Appendix A: Schematics
ECE 492 - Spring 2016

Full System Schematic
GLV Power/SCADA/Safety
TSIHV
TSILV
Accumulator
  Accumulator Wiring Diagram
  PacMan Schematic
  Control Panel Schematic
This document includes
the following plugs, jacks
and wires:
W1<->W29
P1<->P10
J1<->J13
NOTES

1) Fuse holder wires are fitted with crimp connector rings (left).
2) 00 AWG positive cable is fitted with crimp connector (right).
3) 1 ft USB A Male to USB B Male Cable
4) An additional relay is placed on safety loop wires w/ led on 1 of the 4 accumulators in a vehicle. It is located between cell+ and the 200 A fuse.
5) Anderson Power connector requires each 1 black 1327 and 1 red 1327 housing. The snap in recepticle also requires 1 black 4827 housing. (Below)
6) All wire colors agree across connectors

3) 1 ft USB A Male to USB B Male Cable
2) 00 AWG Positive cable is fitted with crimp connector (right).
1) Fuse holder wires are fitted with crimp connector rings (left).
See mechanical drawings for details of aluminum bars used to connect cells.
This power supply is responsible for delivering non-isolated 5V power to the high voltage electronics. All AMS bus connected devices are powered from this regulator. Maximum current draw is 2.2A. This Switcher was selected for its high efficiency even at light load.

Additional documentation includes: PACMAN computer, charge relays, and charge fans.

This flyback regulator is responsible for delivering 9V isolated power to low voltage systems. This includes: PACMAN computer, charge relays, and charge fans. The LT8302 requires a minimum current draw for stable voltage regulation. If this current draw is not met, the +9V rail can go as high as 20% over voltage. The zener diode will allow the required current to pass and maintain a level 9V.

Minimum Current Draw: 10mA  
Maximum Current Draw: 2.2A

DEVELOPMENT ONLY

Engineer: Geoff Nudge
Supervisor: Christopher Nadovich
Fall Semester 2015
Lafayette College
SAFETY LOOP RELAY

This relay is responsible for switching the PACMAN safety loop connection ON/OFF. The lights show the user at a glance if the safety loop is open or closed.

This relay is capable of switching 8A. The SLOOP_CTRL signal is active low.

OPTO-ISOLATOR ON SL CLOSED SIGNAL

This device provides a galvanically isolated signal to the microcontroller to let it know the safety loop is closed in all components. The HV current sensor is enabled as a result. This means the AIRs should be closed if functional.

FAN CONTROL P-FET

This MOSFET is responsible for switching the charge fan ON/OFF. The fan will not come on automatically when charging begins, it is controlled by the software.

FAN Output Voltage: 5V

GROUND LOW VOLTAGE

This device provides a galvanically isolated signal to the microcontroller to let it know the safety loop is closed in all components. The HV current sensor is enabled as a result. This means the AIRs should be closed if functional.

CHARGE CONTROL P-FET

This MOSFET is responsible for connecting the CHARGE relays when the pack charger has been connected. Power is supplied from either the pack terminals, or USB connector.

Fan Output Voltage: 5V

HIGH SIDE P-FET DRIVER

This device is responsible for driving the high side p-fet switches.

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Title: Battery Pack Management Computer

File: safety_loop.sch
Sheet: /Safety Loop Wiring/
NOTE: Population of R26 is optional.
R26 should only be populated if you intend to use this board as a terminating CAN node.
(R26 should usually be unpopulated).
USB BOOTSTRAP POWER

This diode is used to power the PACMAN computer board when the battery pack has been fully discharged. If voltage is not present between PACK+ and PACK-, then this diode will allow the USB port to supply up to 500mA of sustained current. For periods less than 0.1 seconds, 1A can be drawn.

This is an FTDI USB Serial Converter IC, it can be used to upload code, configure the device, or transfer debugging information if the software is configured properly.

Drivers available for Windows, MacOS & Linux
A

B

C

D

1

2

3

4

P1

CONN_01X04

modules:4pin_molex

GND

PB0

+3.3V

PB1

LED-

PB2

LED+

PB3

ADC1

PB4

ADC0

PB5

+5V

SW_SCL

RESET

P2

GPIO

Connect:IDC_Header_Straight_16pins

LEDs:LED=5MM

Date: Spring 2016

KiCad E.D.A. kicad (2015-08-05 BZR 6055, Git fa29c62)-product

Rev: 0.1

Size: A4

Id: 1/1

Title:

File: panel pcb.sch

Sheet: /

Lafayette College ECE

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