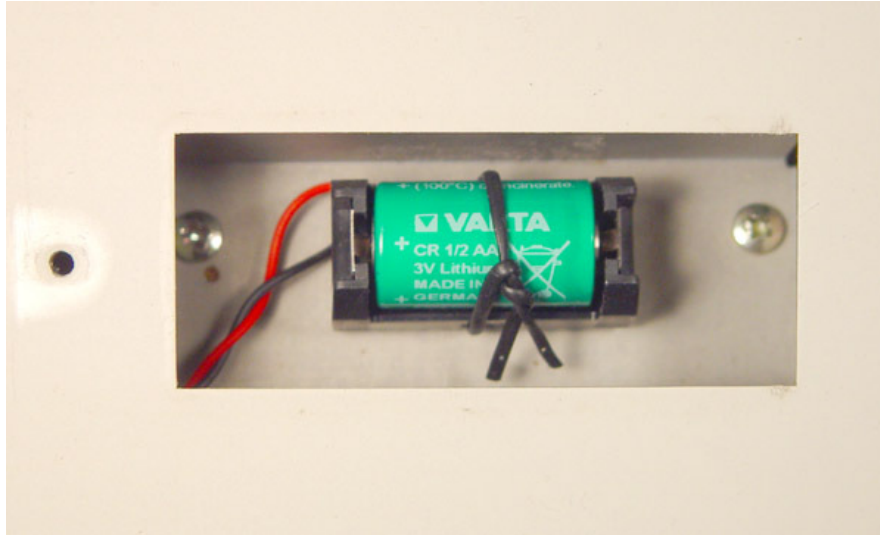


# REAL WORLD INTERFACES

## TR-909 Lithium Battery

Robin Whittle 11 October 2018 <http://www.firstpr.com.au/rwi/tr-909/>



Normally the TR-909's memory is backed up by two AA batteries (ideally alkaline) in a holder with a connection to what looks like a battery clip for 9 volt batteries. Please do not attach a 9 volt battery to this clip!

Over the years these battery holders may break, become lost, or their contacts may become corroded. I have some fresh holders of this kind.

An alternative is to install a holder for a 3 volt (typically 3.2 to 3.3 volts) 1/2AA cylindrical lithium battery. The battery holder is robust and should last indefinitely.

This is a non-rechargeable battery with a capacity of around 0.95 amp hours. Please note that the terminal with the protruding contact is *negative*, not positive as in alkaline batteries.

There is a 100 ohm resistor in series with the positive wire so that a fault condition inside the machine cannot cause excessive currents to flow. This resistor reduces the current to a level far below what could cause a fire or overheating of the battery.

The battery is a Varta CR 1/2 AA, which is a 3 volt cell rated at 950 milliamp hours. The Material Safety Data Sheets at [varta-microbattery.com](http://varta-microbattery.com) state that these batteries contain 0.3 grams of metallic lithium.

These cells have a self-discharge rate of less than 1% per year, depending on the temperature. The current drawn by the TR-909 depends on the particular memory chip which is installed. In one machine at about 20C, the current was 2.0 uA (millionths of an amp), but this would increase with higher temperatures, and fall with lower temperatures.

Ignoring the self-discharge rate, which is likely to be below 1% per year at 20C, and rises with temperature, 2uA drained from a 950,000 uA hour battery would mean that the battery should last for 54 years.

It would not be surprising if the battery does last for five or more decades, but I suggest that it be **checked every ten years with a volt meter**. As long as it is above 3.0 volts, it should last for another 10 years, so I suggest replacing it if its voltage gets close to 3.0 volts.

You can have the machine plugged in and turned on while you remove the old battery and insert the new one. Without a battery or mains power the internal capacitor (I install a 1000uF in the C6 position, replacing the original 10uF) should power the memory chips for at least 5 minutes while you insert the new battery.

The battery is held in place firstly by the spring contacts of the holder, secondly by a twist-tie you can see in the above photo and thirdly by some polyethylene closed wall foam I adhere to the battery compartment cover.

It is best to back up the machine's data via a System Exclusive data dump to a computer rather than rely entirely on the battery backed up memory.

Please see the separate documentation of the version 4 firmware for instructions on clearing patterns if the memory contents become corrupted, as they will if there is no battery supply to the memory chip.

## ***Document history***

- 2018-10-11 Initial version.