

SUBJECT: ALSEP Data Handling Estimates
Case 310

DATE: May 12, 1969

FROM: R. J. Pauly

ABSTRACT

Estimates of the ALSEP data which will be recorded on magnetic tapes by the Manned Space Flight Network are developed which indicate that:

1. Four 14 track tapes containing a total of 6.41×10^8 bits would be recorded each week from each ALSEP supported.
2. During the two years life of an ALSEP a total of 6.69×10^9 bits would be recorded on 416 tapes.

Processing the ALSEP data at the MSC complab is estimated to require:

1. Sixty-nine hours per week on the CDC 3200 computer telemetry system for the worst case load of three ALSEPs.
2. Sixteen hours per week on the U1108 computer for the worst case load of three ALSEPs.

A comparison of the ALSEP with other spacecraft reveals that:

1. Three ALSEPs would produce 12 tapes per week, whereas GSFC is currently receiving 1800 tapes per week from over 36 unmanned spacecraft.
2. Three ALSEPs would produce 2.0×10^{11} bits in two years, versus an estimated data volume of 5.2×10^{11} bits which would be generated in five months by AAP/1-2, 3A, 3-4.

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MEMORANDUM FOR FILE

INTRODUCTION

Data from up to three ALSEPs will be telemetered to the Manned Space Flight Network (MSFN) 24 hours per day and recorded on magnetic tape.* The tapes will be routed to the Manned Spacecraft Center for processing and distribution to the appropriate personnel. An assessment of the ALSEP data handling activities is presented in this memorandum.

DATA VOLUME

Current plans are to record the ALSEP data on 14 track analog tape at 3 3/4 inches per second. Since two of the 14 tracks are needed to record the ALSEP data (one for the PCM data, the other for time and frequency information), it would be possible to have up to seven passes on each tape--with the data recorded on two different tracks each pass. The tapes are such that eight hours of data could be recorded on each pass and up to 56 hours on each tape. Assuming a more conservative estimate of six passes per tape and allowing one hour per pass for setup, 42 hours of data would be recorded per tape. Thus four tapes would be produced per week and a total of 416 tapes would be produced during the two year life of an ALSEP. Each week, 6.41×10^8 bits would be recorded and a total of 6.69×10^{10} bits would be recorded in two years.

DATA PROCESSING

The ALSEP data will be processed by the MSC complab.** The processing will consist of the following activities:

1. Signal processing on CDC 3200 computer telemetry systems - The data on analog tapes will be signal conditioned, converted to digital form, quality checked and recorded on digital tapes. Two passes on the system are required.

*The normal transmission rate from each ALSEP is 1,060 BPS.

**The complab is a general purpose computational facility.

2. Computer processing on U1108 computers - The data on digital tapes will be quality checked, converted into engineering units and sorted onto separate digital tapes for presentation to the appropriate personnel. Multiple passes on the computer are required.

The data recorded on analog tapes at 3 3/4 inches per second could be processed at 60 inches per second in the signal processing activity.* Since two passes are required for each tape, 8 hours of recorded data could be processed in one hour. Allowing a 10% margin for equipment setup time, one week of ALSEP data would require approximately 23 hours of CDC 3200 computer telemetry system processing time.

The U1108 computer can process 30.6 hours of ALSEP data in one hour.** Thus, one week of ALSEP data would require approximately 5.5 hours of computer processing time.

The maximum weekly complab processing load for three ALSEPs would be 69 hours on the CDC 3200 computer telemetry systems and 16 hours on the U1108 computers. The total two year processing requirement for each ALSEP would be 2,392 hours on the CDC 3200 computer telemetry systems and 572 hours on the U1108 computers.

In addition to the normal processing described above, special processing of passive seismic experiment data will be performed. In this activity, special purpose signal processing and decommutation equipment will be used to reconstruct an analog representation of the passive seismic PCM bit stream and record it on seven track analog tapes.

CONCLUDING REMARKS

A better appreciation of the magnitude of the ALSEP data handling activities can be obtained by comparing ALSEP with other spacecraft projects. The estimated weekly data volume from three ALSEPs is 12 analog tapes. The current Goddard Space Flight Center weekly data volume from over three dozen unmanned spacecrafts is 1,800 analog tapes.

The estimated data volume from three ALSEPs operating

*This estimate is based on MSC experience in processing ALSEP test data on CDC 3200 computer telemetry systems.

**This estimate is based on MSC experience in processing ALSEP test data on U1108 computers.

two years is 2.0×10^{11} bits versus an estimated data volume of 5.2×10^{11} bits* which would be generated in five months by the Apollo Application Program missions AAP/1-2, 3A, 3-4. Thus the three ALSEPs would require approximately five times as long to generate less than half as much data as the AAP.

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*AAP Telemetry Data Processing Estimates," R. J. Pauly, Bellcomm Memorandum for File, February 7, 1969.