BENDIX SYSTEMS DIVISION ANN ARBOR, MICH.

Transmission of Engineering (House-
keeping) Data During the Active
Seismic Mode

ATM-235

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This ATM answers Action Item B020107 which requests backup
data for not transmitting engineering (housekeeping) data during the
Active Seismic Mode.

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During the Active Seismic Mode the data processor, as currently designed, accepts fully formatted seismic data. All other data including the analog housekeeping data is inhibited during operation in this mode. The break in the transmission of housekeeping data presents no problem, provided the break is of a relatively short duration.

The current design concept was based on the use of a magnetic tape recorder for the seismic thumper experiment. Certain design changes are required to cope with the new system design concept of direct transmission of the thumper seismic data. The thumper experiment poses more problems than the mortar experiment, so it will be discussed first.

It is important to monitor the housekeeping inputs during the initial set-up period, since the system will not have had time to thermally stabilize. With the use of a recorder the thumper data would be recorded, thus not tieing up the communication link. The recorded data would then be transmitted in a sufficiently short time so as not to interfere with the housekeeping data collection requirements. With no recorder the thumper seismic data must be transmitted directly, requiring approximately 20 to 30 minutes of communications time. With the current design no housekeeping data would be transmitted for this time period. This is too long a period to be without housekeeping data during such a highly critical phase of the mission. It is therefore necessary to modify the phase 1 design so that housekeeping data is transmitted during this critical time period. Some of the design schemes which were investigated are:

1) Provide the critical analog inputs to the Active Seismic Equipment so the data can be inserted in the formatted data.

2) The Data Processor could time share the link with the Active Seismic Equipment. The data rates would, of course, have to be made compatible. Approximately 16 bits of housekeeping data will be added to the seismic data each second.

3) The Data Processor could be switched in and out of the Active Seismic Mode during the seismic tests so housekeeping data can be sampled. This scheme requires the ground station to resynchronize each time. It will probably be necessary to stretch out the experiment time to make this scheme practical.

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4) The Data Processor A/D Converter and Multiplexer could be operated during the Active Seismic Mode to provide digitized housekeeping data to the Active Seismic Equipment. A newly added register in the Active Seismic Equipment would store this data until it can be inserted in the seismic telemetry format. This technique overcomes the timing problems which would be present for the above schemes.

The mortar experiments will be conducted after the ALSEP has been in operation for some time. The Data Processor will have to be in the Active Seismic Mode for approximately 5 minutes for each of the four shots.

If desired, the Data Processor can be switched out of the Active Seismic Mode at the completion of each shot so housekeeping inputs can be monitored. With this scheme the break in sampling of the housekeeping inputs will be only 5 minutes. This certainly presents no problems.

Since the 85-ft antenna will be used for the collection of Active Seismic data, it is desirable to minimize the total time period. If the four mortars are fired over as short a time period as possible and the Data Processor is left in the Active Seismic mode the tests can be completed in about 30 minutes. There is a trade-off between time usage of the large antenna and the length of the break in the sampling of the housekeeping inputs. It may not even be necessary to transmit housekeeping data during this time period, since the tests occur late in the ALSEP Mission.

Based on the studies to date, it is recommended that item 4 be implemented. A small amount of redesign to the phase 1 Data Processor is required to transmit housekeeping data while seismic data is being collected. Additional logic for a buffer register and for control must be added to the Active Seismic Electronics.