

DESCRIPTION

The **TENNELEC TC 814 Pulser** is a single-width NIM module designed to simulate the output from a solid-state or scintillation detector/preamplifier combination, thereby providing a means of testing and calibrating the electronics in a nuclear counting system.

The **TC 814** offers a **fast risetime** (typically 10 nsec) **signal** and **variable repetition rates to 2kHz**. Either square wave or exponential tail pulses are selectable. It is unique in that **the square wave output will not degrade the resolution of a gamma spectroscopy system** even if it is run simultaneously with the germanium detector. Other typical exponential tail pulsers introduce an additional pole into the preamplifier/amplifier combination and thus the amplifier can no longer properly pole-zero the system. This results in spectrum broadening, especially on the low energy side. The variable repetition rate is also useful in determining the system count rate performance.

Calibration of the TC 814 to read directly in terms of energy is possible with the ten-turn precision **PULSE HEIGHT** potentiometer, **NORMALize** control and the step **ATTENUATOR** switches. The **PULSE HEIGHT** control has a maximum nonlinearity of $\pm 0.25\%$ and the **ATTENUATORS** are comprised of 1% resistors.

Calibration of nuclear spectroscopy systems and multichannel analyzers, evaluation of system stability, measuring the integral nonlinearity and noise of amplifiers, and selecting delays in coincidence timing systems are typical of the wide range of applications for the **TENNELEC TC 814 Pulser**.

Either a **direct or attenuated output** is offered on the **TC 814**. When all the attenuator switches are in the "out" position the output is direct. Attenuation factors of up to 1000:1 are selectable via two-position **switches with gold-plated contacts**. These contacts greatly improve both the reliability and the long-term stability of the attenuator section.

A **Disable input** is featured on the **TC 814** for **gated operation** and is selectable as active High or active Low for interfacing with a wide variety of devices. It is also synchronized with the internal pulse generator to prevent erroneous outputs. This Disable feature also enables the **TC 814** to be turned on or off by **remote or computer control**.

A **SYNC** output is provided on the front-panel for convenient oscilloscope triggering while monitoring either the system output or waveforms from the **TC 814**.

SPECIFICATIONS

PERFORMANCE

SWITCHING TRANSIENTS $< 0.1V_{p-p}$,
 $< 20nsec$ duration.

TEMPERATURE INSTABILITY

$< \pm 0.01\%/^{\circ}C$, 0 to $50^{\circ}C$.

INTEGRAL NONLINEARITY $< \pm 0.25\%$
of full-scale.

SUPPLY VOLTAGE INSTABILITY

$< \pm 0.01\%$ for a $\pm 1\%$ change of the
 ± 24 volt supply voltages.

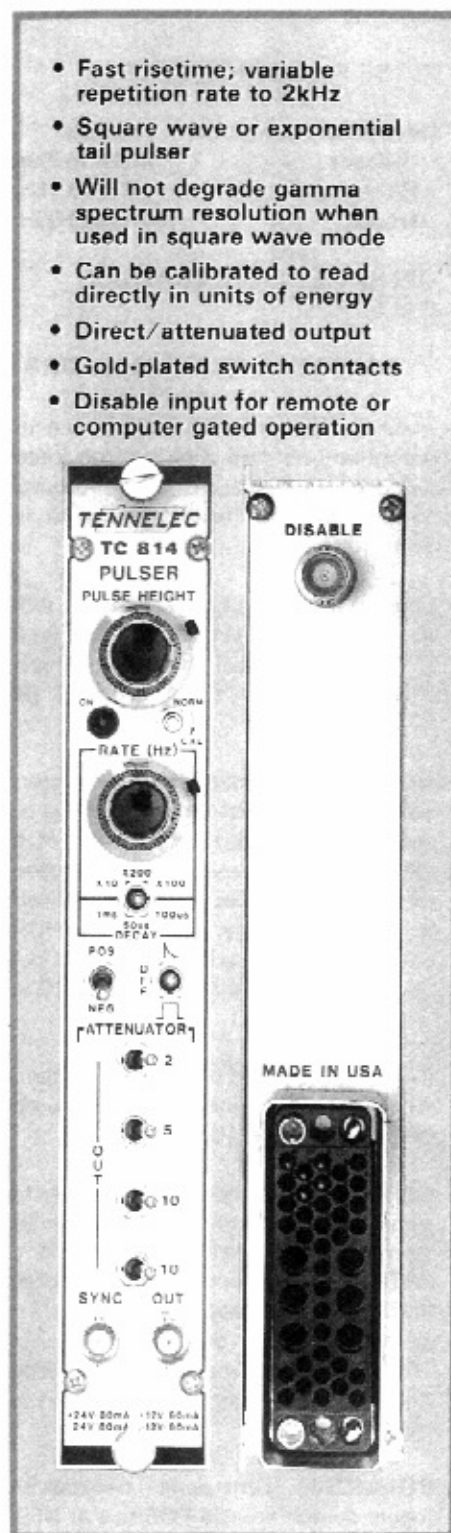
DUTY FACTOR

SQUARE: 49 to 51%.
EXP: Discharge Time 80%.
Charge Time 20%.

NORMALIZE RANGE

RISE TIME (10%-to-90%)
ALL: < 15 nsec.

- Fast risetime; variable repetition rate to 2kHz
- Square wave or exponential tail pulser
- Will not degrade gamma spectrum resolution when used in square wave mode
- Can be calibrated to read directly in units of energy
- Direct/attenuated output
- Gold-plated switch contacts
- Disable input for remote or computer gated operation



TC 814 Pulser

FALL TIME (90%-to-10%)

EXP: DECAY constants of 50 μ sec, 100 μ sec, and 1msec, ($\pm 10\%$) independent of output terminations.

SQUARE: <15nsec.

PULSE REPETITION RATE

Decay time constant	Rate
50 μ sec	: 20 Hz to 2kHz
100 μ sec	: 10Hz to 1kHz
1msec	: 1Hz to 100Hz

OPERATING TEMPERATURE

0 to 50°C.

CONTROLS AND INDICATORS

PULSE HEIGHT Front-panel ten-turn potentiometer and dial controls output pulse amplitude from 0 to ± 10 volts open circuit (0 to ± 5 volts terminated into 50 ohms).

ON Front-panel LED illuminates when the EXP/OFF/SQU switch is in either the EXP or SQU position and the pulser is not disabled through the rear-panel DISABLE input.

NORM Front-panel multi-turn potentiometer allows a 2:1 variation of the output amplitude for normalization of the PULSE HEIGHT dial, enabling the user to calibrate the PULSE HEIGHT dial directly in units of energy. Setting the NORM control fully clockwise to the CAL position provides a calibrated 0 to ± 10 volt output range.

RATE Front-panel ten-turn potentiometer and dial provides control of output frequency with a 100:1 range.

DECAY Front-panel three-position toggle switch selects one of three decay constants in EXP mode and multiplier for the RATE control. Maximum frequency is 2kHz for the 50 μ sec decay constant, 1kHz for the 100 μ sec decay constant, and 100Hz for the 1msec decay constant. Square waves may be selected on any range.

POLARITY Front-panel two-position toggle switch selects POSITIVE or NEGATIVE output pulse polarity.

EXP/OFF/SQU Front-panel three-position toggle switch selects the operating mode of the pulser. OFF disables the output (overrides the rear-panel DISABLE input) and sets the output to 0 volt. EXP selects the tail pulse mode. SQU selects the square-wave mode.

ATTENUATOR Four front-panel two-position toggle switches select attenuation factors of 2, 5, 10 and 10. Total attenuation is the product of the selected attenuators.

DISABLE PCB-mounted jumper selects DISABLE HI (>2 volts) or DISABLE LO (<1.5 volts) mode for rear-panel DISABLE input.

CONNECTORS

OUT Front-panel BNC connector provides attenuated positive or negative tail pulses or square waves; pulse height 0 to ± 10 volts open circuit (0 to ± 5 volts terminated into 50 ohms); rise time <15 nsec; fall time constants are independent of output terminations. Attenuation factors of up to 1000 may be selected. Output impedance is 50 ohms.

SYNC Front-panel BNC connector provides positive- and negative-going pulses for oscilloscope triggering. Positive oscilloscope triggering syncs on the leading edge of the TC 814 output waveform, while negative oscilloscope triggering syncs on the trailing edge of the TC 814 waveform. Sync pulses are approximately ± 3.5 volt, 0.1 μ sec wide. Output impedance is 50 ohms.

DISABLE Rear-panel BNC connector accepts a dc control signal which enables or disables the pulser output signal. Internally selectable as active HI (>2 volts to disable; <1.5 volts to enable) or active LO (<1.5 volts to disable; >2 volts to enable). The DISABLE signal is synchronized to the internal pulse generator to terminate the current pulse at the correct time to prevent erroneous outputs.

ORDERING INFORMATION

POWER REQUIREMENTS

OFF/DISABLED:

+24 V, 80 mA; +12 V, 60 mA
-24 V, 80 mA; -12 V, 80 mA

+10 V SQUARE WAVE, OUTPUT terminated into 50 ohms:

+24 V, 130 mA; +12 V, 60 mA
-24 V, 80 mA; -12 V, 80 mA

-10 V SQUARE WAVE, OUTPUT terminated into 50 ohms:

+24 V, 80 mA; +12 V, 60 mA
-24 V, 130 mA; -12 V, 80 mA

WEIGHT (SHIPPING) 5.0 lbs. (2.3 kg)
(NET) 3.0 lbs. (1.4 kg)

DIMENSIONS Standard single-width NIM module (1.35 x 8.714 in.) per TID-20893 (Rev.).

INSTRUCTION MANUAL One provided with each instrument ordered.