Nemko Test Report:	109285-1TRFWL
Applicant:	Mark IV Industries Corp. 6020 Ambler Drive Mississauga, ON L4W 2P1
Apparatus:	G4E Feedback Transponder
FCC ID:	JQU801970
In Accordance With:	FCC Part 90 Private Land Mobile Radio Services
Authorized By:	 Jason Nison, Wireless/Telecom Specialist
Date:	July 10, 2008
Total Number of Pages:	17

Nemko Canada Inc.
303 River Road,
Ottawa, Ontario
K1V 1H2
T 1 613 737 9680 **F** 1 613 737 9691**TF** 1 800 563 6336
Email Canada@nemko.com
Web www.nemko.com

TABLE OF CONTENTS

Section 1 : Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 90. Conducted measurements were performed in accordance with ANSI TIA-603-B-2002. Radiated tests were conducted is accordance with ANSI C63.4-2003.

The assessment summary is as follows:

Apparatus Assessed:	G4E Feedback Transponder
Specification:	FCC Part 90
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None
Report Release History:	Original Release
Test Location:	Nemko Canada Inc. 303 River Road Ottawa, Ontario K1V 1H2
Tests Performed By:	Heng Lin, EMC/Wireless Specialist
Test Dates:	From June 30, 2008 to July 4, 2008

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

Section 2 : Equipment Under Test

2.1 Identification of Equipment Under Test (EUT)

The following information identifies the EUT under test:

Type of Equipment:	LMS
Brand Name:	Mark IV
Model Name or Number:	G4E Feedback Transponder
Serial Number:	AMLA3-013 and AMLA3-039
Nemko Sample Number:	Item 1 and 2
FCC ID:	JQU801970
Date of Receipt:	June 26, 2008

2.2 Accessories

None

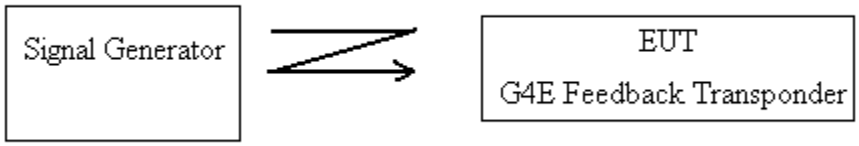
2.3 EUT Description

The EUT is G4E Feedback Transponder used in automatic vehicle monitoring system.

2.4 Technical Specifications of the EUT

Operating Frequency:	914.3 – 915.5 MHz
Modulation:	On-Off Keying of a Manchester encoded data stream
Rated Output Power:	-4.5 dBm
Occupied Bandwidth:	9.96 MHz
Emission Designator:	9M96K1D
Antenna:	Internal antenna etched on the PCB
Power Supply Requirements:	3.6 VDC Lithium Battery

2.5 EUT Setup diagram



2.6 Operation of the EUT during testing

The EUT is activated when a 20 microsecond wake-up pulse is received.

2.7 Modifications incorporated in the EUT

The unit utilized for conducted testing was modified by the manufacturer to include an SMA connection between the circuit and the internal antenna.

The unit utilized for frequency stability testing was modified by the manufacturer to include an SMA connection between the circuit and the internal antenna and to accept external power.

Section 3 : Test Conditions

3.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 2 Subpart J, Equipment Authorization Procedures
FCC Part 90 Private Land Mobile Radio Services

3.2 Deviations From Laboratory Test Procedures

No deviations were made from laboratory test procedures.

3.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	15 – 30 ^{o}C
Humidity range	:	20 - 75 %
Pressure range	:	86 - 106 kPa
Power supply range	:	+/- 5% of rated voltages

3.4 Measurement Uncertainty

Nemko Canada measurement uncertainty has been calculated using guidance of UKAS LAB 34:2003 and TIA-603-B Nov 7, 2002. All calculations have been performed to provide a confidence level of 95% and can be found in Nemko Canada document MU-003.

3.5 Test Equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Cal. Date	Next Cal.
Electro-Magnetic Interference Test Chamber	TDK	SAC-3	FA002047	May 06/08	May 06/09
Bilog	Sunol	JB3	FA002108	Jan. 21/08	Jan. 21/09
Horn Antenna #2	EMCO	3115	FA000825	Jan. 15/08	Jan. 15/09
Horn Antenna #1	EMCO	3115	FA000649	Feb 13/08	Feb 13/09
Log Periodic Antenna	Sunol	LP5	FA002077	July 25/07	July 25/08
Flush Mount Turntable	Sunol	FM2022	FA002082	NCR	NCR
Controller	Sunol	SC104V	FA002060	NCR	NCR
Signal Generator	Rohde & Schwarz	SMR40	FA001879	Aug 8/07	Aug 8/08
Receiver/Spectrum Analyzer	Rohde & Schwarz	ESU 26	FA002043	Dec. 07/07	Dec. 07/08
Spectrum Analyzer	Rohde & Schwarz	FSP40	FA001920	April 14/08	April 14/09
Thermometer	Fluke	7060147	FA001247	Aug 9/07	Aug 9/08
Temperature Chamber	Thermotron	S-4	FA001795	COU	COU
Laboratory DC Power Supply	GW	GPC-1850D	FA001337	Aug 9/07	Aug 9/08
RF AMP	JCA	1-2 GHz	FA001498	Aug. 21/07	Aug. 21/08
RF AMP	JCA	2-4 GHz	FA001496	Aug. 21/07	Aug. 21/08
RF AMP	JCA	4-8 GHz	FA001497	Aug. 21/07	Aug. 21/08
RF AMP	Narda	5 - 18GHz	FA001409	COU	COU

COU – Calibrate on Use
NCR – No Calibration Required

Section 4 : Results Summary

This section contains the following:

FCC Part 90 : Test Results

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

N No : not applicable / not relevant.

Y Yes : Mandatory i.e. the apparatus shall conform to these tests.

N/T Not Tested, mandatory but not assessed. (See Report Summary)

4.1 FCC Part 90 : Test Results

Clause	Test Method	Test Description	Required	Result
90.205	2.1046	Output power	Y	PASS
90.207	2.1047	Modulation Charateristics	N	
90.209	2.1049	Occupied bandwidth	Y	PASS
90.210	2.1051	Spurious Emissions at the antenna terminal	Y	PASS
90.210	2.1053	Field strength of surious radiation	Y	PASS
90.213	2.1055	Frequency stability	Y	PASS
90.214	—	Transient Behavior	N	
90.219	—	Use of boosters	N	

Notes:

Appendix A : Test Results

Clause 90.205 Output Power

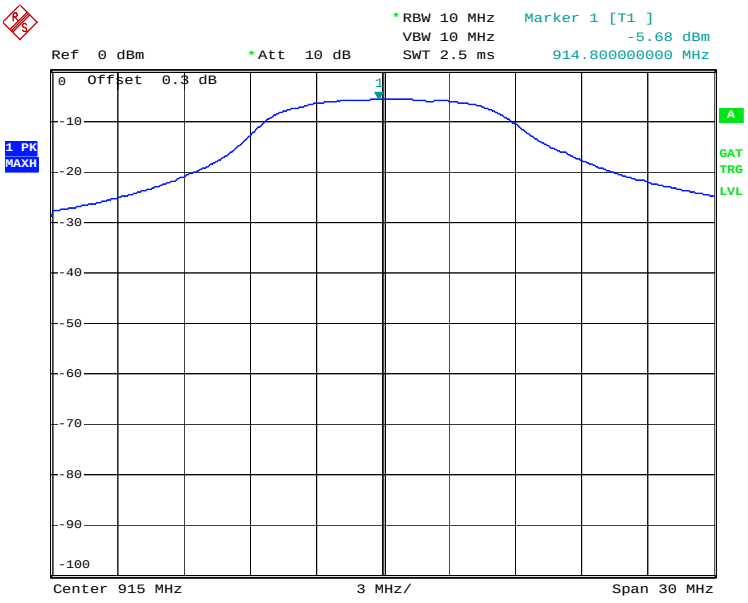
Applicants for licenses must request and use no more power than the actual power necessary for satisfactory operation. Except where otherwise specifically provided for, the maximum power that will be authorized for new stations authorized after August 16, 1995 is as follows in FCC Part 90.205(a) through (r).

Test Results: Pass

Additional Observations:

Both conducted measurement and radiated measurement were performed. The EUT was tested with a fresh battery.

Conducted Output Power:



The maximum measured conducted output power = - 5.68 dBm

Radiated Output Power Measurement (ERP)

The EUT was test with a fresh battery.

The signal substitution method was used to determine the output power level (ERP).

The radiated test was performed using a Peak Detector with 10MHz / 10 MHz RBW/VBW, at a distance of 3 meters.

Radiated Output Power (ERP)

Frequency (MHz)	Ant.	Pol. H/V	RCVD Signal (dBµV)	Signal Substitution Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
914.80	JB3	H	69.42	-76.71	-7.29	44.8	52.09
914.80	JB3	V	58.69	-74.39	-15.7	44.8	60.5

RF Output Signal Level (ERP)= Receiver Signal Level + Signal Substitution Factor.

Signal Substitution Factor = Reference signal level from signal generator
-Reference signal level received from spectrum analyzer reading
+Antenna gain
-Cable loss

Clause 90.209 Occupied Bandwidth

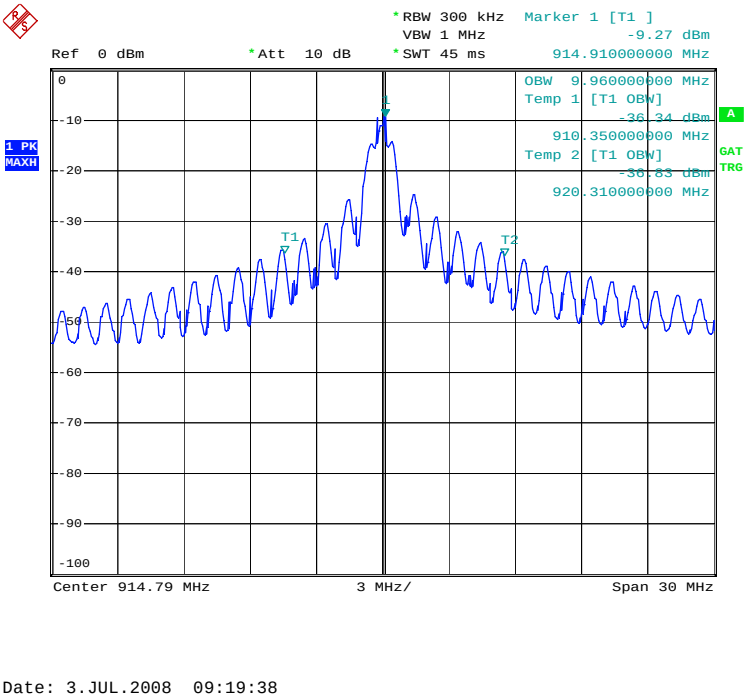
(5) Unless specified elsewhere, channel spacings and bandwidths that will be authorized in the following frequency bands are given in the following Table.

Standard Channel Spacing/Bandwidth

Frequency Band (MHz)	Channel Spacing (kHz)	Authorized Bandwidth (kHz)
Below 25	--	--
25-50	20	20
72-76	20	20
150-174	7.5	20/11.25/6
216-220	6.25	20/11.25/6
220-222	5	4
406-512	6.25	20/11.25/6
806-809/851-854	12.5	20
809-824/854-869	25	20
896-901/935-940	12.5	13.6
902-928	--	--
929-930	25	20
1427-1432	12.5	12.5
2450-2483.5	--	--
Above 2500	--	--

Test Results: Pass

99% Emission Bandwidth



Clause 90.210 Spurious emissions at the antenna terminal

Except as indicated elsewhere in this part, transmitters used in the radio services governed by this part must comply with the emission masks outlined in this section. Unless otherwise stated, per paragraphs (d)(4), (e)(4), and (m) of this section, measurements of emission power can be expressed in either peak or average values provided that emission powers are expressed with the same parameters used to specify the unmodulated transmitter carrier power. For transmitters that do not produce a full power unmodulated carrier, reference to the unmodulated transmitter carrier power refers to the total power contained in the channel bandwidth. Unless indicated elsewhere, the Table below specifies the emission masks for equipment operating in the frequency bands governed under this part.

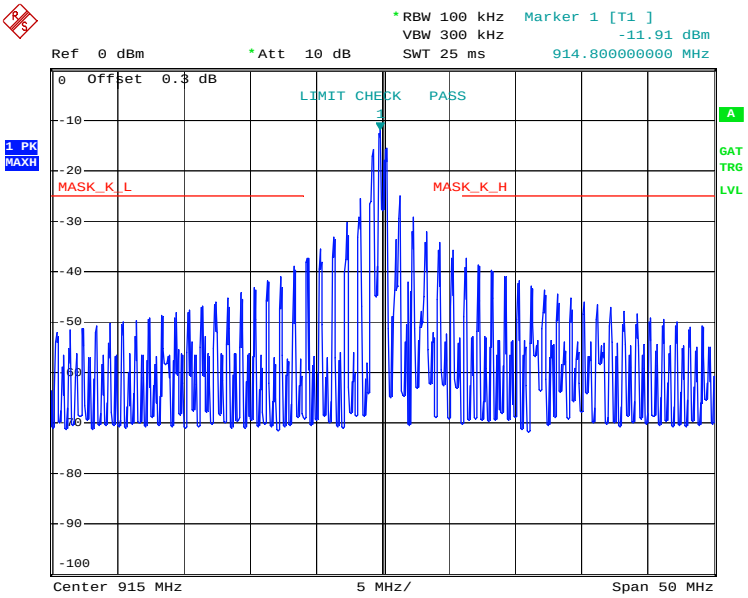
Test Results: Pass

Additional Observations:

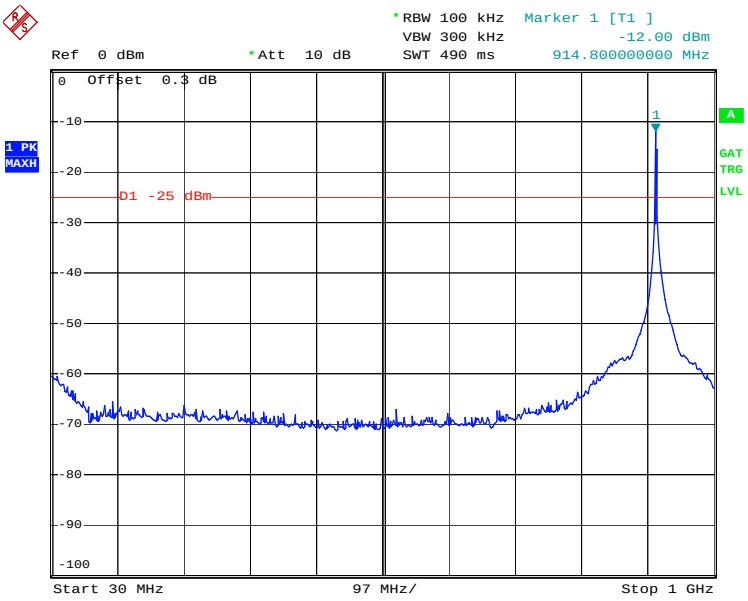
Both conducted measurement and radiated measurement have been performed for spurious emission test.

The EUT was tested with a fresh battery.

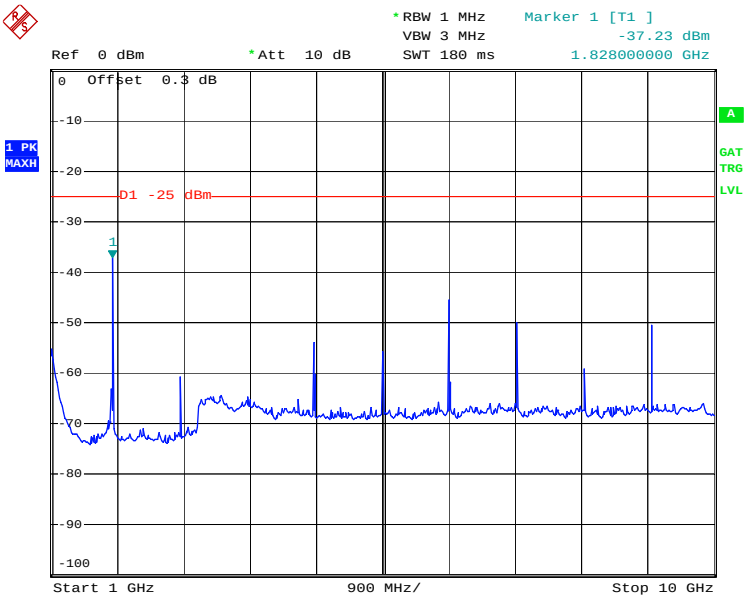
Conducted Emissions:



Date: 3.JUL.2008 09:50:23



Date: 3.JUL.2008 09:53:46



Date: 3.JUL.2008 10:05:31

Clause 90.210 Field Strength of spurious radiation

Except as indicated elsewhere in this part, transmitters used in the radio services governed by this part must comply with the emission masks outlined in this section. Unless otherwise stated, per paragraphs (d)(4), (e)(4), and (m) of this section, measurements of emission power can be expressed in either peak or average values provided that emission powers are expressed with the same parameters used to specify the unmodulated transmitter carrier power. For transmitters that do not produce a full power unmodulated carrier, reference to the unmodulated transmitter carrier power refers to the total power contained in the channel bandwidth. Unless indicated elsewhere, the Table below specifies the emission masks for equipment operating in the frequency bands governed under this part.

Test Results: Pass

Additional Observations:

The Spectrum was searched from 30 MHz to 10 GHz.

The EUT was measured on three orthogonal axis.

All measurements were performed using a Peak Detector with 100kHz RBW below 1GHz and a 1MHz RBW above 1GHz at a distance of 3 meters.

Frequency (MHz)	Ant.	Pol. H/V	RCVD Signal (dBµV)	Signal Substitution Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1829.6	Horn 2	H	35.37	-68.48	-33.11	-25	8.11
1829.6	Horn 2	V	32.63	-68.02	-35.39	-25	10.39
2744.4	Horn 2	H	29.6	-65.52	-35.92	-25	10.92
2744.4	Horn 2	V	27.91	-64.74	-36.83	-25	11.83

RF Output Signal Level (ERP)= Receiver Signal Level + Signal Substitution Factor.

Signal Substitution Factor = Reference signal level from signal generator
-Reference signal level received from spectrum analyzer reading
+Antenna gain
-Cable loss

Clause 90.213 Frequency Stability

a) Unless noted elsewhere, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following Table.
Minimum Frequency Stability
parts per million (ppm)

Frequency range (MHz)	Fixed and base stations 2 watts output power	Mobile stations Over power	2 watts or less output
Below 25	100	100	200
25-50	20	20	50
72-76	5	---	50
150-174	50	5	50
216-220	1.0	---	1.0
220-222	0.1	1.5	1.5
421-512	2.5	5	5
806-809	1.0	1.5	1.5
809-824	1.5	2.5	2.5
851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	0.1	1.5	1.5
902-928	2.5	2.5	2.5
929-930	1.5	---	---
935-940	0.1	1.5	1.5
1427-1435	300	300	300
Above 2450	---	---	---

Test Results: Pass

Note: Fixed non-multilateration transmitters with an authorized bandwidth that is more than 40 kHz from the band edge, intermittently operated hand-held readers and mobile transponders are not subject to frequency stability restrictions.

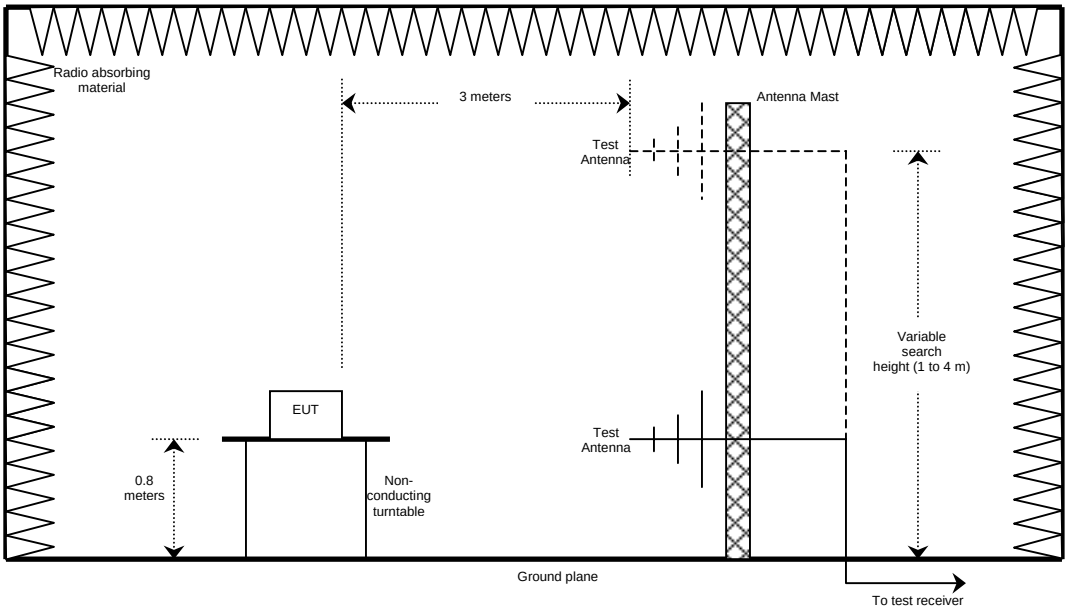
Conditions	Frequency (Hz)	Offset (ppm)
+50°C, Nominal power	914636000	-85.27
+40°C, Nominal power	914678000	-39.36
+30°C, Nominal power	914696000	65.60
+20°C, +10% power	914714000	0
+20°C, Nominal power	914714000	——
+20°C, -10% power	914714000	0
+10°C, Nominal power	914720000	6.56
0°C, Nominal power	914716000	2.19
-10°C, Nominal power	914710000	-4.37
-20°C, Nominal power	914712000	-2.19
-30°C, Nominal power	914708000	-6.56

Appendix B : Setup Photographs

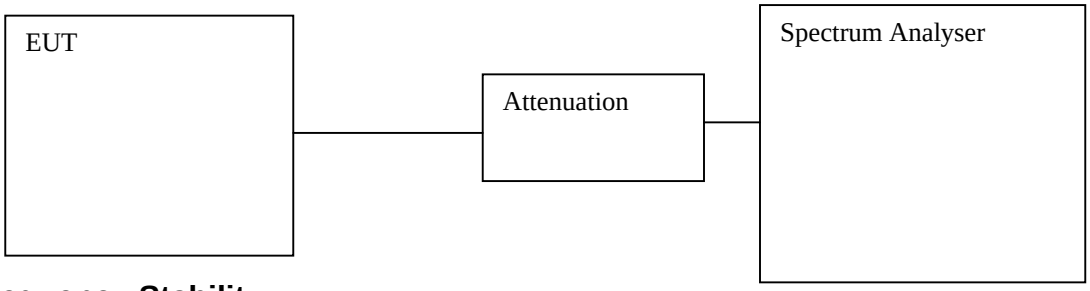
Radiated Spurious Emissions Setup:

Appendix C : Block Diagram of Test Setups

Test Site For Radiated Emissions



Conducted Emissions, Output power, Occupied Bandwidth



Frequency Stability