CTMS Ltd.
3 Cardinal Park
Godmanchester
Huntingdon
Cambridgeshire
PE29 2XN

TEST REPORT ON
Park Air B3060V2

VHF/UHF AM/FM Transmitter

FCC Authorization Procedures
Part 2 subpart J and part 87

TEST REPORT NUMBER
CTMS 2001/2118A
January 2002

Prepared for:

Park Air Electronics Ltd.
Northfields,
Market Deeping,
Peterborough,
Lincolnshire
PE6 8UE

This 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 & 87 of the FCC Code of Regulations 47CFR, the results of which are contained in this test report No: CTMS 2001/2118A

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 : 10/01/02

Name : David Fisher

Title : Radio Technical Manager

General Test Information

Date Test Sample Received	:	6th November 2001
Date Testing Started	:	21st November 2001
Date Testing Finished	:	18th December 2001
Equipment Serial Number	:	1G2408
CTMS Project Number	:	2001/2118A
Test Engineer	:	M. Billis

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 87.

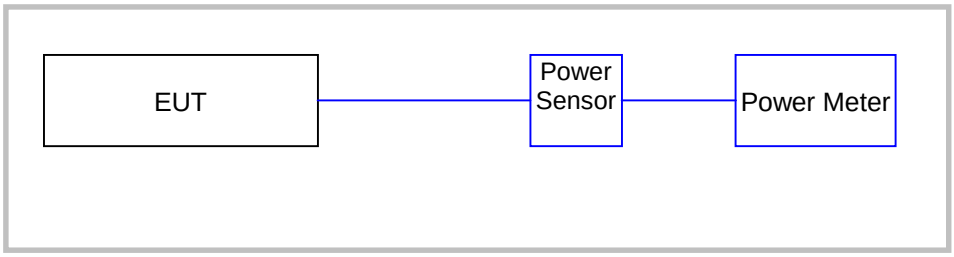
2.1033 (c) (1)	Name of applicant	:	Park Air Electronics Ltd.
	Address of applicant	:	Northfields, Market Deeping, Peterborough, Lincolnshire PE6 8UE
	Contact	:	Mr. A. Horsfield
2.1033 (c) (2)	FCC Identifier	:	C8L B3060V2
	Model Type Number	:	B3060V2
2.1033 (c) (3)	Installation and operating instructions	:	User Guide, see exhibit D
2.1033 (c) (4)	Type(s) of emission	:	Amplitude Modulation or Frequency Modulation (switchable)
2.1033 (c) (5)	Frequency range	:	100.000 -156.000 MHz (VHF) 225.000 - 400.000 MHz (UHF)
2.1033 (c) (6)	Output power range	:	50 W
2.1033 (c) (7)	Maximum power rating (part 87)	:	50 W
2.1033 (c) (8)	dc voltage applied to power amplifier	:	26.0 V
	dc current to power amplifier	:	16.0 A
2.1033 (c) (9)	Tune-up procedure for RF power	:	n/a
2.1033 (c) (10)	Schematic and description of circuit/devices for :		see exhibit D & E
	Stabilizing frequency	:	see exhibit D & E
	Suppression of spurious radiation	:	see exhibit D & E
	Limiting modulation	:	see exhibit D & E
	Limiting Power	:	see exhibit D & E
2.1033 (c) (11)	Photograph of identification plate / label	:	See exhibit ‘A’
2.1033 (c) (12)	Photographs of equipment	:	See pages 35 to 37

RF Power Output at Antenna terminals - 47 CFR 2.1046

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 Power Meter via an attenuator of normal impedance matching that of the transmitter. 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.

(Calibrated items are indicated in Blue)



Test instruments used :

RF Power Meter : Hewlett Packard Type HP 435B
RF Power Sensor : Hewlett Packard Type HP 8481B

Results in accordance with Part 2.1046 and 87.131 Power and emissions

RF Power Output at Antenna terminals - 47 CFR 2.1046

TRANSMITTER POWER (Watts) (VHF AM)		
100.000 MHz	127.000 MHz	155.975 MHz
41.5 W	40.0 W	41.0 W

TRANSMITTER POWER (Watts) (VHF FM)		
100.000 MHz	127.000 MHz	155.975 MHz
61.0 W	59.0 W	60.0 W

TRANSMITTER POWER (Watts) (UHF AM)		
225.000 MHz	310.000 MHz	399.975 MHz
39.0 W	38.0 W	36.0 W

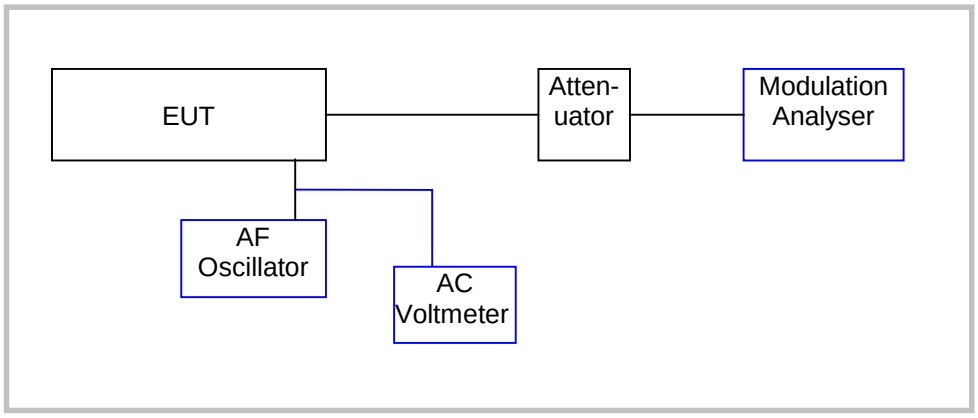
TRANSMITTER POWER (Watts) (UHF FM)		
225.000 MHz	310.000 MHz	399.975 MHz
57.0 W	56.0 W	53.0 W

Modulation Characteristic - 47 CFR 2.1047 (a)

The transmitter is operated under standard test conditions and the output monitored with a modulation analyzer via an attenuator of normal impedance matching that of the transmitter. A test signal of 1000Hz sine wave is applied to the normal input to the modulation circuit to the audio processing circuits, the level adjusted to give 50% depth of modulation / deviation. Ensuring the audio input level is maintained constant, the modulation frequency is varied from 100Hz to 10,000Hz. 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)



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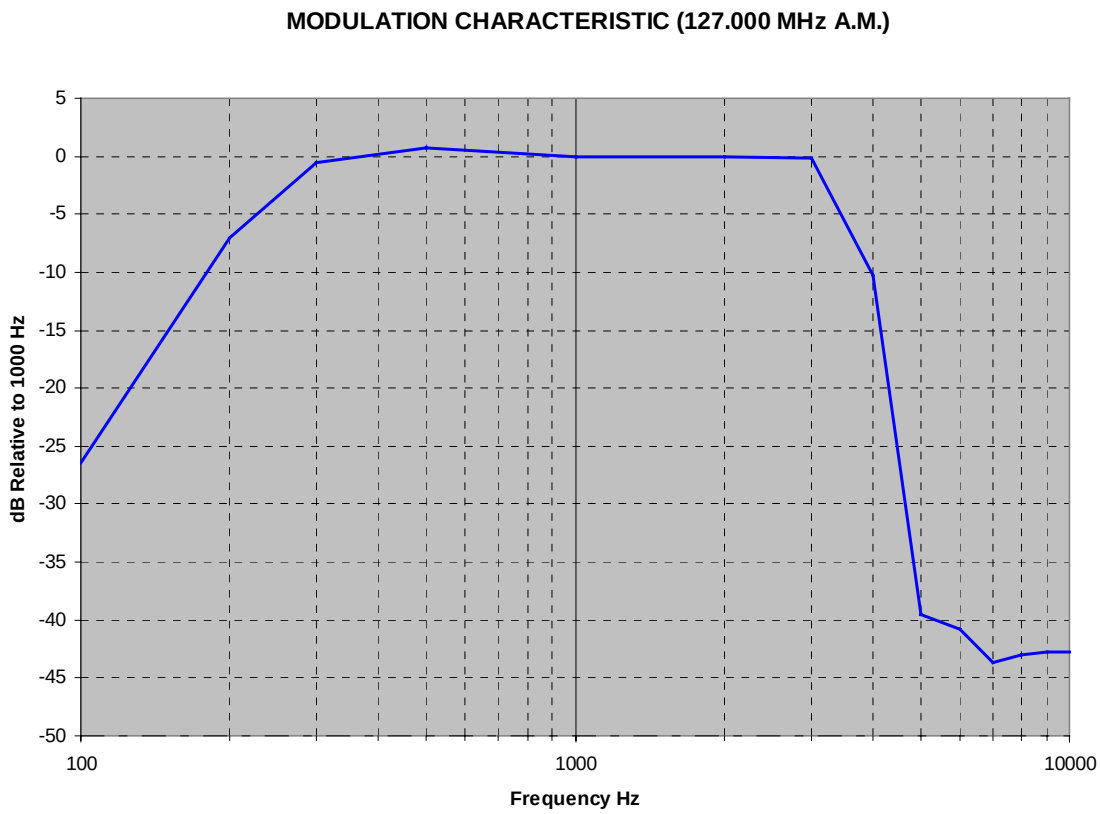
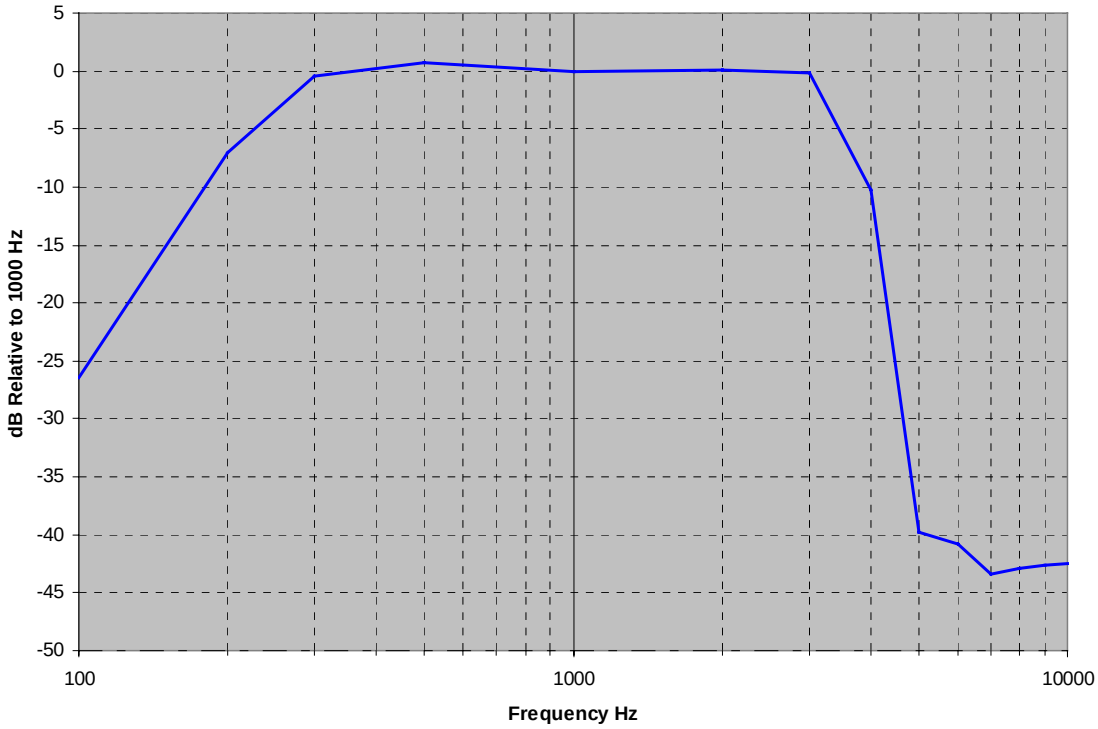
Test instruments used :

RF Attenuator	:	Bird 30dB, 100W Type 8323
AF Oscillator	:	Hewlett Packard Audio Analyser Type HP 8903B
AC Voltmeter	:	Hewlett Packard Audio Analyser Type HP 8903B
Modulation Analyzer	:	Hewlett Packard Modulation Analyser Type HP 8901B

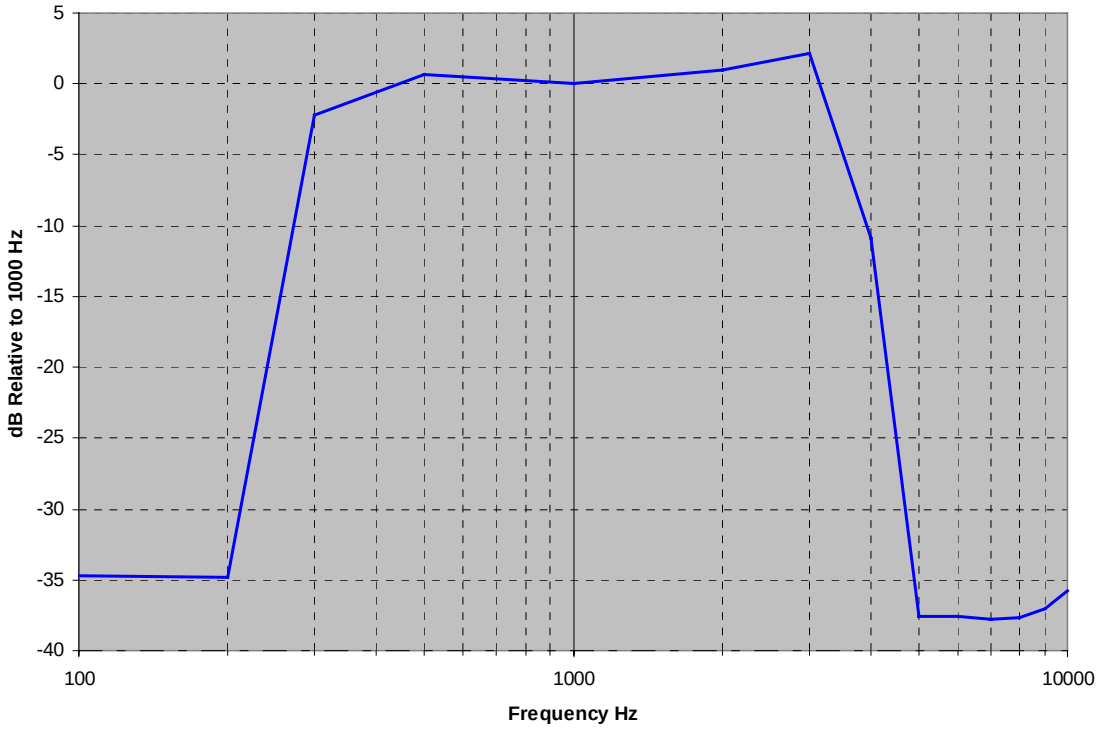
Results in accordance with Part 2.1047(a) and 87.141 Modulation Requirements



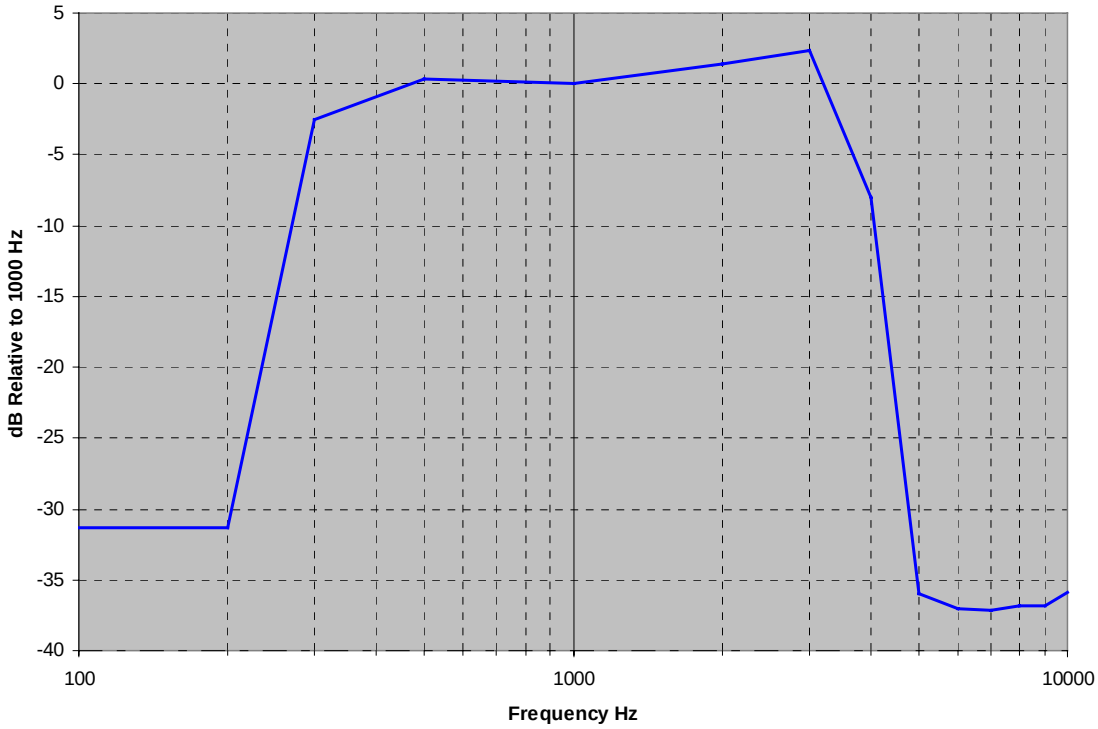
MODULATION CHARACTERISTIC (310.000 MHz A.M.)



MODULATION CHARACTERISTIC (127.000 MHz F.M.)



MODULATION CHARACTERISTIC (310.000 MHz F.M.)



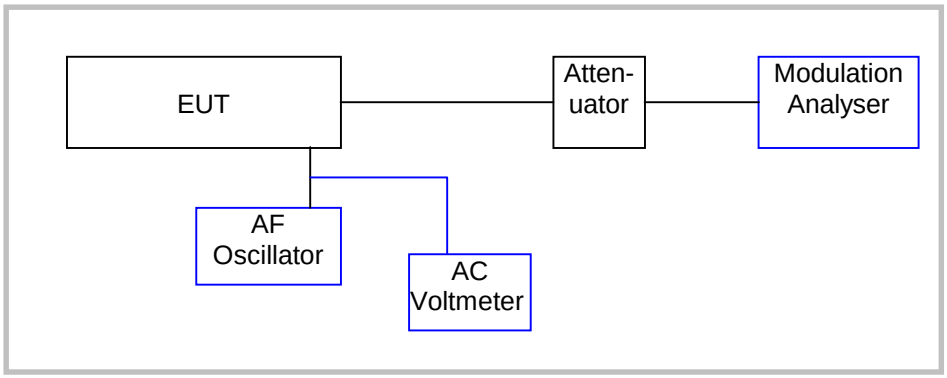
Modulation Limiting Characteristics - 47 CFR 2.1047 (b)

The transmitter is operated under standard test conditions and the output monitored with a modulation analyzer via an attenuator of normal impedance matching that of the transmitter. A test signal of 1000Hz sine wave is applied to the normal input to the modulation circuit to the audio processing circuits, the input level is varied between -50dBm to + 10dBm and the variation in the depth of modulation / deviation is observed and recorded.

The test was repeated with the test modulation frequency of 300Hz and 3000Hz.

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

(Calibrated items are indicated in Blue)

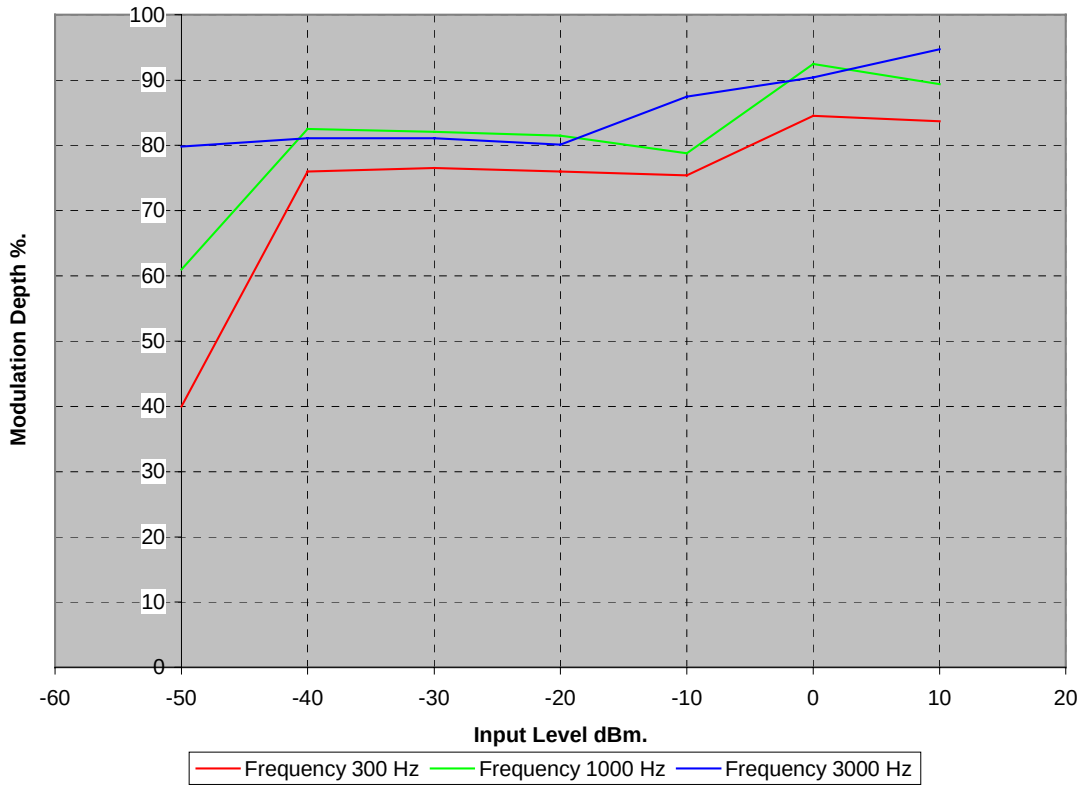


Test instruments used :

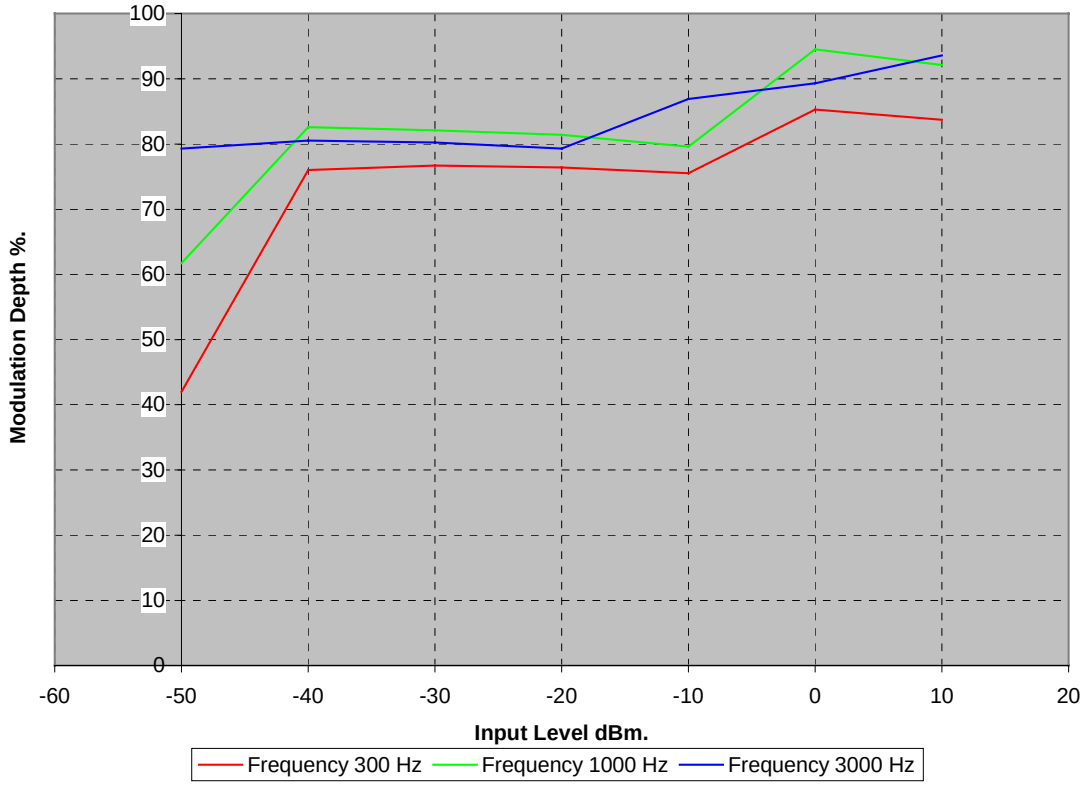
RF Attenuator	:	Bird 30dB, 100W Type 8323
AF Oscillator	:	Hewlett Packard Audio Analyser Type HP 8903B
AC Voltmeter	:	Hewlett Packard Audio Analyser Type HP 8903B
Modulation Analyzer	:	Hewlett Packard Modulation Analyser Type HP 8901B

Results in accordance with Part 2.1047 (b) and 87.141 Modulation Requirements

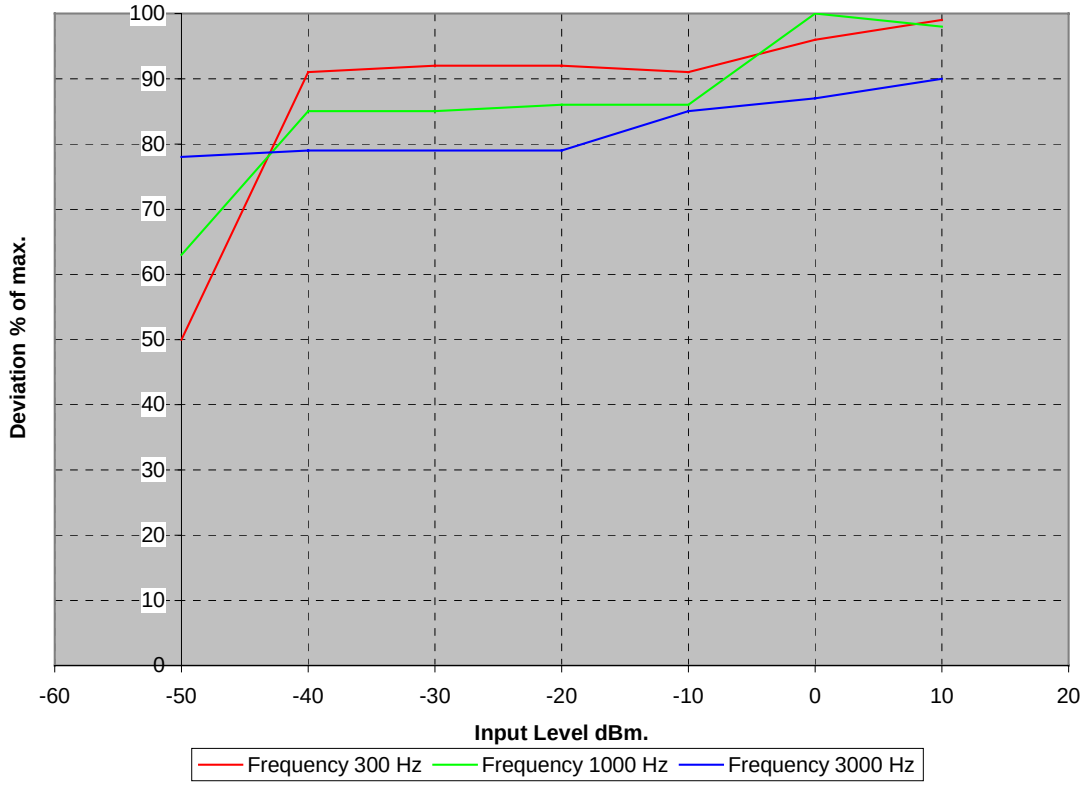
MODULATION LIMITING CHARACTERISTIC (127.000 MHz A.M.)



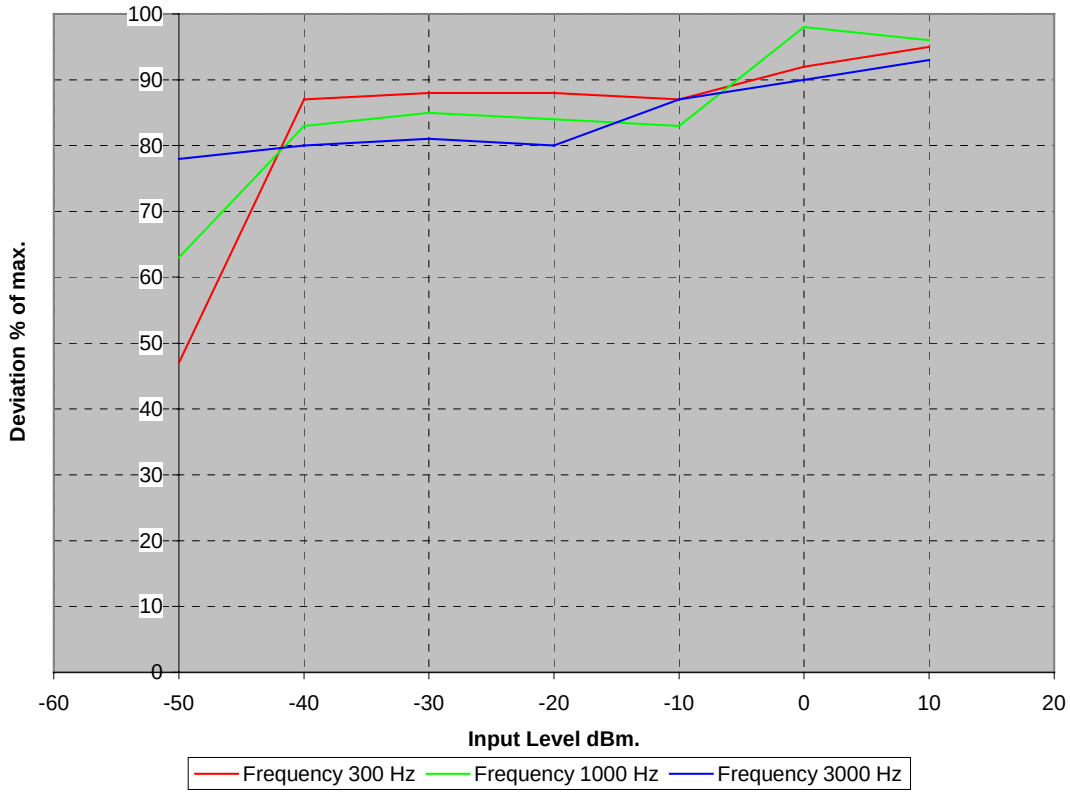
MODULATION LIMITING CHARACTERISTIC (310.000 MHz A.M.)



MODULATION LIMITING CHARACTERISTIC (127.000 MHz F.M.)



MODULATION LIMITING CHARACTERISTIC (310.000 MHz F.M.)



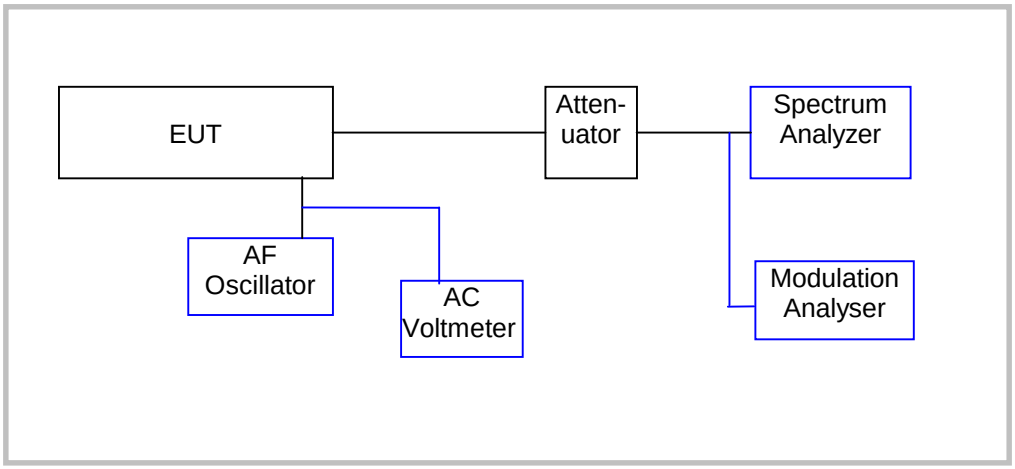
Occupied Bandwidth - 47 CFR 2.1049 (1)

The transmitter is operated under standard test conditions. A test signal of 2500Hz sine wave is applied to the normal input to the modulation circuit to the audio processing circuits, the input level is at a level of +16dB above that which produces a modulation depth of 50% / 50 % maximum deviation.

The output of the transmitter is connected to a spectrum analyzer, via an attenuator 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)

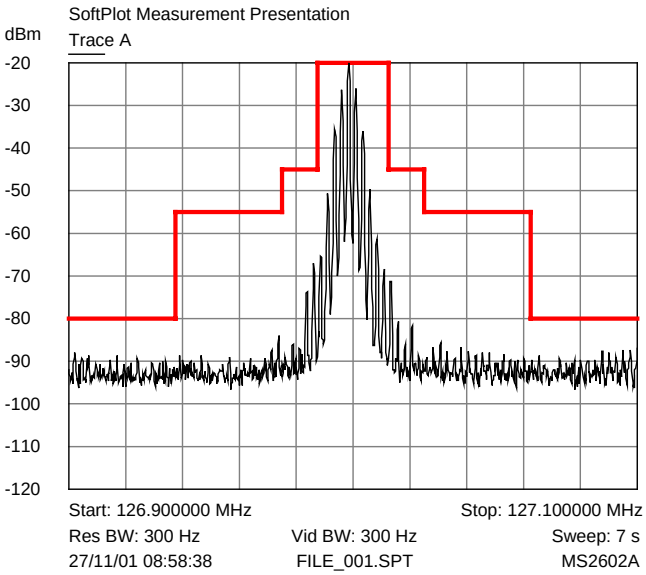


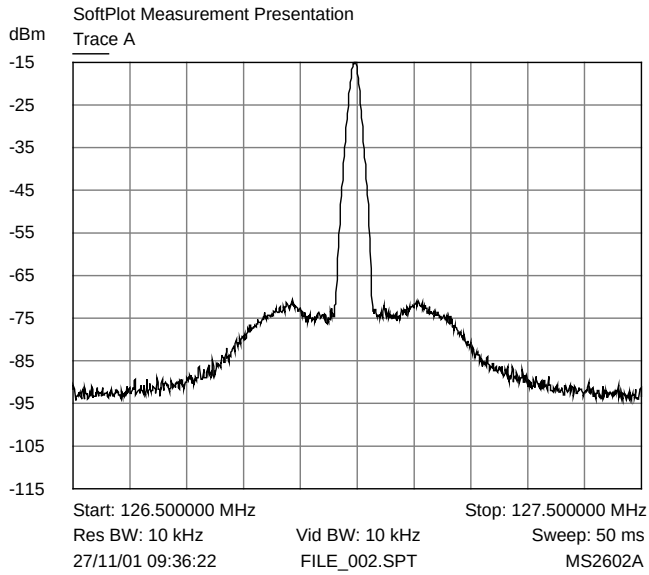
Test instruments used :

RF Attenuator	:	Bird 30dB, 100W Type 8323
AF Oscillator	:	Hewlett Packard Audio Analyser Type HP 8903B
AC Voltmeter	:	Hewlett Packard Audio Analyser Type HP 8903B
Modulation Analyzer	:	Hewlett Packard Modulation Analyser Type HP 8901B
Spectrum Analyzer	:	Anritsu Type MS 2602A

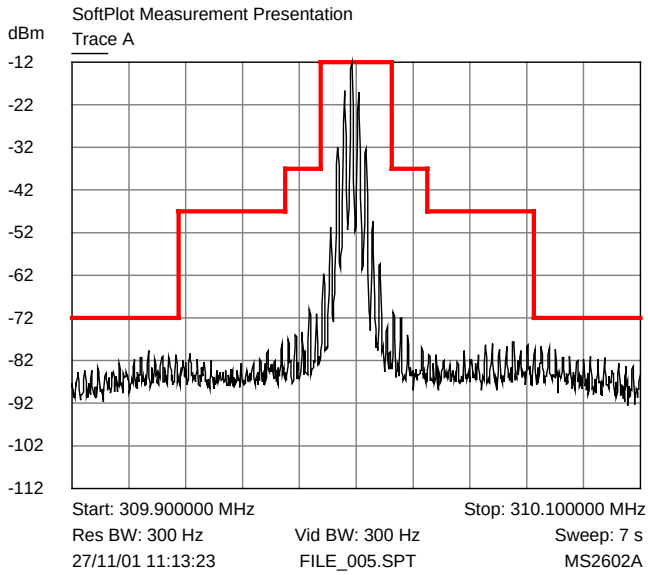
Results in accordance with Part 2.1049 and 87.139

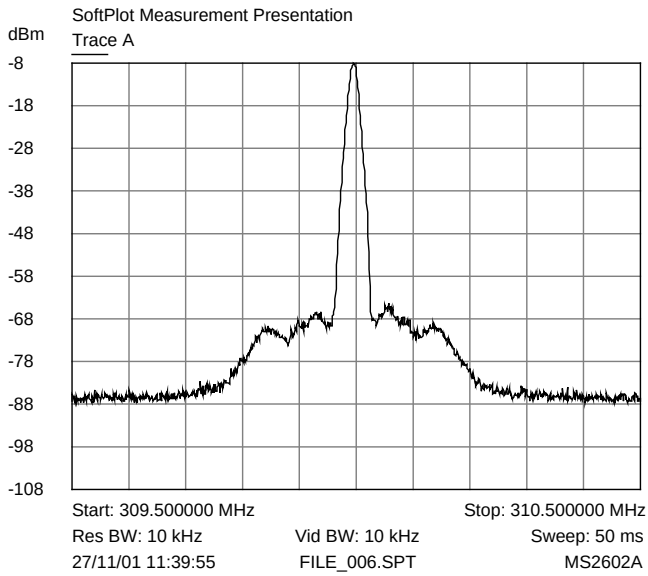
127.000 MHz A.M.



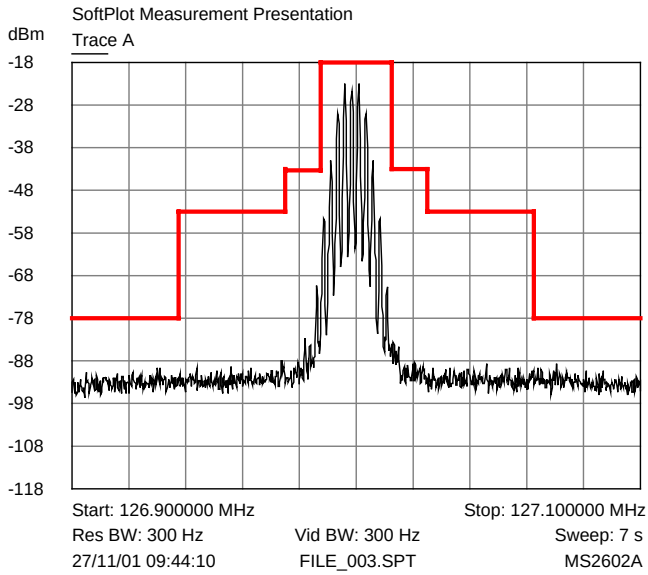


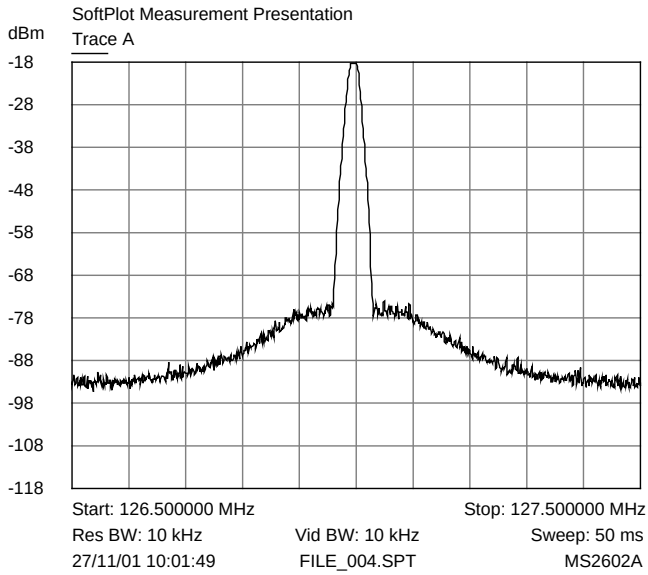
310.000 MHz A.M.



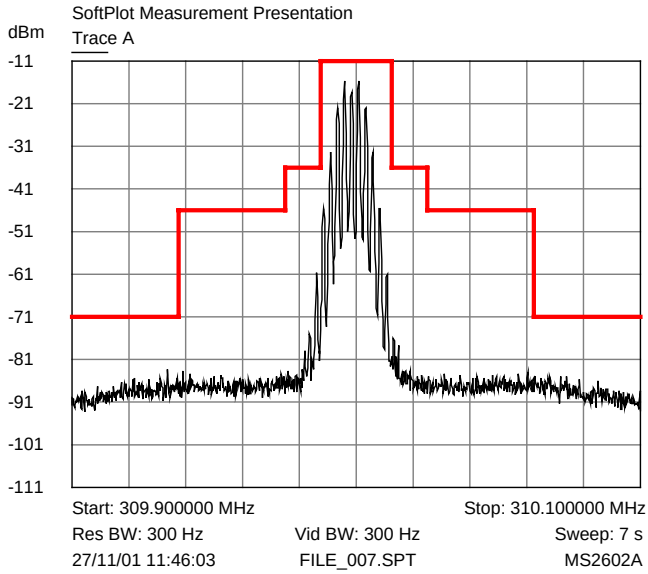


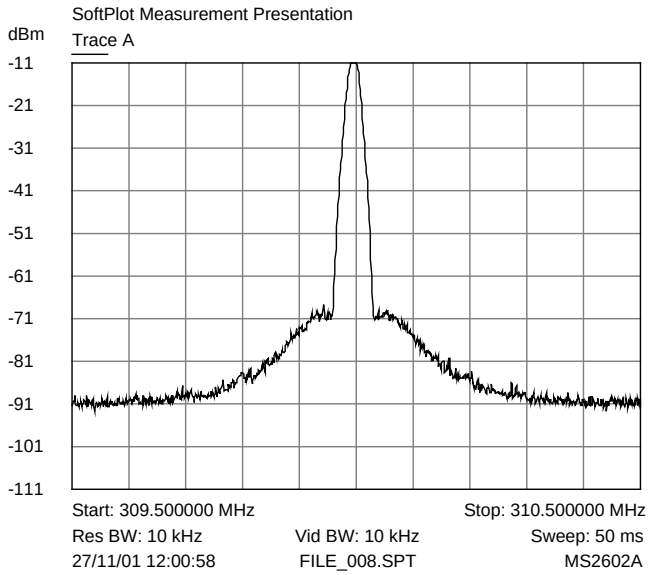
127.000 MHz F.M.





310.000 MHz F.M.





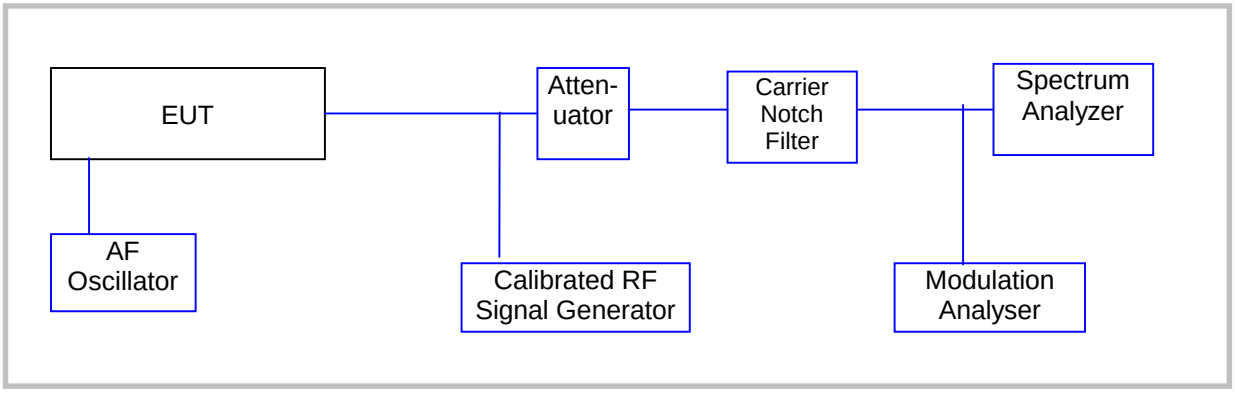
Spurious emissions at antenna terminals - 47 CFR 2.1051

The transmitter is operated under standard test conditions. The transmitter was modulated with normal test modulation, being a sine wave of 1000Hz and a modulation depth / deviation of 50%. The output of the transmitter was connected to a spectrum analyzer, via an attenuator 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 inserted between the attenuator and spectrum analyzer 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.

A calibrated RF signal generator replaced the EUT and the level of the signal generator was adjusted to achieve the same level as that measured on the spectrum analyzer. The level on the signal generator was recorded as being the level of the spurious emission measured by the substitution method. This method was used to as to ensure any non-linearities and unknown responses of the notch filter were taken into full account.

(Calibrated items are indicated in Blue)



Test instruments used :

RF Attenuator	:	Bird 30dB, 100W Type 8323
AF Oscillator	:	Hewlett Packard Audio Analyser Type HP 8903B
RF Signal Generator	:	Marconi Type 2032
Modulation Analyzer	:	Hewlett Packard Modulation Analyser Type HP 8901B
Spectrum Analyzer	:	Anritsu Type MS 2602A
Carrier Notch Filter	:	Telonic Altair Type TTR 190-3EE

Results in accordance with Part 2.1051 and 87.139 Emission Limits

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

Carrier Frequency (Fc) : 127.000 MHz Mode: A.M.

Frequency (MHz)	Identity	Absolute Level dBm	Limit [43+10log(P)]
254.000	2Fc	-53.6	-13 dBm
381.000	3FC	-37.2	-13 dBm
All other emissions were more than 20 dB below the limit			

Carrier Frequency (Fc) : 310.000 MHz Mode: A.M.

Frequency (MHz)	Identity	Absolute Level dBm	Limit [43+10log(P)]
620.000	2Fc	-37.4	-13 dBm
930.000	3FC	-43.8	-13 dBm
All other emissions were more than 20 dB below the limit			

Carrier Frequency (Fc) : 127.000 MHz Mode: F.M.

Frequency (MHz)	Identity	Absolute Level dBm	Limit [43+10log(P)]
254.000	2Fc	-52.7	-13 dBm
381.000	3FC	-51.6	-13 dBm
All other emissions were more than 20 dB below the limit			

Carrier Frequency (Fc) : 310.000 MHz Mode: F.M.

Frequency (MHz)	Identity	Absolute Level dBm	Limit [43+10log(P)]
620.000	2Fc	-42.1	-13 dBm
930.000	3FC	-50.1	-13 dBm
All other emissions were more than 20 dB below the limit			

Field Strength of Spurious radiation - 47 CFR 2.1053

The transmitter (the EUT) was placed on a wooden table with cables suitably dressed. The output of the EUT was connected to a dummy, non-radiating, load of normal impedance matching that of the transmitter. At a distance of 30 (10m) feet from the transmitter (EUT) the radiated field for each spurious radiation, including harmonics from the carrier frequency, were detected and measured on a calibrated receiver which was fed from a calibrated log-periodic antenna. The antenna was oriented in horizontal polarisation plane and was raised and lowered so as to ensure the maximum level of the spurious emission was detached.

The EUT was rotated through 360°, the emission levels for each spurious, including harmonics of the carrier frequency, were observed on the receiver and recorded .

The test above was repeated with the receiving antenna in the vertical polarisation plane.

The EUT was replaced by a calibrated half-wave dipole, the substitution antenna, which was fed from a calibrated signal generator. The level of the signal generator was adjusted to achieve the same level as that detected on the calibrated receiver. The level on the signal generator was recorded as being the level of the spurious emission measured by the substitution method.

For each of the emissions detected the EUT was switched off to determine the emission was that of the EUT.

The measurement facilities at Cambridge Test and Measurement Services LTD, are in accordance with ANSI C63.4 and lodged with the FCC under rule 2.948, a letter from the FCC recognising compliance with the requirements was dated March 02,1999 with the registration number 93385.

Test instruments used :

RF Signal Generator	:	Marconi Type 2032
Receiver(s)	:	Rohde & Schwarz Type(s) ESVS 10, ESHS 10
Antenna(s)	:	Schaffner Type CB2614A & EMCO Type 6502

Results in accordance with Part 2.1053 and 87.139 Emission Limits

Notes: 1 Emissions 20dB below limit are not required to be listed
2 Following a pre-scan from 9kHz to 4GHz, no emissions were detected greater than 20dB below specification limits.

Results in accordance with Part 2.1051 and 87.139 Emission Limits

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

Carrier Frequency (Fc) : 127.000 MHz Mode: A.M.

Frequency (MHz)	Identity	Absolute Level dBm	Limit [43+10log(P)]
All emissions were more than 20 dB below the limit (-13 dBm E.R.P.)			

Carrier Frequency (Fc) : 310.000 MHz Mode: A.M.

Frequency (MHz)	Identity	Absolute Level dBm	Limit [43+10log(P)]
All emissions were more than 20 dB below the limit (-13 dBm E.R.P.)			

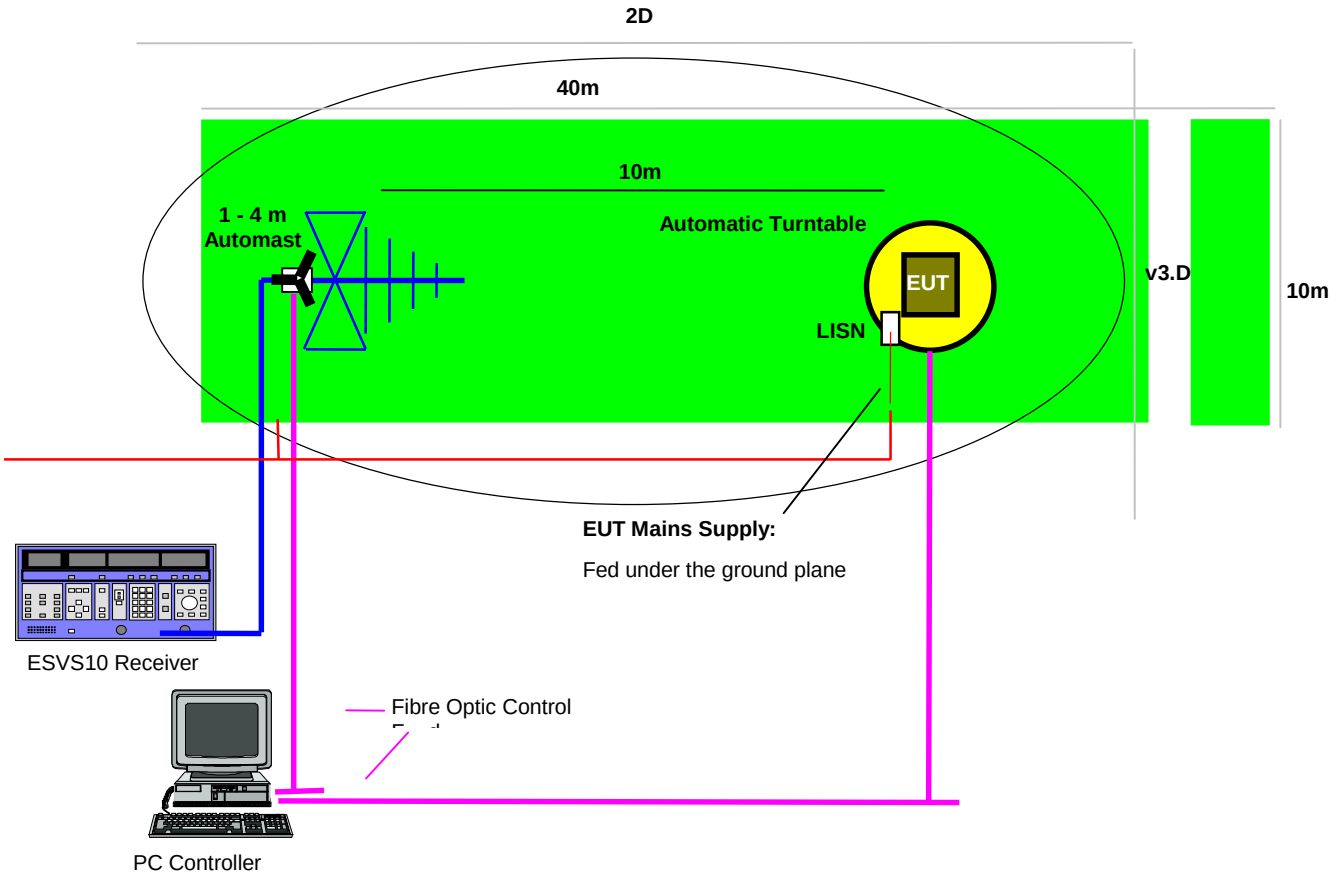
Carrier Frequency (Fc) : 127.000 MHz Mode: F.M.

Frequency (MHz)	Identity	Absolute Level dBm	Limit [43+10log(P)]
All emissions were more than 20 dB below the limit (-13 dBm E.R.P.)			

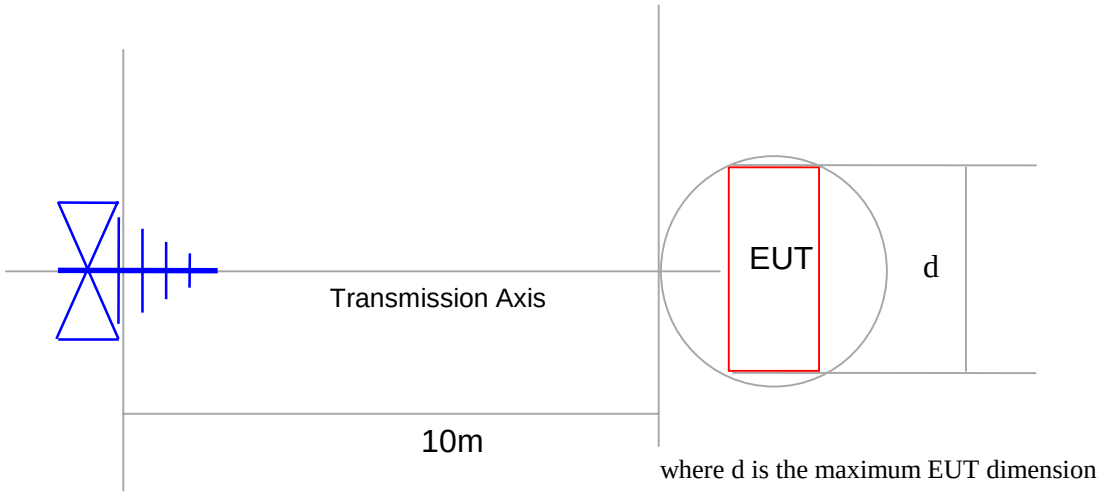
Carrier Frequency (Fc) : 310.000 MHz Mode: F.M.

Frequency (MHz)	Identity	Absolute Level dBm	Limit [43+10log(P)]
All emissions were more than 20 dB below the limit (-13 dBm E.R.P.)			

Open Area Test Site (OATS)



Equipment Test Set Up



Antenna to EUT Distance

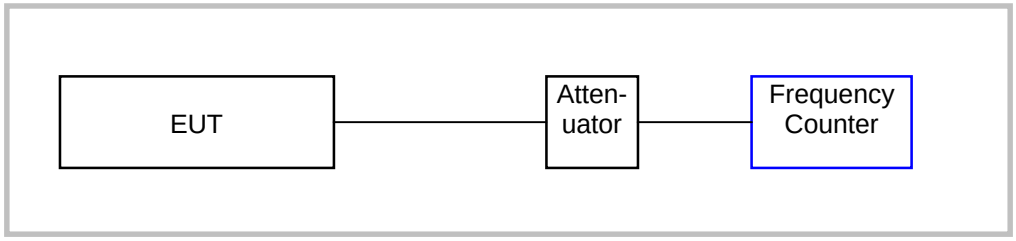
Frequency Stability with Temperature Variation - 47 CFR 2.1055 (a) (1)

The transmitter is operated under standard test conditions, using the standard test voltage. The output from the transmitter's internal 60 MHz local oscillator, locked to the reference was connected to a frequency counter. The frequency 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)

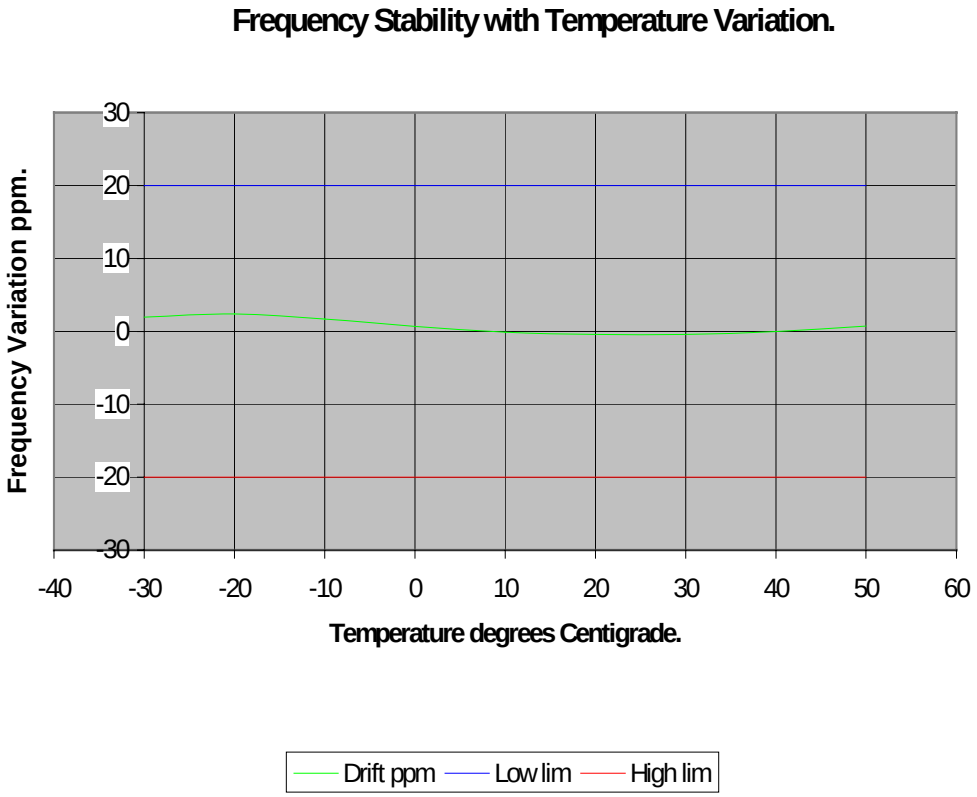


The attenuator was at the nominal impedance of the transmitter.

Test instruments used :

RF Frequency Counter	:	Hewlett Packard Modulation Analyser Type HP 8901B
RF Attenuator	:	Bird 30dB, 100W Type 8323
Climatic Chamber	:	Heraeus Votsch Type VMT/04/240
Off Air Frequency Standard	:	Radio Spares Type 2A

Results in accordance with Part 2.1055 (a) (1) and 87.133, Frequency Stability.



Frequency Stability with primary voltage variation - 47 CFR 2.1055 (d) (1)

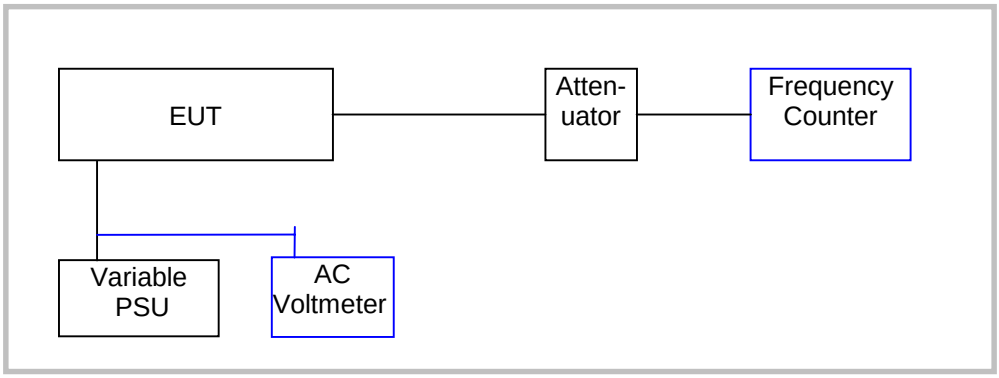
The transmitter is operated under standard test conditions, using the standard test voltage, the transmitter, tuned in accordance with the procedure described in the accompanying documentation, was keyed in an unmodulated condition and the output was connected to a RF Frequency Counter via an attenuator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

The primary voltage was varied from 85 % to 115% of the nominal.

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)



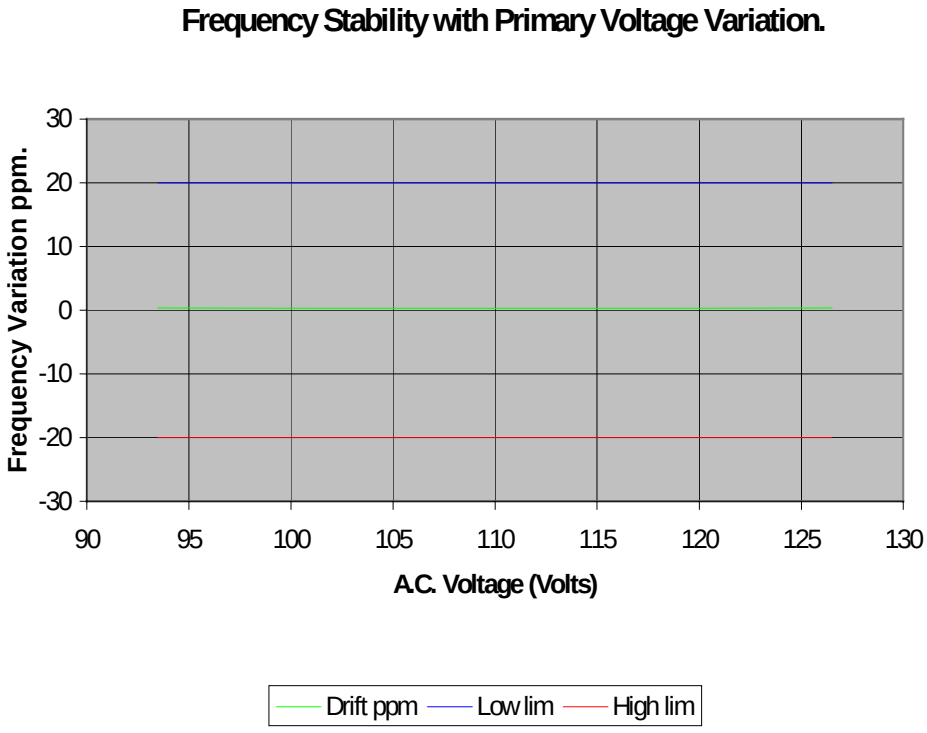
The attenuator was at the nominal impedance of the transmitter.

Test instruments used :

RF Frequency Counter	:	Hewlett Packard Modulation Analyser Type HP 8901B
RF Attenuator	:	Bird 30dB, 100W Type 8323
Variable Power Supply	:	Mains Variac
AC Voltmeter	:	Philips Type PM 2534
Off Air Frequency Standard:		Radio Spares Type 2A

Results in accordance with Part 2.1053 (d) (1) and 87.133 Frequency Stability : see attachment 5

Results in accordance with Part 2.1055 (d) (1) and 87.133, Frequency Stability.



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 Test Conditions

Laboratory environment .

Ambient Temperature : 23 °C

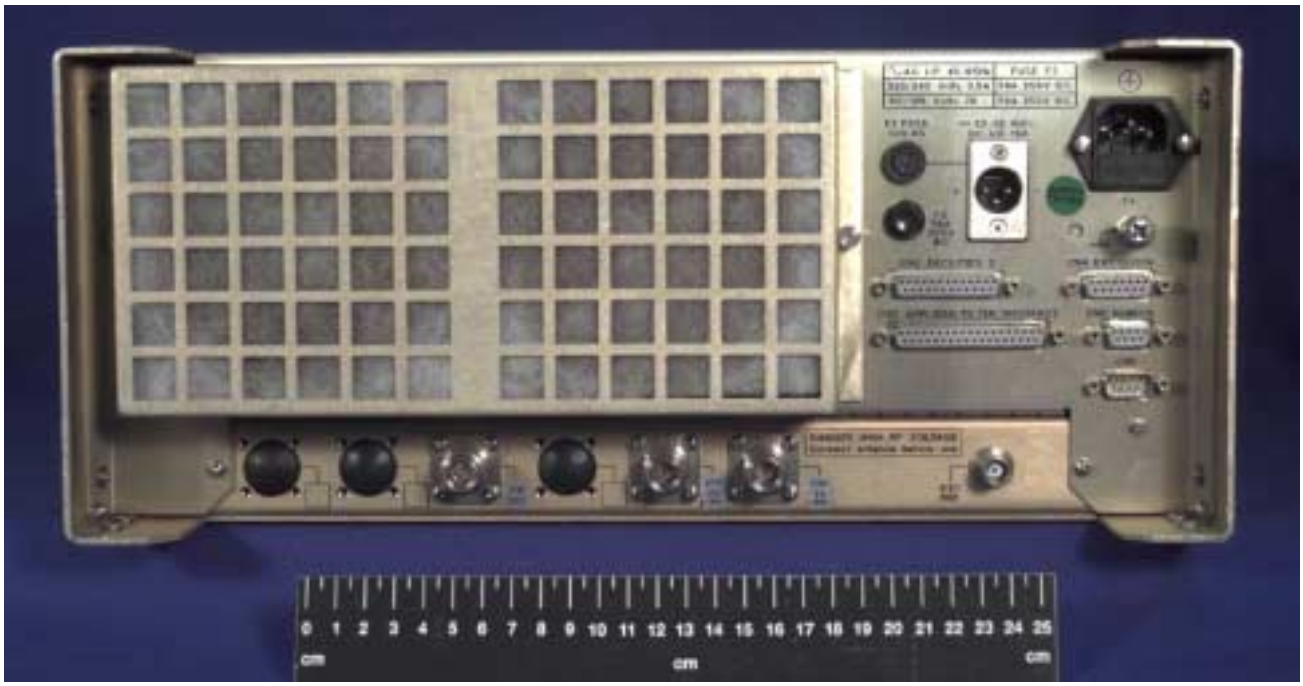
Relative Humidity : 22 %

Open Area test Site : 12 °C

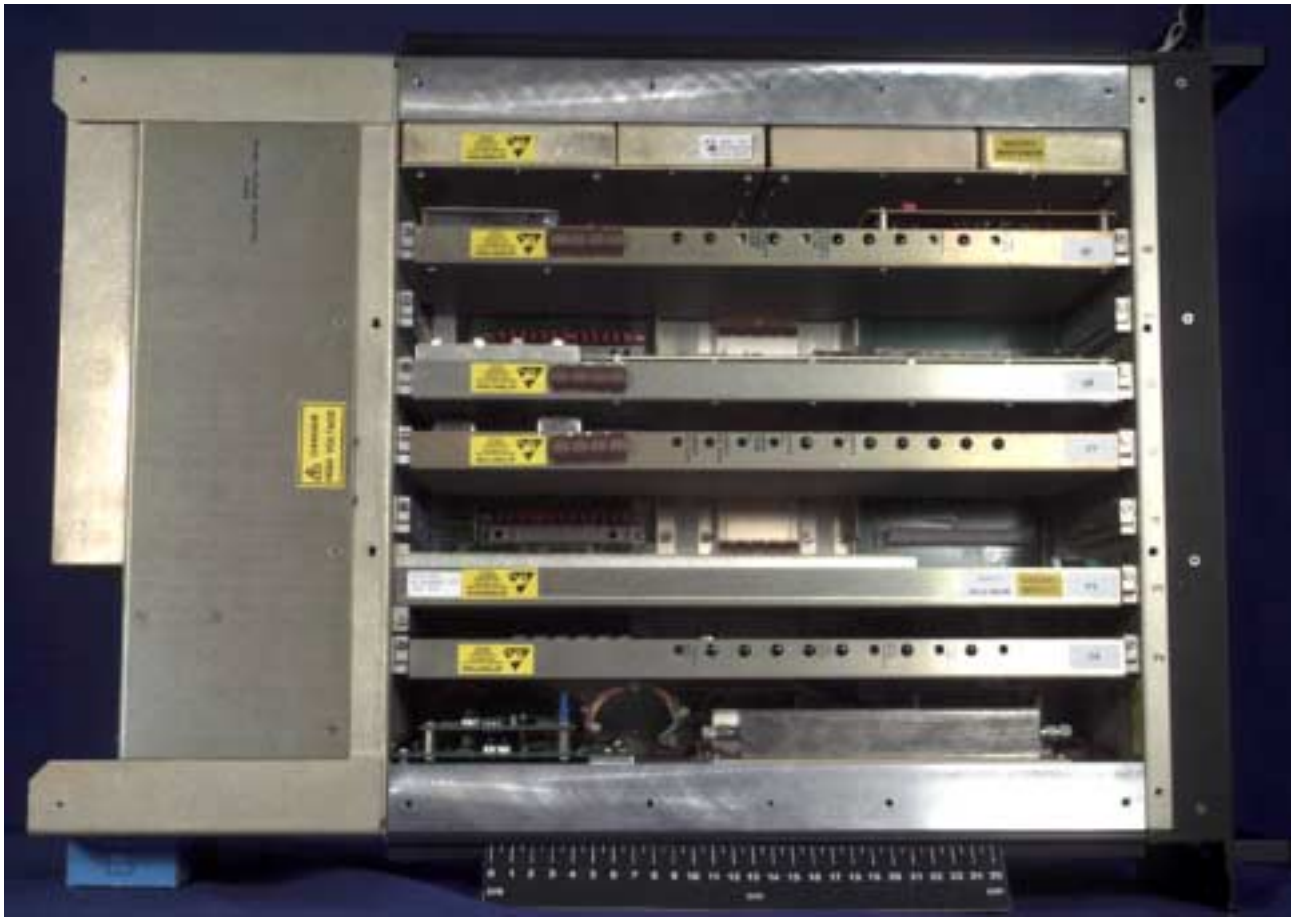
PHOTOGRAPHS OF EQUIPMENT

Transmitter (front view)

Transmitter (rear view)



Transmitter (inside view)



CTMS LTD, Company Accreditations & Credentials

Page No.

United Kingdom Accreditation Service

ACCREDITATION CERTIFICATE

NAMAS

TESTING
No. 1831

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

is accredited to undertake Category C testing in the above named permanent laboratory as detailed in the schedule bearing the above accreditation number and NAMAS logo. From time to time this schedule may be revised and reissued by the United Kingdom Accreditation Service.

This Accreditation shall remain in force until 10 JUNE 2001 subject to continuing compliance with the NAMAS Accreditation Standard, NAMAS Regulations and any further requirements specified by the United Kingdom Accreditation Service. Accredited organisations meet the requirements of EN45001, ISO/IEC Guide 25 and the relevant requirements of the BS EN ISO 9000 series of standards, including those of the model elsewhere in BS EN ISO 9002 when acting as suppliers producing test results.

Accredited to Manage, United Kingdom Accreditation Service

Issued on 12 October 1998 Initial Accreditation 11 June 1997

The Department of Trade and Industry (DTI) has entered into an agreement whereby the United Kingdom Accreditation Service (UKAS) through which UKAS is recognised as the national body responsible for providing National Accreditation of Measurement and Sampling (NAMAS).

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