



# GENERAL RESEARCH OF ELECTRONICS, INC.

Phone: +813-5439-3611

Fax: +813-5439-3644

SHIBA NO.3 AMEREX BLDG.

3-12-17 MITA, MINATO-KU

TOKYO 108-0073, JAPAN

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

Ref.: Radio Shack Model 20-196, FCC ID: AAO2000196:

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 receiver 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 bandpass 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 bandpass filters.

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

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 29 MHz to 512 MHz are shown as follows:

## **PRODUCT DEVELOPMENT & MANUFACTURING**

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FR = 29 to 54 MHz, 108 to 174 MHz, 380 to 512 MHz

IF = 257.5 MHz

FR + 2 x IF = IMAGE FREQ.

(29 to 54) + (2 x 257.5) = 544 to 569 MHz ..... IMAGE FREQ.

(108 to 174) + (2 x 257.5) = 623 to 689 MHz ..... IMAGE FREQ.

(380 to 512) + (2 x 257.5) = 895 to 1027 MHz ..... IMAGE FREQ.

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

2. The image frequencies in the frequency range from 806 to 811 MHz are shown as follows:

FR = 806 to 811 MHz

IF = 254 MHz

FR - 2 x IF = IMAGE FREQ.

(806 to 811) - (2 x 254) = 298 to 303 MHz ..... IMAGE FREQ.

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

3. The image frequencies in the frequency range from 811.0125 to 820.7375 MHz, 849 to 868.9875 MHz, and 894 to 960 MHz are shown as follows:

FR = 811.0125 to 820.7375 MHz, 849 to 868.9875 MHz, 894 to 960 MHz

IF = 257.5 MHz

FR - 2 x IF = IMAGE FREQ.

(811.0125 to 820.7375) - (2 x 257.5) = 296.0125 to 305.7375 MHz ..... IMAGE FREQ.

(849 to 868.9875) - (2 x 257.5) = 334 to 353.9875 MHz ..... IMAGE FREQ.

(894 to 960) - (2 x 257.5) = 379 to 445 MHz ..... IMAGE FREQ.

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

4. The image frequencies in the frequency range from 820.75 to 823.9875 MHz are shown as follows:

FR = 820.75 to 823.9875 MHz

IF = 260 MHz

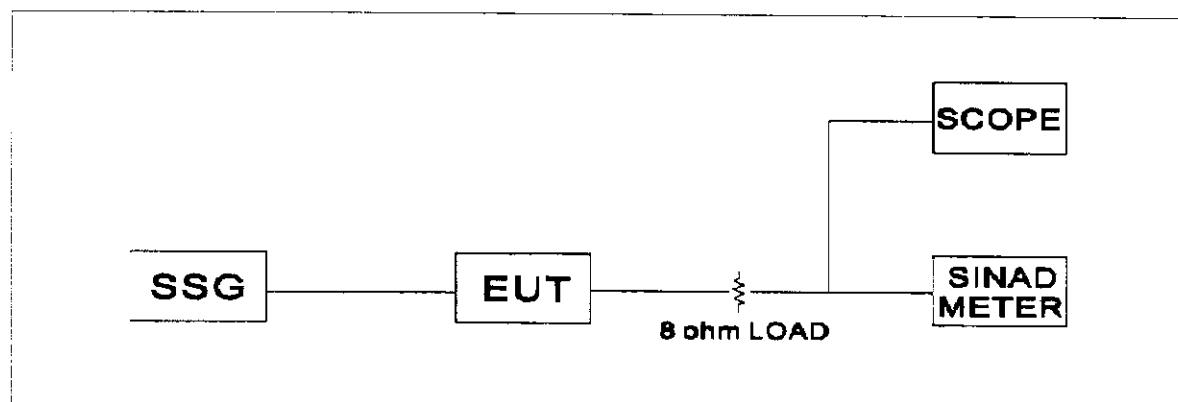
FR - 2 x IF = IMAGE FREQ.

(820.75 to 823.9875) - (2 x 260) = 300.75 to 303.9875 MHz ..... IMAGE FREQ.

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

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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 output 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.

### 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)   |
|--------------------------|---|-------------------------------|-------------------------------|-----------------------------|---|
| 29.000<br>to<br>38.250   | 830.500<br>to<br>849.000                | 29.000<br>34.000<br>38.250    | 830.500<br>840.500<br>849.000 | 68<br>70<br>69              | $1^{st} LO \times 2 + IF = 830.500$<br>$1^{st} LO \times 2 + IF = 840.500$<br>$1^{st} LO \times 2 + IF = 849.000$ |
| 48.250<br>to<br>54.000   | 869.000<br>to<br>880.500                | 48.250<br>51.000<br>54.000    | 869.000<br>874.500<br>880.500 | 68<br>68<br>68              | $1^{st} LO \times 2 + IF = 869.000$<br>$1^{st} LO \times 2 + IF = 874.500$<br>$1^{st} LO \times 2 + IF = 880.500$ |
| 108.000<br>to<br>111.300 | 839.000<br>to<br>848.900                | 108.000<br>110.000<br>111.300 | 839.000<br>845.000<br>848.900 | 76<br>76<br>77              | $1^{st} LO \times 2 + FR = 839.000$<br>$1^{st} LO \times 2 + FR = 845.000$<br>$1^{st} LO \times 2 + FR = 848.900$ |
| 118.000<br>to<br>126.300 | 869.000<br>to<br>893.900                | 118.000<br>122.000<br>126.300 | 869.000<br>881.000<br>893.900 | 82<br>80<br>73              | $1^{st} LO \times 2 + FR = 869.000$<br>$1^{st} LO \times 2 + FR = 881.000$<br>$1^{st} LO \times 2 + FR = 893.900$ |
| 29.000<br>to<br>30.375   | 888.500<br>to<br>894.000                | 29.000<br>-----<br>30.375     | 888.500<br>-----<br>894.000   | 68<br>-----<br>70           | $1^{st} LO \times 4 + FR = 888.500$<br>-----<br>$1^{st} LO \times 4 + FR = 894.000$                               |

IF = 257.500 MHz

FR = received frequency

$1^{st} LO = FR + IF$

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## 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)              |
|-----------------------|---|--------------------------|------------------------------|-----------------------------|--|
| 952.7500              | 824.0000                                | 952.7500                 | 824.0000                     | 49                          | $FR - 1^{st} IF/2 = 824.0000$                                    |
| to                    | to                                      | 956.0000                 | 827.2500                     | 49                          | $FR - 1^{st} IF/2 = 827.2500$                                    |
| 960.0000              | 831.2500                                | 960.0000                 | 831.2500                     | 48                          | $FR - 1^{st} IF/2 = 831.2500$                                    |
| 819.6500              | 824.0000                                | 819.6500                 | 824.0000                     | 64                          | $1^{st} LO \times 2 - 2^{nd} LO - 2^{nd} IF = 824.0000$          |
| to                    | to                                      | -----                    | -----                        | -----                       | -----  |
| 820.7375              | 826.1750                                | 820.7375                 | 826.1750                     | 66                          | $1^{st} LO \times 2 - 2^{nd} LO - 2^{nd} IF = 826.1750$          |
| 849.0000              | 882.7000                                | 849.0000                 | 882.7000                     | 66                          | $1^{st} LO \times 2 - 2^{nd} LO - 2^{nd} IF = 882.7000$          |
| to                    | to                                      | 852.0000                 | 888.7000                     | 65                          | $1^{st} LO \times 2 - 2^{nd} LO - 2^{nd} IF = 888.7000$          |
| 854.6500              | 894.0000                                | 854.6500                 | 894.0000                     | 66                          | $1^{st} LO \times 2 - 2^{nd} LO - 2^{nd} IF = 894.0000$          |
| 937.7000              | 824.0000                                | 937.7000                 | 824.0000                     | 57                          | $1^{st} LO \times 2 - 2^{nd} LO \times 2 + 2^{nd} IF = 824.0000$ |
| to                    | to                                      | 944.0000                 | 836.6000                     | 56                          | $1^{st} LO \times 2 - 2^{nd} LO \times 2 + 2^{nd} IF = 836.6000$ |
| 950.2000              | 849.0000                                | 950.2000                 | 849.0000                     | 55                          | $1^{st} LO \times 2 - 2^{nd} LO \times 2 + 2^{nd} IF = 849.0000$ |

$1^{st} IF = 257.500 \text{ MHz}$

$2^{nd} IF = 21.400 \text{ MHz}$

$FR = \text{received frequency}$

$1^{st} LO = FR - 1^{st} IF$

$2^{nd} LO = 1^{st} IF + 2^{nd} IF$

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

## 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