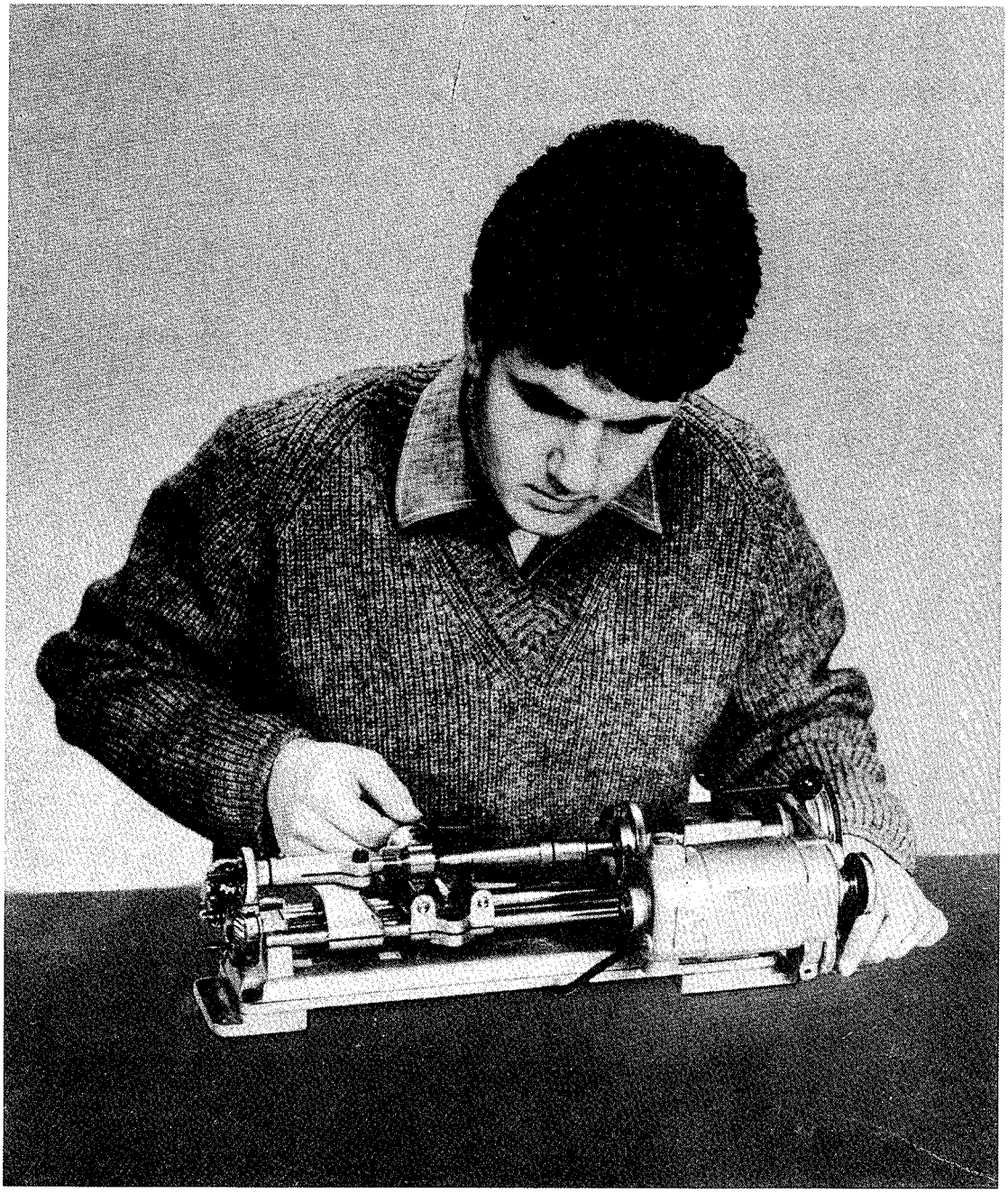
OPERATING INSTRUCTIONS
for the
emco-unimat
Model SL
SMALL MACHINE TOOL



Ref. EN2 020 Auflage 7606 Englisch

WHO USES THE UNIMAT ?

First of all any resourceful hobbyist, model maker and 'Do-it-yourself' enthusiast, of course. But also in the research laboratory, precision machine and optical workshops, etc. - in fact everywhere that precision and true-to-form models parts have to be turned out - the UNIMAT finds a ready application, thanks to its versatility. The UNIMAT is gaining increasing favour as a medium of instruction : In the physics laboratory it is a readily adaptable appliance - without the need for any supplementary mounting fixture - for centrifugal force tests, for demonstrations in the study of wave mechanics, for colour gyroscopics, rotating mirrors, perforated diaphragms and for many other theoretical tests. And if at any time any of the educational equipment has to be repaired, or some provisional item has to be replaced, the UNIMAT proves doubly valuable !

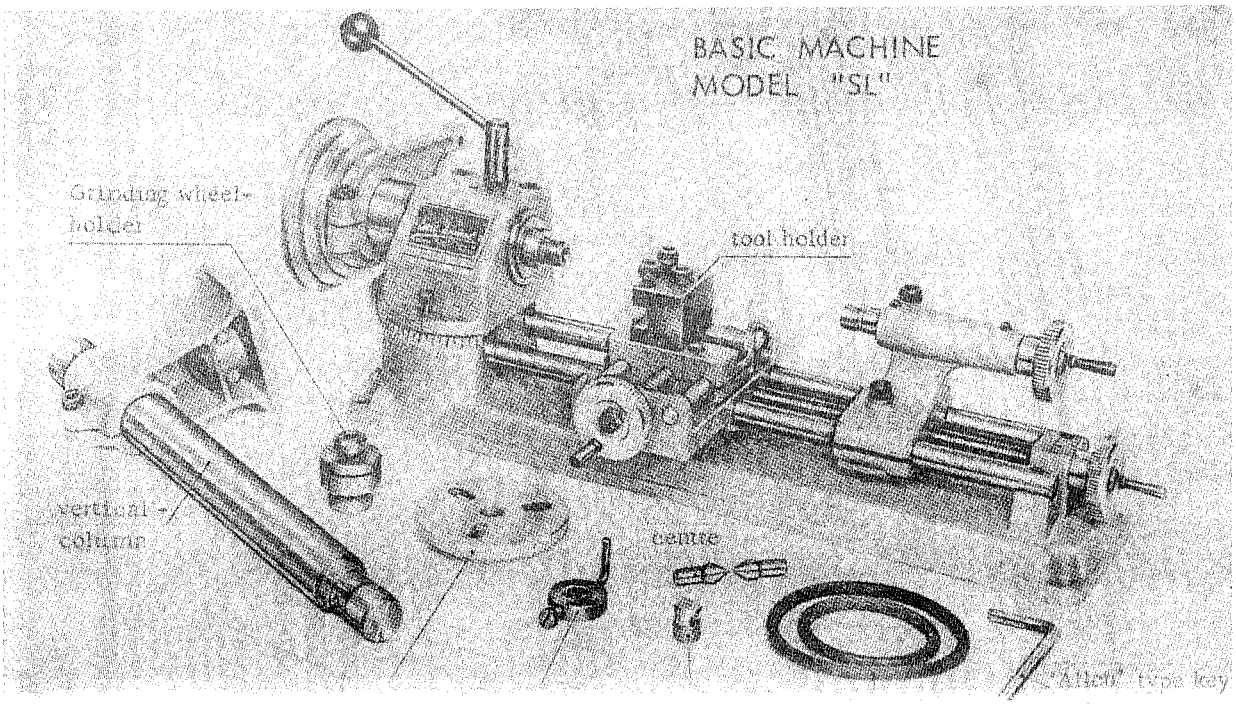
WHAT DOES THE UNIMAT DO ?

The EMCO - UNIMAT is a universal machine tool in the best sense of the word; all types of metalworking can be carried out expertly and precisely : turning, drilling and milling, thread-cutting, circular sawing and grinding; in addition to this the UNIMAT is also an ideal multi-purpose machine for woodworking and for the processing of synthetic resin and similar materials. By using the appropriate accessories you can carry out fretsawing, keyhole sawing and circular sawing, face and angular grinding, as well as lathe turning.
The motor output is 90 Watts, - power enough to perform all work processes expeditiously.

HOW DOES THE UNIMAT WORK ?

The metalworking expert will, of course, quickly be "au fait" with the various functions of the UNIMAT , but even he, without doubt, will gain enthusiasm for various other application possibilities of the UNIMAT from these operation instructions.
For the beginner, naturally, the basic text of the operating instructions is an indispensable prerequisite of the expert handling of the machine and thus also of satisfactory working results.
With this in mind we wish you -

much pleasure and good results !



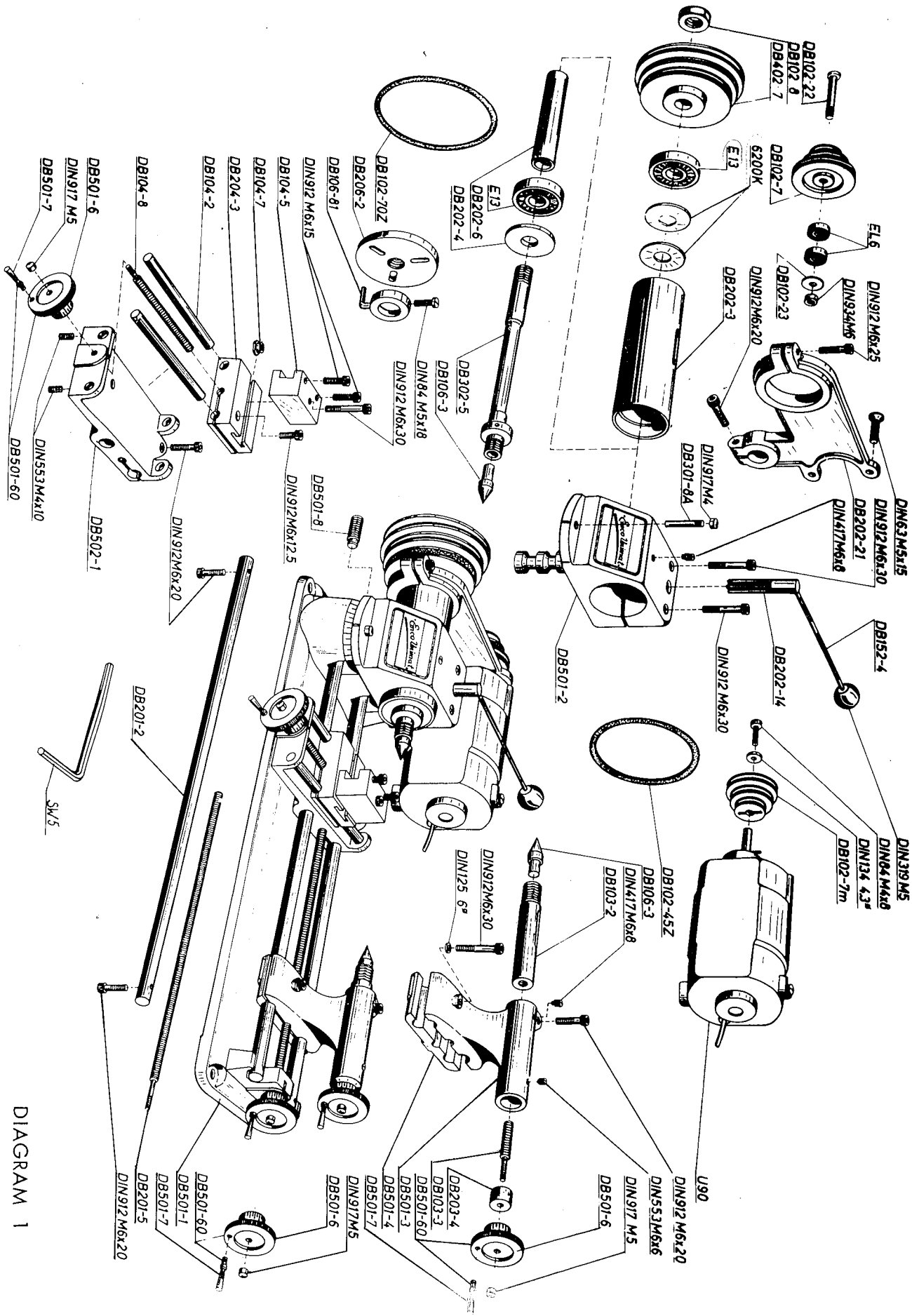

DB102-22
DB102-8
DB402-7
DB102-7
6200K
E13
E13
DB202-6
DB202-4
DB102-70Z
DB206-2
DB106-81
DIN912 M6x15
DB104-5
DB104-7
DB204-3
DB104-2
DB104-8
DB501-6
DIN917 M5
DB501-7
DB501-60
DIN553M4x10
DB502-1
DIN912M6x20
DB201-2
SW5
E16
DIN934M6
DB102-23
DIN912M6x20
DB202-3
DB302-5
DB106-3
DIN84 M5x18
DIN912 M6x30
DB501-8
DIN912M6x12.5
DIN912 M6x25
DIN631M5x15
DIN912 M6x30
DB202-21
DIN4017M6x8
DB152-4
DB202-14
DIN912 M6x30
DIN917M4
DB301-8A
DB501-2
DIN319 M5
DIN84 M4x8
DIN134 4.3
DB102-7m
DB102-45Z
DB106-3
DIN4017M6x8
DB103-2
DIN912M6x30
DIN125 6.4
DB203-4
DB103-3
DB501-60
DB501-3
DB501-4
DB501-7
DIN917M5
DB501-6
DIN917 M5
DB501-6
DIN553M6x6
DIN912 M6x20
U90
DB501-60
DB501-1
DB501-7
DB201-5
DIN912 M6x20

DIAGRAM 1

E M C O U N I M A T SL

TECHNICAL DATA :

Lathe	Height of centres over pillars		1 13/32"
	Width between centres		6 3/4"
Drilling and Milling machine	Drill height 3 7/8"	Overhang	3 3/8"
		Drill travel	3/4"
Grinding machine	Maximum diameter of grinding wheel		2 3/8"
Motor output	90 Watts 110 or 220 Volts 4,000 r.p.m. under load		

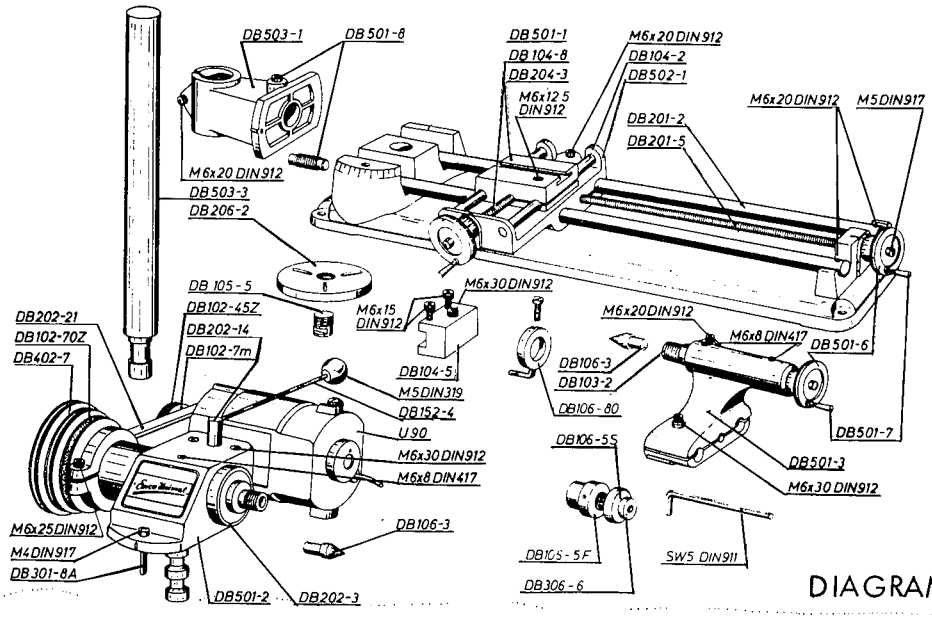


DIAGRAM 2

PART NUMBERS:

DB 102 - 7	Idler pulley	DB 202 - 14	Pinion
DB 102 - 7 m	Motor pulley	DB 202 - 21	Motor bracket
DB 102 - 8	Nut	DB 203 - 4	Guide pin
DB 102 - 22	Bearing bolts	DB 204 - 3	Carriage
DB 102 - 23	Cover disc	DB 206 - 2	Face plate
DB 102 - 45 z	Belt	DB 301 - 8 A	Marker pin
DB 102 - 70 z	Belt	DB 302 - 5	Main spindle
DB 103 - 2	Tailstock sleeve	DB 402 - 7	Belt pulley for spindle
DB 103 - 3	Drive screw	DB 501 - 1	Bed
DB 104 - 2	Guide column	DB 501 - 2	Headstock
DB 104 - 5	Tool holder	DB 501 - 3	Tailstock
DB 104 - 7	T-nut	DB 501 - 4	Clamping plate
DB 104 - 8	Threaded spindle	DB 501 - 6	Hand wheel
DB 106 - 3	Centre	DB 501 - 7	Tapered handle
DB 106 - 81	Lathe dog	DB 501 - 8	Tension screw
DB 152 - 4	Long locking handle	DB 502 - 1	Support
DB 201 - 2 V	Guide column	6200 K	Cup spring
DB 201 - 5	Threaded spindle	SW 5	Allen key
DB 202 - 3	Spindle head sleeve	EL 6	Ball bearing
DB 202 - 4	Spindle wheel	E 13	Ball bearing
DB 202 - 6	Distance bush	U 90	Motor

PLAN DIMENSIONS in mm

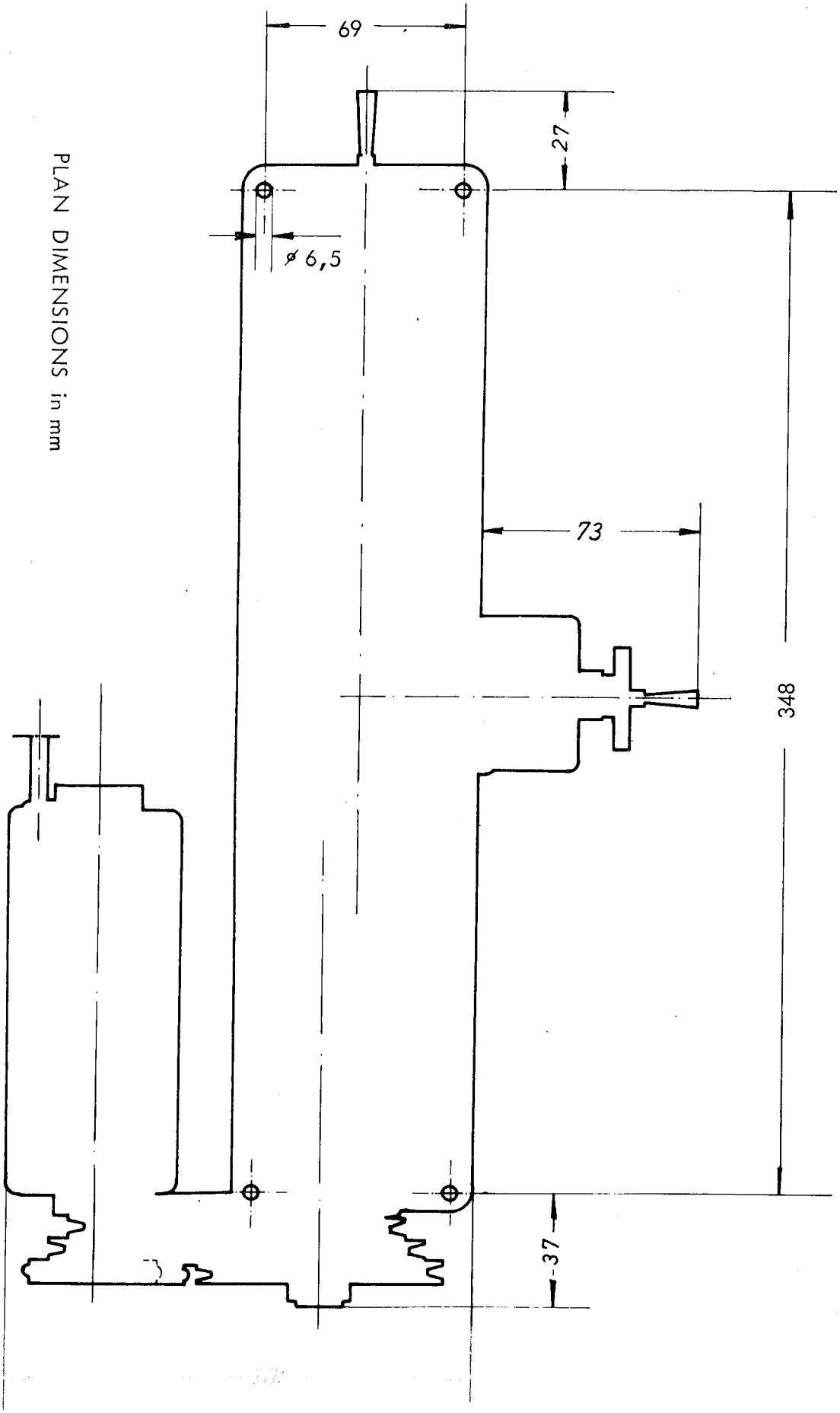
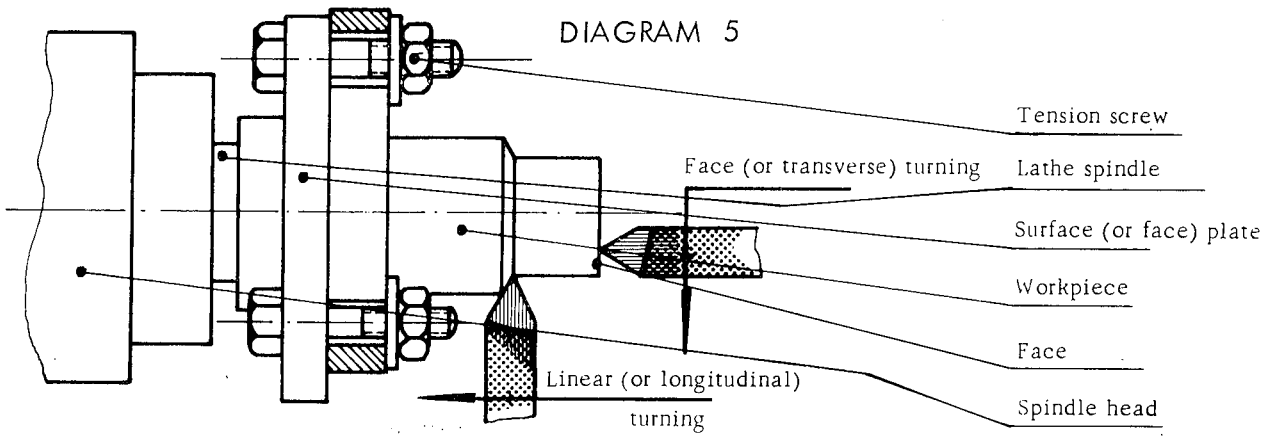


DIAGRAM 3

Basic work procedures on the lathe :

What, in fact, do we understand by turning ?
If we tension a workpiece in a suitable appliance, e.g. between centres, on a surface (or face) plate, in a lathe chuck, or a tensioned clamping device and drive this by means of a motor (over belt pulleys connected to the driving belt), the workpiece rotates with it in the corresponding gear ratio. From this rotary movement of the workpiece we derive the definition "turning." Basically we differentiate between two operating possibilities of the lathe :
On the one hand linear (or longitudinal) turning, by which we understand the circumferential turning down of a workpiece, i.e. to a specific diameter. On the other hand face (or transverse) turning, by which method of turning the face of a workpiece is machined.



With all lathe turning work care must be taken to ensure that the workpiece is securely tensioned. From time to time you should also check the workpiece to make sure it is firmly held. (Grip the tensioning device with one hand and try to move the workpiece with the other. If the workpiece is loose, thghten up the tensioner.)

Tensioning of the workpiece :

We differentiate between various methods.
We can clamp the workpiece (a round metal rod) between the centres of the tailstock and the spindle head and ensure by means of a take-up device (in this case the driver) that it is taken up by the surface (or face) plate. (See diagram.) In order that the workpiece may be tensioned between the centres, centre holes must be drilled on the face ends of the workpiece. One can, however, insofar as the workpiece is of suitable shape (e.g. flange-shaped), clamp it to the surface plate. (See Diagram 5). Tensioning is by means of tension screws. After clamping a check is taken by a short trial run that the workpiece runs true and does not hit. It it only touches slightly the error may be corrected by light taps on the workpiece, with the machine stationary. If it touches very much, the workpiece must be re-tensioned.
A workpiece clamped to the surface plate can be transverse - as well as longitudinally turned.
As further methods of clamping the threee-jaw lathe chuck (Order No. 1001) may be mentioned here. The three jaws provide automatic centering, as with a drill chuck.

Now for the work :

As longitudinal turning is one of the simplest operations, we will for the first test turn :

workpiece down to a specific diameter. Take a circular aluminium or brass rod (soft metals are more suitable for the first attempt than steel), of about 3/8 " diameter and with a hacksaw cut it to a length of about 2". Try to make sure that the saw cuts are as far as possible perpendicular to the axis of the rod (i.e. square), as this simplifies the work considerably (if necessary true up the cut faces with a file).

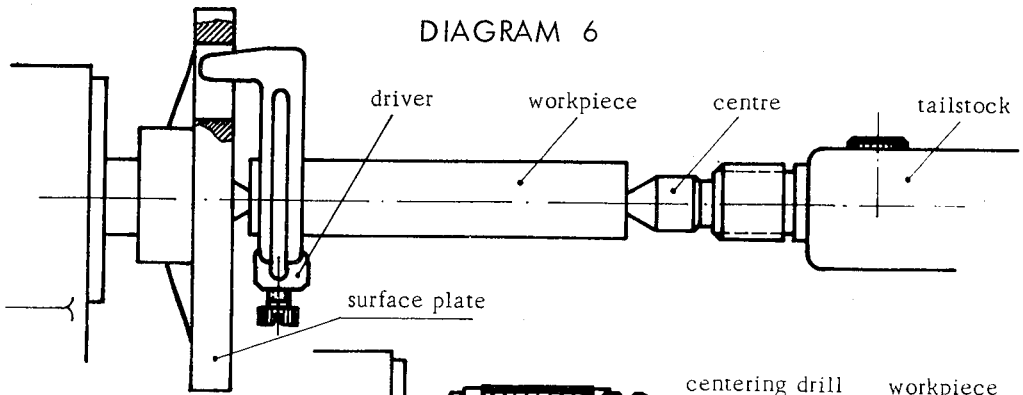
Centering and drilling the centre holes :

So that the workpiece can run true between the tailstock and spindle head centres, centre holes must be drilled at the middle of the two face surface of the workpiece, into which the tips of the tailstock and spindle head centres are inserted. Before a hole is drilled in a workpiece the hole centre must be centre punched, otherwise the drill will run off centre. To centre mark the workpiece clamp it in a vice and locate a centre punch (obtainable from any hardware shop) exactly at the centre point of the face end, making a pot mark by means of a hammer blow, so that the drill can be centred in the indentation. This process is repeated on the other face end.

Drilling the centre holes :

Drilling of the centering holes can be done on the lathe. To do this we unscrew the face plate (see Diagram 7) and in its place screw on a three-jaw drill chuck, available as an accessory (Order No. 1005), insert the centering drill bit into the chuck and clamp it tight with the key. We then insert the centre into the tailstock, hold the workpiece between the centering drill and the centre tip and, after slackening the bottom clamping screw in the tailstock, move it by hand in the direction of the spindle head until the drill contacts the workpiece at the other centering hole. By re-tightening the internal hexagon-headed screw in the base of the tailstock, the latter is firmly clamped to the guide pillars of the lathe bed.

DIAGRAM 6



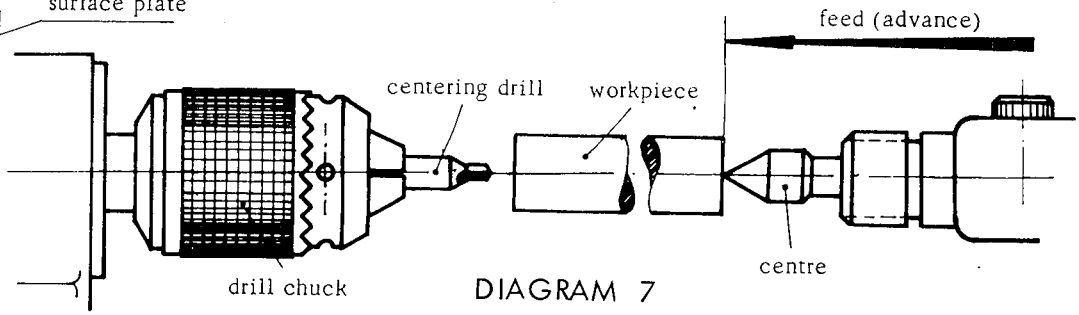


DIAGRAM 7

The workpiece remains clamped between the drill centre on the left hand and the lathe centre on the right hand side, which centres rest in the shallow centering holes. Now unclamp the tailstock sleeve by anti-clockwise turns of the upper clamping screw. If you turn the handwheel on the tailstock to the right, the tailstock sleeve with centre bit inserted in it presses the workpiece up against the rotating drill. With normal drilling, however, the tool is moved up to the

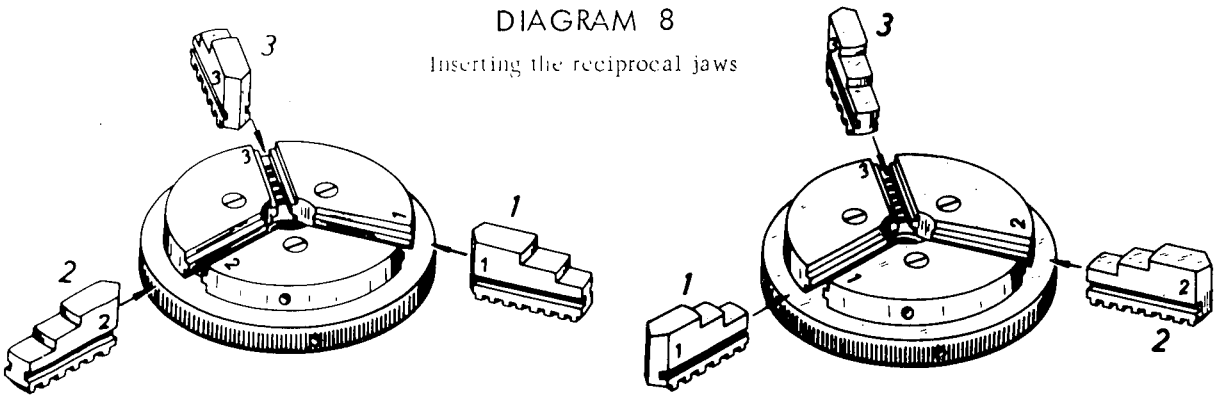
workpiece, but this, as you will surely appreciate, is of no importance to the cutting operation. Then : Switch on the motor, hold the workpiece firmly in one hand and move the tailstock sleeve forward with the other hand. In the same way, after reversing the workpiece, the centering hole is drilled at the other end. This method, without doubt, requires a certain amount of skill and the inexperienced operator will probably not meet with success at the very first attempt.
From the point of view of workshop practice this method can only be regarded as a make shift procedure. The correct way in practice of producing a centre hole requires the use of a three-jaw chuck. (Order No. 1001.) This is screwed on to the spindle head sleeve (in the same way as the face plate on the originally mounted lathe), the drill chuck (Order No. 1005) with the drill clamped in comes on the tailstock side, after the centre has been removed. In this case, then, the drill remains stationary and the workpiece is rotated.

Longitudinal turning :

The originally mounted face plate together with its centre bit is re-mounted and the lathe dog firmly clamped to the workpiece by tightening up the fixing screw. The workpiece together with the lathe dog are then tensioned between the centres, so that the pin in the lathe dog rest in a slot in the face plate. Care should be taken that the centres do not grip the workpiece tightly, though of course without any play. Lubricate the centres with oil from time to time. You will note that the centre of the spindle stock rotates conjointly, whilst that of the tailstock remains stationary. Tensioning of the workpiece between the centres is achieved by advancing the tailstock sleeve. After tensioning, re-clamp the tailstock sleeve. In addition, care should be taken that the clamping screw in the spindle head, which secure the spindle head sleeve, are tightened up.

DIAGRAM 8

Inserting the reciprocal jaws



Mounting the tool holder :

The tool holder (Diagram 10) and its T-nut are inserted in the slot of the support and on this the turning tool is tensioned. The tip of the turning tool must locate at the height of the centres. If necessary several small metal shims are placed underneath the turning tool (Diagram 10) The turning tool holder is adjusted so that the turning tool is at right angles to the workpiece (Diagram 9).

DIAGRAM 9

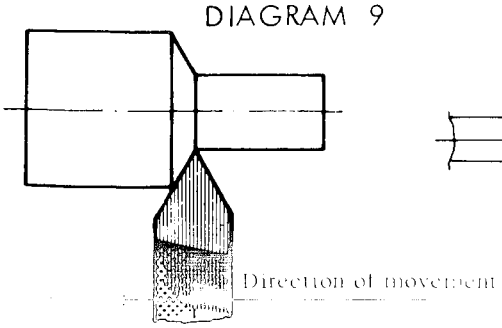
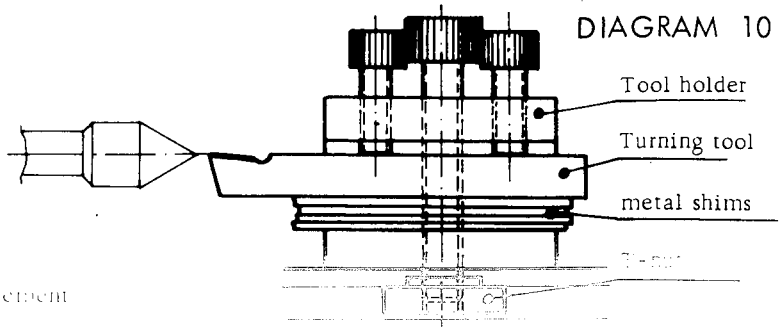


DIAGRAM 10



Types of turning tools :

Each kind of work requires a suitable tool for the purpose. Thus for rough turning, planing, face (transverse) turning, thread cutting, etc. the appropriately shaped turning tools must be selected.

Rough turning tools : The object in rough turning is to remove a large quantity of shaving in a short time.

Planing tools : By planing one attains a smooth surface of the workpiece. For this purpose a planing tool with a rounded off (chamfered) cutting edge is used. Side cutting tools: These are used for transverse turning and for the turning out of sharp angled corners.

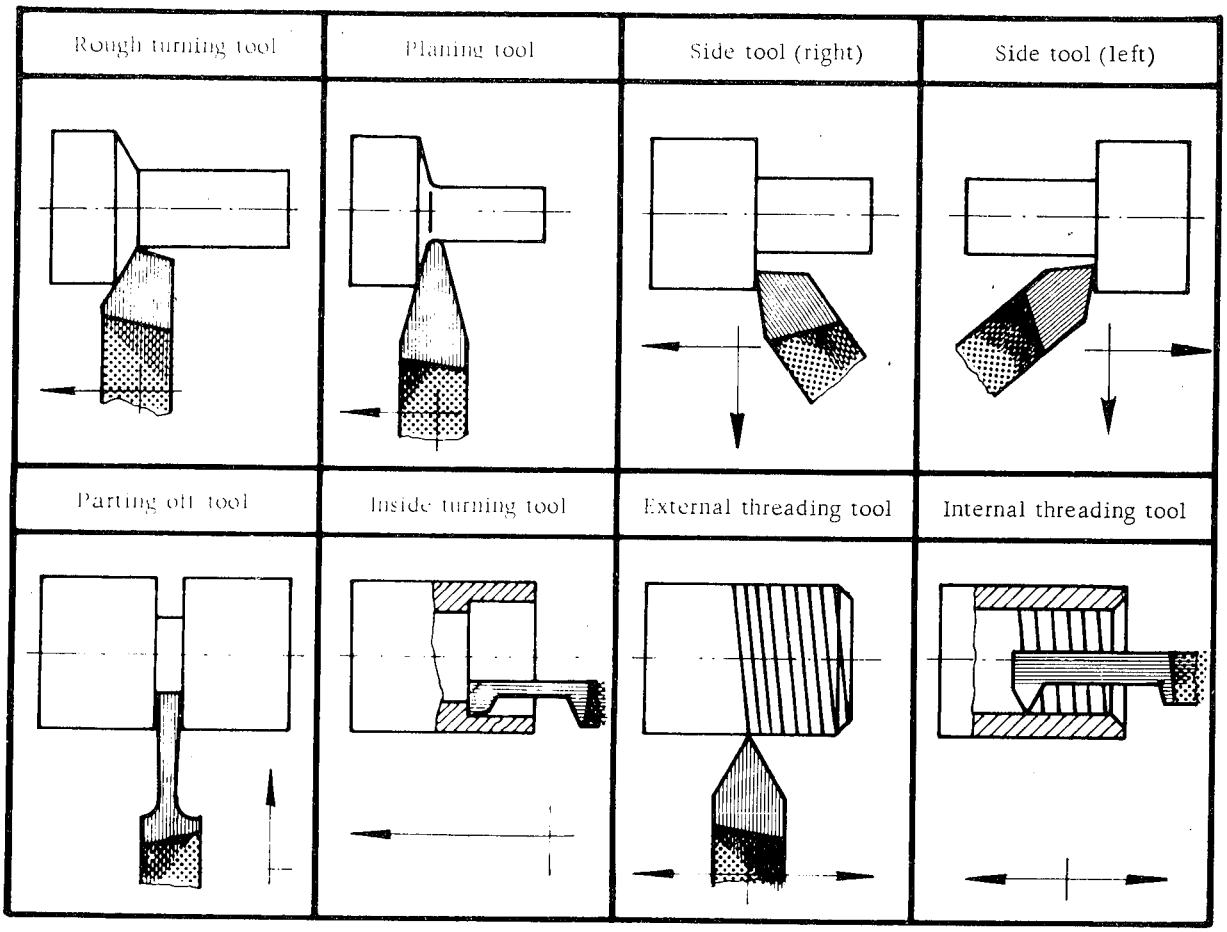


DIAGRAM 11

The initial shaving :

For turning we use the working speeds given in the table. After setting to these you start up the machine with the turning tool lifted. To turn off a thin shaving the turning tool is brought up to the workpiece so that its tip just touches the workpiece following which the support is moved to the right with the cutter tensioned. Movement of the support is done by rotating the handwheel on the longitudinal spindle. The support is moved until such time as the turning tool is located between the centre of the tailstock and workpiece. By rotating the handwheel on the transverse support the depth of shaving is adjusted. (Observe the division scale on the handwheel; by rotating the handwheel one division the turning tool is moved up 0.002"). The actual work movement takes place by rotating the linear spindle handwheel, whereupon the support carrying the turning tool moves up against the spindle head, so removing the shaving. Only after several smaller shavings have been removed in this way and one has become acquainted with the working of the machine, should one go over to bigger shaving depths.

Step turning :

For the next exercise try turning steps of varying diameter.

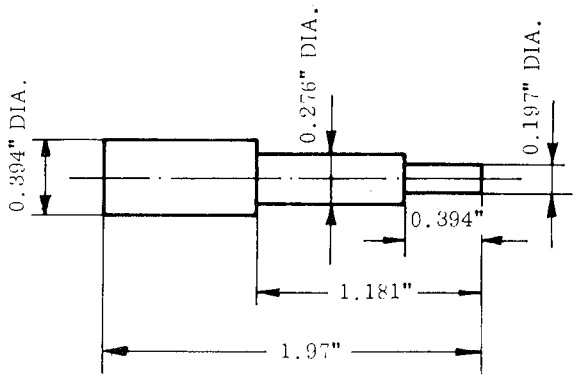


DIAGRAM 12

Based on the above drawing we will make the first step. To do this you move the support back on the tailstock side, set the depth of shaving by the cross spindle (about 0.0197") and move the support against the spindle head in the familiar way by rotating the linear spindle (1.181" according to the drawing.) This procedure is repeated until the diameter of 0.276" has been attained.
The second step is cut in the same way.
For turning longer workpiece to a maximum diameter of 1/4" and when working with a three-jaw lathe chuck, the workpiece can be fed from the left through the centre hole of the spindle.

Face (or transverse) turning :

Not only the convex surface of a cylindrical workpiece, but also its face surface, can be machined on a lathe. The turning of this surface is termed face (or transverse) turning. To face turn, the workpiece must be tensioned on the face plate or in a three-jaw chuck. The tool holder with the clamped-in turning tool is set up in such a way that an angle of 90 degrees is formed between the turning tool and the surface to be machined. The work movement is effected by actuating the transverse spindle and the adjustment of shaving in this case is by the linear spindle.

Use of turning tools :

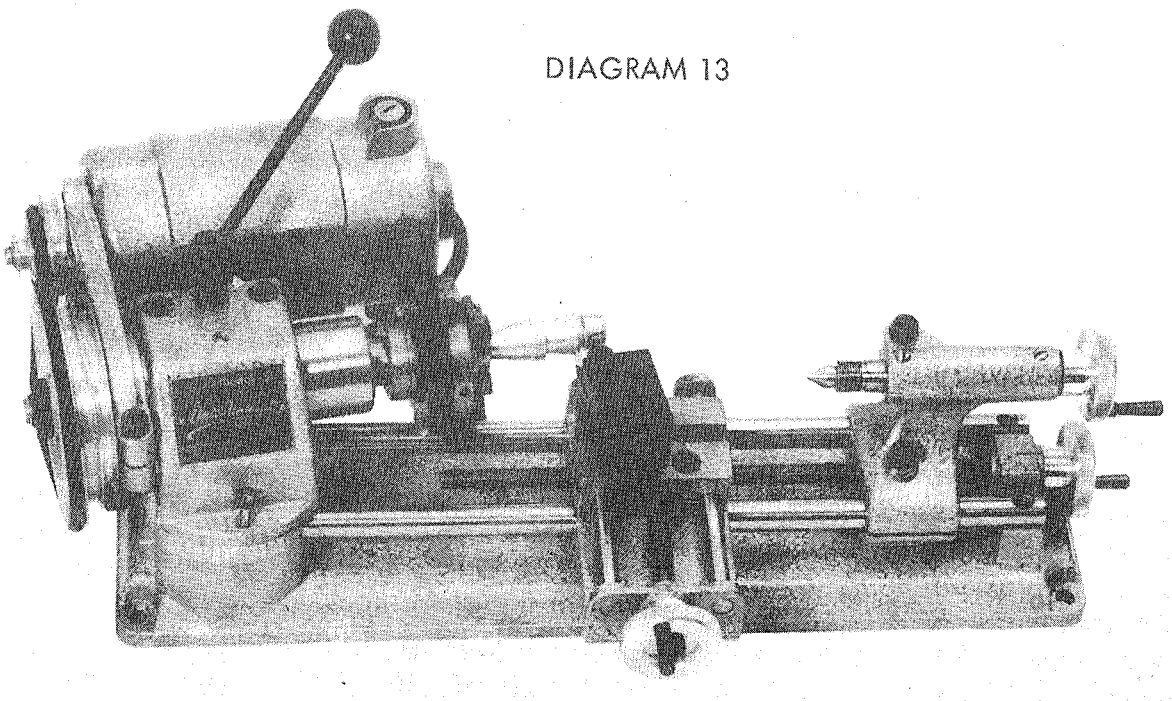
In the tool box (Order No. 1099) there are 2 turning tools. The right handed Side Tool is for normal linear and transverse turning. The rough turning tool is intended primarily for rough turning, i.e. for the removal of large shavings, prior to precision turning to the exact diameter with the right handed side tool.
The point tool may also be used for the pre- (or rough) turning of face surfaces. It is also used for turning ring grooves. Regrinding of the tools contained in the tool box is only recommended in the case of the experienced home worker or modelmaker.
Other tools such as parting off tool, inside turning tool, left handed side tool, external threading tool, internal threading tool can be ordered as extras.

Conical (taper) turning:

For tapering, the spindle head is turned through the desired angel (division marking 5-5 degrees) after slackening off the tension screw and removing the marker pin and then reclamping. If the cone should taper in the direction of the spindle head, the spindle

head must be adjusted anti-clockwise. The shaving here is direct on to the workpiece. Conical turning differs only in this respect from linear turning. To realign the spindle head the tension screw is slackened off, the spindle head is turned by hand to zero and recoupled to the marker pin. The tension screw is then tightened.

DIAGRAM 13



The UNIMAT as a grinding machine :

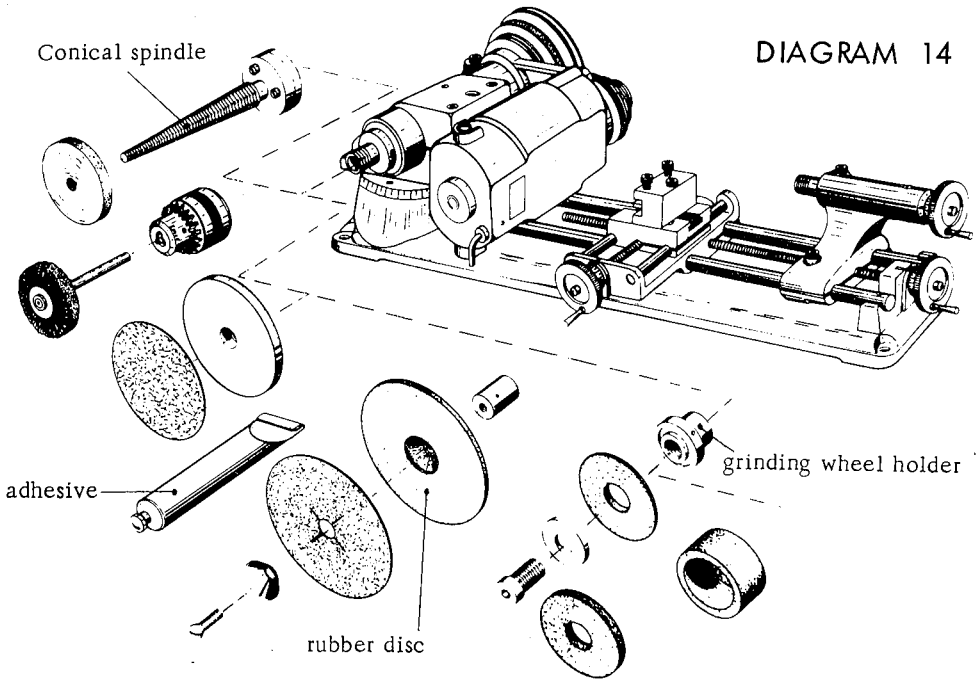


DIAGRAM 14

By mounting a grinding wheel on the grinding wheel holder supplied with the machine and by screwing the same on to the spindle of the spindle head sleeve the UNIMAT has been converted into a useful grinding machine (move tailstock and support right over to the right) and on it all normal grinding work which occurs in workshop practice can be performed. It is desirable to swing the spindle head out 90 degrees, so that on the one hand the grinding wheel is freely accessible and on the other hand the grinding dust does not foul the support guide.
It is expedient to cover the guide columns of the bed with paper. When sharpening tools one should take care to ensure that the angels which the various surfaces of the tool have to one another are retained. In other words, the newly ground surface must lie parallel to that formerly ground-. The beginner should let an expert show him tool grinding, which requires a certain amount of practice.

Surface grinding :

With the aid of a cup wheel simple surface grinding can also be carried out. For this work the tool is simply mounted on the support and clamped by means of a pivoted vice, so that it bears against the grindstone and projects over the support. Adjustment is by means of the linear spindle and the work movement is via the transverse spindle. The spindle head collar must be firmly clamped during grinding. From time to time the grinding wheel must be trued up with a diamond. Blows and knocks on the wheel are to be avoided.

The UNIMAT as a drilling machine :

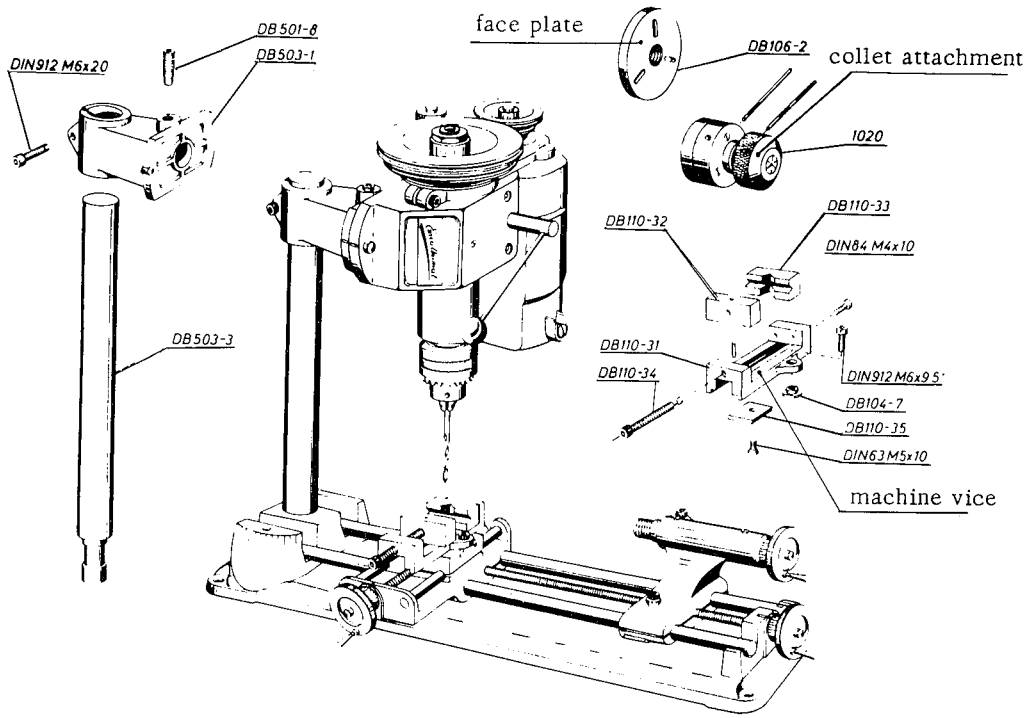


DIAGRAM 15

After slackening the tension screw on the machine bed underneath the belt pulley the complete spindle head and the motor can be lifted out. You can then as you wish, build up either a manual or an upright (or pillar) drilling machine. To make up a hand drilling machine you merely need to screw the drill chuck E 6 G on to the lathe spindle (tightly clamp head sleeve) and for better handling of the equipment secure the clamp head to the headstock.
To produce an upright (or pillar) drilling machine you require the vertical column supplied by us as part of the basic equipment, this being securely clamped by the tension screw to the lathe bed in place of the headstock. Then mount the clamp head on the vertical solumn and tighten it up. Fit the headstock on to the clamp head and clamp securely by means of the tension screw.

Vertical setting of the drill spindle :

For this purpose the surface plate is screwed on to the headstock sleeve in place of the drill chuck, the support slid under the surface plate and thereafter the whole headstock mounted on the support table after slackening off the clamping screw (on the clamp head). The vertical setting thus obtained is secured by fixing the tension screw on the headstock. The headstock can then be remounted at the top and the surface plate and drill chuck reversed. The height of the headstock is adjusted on the drilling column according to the height of the particular work-piece itself is normally laid upon the surface plate which serves as the drilling table, this being secured to the support by means of the grooved (or keyed) screw.
According to requirement oblique holes can also be drilled by distorting the headstock. The drill advance is achieved by slackening the two clamping screws on the headstock and turning down the pinion. (See Diagram 15). It is advantageous only to slacken off the two clamping screws to such an extent that the sleeve does not fall down by its own weight.

The UNIMAT converted in this manner into a drilling machine can also be used in this combination for surface tool grinding (sharpening) by the insertion of grinding tools (bits) or grinding wheels.

The UNIMAT as a milling machine :

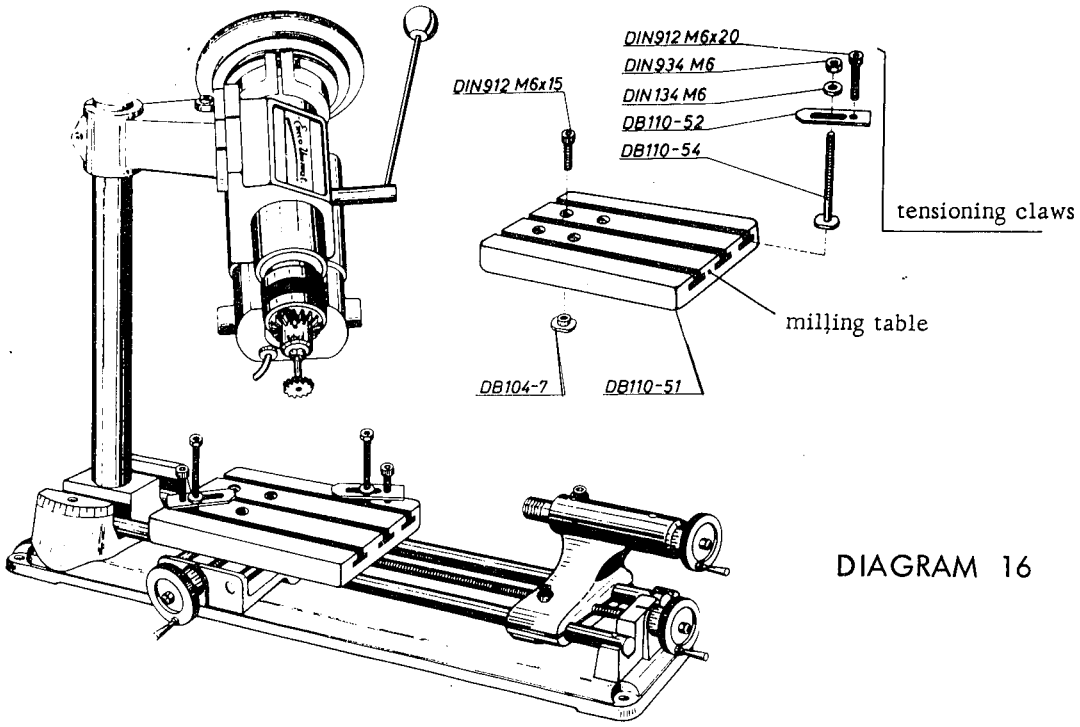


DIAGRAM 16

For milling, the UNIMAT is set up vertically as when used as a drilling machine. The milling cutter is held in the drill chuck screwed on to the spindle head sleeve (for precise tensioning use the collet attachment). According to shape, the workpiece is tensioned in the lathe chuck mounted on the transverse support by means of the grooved (keyed) screw (for round material), in the pivot vice with clamping width up to about 1.064" (for prismatic shapes), or on the milling table (larger and bulky pieces).
Tension screws are supplied with the milling table for workpieces of up to about 1.181" in height. The circular table (Order No. 1261) screwed to the lathe chuck flange may also be used as a milling table with the aid of the grooved (keyed) screw. The workpiece can be fixed on to the circular table with the tensioning claws supplied.
Height setting of the milling cutter is achieved by means of the rack and pinion gearing of the headstock sleeve (Slacken the clamping screw in the headstock, retightening again afterwards). The workpiece is advanced either by means of the transverse support or the linear support. The support, with which the shaving is fed and which does not move during the operation, must be fixed by means of its clamping screw.
The milling cutters contained in the tool box (slot cutter, cylindrical cutter and countersink) constitute universal tools, with which you can carry out all the normal milling work which crops up (vertical and plane milling, groove (or keyway) milling, hole cutting, etc.). By the removal of fine shavings of 0.008" to 0.04", according to material, even the beginner can obtain clean surfaces. The rotating speeds are taken from the speed tabulations.

The Universal Lathe Chuck and its assembly (Order No. 1001):

In the box you will find:
The lathe chuck, a chuck flange, 3 countersunk screws and 2 tension pins.

Fitting the flange to the three-jaw or four-jaw chuck :

Should you receive the chuck with the flange already mounted, the work described in the next paragraphs has already been done by us. The flange must not, therefore, be further machined. Before commencing to fit the UNIMAT Chuck, make sure, that both headstock and tailstock centres are exactly opposite to one another; if this is not so, this setting must be corrected, as explained in the chapter "Conical (taper) turning". Fitting of the chuck can then be proceeded with, the following sequence of operations being observed.

1.) After cleaning the threads of the chuck flange and the spindle nose, screw the flange on to the lathe spindle, as shown in the adjoining diagram (17), taking care that there is no play at the face surface of the flange.

2.) Clamp a point tool in the tool holder and carefully turn down the smaller diameter (turning diameter) of the flange, until the chuck bore (0.669" diameter) may be slid over this without any force, though without any play. Then cleanly face-turn the bearing (contact) surface.
The finished turned flange, after cleaning away the swarf, is lubricated with machine oil, the cleaned lathe chuck is fitted on and screwed firm with the three countersunk screws supplied.

If the chuck flange should have been turned down too small, you will notice this by undue knocking of the chuck. In such case a new chuck flange must be turned, which can always be obtained from us or from a tool shop.
We regret we cannot save you the work of fitting, as completely satisfactory running is only possible by turning the flange on the same machine on which the chuck will be used.

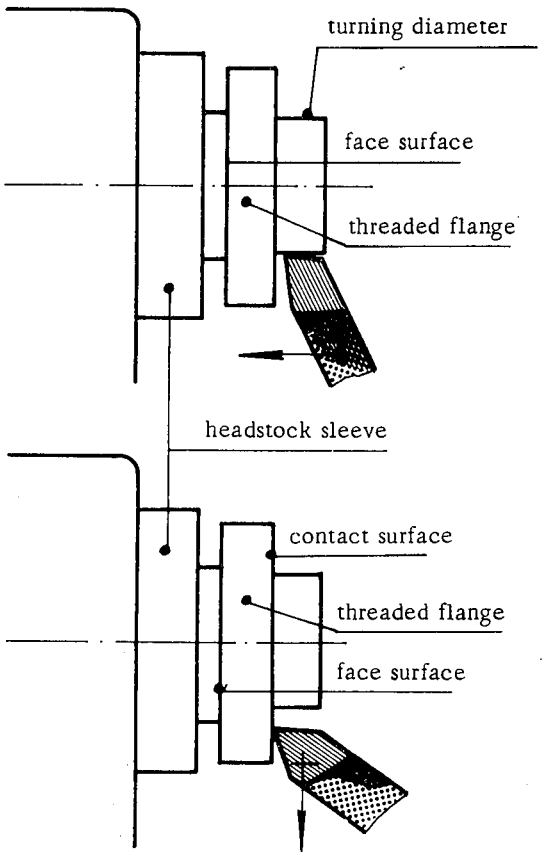


DIAGRAM 17

In the chuck supplied by us the jaws are mounted, stepped outwards. With this arrangement workpieces of smaller diameter (up to about 3/4") can be centrically tensioned from the outside, or ring-shaped or tubular parts from the inside, by means of the stepped guides (of the jaws). If the lathe chuck is to be used for clamping discs or parts of large diameter, the jaws must be mounted in reverse. The jaws are reversed in the following way :
The jaws are unscrewed and cleaned. Thereafter you must turn down the knurled tension ring until the beginning of the spiral thread comes immediately opposite the No. 3 groove of the jaw. Jaw No. 3 is then inserted in reverse and the tension ring rotated, so that this jaw is held firmly.
In the same way jaw No. 2 is then inserted in the guide groove No. 1 and lastly jaw No. 1

in the guide groove No.2. The jaws must then be screwed together at least until they can no longer hit against the guide columns (pillars) of the UNIMAT.
If the jaws should have to be remounted, as originally, as outwardly stepped jaws, the procedure is the same, except that they are inserted in the numerical sequence 1,2, 3 in the identically numbered guide grooves.
To enable firm tensioning to be achieved, 2 tension pins are supplied with the lathe chuck.

The Four-jaw Lathe Chuck (Order No. 1001a):

With the three-jaw lathe chuck only cylindrical workpiece or symmetrically profiled workpieces (circular material, triangular, hexagonal, twelve-sided material) can be tensioned. The four-jaw lathe chuck has individually adjustable jaws, thus presenting the possibility of tensioning a variety of workpiece profiles - four or eight-sided material and non-symmetrical parts.
For precision machining , cylindrical parts can also be fully centralised in the four-jaw lathe chuck. For the assembly of the Four-jaw Lathe Chuck the same procedure applies as already explained in the previous paragraph "Flanging of the Lathe Chuck".

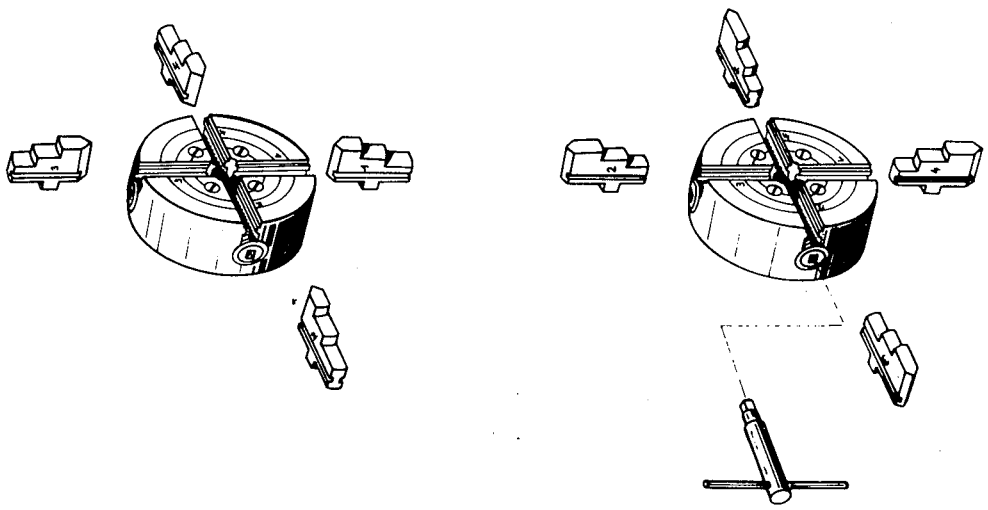


DIAGRAM 18

The Three-jaw Drill Chuck Part No.1005

This is for receiving spiral drills, centre drills, countersinks, milling and grinding cutters. It permits certain, centric tensioning of shank tools of up to 1/4" shank diameter.
For the clamping of workpieces for grinding, milling and drilling we supply a machine vice as an additional accessory.

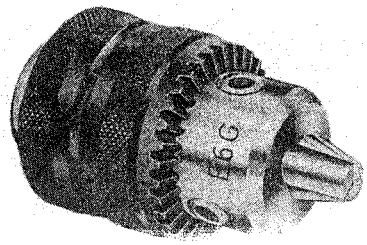


DIAGRAM 19

Machine Vice. Order No.1010:

Fixing is by means of two T-nuts in the support, providing a secure tensioning device for all the operations described.
For work procedures, as described in the chapters "Grinding, Drilling and Milling" fixing direct to the support by means of tensioning claws may also be chosen as a simple method of clamping.

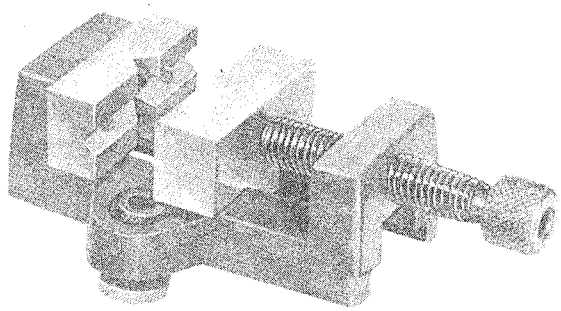


DIAGRAM 20

Milling Table. Order No. 1210 :

The milling table serves primarily for the clamping down of larger and bulky workpieces. By using this special accessory, the UNIMAT becomes an even better milling machine. The milling table has 4 fixing holes, into which two sunk hexagon headed screws with 2 T-nuts can be inserted if desired. The T-nuts are slid into the T-grooves of the transverse (or lateral) support and the table is firmly tensioned by tightening up the sunk hexagon screws. This enables the milling table to be set in the direction of the machine bed, i.e. vertical to it, as well as at an angle of 45° thereto. The type of device chosen for clamping depends both upon the kind of workpiece and on the milling work to be carried out. Clamping of the workpiece is done with the aid of the tensioning claws supplied.
The milling table is also used as a mount for drilling larger workpieces, in place of the surface plate mounted on the support, particulary where it is desirable to secure the workpiece by means of screws. The location of the individual holes can be adjusted for this purpose by means of the longitudinal or lateral support.

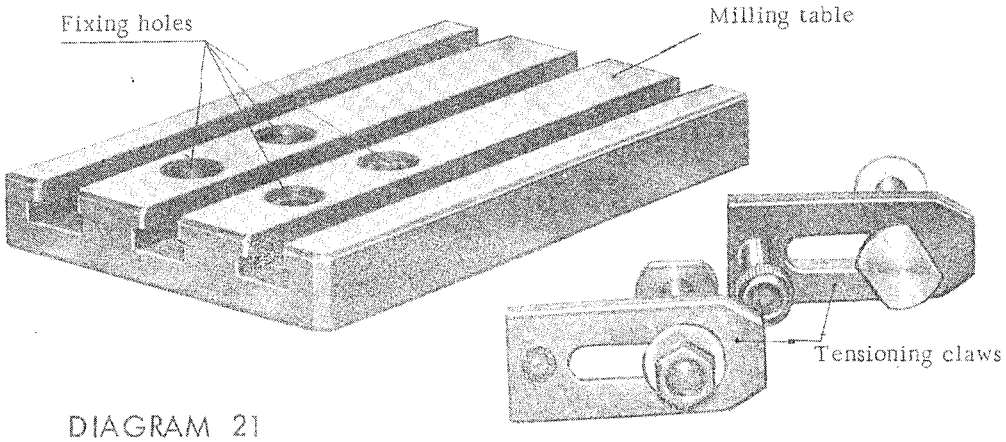


DIAGRAM 21

Flexible Shaft. Order No.1250:

This device is intended for carrying out drilling, grinding, polishing, engraving and similar operations on larger or irregular workpieces, which cannot be executed on the stationary machine. The machine itself is used here purely as a driving unit. The hand spindle has the same spindle nose as the main spindle on the stationary machine, so that all the tools of the standard machine accessory, such as drill chuck, lathe chuck, grinding wheel flange, can also be used

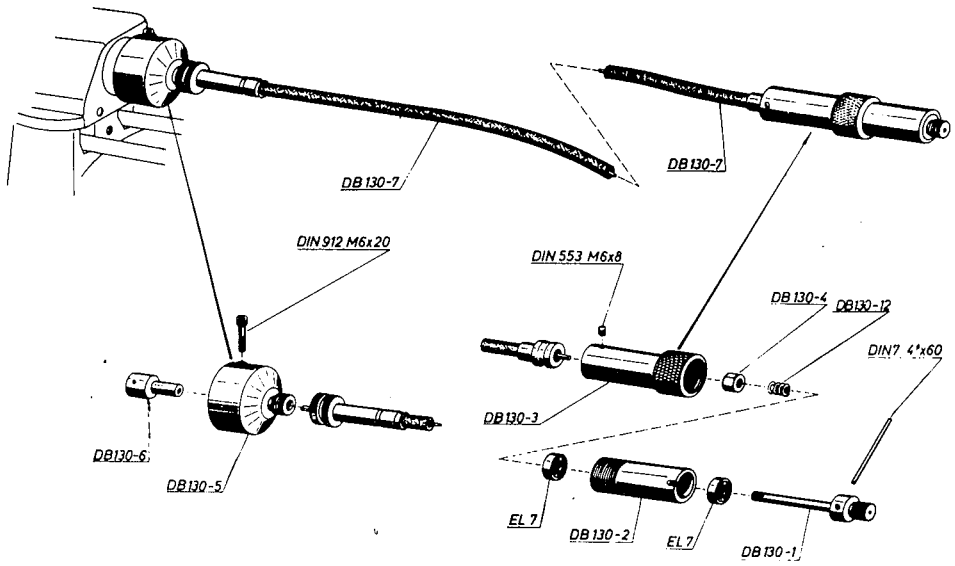


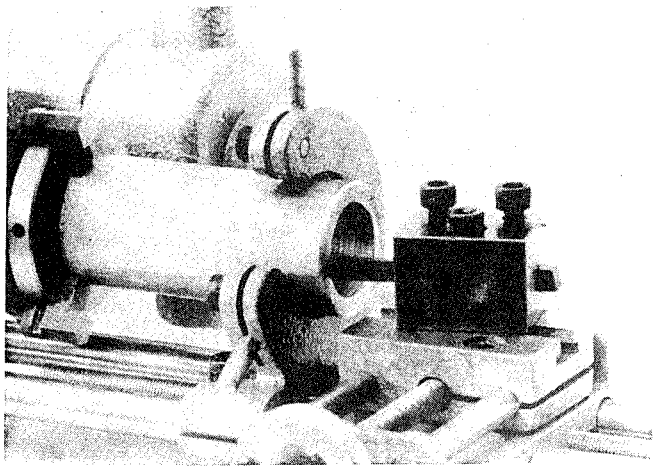
DIAGRAM 22

Assembly of the flexible shaft :

The internally threaded carrying bush (see Diagram 22) is screwed on to the spindle nose of the UNIMAT. Slide the cup over the spindle stock sleeve and securely clamp by means of the clamping screws. Then insert the square head of the flexible shaft into the square hole of the carrier bush and screw the knurled union (or cap nut) of the flexible shaft on to the thread of the cup, thus connecting the shaft securely (against pull-out) to the drive. (No rough milling, use only drills up to 1/8" maximum diameter, speed 3750 r.p.m. maximum). The tool must not jam, otherwise there is a danger of fracturing.

The steady rest. Order No. 1040:

This constitutes an auxilary guide for long, thin diameter turning parts and prevents vibration and knocking of the workpiece. The steady rest is mounted on both guide columns of the bed and firmly clamped. The pass through aperture goes up to 1.378".



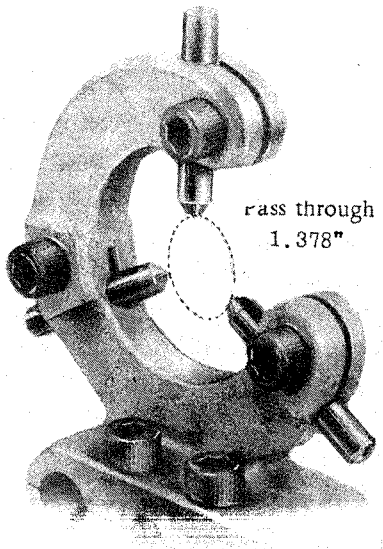
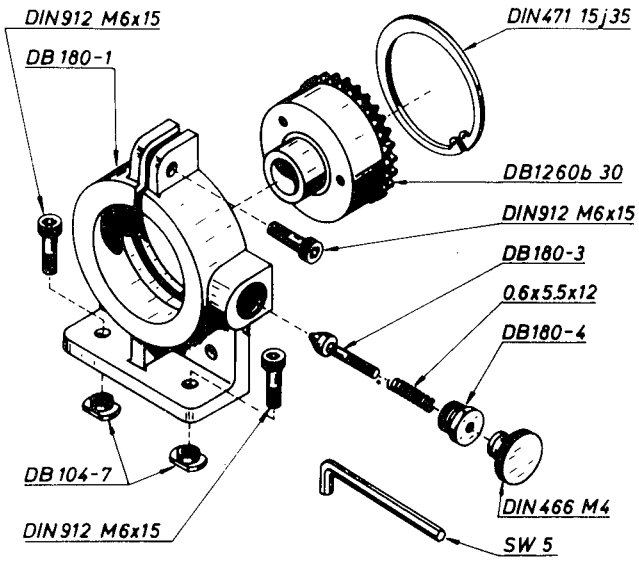


DIAGRAM 24

The Indexing Attachment. Order No. 1260 :

The indexing attachment is secured to the transverse support by means of 2 T-nuts (use the short 'Allen' type key supplied).
Two tensioning positions of the indexing attachment, vertical to each other, on the machine are possible.

DIAGRAM 25



With the working axis in the horizontal position, as illustrated, the indexing attachment is used for the milling of all types of gear wheels and the milling of grooves (keyways) in the shell of cylindrical workpieces. With the working axis in the vertical position radial grooves can be milled, dial plates drilled, etc. The indexing possibilities of the index plate supplied by us number 48 maximum, and accordingly the index numbers 2, 3 ,4, 6, 8, 12, 16, 24 and 48 are possible. Should you require other divisions, you can purchase other index plates from us. The indexing possibilities may be seen in the adjoining tabulation.

Tensioning the workpiece in the indexing attachment :

We differentiate between 2 possibilities :
The Universal-Lathe-Chuck (without threaded flange) is used for the tensioning of studs, plates, rings. The lathe chuck is screwed to the indexing attachment with the 3 countersunk screws M4 x 25 (as otherwise on the threaded flange).

The Circular Table. Order No. 1261 :

is secured to the indexing attachment in the same way (with 3 countersunk screws) and serves to tension asymmetrical workpieces by means of tensioning claws. In the round table there are, besides, 3 M6 threaded holes for the insertion of retaining screws (locking screws). These provide a further clamping possibility, particulary for workpieces which are drilled and slotted. The workpiece is secured to the round table by means of M6 screws and shims. It sometime suffices for the screw to be located at the very edge of the workpiece, so that one head of the screw grips the workpiece and holds it securely.

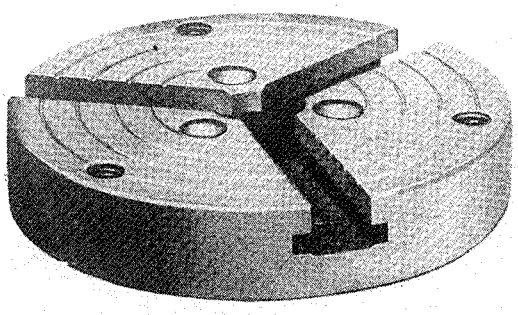


DIAGRAM 26

As an example of work let us explain the milling of spur gear wheels. The UNIMAT is set up as a vertical machine. Mount the indexing attachment, complete with lathe chuck installed thereon on the transverse support in such a manner (see Diagram 27), that the work axis is horizontal. Clamp the workpiece in the universal lathe chuck (gear wheel with shaft can be clamped direct in the chuck, gear wheel without shaft, but drilled, is provided with a drift for working, the drift being clamped in the lathe chuck). Insert the index bolts (Diagram 25) into one of the grooves of the index plate. Fix the index plate with the clamping screws - clamp the tooth shaping cutter on to the tension drift, which is screwed on to the spindle stock sleeve - adjust height with the spindle stock sleeve rack (tooth tip of milling cutter must be at the height of workpiece centre) - clamp spindle stock sleeve.

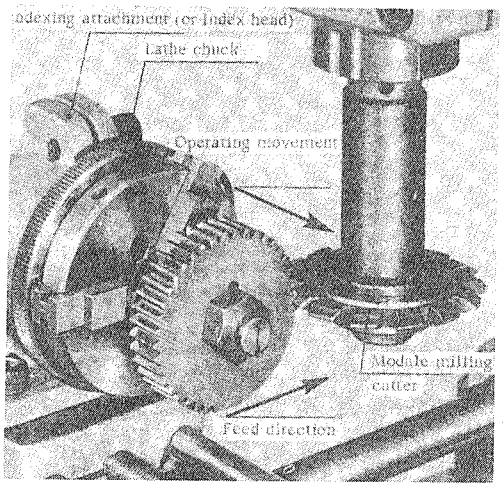


DIAGRAM 27

Set the first shaving by means of the transverse support (milling cutter touching outside diameter of workpiece). Move back workpiece and indexing attachment by means of the transverse support and set depth of teeth by turning the longitudinal spindle. Clamp the longitudinal support firmly during operation (otherwise it will chatter) and with the transverse support mill the bottom land of the tooth.

Second tooth : Move back the workpiece with transverse support - undo the clamping screw - withdraw the index bolts slightly - index again to the desired index amount - let the index bolt rest in the groove and clamp tight - otherwise proceed as before.

Note : By glancing at the clamp slot the number of division marks on the index plate can be seen.

In the position of workpiece and milling cutter decribed other types of work can also be carried out. Milling of keys, hexagons and squares of screw heads, radial grooves (keyways) in plates, etc.

Operations with working axis of index head in vertical position :
(Drilling of dial plates, Face cutting of keyways (grooves), etc.)

Fix indexing attachment to support with T-nut (same procedure as before, but swing index head through 90 degrees). Clamp workpiece in lathe chuck or on to round table, indexing procedure as for gear wheel milling.

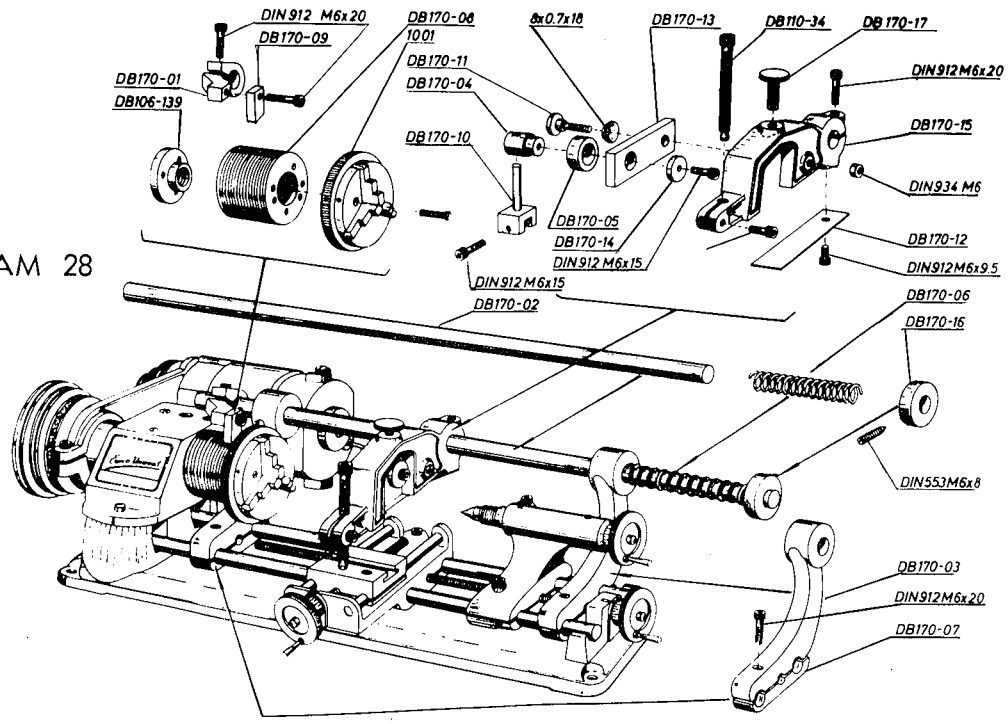
Please note : Before each work procedure always clamp index head firmly.

After removing the snap ring the index plate can be exacted and exchanged for another one. (See tabulation.)

Order No.	Index Plate Number :	Indexing possibilities
1260 b	30	2 3 5 6 10 15 30
1260 c	36	2 3 4 6 9 12 18 36
1260 d	40	2 4 5 8 10 20 40
built-in	48	2 3 4 6 8 12 16 24 48

The Thread Cutting Appliance. Order No. 1270 :

DIAGRAM 28



This is a further auxiliary equipment for the UNIMAT, on which all external and internal threads can be cut. We supply all the associated accessories for it (leaders and followers) (Diagram 28) for the production of various metric or Whitworth thread pitches.

Pitch,
metric threads : 0.5 0.7 0.75 0.8 0.9 1.0 1.25 1.5

Whitworth threads : 16 18 20 22 24 28 32 36 40 48 50 56
Threads per inch :

Thread cutters for internal and external threads may be obtained from us. For other shaped threads (trapesium, flat and round threads) appropriately ground cutters must be used.
In addition you will require the Universal Lathe Chuck and chuck flange for clamping the workpiece.
The mounting of the thread cutting appliance will be clear from Diagram 28.

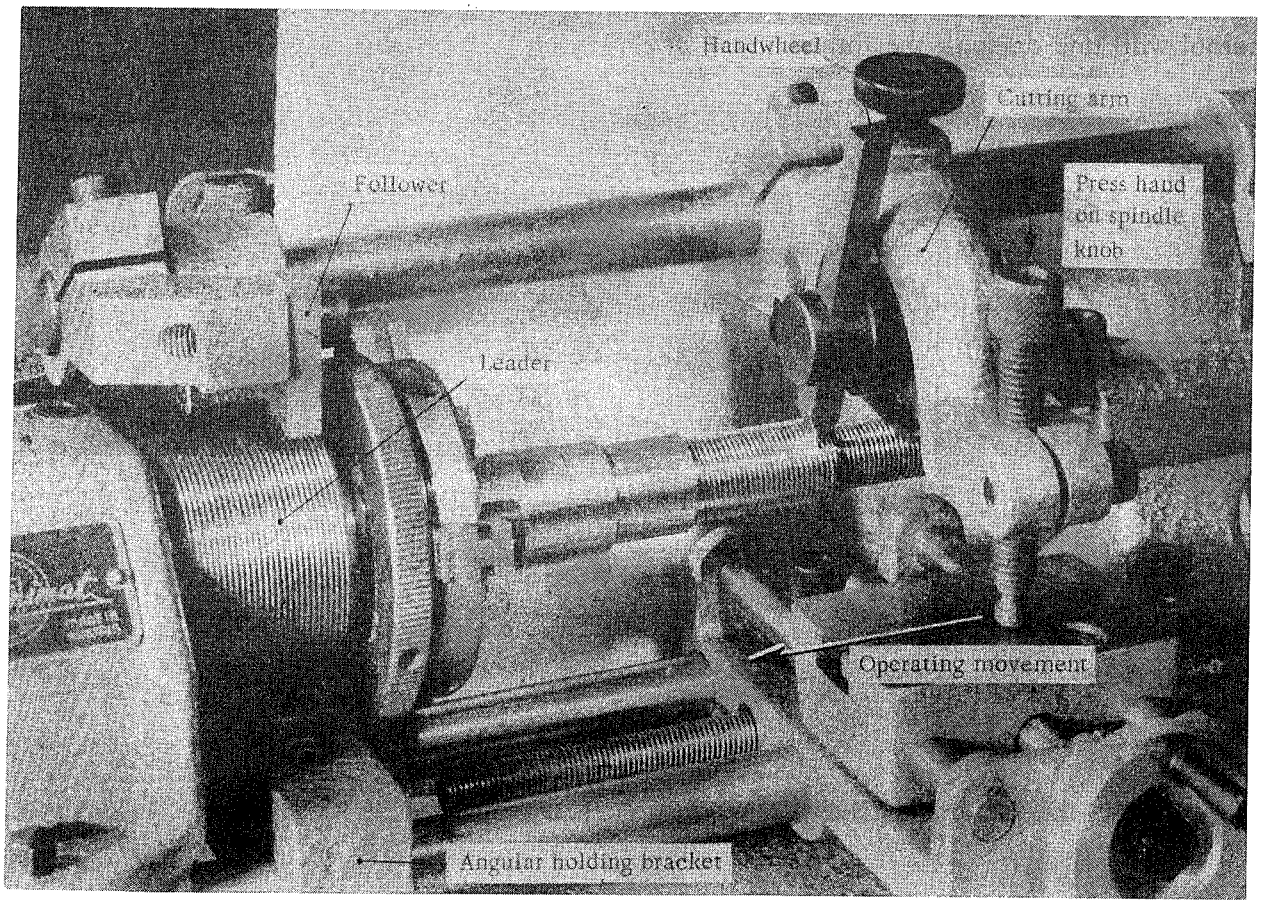
Mount the two angular brackets DB 170-03 on the guide columns of the machine bed. For long workpieces, for which the tailstock must be moved fully to the right you can firmly clamp the right- hand angular holding bracket also to the left of the tailstock on to the guide columns. The Universal-Lathe Chuck must be loosened on the threaded flange and then the chuck flange only screwed on to the spindle head sleeve. Fit the leader on to the chuck flange so that the cup-shaped leader locates over the pushed out spindle head sleeve. (Push the spindle head sleeve right out in the direction of the tailstock.) Then firmly tension the spindle head sleeve again by means of the two clamping screws. Mount the lathe chuck on to the rim of the threaded flange which projects through the leader and secure the chuck and leader with the 3 countersunk screws M4 x 30 to the flange.

Warning : (The left-hand angular holder must not touch against the tension ring of the lathe chuck - see Diagram 28.)

Push the guide rod from the tailstock side through the right-hand angular holder to the height of the support - place the complete cutting arm on the guide rod - push the guide rod through the left-hand angular holder - place the guide arm on the left-hand end of the guide rod and tension firmly with the clamping screw. Slide the spring on to the right-hand end of the guide rod and secure in place with the clamping ring.
As the cutting arm and guide arm move towards the left during thread cutting, the spindle on the cutting arm must be located at the right-hand end of the support in the starting position. Move the support accordingly.
The spindle on the cutting arm serves to adjust for the various workpiece diameters. By rotating the spindle to the right (slacken clamp beforehand and tighten again afterwards) the cutting arm is lifted, so that larger workpieces can be processed.
When adjusting the spindle the thread cutter must be set in the external tool holder so that its tip locates at the centre of the workpiece.

Please note further :

The follower must engage in the leader without any play whatsoever, as otherwise irregularities will occur in cutting the thread. Check the correct engagement of the follower by pressing it firmly into the leader with the clamp of the cutting arm slackened, whereby the spindle must lie snugly on the support and only then should the cutting arm be reclamped.
The operating speeds for thread cutting should be taken from the tabulation of speeds.

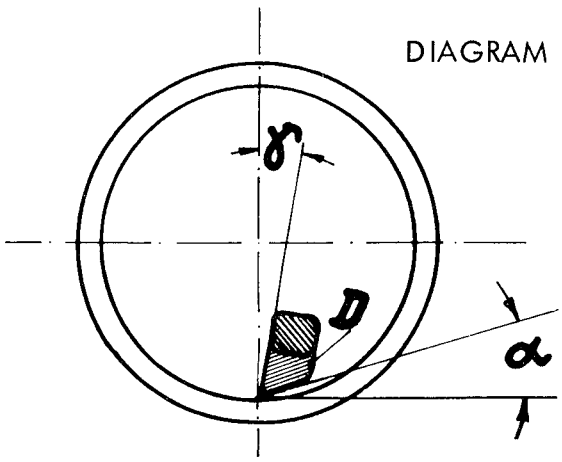


The actual work will now be explained in brief phrases:
Clamp thread cutting tool in external tool holder - flap the cutting device back - start the machine - swing in the cutting device, until spindle lies snugly on support (follower now engages in leader and carries cutting arm to the left) - press with the hand on the knob of the spindle, so that it does not lift from the support, but glides over it - after completing the thread groove lift up the cutting device - spring pulls cutting device to the right again. After cutting through by means of handwheel, set to cutting depth of approx. 0.004" - repeat process until maximum thread depth has been attained.
Check the finished thread with thread gauge or try screwing into thread of nut.
To cut external threads between the two lathe centres (without clamping in the lathe chuck) the procedure is as follows :
The jaws of the lathe chuck are removed - a centre is inserted in the hole of the headstock the lathe dog secured to the workpiece is taken up by one of the jaw guide grooves.

Cutting of internal threads :

Clamp workpiece (pipe, ring, etc.) in Universal-Lathe-Chuck - in place of thread cutter clamp internal tool holder with internal thread cutting tool (point downwards) in cutting arm. By moving the internal tool holder in the external tool holder set height of internal tool in relation to internal diameter of workpiece roughly - tension tool as short as possible (move cutting arm as near as possible to the headstock and clamp firmly to guide rod). Fit on internal cutting tool (see Diagram 30), set feed of cut with handwheel on guide arm. The work then proceed exactly as when cutting external threads, but care must be exercised when lifting the cutting device after completing the cut that the internal cutting tool does not hit on the opposite internal wall and damage the thread.

DIAGRAM 30



γ = cutting angle
α = clearance angle
D = cutting tool

The automatic feed attachment. Order No. 1290:

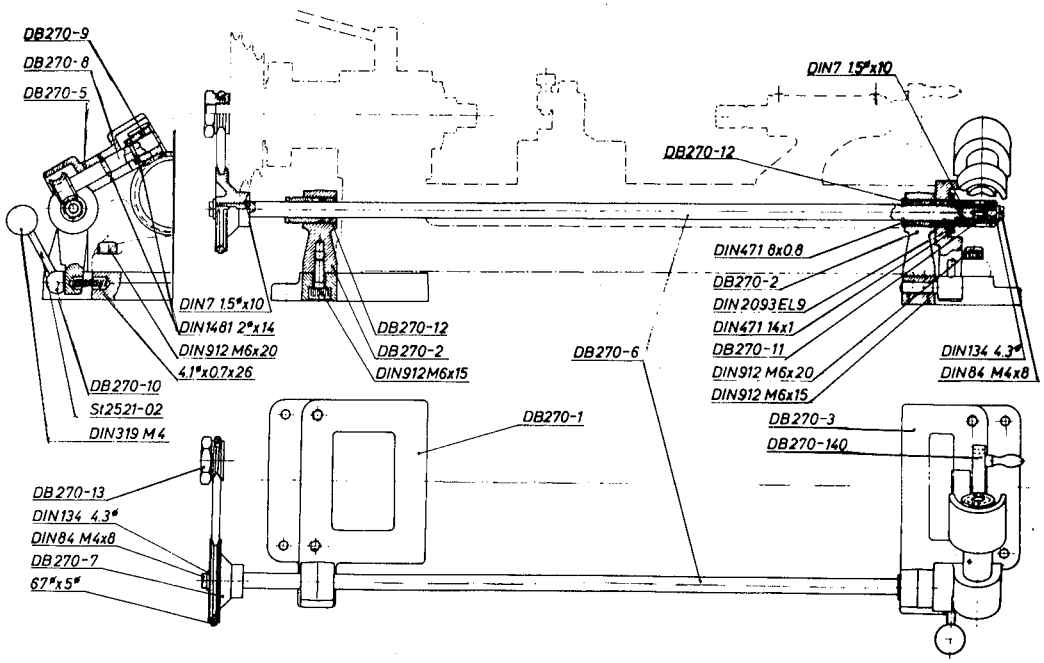


DIAGRAM 31

The UNIMAT - Feed attachment is an auxiliary device that may be mounted subsequently on to any machine. Once mounted it can remain permanently on the machine and need not be removed for any kind of work or conversion.
It is mounted as a complete unit and is supplied ready for mounting. The belt nut DB270-13 and the toothed handwheel DB270-140, as well as 4 internal hexagon headed screws are included as separate parts.

Assembling the belt nut :

The sleeve is removed from the spindle head after extracting the pinion and slackening the two clamping screws. The clamping screw of the motor bracket is then loosened and the latter together with the motor drawn from the sleeve. To unscrew the nut from the large pulley shaft the pulley is held face side in a vice between cardboard or wood packing. The standard nut can then be unscrewed with an SW 19 spanner and the new belt nut screwed on with an SW22 spanner. The sleeve is then refitted to the headstock in the reserve sequence.

Assembling the toothed handwheel :

The standard handwheel on the longitudinal spindle is firmly held by hand by its knurled rim and the hexagon nut (Cap nut) unscrewed with an SW 9 spanner. The standard handwheel is then unscrewed and the toothed handwheel mounted in the reverse sequence. Care should be taken to ensure that the handwheel is screwed home until there is no play axially on the longitudinal spindle, still permitting it, however, to rotate freely.

Assembling of the feed mechanism:

The two base plates are moved aside until the fixing holes in the bed of the supermounted UNIMAT coincide with the screw holes in the two base plates. With the 4 internal hexagon headed screws supplied the two base plates are screwed in this position to the UNIMAT and tightened up until the feed shaft lies in front of the machine below the support and rotates freely in its position. Should the feed shaft jam, the two bearing blocks must be loosened

and reset. (Fixing screws are located on the underside of the base plates.) The sleeve is displaced axially in the headstock to the extent that the two recesses for the rubber ring are in alignment in the belt pulley nut and in the feed belt pulley, whereupon the rubber ring is laid on.
To switch on the feed the lever is swung to the top, whereupon the gearing on the handwheel engages under spring pressure and the longitudinal spindle and the support are set in motion. If on switch-on the gearing locates tooth on tooth, these mesh automatically. To switch off the feed the lever is pressed backwards and downwards. To switch back the support to the original starting position the feed is switched off and turned backwards by the geared handwheel. If the feed device is not being used, the driving belt should be removed, When the feed gear is used the bearing points should be lubricated with sewing machine oil.

The Double Reduction Motor Bracket. Order No. 1280:

With the double reduction gear the minimum speed (365 r.p.m.) can be reduced even further to a minimum speed of 155 r.p.m.

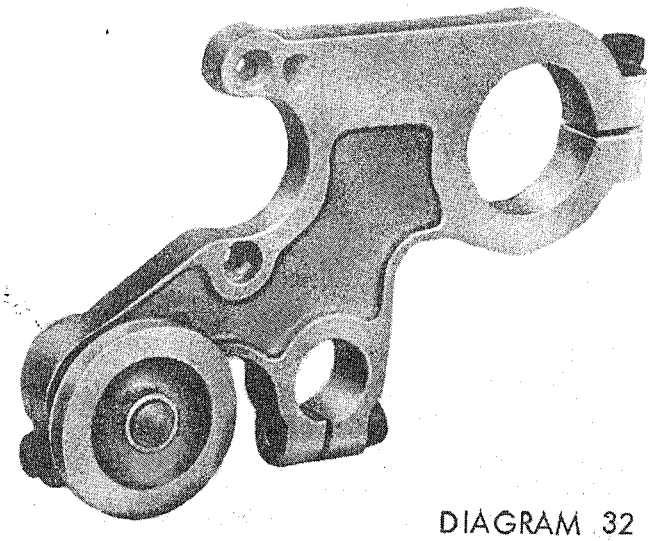


DIAGRAM 32

Assembly of the Double Reduction Gearing :

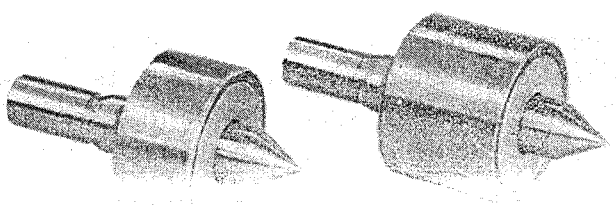
Remove the motor pulley after slackening the M4 cylindrical screws, undo the two motor fixing screws and remove motor. Withdraw spindle sleeve after slackening the clamp screws and removing the pinion. (Unscrew the set screw on the upper side of the headstock right out.) Take off standard gear and reassemble new gearing in reverse sequence. Mount motor pulley, so that the largest step faces motor.

Live Centres:

We distinguish between 2 types : Single ball-bearing. Order No. 1220
Double ball-bearing. Order No. 1220a

The use of the conjointly running centre is partculary advantageous, where workpieces are being machined at high speed. Whilst fixed centres tend to spread by rubbing when running fast, despite good lubrication, this is avoided in the case of the conjointly running centre by the incorporated ball-bearings. The co-running centre can be pressed firmly on to the workpiece, without laving to run it in, as with a fixed centre. The co-running centre tip can easily be ejected and changed by inserting a drift in the centric bore of the device. Also from time to time thick oil or grease should be pumped into the same drill hole.

Live centre



The Polishing Spindle. Order No. 1030:

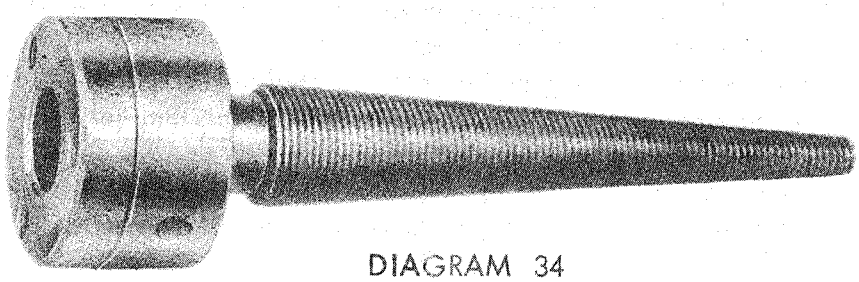


DIAGRAM 34

The polishing spindle is a conical threaded arbor, designed to take felt plates, fabric covered plates, round brushes and all other rotating plates for polishing and grinding (plates with soft cores). The advantage of a polishing spindle lies therein that all the aforesaid plates of hole diameters from 1/4" to 5/8" can be accommodated.

Flanging on:

The associated flange is screwed on to the spindle nose of the UNIMAT and machined in the same way as the lathe chuck. The actual polishing spindle can then be screwed firmly to the flange with the 3 cylindrical screws supplied.

Fitting on the plates:

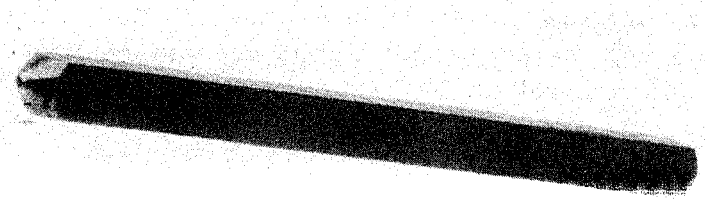
The individual plates or round brushes are fitted on to the running spindle. By the increasing diameter of the thread the plates or brushes screw themselves on firmly and align themselves facially by their own centrifugal force. It is, however, recommended that no plates with hard centres be used, as this will damage the conical thread and may render it unserviceable.

Removal of plate:

The spindle pulley of the UNIMAT is firmly held with the left hand and the plate or brush loosened on the threaded cone by a small left-hand turn with the right hand, whereupon it can easily be removed. To remove the polishing spindle from the UNIMAT the tension pin is inserted into one of the three radial holes and by simultaneous countergripping of the pulley unscrewed from the UNIMAT spindle. In the case of all operations with the polishing spindle it is desirable to swing the headstock through an angle of 90°. This permits free manipulation of the workpiece. The operating speeds may be read off the speed tabulations.

The Truing Diamond. Order No. 1160:

The truing diamond is used for the truing up of grinding wheels and to obtain the smoothest top surfaces.



Truing up a grinding wheel:

The truing diamond is clamped in the tool holder and fine shavings ground off the grinding wheel at approx 2000 r.p.m., until the grinding wheel again runs concentrically and face-true. Perfectly smooth top surfaces are attained by linear and face turning with the truing diamond. It is clamped in the same way as a turning cutter and operated at a speed of twice that for steel turning. Adjust for shaving only with the workpiece in motion and very fine shavings with small feed (shaving depth 0.004").
A further use of the truing diamond is in the turning of plastics such as Bakelite, hard rubber and fibre-glass substances, where clean surfaces can only be achieved with difficulty with the usual turning tools.

The Collet Attachment. Order No. 1020 :

The purpose of this is to clamp round material with smooth, cylindrical surfaces of from 1/16" to 5/16" diameter, by using the collet chucks of the same diameter supplied by us. But also for the precise clamping of shank tools such as milling cutters, grinding pins, drills, countersinks and hones (or reamers). It permits strong and short clamping without damage to the workpiece surface, and in addition true, concentric running.
The special advantage of the double-cone collet chuck as against other collet chucks lies therein that workpiece of any desired length up to 1/4" in diameter can be fed through the spindle centre hole.

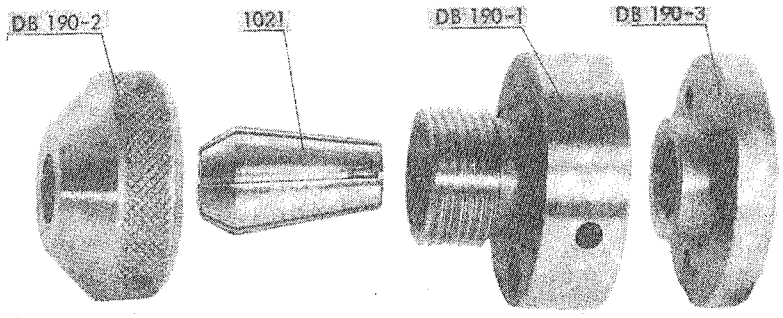


DIAGRAM 36

The collet chuck device consists of the collet chuck holder, the tension nut, the flange for fixing the complete device to the machine, also 3 sunk screws M4, 2 tension pins for tightening the appliance and the slotted double-cone collet chuck of optional clamping diameter (The type E 16). Flanging on of the collet chuck device is carried out in exactly the same manner as in the case of the three-jaw Universal-Lathe-Chuck. It must, however, be done very carefully, as otherwise the high degree of accuracy which favours the use of the collet chuck in place of other appliances would be impaired.

The Clockmaker's Sleeve. Order No. 1022:

This ancillary device permits the most precise lathe turning operations on the UNIMAT and is suitable for the direct reception of clockmaker's collet chucks of type B8.

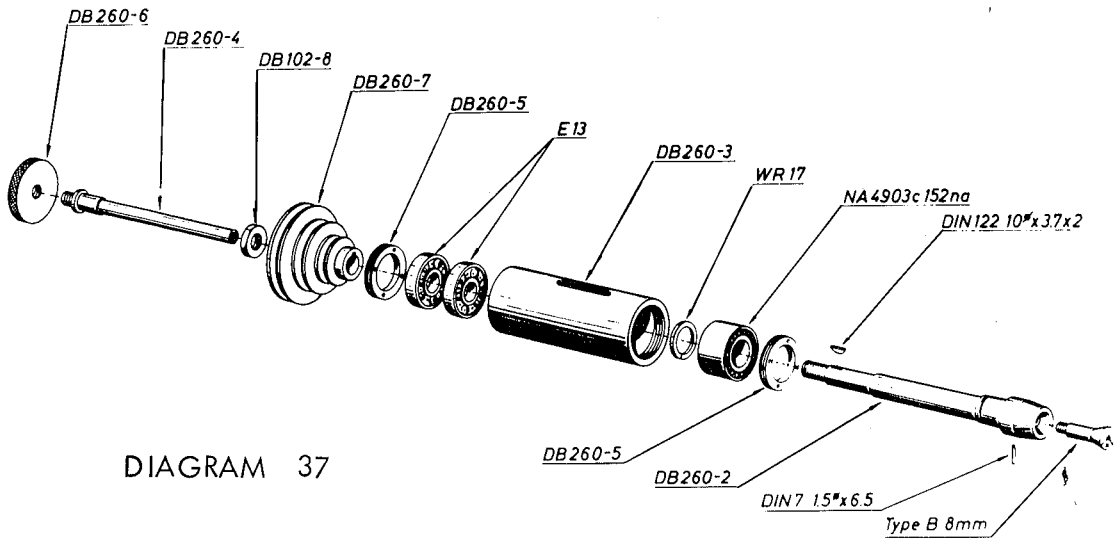


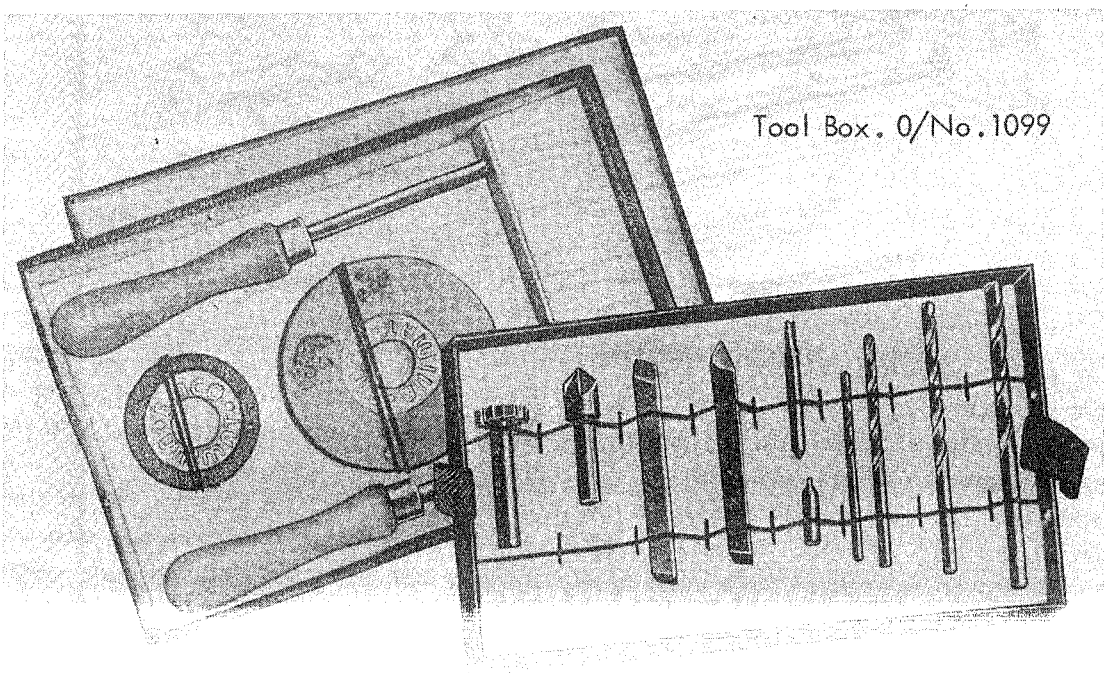
DIAGRAM 37

Installation of Sleeve:

Slacken the two clamping screws and remove the pinion on the headstock. Unscrew the set screw on the upper side of the headstock so far that the spindle sleeve can be withdrawn. The motor holding plate is drawn off by slackening the clamping screw. Then a collet chuck sleeve is installed again in the reverse sequence.

Warning: When screwing in the set screw care must be taken to ensure that the cylindrical or shoulder rim of the pin rest inside the special recess for it in the sleeve (linear groove). Tighten up the set screw and then slacken again half a turn.

Tool Box. Order No. 1099:



CONVERSION OF THE UNIMAT INTO A WOODWORKING LATHE

Conversion Kit. Order No. 1395 (Turning Lathe) :

This conversion kit consists of a pair of long guide columns, a swivable handtool rest and a drive centre.

The conversion is carried out in the following way :

First of all the headstock and tailstock are dismantled. Then the nut and handwheel on the linear spindle are slackened. After removing the 4 internal hexagon screws on the underside of the bed the guide columns with the supportlinear spindle may be pushed against the headstock and then lifted off. The bearing surface of the guide columns on the lathe bed are now cleaned of shavings. In the reverse sequence the long guide columns are screwed on to the machine bed, whereby on to the front column the swivable handtool rest must be slid on. According to the length of the particular workpiece the tailstock must be mounted to the left or right of the machine bed. With this machine workpieces of a diameter of 2 3/4" and up to a length of 13.2" can be processed.

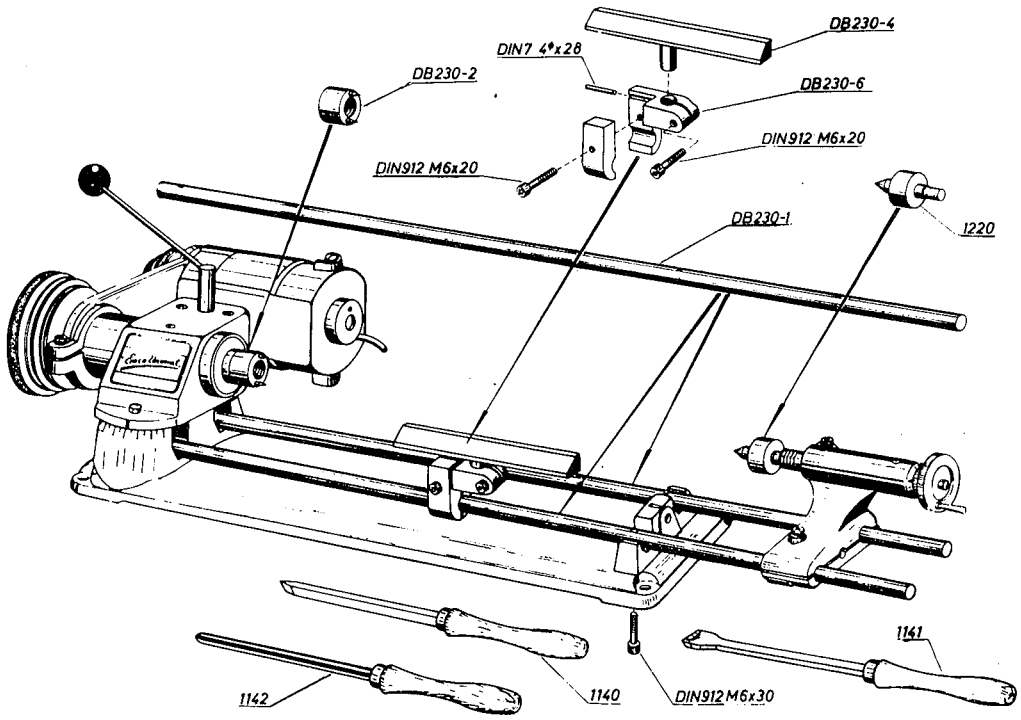


DIAGRAM 39

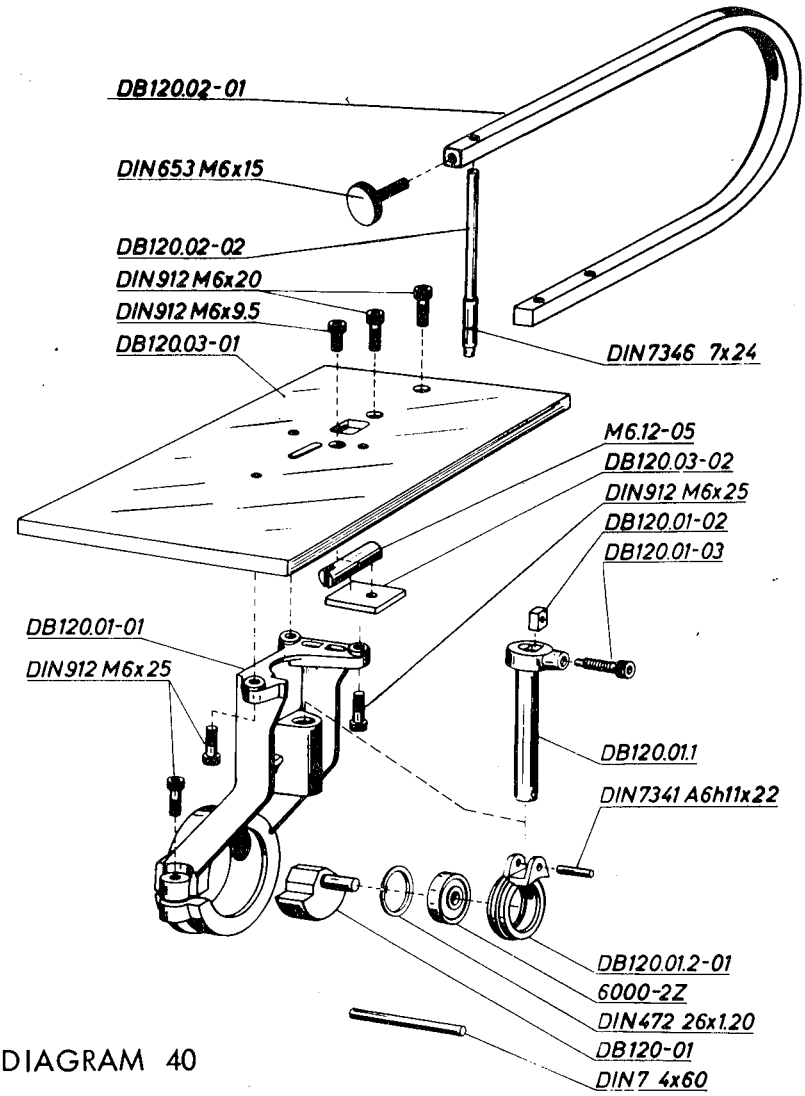


DIAGRAM 40

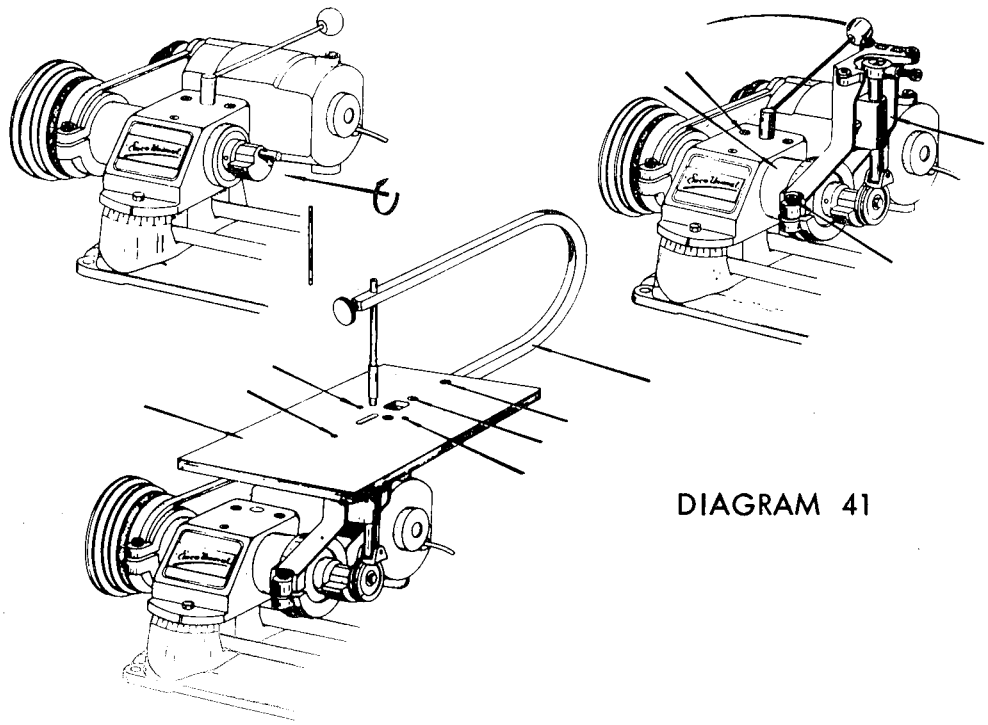


DIAGRAM 41

Fret and Sabre Saw. Order No. 1080:

A further ancillary attachment to the UNIMAT is the fret or sabre saw. With it all fret saw work in wood, metal and plastic can be carried out. Particular care should be taken that the fret saw blades supplied by us with it are not mixed up for the various materials. As despatch has to be effected in the dismantled state for the sake of convenience and ease of packing, the fret saw should be assembled in accordance with the following brief instructions. (See Diagram 40).

We supply the following parts:

1. Saw holder DB 120.01 with loosely fitted drive eccentric.
2. Saw bow DB 120.02 with saw blade holder, knurled screw and 2 screwed in socket head screws.
3. Saw table DB 120.03.
4. 3 socket head screws.
5. 1 cylindrical pin.
6. Assorted fret saw blades.

a) Screw out the two loosely screwed in socket head screws on the upper side of the saw bow, locate the saw bow underneath the table and fix it securely with the two socket head screws.

b) Locate the saw holder beneath the table and screw it on from underneath with the 3 socket head screws supplied. Care should be exercised that the saw blade holder (adjustably mounted on the saw bow), the brass guide (adjustably mounted on the underside of the table) and the clamping device (on the drawing column) are exactly in alignment.
Necessary corrections can be made by virtue of the play in the socket head screws, which secure the saw bow and saw holder to the table.

c) Tensioning of saw blade.
Thread the saw blade into the saw holder and clamp it securely in the drawing column (in clamping head), note direction of teeth ! With the saw holder adjust for thickness of wood to be cut. (Thread saw blade in from top !)

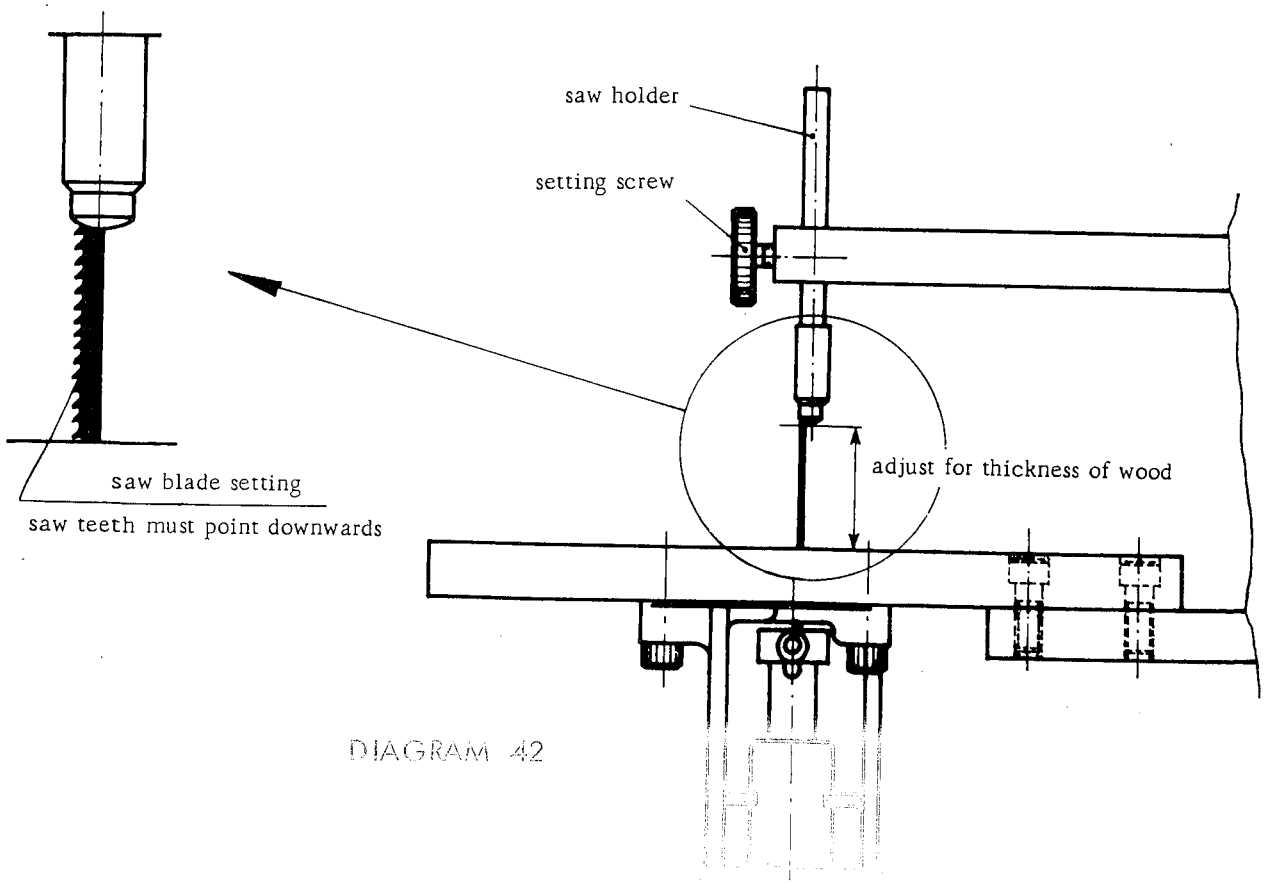


DIAGRAM 42

The assembling of the saw attachment on the UNIMAT should be carried out with the help of Diagram 41.
First of all scew the drive eccentric on to the spindle nose. For securing this firmly use the cylindrical pin supplied by us. The spindle sleeve is then slid up to the shoulder from the front, in the direction of the tailstock and the sleeve again firmly clamped. Next push up the fret saw and at the same time insert the eccentric stud (bolt) into the connecting rod.

The sabre saw:

The erection of the sabre saw is the same as the fret saw, except only for the saw bow, as the sabre saw blade is clamped in only at one end. The advantage of a sabre saw is that one can cut out the widest variety of shapes from any desired sheet size. Any desired sabre saw blades may be used.

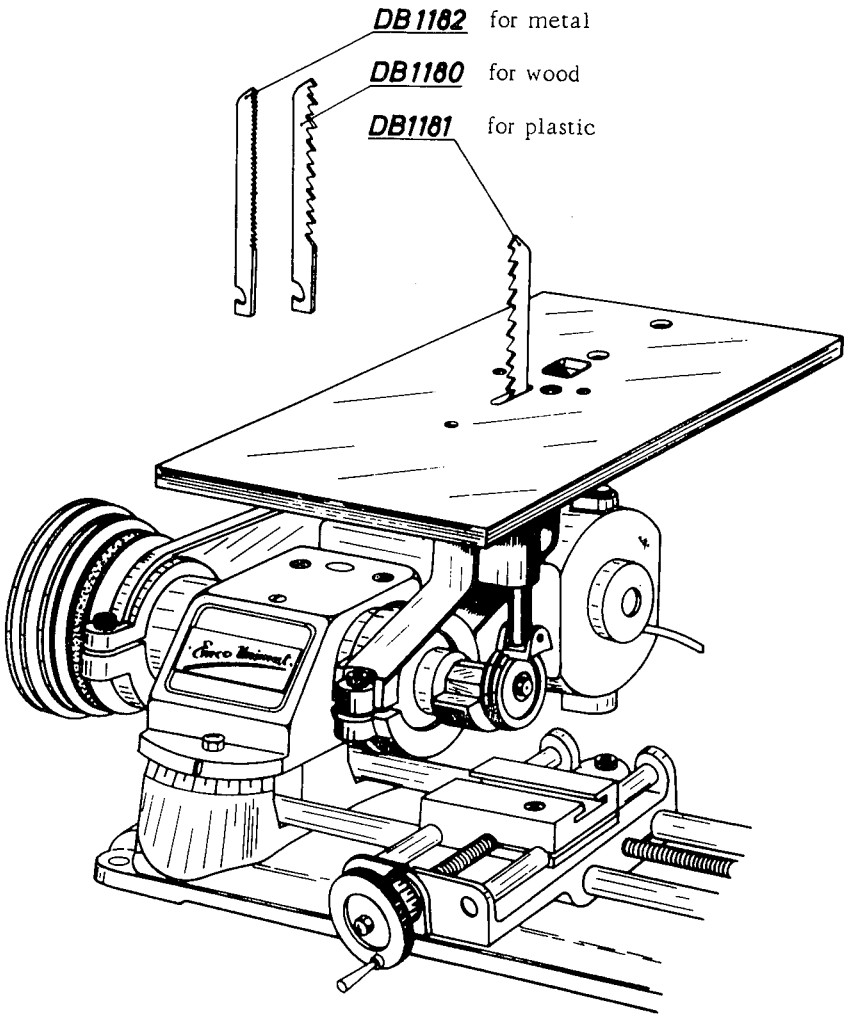


DIAGRAM 43

Circular Saw attachment. Order No. 1240 :

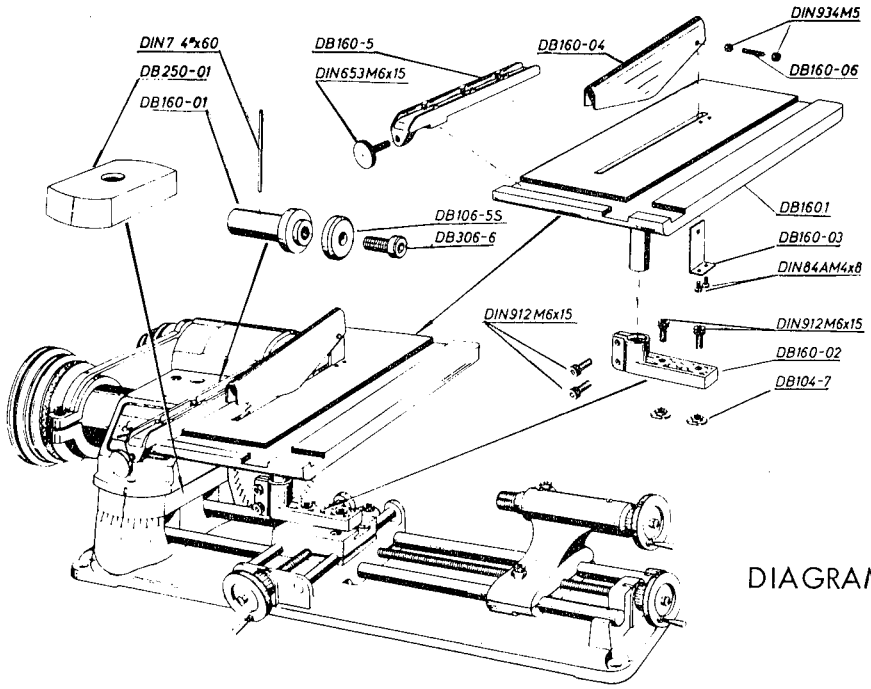


DIAGRAM 44

The circular saw attachment offers multiple application possibilities in all cutting and finishing work. According to the type of saw blade used, metal, wood or plastic can be worked. For circular sawing supplementary to the circular saw attachment the intermediate piece Order No. 1240 has to be used.

Fitting of the Saw Blade :

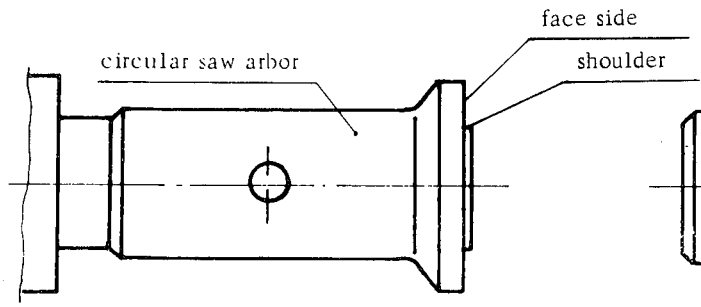


DIAGRAM 45

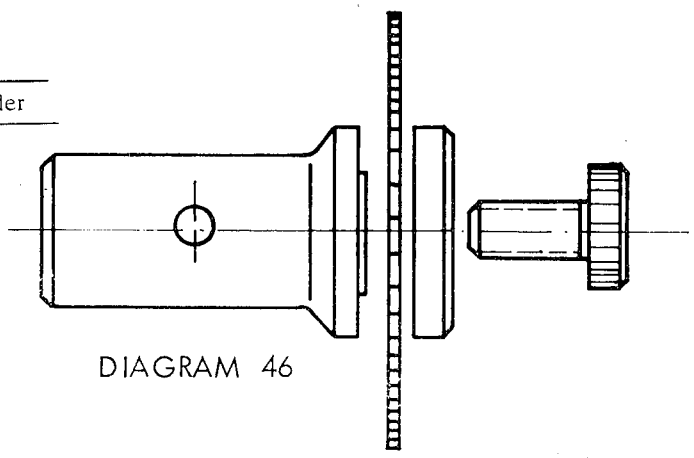


DIAGRAM 46

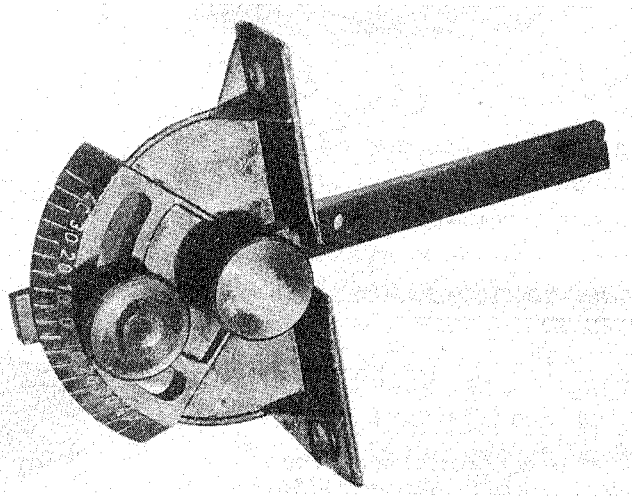
Carefully clean thread and contact surface of the lathe spindle, then securely fix circular saw arbor with the aid of the tensioning pin supplied. To ensure good concentric running, the circular saw blade must be fitted to its arbor. Set the headstock at normal for cylindrical turning. Speed 800 r.p.m. The circular saw blade must slide on easily, but without any play. Turn down fine shavings from the approx. 0.02" wide shoulder of the circular saw arbor (using point tool), until the saw blade with its 0.63" centre hole can be pushed on. Next turn off about 0.008" from the face of the circular saw arbor. Care must be taken that the transfer from the face surface to the outside turned shoulder is sharp edged. The circular saw blade must be fitted so that the teeth point in the direction of rotation.

Assembling the table:

Loosen the table on its holder, slide holder with T-nuts into groove of upper part of support and tighten up. Insert table with studs and clamp tightly so that saw blade comes to rest freely. Then fix both supports with the clamping screws. Take care that the riving knife is set exactly in alignment with the circular saw blade. Fit on the parallel stop and clamp securely to the desired width. When cutting, the workpiece which is moved forward by hand, is simultaneously pressed on to the table and against the stop. With 60 mm-blade nose of bracket DB 160-2 should look downwards, and with 90 mm-blade upwards.
Cutting is done at such a speed that the motor revolutions do not drop unduly. Exact, straight cuts can be achieved with the circular saw. By using the intermediate piece and the 3.543" (90 mm) blade a maximum cutting depth of 0.985" will be obtained.
For producing right-angled transverse cuts (square ended cuts) on short workpieces one employs the

Mitre gauge. Order No. 1241:

DIAGRAM 47



To achieve a right-angled cut on a workpiece, the mitre gauge should be used. In this work procedure the workpiece is fastened to the mitre gauge. See Diagrams 48/49. The mitre gauge can be swivelled on both sides through 45 degrees and is provided with a degree scale.

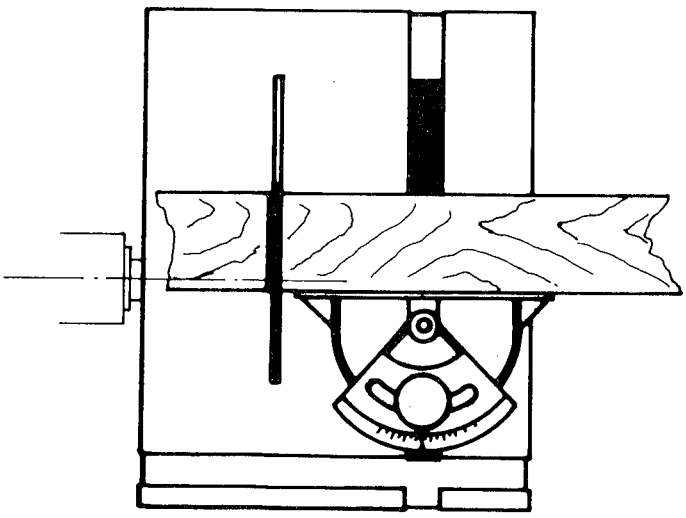


DIAGRAM 48

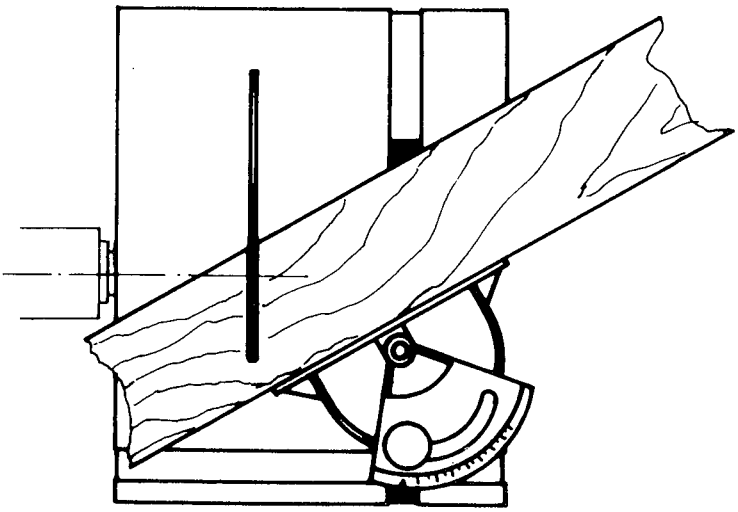
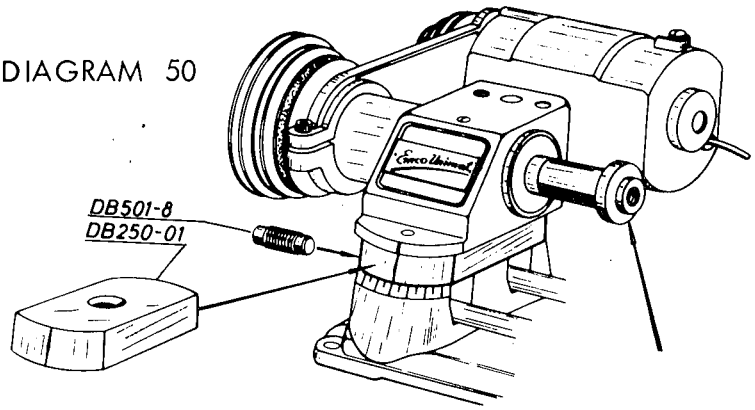


DIAGRAM 49

The best cutting outputs are achieved with the 3.543" diameter circular saw blade supplied by us at a speed of 1600 r.p.m. For this circular saw blade it is necessary to lift the head stock. An intermediate piece must be incorporated between headstock and bed.

Intermediate piece. Order No. 1311:

DIAGRAM 50



Handtool Rest, simple. Order No. 1201:
(Woodworking, turning)

After removing the tool holder the handtool rest is fitted in place of it in such a manner that the resting surface for the lathe cutter is parallel with the lathe axis and located as near to the workpiece as possible.
Those homeworkers and modelmakers, who carry out frequent lathe work are recommended to use the swivable handtool rest, Order No. 1201 a.

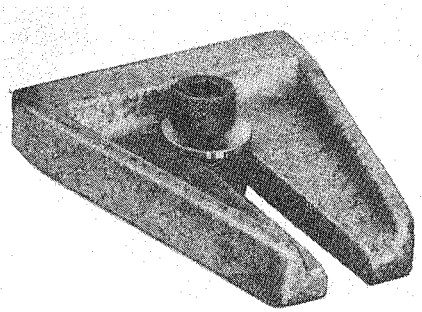


DIAGRAM 51

Sanding Plate. Order No. 1330:

Assembly is similar to that of the circular saw, only instead of the circular saw arbor the sanding plate with sandpaper glued thereon is screwed on to the lathe spindle. The circular saw table is set at its lowest position and together with the support pushed on to the sanding plate. For angle grinding the mitre gauge can be used with reverse installed guide gib on the circular saw table. Self-adhesive grinding sheets can also be employed.

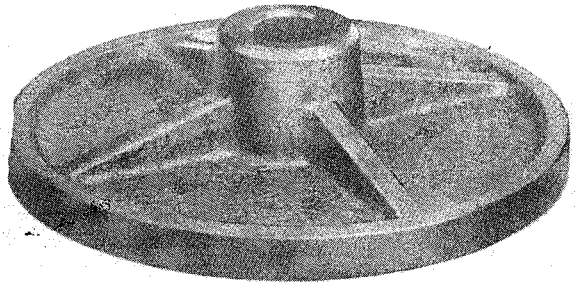


DIAGRAM 52

Rubber Plate. Order No. 1165:

Used in the same way as the sanding plate for sanding work on shaped parts. With a lambswool covering the rubber plate is suitable for the most diverse polishing jobs. The rubber plate can be used with advantage on the hand spindle of the flexible shaft.

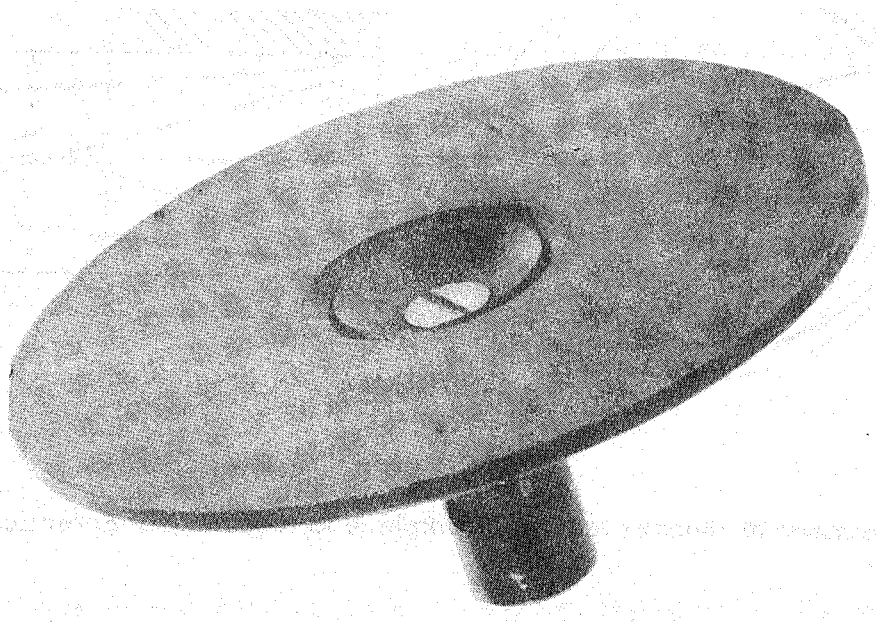


DIAGRAM 53

Care of UNIMAT:

The tools (drills, lathe cutters and millers) should be lubricated. When machining metals use for the lubricant ordinary machine oil (iron and steel), for wood-soap, for aluminium and brass - mineral oil or turpentine. When working on castings no lubricant is used.

When the work is finished first of all remove all shavings and then oil all the plain iron parts by means of a brush or rag, using a good machine oil. Moving parts such as a tailstock and headstock sleeve should be turned out for this purpose.
Take pains to see that the machine looks like new again after working. It will give you a greater amount of pleasure, apart from which a well cared for machine will last longer and retain its original precision. After about 1,000 working hours the two ball-bearing races in the headstock should be regreased. To do this the belt pulley on the headstock spindle is loosened, the pulley unscrewed, then withdrawing the whole lathe spindle.
After cleaning the bearings with petrol regrease them with ball-bearing grease and reassemble spindle sleeve.

CHECKING A WORKPIECE FOR DIMENSIONAL ACCURACY

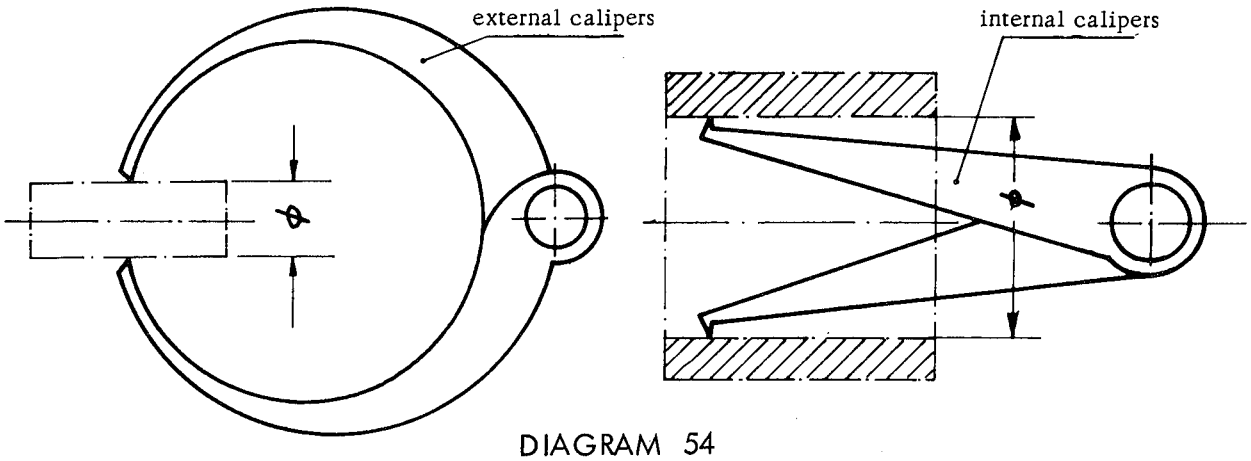


DIAGRAM 54

One of the most common methods of testing a workpiece for accuracy of dimensions is to use the sliding calipers.

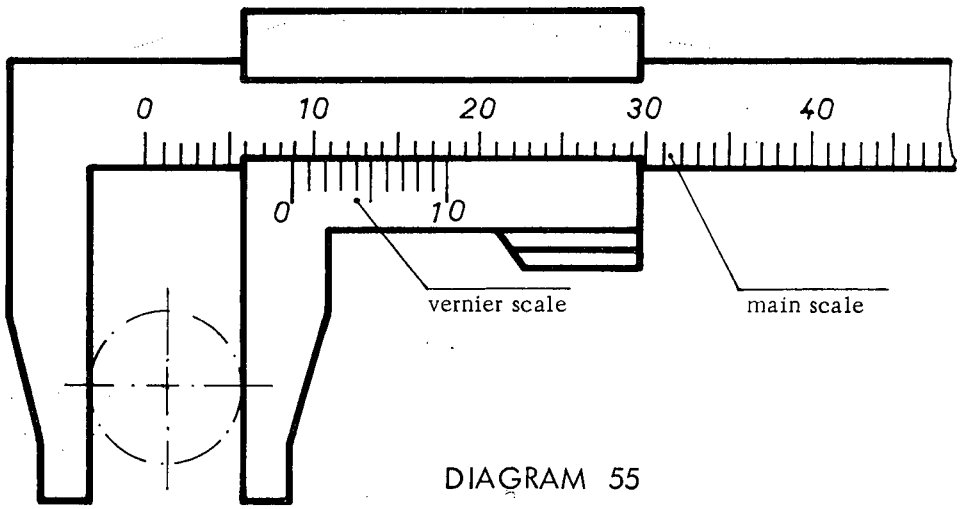


DIAGRAM 55

We will give you an example, based on the above drawing.
The full millimetres may be read off the main scale. The vernier scale division mark which coincides with a main scale division mark gives the answer to one-tenth of a millimeter.
For example the O mark of the vernier scale in the above sketch shows between 8 and 9 on the main scale. This signifies 8 whole millimeters. The 9th division mark on the vernier scale tallies with a division mark on the main scale, and this signifies 9/10th mm. The diameter of the workpiece is thus 8.9 mm.

WORKING SPEEDS

Motor speed (Rated Output) 4000 r.p.m.

Material	up to 3/8"	3/8 - 3/4"	3/4" - 1 1/8"	1 1/8" up
TURNING				
Steel	1100(10)*	850(7)	685(2)	365(1)
Fancy metals	2000(11)	1600(8)	1100(10)	685(2)
Wood, Plastic	generally 1600(8)			
THREAD CUTTING				
All types of materials	generally 300(13)			
FRET or SABRE SAWING				
Steel	generally 365(1)			
Fancy metal	generally 685(2)			
Wood, Plastic	generally 850(3)			
CIRCULAR SAWING				
Steel	generally 365(1)			
Fancy metal	generally 685 (2)			
Wood, Plastic	generally 1600(8)			

* the figures in brackets relate to the corresponding numbered belt settings (Page 38)

MILLING	Speed	Belt Setting
Shank milling up to 5/32" dia.	1100	10
up to 3/8" dia.	850	9
up to 3/4" dia.	685	2
Metal circular saw blades from 1 1/2" dia.	365	1
DRILLING OF STEEL		
for fancy metal approx. double		
up to 1/8" dia. drill	1600	8
1/8 - 5/32" dia. drill	1100	10
5/32-3/16" dia. drill	850	9
3/16-1/4" dia. drill	365	1
GRINDING		
Grinding wheel 2.362" dia. for tool grinding		
Coarse grinding	2000	11
Fine grinding	2600	7
Cup grinding wheel	2600	7
Grinding pins 3/8" dia.	3750	5
Smaller grinding pin	6000	4
GRINDING WITH EMERY		
Cup wheel as required		

BELT SETTING AND SPEEDS

These speeds apply when the load is in proportion to the rated output of the motor. Because of the main (series) characteristics of the motor the speeds increase with the machine running at no load and derease with heavier loading. The speeds given in the tabulation are mean (average) values.

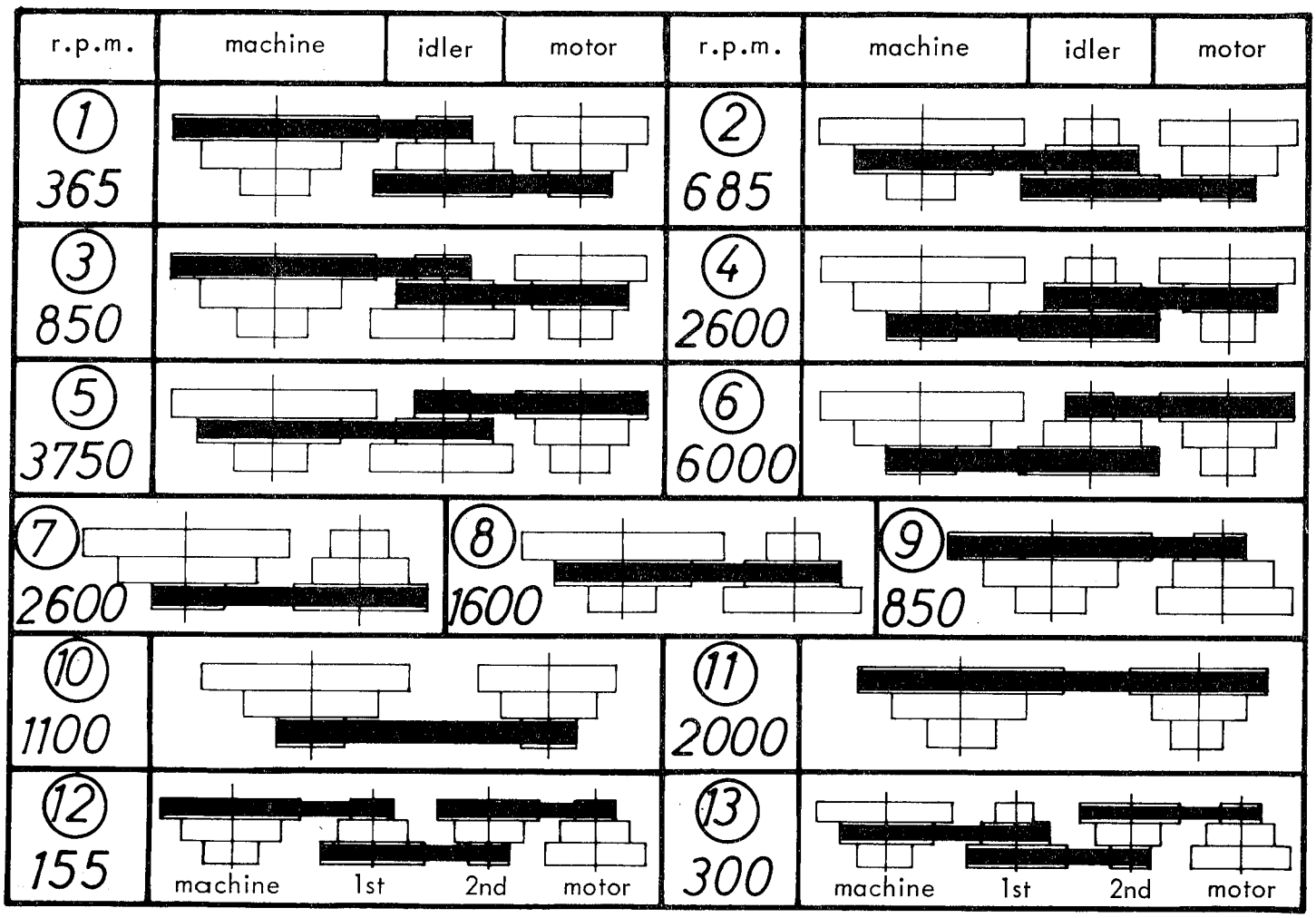


DIAGRAM 56

On the basis of an example we will show you how to calculate a working speed.

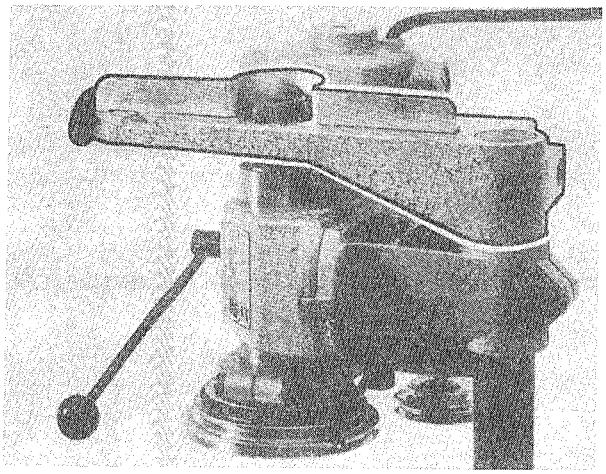
We require two values :
1.) Material (Aluminium, brass, steel, cast metal, etc.)
2.) Thickness of material (diameter) or thickness of workpiece

For our example we will use a brass rod of 19/32" diameter.

Under "TURNING OF FANCY METAL" and "MATERIAL THICKNESS OF 15mm"(0.591") a speed (number of revolutions) of 1600 r.p.m. is given in the tabulation. With the second figure, in this case an 8, we look up in the speed tabulation the necessary belt setting and with the help of the Diagram we thus set the speed on the machine.

THE MOULDING SPINDLE

Order No.1060 This accessory permits the machining of timber picture frame and other types of moulding.



MOUNTING THE MOULDING SPINDLE

1) Remove headstock from bed.
2) Fix vertical column with clamping head with clamping head screw facing towards the bed.
3) Mount headstock complete with motor (spindle nose facing upwards).
4) Screw cutter to spindle nose.
5) Mount moulding table on vertical column; note that:
   a) the table is flush with the column end face,
   b) that the cutter is central with the hole.
6) The moulding depth is adjusted by movement of the headstock quill and the moulding width by adjusting the fence.

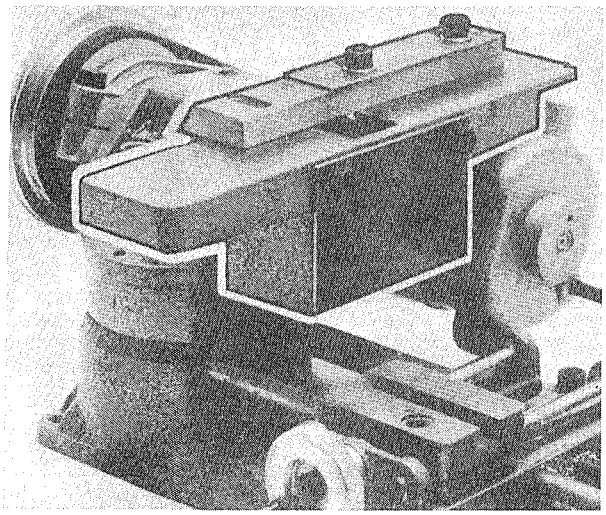
The depth of cut and the feed depend on the timber being machined.

TECHNICAL DATA

Table size 7 7/8" x 3 1/8", cutter diameter 1.10", recommended speed 2600 R.P.M. Belt position 11.

THE PLANING ATTACHMENT

Order No.1050 This accessory permits the planing of timber up to 1" wide.



MOUNTING THE PLANING ATTACHMENT

1) Fit headstock to bed with packing block interposed.
2) Swing motor with mounting arm downwards and tighten.
3) Remove guard plate (2 socket head screws M 6 x 20).
4) Place cutter on spindle nose and screw into position by rotating the spindle pulley.
5) Replace guard plate.

IMPORTANT !

Never operate without the guard plate !

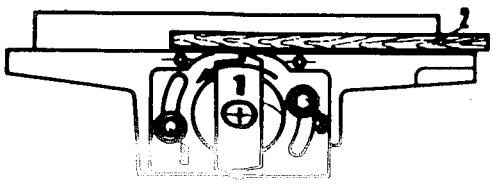
TECHNICAL DATA

Table size 7 7/8" x 2", blade width 1.1/16", depth of cut 0.020", blade envelope 2.1/16" diameter, recommend speed 2600 R.P.M., belt position 11.

ADJUSTING THE DEPTH OF CUT

When the cutter has to be sharpened after extensive use, it is necessary to adjust the planer body to the new cutter envelope (the cutter can be re-ground to an envelope of 1.31/32" dia.)

The adjustment is carried out as follows:



1) Fit cutter to spindle as described above (Item 1)
2) Loosen body retaining screws (2 off M 6 x 10) (Item 3)
3) Place a planed piece of timber on the table (Item 2).
4) Turn complete body in a clockwise direction, until the blade contacts the timber.
5) Lock body in this position (screws item 3).
6) Re-fit guard plate.

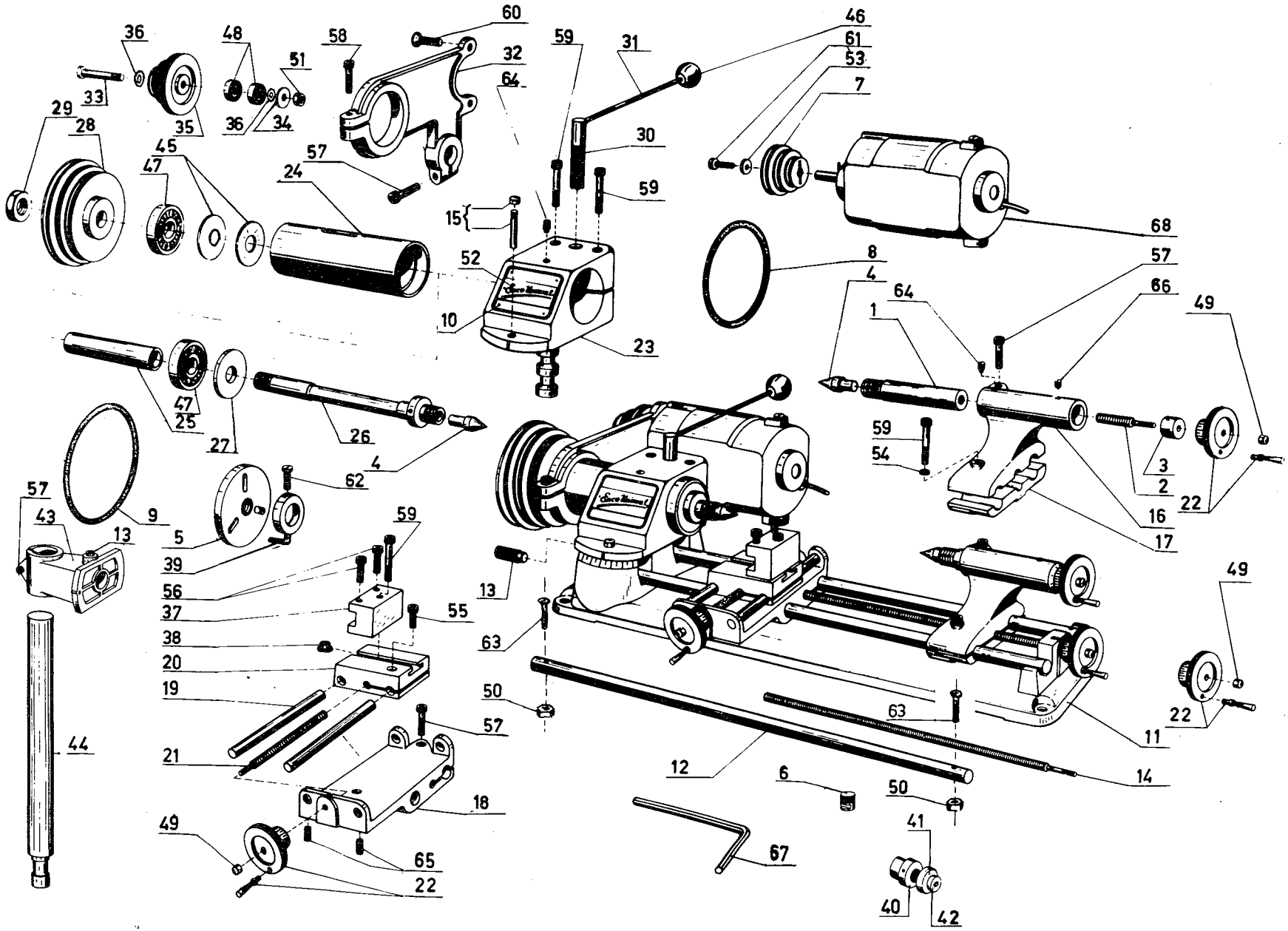
ERSATZTEILLISTE

*

SPARE PARTS LIST

*

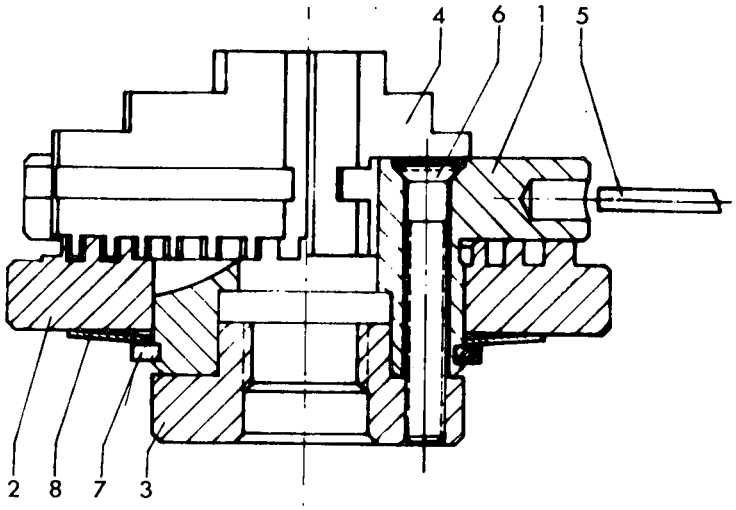
LISTE PIÈCES DE RECHANGE


60
36
48
58
59
46
61
53
31
32
64
7
51
33
35
36
34
29
28
45
47
57
24
30
59
68
15
52
8
4
10
23
57
66
64
1
49
47
25
27
26
4
62
59
54
3
2
22
16
17
57
43
13
9
5
39
56
37
38
20
19
55
59
63
50
57
21
18
49
65
22
44
12
6
50
41
67
40
42
49
22
11
14
63

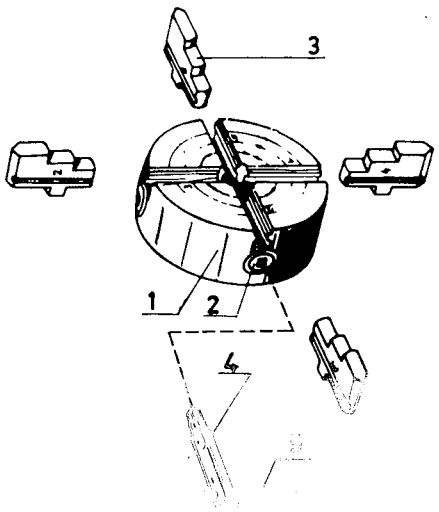
			EMCO Unimat „SL“	EMCO Unimat „SL“	EMCO Unimat SL“
Pos.			BENENNUNG	DESCRIPTION	DÉSIGNATION
1	A2A 000 010		Reitstockpinole	Tailstock ram	Fourreau de contre pointe
2	A2A 000 020		Triebschraube	Lead screw	Vis de commande
3	A2A 000 030		Führungspfropfen	Guide pin	Canon
4	A2A 000 040		Spitze	Center	Pointe
5	A2A 000 051		Planscheibe	Face plate	Plateau de tour
6	A2A 000 060		Nutschraube	Nut-screw	Boulou tête carrêe
7	A2A 000 070		Riemenscheibe Motor	Pulley	Poulie
8	A2A 000 080		Gummiring	Rubber belt	Courroie caoutchouc
9	A2A 000 090		Gummiring	Rubber belt	Courroie cautchouc
10	A2A 000 100		Firmenschild	Name plate	Plaquette nominale
	A2A 000 110		Firmenschild USA	Name plate USA	Plaquette nominale USA
11	A2A 010 010		Bett	Bed	Banc
12	A2A 010 020		Führungssäule	Guide column	Barre de guidage
13	A2A 010 030		Spannschraube	Tension screw	Vis 6pans creux
14	A2A 010 040		Längsspindel	Threaded spindle	Vis fileteé du transv.
15	A2A 010 050		Absteckstift	Marker pin	Goupille de centrage
16	A2A 400 000		Reitstock	Tailstock housing	Contre pointe une
17	A2A 010 070		Klemmplatte	Clamping plate	Plaque de serrage
18	A2A 020 010		Support	Support	Chariot
19	A2A 020 020		Führungssäule	Guide column	Barre de guidage
20	A2A 020 030		Laufstück	Carriage	Coulisse trans
21	A2A 020 040		Gewindespindel	Threaded spindle	Vis filetée du transv.
22	A2A 020 050		Handrad	Hand wheel	Volant
23	A2A 030 000		Spindelstock	Headstock	Poupée fixe
24	A2A 040 010		Pinole Spindelstock	Spindle head sleeve	Canon de poupée fixe
25	A2A 040 020		Distanzbüchse	Distance bush	Douille entre tiase
26	A2A 040 030		Hauptspindel	Main spindle	Broche principale
27	A2A 040 040		Spindelscheibe	Spindle wheel	Rondelle de la broche
28	A2A 040 050		Riemenscheibe Spindel	Belt pulley for spindle	Poulie de la broche
29	A2A 040 060		Mutter	Nut	Ecrou
30	A2A 050 010		Ritzel	Pinion	Pignon de cremaillére
31	A2A 050 020		Knebel lang	Long locking handle	Poignée de command
32	A2A 060 010		Motorhalter	Motor bracket	Support du moteur
33	A2A 060 020		Lagerbolzen	Bearing bolts	Tourillon du palier du renvoi
34	A2A 060 030		Abdeckscheibe	Cover disc	Rondelle
35	A2A 060 040		Riemenscheibe Vorgelege	Idler Pulley	Poulie de renvoi
36	A2A 060 050		Scheibe	Washer	Rondelle
37	A2A 070 010		Stahlhalter	Tool holder	Porte outil
38	A2A 070 020		Nutenstein	T-nut	Boulon dissiere
39	A2A 080 010		Drehherz	Lathe dog	Toc de tour
40	A2A 090 010		Schleifflansch	Grinding wheel adaptor	Porte-meule
41	A2A 090 020		Gegenscheibe	Retaining ring	Contre-flasque
42	A2A 090 030		Schraube	Screw	Vis 6 pans creux
43	A2A 100 010		Klemmkopf	Headstock adaptor coating	Support vertical de poupée
44	A2A 100 020		Vertikalsäule	Vertical column	Colonne verticale
45	ZFD 94 2971		Tellerfeder	Disc spring	Rondelle assiette
46	ZGF 19 2005		Preßstoffkugel	Plastic ball	Boule en plastique
47	ZLG 00 1300		Kugellager	Ball bearing	Roulement à billes
48	ZLG 06 2600		Kugellager	Ball bearing	Roulement à billes
49	ZM... 01 0500		Hutmutter	Domed nut	Ecrou chapeau
50	ZM... 04 0400		Mutter	Nut	Ecrou
51	ZM... 01 0500		Mutter	Nut	Ecrou

52	ZNA	76 0144	Kerbnagel	Rivet	Rivet
53	ZSB	25 0430	Beilagscheibe	Washer	Rondelle
54	ZSB	25 0640	Beilagscheibe	Washer	Rondelle
55	ZSR	12 0612	Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
56	ZSR	12 0616	Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
57	ZSR	12 0620	Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
58	ZSR	12 0625	Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
59	ZSR	12 0630	Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
60	ZSR	63 0515	Senkschraube	Countersunk screw	Vis tête fraisée
61	ZSR	84 0408	Zylinderschraube	Cheese head screw	Vis tête cylindrique
62	ZSR	84 0525	Zylinderschraube	Cheese head screw	Vis tête cylindrique
63	ZSR	91 0525	Linsenkopfschraube	Flat head screw	Boulon tête „goutte de suif"
64	ZST	17 0608	Gewindestift mit Zapfen	Dog point grub screw	Vis à ergot
65	ZST	53 0410	Gewindestift mit Spitze	Cone point grub screw	Vis pointeau
66	ZST	53 0606	Gewindestift mit Spitze	Cone point grub screw	Vis pointeau
67	ZWZ	11 0500	Innensechskantschlüssel	Allen key	Clé coudée 6 pans
68			Motor Typ U 100	Motor type U 100	Moteur type U 100

	A2Z 410		**Drelbackenfutter**	**3-Jaw Chuck**	**Mandrin 3 mors concentriques**
Pos.			BENENNUNG	DESCRIPTION	DÉSIGNATION
1	A2Z 410 O10		Gehäuse	Body	Corps
2	A2Z 410 O20		Planspirale	Scroll	Spirale
3	A2Z 410 O30		Flansch	Flange	Flasque
4	A2Z 410 O40		Backen (1 Satz: 3 Stk.)	Jaws 1 set of 3	Mors (1 jeu 3)
5	A2Z 410 O50		Zylinderstift	Dowel pin	Tige de serrage
6	ZSR 63 0425		Senkschraube	Countersunk screw	Vis tête fraisée
7	ZRG 71 3015		Seegering	Snap ring	Circlip
8	ZFD 94 4653		Tellerfeder	Disc spring	Rondelle assiette

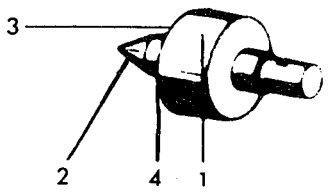


	A2Z 420		**4-Backenfutter**	**Independent chuck**	**Mandrin 4 mors indépendants**
Pos.			BENENNUNG	DESCRIPTION	DÉSIGNATION
1	A2Z 420 O10		Gehäuse	Body	Corps
2	A2Z 420 O20		Spannschraube	Adjusting screw	Vis de commande des mors
3	A2Z 420 O30		Backen (1 Satz: 4 Stk.)	Jaws 1 set of 4	Mors (1 jeu 4)
4	A2Z 420 O40		Schlüssel	Key	Clé
5	ZST 75 0460		Knebel	Key handle	Poignée

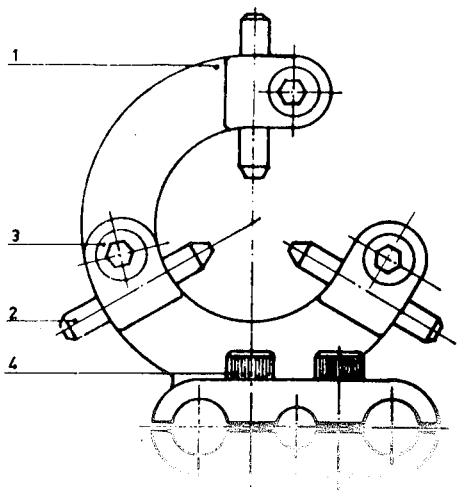


	A2Z 260		**Rollkörner einfach**	**Live center, single**	**Pointe tournante simple**
Pos.			BENENNUNG	DESCRIPTION	DÉSIGNATION
1	A2Z 260 010		Körper	Body	Corps
2	A2Z 260 020		Spitze	Point	Pointe
3	A2Z 260 030		Deckel	Cover	Chapeau
4	ZLG 06 2600		Kugellager	Ball bearing	Roulement à billes

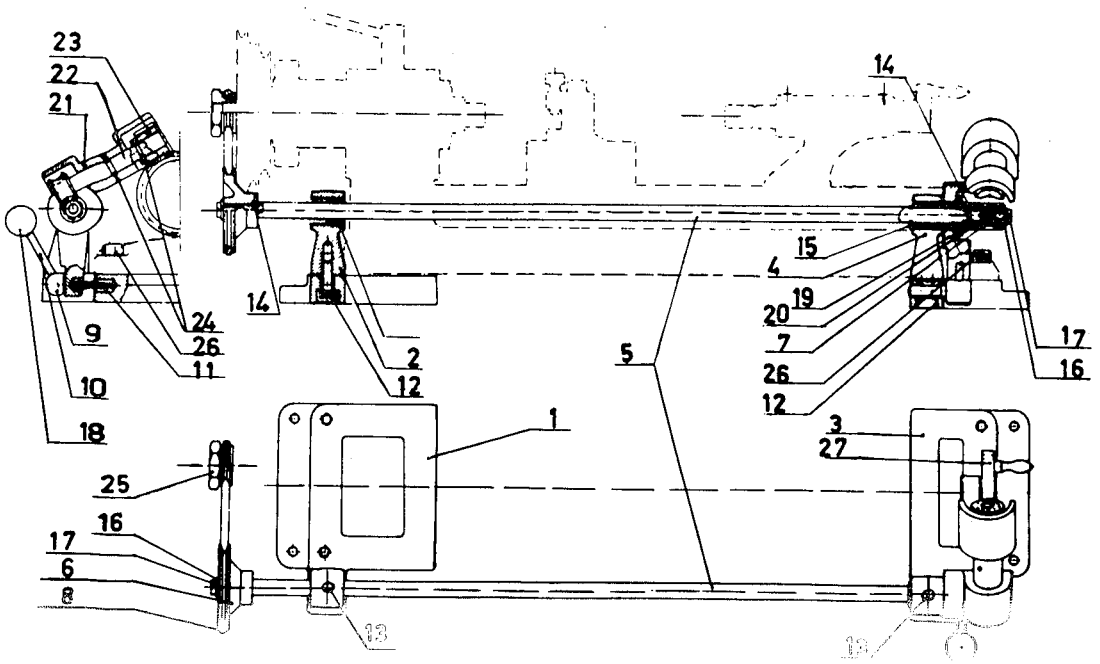
	A2Z 270		**Rollkörner doppelt**	**Live center, double**	**Pointe tournante double**
Pos.			BENENNUNG	DESCRIPTION	DÉSIGNATION
1	A2Z 270 010		Körper	Body	Corps
2	A2Z 270 020		Spitze	Point	Pointe
3	A2Z 270 030		Deckel	Cover	Chapeau
4	ZLG 06 2600		Kugellager	Ball bearing	Roulement à billes



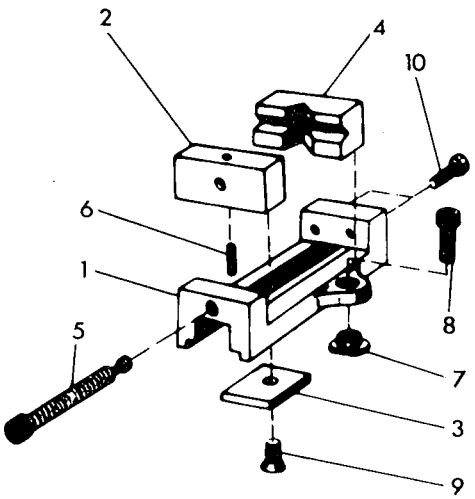
	A2Z 240		**Lünette komplett**	**Steady assy.**	**Lunette complète**
Pos.			BENENNUNG	DESCRIPTION	DÉSIGNATION
1	A2Z 240 010		Lünette	Steady	Lunette
2	A2Z 240 020		Gleitstift	Slide pin	Touche réglable
3	ZSR 12 0612		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
4	ZSR 12 0620		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux



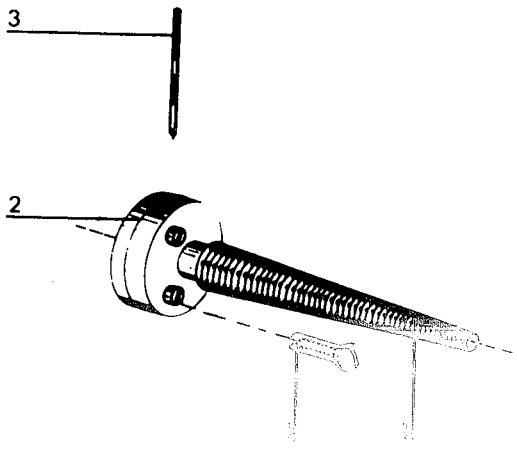
	A2Z 300		**Vorschubgetriebe**	**Power feed attachment**	**Mechanisme d'avance automatique**
Pos.			BENENNUNG	DESCRIPTION	DÉSIGNATION
1	A2Z 300 010		Bodenplatte links	Baseplate left	Plaque d'assise gauche
2	A2Z 300 020		Lagerbock links	Bearing block left	Support de palier gauche
3	A2Z 300 030		Bodenplatte rechts	Baseplate right	Plaque d'assise droite
4	A2Z 300 040		Lagerbock rechts	Bearing block right	Support de palier droite
5	A2Z 300 050		Welle	Shaft	Arbre
6	A2Z 300 060		Riemenscheibe	Belt pulley	Poulie à gorge
7	A2Z 300 070		Schnecke	Worm	Vis sans fin
8	A2A 000 090		Gummiring	Rubber ring	Courroie caoutchouc
9	A2Z 300 090		Hebelbolzen	Lifting stud	Excentrique
10	A2Z 300 100		Hebel	Lever	Levier
11	A2Z 300 110		Druckfeder	Compression spring	Ressort de pression
12	ZSR 12 0616		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
13	ZNP 01 1000		Schmiernippel	Grease nipple	Graisseur
14	ZST 06 0159		Zylinderstift	Dowel pin	Goupille
15	ZRG 71 0808		Seegering	Seeger ring	Circlip
16	ZSB 25 0430		Beilagscheibe	Shim	Rondelle plate
17	ZSR 84 0408		Zylinderschraube	Cheese head screw	Vis 6 pans creux
18	ZGF 19 1604		Kugelknopf	Ball knob	Bouton
19	ZFD 94 2301		Tellerfeder	Disc spring	Rondelle assiette
20	ZRG 71 1410		Seegering	Seeger ring	Circlip
21	A2Z 300 120		Schwenkteil	Swinging section	Pièce pivotante
22	A2Z 300 130		Schneckenradwelle	Worm shaft	Arbre de la vis sans fin
23	A2Z 300 140		Schraubenrad	Worm gear	Roue hélicoidale
24	ZHL 81 0214		Spannhülse	Tension pin	Goupille fendue
25	A2Z 300 080		Mutter	Nut	Ecrou poulie
26	ZSR 12 0620		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
27	A2Z 302 000		Gruppe Handrad	Spezial feed handwheel	Volant de vis-mère complet



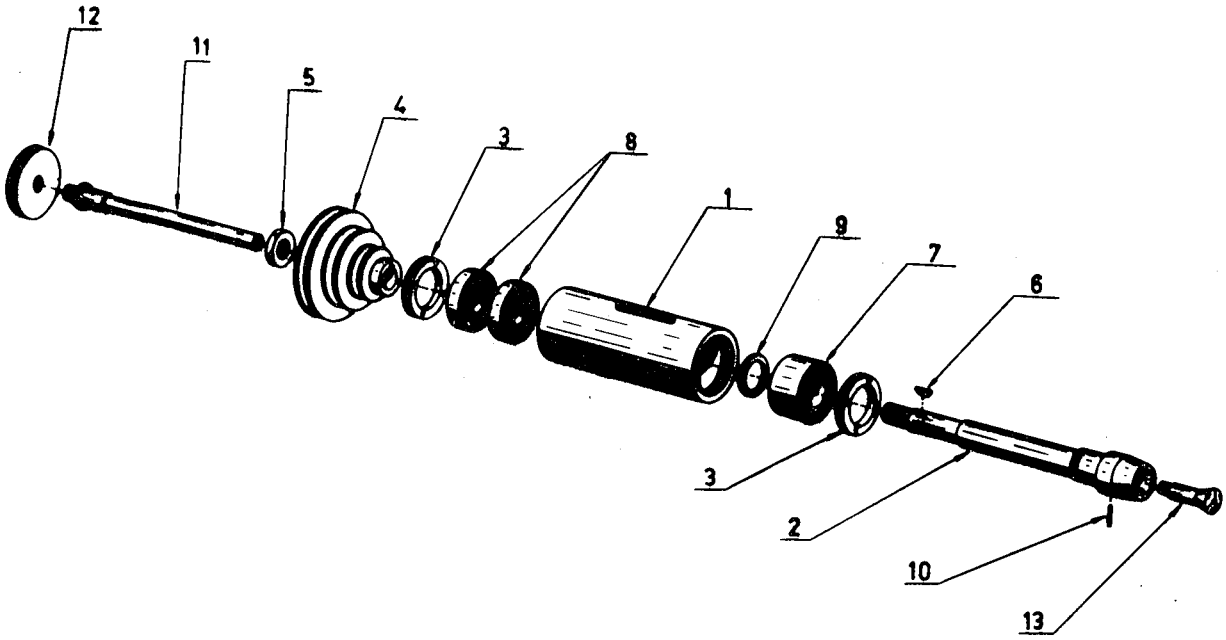
	A2Z 310		**Schraubstock**	**Vice**	**Etau-machine**
Pos.			BENENNUNG	DESCRIPTION	DÉSIGNATION
1	A2Z 310 010		Körper	Body	Corps
2	A2Z 310 020		Backe	Moving jaw	Mors mobile
3	A2Z 310 030		Plättchen	Small plate	Plaquette
4	A2Z 310 041		Prisma	Fixed jaw	Mors fixe
5	A2Z 310 050		Spindel	Operating screw	Broche
6	ZST 06 0220		Zylinderstift	Dowel pin	Goupille
7	A2A 070 020		Nutenstein	T-nut	Ecrou en T
8	ZSR 12 0610		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
9	ZSR 63 0508		Senkschraube	Countersunk screw	Vis tête fraisée
10	ZSR 84 0410		Zylinderschraube	Cheese head screw	Vis tête cylindrique



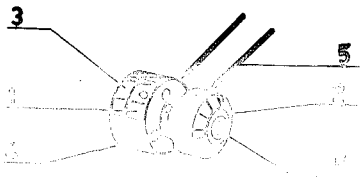
	A2Z 370		**Dentistenspindel kompl.**	**Conical spindle assy.**	**Broche „Queue de rat“**
Pos.			BENENNUNG	DESCRIPTION	DESIGNATION
1	A2Z 370 010		Dentistenspindel	Conical spindle	Broche
2	A2Z 410 030		Flansch	Flange	Flasque
3	A2Z 410 050		Zylinderstift	Dowel pin	Tige de blocage
4	ZSR 84 0416		Zylinderschraube	Slotted screw	Vis tête cylindrique



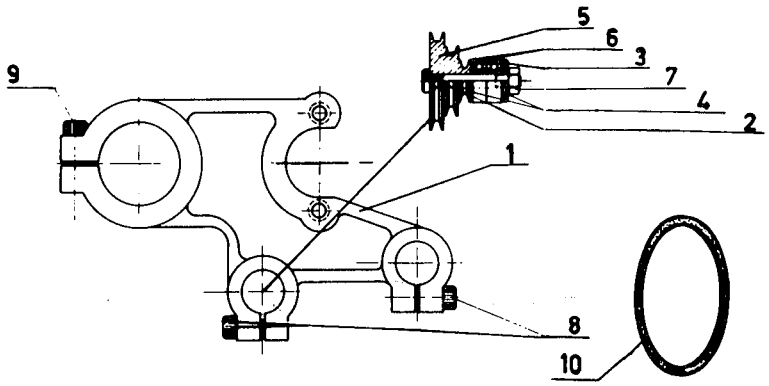
	A2Z 280		**Spannzangenpinole**	**Watchmaker spindle**	**Broche horlogère**
Pos.			BENENNUNG	DESCRIPTION	DÉSIGNATION
1	A2Z 280 010		Spannzangenpinole	Spindle sleeve	Fourreau de la broche
2	A2Z 280 020		Spindel	Spindle	Broche
3	A2Z 280 030		Verschraubung	Screw	Bague filetée
4	A2Z 280 040		Riemenscheibe	Belt pulley	Poulie à gorges
5	A2A 040 060		Mutter	Nut	Ecrou
6	ZFD 88 0226		Scheibenfeder	Circlip	Clavette ½ Lune
7	ZLG 80 4903		Nadellager	Needle bearing	Roulement à aiguilles
8	ZLG 00 1307		Kugellager	Ball bearing	Roulement à billes
9	ZRG 21 0170		Sprengring	Spring ring	Rondelle grower
10	ZST 06 0156		Zylinderstift	Dowel pin	Goupille
11	A2Z 280 050		Zugrohr	Draw bar	Tire-pince
12	A2Z 280 060		Spannrad	Tension wheel	Bouton moleté de serrage
13			Spannzange	Collet	Pince de serrage



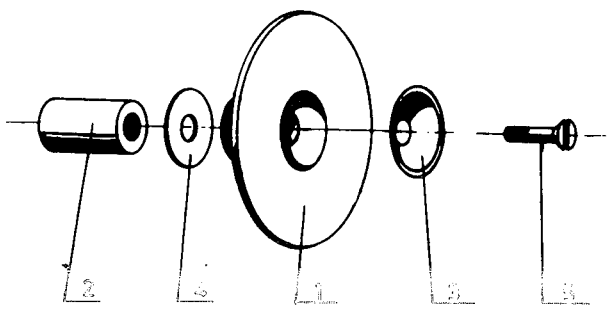
	A2Z 290		**Spannzangenhalter**	**Collet attachment**	**Porte-pince complet**
Pos.			BENENNUNG	DESCRIPTION	DÉSIGNATION
1	A2Z 290 010		Aufnahme	Holder	Porte-pince
2	A2Z 290 020		Spannmutter	Locking ring	Bague de serrage
3	A2Z 290 030		Flansch	Flange	Flasque
4	ZSR 63 0420		Senkschraube	Countersunk screw	Vis tête fraisée
5	A2Z 410 050		Zylinderstift	Dowel pin	Tige de serrage
6			Spannzange	Collet	Pince de serrage



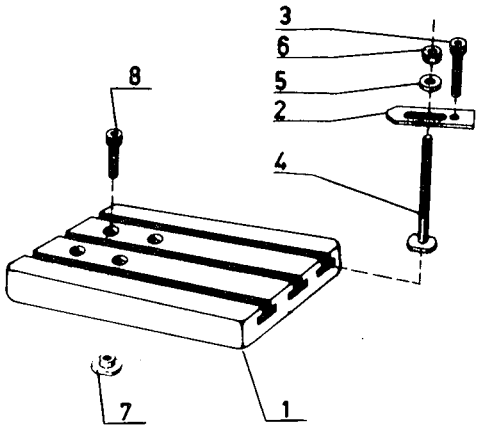
	A2Z 340		**Sondervorgelege**	**Slow speed motor bracket**	**Support moteur reducteur de vitesse**
Pos.			BENENNUNG	DESCRIPTION	DÉSIGNATION
1	A2Z 340 010		Doppelvorgelege	Motor bracket	Support du moteur
2	A2A 060 020		Lagerbolzen	Bearing bolt	Boulon-Axe du moteur
3	A2A 060 030		Abdeckscheibe	Cover plate	Rondelle plate
4	A2A 060 050		Beilagscheibe	Washer	Rondelle plate
5	A2A 060 040		Riemenscheibe Vorgel.	Belt pulley Intermed. Gear	Poulie de réduction de vitesse
6	ZLG 06 2600		Kugellager	Ball-bearing	Roulement à billes
7	ZMU 34 0600		Mutter	Nut	Ecrou
8	ZSR 12 0620		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
9	ZSR 12 0625		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
10	A2A 000 080		Gummiring	Rubber ring	Courroie caoutchouc



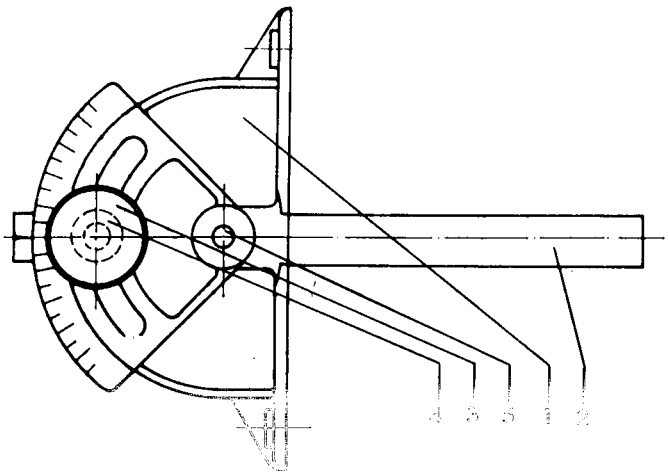
	A2Z 400		**Gummiteller kompl.**	**Rubber sanding disc assy.**	**Disque de poncage caoutchouc complet**
Pos.			BEZEICHNUNG	DESCRIPTION	DÉSIGNATION
1	A2Z 400 010		Gummiteller	Rubber disc	Disque caoutchouc
2	A2Z 400 020		Dorn	Arbor	Broche
3	A2Z 400 030		Topfscheibe	Cup washer	Rondelle assiette
4	A2Z 400 040		Scheibe	Washer	Rondelle plate
5	ZSR 63 0620		Senkschraube	Countersunk screw	Vis tête fraisée



	A2Z 350		**Frästisch**	**Milling table assy.**	**Table de fraisage complete**
Pos.			BENENNUNG	DESCRIPTION	DÉSIGNATION
1	A2Z 350 010		Frästisch	Milling table	Table de fraisage
2	A2Z 351 010		Spanneisen	Clamping claws	Bride
3	ZSR 12 0620		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
4	A2Z 352 010		Spannschraube	Clamping screw	Boulon en T
5	ZSB 25 0640		Beilagscheibe	Shim	Rondelle plate
6	ZMU 34 0600		Sechskantmutter	Hexagon nut	Ecrou à 6 pans
7	A2A 070 020		Nutenstein	Hexagon nut	Ecrou en T
8	ZSR 12 0612		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux



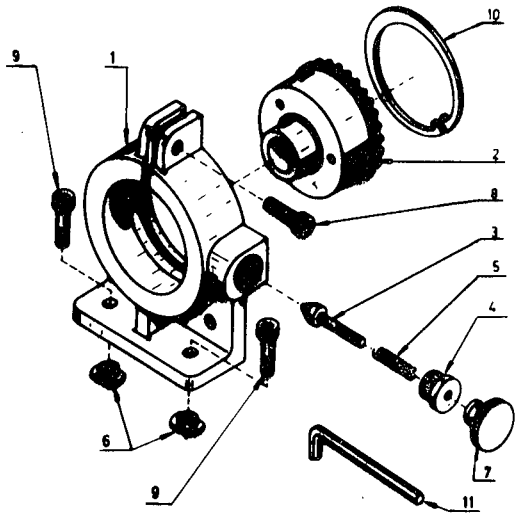
	A2Z 990		**Gehrungslineal kompl.**	**Mitre Gauge assy.**	**Guide d'onglet complét**
Pos.			BENENNUNG	DESCRIPTION	DÉSIGNATION
1	A2Z 990 010		Gehrungskopf	Mitre gauge	Guide d'onglet
2	A2Z 990 020		Lineal	Gauge	Règle
3	A2Z 990 030		Hohe Rändelschraube	High knurled screw	Bouton moletée
4	ZSB 25 0640		Scheibe	Plate	Rondelle
5	ZST 72 0516		Stift	Pin	Goupille



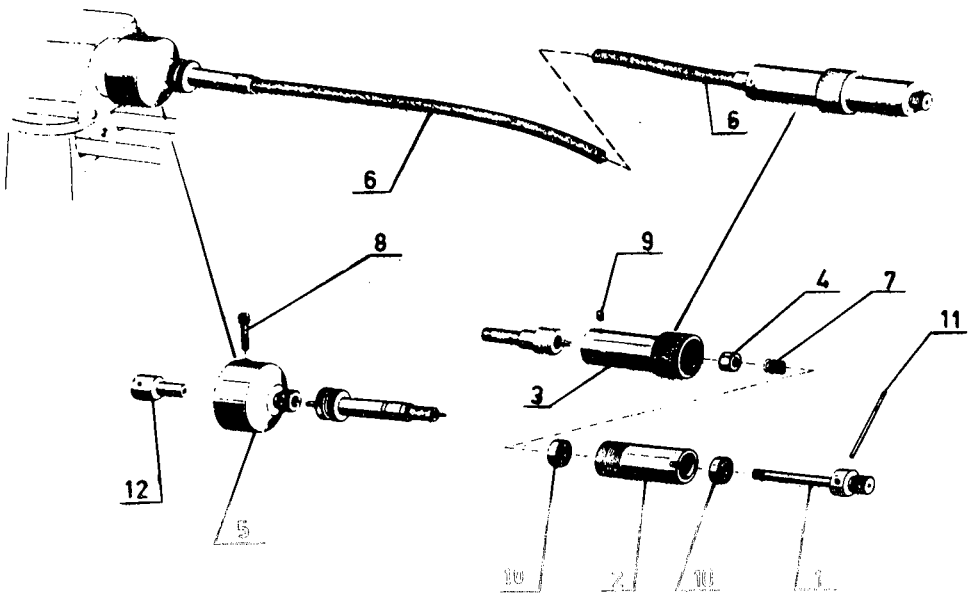
	A2Z 360		**Rundtisch**	**Round table assy.**	**Plateau circulaire complet**
Pos.			BENENNUNG	DESCRIPTION	DÉSIGNATION
	A2Z 360 010		Rundtisch	Round table	Plateau
	A2Z 351 010		Spanneisen	Clamping claws	Bride
	ZSR 12 0620		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
	A2Z 352 010		Spannschraube	Clamping screw	Boulon en T
	ZSB 25 0640		Beilagscheibe	Shim	Rondelle plate
	ZMU 34 0600		Sechskantmutter	Hexagon nut	Ecrou 6 pans

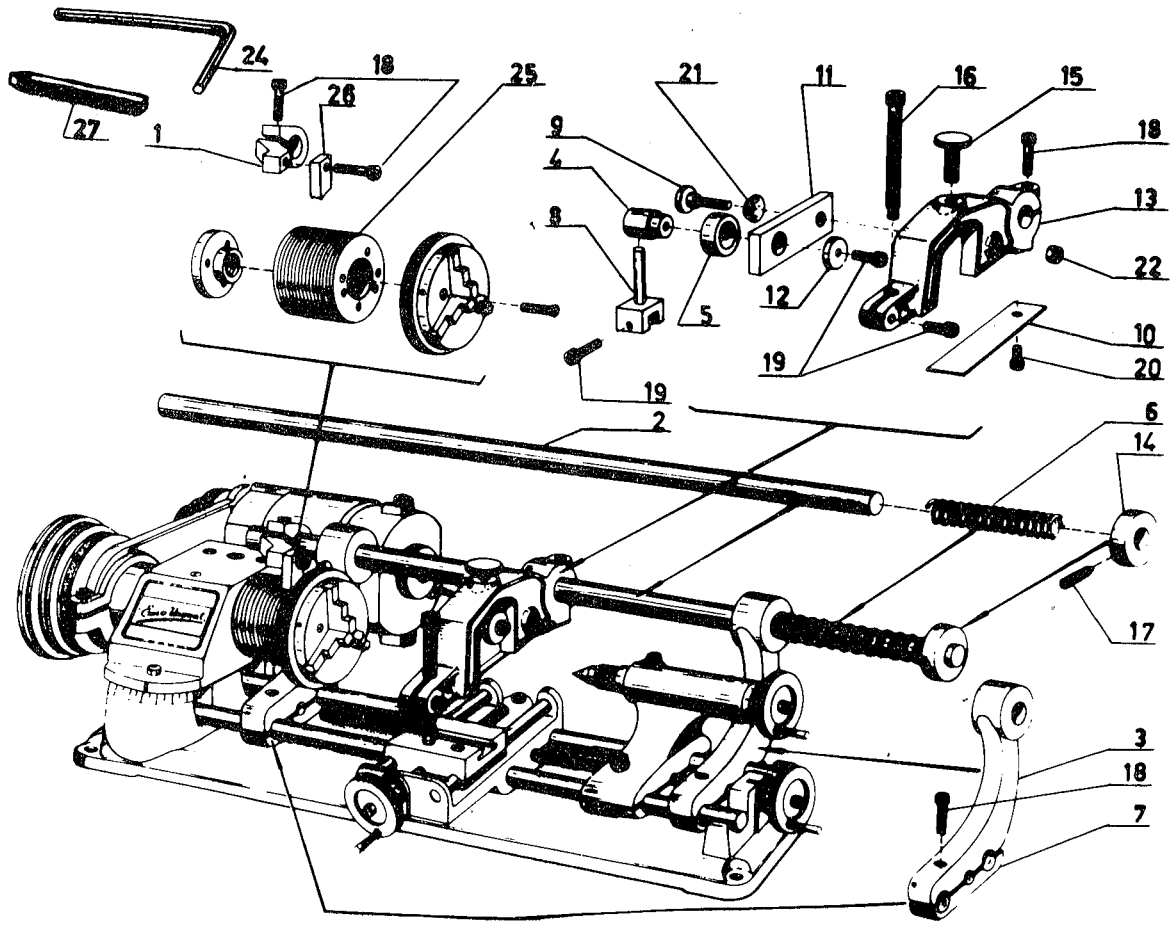
	A2Z 250		**Gewindeschneideeinrichtung**	**Screw cutting attachment**	**Dispositif de filetage**
Pos.			BENENNUNG	DESCRIPTION	DÉSIGNATION
1	A2Z 250 010		Leitarm	Guidearm	Bras de filetage conducteur
2	A2Z 250 020		Leitstange	Guide rod	Barre directrice
3	A2Z 250 030		Winkel	Angular bracket	Equerre support
4	A2Z 250 040		Außenstahlhalter	External toolholder	Porte-outil extèrieur
5	A2Z 250 050		Ring	Ring	Bague
6	A2Z 250 060		Feder	Spring	Ressort
7	A2Z 250 070		Winkelplatte	Angular bracket plate	Semelle de l'équerre support
8	A2Z 250 100		Innenstahlhalter	Internal tool holder	Porte-outil interieur
9	A2Z 250 110		Klemmschraube	Clamping screw	Vis de fixation
10	A2Z 250 120		Blattfeder	Leaf spring	Lame-Ressort
11	A2Z 250 130		Schwenkplatte	Swivel plate	Plaque pivotante
12	A2Z 250 140		Scheibe	Washer	Rondelle
13	A2Z 250 150		Schneidarm	Cutting arm	Bras de filetage
14	A2Z 250 160		Druckring	Thrust-ring	Bague de pression
15	A2Z 250 170		Rändelschraube	Knurled screw	Vis moletée
16	A2Z 310 050		Spindel	Screw	Tige filetée
17	ZST 53 0608		Gewindestift	Grub screw	Vis pointeau
18	ZSR 12 0620		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
19	ZSR 12 0616		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
20	ZSR 12 0610		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
21	ZFD 93 1800		Tellerfeder	Disc spring	Rondelle assiette
22	ZMU 34 0600		Sechskantmutter	Hexagon nut	Ecrou 6 pans
23	ZSB 25 0640		Scheibe	Washer	Rondelle
24	A2Z 320 060		Sechskantstiftschlüssel	Socket head key	Clé 6 pans coudée
25	Z10 127 *		*Patrone mit Backe	Die with chaser	Patronne avec peigne
26	A2Z 720 *		*Backe allein	Chaser only	Peigne seul
27			Außengewindestahl	External screwcutting tool	Outil à fileter extérieur

* Bei Bestellung bitte Steigung angeben!
When ordering please state the pitch!
A la commande spécifier le pas désiré!



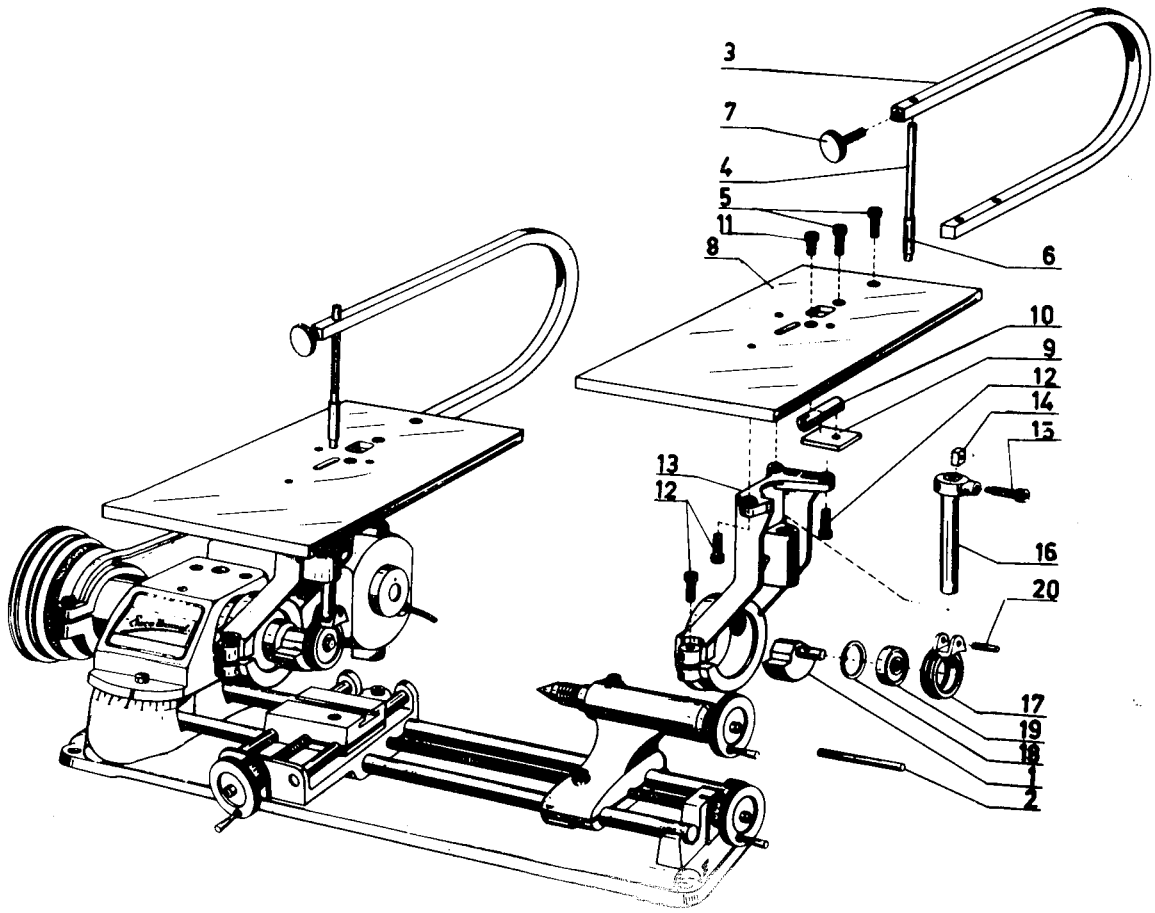
	A2Z 330		**Flex-Welle**	**Flexible shaft**	**Flexible**
Pos.			BENENNUNG	DESCRIPTION	DÉSIGNATION
1	A2Z 330 010		Handspindel	Hand spindle	Broche terminale
2	A2Z 330 020		Hülse	Bush	Fourreau
3	A2Z 330 030		Überwurfmutter	Cap nut	Manchon
4	A2Z 330 040		Mutter	Nut	Ecrou
5	A2Z 330 050		Glocke	Housing	Cloche
6	A2Z 330 070		Flex-Welle	Flexible shaft	Flexible
7	A2Z 330 080		Feder	Spring	Ressort
8	ZSR 12 0620		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
9	ZST 53 0608		Gewindestift	Grub screw	Vis pointeau
10	ZLG 06 0700		Kugellager	Ball bearing	Roulement à billes
11	A2Z 410 050		Zylinderstift	Dowel pin	Tige de blocage
12	A2Z 330 060		Mitnehmer	Drive adaptor	Entraineur



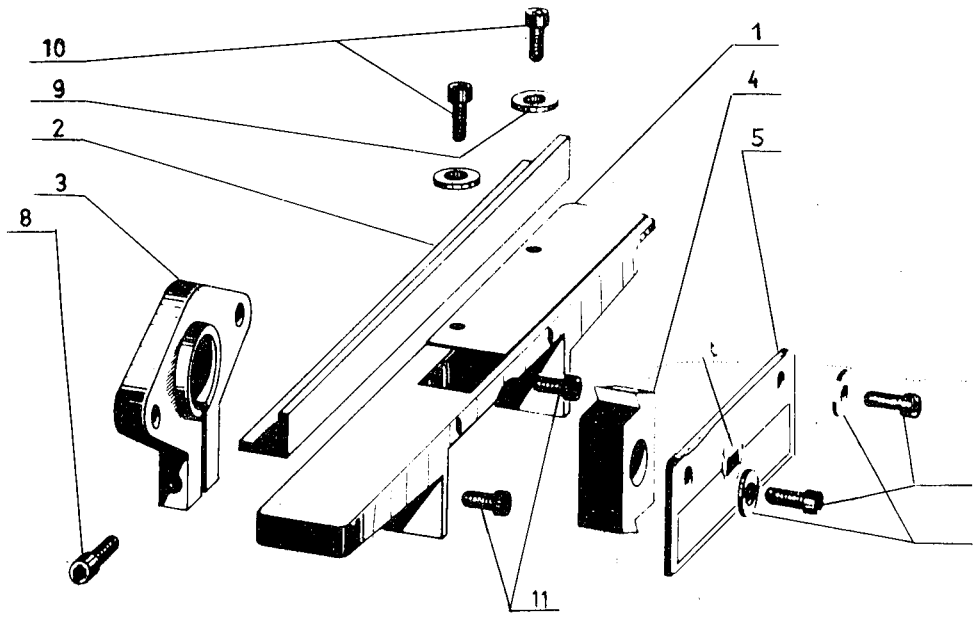


	A2Z 320		**Teilapparat**	**Dividing Head**	**Appareil diviseur**
Pos.			BENENNUNG	DESCRIPTION	DÉSIGNATION
1	A2Z 320 010		Körper	Body	Corps
	A2Z 320 020		Teilscheibe 48	Index plate 48	Disque diviseur 48 dents
2			Teilscheibe 30	Index plate 30	Disque diviseur 30 dents
			Teilscheibe 36	Index plate 36	Disque diviseur 36 dents
			Teilscheibe 40	Index plate 40	Disque diviseur 40 dents
3	A2Z 320 030		Indexbolzen	Index plunger	Boulon index
4	A2Z 320 040		Hohlschraube	Hollow screw	Vis guide
5	A2Z 320 050		Indexfeder	Index spring	Ressort du boulon index
6	A2Z 070 020		Nutenstein	T-nut	Ecrou en T
7	ZMU 66 0400		Hohe Rändelmutter	High knurled nut	Boulon moleté
8	ZSR 12 0616		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
9	ZSR 12 0612		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
10	ZRG 72 3515		Seegering	Snap ring	Circlip
11	A2Z 320 060		Sechskantstiftschlüssel	Socket head key	Creuse

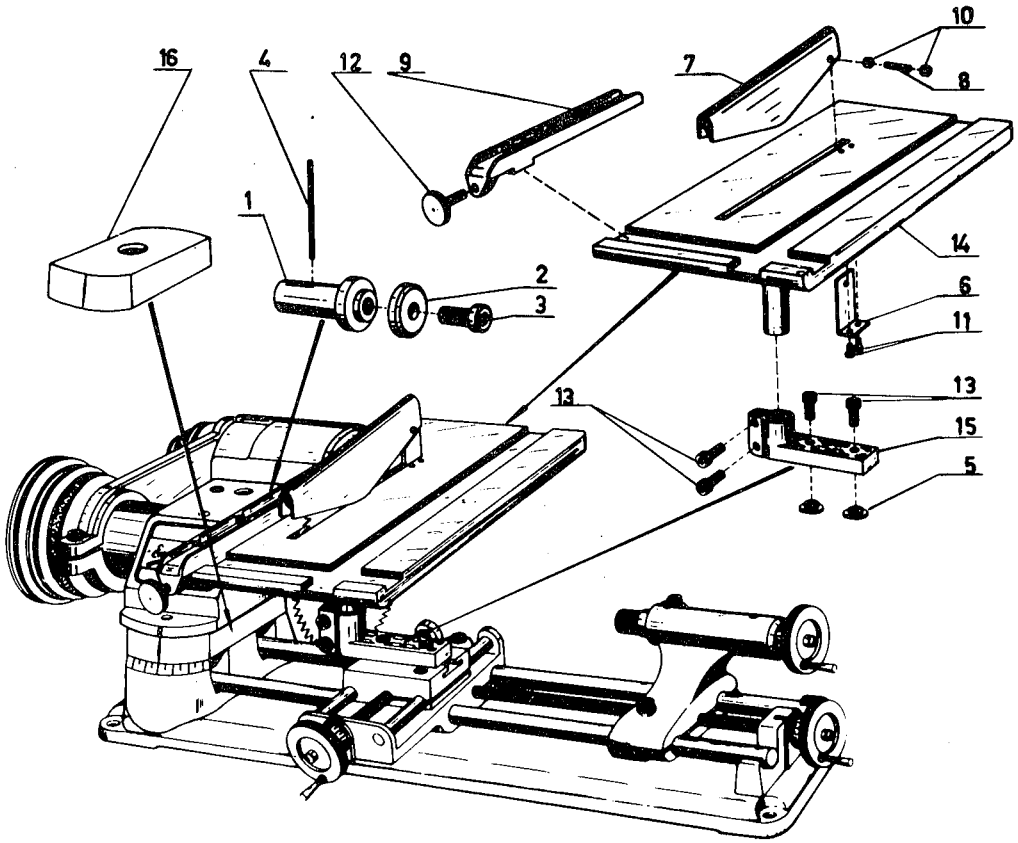
	A2Z 450		**Laubsäge**	**Fret saw**	**Scie de modélite complète**
Pos.			BENENNUNG	DESCRIPTION	DÉSIGNATION
1	A2Z 450 010		Excenter	Excentric	Excentrique
2	A2Z 410 050		Zylinderstift	Dowel pin	Tige de blocage
3	A2Z 451 010		Sägebogen	Saw bow	Archet
4	A2Z 451 020		Sägeführung	Saw guide	Guide-lame
5	ZSR 12 0620		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
6	ZHL 46 0724		Spannhülse	Split sleeve	Douille de guidage
7	ZSR 53 0615		Flache Rändelschraube	Flat knurled screw	Vis tête plate moletée
8	A2Z 452 010		Sägetisch	Saw table	Table de sciage
9	A2Z 452 020		Klemme	Clamp	Plaquette
10	A2Z 452 030		Anschlagbolzen	Stop bolt	Butée
11	ZSR 12 0610		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
12	ZSR 12 0625		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
13	A2Z 453 010		Sägehalter	Saw holder	Porte-lame de scie
14	A2Z 453 020		Spannkeil	Clamping wedge	Coin de serrage
15	A2Z 453 030		Klemmschraube	Clamp screw	Vis de serrage de lame
16	A2Z 454 000		Zugsäule	Draw bar	Tige de traction
17	A2Z 455 010		Pleuel	Crank	Bielle
18	ZRG 72 2612		Sicherungsring	Retaining ring	Circlip
19	ZLG 60 0002		Kugellager	Ball-bearing	Roulement á billes
20	ZST 61 0622		Nietstift	Rivet pin	Goupille



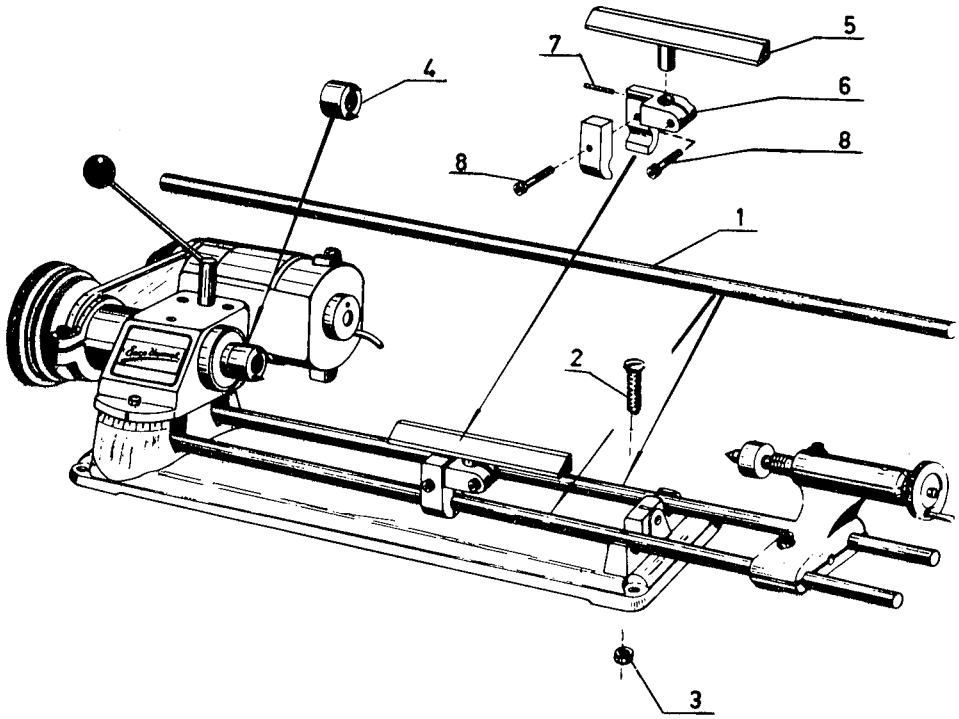
	A2Z 440		**Abrichte**	**Planing attachment**	**Dégauchisseuse**
Pos.			BESCHREIBUNG	DESCRIPTION	DÉSIGNATION
1	A2Z 440 010		Hobelmaschinengehäuse	Planer body	Bati
2	A2Z 440 020		Anschlag	Stop	Guide parallele
3	A2Z 440 030		Klemmring	Clamping ring	Bride de fixation
4	A2Z 440 040		Hobelmesser	Cutter	Fer
5	A2Z 440 050		Deckblech	Guard plate	Plaquette de protection
6	A2Z 430 040		Firmenschild	Name plate	Ecusson „EMCO“
7	ZSR 12 0610		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
8	ZSR 12 0620		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
9	ZSB 25 0640		Beilagscheibe	Washer	Rondelle plate
10	ZSR 12 0612		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
11	ZSR 12 0616		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux



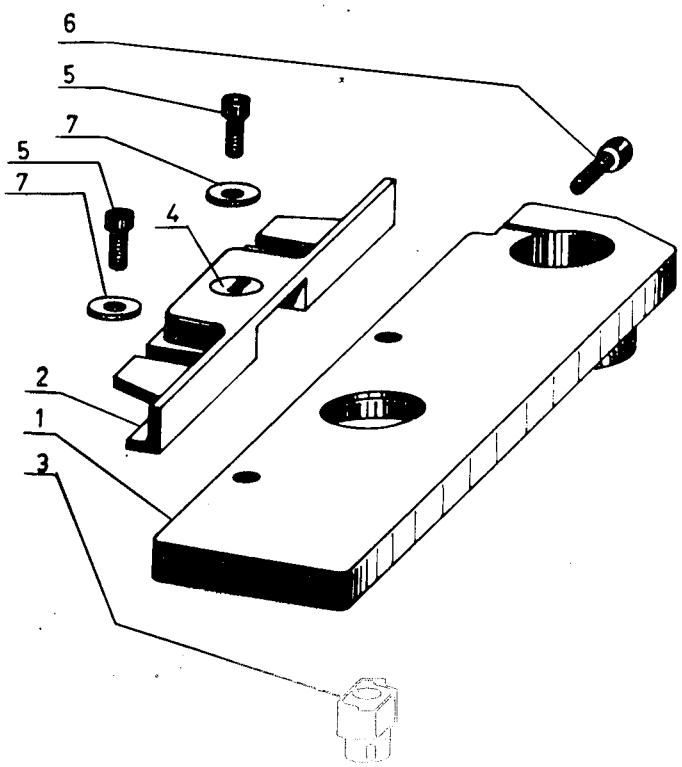
	A2Z 380		**Kreissägeeinrichtung**	**Circular Saw Attachment**	**Dispositif de scie circulaire**
Pos.			BENENNUNG	DESCRIPTION	DÉSIGNATION
1	A2Z 380 010		Dorn	Arbor	Porte-lame
2	A2A 090 020		Gegenscheibe	Retaining ring	Contre-flasque
3	A2A 090 030		Schraube	Screw	Vis
4	A2Z 410 050		Zylinderstift	Dowel pin	Tige de blocage
5	A2A 070 020		Nutenstein	T-nut	Ecrou en T
6	A2Z 380 030		Spaltkeil	Riving knife	Couteau diviseur
7	A2Z 380 040		Schutzblech	Guard cover	Protecteur
8	A2Z 380 050		Gewindestift	Grub screw	Tige filetée
9	A2Z 380 060		Parallelanschlag	Parallel stop	Guide parallèle
10	ZMU 34 0500		Mutter	Nut	Ecrou
11	ZSR 84 0408		Zylinderschraube	Cheese head	Vis tête cylindrique
12	ZSR 53 0615		Rändelschraube	Knurled screw	Vis moletée
13	ZSR 12 0816		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
14	A2Z 381 000		Tisch	Table	Table
15	A2Z 380 020		Halter	Holder	Support de table
16	A2Z 380 070		Beilage	Reiser block	Plaque intercalaire

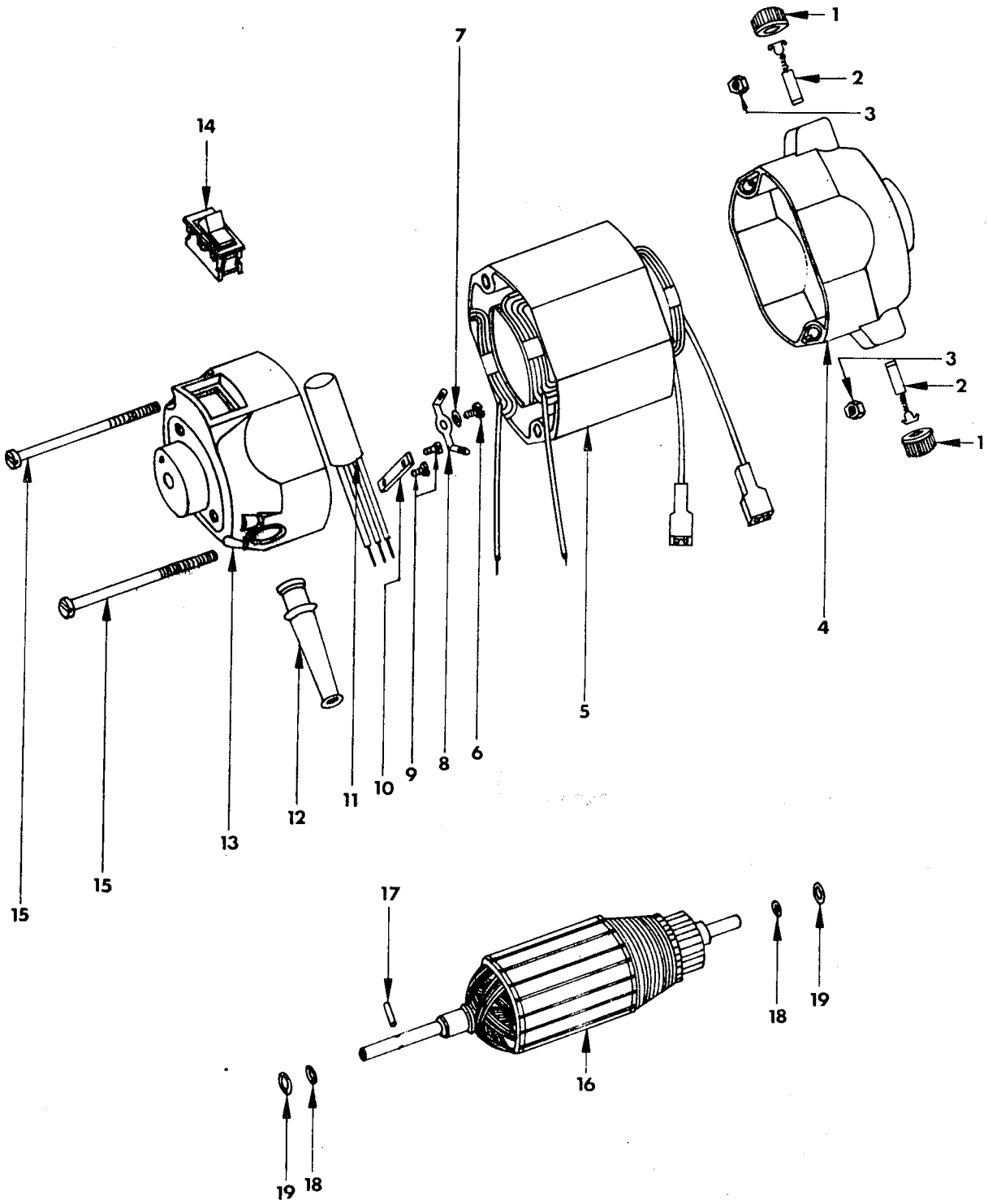


	A2Z 230		**Drechselbank**	**Wood turning lathe**	**Tour à bois complet**
Pos.			BENENNUNG	DESCRIPTION	DÉSIGNATION
1	A2Z 230 010		Führungssäule	Guide bar	Barre de guidage
2	ZSR 91 0525		Linsensenkschraube	Oval cheese head screw	Vis tête goutte de suif
3	ZMU 34 0500		Sechskantmutter	Hexagon nut	Ecrou 6 pans
4	A2Z 231 000		Zweizack kompl.	Drive centre compl.	Entraineur à 2 pointes
5	A2Z 232 000		Stichelauflage	Handtool rest	Appui d'outil
6	A2Z 232 030		Klemme	Clamp	Pièce de serrage du support
7	ZST 11 0428		Zylinderstift	Dowel pin	Goupille
8	ZSR 12 0620		Innensechskantschraube	Socket head screw	Vis 6 pans creux



	A2Z 430		**Oberfräse**	**Routing attachment**	**Toupie-Profileuse**
Pos.			BENENNUNG	DESCRIPTION	DÉSIGNATION
1	A2Z 430 010		Frästisch	Routing table	Table de fraisage
2	A2Z 430 020		Anschlag	Stop	Guide parallèle
3	A2Z 430 030		Messerkopf	Routing Cutter	Fraise
4	A2Z 430 040		Firmenschild	Name plate	Ecusson „EMCO"
5	ZSR 12 0616		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
6	ZSR 12 0620		Innensechskantschraube	Socket head cap screw	Vis 6 pans creux
7	ZSB 25 0640		Beilagscheibe	Washer	Rondelle plate




1
2
3
7
14
3
2
1
4
15
15
13
12
11
10
9
8
6
5
17
18
19
16
19
18

			Motor	Motor	Moteur
Pos.			BENENNUNG	DESCRIPTION	DESIGNATION
1	ZME 84 8002		Kohlekappe	Carbon holder	Chapeau
2	ZME 84 8001		Kohlebürste	Carbon brush	Charbon
3	ZMU 34 0400		Sechskantmutter	Hexagon nut	Ecrou hexagonal
4	ZME 84 8009		Lagerschale	Bearing box	Coquille de coussinet
5	ZME 84 9100		Stator 100 V 50-60 Hz	Stator	Stator
	ZME 84 9110		Stator 110 V 50 Hz	Stator	Stator
	ZME 84 9116		Stator 115 V 60 Hz	Stator	Stator
	ZME 84 9125		Stator 125 V 50 Hz	Stator	Stator
	ZME 84 9220		Stator 220 V 50 Hz	Stator	Stator
	ZME 84 9230		Stator 230 V 50 Hz	Stator	Stator
	ZME 84 9240		Stator 240 V 50 Hz	Stator	Stator
	ZME 84 9250		Stator 250 V 50 Hz	Stator	Stator
6	ZME 84 8012		Zylinderschraube	Flat head screw	Vis cylindriques
7	ZME 84 8013		Zahnscheibe	Ratched wheel	Rondelle
8	ZME 84 8006		Lötöse	Soldering tab	Agrafe
9	ZME 84 8014		Zylinderschraube	Flat head screw	Vis cylindriques
10	ZME 84 8005		Lasche	Fishplate	Eclisse
11	ZME 84 8004		Kondensator	Condenser	Condensateur
12	ZME 84 8007		Knickschutztülle	Protective coating	Passe-fil cauotchouc
13	ZME 84 8008		Lagerschale	Bearing box	Coquille de coussinet
14	ZME 84 8003		Schalter	Switch	Coupleur
15	ZME 84 8011		Zylinderschraube	Flat head screw	Vis cylindriques
16	ZME 84 8100		Rotor 100 V 50-60 Hz	Rotor	Rotor
	ZME 84 8110		Rotor 110 V 50 Hz	Rotor	Rotor
	ZME 84 8116		Rotor 115 V 60 Hz	Rotor	Rotor
	ZME 84 8125		Rotor 125 V 50 Hz	Rotor	Rotor
	ZME 84 8220		Rotor 220 V 50 Hz	Rotor	Rotor
	ZME 84 8230		Rotor 230 V 50 Hz	Rotor	Rotor
	ZME 84 8240		Rotor 240 V 50 Hz	Rotor	Rotor
	ZME 84 8250		Rotor 250 V 50 Hz	Rotor	Rotor
17	ZST 06 0159		Knebelkerbstift	Grooved pin	Vis á tête fendue
18	ZME 84 8016		Stahlscheibe	Washer	Rondelle
19	ZME 84 8017		Polyamidscheibe	Washer	Rondelle