

**FCC ID: PQ9MCW4**

**Exhibit 2a**

**Engineering Report on**

**ERP (2.1046)**



# Assessment of Compliance

for

Measurement of Effective radiated Power (ERP) in  
Accordance with the FCC Rules & Regulations Part 2.1046  
and 90

## Wireless Data Relay

MCW4 with a Research In Motion

R802-M-2-0 radio transmitter

Remtrol, Inc.



July 2001

REMB-MCW4 w. RIM 802D-3734

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## Engineering Report

**Subject:** Measurement of Effective Radiated Power (ERP) in accordance with the FCC Rules & Regulations Parts 2.1046 and 90

**FCC ID:** PQ9MCW4

**Equipment:** Wireless Data Relay

**Model:** MCW4

**Client:** Remtrol, Inc.  
141 Suburban Rd. A2  
San Luis Obispo, CA 93401  
U.S.A.

**Project #:** REMB-MCW4 w. RIM 802D-3734

**Prepared by:** APREL Laboratories,  
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Nepean, Ontario  
K2R 1E6

**Approved by:**

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Technical Director, Standards & Certification

**Date:**

*July 27, 2001*

**Submitted by:**

*Jay Sarkar*  
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Technical Director, Standards & Certification

**Date:**

*July 27, 2001*

**Released by:**

*Dr. Jack J. Wojcik*  
Dr. Jack J. Wojcik, P.Eng.

**Date:**

*July 27/01*



**FCC ID:** PQ9MCW4  
**Applicant:** Remtrol, Inc.  
**Equipment:** **Wireless Data Relay**  
**Model:** MCW4  
**Standard:** FCC Rules and Regulations Part 2.1046 and 90

### ENGINEERING SUMMARY

This report contains the results of the effective radiated power (ERP) measurement performed on a Remtrol Monitoring and Control Solutions **Wireless Data Relay** operating with a built-in Research in Motion ARDIS radio transmitter. The measurements were carried out in accordance with the FCC Rules and Regulations Part 2.1046 and 90. The product was evaluated for ERP when it was set at the maximum power level.

The **MCW4** was tested for ERP at high, middle, and low frequencies with the maximum ERP obtained at channel No.: 24BO with the frequency being 821.00 MHz. The test data is presented in this report under the section: Test Results. **The measured ERP is 1.349 W.**  
(The results presented in this report relate only to the sample tested.)

### Summary of the Results

Test Description	Page No.	Test Set-up Figure No.	Results Summary
RF Power Output as Radiated Ref. Paragraph 2.1046 and 90	8	1	<b>Passed</b>

## INTRODUCTION

### General

This report describes the results of the effective radiated power (ERP) measurement conducted on a Remtrol **Wireless Data Relay** model: **MCW4** operating with a built-in Research in Motion ARDIS radio transmitter.

### Test Facility

The tests were performed for **Remtrol** by APREL Laboratories at APREL's EMI facility located in Nepean, Ontario, Canada. The laboratory operates an (3m and 10m) Open Area Test Site (OATS). The measurement facility is calibrated in accordance with ANSI C63.4-1992.

A description of the measurement facility in accordance with the radiated and AC line conducted test site criteria per ANSI C63.4-1992 is on file with the Federal Communications Commission and is in compliance with the requirements of Section 2.948 of the Commissions rules and regulations.

***APREL's registration number is: 90416***

APREL is accredited by Standard Council of Canada. APREL is also accredited by Industry Canada and recognised by the Federal Communications Commissions (FCC).

### Standard

The evaluation and analysis were conducted in accordance with FCC Rules and Regulations Parts 2.1046 and the appropriate limits.

### Test Equipment

The test equipment used during the evaluation is listed in Appendix A with calibration due dates.

### Environmental Conditions

Measurements were conducted in open area test site.

- Temperature: 25 °C ± 2
- Relative Humidity: 30 - 50 %
- Air Pressure: 101 kPa ± 3

## FCC SUBMISSION INFORMATION

**FCC ID:** PQ9MCW4

**Equipment:** Wireless Data Relay

**Model:** MCW4 With A Research in Motion R802D-2-O transceiver

**For:** Certification

**Applicant:** **Remtrol, Inc..**  
141 Suburban Rd. A2  
San Luis Obispo, CA 93401  
U.S.A.

**Manufacturer:** **Remtrol, Inc..**  
141 Suburban Rd. A2  
San Luis Obispo, CA 93401  
U.S.A.

**Evaluated by:** **APREL Laboratories**  
51 Spectrum Way  
Nepean, Ontario  
Canada K2R 1E6

## MANUFACTURER'S DATA

**FCC ID No:** PQ9MCW4

**Equipment Type:** Wireless Data Relay

**Model:** MCW4

**Reference:** FCC Rules and Regulations Parts 2 and Part 90

**Manufacturer:** Remtrol

**Power Source:** 6 V Rechargeable Battery

**Development Stage of Unit:** Production

## GENERAL SPECIFICATIONS

1. Frequency Range: 806.00 to 821.00 MHz (Transmitter)
2. Measured ERP 1..349 W
3. Emission Designators (See 47 CFR § 2.201 and §2.202): 20K0F1D
4. Antenna Impedance: 50 Ohms



**Test:** RF Power Output as Radiated (ERP)

**Ref.:** FCC Part 2 paragraph 2.1046 and 90

**Criteria:** N/A

**Set-up:** See Figure No. 1.

**Equipment:** See Appendix A.

**Methodology:** RF Power Measurement by Radiated Method (ERP):

Test site: The radiated RF power measurement was taken at APREL Laboratory's open area test site (OATS). This open area test site is calibrated to ANSI C63.4 document and a description of the measurement facility is on file with the Federal Communications Commission and is in compliance with the requirement of Section 2.948 of the Commissions rules and regulations. (FCC File No.: 90416)

The test was set-up as illustrated in Fig.1. The DUI was configured to operate at maximum power with carrier **unmodulated**. The equipment under test was placed on a turntable positioned 3 m away from the calibrated receiving antenna, which in turn was connected to the spectrum analyzer.

For each transmitter frequency, the received signal was **maximised** by rotating the turntable and adjusting the height of the receiving antenna. To obtain the actual ERP, the DUI was replaced by a vertically polarised half-wave dipole antenna resonant to that frequency and fed by a RF power amplifier and signal generator. The center of the dipole antenna was placed precisely in the same location as the DUI . It was ensured that the orientation of the rotating table and the height of the receiving antenna were unmoved. The signal generator level was adjusted until the peak reading on the spectrum analyzer was identical to that obtained when the Hand Held Computer was on the turntable. The two signals were matched by superimposing one signal to the other on the spectrum analyzer screen. The output of power amplifier was disconnected from the substitute dipole antenna and connected to a RF power meter. **The effective radiated power was read directly form the power meter.**

**The process was repeated for two more channels.**

**Results:** See Table 1

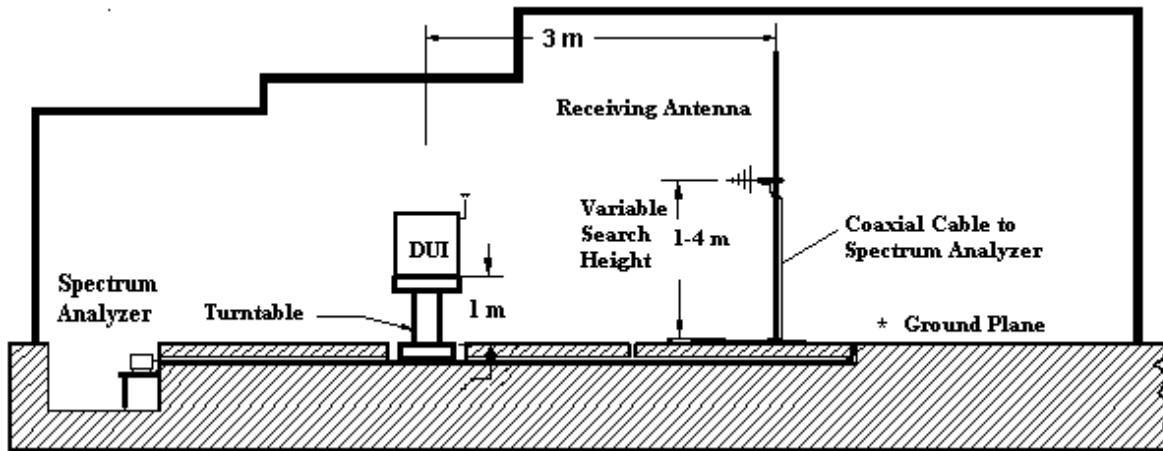
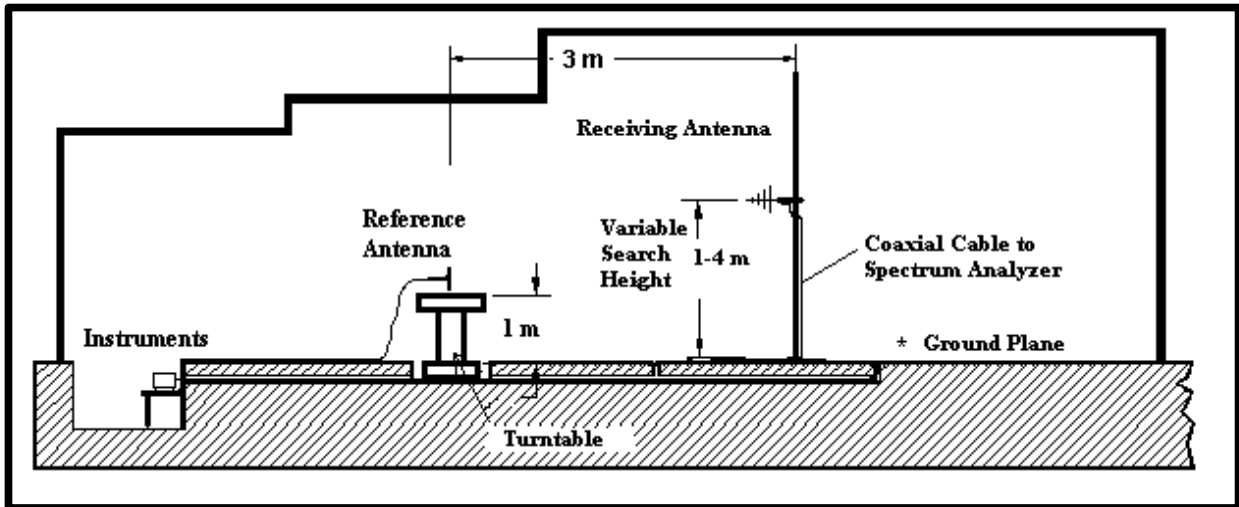


Figure 1.a Test set up for the Radiated Power (ERP) Measurement in OATS (not to scale)



Fig. 1.b APREL's OATS (Open Area Test Site)



**Figure 1.c Test set up for the Radiated Power (ERP) Measurement in OATS (not to scale)**  
**The DUI is replaced by Reference Dipole Antenna.**

**Table 1.**  
**RF Output Power Measurement**  
**ERP**

Channel No.	Nominal Transmit Frequency	Measured Output Power ERP	ERP
	(MHz)	(dBm)	(W)
2000	806.00	30.1	1.023
22D0	815.00	30.2	1.047
24B0	821.00	31.3	1.349

Test performed by: Kulcha Roman Date: June 23, 2001

# APPENDIX A

## List of Test Equipment

### List of Equipment used

Description	Manufacturer	Model #	Asset #	Calibration Due Data
Spectrum Analyzer	Anritsu	MS2661C	301330	Dec 10, 2001
Power Meter	Rhode & Schwarz	NRVS	100851	July 21, 2002
20 dB Attenuator	Pasternack	PE7002-20	301370	CBT
Signal Generator	Hewlett-Packard	HP 8340B	100955	Oct 5, 2001
RF Power Amplifier	Amplifier Research	25W100M	100735	CBT
Reference Half wave Dipole	APREL Inc.	D-8355	N/A	June 16, 2002
Log Periodic Antenna	Eaton	ALP-1	100553	July 21, 2002
Turntable with Controller	EMCO	1060-1.241	100506	CNR
Computer Controlled Antenna Position Mast	EMCO	1051-12	100507	CNR
OATS	APREL Inc.	3m & 10m	N/A	N/A

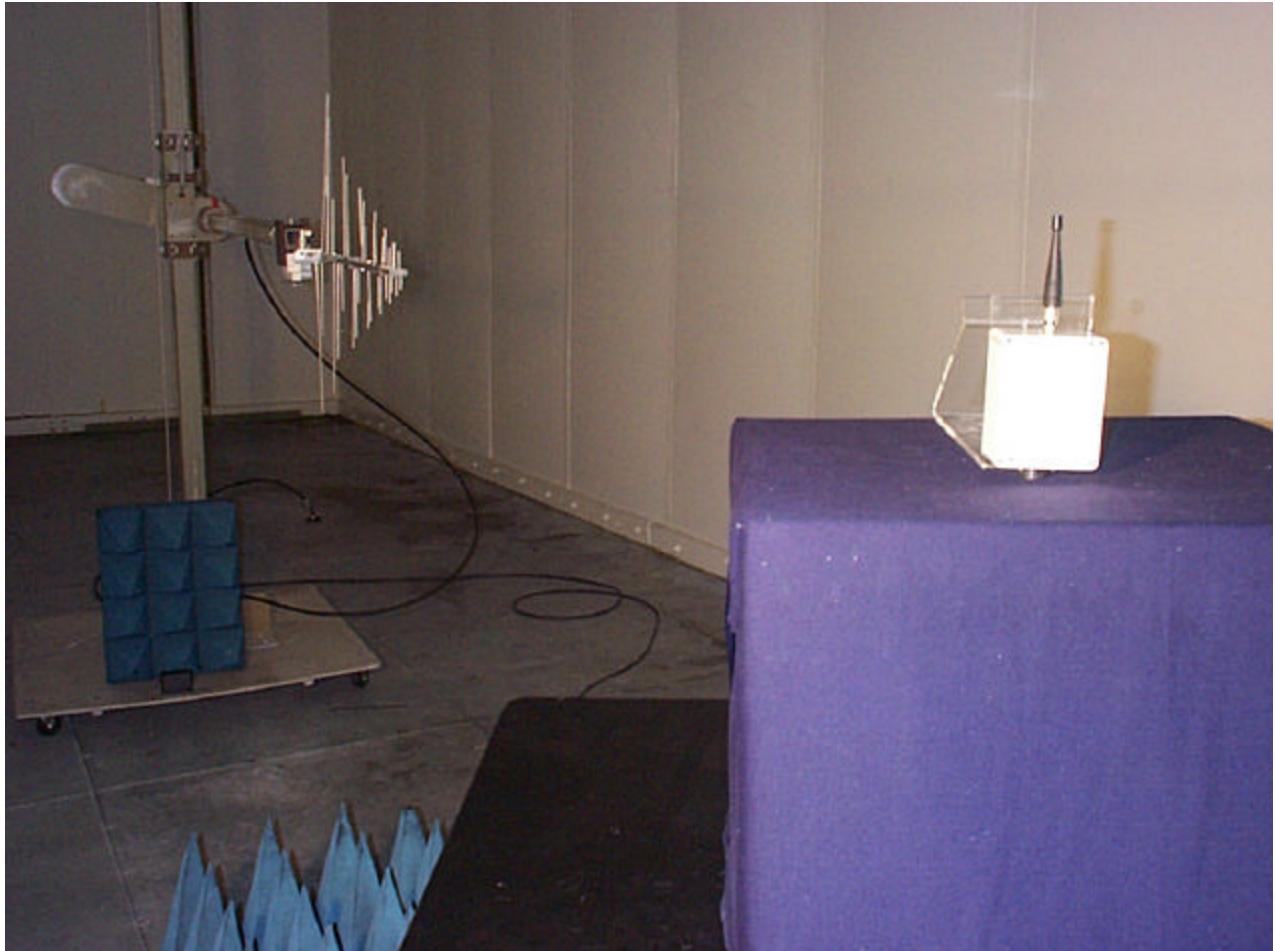
# ***APPENDIX B***

## **PHOTOGRAPHS**

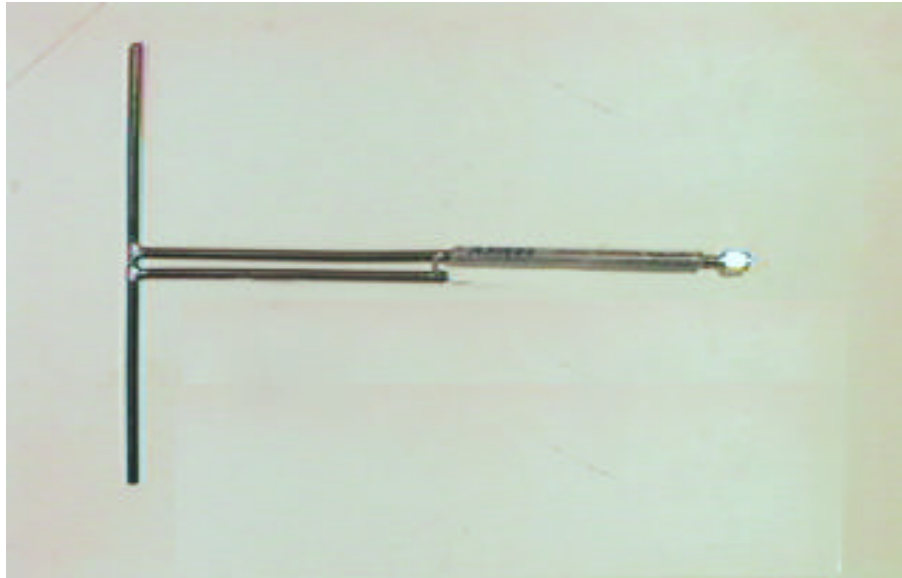


**Sample Installed Remtrol, Inc. MCW4  
With RIM ARDIS R802**





**MCW4 Tested for ERP at the OATS**



**Reference Dipole Antenna Used for ERP Measurement**