Errata

ECE 491 - Fall 2018

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Abstract

This document describes the errors found in both the PiToCan Board and the Break Out Board over course of Fall 2018 during Dyno testing.

Table of Contents

Executive Summary

GLV Break Out Board (BOB)

The BOB is a board that is meant to manage the GLV system within the Electric Vehicle used in Lafayette College. More specifically, the board is used to convert 24V to 5V for the SCADA system, as well as manage the relays for the safety loop, connect the resets and E-Stops to the safety loop, provide power to the TSI, Cockpit, Airs, and Cooling systems as well as several lights on the car.

GLV BOB Errors:

1. This board does not have an output pin for the 24V to supply power to the other subsystems. Instead, the 5V supply was used, this is erroneous and should be the 24V power.
2. In addition, there are not enough pins on the CAN port. There should be 6 pins (CAN+,CAN-,CANSHIELD[CHASSIS GND],GLV+[24V],GLV-[BOARD GND], CHASSIS GND).
3. The rest of the BOB power should also come from GLV+ instead of the BATT+, this is because the load sensor doesn't work properly otherwise.
4. The labeling for the BOB schematic is also very ambiguous, this should be improved in the future so that there is no confusion for what each component is for.
5. In addition, because SCADA does not need ADC support anymore for the HUFFBOX then the MCP6004 chip and the connector to the HUFFBOX are no longer necessary.
6. The AD5593R chip is unnecessary for the GLV BOB. It should be replaced with a cheaper simpler temperature chip which uses I2C.
7. The TPS27081A, High Side Load Switch, was also ineffective at closing the SCADA relay. Instead a 2n7000 was used close the relay. This was a more reliable method.
8. The number of connectors could be reduced if they were combined into one port instead of separate ones, for example the SSOK J11 and RP J3 were going to J4 on the RIGHT SIDE. But they were physically on different locations of the board which made plugging in connectors awkward.
9. The connectors should be relocated so that they can be easy to access inside of the GLV enclosure. Separating the SLOOP connectors from the VSCADA physically could make the GLV setup less messy.
10. In addition, the SSOK ports were connected to the wrong part of the safety loop. They were connected to the AIRS+ line, but should've instead been connected to the MReset_B line.
11. There should be a trace that connects the CAN port to a plated mounting hole, so that it is easier to get CHASSIS_GND.
12. The DB9 connector was initially connected in reverse: pin 7 was CAN+ and pin 2 was CAN-. Instead pin 8 should be CAN+ and pin 4 should be CAN-. This is due to an inconsistency in the PCB layout DB9 footprint where the pin names are the reverse of the actual physical pins.
13. There were also no part numbers on the board.
14. Also, it was not possible to get data from GLV as well as use the RTC with the current setup. This is because there are only 1 SDA and SCL pin on the raspberry pi 3. In the future, it would be better if there were another set of pins for the I2C to attach to other peripheral devices.
15. Another setup of 2x3 pin connectors for the adafruitPiRTC.
16. The SCADA also isn't powered properly through its GPIO pins it cannot source enough current through them. It therefore needs to be able to access 5V+ power through the mini-USB power connector on the side. Therefore, the board should have a usb to mini-USB connector so that the raspberry pi can be properly powered.

17. The SCADA relay and DYNO relay were both (NO) relays, however they should've been (NC) relays.
18. Finally, the 5V+ DC/DC converter should’ve been fused considering that the output of the converter is around 4 A. This could damage sensitive components on the board in the case of an incident and should be accounted for.

GLV Pi To Can Board (P2C)

This board is designed so that the SCADA can connect to the GPIO on the Raspberry Pi 3 device on the Electric Vehicle made in Lafayette College. In previous years, the SCADA could not connect to the Raspberry Pi 3 GPIO because the CAN HAT physically blocked them. This adapter allows those extra pins to be utilized. This allowed for more information to be processed and interpreted. In addition, an RTC could be utilized as well.

P2C PCB Errors:

1. The drawback of this board is that the mounting holes do not line up with the Raspberry Pi 3. Therefore, it is unstable. In order to avoid this, the mounting hole
2. positions should be changed. Or in the future find some other form of bracing the adapter.
3. There were also no part numbers on the board.

DYNO PANEL

This panel was meant to represent the cockpit, left side, and right side panels of the car. However, this panel did not account for SSOK lights, as a result we have updated the design of the panel in the second version of the panel which is available on the project’s website under GLV subsystem.

A Word of Caution

While we have made every attempt to ensure that the information contained in this document is complete, understand that there may still be unforeseen errors.