

Returned Surveyor III Hardware:  
Observations, General Condition and Analysis of Discoloration

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The hardware from Surveyor III, returned to earth by Apollo 12 after two and one-half years on the moon, has been undergoing extensive engineering and scientific evaluation.

This paper will describe some of the general conditions observed during initial examinations, disassembly and test that will be of interest to the audience. Beyond the scope of this meeting and specifically omitted from this paper are the results of extensive tests on the materials, mechanisms, components, optics, etc., from the camera.

Particular emphasis will be on the discoloration observed, the patterns and relative contributions of radiation damage and adhering lunar dust which produced the coloration.

The surprise registered by the astronauts regarding the brown color, was no surprise to those familiar with space radiation effects on white coatings--until the parts were first examined. Radiation induced discoloration and some dust from the abnormal Surveyor III landing was expected. There was no evidence of the expected patterns of discoloration related to solar exposure geometry or of any evident symmetry of dust coverage from the Surveyor landing.

It has been possible from SEM examinations, reflectance measurements, analysis and other tests to separate the relative contributions of radiation damage and dust to discoloration and the expected patterns of radiation damage are evident. The relative amounts of dust on various surfaces indicate a model of dust source and deposition with a major contribution from the LM. This model may have significance to lunar sample analysis and future lunar missions.