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The Mars SEIS experiment : first tests

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The objective of the Mars SEIS experiment is the determination of the deep internal structure of Mars. In particular, geophysical parameters of first importance, such as the state (liquid/solid) and size of the core, as far as structure of the mantle and shape of discontinuities will be determined by the experience. The experiment integrates a Very Broad Band 2 axis seismometer, a 3 axis short period seismometer and environmental sensors for pressure, infrasounds and temperature. The sensors measure signals in an ultra-broad band, from the tidal frequencies (0.05 mHz) up to the short period frequencies (50 Hz). Long term VBB bias will be actively decorrelated from temperature and pressure variations, allowing the sensor to operate in a thermal environment with daily variations of about 40°K Infrasounds, which might be associated to dust devils and atmospheric discharge, will be also monitored. The overall mass of the SEIS experiment is 2.3 kg, including all sensors, data control processors and installation devices. Acquisition will be performed by a series of 24 bits A/D converters, while the thermal and drift control will be performed by a feedback generated by a 24 bits D/A converter. The SEIS is one of the core instruments of the former Netlander mission, which objective was to deploy a network of 4 stations on Mars for one Martian year of operation. This design allows also an implementation under the form of a "geophysical package" to be dropped on Mars by other Martian missions. We are currently at the end of the B phase, with a breadboard of the VBB axis already delivered by industry (EADS-Sodern) in July 2004. Most critical parts have been tested, including shock tests (200g, 20 ms) for pivot, electronics components and displacement sensors. The electronics breadboard has also been delivered and is currently under extensive performance tests at ETH facilities. The Sphere (phase B Breadboard), including the 2

VBB axis, will be delivered by industry (EADS-Sodern) in June 2005. Structural and Thermal Model (STM) of Sphere will be be delivered in June 2005. Full Seismic calibration and environmental tests are planned in 2005. Preliminary results : functional results are satisfying. and noise optimization is under process. Preliminary noise results are encouraging. We expect to demonstrate that we have reached the STS2 noise level in the incoming monthes.