

**APPLICATION FOR FCC CERTIFICATION**  
**For**  
**Radio Shack Corp.**

**Scanning Receiver**  
**Model: 20-315 (PRO-82)**  
**FCC ID: AAO2000315**

**Job # 3022289**  
**Report # 30222891**

**Date of Testing: April 9 – 10 and May 13 - 15, 2002**  
**Date of Report: May 17, 2002**

**Number of Pages: 26**

This report shall not be reproduced except in full, without written approval of Intertek Testing Services.

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

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



FCC Part 15 Scanning Rx Cert

## TABLE OF CONTENTS

|                                                                |           |
|----------------------------------------------------------------|-----------|
| <b>AUTHORIZATION LETTER.....</b>                               | <b>3</b>  |
| <b>ATTESTATION LETTER TO FCC 915.121 .....</b>                 | <b>4</b>  |
| <b>TEST REPORT.....</b>                                        | <b>5</b>  |
| <b>0.0 Summary of Test Results.....</b>                        | <b>5</b>  |
| <b>1.0 General Description .....</b>                           | <b>6</b>  |
| 1.1 Product Description.....                                   | 6         |
| 1.2 Related Submittal(s) Grants.....                           | 6         |
| 1.3 Test Methodology.....                                      | 6         |
| 1.4 Test Facility .....                                        | 6         |
| <b>2.0 System Test Configuration.....</b>                      | <b>7</b>  |
| 2.1 Justification.....                                         | 7         |
| 2.2 EUT Exercising Software .....                              | 7         |
| 2.4 Support Equipment List and Description .....               | 8         |
| 2.4.1 The FCC ID's for all equipment used in the tested system |           |
| 2.4.2 Equipment Setup Block Diagram .....                      | 8         |
| 2.5 Equipment Modification.....                                | 8         |
| <b>3.0 Emission Results .....</b>                              | <b>9</b>  |
| 3.1 Field Strength Calculation .....                           | 10        |
| 3.2 Radiated Emission Configuration Photograph .....           | 11        |
| 3.3 Radiated Emission Data .....                               | 12        |
| 3.4 AC conducted Emission Configuration Photograph.....        | 14        |
| 3.5 Conducted Emission Data .....                              | 15        |
| <b>4.0 List of Test Equipment .....</b>                        | <b>18</b> |
| <b>5.0 Antenna Requirement.....</b>                            | <b>19</b> |
| <b>6.0 Equipment Photographs .....</b>                         | <b>20</b> |
| <b>7.0 Product Labeling.....</b>                               | <b>21</b> |
| 7.1 Label Artwork .....                                        | 21        |
| 7.2 Label Location .....                                       | 22        |
| <b>8.0 Technical Specifications.....</b>                       | <b>23</b> |
| 8.1 Receiver Block Diagram .....                               | 23        |
| 8.2 Receiver Circuit Diagram.....                              | 24        |

Radio Shack Corp., Model No: 20-315 (PRO-82)

FCC ID: AAO2000315

Date of Test: April 9 – 10 and May 13 - 15, 2002

|             |                                |           |
|-------------|--------------------------------|-----------|
| <b>9.0</b>  | <b>Instruction Manual.....</b> | <b>25</b> |
| <b>10.0</b> | <b>Document History.....</b>   | <b>26</b> |

Radio Shack Corp., Model No: 20-315 (PRO-82)  
FCC ID: AAO2000315

Date of Test: April 9 – 10 and May 13 - 15, 2002

**AUTHORIZATION LETTER**

See attachment.

Radio Shack Corp., Model No: 20-315 (PRO-82)  
FCC ID: AAO2000315

Date of Test: April 9 – 10 and May 13 - 15, 2002

**ATTESTATION LETTER TO FCC 315.121**

See attachment.

Radio Shack Corp., Model No: 20-315 (PRO-82)

FCC ID: AAO2000315

Date of Test: April 9 – 10 and May 13 - 15, 2002

## TEST REPORT

### 0.0 Summary of Test Results

GRE America - Model: 20-315 (PRO-82)

FCC ID: AAO2000315

| TEST               | REFERENCE | RESULTS  |
|--------------------|-----------|----------|
| Radiated Emission  | 15.109    | Complies |
| Conducted Emission | 15.107    | Complies |

*We attest to the accuracy of this report:*

\_\_\_\_\_  
Arkadi Kaplan  
Test Engineer

\_\_\_\_\_  
Ollie Moyrong  
EMC Manager

Review Date: \_\_\_\_\_

Radio Shack Corp., Model No: 20-315 (PRO-82)  
FCC ID: AAO2000315

Date of Test: April 9 – 10 and May 13 - 15, 2002

## 1.0 General Description

### 1.1 Product Description

The General Research of Electronics, Inc. Model No.: 20-315 (PRO-82) 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 specifications sheets for more details.

A pre-production version of the sample was received on April 8, 2002 in good condition.

### 1.2 Related Submittal(s) Grants

This is an Application for Certification of a scanning receiver.

### 1.3 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI C63.4 (1992). All measurements were performed in a semi-anechoic chamber. 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 test site and conducted measurement facility used to collect the radiated data is Site 1. 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 placed on top of a non-conductive table. 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**

The unit was 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.

Radio Shack Corp., Model No: 20-315 (PRO-82)

FCC ID: AAO2000315

Date of Test: April 9 – 10 and May 13 - 15, 2002

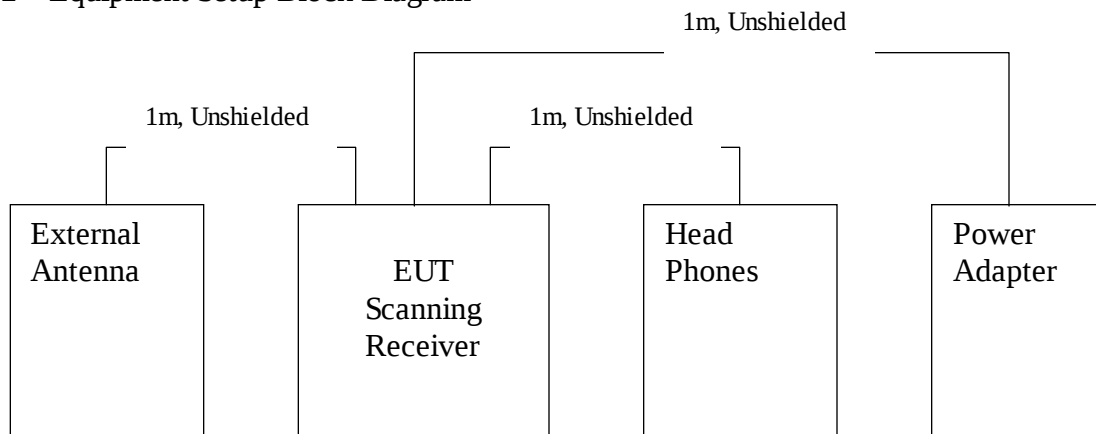
## 2.4 Support Equipment List and Description

None

2.4.1 The FCC ID's for all equipment used in the tested system (included inserted cards, which have grants) are:

Not Applicable

## 2.4.2 Equipment Setup Block Diagram



## 2.5 Equipment Modification

Any modifications installed previous to testing by GRE America will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services

Radio Shack Corp., Model No: 20-315 (PRO-82)

FCC ID: AAO2000315

Date of Test: April 9 – 10 and May 13 - 15, 2002

### **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.

Radio Shack Corp., Model No: 20-315 (PRO-82)

FCC ID: AAO2000315

Date of Test: April 9 – 10 and May 13 - 15, 2002

### 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 $\mu$ V/m  
              RA = Receiver Amplitude (including preamplifier) in dB $\mu$ 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 $\mu$ V/m  
              RR = RA - AG in dB $\mu$ V  
              LF = CF + AF + DF in dB

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

|                               |                      |
|-------------------------------|----------------------|
| RA = 52.0 dB $\mu$ V          | DF = 0 dB            |
| AF = 7.4 dB                   | RR = 23.0 dB $\mu$ V |
| CF = 1.6 dB                   | LF = 9.0 dB          |
| AG = 29.0 dB                  |                      |
| FS = RR + LF                  |                      |
| FS = 23 + 9 = 32 dB $\mu$ V/m |                      |

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

---

Radio Shack Corp., Model No: 20-315 (PRO-82)

FCC ID: AAO2000315

Date of Test: April 9 – 10 and May 13 - 15, 2002

3.2 Radiated Emission Configuration Photograph

See file attachment titled **Test Setup Photos AAO2000315**.

Radio Shack Corp., Model No: 20-315 (PRO-82)

FCC ID: AAO2000315

Date of Test: April 9 – 10 and May 13 - 15, 2002

## 3.3 Radiated Emission Data

|                   |               |
|-------------------|---------------|
| <b>Tested By:</b> | Arkadi Kaplan |
| <b>Test Date:</b> | April 9, 2002 |

|                              |      |
|------------------------------|------|
| <b>Temperature</b> (°C)      | 21.2 |
| <b>Relative Humidity</b> (%) | 47.8 |

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

|                 |                                                                                        |
|-----------------|----------------------------------------------------------------------------------------|
| <b>Results:</b> | <b>Complies</b> by 25.8 dB at 155.5 MHz<br>(Tuned frequency 144.8 MHz, L.O. Frequency) |
|-----------------|----------------------------------------------------------------------------------------|

All other emissions are at least 20 dB below the limits.

Radio Shack Corp., Model No: 20-315 (PRO-82)

FCC ID: AAO2000315

Date of Test: April 9 – 10 and May 13 - 15, 2002

Radiated Emission Data

|                                                   |                                                                         |          |              |          |         |         |       |           |          |        |  |
|---------------------------------------------------|-------------------------------------------------------------------------|----------|--------------|----------|---------|---------|-------|-----------|----------|--------|--|
| Job No.: 3022284                                  |                                                                         |          |              |          |         |         |       |           |          |        |  |
| Company: GRE America                              |                                                                         |          |              |          |         |         |       |           |          |        |  |
| Model: 20-315 (PRO-82)                            |                                                                         |          |              |          |         |         |       |           |          |        |  |
| Test Mode: Rx                                     |                                                                         |          |              |          |         |         |       |           |          |        |  |
| Engineer: Arkadi Kaplan                           |                                                                         |          |              |          |         |         |       |           |          |        |  |
| Date: April, 09 2002                              |                                                                         |          |              |          |         |         |       |           |          |        |  |
|                                                   |                                                                         |          |              |          |         |         |       |           |          |        |  |
| <b>FCC Part 15.109 Class B Radiated Emissions</b> |                                                                         |          |              |          |         |         |       |           |          |        |  |
|                                                   |                                                                         |          |              |          |         |         |       |           |          |        |  |
| Tuned                                             | L.O.                                                                    | Antenna  | Antenna      | Receiver | Antenna | Preampl | Cable | Corrected | Limit    | Margin |  |
| Frequency                                         | Frequency                                                               | Location | Polarization | Reading  | Factor  |         | Loss  | Reading   | At 3 m   |        |  |
| (MHz)                                             | (MHz)                                                                   | (m)      | H/V          | (dBuV)   | (dB/m)  | (dB)    | (dB)  | (dBuV/m)  | (dBuV/m) | (dB)   |  |
| 29.000                                            | 39.700                                                                  | 3.0      | V            | 7.1      | 6.1     | 25.3    | 3.5   | -8.6      | 40.0     | -48.6  |  |
| 41.500                                            | 52.200                                                                  | 3.0      | V            | 7.9      | 4.6     | 25.2    | 3.6   | -9.1      | 40.0     | -49.1  |  |
| 54.000                                            | 64.700                                                                  | 3.0      | V            | 8.6      | 5.4     | 25.3    | 3.8   | -7.5      | 40.0     | -47.5  |  |
| 108.000                                           | 118.700                                                                 | 3.0      | V            | 14.0     | 5.2     | 25.2    | 4.4   | -1.6      | 43.5     | -45.1  |  |
| 122.500                                           | 133.200                                                                 | 3.0      | V            | 13.1     | 6.2     | 25.1    | 4.5   | -1.3      | 43.5     | -44.8  |  |
| 136.988                                           | 147.688                                                                 | 3.0      | V            | 12.1     | 11.1    | 25.0    | 4.5   | 2.7       | 43.5     | -40.8  |  |
| 137.000                                           | 126.300                                                                 | 3.0      | V            | 21.4     | 6.9     | 25.2    | 4.5   | 7.6       | 43.5     | -35.9  |  |
| 155.500                                           | 144.800                                                                 | 3.0      | V            | 27.2     | 11.0    | 25.0    | 4.5   | 17.7      | 43.5     | -25.8  |  |
| 174.000                                           | 163.300                                                                 | 3.0      | V            | 26.4     | 8.7     | 25.0    | 4.6   | 14.7      | 43.5     | -28.8  |  |
| 380.000                                           | 123.100                                                                 | 3.0      | V            | 9.5      | 7.5     | 25.2    | 4.4   | -3.8      | 43.5     | -47.3  |  |
| 446.000                                           | 145.100                                                                 | 3.0      | V            | 11.5     | 11.0    | 25.0    | 4.5   | 2.0       | 43.5     | -41.5  |  |
| 512.000                                           | 167.100                                                                 | 3.0      | H            | 12.2     | 8.6     | 25.0    | 4.6   | 0.4       | 43.5     | -43.1  |  |
|                                                   |                                                                         |          |              |          |         |         |       |           |          |        |  |
|                                                   |                                                                         |          |              |          |         |         |       |           |          |        |  |
| Notes:                                            | Negative signs (-) in the Margin column signify levels below the limit. |          |              |          |         |         |       |           |          |        |  |
|                                                   | All readings are peak measurements.                                     |          |              |          |         |         |       |           |          |        |  |
|                                                   |                                                                         |          |              |          |         |         |       |           |          |        |  |

---

Radio Shack Corp., Model No: 20-315 (PRO-82)

FCC ID: AAO2000315

Date of Test: April 9 – 10 and May 13 - 15, 2002

3.4 AC conducted Emission Configuration Photograph

See file attachment titled **Test Setup Photos AAO2000315**.

Radio Shack Corp., Model No: 20-315 (PRO-82)

FCC ID: AAO2000315

Date of Test: April 9 – 10 and May 13 - 15, 2002

3.5 Conducted Emission Data

|                   |               |
|-------------------|---------------|
| <b>Tested By:</b> | Arkadi Kaplan |
| <b>Test Date:</b> | May 15, 2002  |

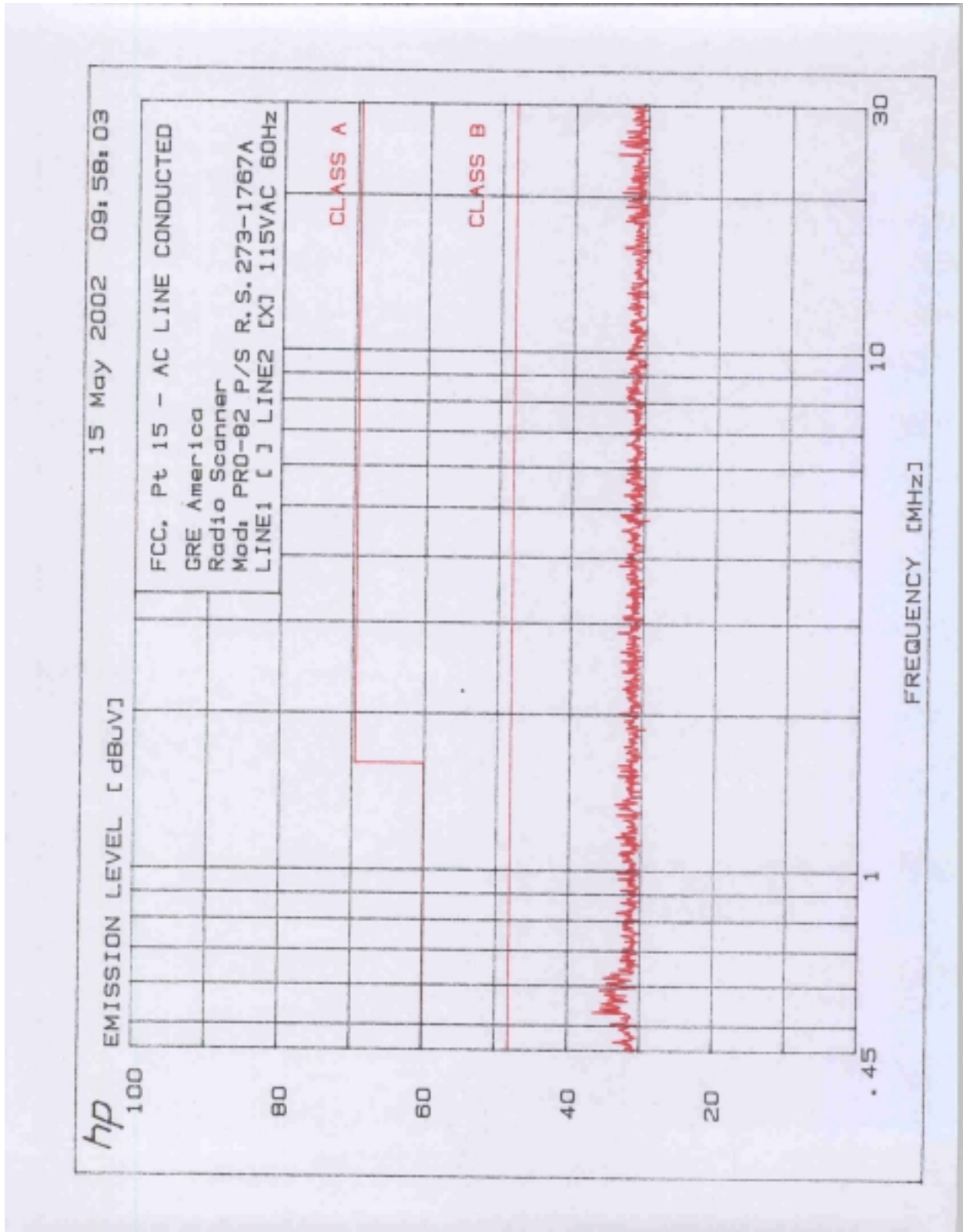
|                              |      |
|------------------------------|------|
| <b>Temperature</b> (°C)      | 21.0 |
| <b>Relative Humidity</b> (%) | 54.0 |

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

|                 |                                        |
|-----------------|----------------------------------------|
| <b>Results:</b> | <b>Complies</b> by 12.0 dB at 0.54 MHz |
|-----------------|----------------------------------------|

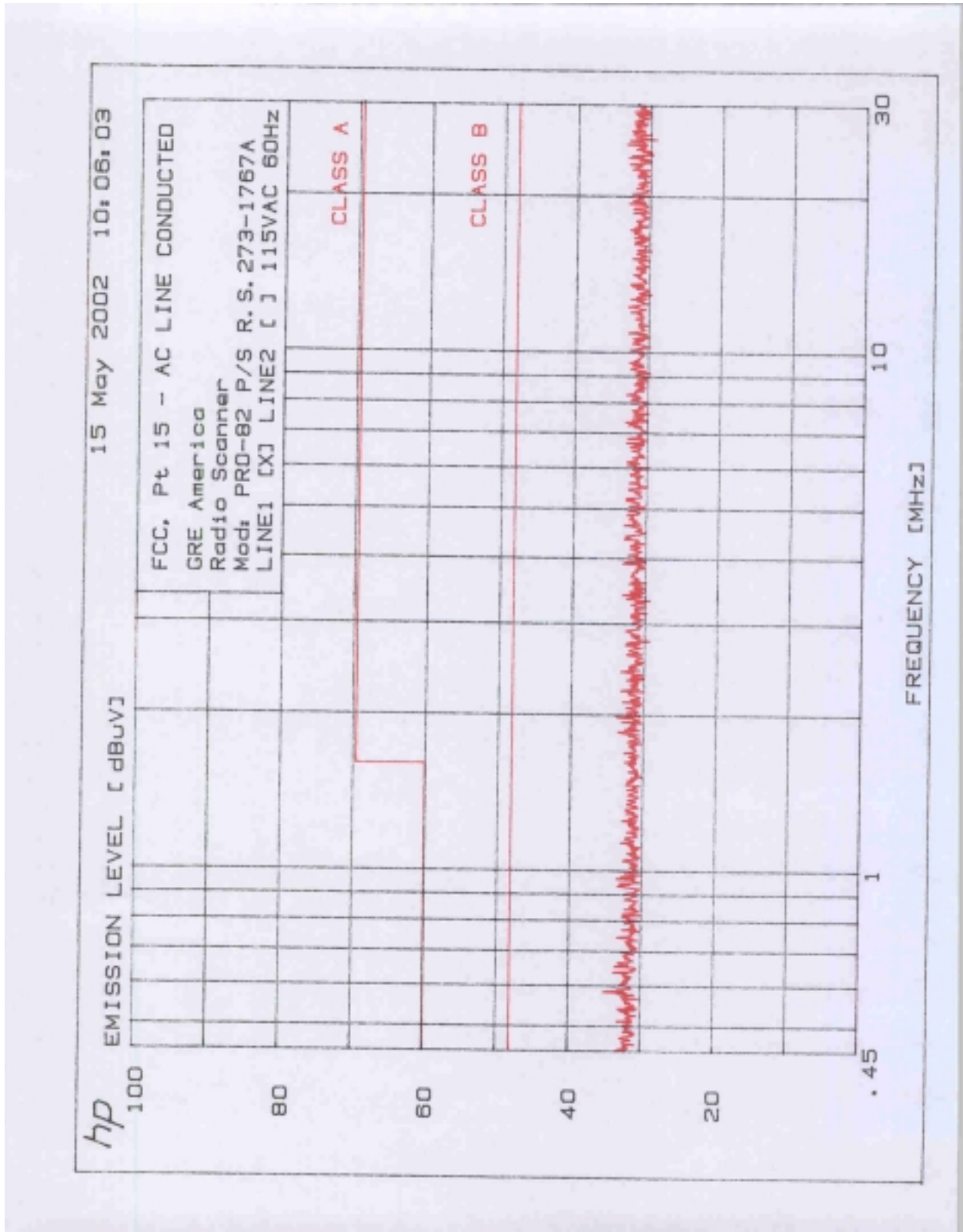
Radio Shack Corp., Model No: 20-315 (PRO-82)  
FCC ID: AAO2000315

Date of Test: April 9 – 10 and May 13 - 15, 2002



Radio Shack Corp., Model No: 20-315 (PRO-82)  
FCC ID: AAO2000315

Date of Test: April 9 – 10 and May 13 - 15, 2002



Radio Shack Corp., Model No: 20-315 (PRO-82)

FCC ID: AAO2000315

Date of Test: April 9 – 10 and May 13 - 15, 2002

#### 4.0 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 |
|-------------------|-----------------|------------|------------|---------|----------|------|
| BI-Log Antenna #1 | EMCO            | 3143       | 9509-1164  | 12      | 3/04/03  | X    |
| Pre-Amplifier     | Sonoma Inst.    | 310        | 185634     | 12      | 01/10/03 | X    |
| RF Filter Section | Hewlett Packard | 85460A     | 3448A00267 | 12      | 7/20/02  | X    |
| EMI Receiver      | Hewlett Packard | 8546A      | 3710A00373 | 12      | 7/20/02  | X    |

---

Radio Shack Corp., Model No: 20-315 (PRO-82)

FCC ID: AAO2000315

Date of Test: April 9 – 10 and May 13 - 15, 2002

## **5.0 Antenna Requirement**

The antenna is affixed to the EUT using a unique connector, which that allows for replacement of a broken antenna, the EUT does use a standard antenna jack or electrical connector.

---

Radio Shack Corp., Model No: 20-315 (PRO-82)  
FCC ID: AAO2000315

Date of Test: April 9 – 10 and May 13 - 15, 2002

## **6.0 Equipment Photographs**

See attachment.

Radio Shack Corp., Model No: 20-315 (PRO-82)

FCC ID: AAO2000315

Date of Test: April 9 – 10 and May 13 - 15, 2002

## **7.0 Product Labeling**

### **7.1 Label Artwork**

See attachment.

---

Radio Shack Corp., Model No: 20-315 (PRO-82)

FCC ID: AAO2000315

Date of Test: April 9 – 10 and May 13 - 15, 2002

7.2 Label Location

See attachment.

Radio Shack Corp., Model No: 20-315 (PRO-82)  
FCC ID: AAO2000315

Date of Test: April 9 – 10 and May 13 - 15, 2002

## **8.0 Technical Specifications**

### **8.1 Receiver Block Diagram**

See attachment.

---

Radio Shack Corp., Model No: 20-315 (PRO-82)

FCC ID: AAO2000315

Date of Test: April 9 – 10 and May 13 - 15, 2002

8.2 Receiver Circuit Diagram

See attachment.

---

Radio Shack Corp., Model No: 20-315 (PRO-82)  
FCC ID: AAO2000315

Date of Test: April 9 – 10 and May 13 - 15, 2002

## **9.0 Instruction Manual**

See attachment.

Radio Shack Corp., Model No: 20-315 (PRO-82)

FCC ID: AAO2000315

Date of Test: April 9 – 10 and May 13 - 15, 2002

## 10.0 Document History

| Revision/<br>Job Number | Writer<br>Initials | Date           | Change            |
|-------------------------|--------------------|----------------|-------------------|
| 1.0 / 30222891          | SS                 | April 15, 2002 | Original document |
|                         |                    |                |                   |
|                         |                    |                |                   |
|                         |                    |                |                   |
|                         |                    |                |                   |
|                         |                    |                |                   |