

AUTOOL

Automatic Grinding Machine & Eng. Co. Ltd.,
PADIHAM ROAD, SABDEN, BLACKBURN, LANCs. BB6 9EW
ENGLAND.

Tel. 0282 (Padiham) 71838/73821
Cables: AUTOGRIND, PADIHAM

PR200 FRONT

MODEL PR200 PROFILE GRINDER

Installation and Operating Instructions

Parts Identification

EEC CONFORMITY

This machine carries a serial plate bearing the CE mark.

The significance of this is that the machine is either new or rebuilt and upgraded. It also conforms with EEC directive 89/329/EWG

Serial No.




AUTOOL GRINDERS
Padiham Road Sabden Clitheroe BB7 9EW
Lancs England
Tel. 01282 (Padiham) 771838/773821/775000
Fax. 01282 773486



Type of machine:	Metal cutting edge tool grinder
Serial & model number:	As the serial plate on the machine
Place of manufacture:	Sabden, England

IF THE PLATE ILLUSTRATED BELOW IS NOT FIXED ON YOUR MACHINE IN A PROMINENT POSITION, PLEASE REQUEST ANOTHER AND ENSURE IT IS FITTED.



WARNING — DANGER

THIS IS A GRINDING MACHINE. IT WILL WORK BETTER AND LAST LONGER IF IT IS REGULARLY CLEANED AND LUBRICATED. CARELESS OR INCORRECT USE COULD BE DANGEROUS. READ AND UNDERSTAND THE INSTRUCTION BOOK BEFORE OPERATING IT. DISCONNECT THE POWER SUPPLY AT SOURCE BEFORE REMOVING ANY COVERS, GUARDS, OR PANELS. DO NOT COVER OR REMOVE ANY NOTICES FROM THIS MACHINE.

NOTE THE VARIOUS SAFETY POINTS GIVEN BELOW AND IN THE TEXT AND OBSERVE THEM WHEN OPERATING THE MACHINE.

MAKE SURE THAT THE MACHINE IS ELECTRICALLY EARTHED / GROUNDED. ISOLATE THE MACHINE ELECTRICALLY BEFORE TOUCHING OR CHANGING A WHEEL, WHEN SETTING UP AND WHEN CLEANING THE MACHINE.

FOLLOW THE SAFETY INSTRUCTIONS WHEN CHANGING A WHEEL. AFTER SWITCHING THE MACHINE OFF WAIT UNTIL THE WHEEL COMES TO REST BEFORE MAKING ANY ADJUSTMENT.

MOVE THE CUTTER AWAY FROM THE GRINDING WHEEL WHEN SETTING UP, CHANGING A CUTTERHEAD, AND WHEN DRESSING THE WHEEL.

WHEN IN THE AREA AND WHEN USING THE MACHINE WEAR SUITABLY APPROVED GOGGLES OR A VISOR.

NEVER RUN A GRINDING HEAD UNLESS ALL THE GUARDS ARE IN PLACE.

CHECK THE WHEEL FOR CLEARANCE AND THE GUARDS FOR SECURITY BEFORE STARTING UP.

GRIND WET, BUT DO NOT RUN COOLANT AGAINST A STATIONARY WHEEL.

KEEP THE FLOOR AROUND THE MACHINE CLEAR AND FREE FROM SCRAP PIECES, SAWDUST, OIL, GREASE AND WATER.

READ AND FOLLOW THE INSTRUCTIONS GIVEN IN THIS MANUAL, AND WORK IN ACCORDANCE WITH GOOD SAFETY AND OPERATIONAL PRACTICES.

C A P T I O N S

- 1 Carriage with linear movement
- 2 Template
- 3 Inspection lamp
- 4 Stylus assembly (behind cutterblock)
- 5 Grinding wheel
- 6 Grinding wheel top shield
- 7 Start and Stop push buttons
- 8 Handwheel for adjusting main clearance angle
- 9 Handwheel for moving grinding wheel towards dresser
- 10 Scale showing main clearance and side clearance angles
- 11 Handlever for tilting grinding wheel for side clearance
- 12 Grinding wheel drive cover
- 13 Locking handle for main clearance angle
- 14 Cutter support
- 15 Cutter arbor handwheel
- 16 Cutter arbor assembly

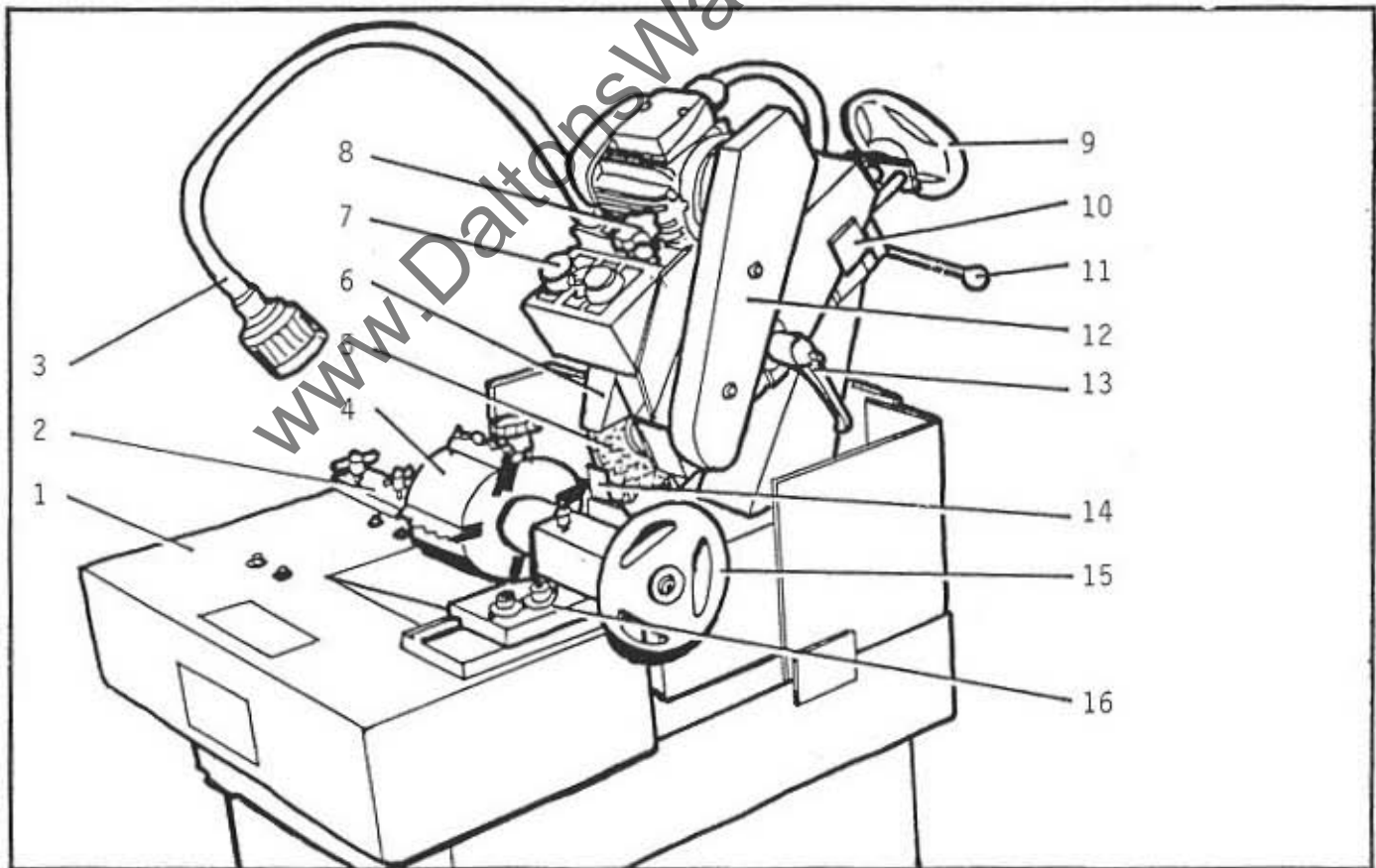


Fig.1

AUTOOL PROFILE GRINDER MODEL PR 200

Technical Specification

Grinding wheel diameter	150 mm (6 in.)
Grinding wheel width	5 mm
Grinding wheel bore	32 mm
Grinding wheel motor	.37KW
Maximum traverse	200 mm (8 in.)
Maximum cutting circle	200 mm (8 in.)
Minimum cutting circle	Zero
Overall height	1m 450 (4'.9")
Working width	850mm (2'.10")
Working depth	950mm (3'.2")

ATTENTION - Safety Precautions.

Note the various safety points given below and in the text and observe them when operating the machine.

Make sure that the machine is electrically earthed - grounded.
Isolate the machine electrically before touching or changing a wheel,
when setting up and when cleaning the machine.

Follow the safety instructions when changing a wheel. After switching the machine off wait until the wheel comes to rest before making any adjustment.

Move the carriage away from the grinding wheel when setting up, changing a cutterhead, and when dressing the wheel.

Carefully lower the cutterhead arbor assembly on to the machine. DO NOT DROP. Take care that hands and fingers are not trapped.

Do not fully tighten a cutter nor loosen it from fully tight whilst the cutterhead is on the grinding machine. Fully tighten prior to fitting using a setting stand.

When in the area and when using the machine wear suitably approved goggles or a visor.

Never run a grinding head unless all the guards are in place.

Check the wheel for clearance and the guards for security before starting up.

Grind wet, but do not run coolant against a stationary wheel.

Note that the wheel is of vitrified bond which by its nature is hard and brittle. Because of this, and its thickness, exercise caution when applying side pressure.

Keep the floor around the machine clear and free from scrap pieces, sawdust, oil, grease and water.

Read and follow the instructions given in this manual, and work in accordance with good safety and operational practices.

INTRODUCTION

The machine is designed for grinding cutters used on small moulders, spindle moulders, shapers etc. The machine uses a template formed to the reverse of the mould profile required and accurately forms cutters to the correct profile each time they are ground - without reliance on traditional grinding skills. Accuracy and repeatability of profile is guaranteed regardless of the cutting angle or the style and pattern of the cutterhead.

There are two basic essentials in cutter grinding. The first is to remove the least amount necessary to form and restore the cutting edge - otherwise cutter life is needlessly wasted. The second is to produce a fine ground finish which experience shows is essential to long machine life. These conditions are difficult to meet even with the most careful hand grinding, but easily met on Autool profile grinders as fine screw adjustment of the cut is provided, and template control allows full spark-out of the grind to give an excellent finish.

In emphasising that less skill is required to profile grind using Autool grinders it would be imprudent to employ an operator without previous grinding knowledge or skills. The use of these machines still requires traditional skills in cutter selection, fitting and grinding.

The method recommended is to grind cutters in the actual cutterhead as this gives greater accuracy of one cutter to another in radial height and alignment than is possible with hand setting. Cutters must be balanced before fitting and then remain in balance when ground on a profile grinder. Whilst cutters can be ground with absolutely equal radial height, this does not guarantee that all cutters will register on the finished surface without jointing.

NOTE - We reserve the right to improve Autool machines as our policy of continuing development demands. For this reason your machine may vary in appearance or dimensions from that shown in this manual.

FITTING THE MACHINE

To lift the machine preferably use a fork lift, passing the forks under the projecting parts of the main fabrication, ensuring proper contact with the feet securing this to the base. Lock the table before lifting using the bolt, wooden block and packings originally supplied.

Place the machine on a solid floor and adjust the feet in the machine base to level it, using a level in two directions on the cutter arbor support surface.

ELECTRICAL DETAILS

The electrical cabling between motors and control gear is completed before the machine is despatched, leaving a short lead from the isolator only for test purposes. Using approved cabling, connect the isolator to the factory supply via a junction box or an approved 3 phase plug and socket.

The colour codings are either:-

1 cable green/yellow	- earth (ground)
3 cables brown	- live (hot)

or

1 cable green/yellow	- earth (ground)
1 cable brown	- live (hot)
1 cable black	- live (hot)
2 cable blue	- live (hot)

Check that the cabling and fuses of the main distribution board correspond to the details on the machine electrical plate. Make sure that the machine is correctly earthed (grounded).

It is essential that the grinding wheel grinds in a downward direction, i.e. counter-clockwise rotation when viewed from the drive side of the grinding wheel. If this is not the case reverse any two connections of the live (hot) cables. The pump motor is internally wired prior to despatch and should have correct rotation when the grinding wheel is correct. However, check rotation, noting the directional arrow.

STARTING AND STOPPING THE MACHINE

The controls are

Push button to start the grinding wheel motor (Note safety precautions).
Push button to start the coolant pump
(do not run pump with the wheel stationary).
Push button to stop both motors.
(Automatic lock-off, turn or pull outwards to release before starting motors)
Isolator
(For safety reasons isolate the machine before setting up)

GRINDING COOLANT

The coolant tank forms the left-hand section of the main fabrication. It should be filled with coolant consisting of a soluble oil and water mix to just below the grill level. This can be poured into the suds tray. Add oil to the mix as recommended, usually in a ratio of one part soluble oil to 40 or 50 parts water. Replace coolant by a fresh mix every 2-4 months. AUTOOL supply a suitable concentrated soluble oil but the following are also suitable.

Shell - MEX and BP - Shell Dromus 10
Solvac Clear - Vacuum Oil Co.

The U.S. equivalent is Mobilmet No. 140 but this is a milky fluid. We recommend the use of clear fluids as with these the cutter rest and cutter are clearly visible.

NOTE - The grill prevents solid waste entering the coolant tank, but this still needs cleaning out at regular intervals, perhaps when replacing the coolant.

Before grinding make sure that the coolant pipe is set and adjusted to flood the cutter with an adequate supply of coolant. The object is to prevent overheating rather than to cool the cutter after this has overheated. Take particular care when grinding tungsten carbide tipped cutters that adequate coolant is used.

TEMPLATE PREPARATION

To produce templates certain basic items are necessary.

- 1 - Blank templates (Autoool can supply)
- 2 - Workbench with soft-jawed vice
- 3 - Suitable grinder for roughing-out, preferably with a thin cut-off wheel to vee-out large sections.
- 4 - A fine metal-cutting bandsaw, jigsaw or hacksaw.
- 5 - Complete set of rough and fine-cut files of various shapes
- 6 - Engineers blue
- 7 - Engineers scriber
- 8 - Good quality steel rule, steel square, engineers protractor, circle and curve guides
- 9 - Fine emery cloth

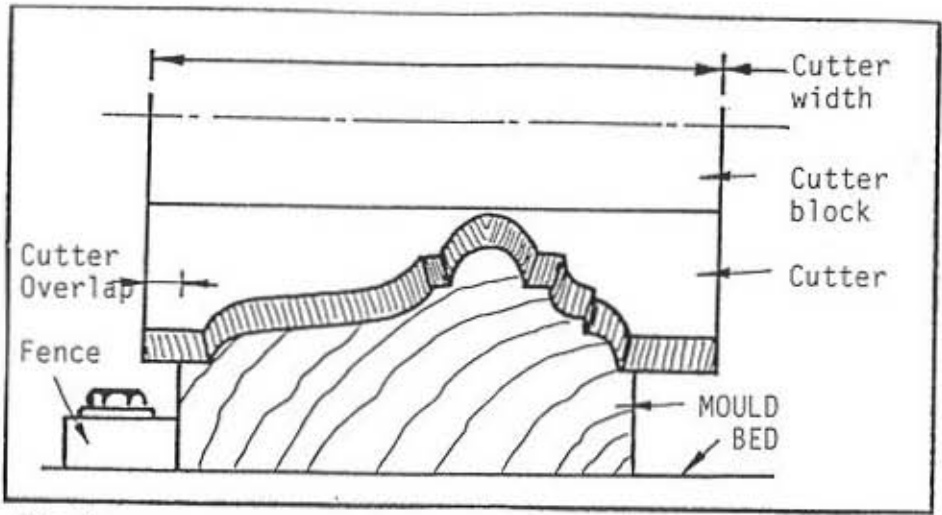


Fig.2

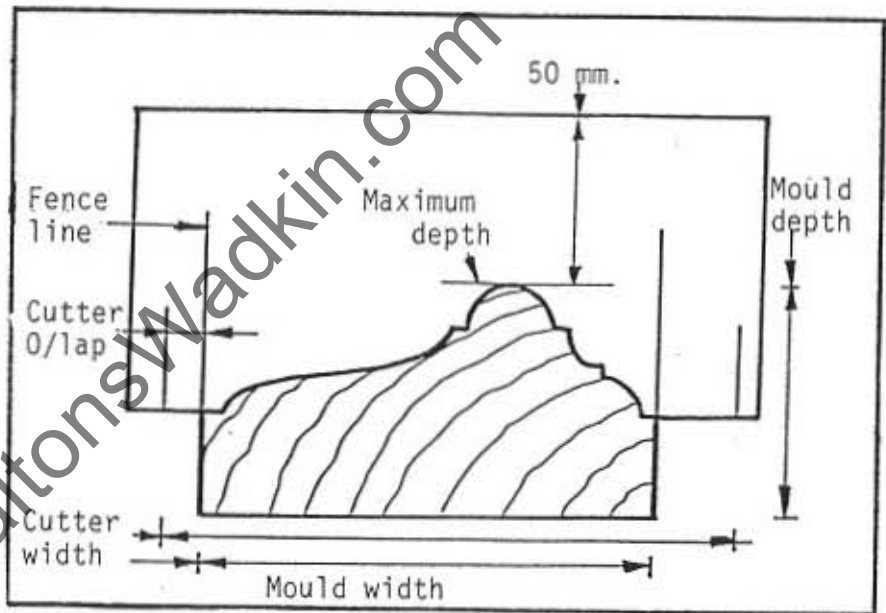


Fig.3

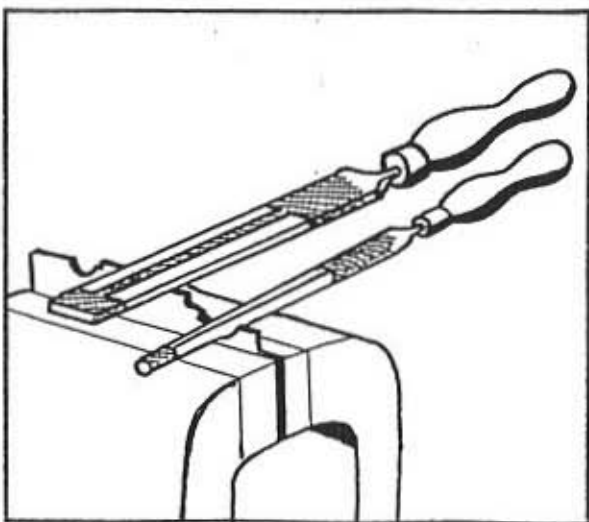


Fig.4

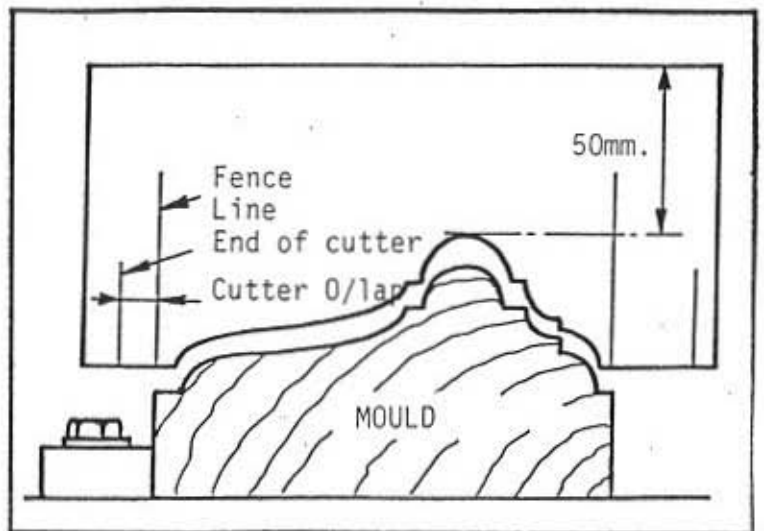


Fig.5

Make templates from Autool blanks to the reverse of the mould required and at least 12mm (1/2") wider than the cutters to be used. Before marking out the template check that the back edge is true. If not, flat-file as necessary. Also check that both ends are square and true. The template is easier to prepare if first coated with engineers blue. Use the scribe to mark guide lines such as minimum and maximum mould depth, fence and bed lines and the profile itself. Finally re-coat the template and clean out the mould profile lines only to avoid mistakenly grinding to guide lines.

TEMPLATE MARKING - (Figs. 2-5)

When preparing templates for moulders:-

Form the mould profile at any suitable position within the template width. Scribe lines corresponding to the cutterblock width and the fence or bed lines. These dimensions will vary, so record them for future use.

If dimension from the end of the cutterblock to the fence or bed line of the moulder (cutter overlap) has not previously been noted, do this now. Fit all heads on the moulder and set all cross-traverse movements to the mid setting. If the outfeed fence adjusts, set this to the average fence-side depth of cut. Carefully mark the fence line on the horizontal cutterblocks and the bed line on the side cutterblocks. Carefully measure and record the cutter or cutterblock projection beyond the fence or bed line for each cutterhead.

Scribe a line 50mm (2 in.) from and parallel to the back edge of the template, then set the deepest point of the mould to just touch this. The mould profile must be seen as though from the outfeed end of the moulder, with the bed or fence lines corresponding to those marked on the template.

When using a drawing, paste a full size copy of this on the template. If using a sample, first square-cut this then place it end-on the template and scribe around its profile.

Grind, saw or file the template to shape taking great care to make the profile accurate and true as irregularities show prominently both on the finished cutter and more especially on the mould. Finish-off to a smooth edge using fine emery cloth backed up by a shaped file to avoid distorting the profile, then possibly burnish the edge as a final operation.

PRE-SETTING CUTTERS

Select and fit suitable balanced cutters to form the mould required. Cutters should be fitted and fully tightened on a setting stand prior to fitting the head on the grinder. Cutters can be initially positioned on the grinder but not fully tightened - to do this transfer the head to a setting stand. In all cases balance blank cutters before fitting them, and ensure that opposing pairs are set absolutely in line and project by the same amount. In subsequent grinding the same amount of metal is ground off both cutters of each pair, so the cutterhead remains in perfect balance. Also see "setting cutters on the grinder".

FITTING THE CUTTERBLOCK

Remove the arbor assembly, then remove the end screw and spacers etc. Fit the cutterblock direct on the arbor or use the step-up collars supplied. The standard arbor is 1 in. diameter and step-up collars are supplied for 1.1/4in and 40mm bores. Other combinations are available to special order. Make up to the total length of the arbor using the spacing collars, and secure the end screw. With narrower cutterblocks add one or more spacers before fitting the cutterblock to allow better access for grinding wheel dressing.

FITTING THE ARBOR ASSEMBLY

Clean the arbor seating surfaces. Draw the table back clear of the grinding wheel and place a wooden block between the table and the grinding head support to prevent the table moving forward.

Pick the arbor assembly via the remote end and the handwheel. Place the assembly on the table so that the slot and tongue engage. Whilst still supporting the left-hand end fit the securing screw to the centre tapped hole and tighten.

STYLUS ADJUSTMENT - (Figs. 6,7, & 8)

Set the stylus (19) to the vertical position using feed handwheel (20). Set the stylus to the central position width-wise using handwheel (17). Place the template in its slot and ensure that it seats properly. Position the table and shift the template so that the cutterblock end aligns with the grinding wheel when the corresponding line on the template aligns with the stylus, then secure the template in place, (Fig.7). Use handwheel (17) as the final setting to attain precise alignment. Loosen the cutterblock arbor assembly (16) and move the arbor 'in' or 'out' so that when the template and stylus are in contact the cutter touches the grinding wheel whilst resting on the cutter support (14). Secure the arbor support in this position. The feed handwheel (20) of the stylus is used to control the grinding cut. When regrinding already formed cutters use this to progressively increase the grind until all cutting edges are restored. When grinding blank cutters the arbor support is normally set at its final position, i.e. when the stylus touches the shallowest section of the template and the cutter touches the grinding wheel, (Fig.8). The initial grind is then made as a series of arc-like movements, progressively grinding deeper until the template and stylus make contact. The initial grind is virtually a free-hand movement, so take care that no side pressure is applied to the grinding wheel. When first using the machine some operators prefer instead to initially position the arbor so that there is a maximum gap of only 2-3mm between the stylus and the deepest point of the template. When this is ground away the arbor is advanced a further 2-3mm, and so on until the final depth is reached.

STYLUS PROFILE

The stylus profile must match that of the grinding wheel. The regular stylus can be used with either a half-round or square-section grinding wheel. The stylus (19) is secured from the front by a screw (18). Before securing, square-up the stylus using the end of the template as a guide.

See sketch showing grinding wheel and stylus profiles.

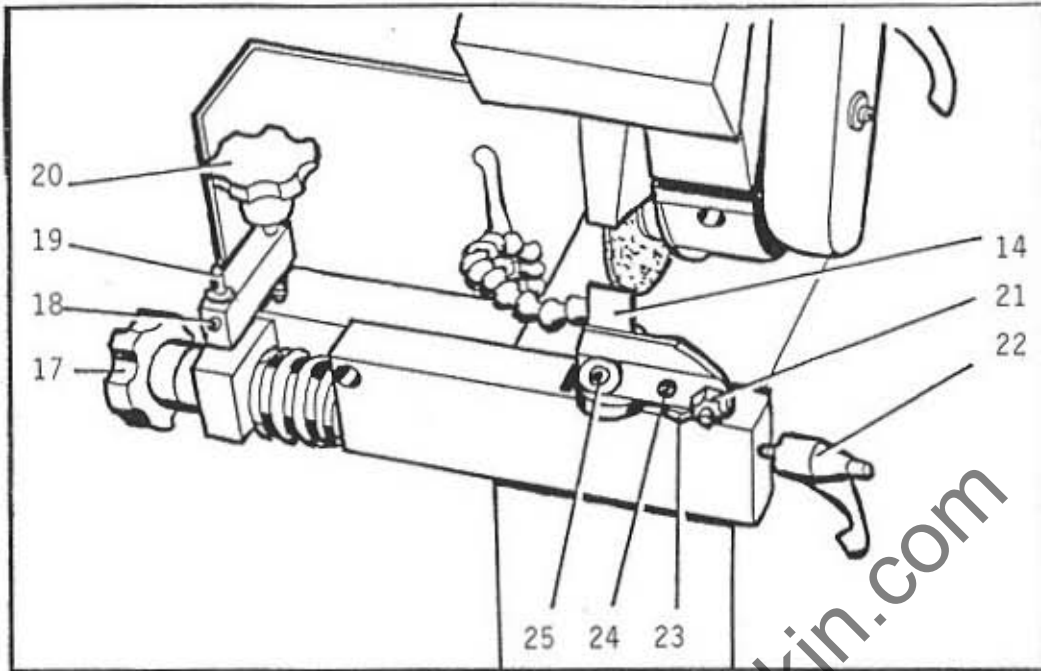


Fig.6

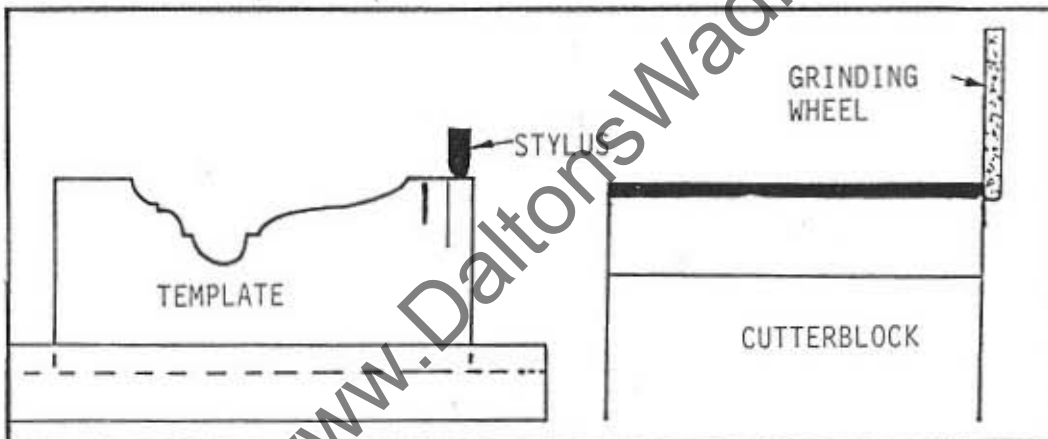


Fig.7

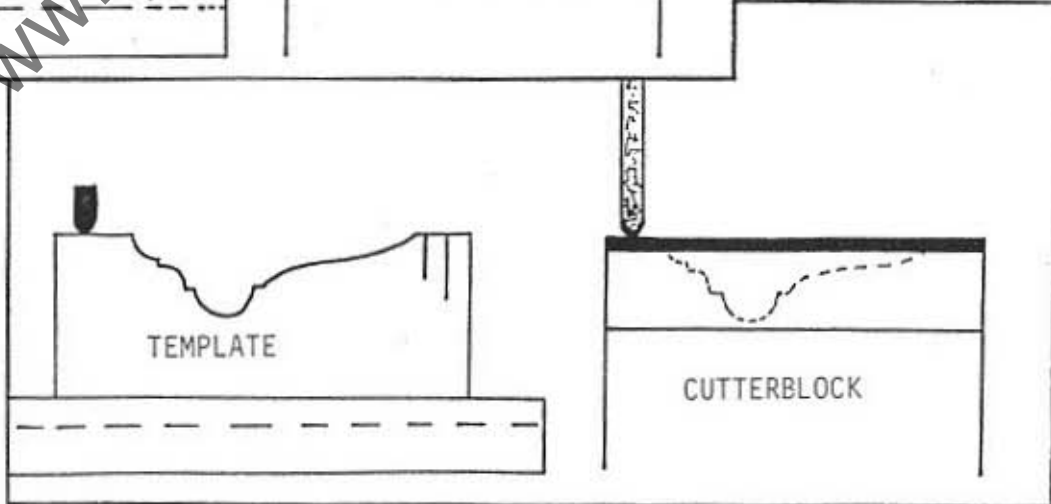


Fig.8

MOUNTING THE GRINDING WHEEL (Fig.19)

Remove the grinding wheel side guard (28), also the nut and outer flange (27) from the arbor. Clean all mating faces. Check the grinding wheel for soundness by lightly tapping it with a piece of wood. A sound wheel has a clear ring whilst an unsafe wheel sounds cracked. Fit the wheel, if sound, with one compressive paper washer between the wheel and each flange, then secure in place. The arbor can be held by pegg spanner engaging in the drilled holes in the drive pulley (accessible by removing the drive guard). Re-fit the guard and adjust the top shield (6) to just clear the grinding wheel before securing.

CAUTION

Grinding wheels should be an easy fit, never force them on to the arbor. Do not over tighten the wheel. Replace the guards before starting and check that the wheel is free to rotate. Allow a new wheel to run free under power for a few minutes with all personnel standing well clear. In the unlikely event of a grinding wheel breaking check the arbor, flanges and guard for damage before fitting another wheel. Take notice of safety regulations relating to grinding wheel usage.

GRINDING WHEEL TYPES

Regular Grit Wheels - These are the most widely used types and are suitable for a wide range of high speed and similar tool steels. They are dressed and formed by the built-in dresser. Initially 6 in (150mm) in diameter, they can be dressed down to about 4.1/2in. (112mm) before being discarded. Grinding wheels must be 5mm thick and are available in 40/60 grit for roughing out and finish grinding, or in 220 grit for fine finishing and to form to square or angular sections. Normally the 40/60 grit wheel is used for the majority of grinding and the 220 grit wheel is used merely for finishing square and angular internal corners.

The grinding wheel specification is printed on the compressive washer as five groups of number and letter combinations.

<u>Group</u>	<u>Identifies</u>	<u>Progression</u>	<u>Example</u>	<u>Other</u>
One	Abrasive type	-	AA = Aluminium oxide	May differ
Two	Abrasive size	8-large grain 600-small grain	46-60 grit size	Universal numbering
Three	Grade or bond strength	E = Soft Z = Hard	K = Medium grade	May differ slightly
Four	Structure	1 = Close 15 = Open	8 = Average structure	May differ slightly
Five	Bond Type	-	V = Vitrified bond	May differ slightly

As a general guide coarse-grit wheels (low number in Group 2) give a fast stock removal but a poorer finish, whilst fine-grit wheels (High number) give a slow grind but a good finish.

Soft-grade wheels wear quickly but grind well. Hard bonded wheels wear very slowly but tend to glaze and require frequent dressing. An open-grade wheel is free-cutting and more suitable when there is a large contact area between grinding wheel and knife. A close-grade wheel is better when the contact area is small.

The knife itself must be taken into account, e.g. hard knives need soft-bonded wheels, and softer knives need hard-bonded wheels. The steel specification also affects how a wheel grinds and this can vary widely.

FORMED WHEELS

These are of diamond or C.B.N. bonded as a relatively thin layer on an aluminium body to half round, square, single or double angle profile and with a width of 5mm or narrower.

Wear on these wheels is minimal when compared with regular-grit wheels. It is not practical to dress them as they wear, and if wear is uneven the cutter profile they produce may differ slightly from that required. The normal practice is to use worn wheels when roughing and new wheels for finish grinding. Because these wheels are not aligned by dressing, manually adjust the grinding head to give a 0.020" (0.5 mm) gap between the wheel and the cutter support.

FORMED WHEEL TYPES

The following types are available:-

- | | |
|------------------------|---|
| CBN | - For HSS and other alloy cutters. |
| Diamond | - For tungsten carbide tips, e.g. for forming brazed-on tips on solid profile cutterheads or loose carbide tips.
Not suitable for conventional cutters with brazed-on facings. |
| Diamond
Composition | - For grinding both the tungsten carbide facing and the steel backing of conventional cutters. This is special Autool wheel type. |

Formed wheels are available in different grits and concentrations and this is shown in their identifying number, viz. 220-D-50 indicates a 220 grit diamond grinding wheel of 50 concentration (B instead of D indicates CBN). As with regular grit wheels the grit size dictates the quality and speed of grind possible. A low number give a faster grind and a commercially acceptable finish, a high number gives a superior finish but a slower stock removal rate. The concentration indicates the amount of diamond or CBN in the wheel. Whilst 50 concentration is normal in other applications, for wheels used in profile grinding it is usual to use 75 or 100 concentration. The additional number is for reference purposes. When ordering replacement wheels quote the full number and the wheel size, type and bore.

We strongly recommend the exclusive use of Autool formed wheels which have been developed expressively for profile grinding.

GRINDING WHEEL STORAGE

Grinding wheels should be stored in medium temperatures (150 C) away from strong sunlight and where they are unlikely to be moved or subjected to damage. Some grinding wheels deteriorate with age and it is advisable to hold them in stock no longer than 12 months. Since many manufacturers have minimum order quantities which may exceed your 12 month requirements it is advisable to buy grinding wheels from ourselves or our agents, who have regular turnover and who are prepared to supply you in the quantities you require.

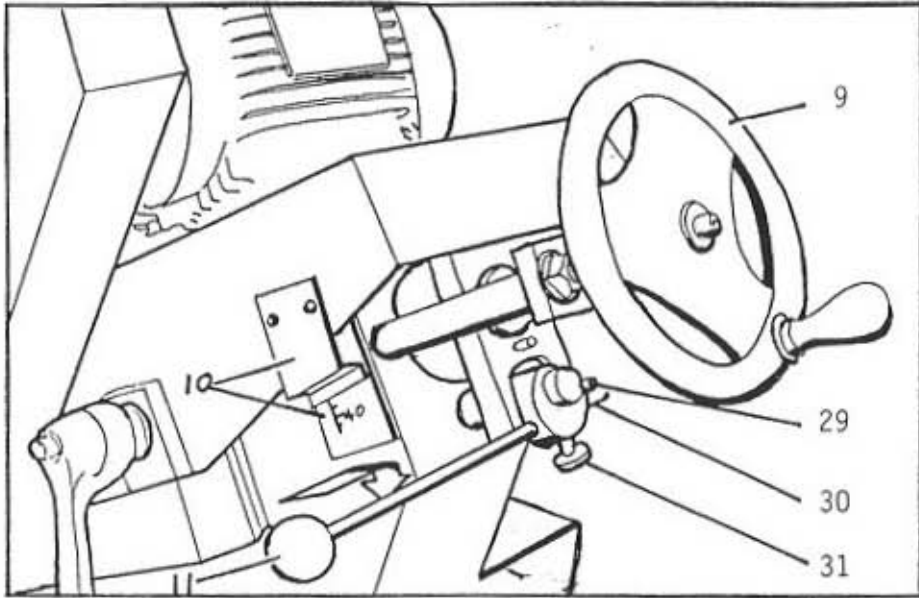


Fig. 9

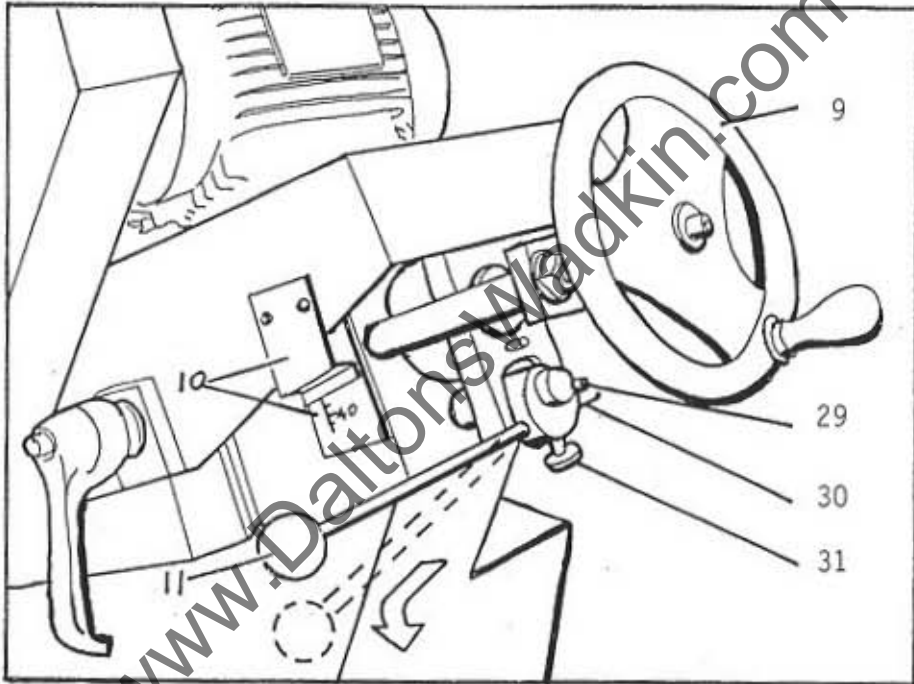


Fig. 10

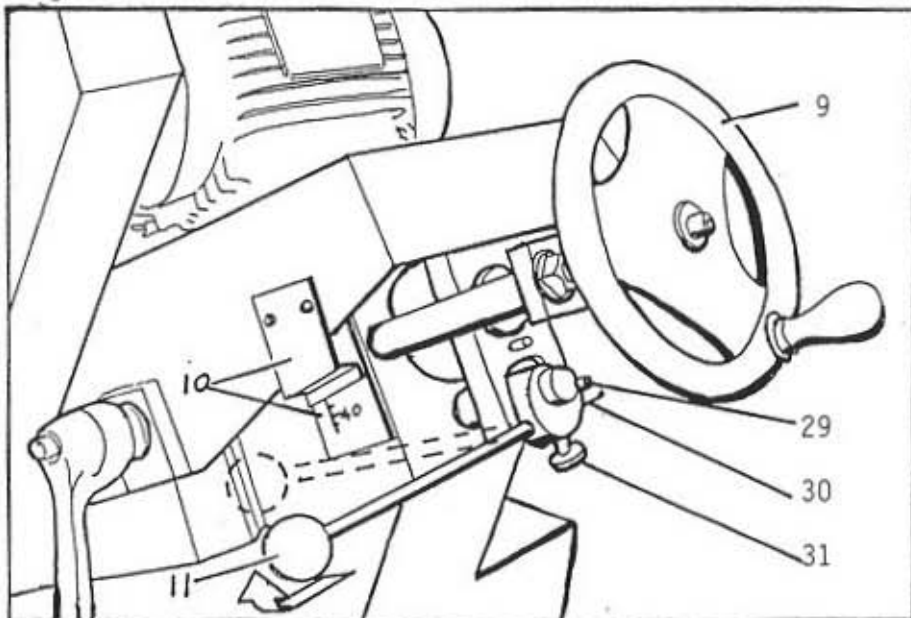


Fig. 11

GRINDING WHEEL ADJUSTMENTS MAIN CLEARANCE ANGLE

The main clearance angle is adjusted by handwheel (8) and is secured by lock lever (13). scale (10) shows the clearance angle formed. As the wheel wears adjust handwheel (8) to retain the clearance angle originally chosen. For average conditions use a clearance angle of approximately 25-30 degrees. The stronger edge formed with smaller angles is suitable for hard timbers, with cutterheads having a large cutting angle, e.g. square blocks and when grinding planing cutters. The cutting edge formed with larger angles gives more clearance with soft, stringy timbers and allows more honing clearance. The clearance angle remains constant to give a consistent gap between the timber and the cutter heel regardless of the type of cutterblock or its cutting angle.

SIDE CLEARANCE ANGLE (Figs. 9,10 & 11)

The grinding head tilts on its barrel to position the grinding wheel vertically or up to 5 degrees either left or right.

To set the wheel vertical, move lever (11) 'in' and down so that the end (30) contacts stop (29). The lever is secured by screw (31). Always set the wheel vertical when dressing it and when rough grinding blank cutters. See Fig. 9. To tilt the wheel first move the lever out so that the end (30) clears stop (29), and secure by screw (31). Move the lever down to tilt the wheel to the right, Fig. 10. Move the lever up to tilt the wheel to the left, Fig. 11. The degree of tilt is shown by scale and pointer (10) and which also shows the clearance angle when the wheel is set vertical.

Only 2-3 degrees tilt is needed to give the required side clearance. It is convenient to set the clearance angle initially between any two suitable marks, e.g. between 25 and 30 degrees. (Small changes in the clearance angle have little effect on cutter performance). The correct settings for side clearance then are when the setting reads either 25 or 30 degrees.

DRESSING THE GRINDING WHEEL (Figs. 6, 12-19)

Caution - wear eye protectors when dressing.

Dress regular grit grinding wheels after fitting, after resetting the clearance angle, as necessary during grinding and always prior to the final grind. Dressing shapes the wheel, restores its cutting ability and precisely re-aligns it with the stylus. Always set the wheel vertical before dressing.

The grinding wheel has screw adjustment towards the diamond dresser via handwheel (9) rim when dressing, and rapid movement away from it to change the wheel using the handwheel quill.

The diamond is mounted on the arm of the cutter support (See Fig.6). To use the dresser, partially release screw (25) and swivel the arm through 90 degrees so that the diamond (21) is central to the grinding wheel before securing. When reverting to grinding, partially release screw (25), and swivel the assembly back until the levelling screw (23) seats properly. Check that the assembly is square-on to the grinding wheel by ensuring that the centre mark is opposite the pointer, or that the dresser support is parallel to the milled face below it before finally securing screw (25) and handlever (22).



Fig.12

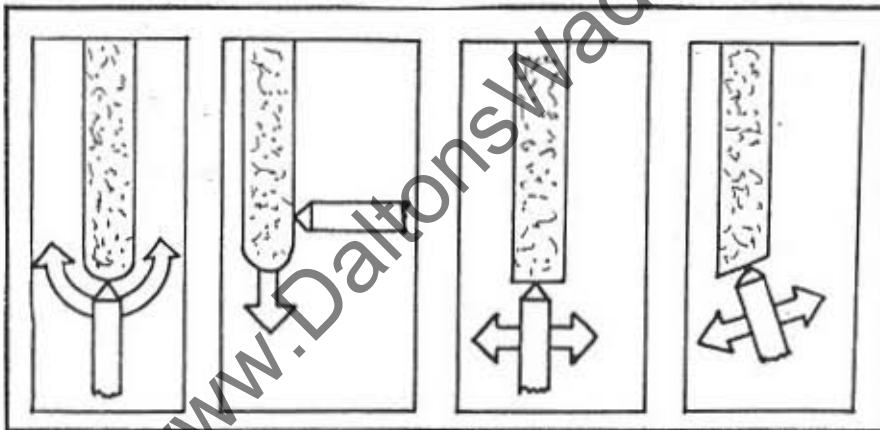


Fig.13

Fig.14

Fig.15

Fig.16

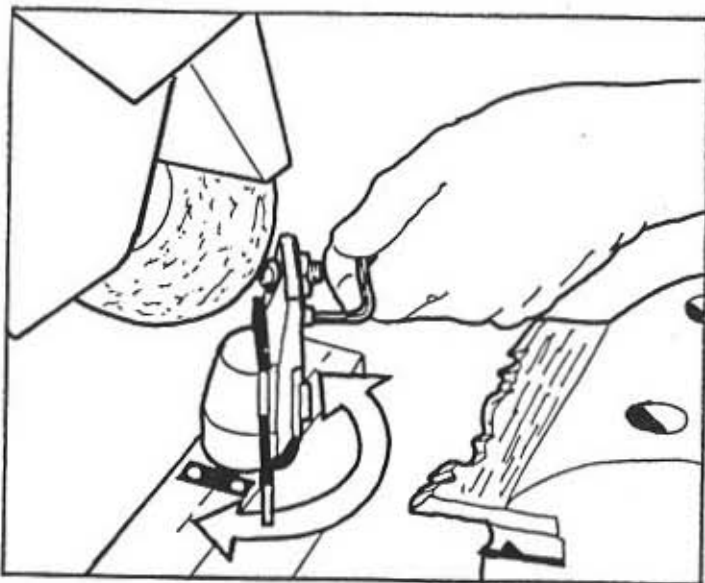


Fig.17

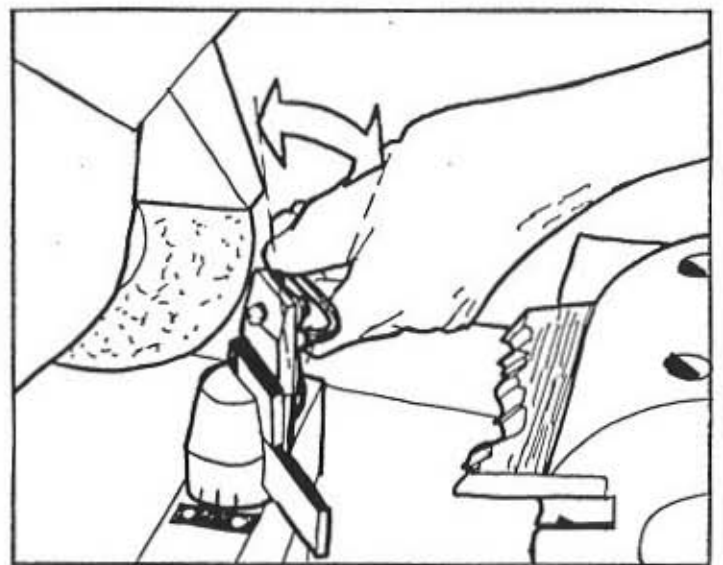


Fig.18

The wheel can be dressed to half-round, square, single or double angle section. Normally a different wheel is used for each different profile.

Before dressing make sure that the grinding wheel is vertical. First rotate or swivel the dresser through its full movement to ensure that it does not foul the wheel, adjusting the grinding head if necessary. Start up the grinding wheel and dress it, as described below, by slowly feeding the wheel forward via handwheel (9) until it is fully dressed, see Fig. 12. When dressing to a half-round or square section the wheel is automatically re-aligned to the stylus, so no further adjustment should be made to the setting of the grinding head. With single and double angle wheel sections the wheel will probably require adjustment after dressing to avoid fouling the cutter support. The dresser movement can be controlled by gripping the cutter support or by an allen key inserted in the allen screw provided (24).

Half-round dressing (Figs. 13 & 17) - Set the diamond central to the wheel and secure screw (25). To dress, release handlever (22) and rotate the assembly through 180 degrees, gripping the cutter support or allen key to give easier control, as shown Fig. 17.

Square dressing (Fig.15) - Set the dresser to the central position but do not secure screw (25). Release handlever (22) rotate the assembly so that the indicator is opposite centre zero, then secure. To dress, oscillate the dresser across the wheel.

Single angle dressing (Figs. 16 & 18) - Set the diamond central to the wheel but do not secure screw (25). Release handlever (22) then rotate the assembly until the indicator is opposite the angle required and secure. The barrel is marked for square, also for 30, 45, 60 and 90 degree settings left and right. The square, 30 and 45 degree settings correspond with standard stylii available for the grinder. To dress, oscillate the dresser across the wheel, Fig. 18.

Double angle dressing - Set the dresser for the first angle as for single angle dressing. On completion move the diamond off-centre, re-set the swivel position to the second angle and again dress, but without re-adjusting the position of the grinding head.

NOTE - When first forming a grinding wheel, first dress slightly beyond half-way, then move the grinding head back before dressing the second angle to the same head setting.

Dressing to width (Fig.19) Grinding wheel makers cannot guarantee that their wheels are flat and true, so we recommend side dressing all wheels when first fitted.

Set the clearance angle to 25-30 degrees (average setting), and set the wheel vertical. Set the diamond central to the wheel and secure screw (25). Rotate the assembly through 90 degrees to either side and secure by handlever (22). The pointer should be opposite to 90 degree mark, see Fig.19.

Start up the wheel and carefully feed the wheel forward using the quill on handwheel (9), past the diamond, but stopping before the grinding wheel or flanges touch any part of the support.

Wind the wheel back, then rotate the support to the opposite side of the wheel and repeat.

Obviously there is a limit to the depth of side grinding possible, but this can be deepened as follows:-

After initial side dressing wind the wheel back. Release screw (25) and handlever (22). Swivel the arm towards the grinding wheel and secure screw (25). Rotate the support so that the diamond just touches an already-dressed section of the wheel. Dress the wheel by winding the wheel forward, taking the same precautions as before. Repeat for the opposite side.

NOTE - Grinding wheels only require side dressing when fitted initially. If a grinding wheel is removed mark the outer face so that it is replaced the same way round.

Resetting the Dresser - If the diamond becomes worn or needs replacing re-set it as follows. Fit a fine grit wheel making sure that the correct compressive paper washers are used. Set the dresser as though to side-dress the right hand (bearing) side of the wheel. Set the diamond as for side dressing (See Fig.19). Release the locknut and adjust the diamond so that it makes light contact only with the side of the wheel and secure. Side dress the grinding wheel at both sides, then measure the grinding wheel thickness relative to the standard 5 mm stylus. The correct diamond setting is when the gauge used is tight on the stylus but easy on the wheel, (or also tight on the wheel but with a piece of paper wrapped around it).

Actual measurements are - stylus 4.7 mm, grinding wheel 4.5 mm.

SETTING CUTTERS ON THE GRINDER (Figs. 20 & 21)

See previous notes under pre-setting cutters.

Move the carriage so that the stylus contacts the template at the shallowest point of the mould profile (least cutter projection) (Fig.20). Holding the two in contact, move the arbor assembly to give the correct clearance both between the cutter support and the wedge and between the grinding wheel and the cutterblock. If clearance between the cutterblock body and the grinding wheel is a problem, this can be increased by using a smaller diameter of grinding wheel or by lowering the grinding wheel. For one-off run a clearance of 1/16" to 1/8" (1.5 - 3mm) is sufficient, but when cutters are to remain in the head for several regrinds clearance should be increased to 3/16" - 5/16" (4 - 6 mm).

Move the carriage so that the stylus contacts the template but this time at the deepest point of the mould profile (the furthest projection of the cutters) (Fig.21), and hold the two in contact. Check that the cutter touches or is beyond the grinding wheel whilst resting on the support. If it fails to reach the grinding wheel use a deeper cutter. Check that the cutter is square and properly aligned, then lightly secure it. Set and lightly secure the remaining cutters in the same way. A convenient method is to set a single cutter as described, then use this as a guide on a setting stand to set remainder. All cutters can then be fully tightened before replacing the head on the grinder. Never fully tighten cutters whilst on the grinder.

GRINDING OPERATION (Fig.22)

Grind by gripping the carriage with one hand and the handwheel with the other. Control and move the carriage so that the template follows the stylus to form the cutters to correct shape. During this the cutters must rest on the cutter support immediately in front of the grinding wheel, so apply light rotary pressure via the handwheel. The cutter profile is controlled by the template via its contact with the stylus and is correctly formed when the full profile can be followed on all cutters without further grinding taking place.

Before starting to grind, see that the grinding wheel is secure, free to rotate and that the guards are in position. Check that the machine is set to form the correct clearance angle and that the grinding wheel is vertical.

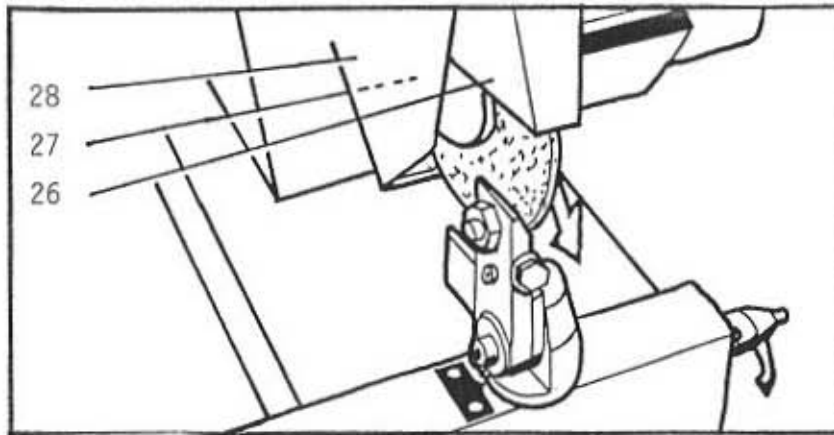


Fig.19

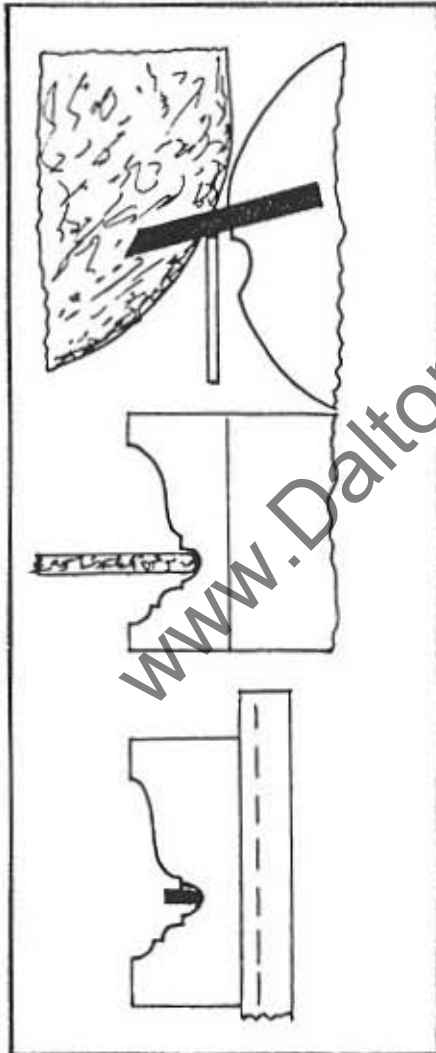


Fig.20

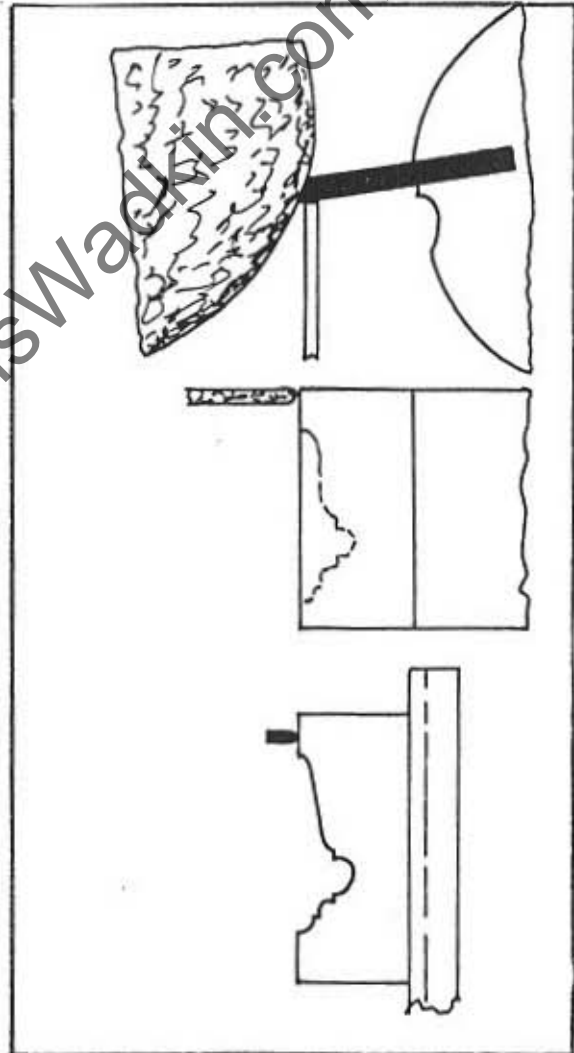


Fig.21

Start up the grinding wheel and coolant, direct the coolant against the rear of the cutter support to deflect coolant upwards against the underside of the cutter. Fit eye protectors and make sure that others in the immediate area are also wearing eye protectors.

GRINDING BLANK CUTTERS (Figs. 23 & 24)

During the initial grinding process the grinding wheel must be vertical. The grinding wheel makers recommend that when grinding blank cutters, or when regrinding previously profile cutters which are badly chipped, first make a series of plunging cuts to rough-out the profile. The pitch of these plunging cuts should be equal to the thickness of the wheel. Cuts of closer pitch would apply side pressure to the wheel which could cause it to fracture in extreme circumstances. Move the carriage squarely into the grinding wheel so that pressure is only applied directly on to the wheel rim. In the same way grind away all the uneven projections remaining before finally following the full profile, Fig.23. Alternatively, make a series of arc-like grinds applying pressure only when grinding 'in' to avoid applying side pressure to the wheel, Fig.24). Autool recommends the latter method, which grinds cooler and with less tendency to glaze.

FINISH GRINDING

When the cutter profile has been fully formed dress the wheel, tilt to one side for side clearance, and regrind. Reverse the tilt and grind a second time to finish the profile completely. Adding side clearance slightly widens the shape to form the correct profile. The machine is so designed that side clearance is only ground-in where it is needed, and is automatically held clear at other points. In this way the full profile can be followed without danger of spoilage when grinding moulds and most other profiles. With square edges such as rebates, however, do not follow the rebate edge with the machine set for the opposite side clearance angle as otherwise the extreme point will be ground off.

Finally traverse across the full cutter width two or three times to spark-out and so improve the ground finish.

GRINDING MULTIPLE CUTTERS

When grinding several cutters in a cutterblock to the same profile, these can be rough-ground and finished individually with the stylus at a single setting. If grinding blank cutters it may be preferred to grind in a series of deepening steps, moving the arbor support forward in stages. In this case it is an advantage to grind all cutters at each setting to keep them in step. When grinding from blanks frequent wheel dressing is essential. Always dress prior to the final grind.

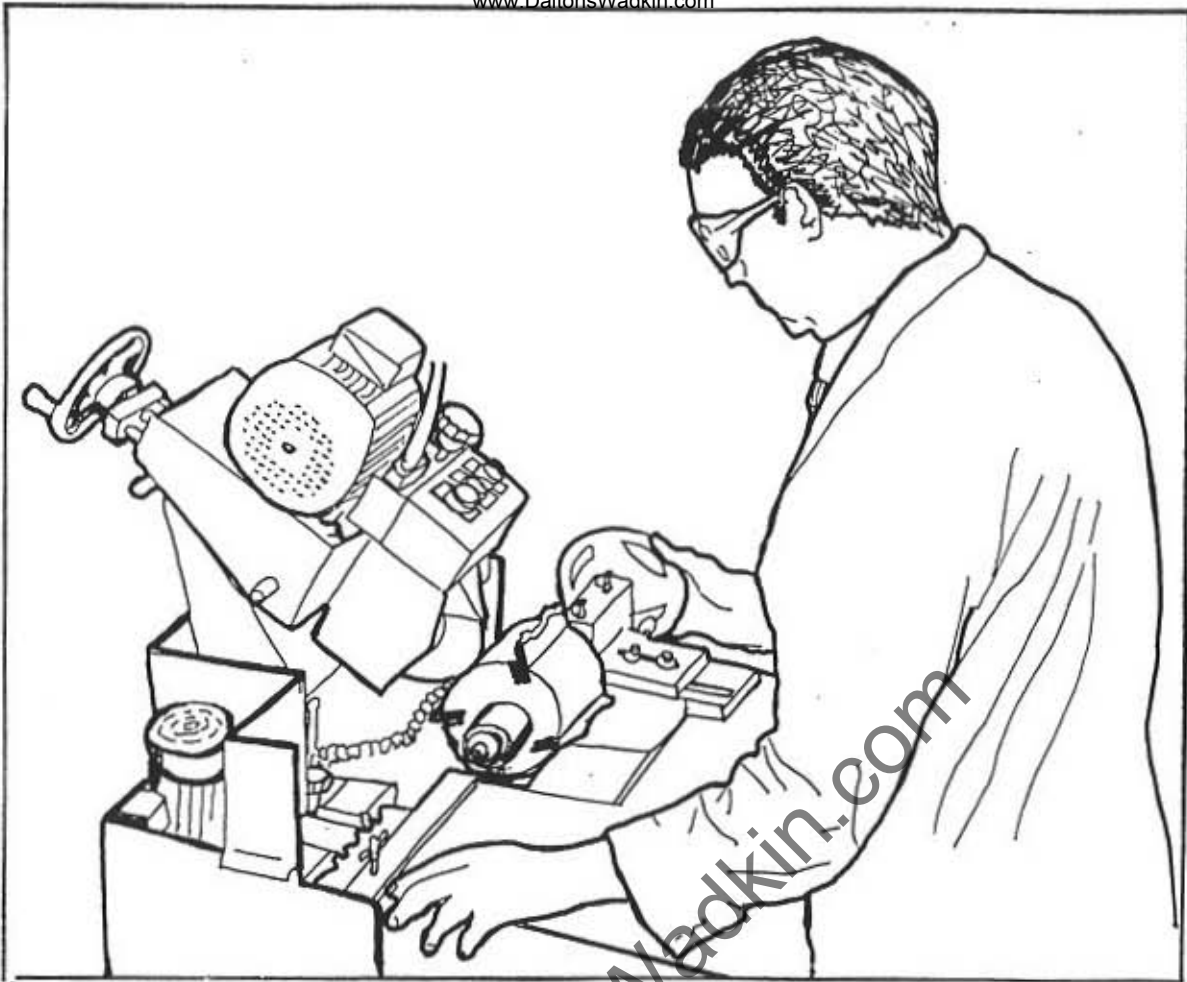


Fig.22

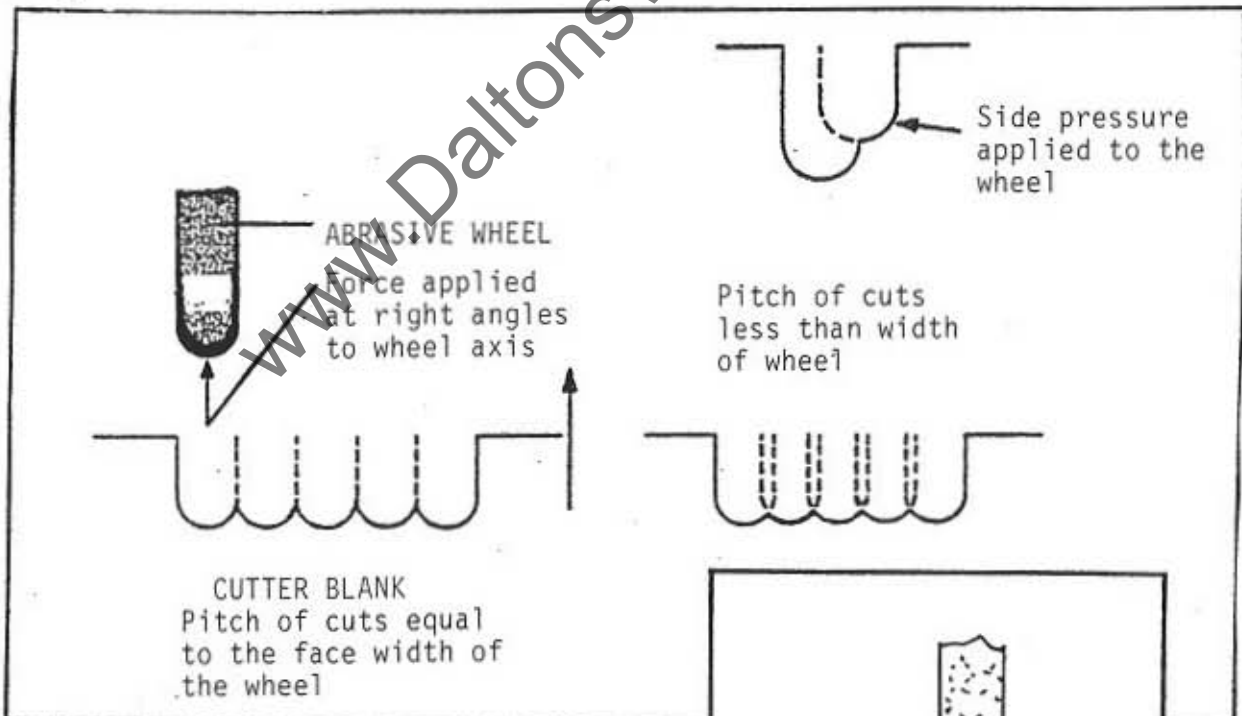


Fig.23

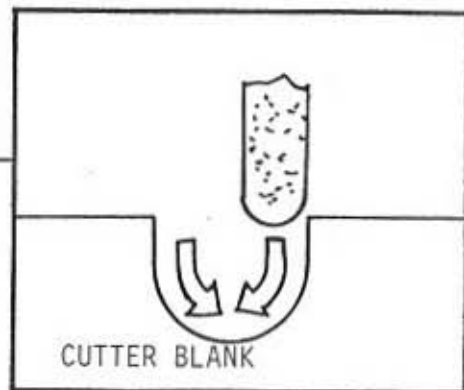


Fig.24

DUAL RADIUS DRESSER

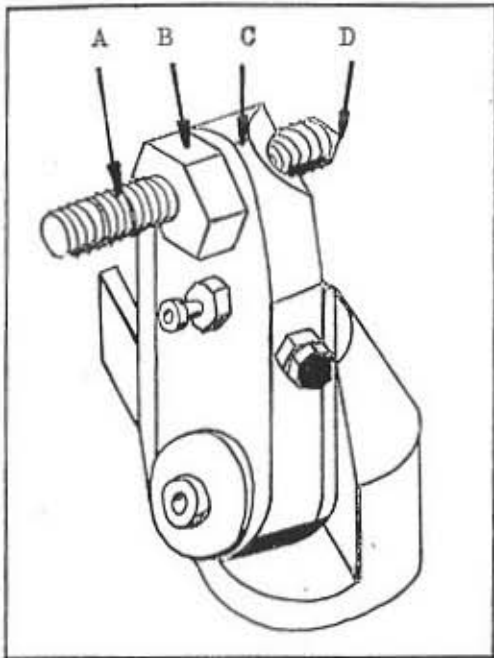


Fig 24

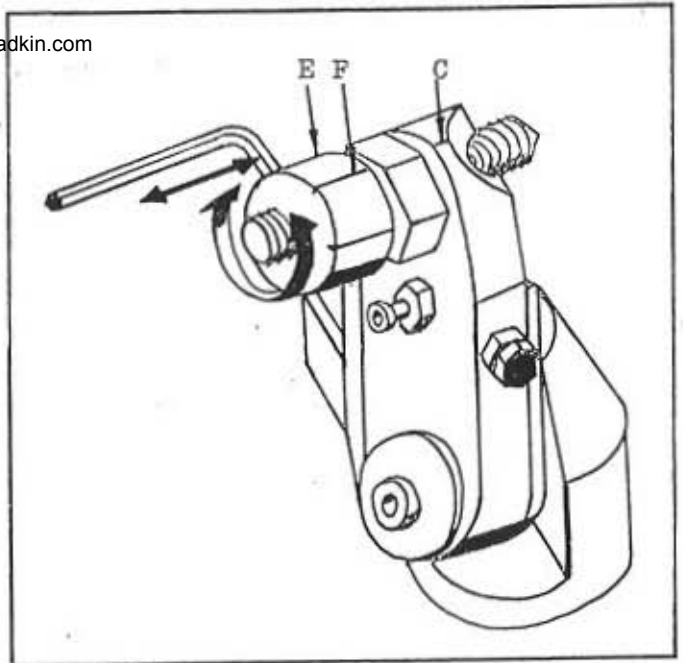


Fig 25

To fit a new dual radius dresser: Fig 24 - Remove the original diamond after first dressing a grinding wheel. Fit the longer dresser (A) and set the diamond (D) to just touch the grinding wheel (i.e. correctly set for 5 mm. thickness). Lock with locknut (B). File a vee mark (C) at the top centre of the dresser support. Fig 25 - Place the indicator (E) on the screw of the dresser and with one indicator mark to the right and the allen screw to the left. Align the top indicator mark (F) to the vee mark (C) and secure the indicator to the screw leaving a 1.5 mm. gap between this and the locknut.

USING THE DRESSER

To reset the dresser release locknut (B) and rotate the indicator (E) and screw to the indicator mark required, then relock the locknut.

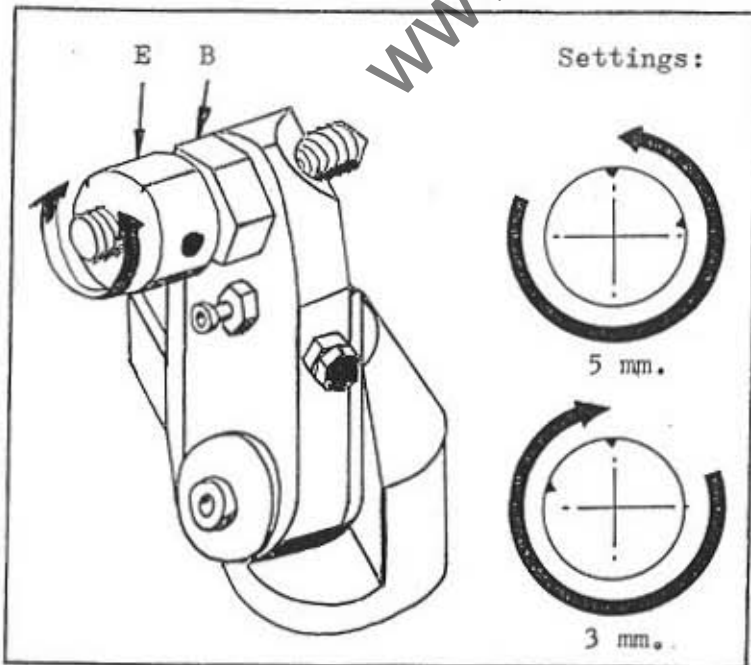
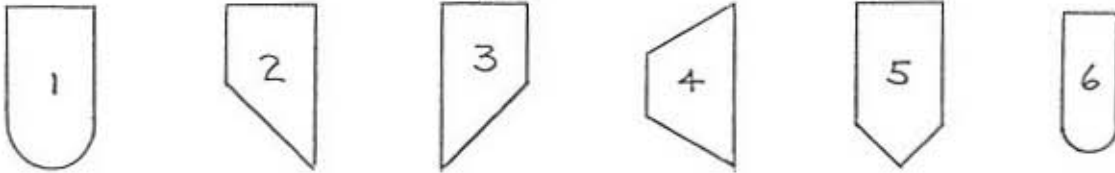


Fig 26

To set to 3 mm. rotate clockwise to align the right hand indicator mark with the vee.

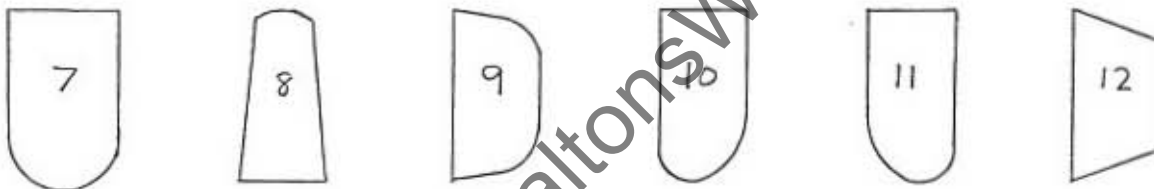
To set to 5 mm. rotate anti or counter clockwise to align the left hand indicator mark with vee.

AUTOOL STYLII



STANDARD RANGE (See price list for cost)

1. Standard half round/square 5 mm. - supplied with each PR100/200/230/300.
2. 45 degree right hand/square 5mm.
3. 45 degree left hand/square 5mm.
4. 30 degree right and left hand 5mm.
5. 90 degree centre point/square 5mm.
6. Half round/square 3mm.



SPECIAL RANGE (Double cost of standard stylii - see price list)

7. Half round/square for main clearance angle on cutters with secondary ground angle, 5 mm.
8. Relieved square for undercut rebate grinding (see data sheet) 5 mm.
9. Double bevel/round for BSI window sections (see data sheet) 5mm.
10. Left-hand for shear cut heads - equivalent to 5 mm. half round. 10, 20, 30, 40 or 50 degree shear angle.
11. As 10, but right-hand.
12. Left and right hand for shear cut heads - equivalent to 5 mm. square. 10, 20, 30, 40 or 50 degree shear angle.

Note: The styliis Nos. 9-10 are used in conjunction with a pair of angled cutter supports which can be supplied for 10, 20, 30, 40 or 50 degree angle shear.

LUBRICATION AND MAINTENANCE

IMPORTANT:

Abrasive dust will damage moving parts and slideways on the machine. It is, therefore, of paramount importance that the operator pays particular attention to machine cleanliness. A daily procedure should be instituted to ensure that bearing surfaces are kept free from grinding dust and dirt.

Grinding dust could also prove hazardous to moving parts, bearings and slideways of other machines in the vicinity. Under no circumstances should the machine be cleaned down with a blower or compressed air.

The spindle unit and pump are fitted with sealed bearings which are permanently lubricated.

Lubricate weekly with medium/light oil all obvious points on the machine and other moving parts.

SPARE PARTS

When ordering spare parts give full details of these together with the machine type and number.

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