



Vehicle Electronics (VEH) System Architecture

sys-veh

Rev: A01

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1 General Setting

In the OA-II VEH system, each payload module is specialize for a special function. In each module, it have three type of board.

1.1 Main Board

The main board is indicate this board finish the most foundmental function of this module. It is a stand alone board that build the foundation for the other board. It will be the first board in the module.

1.2 Feature Board

The feature board is adding more features to the module. It usually need the main board to function and receive commend from the the main board.

2 Payload Frame (PF)

2.1 Discription

In the Payload Frame, most of the signal and power will run through it and arrive to the target board. The payload frame will have different sectors for different modules. In general, it will at least provide three power lines, more than one command line, and four high-speed data lanes.

2.2 Naming Method

OA2-PF-XXX-YY-Z

XXX indicate how much board it can fit for each module. The first number is for COM, then TAM and PAM.

YY Designer name.

Z Revision number. If it is greek numerals, it means this board is a test bench.

example: OA2-PF-333-JC-1

First generation payload frame design by Jinzhi Cai which can contain three COM, TAM, PAM boards.

example: OA2-PF-111-JC-IV

Fourth generation payload frame test bench design by Jinzhi Cai which can contain one COM, TAM, PAM boards.

3 Payload Modules (PM)

3.1 Discription

Payload Modules are specialized circuits which slot into the Payload Frame. They can be divided into three primary types: Computing and Operation Module (COM), Telecommunication and Acquisition Module (TAM), and Power and Actuator Module (PAM).

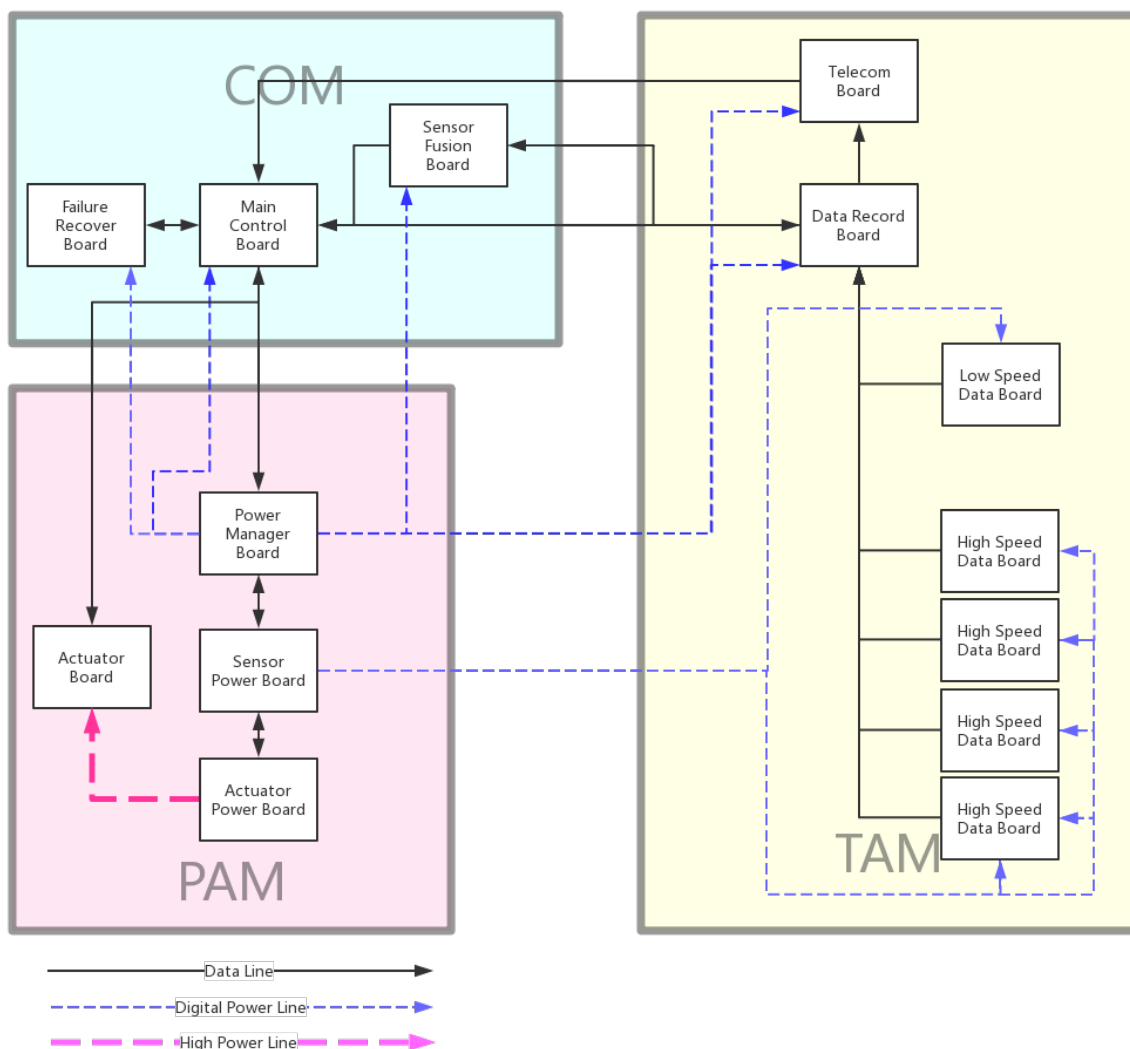


Figure 1: System Diagram

3.2 Computing and Operation Module (COM)

Main Control Board (1)

The main control board will execute all the critical process during the whole launch. It will send command via a command line to other module main board to perform action.

Failure Recover Board (2)

The failure recover board will execute similar code as the main control board and detect any error that send out from the main control board. When main control board have error, it will inquire the main board and check the answer. If a failure scenario is fulfill, it will take over the command line and try to fix the problem by the program storage inside.

Sensor Fusion Board (3)

The sensor fusion board will communicate with the TAM and analyze the data. It will provide to the main control board for more information.

3.3 Telecommunication and Acquisition Module (TAM)

Data record Board (1)

The data record board is use to collecting data from the rest of the sensor board in the module and provide to COM and telecommunication board. It also will back up all the data to a storage to the media for recover after landing.

Telecommunication Board (2)

The telecommunication board is use to collect data from the record board and send it down to the base station. It also will get command that send from the base station and relay it to the COM.

Low Speed Sensor Board (3)

The low speed sensor board is use to contain sensors that have less than 100MB/s data rate. This board will also have memory to buffering some of the data. The power supply for this board will be a low voltage line from the PAM.

High Speed Sensor Board (4)

The high speed sensor board will use to contain sensors that have more than 100MB/s (ex: camera) It will have a special power line from the PAM and itself will have memory for buffering data.

3.4 Power and Actuator Module (PAM)

Power Manager Board (1)

The power manager board is used to control charge and discharge of the on-board main battery. It also has a regulator to provide main rail power for the whole vehicle.

Sensor Power Board (2)

This board contains special purpose voltage regulators and power manager chips. It will provide power for high sensitive sensors and isolate it from high power modules.

Actuator Power Board (3)

This board will directly get power from the battery and regulate it for the high power actuator. It also tries to provide jitter from high power devices.

Actuator Board (4)

This board is to operate any high power device during the mission. It will directly get power from the power board and get commands from the COM.

3.5 Naming Method

OA2-[COM/PAM/TAM]-XX-YY-Z

XX The first number indicate the require board for this board to function, zero for stand alone. The second number indicate the role for the board.

YY Designer name.

Z Revision number.

example: OA2-COM-01-JC-1

First generation Computing and Operation Module main board design by Jinzhi Cai.

4 Revision History

Rev#	Editor	Delta	Date
A01	Jinzhi Cai	Initialize	2019-7-2

Table 1: Summary of Revision History