SOLID STATE EQUIPMENT LIMITED

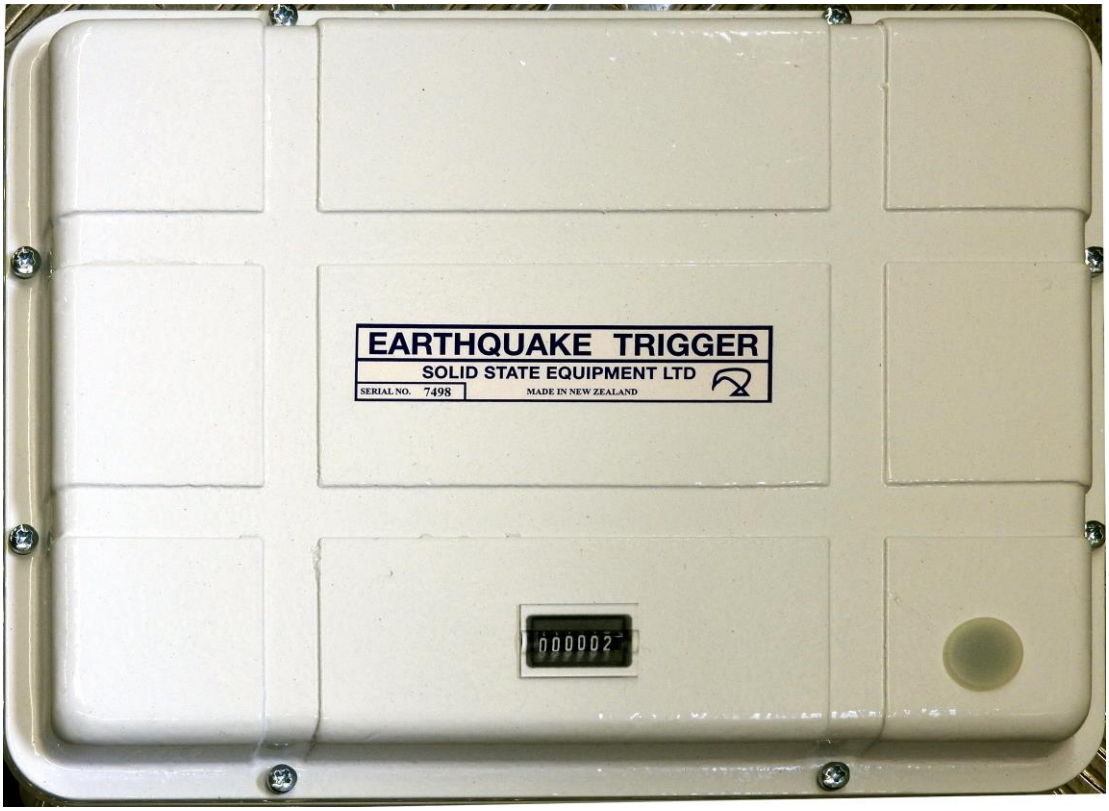
(SSEL)

MK VI EARTHQUAKE TRIGGER RECORDER

USERS MANUAL

For Serial Numbers 7495 and later

ISSUE — 1 April 2019



SOLID STATE EQUIPMENT· LTD

Electronic Development Engineers

3 Rishworth Street
Lower Hutt
New Zealand 5010

P: 027 232 1594
E: neil.poletti@solidstate.co.nz
w: www.solidstate.co.nz

CONTENTS

GENERAL DESCRIPTION:

It's not just the earthquake that causes damage to property, much of the damage is caused by secondary effects such as flooding, fire and explosions. A way of isolating the source of these disasters is an extremely valuable insurance policy. Similarly expensive machinery can be shut down before it is subject to the full effect of earthquake generated forces.

An earthquake generates two types of shock waves: the pressure waves (P-waves, which produce predominantly vertical accelerations) and the sheer waves (S-waves). The S-waves do all the damage but they travel from the earthquake epicentre more slowly than the P-waves. The P-wave can arrive seconds before the damaging S-waves.

Solid State's Earthquake Trigger continuously monitors all components of the earth's acceleration due to seismic forces. It is designed particularly to detect the faster moving P-waves. When the acceleration exceeds the pre-set level the output relay changes state until 8 seconds after the quake. Contacts on this relay may be used to initiate any desired action. The unit has an event counter mounted on the lid to record the total number of operations, including instrument test operations.

AC OPTION

The transformer provides a float charge for the nine cell Nickel Cadmium backup battery. Should the mains fail, the NiCad battery will power the circuit for approximately 24 hours.

DC OPTION

This is used for DC operation from an external no-break battery system either 24 or 110V DC. This option does not require the internal backup battery.

INSTALLATION:

Mounting

The site of installation of the Earthquake Trigger is critical to its performance and reliability. All of the points below should be taken into consideration when choosing a site.

- The Earthquake Trigger may preferably be installed horizontally or alternatively vertical.
- The Earthquake Trigger must be installed at a site where it is unlikely to be subjected to false triggering signals generated by non-earthquake forces such as motor vehicles negotiating an uneven surface or a heavy object dropped near by.
- The device should be installed on a large mass of concrete that is in intimate contact with the earth. A suitable site can usually be found in the foundations of a building.
- The Earthquake Trigger is sensitive to moisture, so its environment should be as dry as possible. Particular attention should be made to avoiding situations, which might flood.

A single 6 mm masonry anchor through the hole in the centre of the aluminium base and into the concrete will hold the Earthquake Trigger down firmly on its three feet and will prevent it rocking. This masonry anchor should not be over tightened as this can damage the cast aluminium case. Tighten the nut finger tight and then apply ~½ a turn with a wrench.

Wiring

Two M16 holes have been provided for cable entry.
Use a bung on any unused cable entry.
Wire the unit as required but take note of these points.

- When removing the lid, be careful of the twisted wires that connect to the counter. Remove the lid just far enough to unplug the connector first. The cable should be left tucked into a cable tie on the counter to prevent damage to the pins if the lid is removed carelessly. Ensure that the counter is reconnected before replacing the lid.
- Ensure the cable is not trapped under the lid when retightening the screws.
- For the AC option the mains supply should be maintained for at least 18 hours out of every 24 hours.
- For the DC option the supply must be continuous.

AC OPTION: terminal strip wiring.

Terminal	Function	Terminal	Function	Terminal	Function	Terminal	Function
1	Earth	4	Batt +	7	Out 2 Corn	10	Out 1 Com
2	Phase	5	Batt -	8	Out 2 N/C	11	Out 1 N/C
3	Neutral	6	-	9	Out 2 N/O	12	Ou1 N/C

DC OPTION: terminal strip wiring.

Terminal	Function	Terminal	Function	Terminal	Function	Terminal	Function
1	Earth	4	-	7	Out 2 Corn	10	Out 1 Corn
2	Batt +	5	-	8	Out 2 N/C	11	Out 1 N/C
3	Common -	6	-	9	Out 2 N/O	12	Ou1 N/C

Commissioning

The setting of the sensitivity is determined by the application. If false triggering is acceptable but any slight earthquake must be detected use the more sensitive settings 0.012 g or greater. Conversely if false triggering is unacceptable and only large potentially damaging earthquakes are required to be detected use the least sensitive settings 0.2g or less.
The sensitivity is determined by the setting on a DIL switch accessible through a hole in the internal shield over the printed circuit. The settings for this are as follows: -

- Number 1 on, all others off, 0.012g trigger level.
- Number 2 on, all others off, 0.025g trigger level.
- Number 3 on, all others off, 0.050g trigger level.
- Number 4 on, all others off, 0.100g trigger level.
- Number 5 on, all others off, 0.200g trigger level.

MAINTENANCE:

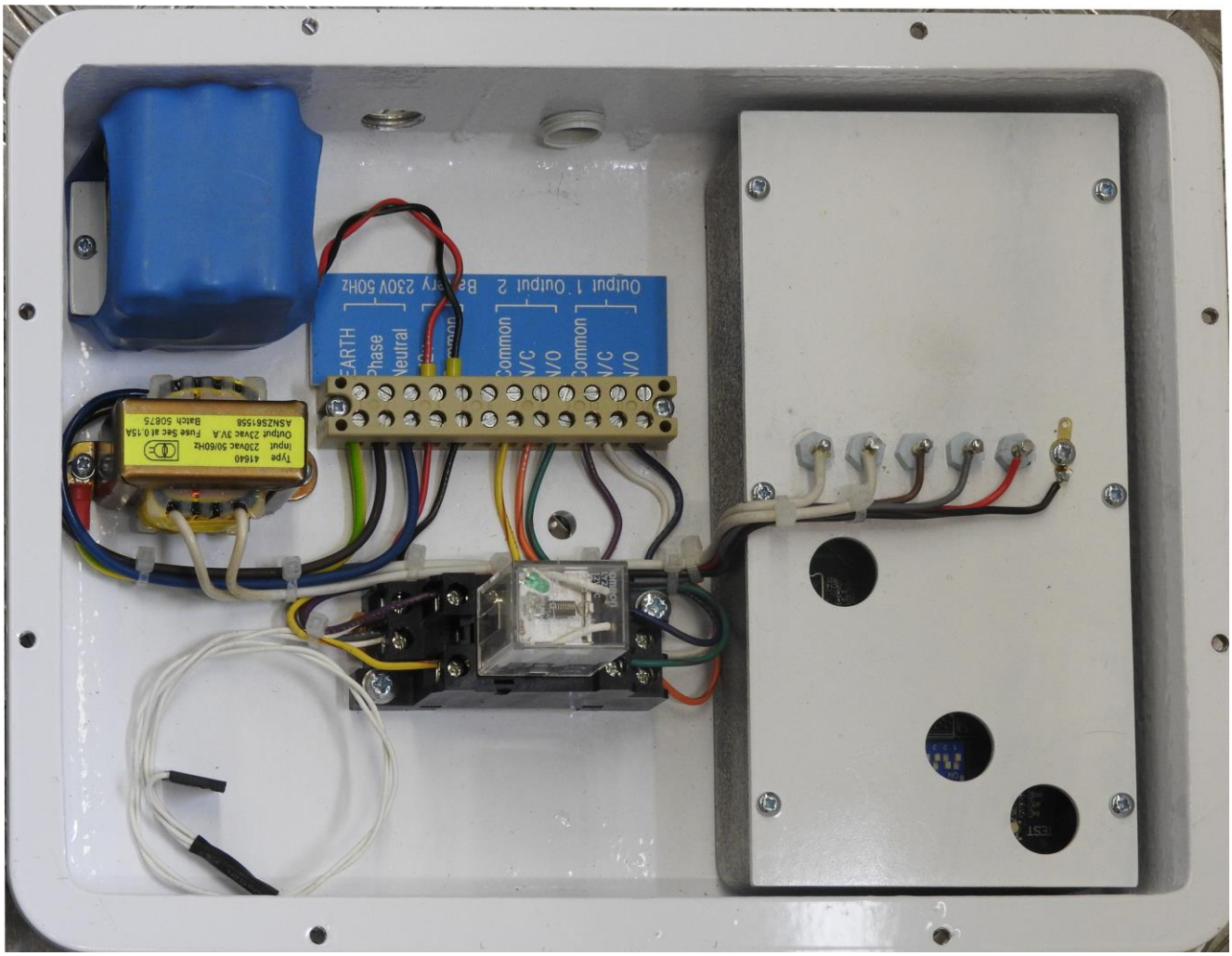
As earthquakes of sufficient magnitude to trigger the device are rare, it is desirable to set up a regular maintenance schedule to check correct operation and consequent action on the protected equipment. All counter increments should be accounted for and noted in the log. Either it was a test a false trigger or an earthquake. If there are too many false triggers due to a poor site or inconsequential earthquakes then reduce the sensitivity.

- A recessed push button is located under a plastic bung on the lid to the right of the counter. To press this you will need to pry the bung up with a screwdriver. Then use a plastic pen to operate the button on the base of the box. Pushing this introduces into the input circuitry a signal equivalent to an acceleration greater than 0.2 g. This signal must trigger the unit.
- A better test which includes the sensor is to shock the concrete floor within a meter or so of the trigger. Three or more quick shocks are required, these can be delivered by blows to the floor with just a carpenter's hammer on the most sensitive ranges.

Our recommendation is that a log be kept of tests (see appendix for format). Shock testing should be conducted at installation and at every 6 months.

The data may be recovered via the USB port but currently only at the factory.

The battery should be replaced every 5 years.



SPECIFICATIONS

Power Supply Requirements:

AC OPTION: 230 V +/-10% 50 Hz Sine wave 3 VA. The AC option provides NiCad battery back up to prevent erroneous operation when the battery goes flat or power is restored.

DC OPTION 1: 24 V DC (+ 10% - 30%). at 20ma standby.

DC OPTION 2: 110 V DC +/-30% at 20 ma standby.
The DC options do not have internal battery backup.

Sensitivity: Selected by internal switch to one of the following 0.012, 0.025, 0.050, 0.100, and 0.200g.
The sensitivity is to any direction of the acceleration. (1g is an acceleration of 9.8 m/s^2 or 1000 mg.)

Frequency Response: Flat from 2 Hz to 10 Hz (+/-3 dB). 10 dB down at 20 Hz.

Operation Time: Relay fully actuated within 10 ms from the time of the first shock of 3 from the earthquake that exceeded the set acceleration. The relay is de-energised 8 seconds from when the set acceleration level was last exceeded.

Test Button: Applies a test signal to the input equivalent to a 0.2g earthquake.

Event Counter: A 6 digit counter which records the total number of operations. (Tests, false alarms and earthquakes).

Contact Ratings: OMROM LY2 RELAY

10A at 230 VAC,
3A at 24 V DC resistive,
2A at 24 V DC inductive,
0.6A at 110 V DC resistive,
0.4A at 110 V DC inductive.

Weight: 3 Kg

Size: 290 x 220 base (mm)
90 mm high

Construction: The unit is housed in a substantial cast aluminium casing, painted with a white polyester finish.

SERVICE LOG

EARTHQUAKE TRIGGER S/N. .....LOG

Date	Time	Count on arrival	Count on Departure	Acceleration setting on departure	Tests done and comments