

APPLICATION FOR FCC CERTIFICATION

Radio Shack, A Division of Tandy Corporation

Scanning Receiver

Model: 20-421 (Pro-2015)

FCC ID: AAO2000421

Job # J98022640

Number of Pages: 19

Date of Report: August 20, 1998

FCC Part 15 Scanning Rx Cert, Ver 3/97
k:\..l\fcc\scanrx.cer

Intertek Testing Services NA Inc.

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Intertek Testing Services

Radio Shack, A Division of Tandy Corporation, Scanning Receiver
FCC ID: AAO2000421

Date of Test: August 7, 1998

Table of Contents

AUTHORIZATION LETTER	1
ATTESTATION LETTER TO FCC §15.121	3
TEST REPORT	4
0.0 Summary of test Results	4
1.0 General Description	5
1.1 Product Description	5
1.2 Related Submittal(s) Grants	5
1.3 Test Methodology	5
1.4 Test Facility	5
2.0 System Test Configuration	6
2.1 Justification	6
2.2 EUT Exercising Software	6
2.3 Support Equipment List and Description	7
2.4 Equipment Modification	7
3.0 Emission Results	8
3.1 Field Strength Calculation	9
3.2 Radiated Emission Configuration Photograph	10
3.3 Radiated Emission Data	11
3.4 AC conducted Emission Configuration Photograph	12
3.5 Conducted Emission Data	13
5.0 Antenna Requirement	14
6.0 Equipment Photographs	15
7.0 Product Labelling	16
7.1 Label Artwork	16
7.2 Label Location	17
8.0 Technical Specifications	18
8.1 Receiver Block Diagram	18
8.2 Receiver Circuit Diagram	19
9.0 Instruction Manual	20

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Radio Shack, A Division of Tandy Corporation, Scanning Receiver
FCC ID: AAO2000421

Date of Test: August 7, 1998

AUTHORIZATION LETTER

Please see attached page

June 19, 1998

Federal Communications Commission
1919 M Street
Washington, DC 20554-1300

SUBJECT: Limited Agency Agreement

RE: FCC ID# AAO2000421

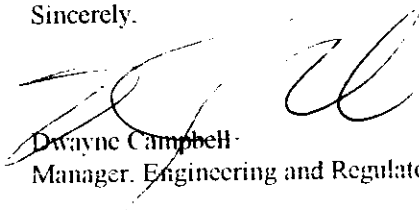
We, RadioShack, A Division of Tandy Corporation, hereby authorize Intertek Testing Services to act as our agent for the purpose of preparing application for FCC ID# AAO2000421 under all applicable parts of the FCC rules and regulations.

The effective date of this limited agency agreement is June 19, 1998. This limited agency agreement expires on December 19, 1998, unless sooner terminated or extended by written notice to the Intertek Testing Services and the Federal Communications Commission.

This is to advise that we are in full compliance with the Anti-Drug Abuse Act. The applicant is not subject to a denial of federal benefits pursuant to Section 5301 of the Anti-Drug Act of 1988, 21 U.S.C. 862, and no party to the application is subject to a denial of federal benefits pursuant to that section.

If you have any questions or comments, please do not hesitate to contact me.

Sincerely,



Dwayne Campbell
Manager, Engineering and Regulatory Affairs

Intertek Testing Services

Radio Shack, A Division of Tandy Corporation, Scanning Receiver
FCC ID: AAO2000421

Date of Test: August 7, 1998

ATTESTATION LETTER TO FCC §15.121

Please see attached page.

Jul. 31, 1998

Federal Communications Commission
Authorization and Evaluation Division
Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046

Ref.: Radio Shack Model 20-421, FCC ID AAO2000421

This is to clarify that the above equipment is not capable of operating within the frequency bands allocated to the Domestic Public Cellular Radio Telecommunications Service, and cannot be readily altered by the user to do so.

The frequencies in question are deleted from the microprocessor ROM during manufacture, and cannot be restored through any readily available process or component such as; installation of cuts, jumper wires, resistors, diodes, or plug-in IC's; deletion of such items; or reprogramming via access codes or external devices such as a personal computer.

The receiver is incapable of converting digital cellular transmission to analog voice audio.

Based on the above, we hereby attest that the equipment in question complies fully with the provisions of §15.121 of FCC Rules.



N. Tomita, Chief Engineer

Intertek Testing Services

Radio Shack, A Division of Tandy Corporation, Scanning Receiver
FCC ID: AAO2000421

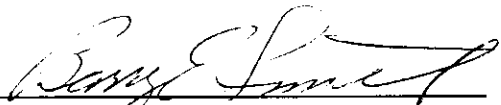
Date of Test: August 7, 1998

TEST REPORT

0.0 Summary of Test Results

Radio Shack, A Division of Tandy Corporation - Model: 20-421 (Pro-2015)
FCC ID: AAO2000421

TEST	REFERENCE	RESULTS
Radiated Emission	15.109	Complies
Conducted Emission	15.107	Complies

Test Engineer:  Date: 8/21/98
Barry Smith

EMC Site Mgr:  Date: 8/26/98
David Chernomordik

Intertek Testing Services

Radio Shack, A Division of Tandy Corporation, Scanning Receiver
FCC ID: AAO2000421

Date of Test: August 7, 1998

1.0 General Description

1.1 Product Description

The General Research of Electronics, Inc. Model No.: 20-421 (Pro-2015) is a scanning receiver.

Please refer to the attached users manual for more details.

A pre-production version of the sample was received on August 7, 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 1. This test facility and site measurement data have been fully placed on file with the FCC.

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Radio Shack, A Division of Tandy Corporation, Scanning Receiver
FCC ID: AAO2000421

Date of Test: August 7, 1998

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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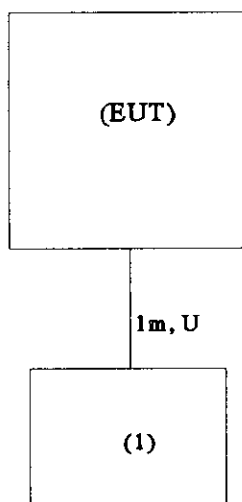
Radio Shack, A Division of Tandy Corporation, Scanning Receiver
FCC ID: AAO2000421

Date of Test: August 7, 1998

2.3 Support Equipment List and Description

Item #	Description	Model No.	Serial No.	FCC ID
1	Radio Shack Power Adapter	20-421	N/A	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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Radio Shack, A Division of Tandy Corporation, Scanning Receiver
FCC ID: AAO2000421

Date of Test: August 7, 1998

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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Radio Shack, A Division of Tandy Corporation, Scanning Receiver
FCC ID: AAO2000421

Date of Test: August 7, 1998

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 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 $\text{dB}\mu\text{V/m}$
- RR = RA - AG in $\text{dB}\mu\text{V}$
- LF = CF + AF + DF in dB

Assume a receiver reading of $52.0 \text{ dB}\mu\text{V}$ is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 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 dB
AF = 7.4 dB	RR = $23.0 \text{ dB}\mu\text{V}$
CF = 1.6 dB	LF = 9.0 dB
AG = 29.0 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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Radio Shack, A Division of Tandy Corporation, Scanning Receiver
FCC ID: AAO2000421

Date of Test: August 7, 1998

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 8.3 dB

Radiated Emissions Test Data

Company: GRE America
EUT: Portable scanner
Project #: J98022640
Test Mode: Receiving on designated frequency

Model #: 20-421 AKA PRO-2015
S/N or FCC# AA02000421 S/N 000007
Engineer: BS
Date of Test: 08/07/98 Initial:

	Antenna	Pre-Amp	Cable A	Cable B	OCF
Number:	2	1	2		
Model:	EMCO 314	HP 8447D	RG214	None	None

Standard_	FCC Part 15B
Limits_	2
Test Distance_	3 meters

Tuned Freq	L.O. Freq	Reading	Det.	Ant. Pol.	nt. Facto	Pre-Amp	sert. Lo	D. F.	Net	Limit @3m	Margin
MHz	MHz	dB(uV)	P/A/Q	H/V	dB(1/m)	dB	dB	dB	dB(uV/m)	dB(uV/m)	dB
29	39.7	35.9	p	v	8.1	27.2	0.2	0.0	17.0	40.0	-23.0
39.5	50.2	41.6	p	v	6.5	27.1	0.3	0.0	21.3	40.0	-18.7
54	64.7	45.2	p	v	6.9	27.0	0.3	0.0	25.4	40.0	-14.6
108	118.7	44.0	p	v	6.9	27.1	0.5	0.0	24.3	43.5	-19.2
122.5	133.2	33.0	p	v	8.2	27.1	0.6	0.0	14.7	43.5	-28.8
136.975	147.675	41.1	p	h	10.0	27.0	0.6	0.0	24.7	43.5	-18.8
137	126.3	43.5	p	v	7.7	27.1	0.6	0.0	24.7	43.5	-18.8
154	143.3	43.9	p	v	9.2	27.0	0.6	0.0	26.7	43.5	-16.8
173.6	162.9	37.0	p	v	9.3	27.0	0.7	0.0	20.0	43.5	-23.5
380	123.1	36.8	p	v	7.1	27.1	0.5	0.0	17.1	43.5	-26.4
440	143.1	52.4	p	v	9.2	27.0	0.6	0.0	35.2	43.5	-8.3
512	167.1	48.3	p	v	9.4	27.0	0.7	0.0	31.4	43.5	-12.1

Notes: a) P: Peak; A: Average; Q: Quasi Peak; H: Horizontal; V: Vertical; OCF: Other Correction Factor; DF: Distance Factor
b) Insert. Loss = Cable A + Cable B + OCF.
c) Negative signs (-) in Margin column signify levels below the limits.
d) All other emissions not reported are below the equipment noise floor which is at least 20 dB below the limits.

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Radio Shack, A Division of Tandy Corporation, Scanning Receiver
FCC ID: AAO2000421

Date of Test: August 7, 1998

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 13.2 dB

hp

EMISSION LEVEL [dBUV]

7 Aug 1998 09:22:45

100

80

60

40

20

.45

1

10

30

FCC, Pt 15 - AC LINE CONDUCTED
GRE AMERICA
PORTABLE SCANNER
MODEL 20-421
☐ LINE ☒ NEUTRAL

CLASS A

CLASS B

FREQUENCY [MHz]

hp

7 Aug 1998 08:46:31

EMISSION LEVEL [dBuV]

100

80

60

40

20

.45

1

10

30

FCC, Pt 15 - AC LINE CONDUCTED
GRE AMERICA
PORTABLE SCANNER
MODEL 20-421
☒ LINE ☐ NEUTRAL

CLASS A

CLASS B

FREQUENCY [MHz]

=====

7 Aug 1998 08:46:31

=====

3. FCC OFR 47, Pt 15

3.1 FCC, Pt 15 - AC LINE CONDUCTED

=====

GRE AMERICA

PORTABLE SCANNER

MODEL 20-421

[X] LINE [] NEUTRAL

PEAKS FOUND ABOVE 33 dBuV

PEAK#	FREQ (MHz)	AMPL (dBuV)
1	1.142	33.0
2	2.441	33.2
3	3.987	33.2
4	6.221	33.1
5	7.265	33.2
6	17.91	33.4

=====

7 Aug 1998 09:22:45

=====

3. FCC OFR 47, Pt 15

3.1 FCC, Pt 15 - AC LINE CONDUCTED

=====

GRE AMERICA

PORTABLE SCANNER

MODEL 20-421

[] LINE [X] NEUTRAL

PEAKS FOUND ABOVE 33 dBuV

PEAK#	FREQ (MHz)	AMPL (dBuV)
1	.5082	33.4
2	.8842	33.4
3	1.216	33.1
4	1.598	33.2
5	7.545	33.0
6	9.424	33.0
7	9.994	33.1
8	11.53	33.2
9	18.83	33.2
10	20.74	33.8
11	23.03	33.4

Intertek Testing Services

Radio Shack, A Division of Tandy Corporation, Scanning Receiver
FCC ID: AAO2000421

Date of Test: August 7, 1998

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.

Intertek Testing Services

Radio Shack, A Division of Tandy Corporation, Scanning Receiver
FCC ID: AAO2000421

Date of Test: August 7, 1998

6.0 **Equipment Photographs**

Photographs of the EUT are attached.