



Advanced Testing Services, Inc.



Users Manual

Advanced Testing MR20

500 kHz - 400 MHz RF Signal Generator

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Introduction

The MR20 from Advanced Testing is an ultra-lightweight and compact RF signal generator capable of outputting 20 independent frequencies from 500 kHz to 400 MHz with 10 Hz frequency resolution. It provides excellent frequency stability and phase noise in a convenient battery or AC powered, hand-held unit that is ideal for field and lab testing of RF systems. The MR20 uses a frequency control chip that is pre-set at the factory for up to 20 customer specified frequencies. Additional frequency control chips may be purchased from Advanced Testing for increased frequency selection. Output frequencies can be selected individually or in pre-set pairs* and output power is controlled with three user selectable attenuation levels set to 0dB, 25dB, and 50dB of attenuation.

Key Features

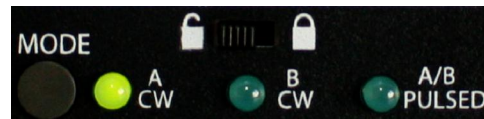
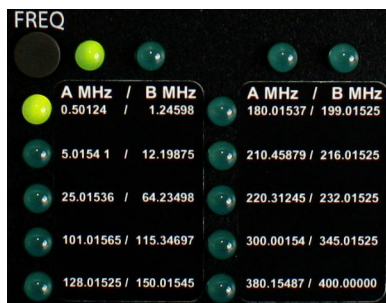
- Easy to use 3 button interface
- 20 Preset Frequencies per Control Chip
- 2 Operating Modes (single or dual frequency)
- 3 Attenuation Levels (0dB, 25dB, 50dB)
- Uses 4AA batteries or AC wall adapter (included)
- 8 hour battery life
- Low battery indicator
- Button lockout switch
- Non-Volatile memory retains current setting on power down/up
- Single board construction for easy conversion to OEM applications
- Frequency stability +/-1ppm
- 100MHz phase noise, -107 dBc/Hz @ 1KHz
- 0dBm +/-1.5 dB output power over frequency range (20dBm output available with OPT10)
- Attenuation accuracy +/-0.25dB

Quick Use Guide

Install 4AA batteries in the back battery compartment and/or use supplied wall adapter to power the device. The MR20 will automatically switch from battery power to wall power and vice versa without any interruption in operation. Turn on the device using rocker switch on top panel. Ensure button lockout switch on front panel is in unlocked position.

Selecting Frequency

Push the <FREQ> button to select the active frequency pair and then push the <MODE> button to select frequency A, B, or A and B pulsed.



Single Frequency Mode

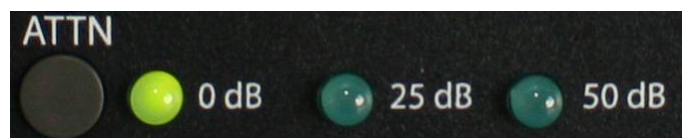
The MR20 is in single frequency mode when the "A CW" or "B CW" LED is lit. Frequency A or B may be selected by pushing the <MODE> button until the desired LED is lit. In this mode the MR20 outputs a continuous wave signal.

Dual Frequency Mode

The MR20 is in dual frequency mode when the "A/B PULSED" LED is lit. Dual frequency mode may be selected by pushing the <MODE> button until the "A/B PULSED" LED is lit. In this mode the MR20 will continuously alternate its output frequency between frequency A and B resulting in a pulsed signal at both frequencies.

Changing Attenuation Level

One of three preset attenuation levels can be set by pushing the <ATTN> button until the LED corresponding to the desired attenuation level is lit.



General Use Guide

Battery Installation

Remove battery compartment cover on back panel and insert 4AA batteries following polarity marks inside battery compartment.



Using AC Adapter

Plug AC adapter into wall outlet and insert DC plug into the DC jack on the left side of the MR20.



The MR20 will automatically switch from battery power to wall power and vice versa without any interruption in operation. The supplied AC adapter supplies 9 Volts at 0.66A, but the MR20 can accept other AC adapters with voltage range 9V - 15V capable of supplying >300mA. The DC jack on the MR20 accepts a mating plug with 2.1mm inside diameter and 5.5mm outside diameter.

Turning MR20 ON

Turn on MR20 using rocker switch on top panel. All lights on front panel will illuminate for one second and then indicate current output configuration.

RF Output

The RF output of the MR20 is located on the top panel and uses a female BNC output connector with 50 Ohm output impedance. This output should be connected to the desired system via a BNC male connector.

Low Battery Indicator

The low battery indicator light will illuminate when the battery level drops below a certain level. Low batteries will not affect the performance of the MR20 and the unit will automatically shut down once the battery level is unable to support operation of the device within the stated performance specifications.



Button Lockout Switch

The button lockout switch located on the front panel disables the <MODE>, <ATTN>, and <FREQ> buttons to eliminate any unwanted output changes caused by inadvertent button presses.



Selecting Frequency

Push the <FREQ> button to select the active frequency pair and then push the <MODE> button to select frequency A, B, or A and B pulsed.



The light above frequency A or B will illuminate to indicate the active frequency in single frequency mode, and both A and B will be lit when dual frequency mode is in use.

Single Frequency Mode

The MR20 is in single frequency mode when the "A CW" or "B CW" LED is lit. Frequency A or B may be selected by pushing the <MODE> button until the desired LED is lit. In this mode the MR20 outputs a continuous wave signal.

Dual Frequency Mode

The MR20 is in dual frequency mode when the "A/B PULSED" LED is lit. Dual frequency mode may be selected by pushing the <MODE> button until the "A/B PULSED" LED is lit. In this mode the MR20 will continuously alternate its output frequency between frequency A and B resulting in a pulsed signal at both frequencies.

In dual frequency mode the average power of the signal at the two frequencies will be approximately 6 dB lower than the average output in single frequency mode. although the average power output (i.e the level that would be read on a spectrum analyzer) is 6dB less than single frequency mode, the peak output power when in dual frequency mode is the same as single frequency mode. For this reason, systems connected to the RF output of the MR20 should have a max peak input power level that is greater than the MR20's single frequency output power, even when being used in dual frequency mode.

Changing Attenuation Level

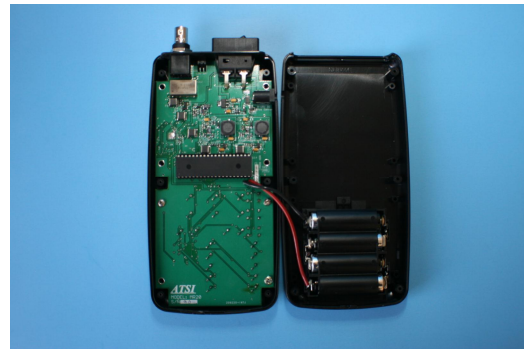
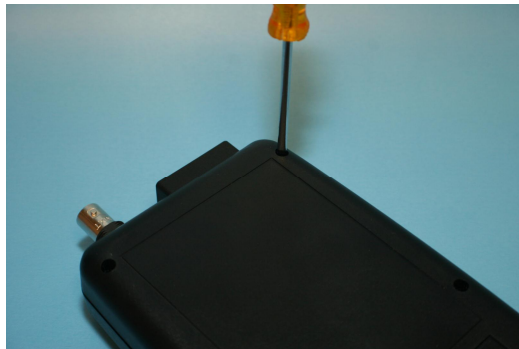
One of three preset attenuation levels can be set by pushing the <ATTN> button until the LED corresponding to the desired attenuation level is lit.



Replacing Frequency Control Chip

The frequency control chip in the MR20 is programmed at the factory with 20 customer specified frequencies. Additional control chips may be purchased from Advanced Testing for added frequency selection and inserted into the MR20 using the following steps.

1. Turn off the MR20 and remove the batteries and AC adapter.
2. Remove the six screws from the back of the MR20 that hold the two sides of the case together and fold open the case like a book.



3. Remove the 40 pin frequency control chip from the socket taking care not to bend the pins of the IC chip. A precision flat head screw driver can be used to gently pry each end of the IC chip out of the socket.



4. Insert the new control chip in the socket making sure the notch on the chip is on the same side as the notch on the socket. Push the IC completely into the socket to ensure it is properly seated.
5. Reassemble the case and the MR20 is ready for use with the new frequencies.