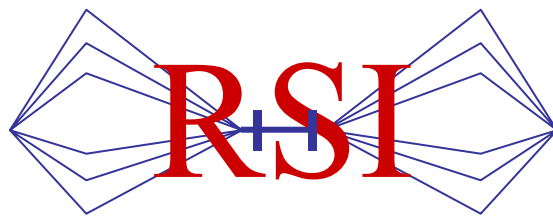


***RUBICOM SYSTEMS, INC.***



**FCC TEST REPORT  
(INTENTIONAL RADIATOR)  
FOR THE  
ROCKWELL COLLINS, INC.  
VHF-2100 COMMUNICATIONS TRANSCEIVER  
(118-137MHz)**



**NOVEMBER 2003**

Rubicom Systems, Inc.  
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FCC TEST REPORT  
(INTENTIONAL RADIATOR)  
FOR THE  
ROCKWELL COLLINS, INC.  
VHF-2100 COMMUNICATIONS TRANSCEIVER  
(118-137MHz)  
S/N: 18J9V

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**ABSTRACT**

This report presents test results of emanations found emitting from the Rockwell Collins VHF-2100 and the comparison of these emissions to the requirements of FCC, Title 47, Part 15, Subpart C for spurious radiated emissions.

This testing was performed on a 3 meter open area test site at Rubicom Systems, Inc. (RSI). The testing was performed for Rockwell Collins, Inc. under purchase order 4501172903 and is filed under JA-2006 at RSI. The results of this test effort demonstrate compliance of the Rockwell Collins, VHF-2100 to FCC, Title 47, Part 15, Subpart C intentional radiators.

Equipment under test (EUT) was a Rockwell Collins VHF-2100 Transceiver, s/n: 18J9V.

## 1.0 INTRODUCTION

### 1.1 Purpose

The purpose of this report is to show compliance of the Rockwell Collins, Inc. Model VHF-2100 to the requirements of Part 15 of the FCC Rules and Regulations (47CFR, Part 15, Subpart C) for intentional radiators. The tests were performed on a 3 meter site.

### 1.2 Requirements

The test requirements are as follows:

#### RADIATED RX MODE (15.209A)

Frequency (MHz)	3 Meter Field Strength ( $\mu\text{V}/\text{m}$ )	3 Meter (dB $\mu\text{V}/\text{m}$ )
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
960 - Above	500	54 Avg. 74 Peak

#### CONDUCTED TX MODE (CFR 87.139)

Harmonics of transmitter attenuated by at least 43dB. This test was performed as a conducted test on the antenna port up to the 10<sup>th</sup> harmonic. No signals appear at the antenna port other than the intended transmit signal.

### 1.3 Equipment Under Test

The VHF-2100 Transceiver is a solid state, 2280 channel AM transceiver designed to provide air to air or air to ground voice or data communications in the 118.000 to 136.975MHz VHF band. It operates in communications systems having 25KHz or 8.33KHz channel spacing. The unit supports voice mode, mode 2 and mode 3.

The unit operates on 27.5 VDC and is packaged for use in configurations that do not use ARINC standard packages. Power output is 30 watts in voice mode and 20 watts in modes 2 and 3. A low pass filter at the output attenuates transmitter harmonics of at least 60dB below the carrier level.

### 1.4 Summary of Results

Results are presented in Paragraph 6.0. The VHF-2100 meets the requirements stated in Paragraph 1.2.

## 2.0 APPLICABLE DOCUMENTS

The following documents form a part of this report to the extent expressed herein:

FCC Code of Federal Regulations Title 47, Part 15
FCC Procedure for Measuring RF Emissions from Computing Devices FCC/OET MP-4, July 1987
ANSI C63.4-1992
FCC Characteristics of Open Field Test Sites Bulletin OET 55, October 1989

### **3.0 TEST SITE DESCRIPTION**

This testing was performed at Rubicom Systems, Inc. 3 meter open area test site. The description of the measurement facility was found to be compliant with the requirements of Section 2.948 of the FCC rules. A copy of the compliance letter is attached to this report as Appendix A.

#### **3.1 Environmental Conditions**

Environmental conditions during testing of the EUT were as follows:

Date: November 6, 2003

Temperature: 73°

Barometer: 29.30 inches

Humidity: 84%



#### 4.0 TEST INSTRUMENTATION

The following test equipment was used to perform this testing.

Qty.	Description	Manufacturer	Model No.	Last Cal.	Cal. Cycle
1	Spectrum Analyzer	Advantest	3265A	05/21/04	1 Yr.
1	BiLog Antenna	Chase	CLB6111B	07/15/04	1 Yr.
1	Amplifier	Hewlett Packard	8449B	05/08/04	1 Yr.
1	Ridge Guide Horn	Electro Metrics	RG-180	05/30/04	1 Yr.
1	Plotter	Hewlett Packard	7440A	NCR	N/A

## **5.0 TEST SAMPLE SETUP AND CONFIGURATION**

The Rockwell Collins, Inc. VHF-2100 was placed on the nonconductive 80cm high manual turntable. The unit was configured with a DC power supply, VHF antenna port to a 30dB attenuator and 50ohm termination. The system cable was coiled on the table with the EUT and dummy load. The DC power supply was located below the EUT.

Photo 1 presents the equipment setup for radiated tests. Photo 2 presents the equipment setup for the conducted measurements.



PHOTO 1



PHOTO 2

## **6.0 PROCEDURES AND RESULTS**

### **6.1 Radiated Emissions (Receive Mode)**

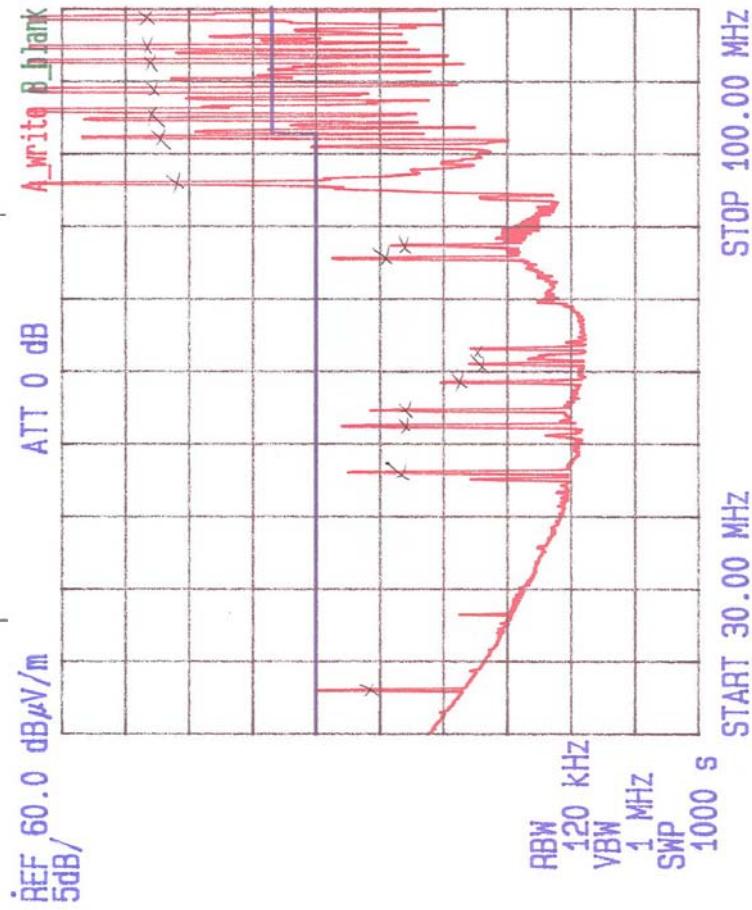
Data Sheets 6.1-1 through 6.1-10 present the scans during electric field testing on the open air test site in Voice Mode. Data Sheets 6.1-11 through 6.1-20 present Mode 2 operation and Data Sheets 6.1-21 through 6.1-30 present Mode 3 operation. There were no signals detected from the transceiver in the receive mode, therefore no tabulated data is listed in this section. Data Sheets 6.1-31 through 6.1-40 present the ambient scans. Data Sheets 6.1-41 through 6.1-48 are the pre-scans performed in an anechoic chamber for signal and frequency identification.

### **6.2 Spurious Emissions (TX Mode)**

Spurious results are presented in Data Sheets 6.2-1 through 6.2-3. The results are for three transmit channels (low, mid and high). This data was collected at the antenna port (attenuated by 20dB) and measured as a conducted measurement to prove the harmonic levels to be greater than 43dB below the transmit signal. Data sheet 6.2-1 is the conducted spurious signal in Voice Mode at the Min, Mid and Max frequencies of 117MHz, 127MHz and 136.975MHz. Data Sheet 6.2-2 presents the data for Mode 2 operation and Data Sheet 6.2-3 presents Mode 3 data.

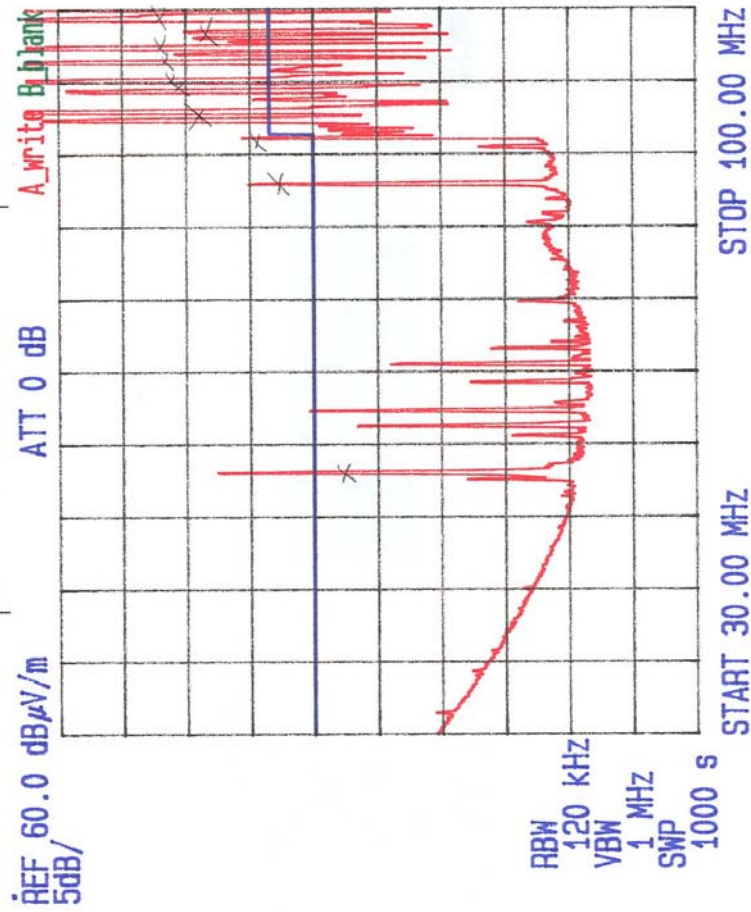


TEST: RADIATED EMISSIONS	EUT: VHF2100 VOICE MODE	S/N: 18J9V
FREQ: 30M-100MHz	SPEC: FCC PART 15	ANT. HT/POL: 1-4M / H
DETECTOR: QUASI PEAK	LINE UNDER TEST: N/A	EUT POSITION: 0-360
DATE: 11/21/03	TEST SITE: 3 METER	TESTER: AB





TEST: RADIATED EMISSIONS	EUT: VHF2100 VOICE MODE	S/N: 18J9V
FREQ: 30M-100MHz	SPEC: FCC PART 15	ANT. HT/POL: 1-4M / V
DETECTOR: QUASI PEAK	LINE UNDER TEST: N/A	EUT POSITION: 0-360
DATE: 11/7/03	TEST SITE: 3-METER	TESTER: AB

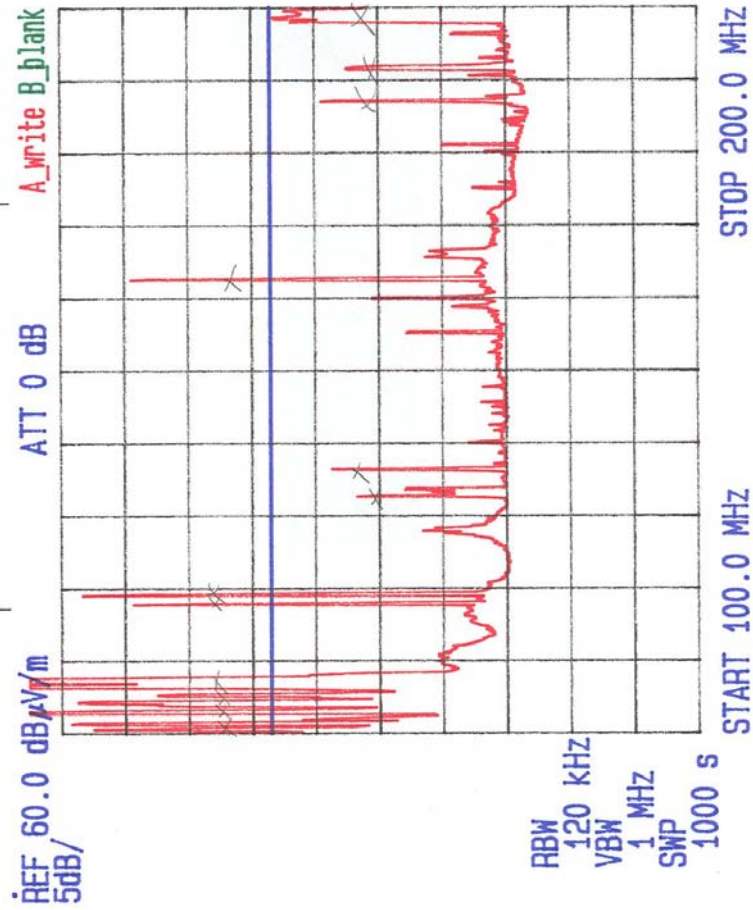


DATA SHEET 6.1-2





TEST: RADIATED EMISSIONS	EUT: VHF2100 VOICE MODE	SIN: 18J9V
FREQ: 100M-200MHz	SPEC: FCC PART 15	ANT. HT/POL: 1.4M / H
DETECTOR: QUASI PEAK	LINE UNDER TEST: N/A	EUT POSITION: 0-360
DATE: 11/12/03	TEST SITE: 3-METER	TESTER: AB

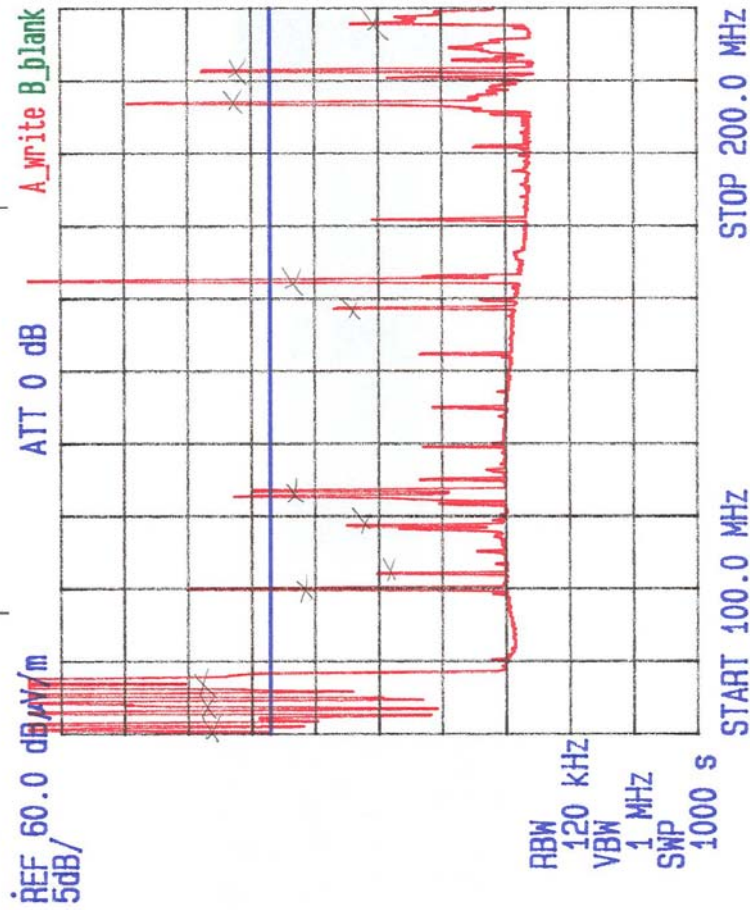


DATA SHEET 6.1-3





TEST: RADIATED EMISSIONS	EUT: VHF2100 VOICE MODE	S/N: 18J9V
FREQ: 100M-200MHz	SPEC: FCC PART 15	ANT. HT/POL: 1-4M / V
DETECTOR: QUASI PEAK	LINE UNDER TEST: N/A	EUT POSITION: 0-360
DATE: 11/7/05	TEST SITE: 3-METER	TESTER: AB



DATA SHEET 6.1-4



TEST: RADIATED EMISSIONS	EUT: VHF2100 VOICE MODE	SIN: 18J9V
FREQ: 200M-1GHz	SPEC: FCC PART 15	ANT. HT/POL: 1-4M / H
DETECTOR: QUASI PEAK	LINE UNDER TEST: N/A	EUT POSITION: 0-360
DATE: 11/1/03	TEST SITE: 3-METER	TESTER: AB

