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COPYING EQUIPMENT

A GSA HANDBOOK

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FOREWORD

The impact of document copiers on Federal operations has been substantial just as it has been in commerce and industry. At this writing there are at least 202 models of copiers available from some 37 different manufacturers or distributors. The United States Government alone has installed approximately 55 thousand machines and the yearly cost of office copying is estimated at 80 million dollars. An increasing number of cost-conscious executives are concerned about the predictions that this cost could double within the next 5 years.

Government offices are finding it difficult to stem rising costs wherein selection and use of copiers is involved. Since the copier industry is so highly competitive, it is a significant challenge to apply the *right copier*, at the *right time*, in the *right place*, and in the *right quantity*. The purpose of this handbook is to assist Government officials to solve their copier problems through a common-sense approach in selecting and controlling such equipment.

The conclusions and the statistical data offered in this handbook are the work of the National Archives and Records Service. Much use was made of an excellent Department of the Army publication and of a report of the General Accounting Office. They are:

Department of the Army Technical Bulletin, TB AG 4, *Copying Equipment*, October 1965.

Report to the Congress of the United States, *Potential Savings Available Through Purchasing Rather Than Leasing Certain Office Copying Machines*, by the Comptroller of the United States, October 1964.

Because of the continuous changes which are occurring within the copier industry, it is planned to issue a revised edition of this handbook when there are enough changes to warrant a revision.

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I. INTRODUCTION

Copying equipment, in the past, was usually located in a centralized reproduction, duplicating, blueprinting, or photostating unit. Skilled or semiskilled help was needed to operate relatively complicated machines. Service was influenced to a great degree by the amount and specific type of equipment installed, as well as its organizational sponsorship. Such reproduction equipment was often placed with the engineering or scientific groups who had a basic and continuing call for blueprints and photographs.

The market was "ripe" for a simple, inexpensive copier. Many new machines designed to produce low-cost, small-volume copies, have made their appearance. As each new machine has appeared, a particular copying requirement (type of original, volume, etc.) was satisfied but with no single copier efficiently and economically capable of the entire demand.

Dispersal of Copiers

Many of the new copiers, as they appeared on the market, were installed in the same centralized reproduction units as were their predecessors. Copy demands, however, soon grew far beyond expectations. The reproduction units realized that they had a difficult situation to deal with. As the volume grew and the deadlines became shorter, the centralized approach served to hinder copier access. Gradually, copiers were located closer to the points of demand and without any time-consuming requisitioning and justification procedures. A specific organizational group shared a machine which was strategically located. Semi-automatic copiers began to replace manually operated ones as a means of increasing total volume. Mass copying became common.

At present, almost every sizable organizational unit has its own copier. Some units have a second or third machine to meet increasing demands. Some Government departments have created centralized copier stations at division, branch, or section levels. Many "broom" closets within office buildings have been converted to copier stations. Some of these copiers are manned by full-time operators, while others are "self-service."

Management of Copying Services

With the dispersal of office copiers throughout Government agencies, the need for a good hard look at the economy and effectiveness of office copying services has become increasingly apparent. The uncontrolled acquisition and use of office copying equipment has often resulted in uneconomic mismatches of user requirements with machine capabilities and wasteful practices in operating copying facilities.

While it may not always be practical, a desirable approach for managing the ever-growing demand for copies can be found in the old saying, "An ounce of prevention is worth a pound of cure." *Before* a heavy investment has been made in a variety of copiers on a hit-or-miss basis, the overall copying requirements of large organizational segments of an agency should be systematically studied.

These studies sould be carried out by knowledgeable personnel such as records managers, management analysts, reproduction specialists, supply officers, or others who are familiar with machine capabilities, price relationships, and procurement options available in today's highly competitive copier market. Above all, such personnel should be knowledgeable of the effect the copiers will have on the paperwork systems and procedures within the agency. For example, the flood of documents pouring out from today's copiers can play havoc with a planned network of file stations, as uncontrolled quick copies cause a proliferation of duplicate files.

Based on analysis of the data obtained, firm answers should be arrived at covering such matters as: centralized or decentralized stations; manned or unmanned facilities; use of lease, purchase, or combination lease/purchase options in procuring

copiers; appropriate machines and methods to obtain the lowest possible cost per copy for multiple copy requirements; most suitable maintenance and service arrangements; special requirements for capabilities to produce masters or transparencies; adequacy of copy quality in terms of the use made of them; types of administrative actions needed to control copier output; supply levels and standardization; and the like.

Where such studies have not been made, an inquiry into the existing copying facilities will offer a high potential for savings. As a minimum, a goal of 10% reduction in overall copying and related paperwork costs would be feasible. This handbook has been prepared to guide managers and others responsible for office copying in providing economical and effective copying service which meets user requirements.

II. PSYCHOLOGY OF MAKING COPIES

Adequacy Versus Perfection

The copying machine produces, at best, "an *imitation* of the original,"—not a facsimile, i.e., an "exact reproduction." The copying machine manufacturers, however are striving constantly to develop machines that produce copies as close to a facsimile as possible. Therefore, today's copying machines are becoming increasingly sophisticated. This trend is causing the user to become less and less satisfied with yesterday's product. Cheaper machines, producing less quality than the user thinks necessary, offend his sense of pride. He wants *one* answer to all copying problems—a machine which will, in fact, give him a facsimile.

Currently, there seems to be a demand that copiers be compact, operate at high speed, turn out "original" copies, cost only a few hundred dollars, never break down, and produce copies that cost about the same as that of a high-speed duplicator. Government users are following a trend, one which usually leads to the purchase or rental of a sophisticated copier capable of doing more than required. In lieu of this approach, users should carefully evaluate their own needs and procure machines which meet their requirements instead of following the practices of other offices.

Many users of copying processes have allowed their sense of value to be distorted in relation to the degree of quality and versatility actually needed. Is it necessary that the copier be able to pick up certain colors or solids? Is a print-like quality important to the use of the copy? Does the fact that the image is grey rather than black make any real difference? Manufacturers have been quick to foster this desire for perfection, and competition has encouraged the hard-sell tactics. The main point for managers to recognize is that most copies are of a routine nature, and need only meet the requisites for the purpose intended, no more, no less.

Malpractices in Using Copiers

Many situations of misuse and careless use occur regularly in many offices. Individually, they may be insignificant, but when they are multiplied daily by large numbers of users, unnecessary copy production soars. Conscientious managers should make every effort to reduce or even eliminate such malpractices. They should determine what may be copied, how many copies are permissible, and what degree of quality is acceptable, but they need the cooperation and backing of their superiors. The following examples represent some of the more common types of malpractice:

- Insisting on the use of a certain brand of copier when others are available, as in the case of centralized centers. This attitude can frequently cause excessive waiting time and delays.
- Making more than is needed on the mere possibility that the extras may be needed.
- Making copies of personal papers for personal use.
- Copying blank forms or publications which are available from stockrooms.
- Using a copier in lieu of making one or two carbons at time of typing.
- Using a copier as a duplicator for unlimited copies.
- Having copies remade because the first were less than perfect.
- Rejecting all copiers which require some manual operation and insisting upon completely automatic features.

Protest Against Dampness

Wet process copiers were considered very fine before the advent of the dry types. Because copies made on them required drying for up to 10 minutes, users have developed a distaste for them in view of the simplicity and speed of the newer models. The fact that they used "messy chemicals" also had a great deal to do with the present attitude. Although many of today's wet process copiers are equipped with a premixed cartridge

loading feature, and require minimal attention to cleaning, the attitude still persists. Copies from most of this equipment still require drying, although there are a few units which produce copies capable of drying in a few seconds. These factors should not operate to exclude such machines from considerations. As a matter of fact, some wet process copiers will produce copies with an extremely sharp and high contrast image.

Hidden Costs

Officials making decisions involving procurement or use of copying equipment often fall into the trap of thinking only of the easily-measured costs of copy preparation, such as meter charges, supply costs, and the like. They tend to forget that the below-listed elements, which are not so easily measured, can also affect their overall copying costs.

- *Production.* The time it takes the copier to produce the copies must be considered and also its effect on personnel costs.
- *Waste.* Because there is virtually no sure way of either tabulating or controlling it, waste can be one of the most misleading factors.
- *Walking.* If copier is in a central or semi-central location, walking time involved is also prone to being stretched—by visiting, passing the snack bar, and other common human weaknesses.
- *Waiting.* When the copier is being used, valuable personnel time is being wasted while the individual is doing nothing.
- *Overproduction.* The "need to know" basis is fast disappearing. It is relatively simple to make copies for everyone in the office.
- *Files Maintenance.* Too many copies intended just for "information" find their way into files. Files maintenance costs money.

Proliferation Problem

This word has of late been applied to the product of copiers—meaning, of course, that the production of copies in quick succession and in large amounts is the result of the newer machines. As manufacturers continue to simplify operation of machines, and as their numbers increase, proliferation will become more and more evident. It is not difficult to find the reasons for this—on the other hand, it is not easy to reduce or eliminate it.

Before the time when it became easy to make a copy of almost anything, our official copying was limited to those documents needed by someone, or required for some purpose. That is, the function for which copies were needed was either impossible to accomplish or made extremely difficulty without such copies. Although these valid purposes still exist, a large proportion of all copying done today is for *convenience.*

What are "convenience" copies? Their identity may vary with individuals or within groups, but generally, these are common types:

(1) Those furnished to members of an office for "information"—even though they may not have any interest in the subject.

(2) Suspense copies—which might have been made as an extra carbon.

(3) Extra copies of actions maintained in file—in case some are needed later.

(4) Alibi copies—usually made for protection or as proof of responsibility.

Convenience copying is not necessarily bad if it saves time. It is, however, often allowed to progress to the point of producing paperwork that is either wasted or never disposed of. What was meant to be a laborsaving device has resulted in the expenditure of more man-hours than was ever before needed for producing copies.

Many agencies have tried using various subterfuges as deterrents to indiscriminate copying. These have included the use of colored copy paper, signs, "freezing" the copy selector knob, sign-in sheets, and surveillance. Such methods were found to be ineffective, and as a result were shortly abandoned. Placing operators on all machines also has its drawback, since it involves additional personnel.

Finding the Solution

The manager must now take definite action if he is really interested in doing something about the problem of proliferation. Two phases are clearly necessary: *education* and *control.*

Education. It is up to management to establish guidelines and up to supervisors to apply them.

There are two basic means of educating the users of copying equipment:

(1) Conduct orientation classes for operational managers and top level supervisors. It should not be assumed that such persons, because of their position, know the facts about copying costs and their role in the paperwork explosion.

(2) Program a continuing campaign through printed or duplicated reminders, discussions at meetings and briefings, evaluations of individual installations, and any other means of communication.

Control. Regardless of what controls are established, they will have little effect if they are not enforced and regularly reviewed. Enforcement need not mean a system of threats and penalties. The following approach can be considered:

(1) Establish realistic limitations and requirements but provide for selective exceptions when warranted. Publish these as regulatory policies and see that they have complete dissemination.

(2) Instruct the responsible individuals on how they should inspect copiers under their jurisdiction. In this connection, inquiries should be made and the actual process observed.

(3) Make periodic informal surveys of copier production. Note infractions and advise management of their findings. The offending office should be notified of violations when considered appropriate. It should be made known that the individuals responsible for the copiers have this authority and management must give them the necessary support.

Several manufacturers offer special totalizer attachments—some with as many as 12 separate switches or keys to activate the copier—to aid in checking on the volume of copies made by component organizational units of an agency.

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III. LEGAL ASPECTS

Copying Laws

Copying laws are almost in the same category as speed limit laws—people forget they are there. Although the former involves much less risk than the latter, the penalty can be much greater. Most documents which are prohibited by law from being copied have their source in State or Federal Government. A partial listing is shown in figure 1. In case of doubt, legal advice should be obtained.

Copyright Laws

The most frequently violated law is the Copyright Law: namely, that law which prohibits the copying of copyrighted material without permission.

The Copyright Law is intended to protect the publisher or author from plagiarism. It gives him the right to say who may reproduce his written or published work, and to demand payment for it. However, the current widespread use of copying machines in reproducing literary works goes beyond the question of plagiarism. It is beginning seriously to affect the sale of published works, such as magazines, textbooks, and technical papers. Prior to this time, a user of such works desiring to have possession of a copy was obliged to purchase the publication if he could not borrow it for an indefinite period. Today, it is relatively simple to make copies of almost any printed matter by means of the office copier.

Because the copier has made it easy to reproduce published works, extra precaution is necessary. Where a notice of copyright is shown, either on the work itself, or by a general statement in the publication, the law is clear: it may not be copied unless permission of the publisher or author is obtained. Where doubt exists as to whether or not an item is copyrighted, the legal officer should be consulted.

MATERIAL THAT MAY NOT BE COPIED

1. Congress, by statute, has forbidden the copying of the following subjects under certain circumstances. There are penalties of fine or imprisonment imposed on those guilty of making such copies.

a. Obligations or securities of the United States Government, such as—

(1) Certificates of Indebtedness.
(2) National Bank Currency.
(3) Coupons from Bonds.
(4) United States Bonds.
(5) Federal Reserve Bank Notes.
(6) Federal Reserve Notes.
(7) Treasury Notes.
(8) Silver Certificates.
(9) Gold Certificates.
(10) Fractional Notes.
(11) Certificates of Deposit.
(12) Paper Money.
(13) Bonds and obligations of certain agencies of the Government such as FHA, etc.
(14) U. S. Savings Bonds.
(15) War Savings Stamps if in albums filled or partially filled. (They may be photographed only if the reproduction is either 25 percent smaller in each dimension or 50 percent larger in each dimension.)
(16) Internal Revenue Stamps. (If it is necessary to copy a legal document on which there is a cancelled revenue stamp, this may be done provided it is for lawful purposes.)
(17) Postage Stamps Cancelled or Uncancelled.
(18) Postal Money Orders.
(19) Bills, Checks, or Drafts for Money drawn by or upon authorized officers of the United States.

b. Adjusted Compensation Certificates for Veterans of the World Wars.

c. Obligations or Securities of any Foreign Government, Bank or Corporation.

d. Copyrighted material of any manner or kind without permission of the copyright owner.

e. Certificates of Citizenship of Naturalization. (Foreign Naturalization Certificates may be photographed.)

f. Passports. (Foreign passports may be photographed.)

g. Immigration Papers.

h. Draft Registration Cards.

i. Selective Service Induction Papers which bear any of the following information: Registrant's earnings or income; dependency status; court record; previous military service; physical or mental condition.

j. Badges, Identification Cards, Passes, or Insignia carried by Armed Forces personnel or employees of the Federal Government.

2. Copying the following is also prohibited in certain states:

a. Automobile licenses.

b. Driver's permits.

c. Automobile Certificates of Title.

Figure 1

IV. COPYING PROCESSES AND HOW THEY WORK

There are 8 commonly recognized copying processes and many different makes and models of copiers available within the different processes. Some of the copiers, particularly the larger diazo types, hardly qualify as "office-type" machines because of their size, although they are usable for making copies of office-type documents under "systems" or "production" situations. Other copiers can be used to produce various types of reproduction masters and transparencies. This chapter, however, is basically concerned with copiers which are used in an office environment for producing page-size paper copies of office documents. Within this frame of reference, a short description of each basic process and how it works follows:

Diffusion Transfer Process

This requires a negative and positive paper for each copy. The negative paper is sensitive to light. Most machines are manually operated, being powered only to the extent of furnishing a light source and activating the feed rollers. A few are completely automatic, requiring only insertion of the original. Most newer machines use a cartridge for chemicals, which can be removed and inserted without handling of the chemicals. This helps the solution to last longer, and simplifies the cleaning of developing trays. Since the copy paper itself (positive) enters the solution, copies always emerge quite damp and must be dried before use.

Procedures are as follows:

(1) Original is exposed to negative paper.

(2) Negative and positive papers are sandwiched and passed into developer through separated slots.

(3) After emerging, the two are pulled apart; the negative is discarded and the positive paper becomes the copy.

Dye Transfer Process

This requires a matrix and copy paper. Although ordinary paper can be used, the treated copy paper gives a darker and more permanent image. The only known dye transfer equipment is made by Eastman Kodak, and generally is known by the name of Verifax. Some models are manually operated, while others are semiautomatic. The new machines use a cartridge for chemicals, which can be replaced without handling chemicals. This equipment is powered only to provide a light source and to activate the feed rollers. Although the copy paper does not enter the solution, it does come in direct contact with the wet matrix; this causes copies to be slightly damp, but they dry within a few seconds.

Procedures are as follows:

(1) Original is exposed to matrix.

(2) Matrix is passed into developing solution.

(3) Copy paper is pressed against matrix.

(4) Copy is peeled from matrix.

(5) If a multiple-copy matrix is used, it can be reinserted into the developing solution, and (3) and (4) above repeated, up to about seven copies. (More are possible if a good matrix has been made.)

Stabilization Process

This is similar to a photographic process, but is much simpler and faster. It uses only one type of coated paper for both negative and positive copies. The first copy is white on black, from which can be made any number of black on white copies. The lower priced machines usually are contact printers, while the larger and more expensive operate by a mirror reversal process, some having the capability to reduce and enlarge. Some are manually operated, while others are completely automatic. The copy emerges damp and requires drying before use.

Procedures are as follows:

In the first procedure the copy paper is exposed to the original by—

(1) Reversing image from mirror (for right reading copy), or

(2) Reflex through copy paper (for reverse reading copy), or

(3) Direct light through translucent original (for right reading copy).

In the second procedure, copy paper passes through developer.

(1) Right reading negatives can be used as copy, or as originals and processed as in (1) or (3) above to make right reading positives.

(2) Reverse reading negatives must be processed as in (3) above to make right reading positives.

Thermal Process

This requires only one coated paper to produce each copy. It is not sensitive to light, but reacts to heat radiated by the image area when exposed to infrared light. For this reason, the original image must contain some metallic substance and colors must be visible to infrared light. Generally, thermal copiers will reproduce most printing inks, liquid writing inks, lead pencil, and typewriter ribbon. It will not reproduce most ball point inks, stamp pad inks, colored pencils, and blue and violet printing inks, which are transparent to infrared light. This is the only copying process in which exposure and development are simultaneous. It is the simplest in both construction and operation. Only one step is involved—the insertion of copy paper and original together into the exposure opening. Although copies made on thermal paper may last indefinitely, it is not recommended as a permanent file paper because of its sensitivity to heat and its tendency to brittleness.

Dual Spectrum Process

This requires two kinds of paper to produce each copy; an intermediate, light sensitive type and a coated, final copy paper. No chemicals are involved, and the machine can copy all colors. The 3–M Company is the only known manufacturer of this process. It makes a variety of these machines including various manually-operated models of differing capabilities (for example, the office model "107" copier), and an automatic model (the "209"). Copies are dry upon completion. The copier works on the principle of creating a latent image on the intermediate paper by means of light, and then transferring this image to the final copy paper by means of heat.

Procedures are as follows:

(1) Original and intermediate paper are exposed to light.

(2) Intermediate paper and copy paper are pressed together and heat is applied. The latent image transfers to the copy paper.

The dual spectrum process can be coupled with another process of the same manufacturer called "Adherography" to produce many copies of a document at the announced rate of 40 copies per minute. To use this related Adherography process, a special master is prepared either on a dual spectrum copier or by direct typing. The master is inserted into a separate machine known as a "Speed Copier" which produces the copies on ordinary paper. When these two processes are coupled together, the manufacturer refers to them as System A–09.

Diazo Process

This requires one copy paper, coated with light-sensitive chemicals. It works on the principle of ultraviolet light passing through a translucent original. This destroys the chemical coating on the copy paper, except where an opaque image has blocked the light. The copy paper is then developed, where the remaining chemical is converted into a readable image. Three kinds of developing agents are used: liquid, ammonia, or heat. The speed of the copy paper, the kind of developer used, and the quality of the translucent original determine how fast copies can be produced and what quality they will be.

Procedures are as follows:

(1) Insert original and copy paper into exposure slot.

(2) Reinsert exposed copy paper only in developing slot.

(3) Copies made by liquid developer machine take several seconds to dry completely.

Transfer Electrostatic Process

This requires ordinary paper only, but it should not be lighter than standard 20 weight. At the present time, the only transfer type on the market is that made by Xerox. It operates on the principle of a charged drum surface being exposed to light reflected through lenses from an original. Where light strikes the drum from white areas of the original, the charge disappears and toner particles cling only to that part of the surface still charged (image area). The latent image is then transferred from the drum to paper, and fused by heat. Only one procedure is involved—inserting the original into the exposure area.

Direct Electrostatic Process (Electrofax)

This requires a coated copy paper. In this process, some machines use a dry toner, but most use a liquid toner. The process is generally the same. The paper is electrically charged, after which its surface is exposed to light reflected from the original. Where light strikes the copy paper from nonimage areas, the charge is dissipated, and the latent image remains. This invisible image is then brushed or sprayed with toner, which clings to the charged area and thereby develops the image. Lastly, the image is either fused by heat (dry toner) or dried by air (liquid toner). The only procedure on most machines is to insert the original into the exposure area.

Supplementary Information

Figure 2 shows a list of the advantages and disadvantages of each process. The chart shows only basic characteristics and should be used for quick reference only.

A glossary of terms used in copying processes is given in figure 3.

ADVANTAGES AND DISADVANTAGES OF VARIOUS PROCESSES

Process	Advantages	Disadvantages
	Wet Process	
1. Diffusion Transfer Process.	*a.* Makes sharp, high contrast copies. *b.* Copies all colors. *c.* Machines are comparatively low in price.	*a.* Uses wet chemicals. *b.* Most machines require large amount of manual operation, but newer models have automatic features. *c.* Copies emerge damp and must be dried. *d.* Cost per copy is comparatively high.
2. Dye Transfer Process.	*a.* Up to seven (possibly more) copies can be made from one multiple-copy matrix. *b.* The more copies made from one matrix, the lower the cost per copy. *c.* Copies all colors. *d.* Can be written on almost immediately.	*a.* Uses wet chemicals. *b.* Most models require a large amount of manual operation, but newer ones have automatic features. *c.* Cost of a single copy is comparatively high.
3. Stabilization Process.	*a.* Copies all colors. *b.* Good for reproduction of photographs.	*a.* Uses wet chemicals. *b.* First copy is white on black (right reading negative). *c.* Deterioration of image possible because of chemical decomposition.
	Heat Process	
4. Thermal Process.	*a.* No chemicals needed. *b.* Simple and fast operation. *c.* Equipment requires minimum maintenance.	*a.* Will not copy images that have no metallic content. *b.* Will not copy colors which are transparent to infrared light. *c.* Copy paper may darken if exposed to heat. *d.* Paper can become brittle with age and with excessive handling.
5. Dual Spectrum Process.	*a.* Uses no chemicals. *b.* Copy paper, although coated, has "feel" of bond. *c.* Copies all colors and solids well. *d.* Makes excellent reproductions of photos, halftones. *e.* Copies books, bound volumes.	*a.* Uses two special papers. *b.* Roll of intermediate paper somewhat difficult to replace. *c.* May require more than the usual amount of maintenance.

Figure 2

ADVANTAGES AND DISADVANTAGES OF VARIOUS PROCESSES

Process	Advantages	Disadvantages
	Diazo Process	
6. Diazo Process.	*a.* Per copy cost is one of the lowest in the copying field. *b.* Can reproduce copies rapidly.	*a.* Does not copy from opaque original or two-sided originals. *b.* In all but the thermal models, requires use of ammonia gas or liquid developer. *c.* Does not copy certain colors which are transparent to ultraviolet light.
	Electrostatic Process	
7. Transfer Electrostatic Process.	*a.* Does not use liquids. *b.* Can copy most colors. *c.* Uses untreated paper. *d.* One of simplest machines to operate.	*a.* Gives poor results from photographs, solids, and light blues. *b.* Requires more than the usual amount of maintenance. *c.* Requires periodic replacement of drum or web.
8. Direct Electrostatic Process (Electrofax).	*a.* Some machines use no liquids. *b.* Copies most colors. *c.* Makes good, sometimes excellent, reproduction of photos, halftones, and solids. *d.* Most machines operate at reasonably fast speed.	*a.* Coated paper must be used. *b.* Copy paper is heavier than ordinary paper. *c.* Surface of copy can be marred by metal objects. *d.* On liquid toner machines, copies may smear immediately after being made. *e.* Liquid toner provides less contrast.

Figure 2 (Continued)

GLOSSARY OF TERMS USED IN COPYING PROCESSES

Anhydrous ammonia. Compressed ammonia captured in a tank and released through controls into a diazo copying machine in the form of a gas.

Coated paper. Treated with an emulsion to make it sensitive to a particular copying process.

Contrast. Degree of difference between depth of image against its background. Jet black against white background is said to have high contrast while gray on white, a low contrast.

Definition. Degree of sharpness or clarity of lines and detail in an image.

Density. Generally referred to in degrees of; the deepness of black, or shade of gray to black.

Developer. a. In electrostatic copiers using a dry toner, a coarse aggregate, such as beads or iron filings, which scatters the toner.

b. In wet process copiers, the fluid solution through which exposed copy paper is passed.

Dispersant. A liquid used in some electrofax copiers in which the liquid toner is dispersed. Usually this is a petroleum base which is constantly agitated to keep the toner in suspension.

Flatbed. A type of exposure unit which consists basically of a flat glass in front of a light source. Capable of copying books and bound volumes.

Fusing. The binding of dry toner to copy paper by a heat process.

Halftone. A photograph which has been printed, the image being made up of dots ranging from white through gray to black. The finer the dots are, the better the image.

Intensifier. In electrofax (liquid toner) processes, a heavy liquid injected when image is too light; supplements the toner.

Latent image. Invisible image resulting from exposure of a sensitized surface to an original; development by one or the other process makes image visible.

Negative copy. A right-reading copy with the image in white with a black background.

Positive copy. A right-reading copy having black image on a white background.

Recycling. The capability of certain copiers to hold the original and reexpose it automatically for the number of copies desired. This feature is only on those machines which have a dial to set for more than 1 copy of the same original.

Solid. Heavy or broad lettering or backgrounds on an image, other than normal reading copy.

Standard paper. Ordinary bond or sulphite paper.

Toner. A fine black powder or semipaste which forms the image on a copy made by the electrostatic or electrofax processes; usually a derivative of carbon black.

Translucent. That quality which enables light to pass through paper. (Not the same as transparent.)

Vehicle. (*See* Dispersant.)

Figure 3

V. SELECTIVE EVALUATION OF COPIERS

Basis for Selection

Because of the many copiers on the market, only a selected few could be evaluated. Evaluation involved actual testing of certain models of machines and reflects Department of the Army experience in meeting its copying requirements. Selection was made as follows:

a. The major interest was directed to the electrostatic types since these are the most competitive at the present time.

b. In the thermal and diazo processes, one machine was selected as being representative of its type.

c. The dye transfer and dual spectrum machines are made by only one company and for this reason one model of each warranted evaluation.

d. The diffusion transfer and stabilization processes were not evaluated for several reasons:

(1) Generally speaking, the per copy cost is higher than that of the newer processes.

(2) On most machines, a large amount of manual operation is required.

(3) Because of the above, many of these machines are continually being replaced by machines using the newer, more automatic processes.

e. As newer machines appear and as otherwise seems appropriate, further evaluations will be made and published.

Description and Costs

The significant points of the selected machines evaluated are discussed in figures 4 through 19 which follow. All information therein is current as of August 1966, but because of continuing price revisions or machine and supply modifications, some of the data is subject to change. *Before selecting a particular copier, offices should check a current Authorized Federal Supply Schedule Price List of the manufacturer concerned to note any possible changes in prices or charges quoted in these figures. Such changes would, of course, affect the unit costs shown.*

Cost charts do *not* include personnel time nor an allowance for waste or spoilage. They are based on the following factors:

(1) Where applicable, Zone 1 (Eastern Zone) prices were used for all equipment.

(2) Monthly purchase costs were computed on a 5-year amortization.

(3) Paper and other supply costs are based on estimated usage of a copier and can vary with price changes, usage, volume purchases, paper size, etc.

(4) Supplies in each case are those recommended by the equipment manufacturer for his particular machine. Using supplies obtained from other sources will change the unit costs shown.

As applicable, the charts do include cost information covering the procurement of the copiers under both rental and purchase plans. To aid in comparing plans, they indicate unit costs (cost per copy) at varying volumes of copies produced under both plans.

When choosing a copier, offices should refer to appendix "B" of this handbook as well as to these figures containing the results of the evaluations of selected copiers. Appendix "B" is a reprint of a near-complete listing of office copiers as of August 1966. This listing, providing detailed information on the attributes of each copier, was published in the September issue of the magazine *Administrative Management*, Volume XXVII, Number 9. As the prices or other charges are for the commercial market, there may be some slight variance with prices or conditions applicable to Federal government procurement. Nevertheless, the listing can be extremely useful in comparing various copiers.

APECO SUPER-STAT

Type: Direct Electrostatic (Electrofax).

Size: Table model, 24¾'' wide (bottom), 35½'' wide (top), 17'' deep, 18'' high; 107 lbs.; portable.

Electrical: 10 amps, 115 volts. May be used in any grounded outlet.

Copy Paper: Cut sheets from 5½'' x 8½'' to 8½'' x 14''. Coated paper, bond weight; surface marked by metal objects. Automatic feed magazine has a capacity of 200 sheets. Paper must be thoroughly "riffled" to prevent feeding problems and double feed.

Original: Flat bed exposure can expose bound volumes as well as single sheets and rigid material. Exposure bed moves automatically on tracks past the exposure lamps. Tracks extend beyond the basic width of the unit, which accounts for the wider top measurement. Safety features are incorporated to prevent injury to operator's hands by the moving top.

Operation: Machine is turned on; density control set; number of copies dialed; start button is pushed which activates process. A dial offers multiple setting for 1 to 10 or "C" for continuous; except for setting "C," it returns to number 1 when last copy is exposed. Operates with liquid toner and dispersant, which are pumped into tank at present rate. Copy paper passes through mixed dispersant and is dried by warm air and pressure. No fusing. One signal light indicates paper magazine is empty or that feed has aborted. Another light comes on when dispersant cartridge is empty. Machine will continue to operate even though this light is on. Cartridge is replaced simply by opening a sliding cover and removing empty cartridge.

Speed: No warm up time. About 13 seconds for single copy, or first copy of multiple run; subsequent copies about 8 to 9 seconds each.

Supplies: Dispersant, available in kits of four 2-quart cartridges, with one pint cartridge of toner. Kit is sufficient to make about 8,000 to 10,000 copies.

Capabilities: Readable copies can be made from any printed matter with white or colored background and any color ink. The machine produces a low-contrast image, somewhat gray rather than black, and because of this it does best with a strong original. Fair on solids and half-tones. Seems to produce better image from originals with colored backgrounds than from those with white backgrounds. The density control has a limited range for most common types of originals, and setting No. 5 seems to give the average copy—lower settings bring out background toning, and higher settings wash out image contrast. Image does not smear with normal handling. Considered a medium volume machine for use only in localized areas. Its primary advantage is that it offers bound volume capability at a low initial price.

Service: Maintenance contract is available for $115.00 per year on machines in a 30-mile radius of the center of the city, and at higher rates beyond that limit. It includes—

a. All emergency calls.

b. All parts except lamps and motors.

Costs:

a. Purchase. The unit price is $867.30 (including discount). Additional discount up to 10% is available if more than 3 machines are purchased at one time.

b. Rental. Not available.

c. Supplies:

(1) *Copy paper.* For 8½'' x 11'' size, prices range from $32.55 per M to $20.00 per M, depending on volume.

(2) *Dispersant kit.* Price is $11.70 for four 2-quart cartridges including 1 pint cartridge of toner.

d. Volume costs are shown on chart on reverse side.

Figure 4

APECO SUPER-STAT

Purchase

Volume per Month	Purchase Cost	Monthly Service Cost	Supplies	Total Monthly Cost	Unit Cost	Remarks
1, 000	14. 46	9. 58	33. 07	57. 11	. 0571	1. Cost based on one machine, $867. 30.
2, 000	14. 46	9. 58	63. 54	87. 58	. 0438	
3, 000	14. 46	9. 58	95. 31	119. 35	. 0398	2. Paper cost in Supply Col. based on 6-month purchase.
4, 000	14. 46	9. 58	127. 08	151. 12	. 0378	
5, 000	14. 46	9. 58	150. 70	174. 74	. 0349	3. Service cost based on 30-mile radius.
10, 000	14. 46	9. 58	260. 70	284. 74	. 0285	
15, 000	14. 46	9. 58	391. 05	415. 09	. 0277	
20, 000	14. 46	9. 58	423. 40	447. 44	. 0224	

Figure 4 (Continued)

BRUNING 2000

Type: Direct Electrostatic (Electrofax).

Size: Floor model, 49" wide, 44" deep, 48" high; 480 lbs. Not portable.

Electrical: Choice of 115 volts, 27.5 amps, or 230 volts, 14.5 amps, 60 cycles.

Copy Paper: Magazine holds about 200 sheets of paper up to 11" x 17". Automatically feeds from check size up to 11" x 17". Paper is coated type, and is easily marked by metal objects.

Original: Roller feed mechanism. Can accept lightweight flexible sheets, or can be adjusted by simple motion to accept cardstock or thin pamphlets. It will not take bound volumes or 3-dimensional objects.

Operation: Easy to use, although original must be fed by hand for each copy made. Paper originals are returned to the front near point of insertion; card stock or thin pamphlets are returned to the back by lifting a hinged lid. Feed mechanism will not accept original when paper supply is low.

Speed: No warmup time required. First copy delivered in 17 seconds. All subsequent copies of the same or other originals in 4 seconds.

Supplies: Toner, drytype—makes about 5,000 copies per pound.

Capabilities: Makes an excellent copy under ideal conditions, i.e., if machine is maintained properly, toner adjustment in order, and it is fusing correctly. Does very well on solids and halftones. The manual feeding of original has two advantages: it permits faster production, and provides a means of automatic collating. Originals are fed in sequence (rather than the same one repeatedly) and copies are delivered in the same sequence. Has counter for operator's use when making multiple copies. Special offset mats available which guarantee 500 prints. The copy paper itself can be used as a very short run offset master, but results are not ideal. If adjustments are out of focus, copies can be grainy, streaked or have background. Considered to be a heavy duty machine, and for centralized or semicentralized operations.

Service:[1]

a. Rental. Repairs and maintenance provided by Bruning Company on all parts except lamps.

b. Purchase. Two options are available:

(1) By oncall service as needed at existing hourly rates and repair costs.

(2) By yearly contract at a rate of $360.00 per year.

c. Lease-Purchase. Repairs and maintenance provided by Bruning Company at no charge within a 25 mile radius of service point.

Costs:[1]

a. Rental. Minimum 4,000 copies per month at the following rates:

(1) $30.00 per month, plus

(2) Meter charge of $.015 per copy.

b. Purchase. $4,407.00.

c. Lease-Purchase. $200.00 per month. If paid within 90 days, 80% of rental applied to price; between 90 days and 6 months, 65%; after 6 months, 55%.

d. Supply costs.

(1) For 8½" x 11" paper, $17.50 per M sheets. Developer is included in this price.

(2) Toner, $20.00 per lb.

(3) Volume costs are shown on chart on reverse side.

[1] See footnote on next page.

Figure 5

BRUNING 2000[1]

Rental

Volume per month	Rental cost	Supplies	Total monthly cost	Unit Cost	Remarks
1,000	90.00	21.50	111.50	.1115	$30.00 per month basic included.
2,000	90.00	43.00	133.00	.0665	4,000 minimum per month
3,000	90.00	64.50	154.50	.0515	.015 per unit.
4,000	90.00	86.00	176.00	.0440	
5,000	105.00	107.50	212.50	.0425	
10,000	180.00	215.00	395.00	.0395	
20,000	330.00	430.00	760.00	.0380	
30,000	480.00	645.00	1,125.00	.0375	
40,000	630.00	860.00	1,490.00	.0373	
50,000	780.00	1,075.00	1,855.00	.0371	
60,000	930.00	1,290.00	2,220.00	.0370	

Purchase

Volume per month	Purchase cost	Supplies	Monthly svc cost	Total monthly cost	Unit Cost	Remarks
1,000	73.46	21.50	30.00	124.96	.1250	Purchase price
2,000	73.46	43.00	30.00	146.46	.0733	$4,407.00
3,000	73.46	64.50	30.00	167.96	.0560	
4,000	73.46	86.00	30.00	189.46	.0474	
5,000	73.46	107.50	30.00	210.96	.0422	
10,000	73.46	215.00	30.00	318.46	.0319	
20,000	73.46	430.00	30.00	533.46	.0267	
30,000	73.46	645.00	30.00	748.46	.0250	
40,000	73.46	860.00	30.00	963.46	.0241	
50,000	73.46	1,075.00	30.00	1,178.46	.0236	
60,000	73.46	1,290.00	30.00	1,393.46	.0233	

[1] Pricing changes have occurred since preparation of these charts. See the latest Authorized Federal Supply Schedule Price List of the manufacturer for revised charges.

Figure 5 (Continued)

BRUNING 3000[1]

Type: Direct Electrostatic (Electrofax).

Size: Table Model, but is made to fit into a matching cabinet, providing a console appearance. 31½" wide, 23" deep, 21" high; 216 lbs. Portable to the extent its weight will permit.

Electrical: 115 volts, 12 amps, single phase, 60 cycle, AC. May be used in any standard grounded outlet.

Copy Paper: Coated type; furnished in three cut-sheet sizes: 5½" x 8½", 8" x 10½", and 8½" x 11". Marked easily by metal objects. Magazine loader at top holds 200 sheets.

Original: Flat bed exposure unit; original does not pass through mechanism, but is exposed on glass area to stationary light source. Books and 3-dimensional objects can be exposed.

Operation: Machine is switched on; original is placed on glass exposure bed; density control set; number of copies is dialed (up to 20). The action of dialing the number of copies automatically activates the machine. New original can be placed as soon as exposure light goes off for last copy of run. Operates on principle of liquid dispersant and liquid toner. Copy passes through liquid mixture and is dried by warm air. There is no fusing. Separate lights come on to indicate need to add dispersant and when last sheet of paper is fed. It is necessary each morning to turn on machine for about five minutes to allow dispersant and toner to mix. Thereafter, it is turned off after each use. There is a continuous counter immediately behind the front panel.

Speed: No warm-up time except initially in the morning. Single copy, or first copy of multiple run takes about 20 seconds. Each copy thereafter, about 9 seconds

Supplies: Developer (dispersant), furnished in carton of six 1-qt. bottles; replenisher (toner), in carton of six 8-oz. cartridges. Each quart of developer will make about 1,000 copies, and each cartridge of replenisher about 2,000.

Capabilities: Produces copies with a very good quality, high contrast image if density control knob is set correctly. The average setting is from No. 4 to No. 6 for ordinary typed or printed copy. A higher setting up to 7 or 8 is better for originals with colored background or for carbons, and a setting to No. 3 is best for light blue print or weak originals. The lower numbers tend to increase the background toning, but will also increase the density of the image. It is well to avoid too much density, since the blacker the copy, the more tendency it has to smear when freshly made. Although copies appear to have damp spots when first emerging, these will disappear in a minute or two. The machine will produce an excellent copy from halftones, and a reasonably good copy from photographs. Solids come out well, as do colors and shadings. Developer must be added about every 500 copies, since the machine will cease to operate once the "ADD DEVELOPER" light comes on. This machine has the advantage of a 20% reduction feature by moving a lever to the "LEGAL" position. In this way, 14" documents can be copied without changing paper. This feature permits all copies produced to be on sheets of uniform size wihtout sacrificing clarity or content. The "LETTER" position copies actual size. All operations are at the top of the machine, i.e., paper loading, exposing, and copy delivery. The exposure unit enables books to be copied right up to the binding with no distortion. This machine is considered appropriate for a decentralized, or semicentralized activity with a moderately heavy monthly volume.

Service:
a. Rental. All services and maintenance furnished at no cost by manufacturer during regular working hours.
b. Purchase. Complete coverage for all repairs and regular maintenance at .005 per copy, with a minimum of $15.00 per month (3,000 copies). Based on regular working hours but includes all interim calls in addition to periodic inspections.

Costs:[2]
a. Rental.
(1) $25.00 per month, plus
(2) .02 per copy.
(3) No minimum copy requirements.
b. Purchase. Price is $1875.00, which includes cabinet base. If the cabinet is not desired, a $95.00 credit is applied to purchase price, or a net of $1780.00 for the machine alone.
c. Supplies. All supplies average $22.75 per thousand copies.
(1) Paper, 8½" x 11", $20.00 per M, in 3M sheet lots. Discounts range from ¼ of 1% to 2%, depending on quantity, up to $25,000.00.
(2) Developer, $9.00 per carton.
(3) Replenisher, $15.00 per carton.
d. Volume costs are shown on the chart on reverse side.

[1] Model is no longer available since handbook was prepared. Those in use are being maintained by the company.

[2] See footnote on next page.

Figure 6

BRUNING 3000[1]

Rental

Volume per month	Rental cost	Supplies	Total monthly cost	Unit cost	Remarks
1,000	45.00	22.75	67.75	.0677	1. No minimum copy requirements.
2,000	65.00	45.50	110.50	.0552	
3,000	85.00	68.25	153.25	.0511	2. Supply discounts *not* considered in figures.
4,000	105.00	91.00	196.00	.0490	
5,000	125.00	113.75	238.75	.0477	
10,000	225.00	227.50	452.50	.0452	
15,000	325.00	341.25	666.25	.0445	
20,000	425.00	455.00	880.00	.0440	
30,000	625.00	682.50	1,307.50	.0436	

Purchase

Volume per month	Purchase cost	Supplies	Monthly service cost	Total monthly cost	Unit cost	Remarks
1,000	29.67	22.75	15.00	67.42	.0674	1. Price of machine only, $1,780.00.
2,000	29.67	45.50	15.00	90.17	.0451	
3,000	29.67	68.25	15.00	112.92	.0376	2. Supply discounts *not* considered in figures.
4,000	29.67	91.00	20.00	140.67	.0352	
5,000	29.67	113.75	25.00	168.42	.0337	
10,000	29.67	227.50	50.00	307.17	.0308	
15,000	29.67	341.25	75.00	445.92	.0298	
20,000	29.67	455.00	100.00	584.67	.0293	
30,000	29.67	682.50	150.00	862.17	.0288	

[1] Pricing changes have occurred since preparation of these charts. See the latest Authorized Federal Supply Schedule Price List of the manufacturer for revised charges.

Figure 6 (Continued)

DENNISON

Type: Direct Electrostatic (Electrofax).

Size: Floor model, 21'' wide, 28'' deep, 45'' high, 300 lbs. Not portable.

Electrical: 110 volts, 60 cycle, 20 amps.

Copy Paper: In roll form, coated type, 688 ft. long, either 8'' or 8½'' wide. Each width makes letter or legal size length copies by setting a switch to either length. Roll makes about 750 letter size or 585 legal size copies. Marked by metal objects.

Original: Flat bed exposure. Accepts sheets, books, 3-dimensional objects. Original does not enter machine.

Operation: Flip switch for letter or legal size copy. Select 1 to 15 copies. Press the print button. Dries image by heat. No fusing. Has supplemental button (or key if desired) for injecting extra intensifier for more contrast. Signal light goes on to show that paper supply or toner is low.

Speed: No warmup time. First copy in 20 seconds. Subsequent copies from same original 7 to 10 seconds each, depending on exposure setting.

Supplies: Toner, semiliquid, cartridge type; about 1,000 copies per 32 oz. container. Intensifier, semiliquid, cartridge type; about 10,000 copies per 8 oz. container.

Capabilities: Produces a reasonably good copy with moderate contrast. Does well on halftones, and reproduces solids well but with a grey tone. Two copy lengths can be chosen by flipping a switch. The 8'' roll will not operate in the 8½'' machine and vice versa. Has toner adjustment knob. Has a slight tendency to smear if hands are damp. Considered a machine for medium to heavy duty, semicentralized functions. Downtime is minimal.

Service:

a. Rental. All service and repairs are furnished by the Dennison Mfg. Co.

b. Purchase. Contract agreement is $90.00 per year. Includes all service as in rental plan with regular inspection.

Costs:

a. Rental. $70.00 per month flat fee.

b. Purchase. $2376.50 for one to nine machines on one order. Ten or more machines receive discounts up to 20%.

c. Lease-Purchase. Rented machines purchased during the first 3 months of use receive a credit of $190.00 toward the purchase price and $23.35 for each succeeding month thereafter. Maximum credit is $1030.00.

d. Supplies.

(1) *Paper.* From $30.40 per M copies to $19.60 per M, depending on volume purchased.

(2) *Toner.* $12.00 per carton of six 1-quart bottles. Intensifier, $20.00 per carton of four 8-ounce bottles. Average cost per thousand copies is $2.50.

Figure 7

237-114 O—67——4

DENNISON

Rental

Volume per Month	Rental Cost	Supplies	Total Monthly Cost	Unit Cost	Remarks
1, 000	70. 00	32. 90	102. 90	. 1029	1. No minimum copy requirements.
2, 000	70. 00	59. 20	129. 20	. 0646	2. Paper costs in Supply column are based on a 6-month purchase.
3, 000	70. 00	79. 80	149. 80	. 0500	
4, 000	70. 00	106. 40	176. 40	. 0441	
5, 000	70. 00	133. 00	203. 00	. 0406	
10, 000	70. 00	242. 00	312. 00	. 0312	
20, 000	70. 00	442. 00	512. 00	. 0256	
30, 000	70. 00	663. 00	733. 00	. 0245	
40, 000	70. 00	884. 00	954. 00	. 0238	

Purchase

Volume per Month	Purchase Cost	Supplies	Monthly Svc. Cost	Total Monthly Cost	Unit Cost	Remarks
1, 000	39. 61	32. 90	7. 50	80. 01	. 0800	1. Price based on one machine, $2,376.50.
2, 000	39. 61	59. 20	7. 50	106. 31	. 0532	2. Paper costs in Supply column based on a 6-month purchase.
3, 000	39. 61	79. 80	7. 50	126. 91	. 0424	
4, 000	39. 61	106. 40	7. 50	153. 51	. 0384	
5, 000	39. 61	133. 00	7. 50	180. 11	. 0361	
10, 000	39. 61	242. 00	7. 50	289. 11	. 0290	
20, 000	39. 61	442. 00	7. 50	489. 11	. 0245	
30, 000	39. 61	663. 00	7. 50	710. 11	. 0237	
40, 000	39. 61	884. 00	7. 50	931. 11	. 0233	

Figure 7 (Continued)

A. B. DICK 650

Type: Direct Electrostatic (Electrofax).

Size: Table Model; 18" wide, 26¾" deep, 19" high; 123 lbs; portable.

Electrical: 115 volts, 60 cycles, 15 amps. May be used in any grounded outlet.

Copy Paper: Coated type; furnished in roll form 460 feet long, and in widths from 3½" to 11". Marked easily by metal objects.

Original: Roller exposure mechanism; original passes through unit. It will accept only single sheets up to medium weight card stock.

Operation: Machine is turned on and original is fed into opening. Up to 15 copies can be made by turning the selector knob. Original stays in exposure mechanism until all copies are made; selector knob returns to "single" after last copy has been exposed. New original can be fed as soon as "feed" light comes on, even though copy is not yet delivered. Operates on principle of liquid toner and liquid dispersant. Copy paper passes through liquid mix and is dried by both pressure and heat. No fusing. Signal light indicates need to add dispersant.

Speed: No warmup time. First copy takes 30 seconds; each copy thereafter about 9 to 10 seconds.

Supplies: Toner-mix (dispersant) furnished in 9 quart lots and 1 cartridge of toner, sufficient to run about 15,000 copies.

Capabilities: Machine furnishes a consistently high quality copy with high to medium contrast, depending upon the original image density and sharpness. Density control has a wide latitude to reproduce various colors and screen out colored or dirty backgrounds. Does very well with ball point pen, ditto, and light density copy. Poor with halftones and photographs. Solids reproduce well, but somewhat grey. Image is highly resistant to smearing. Because of roll paper, can make a copy of any reasonable length. Carrier must be used for tissue originals and for those having overlays. Thin originals will not trigger the exposure mechanism and overlays may jam in the exposure rollers. However, if a jam does occur, the exposure unit is easily removed in seconds without tools, and is simple to replace. Considered to be a medium volume machine for localized or semicentralized application.

Service:

a. Rental. Repairs and maintenance provided on all parts.

b. Purchase. Two options are available:

(1) By oncall service as needed at existing hourly rates and repair costs.

(2) By yearly contract at a rate of $100.00 up to 25 miles from a service point, $125.00 from 26 to 50 miles, and $150.00 from 51 to 100 miles. If equipment is operated over 50 hours up to 99 hours a week, this price is doubled. Maintenance consists of a quarterly check and replacement of standard parts except lamps. Intervening calls will be charged for at existing rates unless the call is due to a part failure.

Costs:

a. Rental.

(1) One time installation charge of $50.00.

(2) Flat rental fee of $35.00 per month.

(3) No minimum copy requirement.

(4) If later purchased, the installation fee, plus $20.00 for each rental month, will be credited against the full purchase price.

b. Purchase price. $1075.00.

c. Supplies.

(1) *Paper.* For 8½" x 11" size, from $33.00 per M copies to $28.00 per M depending on volume purchased.

(2) *Toner and Toner-mix.* $14.25 per case of 9 quarts of dispersant and 1 cartridge of toner.

d. Volume costs are shown on the chart on reverse side.

Figure 8

A. B. DICK 650

Rental

Volume per Month	Rental Cost	Supplies	Total Monthly Cost	Unit Cost	Remarks
1, 000	35. 00	30. 95	65. 95	. 0659	1. Installation fee of $50.00 *not* included in costs.
2, 000	35. 00	61. 90	96. 90	. 0484	2. No minimum copy requirements.
3, 000	35. 00	92. 85	127. 85	. 0427	3. Paper costs in Supply column based on 6-month purchase.
4, 000	35. 00	123. 80	158. 80	. 0397	
5, 000	35. 00	154. 75	189. 75	. 0379	
10, 000	35. 00	309. 50	344. 50	. 0344	
15, 000	35. 00	464. 25	499. 25	. 0333	
20, 000	35. 00	599. 00	634. 00	. 0317	
30, 000	35. 00	898. 50	933. 50	. 0312	

Purchase

Volume per Month	Purchase Cost	Supplies	Service Cost	Total Monthly Cost	Unit Cost	Remarks
1, 000	17. 92	30. 95	8. 34	57. 21	. 0572	1. Service based on 25-mile radius.
2, 000	17. 92	61. 90	8. 34	88. 16	. 0440	2. Paper costs in Supply column based on 6-month purchase.
3, 000	17. 92	92. 85	8. 34	119. 11	. 0398	
4, 000	17. 92	123. 80	8. 34	150. 06	. 0376	
5, 000	17. 92	154. 75	8. 34	181. 01	. 0363	
10, 000	17. 92	309. 50	8. 34	335. 76	. 0336	
15, 000	17. 92	464. 25	8. 34	490. 51	. 0328	
20, 000	17. 92	599. 00	8. 34	625. 26	. 0313	
30, 000	17. 92	898. 50	8. 34	924. 76	. 0309	

Figure 8 (Continued)

DITTO DEC Electrostatic

Type: Direct Electrostatic (Electrofax).

Size: Table model; 16" wide, 26" deep, 16" high; 65 lbs; portable.

Electrical: 110 volts, 60 cycles, 12 amps. May be used in any grounded outlet.

Copy Paper: Coated type; furnished in sheets in sizes from 5½" x 8½" to 11" x 17". Subject to marking by metal objects. About the same weight as regular bond paper. Magazine on top of machine holds a maximum of 250 sheets, and is simple to load.

Original: Roller exposure mechanism; original passes through unit. It will accept thin second sheets of paper to lightweight card stock. Originals shorter than 6" must be placed in a carrier.

Operation: This is a single copy machine without a recycling device. The switch is turned on and original fed into opening at top; original is returned in the middle slot, and the copy at bottom. New original cannot be fed until previous one is returned. Operates with a liquid combination toner and dispersant. Copy paper passes through liquid mix and is dried by pressure. There is no fusing. Has adjustment lever for different density originals. A vibrating noise is heard when last sheet of paper has been fed. Machine is turned off after each use. Toner-mix is simple to add by removing empty cartridge and dropping in a new one.

Speed: No warm-up time. Each copy takes about 7 to 8 seconds. (Although a 15 copy per minute rate is claimed, this could not be achieved during testing.)

Supplies: Premixed toner-dispersant, available in 22 ounce cartridges after initial filling with starter kit. Each cartridge is good for approximately 700 copies.

Capabilities: This is a very simple machine to operate, and it produces a good copy from most common-type originals. The density control lever does not entirely compensate for a light original image, and correspondingly the copy will have a slightly toned background. Otherwise image has good contrast and is highly resistant to smearing. Solids are good and halftones show fairly good definition. Duplicate feed and jams of copy paper are rare; in the event of a jam clearance is simply and quickly done. Failure of original to return is also rare, but if it does occur, retrieval is simple. Generally, the machine is considered to be a good product for medium volume, localized use.

Service:[1] Maintenance contract is available on the following basis:

a. $80.00 per year within 15 mile radius.
b. $90.00 per year between 16 and 25 miles.
c. $10.00 per year for each 5 miles beyond 25.
d. The contract guarantees three inspections a year, plus intermediate calls, and includes all service and parts except lamps and motor.

Costs:[1]

a. Purchase price $670.00
b. Rental not available.
c. Supplies:
  (1) Paper, 8½" x 11", $28.00 in 100M lots.
  (2) Tone-dispersant: Starter kit only, $8.75; cartridges, six 22-oz. containers for $7.50.
d. Volume costs are shown on the chart on reverse side.

[1] See footnote on next page.

Figure 9

DITTO DEC Electrostatic[1]

Purchase

Volume per Mo.	Purchase	Supplies	Service Cost	Total	Unit Cost	Remarks
1000	11.17	33.25	6.67	51.09	.0510	1. $670.00 purchase price.
2000	11.17	64.50	6.67	82.34	.0411	2. Service based on 15-mile radius.
3000	11.17	96.75	6.67	114.59	.0382	3. Paper costs in Supply Col. based on 6-mo. purchase.
4000	11.17	128.90	6.67	146.74	.0367	
5000	11.17	156.25	6.67	174.09	.0349	
10000	11.17	315.00	6.67	332.84	.0333	
15000	11.17	453.75	6.67	471.59	.0315	
20000	11.17	585.00	6.67	602.84	.0302	

[1] Pricing changes have occurred since preparation of these charts. See the latest Authorized Federal Supply Schedule Price List of the manufacturer for revised charges.

Figure 9 (Continued)

EASTMAN KODAK CAVALCADE

Type: Dye Transfer (Wet Process)

Size: Table model, portable.

Electrical: 110–125 volt, 3 wire cord.

Copy Paper: Maximum 8½" x 14". Ordinary bond paper can be used, but not recommended for best results. A special copy paper is available from several sources, in 7 colors. The supply is stored in the machine, and is automatically sandwiched to the matrix.

Original: Single sheets only go through rollers into machine.

Operation: A two stage process is followed: exposure and development. The matrix is automatically exposed by inserting the original. When the matrix emerges, it is inserted into another slot for developing; a timer automatically shows when the matrix is ready, and it is withdrawn, already sandwiched to a sheet of copy paper; these are peeled apart and the near dry copy is ready for use. An average of 7 good copies can be made by reinserting the matrix, withdrawing and peeling. The developing fluid is never handled, but is installed in a cartridge. When it is time to replace the fluid, a loud buzzer sounds at which time the old cartridge is removed, discarded and a new one inserted.

Speed: It takes about 40 seconds to produce one copy. The time required to produce multiple copies depends upon the dexterity and speed of the operator. However, with a little practice, additional copies from the same matrix can be made at about 4 seconds per copy.

Supplies: Activator fluid, one cartridge being good for about 1800 copies. A multiple matrix, good for 1 to 7 copies, or more of lesser quality. (Single copy matrix also available at reduced cost.)

Capabilities: Produces copies which are photographic in appearance, with moderate contrast. Some experimentation is necessary to produce good copies. Image is caused by chemical reaction and cannot rub off. Paper has the feel of ordinary bond. With exposure adjustment, will reproduce all colors or screen out colored backgrounds. Can be used to produce offset masters and transparencies of good quality. Useful in smaller, localized operation—not for use in centralized functions.

Service: Various service and maintenance contracts are available from individual dealers. Machine has very little downtime, however. It is considered more practical to obtain service as needed on the regular hourly rate basis.

Costs: *a.* Purchase, $316.00.

b. Supply costs will vary depending on the number of multiple copies made from any one matrix. The average is generally 4 to 1 and on this basis, the following chart shows costs by volume.

Figure 10

EASTMAN KODAK CAVALCADE

Purchase

Volume per month	Purchase cost	Supplies	Monthly svc cost	Total monthly cost	Unit cost	Remarks
1,000	5.27	27.61	2.50	35.38	.0354	Average ratio is 4:1—250 masters to each 1000 copies.
2,000	5.27	55.22	2.50	62.99	.0315	
3,000	5.27	82.83	2.50	90.60	.0302	
4,000	5.27	110.44	2.50	118.21	.0296	An average of $30.00 per year has been used for maintenance service cost.
5,000	5.27	138.05	2.50	145.82	.0292	
10,000	5.27	276.10	2.50	283.87	.0284	
15,000	5.27	414.15	2.50	421.92	.0282	Purchase price $316.00.

Figure 10 (Continued)

OZALID MODEL 5017 (General Aniline and Film)

Type: Diazo.

Size: Table top model, 40'' wide, 41½'' deep, 28¼'' high. Not portable.

Electrical: 220 volt, 60 cycles, single phase, 15 amps.

Copy Paper: Chemically coated, but after development has the feel of ordinary bond paper. Rolls are available from 8'' to 11'' wide and 600 feet long. Single sheet paper up to 19'' wide.

Original: Hand fed through series of rollers. Must be translucent, having image on one side only; can be onionskin second sheets or transparency. Image on original should be dark for best results. Will not accept bound volumes.

Operation: The emulsion on the copy paper is a diazo coating. When the original is fed through receiving rollers, the copy paper is automatically cut to the length of the original. It then passes under a mercury vapor lamp which burns out the diazo coating in excess of the image. Original is returned immediately after exposure. Copy paper continues through the machine into development chamber where the ammonia darkens the remaining coating into a readable image. Adjustable speed dial regulates exposure time. Venting is necessary to dissipate ammonia fumes.

Speed: Depending on condition of original master, machine can make copies as rapidly as one per second. However, this is faster than original can be fed, and the average is between 2 and 3 seconds per copy.

Supplies: Anhydrous ammonia, one tank lasting about 6 months.

Capabilities: The greatest advantages of the diazo method are its speed and economy of operation. It is limited, however, in that it cannot copy from opaque papers or papers having an image on two sides. Quality of copy will vary from excellent to poor since it is wholly dependent on the translucency and image opacity of the original master. Downtime is minimal. Considered to be capable of large volume production on a continuous basis. Not practical for small volume in local operations. Can also be used for making high quality transparencies. This and other high speed diazo machines can be used in a system in conjunction with an electrostatic copier which can make translucent masters.

Service: *a. Purchase.* Within a radius of 25 miles from a service center, contract is $100.00 per year for a quarterly check (up to 50 hours use per week); $135.00 for bimonthly check (from 51 to 99 hours use per week); and $225.00 for a monthly check (100 hours and over use per week). These rates increase when the 25 mile radius is exceeded. Contract does not include parts or interim calls. It covers only normal maintenance.

b. Rental. All maintenance, service and parts are provided except printing lamp and service calls in excess of 4 times per year.

Costs:

a. Purchase.
(1) Equipment $2530.00.
(2) Installation $25.00.

b. Rental.
(1) Monthly fee $132.50 if within radius of 25 miles of a GAF service center. There is an additional charge of $.07 for each mile the location exceeds the 25 mile radius.
(2) Machines used more than 50 hours per week will have an additional charge of 40% of the rental fee.
(3) If a rented machine is purchased within the first 3 months, 80% of the total rental fee may be credited; within 6 months, 65%; after 6 months, 55%.

c. Supplies.
(1) Paper costs .0040 per 8½'' x 11'' copy.
(2) Ammonia, $8.40 per month, regardless of volume.

Note: For pertinent cost data at varying volumes of copies see figure 21.

Figure 11

237-114 O—67——5

SAVIN CUSTOM SAHARA "200"

Type: Direct Electrostatic (Electrofax).

Size: Table Model; 18" wide, 26¾" deep, 15¾" high; 123 lbs; portable.

Electrical: 117 volts, 60 cycles, 14.5 amps. May be used in any grounded outlet.

Copy Paper: Coated type; furnished in roll form 460 feet long, and in five widths, 4", 5½", 8", 8½", and 11". Marked easily by metal objects.

Original: Roller exposure mechanism; original passes through unit. Besides single sheets, it will accept manifold sets or folded originals, as well as medium weight card.

Operation: Machine is turned on, density control set, and number of copies dialed. Original is inserted into feed slot and emerges into angled tray at bottom. Copy emerges at top of unit. Up to 15 copies can be made by turning the selector knob; original stays in exposure mechanism until all copies are exposed; selector knob returns to "single" after last exposure. New original can be fed when "insert" light comes on, even though copy is not yet delivered. Operates on principle of liquid toner and liquid dispersant. Copy paper passes through liquid mix and is dried by both pressure and warm air. There is no fusing. Signal light indicates need to add dispersant, although machine will continue to operate with light on.

Speed: No warm-up time. First copy takes 30 seconds; each copy thereafter about 12 seconds.

Supplies: Electromix (dispersant and toner) packed 9 quarts of dispersant to case with one 8-oz cartridge of toner. Sufficient to run about 15,000 copies per case.

Capabilities: Machine furnishes a consistently good quality copy with high to medium contrast, depending upon the original image density and sharpness. Density control has a wide latitude to reproduce various colors and screen out colored or dirty backgrounds. Density control setting of 5 to 7 seems to be best for most common-type originals, but a readable copy can be made at any setting, and this is a particular advantage on this type of copier. Settings 7 to 9 do very well in screening out colored backgrounds. Produces a good copy of halftones and solids, and a fair copy of photographs. Does well with light blues, and light density original images. The unit has an "electronic eye" which reportedly gauges the amount of toner needed by scanning the original image. Under normal handling, image is highly resistant to smearing. Because of roll paper, can make a copy of any reasonable length. Carrier must be used for originals having overlays or torn edges to avoid their being caught in rollers. If an original does fail to return, the exposure unit is easily removed in seconds without tools and is simple to replace. Considered to be a good machine for medium volume in localized or semicentralized activities.

Service:

a. Rental. Repairs and maintenance provided by the manufacturer.

b. Purchase. Two options are available:

(1) By on-call service as needed at existing hourly rates and repair costs.

(2) By yearly contract at a rate of $100.00 up to 25 miles from a service point, $120.00 from 26 to 35 miles, and $140.00 from 36 to 50 miles. Maintenance consists of four inspections a year and covers replacement of all parts except lamps and motors.

Costs:

a. Rental.

(1) One time installation charge of $50.00.

(2) Flat rental fee of $35.00 per month.

(3) No minimum copy requirement.

(4) If later purchased, the installation fee, plus $25.00 for each rental month up to 30 months will be credited against the full purchase price.

b. Purchase price: $1075.00.

c. Supplies.

(1) *Paper.* For 8½" x 11" size, from $33.00 per M copies to $27.00 per M, depending on quantity purchased.

(2) *Electromix.* $14.25 per case of 9 quarts of dispersant and 1 cartridge of toner.

d. Volume costs are shown on the chart on reverse side.

Figure 12

SAVIN CUSTOM SAHARA "200"

Rental

Volume Mo.	Rental	Supplies	Total	Unit Cost	Remarks
1000	35.00	34.35	69.35	.0693	1. Installation fee of $50.00 *not* included in costs.
2000	35.00	61.70	96.70	.0483	
3000	35.00	92.55	127.55	.0426	2. No minimum copy requirements.
4000	35.00	123.40	158.40	.0396	
5000	35.00	154.25	189.25	.0378	3. Paper in Supply column based on 6-month purchase.
10000	35.00	308.50	343.50	.0343	
15000	35.00	462.75	497.75	.0332	
20000	35.00	599.00	634.00	.0317	
30000	35.00	898.50	933.50	.0312	

Purchase

Volume Mo.	Purchase	Supplies	Service	Total Cost	Unit Cost	Remarks
1000	17.92	34.35	8.34	60.61	.0606	1. Service based on minimum of 25-mile radius.
2000	17.92	61.70	8.34	87.96	.0439	
3000	17.92	92.55	8.34	118.81	.0397	2. Paper in Supply column based on 6-month purchase.
4000	17.92	123.40	8.34	149.66	.0375	
5000	17.92	154.25	8.34	180.51	.0362	
10000	17.92	308.50	8.34	334.76	.0335	
15000	17.92	462.75	8.34	489.01	.0327	
20000	17.92	599.00	8.34	625.26	.0313	
30000	17.92	898.50	8.34	924.76	.0309	

Figure 12 (Continued)

SCM 44

Type: Direct Electrostatic (Electrofax).

Size: Table model, 18" wide, 27" deep, 16" high; 105 lbs. Rests on 14" swivel (360°) base. Portable.

Electrical: 115 volts, 60 cycles, 13 amps. Any outlet. May be ordered to meet any electrical specifications.

Copy Paper: Sizes from 4½" x 8½" to 11" x 17". May special order up to 11" x 23". Coated paper, slightly heavier than bond; surface marks easily. Automatic feed. Magazine capacity, 250 sheets. Must be thoroughly "riffled" to prevent double feed.

Original: Roller exposure mechanism, original passes through unit. Will accept up to 1/16" thick booklet. Will not accept bound volumes or rigid material.

Operation: Original fed into opening. Up to 10 copies can be made by turning the selector knob. Original stays in feed mechanism until all copies are made; dial setting returns to "single" after last copy. Operates on principle of liquid toner and liquid toner dispersant. Dispersant is sprayed on copy paper and dried by pressure. No fusing. Feed light does not go on when copy paper supply is exhausted. Signal light indicates need to add dispersant. Replenisher is added automatically, but supplemental button can be pressed to add extra replenisher.

Speed: No warm up time. About 6 to 7 seconds each copy. No cool-off period.

Supplies:

a. Dispersant (vehicle). Available 12 quarts to a case, sufficient to run about 20,000 copies.

b. Replenisher (toner). Available in cartridges, each one good for minimum of 2500 copies.

Capabilities: Copier is capable of making copies of any color with varying degrees of shading. Medium contrast. Machine can accommodate 2 sizes of copy paper at one time. Has slight background toning. Image is highly resistant to smearing. Good on solids, photographs and halftones. Has adjustable dial to compensate for exceptionally light or dark originals. A good machine for local activity. Not a high volume producer, capable of medium volume. Downtime relatively infrequent.

Service:

a. Rental. Monthly charge covers all maintenance. Regular periodic inspections.

b. Purchase. First year guarantee covers all parts and labor. Contract available at $85.00 per year. Contract covers all maintenance except replacement of lamps and motor.

Costs: [1]

a. Rental.

(1) Installation $50.00.
(2) $30.00 per month fee.
(3) Service charge $7.50 per month.
(4) At any time during rental period, rentals paid up to three months per unit plus the $50.00 installation charge will be credited toward the purchase price of each unit.

b. Purchase. Purchase price is $1075.00.

c. Supplies.

(1) *Copy paper.* Size 8½" x 11" priced from $32.16 per M copies to $26.50 per M depending upon volume purchased.
(2) *Dispersant.* $13.25 per case (12 quarts).
(3) *Replenisher.* Furnished with paper at no extra cost. If competitive paper is used, replenisher is $20.50 per ½ pint.

d. Volume costs are shown on the following chart.

[1] See footnote on next page.

Figure 13

SCM 44 [1]

Rental

Volume per Month	Rental Cost	Svc. Charge	Supplies	Total Monthly Cost	Unit Cost	Remarks
1, 000	30. 00	7. 50	32. 47	69. 97	. 0699	1. $50.00 installation fee *not* included in costs.
2, 000	30. 00	7. 50	62. 14	99. 64	. 0498	2. No minimum copy requirements.
3, 000	30. 00	7. 50	93. 21	130. 71	. 0435	3. Replenisher included in price of paper.
4, 000	30. 00	7. 50	118. 28	155. 78	. 0390	4. Paper cost in Supply column based on 6-month purchase.
5, 000	30. 00	7. 50	147. 85	185. 35	. 0370	
10, 000	30. 00	7. 50	295. 50	333. 00	. 0333	
15, 000	30. 00	7. 50	442. 05	479. 55	. 0319	
20, 000	30. 00	7. 50	569. 40	606. 90	. 0304	
30, 000	30. 00	7. 50	854. 10	891. 60	. 0297	

Purchase

Volume per Month	Purchase Cost	Svc. Charge	Supplies	Total Monthly Cost	Unit Cost	Remarks
1, 000	17. 92	7. 09	32. 47	57. 48	. 0574	1. Replenisher included in price of paper.
2, 000	17. 92	7. 09	62. 14	87. 15	. 0436	2. Paper cost in Supply column based on 6-months purchase.
3, 000	17. 92	7. 09	93. 21	118. 22	. 0395	3. Service based on $85.00 per year.
4, 000	17. 92	7. 09	118. 28	143. 29	. 0359	
5, 000	17. 92	7. 09	147. 85	172. 86	. 0346	
10, 000	17, 92	7. 09	295. 50	320. 51	. 0321	
15, 000	17. 92	7. 09	442. 05	467. 06	. 0312	
20, 000	17. 92	7. 09	569. 40	594. 41	. 0298	
30, 000	17. 92	7. 09	854. 10	879. 11	. 0294	

[1] Pricing changes have occurred since preparation of these charts. See the latest Authorized Federal Supply Schedule Price List of the manufacturer for revised charges.

Figure 13 (Continued)

SCM 33

General: All factors on this machine are the same as on Model 44 except the following:

Operation: Basically the same as Model 44, except that original is fed into opening for each copy wanted.

Service:

a. Rental. Same as Model 44.

b. Purchase. First year guarantee covers all parts and labor. Contract available at $80.00 per year. Contract covers all maintenance except replacement of lamps and motor.

Cost: [1]

a. Rental.

(1) Installation $50.00.
(2) $25.00 per month fee.
(3) Service charge $7.50 per month.
(4) At any time during rental period, rentals paid up to three months per unit plus the $50.00 installation charge will be credited toward the purchase price of each unit.

b. Purchase. Price is $875.00.

c. All other cost factors the same as the Model 44. Volume costs are shown on the following chart.

[1] See footnote on next page.

Note: SCM has announced the availability under a rental plan of the Coronastat 55 console model multiple copier. This machine, if the copy selector knob is set on "Continuous", can produce as many copies of a document as are included in its paper supply at a claimed rate of 8 copies a minute. There is no installation charge and the cost of supplies is included in the monthly meter charge. The monthly rates announced by the company are:

First 2,000 (Minimum)	copies @	5¾ cents a copy.
2,001–3,000	copies @	4 cents a copy.
3,0001–6,000	copies @	3 cents a copy.
6,001–10,000	copies @	2 cents a copy.
Over 10,000	copies @	1½ cents a copy.

Figure 14

SCM 33 [1]

Rental

Volume per Month	Rental Cost	Svc. Charge	Supplies	Total Monthly Cost	Unit Cost	Remarks
1, 000	25. 00	7. 50	32. 47	64. 97	. 0649	1. $50.00 installation fee *not* included in costs.
2, 000	25. 00	7. 50	62. 14	94. 64	. 0473	
3, 000	25. 00	7. 50	93. 21	125. 71	. 0420	2. No minimum copy requirements.
4, 000	25. 00	7. 50	118. 28	150. 78	. 0377	
5, 000	25. 00	7. 50	147. 85	180. 35	. 0360	3. Replenisher included in price of paper.
10, 000	25. 00	7. 50	295. 50	328. 00	. 0328	
15, 000	25. 00	7. 50	442. 05	474. 55	. 0317	4. Paper cost in Supply column based on 6-month purchase.
20, 000	25. 00	7. 50	569. 40	601. 90	. 0301	
30, 000	25. 00	7. 50	854. 10	886. 60	. 0296	

Purchase

Volume per Month	Purchase Cost	Svc. Charge	Supplies	Total Monthly Cost	Unit Cost	Remarks
1, 000	14. 92	6. 67	32. 47	54. 06	. 0540	1. Replenisher included in price of paper.
2, 000	14. 92	6. 67	62. 14	83. 73	. 0419	
3, 000	14. 92	6. 67	93. 21	114. 80	. 0383	2. Paper cost in Supply column based on 6-month purchase.
4, 000	14. 92	6. 67	118. 28	139. 87	. 0350	
5, 000	14. 92	6. 67	147. 85	169. 44	. 0339	3. Service based on $80.00 per year.
10, 000	14. 92	6. 67	295. 50	317. 09	. 0318	
15, 000	14. 92	6. 67	442. 05	463. 64	. 0310	
20, 000	14. 92	6. 67	569. 40	590. 99	. 0296	
30, 000	14. 92	6. 67	854. 10	875. 69	. 0292	

[1] Pricing changes have occurred since preparation of these charts. See the latest Authorized Federal Supply Schedule Price List of the manufacturer for revised charges.

Figure 14 (Continued)

3–M THERMOFAX SECRETARY

Type: Thermal.

Size: Table model, 19½" wide, 15½" deep, 7½" high. 42 lbs. Portable.

Electrical: 110 volt.

Copy Paper: 8" x 10½" to 8½" x 14"—Special type—manual insertion for each copy. Lightweight stock, tissue appearance, somewhat brittle.

Original: Belt feed exposure. Will accept only originals which are fully flexible. Original travels through imaging unit.

Operation: Original and copy paper are sandwiched and inserted into opening. Action activates switch. Imaging accomplished by reflection from original to copy paper. One step process. Variable exposure control for light or dark originals. Machine shuts off automatically after delivery of copy.

Speed: Variable, depending on exposure setting. Averages about 4 to 7 seconds for each copy.

Supplies: None for making copies. Periodic replacement of belt and belt cleaning fluid.

Capabilities: Provides a fast method of making a reading or information copy. Will not pick up most writing inks; original image must contain metal base such as pencil, printing, typewriter, etc., to permit imaging on copy paper. May require experimentation for different densities of original image. Some brands of white copy paper may be used as Diazo masters. Has additional ability to provide spirit masters, transparencies, and paper offset mats. Practical for small localized output.

Service: Yearly contract is available for $26.00 per year, including lamps and belts.

Costs: *a. Purchase.* Price $371.42.

b. Paper Costs. Vary widely, since it is offered by numerous manufacturers, and is made in many different grades. Cost is between $1.60 and $4.50 per hundred sheets depending upon the quality desired.

Figure 15

237-114 O—67——6

3–M 209 DUAL SPECTRUM-AUTOMATIC

Type: Dual Spectrum.

Size: Table Model, 47'' wide, 31'' deep, 13'' high, 219 lbs. Portable.

Electrical: 100–125 volts. 60 cycles.

Copy Paper: Specially coated type, but will not smear and is not subject to marking under normal handling. Although coated, it is much like ordinary bond paper. Maximum size is 8½'' x 11''. Loads in magazine, about 200 sheets.

Original: Roll fed but passes through rollers rather than around them. Flexibility of original not overly important. Bound volumes can be copied either by an automatic or manual exposure feature.

Operation: Automatic for single sheet original. Manual or automatic exposure for books, after which copy is made and delivered automatically. Operates from an "Intermediate" paper which comes in rolls. Exposure is made to this paper and latent image is then transferred on to "Receptor" paper by means of physical heat. Intermediate paper automatically is re-exposed to destroy latent image for security purposes. Up to 25 copies of one original can be made by dial setting.

Speed: About 12 seconds per copy.

Supplies: Intermediate paper, 650 copies to the roll, regardless of size of original (up to 8½'' x 14'').

Capabilities: Will copy all colors, but with a varying degree of density. It can also be adjusted to screen out unwanted colored paper background. Although rollers are involved in feeding original, it follows a straight path to a flatbed exposure area, which enables the feed mechanism to accept less flexible material. Because the process is somewhat similar to photographic principles, solids, photos, and halftones reproduce with good fidelity and trueness of tone. The image is considered to be permanent. Machine can be used to make transparencies and translucent masters for diazo. Considered good for a specialized, local function, rather than for general use in a centralized activity.

Service:

a. Rental. All maintenance, repair and service provided by the manufacturer.

b. Purchase. Annual contract available for $180.00 to $208.00 depending on the zone. Rate decreases with more than 5 machines in the same location. Service covers all maintenance and repairs.

Costs:

a. Rental.

(1) Charge of .01 for each copy.

(2) Minimum charge per month, $25.00 (2500 copies).

b. Purchase. Price is $1465.10. With purchase of a rented machine, 100% of the meter charge may be applied to the cost within 60 days of installation; after 60 days, 50% of the meter charge may be applied up to 50% of the purchase price.

c. Paper.

(1) Intermediate paper $15.39 per M.

(2) Receptor paper, size 8½'' x 11'' $19.00 per M.

d. Volume costs are shown on chart on reverse side.

Figure 16

3–M 209 DUAL SPECTRUM-AUTOMATIC

Rental

Volume per Month	Rental Cost	Supplies	Total Monthly Cost	Unit Cost	Remarks
1, 000	25. 00	34. 39	59. 39	. 0594	1. Minimum, 2,500 copies per month.
2, 000	25. 00	68. 78	93. 78	. 0469	2. Meter charge, .01 per copy.
3, 000	30. 00	103. 18	133. 18	. 0443	
4, 000	40. 00	137. 57	177. 57	. 0443	
5, 000	50. 00	171. 96	221. 96	. 0443	
10, 000	100. 00	343. 90	443. 90	. 0443	
20, 000	200. 00	687. 80	887. 80	. 0443	
30, 000	300. 00	1, 031. 70	1, 331. 70	. 0443	
40, 000	400. 00	1, 375. 60	1, 775. 60	. 0443	

Purchase

Volume per Month	Purchase Cost	Supplies	Monthly Svc. Cost	Total Monthly Cost	Unit Cost	Remarks
1, 000	24. 41	34. 39	15. 00	73. 80	. 0738	Service based on $180.00
2, 000	24. 41	68. 78	15. 00	108. 19	. 0549	minimum.
3, 000	24. 41	103. 18	15. 00	142. 59	. 0475	
4, 000	24. 41	137. 57	15. 00	176. 98	. 0442	
5, 000	24. 41	171. 96	15. 00	211. 37	. 0422	
10, 000	24. 41	343. 90	15. 00	383. 31	. 0384	
20, 000	24. 41	687. 80	15. 00	727. 21	. 0364	
30, 000	24. 41	1031. 70	15. 00	1071. 11	. 0358	
40, 000	24. 41	1375. 60	15. 00	1415. 01	. 0354	

Figure 16 (Continued)

XEROX 330; 420/3; 420/2; 720

330

This machine is similar to the 813, differing only in the following aspects:

a. Pricing. A new machine is furnished on a rental basis only. It is equipped with 3 meters, the fees being based on the number of copies made of one original.

The first 3 copies are .04 each; the next 4 to 10 are .02 each; and 11 and up are .01 each. Minimum is $60.00 per month, but there is no monthly use charge.

b. Purchase. Machine cannot be purchased new, nor is there any reason to do so. However, a rented one currently in use may be purchased under the same terms as a lease-purchase 813.

c. Multiple copy dial can be set up to 15 for continuous copying.

420/3

This machine is identical to the 914 except for the following:

a. Pricing. A new machine is furnished on a rental basis only. It is equipped with 3 meters, the fees being based on the number of copies made of one original. The first three copies are .04 each; the next 4 to 10 are .02 each; and 11 and up are .01 each. Minimum is $175.00 per month, but there is no monthly use charge.

b. Purchase. Machine cannot be purchased new, and there is no advantage in doing so. However, a rented one currently in use may be purchased under the same terms as a lease-purchase 914.

420/2

a. General. All factors applicable to the 420/3 are the same on the 420/2 except for metering. The 420/2 is equipped with 2 meters, the rates being .04 each for the first 3 copies, and .02 each for those from 4 up. Minimum is $175.00 per month.

b. Purchase. This model is no longer being made or supplied. However, where currently in use, it can be continued under the dual metering plan, or converted to a 420/3, or purchased under the same terms as a lease-purchase 914.

720 (Plan "A"—Modular Pricing)[1]

This is the newest of the Xerox line of copiers and it is similar in appearance to the 914 but with some style modifications. It operates on the same principle, however, except for the following features:

a. Multiply copy dial can be set up to 20, or for continuous copies.

b. It is available for rental only, having 3 meters with the same price range as the 420/3. Minimum is $225.00 per month, but there is no monthly use charge.

c. Speed is greater than the 914 or 420 series. The 720 produces 12 copies of an original per minute after warm-up time.

Costs

These four machines have one thing in common and that is they all operate on multiple metering systems. Supply costs are the same as those for the 813 and 914 respectively. Comparative unit costs are shown on the chart on the reverse side, based on 1 to 15 copies of one original, and presupposing a monthly volume of between 17 and 23 thousand copies. The volume per month has no bearing on the cost of copies except that it must be sufficient to meet the minimum set for each model.

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[1] This machine is also available under a high volume rental plan (Plan "B" or "XDP") similar to that offered for Models 813 and 914. This plan for high-volume users is based on the total monthly copying workload regardless of the number of copies made of particular documents. There is a minimum monthly charge of $600.00 for the first 36,000 copies made and succeeding copies are at .0139 per copy. In addition to a cost advantage, the added speed of this machine provides another advantage over the Model 914 in heavy volume situations. See figure 19 for more details.

The manufacturer has also announced, but not yet marketed, other modified and speedier versions of the 813 and 914 models.

Figure 17

COMPARATIVE UNIT COST OF XEROX 330, 420/2, 420/3, AND 720

(Based on supplies for 17M to 23M per Month)

Copies per Original	330				420/2				420/3 and 720			
	Meter	Supply	Total	Unit	Meter	Supply	Total	Unit	Meter	Supply	Total	Unit
1	.04	.00672	.04672	.04672	.04	.00817	.04817	.04817	.04	.00817	.04817	.04817
2	.08	.01344	.09344	.04672	.08	.01634	.09634	.04817	.08	.01634	.09634	.04817
3	.12	.02016	.14016	.04672	.12	.02451	.14451	.04817	.12	.02451	.14451	.04817
4	.14	.02688	.16688	.04172	.14	.03268	.17268	.04317	.14	.03268	.17268	.04317
5	.16	.03360	.19360	.03872	.16	.04085	.20085	.04017	.16	.04085	.20085	.04017
6	.18	.04032	.22032	.03672	.18	.04902	.22902	.03817	.18	.04902	.22902	.03817
7	.20	.04704	.24704	.03530	.20	.05719	.25719	.03675	.20	.05719	.25719	.03675
8	.22	.05376	.27376	.03422	.22	.06536	.28536	.03567	.22	.06536	.28536	.03567
9	.24	.06048	.30048	.03339	.24	.07353	.31353	.03484	.24	.07353	.31353	.03484
10	.26	.06720	.32720	.03272	.26	.08170	.34170	.03417	.26	.08170	.34170	.03417
11	.27	.07392	.34392	.03127	.28	.08987	.36987	.03363	.27	.08987	.35987	.03272
12	.28	.08064	.36064	.03006	.30	.09804	.39804	.03317	.28	.09804	.37804	.03151
13	.29	.08736	.37736	.02903	.32	.10621	.42621	.03279	.29	.10621	.39621	.03048
14	.30	.09408	.39408	.02815	.34	.11438	.45438	.03246	.30	.11438	.41438	.02960
15	.31	.10080	.41080	.02739	.36	.12255	.48255	.03217	.31	.12255	.43255	.02884

Figure 17 (Continued)

XEROX 813

Type: Transfer Electrostatic.

Size: Table model. 19⅝" wide, 26" deep, 17¼" high. Portable.

Electrical: 115 volt, 60 cycle, 15 amps. Requires clear line.

Copy Paper: 8" x 10½" to 8½" x 14". Standard paper, 20 lb. only. Prone to jam with other weights. Accommodates about 150 sheets in magazine loading. Automatic feed.

Original: Roller feed exposure. Will accept only lightweight flexible original which passes through machine, up to 9" x 14".

Operation: Selector knob for 1 to 10 copies automatically; insertion of original activates start switch. Warning light shows when to feed next original. Buzzing sound indicates copy paper low. Fuse image by heat. Warning light shows when web needs replacing; machine will automatically stop and will not feed next original.

Speed: First copy 26 seconds. Subsequent copies from same original about 11.5 seconds.

Supplies:

a. Drum cleaning web, good for about 1300 copies. Machine will cease to operate at 1500.
b. Developer, one loading good for about 14,000 copies.
c. Toner, dry powder form, about 10,000 copies from 1 lb.

Capabilities: Provided proper maintenance is given, will usually make a clear copy. Does poorly on solids, photos and halftones; light blues come out weak but can be improved by use of a yellow acetate carrier for the original. If not fed properly, original can trigger activating switch, but fail to take original in. Cure for this is to push original into feeding aperture until a slight buckle appears; machine will not take original until it is ready.

Copy is automatically reduced in size by about 6%. It is not a high volume producer because—

a. It has a relatively slow speed.
b. The web must be replaced at least every 1500 copies; causes delay if servicing personnel are not immediately available.
c. Copy paper magazine holds only 150 sheets;
d. It will not copy bound volumes;
e. Copy and original delivery tray has tendency to become clogged due to static.

Despite these factors, the machine is considered very practical on a purchase basis for localized applications, since—

a. It is small and compact, can be put just about anywhere;
b. It can be plugged into ordinary outlet;
c. It is one of the few table models which has a fusing element;
d. It uses ordinary paper.

Service:

a. Rental. All repairs and maintenance except for the drum cleaning web are provided by the company. Servicing is at regular intervals.
b. Purchase. There are two options:
(1) By yearly contract at a rate of .012 per copy. Servicing is the same as for rental.
(2) By oncall service as needed at existing hourly rates and repair costs.
(3) By training of customer employee by Xerox Corp. at a cost of $320.00 plus tool kit and any transportation and living expenses which may be involved.

Costs:

a. Rental. Minimum 500 copies per month. No use charge.
First 1500 copies .045 each.
All additional .035 each. (New plan "B" rates shown on chart.)
b. Purchase. $4,000. A rental customer can apply up to $1,000 of meter charges for the prior 18 months toward the gross purchase price.
c. Supplies. All supplies for either rental or purchase plan will vary from $7.15 to $6.43 per M copies.
d. Volume. Volume costs are shown on the following chart. Compare carefully the unit costs under both the rental and purchase plans.

Figure 18

XEROX 813

Rental

Volume per Month	Rental Cost	Supplies	Total Monthly Cost	Unit Cost	Remarks
1, 000	45. 00	7. 15	52. 15	. 0522	1. 500 minimum per month. 1st 1500—.0450. All addtl.—.0350.
1, 500	67. 50	10. 72	78. 22	. 0522	
2, 000	85. 00	14. 30	99. 30	. 0496	2. No monthly use charge.
2, 500	102. 50	17. 87	120. 37	. 0482	3. Supplies computed on amount of toner purchased on 6-month basis.
3, 000	120. 00	21. 45	141. 45	. 0471	
4, 000	155. 00	28. 60	183. 60	. 0459	
5, 000	190. 00	35. 75	225. 75	. 0451	
PLAN "B," HIGH VOLUME RENTAL					
4, 950	150. 00	35. 39	185. 39	. 0374	1. Minimum monthly charge of $150.00 for first 4950 copies.
5, 000	151. 14	35. 75	186. 89	. 0373	
10, 000	264. 64	68. 50	333. 14	. 0333	2. Succeeding copies at .0227 per copy.
15, 000	378. 14	100. 80	478. 94	. 0319	

Purchase

Volume per Month	Purchase Cost	Supplies	Monthly Svc. Cost	Total Monthly Cost	Unit Cost	Remarks
1, 000	66. 67	7. 15	12. 00	85. 82	. 0858	1. Purchase price $4000.
1, 500	66. 67	10. 72	18. 00	95. 39	. 0636	2. Monthly service cost includes drum at .012.
2, 000	66. 67	14. 30	24. 00	104. 97	. 0525	
2, 500	66. 67	17. 87	30. 00	114. 54	. 0459	3. Supplies computed on amount of toner purchased on 6-month basis.
3, 000	66. 67	21. 45	36. 00	124. 12	. 0414	
4, 000	66. 67	28. 60	48. 00	143. 27	. 0359	
5, 000	66. 67	35. 75	60. 00	162. 42	. 0325	
10, 000	66. 67	68. 50	120. 00	255. 17	. 0256	
15, 000	66. 67	100. 80	180. 00	347. 47	. 0232	

Figure 18 (Continued)

XEROX 914

Type: Transfer Electrostatic.

Size: Floor model, 45'' wide, 46'' deep, 42'' high.
640 pounds. Not portable.

Electrical: 120 volts, 60 cycles, 20 amps. Requires 25–30 amp clear line.

Copy Paper: 7'' x 7'' to 10'' x 15½''. Standard paper, 20 lb. minimum. Card stocks and paper masters. Has tendency to jam with less than 20 lb. weight paper. Accepts translucent paper if loaded with care. Accommodates about ¾'' (about 200 sheets) in magazine loading. Automatic feed.

Original: Flat bed exposure. Accepts sheets, books, 3-dimensional objects. Original does not enter machine.

Operation: Selector knob for 1 to 15 copies automatically; can also be set on "Multiple" for indefinite run, stopping only when counter is set to "1". Print button activates exposure and complete processing. Warning light shows when to expose new original. Flashing light indicates copy paper low. Fuses image by heat.

Speed: Warm up time from cold machine, 24 seconds.
First copy, 32 seconds.
Subsequent copies from same original, 8 seconds.

Supplies: *a.* Selenium coated drum, good for an average of 60,000 copies if properly cared for. (Guaranteed for 20,000.)
b. Glass bead developer, good for a maximum of 35,000 copies before replacing.
c. Toner, dry powder form, about 10,000 copies from 1 lb.
d. Miscellaneous, such as cleaning absorbent, film remover, brush (if purchased), filter bag (if purchased).

Capabilities: Will deliver a good copy fairly consistently but has occasional failures. Very poor on solid areas, photos and halftones. Does satisfactorily with light blue if original is covered with a yellow transparent film. Offset paper mats can be satisfactorily made. Considered a good machine for large volume, continuous production and centralized or semi-centralized locations.

Service: *a. Rental.* All repair and maintenance are provided by the Xerox Corp., except drum replacement. Servicing is at regular intervals.
b. Purchase. There are three options (in all cases, drum replacement cost is the same).
(1) By yearly contract at a rate of .009 per copy. Service and maintenance is the same as for rental.
(2) By oncall service as needed at existing hourly rates and repair costs.
(3) By training of customer employee by Xerox Corp. at a cost of $400.00 plus tool kit and transportation and living expenses which may be involved.

Costs: *a. Rental.* Minimum 1,400 copies per month. Use charge of $25.00 per mo. regardless of volume.

First 20,000 copies	.0350 each	
Next 5,000 copies	.0325 each	(New plan "B" rates shown on chart.)
Next 5,000 copies	.0300 each	
All Addtl.	.0250 each	

b. Purchase. $25,000. A rental customer can apply up to $12,500 in meter and use charges for the prior 24 months toward the gross purchase price.
c. In either rental or purchase, the customer pays $95.00 for drum replacement.
d. Supply costs in either rental or purchase plan, will vary from $8.60 to $7.88 per M copies.
e. Volume costs are shown on the charts on the reverse side. Compare carefully the unit costs under both the rental and purchase plans.

Figure 19

XEROX 914

Rental

Volume per Month	Rental Cost	Supplies	Total Monthly Cost	Unit Cost	Remarks
1, 400	74. 00	12. 04	86. 04	. 0614	1. $25.00 use charge included in Rental.
2, 000	95. 00	17. 20	112. 20	. 0561	2. 1,400 minimum per month.
3, 000	130. 00	25. 80	155. 80	. 0520	1st 20,000—.0350
4, 000	165. 00	34. 40	199. 40	. 0499	Next 5,000—.0325
5, 000	200. 00	43. 00	243. 00	. 0486	Next 5,000—.0300
10, 000	375. 00	83. 00	458. 00	. 0458	All addt'l—.0250
20, 000	725. 00	163. 40	888. 40	. 0445	3. Supplies computed on amount of toner purchased on 6-month basis.
			XEROX 914 PLAN "B", HIGH VOLUME RENTAL		
16, 800	400. 00	137. 16	537. 16	. 0319	1. Minimum monthly charge of $400.00 for first 16,800 copies made. No use charge included.
20, 000	457. 28	163. 40	620. 68	. 0310	2. Succeeding copies at .0179 per copy.
30, 000	636. 28	240. 60	876. 88	. 0290	
40, 000	815. 28	320. 80	1, 136. 08	. 0284	
50, 000	994. 28	394. 00	1, 388. 28	. 0278	
60, 000	1, 173. 28	462. 80	1, 636. 08	. 0273	
			XEROX 720 PLAN "B", HIGH VOLUME RENTAL (See Figure 17 for Plan "A" Data on This Machine)		
36, 000	600. 00	287. 72	887. 72	. 0247	1. Minimum monthly charge of $600.00 for first 36,000 copies made. No use charge included.
40, 000	655. 60	320. 80	976. 40	. 0244	2. Succeeding copies at .0139 per copy.
50, 000	794. 60	394. 00	1, 188. 60	. 0238	
60, 000	933. 60	462. 80	1, 396. 40	. 0233	

Purchase

Volume per Month	Purchase Cost	Supplies	Monthly Svc. Cost	Total Monthly Cost	Unit Cost	Remarks
1, 400	416. 67	12. 04	12. 60	441. 31	. 3152	1. Purchase price $25,000.
2, 000	416. 67	17. 20	18. 00	451. 87	. 2260	2. Supplies computed on amount of toner purchased on 6-month basis.
3, 000	416. 67	25. 80	27. 00	469. 47	. 1565	
4, 000	416. 67	34. 40	36. 00	487. 07	. 1218	
5, 000	416. 67	43. 00	45. 00	504. 67	. 1010	
10, 000	416. 67	83. 00	90. 00	589. 67	. 0590	
20, 000	416. 67	163. 40	180. 00	760. 07	. 0381	
30, 000	416. 67	240. 60	270. 00	927. 27	. 0310	
40, 000	416. 67	320. 80	360. 00	1097. 47	. 0275	
50, 000	416. 67	394. 00	450. 00	1206. 67	. 0242	
60, 000	416. 67	462. 80	540. 00	1419. 47	. 0237	

Figure 19 (Continued)

VI. COPIER COSTS

The preceding figures covering selected individual copiers have provided an explanation of the operating procedures and capabilities of the evaluated machines, and also data on unit costs at varying volumes of copies produced under rental and purchase plans. Since unit cost data is an important consideration in selecting a copier, a clear understanding should be had of how best to use this data. It should be realized that only certain copy-preparation costs which could be easily measured were included in the unit cost computations of the figures. As explained in this chapter—which covers copier costs in general—other costs which are not so easily measured can affect the overall monetary liability a copier installation represents to an agency. These intangible costs must also be considered.

Importance of Per-Copy Cost

Although the cost-per-copy information included in figures 4 through 19—or similar information prepared for other machines—may not be fully comprehensive in coverage, it does provide a usable guide for comparing the prices and charges of various manufacturers, each of whom might use different techniques in stating his charges. These unit costs are, however, subject to frequent changes. A change in any one of the several elements comprising these unit costs will affect the overall cost per copy shown. To be most meaningful, the elements to be included in determining monthly cost per copy for rented copiers are (1) all meter or other monthly charges, and (2) estimates for separate supply costs at the projected monthly volume of copies produced. In a purchase situation, monthly cost per copy should reflect (1) the purchase price computed on the basis of a 5-year amortization, (2) supply costs at the projected volume of copies to be produced, and (3) for the more sophisticated machines, an allowance for monthly maintenance costs such as a service contract.

Even with such uniformity in estimating cost per copy, it is not appropriate to compare various copiers on this basis alone; for example, it is difficult to compare a machine costing $69.50 with one costing as high as $25,000 to buy. While it may be more valid to compare various machines employing the same copying process—electrostatic, for example—here again there can be a wide variance in the capabilities of the separate machines.

If each copying machine never failed to make a copy which suited the purpose, the cost per-copy figure would be a stable factor. Under such circumstances, it would be said positively that this copy cost so much more or less than that copy. However, this cannot be done because these machines and the people who use them are so unpredictable. Many other factors cause the cost per copy to be unstable. Among these are *waste*, *malfunction*, *downtime*, *frequency of servicing*, and *user carelessness*. Any one or all of these factors make a difference in cost.

Cost per copy within process groups varies only slightly among various copiers. For example, those of the charts included in figures 4 through 19 which cover selected electrostatic copiers have shown a variation in cost per copy of only about 1 to 2 cents at the volume of production for which the copiers were intended. In itself this hardly seems significant; yet when multiplied by the thousands of copies produced at a specific location, the monetary difference can be tremendous.

Overhead Costs

These costs are not so easy to figure, but they necessarily must be considered. The mechanics of the machine itself can materially influence overhead costs. Factors to consider include complexity of routine maintenance, ease of using controls, speed of copy production, simplicity of loading toner and paper, and amount of downtime.

Although such factors cannot always be expressed in terms of man-hours or dollars and cents,

they should be evaluated from an operational viewpoint. For example, in a high-volume situation, overall copying costs would be significantly affected by the speed of a copier. Labor costs could be doubled if a machine rated at 5 copies a minute were to be installed instead of one rated at 10 copies a minute.

Other Factors Affecting Cost

Misuse and inefficient use can inflate costs without necessarily showing up in any figures. Consider these possibilities to correct poor usage:

- Match the machine to the job to be done. Copying requirements are not all the same, even though appearance might seem similar.
- Establish controls and enforce them! Half-hearted controls are worse than none at all—they breed inconsistency and encourage partiality.
- Train authorized people to use the copiers. Even if copying is done in a do-it-yourself central location, certain people in an office can be designated who can use the machines.
- Advise supervisory and management personnel in the policies applicable to copying requirements, since they are in an ideal position to implement such policies.

Paper Quality

Special paper needed for a particular process or type of machine is always available from the equipment manufacturer, but many paper companies and equipment competitors offer such paper at reduced prices. Many of these are very suitable, but certain "bargain" papers may mean high waste because of hidden factors which cannot be immediately seen. Two are inconsistent quality and short shelf life. It is advisable to purchase a small amount for trial before placing an order for large quantities based on price only.

Purchase Versus Lease Costs

Federal Property Management Regulations, Subpart 101-25.5, covering purchase or lease determinations in procuring an office copier—included as appendix "A" of this handbook—provide general guidelines in deciding whether it is more economical to lease or purchase a copier. More specific guidance on the relative cost per copy under both a rental and a purchase plan is available in the comparative charts for the selected copiers included in figures 4 through 19.

When manufacturers offer both rental and purchase plans, it usually is more economical to purchase a copier than it is to lease one. There can be exceptions to this rule, however. One exception which requires careful comparison is the Xerox Model 914 because of its high initial purchase price and the variety of rental options offered by this manufacturer. From a cost standpoint, this particular machine must be treated in a special way, so as to obtain the full benefit of the various pricing arrangements. See figure 19 for more details.

One other possible exception involves the procurement of large high-volume machines by offices which may not have completed full-scale feasibility studies. In this situation, it may be advisable to lease the machine for a short trial period prior to purchasing it. Many machines are obtainable under a lease/purchase agreement, whereby a portion of the rental can later be applied to the purchase price. The lease period should be within whatever time limit the manufacturer has set to provide the highest possible application of rental payments to the purchase price.

VII. COPIER SELECTION

General Criteria

Consider the following general criteria before procuring a copier:

- Be sure a copying machine is the answer to your problem, rather than some other method of reproduction.
- Make sure you know your copying needs.
- Determine what kind of copies will best suit those needs.
- Sift the meaningful from the meaningless in sales talk and manufacturers' literature.
- View demonstrations on appropriate copiers.
- Take a "show me" attitude during demonstrations. Use your own test material for copies, whenever possible.
- Consider obtaining the loan of a machine you think will do the job, so that your people may test it themselves.
- Don't buy more capacity and quality than needed.

Analyzing Specific Factors

Before an office requests a copier, it should study thoroughly the factors which will affect the selection and operation of the copier, if procured. Officials should have answers to such questions as:

a. What type of documents will be copied? Are capabilities needed to copy documents having differing sizes, colors, backgrounds, bindings, thickness, or transparencies; and are photographs or halftones included?

b. How good must the copies be? A legible copy is usually the minimum requirement, whereas in a majority of cases it could be the maximum.

c. How many copies of each original will be required? It is important to know the average number of copies of each original since this influences the type of machine that should be selected. Some copying processes and some pricing plans permit making multiple copies at just a fraction of the cost of the first copy.

Figure 20 illustrates the experience of copier installations in the headquarters offices of the Department of the Army. The chart shows 2 significant percentages involving copying requests received which ranged from 1 copy per original to over 25 copies per original. The first column shows the percentage of originals in relation to the total originals submitted, the second shows the percentage of copies made in relation to the total copying work load.

An office requesting a copier should find out if the Army's experience is representative of its own pattern of requests for copies. If significant variations are discovered, a similar chart fitting the local situation should be developed.

d. How many total copies will be needed per month? The total number of copies per month is significant when a copier is being rented—especially when a minimum volume is required or when the meter charge per copy is reduced after a specified volume has been produced. In any case, it has a bearing on whether a light-duty or a heavy-duty copier is selected.

e. What will it cost for the machines, supplies, and maintenance? The cost consideration should be based on both the cost of the machine and the cost per copy. The most expensive machine does not always produce the best or the cheapest copies. Many machines will not produce copies as inexpensively as claimed by the manufacturer because the manufacturer gathers his data under ideal conditions and usually does not consider waste and maintenance costs.

f. What type of service will the manufacturer give? This will vary considerably from one manufacturer to another and from one location to another. In some cases regular rates will apply, while in others, the manufacturer sells a service contract with the machine.

g. How much time and skill will be required to operate the machine? On most machines very little skill is required, but each machine has its own operating characteristics. The important thing in this respect is that those individuals using a machine learn to use it properly.

Determining Your Requirements

Check on what your current procedures require and know how the copier will fit into office paperwork systems. A true evaluation might show some needs which really do not exist. Look over the kind of copying being done now, and find out who uses copies and for what purpose. For example, check into the following:

a. Are copies being made from originals which have an internal source to begin with? Maybe procedures require too few copies when the document is created.

b. Are most copies for temporary use? If so, a sophisticated machine is most likely not the solution. Look at less expensive ones.

c. Are most sent to the general public? It may be advisable to have quality capability in the machine.

d. Is high volume a factor? Consider carefully the speed of a copier as well as other factors.

e. What is the ratio of copies to the original? If this is high in a large majority of requests, a copier with a recycling device may be advisable, or possibly a copier where the cost per copy reduces with the number of copies made per document.

SAMPLE WORKLOAD DATA (DEPARTMENT OF THE ARMY) SHOWING PERCENTAGES OF MULTIPLE COPY REQUESTS

Ratio of Copies to Original	% of Originals in relation to total originals	% of copies in relation to total volume of copies
1:1	44.1	14.4
2:1	17.3	11.2
3:1	11.7	11.4
4:1	7.1	9.4
5:1	4.8	7.8
6:1	3.5	6.9
7:1	2.2	4.8
8:1	1.4	3.7
9:1	.7	1.8
10:1	5.1	16.8
11:1	.3	1.0
12:1	.7	2.8
15:1	.4	2.5
20:1	.3	2.5
25:1	.2	1.8
Over 25:1	.094	1.3

Figure 20

Adequacy of Copy

Persons who are convinced that their copies must be perfect reproductions will find no copier on the market to meet this demand. A copy would appear to be adequate if the image can be read without strain, does not rub off or fade, can take handling without damage, and is reasonable in cost. A copy need only be good enough to suit the purpose for which it is intended.

Multiple Copy Requirements

Several alternative methods are available to reduce the cost per copy when multiple copy requirements must be satisfied. Two of the methods are discussed under this heading and others under the succeeding two headings. Because of the many variables involved, no one method can fit all situations. Offices should adopt the particular approach which best fits their own needs.

For offices with small-volume copy requirements, the *Cavalcade* machine of Eastman Kodak (dye transfer process) is one possibility. This equipment has the potential of making multiple copies from one exposure at a continually reducing cost per copy. Some experience with the machine is necessary before this economy can be realized, but the advantages are fairly obvious.

Other equipment manufacturers offer a variety of pricing plans covering *rented* machines to reduce the cost of multiple copies. These plans are of 2 types. One type establishes a progressively lower charge per copy as successively greater numbers of copies of the *same original* are produced. For example, the Xerox Corporation, as shown in figure 17, offers several multi-metered copiers under such a plan. These copiers are modifications of the basic Models 813 and 914. Typical charges under this plan are 4 cents a copy for the first 3 copies of an original document, 2 cents a copy for the fourth through tenth copies of the document, and 1 cent for all subsequent copies of that document.

Before renting a machine under this plan, an agency should analyze its requests for copies and obtain information on multiple copy requests similar to that shown in figure 20. Also, each agency should determine the advantages of this type of plan, if any, by comparing its cost per copy against the copy costs established for other available copiers or short-run duplicating facilities. Note, for example, that while 73% of the requests for copies received by the Department of the Army were for 3 or less copies of a document, they only represented 37% of the total copying workload. If a copier is rented on this basis, controls are needed to restrict its use to those types of multiple copy requests for which the pricing plan would provide lowest possible per-copy costs.

The other type of rental plan offers an easier method for estimating copying costs. It is based on reducing the per-copy charge after a specified number of copies have been prepared per month on a rented machine. In effect, under this plan, the greater the *total monthly copying workload* on a machine, the lower the overall per-copy cost, regardless if only one or many copies of particular documents are requested. As figure 20 has shown, however, multiple copy requests quickly increase the total copying workload.

Several manufacturers offer this type of rental plan. For example, Xerox Corporation rents the Models 813, 720, and 914 in this manner, the SCM Corporation similarly rents its Coronastat Model 55, the Litton Industries its Royfax 7 Model, and the 3–M Corporation its Adherography System A–09. As newer models of copiers have become speedier and more sophisticated, there has been a trend to reduce the cost per copy in high volume situations. With such pricing plans, certain of the copying machines are becoming increasingly competitive cost-wise in the field of short-term duplicating; for example, with the combination systems discussed under the next heading.

Combination Systems

Among the alternative methods to reduce cost per copy when multiple copies of a document are required, data has been obtained on two employing a combination of an electrostatic copier with another machine. Both of these methods are basically designed to produce a relatively high number of copies per document. In both methods, electrostatic copiers are used to obtain a first document copy or master which is compatible with the second

machine upon which the bulk of the copies are produced.[1]

In one system the electrostatic machine is paired with a *diazo* copying machine. This combination obtains the advantages of the low cost per copy and the relatively fast copymaking rate of diazo copiers for each additional copy to be run from the electrostatically-prepared compatible first copy. In the second system, the electrostatic machine prepares a paper master which can be run quickly and cheaply on an *offset press* to obtain the required numbers of additional copies.

When determining overall costs per copy under these combination systems, the personnel costs involved in operating two machines can be a considerable factor. The previous figures in which cost per copy has been computed did not take into account personnel costs. In considering combination systems, however, it was felt that labor costs should not be ignored, since the use of a full-time operator to man these machines within a reproduction facility is assumed. The labor costs utilized reflect those of a particular printing and reproduction service (the plants of the Department of the Navy Publications and Printing Service). Labor costs and operating methods in printing facilities of other agencies may vary considerably from those of this Service.

Electrostatic-Diazo System. This system, for which detailed cost information is provided in figure 21, pairs a Xerox 914 copier with a diazo copier. The Xerox 914 is not the only electrostatic copier that has the capability of preparing copies which are compatible with diazo machines. For example, the Bruning Company has recently announced the availability of special transluscent copier paper at 3½ cents per sheet for this purpose. However, for comparability of first-copy cost data, in both of these combination systems Xerox 914 costs have been used.

In developing the labor cost data shown in figure 21 for the Xerox 914–Diazo combination, it is assumed that both machines are installed side-by-side and volume is adequate to support the employment of a skilled operator who will operate both machines simultaneously. Other assumptions in computing the labor costs incurred at this particular location are explained in the text of the figure.

Electrostatic-Offset Combination. Again, as in the discussion of the electrostatic-diazo combination, other copiers than the Xerox 914 have the capability of producing paper masters for running on offset presses. For purposes of example, however, Xerox 914 costs are used in figure 22 which covers this process. In this discussion, it is assumed that offset printing is readily available and the required number of copies and quality requirements do not exceed the capabilities of the paper masters.

The following are the assumptions upon which the detailed cost information in figure 22 is based:

The offset printing prices are a constant. (They reflect the price structure established in the plants of the Department of the Navy Publications and Printing Service.)

The Xerox 914 is used as an integral part of a systems operation and in doing so produces significant numbers of masters which may be "bulk" delivered to the offset operation. The offset press is also assumed to be only marginally used on production from masters produced on a single Xerox 914, with the bulk of the offset production being generated elsewhere.

In establishing costs per copy, equipment depreciation costs are nonsignificant.

[1] Electrostatic copiers are not the only copiers capable of producing masters for these types of combination systems. For example, the Adherography combination System A–09 of 3–M Corporation (discussed on page 9) employs a dual spectrum copier to obtain the master copy from which additional copies are run on the special "Speed Copier" machine. The dual spectrum machine also can produce master copies for use in conjunction with other combination systems, such as being paired with a diazo machine. In addition, another combination system pairs thermal copiers with spirit duplicating machines to provide economical short runs of reproduced copies. If a combination system appears to be a good solution in meeting multiple copy requirements, it is essential that whatever copier is selected should have the capability of preparing compatible masters.

COSTS APPLICABLE TO XEROX 914–DIAZO COMBINATION

APPLICABLE LABOR COSTS

No. of Copies	TIME (Seconds)				Labor Cost Per Copy
	Xerox	Diazo	Total	Per Copy	
2	26	—	26	13.00	$0.02160
3	26	—	26	8.67	.01460
4	26	8	34	8.50	.01430
5	26	16	42	8.40	.01410
6	26	24	50	8.33	.01400
7	26	32	58	8.29	.01390
8	26	40	66	8.25	.01386
9	26	48	74	8.22	.01380
10	26	56	82	8.20	.01378
15	26	96	122	8.13	.01370
20	26	136	162	8.10	.01361
25	26	176	202	8.08	.01357
30	26	216	242	8.07	.01356
35	26	256	282	8.06	.01354
40	26	296	322	8.05	.01352
50	26	376	402	8.04	.01351

Note: It is assumed that combination systems are utilized for high production. In this case it is also assumed that both machines will be operated by a single skilled operator. With a single copy cycle of 35 seconds and a consecutive original cycle of 19 seconds for the Xerox, the data in this table assumes that two diazo copies will be produced for each Xerox copy. The 26 second Xerox copy time has been established at the approximate mid-point between the 35 and 19 second cycles to allow for appropriate delay time incident to the synchronization of manual operations to the cycle times of the machines. The delay time assumed also includes an averaging of the Xerox throughput time for the first original as against the lower output cycle times when consecutive originals are fed.

SAMPLE OF OTHER APPLICABLE COSTS AT VARYING VOLUMES [1]

Total Combined Copies Made	Estimated No. of Xerox Masters [2]	Estimated No. of Diazo Copies [2]	914 MASTER COSTS		DIAZO COPY COSTS			Combined Total Cost	Combined Unit Cost
			Meter Charges	Supplies [3]	Purchase-Installation	Maintenance Svc.	Supplies		
6,300	880	5,420	36.75	8.80	42.66	8.34	30.08	$126.63	$0.0201
12,600	1,765	10,835	67.72	17.65	42.66	8.34	51.74	188.11	.0150
18,900	2,648	16,252	98.63	26.48	42.66	8.34	73.41	249.52	.0133

[1] Assumes the rental of Xerox 914 and the purchase of diazo machine. (See figure 11 for specific costs used in the diazo process.)

[2] Estimates of relationship of numbers of Xerox masters to diazo copies are based on experience of Department of the Army contained in figure 20.

[3] Xerox supply costs estimated at .01 per translucent paper master.

Figure 21

Within this framework, the following computations were used to establish the costs per copy, which include labor costs.

Process	*Costs*
Xerox 914 master	$0. 12
Press makeready	. 19
TOTAL ONE-TIME COSTS	. 31
Press run per copy	. 0023
Paper per copy	. 0016
TOTAL PER COPY COSTS	. 0039
ROUNDED TO	. 004

Using these two factors, figure 22 shows the total and per-copy costs for varying numbers of copies of the same original.

XEROX 914—OFFSET COMBINATION COSTS

No. of Copies	COSTS	
	Total	Per Copy
1	$0. 314	$0. 3140
2	. 318	. 1590
3	. 322	. 1073
4	. 326	. 0815
5	. 330	. 0660
6	. 334	. 0557
7	. 338	. 0483
8	. 342	. 0427
9	. 346	. 0384
10	. 350	. 0350
15	. 370	. 0247
20	. 390	. 0244
25	. 410	. 0164
30	. 430	. 0143
35	. 450	. 0129
40	. 470	. 0118
45	. 490	. 0109
50	. 510	. 0102
75	. 610	. 0081
100	. 710	. 0071
200	1. 110	. 0056
300	1. 510	. 0050
400	1. 910	. 0048
500	2. 310	. 0046

Figure 22

The Place of the Xerox 2400?

The introduction of this sophisticated heavy-volume copier, which is now available under rental plans only, has raised speculation concerning its place in the copying field, both as an office copier and as a short-run duplicating machine. This machine has a rated speed of 40 copies of the same document a minute and can automatically produce 499 copies of the same document with one dial setting. It was originally offered under a rental plan (known as Plan "A") based on progressively reducing the charge per copy as successively greater numbers of copies of the *same original* are prepared. The rates under this plan were as follows:

First 3 copies	@ 4¢ each
Copies 4 through 25	@ 2¢ each
Copies 11 through 25	@ 1¢ each
Copies 26 and above	@ ½¢ each
Minimum monthly rental charge	$350.
Estimated supply cost per copy	.0038

Based on these rates, the following two evaluations were made of this machine.

A Department of Health, Education and Welfare (HEW) cost analysis states:

> "In summary then, our conclusion is that at present pricing the Xerox 2400 is essentially convenience equipment. Technically, the machine has a role to play in short-run duplicating that it is presently precluded from playing on a wide basis by economic factors. In a Department as large as this there will be some applications that will be justified. We ask, however, that each potential using office seriously ponder the cost creation capability of a single machine. One Xerox 2400 producing 11 copies per original and working only 7 hours in a day would create an outlay of $61,000 per year. Considering our experience with load increments on other copying machines which have often risen from an originally justified $100 per month to $1,000 per month, we are seriously concerned with the cost creation potential of this particular machine."

Refer to figure 23 for a "Cost Volume Analysis" compiled by this Department covering the use of the Xerox 2400 versus the duplicating press.

COST VOLUME ANALYSIS (HEW)

PRODUCTION OF ONE-SIDED COPY ON XEROX 2400 (UNMANNED) VERSUS ONE-SIDED COPY ON DUPLICATING PRESS

Number Copies Per Original	Maximum Monthly Production Xerox 2400 [1]	Average Monthly Production Offset [2]	Monthly Rental & Supply Costs Xerox 2400	Total Monthly Cost by Offset	Unit Cost Xerox 2400	Unit Cost Offset	Percent Difference in Unit Cost 2400 over Offset
11	178,209	40,138	$5,140	$799	$0.0289	$0.0199	45
15	206,580	53,130	5,157	829	.0251	.0156	61
20	232,760	68,200	5,190	853	.0223	.0125	78
25	251,405	82,109	5,204	877	.0208	.0107	94
30	271,920	94,776	4,720	900	.0174	.0095	84
40	286,000	118,800	4,697	927	.0164	.0078	105
50	299,200	139,700	4,488	964	.0154	.0069	123

[1] Based on maximum speed, i.e., .025 minute per unit.

[2] Based on average speed (43% of maximum) i.e., .020 minute per impression.

N.B. A Xerox 2400 has the potential of expending in excess of $62,000 per year working only 7 hours of the day.

Figure 23

In another Government agency, a special study was also conducted on the potential use of this machine. It was concluded that the availability of the Xerox 2400 is creating widespread interest and demands for this machine are becoming insistent. A point to be remembered is that if one replaces a Xerox 914 with a Xerox 2400, the ability to make a low cost Xerox paper master is lost since the Xerox 2400 will not make masters. The alternative then is to rely upon the Xerox 2400 to substitute for an offset press and by the time it has produced 15 copies it becomes progressively more costly than the Xerox 914–Offset combination. Considering the speeds available at the agency's printing facility, by the time it has produced about 80 copies it becomes progressively slower than the Xerox 914-automated Offset press combination, with uniform paper master, and at the rate of 150 copies, slower than the Xerox 914-Offset press combination with non-uniform masters. Another alternative is to retain the Xerox 914 or some other low cost copying device for making masters in addition to the Xerox 2400. But this alternative does not seem to offer much in the way of economy.

These cost and time factors must be measured against the advantages of simplicity, convenience, and short run speed of the Xerox 2400. In many situations, particularly in non-systems types of applications where the input is random in pages, numbers of copies, sizes, image location, and quality, the advantages of the Xerox 2400 may well override cost considerations, or even, based upon the "mix" of work, provide outright economy. During the test of a preproductive model Xerox 2400, conducted by the agency, a wide variety of work was processed. A sample group of 30 jobs comprising 3226 originals, averaging 21.1 copies was produced at an average rate of 1393 copies per hour, or about 23.2 copies per minute, illustrative of the problem involved in synchronizing human and mechanical effort. In this sample, the range in production speed ran from a low of 120 copies per hour to 2100 copies per hour. The relative merits of convenience, speed, quality, and cost effectiveness must be judged and matched to the job to be done.

The manufacturer has recently announced the availability of a second type of monthly rental

plan (known as as Plan "B" or "XDP") based on the *total monthly copying workload* of a Model 2400. This additional monthly rental plan is as follows:

First 120,000 copies @ .0092 each
(Based on a minimum monthly charge of $1,100.00)
Copies over 120,000 @ .0042 each
(Estimated supply cost per copy .0038)
(Break even with Model 720—Plan "B"—about 56,000 copies at present pricing)

The manufacturer has also recently changed the Plan "A" pricing pattern to be 4 cents for the first 3 copies, 2 cents for copies 4 through 10, and ½ cent for all additional copies made from the same original. Neither the latest price change for Plan "A" nor the optional Plan "B" rates were in effect when the above 2 evaluations of this high-volume copying machine were made. The cost information upon which the evaluations were based, therefore, does *not* reflect current data.

These 2 price changes, and their possible effect on previous decisions made regarding this copying machine, illustrate the problem facing an agency which is conscientiously attempting to get the most value from funds expended for copying services. In this rapidly changing field of copying equipment, each agency must make a positive effort to keep its information current. Neither yesterday's rates nor yesterday's machine capabilities can be relied on when making today's choice as to the best methods or equipment a particular agency should use to meet its multiple copy requirements.[1]

Matching Machines to Need

Get as much in a machine as you need—but not more. Don't pay for extras you don't need. Overbuying—that is buying more capability than required—is one sure way to start a copy explosion.

To sum up, consider all the capabilities needed in a copier to meet the proven requirements of the copying job to be done at a particular location. Preferably, obtain the needed information on requirements by a study of the kinds of materials expected to be copied and the paperwork systems involved in creating these documents.

A clear-cut knowledge of the actual copying requirements of an installation can lead to clear-cut answers to questions as to what machine capabilities are needed, if any, to: copy bound volumes, photographs and charts with solid areas, special colored inks or colored backgrounds, or documents of varying sizes; prepare various types of masters for combination systems; meet proven multiple-copy requirements; produce print-like quality copies; or prepare transparencies for overhead projection.

When matching machines to need, offices should not overlook the availability of accessible copiers already on hand which might be used to meet any infrequently occurring special requirements.

Making the Selection

When selecting a copier, do not carry comparisons of various machines to an extreme, since many copiers in the same grouping have basically similar characteristics. Compare a few types, and have these demonstrated with actual samples of your own documents. Some words of caution are applicable here.

Very often, superb copies are produced on demonstration machines. Although the machine may be capable of producing such copies, the same model of machine used by various persons under actual working conditions might produce copies varying from poor to excellent.

On the other hand, demonstration machines sometimes fail to function as well as they were intended to, and may require some manipulation before performing properly. They may be perfectly capable machines, but rough handling could have disturbed a delicate part. Give each machine ample opportunity to prove itself.

[1] As an example of the rapid changes involved, the Xerox Corporation has announced, but not yet marketed, 3 modified versions of the Model 2400 and an even speedier version to be known as Model 3600. Other companies can be expected to make similar types of revisions or additions to their lines in the extremely competitive copier field.

Try the machine yourself. Ask leading questions. Don't be satisfied with claims.

For guidance on the availability of various makes and models of office copiers, consult the near-complete descriptive listing from the magazine *Administrative Management* included as appendix "B." Consult your procurement or supply officer for information on the availability of whatever copier is selected from the Federal Supply Schedule for FSC group 36 covering copying equipment. Of course, follow any applicable agency or other regulations on clearances required in procuring the selected copier.

All requests for copying equipment should be reviewed by a competent individual who would have the responsibility of investigating the need. This individual could be the records manager or a reproduction or supply specialist. Leaving the selection of copying equipment to someone unfamiliar with the varying capabilities of different machines and the paperwork systems involved can result in the selection of equipment unsuited for the job.

When a machine is found which appears to meet the requirements, it may be desirable to borrow it for onsite testing. If it is decided to do so, arrange adequate wiring beforehand so that installation is not excessively delayed. The machine should not be kept longer than the agreed period. By the end of the trial period, a definite conclusion should be reached. Avoid onsite testing of one machine after the other, as this creates delays, causes confusion, and inhibits continued cooperation. Adequate preliminary evaluation will preclude the necessity for excessive testing.

If a large type of machine is selected but cannot be borrowed for onsite testing, consider procuring it under a lease/purchase agreement, if available. If purchase is advisable, a portion of the rental covering the short testing period can be applied to the purchase price.

Evaluating a Request for a Copier

Persons who review requests for copying machines such as records managers, supply personnel, or reproduction specialists should realize that no two copying requirements are identical, and, thus, no easy formula for evaluation can be developed. The initial determination to be made is not so much what kind of copier is needed, but rather *if* the requesting office needs one. The reviewer must use a systematic approach to each request. The more knowledge he has of overall copying requirements and their paperwork implications—based on actual surveys of large segments of the organization—the more profitable and helpful his review is likely to be.

Answers to specific questions are vital in order to understand the alleged or real problem which faces the requester. These questions are basic—

(1) *Why does the requesting office need a copier?* The answer must indicate the function or activity which creates the requirement for a copier. Are the copies a part of the function? If not, how do they provide assistance in performing the function? Are the copies primarily for convenience only?

(2) *What is the name of the machine requested?* Be sure you know the kind in question. Some manufacturers make only one—others several models. For instance: a "Bruning" means little, since the Bruning Company makes dry and liquid process electrostatic copiers, and also diazo copiers; a "3-M" does not fully describe the kind, since the 3-M Company makes a number of models of both thermal and dual spectrum machines. The model number is most descriptive.

(3) *What is its cost or rental fee?* In many cases, various discounts apply, there may be additional fees for installation, or freight costs can be extra in particular localities.

(4) *What about maintenance service?* There are two major factors involved here: one, the promptness with which service is rendered, and two, the cost of service is often dependent on the distance from a service point.

(5) *Where will the copier be installed?* If the copier is to be used by a major part of the work force, accessibility, in terms of

distance, should be equalized. The "boss," simply because of his position, should not have prime accessibility.

(6) *Who will operate the copier?* If the copier is to be available on a self-service basis, users must be educated in its capabilities and the policies affecting its use, if it is to be used effectively. In addition, specific individuals must be designated who will be responsible for routine maintenance. They should receive adequate instruction for this purpose. If a special operator is to be assigned, the justification should show whether or not the expected savings or benefits will compensate for the operator's salary.

(7) *What is the volume of originals to be copied monthly?* How much of this number are for 2 to 5 copies each? How much for 6 to 10 copies? If the 6 to 10 volume is a large proportion, and is justified by the function, copiers with special capabilities should be considered. If a large proportion is over 10 copies per original, a procedural study may be in order to determine the need. A copier in this instance may be the wrong equipment.

(8) *How many copies are produced each month?* Check the predominant size of the copies also. If larger than legal size, a roll-fed machine may reduce the number of insertions. If a large majority of copies are from bound volumes, a machine with flat-bed exposure is the better approach.

(9) *What use is made of the copies?* Where the major portion is strictly for in-house convenience, rather than a functional necessity, a copier may be an extravagance. If many are being filed, find out why—retention of unneeded copies eventually causes increases in filing equipment.

(10) *What equipment is now being used to produce copies?* If a central facility is currently being used, there must be a reason why it is now considered inadequate for the purpose. If the current machine is to be replaced, what is wrong with it? There is no need to replace a machine simply because it lacks modern features. If it produces well, keep it; if it is not producing effectively, maybe it has been improperly maintained.

(11) *What controls are planned to reduce unauthorized copying and misuse?* It cannot be assumed that all persons will use the copier conscientiously. Realistic policies should be established which include plans for periodic inspections and review of controls.

The above questions will lead to other questions. The information thereby obtained will reveal much more about the copying requirements than the requesting office itself is aware of. Often this type of inquiry will suggest a different approach to the problem.

In addition to these 11 basic questions, other factors to be considered by a reviewer include:

a. Offices having their own copier should be encouraged to share it if it is not being used to capacity. It is poor economy for several adjacent small offices to each have their own copier idle a major portion of each day.

b. Statistics and figures furnished must be realistic. Production or other records will often provide a basis for determining correct figures. If none are available, a sampling might be taken over a short period, and the resultant figures then converted into a month's production. Estimates are acceptable if they are based on a realistic workload; but "guesstimates" pulled out of thin air do not provide a good foundation for evaluation.

c. Remember that the cost per copy is not the only factor to be considered. Although it is important, the capability to meet requirements is a major consideration. Some machines offer specific advantages over others for particular applications.

d. An evaluation should not be rushed through. A few extra days cannot possibly do a great deal

of harm to any operation. There is much truth in the fact that a fully justified copier can be an asset, whereas one not justified is a liability.

e. The reviewer should approach an on-site inspection with a sincere desire to help, although in spite of this approach, it is possible that he or she may encounter resentment or lack of cooperation. Such attitudes, however, serve only to de-emphasize the need for a copier. A cooperative attitude on the part of the requester is evidence of his good faith.

VIII. PUTTING COPIERS TO USE

Checklist for Operation of Copiers [1]

Shown below is a checklist of pertinent factors governing use of copying machines.

(1) Designate a single individual in each installation to control the management of copying machines. This could be the reproduction manager, the records manager, or other personnel of this type who are thoroughly familiar with the use of office copiers or other types of short-run duplicating equipment.

(2) Teach responsible individuals how to use a copying machine. This can be accomplished by a short training program conducted free of charge by the office machine manufacturer. Best results will be obtained with several small groups.

(3) Establish a good set of ground rules and see to it that they are enforced. Make periodic checks of how these rules are being followed. Ineffectively enforced controls may be a costly liability.

(4) Insure that no more than the stipulated maximum number of copies per original are made on copying machines unless there is an emergency need for more than this amount. A maximum of 10 has been found to be most practical unless special machines for multiple copying have been obtained.

(5) Avoid making or filing extra or unnecessary copies.

(6) Accept any copy that is easily read. Do not demand more than is adequate.

(7) Consolidate single copy jobs in order to avoid frequent lengthy walks merely to make just one or two copies.

(8) When considering the use of discount copy paper, test several samples before buying a large quantity in order to assure reasonable quality and consistency.

(9) Inform instructors and lecturers which copying machines are capable of producing transparencies for overhead projection.

Operator Maintenance

The requirement for operator maintenance on electrostatic copiers cannot be overemphasized, particularly where a requirement exists for decentralized equipment. For the most part, machines in individual office areas should be placed under maintenance contract. In addition, to assure the best possible results, a person should be designated to see that the machine is given daily maintenance. These precautions will assure efficient use and reduce waste caused by—

- Paper running out.
- Dirty drums, rollers, and belts.
- Inactive paper and developers or dispersants.
- Depletion of toner.
- Gross misuse.

Copying Classified Documents

Check with your security officer for the policy on copying classified documents. Even though the machine itself may be approved from a security standpoint, there are several conditions which require caution, since the user of the machine is solely responsible for safeguarding classified material. Difficulties can arise from:

- Leaving documents under the cover of flatbed exposure units.

[1] Other ways to reduce copier costs are contained in GSA Notice FSS 37, February 1967, prepared by an interagency Ad Hoc Committee for Improvement in Procurement and Management of Property. Specific techniques adopted by individual agencies for reducing costs of copier supplies, maintenance, and use are presented.

- Not realizing the last copy has not yet emerged from the delivery slot.
- Failure of the machine to deliver the number of copies dialed.
- Damaged copies remaining inside the machine.
- Failure to destroy negatives or matrices when using diffusion transfer or dye transfer machines.
- Failure to stay with the copier if a jam occurs, until service can be rendered.

Requirement Changes

Spot checks should be made from time to time to determine if the original need has changed. If requirements have decreased, a machine should be transferred to satisfy a new requirement or an increased requirement in another area. On the other hand, if user requirements have risen well above those originally planned for, checks of the validity of the copying requests should be made. It is important to know if the original estimates of the requirements were faulty, or if a flood of needless copies is being generated because of ease of access to a copier installation.

IX. CENTRALIZATION VERSUS DECENTRALIZATION

General Considerations

When we speak of "centralized" or "decentralized" copying service, we must also define the nature of these terms. Entire buildings may have a central service, or a single agency, or even a division—yet if several large divisions in an agency have their own "central" copying service, the agency may be described as having a "*de*-centralized" service. Whichever method is chosen, three broad areas must be considered:

- The organizational and physical arrangement.
- The scope and nature of functions.
- The volume of copies produced.

Organizational and Physical Arrangements

There is no straight line approach in making an evaluation—each installation is different and must take into consideration the local conditions. There are, however, the following general criteria to be considered, which can be applied to the specific situations.

- *What offices have a need for copying services?* Different offices have different needs. Their organizational relationship may also have a bearing on how copying service is provided.
- *Where are these offices located in relation to one another?* Where offices needing copies are widely dispersed, centralization may not be practical.
- *What is their individual volume of copy production?* Offices which have a large volume may require their own copier for this reason only. One the other hand, centralized service should be considered only where the total aggregate is relatively high.
- *How do their functions affect their copying requirements?* For instance, consider security, systems work, and urgency.

Dual Advantages

The following may be considered as advantages of a *centralized* facility:

(1) It provides a service to offices which cannot justify a copier in their own right.

(2) It reduces costs since some machines can be eliminated and requirements consolidated. Also, by increasing the number of copies made on each machine through centralization, the cost per copy (unit cost) can be reduced, as shown by figures 4 through 19.

(3) It provides a reserve facility for peak loads or in case there is a breakdown of another machine.

(4) Maintenance is more consistent and more easily provided since this responsibility can be assigned as a major duty.

(5) It can provide a more complete service by having several copying machines of different capabilities. In fact, such a copying center might also include other types of reproduction machines, such as spirit duplicating, mimeograph, or offset equipment. With such a concentration of machines, the full-time manning of the equipment and the procurement of more sophisticated copiers can be easier to justify.

These factors may be considered as advantages of a *decentralized* facility:

(1) Better control of what is being copied can be exercised. The smaller the office, the better this control should be. The manager of the function which the copier is serving is the person responsible for such control.

(2) Walking and waiting time is reduced and in many cases eliminated, thereby reducing delay in furnishing copies when needed. For estimating the cost of travel time, rates in figure 24 can be used.

COST OF DISTANCE IN WALKING TIME

Annually	$3120.00	3328.00	3536.00	3744.00	3952.00	4160.00	4368.00	4576.00	4784.00	4992.00	5200.00	5408.00	5616.00
Monthly	260.00	277.33	294.67	312.00	329.33	346.67	364.00	381.33	398.67	416.00	433.23	450.67	468.00
Weekly	60.00	64.00	68.00	72.00	76.00	80.00	84.00	88.00	92.00	96.00	100.00	104.00	108.00
Hourly	1.50	1.60	1.70	1.80	1.90	2.00	2.10	2.20	2.30	2.40	2.50	2.60	2.70
Per Minute	.0250	.0267	.0283	.0300	.0317	.0333	.0350	.0367	.0383	.0400	.0417	.0433	.0450

Distance and Time		Cost Per Trip To Use Copy Machine											
Feet	Minutes (Round Trip)												
50	.20	.0050	.0053	.0057	.0060	.0063	.0067	.0070	.0073	.0077	.0080	.0083	.0087	.0090
100	.40	.0100	.0106	.0114	.0120	.0126	.0134	.0140	.0146	.0154	.0160	.0166	.0174	.0180
150	.60	.0150	.0159	.0171	.0180	.0189	.0201	.0210	.0219	.0231	.0240	.0249	.0261	.0270
200	.80	.0200	.0212	.0228	.0240	.0252	.0268	.0280	.0292	.0308	.0320	.0332	.0348	.0360
250	1.00	.0250	.0265	.0285	.0300	.0315	.0335	.0350	.0365	.0385	.0400	.0415	.0435	.0450
300	1.20	.0300	.0318	.0342	.0360	.0378	.0402	.0420	.0438	.0462	.0480	.0498	.0522	.0540
350	1.40	.0350	.0371	.0399	.0420	.0441	.0469	.0490	.0511	.0539	.0560	.0581	.0609	.0630
400	1.60	.0400	.0424	.0456	.0480	.0504	.0536	.0560	.0584	.0616	.0640	.0664	.0696	.0720
450	1.80	.0450	.0477	.0513	.0540	.0567	.0603	.0630	.0657	.0693	.0720	.0747	.0783	.0810
500	2.00	.0500	.0530	.0570	.0600	.0630	.0670	.0700	.0730	.0770	.0800	.0830	.0870	.0900
550	2.20	.0550	.0583	.0627	.0660	.0693	.0737	.0770	.0803	.0847	.0880	.0913	.0957	.0990
600	2.40	.0600	.0636	.0684	.0720	.0756	.0804	.0840	.0876	.0924	.0960	.0996	.1044	.1080
650	2.60	.0650	.0689	.0741	.0780	.0819	.0871	.0910	.0949	.1001	.1040	.1079	.1131	.1170
700	2.80	.0700	.0742	.0798	.0840	.0882	.0938	.0980	.1022	.1078	.1120	.1162	.1218	.1260
750	3.00	.0750	.0795	.0855	.0900	.0945	.1005	.1050	.1095	.1155	.1200	.1245	.1305	.1350
800	3.20	.0800	.0848	.0912	.0960	.1008	.1072	.1120	.1168	.1232	.1280	.1328	.1392	.1440
850	3.40	.0850	.0901	.0969	.1020	.1071	.1139	.1190	.1241	.1309	.1360	.1411	.1479	.1530
900	3.60	.0900	.0954	.1026	.1080	.1134	.1206	.1260	.1314	.1386	.1440	.1494	.1566	.1620
950	3.80	.0950	.1007	.1083	.1140	.1197	.1273	.1330	.1387	.1463	.1520	.1577	.1653	.1710
1000	4.00	.1000	.1060	.1140	.1200	.1260	.1340	.1400	.1460	.1540	.1600	.1660	.1740	.1800
1050	4.20	.1050	.1113	.1197	.1260	.1323	.1407	.1470	.1533	.1617	.1680	.1743	.1827	.1890

Note. These costs do *not* include an allowance for interference during the trip (possible additional 10%), or an allowance for nonproductive time such as coffee breaks and the like, which could affect the per-minute rates used.

Figure 24

Approved For Release 2001/07/17 : CIA-RDP74-00005R000100020043-5

(3) Additional personnel spaces are not needed to maintain the copier.

(4) Smaller, less sophisticated, and less expensive copiers can be scattered throughout a large area, thereby placing the supporting service adjacent to the location of the function.

(5) Waste is reduced because copying needs are narrower in scope, the variety and number of users is much smaller, and overproduction is better controlled.

Two Points of View

Both sides of the question have their supporters. It has been cited by the advocates of decentralization that typewriters and telephones are not centralized—each secretary and typist has her own typewriter, and each manager and supervisor his own telephone. However, there are many instances where secretaries and typists are centralized (the typing pool) and the public telephone is a good example of a centralized service. On the other hand, the advocates of centralization say that it reduces misuse. The facts show, however, that most managers of central self-service facilities can not control what is copied because they do not supervise the users, are not responsible for the function requiring the copies, and in addition have many other duties.

Both arrangements can go in one of two directions—either on a self-service basis, or with designated operators provided. A system using operators, of course, has the advantage of providing the highest form of control and quality production. The question to be answered here is whether the savings accrued through the control can equal or surpass the cost of an operator or operators. Full time operators should not be considered if they add to the total copying costs.

There is no such thing, of course, as a 100 percent centralized activity. Small copiers will continue to be used by localized small offices to serve their own needs. There is nothing particularly wrong with this approach provided it is justified.

Successful Centralization

If centralization is going to be adopted, certain factors will have an important bearing on its success:

- If the facility is self-service, it is important that machines be available to users in the shortest possible time. To insure this, limits must be set for the amount of time any one person can use a machine. If it is possible to do so, the most effective method is to set an actual time limit. By this means, a customer can estimate the maximum length of time before a machine becomes available. If this method is not practical, a limit should be set on the total number of copies that can be made at any one visit.

- Some method to control access, such as issuance of identification cards to be shown when entering the center, would be of value if it can be effectively enforced. Similarly, the value of a log or other record of copier production is dependent on the effectiveness of the controls at a particular installation.

- Personnel responsible for maintenance should receive thorough training in general upkeep as well as minor repairs.

- Customer offices can economize on travel to and from the center by consolidating copy work into batches compatible with the limits prescribed. This will reduce the number of trips to the minimum.

Successful Decentralization

If decentralization is adopted, the following factors are pertinent:

- If self-service, designate one or two persons in the vicinity to be responsible for maintenance, and train specific personnel in proper use of the copiers.

- If volume is high, consider assigning an operator or operators, possibly on an added duty basis.

- Insure that office managers issue rules and policies for use of the copier and enforce them.

Updating the Copier Installation

Finally, it should not be taken for granted that once a decision is made, the chosen arrangement is good for all time. Periodic surveys should be made to evaluate changing circumstances and conditions. What has been good for the past two or three years may not be the best approach today. One caution should be observed, however. A machine should not be procured to replace a satisfactorily-operating copier solely because it is the latest model.

APPENDIX A

EXCERPTS FROM FPMR 101–25.5 "GUIDELINES FOR MAKING PURCHASE OR LEASE DETERMINATIONS"

Subpart 101–25.5—Guidelines for Making Purchase or Lease Determinations

§ 101–25.500 Scope of subpart.

This subpart prescribes guidelines to be used by executive agencies in determining whether acquisition of equipment of the types specified in this subpart should be by purchase or lease. If appropriate, executive agencies should use these guidelines in the determination, allowance, or evaluation of costs under FPR 1–15 to the extent that the guidelines are consistent therewith.

§ 101–25.501 General.

Studies conducted by the Federal Government indicate that in many cases substantial savings can be realized through purchasing rather than leasing certain equipment. These studies emphasize the need for making cost comparisons prior to determining method of acquisition.

§ 101–25.501–1 Acquisition considerations.

(a) Prior to acquisition of the types of equipment specified in this subpart (and to other types as appropriate) consideration shall be given to:

(1) Length of time the equipment is to be used, including extent of usage, e.g., three shifts for 2 years, and including potential additional use by another Federal agency if the equipment becomes excess to the acquiring agency;

(2) Financial and other advantages of all types and makes available;

(3) Leasing costs and purchase options;

(4) Costs of purchase and installation;

(5) Imminent technological improvements; and

(6) Other pertinent factors.

(b) Where an agency already has leased equipment in its possession, consideration shall be given to the feasibility of purchasing such equipment or new equipment of a similar or different type and make.

§ 101–25.501–2 Cost comparison methods.

(a) Different methods may be used for projecting pertinent factors into a cost comparison of alternative methods of acquisition. These range from highly technical methods which include the consideration of factors such as interest rates, technological life, and trade-in or salvage value to a basic method which simply compares the cost of purchasing and maintaining equipment against the cumulative costs of leasing. Irrespective of the method used for cost comparison, the point in time at which cumulative leasing costs exceed purchase costs for specific types of equipment usually does not vary significantly.

(b) A simplified method of making a comparative cost analysis of the alternative methods of acquisition is illustrated for each type of equipment for which purchase or lease guidelines and criteria are established in this Subpart 101–25.5.

§ 101–25.501–3 Reviewing application of guidelines.

(a) The acquiring agency has the primary responsibility for appropriate application of the guidelines established in this Subpart 101–25.5. However, GSA will review data relating to equipment acquisitions involving purchase or lease determinations through a sampling of these transactions. Such reviews will be conducted in connection with regular surveys and studies of agency supply management practices and when providing on-site assistance in the development of agency property accounting systems, or through periodic reporting requirements to be established as required.

(b) Copies of cost comparisons and any other pertinent data used to support decisions to lease or purchase equipment shall be retained in the acquiring agency's case file.

§ 101–25.502 Methods of acquisition.

(a) The determination as to whether equipment is to be acquired by purchase or lease shall be made in each case only

after comparison of the relative costs of the equipment through use of the methods shown in this § 101–25.502. Cost comparisons shall include those elements affecting the acquisition cost of the specific types of equipment set forth in this Subpart 101–25.5. The method selected shall be that which offers the greatest advantage to the Government under the circumstances applying to each situation, cost and other factors considered.

(b) Upon request, GSA will assist agencies in making appropriate determinations to lease or purchase equipment by providing the latest information on pending price adjustments to Federal Supply Schedule contracts and other factors such as recent or imminent technological developments, new techniques, and industry or market trends. Inquiries should be addressed to General Services Administration, Federal Supply Service, Procurement Operations Division, Washington, D.C., 20406.

§ 101–25.502–1 Purchase method.

(a) A cost advantage can be obtained by the purchase method provided the equipment is used beyond the point in time at which the cumulative leasing costs exceed purchase costs. The purchase method shall be used when it has been established that the equipment under consideration can be used as provided in §§ 101–25.502(a) and 101–25.502 (b) beyond the point in time at which the purchase method begins to provide a cost advantage.

(b) The acquisition of selected equipment by the purchase method should not be ruled out in favor of leasing such equipment merely because of the possibility that future technological improvements may render the selected equipment less desirable.

§ 101–25.502–2 Lease method.

(a) The lease with option to purchase method shall be used when it is necessary or advantageous to proceed with acquisition of the equipment that meets program or system requirements but it is determined that purchase should be deferred because circumstances do not fully satisfy the conditions set forth in § 101–25.502–1.

(b) The lease method, without option to purchase, may be used when it is necessary or advantageous to proceed with the acquisiton of equipment that meets all program or system requirements, but the conditions for purchase set forth in § 101–25.502–1 cannot be satisfied and a lease contract with purchase option is not attainable.

* * * * * * * * * * * * * *

§ 101–25.504 Office copying machines.

(a) In selecting office copying machines, agencies shall take full advantage of the purchase and lease options that may be available under the terms and conditions of the applicable Federal Supply Schedule contracts. Generally these contracts provide for receiving credit at certain times during the rental period for portions or for all of the rental payments made. These credits may be applied toward the purchase price of the equipment in some instances, and in others, title automatically passes to the Government when a prescribed percentage of the rentals paid equals the purchase price of the equipment. When needed equipment is not available from a Federal Supply Schedule or if it is otherwise necessary for an agency to enter into a lease contract for its own requirements, an option to purchase should be provided in the contract.

(b) Selection of the appropriate and most economical equipment for the application intended is the responsibility of the ordering agency. The selection process should include a review of the functional and financial advantages of all available copying processes (see § 101–26.409).

(c) Prior to acquisition of equipment, a comparison shall be made of the relative costs of acquiring the equipment by use of the methods described in §§ 101–25.502–1 and 101–25.502–2. The cost

comparison shall be based on the best available information and estimates, including those factors in § 101–25.501–1 and any other factors peculiar to office copying machines. The point in time at which cumulative leasing costs exceed the cost of purchasing will be reflected in the comparison. This point in time will provide a basis for appropriate lease or purchase determination based on the expected useful life of the equipment. Where a lease contract contains a purchase option plan, the point in time during a lease period when exercise of the option will be most advantageous will depend upon the purchase option provisions of the contract. The acquisition method selected shall be that which offers the greatest advantage to the Government under the circumstances which pertain to the situation, and the decision shall be supported in accordance with § 101–25.501–3(b).

(d) The following cost comparison is intended to illustrate how a projection of relative costs provides a basis for estimating the approximate point at which cost of leasing will exceed cost of purchasing. The comparison is shown for illustrative purposes only and is not intended to represent an actual situation or take into account cost factors such as cost of supplies, replacement parts, and other factors which may be applicable and may or may not be identical under lease or purchase arrangements. The illustration assumes a lease vs. purchase cost analysis where the lease data is based on a monthly rental charge of $500 and no unit copy charge. The purchase data is based on a purchase price of $15,000 for a new machine, and a maintenance cost of $1,500 per year based on machine usage of 50 hours per week. The purchase option plan permits application toward the purchase price of 75 percent of total rentals paid if purchased during the first 3 months, 60 percent if purchased during the second 3 months, and 50 percent if purchased after 6 months. The purchase option is exercised, in this illustration, at the end of the first year of leasing to give an example of a situation where a budget limitation would not permit immediate purchase or purchase at the time most advantageous for exercising a purchase option. An additional savings of $1,500 could have been realized in this situation if funds had been available and purchase made initially rather than leasing for the first year and exercising the purchase option at the end of that time as illustrated.

Acquisition factor	1st year	2d year	3d year	4th year	5th year	6th year	7th year	8th year
Lease with purchase option (option exercised at the end of the first year):								
Cumulative lease cost	$6,000							
Less credit upon purchase	3,000							
Purchase cost	15,000							
Cumulative maintenance cost		$1,500	$3,000	$4,500	$6,000	$7,500	$9,000	$10,500
Cumulative lease/purchase option cost	18,000	19,500	21,000	22,500	24,000	25,500	27,000	28,500
Lease:								
Cumulative lease cost (including maintenance)	6,000	12,000	18,000	24,000	30,000	36,000	42,000	48,000
Cumulative lease with purchase option costs exceed cumulative lease costs by	12,000	7,500	3,000					
Cumulative lease costs exceed cumulative lease with purchase option costs by				1,500	6,000	10,500	15,000	19,500

(NEXT PAGE IS 2519)

APPENDIX B

CHARACTERISTICS OF VARIOUS COPIERS

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See footnote A MANUFACTURER OR DISTRIBUTOR	MODEL NAME	PRICE	PROCESS	SIZE (H x W x D) (inches)	WEIGHT (lbs.)	Footnote B MAX. SIZE OF ORIGINAL (inches)	WARM-UP TIME (Seconds) – Footnote C	MACHINE WILL COPY: Photos – Footnote D	Opaque originals E	Translucent originals E	Two-sided originals	Bound book pages	Bindi material
ABM BUS. AUTOMATION	ABM Aridfax II	225.00	Thermography	4¾x17x12	20	8½	0		●	●	●		
ABM BUS. AUTOMATION	ABM Aridmatic	299.50	Thermography	7⁵⁄₁₆x16⅝x15¾	33	8½	0		●	●	●		
ABM BUS. AUTOMATION	Dynaphoto	99.50	Diffusion	7¼x18x12¼	15	8½	0		●	●	●		
ANKEN CHEM. & FILM	Anken 124	1,495.00	Electrostatic	40x42x22	250	8½x14	0		●	●	●	●	●
ANKEN CHEM. & FILM	900I	109.00	Diffusion	6½x19x12	20	9	0		●	●	●		
ANKEN CHEM. & FILM	910J	149.00	Diffusion	6x22x12	19	11	0		●	●	●		
ANKEN CHEM. & FILM	920K	169.50	Diffusion	9½x22x12	20	11	0		●	●	●		
ANKEN CHEM. & FILM	930L	259.00	Diffusion	7½x23x44	32	11	0		●	●	●		
APECOM	Copy-Quik	69.50	Diffusion	6x13x21	17	9	0	●	●	●	●		
APECO	Dial-A-Matic	145.00	Diffusion	5x9x24	27	14	0	●	●	●	●		
APECO	Director	125.00	Diffusion	6x12x21	27	8½	0	●	●	●	●		
APECO	Electric-Eye	885.00	Electrostatic	23x30x17½	145	8½	0	●	●	●	●		
APECO	Super-Stat	885.00	Electrostatic	17x20x17½	100	8½x14	0	●	●	●	●	●	●
APECO	Systematic	345.00	Diffusion	16x16x24	48½	11½	0	●	●	●	●		
APECO	Unimatic	245.00	Diffusion	6½x22x13	27	11	0	●	●	●	●		
BRUNING (div. A-M)	Bruning Auto/2000	4,875.00	Electrostatic	48x53x44	533	11	270	●	●	●	●		●
BRUNING (div. A-M)	Bruning Auto/2000R	5,375.00	Electrostatic	48x49x44	533	11	270	●	●	●	●		●
BRUNING (div. A-M)	Bruning 105	345.00	Diazo	10x20x18	54	11	360	●		●			
BRUNING (div. A-M)	Bruning 110	665.00	Diazo	15x22½x17¼	130	11	360	●		●			
BRUNING (div. A-M)	Bruning 120	750.00	Diazo	15x23⅛x17¼	132	11	360	●		●			
BRUNING (div. A-M)	Bruning 250	2,290.00	Diazo	29½x35x53½	720	18½	360	●		●			
BRUNING (div. A-M)	Bruning 255	3,150.00	Diazo	53½x45x46½	750	18	360	●		●			
BRUNING (div. A-M)	Bruning 275	1,795.00	Diazo	27½x35x27	450	18	360	●		●			
BRUNING (div. A-M)	Bruning 280	2,150.00	Diazo	28½x35x27½	485	18	360	●		●			
BRUNING (div. A-M)	Bruning 2000	4,475.00	Electrostatic	42x38¼x44	455	11	270	●	●	●	●		●
BRUNING (div. A-M)	Bruning 2000R	4,975.00	Electrostatic	48x49x44	455	11	270	●	●	●	●		●
BRUNING (div. A-M)	Bruning 2100	5,975.00	Electrostatic	43x46x48	800	11x17	270	●	●	●	●	●	●
BRUNING (div. A-M)	Bruning 3000	1,875.00	Electrostatic	21x31x23	216	8½x14	0	●	●	●	●	●	●
BRUNING-REVOLUTE	720/30W	1,825.00	Diazo	57x66½x41½	950	42	360	●		●			
BRUNING-REVOLUTE	720/40W	2,025.00	Diazo	57x66½x41½	950	42	360	●		●			
BRUNING-REVOLUTE	720/60W	2,275.00	Diazo	57x66½x41½	950	42	360	●		●			
BRUNING-REVOLUTE	750/40W	2,495.00	Diazo	57x66½x41½	1050	42	360	●		●			
BRUNING-REVOLUTE	750/60W	2,745.00	Diazo	57x66½x41½	1050	42	360	●		●			
BRUNING-REVOLUTE	750/80W	3,245.00	Diazo	57x66½x41½	1050	42	360	●		●			
BRUNING-REVOLUTE	820/60W	1,825.00	Diazo	49½x44¾x44	822	20	360	●		●			
BRUNING-REVOLUTE	820/80W	1,975.00	Diazo	49½x44¾x44	822	20	360	●		●			
BRUNING-REVOLUTE	820/100W	2,175.00	Diazo	49½x44¾x44	822	20	360	●		●			
BRUNING-REVOLUTE	830/60W	2,425.00	Diazo	49½x44¾x44	822	18	360	●		●			
BRUNING-REVOLUTE	830/80W	2,575.00	Diazo	49½x44¾x44	822	18	360	●		●			
BRUNING-REVOLUTE	830/100W	2,775.00	Diazo	49½x44¾x44	822	18	360	●		●			
BRUNING-REVOLUTE	835/60W	2,995.00	Diazo	56x47½x47½	815	18	360	●		●			
BRUNING-REVOLUTE	835/80W	3,095.00	Diazo	56x47½x47½	815	18	360	●		●			
BRUNING-REVOLUTE	835/100W	3,195.00	Diazo	56x47½x47½	815	18	360	●		●			
BRUNING-REVOLUTE	860/60W	3,845.00	Diazo	57x66½x41½	1100	42	360	●		●			
BRUNING-REVOLUTE	860/80W	4,345.00	Diazo	57x66½x41½	1100	42	360	●		●			
BRUNING-REVOLUTE	860/100W	4,650.00	Diazo	57x66½x41½	1100	42	360	●		●			

See next page for pertinent footnotes.

EXPO-SURE		COPYING PAPER USED					TO MAKE A COPY . . . See footnote F								FLUID STORAGE		COST/TIME See footnote G		
Flatbed	Rotary	Positive	Bond	Negative	Other	Insert orig. and . . .	Insert orig. + copy paper and . . .	Expose orig. on flat plate and . . .	Expose orig. + copy paper on flat plate and . . .	(Re)insert copy paper and . . .	(Re)insert copy paper + 2nd copy paper and . . .	Peel apart and . . .	OUT COMES COPY	YOU HAVE COPY	Manual	Cartridge	AV. EST. COST PER COPY (Mfr's claim)	AV. TIME TO MAKE 1st COPY (Mfr's claim)	AV. TIME TO MAKE SUBSE-QUENT COPIES
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See footnote A MANUFACTURER OR DISTRIBUTOR	MODEL NAME	PRICE	PROCESS	SIZE (H x W x D) (inches)	WEIGHT (lbs.)	*Footnote B* MAX. SIZE OF ORIGINAL (inches)	WARM-UP TIME (Seconds) *Footnote C*	MACHINE WILL COPY: Photos *Footnote D*	Opaque originals *E*	Translucent originals *E*	Two-sided originals	Bound book pages	Rigid material
COMMODORE BUS. MACH.	Drycopy 10-D	219.50	Thermography	4½x11½x16½	18	8½x14	0		●	●	●		●
COPEASE CORP.	Book Copier AA	249.00	Diffusion	11½x19x18	27	8½x14	0	●	●	●	●	●	●
COPEASE CORP.	Book Copier B	395.00	Diffusion	24x25x13	68	14x7	0	●	●	●	●	●	●
COPEASE CORP.	Cavalier 9	159.50	Diffusion	6½x21½x10½	19	9	0	●	●	●	●		
COPEASE CORP.	Cavalier 15	239.00	Diffusion	6½x26x10½	27	15	0	●	●	●	●		
COPEASE CORP.	Champion 18	395.00	Diffusion	7x30½x7½	32	18	0	●	●	●	●		
COPEASE CORP.	Classic	139.00	Diffusion	8x12x10	14	9	0	●	●	●	●		
COPEASE CORP.	Crusader	295.00	Diffusion	10x16x21½	43	8½	0	●	●	●	●		
COPEASE CORP.	Developing Unit A	149.00	Diffusion	6x20½x10	16	9	0						
COPEASE CORP.	Developing Unit C	269.00	Diffusion	6x29½x10	30	18	0						
COPEASE CORP.	Electrocopy 200	395.00	Electrostatic	9¼x18x12	35	8½x14	0	●		●			
COPEASE CORP.	Electrocopy 400	495.00	Electrostatic	16¾x19x14	59	11x24	0	●	●	●	●		●
COPEASE CORP.	Electrocopy 600	695.00	Electrostatic	16¾x19x14	85	8½x24	0	●	●	●	●		●
COPEASE CORP.	Exposing Unit A	99.00	Diffusion	13x16x18½	18	9x15	0	●	●	●	●	●	●
COPEASE CORP.	Exposing Unit C	224.00	Diffusion	22x27x10	60	17x24	0	●	●	●	●	●	●
COPY-CRAFT INC.	Luxacopy CM24	165.00	Diffusion	7½x19¼x11½	19	9½	0	●	●	●	●		
COPY-CRAFT INC.	Luxacopy CM34	270.00	Diffusion	7½x23½x11½	23	13⅜	0	●	●	●	●		
COPY-CRAFT INC.	Luxacopy CMB3	360.00	Diffusion	10½x25½x23½	44½	13⅜x18	0	●	●	●	●	●	●
COPY-CRAFT INC.	Luxacopy CMB4	295.00	Diffusion	10¼x21x20	34	10x15	0	●	●	●	●	●	●
COPYMATION INC.	Cutlass 2050	1,995.00	Diazo	32x38x67¼	790	45	900			●			
COPYMATION INC.	Cutlass 2150	2,220.00	Diazo	32x63x67¼	790	45	900			●			
COPYMATION INC.	Cutlass 2250	2,195.00	Diazo	32x38x67¼	790	45	900			●			

A—Many foreign companies, not included in this list, also manufacture and/or distribute copiers. *B*—Where one dimension is given, it refers to width; length is then theoretically unlimited. *C*—Column refers essentially to warm-up time at start of business day. *D*—Not all processes reproduce photos with equal fidelity. *E*—Machines may not copy all colors equally well. *F*—Arrowheads refer to steps, or nearest approximate description of steps, in making copy on machine; read to right. *G*—Average claimed cost per copy is given in cents, time in seconds. Administrative Management makes no claim as to the complete accuracy of information in these columns, except to note that it was, in every case, supplied by the manufacturer or distributor involved. Readers should note that estimated average costs and time per copy are sometimes figured on a high-volume basis, and are sometimes likely to be laboratory optimums more than actual in-office realities. *H*—Speed automatically accelerates to maintain preset copy quality. *I*—Also sold as the Ampto 900 and Transrite. *J*—Also sold as the Economaster and Thriftamatic. *K*—Also sold as the Ampto 12 and Transamatic 1. *L*—Also sold as the Controller and Transmaster. *M*—American Photocopy Equipment Co. *N*—See chart, page 86. *O*—When used in conjunction with firm's exposing unit. *P*—When used in conjunction with firm's developing unit. *Q*—Price includes cost of negative. *Editor's notes: 1*—Information in this chart is naturally subject to change, but was current and timely as of August 1, 1966. *2*—Readers' attention is directed to the right-hand column of the chart. Circle the number shown on the reader service card opposite page 98 for more information on the line of copiers in question.

XPO-SURE		COPYING PAPER USED				TO MAKE A COPY . . . *See footnote F*								FLUID STORAGE		COST/TIME *See footnote G*		
Flatbed	Rotary	Positive	Bond	Negative	Other	Insert orig. and . . .	Insert orig. + copy paper and . . .	Expose orig. on flat plate and . . .	Expose orig. + copy paper on flat plate and . . .	(Re)insert copy paper and . . .	(Re)insert copy paper + 2nd copy paper and . . .	Peel apart and . . .	OUT COMES COPY	YOU HAVE COPY	Manual	Cartridge	AV. EST. COST PER COPY (Mfr's claim)	AV. TIME TO MAKE 1st COPY (Mfr's claim)	AV. TIME TO MAKE SUBSEQUENT COPIES
	●				●	▶							●				4	3	3
●		●		●					▶		▶	▶		●		●	5Q	15	15
●		●		●					▶		▶	▶		●		●	5Q	15	15
	●	●		●			▶				▶	▶		●		●	5Q	15	15
	●	●		●			▶				▶	▶		●		●	5Q	20	20
	●	●		●			▶				▶	▶		●		●	5Q	20	20
●	●	●		●			▶				▶	▶		●		●	5Q	20	20
	●	●		●			▶				▶	▶		●		●	5Q	12	12
	●	●							▶O		▶	▶		●	●		5Q	15	15
	●	●							▶O		▶	▶		●	●		5Q	15	15
	●				●		▶						●		●	●	3½	20	18
	●				●		▶						●		●	●	3½	12	12
	●				●		▶						●		●	●	3½	12	12
●		●		●					▶		▶P	▶P		●P				5	5
●		●		●					▶		▶P	▶P		●P				5	5
	●	●		●			▶				▶	▶		●		●	8	15	15
	●	●		●			▶				▶	▶		●		●	8	15	15
●		●		●			▶				▶	▶		●		●	8	12	12
●		●		●			▶				▶	▶		●		●	8	12	12
	●	●		●			▶						●		●		1	20′ per min.	
	●	●		●			▶						●			●	1	20′ per min.	
	●	●		●			▶						●		●		1	30′ per min.	

See footnote A MANUFACTURER OR DISTRIBUTOR	MODEL NAME	PRICE	PROCESS	SIZE (H x W x D) (inches)	WEIGHT (lbs.)	*Footnote B* MAX. SIZE OF ORIGINAL (inches)	WARM-UP TIME (Seconds) - *Footnote C*	MACHINE WILL COPY: Photos - *Footnote D*	Opaque originals E	Translucent E originals	Two-sided originals	Bound book pages	Bind...
COPYMATION INC.	Cutlass 2350	2,420.00	Diazo	32x63x67¼	790	45	900			●			
COPYMATION INC.	Cutlass 2450	2,595.00	Diazo	32x38x67¼	790	45	900			●			
COPYMATION INC.	Cutlass 2550	2,820.00	Diazo	32x63x67¼	790	45	900			●			
COPYMATION INC.	Cutlass 2650	2,995.00	Diazo	32x38x67¼	790	45	900			●			
COPYMATION INC.	Cutlass 2750	3,220.00	Diazo	32x63x67¼	790	45	900			●			
COPYMATION INC.	Cutlass 2850	3,895.00	Diazo	66x63x67¼	920	45	900			●			
COPYMATION INC.	Lancer 1050	5,340.00	Diazo	62¾x72x48	1400	45	900			●			
COPYMATION INC.	Lancer 1150	5,920.00	Diazo	62¾x72x48	1500	45	900			●			
COPYMATION INC.	Lancer 1250	5,975.00	Diazo	62¾x72x48	1400	45	900			●			
COPYMATION INC.	Lancer 1350	6,550.00	Diazo	62¾x72x48	1500	45	900			●			
COPYMATION INC.	Lancer 1450	7,700.00	Diazo	62¾x72x48	1650	45	900			●			
COPYMATION INC.	Sword 100	1,700.00	Diazo	32x67x38	700	45	900			●			
COPYMATION INC.	Sword 150	2,015.00	Diazo	32x67x63	700	45	900			●			
COPYMATION INC.	Sword 200	1,900.00	Diazo	32x67x38	720	45	900			●			
COPYMATION INC.	Sword 250	2,215.00	Diazo	32x67x63	720	45	900			●			
COPYMATION INC.	Sword 300	2,200.00	Diazo	32x67x38	735	45	900			●			
COPYMATION INC.	Sword 350	2,515.00	Diazo	32x67x63	735	45	900			●			
COPYMATION INC.	Sword 400	2,600.00	Diazo	32x67x88	745	45	900			●			
COPYMATION INC.	Sword 450	2,915.00	Diazo	32x67x63	745	45	900			●			
COPY-RITE CORP.	Classic-Fax	219.50	Thermographic	4½x16¾x12¾	23	10	0	●	●	●	●		
COPYSTATICS MFG. CORP.	Copystat	"	Electrostatic	15¾x28x18	100	12	0	●	●	●	●	●	●
DeJUR-AMSCO CORP.	DeJur Lumofax 250	149.50	Diffusion	6¾x19¾x10¼	21	9	0	●	●	●	●		
DENNISON MFG. CO.	Dennison Copier	2,450.00	Electrostatic	45x21x28	300	8½x14	0	●	●	●	●	●	●
A. B. DICK CO.	103	100.70	Diffusion	4¾x18¼x11¾	16	9	0	●	●	●	●		
A. B. DICK CO.	104	141.15	Diffusion	4¾x22¼x11¾	17½	9	0	●	●	●	●		
A. B. DICK CO.	115	303.10	Diffusion	5½x27¼x13¼	28	15	0	●	●	●	●		
A. B. DICK CO.	120	252.50	Diffusion	10x25½x10½	32	10	0	●	●	●	●	●	●
A. B. DICK CO.	650	1,211.00	Electrostatic	19x18x26¾	123	11	0	●	●	●	●		●
DITTO (div. Bell & Howell)	DEC Electrostatic	695.00	Electrostatic	16x16x26	65	11x17	0	●	●	●	●		
DITTO (div. Bell & Howell)	Masterfax	595.00	Thermography	13½x26½x21½	130	10¾x16¾	5		●	●	●		●
DITTO (div. Bell & Howell)	320 Dry Diazo	1,695.00	Diazo	19½x63⅜x34	610	42	420			●			
DITTO (div. Bell & Howell)	330 Dry Diazo	3,095.00	Diazo	29½x63x38	900	42	420			●			
DITTO (div. Bell & Howell)	340 Dry Diazo	6,295.00	Diazo	70⅝x73⅛x43⅛	1700	42	420			●			
DITTO (div. Bell & Howell)	350 Dry Diazo	8,995.00	Diazo	70⅝x85⅛x43⅛	2100	54	420			●			
DITTO (div. Bell & Howell)	360 Dry Diazo	10,175.00	Diazo	70⅝x85⅛x52⅛	2400	54	420			●			
EASTMAN KODAK CO.	Kodak Cavalcade	395.00	Dye Transfer	11⅜x18¼x27	54¼	8½x14	0	●	●	●	●		
EASTMAN KODAK CO.	Kodak Readyprint I	295.00	Dye Transfer	10x20½x22¾	48	8½x14	0	●	●	●	●		
EASTMAN KODAK CO.	Verifax Auto-Twin	485.00	Dye Transfer	14x24x23	41	11x17	0	●	●	●	●		
EASTMAN KODAK CO.	Verifax Regent	240.00	Dye Transfer	14¼x11¼x21⅜	26	8½x11	0	●	●	●	●	●	●
EASTMAN KODAK CO.	Verifax Signet C-K	187.50	Dye Transfer	22x15¼x24⅜	25	8½x14	0	●	●	●	●	●	●
ELECTROCOPY CORP.	Electrocopy 200	395.00	Electrostatic	9¼x18x12	35	8½x14	0	●		●			
ELECTROCOPY CORP.	Electrocopy 400	495.00	Electrostatic	16¾x19x14	59	11x24	0	●	●	●	●		
ELECTROCOPY CORP.	Electrocopy 600	695.00	Electrostatic	16¾x19x14	85	8½x14	0	●	●	●	●	●	●

See next page for pertinent footnotes.

EXPOSURE		COPYING PAPER USED				TO MAKE A COPY ... *See footnote F*									FLUID STORAGE		COST/TIME *See footnote G*		
Flatbed	Rotary	Positive	Bond	Negative	Other	Insert orig. and ...	Insert orig. + copy paper and ...	Expose orig. on flat plate and ...	Expose orig. + copy paper on flat plate and ...	(Re)insert copy paper and ...	(Re)insert copy paper + 2nd copy paper and ...	Peel apart and ...	OUT COMES COPY	YOU HAVE COPY	Manual	Cartridge	AV. EST. COST PER COPY (Mfr's claim)	AV. TIME TO MAKE 1st COPY (Mfr's claim)	AV. TIME TO MAKE SUBSEQUENT COPIES
	●	●		●			▶						●			●	1	30′ per min.	
	●	●		●			▶						●		●		1	40′ per min.	
	●	●		●			▶						●			●	1	40′ per min.	
	●	●		●			▶						●		●		1	60′ per min.	
	●	●		●			▶						●			●	1	60′ per min.	
	●	●		●			▶						●			●	1	60′ per min.	
	●	●		●			▶						●		●		1	60′ per min.	
	●	●		●			▶						●			●	1	60′ per min.	
	●	●		●			▶						●		●		1	75′ per min.	
	●	●		●			▶						●			●	1	75′ per min.	
	●	●		●			▶						●			●	1	75′ per min.	
	●	●		●			▶		▶				●		●		1	20′ per min.	
	●	●		●			▶		▶				●		●		1	20′ per min.	
	●	●		●			▶		▶				●		●		1	30′ per min.	
	●	●		●			▶		▶				●		●		1	30′ per min.	
	●	●		●			▶		▶				●		●		1	40′ per min.	
	●	●		●			▶		▶				●		●		1	40′ per min.	
	●	●		●			▶		▶				●		●		1	60′ per min.	
	●	●					▶						●		●		1	60′ per min.	
	●	●					▶						●				3	2½	2½
●					●		▶						●			●	3½	7	2
	●	●		●			▶			▶				●		●	8½	11	11
●		●						▶					●			●	2.7	18	9
	●	●		●			▶				▶	▶		●	●		5	30	30
	●	●		●			▶				▶	▶		●		●	5	30	30
	●	●		●			▶				▶	▶		●	●		5	30	30
●		●		●			▶		▶		▶	▶		●		●	5	30	30
	●				●	▶							●		●		3½	30	10
	●	●				▶							●			●	3½	10	6
●		●						▶				▶		●			2	12	12
	●	●					▶						●				1	10	10
	●	●					▶						●				1	10	10
	●	●					▶						●				1	8	8
	●	●					▶						●				1	7	7
	●	●					▶						●				1	6	6
	●		●		●		▶			▶		▶		●		●	8.6/.7M	40	5
	●		●	●			▶			▶		▶		●		●	7.2	15	5
			●		●				▶	▶		▶		●K	●L		8.6/.7M	40	5
●			●		●				▶	▶		▶		●	●		8.6/.7M	40	5
●			●		●				▶	▶		▶		●K	●L		8.6/.7M	40	5
	●				●		▶						●		●		3½	17	8
	●				●		▶						●		●		3½	17	4
●					●			▶					●		●		3½	17	4

See footnote A MANUFACTURER OR DISTRIBUTOR	MODEL NAME	PRICE	PROCESS	SIZE (H x W x D) (inches)	WEIGHT (lbs.)	*Footnote B* MAX. SIZE OF ORIGINAL (inches)	WARM-UP TIME (Seconds) *Footnote C*	MACHINE WILL COPY: Photos *Footnote D*	Opaque originals E	Translucent E originals	Two-sided originals	Bound book pages	Rigid material
GEN'L ANILINE & FILM	Bambino	439.00	Diazo	13x16x12	60	9	720			●			
GEN'L ANILINE & FILM	DeAtlas 1710	895.00	Diazo	15x60x24	220	48	300			●			
GEN'L ANILINE & FILM	Ozalid 150 Thermal	1,450.00	Thermal Diazo	30⅝x47⅞x28	280	13	720			●			
GEN'L ANILINE & FILM	Ozalid 5017 Automatic	2,650.00	Diazo	28¼x40x41½	425	11/19N	720			●			
GEN'L ANILINE & FILM	Ozalid 5020 Automatic	2,250.00	Diazo	28¼x35x24½	400	11/16N	720			●			
GEN'L ANILINE & FILM	Ozamatic 60	1,785.00	Diazo	28¼x28½x39½	362	16	720			●			
GEN'L ANILINE & FILM	Ozamatic 360	3,595.00	Diazo	56x33½x46	610	19	720			●			
GEN'L ANILINE & FILM	Ozamatic 3700	4,250.00	Diazo	60x41x65	712	15	720			●			
GEN'L ANILINE & FILM	Printmaster 810	4,295.00	Diazo	61x61x42	1250	42	720			●			
GEN'L ANILINE & FILM	Printmaster 820	4,995.00	Diazo	61x61x61	1249	42	720			●			
GEN'L ANILINE & FILM	Printmaster 910-100	6,995.00	Diazo	70½x72¼x84¼	1900	42	720			●			
GEN'L ANILINE & FILM	Printmaster 910-150	7,995.00	Diazo	70½x72¼x84¼	1970	42	720			●			
GEN'L ANILINE & FILM	Printmaster 1000	11,850.00	Diazo	69x78x93	2500	56	720			●			
GEN'L ANILINE & FILM	Printmaster 1000-100W	10,975.00	Diazo	69x78x93	2500	56	720			●			
GEN'L ANILINE & FILM	Streamliner 100	1,225.00	Diazo	22x46x38	375	30	720			●			
GEN'L ANILINE & FILM	Streamliner 200	1,675.00	Diazo	22x58x38	400	42	720			●			
GEN'L ANILINE & FILM	Streamliner 220	1,975.00	Diazo	22x58x51	420	42	720			●			
GEN'L ANILINE & FILM	Streamliner 400	2,595.00	Diazo	49x63x31	873	42	720			●			
GEN'L ANILINE & FILM	Streamliner 420	2,795.00	Diazo	49x63x31	885	42	720			●			
GEN'L ANILINE & FILM	Super Ozamatic	1,895.00	Diazo	28¼x33⅛x41½	420	19	720			●			
GRAPHIC COMM. CORP.	Graphic Series 200	1,895.00	Electrostatic	41¾x33x27½	176	10x15	0	●	●	●	●	●	●
GRAPHIC COMM. CORP.	Graphic Series 400	495.00	Electrostatic	H	H	11x17	0	●	●	●	●		

A—Many foreign companies, not included in this list, also manufacture and/or distribute copiers. *B*—Where one dimension is given, it refers to width; length is then theoretically unlimited. *C*—Column refers essentially to warm-up time at start of business day. *D*—Not all processes reproduce photos with equal fidelity. *E*—Machines may not copy all colors equally well. *F*—Arrowheads refer to steps, or nearest approximate description of steps, in making copy on the machine; read to right. *G*—Average claimed cost per copy is given in cents, time in seconds. Administrative Management makes no claim as to the complete accuracy of information in these columns, except to note that it was, in every case, supplied by the manufacturer or distributor involved. Readers should note that estimated average costs and time per copy are sometimes figured on a high-volume basis, and are sometimes likely to be laboratory optimums more than actual in-office realities. *H*—Information not available at time of publication. *I*—Up to 110-pound index stock. *J*—Has multiple-copy feature but automatically resets itself for single copying. *K*—Reinsert matrix (master) for up to seven additional copies. *L*—Actimeter accessory is available which provides for cartridge loading. *M*—First figure is claimed time for first copy, second figure for succeeding copies. *N*—First figure is for automatic and second for manual model. *O*—Continuous forms copier. *Editor's notes: 1*—Information in this chart is naturally subject to change, but was current and timely as of August 1, 1966. *2*—Readers' attention is directed to the right-hand column of the chart. Circle the number shown on the reader service card opposite page 98 for more information on the line of copiers in question.

EXPOSURE		COPYING PAPER USED				TO MAKE A COPY...					See footnote F				FLUID STORAGE		COST/TIME		
																	See footnote G		
Flatbed	Rotary	Positive	Bond	Negative	Other	Insert orig. and...	Insert orig. + copy paper and...	Expose orig. on flat plate and...	Expose orig. + copy paper on flat plate and...	(Re)insert copy paper and...	(Re)insert copy paper + 2nd copy paper and...	Peel apart and...	OUT COMES COPY	YOU HAVE COPY	Manual	Cartridge	AV. EST. COST PER COPY (Mfr's claim)	AV. TIME TO MAKE 1st COPY (Mfr's claim)	AV. TIME TO MAKE SUBSEQUENT COPIES
	●				●		▶			▶			●				1	10′ per min.	
	●				●		▶			▶			●				1	8′ per min.	
	●				●		▶						●				1½	40′ per min.	
	●				●	▶							●				½	60′ per min.	
	●				●	▶							●				½	40′ per min.	
	●				●	▶							●				1	40′ per min.	
	●				●	▶							●				½	60′ per min.	
●					●		▶						●				1	30′ per min.	
	●				●		▶						●				¾	40′ per min.	
	●				●		▶						●				¾	50′ per min.	
	●				●		▶						●				¾	75′ per min.	
	●				●		▶						●				¾	75′ per min.	
	●				●		▶						●				½	100′ per min.	
	●				●		▶						●				½	100′ per min.	
	●				●		▶			▶			●				1	14′ per min.	
	●				●		▶			▶			●				1	14′ per min.	
	●				●		▶			▶			●				1	25′ per min.	
	●				●		▶			▶			●				1	24′ per min.	
	●				●		▶			▶			●				1	30′ per min.	
	●				●		▶						●				¾	60′ per min.	
●					●			▶					●			●	2	17	7½
	●					▶							●			●	4	H	H

See footnote A MANUFACTURER OR DISTRIBUTOR	MODEL NAME	PRICE	PROCESS	SIZE (H x W x D) (inches)	WEIGHT (lbs.)	*Footnote B* MAX. SIZE OF ORIGINAL (inches)	WARM-UP TIME (Seconds) *Footnote C*	MACHINE WILL COPY: Photos *Footnote D*	Opaque originals E	Translucent originals E	Two-sided originals	Bound book pages	Rigid material
HUNTER PHOTO COPYIST	Chieftain	329.50	Stabilization	7x5½x24½	45	12	10	●	●	●	●		
HUNTER PHOTO COPYIST	Laird	260.00	Stabilization	5½x15x23½	38	12	0	●	●	●	●		
HUNTER PHOTO COPYIST	Wee Chieftain	169.50	Stabilization	7x15x21	35	9	10	●	●	●	●		
HUNTER PHOTO COPYIST	Wee Scot	99.50	Stabilization	5½x13x19½	25	9	0	●	●	●	●		
INTER-CONT. PHOTOCOPY	ICP 400	959.00	Electrostatic	15x18x24	69	11⅞	0	●	●	●	●		
INTER-CONT. PHOTOCOPY	Princess II	129.00	Diffusion	6½x18x12¼	15	9	0	●	●	●	●		
INTER-CONT. PHOTOCOPY	Princess XII	169.00	Diffusion	6½x21½x12¼	18	12	0	●	●	●	●		
KEE LOX MFG. CO.	Electrocopy 200	395.00	Electrostatic	9¼x18x12	35	8½x14	0	●		●			
MINN. MINING & MFG.	Copy-Mite	159.00	Press. Trans.	5x15¾x12	34½	8½x14	0	●R	●R	●R	●R		
MINN. MINING & MFG.	"The Seventy"	149.00	Dual Spectrum	10x10x13¼	16½	8½x11	150	●	●	●	●	●	●
MINN. MINING & MFG.	Thermo-Fax Encore Auto.	550.00	Thermography	9½x30x26	80	8½x14	45	●	●	●	●		
MINN. MINING & MFG.	Thermo-Fax Major	545.00	Thermography	9x27x15	65	14	0	●	●	●	●		
MINN. MINING & MFG.	Thermo-Fax Secretary	379.00	Thermography	7½x15½x19½	42	8½	0	●	●	●	●		
MINN. MINING & MFG.	3M 107-Office	349.00	Dual Spectrum	8¾x20¼x19	46½	8½x14	30	●	●	●	●	●	●
MINN. MINING & MFG.	3M 107-Portable	279.00	Dual Spectrum	6½x15x15½	23	8½x14	60	●	●	●	●	●	●
MINN. MINING & MFG.	3M Statement Machine	459.00	Thermography	7½x19½x17	49	8½	0-45	●	●	●	●		
MINN. MINING & MFG.	3M 209-Automatic	1,495.00	Dual Spectrum	13x31x31	219	8½x14	90	●	●	●	●	●	●
MINN. MINING & MFG.	System A-09	H	Dual Spectrum Adherography	13x31x31 42x31x34	219 462	8½x14	120 0	●	●	●	●	●	●
OLD TOWN CORP.	750	959.00	Electrostatic	15x18¾x24¼	70	11	0	●	●	●	●		
OLIVETTI-UNDERWOOD	Copia II	1,575.00	Electrostatic	11x42x22	290	8½x14	0	●	●	●	●	●	●
PACIFIC COPY CORP.	Cont'l Autocopy	99.50	Diffusion	7½x19x12	13½	9	0	●	●	●	●		
PACIFIC COPY CORP.	Cont'l Planocop F-7	279.00	Diffusion	7½x18⅛x18⅛	38	10½x14½	0	●	●	●	●	●	●
PACIFIC COPY CORP.	Cont'l Planocop F-9	299.00	Diffusion	7½x22¾x22	53	14⅛x18⅛	0	●	●	●	●	●	●
PACIFIC COPY CORP.	Sec-Re-Stat	495.00	Electrostatic	12x14x14½	38	8½	0		●	●	●		
POLYFAX INC.	Girl Friday	375.00	Thermography	9¼x22¾x19⅜	60	11	0	●	●	●	●		
POLYFAX INC.	711	299.50	Thermography	7¾x16⅝x15¾	33	10	0		●	●	●		
POST, FREDERICK CO.	Diazo/Matic D-19	1,895.00	DiazoK	27x38x42	400	19	480	●		●			
POST, FREDERICK CO.	Diazo/Matic D-19J	2,495.00	DiazoK	27x38x42	450	19	480	●		●			
POST, FREDERICK CO.	Diazo/Matic D-1900	2,145.00	DiazoK	27x38x42	450	19	480	●		●			
POST, FREDERICK CO.	Diazo/Matic D-1900J	2,745.00	DiazoK	27x38x42	500	19	480	●		●			
POST, FREDERICK CO.	Diazo/Matic T-12	1,050.00	DiazoL	16x21x17	150	12	420	●		●			
RONEO (div. Addo-X)	Addo-Fax	259.00	Thermography	11x17x5	25	9x15	0	●	●	●	●		
ROTOLITE SALES CORP.	Diazo-Jet	595.00	Diazo	9x60x13	90M	42	600			●			
ROTOLITE SALES CORP.	Economy 18	129.50	Diazo	5x30x7	25M	18	0			●			
ROTOLITE SALES CORP.	Economy 27	164.50	Diazo	5x39x7	35M	27	0			●			
ROTOLITE SALES CORP.	Economy 42	208.50	Diazo	5x54x7	45M	42	0			●			
ROTOLITE SALES CORP.	Expeediter 18	203.50	Diazo	6x31x7	35M	18	0			●			
ROTOLITE SALES CORP.	Expeediter 42	258.50	Diazo	6x55x7	53M	42	0			●			
ROTOLITE SALES CORP.	Thermomatic	149.50	Diazo	5x56x7	30M	42	600			●			
ROYFAX (div. Litton)	Royfax Ace	349.50	Diffusion	7½x14x23	32	11⅞	0	●	●	●	●		
ROYFAX (div. Litton)	Royfax Custom	199.50	Diffusion	6x11½x21½	29	11⅞	0	●	●	●	●		
ROYFAX (div. Litton)	Royfax Dual 9	129.50	Diffusion	6½x12¼x18½	12	8¾	0	●	●	●	●		
ROYFAX (div. Litton)	Royfax 7	H	Electrostatic	18½x30¼x19	147	11¾	0	●	●	●	●		
ROYFAX (div. Litton)	Royfax 100	259.50	Diffusion	8½x11½x21½	32	11⅞	0	●	●	●	●		
SAVIN BUS. MACH. CORP.	Custom Sahara 200	1,195.00	Electrostatic	15¾x18x26¾	123	11	0		●	●			●

See next page for pertinent footnotes.

EXPOSURE		COPYING PAPER USED				TO MAKE A COPY... See footnote F									FLUID STORAGE		COST/TIME See footnote G		
Flatbed	Rotary	Positive	Bond	Negative	Other	Insert orig. and...	Insert orig. + copy paper and...	Expose orig. on flat plate and...	Expose orig. + copy paper on flat plate and...	(Re)insert copy paper and...	(Re)insert copy paper + 2nd copy paper and...	Peel apart and...	OUT COMES COPY	YOU HAVE COPY	Manual	Cartridge	AV. EST. COST PER COPY (Mfr's claim)	AV. TIME TO MAKE 1st COPY (Mfr's claim)	AV. TIME TO MAKE SUBSEQUENT COPIES
	●			●			▶			▶			●			●	5	45	T
	●			●			▶			▶			●		●		5	45	T
	●			●			▶			▶			●			●	5	45	T
	●			●			▶			▶			●		●		5	45	T
	●				●	▶							●			●	3½	8	6
	●	●		●			▶					▶		●		●	6	15	15
	●	●		●			▶					▶		●		●	6	15	15
	●				●		▶						●			●	3.8	20	18
	●		●				▶				▶			●			1	10	10
●		●							▶		▶	▶		●			5	55	55
	●	●S				▶							●				1-2	2	2
	●	●					▶						●				1-12	6	6
	●	●					▶						●				1-5	4	4
●		●							▶		▶	▶		●			5	15	15
●		●							▶			▶		●			5	15	15
	●	●					▶						●				1-5	5	5
●		●				▶							●				3½	12	12
●			●			▶							●				3½ ½	12 1½	12 1½
	●				●	▶							●			●	3½	5	5
●					●			▶					●			●	3½[1]	17	8
	●		●		●		▶				▶	▶		●		●	6-8½	15	15
●									▶		▶	▶		●		●	6-8½	15	15
●									▶		▶	▶		●		●	6-8½	15	15
	●				●		▶							●			3½	20	20
	●				●		▶						●				3½	5	5
	●				●		▶						●				2½	3½	3½
	●	●					▶						●				1	3	3
	●	●				▶							●				1	3	3
	●	●					▶						●				1	3	3
	●	●				▶							●				1	3	3
	●	●				▶							●				1	3	3
	●			●			▶					▶		●			2	3	3
	●	●					▶			▶			●				1	10	10
	●	●					▶			▶			●				1	60	60
	●	●					▶			▶			●				1	60	60
	●	●					▶			▶			●				1	60	60
	●	●					▶			▶			●				1	30	30
	●	●					▶			▶			●				1	30	30
	●	●								▶			●				1	30	30
	●	●		●			▶					▶		●		●	5½-8½	11	11
	●	●		●			▶				▶	▶		●		●	5½-8½	15	15
	●	●		●			▶				▶	▶		●		●	5½-8½	15	15
	●				●	▶							●				3-7½	17	8½
	●	●		●			▶				▶	▶		●		●	5½-8½	15	15
	●				●	▶							●				3.2	27	13

See footnote A MANUFACTURER OR DISTRIBUTOR	MODEL NAME	PRICE	PROCESS	SIZE (H x W x D) (inches)	WEIGHT (lbs.)	*Footnote B* MAX. SIZE OF ORIGINAL (inches)	WARM-UP TIME (Seconds) *Footnote C*	MACHINE WILL COPY: Photos *Footnote D*	Opaque originals *E*	Translucent *E* originals	Two-sided originals	Bound book pages	Rigid material
SCM CORP.	Coronastat 55	Leased*H*	Electrostatic	34x36x20	240	10x5½	0	●	●	●	●	●	●
SCM CORP.	Model 33	995.00	Electrostatic	18x16x27	105	11	0	●	●	●	●		
SCM CORP.	Model 44	1,195.00	Electrostatic	18x16x27	105	11	0	●	●	●	●		
SCM CORP.	Vivicopy 9	99.50	Diffusion	7x21x12	13	8¾	0	●	●	●	●		
SCM CORP.	Vivicopy 12	169.50	Diffusion	8x21x14	36	11½	0	●	●	●	●		●
SCM CORP.	Wedgelite Book Auxil.	79.95	Diffusion	4½x18½x16¾	18½	9¼x14	0	●	●	●	●	●	●
SPEED-O-PRINT CORP.	9A	99.00	Diffusion	9x16¼x10	14½	9	0	●	●	●	●		●
SPEED-O-PRINT CORP.	9B	169.50	Diffusion	13x17x12	31	9	0	●	●	●	●		●
SPEED-O-PRINT CORP.	9C	259.50	Diffusion	46x21x13	84	9	0	●	●	●	●		●
SPEED-O-PRINT CORP.	9M	149.50	Diffusion	11x16¼x10	16	9	0	●	●	●	●		●
SPEED-O-PRINT CORP.	15A	219.50	Diffusion	11x25x12½	35	15	0	●	●	●	●		●
SPEED-O-PRINT CORP.	15B	249.50	Diffusion	14½x25x12½	60	15	0	●	●	●	●		●
SPEED-O-PRINT CORP.	15C	319.50	Diffusion	46x25x16½	139	15	0	●	●	●	●		●
VIEWLEX INC.	Trans-O-Print	349.50	Diazo-Diff.	15x19x17	40	9½x14	0		●	●	●	●	●
VIEWLEX INC.	Viewfax 6	249.50	Thermography	18x13x5	20	9	0		●	●	●		
XEROX CORP.	330	*H*	Electrostatic	18x20x26	190	9x14	600	●	●	●	●		
XEROX CORP.	420	*H*	Electrostatic	45x46x45	650	9x14	20	●	●	●	●	●	●
XEROX CORP.	720	*H*	Electrostatic	45x46x45	650	9x14	20	●	●	●	●	●	●
XEROX CORP.	813	*H*	Electrostatic	18x20x26	190	9x14	600	●	●	●	●		
XEROX CORP.	914	*H*	Electrostatic	45x46x45	650	9x14	20	●	●	●	●	●	●
XEROX CORP.	2400	*H*	Electrostatic	46x67x31	1100	8⅞x14⅞	180	●	●	●	●	●	●
YORKTOWN INDUSTRIES	Electrostatic Universal 11-17	695.00	Electrostatic	16x16x26	90	11x17	0	●	●	●	●		●
YORKTOWN INDUSTRIES	Photomaster X-100	69.95	Diffusion	5½x12x18	16	9	0	●	●	●	●		
YORKTOWN INDUSTRIES	Photomaster X-200	99.50	Diffusion	8½x12x18	18	9	0	●	●	●	●		

A—Many foreign companies, not included in this list, also manufacture and/or distribute copiers. *B*—Where one dimension is given, it refers to width; length is then theoretically unlimited. *C*—Column refers essentially to warm-up time at start of business day. *D*—Not all processes reproduce photos with equal fidelity. *E*—Machines may not copy all colors equally well. *F*—Arrowheads refer to steps, or nearest approximate description of steps, in making copy on the machine; read to right. *G*—Average claimed cost per copy is given in cents, time in seconds. Administrative Management makes no claim as to the complete accuracy of information in these columns, except to note that it was, in every case, supplied by the manufacturer or distributor involved. Readers should note that estimated average costs and time per copy are sometimes figured on a high-volume basis, and are sometimes likely to be laboratory optimums more than actual in-office realities. *H*—See chart, page 86. *I*—Average estimated cost per copy of 6-inch originals claimed as low as 1.27 cents. *J*—Has automatic paper feed. *K*—Ammonia fume development. *L*—Image developed by exposure to heat. *M*—May be wall hung. *N*—For diffusion copying. *O*—For diazo copying. *P*—Claimed cost with diffusion, 8 cents; with diazo 1 cent. *Q*—Claimed time with diffusion, 15 seconds; with diazo 60 seconds. *R*—Major, Statement Machine or "The Seventy" image an intermediate using thermographic process. Copy-Mite then can make up to ten copies on bond paper from the intermediate. *S*—Systems paper. *T*—Time depends on how fast multiple copies are fed into unit, manufacturer says. *Editor's notes: 1*—Information in this chart is naturally subject to change, but was current and timely as of August 1, 1966. *2*—Readers' attention is directed to the right-hand column of the chart. Circle the number shown on the reader service card opposite page 98 for more information on the line of copiers in question.

EXPOSURE		COPYING PAPER USED				TO MAKE A COPY... *See footnote F*									FLUID STORAGE		COST/TIME *See footnote G*		
Flatbed	Rotary	Positive	Bond	Negative	Other	Insert orig. and...	Insert orig. + copy paper and...	Expose orig. on flat plate and...	Expose orig. + copy paper on flat plate and...	(Re)insert copy paper and...	(Re)insert copy paper + 2nd copy paper and...	Peel apart and...	OUT COMES COPY	YOU HAVE COPY	Manual	Cartridge	AV. EST. COST PER COPY (Mfr's claim)	AV. TIME TO MAKE 1st COPY (Mfr's claim)	AV. TIME TO MAKE SUBSEQUENT COPIES
●					●			▶					●			●	H	12	7½
	●				●	▶							●			●	3	6	6
	●				●	▶							●			●	3	6	6
	●	●		●			▶			▶		▶		●		●	8	20	20
	●	●		●			▶			▶		▶		●		●	8	20	20
●				●					▶		▶	▶		●			8	15	15
	●	●					▶				▶	▶		●		●	8½	12	12
	●	●					▶				▶	▶		●		●	8½	12	12
	●	●					▶				▶	▶		●		●	8½	12	12
	●	●					▶				▶	▶		●		●	8½	12	12
	●	●					▶				▶	▶		●		●	8½	15	15
	●	●					▶				▶	▶		●		●	8½	15	15
	●	●					▶				▶	▶		●		●	8½	15	15
●		●		●	●		▶N	▶O				▶N	●O	●N	●		P	Q	Q
	●				●		▶						●				2-5	4	4
	●		●			▶							●				H	20	12
●			●					▶					●				H	15	8½
●			●					▶					●				H	12	5
	●		●			▶							●				H	20	12
●			●					▶					●				H	15	8½
●			●					▶					●				H	9	1½
	●				●	▶							●			●	3½	6	6
	●	●		●			▶				▶	▶		●	●		5	14	14
	●	●		●			▶				▶	▶		●		●	5	14	14

METERED MACHINES, COMPARISON OF RATES

MANUFACTURER OR DISTRIBUTOR	MODEL NAME	PRICE BREAKS OCCUR... Within each run	PRICE BREAKS OCCUR... Within monthly volume	FIRST COPY COSTS...(Cents)	FIRST PRICE BREAK OCCURS WITH COPY NO.	PRICE PER COPY IS NOW... (Cents)	SECOND PRICE BREAK OCCURS WITH COPY NO.	PRICE PER COPY IS NOW... (Cents)	THIRD PRICE BREAK OCCURS WITH COPY NO.	PRICE PER COPY IS NOW... (Cents)	FOURTH PRICE BREAK OCCURS WITH COPY NO.	PRICE PER COPY IS NOW... (Cents)	RENTAL OR LEASING FEE (If any) ($)	MIN. NO. OF COPIES PER MONTH (If any)
BRUNING (div. A-M)	Auto/2000	A	A	3.65B									45	4,000
BRUNING (div. A-M)	Auto/2000R	A	A	3.65B									60	4,000
BRUNING (div. A-M)	2000	A	A	3.65B									30	4,000
BRUNING (div. A-M)	2000R	A	A	3.65B									50	4,000
BRUNING (div. A-M)	2100	A	A	3.65B									60	4,000
BRUNING (div. A-M)	3,000	A	A	4.25C									25	
MINN. MINING & MFG.	3M 209-Automatic			1	D								25E	2,500
MINN. MINING & MFG.	System A-09		●	1½	10,001	1	25,001	½					75E	
ROYFAX (div. Litton)	Royfax 7F		●	7½	501	5	2,501	4	5,001	3½	7,501	3		500G
SCM CORP.	Coronastat 55		●	4	3,001	3	6,001	2	10,001	1½			50	2,000
XEROX CORP.	330	●		4	4	2	11	1					15	$45H
XEROX CORP.	420	●		4	4	2	11	1						$175H
XEROX CORP.	720	●		4	4	2	11	1					25	$200H
XEROX CORP.	720 XDP		●	1.7I	36,001	1.4							600	36,000
XEROX CORP.	813		●	4½	1,500	3½							10	500
XEROX CORP.	813 XDP		●	3I	4,951	2.3							150	4,950
XEROX CORP.	914			3½	D								25	2,000
XEROX CORP.	914 XDP		●	2.4I	16,801	1.8							400	16,800
XEROX CORP.	2400	●		4	4	2	11	1	26	½				$350H
XEROX CORP.	2400 XDP		●	.9I	120,001	.4							1,100	120,000

Machines with meters—how their rates compare. *A*—Copy costs figured as sum of uniform meter charge plus supply cost. *B*—1.5 cent meter charge plus 2.15 cent supply cost. *C*—2 cent meter charge plus 2.25 supply cost. *D*—Not applicable. *E*—Meter charge. *F*—Prices and number of copies based on 8½ x 11 inches; per-copy charges for other sizes apply accordingly. *G*—No minimum in first billing month. *H*—Number of copies under minimum billing amount varies with average length of run. *I*—At minimum. (Information current as of August 1, 1966.)

(Referred to in footnotes as chart on page 86.)

•U.S. GOVERNMENT PRINTING OFFICE: 1967 O—237-114