

Small Stations: Still Viable Low-Cost Lander for Mars Scouts

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The Small Stations concept was developed in 1986 by the Soviet Union. They were designed, fabricated, and thoroughly tested before being launched on the ill-fated Russian Mars 96 spacecraft. The Small Stations at that time were the smallest qualified Martian lander that could operate over one year. The subsequently designed airbag landers bear conceptual heritage from the Small Stations. The Small Stations are self-sufficient landers with mass of 86 kg when installed on the orbiter and with the surface module mass of 31 kg. Its Entry, Descent and Landing system is based on a single-stage supersonic parachute and dual airbags with heritage from the highly successful Soviet Luna missions. The lander uses the petal verticalization system also inherited from the Luna missions. The payload featured a highly integrated design and accommodate nine scientific instruments. Five of them (one was JPL's MOX – Martian Oxidization Experiment) were installed on deployable petals or a boom. The Small Stations used also a descent camera with real-time data compression. Power and heat was provided by two power sticks 200 mW each. The Stations were developed in through a well working cooperation of Russia, Finland, France, Germany and United States. Because of their robust design, strong inheritance and full flight qualification, new Small Stations could accommodate a variety of payloads for the Martian Scout missions including a thermal drill, inflatable rover and others. More details on design, specifications and operations of the Small Stations are provided. Even now the Small Stations could be a viable low-cost lander for the Mars Scout type of missions.