
British Standard Code of practice for

Safeguarding woodworking machines

Part 2. Circular sawing machines
(sawing machines with rotating tools)

Code de bonne pratique pour la sécurité des machines à travailler le bois
Partie 2. Scies mécaniques circulaires (scies à outil rotatif)

Leitfaden für Schutzeinrichtungen an Holzbearbeitungsmaschinen
Teil 2. Kreissägemaschinen (Sägemaschinen mit rotierenden Werkzeugen)

Foreword

This Part of BS 6854 has been prepared under the direction of the Machine, Engineers and Hand Tool Standards Committee.

It is Part 2 of a series of Parts and contains particular recommendations concerning the safeguarding of circular sawing machines. It should be used in conjunction with Part 1 which contains general recommendations. Other Parts will be as follows:

Part 3 Vertical spindle moulding machines;

Part 4 Planing machines;

Part 5 Narrow band sawing machines.

The background to this code of practice is the high accident incidence rate encountered by woodworking employees and that an estimated 14 % of all machinery accidents occur on woodworking machines. Although the safeguarding of woodworking machines in this code is mainly directed at stationary machines, the same general principles apply to portable and transportable machines. Account has been taken of the fact that woodworking machines may be used for working on bone, plastics, and materials other than wood or wood products. The guidance provided is also relevant to all woodworking machines designed for domestic use but used for industrial purposes.

This code should be of use to designers, manufacturers, suppliers, importers and users alike since in its development account has been taken of practical aspects of safeguarding woodworking machines together with the legal requirements contained in the Health and Safety at Work etc. Act 1974, the Factories Act 1961, and the Woodworking Machines Regulations 1974. The principles of safeguarding given in BS 5304 have also been incorporated.

The term 'reasonably practicable', used in the Health and Safety at Work etc. Act 1974, and adopted by this code, implies starting from the current state of the art and takes into account the cost of what is done in relation to the improvement secured. A manufacturer or supplier who sells goods produced to a British Standard specification and who makes clear the conditions of use for which they are intended will thereby, to the extent that the standard is adequate and appropriate for the particular workplace, be able to indicate compliance with his general duty under Section 6 of the Health and Safety at Work etc. Act 1974. To a similar extent employers, those in charge of premises and employees will be assisted by the provisions of this code of practice.

The code stresses the importance of built-in safety at the design stage, thus encouraging the concept that safeguarding should be viewed as a prime feature of a woodworking machine and not something which is an afterthought. Guidance is given to manufacturers and suppliers on identifying, eliminating or reducing both mechanical and non-mechanical hazards (e.g. noise, dust) which have a bearing on health and safety of persons when the machines are used.

This code will also be of help to purchasers and users when selecting machines, and provides practical guidance on safe working practices including the use of safeguards and safety appliances (e.g. push sticks). Successful implementation of the guidance given in this code of practice requires discussion between supplier and user, and the provision of adequate information.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

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Code of practice

1 Scope

This Part of BS 6854 gives particular recommendations concerned with the safeguarding of the cutters and other dangerous parts of circular sawing machines with and without travelling tables including dimension sawing machines, cross-cutting sawing machines (including rise and fall cross-cut saws and truss saws), panel saws (beam and vertical), multiple rip sawing/straight-line edging machines and portable machines, and should be used in conjunction with BS 6854 : Part 1 which deals with general recommendations.

NOTE. The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this Part of BS 6854 the definitions given in BS 6854 : Part 1 apply together with the following.

circular sawing machine. As defined in the Woodworking Machines Regulations 1974, a sawing machine comprising a saw bench (including a bench in the form of a roller table and a bench incorporating a travelling table) with a spindle situated below the machine table to which a circular saw blade can be fitted for the purpose of dividing material into separate parts, but not a multiple rip sawing machine, a straight-line edging machine or any sawing machine in the operation of which the blade is moved towards the material which is being cut.

3 Statutory requirements

The general statutory requirements relating to the supply and use of woodworking machines are set out in BS 6854 : Part 1.

Statutory requirements relating to the provision and construction of guards for the blades of circular sawing machines and the use of safety devices are contained in Regulation 5 of the Woodworking Machines Regulations 1974. In addition legal requirements for circular sawing machines used in agriculture are contained in the Agriculture (Circular Saws) Regulations 1959.

4 Circular and dimension saws

4.1 Machine descriptions

4.1.1 Circular sawing machine with and without travelling table. A circular saw is used for the general cutting and squaring of stock. In general the blade is mounted on a spindle below the table and facilities are provided to raise and lower the projection of the blade above the table and, in some cases, to cant it for angle cutting (see figure 1).

Circular sawing machines may be used for ripping, cross-cutting and dimensioning.

4.1.2 Dimension saw. A dimension saw is used to produce accurate work with a good finish and has a travelling table and may have a canting spindle (see figure 2).

Dimension saws are often fitted with a scoring or scribing saw unit (see figure 3) mounted at the in-feed side of the saw blade for the clean cutting of laminated panels.

4.2 Design recommendations for safeguards

4.2.1 General. The recommendations given in BS 6854 : Part 1 apply together with the additional recommendations given in 4.2.2 to 4.2.10.

4.2.2 Guarding the blade below the table. The main frame on most circular sawing machines is of the box type which goes down to the floor and completely encloses that part of the blade below the table (see figure 1). On the open frame and smaller pedestal type machines (see figure 4) the saw blade below the table should be guarded to the greatest extent that is practicable. Preferably, this should be achieved by provision of an enclosing exhaust hood connected to a dust extraction system. Panels which have to be removed for clearance of sawdust are not an effective substitute for the guarding described above and, if provided, should be in addition to, and not instead of, an exhaust hood.

NOTE. The open frame circular saw machine is now mainly used in agriculture (see Health and Safety Leaflet AS11 *Agricultural safety – circular saws*).

4.2.3 Guarding the blade above the table

4.2.3.1 Riving knife. Although the riving knife affords some protection against contact with the saw blade at the rear of the machine, its main purpose is to prevent the cut workpiece from closing on the up-running part of the saw blade, thus preventing throwback of the workpiece.

The knife should be manufactured from steel selected in accordance with BS 970, have a smooth surface and be slightly thicker, by approximately 10 %, than the plate of the saw blade but thinner than the kerf (see figure 5). It should be strong and rigid to suit its purpose. If the steel is too soft the knife may be deformed and put out of alignment with the saw by an accidental blow, with the result that it may foul the wood instead of entering the cut. On the other hand a brittle knife could be broken by a heavy blow. Where the riving knife is used as a mounting for the top guard, the knife should be as wide and as stiff as possible to prevent excessive movement of the guard in the event of a blow or vibration.

The riving knife should be securely fixed below the surface of the table and set behind, and accurately in line with, the saw blade. It should be capable of adjustment so as to bring it as close as is practicable to the saw; the distance between the front edge of the knife and the saw teeth should not exceed 12 mm measured at the table level. It should extend upwards from the table surface to a point not more than 25 mm below the top of the saw blade, or to a minimum height of 225 mm if the diameter of the saw blade is 600 mm or more (see figures 6 and 7). It should not be possible to replace or adjust the riving knife except by means of tools. The edge of the knife nearer to the teeth of the saw blade should be so designed that the curve forms an arc of a circle having a radius of the largest saw blade with which the machine is designed to be used.

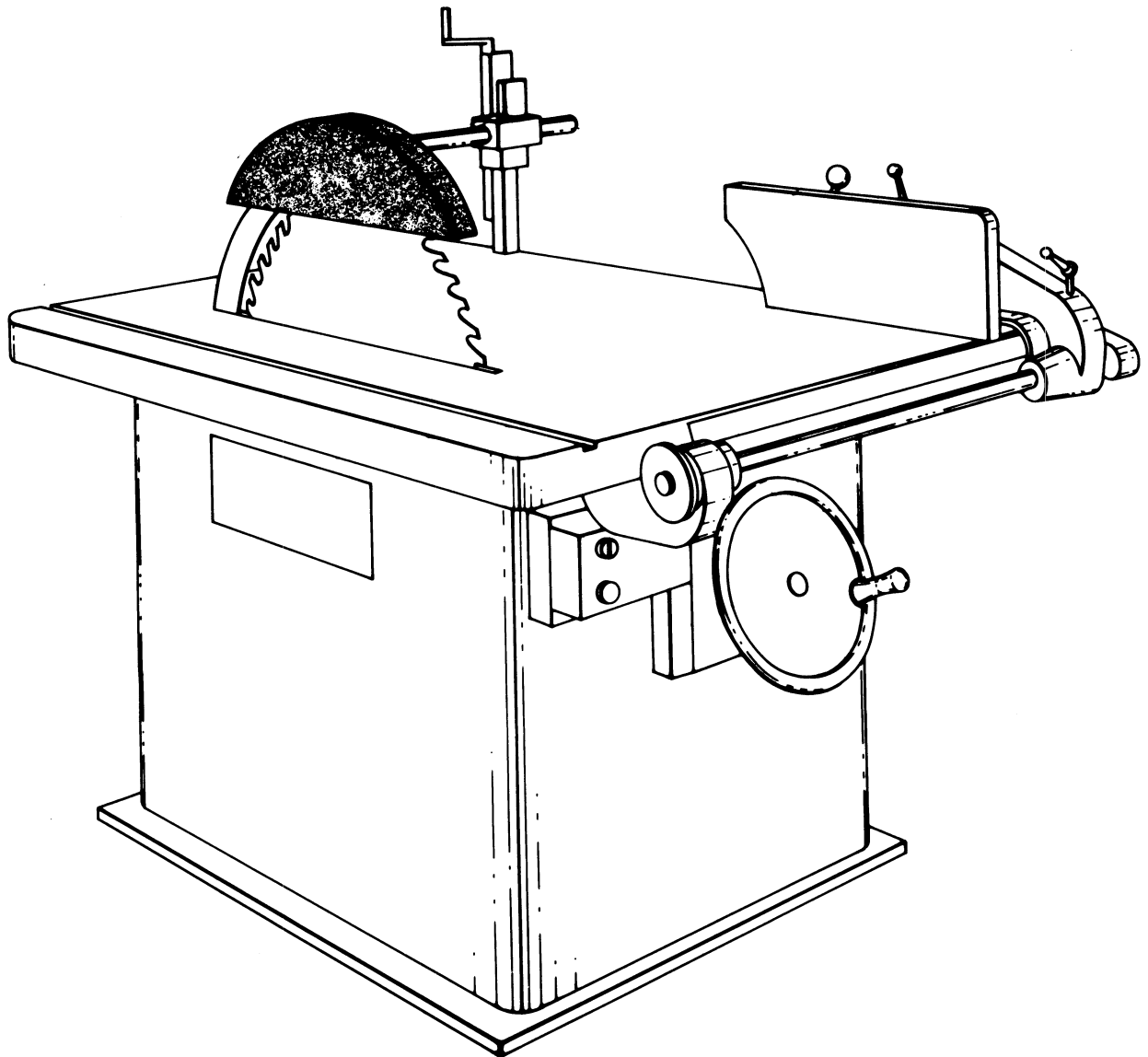


Figure 1. Circular saw bench

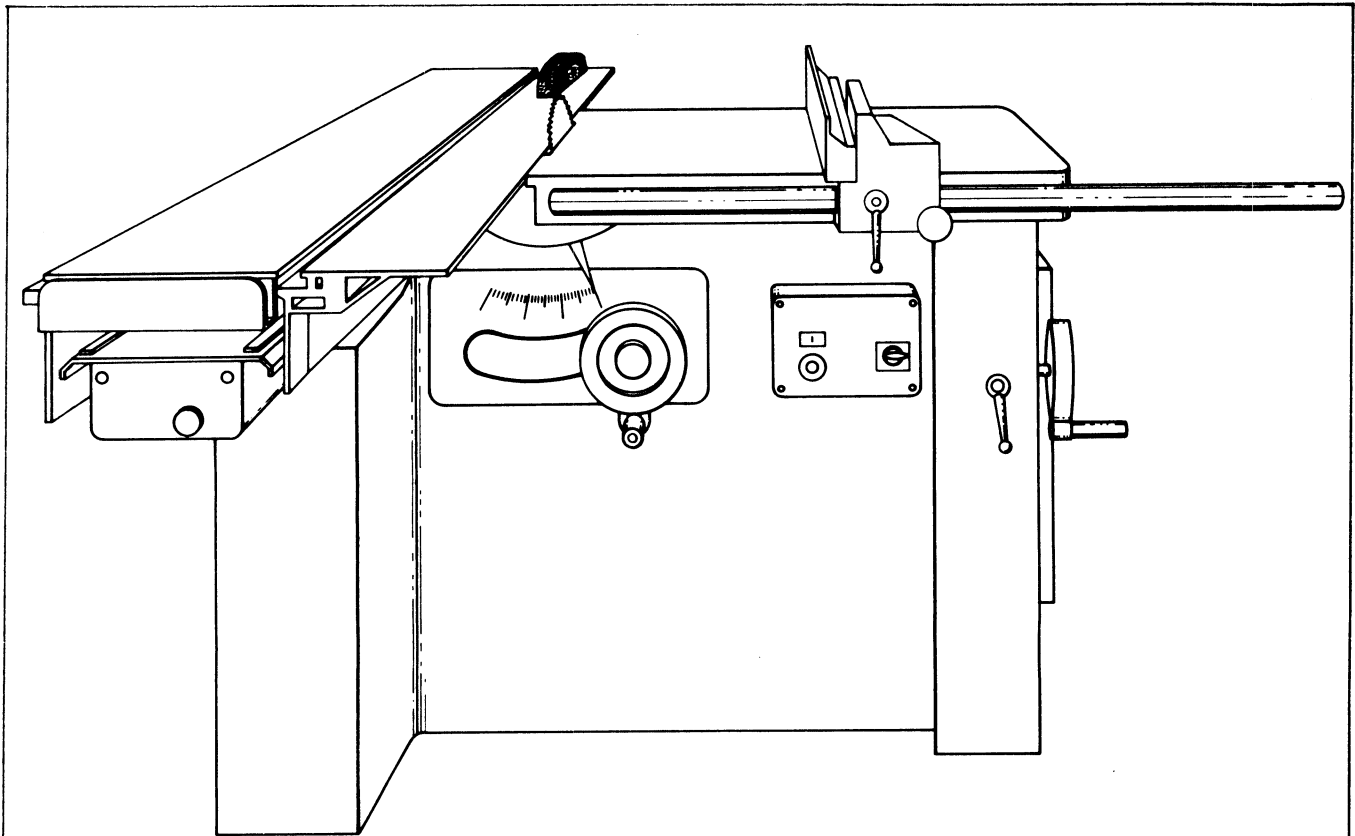


Figure 2. Dimension saw bench

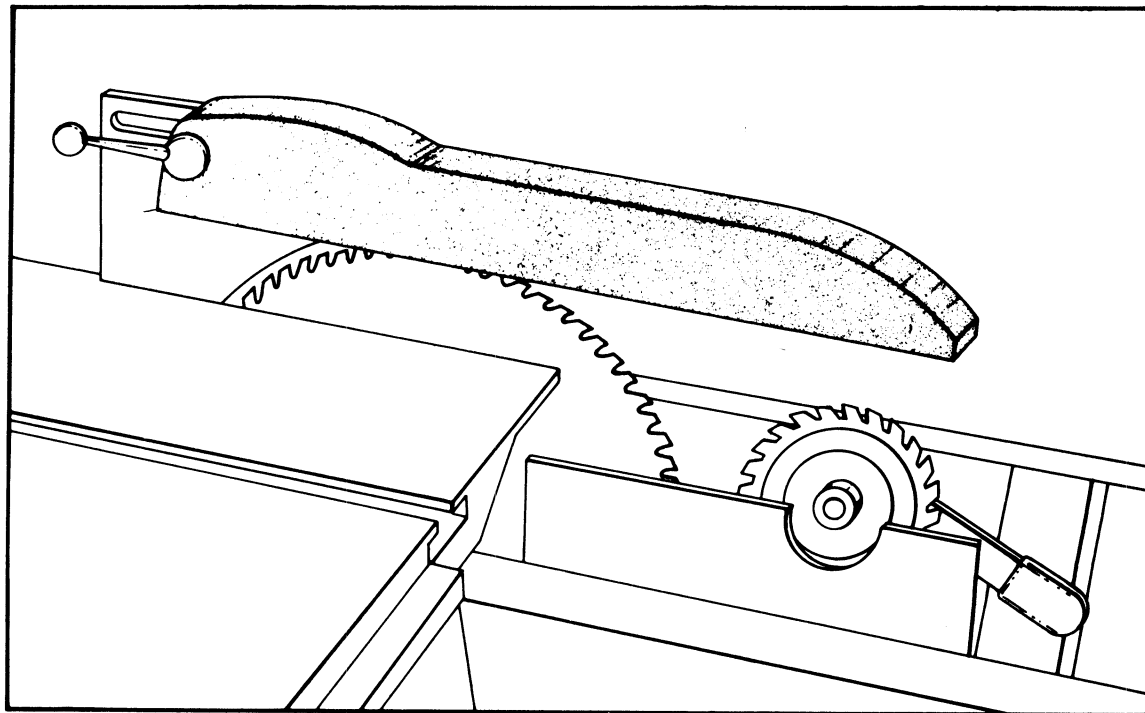


Figure 3. Scoring saw unit fitted to a dimension saw bench

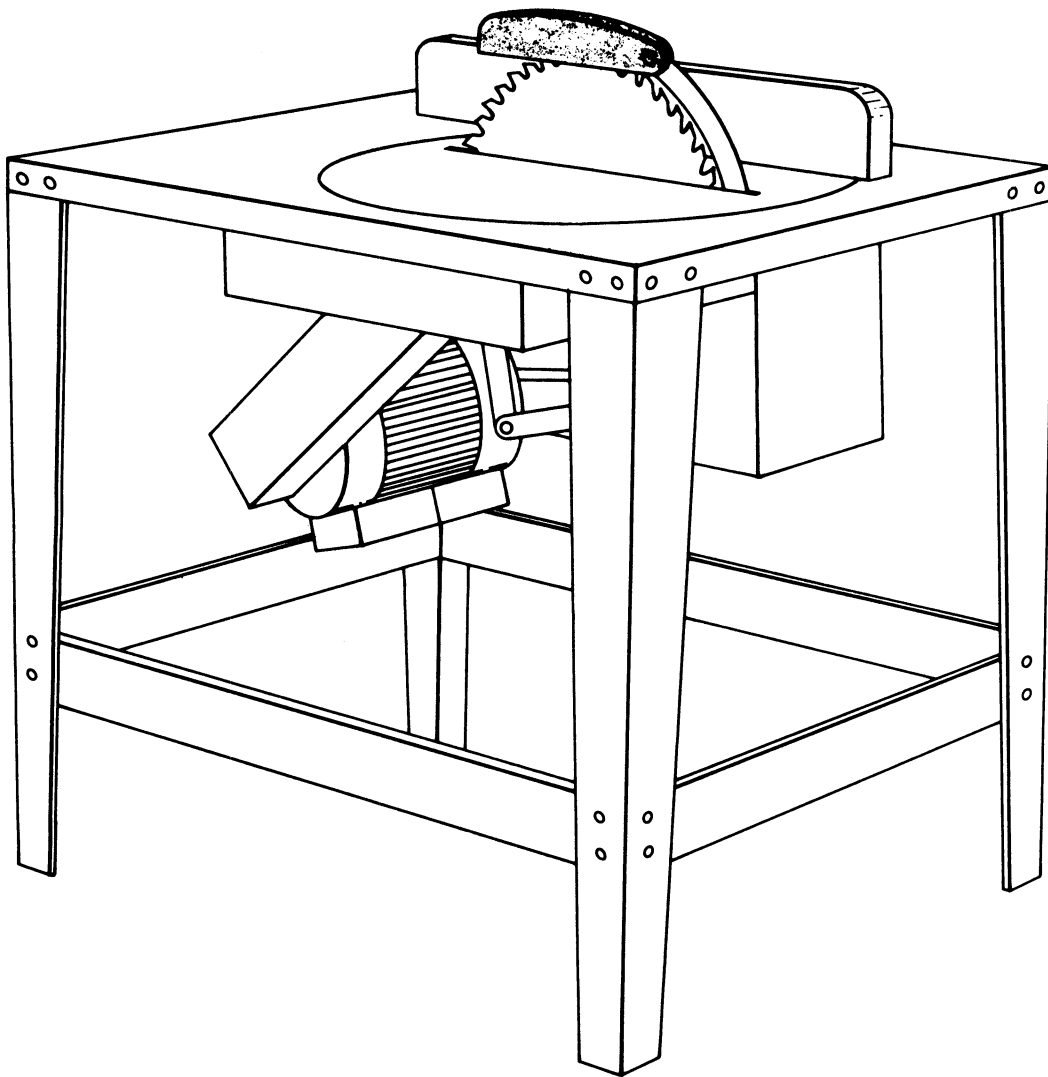
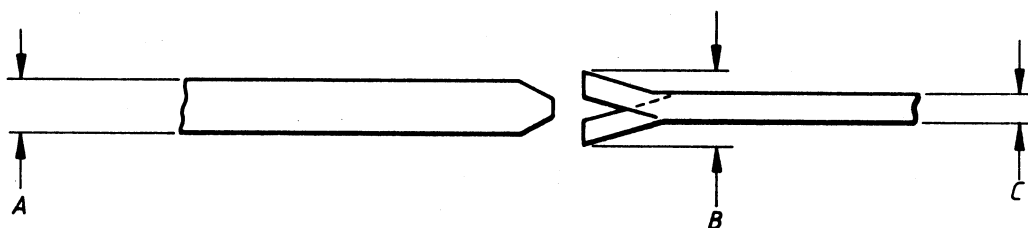


Figure 4. Open frame circular saw bench



Key:

- A** is riving knife
- B** is kerf of saw
- C** is plate of saw

NOTE. *A* to be approximately 10 % greater than *C* but less than *B*.

Figure 5. Recommended thickness of riving knife

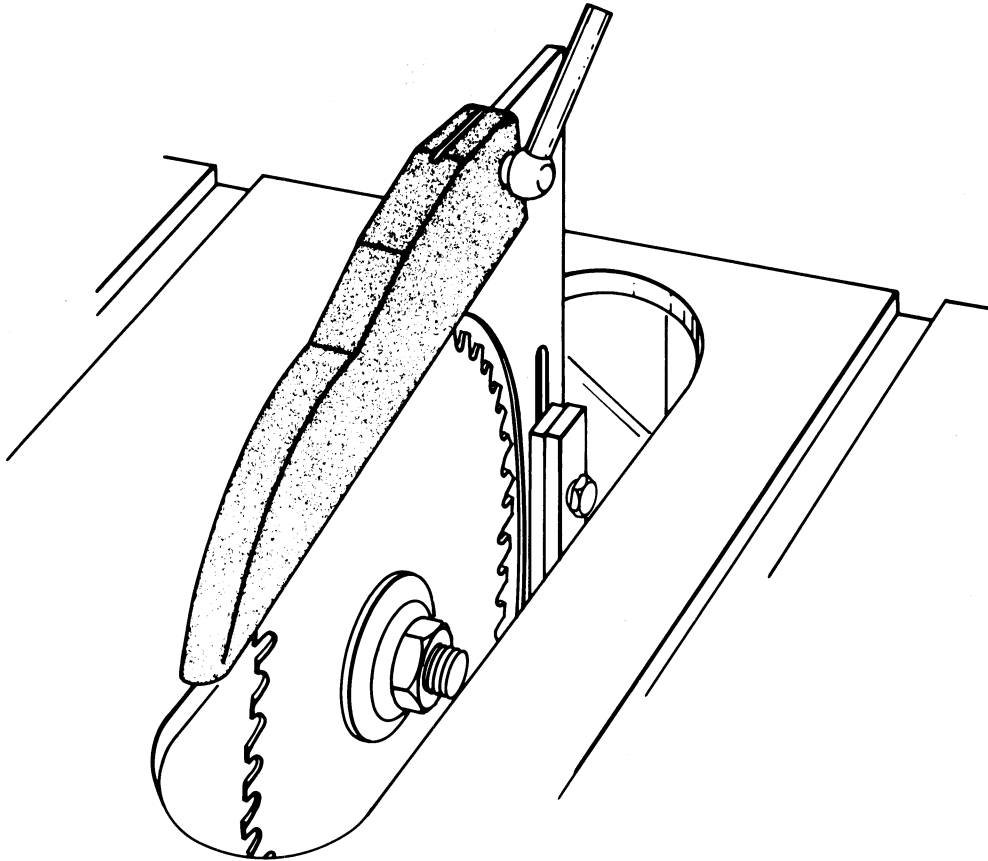
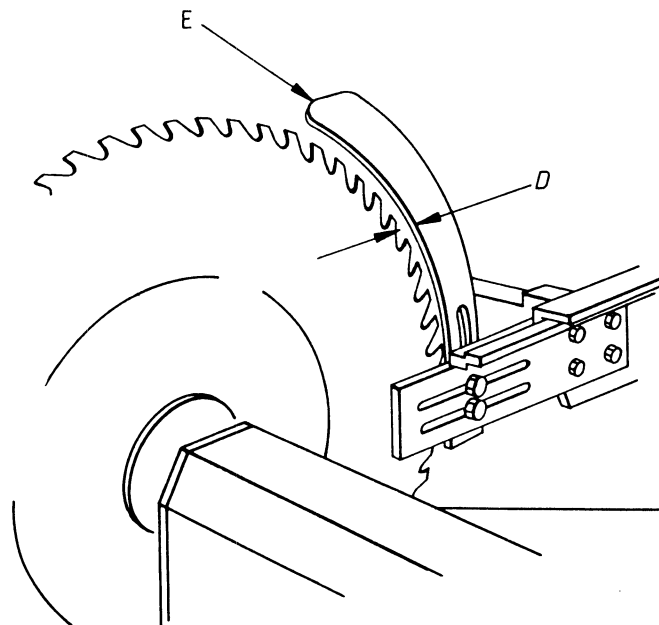


Figure 6. Riving knife fixing



NOTE 1. Distance D measured at table level should not exceed 12 mm. Point E should be not more than 25 mm below the top of saw blade for a saw blade of a diameter of less than 600 mm.

NOTE 2. Guard removed for sake of clarity.

Figure 7. Riving knife fixing with slots for vertical and horizontal adjustment

4.2.3.2 Adjustable guards for the crown and the front of the saw blade. The guard for the exposed part of the saw blade should be strong and easily adjustable so that it extends from the top of the riving knife to a point above, and as close as practicable, to the workpiece. The top guard mounting arrangements should be sufficiently rigid to minimize contact with the blade. This type of guard, in addition to protecting the operator, should be made from material which will withstand contact with the blade without disintegration and will minimize the possibility of the saw blade shattering or saw tooth tips being detached and ejected. When squared stock is being hand fed the guard should be capable of adjustment so that it is not more than 12 mm above the top surface of the workpiece.

The top guard should have a flange on each side of the saw blade. The flange depth and guard adjustment should ensure that the roots of the teeth are covered. Where the guard is fitted with an adjustable front extension piece, that extension piece should have a flange of adequate depth along its whole length on the side remote from the fence. It should be adjusted so that it extends below the roots of the teeth of the saw blade on the side furthest away from the fence.

Where the top guard is attached to the riving knife it should rise and fall with the saw blade and be capable of being canted with the saw blade whilst remaining correctly adjusted (see figure 8).

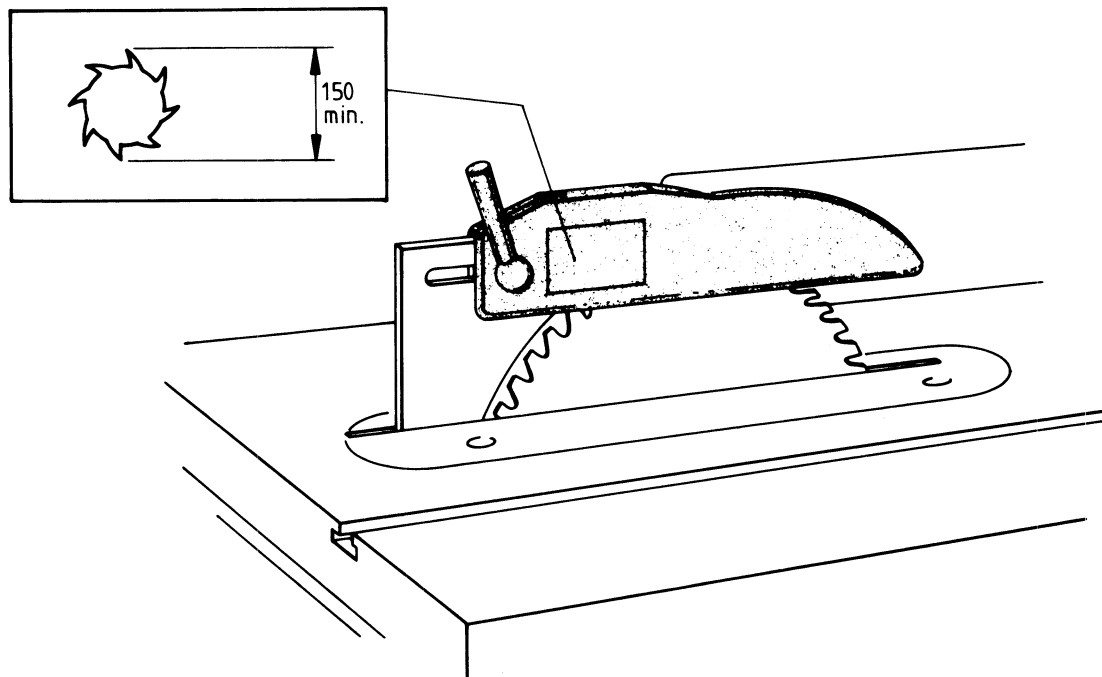
NOTE. Alternative designs of top guard may be used provided that at least an equivalent standard of safeguarding to that afforded by the standard guards is achieved. An example is shown in figure 9 where a plastics top guard is mounted on a pivoting support with guide rollers at the feed and delivery ends.

4.2.3.3 Self-adjusting guards. On machines with smaller saw blades (i.e. up to 300 mm diameter) self-adjusting guards of the type shown in figure 10 may be used.

Where a machine is used for cutting sheet material only, within a limited thickness range, a self-adjusting guard of the type shown in figure 11 may be used. It consists of a wooden box, with spring loaded skids, supported on a wide riving knife. The curved lead-in of the skids allows the workpiece to enter easily whilst the springs keep the skids on the material throughout the cut.

If the material from which a self-adjusting guard is made is liable to cause danger when coming into contact with the saw blade, the guard should be lined with a suitable material to prevent this hazard.

4.2.3.4 Extension table. Unless fitted with a roller table or travelling table an extension table should be provided where any person, other than the operator, is employed for taking off on circular sawing machines in a fixed operating location and also on all transportable machines able to accommodate a saw blade of diameter greater than 400 mm. The width of the extension table should be at least equal to the width of the machine table and of a length such that the distance of the outfeed edge of the table, from the up-running part of the saw blade, is not less than 1200 mm (see figure 12 and the Woodworking Machines Regulations 1974 (Regulation 20)).



Dimension is in millimetres.

Figure 8. Riving knife and guard with warning notice specifying the smallest diameter saw blade which may be used on the machine

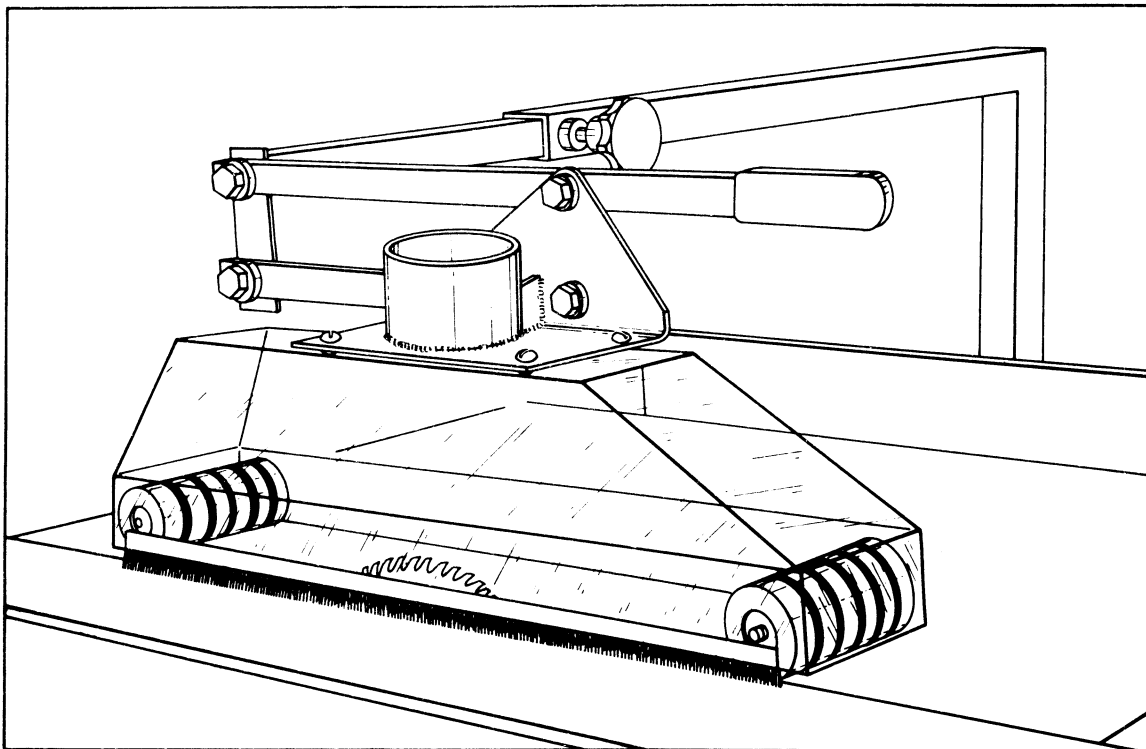
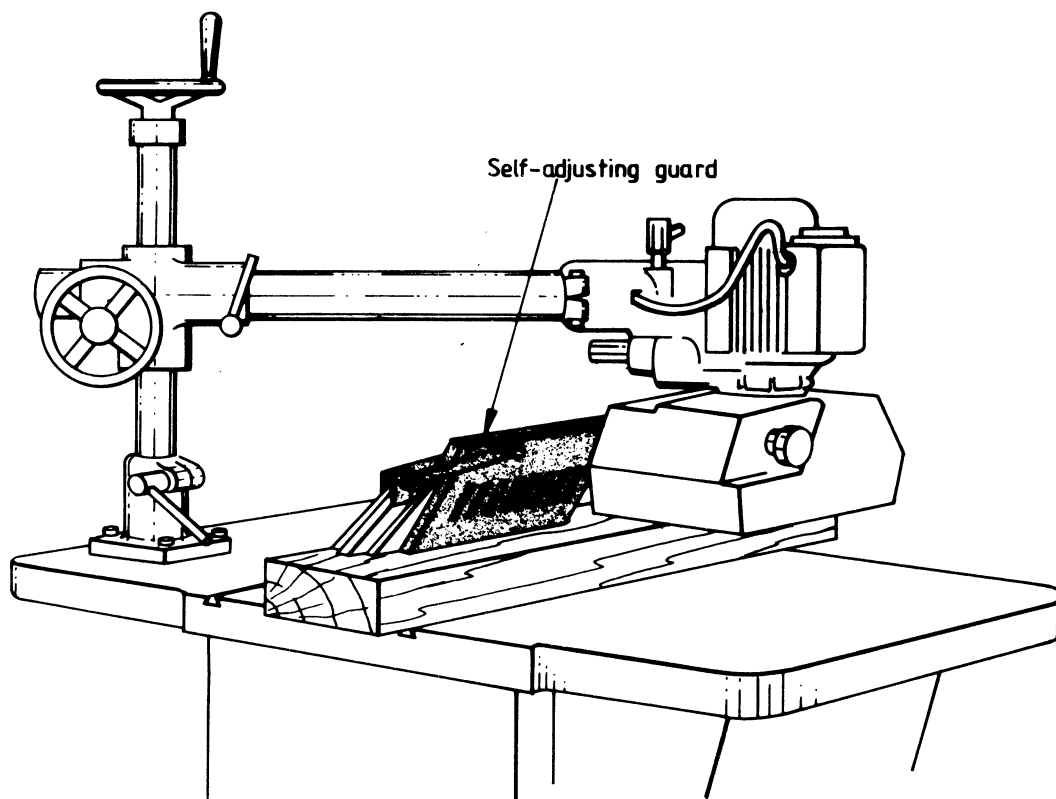
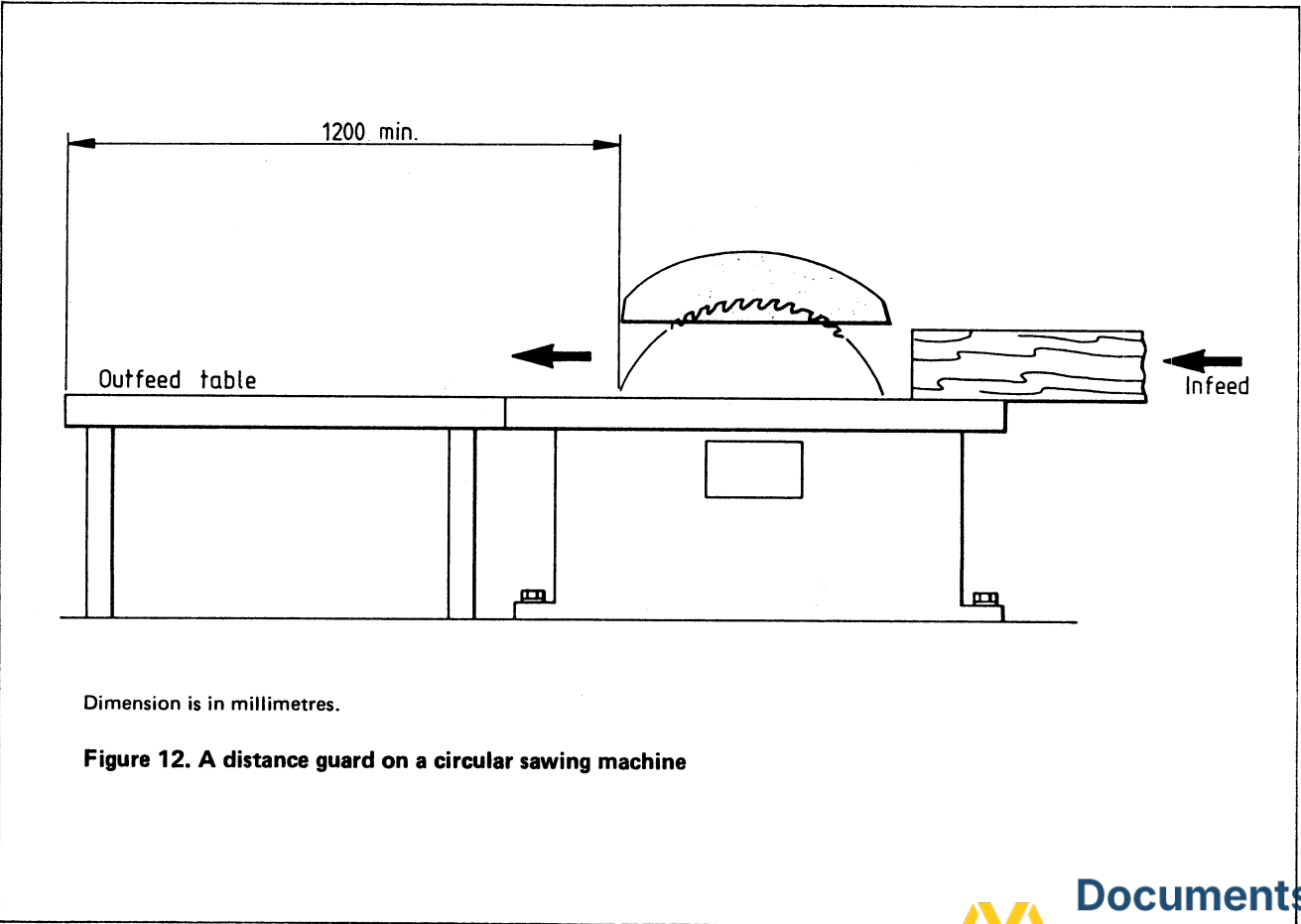
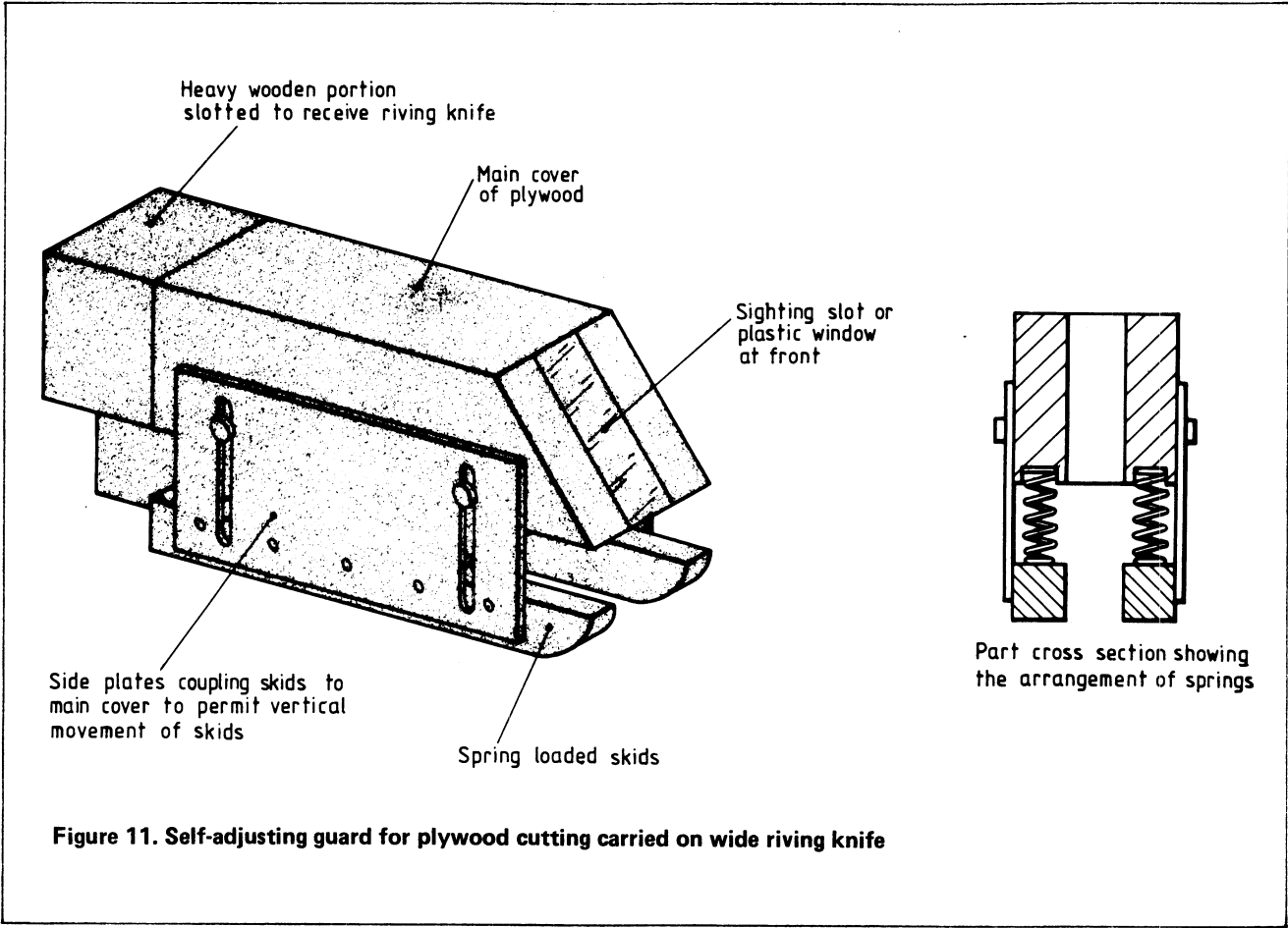


Figure 9. Plastics crown guard with front and rear pressure rollers and dust extraction outlet



NOTE. A power feed unit is fitted to the machine.

Figure 10. Self-adjusting guard for small sawing machines with blade up to 300 mm diameter



4.2.3.5 Work guides and fences. Where appropriate the machine table should be so designed that ripping and cross-cutting fences and mitre guides may be fitted. The rip fence (see figures 13 and 14) provides the guide which determines the line of cut. When cutting squared stock ripping fences should be accurately adjusted so as to extend not more than 50 mm beyond the tips of the saw teeth. This is to avoid the possibility of cut timber either becoming trapped between the fence and the up-cutting part of the saw blade and being ejected towards the operator, or twisting and causing a hazard by possible distortion and breakage of the saw blade.

When ripping narrow pieces or when the blade is tilted, if it is not practicable to lower the guard because of the interference of the fence, it may be necessary to use a running piece along the length of the fence which should be secured either to the fence or to the table, or a lower fence should be employed (see figure 14).

NOTE. The front of the guard is lifted by the wood as it is presented. The guard rests on top of the wood throughout the cut and returns to rest on the top of the table afterwards, thus ensuring that the whole of the saw blade above the table is covered at all times.

4.2.4 Saw blades. Dimensions and material for certain circular saw blades, i.e. plate saws for ripping or cross-cutting, single swage saws and double swage saws should be as specified in BS 411.

Tipped blade or segmental circular saw blades, etc. may also be used with these machines.

NOTE. For advice on cleaning and repair see 12.3.

4.2.5 Table slot for the saw blade. For machines designed to be used without saw packings the width of the table slot should not exceed the thickness of the saw blade in use by more than 10 mm.

The table slot should extend to a sufficient distance behind the saw blade to permit a suitable riving knife to be fitted when the largest saw blade for which the machine is designed is in use, and the front portion of the table slot should not be larger than is necessary to accommodate the largest saw blade for which the machine is designed.

4.2.6 Push sticks. A push stick should be made available for use on all circular sawing machines which are fed by hand (see figure 15).

Push sticks and blocks should be constructed from hard, straight-grained wood, capable of withstanding the pressure necessary to feed the workpiece. There should be no metal attachments at the lower end. A straight push stick with a rounded or pistol grip is preferred. A curved grip should not be used because of its cross-grained section which may break under pressure.

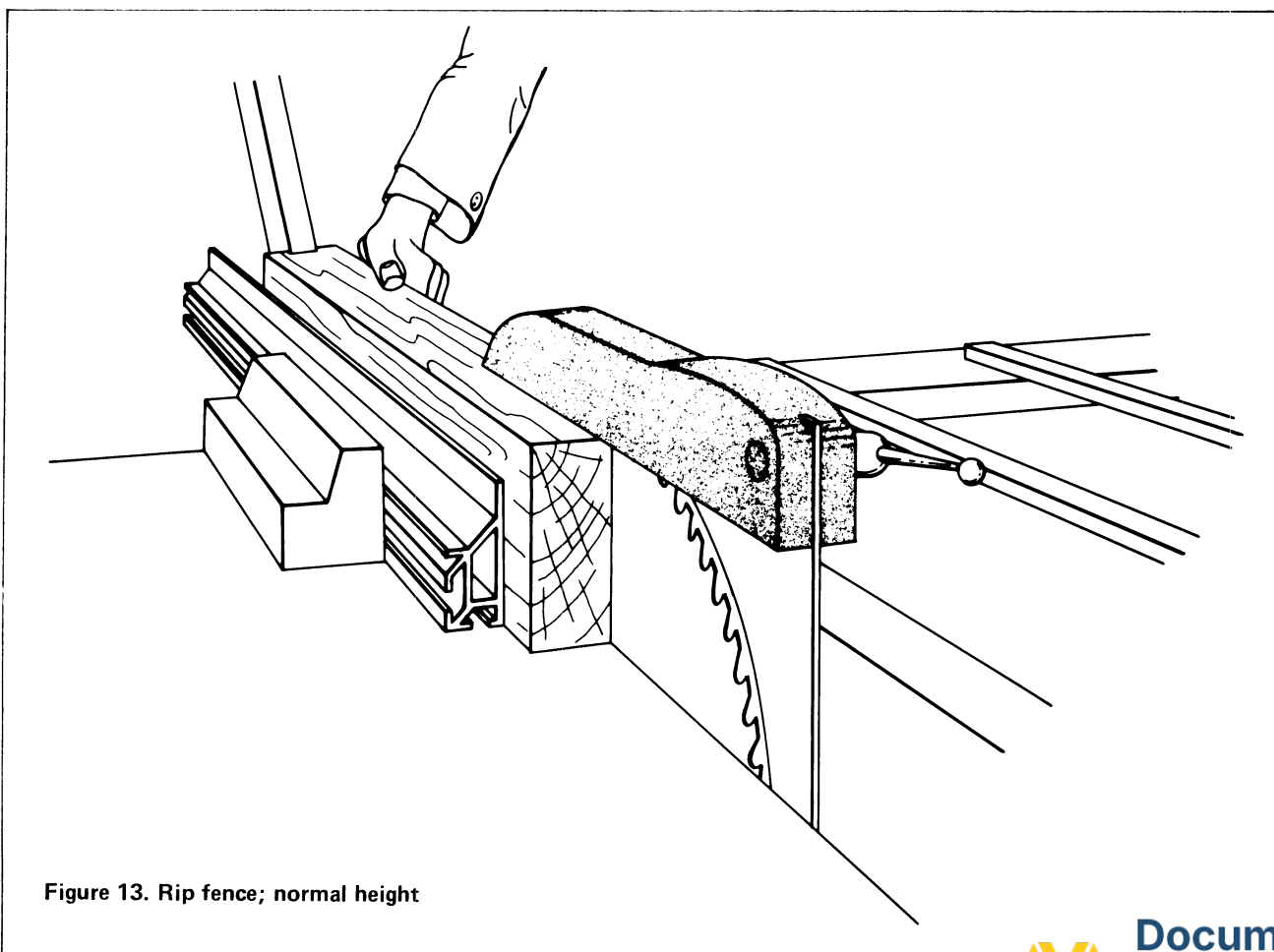


Figure 13. Rip fence; normal height

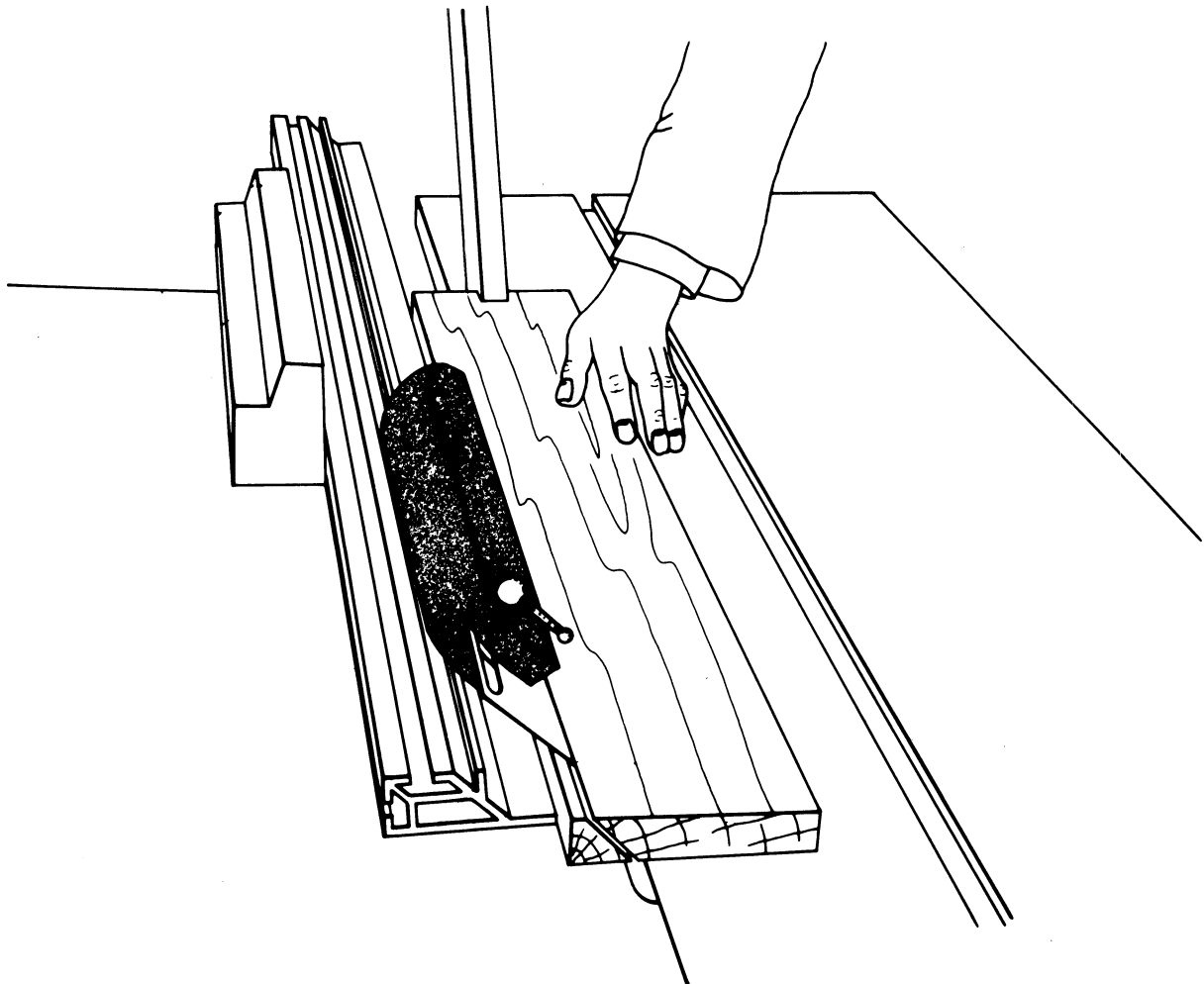


Figure 14. Rip fence; reduced height

4.2.7 Power feed. Power feed systems should be used wherever reasonably practicable as this will eliminate many of the hazards arising from hand feeding.

Power feed units, such as feed rollers, should be effectively guarded.

Separate starting and stopping devices should be provided for the power feed, and the power feed should not be started until the saw blade has attained the correct working speed.

4.2.8 Rebating, tenoning, moulding and grooving. The use of a circular saw for cutting of any rebate, tenon, moulding or groove is prohibited under the Woodworking Machines Regulations 1974 (Regulation 18(1)), unless the part of the blade above the table is effectively guarded.

It is not practicable to carry out these operations with the riving knife and top guard in position, so suitable alternative guards and fixtures are necessary.

Figure 16 shows an example of one method of rebating, moulding and grooving using a Shaw guard. The tunnel

formed by the pressure pads should be long enough to prevent access to the cutters (see BS 5304 for general guidance).

This form of guarding should not be used, however, if a stopped cut has to be made. This is particularly dangerous and should be done on a vertical spindle moulding machine and not on a circular sawing machine. A safe method of grooving with a circular saw is shown in figure 17.

The illustration in figure 17 shows one method of achieving effective guarding when grooving in which boards are attached to the machine table and fence (various methods, e.g. a 'G' clamp, can be employed). However, because of the risk of throw-back, this method should be used only where the workpiece protrudes above the boards sufficiently to allow it to be held firmly by hand during machining. In order for the guard to be effective, dimensions *F*, *G* and *H* in relation to *X* should be maintained.