ORBiT Avionics II System Requirement

Sys-Req

Rev: A01

Jinzhi Cai

2019–06–21

Table of Contents

1 Introduction to ORBiT Avionics II System (OA-II)

1.1 Introduction

ORBiT Avionics II System is a new generation avionics system for Orange Rocket Ballistics Team rocket. It include twq major part, the On Board part, and the Base Station part. All the compone in the OA-II system are inter connect with a unique backplane system and wireless system.

On Board Part (OBP)

The OA-II OBP is use to collecting information about the rocket and deliver it to the OA-II BSP for further analysis. In the same time, it also will back up all the information to a on board storage in case wireless connection failure.

Base Station Part (BSP)

The OA-II BSP is use to receive the information delivered by OA-II OBP via wireless connection and perform basic analyze on roket status. The OA-II BSP provide live for rocket status and location and data storage for further analysis. The OA-II BSP also help to indetify the rocket location after it is landed for reclaim personnel to locate the rocket.

Backplane System (BPS)

The OA-II BPS is a unique, muti-level information exchange system that link different part in the OA-II BSP and the OA-II OBP. It provide different speed mode for different compone.

Wireless System (WLS)

The OA-II WLS is a wireless communication system which provide communication between OA-II BPS and OA-II OBP. In the same time, it also provide landing locating signal.

1.2 Requirement

On Board Part (OBP)

Reqire feature

- Three dimension linear kinematics data. P(position), V(velocity), A(acceleration) data.

- Three dimension Rotational kinematics data. θ(angle), ω(angular velocity), α(angular acceleration) data.
- Air pressure data.
- Sound frequency level ADC(Sample frequency $\geq$40kHz)
- Power manage (convert from 24V)
- High power driver (Peak Power $\geq$50W)
- 720p 24Hz RGB Camera
- Landing location broadcast (up to 2 hours, 3km range, low power consumption)

Addtional feature

- Radio frequency level ADC(Sample frequency $\geq$4GHz)
- 1080p 60Hz RGB Camera

Base Station Part (BSP)

Reqire feature

- Receving Data from rocket.
- Display Rocket Status informaiton.
- Basic Data analyzation(Normal/Warning/Error Status).
- Locate rocket after landing.
- Ignition control system
  Rocket engine fual injection and ignition
  Critical cutoff
  Fire control

Addtional feature

- Rocket Tracking(via camera or radio)
- Launch Pad Control
- Automatic system check

Backplane System (BPS)

- Provide different speed mode with ms level delay
  Info level($\leq$3MB/s)
  Data level($\approx$50MB/s)
  Stream level($\geq$100MB/s)
- Tolerance high vibration and EMP
- Tolerance high temperture ($\leq 75^{\circ}C$)

Wireless System (WLS)

- Provide high speed data connection within 10km
- Provide low speed, low power consumption data connection within 3km

2 Revision History

Reversion Number	Person	Change Log	Time
A01	Jinzhi Cai	Initialize	2019-6-21

Table 1: Summary of Revision History