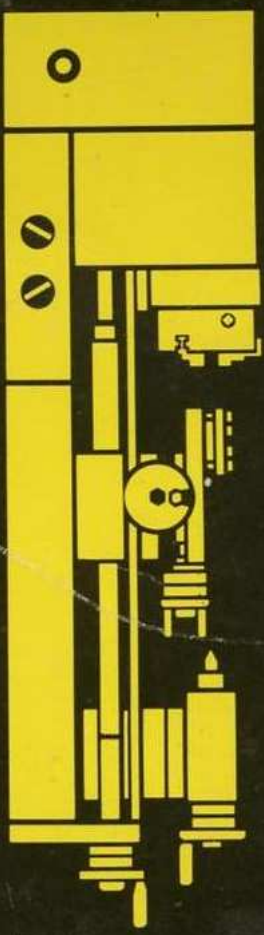


HOBBY MAT



Precision Lathe
Type MD 65
(50-398)

\$164900

Operating Instructions
and Spare Parts List



North American Sales Office

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Dear Customer,

Please study the following instructions carefully before putting your new precision lathe into operation.

In these instructions all functions of the machine are explained in detail to familiarize you with the mode of action of the machine.

You have acquired a high-accuracy machine designed and constructed by experts who made a tradition of their precision work.

The compact construction of the lathe and the clearly arranged controls enable a neat work to be carried out after a short period of testing.

Making a few trial pieces will be helpful in gaining skill of operating the machine.

Always remember that practice makes perfect.

We reserve the right to make minor alterations in the illustrations and descriptions in compliance with technological progress.

We wish you joy in working with your precision lathe.

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Specifications

Ratings

Height of centres	65 mm
Distance between centres	300 mm
Turning diameter over carriage	62 mm
Cross slide traverse	80 mm
Saddle traverse	55 mm
Division of numbered scales	0.025 mm/scale division
Electric connection, voltage	220 V 50 Hz (a.c. only)
Current consumption	435 W
Rated power	250 W
Space required	800 x 280 mm
Weight	45 kg

Design

Headstock:

Spindle nose with flange for lathe chucks and with Morse taper MK 2S.

Capacity of the lathe 12 mm Ø.

Main spindle supported in adjustable high-accuracy tapered roller bearings.

250, 500, 1,000, 2,000 r.p.m. Power transmission by V-belt through stepped pulleys, spring-loaded.

Main spindle speeds:

Feed gear with 2 rates of feed:

Thread leads:

0.16 mm/rev. for roughing operations
0.08 mm/rev. for finishing operations
metric thread 0.2-3.0 m = 18 standardized leads
English ththread 11-24 threads/in. = 10 leads
module thread 0.1-0.6 = 8 leads

Tailstock:

Tool holding fixture: Morse taper 1.
Dia. of sleeve 22 mm. Traverse of sleeve 40 mm.
Max. drilling depth 35 mm.

Work clamping acc. to machining method:

- in three-jaw chuck with internal and external jaws
- between centres
- with collet attachment
- in multiple tool holder
- in tailstock drill chuck

Tool clamping:

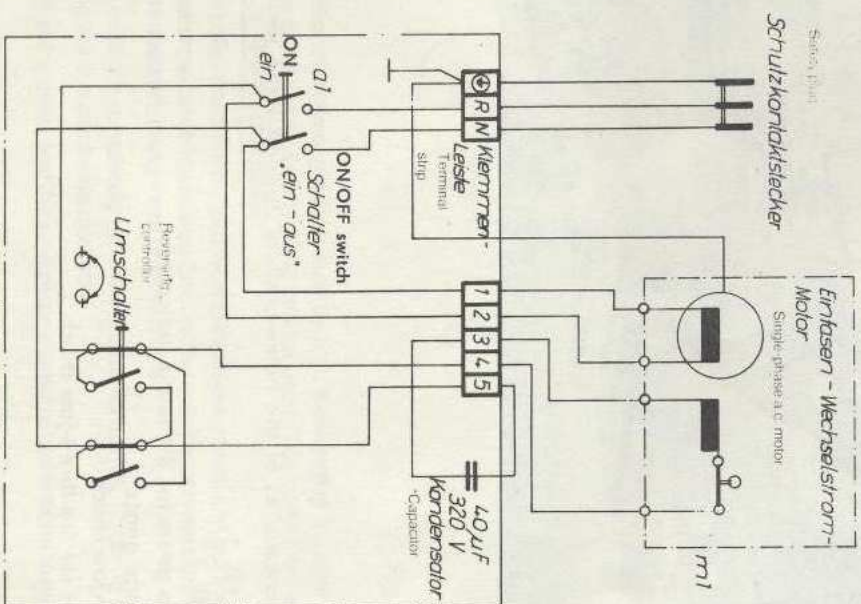
Driving motor:

Single-phase altering current motor
Type EAM 63 G 2 - k12 220 V 50 Hz
Rated power 250 W
Current consumption 435 W
Speed 2850 r.p.m.

Radio-shielded,
with centrifugally operated switch and
starting capacitor 40 µF 320 V

ON/OFF switch and Jack switch 22.5 with two switching positions,
reversing controller: equipped with ram-type switch A 21 250 V 10 A.
Turn the switches up to the stop in any position.

Wiring diagram:



Standard accessories to the machine

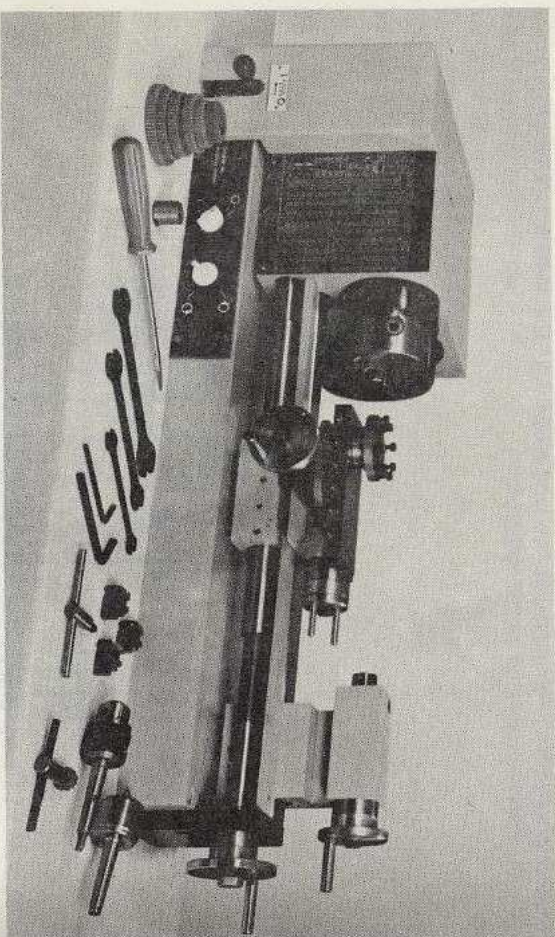


Fig. 1

The standard accessories of the home-crafters' turning lathe include

- 1 dead centre MK 1
- 1 live centre MK 1
- 1 set of change gears for the leads indicated
- 1 liner for change gears
- 1 key for three-jaw chuck
- 3 external jaws for the three-jaw chuck

Extras

Collet attachment

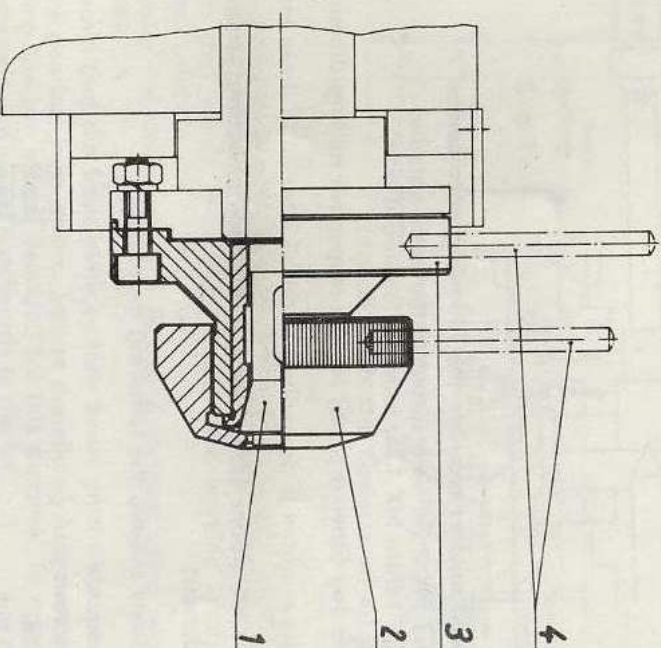


Fig. 2

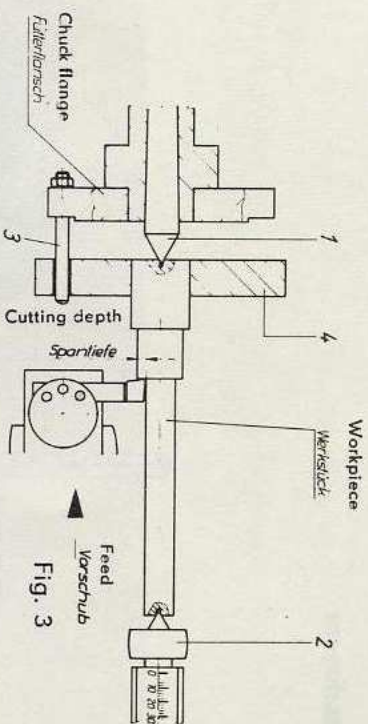
The collet attachment distinguishes itself by high truerunning accuracy. Collets for compressive strains according to DIN 6343 can be used. The collets are available from 3 to 12 mm ($17.5 \times R3-12$, DIN 6343).

To mount the collet attachment, remove the three-jaw chuck and put the collet attachment (3) on to the external centering device. Secure the collet attachment in the same manner as the chuck was secured, using three bolts and nuts.

To insert the collet (1) completely unscrew the clamp nut (2). To clamp the workpiece, just turn the clamp nut in a clockwise direction.

Note: Mind that the collet and the workpiece diameter correspond to each other.

Accessories for turning between centres



Turning between centres requires the following accessories:

- 1) Dead centre MK 2 (to be inserted in the main spindle)
- 2) Live or dead centre MK 1 for tailstock (standard part)
- 3) Driving pin (to be screwed into chuck flange)
- 4) Safety lathe dog (driving plate) for the respective turning diameter

Resetting of the machine is described in detail later on in these instructions.

Milling attachment

Milling operations require the following accessories:

- 1) Setting-up square
- 2) Fastening screws
- 3) Machine vice, opening 50 mm

Resetting and operation are described in detail later on in these instructions.

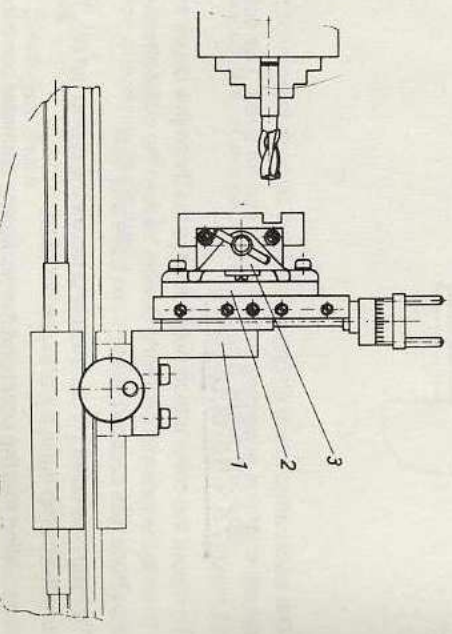


Fig. 4

Mounting the machine

The turning lathe features compact construction. The gear box (part 9, cover of the drive) and the clamping tools are furnished loose in the transport container.

At first prepare the mounting surface for the machine.

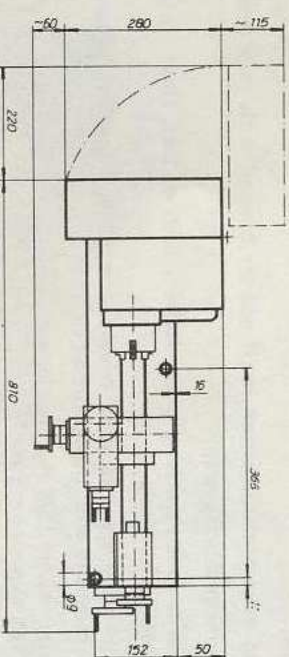


Fig. 5

The mounting surface (a table or a work bench) should be even, free from vibrations, and sturdy. Vibrations impair the working accuracy and the operational safety.

Firmly secure the machine to the mounting surface, using two screws 8 mm in diameter.

Make certain that the base plate entirely bears on the mounting surface.

Put on the gearbox from above. Secure the sliding hinge on the motor base plate, using the two screws provided for this purpose. To open the gearbox, move it upwards and swivel it outwards to the left.

During operation the gear box must be closed.

Screw the lever for the coupling (part 3) into the tapped hole. Screw the handles into the handwheels. Use an open-end wrench.

The machine has a connecting line with a safety plug. The socket with the protective ground contact for the connection of the machine must be within reach.

The bright parts of the machine as supplied are protected with an anti-corrosion grease. This grease will not effect lubrication of the sliding surfaces. Carefully clean the bright parts with petroleum to wash the anti-corrosive grease off.

Important: Never use washing benzene, trichlorethylene, acetone, or any other solvent.

Afterwards, provide the bright parts and the sliding surfaces with a non-acid oil and grease, respectively.

Refer to the lubrication chart, Fig. 15.

Safety instructions

Always remember that

- the electric connection must be established via a socket having a protective ground contact and fused with a sluggish fuse, 6 A;
- for any maintenance and servicing jobs the machine must be disconnected and the mains plug pulled;
- the machine must be disconnected when clamped workpieces are being measured;
- the workpieces and the chuck must not be braked with your hand.

Avoid protruding chuck jaws.

Be careful as to loose parts of your clothes, such as ties, sleeves, jewelry, etc. Wear a protective hairnet.

Make certain that guards and covers are placed on the machine (never operate the machine with the gearbox opened).

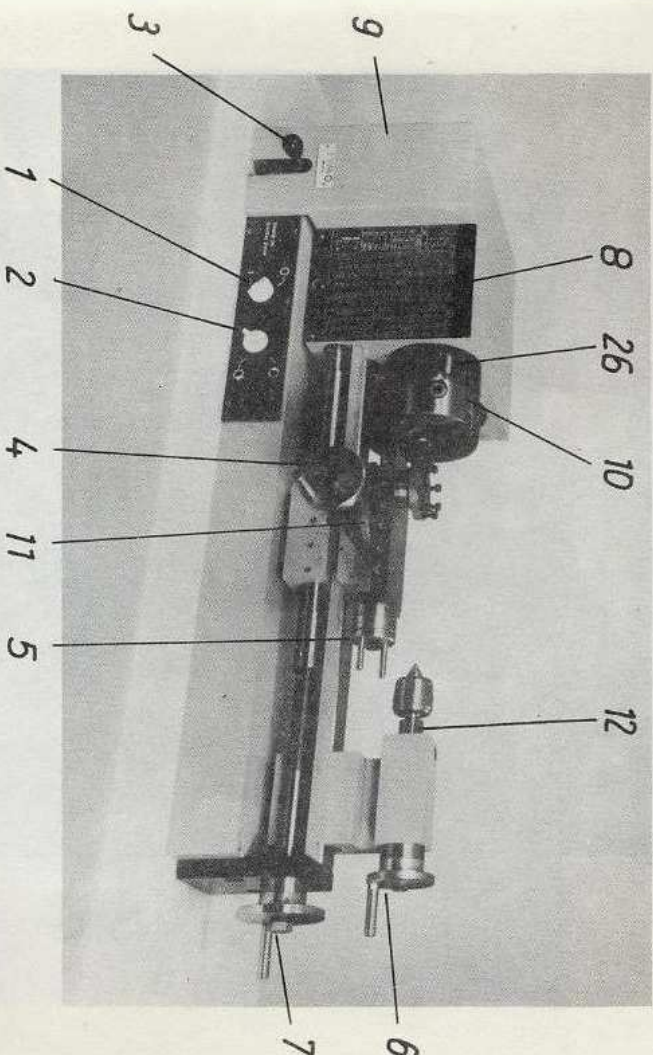
Wear goggles when turning brittle materials (such as brass, grey cast iron etc.) and when sharpening tools.

Never remove chips with your hands, always use a hook, brush or hand broom to remove chips.

Pull off the key of the chuck whenever used and on completion of the job. Never leave the turning lathe unattended when it is switched on.

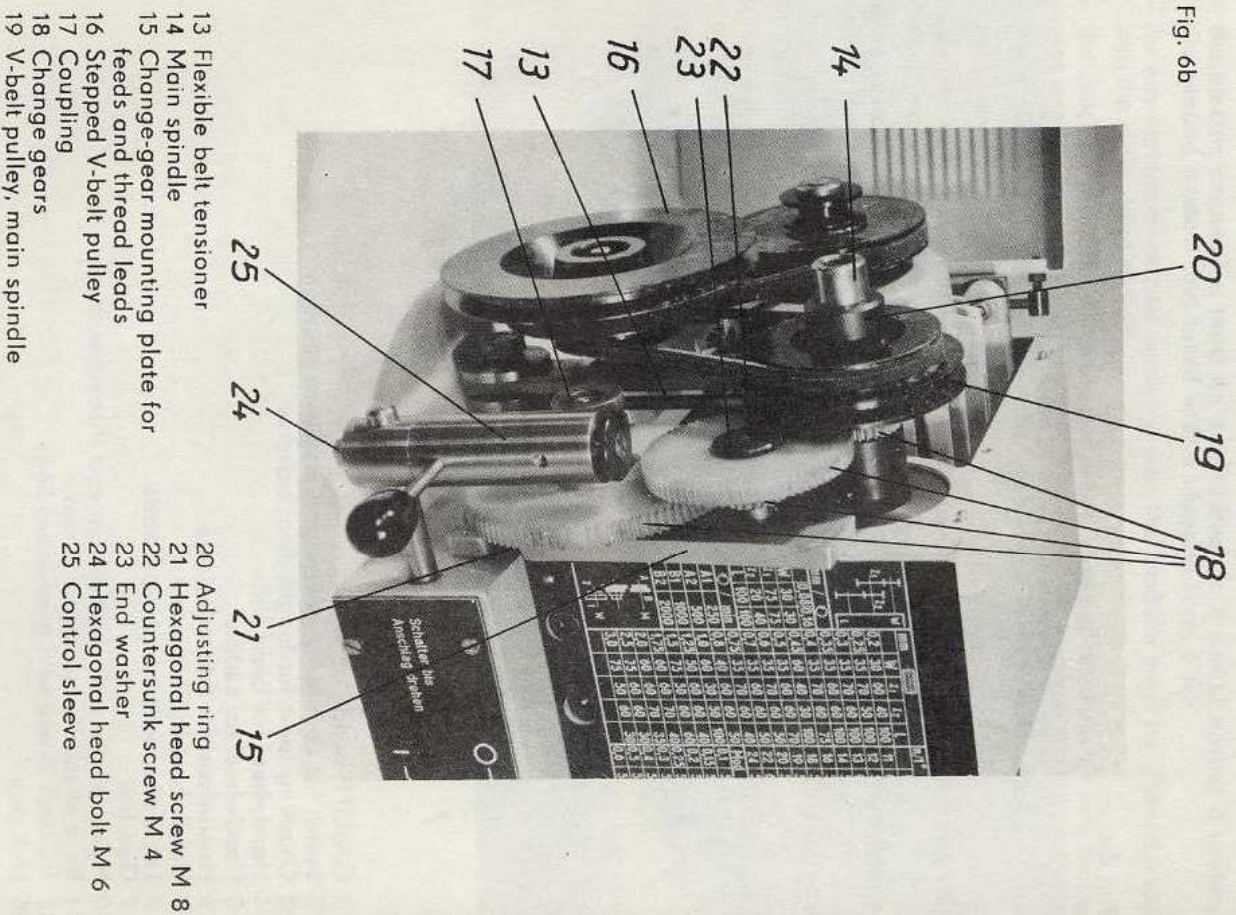
Description of the machine and the controls

Fig. 6a



- 1 ON/OFF switch
- 2 Switch for counter-clockwise and clockwise rotation
- 3 Coupling lever for longitudinal traverse
- 4 Handwheel for cross slide
- 5 Handwheel for saddle
- 6 Handwheel for tailstock sleeve
- 7 Handwheel for leadscrew
- 8 Table of speeds and thread leads
- 9 Gearbox
- 10 Main spindle with chuck flange and three-jaw chuck
- 11 Base of saddle, arranged to swivel
- 12 Tailstock sleeve with graduation lines

Fig. 6b



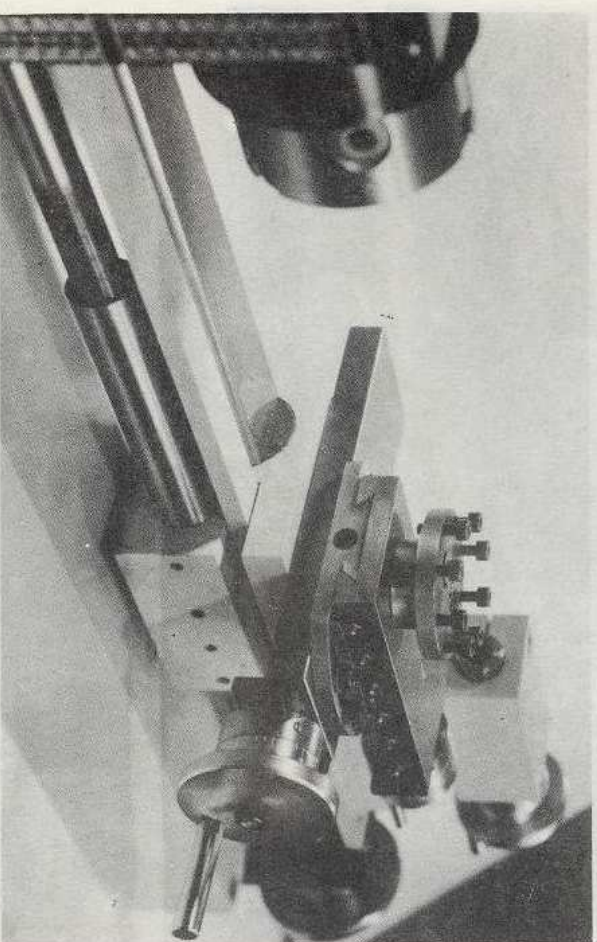
Base plate

The ribbed and, thus, torsion-free base plate carries the headstock and the slideway and houses the electrical equipment. The base plate safety supports the entire machine.

Bed

The bed features high-grade continuous casting design. The guiding surfaces are ground. Due to its specific construction the bed is very sturdy and imparts excellent guiding qualities to the carriage and the tailstock.

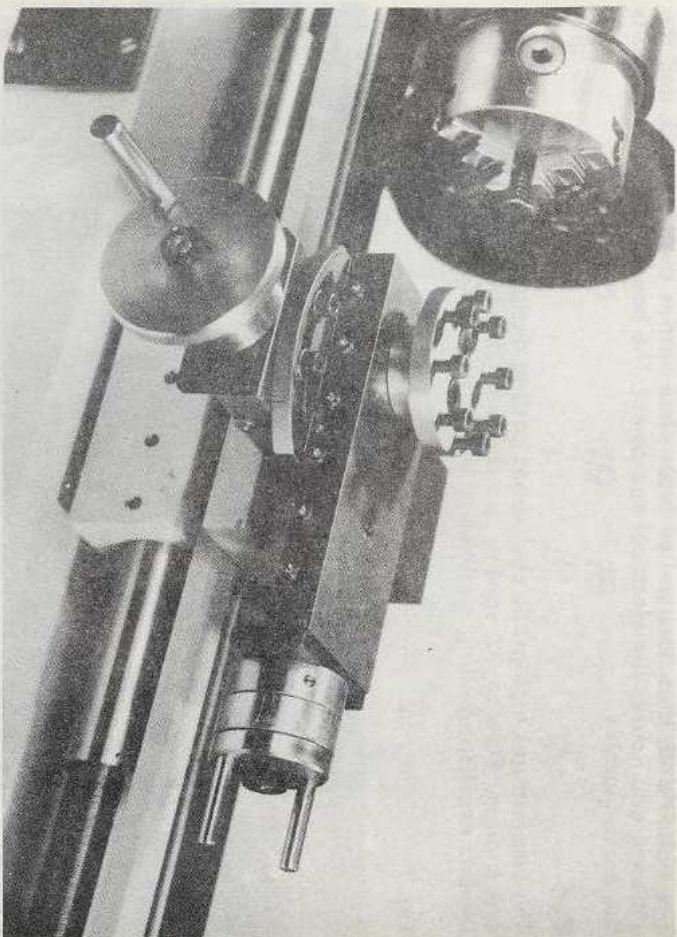
Fig. 7



Compound slide (see Fig. 8)

The compound slide consists of high-duty cast iron. It is fitted on the bed without play and has long guideways for top accuracy and stability. The cross slide is dovetailguided on the base of the compound slide. The feed motion is effected through a conveniently arranged handwheel having an adjustable graduated collar. Mounted on the cross slide there is the saddle with base. The saddle is guided and moved in the same manner as the cross slide. For taper turning, the base can be swivelled through 45° and locked with 4 screws on the cross slide. The saddle carries the multiple tool holder of rugged design.

Fig. 8



Tailstock (see Fig. 9)

The tailstock can be shifted on the bed and locked in any position, using a strong hexagonal socket-head bolt.

Note: Refer to Fig. 16.

The tailstock sleeve has a Morse taper K 1 and an easy-to-read graduation on its outer diameter. The feed motion of the sleeve is effected through the handwheel at the right-hand side of the tailstock. The sleeve, too, can be locked in any position, using the hexagonal socket head bolt arranged on the top of the tailstock. Ejection of the Morse taper is achieved by fully withdrawing the sleeve in the tailstock.

Headstock (see Fig. 10)

The main spindle is supported in two adjustable precision tapered roller bearings in the headstock. The capacity of the lathe is 12 mm. Built into the headstock there is the driving motor. The bed is accommodated in a hole underneath the main spindle.

Fig. 9

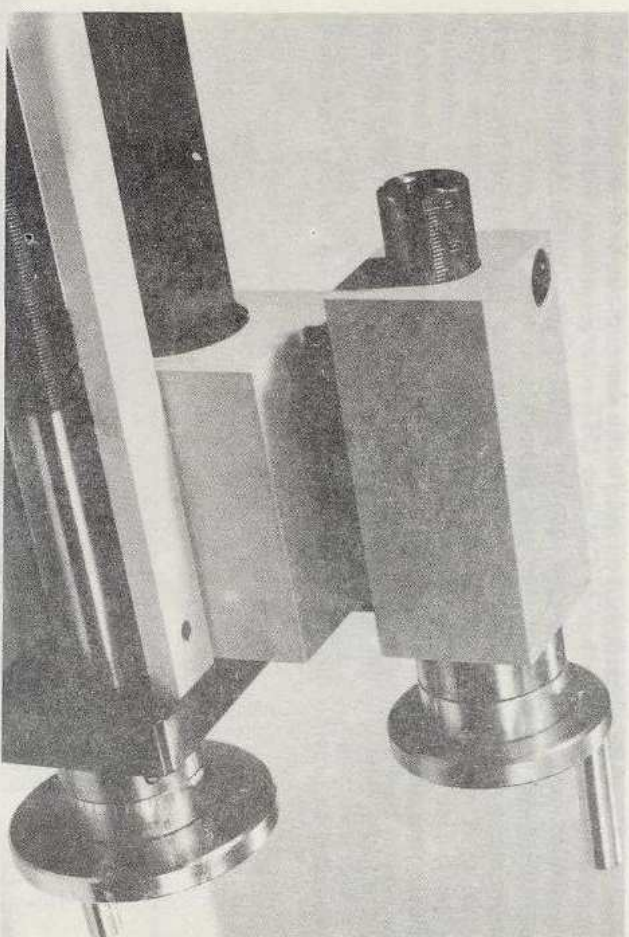
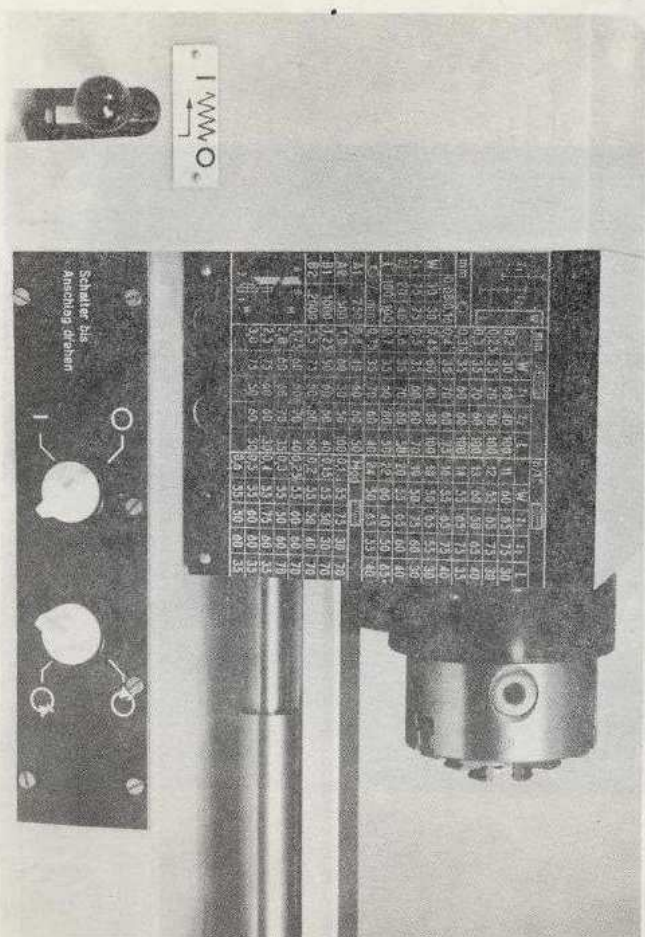


Fig. 10



Electrical equipment

The electrical equipment is housed in the base plate and protected from accidental access. The handy ON and OFF rotary switches and the reverse controller are clearly arranged on the switch plate, thereby ensuring safe control of the machine.

Power transmission

Power transmission from the electromotor to the main spindle is effected with a V-belt through an intermediate gear. The intermediate gear is spring mounted to provide flexible, self-adaptive belt tensioning for any operation.

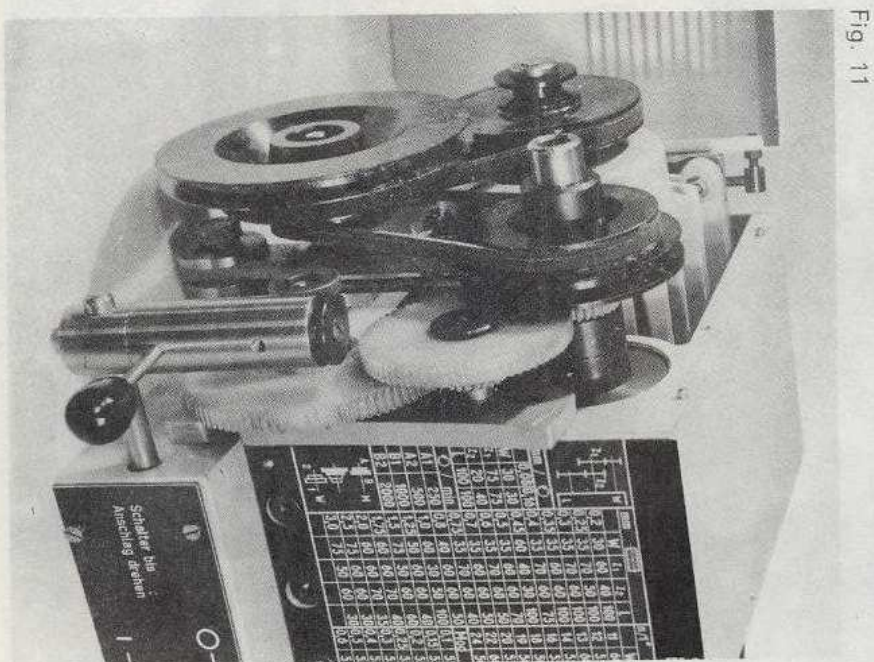


Fig. 11

Lead screw

The lead screw is supported free from play in combination sliding and thrust bearings in the headstock.

An additional bearing is provided at the right in the bedway. The rotary motion of the lead screw is converted into the longitudinal motion of the compound slide through a wear-resistant bronze nut inserted in the compound slide. Arranged at the right-hand side of the lead screw there is a large handwheel with graduated collar for moving the compound slide manually. Mounted to the left-hand extension of the lead screw there is a gear and the coupling which, on connection of the machine, bring about the feed movement according to the feed selected. Play-free adjustment is made through the handwheel and the hexagon nut which is easily accessible.

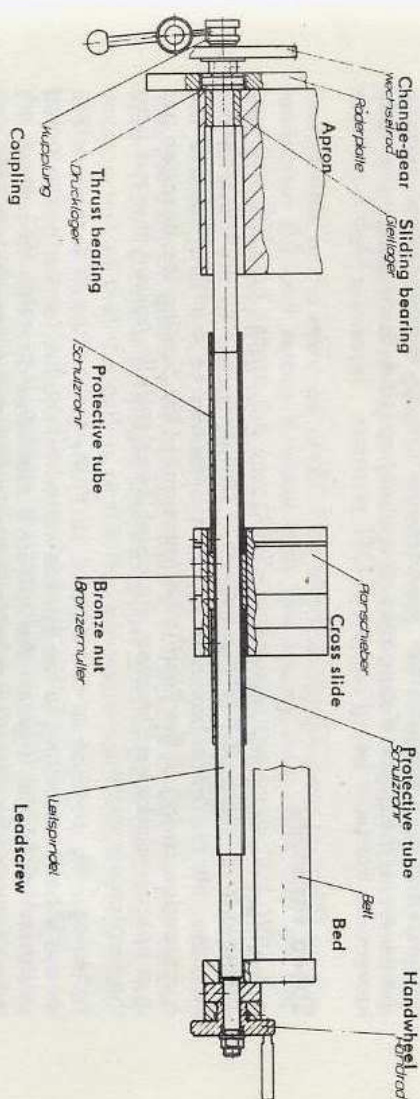


Fig. 12

Putting the machine into operation

General

- Check the machine for having all its parts and the extras ordered as well.
- Check that the mains voltage and the frequency of your house connection comply with the ratings on the nameplate of the machine.
- Check that the plug socket with protective ground contact is protected by a 6 A fuse.

Carry out a performance test and familiarize yourself with the controls of the machine.

Switch 1 is used to connect and disconnect the machine. Switch 2 is used to reverse the direction of rotation of the main spindle. Before reversing the direction of rotation, make certain that the machine is disconnected.

Lever 3 is used to engage the coupling while the machine is running. This connects the feed movement of the carriage through the leadscrew. Turning the lever to the right disengages the coupling and disconnects the feed movement, the lever being caught at OFF position.

Speed variation

Disconnect the machine and pull out the mains plug as a precaution against accidental reconnection of the machine. To get access to the drive of the machine, lift the gear box and swivel it outwards to the left. Release the compression spring of the flexible belt tensioner (13), turning the hexagon nut in a counter-clockwise direction. Be careful not to fully remove the nut from the tensioning screw.

To change the position of the V-belts, carefully lift the V-belt tensioner. Put on the V-belts according to the speeds stated on the instruction plate. Speed selection completed, tighten the nut in a clockwise direction to restore the V-belt tension. Be careful not to compress the compression spring such that the windings come into contact with each other.

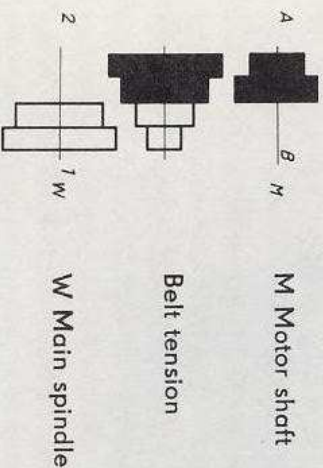


Fig. 13

A : 1	250 r.p.m.
A : 2	500 r.p.m.
B : 1	1000 r.p.m.
B : 2	2000 r.p.m.

Changing the gears for feed and thread lead selection

Disconnect the machine, pull out the mains plug, open the gear box. The thread lead can be selected by changing the gears. The combination of gears required for the respective feeds and leads is indicated on the instruction plate on page 18. For a 2 mm lead the following gears are required:

Main spindle (W) 60 teeth, apron (Z2) 70 teeth, leadscrew (L) 35 teeth (Z = number of teeth, embossed).

Proceed as described below. Refer to Fig. 14.

Release the belt tension and remove the V-belt from the pulley (19). Remove the adjusting ring (20) by unscrewing the threaded stud. Pull the V-belt pulley (19) and the change gear (z = 30) off the shaft W.

Slacken the hexagonal head screw (21) and swivel the apron (15) in forward direction. After slackening the countersunk screw (22) pull off the end washer (23) and the gears (z = 75, z = 20). Unscrew the hexagonal head screw (24) and swivel the coupling (25) forward. First remove the coupling (17) and afterwards the change gear (z = 100) from the leadscrew (L). The change gear is retained by a spring ring which can be pulled off with a screw driver, exerting a light pressure.


Reassemble in the reversed order. First slip the change gear (z = 35) on the leadscrew (L) and retain it there with the spring ring, then slip on the coupling (17) and secure the part (25) by tightening the screw (24). With the coupling disengaged, an axial play of no less than 1 mm should exist between the exposed claws.

Slip the pair of gears z = 70 (Z2) and z = 60 (Z1) on to the pin of the apron (15). To this end, mount the two gears to the bush (included in the accessories) so that the collars of the change gears point towards the collar of the bush. Slip on the bush with its collar pointing to the right (the collar being used as the stop) and secure the bush with the end washer (23) and the screw (22). Prior to it, slacken the pin of apron (15) and shift the pin in the oblong hole until the gear slipped on meshes with the gear on the leadscrew. Afterwards, lock the pin by turning the wrench in clockwise direction.

Slip the change gear (z = 60) on to shaft W. Mount the pulley (19) and the adjusting ring (20). Finally, swivel back the apron (15) and lock it with the screw (21). Make certain that some play is left between the gears to ensure smooth and noiseless running of the change gears. To this end, place a strip of paper between the mating gears when swivelling back the apron. The thickness of the paper corresponds to the amount of play required between the teeth to warrant proper meshing of gears. Put on the V-belt and tighten it as described above.



Instruction plate MD 65

										mm				
W		Z1	Z2	L	mm		mm		n/°					
0.2	30	60	40	100	11	60	65	75	30					
0.25	35	70	50	100	12	55	65	75	30					
0.3	35	70	60	100	13	60	50	65	40					
0.35	35	70	60	100	14	55	65	75	35					
0.4	35	70	60	100	16	55	65	75	40					
0.45	35	60	40	100	18	50	65	55	30					
0.5	35	60	60	70	19	50	75	60	30					
0.6	35	70	60	50	20	55	65	60	40					
0.7	35	60	60	50	22	60	40	50	65					
0.75	35	70	60	40	24	50	65	55	40					
0.8	35	60	60	50	Mod									
1.0	60	30	50	100	0.1	55	75	30	70					
1.25	50	60	60	40	0.15	55	50	30	70					
1.5	75	50	60	60	0.2	55	50	40	70					
1.75	60	60	70	40	0.25	55	60	60	70					
2.0	60	60	70	35	0.3	55	50	60	70					
2.5	75	60	60	30	0.4	55	75	60	35					
3.0	75	50	60	30	0.5	55	60	60	35					
					0.6	55	50	60	35					

Maintenance and lubrication

Your machine, as is the case with any machine being used, is subjected to wear in spite of the fact that experienced designers made it a perfected type. However, proper maintenance and servicing will be helpful in retaining precision and life of your machine for a long time. Clean and lubricate the machine whenever you have used it, taking special care of the components subjected to the heaviest strain. Oil the bed everytime before you start working on the machine. Regularly oil the screw and the dovetail guides to ensure smooth sliding of the compound slide. To this end, unscrew the threaded studs from the spindle guidings, supply the oil holes with some drops of oil, and close the holes.

Turn the tailstock sleeve outwards to take it out, clean it, and lubricate it.

Clean the chuck after every 25 operating hours and lubricate it. Turn the key of the chuck in a counter-clockwise direction until the jaws are turned outwards so that they can be taken out. When reassembling the jaws, reinsert them in the order of their numberings.

Check for true running.

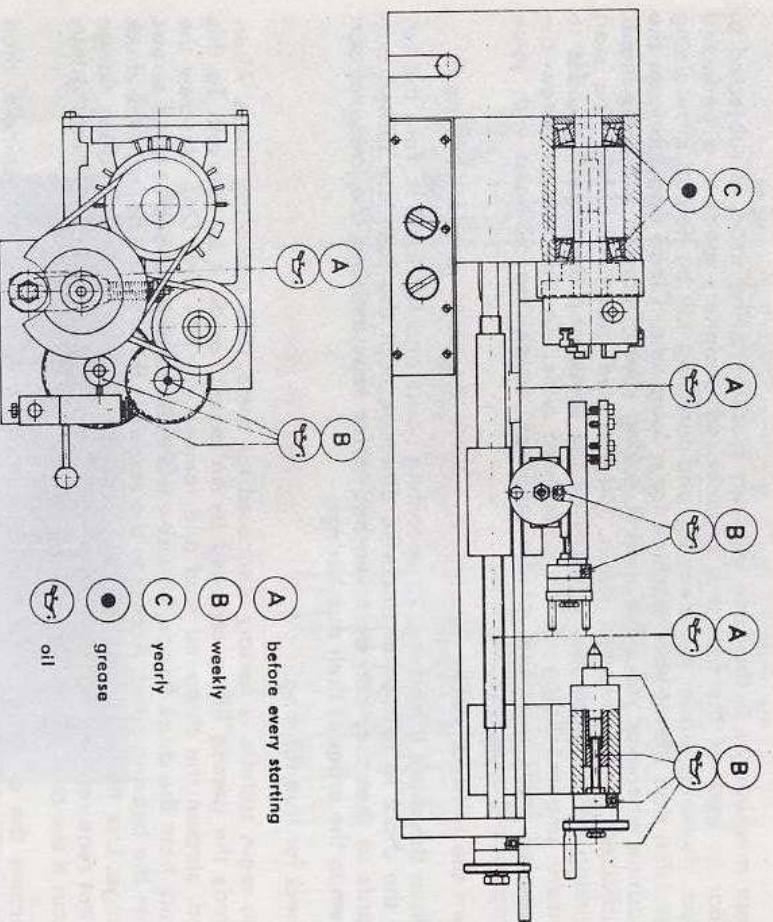
The main spindle is factory-lubricated for some 1500 operating hours. Afterwards the grease filling renewed by an expert, or do it by yourself. To this end, slacken the threaded stud and remove the lock ring (26). Unscrew the chuck from the chuck flange. Unscrew the three hexagonal socket head screws from the bearing cover. Access to the screws is through the holes in the chuck flange. Use the hexagonal socket screw wrench. Unscrewing the chuck flange is not required and not advisable, because deviations from true running may occur if the chuck flange is improperly replaced.

Remove the adjusting ring from the driving end of the main spindle, then remove V-belt pulley, gear, and feather. Unscrew the locked adjusting nuts. Remove the bearing cover and carefully drive out the main spindle in the direction towards the tailstock using a wood, rubber or aluminium hammer. Wash the antifriction bearings with petroleum. When dried, provide them with enough of top-grade antifriction bearing grease.

Reassemble in reversed order. Mind the adjustment of the bearing clearance. Lubricate all moving parts with finest acid-free precision instrument oil according to instructions (See Figs. 15, 8). Clean the enamelled surfaces of the machine with a dry rag or leather to preserve their stability and lustre.

Never clean bright parts with a solvent or with water.

Fig. 15



Readjusting the main assemblies

Despite highest precision in manufacturing the turning lathe impermissible bearing play will occur after a longer period of operation. Carry out the following adjustments to restore the working accuracy of your machine.

Main spindle

Readjustment to reduce the play is done with the adjusting nuts on the driving end. Unscrew rear nut by turning it in a counter-clockwise direction; readjust front nut accordingly. Afterwards, firmly lock both nuts. The spindle should always be comparatively easy-running. The machine should always operate perfectly at a speed of 2000 r.p.m.; otherwise, the bearings are adjusted too tight. In such a case, again unscrew the nuts and lightly beat on the spindle in the direction towards the tailstock, using a piece of wood. Readjust. Never use a steel hammer. If demounting of the main spindle is required, refer to "Maintenance and lubrication".

Cross slide and saddle

Readjust the guideways by slackening the hexagon nuts 1 and readjusting the threaded studs 2 with a screw driver. Take care to see that no chips are jammed and that the ways are clean.

Handwheels for slide feed motion

In case that the play exceeds two scale divisions, readjust as described below. Slacken lock nut with open-end wrench (lock nut 3). Readjust hand wheel 4 by turning it in a clockwise direction. Lock the nut with the open-end wrench while exerting a firm counterpressure on the hand-wheel.

Ease of movement of carriage and tailstock

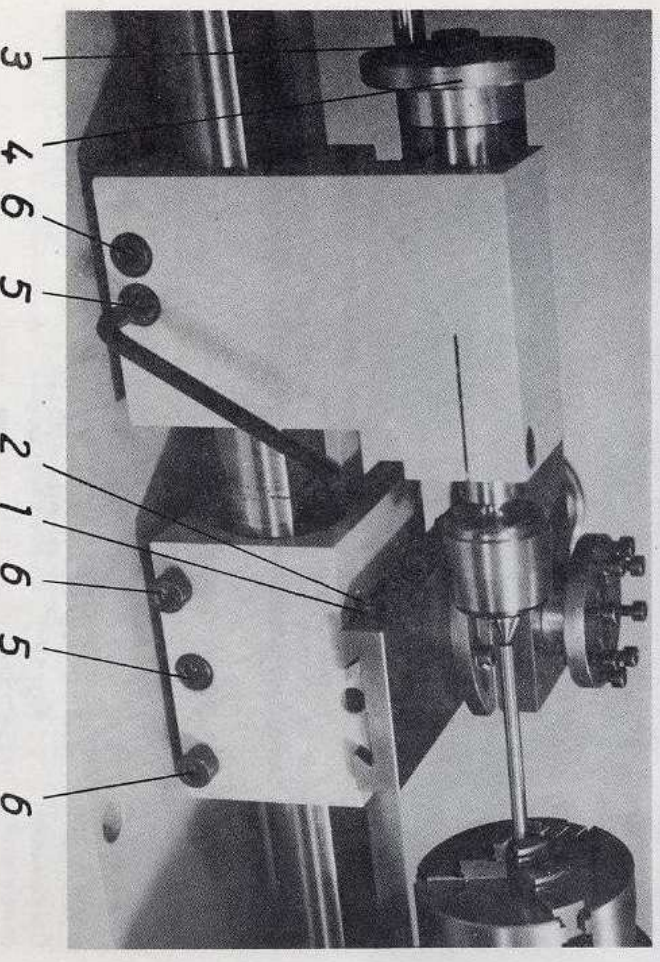
The carriage and the tailstock have locking screws 5 and forcing screws 6. Unscrew the forcing screw. Carefully tighten the locking screw 5 with a hexagon socket screw wrench to lock the respective assembly on the bed.

If the movement is too sluggish, slacken the locking screw and tighten the forcing screw a little to increase the play.

Note – If the carriage moves too easily, the working accuracy is considerably reduced.

Important: Tighten the forcing screws on the carriage (6) and on the tailstock (6) no more than a quarter of a turn.

Fig. 16



Lathe tools and inserts

The tools described below are available for the various machining methods.

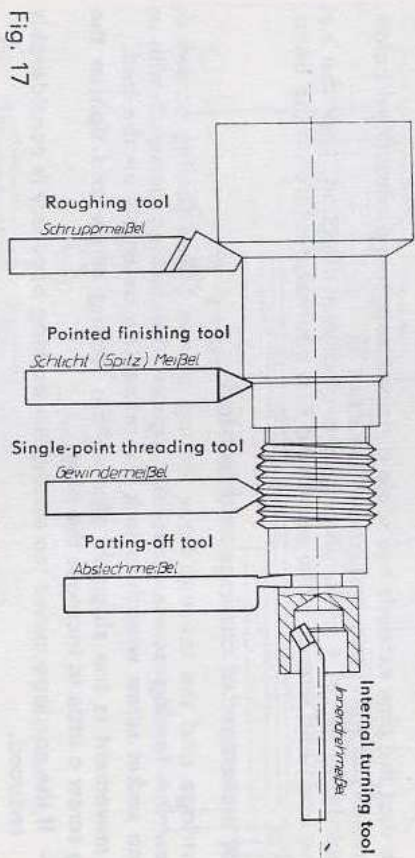


Fig. 17

Lathe tools

Roughing tool

Removes a thick chip within a short period of time

Pointed finishing tool

Produces an accurate and regular surface

Slide turning tool,

L.H. – R.H.

For sliding and facing and turning out of defined angles, R.H. and L.H. direction of machining

Parting-off tool

Cuts recesses in workpieces and cuts workpieces off.

For parting-off operations mind the

- proper centre height of the tool,
- low speed,
- cooling of the tool.

Threading tool

For external threading operations, tool ground according to the form of the thread

Twist drill

Fig. 18



Fig. 19



Combination centre drill



Centre point



Brass

Countersink

Fig. 20



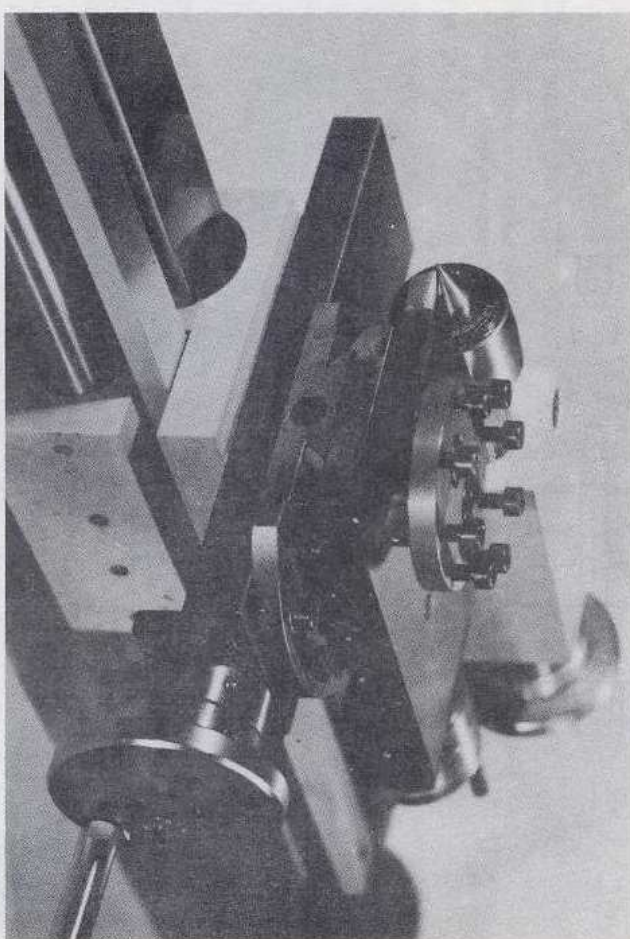
End mill cutter

Fig. 21



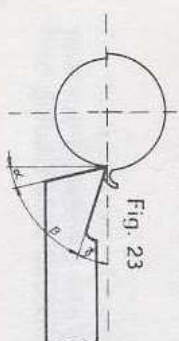
Mounting of the tools and inserts

Fig. 22



The cutting edge of the lathe tool should be exactly at the level of the machine centre. If the cutting edge is positioned too low, place shims underneath.

Note – Give the tool a short overhang. A long overhang will result in vibrations and inaccuracies.

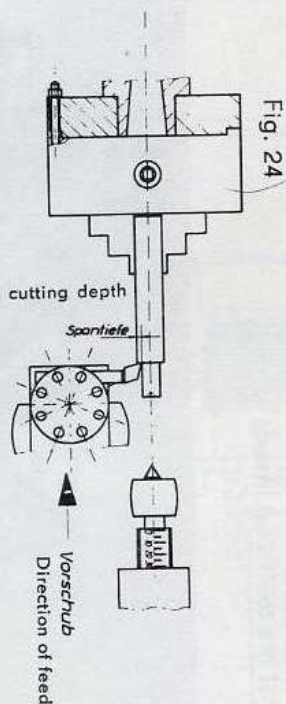


Tool angles according to the materials to be machined.

Fig. 23

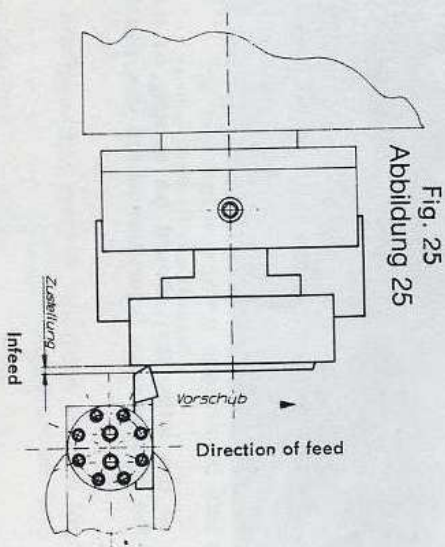
Sliding

The tool moves in parallel with the axis of rotation. The feed motion is effected by turning the saddle handwheel or the leadscrew handwheel. The depth of cut is set with the cross slide.



Facing

The tool is moved at a right angle relative to the axis of rotation. The face end of the workpiece as well as recesses and grooves on the outer diameter can be machined. The feed motion is effected by turning the cross slide handwheel. The depth of cut is set with the saddle.



Manual mode of operation

All operations with the exception of thread cutting can be carried out with manual feed by turning the handwheels on the compound slide (sliding and facing) or on the leadscrew.

Operation with automatic feed motion

The automatic feed produces a regular surface. Two rates of feed are available,

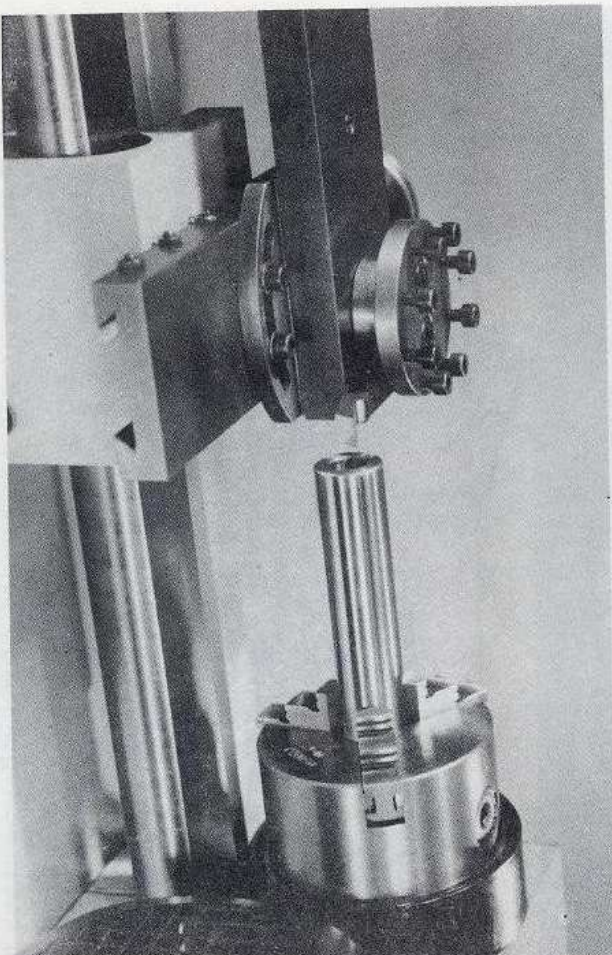
0.08 mm/rev. (suitable for finishing) and
0.16 mm/rev. (suitable for roughing).

The rates of feed are set with the aid of combinations of changes gears according to the Table on the instruction plate. To switch on the automatic feed motion move the control lever of the coupling upwards and shift it to the left with the machine running. At OFF position the lever is locked to prevent that the automatic feed motion is switched on accidentally.

Chuk work

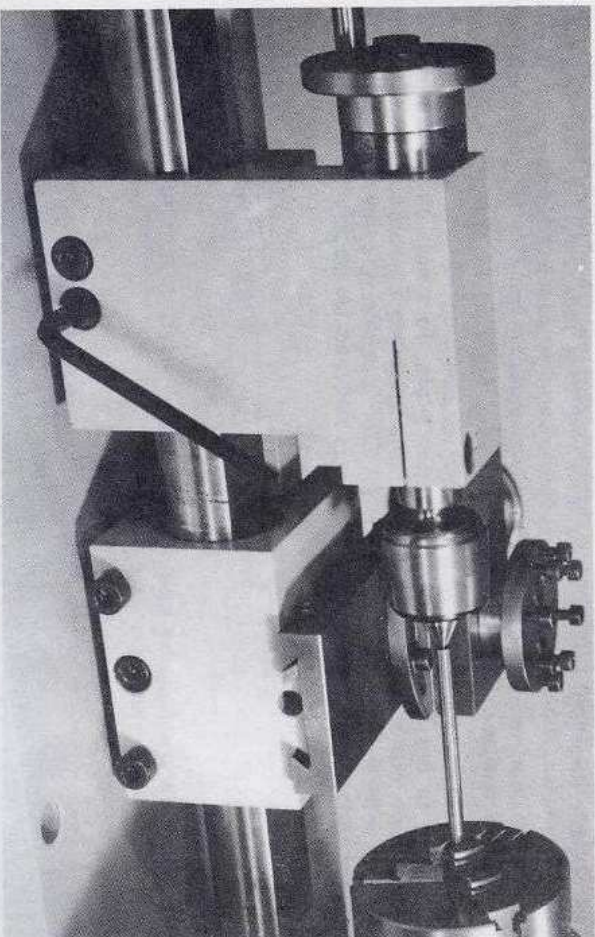
The three-jaw chuck is the holding tool usually used in turning.

Fig. 26



For the machining of long workpieces a centre in the tailstock sleeve is used as an end support. For this purpose a centre hole is to be provided in the face end of the workpiece (see Fig. 27).

Fig. 27



Turning between centres

Workpieces where true running is critical are to be machined between centres. To mount the workpiece, drill a centre hole into both face ends of the workpiece. The face ends must have been faced down beforehand. The depth of the centre holes is determined by the size of the workpiece. The driving pin which is screwed into the chuck flange engages the work driver mounted on the workpiece. The dead centre in the tailstock slides in the centre hole of the workpiece. This place should be well lubricated.

Resetting the machine for turning between centres is done with a few manipulations:

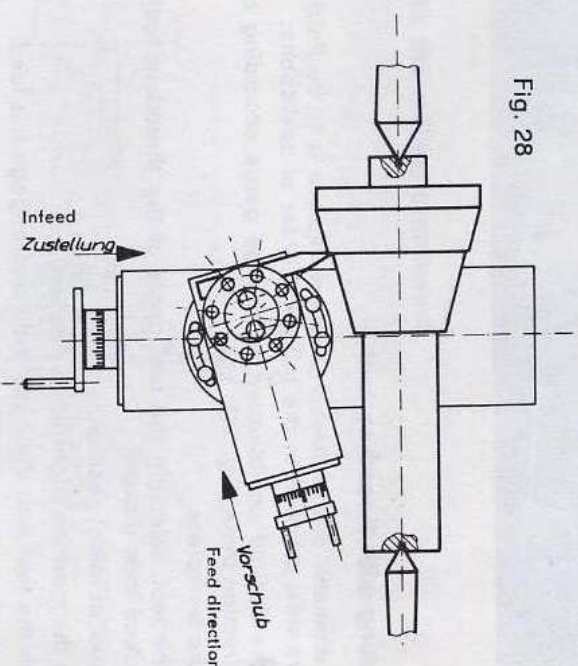
- Unscrew the threaded stud M 3 to remove the lock ring.
- Unscrew three hexagon nuts M 6 to remove the chuck.
- Insert the dead centre M 2 into the main spindle. Carefully clean the taper and the centre.
- Insert the driving pin in one of the three mounting holes in the chuck flange and secure the pin with a nut, M 6.
- Mount the safety work driver on the workpiece.
- Insert the centre MK 1 into the tailstock sleeve. Again, make certain that the taper and the centre are clean.

- Mount the workpiece together with the safety work driver between the two centres. Fit the centres into the centre holes drilled beforehand into both face ends of the workpiece. Clamp the workpiece by moving the tailstock sleeve towards the headstock. Make certain that the tailstock was locked on the bed beforehand. When the workpiece is mounted to rotate between the two centres, lock the tailstock sleeve.
- Machining of the workpiece can be started.

Taper turning

For taper turning adjust the saddle to the desired angle of taper indicated on the swivelling base of the saddle. Use the four locking screws to lock the base after the adjustment has been made. The feed motion is obtained by shifting the small handwheel in longitudinal direction.

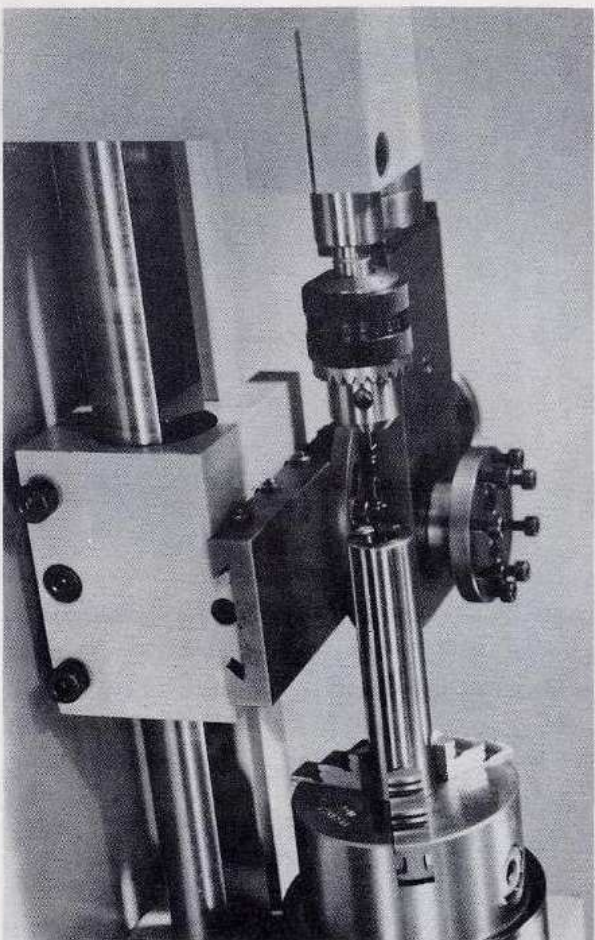
Fig. 28



Drilling (see Fig. 29)

The workpiece is mounted in the three-jaw chuck. The drill is mounted in the drill chuck. The tailstock sleeve holds the drill chuck and the arbor. The feed motion is obtained by turning the handwheel on the tailstock with your hand. Twist drills with Morse taper MK 1 can also be used in the tailstock sleeve.

Fig. 29



Thread cutting with threading tool

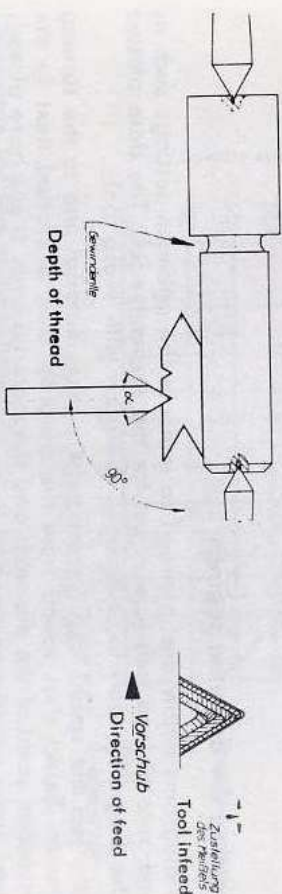
The major diameter of the thread on the workpiece is to be finished before-hand. Afterwards, proceed in the following order of operations:

- Select the desired combination of change gears according to the lead (see instruction plate, Fig. 14).
- Clamp the workpiece.
- Mount the tool, selecting the tool angle of the threading tool according to the thread form desired.
- Set the tool at initial position.
- Connect the machine (right-hand rotation).
- Approach the tool with the cross slide and engage the feed.
- As soon as the screw length is cut (undercut must exist), disconnect the machine. Keep the coupling engaged all time until thread cutting is finished.
- Withdraw the tool from the workpiece.
- Reverse the direction of rotation.
- Reconnect the machine and allow the carriage to return to initial position.

- k) Approach the tool.
Repeat operations a) to k) until the desired depth of thread is attained.
Note – For perfect thread cutting mind the following:

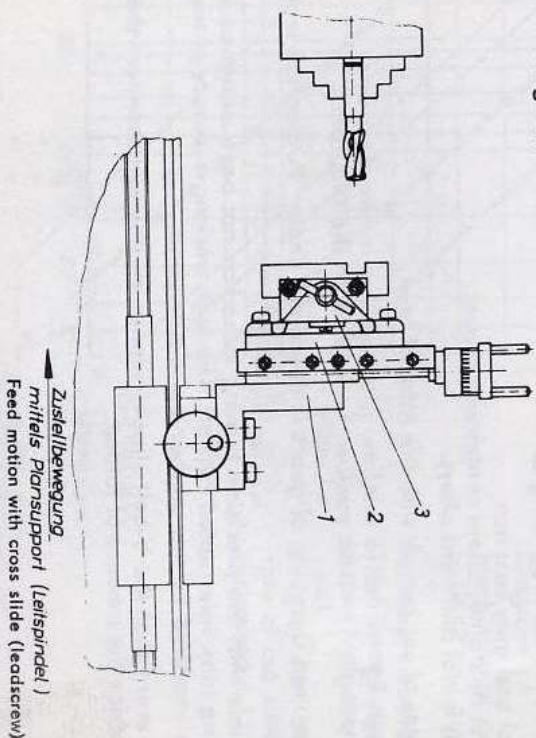
Approach the threading tool with the cross slide as indicated under f) above. Move the saddle from chip to chip once to the left and once to the right by as little as 0.02 to 0.03 mm. Cut centrally by slightly infeeding only short before reaching the depth of thread.

Fig. 30



Milling with the milling attachment

Fig. 31



Using the milling attachment converts your turning lathe into a small milling machine. Resetting is to be carried out in the manner described below.

- Unscrew two screws to demount the tool holder from the saddle. Remove the threaded stud M 8 from the saddle.
 - Demount the saddle from the cross slide by unscrewing the screws.
 - Screw the setting-up square (1) to the cross slide, using four screws M 5.
 - Secure the saddle (4) with the aid of hexagonal head screws to the setting-up square.
 - Screw the vice in the desired position to the saddle.
- The use of the complete saddle enables swivelling in two directions. The milling attachment can be used for the three-dimensional machining of work-pieces.

Selecting the optimum settings

The diagrams below are intended to indicate the optimum settings such as speed, rate of feed and rate of cut for the respective job. The data plotted in the diagrams apply to continuous operation with sharp tools.

First select the speed that corresponds to your material and to the turning diameter. Select that speed from the diagram that is plotted next to the intersection point of the diameter and the material lines. If you have already gained some experience you will carry out fine turning jobs at the higher speed with the turning tool sharpened accordingly.

Normally, the rule of thumb applies that a lower speed ensures a sharp tool over a longer period of time.

Selection of the rate of cut can be done with the aid of three diagrams, i.e. one each for the machining of

- steel and grey cast iron,
- brass and other alloys containing copper,
- light metal and light alloys.

The rates of cut comply with the rates of feed:

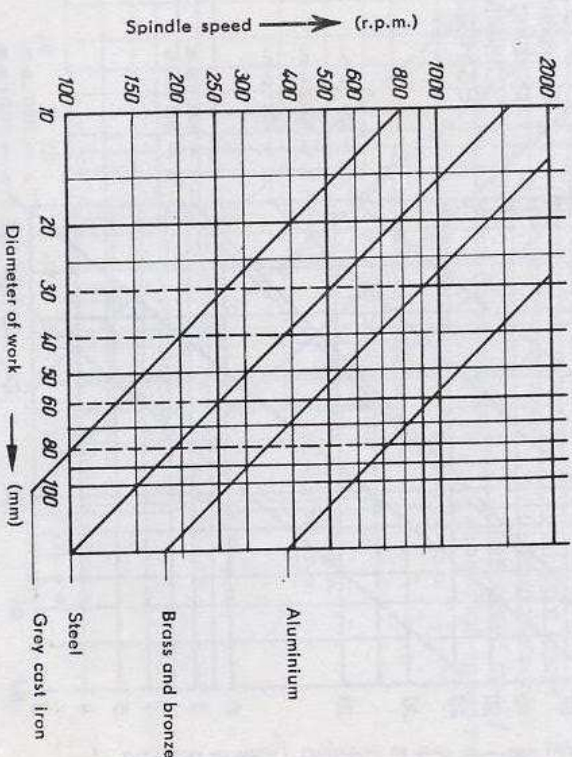
- Roughing 0.16 mm/rev. (dashed line in the diagrams)
- Finishing 0.08 mm/rev. (solid line in the diagrams).

The required changing of gears is described under "Putting the machine into operation".

Note here that the precision turning lathe has not been designed for coarse roughing jobs, interrupted cuts etc. The high working accuracy of the machine will be impaired by any mechanical overloading.

In the event that the V-belt should slip, immediately disconnect the machine and reduce the amount of infeed.

Diagram for speed selection



Diagrams for the cutting capacity

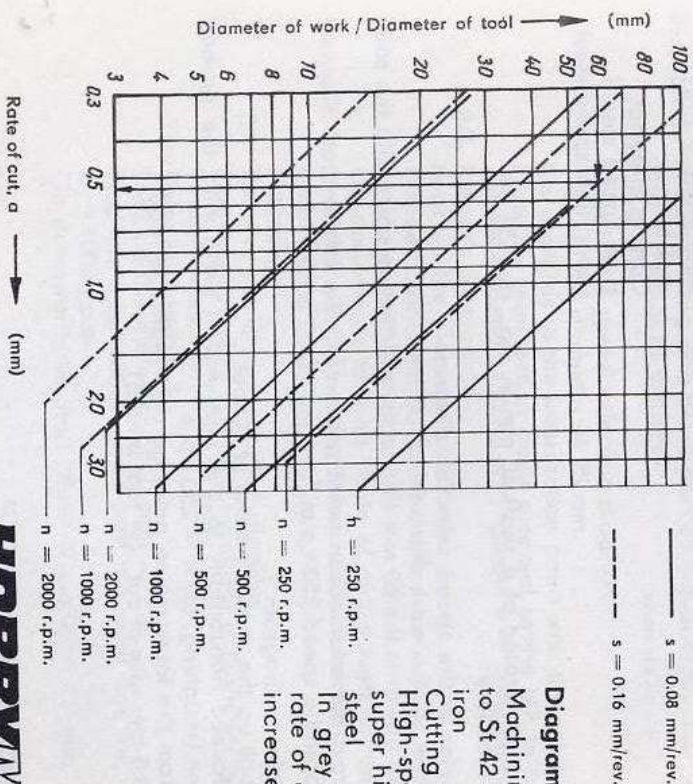


Diagram 1

Machining of steel up to St 42 and grey cast iron
Cutting material: High-speed steel / super high-speed steel
In grey cast iron the rate of cut can be increased x 1.25.

Examples

Example 1: Rough-turning of a shaft 60 mm in dia., steel St 34

Procedure:

- 1.1. Refer to the speed selection diagram.
Look up the work diameter of 60 mm.
Go upwards the 60 mm line to its intersection point with the solid line for steel.
From the intersection point proceed to the left to read "Spindle speed 250 r.p.m.."
- 1.2. Refer to diagram 1.
Look up the work diameter of 60 mm.
Proceed horizontally to the intersection point with the dashed line (roughing) for $n = 250$ r.p.m.
From the intersection point go downwards to read "0.6 mm rate of cut" (= tool infeed).

Machining of brass
and bronze
Cutting material:
High-speed steel /
super high-speed steel

Diagram 2

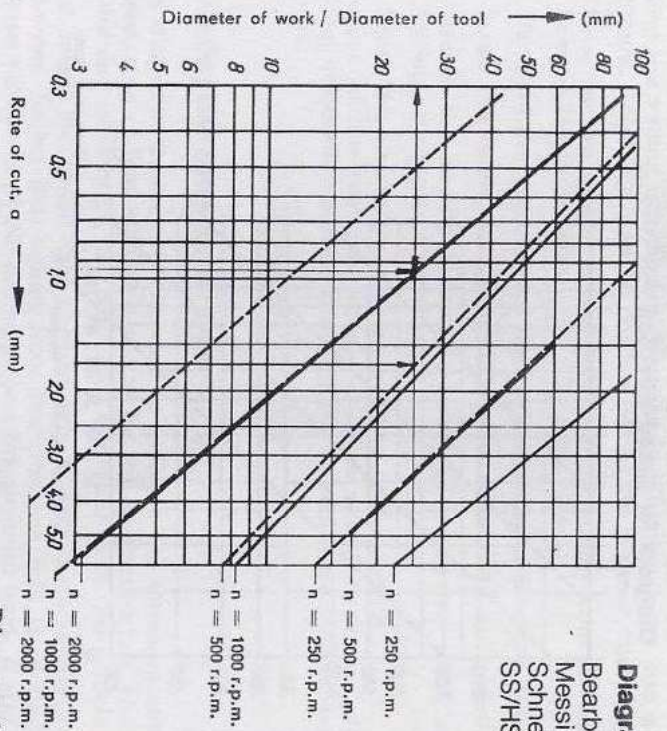


Diagram 2
Bearbeitung von
Messing und Bronze
Schneidwerkstoff:
SS/HSS

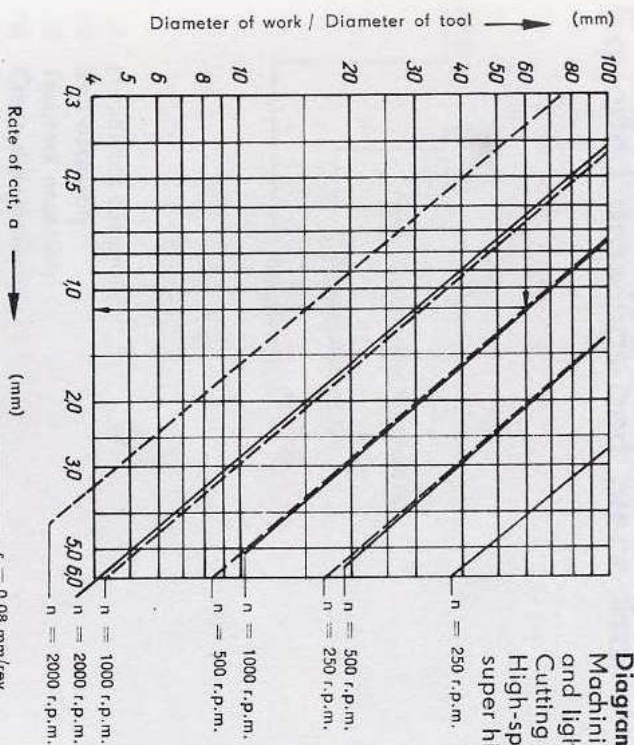


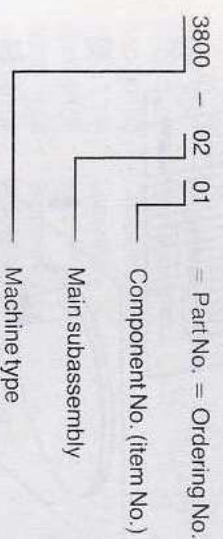
Diagram 3
Machining of aluminum
and light alloys
Cutting material:
High-speed steel /
super high-speed steel

Example 2: Rough-turning of a brass part 25 mm in dia., rate of feed 0.16 mm/rev.

Procedure:

- 2.1. Refer to the speed selection diagram.
Look up the diameter of 25 mm.
Go upwards to the intersection point with the solid line for brass.
From the intersection point proceed to the left to read "Spindle speed 1150 r.p.m.". Select $n = 1000$ r.p.m.
 - 2.2. Refer to diagram 2.
Look up the diameter of 25 mm.
Proceed horizontally to the intersection point with the dashed line for $n = 1000$ r.p.m.
Go downwards to read "Rate of cut, $a = 0.95$ mm".
- Example 3: Finish-turning of an aluminium part 60 mm in dia., rate of feed 0.08 mm/rev.
- Procedure:
- 3.1. Refer to the speed selection diagram.
Find the speed of $n = 980$ r.p.m. for a diameter of 60 mm in aluminium. Select $n = 1000$ r.p.m.
 - 3.2. Refer to diagram 3.
Look up the diameter of 60 mm.
Find the intersection point with the solid line for $n = 1000$ r.p.m.
Go downwards to read "Rate of cut, $a = 1.2$ mm"

Exploded drawings and piece lists



- 01 Headstock assembly
- 02 Bed assembly
- 03 Tailstock assembly
- 04 Cross slide assembly
- 05 Saddle assembly
- 06 Motor and drive assembly
- 07 Electrical equipment
- 08 Apron and change gear assembly

Final remarks

For more comprehensive information on metal working please refer to the pertaining literature. Your bookseller will surely provide you with technical literature on turning which is but a section of metal cutting.

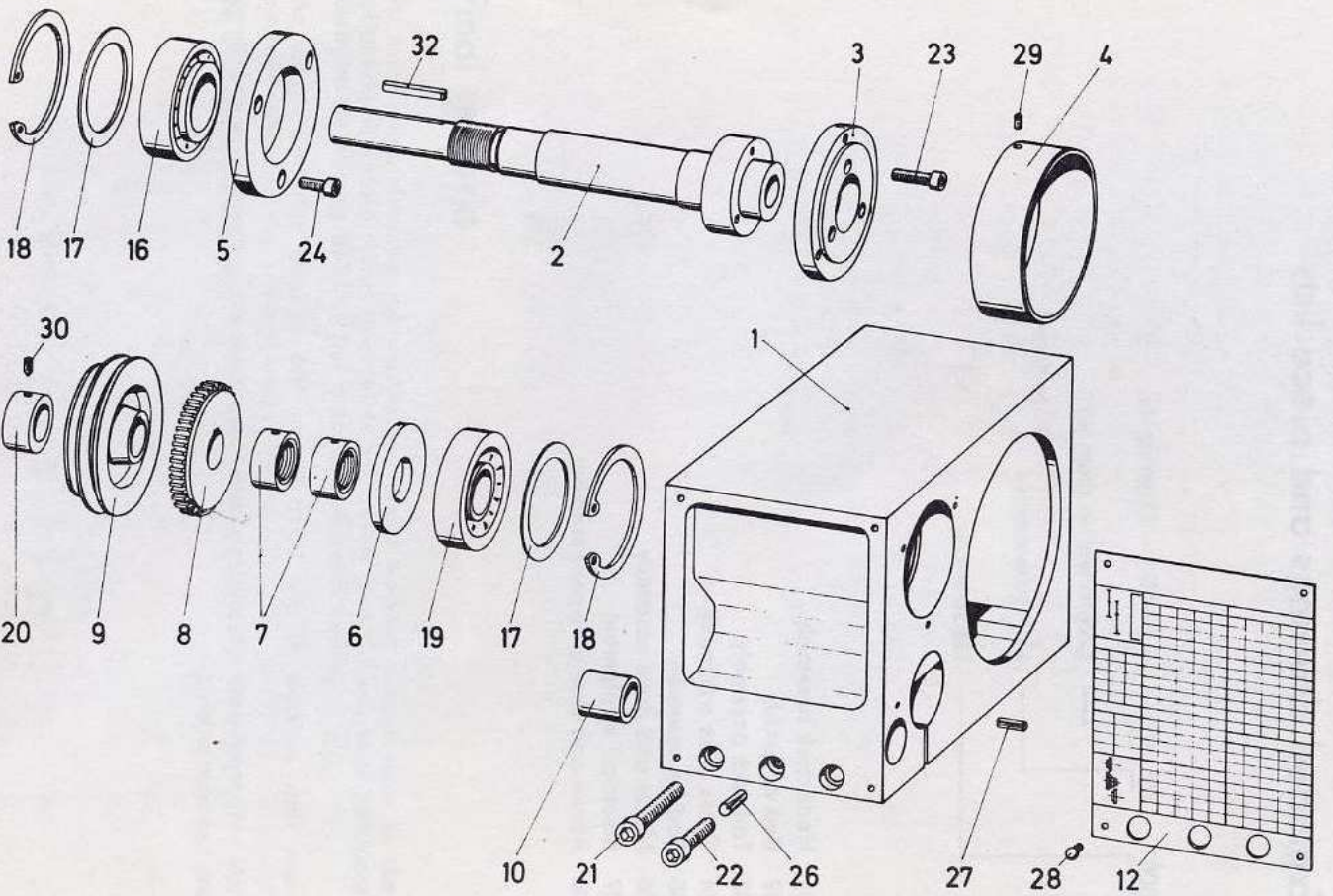
The contents of this booklet will merely assist you in working with your precision lathe.

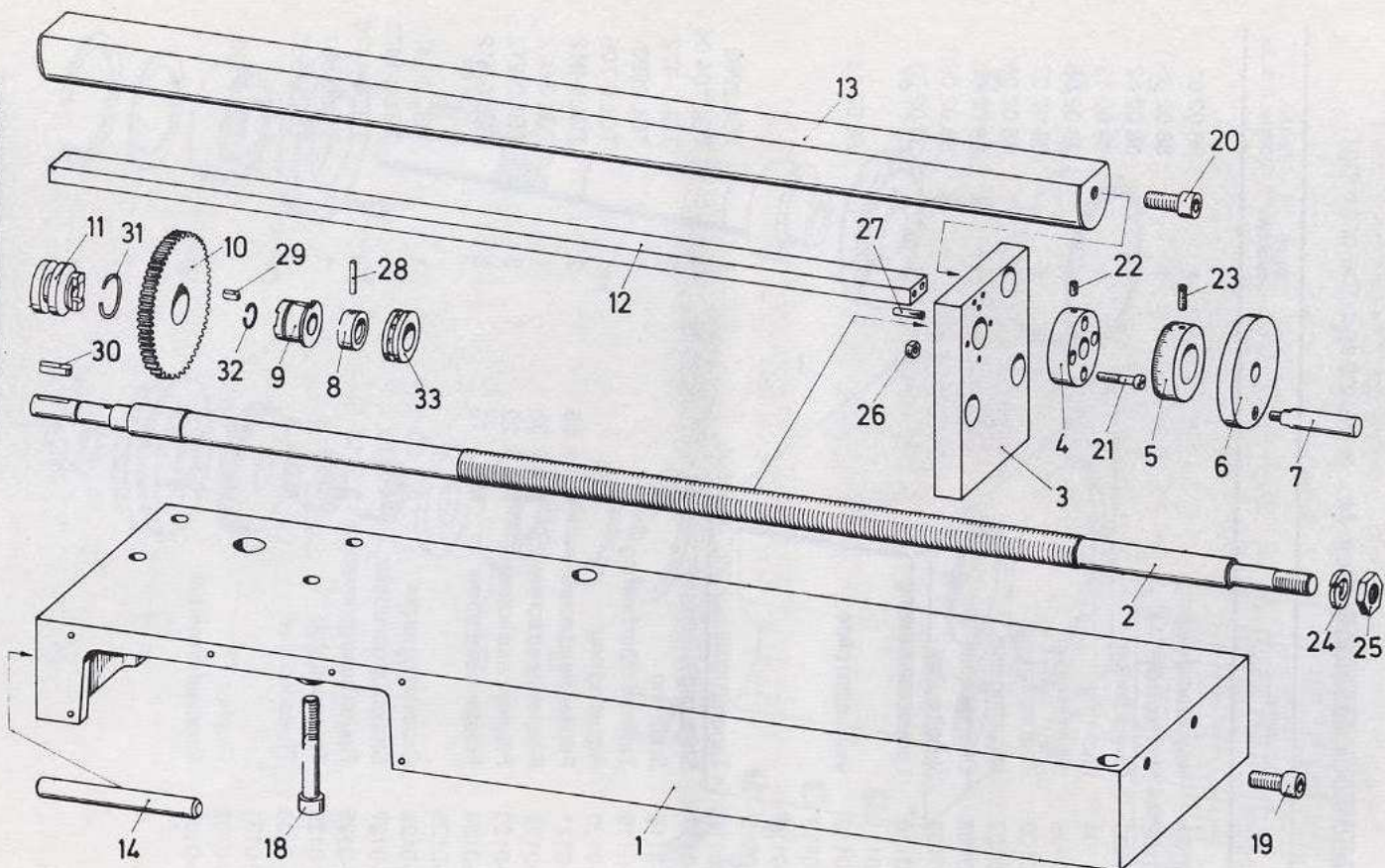
We wish you every success.

Note - We reserve the right to supply certain assemblies with all their parts, even if one part only has been ordered.

01 Headstock assembly (Item No. = Number in the drawing)

Item No.	Description	No. of machine	Part No. DIN No., TGL No.
3800-0101	Headstock housing	1	38 02 01
3800-0102	Main spindle	1	38 02 05/1
3800-0103	Chuck flange	1	38 02 12
3800-0104	Lock ring	1	38 02 13
3800-0105	Bearing cover	1	38 02 06
3800-0106	Bearing cover	1	38 02 07/1
3800-0107	Adjusting nut	1	38 02 08/1
3800-0108	Change gear	1	39 02 00
3800-0109	V-belt pulley	1	38 02 09/1
3800-0110	Leadscrew bearing	1	38 02 03
3800-0111			
3800-0112	Instruction plate	1	38 02 18/1
3800-0113			
3800-0114			
3800-0115			
3800-0116	Tapered roller bearing	1	TGL 2993
3800-0117	Shim ring	2	TGL 104 04
3800-0118	Snap ring	2	TGL 0-472
3800-0119	Tapered roller bearing	1	TGL 2993
3800-0120	Adjusting ring	1	TGL 0-705
3800-0121	Fillister-head screw	2	TGL 0-912
3800-0122	Fillister-head screw	1	TGL 0-912
3800-0123	Fillister-head screw	3	TGL 0-912
3800-0124	Fillister-head screw	3	TGL 0-912
3800-0125			
3800-0126	Grooved taper pin	1	TGL 0-1471
3800-0127	Straight grooved pin	1	TGL 0-1473
3800-0128	Round head grooved pin	4	TGL 0-1476
3800-0129	Threaded stud	1	TGL 0-551
3800-0130	Threaded stud	1	TGL 0-553
3800-0131			
3800-0132	Feather	1	TGL 9500
3800-0133	Grooved dowel pin	2	





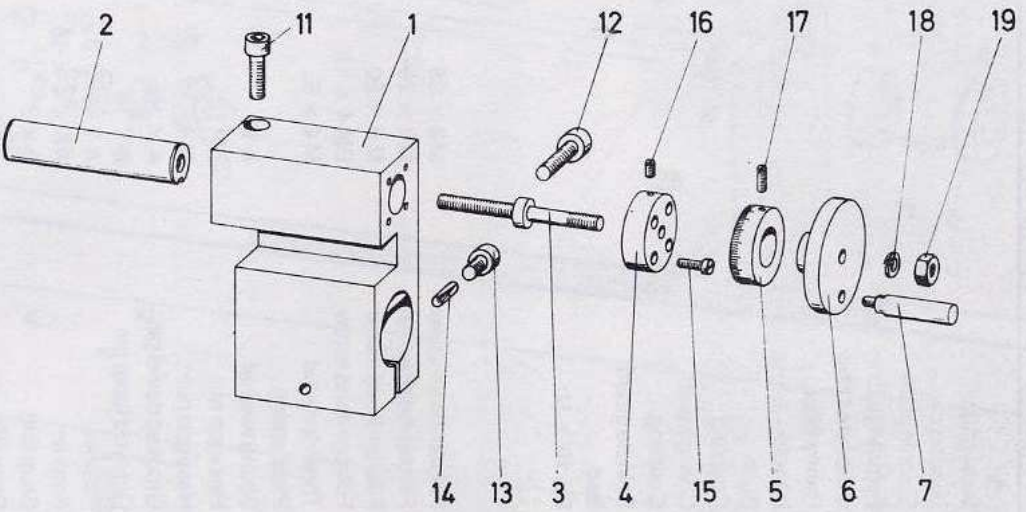
02 Bed assembly, base plate, leadscrew

(The last figure in the part No. = Number in the drawing)

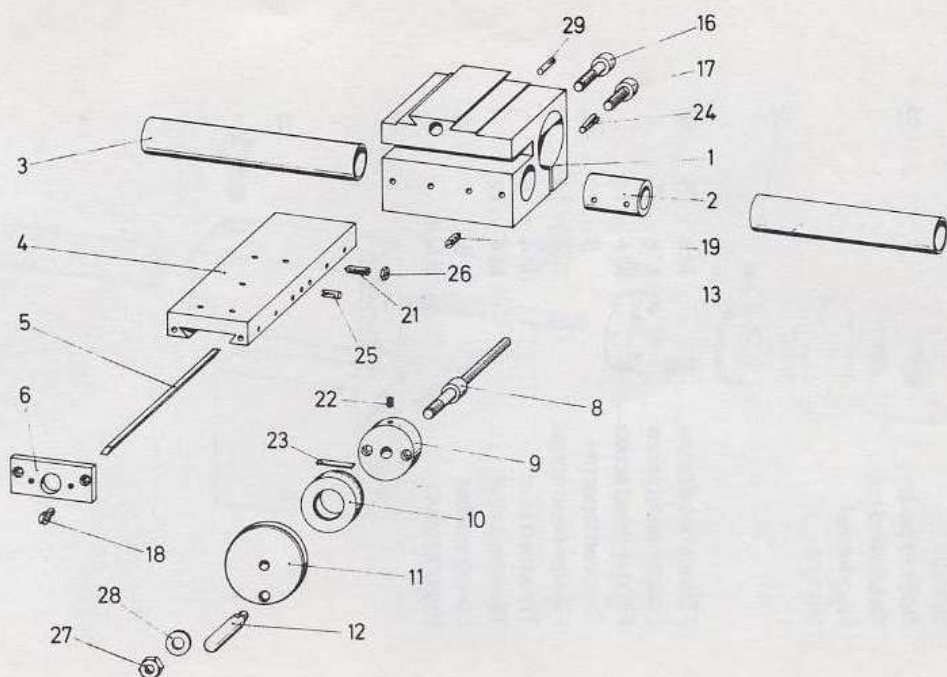
Part No.	Description	No. off
3800-0201	Base plate	1
3800-0202	Leadscrew	1
3800-0203	Spindle plate	1
3800-0204	Spindle guiding	1
3800-0205	Graduated ring	1
3800-0206	Handwheel	1
3800-0207	Handle	1
3800-0208	Bush	1
3800-0209	Coupling	1
3800-0210	Change gear	1
3800-0211	Coupling	1
3800-0212	Spindle guard	1
3800-0213	Bed	1
3800-0214	Pin 10 x 90	1
3800-0215		
3800-0216		
3800-0217		
3800-0218	Fillister-head screw	4
3800-0219	Fillister-head screw	2
3800-0220	Fillister-head screw	1
3800-0221	Fillister-head screw	4
3800-0222	Threaded stud	1
3800-0223	Plate spring	1
3800-0224	Spring washer	2
3800-0225	Hexagon nut	1
3800-0226	Hexagon nut	4
3800-0227	Grooved dowel pin	2
3800-0228	Grooved taper pin	1
3800-0229	Feather	1
3800-0230	Feather	1
3800-0231	Snap ring	1
3800-0232	Snap ring	1
3800-0233	Grooved ball thrust bearing	1

03 Tailstock assembly

Part No.	Description	No. off
3800-0301	Tailstock housing	1
3800-0302	Tailstock sleeve	1
3800-0303	Spindle	1
3800-0304	Spindle guiding	1
3800-0305	Graduated ring	1
3800-0306	Handwheel	1
3800-0307	Handle	1
3800-0308		
3800-0309		
3800-0310		
3800-0311	Fillister-head screw	1
3800-0312	Fillister-head screw	1
3800-0313	Fillister-head screw	1
3800-0314	Grooved taper pin	1
3800-0315	Fillister-head screw	4
3800-0316	Threaded stud	1
3800-0317	Threaded stud	1
3800-0318	Spring washer	1
3800-0319	Hexagon nut	1



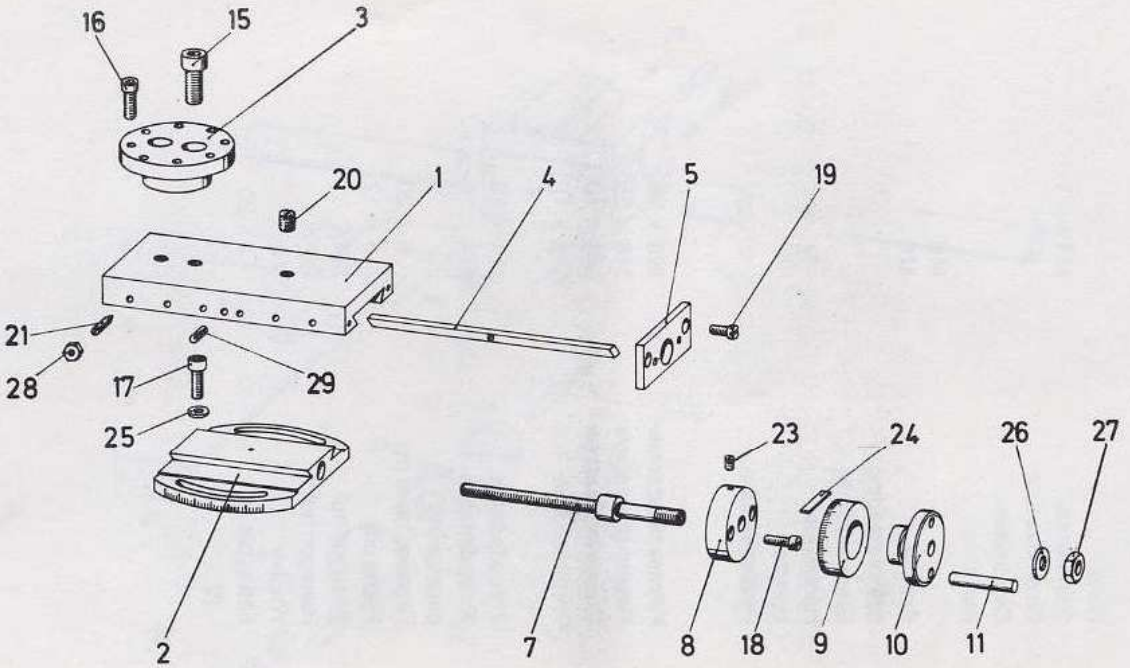
04 Cross slide assembly



Part No.	Description	No. off
3800-0401	Base	1
3800-0402	Spindle nut	1
3800-0403	Protective tube	1
3800-0404	Cross slide	1
3800-0405	Bar	1
3800-0407	Spindle	1
3800-0408	Spindle guiding	1
3800-0409	Graduated ring	1
3800-0410	Handwheel	1
3800-0411	Handle	1
3800-0412	Protective tube	1
3800-0413		
3800-0414		
3800-0415		
3800-0416	Fillister-head screw	2
3800-0417	Fillister-head screw	1
3800-0418	Fillister-head screw	2
3800-0419	Threaded stud	4
3800-0420		
3800-0421	Threaded stud	6
3800-0422	Threaded stud	1
3800-0423	plate spring	
3800-0424	Grooved taper pin	1
3800-0425	Fitting pin	1
3800-0426	Hexagon nut	6
3800-0427	Hexagon nut	1
3800-0428	Washer	1
3800-0429	Fitting pin	2

05 Saddle assembly

Part No.	Description	No. off
3800-0501	Saddle	1
3800-0502	Base of saddle	1
3800-0503	Tool holder	1
3800-0504	Gib	1
3800-0505	Spindle guiding plate	1
3800-0506	Spindle	1
3800-0507	Spindle guiding	1
3800-0508	Graduated collar	1
3800-0509	Handwheel	1
3800-0510	Straight pin	2
3800-0511		
3800-0512		
3800-0513		
3800-0514		
3800-0515	Break screw	2
3800-0516	Fillister-head screw	8
3800-0517	Fillister-head screw	4
3800-0518	Fillister-head screw	2
3800-0519	Fillister-head screw	2
3800-0520	Threaded stud	1
3800-0521	Threaded stud	6
3800-0522		
3800-0523	Threaded stud	1
3800-0524	Plate spring	1
3800-0525	Washer	4
3800-0526	Washer	1
3800-0527	Hexagon nut	1
3800-0528	Hexagon nut	6
3800-0529	Grooved dowel pin	1

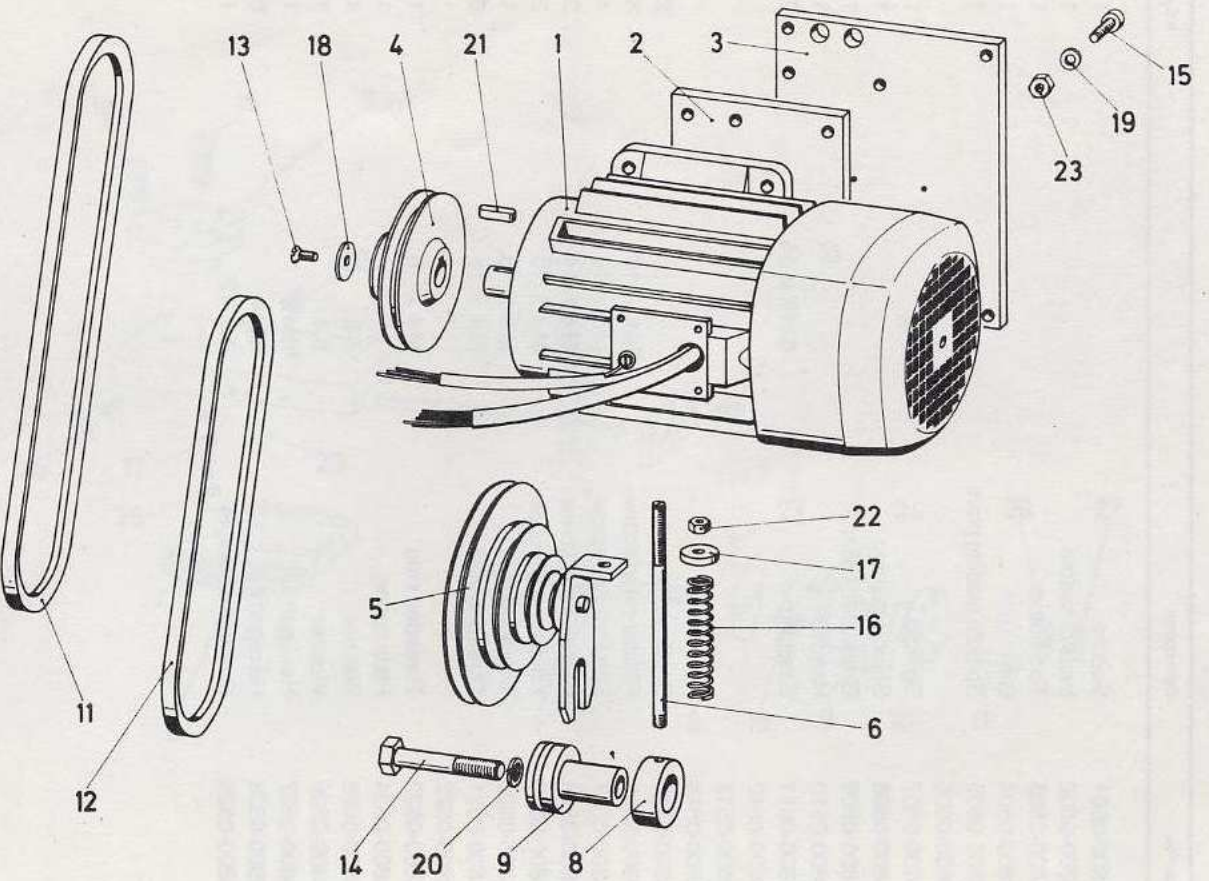


06 Motor and drive assembly

Item No.	Description	No. of	Part No. DIN No./TGL No.
3800-0601	Motor EAM 63 G 2 - AK 12 220 V	1	38 02 30
3800-0602	Intermediate plate	1	38 02 14/1
3800-0603	Motor base plate	1	38 02 17/1
3800-0604	V-belt pulley	1	
3800-0605	Stepped V-belt pulley	1	
3800-0606	Draw spindler	1	38 02 34
3800-0608	Adjusting ring	1	
3800-0609	Slipper	1	38 02 31
3800-0611	V-belt	1	TGL 6554
3800-0612	V-belt	1	TGL 6554
3800-0613	Countersunk screw	1	TGL 5683
3800-0614	Hexagonal head screw	1	TGL 0-931
3800-0615	Fillister-head screw	2	TGL 0-912
3800-0616	Compression spring	1	TGL 18 395
3800-0617	Washer	1	TGL 0-125
3800-0618	End washer	1	TGL 17 491
3800-0619	Washer	2	TGL 0-125St
3800-0620	Spring washer	1	TGL 7403
3800-0621	Feather	1	TGL 9500
3800-0622	Hexagon nut	1	TGL 0-934
3800-0623	Hexagon nut	4	TGL 0-934
3800-0624	Fillister-head screw	6	TGL 0-912
3800-0625	Fillister-head screw	2	TGL 0-912

07. Electrical equipment

Part No.	Description	No. of
3800-0701	ON/OFF switch	1
3800-0702	R. H./L. H. switch	
3800-0703	Switch plate including screws	1
3800-0704	Capacitor	1
3800-0705	Lower cover plate including screws, terminals and pull relief	1
3800-0706	Mains connection including mains plug	1

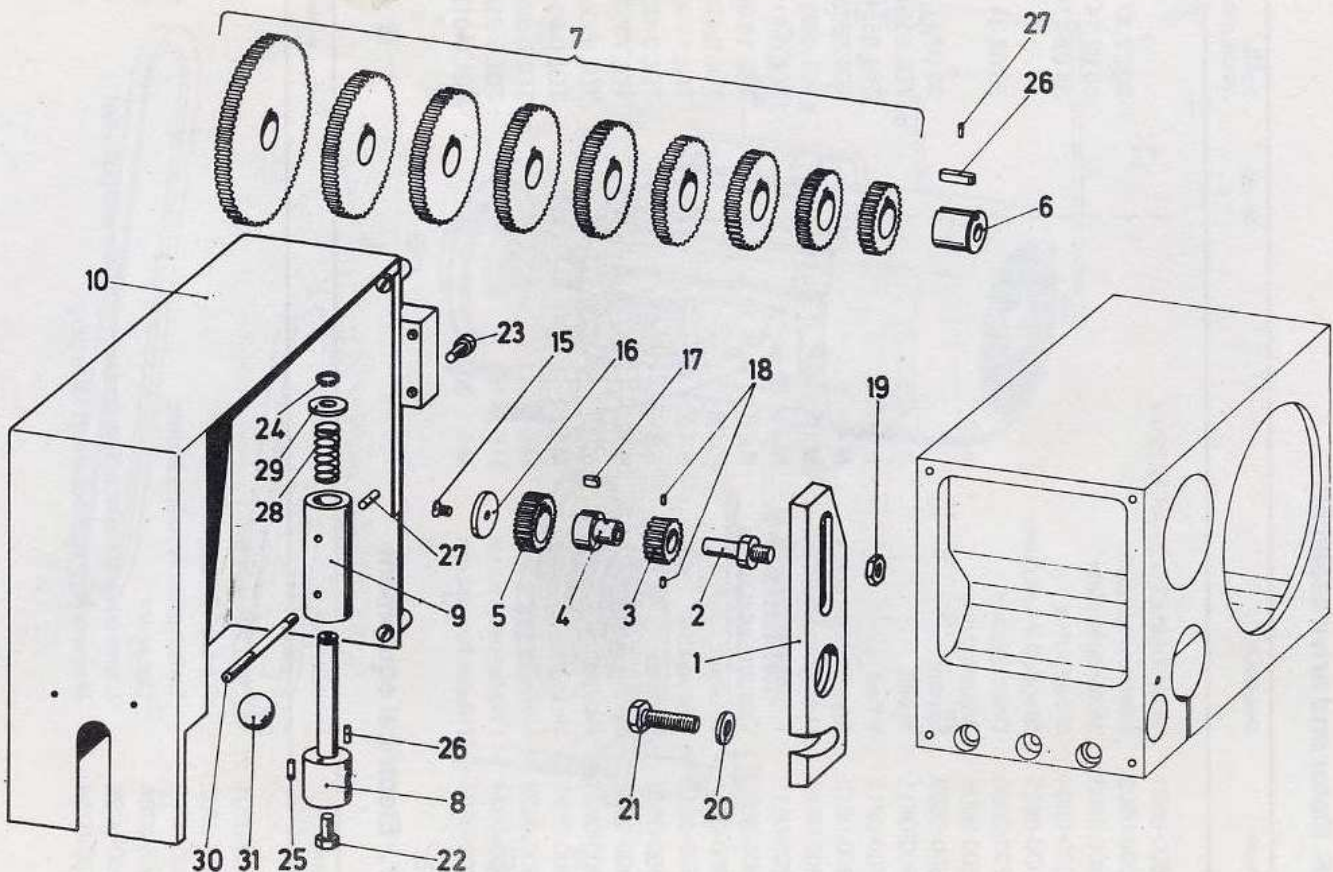


08 Apron, change gear and coupling assembly

Item No.	Description	No. of machine	Part No. DIN/No./TGL No.
3800-0801	Apron	1	38 01 01/1
3800-0802	Wheel stud	1	39 01 12/1
3800-0803	Gear	1	39 01 06
3800-0804	Bush	1	39 01 09/1
3800-0805	Gear	1	39 01 10
3800-0806	Bush	1	39 01 14/1
3800-0807	Set of change gears	9	39 02 00
3800-0808	Stud bolt	1	39 03 02-2
3800-0809	Sleeve	1	39 03 03-2
3800-0810	Gear box, complete		
3800-0811			
3800-0812			
3800-0813			
3800-0814			
3800-0815	Countersunk screw	1	TGL 5683
3800-0816	End washer	1	TGL 17481
3800-0817	Feather	1	TGL 9500
3800-0818	Straight grooved pin	2	TGL 0-1473
3800-0819	Hexagon nut	1	TGL 0-439
3800-0820	Washer	1	TGL 0-125St
3800-0821	Hexagonal head screw	1	TGL 0-933
3800-0822	Hexagonal head screw	1	TGL 0-933
3800-0823	Fillister-head screw	2	TGL 0-912
3800-0824	Snap ring	1	TGL 0-471
3800-0825	Grooved dowel pin	1	TGL 0-1474
3800-0826	Straight pin	1	TGL 0-6325
3800-0827	Straight pin	1	TGL 0-6325
3800-0828	Compression spring	1	TGL 18395
3800-0829	Washer	1	TGL 0-125
3800-0830	Stud bolt	1	TGL 2950
3800-0831	Ball handle	1	TGL 2950

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9. Readjusting the main assemblies

Despite highest precision in manufacturing the turning lathe impermissible bearing play will occur after a long period of operation. Carry out the following adjustments to restore the working accuracy of your machine.

Main spindle

Readjustment to reduce the play is done with the adjusting nuts on the driving end. Unscrew rear nut by turning it in a counter-clockwise direction, readjust front nut accordingly. Afterwards, firmly lock both nuts. The spindle should always be comparatively easy running. The machine should always operate perfectly at a speed of 2000 r.p.m.; otherwise the bearings are adjusted too tight.

In such a case, again unscrew the nuts and lightly beat on the spindle in the direction towards the tailstock, using a piece of wood. Readjust.

Never use a steel hammer!

If demounting of the main spindle is required, refer to "Maintenance and lubrication".

Cross slide and saddle

Readjust the guideways by slackening the hexagon nut (1) and readjusting the threaded studs (2) with a screw driver. Take care to see that no chips are jammed and that the ways are clean.

Hand wheels for slide feed motion

In case that the play exceeds two scale divisions, readjust as described below.

- Slacken lock nut (3) with open-end wrench.
- Readjust hand wheel (4) by turning it in a clockwise direction.
- Lock the nut with the open-end wrench while exerting a firm counterpressure on the handwheel.

Ease of movement of carriage and tailstock

The carriage and the tailstock have locking screws (5) and forcing screws (6). Unscrew the forcing screw. Carefully tighten the locking screw (5) with a hexagon socket screw wrench to lock the respective assembly on the bed.

If the movement is too sluggish, slacken the locking screw and tighten the forcing screw a little to increase the play.

Attention! If the carriage moves too easily, the working accuracy is considerably reduced.

Important: Tighten the forcing screws (6) on the carriage and on the tailstock no more than a quarter of a turn!

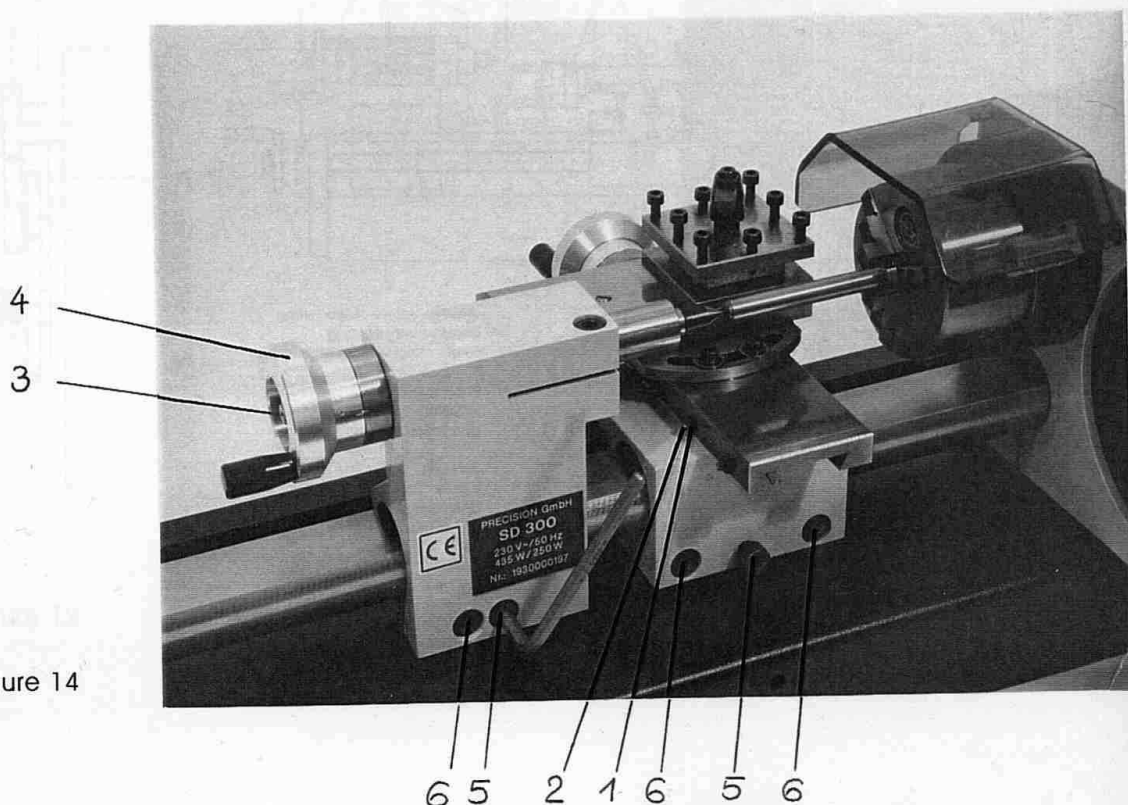


Figure 14