CR-160-R7 Gaussian shaping amplifier evaluation board: application guide

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General Description

The CR-160-R7 is an evaluation board for the CR-200-XX series of Gaussian shaping amplifier modules. The CR-160-R7 makes it easy for the casual experimenter to use the CR-200-XX, providing BNC connectors for input and output, a power supply terminal block, and a socket for the insertion of the CR-200-XX shaping amplifier modules. To provide flexibility in the implementation of the CR-160-R7 within the users' instrumentation, the connectors have been provided unassembled to the CR-160-R7 board.

The CR-160-R7 also includes an adjustable low-noise wide-band amplifier having gains adjustable from 0 to 100. Combined with the CR-200-XX gain of 10 (8 in the case of CR-200-50ns), this allows an overall gain of 0 to 1000. Furthermore, an inverted-polarity signal is available, as well as adjustments for pole-zero correction and DC offset.

The CR-160-R7 also includes a socket for the optional use of the CR-210 baseline restoration module. This module is more fully described at the Cremat web site: **http://cremat.com/CR-210.htm**

The CR-160-R7 board has dimensions: 3.7 inches x 2.3 inches

Gain Adjustment

The fine gain of the on-board amplifier can be continuously adjusted using a small potentiometer placed between the input and output connectors (see diagram to the right). The coarse gain may be adjusted by implementing one, both, or neither of the two separate amplification stages, each of which has a gain of 10 when 'on' (down). When 'off' (up), the gain of the stage is 1. Keep in mind that, in addition to the gain of the amplifiers on the CR-160-R7 evaluation board, the CR-200-XX shaping amplifier module itself has a gain of 10, resulting in an overall gain to the input signal of anything in the range of 0 to 1000.

Installing the CR-200-XX and CR-210 Modules

Make sure that any module installed on the CR-160-R7 board is installed in correct direction! Installing the modules in the opposite direction will result in damage. Connect pin 1 of the modules (marked with a white dot on the label) to the side of the socket marked "1".

Offset Adjustment

The DC offset of the output can be adjusted using the potentiometer which can be located using the diagram on the right.

Signal Polarity

Signal polarity can be changed using one of the 'piano style' switches located between the input and output connectors. See the diagram for the precise location. Switch position of 'on' (down) inverts the signal from the input. If the CR-210 baseline restoration module is being used, the CR-160-R7 output pulses must be positive for the baseline restoration circuit to operate properly. The polarity switch should be used in this case to insure that the output pulse polarity is in fact positive.

Application of Power

The CR-160-R7 requires positive and negative DC power in order to operate. The supply voltage must be in the range from +/- 7 volts to +/- 13 volts. At +/- 12 volts the current draw is 40 mA on both the positive and negative power supplies. This figure includes the current drawn by the installed CR-200-XX module and CR-210 module. If the CR-210 module is not installed, the overall current draw is reduced to 25 mA on the positive and negative supplies.

Output Swing

The output of the CR-160-R7 can swing to up to +4V in the unloaded state, assuming the supply voltages are +/-12V. Generally, the maximum output is 3V less than the supply voltage. Maximum output current is 90 mA. Output impedance is 2 ohms.

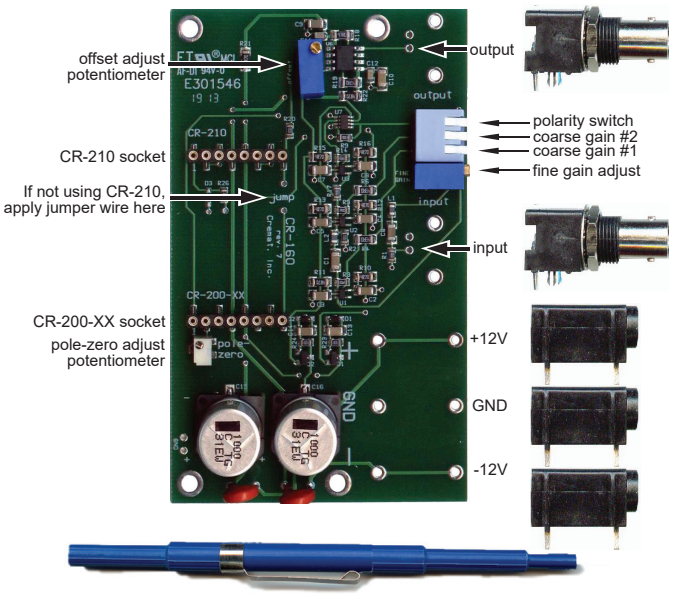
Jumper Regarding Optional Use of the CR-210

The CR-160-R7 board is normally set to be used with both a CR-200-XX shaping amplifier module and a CR-210 baseline restoration module installed. If for some reason the user does not want to use baseline restoration, the CR-210 module may be omitted. If omitted, however, the user should add a wire jumper at the location shown in the figure. This jumper effectively shunts the CR-210 circuit.

Caution

Set-up of the CR-160-R7 board requires the user to be able to (and preferably be comfortable with) soldering and connecting wires, cables, and connectors to PC boards.

A schematic diagram of the CR-160-R7 can be found at: **http://www.cremat.com/CR-160-R7-schematic.pdf**



The CR-160-R7 comes with the parts shown above. The connectors are supplied unassembled to the board in order to allow the user greater flexibility in their implementation. If the connectors are in fact assembled to the CR-160-R7 board, one may consider installing the assembled board into the CR-160-BOX-R3 housing (as is shown in the figures below). The CR-160-BOX-R3 housing is sold separately. More information on the CR-160-BOX-R3 housing can be found at our web site: **http://www.cremat.com/CR-160-BOX-R3.pdf** Note: previous versions of the CR-160 (e.g. R6) used a different box layout.

The CR-160-R7 board inside the CR-160-BOX-R3 housing (lid not shown).

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Making pole-zero adjustment to the CR-160-R7

'Pole-zero' adjustment can be made using a small potentiometer located near the CR-200-XX module, and corrects and compensates the exponentially-decaying tail that may follow the Gaussian pulse. This exponentially decaying tail is a consequence of the preamplifier signal's exponentially-decaying pulse.

The following three figures illustrate the effect of the pole-zero adjustment and shows when the pole-zero is adjusted properly. After changing CR-200-XX modules from one shaping time to another, it may be necessary to readjust the pole-zero.