REPORT TO THE CONGRESS

Opportunities For Improving Computer Use In The Bureau Of The Mint

Department of the Treasury

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

FGMSD-75-19

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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

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To the President of the Senate and the
Speaker of the House of Representatives

This is our report entitled "Opportunities for Improving Computer Use in the Bureau of the Mint."

We made our review pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

Copies of this report are also being sent to the Director, Office of Management and Budget; the Administrator of General Services; and the Secretary of the Treasury.

Elmer B. Staats

Comptroller General
of the United States

Contents

ABBREVIATIONS

ADP	automatic data processing
GAO	General Accounting Office
GSA	General Services Administration
IBM	International Business Machines Corporation
NUCOS	Numismatic Coin Operations System

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

OPPORTUNITIES FOR IMPROVING COMPUTER USE IN THE BUREAU OF THE MINT
Department of the Treasury

D I G E S T

WHY THE REVIEW WAS MADE

Early in 1973 the Bureau of the Mint installed in its San Francisco facility a $4 million computer system. This system is used for operating and managing a program to sell proof coins, uncirculated coins, and commemorative medals to the public.

GAO reviewed the Mint's computer operations (1) because several uses originally considered for it had not been implemented and (2) to determine whether the computer could be used more efficiently and effectively.

FINDINGS AND CONCLUSIONS

Increasing computer use by sharing time with other agencies

Nearly a year after installing its computer, an IBM 370/155, the Mint was using only one-third of the system's productive capacity. Only one major computer application, the Numismatic Coin Operations System, had been designed and put into service. (See p. 3.)

In January 1974, GAO told the Mint and the Treasury of the savings potential from sharing the Mint's computer with other agencies under the Federal ADP (automatic data processing) Sharing Program. The Mint, working through the sharing program, later notified other agencies that time was available. (See p. 5.)

The Treasury canceled a request from the U.S. Customs Service for a new IBM 370/155 and directed Customs to use the Mint's computer. As a result, the Treasury will save about $324,000 during the next two fiscal years. (See p. 5.)

Even though Customs is now using the Mint's computer, potentially productive capacity, with an estimated annual value of about $500,000, remains unused and available to other agencies. (See p. 6.)

Need to identify and justify total ADP resource requirements

Federal regulations require agencies to select computers on the basis of detailed specifications of an agency's data processing requirements so that only needed computing capacity is acquired. Before selecting the IBM 370/155, however, the Mint did not meet this requirement for the applications that were to be run on the computer. (See pp. 8 and 9.)

By August 1974 the Mint had put into use only one application and was taking a piecemeal approach to justifying and implementing others. (See p. 9.)

Eliminating duplicate records to result in savings

The master file in the Numismatic Coin Operations System has about 2.8 million customer name and address records. This file was used eight times in 1974 to prepare mail-order forms whenever a new coin or medal was offered for sale.

The file had about 224,000 duplicate records which caused the Mint to send duplicate mail-order forms to customers at a cost of about $200,000 a year. (See p. 11.)

Internal audit needs to review ADP activities

In 1968, and again in 1974, GAO stated that internal auditors should review the adequacy of internal controls during the design, development, and operation of data processing activities. Internal auditors, with their training and experience, can be a great help to management in evaluating and instituting controls in and around the computer. (See p. 15.)

The Mint's internal auditors did not evaluate internal controls of the Numismatic Coin Operations System during its design and development. After it became operational, several internal control weaknesses were discovered. For example, controls were not adequate to

--prevent multiple shipments on a single order and

--provide a complete audit trail showing an order's status from initial receipt through shipment.

The Mint subsequently acted to correct weaknesses of this type in the system. (See p. 15.)

GAO reviewed the operating controls for managing the computer center and found them to be generally adequate. For example, procedures were adequate to

--protect and retain critical files and programs and

--restrict access to the computer room by unauthorized people.

Although these procedures generally were followed, the Mint's auditors should evaluate them periodically to insure management that they are followed continually and remain effective. (See p. 16.)

RECOMMENDATIONS

The Secretary of the Treasury should direct the Mint to

--seek ways to productively use the excess computer capacity, including opportunities available through the Federal ADP Sharing Program;

--prepare a master plan for developing and implementing additional applications to

be processed on the computer system and submit it to appropriate Treasury officials for approval;

--remove duplicate customer names and addresses from the master file; and

--require the internal auditors to evaluate the adequacy of internal controls during the design, test, and operation of applications and to periodically evaluate the management and operation of the data center.

AGENCY ACTIONS AND UNRESOLVED ISSUES

The Treasury agreed in principle with these recommendations and said that

--sharing activities of the Customs Service and other agencies, together with certain increased computing requirements of the Mint, are estimated to make significantly better use of the unused capacity (see p. 7);

--the Mint is now developing an ADP master plan in accordance with the four minimum requirements discussed in the report (see p. 10);

--the Mint has established a three-step plan for eliminating duplicate records (see p. 13); and

--a formalized long-range audit plan was approved in July 1974 and that the internal auditors are currently engaged in audits of the data center and, as new applications are considered for automation, will perform the recommended evaluations (see p. 17).

MATTERS FOR CONSIDERATION BY THE CONGRESS

The Congress has shown particular interest in management practices of automatic data processing, the subject of this report. It will also be helpful to congressional committees having oversight for the Mint.

CHAPTER 1

INTRODUCTION

The Bureau of the Mint, Department of the Treasury, manufactures and distributes U.S. coins and redeems outdated and mutilated U.S. coins. In addition, the Mint receives deposits of gold and silver, refines gold and silver bullion, safeguards the Government's holdings of monetary metals and coins, and manufactures coins for foreign countries.

The Mint also operates a numismatic program to manufacture and sell to the public various proof coins, uncirculated coins, and coin sets; medals of national figures; and special medals requested by other Government agencies. The number of medal and coin offerings made each year has increased from two in 1968 to eight in 1974. In fiscal year 1973, approximately three million orders, valued at $50.4 million, were processed. This program cost about $29.6 million. Net proceeds of $20.8 million were paid to the Treasury's general fund.

DATA PROCESSING AT THE MINT

The Mint has used automatic data processing (ADP) equipment for many years. At first, the Mint used electronic accounting machines to process accounting and selected financial transactions. However, in 1969 the Mint began using a computer to process orders for numismatic items. The General Services Administration (GSA) developed an automatic numismatic coin operations system for the Mint and provided the computer time to operate the system. As the volume of orders grew, the Mint acquired additional computer time from other Government agencies.

Late in 1971 the Mint decided to centralize numismatic data processing and develop a more responsive data processing system. Early in 1973 a large third-generation computer (IBM 370/155) was installed in the Mint's San Francisco facility. This computer, valued at about $4 million, handles the processing requirements for the Numismatic Coin Operations System (NUCOS). NUCOS stores order and shipment information on all customers and produces mail-order forms, order shipment documents, and various management reports. It has a real-time feature for instantaneous access to information needed for responding to inquiries on customer order status.

SCOPE OF REVIEW

We reviewed NUCOS, the operation of the Mint's data processing center in San Francisco, and the acquisition of

the IBM 370/155 computer. Specifically, we reviewed (1) management policies and plans, (2) major computer application design, (3) machine utilization, (4) the configuration of the computer equipment, (5) organization and staffing, and (6) the acquisition process, including contracting, testing, and acceptance procedures.

We made our review primarily at the Mint's data center at San Francisco and held discussions with Mint headquarters officials and with GSA and Treasury representatives.

The principal Treasury and Mint officials responsible for the activities discussed in this report are listed in appendix III.

CHAPTER 2

INCREASING COMPUTER USE BY SHARING TIME WITH OTHER AGENCIES

Nearly a year after installing the IBM 370/155, the Mint was using only one-third of the system's potentially productive capacity. Early in our review we suggested to Treasury and Mint officials that this capacity be made available to other agencies through the Federal ADP Sharing Program.

The Treasury later directed the U.S. Customs Service to use the available time on the Mint's computer instead of acquiring a new IBM 370/155 computer. We estimate that the Treasury, as a result of this action, will save about $324,000 in data processing costs during the next two fiscal years.

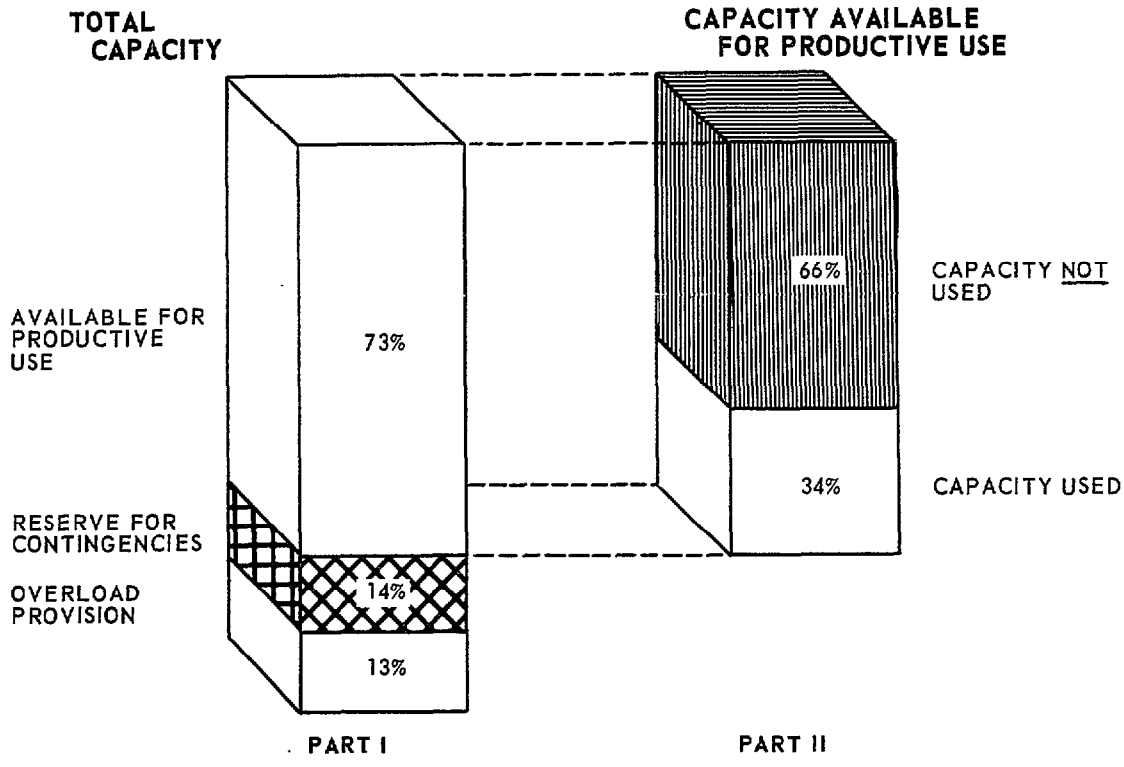
Even though Customs is now using the Mint's computer, a large amount of potentially productive capacity is still available to other agencies. On the basis of July 1974 utilization levels, we estimate that capacity worth about $500,000 annually is still available.

LARGE AMOUNT OF UNUSED COMPUTING CAPACITY

In January 1974 the Mint operated its computer about 96 of the 168 hours available in a week. The number of hours of operation, however, is not the most meaningful indication of the use of a computer like the 370/155 because it can process several computer programs concurrently (multiprograming).

Performance evaluation tools and techniques have been developed to more precisely measure the effective use of multiprogramable computers. In our review we used a special monitoring device and a technique known as job-stream analysis to determine the unused capacity or growth potential of the Mint's computer. These techniques and the details of our analysis are discussed more fully in appendix II.

The results of this analysis are summarized in the chart on page 4 and cover two key areas: (1) the productive capacity of the 370/155 configuration, considering all components of the system, and (2) the Mint's effective use of this capacity.



As shown in part I, not all the Mint's computer capacity can be used for productive work. Part of the total capacity must be set aside to cover such emergencies as extended downtime, abnormal reruns, and unexpected hardware and software maintenance. Such emergencies do occur, making it necessary to reserve some recovery time. Without such a provision, the normal use of the computer would be seriously disrupted when these emergencies arise. According to ADP consultants, 24 hours a week, or about 14 percent of the total capacity, is generally adequate to cover these emergencies.

In determining productive capacity, time--sometimes known as an overload provision--must also be allowed for certain nonproductive activities that normally occur during the operation of all computers. These activities include normal reruns and downtime, unavoidable idle time, and planned hardware and software maintenance. The capacity used by these items will vary depending on how well they are controlled by the Mint. According to Mint statistics, about 13 percent of total capacity is needed for these activities. Therefore, about 27 percent of the total capacity should be allowed for emergencies and overload provision, leaving 73 percent for productive use.

An analysis of the Mint's use of the computer showed, however, that its workload required only 34 percent of the potentially productive capacity of the system and that about 66 percent was unused. This analysis covered February 1974

which, according to Mint officials, was a representative period of processing.

OPPORTUNITY FOR COST SAVINGS THROUGH COMPUTER SHARING

The Mint had no plans for greatly increasing its use of the computer in the near future. GSA officials, however, told us that several agencies in the San Francisco area had an immediate need for 370/155 computer time. Consequently, in a January 30, 1974, letter, we told the Director of the Mint about the potentially productive capacity that could be used by other agencies and recommended that the capacity be made available under the Federal ADP Sharing Program. Under this program, agencies that need computer time must consider using the available time on computers in other agencies before buying time from a commercial service bureau. GSA acts as a clearinghouse to match agency demands for computer time with excess time available at other agencies.

On February 21, 1974, the Mint replied that it would make its excess capacity available to other agencies. Working through the sharing program, the Mint later notified other agencies that its computer time was available and designated a member of the data center to handle all inquiries about sharing. Since that time the Mint has received six requests from other agencies for computer time. According to the Mint, it cannot accommodate three of these requests because they require certain hardware and/or software features not presently available on the Mint's computer.

TREASURY ACTIONS TO SAVE $324,000

The Treasury also took steps to improve the use of the Mint's computer through sharing with other Treasury components. Shortly after receiving our letter, the Treasury received a request from the Customs Service to approve acquiring a 370/155 model computer. Customs planned to use the computer up to 2 years.

The Treasury directed Customs to process some of its workload on the Mint's computer and the remainder on a commercial service bureau computer. According to Treasury officials, the commercial service bureau had to be used for a part of the workload because some of the programs were originally designed for processing on another manufacturer's computer; therefore, an extensive reprograming effort would have been required to process them on the Mint's computer.

On the basis of information Treasury officials provided to us, we estimate that Customs' use of the Mint's computer will save about $324,000 over the next 2 years.

Cost of Customs' proposed rental of a 370/155 computer		$1,035,000
Less:		
Cost for remote terminal and supporting communications needed to use the Mint's computer	$144,000	
Purchase of service bureau time	567,000	711,000
Estimated savings		$ 324,000

ADDITIONAL OPPORTUNITIES FOR SHARING

Although Customs and other agencies have used the Mint's computer since April 1974, the Mint's July 1974 utilization statistics indicate the unused productive capacity still remains high. We estimate the annual value of this time at about $500,000. Since other agencies are still interested in using this capacity, we believe it can be put to use through sharing.

CONCLUSIONS

Many months will elapse before the Mint will be able to use most of its present excess capacity. During these months, however, the Mint has an added responsibility to seek other ways to productively use this capacity. Allowing it to remain idle over the short term results in a nonrecoverable loss of a costly and valuable resource. Sharing the computer with other agencies, however, allows the Government to realize at least some productive value from this resource as well as to reduce out-of-pocket expenditures, as illustrated by Customs' use of the computer.

The sharing program can be a convenient vehicle for the Mint to identify potential Federal computer users. The Mint, as well as other agencies, should make every reasonable effort to accommodate the needs of prospective users identified through the sharing program.

RECOMMENDATION

We recommend that, to insure more effective use of the Mint's computer system, the Secretary of the Treasury direct

the Mint to seek ways to productively use the excess computer capacity, including opportunities available through the sharing program.

AGENCY COMMENTS

In a December 19, 1974, letter, the Assistant Secretary of the Treasury (for Enforcement, Operations, and Tariff Affairs) agreed in principle with our recommendation. The Assistant Secretary pointed out that current Treasury estimates showed that the Customs Service alone would use a major portion of the unused capacity. He also noted that other agencies are now using the Mint's computer.

The Assistant Secretary also pointed out that the Mint's projections for the Bicentennial Coin Program indicate that its computing requirements may exceed those for all other coin programs and thereby validate the original NUCOS workload projection. The Treasury believes that the computing requirements of this coin program and some other recently added applications, together with the sharing activities with other agencies, will make signicantly better use of the unused capacity.

CHAPTER 3

NEED TO IDENTIFY AND JUSTIFY TOTAL ADP RESOURCE REQUIREMENTS

Before acquiring the computer, the Mint did not justify and adequately define its total ADP resource requirements. Consequently, the Mint selected a larger computer system than it could effectively use. As of August 1974, nearly 3 years after deciding to acquire a computer, the Mint had implemented only one application and was taking a piecemeal approach to justifying and implementing others.

TOTAL DATA PROCESSING NEEDS NOT JUSTIFIED OR CLEARLY DEFINED

The Mint acquired its computer primarily to improve numismatic order processing and to handle an expected increase in the volume of these orders. Processing other applications, such as financial management, production management, inventory control, equipment management, and personnel management, was also considered.

In justifying the cost of a new computer, the Mint considered the cost and benefits of only one application--NUCOS. Its analysis showed that processing NUCOS on a $4 million computer--about the size of the 370/155--would save $58,416 over a 6-year period. A cost-benefit analysis to determine if additional savings or costs could be anticipated was not made for the other applications.

In addition, the Mint did not follow long-established Federal policies for acquiring computer systems. Federal Management Circular 74-5 (formerly Office of Management and Budget Circular A-54) requires that the selection of ADP equipment be based on detailed systems specifications which include the system's objectives, a description of the data output and its intended uses, the data input, the data files and record content, and other facts necessary for fully describing the system.

The Mint developed this type of specification for the NUCOS application only. The specifications, however, were limited to a superficial description of the number of transactions to be processed against a file of 3.5 million records during a 40-hour-a-week processing cycle.

On the basis of these specifications, the Treasury requested a delegation of authority from GSA to acquire a computer for the Mint. GSA reviewed the specifications and told the Treasury that:

"* * * it does not express your requirements to the industry adequately * * *. Our experience shows that a solicitation based upon undefined data systems specifications usually results in procuring more capacity than is really needed." (Underscoring supplied.)

GSA told the Treasury that it would not object to releasing the solicitation if better defined specifications were developed and used to select the equipment.

Mint personnel told us, however, that no further specifications were developed.

PIECEMEAL APPROACH TO PLANNING FOR FUTURE SYSTEM APPLICATIONS

In 1970 we reported to the Congress that the Mint was not realizing the full potential of ADP because it was taking a piecemeal approach to planning for its use. At that time, the Mint was considering renting a computer to process only numismatic orders. We recommended a more comprehensive approach that will consider the Mint's entire data processing needs, including a centralized accounting system.

The Mint has not substantially changed its approach to ADP. For example, in 1971 the Mint renewed its efforts to acquire its present computer but justified it on the basis of only one application, NUCOS. Nearly 3 years later, the computer is still basically a one-application machine.

During our audit, only one other application--a payroll system--was being tested for implementation. The Mint did not conduct a formal cost-benefit analysis to justify implementing this system; however, according to the Assistant Secretary of the Treasury, the Mint had informally estimated a savings of 4 staff-years. In addition, we found that little consideration had been given to the interrelated needs of other applications being considered for automation. For example, payroll, cost accounting, and production management applications could have and probably will have some data which is needed by each application.

At various times during our review, we discussed with Mint and Treasury officials the need for more comprehensive planning for use of the Mint's computer. In a July 30, 1974, letter, the Treasury told us that it had recently approved the Mint's plan for automating more applications. The plan, however, included a cost-benefit study for only one more project--a project to convert various functions processed on electronic accounting machines. Other potential applications

were also included in the plan, but these were simply listed by generic name without general system descriptions, data specifications, or supporting cost studies. According to Treasury officials, the Mint does not need additional Treasury approval to proceed with designing and developing these other potential applications.

CONCLUSIONS

An overall evaluation of ADP requirements is essential to the sound management of expensive data processing resources. Before adding other applications, the Mint needs to evaluate its total ADP requirements to determine whether the size and capabilities of the IBM 370/155 are more, less, or adequate for its future information processing needs. A total assessment, supported by cost-benefit justifications for each application, is also needed so that the Mint can concentrate its efforts on developing and implementing applications that will provide the earliest maximum benefits.

We believe that a master plan for the future use of the computer will help the Mint evaluate its overall ADP requirements and plan for an orderly implementation of other computer applications. At a minimum, a master plan should include

--the objectives of each proposed application;

--a justification for each application supported by a cost-benefit analysis;

--a definition of each application's data processing requirements, including the extent to which it must interface with other applications; and

--a priority, time-phased schedule for developing and implementing all applications.

RECOMMENDATION

We recommend that the Secretary of the Treasury direct the Mint to prepare a master plan for developing and implementing additional applications to be processed on the computer system and to submit it to Treasury officials for approval before other applications are added.

AGENCY COMMENTS

The Assistant Secretary of the Treasury agreed in principle with our recommendation and told us that the Mint is developing an ADP master plan. A draft plan originally prepared in May 1974 is being updated to include the four minimum requirements discussed above.

CHAPTER 4

ELIMINATING DUPLICATE RECORDS TO RESULT IN SAVINGS

The Mint's computerized file of customer mailing addresses contains duplicate records which, if eliminated, could save the Mint about $200,000 annually in mailing and related supply costs.

DUPLICATES CAUSED BY LACK OF A STANDARD FORMAT

On the basis of our analysis of a random sample of the 2.8 million records on the computer master file, we estimate that about 8 percent, or 224,000, of the active records are duplicates. Most of the duplicate records exist because a standard name and address format was not used when the master file was created. Before NUCOS, customer name and address information for each coin program was kept in separate computerized files. When these files were merged to create the master file, the computer could not recognize many of the records as duplicates because the name and address formats for each file differed.

The duplicate records have the following characteristics:

--Minor variations in names.

Examples:

R. Silver
RR Silver

MD McWilliams
MD Mc Williams

--Minor variations in addresses.

Examples:

P.O. Box 306
POB 306

2246 BROOKSIDE AVE.
2246 BROOSIDE AVE.

2 OAK COURT
2 OAK CT.

The Mint has not taken steps directed specifically at identifying and removing these duplicates since implementing

NUCOS. Instead, the Mint generally relies on its customers to request that duplicate mail-order forms not be sent. According to the Mint, some duplicates are also identified and removed when the United States Postal Service returns undeliverable mail.

The master file contains 2.8 million records and is used to prepare mail-order forms each time a new coin or medal is offered for sale to the public. The file was used eight times in 1974. Assuming that new offerings will continue at this rate, about 1.8 million duplicate order cards are mailed at an annual cost of about $200,000 for postage and supplies. This estimate does not include the costs of computer processing and clerical personnel.

On March 15, 1974, we suggested to the Mint that these duplicates be eliminated. In its reply of April 26, 1974, the Mint agreed to study ways to eliminate the duplicates but expressed concern that the cost might exceed the resulting savings. According to one data center official, however, these duplicates could be eliminated at a cost of less than $10,000 by using modern programing techniques.

LACK OF ORDER LIMITATION ENFORCEMENT ENCOURAGES DUPLICATION

Some coin collectors are listed on the file several times with identical last names and addresses but with different initials. These appear to be duplicates which allow collectors to purchase more coins than allowed under the Mint's current coin limitation policy. For example, one individual paid for 245 identical coin sets ordered under 49 variations of his name and address. The Mint's policy limits each person to only five coin sets.

We found 24 other persons listed in the file 10 or more times; 1 was in the file 143 times. Several of these persons have ordered many more coins than the policy permits.

The Mint established the policy to insure each person an adequate opportunity to receive a fair share of the coins and medals produced. These duplicates, however, defeat the policy's intent. On March 15, 1974, we told the Mint that this type of apparent duplication existed and asked its views on the need to enforce the policy.

The Director of the Mint replied that the Mint was aware some customers were using this method to acquire more coins than permitted but that it was not the Mint's policy to monitor its customers. The Director also said that the cost to enforce the policy "would appear to serve no benefit to the public."

The Mint's reluctance to enforce its marketing policy raised a question about the need for the policy and its ultimate effectiveness. We suggested that cost and related benefits of the limitation policy be reexamined. In his December 19, 1974, letter, the Assistant Secretary stated:

> "There is a definite need for an order limitation policy. The Mint's policy of one order per customer and five sets per order insures wide distribution of the limited number of special coins and medals that can be produced. Before this policy came into effect in 1970, the Mint had several experiences where a few large buyers who got their orders in early bought all sets available and thousands of smaller buyers had their orders returned to them unfilled. In their report of March 22, 1965, the House Committee on Government Operations requested the Mint to adopt policies and procedures which would help ensure the widest possible distribution of the limited number of special coin sets and avoid turning away thousands of small customers. The House Subcommittee on Consumer Affairs concurred with this policy in 1969. Since the institution of the order limitation the Mint has been able to fill all orders received. The NUCOS system was also designed to re-allocate coins sets, if over-subscription occurs, so that no one would be turned away completely."

CONCLUSION

The Mint's concern about the cost to eliminate the duplicates caused by the lack of a format standard appears to be unfounded. Even if the actual cost to eliminate these duplicates is higher than the data center official's estimate of $10,000, it is nonetheless a one-time cost that would ultimately be offset by the potential recurring savings of $200,000 a year.

RECOMMENDATION

We recommend that, to avoid unnecessary mailing and related supply costs, the Secretary of the Treasury require the Mint to eliminate duplicate records from the master file.

AGENCY COMMENTS

In his December 19, 1974, letter, the Assistant Secretary of the Treasury said that the Mint is aware that some duplication exists but questions that it is as high as

224,000 records. Nonetheless, the Mint has established the following three-step plan to eliminate duplicate records.

1. Purchase a computer program to standardize the records in the master file.

2. Include a special message card and envelope in one of its mailings which will ask the customer to put any duplicate cards received in the special envelope and return them.

3. In July 1975, drop all names on the file which have not been active for the past 2 years.

We believe that the full implementation of this plan will effectively eliminate the duplicates. We plan to follow up on these proposed actions to determine the results achieved and to reassess the impact on the need to enforce the order limitation policy.

CHAPTER 5

INTERNAL AUDIT NEEDS TO REVIEW ADP ACTIVITIES

Several internal control weaknesses requiring modifications to NUCOS were not discovered until after the system became operational. In addition, the operating controls for managing the computer center were not independently reviewed to insure that the controls were carried out properly and that they remain effective.

Internal auditors in Federal agencies are responsible for reviewing the adequacy of internal controls for management, but the Mint's auditors had not reviewed the internal controls in NUCOS or the computer center. During our audit, they did not have an approved plan for auditing the Mint's data processing activities.

INTERNAL AUDIT RESPONSIBILITIES IN DATA PROCESSING

In 1957, 1968, and 1974 we issued guidelines to Federal agencies for developing internal audit organizations and procedures. We stated in those guidelines that internal auditing should extend to all agency activities and related management controls. In the specific area of data processing, the internal auditor should evaluate the adequacy of controls during the design, development, and test of ADP systems to help avoid costly changes after a system has been installed. Also the auditor should continuously evaluate computer operations to determine whether an effective and reliable system is functioning.

NUCOS INTERNAL CONTROLS NOT REVIEWED BY INTERNAL AUDITORS

A contractor developed the design specifications for NUCOS and submitted them to the Mint for approval. After data processing personnel reviewed and approved the specifications, the contractor was authorized to proceed with the NUCOS development. The internal auditors, however, did not review the specifications to determine whether adequate internal controls were specified for NUCOS.

On June 30, 1973, the Mint released the contractor and soon began operating NUCOS. By October the Mint had identified 30 general areas for potential system enhancement; 10 related to weaknesses in financial and management controls, such as

--reconciling cash received to the dollar value of coin orders recorded in NUCOS,

--preventing multiple shipments on a single order,

--preventing the shipment of coins after a customer has canceled an order and a refund has been made, and

--providing a complete audit trail showing an order's status from initial receipt through shipment.

The Mint later recognized that the system needed major modifications and established a NUCOS review committee to identify and implement needed improvements. Although named as committee members, the internal auditors have not participated.

COMPUTER CENTER OPERATING CONTROLS NOT REVIEWED BY INTERNAL AUDITORS

During our review we noted that the operating controls for managing the computer center appeared adequate. For example, procedures were adequate to

--restrict access to the computer room by unauthorized people;

--protect and retain critical files and programs;

--insure that all scheduled jobs were processed to completion, or otherwise accounted for; and

--record and account for all uses of the computer.

These procedures were generally being followed, with a few minor exceptions. These exceptions were discussed with the chief of the data center who promised immediate corrective action.

Although these control procedures were generally followed at the time of our review, the internal auditors had not reviewed them. Internal auditors' periodic reviews of these procedures are necessary to insure management that the procedures have been properly implemented and that they remain effective.

FUTURE INTERNAL AUDIT PLANS FOR ADP

During the period that the computer was being installed and made operational, the Internal Audit Staff underwent major reorganization, staffing, and decentralization changes. A resident audit office in San Francisco is now responsible for reviewing all Mint activities in the area, including the computer center. During our review, however, the internal

auditors did not have an approved ADP audit plan for reviewing the controls in the data center, NUCOS, or any other applications being considered for computer processing.

CONCLUSIONS

Since automatic data processing is an integral part of the Mint's $50 million numismatic program, the internal auditors should include these activities in the scope of their future work. Internal auditors, with their training and experience, can be a great help to management in evaluating and instituting controls in and around the computer.

Many of the internal control weaknesses found in NUCOS could have been detected earlier if the internal auditors had actively monitored the NUCOS design, development, and operation. Similarly, management would have greater assurance that the computer center procedural controls would remain effective if the internal auditors had periodically reviewed the operations of the center.

RECOMMENDATIONS

We recommend that, to help insure that an effective system of internal control is established and implemented, the Secretary of the Treasury require the Mint's internal auditors to undertake a comprehensive program for auditing data processing activities. As part of this program, the internal auditors should

--evaluate the adequacy of internal controls during the design, test, and operation of applications and

--periodically evaluate the management and operation of the data center.

AGENCY COMMENTS

The Assistant Secretary of the Treasury agreed in principle with our recommendation, told us that the internal auditors are now engaged in audits of the data center, and, as new applications are considered for automation, will perform the recommended evaluations.

The Assistant Secretary pointed out that the Internal Audit Staff began as early as February 1974 to prepare an audit schedule which included specific coverage of NUCOS and ADP activities. This schedule was formally approved with the adoption of a long-range audit plan in July 1974. We were told that, as of October 15, 1974, three audits were completed and that reports were being drafted.

We believe that adoption of the Treasury-approved audit plan and the Assistant Secretary's assurance that the recommended evaluations will be made are the necessary first steps in implementing a comprehensive program for auditing the Mint's data processing activities. The three audits appear to cover some of the recommended areas and should provide the auditors with a basic level of experience from which to build an effective ADP auditing organization.

THE DEPARTMENT OF THE TREASURY
WASHINGTON, D.C. 20220

ASSISTANT SECRETARY

DEC 19 1974

Dear Mr. Scantlebury:

This is in response to your request for comments on the draft report titled "Opportunities for Improving Computer Utilization in the Bureau of the Mint (B)". We agree in principle with most of the report recommendations. These matters are not new to us and represent problems that the Mint was correcting during the audit.

Our detailed comments on the report are attached.

Sincerely,

David R. Macdonald
Assistant Secretary
(Enforcement, Operations,
and Tariff Affairs)

Mr. D.L. Scantlebury, Director
Financial and General
Management Studies Division
United States General Accounting Office
Washington, D. C. 20548

APPENDIX I

RESPONSE TO GENERAL ACCOUNTING OFFICE DRAFT REPORT
ON OPPORTUNITIES FOR IMPROVING
COMPUTER UTILIZATION IN THE
BUREAU OF THE MINT

RECOMMENDATION

THAT THE SECRETARY OF THE TREASURY DIRECT THE BUREAU OF THE MINT TO CONTINUE MAKING EXCESS COMPUTER CAPACITY AVAILABLE TO OTHER GOVERNMENT AGENICES THROUGH THE FEDERAL ADP SHARING PROGRAM.

Comments

The current and planned customs workload will use a significant portion of this capacity. Several new applications are being processed on the system in addition to the Customs Service work. The Departmental Integrated Personal Services (DIPS) system is currently on line, and all of the San Francisco functions previously on EAM equipment have been converted to the computer. By letter dated February 21, 1974, the Mint informed the General Accounting Office (GAO) that it has always been its intention to provide computer service to other Government agencies unless it interfered with its own applications. The Mint has received six requests from other agencies for computer time. However, the Mint can accommodate only three of these requests with present equipment and software. The remaining three would require additional resources such as hardware and/or software.

The draft makes no mention of the Bicentennial Coin program, which is of particular interest to the discussion of capacity. The Mint's projections indicate that the capacity required for this program may exceed that needed for all other Mint programs combined. Congress and the public expect this project to be conducted in an orderly and timely manner. Therefore, we are fortunate to be in a position to meet this responsibility. A significant portion of "unused capacity" will be absorbed by NUCOS in processing these orders.

An additional point needs to be made about the excess computer capacity. The capacity came essentially as a by-product of the purchase of the typical general purpose computer that was large enough to meet the requirements established for the NUCOS program. That is, the requirement stated that a large data base must be readily accessible for order inquiry and order processing. The currently available general purpose computers that meet this requirement also have inherent in their design the ability to process data very rapidly. The Mint did not specifically

require this high speed, but was unable to acquire the data base handling capability without the speed. As a result, the computer that was acquired is capable of processing additional data at the same time that it is handling other applications.

RECOMMENDATION

THAT THE SECRETARY OF THE TREASURY DIRECT THE BUREAU OF THE MINT TO PREPARE A MASTER PLAN FOR DEVELOPING AND IMPLEMENTING ADDITIONAL APPLICATIONS TO BE PROCESSED ON THE COMPUTER SYSTEM AND SUBMIT IT TO APPROPRIATE DEPARTMENT OF TREASURY OFFICIALS FOR APPROVAL.

Comments

The Mint is developing an ADP Master Plan and is doing detailed resource estimation and cost-benefit analyses. The first draft plan was prepared in May, 1974. This is being updated and improved in keeping with the four minimum requirements listed on page 17 of the draft report.

With respect to the draft report's comment on page 16 concerning the lack of a cost-benefit analysis to justify implementing a payroll system, we would like to point out that while the Mint did not conduct a formal cost-benefit analysis prior to implementing DIPS, it did perform an informal study and a savings of four man-years was determined.

On page 14 of the draft report, GAO states that the Mint selected a larger computer system than it could effectively use. It should be noted that, in sizing the computer, the Mint had to exercise its own judgment in projecting the future NUCOS workload. It appears that present requirements plus the Bicentennial Coin program have, in fact, validated the NUCOS workload projection. Copies of the Request for Proposals, translating the NUCOS systems requirements into hardware systems specifications and of responses to the vendors' questions on the subject were provided to the GAO auditors.

RECOMMENDATION

THAT THE SECRETARY OF THE TREASURY DIRECT THE BUREAU OF THE MINT TO REMOVE DUPLICATE CUSTOMER NAMES AND ADDRESSES FROM THE MASTER FILE AND RE-EVALUATE THE NEED FOR THE ORDER LIMITATION POLICY ON NUMISMATIC PRODUCTS.

Comments

The Mint does not fully agree with this recommendation because it has found that there are many families of collectors who do live at the same address, and many will have the same initials; therefore, all of the duplications of this type cannot be considered redundancies in the file.

If the GAO estimate is based solely on apparent duplications of the names, we cannot agree with the conclusion in the report (page 18) that an estimated 224,000 active records are duplicates. The Mint, of course, is aware that some duplication exists and is continuing its efforts to remove them from the file.

In addition to the continuing purification process described in the Director of the Mint letter to GAO, dated April 24, 1974, the Mint has a three-step plan to eliminate duplicates on the customer file. The first element is to purchase a program and standardize file listings. Secondly, the Mint will include a special message card and envelope in one of its mailings which will ask the customer to put any duplicate cards received in the special envelope and return them. Finally, in July 1975, when two full cycles of programs have been completed, the Mint will drop all names on the file which have not been active for the two-year period. Although this has been planned since the initial development of the system, July 1975 will be the first time it can be done, as the Mint's computer files do not go back beyond July 1973.

There is a definite need for an order limitation policy. The Mint's policy of one order per customer and five sets per order insures wide distribution of the limited number of special coins and medals that can be produced. Before this policy came into effect in 1970, the Mint had several experiences where a few large buyers who got their orders in early bought all sets available and thousands of smaller buyers had their orders returned to them unfilled. In their report of March 22, 1965, the House Committee on Government Operations requested the Mint to adopt policies and procedures which would help ensure the widest possible distribution of the limited number of special coin sets and avoid turning away thousands of small customers. The House Subcommittee on Consumer Affairs concurred with this policy in 1969. Since the institution of the order limitation the Mint has been able to fill all orders received. The NUCOS system was also designed to re-allocate coins sets, if over-subscription occurs, so that no one would be turned away completely.

RECOMMENDATION

THAT THE SECRETARY OF THE TREASURY DIRECT THE BUREAU OF THE MINT TO REQUIRE THE INTERNAL AUDITORS TO EVALUATE THE ADEQUACY OF INTERNAL CONTROLS DURING THE DESIGN, TEST, AND OPERATION OF APPLICATIONS, AND TO PERIODICALLY EVALUATE THE MANAGEMENT AND OPERATION OF THE DATA CENTER.

Comments

The internal auditors are currently engaged in audits at the data center

and, as new applications are considered for automation, will perform the recommended evaluations.

The draft report describes at length what the internal auditors did not do with respect to automatic data processing activities. It should also note, as the GAO auditors were well aware, that the Mint's Internal Audit Staff underwent major reorganization, staffing, and decentralization changes during the period that the computer was being installed and made operational.

The report incorrectly states on page 24 that, at the end of the GAO review in August 1974, the auditors had not developed on ADP audit plan for reviewing the controls in the data center, the NUCOS system, or any other applications being considered for processing on the computer. In fact, the Internal Audit Staff began as early as February 1974 to prepare a sound audit schedule which included specific coverage of the NUCOS system and ADP activities. This was formalized with the adoption of a long-range audit plan in July 1974.

As of October 15, 1974, the following audits were completed and draft reports were in process:

NUCOS	-	Undelivered Coin/Sets
NUCOS	-	Receipts and Deposits
DIPS	-	Implementation at San Francisco

In the NUCOS Undelivered Coin/Sets audit, ADP assistance was requested by the San Francisco resident auditors and a thorough evaluation of the status of the returned coin set inventory files at the San Francisco Assay Office and the Old Mint was made.

The NUCOS Receipts and Deposits audit identified significant procedural deficiencies in the deposit and accountability of NUCOS receipts. Specific recommendations were made for increased internal controls through a computer analysis of receipts and deposits versus shipments on each coin cycle.

The DIPS Implementation audit dealt specifically with ADP systems problems. The internal auditor's recommendations resulted in a significant revision of the DIPS implementation schedule.

A review of ADP/NUCOS control functions is underway and an automated sampling program is under discussion with data center personnel and is planned for implementation as soon as practicable. This application will provide the audit trail mentioned on page 4 of the draft report.

In addition, members of the Internal Audit Staff are increasingly enhancing their knowledge of ADP audit techniques through attendance at a variety of ADP Audit classes conducted by the Civil Service Commission and IBM. Knowledge gained through these courses is being applied by the utilization of specific ADP audit techniques. Planned continuous training in this area will further increase the effectiveness of audit coverage.

SUMMARY

GAO has discussed in detail four areas of primary concern:

1. Excess capacity
2. ADP master planning
3. Duplicate records in data base
4. Internal Audit of the ADP facility.

These areas are being aggressively and productively addressed at this time. They will continue to be subjects of Management review and improvement.

The primary purpose of this facility is to process the NUCOS application. This service to the public has been both prompt and accurate. It has also generated significant revenue for the General Fund of the United States Treasury. In addition, the Mint is in a position to respond positively to the demands of the Bicentennial Coin program.

Although Treasury is certainly proud of these achievements, we acknowledge a responsibility for continuing improvements. We sincerely believe the Mint's plans and programs will yield positive results.

ANALYSIS OF COMPUTER UTILIZATION AT THE BUREAU OF THE MINT

Modern computers, such as the IBM 370/155, can process several jobs concurrently (multiprograming) which introduces a new complexity into the analysis of computer utilization. A meaningful analysis must consider the number of jobs which can be processed at one time.

Multiprograming at the Mint

Consultants helped us determine the concurrent job processing capacity (multiprograming factor) of the Mint's computer. On the basis of the entire configuration of the Mint's 370/155 and the typical job performed, they estimated that the computer was capable of processing an average of five jobs concurrently. If more jobs were processed at a time, a decrease or degradation in performance of the system could be expected.

Analysis of practical capacity

Assuming that five jobs can be processed concurrently, 1 hour would represent 5 potential job-stream hours. Therefore, the total workload capacity of the Mint's computer would be 840 job-stream hours a week (five jobs concurrently x 24 hours a day x 7 days a week).

The entire capacity, however, is not available for production. Time on any computer must be reserved for emergencies such as extended downtime or abnormal reruns. If a data center does not reserve time for these events, their occurrence can seriously disrupt the production schedule.

Our consultants estimate that the Mint should reserve, at most, 24 hours (120 job-stream hours) each week for emergencies. Therefore, the practical capacity is 720 job-stream hours a week.

	Job-stream hours a week
Total job capacity	840
Less emergency time (five jobs concurrently x 24 hours a week)	120
Practical capacity	720

Available productive capacity

Not all practical capacity is available for production work. Some of it will be consumed as overload. Overload represents a normal level of reruns, failures, downtime, unavoidable idle time, and scheduled maintenance of the hardware and supporting operating system software. Using the Mint's statistics and assuming a 24-hour-a-day operation, we estimate that about 110 job-stream hours a week are not available for production.

		Job-stream hours a week
Practical capacity		720
Less provision for overload:		
Downtime	38	
Reruns and failures	9	
Unavoidable idle and other lost time	18	
Scheduled maintenance	45	110
Available productive capacity		610

Available productive capacity used

According to Mint officials, February 1974 was a representative period of active processing. We reviewed computer use during this month and found that 208 job-stream hours were used for production, testing, and other runs, excluding GAO tests. Therefore, computer capacity of 402 job-stream hours a week was not used.

		Job-stream hours	Percent
Available productive capacity		610	100
Less:			
Production (excluding GAO test time)	104		
Testing	72		
Other	32	208	34
Productive capacity unused		402	66

On the basis of this analysis, the Mint could process about three times as much work on the 370/155.

PRINCIPAL OFFICIALS RESPONSIBLE FOR ACTIVITIES DISCUSSED IN THIS REPORT

	Tenure of office			
	From		To	
SECRETARY OF THE TREASURY:				
William E. Simon	May	1974	Present	
George P. Schultz	June	1972	May	1974
John B. Connally	Feb.	1971	June	1972
David M. Kennedy	Jan.	1969	Feb.	1971
Joseph W. Barr	Dec.	1968	Jan.	1969
Henry H. Fowler	Apr.	1965	Dec.	1968
DIRECTOR, BUREAU OF THE MINT:				
Mary Brooks	Sept.	1969	Present	
Eva Adams	Oct.	1961	Aug.	1969

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