



Nemko

Test Report: 2W06569
Issue III

Applicant: Instantel Inc.
309 Legget Drive
Kanata, Ontario
K2K 3A3

**Equipment Under Test:
(EUT)** XMARK Large Exciter
312.5KHz Transmitter

FCC ID: ISEXLX

In Accordance With: **FCC Part 15, Subpart C**

Tested By: Nemko Canada Inc.
303 River Road, R.R. 5
Ottawa, Ontario K1V 1H2



Authorized By: Kevin Carr, EMC Specialist

Date: 28 November 2002

Total Number of Pages: 17

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EQUIPMENT:XMARK Large Exciter

Section 1. Summary Of Test Results

General

All measurements are traceable to national standards.

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 15, Subpart C, 15.209. All tests were conducted using measurement procedure ANSI C63.4-1992. Radiated Emissions were made on an open area test site. A description of the test facility is on file with the FCC.

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.



TESTED BY: _____
Glen Westwell, Wireless Technologist

DATE: 28 November 2002

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This report applies only to the items tested.

Summary Of Test Data

Name Of Test	Para. No.	Result
Powerline Conducted Emissions	15.207	Complies
Radiated Emissions	15.209	Complies

Notes: This unit is power by an external OEM 12Vdc source.

Ferrite 28A-20290A2 was used at the DC input power line to reduce emissions detected at 30 & 60MHz. This ferrite has been incorporated in the B.O.M (see set up photo's).

Test Conditions:

Indoor Temperature: 24°C
 Humidity: 34%

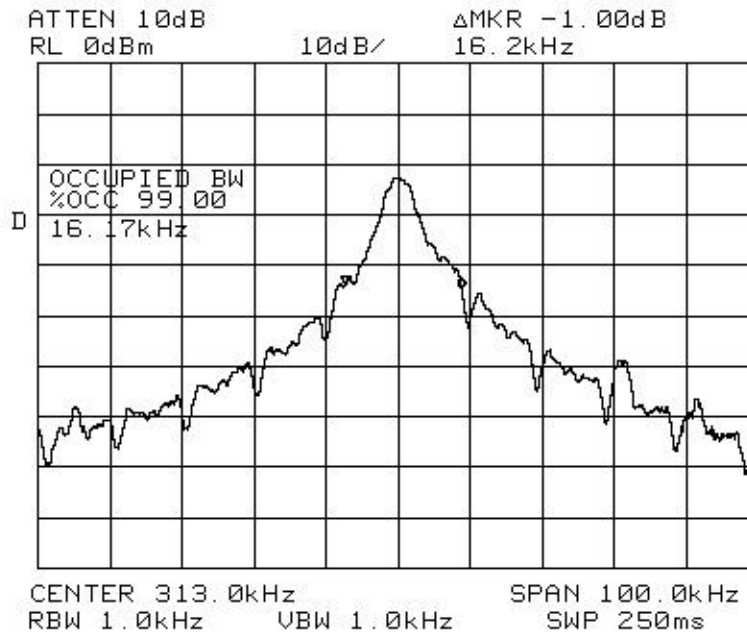
Outdoor Temperature: 17°C
 Humidity: 31%

Section 2. General Equipment Specification

Manufacturer:	Instantel Inc.
Model No.:	805A6201
Serial No.:	none
Date Received In Laboratory:	21 Oct. 2002
Nemko Identification No.:	1
Transmit Frequency (fixed)	312.5KHz
Type of Modulation:	On/Off Keying (OOK)
Emission designator:	16K2POD

EQUIPMENT:XMARK Large Exciter

99% Occupied Bandwidth



EQUIPMENT:XMARK Large Exciter

Section 3. Powerline Conducted Emissions

Para. No.: 15.207

Test Performed By: Glen Westwell	Date of Test: 1 Nov 2002
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Minimum Standard:

Frequency	Maximum Powerline Conducted RF Voltage	
(MHz)	(μV)	(dBμV)
0.45 - 30.0	250	48

Test Results: Complies.

Measurement Data: See attached tables & graph(s).

EQUIPMENT:XMARK Large Exciter

No Ferrite installed on AC Power Line**Class B Mains limits (Neutral)**

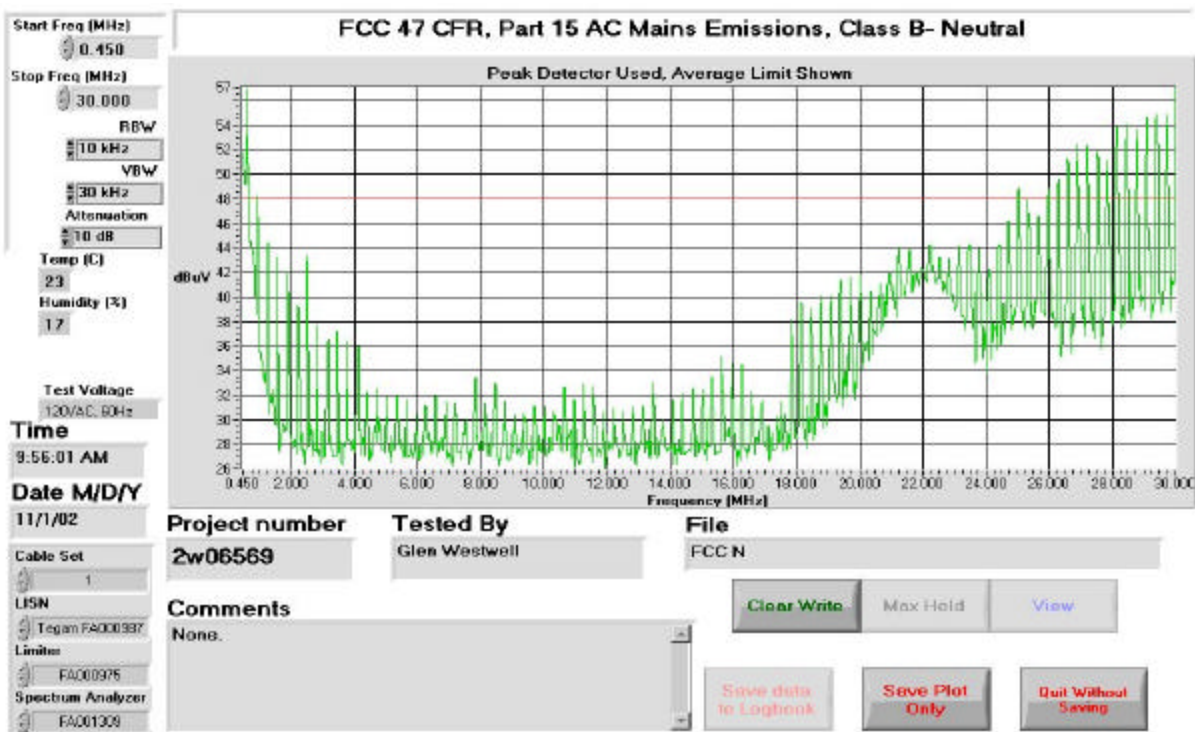
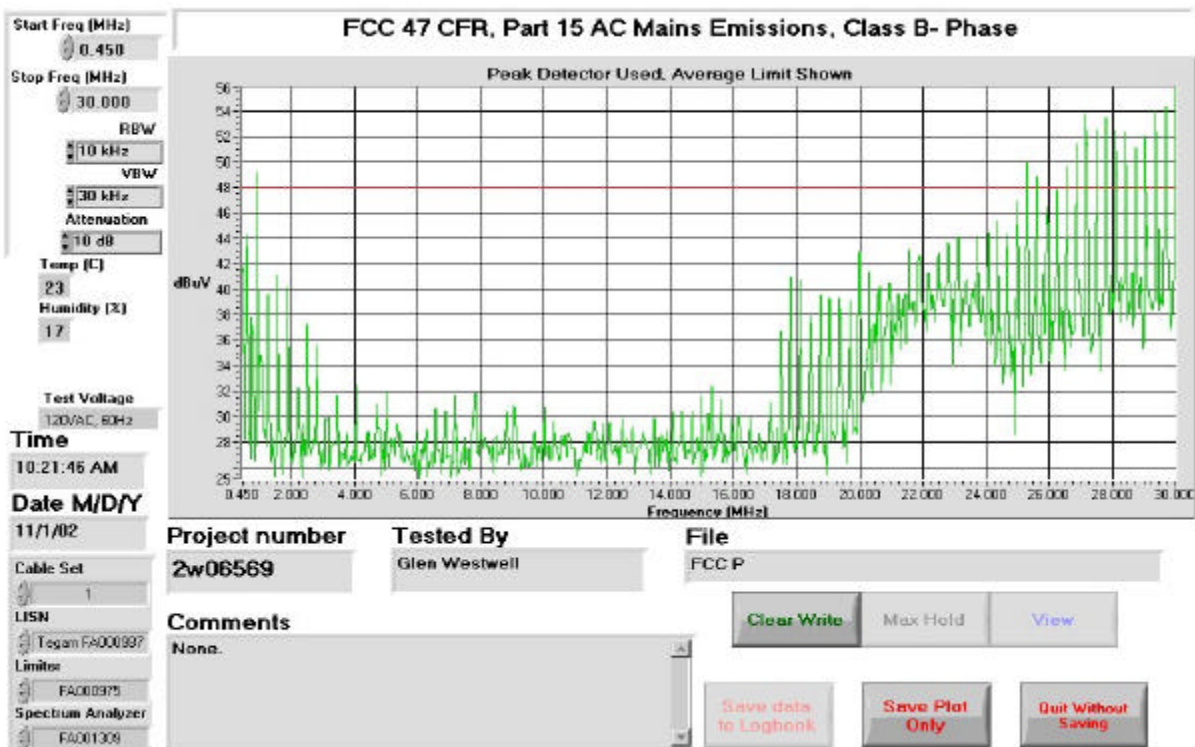
No.	Frequency of Emission (MHz)	Detector	Emission Level (dBV)	Limit (dBuV)	BB / NB	BB Corr. (dB)	Result (dB)
1	30.0000	Quasi-Peak	54.2	48.0	BB	13	6.8
	30.0000	Average	39		BB	13	
2	0.6300	Quasi-Peak	55.4	48.0	BB	13	5.6
	0.6300	Average	31.7		BB	13	
3	29.1100	Quasi-Peak	47.9	48.0	BB	13	13.1
	29.1100	Average	29.1		BB	13	
4	29.7000	Quasi-Peak	47.8	48.0	BB	13	13.2
	29.7000	Average	29.1		BB	13	
5	28.4600	Quasi-Peak	42.9	48.0	BB	13	18.1
	28.4600	Average	26.2		BB	13	
6	29.4100	Quasi-Peak	41.5	48.0	BB	13	19.5
	29.4100	Average	26.4		BB	13	

Class B Mains limits (Phase)

No.	Frequency of Emission (MHz)	Detector	Emission Level (dBV)	Limit (dBuV)	BB / NB	BB Corr. (dB)	Result (dB)
1	30.0000	Quasi-Peak	55	48.0	BB	13	6.0
	30.0000	Average	39.1		BB	13	
2	29.7000	Quasi-Peak	47.9	48.0	BB	13	13.1
	29.7000	Average	29		BB	13	
3	27.8100	Quasi-Peak	48.3	48.0	BB	13	12.7
	27.8100	Average	29		BB	13	
4	27.5200	Quasi-Peak	43	48.0	BB	13	18.0
	27.5200	Average	29		BB	13	
5	28.1100	Quasi-Peak	34.1	48.0	BB	13	26.9
	28.1100	Average	21.6		BB	13	
6	29.3500	Quasi-Peak	33.2	48.0	BB	13	27.8
	29.3500	Average	21.6		BB	13	

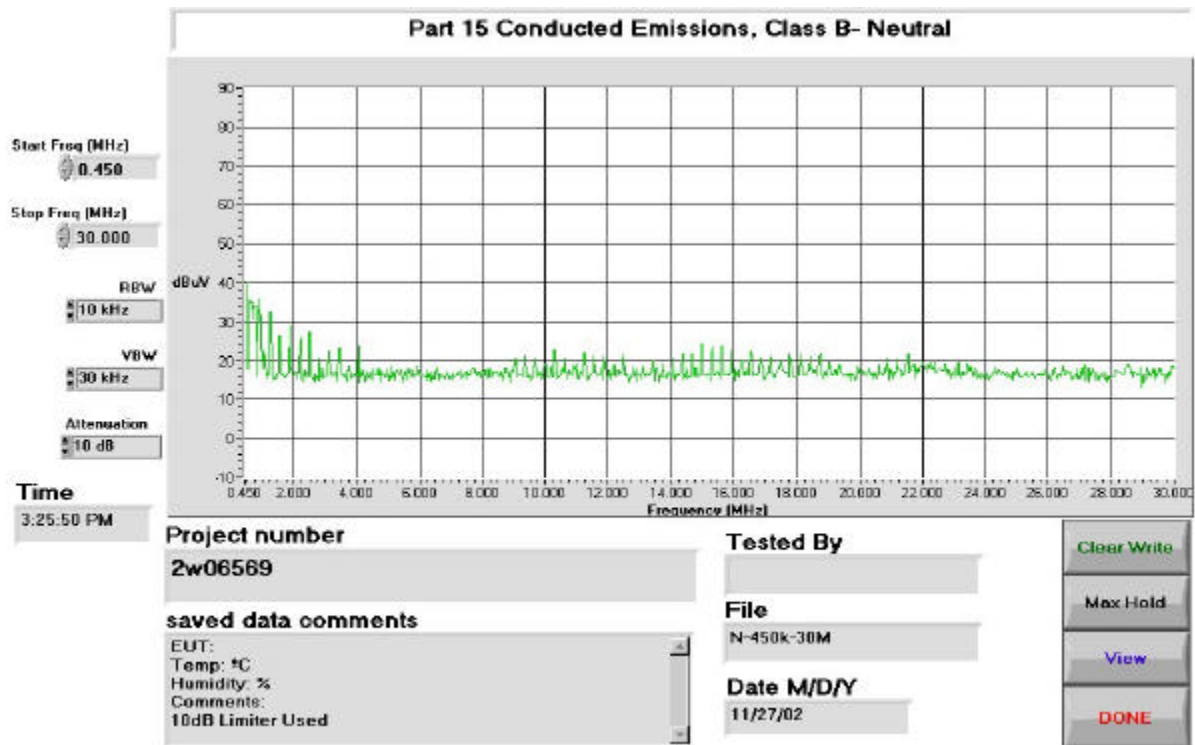
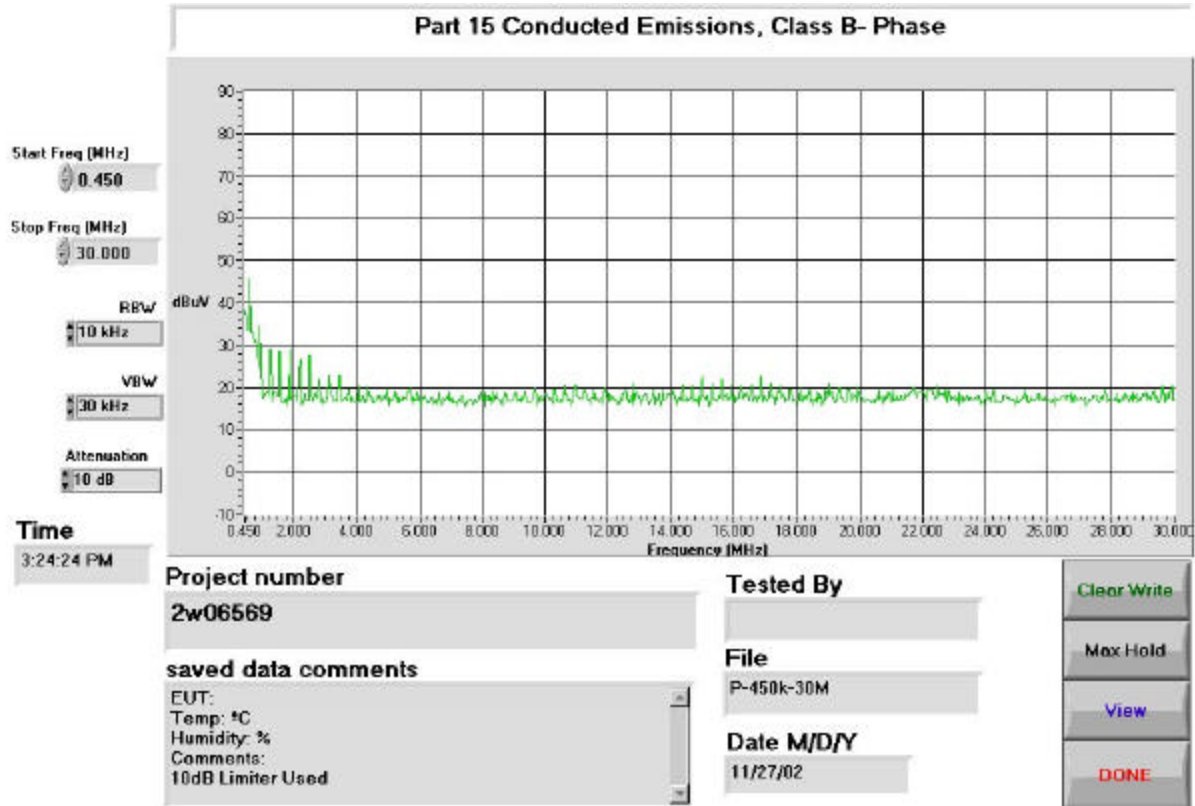
EQUIPMENT:XMARK Large Exciter

No Ferrite installed on AC Power Line



EQUIPMENT:XMARK Large Exciter

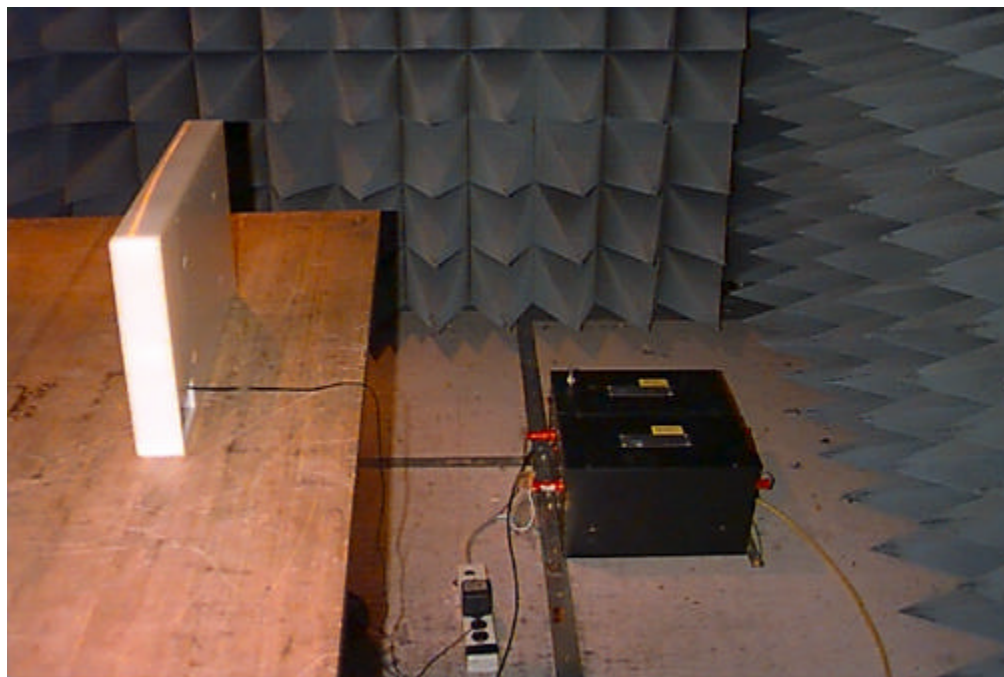
28A-20290A2 Ferrite installed on AC Power Line



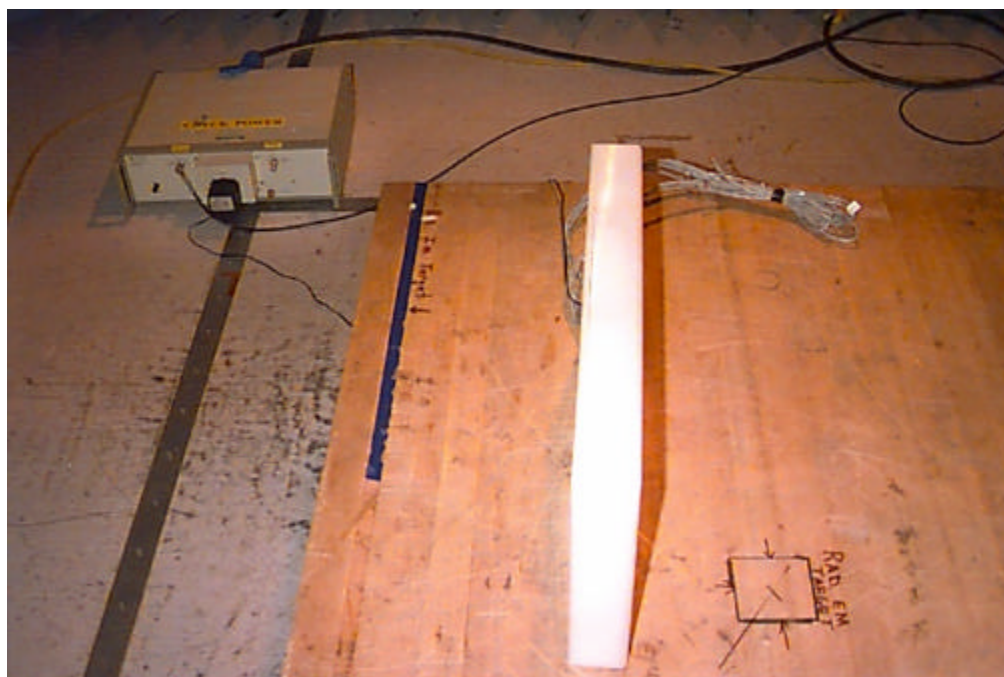
EQUIPMENT:XMARK Large Exciter

Power Line Conducted Photo

No Ferrite on AC Power Line



28A-20290A2 Ferrite installed on AC Power Line



EQUIPMENT:XMARK Large Exciter

Section 3. Radiated Emissions**Para. No.: 15.209****Test Performed By: Glen Westwell****Date of Test: 21 Oct. 2002**

Minimum Standard:

Tx = 312KHz

Fundamental (MHz)	Field Strength (μV/m)	Field Strength (dBμV)
0.009 - 0.490	2400/F(kHz) @ 300m	17.7
0.490 - 1.705	24000/F(kHz) @ 30m	—
1.705 - 30	30 @ 30m	—
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

Test Results:

Complies.

Note: Ferrite 28A-20290A2 was used at the DC input power line to reduce emissions detected at 30 & 60MHz. This ferrite has been incorporated in the B.O.M.

Measurement Data:

See attached table.

- Worst case emissions data has been presented.
- The EUT was searched up to 1000MHz.
- The input power was varied as per 15.31(e) to determine maximum emission level.
- The EUT was searched for worst case configuration with a 1m unshielded external control wire(s) attached (see set up photo).

EQUIPMENT:XMARK Large Exciter

Test Data: Fundamental

Test Distance (meters):		10		Receiver:		ESH3			Range:		A	
Detector:		Avg		RBW(kHz):		10		Environmental Factors:		None		
No.	Freq. (MHz)	Ant.	Pol (V/H)	Field Strength at 10 meters (dBμV)	Ant. Factor (dB)**	Amp. Gain (dB)* **	Dist. Corr. (dB)	Field Strength Extrapolated to 300m (dBμV)	Limit At 300 meters (dBuV)	Margin (dB)		
1	0.312	Active Loop		61.7				2.6	17.7	15.1		

Notes:

B/C = Biconical, BL = Bilog, L/P = Log-Periodic, H = Horn, D/P = Dipole, E/D = EMCO Dipole

* Re-measured using dipole antenna.

** Includes cable loss when amplifier is not used.

*** Includes cable loss.

() Denotes failing emission level.

N.D. = Not Detected

All emissions measured were extrapolated using 40 dB/decade extrapolation factor.

Harmonics

Test Distance (meters):				3		Receiver:		ESH3			Range:		A	
Detector:		Avg			RBW(kHz):		10		Environmental Factors:			None		
No.	Freq. (MHz)	Ant.	Pol (V/H)	Field Strength at 3 meters (dBμV)	Ant. Factor (dB)**	Amp. Gain (dB)* **	Dist. Corr. (dB)	Field Strength Extrapolated to 30m (dBμV)		Limit At 30 meters (dBuV)		Margin (dB)		
1	0.624	Active Loop		42.2				2.2		31.7		29.5		
2	0.936	Active Loop		39.3				-0.7		28.2		28.9		
No.	Freq. (MHz)	Ant.	Pol (V/H)	Received Signal 3 meters (dBμV)	Ant. Factor (dB)**	Amp. Gain (dB)* **	Dist. Corr. (dB)	Field Strength (dBμV)		Limit (dBuV)		Margin (dB)		
3	30.647	BL	V	17.4	20.4			37.8		40.0		2.2		
	30.647	BL	H	16.4	20.4			36.8		40.0		3.2		
4	60.4	BL	V	27.5	8.1			35.6		40.0		4.4		
	60.4	BL	H	23.3	8.1			31.4		40.0		8.6		

Notes:

B/C = Biconical, BL = Bilog, L/P = Log-Periodic, H = Horn, D/P = Dipole, E/D = EMCO Dipole

* Re-measured using dipole antenna.

** Includes cable loss when amplifier is not used.

*** Includes cable loss.

() Denotes failing emission level.

N.D. = Not Detected

All emissions measured were extrapolated using 40 dB/decade extrapolation factor.

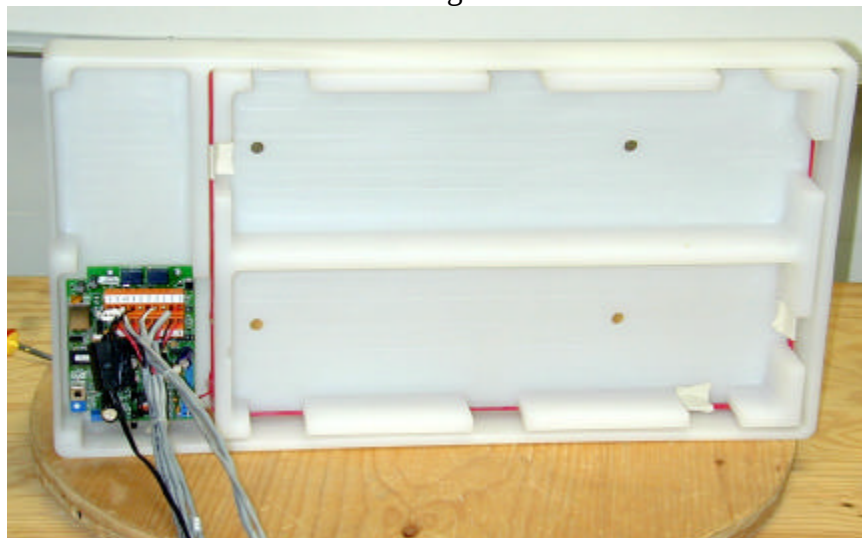
EQUIPMENT:XMARK Large Exciter

All harmonic and spurious emissions were searched up to the 10th harmonic

Photo, Test Set-up



Test Configuration

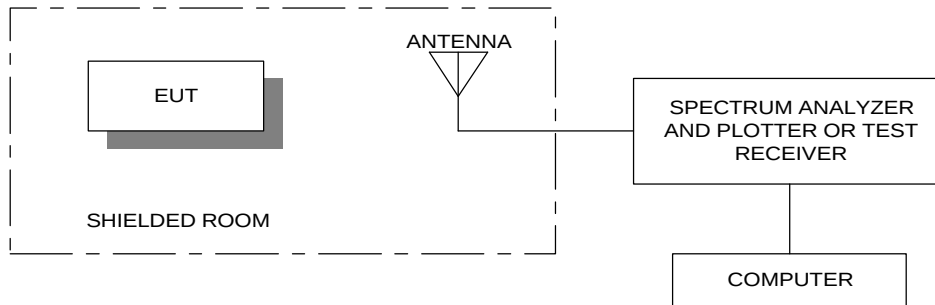


Ferrite on Power Line

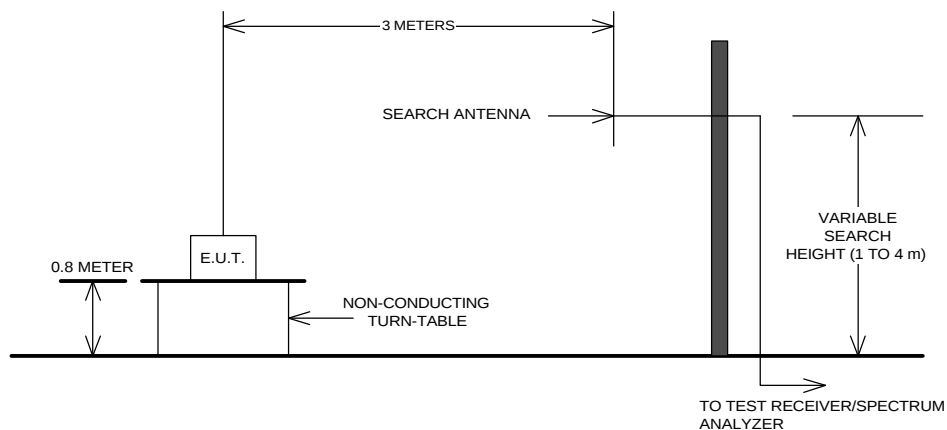
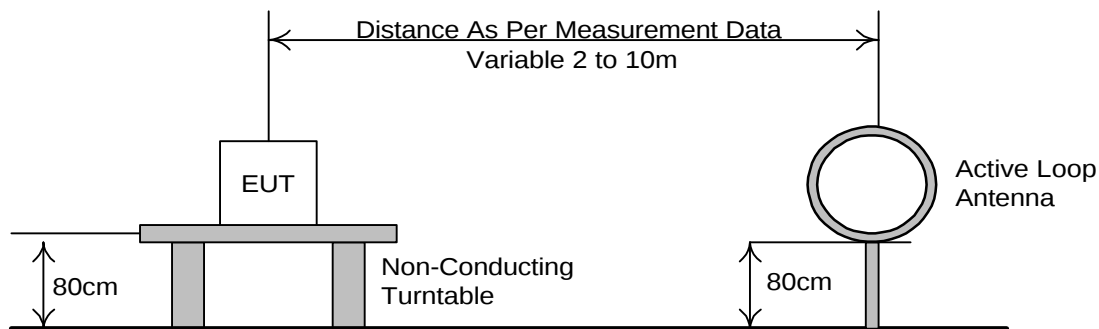


Section 4. Block Diagrams

Radiated Prescan



Test Site For Radiated Emissions



*EQUIPMENT:XMARK Large Exciter***Section 5. Test Equipment List**

CAL Cycle	Equipment	Manufacturer	Model No.	Asset/Serial No.	Last Cal.	Next Cal.
1 Year	Receiver	Rohde & Schwarz	ESH3	FA000872	May 02/02	May 02/03
1 Year	Receiver	Rohde & Schwarz	ESVS-30	FA001445	June. 07/02	June. 07/03
1 Year	Spectrum Analyzer	Hewlett-Packard	8565E	FA000981	July. 15/02	July. 15/03
1 Year	Active Loop Antenna	Rohde & Schwarz	HFH2-Z2	FA000631	May. 12/02	May. 12/03
1 Year	Bilog	Schaffner	CBL6112B	FA001503	July. 02/02	July. 02/03
Extended	LISN(peripheral)	Tegam	95300-50	FA000986	Oct. 22/01	Nov. 22/02
Extended	LISN(peripheral)	Tegam	95300-50	FA000987	Oct. 22/01	Nov. 22/02
NCR	International Power Supply	California Instruments	1001WP	FA000965	NCR	NCR
1 Year	Spectrum Analyzer	Hewlett-Packard	8566B	FA001309	Nov. 27/01	Nov. 27/02
1 Year	Spectrum Analyzer Display	Hewlett-Packard	85662A	FA001309	Nov. 27/01	Nov. 27/02
1 Year	Quasi-Peak Adapter	Hewlett-Packard	85650A	FA000801	Nov. 27/01	Nov. 27/02