FCC PART 15.209, SUBPART A, B & C
TEST REPORT

for

AUDIO CONTROL UNIT (ACU)
M/N: 580230
FCC ID: QY4-580230

Prepared for

APPLIED WIRELESS, INC.
1250-F AVENIDA ACASO
CAMARILLO, CA 93012

Prepared by: _____

JOEY MADLANGBAYAN

Approved by: _____

JOHN ETHINGTON

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DATE: JUNE 7, 2005

	REPORT BODY	APPENDICES							TOTAL
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GENERAL REPORT SUMMARY

This electromagnetic emission report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced in any form except in full, without the written permission of Compatible Electronics.

This report must not be used to claim product endorsement by NVLAP, NIST or any other agency of the U.S. Government.

Device Tested: Audio Control Unit (ACU)
Model Number: 580230
SN: 009

Product Description: The EUT is an audio transmitter used aboard passenger trains. It transmits audio associated with a series of monitors installed on the train. One Audio Control Unit (ACU) is installed on each "married pair" of rail cars. There are two RF outputs; one of which connects to the antenna system on the rail car on which the ACU is installed, while the other connects to the antenna system on the other car, which has a higher power output to account for the signal loss over the length of cable required to reach the other car. The system transmits on up to seven channels of audio simultaneously. The audio channels are within the 88 to 108 MHz FM band. The FM channels on which it transmits are selected based on the occupancy of the local FM radio stations in the area in which the device will be used. Only channels which are not already occupied by FM radio stations are selected for use in a particular area. The audio is intended to be received by passengers utilizing their own portable FM receivers.

Modifications: The EUT was not modified during the testing.

Manufacturer: Applied Wireless, Inc.
1250-F Avenida Acaso
Camarillo, CA 93012

Test Dates: April 11-26, & May 2-10, 2005

Test Specifications: EMI requirements
FCC CFR Title 47, Part 15 Subpart A, B (15.109) and C sections 15.205 and 15.209
Test Procedure: ANSI C63.4: 2003.

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 150 kHz - 30 MHz.	This is a DC powered device that does not plug into AC mains; therefore this test was deemed unnecessary.
2	Radiated RF Emissions, 9 kHz – 1080 MHz.	Complies with the limits of FCC CFR Title 47, Part 15 Subpart C 15.205, 15.109 and 15.209.

1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the Audio Control Unit Model Number: 580230. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4: 2003. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the specification limits defined in FCC CFR Title 47, Part 15 Subpart A, Subpart B 15.109 Subpart C 15.205 and 15.209.

2. ADMINISTRATIVE DATA

2.1 Location of Testing

The EMI tests described herein were performed at the facility of MARTA major repair maintenance yard, 2775 E. Ponce De Leon Decatur, Georgia 30030.

2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

2.3 Cognizant Personnel

Applied Wireless, Inc.	
Davis Nichols	President
Rail X, Co.	
Keith Blackburn	Senior Engineer
TRN Atlanta. LLC	
David Lane	Chief Executive Officer
A.J. Jordan	Project Manager
Doug Mangran	Operations Manager
Leroy Anthony Coles	VP of Operations
Compatible Electronics, Inc.	
Joey J. Madlangbayan	Test Engineer
Scott McCutchen	Senior Technical Advisor
Ruby A. Hall	Lab Manager
Jeff S. Klinger	Director of Engineering

2.4 Date Test Sample was Received

The test sample was received on March 11, 2005.

2.5 Disposition of the Test Sample

The test sample remains at TRN Atlanta, LLC.

2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

RF	Radio Frequency
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
HP	Hewlett Packard
ITE	Information Technology Equipment
CML	Corrected Meter Limit
LISN	Line Impedance Stabilization Network

3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this EMI Test Report.

SPEC	TITLE
FCC CFR Title 47, Part 15 Subpart A	FCC Rules – General
FCC CFR Title 47, Part 15 Subpart B	FCC Rules – Unintentional Radiators
FCC CFR Title 47, Part 15 Subpart C	FCC Rules – Intentional Radiators.
CISPR 16 1993	Specification for radio disturbance and immunity measuring apparatus and methods.
ANSI C63.4 2003	Methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz.

4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration - EMI

The EUT was installed in the equipment cabinet of the "B" car inside of three pairs of representative rail cars, continuously transmitting 3 RF signals. The two RF outputs are connected to two RF splitters, one in each rail car. The coax cables connecting the EUT to the transmitting antennas were also installed on the upper ceiling of the train cars. The EUT was connected to a video media controller and subscriber unit via the I/O and Ethernet ports respectively. See section 4.1.2 for the individual cable descriptions and terminations. The EUT transmitting antennas are comprised of 50-ohm leaky coax cable elements.

The highest emissions were found when the EUT was running in the above configuration. The cables were setup in a representation of typical layout to simulate the actual installation. The final radiated data was taken in this mode of operation. All initial investigations were performed with the spectrum analyzer in manual mode scanning the frequency range continuously. The cables were routed as shown in the photographs in Appendix F.

4.1.2 Cable Construction and Termination

EUT (Audio Control Unit) to VMC unit (Video Media Controller)

Cable 1

This is a 30cm, foil shielded round (CAT 5) cable that connects the EUT (Ethernet/VMC port) to the VMC (J2). There is a metallic DB-9 connector at the EUT end and a metallic DB-25 connector at the VMC end of the cable. The shield of the cable was grounded to the chassis via the connectors.

Cable 2

This is a 50cm, foil shielded round (twin CAT 5) cable that connects the EUT (Stereo/CH 5-7 port) to the VMC (S3 port). There are metallic DB-25 connectors at both ends of the cable. The shield of the cable was grounded to the chassis via the connectors.

Cable 3

This is a 40cm, foil shielded round (CAT 5) cable that connects the EUT (Mono/CH 1-3 port) to the VMC (S2 port). There are metallic DB-25 connectors at both ends of the cable. The shield of the cable was grounded to the chassis via the connectors.

Cable 4

This is a 50 cm, foil shielded round (twin CAT 5) cable that connects the EUT (Stereo CH4/ ISO out port) to the VMC (S5 port). There are metallic HD-15 pin connectors at both ends of the cable. The shield of the cable was grounded to the chassis via the connectors.

EUT Power In had a metallic 3 pin D-shell connector.

EUT ISO IN port had a metallic 5 pin D-shell connector.

EUT to Subscriber Unit

Cable 5

This is a 4.6 meter, foil shielded round (CAT 5) cable that connects the EUT (Ethernet/SU port) to the Subscriber Unit (POE port). There is a metallic DB-9 connector at the EUT end and a plastic RJ45 connector at the Subscriber Unit end. The shield of the cable was grounded to the EUT chassis via the connector.

EUT to Leaky Coax Antenna configuration.

Cable 6

This is a 14 meter, coax cable that connects the EUT (CH A) to splitter B. There is a BNC connector at both ends of the cable. The shield of the cable was grounded to the EUT chassis via the connectors.

Cable 7

This is a 36 meter, coax cable that connects the EUT (CH B) to splitter A. There is a BNC connector at both ends of the cables. The shield of the cable was grounded to the EUT chassis via the connectors.

Cable 8

This is a 9.5 meter, coax cable that connects splitter B to Antenna 1. There is a BNC connector at both ends of the cables. The shield of the cable was grounded to the EUT chassis via the connectors.

Cable 9

This is a 6 meter, coax cable that connects splitter B to Antenna 2. There is a BNC connector at both ends of the cables. The shield of the cable was grounded to the EUT chassis via the connectors.

Cable 10

This is a 2.7 meter, coax cable that connects splitter A to Antenna 3. There is a BNC connector at both ends of the cables. The shield of the cable was grounded to the EUT chassis via the connectors.

Cable 11

This is a 11.5 meter, coax cable that connects splitter A to Antenna 4. There is a BNC connector at both ends of the cables. The shield of the cable was grounded to the EUT chassis via the connectors.

5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

5.1 EUT and Accessory List

#	EQUIPMENT TYPE	MANUFACTURER	MODEL	SERIAL NUMBER
1	ACU (Audio Control Unit)	APPLIED WIRELESS	580230	0009
	VMC (VIDEO MEDIA CONTROLLER)	TRN ATLANTA	NONE	NONE
2	SUBSCRIBER UNIT	PROXIM	TMP.11 5054-R SUA-US	04UT51710160
3	POWER SPLITTER B (Car B)	MINI-CIRCUITS	ZSC-4-3 PN: BF253600451	NONE
4	POWER SPLITTER A (Car A)	MINI-CIRCUITS	ZSC-4-3 PN: BF253600451	NONE

5.2 EMI Test Equipment

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
Spectrum Analyzer	Hewlett Packard	8566B	3014A06518	Jan. 13, 2005	Jan. 13, 2006
Quasi-Peak Adapter	Hewlett Packard	85650A	2811A01362	Jan. 13, 2005	Jan. 13, 2006
Loop Antenna	Com Power	AL-130	17070	Jul. 8, 2003	Jul. 8, 2005
Biconical Antenna	Com Power	AB-100	015129	Mar. 8, 2005	Mar. 8, 2006
Log Periodic Antenna	Com Power	AL-100	16216	Apr. 4, 2005	Apr. 4, 2006
Horn Antenna	Com Power	AH-118	10085	Jan. 8, 2004	Jan. 8, 2006
Antenna Mast	Com Power	AM-400	N/A	N/A	N/A
Computer	Hewlett Packard	Pavilion 4530	US92020583	N/A	N/A
Radiated Emissions Test Software	Compatible Electronics	Vcap1A	2.3	N/A	N/A
(Software) Radiated Emissions Transmitter Data Program	Compatible Electronics	DOC No: EMI_PART15TX-B-0-50	Rev. X	N/A	N/A

6. TEST SITE DESCRIPTION

6.1 Test Facility Description

Please refer to section 2.1 and 7.1.2 of this report for EMI test location.

6.2 EUT Mounting, Bonding and Grounding

The EUT was installed and bonded to inside railcar access compartment. The Railcar it self was setup on the Major Repair maintenance rail yard.

The EUT was grounded and bonded to the rack-mount chassis of the railcar access control compartment.

7. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

7.1 RF Emissions

7.1.1 Conducted Emissions Test

The Spectrum Analyzer was used as a measuring meter along with the quasi-peak adapter. The data was collected with the Spectrum Analyzer in the peak detect mode with the "Max Hold" feature activated. The quasi-peak was used only where indicated in the data sheets. A 10 dB attenuation pad was used for the protection of the Spectrum Analyzer input stage, and the Spectrum Analyzer offset was adjusted accordingly to read the actual data measured. The LISN output was read by the Spectrum Analyzer. The output of the second LISN was terminated by a 50 ohm termination. The effective measurement bandwidth used for the conducted emissions test was 9 kHz.

Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The EUT was powered through the LISN, which was bonded to the ground plane. The LISN power was filtered and the filter was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in ANSI C63.4. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The initial test data was taken in manual mode while scanning the frequency ranges of 150 kHz to 1.6 MHz, 1.6 MHz to 5 MHz and 5 MHz to 30 MHz. The conducted emissions from the EUT were maximized for operating mode as well as cable placement. Once a predominant frequency (within 12 dB of the limit) was found, it was more closely examined with the spectrum analyzer span adjusted to 1 MHz.

The EUT is DC powered, and does not connect to the public AC mains; therefore this test was deemed unnecessary.

7.1.2 Radiated Emissions Test

The spectrum analyzer was used as a measuring meter along with a quasi-peak adapter. The Spectrum Analyzer was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the spectrum analyzer records the highest measured reading over all the sweeps. This final reading is then recorded into a Computer data recording program, which takes into account the cable loss and antenna factors, so that a true reading is compared to the true limit. The quasi-peak adapter was used only for those readings, which are marked accordingly on the data sheets. The effective measurement bandwidth used for the radiated emissions test was according to the frequency measured (200 Hz for 9kHz-150kHz, 9 kHz for 0.150kHz-30MHz, 120 kHz for 30-1000MHz and 1 MHz for 1000MHz and above).

Broadband loop, biconical, log periodic and horn antennas were used as transducers during the measurement. The loop antenna was used from 9 kHz to 30 MHz, the biconical antenna was used from 30 MHz to 300 MHz, the log periodic antenna was used from 300 MHz to 1000 MHz and the horn antenna was used for 1 GHz and above. The frequency spans were wide (30 MHz to 88 MHz, 88 MHz to 216 MHz, 216 to 300 MHz and 300 MHz to 1.08 GHz) during preliminary investigations. The final data was taken with a frequency span of 1 MHz. Furthermore, the frequency span was reduced during the preliminary investigations as deemed necessary.

The EUT installation test site at the MARTA major repair maintenance rail yard was used for the radiated emission testing. The test was performed according to ANSI C63.4. A minimum of 16 measurement points around the train cars were established and measurement data was then recorded at these points. At any area in which the maximum emissions were found, emissions were further explored between the points to ensure there were no other higher emissions found. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. Data was collected in the worst case (highest emission) configuration of the EUT. At each reading, the antenna height was varied from 1 to 4 meters (for E field radiated field strength).

The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT. The EUT was tested at a test distance of 3 meters to obtain final test data. At any time an ambient signal was detected and on the exact frequency of the EUT, the test distance was reduced to 1 meter and then a correction factor was added to adjust the corrected reading. The final test data is located in Appendix G.

7.1.3 RF Emissions Test Results

The fundamental and up to the 10th harmonic emissions are within the specifications.

APPLIED WIRELESS
Audio Control Unit (ACU)
Model: 580230

RADIATED EMISSIONS – SPURIOUS

The Frequency Band from 9 kHz to 1.08 GHz was specifically scanned. Please see test data in Appendix G.

RF Energy from the EUT at 3 meters (µV/m) is below the limits in the following ranges listed below.

0.090-0.110	<70	16.69475-16.69525	<70
0.495-0.505	<70	16.80425-16.80475	<70
2.1735-2.1905	<70	25.5-25.67	<70
4.125-4.128	<70	37.5-38.25	<100
4.17725-4.17775	<70	73-74.6	<100
4.20725-4.20775	<70	74.8-75.2	<100
6.215-6.218	<70	108-121.94	<100
6.26775-6.26825	<70	123-138	<150
6.31175-6.31225	<70	149.9-150.05	<150
8.291-8.294	<70	156.52-156.52	<150
8.362-8.366	<70	162.01-167.17	<150
8.37625-8.38675	<70	167.72-173.2	<150
8.41425-8.41475	<70	240-285	<200
12.29-12.293	<70	322-335.4	<200
12.51975-12.52025	<70	399.9-410	<200
12.57675-12.57725	<70	608-614	<200
13.36-13.41	<70	960-1240	<500
16.42-16.423	<70		

7.1.4 Sample Calculations

A correction factor for the antenna, cable and a distance factor (if any) must be applied to the meter reading before a true field strength reading can be obtained. This Corrected Meter Reading is then compared to the specification limit in order to determine compliance with the limits.

The equation can be derived in the following manner:

Specification limit (μV/m) log x 20 = Specification Limit in dBuV

(Specification distance / test distance) log x 40 = distance factor

Note: When using an Active Antenna, the Antenna factor shall be subtracted due to the combination of the internal amplification and antenna loss. At lower frequencies the cable loss is negligible.

OR

Corrected Meter Reading = meter reading + F + C

where: F = antenna factor
C = cable loss

The correction factors for the antennas are attached in Appendix D of this report. The data sheets are attached in Appendix G.

The distance factor is 0 when the test is performed at the required specification distance.

8. TEST PROCEDURE DEVIATIONS

There were no deviations from the test procedures.

9. CONCLUSIONS

The Audio Control Unit (ACU) Model Number: 580230 meets all of the requirements of the FCC CFR, Title 47, Part 15 Subpart A, Subpart B 15.109, Subpart C 15.205 and 15.209.

APPENDIX A

LABORATORY ACCREDITATIONS

LABORATORY ACCREDITATIONS AND RECOGNITIONS

NVLAP CODES 200063-0, 200528-0, 200527-0

For US, Canada, Australia/New Zealand, Taiwan and the European Union, Compatible Electronics is currently accredited by NVLAP to ISO/IEC 17025 an ISO 9002 equivalent. Please follow the link to the NIST site for each of our facilities NVLAP certificate and scope of accreditation.

Silverado/Lake Forest Division: http://ts.nist.gov/ts/htdocs/210/214/scopes/2005270.htm
Brea Division: http://ts.nist.gov/ts/htdocs/210/214/scopes/2005280.htm
Agoura Division: http://ts.nist.gov/ts/htdocs/210/214/scopes/2000630.htm

Compatible Electronics has been accredited by ANSI and appointed by the FCC to serve as a Telecommunications Certification Body (TCB). Compatible Electronics ANSI TCB listing can be found at: http://www.ansi.org/public/ca/ansi_cp.html

Compatible Electronics has been nominated as a Conformity Assessment Body (CAB) for EMC under the US/EU Mutual Recognition Agreement (MRA). Compatible Electronics NIST US/EU CAB listing can be found at: http://ts.nist.gov/ts/htdocs/210/gsig/emc-cabs-mar02.pdf

Compatible Electronics has been nominated as a Conformity Assessment Body (CAB) for Taiwan/BSMI under the US/APEC (Asia-Pacific Economic Cooperation) Mutual Recognition Agreement (MRA). Compatible Electronics NIST US/APEC CAB listing can be found at: http://ts.nist.gov/ts/htdocs/210/gsig/apec/bsmi-cabs-may02.pdf

World Wide Market Access with Nemko

Compatible Electronics has been validated by NEMKO against ISO/IEC 17025 under the NEMKO EMC Laboratory Authorization (ELA) program to all EN standards required by the European Union (EU) EMC Directive 89/336/EEC. Please follow the link to the Compatible Electronics' web site for each of our facilities NEMKO ELA certificate and scope of accreditation. http://www.celectronics.com/certs.htm

We are also certified/listed for IT products by the following country/agency:

Compatible Electronics VCCI listing can be found at:
http://www.vcci.or.jp/vcci_e/member/tekigo/setsubi_index_id.html

Just type "Compatible Electronics" into the Keyword search box.

Compatible Electronics FCC listing can be found at:
https://gullfoss2.fcc.gov/prod/oet/index_ie.html

Just type "Compatible Electronics" into the Test Firms search box.

Industry Canada Industrie Canada

Compatible Electronics IC listing can be found at:
http://spectrum.ic.gc.ca/~cert/labs/oats_lab_c_e.html

APPENDIX B

MODIFICATIONS TO THE EUT

MODIFICATIONS TO THE EUT

There were no modifications made to the EUT during the test.

APPENDIX C

ADDITIONAL MODELS COVERED UNDER THIS REPORT

ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

Audio Control Unit (ACU)
M/N: 580230
S/N: 009

There were no additional models covered under this report.

APPENDIX D

DIAGRAMS, CHARTS AND PHOTOS

COM-POWER AL-130

ACTIVE LOOP ANTENNA

S/N: 17070

CALIBRATION DATE: JULY 08, 2003

FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)
0.009	-40.0	11.5
0.01	-40.1	11.4
0.02	-41.3	10.2
0.05	-39.9	11.6
0.07	-41.3	10.2
0.1	-41.5	10
0.2	-43.8	7.7
0.3	-41.4	10.1
0.5	-41.3	10.2
0.7	-41.2	10.3
1	-40.8	10.7
2	-40.3	11.2
3	-40.6	10.9
4	-40.7	10.8
5	-40.1	11.4
10	-40.5	11.0
15	-41.3	10.2
20	-41.1	10.4
25	-41.7	9.8
30	-43.1	8.4

COM-POWER AB-100

BICONICAL ANTENNA

S/N: 15129

CALIBRATION DATE: MAR. 8, 2005

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
25	9.6	125	12.7
30	9.1	150	12.1
40	9.8	175	15.0
50	10.3	200	16.9
60	9.8	225	16.4
70	7.9	250	15.9
80	6.5	275	18.9
90	8.0	300	19.5
100	10.7		

COM-POWER AL-100

LOG PERIODIC ANTENNA

S/N: 16216

CALIBRATION DATE: APR. 04, 2005

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
300	13.5	700	18.7
350	15.3	750	19.5
400	15.6	800	20.0
450	15.4	850	20.2
500	16.6	900	20.6
550	15.2	950	22.6
600	17.9	1000	23.9
650	17.7		

A.R.A DRG-118

HORN ANTENNA

S/N: 10085

CALIBRATION DATE: JAN. 08, 2004

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
1000	24.5	10000	38.7
1500	26.7	10500	39.2
2000	30.8	11000	39.2
2500	30.3	11500	40.3
3000	30.3	12000	41.2
3500	30.7	12500	41.7
4000	31.3	13000	41.5
4500	32.6	13500	41.7
5000	33.9	14000	41.6
5500	34.3	14500	44.2
6000	34.3	15000	47.6
6500	39.4	15500	42.5
7000	37.1	16000	42.3
7500	38.6	16500	41.7
8000	39.4	17000	43.9
8500	39.3	17500	48.7
9000	38.7	18000	52.4
9500	38.7		

APPENDIX E

TEST SETUP PHOTOS


MR
4
MR
3
10 11:51 AM

MR 5

MR 4

marta

284

TESTING IN PROGRESS

MARTA

STOP

9 4:19 PM


KNIFE SWITCH
Must Not be Operated Under Load
DANGER
HIGH VOLTAGE
6 1:24 PM


671
750 V
NO STEP
6 1:25PM

APPENDIX F

ANTENNA CONFIGURATION DIAGRAMS

CQ310

RAIL CAR "B" (# 120)

ACU

LEAKY COAX ANTENNA

RF SPLITTER

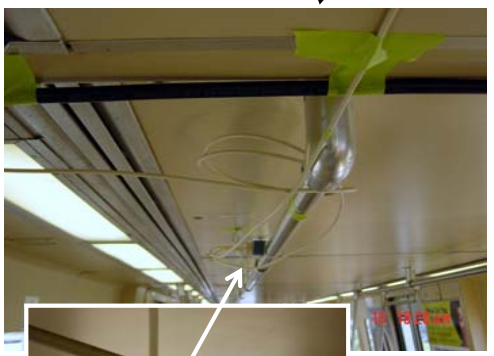
LEAKY COAX ANTENNA

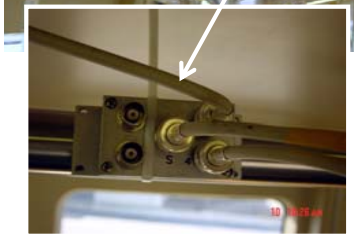
LEAKY COAX ANTENNA

RF SPLITTER

LEAKY COAX ANTENNA

RAIL CAR "A" (# 119)





CQ311

RAIL CAR "B" (# 284)

LEAKY COAX ANTENNA

ACU

RF SPLITTER

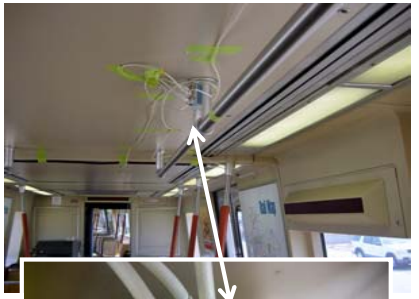
LEAKY COAX ANTENNA

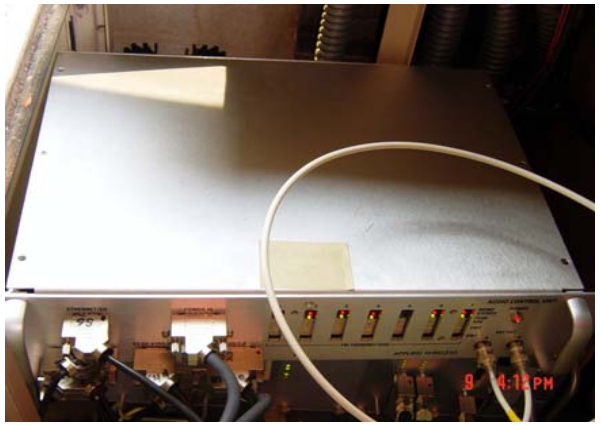
RAIL CAR "A" (# 283)

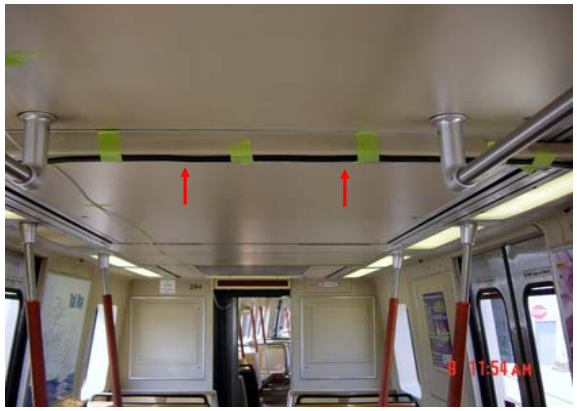
LEAKY COAX ANTENNA

RF SPLITTER

LEAKY COAX ANTENNA







CQ312

RAIL CAR "B" (# 672)

ACU

LEAKY COAX ANTENNA

LEAKY COAX ANTENNA

RF SPLITTER

RF SPLITTER

LEAKY COAX ANTENNA

LEAKY COAX ANTENNA

RAIL CAR "A" (# 671)