COMMUNICATION CERTIFICATION LABORATORY

1940 West Alexander Street
Salt Lake City, UT 84119
801-972-6146

Test Report

Certification

Test Of:

RAV Mixer
Converge Mixer

Test Specification:

FCC PART 15, Subpart C

Test Report Serial No: 863

Applicant:

ClearOne Communications, Inc.
5225 Wiley Post Way, Suite 500
Salt Lake City, UT 84116

Date of Test: June 25 and July 25 - 26, 2007

Issue Date: August 1, 2007

Accredited Testing Laboratory By:

NVLAP

NVLAP Lab Code 100272-0

CERTIFICATION OF ENGINEERING REPORT

This report has been prepared by Communication Certification Laboratory to document compliance of the device described below with the requirements of Federal Communications Commission (FCC) Part 15, Subpart C. This report may be reproduced in full. Partial reproduction may only be made with the written consent of the laboratory. The results in this report apply only to the sample tested.

- Applicant: ClearOne Communications, Inc.
- Manufacturer: ClearOne Communications, Inc.
- Brand Name: ClearOne
- Model Number: RAV Mixer and Converge Mixer
- FCC ID Number: FBIRAV

On this 1st day of August 2007, I, individually, and for Communication Certification Laboratory, certify that the statements made in this engineering report are true, complete, and correct to the best of my knowledge, and are made in good faith.

Although NVLAP has accredited the Communication Certification Laboratory EMC testing facilities, this report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

COMMUNICATION CERTIFICATION LABORATORY

Tested by: Norman P. Hansen
EMC Technician

TABLE OF CONTENTS

PAGE

SECTION 1.0 CLIENT INFORMATION

1.1 Applicant:

Company Name: ClearOne Communications, Inc.
5225 Wiley Post Way, Suite 500
Salt Lake City, UT 84116

Contact Name: Roger Midgley
Title: Project Manager

1.2 Manufacturer:

Company Name: ClearOne Communications, Inc.
5225 Wiley Post Way, Suite 500
Salt Lake City, UT 84116

Contact Name: Roger Midgley
Title: Project Manager

SECTION 2.0 EQUIPMENT UNDER TEST (EUT)

2.1 Identification of EUT:

Brand Name:	ClearOne
Model Number:	RAV Mixer
Serial Number:	None
Options Fitted:	N/A

2.2 Description of EUT:

The RAV product line is a complete audio conferencing system that fits a broad range of applications. RAV is available in two models, RAV 600 and RAV 900, and is designed for use in medium to large conference rooms. RAV 600 includes an audio mixer with an integrated telephone interface and amplifier, two RAV microphone pods (comprised of three microphones each), two Bose® ceiling (FreeSpace model 16) or wall-mount speakers (model 161), either a wired or wireless control unit or for dialing functions and RAV-Ware software. The RAV 900 adds an extra microphone pod to deliver optimal voice pickup in larger rooms. The RAV 600's main board is a short stuffed version of the fully populated RAV 900.

The Converge 590 and 560 are complete audio conferencing systems that fit a broad range of applications. The Converge 590 and 560 systems are designed for use in medium to large conference rooms. The Converge 560 includes an audio mixer with an integrated telephone interface and amplifier, two microphone boxes with three microphones each, two Bose® wall-mount speakers (model 161) or JBL Control Micro speakers, a wireless control unit for dialing functions, and software. The Converge 590 adds an extra microphone box and 3 microphones. The Converge 560's main board is a short stuffed version of the fully populated Converge 590. The audio mixer and the microphone box assembly are rack mounted with the boxes mounted directly below the audio mixer.

The RAV Mixer and Converge Mixer use the same PCB and transceiver circuitry. There are two antennas for use with the EUT. One is a direct connect monopole antenna and the second is a remote monopole antenna that connects to the mixer by a 13 foot coax cable. Both antennas have a gain of less than 6 dBi.

2.3 EUT and Support Equipment:

The FCC ID numbers for all the EUT and support equipment used during the test are listed below:

Brand Name Model Number Serial No.	FCC ID Number	Description	Name of Interface Ports / Interface Cables
BN: ClearOne MN: RAV 900 (Note 1)	Verification (Mixer FCC ID FBIRAV)	Conferencing System	See Section 2.4 and Section 2.5
BN: ClearOne MN: Converge 590 (Note 1)	Verification (Mixer FCC ID FBIRAV)	Conferencing System	See Section 2.6 and Section 2.7
BN: TRENDnet MN: TE100-S8P SN: 0243C3A16540	Verification	8 port LAN hub	Ethernet/Cat 5 cable w/RJ45 connectors (Note 2)
BN: Toshiba MN: 2060	N/A	PBX	Unshielded Telco w/RJ11 connector (Note 2)
BN: Comdial MN: 2500-CB-CW-000M	N/A	Single line telephone	Unshielded Telco w/RJ11 connector (Note 2)

Note: (1) EUT
(2) Interface port connected to EUT (See Section 2.4)

The support equipment listed above was not modified in order to achieve compliance with this standard.

2.4 Interface Ports Between RAV 900/RAV 900 Wired Components:

Brand Name Model Number	Quantity in RAV 900	Description	Interface Cables /Length
BN: ClearOne MN: RAV Controller	1	Controller	Unshielded Cable w/RJ-11 to DB9 adapter/12 meters
BN: ClearOne MN: RAV Mic Pod	3 (Note 1)	Microphone Pods	CAT5 cables w/RJ45 connectors />3 meters

Brand Name Model Number	Quantity in RAV 900	Description	Interface Cables /Length
BN: Bose MN: 161	2 (Note 2)	Wall Speakers	Unshielded 2 conductor speaker cables/>3 meters
BN: JBL MN: Control Micro	2 (Note 2)	Speakers	Unshielded 2 conductor speaker cables/>3 meters
BN: ClearOne MN: RAV Mixer	1	Audio Mixer	See Section 2.5
BN: Phihong MN: PSC30U-120	1	Desktop Power Supply	Unshielded DC cable Grounded Nema connector for AC mains
Note 1: Microphone pods are daisy-chained together. Only 2 microphone pods are supplied in the RAV 600 system. Note 2: The RAV 900 and RAV 600 systems contain 2 speakers, either the Bose or JBL.			

2.5 Interface Ports of the RAV 900 Wired for Connection to Peripheral Equipment:

Name of Ports	No. of Ports Fitted to EUT.	Cable Descriptions/Length
Telephone Line	1	Modular phone cord w/RJ11 connectors/2 meters
Telephone Set	1	Modular phone cord w/RJ11 connectors/2 meters
RS-232	1	Shielded serial cable w/DB9 connectors/2 meters
Camera Control	1	Shielded cable w/DIN connectors/2 meters
LAN	1	CAT5 cable w/RJ45 connectors/>3 meters
Playback/Record	2	Shielded cables w/RCA connectors/1 meter

Name of Ports	No. of Ports Fitted to EUT.	Cable Descriptions/Length
Line In	1	Shielded cable w/RCA connectors/1 meter
Line Out	1	Shielded cable w/RCA connectors/1 meter
Antenna	1	Antenna w/direct connection or Antenna w/4 meter cable
USB	1	USB cable/1 ½ meters

2.6 Interface Ports Between Converge 590/Converge 590 Wired Components:

Brand Name Model Number	Quantity in Converge	Description	Interface Cables /Length
BN: ClearOne MN: Controller	1	Controller	Unshielded Cable w/RJ-11 to DB9 adapter/12 meters
BN: ClearOne MN: Microphone Box	3 (Note 1)	Microphone Box	CAT5 cables w/RJ45 connectors /40 cm
BN: ClearOne MN: External Microphone	9 (Note 2)	Microphone	Shielded cables with XLR connectors
BN: Bose MN: 161	2 (Note 3)	Wall Speakers	Unshielded 2 conductor speaker cables/>3 meters
BN: JBL MN: Control Micro	2 (Note 3)	Speakers	Unshielded 2 conductor speaker cables/>3 meters
BN: ClearOne MN: Mixer	1	Audio Mixer	See Section 2.5
BN: Phihong MN: PSC30U-120	1	Desktop Power Supply	Unshielded DC cable Grounded Nema connector for AC mains

Brand Name Model Number	Quantity in Converge	Description	Interface Cables /Length
Note 1: Microphone boxes are daisy-chained together. Only 2 microphone boxes are supplied in the Converge 560 systems. Note 2: Three microphones interface one microphone box. There are a total of 9 microphones in the Converge 590 systems and 6 microphones in the Converge 560 systems. Note 3: The Converge 590 and 560 systems contain 2 speakers.			

2.7 Interface Ports of the Converge 590 Wired for Connection to Peripheral Equipment:

Name of Ports	No. of Ports Fitted to EUT.	Cable Descriptions/Length
Telephone Line	1	Modular phone cord w/RJ11 connectors/2 meters
Telephone Set	1	Modular phone cord w/RJ11 connectors/2 meters
RS-232	1	Unshielded Cable w/RJ-11 to DB9 adapter for wired controller/12 meters (Note 1)
Camera Control	1	Shielded cable w/DIN connectors/2 meters
LAN	1	CAT5 cable w/RJ45 connectors/>3 meters
Record (Left and Right)	1 Left and 1 Right	Shielded cable w/RCA connectors/1 meter
Playback (Left and Right)	1 Left and 1 Right	Shielded cable w/RCA connectors/1 meter
Line In	1	Shielded cable w/RCA connectors/1 meter
Line Out	1	Shielded cable w/RCA connectors/1 meter
Antenna	1	Antenna w/direct connection
USB	1	USB cable/1 ½ meters
Note 1: On the Converge 590 and 560 systems with wireless controllers, this port would be used for other RS-232 interfaced devices.		

2.8 Modification Incorporated/Special Accessories on EUT:

There were no modifications or special accessories required to comply with the specification.

Signature: _____

Typed Name: Roger Midgley

Title: Project Manager

SECTION 3.0 TEST SPECIFICATION, METHODS & PROCEDURES

3.1 Test Specification:

Title:	FCC PART 15, Subpart C (47 CFR 15) Limits and methods of measurement of radio interference characteristics of radio frequency devices.
Purpose of Test:	The tests were performed to demonstrate initial compliance.

3.2 Methods & Procedures:

3.2.1 §15.203 Antenna Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

3.2.2 §15.207 Conducted Limits

(a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHZ to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage

between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-peak	Average
0.15 – 0.5*	66 to 56*	56 to 46*
0.5 – 5	56	46
5 - 30	60	50

*Decreases with the logarithm of the frequency.

(b) The shown limit in paragraph (a) of this Section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

(1) For carrier current systems containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: nolimit on conducted emissions.

(2) For all other carrier current systems: 1000 uV within the frequency band 535-1705 kHz, as measured using a 50 µH/50 ohms LISN.

(3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits in Section 15.205 and Section 15.209, 15.221, 15.223, 15.225 or 15.227, as appropriate.

(c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provision for, the use of battery chargers which permit operating while charging, AC adaptors or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

3.2.3 §15.249 Operation within the bands 902 – 928 MHz, 2400 – 2483.5 MHz, 5725 – 5875 MHz, and 24.0 – 24.25 GHz

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 – 928 MHz	50	500
2400 – 2483.5 MHz	50	500
5725 – 5875 MHz	50	500
24.0 – 24.25 GHz	250	2500

(b) Fixed, point-to-point operation as referred to in this paragraph shall be limited to systems employing a fixed transmitter transmitting to a fixed remote location. Point-to-multipoint systems, omnidirectional applications, and multiple co-located intentional radiators transmitting the same information are not allowed. Fixed, point-to-point operation is permitted in the 24.05-24.25 GHz band subject to the following conditions:

(1) The field strength of emissions in this band shall not exceed 2500 millivolts/meter.

(2) The frequency tolerance of the carrier signal shall be maintained within + 0.001% of the operating frequency over a temperature variation of –20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

(3) Antenna gain must be at least 33 dBi. Alternatively, the main lobe beamwidth must not exceed 3.5 degrees. The beamwidth limit shall apply to both the azimuth and elevation planes. At antenna gains over 33 dBi or beamwidths narrower than 3.5 degrees, power must be reduced to ensure that the field strength does not exceed 2500 millivolts/meter.

(c) Field strength limits are specified at a distance of 3 meters.

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

(e) As shown in Section 15.35(b), for frequencies above 1000 MHz, the above field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

(f) Parties considering the manufacture, importation, marketing or operation of equipment under this section should also note the requirement in Section 15.37(d).

3.3 Test Procedure

The line conducted and radiated emissions testing was performed according to the procedures in ANSI C63.4 (2003). Testing was performed at CCL's Wanship open area test site #2, located at 550 West Wanship Road, Wanship, UT. This site has been fully described in a report submitted to the FCC, and was accepted in a letter dated June 6, 2006 (90504).

CCL participates in the National Voluntary Laboratory Accreditation Program (NVLAP) and has been accredited under NVLAP Lab Code:100272-0, which is effective until September 30, 2007.

For radiated emissions testing at 30 MHz or above that is performed at distances closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

SECTION 4.0 OPERATION OF EUT DURING TESTING

4.1 Operating Environment:

Power Supply: 120 VAC
AC Mains Frequency: 60 Hz

4.2 Operating Modes:

Each mode of operation was exercised to produce worst-case emissions. The worst-case emissions were with the RAV 900 mixer constantly transmitting and using the short, direct connecting antenna. The antenna was oriented vertically and horizontally for testing. The mixer is rack mounted and was placed flat on the EUT table as if mounted in a rack for testing.

4.3 EUT Exercise Software:

ClearOne software was used to control the transmitter.

SECTION 5.0 SUMMARY OF TEST RESULTS

5.1 FCC Part 15, Subpart C

5.1.1 Summary of Tests:

Port	Environmental Phenomena	Frequency Range (MHz)	Result
15.203	Antenna Requirements	Structural requirement	Complied
15.207	Conducted Emissions at Mains Ports	0.15 to 30	Complied
15.249	Radiated Power	30 to 9280	Complied

5.2 Result

In the configuration tested, the EUT complied with the requirements of the specification.

SECTION 6.0 MEASUREMENTS, EXAMINATIONS AND DERIVED RESULTS

6.1 General Comments:

This section contains the test results only. Details of the test methods used and a list of the test equipment used during the measurements can be found in Appendix 1 of this report.

6.2 Test Results:

6.2.1 Antenna requirement

The antenna uses a reverse SMA connector; therefore, the EUT meets the requirement.

6.2.2 Conducted Disturbance at Mains Ports Data (Hot Lead)

Frequency (MHz)	Lead (Hot or Neutral)	Detector	Measured Level (dBμV)	Limit (dBμV)	Margin (dB)
0.16	Hot	Peak (Note 1)	49.4	66.0	-16.6
2.89	Hot	Peak (Note 1)	51.5	60.0	-8.5
3.08	Hot	Peak (Note 1)	50.5	60.0	-9.5
3.15	Hot	Peak (Note 1)	49.7	60.0	-10.3
3.47	Hot	Peak (Note 1)	49.2	60.0	-10.8
3.71	Hot	Peak (Note 1)	49.8	60.0	-10.2
3.78	Hot	Peak (Note 1)	49.0	60.0	-11.0
2.89	Neutral	Peak (Note 1)	51.4	60.0	-8.6
3.01	Neutral	Peak (Note 1)	50.9	60.0	-9.1
3.07	Neutral	Peak (Note 1)	52.1	60.0	-7.9
3.80	Neutral	Peak (Note 1)	52.5	60.0	-7.5
3.93	Neutral	Peak (Note 1)	52.2	60.0	-7.8

Note 1: The reference detector used for the measurements was Quasi-Peak or Peak and the data was compared to the average limit; therefore, the EUT was deemed to meet both the average and quasi-peak limits.

RESULT

The host of the EUT is a Class A device. Measurements were taken with the EUT transmitting and not transmitting. No change

was seen in the emission levels and no emissions were seen that could be attributed to the transmitter. The emissions shown in the table above reflect the host system emissions and since it is a class A device, the class A limits were used for comparison of the emission levels.

6.2.3 Radiated Disturbance Data (Vertical Polarity)

Transmitting at 904.3 MHz

Frequency (MHz)	Detector	Receiver Reading (dBμV)	Correction Factor (dB/m)	Field Strength (dBμV/m)	3 m Limit (dBμV/m)	Margin (dB)
904.3	Peak	58.3	28.2	86.5	94.0	-7.5
1808.6	Peak	11.4	29.7	41.1	54.0	-12.9
2712.9	Peak	9.2	32.1	41.3	54.0	-12.7
3617.2	Peak	7.7	34.5	42.2	54.0	-11.8
4521.5	Peak	8.2	36.1	44.3	54.0	-9.7
5425.8	Peak	7.0	38.0	45.0	54.0	-9.0
6330.1	Peak	9.5	39.1	48.6	74.0	-25.4
6330.1	Average	-4.2	39.1	34.9	54.0	-19.1
7234.4	Peak	9.1	40.9	50.0	74.0	-24.0
7234.4	Average	-3.7	40.9	37.2	54.0	-16.8
8138.7	Peak	8.5	42.7	51.2	74.0	-22.8
8138.7	Average	-2.3	42.7	40.4	54.0	-13.6
9403.0	Peak	10.7	42.9	53.6	74.0	-20.4
9403.0	Average	-1.9	42.9	41.0	54.0	-13.0

Transmitting at 913.2 MHz

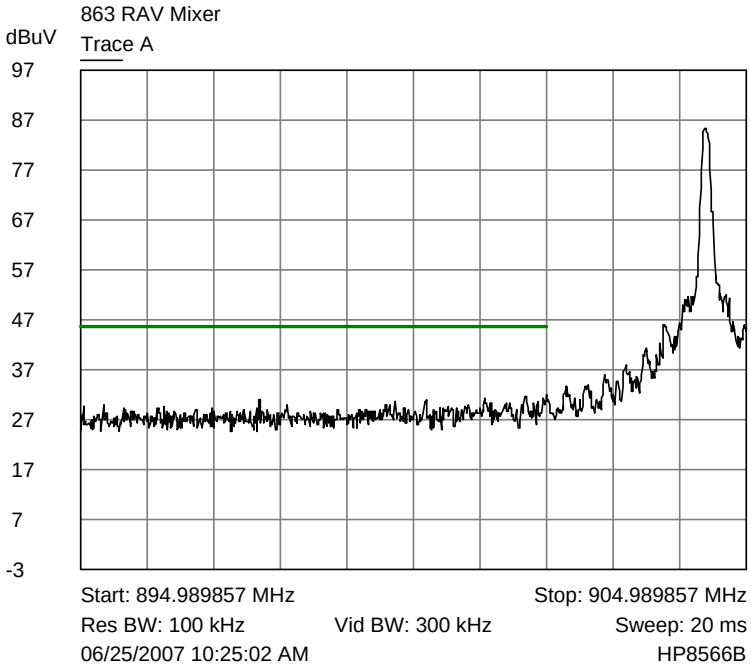
Frequency (MHz)	Detector	Receiver Reading (dBμV)	Correction Factor (dB/m)	Field Strength (dBμV/m)	3 m Limit (dBμV/m)	Margin (dB)
913.2	Peak	57.2	28.1	85.3	94.0	-8.7
1826.6	Peak	11.7	29.8	41.1	54.0	-12.9
2739.8	Peak	8.9	32.2	41.3	54.0	-12.7
3653.1	Peak	7.2	34.5	42.2	54.0	-11.8

Frequency (MHz)	Detector	Receiver Reading (dBμV)	Correction Factor (dB/m)	Field Strength (dBμV/m)	3 m Limit (dBμV/m)	Margin (dB)
4566.4	Peak	7.9	36.1	44.3	54.0	-9.7
5479.7	Peak	7.5	38.0	45.0	54.0	-9.0
6393.0	Peak	9.5	39.1	48.6	74.0	-25.4
6393.0	Average	-4.2	39.1	34.9	54.0	-19.1
7603.6	Peak	9.1	40.9	50.0	74.0	-24.0
7603.6	Average	-3.7	40.9	37.2	54.0	-16.8
8219.7	Peak	8.5	42.7	51.2	74.0	-22.8
8219.7	Average	-2.3	42.7	40.4	54.0	-13.6
9132.0	Peak	10.7	42.9	53.6	74.0	-20.4
9132.0	Average	-1.9	42.9	41.0	54.0	-13.0

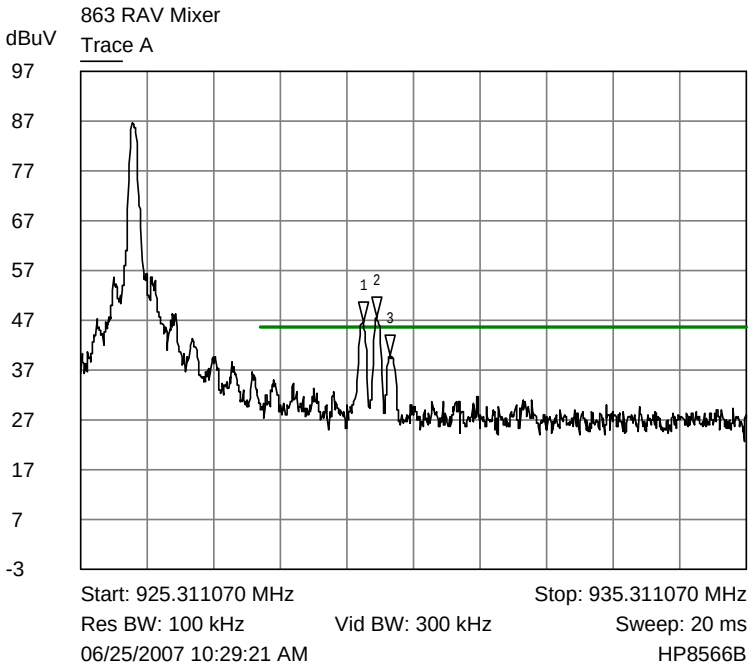
Transmitting at 926.1 MHz

Frequency (MHz)	Detector	Receiver Reading (dBμV)	Correction Factor (dB/m)	Field Strength (dBμV/m)	3 m Limit (dBμV/m)	Margin (dB)
926.1	Peak	56.6	28.2	84.8	94.0	-9.2
1852.2	Peak	11.8	29.9	41.7	54.0	-12.3
2778.3	Peak	9.3	32.2	41.5	54.0	-12.5
3704.4	Peak	8.2	34.7	42.9	54.0	-11.1
4630.5	Peak	7.3	36.4	43.7	54.0	-10.3
5556.6	Peak	6.4	38.1	44.5	54.0	-9.5
6482.7	Peak	9.5	39.1	48.6	74.0	-25.4
6482.7	Average	-4.2	39.1	34.9	54.0	-19.1
7408.8	Peak	9.1	40.9	50.0	74.0	-24.0
7408.8	Average	-3.7	40.9	37.2	54.0	-16.8
8334.9	Peak	8.5	42.7	51.2	74.0	-22.8
8334.9	Average	-2.3	42.7	40.4	54.0	-13.6
9261.0	Peak	10.7	42.9	53.6	74.0	-20.4
9261.0	Average	-1.9	42.9	41.0	54.0	-13.0

The plots below show the lower and upper channels residing totally within the operating band of 902 - 928 MHz.



Trace A Lower channel band edge plot



1 929.551070 MHz
46.7000 dBuV
2 929.751070 MHz
47.9000 dBuV
3 929.971070 MHz
40.2000 dBuV

Trace A Upper channel band edge plot

Note: Points 1 – 3 in the plot above are ambient noise emissions at the test site and are not associated with this device.

RESULT

The EUT complied with the specification limit by a margin of 7.5 dB and the operating band of the EUT is totally within the allowed frequency range.

6.2.4 Radiated Disturbance Data (Horizontal Polarity)

Transmitting at 904.3 MHz

Frequency (MHz)	Detector	Receiver Reading (dBμV)	Correction Factor (dB/m)	Field Strength (dBμV/m)	3 m Limit (dBμV/m)	Margin (dB)
904.3	Peak	54.8	28.2	83.0	94.0	-11.0
1808.6	Peak	10.5	29.7	40.2	54.0	-13.8
2712.9	Peak	9.1	32.1	41.2	54.0	-12.8
3617.2	Peak	7.5	34.5	42.0	54.0	-12.0
4521.5	Peak	8.2	36.1	44.3	54.0	-9.7
5425.8	Peak	6.8	38.0	44.8	54.0	-9.2
6330.1	Peak	9.5	39.1	48.6	74.0	-25.4
6330.1	Average	-4.2	39.1	34.9	54.0	-19.1
7234.4	Peak	9.1	40.9	50.0	74.0	-24.0
7234.4	Average	-3.7	40.9	37.2	54.0	-16.8
8138.7	Peak	8.5	42.7	51.2	74.0	-22.8
8138.7	Average	-2.3	42.7	40.4	54.0	-13.6
9403.0	Peak	10.7	42.9	53.6	74.0	-20.4
9403.0	Average	-1.9	42.9	41.0	54.0	-13.0

Transmitting at 913.2 MHz

Frequency (MHz)	Detector	Receiver Reading (dBμV)	Correction Factor (dB/m)	Field Strength (dBμV/m)	3 m Limit (dBμV/m)	Margin (dB)
913.2	Peak	52.8	28.1	80.9	94.0	-13.1
1826.6	Peak	10.0	29.8	39.8	54.0	-14.2
2739.8	Peak	9.3	32.2	41.5	54.0	-12.5
3653.1	Peak	7.3	34.5	41.8	54.0	-12.2
4566.4	Peak	7.8	36.1	43.9	54.0	-10.1
5479.7	Peak	7.0	38.0	45.0	54.0	-9.0
6393.0	Peak	9.5	39.1	48.6	74.0	-25.4
6393.0	Average	-4.2	39.1	34.9	54.0	-19.1
7603.6	Peak	9.1	40.9	50.0	74.0	-24.0
7603.6	Average	-3.7	40.9	37.2	54.0	-16.8
8219.7	Peak	8.5	42.7	51.2	74.0	-22.8
8219.7	Average	-2.3	42.7	40.4	54.0	-13.6
9132.0	Peak	10.7	42.9	53.6	74.0	-20.4
9132.0	Average	-1.9	42.9	41.0	54.0	-13.0

Transmitting at 926.1 MHz

Frequency (MHz)	Detector	Receiver Reading (dBμV)	Correction Factor (dB/m)	Field Strength (dBμV/m)	3 m Limit (dBμV/m)	Margin (dB)
926.1	Peak	54.7	28.2	82.9	94.0	-11.1
1852.2	Peak	11.0	29.9	40.9	54.0	-13.1
2778.3	Peak	9.4	32.2	41.6	54.0	-12.4
3704.4	Peak	8.0	34.7	42.7	54.0	-11.3
4630.5	Peak	7.2	36.4	43.6	54.0	-10.4
5556.6	Peak	6.6	38.1	44.7	54.0	-9.3
6482.7	Peak	9.5	39.1	48.6	74.0	-25.4
6482.7	Average	-4.2	39.1	34.9	54.0	-19.1
7408.8	Peak	9.1	40.9	50.0	74.0	-24.0

Frequency (MHz)	Detector	Receiver Reading (dBμV)	Correction Factor (dB/m)	Field Strength (dBμV/m)	3 m Limit (dBμV/m)	Margin (dB)
7408.8	Average	-3.7	40.9	37.2	54.0	-16.8
8334.9	Peak	8.5	42.7	51.2	74.0	-22.8
8334.9	Average	-2.3	42.7	40.4	54.0	-13.6
9261.0	Peak	10.7	42.9	53.6	74.0	-20.4
9261.0	Average	-1.9	42.9	41.0	54.0	-13.0

RESULT

The EUT complied with the specification limit by a margin of 9.0 dB.

6.3 Sample Field Strength Calculation:

The field strength is calculated by adding the Correction Factor (Antenna Factor + Cable Factor), to the measured level from the receiver. The receiver amplitude reading is compensated for any amplifier gain. The basic equation with a sample calculation is shown below:

FS = RA + CF Where

FS = Field Strength
RA = Receiver Amplitude Reading (Receiver Reading - Amplifier Gain)
CF = Correction Factor (Antenna Factor + Cable Factor)

Assume a receiver reading of 42.5 dBμV is obtained from the receiver, an amplifier gain of 26.5 dB and a correction factor of 8.5 dB/m. The field strength is calculated by subtracting the amplifier gain and adding the correction factor, giving a field strength of 24.5 dBμV/m, FS = (42.5 - 26.5) + 8.5 = 24.5 dBμV/m.

APPENDIX 1 TEST PROCEDURES AND TEST EQUIPMENT

A1.1 Conducted Disturbance at Mains Ports:

The conducted disturbance at mains ports from the EUT was measured using a spectrum analyzer with a quasi-peak adapter for peak, quasi-peak and average readings. The quasi-peak adapter uses a bandwidth of 9 kHz, with the spectrum analyzer's resolution bandwidth set at 100 kHz, for readings in the 150 kHz to 30 MHz frequency ranges.

The conducted disturbance at mains ports measurements are performed in a screen room using a (50 Ω/50 μH) Line Impedance Stabilization Network (LISN).

Where mains flexible power cords are longer than 1 m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4 m in length.

Where the EUT is a collection of ITE with each ITE having its own power cord, the point of connection for the LISN is determined from the following rules:

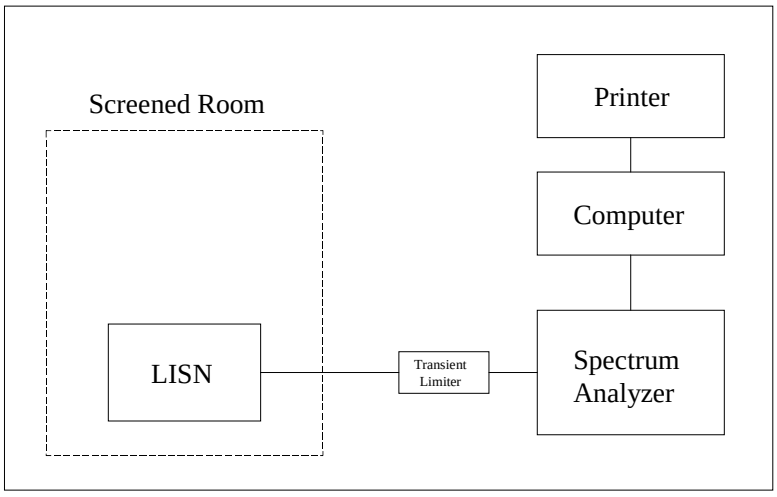
a) Each power cord, which is terminated in a mains supply plug, shall be tested separately.
b) Power cords, which are not specified by the manufacturer to be connected via a host unit, shall be tested separately.
c) Power cords which are specified by the manufacturer to be connected via a host unit or other power supplying equipment shall be connected to that host unit and the power cords of that host unit connected to the LISN and tested.
d) Where a special connection is specified, the necessary hardware to effect the connection is supplied by the manufacturer for the testing purpose.
e) When testing equipment with multiple mains cords, those cords not under test are connected to an artificial mains network (AMN) different than the AMN used for the mains cord under test.

Desktop EUT are placed on a non-conducting table at 0.8 meters from the metallic floor. The vertical coupling plane (wall of the screened room) is located 40 cm to the rear of the EUT. Floor standing equipment is placed directly on the earth grounded floor.

Type of Equipment	Manufacturer	Model Number	Serial Number	Date of Last Calibration
Wanship Open Area Test Site #2	CCL	N/A	N/A	10/25/2006
Test Software	CCL	Conducted Emissions	Revision 1.2	N/A
Spectrum Analyzer	Hewlett Packard	8566B	2230A01711	10/28/2006
Quasi-Peak Detector	Hewlett Packard	85650A	2043A00137	10/10/2006
LISN	EMCO	3825/2	9305-2099	03/16/2007
Conductance Cable Wanship Site #2	CCL	Cable J	N/A	12/26/2006
Transient Limiter	Hewlett Packard	11947A	3107A02266	12/26/2006

An independent calibration laboratory or CCL personnel calibrates all the equipment listed above at intervals defined in ANSI C63.4:2003 Section 4.4 following outlined calibration procedures. All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Supporting documentation relative to tractability is on file and is available for examination upon request.

Conducted Emissions Test Setup



A1.2 Radiated Disturbance:

The radiated disturbance from the EUT was measured using a spectrum analyzer with a quasi-peak adapter for peak and quasi-peak readings. A preamplifier with a fixed gain of 26 dB and a power amplifier with a fixed gain of 22 dB were used to increase the sensitivity of the measuring instrumentation. The quasi-peak adapter uses a bandwidth of 120 kHz, with the spectrum analyzer's resolution bandwidth set at 1 MHz, for readings in the 30 to 1000 MHz frequency ranges.

A biconilog antenna was used to measure the frequency range of 30 to 1000 MHz, at a distance of 3 meters from the EUT. The readings obtained by these antennas are correlated to the levels obtained with a tuned dipole antenna by adding antenna factors. A double-ridged guide antenna was used to measure the emissions at frequencies above 1000 MHz at a distance of 3 meters from the EUT.

The configuration of the EUT was varied to find the maximum radiated emission. The EUT was connected to the peripherals listed in Section 2.3 via the interconnecting cables listed in Section 2.4. A technician manually manipulated these interconnecting cables to obtain worst-case radiated disturbance. The EUT was rotated 360 degrees, and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission. Where there was multiple interface ports all of the same type, cables are either placed on all of the ports or cables added to these ports until the emissions do not increase by more than 2 dB.

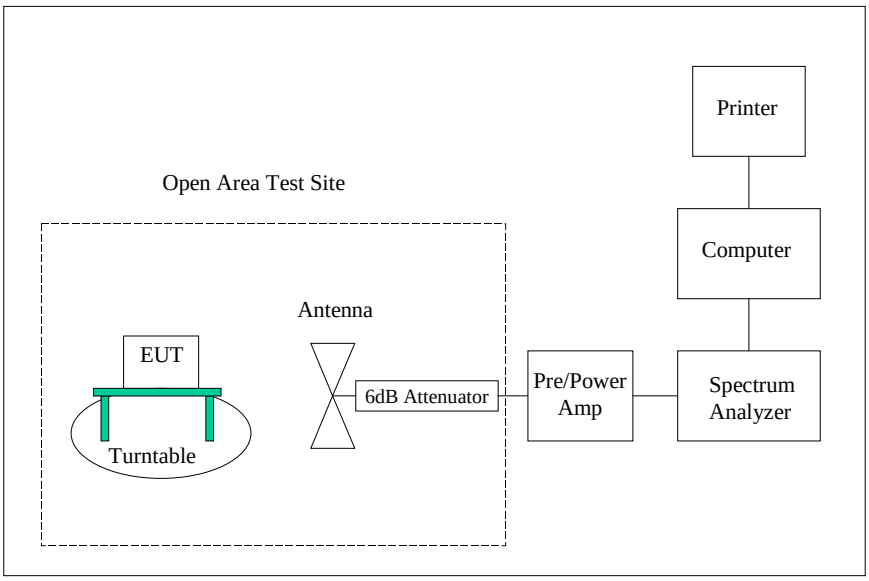
Desktop EUT are measured on a non-conducting table 0.8 meters above the ground plane. The table is placed on a turntable, which is level with the ground plane. For equipment normally placed on floors, the equipment shall be placed directly on the turntable.

Type of Equipment	Manufacturer	Model Number	Serial Number	Date of Last Calibration
Wanship Open Area Test Site #2	CCL	N/A	N/A	10/25/2006
Test Software	CCL	Radiated Emissions	Revision 1.3	N/A
Spectrum Analyzer	Hewlett Packard	8566B	2230A01711	10/28/2006
Quasi-Peak Detector	Hewlett Packard	85650A	2043A00137	10/10/2006

Type of Equipment	Manufacturer	Model Number	Serial Number	Date of Last Calibration
Biconilog Antenna	EMCO	3142	9601-1009	10/19/2006
Double Ridged Guide Antenna	EMCO	3115	9409-4355	04/30/2007
High Frequency Amplifier	Hewlett Packard	8449B	3008A00777	04/30/2007
3 Meter Radiated Emissions Cable Wanship Site #2	CCL	Cable K	N/A	12/26/2006
10 Meter Radiated Emissions Cable Wanship Site #2	CCL	Cable L	N/A	12/26/2006
Pre/Power-Amplifier	Hewlett Packard	8447F	3113A05161	09/06/2006
6 dB Attenuator	Hewlett Packard	8491A	32835	12/26/2006

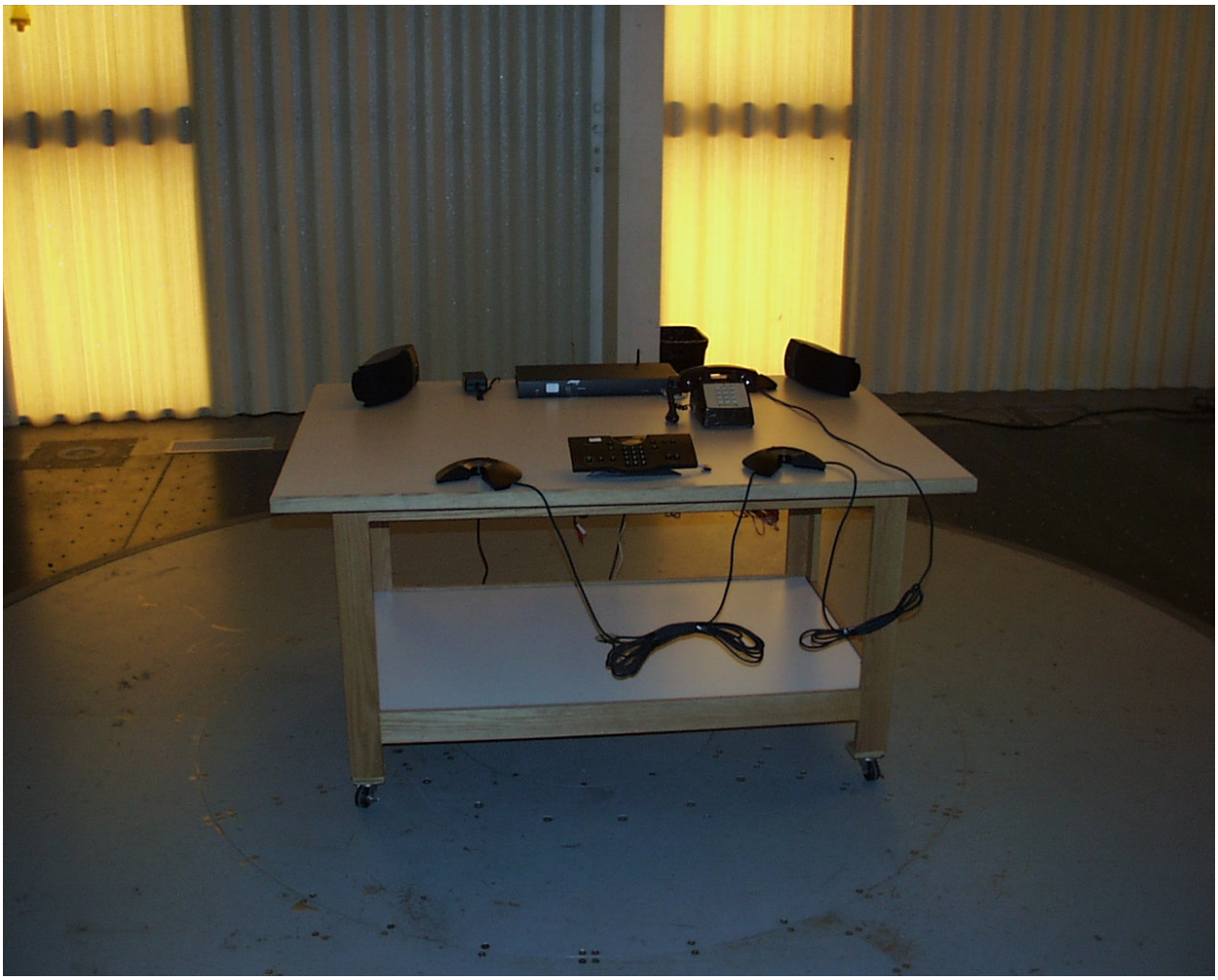
An independent calibration laboratory or CCL personnel calibrates all the equipment listed above at intervals defined in ANSI C63.4:2003 Section 4.4 following outlined calibration procedures. All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Supporting documentation relative to tractability is on file and is available for examination upon request.

Radiated Emissions Test Setup

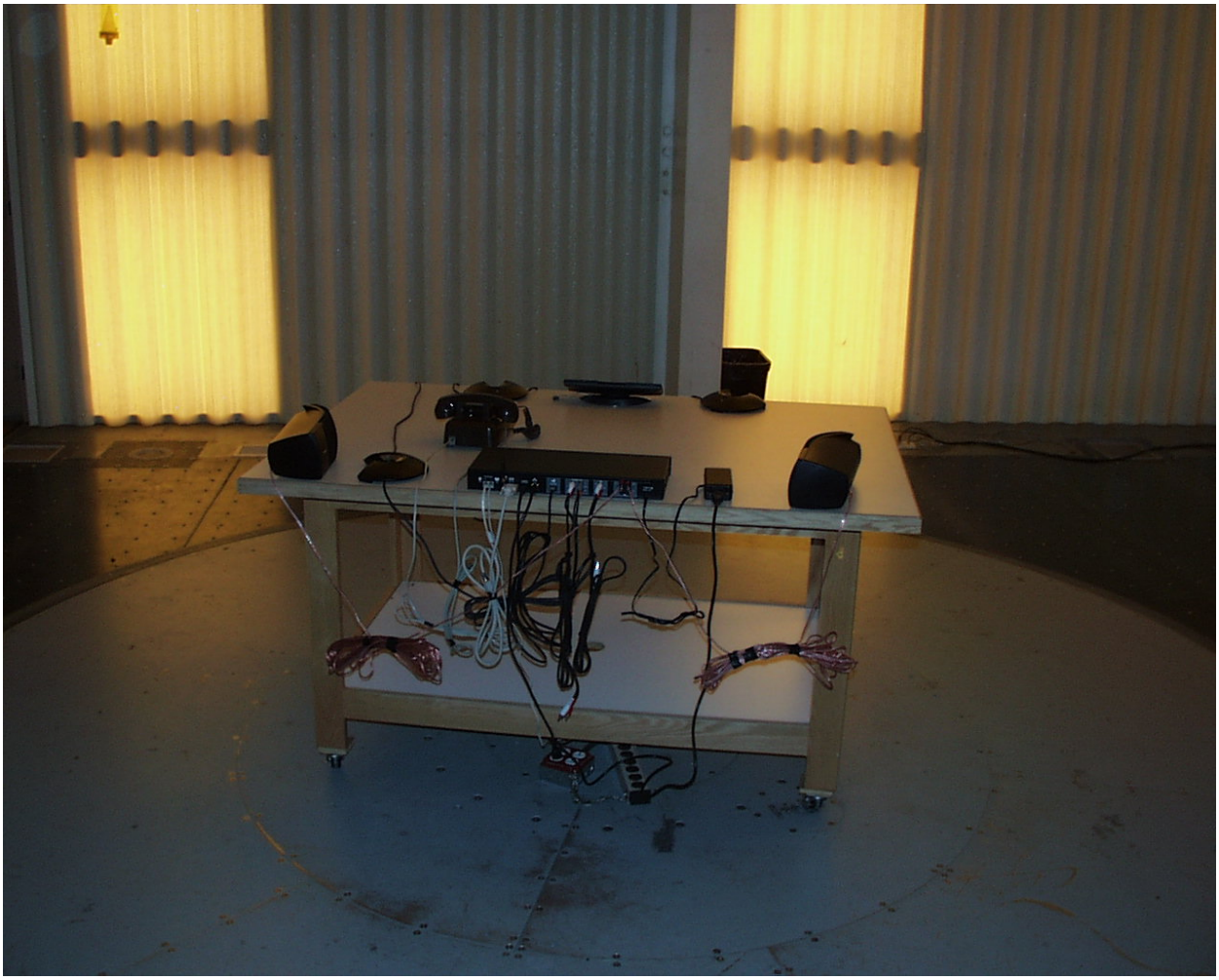


APPENDIX 2 PHOTOGRAPHS

Photograph 1 – Front View Radiated Disturbance Worst Case Configuration



Photograph 2 – Back View Radiated Disturbance Worst Case Configuration



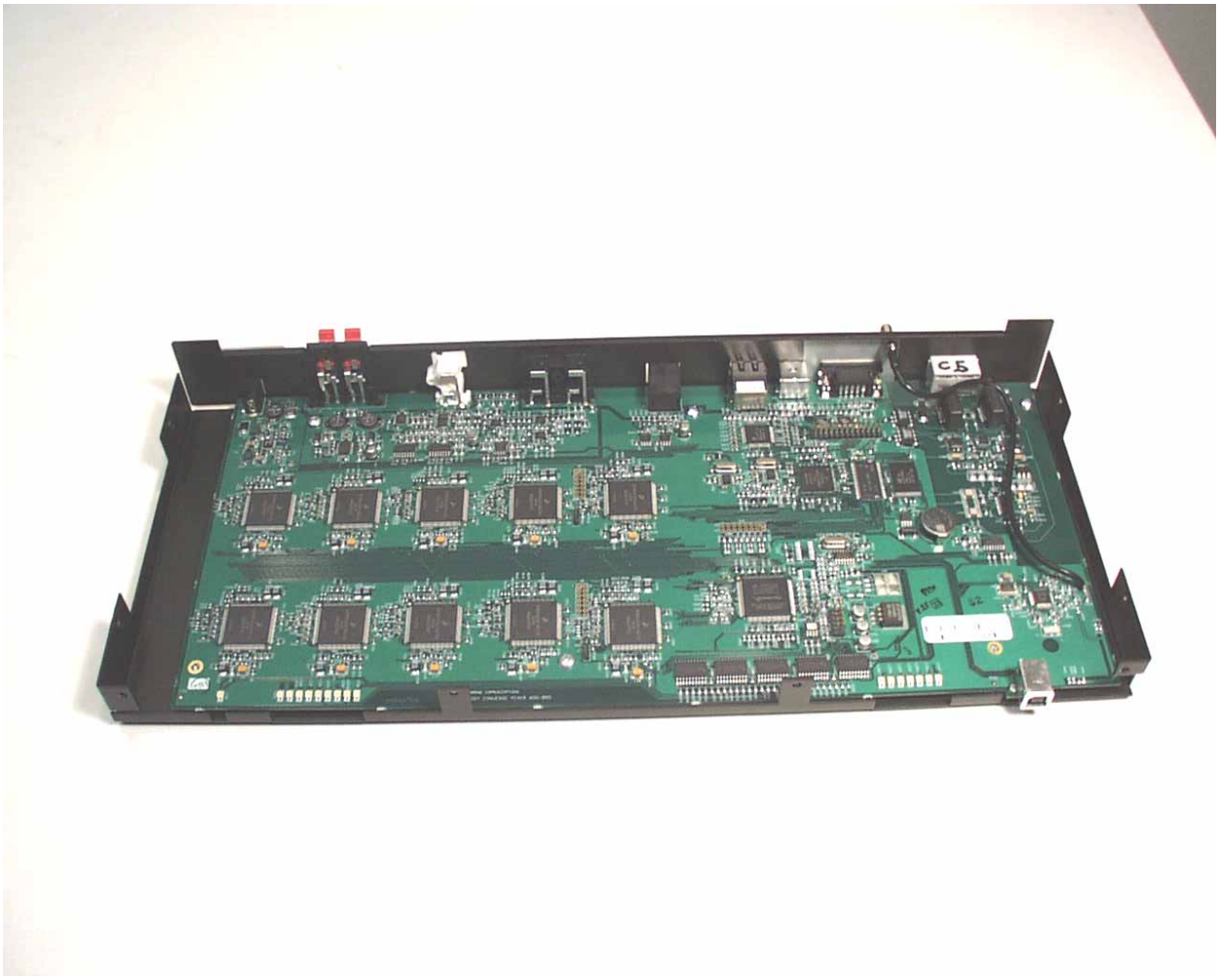
Photograph 3 – Front View Conducted Disturbance Worst Case Configuration

Photograph 4 – Back View Conducted Disturbance Worst Case Configuration

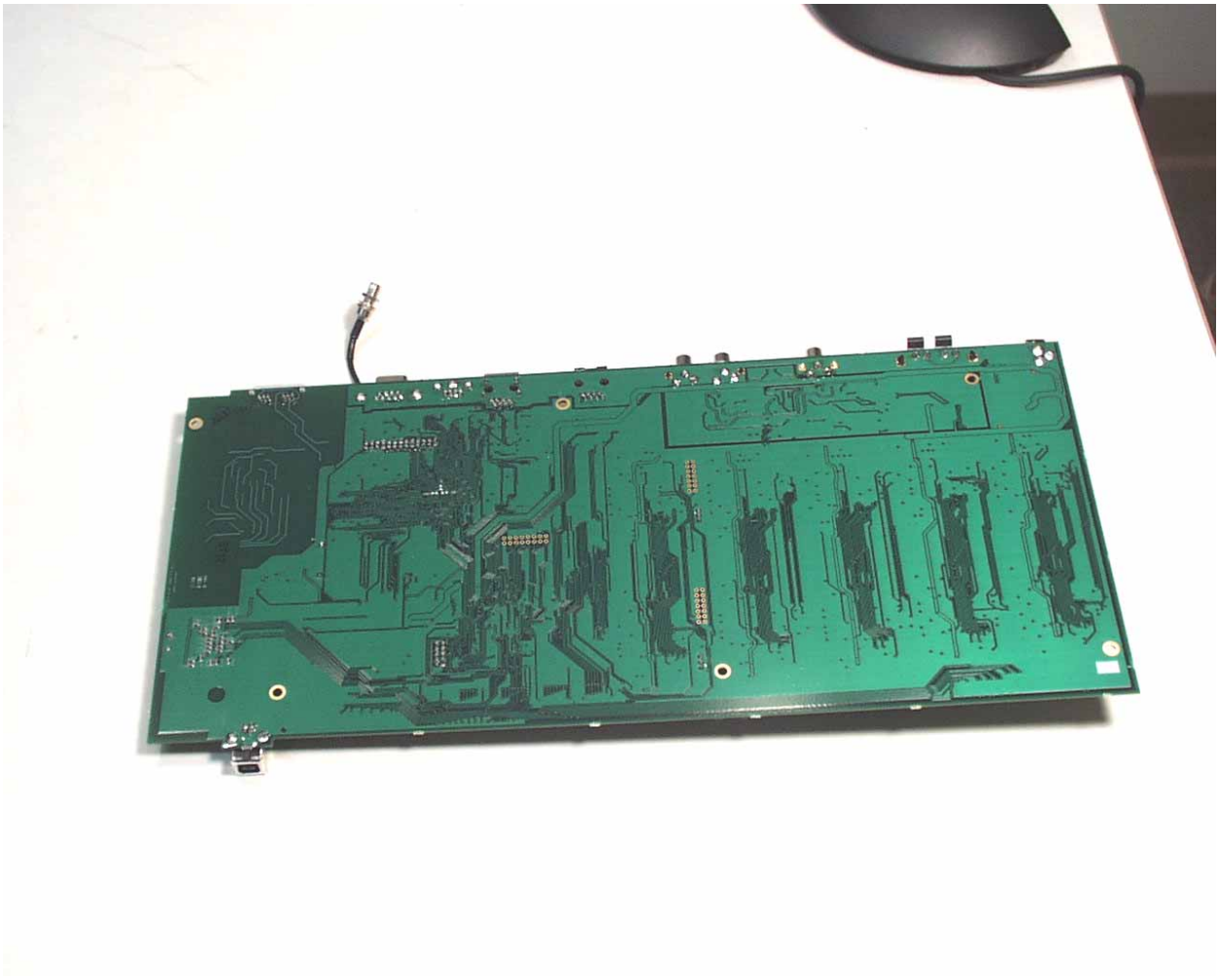
Photograph 5 – Front View of the Mixer

Photograph 6 – Back View of the Mixer

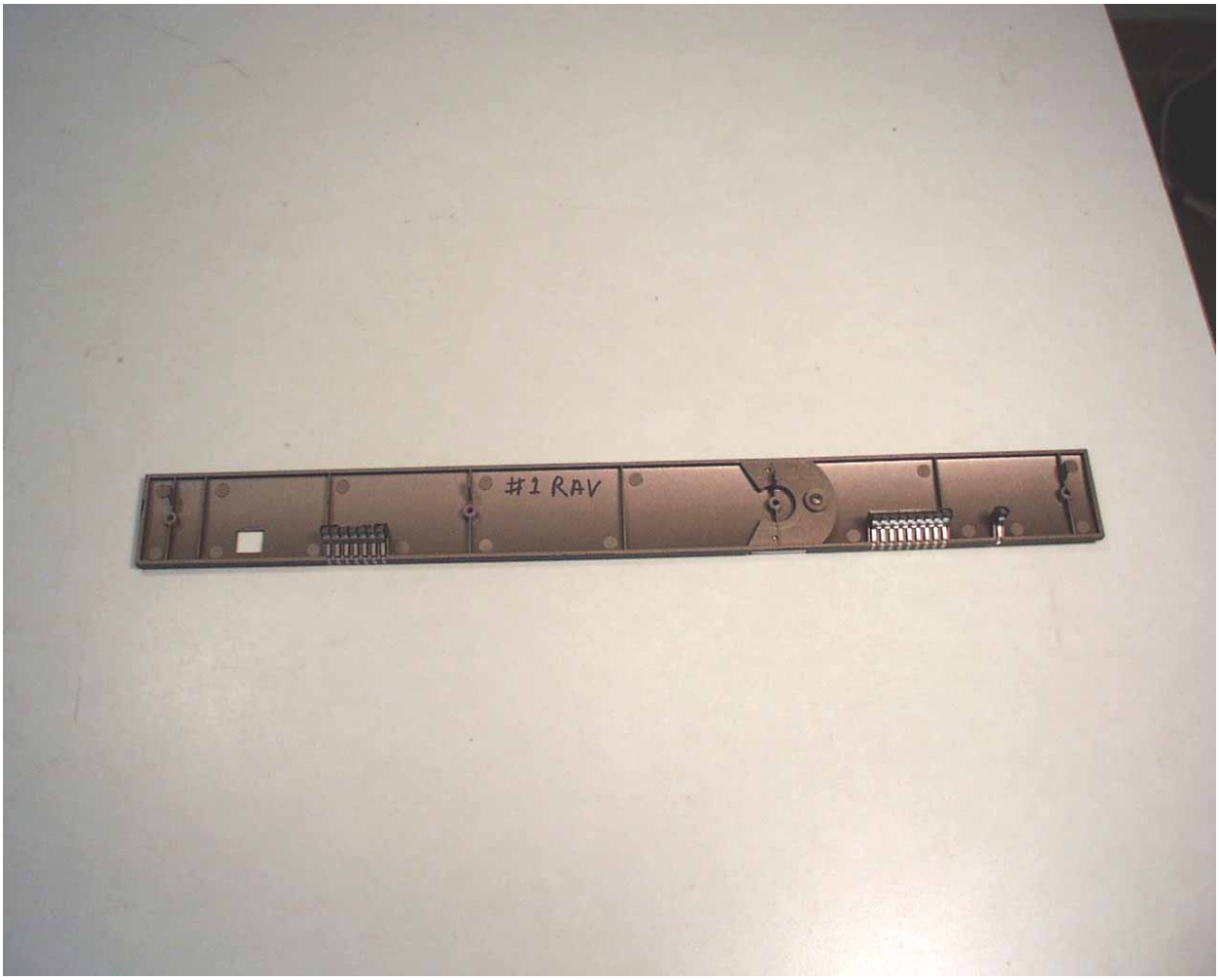
Photograph 7 – View of the Component Side of the Mixer PCB



Photograph 8 – View of the Trace Side of the Mixer PCB



Photograph 9 – View of the Front Panel



Photograph 10 – View of the Phihong Power Supply

Photograph 11 – Top View of a RAV Microphone

Photograph 12 – Bottom View of a RAV Microphone

Photograph 13 – View of the Controller Assembly

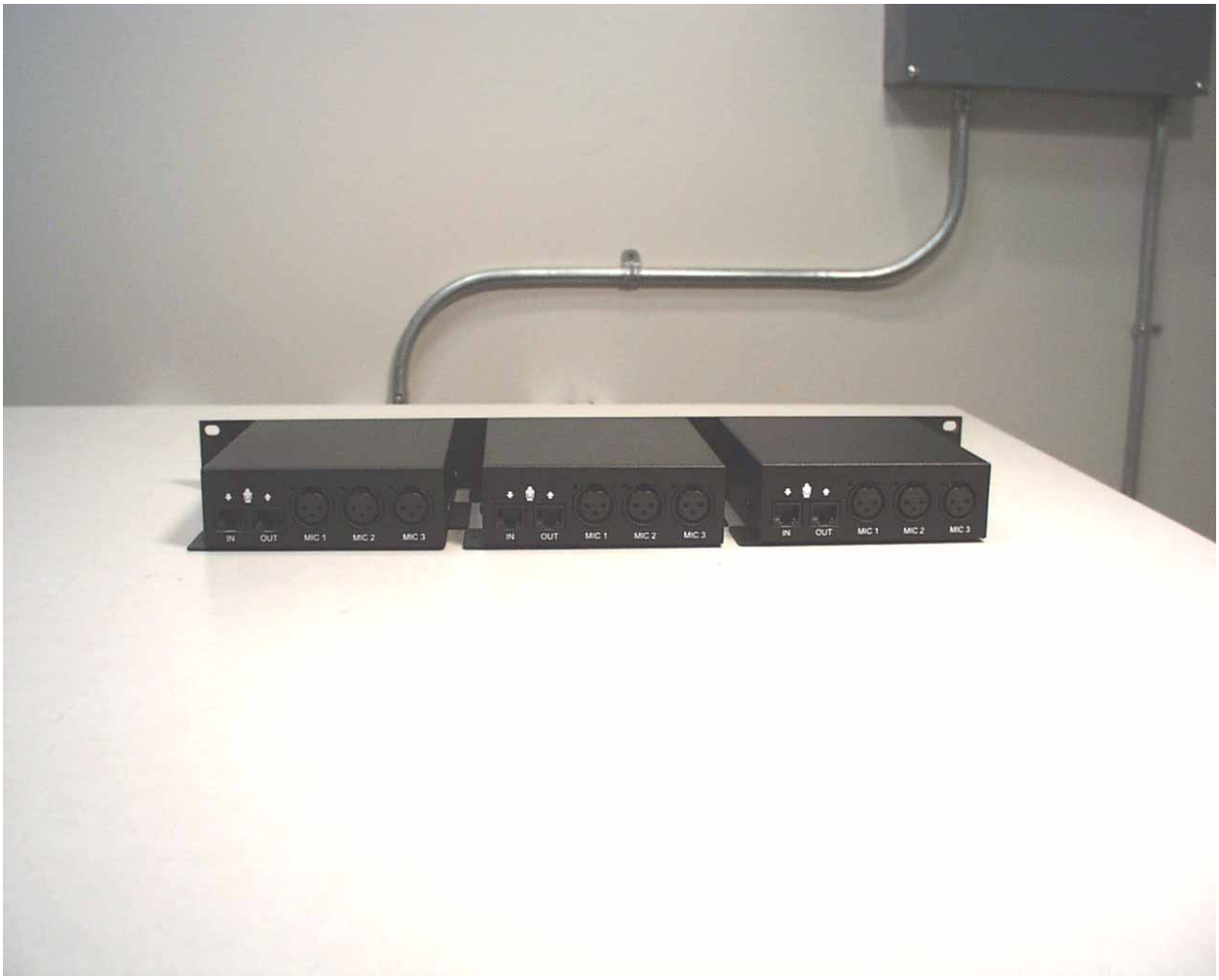
Photograph 14 – Front View of the Wall Speaker

Photograph 15 – Back View of the Wall Speaker

Photograph 16 – View of the JBL Speaker

Photograph 17 – Front View of the Converge Microphone Breakout Assembly

Photograph 18 – Back View of the Converge Microphone Breakout Assembly



Photograph 19 – View of a Converge Microphone