Features

- Small size for portability and ease of installation
- Battery or mains operation
- Complete support, including bias, for standard neutron detectors
- A powerful communications package to facilitate robust external control over a serial port
- A C-library to simplify creating external control programs in computers or controllers

Description

The Portable Shift Register (PSR) is a battery operated, self contained, neutron coincidence counter. Developed for those applications not adequately addressed by commercial packages, the PSR provides in-plant measurements to demonstrate compliance with regulations (domestic and international), in-plant process control, and in-field environmental monitoring/safeguards measurements. It also performs all measurements made by previous neutron coincidence counter instruments developed at Los Alamos National Laboratory.

Exclusive of the carrying handle, the portable PSR electronics package measures 8 x 10 x 20 cm and contains the circuit boards, battery, and bias supply. The PSR may optionally be purchased as an ac-powered bench top instrument as well. The PSR provides a combined set of hardware and software tools for neutron coincidence and multiplicity counting. These tools cover the range of applications from portable to battery operated, to remote and unattended, to installed in-plant. The PSR processes incoming signals from standard neutron detectors to count neutron signals and coincidences, and determine multiplicities. It also provides low and bias voltages for the detector, resident control and storage of data, and firmware to control the interface with an external controller. The system also contains a software library that provides an interface between the basic package and user programs written in high-level languages for external computers or controllers.

The PSR utilizes a standard RS-232 serial interface and command set and protocol, compatible with currently used instruments as well as existing user programs. A library written in Microsoft C is available with the PSR to make writing the user programs' hardware and interface parts very simple. Also included is a software tool kit that is very powerful, versatile, and easy to use for developing and implementing the hardware and interface parts of application-specific software. The PSR can be reconfigured to be an intelligent peripheral in the evolving miniature and modular multi-channel analyzer family of instruments.

Specifications

INPUTS

SIGNAL – Coincidence input accepts standard TTL-level signals from preamplifier; pulse width: 40 ns, min.; pulse pair resolution: 25 ns; the asynchronous de-randomizing input-buffer is 15 events deep and is clocked out at a synchronous rate of 4 MHz; LEMO S-Series size 00 connector.

AUX 1/AUX 2 – Singles input accepts standard TTL-level signals from preamplifier; pulse width: 40 ns, min.; asynchronous counter with pulse pair resolution of 20 ns; LEMO S-Series size 00 connectors.

OUTPUTS

LOW VOLTAGE – +5 V power for neutron counter (750 mA max.).
HIGH VOLTAGE – 250 V dc to 2000 V dc bias for detector, positive polarity.

COMMUNICATIONS

SERIAL I/O – Serial RS-232 to 9600 baud; RJ-11 connector.

PERFORMANCE

SIGNAL REGISTERS – Totals: 36 bits deep; R+A and A: 48 bits deep; AUX 1 and AUX 2: 40 bits deep.
MULTIPLICITY REGISTER – R+A and A: 256 each, 32 bits deep.
COUNTING TIME – 0.1 to approximately 1.67×10^6 s; resolution 0.1 s; programmable.
PRE-DELAY – 0 to 1023.75 μs in steps of 0.25 μs; programmable.
GATE – 0.25 to 1024 μs in steps of 0.25 μs; programmable.
LONG DELAY – 4096 μs; fixed.
SHIFT-REGISTER CLOCK SPEED – 4 MHz; fixed.

POWER

BATTERY – 12 V, 2.2 A-h nickel metal hydride (up to 8 hours of operation, depending on detector load).
EXTERNAL – 13.6 V filtered dc, 750 mA (operating).
DC – 13.6 V filtered dc, 2000 mA (operating and charging).

HARDWARE

MAIN BOARD – Application-specific programmable gate arrays for implementation of shift register, and for system control and decoding
MICROCONTROLLER – MC68HC11 single-chip; asynchronous serial port (125 kbaud max.); synchronous serial interface (1 Mbaud max.); 8-bit ADC with 8-channel multiplexer; 256 bytes internal RAM; 512 bytes EEROM; power-down modes.
SYSTEM MEMORY – 1/M 32 kbytes EROM; 1/M 32 kbytes static RAM.
BUS INTERFACE – 8-bit multiplexed address/data lines; three external select lines; one interrupt line; one reset line; 3-line synchronous serial interface; two-system clock signals.
POWER SUPPLY BOARD – ±12 V power supply and second +5 V supply; 200–2000 V positive-bias supply with mA capability and SHV connector; high-rate battery charger.
ADDITIONAL FEATURES – Battery-backed real-time clock; ambient temperature monitor; power supply monitors; +5 V power supply; unique processor-readable 48-bit serial number.

ISO 9001 REGISTERED

Aquila Technologies Group, Inc. 8401 Washington Pl., NE, Albuquerque, NM 87113 Telephone: 505-828-9100 FAX: 505-828-9115
http://www.aquilagroup.com