

APPLICATION FOR FCC CERTIFICATION
For
Radio Shack, A Division of Tandy Corporation

Scanning Receiver
Model: 20-466 (PRO-2053)
FCC ID: AAO2000466

Job # J20046205
Report #20462052

Date of Testing: April 25, 2001
Date of Report: April 26, 2001

Number of Pages: 34 + Data Pages

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The results contained in this report were derived from measurements performed on the identified test samples. Any implied performance of other samples on this report is dependent on the representative of the samples tested.

NVLAP Laboratory Code: 200201-0



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AUTHORIZATION LETTER

Please see attached page.

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ATTESTATION LETTER TO FCC 315.121

Please see attached page.

Radio Shack, A Division of Tandy Corporation, Model No: 20-466 (PRO-2053)
FCC ID: AAO2000466

Date of Test: April 25, 2001

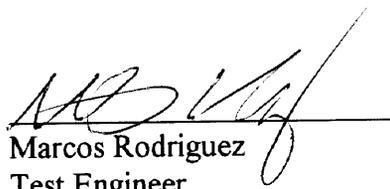
TEST REPORT

0.0 Summary of Test Results

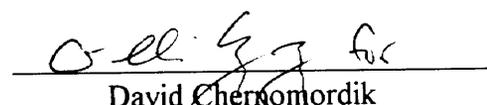
Radio Shack, A Division of Tandy Corporation - Model: 20-466 (PRO-2053)
FCC ID: AAO2000466

TEST	REFERENCE	RESULTS
Radiated Emission	15.109	Complies
Conducted Emission	15.107	Complies

We attest to the accuracy of this report:



Marcos Rodriguez
Test Engineer



David Chernomordik
EMC Site Manager

Review Date: 4/30/01

Radio Shack, A Division of Tandy Corporation, Model No: 20-466 (PRO-2053)

FCC ID: AAO2000466

Date of Test: April 25, 2001

1.0 General Description

1.1 Product Description

The General Research of Electronics, Inc. Model No.: 20-514 (PRO-89) is a scanning receiver used to listen to police and fire departments, ambulance services, government agencies, private companies, amateur radio services, aircraft and military operations.

Please refer to the attached specification sheets for more details.

A pre-production version of the sample was received on April 24, 2001 in good condition.

1.2 Related Submittal(s) Grants

This is an Application for Certification of a scanning receiver.

1.3 Test Methodology

Both AC mains line-conducted (if applicable) and radiated emission measurements were performed according to the procedures in ANSI C63.4 (1992). All measurements were performed in Open Area Test Sites. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the **“Data Section”** of this Application.

1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is Site 3. This test facility and site measurement data have been fully placed on file with the FCC.

2.0 System Test Configuration

2.1 Justification

The tests were performed according to the test procedure as outlined in CFR47 Part 15.31(m) and in ANSI C63.4 Section 12.1.

For emission testing, the equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). During testing, all cables were manipulated to produce worst case emissions.

For the measurements, the EUT is attached to a cardboard box (if necessary) and placed on the wooden turntable. If the EUT attaches to peripherals, they are connected and operational (as typical as possible).

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Detector function is in peak mode. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three-meter reading using inverse scaling with distance if measured at a closer distance.

2.2 EUT Exercising Software

For emissions testing, the units were setup to receive continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing.

2.3 Mode of Operation

The EUT was tested in two modes and the worst case emission was recorded:

Test Mode 1: The EUT was set to constantly receive at a particular frequency (1 near the top, 1 near the middle, and 1 near the bottom of each band).

Test Mode 2: The EUT was set to constantly scan and receive a particular band.

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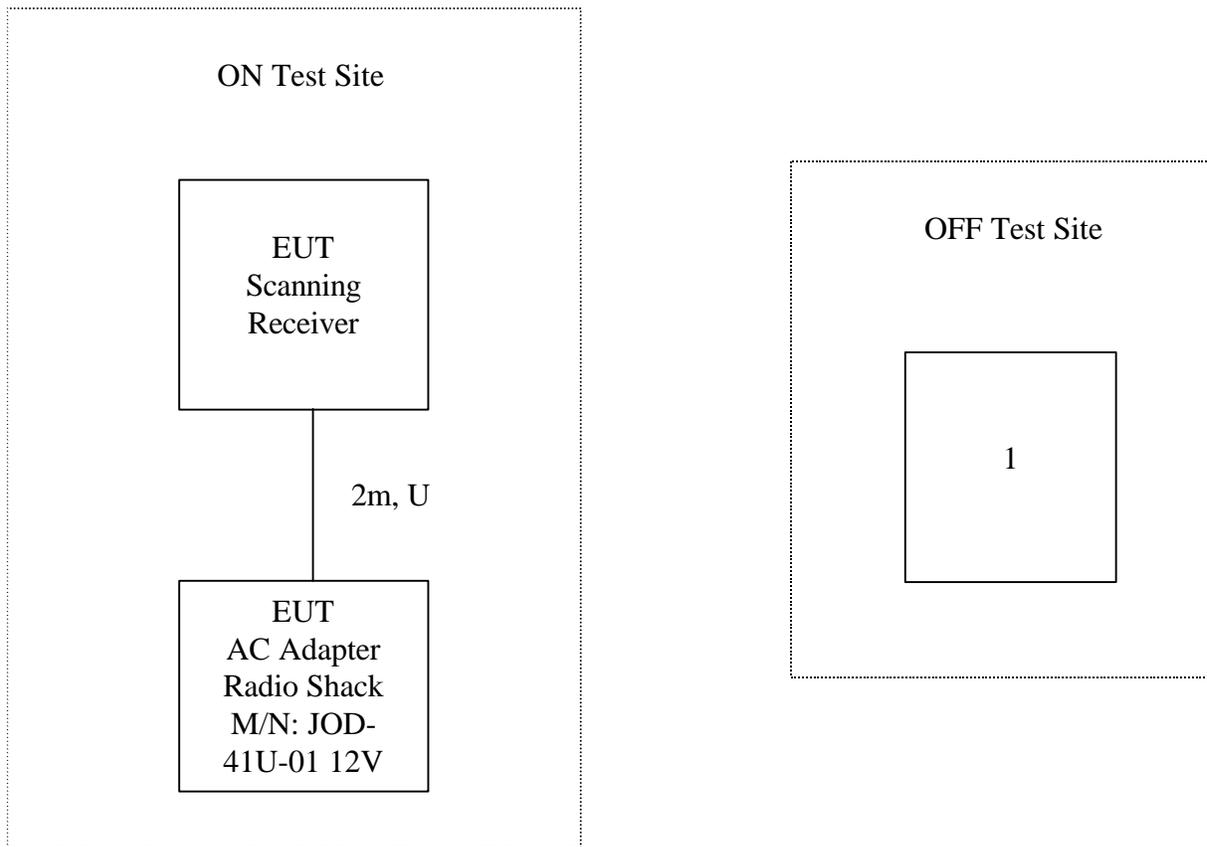
Date of Test: April 25, 2001

2.3 Support Equipment List and Description

Item #	Description	Manufacturer	Model No.	Serial No.
1	Signal Generator	Hewlett Packard	8663	2537A00214

2.3.1 The FCC ID's for all equipment used in the tested system (included inserted cards, which have grants) are: Not Applicable

2.3.2 Equipment Setup Block Diagram



U: Unshielded Cable
m: Length in meters

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2.4 Equipment Modification

Any modifications installed previous to testing by Radio Shack, A Division of Tandy Corporation will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services.

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3.0 Emission Results

AC line conducted emission measurements were performed from 0.45 MHz to 30 MHz. Analyzer resolution is 10 kHz or greater.

Radiated emission measurements were performed from 30 MHz to 5000 MHz. Analyzer resolution is 100 kHz or greater for 30 MHz to 1000 MHz, 1 MHz for >1000 MHz.

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included. All measurements were performed with peak detection unless otherwise specified.

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3.1 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:

$$FS = RA + AF + CF - AG + DF$$

Where FS = Field Strength in dB μ V/m

RA = Receiver Amplitude (including preamplifier) in dB μ V

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB

AG = Amplifier Gain in dB

DF = Distance Factor

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 dB μ V/m

RR = RA - AG in dB μ V

LF = CF + AF + DF in dB

Assume a receiver reading of 52.0 dB μ V 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 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

$$RA = 52.0 \text{ dB}\mu\text{V}$$

$$DF = 0 \text{ dB}$$

$$AF = 7.4 \text{ dB}$$

$$RR = 23.0 \text{ dB}\mu\text{V}$$

$$CF = 1.6 \text{ dB}$$

$$LF = 9.0 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$FS = RR + LF$$

$$FS = 23 + 9 = 32 \text{ dB}\mu\text{V/m}$$

Level in μ V/m = Common Antilogarithm [(32 dB μ V/m)/20] = 39.8 μ V/m

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3.2 Radiated Emission Configuration Photograph

Radiated Emission Test Setup



3.2 Radiated Emission Configuration Photograph (Continued)

Radiated Emission Test Setup



Job No.: J20046205 S/N: C000021
 Company: GRE America
 Model: PRO-2053
 Test Mode: Rx
 Engineer: Marcos Rodriguez
 Date: April, 25 2001

FCC Part 15.109 Class B Radiated Emissions

Tuned Frequency (MHz)	L.O. Frequency (MHz)	Antenna Location (m)	Antenna Polarization H/V	Receiver Reading (dBuV)	Antenna Factor (dB/m)	Preamplifier (dB)	Cable Loss (dB)	Corrected Reading (dBuV/m)	Limit At 3 m (dBuV/m)	Margin (dB)
25.000	405.800	3.0	V	29.2	17.3	17.7	4.8	33.6	46.0	-12.4
40.000	420.800	3.0	H	29.3	17.3	17.7	4.8	33.7	46.0	-12.3
54.000	434.800	3.0	V	29.0	17.9	17.7	4.8	34.0	46.0	-12.0
132.413	513.210	3.0	V	29.1	19.4	16.2	5.2	37.5	46.0	-8.5
153.200	534.010	3.0	V	22.4	19.7	16.2	5.2	31.1	46.0	-14.9
174.000	554.800	3.0	V	25.0	20.1	15.6	5.2	34.7	46.0	-11.3
216.003	596.800	3.0	V	23.2	20.2	15.6	5.2	33.0	46.0	-13.0
220.498	600.800	3.0	V	24.0	21.0	15.0	5.2	35.2	46.0	-10.8
225.000	605.800	3.0	V	25.8	21.0	15.0	5.2	37.0	46.0	-9.0
406.000	786.800	3.0	V	23.9	22.8	13.4	5.4	38.7	46.0	-7.3
459.000	839.800	3.0	V	24.0	23.3	14.3	6.0	39.0	46.0	-7.0
512.000	892.800	3.0	V	22.1	24.0	12.7	6.1	39.5	46.0	-6.5
806.000	425.200	3.0	V	29.6	17.9	17.7	4.8	34.6	46.0	-11.4
814.987	434.190	3.0	V	29.7	17.9	17.7	4.8	34.7	46.0	-11.3
823.987	443.190	3.0	V	29.7	17.9	17.7	4.8	34.7	46.0	-11.3
849.000	468.200	3.0	V	29.4	18.4	17.0	4.9	35.7	46.0	-10.3
858.987	478.190	3.0	V	29.2	19.2	17.0	4.9	36.3	46.0	-9.7
868.987	488.190	3.0	V	30.4	19.2	17.0	4.9	37.5	46.0	-8.5
894.000	513.200	3.0	V	29.0	19.4	16.2	5.2	37.4	46.0	-8.6
922.000	546.200	3.0	V	23.0	19.7	16.2	5.2	31.7	46.0	-14.3
960.000	579.200	3.0	V	23.7	20.2	15.6	5.2	33.5	46.0	-12.5
1240.000	859.200	3.0	V	20.8	23.4	12.7	6.1	37.6	46.0	-8.4
1270.000	889.200	3.0	V	19.9	24.0	12.7	6.1	37.1	46.0	-8.9
1300.000	919.200	3.0	V	16.7	24.3	8.2	6.3	39.1	46.0	-6.9
25.000	384.4	3	H	27.3	17.2	17.9	4.6	31.2	46	-14.8

Notes: Negative signs (-) in the Margin column signify levels below the limit.
 All readings are peak measurements.

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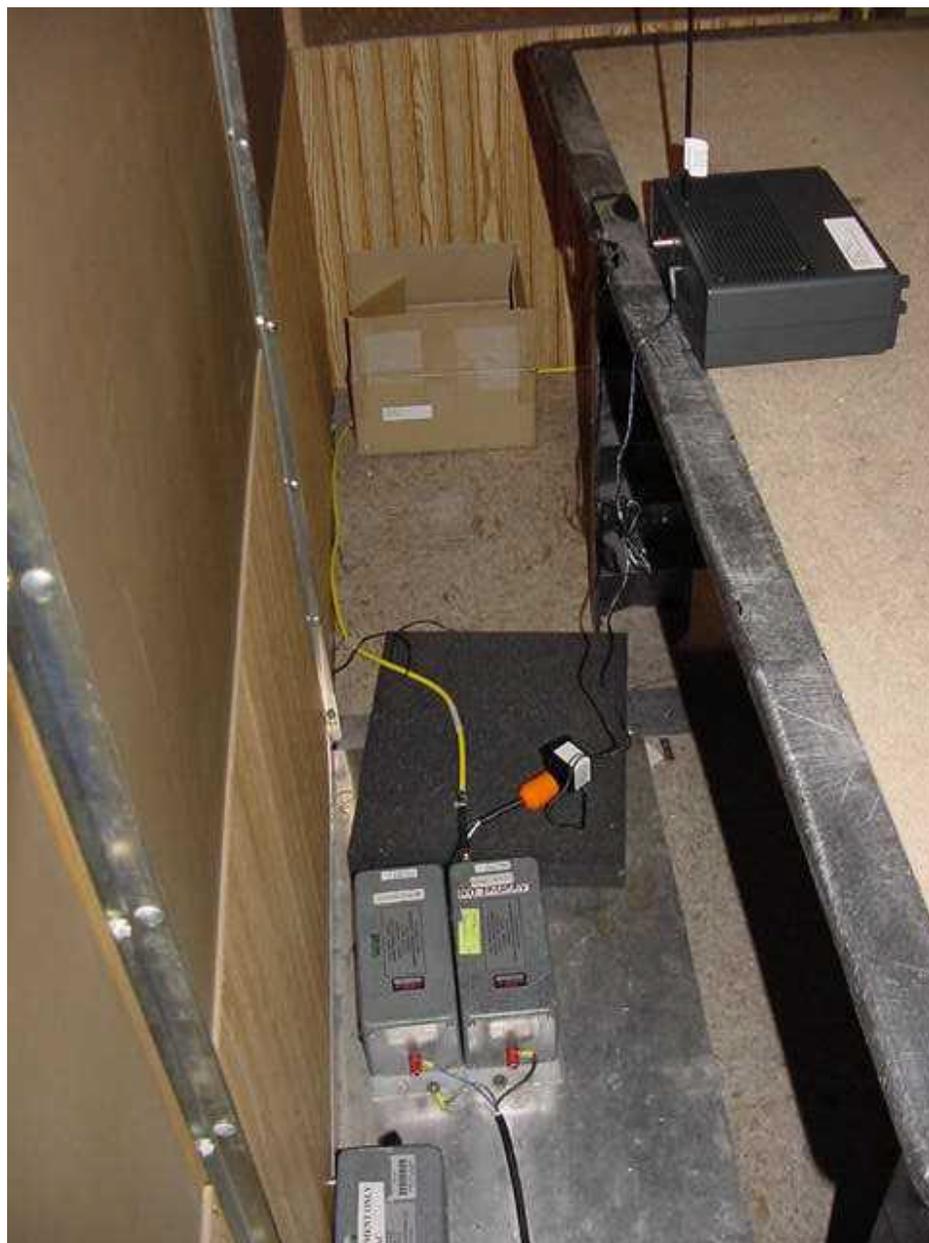
3.4 AC conducted Emission Configuration Photograph

Conducted Emission Test Setup



3.4 AC conducted Emission Configuration Photograph (Continued)

Conducted Emission Test Setup



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3.5 Conducted Emission Data

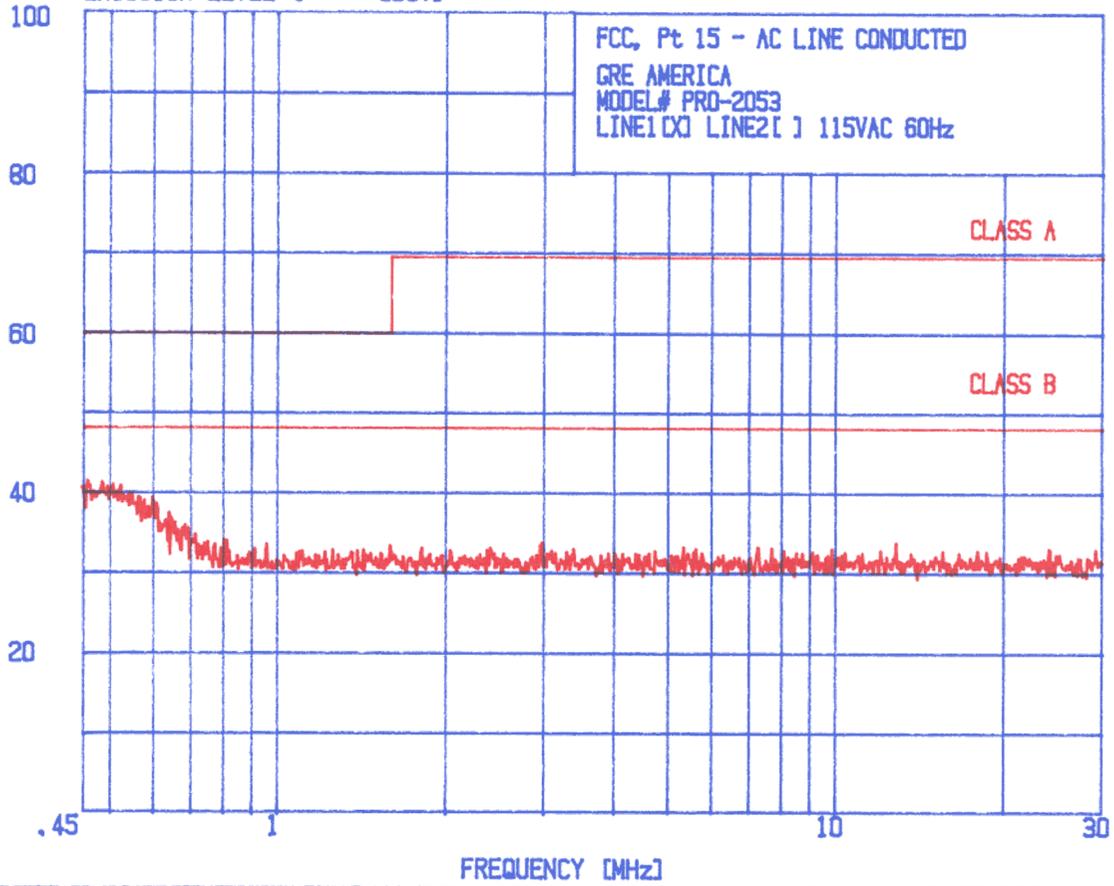
The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

Judgement: Passed by 6.0 dB at 0.5 MHz

hp

ITS, Menlo Park, CA
EMISSION LEVEL [dBuV]

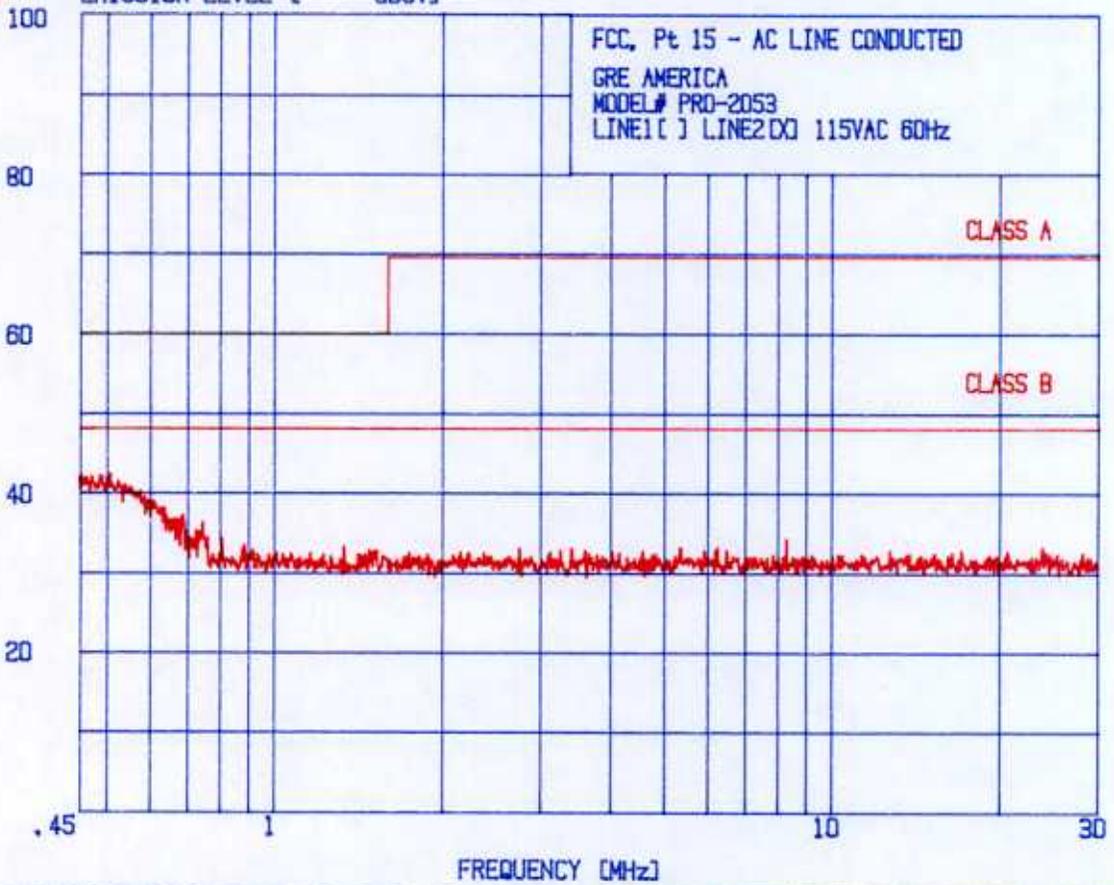
25 Apr 2001 13:42:28



hp

ITS, Menlo Park, CA
EMISSION LEVEL [dBuV]

25 Apr 2001 13:32:53



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4.0 Antenna Requirement

The antenna is affixed to the EUT using a unique connector, which allows for replacement of a broken antenna, the EUT does not use a standard antenna jack or electrical connector.

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5.0 Equipment Photographs

Photographs of the EUT are attached.

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EUT Photo



EUT Photo



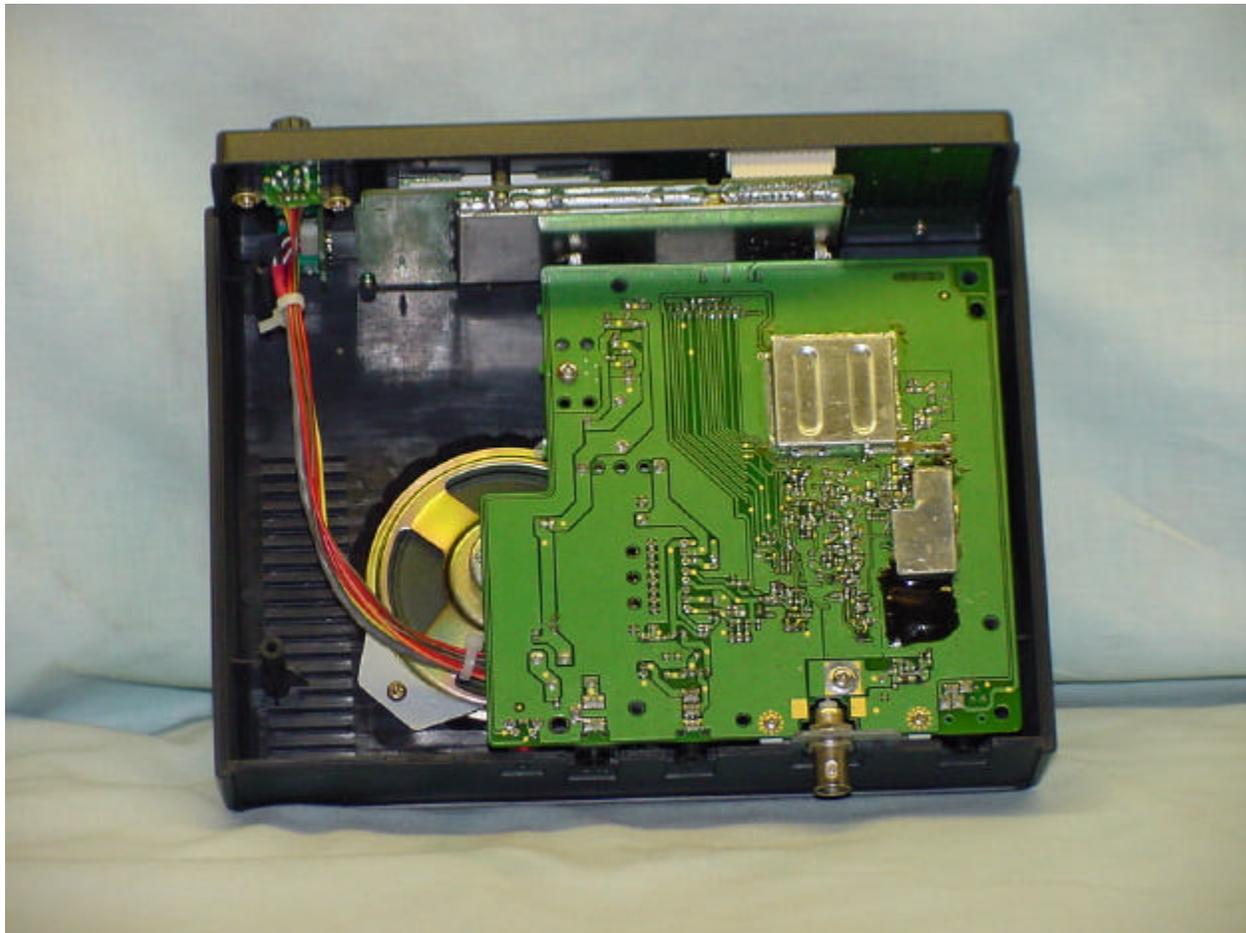
EUT Photo



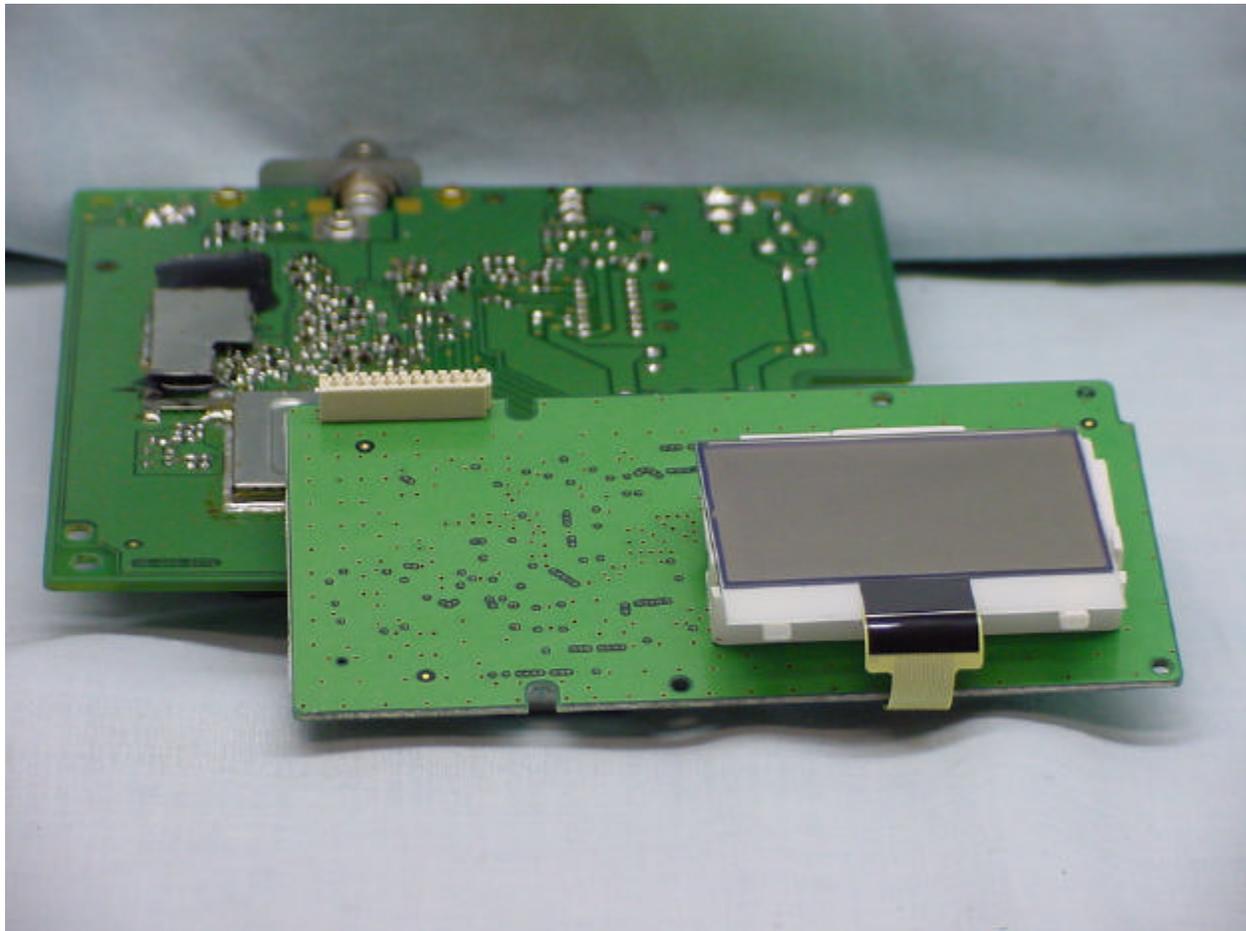
EUT Photo



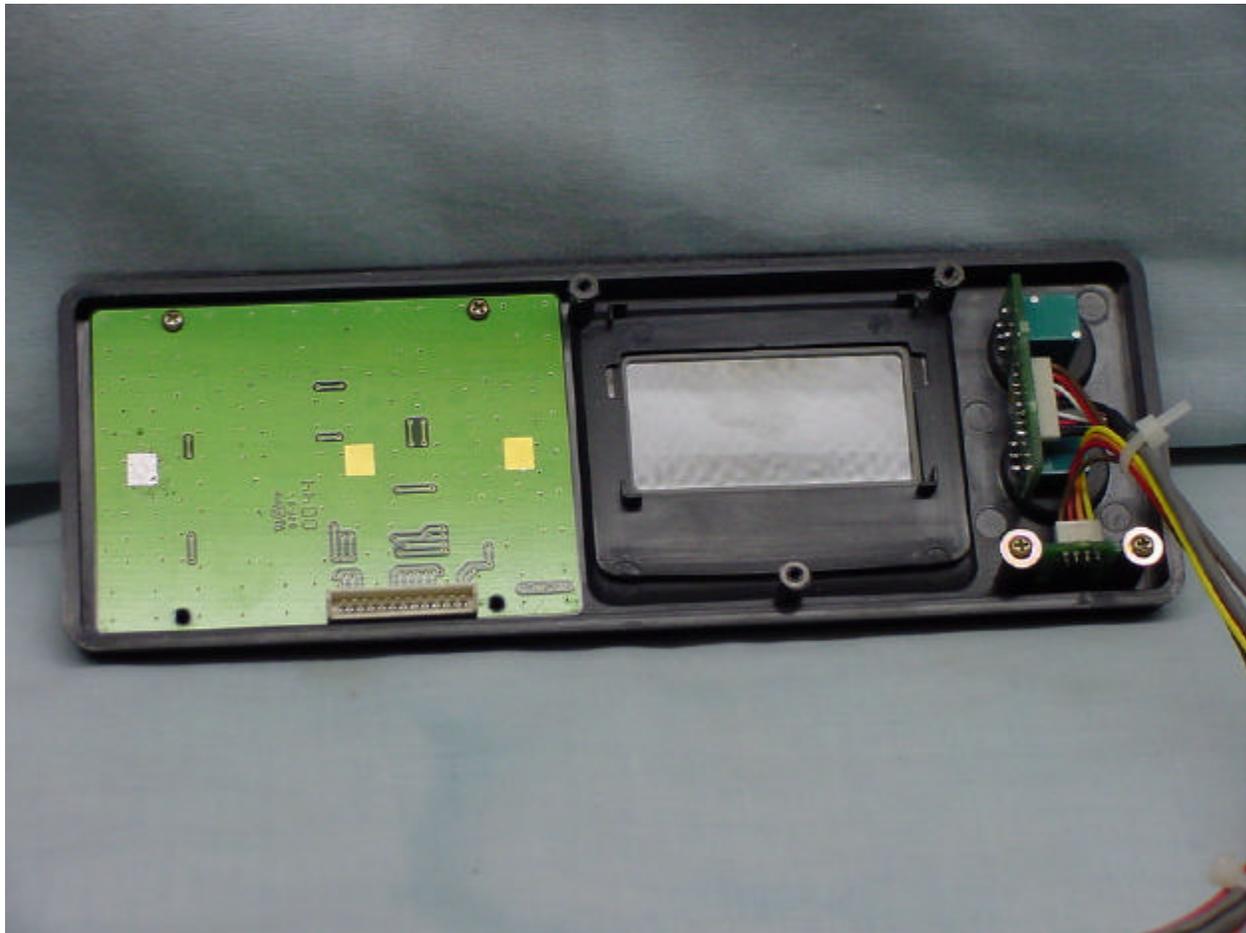
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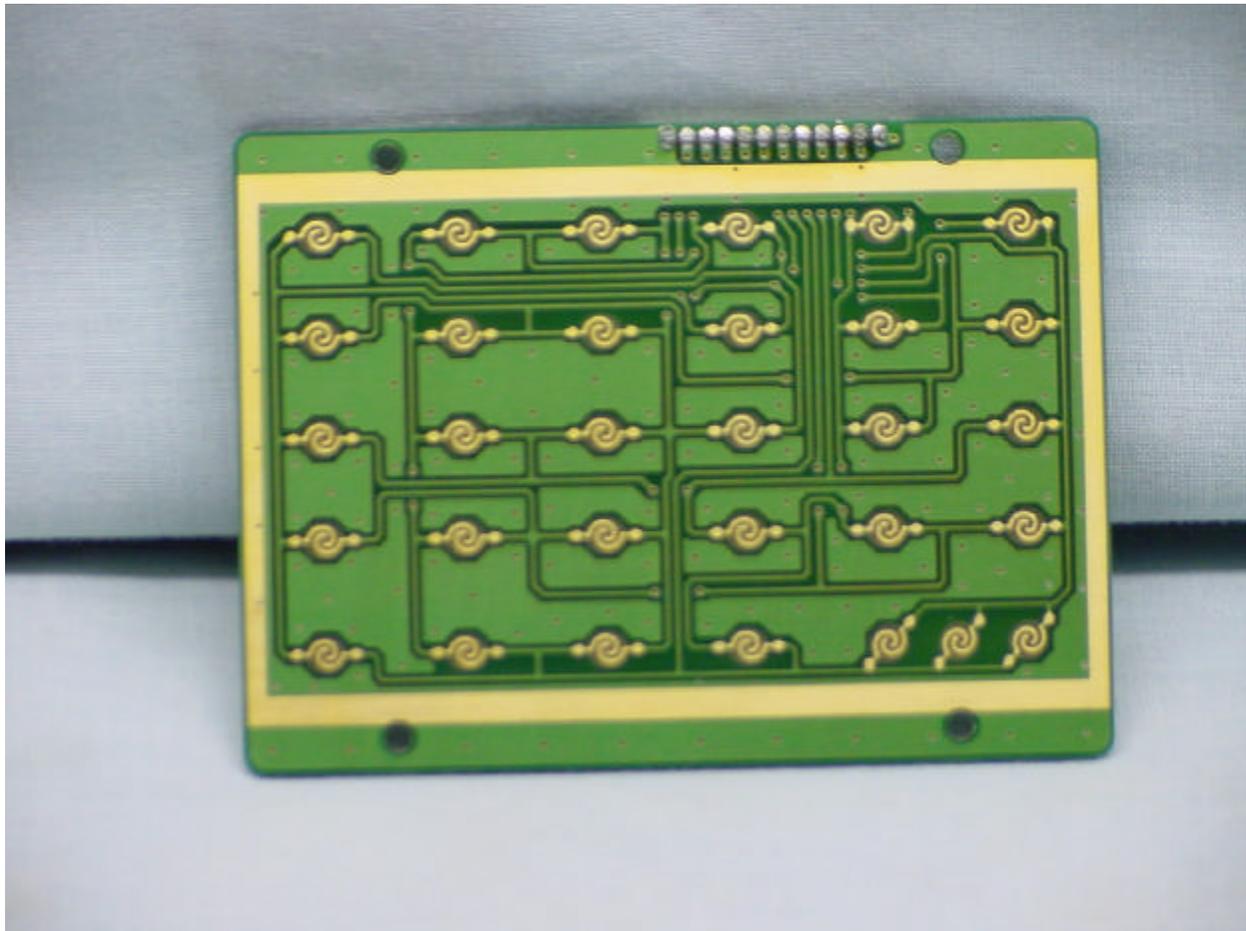
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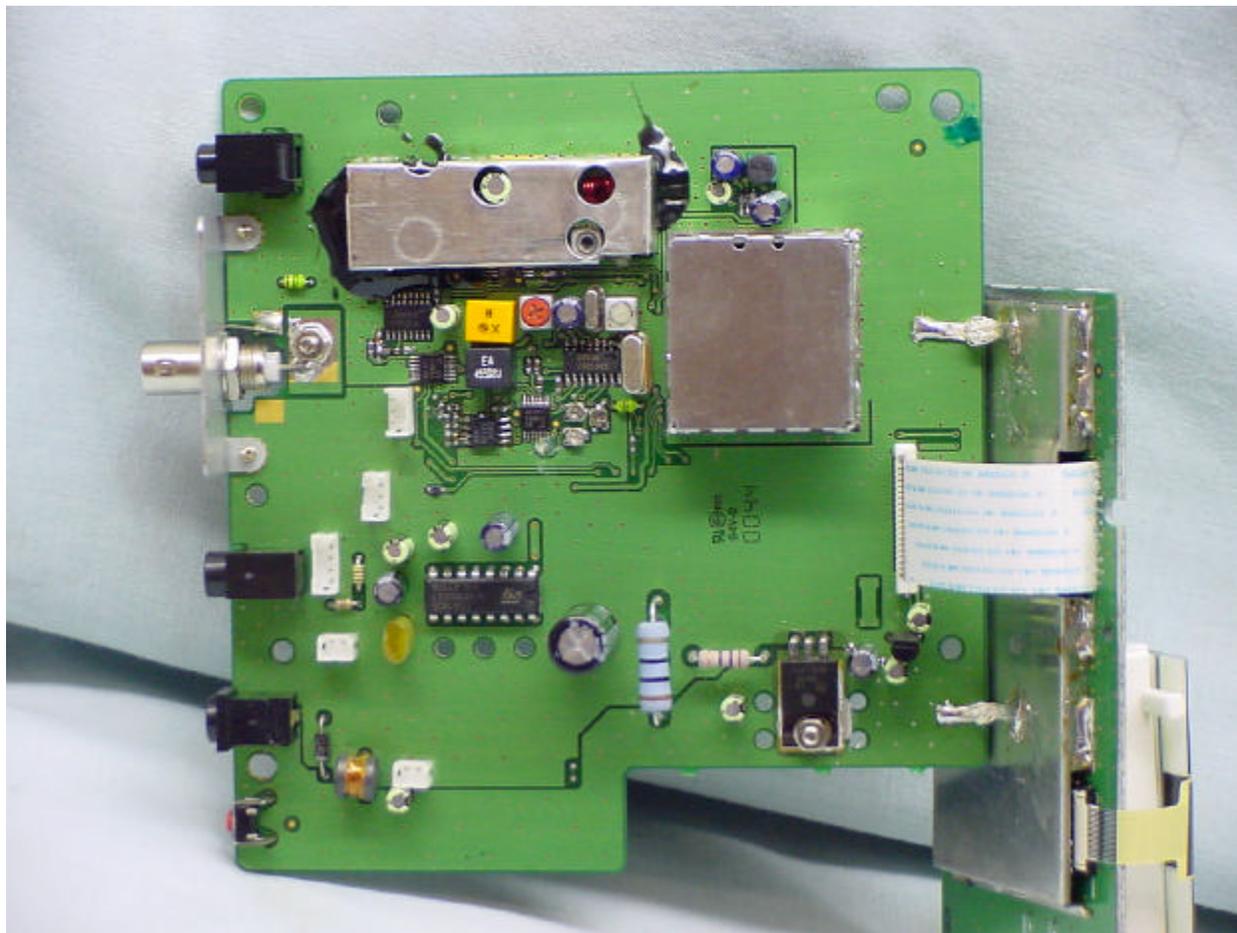
EUT Photo



EUT Photo



EUT Photo



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6.0 Product Labeling

6.1 Label Artwork

An engineering drawing of the label that will be permanently affixed to the unit is attached. This label will be attached to the unit at the location shown in Section 6.2.

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6.2 Label Location

See attached page.

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7.0 Technical Specifications

7.1 Receiver Block Diagram

See attached page.

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7.2 Receiver Circuit Diagram

See attached page.

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8.0 Instruction Manual

Attached is a preliminary copy of the Instruction Manual.

This manual will be provided to the end-user with each unit sold/leased in the United States.

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9.0 Document History

Revision/ Job Number	Writer Initials	Date	Change
1.0 / J20046205	SS	April 26, 2001	Original document