
-33.40 dBm
REF 30.0 dBm ATTEN 30 dB
10 dB/
OFFSET
20.0
dB
DL
-20.0
dBm
START 30.0 MHz
RES BW 100 kHz VBW 100 kHz
STOP 896.0 MHz
SWP 200 msec

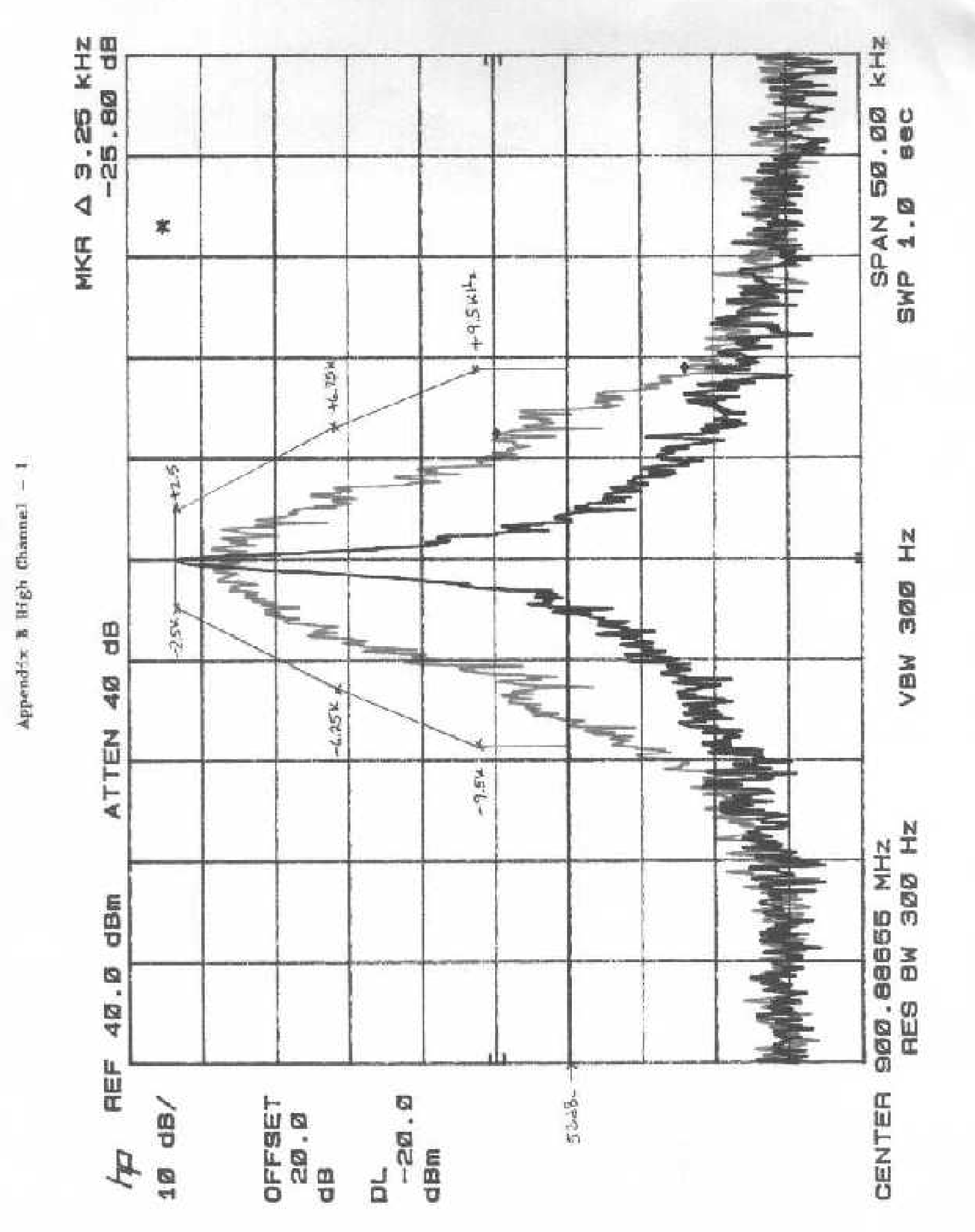

Appendix B Low Channel - 3
*ATTEN 20dB
RL 30.0dBm
10dB/
MKR -24.50dBm
2.679GHz
D
R
START 896MHz
STOP 9.000GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 170ms

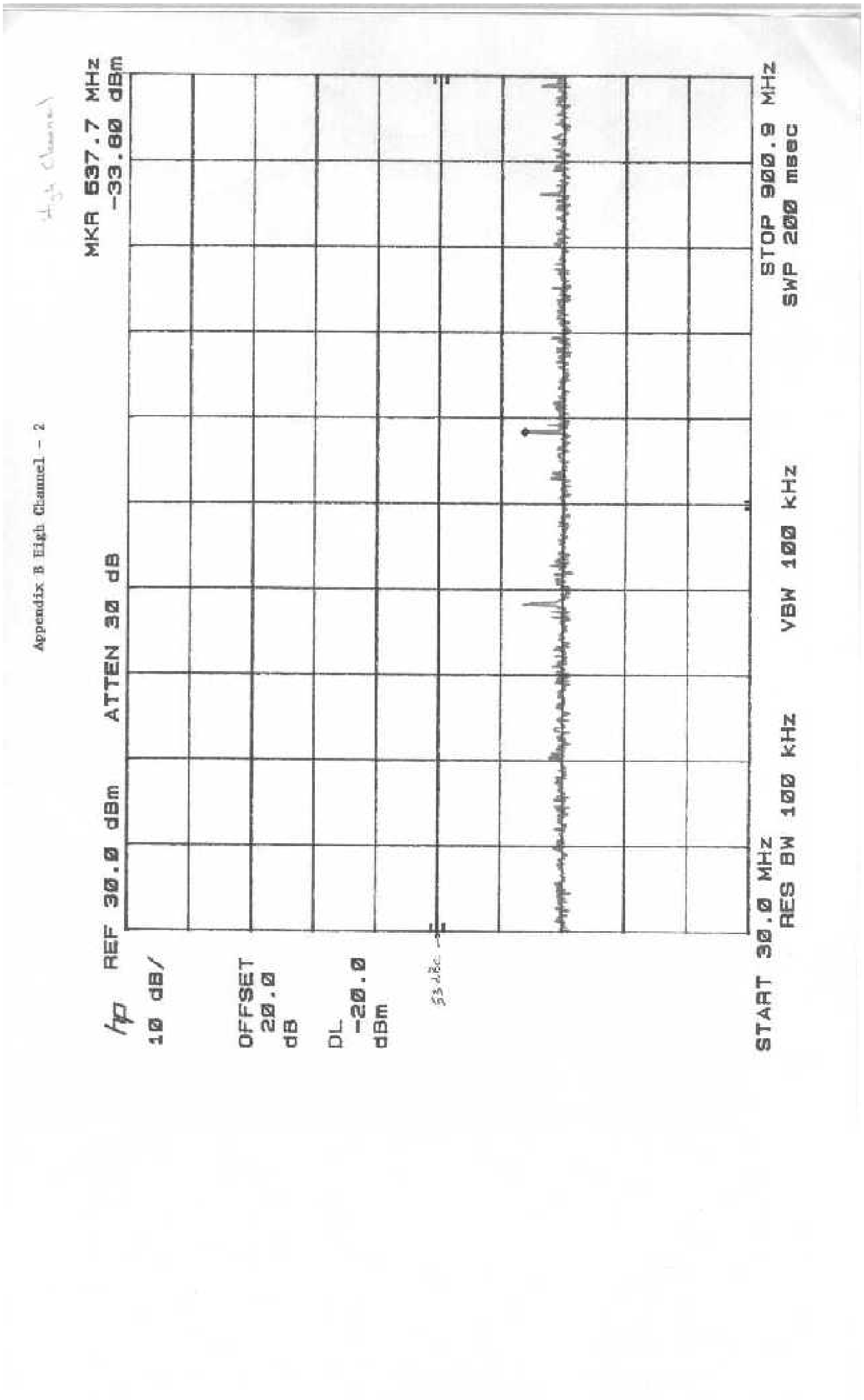

Appendix B Mid Channel - 1
MKR Δ 6.30 kHz
-35.20 dB
REF 40.0 dBm
ATTEN 40 dB
10 dB/
OFFSET
20.0
dB
DL
-20.0
dBm
CENTER 898.38650 MHz
RES BW 300 Hz
VBW 300 Hz
SPAN 50.00 kHz
SWP 1.0 sec

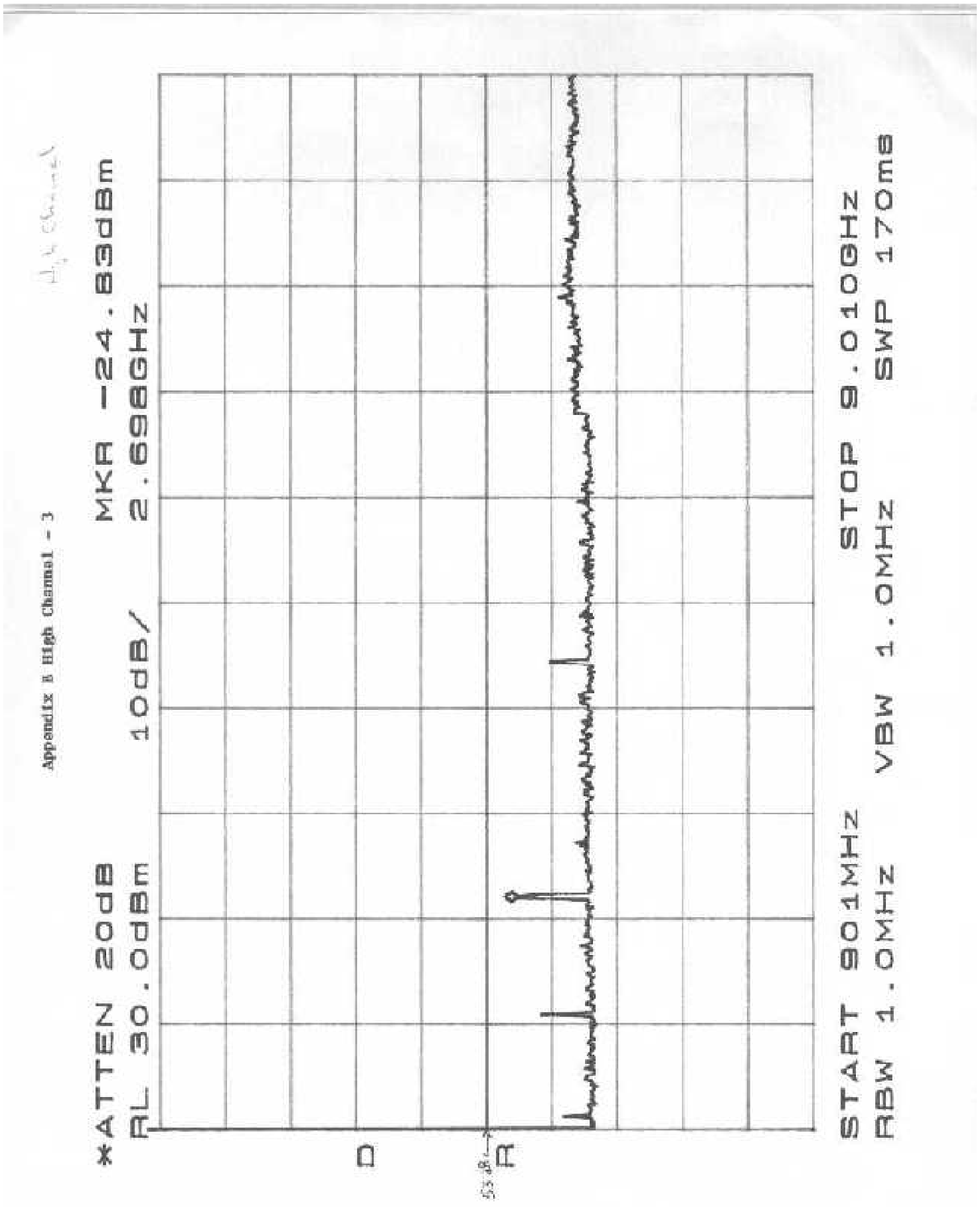

Appendix B Mid Channel - 2
MKR 370.4 MHz
-33.60 dBm
REF 30.0 dBm
ATTEN 30 dB
10 dB/
OFFSET
20.0
dB
DL
-20.0
dBm
START 30.0 MHz
STOP 898.4 MHz
RES BW 100 kHz
VBW 100 kHz
SWP 200 msec



Appendix B Mid Channel - 3
*ATTEN 20dB
RL 30.0dBm
10dB/
MKR -24.67dBm
2.680GHz
D
R
START 898MHz
STOP 9.000GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 170ms


MKR Δ 3.25 kHz
-25.80 dB
REF 40.0 dBm
ATTEN 40 dB
10 dB/
OFFSET
20.0
dB
DL
-20.0
dBm
CENTER 900.88655 MHz
RES BW 300 Hz
VBW 300 Hz
SPAN 50.00 kHz
SWP 1.0 sec


Appendix B High Channel - 2
MKR 537.7 MHz
-33.80 dBm
REF 30.0 dBm
ATTEN 30 dB
10 dB/
OFFSET
20.0
dB
DL
-20.0
dBm
START 30.0 MHz
STOP 900.0 MHz
RES BW 100 kHz
VBW 100 kHz
SWP 200 msec


Appendix B High Channel - 3
*ATTEN 20dB
RL 30.0dBm
10dB/
MKR -24.83dBm
2.698GHz
D
R
START 901MHz
STOP 9.010GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 170ms

APPENDIX C

STATEMENT OF MEASUREMENT UNCERTAINTY

For the purposes of the measurements performed by Washington Laboratories, the measurement uncertainty is ±2.3 dB. This has been calculated for a *worst-case situation* (radiated emissions measurements performed on an open area test site).

The following measurement uncertainty calculation is provided:

$$\text{Total Uncertainty} = (A^2 + B^2 + C^2)^{1/2}/(n-1)$$

where:
A = Antenna calibration uncertainty, in dB = 2 dB
B = Spectrum Analyzer uncertainty, in dB = 1 dB
C = Site uncertainty, in dB = 4 dB
n = number of factors in uncertainty calculation = 3

Thus, Total Uncertainty = $0.5\ (2^2 + 1^2 + 4^2)^{1/2} = \pm 2.3$ dB