National Aeronautics and
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NASA

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Reply to Attn of: AH22

TO: Raymond C. Watson, Jr., Director
Engineering and Applied Science Programs
Southeastern Institute of Technology

FROM: AH22/R. L. Neece

SUBJECT: Real-Time Data Reduction Support to the Fluids Experiment System/Vapor Crystal Growth System (FES/VCGS)

The purpose of this memorandum is to confirm that Mr. Von L. Burton, Jr. served as Data Reduction Manager for the FES/VCGS payload that flew aboard STS-51E on April 29, 1985. This represented the first time data from a payload that flew aboard the Space Shuttle were received and processed in a real-time operation at the Marshall Space Flight Center. Prior to this mission, data were recorded using magnetic tape units that were a part of the experiment hardware. The recorders from these experiments were removed from the orbiter upon landing and hand-carried to the Data Reduction Facility located at the Marshall Space Flight Center for processing.

The size of the FES/VCGS made a tape recording system unsuitable. Further the Principal Investigators responsible for the scientific aspects of the mission, and the Supporting Engineers responsible for the supporting hardware required real-time data reduction support in a period of time that would permit on-orbit corrections by the astronauts. The corrections would be determined by the Principal Investigators and Supporting Engineers from the real-time data and uplinked to the astronauts. The Data Reduction Facility was confronted, therefore, with the following problem.

> "How do we provide real-time support to the FES/VCGS and provide the results in sufficient time as to permit on-orbit corrections by the crew as determined by the Principal Investigators and Supporting Engineers who would be stationed on the ground during the mission?"

The solution to this problem was outside of the scope of the normal course of operations and required the following over and above that required from experiments that implemented a tape recording system.

- The development of new software capable of merging and processing the data stream; the merging consisting of the data stream received via the Telemetry Data Relay Satellite and those received via the Ground Station Network.

- The creation of both compressed and non-compressed data bases.

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- The design and development of a portable hybrid single board/desk top computer system.
- The special configuration of computers to receive the data.
- Intercenter coordination between NASA Centers that would participate in the support to the mission.
- The purchase of special pieces of hardware necessary for the acquisition of real-time data and the implementation of this hardware in an existing computer system.
- The successful carrying out of simulations across the data link network (from New Mexico to Alabama via Texas and Maryland) to confirm that this support function was possible.
- The creation of special support teams during the mission, such as teams responsible for the scheduling and disseminations of the output.

The implementation of the requirements for this mission required the skills of people not normally required to support a flight experiment. Further, operation of the Data Reduction Facility was required on a 24 hour per day basis; requiring the need for three shifts as opposed to the normally single shift. In addition the management aspects were quite extensive requiring several meetings and a Mission Readiness Review for the Principal Investigators and Supporting Engineers.

Mr. Burton's duties consisted of all the above functions as well as additional functions that were necessary for the reception and data reduction of data that were received from this flight. As indicated from the attached letter, Mr. Burton carried out these functions in a highly successful manner.

R. L. Neece

R. L. Neece
Chief
Data Reduction Branch