

**CI 800**

S E R I E S

**CANBERRA INDUSTRIES**

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**Instruction Manual**

**SINGLE CHANNEL ANALYZER  
MODEL 830**

**Canberra 800 Series of  
Modular Nuclear Instruments**

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# MODEL 830 SINGLE CHANNEL ANALYZER

## 1.0 GENERAL

### 1.1 Description

The Model 830 Single Channel Analyzer is used to sort, from all input pulses, those that fall within a preselected energy range. It generates an output (or logic) pulse whenever the input signal from a pulse shaping amplifier falls between two chosen voltage or energy levels determined by separate baseline and window width controls.

### 1.2 Applications

The Model 830 sorts out from all pulses coming to it those with a voltage in the range of interest. This application of voltage constraints is equivalent to the application of energy constraints on the nuclear events being detected. This selection process may be done for several reasons.

First, this process permits energy analysis to be performed on detected nuclear events.

Second, it permits nuclear counting to be limited to events of interest (i.e. in a specific energy range) only, excluding all others that may be detected.

Third, it permits an immediate reduction of incoming data so that further processing and analysis is performed only on selected events, thus increasing the efficiency with which subsequent analysis tools are used.

## 2.0 SPECIFICATIONS

### 2.1 Performance

- Baseline Bias Linearity: better than 0.5% of full scale
- Window Width Linearity: better than 0.5% of full scale (with optional ten-turn potentiometer)
- Baseline Stability: better than 0.1% of full scale over 24 hours
- Window Width Stability: better than 0.1% of full scale over 24 hours
- Pulse Pair Resolution: less than 2 microseconds (when adjusted for minimum width input pulse)

## 2.2 Controls, Inputs, Outputs

### 2.2.1 Controls

- Baseline: ten-turn potentiometer to establish minimum energy for input signal; 0.25 to 10 volts
- Window Width: single-turn potentiometer to establish range above baseline setting for input signal; 0 to 10 volts
- External Baseline IN/OUT: newer units permit the use of an external ramp (IN) to sweep the window from 0 - 10 volts; in the OUT position, the front panel baseline control sets the lower level of the window position

### 2.2.2 Inputs

- Signal: positive unipolar or bipolar 0.25 to 10 volt pulses, rise time less than 10 microseconds, width greater than 75 nanoseconds; input impedance greater than 1000 ohms
- External Baseline: rear panel 0 to +10 volt ramp, input impedance 1000 ohms

### 2.2.3 Output

- Output: positive 10 volts, 1 microsecond wide; rise time less than 50 nanoseconds; output impedance less than 100 ohms

## 3.0 INITIAL OPERATION

### 3.1 Setup

- Insert module in AEC compatible base unit/power supply such as Canberra Model 800; turn on power switch
- Connect output from pulse shaping amplifier such as Canberra Model 810 to input connector of Model 830. Using a "tee" connector, simultaneously observe amplifier output on oscilloscope (2v/cm, 1 usec/cm), or observe amplitude on multichannel analyzer
- Set baseline potentiometer to 5.00

- Set window width potentiometer to about 1.0
- Connect module output to second input on oscilloscope (5v/cm, 1 usec/cm), or to a scaler

### 3.2 Initial Checkout

- Increase amplifier output slowly until output is just observed; increase amplitude until output is fully on.
- Input amplitude at half-maximum output should be about 5.00; range between full off and full on is a measure of amplifier peak to peak noise; check this range by increasing Baseline setting until output disappears and decreasing until output is fully on; measure amplifier amplitude at half-maximum visually on oscilloscope or on calibrated multichannel analyzer - return Baseline setting to 5.00
- Increase amplifier output until SCA output begins to disappear; repeat tests of previous step and verify Window Width setting is about 1.0
- Vary Baseline and Window Width settings and repeat Steps 1 and 2
- If a 0 to +10 volt ramp is available, insert into the rear panel External Baseline connector and switch the External Baseline switch on the rear of the unit to IN. Note that the one volt wide window now sweeps from zero to ten volts; the SCA output, connected to a ratemeter, constitutes a spectrometer whose output of count rate vs. voltage (energy) may be recorded on a strip chart recorder.

## 4.0 MODULE OPERATION

### 4.1 Control Functions

- Baseline Level: the "E" or baseline level is set by a ten-turn adjustable potentiometer. The usable range of baseline settings extends from a minimum of about 250 millivolts to a maximum of 10 volts.
- Window Width: the " $\Delta E$ " or window width is determined by a one-turn adjustable potentiometer. The window rides on top of the baseline setting, and may be opened over a range of 0 to 10 volts. A ten-turn control option is available for \$25.

- External Baseline IN/OUT: newer units permit the use of an external ramp (IN) to sweep the window from 0 - 10 volts; in the OUT position, the front panel baseline control sets the lower level of the window position

#### 4.2 Input Requirements

- Signal: positive unipolar or bipolar pulses 0.25 to 10 volts in amplitude, rise time less than 10 microseconds, width greater than 75 nanoseconds; input impedance greater than 1000 ohms; BNC connectors
- External Baseline: 0 to +10 volt ramp or sawtooth, input impedance 1000 ohms or greater; BNC connector

#### 4.3 Output Specifications

- Signal: positive 10 volt logic pulse, 1 microsecond wide, rise time less than 50 nanoseconds; output impedance less than 100 ohms