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November 6, 1964

SUBJECT: Evaluation of R/V Debris

Reports are required from the following Components, documenting results of measurements, evaluation, and analysis performed relative to the R/V debris turned over to this Operation by Orbital Systems Management:

a. Thermodynamics Technology
b. Flight Dynamics Technology
c. Materials Performance Technology
d. Structural Mechanics Technology
e. Metallurgy and Ceramics Technology
f. Plastics Technology

-We have not and do not expect to receive ephemeris and tracking data from the customer. Consequently, an additional degree of uncertainty exists with regard to configuration, separation, body attitude and motion, and trajectory during decay-in and re-entry. None the less, we can make assumptions as to decay-in and re-entry conditions, and compare measured/observed performance to assumed conditions One area of interest is, at what altitude range would the pin-pullers have heated sufficiently to cook-off, and does prediciton jibe with observed radar pips. In the structures area, does the debris indicate that shield cracking probably occurred during stabilized orbital flight, and what effect did these cracks have on shield integrity during re-entry? Can impacted fragments tell us anything about structural adequacy of mounting ring, etc?

In the materials areas, a decomposition profile is possible, char through virgin material,and unflown materials as a reference. TGA, DTA, char density/porosimetry, mechanical, and possibly other techniques can be employed (see TIS 62SD711 Supplement for approach/results of similar evaluation). The new gap sealant material can be compared to the old polysulfide material. Wiring insulation (vinyl?) degradatic gives a fix on temperatures experienced. Likewise then organic materials, including the M & P 100 adhesive used extensively, and observations of the phenolic-glass and phenolic nylon-bond, delaminations, etc. Temperature effects, foreign matter deposits and corrosion on metal parts (esp. magnesium ring) can be interpreted, and temperature history bracketed.

In the flight dynamics area, a decay-in orbit and trajectory history to separatio (four blips?) can be constructed for the in-orbit configuration, and the low R/V re-entry for assumed angle of attack conditions provided to thermodynamics. Heat shield degradation can be measured and interpreted. Likewise aft end heating effects on antennas, capsule cover, parachute cover, and shield interior.

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The above refresher is intended as a guide, since some time has passed from the date of the working meeting, and work has apparently not yet started in some areas. We must provide a report to the customer before much longer, and the end of next week (FW 46) is the tentative due date for all technology reports. Please notify me immediately of significant problems in meeting this date. Publish reports as STRICTLY PRIVATE letters, copies to [redacted] and me.

Funding allocated for this project is:

[redacted]

Component	[redacted]	[redacted]	[redacted]
Thermodynamics			
Flight Dynamics			
Materials Performance			
Structural Mechanics			
Metallurgy and Ceramics			
Plastics			

Thank You

[redacted]
Technology Engineer
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[redacted]

Distribution:

[redacted]

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