

**Octal Constant Fraction Discriminator**

- Good time resolution with a wide range of pulse amplitudes
- Internal delay - no cable necessary
- ECL outputs
- Energy Outputs
- Automatic walk adjustment
- Multiplicity and OR logic outputs
- Analog sum output
- Inhibit input

The flexible ORTEC CF8000 Octal Constant-Fraction Discriminator has the performance and convenience features necessary for ease of use in even the most demanding timing or coincidence experiments with multiple detectors. It contains eight constant-fraction discriminators in a single-width NIM module. The constant-fraction technique provides optimum time resolution over a wide range of pulse amplitudes.

Exclusive features of the CF8000 discriminator include internal shaping delay, automatic walk adjustment, an analog summation output, and built-in logic functions to minimize external logic requirements.

The input signals can range from 0 to -5 V. Each input has a separate threshold adjustment (with front-panel monitor), which may range from -10 mV to -1 V.

For each channel, there are three Fast-NIM logic outputs - one "A" and two "B" outputs. All outputs have adjustable widths. There is a single-width adjustment for all eight "A" outputs, and another width adjustment for all 16 "B" outputs. There are also eight rear-panel ECL outputs that have the same width as the "B" outputs. LEMO connectors are used for maximum packing density.

Each channel has a rear-panel "E" output that buffers the input signal.

External delay cables are not necessary on the CF8000 discriminator. Each channel has an internal shaping-delay circuit that can be set for 2, 4, 6, 8, or 10 ns. Optional delay line plug-ins are available for changing the shaping delay ranges to 5, 30, or 50 ns. For all delay plug-ins, there are five possible delay settings. (See Accessories section.)

The automatic-walk adjustment of the CF8000 instrument simplifies set-up and reduces the effects of ground-loops on the incoming signal.

Other front-panel connections include: (1) an analog sum output ( $\Sigma$ ), which provides an attenuated summation of all inputs; (2) a multiplicity output (M), which provides a voltage proportional to the number of valid "B" outputs; (3) an OR logic output that provides a logic output for every active "B" output; and (4) an inhibit input (INH), which disables all "B" outputs.

The constant-fraction ratio is factory set at 0.4.

**PERFORMANCE**

**WALK**  $<\pm 250$  ps from -50 mV to -5 V for a pulse rise time of 1 ns, a pulse width of 10 ns, a 2-ns delay, and the threshold set at minimum.

**CONSTANT-FRACTION RATIO** 0.4.

**INPUT/OUTPUT RATE** 20 MHz maximum.

**PULSE/PAIR RESOLUTION**  $<50$  ns.

**TRANSMISSION DELAY**

**"A" Outputs** 13 ns, typically.

**"B" Outputs** 16 ns, typically.

**THRESHOLD TEMPERATURE**

**SENSITIVITY**  $<\pm 100$  ppm/ $^{\circ}$ C from 0 to  $+50^{\circ}$ C.

**ELECTRICAL AND MECHANICAL**

**POWER REQUIRED** +12 V, 40 mA; -12 V, 40 mA; +6 V, 250 mA; -6 V, 1000 mA.

**WEIGHT** 1.5 kg (3.3 lbs).

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

**OPTIONAL ACCESSORIES**

**CFD-DELAY-5 ns** Delay plug-in for 1, 2, 3, 4, or 5-ns delay settings.

**CFD-DELAY-10 ns (Factory installed in the instrument)** Delay plug-in for 2, 4, 6, 8, or 10-ns delay settings.

**CFD-DELAY-30 ns** Delay plug-in for 6, 12, 18, 24, or 30-ns delay settings.

**CFD-DELAY-50 ns** Delay plug-in for 10, 20, 30, 40, or 50-ns delay settings.

**CONTROLS**

**THRESHOLD CONTROL (TH)** 20-turn front-panel screwdriver adjustment for each discriminator channel; nominally variable from -30 mV to -1 V.

**THRESHOLD MONITOR** Front-panel test point located to the right of the threshold control. Outputs actual threshold voltage.

**WIDTH ADJUSTMENTS (TA and TB)**

20-turn front-panel screwdriver adjustments to set the width of the "A" and "B" Fast-NIM logic outputs. Adjustment range: nominally 20-200 ns.

**DELAY** Internal PCB jumper setting allows the proper shaping delay to be selected. Five possible positions: 2, 4, 6, 8, or 10 ns. Other delays available on order.

**INPUTS**

**INPUTS** Front-panel LEMO connector for each channel.

**INPUT RANGE** 0 to -5 V.

**PROTECTED TO** -100 V for pulse duty cycles  $<0.05\%$ .

**IMPEDANCE** 50  $\Omega$ , dc-coupled.

**INHIBIT INPUT** Front-panel LEMO connector accepts negative Fast-NIM signal. Active-low signal disables "B" logic outputs.

**OUTPUTS**

**"A" LOGIC OUTPUTS (A)** Eight front-panel LEMO connectors provide adjustable-width, updating Fast-NIM logic signals for inputs above threshold setting. **Amplitude** -0.7 V minimum with 50- $\Omega$  load. **Width** Settable from nominally 20-200 ns by 20-turn front-panel screwdriver adjustment (TA).

**"B" LOGIC OUTPUTS (B)** Sixteen front-panel LEMO connectors provide adjustable-width, updating Fast-NIM logic signals for inputs above threshold setting. **Amplitude** -0.7 V minimum with 50- $\Omega$  load. **Width** Settable from nominally 20-200 ns by 20-turn front-panel screwdriver adjustment (TB).

**MULTIPLICITY OUTPUT (M)** Front-panel LEMO connector provides a pulse signal with amplitude proportional to the number of "B" logic outputs active at any instant.

**Amplitude Range** Nominally 0 to -0.5 V with 50- $\Omega$  load.

**OR OUTPUT (OR)** Front-panel LEMO connector provides logical OR of all "B" logic outputs. Negative Fast-NIM signal.

**ANALOG SUM OUTPUT ( $\Sigma$ )** A front-panel LEMO connector provides an analog summation of all input channels divided by an attenuation factor of approximately 16, with a 50- $\Omega$  load.

**ENERGY OUTPUTS** Eight, rear-panel LEMO connectors provide the buffered input signal from each channel.

**ECL OUTPUTS** Rear-panel 2 x 8 differential ECL logic connector that provides an ECL version of the eight "B" outputs.

**Line Impedance** 112  $\Omega$ .