



Engineering and Testing for EMC and Safety Compliance

## CLASS II PERMISSIVE CHANGE REPORT

### FCC PART 90

AMCO Automated Systems, LLC  
107 Erskine Lane  
Scott Depot, WV 25560

MODEL: Mini-Mobile Interrogator

FCC ID: G8JMMI01

*July 7, 2004*

| Standards Referenced for this Report |                                                                                |
|--------------------------------------|--------------------------------------------------------------------------------|
| Part 2: 2003                         | Frequency Allocations and Radio Treaty Matters; General Rules and Regulations  |
| Part 15: 2003                        | Radio frequency devices - §15.109: Radiated Emissions Limits                   |
| Part 90: 2003                        | Private Land Mobile Radio Services                                             |
| ANSI C63.4-2001                      | Standard Format Measurement/Technical Report Personal Computer and Peripherals |

| Frequency Range | Output Power (W)<br>Conducted | Frequency Tolerance (ppm) | Emission Designator |
|-----------------|-------------------------------|---------------------------|---------------------|
| 450-460         | 7.44                          | 5                         | 6K00A3D             |

**REPORT PREPARED BY TEST ENGINEER: Daniel Baltzell**

*Document Number: 2004103 R0.00 / QRTL04-219*

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## **1 GENERAL INFORMATION**

The following Permissive Change Report is prepared on behalf of AMCO Automated Systems, LLC in accordance with the Federal Communications Commission's Rules and Regulations. The Equipment Under Test (EUT) was Model: MINI-MOBILE INTERROGATOR; FCC ID: G8JMMI01. The test results reported in this document relate only to the item that was tested.

All measurements contained in this application were conducted in accordance with FCC Rules, and ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 2001. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

### **1.1 TEST FACILITY**

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report dated March 3, 2000, submitted to and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 2001).

### **1.2 RELATED SUBMITTAL(S)/GRANT(S)**

This is a Class II Permissive Change application per FCC Part 2.1043(b)(2). The change is a new enclosure. The original circuitry and PCB have not changed since the original certification.

## 2 CONFORMANCE STATEMENT

| STANDARDS REFERENCED FOR THIS REPORT |                                                                                |
|--------------------------------------|--------------------------------------------------------------------------------|
| PART 2: 2003                         | FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS  |
| PART 15: 2003                        | RADIO FREQUENCY DEVICES - §15.109: RADIATED EMISSIONS LIMITS                   |
| PART 90: 2003                        | PRIVATE LAND MOBILE RADIO SERVICES                                             |
| ANSI C63.4-2001                      | STANDARD FORMAT MEASUREMENT/TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS |

| Frequency Range | Output Power (W)<br>Conducted | Frequency Tolerance (ppm) | Emission Designator |
|-----------------|-------------------------------|---------------------------|---------------------|
| 450-460         | 7.44                          | 5                         | 6K00A3D             |

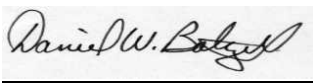
We, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this attached test record. There was no deviation from, additions to, or exclusions from, the above standards for Certification methodology. In order to achieve compliance with digital emissions during testing, a FerriShield ferrite clamp P/N CS28B1805 was added to the rear +5V Power Supply Line.

Signature: 

Date: July 7, 2004

Typed/Printed Name: Desmond Fraser

Position: President

Signature: 

Date: July 7, 2004

Typed/Printed Name: Daniel Baltzell

Position: Test Engineer



Accredited by the National Voluntary Accreditation Program for the specific scope of accreditation under Lab Code 200061-0.

**Note: This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.**

### 3 TESTED SYSTEM DETAILS

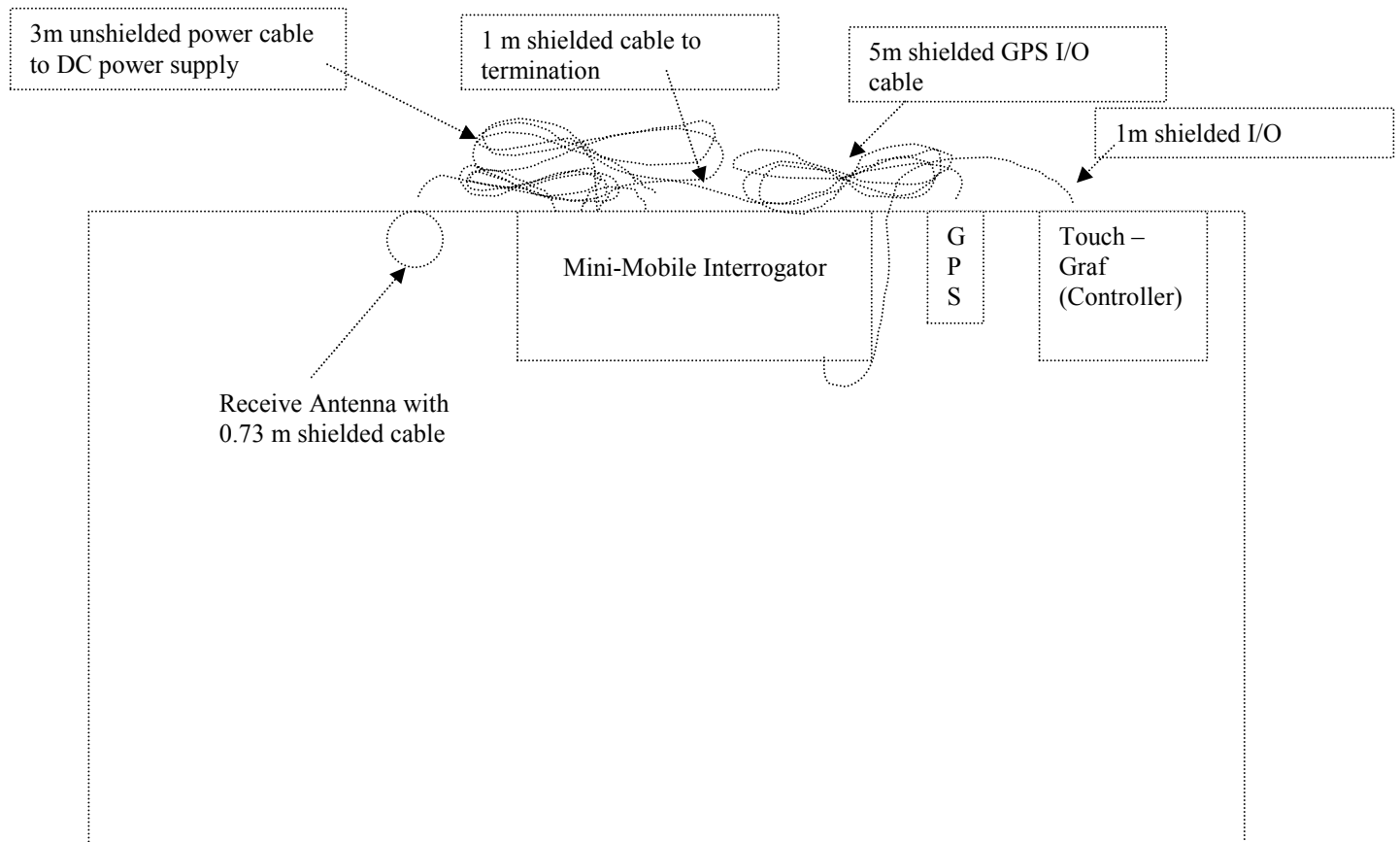
The test equipment was received on July 6, 2004. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable. A FerriShield Ferrite clamp P/N CS28B1805 was added to the rear +5V Power Supply Line to pass digital emissions.

**TABLE 3-1: EQUIPMENT UNDER TEST (EUT)**

| DESCRIPTION              | MANUFACTURER                | MODEL                    | SERIAL NO. | FCC ID   | CABLE DESCRIPTIONS  | RTL BAR CODE |
|--------------------------|-----------------------------|--------------------------|------------|----------|---------------------|--------------|
| Mini-Mobile Interrogator | AMCO Automated Systems, LLC | Mini-Mobile Interrogator | 0000350    | G8JMMI01 | 3m unshielded power | 16046        |
| Whip Antenna             | MaxRad                      | MUFL                     | N/A        | N/A      | 0.73 m shielded I/O | 16042        |
| Controller               | AMCO Automated Systems, LLC | TouchGraf                | 274465     | N/A      | 1m unshielded I/O   | 16044        |
| GPS                      | Garmin                      | 35-HVS                   | 7195394    | N/A      | 5m shielded I/O     | 16045        |

**TABLE 3-2: AUXILIARY TEST EQUIPMENT**

| DESCRIPTION     | MANUFACTURER          | MODEL  | SERIAL NO. | FCC ID | CABLE DESCRIPTIONS  | RTL BAR CODE |
|-----------------|-----------------------|--------|------------|--------|---------------------|--------------|
| Termination     | Bird Electronic Corp. | 8141   | 4005       | N/A    | 1m shielded I/O     | 900714       |
| DC Power Supply | Radio Shack           | 22-506 | 900176     | N/A    | 2m Unshielded Power | 16043        |



**FIGURE 3-1: CONFIGURATION OF TESTED SYSTEM**

#### 4 FCC RULES AND REGULATIONS PART 2 §2.1046 (A): RF POWER OUTPUT: CONDUCTED

##### 4.1 TEST PROCEDURE

ANSI 63.4

The EUT was connected to a coaxial attenuator having a 50Ω load impedance.

##### 4.2 TEST DATA

The carrier (in MHz) was tested: 451.35 MHz

**TABLE 4-1: RF POWER OUTPUT: CARRIER OUTPUT POWER (UNMODULATED)**

| Frequency (MHz) | RF Power Measured (Watt)* |
|-----------------|---------------------------|
| 451.35          | 7.44                      |

\* Measurement accuracy: +/- .02 dB (logarithmic mode)

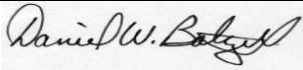
**TABLE 4-2: RF POWER OUTPUT (RATED POWER)**

| Rated Power (W) |
|-----------------|
| 7.44            |

**TABLE 4-3: TEST EQUIPMENT USED FOR TESTING RF POWER OUTPUT - CONDUCTED**

| RTL Asset #   | Manufacturer | Model         | Part Type            | Serial Number         | Calibration Due Date |
|---------------|--------------|---------------|----------------------|-----------------------|----------------------|
| 901184/901186 | Agilent      | E4416A/E9323A | Power Meter / Sensor | GB41050573/US40410380 | 07/30/04             |

TEST PERSONNEL:

|                          |                                                                                     |              |
|--------------------------|-------------------------------------------------------------------------------------|--------------|
| DANIEL W. BALTZELL       |  | July 6, 2004 |
| TEST TECHNICIAN/ENGINEER | SIGNATURE                                                                           | DATE OF TEST |

## 5 FCC RULES AND REGULATIONS PART 2 §2.1053 (A): FIELD STRENGTH OF SPURIOUS RADIATION

### 5.1 TEST PROCEDURE

ANSI 63.4; the transmitter is terminated with a 50  $\Omega$  rated termination. The spurious emissions levels were measured and the device under test was replaced by a substitution antenna connected to a signal generator. The signal generator level was then corrected by subtracting the cable loss between the substitution antenna and the signal generator. The gain of the antenna was further corrected to a half wave dipole.

**TRANSMITTER INPUT MODULATION:** The test signal was modulated using the EUT.

### 5.2 TEST DATA

#### 5.2.1 CFR 47 PART 90.210 REQUIREMENTS

The worst-case emissions test data are shown. The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

**TABLE 5-1: FIELD STRENGTH OF SPURIOUS HARMONIC-CARRIER AT 451.35 MHZ**

Radiated Spurious Emissions; Carrier 451.35 MHz; Limit =  $43 + 10 \log P = 51.7$  dBc; Conducted Power = 7.44 W

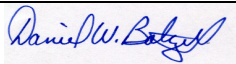
| Frequency (MHz) | Spectrum Analyzer Level (dBuV) | Signal Generator Level (dBm) | Cable Loss (dB) | Antenna Gain (dBd) | Corrected Signal Generator Level (dBc) | Limit (dBc) | Margin (dB) |
|-----------------|--------------------------------|------------------------------|-----------------|--------------------|----------------------------------------|-------------|-------------|
| 902.700         | 69.3                           | -45.8                        | 0.5             | -1.1               | 86.1                                   | 51.7        | -34.4       |
| 1354.050        | 57.1                           | -46.4                        | 1.0             | 3.3                | 82.8                                   | 51.7        | -31.1       |
| 1805.400        | 56.0                           | -44.6                        | 1.0             | 4.8                | 79.5                                   | 51.7        | -27.8       |
| 2256.750        | 45.7                           | -47.5                        | 0.9             | 5.0                | 82.1                                   | 51.7        | -30.4       |
| 2708.100        | 51.7                           | -39.3                        | 1.1             | 5.6                | 73.5                                   | 51.7        | -21.8       |
| 3159.450        | 47.0                           | -45.7                        | 1.0             | 6.2                | 79.2                                   | 51.7        | -27.5       |
| 3610.800        | 31.8                           | -60.0                        | 1.1             | 5.9                | 93.9                                   | 51.7        | -42.2       |
| 4062.150        | 31.8                           | -55.6                        | 1.0             | 6.0                | 89.3                                   | 51.7        | -37.6       |
| 4513.500        | 31.0                           | -57.5                        | 1.0             | 7.1                | 90.1                                   | 51.7        | -38.4       |

\*This insertion loss corresponds to the cable connecting the RF Signal Generator to the  $\frac{1}{2}$  wave dipole antenna, or horn antenna.

**TABLE 5-2: TEST EQUIPMENT USED FOR TESTING FIELD STRENGTH OF SPURIOUS RADIATION**

| RTL ASSET # | MANUFACTURER          | MODEL             | PART TYPE                                          | SERIAL NUMBER   | CALIBRATION DUE DATE |
|-------------|-----------------------|-------------------|----------------------------------------------------|-----------------|----------------------|
| 901053      | Schaffner-Chase       | CBL6112           | Antenna (25 MHz – 2 GHz)                           | 2648            | 09/03/04             |
| 900151      | Rhode and Schwarz     | HFH2-Z2           | Loop Antenna (9 kHz - 30 MHz)                      | 827525/019      | 8/25/06              |
| 900932      | Hewlett Packard       | 8449B OPT H02     | Preamplifier (1 - 26.5 GHz)                        | 3008A00505      | 5/05/05              |
| 901020      | Hewlett Packard       | 8564E             | Portable Spectrum Analyzer (9 kHz - 40 GHz)        | 3943A01719      | 07/15/04             |
| 900928      | Hewlett Packard       | HP 83752A         | Synthesized Sweeper (.01 – 20 GHz)                 | 3610A00866      | 08/05/04             |
| 900811      | Rhein Tech Labs       | PR-1040           | Amplifier                                          | 1003            | 2/23/05              |
| 900878      | Rhein Tech Labs       | AM3-1197-0005     | 3 meter antenna mast, polarizing                   | Outdoor Range 1 | Not Required         |
| 901231      | IW Microwave Products | KPS-1503-2400-KPS | High frequency RF cables                           | 240"            | 9/05/04              |
| 901232      | IW Microwave Products | KPS-1503-2400-KPS | High frequency RF cables                           | 240"            | 9/05/04              |
| 901235      | IW Microwave Products | KPS-1503-360-KPS  | High frequency RF cables                           | 36"             | 9/05/04              |
| 901242      | Rhein Tech Labs       | WRT-000-0003      | Wood rotating table                                | N/A             | Not Required         |
| 900772      | EMCO                  | 3161-02           | Horn Antenna (2 - 4 GHz)                           | 9804-1044       | 5/20/07              |
| 900321      | EMCO                  | 3161-03           | Horn Antennas (4 - 8,2 GHz)                        | 9508-1020       | 5/20/07              |
| 900889      | Hewlett Packard       | 85685A            | RF Preselector for HP 8566B (20 Hz - 2 GHz)        | 3146A01309      | 3/10/05              |
| 900896      | Hewlett Packard       | 85662A            | Display Section                                    | 2816A16471      | 2/27/05              |
| 900901      | Hewlett Packard       | 85650A            | Quasi-Peak Adapter (30 Hz - 40 GHz)                | 3145A01599      | 2/27/05              |
| 900931      | Hewlett Packard       | 8566B             | Spectrum Analyzer (100 Hz - 22 GHz)                | 3138A07771      | 6/23/05              |
| 901053      | Schaffner Chase       | CBL6112B          | Bi-Log Antenna (20 MHz - 2 GHz)                    | 2648            | 9/03/04              |
| 900154      | Compliance Design     | Roberts Dipole    | Adjustable Elements Dipole Antenna (30 - 1000 MHz) | N/A             | 10/6/04              |
| 900814      | Electro-Metrics       | EM-6961 (RGA-60)  | Double Ridged Guide Antenna (1 - 18 GHz)           | 2310            | 2/17/06              |

TEST PERSONNEL:

|                          |                                                                                     |              |
|--------------------------|-------------------------------------------------------------------------------------|--------------|
| DAN BALTZELL             |  | July 7, 2004 |
| TEST TECHNICIAN/ENGINEER | SIGNATURE                                                                           | DATE OF TEST |

## 6 RADIATED EMISSION FOR DIGITAL EMISSIONS - §15.209

### 6.1 RADIATED EMISSION TEST PROCEDURE FOR DIGITAL EMISSIONS

Radiated spurious emissions for digital interface are subject to the limits of FCC §15.109.

### 6.2 RADIATED EMISSION TEST DATA - DIGITAL INTERFACE

**TABLE 6-1: RADIATED EMISSIONS**

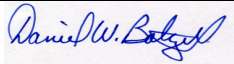
| Temperature: 30°F Humidity: 46% |               |                        |                         |                    |                         |                               |                         |                |             |
|---------------------------------|---------------|------------------------|-------------------------|--------------------|-------------------------|-------------------------------|-------------------------|----------------|-------------|
| Emission Frequency (MHz)        | Test Detector | Antenna Polarity (H/V) | Turntable Azimuth (deg) | Antenna Height (m) | Analyzer Reading (dBuV) | Site Correction Factor (dB/m) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
| 112.000                         | Qp            | H                      | 270                     | 1.5                | 40.3                    | -17.0                         | 23.3                    | 43.5           | -20.2       |
| 160.000                         | Qp            | H                      | 0                       | 1.0                | 26.0                    | -18.8                         | 7.2                     | 43.5           | -36.3       |
| 180.000                         | Qp            | H                      | 0                       | 1.0                | 26.0                    | -19.6                         | 6.4                     | 43.5           | -37.1       |
| 220.000                         | Qp            | H                      | 0                       | 1.0                | 25.9                    | -18.8                         | 7.1                     | 46.0           | -38.9       |
| 240.000                         | Qp            | H                      | 0                       | 1.0                | 25.9                    | -16.6                         | 9.3                     | 46.0           | -36.7       |
| 400.000                         | Qp            | H                      | 0                       | 1.0                | 25.9                    | -11.7                         | 14.2                    | 46.0           | -31.8       |

QP: RES. =100 kHz, VID= 100 kHz

**TABLE 6-2: TEST EQUIPMENT USED FOR TESTING DIGITAL EMISSIONS RADIATION**

| RTL ASSET # | MANUFACTURER          | MODEL             | PART TYPE                                   | SERIAL NUMBER   | CALIBRATION DUE DATE |
|-------------|-----------------------|-------------------|---------------------------------------------|-----------------|----------------------|
| 900811      | Rhein Tech Labs       | PR-1040           | Amplifier                                   | 1003            | 2/23/05              |
| 900878      | Rhein Tech Labs       | AM3-1197-0005     | 3 meter antenna mast, polarizing            | Outdoor Range 1 | Not Required         |
| 900889      | Hewlett Packard       | 85685A            | RF Preselector for HP 8566B (20 Hz - 2 GHz) | 3146A01309      | 3/10/05              |
| 900896      | Hewlett Packard       | 85662A            | Display Section                             | 2816A16471      | 2/27/05              |
| 900901      | Hewlett Packard       | 85650A            | Quasi-Peak Adapter (30 Hz - 40 GHz)         | 3145A01599      | 2/27/05              |
| 900931      | Hewlett Packard       | 8566B             | Spectrum Analyzer (100 Hz - 22 GHz)         | 3138A07771      | 6/23/05              |
| 901053      | Schaffner Chase       | CBL6112B          | Bi-Log Antenna (20 MHz - 2 GHz)             | 2648            | 9/03/04              |
| 901231      | IW Microwave Products | KPS-1503-2400-KPS | High frequency RF cables                    | 240"            | 9/05/04              |
| 901232      | IW Microwave Products | KPS-1503-2400-KPS | High frequency RF cables                    | 240"            | 9/05/04              |
| 901235      | IW Microwave Products | KPS-1503-360-KPS  | High frequency RF cables                    | 36"             | 9/05/04              |
| 901242      | Rhein Tech Labs       | WRT-000-0003      | Wood rotating table                         | N/A             | Not Required         |

#### TEST PERSONNEL:

|                          |                                                                                     |              |
|--------------------------|-------------------------------------------------------------------------------------|--------------|
| DAN BALTZELL             |  | July 7, 2004 |
| TEST TECHNICIAN/ENGINEER | SIGNATURE                                                                           | DATE OF TEST |

## **7 CONCLUSION**

The data in this measurement report shows that the AMCO Automated Systems, LLC, Model: Mini-Mobile Interrogator, FCC ID: G8JMMI01, complies with all the applicable requirements of Parts 90, 15 and 2 of the FCC Rules and Regulations.