Innovator In Spectroscopy Equipment

CONSTANT FRACTION DISCRIMINATOR
MODEL CFD2017

NUCLEAR INSTRUMENTS MODULE

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Features:

- 100MHz count rate
- 1000: 1 dynamic range
- Five operating modes
  - CFT (Constant Fraction Timing)
  - LET (Leading Edge Timing)
  - CFRR (Constant Fraction with Slow Rise Time Rejection)
  - ZCT (Zero Cross Timing)
  - ARC (Amplitude and Rise Time Compensated Timing)
- Walk < 30psec typically for 100: 1 Range
- Simultaneous Dual Positive and Negative Fast NIM Outputs
- Multicolor Count Rate Indicator
- Full DC coupling
- Full adjustable module

Description:

The Model CFD2017 is a fully dc-coupled Unit with a dynamic range of up to 1000:1. Five operating modes provide optimum time resolution for many detector types and applications. For example:

CFT-Constant fraction mode for fast detectors, CFRR-Slow rise time reject mode for Ge detectors, LET-Leading edge mode for single photon counting In addition, internally selectable program modules provide for

1) User change of fraction from the standard 40%
2) Operation of the unit as a Zero Crossing Discriminator for bipolar inputs
3) Operation of the unit as a Leading Edge Discriminator without termination of the delay ports.

The Model 2017 has a dc-coupled 50 ohm input which accepts negative pulses. The constant fraction composite signal is formed by the algebraic sum of a direct, attenuated signal path and a delayed. The delay time is user selected by cable delay. Optimum selection of this external delay provides full compensation for timing distortions due to both amplitude- and rise time variations in the input signal.

Four simultaneous, independent output signals are provided. The two positive outputs are adjustable in width, the width duration sets the internal dead time required to suppress spurious outputs due to input signal anomalies. The two negative outputs are fixed-width pulses keyed to the start of the dead time period. The front panel WALK ADJUST control and INSPECT OUTPUT permit the user to trim the time walk characteristics of the experimental setup for optimum timing resolution. A novel front panel LED indicates count rate by color change.

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Specifications:

- **Inputs:**
  - Input - Accepts -5 mV to -5V linear pulses: width: > 1nsec, Zin= 50 Ohms, dc coupled; front panel BNC connector.
  - Delay - 2 front panel BNC connectors accept 50 Ohm delay cable to form the internal constant fraction signal.
- **Outputs:**
  - Walk Inspect - Displays signal of zero crossing discriminator for use in trimming time walk.
  - Leading EDGE - (With fraction module inserted) displays leading edge discriminator output.
  - Outputs (-) - Two independent negative current outputs, each providing -32mA into 50 ohms; rise time < 3 ns, pulse width 5 ns nominal, dc coupled.
  - Outputs (+) - Two independent positive voltage outputs providing 2 V (minimum) into 50 ohms, rise time< 5 ns, width adjustable by adjacent width trimming potentiometer, which also determines internal dead time.
  - Clip Cable (Rear Panel) - 2 BNC connectors accept 50 Ohm delay cable to adjust width of the negative output pulses: controlled by adjacent IN-EXT switch.
- **Controls**
  - Threshold - Front panel 10-turn locking dial potentiometer to set acceptance threshold for input pulses: range - 5mV to -2V.
  - Inspect Walk - Front panel trim pot to compensate walk of the internal zero crossing discriminator.
  - Leading Edge Width - Front panel trim pot: With fraction module inserted sets leading edge width to input pulse duration: With zero cross module inserted sets leading edge width beyond Z/C point of the input signal.
  - CFRR-CFT-LET - Front panel three position rotary switch to select constant fraction with slow rise time reject (CFRR), basic constant fraction timing (CFT), or leading edge timing (LET) modes of operation.
  - **Output Width** - Front panel 10-turn screwdriver adjustable potentiometer to set width of slow positive output pulse, which is equal to the internal dead time of the discriminator - max. Setting: 1μsec.
  - **IN—EXT (Rear Panel)** - Toggle switch allows use of external cable to widen negative outputs.

Performance

- Dynamic Range - 1000:1
- CF Mode Walk - <±50ps (typically ±30ps) for-30mV to -3V range with <2nsec rise time.

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- Counting Rate up to 100 MHz, limited by dead time (Output Width setting).
- Pulse Pair Resolution - <10ns, or as limited by dead time.
- Temperature Range - 0 to + 50°C
- Typical Cable Lengths (RG-58)
  - For Plastic or NE213 detectors- 0.3 to 0.5m
  - For NaI and Si (S.B.) detectors- 0.5 to 1.0m
  - For Planar Germanium detectors- 1.0 to 2.0m
  - For Coaxial Ge- 2.0 to 4.0m

Electrical and Mechanical Power Required:

- **Typical Power Requirements**
  - Standard version +6 V - 150mA, - 6 V - 420mA
- **Physical**
  - Size: Single width NIM module 3,43 X 22,12 cm (1.35 X 8.71 inches) per TID-20893 (rev.)
  - Weight: Net Weight - 0.9kg (2.0lbs.) & Shipping Weight - 2.2 kg (4.9 lbs.)
- **Accessories Included**
  - Fraction module f = 0.4
  - Leading edge module
  - Zero cross module


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