ELECTRICAL SCHEMATIC VERSION\_4 REPORT

This is the Version\_4 report of Electrical Schematic. The difference between Version\_3 and Version\_4 is that in 4th version instead of SME Inverter, the Alpha Inverter is used and for that new Battery Pack AUG 144V 117Ah NCM is used.

In the Schematic, yellow color indicates components which are on [PCB](https://www.dropbox.com/s/31hrxkpsa7t9hiq/220506_EVERGRIN_Retrofit%20kit_PCB%20Schematic%20for%20PowerBox_V1.pdf?dl=0), Purple colored components are in PowerBox along with all connections.

**Diagram, schematic

Description automatically generatedSheet1:**

According to Battery Schematic from Supplier, the pins C+, C- from Battery charger connects to P+,P- to charge battery. And 12V+,12V- from Charger connects to Charge\_12V+, Charge12V- of HV battery. The pins of High voltage HV battery Box like, Activation\_Signal\_12V and DC12V+ through BUS\_HV\_Battery connects to VMU to control Battery. CAN\_H,CAN\_L,Can\_G connects to Can network for both charger and HV battery box. HV Battery Box terminals are also connected to High voltage terminals B- and B+ of Inverter and to the Inputs of DC/DC converter.

**InterLock:**

Software needed: No

Hardware needed: R4 Relay on [PCB](https://www.dropbox.com/s/31hrxkpsa7t9hiq/220506_EVERGRIN_Retrofit%20kit_PCB%20Schematic%20for%20PowerBox_V1.pdf?dl=0) and ACCHG\_12V signal

At 12V+ pin of Battery Charger, ACCHG\_12V/2.1D signal when applied means Battery is at charging state which stops the inverter working as, R4 relay of inverter with 33.3mA rated current is also, attached with ACCHG\_12V/6.2B signal which at the time of battery charging, stops inverter and hence, protects the inverter to run at the time of Battery Charging.12V R4 relay with rated current 33.3mA and 12V R5 relay with rated current 9.2mA are on [PCB](https://www.dropbox.com/s/31hrxkpsa7t9hiq/220506_EVERGRIN_Retrofit%20kit_PCB%20Schematic%20for%20PowerBox_V1.pdf?dl=0). ACCHG\_12V/2.1D signal of R4 controls the relay to connect Inverter to +12V\_PCB\_KeyOn.

**Diagram, schematic

Description automatically generatedSheet2:**

Alpha Inverter is used in this schematic. R5 12V relay with 9.2mA rated current and R4 12V relay with 33.3mA rated current are parts of [PCB](https://www.dropbox.com/s/31hrxkpsa7t9hiq/220506_EVERGRIN_Retrofit%20kit_PCB%20Schematic%20for%20PowerBox_V1.pdf?dl=0)(sheet1). Coil of R4 is attached to ACCHG\_12V/6.2B and NC of relay is connected to the Inverter\_PWR/6.2C which is further connected to the coil of R5 relay. So, these connections stops working of Inverter at the time of Charging of battery and continue supplying Continue\_Electric\_12V+ of Inverter when Inverter\_PWR/6.2C signal applied at R4 from VMU. Then, Can\_L and CAN\_H pins of Inverter connected to CAN network. Inverter\_Enable/6.2C is connected to WakeUp Signal of Inverter, from VMU we sent Enable signal for the Input and Analog Torque signal to Throttle Input of Inverter to meet requirements to unlock CAN network control of Inverter. Then, A,B,C are 3- phase output terminals connect to motor. B- and B+ are for Inverter’s high voltage connections to HV battery controlled by Main Contactor relay whose coil is controlled by VMU. And according to inverter’s standard configuration, Resolver\_Excitation-ve, Resolver\_Cos+ve, Resolver\_Cos-ve, Resolver\_Sin+ve, Resolver\_Sin-ve, Resolver\_Excitation+ve,Motor\_Temperature+ve and Motor\_Temperature-ve of Inverter connects to Motor.

**Connector Code:** D+ signalofInverter (A010) with Connector A - 1 connection ends at VMU(M010) with Code C-6 and intermediate connector code-pin D004A - B

**Timeline

Description automatically generated with medium confidenceSheet3:**

Direction switches connects to FWD/6.2B and REV/6.2B to apply signal to Forward and Reverse pin of VMU. Similarly, Brake pedal connected to DECEL/6.2B of VMU. +12V is given for FWD, REV and Brake from Accelerator pedal. And same +12V\_PCB\_KEYON/5.2C is applied for Continue\_Electric\_12V+ of inverter through R5. And to Liquid heater pump to control Liquid heater R8 relay coil. Analog signal\_1&2 from accelerator pedal goes to Throttle\_1&2 of VMU to inform VMU about how much pedal is pressed.

Output of DC/DC converter gives 12V which is further connected to 12V battery and +12V\_PCB/6.1B for VMU to apply +12V at SW\_Heater pin of VMU.

**Connector Code:** Brake signal of Brake switch (I030) connection ends at Body computer (M001) ABS control unit (M050) with Connector Code-pin B-5 20 and intermediate connector code D097C – 1. Also, Reverse signal of Reverse switch (I020) connection ends at VMU(M001) with connector code C - 1

**Diagram

Description automatically generatedSheet4:**

High voltage from HV\_Battery is applied at the inputs of DC/DC Converter to convert to 12V which will be provided to 12V pin of Key Block etc. R7 12V relay with 9.2mA rated current is part of [PCB](https://www.dropbox.com/s/31hrxkpsa7t9hiq/220506_EVERGRIN_Retrofit%20kit_PCB%20Schematic%20for%20PowerBox_V1.pdf?dl=0)(sheet2). At the coil of this relay DCDC\_PWR/6.2C signal when applied from VMU, enable pin applies High voltage at enable signal to do DC/DC Conversion.

**Diagram, schematic

Description automatically generatedSheet5:**

F12(15A) and F8(2A) fuses, R8\_A and R8 12V relays are parts of [PCB](https://www.dropbox.com/s/31hrxkpsa7t9hiq/220506_EVERGRIN_Retrofit%20kit_PCB%20Schematic%20for%20PowerBox_V1.pdf?dl=0)(sheet2). Rated current of R8 is 66.6mA and of R8\_A is 9.2mA. When Heater\_PWR/6.2B signal is applied from VMU to the coil of R8\_A, the +12V \_PCB\_KeyOn/3.5C connects which goes to Liquid heater pump and also, it goes to the coil of R8 which connects the Liquid Heater to high voltage supply.

**Diagram, schematic

Description automatically generatedSheet6:**

On the VMU, Key\_On and Key\_Crank connected to On and Crank and +12V applied from battery. Throttle\_1\_In & Throttle\_2\_In used to get analog signal from Accelerator pedal informing about, how much pedal pressed. Decel\_In, FWD,REV signals applied for Forward, reverse direction switches and brakes. ACCHG\_12V signal is used for Interlock at the time of Battery Charging, stops the inverter from working by turning off the relay. SW\_Heater and 12V bus\_sense\_In are connected to +12V\_PCB/3.6A. Heater\_PWR is output type which turns on the coil of R8\_A relay and controls the +12V\_PCB\_KeyOn/3.5C connection to Liquid Heater pump and also, this controls the further R8 relay which, when the signal at the coil applied, connects the high voltage to Liquid heater. Inverter\_PWR, DC/DC\_PWR, VAC\_PWR signals controls the relays used for inverter, DC/DC convertor and Vacuum pump. And from VMU we sent Enable signal for WakeUp and Analog Torque signal to Throttle Input of Inverter to meet requirements to unlock CAN network control of Inverter. +12V\_PCB supply and 12V\_GND\_PCB for VMU applied from [PCB](https://www.dropbox.com/s/31hrxkpsa7t9hiq/220506_EVERGRIN_Retrofit%20kit_PCB%20Schematic%20for%20PowerBox_V1.pdf?dl=0).

R3 12V relay is part of [PCB](https://www.dropbox.com/s/31hrxkpsa7t9hiq/220506_EVERGRIN_Retrofit%20kit_PCB%20Schematic%20for%20PowerBox_V1.pdf?dl=0)(sheet 1) with rated current 9.2mA. When HVBat\_PWR\_Out signal applied at coil of relay, it sends 12V for HV battery box. HVBat\_Activation\_Out, HVBat\_DC12V+\_Out etc applied to HV Battery box through Bus HV\_battery according to configuration for activation of battery. Then Can\_G, Can\_L and Can\_H used for Can Network.

**Connectors:** Start signal of Key Lock(H01) with Connector code-pin A-3 ends at Starter motor (A020) with connector code-pin A-1 and intermediate connector code-pin D004A-G

Also, INT signal of Key Lock(H01) path ends at Brake pedal switch (I030) with connector code-pin 4 and intermediate connector code-pin D001 – 6.

**Diagram

Description automatically generatedSheet7:**

In this sheet, F1(30A), F2(20A) fuses and R1,R2,R2\_C 12 V relays are parts of the [PCB](https://www.dropbox.com/s/31hrxkpsa7t9hiq/220506_EVERGRIN_Retrofit%20kit_PCB%20Schematic%20for%20PowerBox_V1.pdf?dl=0) on sheet 1 and 3. With R1,R2 rated currents are 133mA and rated current of R2\_C is 9.2mA. When signal from Key\_On applied at coil of R1, it applies +12V\_PCB which passes through fuse to reach the Vacuum\_Pump\_+/3.4D. Relay R2’s coil is controlled by R2\_C which operates when VAC\_PWR/6.2C signal applies from VMU.