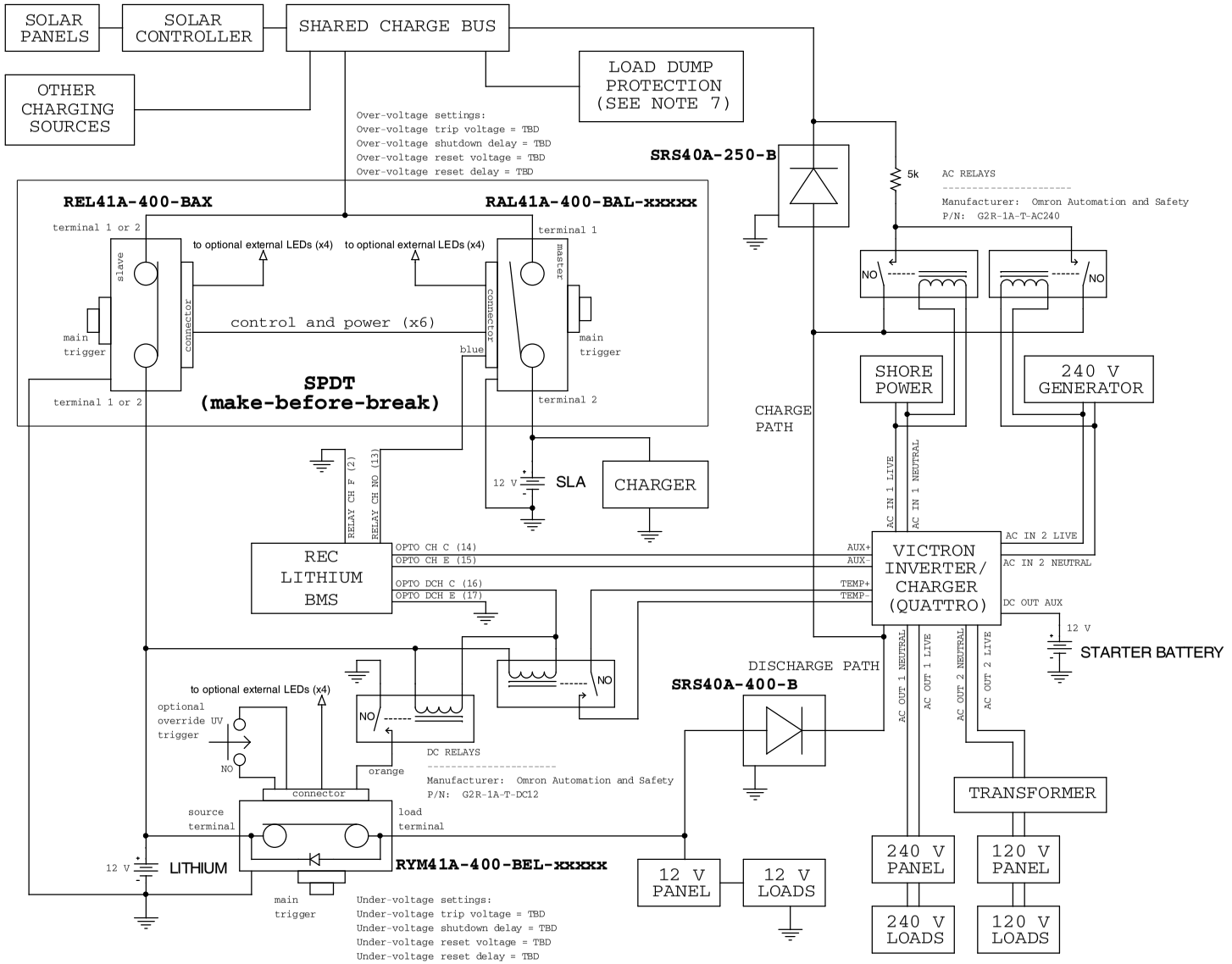

REVISION HISTORY

1: Original

2: Single rectifiers added. AC relays and 5k resistor added for charger battery sensing.

NOTES:

1. Lithium BMS connects "RELAY CH F" to "RELAY CH NO" when charging is allowed and disconnects them when charging is disallowed.
2. Should the BMS detect an over-voltage condition, it will trigger the slave relay to open and the master relay to close, while also signaling the Quattro to inhibit charging.
3. Should the BMS detect an under- or over-voltage condition, it will trigger the load relay open (see note 2).
4. The relay main triggers enable normal operation (i.e. allows the relays to respond to the BMS signals and optional triggers). Should a relay open due to an over-current or short-circuit event, toggling the relay's main trigger will reset the device. In the case of the load relay, toggling of the BMS output wil also reset the relay. The main triggers also allow for safe installation and removal by providing a way to force the relay open.
5. Relay ground wires should be connected as close as possible to battery negative terminals.
6. External LED connections are not required for proper relay operation, but are included to allow for maximum monitoring flexibility.
7. Load dump protection is necessary in case slave relay is off and the master relay opens due to an over-current, short-circuit, or over-temperature event. Disconnection of the battery from the charge bus can cause an alternator to generate a large voltage spike (i.e. a load dump) as it attempts to dissipate the energy from magnetic field (the higher the current generated by the alternator at the moment of battery disconnection, the higher the voltage spike). 12 V relays can tolerate a spike up to 40 V; many alternators today have integrated load dump protection in the form of avalanche diodes, but it is up to the customer to eensure that a load dump condition will not exceed 40 V.
8. Should an over-voltage event on the charge bus occur, the slave relay will open and the master relay will close.
9. All battery and load grounds should be tied together with low impedance cables.
10. Uni-directional relay RYM41A-400-BEL-xxxxx will go into its low-power sleep mode immediately upon opening due to an under-voltage event. The purpose of this is to minimize the current draw on the lithium battery, and, therefore, the possibility of deep discharge (which can pose a safety threat). If the optional override trigger is activated, the relay will wake up from its low-power sleep mode and close only if the the main trigger is active; if this occurs and the override trigger is then de-activated, the relay will go back into its low-power sleep mode if an under-voltage reset event has not occurred.
11. The slave relay is powered from the higher of the SLA battery and the sharged charge bus voltages. The purpose of this is to reduce the current draw on the lithium battery, particularly when its has reached a low-voltage condition (defined by either the BMS or the uni-directional relay's internal settings).
12. Current draw on the lithium battery when its voltage is 11 V and the uni-directional relay is in its low-power sleep mode is a maximum of 2.0 mA.
13. Connections to labeled relay terminals must be adhered to.
14. Should the control and power harness between the two SPDT relays become disconnected, both relays will be forced open, the power OK LEDs will go dark, and the red fault LEDs will illuminate.
15. "xxxxx" in the master and load relays are specification codes to be assigned once the under- and over-voltage settings are chosen.
16. Single rectifiers (SRS40A) ensure that Quattro can only supply charge current through the charge bus, and can only discharge current through the load bus.
17. When AC is present (either through shore power or through the generator), one or both of the AC relays will connect the 5k resistor between the charge bus and the Quattro, allowing it to properly sense battery voltage for charging start-up. 5k resistor must have a minimum power rating of 1/4 W.
18. Single rectifier grounds should be tied to the lithium battery negative.

DRAWING IS FOR APPLICATION DISCUSSION ONLY. USER IS RESPONSIBLE FOR ENSURING ALL POWER-GATE ELECTRICAL LIMITS ARE ADHERED TO.

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Title: SAMPLE - POWER-GATE Implementation for Lith ium Battery System

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