

**Radio Technology & Compatibility  
Group**

Measurement of local oscillator  
emissions from a range of  
domestic television receivers  
in accordance with the requirements of  
British Standard EN 55013.

for

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RA1/ERU

Project No. 466  
**(final report)**

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## **1.0 INTRODUCTION**

- 1.1 The objective of Project 466 is to measure local oscillator (LO) emission levels both radiated and conducted, from a range of typically available TV receivers, in accordance with the requirements of British Standard (BS) EN 55013.
- 1.2 Conducted emission measurements were made on six of the most recently purchased Radio Technology and Compatibility Group (RTCG) stock receivers. From these six, the four most modern receivers were selected for radiated measurements.

## **2.0 TEST METHOD**

### **2.1 CONDUCTED EMISSIONS**

- 2.1.1 With the equipment set up as specified in BS EN 55013: 1997, the LO emission level at the antenna terminal of each equipment under test (EUT) was measured with the EUT set to low, mid and high channels (Ch21, Ch45 and Ch69), after allowing a one hour temperature stabilisation period.
- 2.1.2 Each test was repeated with the EUT switched off, in order to assess the system noise floor and to ensure that the measured signal was not emanating from the generator providing the test signal.
- 2.1.3 The levels indicated on the measuring receiver were corrected for losses incurred in the connecting leads, matching pad and combiner before being recorded in table 1. Each TV receiver is identified by means of its RTCG Plant Number.

### **2.2 RADIATED EMISSIONS**

- 2.2.1 With the equipment set up as specified in BS EN 55013: 1997, on a CISPR compliant open area test site (OATS), both horizontal and vertical components of the LO radiated emission from each EUT were measured with the EUT set to low, mid and high channels (Ch22, Ch45 and Ch69), after allowing a one hour temperature stabilisation period. Emissions on channel 21 could not be assessed, as their frequency coincides with channel 26 transmissions from Crystal Palace.
- 2.2.2 Each test was repeated with the EUT switched off, in order to assess the system noise floor and to ensure that the measured signal was not emanating from the generator providing the test signal.
- 2.2.3 The levels indicated on the measuring receiver were corrected for feeder losses and antenna factor before being recorded in table 2.

## **3.0 FURTHER WORK**

- 3.1 A useful extension to the results of this project might be measurement of LO emissions from TV satellite down-converters, VCRs and computer TV cards.

## 4.0 TABULATED RESULTS

### 4.1 Table 1 - LO conducted emission levels (dB $\mu$ V).

(ESVP measuring receiver set to CISPR)

Channel number	P/N 1807	P/N 2186	P/N 2185	P/N 2505	P/N 2392	P/N 1770
21	<b>57.18</b>	<b>34.78</b>	<b>20.88</b>	<b>39.38</b>	<b>33.58</b>	<b>39.78</b>
45	<b>53.78</b>	<b>41.58</b>	<b>42.88</b>	<b>40.78</b>	<b>37.98</b>	<b>43.58</b>
69	<b>59.28</b>	<b>46.08</b>	<b>48.28</b>	<b>42.58</b>	<b>34.08</b>	<b>41.68</b>
Purchase date	30/01/90	14/07/93	14/07/93	14/11/95	20/12/94	pre-1991

Level accuracy of ESVP measuring receiver =  $\pm 0.25$ dB at the 95% confidence level (interpolated from frequency response plot on NAMAS calibration certificate).

### 4.2 Table 2 - LO radiated emission levels (dB $\mu$ V/m)

(ESVP measuring receiver set to CISPR)

Channel number	P/N 2186		P/N 2185		P/N 2505		P/N 2392	
	Vpol	Hpol	Vpol	Hpol	Vpol	Hpol	Vpol	Hpol
22	<b>45.0</b>	<b>40.0</b>	<b>35.8</b>	<b>34.0</b>	<b>45.2</b>	<b>44.1</b>	<b>48.5</b>	<b>44.1</b>
45	<b>46.4</b>	<b>46.1</b>	<b>42.5</b>	<b>40.0</b>	<b>42.4</b>	<b>42.4</b>	<b>51.3</b>	<b>46.1</b>
69	<b>49.4</b>	<b>49.3</b>	<b>48.6</b>	<b>46.3</b>	<b>44.5</b>	<b>43.8</b>	<b>55.5</b>	<b>46.1</b>
Purchase date	14/07/93		14/07/93		14/11/95		20/12/94	

Estimated uncertainty of measuring antenna is  $\pm 0.7$ dB from 501MHz to 700MHz and  $\pm 1.0$ dB from 701MHz to 1000MHz (taken from NPL calibration certificate).

## 5.0 EQUIPMENT USED

Type	Make	Model	Plant No.
Test receiver	R&S	ESVP	1698
Signal combiner	Suhner	-6dB resistive	0206
Matching pad	Rosenberger	75/50 $\Omega$ minimum loss resistive	2615
Video Generator	Philips	PM 5519	1533
IF modulator	Philips	PM 5680	2220
Up converter	Philips	PM 5690	1822
Tuned dipole antenna	Anritsu	MP651A	0326
Turntable	EMCO	1061-2.03	2292
Antenna mounting	EMCO	Universal	2322
Antenna mast	EMCO	1050 (four metre)	0216