Digitimer

Isolated Stimulator model DS2A

OPERATORS MANUAL

Document - N:\Docs\Company\Manuals\DS2A\Issue-1 \ DS2A-2.lwp
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NOTE to printers:

This document is to be printed as an A5 portrait booklet.

This page is the inside front cover.

The cover is to be approx. 125-150gsm card with an agreed green tint .

Other 8 pages to be 2 sheets of white 105gsm A4.

The booklet is to be stitched with 2 staples.

27/10/94 - The staples are to have their 'folds' internal to the booklet.

In WordPro, with the Ricoh

Insides

Use “Properties” to set “Duplex - on”, “2 pages per sheet”, “Collate-on”

Use “Selected Pages” & Print (cut & paste following) -

6-8,5, 4,9-10,3

Set the required number of copies (books, not pages) **and print** the inner 2 sheets.

NOTE: Set Collate ON

Cover

Use “Properties” to set “Duplex - off”, “2 pages per sheet”, “Collate-off”

Use “Selected Pages” & Print (cut & paste following) -

12, 1

And **print just 1 copy**

You will now have to place the printed copy, as an original, on the platen and select the bypass tray as the paper source. (I can’t get WordPro to use the bypass tray).

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Introduction

The DS2A is the most recent isolated stimulator in a long line that spans back over 30 years. The line started with the Devices Ltd model 2530, then through Mk II, Mk III and Mk IV to the 2533 - all of which needed a -12V trigger signal. The DS2 evolved using self-contained, readily available, 9V batteries and worked with either a -12V or +12V trigger input. The DS2A is characterised for use with positive trigger signals that also include most "TTL" outputs. A negative signal can also be used as described below.

The DS2A provides an isolated source of power and is isolated from the trigger source by an optical device which ensures a very low capacitive coupling between trigger source and stimulator of approximately 3pF. The self-contained batteries, without a DC-DC converter, ensure that the stimulator is ultra-quiet and does not induce any high-frequency noise into the recording system.

A ten-turn dial on the front panel of the instrument provides a continuous adjustment of the maximum available output which is indicated on the vernier dial as a percentage of the maximum 97V output. The existence of an output pulse is indicated by an LED.

The output impedance is dependent on the position of the amplitude control. When set to the mid position, the output impedance is 1.25k ohms dropping to 200 ohms at either end. The range of pulse widths available can be varied using a five-position switch and multiplier within the range 20 microseconds to 2 seconds.

A feature of this stimulator is the automatic overload circuit preventing excessive output current being drawn by reducing the output pulse width to less than 10µs when an overload current is detected. An overload current is sensed when the output reaches approximately 50mA. It is also worth noting that battery current is only drawn when the stimulator is delivering an output pulse.

The stimulator may be mounted in a 19" rack using a mounting frame (model D121-11) specially fabricated by Digitimer Ltd. Alternatively, the unit may be clamped to a laboratory stand by means of a ¼" diameter rod, available from Digitimer Ltd., using 0.25" DCA rod clamps.

The stimulator is produced in a box made of an insulating material and may therefore be connected to a metal mounting frame without connecting the internal circuits of the instrument to ground.

Input Requirements

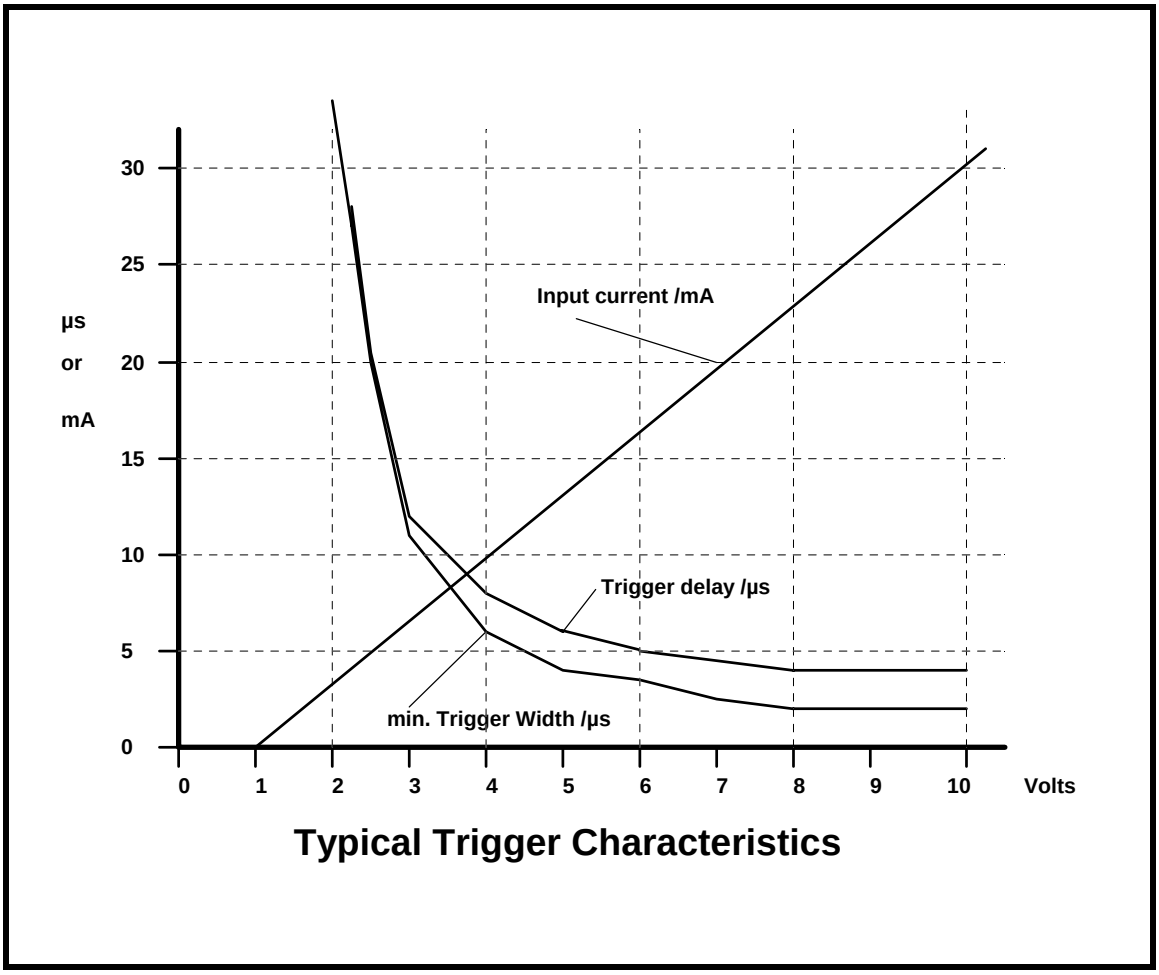
The DS2A stimulator will trigger only from a positive pulse. Should it be necessary to use a negative trigger pulse, this can be done as the BNC socket is isolated from the rest of the circuitry. By connecting the centre of the input BNC socket to ground (or common) and driving the body of the BNC negative, the unit triggers as normal.

The amplitude of the trigger pulse applied to the BNC socket on the front panel should be between 3V and 15V when loaded by the input circuit of the stimulator.

The trigger input characteristics graph shows the minimum usable pulse width (µs/V) and the minimum input current (mA/V) to ensure satisfactory operation.

The stimulator will trigger from the leading edge of the trigger pulse with a delay of approx. 20µs at 2.5V reducing to 6µs at 5V. As the graph shows, if a higher amplitude trigger pulse is available, it should be used. This lowers the pulse width required as well as the delay generated by the unit.

Single Shot: A single-shot facility is provided by means of a push button, which operates at all times irrespective of other trigger inputs.



Typical Trigger Characteristics

Trigger Sources

Digitimer Ltd offer a growing range of trigger sources. These range from simple pulse generators and other timing modules of the ***NeuroLog***™ system through to crystal-controlled programmers.

Output

The stimulus output is isolated from the trigger source by an optical circuit providing less than 3pF capacitive coupling. Power is provided by a battery source that is loaded only during the generation of an output pulse. Continuous control of pulse width from 20 microseconds to 2 seconds is available by means of a five-position range switch and multiplier potentiometer. A ten-turn potentiometer varies the amplitude of the output pulse from zero to the maximum battery voltage. The DS2A stimulator has a toggle switch that selects either one or eleven battery sections. The output pulse is of a square shape, having rise time of 1 microsecond and fall time of 3 microseconds into a resistive load and is indicated by a front panel LED.

The output impedance varies with the position of the amplitude control. The maximum of 1.25k ohms appears at the centre position of the output potentiometer.

An automatic overload circuit prevents excessive output current by reducing the output pulse width to less than 10µs when an overcurrent condition of approximately 50mA is detected. The circuit will automatically reset when the overload condition is removed. The polarity of the output pulse may be reversed by means of the Normal/Reverse switch. Normal means that the red output terminal goes positive with respect to the black terminal.

Mounting

The DS2A can be mounted and positioned in any plane and 19" rack mounting is possible by using two of the box fixing screws through the model D121-11.

A ¼" diameter circular rod is available from Digitimer Ltd. that can be used to mount the box with a 0.25" DCA rod clamp.

Batteries

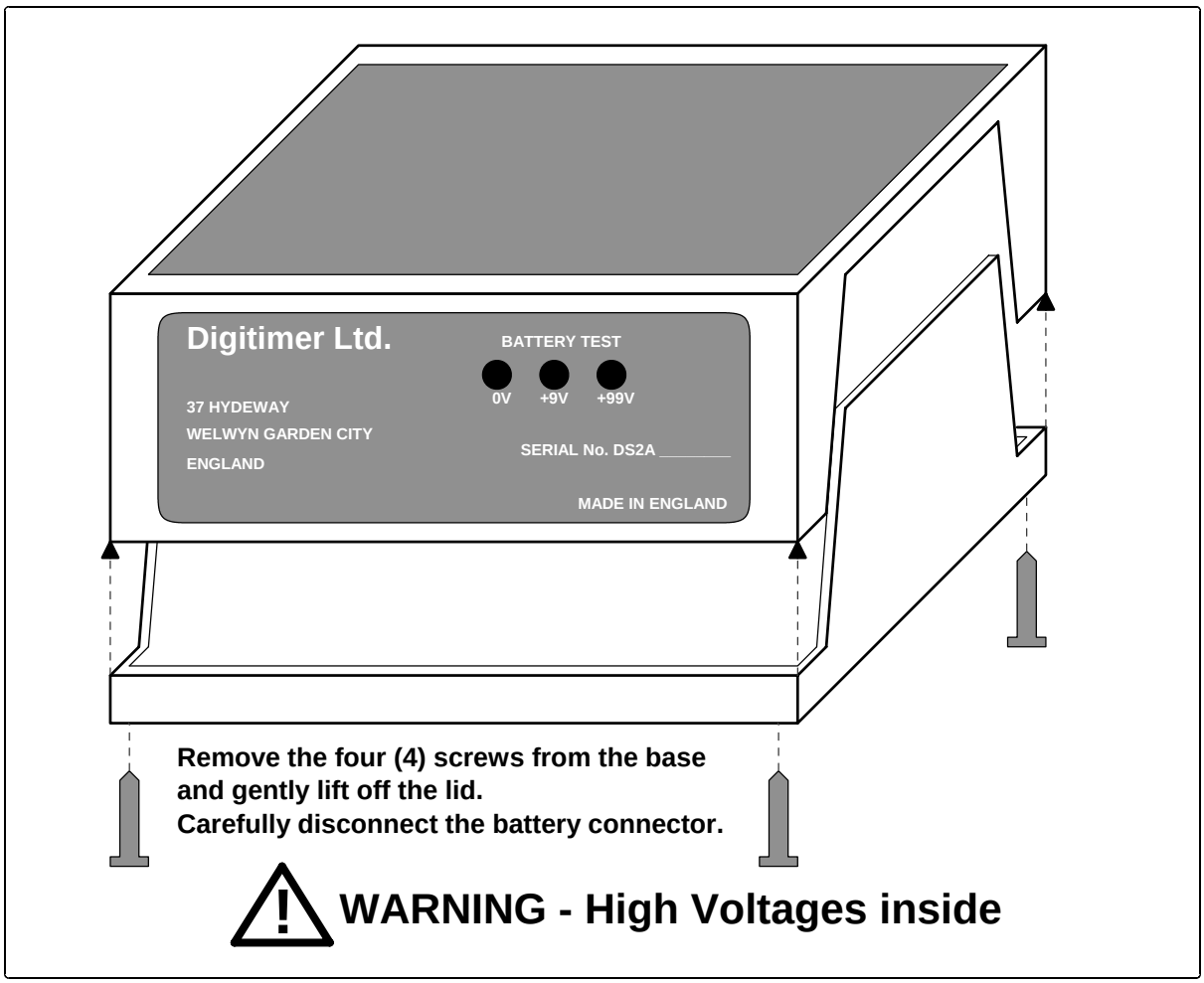
The DS2A stimulator employs a total of 11 x 9V (PP3, IEC - 6R61) batteries using one of them to power the timing circuits. It will operate satisfactorily when the batteries are discharged down to approximately 60% of their nominal voltage without undue loss of timing accuracy, but, of course, with reduced maximum output voltage. When using the battery test terminals, it is desirable that the battery voltage is measured when operating with a repetitive trigger signal providing a duty cycle greater than 20% or by using the single-shot facility with the maximum (2 second) pulse width. This method will show up any high-resistance battery condition.

Battery Life

This will depend on the frequency of operation and will therefore vary widely with the application, but the following example may be considered typical.

Output current - 20mA, duty cycle - 1:10, period of operation - 2 hours/day. Estimated life to end point voltage of 6V per 9V battery - 2 months.

Replacement batteries should be of premium grade sealed type and batteries should not be left in an unused stimulator for more than, say, 9 months without replacement.



Battery replacement

This must be performed by a competent person.

CAUTION must be used when replacing the batteries as they present voltages up to 99V between different points.

The DS2A stimulator is manufactured in a two-part plastic box that is held together by four screws through the base of the box. The two halves may be separated by removing these screws, sliding the two halves apart and disconnecting the battery leads by removing the connector. Ten of the batteries are firmly held within the compartment that is screwed to the base and one within the bracket fixed to the side wall.

All batteries must replaced at the same time. Only use new batteries that are from the same manufacturer and are the same type.

Reassemble is the reverse process of the above. Do NOT tighten the screws more than necessary and ensure that there are no trapped wires between the case top and bottom when they are assembled.

Specifications

Maximum Output Voltage:	97V (High), 7V (Low) selected by front panel switch. Square wave pulse shape, typical rise time 1µs, fall time 3µs into resistive load.
Amplitude Control:	A ten-turn dial provides continuous adjustment. The dial indicates percentage of maximum output.
Output Indicator:	An LED operates for the duration of each output pulse.
Normal/Reverse Switch:	Normal: Red output terminal positive w.r.t. Black. Reverse: Red output terminal negative w.r.t. Black.
Output Impedance:	Dependent on the position of the amplitude control, 1.25k ohms max. at centre position, 200 ohms at either end of control.
Output Terminals:	Two 4mm sockets on the front panel, spaced at 0.75".
Overload:	An automatic overload circuit prevents excessive output current being drawn by reducing the output pulse width to less than 10µs when a current of greater than 50mA is detected.
Pulse Width Controls:	Two controls provide continuous adjustment over the range 20µs to 2s. (1) Five-position switch for pulse widths:- 0.02, 0.2, 2, 20, 200ms with ±10% accuracy. (2) Multiplier continuously variable over range x1 to x10. The pulse width is the product of the two dial settings.
Trigger Requirements:	A positive pulse of minimum 3V, maximum 20V amplitude is required to trigger the stimulator. The trigger input current varies from 7mA to 63mA over the above voltage range. The trigger pulse width should not normally be less than 10µs.
Trigger Isolation:	Optical coupling is employed between the trigger source and the stimulator circuitry. The capacity coupling is less than 3pF.
Single Shot:	A single-shot push button is provided. This operates at all times irrespective of other trigger inputs.
Batteries:	Self-contained batteries are used to provide an isolated source of power. Current is drawn only when delivering an output pulse. The maximum current drain is 30mA plus the load current for the DS2A.

Battery Type:	11 x PP3 - (IEC-6R61) style batteries. Alkaline preferred.
Battery Test Sockets:	Sockets are provided on the top of the instrument case to allow the batteries to be checked without removing them from the case.
Dimensions:	Panel Size: 190mm x 110mm. Depth: 80mm over knobs.
Mounting:	One or two stimulators may be mounted in a 19" rack using a specially fabricated mounting frame (model D121-11) available from **Digitimer Ltd.** Alternatively, the unit may be clamped to a laboratory stand by means of a ¼" diameter rod (available from Digitimer Ltd.) and employing 0.25" DCA rod clamps.
Weight:	800g complete with batteries.

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