15.247 Certification
FCC ID: NVC-BSR-0002

EMI TEST REPORT

Base Station Concentrator
Base Station Master
Base Station Repeater

Prepared for

Whisper
3200 Coronado Drive
Santa Clara, CA 95054
Tel: (408)490-3800
Fax: (408)490-3801

Prepared by

Electronic Compliance Laboratories Inc.
1249 Birchwood Dr.
Sunnyvale, CA 94089
Tel: (408) 747-1490
Fax: (408) 747-1495

Test Report Number: A903001

Date of Test: November 3, 1998

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1.0 TEST FACILITY

Name: Electronic Compliance Laboratories

Location: 1249 Birchwood Dr.
Sunnyvale, CA 94089

Site Filing: A site description is on file at the
Federal Communications Commission
P.O. Box 429
Columbia, MD 21045

Types of Sites: Open Field Radiated and Indoor Screen Room (Line Conducted). All sites are constructed and calibrated to meet ANSI C63.4-1994 requirements.
Test facility is recognized by the National Voluntary Laboratory Accreditation Program for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations.

NVLAP Code: 20089 effective through: March 31, 1999

2.0 TEST EQUIPMENT

Description	Manufacturer	Model	SN
EMI Receiver	HP	8546A	3325A00137
Power Meter	HP	437B	3125U13399
Power Sensor	HP	8481	3318A16275
Spectrum Analyzer	HP	8563E	3137A01183
Preamp	HP	8447F	3113A05849
Preamp	HP	8449B	3008A00527
LISN	EM	ANS-25/2	2532
Biconical Antenna	EM	EM 6912	677
Log Periodic Ant	EM	EM 6950	858
Double Ridge Horn	EM	EM 6961	6231
Filter BP 1.2-4 GHz	FSY	HM1160-11SS	001
Filter BP 4-10 GHz	FSY	HM2950-15SS	001
Filter BP10-18 GHz	FSY	HP8601-7SS	001

3.0 EUT

The Whisper System RF Metering System is defined as various gas and electric Remote Meter Interface (RMI) devices using spread spectrum, frequency hopping (SSFH) radio technology to communicate energy usage data to a Base Station Repeater (BSR) unit on a reporting schedule. The BSR communicates to a Base Station Master (BSM) over a separate SSFH RF link using MDCN protocol on a scheduled basis. Base Station Concentrators (BSC's) are stand alone RF data concentrators that function both as a BSM and a BSR. BSC's only use SSFH to communicate with and receive scheduled reports from RMI's. BSM's and BSR's are connected to a Host Control program using a land line or other WAN interface. All RF devices operate in the 902 to 928 MHz range. In addition, a back up battery box can be attached to a BSR, BSM, or BSC to provide electrical power to the device during power outage conditions.

RMI's are integrated into or connected to a standard residential or Commercial and Industrial Electro-mechanical demand meter. RMI's are powered from the line for units integrated into an Electric Meter. Gas and Water Meter RMI's are battery powered. RMI's report to a BSR or BSC on a scheduled basis, transmissions in a single channel are less than 400 mS.

The BSM Base Station Master (BSM) that polls 20 to 30 Base Station Repeaters (BSR's). A BSR can control and receive scheduled reports from 540 RMI's using a one hour reporting schedule. A BSR utilizes a schedule that assigns a six second slot to each RMI reporting to a BSM. The RMI utilizes the first two seconds of the time slot for scheduled reports. The remaining 4 second period is used for new acquisitions or re-acquisitions of RMI's. A BSR reports to a BSM every tenth reporting slot (60 seconds). A BSR to BSM reporting schedule is 2 seconds. A BSR supports 540 RMI reporting slots and 60 slots for reporting data to a BSM

Base Station Master	M/N 510M2-0x-HTD
Base Station Repeater	M/N 510R2-1x-WTH
Base Station Concentrator	M/N 500c-10-WSR

The unit tested was a:

BSM containing the following:

	Hitest Radio – previously approved under FCC ID: NVC-BSR-0001
	Aprotek PC-104 modem FCC ID – G4LUSA-73282-DT-E
	Ampro PC 104 CPU / Processor board
Model Number	510M2-0B-HTD / 510R2-1B-WTH
Serial Number	826204

4.0 SUPPORT EQUIPMENT

Equipment Type:	Battery Box
Model Number:	500-B-00-000
Serial Number:	827409
Manufacturer:	Whisper

Equipment Type:	Telephone
Model Number:	KX-T7020
Serial Number:	3E IDO89719
Manufacturer:	Panasonic

5.0 EQUIPMENT CONFIGURATION

All of the equipment and cables were placed in worst case positions to maximize emissions.

Interconnecting cables were of the type and length specified in the individual equipment requirements.
Grounding was in accordance with the manufacturers requirements and conditions for intended use.

EUT PORT	CONNECTED TO	CABLE TYPE
Signal Out	Telephone	Standard telephone cable

6.0 SUMMARY OF TESTS

The Whisper BSC / BSM / BSR are a frequency hopping spread spectrum (FHSS) radio system operating in the 902-928 MHz band. Tests were performed on the BSC / BSM with one standard antenna. This is the most complicated of the models. Test firmware resident in the EUT and software provided by Whisper was used to do the test.

6.1 15.247(a)(1) FREQUENCY HOPPING SYSTEMS

The BSC / BSM / BSR use one FHSS radio that handles two protocols, which will be referenced in this report as the "BSR-BSM Protocol" and the "BSR/BSM –RMI Protocol". The system hops using pseudorandom sequences. On average, each channel is used equally. Please refer to "**Hi-Test Type II BSx Detailed Circuit Description** " in the confidentiality package attached to this submission for more details.

6.1.1 15.247(a)(1)(i) CHANNEL UTILIZATION

BSR – BSM Protocol

The BSR / BSM protocol radio uses 162 channels each 160 kHz wide.

Three spectrum analyzer plots labeled "**CHANNEL UTILIZATION 902 - 908 MHz**", "**CHANNEL UTILIZATION 908 - 915 MHz**", and . The total number of channels shown is 75, which exceeds the minimum requirement of 50. **Plots are in Appendix A.**

Three spectrum analyzer MAX HOLD plots labeled " **20 dB BANDWIDTH**" show the 20 dB bandwidth of the hopping channel to be < 500 kHz (133 / 127 / 128 kHz) at the low/midband/high frequencies of 902.08 / 914.08 / 927.84 MHz. **Plots are in Appendix A.**

Zero span spectrum analyzer plots labeled "**CHANNEL DWELL TIME**" shows Worst case transmission time in a given slot: 180 msec elapsed time, <100 % duty

Maximum allowed: 400 msec.
The test plots are in Appendix A.

6.1.2 15.247(b) MAXIMUM PEAK OUTPUT POWER

The maximum power of the hopping channel is +30.0 dBm or .891 W. The EUT was made to transmit uninterrupted random data on each of the low / mid / high channels.

The output was fed directly via a cable to the spectrum analyzer set on MAX HOLD with 6 dB of additional attenuation.

At 902.08 MHz Pout = 30.0 dBm / 1.0 W
At 914.08 MHz Pout = 29.8 dBm / .95 W
At 927.84 MHz Pout = 29.8 dBm / .95 W

Limit: +30 dBm / 1 W maximum power

6dBi antenna,
EIRP = +30.0 (peak power) +6.0(peak gain, dBi) = +36.0 dBm / 4.0W EIRP

6.1.3 15.247(c) OUT OF BAND EMISSIONS

The spectrum analyzer plots, **in Appendix A**, titled "**OUT OF BAND Lower Band Edge**" , "**OUT OF BAND Upper Band Edge**" shows the output spectrum of the EUT at its highest and lowest operating frequencies. The plots show the out put of the EUT to be at least 20dB down at the band edges.

The spectrum analyzer plots labeled "**OUT OF BAND Emissions 30 MHz - 1 GHz** ", "**OUT OF BAND Emissions 1 - 2.75 GHz** ", "**OUT OF BAND Emissions 2.75 - 26.5 GHz** "show that emissions are more than 20 dB below the highest level of the desired power outside of the 902 - 928 MHz band.

BSC / BSM – RMI Protocol

6.2.1 15.247(a)(1)(i) CHANNEL UTILIZATION

The BSR / BSM – RMI protocol radio uses 128 channels each 180 kHz wide.

Three spectrum analyzer plots labeled "**CHANNEL UTILIZATION 902 - 908 MHz**", "**CHANNEL UTILIZATION 908 - 915 MHz**", and The total number of channels shown is 63, which exceeds the minimum requirement of 50. **Plots are in Appendix A.**

Three spectrum analyzer MAX HOLD plots labeled "**20 dB BANDWIDTH**" show the 20 dB bandwidth of the hopping channel to be < 500 kHz (42.5.7/40.0/42.5 kHz) at the low/midband/high frequencies of 903.42 / 914.94 / 926.28 GHz. **Plots are in Appendix A.**

Zero span spectrum analyzer plots labeled "**CHANNEL DWELL TIME**" shows Worst case transmission time in a given slot: 100 msec elapsed time, <100 % duty

Maximum allowed: 400 msec.
The test plots are in Appendix A.

6.2.2 15.247(b) MAXIMUM PEAK OUTPUT POWER

The maximum power of the hopping channel is +30.0 dBm or 1.0W. The EUT was made to transmit uninterrupted random data on each of the low/mid/high channels.

The output was fed directly via a cable with a 10 dB pad to the spectrum analyzer set on MAX HOLD with 6 dB of additional attenuation.

At 903.42 MHz Pout = 30.0 dBm / 1.0 W
At 914.94 MHz Pout = 30.0 dBm / 1.0 W
At 926.28 MHz Pout = 30.0 dBm / 1.0 W

Limit: +30 dBm / 1 W maximum power

6dBi antenna,
EIRP = +30.0 (peak power) +6.0(peak gain, dBi) = +36.0 dBm / 4.0W EIRP

6.2.3 15.247(c) OUT OF BAND EMISSIONS

The spectrum analyzer plots, **in Appendix A**, titled "**OUT OF BAND Lower Band Edge**" , "**OUT OF BAND Upper Band Edge**" shows the output spectrum of the EUT while hopping one of the pseudorandom sequences and continuously transmitting packetized data. The analyzer was placed in MAX HOLD mode, and individual sweeps were recorded continually for 10 minutes with the same spectrum analyzer connection as was used for peak output power. The resultant plot shows that the EUT emissions remain inside the 902-928 MHz band .

The spectrum analyzer plots labeled "**OUT OF BAND Emissions 30 MHz - 1 GHz** ", "**OUT OF BAND Emissions 1 - 2.75 GHz** ", "**OUT OF BAND Emissions 2.75 - 26.5 GHz** "show that emissions are more than 20 dB below the highest level of the desired power outside of the 902 - 928 MHz band.

6.3 15.203 ANTENNA REQUIREMENT

This product is intended for professional installation by trained personnel and is therefore exempt from the requirements of 15.203.

6.4 15.205 RESTRICTED BAND RADIATION LIMITS

The EUT was placed on a wooden table resting on a turntable. The wooden table was approximately 1 meter above the groundplane of the 3 meter test site. The search antenna was moved in to 1 meter when necessary to improve the noise floor, and the appropriate range factor was applied. While the EUT was transmitting uninterrupted random data on each of the low/mid/high channels and with the spectrum analyzer on MAX HOLD, the turntable was rotated, and the search antenna raised and lowered in an attempt to maximize the received radiated emission level. Test results are attached in tabular form showing that no spurious signals were detected above the 74 dBuV/m peak/54dBuV/m average limits. Peak measurements were taken with an RBW and VBW = 1MHz. Average readings were taken with an RBW = 1MHz and a VBW = 10 Hz. **Test data is in Appendix B.**

6.5 15.207 AC LINE CONDUCTED EMISSIONS

The RF line conducted levels for emissions in the 0.45 - 30 MHz band must not exceed 250 μV when measured with a LISN. Attached graphs and tabular data show that emissions are below the 250 μV (48 dBμV) maximum allowed level. **The test data sheets are in Appendix C.**

6.6 15.209 RADIATED EMISSIONS

The data sheets in Appendix D show that the Class B radiated limits from 30 - 1000 MHz are not exceeded by the EUT. The EUT was operating normally with a combination of transmission and reception and hopping using a pseudorandom sequence during this test. The EUT was placed near one edge of a wooden table resting on a turntable. The wooden table was approximately 1 meter above the groundplane . The search antennas were located at 3 meters. Measurements were made in accordance with ANSI C63.4-1994.

Electronic Compliance Laboratories

_____ _____

Chris Byleckie Date
Technical Director

APPENDIX A

SPREAD SPECTRUM PLOTS

The spread spectrum plots were sent as a separate file

APPENDIX B

RESTRICTED BAND DATA

EUT:	VSM 82604	**CUSTOMER NAME:**	DIABLO
RULE PART:	FCC PART 15.205	**WORK ORDER:**	8110301
		FILE:	8110301.XLS
ANTENNA:	HORN 0	**ATTN dB:**	0
POLARIZATION:	VERTICAL	**DUTY dB:**	0
MODULATION TYPE:		**HP IL dB:**	0
TESTED BY:	SURESH	**DIST dB:**	0
COMMENT:			

FREQ. MHz	READING dB(uV)	NF	Pk or Av	A.F. dB	Cbl dB	FLTR dB	AMP dB	TOTAL, dB(uV/m)	LIMIT dB(uV/m)	DELTA dB
Ch 0 / 902.08 MHz										
2706.24	44.00		Pk	28.6	-5.3	-0.4	35.6	42.7	74.0	-31.3
2760.24	33.17		Avg	28.6	-5.3	-0.4	35.5	31.9	54.0	-22.1
3608.32	44.33		Pk	32.4	-6.2	-0.4	35.1	48.2	74.0	-25.8
3608.32	33.33		Avg	32.4	-6.2	-0.4	35.1	37.2	54.0	-16.8
4512.40	44.83	*	Pk	32.8	-7.0	-0.4	35.1	49.9	74.0	-24.1
4510.40	23.50	*	Avg	32.8	-7.0	-0.4	35.1	28.6	54.0	-25.4
5412.48	34.00	*	Pk	33.6	-8.1	-0.4	35.0	41.1	74.0	-32.9
5412.48	22.83	*	Avg	33.6	-8.1	-0.4	35.0	29.9	54.0	-24.1
8118.72	38.00	*	Pk	37.0	-11.4	-0.4	35.5	51.3	74.0	-22.7
8118.72	27.50	*	Avg	37.0	-11.4	-0.4	35.5	40.8	54.0	-13.2
9020.80	37.50	*	Pk	37.8	-12.1	-0.4	35.5	52.3	74.0	-21.7
9020.80	26.50	*	Avg	37.8	-12.1	-0.4	35.5	41.3	54.0	-12.7
CH 75 / 914.08 MHz										
2742.24	44.17		Pk	28.6	-5.3	-0.4	35.5	42.9	74.0	-31.1
2742.24	37.50		Avg	28.6	-5.3	-0.4	35.5	36.3	54.0	-17.7
3656.32	44.17		Pk	32.4	-6.2	-0.4	35.1	48.0	74.0	-26.0
3656.32	32.33		Avg	32.4	-6.2	-0.4	35.1	36.2	54.0	-17.8
4570.40	45.50	*	Pk	32.8	-7.0	-0.4	35.1	50.6	74.0	-23.4
4570.40	22.67	*	Avg	32.8	-7.0	-0.4	35.1	27.7	54.0	-26.3
7312.64	37.50	*	Pk	36.0	-10.6	-0.4	35.4	49.1	74.0	-24.9
7312.64	27.33	*	Avg	36.0	-10.6	-0.4	35.4	38.9	54.0	-15.1
8226.72	38.33	*	Pk	37.0	-11.4	-0.4	35.5	51.6	74.0	-22.4
8226.72	27.50	*	Avg	37.0	-11.4	-0.4	35.5	40.8	54.0	-13.2
9140.80	37.67	*	Pk	37.8	-12.1	-0.4	35.5	52.4	74.0	-21.6
9140.80	26.67	*	Avg	37.8	-12.1	-0.4	35.5	41.4	54.0	-12.6
CH 161 / 927.84 MHz										
2783.52	44.17		Pk	28.6	-5.3	-0.4	35.5	43.0	74.0	-31.0
2783.52	32.67		Avg	28.6	-5.3	-0.4	35.5	31.5	54.0	-22.5
3711.36	44.33		Pk	32.4	-6.2	-0.4	35.1	48.2	74.0	-25.8
3711.36	32.33		Avg	32.4	-6.2	-0.4	35.1	36.2	54.0	-17.8
4639.20	43.17	*	Pk	32.8	-7.0	-0.4	35.1	48.3	74.0	-25.7
4639.20	31.83	*	Avg	32.8	-7.0	-0.4	35.1	36.9	54.0	-17.1
7422.72	47.67	*	Pk	36.0	-10.6	-0.4	35.4	59.3	74.0	-14.7
7422.72	36.50	*	Avg	36.0	-10.6	-0.4	35.4	48.1	54.0	-5.9
8350.56	47.17	*	Pk	37.0	-11.4	-0.4	35.4	60.6	74.0	-13.4
8350.56	26.67	*	Avg	37.0	-11.4	-0.4	35.4	40.1	54.0	-13.9

APPENDIX C

CONDUCTED EMISSIONS

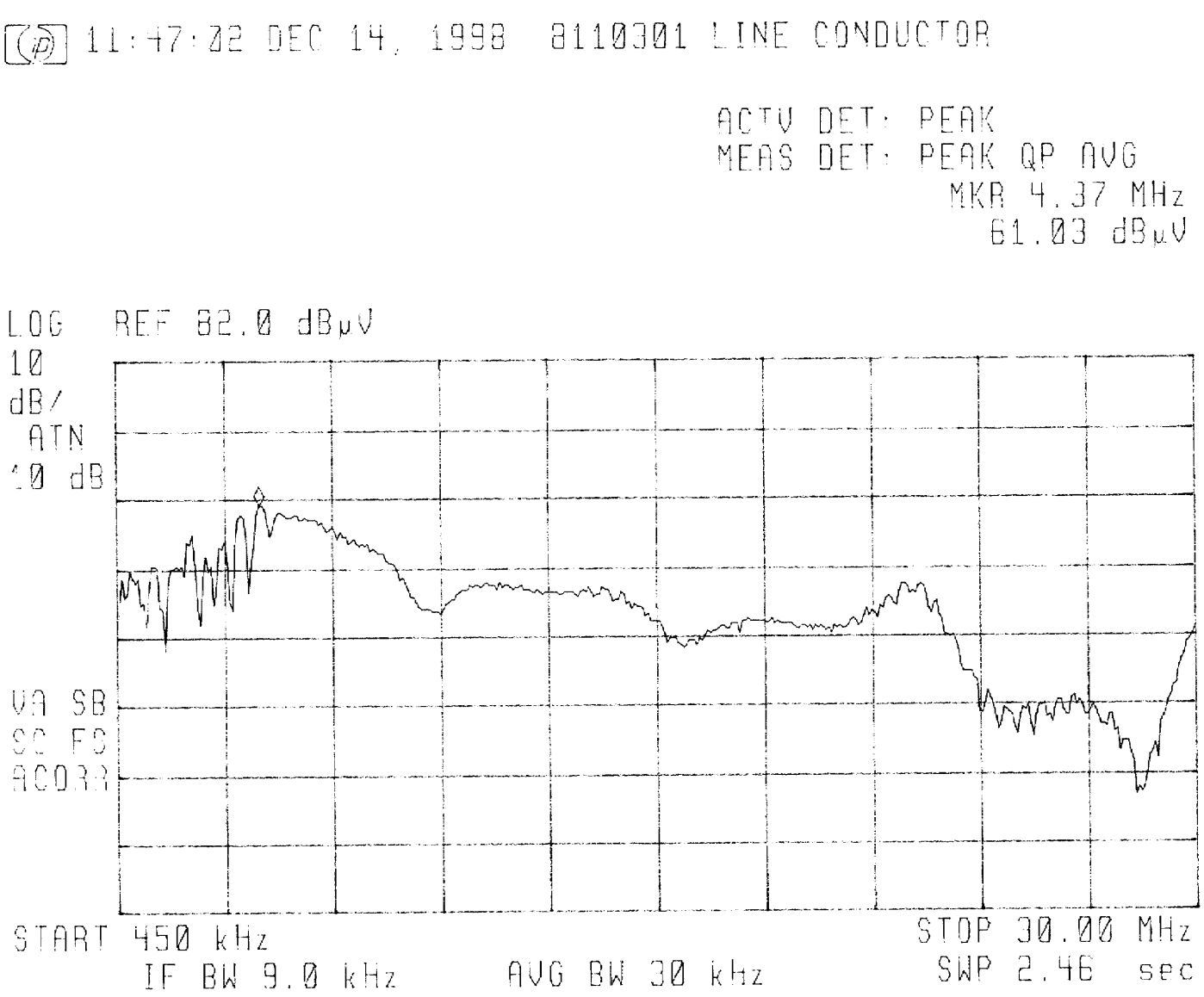
Electronic Compliance Laboratories, Inc.
1249 Birchwood Ave.
Sunnyvale, CA
Conducted Emissions
Radiated Emissions
Frequency range: 450KHz-30MHz

Government Agency and Limit: FCC Class A

QP = Quasi-Peak Note: Ignore peak readings when Quasi-Peak reading exists
PK = Peak

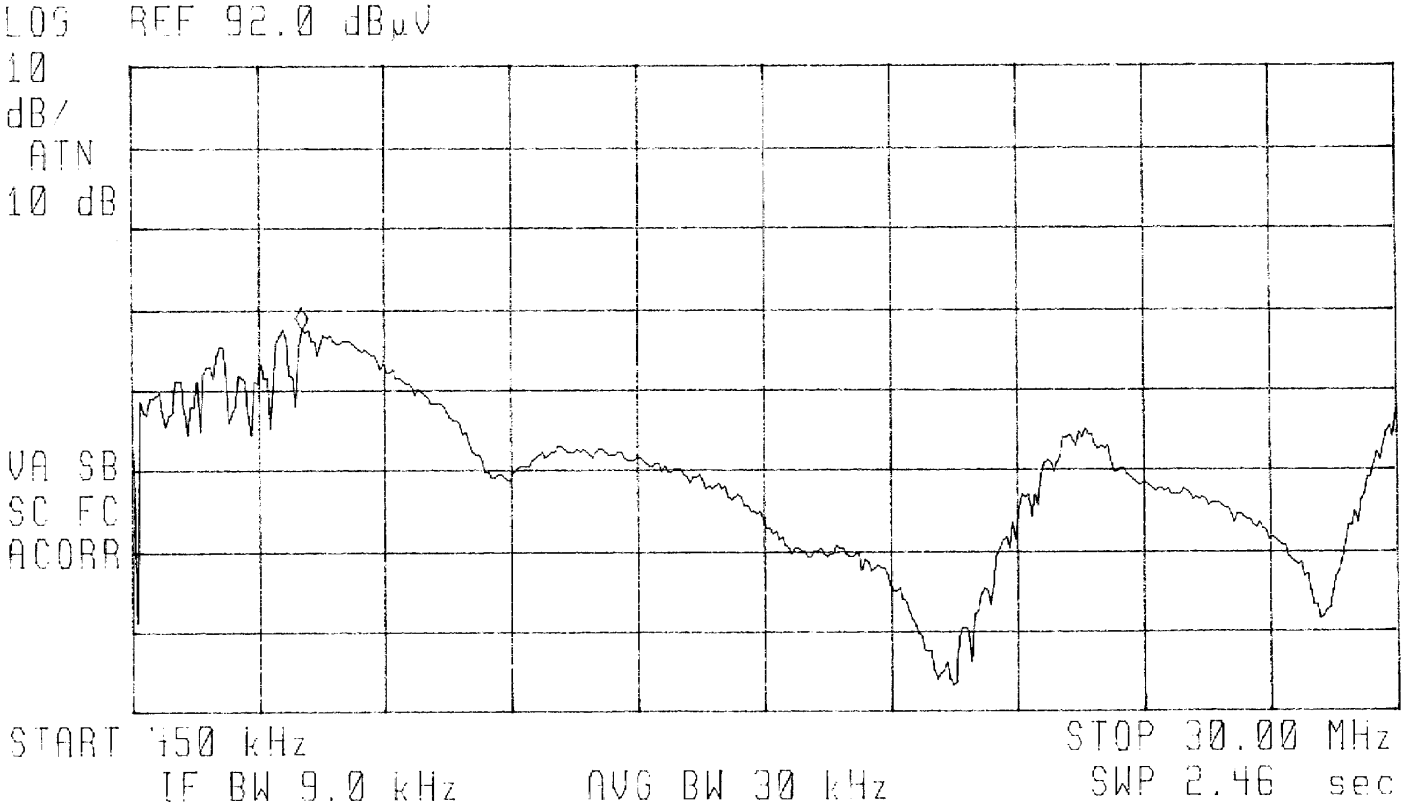
Customer:	WHISPER	Operator:	Suresh
Date:	12-14-1998	Time:	10:45:03
Temperature Range:	55 Deg F	Percent Humidity:	65
E.U.T.:	BASE STATION MASTER/REPEATER 510M2-OB-HTD 510R2-1B-WTH		
Serial Number:	826204		
Support Devices:	BATTERY		
Serial Number:			
FCC ID:			
Exercise Program:			
Modifications:	NONE		
Report File Name:	F:\TESTDATA\8110301.F		

TEST FREQ	TEST dBuV	CLASS A LIMIT	VERSUS A LIMIT	CONDUCTOR	TYPE
0.820	51.5	60.0	-8.5	LINE	PK
2.520	56.5	69.5	-13.0	LINE	PK
4.370	61.0	69.5	-8.5	LINE	PK
22.390	49.0	69.5	-20.5	LINE	PK
2.590	57.1	69.5	-12.4	NEUTRAL	PK
4.590	59.3	69.5	-10.2	NEUTRAL	PK
22.760	46.8	69.5	-22.7	NEUTRAL	PK
30.000	48.5	69.5	-21.0	NEUTRAL	PK


11:47:02 DEC 14, 1998 8110301 LINE CONDUCTOR
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 4.37 MHz
61.03 dBµV
LOG REF 82.0 dBµV
10
dB/
ATN
10 dB
VA SB
START 450 kHz
IF BW 9.0 kHz
AVG BW 30 kHz
STOP 30.00 MHz
SWP 2.46 sec

12:04:39 DEC 14, 1998 8110301 NEUTRAL CONDUCTOR
16:09:17 JUN 29, 1994 16:36:52 JUN 29, 1994

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 4.44 MHz
59.27 dBµV



APPENDIX D

RADIATED EMISSIONS

Electronic Compliance Laboratories, Inc.
1249 Birchwood Ave.
Sunnyvale, CA

Radiated Emissions
Frequency range: 30 MHz-1000 MHz

10 Meter Open Site
Site Calibrated: June 1997

Government Agency and Limit: FCC Class A

QP = Quasi-Peak Note: Ignore peak readings when Quasi-Peak reading exists
PK = Peak

Customer:	DIABLO	Operator:	SURESH
Date:	11-03-1998	Time:	11:28:49
Temperature Range:	70 Deg F	Percent Humidity:	70
E.U.T.:	VSM		
Serial Number:	826204		
Support Devices:			
Serial Number:			
FCC ID:			
Exercise Program:			
Modifications:	None		
Report File Name:	F:\TESTDATA\8110301.RF		

Antenna Type: BICONICAL

TEST FREQ	TEST dBuV	ACTUAL dBuV/m	CLASS A LIMIT	VERSUS A LIMIT	TABLE DEGREES	ANTENNA HEIGHT	POLAR-IZATION	DETECTOR Type
35.858	48.7	38.8	39.0	-0.2	180	1.0	V	PK
35.858	47.4	37.6	39.0	-1.4	180	1.0	V	QP
53.670	47.9	31.4	39.0	-7.6	0	1.5	V	PK
68.000	44.5	26.6	39.0	-12.4	300	1.5	V	PK
70.450	46.8	29.0	39.0	-10.0	300	1.5	V	PK
43.135	39.8	27.4	39.0	-11.6	90	1.5	V	PK
48.800	46.3	31.6	39.0	-7.4	180	2.0	H	PK
54.650	45.3	28.5	39.0	-10.5	180	1.5	H	PK
70.000	45.1	27.3	39.0	-11.7	270	2.0	H	PK
35.800	38.1	28.2	39.0	-10.8	270	2.0	H	PK

CHANGED ANTENNA TO LOG PERIODIC

392.000	29.2	21.2	46.4	-25.2	0	2.0	H	PK
400.000	34.6	26.9	46.4	-19.5	270	2.0	H	PK

NO OTHER EMISSION WAS FOUND ABOVE NOISE FLOOR LEVEL FOR BOTH V & H POLARIZATIONS

APPENDIX E

ANTENNA DATA SHEETS

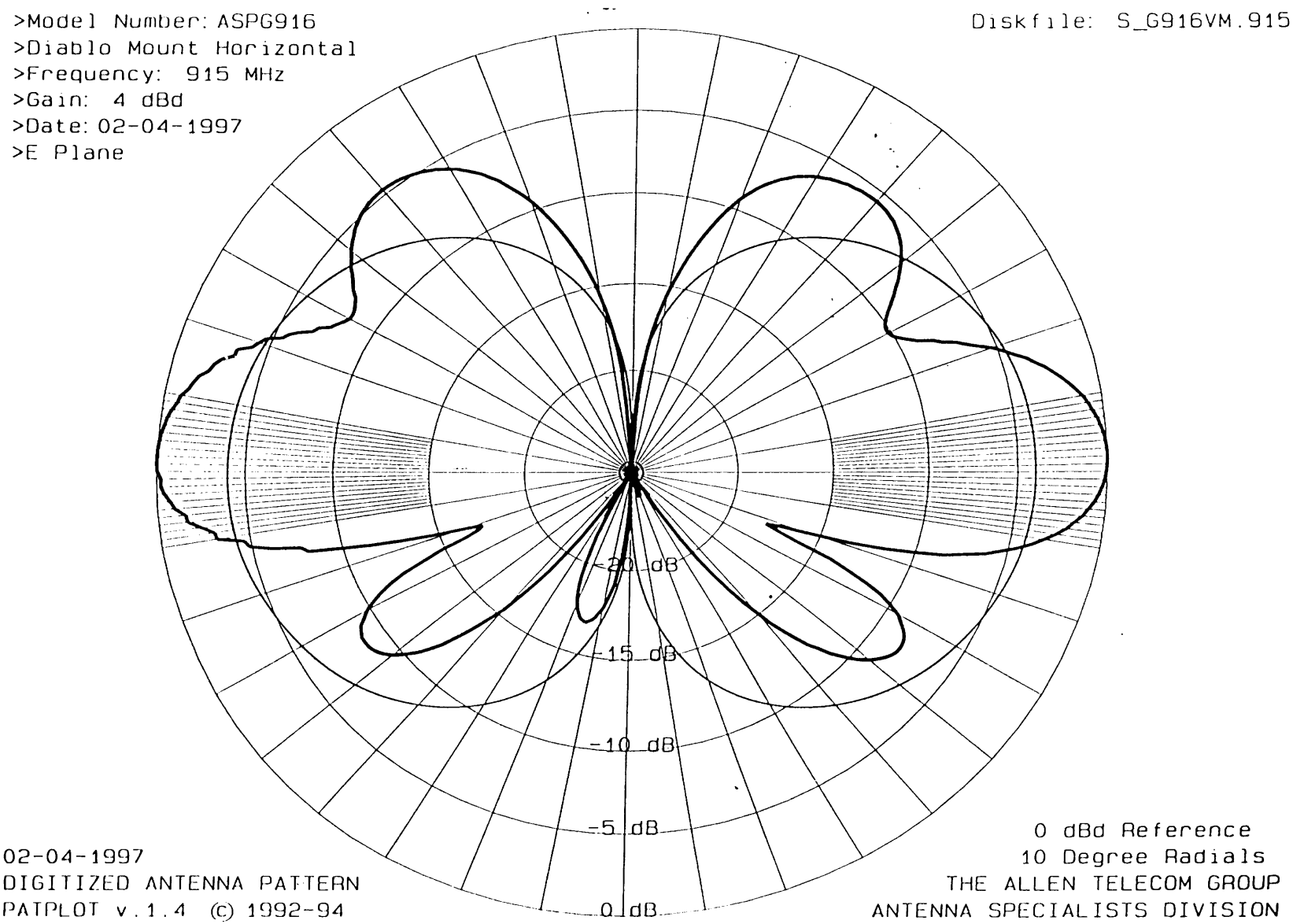
ODUCT CODE NO: 0189 DESCRIPTION:

ELECTRICAL	MOBILE DATA	MECHANICAL (Base Station)
Frequency Range 902-928 MHz	Mount Type: Rooftop	Total Length in m
VSWR Bandwidth @ 1.5:1 26 MHz @ 2.0:1	Mounting Diameter in .750 mm 19.05	Mounting Length in mm Mounting mast Dia in mm
Power Rating (CW) 10 W	Cable Length in 9 mm 228.6	Weight lb kg
Input Impedance 50 ohms	Cable Type: RG-316	Cable: Length ft m
Polarization: Vertical	Connector: SMB straight plug	Radiator Material:
Gain: 3.5 dBd omni (See Notes 2 & 3) dBd dir	Max-whip Length in 21.0 mm 533.4	Reflector Size x in x mm
Azimuthal Variation ± 1.5 dB	Whip Material: 17-7 PH St. Steel	Reflector Material
RADIATION PATTERN	Whip Diameter in .100 mm 2.54	Weather Protection: Fiberglass Radome
E-Plane beamwidth @ - 3 dB 24 ± 2°	Spring Material: N/A	
H-Plane beamwidth @ -3dB omni ° Omnidirectional	Spring Diameter in N/A mm	Turning Radius _____ ft _____ m
Beamtilt @ bandwidth limits Low __6__° High __-1__°	Spring Length N/A in mm	RS-329 WINDLOAD DATA
Relative level of largest sidelobe from major lobe >5 dB	Mount Insulation: Teflon	NO ICE RS-329 Velocity ___ mi/h ___ km/h Fatal Velocity ___ mi/h ___ km/h Windload Area (EFP) ___ ft² ___ m²
Front-to-back ratio dB	SHIPPING WEIGHT lb (See Note #1) kg SHIPPING DIMENSIONS 9 in x 8 in x 22.75 in 229 mm 204 mm x 578 mm (OR) _____ dia x _____ in _____ dia x _____ mm	NO ICE (At Rated Velocity) Lateral Thrust ___ lb ___ kg Bending Moment ___ ft-lb ___ N-m Torque Moment _____ft-lb _____N-m
Wide angle radiation level dB		NO ICE (At 100 mi/h (161 km/h): Lateral Thrust ___ lb ___ kg Bending Moment ___ ft-lb ___ N-m torque Moment _____ft-lb _____N-m
OPERATING PRINCIPLES: - 3 element collinear whip over ground plane. - 1/2 wave, over 1/2 wave, over 1/4 wave. FEATURES:		1/2" ICE RS-329 Velocity ___ mi/h ___ km/h Fatal Velocity ___ mi/h ___ km/h Windload Area (EFP) ___ ft² ___ m²
		1/2" ICE (At Rated Velocity) Lateral Thrust ___ lb ___ kg Bending Moment ___ ft-lb ___ N-m Torque Moment ___ ft-lb ___ N-m
		NO ICE (At 100 mi/h (161 km/h): Lateral Thrust ___ lb ___ kg Bending Moment ___ ft-lb ___ N-m Torque Moment ___ ft-lb ___ N-m

NOTES:

1. Antennas are individually sealed in poly bags and then bulk packed into master carton for shipment (approx. 25 antennas per carton, weighing approx. 20-25 lbs).
2. The antenna design intent is for usage with base housing, supplied by customer (Diablo), which serves as a ground plane and support structure (non-mobile application).
3. Maximum gain occurs at the horizon, in the long direction of the base housing. The gain in the short direction can be as much as 2 dB lower.

2791751 4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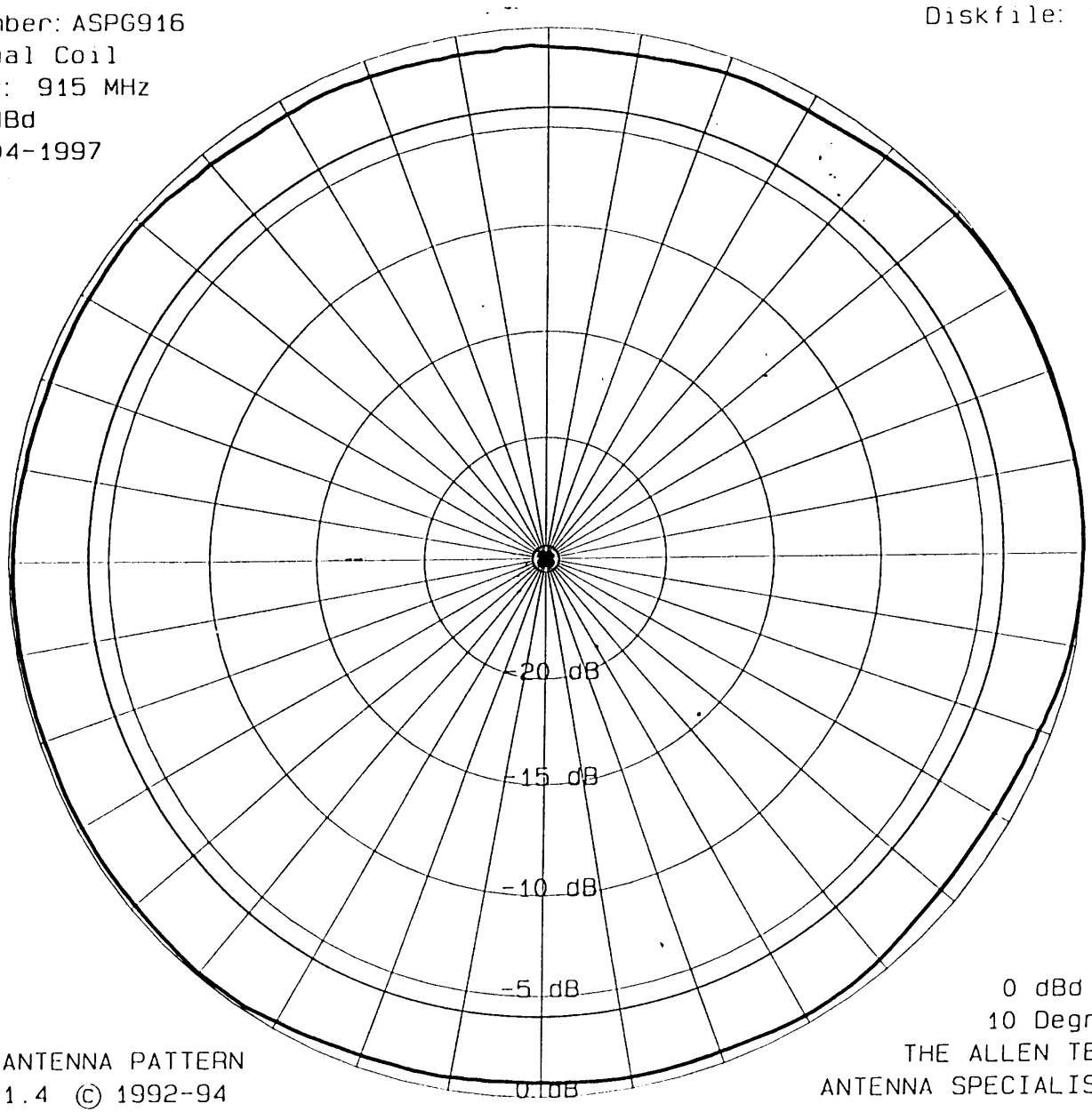
>Diablo Mount Horizontal
>Frequency: 915 MHz
>Gain: 4 dBd
>Date: 02-04-1997
>E Plane
Diskfile: S_G916VM.915
-20 dB
-15 dB
-10 dB
-5 dB
0 dB
02-04-1997
DIGITIZED ANTENNA PATTERN
PATPLOT v.1.4 (c) 1992-94
0 dBd Reference
10 Degree Radials
THE ALLEN TELECOM GROUP
ANTENNA SPECIALISTS DIVISION

>Model Number: ASPG916
>Diablo Dual Coil
>Frequency: 915 MHz
>Gain: 4 dBd
>Date: 02-04-1997
>H Plane

Diskfile: S_G916HM.915



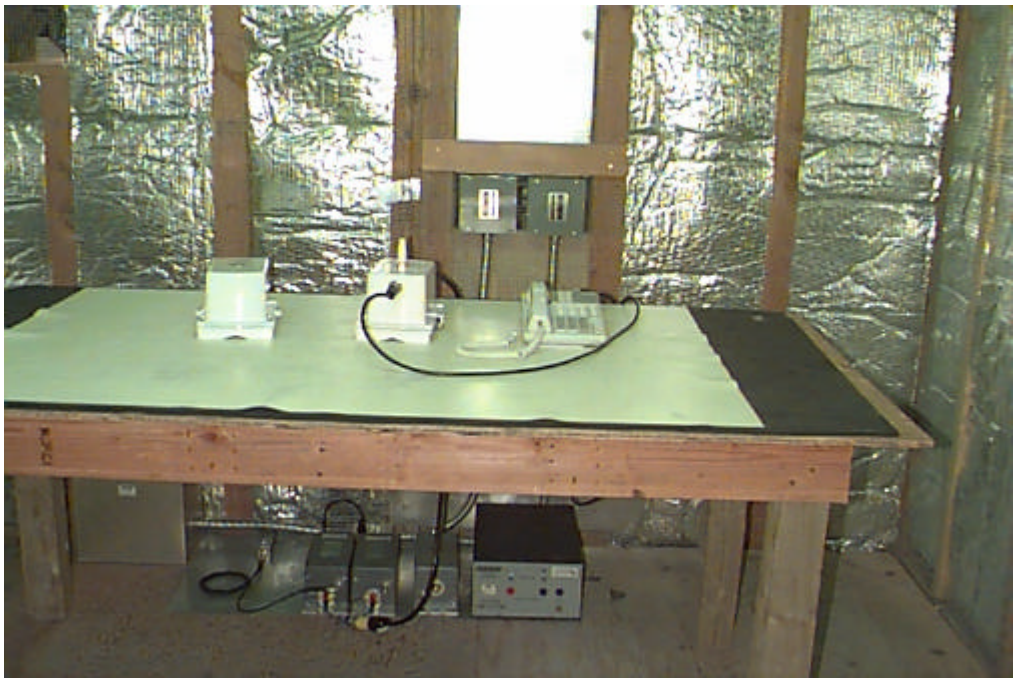
02-04-1997
DIGITIZED ANTENNA PATTERN
PATPLOT v.1.4 © 1992-94

0 dBd Reference
10 Degree Radials
THE ALLEN TELECOM GROUP
ANTENNA SPECIALISTS DIVISION

APPENDIX F

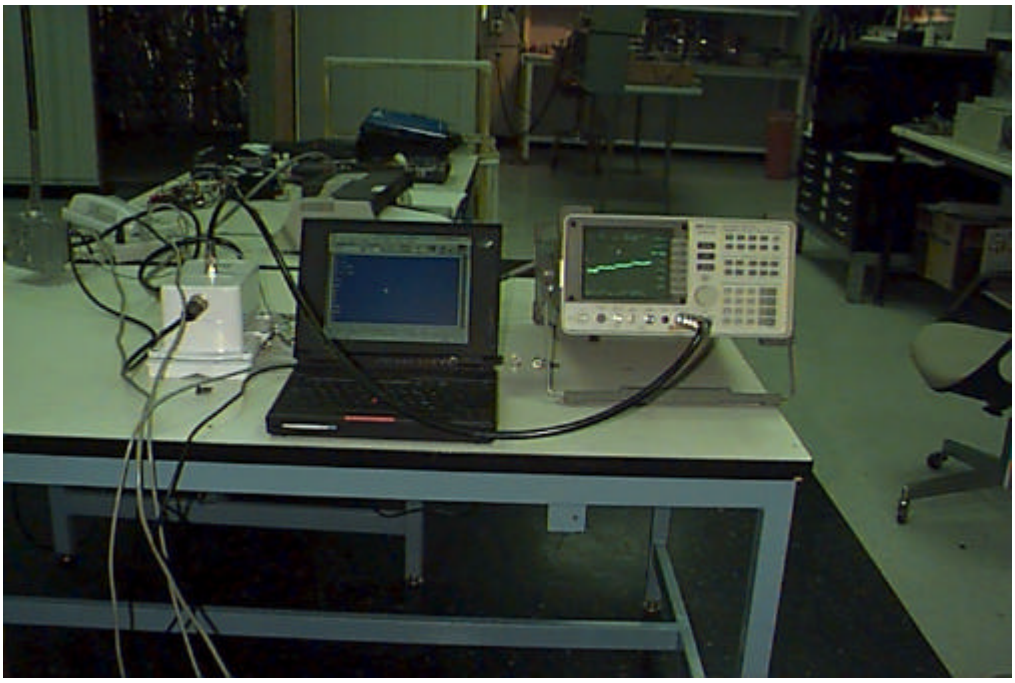
SET-UP PHOTOS

FCC Part 15.209
Radiated Emissions



FCC Part 15.207
Conducted Emissions

FCC Part 15.205
Restricted Band



FCC Part 15.247
Conducted RF at Antenna Terminals