SCRAMP : The Development of an Advanced Planetary Probe From CFD to Re-entry Test Flight

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Introduction: The development of a very stable and lightweight planetary entry probe termed SCRAMP (Slotted Compression RAM Probe) is described. The probe geometry is comprised of a sphere-cylinder forebody with a larger diameter flare-skirt aft-body which produces most of the drag (Figure 1). The geometry permits a large static margin due to the separation of the payload/forebody and relatively lightweight aft-body. The CFD and initial ballistic range tests are presented. In addition, several sub-orbital test flights were conducted using the sounding rocket-based SOAREX (Sub-Orbital Aerdynamic Re-entry Experiments) test flight series. The dynamic stability was demonstrated from the very quick recovery of the design flight attitude from a tumble induced from the exo-atmospheric deployment (Figure 2). For certain future planetary missions such as network and 'companion' missions, this new probe configuration may be particularly attractive. The latter is due to the overall reduction in mass, as well as the elimination of the gyroscopic stabilization systems required in the current generation of Newtonian sphere-cone derived configurations

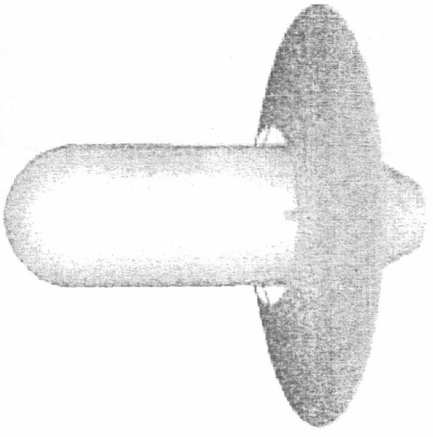

Figure 1. Typical SCRAMP geometry

Figure 2. Sub-orbital re-entry flight test (deployment at 314 km)