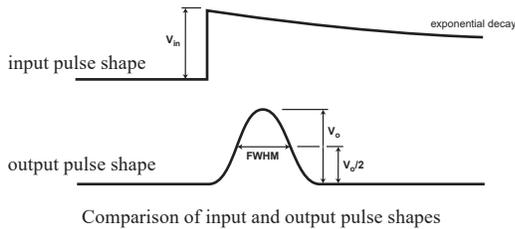


The CR-S-XX is a single channel Gaussian shaping amplifier instrument, meant for processing signals from charge sensitive preamplifiers. Most radiation detection instrumentation employing charge sensitive preamplifiers use shaping amplifiers to transform the shape of the pulses from a tail-pulse function (voltage step with an exponential decay) to a Gaussian-like function (bell-shaped). The purposes of the shaping stage is not only to provide a quick return to the baseline, but also to filter noise and to further amplify the small signals.

Input and Output Pulse Shapes

The shaping time of the CR-S-XX instrument is fixed by the shaping amplifier module installed within it. The shaping time can be changed by swapping out the CR-200-XX module inside the unit with one of a different shaping time. Each CR-S-XX instrument consists of a Cremat CR-200-XX shaping amplifier module, a CR-210 baseline restoration module, and a CR-160-R7 board. The housing is a die-cast aluminum box. The included power supply provides +/-12V to the amplifier circuitry. Photo of the instrument is shown below.



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 gain. The total gain range of the instrument is listed in the specifications table.

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. A switch position of 'on' (down) inverts the signal from the input. The CR-S-XX output pulses must be positive for proper operation. The polarity switch should be used to insure that the output pulse polarity is in fact positive.

Baseline Restoration

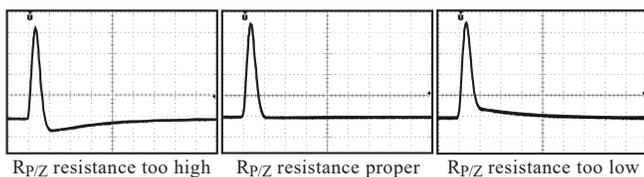
The CR-S-XX comes with a CR-210 baseline restoration module installed. This module corrects for the depression of the output baseline voltage which normally occurs at medium to high count rates. More information regarding the baseline restoration can be found on the CR-210 spec sheet: <http://cremat.com/CR-210.pdf>

Internal Adjustments: Pole/Zero Correction and Output Offset

The long decay time of the input pulse creates a small overshoot in the shape of the output pulse unless a pole/zero correction is utilized. This pole/zero correction is made using an on-board potentiometer ($R_{p/z}$) located internally, as shown in the board photo.

The CR-S-XX is sold with $R_{p/z}$ adjusted for the CR-200-XX shaping module installed. In the event that the user switches shaping modules to a different shaping time, $R_{p/z}$ needs to be readjusted.

The effect of adjusting the pole/zero correction potentiometer ($R_{p/z}$) on the pulse shape can be seen in the pulse waveforms shown in the figures below:



In addition to the pole/zero correction potentiometer, there is also a potentiometer for adjusting the output offset. This has been factory-adjusted to provide an output that is close to ground potential in the absence of a signal.

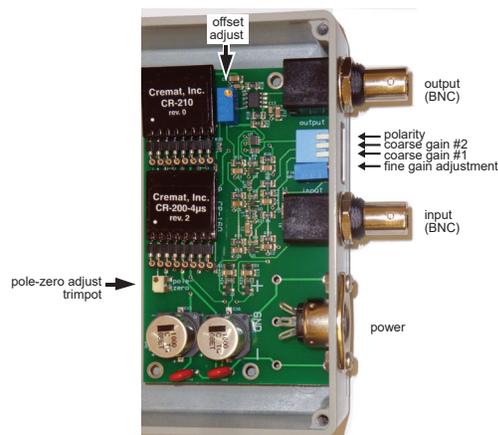
Specifications

Assume temp =20°C, unloaded output

box dimensions	4.69 x 3.69 x 1.34	inches	
Amplification channels	1		
gain	variable, from 0 to maximum gain (below)		
input polarity	can be either, output must be positive		
operating temp. range	-40°C to 85°C		
output impedance	2	Ω	
maximum output swing	0 to +6	volts	
maximum output swing (with output load =50ohms)	0 to +4.5	volts	
maximum output current	90	mA	
model number	noise voltage (μ V RMS)*	output pulse width (FWHM)	maximum gain
CR-S-50ns	11	150 ns	800
CR-S-100ns	7	250 ns	1000
CR-S-250ns	5	590 ns	1000
CR-S-500ns	3.4	1.2 μ s	1000
CR-S-1 μ s	2.3	2.4 μ s	1000
CR-S-2 μ s	1.8	4.7 μ s	1000
CR-S-4 μ s	1.4	9.4 μ s	1000
CR-S-8 μ s	1.1	19 μ s	1000

* quoted noise figures are referred to the input, and represent the case when the two auxiliary amplification stages are set to gain=10 and the fine gain set to the maximum.

A schematic diagram of the CR-S-XX can be found at: <http://cremat.com/CR-160-R7-schematic.pdf>



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