

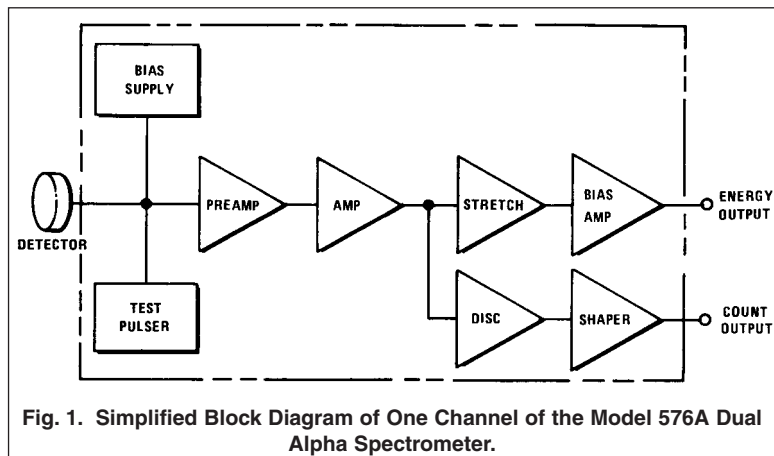
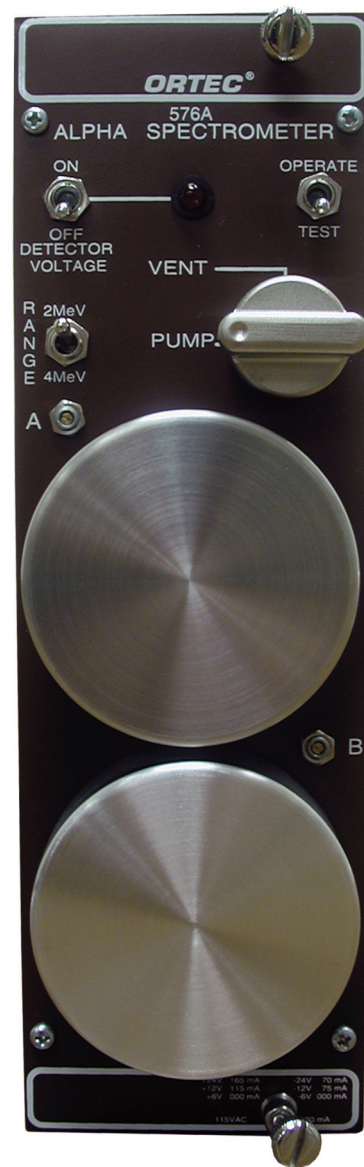
- Two independent alpha-spectroscopy channels
- Each channel includes vacuum chamber, sample holder, detector, bias supply, preamplifier, amplifier, biased amplifier, test pulser, and discriminator
- Separate energy range selections for each channel: 3–5, 4–6, or 5–7 MeV and 3–7, 4–8, or 5–9 MeV
- Choice of either vertical or horizontal sample holder
- Available with ULTRA™ or Ruggedized™ detector areas of 300 mm<sup>2</sup>, 450 mm<sup>2</sup>, or 600 mm<sup>2</sup>

The Model 576A Dual Alpha Spectrometer is a self-contained, double-wide NIM module that contains two independent alpha-spectroscopy channels. Each channel includes a vacuum chamber, a choice of either a vertical (requires a “B” mounted detector) or horizontal (requires a “T” mounted detector) sample holder, and ORTEC ULTRA low-background, ion-implanted silicon detector or a Ruggedized low-background surface barrier detector (300-mm<sup>2</sup>, 450-mm<sup>2</sup>, or 600-mm<sup>2</sup> detectors are available), a detector bias supply, a preamplifier, a shaping and stretching amplifier, a biased amplifier, a test pulser, and a discriminator (Fig.1). The unit is factory calibrated, and no further adjustments are necessary.

By a simple jumper selection on the side panel and a front-panel energy range switch, each channel can be set so that the output range represents energies from 3 to 5, 4 to 6, or 5 to 7 MeV in the 2-MeV position; and from 3 to 7, 4 to 8, or 5 to 9 MeV in the 4-MeV position. Another simple jumper selection sets the internal pulser signal at the center of the appropriate range (Fig.2).

Together with a vacuum pump and a multichannel analyzer, the Model 576A provides a complete reliable, easy-to-operate, low-level dual alpha spectroscopy system. Eight- or sixteen-channel alpha spectroscopy systems can easily be configured by utilizing the ORTEC Model 920E 16-Input Multichannel Buffer.

The special ULTRA or Ruggedized low-background detectors supplied with each Model 576A Dual Alpha Spectrometer have been processed through the standard ORTEC quality control procedures. To eliminate the possibility of low-level alpha contamination, these detectors have not been exposed to alpha particles. Instead, alpha resolution is measured on a representative sample of detectors from each batch of ULTRA or Ruggedized low-background detectors produced to ensure that the specified alpha resolution is met. The alpha resolution and noise resolution are measured in accordance with IEEE Standard 300-1998. (Ruggedized detectors are tested at a 0.5 μs amplifier shaping time constant, ULTRA detectors at 1.0 μs).



# 576A

## Dual Alpha Spectrometer

### Specifications

#### PERFORMANCE

**SYSTEM NOISE**  $\leq 24$  keV FWHM for 300- and 450-mm<sup>2</sup> detectors and  $\leq 35$  keV FWHM for 600-mm<sup>2</sup> detectors (at 22°C).

**BACKGROUND†**  $< 30$  counts/day above 3.0 MeV (measured from COUNT output) with 300- and 450-mm<sup>2</sup> active area, both R-Series and ULTRA detectors; and  $< 40$  counts/day for 600-mm<sup>2</sup> active area, both with R-Series and ULTRA detectors.

**SAMPLE SIZE** Up to 3.8 cm (1.5 in.) diameter planchets or filter paper for vertical sample holder; up to 2.54 cm (1.0 in.) diameter for horizontal sample holder.

**SAMPLE SPACING** The vertical sample holder is supplied with a ~1-mm source-to-detector spacer. Spacers of up to ~15-mm are available by special order. The horizontal sample holder provides 1-mm or 5-mm spacing from the detector housing.

**ENERGY RANGES** Separately selectable for each channel: 3 to 5 MeV, 3 to 7 MeV, 4 to 6 MeV, 4 to 8 MeV, 5 to 7 MeV, or 5 to 9 MeV. Limited operation from 0 to 2 MeV or 0 to 4 MeV.

**NONLINEARITY**  $\leq \pm 0.1\%$  of full-scale energy (5, 6, 7, 8, or 9 MeV as selected) in accordance with IEEE Standard No. 301-1988.

**ELECTRONIC SYSTEM INSTABILITY**  $\leq \pm 0.15\%$  of full-scale energy for 22°C in accordance with IEEE Standard No. 301-1988.

**DETECTOR VOLTAGE SUPPLIES** Fixed at 50 V to preamplifier section; polarity individually selectable on printed wiring board (PWB) for each channel. The Model 576A is shipped with the bias polarity positive when equipped with ULTRA detectors, and negative when equipped with Ruggedized detectors.

**PULSER** 50 ppm/°C; rate ~100 counts/s.

#### CONTROLS

**VACUUM FACILITY** Rear-panel vacuum pump connector for connection to roughing pump or vacuum manifold; Swagelok® connector for 1/4-in. O.D. tubing.

**PUMP/VENT** Two-position, front-panel valve control selects either the vacuum line or atmospheric pressure for both chambers.

**DETECTOR VOLTAGE** On/Off toggle switch with LED indicator on front panel controls power to both detector voltage supplies.

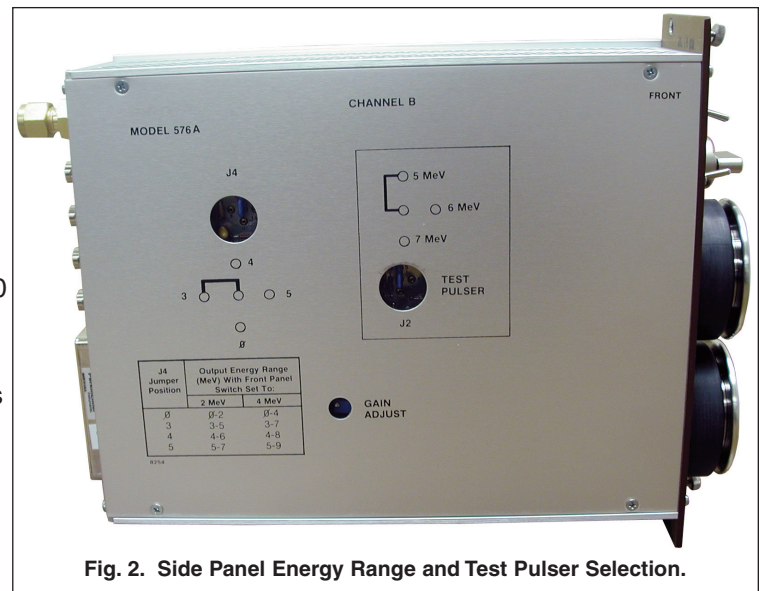


Fig. 2. Side Panel Energy Range and Test Pulsers Selection.

**PULSER (OPERATE/TEST)** Front-panel toggle switch turns on both pulsers for Test and turns off both pulsers for Operate.

**RANGE** Front-panel, two-position toggle switch. Allows selection of an energy span of 2 MeV or 4 MeV above biased amplifier energy level selected by PWB jumper J4.

**BIAS ENERGY LEVEL** Front-panel trim potentiometers marked A and B allow adjustment of energy zero for each channel. Range of adjustment is about 100 keV.

**ENERGY RANGE** PWB jumpers (J4) allow selection of lower end of energy range as either 0, 3, 4, or 5 MeV. Jumpers are accessible through side panels.

**TEST PULSER** PWB jumpers (J2) allow selection of internal pulser energies of 5 MeV, 6 MeV, or 7 MeV. Jumpers are accessible through side panels.

**GAIN** PWB-mounted potentiometers accessible through the side panels for gain adjustment if exact matching of gain of multiple channels is desired.

#### OUTPUTS

**CHANNEL A ENERGY** 0.1 to 10 V positive pulses representing an energy span of 2 MeV or 4 MeV above selected biased amplifier lower level (0, 3, 4, or 5 MeV); stretched for MCA compatibility except for the 0 to 2 MeV range of operation.

**CHANNEL B ENERGY** Same as Channel A Energy characteristics.

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**CHANNEL A COUNT** A positive NIM logic pulse is furnished for each alpha above 2.7 MeV; can be used for gross counting or for MCA subgroup routing.

**CHANNEL B COUNT** Same as Channel A Count characteristics.

### ELECTRICAL AND MECHANICAL

**POWER REQUIRED** +12 V, 115 mA; -12 V, 75 mA; +24 V, 165 mA; -24 V, 70 mA; 117 V ac, 60 mA.

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

**WEIGHT**

Net 2.4 kg (5.2 lb)  
Shipping 3.3 kg (7.3 lb)



### Ordering Information

Model No.	Description
576A-XXXV	576A module without Detectors; Vertical Sample Holder
576-XXXH	576A module without Detectors; Horizontal Sample Holder

When purchasing detectors separately, please indicated "for use with Model 576A Dual Alpha Spectrometer" on your purchase order, and specify the geometrical configuration desired (vertical or horizontal). Detector extraction tools are **not** supplied with this model.

**with ULTRA-AS Detectors**

576A-300UV	Vertical 576A module with two 300-mm <sup>2</sup> ULTRA-AS
576A-450UV	Vertical 576A module with two 450-mm <sup>2</sup> ULTRA-AS
576A-600UV	Vertical 576A module with two 600-mm <sup>2</sup> ULTRA-AS
576A-300UH	Horizontal 576A module with two 300-mm <sup>2</sup> ULTRA-AS
576A-450UH	Horizontal 576A module with two 450-mm <sup>2</sup> ULTRA-AS
576A-600UH	Horizontal 576A module with two 600-mm <sup>2</sup> ULTRA-AS

**with Ruggedized Detectors**

576A-300RV	Vertical 576A module with two R-Series (300 mm <sup>2</sup> , 100 μm deep)
576A-450RV	Vertical 576A module with two R-Series (450 mm <sup>2</sup> , 100 μm deep)
576A-600RV	Vertical 576A module with two R-Series (600 mm <sup>2</sup> , 100 μm deep)
576A-300RH	Horizontal 576A module with two R-Series (300 mm <sup>2</sup> , 100 μm deep)
576A-450RH	Horizontal 576A module with two R-Series (450 mm <sup>2</sup> , 100 μm deep)
576A-600RH	Horizontal 576A module with two R-Series (600 mm <sup>2</sup> , 100 μm deep)

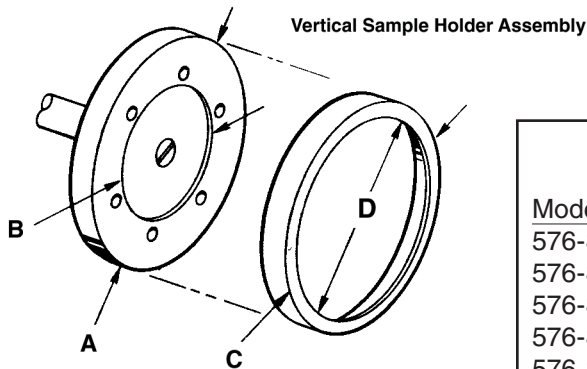
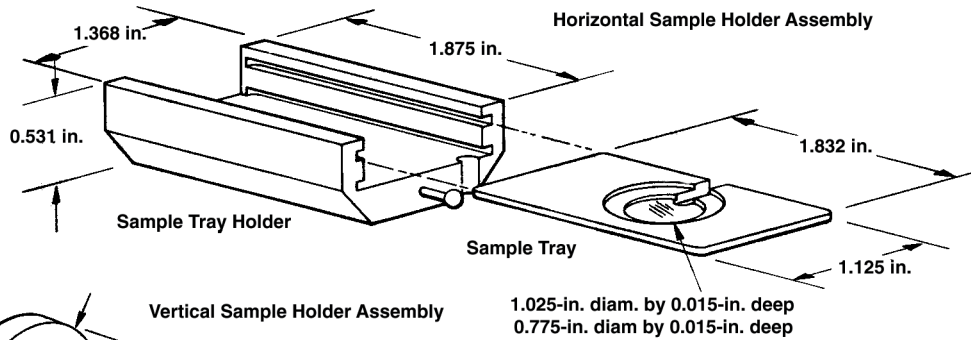
- Vertical models include two 576-SHAV-K sample holder assembly kits (unless other sample holders are requested) and one 576-DETV detector extraction tool.
- Horizontal models include two 576-HTH horizontal sample tray holders, two 576-HT horizontal sample trays, and one 576-DETH detector extraction tool.

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## Dual Alpha Spectrometer

### Accessories and Sample Holder Assemblies

- 576-DETH Horizontal Detector Extraction Tool
- 576-DETV Vertical Detector Extraction Tool
- 576-HTH Horizontal Sample Tray Holder
- 576-HT Horizontal Sample Tray
- 576-OVC Spare O-Rings
- 576-SHAV-S Customized Sample Holder
- 576-SHAV-K Sample Holder Kit (includes 576-SHAV-1, 576-SHAV-2, 576-SHAV-4, and 576-SHAV-5)
- 576-SHAV-1 Vertical Sample Holder (for use with 1" x 0.025" thick flat metal planchet)
- 576-SHAV-2 Vertical Sample Holder (for use with 1.25" x 0.025" thick flat metal planchet)
- 576-SHAV-3 Vertical Sample Holder (for use with 25-mm filter paper)
- 576-SHAV-4 Vertical Sample Holder (for use with 37-mm filter paper)
- 576-SHAV-5 Vertical Sample Holder (for use with .75" x 0.025" thick flat metal planchet)
- 576-VCD Vacuum Chamber Door



Model No.	Sample Holder Dimensions (Diameter)		Retaining Ring Dimensions (Diameter)	
	A	B	C	D
576-SHAV-1	1.500	1.010	1.555	0.910
576-SHAV-2	1.500	1.260	1.555	1.160
576-SHAV-3	1.000	No C Bore	1.055	0.890
576-SHAV-4	1.500	No C Bore	1.555	1.390
576-SHAV-5	1.000	0.765	1.055	0.670

Specifications subject to change  
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