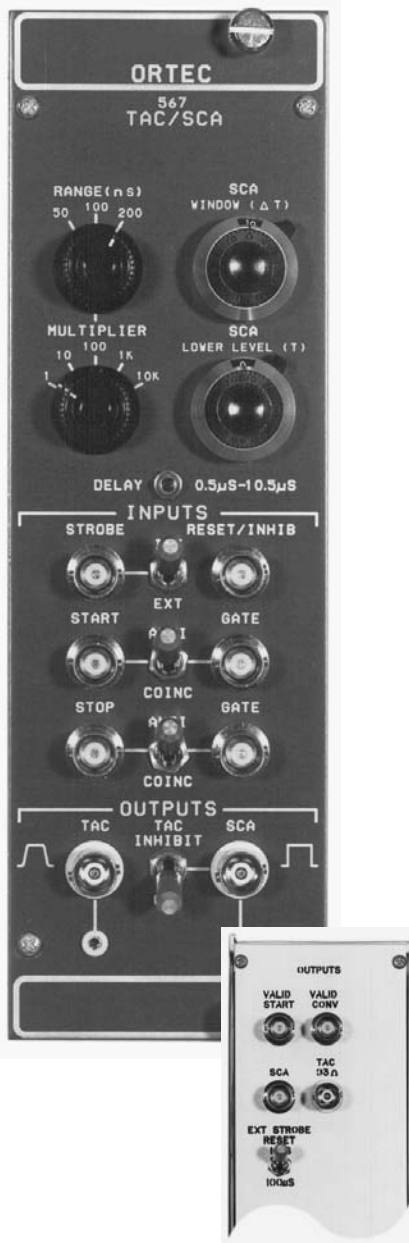


Time-to-Amplitude Converter/SCA

- For time spectroscopy in the range from 10 ns to 2 ms
- Includes SCA to set a time window for coincidence experiments
- Valid Start and Valid Conversion outputs
- Selectable output delay and width
- Output synchronized with a stop or external strobe signal
- Provision to reject unwanted start or stop input signals
- Positive or negative input signals



The ORTEC Model 567 Time-to-Amplitude Converter/Single-Channel Analyzer (TAC/SCA) measures the time interval between start and stop input pulses, generates an analog output pulse proportional to the measured time, and provides built-in single-channel analysis of the analog signal. Additional gating modules are not necessary with this unit, and timing experiments requiring time ranges of 10 ns to 2 ms may be performed with single-channel analysis, giving the experimenter unparalleled flexibility in analyzing random events that occur within a selected time range.

Separate gating (anticoincidence or coincidence) of the start and stop inputs eliminates unwanted events from the time spectra via externally imposed energy or timing restrictions. The Model 567 also incorporates a built-in SCA inhibit feature in which a TAC output is available only if the output pulse falls within the window restrictions imposed by the SCA. This feature may be switched in or out by a convenient front-panel switch.

In addition to its start and stop input gating capabilities, the Model 567 provides for a pulsed or dc-level Reset/Inhibit signal via a front-panel input connector. A Reset/Inhibit input signal terminates the conversion cycle and maintains a reset condition, inhibiting further TAC conversions for the duration of the Reset/Inhibit pulse. A TAC output pulse that is in process at the time a Reset/Inhibit input is received will be completed before converter reset is initiated.

Valid Start and Valid Conversion outputs are provided for each accepted start and stop input respectively. The duration of the Valid Start output indicates the interval from the accepted start until the end of reset. Valid Conversion occurs from the end of the internal delay after stop to the end of reset.

The selectable TAC output width and variable delay, which are easily adjustable, further serve to make the Model 567 a flexible instrument. The output of the TAC may be synchronized with the stop signal or an external strobe signal to further enhance its versatility.

The single-channel analyzer section of the Model 567 allows the experimenter to

place very specific time restrictions on the timing spectrum. The SCA is operated in the Window mode, where the upper-level discriminator setting is added to that of the lower-level discriminator. The SCA output pulse width is equal to the time from the occurrence of the TAC output until the end of the reset pulse or the end of the TAC output. The synchronization of the SCA output with the stop input virtually eliminates any time walk in the SCA output.

All Model 567 inputs are printed wiring board (PWB) jumper-selectable to accept either negative or positive NIM standard signals. All inputs and outputs are dc-coupled so that changing input count rates will not hinder normal operation of the Model 567. The TAC output should be connected to the dc-coupled input of a multichannel analyzer (MCA) for optimum high count-rate performance.

Specifications

PERFORMANCE

Time-to-Amplitude Converter

TIME RESOLUTION FWHM $\leq 0.01\%$ of full scale plus 5 ps for all ranges.

TEMPERATURE INSTABILITY $\leq \pm 0.01\%/^{\circ}\text{C}$ (± 100 ppm/ $^{\circ}\text{C}$) of full scale, 0 to 50 $^{\circ}\text{C}$ (whichever is greater), 0 to 50 $^{\circ}\text{C}$.

DIFFERENTIAL NONLINEARITY Typically $< 1\%$ from 10 ns or 2% of full scale (whichever is greater) to 100% of full scale.

INTEGRAL NONLINEARITY $\leq \pm 0.1\%$ from 10 ns or 2% of full scale (whichever is greater) to 100% of full scale.

RESET CYCLE Fixed 1.0 μs for X1 and X10 Multipliers, fixed 5 μs for X100 Multiplier, and fixed 50 μs for X1K and X10K Multipliers. Occurs after Over Range, Strobe cycle, or Ext Strobe Reset cycle.

START-to-STOP CONVERSION TIME
Minimum ≤ 5 ns.

Single-Channel Analyzer

THRESHOLD INSTABILITY $\leq \pm 0.01\%/^{\circ}\text{C}$ (± 100 ppm/ $^{\circ}\text{C}$) of full scale, 0 to 50 $^{\circ}\text{C}$ (referenced to +12 V NIM bin).

THRESHOLD NONLINEARITY $\leq \pm 0.5\%$ of full scale.

CONTROLS (Front Panel)

RANGE (ns) Three-position rotary switch selects full scale time interval of 50, 100, or 200 ns between accepted Start and Stop input signals.

Time-to-Amplitude Converter/SCA

MULTIPLIER Five-position rotary switch extends time range by a multiplying factor of 1, 10, 100, 1K, or 10K.

DELAY 20-turn screwdriver-adjustable potentiometer varies the delay of the TAC and SCA outputs from 0.5 μ s to 10.5 μ s, relative to an accepted Stop input signal; operable in the Int Strobe mode only.

STROBE MODE Two-position locking toggle switch selects either Internal or External source for initiating the strobe cycle to strobe valid information from the TAC and SCA outputs.

START GATE MODE Two-position locking toggle switch selects Coincidence or Anti-coincidence mode of operation for the Start circuitry. Start circuitry is enabled in the Coinc position or inhibited in the Anti position during the interval of a Start Gate input signal.

STOP GATE MODE Two-position locking toggle switch selects Coincidence or Anti-coincidence mode of operation for the Stop circuitry. Stop circuitry is enabled in the Coinc position or inhibited in the Anti position during the interval of a Stop Gate input signal.

SCA WINDOW (ΔT) 10-turn precision locking potentiometer sets the SCA upper-level discriminator threshold from 0.05 V to 10.05 V above the Lower Level (T) setting.

SCA LOWER LEVEL (T) 10-turn precision locking potentiometer sets the SCA lower level discriminator threshold from 0.05 V to 10.05 V.

TAC INHIBIT Two-position locking toggle switch. In the Inhibit position, the TAC output is available only if the output amplitude is within the SCA window. In the Out position, the SCA has no effect on the TAC output.

CONTROLS (Rear Panel)

EXT STROBE RESET Two-position locking toggle switch allows the converter to be reset nominally 10 μ s or 100 μ s after an accepted Stop input signal if an Ext Strobe signal has not been received.

INPUTS

All six front-panel inputs listed below are dc-coupled, edge-triggered, and printed wiring board (PWB) jumper selectable to accept either negative or positive NIM-standard signals. Input impedance is 50 Ω in the negative position and >1 k Ω in the positive

position. The threshold is nominally -400 mV in the negative position and +2 V in the positive position.

STROBE Provides an external means to strobe a valid output signal from the TAC in the Ext Strobe mode. The input signal, exceeding threshold within the Ext Strobe Reset interval after the Stop input, initiates the read cycle for the linear gate to the TAC output. Factory-set in the positive input position. Ext Strobe Reset interval has a minimum value of ~0.5 μ s and a maximum value of nominally 10 μ s or 100 μ s, switch-selectable on rear panel.

START Time conversion initiated when Start input signal exceeds threshold. Factory-set in negative input position.

STOP Time conversion terminated when Stop input signal exceeds threshold. Factory-set in negative input position.

RESET/INHIB Terminates conversion cycle and maintains reset condition, inhibiting further TAC conversions, for the duration of the reset cycle or the Reset/Inhib pulse, whichever is longer. A TAC output pulse in process at the time of a Reset/Inhib signal will be completed before converter reset is initiated. Factory-set in the positive input position.

START GATE Provides an external means of gating the Start circuitry in either Coincidence or Anticoincidence with the Start input signal. Start Gate input signal must cross threshold ≥ 10 ns prior to the Start input signal and overlap the trigger edge of the signal. Factory set in the positive input position.

STOP GATE Provides an external means of gating the Stop circuitry in either Coincidence or Anticoincidence with the Stop input signal. Stop Gate input signal must cross threshold ≥ 10 ns prior to the Stop input signal and overlap the trigger edge of the signal. Factory set in the positive input position.

OUTPUTS

TAC Front- and rear-panel BNC connectors provide unipolar pulse.

Amplitude 0 to +10 V proportional to Start/Stop input time difference.

Time End of delay period in Int Strobe mode; prompt with Strobe input in Ext Strobe mode.

Width Adjustable by PWB potentiometer from 1 μ s to 3 μ s.

Impedance Front panel $Z_o < 10 \Omega$; rear panel 93 Ω .

Rise Time ~250 ns.

Fall Time ~250 ns.

VALID START Rear-panel BNC connector provides NIM-standard slow positive logic level signal.

Amplitude Nominally +5 V. Complement signal selectable by PWB jumper.

Time and Width From accepted Start input to end of reset.

Impedance $Z_o < 10 \Omega$.

Rise Time ≤ 50 ns.

Fall Time ≤ 50 ns.

VALID CONV Rear-panel BNC connector provides NIM-standard slow positive logic level signal to indicate a Valid Conversion.

Amplitude Nominally +5 V. Complement signal selectable by PWB jumper.

Time and Width From end of internal delay after Stop to end of reset.

Impedance $Z_o \leq 10 \Omega$.

Rise Time ≤ 50 ns.

Fall Time ≤ 50 ns.

SCA Front- and rear-panel connectors provide NIM-standard slow positive logic level signals.

Amplitude Nominally +5 V. Complement signal selectable by PWB jumper.

Time and Width From start of TAC linear output to either end of reset or end of linear output, PWB selectable. Factory-set at end of reset.

Impedance $Z_o \leq 10 \Omega$.

Rise Time ≤ 50 ns.

Fall Time ≤ 50 ns.

ELECTRICAL AND MECHANICAL

POWER REQUIRED +24 V, 95 mA; +12 V, 210 mA; -24 V, 165 mA; -12 V, 330 mA.

WEIGHT

Net 1.4 kg (3 lb).

Shipping 3.2 kg (7 lb).

DIMENSIONS NIM-standard double-wide module 6.90 X 22.13 cm (2.70 X 8.714 in.) per DOE/ER-0457T.

Ordering Information

Model	Description
567	Time-to-Amplitude Converter/SCA

Specifications subject to change
011008

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