



GEROTEK
TEST • FACILITIES

TEST REPORT:
EVALUATION OF AIMS MIV
72MN95901

TEST REPORT: AIMS M1V**STATEMENT OF AUTHORITY**

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2002-06-07

Date

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2002-06-07

Date

APPROVAL:

JF SMIT
EXECUTIVE MANAGER:
TECHNICAL SERVICES

2002-06-07

Date

TEST INFORMATION

TEST(S) REQUESTED BY: MARINE DATA SYSTEMS

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Halfway House
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TEST PROCEDURES USED: 1. IEC 945

TYPE OF TEST(S): 1. IEC 945 – Radiated and conducted interference field strength 0.01MHz to 1GHz
2. IEC 1000-4-2 – Electrostatic discharge.
3. IEC 1000-4-3 – Radiated radio frequency electromagnetic field 80MHz to 1000MHz.
4. IEC 1000-4-6 : Conducted disturbances induced by radio frequency field 0.15MHz to 80MHz.
5. IEC 945 – Immunity to conducted low frequency interference

TEST ITEM DESCRIPTION: AIMS IV

MANUFACTURER: Marine Data Systems

MODEL NO.: MIV

SERIAL NO.: 020002642

DATE RECEIVED: 2002-05-23

REMARKS: Test equipment must be collected within three months otherwise it would be disposed of.

TEST(S) PERFORMED BY: Gerotek Test Facility
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0001

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SUB CONTRACTORS USED: N/A

TEST OFFICIALS: PP Govender

CELL No: 083 651 4688

TEST COMMENCEMENT DATE: 2002-05-23

TEST COMPLETED DATE: 2002-05-27

TEST WITNESSED BY: N/A

TEMPERATURE: 22°C – 25°C

RELATIVE HUMIDITY: 32% - 34%

TRACEABILITY: All test equipment utilised to conduct tests were calibrated in terms of standards, the accuracy of which is traceable to the national measuring standards kept and maintained by the CSIR.

Test equipment utilised

Type of Instrument	Model No.	Lab / Serial No.	Cal certificate No.
Automated EMI Analyser	EMC-30	OTF 475	GER 0280
Biconical Antenna, 30MHz – 200MHz	BIA-25	OTF 447	GER 0207
Log periodic Antenna, 200MHz –1000MHz	3146	OTF 512	GER 0237
Spectrum Analyser	HP 8591A	OTF 520	GER 0292
Transient Limiter	HP 11947A	OTF 01119	GER 0212
EMCO LISN	3825/2	OTF 523	GER 0297
Signal Generator	R&S SMPC	OTF 726	GER 0206
Power Amplifier	AR100/250	OTF 2404	N/A
Power Amplifier	AR100/1000	OTF 2414	N/A
Keytek	CE MASTER	OTF 2485	C02253
Electric Field Monitor System	FM2004	OFT 2159	GER 0247
Electric Field Probe	FP2000	OTF 2610	GER 0247
Log periodic Antenna, 80MHz –1000MHz	BN1500203	-	N/A
True RMS Voltmeter	MAJOR TECH	OTF 2406	A-05124
Magnetic Loop Antenna	6502	OTF 522	Verified before use

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1. SUMMARY OF REPORT

The AIMS IV complied fully with the specifications listed below. Table A shows a summary of the results obtained.

Test	Reference Specification	Results
Radiated emissions – 150KHz to 1000MHz	IEC 945	Pass
Conducted emissions – 10KHz to 30MHz	IEC 945	Pass
Electrostatic discharge – ±6kV contact/ ±8kV air	IEC 1000-4-2	Pass
Radiated immunity – 80MHz to 1000MHz – 400Hz / 80% AM – Electric field	IEC 1000-4-3 10V/m	Pass
Conducted immunity – 150KHz to 80MHz – 400Hz / 80% AM – 3VRMS Power	IEC1000-4-6 3Vrms 10Vrms spot frequencies	Pass
Conducted low frequency interference 50Hz to 10KHz	IEC 945	Pass

2. TEST RESULTS

Refer to Appendix A for EUT photograph.

2.1 TEST SETUP

The AIMS IV was tested in accordance with the test specification listed on page 3.

The system set-up.

1. Aims unit
2. External test equipment (Target radio's)

Cable lengths

1. Power – 0.8m
2. RS 422 ports (x4) – 3m
3. RS 422 ports (x2) – 2m

The unit was powered from +24Vdc. The chassis was connected to the reference ground plane during all the tests. The unit was setup to transmit every 6 minutes into a dummy load. The RS 422 ports were all terminated with 150 ohm resistors.

2.2 IEC 945 : RADIATED EMISSIONS – 150KHz to 1000MHz

The radiated emissions test was performed in accordance with the specification listed on page3. The test guidelines were performed in accordance with CISPR publication 16.

All measurements were performed with a full compliance test receiver equipped with a quasi-peak detector utilising a 120kHz measuring bandwidth.

Frequency (MHz)	Polarization	Graph No.	Result
150KHz to 30MHz	Vertical	01	Pass
30MHz to 200MHz	Horizontal	02	Pass
30MHz to 200MHz	Vertical	03	Pass
200MHz to 1000MHz	Horizontal	04	Pass
200MHz to 1000MHz	Vertical	05	Pass

Table 1

Results: Pass. The test excludes the transmission frequency of 161.975MHz.

2.3 IEC 945 : CONDUCTED EMISSIONS – 10KHz to 30MHz

The conducted emission test was performed with a 50 Ω /50 μ H line impedance stabilisation network (LISN). Tests were performed on both power leads respectively. The measuring bandwidth for the test was 9kHz. A full compliance test receiver (quasi-peak and average detector) was used to perform the test. Table 2 illustrates the results of these tests.

Frequency (MHz)	Measuring point	Graph No.	Result
0.01MHz to 30MHz	+24Vdc	06	Pass
0.01MHz to 30MHz	0V	07	Pass

Table 2

Result: Pass.

2.4 IEC 1000-4-2 – ELECTROSTATIC DISCHARGE

The system was set-up in accordance with the test set-up described in paragraph 2.1.

The following discharges were applied to the enclosure and cable of the unit.

- a) $\pm 8\text{kV}$ air discharge
- b) $\pm 6\text{kV}$ contact discharge

Test results air discharge: Pass criteria A Normal operation during and after test.

Test results contact discharge: Pass criteria A. Normal operation during and after test.

2.5 IEC 1000-4-3 – RADIATED IMMUNITY – 80MHz to 1000MHz

The system was set-up in accordance with the set-up described in paragraph 2.1. The field was pre-calibrated using a 1.5 metre x 1.5 metre non-metallic structure. The 10V/m pre-calibration was performed with no modulation, as outlined in IEC 1000-4-3. A uniform field was attained over 75% of the surface of the structure (i.e. 12 of the 16 points were within tolerance of -6dB to $+6\text{dB}$).

Before testing, the intensity of the established field strength was verified by placing a field sensor at a calibrated grid point, and with the field generating antenna and cables in the same position as used for the calibration, the forward power needed to give the field strength was measured. This was recorded to be the same as recorded during the calibration.

The test was carried out with the same forward power achieved during the pre-calibration process for all the test frequencies incremented at 1%. Modulation was used during the test (400Hz/80% AM). The dwell time between frequencies increments was 1000 milli-seconds. The frequency increments were 1%. The test was performed on one side of the U.U.T. All signal cables were facing the test antenna. It was decided to test only this side as the U.U.T is a complete metal enclosure. Both vertical and horizontal polarizations of the log periodic antenna were used during the test. The system was monitored constantly for malfunction.

Test result: Pass. Normal operation during and after test.

2.6 IEC 1000-4-4 – ELECTRICAL FAST TRANSIENTS

The test is not applicable to DC powered equipment on the power input port. The signal and control cables were excluded from the test as all cables are screened.

2.7 IEC 1000-4-6 – CONDUCTED IMMUNITY – 150KHz to 80MHz

The system was set-up in accordance with the test set-up described in paragraph 2.1. The frequencies were pre-calibrated without modulation prior to performing the test. A test level of 3Vrms and 10Vrms was used. The output of the signal generator was fed into a power amplifier. The output of the power amplifier was sent to a directional coupler, which in turn was split to the current probe (100 Ω calibration jig) and the input of a 50 Ω spectrum analyser. The frequency increment used was 1% of the start frequency. The pre-calibration voltage was achieved when the spectrum analyser read the correct test level. The frequency was incremented and the pre-calibration voltage test level recorded at each increment.

For the test the forward power recorded during the calibration was injected onto the system's test loom for all the test frequencies and voltage levels achieved during the pre-calibration process. Modulation was used and this was 400Hz/80% AM. The 10Vrms test was performed at spot frequencies of 2MHz, 3MHz, 4MHz, 6.2MHz, 8.2MHz, 12.6MHz, 16.5MHz, 18.8MHz, 22MHz and 25MHz.

Test result power: Pass. Normal operation during and after the test.

Note : The signal cables were not tested as they are all screened.

2.8 IEC 945 : IMMUNITY TO POWER SUPPLY FAILURE

The test was performed manually. The power was interrupted for 3 times at intervals of 60s.

Test result : Pass. The unit reset at each power interruption and resumes normal operation.

2.9 IEC 945 : IMMUNITY TO LOW FREQUENCY INTERFERENCE

The test signal (50Hz to 10KHz) was injected via an audio isolation transformer onto the +24VDC power lead. A test amplitude of 3Vrms was used.

Test result : Pass.

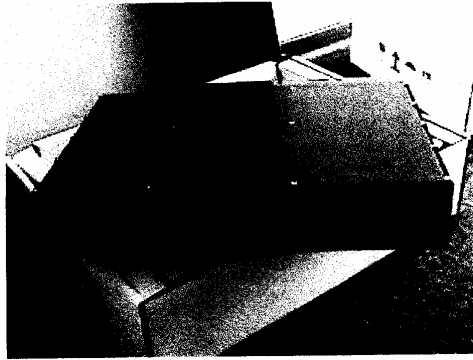
3. UNCERTAINTY OF MEASUREMENT

The reported expanded uncertainty of measurements stated as the standard uncertainty of measurements multiplied by the coverage factor $k=2$, which for normal distribution corresponds to a coverage factor probability of approximately 95%.

4. MEASUREMENT UNCERTAINTY

Not Applicable

APPENDIX A PHOTOGRAPH



AIMS MIV

Protek Product Testing

160945 Radiated Emissions

Date : 05/27/02

Technician : P.P. Govender

Test Method : Radiated Emissions

Equipment : AIMS MIV

Mode of Op. : Operational

Serial No. : 020002642

Time : 18:48:56.95

Test Equip. : EMC30 EMF Analyzer

Test Number : 01

Sensor Loc. : 3m from E.U.T

Sensor Pol. : Horizontal

Ext. Atten. : 0 dB

EMC-30 SETTINGS

Detector : QuasiPeak

Bandwidth : Per Band

Dwell : N/A

RF Atten. : 0 dB

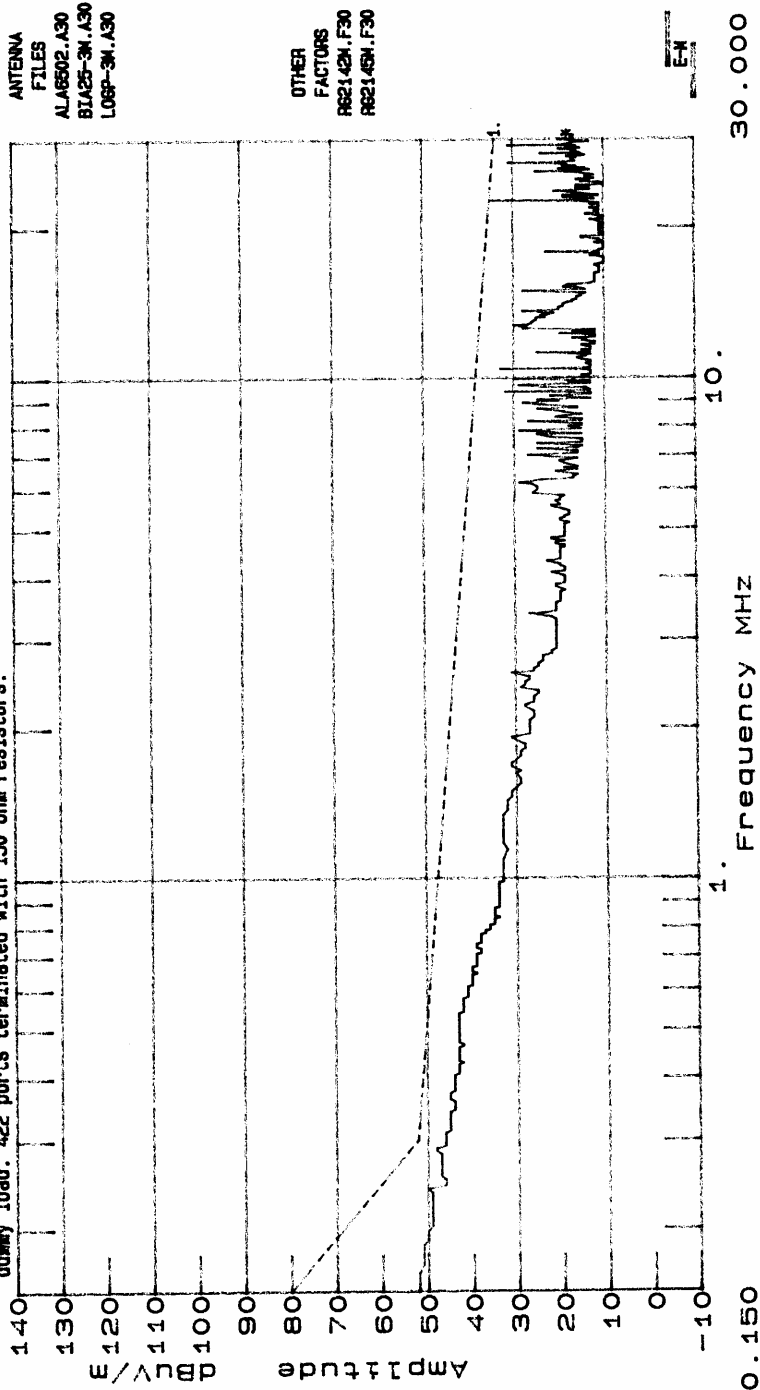
IF Atten. : 0 dB

SPECS

1) Radiated Emissions EN60945

2)

Comment : Unit powered from +24VDC. Setup to transmit every 6 minutes into a dummy load. 422 ports terminated with 150 ohm resistors.



errotek Product Testing

EN60945 Radiated Emissions

Date : 05/23/02
 Technician : P.P. Govender
 Test Method : Radiated Emissions
 Equipment : AIMS MIV
 Mode of Op. : Operational
 Serial No. : 020002642

Time : 11:59:24.57
 Test Equip. : EMC30 EMI Analyzer
 Test Number : 02
 Sensor Loc. : 3m from E.U.T
 Sensor Pol. : Horizontal
 Ext. Atten. : 0 dB

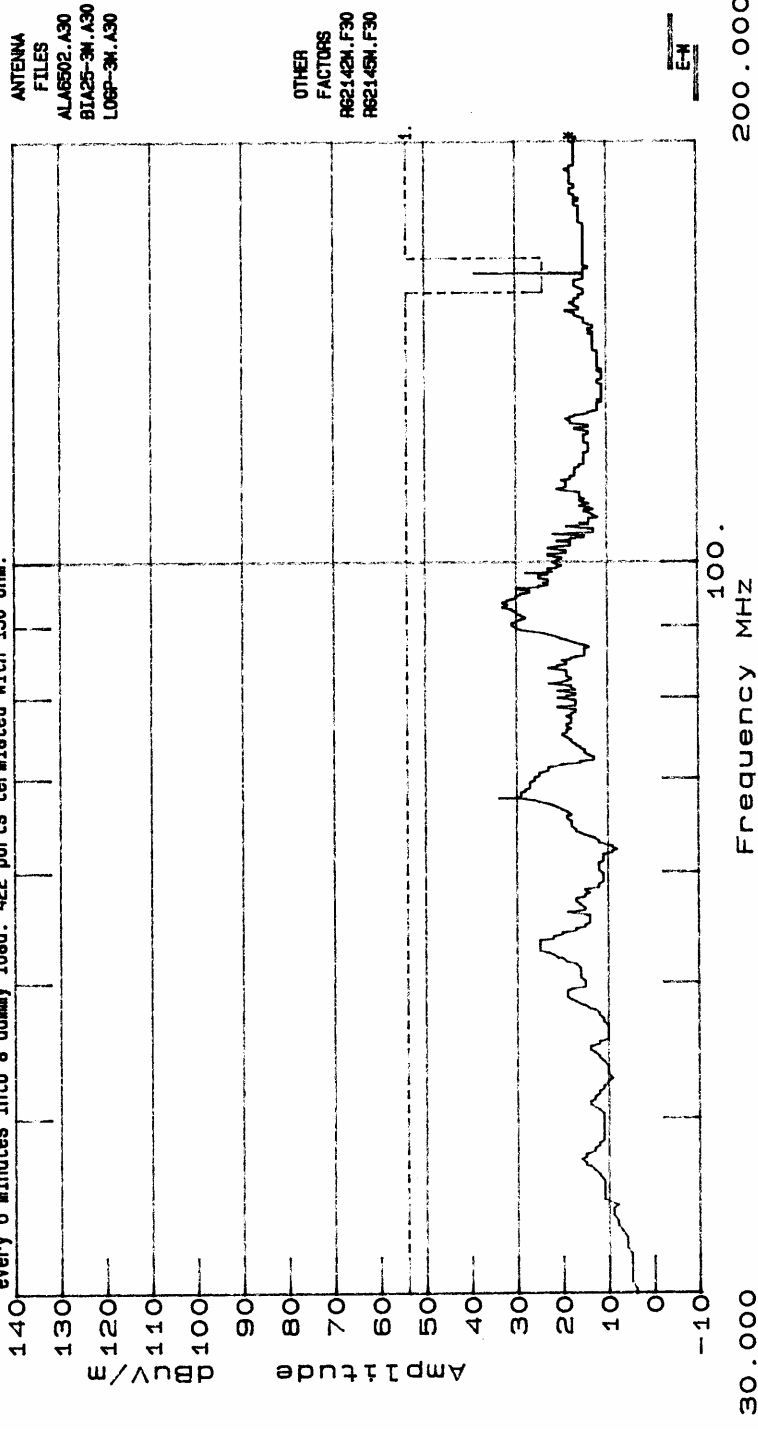
EMC-30 SETTINGS

Detector : QuasiPeak
 Bandwidth : Per Band
 Dwell : N/A
 RF Atten. : 0 dB
 IF Atten. : 0 dB

SPECS

1) Radiated Emissions EN60945
 2)

Comment : Unit powered from two 12V lead acid batteries. Setup to transmit every 6 minutes into a dummy load. 422 ports terminated with 150 ohm.



errotek Product Testing

N60945 Radiated Emissions

Date : 05/23/02

Technician : P.P. Govender

Test Method : Radiated Emissions

Equipment : AIMS MIV

Mode of Op. : Operational

Serial No. : 020002642

Time : 12:28:42.29

Test Equip. : EMC30 EMI Analyzer

Test Number : 03

Sensor Loc. : 3m from E.U.T

Sensor Pol. : Vertical

Ext. Atten. : 0 dB

EMC-30 SETTINGS

Detector : QuasiPeak

Bandwidth : Per Band

Dwell : N/A

RF Atten. : 0 dB

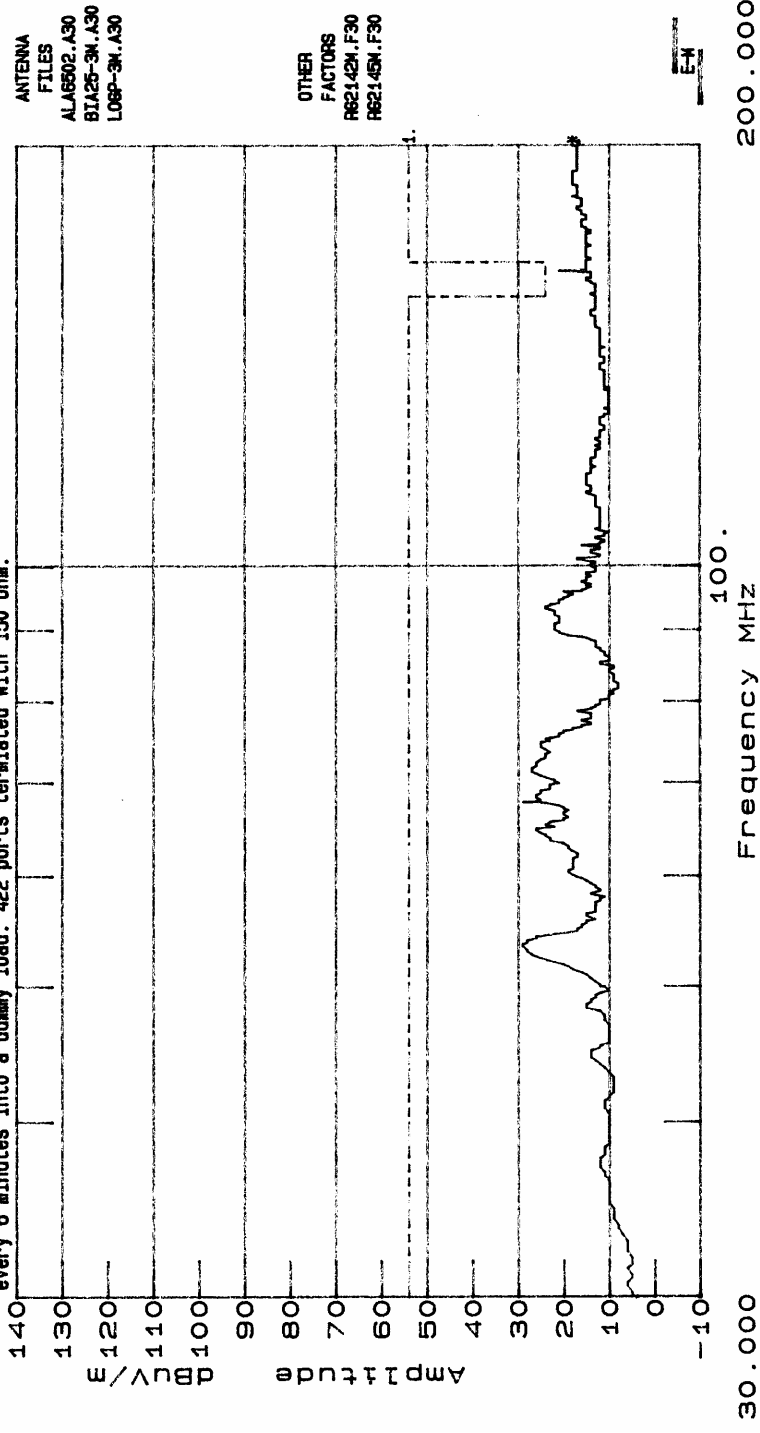
IF Atten. : 0 dB

SPECS

1) Radiated Emissions EN60945

2)

Comment : Unit powered from two 12V lead acid batteries. Setup to transmit every 6 minutes into a dummy load. 422 ports terminated with 150 ohm.



errotek Product Testing

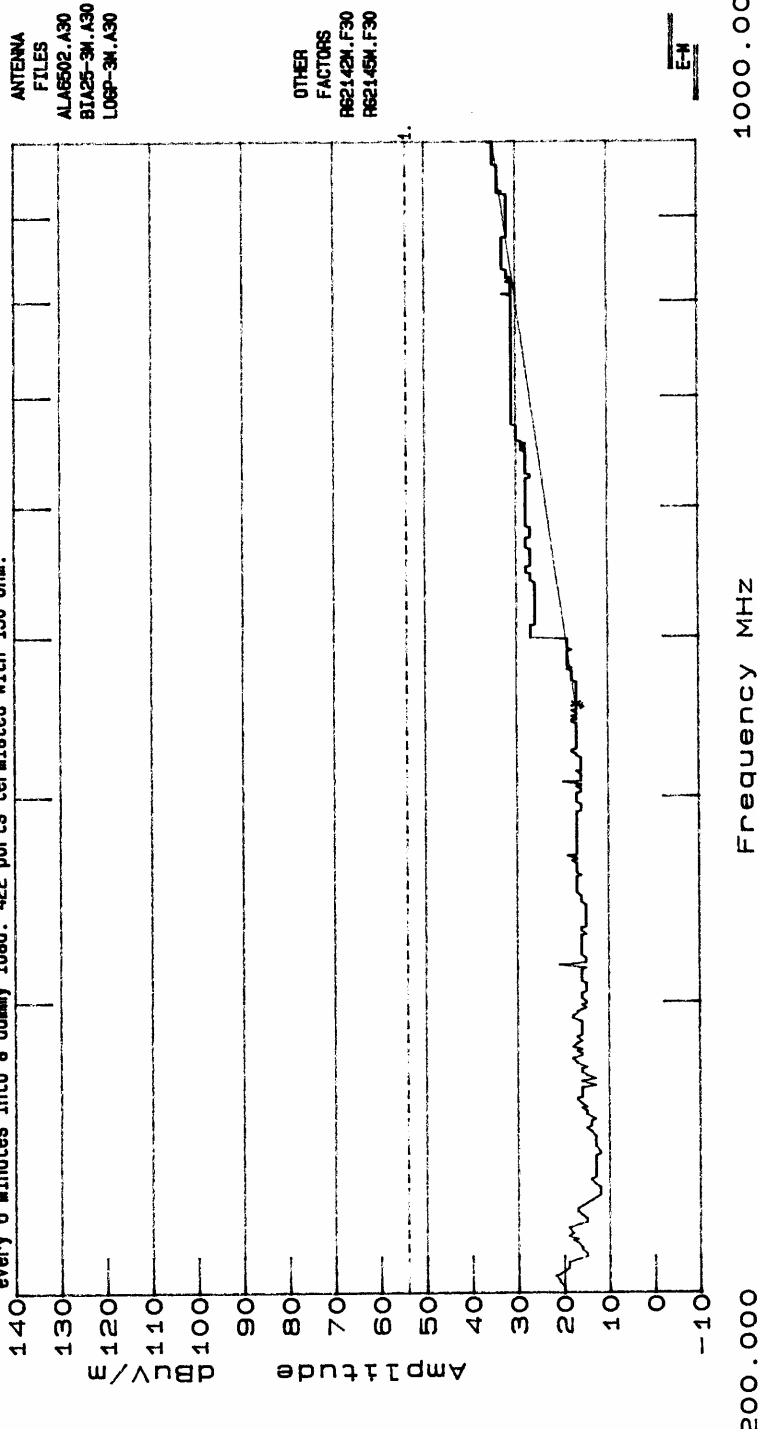
V60945 Radiated Emissions
 Date : 05/23/02
 Technician : P.P. Govender
 Test Method : Radiated Emissions
 Equipment : AIMS MIV
 Mode of Op. : Operational
 Serial No. : 020002642

Time : 12:51:07.58
 Test Equip. : EMC30 EMI Analyzer
 Test Number : 04
 Sensor Loc. : 3m from E.U.T
 Sensor Pol. : Horizontal
 Ext. Atten. : 0 dB

EMC-30 SETTINGS
 Detector : QuasiPeak
 Bandwidth : Per Band
 Dwell : N/A
 RF Atten. : 0 dB
 IF Atten. : 0 dB

SPECS
 1) Radiated Emissions EN60945
 2)

Comment : Unit powered from two 12V lead acid batteries. Setup to transmit every 6 minutes into a dummy load. 422 ports terminated with 150 ohm.



errotek Product Testing

№60945 Radiated Emissions

Date : 05/23/02

Technician : P.P. Govender

Test Method : Radiated Emissions

Equipment : AIHS MIV

Mode of Op. : Operational

Serial No. : 020002642

Time : 13:52:53.68

Test Equip. : EMC30 EMI Analyzer

Test Number : 05

Sensor Loc. : 3m from E.U.T

Sensor Pol. : Vertical

Ext. Atten. : 0 dB

EMC-30 SETTINGS

Detector QuasiPeak

Bandwidth Per Band

Dwell N/A

RF Atten. 0 dB

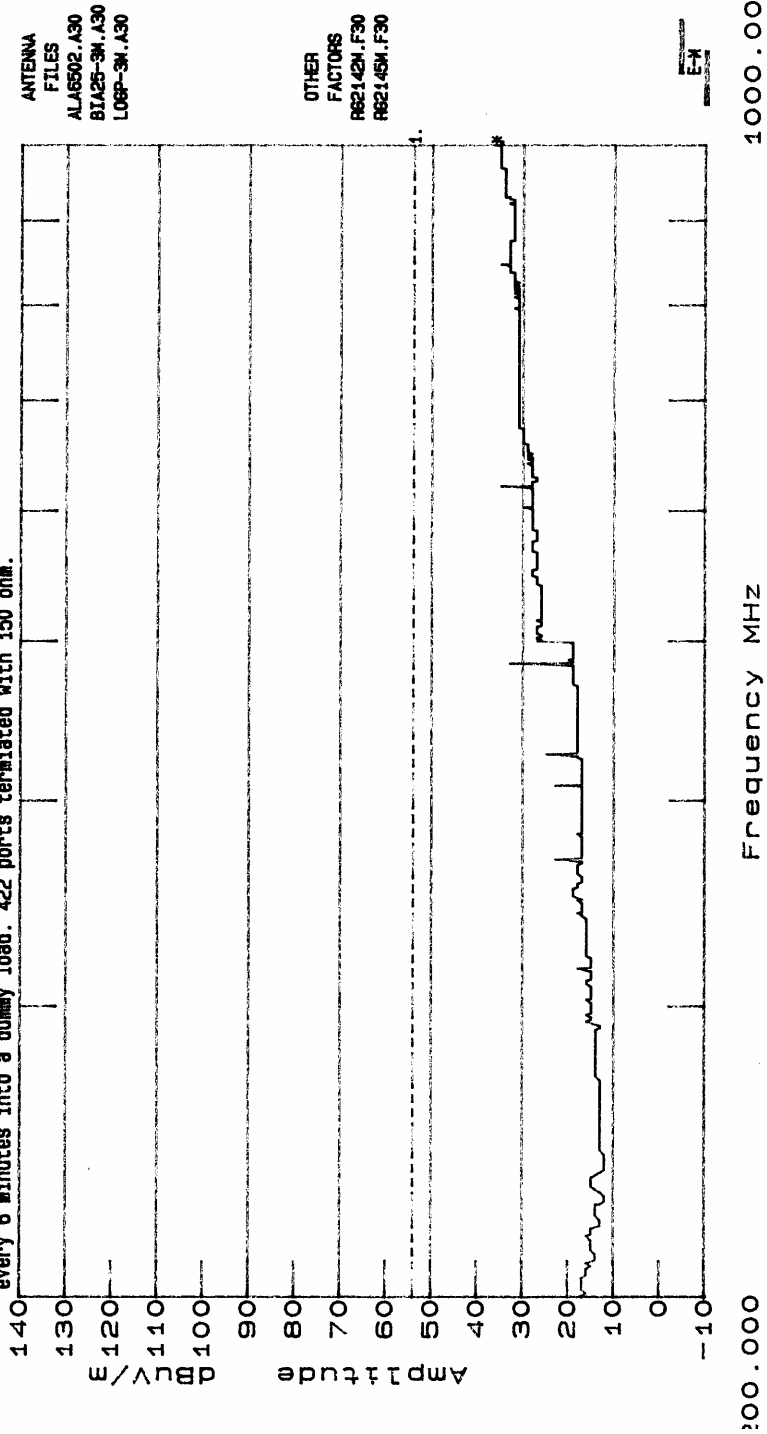
IF Atten. 0 dB

SPECS

1) Radiated Emissions EN60945

2)

Comment : Unit powered from two 12V lead acid batteries. Setup to transmit every 6 minutes into a dummy load. 422 ports terminated with 150 ohm.



erotek Product Testing

460945 Conducted Emissions

Date : 05/24/02

Technician : P.P. Govender

Test Method : Conducted Emissions

Equipment : AIMS MIV

Mode of Op. : Operational

Serial No. : 020002642

Time : 09:10:49.71

Test Equip. : EMC30 EMI Analyzer

Test Number : 06

Sensor Loc. : +24V lead

Sensor Pol. : N/A

Ext. Atten. : 10 dB

Comment : E.U.T powered from +24V lead acid batteries.

EMC-30 SETTINGS

Detector QuasiPeak

Bandwidth Per Band

Dwell N/A

RF Atten. 0 dB

IF Atten. 0 dB

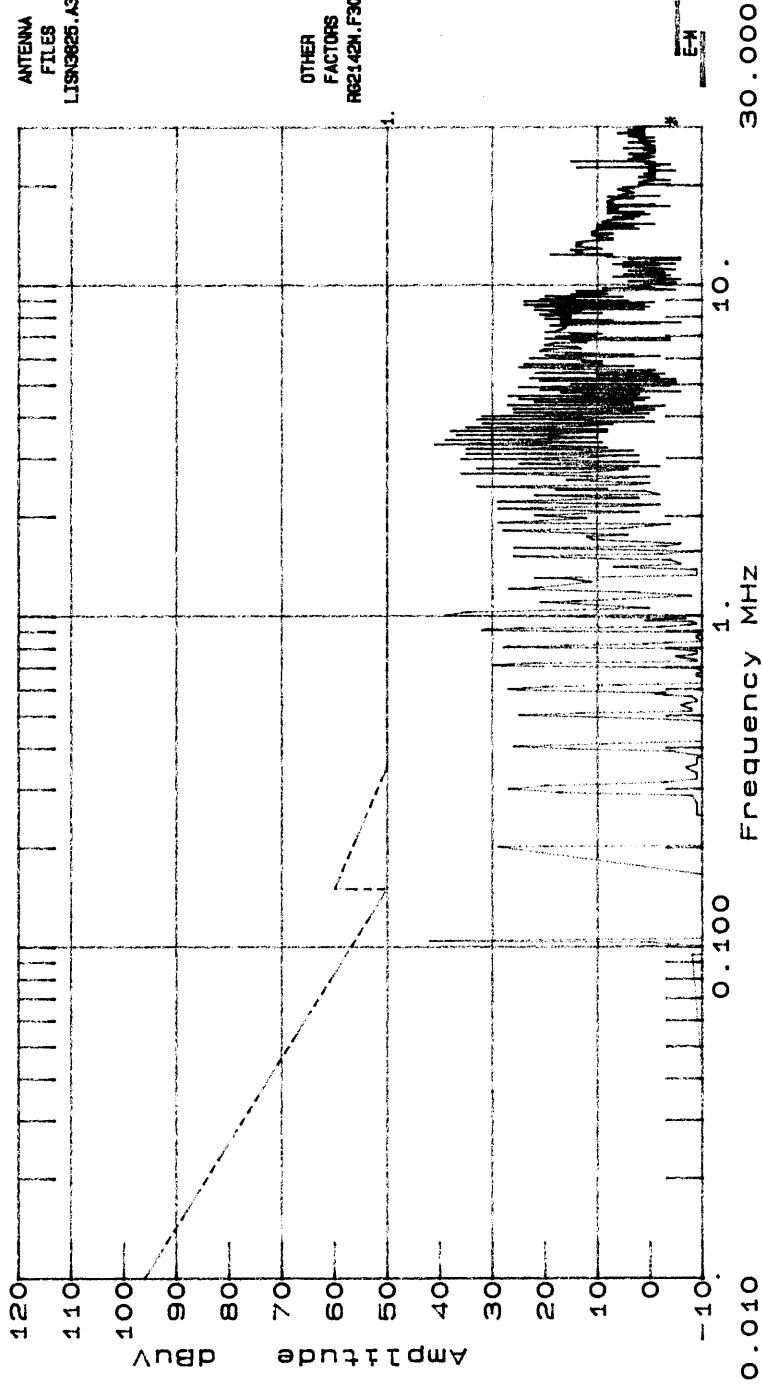
SPECS

1) EN60945 Conducted Emissions

2)

ANTENNA
FILES
LISN3825.A30

OTHER
FACTORS
RB2142N.F30



terrotek Product Testing

N60945 Conducted Emissions

Date : 05/24/02

Technician : P.P. Govender

Test Method : Conducted Emissions

Equipment : AIMS MIV

Mode of Op. : Operational

Serial No. : 020002642

Comment : E.U.T powered from +24V lead acid batteries.

Time : 10:30:58.32

Test Equip. : EMC30 EMI Analyzer

Test Number : 07

Sensor Loc. : 0V lead

Sensor Pol. : N/A

Ext. Atten. : 10 dB

EMC-30 SETTINGS

Detector QuasiPeak

Bandwidth Per Band

Dwell N/A

RF Atten. 0 dB

IF Atten. 0 dB

SPECS

1) EN60945 Conducted Emissions

2)

