

LCB Checkout Procedure

Brief Version for Production

17 Jul 14 ecm fork from LCBCheckout.rtf (old full version)
24 Jul 14 ecm Rev 2: add current limit test, *outline* for in-backplane serial and overcurrent tests

Equipment

Backplane test connector with Logic 3.3V and VBatt power inputs.
Instrument Power output cable

Logic power supply: 3.3V @ 500mA
HV power supply: 0-30V @ 3A adjustable
DVM ammeter with mA and A ranges
DVM voltmeter
Power Resistor Decade with 3A/50W capability

Procedure: Basic Switch Function

- 1) Visual Inspection
 double-check configuration: jumpers and IC's (especially JMP2)
- 2) Program PIC with On-Off cycle program. This program will, at one-second intervals, start from the Off state, Enable the switch section, turn On the switch section, turn Off the switch section, Disable the switch section, and repeat.
- 3) Set Relay
 - a) connect VBatt leads to HV power supply via DVM ammeter
 - b) connect Logic 3.3V leads to Logic power supply
 - c) advance HV Supply to 15V
 - d) switch on Logic supply; relay should audibly click
- 4) Configure for Board voltage (if board is not a Batt voltage board)
 - a) turn HV supply to zero output
 - b) disconnect +VBatt lead from DVM ammeter
 - c) connect test clip lead to DVM ammeter
 - d) connect test clip to D7 cathode lead
 - e) turn HV supply up to board nominal voltage (3.3, 5, 12, or 24)
- 5) Check Off/Enable/On no-load current
 - a) Set DVM ammeter to mA range
 - b) Switch will be cycling through Off, Enabled, and On states at 1-second intervals.
 - c) Off state Hi limit is 0.05mA, Lo limit 0.01 mA
 - d) Enabled state Hi limit is 0.15mA, Lo limit 0.07 mA
 - e) On state Hi limit is 0.33 mA, Lo limit 0.15 mA
 - f) Set DVM ammeter back to A range

- 6) Check On state voltage drops (on resistance)
 - a) Connect Instrument Power cable to resistor decade; set decade to draw 1.0 A (i.e. set Ohms = Board Voltage)
 - b) Connect Instrument Power cable to board, verify the load draws 1.0A when switch is in On state. (May need to increase HV supply slightly.)
 - c) Check high side voltage drop with DVM voltmeter probes between D7 cathode and TP5. Hi limit 60 mV; Lo limit 40 mV.
 - d) Check low side voltage drop with DVM voltmeter between D7 anode and TP6. Hi limit 15 mV, Lo limit 7 mV.
- 7) Check current limit function
 - a) Set decade to draw 3.0 A (Ohms = Board Voltage/3)
 - b) Briefly connect to board, check current on ammeter during on state. (Note: switch transistor will get hot, limit this test to a few on cycles)
 - c) Hi limit 2.8 A, Lo limit 2.5 A
- 7) Install shunt on JMP1 and verify LED function.
- 8) Wrap up of Basic Switch Function.
 - a) Turn down HV supply and switch off.
 - b) Switch off Logic supply
 - c) Disconnect HV test clip (if used) from D7

Procedure: Advanced (Circuit Breaker, Telemetry) and Serial I/O Function

[Draft – this is an outline of final full procedure]

- 9) *Switch function and telemetry*
 - a) *Plug board into Power Backplane and apply power*
 - b) *Verify communication between Vehicle CPU and board*
 - c) *Verify basic switch-on/switch-off function*
 - d) *Connect 1A load (decade box) and verify current reading from board*
 - e) *Verify voltage reading from board.*
- 10) *Circuit Breaker function*
 - a) *Switch board on*
 - b) *Connect 3A load (standard board) or 6A load (5A board)*
 - c) *Verify switch turns off within 50-70 msec*
- 11) *Serial I/O function*
 - a) *RS-232 board: install RS-232 loopback connector (loops J2 pin 1 to pin 2)*
 - b) *485 board: half duplex, no loopback needed*
 - c) *Send character string and verify echo*