

CsI Scintillation Detector Counting System

The most common inorganic scintillator employed in nuclear medicine is thallium-activated sodium iodide or CsI developed for use in gamma ray counting.

Necessary Equipment

- CsI Detector
- Preamplifier Model 3001
- Bin Power Supply Model 8010
- High Voltage Power Supply Model 8100
- Amplifier Model 3600
- Timing Single Channel Analyzer (TSCA)-2575
- Counter-Timer 20 Ch -2655
- BNC and SHV Cables
- Gamma Emitting Source

All products are provided by Iman Gostar Raman Kish company

Instruments Used in This Set

1. CsI Detector

CsI detector is available in various sizes (usually "3 ×" 3 detector)

2. Preamplifier Model 3001

The IAP 3001 scintillation preamplifier is an all-transistor preamplifier designed for use with photomultiplier tubes. It is non inverting preamplifier with no provisions for pulse shaping excepts the variation of fall time. A diode network prevents destruction of the input transistor if a sudden positive or negative high voltage is applied to the input.

Specification

- Rise time: $< 60nsec$.
- Fall time: fall time constant is designed for $50\mu sec$, assuming a signal source impedance of $1M\Omega$
- Internal nonlinearity: $\leq 0.02\%$.
- Power required: +24V dc, 17mA; -24Vdc, 17mA; supplied from any IAP transistor main amplifier or an IAP preamplifier power supply through 10-ft captive cable.
- Input: BNC connector; isolated for 1000V; positive or negative polarity, $1M\Omega$ impedance shunted by 45 pF plus the capacity selected by jumper S1 (0,100, 200, 500, or 1000 pF).
- Test pulse: BNC connector; accepts a pulse generator output with fast rise and slow decay to check operation of the electronics; input impedance

3. BIN Power Supply Model 8010

The 8000 power supply is a 19 inch rack with a power supply of 160 watts, and all of its connectors have the standard voltage of a NIM bin.

Specifications

- Input: 220 or 115 Vac,
- Output impedance: $< 0.3\Omega$ at any frequency up to 100 KHZ for the dc output.
- Temperature coefficient: $< 0.02\% / ^\circ C$, 0 to $60^\circ C$.
- Output ripple: $< 3 mV$
- Voltage Adjustment: $\pm 2\%$ minimum range

4. 8100 High Voltage Power Supply

The IAP 8100 high voltage power supply is used for biasing various detectors.

Specifications

- Output polarity: Positive or negative
- Output voltage: 0 to 3 KV
- Output current: 0- 10 mA
- Output ripple: $< 10 mV$

- Power: 220 Vac

5. Spectrophotometer Amplifier Model 3600

The 3600 spectrophotometer amplifier used in nuclear spectrometers amplify and shape the signals coming from the preamplifier.

Specifications

- Input: accepts positive or negative pulses from an associated preamplifier.
- Input impedance: $\approx 1\text{kilohm}$.
- Connector: BNC
- Output: Semi-Gaussian shaped pulses, unipolar and bipolar
- Output: $\pm 5\text{ mV}$
- Output impedance: $\approx 93\text{ ohms}$
- Gain factor: 0.3 -3000

6. Timing Single Channel Analyzer: TSCA

The TSCA device is used as a single-channel analyzer (SCA) or a discriminator. Its main output is a fast negative signal and a slow positive pulse. Two separate outputs are considered for low and high level analyzers in this device.

Specifications

- Dynamic range: 1-200
- Pulse pair resolving time: minimum pulse-pair resolving time for negative and positive output is 200 ns.
- Temperature instability: less than $\pm 0.01\% / ^\circ\text{C}$
- Discriminator nonlinear: less than $\pm 0.25\%$
- Delay temperature instability: less than $\pm 0.03\% / ^\circ\text{C}$
- Delay nonlinear: less than $\pm 2\%$

7. Counter-Timer 20 Ch -2655

Counter-Timer is a *device* that counts and stores the input pulses and sends them to a computer for further analysis.

8. Counter Timer Software Model 2655

Counter timer software model 2655 is designed to use and communicate between the counter and the computer

9. Cables

- SHV and BNC

10. Gamma Emitting Source

It is possible to supply a variety of laboratory source for research applications through Iman Gostar Raman Kish company.