BY IRWIN MATH, WA2NDM

MATH'S NOTES

WHAT'S NEW AND HOW TO USE IT

Battery Backup

Several months ago we presented a couple of ways to add a battery backup circuit to equipment you might be building. These schemes relied on reverse and forward biased diodes to switch between the AC line derived power source and the backup battery. One such circuit is reproduced in fig. 1 to jog your memory. While this type of method is simple and does work, it is less than ideal in the sense that the drop across the diodes subtracts from the voltage available from the backup battery. This means that in backup operation, every "last drop" of power cannot be obtained—an unallowable situation in the eleventh hour of Field Day! In addition, it requires that the incoming voltage must be higher than the backup battery in order to switch properly.

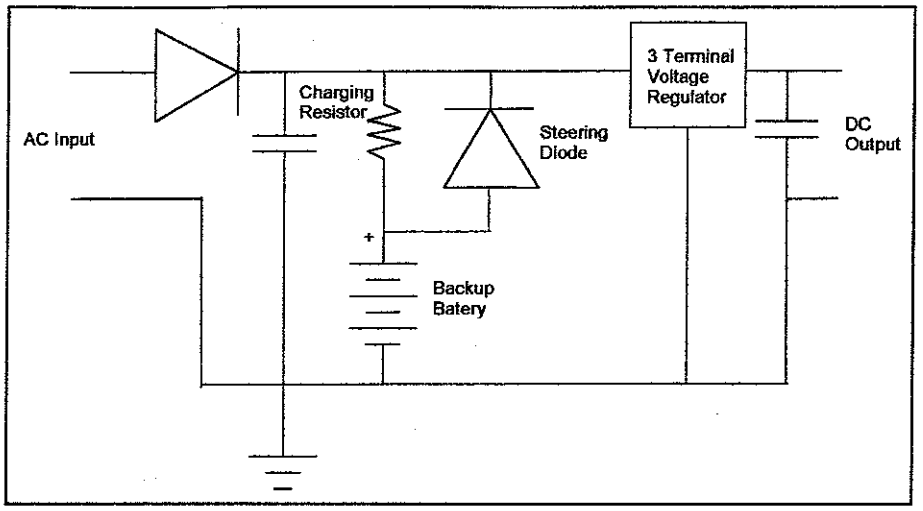

Fig. 1-- Reference battery backup/regulator circuit.

What if you wanted two backups? Or what if your two sources were equal-voltage car batteries? Well, for those of you who wish to go further, the approach to be described this month centers around a new chip offered by Linear Technologies that is specifically designed for backup service. As you soon will see, the shortcomings of the previous method are easily overcome with this new chip.

Fig. 2 is a schematic diagram of a battery backup system using the new Linear Technologies LT1579. As you can see from the schematic, the chip has two inputs. Vin 1 is for the primary source of power, and Vin 2 is for the backup battery input. When initially turned on, the regulated 5 volt output is provided from the source connected to Vin 1. When the circuit senses that Vin 1 has dropped to the point where it can no longer sustain a 5 volt output, the chip then switches to the backup input source connected to Vin 2. The chip operates in this manner whether Vin 1 is larger or smaller than Vin 2. Vin 1 is always the primary, and Vin 2 is always the backup.

The LT1579 also contains two voltage comparators for status monitoring purposes. These comparators, S1 and S2, are driven by voltage dividers that are user-set for the desired sensing levels. In the example of fig. 2, the primary comparator (S1/Comp 1) is set to sense 5.4 volts, and the secondary comparator (S2/Comp 2) is set to sense 6.2 volts. When these levels are reached, the outputs, which are open collectors, conduct. Usually these outputs are pulled up to Vcc and used to provide signals for switching other circuitry. One common application of this type of signal would be to disconnect batteries that must not be allowed to totally discharge.

The two other outputs shown in fig. 2 are B/U and D/O. B/U is called "backup" and conducts when the LT1579 switches from the primary to the secondary input. D/O is similarly called "dropout" and conducts when there is not enough voltage from either source to sustain the 5 volt output. These can also be used for indicator purposes or for other power management circuits.

Additional features of the LT1579 chip include a regulated output, an input to output drop of only 0.4 volts, and input reverse polarity protection. This means that primary or secondary inputs only 0.4 volts higher than the output (5.4 volts) will drive the circuit, allowing every last drop of power to be obtained from a battery. It also means that if you accidentally connect the battery with the wrong polarity, nothing will be damaged.

In conclusion, the LT1579 seems to be the ideal backup controller. For further information, contact Linear Technologies at 1630 McCarthy Blvd., Milpitas, CA 95035-7417, or call their literature "hot line" at 1-800-4-LINEAR.

73, Irwin, WA2NDM

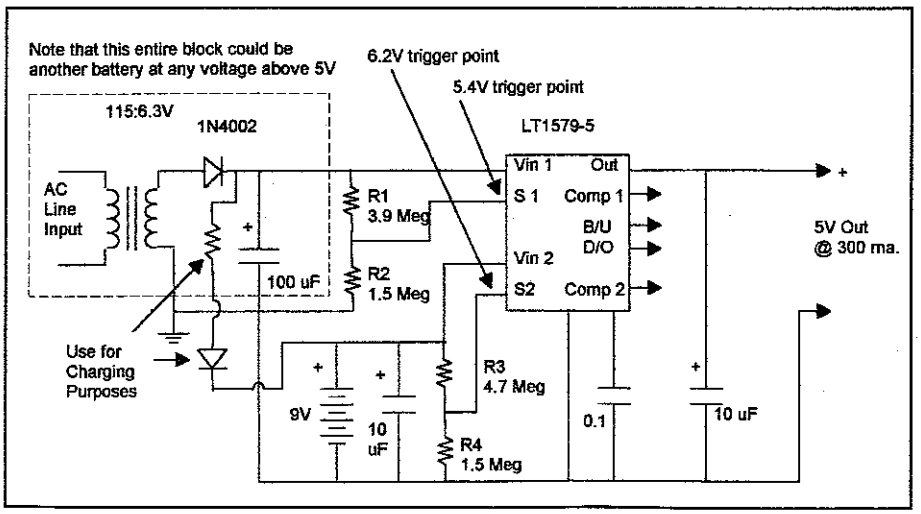

Fig. 2-- Battery backup circuit using National LT1579.

c/o CQ magazine