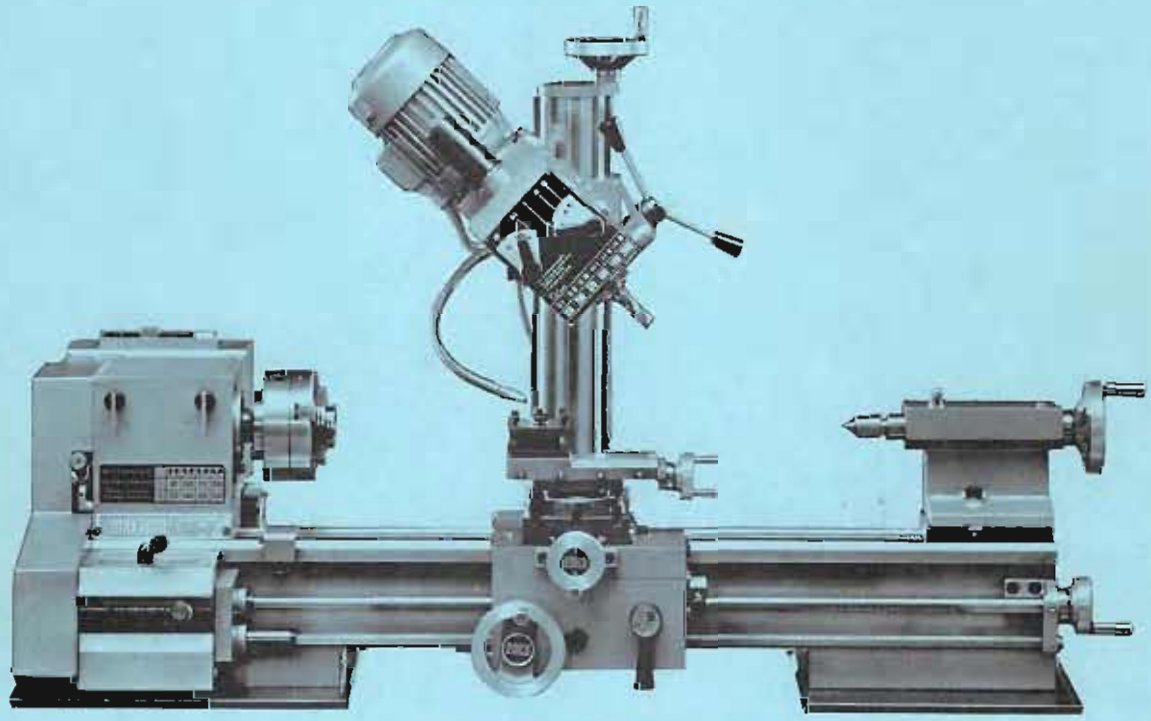
Instruction book

Service parts

maximat V10-P maximat MENTOR 10



ENGLISH

Edition 7801 Ref. Nr. EN 2440

Maier + Co.
A-5400 Hallein/Austria

INDEX

Unpacking – Setting up – Preparing for operation 1
Fitting the vertical attachment 2
Important operating instructions 3
Technical data (basic machine) 4
Required floor space 5
Technical data (vertical attachment) 5
Controls 6, 7

General Description

Machine bed 8
Headstock 8
Quick-change gearbox 8
Drive and electrical equipment 8
Saddle, cross- and top slide 8
Tailstock 8
Safety slipping clutch 8
Apron 9
Backplate mounting chucks 9
Instructions for fitting the backplate 9

Accessories and Description of their Uses

A) Lathe Accessories

Universal lathe chuck with 3 or 4 jaws 10
4-jaw independent chuck 10
Special chuck 10
Collet attachment 10
Quick-action collet chuck 11
Replacing the collet 11
Drill chuck (3-jaw) 12
Morse taper arbor 12
Live centre 12
Thread dial indicator 12
Four-way toolpost 12
Quick-change toolpost 13
Turning tools 13
Universal quadrant with set of change gears 14
Screw cutting on the MAXIMAT 14
Cutting of inch- and module pitches 14
Tool bit box 14
Travelling steady 15
Fixed steady 15
Toolpost grinder 16
Technical data 16
Diamond-dressing the grinding wheel 17
External grinding/Internal grinding 17
Taper grinding 17
Machine Lamps 18
Length stop 18
Plastic Covers 18
Floor stand 19
Coolant attachment 20

B) Vertical Attachment Accessories

Machine vice 21
Swivel base plate 21
Stepped clamping shoe 21
Collet holder 21
Dividing head 22
Intermediate flange 22
Direct indexing 22
Worm indexing 23
Practical indexing operation 23, 24
Indexing chart 25
Tool mounting and -ejection on vertical spindle 26
Tools for vertical attachment 27

C) Safety Devices

Chuck guard 28
Chip guard 28
Armoured conduit 28

Description of working operations 29, 30
Safety regulations 30
Turning with power feed 31
Screw cutting 31
Taper turning using tailstock set-over 32
Taper turning by setting the top slide 32
Drilling with the vertical attachment 33

Diagrams and Charts

Cutting speed chart 34
Pitch chart/feed chart 35
Module leads 35
Change gear chart for standard Whitworth threads 36
Lubrication chart 37

Bearing and Slide Adjustment

Adjustment of work spindle bearings 38
Adjustment of cross- and top slides 38
Adjustment of feed screw end float 38
Adjustment of feed screw backlash in nuts 38
Adjustment of half-nut guide 39
Adjustment of vertical head feed screw backlash in threaded bushing 39
Adjustment of vertical head guide 40
Timing belt drive 40
a) Checking of correct tension
b) Changing the belt
Setting of safety slipping clutch 40
Changing of shear pins on leadscrew and feed shaft 41

Electrical Connections and Wiring Diagrams

Claim Form

Unpacking the MAXIMAT

The MAXIMAT is delivered packed in a special shipping crate containing the fully assembled machine and all the standard equipment To prevent it from shifting inside the crate. the MAXIMAT is fastened to the bottom of the case with four locking bolts

Standard equipment

1 Centre MT2
1 Centre MT3
Driving plate
Driving pin
Driver
Length stop
1 Grease gun
1 Single toolholder
3 Shear pins for feed shaft
3 Shear pins for leadscrew
1 Set of servicing tools

Setting up the MAXIMAT

When the machine is set up in a permanent location, the bed should be accurately leveled and solidly bolted down. Accurate leveling insures that the ways will not be twisted as the machine is bolted down.
The heavy steel cabinet base, available as an accessory, is designed especially for the MAXIMATS; it is furthermore fitted with lockable tool cabinet and removable chip tray. The machine bed is bolted directly to the supporting frame of the cabinet base.
Level the machine with shims inserted under the bed as needed.

Preparing for Operation

Owing to the large variety of electric plugs, EMCO universal machine tools are supplied with bare mains ends- i. e. without a plug. Only use earthed plugs with built in fuse protection in accordance with electrical safety regulations. The green/yellow wire of the mains is earth and must be connected to the earth connection on the plug.

Before using the machine, remove the protecting oil film, which has been applied to all bright surfaces, with paraffin. (Remove the solvent and oil residue thoroughly with a clean cloth). Afterwards oil all slide ways with a good quality acid-free oil.
Fill the headstock gearbox as well as the quick change gearbox with oil (see lubrication diagram, page 37).

Push-button switch unit (MAXIMAT V10P)

When using three phase iduction motors, watch the direction of rotation. If the motor runs in the wrong direction, 2 phases on the plug have to be interchanged.

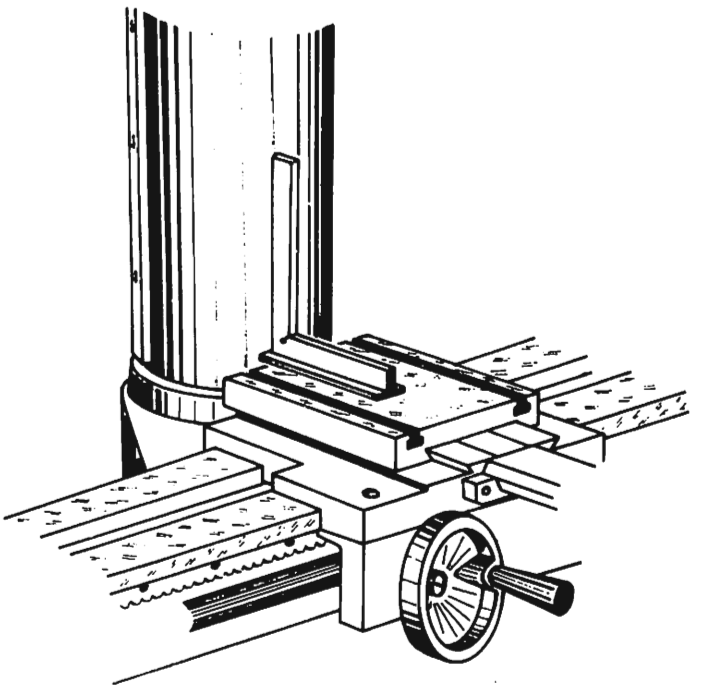
Safety control panel (MAXIMAT MENTOR 10)

Remove both E-housing cover (rear of headstock) and 2 cover plates (on left stand of cabinet base). The safety control panel, comprising the bulk of the electrical equipment, is inserted into the aperture in the left leg of the stand The protruding cables at the rear are bent upward and connected to marked terminal strip according to the wiring instructions Then fit plug to mains cable
The safety control panel is inserted together with its protective sleeve to guard against electric-shock hazard (black pressboard casing)

Fitting the Vertical Attachment

The vertical attachment is attachet to the rear of the lathe bed with four fastening bolts. Check with a square the accuracy of the angle (refer to sketch). The electric connection of the vertical attachment motor is carried out as shown on the connection diagrams.

a) Push-button switch unit (V10P)
b) Safety control panel (MENTOR 10).



Important Operating Instructions

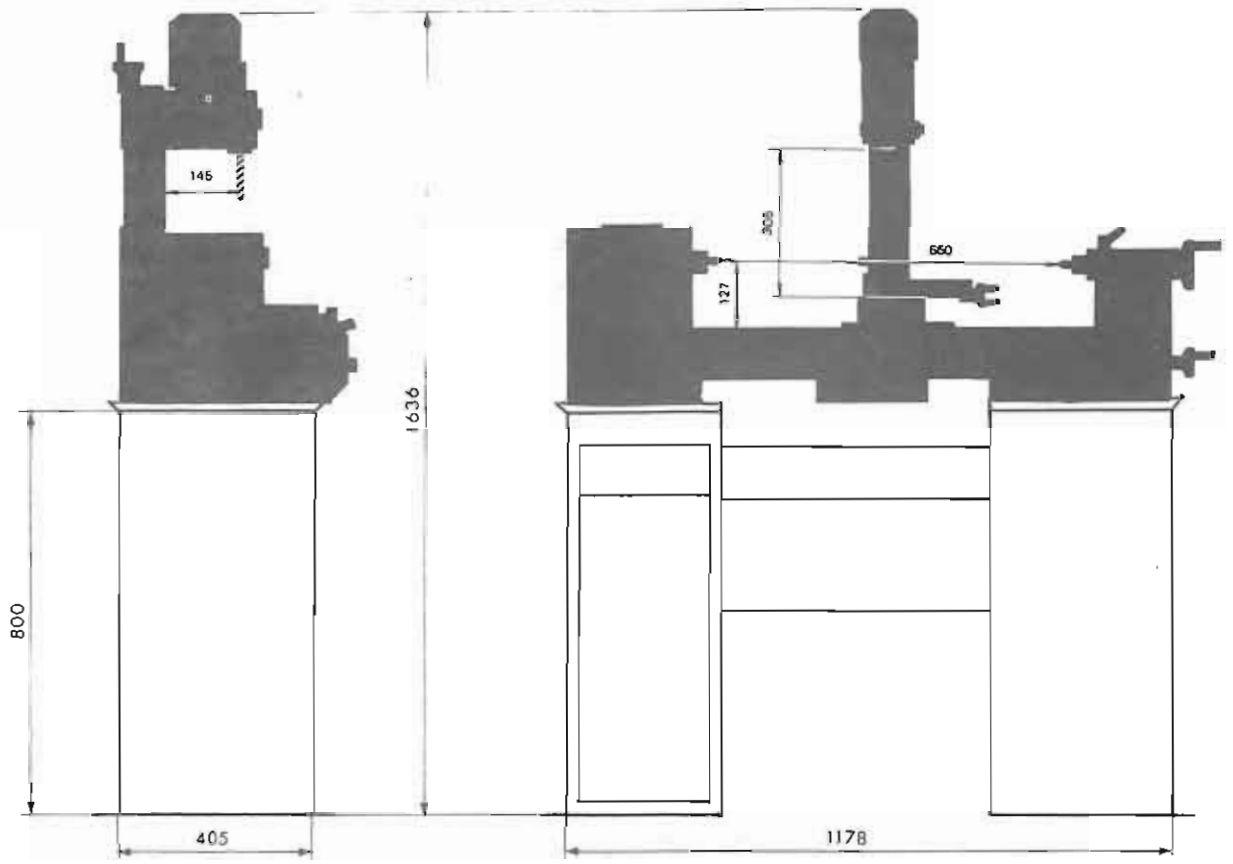
1. a) Only use fused plugs with earth connection.
   The green/yellow wire of the mains is earth!
   b) Protect the mains cable against damage!
   The mains cable should not be left lying unprotected on the floor – if possible use conduits.
2. After mounting a chuck, faceplate or quick-action collet chuck, make sure that you fully tighten the clamp ring at the back of the screwed backplate. (Clamping ring prevents chucks from accidentally spinning off).
3. Always stop the machine to change spindle speed or to reverse the lathe's leadscrew. (Reversing gear mechanism).
4. Be sure the gears fully engage!
5. Mount length stop carefully onto the properly cleaned Vee-way (careless tilting of the length stop will damage the Vee-way).
6. As a matter of principle, the length stop should be set so that the slides (saddle, cross-, top-) cannot run into the chuck.
7. a) When using longitudinal or cross power feed, push in the two-position sliding gear before starting the machine.
   (Knob protrudes through hole in gear cover; refer to page 6, item No. 4).
   b) When cutting threads, pull out the two-position sliding gear before starting the machine.
8. Shear pin for leadscrew and feed shaft are made from an aluminium alloy. If they shear off due to overload, only original EMCO shear pins may be used to replace them. (Under no circumstances may harder pins be used.
9. Half-nut lever and lever for longitudinal – and cross feed are interlocked – Do not use force!
10. a) Check headstock – oil level regularly!
    Middle of oil level indicator (next to spindle nose) gives correct oil level.
    Change oil after first 100 hrs, refilling either with EMCO original oil (Order No. H13 7510) or commercial grade motor oil SAE 10 (0,2 l), and thereafter every 500 hrs.
    b) Quick-change gearbox: 0,25 l EMCO gear-oil (Order No. H14 5520) or commercial grade gear oil SAE 140; to be changed every 500 hrs.
    c) Re-lubricate all lubrication points according to chart (see page 37).
11. a) Whenever coolant has been used, the machine and all bright surfaces (guide ways) should be cleaned. (Bright surfaces are best oiled with an oily rag.)
    b) Be sure no coolant trickles into switch unit or motor.
12. Do not clean the machine with compressed air; turnings and borings easily get trapped in guides, bearings or in the electrical equipment causing damage!
13. Check correct tension of timing belt!
14. Never hammer the workspindle (precision bearings)!
15. When using the toolpost grinder, cover all unprotected slides.

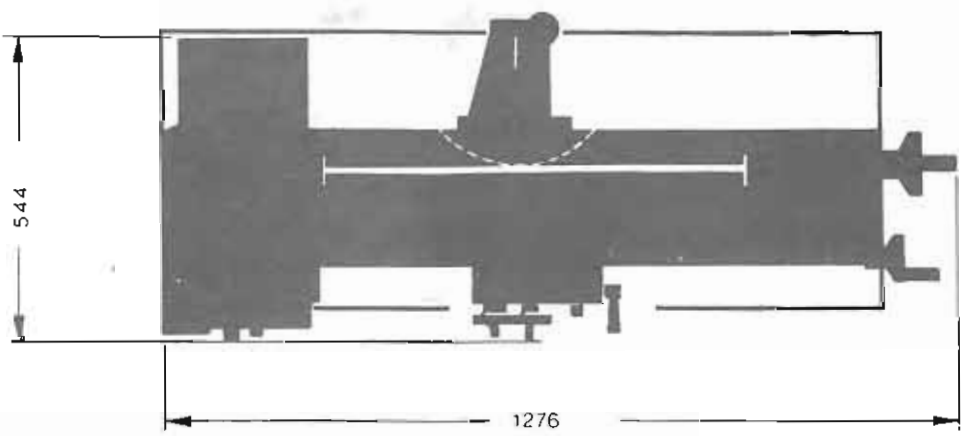
For further information refer to the individual chapters!

Technical Data of Lathe:

Motor rating	
Main drive motor	
Three-phase a/c	1400/2800 rpm; 0,6/1 HP
Single-phase a/c	1400/2800 rpm; 0,6/0,85 HP
Distance between centres	650 mm
Centre height	127 mm
Swing over cross slide	145 mm
Required floor space	1280 x 550 mm
Net weight	
without floor stand	approx. 128 kg
with floor stand	approx. 188 kg
Headstock	
Spindle nose	Form E – M39 DIN 800 with Morse taper No. 3
Hole through spindle	20 mm
Taper socket for collets	L2040 – 826
Spindle bearing arrangement	2 precision taper roller bearings
Spindle speeds	60-120-240-315-480-630-1250-2500 rpm
Feeds	
24 – longitudinal feeds	from 0.028 – 0.444 mm/turn
24 – cross feeds	from 0.014 – 0.222 mm/turn
Thread pitches	
24 metric threads	from 0,25 – 4,00 mm
Whitworth threads	from 120 – 6 threads/inch
Module threads	from M 0.15 – M 2.00
Tailstock	
Barrel diameter	30 mm
Traverse of barrel	80 mm
Morse taper	No. 2
Set-over	12,5 mm on each side of axis

Required Floor Space for the MAXIMAT





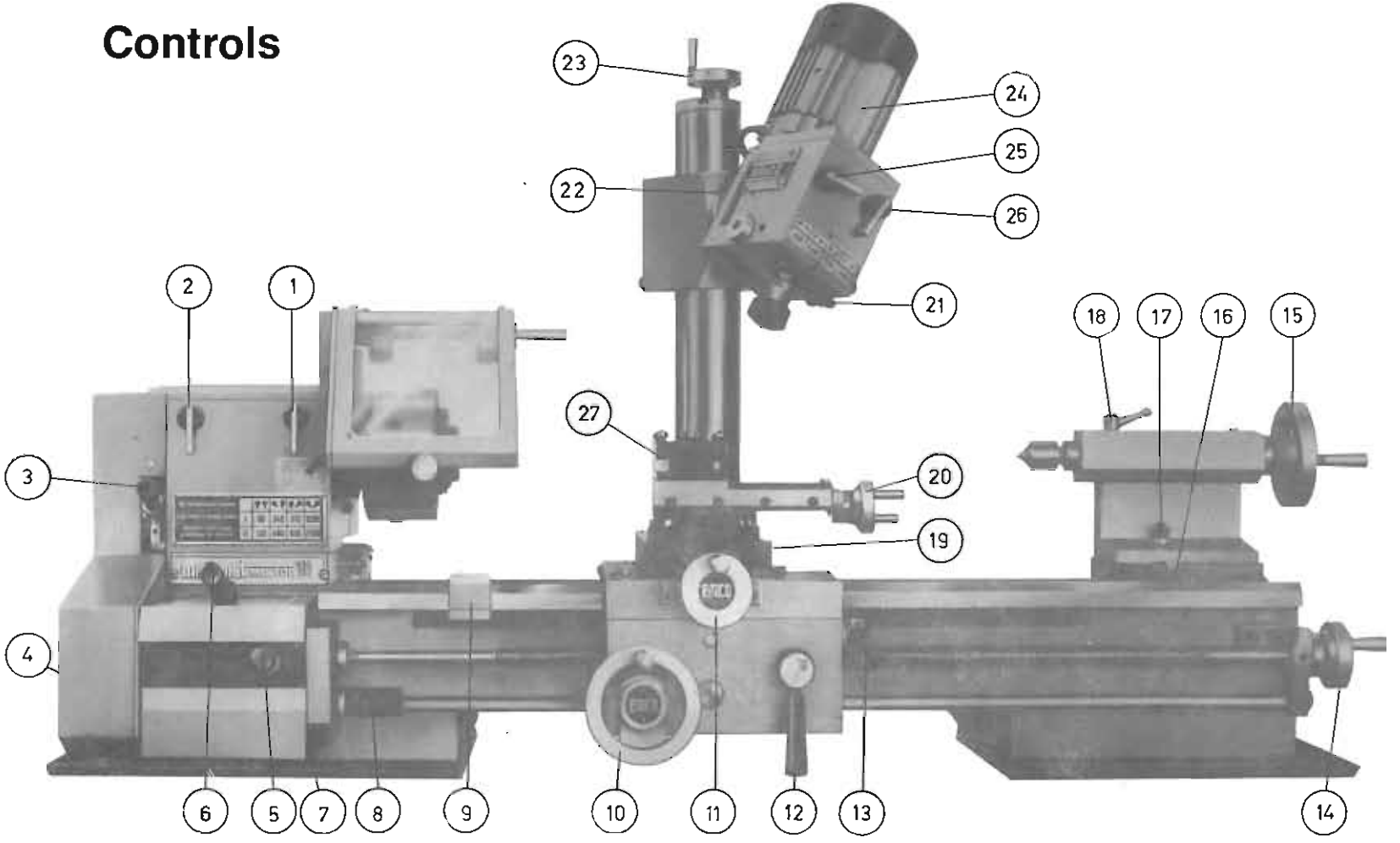
The Vertical Attachment

is a complete small drilling and milling machine. The vertical head can be rotated and turned on both planes through 360°, and is moreover adjustable in height to a maximum of 305 mm. Locking is possible in any position.

Technical Data of Vertical Attachment:

Max. height between support table (cross slide) and vertical spindle	305 mm
Distance centre of spindle to column	145 mm
Spindle taper	Morse taper 2
Stroke of quill	40 mm
Vertical spindle speeds	350-640-780-1450 rpm
Motor rating	
Three-phase a/c	0,25 HP
Single-phase a/c	0,20 HP
Net weight	approx. 36 kg

Controls



IMPORTANT!

All control levers and knobs must always be completely engaged.

Stop machine to change spindle speeds!

* Disengage lever – swing – with light pressure find engagement point – if necessary, turn spindle.

Controls

Maximat

1,2 Speed selection levers
(Stop machine to change spindle speeds)

3 Leadscrew reverse lever
(Pull out – swing up/down – re-engage)

4 Two-position sliding gear
(Stop machine to change from feeding to thread cutting or vice-versa)

5,6 Tumbler lever and gear lever for quick – change gearbox
(Stop machine to shift gears)

7 Oil drain plug for quick-change gearbox

8 Safety slipping clutch

9 Length stop

10 Carriage traverse handwheel

11 Cross slide handwheel

12 Half-nut lever

13 Lever for longitudinal- and cross feed

14 Leadscrew handwheel

15 Tailstock barrel handwheel

16 Tailstock set-over screw, front

17 Tailstock locking

18 Tailstock barrel clamping lever

19 Mounting of vertical column

20 Top slide handwheel

21 Rack and pinion feed/depth gauge for vertical spindle

22 Tilt angle adjustment of vertical head

23 Vertical leadscrew handwheel

24 Tool ejection nut

25,26 Vertical spindle speed selection levers
(Stop machine to change spindle speeds)

27 Single – or Four-way toolpost

General Description

Lathe Bed
The lathe bed with its ground slide ways is diagonally ribbed and made of high grade cast iron. The rack for the carriage traverse, the leadscrew and the feed shaft are located at the front.

Headstock
The hardened and ground main spindle runs in 2 precision taper roller bearings. The hole through spindle is 20 mm. The spindle nose is provided with a No. 3 Morse Taper and a Taper socket for type L20/40–826 collets. The headstock spindle gears are oil bath lubricated.

Norton Type Quick-Change Gearbox
The quick-change gearbox is a 24 stage gearbox giving 24 longitudinal – and cross feeds and 24 speeds. The speeds and feeds are selected with tumbler- and gear lever.

Drive and Electrical Equipment.
The drive is taken from a single-phase or from a three-phase a. c. motor fitted to the rear of the lathe bed. The power is transmitted from the motor shaft by a timing belt to the back gear shaft and from there through spur gears to the main lathe spindle. All electric parts (push-button switch unit, capacitors, etc. (MAXIMAT V10P) are factory wired and totally located in an E-housing. The E-housing is mounted at the rear of the headstock casting. The safety control panel is a completely wired independent unit, which can easily be removed from the cabinet base for servicing.

Slides
The sturdy carriage carries the cross slide. Equipment for use in conjunction with the vertical attachment can be fitted to the cross slide. The top slide is arranged on the cross slide and can swivel in either direction. All slide gibs are adjustable and slides can be locked in any position with the aid of clamping screws. The graduated index collars on the slide handwheels permit accurate adjustment and readings.

Tailstock
The tailstock is of a compact design. The heavy duty tailstock barrel is provided with a scale graduated in millimeters or inches and has a number 2 internal Morse taper. The handwheel is provided with a graduated. adjustable index collar fpr precision work (graduation 5/100 resp. 0,002").

Safety slipping clutch
By means of adjustable stops (lenght- and cross stop) used in conjunction with the safety slipping clutch, automatic turning to lenght or size is possible. The clutch also protects the quick-change gearbox in case of overloads caused by a slide jamming.

Carriage apron
The apron is bolted to the carriage and carries the coveniently arranged carriage traverse andwheel, the half-nut lever and the feed lever. The feed mechanism is contained in the apron.

Backplate Mounting of Chucks

All chucks are fitted to the lathe (main) spindle by means of a backplate. The backplate provides a highly accurate location for the chuck thereby ensuring true running and optimum accuracy.

As the backplates are supplied finish-machined on the side facing the spindle nose it is necessary to machine them on the side facing the chuck. A backplate which has been fitted to a particular chuck should be left fitted to it and not used for any other chuck, or on any other machine.

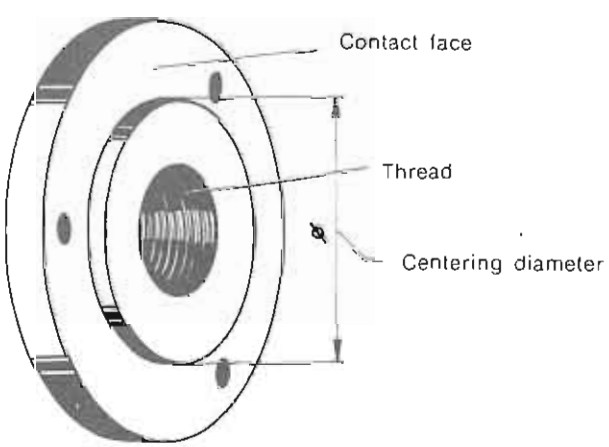
The instructions for backplate fitting apply to the following chucks:

a) Lathe Chuck; Universal 3-jaw and 4-jaw Chucks and the 4-jaw Independent Chuck.
b) Quick Action Collet Chuck; this accessory is also mounted by means of a backplate to the machine.

Machining Instructions for Fitting the Backplate

Both the spindle nose and the threaded backplate must be thoroughly clean and free of adhering (borings or millings). Then screw the backplate on to the spindle nose taking care that the backplate is screwed tight up to the face of the spindle nose. Now turn a spigot of approximately 2 mm depth (but not deeper than 2½ mm).

The diameter of the spigot must conform exactly to the centering diameter of the chuck and this spigot must be turned so accurately, that the chuck can be mounted without the use of force, although free from play and firmly adhering. Then take a fine cut over the contact face of the backplate, thereby providing a clean and smooth bearing surface for the lathe chuck. Thoroughly clean the centering recess of the chuck. Lightly lubricate the fitting surface and screw the chuck on to the backplate with the screws provided.



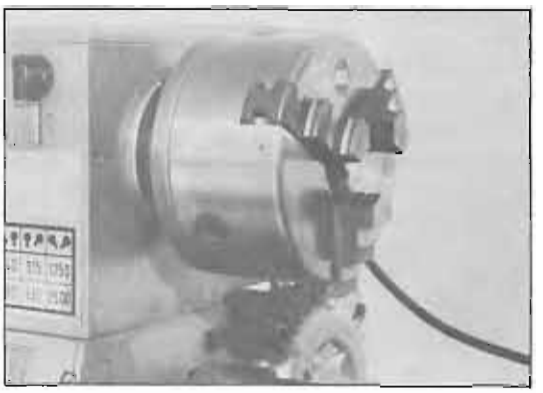
Accessories and Description of their Uses

A) Lathe accessories

Universal lathe chuck of 3-jaw or 4-jaw design

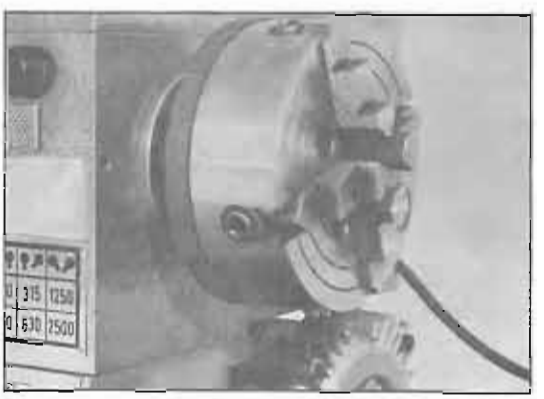
Using these Universal Chucks, cylindrical or symmetrically profiled work pieces (round stock, triangular, square, hexagonal, octagonal or twelve-cornered stock) can be clamped.

Note: New lathe chucks have very tightly fitting jaws. This is of vital necessity to ensure accurate clamping and a long service life. Due to repeated opening and closing the jaws adjust themselves automatically and their operation becomes progressively smooth. For greasing we recommend Molykote Paste G.



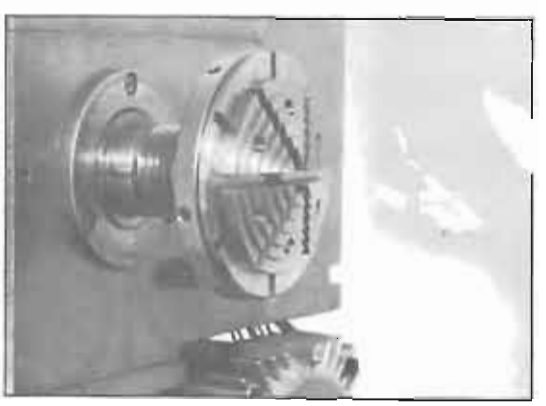
4-jaw Independent Chuck

This special chuck has 4 independently adjustable chuck jaws; these permit the holding of assymmetrical components and enable the accurate setting up of cylindrical components.



Special chuck

serves for sensitive-tightening of thin-walled work pieces and for accurate finishing. The special chuck can be supplied with 6 external jaws or, alternatively, with 6 internal jaws. The special chuck with its pilot taper MT3 is fitted in the spindle nose taper socket. The chuck is rigidly held in position by the draw-in tube.

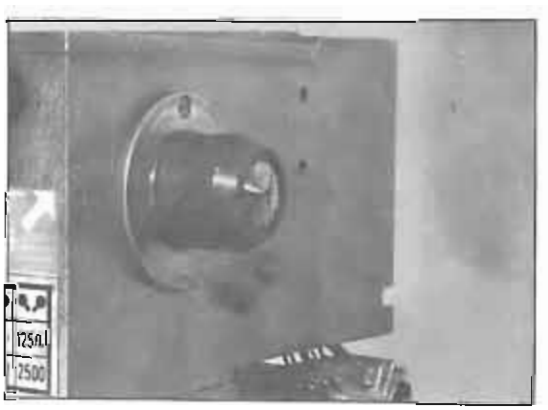


The collet attachment

Consists of cap nut and draw-in tube.

Mounting of the collet attachment

Screw cap nut onto spindle nose and insert the Schaublin Type L20 collet (special design) into the spindle. (Note the correct position of slot.) Push the draw-in tube into the spindle from the left-hand side and screw it into the collet. The collets must NOT be used for sizes other than those for which they are intended.



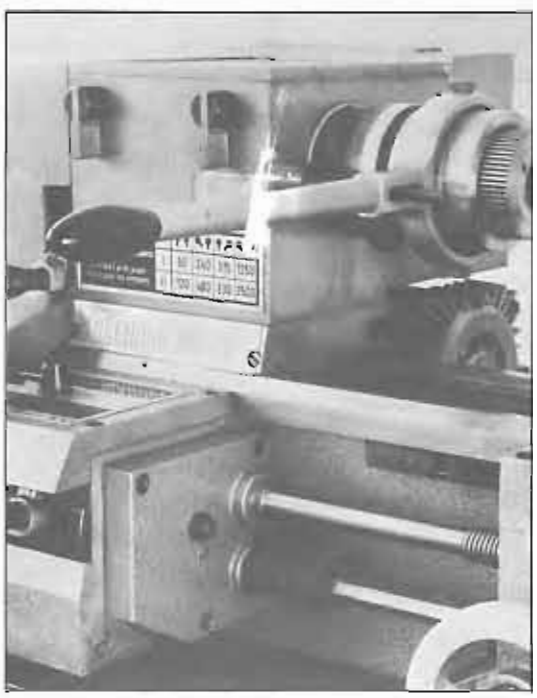
Quick-action chuck type

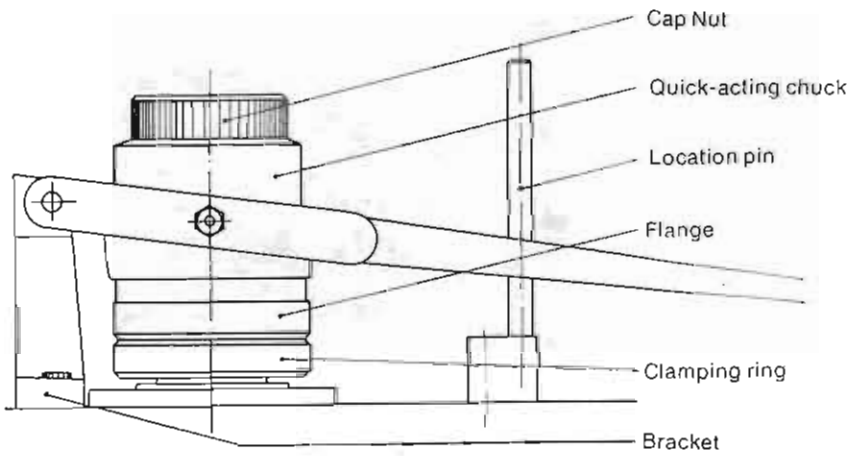
This collet chuck is mainly used for production batches. Its advantage lies in the fact that the bar stock up to 20 mm dia. can be clamped and released whilst the machine is running. The rubber flex collets have a clamping range of max. 2 mm down from nominal size. This means that a 10 mm collet will clamp 8 mm bar. The clamping range of steel collets, which can also be used, is only 0.5 mm. The actual clamping size is adjusted with the front cap nut which operates on the ratchet principle. The quick action chuck has been designed for continuous operations and is adequately protected against the penetration of dirt.

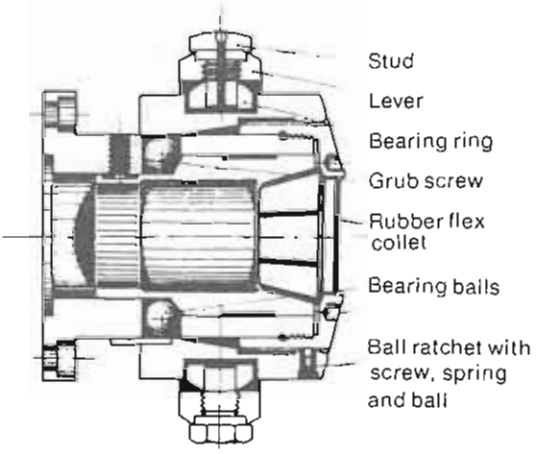
The quick action chuck is mounted on a flange similar to the ordinary backplate. This backplate is faced and turned to fit the centering spigot bore of the chuck.

The bracket supplied with the chuck must be fitted so that the open end of the slot faces the spindle nose (tapped holes behind the spindle nose).

Screw in and fix location pin (tapped hole in front of spindle nose). Screw chuck with back plate onto spindle nose and lock with clamp ring; simultaneously insert lever into bracket and over location pin.







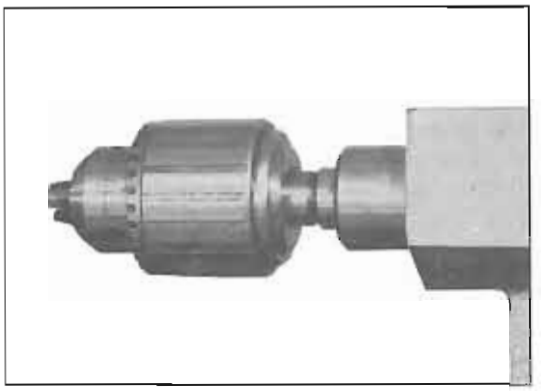
Replacing the Collet

To mount the new collet unscrew the cap nut and insert the new collet in cleaned condition, screw on the cap nut and adjust for the given chucking capacity.

The sliding sleeve requires regular lubrication; apply a good quality slide bearing oil through the lubricating hole provided in the locating screw. Do not over oil as otherwise this will spray out while the machine is running.

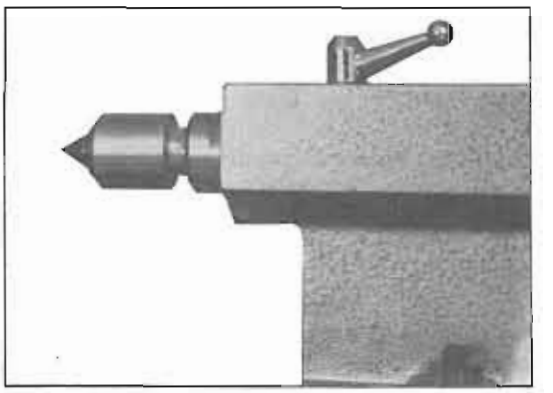
When replacing collets be sure to clean all locating faces very carefully! Do not lubricate in excess! Use no force when dismantling and reassembling the chuck!

Drill chuck
With its three self-centering jaws, it is used for holding centre drills and twist drills.

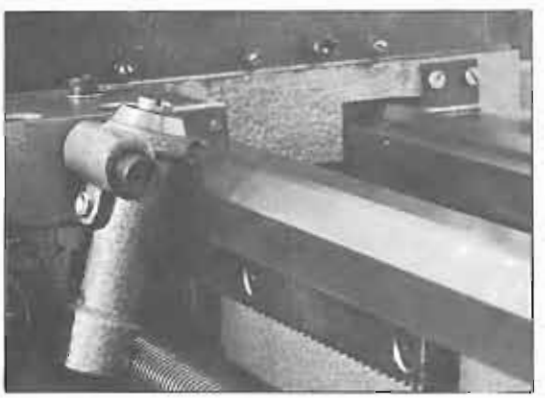


Morse taper arbor
The arbor is necessary to hold the drill chuck in the tailstock or vertical attachment spindle. The arbor is provided with a No. 2 Morse taper.

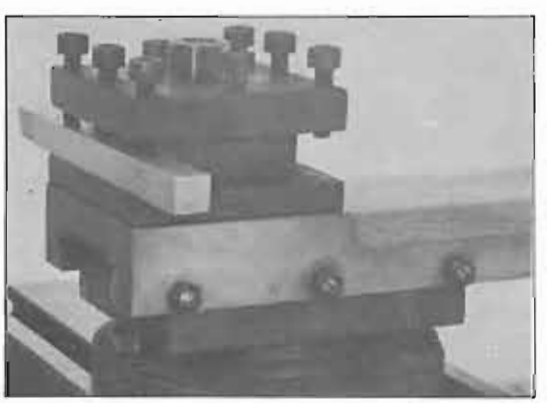
Live centre
The live centre is mounted on three ball bearings. It therefore is highly recommended for turning at speeds in excess of 500 rpm.



Thread dial indicator
The thread dial indicator is provided as an aid in screw cutting and is only be used in cutting inch threads on machines with inch system leadscrews. The indicator is fitted to the right hand side of the apron with a hexagon socket screw and pushed forward to engage with the leadscrew.
Then a graduation line of the graduated dial is aligned with the mark on the body. When screw cutting it is essential that on engaging the half-nut lever the same marks coincide; otherwise split threads will result.

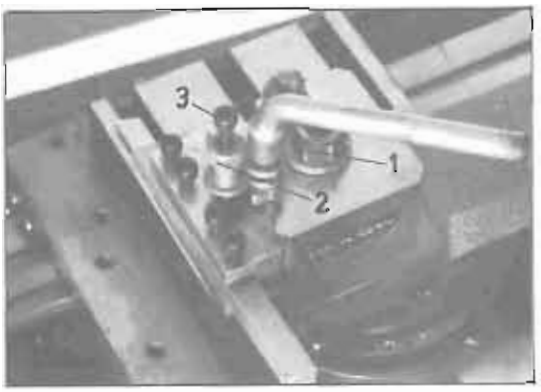


Four-way toolpost
The four-way toolpost is mounted on the top slide in place of the plain toolpost and permits simultaneous clamping of 4 tools. Any tool can be swung into the correct position merely by unlocking the toolpost body.



Quick-change toolpost

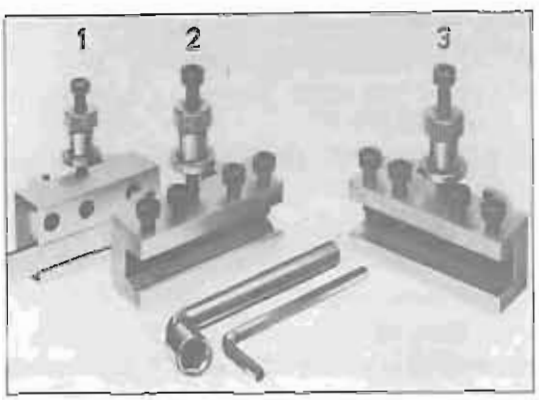
is easily fitted and gives precise repeatability. There is a substantial reduction in setting time with the quick-change toolpost as no packing or shimming is necessary.



Mounting the quick-change toolpost:

1. Unscrew hexagon nut (1); remove four-way toolpost.
2. Mount quick-change toolpost body in position; screw on and tighten hexagon nut (1).

knurled sleeve (2); secure toolholder by tightening hexagon socket screw (3) and screw for quick release clamp with respective operating key.



Three toolholders are available:
Parting-off toolholder (1)
Vee-toolholder for tools with round section (2)
Standard toolholder for tools of square section (3).

Carbide-tipped turning tools

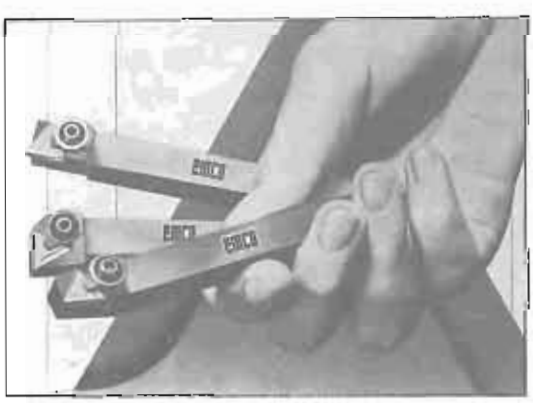
The use of carbide-tipped turning tools does require some know-how. Resharpening also takes professional knowledge. For resharpening carbide-tipped tools, only use siliconcarbide or diamond wheels.

Throw-away tip toolholders for carbide tips.

Facing toolholder
Roughing toolholder
Side toolholder

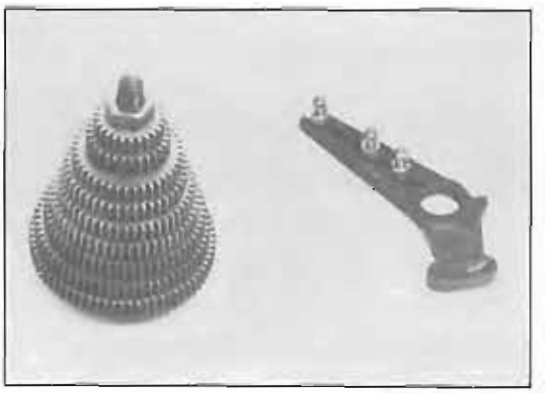
Advantages:

Rapid changing of cutting edges without having to remove the toolholder.
No resharpening! (indexable inserts can be used on all three sides).
Optimum cutting capacity!



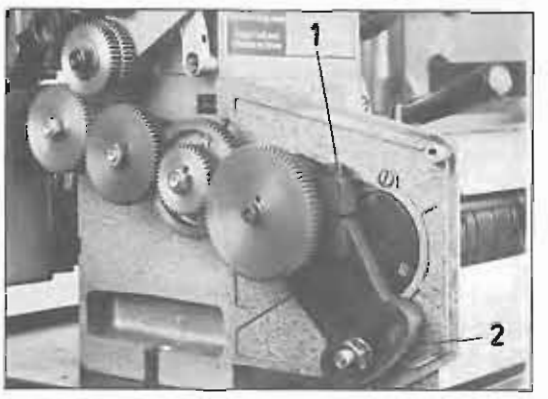
Change gears and universal quadrant

This equipment permits the cutting of English threads from 6 to 120 threads/inch and module threads of 0,15 to 2 module with the metric leadscrew. For possible change gear combinations refer to chapter „Diagrams and Charts" on page 34.
Attention! When using the universal quadrant the feed lever (power longitudinal and cross feed) must under no circumstances be engaged.



Mounting the universal quadrant:

1. Unscrew hexagonal nut (2)
2. Unscrew hexagonal socket screw (1)
3. Remove standard quadrant
4. Mount universal quadrant
5. Mount required change gear combination (refer to page 35, 36)
6. Screw on and tighten hexagon socket screw (1) and hexagonal nut (2).



Screw cutting on the MAXIMAT (Metric machines)

Metric thread from 0,25–4,00 mm pitch

Prior to screw cutting pull the two-position sliding gear (Part No. 4 of operating controls) fully out. Select the required pitch with tumbler- and gear lever (Part No. 5, 6 of operating controls). The leadscrew reverse lever (Part No. 3) is placed in the relevant position for right-hand or left-hand thread. For half-nut engagement swing lever to the left.
Do not change gears whilst the machine is running!
The half-nuts can be opened after each cut when cutting any of the following pitches, 3–1, 5–1–0, 6–0, 5–0, 3–0, 2–0,15

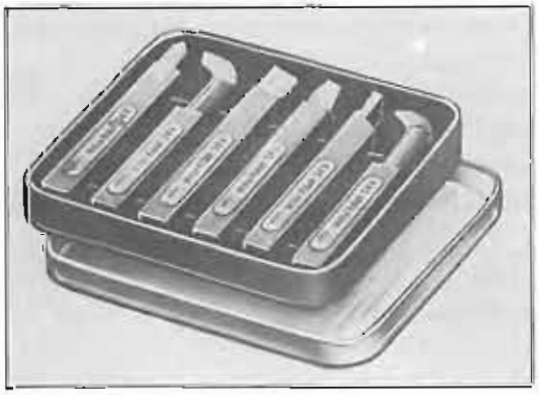
Cutting of inch- and module leads (Metric machines)

This necessitates the removal of the standard quadrant and sliding gear from the quick-change gearbox and replacing this with the universal quadrant and the required change gears. The change gears are assembled according to the quick-change gearbox table to suit the required pitch (for module and inch leads see page 35, 36).
It is now possible to select several inch pitches with the quick-change gearbox without altering the change gear combination. All these inch pitches are shown in the vertical rows of the change gear combination table (refer to page 36).

Tool bit box

This box contains 6 ground tools:

1 Side finishing tool, right-hand (for finish turning)
1 Parting-off tool (for grooving and parting-off)
1 Inside turning tool (for boring).
1 Internal thread cutting tool – 60° thread angle
1 External thread cutting tool –60° thread angle
1 Side roughing tool (to take roughing cuts).



Travelling steady

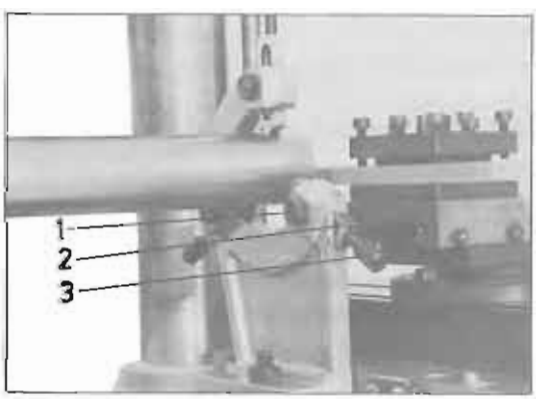
The travelling steady is mounted on the saddle, and thus follows the movement of the turning tool. As the centre part of the travelling steady is always level with the height of the tool only two sliding fingers are required whereas the place of the third is taken by the turning tool.
The travelling steady is used for turning operations on long, slender workpieces; it prevents "springing" of the work piece under the pressure of the turning tool.
The sliding fingers are set similarly to those of the fixed steady: free of play but not seizing. They should be adequately lubricated during the operation.

Fixed steady

The fixed steady serves predominantly as a support for shafts on the free tailstock end. For many operations the tailstock cannot be used as it is in the way of the turning tool or the drilling tool, and therefore must be removed from the machine. It is then the fixed steady which functions as end support ensuring a chatter-free running of the machine. The fixed steady is mounted on the bedway and secured from below in the desired position by means of a locking plate. The sliding fingers require continous lubrication at the contact points with the workpiece to prevent their premature wear. When setting the fingers to the workpiece care should be taken not to press it off centre in cases it works loose in the lathe chuck and gets damaged by the lathe chuck jaws.

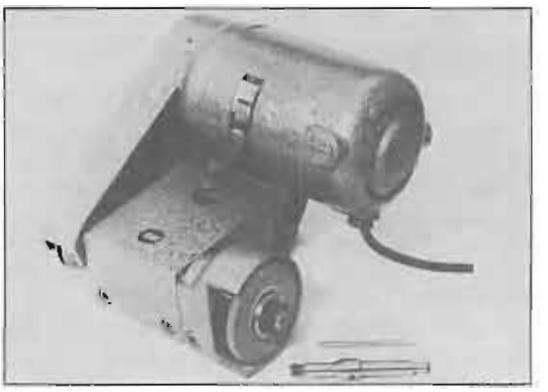
Setting the steady

1. Slacken the 3 laterally located hexagonal nuts (1).
2. Unscrew the knurled screws (3) and advance the sliding fingers by hand. Open the sliding fingers sufficiently wide until the fixed steady can be moved with its fingers around the workpiece. Secure the fixed steady in this position.
3. By turning the knurled screws into position the sliding fingers can be set to the workpiece. They must be applied free of play but must not be too tight. Tighten the hexagonal nuts. Lubricate the sliding points with machine oil.
4. When after prolonged operating time the jaws show wear, the tips of the fingers can be remilled or filed over.



Tool post grinder (Type SV 10)

This attachment is an integral grinding machine with its own driving motor (150 W output), and mounts on the top slide in place of the toolholder. It lends itself for both external and internal ginding. The grinding spindle revolves on precision bearings; therefore knocking these precision parts should be avoided as any blow reduces their accuracy.
Shifting the V-belt allows for three speeds, viz. 4500, 8000 and 12.000 rpm.
The belt should only be moderately tensioned to prevent unnecassary power consumption and undue wear.



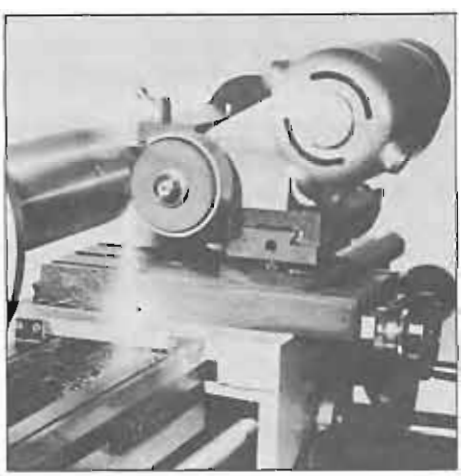
Technical Data

External grinding	
Max. grinding wheel dia.	∅ 65 mm
Min. grinding wheel dia.	∅ 45 mm
Bore dia.	∅ 16 mm
Internal grinding	
Max. grinding wheel dia.	∅ 20 mm with arbor 35 mm long
Bore dia.	∅ 6 mm with arbor 35 mm long
Spindle speeds	4500–8000—12.000 rpm
Drive motor*	Type U 150 single-phase a. c. motor rating: 150 W speed: 4000 rpm
Height of spindle above toolpost	19 mm

*When ordering, please state voltage and frequency.

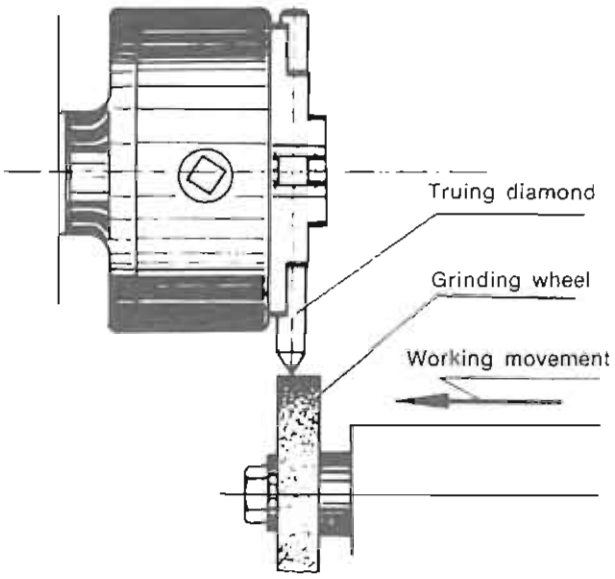
Mounting the toolpost grinder on the lathe

Remove toolpost. Mount toolpost grinder in its place on top slide, so that toolpost stud protrudes above the slotted hole of the toolpost grinder. Then set toolpost grinder parallel to workpiece axis. Secure toolpost grinder by screwing on and tightening hexagonal nut (do not forget washer).



Dressing or truing of the grinding wheel

To obtain a perfect finish on the workpiece to be ground it is essential to true the grinding wheel with a truing diamond prior to every grinding operation.
Clamp the truing diamond in the lathe chuck (see sketch) so that the diamond will be level with the height of the centres and pointing forward. To prevent the lathe chuck from turning during the truing operation change the headstock speed to the lowes speed. Then set for a 4500 rpm speed of the toolpost grinder and start feeding. Move the revolving grinding wheel close to the point of the truing diamond – just to touch it. Feed 0,05 mm with the cross support and carry out the truing operation with the saddle. This operation should be repeated until the grinding wheel is completely clean over its entire periphery. Never apply more than 0,05 mm lest the truing diamond be damaged.



External grinding

For most external grinding the 60 mm dia. grinding wheel, grain 80, hardness grade M, is used. The grinding wheel is bolted to the arbor at the toolpost grinder, trued and should remain in this position until it becomes worn out. The locating arbor with the mounted grinding wheel is clamped in the spindle by means of a draw-in tube. To grind the workpiece the toolpost grinder with the rotating grinding wheel (4500 rpm) is fed in to the slowly revolving workpiece until a slight grinding spark formation occurs. The longitudinal slide rest of the toolpost grinder is then moved into the initial position. Apply a feed of maximum 0,1 mm with the cross slide and engage the automatic feed. The grinding operation will proceed automatically.

Internal grinding

Replace the external grinding arbor by the internal grinding arbor. Smaller grinding wheels can be mounted on the front end of the grinding arbor (6 mm dia.) and secured by means of a M3 screw. Very small grinding wheels (below 15 mm) have a cast-in M3 type screw and can be screwed direct into the grinding arbor; if they are equipped with cylindrical shanks a suitable Lorch-Schmidt watchmaker's collet of type B8 can be inserted in the spindle and clamped. These small grinding wheels also require turning by the truing diamond. Adjust for a spindle speed of 8000 or 12.000 rpm internal grinding. The grinding operation is similar to that of external grinding.

Taper grinding

For taper grinding move the toolpost grinder with the top slide into the desired angular position. Adjust with the cross slide; the feed for the longitudinal movement is controlled by turning the top slide handwheel.

Note!

An increase in operating temperature can occur during the first few hours, but this will not harm the spindle. The temperature will automatically drop after a few hours.

ATTENTION! Don't use the cooling attachment for grinding !

Cleaning and Servicing

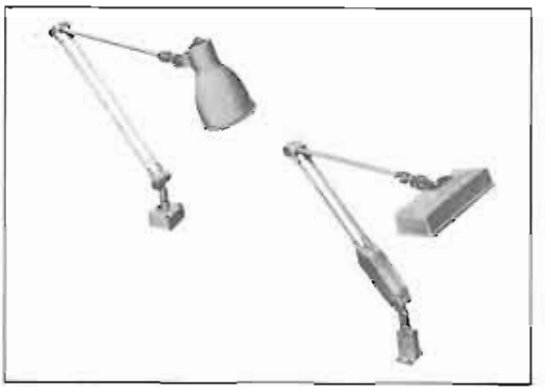
The quill is of a dust-tight design and all bearings are lubricated for life. In spite of this, the swarf clinging of the toolpost grinder should be wiped off after use. When re-setting the toolpost grinder from external to internal grinding or vice-versa, the taper socket must be cleaned meticulously.

Machine lamps

They represent an advantageous accessory, especially when accurate work has to be carried out.

Two types are available:
a) Standard machine lamp: suitable for bulbs (max. 100 W).
b) Fluorescent strip lamp (non heat emitting light): for 100–130 Volts and 200–240 Volts.

The machine lamps are supplied with cable and lamp mounting, but without plug. Mounting instructions for lamps are attached.



Length stop

The length stop is mounted on the lathe's Vee-way. It represents a valuable device for longitudinal turning and milling.

Longitudinal turning using the length stop:

As a matter of principle the length stop should be set so that the slides (saddle, cross-, top-) cannot run into the chuck!

Shear pin for leadscrew and feed shaft are made from an aluminium alloy. If they shear off due to overload, only original EMCO shear pins may be used to replace them! (Under no circumstances may harder pins be used!)

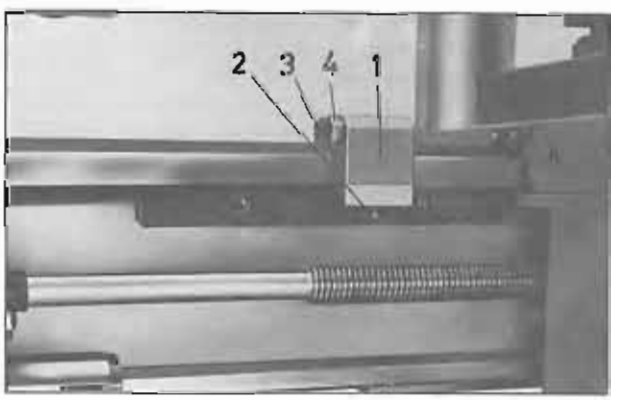
If necessary, the safety slipping clutch can be set to slip at a higher or lower torque!

Setting the length stop:

1. Press length stop 1 onto Vee-way and secure it with hexagon head screw (2).
2. Fine adjustment of the carriage end position is done with the slotted dog point set screw (3).
3. Secure set screw with check nut (4).

As soon as the carriage hits the stop, the safety slipping clutch slips, i. e. the carriage comes to rest.

Note!
Length- and cross stops can only be used when working with the feed shaft.
Never make use of stops, when half-nut engages, i. e. when working with the leadscrew.

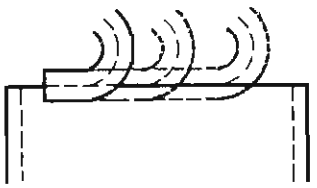


Plastic Covers

protect the machine from getting dusty. They are simply pulled over the machine.

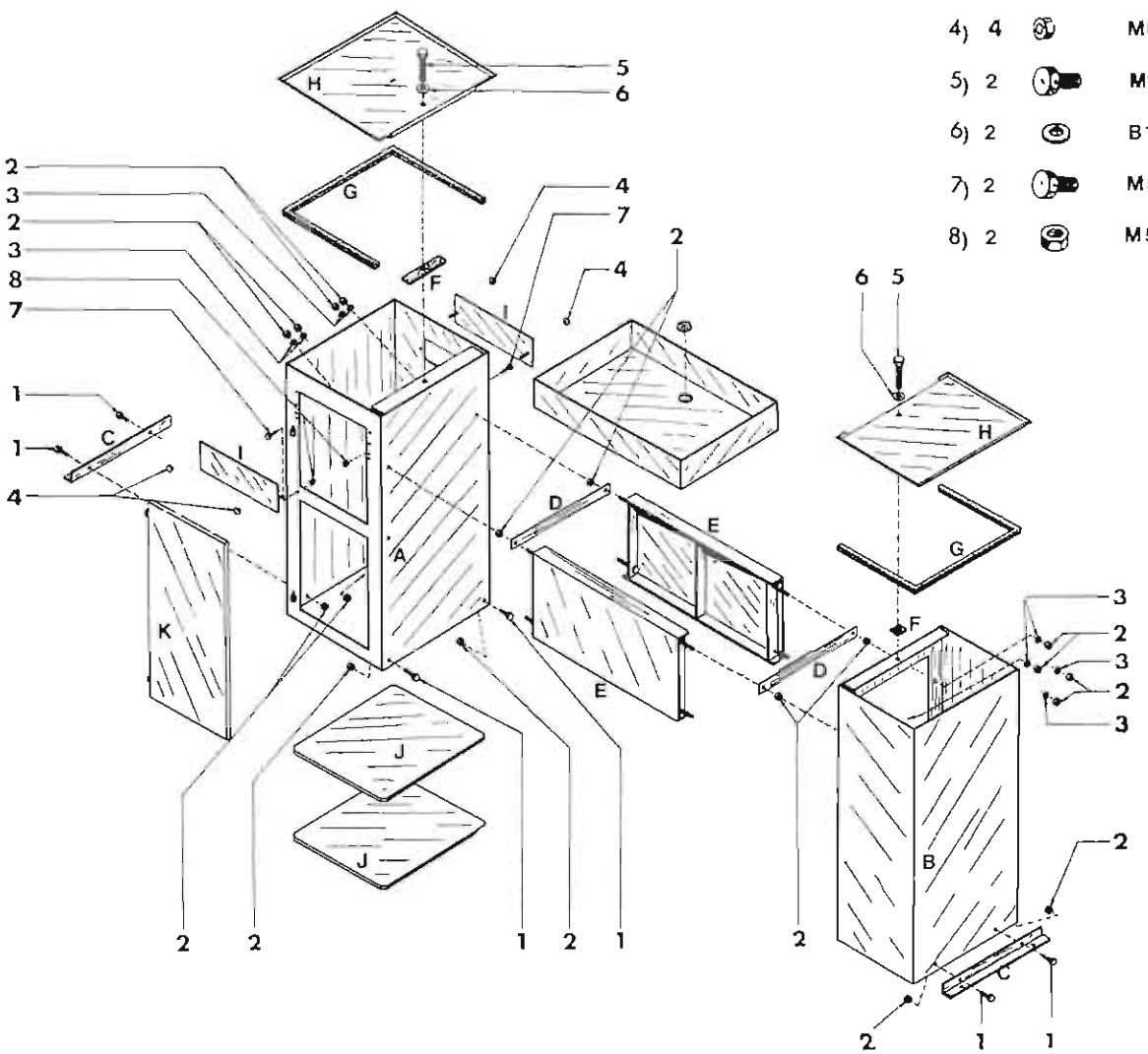
Cabinet stand

Assembly of cabinet stand:
Put up left (A) and right (B) stand. Screw both angle irons (C) with 2 bolts each (M8x12 DIN933) to stand A, respectively B.
Bolt steel flats (D) and mid-portions (E) together (4 nuts M8, DIN934). Bolt assembled mid-portions (E) to both stands (A and B) (8 nuts M8, DIN934 and 8 lock washers DIN127).
Screw supporting bolts for inserts (J) in place (2 bolts M5 x8 DIN933, respectively M8x12 DIN933; nuts on inside of stand).
Put on rubber pads (F), rubber packings (G) and trays (H). Bolt both cover plates (I) to left stand (4 screws each, M6x8 DIN84). Fit inserts (J) into left stand (A). Put too cabinet door (K) on hinges.
Mount machine in position and bolt it with 2 bolts M10x 35 DIN933 to cabinet stand.



Hold down rubber packing with left hand. Then bend rubber packing with right hand upward and press it bit by bit onto the rim of the cabinet stand.
Note: When mounting the rubber packing, do not stretch it!

1)	6	M8×12	DIN933
2)	18	M8	DIN934
3)	8	A8	DIN127
4)	4	M6×8	DIN84
5)	2	M10×35	DIN933
6)	2	B10,5	DIN125
7)	2	M5×8	DIN933
8)	2	M5	DIN934



Coolant attachment

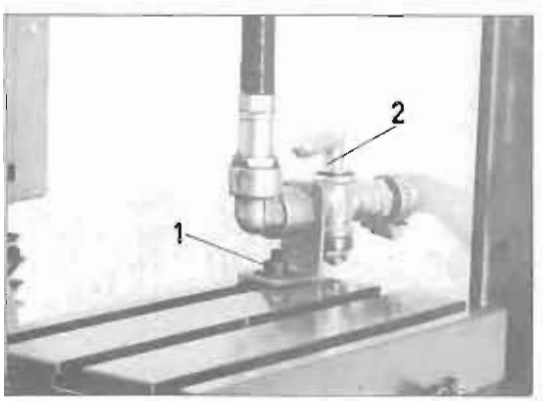
completes the range of accessories. It permits use of the MAXIMAT for quantity production.

Technical Data:

Motor rating: 45 Watt with three-phase operation.
Head: 2,5 m

Assembly

Refer to assembly instructions attached to coolant attachment.



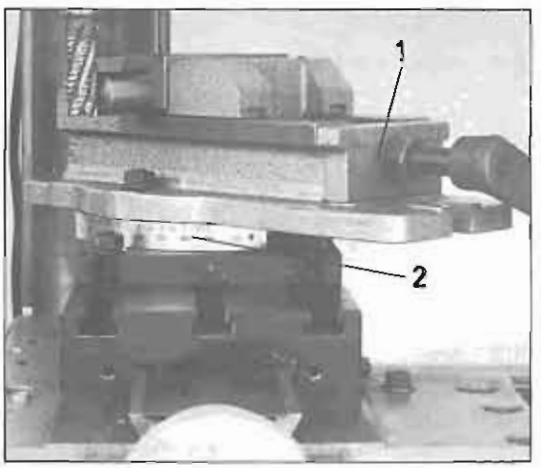
Service:

Clean swarf box every now and then, i. e. remove swarf, chips, turnings etc. Apart from that, the coolant attachment is maintenance-free!

B) Vertical Attachment Accessories

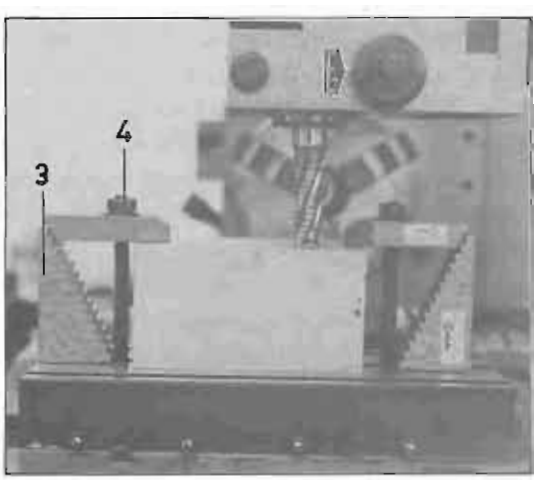
Machine vice (1)

The vice is of robust design; it has jaws of 84 mm with and a gripping capacity of 80 mm. This vice is an indispensable piece of equipment for vertical attachment operations. It is secured to the cross slide by means of T-slot bolts. Do not hammer the square spanner when clamping work pieces. The gripping power is quite adequate using the spanner and hand pressure.



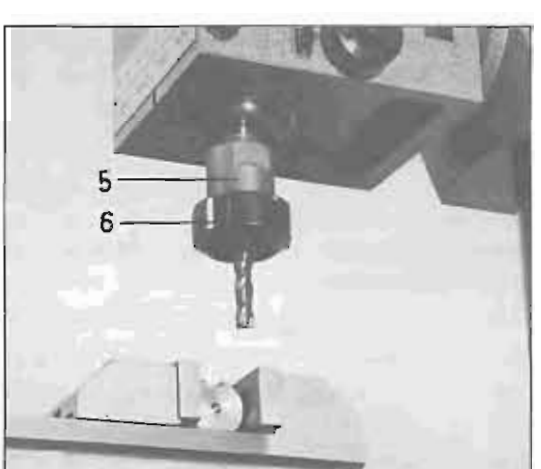
Swivel base (2)

This accesory enables the user to rotate the machine vice in the horizontal plane through 360° and lock it in any position.
It is secured to the cross slide by means of 4 T-slot boits.



Stepped clamping shoe (3)

It has a gripping capacity from 0–60 mm and is supplied complete with clamping bolt (4).



Collet holder

for double-conical collets of type E25. The collet holder is clamped with the adaptor and the draw bolt in the vertical spindle. The collet required is inserted by unscrewing the cap nut (6).

Note!

The collets must not be used for any other diameter than that indicated on the collet!

Dividing head

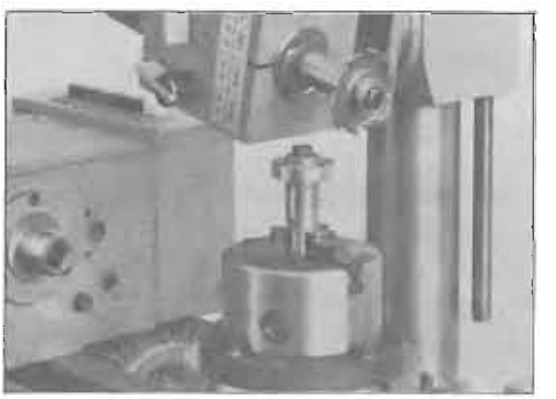
The dividing head is equipped for direct indexing using an index plunger and for worm (indirect) indexing using the worm dividing unit (reduction ratio = 1:40). Graduations are provided on the outside of the table to cross check the index sequence.

Mounting of the dividing head:
The unit is mounted on the cross slide and located with 2 clamping bolts. The indexing plate with the crank handle is arranged right hand in front.

Loading the workpieces:
Cumbersome and asymmetric workpieces are clamped on the rotary worktable; 4 holding T-slots are milled into this worktable, and centering grooves are cut into its clamping surface, which facilitate the centering of the workpiece.

Intermediate flange

For clamping cylindrical workpieces and workpieces of symmetric section the 3 or 4-jaw chuck is used on the indexing unit. First unscrew the chuck from its backplate, fasten the intermediate flange to the lathe chuck with three socket head cap screws, and finally bolt down the chuck (with intermediate flange) with 4 T-slot bolts on to the rotary worktable.



Indexing plate

The indexing unit is supplied with 3 indexing plates, two of which have each 3 circles of holes, whereas the third has 2 circles of holes. Thus 8 circles of holes of 27 to 42 are available, as referred to in the indexing **Table!**

Direct indexing

The advantage of the "Direct Indexing" method lies in the quick manipulation; moreover, by engaging a bolt into a tooth space indexing faults are avoided. The dividing wheel has a tooth space every 15°, thus 24 tooth spaces over the entire periphery. In this way all indexing numbers of 24, i. e. 2, 3, 4, 6, 8, 12 and 24 can be direct-indexed.

Operating the direct-indexing method

1. Release locking levers, part Nos. 1, 2.
2. Slacken clamping screw, part No. 3. Swing. aside anti-clockwise the indirect-indexing head until the stop, and lock in this position.
3. Pull out the direct-indexing lever, part No. 4, and swing sideways by 45° in anti-clockwise direction.

The rotary worktable can now be turned into any desired position and locked with the two locking levers, part Nos. 1, 2. If a part is required with 6 divisions turn the rotary worktable until the zero mark coincides with the divison mark of the pointer. In this position the direct indexing lever, part No. 4, should be engaged and the rotary worktable locked with the locking levers (part Nos. 1, 2). Proceed now with the initial dividing operation. For continued indexing by one sixth loosen the locking levers (part Nos. 1, 2) pull out the direct indexing lever and rotate the rotary worktable by 4 tooth spaces (hence 60°). Engage again the indexing lever, and then lock the rotary worktable again with the two locking levers (part No. 1, 2). The remaining dividing operations are carried out in a similar manner.

Worm indexing

Indirect indexing is the most accurate dividing process due to the provision of a worm reducting gear of 1:40 ratio. (Indexing faults are thereby reduced to 1:40!) By using the various indexing plates (part No. 5) any desired dividing can be carried out.

The indirect indexing method

Due to the worm reduction ratio of 1:40, forty turns of the indexing crank handle are required for one complete revolution of the indexing table. Thus all divisors contained in the number 40 (viz. 40, 20, 10, 8, 5, 4, 2) can be set straight away.
To provide for further setting it is necessary to make not only complete turns of the crank handle but also parts of a turn. To that purpose the indexing plate is subdivided.

The indexing chart

The first vertical column shows the number of the desired dividing numbers, the second column shows the degrees of angle corresponding to the dividing number. The third column shows the number of complete turns to be made with the crank of the indirect indexing arrangement for the corresponding divisor. The remaining eight columns refer to the number of holes which must be added to the complete revolutions of the circle of holes.

A practical example for the dividing operation

To index a 13-dividing – The number of dividing plate holes required for the operation will be found in the Indexing Chart. Accordingly the dividing plate having a circle of 39 holes will have to be mounted on the indirect indexing head.

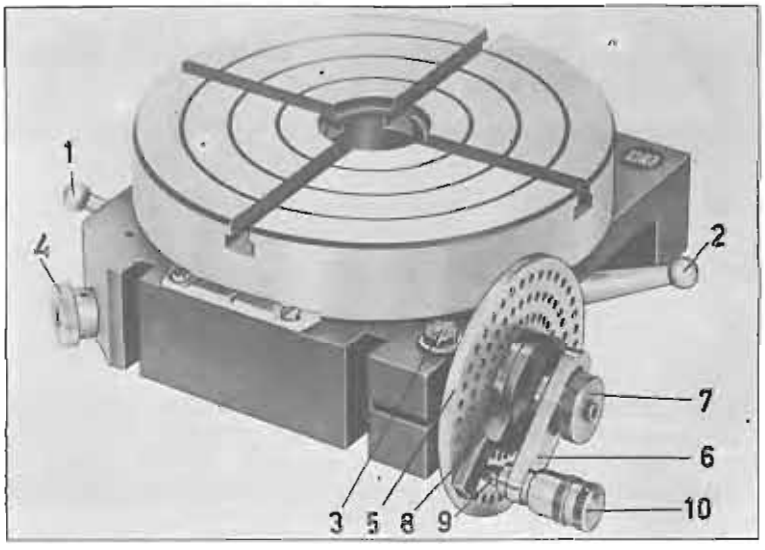
The operation is to be carried out as follows:

1. Unscrew the knurled nut (part No. 7); remove lever (part No. 6).
2. Remove shears (part No. 8).
3. Unscrew the two countersunk screws and withdraw the indexing plate.
4. Fit up the indexing plate with a circle of 39 holes, and re-mount the indirect indexing head in reverse order.
5. Set crank with its indexing finger for the 39 holes circle.
6. Slacken locking screw and adjust shears so that 4 indexing holes are included (when extra three holes are to be indexed).
7. Slacken locking screw (part No. 3), swing the indirect indexing head in clockwise direction until the stop and locate it again with locking screws.
8. The two locking levers should now be slackened and the direct indexing unit swivelled sideways.
9. The shears should then be moved in crank turning direction until one leg bears against the indexing pin (part No. 9).
10. Pull out the indexing pin with the handlever (part No. 10), make three complete revolutions: the indexing pin is again in position above the starting hole.
11. Now add the three extra dividing holes in the same direction of rotation, and let the index pin engage in the dividing hole. (The index pin must bear against the second leg of the shears).
12. Locate the rotary worktable with the two locking levers.
13. For the next dividing operation continue swiveling the shears in the direction of rotation until the first leg bears again against the indexing finger.

This completes the first dividing operation. The next dividing operation with the workpiece is carried out in the same manner.

Attention: Prior to every dividing operation the locking levers (part Nos. 1, 2) must be slackened and re-locked after the operation.

Note: If a number of indexing holes is to be set with the shears, which exceed the shears' maximum opening, e. g. 38 holes on the 42-indexing plate, set the difference of the holes between the two legs of the shears.



An example:

42–38 = 4 holes. For indexing one extra complete revolution has now to be made, and the set hole number 4 between the two legs of the shears should not be added but deducted.

INDEX TABLE for MAXIMAT

Formula for the Calculation of the Hole Numbers Required

z = No. of divisions required for one revolution of the workpiece.

K = No. of revolutions of handle for a complete revolution of the workpiece.

n = No. of revolutions of handle for one dividing move: $n = \frac{K}{z}$

Worm reduction of dividing head 1:40; i. e. K = 40.

Division Desired	Degrees	No. of crank turns req'd	Amount of holes to be added for each index plate							
			27	33	34	36	38	39	40	42
2	180°	20								
	175°	19	12							
	170°	18	24							
	160°	17	21							
	150°	16	18							
	140°	15	15							
	130°	14	12							
	125°	13	24							
3	120°	13	9	11		12		13		14
	110°	12	6							
	100°	11	3							
4	90°	10								
	80°	8	24							
	75°	8	9	11		12		13		14
5	72°	8								
	70°	7	21							
	65°	7	6							
6	60°	6	18	22		24		26		28
	55°	6	3							
7		5								30
	50°	5	15							
8	45°	5								
9	40°	4	12			16				
10	36°	4								
11		3		21						
12	30°	3	9	11		12		13		14
13		3						3		
14		2								36
	25°	2	21							
15	24°	2	18	22		24		26		28
16		2			17	18	19		20	21
17		2			12					
18	20°	2	6			8				
19		2					4			
20	18°	2								
	16°	1	21							
21		1								38
22		1		27						
24	15°	1	18	22		24		26		28
25		1							24	
26		1						21		
27		1	13							
28		1								18
30	12°	1	9	11		12		13		14

Division Desired	Degrees	No. of crank turns req'd	Amount of holes to be added for each index plate							
			27	33	34	36	38	39	40	42
32		1				9			10	
33		1		7						
34		1			6					
35		1								6
36	10°	1	3			4				
38		1				·	2			
39		1						1		
40	9°	1								
42										40
44				30						
45	8°		24			32				
48						30				35
50									32	
	7°		21			28				
52								30		
54			20							
55				24						
56										30
60	6°		18							
64									25	
65								24		
66				20						
68					20					
70										24
72	5°		15			20				
76							20			
78								20		
80					17	18	19		20	21
84										20
85					16					
88				15						
90	4°		12			16				
95							16			
96						15				
100									16	
120	3°		9	11		12		13		14
180	2°		6			8				
200									8	
240						6				7
270			4							
360	1°		3							
	40'		2							
	30'					2				
	20'		1							

Tool mounting and -ejection on vertical spindle

Screw the adaptor with its male thread (M10) into the tool shank. The drawbolt in turn screws into the female thread (M8) of this adaptor. The drawbolt seats tool very tightly (Fig. 1).

To eject tools from the spindle, unscrew the drawbolt and insert the jacking pin in the spindle, tenoned-end-down (Fig. 2). Screwing the jacking nut on the spindle and turning it down with the machine's wrench, screw-ejects the tool (spindle to be held with its spanner – width over flats 32 mm – to keep it from turning).

Tools without draw-in screw thread are also ejected by using jacking pin and nut.

Attention! Never drive out tools by inserting a rod through the spindle bore and hammering the rod.

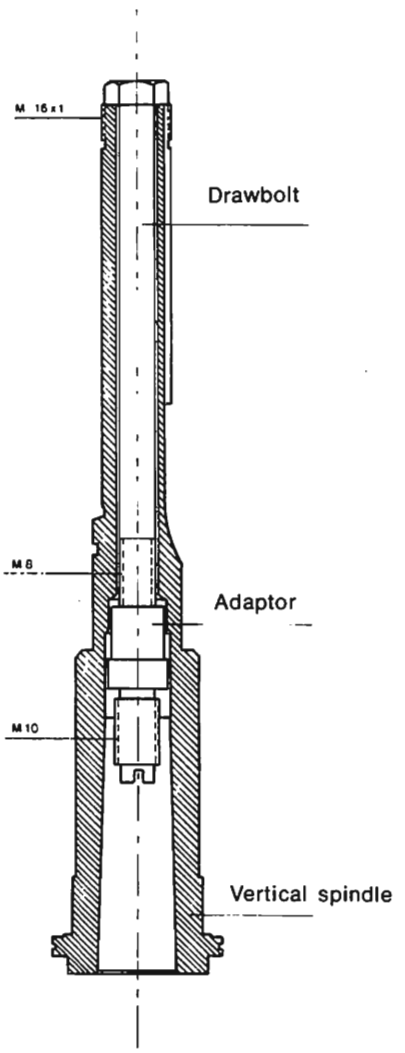


Fig.1

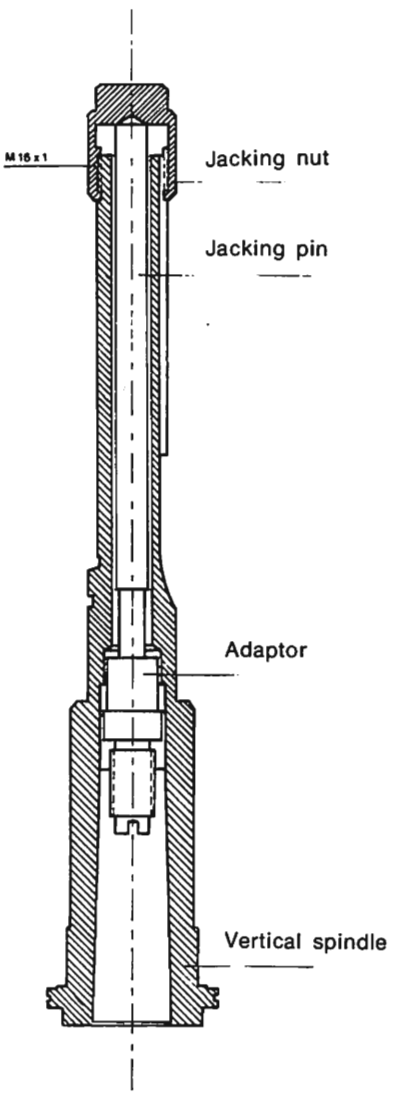


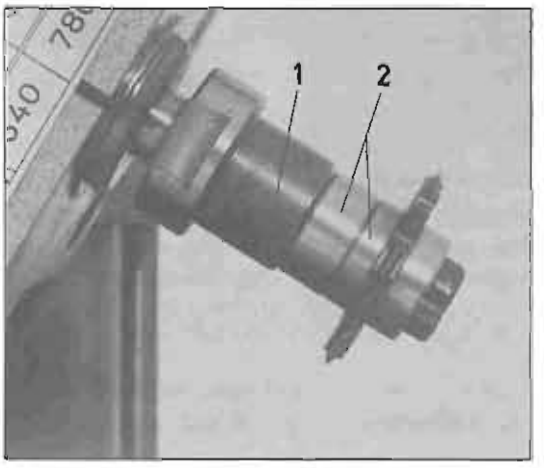
Fig.2

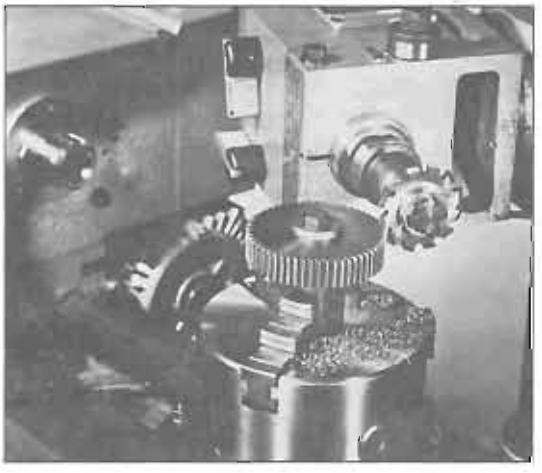
Tools for Vertical Attachment

Shell end mill arbor (1)

to accommodate side milling cutters as well as circular saw blades. As the various milling tools are not always of the identical width, hardened and ground spacing collars (2) are used for compensating these differences.

Width of spacing collars: 4,.6, 8, 12 mm



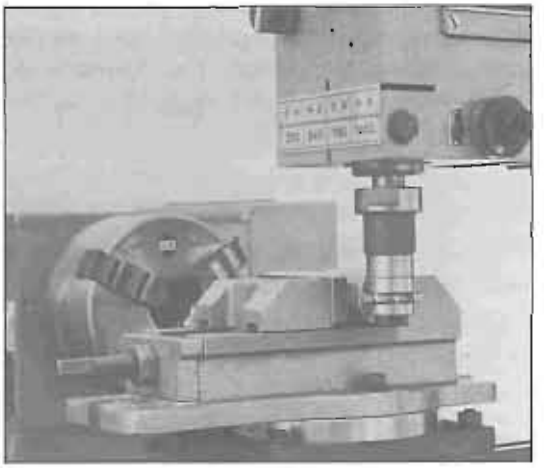


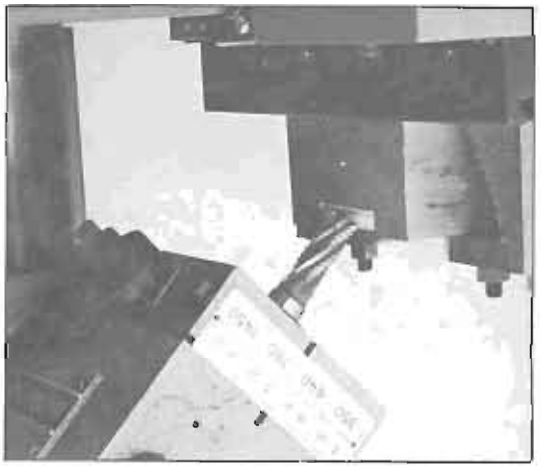
Staggered tooth side milling cutter

bore ∅ 16 mm, width 5 mm, HSS

Gear milling cutter

bore ∅ 16 mm, for 20° pressure angle, relieved, HSS



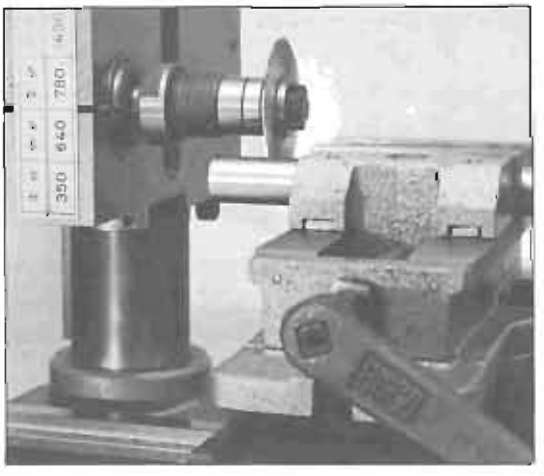


Heavy-duty end mill

for roughing cut, dia. of cutter 8 mm, HSS

Circular saw blade

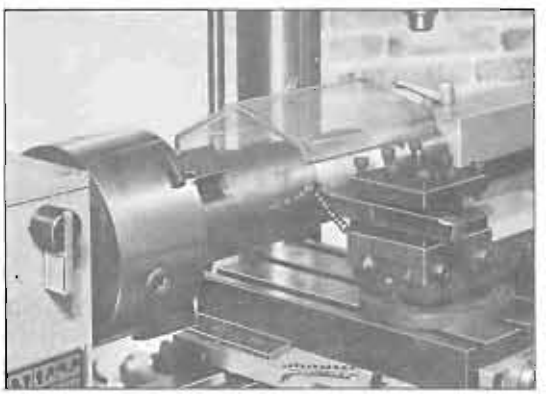
for cutting to lenght
bore ∅ 16 mm, dia. of cutter 60 mm,
width 0,8 mm.



C) Safety Devices

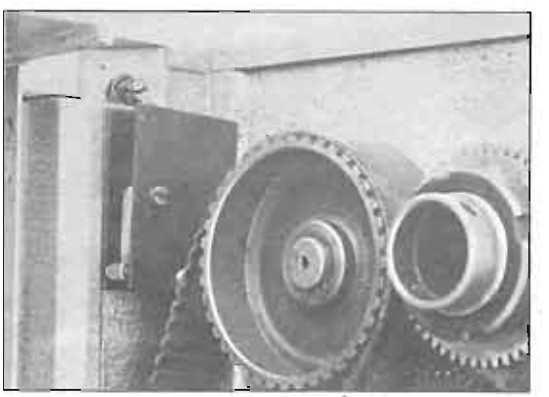
Chuck guard

protects the operator against possible injury caused by the rotating chuck. The chances of inadvertently leaving a chuck wrench in the chuck are also substantially reduced. The chuck guard consists of plexiglass-panels held in an aluminium die cast frame.



Chip guard

is mounted on the cross slide and therefore follows the turning tool. It protects the operator against turnings flung away. Even if the turning tool should break, the chip guard stillprovides sufficient protection.



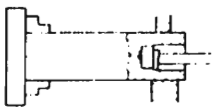
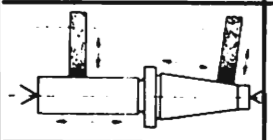
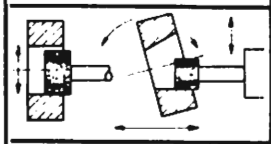
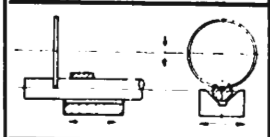
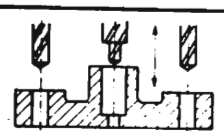
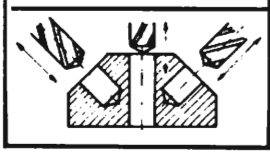
Limit switch

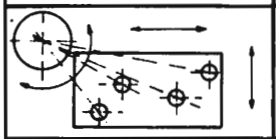
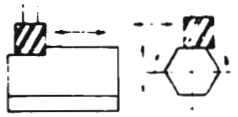
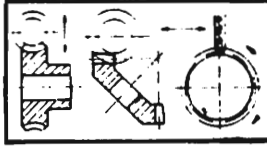
Serves as a safety switch against unintentional opening of the gear cover whilst the machine is running; i. e. the circuit is broken and the machine comes to rest.
With gear cover open, the machine cannot be started. This device substantially reduces the danger of injury.

Armoured conduit

Metal-casing protects the cable between headstock and vertical attachment against mechanical damage. The metal-casing is simply pulled over the cable.

Description of Working Operations

Diagrammatic representation of the operations	Description
	Turning
	Cylindrical and taper turning, facing
	Turning using the steady
	Screw cutting: single-, multiple threads/left-hand-, right-hand threads/cylindrical
	Plain grinding
	Cylindrical-, taper grinding
	Internal grinding
	Internal grinding (cylinder, taper)
	Cutting to length of round stock, flat stock and square-section rod
	Drilling work
	Drilling of perpendicular holes
	Drilling jobs at any angle

Diagrammatic representation of the operations	Description
	Radial drilling
	Milling operations
	Vertical and horizontal milling
	Milling jobs at any angle
	Cutting gears
	Manufacture of spline teeth, spur gears with straight and inclined teeth, worm gears with the aid of the indexing head.

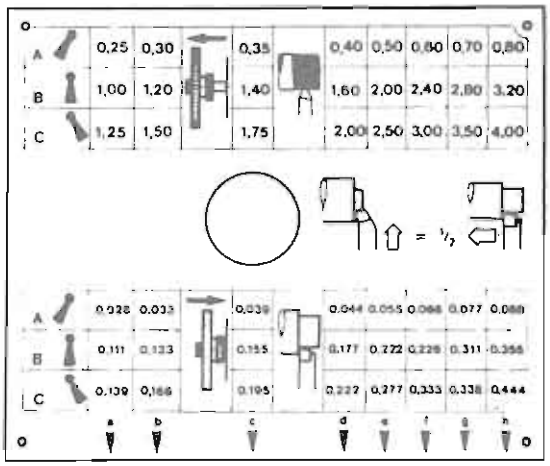
Safety Regulations

When machining rod stock, tubular steel etc., the protruding rotating part has to be completely covered by a stationary guard.

The protruding end of a draw-in tube must also be shielded with a stationary guard. The end of a rotating draw-in tube can be left unguarded if it has no sharp edges and is less than 5 cm long.

Turning with power feed

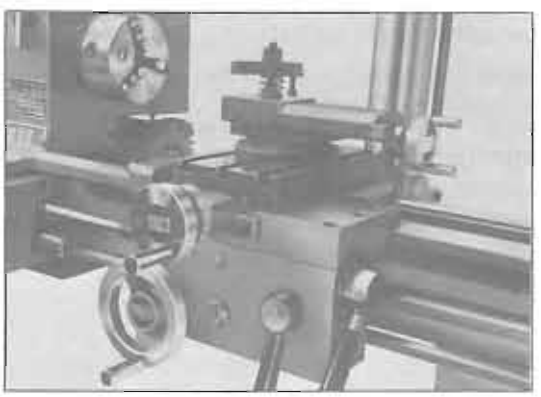
By engaging gears of the quick-change gearbox according to the feed chart, feeds shown in this chart can be selected.



Attention! Cross feeds are half the feed rates shown on the feed chart.

Longitudinal power feed

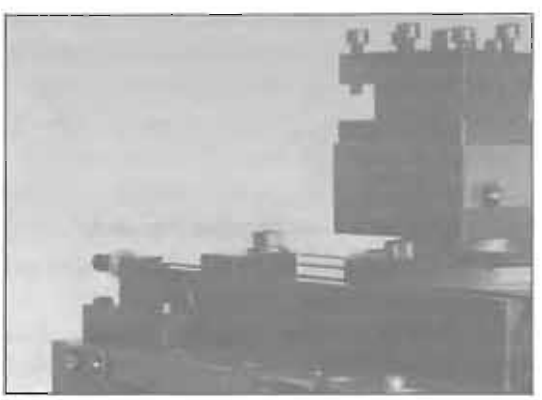
Selecting feed:
Pull lever out and move it upward, holding lever out.
Stopping feed:
Move lever downwards, don't pull it outwards, and it will automatically drop into the neutral position.
When feeding two-position sliding gear must be pushed in.



Cross power feed

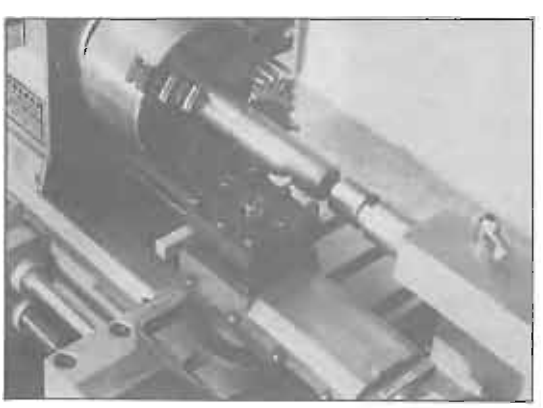
Selecting feed:

Pull lever out and move it downwards until it reaches the stop.
Stopping feed:
Pull lever up, don't pull it outwards, and it will automatically drop into the neutral position.
When feeding two-position sliding gear must be pushed in.



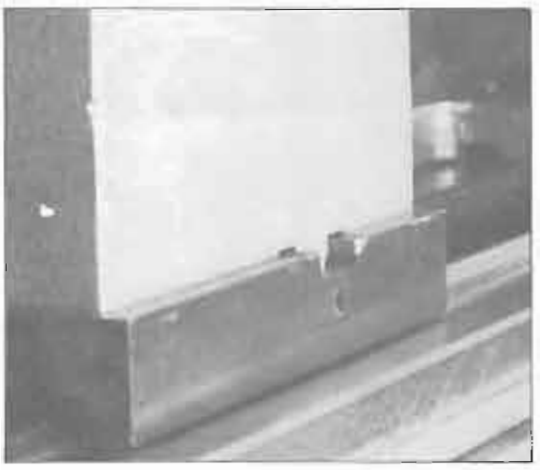
Screw cutting

When screw with cutting the MAXIMAT, the two-position sliding gear must be in the pulled out position. Each of the 24 pitches shown on the chart can be obtained by setting the lever in the corresponding positions.
Moving the half-nut lever to the left causes the half-nut to engage with the leadscrew.
When cutting inch- and module threads, the universal quadrant with gears from the set of change gears has to be used (refer to accessories on page 13).



Taper turning using tailstock set-over

Work up to a side angle of 5° can be turned by setting over the tailstock (the angle depends on the length of the workpiece). If the smallest diameter of the taper is on the tailstock end, the tailstock must be moved towards the leadscrew.



Operation instructions

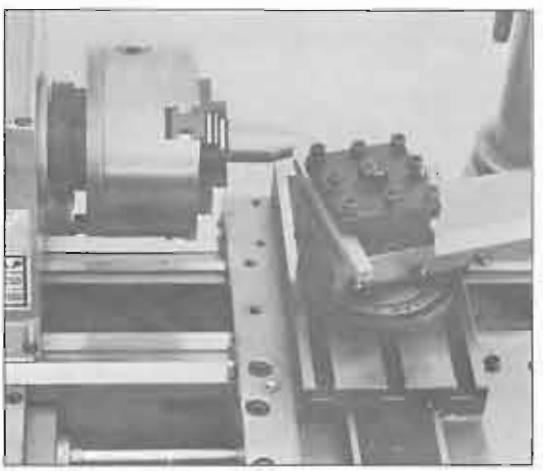
To set over the tailstock, slacken the locking screw. Screw out the front adjusting screw. Screw in the adjusting screw at the rear of the tailstock until the required taper has been obtained. Tighten the front adjusting screw to lock the tailstock to the base. It is essential that the work be carried between centres. The workpiece is driven by the lathe carrier and driving plate.

After the completion of the taper turning operation, the tailstock is returned to its original position. The zero position of the tailstock is checked by turning a test piece with constant adjustment until test piece is absolutely cylindrical.

Taper turning by setting the top slide

By setting the top slide, tapers can also be turned.

Angular adjustment of top slide:
After slackening the hexagon head screw (A/F 13), the top slide can be swiveled freely. A gratuated scale permits an accurate adjustment of the top slide. This method can only be applied for short tapers.



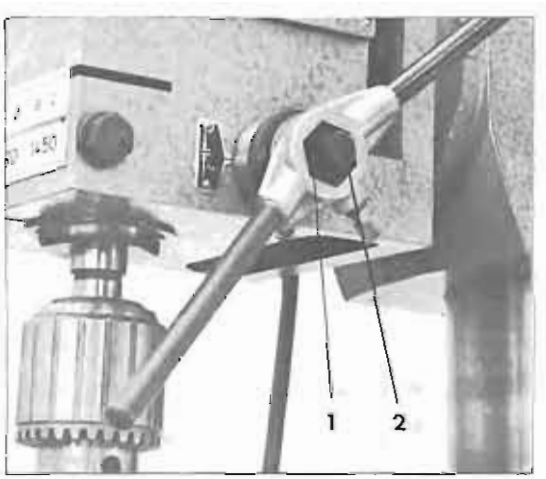
Drilling with the vertical attachment

For drilling, the drill chuck together with the Morse taper arbor is used. (Morse taper 2; can also be used with the tailstock).

Setting constant drilling depth

If several holes of identical depth are to be produced, it is possible to set the stop as follows to achieve this:

1. Slacken quill locking screw (13 mm A/F). The quill returns to the zero position.
2. Slacken hexagon screw part (2) whilst holding hexagon screw part (1).
3. Fit drilling key and drop quill together with tool until the latter touches the workpiece.
4. Hold the quill in this position. Turn index collar clockwise to its stop and lock with hexagon head screw part (2) whilst holding screw part (1).
5. The required depth of hole can now be read directly from the dial. (From graduation to graduation = 1 mm).
6. When the required depth has been reached, hold down the quill, slacken screw part (2) and rotate the dial anticlockwise to the stop and re-lock with screw part (2) whilst holding screw part (1).



Any number of holes can now be drilled on identical components having the same hole depth.

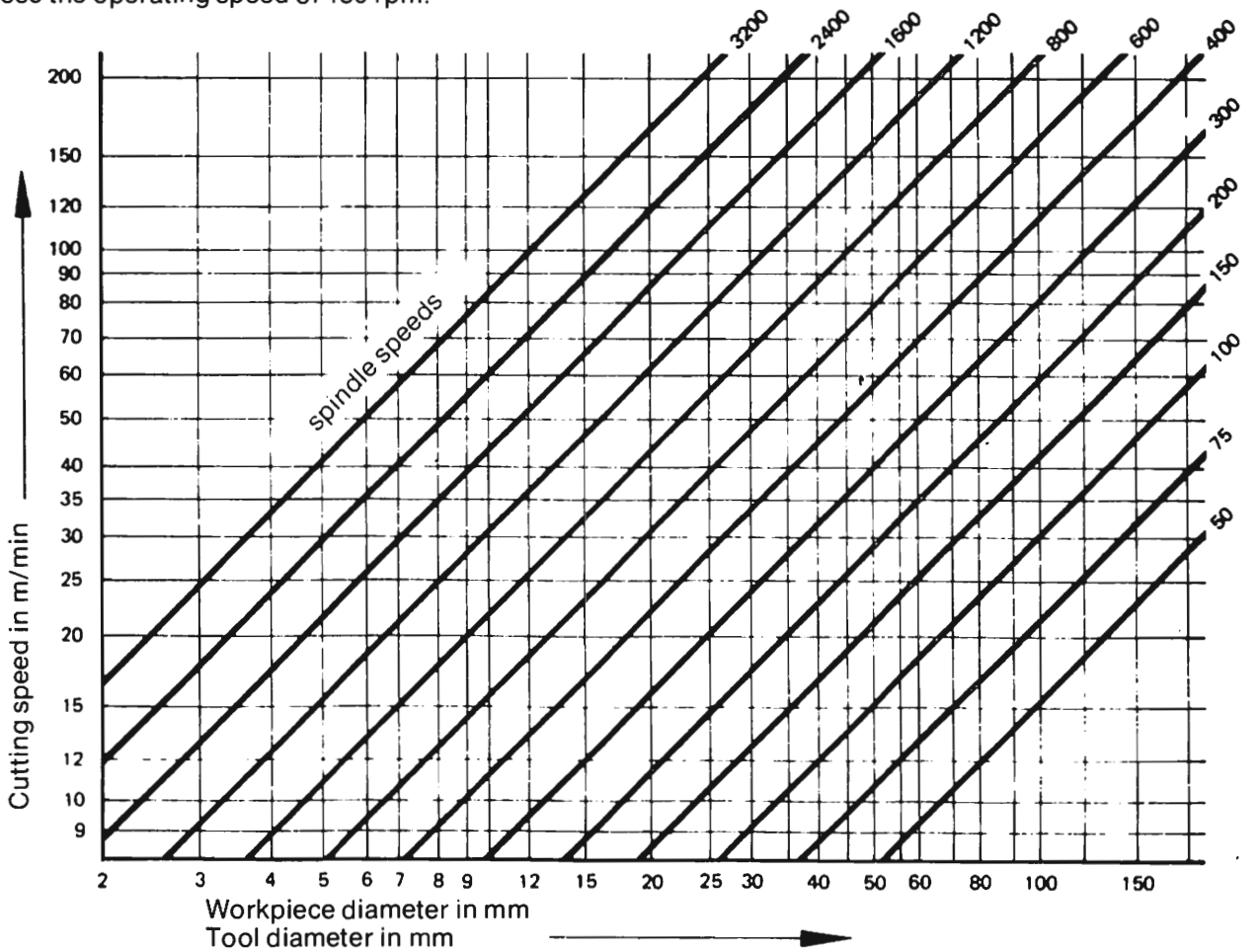
Diagrams and Charts

Material table for lathe and vertical attachment

MATERIAL	Cutting speeds in m/min for HSS Tools					VERTICAL ATTACHMENT
	Roughing	Finishing	Drilling	Reaming	Screw cutting	
Freecutting Steel	35	50	40	12	20	
Steel strength 50 kp/mm²	30	40	35	10	15	25
Steel strength 70 kp/mm²	20	30	30	8	8	25
Cast iron	20	35	20	8	8	25
Brass	60	100	60	20	30	60
Alum. alloy	60	150	60	30	30	200

Example of selecting the correct operating speed:

Rough turning of a shaft made of steel having a strength of 70 kp/mm². Shaft dia. 60 mm.
We note from the material Table under headings "Steel strength 70 kp/mm²" and „Rough turning" a cutting speed of 20 m/min.
Looking up the Cutting Speed Table and column "Workpiece dia. 60 mm", and following the vertical auxiliary line up until the crossing point with the horizontal auxiliary line of 20 m/min we find that the point of intersection lies between the speeds of 100 and 150 rpm. But as this point is nearer to the higher speed, we choose the operating speed of 130 rpm.

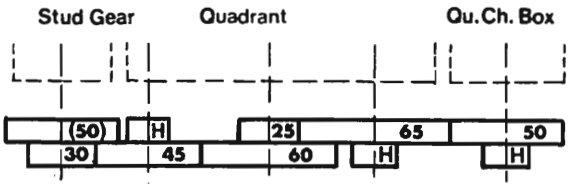


Quick Change Box M Pitch 0,75

Change Gear Combination for Universal Quadrant M

Top lever position: C

Tumbler lever position: b

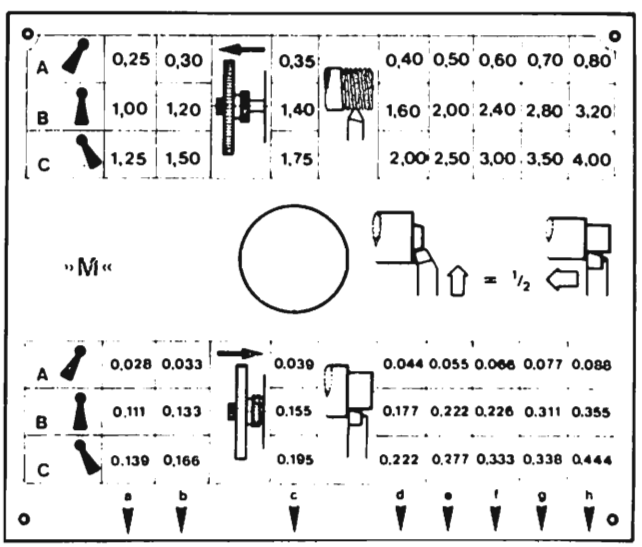


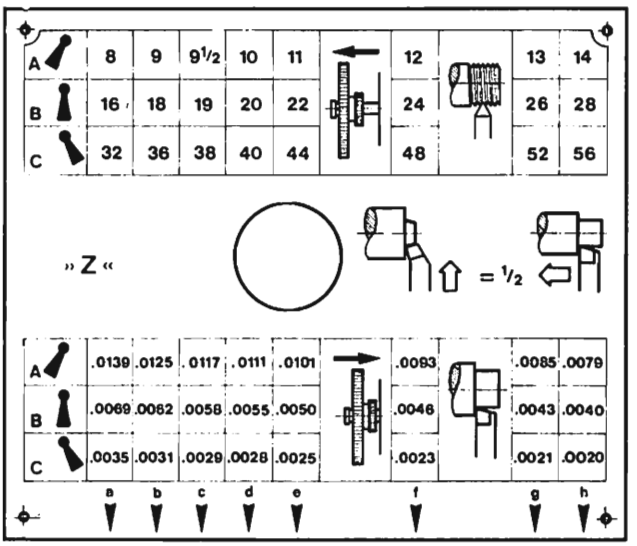
Pitch Chart / Feed Chart

There are two tables on the feed chart each divided in 3 rows horizontally, and 8 columns vertically. Each row A, B or C is related to a position of the top lever, and each column a–h lines up with a position of the tumbler lever on the front face of the gearbox.
When screwcutting each of the 24 screw pitches (in mm or threads / inch with machines having a inch-leadscrew) shown on the chart can be obtained by setting the lever in the corresponding positions.
In addition the diagram of the two-position sliding gear reminds, that the push-pull knob must be in the pulled-out position.

When powerfeeding each of the 24 speeds (mm/rev or inches/rev with machines having a inch-leadscrew) is selected in a similar way. The diagram of the two-position sliding gear reminds, that the push-pull knob must be in the pushed-in position.

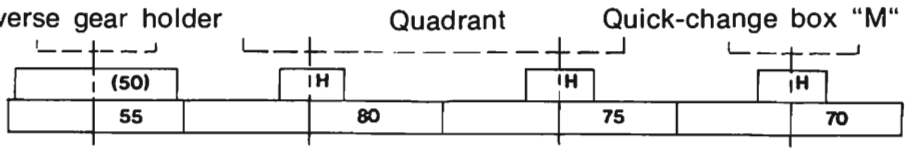
Attention! Cross feeds are half the feed rates shown on the feed chart!
A symbol in the centre of the feed chart is designed as a reminder that cross feed is 1/2 longitudinal feed; this applies also when milling with the vertical attachment.





Module Thread for MAXIMAT Quick-Change Box "M"
Change Gear Combination for Universal Quadrant "M"

H = Spacer sleeve A–C = Top lever position a–h = Tumbler lever position

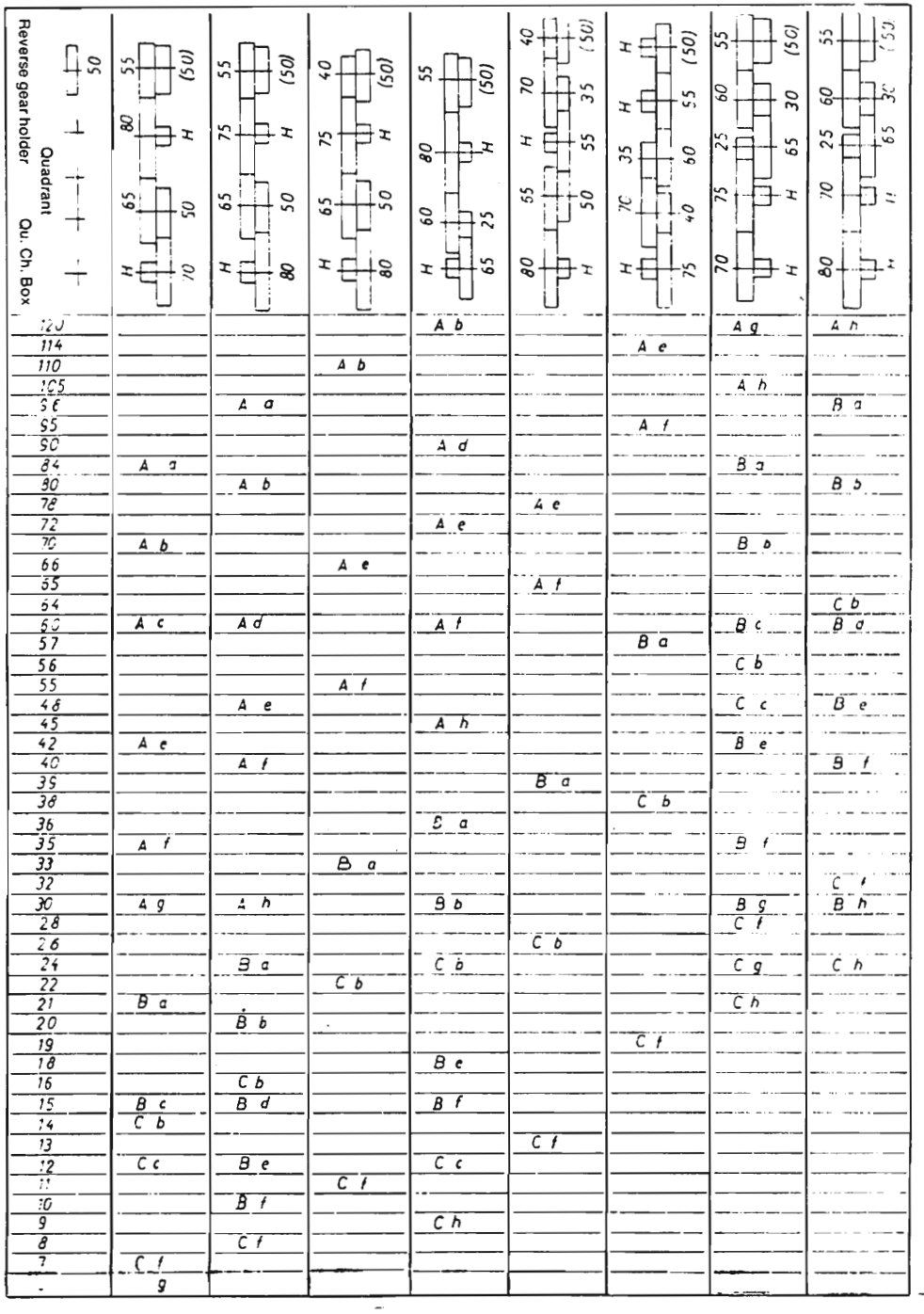


Module	Top lever and tumbler lever	Module	Top lever and tumbler lever
0,15	A b	0,75	C b
0,175	A c	0,80	B d
0,20	A d	1,00	B e
0,25	A e	1,20	B f
0,30	A f	1,25	C e
0,35	A g	1,40	B g
0,40	A h	1,50	C f
0,50	B a	1,60	B h
0,60	B b	1,75	C g
0,70	B c	2,00	C h

THREADS PER INCH WITH QUICK CHANGE BOX "M"

Change Gear Combinations for Universal Quadrant "M"

H = sleeve
A–C = lever position
a–h = tumbler lever position

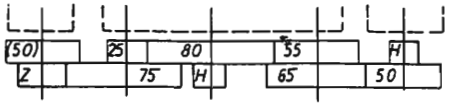


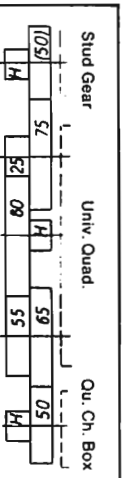
METRIC THREADS CUTTING WITH QUICK CHANGE BOX "Z"

Universal quadrant with 12 change gears

H = Spacer sleeve
A–C = Top lever position
a–h = Tumbler lever position
Z = Stud gear on reverse gear holder

Stud Gear Universal Quadrant Quick Change Box

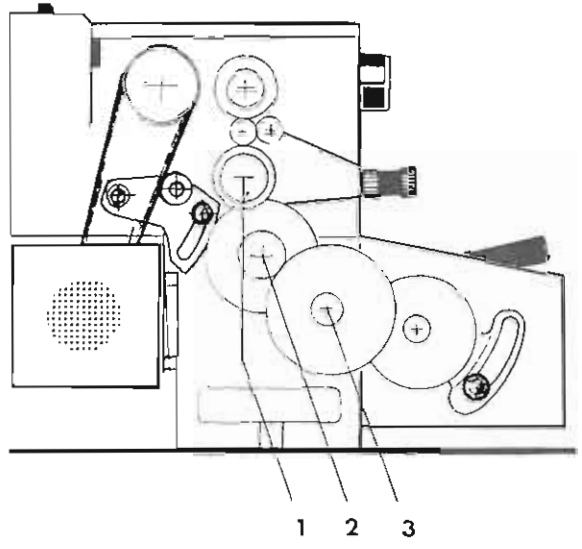




Pitch in mm	Z – 30	Z – 35	Z – 40	Z – 45	Z – 60	
0,25	C f	C h				
0,30	C d					
0,35		C d				
0,40			C d			
0,45				C d		
0,50	B f	B h	C a	C b	C f	C d
0,60	B d				C d	
0,70		B d				
0,75	B a			B f	C a	
0,80			B d			
0,90				B d		
1,00	A f	A h	B a	B b	B f	B d
1,25						B a
1,50	A a			A f	B a	
1,75		A a				
2,00			A a	A b	A f	A d
2,25				A a		
2,50						A a
3,00					A a	

Lubrication Chart

	No	Interval	Position	Grease	Oil
◇	1	Prior to starting	Gears, nipple: grease; gear: oil	■	■
◇	2	"			
◇	3	"			
◇	4	"	Check oil, sight glass headstock R. H. side		■
◇	5	"	Screw off vertical head adjustment		■
◇	6	"	Vertical column		■
◇	7	"	Clean leadscrew and oil all over		■
◇	8	"	Grease traverse rack		■
◇	9	"	Keep bedways clean all over		■
◇	10	"			
◇	11	"	Grease R. H. leadscrew bearing	■	
◇	12	"	Top slide and guides, screw		■
◇	13	"	Cross slide and guides screw		■
□	14	Every 500 hours	Lubricating nipples for carriage and half-nut	■	
□	15	"	Tailstock barrel	■	
○	16	Every 100 hours	Headstock gears: SAE 10/0.2 l oil		■
○	17		Gears of vertical head	■	
○	18		Quick-change box		■

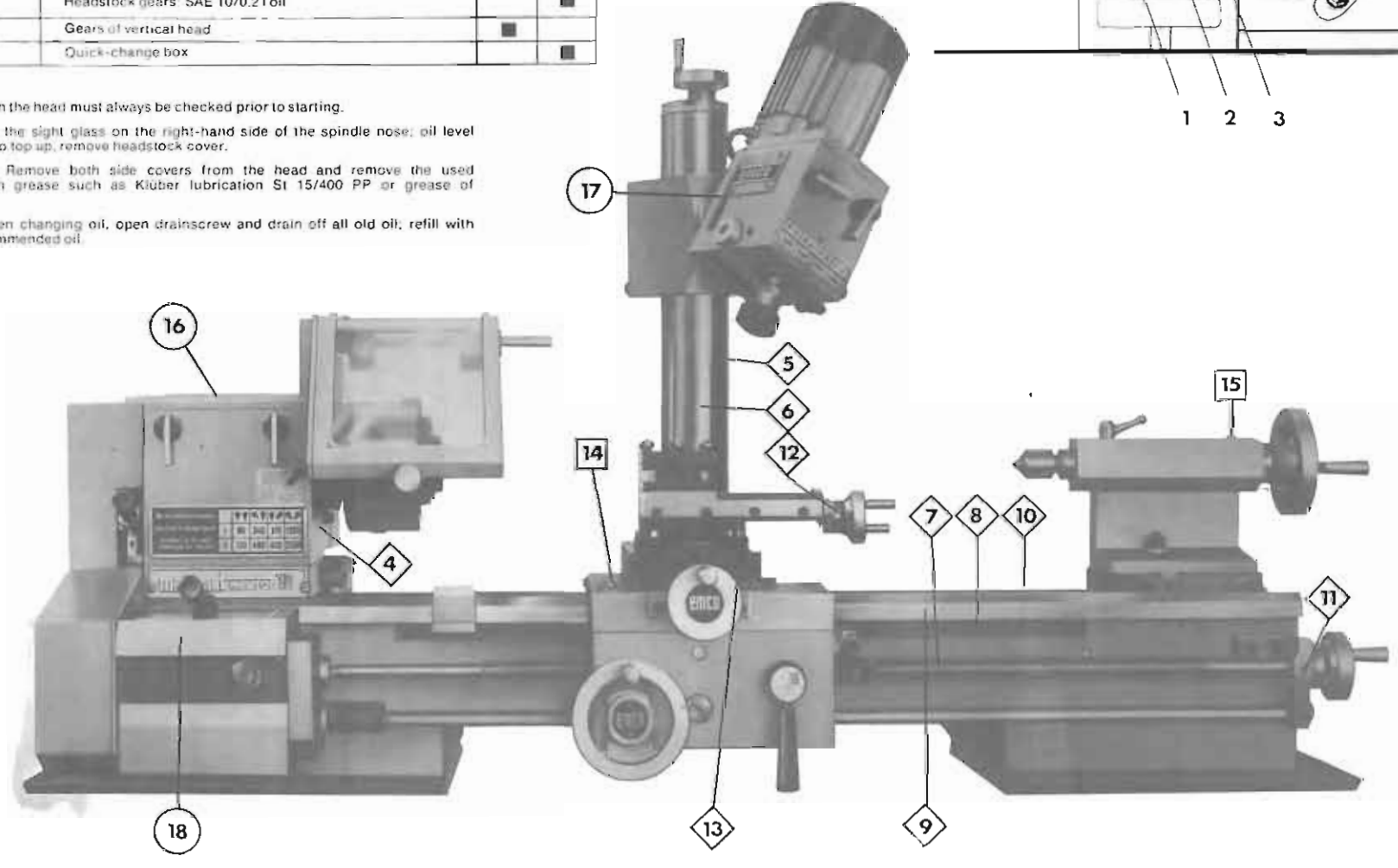


HEADSTOCK: The oil level in the head must always be checked prior to starting.

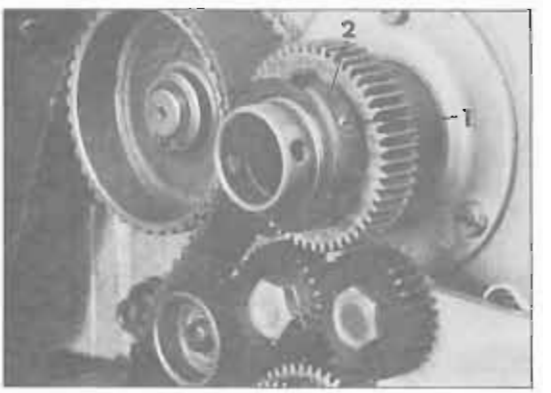
The oil level is checked at the sight glass on the right-hand side of the spindle nose; oil level must be at centre of glass. To top up, remove headstock cover.

VERTICAL ATTACHMENT: Remove both side covers from the head and remove the used grease; replace with fresh grease such as Klüber lubrication St 15/400 PP or grease of similar quality.

QUICK-CHANGE BOX: When changing oil, open drainscrew and drain off all old oil; refill with correct quantity of the recommended oil.

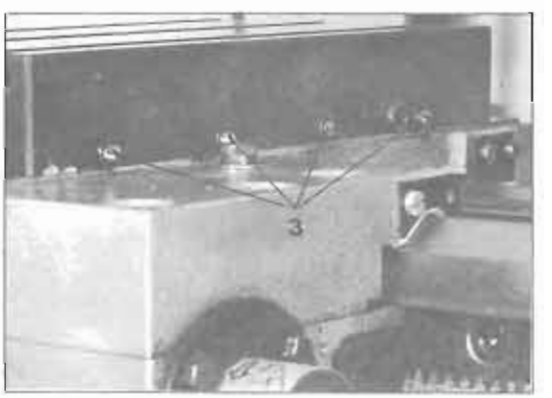


Bearing and Slide Adjustment



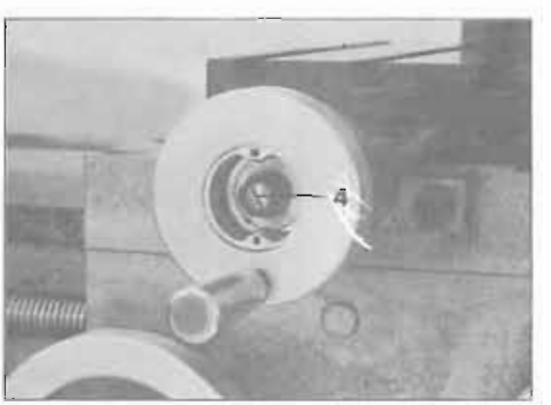
Adjustment of mainspindle bearings

The mainspindle bearings are correctly adjusted at the works. If end play becomes evident after considerable use, the bearings can be adjusted by slackening the grub (1) in the slotted nut (2) on the left-hand side of the spindle and to tighten the slotted nut with a "C" spanner until all end play is taken up, but with the spindle still revolving freely. (Excessive preloading will damage the bearings). Tighten grub screw.



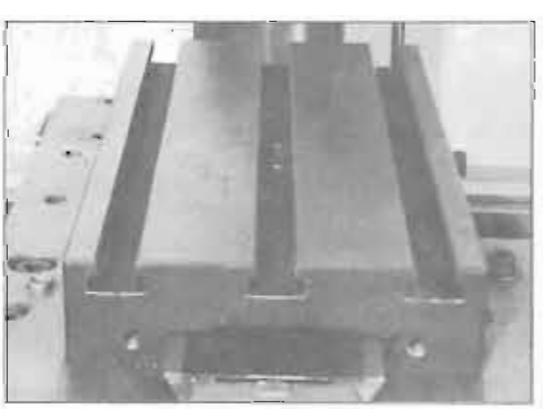
Adjustment of cross and top slides

Each slide is fitted with a gib strip which can be adjusted with 4 screws (3) fitted with lock nuts. The gib strip is adjusted with the screws until the slide moves freely without play, after which the lock nuts are tightened.



Adjustment of feed screw end float

when one of the slides (saddle, cross or top slide) develops end float, slacken the screw in the relevant hand wheel and adjust the nut until all play has been taken up. Re-lock the nut with the screw.

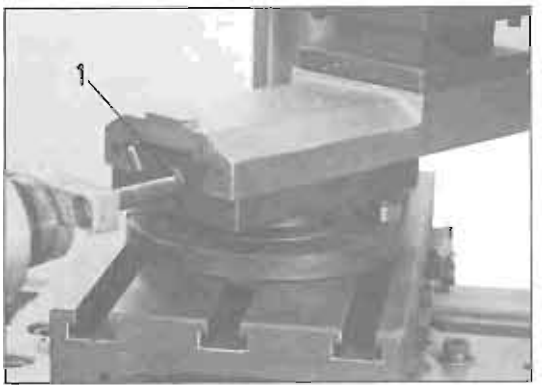


Adjustment of feed screw backlash in nuts

Cross slide spindle
Remove the 2 screws holding the spindle bracket in position and unscrew the spindle. Adjust the screwed ring until the backlash is eliminated.

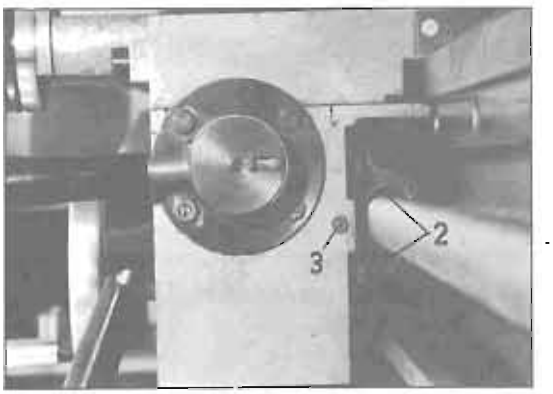
Top slide spindle

Remove the 2 screws holding the spindle bracket in position and unscrew the spindle. Adjust the screwed ring (1) until all backlash has been eliminated.



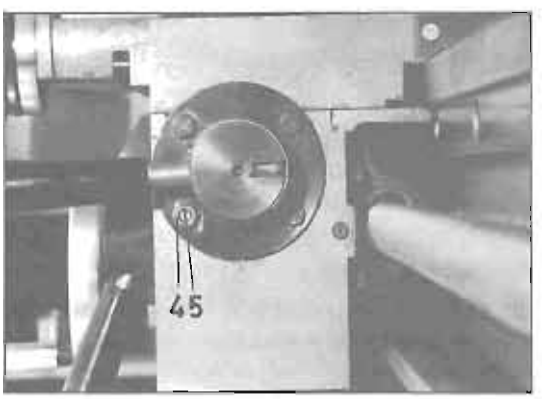
Adjustment of half-nut guide

Loosen the 2 hexagon head screws (2) on the rear of the apron and adjust the control screw (3) until both half-nuts move freely without play. Tighten both hexagon head screws again.



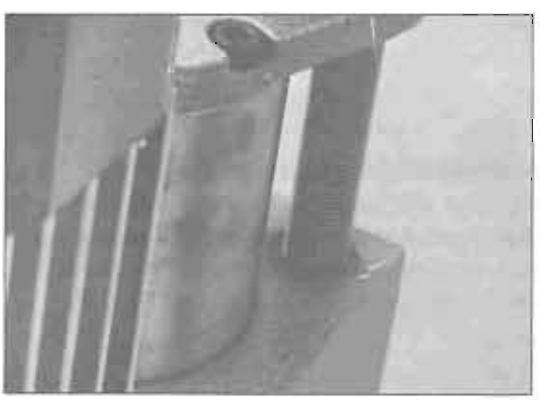
Adjustment of leadscrew backlash

Loosen lock nut (4) and screw grubscrew (5) outwards, until – with the half-nuts engaging the leadscrew – all free play and endfloat has been taken out. Retighten look nut.



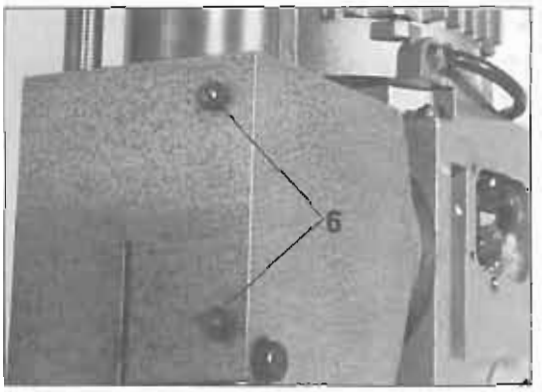
Adjustment of vertical head feed screw backlash

Also in this case, adjust the screwed ring until all backlash has been eliminated.



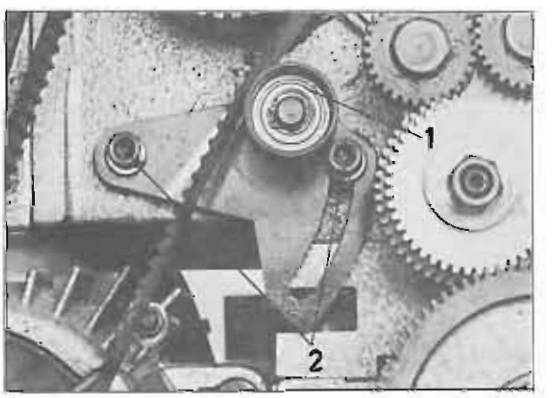
Adjustment of vertical head guide

The vertical head guide is fitted with a gib strip which can be adjusted with 2 screws (6) (screws are secured with check nuts).



Timing belt drive

Checking of correct tension
When correctly adjusted the belt should deflect about 6–8 mm, when moved by hand (1). To increase belt tension the idler (1) must be adjusted. This is done by loosening the 2 socket screws (2), swinging the idler (1) in against the belt, and retightening the 2 socket screws. After adjusting check the belt tension again.



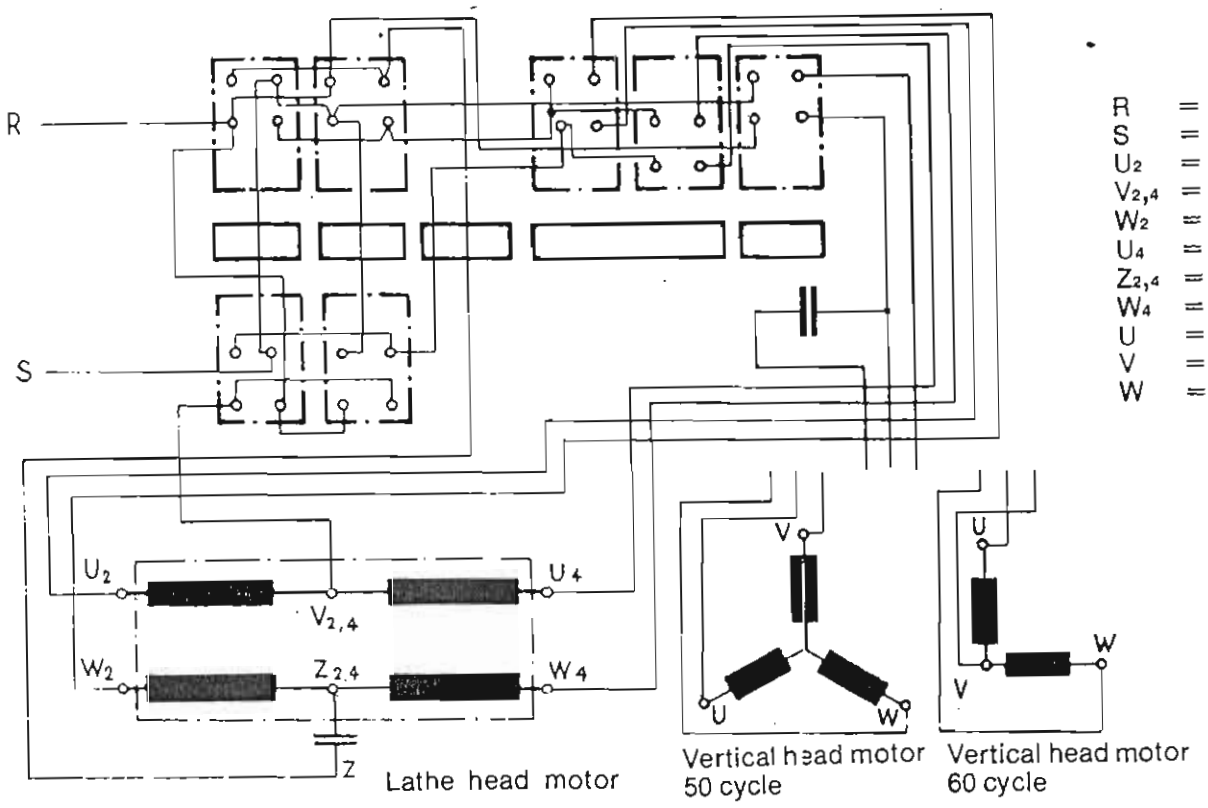
Changing the belt

When the driving belt (between the motor and countershaft) needs replacing, remove the motor fan casing, remove safety ring and then the timing belt pulley, followed by the belt itself. Now replace the belt, timing pulley and lock. When replacing the fan casing make sure that the belt lies properly inside the recesses to prevent scuffing.

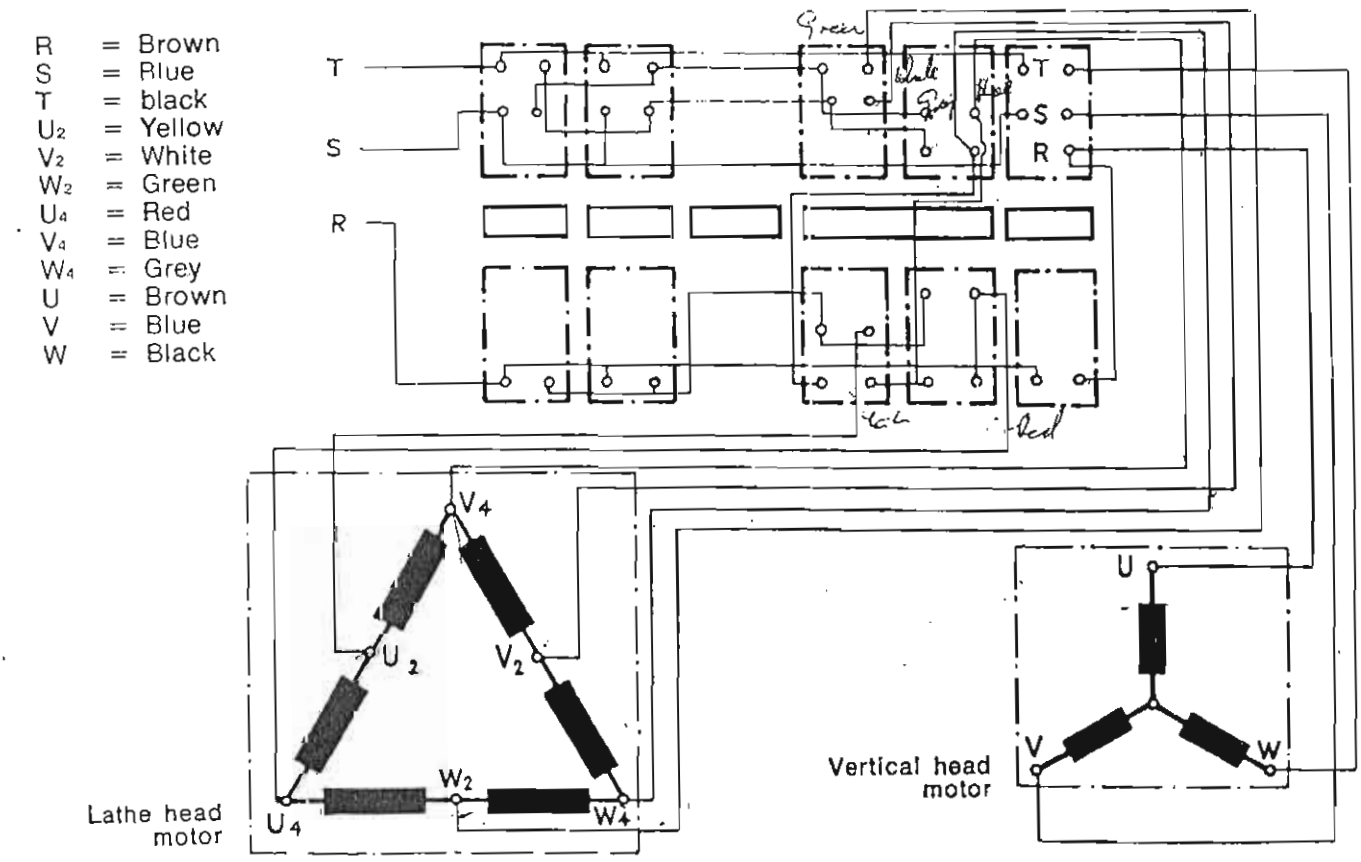
Setting of safety slipping clutch

Every clutch is preset at the factory. If required the clutch can be readjusted in the following way:
Using a special 2-pin spanner, turn the adjusting screw in the clutch body, about 90° clockwise. Check the adjustment by running the saddle into the bed stop under power. Repeat the adjustment as necessary until the required slipping torque is reached.

Wiring diagram for single phase motor "1 ph"



Wiring diagram for three phase motor "3 ph"



ELCOMP (PTY) LTD

232 Element Rd., Chloorkop Ext. 1
P O. Box 904 RIVONIA 2128
TEL. (011) 393-3731
FAX. (011) 393-3916