

# MECA Electrometer: An old instrument finds a new application

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**Introduction:** The Mars '01 lander contains an electrometer designed to evaluate the electrostatic nature of the Martian regolith (soil) and atmosphere. The electrometer is part of MECA (Mars Environmental Compatibility Assessment) project. The objective is to gain a better understanding of the hazards related to the human exploration of Mars. The electrometer was designed to fit into the heel of the scoop of the robotic arm. As seen in Fig. 1, the instrument has four sensor types: (a) triboelectric field, (b) electric-field, (c) ion current, (d) temperature. The triboelectric field sensor array contains five insulating materials to determine material charging effects as the scoop is dragged through the Martian regolith. The sensor has an electric field sensitivity of 35 kV/cm·V and room temperature drift of  $\sim 3 \mu\text{V}/\text{sec}$ . The sensor has been operated as low as  $-60^\circ\text{C}$  where the drift is undetected. This talk with focus on the operating principles of the triboelectric sensors and present some of test results.

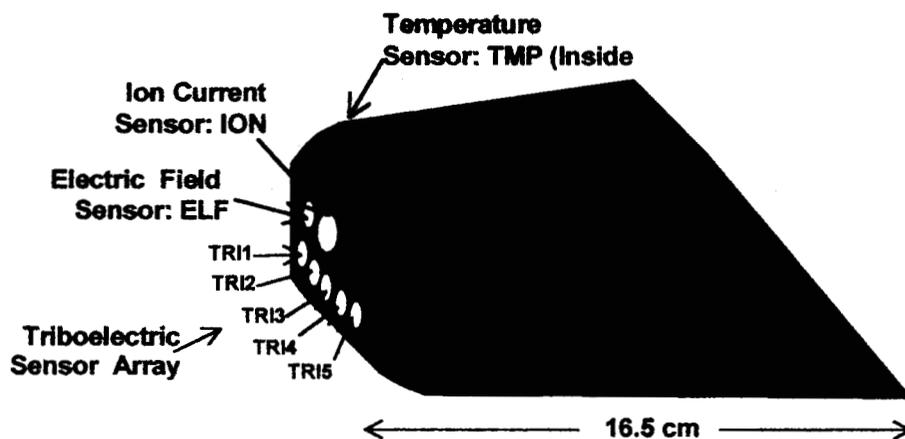


Figure 1. Electrometer sensor suite mounted in the heel of the Mars '01 scoop. The electrometer operates over an 8-wire serial interface, is housed in a volume of  $\sim 50 \text{ cm}^3$ , consumes less than 250 mW, and weighs  $\sim 50 \text{ g}$ .