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P3E-Update

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The previous three months were nearly completely consumed by the preparations for the 30 year celebration of AMSAT-DL. As a result there was no major progress made. There was, however, some work done on the details.

30 Year Celebration used for Discussions

Several of the transponder builders met at the occasion of the 30 year AMSAT-DL celebration in Bochum to present the intermediate developments and to discuss further details of the mechanical interfaces.

Mirek Kasal brought his modules for the L-band and the command receiver. They are waiting for the final programming of the uplink frequencies and the integration into the complete module housing for construction in the satellite. The L-band module then becomes the second integration ready module after the main battery. The work on the transmitters for 24 and 47 GHz as well as the C-band receiver is close to being flight ready.

Michael Fletcher was able to demonstrate his prototype of the X-band transistor output stage in Bochum. They will be a

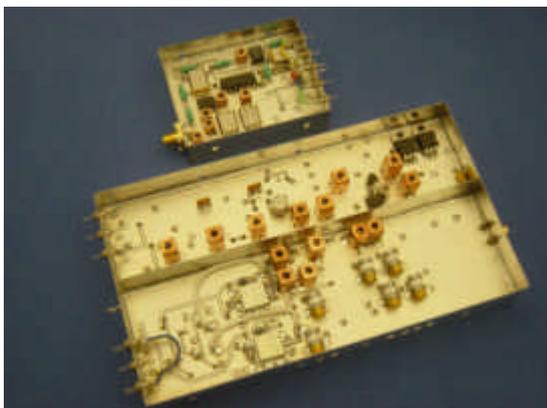


Figure 1: The front end and command receiver for P3-E's L-band receiver.

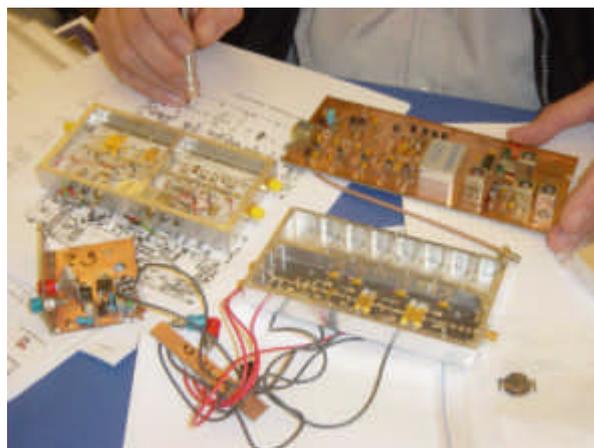


Figure 2: The parts of the X-band output stage in the opened housings, on the right rear the 29 MHz RX on a sample board.

permanent part of the P5A test transponder that can also be switched on as a liner transponder on P3E. Additionally, Michael Fletcher also had a sample construction of the 29 MHz uplink receiver. It is still not clear if the 10 meter band can be integrated on board the P3E. On the one hand there has to be enough available space, and on the other hand the noise level through the switching controls and the oscillators from the satellite cannot be too high. Inclusion of the 29 MHz RX will be decided definitely during the integration work.

The work on the transponder parts for 145, 435, and 2400 MHz has also begun again. William Leijennar presented a more robust design of a U/V transponder. We hope to be able to report in the next Journals about further progress on the main transponders.

Preparations on the Cable Assembly

One of the main jobs in the near future is the production of the cable assembly. A P3E 1:1 wooden model was built in Marburg. Originally the model was a rough wooden frame and was intended for cable layout and measurement. Finally a model evolved, thanks to the competence of Andreas Werner who is a professional cabinet maker and was present in Marburg; this can later be used for exhibition purposes.



Figure 3: Andreas Werner with the early construction of the P3-E that is to be used for the completion of the cable assembly and later as a demonstration model. See also in the next picture.



As a result it is presumed that at the beginning of next year the cable assembly can be completed at the model, and can later be integrated into the flight structure.

Problems with the Auxiliary Battery

A secondary or auxiliary battery was again included in the plans for P3E after the difficulties after the battery damage on AO-40. A 4-Ah size battery is being considered. Unfortunately the first cells ordered have proven to be unsuitable. Currently, more suitable cells are being sought in the marketplace.

The auxiliary battery on P3E will only be installed if a safe solution to switching between the two batteries can be found, which can't introduce any new failure sources, so that we don't have the switching problems between main and auxiliary batteries that plagued AO-40.

IHU-3 Shows First Signs of Life

The new on-board computer IHU-3, which has already been laid out for the Mars Mission, has successfully completed its early function tests. Program code was able to be performed on the various memory areas (flash, EDAC-RAM, unshielded RAM) after the very extensive logic for the Watchdog, control and error correction had been burned into two FPGA's.

Additionally, several of the basic I/O functions tested positive. Necessary design changes will be introduced in the next prototypes, which can then be used for the implementation of the IPS.

An advantage of the new IHU-3 is its utility for digital signal processing. This then offers better command possibilities for P3E and later radio contact to Mars on P5A. The new IHU with its replaceable implementation could be used for the planned RUDAK system on P3E

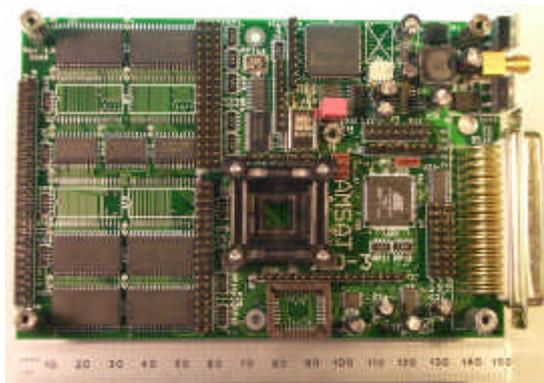


Figure 4: IHU-3 prototype. Meanwhile basic function tests of the new IHU were conducted successfully.

Until now there is no final concrete proposal from a development group so that at least a flight ready hardware package can be assemble based on the IHU-3, the beacon module, and the technology of the command receiver. Still missing is the software for the RUDAK-F communication protocol and the related user services.

Further Working Meetings Planned

Two working meetings are planned for January and February. At one of the meetings the details for the IHU-3 and the interface to the satellite will be finalized.

The second meeting is central to the transponder and should clear up the open matters of the interface and the individual modules and the integration.