

Power systems board documentation

Introduction

The power systems board monitor the status of all safety systems and make sure the main relays are opened if a failure is detected. A circuit diagram can be seen in the end of the document.

Passive safety systems

The passive safety systems act as a contact which is closed when a safe state is present, and will open if a failure is detected. The passive systems are:

- E-stop (right)
- E-stop (left)
- E-stop (cockpit)
- Inertia switch
- BOTS
- HVD interlock
- TSMS

Active safety systems

The active systems will send a high signal when a safe state is measured, and break the signal if a failure is detected. The active systems are:

- BSPD
- IMD
- AMS
- Master OS

Latching logic

The BSPD, IMD and AMS have a latching relay connected. When the signal from the safety system breaks, an op-amp will detect this and activate one coil on the latching relay. (working much like an inverter). To reset the relay, an external button is used to connect the other relay coil to the supply. The external button is connected to the 2-pin connector marked with RST in the diagram.

AIR and pre-charge control

The BMS' GPIO ports can be connected to the AIR-, AIR+ and pre-charge relay coils to be able to control the start-up operation. The discharge operation is controlled automatically via the AIRs control system. It's required to connect an external pre-charge and discharge power resistor to the power systems board.

- Pre-charge: 1 x 100 ohm power resistor
- Discharge: 3 x 100 ohm power resistors in parallel (equivalent to 33.3 ohms)

High voltage connections

The board will have to be connected to SYS+ and SYS- (outside system terminals) and ACC+ (internal accumulator positive pole)

Fusing

Two 230V cylindrical fuses is connected to protect the battery against overcurrent. A mini automotive blade fuse is connected too to protect the low-voltage system against overcurrent.

Parts list

The parts list is incomplete. All the right components are mounted on the prototype PCB.

Part	Price per unit	RS/Farnell partnumber
NO relay	23,50 kr	686-7051
Latching relay	45,00 kr	134-7952
NC relay	13,50 kr	2748075
Reset button	70,00 kr	1843025
Large flyback diode (for AIRs)	3,10 kr	2696604

Future improvements

Make sure all relay coils have a fly-back diode. A large flyback diode will also have to be connected to the main relays coils, either externally or on the power systems board.

The newest version of the PCB design include mounting holes which isn't present on the current prototype PCB.

