

12/24 Volt Battery Switching, version 1.2

By R. G. Sparber

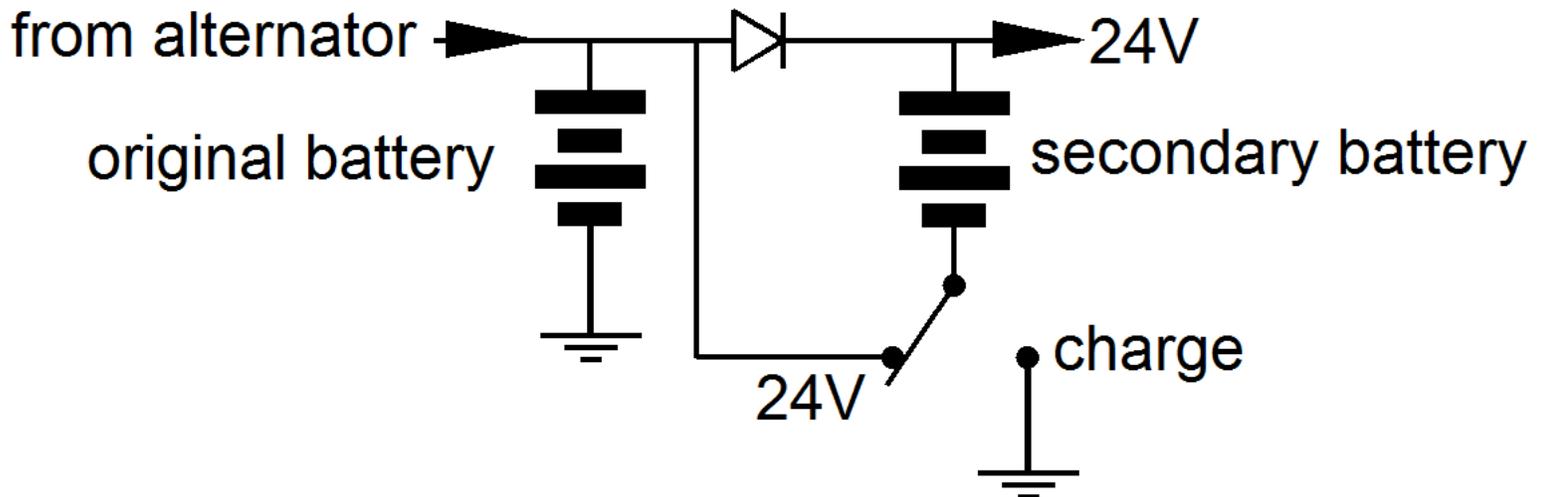
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The problem I am solving here is how to connect two 12 volt batteries such that they will charge with a conventional tractor charging system yet can be switched to output 24V to run a welder.

I offer a basic circuit and then one with more features.

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Basic Circuit



The original battery and charging system is untouched. The secondary battery is charged through a diode and the "charge" switch contacts. The diode should be sized to withstand 150% of the maximum charging current into the secondary battery. The Single Pole Double Throw (SPDT) switch would be sized to withstand the maximum current flowing to the 24V load.

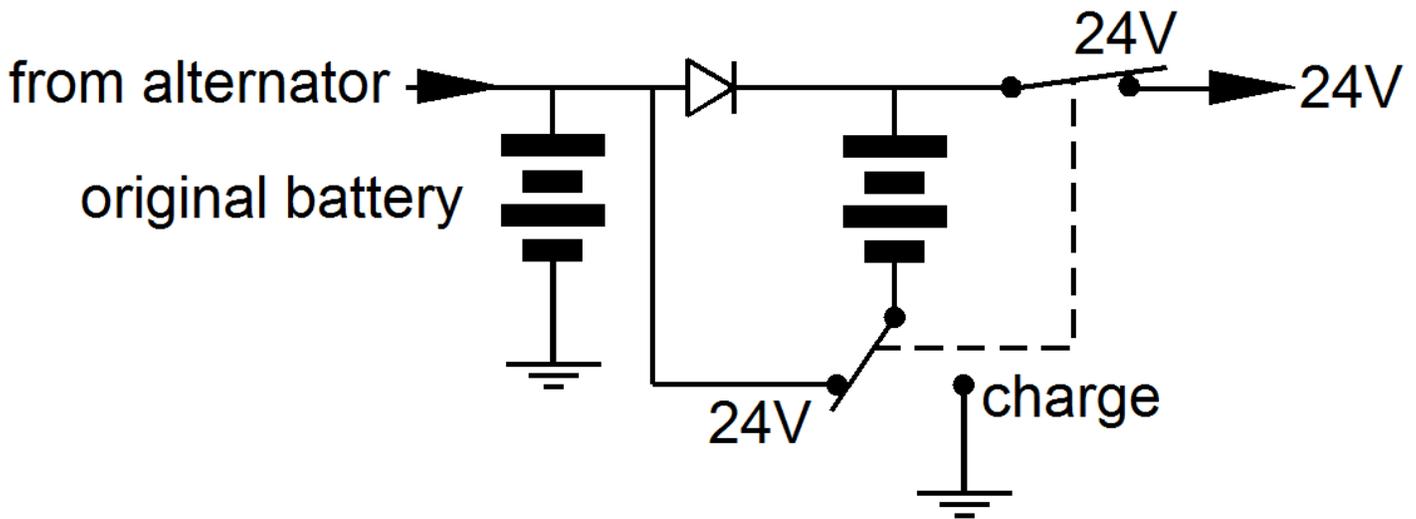
It is assumed that the load would not draw current while the switch is changing state. This can cause arcing that can weld the switch contacts. Note when shopping for the switch that you are switching DC and not AC. The ratings are not the same.

With the switch set to "charge", the secondary battery is fed charging current via the diode. The diode prevents the two batteries from being directly connected together. Doing so can cause accelerated self discharge of both batteries.

With the switch set to "24V", the negative terminal of the secondary battery is connected to the positive terminal of the original battery. This causes the output to equal 24V.

The negative terminal of the 24V load connects to ground.

Improved Circuit



The SPDT switch has been replaced by a Double Pole Double Throw (DPDT) switch. In this way the load current cannot pass through the diode. When the switch is set to "charge", the secondary battery is fed from the diode and the load sees an open circuit. When the switch is set to 24V, the diode turns off and the load sees two 12V batteries in series.

Two additional improvements can be added. The first is a fuse at the output which is highly recommended. The second is an LED with 1K ohm $\frac{1}{2}$ watt series resistor that goes across the diode. When the 24V output is on, the LED would light. This may reduce the chances of forgetting to put the switch back to the charge state.

If forgetting is a major problem, the switch can be replaced by a relay and push to start button. Then when the 24V load is turned off, the circuit will automatically switch back to charging.

Thanks to Dave Kellogg for finding a typo.

I welcome your comments and questions.

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