MULTI-BATTERY TROUBLESHOOTING

Failure Modes and Possible Effects Analysis for Solid State Diode Type Isolators

Carl Smith
Applications Engineer

Four possible failure modes exist for the Sure Power solid state diode type isolators. These failure modes are outlined, followed by an effects analysis. These analyses are derived from a single input, dual output isolator but can be applied to models with differing numbers of inputs or outputs, and different current levels.

Note: Diode 1 will be defined as the diode(s) connecting from the alternator terminal of the isolator (input) to the main battery terminal of the isolator (output 1). Diode 2 will be defined as the diode(s) connecting from the alternator terminal of the isolator (input) to the auxiliary battery terminal of the isolator (output 2).

FAILURE MODE 1

DIODES BECOME SHORT CIRCUITED

Diode 1 Shorted

The main battery will charge to 14 volts. Auxiliary batteries will charge to 13 volts. When a partial isolation condition exists: the main battery can now discharge into the auxiliary battery.

Diode 2 Shorted

The main battery will charge to 14 volts. Auxiliaries batteries will charge to 15 volts. When partial isolation condition exists: the auxiliary battery can now discharge into the main battery.

Diode 1 and 2 Shorted

The main battery will charge to 14 volts. Auxiliary batteries will charge to 14 volts. Isolation no longer exists: both batteries can discharge into the other.

FAILURE MODE 2

DIODE(S) OPEN CIRCUIT

Diode 1 Opens

The main battery will not charge. The auxiliary battery may overcharge if the regulator is sensing the main battery deficiency. The auxiliary battery will charge to 14 volts if the regulator is:

- Alternator sensing
- Diode trio/isolator sensing
- Auxiliary battery sensing

Diode 2 Opens

The main battery will charge to 14 volts unless the regulator is sensing voltage at the auxiliary battery, in which case the main battery may overcharge. The auxiliary battery will not charge.

Diode 1 and 2 Opens

The main battery and auxiliary battery will not charge.

FAILURE MODE 3

DIODE(S) BECOME RESISTIVE

Similar effects occur as with Diode(s) Open Circuit. See above.

FAILURE MODE 4

ALTERNATOR POST SHORTS TO HEATSINK

The main battery and the auxiliary battery will not charge. The alternator may current-limit to ground.

For quality Technical assistance, 1-800-845-6269

SURE POWER INDUSTRIES, INC.

10189 SW Avery • Tualatin, OR 97062 • USA • Tel: (503) 692-5360 • Fax: (503) 692-9091