EMC MEASUREMENT/TECHNICAL REPORT

Manufacturer: Harris Corporation
Equipment Under Test: **Local Area Augmentation System (LAAS)**

Test Specification: **FCC PART 15, CLASS A**

Test Report No.: **111147 FCC**
Purchase Order No.: **324976-000**

DOCUMENT HISTORY

Revision	*Issue Date*	*Affected Page(s)*	*Description of Modifications*	*Revised By*	*Approved By*
0	8 June 2000		Initial release		

EMC MEASUREMENT/TECHNICAL REPORT
Document No.: 111147 FCC
From
Instrument Specialties Co., Inc.
World Compliance Center

Test for
Harris Corporation
Local Area Augmentation System (LAAS)

Written By — Bridget Keesser, EMC Technical Writer — Date: 8 June 2000

Authorized By — J. Fred Gardner, EMC Quality Assurance — Date: 8 June 2000

TEST PERSONNEL – Instrument Specialties Co., Inc.

Sean Charles, EMC Technician	13 December 1999
Grant Metzgar, Sr. EMC Technician	29 March 2000

CUSTOMER TEST WITNESS

Jack Di Polito	Harris Corporation
Steve Erdle	Harris Corporation

EUT RECEIPT/DISPOSITION INFORMATION

Date of Receipt of Equipment Under Test (EUT)	13 December 1999
Disposition of EUT	Retained by Manufacturer

Test Facility	Instrument Specialties Company Incorporated
Address	Shielding Way
City, State Zip Code	Delaware Water Gap, PA 18327
Phone	(570) 424-8510 ext. 1216
Fax	(570) 421-4227

TABLE OF CONTENTS (This document contains a total of 33 pages.)

1 MEASUREMENT/TECHNICAL REPORT SUMMARY

Representative **Manufacturer** **Manufacturer Address** **City, State Zip Code** **Phone** **Fax**	Steve Erdle Harris Corporation 1680 University Avenue Rochester, NY 14610-1839 716-242-3654 716-242-4754
Type of Authorization	Verification for Class A digital device
Applicable FCC Rules	PART 15 – RADIO FREQUENCY DEVICES Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Chapter 1 (10-1-99 Edition). The following subparts are applicable to the results in this test report: Part 15, Subpart B – Unintentional Radiators Paragraph 15.107 – Conducted limits Paragraph 15.109 – Radiated emission limits Paragraph 15.111 – Antenna power conduction limits for receivers
Equipment Under Test	LAAS Receiver
Testing Dates	13 December 1999, 29 March 2000, 10 May 2000
Summary of Data	EUT complies with the following sections of 47 CFR Chapter 1 (10-1-99 Edition): Paragraph 15.107 – Conducted limits Paragraph 15.109 – Radiated emission limits Paragraph 15.111 – Antenna power conduction limits for receivers

2 GENERAL INFORMATION

2.1 Product Description

Equipment Under Test	LAAS Receiver
Model Number	VLR-4201-001
Serial Number	0103
Description	The Local Area Augmentation System (LAAS) is a VHF Transmitter/Receiver system, which will be used as commercial aircraft GPS landing guidance system. The system consists of a transmitter (power supply and power amplifier) and a receiver and operates at 150 watts average power in the frequency range of 108 - 117.975 MHz.

2.2 Related Submittal(s)/Grant(s)

There are no related submittal grants

2.3 Table: Tested System Details

Item No.	*Description*	*Model No.*	*Serial No.*
1.	VHF Receiver	VLR-4201-001	0103

2.4 Table: Accessory/Peripheral Equipment

The following table lists the accessory and peripheral equipment:

Item No.	*Description*	*Model No.*
1.	Resnet Dummy Loads (2)	RFA500NMF-30
2.	Gateway 2000 PC	Baby AT
3.	Gateway Monitor	CS15720G
4.	Harris Test Fixture	N/A
5.	VHF Transmitter Power Supply	VLR-4141PS-001
6.	VHF Transmitter Power AMP	VLR-4141PA-001

2.5 Table: Cabling of the EUT

No.	*Description*	*Tested Length*	*Connected From*	*Connected To*
A	28 Volt DC Power Interconnect (Transmitter)	20"	PS – J4	PA – J4
B	Power Supply Interface (Transmitter)	18"	PS – J3	PA – J3
C	DC Power Main Input (Transmitter)	6'	PS – J2	DC Supply
D	AC Power Main Input (Transmitter)	6'	PS – J1	AC Supply
E	24 Volt DC Input (Receiver)	6'	RX – J5	DC Supply
F	AC Power Input (Receiver)	6'	RX – J6	AC Supply
G	Antenna (Transmitter)	36'	PA – J1	Antenna
H	Antenna (Receiver)	32'	RX – J1	Antenna
I	GPS Time Mark (Transmitter)	30'	PA – J3	Test Fixture
J	Data I/O	30'	PA – J2	Test Fixture
K	GPS Time Mark (Receiver)	30'	RX – J3	Test Fixture
L	Data I/O (Receiver)	30'	RS – J2	Test Fixture
M	RF Ground Braid	4'	3 EUT	Ground Ref Plane

2.6 Test Methodology

Conducted emissions tests were performed according to the general provisions of ANSI C63.4-1992 (American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz).

Radiated emissions tests were performed according to the general provisions of ANSI C63.4-1992 (American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz). Radiated emissions tests were performed at an antenna to EUT distance of 10 meters.

2.7 Test Facility

The open area test site and measurement facility used to collect the radiated data is located at the Instrument Specialties Co., Inc. test facility in Delaware Water Gap, PA. This site has been fully described in a report submitted to the FCC, and accepted in a letter dated 22 August 1997 (31040/SIT 1300F2). The lab is accredited by NVLAP (LAB CODE: 200076-0) for FCC Part 15 and CISPR 22 emissions measurements.

3 PRODUCT LABELING

3.1 FCC ID Label

Labels are to follow the existing size requirements in that they must contain letters, numbers and symbols that are visible and readable without the use of magnification.

When the device is so small or for such use that is not practicable to place the statement specified on the label, such as for a CPU board or a plug-in circuit board peripheral device, the text associated with the logo may be placed in a prominent location in the instructional manual or pamphlet supplied to the user. However, the unique identification (trade name and model number) and the logo must be displayed on the device.

All warning statements regarding interference potential are to be placed in the user manual, rather than on the label as is currently required. The user manual contains general operating instruction on the use of a device, and, according to the FCC, placing the warning statements in the user manual would better serve the consumer. The requirement that an informational statement be included in the user's manual regarding actions the user can take to resolve any interference that may occur from use of the device is still required.

The label showing the equipment identification data may be combined with a label showing other information (serial numbers, other government requirements, etc.), if desired. Compliance statements, when required, may be shown on the same label or a separate label.

> This device complies with PART 15 of the FCC rules and regulations. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference including interference that may cause undesired operation.

3.2 Location of Label on EUT

The label shall be located in a place consistent with the requirements of paragraph 15.19 of FCC CFR 47.

4 SYSTEM TEST CONFIGURATION

4.1 Justification

The receiver was tested with the transmitter and power supply. Radiated emissions was tested at three frequencies in the low, middle and high end of the receiving band. The transmitter was attached directly to the receiver through a high power attenuator.

4.2 EUT Exercise Software/Equipment

Harris Corporation test software was used to transmit data directly from the transmitter to the receiver. The status of the transmission was monitored on a PC.

4.3 Special Accessories

The EUT requires no special accessories to comply with the required specification limits.

4.4 Equipment Modifications

No modifications and/or adjustments were made to the EUT during compliance testing to achieve the required specification limits.

4.5 Configuration of Tested System

The receiver, transmitter, and power supply were tested on a non conductive table 80 centimeters above the ground plane. The antenna port of the transmitter was connected to a high power attenuator located below the ground plane. The receiver was connected to the other side of the attenuator.

Refer to Attachment A for Block Diagram of EUT.

5 TEST DATA

5.1 Conducted Emissions Data

5.1.1 Table: FCC Part 15, Subpart B, Class A Conducted Emissions Limits

Frequency Range - MHz	*Limit - dB(μV)*
0.45 – 1.705	60
1.705 – 30.0	69.54

5.1.2 Data Collection Procedure

The initial step in collecting data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the data page, and these signals are then quasi-peaked if necessary. Spectrum analyzer plots and additional tabulated data are included in the Appendices of this document. The following data lists the significant emission frequencies and measured levels measured from the EUT.

5.1.3 Table: Judgement

EUT	LAAS Receiver
Judgement	Passed by 16.2 dB

5.1.4 Table: Summary of Highest Conducted Emissions Levels and Limits

Frequency MHz	*Sensor Location (Line Phase)*	*Detection Mode*	*Corrected Reading dB(μV)*	*Limit dB(μV)*	*Margin to Quasi Peak Limit dB*
5.99	Line	Peak	53.3	69.54	-16.2
6.195	Line	Peak	50.4	69.54	-19.1
6.066	Line	Peak	46.2	69.54	-23.3
9.994	Line	Peak	42.7	69.54	-26.8
9.384	Line	Peak	40.1	69.54	-29.4
5.768	Line	Peak	37.8	69.54	-31.7
9.384	Neutral	Peak	47.3	69.54	-22.2
6.066	Neutral	Peak	40.7	69.54	-28.8
6.169	Neutral	Peak	40.3	69.54	-29.2
5.965	Neutral	Peak	40.0	69.54	-29.5
6.117	Neutral	Peak	39.4	69.54	-30.1
13.86	Neutral	Peak	39.4	69.54	-30.1

- All readings are peak unless stated otherwise.

5.1.5 Measurement Uncertainty

The measurement uncertainty (with a confidence level of 95%) for this test was: +/- 3 dB

5.1.6 Measured Calculation

Corrected Reading = CL + LISN

where: Corrected Reading = dB(μV)
CL = cable loss - dB
LISN = LISN correction factors – dB

5.2 Power at Antenna Terminal

5.2.1 Table: Power Requirements

Frequency Range - MHz	*Limit*
20 – 1000 MHz	50 nanowatts

5.2.2 Data Collection Procedure

The requirement for power at the antenna terminal was met using the test procedure of MIL-STD-461 CE01. The limits for CE01 are 34 dBµV. The FCC limit for power at the antenna terminal is 50 nanowatts. The receiver antenna port matches a 50 ohm load. The power was measured using the HP receiver system connected directly to the antenna port of the receiver under test. The data was compared to a limit of 64 dBµV or 50 nanowatts in a 50 ohm load.

5.2.3 Table: Judgement

EUT	LAAS Receiver
Judgement	Passed by 54.2 dB

5.2.4 Table: Summary of Highest Conducted Emissions Levels and Limits

Frequency MHz	*Sensor Location (Line Phase)*	*Detection Mode*	*Corrected Reading dB(µV)*	*Limit dB(µV)*	*Margin to Quasi Peak Limit dB*
89.61	Receiver Port	Narrow Band	9.8	64	-54.2
115.68	Receiver Port	Narrow Band	8.3	64	-55.7
27.98	Receiver Port	Narrow Band	7.8	64	-56.2
959.06	Receiver Port	Narrow Band	7.6	64	-56.4
87.78	Receiver Port	Narrow Band	7.4	64	-56.4
101.93	Receiver Port	Narrow Band	7.1	64	-56.9
113.57	Receiver Port	Narrow Band	6.8	64	-57.2

- All readings are peak unless stated otherwise.

5.3 Radiated Emissions Data

Limit: EN 55022:1995 Class A

Frequency Range MHz	*Mode*	*Limit dB(µV/m)*	*Test Distance*	*Remarks*
30 – 230	Quasi Peak	40	10 meters	none
230 – 1000	Quasi Peak	47	10 meters	none

5.3.1 Data Collection Procedure

The following data lists the significant emission frequencies, measured levels, correction factor (includes cable, preamplifier and antenna corrections), the corrected reading, plus the limit. Supplemental data is included in the Appendices of this document. The following data lists the significant emission frequencies and measured levels measured from the EUT. The receiver was tested with the transmitter connected directly into the receiver through a high power attenuator. The frequency range of 30 MHz to 1000 MHz was scanned. Testing was performed over two periods of time. Initially the system was tested to the Class B requirements at 113 MHz. The transmitter did not meet the required limits at the harmonics of the transmit frequency. After modifications were made to the transmitter the system was re-tested to the Class A limits at three operating frequencies. The highest emissions are reported but the only significant signals found were harmonics from the transmitter. These frequencies are reported for information purpose but none of the signals detected are from the receiver.

5.3.2 Table: Judgement

EUT	LAAS Receiver
Judgement	The receiver meets the Class B limits by 1.8 dB see Table 5.3.3.3

5.3.3 Table: Summary of Highest Radiated Emissions Levels at 108 MHz

Frequency MHz	*Polarity V/H*	*Antenna Height cm*	*Antenna Azimuth deg*	*Correction Factor dB(1/m)*	*Limit dB(μV/m)*	*Corrected Reading dB(μV/m)*	*Margin dB*
323.968	H	330	180	-13.6	47.0	46.9 QP*	-0.1
539.981	H	161	240	-5.2	47.0	42.1 QP*	-4.9
972.005	V	150	180	1.4	47.0	40.2*	-6.8
864.003	V	173	180	0.6	47.0	39.8*	-7.2
215.989	V	116	30	-18.2	40.0	32.4 QP*	-7.6
755.980	H	100	90	-1.6	47.0	39.2*	-7.8

- * harmonics of the fundamental transmit frequency
- All readings are peak unless stated otherwise, with an IF bandwidth of 120 kHz, along with a 100 ms sweep time. A video filter was not used.

5.3.3.1 Test Results at 113 MHz

Table: Worst-case radiated emissions

Frequency MHz	*Polarity V/H*	*Antenna Height cm*	*Antenna Azimuth deg*	*Correction Factor dB(1/m)*	*Limit dB(μV/m)*	*Corrected Reading dB(μV/m)*	*Margin dB*
564.989	H	171	345	-4.7	47.0	47.0 QP*	0.0
904.016	H	248	150	1.0	47.0	41.0*	-6.0
677.990	H	130	90	-3.9	47.0	40.2 QP*	-6.8
338.981	V	100	270	-12.9	47.0	47.0*	-11.6
790.001	H	100	45	-1.3	47.0	35.3*	-11.7
225.975	V	109	0	-17.5	40.0	27.9*	-12.1

- * harmonics of the fundamental transmit frequency
- All readings are peak unless stated otherwise, with an IF bandwidth of 120 kHz, along with a 100 ms sweep time. A video filter was not used.

5.3.3.2 Test Results at 117 MHz

Table: Worst-case radiated emissions

Frequency MHz	*Polarity V/H*	*Antenna Height cm*	*Antenna Azimuth deg*	*Correction Factor dB(1/m)*	*Limit dB(μV/m)*	*Corrected Reading dB(μV/m)*	*Margin dB*
353.887	V	100	0	-12.2	47.0	43.1 QP*	-3.9
589.868	H	129	150	-4.8	47.0	41.5 QP*	-5.5
943.807	H	110	45	0.8	47.0	38.9*	-8.1
707.862	H	121	105	-3.4	47.0	38.4*	-8.6
471.895	V	101	75	-8.1	47.0	36.6*	-10.4
825.821	H	124	270	-0.3	47.0	36.4*	-10.6

- * harmonics of the fundamental transmit frequency
- All readings are peak unless stated otherwise, with an IF bandwidth of 120 kHz, along with a 100 ms sweep time. A video filter was not used.

5.3.3.3 Test Results at 113 MHz

The following are test results on the entire system prior to modifications made on the transmitter to bring the transmitter into compliance.

Port Tested	*Test Distance*	*Comment*	*Result*
receiver	10 meters	note 1	Passed by 1.8 dB

Note 1: The highest emissions are listed in the tables below:

Limit: EN 55022:1995 Class B

Frequency Range MHz	*Mode*	*Limit dB(μV/m)*	*Test Distance*	*Remarks*
30 – 230	Quasi Peak	30	10 meters	none
230 – 1000	Quasi Peak	37	10 meters	none

Table: Worst-case radiated emissions

Frequency MHz	*Polarity V/H*	*Antenna Height cm*	*Antenna Azimuth deg*	*Correction Factor dB(1/m)*	*Limit dB(μV/m)*	*Corrected Reading dB(μV/m)*	*Margin dB*
113.015	v	100	240	-15.8	30.0	64.2 QP*	34.2
339.045	V	100	0	-10.7	37.0	59.5 QP*	22.5
904.012	H	256	240	3.4	37.0	55.3 QP*	18.3
678.003	H	100	150	-0.1	37	54.6 QP*	17.6
565.018	V	100	300	-1.8	37.0	52.0 QP*	15.0
452.027	H	194	330	-5.6	37.0	48.7 QP*	11.7
790.996	H	100	285	1.8	37.0	42.8 QP*	5.8
226.003	V	100	30	-15.3	30.0	32.1 QP*	2.1
92.061	V	100	150	-18.4	30.0	28.2 QP	-1.8
120.230	V	100	60	-15.1	30.0	27.9 QP	-2.1
128.027	V	100	30	-15.1	30.0	26.7 QP	-3.3
370.003	V	100	105	-9.4	37.0	31.0 PK	-6.0
140.589	V	100	30	-15.0	30.0	21.3 QP	-8.7
85.241	V	100	180	-19.5	30.0	20.0 QP	-10.0

- * Indicates that the measurement is a harmonic of the transmit frequency and not related to the receiver.
- All readings are peak unless stated otherwise, with an IF bandwidth of 120 kHz, along with a 100 ms sweep time. A video filter was not used.

5.3.4 Measurement Uncertainty

The measurement uncertainty (with a confidence level of 95%) for this test was: 5.59 dB

5.3.5 Field Strength Calculation

The field strength is calculated by adding the antenna factor and cable factor, and subtracting the amplifier gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS=RA + AF + CF – AG

where:

FS = field strength - dB(μV/m)
RA = receiver amplitude - dB(μV)
AF = antenna factor - dB/m
CF = cable attenuation factor - dB
AG = amplifier gain - dB

Example: Assume a receiver reading of 52.5 dB(μV) is obtained. The antenna factor of 7.4 and cable factor of 1.1 is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB(μV/m.)
FS = 52.5 + 7.4 + 1.1 – 29 = 32 dB(μV/m)

6 TEST EQUIPMENT

A complete list of test equipment used for each test can be found in their perspective test procedure. The absolute performance calibration of equipment requiring calibration is performed on an as needed basis in accordance with MIL-STD 45662. However, calibration periods do not exceed one (1) year. The test equipment is capable of making measurements within tolerances of at least +/- 2 dB amplitude and +/- 2% frequency deviation. Equipment certifications showing traceability to NIST (National Institute of Standards and Technology) are maintained on file at Instrument Specialties Corporate offices in Delaware Water Gap, PA. All equipment is checked and verified for proper operation before and after each series of tests.

6.1 Conducted Emissions

Mfgr./Model	Description	Serial	Calibration Due
FCC/LISN-3B	(1 phase) (10 kHz - 30 MHz) LISN	33	9/27/00
FCC/LISN-3B	(1 phase) (10 kHz - 30 MHz) LISN	36	9/27/00
HP/8572A	(100 Hz - 22 GHz) EMI receiver sys #1	3010A01163	9/29/00
HP/85869A	EMI Conducted Emissions Measurement software	VA 03.00	Calibration Not Required

6.2 Radiated Emissions

Mfgr./Model	Description	Serial	Calibration Due
CHA/CBL6111A	(30 MHz - 1 GHz) bilog	1822	12/29/00
HP/8572A	(100 Hz - 22 GHz) EMI receiver sys #1	3010A01163	9/29/00
HP/85879A	EMI Radiated Emissions Measurement software	VA 02.01	Calibration Not Required

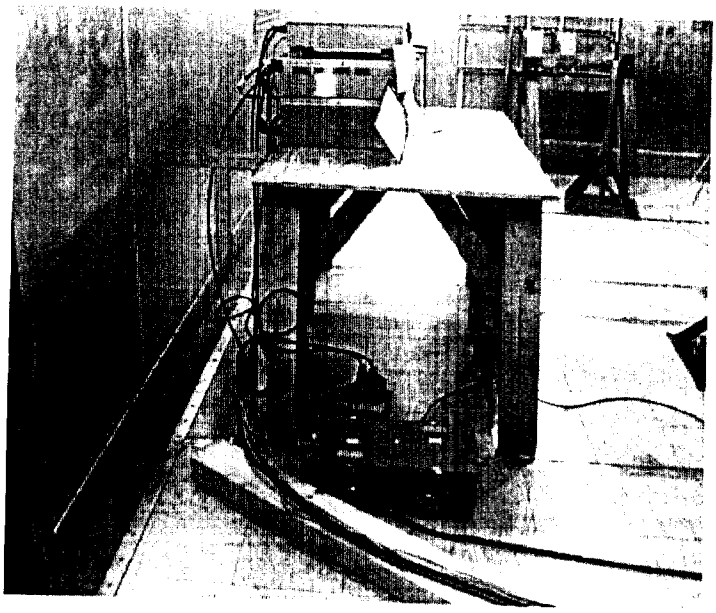
6.3 CE06

Mfgr./Model	Description	Serial	Calibration Due
HP/8572A	(100 Hz - 22 GHz) EMI receiver sys #1	3010A01163	9/29/00

7 TEST MEASUREMENT PHOTOS

7.1.1 Test Photographs

Photo Layout	*Test Type*	*Remarks*	*Page No.*
Top	Conducted Emissions	LAAS System	15
Bottom	Radiated Emissions	LAAS System	



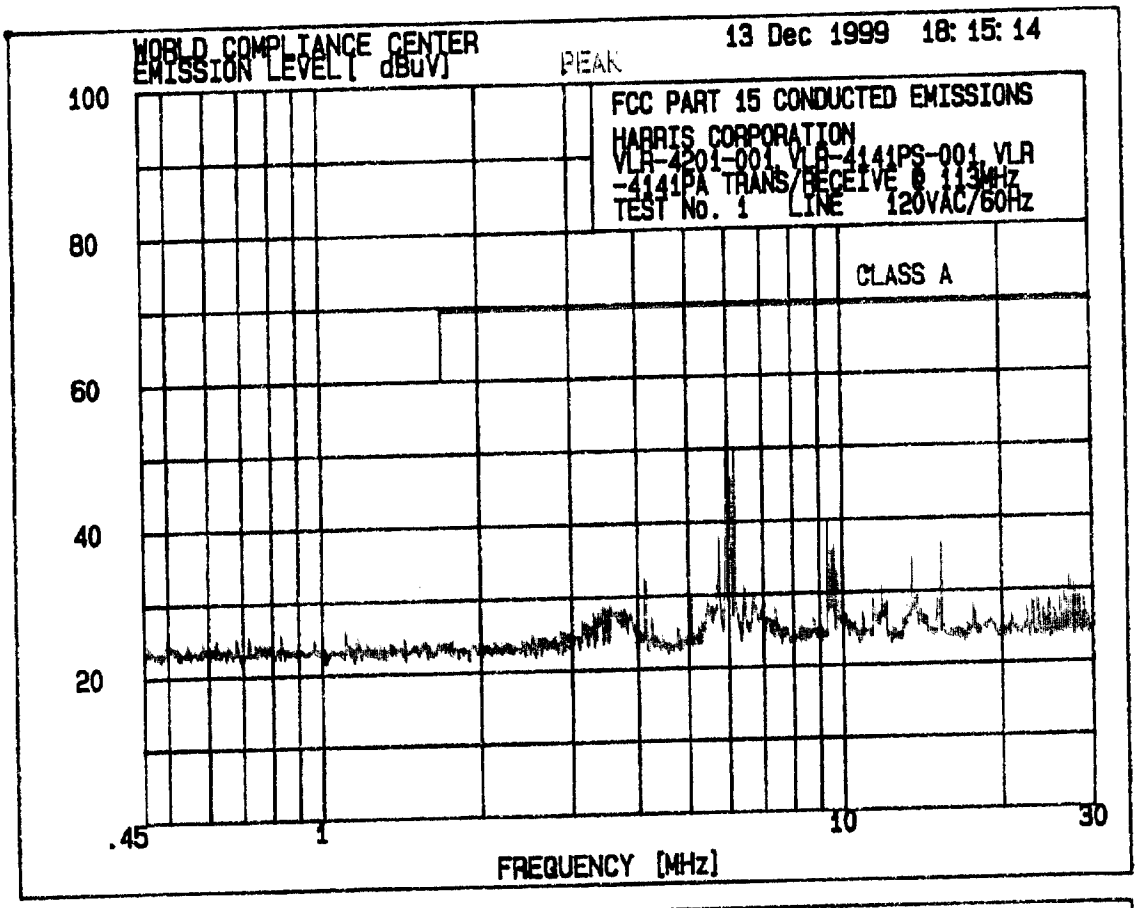
LAAS System Conducted Emissions

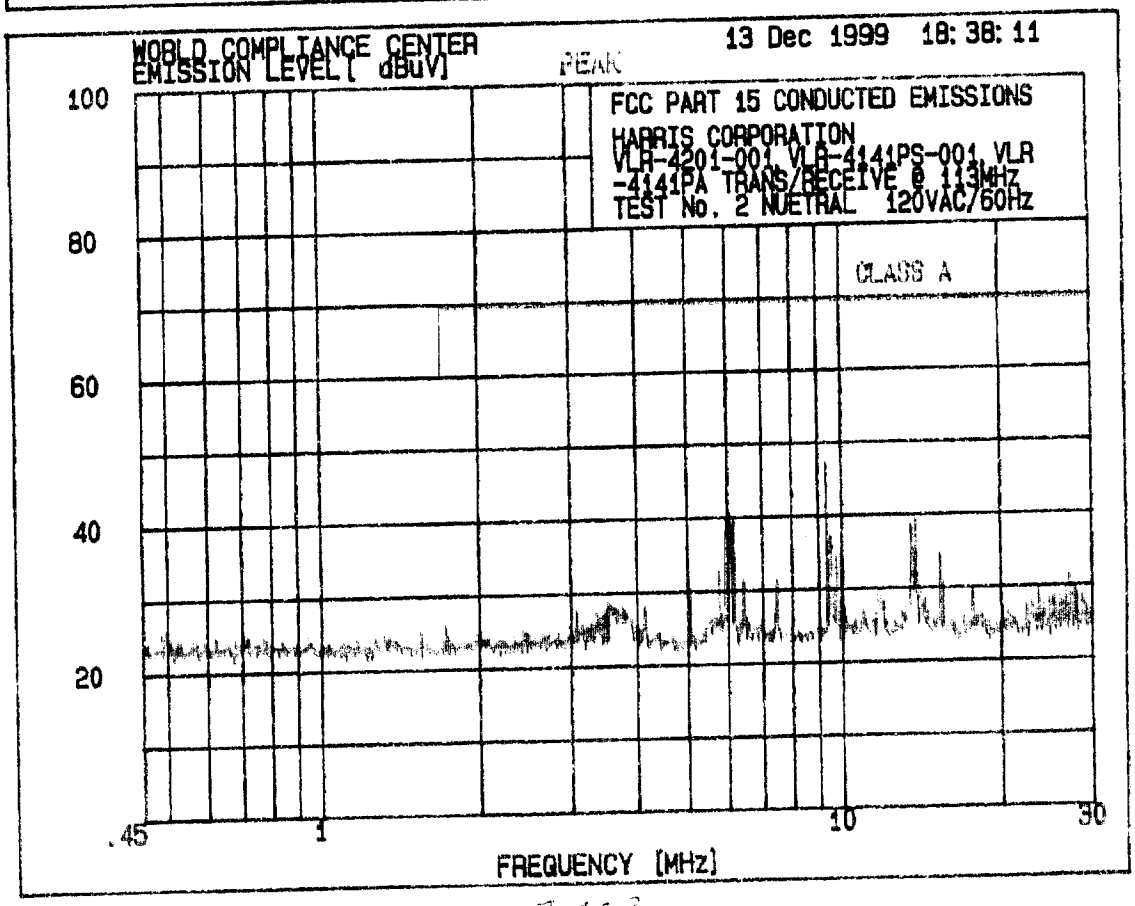
LAAS System Radiated Emissions

8 SUPPLEMENTAL TEST DATA

8.1 Table: Index of Test Data Sheets

8.1.1 Test Data Sheets


WORLD COMPLIANCE CENTER
13 Dec 1999 18:15:14
EMISSION LEVEL[dBuV]
PEAK
FCC PART 15 CONDUCTED EMISSIONS
HARRIS CORPORATION
VLR-4201-001 VLR-4141PS-001 VLR
-4141PA TRANS/RECEIVE @ 113MHz
TEST No. 1 LINE 120VAC/60Hz
CLASS A
100
80
60
40
20
.45
1
10
30
FREQUENCY [MHz]


WORLD COMPLIANCE CENTER
13 Dec 1999 18:38:11
EMISSION LEVEL[dBuV]
PEAK
FCC PART 15 CONDUCTED EMISSIONS
HARRIS CORPORATION
VLR-4201-001 VLR-4141PS-001 VLR
-4141PA TRANS/RECEIVE @ 113MHz
TEST No. 2 NUETRAL 120VAC/60Hz
CLASS A
100
80
60
40
20
.45
1
10
30
FREQUENCY [MHz]

INSTRUMENT SPECIALTIES CO., INC
WORLD COMPLIANCE CENTER
TEST DATA

REPORT No.: 111147 DATE: 13 DECEMBER 1999 TEST No.: 1
TITLE OF TEST: FCC PART 15 CLASS A CONDUCTED EMISSIONS
CUSTOMER: HARRIS CORPORATION
EUT DESCRIPTION: LAAS TRANSMITTER/RECEIVER S/N 0103
TEST MODE: TRANSMITTING/RECEIVING @ 113MHz
SERIAL No.: 0103
FREQUENCY RANGE: 450kHz - 30MHz SENSOR LOCATION: LINE
INPUT POWER: 120VAC/60Hz TEMP: 72.7 f HUM: 34.3 % BAR: 30.06
TEST PERFORMED BY: SEAN CHARLES
TEST RESULTS: COMPLIES
TEST CONDITIONS: TABLE TOP ARRANGEMENT WITH 500W 30dB RESISTIVE LOAD AND GATEWAY COMPUTER SYSTEM LOCATED OUTSIDE TEST CHAMBER

==========
WORLD COMPLIANCE CENTER 13 Dec 1999 18:15:14
==========
1. CONDUCTED EMISSIONS
1.1 FCC PART 15 CONDUCTED EMISSIONS
==========
HARRIS CORPORATION
VLR-4201-001,VLR-4141PS-001,VLR-4141PA TRANS/RECEIVE @ 113MHz
TEST No. 1 LINE 120VAC/60Hz

22 highest Peaks above -50 dB of limit line #1
peak criteria = 2 dB

PEAK#	FREQ (MHz)	(dBuV)	DELTA
1	5.99	55.3	-16.2
2	6.195	50.4	-19.1
3	6.066	46.2	-23.3
4	9.984	42.7	-26.8
5	9.384	40.1	-29.4
6	5.768	37.8	-31.7
7	9.624	36.8	-32.7
8	15.43	36.5	-33.0
9	9.543	35.7	-33.8
10	1.118	25.9	-34.1
11	.504	25.6	-34.4
12	.8373	25.6	-34.4
13	.726	25.3	-34.7
14	.6242	25.1	-34.9
15	.6846	25.1	-34.9
16	13.58	34.5	-35.0
17	1.181	24.9	-35.1
18	.5886	24.7	-35.3
19	.9738	24.7	-35.3
20	1.445	24.7	-35.3
21	1.584	24.4	-35.6
22	1.295	24.3	-35.7

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INSTRUMENT SPECIALTIES CO., INC
WORLD COMPLIANCE CENTER
TEST DATA

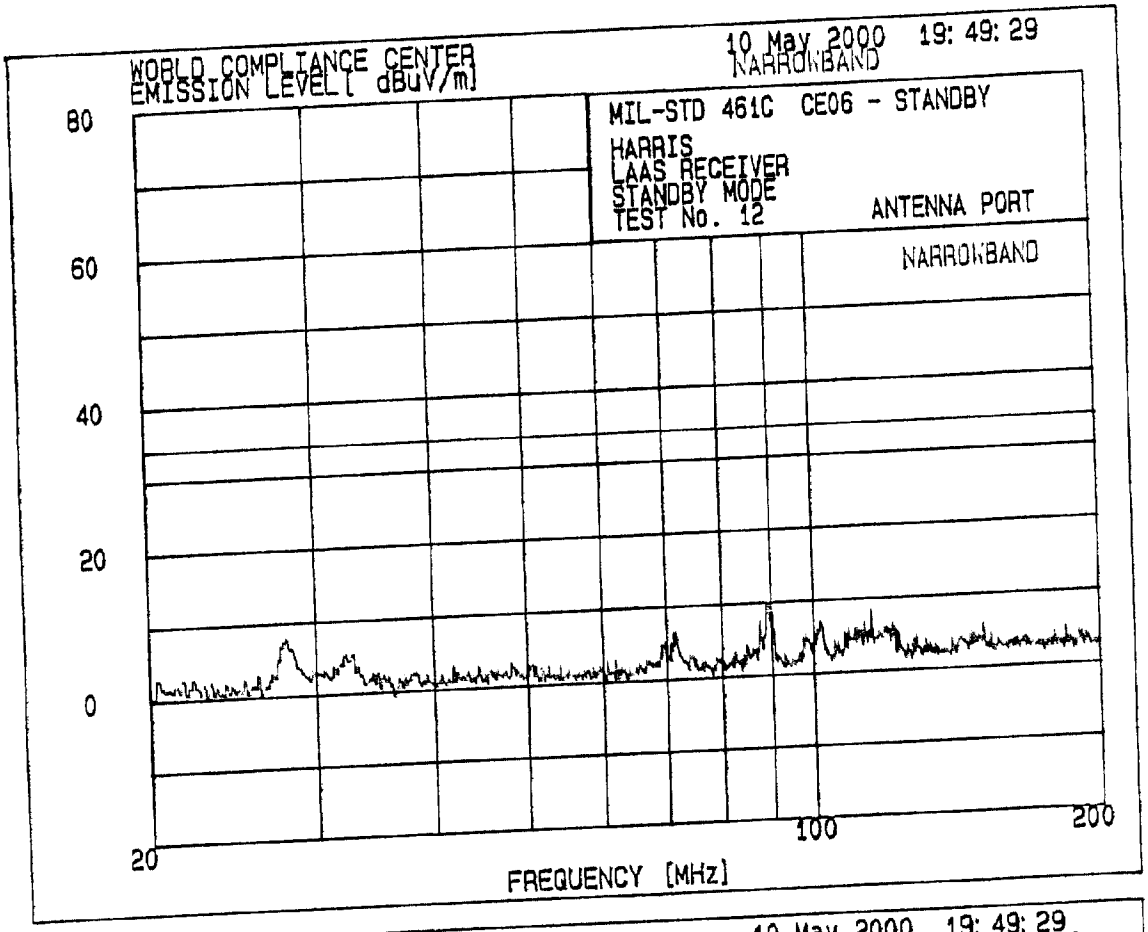
REPORT No.: 111147 DATE: 13 DECEMBER 1999 TEST No.: 2
TITLE OF TEST: FCC PART 15 CLASS A CONDUCTED EMISSIONS
CUSTOMER: HARRIS CORPORATION
EUT DESCRIPTION: LAAS TRANSMITTER/RECEIVER S/N 0103
TEST MODE: TRANSMITTING/RECEIVING @ 113MHz
SERIAL No.: 0103
FREQUENCY RANGE: 450kHz - 30MHz SENSOR LOCATION: NUETRAL
INPUT POWER: 120VAC/60Hz TEMP: 72.7 f HUM: 34.3 % BAR: 30.06
TEST PERFORMED BY: SEAN CHARLES
TEST RESULTS: COMPLIES
TEST CONDITIONS: TABLE TOP ARRANGEMENT WITH 50OW 30dB RESISNET LOAD AND GATEWAY COMPUTER SYSTEM LOCATED OUTSIDE TEST CHAMBER

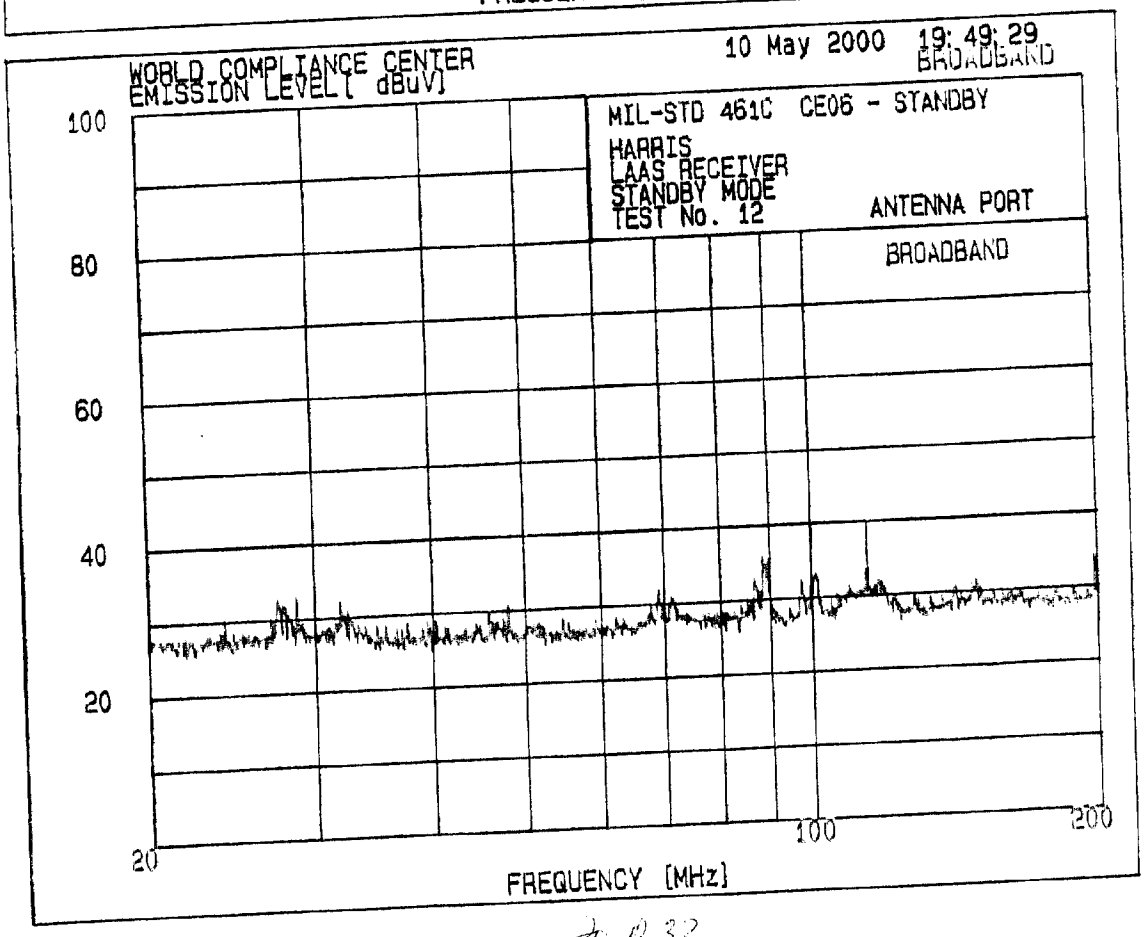
==========
WORLD COMPLIANCE CENTER 13 Dec 1999 18:38:11
==========
1. CONDUCTED EMISSIONS
1.1 FCC PART 15 CONDUCTED EMISSIONS
==========
HARRIS CORPORATION
VLR-4201-001,VLR-4141PS-001,VLR
-4141PA TRANS/RECEIVE @ 113MHz
TEST No. 2 NUETRAL 120VAC/60Hz

22 highest Peaks above -50 dB of Limit Line #1
peak criteria = 2 dB

PEAK#	FREQ (MHz)	(dBuV)	DELTA
1	9.384	47.3	-22.2
2	6.066	40.7	-28.8
3	6.169	40.3	-29.2
4	5.965	40	-29.5
5	6.117	39.4	-30.1
6	13.86	39.4	-30.1
7	13.58	38.6	-30.9
8	9.543	37.5	-32.0
9	.4998	25.9	-34.1
10	.4914	25.4	-34.6
11	9.745	34.9	-34.6
12	9.994	34.7	-34.8
13	15.4	34.7	-34.8
14	1.558	25.1	-34.9
15	.7169	25	-35.0
16	1.357	24.9	-35.1
17	.5621	24.8	-35.2
18	.6268	24.8	-35.2
19	.5256	24.7	-35.3
20	.9556	24.7	-35.3
21	1.374	24.7	-35.3
22	.7797	24.6	-35.4

19733


WORLD COMPLIANCE CENTER
EMISSION LEVEL [dBuV/m]
10 May 2000 19: 49: 29
NARROWBAND
MIL-STD 461C CE06 - STANDBY
HARRIS
LAAS RECEIVER
STANDBY MODE
TEST No. 12
ANTENNA PORT
NARROWBAND
80
60
40
20
0
20
100
200
FREQUENCY [MHz]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EMISSION LEVEL [dBuV]
10 May 2000 19: 49: 29
BROADBAND
MIL-STD 461C CE06 - STANDBY
HARRIS
LAAS RECEIVER
STANDBY MODE
TEST No. 12
ANTENNA PORT
BROADBAND
100
80
60
40
20
20
100
200
FREQUENCY [MHz]

A 433

INSTRUMENT SPECIALTIES CO., INC

WORLD COMPLIANCE CENTER
TEST DATA

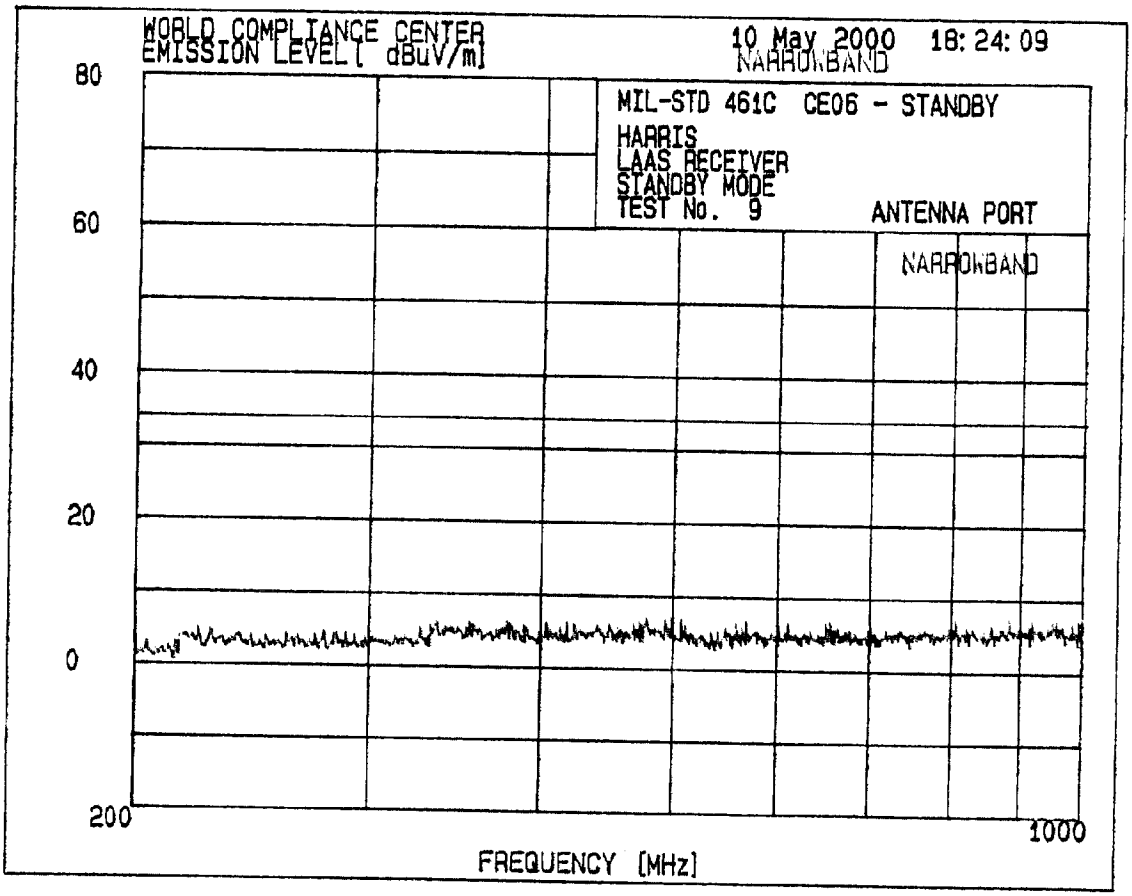
REPORT No.: 111147-B DATE: 10 MAY 2000 TEST No.: 12
TITLE OF TEST: MIL-STD 461C PART 2 CLASS A1c CE06
CUSTOMER: HARRIS CORPORATION
EUT DESCRIPTION: LAAS RECEIVER
TEST MODE: STANDBY AWAITING RECEIVE @ 113MHz
SERIAL No.: SEE TEST PLAN
FREQUENCY RANGE: 20MHz - 200MHz SENSOR LOCATION: RCVR PORT
INPUT POWER: 120VAC/60Hz TEMP: 71.0 f HUM: 34.2 % BAR: 30.30 "
TEST PERFORMED BY: EUGENE P. CLARKE SR.
TEST RESULTS: COMPLIES
TEST CONDITIONS: COPPER TABLE TOP ARRANGEMENT
NOTE TRANSMITTER and RECEIVER ARE IN STANDBY MODE CONTROLLING COMPUTER IS LOCATED INSIDE TESTING BOUNDARY WITHIN THE SAME SHIELDED ENCLOSURE.

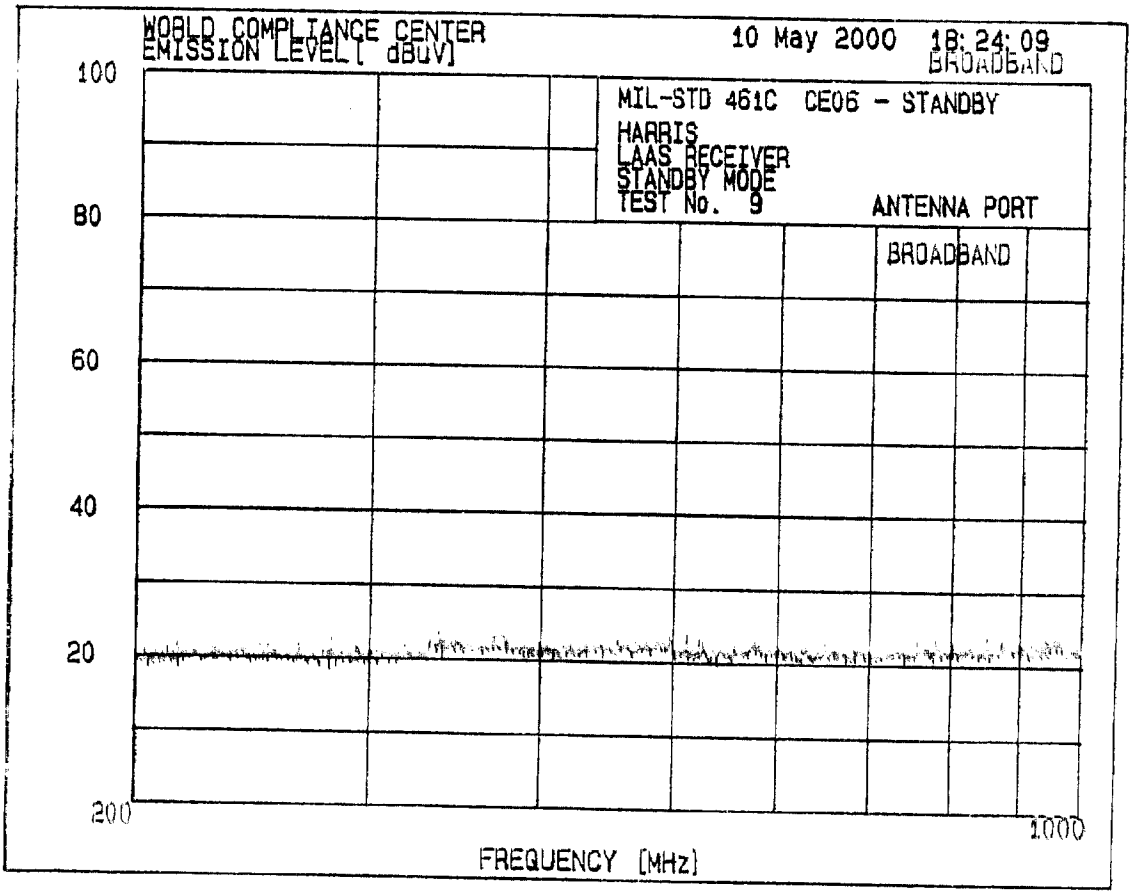
==========
WORLD COMPLIANCE CENTER 10 May 2000 19:19:29
==========
1. MIL-STD-461C PART 2 CE06 - STANDBY
1.7 CE06 - STANDBY 20 mHz - 200 MHz
==========
HARRIS
LAAS RECEIVER
STANDBY MODE
TEST No. 12 ANTENNA PORT

23 Highest FD Peaks above -60 dB of Limit Line #1
Peak criteria = 2 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	89.61	9.8	-24.2
2	115.68	8.3	-25.7
3	27.98	7.8	-26.2
4	87.78	7.4	-26.6
5	101.93	7.1	-26.9
6	113.57	6.8	-27.2
7	71.69	6.6	-27.4
8	121.69	6.4	-27.6
9	111.5	6.2	-27.8
10	120.02	6.2	-27.8
11	151.41	5.8	-28.2
12	122.81	5.5	-28.5
13	98.25	5.4	-28.6
14	103.22	5.4	-28.6
15	32.42	5.3	-28.7
16	69.71	5.3	-28.7
17	123.38	5.3	-28.7
18	184.53	5.2	-28.8
19	128.89	1.7	-29.3
20	101.45	1.7	-29.3
21	108.24	1.3	-29.7
22	178.51	1.3	-29.7
23	191.89	1	-30.0

21 of 52


WORLD COMPLIANCE CENTER
EMISSION LEVEL [dBuV/m]
10 May 2000 18:24:09
NARROWBAND
MIL-STD 461C CE06 - STANDBY
HARRIS
LAAS RECEIVER
STANDBY MODE
TEST No. 9
ANTENNA PORT
NARROWBAND
80
60
40
20
0
200
1000
FREQUENCY [MHz]


WORLD COMPLIANCE CENTER
EMISSION LEVEL [dBuV]
10 May 2000 18:24:09
BROADBAND
MIL-STD 461C CE06 - STANDBY
HARRIS
LAAS RECEIVER
STANDBY MODE
TEST No. 9
ANTENNA PORT
BROADBAND
100
80
60
40
20
200
1000
FREQUENCY [MHz]

INSTRUMENT SPECIALTIES CO., INC
WORLD COMPLIANCE CENTER
TEST DATA

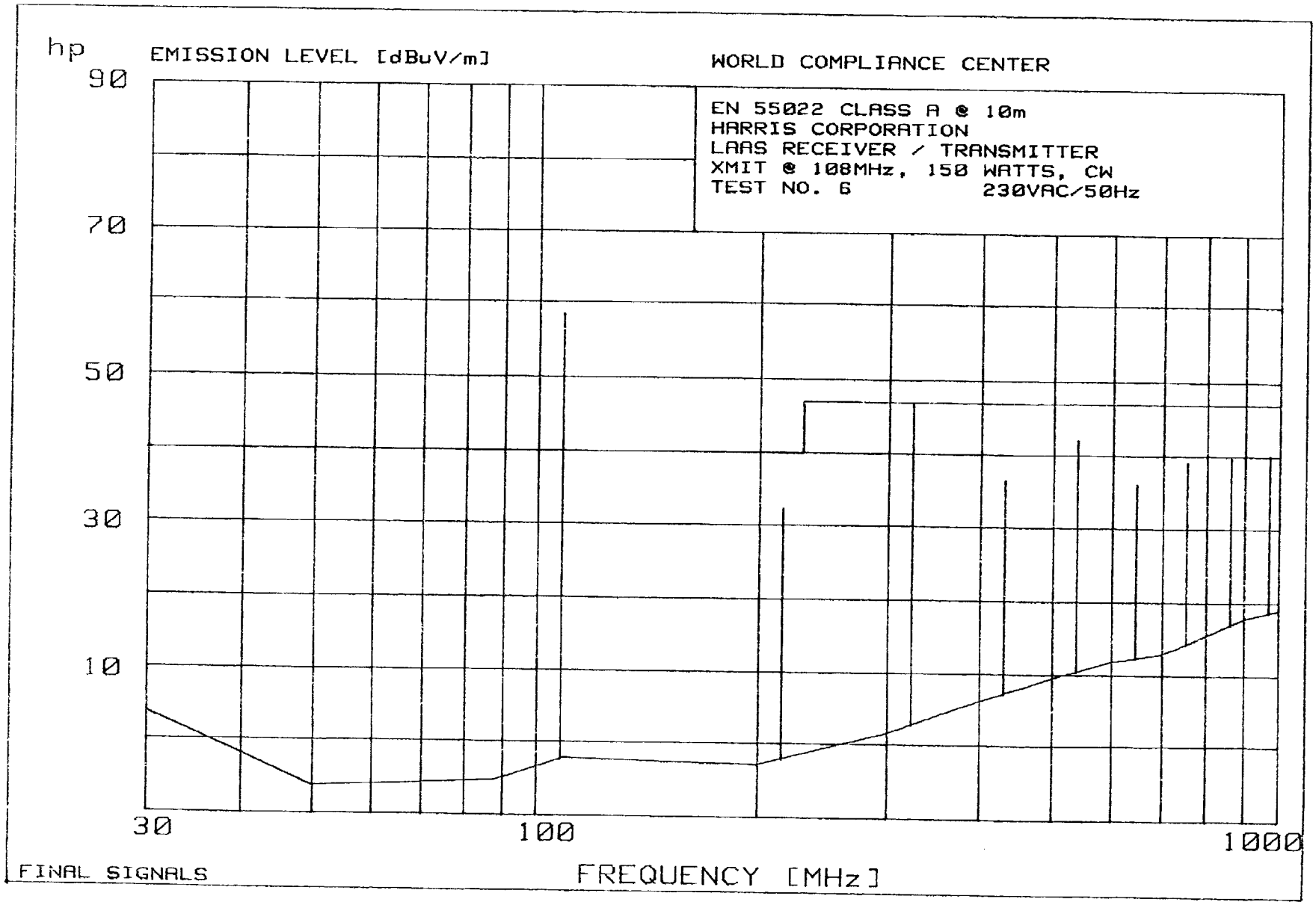
REPORT No.: 111147-B DATE: 10 MAY 2000 TEST No.: 9
TITLE OF TEST: MIL-STD 461C PART 2 CLASS A1c CE06
CUSTOMER: HARRIS CORPORATION
EUT DESCRIPTION: LASS RECEIVER
TEST MODE: STANDBY AWAITING RECEIVE @ 113MHz
SERIAL No.: SEE TEST PLAN
FREQUENCY RANGE: 200MHz - 1000MHz SENSOR LOCATION: RCVR PORT
INPUT POWER: 120VAC/60Hz TEMP: 71.0f HUM: 34.2% BAR: 30.30"
TEST PERFORMED BY: EUGENE P. CLARKE SR.
TEST RESULTS: COMPLIES
TEST CONDITIONS: COPPER TABLE TOP ARRANGEMENT
NOTE TRANSMITTER and RECEIVER ARE IN STANDBY MODE CONTROLLING COMPUTER IS LOCATED INSIDE TESTING BOUNDARY WITHIN THE SAME SHIELDED ENCLOSURE.

==========
WORLD COMPLIANCE CENTER 10 May 2000 18:24:09
==========
4. MIL-STD-461C PART 2 CE06 - STANDBY
4.8 CE06 - STANDBY 200 - 1000 MHz
==========
HARRIS
LAAS RECEIVER
STANDBY MODE
TEST No. 9 ANTENNA PORT

23 highest NB Peaks above -50 dB of Limit Line #1
peak criteria = 1 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	959.06	7.6	-26.4
2	884.98	7.4	-26.6
3	499.28	7.1	-26.9
4	807.48	7.1	-26.9
5	919.79	7.1	-26.9
6	995.19	7.1	-26.9
7	478.07	7	-27.0
8	952.91	6.9	-27.1
9	508.19	6.8	-27.2
10	657.28	6.8	-27.2
11	494.49	6.7	-27.3
12	569.65	6.7	-27.3
13	985.63	6.7	-27.3
14	653.07	6.5	-27.5
15	969.91	6.5	-27.5
16	472.72	6.4	-27.6
17	612.39	6.4	-27.6
18	858.35	6.4	-27.6
19	913.9	6.4	-27.6
20	966.8	6.4	-27.6
21	378.66	6.3	-27.7
22	418.35	6.3	-27.7
23	511.47	6.3	-27.7

23733


hp
EMISSION LEVEL [dBuV/m]
WORLD COMPLIANCE CENTER
EN 55022 CLASS A @ 10m
HARRIS CORPORATION
LAAS RECEIVER / TRANSMITTER
XMIT @ 108MHz, 150 WATTS, CW
TEST NO. 6
230VAC/50Hz
90
70
50
30
10
30
100
1000
FINAL SIGNALS
FREQUENCY [MHz]

INSTRUMENT SPECIALTIES CO., INC
WORLD COMPLIANCE CENTER
TEST DATA

REPORT No.: 111147 DATE: 29 MARCH 2000 TEST No.: 6
TITLE OF TEST: EN55022 CLASS A RADIATED EMISSIONS @ 10 METERS
CUSTOMER: HARRIS CORPORATION
EUT DESCRIPTION: LAAS TRANSMITTER / RECEIVER
TEST MODE: TRANSMIT @ 108 MHz, 150 WATTS, CW MODE
SERIAL No.:
FREQUENCY RANGE: 30 MHz - 1000 MHzSENSOR LOCATION/POLARIZATION: WORSE CASE
INPUT POWER: 230VAC/50Hz TEMP: 69.6 f HUM: 26.9 % BAR: 30.00 "
TEST PERFORMED BY: GRANT METZGAR
TEST RESULTS: 324 MHz 0.1 dB UNDER LIMIT
TEST CONDITIONS: TABLE TOP SETUP.
* NOTE * CONTROL COMPUTER AND TRANSMIT LOAD LOCATED BELOW GROUND PLANE.
* NOTE * REINTALLED TWO INTERNAL UNSHIELDED CABLES.

PRODUCT EMISSIONS

EN 55022 CLASS A @ 10m Data File: TEST NO.6 @108MHz 29 Mar 00

No	EMISSION FREQUENCY MHz	SPEC LIMIT dBuV/m	MEASUREMENTS ABS	dLIM dB	MODE	POL	SITE HGT cm	SITE AZM deg	CORR FACTOR dB	COMMENTS
1	107.983	40.0	58.4	18.4	QP	V	100	240	-18.6	
2	215.989	40.0	32.4	-7.6	QP	V	116	30	-18.2	
3	323.968	47.0	46.9	-0.1	QP	H	330	180	-13.6	
4	432.000	47.0	36.5	-10.5	PK	H	183	90	-9.4	
5	539.981	47.0	42.1	-4.9	QP	H	161	240	-5.2	
6	648.002	47.0	36.2	-10.8	PK	H	100	180	-4.2	
7	755.980	47.0	39.2	-7.8	PK	H	100	90	-1.6	
8	864.003	47.0	39.8	-7.2	PK	V	173	180	0.6	
9	972.005	47.0	40.2	-6.8	PK	V	150	180	1.4	

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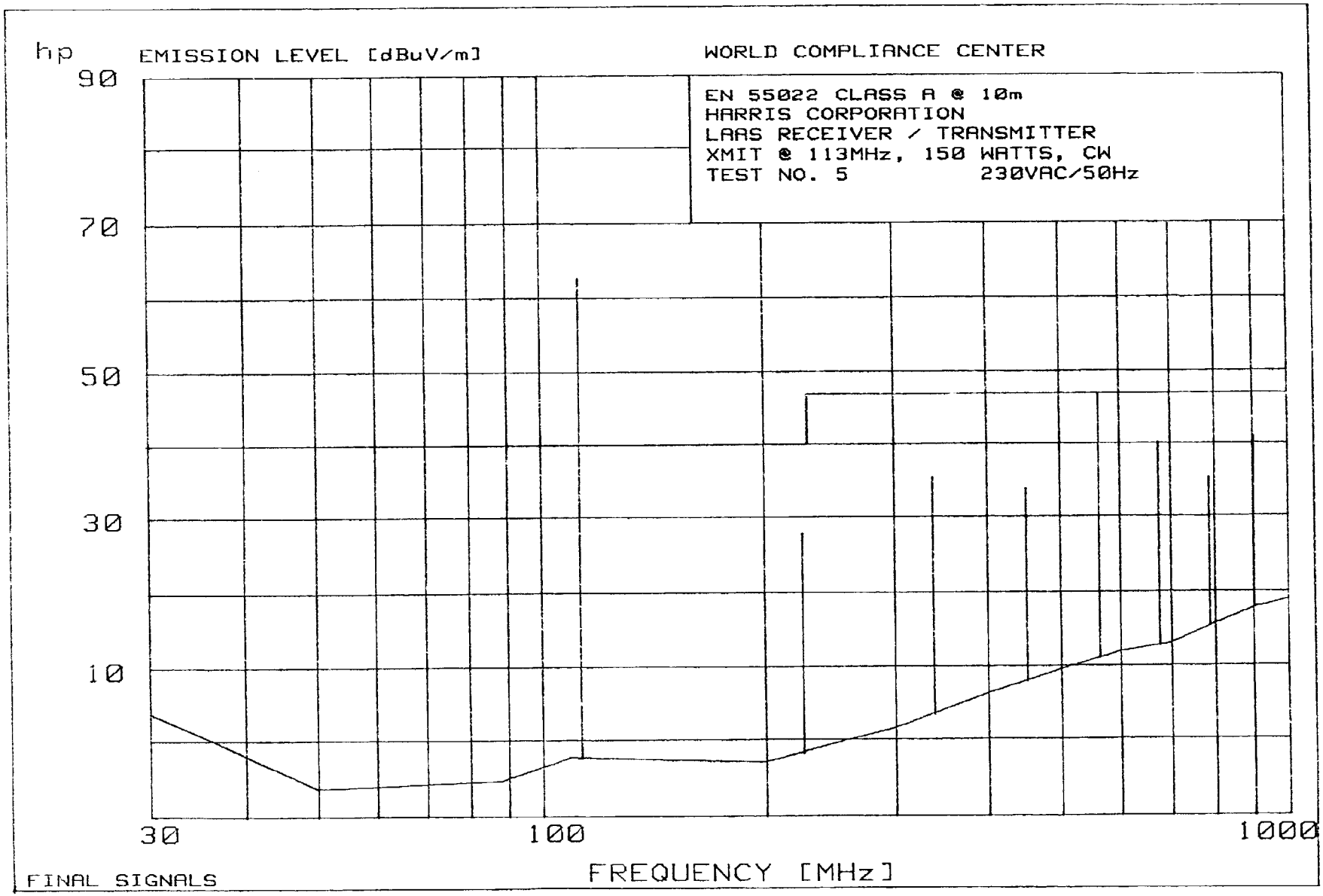

hp
EMISSION LEVEL [dBuV/m]
WORLD COMPLIANCE CENTER
EN 55022 CLASS A @ 10m
HARRIS CORPORATION
LAAS RECEIVER / TRANSMITTER
XMIT @ 113MHz, 150 WATTS, CW
TEST NO. 5
230VAC/50Hz
90
70
50
30
10
30
100
1000
FREQUENCY [MHz]
FINAL SIGNALS

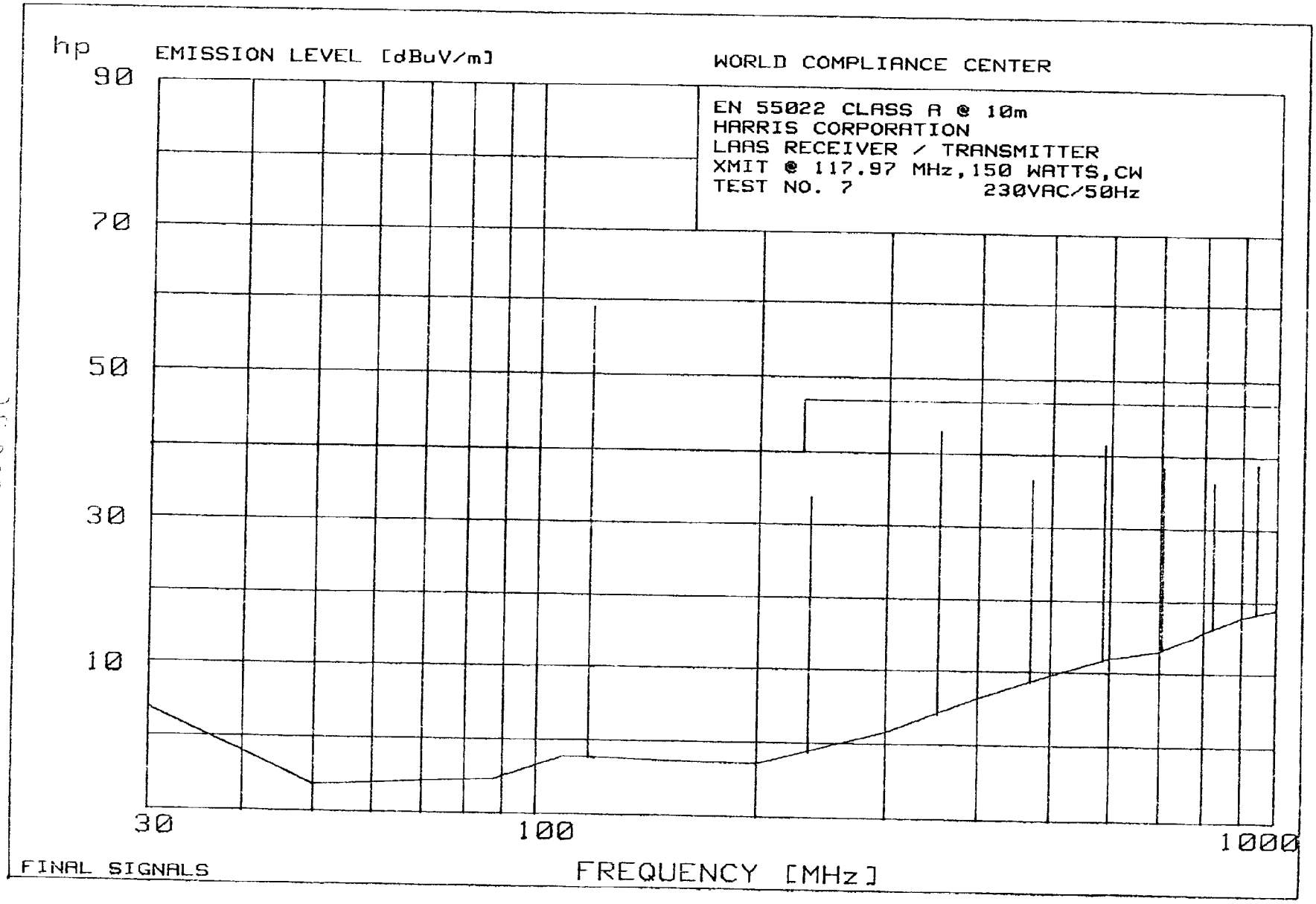
INSTRUMENT SPECIALTIES CO., INC
WORLD COMPLIANCE CENTER
TEST DATA

REPORT No.: 111147 DATE: 29 MARCH 2000 TEST No.: 5
TITLE OF TEST: EN55022 CLASS A RADIATED EMISSIONS @ 10 METERS
CUSTOMER: HARRIS CORPORATION
EUT DESCRIPTION: LAAS TRANSMITTER / RECEIVER
TEST MODE: TRANSMIT @ 113 MHz, 150 WATTS, CW MODE
SERIAL No.:
FREQUENCY RANGE: 30 MHz - 1000 MHzSENSOR LOCATION/POLARIZATION: WORSE CASE
INPUT POWER: 230VAC/50Hz TEMP: 69.6 f HUM: 26.9 % BAR: 30.00 "
TEST PERFORMED BY: GRANT METZGAR
TEST RESULTS: AT LIMIT @ 565 MHz HARMONIC
TEST CONDITIONS: TABLE TOP SETUP.
* NOTE * CONTROL COMPUTER AND TRANSMIT LOAD LOCATED BELOW GROUND PLANE.
* NOTE * REINTALLED TWO INTERNAL UNSHIELDED CABLES.

PRODUCT EMISSIONS

EN 55022 CLASS A @ 10m Data File: TEST NO.3 @113 MHz, CW 29 MAR 00

No	EMISSION FREQUENCY MHz	SPEC LIMIT dBuV/m	MEASUREMENTS ABS	dLIM dB	MODE	POL	SITE HGT cm	AZM deg	CORR FACTOR dB	COMMENTS
1	112.965	40.0	62.8	22.8	QP	V	109	0	-18.2	
2	225.975	40.0	27.9	-12.1	PK	V	109	0	-17.5	
3	338.981	47.0	35.4	-11.6	PK	V	100	270	-12.9	
4	451.989	47.0	33.9	-13.1	PK	H	194	180	-8.7	
5	564.989	47.0	47.0	0.0	QP	H	171	345	-4.7	
6	677.990	47.0	40.2	-6.8	QP	H	130	90	-3.9	
7	790.001	47.0	35.3	-11.7	PK	H	100	45	-1.3	
8	904.016	47.0	41.0	-6.0	PK	H	248	150	1.	


hp
EMISSION LEVEL [dBuV/m]
WORLD COMPLIANCE CENTER
EN 55022 CLASS A @ 10m
HARRIS CORPORATION
LAAS RECEIVER / TRANSMITTER
XMIT @ 117.97 MHz, 150 WATTS, CW
TEST NO. 7
230VAC/50Hz
90
70
50
30
10
30
100
1000
FINAL SIGNALS
FREQUENCY [MHz]

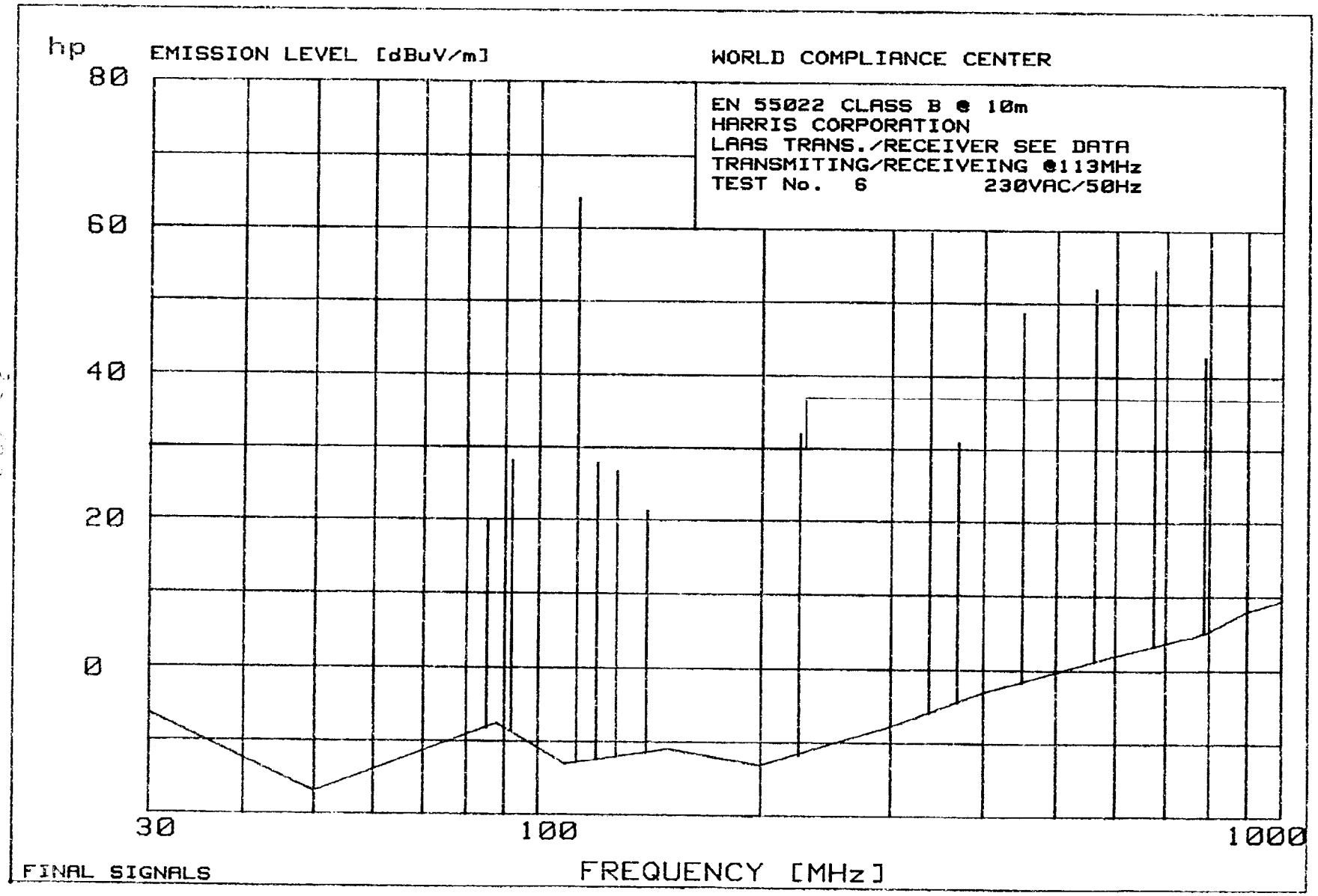
INSTRUMENT SPECIALTIES CO., INC
WORLD COMPLIANCE CENTER
TEST DATA

REPORT No.: 111147 DATE: 29 MARCH 2000 TEST No.: 7
TITLE OF TEST: EN55022 CLASS A RADIATED EMISSIONS @ 10 METERS
CUSTOMER: HARRIS CORPORATION
EUT DESCRIPTION: LAAS TRANSMITTER / RECEIVER
TEST MODE: TRANSMIT @ 117.975 MHz, 150 WATTS, CW MODE
SERIAL No.:
FREQUENCY RANGE: 30 MHz - 1000 MHzSENSOR LOCATION/POLARIZATION: WORSE CASE
INPUT POWER: 230VAC/50Hz TEMP: 69.6 f HUM: 26.9 % BAR: 30.00 "
TEST PERFORMED BY: GRANT METZGAR
TEST RESULTS: UNDER LIMIT
TEST CONDITIONS: TABLE TOP SETUP.
* NOTE * CONTROL COMPUTER AND TRANSMIT LOAD LOCATED BELOW GROUND PLANE.
* NOTE * REINTALLED TWO INTERNAL UNSHIELDED CABLES.

PRODUCT EMISSIONS

EN 55022 CLASS A @ 10m Data File: TEST NO.7 @117MHz 29 Mar 00

No	EMISSION FREQUENCY MHz	SPEC LIMIT dBuV/m	MEASUREMENTS ABS	dLIM dB	MODE	POL	SITE HGT cm	AZM deg	CORR FACTOR dB	COMMENTS
1	117.939	40.0	59.0	19.0	QP	V	100	0	-17.7	
2	235.974	47.0	33.9	-13.1	PK	V	100	30	-16.8	
3	353.887	47.0	43.1	-3.9	QP	V	100	0	-12.2	
4	471.895	47.0	36.6	-10.4	PK	V	101	75	-8.1	
5	589.868	47.0	41.5	-5.5	QP	H	129	150	-4.8	
6	707.862	47.0	38.4	-8.6	PK	H	121	105	-3.4	
7	825.821	47.0	36.4	-10.6	PK	H	124	270	-0.3	
8	943.807	47.0	38.9	-8.1	PK	H	110	45	0.8	


hp
EMISSION LEVEL [dBuV/m]
WORLD COMPLIANCE CENTER
EN 55022 CLASS B @ 10m
HARRIS CORPORATION
LAAS TRANS./RECEIVER SEE DATA
TRANSMITING/RECEIVEING @113MHz
TEST No. 6
230VAC/50Hz
80
60
40
20
0
30
100
1000
FINAL SIGNALS
FREQUENCY [MHz]

INSTRUMENT SPECIALTIES CO., INC
WORLD COMPLIANCE CENTER
TEST DATA

REPORT No.: 111147 DATE: 17 DECEMBER 2000 TEST No.: 6
TITLE OF TEST: EN 55022 CLASS B RADIATED EMISSIONS @ 10m
CUSTOMER: HARRIS CORPORATION
EUT DESCRIPTION: LAASS TRANSMITTER,RECEIVER,POWER SUPPLY
TEST MODE: TRANSMITTING/RECEIVEING 313MHz @ 150w
SERIAL No.: 0103
FREQUENCY RANGE: 30MHz-1000MHz SENSOR LOCATION/POLARIZATION: WORST CASE
INPUT POWER: 230VAC/50Hz TEMP: 73.1 f HUM: 23.2 % BAR: 30.12
TEST PERFORMED BY: SEAN CHARLES
TEST RESULTS: DOES NOT COMPLY
TEST CONDITIONS: LOAD AND COMPUTER BENEATH TEST GROUND PLANE. AS MANY OF THE SEEMS THAT I COULD ARE TAPED WITH COPPER TAPE. SO OEM CODS ARE ON THE TOXC BAC CONNECTORS ON THE BACK. COPPER TAPE IS OVER THE SWITCHES IN THE BACK.

PRODUCT EMISSIONS

EN 55022 CLASS B @ 10m Data File: TEST No. 6 18 Dec 1998 10:21

No	EMISSION FREQUENCY MHz	SPEC LIMIT dBuV/m	MEASUREMENTS ABS	REL dB	MODE	SITE POL	HGT cm	AZM deg	CORR FACTOR dB	COMMENTS
1	85.241	30.0	20.0	-10.0	QP	V	100	180	-16.5	BEOWULF 2.0
2	92.387	30.0	28.2	-1.8	QP	V	100	150	-15.5	BEOWULF 2.0
3	113.015	30.0	64.2	34.2	QP	V	100	210	-16.8	
4	120.230	30.0	27.9	-2.1	QP	V	100	60	-15.[illegible]	BEOWULF 2.0
5	128.027	30.0	26.7	-3.3	QP	V	100	30	-15.1	BEOWULF 2.0
6	140.539	30.0	21.3	-8.7	QP	V	100	30	-[illegible].5	
7	226.003	30.0	32.1	2.1	QP	V	100	30	-16.3	
8	338.045	37.0	59.5	22.5	QP	V	100	0	-10.7	
9	370.003	37.0	31.0	-6.0	PK	V	100	105	-9.[illegible]	
10	452.327	37.0	48.7	11.7	QP	H	184	350	-5.8	
11	565.018	37.0	52.0	15.0	QP	V	100	300	-[illegible].5	
12	678.035	37.0	54.6	17.6	QP	H	100	150	-[illegible]	
13	790.996	37.0	42.9	5.9	QP	H	100	237	-1.7	
14	904.012	37.0	55.3	18.3	QP	H	253	240	-2.[illegible]	

9 INDEX OF ATTACHMENTS

9.1.1 Attachments

Attachment Number	*Description of Contents*
A	Block Diagram of EUT

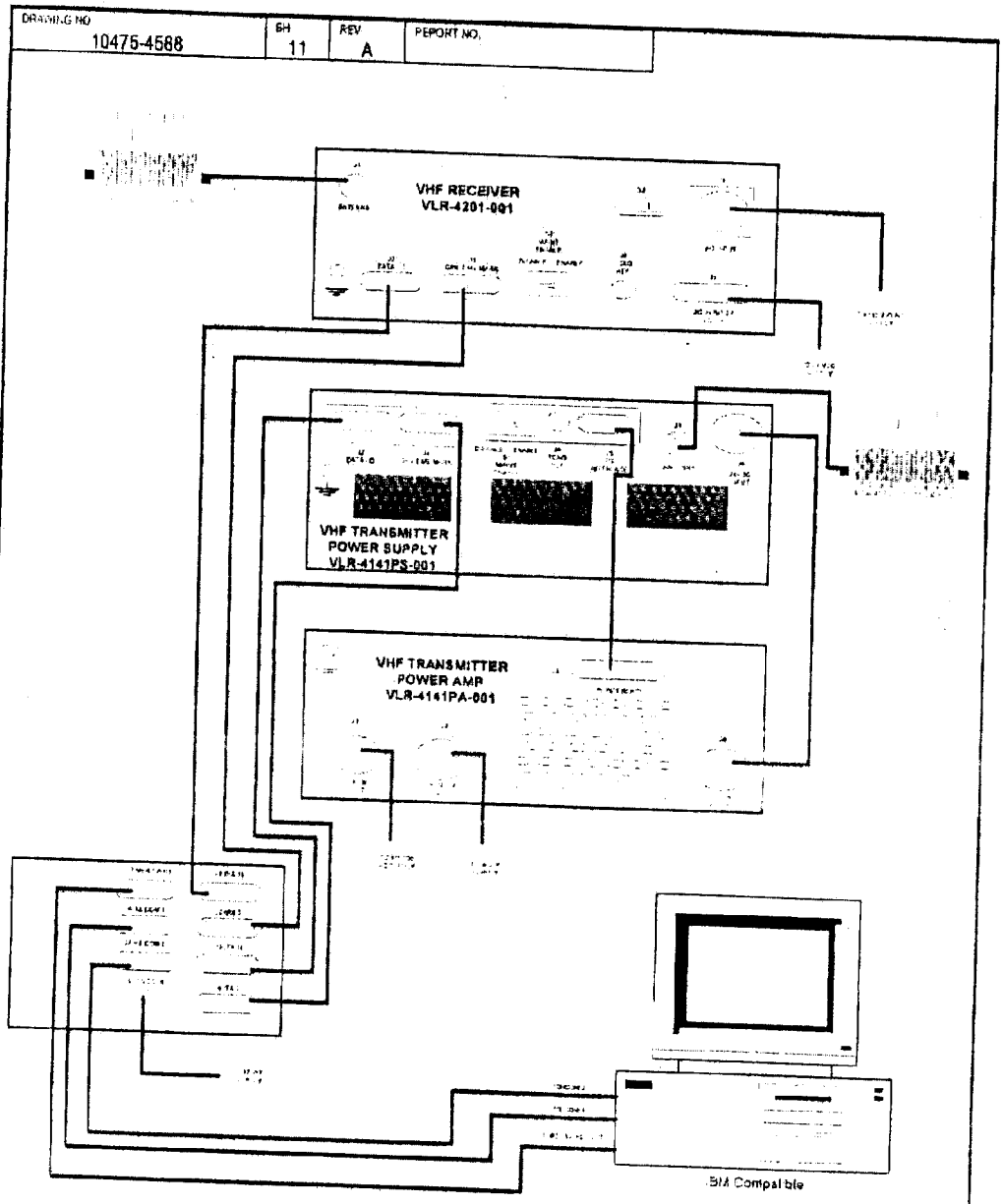


FIGURE 6.1
LAAS TRANSMITTER / RECEIVER
EMI/EMC ELECTRICAL PERFORMANCE SET UP