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OCULUS-ASR SPACECRAFT SUMMARY

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REVISION HISTORY

| Revision | Revised By: | Revised On | Changes |
|----------|-----------------|------------|---|
| - | Anthony Sirotti | 02/17/2014 | Initial Release |
| 01 | Andrew Conley | 01/29/2016 | Updated orbit parameters; Downlink freq. to 437.200 MHz |

SIGNATURES

| | |
|-----------|--|
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TABLE OF CONTENTS

| | |
|------------------------------------|---|
| Abstract | 3 |
| Mission Overview | 3 |
| Spacecraft Overview..... | 3 |
| Communication System Overview..... | 4 |

ABSTRACT

This document is to provide an overview of the Oculus-ASR spacecraft and mission as part of the FCC licensing process.

MISSION OVERVIEW

The Oculus-ASR is a Nano satellite being developed through collaboration between Michigan Technological University (MTU) and the Air Force Research Laboratory (AFRL) by MTU undergraduate students. The Oculus-ASR's mission is to provide calibration opportunities for ground-based observers attempting to validate and/or anchor algorithms capable of determining spacecraft attitude and configuration using unresolved optical imagery.

The optical signature of the vehicle will be extensively characterized in ground facilities before launch. Once in orbit, the Oculus-ASR will serve as a cooperative imaging target for ground-based telescopes at Advanced Maui Optical Supercomputing Observatory (AMOS). Ground controllers in MTU will command the vehicle to perform various attitude-based maneuvers during flights over these telescopes. After each ground-viewing opportunity, the MTU team will provide attitude truth history to the telescope observers at Maui for comparison with their findings.

The Oculus-ASR is scheduled to launch in early 2017 as part of the STP-2 mission. The spacecraft will be in an 860x300km orbit at an inclination of 28.5°.

SPACECRAFT OVERVIEW

Oculus-ASR is a 70-kg Nano satellite which consists of two modules that are permanently attached. An octagonal module, referred to as the Oculus module, sits atop a square module, known as the ASR module. Figure 1 shows the assembled vehicle and identifies the major features on the exterior of the satellite. Each of the four sides on the ASR module has a deployable panel. Three of these panels are covered in solar cells. The fourth is covered in Duraflect material. Duraflect is a highly reflective, diffuse, white coating used as an optical standard for characterization and calibration measurements.

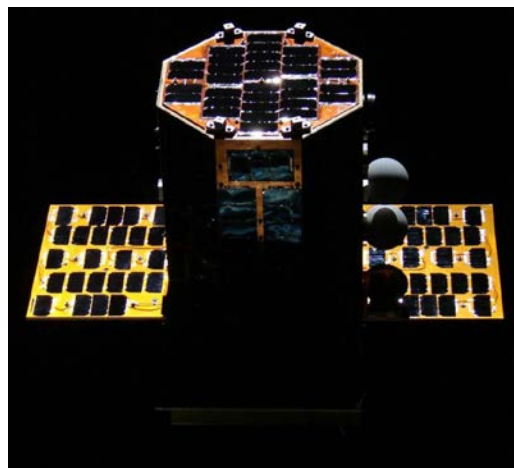


Figure 1. Oculus-ASR

COMMUNICATION SYSTEM OVERVIEW

The Oculus-ASR is equipped with an Astrodev He-100 transceiver. The radio operates in the 2m band for uplink and the 70cm band for downlink. The spacecraft is equipped with two Spacequest ANT-100 ¼-wave monopole antennas. Table 1 contains the exact specifications of the Oculus-ASR communications system.

| | |
|--------------------|-------------|
| Uplink Frequency | 145 MHz |
| Downlink Frequency | 437.200 MHz |
| Data Rate | 9600 baud |
| Modulation | GMSK |
| Transmit Power | 4W |