

R1CC-

#v

STATEMENT OF FACTS DEVELOPED BY
GENERAL ACCOUNTING OFFICE RELATIVE TO
THE MANAGEMENT OF AUTOMATIC DATA PROCESSING
FACILITIES AND RELATED CONTRACTS BY
NASA, MANNED SPACECRAFT CENTER

The purpose of this memorandum statement is to summarize our understanding of the facts developed to date by our audit concerning the attached items in order that they may be reviewed by Manned Spacecraft Center (MSC) to provide assurance to MSC, and to us, that we have considered all the pertinent facts.

The comments of MSC are requested as to whether it concurs with the following statements of facts and whether it has any additional pertinent information which it considers should be included in the statement of facts.

4 Copies made 4/25/63

Distribution
Cassins
Brook
Haven

John J. Reed
4/24/63

Hq to study

PROPOSED PURCHASE OF COMPUTER SYSTEMS

Manned Spacecraft Center (MSC) will utilize four IBM 7094 computer systems at the Real Time Computer Complex, Ground Systems Project Office (GSPO), as follows:

- 1 7094 system installed January 15, 1963
- 1 7094 system to be installed about May 1, 1963
- 1 7094 system to be installed about June, 1963
- 1 7094 system - date of installation not firm

GSPO anticipates that two of the IBM 7094 systems will be used a minimum of four years. Preliminary review by GSPO indicates that the purchase of two IBM 7094 systems will result in a savings by about June 30, 1967. On this basis, MSC plans to purchase two new IBM 7094 systems as soon as funds become available.

MSC currently leases an IBM 7094 and two IBM 1401 systems at the Computation and Data Reduction Division, Site 11. MSC projected plans call for usage of the IBM 7094 and 1401 systems installed at site 11 about 18 more months.* At that time, the leased systems will be released and replaced by faster equipment.

The fiscal year 1964 budget for MSC includes plans for the purchase of an IBM 7040 computer system for installation at the Spacecraft Technology Division. The IBM 7040 system will replace an IBM 1620 system.

Certain components of the IBM 7094 system and the IBM 1401 system installed at Site 11 are identical to the components of the IBM 7094 systems installed or to be installed at the Real Time Computer Complex and the IBM 7040 system to be installed at the Spacecraft Technology Division. At July 1, 1963, the following components of the IBM 7094 system installed at Site 11 will have depreciated to .82500 of the purchase price new. A comparison of the new purchase price and the depreciated purchase price of these components follows:

TYPE	DESCRIPTION	COST		DIFFERENCE
		NEW	DEPRECIATED	
7094				
7151	Console control unit	\$ 66,700	\$ 55,027	\$ 11,673
7608	Power converter	25,000	20,625	4,375
7617	Data channel console	10,900	8,992	1,908
7617	Data channel console	10,900	8,992	1,908
7618	Power control	35,000	28,875	6,125
1401				
1403	Printer	34,000	26,633	7,367
729	5 model 5 Tape drives	186,000	150,350	35,650
		<u>\$ 368,500</u>	<u>\$ 299,494</u>	<u>\$ 69,006</u>

Assuming purchase at July 1, 1963, the difference in the new and depreciated cost of these components would be about \$69,006.

* from January 1, 1963

MSC's current and projected utilization of the computer systems installed or to be installed follows:

1 IBM 7094 installed at Site 11	3 shifts
4 IBM 7094's installed or to be installed at RTCC	2 shifts
1 IBM 7040 to be installed at Space-craft Technology Division	2 shifts

Because of the additional cost of third shift usage, the difference in lease payments for the components of the IBM 7094 installed at Site 11 and the projected two shift usage of the RTCC and STD components would be about \$ 19,778 for the period 7-1-63 through 6-30-64, computed as follows:

TYPE	DESCRIPTION	LEASE COSTS		DIFFERENCE
		3 shift use	2 shift use	
7151	Console control unit	\$ 28,614	\$ 22,257	\$ 6,357
7608	Power converter	15,116	11,758	3,358
7617	Data channel console	4,854	3,777	1,077
7617	Data channel console	4,854	3,777	1,077
7618	Power control	19,204	15,012	4,192
1403	Printer	16,734	13,017	3,717
729	*Tape drives (5)	45,000	45,000	-0-
		\$ <u>134,376</u>	\$ <u>114,598</u>	\$ <u>19,778</u>

* Cost based on one shift usage. Tape drives are not normally used on extra shift basis for rental purposes.

Assuming purchase at July 1, 1963 of the components used three shifts, lease payments totaling \$ 19,778, which will otherwise be lost, would be applied to the purchase cost.

Maintenance costs for these components, if purchased, will total about \$ 2,637 for the period July 1, 1963 through June 30, 1964.

Interest costs, using the average rate of marketable obligations of the outstanding public debt as of December 31, 1962 (3.357 percent), for these components will total about \$2,278 for the period July 1, 1963 through June 30, 1964.

1a.

#2 Supplement

PROPOSED PURCHASE OF COMPUTER SYSTEMS

Subsequent to our discussions with MSC officials concerning the feasibility of purchasing depreciated equipment, we were informed that MSC ^{has} ~~has~~ determined that all the main frame components of the IBM 7094 installed at Site 11 were suitable for installation at the Real Time Computer Complex, except for the 7302 - Core Storage Unit and certain components which would require modification at the factory.

We were informed that the following actions have been proposed. (1) In October 1963, return the 7109, 7110, and 7606 components, presently installed at Site 11, to the IBM factory for modification, with the stipulation that these machines be incorporated into the system to be installed in January 1964 at the Real Time Computer Complex, (2) concurrently acquire, on a straight line lease basis, replacements for these three machines for the system installed at Site 11, (3) in January 1964, when the RTCC system arrives, purchase the three modified machines (7109, 7110, and 7606) and the 7151, 7608, and 7618 components presently installed at Site 11, for installation at the RTCC.

A comparison of the depreciated cost and the new cost of the main frame components currently installed at Site 11, which MSC proposes to purchase for installation at the RTCC follows:

Type	Description	Cost		Difference
		New	Depreciated * 1-1-64	
7109	Arithmetic sequence unit	\$ 372,000	\$ 288,300	\$ 83,700
7110	Instruction processing unit	693,000	641,025	51,975
7151	Console control unit	66,700	51,693	15,007
7606	Multiplexor	158,300	122,683	35,617
7608	Power convertor	25,000	19,375	5,625
7618	Power control	35,000	27,125	7,875
		<u>\$ 1,350,000</u>	<u>\$ 1,150,201</u>	<u>\$ 199,799</u>

* all components depreciated on the basis of 27 months, except the 7110, which was depreciated on the basis of 9 months.

We were informed by an official of IBM that the components of the IBM 7094 currently installed at Site 11 could be modified in the field to duplicate the components required by the RTCC. The official estimated that from 200 to 500 hours would be required to make the modification and the cost would be about \$10.00 an hour.

On the basis of MSC's proposed action, savings of about \$199,799 less modification costs, will result by purchasing the depreciated equipment in lieu of new equipment as originally planned.

We were also informed that the purchase of the IBM 11401 main frame currently installed at Site 11 was under consideration, to be installed with the IBM 7040 system scheduled for delivery in August 1963.

In addition, MSC proposes to deposit \$ 8,400 prior to the installation date (July 1963) to acquire a purchase option on the 7302 - Core Storage Unit of the system scheduled for installation in July 1963. Because of the depreciation factor, purchase of the 7302 - Core Storage Unit installed at the RTCC in January 1963 rather than purchase of the 7302 scheduled for installation in July 1963, would result in a savings of about \$ 16,000, if purchased on January 1, 1964.

J. Reese
4-30-63

2. USE OF CONTRACT EMPLOYEES

In December 1961, Manned Spacecraft Center entered into contract 9-207 with Computer Laboratories, Inc., a local service bureau, for computer services. Amendment No. 7, dated September 17, 1962, provided for personal services as follows:

<u>Service</u>	<u>Rate</u>
Key punch operators	\$ 4.50 an hour
EAM operators	4.65 an hour

The use of contractor-furnished employees for the automatic data processing operation has increased rapidly since September 1962. For example, the use of contractor-furnished key punch operators increased from 56.7 hours in September 1962 to 839.6 hours in February 1963.

A comparison of the approximate annual cost of one contract employee and one Civil Service employee on a full time basis follows:

* Key punch operator

<u>Civil Service</u>		
Basic annual salary GS-3, step 5		\$ 4,240
Health insurance		72
Retirement		276
		<u>4,588</u>
Add cost of contractor employee assuming Civil Service employee uses 160 hours annual leave and 104 hours sick leave annually		
264 hours @ \$ 4.50 an hour		<u>1,188</u>
Approximate cost		\$ 5,776
<u>Contractor</u>		
Annual work hours	2080	
Less 8 holidays	64	
\$ 4.50 times	<u>2016</u> hours	<u>9,072</u>
Difference		\$ <u>3,296</u>

* the cost of administrative and related expenses for civil service and contractor furnished employees were considered as offsetting factors.

Contractor furnished employees are also used to provide Manned Spacecraft Center with other services such as programmers, electric accounting machine operators, and computer operators.

The Chief, Management Computer Applications Branch, informed us that when the contract was amended, the operators were needed only intermittently, therefore, the contract cost was based on the contractor furnishing operators on an "as required" basis. Further, that due to increased workload, the number of hours worked by contract keypunch personnel has

*Don't argue these
figs*

reached a "full time" degree for several operators. The official stated that although there were only four civil service keypunch operators in the Management Computer Applications Branch, current workload justifies a minimum of seven full time personnel.

The official indicated that using contractor personnel provided several advantages including flexibility for peak load requirements, and obviating the use of critically needed spaces, which were not available. He indicated that the current contract contained a price that was based on "as required" personnel and expected that a new contract, open bid, would result in a lower hourly rate. He also indicated that with the growth of Manned Spacecraft Center, the volume of work would increase proportionately.

3. INVENTORY OF MAGNETIC TAPES

A physical inventory disclosed that Manned Spacecraft Center records did not show the disposition of 37 reels of magnetic tape, valued at approximately \$1,565, computed as follows:

Tapes on hand 6-30-62	220
Tapes acquired 7-1-62 through 12-31-62	<u>300</u>
	520
Less tapes destroyed 7-1-62 through 12-31-62	<u>25</u>
Total tapes to be accounted for	495
Tapes on hand per physical inventory 2-1-63	<u>458</u>
Total tapes which could not be located	<u>37</u>

37 - 10 to Hq - dit - RTR T

A physical inventory was not made of magnetic tapes when the tapes were transferred from Langley, Virginia to Houston, Texas.

We were informed by the magnetic tape librarian that it was believed that 19 tapes were never transferred from Langley, Virginia; 10 tapes were ordered, received, and shipped to another location without the tape librarian's knowledge and; 8 tapes were dropped from the records without explanation.

RENTAL OF EXTRA COMPUTER MEMORY DEVICE

H.
Manned Spacecraft Center currently leases an extra memory device costing \$ 18,900 annually on an IBM 1401 computer located at Site 11. The extra memory device was installed for use in management applications and is not used in scientific applications.

In July 1962, an IBM 1401 computer having a 16,000 character storage capacity (16 K) was installed at Manned Spacecraft Center, Site 11. The basic storage capacity of the computer was 4,000 (4 K) characters. An extra memory device with a storage capacity of 12,000 (12 K) characters, costing \$ 1575 a month, was leased making the total storage capacity of the computer 16,000 characters (16 K).

The computer was originally installed at Site 11 for management applications developed by the Management Computer Applications Branch located at Ellington Field, Site 8. However, because of the workload resulting from scientific applications at Site 11, MSC used a contractor's computer for management applications and the capacity of the 16 K computer was only used occasionally by the Management Computer Applications Branch for items such as payroll. In April 1963, an IBM 1410 computer was installed at Site 8 to provide in-house capability for MSC's management applications.

At the present time, at least two computers in the Houston area are capable of providing back-up for the management computer located at Site 8. These computers are located at Computer Laboratories, Inc., and the Hughes Tool Company.

Do look to these now for backup

The Chief, Computation and Data Reduction Division informed us that the 4,000 (4 K) character storage capacity of the IBM 1401 computers was adequate for the scientific work performed at Site 11. We were informed that the 16 K computer was originally installed for use of the Management Computer Applications Branch and that the extra storage capacity was necessary for management applications. We were informed that rental of the extra memory device was not discontinued because of the need for back-up capability in the event of a breakdown of the computer installed at Site 8. We were further informed that the continued need for the extra memory device would be studied and that if adequate back-up capability could be provided elsewhere, rental of the memory device would be discontinued.

USAGE OF COMPUTER BY THE UNIVERSITY OF HOUSTON

5. Manned Spacecraft Center (MSC) provides the University of Houston with the use of an IBM 7094 without charge. The cost of computer time provided without charge totaled about \$ 5,500 through March 1963, computed as follows:

IBM 7094 computer

Basic monthly rental - December 1962 \$ 74,675
Extra shift rental - December 1962 20,408

Total rental costs - December 1962 \$ 95,083

Hours used basic shift 176 hours
Extra shift use 165 hours
 341 hours

\$ 95,083 divided by 341 hours = \$ 278.60 an hour

Hours used by the University, October 1962 through
March 1963 - 19.90 hours times \$ 278.60 = \$ 5,544.14

We found no evidence of a formal agreement between MSC and the University of Houston concerning the free use of the computer.

MSC records show that the University has charged for use of the main auditorium beginning in August 1962. Also, beginning in November 1962, MSC began operating the IBM 7094 on a three shift basis. In addition, a contractors' computer was being used not less than 34 hours a month at a prime rate of \$550 an hour and off shift rate of \$450 an hour.

The Manager, Center Services, stated in a memorandum for the record dated March 20, 1963 that University representatives said that the main auditorium and certain of their other lecture facilities could be made available to the NASA, and that complete cooperation between the University and MSC with regard to training could be expected. The University also requested that, if possible, use could be made by their faculty of MSC computers for instructional and computational activities. The Chief, Computation and Data Reduction Division, indicated that due to the heavy schedule, it was very unlikely that a large amount of time could be available, but that it was possible that with proper timing a cooperative program of some sort could be worked out. Subsequently, on a number of occasions, NASA has utilized the large main auditorium at no cost. More recently, the auditorium has been used with a charge for janitorial and related expenses.

On the basis of this memorandum, it appears that no formal agreement for the administration and control of computer time furnished to the University exists.

TRANSFER OF COMPUTER FROM LANGLEY TO HOUSTON

6. Manned Spacecraft Center (MSC) leased an IBM 7090 computer system, which was ordered and installed at Langley Research Center, Langley, Virginia, beginning in October 1961.

On September 19, 1961, the formal announcement that Houston had been selected as the site for MSC was made. Subsequently, in July 1962, the IBM 7090 was transferred from Langley to Houston, Texas. The computer rental contract provided that equipment could be moved from one location to another without cessation of rental charges during the period of transfer. MSC paid rental charges totaling about \$ 30,300 during the 13 days required to move the equipment from Langley to Houston. The contract also provided that there would be no charge for program testing time during the first 90 consecutive day period following initial installation of an IBM 7090 system. MSC paid extra shift charges totaling about \$ 17,000 during the first 90 consecutive day period following installation of the system at Houston. However, because the initial installation was made at Langley, no credit was available.

The contract provided that orders for periods of one year or less would be honored and that a system could be discontinued by the Government at any time 90 days after written notice to the contractor. The estimated lead time required for delivery of a computer system similar to the one installed at Langley was about 5 to 6 months.

Comments regarding the transfer of electronic computing equipment from Mr. Jack C. Heberlig are attached.

UNITED STATES GOVERNMENT

Memorandum

TO : Chief, Computations and Data Reduction
Division

DATE: March 21, 1963

John
FROM : Jack C. Heberlig - E

SUBJECT: Transfer of Electronic Computing Equipment from MSC-Langley to
MSC-Houston

Recently, a meeting was held in this office with Messrs. Booker and Reese of the GAO to discuss the subject activity. In this regard the writer described the technical and operational aspects of the equipment use, after which the following five questions were offered for comment:

- a. When was the decision made to establish the ADP Group at MSC, Houston?
- b. When was the decision made to move the IBM 7090 system and the IBM 1620 system from Langley, Virginia to Houston?
- c. What factors were considered in arriving at the decision to move the IBM 7090 and IBM 1620 systems?
- d. What considerations were given to terminating the rental contract at Langley and ordering replacement systems for installation at Houston?
- e. What benefits were derived in electing to move the IBM 7090 and IBM 1620 rather than obtaining replacement systems?

Basically, two areas of concern were prevalent in moving some of the electronic computing equipment to Houston: (a) Orbital flight operational requirement, and (b) Administrative management dictates. The operational requirements for the Glenn and Carpenter orbital flights fostered the control inputs.

When it was officially established that the Space Task Group would become the nucleus for the NASA-Manned Spacecraft Center and be relocated to Houston, Texas, it was NASA policy to not permit any immediate transfers to interfere with the upcoming Glenn flight (MA-6) then scheduled for the 4th quarter of 1961. A policy determination was also made as to when the decision was needed to implement the MA-7 flight. This firm decision could not be finalized pending MA-6 flight analysis.

Subject: Transfer of Electronic Computing Equipment from MSC-Langley to MSC-Houston

The subsequent slippage of the MA-6 launch to February 20, 1962, its outstanding success, and the requirement to keep the operational team as an integrated unit (plus high level government decisions the writer is not fully aware of) resulted in the MA-7 flight being scheduled immediately for late April 1962. It later flew a successful mission on May 24, 1962.

The personnel and equipments whose top priority jobs to support the MA-6 flight and MA-7 flight had to expend their time and energies to meeting this requirement. The electronic computing equipment used for preflight activity, operational support, and post flight data reduction were fully committed to the MA-6 flight and pending this outcome, would or would not be needed for additional flight support. Up until the time of the decision to proceed with the MA-7 flight, and complete the transfer of all MSC employees to Houston by June 30, firm plans of action could not be formalized.

The initiation of MSC at Houston did not effectively begin until late December 1961 or early January 1962. The rental surveys with GSA and allocation of space had to be fluid in order to maintain continuing project support. Long lead time items could not properly be reflected upon due to lack of prerequisite data.

The questions proposed in paragraph 1a through 1c relate only to the equipments moved to MSC-Houston and are not concerned with those equipments left for LRC use or equipment terminations with IBM. That equipment transferred had unique adaptations with internal timers and tape switching devices not found in the logics of standard marketed equipments. The high speed computation equipment was operated above 98% efficiency from date of installation in October 1962, which was a prime requirement since it was part of the real-time flight data link.

Considerations were given to ordering new items; however, equipment overlaps would have occurred due to lack of known termination dates. Excess transportation costs would have been experienced due to the return shipping requirements of the contract. However, these reasons were not altogether the control in this case. The technical personnel requirement for machine utilization, plus a minimum of being away from their job during the flight activity and subsequent move was of prime importance. "Debugging" a machine is very costly in terms of having much work done by North American or McDonnell type contractors.

I have discussed this in brief with the procurement staff here and at LRC. The strong concensus is the procedures that had to be followed during this time period were indeed sound, and presented the best government advantage. It is noted available monies for STG during this period for electronic data

Subject: Transfer of Electronic Computing Equipment from MSC-Langley to
MSC-Houston

reduction machine rentals were extremely underprogrammed for the tasks to be performed. In lieu of the fact that the required mission objectives were met with an extremely small staff of dedicated personnel, together with the memorandums reviewed by the writer, indicates the pros and cons of the subject activity were very consciously considered.

Please advise me if I can be of any further assistance with this matter.