FCC PART 15 SUBPART B and C
AND RSS-210 ISSUE 2
TEST REPORT

for

TERMINAL TRANSCEIVER

Model: FXV-01

Prepared for

HYPERCOM CORPORATION
2851 WEST KATHLEEN ROAD
PHOENIX, ARIZONA 85053

Prepared by: _____

KYLE FUJIMOTO

Approved by: _____

SCOTT McCUTCHAN

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114 OLINDA DRIVE
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DATE: DECEMBER 28, 1998

	REPORT BODY	APPENDICES				TOTAL
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GENERAL REPORT SUMMARY

This electromagnetic emission test report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced in any form unless done so in full with the written permission of Compatible Electronics.

This report must not be used to claim product endorsement by NVLAP or any other agency of the U.S. Government.

Device Tested: Terminal Transceiver
Model: FXV-01
S/N: N/A

Product Description: The EUT is a radio transceiver operating in the FCC, ISM band.

Modifications: The EUT was not modified during the testing.

Manufacturer: Hypercom Corporation
2851 West Kathleen Road
Phoenix, Arizona 85053

Test Date: December 21, 1998

File # for Canada: IC 2154-D

Test Specifications: EMI requirements
FCC Title 47, Part 15 Subpart B and C, Sections 15.205, 15.207 and 15.249
RSS-210 Issue 2

Test Procedure : ANSI C63.4: 1992

Test Deviations: The test procedure was not deviated from during the testing.

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 450 kHz - 30 MHz	Complies with the of FCC Title 47, Part 15 Subpart B and C, sections 15.207 and 15.249
2	Radiated RF Emissions, 10 kHz - 9300 MHz	Complies with the limits of FCC Title 47, Part 15 Subpart C, sections 15.205, and 15.249; and RSS-210 section 6.2.2. (m), 6.6, and table 3 (general field strength limits)

1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the Terminal Transceiver Model: FXV-01. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4: 1992. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the specification limits defined by FCC Title 47, Part 15, Subpart C, sections 15.205, 15.207 and 15.249; and RSS-210 Issue 2, section 6.2.2 (m), 6.6, and table 3 (general field strength limits).

2. ADMINISTRATIVE DATA

2.1 Location of Testing

The EMI tests described herein were performed at the test facility of Compatible Electronics, 114 Olinda Drive, Brea, California 92823.

2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

2.3 Cognizant Personnel

Hypercom Corporation

Robert "Bob" Lindy Electronic Engineer, Hypercom POS Development

Compatible Electronics Inc.

Kyle Fujimoto Test Engineer
Scott McCutchan Lab Manager

2.4 Date Test Sample was Received

The test sample was received on December 16, 1998

2.5 Disposition of the Test Sample

The test sample was returned to Hypercom Corporation on December 21, 1998.

2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

RF	Radio Frequency
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
HP	Hewlett Packard
ITE	Information Technology Equipment
CML	Corrected Meter Limit
LISN	Line Impedance Stabilization Network
POS	Point of Sale

3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this EMI Test Report.

SPEC	TITLE
FCC Title 47, Subpart C.	FCC Rules - Radio frequency devices (including digital devices) – Intentional Radiators.
FCC Title 47, Subpart B	FCC Rules - Radio frequency devices (including digital devices) – Unintentional Radiators.
ANSI C63.4 1992	Methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz.
RSS-210 Issue 2	Low Power Licence–Exempt Communication Devices

4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration - EMI

Setup and operation of the equipment under test.

Specifics of the EUT and Peripherals Tested

The EUT was tested in two different configurations:

1. **Transmitting Mode:** The Terminal Transceiver Model: FXV-01 (EUT) was connected to an RJ-11 box. The RJ-11 box was connected to a POS terminal. The POS terminal was connected to an AC adapter via its DC IN port. The RJ-11 box was used to allow the EUT to switch from continuously transmitting to continuously receiving. The EUT was continuously transmitting during the test and was tested in two different orthogonal axis.

2. **Receiving Mode:** The Terminal Transceiver Model: FXV-01 (EUT) was connected to an RJ-11 box. The RJ-11 box was connected to a POS terminal. The POS terminal was connected to an AC adapter via its DC IN port. The RJ-11 box was used to allow the EUT to switch from continuously transmitting to continuously receiving. The EUT was continuously receiving (916.50 MHz) during the test and was tested in two different orthogonal axis. A signal generator and another transmitting antenna was used at 916.50 MHz to transmit a signal to the EUT to verify the emissions did not get higher when it was receiving a signal at 916.50 MHz

   During the preliminary investigation, the spurious emissions were checked in both the Transmitting mode and Receiving mode (including the receiver's fundamental frequency) to see which one was the worst case. The worst case was in the Transmitting mode and the final spurious emissions data was taken in that mode. For the harmonics, complete data is shown for both the Transmitting and Receiving modes. For conducted, the transmitting mode was determined to be the worst case and final conducted data was taken in the transmitting mode.

4.1.1 Cable Construction and Termination

Cable 1

This is a 2 meter unshielded cable connecting the AC Adapter to the POS terminal. It has a 3-pin power connector at the POS terminal end and is hard wired into the AC Adapter. The cable was bundled to a length of 1 meter.

Cable 2

This is a 1 foot unshielded cable connecting the POS terminal to the RJ-11 box. It has an RJ-11 connector at the POS terminal end and is hard wired into the RJ-11 box.

Cable 3

This is a 3 meter unshielded cable connecting the RJ-11 box to the EUT. It has an RJ-11 connector at the RJ-11 box end and is hard wired into the EUT. The cable was bundled to a length of 1 meter.

5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

5.1 EUT and Accessory List

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID
TERMINAL TRANSCEIVER (EUT)	HYPERCOM CORPORATION	FXV-01	N/A	NVA020123-002
POS TERMINAL	HYPERCOM CORPORATION	ICE 5000	N/A	N/A
AC ADAPTER	HYPERCOM CORPORATION	WLT-2408-1	9710	N/A
RJ-11 ADAPTER BOX	N/A	N/A	N/A	N/A

5.2 EMI Test Equipment

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
Spectrum Analyzer	Hewlett Packard	8566B	3638A08784	Nov. 16, 1998	May 16, 1999
Preamplifier	Com Power	PA-102	1017	Feb. 16, 1998	Feb. 16, 1999
Quasi-Peak Adapter	Hewlett Packard	85650A	3303A01688	June 23, 1998	June 23, 1999
RF Attenuator	Com-Power	A-410	1602	Nov. 25, 1998	Nov. 25, 1999
LISN	Com Power	LI-200	1764	Jan. 3, 1998	Jan. 3, 1999
LISN	Com Power	LI-200	1771	Jan. 3, 1998	Jan. 3, 1999
LISN	Com Power	LI-200	1775	Jan. 3, 1998	Jan. 3, 1999
LISN	Com Power	LI-200	1780	Jan. 3, 1998	Jan. 3, 1999
Biconical Antenna	Com Power	AB-100	1548	Oct. 15, 1998	Oct. 15, 1999
Log Periodic Antenna	Com Power	AL-100	1117	Oct. 15, 1998	Oct. 15, 1999
Antenna Mast	Com Power	AM-100	N/A	N/A	N/A
Turntable	Com Power	TT-100	N/A	N/A	N/A
Computer	Hewlett Packard	HP98561A	2522A05178	N/A	N/A
Printer	Hewlett Packard	2225A	2925S33268	N/A	N/A
Plotter	Hewlett Packard	7440A	8726K38417	N/A	N/A
Microwave Amplifier	Com-Power	PA-122	25321	Oct. 13, 1998	Oct. 13, 1999
Horn Antenna	Antenna Research	DRG-118/A	1053	Dec. 8, 1995	N/A
Loop Antenna	Com-Power	AL-130	25309	Feb. 5, 1998	Feb. 5, 1999

6. TEST SITE DESCRIPTION

6.1 Test Facility Description

Please refer to section 2.1 and 7.1.2 of this report for EMI test location.

6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 1.0 by 1.5 meter non-conductive table 0.8 meters above the ground plane.

The EUT was not grounded.

7. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

7.1 RF Emissions

7.1.1 Conducted Emissions Test

The spectrum analyzer was used as a measuring meter along with the quasi-peak adapter. The data was collected with the spectrum analyzer in the peak detect mode with the "Max Hold" feature activated. The quasi-peak detector was used only where indicated in the data sheets. A 10 dB attenuation pad was used for the protection of the spectrum analyzer input stage, and the spectrum analyzer offset was adjusted accordingly to read the actual data measured. The LISN output was read by the spectrum analyzer. The output of the second LISN was terminated by a 50 ohm termination. The effective measurement bandwidth used for the conducted emissions test was 9 kHz.

Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The EUT was powered through the LISN, which was bonded to the ground plane. The LISN power was filtered and the filter was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in ANSI C63.4: 1992. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The initial test data was taken in manual mode while scanning the frequencies ranges of 0.45 MHz to 1.6 MHz, 1.6 MHz to 5 MHz and 5 MHz to 30 MHz. The conducted emissions from the EUT were maximized for operating mode as well as cable placement. Once a predominant frequency (within 12 dB of the limit) was found, it was more closely examined with the spectrum analyzer span adjusted to 1 MHz.

7.1.2 Radiated Emissions (Spurious and Harmonics) Test

The spectrum analyzer was used as a measuring meter along with the quasi-peak adapter. Amplifiers were used to increase the sensitivity of the instrument. The Com Power Preamplifier Model: PA-102 was used for frequencies from 30 MHz to 1 GHz, and the Com Power Microwave Amplifier Model: PA-122 was used for frequencies above 1 GHz. The spectrum analyzer was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the spectrum analyzer records the highest measured reading over all the sweeps. The quasi-peak adapter was used only for those readings which are marked accordingly on the data sheets. The measurement bandwidths and transducers used for the radiated emissions test were:

FREQUENCY RANGE	EFFECTIVE MEASUREMENT BANDWIDTH	TRANSDUCER
10 kHz to 150 kHz	200 Hz	Active Loop Antenna
150 kHz to 30 MHz	9 kHz	Active Loop Antenna
30 MHz to 300 MHz	120 kHz	Biconical Antenna
300 MHz to 1 GHz	120 kHz	Log Periodic Antenna
1 GHz to 9.3 GHz	1 MHz	Horn Antenna

The open field test site of Compatible Electronics, Inc. was used for radiated emission testing. This test site is set up according to ANSI C63.4: 1992. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength). The gunsight method was used when measuring with the horn antenna in order to ensure accurate results.

The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT. The EUT was tested at a 3 meter test distance to obtain final test data.

7.3 Bandwidth of the Transmitted Signal

The bandwidth of the transmitted signal was measured using a CISPR meter as described in section 4.2 of RSS-210 Issue 2. For the transmitted signal being tested, there is no bandwidth value specified per table 5 of RSS-210 Issue 2, so the transmitted signal was reported at its nominal 6 dB bandwidth. Please see Appendix D for the bandwidth plot.

The bandwidth at the –6dB points was 112 kHz.

8. CONCLUSIONS

The Terminal Transceiver Model: FXV-01 meets all of the specification limits defined in FCC Title 47, Part 15, Subpart B and C, sections 15.205, 15.207, 15.249, and RSS-210, Issue 2.

APPENDIX A

MODIFICATIONS TO THE EUT

MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC Subpart B and C; and RSS-210, Issue 2 specifications.

All the rework described below was implemented during the test in a method that could be reproduced in all the units by the manufacturer.

Modifications:

No modifications were made to the EUT.

APPENDIX B

ADDITIONAL MODELS COVERED UNDER THIS REPORT

ADDITIONAL MODELS COVERED UNDER THIS REPORT

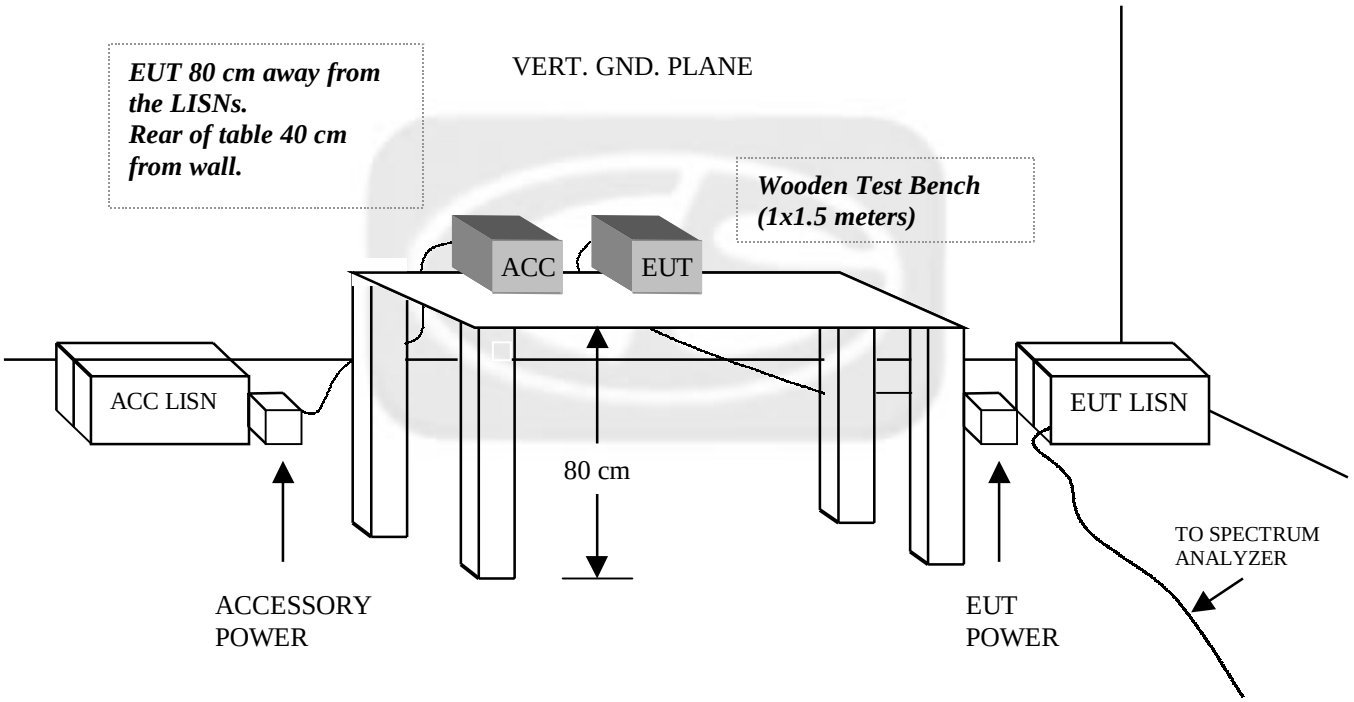
USED FOR THE PRIMARY TEST	Terminal Transceiver Model: FXV-01 S/N: N/A

There were no additional models covered under this report.

APPENDIX C

DIAGRAMS, CHARTS AND PHOTOS

FIGURE 1: CONDUCTED EMISSIONS TEST SETUP



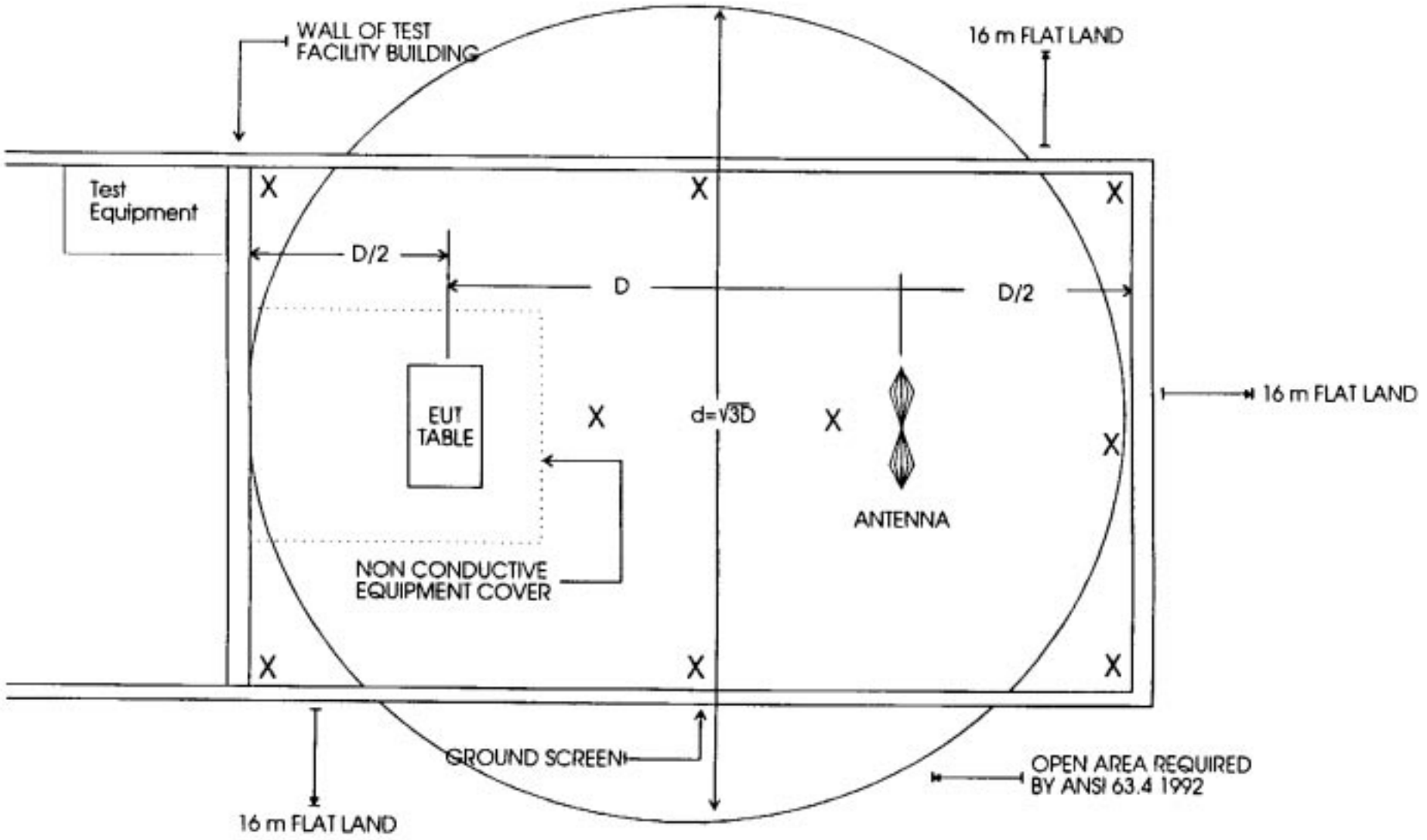
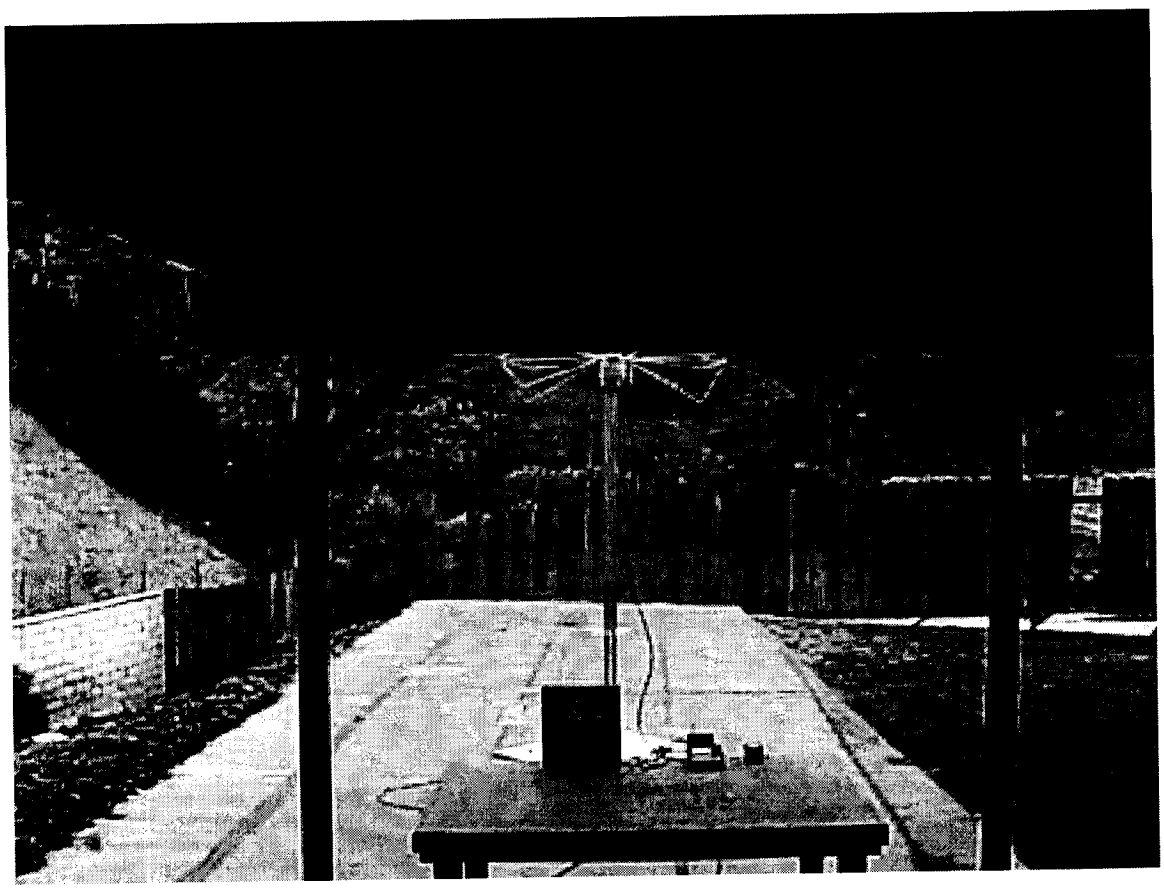


FIGURE 2: PLOT MAP AND LAYOUT OF TEST SITE “D”

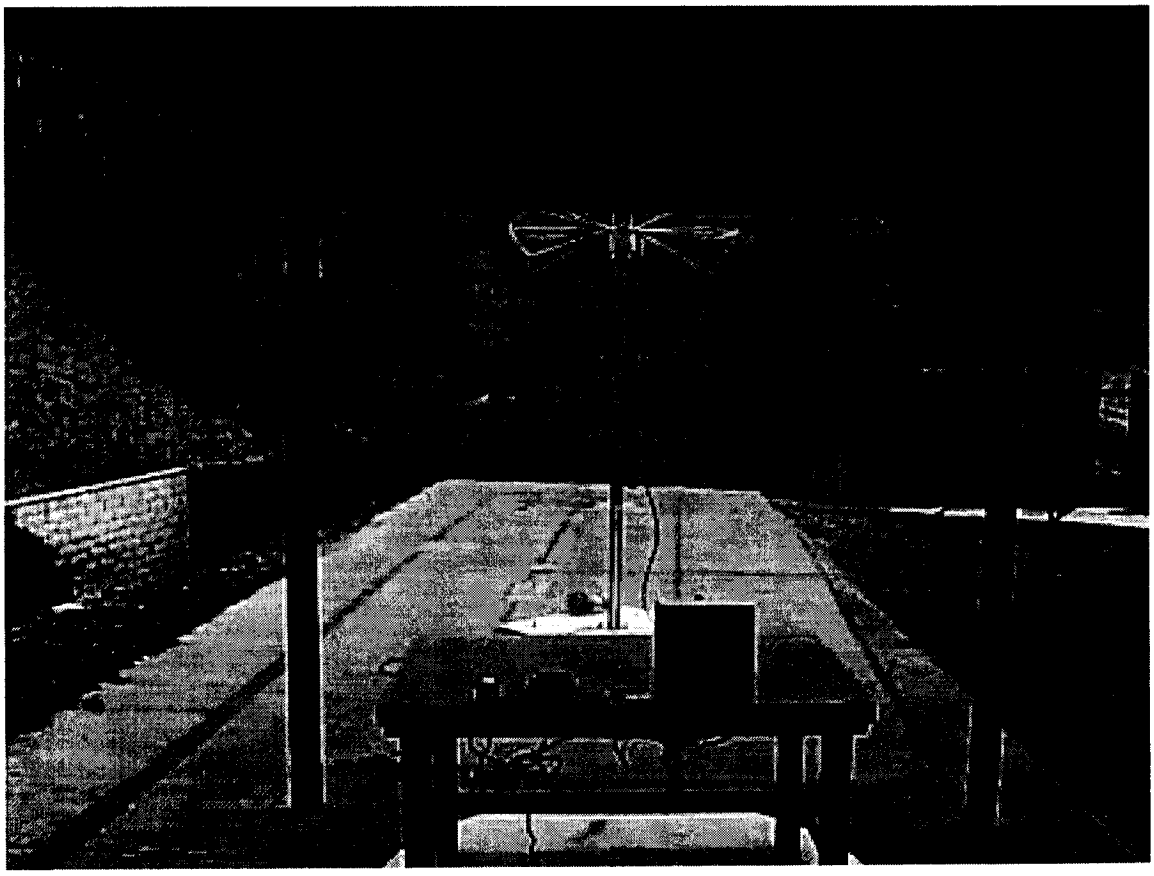


FRONT VIEW

HYPERCOM CORPORATION
TERMINAL TRANSCEIVER
Model: FXV-01
FCC SUBPART B AND C - RADIATED EMISSIONS – 12-16-98 and 12-21-98

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

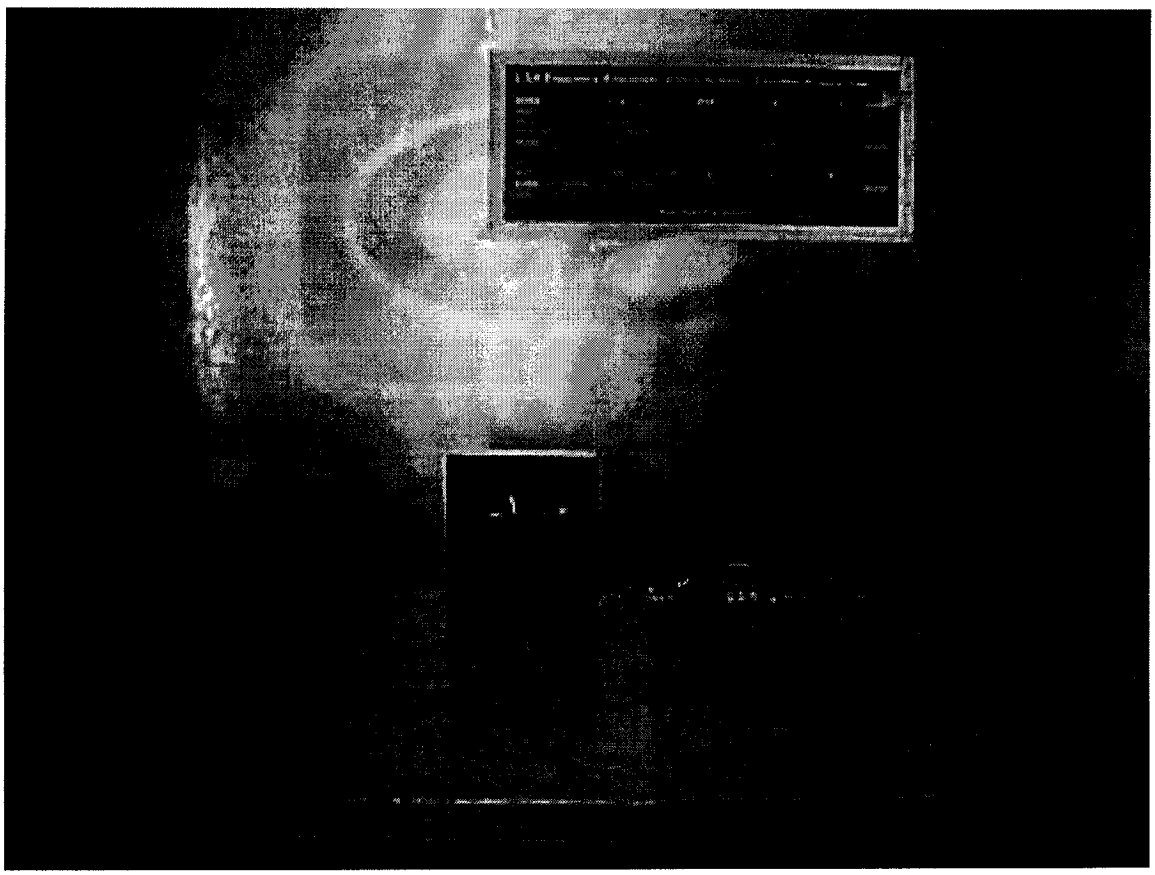
114 OLINDA DRIVE, BREA, CALIFORNIA 92823 PHONE: (714) 579-0500 FAX: (714) 579-1850



REAR VIEW

HYPERCOM CORPORATION
TERMINAL TRANSCEIVER
Model: FXV-01
FCC SUBPART B AND C - RADIATED EMISSIONS – 12-16-98 and 12-21-98

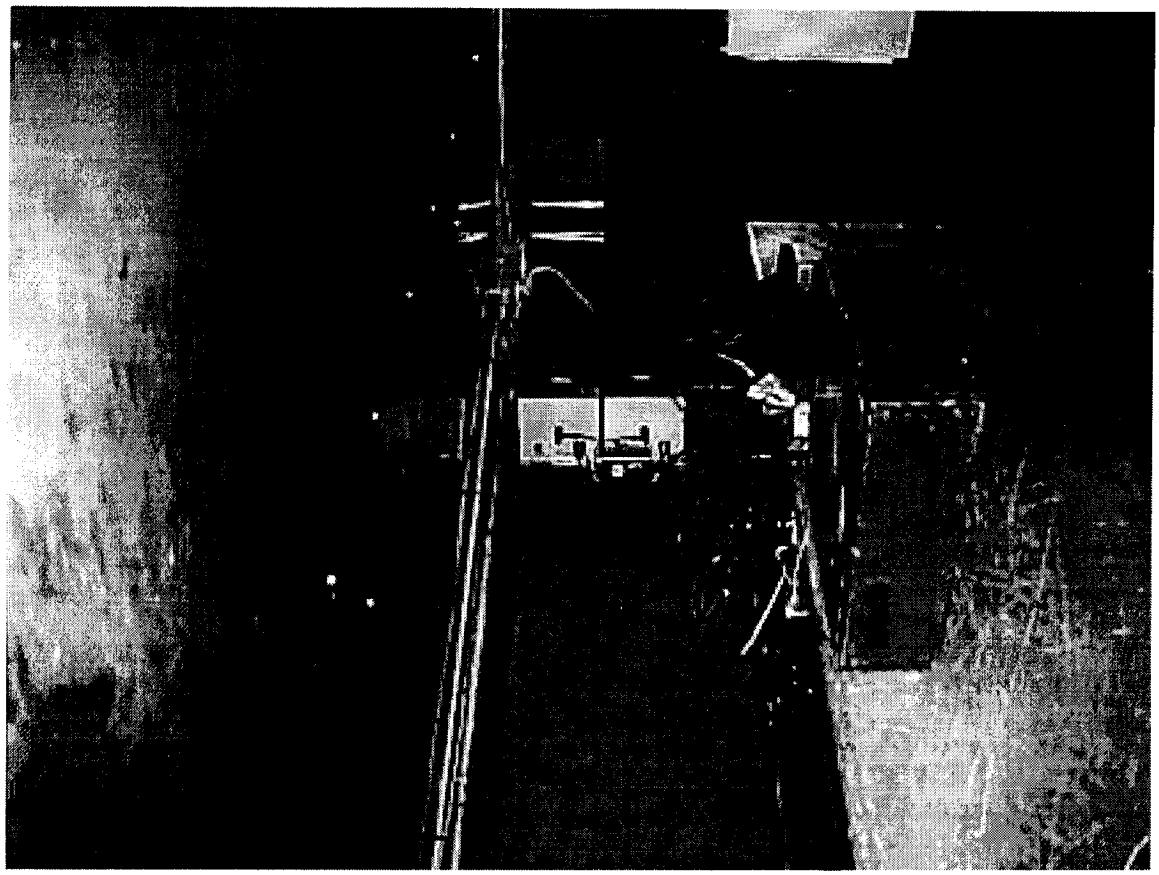
PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



FRONT VIEW

HYPERCOM CORPORATION
TERMINAL TRANSCEIVER
Model: FXV-01
FCC SUBPART B AND C - CONDUCTED EMISSIONS – 12-21-98

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



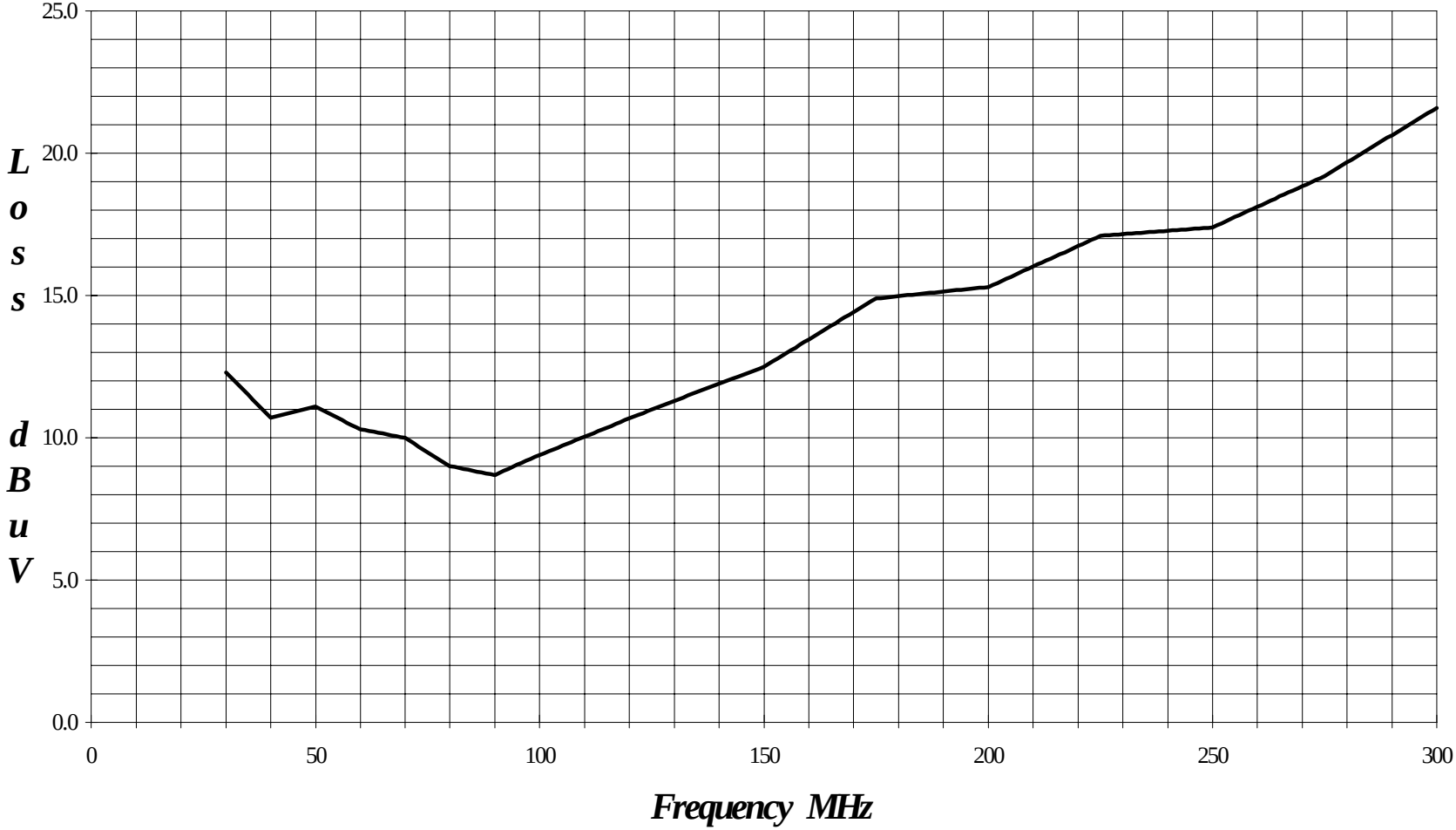
REAR VIEW

HYPERCOM CORPORATION
TERMINAL TRANSCEIVER
Model: FXV-01
FCC SUBPART B AND C - CONDUCTED EMISSIONS – 12-21-98

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

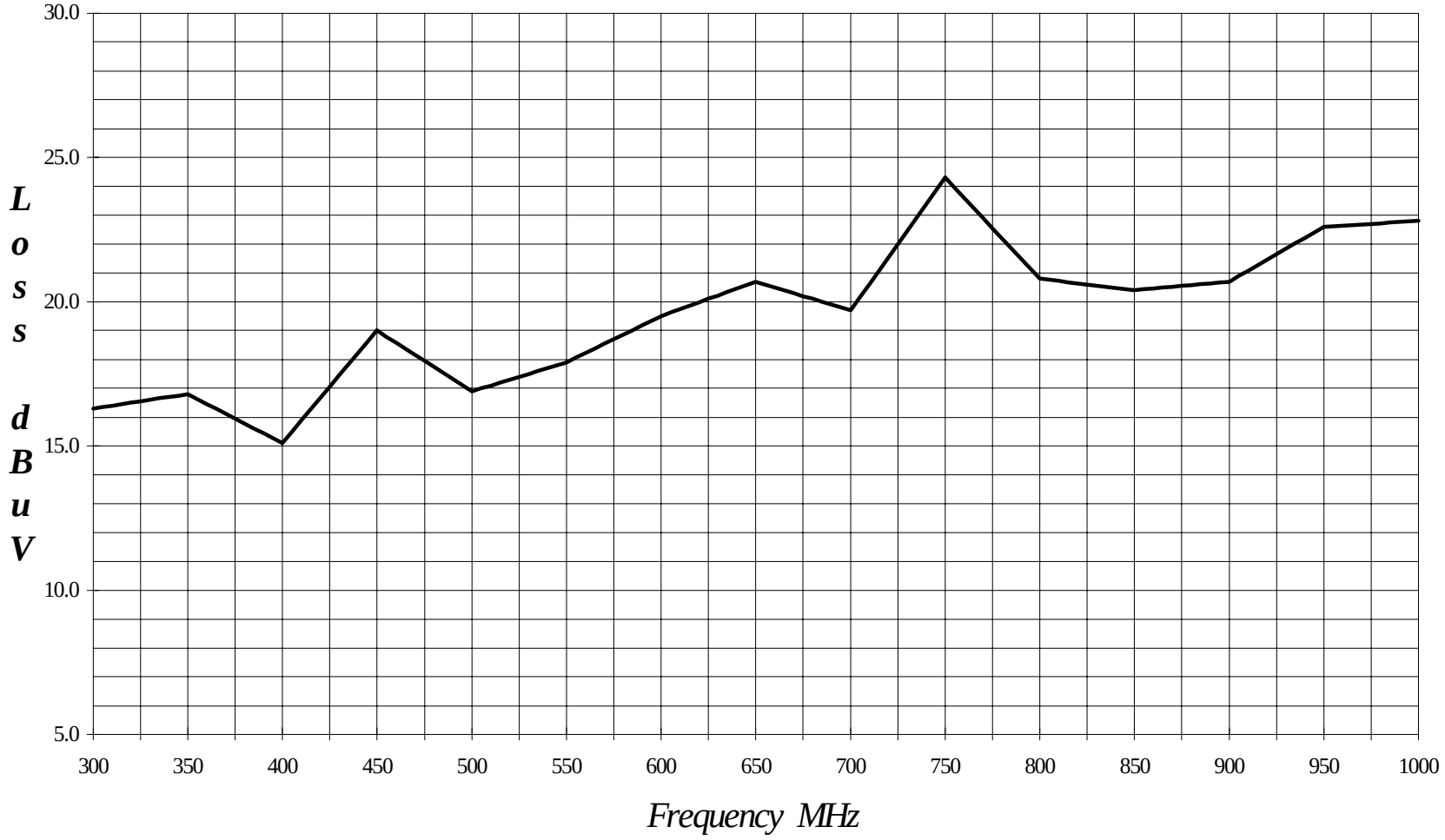
***Cal*: 10/15/98**

LAB "D" BICONICAL ANTENNA AB-100 S/N 01548



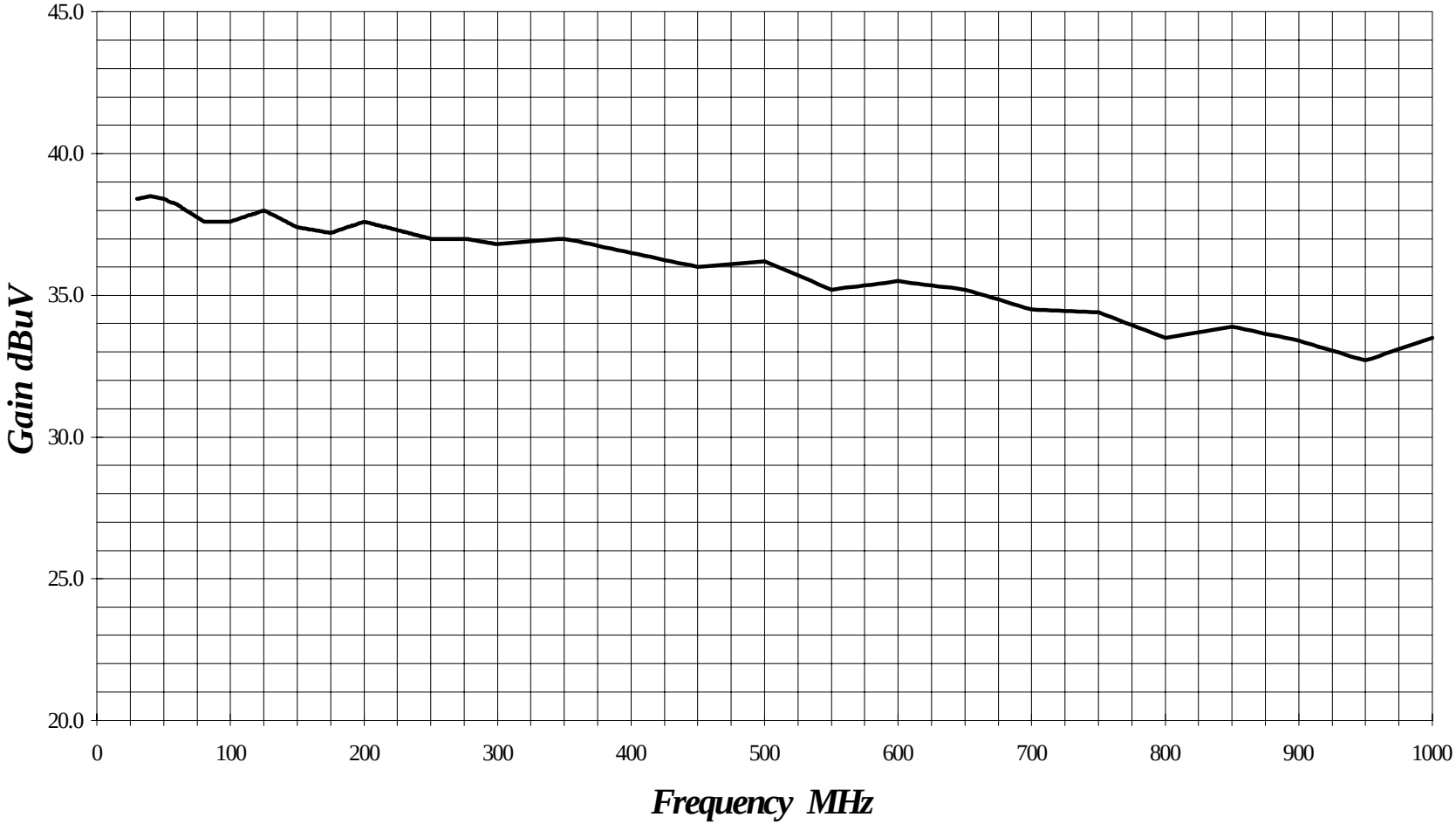
***Cal*: 10/15/98**

LAB "D" LOG PERIODIC ANTENNA AL-100 S/N 01117



Lab "D" Effective: **2/16/98** *Effective Gain = Preamplifier Gain – Cable Loss*

PREAMPLIFIER EFFECTIVE GAIN AT 3 METERS PA-102 S/N: 1017



COM-POWER PA-122

MICROWAVE PREAMPLIFIER

S/N: 25132

CALIBRATION DATE: OCTOBER 13, 1998

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	33.7	8.0	32.9
1.1	33.5	8.5	32.7
1.2	33.5	9.0	33.2
1.3	33.6	9.5	33.7
1.4	33.5	10.0	34.6
1.5	33.0	10.5	32.7
1.6	33.4	11.0	30.8
1.7	33.5	11.5	32.1
1.8	33.6	12.0	31.7
1.9	33.5	12.5	32.9
2.0	33.9	13.0	27.8
2.5	33.9	13.5	30.7
3.0	33.6	14.0	30.4
3.5	33.5	14.5	31.7
4.0	33.4	15.0	32.2
4.5	32.9	15.5	34.0
5.0	32.4	16.0	31.6
5.5	32.7	16.5	32.7
6.0	33.6	17.0	31.7
6.5	32.5	17.5	31.2
7.0	33.0	18.0	30.2
7.5	33.7		

ANTENNA RESEARCH ASSOCIATES, INC.
11317 Frederick Avenue, Beltsville, MD 20705

E-FIELD ANTENNA FACTOR CALIBRATION

E(dB V/m) = Vo(dB V) + AFE(dB/m)

Model number : DRG-118/A

Frequency GHz	AFE dB/m	Gain dBi
1	22.3	8.0
2	26.7	9.5
3	29.7	10.1
4	29.5	12.8
5	32.3	12.0
6	32.4	13.4
7	36.1	11.0
8	37.4	10.9
9	36.8	12.5
10	39.5	10.7
11	39.6	11.5
12	39.8	12.0
13	39.7	12.8
14	41.8	11.3
15	41.9	11.9
16	38.1	16.3
17	41.0	13.9
18	46.5	8.9

Serial number : 1053
Job number : 96-092
Remarks : 3 meter calibration
Standards : LPD-118/A, TE-1000

Temperature : 72° F
Humidity : 56 %
Traceability : A01887
Date : December 08, 1995

Calibrated By

Com-Power Corporation

(714) 587-9800

Antenna Calibration

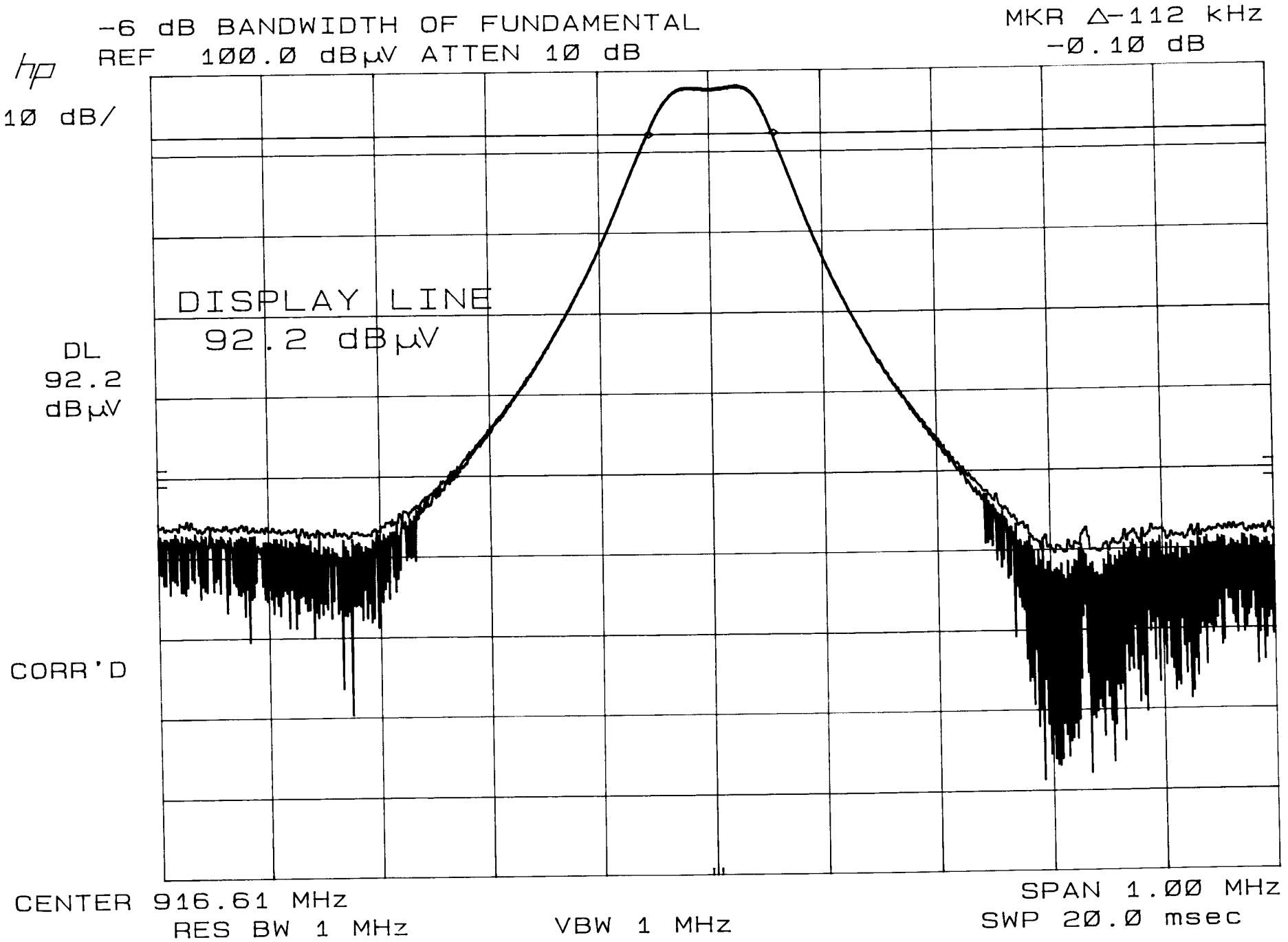
Antenna Type:	Loop Antenna
Model:	AL-130
Serial Number:	25309
Calibration Date:	2/5/98

Frequency MHz	Magnetic (dB/m)	Electric dB/m
0.01	-40.5	11.0
0.02	-41.6	9.9
0.03	-40.0	11.5
0.04	-40.3	11.2
0.05	-41.6	9.9
0.06	-41.1	10.4
0.07	-41.3	10.2
0.08	-41.6	9.9
0.09	-41.7	9.8
0.1	-41.8	9.7
0.2	-44.0	7.5
0.3	-41.6	9.9
0.4	-41.7	9.8
0.5	-41.7	9.8
0.6	-41.5	10.0
0.7	-41.5	10.0
0.8	-41.6	9.9
0.9	-41.6	9.9
1	-41.1	10.4
2	-40.7	10.8
3	-40.7	10.8
4	-40.9	10.6
5	-40.1	11.4
6	-40.0	11.5
7	-40.3	11.2
8	-39.8	11.7
9	-38.8	12.7
10	-40.8	10.7
12	-41.4	10.1
14	-41.4	10.1
15	-40.9	10.6
16	-40.8	10.7
18	-41.5	10.0
20	-41.5	10.0
25	-41.2	10.3
30	-41.4	10.1

Trans. Antenna Height	2 meter
Receiving Antenna Height	2 meter

APPENDIX D

DATA SHEETS


-6 dB BANDWIDTH OF FUNDAMENTAL
REF 100.0 dBµV ATTEN 10 dB
MKR Δ-112 kHz
-0.10 dB
10 dB/
DISPLAY LINE
92.2 dBµV
DL
92.2
dBµV
CORR'D
CENTER 916.61 MHz
RES BW 1 MHz
VBW 1 MHz
SPAN 1.00 MHz
SWP 20.0 msec

RADIATED EMISSIONS

COMPANY	**HYPERCOM CORPORATION**	**DATE**	**12/16/98**
EUT	**TERMNAL TRANSCEIVER**	**ANTENNAS**	**LOG PERIODIC AND HORN**
MODEL	**FXV-01**	**POLARIZATION**	**SEE BELOW**
DUTY CYCLE	**40% = 7.9 dB drop for AVERAGE READINGS**	**TEST DISTANCE**	**3 METERS**
EUT MODE	**FUNDAMENTAL AND HARMONICS**	**LAB**	**D**

Frequency MHz	Peak Reading (dBuV)	Average or Quasi-Peak (dBuV)	Antenna Height (meters)	Azimuth (degrees)	Distance Factor (dB)	Antenna Factor (dB)	Cable Loss (dB)	Amplifier Gain (dB)	*Corrected Reading (dBuV/m)	Delta ** (dB)	Spec Limit (dBuV/m)	Comments
916.50	98.2	98.1	1.0	**180**	0.0	21.3	4.2	37.3	86.3	-7.7	94.0	**Vertical Polarization**
1833.00	51.7	43.8	2.0	**0**	0.0	24.5	5.9	33.6	40.6	-13.4	54.0	**Vertical Polarization**
2749.50	46.4	38.5	2.0	**180**	0.0	26.7	4.8	33.9	36.1	-17.9	54.0	**Vertical Polarization**
3666.00	54.8	46.9	1.5	**0**	0.0	29.6	6.9	33.5	49.9	-4.1	54.0	**Vertical Polarization**
4582.50	49.3	41.4	2.5	**0**	0.0	30.9	8.6	32.9	48.0	-6.0	54.0	**Vertical Polarization**
5499.00	39.6	31.7	2.5	**0**	0.0	32.4	9.2	32.7	40.6	-13.4	54.0	**Vertical Polarization**
6415.50	36.6	28.7	1.0	**0**	0.0	34.3	10.3	32.5	40.8	-13.2	54.0	**Vertical Polarization**
7332.00	36.9	29.0	1.0	**90**	0.0	36.8	11.4	33.7	43.5	-10.5	54.0	**Vertical Polarization**
8248.50	36.7	28.8	2.0	**270**	0.0	37.4	13.1	32.9	46.4	-7.6	54.0	**Vertical Polarization**
9165.00	33.4	25.5	2.0	**0**	0.0	36.8	12.4	33.2	41.5	-12.5	54.0	**Vertical Polarization**
916.50	94.0	93.9	1.0	**180**	0.0	21.3	4.2	37.3	82.1	-11.9	94.0	**Horizontal Polarization**
1833.00	47.3	39.4	2.0	**90**	0.0	24.5	5.9	33.6	36.2	-17.8	54.0	**Horizontal Polarization**
2749.50	44.0	36.1	2.0	**90**	0.0	26.7	4.8	33.9	33.7	-20.3	54.0	**Horizontal Polarization**
3666.00	53.0	45.1	2.0	**90**	0.0	29.6	6.9	33.5	48.1	-5.9	54.0	**Horizontal Polarization**
4582.50	53.0	45.1	3.0	**180**	0.0	30.9	8.6	32.9	51.7	-2.3	54.0	**Horizontal Polarization**
5499.00	41.9	34.0	1.5	**270**	0.0	32.4	9.2	32.7	42.9	-11.1	54.0	**Horizontal Polarization**
6415.50	38.0	30.1	2.0	**180**	0.0	34.3	10.3	32.5	42.2	-11.8	54.0	**Horizontal Polarization**
7332.00	38.7	30.8	2.0	**270**	0.0	36.8	11.4	33.7	45.3	-8.7	54.0	**Horizontal Polarization**
8248.50	37.7	29.8	3.0	**270**	0.0	37.4	13.1	32.9	47.4	-6.6	54.0	**Horizontal Polarization**
9165.00	33.6	25.7	2.0	**180**	0.0	36.8	12.4	33.2	41.7	-12.3	54.0	**Horizontal Polarization**

* CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

** DELTA = SPEC LIMIT - CORRECTED READING

*** BELOW 1 GHz, QUASI-PEAK MEASUREMENT IS EMPLOYEED, ABOVE 1 GHz, AVERAGE MEASUREMENT IS EMPLOYED

**** AVERAGE READINGS IS BASED ON DUTY CYCLE FORMULA 20*LOG (DUTY CYCLE%)

Test location: Compatible Electronics
Customer : HYPERCOM CORPORATION
Manufacturer : SAME
EUT name : TERMINAL TRANSCEIVER
Specification: Fcc_B Test distance: 3.0 mtrs
Distance correction factor(20*log(test/spec))
Test Mode : SPURIOUS EMISSIONS
TEMPERATURE 55 DEGREES F.
RELATIVE HUMIDITY 75%
TESTED BY: Kyle Fujimoto
KYLE FUJIMOTO

Date : 12/21/1998
Time : 13.08
Model: FXV-01
Lab: D
: 0.00

Pol	Freq MHz	Rdng dBuV	Cable loss dB	Ant factor dB	Amp gain dB	Cor'd rdg = R dBuV	limit = L dBuV/m	Delta R-L dB
1V	49.25	53.80	0.59	11.07	39.00	26.46	40.00	-13.54
2V	68.89	59.20	0.70	10.03	38.63	31.30	40.00	-8.70
3V	98.39	59.70	0.88	9.29	38.48	31.39	43.50	-12.11
4V	108.20	69.00	0.93	9.92	38.66	41.19	43.50	-2.31
5V	108.21	68.99	0.93	9.93	38.66	41.18Qp	43.50	-2.32
6V	118.03	61.10	0.97	10.55	38.86	33.77	43.50	-9.73
7V	127.87	65.00	1.02	11.17	38.95	38.24	43.50	-5.26
8V	137.70	56.90	1.10	11.76	38.80	30.97	43.50	-12.53
9V	147.52	60.00	1.18	12.35	38.64	34.89	43.50	-8.61
10V	167.18	54.60	1.34	14.15	38.60	31.49	43.50	-12.01
11V	186.83	49.40	1.40	15.09	38.79	27.10	43.50	-16.40
12V	226.23	51.80	1.41	17.11	38.70	31.63	46.00	-14.37

Test location: Compatible Electronics
Customer : HYPERCOM CORPORATION Date : 12/21/1998
Manufacturer : SAME Time : 13.39
EUT name : TERMINAL TRANSCEIVER Model: FXV-01
Specification: Fcc_B Test distance: 3.0 mtrs Lab: D
Distance correction factor(20*log(test/spec)) : 0.00
Test Mode : SPURIOUS EMISSIONS
TEMPERATURE 55 DEGREES F.
RELATIVE HUMIDITY 75%
TESTED BY: Kyle Fujimoto
KYLE FUJIMOTO

Pol	Freq MHz	Rdng dBuV	Cable loss dB	Ant factor dB	Amp gain dB	Cor'd rdg = R dBuV	limit = L dBuV/m	Delta R-L dB
1H	49.23	48.40	0.59	11.07	39.00	21.06	40.00	-18.94
2H	59.05	48.10	0.69	10.38	38.91	20.26	40.00	-19.74
3H	68.88	55.80	0.70	10.03	38.63	27.90	40.00	-12.10
4H	108.20	62.20	0.93	9.92	38.66	34.39	43.50	-9.11
5H	127.86	63.50	1.02	11.17	38.95	36.74	43.50	-6.76
6H	137.70	59.00	1.10	11.76	38.80	33.07	43.50	-10.43
7H	147.54	67.80	1.18	12.35	38.64	42.69	43.50	-0.81
8H	147.54	65.91	1.18	12.35	38.64	40.80Qp	43.50	-2.70
9H	157.35	58.20	1.26	13.21	38.60	34.06	43.50	-9.44
10H	167.19	61.30	1.34	14.15	38.60	38.19	43.50	-5.31
11H	186.86	52.60	1.40	15.09	38.79	30.30	43.50	-13.20
12H	206.55	47.10	1.40	15.77	38.92	25.35	43.50	-18.15
13H	226.18	59.80	1.41	17.11	38.70	39.63	46.00	-6.37
14H	265.48	46.00	1.66	18.51	38.66	27.51	46.00	-18.49

Test location: Compatible Electronics
Customer : HYPERCOM CORPORATION
Manufacturer : SAME
EUT name : TERMINAL TRANSCEIVER
Specification: Fcc_B Test distance: 3.0 mtrs
Distance correction factor(20*log(test/spec))
Test Mode : SPURIOUS EMISSIONS
TEMPERATURE 55 DEGREES F.
RELATIVE HUMIDITY 76%
TESTED BY: Kyle Fujimoto
KYLE FUJIMOTO

Date : 12/21/1998
Time : 12.51
Model: FXV-01
Lab: D
: 0.00

Pol	Freq MHz	Rdng dBuV	Cable loss dB	Ant factor dB	Amp gain dB	Cor'd rdg = R dBuV	limit = L dBuV/m	Delta R-L dB
1H	334.31	47.00	1.87	16.64	38.81	26.71	46.00	-19.29
2H	363.82	53.30	1.93	16.33	38.73	32.82	46.00	-13.18
3H	383.47	52.10	1.97	15.66	38.57	31.16	46.00	-14.84
4H	432.62	48.50	2.13	17.64	38.30	29.97	46.00	-16.03
5H	452.34	50.30	2.21	18.90	38.22	33.19	46.00	-12.81
6V	314.66	49.80	1.83	16.45	38.69	29.39	46.00	-16.61
7V	334.31	50.20	1.87	16.64	38.81	29.91	46.00	-16.09

RADIATED EMISSIONS

COMPANY NAME: HYPERCOM CORPORATION **DATE:** 12-21-98

EUT: TERMINAL TRANSCEIVER **EUT S/N:**

EUT MODEL: FXV-01 **LOCATION:** ■ BREA ☐ SILVERADO ☐ AGOURA

SPECIFICATION: FCC 15.249 **CLASS:** **TEST DISTANCE:** 3M **LAB:** D

ANTENNA: ■ LOOP ☐ BICONICAL ☐ LOG ☐ HORN **POLARIZATION:** ☐ VERT ☐ HORIZ

■ QUALIFICATION ☐ ENGINEERING ☐ MFG. AUDIT **ENGINEER:** KYLE F.

NOTES: TRANSMITTING MODE

Frequency (kHz)	Peak Reading (dBuV)	Avg. ☐ Q.P. ☐ (dBuV)	Antenna Height (meters)	Azimuth (degrees)	Distance Factor (dB)	Antenna Gain (dB)	* Corrected Reading (dBuV)	Delta ** (dB)	Spec Limit (dBuV)
			NO EMISSIONS FOUND						
			BETWEEN 10KHz AND 30 MHz						

* **CORRECTED READING** = METER READING - DISTANCE FACTOR - ANTENNA GAIN

** **DELTA** = CORRECTED READING - SPECIFICATION LIMIT

COMPATIBLE ELECTRONICS

RADIATED EMISSIONS

COMPANY NAME: HYPERCOM CORPORATION **DATE:** 12-21-98

EUT: TERMINAL TRANSCEIVER **EUT S/N:** N/A

EUT MODEL: FXV-01 **LOCATION:** ■ BREA ☐ SILVERADO ☐ AGOURA

SPECIFICATION: FCC **CLASS:** B **TEST DISTANCE:** 3M **LAB:** D

ANTENNA: ☐ LOOP ☐ BICONICAL ☐ LOG ■ HORN **POLARIZATION:** ■ VERT ■ HORIZ

■ QUALIFICATION ☐ ENGINEERING ☐ MFG. AUDIT **ENGINEER:** KYLE F.

NOTES:

RECEIVING MODE
HARMONICS AND SPURIOUS

Frequency (GHz)	Peak Reading (dBuV)	Average Reading (dBuV)	Antenna Height (meters)	Azimuth (degrees)	Delta * (dB)	Corrected Limit (dBuV)	Comments
		NO	EMISSIONS	FOUND			
		FROM	1 GHZ - 5 GHZ				
		IN	EITHER	POLARIZATION			
		WHEN	IN	RECEIVE	MODE		

* **DELTA** = METER READING - CORRECTED LIMIT

COMPATIBLE ELECTRONICS

12/16/1998 11:21:06

HYPERCOM CORPORATION
TERMINAL TRANSCEIVER
MODEL: FXV-01
FCC C - BLACK LEAD
TEST ENGINEER : Kyle Fujimoto
KYLE FUJIMOTO

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30 highest peaks above -50.00 dB of CLASS B limit line
Peak criteria : 0.50 dB, Curve : Peak

Peak#	Freq(Mhz)	Amp(dBuV)	Limit(dB)	Delta(dB)
1	0.462	49.17	48.00	1.17
2	0.485	47.97	48.00	-0.03
3	0.470	47.97	48.00	-0.03
4	0.480	47.77	48.00	-0.23
5	0.474	47.47	48.00	-0.53
6	0.513	46.47	48.00	-1.53
7	0.530	46.27	48.00	-1.73
8	0.522	46.27	48.00	-1.73
9	0.504	46.17	48.00	-1.83
10	0.539	45.47	48.00	-2.53
11	0.570	45.17	48.00	-2.83
12	0.546	45.17	48.00	-2.83
13	0.592	44.67	48.00	-3.33
14	0.587	44.47	48.00	-3.53
15	0.558	44.47	48.00	-3.53
16	0.581	43.87	48.00	-4.13
17	0.599	43.67	48.00	-4.33
18	0.563	43.67	48.00	-4.33
19	0.609	43.27	48.00	-4.73
20	0.620	42.77	48.00	-5.23
21	0.641	42.37	48.00	-5.63
22	0.627	42.37	48.00	-5.63
23	0.652	41.67	48.00	-6.33
24	0.635	41.67	48.00	-6.33
25	14.334	40.57	48.00	-7.43
26	0.679	40.47	48.00	-7.53
27	0.688	40.37	48.00	-7.63
28	0.666	40.27	48.00	-7.73
29	29.396	39.93	48.00	-8.07
30	0.697	39.57	48.00	-8.43

SEE QUASI-PEAK READINGS ON NEXT PAGE AND ON PLOT

COMPATIBLE ELECTRONICS

12/16/1998 11:21:06

HYPERCOM CORPORATION
TERMINAL TRANSCEIVER
MODEL: FXV-01
FCC C - BLACK LEAD
TEST ENGINEER : Kyle Fujimoto
KYLE FUJIMOTO

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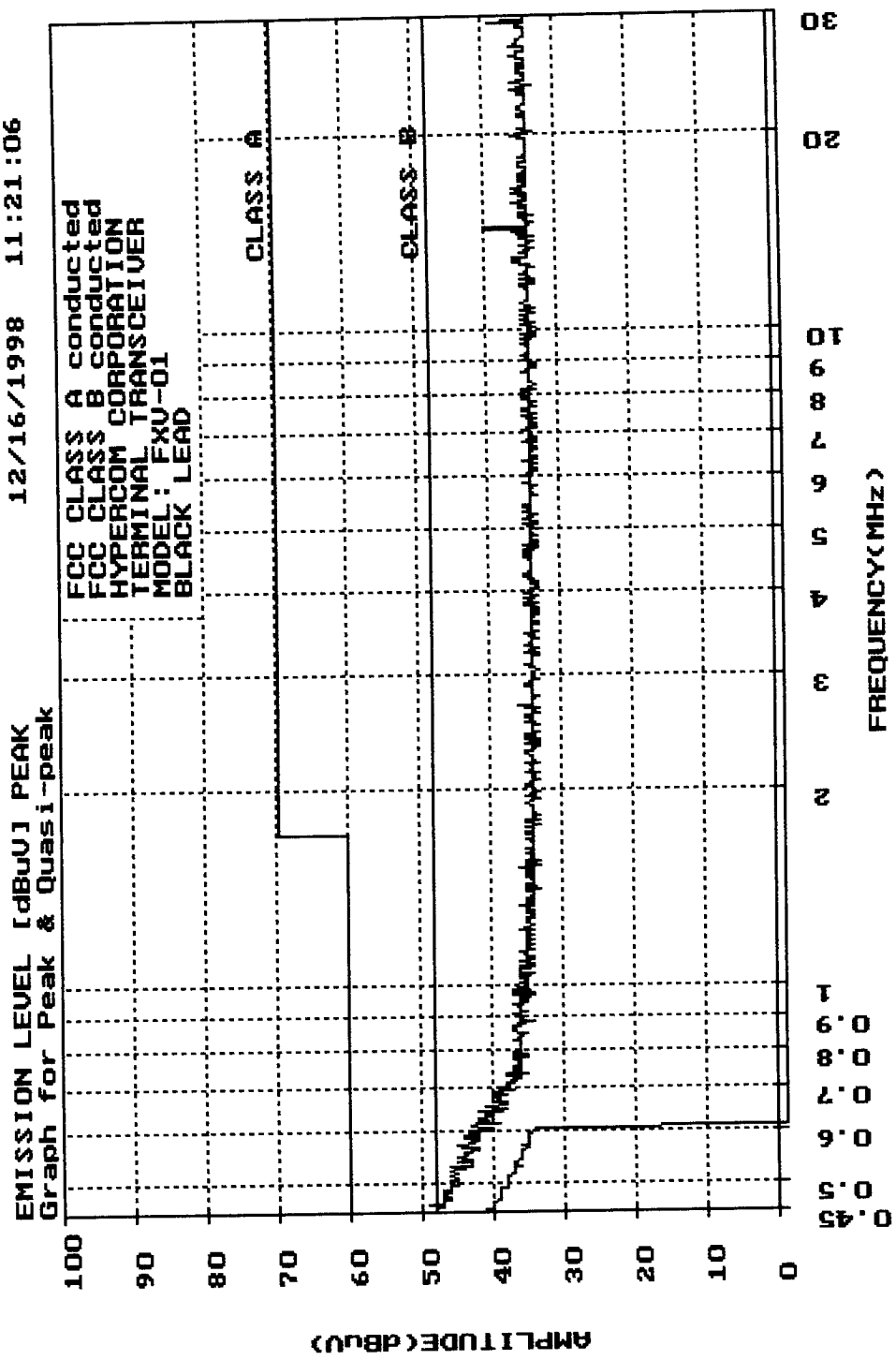
17 highest peaks above -50.00 dB of CLASS B limit line
Peak criteria : 0.00 dB, Curve : Quasi-peak

Peak#	Freq(Mhz)	Amp(dBuV)	Limit(dB)	Delta(dB)
1	0.454	41.04	48.00	-6.96
2	0.464	40.33	48.00	-7.67
3	0.474	39.96	48.00	-8.04
4	0.487	39.48	48.00	-8.52
5	0.494	39.00	48.00	-9.00
6	0.507	38.62	48.00	-9.38
7	0.511	38.12	48.00	-9.88
8	0.526	37.74	48.00	-10.26
9	0.539	37.21	48.00	-10.79
10	0.535	37.10	48.00	-10.90
11	0.544	36.91	48.00	-11.09
12	0.556	36.50	48.00	-11.50
13	0.560	36.33	48.00	-11.67
14	0.570	36.02	48.00	-11.98
15	0.587	35.20	48.00	-12.80
16	0.592	35.14	48.00	-12.86
17	0.607	34.73	48.00	-13.27


EMISSION LEVEL [dBuV] PEAK
Graph for Peak & Quasi-peak
12/16/1998 11:21:06
FCC CLASS A conducted
FCC CLASS B conducted
HYPERCOM CORPORATION
TERMINAL TRANSCEIVER
MODEL: FXU-01
BLACK LEAD
CLASS A
CLASS B
AMPLITUDE(dBuV)
FREQUENCY(MHz)
100
90
80
70
60
50
40
30
20
10
0
0.45
0.5
0.6
0.7
0.8
0.9
1
2
3
4
5
6
7
8
9
10
20
30

COMPATIBLE ELECTRONICS

12/16/1998 11:04:03

HYPERCOM CORPORATION
TERMINAL TRANSCEIVER
MODEL: FXV-01
FCC C - WHITE LEAD
TEST ENGINEER : Kyle Fujimoto
KYLE FUJIMOTO

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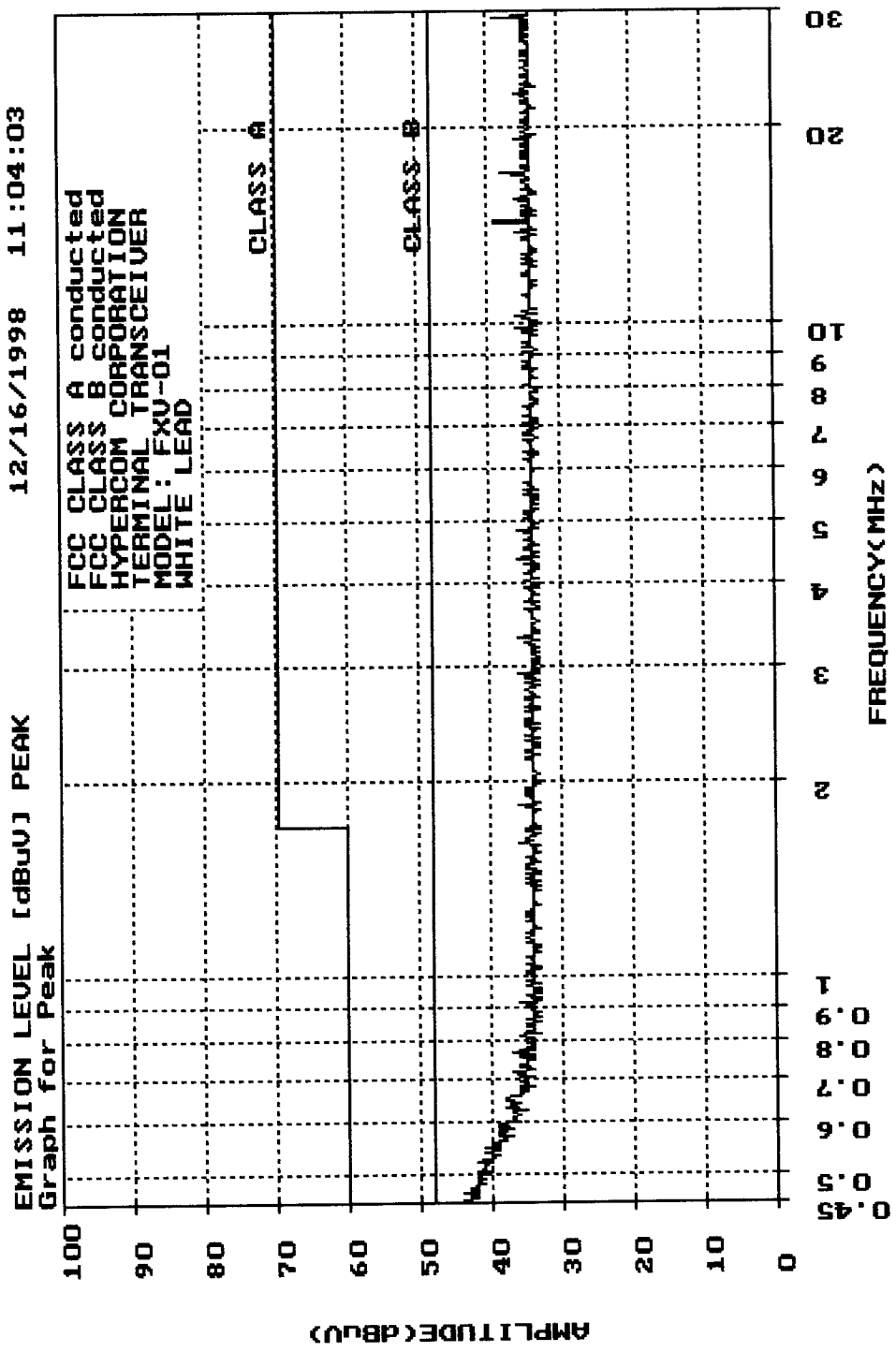
15 highest peaks above -50.00 dB of CLASS B limit line
Peak criteria : 0.50 dB, Curve : Peak

Peak#	Freq(Mhz)	Amp(dBuV)	Limit(dB)	Delta(dB)
1	0.466	44.18	48.00	-3.82
2	0.454	44.08	48.00	-3.92
3	0.462	43.98	48.00	-4.02
4	0.476	43.48	48.00	-4.52
5	0.496	42.88	48.00	-5.12
6	0.485	42.88	48.00	-5.12
7	0.504	42.28	48.00	-5.72
8	0.522	42.18	48.00	-5.82
9	0.546	41.98	48.00	-6.02
10	0.517	41.68	48.00	-6.32
11	0.537	41.38	48.00	-6.62
12	0.553	40.28	48.00	-7.72
13	0.574	39.98	48.00	-8.02
14	14.272	39.83	48.00	-8.17
15	0.594	39.78	48.00	-8.22


EMISSION LEVEL [dBuV] PEAK
Graph for Peak
12/16/1998 11:04:03
FCC CLASS A conducted
FCC CLASS B conducted
HYPERCOM CORPORATION
TERMINAL TRANSCEIVER
MODEL: FXU-01
WHITE LEAD
CLASS A
CLASS B
AMPLITUDE(dBuV)
FREQUENCY(MHz)
100
90
80
70
60
50
40
30
20
10
0
0.45
0.5
0.6
0.7
0.8
0.9
1
2
3
4
5
6
7
8
9
10
20
30