Control Design and Testing, Inc. 6010 Red Fox Drive – Spotsylvania, VA 22553

Radiated Emissions Test Report Prepared for ADRad Communications, Inc. November 29, 2001

A. DEVICE UNDER TEST

The device is a VHF Repeater operating under Part 90 of the FCC rules. The device is configured as a metal cased, rack mountable unit, powered from an external DC source of 13.8 volts, nominal. The device covers the frequency range of 216.000 MHz. to 222.000 MHz.

B. MEASUREMENT PROCEDURE:

Radiation measurements were conducted according to the procedures set forth in ANSI C63.4 (1992). The device was tested as follows:

The unit was placed on the center of the turntable directly on top of the DC supply. A 50 ohm, 100 watt load termination was connected to the transmitter section output terminal (type N) and an EMCO model 3148A log periodic antenna (200 to 1000 Mhz.) was connected to the receiver section input terminal (BNC). The test sample was provided with an external, plug-in switch to lock the the device in transmit mode. The test was conducted with the device positioned as shown in the photographs. The unit was tested the low, mid and high ends of its band.

The device was scanned from 30 MHz. to 4 GHz. and all emissions within -30 dB. of the limit were noted. For transmitter cabinet radiation measurements, the tables below only record emissions up to the $12^{\rm th}$ harmonic. Although higher harmonic emissions were detected, all were more than 30 dB. below the limit. In this case, the only transmitter emissions detected were those harmonically related to the fundamental transmit frequency.

For receiver section measurements, the device was checked in both the active and inactive states. A search was made specifically for emissions from the processor crystal and local oscillators but were nothing that could be related those frequencies was detected. The receiver emissions that are recorded in the tables were present in both states and at all three channel settings.

The field strength measurements were taken using an HP8596E spectrum analyzer, an EMCO 3121C dipole set and an Avantek UJ210 preamp. The devices were powered by an HP6264 power supply.

At each detected frequency of emission, the device was measured by rotating the turntable and adjusting the antenna height over a range of 1 to 4 meters to obtain the maximum emission level. This procedure was performed with both horizontal and vertical antenna polarizations. The peak reading for each frequency was recorded. The computed field strength for the readings appear in the tables below.

Table 1

RADIATED EMISSIONS DATA	CLIENT: ADRAD COMMUNICATIONS
ANTENNA: DIPOLES/DRG HORN	EUT: VHF REPEATER
MODEL: MX800FFHNSZ2CD	TEST DATE: 19-NOV-01

		Ant.	Peak	Duty	Peak	Adjusted	
Frequency	Ant.	Factor	reading	cycle	power	power	FCC limit
MHz.	H/V	dB	dBm	dB	uV/m@3m	uV/m@3m	uV/m3m

Low Channel:	: 216.0	216.000 MHz. TRANSMIT MODE CABINET RADIATION							
432.000	V	23.2	-68.90		1161		7385		
648.000	V	27.2	-87.22		223		7385		
864.000	V	29.9	-83.76		454		7385		
1080.000	V	26.5	-89.01		168		7385		
1296.000	V	27.6	-77.59		709		7385		
1512.000	V	28.7	-91.48		163		7385		
1728.000	V	29.8	-92.57		163		7385		
1944.000	V	30.7	-99.25		84		7385		
2160.000	V	31.6	-90.53		253		7385		
2376.000	Н	32.4	-94.05		185		7385		
2592.000	Н	33.1	-94.11		199		7385		

Table 2

RADIATED EMISSIONS DATA CLIENT: ADRAD COMMUNICATIONS

ANTENNA: DIPOLES/DRG HORN EUT: VHF REPEATER MODEL: MX800FFHNSZ2CD TEST DATE: 20-NOV-01

		Ant.	Peak	Duty	Peak	Adjusted	
Frequency	Ant.	Factor	reading	cycle	power	power	FCC limit
MHz.	H/V	dB	dBm	dB	uV/m@3m	uV/m@3m	uV/m3m

Mid Channel:	219.0	219.000 MHz. TRANSMIT MODE CABINET RADIATION						
438.000	V	23.3	-69.93		1044		7385	
657.000	V	27.3	-91.42		139		7385	
876.000	V	30.1	-82.27		551		7385	
1095.000	V	26.6	-89.03		169		7385	
1314.000	V	27.7	-80.29		525		7385	
1533.000	V	28.7	-89.84		196		7385	
1752.000	V	29.8	-86.05		345		7385	
1971.000	V	30.8	-100.18		76		7385	
2189.999	Н	31.7	-87.37		369		7385	
2408.999	Н	32.5	-98.94		107	·	7385	
2627.999	Н	33.3	-85.73		535		7385	

Table 3

RADIATED EMISSIONS DATA CLIENT: ADRAD COMMUNICATIONS

ANTENNA: DIPOLES/DRG HORN EUT: VHF REPEATER MODEL: MX800FFHNSZ2CD TEST DATE: 20-NOV-01

		Ant.	Peak	Duty	Peak	Adjusted	
Frequency	Ant.	Factor	reading	cycle	power	power	FCC limit
MHz.	H/V	dB	dBm	dB	uV/m@3m	uV/m@3m	uV/m3m

High Channe	l: 222.0	000 MHz.		TRANSM	IIT MODE C	ABINET RAD	NOITAIC
444.000	V	23.4	-72.98		743		7385
666.000	V	27.5	-94.35		102		7385
888.000	V	30.2	-84.08		453		7385
1110.000	V	26.7	-88.41		184		7385
1332.000	V	27.8	-80.22		536		7385
1554.000	V	28.8	-94.40		117		7385
1776.000	V	29.9	-101.57		58		7385
1998.000	V	30.9	-102.32		60		7385
2219.999	V	31.8	-79.83		888		7385
2441.999	Н	31.7	-96.51		129		7385
2663.998	Н	33.2	-92.1		254		7385

Table 4

RADIATED EMISSIONS DATA
ANTENNA: DIPOLES

MODEL: MX800FFHNSZ2CD

CLIENT: ADRAD COMMUNICATIONS
EUT: VHF REPEATER
TEST DATE: 20-NOV-01

All Channels:				RECEIVE MODE CABINET RADIATION			
		Ant.	Peak	Duty	Peak	Adjusted	
Frequency	Ant.	Factor	reading	cycle	power	power	FCC limit
MHz.	H/V	dB	dBm	dB	uV/m@3m	uV/m@3m	uV/m3m
304.806	Н	19.9	-106.08		11		150
314.639	Н	20.2	-104.45		14		150

C. FACILITY

Radiated emissions testing for this device was conducted by Control Design & Testing, Inc. Testing was performed at the Hyak Laboratories three meter open area test site located in Spotsylvania, VA. FCC test site #90660.