# SECTION EIGHT

# FINISHING

## COLLATING AND GATHERING

### Hand Collating

Collating can be carried out by unskilled staff with little or no training and in many cases without equipment. A benchtop is all that is needed. It should be long enough to allow the sheets or sections to be laid out in order. These are then gathered one by one to make up the finished job. If the worktop is wide enough, the sheets can be laid out in two rows, head to head. The person or persons collating then walk round the bench picking up the sheets and stacking the sets at the end of each circuit. If only a few sections are being collated, it may be possible to stack two identical sets of sections head to head and stack the sets at the end of each half circuit. It is best to experiment with different techniques to see which suits staff, space and worktop best.

The time taken to collate any particular job by hand will depend on the number of workers gathering the sheets. It will be found that some workers are fast and some slow. It is important when using a number of staff for collating to choose a team in which everyone works at about the same pace.

Though hand collating is a primitive system, it lends itself not only to the gathering of single sheets but also to folded sections before they are either side-stitched or perfect bound into books. In addition it is easy for the workers to see and remove any spoiled or blank sheets. It can provide work for unskilled staff.

**Collating Machines**

Where a large volume of collating is undertaken, semi-automatic and automatic collators are available. They speed up the process, cut out fatigue in the workers, and reduce the number of personnel involved in hand collating.

Revolving circular table models save both floor space and legwork. The revolving table has containers to hold the sheets to be collated, and the operator can sit in one place and gather sheets as the table revolves. The machine is controlled by a pedal which not only starts and stops it but also adjusts the speed to suit the operator.

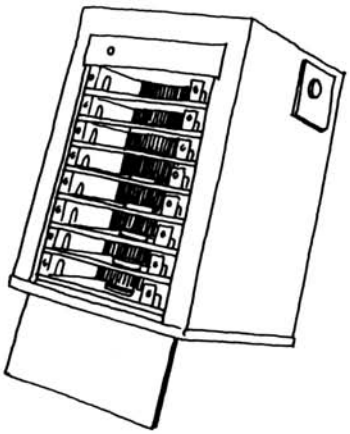


*Diagram 22: Bench top collator*

Benchtop models contain six or eight trays of varying capacity ranged one above the other. The action is semi-automatic. When a foot control is pressed, the top sheet in each tray is thrust forward by friction feed rollers. The whole set can then be gathered between thumb and fingers and withdrawn for stacking. This system can be doubled by placing two such collators side by side. It will still need only one operator, who will use both hands at the same time.

Horizontal models have 12 bins for the sheets, inclined at an angle of about 60°. They can be freestanding or benchtop. Each bin has a maximum capacity of 300 sheets, varying with the thickness of the printed paper. By depressing a lever the top sheet of each bin is raised, and the complete set can be gathered with one sweep of the hand.

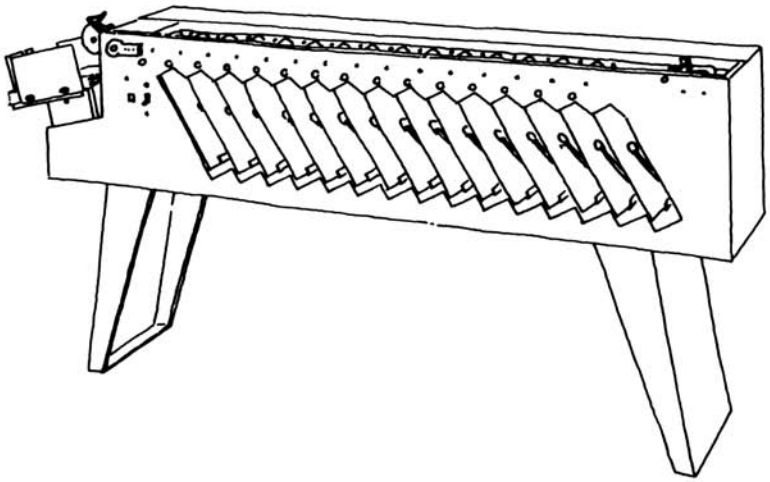


*Diagram 23: Floor standing horizontal collator*

The electric models automatically present the sheets at a regular rate which can be pre-set. The sheets are gathered by passing a rubber-faced pad over them. It is possible to gather over 1000 sheets an hour with this type of collator. These models can only handle successfully the middle range of paper thickness. Very thin papers will need specially-designed collators that have sheet separation mechanisms and suction feed systems.

The important thing in choosing a collating machine is to ensure that it is not too small to handle the output of the printing machines. This is one part of a printshop where bottlenecks can easily occur.

**Jogging Machine**

After collating, the sheets need to be carefully aligned at the top (head) and at the back. This can be done manually by banging them lightly on the bench with both hands or by using a jogging machine.

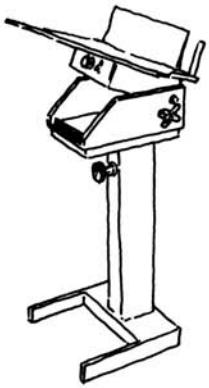


*Diagram 24: Jogger*

**Conclusion**

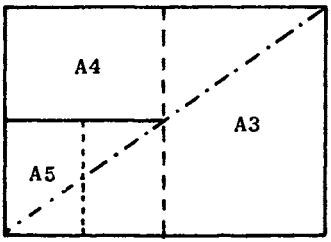
The simplest collators are quite easy to operate. The number of sets gathered from these models is dependent solely on the dexterity of the operator.

For really high-volume collating, there are fully-automatic machines capable of gathering sets of up to 22 sheets at speeds in excess of 2000 sets an hour. This is more than a small printing unit will need. Some of these collators can be put in line with folders and staplers.

**FOLDING**

Folding can be done with or without machines. If it is only occasionally necessary to fold printed sheets, it is best to fold them by hand rather than buy a machine that will frequently stand idle.

To fold sheets by hand, only one simple tool is needed: a 'bone', so called because it is made from a rounded and polished section of animal bone. Four-page and eight-page sections can be folded quite easily and speedily by hand. An A3 sheet is probably the largest paper size a unit would use. When an A3 sheet is folded as Diagram 24 shows, it gives two A4 size sheets; and when an A4 sheet is folded again, it gives an A5 size. To produce an accurate fold each sheet must be folded separately.




*A3* *297 x 420 mm*
*A4* *210 x 297 mm*
*A5* *148 x 210 mm*

*Diagram 25: Folding A3 paper to give A4 and A5*

**Folding machine**

As an increasing number of books are being produced in A4 format, the single fold of an A3 sheet to A4 will be used quite often. Most of the work of the folding machine will be to fold an A4 sheet to form an A5 section, or to fold an A4 sheet into three to make a leaflet or brochure.

Folding machines will fold only one sheet of paper at a time. Small ones of the sort shown in diagram 26 are able to take a sheet up to A4 in size and make either one fold on two parallel folds in it. They cannot make right-angle folds.

There are two kinds of folding machine: buckle or plate models, and knife and buckle models. Each kind has its advantages and disadvantages.

Buckle folder

The buckle folder is certainly the most versatile for producing a number of folds at high speed and it is this

principle that is employed on most present-day machines. They are made in a variety of models to accommodate different paper sizes. The smallest models take an A4 sheet and make one or two parallel folds. These are benchtop models and are intended for the busy office rather than the small printer.

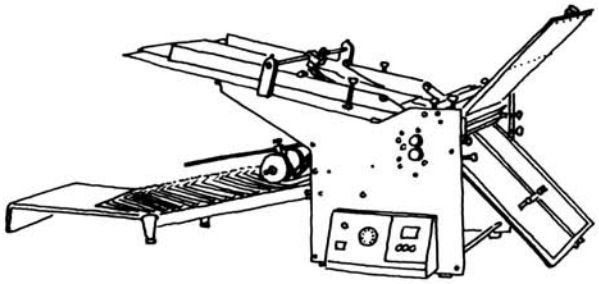


*Diagram 26: Bench top folder (parallel folds only)*

The next size up is capable of feeding an A3 sheet and is probably the best folder for the small printing unit to purchase at the outset. It can make a variety of folds, but only in parallel. If the work of a small unit sometimes requires a crossfold, the second fold can be done by hand. A crossfold extension to the machine can be added when the volume of work justifies the expense.

It is difficult to give machine speeds for folding as much depends on the type of fold and the weight of paper. It should be possible to set the machine up (that is to do the adjustments necessary to produce an accurately folded sheet) and fold about 1500 sheets an hour. A certain amount of skill is required to make the correct adjustments, but the skills could be acquired in a day at most. The majority of problems arising will become less troublesome as the operator's experience with the machine increases. The only running cost for a folding machine is electricity.

## Buckle and knife folder

Its main advantage is that it can make a parallel fold and a right-angle fold at the same time with great accuracy. Its chief disadvantage is its cost, which is at least twice as much as for the buckle folder. It is used mainly for folding 16-page or 32-page book or magazine sections.

**Hints and tips**

1. Although buckle folders are very versatile in the number of folds they can make, they have limitations in the kind of stock they can handle. Card thicker than 200 gsm and paper thinner than approximately 60 gsm in weight cannot be accurately folded with any certainty.

2. Art or coated papers also cause problems. The surface tends to crack along the fold and give an unsightly appearance to the sheet. This can be overcome only by passing sheets through a creasing mechanism first. Although it means the sheets going through the folder twice, the result is worth while.

3. Care must be taken to feed the printed sheets correctly into the folding machine. Page numbers must be checked to give the correct sequence of pages after the final fold. It will be advisable to perform a sample fold before running off the printed sheets.

## BINDING AND TRIMMING

### Binding

The output of a small printing unit consists most commonly of single sheets which must be collated and fastened together. It is possible to do this with a single staple in the top left-hand corner, but this can hardly be dignified with the name of "binding". Any small printing unit will need to possess equipment capable of something more ambitious.

There are two binding methods: hand binding, and mechanical binding.

#### Hand binding

This very simple form of binding has been in use for many years for binding pads or writing blocks. The binding is done by using adhesive. It is a simple method and can be done by hand. The sheets are held in a press, the spine is coated with glue (adhesive) and a muslin strengthening strip

is added. Today not only pads but books of almost any thickness can be bound in this way. However it is not suitable for books that have to be used often: the glue will crack and allow pages to fall out.

To improve the appearance and to give extra strength, it is usual to apply a self-adhesive tape of linen or plastic along the spine and fold it over the front and back covers. This self-adhesive tape will also improve the appearance of side-stitched books.

There are various makes of machine available to do this job. The commonest type contains clamping bars to hold the sheets while they are being glued, and an infra-red heating element to speed up the drying of the adhesive. The linen tape for the spine is then added. Only one book at a time can be finished in these machines.

## Adhesive binding

Machines exist which clamp, bind and tape the backs in one operation. The tape has a heat-softened adhesive which allows the machine to glue it to the spine. If the spine is to be titled, this must be done before the back is glued on. It is not possible to print the title by offset: some other method must be used. Such a machine would cost a little less than an electric golfball typewriter.

## Plastic slide binding

This is the simplest method of fastening loose sheets together. It makes use of a plastic slide which clips over the spines of all the sheets including the cover. This method is cheap and very useful if material has to be up-dated, as any sheet can be easily replaced at any time.

The slide binders vary in width up to an inch, according to the thickness of the work to be bound, and come in pre-determined lengths and in different colours. No special equipment or skill is required. A little extra space must be left on the inside margins to allow for space taken up by the plastic slide. Those setting the text should be instructed

to leave the extra space on the right-hand side of left-hand (even-numbered) pages, and on the left-hand side of right-hand (odd-numbered) pages. Printers should be warned to make allowance for the extra spine margin and not print the text centrally on the page.

**Stapling**

Material can be stapled in two ways. The first, known as 'side stitching' consists of stapling single sheets of paper down one side. The sheets are collated with their covers, carefully aligned, and two or more staples driven through the long edge. Any stapler can be used for side stitching up to about 10 sheets of paper of average thickness. For more than that number, a heavy duty stapler or bench stapler may be needed which can take staples of varying lengths.

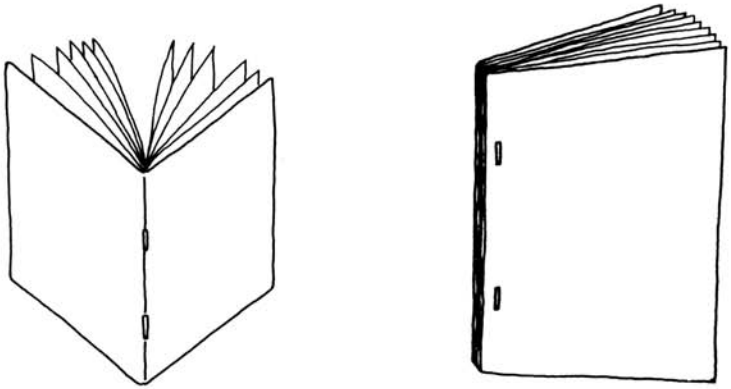


*Diagram 27: Saddle stitch (left) and side stitch*

For the second method, known as "saddle stitching" the sheets to be bound are folded in half and gathered into sets. Each set is then opened up again and two staples are inserted along the line of fold. In order to reach as far as the fold a "long-arm" stapler is needed with an arm 8 or 10 inches in length. Inexpensive ones are made which can punch through about 10 or 12 sheets of paper. As there are four pages on every folded sheet, this stapler should be able to staple a 40-page book.

## Bench stapler

This is the best machine for a small printing unit to start with as it is capable of stapling much thicker pads and books than the long-arm stapler. It usually has an adjustable plate so that saddle-stitching and side-stitching can both be accommodated with very little trouble. The kind with a foot control is faster tc operate as it leaves both hands free to manoeuvre the material to be stapled. There is also a freestanding machine operated by a foot control. It is more expensive than the bench model but has the advantage of being easily portable.

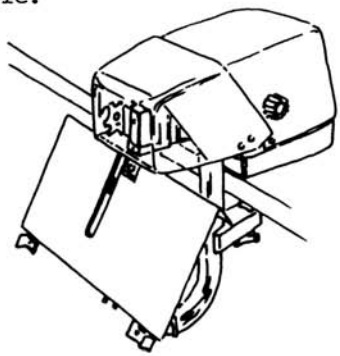


*Diagram 28: Electric bench stapler*

## Wire Stitchers

Where thicker books are to be stitched, or a higher level of production is needed, a power-driven wire stitcher is essential. Although freestanding, this machine is heavy and needs to be connected to a power supply so it cannot be moved about. It is not difficult to operate but skill is needed to adjust the machine before work can start.

The staples are formed by the machine from a long length of wire. To overcome the problem of the staples buckling when being forced through very thick books, different thicknesses of wire can be used. With the correct adjustment, books an inch thick can be stapled. Stainless steel wire is recommended so that the staples do not rust. Over long runs the wastage of staples will be considerably less than the other types of stapling machines.

## Plastic comb binding

This process makes use of two machines. The first punches a row of holes in the collated sheets including the cover and the backing sheet. Preformed plastic combs are put into the second machine, which opens them up to allow the punched sheets to be slipped over the teeth of the combs. The combs are made from plastic and the teeth are quite springy. Once released they curl back again to hold the sheets together. They come in a variety of sizes. The operation can be done either manually or electrically.

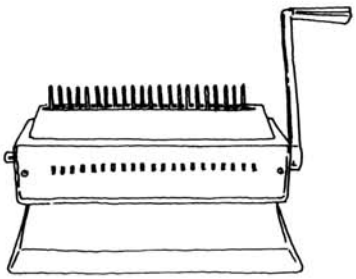


*Diagram 29: Comb binder*

## Spiral wire binding

This process is very similar to the plastic comb binding. Two manually-operated machines are usually needed. One machine punches a row of holes along the side of the collated sheets including the cover and backing sheet. The second machine feeds a preformed wire spiral through the punched holes and clamps the ends. The size of the wire spiral will depend on the number of pages to be bound. The preformed wire spirals can be obtained in various lengths and diameters.

There is a single, but more expensive, machine which does the job more quickly. It punches the holes and feeds the wire through them from a spool. The spiral formed by the machine must be adjusted to the thickness of the book being bound. The machine is electrically powered and the operator needs a little more training than for the manually-operated machine.

Perfect binding

Perfect binding is expensive and complicated, and a small printing unit would need a large turnover of books to justify the purchase of one of these machines. If perfect binding is required and the equipment is not available, then the printed sheets can be sent out to a printer.

The sheets to be bound are fed by hand into clamps on the machine. The machine then does the complete binding operation, leaving only the trimming of three edges to be carried out at the end.

**Case binding**

When a hard cover is put on a book, it is called "case binding". It is a highly-skilled craft needing some expensive equipment. This is a method of binding that a small unit should not contemplate. If this type of binding is needed, it would be best to find an outside binder to do the work for you.

## TRIMMING

**Cardcutters**

It will always be useful to have a cardcutter in the unit. It need not be large but should be capable of cutting as many as 32 sheets of paper, depending on the thickness, at one time, accurately. It can be quite simple, with a baseboard with a leading edge set at rightangles to the blade and raised to give a stop against which the paper can be placed. At the edge of the baseboard where the blade comes down there should be a hand-operated clamp to hold the sheets firm during the cutting operation.

Many print-room operators refer to the simplest forms of papercutter as "guillotines". This is incorrect. These simple types consisting of a baseboard and hinged blade are not guillotines but papercutters or cardcutters.

It is possible to buy cardcutters with the leading edge marked in inches and/or millimetres. Some will also have a device beyond the blade to give the measure of the piece of paper being cut off. However, these are only refinements to the basic machine. What a good cardcutter must have is a strong clamp and the leading edge on the base at exactly 90° to the blade.

Cardcutters are made in a range of sizes to suit different paper sizes and need very little skill to operate.

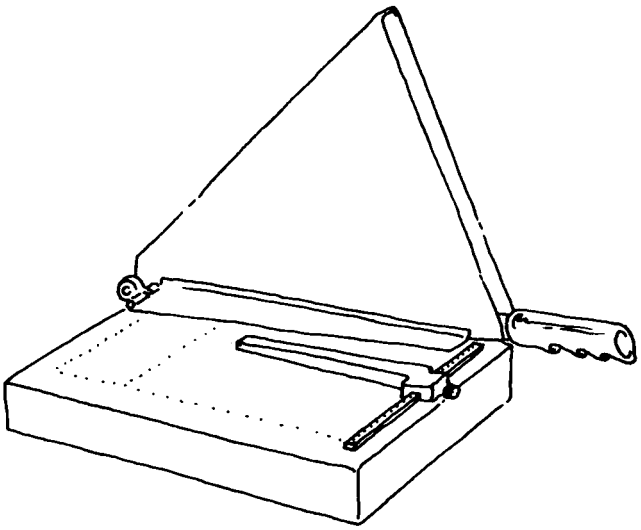


*Diagram 30: Card cutter*

**Guillotine**

The true guillotine of the printing trade is a machine capable of cutting through as many as 500 sheets of paper. The most popular models are driven by an electric motor and do not need the physical strength that is demanded by a manual machine. The choice is a matter of economics. A manual model with a cutting blade of 18 inches will cost about three-quarters the price of a golfball typewriter; an 18-inch power driven guillotine will cost about twice as much.

Some guillotines are large, sophisticated, and expensive. They are intended for big printing firms, not small units.

All models are fitted with a safety device. One such device ensures that the operator must simultaneously press two buttons positioned on opposite sides of the machine. If either hand is lifted for any reason, the blade stops immediately. Another consists of a number of moving bars which, if touched, automatically halt the machine. A third uses "magic eyes". A number of beams of light are displayed across the face of the machine and, if they are impeded at any time, the machine stops immediately.

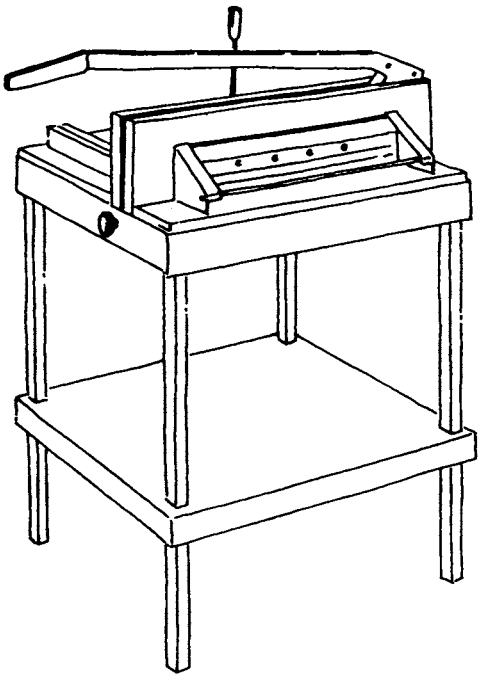


*Diagram 31: Hand guillotine*

For the small printing unit, the best machine to purchase will be semi-automatic, that is a model where back-plate and clamp are operated by control wheels at the front of the machine, and a blade that is motor driven and has one of the built-in safety devices mentioned above.

When choosing a guillotine, make sure it is wide enough to take the largest sheets of paper used in the print room. The length of the diagonal of the sheet can be used as a guide. This enables the paper to be turned in the guillotine without having to be brought out.

Operating speeds with a manual guillotine depend on the skill and temperament of the operator. For electrically-driven models most manufacturers give machine speeds at so many cuts per minute. This is somewhat misleading as they are only pointing out how many times the blade will go up and down, without taking into account changing the position of the back plate, turning the paper, and clamping.

The siting of the guillotine is important. It is the machine that is used at the beginning of the operation to cut paper for the printing machines, and at the end to trim the finished work. It is unsound economically to have more than one guillotine. Because a guillotine is not easy to move, its location must be as permanent as possible. A quiet section away from the flow of personnel would benefit the operator.