GENERAL RESEARCH OF ELECTRONICS, INC.

Phone: +813-5439-3611
Fax: +813-5439-3644

SHIBA NO.3 AMEREX BLDG.
12-17 MITA 3-CHOME, MINATO-KU
TOKYO 108-0073, JAPAN

Apr. 2, 2001

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

Ref.: Radio shack Model 20-466, FCC ID: AAO2000466

This is to clarify that the above equipment is incapable of operating (tuning) or readily being altered by the user to operate, within the frequency bands to the Cellular Radiotelephone Service.

The frequencies in question are deleted from the 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 transmissions to analog voice audio.

Assessing the vulnerability of the receiver to possible modification

The receive has the possibility of reducing the threshold value to discern transmissions from the Cellular Radiotelephone Service by making modification such as adding jumper wire to the RF band pass filters.

Design features that prevent modification of the receiver to receive Cellular Service

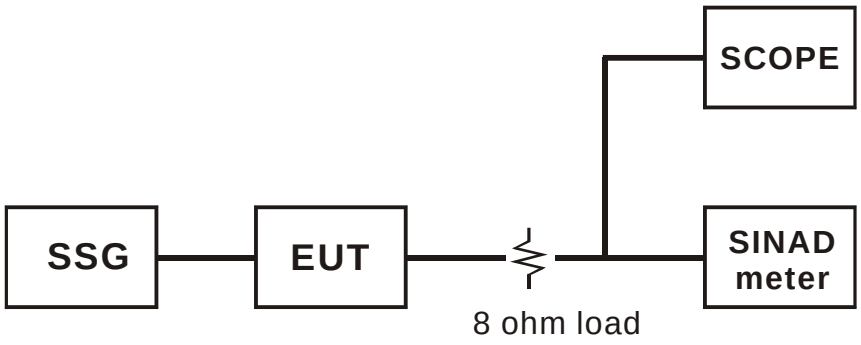
The scanning receiver is designed to prevent any attempt for the user to modify the receiver to receive transmissions from the Cellular Radiotelephone Service by using epoxy to cover the required parts of the RF circuitry including control circuits and band pass filters.

Testing method used to determine compliance with the 38 dB rejection ratio

Testing method

The 12 dB SINAD measurement method in the Cellular Radiotelephone Service used for frequencies that the receiver tunes and the signal rejection ratio gained by the measurement.

Equipment Setup Block Diagram



Measurement method

Tune the receiver to the received frequency and outputs the receiving frequency from SG to obtain its 12 dB SINAD. Then output the interference frequency to obtain its 12 dB SINAD. The signal rejection ratio is the ratio between these two SSG output levels.

The scanning receiver prevents transmissions more than 38 dB from the Cellular Radiotelephone Service from being received for the following reasons:

1. The image frequencies in the frequency range from 25 MHz to 512 MHz are shown as follows:

   FR = 25 to 54 MHz, 108 to 174 MHz, 216.0025 to 225 MHz, 406 to 512 MHz

   IMAGE FREQ. = FR + 1^{st} IF x 2

   1^{st} IF = 1^{st} Local – FR

   1^{st} Local = A x 0.075

   A = (FR + 380.8)/0.075

   = A.xxx (Cut away decimal)

   (25 to 54) + (1^{st} IF x 2) = 786.5 to 815.55 MHz ..... IMAGE FREQ.

   (132.4125 to 174) + (1^{st} IF x 2) = 893.8875 to 935.55 MHz ..... IMAGE FREQ.

   (216.0025 to 225) + (1^{st} IF x 2) = 977.5475 to 986.55 MHz ..... IMAGE FREQ.

   (406 to 512) + (1^{st} IF x 2) = 1167.5 to 1273.6 MHz ..... IMAGE FREQ.

These image frequencies are not included within the Cellular Radiotelephone Service Frequency Band except as follows.

(108 to 132.4875) + (1st IF x 2) = 869.550 to 893.9625 MHz ..... IMAGE FREQ.

Test Results 108 to 132.4875 MHz

Frequency range (MHz)	Cellular frequency range included (MHz)	Received frequency (MHz)	Interference frequency (MHz)	Signal rejection ratio (MHz)	Equation for interference frequency reception (MHz)
108.000 to 132.4875	869.550 to 893.9625	108.000 124.000 132.4875	869.550 885.500 893.9625	50 47 46	FR + (IF x 2) = 869.550 FR + (IF x 2) = 885.500 FR + (IF x 2) = 893.9625

The above test results indicate that all the signal rejection ratios for the Cellular Radiotelephone Frequency Service Band are higher than 38 dB.

2. The image frequencies in the frequency range from 806 to 1300 MHz are shown as follows:

FR = 806 to 823.9875 MHz, 849 to 868.9875 MHz, 894 to 960 MHz, 1240 to 1300 MHz

IMAGE FREQ. = FR – 1st IF x 2

1st IF = FR – 1st Local

1st Local = A x 0.075

A = (FR – 380.8)/0.075

= A.xxx (Cut away decimal)

(806 to 823.9875) – (1st IF x 2) = 44.35 to 62.3625 MHz ..... IMAGE FREQ.

(849 to 868.9875) – (1st IF x 2) = 87.3 to 107.3625 MHz ..... IMAGE FREQ.

(894 to 960) – (1st IF x 2) = 132.3 to 198.3 MHz ..... IMAGE FREQ.

(1240 to 1300) – (1st IF x 2) = 478.4 to 538.4 MHz ..... IMAGE FREQ.

These image frequencies are not included within the Cellular Radiotelephone Service Frequency Band.

3. Other rejection results

Test Results (1)

Frequency range (MHz)	Cellular frequency range included (MHz)	Received frequency (MHz)	Interference frequency (MHz)	Signal rejection ratio (dB)	Equation for interference frequency reception (MHz)
25.000 to 29.145 35.825 to 44.145	836.500 to 848.895 869.075 to 893.895	25.000 to 29.145 35.825 to 40.000 44.145	836.500 to 848.895 869.075 881.500 893.895	74 70 65 64 64	1^{st} Lo x 3 – 1^{st} IF = 836.500 to 1^{st} Lo x 3 – 1^{st} IF = 848.895 1^{st} Lo x 3 – 1^{st} IF = 869.075 1^{st} Lo x 3 – 1^{st} IF = 881.500 1^{st} Lo x 3 – 1^{st} IF = 893.895
221.6025 to 225.000	824.0025 to 830.775	221.6025 to 225.000	824.0025 to 830.775	69 68	1^{st} Lo x 2 – 1^{st} IF = 824.000 to 1^{st} Lo x 2 – 1^{st} IF = 830.775

1^{st} IF = 1^{st} Local – FR
1^{st} Local = A x 0.075
A = (FR + 380.8)/0.075
= A.xxx (Cut away decimal)

Test Results (2)

Frequency range (MHz)	Cellular frequency range included (MHz)	Received frequency (MHz)	Interference frequency (MHz)	Signal rejection ratio (dB)	Equation for interference frequency reception (MHz)
849.000 to 859.6875	838.300 to 848.9875	849.000 to 859.6875	838.300 to 848.9875	80 80	{(FR x 2) – 2^{nd} IF}/2 = 838.300 to {(FR x 2) – 2^{nd} IF}/2 = 838.9875
866.800 to 868.9875	824.000 to 826.1875	866.800 to 868.9875	824.000 to 826.1875	51 51	FR + (2^{nd} IF x 2) = 824.000 to FR + (2^{nd} IF x 2) = 826.1875
894.000 to 904.6875	883.300 to 893.9875	894.000 to 904.6875	883.300 to 893.9875	81 81	{(FR x 2) – 2^{nd} IF}/2 = 883.300 to {(FR x 2) – 2^{nd} IF}/2 = 893.9875
911.800 to 936.7875	869.000 to 893.9875	911.800 920.000 936.7875	869.000 877.200 893.9875	51 51 51	FR + (2^{nd} IF x 2) = 869.000 FR + (2^{nd} IF x 2) = 877.200 FR + (2^{nd} IF x 2) = 893.9875

The above test results indicate that all the signal rejection ratios for the Cellular Radiotelephone Service Frequency Band are higher than 38 dB.

LOCAL OSC FREQUENCY CALCULATION

Receiving band (FR step)	Freq. step (kHz)	Receiving freq. FR (MHz)	1st Local PLL 1/ VCO 1 or VCO 2 (MHz)	2nd Local PLL 2/VCO 3 (MHz)	3rd Local X'tal (MHz)
VHF Low	5.0	25.0000 – 54.0000	A = (FR + 380.800)/0.075	2nd Local = 1st IF – 21.4	20.9450
VHF High	12.5	108.0000 – 136.9875	= A.xxx (Cut away decimal)	2nd Local = 1st IF – 21.4	20.9450
	5.0	137.0000 – 150.7750	1st Local = A x 0.075	2nd Local = 1st IF – 21.4	20.9450
	7.5	150.7825 – 150.8125	1st IF = 1st Local – FR	2nd Local = 1st IF – 21.4025	20.9475
	7.5	150.8150 – 154.4525		2nd Local = 1st IF – 21.4	20.9450
	7.5	154.45625 – 154.47875		2nd Local = 1st IF – 21.4	20.9450
	7.5	154.4825 – 154.5050		2nd Local = 1st IF – 21.4	20.9450
	5.0	154.5100 – 154.5250		2nd Local = 1st IF – 21.4	20.9450
	6.25	154.52750 – 154.54625		2nd Local = 1st IF – 21.3975	20.9425
	7.5	154.5475 – 154.6075		2nd Local = 1st IF – 21.4025	20.9475
	5.0	154.6100 – 154.6550		2nd Local = 1st IF – 21.4	20.9450
	7.5	154.6575 – 156.2475		2nd Local = 1st IF – 21.3975	20.9425
	5.0	156.2500 – 157.4750		2nd Local = 1st IF – 21.4	20.9450
	7.5	157.4775 – 161.5650		2nd Local = 1st IF – 21.3975	20.9425
	5.0	161.5700 – 173.2000		2nd Local = 1st IF – 21.4	20.9450
	6.25	173.20375 – 173.22250		2nd Local = 1st IF – 21.4025	20.9475
	6.25	173.22500 – 173.38750		2nd Local = 1st IF – 21.4	20.9450
	6.25	173.39000 – 173.41500		2nd Local = 1st IF – 21.3975	20.9425
	5.0	173.4200 – 174.0000		2nd Local = 1st IF – 21.4	20.9450
	5.0	216.0025 – 221.9975		2nd Local = 1st IF – 21.4025	20.9475
	5.0	222.0000 – 225.0000		2nd Local = 1st IF – 21.4	20.9450
UHF Low	6.25	406.0000 – 512.0000		2nd Local = 1st IF – 21.4	20.9450
UHF High	6.25	806.0000 – 823.9875	A = (FR – 380.800)/0.075	2nd Local = 1st IF – 21.4	20.9450
	6.25	849.0000 – 868.9875	= A.xxx (Cut away decimal)	2nd Local = 1st IF – 21.4	20.9450
	6.25	894.0000 – 960.0000	1st Local = A x 0.075	2nd Local = 1st IF – 21.4	20.9450
	6.25	1240.0000 – 1300.0000	1st IF = FR – 1st Local	2nd Local = 1st IF – 21.4	20.9450

RF DENOTES Frequency received

IF FREQUENCY

1st IF: 380.7300 – 380.850 MHz

2nd IF: 21.3975 MHz/21.4000 MHz/21.4025 MHz

3rd IF: 455 kHz

Label Requirement

The scanning receiver has a label affixed to the product shown on the attached drawing of the model label, which reads as follows:

> WARNING: MODIFICATION OF THIS DEVICE TO RECEIVE CELLULAR RADIOTELEPHONE SERVICE SIGNALS IS PROHIBITED UNDER FCC RULES AND FEDERAL LAW.

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

M. Ishizuka

M. Ishizuka, Chief Engineer