

Dyno Interconnect User Manual

ECE 492 - Spring 2020

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Abstract

This document is intended to inform the LFEV team on how to operate the complete electrical system either within the Dyno Room or in the car.

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Executive Summary

Introduction

This document will breakdown how to start up the complete electrical system of the full car.

Components

PC

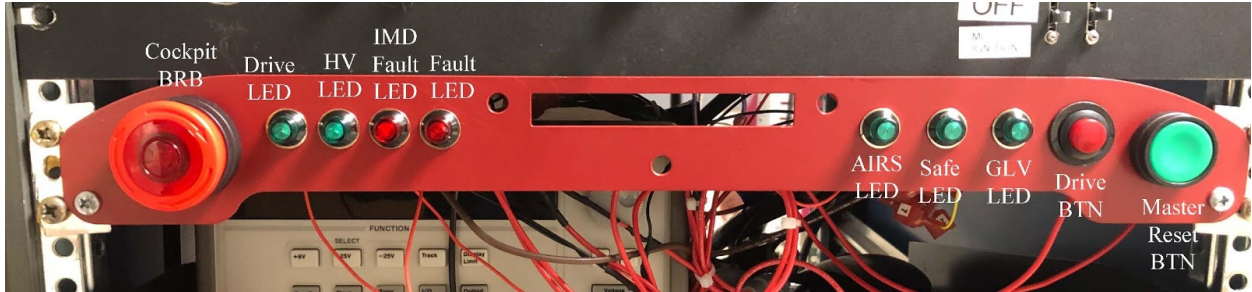
Description:

- a PC with a serial port or USB to serial adapter and terminal or CAN Open compatible USB dongle and PC SW
- With eDrive Configuration software installed you are able to enter analog throttle mode and manually control the motor
- requirements for setting application once the software is installed can be found in section 7.4.1 of [emDrive 500 Motor Controller User Manuel](#)

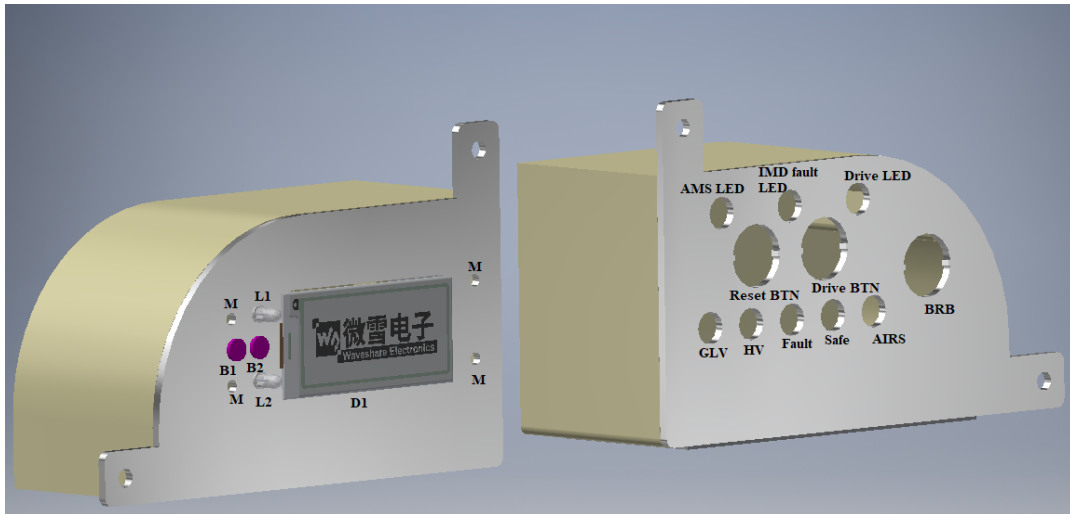
Cockpit Panel

Description:

- The aluminum panel: used as a mounting frame for the following components.
- Cockpit BRB: the driver can use this to disengage the safety loop.
- Red LED: indicates a fault in the safety loop.
 - o IMD Fault
 - o Fault LED
- Green LED: indicates the status of the safety loop.
 - o GLV LED
 - o Safe LED
 - o Airs LED
 - o Drive LED
 - o HV LED
- Drive BTN: used to enter drive mode.
- Driver Reset BTN: used as a part of the safety loop.
- Dashboard Display: the driver is alerted of the various states of the car
 - o For more detailed instructions and explanation see Dashboard Display User Manuel



Current setup in dyno room. Used for testing only.



Cockpit panel design to be integrated into the car.

Right Side Panel

Description:

- The aluminum panel: used as a mounting frame for the following components.
- GLVMS: used to power the GLV.
- Emergency Estop (BRB): used to disengage the safety loop.
- IMD Reset AMS Reset (Master Reset): used as a part of the safety loop.
- TSVMS: used to enable power to the AIRS.
- Safety System OK (SSOK): indicates that the Master Reset has been pressed according to the startup procedure.



Left Side Panel

Description:

- The aluminum panel: used as a mounting frame for the following components.
- Emergency Estop (BRB): used to disengage the safety loop.
- Safety System OK (SSOK): indicates that the Master Reset has been pressed according to the startup procedure.



TSI Testing Panel

Description:

- Acrylic board: used to test pedal, brake, and Break Over Travel (BOT) with the following components.
- Break Over Travel (BOT): a switch used in the safety loop.
- Break Button: used to test the brake light.
- APPS1 and APPS2: switches used to set the bias of two potentiometers to 0 or 5 volts.

- RV1 and RV2: resistance valves.
- Panel Voltmeter: shows the throttle voltage.
- 4 Banana Jack Sockets: testing points used to calibrate the two potentiometers to have 5V bias.



Pre-Startup Procedure Checklist

Safety Inspection

In order to safely and efficiently, start the system to verify the pre-startup procedure checklist.

Pre-Startup Procedure Checklist		Check
1	All cockpit lights are off	
2	Cockpit BRB is disengaged	
3	Right side panel SSOK light is off	
4	Right side panel BRB is disengaged	
5	Right side panel GLVMS is off, handle pointing downward	
6	Right side panel TSVMS is off, handle pointing downward	
7	Left side panel SSOK light is off	
8	Left side panel BRB is disengaged	
9	Toggle TSI testing panel APPS1 switch upward	
10	Toggle TSI testing panel APPS2 switch upward	
11	Set RV1's "hour hand" to 1 and "minute hand" to 10	

12	Set RV2's "hour hand" to 1 and "minute hand" to 0	
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Getting Started

Engaging the Safety Loop

In order to engage the safety loop, the following startup procedure must be followed.

Startup Procedure		Check
1	GLV Battery is connected to port J1	
2	Twist open right side BRB	
3	Twist open left side BRB	
4	Turn on GLVMS on the right side panel	
5	Check GLV light is on	
6	Check IMD Fault light is on then goes off	
7	Check if Fault light is off	
8	Check Current/Voltage and Power Display on GLV Box is on and displays 24V	
9	Check VSCADA Display on GLV Enclosure is on	
10	Press green Mreset button on the right side panel	
11	Check if SSOKs are on	
12	Check Safelight is on	
13	Assure that driver is conscious and ready	
14	Make sure no one is in front of or behind the car	
15	The driver should twist open cockpit BRB	
16	The driver should press green Mreset on the cockpit panel	
17	Turn on TSVMS on the right side panel	
18	Check AIRs light is on	
19	Check TSEL light is on	
20	The driver should press brake, and not accelerator, and press drive button	
21	Check Drive light on	
22	Drive	
Shutdown Procedure		Check
1	Press Drive button and brake to exist drive mode	

2	Drive LED is off	
3	Press Cockpit BRB	
4	HV LED is off	
5	TSEL is off	

Disengaging the Safety Loop

In the case of an emergency, the Safety loop can be disengaged completely at any point using either of the side panel BRBs or the GLV Master Switch (GLVMS). The driver can also disengage the safety loop using the brake overtravel or the Cockpit BRB. A jumper found on one of the TSV packs can be used as a manual disconnect jumper as well. In addition, the SCADA, IMD and TSV systems have the ability to disengage the safety loop if there is a fault detected.

Re-engaging the Safety Loop After a Fault

After the safety loop is disengaged it is possible to close the loop again depending on the location of the fault. Only certain steps of the startup procedure need to be executed to re-engage the safety loop based on the following faults:

- Steps 1 – 22:
 - o Right side BRB has been pressed.
 - o Left side BRB has been pressed.
 - o GLVMS key has been removed or disengaged.
- Steps 7 – 22:
 - o IMD Fault
 - o AMS Fault
 - o Jumper Removal
 - o Brake Overtravel
 - o SCADA Fault
- Steps 15 – 22:
 - o Cockpit BRB has been pressed.
- Steps 17 – 22:
 - o TSVMS key has been removed or disengaged.

Acknowledgments

This document is largely based on the template created and used by the Class of 2015 team.