Book Copying Machines; A Description and Evaluation*

BY ARNOLD SADOW

Business, Science and Technology Division
Queens Borough Public Library

The rapid development of simple photocopying methods and machines during the past ten years has made possible much wider use of photography in libraries than ever before. As a result some libraries which had previously been unable to offer a copying service to their users have now begun to do so and it seems likely that many more will do the same in the next few years. The increasing use of these new methods in libraries indicates that librarians are aware of their obvious advantages. For this reason I shall discuss only briefly and in general the methods and value of photocopying in libraries, giving a few specific applications as examples, and devote the major part of this article to a description and evaluation of the new equipment, particularly the kind known as book printers or book copiers, since there is at present a widespread and growing interest in this type of apparatus.

Within the limits of the term photocopying, I include all methods, photographic or not, which yield facsimile copies at or near original size. The photostat process is, of course, the best known example, but there are now a large variety of other methods, and the list grows longer every year. Among these are the contact processes—transfer, diazo, and thermography. There are also a number of processes based on electrical or electronic principles—xerography, Electrofax, and several scanning methods. Transfer, thermography, and xerography have so far aroused the greatest interest among American librarians, while the others appear likely to have important library uses in future years (1). I shall confine my discussion mainly to the contact processes, since the others have as yet only limited library applications.

By far the most outstanding library application of photocopying recently has been the use of contact machines. Contact equipment now enables any library to supply its users with copies of any of its material and to supply such copies quickly, cheaply, and easily. In fact the operation of contact machines is considered so simple by some libraries that they permit their readers to make their own copies using library equipment.

Several new applications have developed from the use of contact equipment.

BOOK COPYING MACHINES

Some libraries send contact copies of magazine articles selected from abstract and table of contents bulletins instead of routing the original publication to departments or individuals. Contact equipment is being used for reproducing catalog cards in small quantities (2). Although results are not as good as those obtained by conventional methods, they are cheap and easy to make. Another recent application of contact copying has been the publication of bulletins, a method which is practicable if editions are fairly small (3). Contact machines have also proved useful for administrative and technical routines, such as the copying of letters and records of all kinds.

For these and other library applications a variety of machines of various types are now available (4). Some of these machines have been designed specifically for library purposes, while others have been adapted to library needs.

Libraries use two main types of photocopying machines: optical or projection and contact. A projection copier is essentially a camera which makes a copy on photographic paper instead of film. In addition to a camera, a darkroom and other photographic apparatus are usually required. The most familiar example of a projection copier is the Photostat, a machine manufactured by the Photostat Corporation. Other machines similar to the Photostat are the Dexigraph, a product of Remington Rand, and the Rectigraph, made by the Haloid Company. Projection equipment will copy most types of library material satisfactorily, including books and bound volumes of periodicals and newspapers of any size. They produce copies at the same size as the original, enlarged or reduced. For large quantities of work projection copiers are the most economical of all copying machines. They are, however, expensive, occupy much space, and require trained operators. For these reasons they are found usually in libraries which have sufficient volume of work to justify their use.

A contact copier is a photographic printer. It is not a camera, nor does it have a lens or resemble a camera in any way. It is essentially a device for holding the photographic paper in contact with the original. In its simplest form a printer consists of a glass plate laid over the material and a light source which shines on the paper and impresses an image of the text upon it. Usually a printer is constructed in the form of a box or a cylinder enclosing the light source. Contact printers can make copies only the same size as the original. Some contact copiers are designed specifically for copying pages of books and are therefore known as book copiers or book printers. Book copiers will copy loose sheets as well as books and bound volumes.

Book copiers are relatively inexpensive machines which take up little space and require less skill to use than projection machines. For these reasons they are most suitable for use in libraries which have only a moderate amount of copying to do.

A good book copier has the following characteristics:

1. It copies all types of material: books and bound volumes of any size or thickness, as well as loose material, illustrations, maps, and charts.
2. It produces a copy which compares favorably with that of the original in respect to legibility, and appearance.
3. It is easy to operate, requiring little training or skill.
4. It has some mechanical means of applying pressure on the book without damage to the spine or any other part.
5. It will copy pages of books which are tightly bound and have narrow inner margins without obliterating any part of the text.
6. It has a timer for setting the exposure and automatically turning the light on and off after the required length of time.

The chief defect of most book copiers is that they are awkward to use, primarily because they require that the book be turned over and placed on the printer face down. To copy successive pages, the book must be removed from the printer, in order to copy the facing page or to turn the page to copy the other side, and then placed back on the printer. Since the paper is hidden from view, the operator cannot tell if it is positioned correctly. In some cases this results in incomplete copying of the text or a tilted position of the text on the copy paper. It is obvious that this procedure is not an appropriate method for copying pages of books, since it is slow, clumsy, and inefficient. An improved book copier is one which holds the book face up, so that the book remains in the printer at all times. The user can then turn the pages easily and position the copy paper on the page correctly.

Another source of trouble is the necessity to apply pressure on the book by hand, in order to secure even contact of the copy paper over the entire surface of the page. If the user applies insufficient pressure, copies may have blurred areas or blank spots. A copier which has a mechanical method of applying pressure produces better results than one which requires hand pressure.

Another desirable feature of a book copier is the ability to copy two facing pages at the same time; most book copiers now available can copy only one page at a time.

A serious defect of many copiers is the use of a chemical solution for processing the copy. Chemical processing with solutions requires a separate device either in the form of another machine or one built into the printer. Chemical solutions spoil quickly so that they must be replaced periodically. They also precipitate and clog the machine so that it must be cleaned frequently. Machines which do not use chemical solutions are preferable to those which do, since they are simpler, faster, and more convenient to use.

Most copiers require the use of two sheets of paper, one of which is discarded, resulting in increased cost of each copy. In addition the use of two sheets of paper makes necessary two or more steps to produce a finished copy, lengthening the time of operation. Copiers which use a single sheet of paper and produce a copy in a single step cost less per unit copy and take less time than those which do not.
BOOK COPYING MACHINES

Most book copiers will make fairly acceptable reproductions of illustrations, but not in all cases; for example, continuous tone photographs and colored pictures reproduce poorly.

Finally practically all book copiers make copies which do not have archival permanence, although they can be considered semi-permanent and adequate for most purposes. To secure archival permanence, even in the case of photo-stats, requires additional work and special treatment.

There are at least eight book copiers now available: the Contoura, Copease, Cormac, Dri-Stat, Hunter, Photostat, Thermofax, and the Copyflex.

The Contoura, which is the least expensive and the only one which is portable, is a machine which has two separate parts: the exposing unit, called the Contoura, and the processing unit called the Constat. The Contoura makes the exposure on a sheet of negative paper, which is then processed and transferred to the positive paper in the Constat. Three models are available in different sizes: 8 x 10, 8 1/2 x 14, and 14 x 18 inches. To make a copy the operator places the Contoura on the page of the book, which is open face up, and presses the Contoura down on the book by hand. If insufficient pressure is applied, a partially blurred or streaky copy may result. The Contoura produces satisfactory copies of book pages, unless the book is tightly bound and has narrow inner margins. In this case part of the text next to the gutter may be blurred or completely illegible. The Contoura is most suitable for research workers, scholars, and others who desire to make their own copies in libraries.

The Cormac Book Printer, a two-unit copier having separate exposing and processing machines, will copy material up to 11 x 17 inches. The exposing unit is roughly the shape of a right triangle, the hypotenuse of which is the printing surface. The book is placed on the printing surface face down with the gutter of the book resting on the top edge. One side of the book hangs down behind the machine and the other rests on the printing surface. The copier does not have a cover for book work and the user must apply pressure by hand. Since the exposing surface is a sloping one, the amount of pressure which can be applied is not as great as a flat surface. As a result this machine requires more care to use than other copiers and does not produce as consistently good results.

The Dri-Stat Flat-Bed Printer, like the Cormac, is a two-unit model having separate exposing and processing units. It will copy material 9 x 15 inches or smaller. The cover of the Dri-Stat is automatically adjustable for various thicknesses of books. The operator applies pressure on the cover by hand. As in other copiers which require hand pressure, insufficient pressure may result in streaky or partially blurred copies. The Dri-Stat will copy pages of tightly bound books with narrow inner margins without obliterating any part of the text. The Dri-Stat also has an excellent system of illumination for exposure and produces a very evenly toned copy.

The Copease is a book copier made in both a two-unit model, having separate
exposing and processing machines, and a single unit model, combining exposing and processing units in one machine. The single unit model is the more compact of the two, having also compartments for holding the paper. The two-unit model, made in two sizes, copies material up to 8.5 x 14 and 14 x 17 inches; the single unit model copies material 8.5 x 14 inches or smaller. An outstanding feature of the Copease is its cover, which is adjustable for various thicknesses of books. The cover also clamps down over the book locking it tightly in place. No hand pressure is necessary. The printing surface extends out to the edge of the machine and partly down the side making it possible to copy tightly bound books which have narrow inner margins, reproducing the entire text of the page completely, even if there is no inner margin at all. In the latter case the operator must be careful to push the book up to the edge of the printing surface so that the gutter touches the edge at all points. The Copease takes more time to use than other printers, because it is necessary to adjust the cover for different thicknesses or for facing pages of the book.

The Hunter Vacuum Bookmaster, the most expensive of all contact book copiers, has two separate units: a printer, made to order in any desired size, and a processor. The printer has its light source in the top of the machine so that the light falls on the book from above, as in the Contoura. The book is placed in the bottom of the machine face up, so that successive pages can be copied without removing the book from the machine. To secure contact between copy paper and text, a plastic sheet attached to a frame folds down over two facing pages and the air is pumped out of the area between the frame and the book, producing a vacuum and forcing the plastic sheet tightly over the pages. In this way two pages can be copied at a time. The copy may be darker on one side than on the other, particularly if the book is thick and does not open flat. If the book is tightly bound and has a narrow inner margin, better results are obtained if one page is copied at a time.

The processing machines of any of the two-unit models can be used interchangeably with any printer or exposing unit, since they all use the same process, diffusion transfer. Processors consist basically of three parts: a tray containing a chemical solution, two heavy rollers which squeeze the negative and positive papers together, and a device for guiding the paper through the machine. Some processors have trays which can be pulled out of the side of the machine without removing any of the other parts. These processors are preferable to others which require the removal of one or more parts.

The copy paper and chemical solution of any brand can also be used in any processor. Paper of one make and solution of another can also be used together, although best results are obtained with paper and solution of the same brand. Papers vary in quality and it would be wise to try several brands to find which gives the best results. Chemicals are available in either powder or liquid forms. The solution will process about 100 copies after which it becomes exhausted and
must be replaced by fresh chemicals. If the solution is not replaced within a week or ten days, it also becomes exhausted even if fewer than 100 copies are made in that time. In this case the life of the solution can be extended if it is removed from the processor after use and poured into a plastic bottle. The trick is to squeeze the air out of the bottle and stopper it tightly. In this way it will last indefinitely and can be used until 100 copies have been made. The processor should be washed periodically or it will clog up. Cleaning solutions are available for badly clogged machines.

The Photostat Instant Copier, Bookholder model, a one unit machine combining exposing and processing units, will copy material 8\(\frac{1}{2}\) x 14 inches or smaller. The Instant Copier, based on the gelatin transfer process, is similar in design and construction to the Verifax Office Copier, but it has one important difference. Its cover is lined with a thick pad of foam rubber, which can be locked over the book. No hand pressure is necessary. The Instant Copier is a compact machine, housing not only a printer and a processor, but also compartments for the paper. The outstanding feature of the Instant Copier is its ability to make more than one copy, up to four or five, from the same negative. All other copiers can make only one or two. It is cheaper and faster to make multiple copies from the same negative than to use one negative for each copy. To make multiple copies from the same negative, the recommended procedure is to increase the time of separation between negative and positive proportionately for each successive copy. For four copies, separate the first copy from the negative after three seconds; the second copy after five seconds; the third copy after ten seconds; and the fourth copy after 30 seconds. Under favorable conditions a fifth copy can be made if the separation time on the fourth is reduced to 10 seconds and the fifth copy separated after 45 seconds.

The Instant Copier produces its best results when the solution is kept at a temperature of about eighty degrees. To maintain the proper temperature, it has a built-in thermostat and heater. Before use, the heater should be turned on and allowed to warm up the solution. If the machine is to be used for any length of time, the heater should be kept on continuously.

Photostat Instant copies turn slightly brown and are not as legible as copies made by diffusion transfer machines. Letters such as a's and e's tend to fill in and small print may not be legible. Multiple copies made from the same negative are not as good as the first copy.

The Copyflex Model 6, the only book copier on the market based on the diazo process, is a three unit model consisting of a printer, a stripper, and a processor. It will make copies of book pages and other material in any size up to 10 x 15 inches. To make a copy the book is placed in the printer face up. A heavy cloth sheet attached to a cylindrical light housing is pulled up under the page to be copied. The light housing is then moved over the page and at the same time the cloth sheet wraps itself around the cylinder pressing the page
evenly around the surface of the cylinder. Two sheets are used to make a copy; the first is a light-sensitive diazo film coated with a special screen, and the second is a light-sensitive sheet of paper. Five steps are required to make a copy: the film is exposed in the printer, processed, and stripped. The result is a transparent positive from which a paper copy is made by exposing it in contact with the film and processing it.

Copyflex copies have a brown tint, but otherwise compare favorably with diffusion transfer copies. It is more expensive and takes longer to make a copy of a book page with the Copyflex than with other machines. However if more than one copy of the same page is required, particularly in amounts of from 10 to 20 it is cheaper to use the Copyflex.

The Thermofax Premier, based on thermography, is the simplest and fastest book copier on the market. It is a one unit model, consisting of a contact printer. No processor or any other additional apparatus is needed. The Premier has a cover which automatically adjusts itself to the thickness of the book and holds the book in place during the exposure. The outstanding feature of the Premier is that it makes a copy in a single step and is completely dry, requiring no chemicals. Exposure and processing take place almost instantaneously and the entire procedure takes about 10 seconds. The machine will copy books with pages $8\frac{1}{2} \times 14$ inches or smaller and take books up to 2 inches thick. The quality of Thermofax copies is not as good as that of copies made by diffusion transfer machines or diazo. Legibility is poor, the paper is thin, and the background tinted slightly orange. Some types of originals will not reproduce at all, notably ball point writing and hectograph printing. Books with thin paper may copy with streaks and blank spots. Text near the gutter will not copy. Multiple copies of the same original can be made quickly and cheaply, amounting to about the same in both cost and speed as multiple copies made by the Photostat Instant Copier.

In summary, the chief advantages of book copying machines are their inexpensiveness, compactness and relative simplicity of operation. They will produce acceptable results if a careful selection is made to suit the particular needs and preferences of a library. However none of these machines is completely satisfactory for library use, since most of them are awkward to use, require some skill and experience, and do not produce good results in all cases. Despite the paucity of good equipment, we should be grateful that manufacturers have finally turned their attention to the production of machines for library use. Let us hope that existing machines will serve as the forerunners of new and better equipment.

BIBLIOGRAPHY


Additional references


