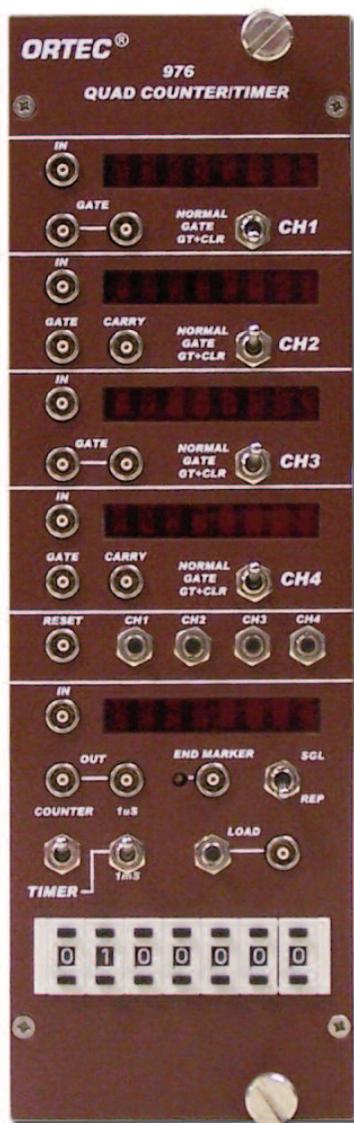# ORTEC®

- **Solves Multiple Counting Set-up Issues for Large Physics or Chemistry Experiments**
- **Four Independent 8-Digit Counters**
- **Fifth Counter or Timer**
- **Auto Repeat Counting**
- **Simple yet Flexible Multiple Counter**
- **Rate Divider and Delay Functions**
- **Five Displays**
- **250-MHz**
- **Fast NIM or TTL**

The 976 has four independent 8-digit counters each with their own display and can accept up to 250-MHz input rates. These counters can be cascaded to increase the word length to 16-digits for two counters, and 24-digits for three counters. Counters 2 and 4 have a "Carry" or overflow output to allow the cascading of the counters.

Counters 1 and 3 have a set of bridged gate connectors to allow a single gate to be used on multiple counters.

An 80-MHz fifth counter with its own display can be used as a timer, counter, rate divider, or delay.

Specifications

PERFORMANCE

Clock: 1 MHz crystal controlled internal clock ±50 ppm is provided. Temperature coefficient is <2 ppm/°C and jitter is <3 ppm with 1 µs clock period and <5 ppm with 1 ms clock period.

Time Delay Uncertainty: Equal to one clock period.

INPUTS AND OUTPUTS

CH 1, 2, 3, & 4 IN: Accepts positive TTL or Fast negative NIM signals. Minimum Pulse width is 2 ns. Pulse pair resolution is 4 ns. Accepts up to 250 MHz. Z_{in} = 50 Ω. LEMO 00 connector.

SECTION 5 IN: Accepts positive TTL or Fast negative NIM signals up to 80 MHz. Z_{in} = 50 Ω. LEMO 00 connector.

CH 1 & 3 Gate: Accepts positive TTL or Fast negative NIM levels. Z_{in} = 50 Ω. LEMO 00 connector.

CH 2 & 4 Gate: Accepts positive TTL or Fast negative NIM signals. Bridged input allows multiple connections. Z_{in} = 1 kΩ. LEMO 00 connector.

CH 2 & 4 Carry: Provides a fast NIM output when the counter has fully cycled (transisiton from maximum counts to zero) allowing cascade operation. LEMO 00 connector.

RESET: Input that clears all four counter inputs accepts positive TTL or Fast negative NIM levels. Z_{in} = 50 Ω. LEMO 00 connector.

LOAD: Input that accepts positive TTL or Fast negative NIM signals. Z_{in} = 50 Ω. Lemo 00 connector. Loads the section 5 counter with preset values from the thumb switches. Load input is disabled in REP mode, and while the counter is counting in SGL mode.

Note if the section 5 counter has an error condition due to:
- Using an external clock greater than 80 MHz.
- Using an external clock with pulse widths <3 ns.
- Changing the external clock frequency.
- Switching from internal to external clock.

The LOAD input signal (or LOAD pushbutton) will reset the section 5.

OUT: Two separate outputs provide a negative NIM level output (–800 mV) as long as the counter contents are other than zero. The trailing edge of the first input pulse initiates the NIM level output and the trailing edge of the last input pulse switches the output to zero.

END MARKER: Negative NIM level output (–800 mV). Pulse width adjustable from 50 ns to 1 µs.

CONTROLS

CH 1, 2, 3, & 4 NORMAL, GATE, GT & CLR Switches: Switches counter modes:
- Normal – Counter free runs and is incremented by the input.
- Gate – Counter runs only with a gate present.
- GT & Clear – Counter runs with gate present, the leading edge of the gate clears the counter.

A logic signal at the Reset input will reset all four counters to zero and individual channels can be manually reset by pushing the corresponding channel reset button.

AMETEK®

RST CH1, CH2, CH3, & CH4 Switches: Pushbutton will manually reset the corresponding channel to zero.

END MARKER (Trim pot): Screwdriver adjustment for the End Marker pulse width between 50 ns and 1 μs.

SGL/REP Switch: Switches mode of operation for section 5. SGL or Single mode disables the LOAD input during an active count. The LOAD input can start a new count after a count is complete. Once started, the counter counts until zero is reached and then stops. The LOAD button can start a new count at any time (even during a count). Note, the counter delays acceptance of a manual LOAD pulse (using the pushbutton) by 80 ns. REP or Repeat mode causes an automatic LOAD pulse to be generated 2 seconds after a cycle ends. Connection of the END MARKER output to the LOAD input removes this 2 second delay. The LOAD input is completely disabled in REP mode. Note, the LOAD pushbutton will still cause a restart at any time.

COUNTER/TIMER Switch: Switches the function of the fifth channel to act as either a counter or a timer.

1 μs/1 ms Switch: Switches the clock frequency in "Timer" mode to 1 MHz in the 1μs position and 1 kHz in the 1 ms position.

LOAD Switch: Pushbutton switch to load the thumbwheel settings for either the counter or timer mode for section 5.

Note, if the section 5 counter has an error condition due to:
• Using an external clock greater than 80 MHz.
• Using an external clock with pulse widths <3 ns.
• Changing the external clock frequency.
• Switching from internal to external clock.

The LOAD pushbutton (or LOAD input signal) will reset the section 5.

THUMBWHEEL Switches: Seven section switches that allow a preset value for either the counter or timer model for section 5.

ELECTRICAL AND MECHANICAL

POWER REQUIRED: +6 V, 0.7 A; –6V, 0.9 A

WEIGHT
    Net: 1.02 kg (2.3 lb).
    Shipping: 3.7 kg (8.2 lb).

DIMENSIONS: NIM-standard double width module   6.90 x 22.13 cm (2.70 x 8.714 in.) front panel per DOE/ER-0457T.

Ordering Information

Model	Description
976	Quad 250-MHz Counter/Timer

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