TEST REPORT ON
AUDIO LTD.

Microphone Type HXIR

FCC Authorization Procedures
Part 2 subpart J and part 74

TEST REPORT NUMBER
CTMS 2001/1128a
March 2001

Prepared for:

Audio Ltd.
Audio House
Progress Road
High Wycombe
Bucks. HP12 4JD
England

The results in this report refer to the tested unit only

Certificate of Application

Cambridge Test and Measurement Services Ltd., certifies that the product tested was fully compliant with the requirements of Parts 2 & 74 of the FCC Code of Regulations 47CFR, the results of which are contained in this test report No: CTMS 2001/1128a

I certify that the application was prepared under my supervision and that to the best of my knowledge and belief, the facts set forth in this application and technical data, are true and correct.

Signature :

Date :

Name : David Fisher

Title : Radio Technical Manager

General Test Information

Date Test Sample Received	:	20th March 2001
Date Testing Started	:	20th March 2001
Date Testing Finished	:	27th March 2001
Equipment Serial Number	:	13160-05
CTMS Project Number	:	2001/1128a
Test Engineer	:	K. D. Barker

Report Copy No 1

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2.1033 **Application for Certification**

For use in accordance with FCC Rules and Regulations 47 CFR parts 2 and parts 74.

2.1033 (c) (1)	Name of applicant	:	Audio Ltd.
	Address of applicant	:	Audio House, Progress Road, High Wycombe, Bucks. HP12 4JD
	Contact	:	Mr. Kishore Patel
2.1033 (c) (2)	FCC Identifier	:	NRKHXIR
	Model Type Number	:	HXIR
2.1033 (c) (3)	Installation and operating instructions	:	See attachments.
2.1033 (c) (4)	Type(s) of emission	:	Frequency Modulated 200KF3E
2.1033 (c) (5)	Frequency range	:	683.10 - 706.90 MHz
2.1033 (c) (6)	Output power range	:	10 mW
2.1033 (c) (7)	Maximum power rating (part 74)	:	250 mW
2.1033 (c) (8)	dc voltage applied to power amplifier	:	3.0 V
	dc current to power amplifier	:	N/A
2.1033 (c) (9)	Tune-up procedure for RF power	:	See attachments.
2.1033 (c) (10)	Schematic and description of circuit	:	See attachments.
2.1033 (c) (11)	Photograph of identification plate / label	:	See attachments.
2.1033 (c) (12)	Photographs of equipment	:	See page 19
2.1033 (c) (14)	Measurement data	:	This report

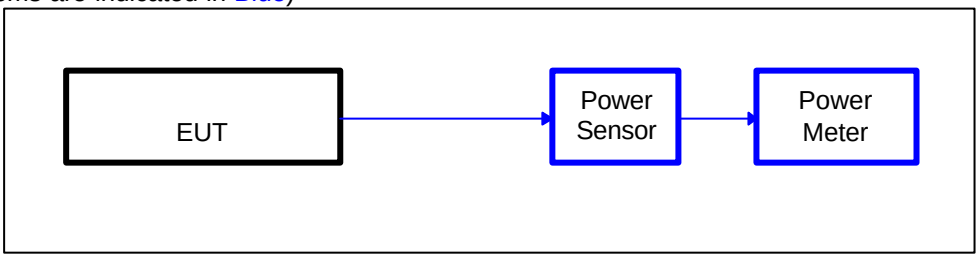
47 CFR Part 2.1033 (c) (14) MEASUREMENT DATA.

RF Power Output at terminals - 47 CFR 2.1046

The transmitter is operated under standard test conditions, using the standard test voltage from a single AA internal battery. The transmitter is fitted with a temporary 50 ohm antenna socket to allow conducted measurements to be made. The transmitter, tuned by the manufacturer in accordance with the stated procedure, was keyed in an unmodulated condition and the output was connected to a RF Power Meter via a matching Power Sensor. The RF Power Output was observed and recorded.

The RF Power Output was measured in accordance with the following test configuration, using the test instruments listed, on the lower, mid and upper frequencies of the switching range.

(Calibrated items are indicated in Blue)



Ambient Conditions. Temperature = 25ºC Relative Humidity = 24 %

Test instruments used :

RF Power Meter : Hewlett Packard Type HP 435B, S/N 2005A03070.
RF Power Sensor : Hewlett Packard Type HP 8481B, S/N 1801A01640

Results in accordance with Part 2.1046 and 74.861. e.(1) Unmodulated Power

TRANSMITTER POWER (mWatts)		
683.10 MHz	695.00 MHz	706.90 MHz
9.8 mW	6.32 mW	3.8 mW

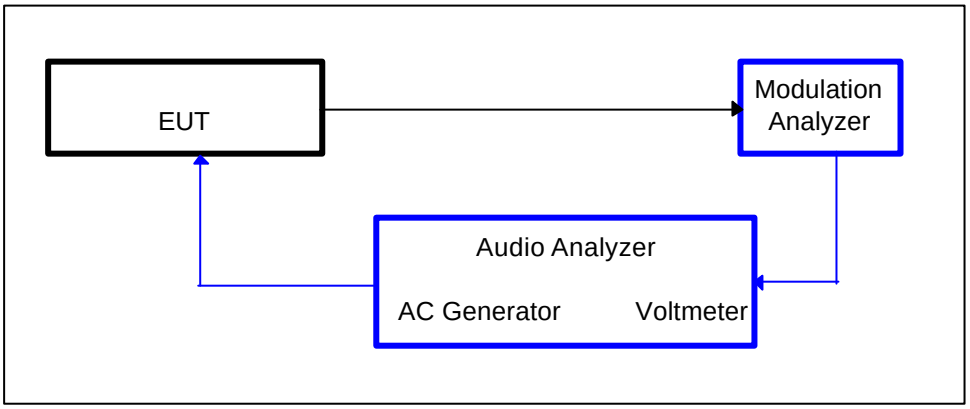
LIMIT in 74.861 (e) (1) (ii)	250 mW

Modulation Characteristics - 47 CFR 2.1047 (a)

The transmitter is operated under standard test conditions and the output monitored with a modulation analyzer of normal impedance matching that of the transmitter. A test signal of 1000Hz sine wave is applied to the normal input of the modulation circuit via a dummy capsule to the audio processing circuits, the level adjusted to give ±20kHz deviation. Ensuring the audio input level is maintained constant, the modulation frequency is varied from 50Hz to 25,000Hz. The variation in the depth of modulation is observed and recorded.

The modulation characteristic was measured in accordance with the following test configuration, using the test instruments listed.

(Calibrated items are indicated in Blue)

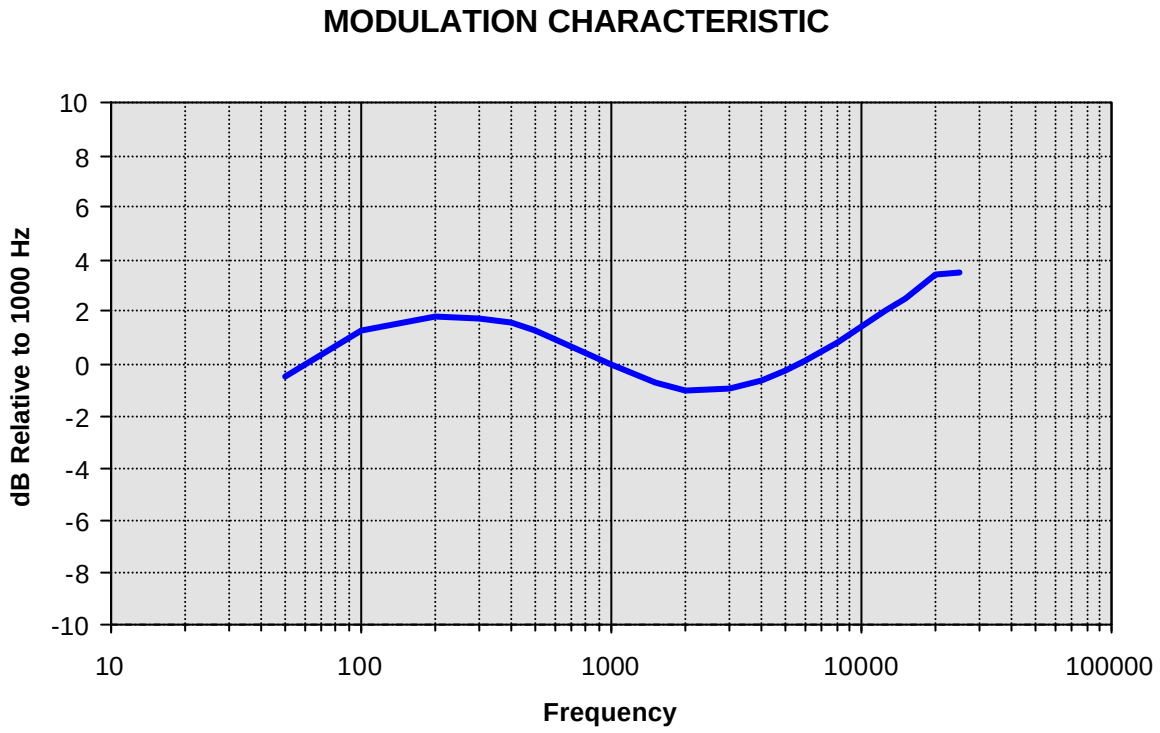


Ambient Conditions. Temperature = 25ºC Relative Humidity = 24 %

Test instruments used :

Audio Analyzer : Hewlett Packard Audio Analyzer Type HP 8903B, S/N2836A05420
Modulation Analyzer : Hewlett Packard Mod Analyzer Type HP 8901B, S/N2642A01009

Results in accordance with Part 2.1047(a) and 74.681 (e) (3) Modulation Characteristic.



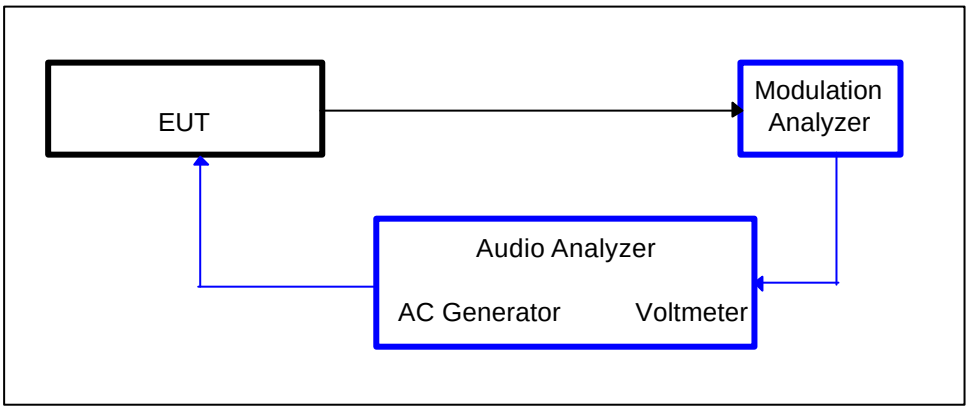
Modulation Limiting Characteristics - 47 CFR 2.1047 (b)

The transmitter is operated under standard test conditions and the output monitored with a modulation analyzer of normal impedance matching that of the transmitter. A test signal of 1000Hz sine wave is applied to the normal input of the modulation circuit via a dummy capsule to the audio processing circuits, the input level is varied between -50dBm to +0dBm and the variation in the frequency deviation is observed and recorded.

The test was repeated with the test modulation frequencies of 300Hz and 15000Hz.

The modulation limiting characteristic was measured in accordance with the following test configuration, using the test instruments listed.

(Calibrated items are indicated in Blue)



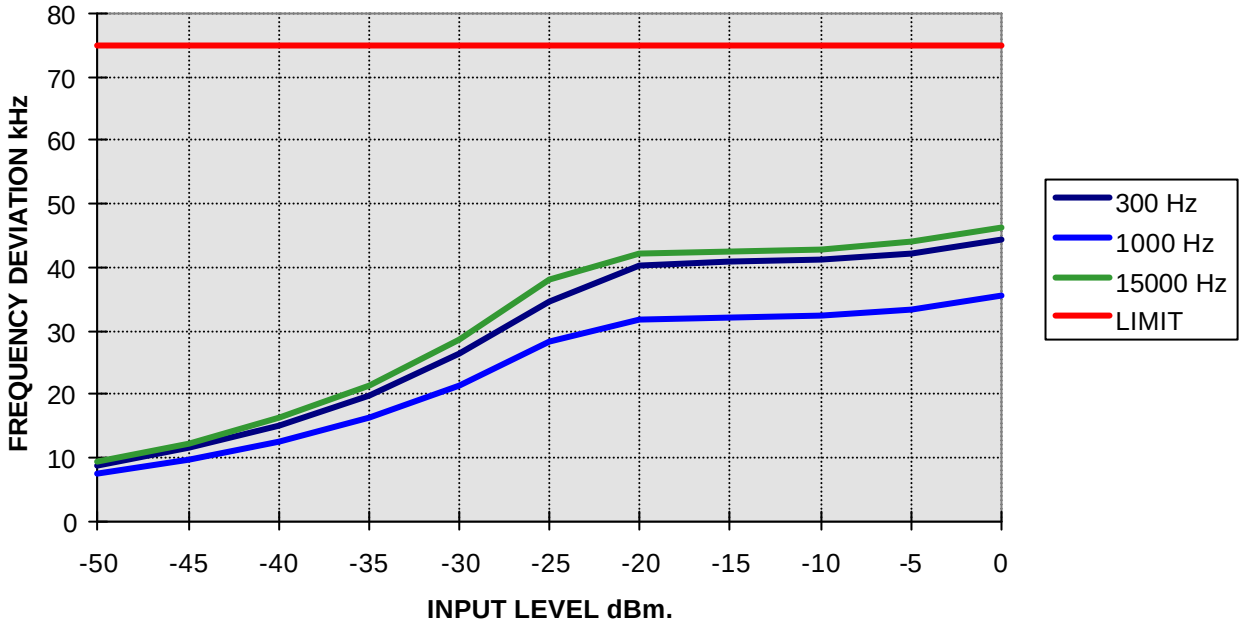
Ambient Conditions. Temperature = 25ºC Relative Humidity = 30 %

Test instruments used :

Audio Analyzer : Hewlett Packard Audio Analyzer Type HP 8903B, S/N2836A05420
Modulation Analyzer : Hewlett Packard Mod Analyzer Type HP 8901B, S/N2642A01009

Results in accordance with Part 2.1047 (b) and 74.861 (e)
Modulation Limiter Requirements.

Modulation Limiting Characteristic.



LIMIT in 74.861 (e) (3)	Maximum Deviation 75 kHz

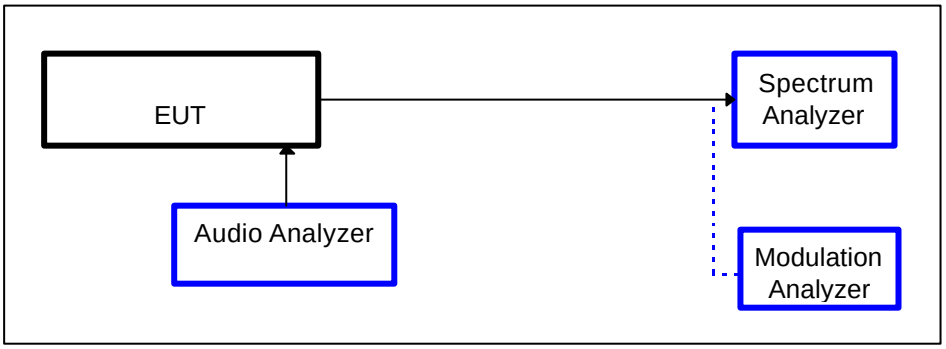
Occupied Bandwidth - 47 CFR 2.1049 (e)

The transmitter is operated under standard test conditions. A test signal of 15000Hz sine wave is applied to the normal input to the modulation circuit, via a dummy capsule to the audio processing circuits, the input level is at a level of +16dB above that which produces a modulation depth of 25 kHz deviation.

The output of the transmitter is connected to a spectrum analyzer of normal impedance matching that of the transmitter. The occupied bandwidth is observed and recorded.

The occupied bandwidth was measured in accordance with the following test configuration, using the test instruments listed.

(Calibrated items are indicated in Blue)

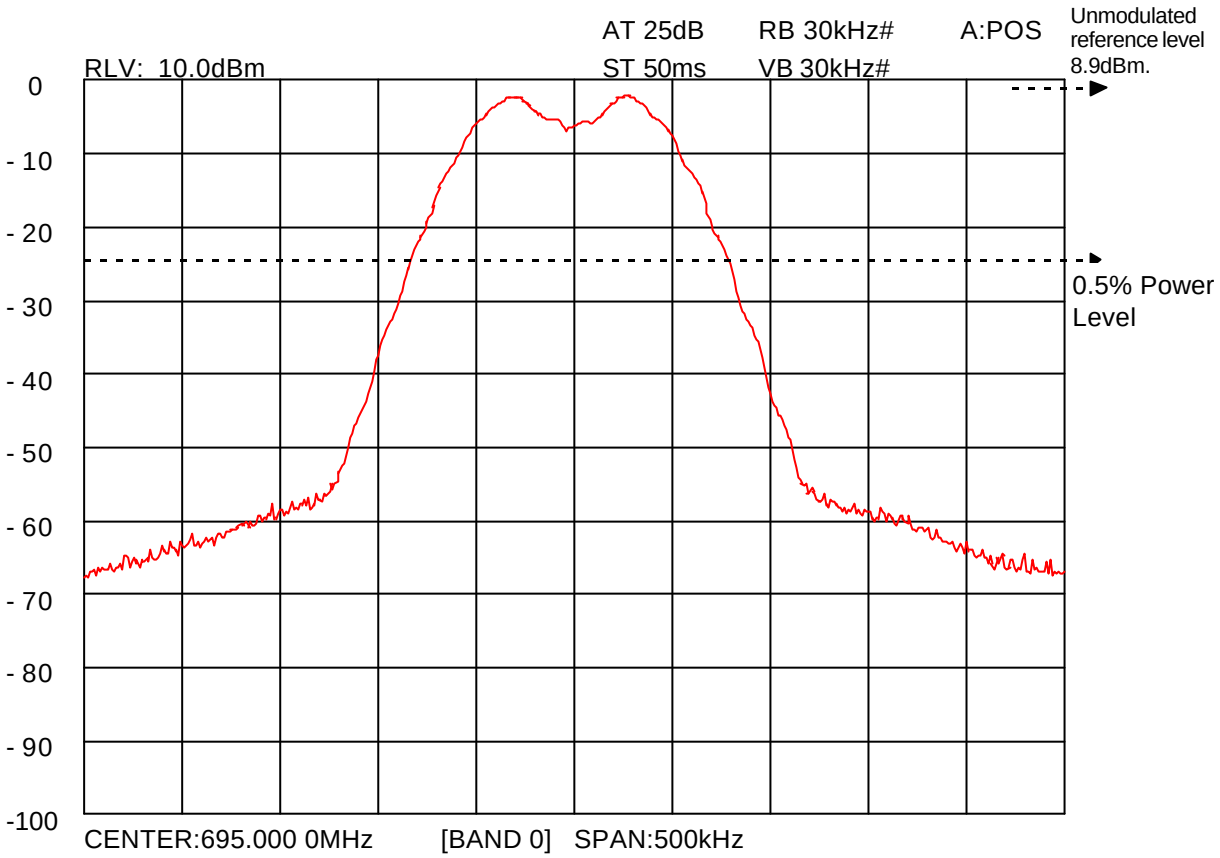


Ambient Conditions. Temperature = 25ºC Relative Humidity = 30 %

Test instruments used :

Audio Analyzer : Hewlett Packard Audio Analyzer Type HP 8903B S/N2836A05420
Modulation Analyzer : Hewlett Packard Mod Analyzer Type HP 8901B S/N2642A01009
Spectrum Analyzer : Anritsu Type MS 2602A S/N MT88057

Results in accordance with Part 2.1049 and 74.861 (e) (5).



Frequency of lower -23dB point	694.916 Mhz
Frequency of higher -23dB point	695.079 MHz
Measured Occupied Bandwidth	163 kHz
Occupied Bandwidth Limit	200 kHz

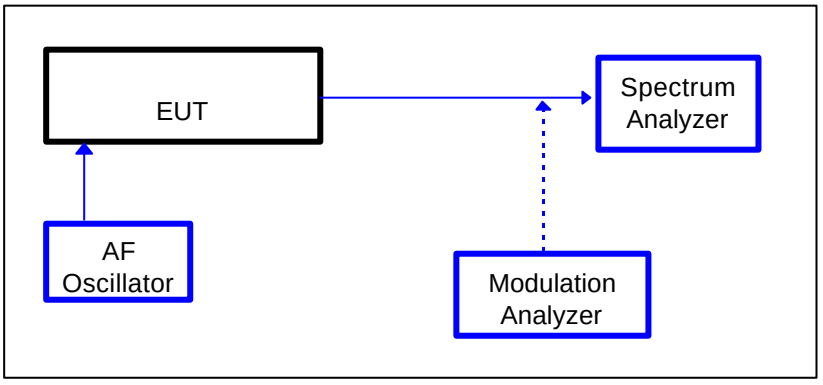
Spurious emissions at antenna terminals - 47 CFR 2.1051

The transmitter is operated under standard test conditions. The transmitter was modulated with normal test modulation being a sine wave of 15000Hz and a modulation depth of 50%. The output of the transmitter was connected to a spectrum analyzer of normal impedance matching that of the transmitter. The spurious emissions, including harmonics of the fundamental carrier frequency, were observed.

A carrier notch filter was not necessary when the attenuator of the spectrum analyzer was adjusted to ensure the spectrum analyzer was not overloaded and maintaining linearity. The spurious emissions, including harmonics of the fundamental carrier frequency, were measured and recorded.

The responses found on the wide band scan of the spectrum analyzer were analysed in detail to determine correct power level. The level on the spectrum analyzer was recorded as being the level of the spurious emission.

(Calibrated items are indicated in Blue)



Ambient Conditions. Temperature = 25ºC Relative Humidity = 30 %

Test instruments used :

Audio Analyzer : Hewlett Packard Audio Analyzer Type HP 8903B S/N2836A05420
Modulation Analyzer : Hewlett Packard Mod Analyzer Type HP 8901B S/N2642A01009
Spectrum Analyzer : Anritsu Type MS 2602A S/N MT88057

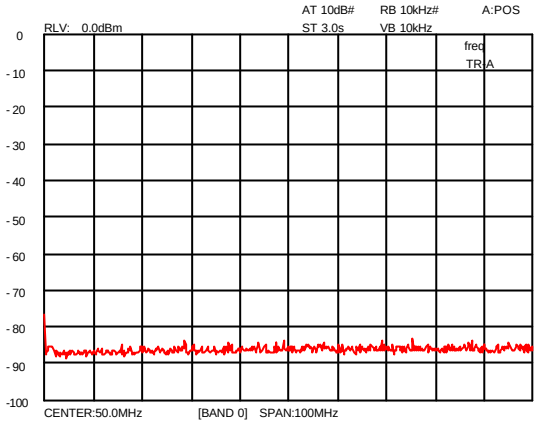
Results in accordance with Part 2.1051 and 74.861 (6) Emission Limits

Note: Emissions 20dB below limit are not required to be listed

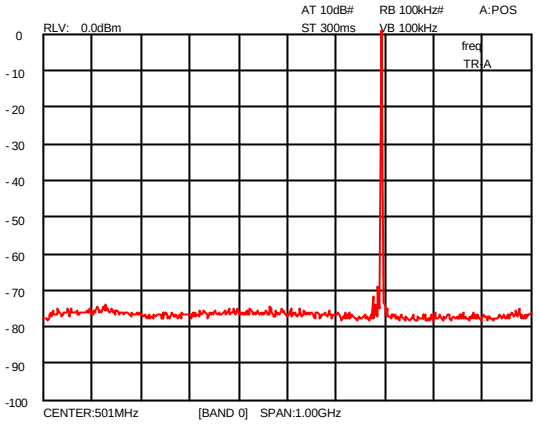
Carrier Frequency (Fc) : 695.00 MHz

		Absolute Level	Level dB w.r.t limit of 43+10 log power	
Frequency	**Identity**	**dBm**	**dBc**	**Remarks**
(MHz)		**limit - 13**	**limit - 21**	
1390	2Fc	-56.0dBm	-64.0dBc	All greater than
2085	3FC	-62.0dBm	-70.0dBc	20dB within
2780	4Fc	-57.0dBm	-65.0dBc	Specification
3475	5Fc	-68.0dBm	-76.0dBc	Limit.
4170	6Fc	-63.5dBm	-71.5dBc	
4865	7Fc	-63.0dBm	-71.0dBc	
5560	8Fc	-51.5dBm	-59.5dBc	
6255	9Fc	-49.5dBm	-57.5dBc	
6950	10Fc	-66.0dBm	-74.0dBc	

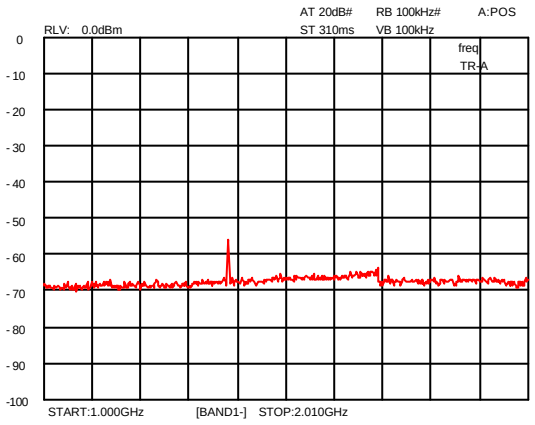
Plots of Spectrum Scans.



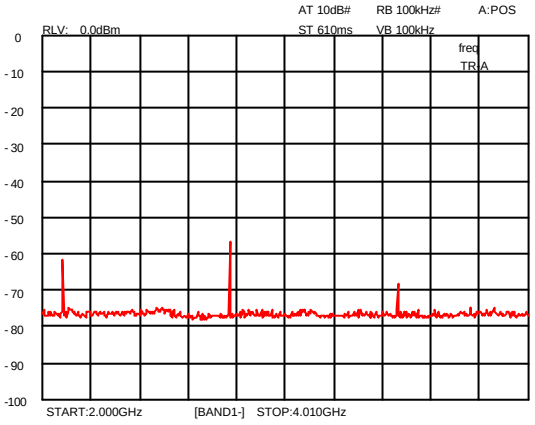
0 - 100MHz Scan



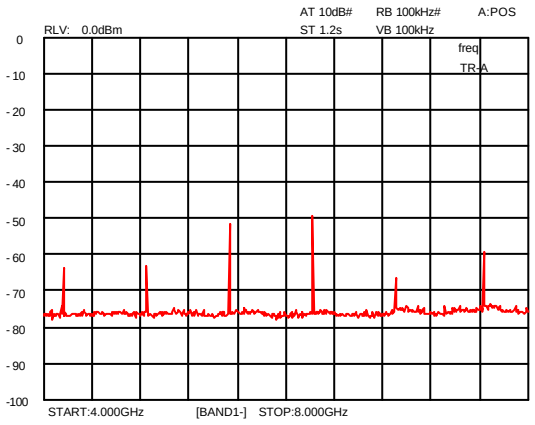
1 - 1001 MHz Scan



1.00 - 2.01 GHz Scan



2.00 - 4.01 GHz Scan



4.00 - 8.00 GHz Scan

Frequency Stability - 47 CFR 2.1055 (a) (1) (d) (2)

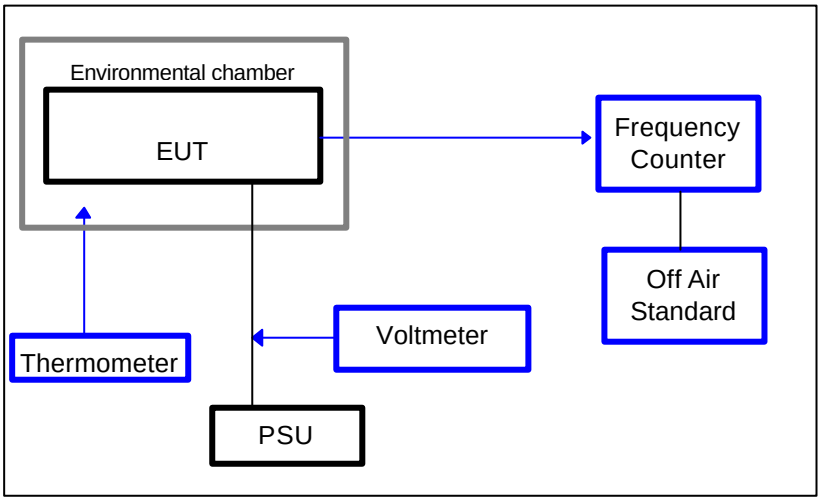
The transmitter is operated under standard test conditions, using the standard test voltage, the transmitter, tuned in accordance with the procedure described in the accompanying documentation, was keyed in an unmodulated condition and the output was connected to a RF Frequency Counter via an attenuator of normal impedance matching that of the transmitter.

The temperature was measured over the range of -30° C to + 50 ° C in steps of 10°

The Frequency drift of the EUT was observed and recorded.

The frequency drift was measured in accordance with the following test configuration, using the test instruments listed.

(Calibrated items are indicated in Blue)



The attenuator was at the nominal impedance of the transmitter.

Test instruments used :

RF Frequency Counter : H. P. Modulation Analyzer Type HP 8901B, S/N2642A01009
Off Air Standard : Quartzlock Type 2A S/N41125
Climatic Chamber : Heraeus Votsch Type VMT/04/30 S/N 24558
Thermometer : R S Type 206-3722, S/N 831016600
Voltmeter : Hewlett Packard Type HP34401A S/N US36090783.
Power Supply Unit : Kingshill Type18V10C S/N 561

Ambient Conditions. Temperature = 23ºC Relative Humidity = 35 %

Results in accordance with Part 2.1053 (a) (1) (d) (2) and 74.861 (e) (4)
Frequency Stability.

Temperature °C	Tx Frequency MHz normal Volts = 1.5 V	Tx Frequency MHz low Volts = 1.0 V
-30	695.002529	695.002520
-20	695.005544	695.005547
-10	695.006705	695.006702
0	695.006464	695.006460
+10	695.005153	695.005139
+20	695.002749	695.002796
+30	695.000647	695.000606
+40	694.997682	694.997641
+50	694.995102	694.995097

Frequency Error	kHz
Minimum	4.910
Maximum	6.705
Limit specified in 74.681.(e) (4)	34.75

Frequency spectrum to be investigated - 47 CFR 2.1057

The level of frequency search was from the lowest radio frequency generated to the 10th Harmonic of the fundamental frequency, the highest carrier frequency.

General Information and Attachments.

Equipment Under Test (EUT).

The EUT is a hand held Microphone containing a battery powered transmitter designed to operate as a low powered auxiliary station in the frequency band allocated to “Auxiliary Broadcasting”.

The FCC technical requirements for this equipment are specified in CFR 47 part 74 subpart H.

Primary Supply Voltage : 1.5 V Alkaline AA Cell.

Battery end point Voltage : 1.0 V

Transmitter can be switched on locally and all other control is via a infra red link remote control unit.

The Transmitter is programmed on three channels at the top, middle and bottom of the band, (706.90, 695.00 and 683.10 MHz).

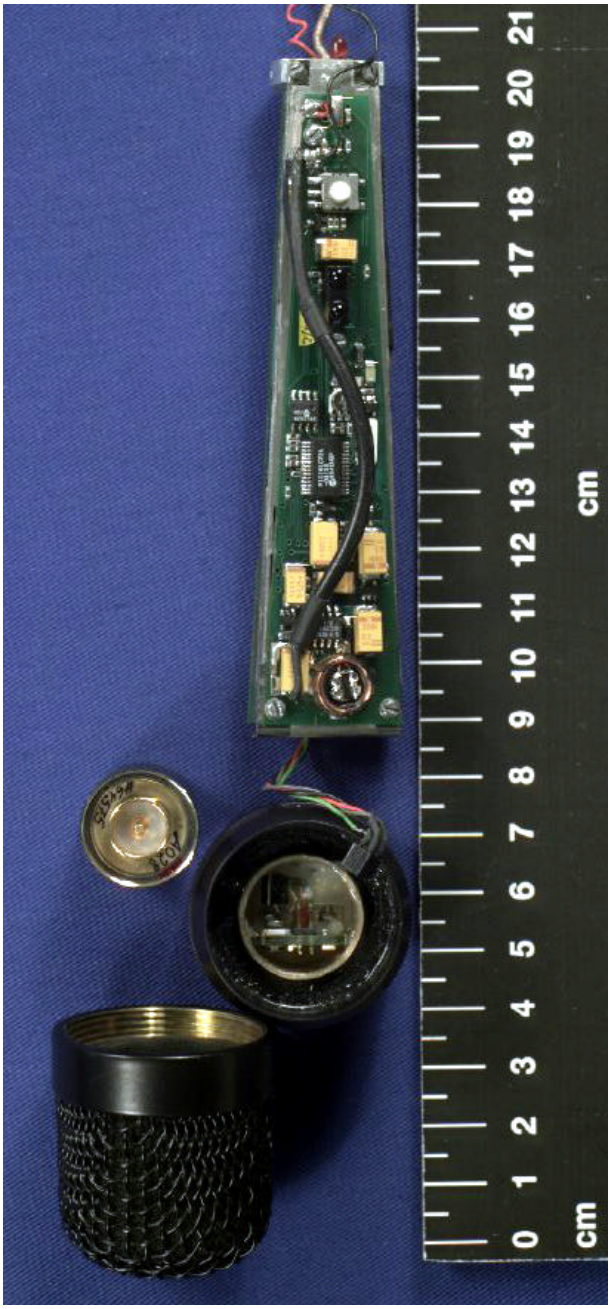
The EUT Power Amplifier was fitted with a temporary 50 ohm output cable in place of the internal antenna, to enable conducted measurements to be performed.

For the power and emissions tests a dummy (deaf) capsule was fitted to the microphone to give an unmodulated signal.

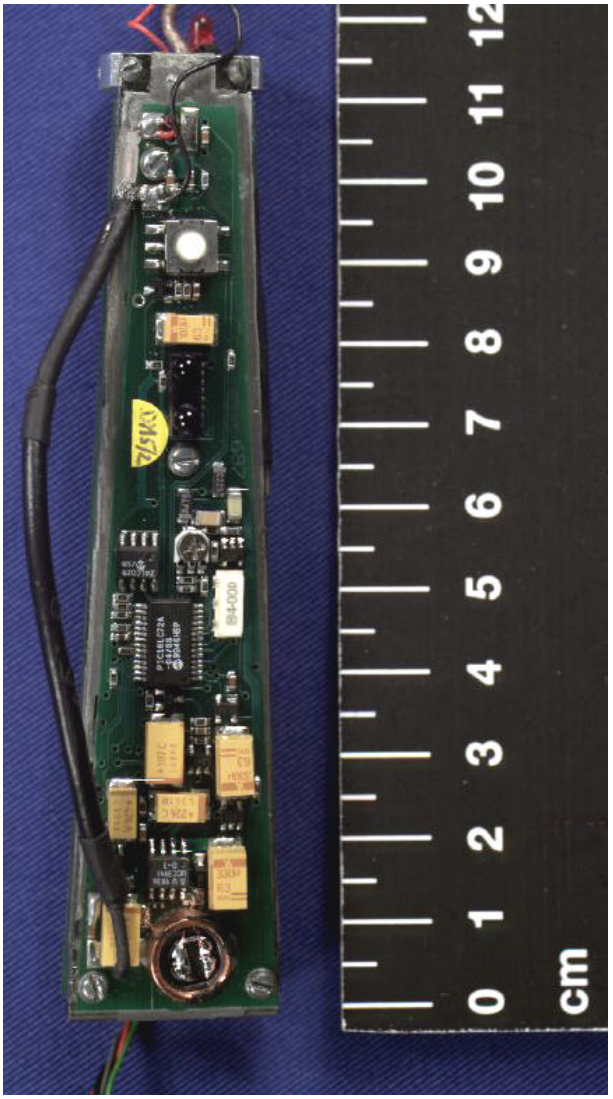
PHOTOGRAPHS OF EQUIPMENT

Microphone Front View, without battery cover

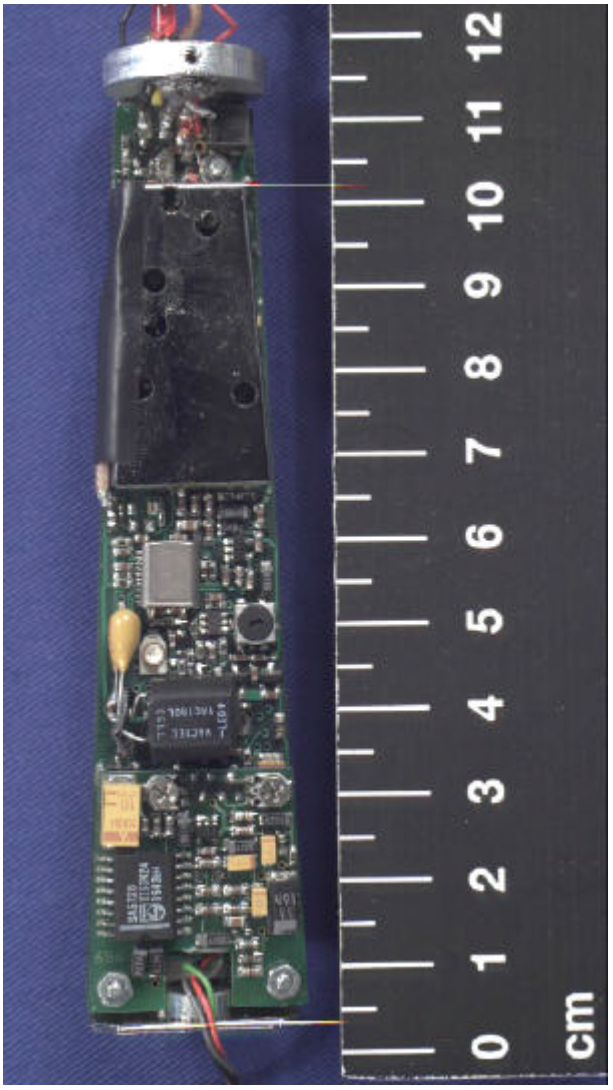
Microphone Internal View with head assembly



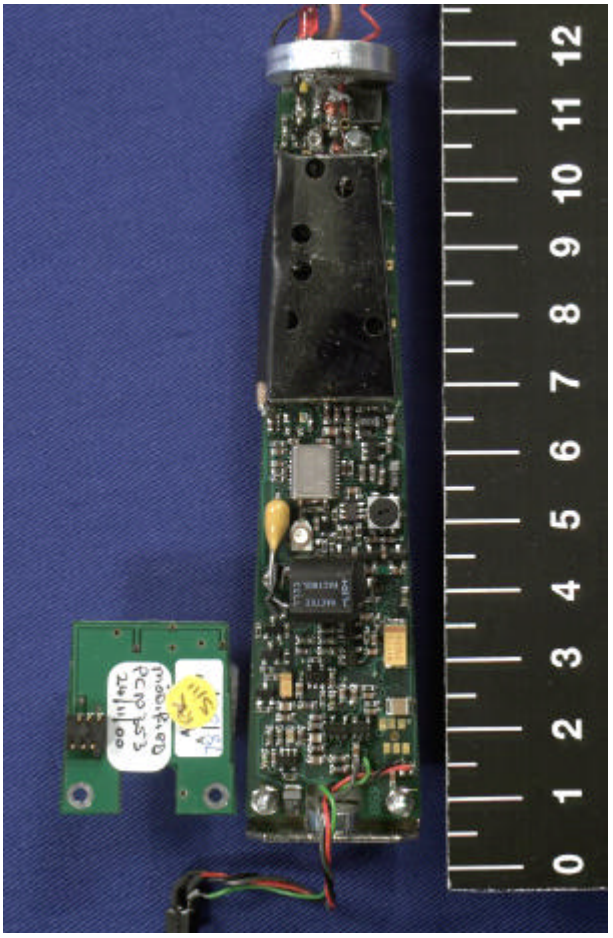
Power and processor PCB components



RF and Audio PCB components



RF and Audio PCB with Compander removed



CTMS LTD, Company Accreditation's & Credentials

United Kingdom Accreditation Service

ACCREDITATION CERTIFICATE

TESTING LABORATORY
No. 1831

Cambridge Test and Measurement Services Ltd
PO Box 465
St Andrews Road
Cambridge
CB4 1ZJ

is accredited to undertake tests as detailed in the schedule bearing the accreditation number above. From time to time this schedule may be revised and reissued by the United Kingdom Accreditation Service.

This Accreditation shall remain in force until the expiry date printed below, subject to continuing compliance with United Kingdom Accreditation Service requirements. Accredited organisations meet the requirements of EN 45001, ISO/IEC Guide 25 and the relevant requirements of the BS EN ISO 9000 series of standards, including those of the model described in BS EN ISO 9002 when acting as suppliers producing test results.

Initial Accreditation 11 June 1997

Accreditation Manager, United Kingdom Accreditation Service

This certificate issued on 16 June 2000 **Expiry date 31 May 2001**

The Department of Trade and Industry (DTI) has entered into a memorandum of understanding with the United Kingdom Accreditation Service (UKAS) through which UKAS is recognised as the national body responsible for assessing and accrediting the competence of organisations in the fields of measurement, testing, inspection and certification of systems, products and personnel.

SGS Yarsley
International Certification Services Limited

Certificate Number

Q10171

This is to certify that the Quality Management systems of

Cambridge Test and Measurement Services Limited

have been assessed and registered as meeting the requirements of ISO 9002

The scope of registration is detailed on the Assessment Schedule bearing this certificate number.

SGS Yarsley International Certification Services Ltd
Signed by

30 June 1997

This certificate remains valid subject to satisfactory maintenance of the system

Registered Office:
SGS Yarsley
International Certification Services Limited
SGS House, 217/221 London Road,
Camberley, Surrey GU15 3EY, United Kingdom.

NATIONAL ACCREDITATION OF CERTIFICATION BODIES
Registration Number
005

United Kingdom Accreditation Service

TESTING LABORATORY
No. 1831

SCHEDULE

UKAS TESTING

Testing Performed at Permanent Laboratory

Address of permanent laboratory	Laboratory contact: Mr D Fisher
Cambridge Test & Measurement Services Ltd PO Box 465 St Andrews Road Cambridge CB4 1ZJ	Telephone: +44 (0) 1223 876876 Fax: +44 (0) 1223 876851 EMail: Issue No: 7 Date: 16 June 2000

Materials/Products Tested	Type of Test/Properties Measured Range of Measurement	Standard Specifications Equipment/Techniques Used
Computers and peripherals Domestic appliances Electrical/Electronic components Electrical/Electronic products Telecommunications equipment IT equipment Pager and pager devices Mobile/Portable radio - PMR PMR and ancillary equipment Fixed/Link PMR equipment Low power devices	**1 EMC TESTS** 1.1 Conducted Emissions 150 kHz to 30 MHz	EN 55011:1997 EN 55014:1993 Discontinuous emissions EN 55022:1994 CISPR 14-1:1997 Disturbance power CISPR 22:1993 FCC Part 15:1996 ANSI C63.4:1992
	1.2 Radiated Emissions - Electric Field 30 MHz to 1 GHz	EN 55011:1997 EN 55022:1994 CISPR 22:1993 FCC Part 15:1996 ANSI C63.4:1992
	1.3 Mains Harmonics and Flicker	EN 61000-3-2:1995 EN 61000-3-3:1995
	1.4 Discontinuous Emissions (Clicks): 10 kHz to 30 MHz	EN 55014-1:1997
	1.5 Power Absorbing Emissions Measurements (Power Clamp) 30 MHz to 300 MHz	EN 55014-1:1997
	Continued on Sheet 2	

United Kingdom Accreditation Service

TESTING LABORATORY No. 1831 **Testing Performed at Permanent Laboratory**	**SCHEDULE** Issue No: 7 Date: 16 June 2000

Materials/Products Tested	Type of Test/Properties Measured Range of Measurement	Standard Specifications Equipment/Techniques Used
As listed on Sheet 1	**1 EMC TESTS** (cont'd)	
	1.6 Electrostatic Discharge Up to 15 kV	IEC 801-2:1991 IEC 1000-4-2:1995 EN 61000-4-2:1995
	1.7 Radiated Immunity 80 MHz to 1000 MHz, 1.4 GHz to 2.0 GHz up to 10 V/m	IEC 1000-4-3:1995 EN 61000-4-3:1996 Including Amendment 1:1998 ENV 50140:1993 ENV 50204:1995
	1.8 Fast Transient and Burst Immunity	IEC 801-4:1988 IEC 1000-4-4:1995 EN 61000-4-4:1995 ISO 7637:Part 1:1990
	1.9 Surge Immunity	IEC 1000-4-5:1995 EN 61000-4-5:1995 ENV 50142:1994
	1.10 Conducted Radio Frequency Disturbance	IEC 61000-4-6:1996 EN 61000-4-6:1996 ENV 50141:1993
	1.1 Mains Dips and Interruptions	IEC 1000-4-11:1994 EN 61000-4-11:1994
	1.12 Magnetic Field Immunity	EN 61000-4-8:1994
	Continued on Sheet 3	

United Kingdom Accreditation Service

TESTING LABORATORY No. 1831 **Testing Performed at Permanent Laboratory**	**SCHEDULE** Issue No: 7 Date: 16 June 2000

Materials/Products Tested	Type of Test/Properties Measured Range of Measurement	Standard Specifications Equipment/Techniques Used
As listed on Sheet 1	**1 EMC TESTS** (cont'd) 1.13 EMC Tests These generic and product specific tests are included in this Schedule, but limited to those basic standards that are explicitly listed in Sections 1.1 to 1.10.	Generic and Product Standards EN 50081-1:1992 EN 50081-2:1994 EN 50082-1:1996 EN 50082-2:1996 EN 50130-4:1995 EN 50199:1995 EN 55024:1998 EN 60601-1-2:1993 EN 60945:1997 EN 61000-6-2:1999 EN 61326:1997 ETS 300 279:1995 ETS 300 329:1997 ETS 300 339:1994 ETS 300 340:1994 ETS 300 342-1:1997 ETS 300 445:1996 ETS 300 446:1997 ETS 300 680-1:1997 ETS 300 682:1997 ETS 300 683:1997 ETS 300 684:1997 ETS 300 717:1997 ETS 300 741:1998 ETS 300 826:1997 ETS 300 827:1998 AS/NZS 2064:1997 AS/NZS 3548:1995 AS/NZS 4251.1:1994
Fixed, Mobile, Portable radio equipment PMR and ancillary equipment Low power telemetry Low power telecommand Low power devices Maritime (VHF) Ship to shore Maritime (VHF) Shore stations	**2 RADIO TESTS** Frequency range: 9 kHz to 4 GHz Power Output up to 150 W Tests on Radio Transmitters 2.1 Frequency 2.2 RF Power, conducted and radiated 2.3 Modulation 2.4 Adjacent channel power Continued on Sheet 4	MPT 1250:1978 MPT 1251:1973 MPT 1305:1996 MPT 1308:1978 MPT 1312:1993 MPT 1314:1994 MPT 1325:1998 MPT 1328:1997 MPT 1329:1994

United Kingdom Accreditation Service

TESTING LABORATORY No. 1831 **Testing Performed at Permanent Laboratory**	**SCHEDULE** Issue No: 7 Date: 16 June 2000

Materials/Products Tested	Type of Test/Properties Measured Range of Measurement	Standard Specifications Equipment/Techniques Used
As listed on Sheet 3	**2 RADIO TESTS** (cont'd)	
	2.5 Spurious Emissions - conducted and radiated	MPT 1330:1994 MPT 1335:1993
	2.6 Transmitter intermodulation	MPT 1336:1992
	2.7 Transmitter transient behaviour	MPT 1338:1994
	2.8 Audio response	MPT 1340:1997
	2.9 Audio distortion	MPT 1344:1994 MPT 1345:1994
	Tests on Radio Receivers	MPT 1350:1994 MPT 1357:1996
	2.10 Sensitivity - SINAD	MPT 1360:1994
	2.11 Adjacent channel selectivity	MPT 1361:1994
	2.12 Receiver intermodulation	MPT 1365:1996
	2.13 Co-channel rejection	MPT 1374:1994
	2.14 Blocking performance	MPT 1382:1997
	2.15 Spurious emissions - conducted and radiated	MPT 1411:1993 MPT 1601:1993
	2.16 Audio response	ETS 300 086:1991
	2.17 Audio distortion	ETS 300 113:1995 ETS 300 135:1991 ETS 300 162:1998 ETS 300 219:1993 I-ETS 300 220:1992 I-ETS 300 296:1994 ETS 300 328:1996 ETS 300 330:1990 ETS 300 390:1996 ETS 300 341:1995 I-ETS 300 422:1995 ETS 300 440:1999 ETS 300 454:1995 ETS 300 676:1997 ETS 300 719-1:1996 EN 300 220-1:1997 EN 300 220-2:1997 EN 300 422:V1.2.1:1999 EN 301 178:1999 EN 301 357:V1.1.1:1999 EN 301 688:1999 AS 4268.2:1995 AS 4295:1995
	Continued on Sheet 5	

United Kingdom Accreditation Service

TESTING LABORATORY No. 1831 **Testing Performed at Permanent Laboratory**	**SCHEDULE** Issue No: 7 Date: 16 June 2000

Materials/Products Tested	Type of Test/Properties Measured Range of Measurement	Standard Specifications Equipment/Techniques Used
	Facilities: Open area test site: 3, 10 and 30 m Screened Room (Partially Lined RF Absorber) 6.4 m x 4.9 m x 2.8 m Screened Room (unlined) 3.7 m x 2.6 m x 2.5 m Screened Room (unlined) 3.0 m x 2.4 m x 2.4 m Environmental Chambers (various)	
	END	