

Tethys LRAUV

Load Control System

Capabilities

05 Feb 15 ecm extract from full Description document
17 May 17 ecm minor edits for clarity

Summary

The Load Control System distributes and controls serial I/O and power to peripheral devices within the Tethys vehicle. The overall system consists of a 24-slot Power Backplane, two Power Converter boards, and several Load Control Boards (up to 22 total, one for each device in the vehicle).

The Load Control System accepts raw battery power (10-24 VDC), SPI communications, and address and control signals from the main vehicle CPU ("Motherboard"). The system generates and distributes 3.3, 5, 12, and 24 volt payload power, along with conditioned battery power and RS-232, 485, or TTL serial communications.

Each Load Control Board contains a SPI UART, level shifters for RS-232 or RS-485, and a power switch with soft start, current limit, and circuit breaker functions. Relays provide switchable galvanic isolation for both power and communication signals. Each board is configured at assembly time for one of the three serial formats and one of the five power distribution voltages. A microcontroller on each board operates the power switch section based on SPI commands from the main vehicle computer, and returns telemetry of current, voltage, and switch state. Individual peripheral devices throughout the vehicle plug into output connectors on each LCB to receive switched power and serial comms.

The Load Control System is designed with micropower operation as a design priority, and operates in standby (power on, no serial traffic) on <10 mW per channel.

Specifications

Power Voltages: Nominally 3.3V, 5V, 12V, Raw Battery (10-24V), and 24V

System Total Current Output: 3.3V: 1.5A
 5V: 1.5A
 12V: 3A
 24V: 5A
 Batt: 20A max, 10A with 3-5-12-24 converters loaded

LCB channel Current Output: 3.3V: 1.5A
 5V: 1.5A
 12V: 3A
 24V: 3A
 Batt: 4.5A

LCB Circuit Breaker: Hardware current limit at 2.2, 3.3, or 5A
 Fast software circuit breaker after 70 msec in current limit
 Slow software circuit breaker with separate Peak and
 Average trip values
 5A fuse

Soft Start: Load inrush charge 0.2 Coulomb max (approx)
 e.g. up to 6800 uF at 24V, up to 33,000 uF at 5V, etc

Isolation:	dual coil latching relays DPST power, 4PST comms
Serial Comms:	9600 - 115k bits/sec RS-232, RS485, or TTL (configuration option) 8-byte send and receive FIFOs
Telemetry:	0 - 5A, 0 - 25V, 10 bit resolution Switch Closed, CB Tripped, and Output-On flags
LCB Power:	3.3V logic supply @ ~1 mA 3.3V serial comms supply, current depends on serial format per channel Power switch circuit draws 0.25 mA from configured power rail, when active
Dimensions:	LCB and Power Converters: 5"w x 2"h x 0.45"t, fits 0.5" backplane pitch Backplane: 15"l x 5"w.
Connectorization:	Power: Tyco "Micro Mate-N-Lok", 3-7 pins dependent on voltage (multiple contacts suggested for >3A output) Serial: Molex C-Grid SL 4