

CHARGE TWO CAR BATTERIES AT ONCE

Speed charging time of batteries by doubling up on the circuit

BY CHARLES COHN

CHARGING two or more lead-acid batteries with one battery charger, while keeping them isolated from each other, can be a snap with the simple circuit modification described here. One of its uses is for recreational vehicles that have a main battery for starting and ignition and an auxiliary battery for accessories. These batteries are isolated from each other so that overuse of accessories while the engine is off will not run down the starting battery and immobilize the vehicle.

Circuit Operation. Figure 1 shows a simplified schematic of a commercially available "automatic" battery charger (the type that can be left permanently connected to a battery without danger of overcharging). A transformer and rectifier feed rectified ac to the battery through a silicon controlled rectifier (SCR). A recreational vehicle usually has a power converter that charges the auxiliary battery when line power is available. The converter works in much the same way as the battery charger. However, in some converters, the SCR anode is connected directly to one side of the power transformer.

In the battery charger, the control

circuit senses the battery voltage. If that voltage is below a preset point (e.g. 13.4 volts), the circuit turns on the SCR. The SCR, in turn, passes current to the battery. When the battery is fully charged, its voltage rises above the preset point and the SCR is *not* gated on. Recall that the gate of an SCR can turn it on but cannot turn it off. However, SCR turnoff is guaranteed in this circuit because of the absence of a filter capacitor following the rectifier. Without filtering, the rectifier output drops to zero every half cycle, turning off the SCR. When self-discharge, electrolyte diffusion, or loading pulls the battery voltage below the preset point, the charger turns on again—just long enough to bring the voltage back up. Thus, the battery floats at full charge.

Construction. Figure 2 shows how to modify the battery charger to charge two batteries at once. Break the connections between the SCR cathode, the output, and the voltage sensing lead. Connect a diode between the SCR cathode and each battery, with the diode cathode going to the battery. You can use a lug terminal strip to make connections. Select diodes that have a current rating at

least equal to the maximum output of the charger.

Connect the voltage sensing lead to one of the batteries. It's best to connect it to the battery that is most likely to need charging, for example, the auxiliary battery on a recreational vehicle. The other battery will follow. If the second battery has a higher state of charge than the controlled battery, the diodes will steer the charging current away from it. If it is lower than the controlled battery, the diodes will steer the current into it. The charger will not shut off until the controlled battery comes to full charge. That won't happen until the other battery comes up enough to allow current to be steered to the controlled battery. Self-discharge will always bring the controlled battery down enough to turn on the charger.

If your recreational vehicle has a solid-state battery isolator, you don't need the diodes. Simply connect the SCR cathode to the center terminal of the isolator, the one to which the alternator connects.

If you don't want to use individual diodes, you can use a bridge rectifier assembly with the appropriate current rating, as shown in Fig. 3. Here, two of the diodes are active, while the other two are in series opposing and do nothing. This circuit has been used with a Heathkit GP-21 10-A battery charger installed in a camper van and it works very well. ◇

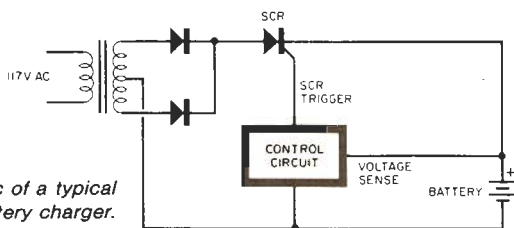


Fig. 1. Simplified schematic of a typical commercial "automatic" battery charger.

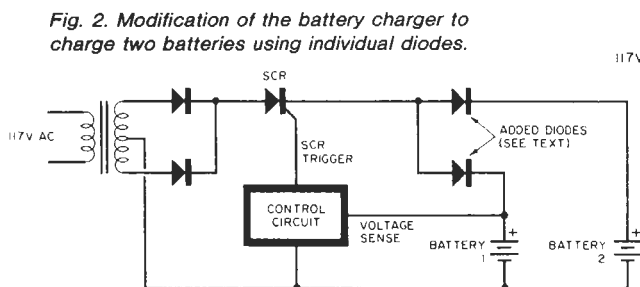


Fig. 2. Modification of the battery charger to charge two batteries using individual diodes.

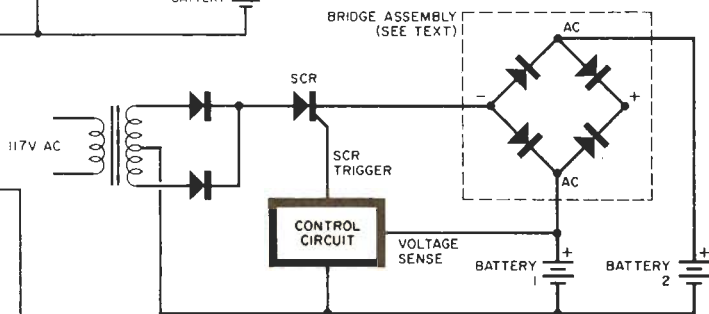


Fig. 3. The charger circuit can also be modified by adding a bridge rectifier assembly.