

# Certification Test Report

For a

## Remote Control

**Manufacturer:**

TeleRadio Remote Control  
1006 Corporate Lane, Unit C  
Murry Corporate Park  
Export, PA 15632 USA

**Testing Facility:**

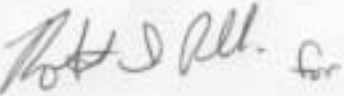
F-Squared Laboratories  
10880 Moxley Road  
Damascus, MD 20872 USA

The Remote Control, model Tele Radio 860, has been tested and found to comply with the requirements of the Federal Communications Commission outlined in the Federal Register CFR 47, Part 15 subpart C. The product was received on April 25, 2003 and the testing was completed on May 14, 2003.

**Evaluation Conducted By:**

  
Shi-Lun Chau  
Senior EMC Engineer

**Report Reviewed By:**

  
John A. Harrington  
EMC Technical Manager



*success thru compliance*

F-Squared Laboratories  
9890 Main Street  
Damascus, MD 20872  
(301) 253-4500  
Fax (301) 253-5179

This report shall not be duplicated except in full without the written approval of F-Squared Laboratories.

**Client:** TeleRadio  
**Model:** Tele Radio 860

**Order Number:** 03017-01  
**Date:** May 14, 2003

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**Order Number:** 03017-01  
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## Exhibit I

### Engineering Statement

This report has been prepared on behalf of CSA International to provide documentation for the testing described herein. This equipment has been tested and found to comply with Part 15 subpart C of the FCC Rules under the regulation section 15.231, 15.207 section 15.209, using the standard ANSI C63.4 1992. The test results found in this report relate only to the items tested.

**EQUIPMENT UNDER TEST:** **TeleRadio**  
Trade Name: TeleRadio Remote Control  
Model No.: Tele Radio 860  
Power Supply: Input 100-120VAC, Output 12VDC

**APPLICABLE RULES:** CFR 47 Part 15

**EQUIPMENT CATEGORY:** **Remote Control**

**MEASUREMENT LOCATION:** F-Squared Laboratories in Damascus, MD. Site description and attenuation data are on file with the FCC's Sampling and Measurement Branch at the FCC Laboratory in Columbia, MD.

**MEASUREMENT PROCEDURE:** All measurements were performed according to the 1992 version of ANSI C63.4. A list of the measurement equipment can be found in Exhibit II.

**A2LA STATEMENT:** This laboratory is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with the laboratory's terms of accreditation unless stated otherwise in the report.

**A2LA CERTIFICATE NUMBER:** 793.01

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**UNCERTAINTY BUDGET:**

- Radiated Emission  
Combined Uncertainty (+ or -) 2.24 dB  
Expanded Uncertainty (+ or -) 4.48 dB
- Conducted Emission  
Combined Uncertainty (+ or -) 1.13 dB  
Expanded Uncertainty (+ or -) 2.26 dB

**ENGINEERING STATEMENT:**

I hereby state that: The measurements shown in this application were made in accordance with the procedures indicated and the energy emitted by this equipment was found to be within the limits. I assume full responsibility for the accuracy and completeness of these measurements.

I further state that: On the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 15 of the FCC Rules under normal use and maintenance.

Certified by:

  
John A. Harrington, EMC Technical Manager

Client: TeleRadio  
Model: Tele Radio 860

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## Exhibit II

### List of Measurement Instrumentation

Equipment Type	Manufacturer	Model No.	Serial No.	Calibration Due Date
Receiver System	Rohde & Schwarz	ESMI	DE23119	February 20, 2004
LISN #1	Solar	8012-50-R-24-BNC	910488	February 7, 2004
LISN #2	Solar	8012-50-R-24-BNC	933201	February 7, 2004
Attenuator	MCE/Weinschel	24-30-34	BN6466	Verified May 14, 2003
Combination Antenna	Sunol	BJ1	A101101	December 5, 2003
Biconilog Antenna	ETS/EMCO	3142	1330	May 2, 2004
Antenna Mast	Compliance Design, Inc.	M100	NA	NA
Microwave System Amplifier	HP	83006A	3104A00500	September 3, 2003
Turntable	F-Squared Laboratories	Site 1	NA	NA
Spectrum Analyzer	HP	8591E	35200804145	March 24, 2004
Pre-Amplifier	HP	8447D	1726A01006	July 30, 2003

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### Exhibit III

## Equipment Under Test Information and Data

- TEST ITEM CONDITION:** The equipment to be tested was received in good condition.
- TESTING ALGORITHM:** The EUT was powered on and the start key was pressed to enable continuous transmission during the test. The fundamental emission, harmonic emissions up to the 10<sup>th</sup> and the other worst case spurious emissions were recorded in the data tables.
- RADIATED EMISSION TESTING:** The EUT was tested at a distance of 3 meters. The emissions were maximized by rotating the table and raising/lowering the antenna mounted on a 4 meter mast. Both horizontal and vertical field components were measured. The output of the antenna was connected through a pre-amplifier, to the input of the receiver and emissions were measured in the range 30 MHz to 1 GHz. The values up to 1 GHz with a resolution bandwidth of 120 kHz are quasi-peak reading made at 3 meters. The measurements above 1 GHz with a resolution bandwidth of 1 MHz are peak reading at a distance of 3 meters. All data for radiated emissions is found in Exhibit VI.
- CALCULATION OF DATA:** **RADIATED EMISSIONS** – The antenna factors (included cable losses) of the antennas used, and the pre-amplifier gain, are input into the memory of the receiver. The receiver then corrects the reading for amplitude automatically. The field strength reading can then be taken directly from the receiver and compared to the FCC limits in dB $\mu$ V/m. The following equation is used to convert to  $\mu$ V/m:

$$E_{\mu V/m} = \text{antilog}(E_{dB_{\mu V/m}/20})$$

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**SAMPLE OF FIELD STRENGTH CALCULATION:**

$$E_a = V_a + AF + A_c + (-AG)$$

Where  $E_a$  = Field Strength (dB $\mu$ V/m)  
 $V_a$  = 20 x log10 (measure RF voltage,  $\mu$ V)  
 $A_c$  = Cable Loss Factor, dB  
 $AG$  = Amplifier Gain, dB  
 $AF$  = Antenna Factor dB(m-1)

I.e., if the reading is 57.0 dB $\mu$ V, the antenna factor 8.0 dB, cable loss factor 1.0 dB and Amplifier gain is 25.0 dB, the field strength will be:

$$\begin{aligned} E_a(\text{dB}\mu\text{V/m}) &= 57 + 8 + 1 + (-25) \\ &= 41 \text{ dB}\mu\text{V/m} \end{aligned}$$

OR

$$\begin{aligned} E_a(\mu\text{V/m}) &= 10^{(41/20)} \\ &= 112.20 \mu\text{V/m} \end{aligned}$$

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## Exhibit IV

### EUT Configuration and Cables

**EUT:**

Device	Manufacturer	Model No.
Remote Control	TeleRadio Remote Control	Tele Radio 860
Power Adapter	Mean Well	WA15-120
Test Fixture	TeleRadio Remote Control	Prototype

**Cable:** All one meter or greater in length – bundled according to ANSI C63.4 – 1992

Cable Descriptions	Shielded/Unshielded	Quantity
Power Adapter	Unshielded	1



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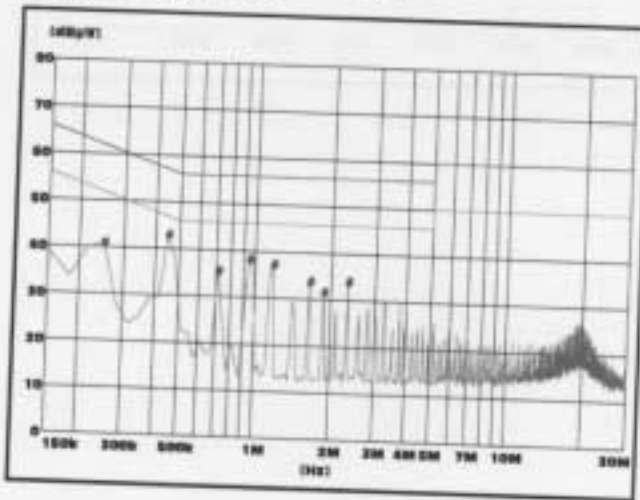
## Exhibit V

### Conducted Test Data

Test Date:	April 25, 2003	Test Engineer:	Shi-Lun Chau
Limit:	Class B	Air Temperature:	25 °C
Pass/Fail	Pass	Barometric Pressure:	987 mB
		Relative Humidity:	34 %

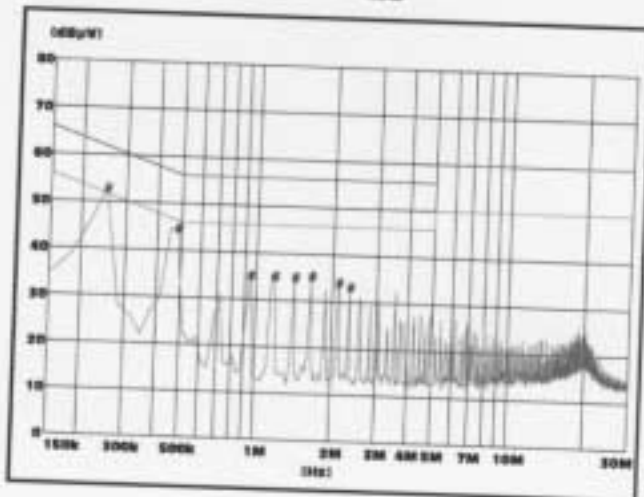
Frequency (MHz)	Quasi-Peak (dB $\mu$ V)	Average (dB $\mu$ V)
0.15 ~ 0.50	66.0 ~ 56.0	56.0 ~ 46.0
0.50 ~ 5.0	56.0	46.0
5.0 ~ 30.0	60.0	50.0

Conducted Test Line: L1



Peak Detected Value		
Frequency MHz	Level dB $\mu$ V	Ave. Limit dB $\mu$ V
0.25	41.00	51.76
0.45	42.97	46.88
0.71	35.58	46.00
0.95	38.30	46.00
1.18	37.39	46.00
1.64	33.88	46.00
1.87	31.67	46.00
2.34	34.14	46.00

Conducted Test Line: L2

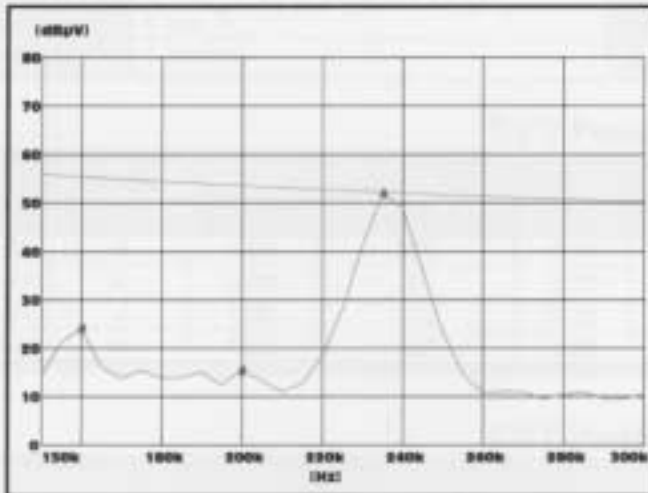


Peak Detected Value		
Frequency MHz	Level dB $\mu$ V	Ave. Limit dB $\mu$ V
0.25	52.94	51.76
0.48	44.70	46.34
0.95	35.20	46.00
1.18	35.15	46.00
1.41	35.00	46.00
1.64	35.33	46.00
2.11	34.13	46.00
2.34	33.25	46.00

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Conducted Test Line: L2



Ave. Detected Value		
Frequency MHz	Level dBµV	Ave. Limit dBµV
0.16	24.12	55.46
0.20	15.46	53.61
0.24	52.08	52.10

Client: TeleRadio  
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### Radiated Test Data

Test Date:	4/28/2003	Test Engineer:	Shi-Lun Chau
Standard:	FCC Part 15 (C) Section 15.231	Air Temperature:	21 °C
Limit:	Class B	Barometric Pressure:	997 mB
Distance:	3 Meters	Relative Humidity:	34 %

### EUT Position X

Frequency (MHz)	Antenna Polarization	Position		Cable Loss (dB)	Antenna Factor (dB/m)	Reading (dBµV)	Emission (dBµV/m)	FCC Limit (dBµV/m)	Margin (dBµV/m)
		Height (m)	Azimuth (Degrees)						
434.49	H	1.00	260	2.10	17.10	35.45	54.65	81.00	-26.35
434.49	V	1.00	0	2.10	17.10	50.77	69.97	81.00	-11.03
869.01	V	1.00	270	3.30	22.70	6.26	32.26	61.00	-28.74
1303.49	H	1.00	180	3.80	26.50	8.33	38.63	61.00	-22.37

### EUT Position Y

Frequency (MHz)	Antenna Polarization	Position		Cable Loss (dB)	Antenna Factor (dB/m)	Reading (dBµV)	Emission (dBµV/m)	FCC Limit (dBµV/m)	Margin (dBµV/m)
		Height (m)	Azimuth (Degrees)						
434.49	H	1.00	170	2.10	17.10	45.92	65.12	81.00	-15.88
434.49	V	1.00	315	2.10	17.10	34.99	54.19	81.00	-26.81
869.01	H	1.10	0	3.30	22.70	5.22	31.22	61.00	-29.78
1303.43	H	1.05	350	3.80	26.50	12.36	42.66	61.00	-18.34
1303.43	V	1.10	90	3.80	26.50	8.71	39.01	61.00	-21.99

### EUT Position Z

Frequency (MHz)	Antenna Polarization	Position		Cable Loss (dB)	Antenna Factor (dB/m)	Reading (dBµV)	Emission (dBµV/m)	FCC Limit (dBµV/m)	Margin (dBµV/m)
		Height (m)	Azimuth (Degrees)						
434.49	H	1.00	120	2.10	17.10	46.60	65.80	81.00	-15.20
434.49	V	1.25	160	2.10	17.10	36.67	55.87	81.00	-25.13
869.01	H	1.00	70	3.30	22.70	3.34	29.34	61.00	-31.66
1303.44	H	1.10	350	3.80	26.50	11.27	41.57	61.00	-19.43
1303.44	V	1.50	0	3.80	26.50	6.70	37.00	61.00	-24.00

Remark: The radiated emissions from the EUT, above the frequency of 1310.0 MHz, were below the noise floor of the receiver system. (Receiver System noise floor is 20 dBµV).

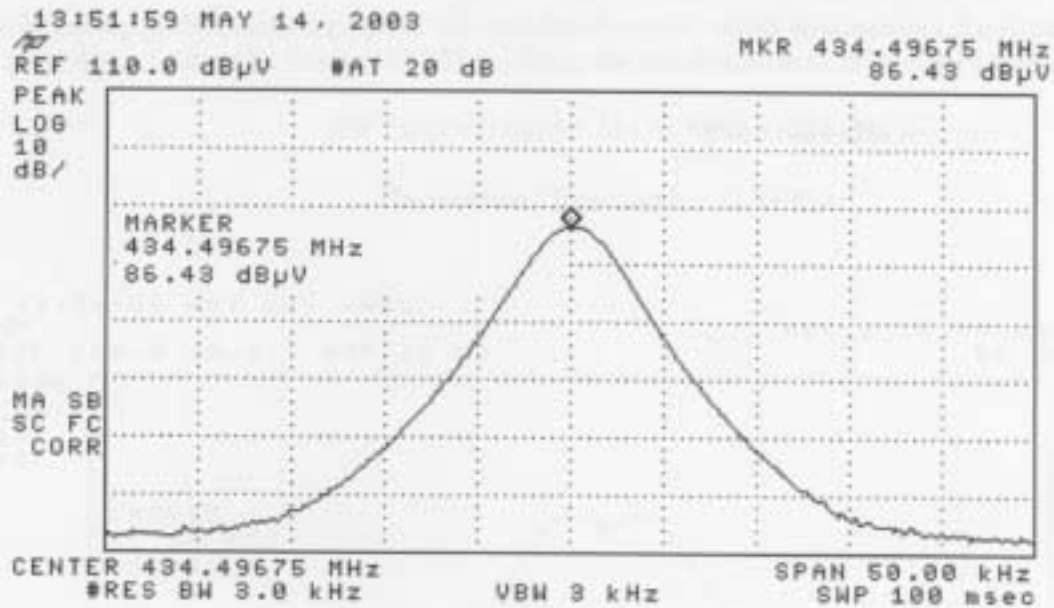
PASS

FAIL

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### 20 dB Bandwidth Measurement without modulation 30 dB External Attenuator



Client: TeleRadio  
Model: Tele Radio 860

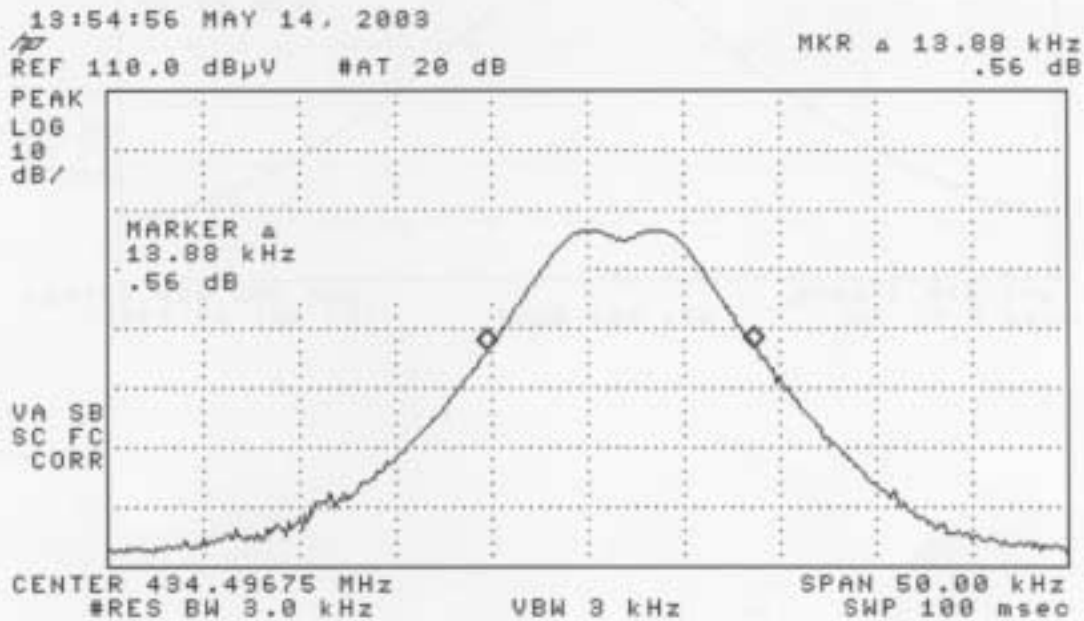
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### 20 dB Bandwidth Measurement with modulation 30 dB External Attenuator

The following plots include a graph of the modulated carrier, which demonstrates the Bandwidth at a 20 dB point down from peak. Section 15.231 (c) limits the Bandwidth to 0.25% of the center frequency:

$$\text{BW Limit} = 0.0025 * 434.49 \text{ MHz} = 1086 \text{ kHz}$$

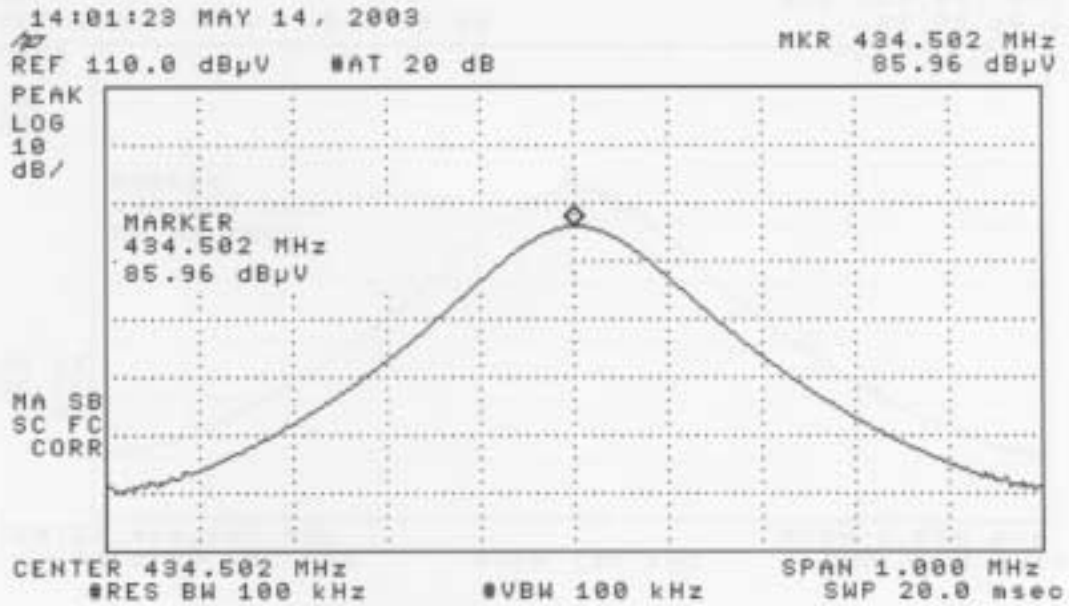
The measured Bandwidth = 13.88 kHz



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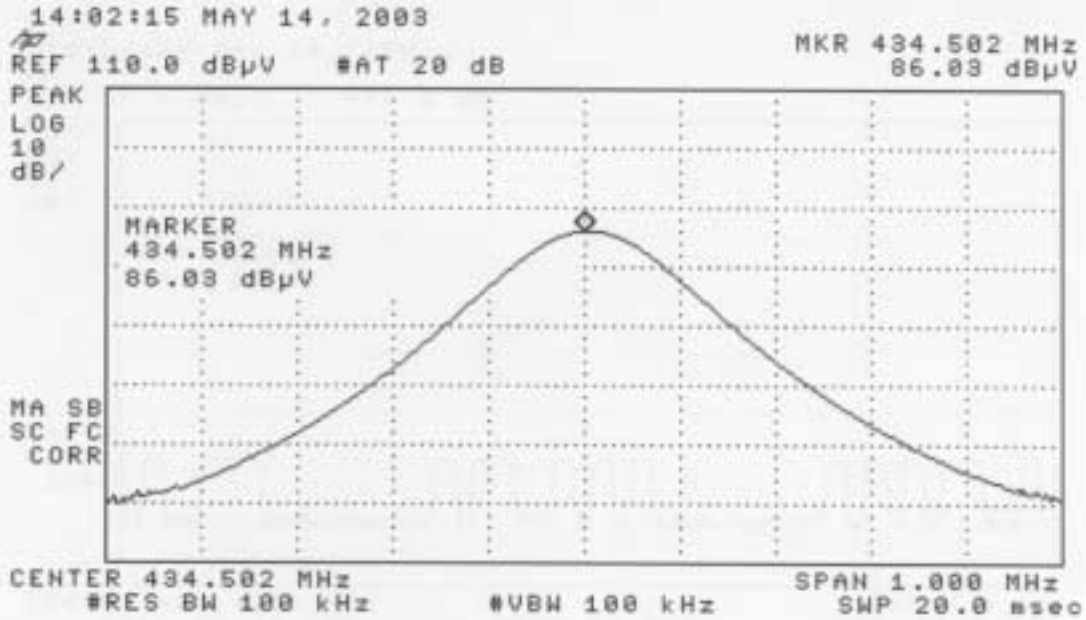
### Peak Carrier Power Level without modulation 30 dB External Attenuator



Client: TeleRadio  
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### Peak Carrier Power Level with modulation 30 dB External Attenuator



Client: TeleRadio  
Model: Tele Radio 860

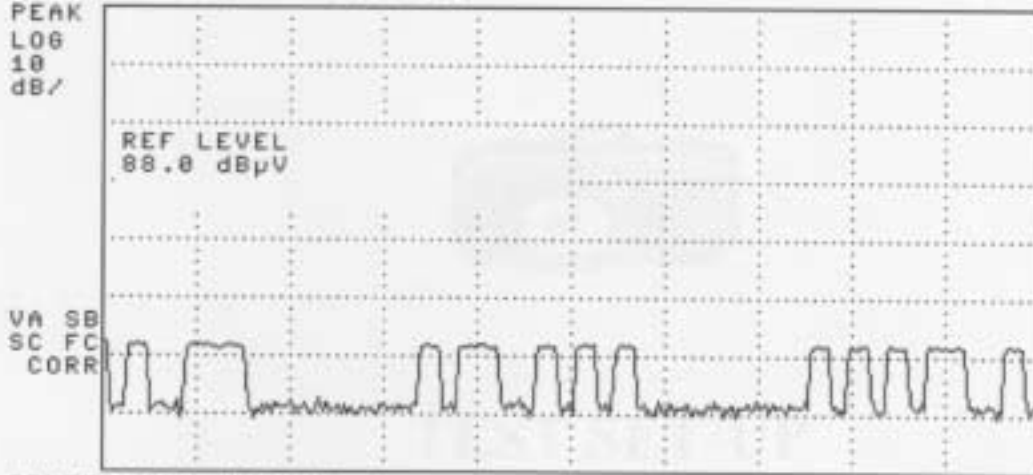
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### Duty Cycle Measurement

14:24:29 MAY 14, 2003

REF 88.0 dB $\mu$ V #AT 0 dB

PEAK  
LOG  
10  
dB/



CENTER 434.4955 MHz  
#RES BW 30 kHz

#VBW 30 kHz

SPAN 0 Hz  
SWP 20.0 msec



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## **Exhibit VII**

### **Modifications**

EUT COMPLIES

WITHOUT MODIFICATIONS