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FCC, PART 15, SUBPART C

CERTIFICATION REPORT

For The AM Radio Transmitter

Model: **TR1500**

FCC ID: **PPUTR1500-ARS** (PENDING)

PREPARED FOR:

Antique Radio Store
7420 Clairemont Mesa Blvd. # 103
San Diego, CA 92111

PREPARED ON **APRIL 18, 2001**

REPORT NUMBER 21-076

This report has been prepared in accordance with all applicable requirements of ANSI C63.4-1992

DOCUMENT HISTORY

REVISION	DATE	COMMENTS	
-	05/8/01	Prepared By:	W. Weber
-	05/10/01	Reviewed By:	A. Smith
-	05/11/01	Initial Release:	J. L. Griffin

NOTE: Nemko EESI, Inc. hereby makes the following statements so as to conform to Chapter 10 (Test Reports) Requirements of ANSI C63.4 (1992) "Methods and Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz":

- The unit described in this report was received at Nemko EESI, Inc.'s facilities on May 15, 2000. Testing was performed on the units described in this report May 17, 2000.
- The Test Results reported herein apply only to the units actually tested, and to substantially identical units.
- This test report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

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CERTIFICATION

The Radio Frequency Interference (RFI) testing, data evaluation and this report have been prepared by Nemko EESI, Inc., an independent electromagnetic compatibility consulting and test laboratory.

The testing and data collection were accomplished in accordance with the requirements of the ANSI, C63.4-1992 standard and the applicable sections of FCC, Part 15, Subpart C for intentionally radiating equipment. Refer to the Administrative Summary for a description of the test sample.

I certify the data, data evaluation and equipment configuration herein to be a true and accurate representation of the sample's radio frequency interference emission characteristics, as of the test date(s), and for the design of the test sample utilized to compile this report.

This report, in its entirety, consists of 28 pages.

J. L. Griffin
Director of Laboratory Operations

1. ADMINISTRATIVE DATA AND TEST SUMMARY

1.1 Administrative Data

CLIENT: Antique Radio Store
7420 Clairemont Mesa Blvd. # 103
San Diego, CA 92111
(858) 268-4155

CONTACT: Jeff Stevko

DATE (S) OF TEST: May 17, 2000

TEST SPECIFICATION: FCC, Part 15, Subpart C, for intentional radiators

EQUIPMENT UNDER TEST (EUT): AM Radio Transmitter
Model Number: TR1500
Serial Number: N/A
FCC ID Number (pending): PPUTR1500-ARS

EUT transmitter fundamental frequency: 850-1470 kHz

1.2 FCC Test Requirements

FCC Rule	*Description*
1.1310	Radiation Exposure
15.31	Measurement Standards
15.203	Antenna Requirements
15.207	AC Conducted Emissions
15.219	Measurements required for Operation in the band 510-1705 kHz
15.219 (a)	Total Input Power
15.219 (b)	Total Length of Antenna and Ground
15.219 (c)	Out Of Band Emissions

1.3 FCC Test Summary

FCC Section	*Notes*	*Results*
1.1310	The criteria listed in table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency RF radiation.	**PASS**
15.31	The TR1500 transmitter, Section 15.31 requires that all "Transmitter" function tests be performed at one frequency of the adjustment range. The one frequency used for testing of the TR1500 was 1150kHz.	**PASS**
15.203	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 EUT has a permanently attached antenna.	**PASS**
15.205	This section specifies restricted bands of operation. The EUT has an operating frequency of 850 to 1470kHz and was determined to meet the restricted band requirement	**PASS**
15.207	The TR1500 was tested to the requirements of 15.207 for AC Line Conducted Emissions for Part "C" intentional radiating devices.	**PASS**
15.209	This section specifies the radiated RF emissions limits. The EUT is a low power/short distance transmitter. No measurable Emissions (other than the fundamental) were noted in the frequency range of 9kHz- 1GHz	**PASS**
15.219(a)	The total input power to the final radio frequency stage (exclusive of filament or heater power) shall not exceed 100 milliwatts.	**PASS**
15.219(b)	The total length of the transmission line, antenna and ground lead (if used) shall not exceed 3 meters	**PASS**
15.219(c)	All emissions below 510 kHz or above 1705 kHz shall be attenuated at least 20 dB below the level of the unmodulated carrier. Determination of compliance with the 20 dB attenuation specification may be based on measurements at the intentional radiator's antenna output terminal unless the intentional radiator uses a permanently attached antenna, in which case compliance shall be demonstrated by measuring the radiated emissions.	**PASS**

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J. L. Griffin, Nemko EESI, Inc.

2. SYSTEM DESCRIPTION AND CONFIGURATION

2.1 System Description and Method of Exercising

The TR1500 is an AM Radio Transmitter. The transmitter operates between approximately 850 and 1450 kHz, and accepts inputs from cassette decks, CD players, etc. It is intended for short-range (in home) usage.

The EUT was exercised by connecting a cassette deck to the unit and playing a tape. The EUT was placed on a non-conducting table and powered by 115 VAC. The antenna was pulled straight up as far as room allowed, and then pulled to one side (outside on the OATS it was straight up). The TR1500 was adjusted to a quiet place in the AM spectrum (1150kHz) and music was played during testing. The transmission was monitored over the radio.

2.2 System Components and Power Cables

DEVICE	MANUFACTURER MODEL # SERIAL #	POWER CABLE
EUT- AM Radio Transmitter	Antique Radio Store TR1500 N/A	AC/DC Converter
Audio Tape Player	Optimus SCP-32 N/A	Standard 2-prong power cable

2.3 Device Interconnection and I/O Cables

CONNECTION	I/O CABLE
EUT to Tape Player	1.5m, audio cable

2.4 Design Modifications for Compliance

Device: AM Radio Transmitter

Model: TR1500

No design modifications were made to the EUT during testing.

3. DESCRIPTION OF TEST SITE AND EQUIPMENT

3.1 Description of Open Area Test Site

The test site is located at 11696 Sorrento Valley Road, Suite F, San Diego, CA 92121. The site is physically located 18 miles Northwest of downtown San Diego. The general area is a valley 1.5 miles east of the Pacific Ocean. This particular part of the valley tends to minimize ambient levels, i.e. radio and TV broadcast stations and land mobile communications. The three and ten-meter Open Area Test Site (OATS) is located behind the office/lab building. It conforms to the normalized site attenuation limits and construction specifications as set in the EN 55022 (1987), CISPR 16 and 22 (1985) and ANSI C63.4-1992 documents. The OATS normalized site attenuation characteristics are verified for compliance every year and the entire measurement facility was last registered with the Federal Communications Commission on December 15, 1999, FCC Registration Number 90579.

3.2 Test Equipment

The following test equipment was used to collect data for this report. All devices used were of current calibration and of the type required in the applicable documents section of this report.

DEVICE	MANUFACTURER	MODEL	ASSET #	CAL. DATE	CAL. DUE
Quasi-Peak Adapter	Hewlett Packard	85650A	538	3/24/00	9/24/00
Spectrum Analyzer Display	Hewlett Packard	85662A	537	3/24/00	9/24/00
Spectrum Analyzer	Hewlett Packard	8566B	711	3/24/00	9/24/00
RF Preselector	Hewlett Packard	85685A	673	8/10/99	8/10/00
Line Impedance Stabilization Network	EMCO	3825/2	147	12/7/99	12/7/00
Transient Limiter	Hewlett Packard	11947A	682	2/28/00	2/28/01
High Pass Filter	Solar	7801-5.0	542	12/27/99	12/27/00
Multimeter	Beckman	2020	516	8/9/99	8/9/00
Variac	Deltec Powerstat	236B	N/A	NCR	NCR
Line Impedance Stabilization Network	Solar	9348-50-R-24-BNC	384	3/20/00	3/20/01

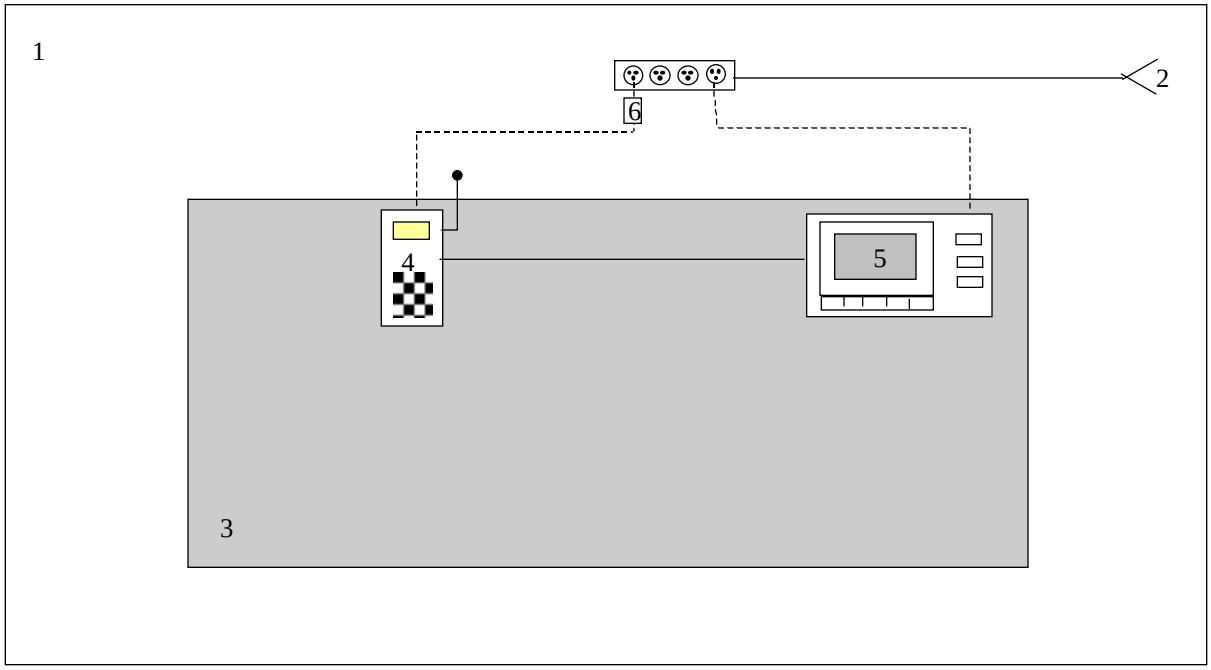
4. DESCRIPTION OF TESTING METHODS

4.1 Introduction

As required in 47 CFR, Parts 2 and 15, the methods employed to test the radiated and conducted emissions (as applicable) of the EUT are those contained within the American National Standards Institute (ANSI) document C63.4-1992, titled "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz." All applicable FCC Rule Sections that provide further guidance for performance of such testing are also observed.

For General Test Configuration please refer to Figure 1 on the following page.

Figure 1. General EUT Test Setup Diagram



NOT TO SCALE

CONFIGURATION LEGEND

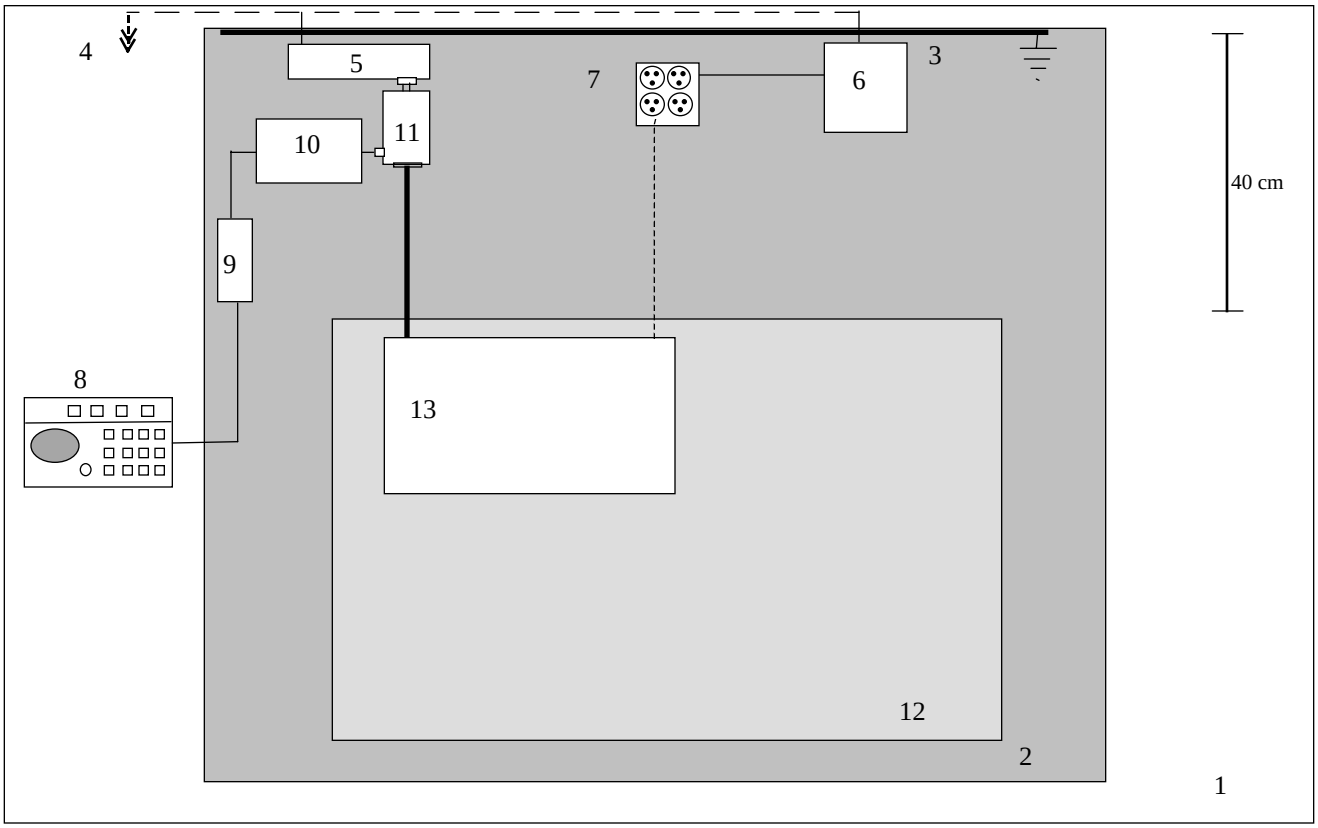
1. Test Laboratory
2. AC Power for Devices
3. Non-Conducting tables 80 cm above ground plane
4. EUT: AM Radio Transmitter
5. Cassette Player
6. AC/DC Adapter

4.2 Configuration and Methods of Measurements for Conducted Emissions

Section 7 of ANSI C63.4 determines the general configuration of the EUT and associated equipment, as well as the test platform for conducted emissions testing. Tabletop devices are placed on a non-conducting surface 80 centimeters above the ground plane floor and 40 centimeters from the ground plane wall. The EUT and associated system are configured to operate continuously, representing a "normally operating" mode. Power is supplied via a Line Impedance Stabilization Network (LISN). The emissions are recorded using the required bandwidth of 9 kHz in the quasi-peak mode. The average amplitude is also observed employing a 10 Hz bandwidth to determine the presence of broadband RFI. When such interference is caused by broadband sources (as defined by the FCC and ANSI Rules), the deviation guidelines contained in Section 11.3.1 of ANSI C63.4 are employed, which allows a correction factor of 13 dB to be subtracted from the quasi-peak reading. The emission levels are then compared to the applicable FCC limits to determine compliance.

For Conducted Emissions Test Configuration please refer to Figure 2 on the following page.

Figure 2. Conducted Emissions Test Setup Diagram



NOT TO SCALE

CONFIGURATION LEGEND

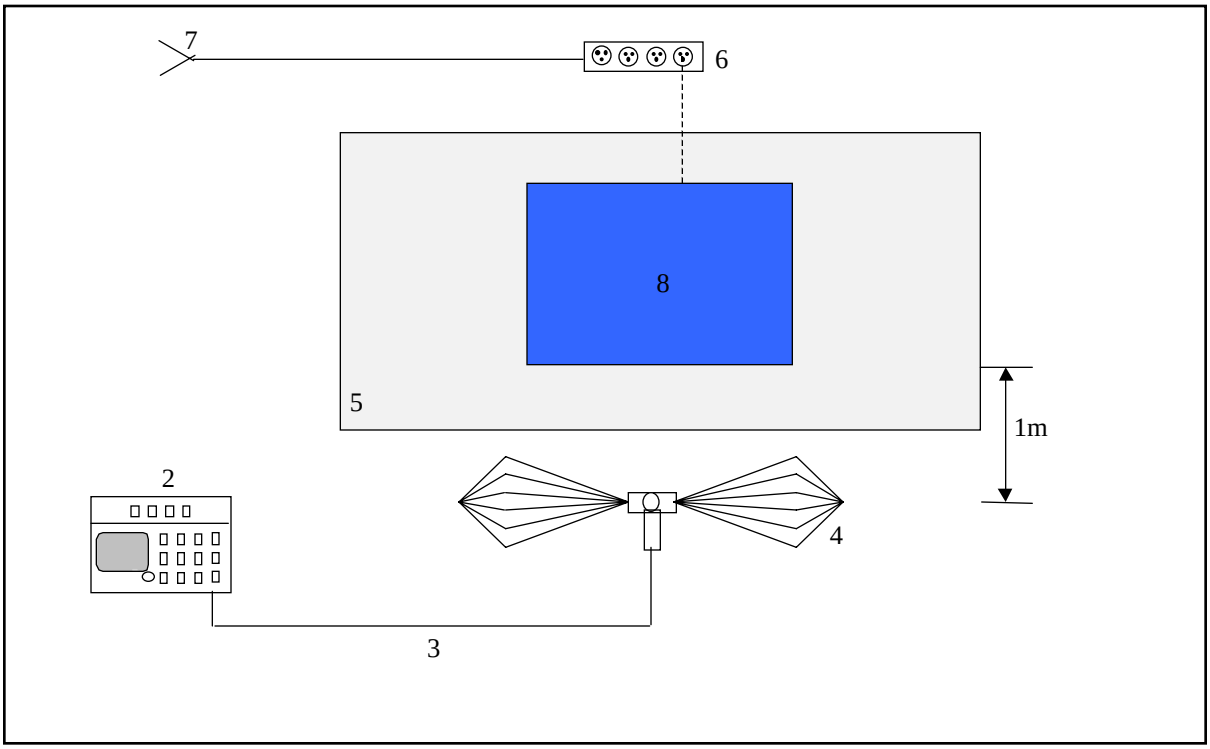
1. Test Laboratory (6 X 6 meters)
2. Ground Plane (15 square meters)
3. Vertical Conducting Wall (Grounded through Ground Plane via 10' ground rod)
4. AC Power for Devices (120V, 60 cycles, single phase)
5. Power Line Filter, Lindgren, 120 dB, 30 amp
6. Line Impedance Stabilization Network (LISN) for peripheral devices
7. Power Distribution Box for peripheral devices
8. Spectrum Analyzer with Quasi-Peak Adapter
9. High Pass Filter
10. Transient Limiter
11. LISN for EUT
12. Non-Conducting table 80 cm above ground plane
13. EUT: AM Radio Transmitter and Associated Cassette Player

4.3 Configuration and Methods of Measurements for Ambient Signals

When performing all testing of equipment, the actual emissions of the EUT are segregated from ambient signals present within the laboratory or the open-field test range. Preliminary testing is performed to insure that ambient signals are sufficiently low to allow for proper observation of the emissions from the EUT. Incoming power lines are filtered using a 120 dB, 30-ampere; 115/208-volt filter to assist in reducing ambient signals for tests of levels of conducted emissions. Ambients within the laboratory are compared to those noted at the nearby open-field site to discriminate between signals produced from the EUT and ambient signals. In the event that a significant emission is produced by the EUT at a frequency which is also demonstrating significant ambient signals, the spectrum analyzer is placed in the peak mode, the bandwidth is narrowed, the EUT's signal is centered on the analyzer, the scan width is expanded to 50 kHz while monitoring the audio to ensure that only the EUT signal is present, the analyzer is switched to quasi-peak mode, and the level of the EUT signal is recorded.

For Frequency ID Test Configuration please refer to Figure 3 on the following page.

Figure 3. Radiated Emissions Frequency ID Test Setup Diagram



NOT TO SCALE

CONFIGURATION LEGEND

1. Test Laboratory
2. Spectrum Analyzer with Quasi-Peak Adapter
3. Coax interconnect from Antenna to Spectrum Analyzer
4. Receive Antenna (basic relative position)
5. Non-Conducting table 80 cm above ground plane
6. Power strip for EUT and peripherals
7. AC power for devices (120 VAC, 60 cycles, single phase)
8. EUT: AM Radio Transmitter and Associated Cassette Player

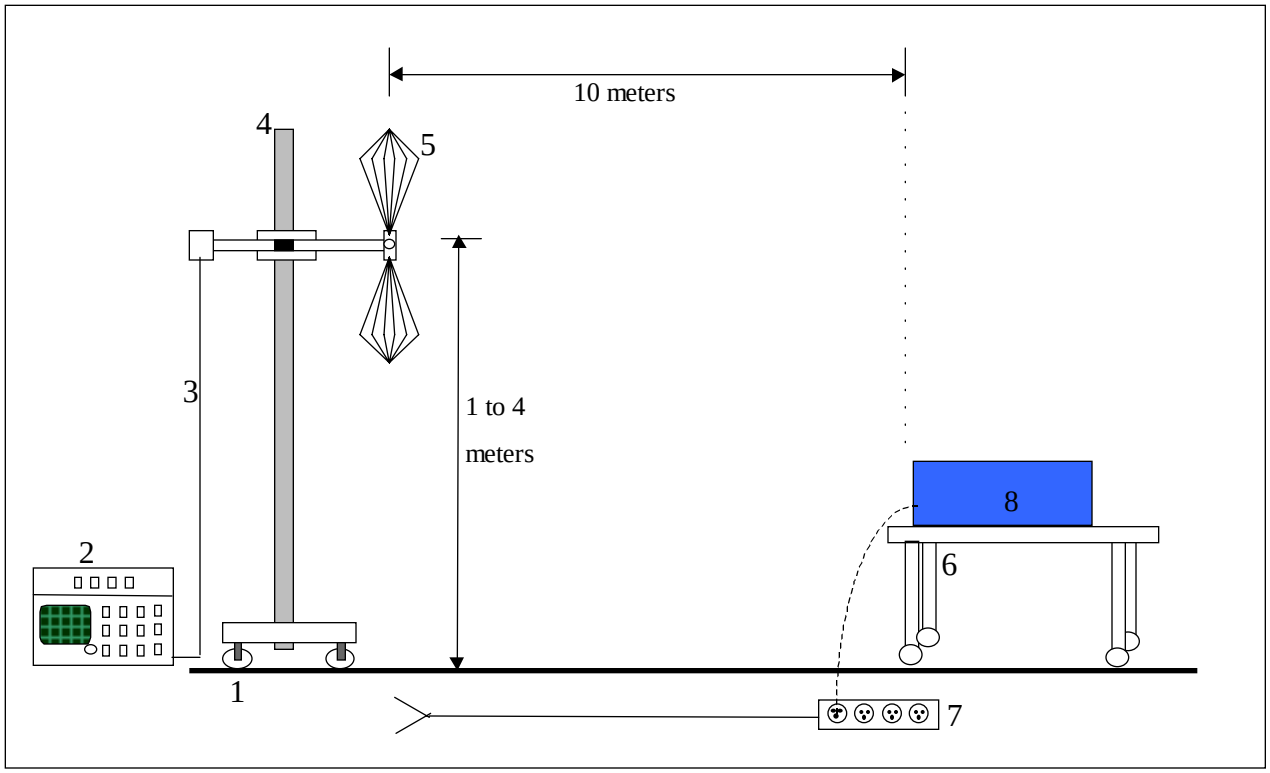
4.4 Configuration and Methods of Measurements for Radiated Emissions

Section 8 of ANSI C63.4 determines the general configuration and procedures for measuring the radiated emissions of equipment under test. Initially, the primary emission frequencies are identified inside the test lab by positioning a broadband receive antenna one meter from the EUT to locate frequencies of significant radiation. Normally this is done inside a shielded chamber to eliminate ambients. Next, the EUT and associated system are placed on a turntable on a 10 meter open area test site (registered with the FCC in accord with its Rules and ANSI C63.4) and the receive antenna is located at a distance of three meters from the EUT.

The EUT and cassette player are configured to play a cassette tape, which the TR1500 transmits, representing a "normally operating" mode. To ensure that the maximum emission at each discrete frequency of interest is observed, the receive antenna is varied in height from one to four meters and rotated to produce horizontal and vertical polarities, and the turntable is also rotated to determine the worst emitting configuration.

For Frequency ID and Radiated Emissions test configurations please refer to Figure 4 on the following page.

Figure 4. Radiated Emissions (OATS) Test Setup Diagram



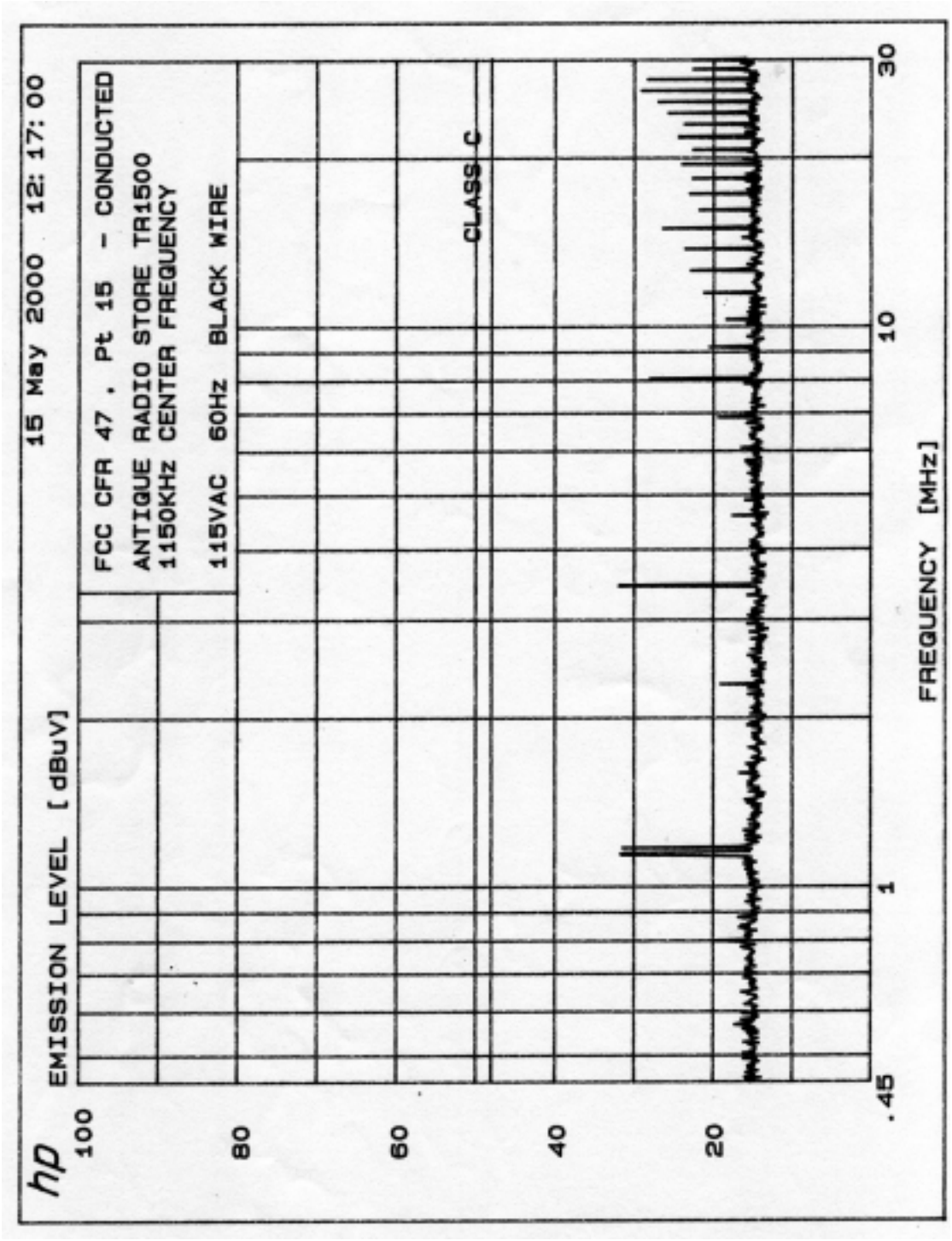
NOT TO SCALE

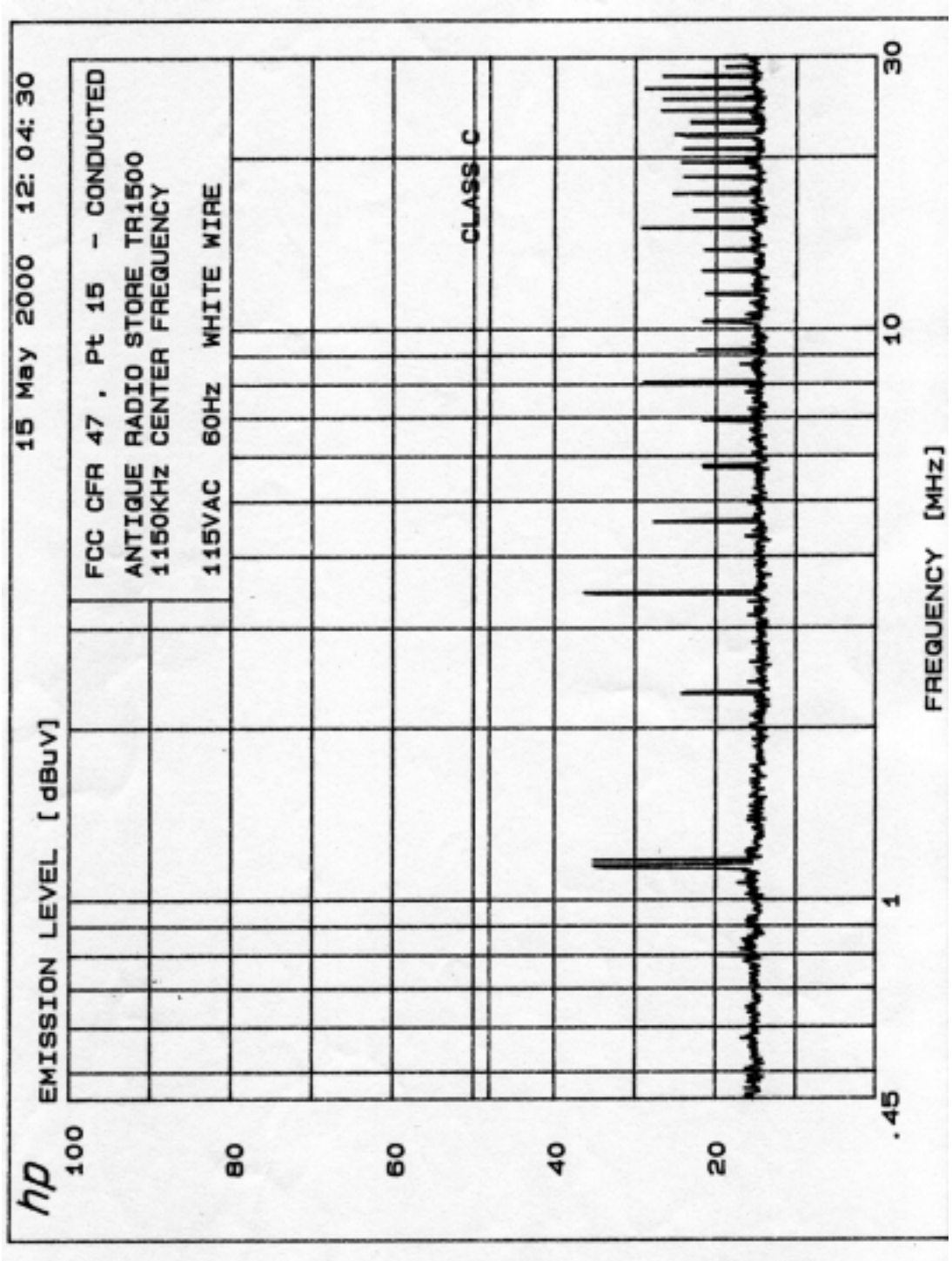
CONFIGURATION LEGEND

1. Ground plane (11 X 17 meters)
2. Spectrum Analyzer with Quasi-Peak Adapter
3. Coax interconnect from Receive Antenna to Spectrum Analyzer
4. Antenna Mast with motorized mounting assembly
5. Receive Antenna (basic relative position)
6. Non-Conducting table 80 cm above ground plane
7. AC power for devices (120/230 VAC, 50/60 cycles, single phase)
8. EUT: AM Radio Transmitter and Associated Cassette Player

5. TEST RESULTS

5.1 Conducted Emissions Test Data




15 May 2000 12:04:30
FCC CFR 47 , Pt 15 - CONDUCTED
ANTIQUE RADIO STORE TR1500
1150KHz CENTER FREQUENCY
115VAC 60Hz WHITE WIRE
CLASS C
EMISSION LEVEL [dBuV]
100
80
60
40
20
.45
1
10
30
FREQUENCY [MHz]

5.2 15.219 Test Data

5.2.1 15.219 (a) Output Power (<100mW)

Measuring across the output source resistor R8 (=100) as follows (base drive of Q1 is negligible):

5.95V
-2.50V
3.45 on 100 Voltage across R8

34.5mA Current through R8

34.5mA X 2.5V =86.25mW

The TR1500 is compliant

5.2.2 15.219 (b) Total Antenna Length (<10 feet)

6 feet =Length of the Antenna
±3 feet =Length of the Ground
9 feet total

The TR1500 is compliant

5.2.3 15.219 (c) Radiated Emissions (see range data following page)

Vary input voltage ± 15% and remain in band. Negative variation is -1.05kHz, Positive variation is +0.4kHz.

So the maximum claimed bandwidth is increased to 849kHz-1450kHz, which is within the allowed bandwidth of 510-1705kHz.

99.5 VAC = 1149.81kHz

117 VAC = 1150.86kHz

134.5 VAC = 1151.26kHz

The TR1500 is compliant

5.2.4 Radiated Emissions Test Data