Underwriters Laboratories Inc.
1285 Walt Whitman Road
Melville, New York 11747-3081
(631) 271-6200

Report of Measurements
of Electromagnetic Compatibility Testing

Test Report File No.	:	**MC4085**	Date of issue: December 10, 2001
Applicant	:	Hafele America Co.	
Model / Serial No.	:	910.51.510	
Product Type	:	Programming Station Controller	
Power Supply	:	120VAC to 9 VDC Adapter	
Manufacturer	:	Same as Applicant	
License holder	:	Same as Applicant	
Address	:	3901 Cheyenne Dr. P.O. Box 4000	
	:	Archdale, NC 27263	
Test Result	:	☒ **Positive**	☐ **Negative**
Test Project Number	:	00ME10760	
References(s)		FCC ID: PW3103	

Report Directory

1.0 G E N E R A L - Product Description

The equipment under test (EUT) is a device that intentionally transmits a radio frequency (RF) to a transponder key and allows that key to be programmed. The device, with a connection with a PC and programming software allows all electronic keys to be programmed. The keys are "transponders" which are passive, that takes the energy from the magnetic field of any device associated with the manufacturer and is issued a unique number out of 4.3 billion combinations.
The EUT operates at an intentional radiation frequency of 134Khz.
The transmitting antenna is not removable.

1.1 Device Configuration During Test

The device under test was configured to continuously transmit the RF programming parameters of an electronic key. The controller was interfaced via RS 232 to a PC to send the programming parameters from the PC to the controller.
The following was utilized during emissions.
The Laptop computer is manufactured by Toshiba. The Laptop was model number Techra8000. During conducted emissions tests, the laptop computer was powered via internal batteries. During radiated emissions, the laptop computer was powered via 120VAC, 60Hz to 15VDC adapter. The AC adapter was model PA240U manufactured by Toshiba.
Software was utilized to exercise the device. The manufacturer provided the software.
The device was tested in its normal orientation. All other orientation was examined. The data contained in this report represents the worst case axis.
The controller was powered with a 120VAC, 60Hz to 9VDC utilizing a voltage converter. The adapter used was model 35-9-300 C manufactured by CUI Stack.

"The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report."

1.1.1 Deviations from ANSI C63.4 Standard Test Set-up

☒ None

1.2 Device Modifications Necessary for Compliance

☒ N/A

☐ As described below:

Environmental conditions in the lab:

	Range
Temperature:	20-25°C
Relative Humidity	30 - 60 %
Atmospheric pressure	680 - 1060 mbar

2.0 EMISSIONS TEST REGULATIONS:

☐ EN 50081-1 /1992		
☐ EN 50081-2 /1993		
☐ EN 55011 / 3.1991	☐ Group 1 ☐ Class A	☐ Group 2 ☐ Class B
☐ EN 55011/1998	☐ Group 1 ☐ Class A	☐ Group 2 ☐ Class B
☐ EN 55013 / 6.1990		
☐ EN 55013/1997		
☐ EN 55014–1: 1997	☐ Household appliances and similar ☐ Portable tools ☐ Semiconductor devices	
☐ EN 55015 / 1993		
☐ EN 55020 / 1995		
☐ EN 55022 / 4.1998	☐ Class A	☐ Class B
☐ EN60555-2/1987, EN60555-3/1987		
☐ EN60601-1-2: 1993		
☐ EN61000-3-2, 1995, EN61000-3-3, 1995		
☐ VCCI	☐ Class 1	☐ Class 2
☒ FCC Part, 15, Subpart B	☐ Class A	☒ Class B

☒ FCC Part , 15, Subpart C Paragraphs 15.109 15.207 and 15.209[operating frequency of 134kHz]
☐ FCC Part 18
☐ CISPR 11 (1997)
☐ CISPR 14-1(1998)
☐ CISPR 22
☐ DENTORI
☐ AS3548
☐ Bellcore GR-1089-CORE: Issue 2, 12/1997 with Rev. 1, 2/1999
☐ (OTHER) _____

2.1 EUT OPERATION MODE - EMISSIONS TESTS:

☐ Standby
☐ Test program (H-Pattern)
☐ Test program (color bar)
☐ Test program (customer specific)
☐ Practice operation
☒ Normal operation Mode: Continuous sense for key to program.
☒ As per manufacturer's instructions
☐ other

2.1.1 Conducted Emissions Tests:

☒ **Test Applicable** ☐ **Test Not Applicable**

Frequency range on each side of line.			**Measurement Point**	
☐ 9kHz to 30MHz	☐ Voltage	☐ Current	☐ Mains	☐ I/O Lines
☐ 10kHz to 30MHz	☐ Voltage	☐ Current	☐ Mains	☐ I/O Lines
☐ 20kHz to 30MHz	☐ Voltage	☐ Current	☐ Mains	☐ I/O Lines
☐ 150kHz to 30MHz	☐ Voltage	☐ Current	☐ Mains	☐ I/O Lines
☒ 450kHz to 30 MHz	☒ Voltage	☐ Current	☒ Mains	☐ I/O Lines
☐ 500kHz to 30MHz	☐ Voltage	☐ Current	☐ Mains	☐ I/O Lines

Line Description:

Line Number	Type/Designation
L1	Hot side of AC line
L2	Neutral side of AC line

Test equipment used for conducted emissions:

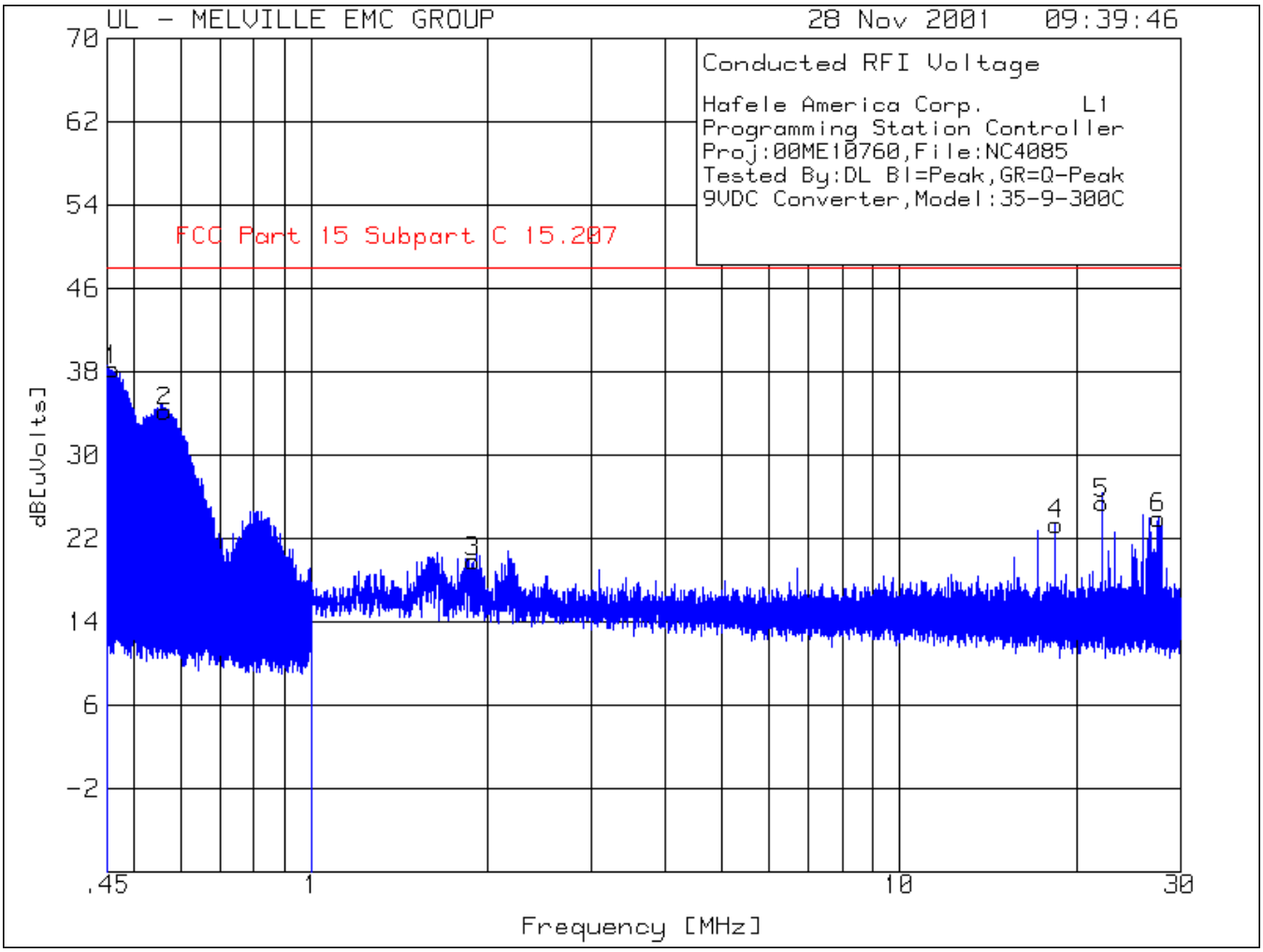
☒ **R3261C** **Advantest** **Spectrum Analyzer** **Equipment No.: ME5A-229**
Resolution BW: 100kHz
Video BW: 100kHz
QP BW: 10kHz
Range: .45-30MHz Last Calibration Date: 06-22-01 Calibration Due Date: 06-22-02

☒ **R3551** **Advantest** **Pre-Selector** **Equipment No.: ME5A-228**
Range: .45-30MHz Last Calibration Date: 07-31-01 Calibration Due Date: 07-31-02

Test Accessories for Conducted Emissions:

☒ **EC - 3825/2** **Electro-Mechanics (EMCO)** **50 Ω LISN** **Equipment No.: ME5-629**
Last Calibration Date: 02-26-01 Calibration Due Date: 02-24-02

☒ **11947A** **Hewlett Packard** **Transient Limiter** **Equipment No.: ME5A-444**
Last Calibration Date: 12-20-00 Calibration Due Date: 12-20-01



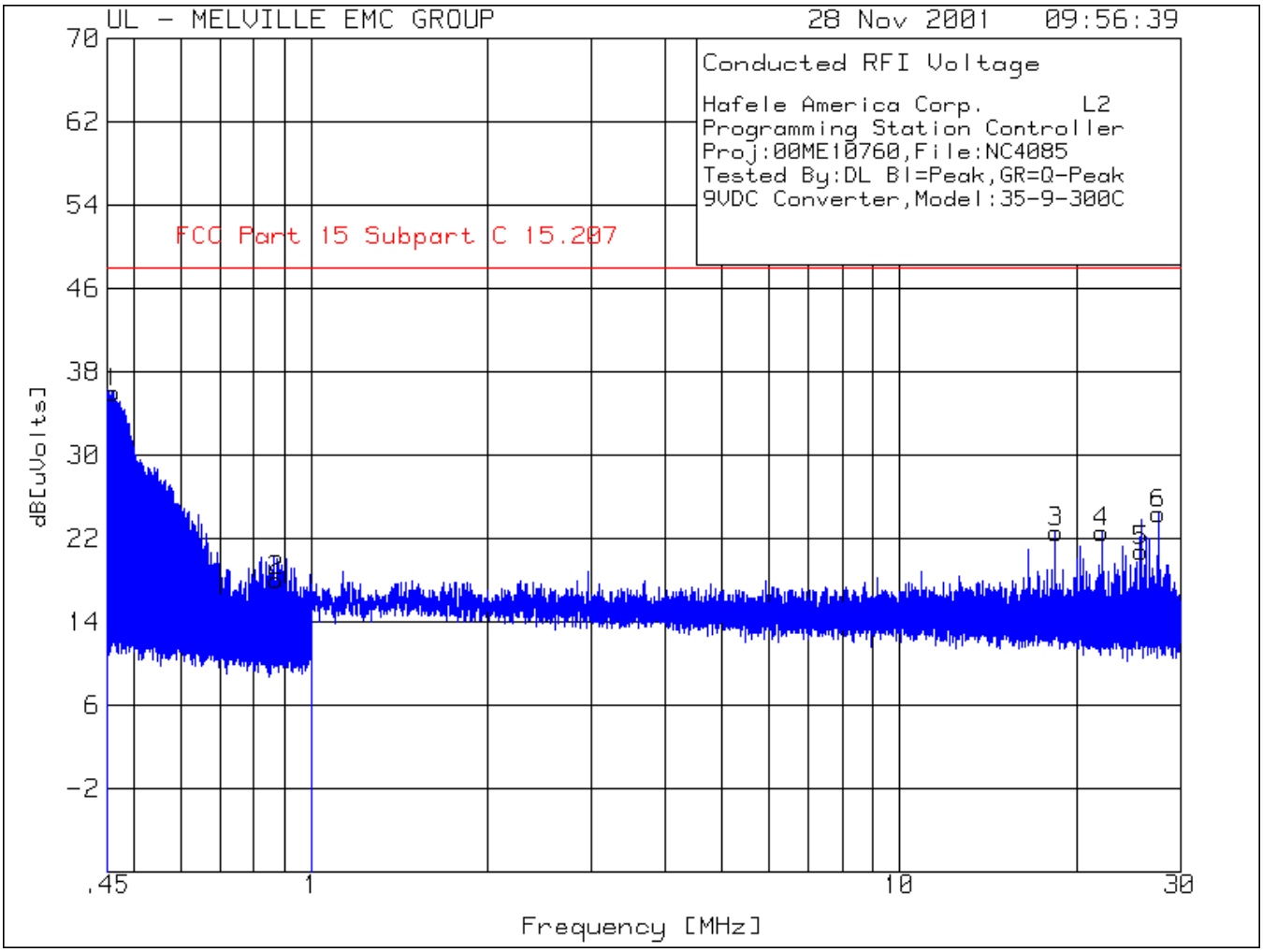
Underwriters Laboratories Inc. 1285 Walt Whitman Rd. Melville, New York 11747 USA Tel.: 631-271-6200 Fax: 631 439-6095 Rev. No 1.2

Hafele America Corp. L1
Programming Station Controller
Proj:00ME10760,File:NC4085
Tested By:DL Bl=Peak,GR=Q-Peak
9VDC Converter,Model:35-9-300C

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2	3	4
1	.45959	28.1 pk	10.1	0	38.2	48	N/A	N/A	N/A
Azimuth: N/A	Height: N/A				Margin [dB]	-9.8	N/A	N/A	N/A
2	.56294	24.1 pk	10.1	0	34.2	48	N/A	N/A	N/A
Azimuth: N/A	Height: N/A				Margin [dB]	-13.8	N/A	N/A	N/A
3	1.88689	9.7 pk	10.1	0	19.8	48	N/A	N/A	N/A
Azimuth: N/A	Height: N/A				Margin [dB]	-28.2	N/A	N/A	N/A
4	18.42596	13 pk	10.4	0	23.4	48	N/A	N/A	N/A
Azimuth: N/A	Height: N/A				Margin [dB]	-24.6	N/A	N/A	N/A
5	22.11625	15 pk	10.4	0	25.4	48	N/A	N/A	N/A
Azimuth: N/A	Height: N/A				Margin [dB]	-22.6	N/A	N/A	N/A
6	27.56015	13.6 pk	10.4	0	24	48	N/A	N/A	N/A
Azimuth: N/A	Height: N/A				Margin [dB]	-24	N/A	N/A	N/A

LIMIT 1: FCC Part 15 Subpart C 15.207
LIMIT 2: NONE
LIMIT 3: NONE
LIMIT 4: NONE

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
tm - Trace Math Result



Underwriters Laboratories Inc. 1285 Walt Whitman Rd. Melville, New York 11747 USA Tel.: 631-271-6200 Fax: 631 439-6095 Rev. No 1.2

Hafele America Corp. L2
Programming Station Controller
Proj:00ME10760,File:NC4085
Tested By:DL Bl=Peak,GR=Q-Peak
9VDC Converter,Model:35-9-300C

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	2	3	4
1	.45971	25.9 pk	10.1	0	36	48	N/A	N/A	N/A
Azimuth: N/A	Height: N/A				Margin [dB]	-12	N/A	N/A	N/A
2	.87123	7.9 pk	10.1	0	18	48	N/A	N/A	N/A
Azimuth: N/A	Height: N/A				Margin [dB]	-30	N/A	N/A	N/A
3	18.42286	12.2 pk	10.4	0	22.6	48	N/A	N/A	N/A
Azimuth: N/A	Height: N/A				Margin [dB]	-25.4	N/A	N/A	N/A
4	22.1147	12.2 pk	10.4	0	22.6	48	N/A	N/A	N/A
Azimuth: N/A	Height: N/A				Margin [dB]	-25.4	N/A	N/A	N/A
5	25.77706	10.4 pk	10.4	0	20.8	48	N/A	N/A	N/A
Azimuth: N/A	Height: N/A				Margin [dB]	-27.2	N/A	N/A	N/A
6	27.56067	14 pk	10.4	0	24.4	48	N/A	N/A	N/A
Azimuth: N/A	Height: N/A				Margin [dB]	-23.6	N/A	N/A	N/A

LIMIT 1: FCC Part 15 Subpart C 15.207
LIMIT 2: NONE
LIMIT 3: NONE
LIMIT 4: NONE

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
tm - Trace Math Result

Conducted Emissions Test

2.2.2 Radiated Emissions Test (10 Meter Semi-Anechoic Chamber):

☒ Test Applicable ☐ Test Not Applicable

120kHz – 30MHz using Magnetic loop Antenna
The measurement antenna distance ☒ 3 ☐ 10 meters from the EUT.

30MHz – 1000MHz
The measurement antenna distance ☒ 3 ☐ 10 meters from the EUT.

Tests were performed on the transmitter in accordance with the limitation set forth by CFR47 FCC Part 15 Subpart B, Class B, Paragraphs 15.209 and tested in accordance with the test procedures and methodologies in ANSI C63.4:1992.

The EUT was checked throughout the frequency band 120kHz to 1000MHz. The transmitter operated at 134kHz. The allowable field strength limits in accordance with 15.209 were applied to the fundamental frequency. All other emissions were tested in accordance with the general limitations 15.209.

From 120kHz to 30MHz, measurements were made at a distance of 3 meters. The limit was adjusted to a 3-meter limit using the 40dB/decade-limit extrapolation method.

Test equipment used for final radiated emissions tests:

☒ **HP 8574A** **Hewlett-Packard** **EMI Reciever,** **Equipment No.: ME5A-461**
Range: .100-1000MHz Last Calibration Date: 01-27-01 Calibration Due Date: 01-27-02

Consisting of:

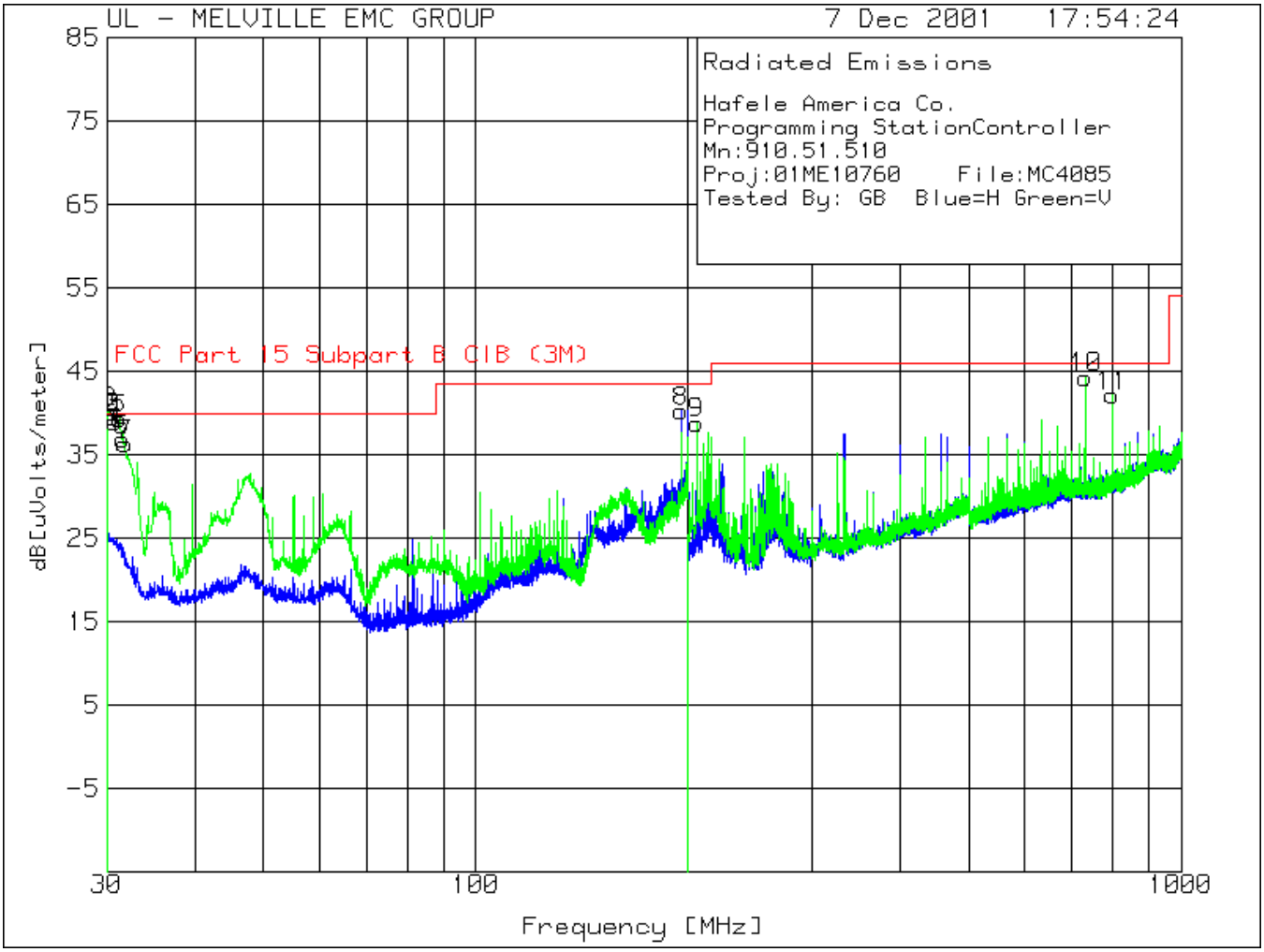
HP - 8566B	**Hewlett-Packard**	**Spectrum Analyzer,**
	Resolution BW: 1MHz	
	Video BW: 1MHz	
HP - 85662A	**Hewlett-Packard**	**Analyzer Display**
HP - 85650A	**Hewlett-Packard**	**Quasi-Peak Adapter,**
	BW: 120kHz	
HP - 85685A	**Hewlett-Packard**	**Preselector**

Test Accessories:

☒ **3104C** **EMCO** **Biconnical Antenna** **Equipment No.: ME5-810**
Last Calibration Date: 03-16-01 Calibration Due Date: 03-16-02

☒ **3146** **EMCO** **Log Periodic Antenna** **Equipment No.: ME5-811**
Last Calibration Date: 03-07-01 Calibration Due Date: 03-07-02

☒ **6507** **EMCO** **Active Loop Antenna** **Equipment No.: ME5A-288**
Last Calibration Date: 02-01-01 Calibration Due Date: 02-01-02



Radiated Emissions 30 – 1000 MHz

Underwriters Laboratories Inc. 1285 Walt Whitman Rd. Melville, New York 11747 USA Tel.: 631-271-6200 Fax: 631 439-6095 Rev. No 1.2

Hafele America Co.
Programming StationController
Mn:910.51.510
Proj:01ME10760 File:MC4085
Tested By: GB Blue=H Green=V

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level	Limit:1	2	3	4
1	30.1274	26.6 pk	.8	12.6	40	40	N/A	N/A	N/A
Azimuth: 13	Height:98 Vert			Margin [dB]	0		N/A	N/A	N/A
2	30.2123	26.7 pk	.8	12.6	40.1	40	N/A	N/A	N/A
Azimuth: 200	Height:98 Vert			Margin [dB]	.1		N/A	N/A	N/A
3	30.5096	26.2 pk	.8	12.5	39.5	40	N/A	N/A	N/A
Azimuth: 221	Height:98 Vert			Margin [dB]	-.5		N/A	N/A	N/A
4	30.7644	25.7 pk	.8	12.4	38.9	40	N/A	N/A	N/A
Azimuth: 75	Height:98 Vert			Margin [dB]	-1.1		N/A	N/A	N/A
5	31.2316	26.1 pk	.9	12.3	39.3	40	N/A	N/A	N/A
Azimuth: 116	Height:98 Vert			Margin [dB]	-.7		N/A	N/A	N/A
6	31.5713	23.7 pk	.9	12.2	36.8	40	N/A	N/A	N/A
Azimuth: 33	Height:98 Vert			Margin [dB]	-3.2		N/A	N/A	N/A
7	31.7837	23.3 pk	.9	12.1	36.3	40	N/A	N/A	N/A
Azimuth: 263	Height:98 Vert			Margin [dB]	-3.7		N/A	N/A	N/A
8	195.6682	20.2 pk	2	18	40.2	43.5	N/A	N/A	N/A
Azimuth: 48	Height:98 Horz			Margin [dB]	-3.3		N/A	N/A	N/A
9	205.995	24.8 pk	2.1	11.9	38.8	43.5	N/A	N/A	N/A
Azimuth: 46	Height:98 Vert			Margin [dB]	-4.7		N/A	N/A	N/A
10	732.6228	19.2 pk	3.9	21.2	44.3	46	N/A	N/A	N/A
Azimuth: 14	Height:199 Vert			Margin [dB]	-1.7		N/A	N/A	N/A
11	799.5004	15.8 pk	4.2	22.1	42.1	46	N/A	N/A	N/A
Azimuth: 272	Height:98 Vert			Margin [dB]	-3.9		N/A	N/A	N/A

LIMIT 1: FCC Part 15 Subpart B ClB (3M)
LIMIT 2: NONE
LIMIT 3: NONE
LIMIT 4: NONE

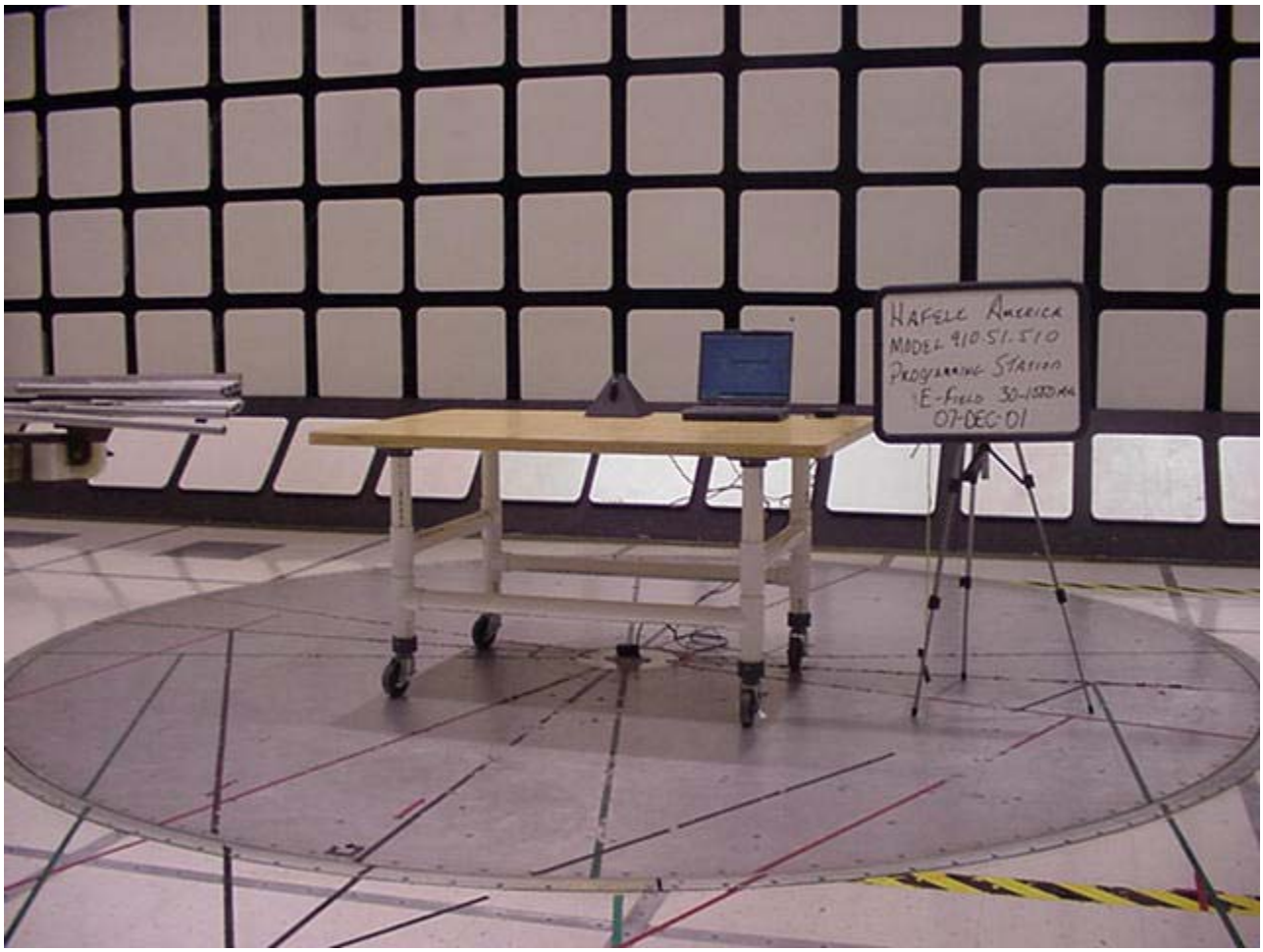
pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
tm - Trace Math Result

Hafele America Co.
Programming StationController
Mn:910.51.510
Proj:01ME10760 File:MC4085
Tested By: GB Blue=H Green=V

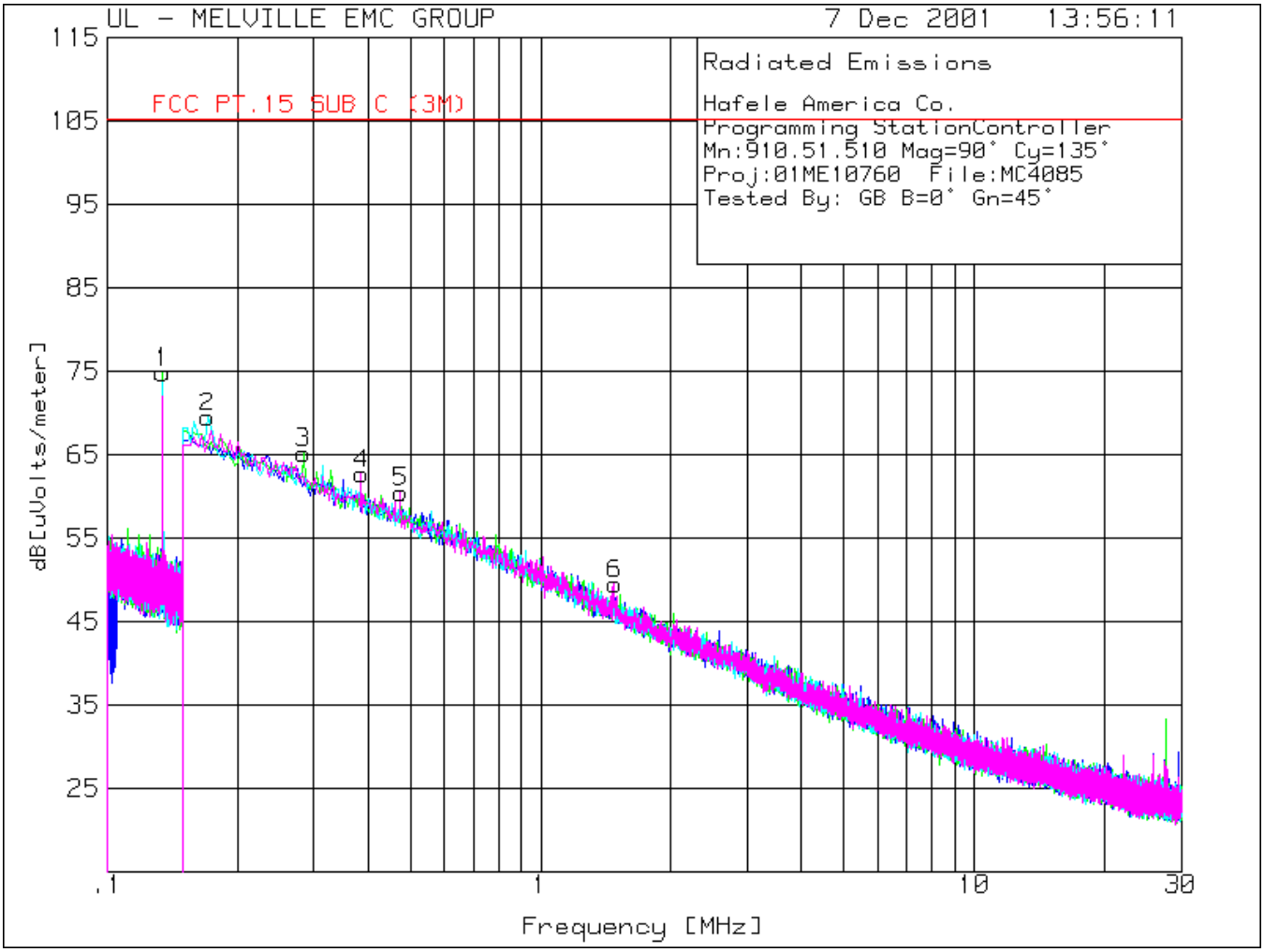
Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
30.123	11.68 qp	.8	12.6	25.08	40	N/A	N/A	N/A
Azimuth: 305	Height:134 Vert		Margin [dB]	-14.92		N/A	N/A	N/A
30.2185	13.74 qp	.8	12.6	27.14	40	N/A	N/A	N/A
Azimuth: 319	Height:143 Vert		Margin [dB]	-12.86		N/A	N/A	N/A
30.506	10.6 qp	.8	12.5	23.9	40	N/A	N/A	N/A
Azimuth: 216	Height:149 Vert		Margin [dB]	-16.1		N/A	N/A	N/A
30.746	15.54 qp	.8	12.4	28.74	40	N/A	N/A	N/A
Azimuth: 300	Height:169 Vert		Margin [dB]	-11.26		N/A	N/A	N/A
31.2185	13.85 qp	.9	12.3	27.05	40	N/A	N/A	N/A
Azimuth: 144	Height:181 Vert		Margin [dB]	-12.95		N/A	N/A	N/A
31.573	16.09 qp	.9	12.2	29.19	40	N/A	N/A	N/A
Azimuth: 144	Height:181 Vert		Margin [dB]	-10.81		N/A	N/A	N/A
31.779	11.37 qp	.9	12.1	24.37	40	N/A	N/A	N/A
Azimuth: 102	Height:202 Vert		Margin [dB]	-15.63		N/A	N/A	N/A
195.368	10.3 qp	2	18	30.3	43.5	N/A	N/A	N/A
Azimuth: 285	Height:182 Horz		Margin [dB]	-13.2		N/A	N/A	N/A
206.14	26.6 qp	2.1	11.9	40.6	43.5	N/A	N/A	N/A
Azimuth: 175	Height:101 Vert		Margin [dB]	-2.9		N/A	N/A	N/A
733.124	17.38 qp	3.9	21.2	42.48	46	N/A	N/A	N/A
Azimuth: 337	Height:112 Vert		Margin [dB]	-3.52		N/A	N/A	N/A
799.7912	13.6 qp	4.2	22.1	39.9	46	N/A	N/A	N/A
Azimuth: 310	Height:100 Vert		Margin [dB]	-6.1		N/A	N/A	N/A

LIMIT 1: FCC Part 15 Subpart B ClB (3M)
LIMIT 2: NONE
LIMIT 3: NONE
LIMIT 4: NONE

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - Average log detector



Radiated Emissions Test 30 – 1000MHz



Radiated Emissions .1 – 30 MHz

Underwriters Laboratories Inc. 1285 Walt Whitman Rd. Melville, New York 11747 USA Tel.: 631-271-6200 Fax: 631 439-6095 Rev. No 1.2

Hafele America Co.
Programming StationController
Mn:910.51.510 Mag=90° Cy=135°
Proj:01ME10760 File:MC4085
Tested By: GB B=0° Gn=45°

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
1	.13431	58.6 pk	.1	16.1	74.8	105.1	N/A	N/A	N/A
Azimuth: 0		Height:123 Horz			Margin [dB]	-30.3	N/A	N/A	N/A
2	.17088	53.6 pk	.1	15.8	69.5	105.1	N/A	N/A	N/A
Azimuth: 0		Height:150 Horz			Margin [dB]	-35.6	N/A	N/A	N/A
3	.2842	49.6 pk	.2	15.4	65.2	105.1	N/A	N/A	N/A
Azimuth: 0		Height:125 Horz			Margin [dB]	-39.9	N/A	N/A	N/A
4	.3856	47.1 pk	.2	15.4	62.7	105.1	N/A	N/A	N/A
Azimuth: 0		Height:168 Horz			Margin [dB]	-42.4	N/A	N/A	N/A
5	.47507	45 pk	.2	15.3	60.5	105.1	N/A	N/A	N/A
Azimuth: 0		Height:168 Horz			Margin [dB]	-44.6	N/A	N/A	N/A
6	1.48011	34.1 pk	.2	15.2	49.5	105.1	N/A	N/A	N/A
Azimuth: 358		Height:168 Horz			Margin [dB]	-55.6	N/A	N/A	N/A

LIMIT 1: FCC PT.15 SUB C (3M)
LIMIT 2: NONE
LIMIT 3: NONE
LIMIT 4: NONE

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
tm - Trace Math Result

Hafele America Co.
Programming StationController
Mn:910.51.510 Mag=90° Cy=135°
Proj:01ME10760 File:MC4085
Tested By: GB B=0° Gn=45°

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
.1342	30.81 av	.1	16.1	47.01	105.1	N/A	N/A	N/A
Azimuth: 248	Height:124 Horz		Margin [dB]	-58.09	N/A	N/A	N/A	

LIMIT 1: FCC PT.15 SUB C (3M)
LIMIT 2: NONE
LIMIT 3: NONE
LIMIT 4: NONE

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - Average log detector

Spectrum Analyzer Settings:

Frequency Span = 0Hz, Resolution Bandwidth = 100kHz, Video Bandwidth = 10Hz

Radiated Emission Test .1 – 30MHz

2.3 EMISSIONS TEST RESULTS

☒ Conducted Emissions

☒ Voltage(Section 2.1.1)	☒MET	☐ NOT MET
☐ Current(Section 2.1.1)	☐ MET	☐ NOT MET
☐ Clicks(Section 2.1.2)	☐ MET	☐ NOT MET

☒ Radiated Emissions(Section 2.2.2)	☒ MET	☐ NOT MET

The tractability of the measurements contained in this report is achieved by the use of calibrated equipment, which is traceable back to NIST.

3.0 Sample Calculations

Radiated Emissions Limit conversion from μV/m to dBμV/m
(Limits in accordance with paragraph 15.109)

Radiated Emissions Limit (dBμV/m) = 20*log (μV/m)
Radiated Emissions Limit (dBμV/m) = 20 * log (90)
Radiated Emissions Limit (dBμV/m) = 39.1

Radiated Emissions test data obtained during measurements.

Field Strength (dBμV/m) = Measured field strength (dBμV/m) + Antenna Factor (dB) + Cable Factor (dB)
Field Strength (dBμV/m) = 19.7dBμV/m + 12.5dB + 0.3dB
Field Strength (dBμV/m) = 32.5

Radiated Emissions Limit conversion from μV/m to dBμV/m and 40dB/decade
(Limits in accordance with paragraph 15.209)

Radiated Emission Limits; General Requirements

Frequency between 0.009-0.490 MHz,
2400/F(kHz) at 300 meters = Field Strength in μV/meter
Fundamental Frequency=134kHz
2400/(134) at 300 meters
Radiated emissions at 134 kHz at 300 meters =17.9μV/meter
dBμV/m=20*log(17..9μV/m)
dBμV/m=25.05 at 300meters
Add 40dB/decade
300 meters to 3 meters = 80 dB
Radiated Emissions Limit = dbμV/m + dB
25.05 + 80
105.05 dBμV/m

Magnetic field conversion of the active loop antenna:

The magnetic field reading was converted to an electrical field reading by adding the Electric Antenna factors (dB) to the field strength reading. The electric antenna factors are established at the time of the antenna calibration.

4.0 SUMMARY:

The equipment under test has

☒ met the technical requirements as defined under section(s) ☒ 2.0 and ☐ 3.0

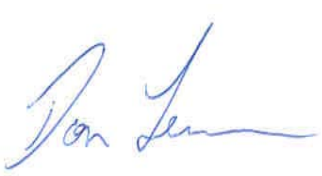
☐ not met the technical requirements as defined under section(s) ☐ 2.0 and ☐ 3.0.

Test Start Date: 5/19/00

Test Completion Date: 12/07/01

- UNDERWRITERS LABORATORIES, INC. -

Project Engineer



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