



Engineering and Testing for EMC and Safety Compliance

CLASS II PERMISSIVE CHANGE REPORT

FCC PART 90

FCC ID: G8JURF01

MODEL:

TRACE UNIVERSAL
RF INTERROGATOR

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

February 19, 2004

STANDARDS REFERENCED FOR THIS REPORT	
PART 2: 2001	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS
PART 15: 2001	RADIO FREQUENCY DEVICES - §15.109: RADIATED EMISSIONS LIMITS
PART 90: 2001	PRIVATE LAND MOBILE RADIO SERVICES
ANSI C63.4-1992	STANDARD FORMAT MEASUREMENT/TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS
ANSI/TIA/EIA603- 1992	LAND MOBILE FM OR PM COMMUNICATIONS EQUIPMENT MEASUREMENT AND PERFORMANCE STANDARDS
ANSI/TIA/EIA 603-1-1998	ADDENDUM TO ANSI/TIA/EIA 603-1992
ANSI/TIA/EIA -102.CAAA; 1999	DIGITAL C4FM/CQPSK TRANSCEIVER MEASUREMENT METHODS

Frequency Range	Output Power (W) Conducted	Frequency Tolerance (ppm)	Emission Designator
450-460	1.5	2	11K1A1D

REPORT PREPARED BY TEST ENGINEER: DAN BALTZELL

Document Number: 2003202 R0.01 / QRTL03-181

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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 AMCO's Model: TRACE UNIVERSAL RF INTERROGATOR; FCC ID: G8JURF01. 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, 1992. 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 1992).

1.2 RELATED SUBMITTAL(S)/GRANT(S)

This is a Class II Permissive Change application per FCC Part 2.1043(b)(2). The original device had two antennas - one for transmitting and one for receiving. The modified device uses an AS191-73 active antenna switch to switch the transmit and receive signals to a single antenna. The control signal comes from an existing pin on the URFI digital board connector. The antenna switch inputs are also from existing connectors on the board. The original circuitry and PCB have not changed since the original certification. The antenna is the same type as used before.

2 CONFORMANCE STATEMENT

STANDARDS REFERENCED FOR THIS REPORT	
PART 2: 2001	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS
PART 15: 2001	RADIO FREQUENCY DEVICES - §15.109: RADIATED EMISSIONS LIMITS
PART 90: 2001	PRIVATE LAND MOBILE RADIO SERVICES
ANSI C63.4-1992	STANDARD FORMAT MEASUREMENT/TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS
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Frequency Range	Output Power (W) Conducted	Frequency Tolerance (ppm)	Emission Designator
450-460	1.5	2	11K1A1D

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. No modifications were made to the equipment during testing in order to achieve compliance with these standards.

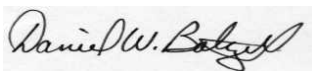
Furthermore, there was no deviation from, additions to, or exclusions from, the above standards for Certification methodology.

Signature: 

Date: February 19, 2004

Typed/Printed Name: Desmond Fraser


Position: President

Signature: 

Date: February 19, 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

Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

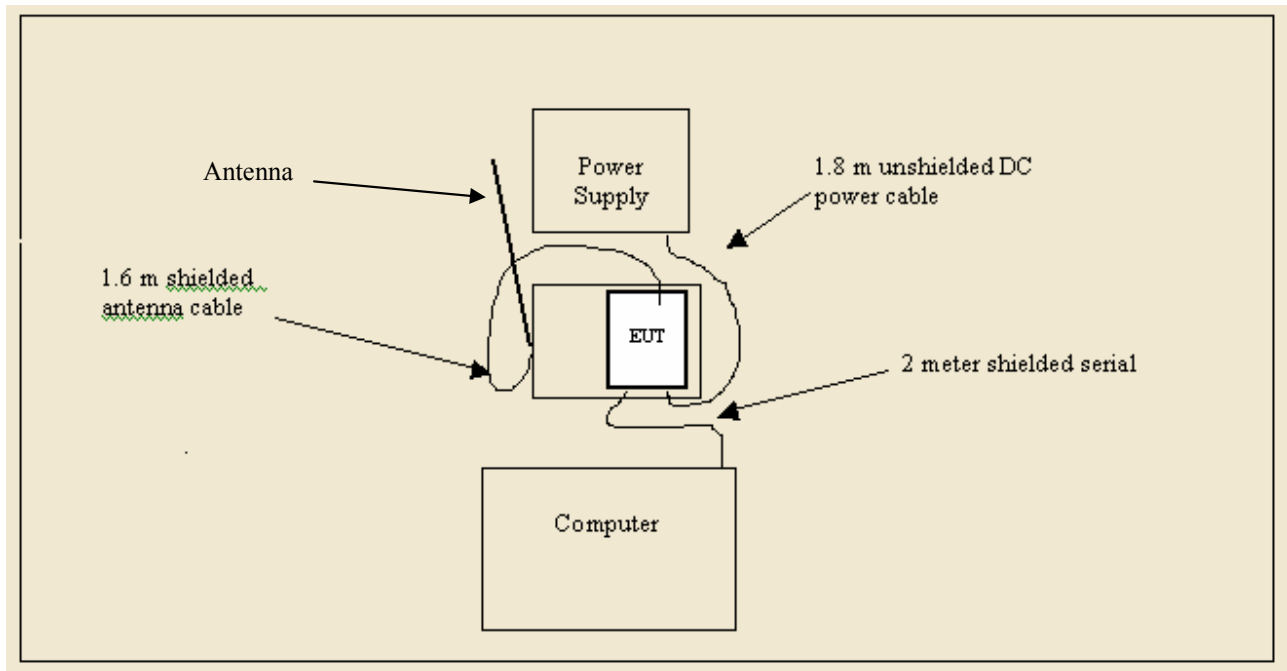
TABLE 3-1: EQUIPMENT UNDER TEST (EUT)

DESCRIPTION	MANUFACTURER	MODEL	SERIAL NO.	FCC ID	CABLE DESCRIPTIONS	RTL BAR CODE
Transmitter Module (EUT)	AMCO Automated Systems, LLC	TRACE UNIVERSAL RF INTERROGATOR	000188	G8JURF01	1.8m unshielded power; 2m unshielded serial	15597
Whip Antenna	C-MET Co., Ltd	SH-55	N/A	N/A	1.6 m shielded	15603/15698

TABLE 3-2: AUXILIARY TEST EQUIPMENT

DESCRIPTION	MANUFACTURER	MODEL	SERIAL NO.	FCC ID	CABLE DESCRIPTIONS	RTL BAR CODE
Computer	Toshiba	1905-S301	92043315C	DoC	2m unshielded power	N/A
DC Power Supply	Alinco	DM-330MVT 32A	0001637	N/A	1m unshielded AC power	901126

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/TIA/EIA-603-1992, section 2.2.1

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	1.5

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

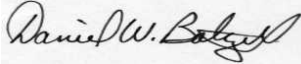
TABLE 4-2: RF POWER OUTPUT (RATED POWER)

Rated Power (W)
1.4

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		February 19, 2004
TEST TECHNICIAN/ENGINEER	SIGNATURE	DATE OF TEST

5 FCC RULES AND REGULATIONS PART 2 §2.1046 (A): RF POWER OUTPUT: RADIATED

5.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, section 2.2.1

The EUT was connected to the 3.2dBi omni whip antenna.

5.2 TEST DATA

The carrier (in MHz) was tested:

TABLE 5-1: RF POWER OUTPUT: CARRIER OUTPUT POWER (UNMODULATED)

Channel	Frequency (MHz)	RF Power Measured (Watt)*
1	451.35	0.112

* Measurement accuracy: +/- 0.5 dB

TABLE 5-2: TEST EQUIPMENT USED FOR TESTING (RF POWER OUTPUT - RADIATED)

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901053	Schaffner-Chase	CBL6112	Antenna (25 MHz – 2 GHz)	2648	07/03/04
900878	Rhein Tech Labs	AM3-1197-0005	3 Meter Antenna Mast, Polarizing	Outdoor Range 1	Not Required
901242	Rhein Tech Labs	WRT-000-0003	Wood rotating table	N/A	Not Required

TEST PERSONNEL:

DANIEL W. BALTZELL		February 19, 2004
TEST TECHNICIAN/ENGINEER	SIGNATURE	DATE OF TEST

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

6.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, section 2.2.12; the transmitter is terminated with a 50 Ω rated antenna which is the permissive change. 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 client provided settings using a serial connection to an external computer using hyperlink to set modulation and power levels.

6.2 TEST DATA

6.2.1 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 6-1: FIELD STRENGTH OF SPURIOUS HARMONIC-CARRIER AT 451.35 MHZ

Radiated Spurious Emissions; Carrier 451.35 MHz; Limit = 43 + 10 Log P = 44.8 dBc; Conducted Power = 1.5 W

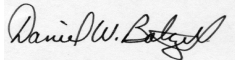
Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Limit (dBc)	Margin (dB)
902.700	49.7	-65.4	0.5	-1.1	98.8	44.8	-54.0
1354.050	51.8	-65.9	1.0	3.6	95.1	44.8	-50.3
1805.400	48.7	-51.9	0.9	4.9	79.7	44.8	-34.9
2256.750	65.7	-27.5	3.9	5.9	57.3	44.8	-12.5
2708.100	50.8	-40.1	4.8	7.1	69.6	44.8	-24.8
3159.450	47.0	-45.2	5.5	7.3	75.2	44.8	-30.4
3610.800	46.5	-45.3	5.7	7.5	75.3	44.8	-30.5
4062.150	54.5	-32.9	5.5	7.3	62.9	44.8	-18.1
4513.500	38.2	-50.3	5.7	8.1	79.7	44.8	-34.9

*This insertion loss corresponds to the cable connecting the RF Signal Generator to the ½ wave dipole antenna.

TABLE 6-2: 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	07/03/04
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	4/22/04
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	2/13/05
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"	1/30/05
901232	IW Microwave Products	KPS-1503-2400-KPS	High Frequency RF Cables	240"	1/30/05
901235	IW Microwave Products	KPS-1503-360-KPS	High Frequency RF Cables	36"	1/30/05
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	3/15/04
900321	EMCO	3161-03	Horn Antennas (4 - 8,2 GHz)	9508-1020	4/10/04

TEST PERSONNEL:

DAN BALTZELL		February 19, 2004
TEST TECHNICIAN/ENGINEER	SIGNATURE	DATE OF TEST

7 RADIATED EMISSION FOR DIGITAL EMISSIONS - §15.209

7.1 RADIATED EMISSION TEST PROCEDURE FOR DIGITAL EMISSIONS

Radiated spurious emissions for digital interface are subject to the limits of FCC §15.109, except for the emissions contained in the restricted frequency bands in FCC §15.205.

7.2 RADIATED EMISSION TEST DATA - DIGITAL INTERFACE

TABLE 7-1: 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)
166.400	Qp	H	270	1.5	43.4	-19.1	24.3	43.5	-19.2
332.800	Qp	H	180	1.0	49.9	-13.9	36.0	46.0	-10.0
343.496	Qp	H	180	1.0	43.5	-13.6	29.9	46.0	-16.1
617.754	Qp	H	270	1.1	39.3	-7.7	31.6	46.0	-14.4
665.600	Qp	H	180	1.4	38.9	-6.7	32.2	46.0	-13.8
686.992	Qp	H	180	1.1	42.6	-6.7	35.9	46.0	-10.1
1030.488	Av	H	280	1.1	37.1	-2.3	34.8	54.0	-19.2
1235.522	Av	H	280	1.1	35.8	0.0	35.8	54.0	-18.2
1373.984	Av	H	180	1.1	28.6	2.8	31.4	54.0	-22.6
1717.501	Av	H	180	1.0	33.2	5.6	38.8	54.0	-15.2

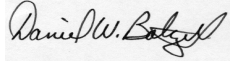
QP: RES. =100 kHz, VID= 100 kHz

TABLE 7-2: 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	2/13/05
900878	Rhein Tech Labs	AM3-1197-0005	3 Meter Antenna Mast, Polarizing	Outdoor Range 1	Not Required
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	7/15/04
901053	Schaffner Chase	CBL6112B	Bi-Log Antenna (20 MHz - 2 GHz)	2648	7/03/04
901231	IW Microwave Products	KPS-1503-2400-KPS	High Frequency RF Cables	240"	1/30/04
901232	IW Microwave Products	KPS-1503-2400-KPS	High Frequency RF Cables	240"	1/30/04
901235	IW Microwave Products	KPS-1503-360-KPS	High Frequency RF Cables	36"	1/30/04
901242	Rhein Tech Labs	WRT-000-0003	Wood rotating table	N/A	Not Required

TEST PERSONNEL:

DAN BALTZELL



December 10, 2003

TEST TECHNICIAN/ENGINEER

SIGNATURE

DATE OF TEST

8 CONCLUSION

The data in this measurement report shows that the AMCO Automated Systems, LLC, Model: TRACE UNIVERSAL RF INTERROGATOR, FCC ID: G8JURF01, complies with all the applicable requirements of Parts 90, 15 and 2 of the FCC Rules and Regulations.