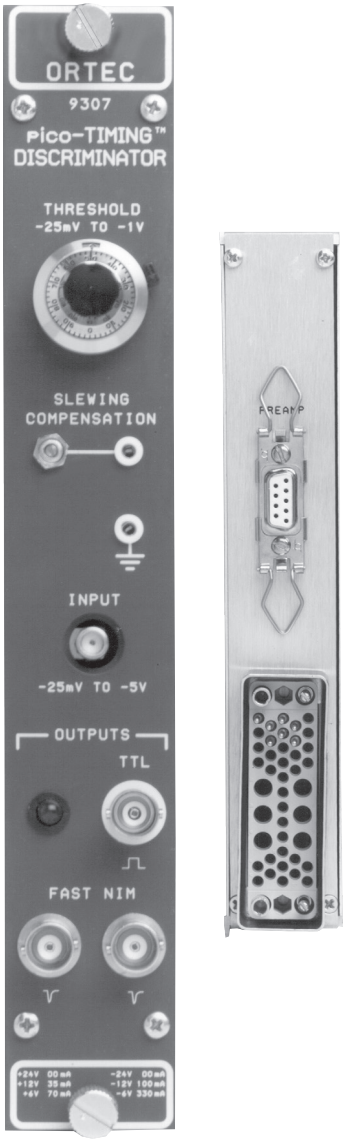
ORTEC®

AMETEK®

9307
pico-Timing Discriminator

- **Ideal for microchannel plate detectors, microchannel plate photomultiplier tubes, channeltrons, fast silicon photodiodes, and fast photomultiplier tubes**
- **Accepts input pulse widths from 400 ps to 5 ns, and pulse amplitudes from –50 mV to –5 V**
- **Time slewing <±20 ps from –150 mV to –1.5 V**
- **Optimized internal pulse shaping eliminates cable adjustment**
- **One TTL output and two fast negative NIM timing outputs**
- **Threshold adjustable from –25 mV to –1 V**



The ORTEC Model 9307 pico-TIMING Discriminator defines the arrival time of analog pulses from ultra-fast detectors with picosecond precision. Moreover, this superb performance is delivered over an extremely wide range of pulse heights with negligible influence of pulse amplitude on the timing output. With the Model 9307, the difficult task of adjusting pulse-shaping cables has been eliminated. The internal pulse shaping in the pico-TIMING Discriminator is optimum for single-photon or single-ion time measurements with microchannel plate detectors, microchannel plate photomultiplier tubes (PMTs), channeltrons, fast photomultiplier tubes, and fast silicon photodiodes. The pico-TIMING Discriminator accepts analog input pulses with amplitudes ranging from –50 mV to –5 V, and pulse widths from 400 ps to 5 ns FWHM. The amplitude threshold for generating a timing output is adjustable from –25 mV to –1 V with a 10-turn locking dial.

Ultra-fast circuits are incorporated in the pico-TIMING Discriminator to minimize time slewing. As a result, input amplitudes can vary over as much as a 100:1 range with negligible shift in the timing output. This ensures excellent time resolution, even when the signal source produces a wide range of randomly varying signal amplitudes. A front-panel screwdriver adjustment permits fine-tuning the slewing compensation to match the characteristics of a particular detector. An adjacent test point makes it easy to monitor the adjustment with a voltmeter.

Two fast negative NIM outputs provide the flexibility to trigger a time-to-amplitude converter (TAC) while simultaneously driving other instruments. The 500-ns-wide TTL output can be used with instruments that require a positive logic signal, such as counters and ratemeters. A front-panel LED flashes with each output pulse to indicate triggering.

For detectors having rise times less than 1 ns, the ORTEC Model 9306 1-GHz Preamplifier should be used to amplify small signals before presentation to the input of the Model 9307 pico-TIMING Discriminator. For rise times ≥1 ns, the Model VT120 Fast-Timing Preamplifier should be substituted for the Model 9306. The Model 9307 incorporates a compatible, 9-pin D connector on its rear panel to supply power to either preamplifier.

Specifications

PERFORMANCE

TIME SLEWING (Walk) <±20 ps shift in the timing output for input signal amplitudes from –150 mV to –1.5 V. (Typically <±50 ps for signal amplitudes from –50 mV to –5 V.) Measured using a 1-ns-wide input pulse with 350-ps rise and fall times.

PULSE-PAIR RESOLUTION <10 ns at the fast negative NIM outputs.

MAXIMUM INPUT/OUTPUT RATE Accepts burst rates up to 100 MHz.

OPERATING TEMPERATURE RANGE 0 to 50°C.

THRESHOLD TEMPERATURE SENSITIVITY <±0.1 mV/°C (0 to 50°C).

TRANSMISSION DELAY TEMPERATURE SENSITIVITY <±10 ps/°C (0 to 50°C).

CONTROLS AND INDICATORS

THRESHOLD Front-panel, 10-turn potentiometer with locking dial allows adjustment of the input discriminator threshold from –25 mV to –1 V.

SLEWING COMPENSATION Front-panel, 20-turn, screwdriver fine-tuning to minimize time slewing as a function of input pulse amplitude. Adjustable over a range of approximately ±30 mV. A front-panel test point located next to the potentiometer facilitates monitoring the actual setting. Test point output impedance: 100 Ω.

OUTPUT LED Front-panel LED flashes on each output pulse to indicate active triggering.

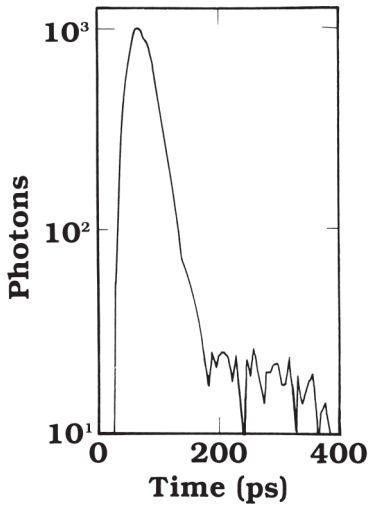


Figure 1. The Fluorescence Lifetime Instrument Response Function Recorded with a Model 9306 1-GHz Preamplifier and the Model 9307 pico-TIMING Discriminator. Time resolutions from 30 to 60 ps FWHM are possible with the system shown in Figure 2.

9307
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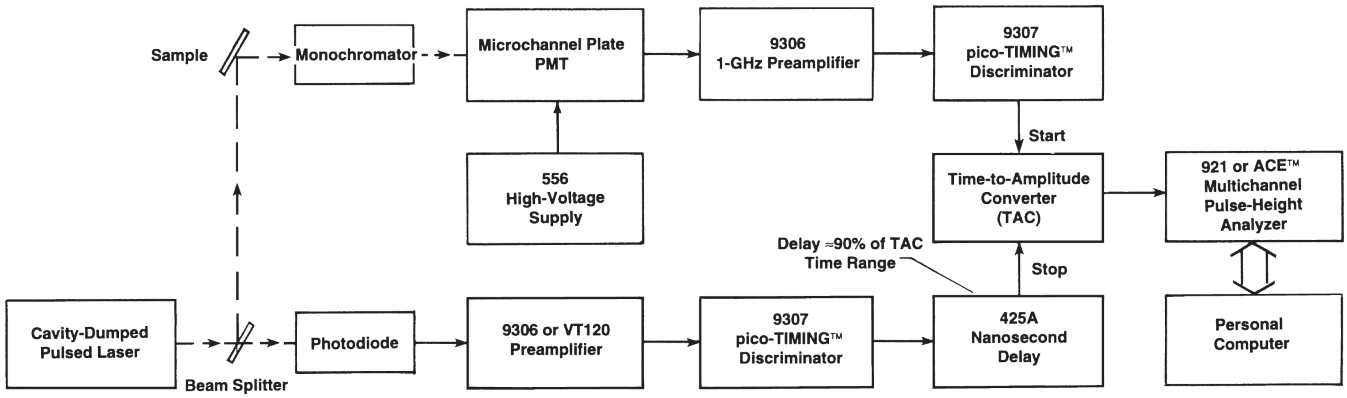


Figure 2. Typical Block Diagram for a Fluorescence Lifetime Spectrometer.

INPUTS

INPUT Front-panel SMA connector accepts unipolar input signals with amplitudes in the range of –50 mV to –5 V. Minimum input pulse width: 400 ps (FWHM). Maximum input pulse width: 5 ns (FWHM). Input impedance: 50 Ω. The input is protected to ±5 V.

OUTPUTS

FAST NEGATIVE NIM OUTPUTS Front-panel BNC connectors provide two independent, fast negative NIM output logic pulses. Output amplitude is nominally –800 mV into a 50-Ω load. Pulse width is nominally 2.5 ns.

TTL OUTPUT Front-panel BNC connector provides a positive TTL pulse, triggered by the fast negative NIM output. The 500-ns width of the TTL pulse is nonupdating. Output impedance: <1 Ω, short-circuit protected.

PREAMP POWER Rear-panel, 9-pin D connector provides ±12-V and ±24-V power for the ORTEC Model 9306 1-GHz Preamplifier, the Model VT120 Fast-Timing Preamplifier, or other preamplifiers utilizing the industry-standard preamplifier power plug.

ELECTRICAL AND MECHANICAL

POWER REQUIRED The Model 9307 derives its power from a NIM bin/power supply, such as the ORTEC Model 4001A/4002D. Required DC voltages and currents are: +12 V at 35 mA, +6 V at 70 mA, –6 V at 360 mA, and –12 V at 100 mA.

WEIGHT
Net 0.9 kg (2.0 lb).
Shipping 1.8 kg (4.0 lb).

DIMENSIONS NIM-standard single-width module, 3.43 x 22.13 cm (1.35 x 8.714 in.) front panel per DOE/ER-0457T.

Optional Accessories

The **Model 9306 1-GHz Preamplifier** is recommended for amplifying ultra-fast analog signals before presentation to the input of the Model 9307 pico-TIMING Discriminator. These ultra-fast analog signals require the use of 50-Ω coaxial cable with SMA connectors. To preserve the 350-ps rise time of the 9306, the total cable length from the detector to the preamplifier, and from the preamplifier to the 9307 should be <1.7 m. Consult the ordering information for the appropriate SMA cables and adapters.

For detectors having rise times >1 ns, the **Model VT120 Fast-Timing Preamplifier** should be substituted for the Model 9306. In that case, 50-Ω coaxial cables with BNC connectors can be used.

Consult the list below for BNC to SMA adapters, and refer to the Cables and Accessories data sheet for the desired cables.

Ordering Information

Model	Description
9307	pico-TIMING™ Discriminator
SMA58-0.15	RG-58A/U (50-Ω) Coaxial Cable with SMA Connectors, 0.15-m length
SMA58-0.5	RG-58A/U (50-Ω) Coaxial Cable with SMA Connectors, 0.5-m length
SMA58-1.5	RG-58A/U (50-Ω) Coaxial Cable with SMA Connectors, 1.5-m length
SMA/BNC	SMA to BNC Adapter with male SMA and female BNC
BNC/SMA	BNC to SMA Adapter with male BNC and female SMA

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