

# Intertek Testing Services

Radio Shack, A Division of Tandy Corporation, Scanning Receiver Date of Test: July 20 & 23, 1998  
FCC ID: AAO2000312

## TEST REPORT

### 0.0 Summary of Test Results

Radio Shack, A Division of Tandy Corporation - Model: 20-312 (Pro-75)  
FCC ID: AAO2000312

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

Test Engineer: Ollie Moyrong Date: 7/30/98  
Ollie Moyrong

EMC Site Mgr: David Chernomordik Date: 7/30/98  
David Chernomordik

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## 1.0 **General Description**

### 1.1 Product Description

The General Research of Electronics, Inc. Model No.: 20-312 (Pro-75) is a scanning receiver.

Please refer to the attached users manual for more details.

A pre-production version of the sample was received on July 20, 1998 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 2. This test facility and site measurement data have been fully placed on file with the FCC.

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## 2.0 System Test Configuration

### 2.1 Justification

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 EUT is wired to transmit full power without modulation.

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.

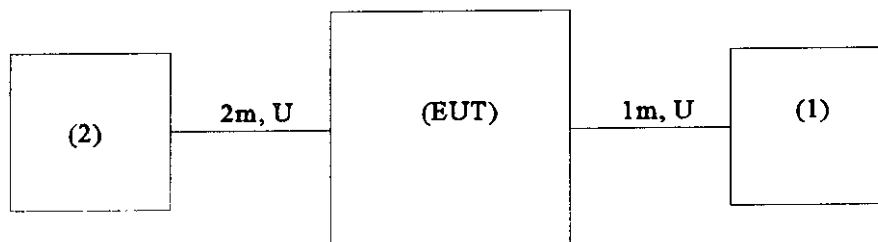
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### 2.3 Support Equipment List and Description

| Item # | Description                  | Model No. | Serial No. | FCC ID |
|--------|------------------------------|-----------|------------|--------|
| 1      | Sony Headphones              | N/A       | N/A        | N/A    |
| 2      | Radio Shack AC Power Adapter | 273-1662  | 9615       | N/A    |

### b) Equipment Setup Block Diagram



\* = EUT

\*\* = No ferrites on video cable

S = Shielded;

U = Unshielded

F = With Ferrite

### 2.4 Equipment Modification

Any modifications installed previous to testing by Radio Shack 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  $\text{dB}\mu\text{V/m}$   
               $RA$  = Receiver Amplitude (including preamplifier) in  $\text{dB}\mu\text{V}$   
               $CF$  = Cable Attenuation Factor in  $\text{dB}$   
               $AF$  = Antenna Factor in  $\text{dB}$   
               $AG$  = Amplifier Gain in  $\text{dB}$   
               $DF$  = 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  $\text{dB}\mu\text{V/m}$   
               $RR = RA - AG$  in  $\text{dB}\mu\text{V}$   
               $LF = CF + AF + DF$  in  $\text{dB}$

Assume a receiver reading of  $52.0 \text{ dB}\mu\text{V}$  is obtained. The antenna factor of  $7.4 \text{ dB}$  and cable factor of  $1.6 \text{ dB}$  is added. The amplifier gain of  $29 \text{ dB}$  is subtracted, giving a field strength of  $32 \text{ dB}\mu\text{V/m}$ . This value in  $\text{dB}\mu\text{V/m}$  was converted to its corresponding level in  $\mu\text{V/m}$ .

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

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

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### 3.3    Radiated Emission Data

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

Judgement : Passed by 10.1 dB

## INTERTEK TESTING SERVICES

**Company:** General Research of Electronics  
**EUT:** Portable Scanning Receiver  
**Model:** 20-312 (Pro-75)  
**Test Mode:** Rx

**Project #:** J98020207  
**Date of Test:** 7/20/98  
**Test Site #:** 2  
**Engineer:** Ollie Moyrong

### FCC Part 15 Class B Radiated Emissions

| Tuned Frequency (MHz) | L.O. Frequency (MHz) | Antenna Location (m) | Antenna Polarization (H=0/V=1) | Reading (dBuV) | Antenna Factor (dB/m) | Preamp (dB) | Cable Loss (dB) | Corrected Reading dBuV/m | Limit At 3 m (dBuV/m) | Margin (dB) |
|-----------------------|----------------------|----------------------|--------------------------------|----------------|-----------------------|-------------|-----------------|--------------------------|-----------------------|-------------|
| 29.000                | 39.700               | 3.0                  | 1                              | 28.8           | 9.6                   | -12.9       | 0.8             | 26.3                     | 40.0                  | -13.7       |
| 39.500                | 50.200               | 3.0                  | 1                              | 31.0           | 11.0                  | -12.9       | 0.8             | 29.9                     | 40.0                  | -10.1       |
| 54.000                | 64.700               | 3.0                  | 1                              | 31.8           | 9.4                   | -12.9       | 1.2             | 29.5                     | 40.0                  | -10.5       |
| 108.000               | 118.700              | 3.0                  | 1                              | 25.6           | 14.3                  | -12.9       | 2.1             | 29.1                     | 43.5                  | -14.4       |
| 122.500               | 133.200              | 3.0                  | 1                              | 31.1           | 12.6                  | -13.0       | 2.2             | 32.9                     | 43.5                  | -10.6       |
| 136.975               | 147.675              | 3.0                  | 1                              | 28.3           | 12.6                  | -13.0       | 2.2             | 30.1                     | 43.5                  | -13.4       |
| 137.000               | 126.300              | 3.0                  | 1                              | 29.6           | 12.7                  | -13.0       | 2.2             | 31.5                     | 43.5                  | -12.0       |
| 154.000               | 143.300              | 3.0                  | 1                              | 30.2           | 12.4                  | -13.0       | 2.2             | 31.8                     | 43.5                  | -11.7       |
| 174.000               | 163.300              | 3.0                  | 1                              | 26.7           | 15.5                  | -13.1       | 2.3             | 31.3                     | 43.5                  | -12.2       |
| 380.000               | 123.100              | 3.0                  | 1                              | 28.2           | 13.3                  | -12.9       | 2.1             | 30.7                     | 43.5                  | -12.8       |
| 440.000               | 143.100              | 3.0                  | 1                              | 30.5           | 12.4                  | -13.0       | 2.2             | 32.1                     | 43.5                  | -11.4       |
| 512.000               | 167.100              | 3.0                  | 1                              | 28.4           | 15.6                  | -13.1       | 2.3             | 33.2                     | 43.5                  | -10.3       |

**Note:** Negative signs (-) in the Margin column signify levels below the limit.  
 Readings followed by a '\*' are quasi-peak measurements.

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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 14.3 dB

20 Jul 1998 17:17:40

EMISSION LEVEL [ dBuV]

100

80

60

40

20

.45

1

10

30

FREQUENCY [MHz]

FCC, Pt 15 - AC LINE CONDUCTED  
GENERAL RESEARCH OF ELECTRONICS  
PORTABLE SCANNING RECEIVER  
MODEL: 20-312 (PRO-75)  
☒ HOT, ☐ NEUTRAL, 120V

20 Jul 1998 17:25:21

EMISSION LEVEL [ dBuV]

100

80

60

40

20

.45

1

10

30

FREQUENCY [MHz]

FCC, Pt 15 - AC LINE CONDUCTED  
GENERAL RESEARCH OF ELECTRONICS  
PORTABLE SCANNING RECEIVER  
MODEL: 20-312 (PRO-75)  
☐ HOT, ☒ NEUTRAL, 120V

\*\*\*\*\*  
20 JUL 1990 17:17:40  
\*\*\*\*\*

3. FCC CFR 47, Pt 15

3.1 FCC, Pt 15 - AC LINE CONDUCTED

\*\*\*\*\*  
GENERAL RESEARCH OF ELECTRONICS  
PORTABLE SCANNING RECEIVER  
MODEL: 20-31C (FRQ-T5)  
(X) HOT, ( ) NEUTRAL, 120V

PEAKS FOUND ABOVE 33 UBVV

| PEAK# | FREQ (MHz) | AMPL (UBVV) |
|-------|------------|-------------|
| 1     | .8438      | 33.0        |
| 2     | .8537      | 33.0        |
| 3     | .8611      | 33.0        |
| 4     | 8.980      | 33.2        |
| 5     | 8.705      | 33.0        |
| 6     | 20.22      | 73.1        |

\*\*\*\*\*  
20 JUL 1990 17:25:21  
\*\*\*\*\*

3. FCC CFR 47, Pt 15

3.1 FCC, Pt 15 - AC LINE CONDUCTED

\*\*\*\*\*  
GENERAL RESEARCH OF ELECTRONICS  
PORTABLE SCANNING RECEIVER  
MODEL: 20-31C (FRQ-T5)  
( ) HOT, (X) NEUTRAL, 120V

PEAKS FOUND ABOVE 33 UBVV

| PEAK# | FREQ (MHz) | AMPL (UBVV) |
|-------|------------|-------------|
| 1     | .8661      | 33.1        |
| 2     | .8184      | 33.0        |
| 3     | 1.184      | 33.0        |

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### 5.0 Antenna Requirement

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

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### 6.0 **Equipment Photographs**

Photographs of the EUT are attached.