

## Model 978 Dual Timer/Pulse Generator Operating Instructions

### DESCRIPTION

The ORTEC 978 Dual Timer is a single-width NIM module housing two identical, flexible-triggered pulse generators. They produce triggered fast-negative NIM and ECL pulses or complementary NIM pulses with adjustable widths from 50 ns to 10 s. Each section has a pulse END MARKER output signal which can be used to re-trigger the timer for repeat mode. The START trigger can be activated electronically by an external signal or manually by a front-panel switch. The VETO input can act as an inhibit gate for the start input signal. Cascading the two timers forms a pulser with independently variable width and rate. Overall accuracy is 10% of full scale plus a temperature coefficient of 0.1% per °C.

Figure 1 shows the outputs for one of the sections. Figure 2 shows the front panel.

### SPECIFICATIONS

#### Outputs

- **Normal NIM** 2 independent, negative-going, fast-NIM outputs (LEMO 00,  $Z_{out} = 50 \Omega$ ); output width ranges from 50 ns to 10 s (plus  $\infty$  setting), controlled by 9-decade coarse-adjustment knob and fine-adjustment potentiometer with locking dial.
- **Normal ECL** 1 positive-going ECL output, (dual-pin, ECL logic,  $Z_{out} = 100 \Omega$ ); output width range and adjustment same as for normal NIM outputs.
- **Complementary NIM** 1 positive-going, fast-NIM output (LEMO 00,  $Z_{out} = 50 \Omega$ ); output width range an adjustment same as for normal NIM outputs.
- **END MARKER** Fast-NIM (LEMO 00  $Z_{out} = 50 \Omega$ ) and ECL (dual-pin,  $Z_{out} = 100 \Omega$ ); provides a 15 ns wide output pulse, the leading edge coincident with the trailing edge of the outputs within  $\pm 2$  ns. Can be connected to START input for free running operation (sequence activated manually with the START switch).

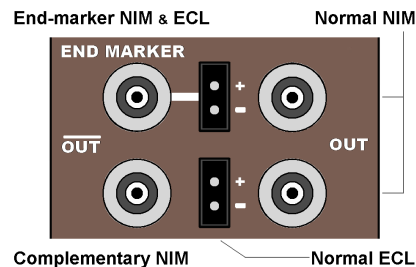


Figure 1. NIM and ECL Outputs.

**Dead Time** Shorter than the cycle time; the timer can be triggered well before the end of the timing cycle.

**Rise/Fall Time**  $\leq 2$  ns.

**I/O Delay** Delay from START to leading edge of output or from RESET to trailing edge is approximately 13 ns.

#### Inputs

**START** LEMO 00 connector inputs ( $Z_{in} = 50 \Omega$ ) accept fast-negative NIM signals with minimum pulse widths of 5 ns. ECL inputs are dual-pin with  $Z_{in} = 100 \Omega$ .

**VETO** LEMO 00 connector inputs ( $Z_{in} = 50 \Omega$ ) accept fast-negative NIM logic and disables the Start Inputs when logic is TRUE within  $\pm 2$  ns of Start leading edge.

**RESET** LEMO 00 connector inputs ( $Z_{in} = 50 \Omega$ ) accept fast-negative NIM logic, minimum width of 7 ns (15 ns for recurring operation). This input can be applied at any time producing an END MARKER.

#### Controls

**Momentary START** Switch generates an END MARKER signal and provides a manual RESET.

**WIDTH** Nine-decade selector from 50 ns to  $\infty$ . The  $\infty$  setting provides bi-stable operation.

**FINE WIDTH Potentiometers** Fine adjustment for each of the width switch settings with overlap. Accuracy  $\pm 10\%$  of full scale (temperature coefficient 0.1% per °C of setting).

## Indicators

**LED** LEDs flash for 0.1 s or the output width, whichever is greater (for output widths <0.1 s, the flashing rate is not synchronized with the output signals).

## Electrical and Mechanical

**Power Required** +6 V, 55 mA; -6 V, 560 mA; +12 V, 17 mA; +24 V, 40 mA; -24 V, 18 mA.

**Weight** Net 0.9 kg (2 lb), shipping 2.25 kg (5 lb).

**Dimensions** NIM-Standard single width 3.43 cm x 22.13 cm (1.35 in x 8.714 in) front panel per DOE/ER-0457T.

**CE** Conforms to CE standards low-voltage power directives.

## TEST PROCEDURE

Necessary equipment: 20 MHz pulse generator (NIM standard and ECL outputs); oscilloscope (Tektronix Model 475A or equivalent).

- 1) Set the output coarse-adjustment selector in the  $\infty$  position.
- 2) Move the START switch to the right; the LED will light and remain on.
- 3) Move the START switch to the left or feed the RESET input the proper signal; the lamp should switch off.
- 4) Put the output coarse-adjustment selector in any other position.
- 5) Feed the START input a NIM signal having a period greater than the selected width.
- 6) Check that the OUT and OUT signals have the same period as the START width input, and that the width varies uniformly within the selected limits controlled by the FINE WIDTH potentiometer.
- 7) Check that the END-MARKER output signal starts on the trailing edge of the OUT signal, and has a 15–20 ns width.
- 8) Repeat steps 4–7 for all width settings.
- 9) Feed the START input an ECL signal having a period greater than the selected width. Repeat steps 6–8.
- 10) Feed the START input a NIM signal, feed the VETO input another NIM signal. If the leading edge of the START input coincides with the leading edge of the VETO input ( $\pm 1$  ns), the 978 must be inhibited.

**NOTE:** In the  $\infty$  position the outputs are dc levels.



Figure 2. Front Panel.

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