

REPORT OF MEASUREMENTS
PART 90: PRIVATE LAND MOBILE RADIO SERVICES
RADIATED SPURIOUS EMISSIONS

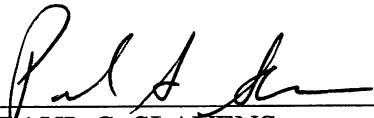
DEVICE: 29.0 - 50.0 MHz FM TRANSMITTER

MODEL: VT-3H040-S

MANUFACTURER: DANIELS ELECTRONICS LTD.

ADDRESS: 43 ERIE STREET
VICTORIA BRITISH COLUMBIA
CANADA V8V 1P8

THE DATA CONTAINED IN THIS REPORT WAS
COLLECTED ON 17 APRIL 1997 AND COMPILED BY:



PAUL G. SLAVENS
CHIEF EMC ENGINEER

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1. General

1.1 Purpose

The purpose of this report is to show compliance to Electromagnetic Emissions requirements outlined in the referenced specifications

1.2 Manufacturer

Company Name: Daniels Electronics Ltd.
Contact: Colin Gunn
Street Address: 43 Erie Street
City/Province: Victoria British Columbia
Country/Postal Code: Canada V8V 1P8
Telephone: 250 382-8268
Fax: 250 382-6139

1.3 Test location

Company: Acme Testing
Street Address: 2002 Valley Highway
Mailing Address: PO Box 3
City/State/Zip: Acme, WA 98220-0003
Laboratory: Test Site 2
Telephone: 1-888-ACMETES
Fax: 1-360-595-2722
Receipt of EUT: 17 April 1997

1.4 Test Personnel

Paul G. Slavens

2. Manufacturer's Statement Of Responsibility

This equipment has been tested in accordance with the requirements contained in the appropriate Commission regulations. To the best of my knowledge, these tests were performed using measurement procedures consistent with industry or Commission standards and demonstrate that the equipment complies with the appropriate standards. Each unit manufactured, imported or marketed, as defined in the Commission's regulations, will conform to the sample(s) tested within the variations that can be expected due to quantity production and testing on a statistical basis. I further certify that the necessary measurements were made by:

Acme Testing, 2002 Valley Highway, P.O. Box 3, Acme, Washington 98220-0003, 360-595-2785.

Signature

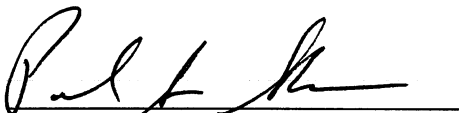
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3. Test Results Summary

Summary of Test Results

<u>Test Specification</u>	<u>Test Description</u>	<u>Compliance Criteria</u>	<u>Status</u>
FCC CFR47, Part 90	Radiated Spurious Emissions 30 MHz - 1000 MHz	90.209(c)	Pass

All emissions from the device were found to be within the limits outlined in this report. Acme Testing assumes responsibility only for the accuracy and completeness of this data as it pertains to the sample tested.



Paul G. Slavens
Chief EMC Engineer

30 APRIL 1997

Date of Issuance

4. Description of Equipment and Peripherals

4.1 Equipment Under Test (EUT)

Device: 29.0 - 50.0 MHz FM TRANSMITTER
Model Number: VT-3H040-S
FCC ID: H4JVT-3H040-S
Power: 12 VDC
Grounding: Local
Transmit Frequency: 39.5 MHz = Serial Number: 10001

4.2 EUT Peripherals

Device	Manufacturer	Model Number	FCC ID
System Monitor	Daniels Electronics Ltd.	SM-3B	None
Radio Communications Test Set	Marconi Instruments	2955B	None
Power Supply	Topward Electric Instruments Company Ltd.	TPS-2000	None

4.3 Description of Interface Cables

EUT/POWER SUPPLY

Shielded	Unshielded	Flat	Round	Length	Ferrite
NO	YES	NO	YES	1 m	NO

EUT/ RADIO COMMUNICATIONS TEST SET

Shielded	Unshielded	Flat	Round	Length	Ferrite
YES	NO	NO	YES	5 m	NO

ARRANGEMENT OF INTERFACE CABLES: All interface cables were positioned for worst case maximum emissions within the manner assumed to be a typical operation condition (please reference photographs).

4.4 The Mode of Operation During Tests

The EUT was configured as a 29.5 MHz FM transmitter. The EUT was modulated with the radio communications test set. The antenna output port was dummy loaded.

4.5 Modifications Required for Compliance

1. None.

5. Radiated Emissions Tests

Regulation Applied: FCC CFR47, Part 90.209(c)

Measurement Procedure: TIA/EIA-603 & ANSI C63.4 - 1992

5.1 Test Equipment

- ⇒ Spectrum Analyzer: Hewlett Packard 85668, Serial Number 06499-00168, Calibration due Date: September 1997
- ⇒ RF Preselector: Hewlett Packard 85685, Serial Number A00106, Calibration due Date: September 1997
- ⇒ Quasi Peak Adapter: Hewlett Packard 85650, Serial Number A0327, Calibration due Date: September 1997
- ⇒ Line Impedance Stabilization Network: EMCO 3825-2, Serial Number 1601, Calibration due Date: June 1997
- ⇒ Active Loop H-Field Antenna (10 kHz to 30 MHz): EMCO 6502, Serial Number 2016, Calibration due Date: June 1997
- ⇒ Broadband Biconical Antenna (20 MHz to 200 MHz): EMCO 3110, Serial Number 1115, Calibration due Date: June 1997
- ⇒ Broadband Log Periodic Antenna (200 MHz to 1000 MHz): EMCO 3146, Serial Number 2853, Calibration due Date: June 1997
- ⇒ Roberts Dipole Antenna Set (30 MHz to 1000 MHz): Compliance Design A 100
- ⇒ Active Monopole E-Field Antenna (10 kHz to 30 MHz): A.H. Systems 2057, Serial Number 112
- ⇒ EUT Turntable Position Controller: EMCO 1061-3M 9003-1441
- ⇒ Antenna Mast: EMCO 1051 9002-1457
- ⇒ 2 GHz to 10 GHz Low Noise Preamplifier: Milliwave 593-2898, Serial Number 2494, Calibration due Date: June 1997

5.2 Purpose

The purpose of this test is to evaluate the radiated electromagnetic interference characteristics of the EUT.

5.3 Test Procedures

For tabletop equipment, the EUT is placed on a 1 meter by 1.5 meters wide and 0.8 meter high nonconductive table that sits on a flush mounted metal turntable. The EUT is connected to its associated peripherals with any excess I/O cabling bundled to approximately 1 meter. The antenna port is connected to a non-radiating load.

Preview tests are performed to determine the "worst case" mode of operation. With the EUT operating in "worst case" mode, emissions from the unit are maximized by adjusting the polarization and height of the receive antenna and rotating the EUT on the turntable. EUT emissions are also maximized by manipulating the system cables.

Radiated Emissions Test Characteristics

Frequency range	30 MHz- 1 GHz
Test distance	3 meters
Test instrumentation resolution bandwidth	3 kHz
Receive antenna scan height	1 - 4 meters
Receive antenna polarization	Vertical/Horizontal

5.4 Calculation of limits

CALCULATION OF FIELD STRENGTH LIMIT

The emissions limits are expressed as a field strength. The limit is related to the effective radiated power (E.R.P.) using the formula:

$$E = \sqrt{(30 \cdot G \cdot P)} / R$$

Where:

E = Field strength in volts/meter

G = Arithmetic gain of the antenna

P = Power in watts

R = Test distance in meters

Therefore at a test distance of three meters, a limit of 50 μ W (E.R.P.) and the arithmetic gain of a dipole being 1.64, the limit calculation follows:

$$\begin{aligned} E(\text{limit}) &= \sqrt{(30 \cdot 50 \cdot 10^{-6} \cdot 1.64)} / 3 \\ &= 0.0165 \text{ V/m} \\ &= 84.3 \text{ dB}\mu\text{V/m} \end{aligned}$$

5.5 Test Results

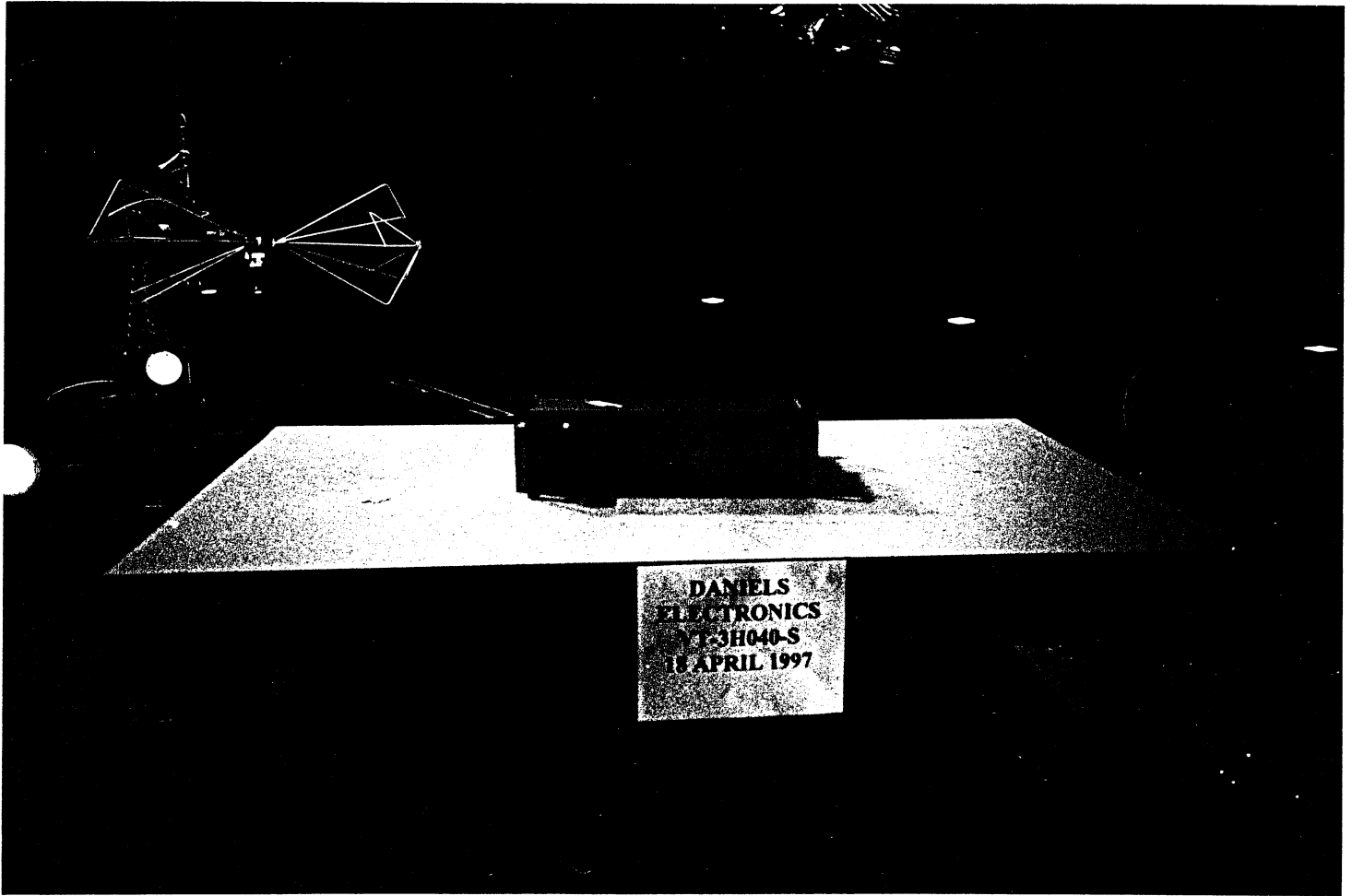
NO PRODUCT EMISSIONS WERE DETECTED

6. Miscellaneous Comments and Notes

1. None.

7. List of Attachments

1. Photographs of test set-ups. (1)



DANIELS
ELECTRONICS
Y13H040-S
18 APRIL 1997