

- **16-input, high-performance MCA in a two-wide NIM**
- **Integral Ethernet connection for instant integration into CONNECTIONS spectroscopy networks**
- **16k-channel data memory,  $2^{31}-1$  counts per channel**
- **4k-channel ADC (15- $\mu$ s fixed conversion time)**

The ORTEC Model 920E is a member of the EtherNIM family of multichannel buffers. Combined with appropriate computer hardware, ORTEC signal-processing electronics, and ORTEC *CONNECTIONS* applications software, EtherNIM multichannel buffers are the ideal data acquisition hardware for a wide variety of applications in pulse-amplitude spectrometry. The 920E, a two-wide NIM, accommodates up to 16 inputs, with independent start/stop/ preset control. The unique “dynamic routing” feature enhances flexibility.

The Model 920E provides the following functions (see block diagram):

1. High-speed multiplexer/router with 16 inputs
2. 4k-channel, successive-approximation ADC, with fixed conversion time of <15  $\mu$ s; memory divisible into 1, 2, 4, 8, or 16 segments; memory size selectable as 1024, 2048, 4096, or 16,384 channels. Connection between physical input and memory segment allocated under software control (“dynamic routing”).
3. Nonvolatile memory; 16k channels,  $2^{31}-1$  counts per channel

The 920E is readily connected into an Ethernet environment. It may be integrated easily into existing networks. Control and spectral display is achieved by using a suitable ORTEC *CONNECTIONS* applications package such as MAESTRO, AlphaVision, or Renaissance.

The 920E employs a dual Direct Memory Access (DMA) architecture to maximize system throughput. The unique “dynamic routing” feature allows any one, or any

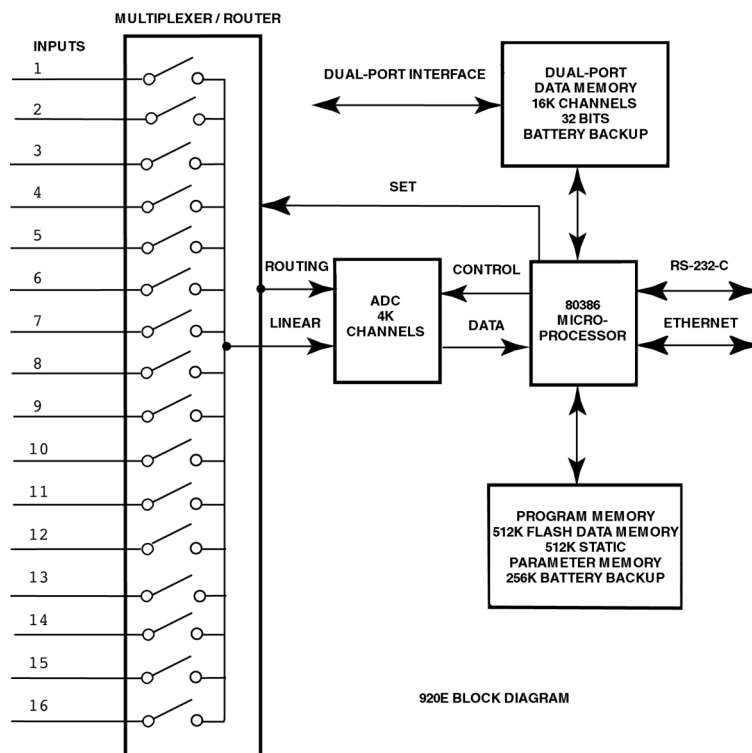
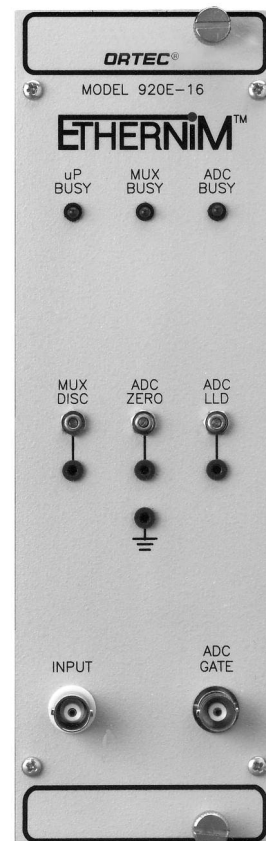
group of inputs to be routed to any memory segment. This has many applications in areas as diverse as whole-body counting and fuel-pin scanning.

The communications protocol used by the 920E is the “traditional” NIM digital bus NIM/488<sup>1</sup> per DOE/ER-0457T (formerly NIM-GPIB) protocol used for several years in all ORTEC MCB products.<sup>2</sup>

For the “Do it yourself” programmer, software toolkits are available to simplify the task of making a user-written application communicate with the Model 920E.

<sup>1</sup>Please refer to “Standard NIM Digital Bus (NIM/488),” DOE/ER-0457T, U.S. NIM committee, May 1990; Standard NIM Instrumentation System, NTIS, U.S. Department of Commerce, Springfield, Virginia 22161.

<sup>2</sup>The 920E also provides the ORTEC Dual-Port Memory connector on the rear panel. DPM communications are still supported by ORTEC applications packages for historical reasons, but Ethernet communications are recommended in most cases, for convenience (especially over large distances) and for ease and reduced cost of implementation. An RS-232-C port is also provided for diagnostic purposes.



920E BLOCK DIAGRAM

# 920E

## 16-Input Multichannel Buffer

### Specifications

#### PERFORMANCE

**ADC** Successive-approximation type with sliding scale linearization.

**MAXIMUM RESOLUTION** 4096 channels, software selectable independently for each segment as 64, 128, 256, 512, 1024, 2048, and 4096.

**DIGITAL OFFSET** Independent for each segment in increments of 1 channel from 0 to 4096.

**CONVERSION TIME PER EVENT** 15  $\mu$ s (fixed).

**INTEGRAL NONLINEARITY**  $\leq \pm 0.025\%$  over top 97% of dynamic range.

**DIFFERENTIAL NONLINEARITY**  $\leq \pm 1\%$  over top 97% of dynamic range.

**GAIN INSTABILITY**  $< 50$  ppm/ $^{\circ}$ C.

**DEAD TIME CORRECTION** Extended Live-Time correction according to Gedcke-Hale method.<sup>3</sup>

**DATA MEMORY** 16k channels of nonvolatile memory;  $2^{31}-1$  counts per channel (over 2 billion).

#### PRESETS

**Real Time/Live Time** Multiples of 20 ms.

**Region of Interest** Peak count/integral count.

**Data Overflow** Terminates acquisition when any channel exceeds 2 billion.

**Peak Uncertainty**

**Nuclide MDA**

#### MULTIPLEXER/ROUTER

**Inputs** One to 16, software selectable.

**Signal Isolation** Typically  $> 72$  db rejection of unselected inputs.

**Input Threshold** Set by front-panel screwdriver adjustment. Range is from 100 to 500 mV and is common to all inputs.

**Gain** Nominally unity.

**DC Level Instability**  $\leq 20$   $\mu$ V/ $^{\circ}$ C.

**Integral Linearity** 0.05%.

**Gain Instability** 50 ppm/ $^{\circ}$ C.

#### FRONT-PANEL INDICATORS

**CPU BUSY** Red LED's intensity indicates the relative activity of the microprocessor.

**MUX BUSY** Red LED's intensity indicates the relative activity of the multiplexer/router.

**ADC BUSY** Red LED flashes once for each pulse digitized by ADC.

#### CONTROLS

**MUX DISC** Screwdriver potentiometer from 100 to 500 mV.

**ADC ZERO** Screwdriver potentiometer adjusts the ADC zero offset  $\pm 250$  mV.

**ADC LLD** Screwdriver potentiometer adjusts the lower level discriminator from 0 to 50% of full scale.

#### INPUTS

**INPUT 1** Front-panel BNC accepts positive unipolar, positive gated integrator, or positive-leading bipolar, +10 V, pulse; +12 V maximum; semi-Gaussian-shaped or gated-integrator-shaped time constants of 0.50 to 30  $\mu$ s.  $Z_{in} = 1000 \Omega$ , dc-coupled. No internal delay.

**AMPLIFIER INPUTS** Accepts positive unipolar, positive gated integrator, or positive-leading bipolar +10 V; +12 V maximum; semi-Gaussian-shaped or gated-integrator-shaped time constants of 0.50 to 30  $\mu$ s.  $Z_{in} = 1000 \Omega$ , dc-coupled. No internal delay. Inputs 1 to 16 are on rear-panel, 50-pin Amplifier Input connector. Optional cable (920-16-OPT1) converts 50-pin D connector to multiple BNCs.

**ADC GATE** Optional, slow positive NIM input. Computer-selectable Coincidence or Anticoincidence. Signal must occur prior to and extend 0.5  $\mu$ s beyond peak of input pulse. Front-panel BNC connector. Gate control for all active inputs.

#### INTERFACES<sup>4</sup>

**ETHERNET** Rear-panel BNC connector, accepts IEEE 802.3 10BASE2 (thin-wire coax).

#### ELECTRICAL AND MECHANICAL

**POWER REQUIRED** +24 V, 165 mA; -24 V, 165 mA. +12 V, 160 mA; -12 V, 110 mA; +6 V, 1.2 A.

#### WEIGHT

**Net** 2.25 kg (5 lb).

**Shipping** 3.1 kg (7 lb).

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

### Ordering Information

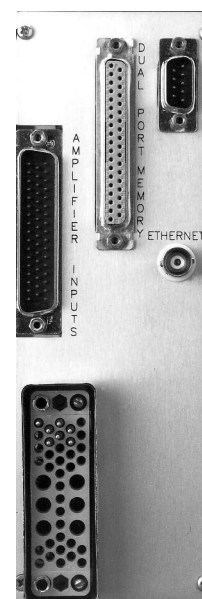
Model	Description
920E	920-16 EtherNIM Multichannel Buffer with 16 detector inputs
920-16-OPT1	Optional cable to convert 50-pin D connector to multiple BNCs for Model 920E

<sup>3</sup>Ron Jenkins, R.W. Gould, and Dale Gedcke, *Quantitative X-Ray Spectrometry* (New York: Marcel Dekker, Inc.), 1981 pp 266-267.

<sup>4</sup>The following connectors are also available:

**Dual-Port Memory** — ORTEC dual-port interface, 37-pin D connector.

**RS-232-C** — Serial standard RS-232-C 25-pin; male wired as DTE to run at 38.4k baud maximum, with modem control. Software selectable baud rate. (For diagnostics)



Specifications subject to change  
082916

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