

Test Site Services. Inc.

EMI Test Report

For Acom International

Acom 1000A

Emissions

FCC, Part 97 Sub Part D
External RF Power Amplifier

Test # B00139

Test Site Services, Inc.
P.O. Box 766
Marlboro, MA 01752
U.S.A.
Phone/Fax: (508) 481-1684

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**EMI Test Report
for
Acom International**

Test Number : B00139

Product Name : Acom 1000A

Regulation : FCC, Part 97 Sub Part D
: External RF Power Amplifier

Date: 6/30/00

**Report Reviewed
& Accepted by:**



K. Petrov

Acom International
157 Horse Pond Road
Sudbury, MA 01776
Phone: (978) 440-7555
Fax : (978) 440-9008

Report Issued By:



Richard L. Wiedeman, Laboratory Director

Tested By:



Tom Charron, Test Engineer

This test report is not valid without the signatures of Test Site Services, Inc. personnel.

Administrative Data

Regulation : FCC, Part 97 Sub Part D
: External RF Power Amplifier

Test Method : FCC, Part 97.317 (a) (1) (2) (3),(b) (1) (2),(c) (i) (ii)
Part 97.307 (d),(e)

Test Type : Qualification

Responsible Parties

Manufacturer : Acom OOD - Bulgaria
Applicant : Acom International Inc. USA

EUT Type/Model # : Linear Amplifier / 1000A

Date(s) of Test : 6/30/00

Customer : Krassimir Petkov President
Personnel

TSS Personnel : R. Wiedeman EMC Engineer
: Ken Raymond Test Engineer
: Tom Charron Test Engineer

Test Location : Open Area Test Site
Test Site Services, Inc.
30 Birch St.
Milford, MA 01757 U.S.A.

NOTICE	: FCC Rule 2.955 requires that a Verification Report for a Class A Computing Device must be signed by "an Official of the Company responsible for the device". A signature block has been provided on the first page for this purpose.
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EUT Description

The EUT (Acom 1000A) is a Linear Amplifier for Amateur Radio.
A complete description of the EUT may be found on block identifier page one.

The tests were run in a typical configuration including the following support equipment;

- 1) H.F. Transceiver
- 2) Six Meter Transceiver
- 3) Power Supply
- 4) Band Pass Filters

REASON FOR TEST

Qualification for FCC Part 97

CHANGES MADE DURING TEST

None

DEVIATIONS FROM STANDARD TEST METHOD

None

Test Summary

The Acom 2000A complied with FCC Part 97 Subpart D, 97.307 and 97.317 Limits for Amateur Radio equipment when tested in the system configuration defined herein.

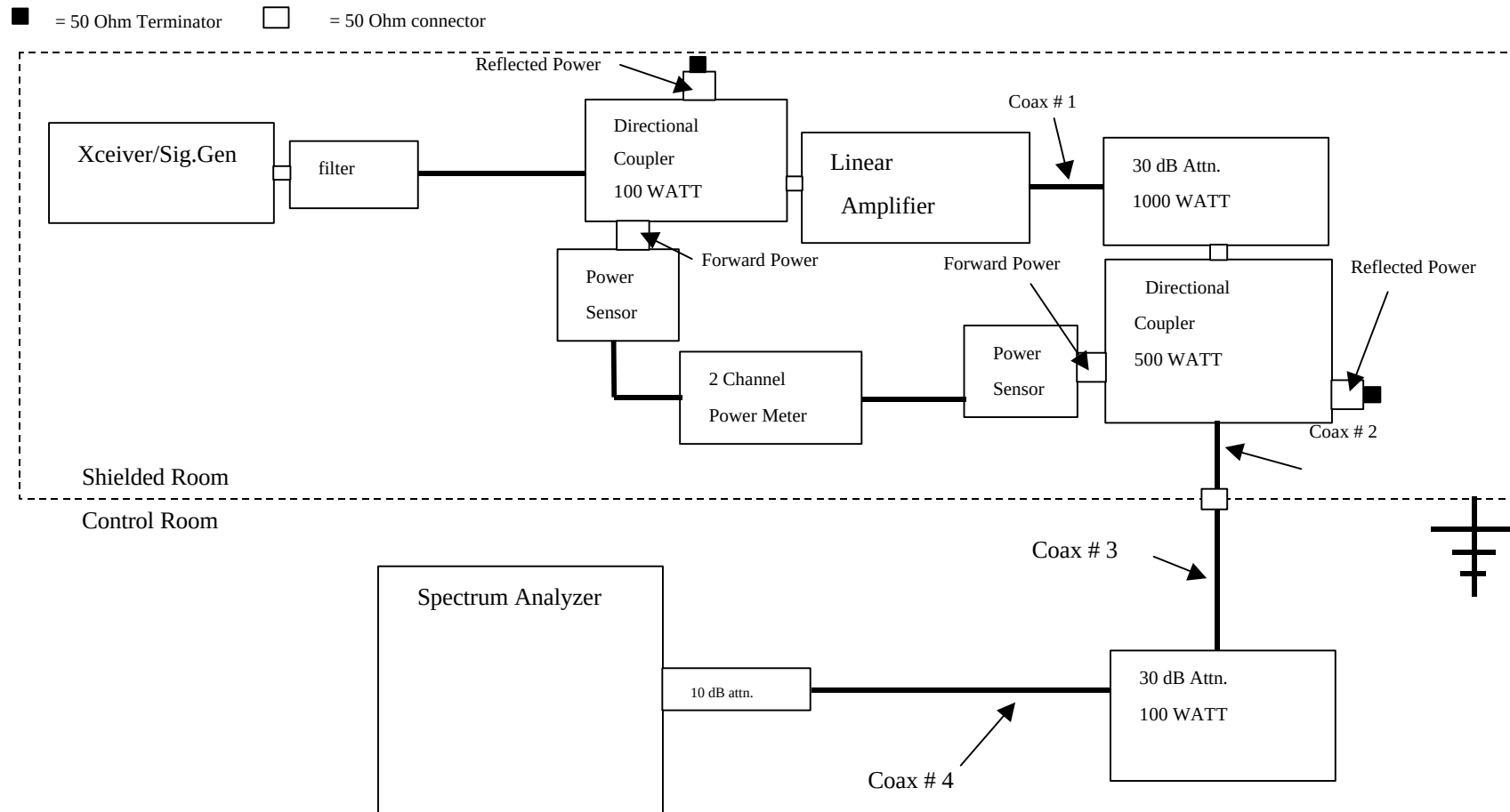
The following table indicates the margins (i.e. difference between measurement point and limit) of the data points and their harmonics to the tenth order:

Results reflect amplifier as shipped with 24 and 28 MHz. Bands disabled and amplifier unlocked in the 24 and 28 MHz. Bands

Power Gain 97.317 (a) (1) (2) (3),(c) (6) (ii)				Spurious emissions 97.307 (d), (e)			
Frequency (Mhz.) f1	Power in (W)	Power out (W)	Gain dB	2f1 dBc	3f1 dBc	4f1 dBc	5-10f1 dBc
1.9	71	891	11	-51.1	-73.8	-73.4	>-73.0
3.75	69	914	11.21	-52.6	-75.0	-73.9	>-74.0
7.15	71	885	10.98	-57.9	-77.1	-78.0	>-76.0
10.125	74	931	11.02	-57.8	-76.1	-75.4	>-76.0
14.175	75	889	10.72	-55.5	-73.2	-72.2	>-70.0
18.118	74	881	10.75	-61.9	-76.3	-75.4	>-74.0
21.225	74	871	10.70	-61.5	-76.0	-73.9	>-72.0
24.930	66	828	10.98	-68.7	-70.9	-70.9	>-73.0
28.500	69	822	10.77	-71.4	-73.0	-70.1	>-70.0
52.00	35	537	11.88	-66.4	-63.0	-64.9	>-64.0
97.317 (b) (1) (2) 0 dB gain was noted in the 12 & 10 meter bands and measured with internal lock in place.							
24.930	91.0	92.0	0.04				
28.50	92.0	93.0	0.03				
97.317 (c) (6) (i) was not capable of full power output when driven with < 50 watts							
1.9	33.0	388.0	10.72				
3.75	29.0	387.0	11.28				
7.15	27.0	297.0	10.34				
10.125	27.0	352.0	11.08				
14.175	27.0	349.0	11.13				
18.118	27.0	286.0	10.28				
21.225	27.0	383.0	11.47				
24.930	27.0	290.0	10.28				
28.50	28.0	344.0	10.92				
52.0	30.0	528.0	12.39				

See data section for additional detail.

Block Diagram for Acom 1000A



Correction Factor Power Meter Channel 1 = Attn. Directional Coupler Forward Power

Correction Factor Power Meter Channel 2 = Coax # 1 + 1 KW Attn + Attn Forward Power 500 W Coupler

Corection Factor Spectrum Analyzer = Coax # 1 + 1 KW Attn + Coupler # 2 Power Out + Coax 2 + 3 with Connector + 100 W Attn + Coax # 4

EUT Technical Data – Block Identifier 1

Description : Linear Amplifier

Manuf/Model : Acom International

Model No.: :1000A

Serial # :

FCC/FTZ Ident. : N/A

Power (Rated) : 240 VAC 60 Hz.

:

Power (Tested) : 240 VAC 60 Hz.

:

Internal Options :

None

External Options:

None

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Frequencies Generated:

Amateur radio bands from 1.8 MHz through 54.0 MHz

Comments:

Support Equipment Data – Block Identifier 2

Description : H.F. Transceiver

Manuf / Model : Yeasu

Model No.: FT1000MP

Serial # : 86300065

FCC/FTZ Ident. :

Power : 120 VAC 60 Hz.

Internal Options:

None

External Options:

CW Key (Vibroplex)

Frequencies Generated:

Amateur radio bands from 1.8 MHz through 30.0 MHz

Comments:

Support Equipment Data – Block Identifier 3

Description : Six Meter. Transceiver

Manuf / Model : Icom

Model No.: IC 706 MK II

Serial # : 05500

FCC/FTZ Ident. :

Power : 120 VAC 60 Hz.

Internal Options:

None

External Options:

CW Key (Vibroplex)

Frequencies Generated:

Amateur radio bands from 50.0 MHz through 54.0 MHz

Comments:

Support Equipment Data – Block Identifier 4

Description : Band Pass Filters

Manuf/Model : Industrial Communications Engineers Ltd.

Model No.: 160 Meter 403

Qty: 5 : 80 Meter 404

40 Meter 405

Serial # : None 20 Meter 406

10 Meter 407

Power : No power Required

Internal Options: None

External Options: None

Frequencies Generated: None

Comments:

Cable Descriptions

Coax 1	Function	:	(RF Power) Amplifier Output
Qty = 1	Type	:	Shielded
	Length	:	6 feet
	# of Conductors	:	2
	Connector Shell	:	Shielded
	Part Number	:	
	Miscellaneous	:	Alpha Wire RG 214/U
Coax 2	Function	:	(RF Power) to Spectrum Analyzer
Qty = 1	Type	:	Shielded
	Length	:	12 feet
	# of Conductors	:	2
	Connector Shell	:	Shielded
	Part Number	:	
	Miscellaneous	:	Pasternac RG 58/U
Coax 3	Function	:	(RF Power) to Spectrum Analyzer
Qty = 1	Type	:	Shielded
	Length	:	12 feet
	# of Conductors	:	2
	Connector Shell	:	Shielded
	Part Number	:	
	Miscellaneous	:	Pasternac RG 58/U
Coax 4	Function	:	(RF Power) to Spectrum Analyzer
Qty =	Type	:	Shielded
	Length	:	4 feet
	# of Conductors	:	2
	Connector Shell	:	Shielded
	Part Number	:	
	Miscellaneous	:	Pasternac RG 58/U

EUT I/O Ports – Cable Configuration

All testing was performed with the following cables/terminators connected to the EUT I/O ports:

EUT I/O Ports (All available by type)	Cable Attached (Yes/No)
Key In	Yes
RF In	Yes
RF Out	Yes
AC In	Yes

Test Equipment List

#	Equipment Type	Manufacturer	Model #	Serial #	Cal Date	Cal Due	Used
1	Spectrum Analyzer	Hewlett-Packard	8568B	2207A01917	8/9/99	8/9/00	X
2	Quasi-Peak Adapter	Hewlett-Packard	85650A	2043A00249	8/9/99	8/9/00	X
3	RF Pre-Selector	Hewlett-Packard	85685A	2648A00500	8/9/99	8/9/00	X
4	Spectrum Analyzer	Hewlett-Packard	8566B	2532A02250	7/5/00	7/5/01	
5	Quasi-Peak Adapter	Hewlett-Packard	85650A	2521A00665	7/5/00	7/5/01	
6	RF Pre-Selector	Hewlett-Packard	85685A	2510A00186	7/5/00	7/5/01	
7	EMI Receiver	Rhode & Schwarz	ESV33	8726315	11/11/99	11/11/00	
8	Comb Generator	Com Power	CG-520	20129	5/18/99	5/18/00	
9	RF Probe	Fischer	F-33-1	367	2/8/00	2/8/01	
10	RF Pre-Amplifier	Hewlett Packard	8447D	1937A02850	5/18/00	5/18/01	
11	Pre-Amplifier	Hewlett-Packard	8449B	3008A00952	5/18/00	5/18/01	
12	1 KW 30 dB Atten.	Bird	8327-300	1841	6/20/00	6/20/01	X
13	100 W 30 dB Atten.	Bird	8323	321	6/20/00	6/20/01	X
14	20 dB Atten.	JFW	50HF-020		6/20/00	6/20/01	X
15	20 dB Atten.	JFW	50F-020		6/20/00	6/20/01	X
16	10 dB Atten.	Stoddart Electro	90513	10276	6/20/00	6/20/01	X
17	Signal Generator	HewlettPackard	8642B	2551A00530	6/14/00	6/14/01	X
18	Amplifier	Kalmus	275LC-CE	86971	3/31/00	3/31/01	X
19	Power Meter	Boonton	4232A	21901	5/22/00	5/22/01	X
20	Power Sensor	Boonton	51011-EMC	21054	5/22/00	5/22/01	X
21	Power Sensor	Boonton	51011-EMC	21102	5/22/00	5/22/01	X
22	Directional Coupler	Werlatone	C5091	7231	5/18/00	5/18/01	X
23	Directional Coupler	Werlatone	C5091	7247	5/18/00	5/18/01	X

Appendix A

TEST DATA

Sheet1									
EUT:	Acom 1000	Test Site Services Inc					Date:	06/30/2000	
Spec	FCC Part 97	Data Sheet					Test No.	B00139	
							Test Eng.	T. Charron	
FUNDAMENTAL				HARMONIC					
Freq	Signal	Correction	Product	Freq *	Signal	Correction	Limit	Margin	
MHz	Strength	Factor	Level		Strength	Factor			
	dBuV	dB	dBuV		dBuV	dB	dBuV	dB	
1.900	86.4	80.4	166.8						
			0.0	f ₂	3.800	35.2	80.45	166.8	-51.1
			0.0	f ₃	5.700	12.4	80.55	166.8	-73.8
			0.0	f ₄	7.600	12.7	80.7	166.8	-73.4
			0.0	f ₅	9.500	12.1	80	166.8	-74.7
			0.0	f ₆	11.400	11.8	80.85	166.8	-74.1
			0.0	f ₇	13.300	11.9	80.85	166.8	-74.0
			0.0	f ₈	15.200	11.8	81.05	166.8	-73.9
			0.0	f ₉	17.100	11.5	81.05	166.8	-74.2
			0.0	f ₁₀	19.000	8.8	81.1	166.8	-76.9
* = Receiver BW = 9 kHz				Receiver BW = 120 kHz.		N/F = Noise Floor			

[illegible]

EUT:		Acom 1000		Test Site Services Inc		Date:		06/30/2000	
Spec		FCC Part 97		Data Sheet		Test No.		B00139	
						Test Eng.		T. Charron	
FUNDAMENTAL				HARMONIC					
Freq	Signal	Correction	Product		Freq*	Signal	Correction	Limit	Margin
MHz	Strength	Factor	Level		MHz	Strength	Factor	dBuV	dB
14.175	85.8	80.9	166.7						
			0.0	f ₂	28.350	29.9	81.3	166.7	-55.5
			0.0	f ₃	42.525	11.9	81.6	166.7	-73.2
			0.0	f ₄	56.700	12.6	81.9	166.7	-72.2
			0.0	f ₅	70.875	14.1	82.4	166.7	-70.2
			0.0	f ₆	85.050	11.1	82.4	166.7	-73.2
			0.0	f ₇	99.225	11.6	82.7	166.7	-72.4
			0.0	f ₈	113.400	10.7	82.8	166.7	-73.2
			0.0	f ₉	127.575	10.4	82.9	166.7	-73.4
			0.0	f ₁₀	141.750	22.1	83.1	166.7	-61.5
* = Receiver BW = 9 kHz		Receiver BW = 120 kHz.		N/F = Noise Floor					
FUNDAMENTAL				HARMONIC					
Freq	Signal	Correction	Product		Freq*	Signal	Correction	Limit	Margin
MHz	Strength	Factor	Level		MHz	Strength	Factor	dBuV	dB
18.118	85.5	81.1	166.6						
			0.0	f ₂	36.236	23.2	81.5	166.6	-61.9
			0.0	f ₃	54.354	8.4	81.9	166.6	-76.3
			0.0	f ₄	72.472	9	82.2	166.6	-75.4
			0.0	f ₅	90.590	7.8	82.4	166.6	-76.4
			0.0	f ₆	108.708	7.9	82.8	166.6	-75.9
			0.0	f ₇	126.826	7.6	82.9	166.6	-76.1
			0.0	f ₈	144.944	7.6	83.15	166.6	-75.9
			0.0	f ₉	163.062	7.2	83.4	166.6	-76.0
			0.0	f ₁₀	181.180	8.2	83.5	166.6	-74.9
* = Receiver BW = 9 kHz		Receiver BW = 120 kHz.		N/F = Noise Floor					

								Sheet1		
EUT:	Acom 1000		Test Site Services Inc					Date:	06/30/2000	
Spec	FCC Part 97		Data Sheet					Test No.	B00139	
								Test Eng.	T. Charron	
FUNDAMENTAL					HARMONIC					
Freq	Signal	Correction	Product		Freq*	Signal	Correction	Limit	Margin	
MHz	Strength	Factor	Level		MHz	Strength	Factor			
	dBuV	dB	dBuV			dBuV	dB	dBuV	dB	
21.225	85.5	81.1	166.6							
			0.0	f ₂	42.450	23.5	81.6	166.6	-61.5	
			0.0	f ₃	63.675	8.7	81.9	166.6	-76.0	N/F
			0.0	f ₄	84.900	10.3	82.4	166.6	-73.9	N/F
			0.0	f ₅	106.125	9.6	82.8	166.6	-74.2	N/F
			0.0	f ₆	127.350	9.9	83	166.6	-73.7	N/F
			0.0	f ₇	148.575	9.7	83.2	166.6	-73.7	N/F
			0.0	f ₈	169.800	10.6	83.5	166.6	-72.5	N/F
			0.0	f ₉	191.025	10.1	83.6	166.6	-72.9	N/F
			0.0	f ₁₀	212.250	9.6	83.9	166.6	-73.1	N/F
* = Receiver BW = 9 kHz				Receiver BW = 120 kHz.				N/F = Noise Floor		

[illegible]

EUT:	Acom 1000				Test Site Services Inc				Date:	06/30/2000		
Driven to Full Power	Tolerance -0+ 0.3dB				Data Sheet				Test Eng.	K. Raymond		
Freq	Coupler A	CH "A"	Amp Input	Amp Input	Coax 1	Atten B	Tolerance -0+ 0.5dB	CH "B"	Amp Output	Amp Output	Gain	
MHz	dB	dBm	dBm	Watts	dB	dB	Coupler B	dBm	dBm	Watts	dB	
1.900	40	8.5	48.5	71	0.05	30	30	-0.55	59.5	891	11	
3.750	40	8.4	48.4	69	0.05	30	30	-0.44	59.61	914	11.21	
7.150	40	8.49	48.49	71	0.05	30	30	-0.58	59.47	885	10.98	
10.125	40	8.67	48.67	74	0.05	30	30	-0.36	59.69	931	11.02	
14.175	40	8.77	48.77	75	0	30	30	-0.51	59.49	889	10.72	
18.118	40	8.7	48.7	74	0.1	30	30	-0.65	59.45	881	10.75	
21.225	40	8.7	48.7	74	0.1	30	30	-0.7	59.4	871	10.7	
52.000	40	5.42	45.42	35	0.1	30	30	-2.8	57.3	537	11.88	
Amplifier	Unlocked											
24.930	40	8.2	48.2	66	0.1	30	30	-0.92	59.18	828	10.98	
28.500	40	8.38	48.38	69	0.1	30	30	-0.95	59.15	822	10.77	
Driven with < 50 Watts	Tolerance -0+ 0.3dB				Tolerance -0+ 0.5dB				Tolerance -0.05+ 0.85dB			
Freq	Coupler A	CH "A"	Amp Input	Amp Input	Coax 1	Atten B	Coupler B	CH "B"	Amp Output	Amp Output	Gain	
MHz	dB	dBm	dBm	Watts	dB	dB	dB	dBm	dBm	Watts	dB	
1.900	40	5.17	45.17	33	0.05	30	30	-4.16	55.89	388	10.72	
3.750	40	4.6	44.6	29	0.05	30	30	-4.17	55.88	387	11.28	
7.150	40	4.39	44.39	27	0.05	30	30	-5.32	54.73	297	10.34	
10.125	40	4.38	44.38	27	0.05	30	30	-4.59	55.46	352	11.08	
14.175	40	4.3	44.3	27	0	30	30	-4.57	55.43	349	11.13	
18.118	40	4.29	44.29	27	0.1	30	30	-5.53	54.57	286	10.28	
21.225	40	4.36	44.36	27	0.1	30	30	-4.27	55.83	383	11.47	
52.000	40	4.84	44.84	30	0.1	30	30	-2.87	57.23	528	12.39	
24.930	40	4.35	44.35	27	0.1	30	30	-5.47	54.63	290	10.28	
28.500	40	4.45	44.45	28	0.1	30	30	-4.73	55.37	344	10.92	
Amplifier	Locked	in Stand-by										
24.930	40	9.59	49.59	91	0.1	30	30	-10.47	49.63	92	0.04	
28.500	40	9.65	49.65	92	0.1	30	30	-10.42	49.68	93	0.03	
Amplifier	Locked	Amplifier on										
24.930	40	9.62	49.62	92	0.1	30	30	-48.3	11.8	0	-37.82	
28.500	40	9.66	49.66	92	0.1	30	30	-39.82	20.28	0	-29.38	
Amplifier displays 0 dB gain between 24 - 35 MHz. In standby mode												
Amplifier displays negative gain between 24 - 35 MHz. With Amplifier on in locked mode												
Amplifier displays protect message on front panel display in locked mode												
Amplifier lock is internal mechanical device												

Appendix B

MEASUREMENT FACILITIES INFORMATION

DESCRIPTION of MEASUREMENT FACILITIES

The Open Area Test Site (OATS) is composed of a building and associated ground screen with a control room underneath.

The building is a TUFF-SPAN enclosure constructed of fiberglass reinforced plastic materials which provide above-ground weather protection. These materials are non conductive, non magnetic and RF transparent. They do not impact the surrounding electromagnetic environment and are corrosion resistant. The enclosure size permits Ten Meter Radiated Measurements within its confines and utilizes a remote controlled Macton Turntable Assembly. The conductive turntable is 16 feet in diameter and capable of moving a 10,000 pound load a full 360 degrees of rotation. It is flush-mounted to the ground screen and edge bonded circumferentially to the ground screen with beryllium copper "fingers". The ground screen is constructed of welded wire mesh lying directly on top of a concrete-over-steel foundation. The screen is extended beyond the building itself to provide 30 meter measurement capability when needed. There are no reflecting objects within the required obstruction free oval area.

The control room is located beneath the ground screen level with stairwell access to the ground plane area. An elevator is located beyond the ground screen and provides access to the control room, shipping dock and ground screen areas for large sized EUT's. Primary power cabling to the EUT is fed through a hole in the center of the table along with necessary EUT/Support Equipment interface cabling. A remote controlled EMCO Antenna Mast Assembly is located on the ground screen. It provides the operator with adjustable antenna height over the 1 meter through 4 meter range as well as allowing both horizontal and vertical polarizations at any height.

A conducted emissions measurement area is located in a shielded room and consists of a conductive (galvanized sheet metal) wall 20' wide x 8' high with a metal floor bonded to the wall. AC Power is supplied through receptacles located on the vertical wall. Each receptacle is adequately filtered using Shielded Room EMI Power Line Filters (Rayproof 1B42 Units) which provide 100 db attenuation over the 14KHz to 10GHz frequency range. The shielded room itself is bonded directly to earth ground.

Additionally, both the control room/shielded rooms and ground plane area have heating, air conditioning and relative humidity controlled environments.

Capability

Test Site Service's open area Test Sites have been evaluated in accordance with ANSI C63.4 procedures and found to be in compliance with ANSI C63.4-(1992) Site Attenuation and LISN requirements.

In addition, Test Site Services is Assessed and Approved annually by a European Competent Body to assure competence in testing products for CE Mark Compliance (Emissions and Immunity).

All of Test Site Service's measurement facilities meet the technical requirements for qualification testing of products to FCC, CISPR, IEC, VCCI, BSMI and other International Standards.

Accreditation / Approval

- FCC Registered
- VCCI Registered
- BSMI Accreditation
- NVLAP Accredited
- AUSTEL Listed
- New Zealand Approved (Ministry of Commerce)
- Competent Body Assessment / Approval (Technology International, UK)
- Competent Body Assessment / Approval (Nemko AS, Norway)
- Sub-Accredited by Hewlett Packard (Mass. Medical Environmental Test Lab.)
- NARTE certified EMC Engineers and Technicians.