

ORTEC 550 Single Channel Analyzer

The manual for this module is no longer readily available. In the web site of KEK, the High Energy Accelerator Research Organization, in Japan, is a page that describes the operation of the 550 and its controls, and gives a list of specifications. The URL for this page is: <http://pfwww.kek.jp/hirano/550.html>

EG&G ORTEC 550



1. DESCRIPTION

1.1 GENERAL

The ORTEC 550 Single Channel Analyzer has the exceptionally wide dynamic range, high stability, and resolution that are necessary for use in high-resolution counting experiments. It is compatible with the requirements of Ge(Li) or HPGe detectors, and is more than adequate with scintillation counters and ionization chambers. The unit is contained in a NIM-standard single width module and employs integrated circuit logic to assure superior reliability in the minimum space.

The 550 accepts either positive unipolar or bipolar input pulses from linear amplifiers that have either RC or delay-line shaping. It examines the amplitude of each input pulse and generates appropriate NIM-standard positive logic output pulses separately for SCA, LLD, and ULD responses. The instrument is designed to meet the recommended interchangeability standard of USAEC Report TID-28093(Rev). An ORTEC 401/402 Series Bin and Power Supply provides all the necessary power through the rear module power connector. All signal levels and impedances are compatible with other ORTEC modules.

1.2. MODES OF OPERATION

The 550 has a 3-position locking toggle switch on the front panel that selects the integral mode of operation or either of two types of differential single channel analysis modes. For normal operation, each of the discriminator levels is adjusted independently through the full dynamic range of 0 to +10 V. For window operation, the LLD range is 0 to +10 V and the ULD range is the adjusted LLD level plus 0 to +10 V.

Integral Mode Operation: In the integral mode, the 550 provides an output signal to the SCA connector on the rear panel and to the Pos Output connector on the front panel if the input pulse amplitude exceeds the adjusted lower level threshold; the range is 0 to +10 V.

Normal Mode Operation: In the normal mode, the 550 provides an output pulse to the SCA connector on the rear panel and to the Pos Output connector on the front panel if the input pulse amplitude exceeds the lower level threshold but does not exceed the upper level threshold. In

this mode, each threshold is adjusted independently in the range of 0 to +10 V, and the ULD level must be sent higher than the LLD level to permit the SCA output to be generated.

Window Mode Operation: In the window mode, the 550 provides an output pulse to the SCA connector on the rear panel and to the Pos Output connector on the front panel if the input pulse amplitude exceeds the lower level threshold, but by an amount that is less than the adjusted window width. The range of the LLD is 0 to +10 V, and the range of the window is adjusted from 0 to +10 V above the LLD level. This mode is especially adapted to high-resolution spectroscopy because the very narrow windows that are required for this type of operation can be obtained easily and reproducibly.

The SCA and Pos Output pulses from the 550 are generated when the trailing edge of the input signal being analyzed crosses the lower level threshold, provided the LLD and ULD threshold requirements have been met. For this reason, the 550 cannot be used effectively for crossover timing applications.

1.3. LEADING EDGE TIMING

Connectors are included on the rear panel for LL and UL outputs. The pulses that are furnished through these connectors are generated on the leading edge of the input signal, each one occurring when the corresponding discriminator is triggered by the input pulse amplitude. Either of these pulses can be used for timing applications or for pulse-routing into a multichannel analyzer. In any mode of operation, either the LL or the UL output can be used to monitor the number of input pulses that cross the corresponding threshold.

1.4. LOWER LEVEL REFERENCE

A rear panel 2-position locking toggle switch selects either the front panel Lower Level control or the voltage signal applied through the rear panel LL Ref connector as the reference level for the lower level discriminator. This permits flexibility in operation where an external reference source can furnish the LLD with a stepped or sliding threshold to automatically sweep the SCA response through a spectral range.

2.SPECIFICATIONS

2.1. PERFORMANCE

Dynamic Range	500:1.
Pulse-Pair Resolving Time	200 ns plus output pulse width.
Threshold Temperature Instability	$\leq 0.01\%$ /°C of full scale, 0 to 50 °C using a NIM class A power supply (referenced to -12 V).
Window Width Constancy	< 0.1 % variation of full-scale window width over the linear 0 to +10 V range.

Discriminator Nonlinearity	< $\pm 0.25\%$ of full scale (integral) for both discriminators.
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2.2. CONTROLS

Window or Upper Level	Front panel 10-turn potentiometer determines the window width (0 to +1 V) in the Window mode or the upper level (0 to +10 V) threshold in the Normal or Integral modes.
Lower Level	Front Panel 10-turn potentiometer adjustable from +20mV to +10.02 V; where the rear panel LL Ref switch selects Int, determines the threshold setting for the lower level discriminator; when the LL Ref switch selects Ext, this control is ineffective.
Integral/Normal/Window	Front panel 3-position locking toggle switch selects one of three operating modes. Integral LL and UL are independently adjustable (0 to +10 V); the UL response is ignored for an SCA output. Normal LL and UL are independently adjustable (0 to +10 V); differential mode operation is effective. Window LL sets the baseline level (0 to +10 V) and UL sets the window width (0 to +1 V); differential mode operation is effective.
LL Ref Mode	Rear panel 2-position locking toggle switch selects either the front panel Lower Level control or the voltage signal furnished through the rear panel LL Ref connector as the lower level threshold.

2.3. INPUTS

Signal Inputs	Front panel dc-coupled BNC connector accepts positive unipolar or bipolar signal, 0 to +10 V linear range, ± 12 V maximum; width, ≥ 100 ns; $\geq 1000 \Omega$ input impedance. Rear panel ac-coupled BNC connector accepts positive unipolar or bipolar signal, 0 to +10 V linear range, ± 100 V maximum; 0.2 to 10 μ s width; $\geq 1000 \Omega$ input impedance.
LL Ref Ext	Rear panel BNC connector accepts bias for the lower level discriminator when the LL Ref toggle switch selects Ext; 0 to -10 V on this connector corresponds to a range of 0 to +10 V for the lower level discriminator setting; input protected to ± 24 V.

2.4. OUTPUTS

SCA	Front and rear panel BNC connectors provide positive NIM-standard output,
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Out (Pos Out)	nominally + 5 V, 500 ns wide; $Z_0 < 10 \Omega$. Output occurs when the trailing edge of the linear input crosses the lower level threshold.
LL Out	Rear panel BNC connector provides positive NIM-standard output, nominally + 5 V, 500 ns wide; $Z_0 < 10 \Omega$. Output occurs when the leading edge of the linear input crosses the lower level threshold.
UL Out	Rear panel BNC connector provides positive NIM-standard output, nominally +5 V, 500 ns wide; $Z_0 < 10 \Omega$. Output occurs when the leading edge of the linear input crosses the upper level or window threshold.

2.5. RELATED EQUIPMENT

The 550 is compatible with all ORTEC amplifiers and other amplifiers having a 0 to + 10 V positive linear output range.

2.6. ELECTRICAL AND MECHANICAL

Power Required.	+ 12 V, 130 mA; -12 V, 50 mA.
Dimensions	NIM-standard single width module (1.35 by 8.714 in) per TID-20893(Rev).