

Commercial In Confidence

TEST REPORT No: P4285-1/FCC

Issue 1

Customer/Applicant:	Dream Link Ltd		
Address:	Room 1207 Peninsula Centre 67 Mody Road Tsim Sha Tsui East Kowloon Hong Kong		
Subject:	RADIO FREQUENCY DEVICES		
Customer Ref:	Nixon Wu		
Manufacturer:	Dream link		
Product:	Radio Controlled Novelty Toys		
Model/Trade Name:	Transmitter (27.145 MHz)		
Model No/Type:	Sumo #771		
Serial No	-		
Tests Carried Out:	FCC rules CFR 47 Part 15.109 Un-Intentional Radiator CFR 47 Part 15.227 Intentional Radiator (NUA)		
Date Of Test	12-15 th Aug 05	Location	Ringwood

This Report applies only to the above referenced EQUIPMENT and details the tests applied using test equipment calibrated to traceable National Standards and is not indicative of the qualities of identical or similar products

Report Author: F Barkas **Checked By:** O.W.Cockram
Title: (Planning Co-ordinator Radio) **Title:** (General Manager)

Signature _____ **Signature** _____

Issue Date: Aug 2005

Tests marked "NUA" in this report are not included in the UKAS accreditation schedule for our laboratory. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation. This Report is for the exclusive use of the Customer detailed and should not be reproduced except in full without written authority of EMC Projects Ltd.

Report Summary

<u>Report Number:</u>	P4285-1/FCC
<u>Project Number:</u>	P4285
<u>Test Dates:</u>	12 – 15 th , Aug 2005
<u>Test Engineer:</u>	Mr Frank Barkas
<u>In Attendance:</u>	-
<u>Product Use:</u>	Radio Control
<u>Model/Type Tested</u>	Sumo # 711
<u>Operating Frequency</u>	27.145 MHz
<u>Channel Spacing</u>	-
<u>Number of Channels</u>	1
<u>Antenna Type</u>	Integral
<u>Alternative Antenna Type</u>	-
<u>Power Supply</u>	9v dc Battery

Summary of Results:

The equipment was assessed to the requirements of the following tests:-

Rule Part	Test Description	Result / Class	Pass/Fail Margin	Levels/Comments Limits
15.227	Intentional Emission Frequency	Pass	27.146625 MHz	26.96 – 27.28 MHz
15.227(e)	Intentional Emission Field Strength	Pass	38.16 dB μ V/m	41.84 dB Below Limit
15.231(e)	Spurious emissions transmitter operating – radiated	Pass	Maximum level 30.26 dB μ V/ m	9.74 dB Below Limit
15.109	Unintentional Emitters	Pass	Maximum level 41.26 dB μ V/ m	4.74 dB Below Limit
15.203	Antenna Arrangements Integral	Pass	-	-
15.204	Antenna Arrangements External Connector	N/A	-	-
15.205	Restricted Bands	-	-	-
15.31(f)	Extrapolation Factor	-	-	10.46dB

For full details of pass level/criteria/class etc. see individual test results

Table 1

Distribution:-

Dream Link Ltd
EMC Projects Limited
TRL Compliance Services

Copy No 1
Copy No 2
Copy No.3

CONTENTS	Page
1. Applicants Summary/Declarations	4
2. List Of Measurements	4
3. Modes of operation	5
4. Test Setup	5
5. Deviations from Standard	5
6. Test Procedures	5
7. Modification	5
8. Part 15.227 - Transmitter Intentional Emissions – Radiated	6
8.1. Intentional Emission Frequency	6
8.2. Intentional Emission Field Strength	6
8.3. Test Method Part 15.227	6
8.4. Test Equipment Used:	6
9. Part 15.227 - Transmitter Spurious Emissions – Radiated	7
9.1. Transmitter Spurious Emissions <1000MHz	7
9.2. Test Method Part 15.227	7
9.3. Test Equipment Used:	7
10. Part 15.109 - Ancillary Spurious Emissions – Radiated	8
10.1. Spurious Emissions <1000MHz	8
10.2. Test Method Part 15.109	8
10.3. Test Equipment Used:	8
11. Graphs	9
11.1. Figure 1-Radiated Emissions -Transmitter On Fundamental	10
11.2. Figure 2-Radiated Emissions- Transmitter On Spurious	11
11.3. Figure 3-Radiated Emissions –Transmitter & Ancillary Equipment Standby	12
11.4. Figure 4-Radiated Emissions –Transmitter & Ancillary Equipment Operating	13
12. Photographs	15
12.1. Figure 5 Test Set Up OATS	15
12.2. Figure 6 Transmitter and Ancillary as Supplied View 1	16
12.3. Figure 7 Transmitter and Ancillary as supplied View 2	17
12.4. Figure 8 Transmitter Circuit Board View 1	18
12.5. Figure 9 Transmitter Circuit Board View 2	19

1. Applicants Summary/Declarations

1	Duty Cycle		
2	Equipment Category	Yes	Single Channel
		No	Two Channel
		No	Multi-Channel
3	Channel Spacing	Yes	Narrowband
		-	Wideband
4	Frequency Generation	-	SAW Resonator
		Yes	Crystal
		-	Synthesiser
5	Modulation Method	Return to zero pulse width modulation	Amplitude
		-	Digital
		-	Angle
6	Applicants Contact Person		Nixon Wu
		e-mail	info@dreamlink.info
		Tel	85225150832
		Fax	85225059916
7	Applicants Category		Manufacturer

2. List Of Measurements

The list of measured parameters called for in FCC Rules CFR Part 15 is given below.

Rule Part	Transmitter parameters	Applied	Comments
15.227	Intentional Emission Frequency	Yes	Peak Detector
15.227 (a)	Intentional Emission Field Strength	Yes	Average Detector
15.227(b)	Spurious emissions transmitter operating – radiated	Yes	Quasi Peak Detector
15.109	Unintentional Emitters	Yes	Quasi Peak Detector
15.203	Antenna Arrangements Integral	Yes	-
15.204	Antenna Arrangements External Connector	No	-
15.205	Restricted Bands	-	-
15.31(f)	Extrapolation Factor	Yes	10.46 dB

3. Modes of operation

For the duration of the testing the EUT (Equipment Under Test) was operated in the following modes:-

1. Test 1& 2 The transmitter in the transmit condition
2. Test 3 The transmitter in standby condition The ancillary equipment in standby (transmitter not in communications with the receiver)
3. Test 3 The ancillary equipment operating (transmitter in communications with the ancillary equipment)

The full operational mode required is detailed on a test-by-test basis.

4. Test Setup

The EUT was set-up for the individual tests in accordance with the test specification requirements as shown in the test section.

5. Deviations from Standard

No deviations from the applied standards were carried out unless stated in the individual test results

6. Test Procedures

Procedures and methods of test employed were in accordance with the requirements of the specifications applied, using accredited in-house test procedures. During testing the ambient conditions required were measured and found to be satisfactory.

7. Modification

No modifications were carried out in order for the equipment to comply with the requirements of the standard applied: -

8. Part 15.227 - Transmitter Intentional Emissions – Radiated

8.1. Intentional Emission Frequency

8.2. Intentional Emission Field Strength

Ambient temperature °C	23	Measurement Distance	10 m
Relative humidity %	50	Extrapolated Distance	From 10 to 3m
Supply Voltage V	9	Detector function – 8.1	Average
Channel No	1	Detector function – 8.2	Average

Graphs & Plots Figure 1 as representative sample - intentional emission

Freq (MHz)	OATS Reading (dB μ V)	Antenna Correction (dB)	Cable Correction (dB)	10m Field Strength (dB μ V/m)	Extrapolation Factor (dB)	3m Field Strength (dB μ V/m)	3m Limit (dB μ V/m)
27.146625	8	18.1	1.6	27.7	10.46	38.16	80
Antenna Polarisation				Vertical			

8.3. Test Method

Part 15.227

1. As per Radio-Noise Emissions, ANSI C63.4:2004
2. An initial assessment was carried out on a indoor test site, to obtain the position and setup of the EUT which gave maximum emission levels, the results of this assessment was used during final calibrated measurement on a Open Area Test Site (OATS)
3. The EUT was placed at a height of 0.8 metres above the ground plane
4. Emissions maximised:-
 - a. by rotation of the EUT, on a automatic turntable.
 - b. receiving antenna was raised and lowered between 1-4 m above the ground plane
 - c. using both the horizontal & vertical polarisations of the receiving antenna
 - d. orientation of the EUT in 3 orthogonal planes.
 - e. the maximum-recorded emissions recorded.
5. Receiver Bandwidth – 120kHz using a Quasi Peak 100kHz using a Peak /Average Detector
6. Final measurements were carried out with a new battery fitted as part 15.31e

8.4. Test Equipment Used:

Pre Scan	SA9	GS1	PA2	
Frequency	CT1	GS1	PA2	
OATS	OATS2	RX11	BA4	

9. Part 15.227 - Transmitter Spurious Emissions – Radiated

9.1. Transmitter Spurious Emissions <1000MHz

Ambient Temperature °C	23	Measurement Distance	10 M
Relative Humidity %	50	Extrapolated Distance	From 10 To 3 M
Supply Voltage V	9	Detector Function	Quasi Peak
Channel No	1	Antenna Polarisation	Vertical unless stated otherwise

Graphs & Plots Figure 2 as representative sample – Spurious emission

Only Emissions within 20dB of the limit are listed

Frequency Range (MHz)	Freq (MHz)	OATS Reading (dB μ V)	Antenna Correc. (dB)	Cable Correc. (dB)	10m Field Strength (dB μ V/m)	Extrapolation Factor (dB)	3m Field Strength (dB μ V/m)	Limit (dB μ V/m)
30-88	54.3	11	6.3	2.5	19.8	10.46	30.26	40
30-88	81.45	9	7.3	3.0	19.3	10.46	29.76	40
216-960	217.1	9	8.5	4.5	22	10.46	32.46	46
216-960	234	0	10.2	4.6	14.8	10.46	25.26	46
216-960	271.4	5	12.7	4.9	22.6	10.46	33.06	46
216-960	298.6	5.5	13.2	5.2	23.9	10.46	34.36	46
216-960	325.7	3	13.7	5.4	22.1	10.46	32.56	46
216-960	352.9	0	14.6	5.6	20.2	10.46	30.66	46
216-960	380	-4	15.3	5.8	17.1	10.46	27.56	46

9.2. Test Method

Part 15.227

1. As per Radio-Noise Emissions, ANSI C63.4:2004
2. Emissions were searched to 1000 MHz inclusive as required by part 15.33a
3. An initial assessment was carried out on a indoor test site, to obtain the position and setup of the EUT which gave maximum emission levels, the results of this assessment was used during final calibrated measurement on a Open Area Test Site (OATS)
4. The EUT was placed at a height of 0.8 metres above the ground plane
5. Emissions maximised:
 - a. by rotation of the EUT, on a automatic turntable.
 - b. receiving antenna was raised and lowered between 1-4 m above the ground plane
 - c. using both the horizontal & vertical polarisations of the receiving antenna
 - d. orientation of the EUT in 3 orthogonal planes.
 - e. the maximum-recorded emissions recorded.
6. Extrapolation factor 10.46 dB from 3-10m as part 15.31f
7. Receiver Bandwidth – 120kHz using a Quasi Peak 100kHz using a Peak/Average Detector
8. Final measurements were carried out with a new battery fitted

9.3. Test Equipment Used:

Pre Scan	SA9	GS1	PA2	
OATS	OATS2	RX11	BA4	

10. Part 15.109 - Ancillary Spurious Emissions – Radiated**10.1. Spurious Emissions <1000MHz**

Ambient Temperature °C	23	Measurement Distance	10 M
Relative Humidity %	50	Extrapolated Distance	From 10 To 3 M
Supply Voltage V	9	Detector Function	Quasi Peak
Channel No	1	Antenna Polarisation	-

Graphs & Plots Figure 3 as representative sample – Spurious emission

Only Emissions within 20dB of the limit are listed

Frequency Range (MHz)	Freq (MHz)	OATS Reading (dB μ V)	Antenna Correc. (dB)	Cable Correc. (dB)	10m Field Strength (dB μ V/m)	Extrapolation Factor (dB)	3m Field Strength (dB μ V/m)	Limit (dB μ V/m)
88-216	126	-5	11.2	2.3	8.5	10.46	18.96	43.5
216-960	358	1	14.8	4.5	20.3	10.46	30.76	46
216-960	608	4	19.9	6.9	30.8	10.46	41.26	46
216-960	614	0	20.1	6.9	27	10.46	37.46	46
216-960	798	-5	22.6	7.2	24.8	10.46	35.26	46
216-960	980	-5	24.7	8.1	27.8	10.46	38.26	54

10.2. Test Method**Part 15.109**

9. As per Radio-Noise Emissions, ANSI C63.4:2004
10. Emissions were searched to 1000 MHz inclusive as required by part 15.33a
11. An initial assessment was carried out on a indoor test site, to obtain the position and setup of the EUT which gave maximum emission levels, the results of this assessment was used during final calibrated measurement on a Open Area Test Site (OATS)
12. The EUT was placed at a height of 0.8 metres above the ground plane
13. Emissions maximised:
 - f. by rotation of the EUT, on a automatic turntable.
 - g. receiving antenna was raised and lowered between 1-4 m above the ground plane
 - h. using both the horizontal & vertical polarisations of the receiving antenna
 - i. orientation of the EUT in 3 orthogonal planes.
 - j. the maximum-recorded emissions recorded.
14. Extrapolation factor 10.46 dB from 3-10m as part 15.31f
15. Receiver Bandwidth – 120kHz using a Quasi Peak, 100kHz using a Peak/ Average Detector
16. Final measurements were carried out with a new battery fitted

10.3. Test Equipment Used:

Pre Scan	SA9	GS1	PA2	
OATS	OATS2	RX11	BA4	

11. Graphs

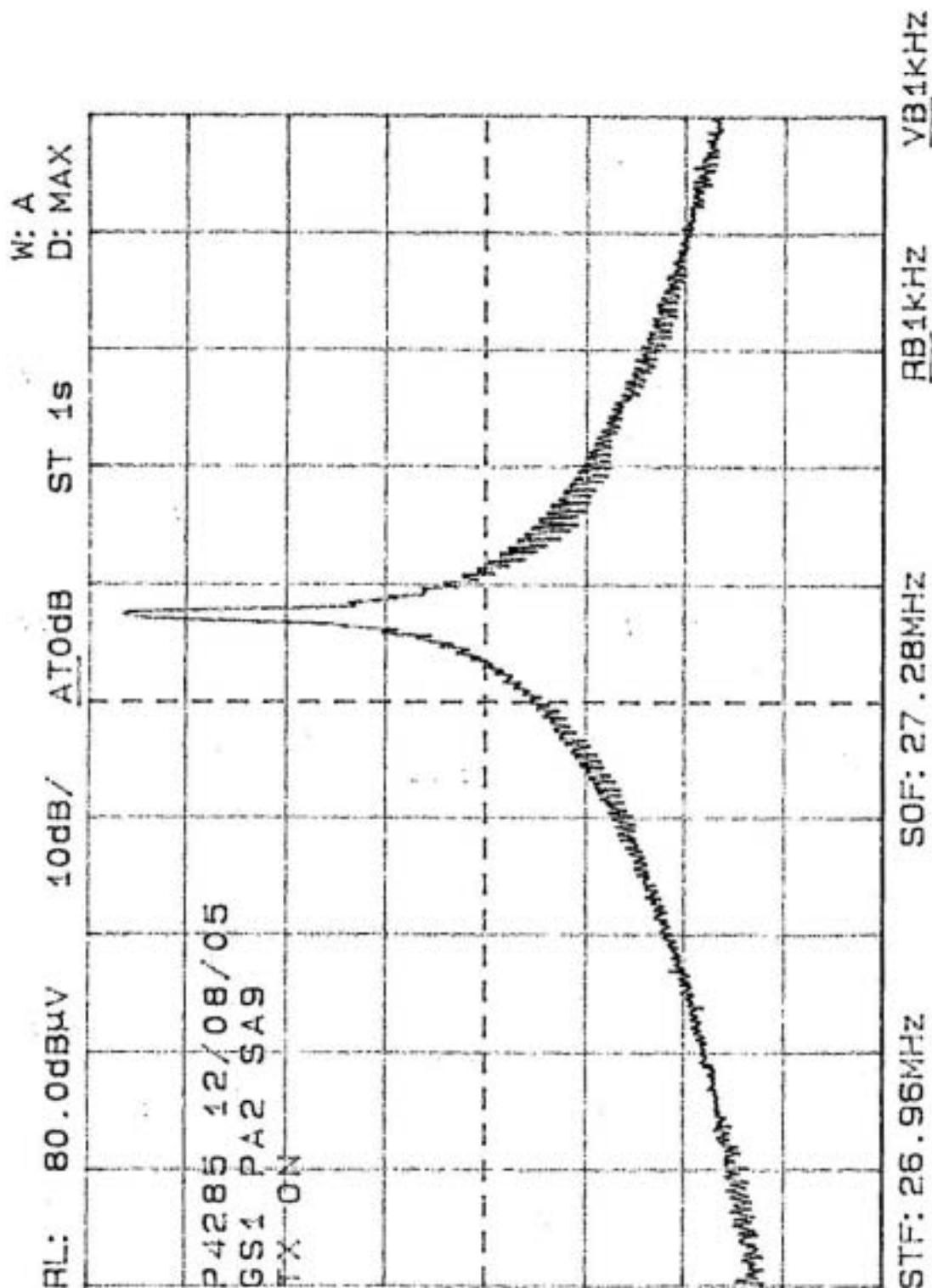
Figure 1-Radiated Emissions -Transmitter On Fundamental

Figure 2-Radiated Emissions -Transmitter On Spurious

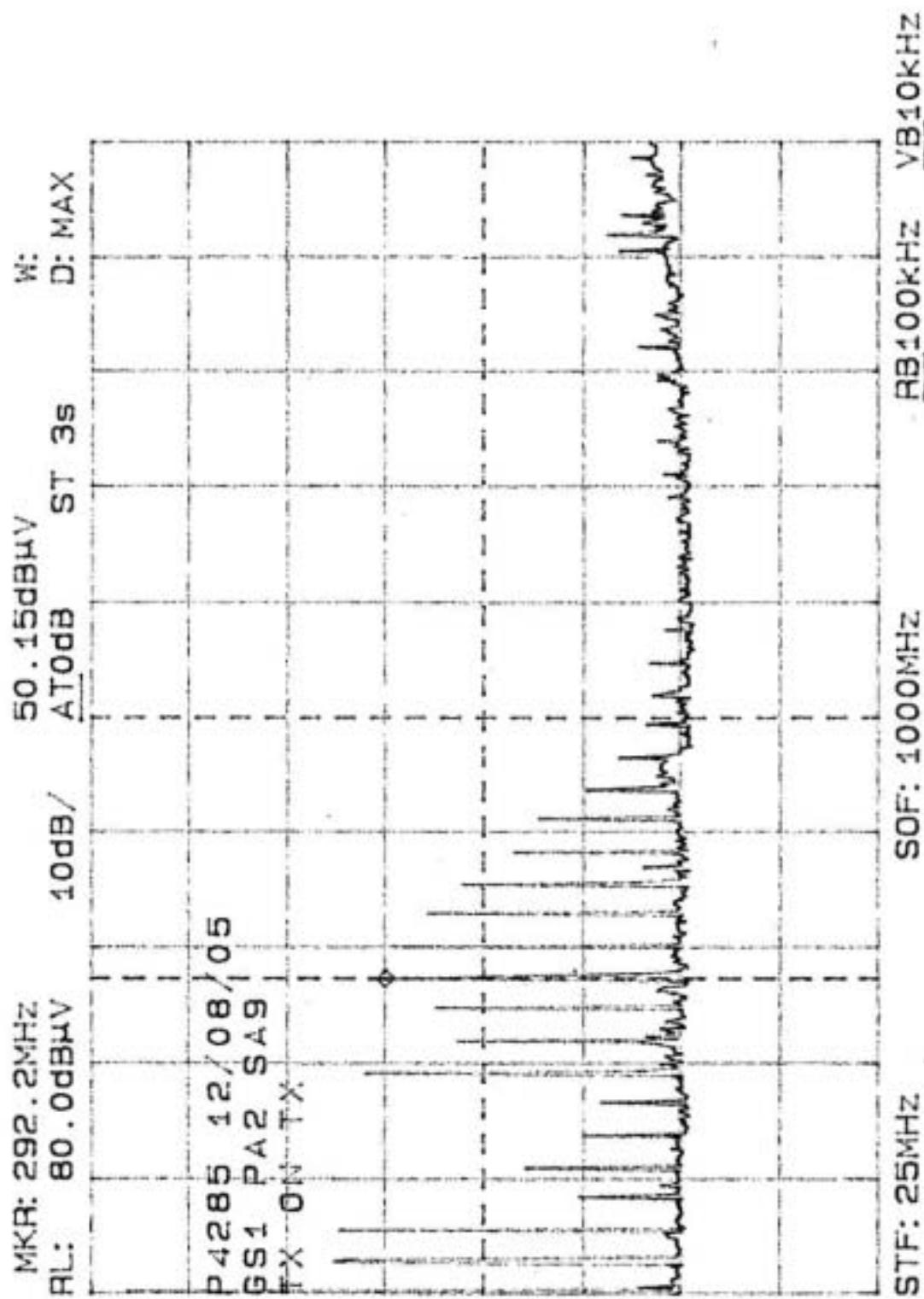
Figure 3-Radiated Emissions -Transmitter & Ancillary Equipment Standby

Figure 4-Radiated Emissions -Transmitter & Ancillary Equipment Operating

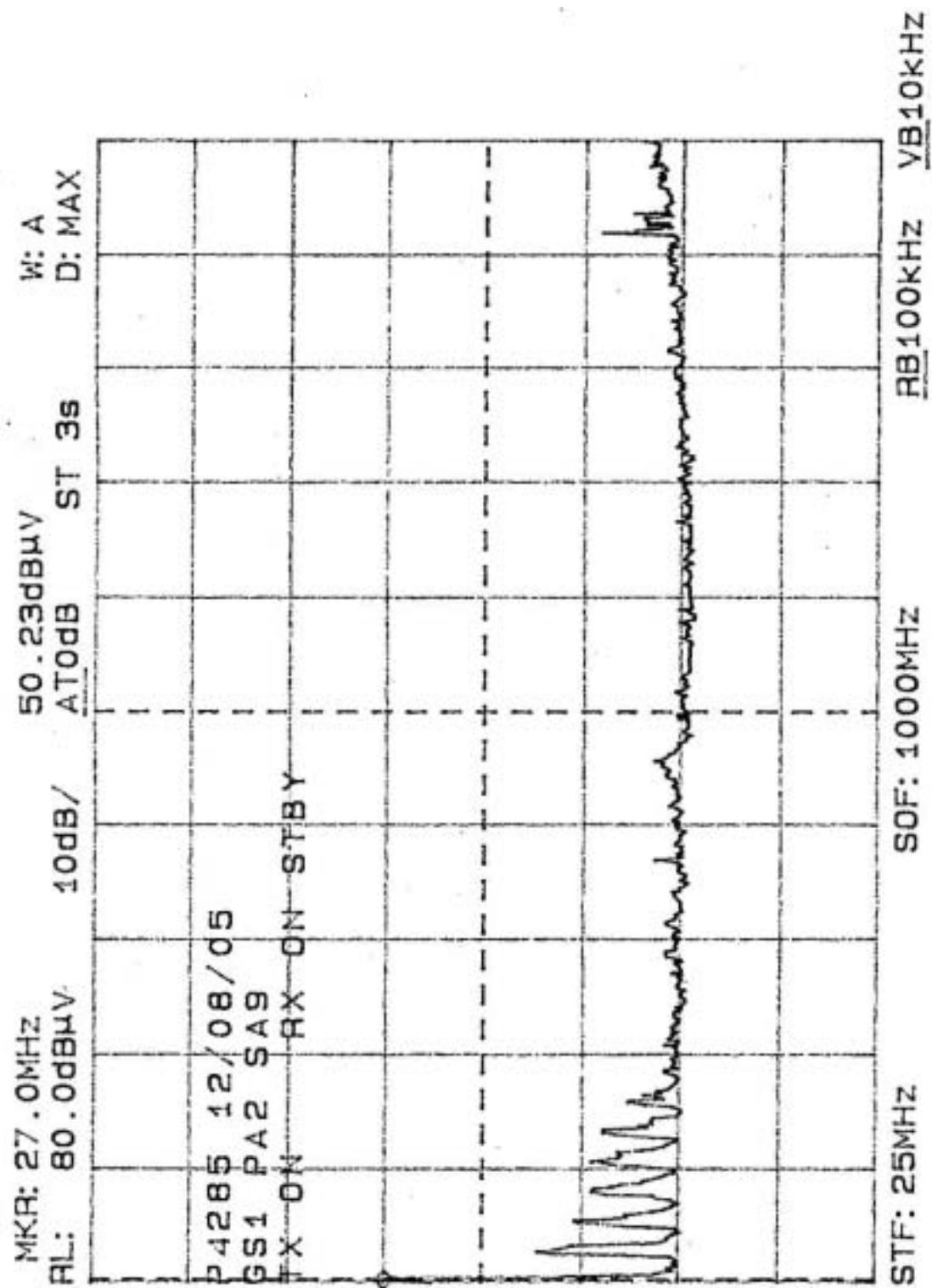
11.1. **Figure 1-Radiated Emissions -Transmitter On Fundamental**
(Un-corrected Screened Enclosure Emission Measurements)



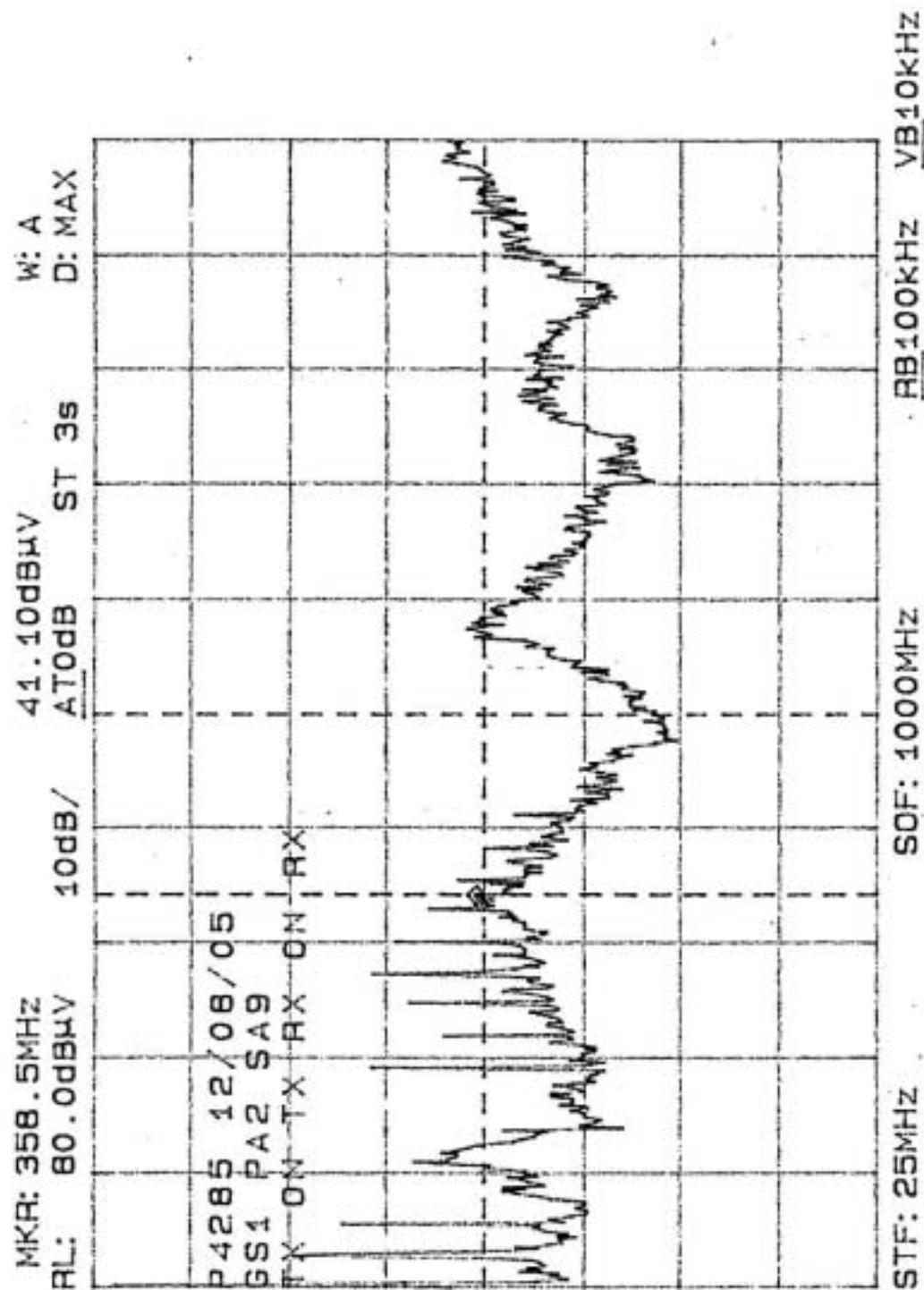
11.2. Figure 2-Radiated Emissions- Transmitter On Spurious
(Un-corrected Screened Enclosure Emission Measurements with PA2)



11.3. **Figure 3-Radiated Emissions –Transmitter & Ancillary Equipment Standby**
(Un-corrected Screened Enclosure Emission Measurements with PA2)



11.4. **Figure 4-Radiated Emissions –Transmitter & Ancillary Equipment Operating (Un-corrected Screened Enclosure Emission Measurements with PA2)**



TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

All test equipment used for the tests was calibrated and its operation verified prior to being used:-

No	Instrument Or Ancillary	Type	Manufacturer	Serial No.
AV10	Multimeter	AVO8 MkIV	AVO	1037M91516
BA4	Bilog Antenna	CBL6111A	Chase	1667
BIC5	Biconical Antenna	VHBC 9133	Scharzbeck	9124/0272
CT1	Communication Set	CMS 52	Rohde & Schwarz	825384/001
DRGFS	Double Ridge Guide Horn Antenna	EMCO 3115	EMC Test Systems	9701-5093
EC1	Environmental	Chamber	Fison	5360
GS1	G Strip Chamber	Comtest	Comtest ThermoVoltek	CC107-0050
LP4	Log Periodic	9107	Schwarzbeck	9107534
LP7	Log Periodic	VUSLP 9111	Schwarzbeck	9111197
OATS2	OATS		EMC Projects	
OATS2/3	Cable		EMC Projects	OAT2/3
OSC3	2 Channel Oscilloscope	TDS360	Tektronix	BO11912
PA2	Pre Amplifier		EMC Projects	PA2
PA5	Pre Amplifier	8449B	Hewlett Packard	3008A00176
Rx11	Receiver	UHR 4000	Chase	6114
Rx12	Receiver ESAI-D	804.8932.52	Rhode & Schwarz	87961/035
Rx14	ESMI-RF Receiver	1032.5510.53	Rhode & Schwarz	87961/035
SA10	Spectrum Analyser	2390A	Marconi	1601
SA14	Spectrum Analyser	8591EM	Hewlett Packard	3536A00301
SA8	Spectrum Analyser	MS2601B	Anritsu	MW39953
SA9	Spectrum Analyser	MS2601B	Anritsu	MT54360
SG20	Signal Generator	2031	Marconi	119595/009
SG21	Signal Generator	2023	Marconi	112158/001
SP9	100MHz Oscilloscope Probe	P3010 x 10	Tektronix	
YI5	Digital Temperature Meter	2455	Yokagawa	75JV0142
	Probe for YI5	Type K	Yokagawa	08471T

12. Photographs

All size were indicated are in centimetre's

12.1. **Figure 5** Test Set Up OATS



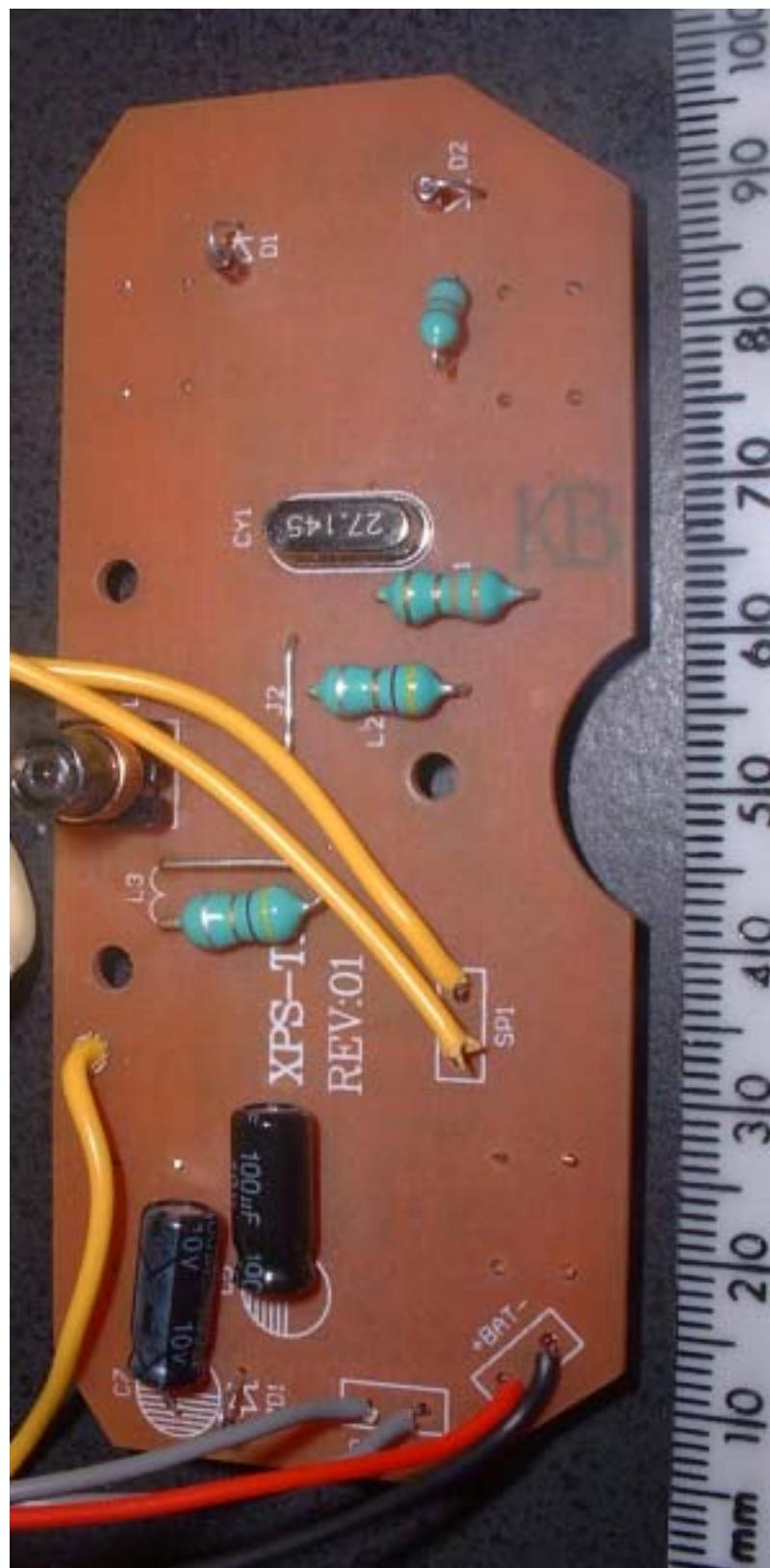
12.2. Figure 6 Transmitter and Ancillary as Supplied View 1



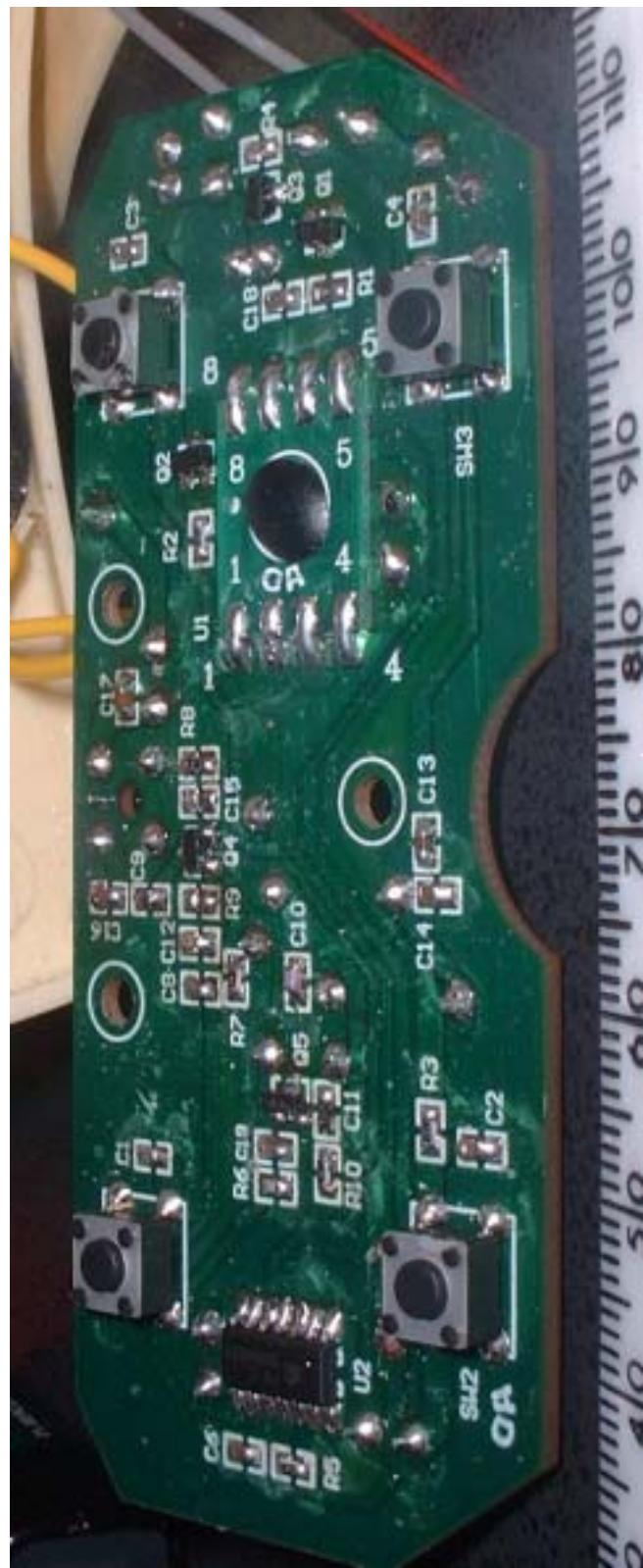
12.3. Figure 7 Transmitter and Ancillary as supplied View 2



12.4. Figure 8 Transmitter Circuit Board View 1



12.5. Figure 9 Transmitter Circuit Board View 2



Last page
Intentionally left blank