

Model 5112  
Multi-Carrier Signal Generator  
User Operation Manual



|          |              |
|----------|--------------|
| Revision | 2.6          |
| Date     | May 22, 2018 |

## Table of Contents

|   |          |
|---|----------|
| <b>1 INTRODUCTION.....</b>                        | <b>3</b> |
| 1.1 Symbols Used.....                             | 3        |
| 1.2 Safety Instructions.....                      | 3        |
| <b>2 OPERATING INSTRUCTIONS.....</b>              | <b>4</b> |
| 2.1 Front Panel.....                              | 4        |
| 2.2 Rear Panel.....                               | 5        |
| 2.3 AC Operation.....                             | 5        |
| 2.4 Operating Conditions.....                     | 6        |
| 2.5 Water Ingress and Mounting.....               | 6        |
| <b>3 SYSTEM CARRIER-TO-NOISE MEASUREMENT.....</b> | <b>7</b> |
| <b>4 SERVICING INSTRUCTIONS.....</b>              | <b>8</b> |
| 4.1 Battery Replacement.....                      | 8        |
| <b>5 SPECIFICATIONS.....</b>                      | <b>9</b> |

## 1 INTRODUCTION

The Model 5112 generates RF continuous wave signals for use as reference signals when aligning 2-Way CATV forward and return bands. This fully portable, battery-powered unit may be configured with one to four RF carriers. Up to six carriers may be used when all carriers are less than 180 MHz. Each carrier may be activated individually or simultaneously. The optional built-in attenuator provides up to 70 dB of carrier amplitude range. The compact design allows convenient return alignment in conjunction with forward sweep or rough balance efforts. With spectral purity of at least 60 dBc, the carriers may also be used for hum and noise evaluation tests. The unit will operate continuously for multiple hours, longer with low frequency carriers. It is enclosed in a rugged, portable case.

### 1.1 Symbols Used

The following symbols are used in this manual and/or marked on the instrument.



Hazardous areas on the instrument are marked with this symbol. Consult this manual to learn the nature of the hazard and proper actions for safe operation.



Indicates an earth ground terminal.



Indicates possibility of electric shock.



Indicates a protective conductor terminal

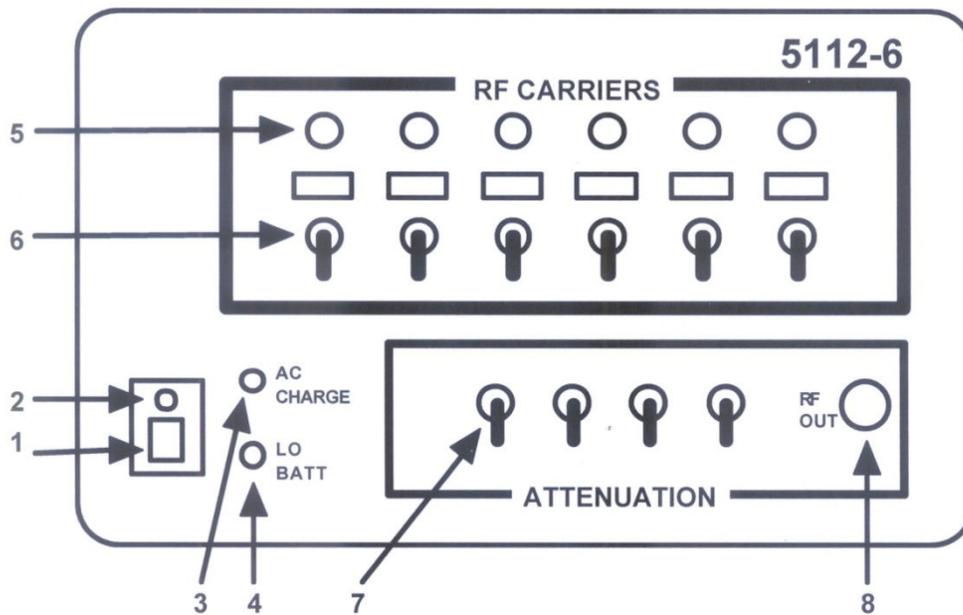
### 1.2 Safety Instructions

- Read and follow all instructions in this manual.
- Risk of electrical shock exists if the unit is opened when AC is connected.
- Unplug and turn unit off before cleaning. Clean with a dry cloth only.
- Use only the cord supplied with the unit or an equivalent cord rated for at least 1.5 Amps and containing a protective earth ground conductor.
- Servicing should be done by qualified service technicians only.
- Use of the instrument in a manner not consistent with the instructions in this manual may impair the safety features and lead to damage or injury.

## 2 OPERATING INSTRUCTIONS

This section provides the instructions and information necessary to connect and operate the Model 5112 Multi-Carrier Signal Generator. Included are the identification and function of controls, connectors, and indicators. Before turning on the instrument become familiar with the functional components of the unit.

### 2.1 Front Panel



1. Power on-off switch - Three-position switch to apply instrument power. In the center position, instrument power is off. In the upper 'ON AC' position, instrument power is provided from the AC power receptacle. In the lower 'ON DC' position, instrument power is provided from the internal battery pack.
2. Power on indicator LED - LED illuminates when power has been applied to the instrument. This powering may be from either the AC receptacle or the DC battery pack.
3. AC Charge LED - LED illuminates whenever the Model 5112 is connected through the AC receptacle to an AC source. The internal battery will be charged when the AC receptacle is connected to an AC source.
4. Lo Battery LED - LED flashes whenever battery pack is in need of recharging.
5. Ampl Set - Individual carrier amplitude adjustments controls. Each control allows adjustment of at least 13 dB to the associated carrier.
6. Carrier On-Off toggle switches - On - Off controls for individual carriers.
7. Output level attenuator toggle switches - switches allow output level attenuation of all carriers from 0 dB to 70dB in 10 or 20 dB steps.

8. RF out - Female RF output F-connector with replaceable barrel. Connect to the cable system being tested. This port includes a blocking capacitor which will block DC or AC voltage up to 200 Volts. Higher voltages will damage the instrument.

## 2.2 Rear Panel



1. A.C. Cord Attachment - 120/240V 50-60 Hz power attachment receptacle
  - a) Type IEC 60320-1 C-13
  - b) 1.5 amp cord rating (typical AC operating current <100 mAmps)

## 2.3 AC Operation



When operating the instrument from AC power, adhere to these rules:

1. Warning: The appliance coupler is used as the disconnect device. Do not position the instrument so that it is difficult to operate the appliance coupler.
2. Use only the cord supplied with the unit or an equivalent cord rated for at least 1.5 Amps and containing a protective earth ground conductor.
3. Warning: The AC plug shall be connected to a mains socket outlet with a protective earthing connection.

## 2.4 Operating Conditions

This instrument is intended for use under the following environmental conditions. Use outside of these conditions may result in safety hazards, incorrect operation, or damage.

1. Indoor use
2. Altitude  $\leq$  2000 meters
3. Ambient temperature 0 °C to 50 °C
4. Relative humidity  $<80\%$  up to 31 °C,  $<50\%$  at 40 °C
5. AC voltage  $\pm 10\%$  of nominal (some temporary over-voltage tolerated)
6. Transient voltage spikes  $<2500$  Vp
7. Pollution degree 2 or less, non-conductive pollution

## 2.5 Water Ingress and Mounting

Do not set up or use unit where liquids or other conductive materials are used. Ensure that no liquids are spilled into the unit.

If water or other conductive material enters the enclosure, immediately turn off the unit and unplug it. Contact a qualified technician or return the unit to Applied Instruments for repair.

### 3 SYSTEM CARRIER-TO-NOISE MEASUREMENT

Carrier-to-noise ratio is a measurement of a carrier amplitude relative to the noise floor of the transmission system. This noise floor is created by the summation of natural thermal noise (-59.75 dBmV @25C. in a 4 MHz BW) and the noise figure of each active device. Since all the inbound amplifiers "funnel" into the headend, the return portion of a two-way system is the main contribution to the noise floor. This is especially true in block translated systems where a portion of the inbound noise is converted, along with the desired carrier, to the outbound leg.

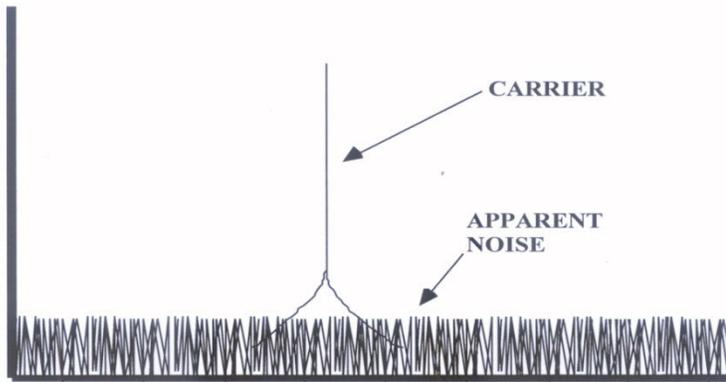


Fig.1: Carrier-to-noise

Figure 1 is a display of a carrier surrounded by broadband noise. The term "apparent" is used as the noise level presentation is typically a factor of the resolution bandwidth of the test receiver. To evaluate the carrier-to-noise ratio, insert a test carrier at the point of origin and adjust to system amplitude.

NOTE: If the test carrier is not at system level, record the difference in dB and add this quantity to the final reading.

Now connect a spectrum analyzer or signal level meter to the system test point.

NOTE: For tap levels below +15 dBmV, the receiver may require pre-amplification to assure "sample noise" levels are significantly above the receiver noise floor.

Tune the receiver to the test carrier frequency and record the level in dBmV. Next, remove the test carrier or tune the receiver about 2 MHz off center frequency. Remove attenuation as needed and assure that the noise level changes 1dB per dB of attenuator change. Read the level of noise and apply bandwidth and other noise correction as described in the receiver manual. Record this level. To obtain the system carrier to noise relationship, subtract the corrected noise level from the recorded signal level of the test carrier. If the test carrier was inserted at a level lower than system level, add this difference to the resultant. Repeat the above process at other frequencies in the spectrum.

## **4 Servicing Instructions**

With normal use, the only servicing of the unit that should be expected is replacement of the battery when it becomes worn out.



**All service should be performed by a qualified technician only.**

WARNING: Risk of shock is present when the cover is removed and AC power is present. Be sure to disconnect from AC before opening unit.

### **4.1 Battery Replacement**

1. Obtain a new battery pack from Applied Instruments. This pack includes a mounting bracket, cable and connector. Only the pack from Applied Instruments should be used to ensure safe operation.
2. Ensure that the unit is OFF and unplugged.
3. Remove the six screws on the sides of the bottom half of the clam shell cover.
4. Carefully remove the bottom half of the clam shell and unplug the battery cable from the circuit board while doing so. The battery pack is attached to the bottom half of the clam shell.
5. Remove the six screws from the bottom of the clam shell half holding the battery pack.
6. Replace the battery pack and reassemble in the reverse order.
7. Test for safe operation.

## 5 SPECIFICATIONS

### Frequency

Frequency Range ..... 5-1218 MHz  
 Frequency Accuracy .....  $\geq 0.01\%$

### Output

Attenuator ..... 0-70 dB in 10 or 20 dB steps  
 Individual Amplitude Adjustment (pot)..... 0-13 dB  
 Amplitude Stability ..... + 0.5 dB/setting  
 Residual Hum .....  $< 0.1\%$   
 Output Impedance ..... 75 Ohm  
 Spectral Purity (spurious & harmonic) .....  $\geq 60$  dBc

|   |     | Frequency (MHz) |          |           |
|---|-----|-----------------|----------|-----------|
|   |     | 5-860           | 861-1000 | 1001-1200 |
| Max output level per carrier (dBmV)               |     |                 |          |           |
| For hardware configurations up to 2 carriers..... | +59 |                 | +57      | +55       |
| For hardware configurations up to 4 carriers..... | +55 |                 | +53      | +51       |
| For hardware configurations up to 6 carriers..... | +52 |                 | +50      | +48       |

### Mechanical

Operating Temperature Range ..... 0-50 Degrees Celsius  
 Power DC ..... Internal Ni-cad Batteries  
 Power AC ..... 120/240V, 50-60 Hz, 1.5A max  
 Battery Life .....  $> 3$  Hours Continuous  
 Size ..... 4" H. x 7.25"W. x 10"D.  
 Weight ..... 8 Pounds

Applied Instruments, Inc  
5230 Elmwood Avenue  
Indianapolis, IN 46203 USA  
<http://www.appliedin.com>

Tel: +1 (317) 782-4331  
Tel (Toll-free within USA): (800) 244-2976  
Fax: +1 (317) 786-9665  
Email: [info@appliedin.com](mailto:info@appliedin.com)