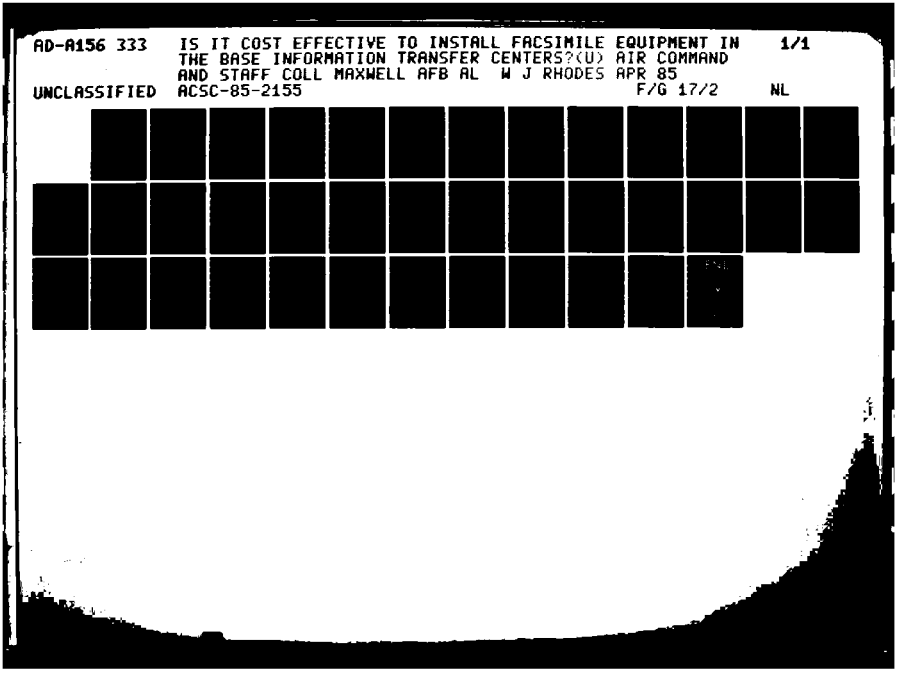
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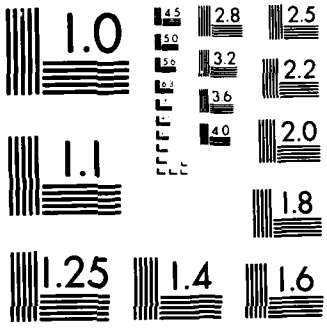

AIR COMMAND AND STAFF COLLEGE

STUDENT REPORT

MAJOR WILLARD JON RHODES

REPORT # 85-2155

"insights into tomorrow"

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REPORT NUMBER 85-2155

TITLE IS IT COST EFFECTIVE TO INSTALL FACSIMILE EQUIPMENT IN THE BASE INFORMATION TRANSFER CENTERS?

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For years, administrative managers have been dealing with ever increasing official mail costs. The rise in postal rates 17 Feb 85 will undoubtedly make the problem even more difficult. Technological improvements in facsimile equipment in recent years may help to offset some of these postal costs, particularly those involving USPS express mail. This study examines the base Information Transfer System (BITS) within Air University to determine the feasibility of using such equipment to reduce express mail costs. It concludes that the concept has potential for improved service and reduced postal expenditures; however, because of the relatively low demand for mailing time-sensitive documents in the Command, it would not be cost effective to employ this concept in Air University at this time.

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PREFACE

Administration managers at all levels of command. have been contending with rising official mail costs for a n ber of years. The increased postal rates on 17 Feb 85 only added to the problem. As a result, some managers are seeking new ways to control these costs.

Headquarters AFLC turned to improved equipment technology as a means of not only reducing their postal costs, but improving their services as well. In 1980, they placed facsimile equipment in their Base Information Transfer Centers (BITC) in an attempt to offset the costs of mailing time-sensitive documents. This paper examines this concept with a view to applying it to the operations of the BITC in Air University.

ABOUT THE AUTHOR

Major Rhodes enlisted in the Air Force in 1962. He received his bachelors degree from the University of Nebraska at Omaha in 1971. Receiving his commission through OTS later that year, he went on to serve in a variety of administrative assignments at different levels of command. Major Rhodes was a headquarters squadron commander at both base and command level. He also served as a MAJCOM administration division chief and an executive officer at a numbered air force. Along the way, he completed SOS by correspondence and ACSC by seminar. Major Rhodes earned his masters degree in public administration from the University of Alaska, Anchorage in 1978. His last assignment was with AFROTC at the University of Pittsburgh where he served as an assistant professor of aerospace studies.

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Part of our College mission is distribution of the students' problem solving products to DoD sponsors and other interested agencies to enhance insight into contemporary, defense related issues. While the College has accepted this product as meeting academic requirements for graduation, the views and opinions expressed or implied are solely those of the author and should not be construed as carrying official sanction.

"insights into tomorrow"

REPORT NUMBER 85-2155

AUTHOR(S) MAJOR WILLARD J. RHODES, USAF

TITLE IS IT COST EFFECTIVE TO INSTALL FACSIMILE EQUIPMENT IN BASE INFORMATION TRANSFER CENTERS?

I. Purpose: To determine the feasibility of installing facsimile equipment in the Air University Base Information Transfer Centers (BITC) as a means of reducing official mail costs.

II. Problem: Official mail costs have been increasing for years. One way of reducing at least part of these expenses is by focusing on the costs associated with overnight delivery service as offered by USPS through their express mail. State-of-the-art facsimile equipment now offers the potential of providing rapid transmission of time-sensitive documents at a cost that is competitive with USPS.

III. Data: HQ AFLC has turned to extensive use of facsimile devices through a concept they have termed "facsimile electro mail," locating their facsimile devices in their BITC, they have established a BITC-to-BITC facsimile network with other bases. This paper investigated the possibility of reducing express mail costs by employing this concept in Air University. At one time, facsimile equipment was too slow to compete with other means of information transfer. Older equipment took six minutes or more to process one piece of paper. However, the equipment now available will transmit the same information in less than a minute. Whether it would be practical to use these machines in the BITC required an examination of the present operation, and an evaluation of some of the costs associated with facsimile equipment. It also required an investigation into the requirements of the base organizations. Prior to undertaking the

research, it was assumed that only costs directly applicable to the study should be included. Fixed costs such as facilities, equipment presently in place, and vehicle operations were not considered pertinent since they exist regardless of the installation of facsimile equipment. It was also assumed that there will be a continuing need for transferring paper copies through the BITC, at least for the immediate future. Finally, it was assumed that the BITC would continue to function in much the same manner in the forseeable future as it does today.

IV. Recommendations: Air University should not lease additonal facsimile equipment for installation in the BITC. While there is a potential of reducing some of the costs of express mail, there is insufficient utilization of other base common-user devices to justify this additional expense. It would be better to place additional emphasis on publicizing the location of the common-user machines which are now in place. Finally, the use of these devices should be closely monitored with a view to relocating or eliminating equipment which is underutilized.

V. Conclusions: The use of facsimile equipment in the BITC has the potential for increased service while reducing some postage costs. This study identified a potential savings of 38 percent in express mail expenses. However, to be cost effective, there has to be a sufficient volume of time-sensitive material to justify the costs of the equipment and the personnel who operate the machines. The concept employed by AFLC may be effective in other commands, but is not really needed within Air University at this time.

Chapter One

INTRODUCTION

In the Air Force, the transfer of written communications is one of the functions of administration. The Base Chief of Administration is tasked to evaluate new systems which will insure administrative communications are processed between organizations in a timely and efficient manner. (12:1) Implied in this responsibility is the requirement to insure the system provides for the expeditious flow of written communications between the originator and the addressee. Within the Air Force, this service is provided through the Base Information Transfer System (BITS).

The BITS is a labor-intensive process that is sometimes too slow to respond to the requirements of the organizations it serves. As a result, some organizations turn to other means of getting their communications to their destination when time is at a premium. Consequently, they employ overnight delivery services such as USPS express mail to insure the material gets to its destination when needed. However, at $9.35 for an overnight letter, this can be one of the more expensive alternatives to Air Force administrators. (5:53) Another possibility involves the use of facsimile equipment as a means of transferring information between bases.

The purpose of this paper was to determine the feasibility of using facsimile equipment in Base Information Transfer Centers (BITC) as a means of improving service. Using the BITC in Air University as the focus of this study, it was also an intent to identify potential savings, if any, through the use of this equipment. While researching this project, it was learned that this concept has already been employed by Air Force Logistics Command (AFLC) through a system they have termed "facsimile electro mail." (3:2) Therefore, it became an additional purpose of this paper to determine if the procedures and techniques used by AFLC have any applicability to the BITC in Air University.

METHODOLOGY

The research on this project began with an examination of the present system. Using AFR 182-2 as a reference point, this publication was reviewed to determine how administrative communications are required to be processed between Air Force organizations.

Next, an attempt was made to determine some of the pertinent costs associated with the present system. Using quarterly postage expenditure reports, the expenses for all classes of mail over the last three years were collected to identify trends, and areas of potential application for facsimile devices. This data was then used to focus on the extent that express mail is being used by base organizations throughout the Command.

Following the identification of postage costs, it was realized that the available data was inadequate to determine the extent that facsimile service was needed in the Command. Using facsimile logs on file with the 1973 Communications Squadron, the data was reviewed to identify how much facsimile machines are presently being used throughout Air University, the location of the equipment and the volume of traffic processed over the devices. However, after this information was collected, the available data was still believed to be inadequate to verify if there was an additional need which was not being met with the available equipment. Consequently, a survey was conducted of base organizations in an attempt to measure any additional requirements for facsimile equipment.

To ascertain the effectiveness of facsimile service in a base distribution system, a visit was made of AFLC headquarters. This enabled direct observation of their operation. The information collected during this visit helped in the assessment of the effectiveness of using facsimile equipment in a base distribution center.

ASSUMPTIONS

Before this study was begun, it was necessary to make certain assumptions about the role of base distribution in transferring information in the future. Although there have been a number of technological developments in the area of information transfer, it will probably be awhile before the paperless office in the Air Force is the rule rather than the exception.

When determining the overall costs of the operation of the base information transfer system, only those costs that were directly applicable to the study were included. The costs of the

facilities, equipment and vehicle operation were not considered germane to the installation and operation of facsimile machines, since they are relatively fixed costs that would exist regardless of the use of this equipment.

Finally, it was assumed that the present operation of the BITC would remain approximately the same in the near future. Assigned personnel will continue to operate in accordance with procedures specified in AFR 182-2; and there are no known or anticipated changes which will alter the way official mail is processed through the BITS.

Now that the reason for this study has been addressed, as well as the methodology used and some of the assumptions, it is appropriate to explain the overall operation of the BITS. The next chapter discusses some of the responsibilities and procedures followed by the base distribution centers in Air University.

Chapter Two

DISTRIBUTION OF OFFICIAL MAIL IN AIR UNIVERSITY

Within the Command, overall management of official mail is the responsibility of the Air University Director of Administration (AU/DA). In this capacity, the AU/DA provides functional guidance to the Chiefs of Base Administration at the two installations assigned to the Command: Maxwell AFB and Gunter AFS. Both bases are located in Montgomery, Alabama.

The Base DAs are responsible for the distribution of administrative communications on their installations. They are required to establish necessary procedures to implement policies contained in applicable directives. (12:3) In the case of the distribution of official mail, they follow the procedures specified in AFR 182-2.

This regulation is considered the bible for operations dealing with the processing of official mail. Among other subjects, it discusses the establishment of a BITS to process inter and intra-base communications. (14:35-38) At the same time, BITS managers are given the latitude to use mechanical and electronic means to carry out this responsibility. (14:35) For example, most of us are familiar with the mobile distribution system. Both Maxwell AFB and Gunter AFS use these vehicles to pick up, sort while en route, and deliver administrative communications among base organizations. Other bases could use different means of delivering official mail, including pneumatic tubes, facsimile equipment, direct pick up/delivery from the BITC by base organizations.

BASE INFORMATION TRANSFER CENTERS

The focal point for the BITS is the base information transfer center (BITC). This facility houses the equipment and personnel who process the official mail as it arrives or leaves the base. To a certain extent, the BITC serves the same function as the Post Office. In fact, to maximize the use of their resources, BITC managers are encouraged to collocate their operations with

their servicing USPS facilities. (14:38) Within Air University, the two BITC operations are located in the same buildings as the base post offices.

To assist their base customers in planning their receipt and dispatch of administrative communications, the BITC managers at both locations publish an information transfer schedule. This schedule reflects cut-off time for acceptance of official mail from the distribution offices around the base. (14:38)

One particularly valuable service provided by the BITC concerns transit time data. The BITC maintains records of transit times, and provides these data to base customers. (14:38) With this information available, managers can better decide the methods of mailing their official correspondence. Based on the time sensitivity of the document, they can decide if ordinary first class mail is sufficient, or whether another method is more appropriate. Alternate means include the telephone, electrical message, express mail, or telefax service. In some instances, TDY may be considered as a necessary method of getting the document to its destination in time. Thus, the transit time data collected by the BITC helps the manager to make the appropriate decision regarding transmission of the document before it leaves the activity distribution office.

ACTIVITY DISTRIBUTION OFFICES

As the bridge between the action office and the BITC, the activity distribution office serves as a necessary link in the base information transfer system. This function is usually a centralized office within organizations which receive and dispatch official mail. Personnel who manage these offices perform tasks similar to those accomplished in the BITC. They are required to receive, sort, and distribute incoming official communications to action offices.

They also furnish action offices with base distribution schedules, in order to facilitate the processing of communications into the BITS. This is designed to reduce the need for action offices to have to send personnel as messengers on the base. (14:41)

Now that the processing of official mail is better understood, it is time to turn to an examination of official mail costs. Beginning with a discussion of some recent Air Force experiences regarding postage expenditures, this paper will then focus on related expenses incurred by Air University.

Chapter Three

OFFICIAL MAIL COSTS

INTRODUCTION

Over the last few years, the Air Force has experienced an ever-increasing rise in its annual postage expenditures. Despite the fact that USPS has not increased its rates since November 1981, Air Force postal costs rose twenty-three percent from FY 1981 through FY 1983, as shown in the following table:

Table 1. USAF Postage Expenditures

FY	POSTAGE COSTS ($000)	AMOUNT INCREASED ($000)	PERCENT INCREASED
1981	$7,616	$641	9.2
1982	8,423	807	10.6
1983	9,367	944	11.2

Source: HQ USAF/DA

With this rise in postage expenditures, it is becoming increasingly important for Air Force managers to look to ways to utilize their resources as efficiently as possible. The increase in postage rates on 17 Feb 1985 will exacerbate the Air Force problem of controlling mailing costs. (4:1) As this study progresses, it will become apparent that technology may again be one way of offsetting these mailing costs. The following section will show how Air University postage expenses compare with the total Air Force budget for official mail.

AIR UNIVERSITY

Although AU is a major command, its size is relatively small. It has approximately 9,000 personnel permanently assigned to its two bases at Maxwell AFB and Gunter AFS. (6:C-20) Its mission is to provide professional military education through its schools which include the Air War College, Air Command and Staff College, Squadron Officer School and NCO Leadership School. The schools offer both resident and nonresident programs. Correspondence

courses are offered by the Extension Course Institute. (1:100) So it can be seen, that AU has a worldwide mission resulting in the need for a relatively high postage budget.

According to Air University's postal reports, postage costs for FY 1984 totaled $1,205,000 (rounded to the nearest $000). When compared to the overall postage costs for the Air Force the previous year, it can be seen that this represents about thirteen percent of the total Air Force expenses for mail; a significant amount considering the size of the Command. It was believed that the nature of the mission, which in many cases involved the mailing of correspondence and nonresident courses to Air Force personnel around the world, would have a large impact on these mail expenses. This appeared to be verified in the Quarterly Postage Expenditure Reports.

A review of the Quarterly Postage Expenditure Reports (AF Forms 1394) identified the following postage expenses for FY 1984: postage meters, $818,000; permit mail, $222,000; express mail, $2,000; and business reply mail, $163,000. The following table reflects the postage meter usage of the organizations within Air University:

Table 2. AU Postage Meter Expenditures, FY 1984

ORGANIZATION	POSTAGE METERS ($000)	PERCENT
3800 ABW	$340,000	42
ECI	232,000	28
AFROTC	70,000	9
CAP	58,000	7
3800 ABS	48,000	6
AF Data System Design Center	36,000	4
Other	34,000	4
	$818,000	100

Source: AF Forms 1394, Quarterly Postage Expenditure Reports, FY 1984, 3800 ABW/DAA

As expected, a significant amount of the postage meter expenses went for 3800 ABW and ECI activities. In fact, about seventy percent of the total official mail expenditures by AU in FY 1984 were from these organizations. This is undoubtedly due to the large amount of academic correspondence courses which are mailed on an annual basis. The importance of these data lies mainly in the area of identifying some of the limitations and constraints which exist when determining suitable material for transmission via electronic media. A discussion of correspondence

appropriate for telefax equipment will follow in the next chapter. First it is necessary to briefly explain about the organizational structure and personnel costs associated with the BITC operation.

ORGANIZATION AND PERSONNEL

MAXWELL

The Base Information Transfer Center at Maxwell AFB is collocated with the Base Post Office. Organizationally, the BITC is part of Administrative Communications and Postal Branch. The Administrative Orders Section, Document Security Section, Base Information Transfer Section and Postal Service Section all fall under the Chief Administrative Communications and Postal Branch who reports to the 3800 Air Base Wing Chief, Base Administration. (7:13-2)

The BITC is authorized nine personnel (three military and six civilians) as follows:

Table 3. Maxwell Base Information Transfer Center

AUTH GRADE	AUTH AFSC	DUTY TITLE
SSGT	1-70250A	NCOIC, Base Information Transfer Center
AIC	2-70230A	Mail Processing Clerk
GS-3	6-70230A	Mail Clerk

Source: 3800 ABW Manning Document

The costs of the authorized personnel are $141,783 per year. Annual and hourly personnel costs are reflected in the following table:

Table 4. Maxwell BITC Personnel Costs

GRADE	ANNUAL COSTS		
SSGT	$18,305	x 1 =	$ 18,305
AIC	13,118	x 2 =	26,236
GS-3	16,207	x 6 =	97,242
			$141,783

Source: Costs are computed according to AFR 173-13

GUNTER AFS

At Gunter AFS, the BITC also functions as part of Base Administrative Communications. (9:5) It is located in Bldg 421 along with the USPS. Organizationally it is structured similarly to the Maxwell BITC, with the NCOIC under the management of the 3800 ABS Chief of Base Administration.

The Gunter BITC is authorized five personnel (two military and three civilians). The following table reflects the authorized manning:

Table 5. Gunter Base Information Transfer Center

AUTH GRADE	AUTH AFSC	DUTY TITLE
TSgt	1-70270	NCOIC
Sgt	1-70250A	Mail Clerk
GS-3	3-70230A	Mail Clerk

Source: 3800 ABS/DAA

The costs of the authorized personnel are $85,957 annually as reflected in the following table:

Table 6. Gunter BITC Personnel

GRADE	ANNUAL COSTS		
TSgt	$21,806	x 1 =	$21,806
Sgt	15,530	x 1 =	15,530
GS-3	16,207	x 3 =	48,621
			$85,957

Source: Costs were calculated from AFR 173-13

There are other organizational costs that could be considered for a study of this nature. Facilities, telephone lines, and

additional manpower requirements are a few of these. However, these expenses were not considered pertinent because both centers would probably have sufficient manpower and equipment to accommodate facsimile equipment. According to AFLC/DAA, the facsimile electro mail system in AFLC did not result in a requirement for additional personnel. The costs of the equipment, itself, will be addressed later in this study under comparison of equipment.

For now it is appropriate to discuss other factors which should be considered when examining the feasibility of facsimile equipment in the BITC. The next chapter is designed to focus on the types of information suitable for facsimile transmission in Air University.

Chapter Four

SURVEY

In January 1985, it was determined that a survey would have to be conducted of organizations served by the BITS within the Command. The purpose of the survey was to verify any additional need for facsimile service which was not currently being met. It was theorized that some organizations may be involved in projects which would require transmission of time-sensitive documents.

SURVEY DESIGN

When the survey was developed, it was designed to be as simple as possible while addressing the basic questions which prompted it. The questionnaire explained why the survey was needed, what facsimile mail is, how it works, when the survey needed to be returned, and who to contact for information. It was limited to five questions.

The first question asked for the identification of the respondent's organization and phone number. The purpose of this question was to make a comparison of the information with available data on express mail and facsimile equipment now being used. A crosscheck of the data would facilitate validation of the information. And, if there were any questions, a phone number would help get them answered.

The second question asked if their organization would use facsimile service if it were available. A follow-up question asked for a brief explanation in case of a negative response. This question was designed to simply see which organizations require such a service. The follow-up question was purposely open ended to determine why the organization would not use the service. The anticipated response was that none of their mail is time sensitive.

If the respondents answered affirmatively to question two they continued to the third question; otherwise they were instructed to skip to question five. The third question was also open ended. It asked the individuals to list the bases or other locations their organizations would need to communicate with

using facsimile service. If there was a relationship between express mail and facsimile service, the responses to this question were expected to be approximately the same.

The fourth question was designed to determine the monthly usage of facsimile service. The respondents were asked how many pages their organizations were expected to transmit over a facsimile network on a monthly basis. The answer would help to determine the type of equipment required.

The final question dealt with overnight mail delivery service, such as express mail. The question asked if the respondents' organizations used such a service to specifically transmit any documents this past year; and if so, to indicate the number of pages per month. The answer to this question would help to serve as a crosscheck to surveys in which the individuals had indicated they did not need facsimile service and still answered that they used express mail. The answers would also help to determine the approximate number of pages that were sent out through express mail last year.

RESULTS

The survey was addressed to all organizations on Maxwell AFB and Gunter AFS. Using a categorical address element, they were distributed through the BITS at both installations to approximately 130 assigned or attached units under the functional address element of "administration." A self-addressed return envelope was provided with each survey with instructions to place it in the base distribution system upon completion of the questionnaire.

Since the survey was entirely voluntary, the number of expected responses was unknown. Nevertheless, it was hoped that a sufficient number of the questionnaires would be returned to allow an adequate evaluation. So the number of the responses were not as critical as the information contained in the questionnaires.

Of the 130 surveys distributed, 61 were returned. On the surface this would seem to represent a little less than half (46.9 percent) of the total. Actually, the percentage is somewhat more than what it seemed. An analysis of the distribution scheme used for this survey revealed a number of organizations that either would not apply because of their location or function; and second, that were in dual AU/3800 ABW positions. Examples of organizations that probably should not be included in this survey were the Federal Prison Camp and the Red Cross.

If these organizations were excluded, the number of organizations in the survey is reduced to 119. This raises the overall response rate slightly to 51 percent. However, as indicated previously, the number of responses was not as important as the information contained in them.

There were several organizations which expressed interest in a facsimile mail system in the BITC. Of the 61 responses, a little over half (52 percent) indicated their organizations would use such a service on a fairly regular basis, if it was available. The following are the survey results by major organizational categories.

The response from the AU staff was generally mixed. There were 33 surveys distributed to these organizations. Only ten were returned. However, nine of the ten indicated they would have a requirement to use facsimile mail service through the BITC. Only one indicated no. The responses from the AU staff were interesting, in view of the fact that many of these organizations already have access to a common-user facsimile device in the AU Headquarters building.

The 3800 ABW staff was generally less inclined to use such a service. Of the 47 distributed to these organizations, only twelve responded that they had a need for facsimile mail through the BITC. Sixteen responded they had no need for this service. Nineteen did not return their surveys.

There were 14 questionnaires sent out to the "AU Commanders/Commandants ." These included such activities as Air Command and Staff College (ACSC), Extension Course Institute (ECI), Air War College (AWC), and the Squadron Officer School (SOS). Of the surveys distributed to these organizations, two responded that they need such a service. Seven indicated no, while there was no response from five.

By and large, the tenant organizations on Maxwell, as a category, responded favorably to the idea of having facsimile mail service available through the BITC. The tenant organizations included activities, such as the Commissary (AFCOMS), Air Force ROTC (AFROTC), and the Community College of the Air Force (CCAF). There were 13 surveys distributed to these organizations. Of these, eight responded that they would use such a service. Two indicated no, while there were three which did not return their surveys. One, AFROTC, already has a facsimile machine.

Of the negative responses to the survey, the stated reason for not requiring such a service from the BITC, tended to vary. Approximately half indicated the nature of their operations was

the main reason they would not need to use facsimile service. About 38 percent believed ordinary first class mail satisfied their organizations' mailing requirements. A few, 13 percent, indicated they were either now using, or will use in the near future, computer-generated electronic mail to satisfy their requirements for time-sensitive mail.

Of those who responded they had a need for facsimile mail service, most indicated that they were sending time-sensitive correspondence to a relatively few locations. As expected, the two locations which receive most time-sensitive mail from AU organizations were Randolph AFB, Texas, and HQ USAF. Over 56 percent of the responses listed Randolph, and approximately 38 percent were frequently sending such mail to the Washington, D.C. area. Wright-Patterson and Kelly AFB were the next highest, receiving 13 percent and 9 percent, respectively, of such correspondence. However, there were about 16 percent of the responses which indicated they have a requirement to send time-sensitive correspondence to most of the MAJCOMs. The rest of the responses identified small requirements for bases primarily throughout the southeast area.

The volume of facsimile mail for these locations varied considerably. The respondents were asked to estimate the number of pages they would transmit over a facsimile mail network each month, if it were available. A few were not sure how many pages they would send. However, the rest listed varying amounts which ranged from a low of one to a high of 3,000 pages monthly. Approximately 86 percent of the organizations indicated they would need to send 50 pages or less per month. Four respondents believed they would have to send over 100 pages on a monthly basis.

The final survey question was designed to help in the evaluation of express mail. It asked the respondents to verify whether their organization had used this service. If they had, they were to indicate how many pages they send each month. Nineteen of the 61 (31 percent) indicated they used express mail. Approximately 63 percent were ten pages or less. This would be the category that would be ideal for facsimile equipment, assuming there are no other requirements, such as a need for original signatures. Less than sixteen percent were more than 55 pages in length, an amount that would probably be too lengthy for the equipment under study.

The survey provided a number of answers in attempting to determine the need for facsimile mail service through the BITC. The potential users, their addressees and estimated monthly usage are all important considerations when identifying support equipment. This next chapter will use some of this information when discussing the type of equipment available.

Chapter Five

FACSIMILE EQUIPMENT

BACKGROUND

The telefax machine is not a new device. In fact, it has been around for more than a hundred years. Invented in 1875 by William Sawyer (2:3), the process involves five components consisting of a scanner, an interconnecting device (modem), a means of transmission and a receiver/recorder. (3:102) The equipment is designed to send page images over telephone lines. It does this by breaking down the page into black and white spots known as picture elements. The number of spots affect the overall quality of the image. The higher the number per square inch, the better the quality. The range of spots per square inch varies from 6,000 to 160,000. (2:3)

To transmit the page, the equipment first scans the material with a beam of light at the sender's unit. As the light is reflected off the document, it is projected back onto a photocell where the image is converted to an electronic impulse. This impulse is sent over the telephone lines to a receiving station where the image is reconstructed onto a sheet of paper in a manner similar to a copying machine.

Although facsimile machines have existed for more than a century, it was only in the last twenty years that they became practical. ". . .(T)he introduction of a low-priced, plain paper, facsimile unit in 1966 . . ." contributed to the rise in utility of this information transmission medium. (2:3) One of the major drawbacks, however, was its lengthy transmission time. For one page to be sent though this equipment, it generally took about six minutes to process.

As a result, facsimile equipment developed a reputation for being a slow method of transferring information. (3:102) This is not to imply that such equipment is too slow for practical use. By comparison though, it is much slower than other communication media such as the telephone, television and computer. In fact, feedback from the survey identified some dissatisfaction with

equipment now being used in the Command because it takes too long to transmit material. One comment estimated it takes approximately one tenth of a manhour to process one page.

Today, facsimile equipment can transmit information at a much higher rate of speed. In fact, the speed of transmission is one way of categorizing facsimile machines. The slower equipment is classified as Group I. Like the facsimile units first introduced in the mid-1960s, the Group I machines transmit a page in four to six minutes. Group II devices are able to reduce the transmission time by fifty percent. These machines are capable of transmitting a page in two to three minutes. Group III equipment uses digital techniques to compress the information. As a result, these machines are capable of transmitting a page in one minute or less. (2:3)

There is some equipment available which can transmit information at even higher rates of speed. Some of these devices have the capability of sending a page of information in less than 35 seconds. Capable of transmitting worldwide, these systems are also able to operate unattended 24 hours a day. The equipment answers the phone, adjusts its speed to the sending machine and prints out the information without the need of an individual operating the equipment. (10:102)

In the future, the Department of Defense has plans to upgrade its facsimile equipment. Plans call for gradually phasing out nonsecure networks and eventually replacing them with a secure system. High-speed digital facsimile equipment is programmed for installation in Army message centers on a world-wide basis. This system will use the automatic voice network (AUTOVON), wide area telecommunications service (WATS), and direct distance dialing (DDD) as the main method transmitting and receiving the information. Later, the system will be converted to the Defense Data Network. (10:1-2)

The Air Force follows Joint Chiefs of Staff Memorandum of Policy (MOP) 151 when facsimile equipment is tied into the AUTOVON and automatic secure voice communications (AUTOSEVOCOM) systems. This memorandum distinguishes between two general types of facsimile devices: common-user and dedicated. Common-user machines are authorized by the base commander to be used by a number of activities. The devices are centrally located and listed in the facsimile directory. Dedicated machines are generally available to only one activity or organization. (10:1-4)

Depending on the type of equipment, common-user or dedicated, there are certain procedures which must be followed. Transmission time by common-user machines over the AUTOVON system is

...ted, but the highest precedence level allowed is routine. ...ever, transmission time over dedicated circuits is restricted ... continuous minutes. (13:3-16)

...e policy memorandum specifies additional requirements on ... facsimile equipment design. Whenever it is connected to ..., it's required to have an automatic disconnect ...ility. This is needed to enable the circuit to be free in ...ent there is no activity on the line after one minute. The ...irective, specifies that facsimile equipment will not be ... place of the US mail or AUTOVON unless justified by the ... of need. (10:1-3)

...h these requirements in mind, it is time to turn to a ...ion of the types of equipment available. This next section ... briefly cover the facsimile machines that meet the ...irements of the Air Force and Air University's organizations.

EQUIPMENT SELECTION

...e are certain tradeoffs associated with choosing telefax ...ment. Some considerations recommended by Auerbach are ...ment costs versus transmission time and ease of use. While ...igh-speed devices are more expensive, operator productivity ... be improved. The same holds true for other associated ...es such as automatic page feeders. These devices add to the ..., but could be offset with improved productivity through ease ... "Key considerations include the type and volume of ..., location of intended recipient, and type of equipment ... by the intended recipient." (2:3)

...e there is a wide range of facsimile equipment available, ...ing to the equipment manager in 1973 Communications ..., the Air Force has approved bulk contracts for only two ... the Rapicom 3300 and the 3M EMT 9165. Both meet the ...ts of AU organizations as identified in this study, and ... features which enhance the ease of operation and ...

...Rapicom 3300 is compatible with all Group III devices. ...ommunications with the slower speed analog units, this ... has a Group II compatibility option. It has the ...lity of receiving transmissions automatically and has an ... page feeding device with a 30-document capacity. In a ...ard transmission mode of 4800 bits per second (bps), the ...om 3300 will transmit a document in about 45 seconds. Pages ... require finer detail take about twice as long to process. ...ing to the base equipment manager, this device leases for ... month.

The 3M 9165 is compatible with all three groups of facsimile devices. This machine allows delayed transmission of up to 50 documents to five different locations. It also has an automatic answering feature in either the Group I, II, or III speeds. The machine has the capability of producing high-resolution documents in about 35 seconds. An additional feature allows transmission in 24 seconds through a special hyper-speed. The equipment manager indicated the monthly lease cost is $97.

The Air Force recognizes full compatability is not possible between facsimile machines because of differences in signalling methods which exist for handshaking, selection of speed, and unattended operations. Generally operators are able to overcome differences in compatibility, but at a cost of copy quality. (28:1) Nevertheless, both the Rapicom 3300 and 3M EMT 9165 appear to minimize these compatibility problems.

This chapter has discussed facsimile equipment in general. The type of equipment selected depends on a number of factors including user requirements, volume of usage and Air Force restrictions. An important consideration concerns any savings associated with its use. The next chapter will discuss the costs and related savings of using facsimile equipment.

Chapter Six

COST ANALYSIS

POTENTIAL SAVINGS

As indicated previously, one of the purposes of this paper was to determine if there are any savings to be derived from installing facsimile equipment in Base Information Transfer Centers. On the surface, identifying potential savings appears to be a matter that is not very complicated. One simply takes the monthly cost of the equipment and divides that by the number of pages to be processed. The figure would then yield the cost per page. However, there are more factors that should be considered besides equipment charges.

In evaluating the cost effectiveness of using facsimile equipment, it was believed necessary to include the monthly rental charges. The purchase price was not considered because of the untested nature of the concept, and the possibility that the facsimile machines would be replaced when the high-speed facsimile system tied to the Defense Data Network materializes.

Besides lease expenses, it was necessary to include the operator costs because of the time involved in starting the machine, dialing the addressee(s), and feeding the document into the equipment. The cost of the paper was considered incidental and would be a necessary, comparable expense whether regular mail or facsimile equipment was used. If there is a requirement for a telephone line, the cost of installation should also be considered as well as the cost of an additional instrument. Depending on the volume of traffic expected, any additional personnel cost should also be considered. But before it was possible to compute costs, it was necessary to establish whether or not a need existed for facsimile service.

FACSIMILE UTILIZATION

To evaluate if there was a requirement for facsimile service, it was necessary to determine the number of machines already in operation in AU. Since the Base Communications Officer manages this equipment, the 1973 Communications Squadron was contacted for this information. They indicated there are five machines operational in the Command. A common-user device was located on Maxwell AFB in the AU/Correspondence Management Distribution Branch (Building 800). Another common-user machine was located at Gunter AFS in 3800 ABS/DARP (Building 547). The three others are dedicated machines. One is in AFROTC. The other two are located at Gunter AFS. To determine the extent of the need, the facsimile logs for the first six months of 1984 were reviewed. The monthly usage of these machines are summarized in Table 7.

Table 7. Facsimile Equipment Usage - 1984

ORG	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
AU/CSA	134	101	144	135	164	132	810
AFROTC					16	66	82
DSDO	42	35	88	83	78	97	423
ASPO	17	41	41	75	50	58	282
DARP			2		29	21	52
							1649

Source: 1973 Communications Sq

The foregoing table requires some explanation. AU/CSA at first would seem to indicate the highest usage for the Command with approximately 49 percent of the total. However, an analysis of the communication logs showed AFROTC was responsible for 302 transmissions of this amount. Before AFROTC received their dedicated device in May 1984, they were a major user of the facsimile equipment in AU/CSA. This represented approximately 41 percent of their volume.

The amount of usage in DARP, a common-user device, is much lower than the others. Although this organization was without their facsimile equipment for part of the year, due to a changeover in machines, the usage is still low when the previous six months are reviewed. Between July and December 1983, DARP used their machine to transmit/receive 47 pages.

When compared with the results of the survey, there appears to be a large difference between the current usage of the Command's facsimile equipment and user requirements. The survey identified a monthly requirement of between 3,400 and 4,600 pages. However, current usage of the common-user devices, exclusive of AFROTC, ranged between 38 and 153 pages with the average at approximately 75 per month.

The time involved in processing the documents varied, depending on the location of the addressee. It has been previously estimated that it takes one tenth of a manhour to transmit a page. Assuming the operator is an AIC, the personnel costs would approximate $0.63 per page ($6.31 x 0.1).

The costs of the machine will vary depending on the volume of material processed. Assuming an average lease price of $90, the rental costs per page is approximately $2.40 ((2 x $90)/75). Thus, the costs of using facsimile equipment last year in AU over the common-user devices amounted to $3.03 per page.

If given a choice between using facsimile equipment and express mail, the decision, in a strictly monetary sense, would have been cut off at three pages or less. Since last year it cost $9.35 for the first two lbs to use express mail, a three page document would be only $9.09 ($3.03 x 3) and would have been less expensive using facsimile equipment.

Of course, there are a number of other considerations involved in choosing which medium to use. Equipment availability, compatibility and the need for original signatures are a few of the factors that influence this decision. Nevertheless, it can be seen how the cost per page of using facsimile machines is directly related to equipment usage.

Whether there would be sufficient savings from the offsetting costs of express mail is speculative. The survey identified the monthly usage of express mail by the respondents. Fifteen indicated they are using this service regularly. Eleven (approximately 73 percent) were mailing documents consisting of three pages or less on a monthly basis. The average length of the documents these eleven were sending out was 1.18 pages which equates to about 13 pages (11 x 1.18). Since these eleven documents were sent express mail, the overall cost per month was about $103 ($9.35 x 11). If they had been sent over a facsimile network, the cost would have been approximately $39 ($3.03 x 13) which is $64 less than the cost of express mail. This represents a savings of about 38 percent. Since the Command spent $2,000 in express mail last year, this would amount to $760 in reduced postal costs, or approximately $53 per month.

The savings can be even greater, considering the increase in postal rates on 17 Feb 85. Express mail charges rose from $9.35 to $10.75 the first two lbs, an increase of about 15 percent. If this is taken into consideration, using the $2000 expended last year as a base line, the expected express mail charges per year would be $2300 (.15 x $2000). Other personnel and equipment costs notwithstanding, annual savings from using telefax equipment vice express mail would approximate $874, which is about $73 per month.

It seems apparent that any potential savings to be derived from the use of facsimile equipment would be minimal, particularly if additional equipment is installed in the BITC. Leasing a machine for both base distribution centers in the Command would probably result in an improvement in service to the base customers, but would cost more than they would save. The two machines would lease for approximately $180 per month. Since the monthly savings in express mail is estimated to be about $73, the cost of the equipment would be about $1,284 per year ($180 - 73) x 12.

One factor that works against the installation of additional equipment is the present capacity of the two common-user machines. At least one other command (AFLC) is sending documents over their facsimile machines at a rate of about 190 pages per day. (15) Using an eight-hour day, this amounts to approximately a page every two and one-half minutes. Based on this estimate, the two common-user machines in the Command, collectively, are operating at approximately two percent of capacity. Therefore, these two machines should have the capability of processing the additional requirements identified in the survey.

Of course, any installation of additional machines would probably have an impact on the common-user devices. Depending on the location, capability, and ease of use, such equipment would undoubtedly be used at the expense of the presently installed machine. An obvious effect would be an increase in the cost per page of the equipment currently in place.

Having looked at the costs of the equipment and the utility of using facsimile machines, it is possible to draw some conclusions. The next chapter will discuss some of the observations that were made in the process of this study, along with appropriate recommendations.

Chapter Seven

CONCLUSIONS

OBSERVATIONS

The research into the material relating to this paper resulted in a number of observations concerning the use of facsimile equipment to transmit time-sensitive material. AFLC established their facsimile electro mail network in 1980. It ties their facilities together on a national basis. Using six 3M 9165 and two older 3M 9660 machines, their headquarters processes approximately 25,000 transmissions each month at no increase in manpower. To additionally upgrade their facsimile services, they recently expanded their system to provide the same capability for transmitting classified information. (15)

It is also apparent that the use of facsimile equipment throughout the Air Force is widespread. AFCCP 100-7 provides a directory of bases in the CONUS and overseas areas which have both common-user and dedicated facsimile machines. This equipment is located in different functional areas. The size of the directory gives an indication of the extent that these machines are being used. There are 78 pages which list Air Force organizations and the facsimile equipment being used. In the same pamphlet is a listing of the Army installations which are using facsimile equipment. Whether or not these machines are being effectively used is beyond the scope of this paper.

A review of this pamphlet, however, indicated a potential problem regarding this equipment. Many of the machines are incompatible with other devices. Therefore, it is incumbent upon potential users of facsimile equipment to determine the intended addressees of the system and the equipment in use. The value of the machines would be substantially reduced, depending on the compatibility limitations of the equipment.

Some areas in Air University have difficulty using facsimile equipment over AUTOVON lines which can result in certain problems. First, if the equipment is a dedicated circuit, transmission time is limited to eighteen continuous minutes for a total transmission time of one hour during normal business hours

on any one day. Second, facsimile transmissions over AUTOVON cannot exceed routine precedence. This, combined with transmission reliability problems, can lead to interruptions of the signal and sometimes results in line disconnects, particularly involving multi-page documents. Of course it necessitates additional operator time in reconnecting the link, and this can be a frustrating experience, particularly if it occurs too frequently. Other services such as Wide Area Telephone Service (WATS) can be more reliable, but at an increased cost, particularly if transmitting time over this circuit is extensive.

RECOMMENDATIONS

As stated in the beginning of this paper, the purpose of this study encompassed two objectives: to determine the feasibility of using facsimile equipment in the BITC as a means of improving service, and to identify potential savings, if any, associated with the use of this equipment. Other commands including TAC, AFLC and HQ USAF are using this equipment in their distribution centers. This leads to a number of recommendations.

The first recommendation is to not lease additional facsimile machines. This would not be cost effective. The survey had identified an apparent requirement for additional facsimile service, but the number of machines available should be able to meet any additional requirements for now.

The second recommendation concerns the need to place additional emphasis on publicizing the locations and availability of facsimile equipment. It may be possible to reduce the costs of express mail by educating BITC customers of the availability of the common-user machines. The study identified a potential savings of 38 percent in express mail through increased use of this equipment as an alternative means of transmitting time-sensitive information.

The final recommendation concerns the facsimile machine located in DARP at Gunter AFS. The monthly use of this device should be closely monitored. In the event that publicity does not result in an increased utilization, consideration should be given to relocating the equipment in the BITC or evaluating the need for continuing to lease the equipment.

CONCLUSION

In conclusion, this study showed that the use of facsimile machines in a BITC is feasible, but not necessarily cost effective. However, the concept as used by AFLC has several possibilities. It offers the potential of improved service at a

reduced cost. Nevertheless, the concept also has certain limitations. To be cost effective, the Command must produce a relatively large volume of time-sensitive correspondence on a monthly basis, telephone lines must be reliable, and the equipment must be able to efficiently and effectively process the material with a minimum of operator involvement. While equipment availability may satisfy the last limitation, the first two factors have not been met. Therefore, it is not considered practical to adopt the concept in the Air University BITC at this time.

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