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P3E-Update

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Things are happening at P3E. This is how the last months since the last Journal can be characterized. P3E is coming closer to that moment at which the integration of the electronics can begin.

Electronic Modules in Progress

The main battery is available as one of the first modules. Two sets of 10 units were selected from a total of 100 conditioned and measurement-tested storage cells. Horst Wagner has assembled two battery modules from them, one for the working unit during integration and testing and one further one as a flight module. Meanwhile, planning for an eventual support battery has begun and suitable storage cells will be ordered accordingly.

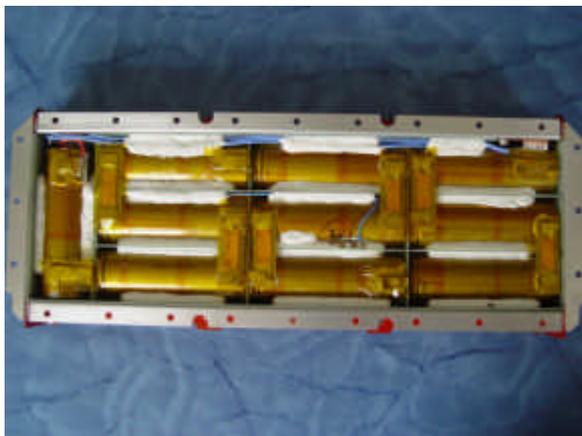


Figure 2: A view into the still open housing of the main battery

A further electronic module currently existing is the Sensor Electronic Unit (SEU) at the AMSAT-DL location, Marburg. Because of the introduction of the CAN-Bus on the satellite there were major modifications necessary related to the interface design of the earlier SEU version.



Figure 1: Horst Wagner assembling the battery module. The test module is in progress, and the 13 AH-NiNM cells of the main battery are in the foreground

Before a flight unit can be built, the SEU will undergo extensive tests.

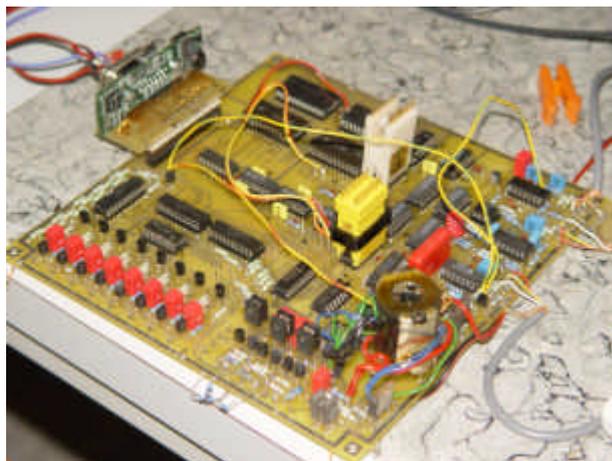


Figure 3: The SEU on the laboratory table for measurement purposes

Progress has also been made on the transponders for the main bands. A team from AMSAT-New Zealand has thus offered to help with the transponder construction. Currently that team is examining the availability of suitable building blocks, to connect to the previous transponder design.

Helium Tank – Pressure Test Successfully Completed

As with all earlier P-3-satellites, AMSAT P3E will have its own propulsion system, in order to arrive in the desired orbit from the geo-stationary transfer orbit (GTO) of the Ariane-5 rocket. The height of the perigee and the inclination especially must be lifted.

P3E requires a helium tank for the propulsion system of at least 400 bar, with a volume of about 2 liters. The container is wrapped with a carbon filament fabric, which must be able to withstand the high pressure.

Additional certification tests were required with accordingly high safety factors to satisfy the high safety requirements of the rocket. For this, the propulsion team (Martin Riehle, Thomas Maier, and Wolfgang Müller) along with the EADS space transportation (www.eads.com) in Lampoldshausen performed several tests with the complete P3E high pressure apparatus.

Initially, there was a life and leak test at 50 bar for three weeks. Then there were two complete cycles as proof test including gas at a pressure of 600 bar, followed by a new life and leak test at 400 bar for one week.



Figure 4: The helium flask burst at 1600 bar, it has to withstand 400 bar on board P3E.

The helium tank was put under a burst test of several cycles at 1000 bar; there were no material fatigue or other negative symptoms. Following that there was a destructive burst test undertaken at 1600 bar, which demonstrated the appropriate reserves.

Everything worked first class; the strength and the reserves/safety-factors have thus been proven. The large fuel tank was tested several months ago for integrity and pressure and likewise satisfied the requirements.



Figure 5: The fuel tank being tested for integrity by the propulsion team at EADS. In the picture Thomas Meier is preparing for the measurements.



Figure 7: The last integrity test of the tank's end.

STAR Camera Made the First Astronomic Images

In May there was the opportunity to test the STAR camera for P3E (named for its development location, Arizona, also called AZStar) with a 150-cm telescope at the Mt. Hopkins Observatory. The camera was mounted on the end of the telescope for this test. At this time the primary instrument was a spectrometer, so only about 2% of the light was available for STAR. Next to a test image of the comet C/2001 Q4 (NEAT) with an exposure time of 5 seconds an image of the planet Pluto resulted with a 25-second exposure. Pluto had a magnitude of 14 at that time. There were no special tricks used in reworking the picture.

Chuck Green writes that at such long exposure times that known, undesirable effects can be observed, that the three nights were lots of fun with the camera, and that the test was very instructive for further improvements on the camera.

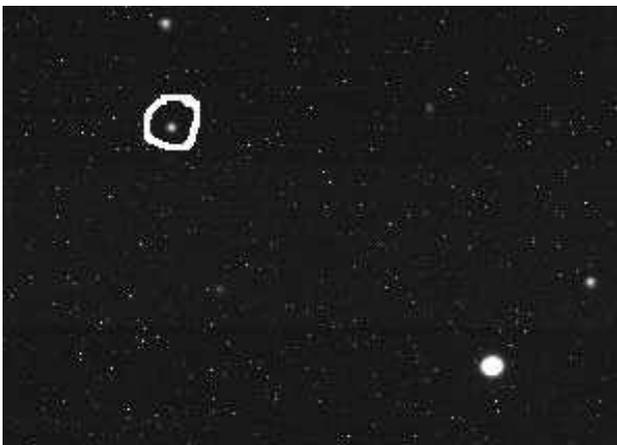


Figure 8: The planet Pluto (circled) through the eyes of the P3E navigation camera, STAR. A prototype of the camera was mounted on the 1.5-m telescope of Mt. Hopkins Observatory.

Additionally, the camera was set up from time to time after the aiming the telescope.

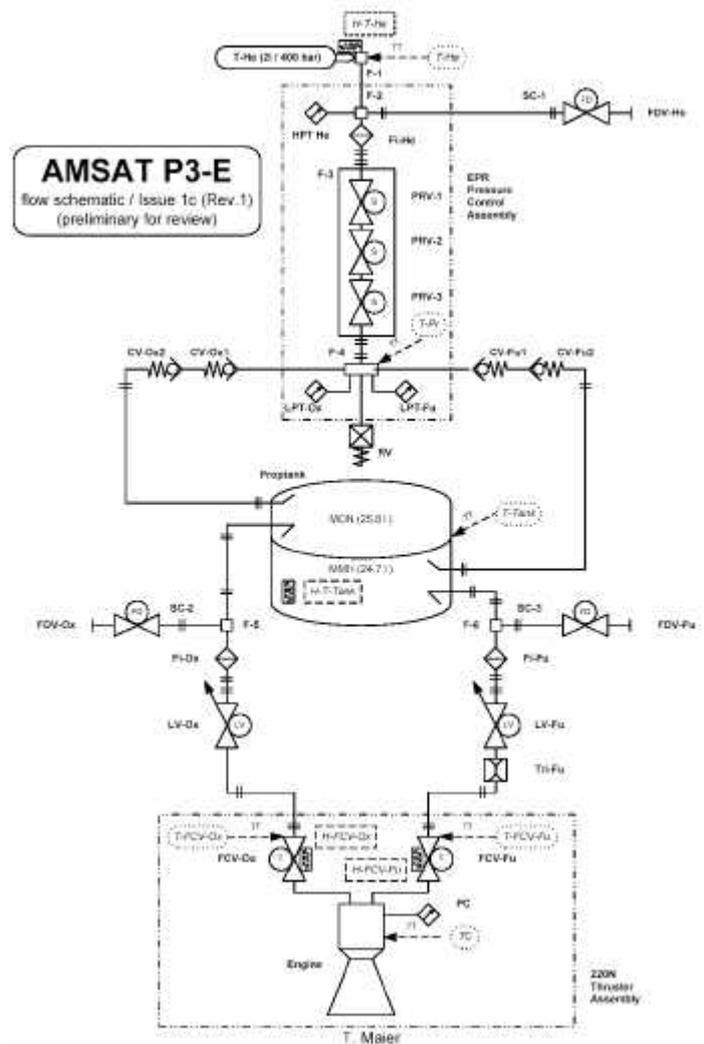


Figure 6: An overview of the drive system of P3E