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FCC Part 15 Subpart B Emissions Test Report

for

Western Multiplex Corporation

on the

U-NII Radio

Model: # 27900

Test Report #: 20533091
Date of Report: June 28, 2001

Job #: J20053309
Date of Test: June 21 to 25, 2001

Total No of Pages Contained in this Report: 20 + Data Sheets

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NVLAP Laboratory Code 200201-0

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David Chernomordik	David Chernomordik, EMC Technical Supervisor

Review Date: 6/29/01

Part 15 Class B and ANSI C63.4-1992, Rev. 01/01

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ETL SEMKO

VERIFICATION OF COMPLIANCE
Report No. 20533091

Verification is hereby issued to the named APPLICANT and is VALID ONLY for the equipment identified hereon for use under the rules and regulations listed below.

Equipment Under Test:	U-NII Radio
Trade Name:	Western Multiplex
Model No.:	27900
Serial No.:	Not Labeled
Applicant:	Western Multiplex Corporation
Contact:	Ms. Caroline Yu
Address:	1196 Borregas Avenue Sunnyvale, California 94089 USA
Tel. number:	(408) 542-5200
Fax number:	(408) 542-5300
Applicable Regulation:	FCC Part 15, Subpart B, and Industry Canada ICES-003
Equipment Class:	Class B
Date of Test:	June 21 to 25, 2001

We attest to the accuracy of this report:

Ollie Moyrong
Test Engineer

David Chernomordik
EMC Technical Supervisor

Table of Contents

1.0 Introduction

This report intends to show compliance with the FCC Part 15, Subpart B Rules for an unintentional radiator. The test procedures, as described in American National Standards Institute C63.4-1992, were employed. A description of the product and operating configuration, the various provisions of the rules, the methods for determining compliance and a detailed summary of the results are included within this test report.

2.0 Description of Equipment

The Model 27900 is an intentional transmitter used for wireless point-to-point communications operating in the frequency ranges: 5.25 - 5.35 GHz and 5.725 - 5.825 GHz.

A production version of the EUT was received on June 20, 2001 in good condition.

3.0 Test Summary

Test results are given in full in Sections 5 and 6.

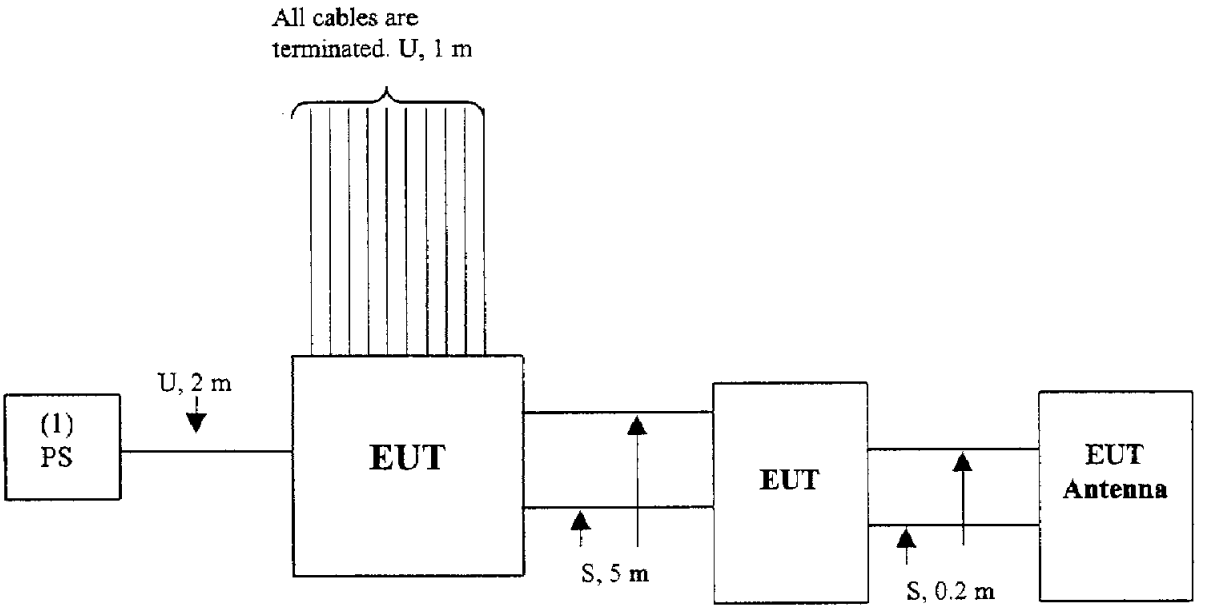
FCC Subpart B Summary of Test Results			
Test Condition	**Description**	**Class**	**Compliance Status**
Conducted Emission (AC main)	0.45 MHz - 30 MHz	B	Passed
Radiated Emission	30 MHz - 1000 MHz	B	Passed

4.0 System Test Configuration

4.1 Support Equipment

Item #	Description	Model No.	Serial No.
1	HP DC Power Supply	6296A	2234A04750

4.2 Block Diagram of Test Setup



* = EUT	**S** = Shielded;	**F** = With Ferrite
** = No ferrites on video cable	**U** = Unshielded	

4.3 Justification

Model # 27900 was configured for testing, as a Western Multiplex Corporation customer would normally use it.

4.4 Software Exercise Program

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. For emissions testing, the units were setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing.

4.5 Mode of Operation During Test

Receive mode.

4.6 Modifications Required for Compliance

No modifications were installed by Intertek Testing Services during compliance testing in order to bring the product into compliance (Please note that this does not include changes made specifically by Western Multiplex Corporation prior to compliance testing).

4.7 Additions, deviations and exclusions from standards.

No additions, deviations or exclusions from the standard were made.

5.0 Radiated Emissions

5.1 Radiated Emission Limits

The following radiated emission limits apply to Class B unintentional radiators:

Radiated Emissions Limits, Section 15.109(a)

Frequency (MHZ)	Class B at 3m (μV/m)	Class B at 3m (dBμV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Note: Three sets of units are commonly used for EMI measurement, decibels below one milliwatt (-dBm), decibels above a microvolt (dBμV), and microvolts (μV). To convert between them, use the following formulas: 20 LOG_{10}(μV) = dBμV, dBm = dBμV-107.

5.2 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG
Where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:

FS = RR + LF
Where FS = Field Strength in dBμV/m
RR = RA - AG in dBμV
LF = CF + AF in dB

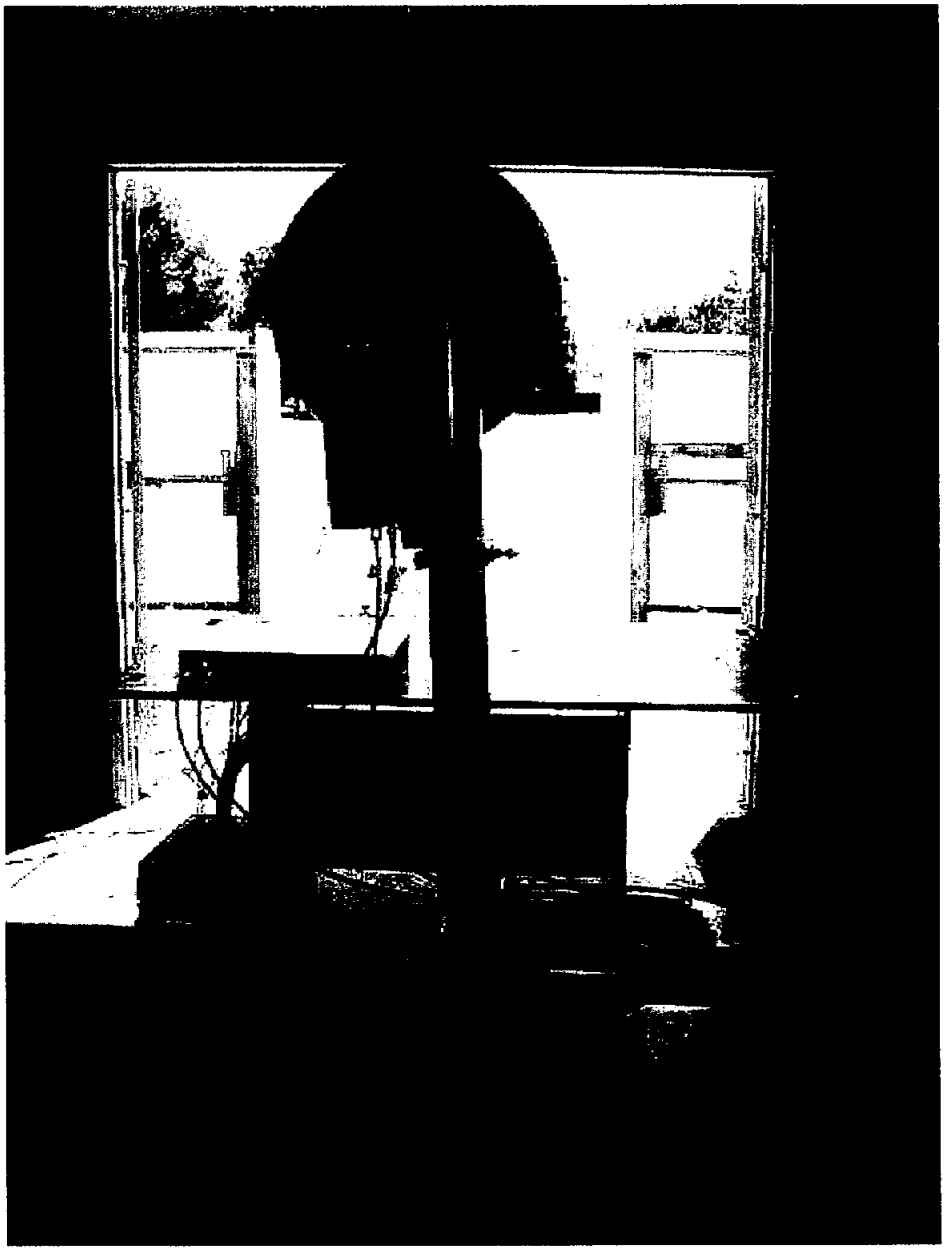
Assume a receiver reading of 52.0 dBμV is obtained. The antennas factor of 7.4-dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving field strength of 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 52.0 dBμV
AF = 7.4 dB RR = 23.0 dBμV
CF = 1.6 dB LF = 9.0 dB
AG = 29.0 dB
FS = RR + LF
FS = 23 + 9 = 32 dBμV/m

Level in μV/m = Common Antilogarithm [(32 dBμV/m)/20] = 39.8 μV/m

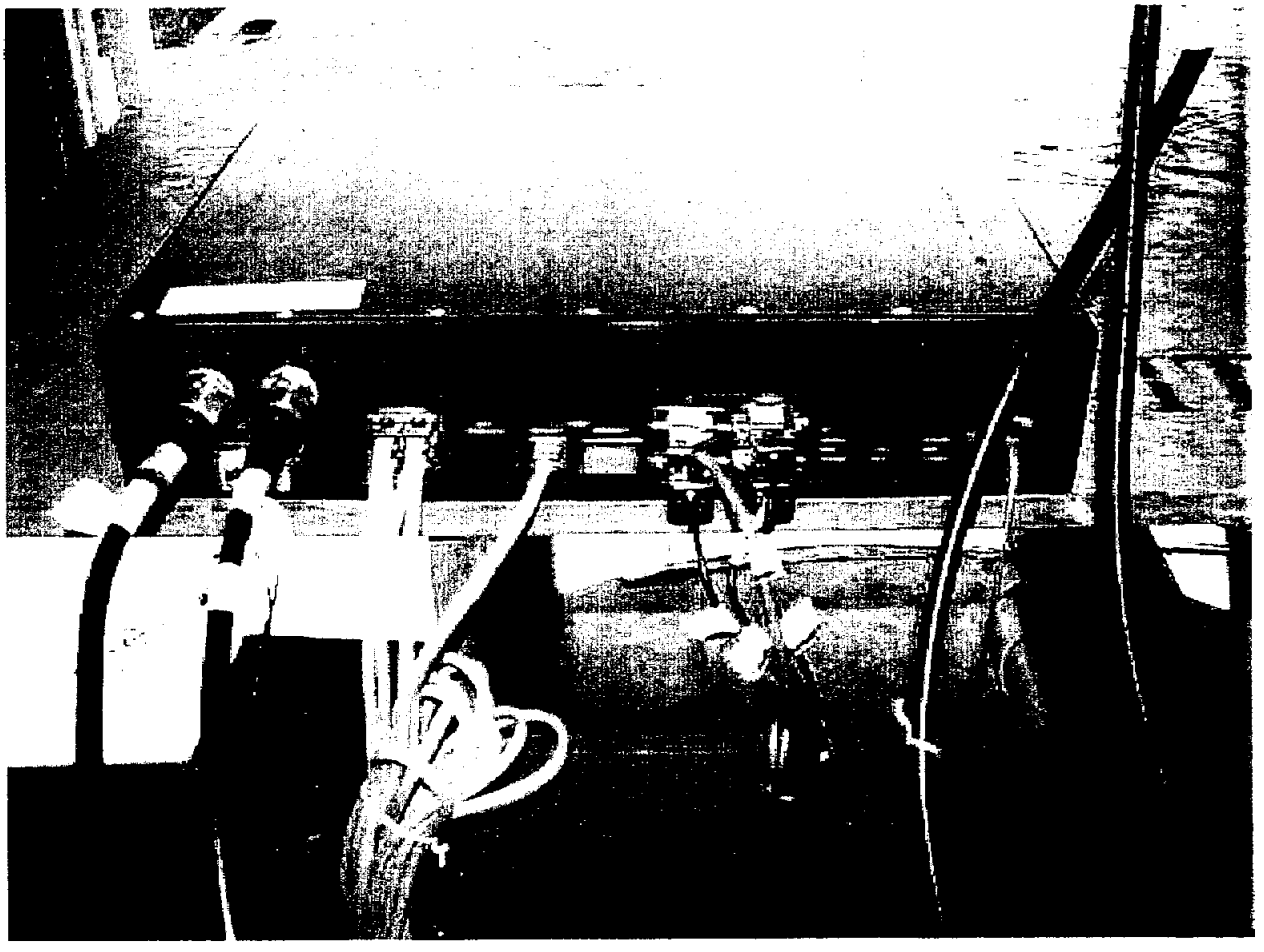
5.3 Configuration Photographs

Radiated Emission Test Setup



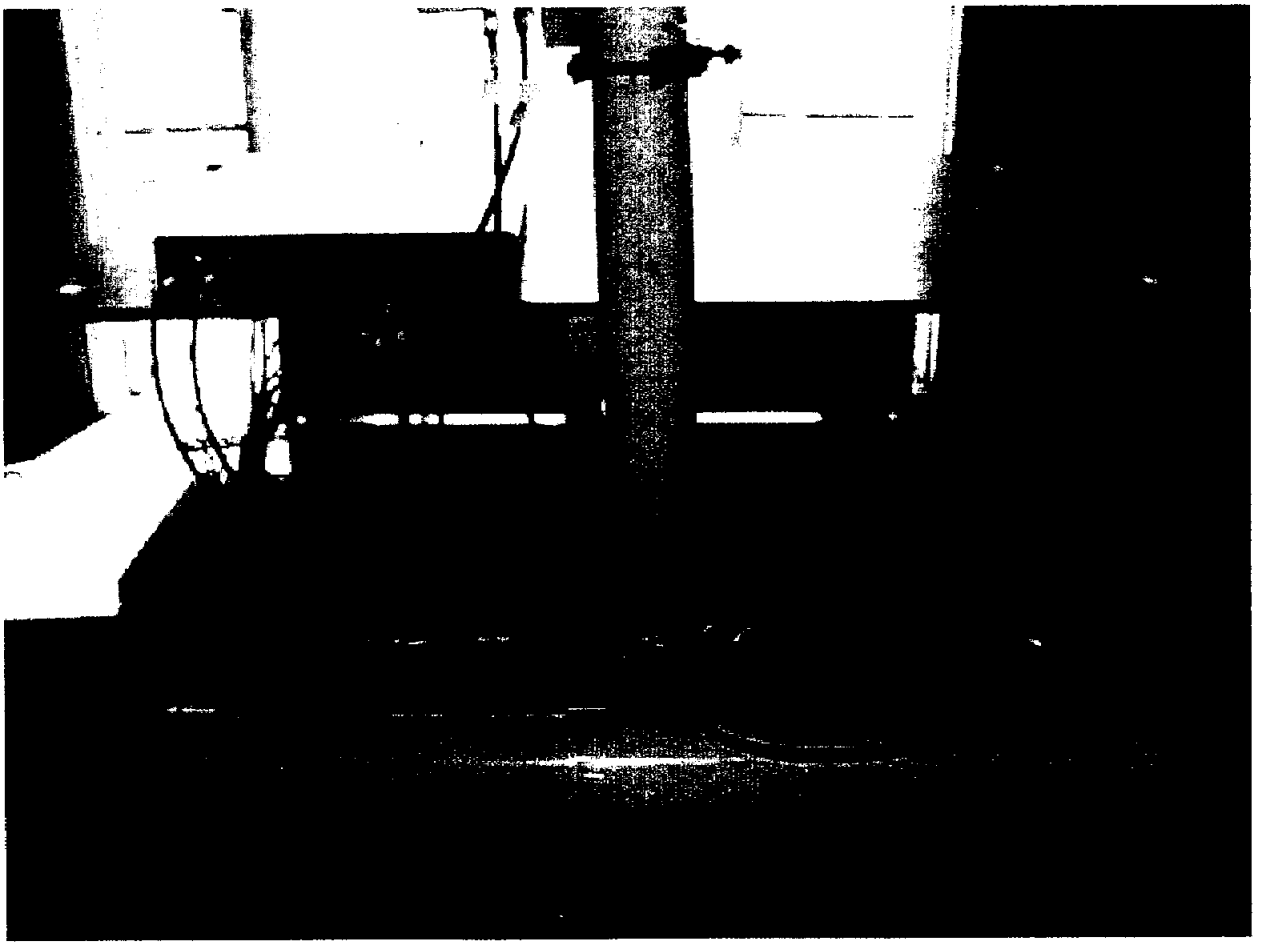
5.3 Configuration Photographs (Continued)

Radiated Emission Test Setup



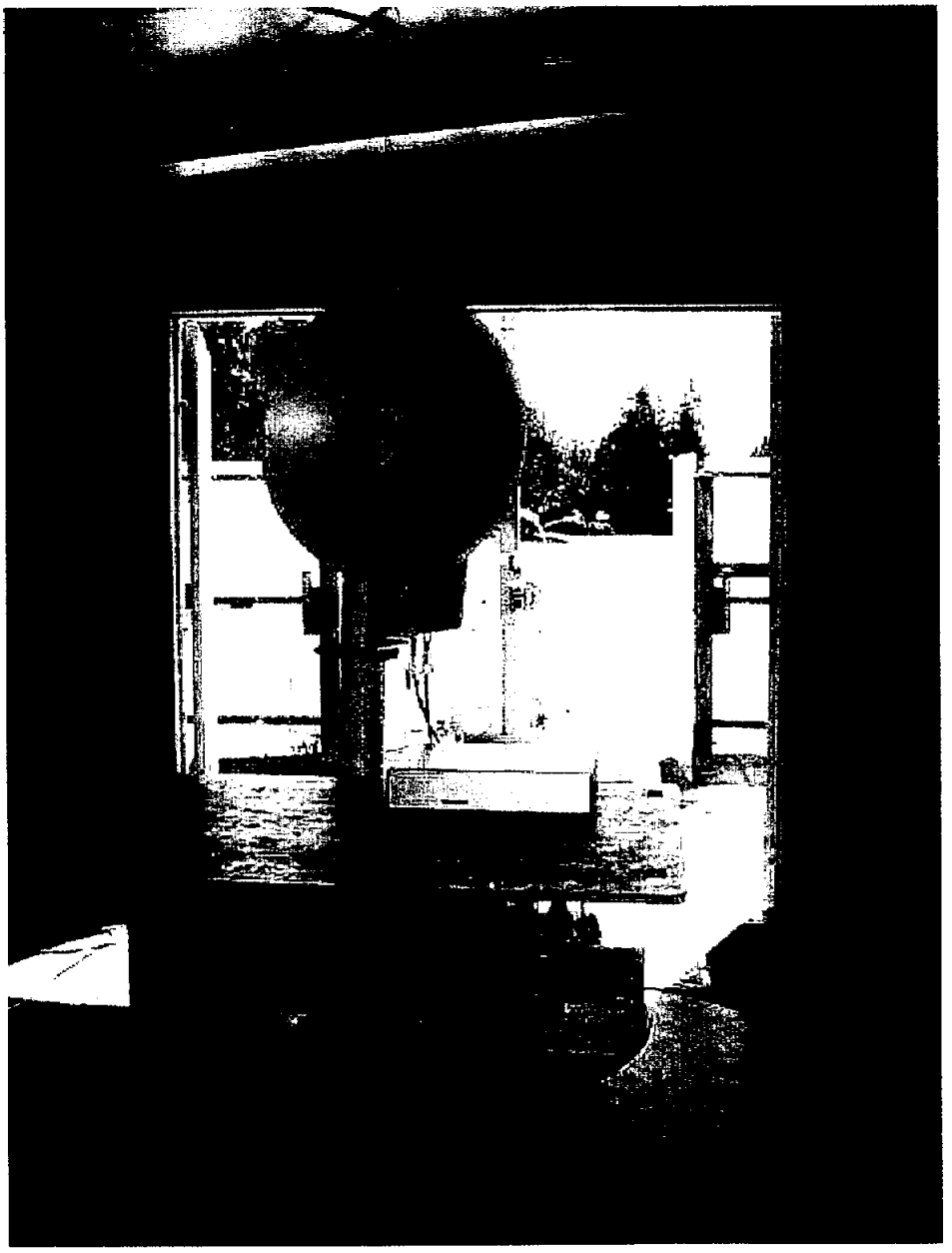
5.3 Configuration Photographs (Continued)

Radiated Emission Test Setup



5.3 Configuration Photographs (Continued)

Radiated Emission Test Setup



5.4 Test Data

The results on the following page(s) were obtained when the device was tested in the condition described in Section 4.

Results:	**Passed** by 4.7 dB at 479.9 MHz

ITS Intertek Testing Services

Job No.:	J20053309
Company:	Western Multiplex
Model:	Tsunami Radio
Test Mode:	Rx
Engineer:	Ollie Moyrong
Date:	June_21_2001

FCC Part 15.109 Class B Radiated Emissions

Frequency (MHz)	Antenna Location (m)	Antenna Polariz. (H/V)	Reading (dBuV)	Antenna Factor (dB/m)	Preamp (dB)	Correction Factor (dB)	Cable Loss (dB)	Corrected Reading (dBuV/m)	Limit At 3 m (dBuV/m)	Margin (dB)	
49.40	3.0	V	33.6	11.8	-18.5	0.0	2.1	29.0	40.0	-11.0	
62.50	3.0	V	31.2	10.5	-18.7	0.0	2.3	25.3	40.0	-14.7	
65.62	3.0	V	28.5	9.3	-18.7	0.0	2.3	21.4	40.0	-18.6	
240.00	3.0	H	42.7	14.3	-19.6	0.0	3.8	41.2	46.0	-4.8	*
294.87	3.0	V	28.6	16.2	-18.1	0.0	4.2	30.9	46.0	-15.1	
320.00	3.0	H	35.2	16.5	-18.1	0.0	4.2	37.8	46.0	-8.2	
335.90	3.0	H	35.7	16.6	-17.9	0.0	4.6	39.0	46.0	-7.0	
360.00	3.0	V	37.0	16.6	-17.9	0.0	4.6	40.3	46.0	-5.7	
429.65	3.0	H	31.5	18.4	-17.0	0.0	4.9	37.8	46.0	-8.2	*
445.31	3.0	V	31.3	18.4	-17.0	0.0	4.9	37.6	46.0	-8.4	
479.91	3.0	H	32.9	19.4	-16.2	0.0	5.2	41.3	46.0	-4.7	*
545.24	3.0	H	30.7	20.1	-15.6	0.0	5.2	40.4	46.0	-5.6	*

Notes: Negative signs (-) in the Margin column signify levels below the limit.
Readings followed by a '*' are Quasi-peak measurements. All other readings are peak measurements.
All other emissions not reported are at least 20 dB below the applicable limits.
Frequency range of investigation is 30 MHz - 1 GHz.

6.0 AC Mains Line-Conducted Emissions

6.1 AC Line Conducted Emission Limits

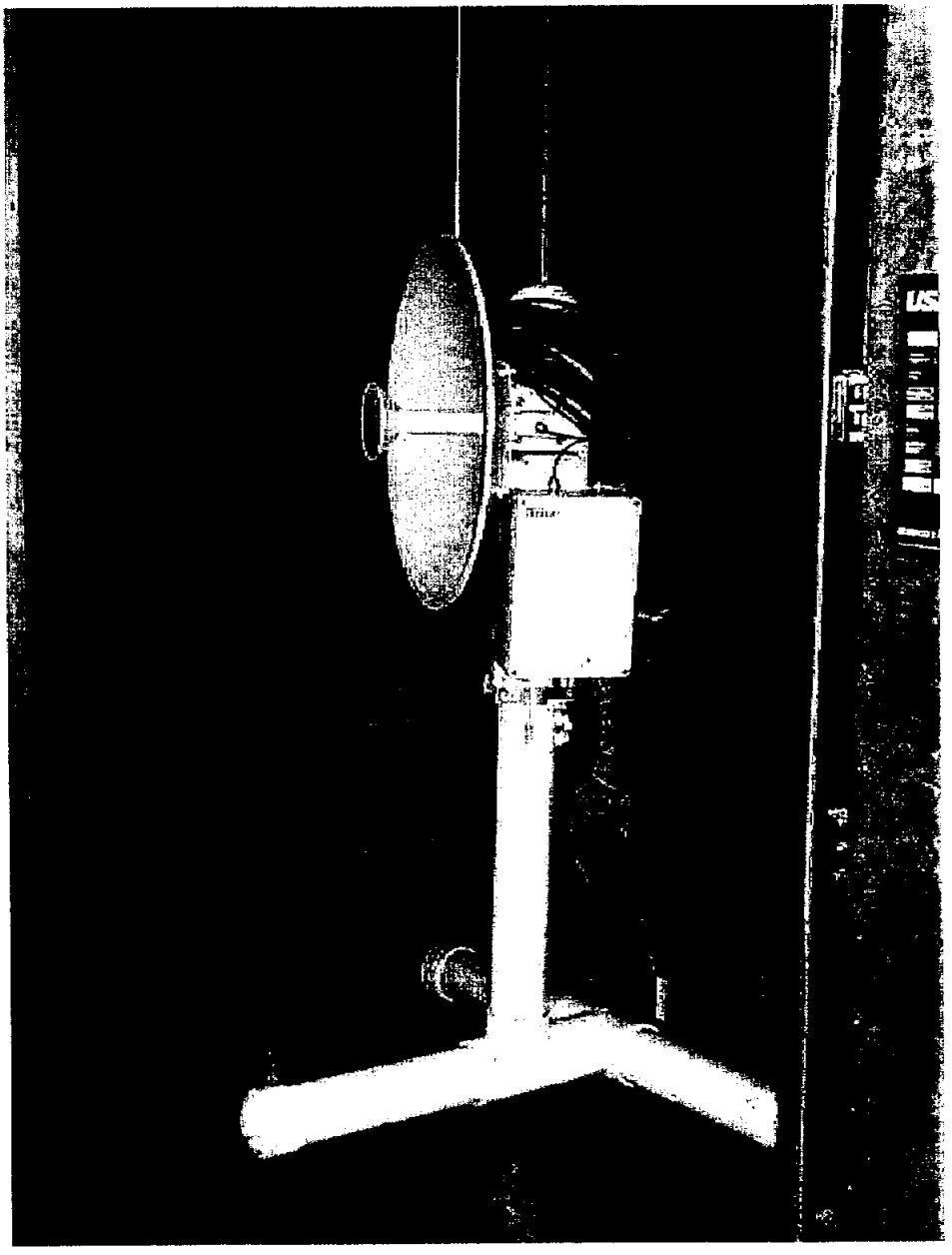
Conducted Emissions Limits, Section 15.107(a)

Frequency (MHz)	Class B (μV)	Class B (dB V)
0.45 - 1.705	250	48
1.705 to 30.000	250	48

Note: Three sets of units are commonly used for EMI measurement, decibels below one milliwatt (-dBm), decibels above a microvolt (dBμV), and microvolts (μV). To convert between them, use the following formulas: 20 LOG$_{10}$(μV) = dBμV, dBm = dBμV-107.

6.2 Configuration Photographs

AC Line-Conducted Emission Test Setup



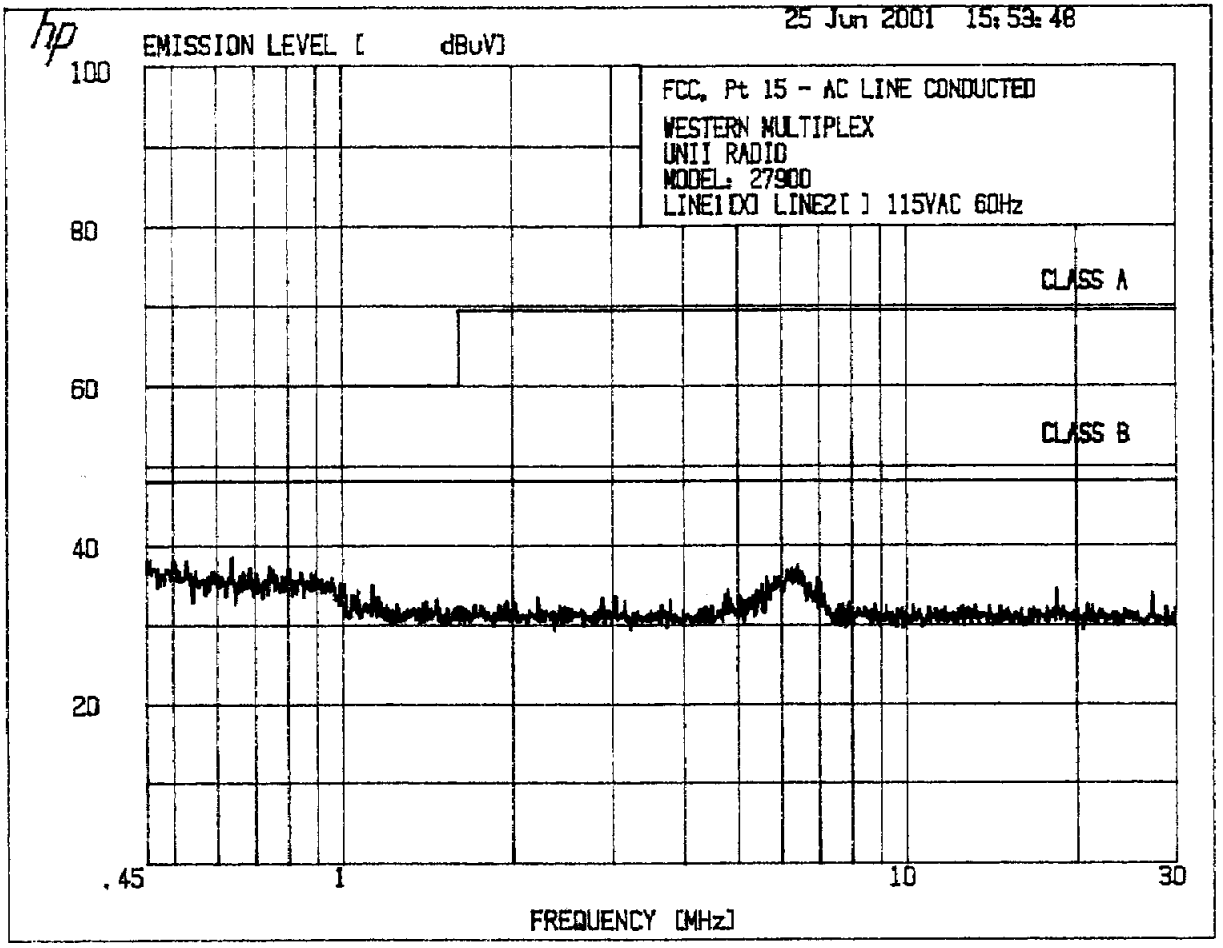
6.2 Configuration Photographs (Continued)

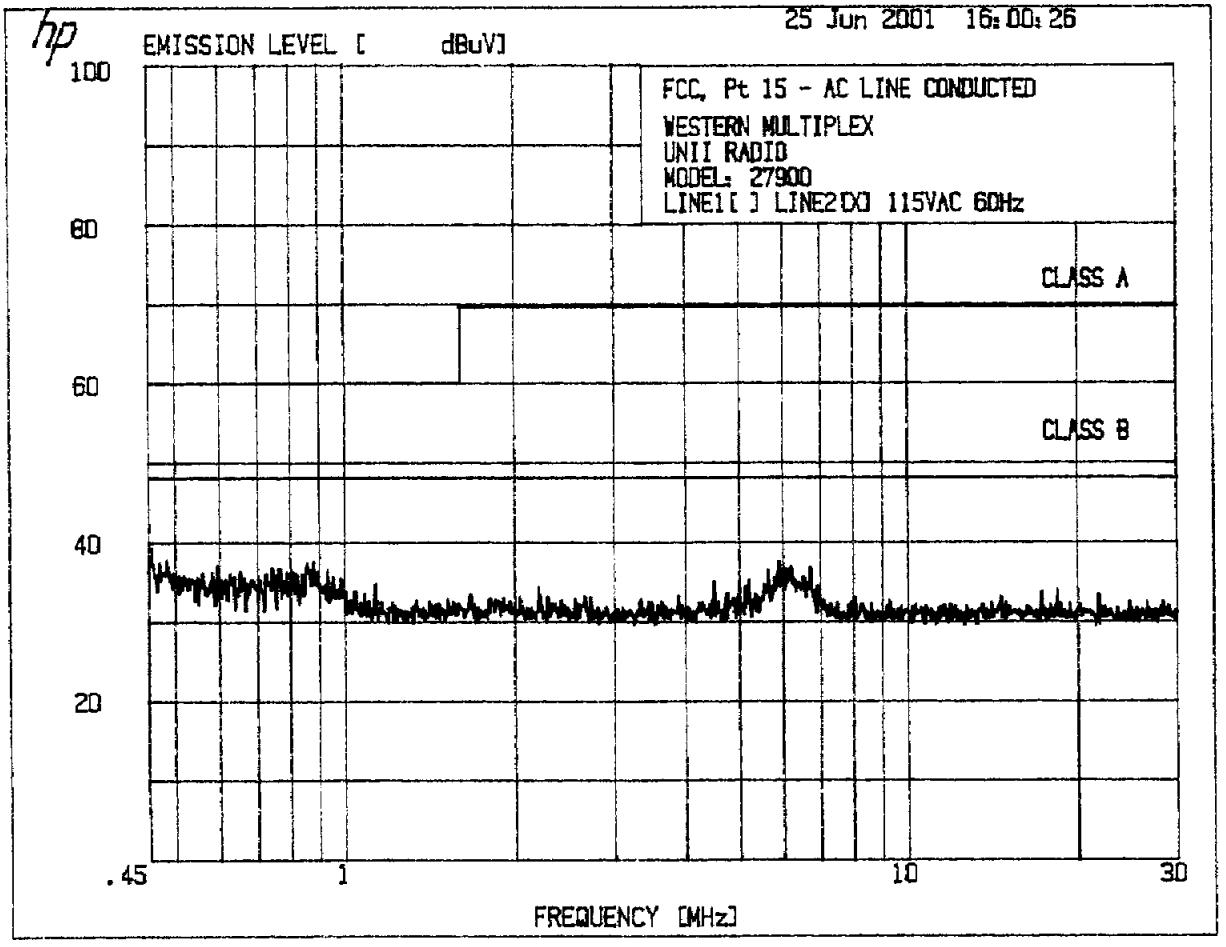
AC Line-Conducted Emission Test Setup

6.3 Test Data

The results on the following page(s) were obtained when the device was tested in the condition described in Section 4.

Results:	**Passed** by 8 dB at 0.45 MHz


25 Jun 2001 15:53:48
EMISSION LEVEL [dBuV]
100
80
60
40
20
.45
1
10
30
FREQUENCY [MHz]
FCC, Pt 15 - AC LINE CONDUCTED
WESTERN MULTIPLEX
UNII RADIO
MODEL: 27900
LINE1[X] LINE2[ ] 115VAC 60Hz
CLASS A
CLASS B


25 Jun 2001 16:00:26
EMISSION LEVEL [dBuV]
100
80
60
40
20
.45
1
10
30
FREQUENCY [MHz]
FCC, Pt 15 - AC LINE CONDUCTED
WESTERN MULTIPLEX
UNII RADIO
MODEL: 27900
LINE1[ ] LINE2[X] 115VAC 60Hz
CLASS A
CLASS B

7.0 List of Test Equipment

Measurement equipment used for emission compliance testing utilized the equipment on the following list:

Equipment	Manufacturer	Model/Type	Serial #	Cal Int	Cal Due	USED
Biconical Antenna, #9	EMCO	3104	3789	12	4/4/02	X
Log Periodic Antenna #18	EMCO	3148	9904-1062	12	2/26/02	X
Pre-Amplifier	Hewlett Packard	8447D	1937A03096	12	4/30/02	X
Spectrum Analyzer w/85650 QP Adaptor	Hewlett Packard	8566B	2416A00317 2043A00251	12	4/06/02	X
Spectrum Analyzer w/8650 QP Adaptor (LC Room)	Hewlett Packard	8568B	1912A0053 2521A01021	12	2/23/02	X
LISN	Solar Electronics	8028-50-TS-24-BNC	980235	12	3/22/02	X
LISN	Solar Electronics	8025-50-TS-24-BNC	912432	12	3/30/02	X

8.0 Miscellaneous Information or Other Comments

None.

8.1 Labeling - USA

Class B Labeling and Instruction Manual Requirements

Devices subject to Class B verification (not certification) must be labeled with the following statement:

> **This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.**

In addition, for a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

> *Warning:* **Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.**
>
> *NOTE:* **This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:**
>
> - **Reorient or relocate the receiving antenna.**
> - **Increase the separation between the equipment and receiver.**
> - **Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.**
> - **Consult the dealer or an experienced radio TV technician for help.**

If shielded cables or other specialized accessories are necessary for the unit to achieve compliance, a statement similar to the following should be added:

> **Shielded cables must be used with this unit to ensure compliance with the Class B FCC limits.**

8.2 Labeling - Canada

Canadian Emissions Labeling Requirements

According to Industry Canada Notice ICES-003, Issue 2:

> A written notice indicating compliance must accompany each unit of digital apparatus to the end user. The notice shall be in the form of a label that is affixed to the apparatus. Where because of insufficient space or other restrictions it is not feasible to affix a label to the apparatus, the notice may be in form of a statement included in the user's manual.

A suggested text for the notice, in English and French, is as follows:

> **This Class [*] digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.**
>
> **Cet appareil numérique de la classe [*] respecte toutes les exigences du Réglement sur le matériel brouilleur du Canada.**

*Insert either "A" or "B" but not both as appropriate for the equipment requirements.

This text may be added to the FCC-required label to satisfy both US and Canadian EMI requirements.

9.0 Document History

Revision/ Job Number	Writer Initials	Date	Change
1.0 / J20053309	SS	June 28, 2001	Original document