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Dear Mr. Chairman:

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As we reported on July 7, 1969, on our report on the automatic data processing policies, procedures, and practices at the Jet Propulsion Laboratory (JPL), Pasadena, California, we have kept abreast of JPL's progress in combining its business and scientific data processing operations. As stated in our report, JPL had three major general data processing organizations at the time of our previous review.

- The Scientific Computing Facility (SCF), responsible for furnishing computer support to all scientific, engineering, and technical functions.
- The Administrative Computer Services Facility, responsible for performing all business data processing (referred to herein as business programs).
- The Space Flight Operations Facility (SFOF), as part of the National Aeronautics and Space Administration's (NASA) Deep Space Network, a command and control center that uses its data processing equipment for the preparation and support of mission flight analysis and control on an immediate-response-to-inquiries (real-time) basis, plus some scientific, engineering, and data reduction work.

Automatic & data processing of electronic information systems

JPL was considering several methods of combining its business and scientific data processing operations, and it recently adopted a plan for combining the operations, which should reduce costs by \$65,000 during fiscal year 1971 and \$325,000 annually thereafter.

Combination status at the time of our July 1969 report

JPL initially considered combining its business and scientific data processing operations as early as July 1965; however, neither NASA nor JPL aggressively pursued this objective. Major computer changes were being made without a prior determination of their effect on a possible data processing combination. In 1969 JPL was exploring the advantages

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and disadvantages of processing the business computing work load on the SCF Univac 1108 computing system. This alternative was determined to be uneconomical because of the high re-programming costs--estimated to be \$1.5 million--to convert International Business Machines Corporation (IBM) 360 business programs for use on the Univac 1108 system. JPL believed, however, that a further study should be made of other alternatives, and it was at this point that we completed our previous work and issued the July 1969 report.

Combination of JPL's business and scientific data processing operations

JPL started to reorganize its computer operations in November 1969 in an effort to centralize responsibility over its general-purpose scientific and business computing systems. The responsibility for business operations was transferred to the Assistant Laboratory Director for Technical Divisions, who already had responsibility for the two major scientific computing centers--SCF and SFOF. This change, however, did not result in an immediate consolidation of actual computer operations.

In October 1969 and April 1970, two Government-owned IBM 360-75 computing systems, excess to the needs of two other NASA centers, were installed at JPL and replaced six large-scale SFOF computing systems. It became apparent to JPL and to NASA that, with the addition of the IBM 360-75 systems, other work could be placed on these systems to permit more efficient utilization of equipment.

In the past the use of SFOF computing systems had been limited to Deep Space Network and other space-flight-oriented work. In May 1970 NASA issued to JPL a set of guidelines clarifying its position on the IBM 360-75 systems and permitting the use of the IBM 360-75 computing systems for nonflight mission support tasks on a noninterference basis.

JPL, after considering the impact of these guidelines on its data processing operations, proposed to NASA the transfer of the processing of its business programs to the IBM 360-75

computers. This action would permit the release of JPL's IBM 360-40 business computing system without jeopardizing the operational use of the IBM 360-75 systems. This alternative was considered cost effective and was consistent with the recommendations in our July 1969 report. JPL and NASA representatives discussed JPL's proposal and agreed to the following decisions.

- Accelerate the transfer of business computing from the IBM 360-40 to the IBM 360-75.
- Terminate the lease of the IBM 360-40 at the earliest practicable date.
- Convert the business programs to operate in a time-shared batch-processing mode by July 1971.

In September 1970 JPL prepared a two-phase implementation schedule for the conversion of the business programs to operate on the IBM 360-75 systems. The first phase, an interim measure completed in December 1970, transferred the business programs to operational use on the IBM 360-75 systems during the third shift on a block- or dedicated-time basis. The second phase, started in January 1971, involved converting the business programs to make them compatible for use with the 360-75 computers' real-time operating system to permit the processing of the business and scientific data on a time-shared basis. Phase two is scheduled for June 1971 completion. With the conversion of the business programs accomplished under phase one, JPL released the 360-40 on December 31, 1970.

After phase two is completed, JPL's business programs will be processed along with other scientific and mission support programs under the IBM 360-75 real-time operating system and thereby eliminate the need for dedicated block time to process the business work load. Although processing priority will be given to some of the scientific and mission support work, sufficient computer capacity will be available for the business work load. To avoid possible interference at critical times during space flight missions, such as the upcoming Mariner 71

launch, a backup IBM 360-75 computing system is available to process the business programs at the California Institute of Technology (CIT), also located in Pasadena.

JPL estimates that it will incur about \$110,000 in one-time conversion costs in combining its business and scientific data processing operations. With the release of its 360-40 business computing system, JPL estimates a net savings (i.e., after conversion costs) of about \$65,000 in fiscal year 1971 and about \$325,000 in each subsequent year. These estimates reflect out-of-pocket costs and take into account only equipment rentals, although other cost elements are expected to stay about the same. The estimated savings could be reduced by about \$50,000 annually if CIT's computer has to be used as backup.

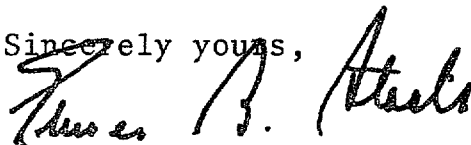
Conclusion

In our 1969 report to the Committee, we recommended that NASA provide guidance regarding combining the data processing centers at JPL. Subsequently, in May 1970 NASA issued guidance permitting JPL to use SFOF computers on business functions. We believe that the action taken by NASA and JPL on our recommendation will result in substantial savings to the Government for many years to come.

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We hope that the information presented will be helpful to you. We are sending copies of this letter to the Administrator, NASA; however, we plan to make no further distribution of this report unless copies are specifically requested, and then we shall make distribution only after your agreement has been obtained or public announcement has been made by you concerning the contents of the letter.

Sincerely yours,



Comptroller General
of the United States

The Honorable George P. Miller, Chairman
Committee on Science and Astronautics
House of Representatives

Handwritten: 720 03400