

Notes on the use of

Kentech Instruments Ltd.

Special Three Output
CPS1 Pulser
Serial No. J04*****

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Introduction

Our range of solid state pulsers (ASG, SPS, HMPS and PBG series) allows very high voltage, fast rising pulses to be obtained from compact bench top units. Voltage pulses as short as 100ps FWHM, in excess of 4kV peak voltage into 50 Ω , and with a pulse repetition frequency (PRF) >1 kHz can be produced. The performance of our compact, convenient and reliable pulsers is to our knowledge exceeded only by laser driven photoconductive switches in terms of voltage switching speeds. These pulsers will find applications in many fields such as high speed camera research, electro-optic switching, triggering systems and radar.

A large range of output pulse lengths can be provided by the incorporation of internal passive pulse forming networks. There is very little jitter in the output of the pulsers and two independent pulsers can be used in parallel to drive low impedances. This aspect makes the pulsers particularly useful for driving microchannel plate systems. Transformers with output impedances as low as 5 Ω are available.

The standard drivers and speed-up modules have a life of $>10^{10}$ pulses and have a PRF of . 1000Hz, although special units with a PRF >50 kHz can be supplied. The high repetition rates allow sampling oscilloscopes to be used to characterise a system and verify the pulse shape.

The pulsers can feed into a short circuit load without damage. This allows them to be used in sub-nanosecond pulse chopping systems by feeding through a pockels cell into a shorting stub. Variations on the standard driver are available.

Use

The pulser requires A.C. power and a trigger signal to operate. The trigger signal can be generated internally or applied externally. When external triggering is used the trigger signal applied to the trigger input (BNC) should be 5 volts into 50 Ω with a fast rising edge (<5ns) to maintain the low jitter of the system.

When triggered the “triggered” light on the front panel will flash. A pretrigger pulse is available at the monitor output (BNC) which may be used to remotely trigger ancillary equipment, e.g. intensifiers etc.

The three fixed pulse length outputs of the unit appear at the front panel connectors (N type). The outputs may be used individually without need to terminate the others. Each output is individually dc isolated with a series capacitor in order to allow bias voltages to be superimposed on the output pulses. The rising edges of the output pulses occur at the same time. The amplitude of all the outputs can be adjusted either by a single turn potentiometer on the front panel, or by an external 0 to +10 volts analogue input (BNC). All three output amplitudes are controlled by the same input.

If it is necessary to monitor or characterise the pulse outputs then suitable attenuators should be used. Kentech Instruments recommends the use of a Barth 142 x10 attenuator as the first in a series string.

The output may be observed with a high bandwidth oscilloscope. This may either be a fast (>3GHz) direct access type or a sampling type.

If the output of the pulser is to be used directly or via any passive network it is essential that cable lengths are kept as short as possible and that only high quality cable is used. This will enable the fast rising edge generated by the unit to reach the load without serious degradation.

In the internal trigger, single shot and “delayed” modes there is an internal delay which may be adjusted by the user. There are coarse (10ns per step) and fine (~12ns full scale) delay controls.

There are thermal drifts in the delay generator which will stabilise after the pulser has been switched on for ~20 minutes.

In “direct” mode the trigger is applied directly to the avalanche stack and the low level circuitry is bypassed. The BNC monitor output does not work in “direct” mode. In this mode the trigger delay and thermal drift are at a minimum.

SPECIFICATIONS

General:

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|--------------------------------------|--|
| Output channels: | 3 x 50 Ω |
| Output amplitude: | Adjustable >300V to <160V into 50 Ω |
| Polarity: | Negative |
| Pulse width: | Output A : 200ps fixed pulse width Output B : 500ps fixed pulse width Output C : 1ns fixed pulse width |
| Rise time: | <150ps at 200V amplitude. |
| Output bias: | \pm 300V may be externally applied to individual outputs. |
| Trigger: | 5V into 50 Ω , <5ns rise time. |
| Jitter: | <20ps RMS |
| Monitor output | 10V into 50 Ω Pretrigger adjustable by delay setting. |
| Trigger input to pulse output delay: | ~16ns - Direct mode ~33ns - Delay mode, delay set to minimum |
| Monitor output to pulse output: | ~16ns - Delay mode or internally triggered, delay set to minimum |
| Maximum repetition rate: | 100Hz |
| Power supply: | 90-240V AC 50/60 Hz |

Outputs:

| | |
|-----------------|---|
| Pulse output: | 3 x N type 200V pulses of 200, 500, 1000ps |
| Monitor output: | BNC 10V into 50 Ω , leads main output by the delay when the delay is active. |

Inputs:

| | |
|-------------------|--|
| Trigger input: | BNC 5V, 50 Ω |
| Remote amplitude: | BNC 0 to +10V into 10K Ω (when selected). One input controls all three output amplitudes. |

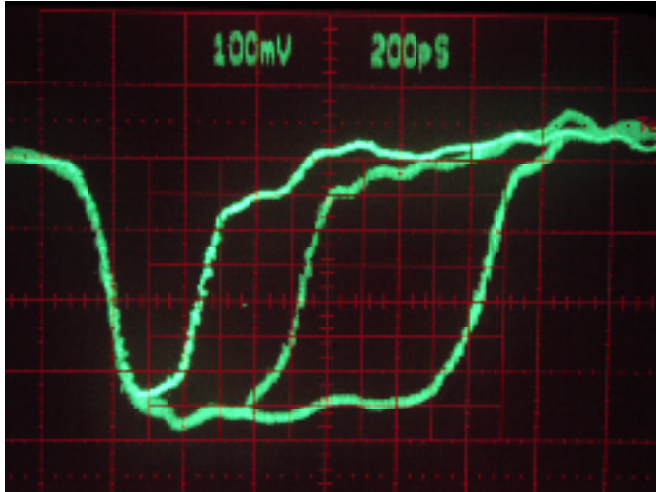
Controls:

| | |
|------------------|--|
| Amplitude: | Toggle switch to select between Local and Remote |
| Local amplitude: | Single turn potentiometer to adjust all three output pulse amplitudes (when selected). |
| Mode: | Sets one of the following modes: Single shot (delay active) 0.01 - 0.1Hz (delay active) 0.1 - 1Hz (delay active) 1 - 10Hz (delay active) |

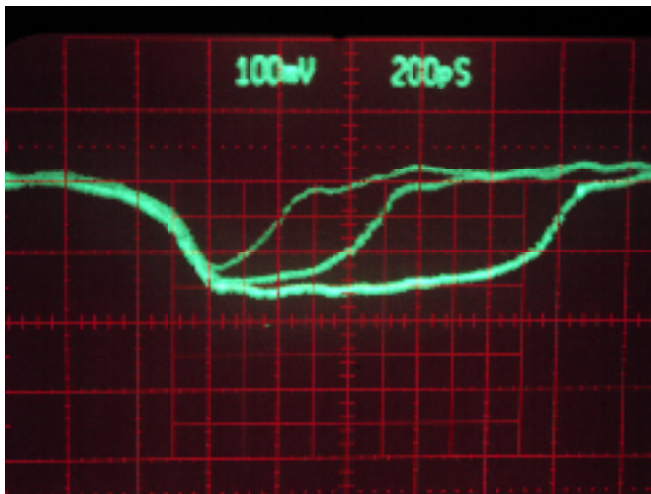
10Hz - 100Hz (delay active)
External trigger (delay active)“Delay”
External trigger (delay inactive)”Direct”
Fine rate: Varies internal rate by a ratio of 10:1(Cal = high PRF)
Coarse delay: Sets internal delay in steps of ~10ns up
to ~100ns.
Fine delay: Sets continually adjustable internal
delay up to ~12ns.
Single shot button: Depressing this button causes a single
trigger when single shot mode selected.
Power: Switches AC power in the pulser.
Indicators :
Power: Shows that AC power is applied and the unit is switched
on.
Triggered: Illuminates while the unit is being triggered.

Test Data J98 *****

Test Equipment: TEK Scope 7834
7S11 + S4, 7T11
Barth 142 Attenuators.
EXTERNEAL TRIGGER FROM KENTECH APG1



> 300V AMPLITUDE
200ps, 500ps, 1ns pulses
VERT: 100V/Div
HORIZ: 200ps/Div
100Hz



< 160V AMPLITUDE
200ps, 500ps, 1ns pulses
VERT: 100V/Div
HORIZ: 200ps/Div
100Hz