550A

Single-Channel Analyzer

- **Ideal for selecting a range of pulse amplitudes from a spectroscopy amplifier for counting on a ratemeter or counter/timer**
- **Provides the excellent stability, resolution, and dynamic range demanded by high-resolution detectors**
- **Four operating modes:**
  - **Integral**
  - **Normal (independent upper and lower levels)**
  - **Asymmetric window**
  - **Symmetric window**
- **DC-coupled for high counting rates**
- **SCA output generated when the input signal falls below the lower level**

The ORTEC Model 550A Single-Channel Analyzer is ideally suited for selecting a range of output pulse amplitudes from a spectroscopy amplifier for subsequent counting on a ratemeter or a counter/timer. It provides the excellent stability, resolution, and dynamic range needed for measurements with high-resolution germanium and silicon detectors. These same features provide more than adequate performance with scintillation counters, proportional counters, and ionization chambers. The entire instrument is dc-coupled to ensure that the discriminator levels are not affected by changes in the counting rate, even at very high counting rates.

The versatility of the Model 550A is enhanced by four basic operating modes. In the INTEGRAL mode, all input pulse amplitudes above the lower level produce an SCA output logic pulse. This mode is useful for counting all pulses above the noise level, or above a well-defined lower amplitude limit. The INTEGRAL mode can also be used for leading edge timing, or pulse routing logic. In the NORMAL mode, the upper- and lower-level discriminators are independently variable over the full +20 mV to +10 V range. The SCA output is generated only for pulse amplitudes that occur between the upper and lower levels. This mode is useful when a wide range of pulse heights must be selected for counting. In the ASYMMETRIC WINDOW mode, the upper-level dial becomes a window width control with a 0 to +1 V range. The lower-level dial controls the lower limit of the window over a +20 mV to +10 V range. Pulse amplitudes between the upper and lower limits of the window produce an SCA output. This mode is useful when a narrow range of pulse heights must be selected. In the SYMMETRIC WINDOW mode, the upper-level dial still controls the window width over the range of 0 to +1 V, but the lower-level dial sets the position of the center of the window over a range of +20 mV to +10 V. The SYMMETRIC WINDOW mode is useful when the window has been centered on a peak in the spectrum and it is desirable to widen (or narrow) the window to accept more (or less) of the peak width.

Rear-panel connectors provide separate outputs for the upper- and lower-level discriminators. These logic outputs are generated at the instant the input signal exceeds the corresponding discriminator level. The SCA output logic pulse is generated when the input signal falls through the lower-level threshold.

An external input for the lower-level setting is switch selectable to allow recording the entire pulse-height spectrum utilizing a scanning technique. A narrow window is selected, and an external voltage source is employed to slowly scan the lower level through the 0 to 10 V range. A ratemeter counts the SCA output and draws the spectrum on a strip chart recorder.

Specifications

PERFORMANCE

DYNAMIC RANGE 500:1.

PULSE-PAIR RESOLVING TIME 100 ns plus output pulse width.

THRESHOLD TEMPERATURE SENSITIVITY <0.01% of full scale per °C, from 0 to 50°C, using a NIM Class A power supply (referenced to –12 V).

WINDOW WIDTH CONSTANCY Variation <±0.1% of full-scale window width over the +20 mV to +10 V linear input range.

DISCRIMINATOR NONLINEARITY <±0.25% of full scale for both discriminators.

INDICATORS

SCA OUT LED Front-panel LED flashes whenever an SCA output pulse is generated.

CONTROLS

WINDOW OR UPPER LEVEL Front-panel, 10-turn, locking dial determines the window width (0 to 1 V) in the WINDOW modes, or the upper-level threshold (0 to +10 V) in the NORMAL and INTEGRAL modes.

LOWER LEVEL Front-panel, 10-turn, locking dial determines the threshold setting (+20 mV to +10 V) for the lower-level discriminator when the rear-panel LL REF switch is in the INT position. The LOWER-LEVEL control is disabled when the EXT position is selected on the rear-panel LL REF switch.

INT, ASYM WINDOW, SYM WINDOW, NORM Front-panel, four-position rotary switch selects one of four operating modes:

INT In the INTEGRAL mode, the lower level and upper level are independently adjustable from +20 mV to +10 V. The SCA OUT is generated for all pulse amplitudes exceeding the lower-level threshold.

NORM In the NORMAL mode, the lower level and upper level are independently adjustable from +20 mV to +10 V. The SCA OUT is generated for pulse amplitudes that exceed the lower-level threshold, but do not exceed the upper-level threshold.

ASYM WINDOW In the ASYMMETRIC WINDOW mode, the **lower limit** of the window is adjustable from +20 mV to +10 V using the LOWER LEVEL dial. The WINDOW dial adjusts the width of the window from 0 to 1 V. The SCA OUT is generated for pulse amplitudes between the upper and lower limits of the window.

SYM WINDOW In the SYMMETRIC WINDOW mode, the **center** of the window is adjustable from +20 mV to +10 V using the LOWER LEVEL dial. The WINDOW dial adjusts the width of the window from 0 to 1 V. The SCA OUT is generated for pulse amplitudes between the upper and lower limits of the window.

INT/EXT LL REF A rear-panel locking toggle switch selects either the front-panel LOWER LEVEL dial (INT position), or the rear-panel LL REF input (EXT position) for controlling the lower-level threshold.

INPUTS

INPUT Front-panel BNC connector accepts unipolar or bipolar linear signals for pulse amplitude selection in the range of +20 mV to +10 V (dc-coupled). The minimum input pulse width is 100 ns. The maximum amplitude of signal plus dc offset is ±12 V. Input impedance is approximately 1000 Ω. Front-panel test point wired to the INPUT connector through a 470-Ω resistor.

IN Rear-panel BNC connector identical to INPUT connector.

LL REF Rear-panel BNC connector accepts a dc voltage from an external source for controlling the lower-level threshold when the INT/EXT LL REF switch is in the EXT position. The input range of –20 mV to –10 V corresponds to a lower-level threshold range of +20 mV to +10 V. The input is overload protected to ±15 V.

OUTPUTS

SCA OUT Front- and rear-panel BNC connectors provide a NIM-standard, positive logic pulse output: nominally +5 V amplitude and 500-ns width. Output impedance <15 Ω. Front- and rear-panel outputs have separate output drivers. The output pulse occurs when the trailing edge of the linear input pulse crosses the lower-level threshold. See description under CONTROLS for output logic modes. Front-panel test point wired to the SCA OUT connector through a 470-Ω resistor.

LL OUT Rear-panel BNC connector provides a NIM-standard, positive logic pulse output: nominally +5 V amplitude and 500-ns width. Output impedance <15 Ω. The output pulse occurs when the leading edge of the linear input pulse crosses the lower-level threshold (INT or NORMAL modes), or the lower limit of the window (WINDOW modes).

UL OUT Rear-panel BNC connector provides a NIM-standard, positive logic pulse output: nominally +5 V amplitude and 500-ns width. Output impedance <15 Ω. The output pulse occurs when the leading-edge of the linear input pulse crosses the upper-level threshold (INT or NORMAL modes), or the upper limit of the window (WINDOW modes).

ELECTRICAL AND MECHANICAL

POWER REQUIRED +12 V at 75 mA, –12 V at 35 mA.

WEIGHT
Net 0.9 kg (2.0 lb)
Shipping 2.3 kg (5.0 lb)

DIMENSIONS NIM-standard single-width module 3.43 X 22.13 cm (1.35 X 4.714 in.) front panel per DOE/ER-0457T.

Ordering Information

To order, specify:

Model	Description
550A	Single-Channel Analyzer

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