

**INSTRUMENT SPECIALTIES CO., INC. – WORLD COMPLIANCE CENTER  
EMC MEASUREMENT/TECHNICAL REPORT**

<b>FCC PART 15 Subpart C Section 15.231 MFGR: Martec Access Products EUT: KWT Transmitter FCC ID: KJ802-3039</b>	<b>Document No.</b>	<b>Revision</b>	<b>Issue Date</b>
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**EMC MEASUREMENT/TECHNICAL REPORT**

Manufacturer: Martec Access Products, Inc.  
Equipment Under Test: KWT Transmitter  
FCC ID No.: KJ802-3039

Test Report No.: 112384-A  
Purchase Order No.: 1702-00

**DOCUMENT HISTORY**

<b>Revision</b>	<b>Issue Date</b>	<b>Affected Page(s)</b>	<b>Description of Modifications</b>	<b>Revised By</b>	<b>Approved By</b>
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# EMC MEASUREMENT/TECHNICAL REPORT

**Document No.: 112384-A**

**From**

**Instrument Specialties Co., Inc.  
World Compliance Center**

**Test for  
Martec Access Products, Inc.  
KWT Transmitter**

Written By

\_\_\_\_\_  
Bridget A. Keesser, EMC Sales Representative

\_\_\_\_\_  
Date

Reviewed By

\_\_\_\_\_  
Grant Metzgar, Senior EMC Technician

\_\_\_\_\_  
Date

Authorized By

\_\_\_\_\_  
J. Fred Gardner, EMC Quality Assurance Manager

\_\_\_\_\_  
Date

## TEST PERSONNEL – Instrument Specialties Co., Inc.

Grant Metzgar, Senior EMC Technician	21, 23 December 1999
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## EUT RECEIPT/DISPOSITION INFORMATION

Date of Receipt of Equipment Under Test (EUT)	21 December 1999
Disposition of EUT	In House

<b>Test Facility</b>	Instrument Specialties Company Incorporated
<b>Address</b>	Shielding Way
<b>City, State Zip Code</b>	Delaware Water Gap, PA 18327
<b>Phone</b>	(570) 424-8510 ext. 1216
<b>Fax</b>	(570) 421-4227

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**EMC MEASUREMENT/TECHNICAL REPORT**

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## 1 MEASUREMENT/TECHNICAL REPORT SUMMARY

<b>Grantee</b> <b>Address</b> <b>City, State Zip Code</b> <b>Phone</b> <b>Fax</b>	Wayne Dalton Corp. 3395 Addison Dr. Pensacola, FL 32514 800-474-9890 850-474-1254
<b>Representative</b> <b>Manufacturer</b> <b>Manufacturer Address</b> <b>City, State Zip Code</b> <b>Phone</b> <b>Fax</b>	Bernard Kasmir Martec Access Products, Inc. 240 Sheffield St. Mountainside, NJ 07092 908-233-0044 908-233-4111
<b>Type of Authorization</b>	Certification Part 15, Subpart C - Intentional Radiators
<b>Applicable FCC Rules</b>	PART 15 – RADIO FREQUENCY DEVICES Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Chapter 1 (10-1-99 Edition). The following subparts are applicable to the results in this test report:  Part 2, Subpart J Paragraph 2.1031 - Certification  Part 15, Subpart A Paragraph 15.31 – Measurement Standards Paragraph 15.33 – Frequency Range of Radiated Measurements Paragraph 15.35 – Measurement Detector Functions and Bandwidths  Part 15, Subpart C – Intentional Radiators Paragraph 15.203 – Antenna Requirement Paragraph 15.205 – Restricted Bands of Operation Paragraph 15.209 – Radiated emission limits, general requirements Paragraph 15.231 – Operation with the bands 40.66 – 40.70 MHz and above 70 MHz
<b>Equipment Under Test</b>	KWT Transmitter, Model 3039
<b>FCC ID</b>	KJ802-3039
<b>Testing Dates</b>	21, 23 December 1999
<b>Summary of Data</b>	The equipment tested is capable of operation in accordance with the requirements of 47 CFR Chapter 1 Part 15.

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## 2 GENERAL INFORMATION

### 2.1 Product Description

Equipment Under Test	KWT Transmitter
Model Number	02-3039
Serial Number	None
Description	The EUT is a wall mounted transmitter that activates a garage door opener upon receiving a valid code.
Power	9 VDC
Clock Frequencies	12 MHz
Transmit Frequency	303 MHz

### 2.2 Related Submittal(s)/Grant(s)

This transmitter is manufactured by Martec Access Products for Wayne Dalton Corporation. Challenger a Division of Wayne Dalton Corporation holds the original submittal grant filed under FCC ID. FON02-3039. The test sample is identical to the original filing except that a metal foil shield as been removed which allows for a slightly higher transmit level.

### 2.3 Table: Tested System Details

<i>Manufacturer</i>	<i>Description</i>	<i>Model No.</i>	<i>Serial No.</i>	<i>FCC ID</i>
Martec Access Products	KWT Transmitter	02-3039	N/A	KJ802-3039

Martec Access Products is manufacturing this product for Wayne Dalton Corp. who will hold the Grantee for this application.

### 2.4 Test Methodology

Radiated emissions tests were performed according to the general provisions of ANSI C63.4-1992 (American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz). Radiated emissions tests were performed at an antenna to EUT distance of 3 meters. Conducted emissions were not performed since the unit is battery operated.

### 2.5 Test Facility

The open area test site and measurement facility used to collect the radiated data is located at the Instrument Specialties Co., Inc. test facility in Delaware Water Gap, PA. This site has been fully described in a report submitted to the FCC, and accepted in a letter dated 22 August 1997 (31040/SIT 1300F2). The lab is accredited by NVLAP (LAB CODE: 200076-0) for FCC Part 15 and CISPR 22 emissions measurements.

## 3 PRODUCT LABELING

### 3.1 FCC ID Label

<div style="border: 1px solid black; padding: 2px; display: inline-block;">FCC ID: KJ802-3039</div>	
Date: WW YY X XX	Canada ID: xxxx xxx xxx Model: 02-3039 FREQ: 303 MHz
THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS. (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRE OPERATION.	
WAYNE DALTON CORP. .....	

### 3.2 Location of Label on EUT

The ID label shall be located on rear of unit.

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## 4 SYSTEM TEST CONFIGURATION

### 4.1 Justification

The EUT tested was a prototype unit identical in construction to a production unit. The test sample was arranged in a tabletop configuration. The transmitter was configured for constant transmit in a CW mode.

### 4.2 Special Accessories

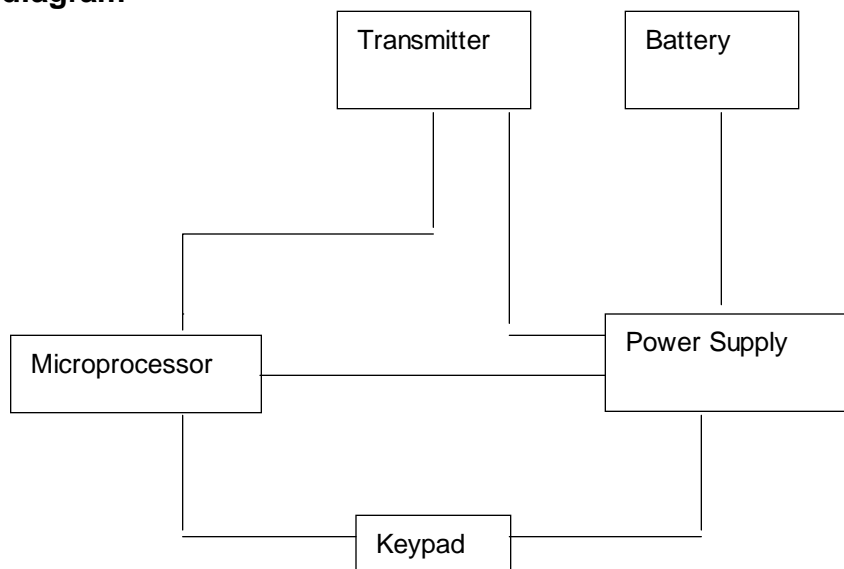
The EUT requires no special accessories to comply with the required specification limits.

### 4.3 Equipment Modifications

No modifications and/or adjustments were made to the EUT during compliance testing to achieve the required specification limits.

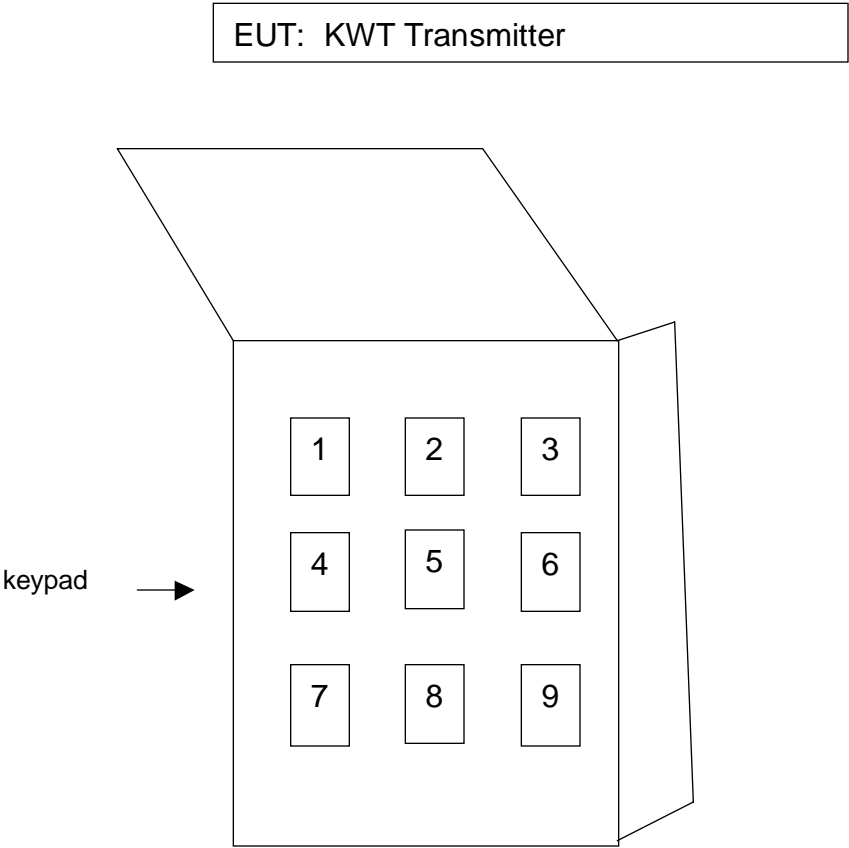
## 5 BLOCK DIAGRAM(S) OF THE EUT

### 5.1 Block diagram



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5.2 Figure: Configuration of Tested System



Radiated Emissions Table Top

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## 6 TEST DATA

### 6.1 Radiated Emissions Data

#### 6.1.1 Table: FCC Part 15, Subpart C, Section 15.231 Radiated Emissions Limits

<b>Fundamental Frequency (MHz)</b>	<b>Field Strength of fundamental dB(μV/m)</b>	<b>Field Strength of Spurious Emissions dB(μV/m)</b>
260 – 470	71.48 – 81.94	51.48 – 61.94
303	74.95*	54.95*

\* Linear interpolation of field strength requirement.

Note: Radiated Emission Limits for the Restricted Bands are the same as Table 6.1.4.

#### 6.1.2 Table: Judgement

<b>EUT</b>	KWT Transmitter
<b>Judgement</b>	Passed by 3.97 dB

**FCC Part 15 Subpart C Section 15.231**  
**Radiated Emissions @ 3 Meters**  
**Data Sheet**

**Date** :23 December 1999

**Customer** :Martec Access Products

**Technician** :Grant Metzgar

**EUT** : KWT Remote Transmitter

	<b>Frequency (MHz)</b>	<b>Measured Level (dBuV)</b>	<b>Antenna Factor +(dB)</b>	<b>Cable Loss +(dB)</b>	<b>Preamp Gain -(dB)</b>	<b>Corrected Level* (dBuV/m)</b>	<b>Spec Limit (dBuV/m)</b>	<b>Polarity ( V/H )</b>	<b>Delta to Limit</b>	<b>Restricted Bands</b>
1	303	92.9	13.8	3.5	32.5	66.70	74.90	V	-8.20	No
2	606	65.8	19.9	5.7	32.0	48.40	54.95	V	-6.55	No
3	909	41.55	23.2	7.3	32.0	29.05	54.95	V	-25.90	No
4	1212	51.3	26.30	4.30	29.90	41.00	54.95	V	-13.95	No
5	1515	60.3	25.80	4.30	29.40	50.00	53.97	V	-3.97	Yes
6	1818	40.5	27.10	4.20	29.20	31.60	54.95	V	-23.35	No
7	2121	42.1	29.80	4.00	29.00	35.90	54.95	H	-19.05	No
8	2424	44.2	30.10	4.10	27.50	39.90	54.95	V	-15.05	No
9	2727	-7.2	30.40	5.20	27.50	-10.10	53.97	V	-64.07	Yes
10	3030	-5.3	30.80	6.40	24.90	-4.00	54.95	V	-58.95	No

\*Includes Duty Cycle Correction Factor : 11dB

**Equipment used :**

Low loss cables, S/N 329 (3m), S/N 338 (3m), S/N 331 (1m)

HP8449B Preamp

EMCO 3115 Antenna S/N 2845

HP8572A EMI receiver S/N 3010A01163



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### 6.1.3 Correction Factors

<b>Frequency MHz</b>	<b>Antenna Factor +(dB)</b>	<b>Cable Loss</b>	<b>Preamp Gain -(dB)</b>	<b>Duty Cycle Correction -(dB)</b>	<b>Correction Factor dB(1/m)</b>
303.0	13.8	3.5	32.5	11	26.2
606.0	19.9	5.7	32.0	11	17.4
909.0	23.2	7.3	32.0	11	12.5
1212.0	26.30	4.30	29.9	11	10.3
1515.0	25.80	4.30	29.40	11	10.3
1818.0	27.10	4.20	29.20	11	8.9
2121.0	29.80	4.00	29.00	11	6.2
2424.0	30.10	4.10	27.50	11	4.3
2727.0	30.40	5.20	27.50	11	2.9

#### 6.1.3.1 Duty cycle calculations

Total pulse length is 58.2 ms

Two pulses of 1.52 ms and 40 pulses of 0.520 ms for a total of 23.84 ms

For reporting purpose a more conservative 28 ms taken from manufacturing data was used.

28 ms /100 ms = 280 ms      20 log 280 ms = 11 dB

### 6.1.4 Table: Section 15.209 Radiated Emissions Limits General Requirements

<b>Fundamental Frequency (MHz)</b>	<b>Field Strength dB(μV/m)</b>
30 – 88	40
88 – 216	43.52
216 – 960	46.02
Above 960	53.97

### 6.1.5 Data Collection Procedure

The following data lists the significant emission frequencies, measured levels, correction factor (includes cable, preamplifier, antenna and duty cycle), the corrected reading, plus the limit. An initial scan of the device was made over the frequency range of 30 MHz to 10 times the fundamental frequency of 303.83 MHz in a shielded enclosure.

Final data was measured in an open field test site at 3 meters. Supplemental data is included in the Section 9 of this report.

#### 6.1.6 Table: Judgement

<b>EUT</b>	KWT Transmitter
<b>Judgement</b>	Passed by 17.8 dB

#### 6.1.7 Table: Summary of Highest Radiated Emissions Levels

<b>Frequency MHz</b>	<b>Polarity V/H</b>	<b>Antenna Height cm</b>	<b>Antenna Azimuth deg</b>	<b>Correction Factor dB(1/m)</b>	<b>Limit dB(μV/m)</b>	<b>Corrected Reading dB(μV/m)</b>	<b>Margin dB</b>
636.600	V	100	0	-5.8	46.02	28.2	-17.8
564.700	V	100	0	-7.2	46.02	27.0	-19.0
81.170	V	100	0	-23.4	40.00	20.8	-19.2
291.399	V	100	0	-15.5	46.02	21.3	-24.7
192.300	V	100	0	-20.4	43.52	17.7	-25.8
168.400	V	100	0	-19.8	43.52	17.6	-25.9

- All measured levels are made using a peak detector unless stated otherwise, with an IF bandwidth of 120 kHz, up to 1 GHz and a 1 MHz IF bandwidth above 1 GHz. A video filter was not used.
- No emissions were detected below the fundamental frequency.

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### 6.1.8 Field Strength Calculation

The field strength is calculated by adding the antenna factor and cable factor, and subtracting the amplifier gain (if any) and duty cycle correction factor from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG - DC$$

Where:

FS = field strength dB ( $\mu$ V/m)

RA = receiver amplitude dB ( $\mu$ V)

AF = antenna factor dB/m

CF = cable attenuation factor dB

AG = amplifier gain dB

DC = duty cycle correction factor

Example: Assume a receiver reading of 99.2 dB ( $\mu$ V) is obtained. The antenna factor of 13.3 and cable factor of 4 is added. The amplifier gain of 32.5 dB is subtracted, and the duty cycle correction factor of 10.7 is subtracted giving a field strength of 73.3 dB ( $\mu$ V/m.)

$$FS = 99.2 + 13.3 + 4.0 - 32.5 - 10.7 = 73.3 \text{ dB } (\mu\text{V/m})$$

### 6.1.9 Measurement Uncertainty

The measurement uncertainty (with a confidence level of 95%) for this test was: 5.59 dB

## 6.2 Section 15.231 Bandwidth Measurements

The requirement for bandwidth is 0.25% of the fundamental measured 20 dB down from the modulated carrier. At 303.85 MHz 0.25% is 7.57.71 kHz. The actual measurement at 20 dB down was 211 kHz, which complies with the rules. See Section 9, Supplemental Pages Section for bandwidth measurements.

## 6.3 Section 15.203 Antenna Requirement

Requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. Since there is no external antenna and no user installable antenna the device complies with the rules.

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## 7 TEST EQUIPMENT

A complete list of test equipment used of reach test can be found in their perspective test procedure. The absolute performance calibration of equipment requiring calibration is performed on an as needed basis in accordance with MIL-STD 45662. The test equipment is capable of making measurements within tolerances of at least +/- 2 dB amplitude and +/- 2% frequency deviation. Equipment certifications showing traceability to NIST (National Institute of Standards and Technology) are maintained on file at Instrument Specialties Corporate offices in Delaware Water Gap, PA. All equipment is checked and verified for proper operation before and after each series of tests.

### 7.1 Measurement Equipment

<b>Mfgr./Model</b>	<b>Description</b>	<b>Serial</b>	<b>Calibration Due</b>
HP/8572A	(100 Hz – 22 GHz) EMI receiver sys #1	3010A01163	9/29/00
HP/85879A	EMI Radiated Emissions Measurement software	VA 02.01	Calibration Not Required
CHA/CBL6111A	(30 MHz – 1 GHz) bilog	1822	12/28/99
EMCO/3115	Antenna	2845	10/11/00
HP/8449B	1.265 GHz RF amplifier	3008A00373	9/29/00

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## 8 TEST MEASUREMENT PHOTOS

### 8.1.1 Test Photographs

<i>Photo Layout</i>	<i>Test Type</i>	<i>Remarks</i>	<i>Page No.</i>
Top	Radiated Emissions	FCC Part 15, Class B	13
Bottom	Radiated Emissions	FCC Part 15, Class B	
Top	Radiated Emissions above 1 GHz	FCC Subpart C 15.231	14
Bottom	Radiated Emissions above 1 GHz	FCC Subpart C 15.231	

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## 9 SUPPLEMENTAL TEST DATA

### 9.1 Table: Index of Test Data Sheets

#### 9.1.1 Test Data Sheets

<b>Test Type</b>	<b>Test Name</b>	<b>Comments</b>	<b>Data Format</b>	<b>Page No.</b>
Radiated Emissions	FCC Part 15 at 3 meters	Spurious Emissions	plotted	16
Radiated Emissions	FCC Part 15 at 3 meters	Spurious Emissions	tabulated	17
Radiated Emissions	FCC Part 15 at 3 meters	Harmonics	tabulated	18
Radiated Emissions	FCC Part 15 at 3 meters	Fundamental	plotted	19
Radiated Emissions	FCC Part 15 at 3 meters	Bandwidth	plotted	20-21
Conducted Emissions	Duty Cycle	Pulse Width	plotted	22
Conducted Emissions	Duty Cycle	Pulse Width	plotted	23
Conducted Emissions	Duty Cycle	Pulse Train Duration	plotted	24
Conducted Emissions	Duty Cycle	Pulse Train Repetition	plotted	25