Current status of technical development of the penetrator

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In the previous Japan Geoscience meeting in 2006, we introduced a three year program to accomplish the technology of the LUNAR-A penetrator. We have approached two different aspects having the robustness of the penetrator system.

The first one was a reliable operation after the penetration. At the penetration moment into the regolith, some electrical noises by the ESD or other origins are considered to cause a fatal operational errors. In order to avoid this possibility, we developed a power-on system after the penetration in the regolith.

The second approach to have the robustness of the system is to have enough margin of the communication link between the penetrator and the mother spacecraft. From our investigation, one of the main reason to reduce performance was the effect of noise originated from the digital circuit board(DPU). Therefore, we fully re-designed the DPU board and are now manufacturing the test circuit board to confirm the validity of our design.

A shock experiment of elemental parts, which consist of miniature shock triggered switch, and electronics circuits, was performed in November 2005. We reported previously that all the sensors and the electronics circuit functioned successfully after the impact experiment.

We newly performed a QT level penetration experiment in order to confirm the integrated performance by adding the power on system on board. The experiment was executed in June 2006 at Sandia National Laboratory. We could successfully communicate with the penetrator which was left in the sand after the experiment. We also obtained good performance both sensors and bus system performance by further investigation.

We are now proceeding to manufacture the flight model qualified penetrator and are planning to have the Qualification Test in the fiscal year 2007.