HIGH PRECISION LEADSCREW LATHE

SCHAUBLIN 160

BL : _____

Edition : 21.11.1969

SERVICE INSTRUCTIONS

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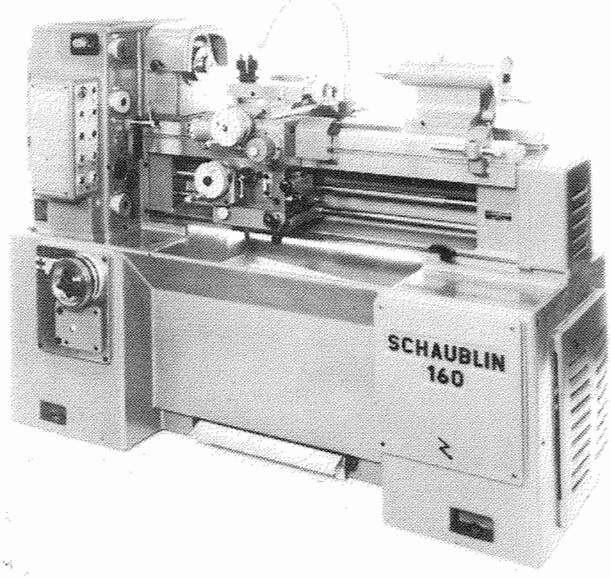
HIGH PRECISION LEADSCREW LATHE

SCHAUBLIN 160



SERVICE INSTRUCTIONS

To be handed over to the operator in charge of the machine.

Dimensions, figures and weights are not binding. We reserve the right to introduce such constructional changes we may deem necessary in order to improve our product.

Machine N° : _____

BL N° : _____

Voltage : _____

FABRIQUE DE MACHINES
SCHAUBLIN S.A.
2735 BEVILARD SUISSE

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HIGH PRECISION LEADSCREW LATHE SCHAUBLIN 160

SPECIFICATIONS

Height of centres	160 mm
Distance between centres	750 mm
Swing over bed	375 mm
Swing over carriage	180 mm

HEADSTOCK

Spindle speeds, infinitely variable	38 - 3000 r.p.m.
with open belt drive 190 - 3000 r.p.m.	
with reduction gear 38 - 600 r.p.m.	
Spindle nose, outside diameter 117,45 mm	Camlock D1-4"
Spindle internal taper	Morse No. 5
Spindle bore diameter	40 mm
Reduction socket for collet	B32
Bar capacity in collet	24 mm

SCREWCUTTING AND FEED CONTROL BOX

48 metric pitches	0,25 to 14 mm
48 english pitches	72 to 1 t.p.i.
48 module pitches	0,125 to 8
24 fine longitudinal and transverse feeds	0,015 to 0,21 mm/rev.
24 longitudinal and transverse feeds	0,025 to 0,35 mm/rev.
Larger feeds by using the screwcutting gear wheels	

CARRIAGE

Longitudinal travel	750 mm
Tool slide traverse	120 mm
Cross slide traverse	215 mm
Height of centres above slide	32 mm
Tool section	20 x 20 mm

TAILSTOCK

Spindle internal taper	Morse 3
Spindle traverse	120 mm
Spindle lateral adjustment	$\pm$ 10 mm

DRIVING MOTOR

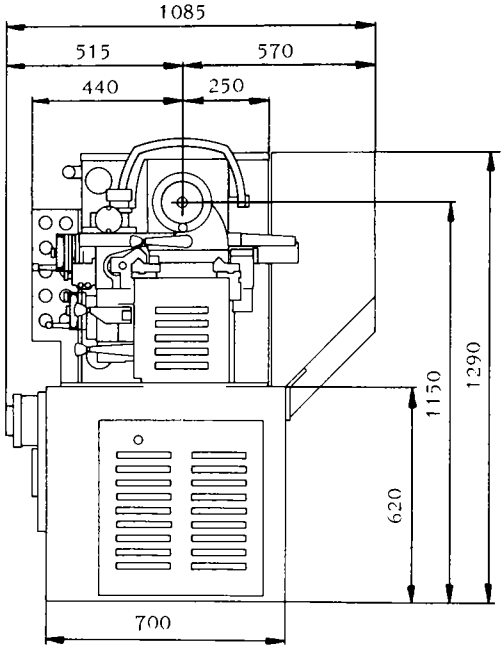
Speed	750 / 3000 r.p.m.
Power	3/6 h.p.

WEIGHTS

With standard equipment,	net	1950 kg
	gross	2200 kg

OVERALL DIMENSIONS

Lathe	length x width x height	1880 x 1085 x 1290 mm
Electrical switchgear cabinet	length x width x height	754 x 650 x 1000 mm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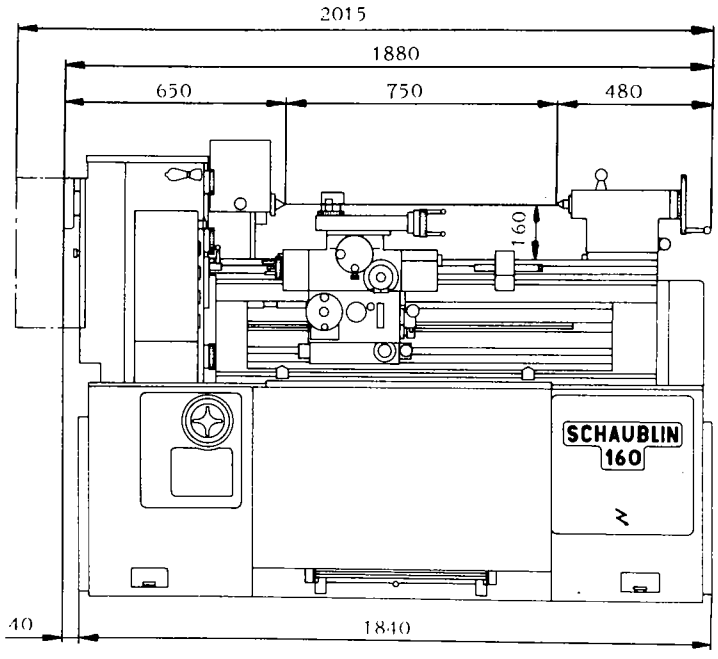
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SCHAUBLIN
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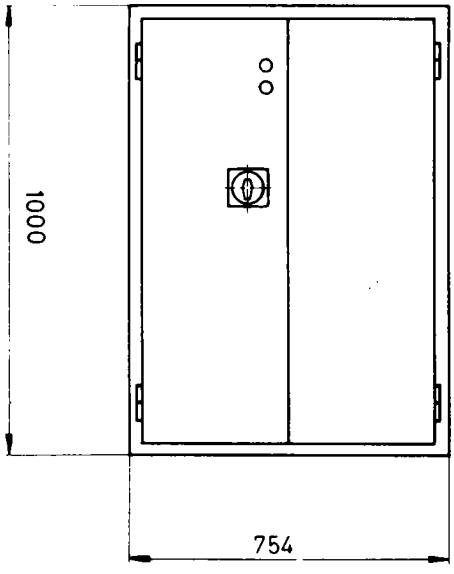
1840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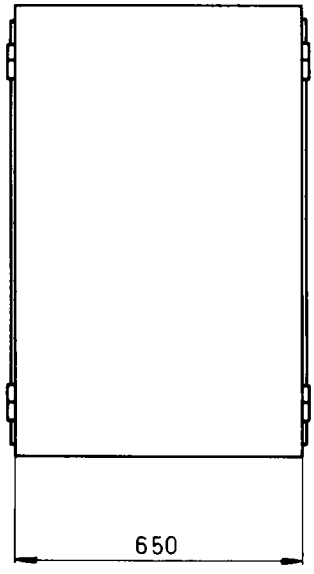
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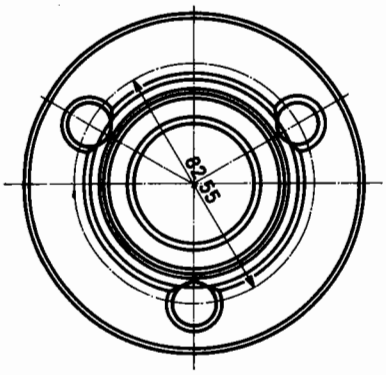
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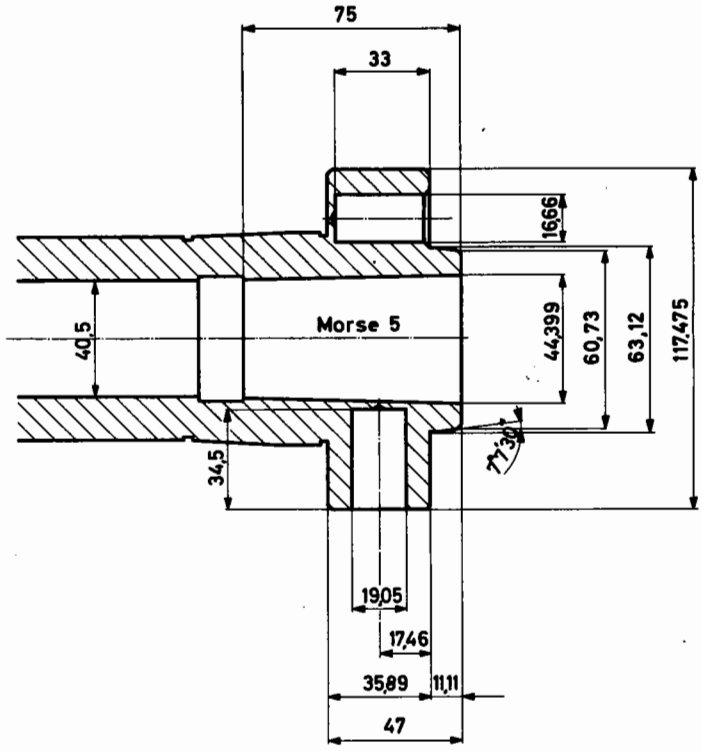
75
33
16,66
40,5
Morse 5
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60,73
63,12
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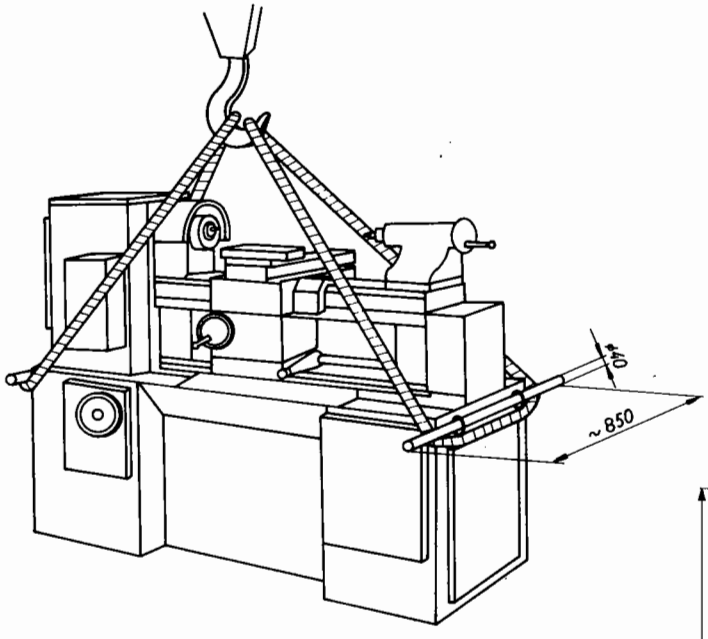
34,5
27°30'
19,05
17,46
35,89
11,11
47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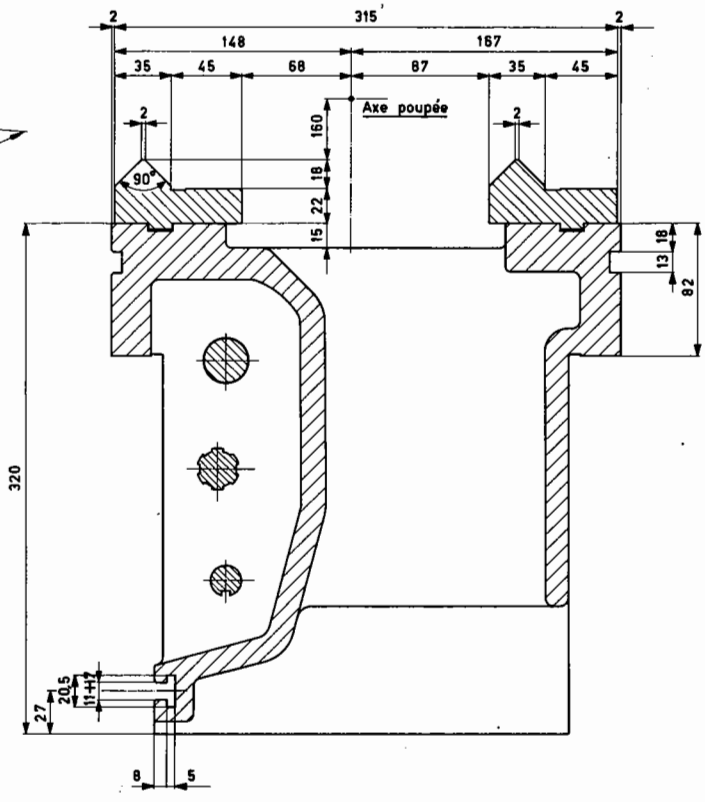

315
2
148
167
35
45
68
87
35
45
Axe poupée
160
18
22
15
90°
13
18
82
320
20,5
11+1
27
8
5

INSTALLATION

Unpacking and transport

Unscrew the upper and side panels of the case. The electrical cabinet and the accessories are contained in a second case.

The lathe weighs approximately 1950 kg. For transporting the machine by means of a hoist or a crane, free it from the bottom of the case, pass the ropes as shown by the sketch on page 6. Introduce two rods 40 mm. in diameter and approximately 850 mm long into the lifting rings screwed into the bed base.

If there is no lifting means available, keep the machine on the bottom of the case and shift it on rollers. Do not omit to remove the levelling screws in the base before moving the lathe onto the floor.

Concrete foundation

The SCHAUBLIN 160 lathe should preferably be installed on a concrete foundation the dimensions of which are given in page 9. The thickness of the concrete slab depends on the nature of the ground which must be stable. The fixation points with the levelling screws are numbered 1 to 4 in the foundation plan. The lathe must be supported on four resting plates 100 mm in diameter and, then, fastened by means of Seetru bolts 135-80.050.

In order to hide the electrical connections between the control cabinet (point B) and the bed base (point C), it is necessary to arrange a channel in the ground to accommodate two cables diameter 35 mm. The cables as normally supplied allow a distance of 2 m between the points B and C.

The net feeding cables arrive at the point A and must emerge by about 50 cm. above the floor.

Free access to the lathe must be foreseen. (See hatched portion of the foundation plan).

Levelling

Proceed to levelling the lathe by taking the bed ways as reference plane:

1. Crosswise levelling on headstock side.
   Tighten bolts 1 and 2 slightly; adjust level using the levelling screws 1 and 2. Then, clamp bolts 1 and 2.
2. Lenghtwise levelling to be tested over the full length of the bed.
   Tighten bolts 3 and 4 slightly ; adjust level by means of the levelling screws 3 and 4.
3. Crosswise levelling on tailstock side by the aid of the levelling screws 3 and 4. Verify the longitudinal levelling and clamp blots 3 and 4.

Accurate levelling of the machine is very important. Use a precision bulb level.

Cleaning

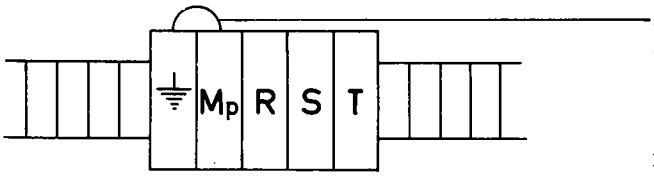
When removing the anti-rust grease and cleaning the lathe, use exclusively clean and chemically neutral rags (preferably white).

First take off the anti-rust grease with a dry rag. Then, wipe the surfaces with a clean rag drenched in kerosene and then squeezed in order to extract the excess of kerosene. The anti-rust grease has no lubricating properties whatever and should be carefully removed in order to prevent possible seizing during operation.

Then oil all metallic parts.

Putting the machine into service

Connect the feeding wires to the terminals of the control cabinet according to the diagram herebelow. Earthing is to be made for operator's safety.



4-wire net with neutral connected to earth

5-wire net without connection of neutral to earth

Consult the wiring diagram supplied with this manual.

Connect the two cables linking the control cabinet to the machine according to the wiring diagram.

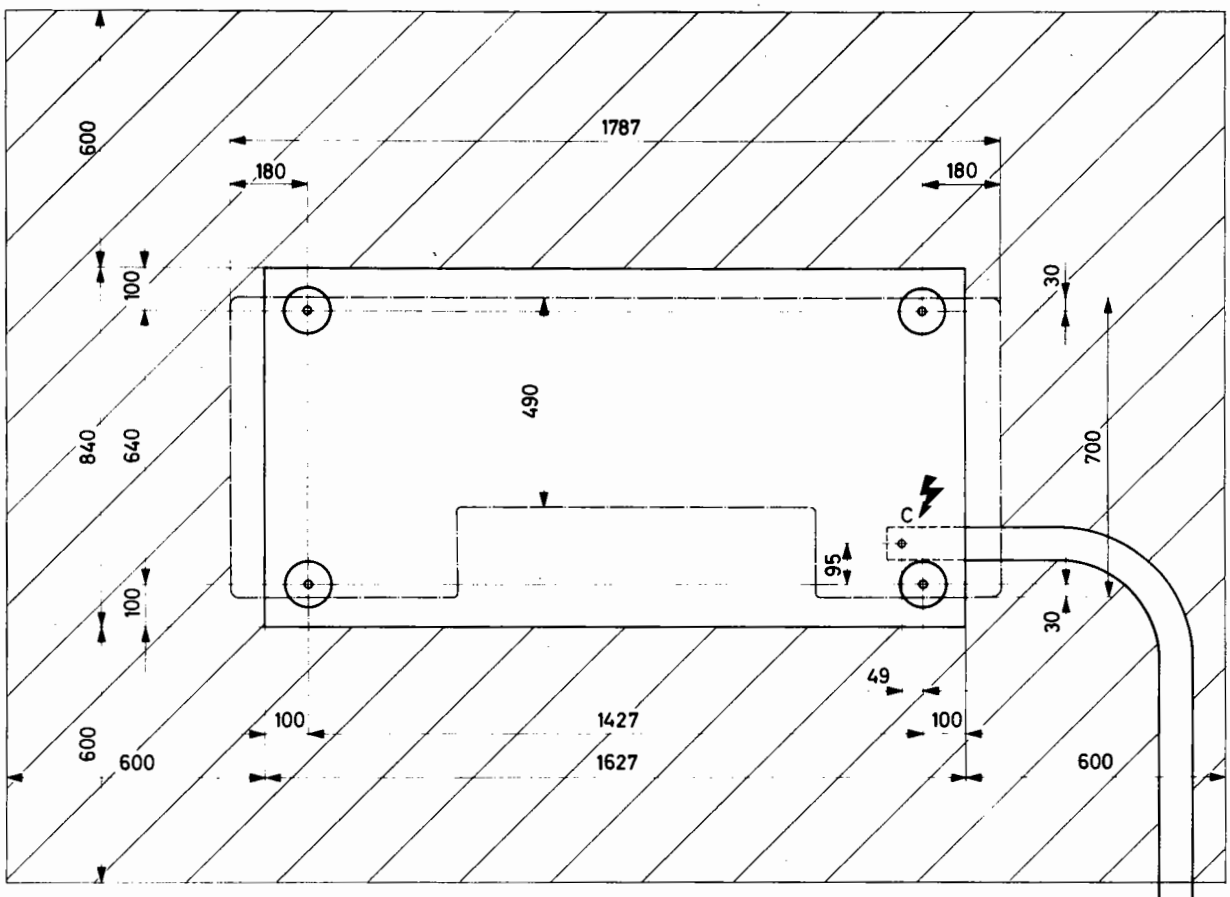
Make sure that lubrication has been actually performed according to the directions given in the following pages.

Place the feed engaging lever 75 on neutral position 0 (see page 16)

Start the machine and check the performance of each element according to the directions contained in pages 17 to 21.

Let the lathe run freely during a few hours, beginning with the lower speeds.

Inverse two of the three wires R, S and T if the motor rotates in reverse direction.


600
1787
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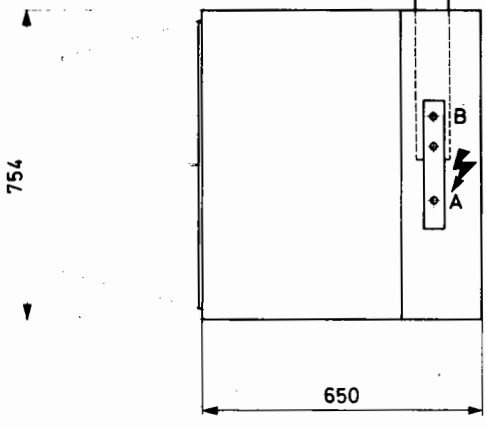
754
B
A
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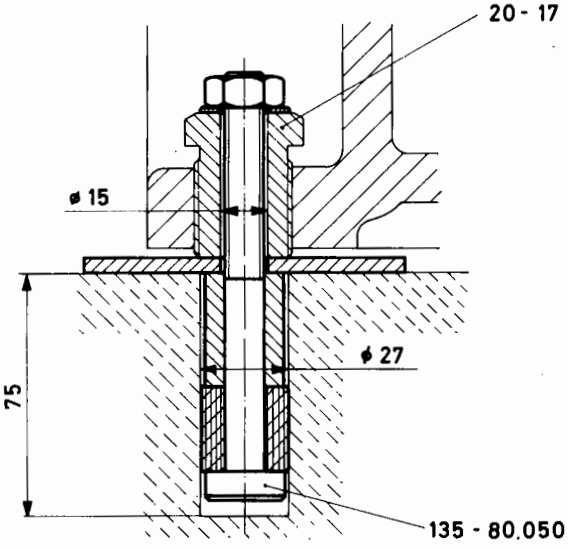

20 - 17
ø 15
ø 27
75
135 - 80.050

LUBRICATION AND MAINTENANCE

Before starting the lathe:

Lubricate all moving parts. Use a pure mineral oil of good quality, viscosity 4,5°E at 50°C.

Fill the reservoir 2 which has been emptied before transport through the hole 1 (see line drawing on page 13) with MOBIL OIL Velocite No. 6 to be found in the machine case.

Check the levels 3, 4 and 21.

We recommend the use of the oil and grease qualities listed in the lubrication chart in page 14.

Important! Never mix oils of different brands which may chemically react and lose their lubricating properties or provoke deposits.

Pressure lubrication

All points to be lubricated by a hand pressure gun are marked ● on the illustrations in page 11. Four to five shots every week are sufficient.

Oil level control

Check every week the oil level in the reservoir (3) and apron (4). Replenish them if necessary.

Oil bath of the transverse screw rear bearing

Drain it once a year by unscrewing the oil sighter 5. Remove both screws 6. Screw a lubricating nipple  in one of the two holes, the other hole serving for air . Replenish the bath by means of the oil gun.

Oil bath of the carriage apron with oil reserve for the "one-shot" pump

Give every day a few shots on the pusher of the pump 7.

Once a week check the level 4 (max. and min.) of the oil bath.

Remove plug on hole 8 and fill oil up to the upper level (bath capacity 2,6 litres).

Drain once a year by removing the screw plug 9 and rinse with kerosene.

Oil bath of the variator

Drain once a year by removing the plug 22 and rinse with kerosene.

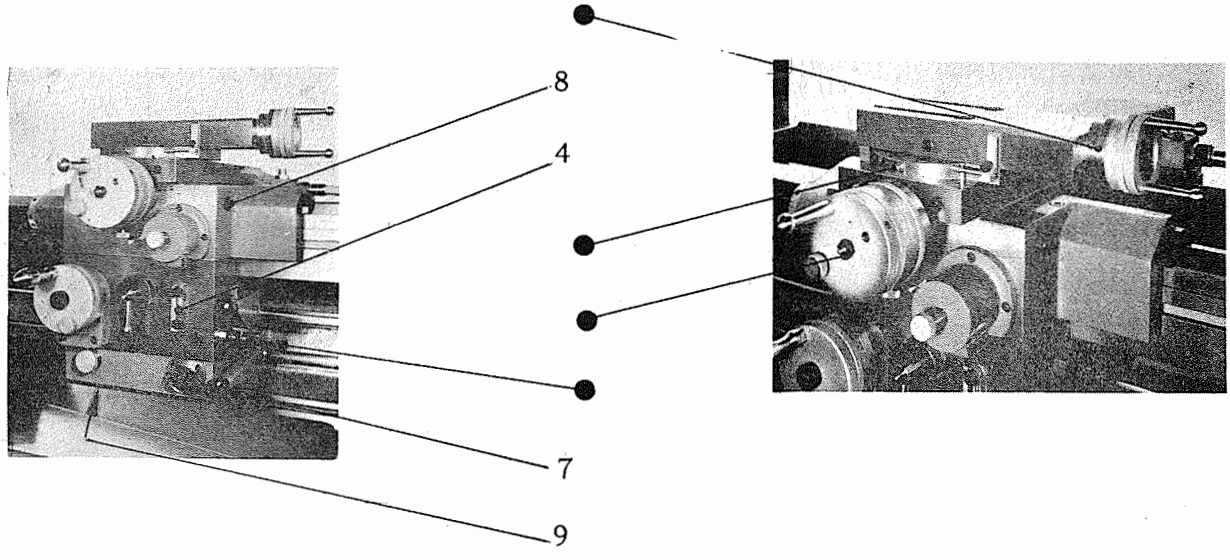
Refill oil through hole 23.

Leadscrew lubrication

Renew once a year the grease along the entire length of the leadscrew. Remove both protections according to directions given in page 36. Also grease bearings INA - RNA 4901 and PI - 30205 H.

Lubrication of main motor and both "stop" motors of the variator and rapid displacement

The Service Instructions for "OERLIKON" and "B.B.C." motors here attached give all directions as regards the upkeep of the motors.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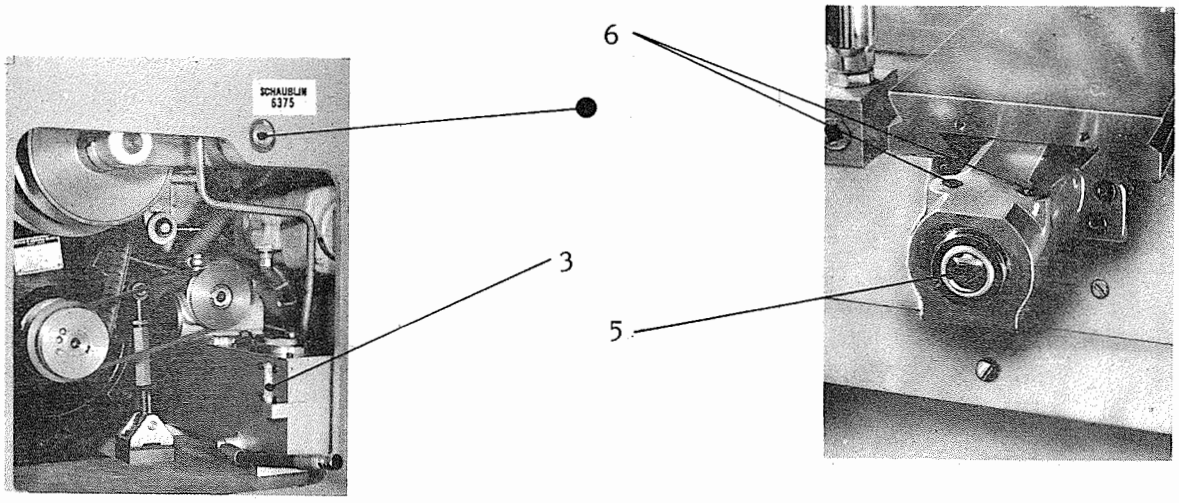
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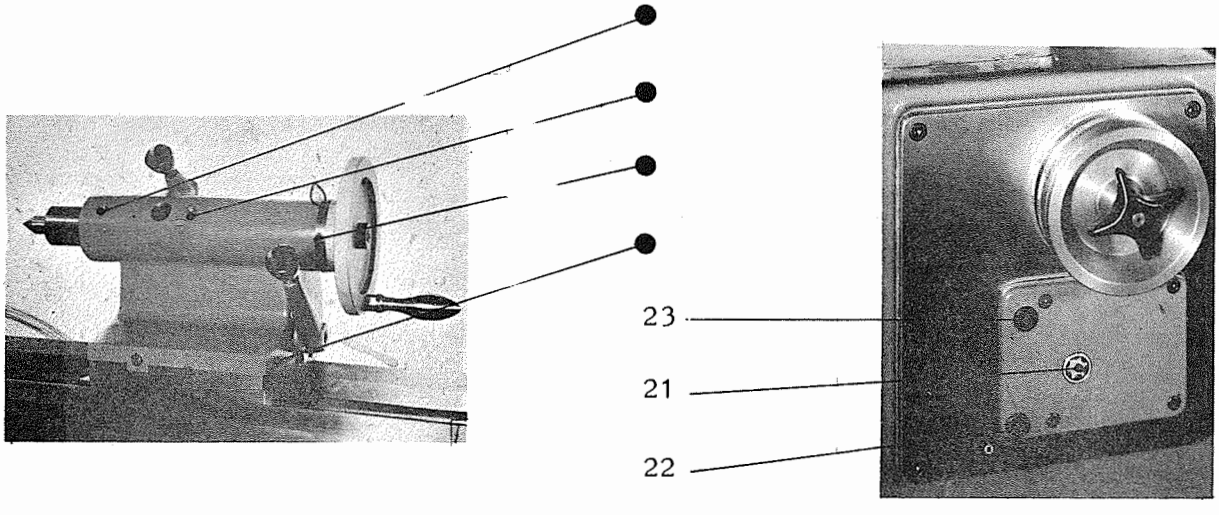

23
21
22

LUBRICATION CIRCUIT

The pump 10 immersed in the tank 2 ensures the lubrication of the headstock, the screwcutting and feed box and the variator.

The whole circuit must be drained and cleansed once a year.

Emptying

1. Reservoir.
   Remove screw plug 11, drain by means of the flexible pipe.
2. Screwcutting and feed box oil bath.
   Remove screw plug 20-20.097.

Dismantling.

1. Remove the belt of the motor pulley, withdraw the variator pulley in uppermost position (dial 83 on 750 r.p.m.).
2. Remove the magnetic cartridge 1.
3. Uncouple the pipes line 13, 16 and 17 on the side of the reservoir and of the pump
4. Remove the filter with strainer held by 3 screws 15.
5. Remove the pump (2 screws CCM M6× 20) by tilting it forward.
6. Remove the cover of the reservoir 18 which is fixed with 6 screws CCM M6× 10.

Cleaning

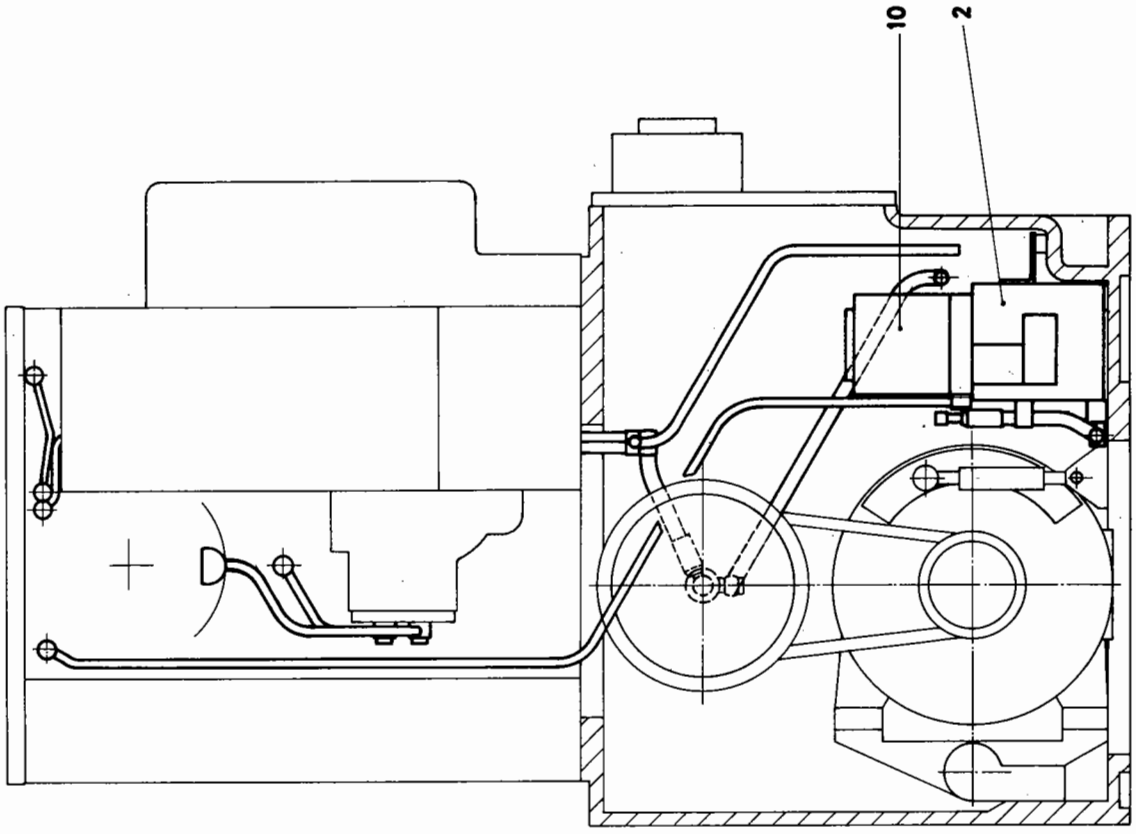
1. Tank.
   Clean it without removing it from the base.
2. Oil pump
   To be cleansed with petrol; dry it with compressed air.
   Important : Renew the grease of the motor bearings once a year.
3. Magnetic cartridge and strainer filter.
   Clean with petrol, dry with compressed air. Do not bush or hit the filter.

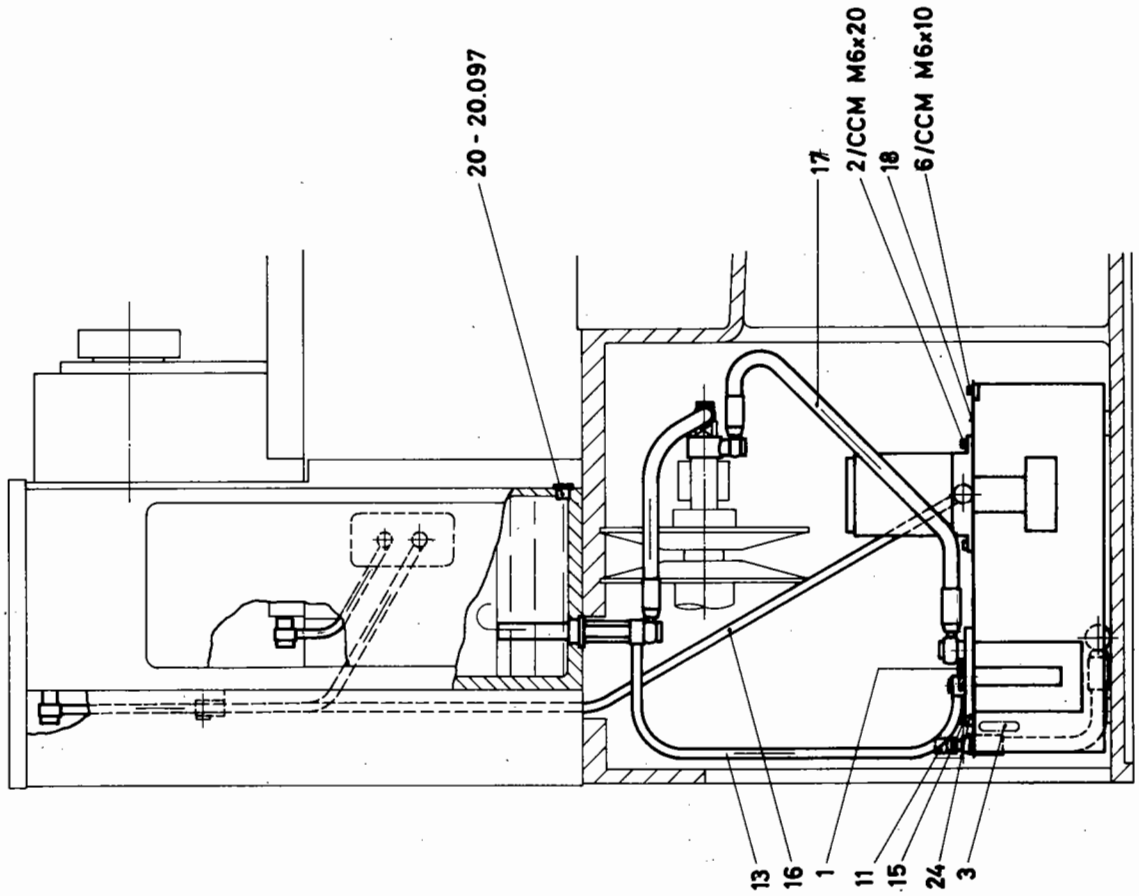
Oil replenishment

Use a good quality fine mineral oil for lubrication systems : viscosity 1,2° to 1,6° E at 50° C. Capacity of the whole circuit 11 l.

1. Pour oil through filling hole 1 up to the upper mark of the sighter 3.
2. Start the lathe at reduced speed.
3. Let it run till the oil bath are supplied. Complete the reservoir content so that it lies on the upper line of the sighter 3.

Note: It is possible to verify that the oil circulates correctly by disconnecting the conduit 17 and asserting that the oil flow is plentiful.


10
2


20 - 20.097
17
2/CCM M6x20
18
6/CCM M6x10
13
16
1
11
15
24
3

LUBRICATION CHART SCHAUBLIN 160 LEADSCREW LATHE

MACHINE PARTS	LUBRICATING MODE		CHECK	TO BE DRAINED OR LUBRICATED	OIL VISCOSITY
Headstock	Oil	Pressure lubrication	Weekly reservoir level	Yearly	Mobil Velocite No. 6 1,55°E at 50°C
Screwcutting and feed gear box	Oil	Pressure lubrication			
Speed variator bearings	Oil	Pressure lubrication			
Apron and carriage body	Oil	Bath	Weekly	Yearly	Mobil Vactra Oil Heavy Medium 4,4°E at 50°C
Apron guide ways Cross slide and screw	Oil	One-shot pump		Drain yearly Lubricate daily	
Cross slide screw rear bearing	Oil	Bath	Monthly	Yearly	
Cross slide screw front bearing	Oil	Hand gun		Weekly	
Speed variator drive	Oil	Bath	Monthly	Yearly	
Starting lever - Driving bars	Oil	Hand gun		Weekly	
Speed variator pivoting shaft	Oil	Hand gun		Weekly	
Tool slide	Oil	Hand gun		Weekly	
Tailstock	Oil	Hand gun		Weekly	
General lubrication	Oil	Oil can		Weekly	
Taper turning attachment	Oil	Hand gun		Weekly	
Quick clamping device	Oil	Hand gun		Weekly	
Pumps motors bearings	Grease	Packing		Yearly	Mobiplex 47
Leadscrew and its both bearings	Grease	Packing		Yearly	Mobiplex 47
Bearings of main motor and both «stop» motors	Grease	Packing		According to Service Instructions here attached for OERLIKON and BBC motors	

FABRIQUE DE MACHINES SCHAUBLIN S.A. BÉVILARD/SUISSE

COOLANT SUPPLY

Maintain the coolant level above the two-thirds of the tank capacity. Pour fresh coolant into the tank through the bucket in the base.

Start and stop controlled by the swith 59.

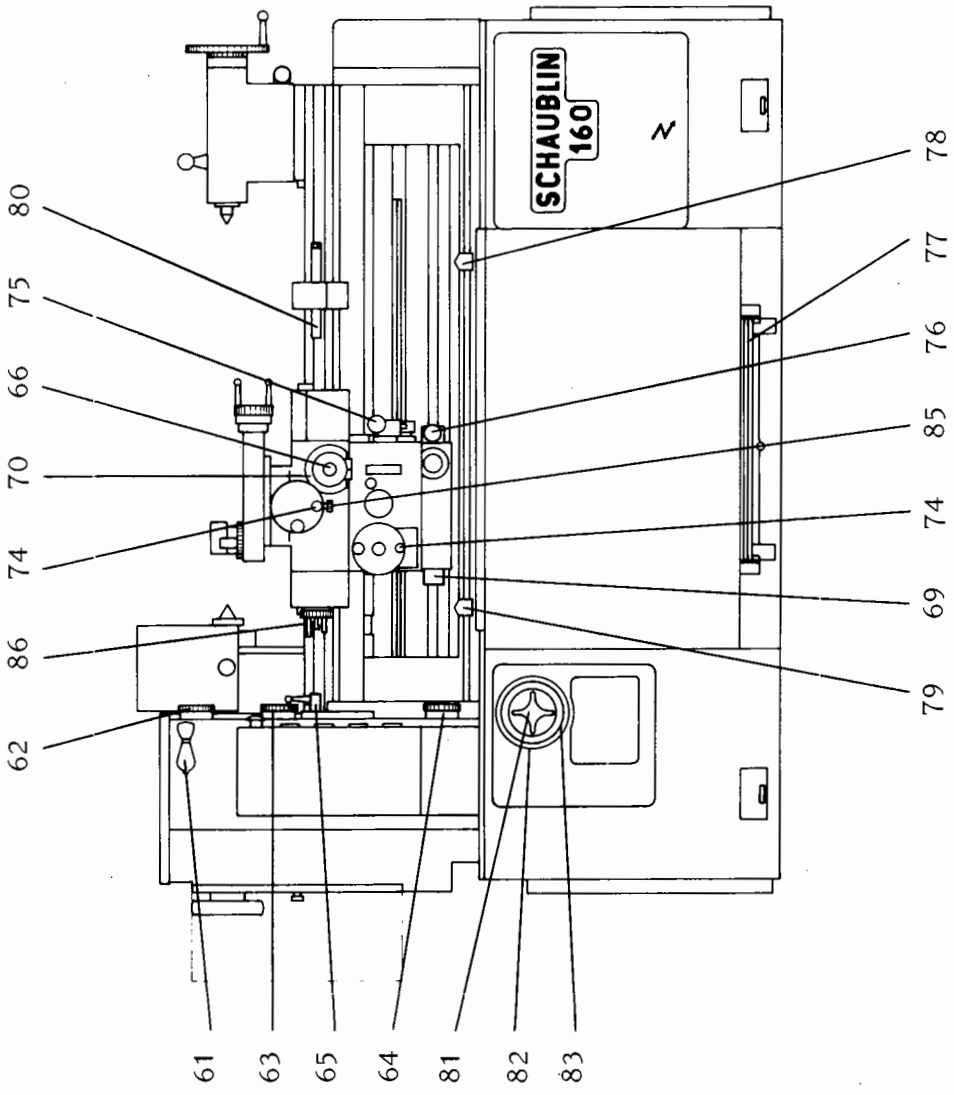
Do not throw on the pump when the tank is empty or when the lathe is idle. Stopping the lathe by means of the push-button " STOP" 51 or the foot pedal 77 does not stop the coolant pump.

Recommendation! Experience has shown that it is preferable to use a straight cutting oil of good quality rather than soluble oils which have the tendency to decompose after a certain time and to provoke corrosion of the machine.

Preventive maintenance

In order to minimize wear, it is important that the system should be cleansed two or three times a year, especially if soluble oils are used.

1. Dismantle the pump, the tank, the pipes and the filters thoroughly. The tank (capacity 60 litres or 13 G.B. galls.) can be removed from the base.
2. Clean all parts in petrol.
3. Renew the grease in the motor bearings once a year.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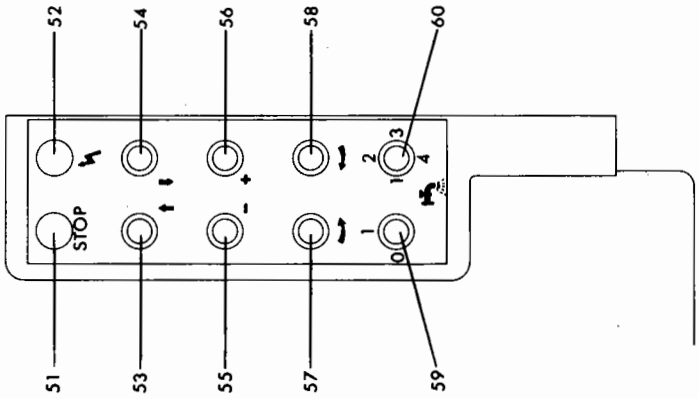

52
54
56
58
60
STOP
51
53
55
57
59

OPERATING DIRECTORY

Spindle speeds

All spindle speeds can be read on the four scales of the speed indicator 83.

a) White scale – Headstock reducer gear engaged
38 to 150 r.p.m. Motor speed 750 r.p.m. (push-button 54)

b) Green scale – Without reducer gear
190 to 750 r.p.m. Motor speed 750 r.p.m. (push-button 54)

c) White scale – Headstock reducer gear engaged
150 to 600 r.p.m. Motor speed 3000 r.p.m. (push-button 53)

d) Red scale – Without reducer gear
750 to 3000 r.p.m. Motor speed 3000 r.p.m. (push-button 53)

The plate with the red symbol  (engage reducer when spindle is stopped) recalls that the spindle must be at standstill before the lever 61 engaging the reducer is actuated.

Possibility of selecting 4 spindle speeds for repeat work.

Two speeds are obtained by the automatic setting of the variator on two speed rates chosen and selected by the two indexes of the dials 82. Set these indexes to the desired speeds and lock them in position by means of the clamping knob 81. Use the push-buttons 55 and 56 for changing speed.

Two speeds are obtained through the speed change geard operated by the push-buttons 53 and 54.

Spindle rotation

1. At standstill the spindle is locked by the electromagnetic brake mounted on the motor shaft. It can be released by setting the reducer engaging lever 61 in position. 
2. Throw on the general section switch mounted on the electrical switchgear cabinet. The red signal lamp must then illuminate.
3. Select the direction of the spindle rotation, using the luminous push-buttons 57 or 58. If both push-buttons illuminate together, the spindle cannot be started, unless the rapid displacement controlling lever 76 is set on 0.
4. Start the spindle:
   Low speeds: by means of the luminous green push-button 54.
   High speeds: by means of the luminous red push-button 53.

   Possibility to pass rapidly from one to the other.
5. Speed variator control:
   Slow-down by push-button 55.
   Speed increase by push-button 56.

   Depress button till the desired speed is attained.

6. Spindle stop by the foot pedal 77 or the emergency red "STOP" switch. The latter also stops the rapid displacement if it is engaged.

Working feeds

The feed rates are read in mm/rev. of the spindle on the chart secured to the screwcutting and feed box. There are :

24 fine longitudinal and cross feed rates from 0,015 to 0,21 mm

24 longitudinal and cross feed rates from 0,025 to 0,35 mm

These 48 feed rates are not modified by the change of the screwcutting gear wheels.

Larger feeds can be obtained by using the screwcutting positions. Commutator 60 must be switched to position 1.

All feed changes can be made when the lathe is running by operating the selecting handwheels as follows :

Handwheel 62 for selecting : normal feeds VVV , fine feeds WW .

Beware! Do not set the handwheel 62 on position "short pitches" or "large pitches" when the spindle is running.

Handwheel 64 for rapid changes of the feed rate within small limits (is used then as feed variator). See figures 1, 2, 3, 4, 5, 6 on the chart fixed on the screwcutting and feed box.

Handwheel 63 for rapid changes of the feed rate over large limits. See letters A, B, C, D on the chart of the feed box.

The longitudinal and transverse displacements are read to 0,01 mm on the vernier of the graduated drums of the carriage apron. Zeroing is made possible by unscrewing the knurled knob 74. The transverse drum is provided with an additional vernier which indicates the traval effected in mm. Zeroing can be made by unscrewing the knob 85.

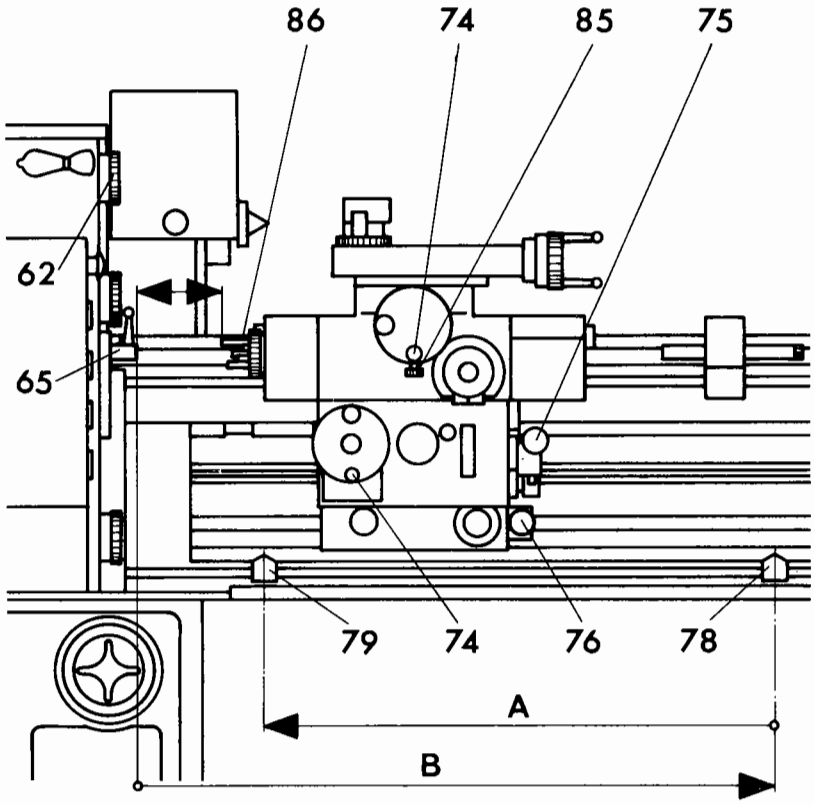
Rapid longitudinal displacement (see illustration page 19)

The lever 76 controls the rapid longitudinal displacement in either direction (3,5 m).

The adjustable stop 79 automatically limits the rapid approach travel A, while the adjustable stop 78 limits the rapid return stroke B. The rapid displacement can be used while a working feed is engaged.

By selecting the pitch with the handwheel 62, the rapid displacement is made inoperative and the stops 78 and 79 control the spindle stop.

The possibility of engaging the rapid longitudinal displacement while keeping the feeds obtained by the screwcutting gear wheels is to be selected by switching commutator 60 to position 1. Positions 3 end 4 are not used for the normal version. They are in use when the lathe is provided with automatic thread cutting equipment.



TURNING

The feed engaging lever 75 can occupy six positions.

It is to be pushed close to the apron for longitudinal feeds.

I from right to left

0 neutral position

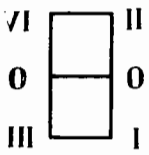
II from left to right

For transverse feeds the lever 54 is set in remote position.

III from front to rear

0 neutral position

IV from rear to front



Limit stops - Feed disengagement

Longitudinal travel

The six-position abutment 86 and the stops 65 or 80 (see page 16) limit the longitudinal displacement when using hand control, or release the automatic feed.

The stop 80 can also be mounted on the left of the carriage if the stop 64 cannot be attained. It is possible to remove the six-position abutment without any further dismantling and to substitute preset stops for repeat work.

Transverse travel

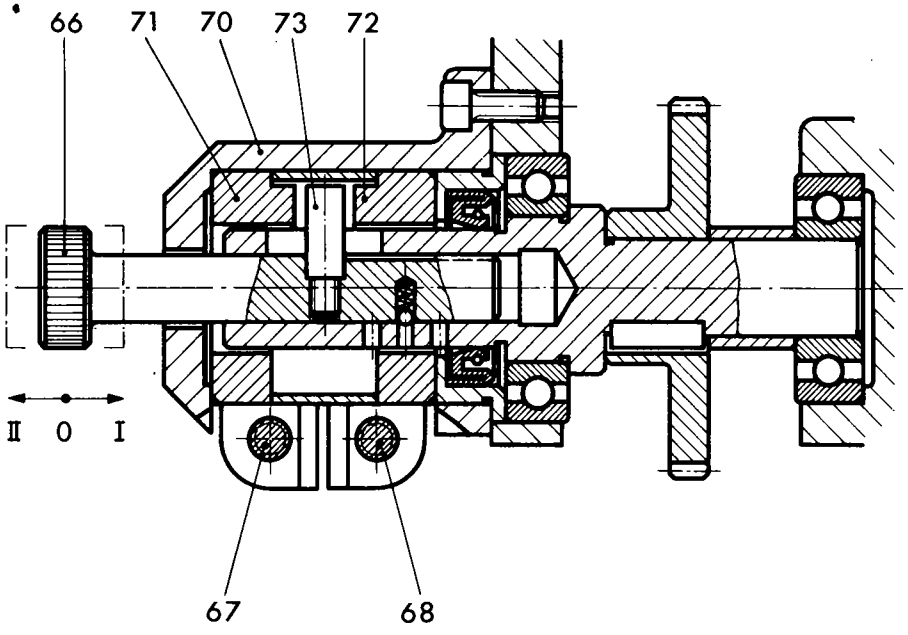
The housing 70 incorporates two adjustable precision abutments which limit the displacement of the cross slide when using hand control, or release the automatic feed.

The abutment must be made to operate 1 to 8 mm before the prescribed cross slide stop by setting the knob 66 in the position I or II (see illustration here below).

Position 0 - The stud 73 lies between the abutments 71 and 72.

Position I - The stud 73 is in contact with the abutment 72.

Position II - The stud 73 is in contact with the abutment 71.



Adjusting the abutments:

1. Loosen the screw 68.
2. Set the tool to the diameter of the workpiece, set the vernier on 0.
3. Push the knob 66 on position I.
4. Rotate the cross slide handwheel 4 turns backward.
5. Move it 4 turns forward, up to 0 (preset at point 2).
6. Lock the screw 68 and check the stop.

A second stop can be adjusted by effecting the same operations using the screw 67 and the knob 66 being pulled in position II.

Adjust the effort required to release the cross slide feed according to the kind of work to be performed (roughing, finishing, or safety of threading) by means of the knob 69 (page 16).

SCREW THREAD CUTTING

Automatic threadcutting with thread pickup equipment (see special instruction)

1. Depress button "STOP", place the lever 76 controlling the rapid displacement in position 0. Switch commutator 60 to pos. 2.
2. Verify the set of screwcutting gear wheels.
3. Select short pitches or large pitches

   Short pitches : Place the lever 61 on or

   Set the handwheel 62 on or

   Large pitches : Place the lever 62 on

   Set the handwheel 62 on

   When the handwheel 62 is set in one of the above positions, the rapid displacement is made inoperative and the lever 76 controls the threading feed and the spindle rotation.
4. Set the handwheels 63 and 64 in the positions indicated in the threading chart for selecting the pitch to be machined.
5. Screw the knob 69 up to maximum resistance in order to avoid the feed disengagement.

Threading cycle

1. Determine the direction of the thread with regard to the direction of the spindle rotation according to the chart on page 22.
2. Adjust the travel of the apron by setting the two abutments 78 and 79.
3. Set the engaging lever 75.
4. Operate the lever 76 for threading.
5. At the completion of the thread, free the tool by actuating the carriage screw handwheel. The spindle is stopped and the feed released automatically.
6. Set the lever 76 for return travel. (If the latter is long, the return speed can be increased by depressing the button 53).
7. Automatic stop of the return stroke.
8. Advance the tool.

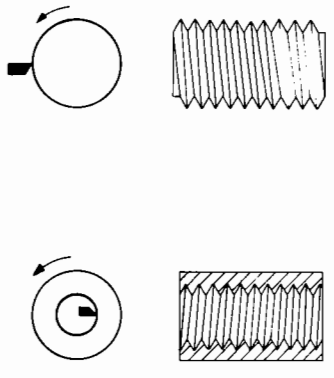
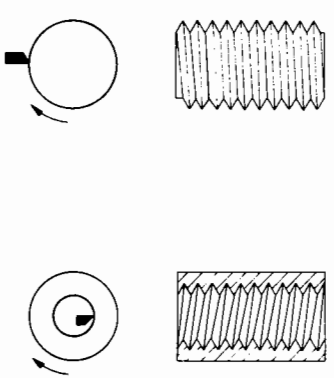
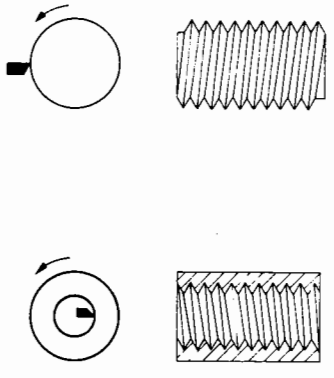
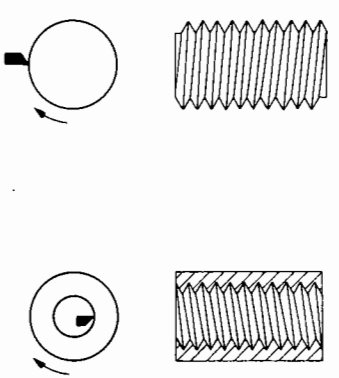
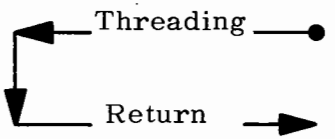
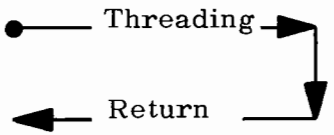
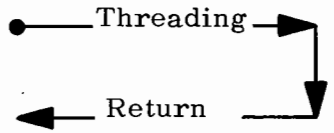
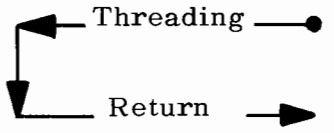
Screwcutting gear wheels

E : Gear driven by the headstock.

F, G, H, I = Threading gear wheels mounted on the swing frame.

K = Gear mounted at the front of the screwcutting box.

THREADING CYCLE

	Right-hand pitches		Left-hand pitches	
Spindle rotation				
Threading				
Feed selecting lever 75 (II, IV, 0, 0, I, III)	I	II	II	I
Spindle start lever 76 (II, 0, I) — Threading	I	II	I	II
Spindle start lever 76 (II, 0, I) — Return	II	I	II	I

Set of gear wheels supplied with the machine:

45 - 50 - 50 - 55 - 60 - 62 - 70 - 72 - 75 - 79 - 80 - 84 - 89 - 91

The three screwcutting charts enclosed and the chart affixed on the machine contain the full list of the normal pitches.

The positions A, B, C, D and 1, 2, 3, 4, 5, 6 of the threading box, when combined with the set of gear wheels supplied with the machine, provide a great number of possibilities which permit the machining of:

1. Metric threads — Finely cut
2. Metric threads with special pitches
3. English threads
4. Module threads

} With approaching accuracy

For threads with approaching accuracy, the error between the theoretical ratio to be introduced and the actual ratio of the change gears must not exceed 0,0002 (refer to examples here after).

On request we calculate the necessary sets of gear wheels at shortest notice.

Metric threads (accurate machining)

Example: Determine the set of gears for a pitch of 2,7 mm.
Choose in the Metric chart a pitch* approaching 2,7 - that is 2,8.

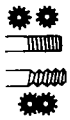
$$\text{Ratio of the gears to be used} = \frac{\text{Pitch to be obtained}}{\text{Pitch*}} = \frac{2,7}{2,8}$$

Select the number of teeth of the gears in the ratio $\frac{27}{28}$

$$\frac{\text{Driving gears}}{\text{Driven gears}} = \frac{E \times G \times I}{F \times H \times K} = \frac{27}{28} = \frac{50 \times 75 \times 72}{70 \times 80 \times 50}$$

Set the handwheels 62, 63, 64 and the lever 61 as foreseen for pitch* 2,8 viz.:

Lever 55 on  or 

Handwheel 62 on 

Handwheel 63 on 3

Handwheel 64 on D

Metric threads with special pitches (approaching accuracy)

Example: Determine the set of gears for a pitch of 3,75 mm
Choose in the Metric chart a pitch* approaching 3,75 that is 3,5.

$$\text{Theoretical ratio of the gears to be used} = \frac{\text{Pitch to be obtained}}{\text{Pitch*}} = \frac{3,75}{3,5} = 1,07143$$

Select the number of teeth of the gears the ratio of which gives a quotient close to 1,07143.

$$\frac{\text{Driving gears}}{\text{Driven gears}} = \frac{E \times G \times I}{F \times H \times K} = \frac{50 \times 84 \times 62}{72 \times 75 \times 45} = 1,07160$$

Theoretical ratio = 1,07143

Ratio of the gear set = 1,07160

Error = 0,00017

Set the handwheels 62, 63, 64 and the lever 61 as foreseen for the pitch* 3,5.

English threads

Example: Determine the set of gears for a pitch of 47 t.p.i.

Choose in the Metric chart a pitch* approaching $\frac{25,4}{47}$ that is 0,4375

Theoretical ratio of the gears to be used = $\frac{25,4}{\text{threads per inch x pitch*}}$ =

$= \frac{25,4}{47 \times 0,4375} = 1,23526$

Select the number of teeth of the gears the ratio of which gives a quotient close to 1,23526.

$\frac{\text{Driving gears}}{\text{Driven gears}} = \frac{E \times G \times I}{F \times H \times K} = \frac{55 \times 89 \times 62}{60 \times 91 \times 45} = 1,23520$

Theoretical ratio = 1,23526

Ratio of the gear set = 1,23520

Error = 0,00006

Set the handwheels 62, 63, 64 and the lever 61 as foreseen for the pitch* 0,4375.

Module pitches

Example: Determine the set of gears for a Module pitch 4,25.

Choose in the Metric chart a pitch* approaching 4,25 x π that is 12,5.

Theoretical ratio of the gears to be used = $\frac{\text{Module} \times \pi}{\text{Pitch*}}$

$= \frac{4,25 \times 3,14159}{12,5} = 1,06814$

Select the number of teeth of the gears the ratio of which gives a quotient close to 1,06814.

$\frac{\text{Driving gears}}{\text{Driven gears}} = \frac{E \times G \times I}{F \times H \times K} = \frac{50 \times 89 \times 72}{80 \times 75 \times 50} = 1,06800$

Theoretical ratio = 1,06814

Ratio of the gear set = 1,06800

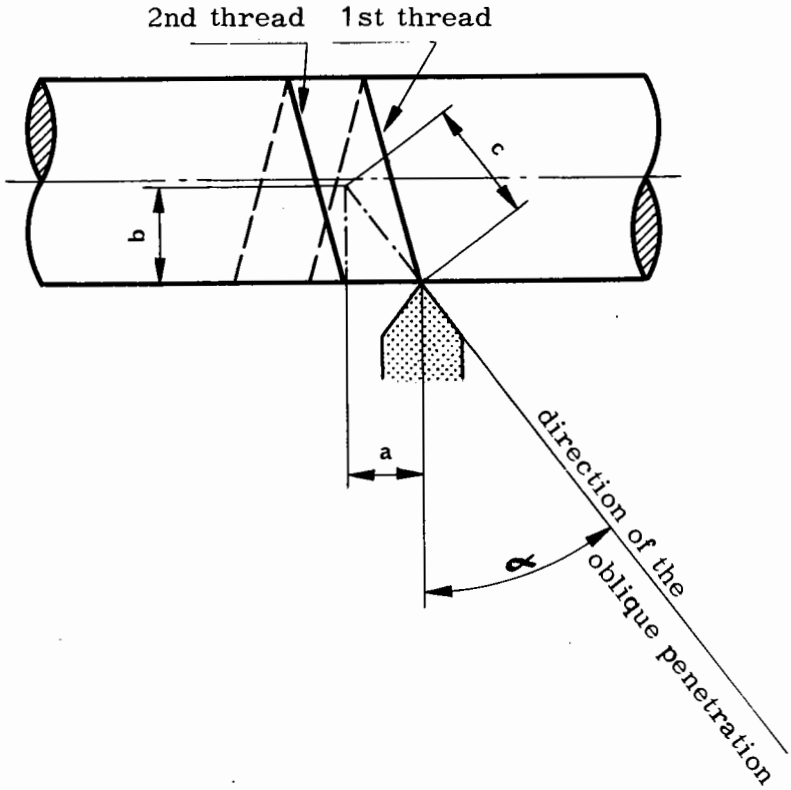
Error = 0,00014

Set the handwheels 62, 63, 64 and the lever 61 as foreseen for the pitch* 12,5.

MULTIPLE THREADS

1. With one multiple tool.
2. By offsetting the slide when using the oblique penetration system (see drawing here below).

   The actual displacement of the tool is determined in this system by the orientation of the tool slide. It is therefore very important that this orientation be accurately adjusted. For want of precise angular measuring devices (optical protractor, sine bar, etc.), it is recommended to proceed to a few threading trials and to correct the carriage orientation if necessary.



a = $\frac{1}{2}$ pitch (or 1/3, 1/4, etc.)

b = $\frac{a}{tg}$ = feed given by the cross slide

c = $\frac{a}{\sin}$ = oblique feed given by the tool slide.

RADIALS PITCHES.

The metric, english and module radial pitches can be obtained by means of the gears and positions given for the longitudinal pitches.

Put lever 75 on positions III or IV.

SCHAUBLIN 160

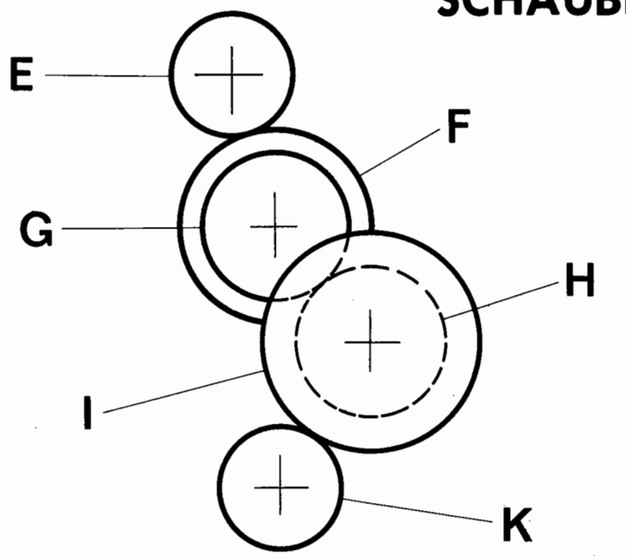


TABLEAU DE FILETAGE
GEWIDESCHNEIDTABELLE
SCREW-CUTTING CHART

FILETS METRIQUES

METRISCHE GEWINDE

METRIC THREADS

Pas courts / Kleine Steigungen / Short pitches								Pas longs / Grosse Steigungen / Long pitches							
Pas Steigung Pitch mm	Roues - Räder - Gears						Position Stellung Position	Pas Steigung Pitch mm	Roues - Räder - Gears						Position Stellung Position
	E	F	G	H	I	K			E	F	G	H	I	K	
0,2	45	72	60	75	80	50	A1	✳1,25	50	79	--	62	--	50	A1
0,225	45	79	--	62	--	50	A1	✳1,5625	50	79	--	62	--	50	A2
✳0,25	50	79	--	62	--	50	A1	✳1,75	50	79	--	62	--	50	A3
0,3	45	79	--	62	--	60	A5	✳1,875	50	79	--	62	--	50	A4
✳0,3125	50	79	--	62	--	50	A2	✳2	50	79	--	62	--	50	A5
✳0,35	50	79	--	62	--	50	A3	✳2,1875	50	79	--	62	--	50	A6
✳0,375	50	79	--	62	--	50	A4	✳2,5	50	79	--	62	--	50	B1
✳0,4	50	79	--	62	--	50	A5	✳3,125	50	79	--	62	--	50	B2
✳0,4375	50	79	--	62	--	50	A6	✳3,5	50	79	--	62	--	50	B3
0,45	45	79	--	62	--	50	B1	3,6	50	75	72	80	60	50	C1
✳0,5	50	79	--	62	--	50	B1	✳3,75	50	79	--	62	--	50	B4
0,6	45	79	--	62	--	60	B5	✳4	50	79	--	62	--	50	B5
✳0,625	50	79	--	62	--	50	B2	✳4,375	50	79	--	62	--	50	B6
✳0,7	50	79	--	62	--	50	B3	4,4	55	79	--	62	--	50	B5
✳0,75	50	79	--	62	--	50	B4	4,5	45	79	--	62	--	50	C1
✳0,8	50	79	--	62	--	50	B5	✳5	50	79	--	62	--	50	C1
✳0,875	50	79	--	62	--	50	B6	5,5	55	79	--	62	--	50	C1
0,9	50	79	--	62	--	50	C1	6	45	79	--	62	--	60	C5
✳1	50	79	--	62	--	50	C1	✳6,25	50	79	--	62	--	50	C2
1,1	55	79	--	62	--	50	C1	✳7	50	79	--	62	--	50	C3
1,2	45	79	--	62	--	60	C5	✳7,5	50	79	--	62	--	50	C4
✳1,25	50	79	--	62	--	50	C2	✳8	50	79	--	62	--	50	C5
✳1,4	50	79	--	62	--	50	C3	✳8,75	50	79	--	62	--	50	C6
✳1,5	50	79	--	62	--	50	C4	9	45	79	--	62	--	50	D1
✳1,6	50	79	--	62	--	50	C5	✳10	50	79	--	62	--	50	D1
✳1,75	50	79	--	62	--	50	C6	12	45	79	--	62	--	60	D5
1,8	45	79	--	55	--	50	D1	✳12,5	50	79	--	62	--	50	D2
✳2	50	79	--	62	--	50	D1	✳14	50	79	--	62	--	50	D3
2,2	55	79	--	62	--	50	D1	✳15	50	79	--	62	--	50	D4
2,4	45	79	--	62	--	60	D5	✳16	50	79	--	62	--	50	D5
✳2,5	50	79	--	62	--	50	D2	✳17,5	50	79	--	62	--	50	D6
✳2,8	50	79	--	62	--	50	D3	18	50	45	72	80	60	50	D4
✳3	50	79	--	62	--	50	D4	20	45	72	80	60	75	50	D5
✳3,2	50	79	--	62	--	50	D5	25	50	70	80	60	75	50	D6
✳3,5	50	79	--	62	--	50	D6	30	50	80	91	60	89	45	D5
1,666	45	75	84	60	62	50	C5								

✳ Pour le calcul des jeux de roues employer seulement les pas ✳
Exemples voir pages 23 et 24.

✳ Für die Berechnung von Wechselrädern nur mit ✳ bezeichnete Steigungen verwenden
Beispiele siehe Seite 23 und 24.

✳ For calculation of change gears only take pitches marked with ✳
For exemples refer to pages 23 and 24.

Jeu de roues	45	50	50	55	60
Rädersatz	62	70	72	75	79
Set of change gears	80	84	89	91	

SCHAUBLIN 160

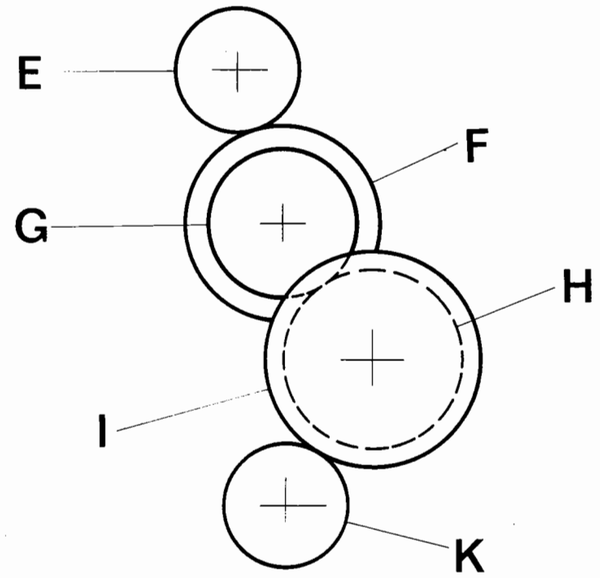


TABLEAU DE FILETAGE
GEWINDESCHNEIDTABELLE
SCREW-CUTTING CHART

FILETS ANGLAIS

ENGLISCHE GEWINDE

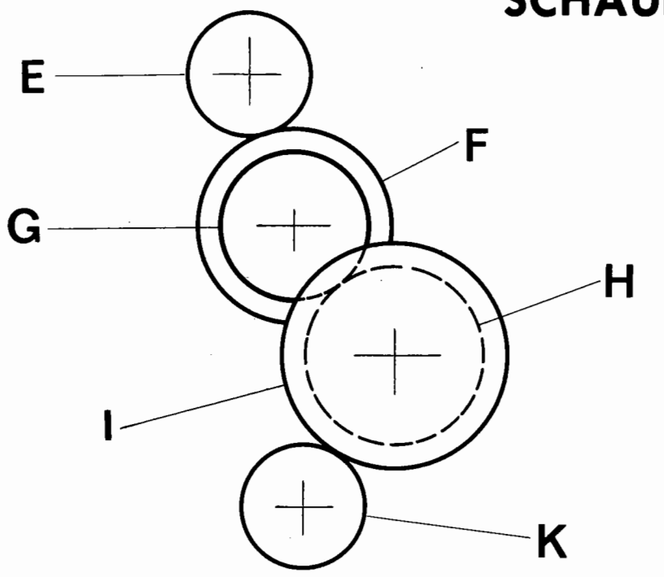
ENGLISH THREADS

Pas courts Kleine Steigungen Short pitches								Pas longs Grosse Steigungen Long pitches							
Filets au" / Gänge auf 1" / Threads per In	Roues - Räder - Gears						Position / Stellung / Position	Filets au" / Gänge auf 1" / Threads per In	Roues - Räder - Gears						Position / Stellung / Position
	E	F	G	H	I	K			E	F	G	H	I	K	
80	50	62	75	80	60	50	A3	26	50	75	--	50	--	80	A2
72	50	79	89	55	62	45	A1	13	50	75	--	50	--	80	B2
64	50	62	75	80	60	50	A6	10	50	62	91	79	75	60	A6
62	45	72	89	79	80	55	A5	9	50	79	89	55	62	45	A5
56	50	62	91	80	89	45	A1	8	50	62	91	80	89	45	A3
48	50	79	89	55	62	45	A4	7	50	62	91	80	89	45	A5
45	50	79	89	55	62	45	A5	6	50	84	70	62	72	50	B6
44	45	62	79	91	72	55	B3	5	50	62	91	79	75	60	B6
40	50	62	91	80	89	45	A3	4 1/2	50	79	89	55	62	45	B5
36	50	79	89	55	62	45	B1	4	50	62	91	80	89	45	B3
35	50	62	91	80	89	45	A5	3 1/2	50	62	91	80	89	45	B5
32	50	62	91	80	89	45	A6	3 1/4	50	75	--	50	--	80	D2
30	50	62	70	84	72	50	B6	3	50	84	70	62	72	50	C6
28	50	62	91	80	89	45	B1	2 7/8	45	89	91	72	79	50	C6
27	50	62	80	72	60	50	B6	2 3/4	50	60	75	62	72	55	C3
24	50	79	89	55	62	45	B4	2 5/8	50	72	91	80	70	50	C6
22 1/2	50	79	89	55	62	45	B5	2 1/2	50	62	91	79	75	60	C6
22	45	62	79	91	72	55	C3	2 1/4	50	79	89	55	62	45	C5
20	50	62	91	80	89	45	B3	2	50	62	91	80	89	45	C3
19	55	72	75	80	60	45	C3	1 3/4	50	62	91	80	89	45	C5
18	50	79	89	55	62	45	C1	1 1/3	50	60	79	75	62	50	D6
17 1/2	50	62	91	80	89	45	B5	1 1/2	50	84	70	62	72	50	D6
16	50	62	91	80	89	45	B6	1 1/4	50	62	91	79	75	60	D6
14	50	62	91	80	89	45	C1	1 1/8	50	79	89	55	62	45	D5
12	50	79	89	55	62	45	C4	1	50	62	91	80	89	45	D3
15	50	62	70	84	72	50	C6	7/8	50	62	91	80	89	45	D5
11 1/4	50	79	89	55	62	45	C5	5 1/2	45	79	80	89	62	55	C5
11	45	62	79	91	72	55	D3	11 1/2	45	89	91	72	79	50	A6
10	50	62	91	80	89	45	C3								
9	50	79	89	55	62	45	D1								
8 3/4	50	62	91	80	89	45	C5								
8	50	62	91	80	89	45	C6								
7	50	62	91	80	89	45	D1								
6	50	79	89	55	62	45	D4								
5 5/8	50	79	89	55	62	45	D5								
5	50	62	91	80	89	45	D3								
4 3/8	50	62	91	80	89	45	D5								
4	50	62	91	80	89	45	D6								

Exemples de calcul voir pages 23 et 24
Berechnungsbeispiele siehe Seiten 23 und 24
Examples of calculation see pages 23 and 24

Jeu de roues	45	50	50	55	60
Rädersatz	62	70	72	75	79
Set of change gears	80	84	89	91	

SCHAUBLIN 160



Exemples de calcul voir pages 23 et 24
Berechnungsbeispiele siehe Seiten 23 und 24
Examples of calculation see pages 23 and 24

Jeu de roues	45	50	50	55	60
Rädersatz	62	70	72	75	79
Set of change gears	80	84	89	91	

TABLEAU DE FILETAGE
GEWIDESCHNEIDTABELLE
SCREW-CUTTING CHART

FILETS AU MODULE

MODULGEWINDE

MODULE THREADS

Pas courts
Kleine Steigungen
Short pitches

Module Modul Module	Roues - Räder - Gears						Position Stellung Position
	E	F	G	H	I	K	
0,25	50	55	72	80	**60**	**50**	B5
0,3	45	55	91	79	75	60	B5
0,3	50	55	79	80	60	**50**	B6
0,325	50	55	91	80	79	50	B2
0,35	**45**	**50**	**84**	75	**60**	55	C1
0,375	45	55	91	79	75	60	C1
0,4	50	55	91	79	**80**	**50**	B4
0,45	45	89	91	72	79	50	C3
0,5	50	55	72	80	60	50	C5
0,55	50	79	91	80	72	45	C4
0,6	45	55	91	79	75	60	C5
0,6	50	55	79	80	60	50	C6
0,7	**45**	**50**	**84**	75	**60**	55	D1
0,75	45	55	91	79	75	60	D1
0,8	**50**	55	91	79	80	50	C4
0,9	**45**	89	91	72	79	50	D3
1	50	55	72	80	60	50	D5
0,125	50	55	72	80	60	50	A5

Pas longs
Grosse Steigungen
Long pitches

Module Modul Module	Roues - Räder - Gears						Position Stellung Position
	E	F	G	H	I	K	
0,75	50	55	79	80	60	50	A6
1	50	55	91	79	80	50	A4
1,125	45	89	91	72	79	50	B3
1,25	50	55	72	80	60	50	B5
1,375	50	79	91	80	72	45	B4
1,5	45	55	91	79	75	60	B5
1,5	50	55	79	80	60	50	B6
1,75	**45**	**50**	**84**	**75**	60	**55**	C2
2	50	55	91	79	80	50	B4
2,25	45	89	91	72	79	50	C3
2,5	50	55	72	80	60	50	C5
2,75	50	79	91	80	72	**45**	C4
3	45	55	91	79	75	60	C5
3	50	55	79	80	60	50	C6
3,25	50	55	91	80	79	50	C2
3,5	**45**	50	**84**	**75**	**60**	**55**	D2
3,75	45	55	91	79	75	60	D1
4	50	55	91	79	80	50	C4
4,5	45	89	91	72	79	50	D3
5	50	55	72	80	60	50	D5
5,5	50	79	91	80	72	45	D4
6	45	55	91	79	75	60	D5
6	50	55	79	80	60	50	D6
6,5	50	55	91	80	79	50	D2
7	**50**	**80**	**84**	**50**	72	**55**	D5
7,5	50	60	91	89	79	50	D6
8	50	55	91	79	80	50	D4

ADJUSTMENTS

Spindle bearings

Both spindle bearings are carefully adjusted when testing the lathe in our works. They are of "ULTRA PRECISION" quality and will not need readjustment before a long time.

Readjustment requires maximum cleanliness and accuracy.

Adjustment of the front bearing radial and axial play

1. Determine the value of both plays by the aid of a micrometer reading to 0,001 mm.
2. Remove the eight screws M6 on cover plate 160-21.114.
3. Dismantle the cover plate 135-21.063 held by five screws CCM M6x15.
4. Loosen the two set screws MKT M4x10 on nut 135-21.044, remove the latter and the oil retainer 135-21.014 (distance piece).
5. Drive out the spindle carefully using a lead hammer; collect the outer race of roller bearing NN 3012 XKM/SP.
6. Loosen the two set screws MKT M4 x 10 on nut 135-21.071 and remove it.
7. Drive out the thrust bearing 234 414 M/UP and the roller bearing NN 3014 XK M/UP by hitting the spindle at the rear.
8. Reduce the thickness of the oil retainer (distance piece) 135-21.068 by an amount to be determined according to the value of the radial play measured as follows:

   e = radial play in mm x 14

   Example: Assuming that a radial play of 0,008 mm has to be taken up.

   e = 0,008 x 14 = 0,112 mm.
9. Reduce the thickness of the spacing ring of the thrust bearing 234 414 M/UP by the amount to be taken up + 0,001 to 0,002 mm for preload.
10. Carefully clean all parts when reassembling. Slightly oil the bearings.
11. The spindle as well as all bearing races carry a locating line (a, b and c in sectional view page 33).

    Place the four lines b) in alignment, at 180° with regard to the spindle line a) during the operations 12, 13 and 15.
12. Push the inner race of the bearing NN 3014 XK M/UP over the spindle taper till the distance piece (oil retainer) is pressed laterally.
13. Assemble the thrust bearing, tighten the nut 135-21.071 and lock it with the set screws MKT M4x10.
14. Mount the spindle, assemble the cover plate 160-21.114.
15. Mount the rear bearing NN 3012 XK M/SP without play, according to the directions of the next chapter.

16. Loosen the eight screws on cover plate 160-21.114 and check the play of the front bearing which must be practically naught.

Adjustment of the rear bearing radial play

1. Determine the value of radial play by the aid of a micrometer reading to 0,001 mm.
2. Unlock nut 135-21.044 by loosening the set screws MKT M4x10, and screw it in according to the amount of play to be taken up. The slight conicity of the inner race of the roller bearing NN 3012 XKM/SP prevents the nut from advancing regulary. Hit the nut concentrically, using a tube of adequate diameters so as to provoke a slight displacement of the inner race of the bearing over the spindle taper. Then tighten it again.

   Repeating this procedure a few times will permit to rotate the nut by the desired angle. Check carefully the advance of the nut as it will be difficult to withdraw the bearing inner race if it is pushed too far.

   Advance of the nut 135-21.044 = Radial play to be taken up x 14 mm.
   Pitch of the nut = 1,25 mm.
   Example: Assuming that a radial play of 0,01 mm is to be taken up.
   The advance of the nut must be = 0,01 x 14 = 0,14 mm corresponding to

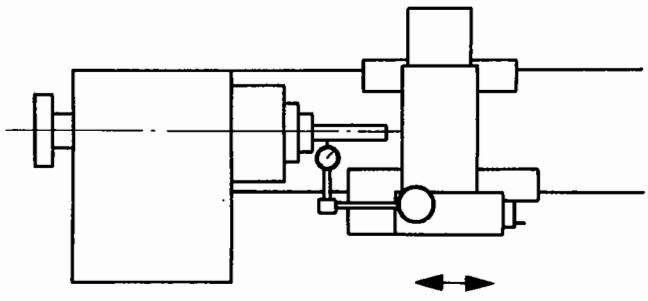
   a rotation of $\frac{0{,}14 \times 360^\circ}{1{,}25} = 40^\circ$ or

   a peripheral distance of $\frac{76 \times \pi \times 40}{360} = \sim 26{,}5$ mm as measured on the outside diameter 76 mm of the nut.

3. Lock the nut by means of the set screws MKT M4x10.
4. Check the radial play which must be practically naught. The roller bearing NN 3012 XK M/SP must be quite clean and slightly oiled when carrying out this check.

Adjustment of the spindle parallelism

It is possible to adjust the headstock in the horizontal plane in order to set the spindle centre line accurately parallel with regard to the carriage longitudinal travel.

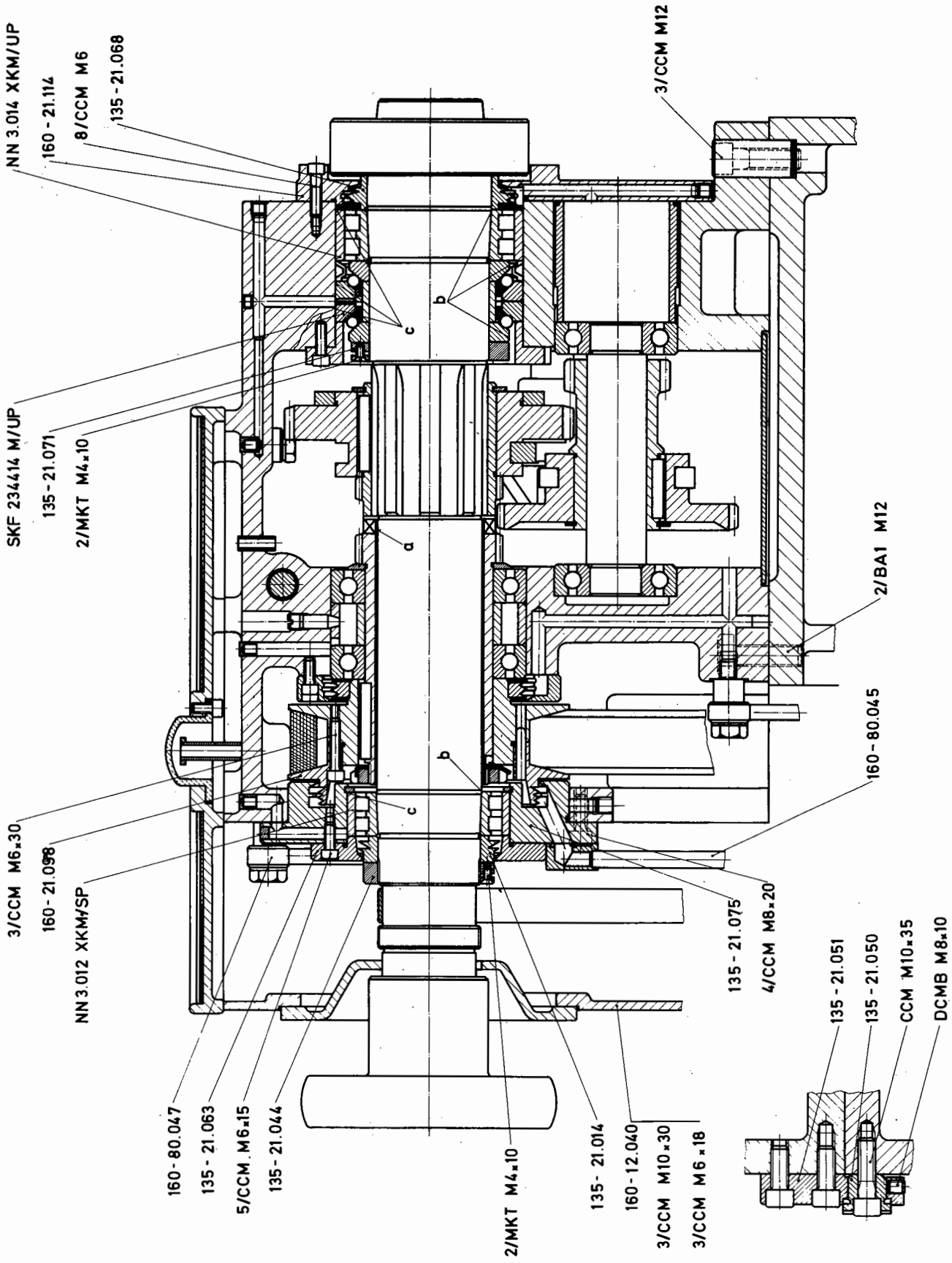


Dial indicator reading to 0,001 mm on tool slide

Reference arbor mounted in the spindle.

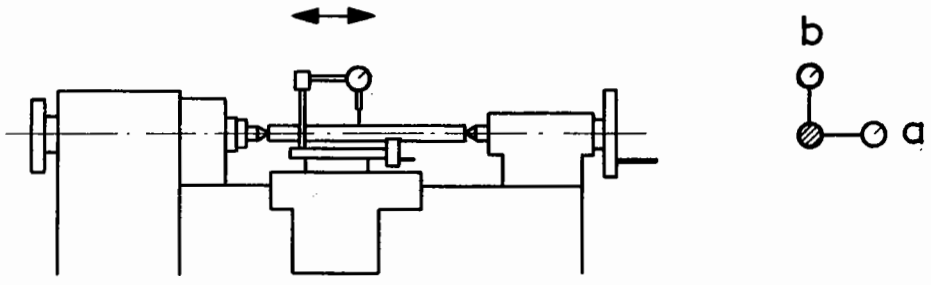
Testing the parallelism is made by moving the carriage apron along the bed.

1. Disconnect the pipe 160-80.045.
2. Loosen the two screws CCM M12 and the two screws BA1 M12 which secure the headstock to the bed.
3. Loosen the screw DCMB M8x10 and the screw CCM M10x35 on plate 135-21.051.
4. Adjust headstock by means of the adjusting screws 135-21.050 and the screws CCM M10x35, and check the parallelism with the dial indicator.
5. Clamp the adjusting screws.
6. Tighten the four screws fixing the headstock to the bed.


NN 3.014 XKM/UP
160 - 21.114
8/CCM M6
135 - 21.068
3/CCM M12
SKF 234414 M/UP
135 - 21.071
2/MKT M4x10
2/BA1 M12
3/CCM M6x30
160 - 21.098
NN 3.012 XKM/SP
160 - 80.045
135 - 21.075
4/CCM M8x20
160 - 80.047
135 - 21.063
5/CCM M6x15
135 - 21.044
2/MKT M4x10
135 - 21.014
160 - 12.040
3/CCM M10x30
3/CCM M6x18
135 - 21.051
135 - 21.050
CCM M10x35
DCMB M8x10
a
b
c
d

Tailstock alignment

This will become necessary when the axis of the headstock and tailstock centres is no more exactly parallel with the longitudinal travel of the carriage.

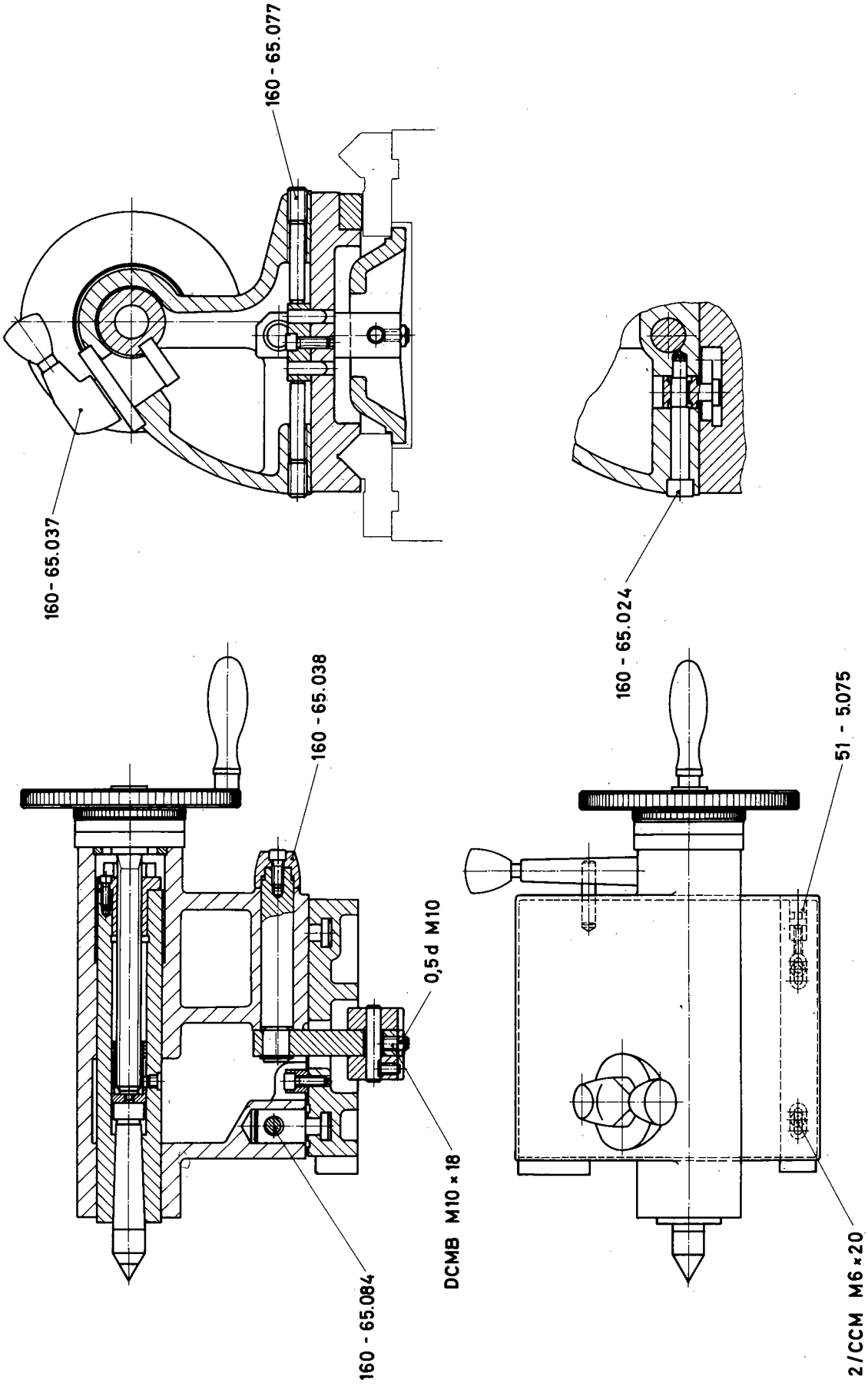


Dial indicator reading to 0,001 mm on swivelling slide.
Reference mandrel held between centres.
Check is performed by moving the carriage along the bed.

1. Remove the tailstock from the bed ways.
2. Loosen the two eccentrics 160-65.024 and 65.084.
3. Move the tailstock on its base plate by means of the two screws 160-65.077 till the screws CCM M6x20 of the gib are accessible.
4. Loosen these screws.
5. Bring the tailstock back to the centre and replace it on the bed ways.
6. Adjust the centre height by rotating the screw 51-5075 (clockwise for raising), check the setting by placing the dial indicator on b.
7. To tighten the screws CCM M6x20 of the gib repear operations as described in pos. 1 . 3 and 5.
8. Adjust parallelism by operating the two screws 160-65.077. Check it by placing the dial indicator on a.
9. Clamp the two eccentrics 160-65.024 and 65.084.

Adjustment of the tailstock locking device

1. Unlock the nut 0,5d M10.
2. Slightly tighten the screw DCMB M10x18.
3. The inner serrations of the levers 160-65.037 and 38 allow them to be set in the most favourable operating position.


160 - 65.077
160 - 65.037
160 - 65.024
160 - 65.038
51 - 5.075
0,5d M10
DCMB M10 x 18
160 - 65.084
2/CCM M6 x 20

Replacement of the leadscrew protections - Elasticone Covers 2536 SH

On tailstock side

1. Unlock the nut KM4X and remove it. Take off the toothed pulley 160-16.072
2. Remove the coverplate 160-16.017 held by three screws CCM M8x30.
3. Unlock the nut KM5 and remove it.
4. Remove the bearing PI 30205-H.
5. Remove the casing 160-16.057 and 160-16.071.
6. Withdraw Elasticone from rear of bed.

On headstock side

1. Move carriage by hand towards tailstock. Unscrew the leadscrew.

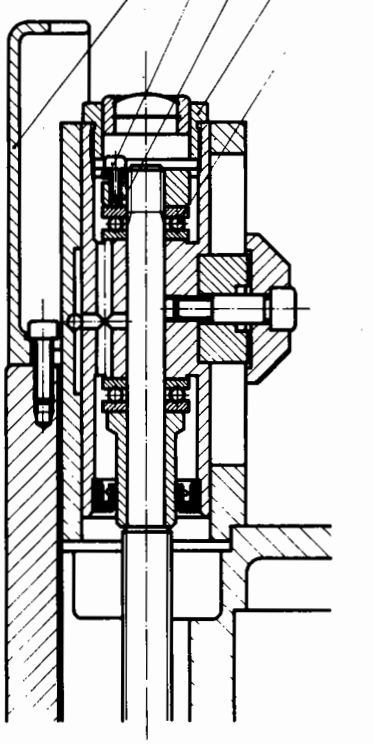
Important! Do not overrun distance A = ~902 mm in order to prevent the balls from escaping the nuts.

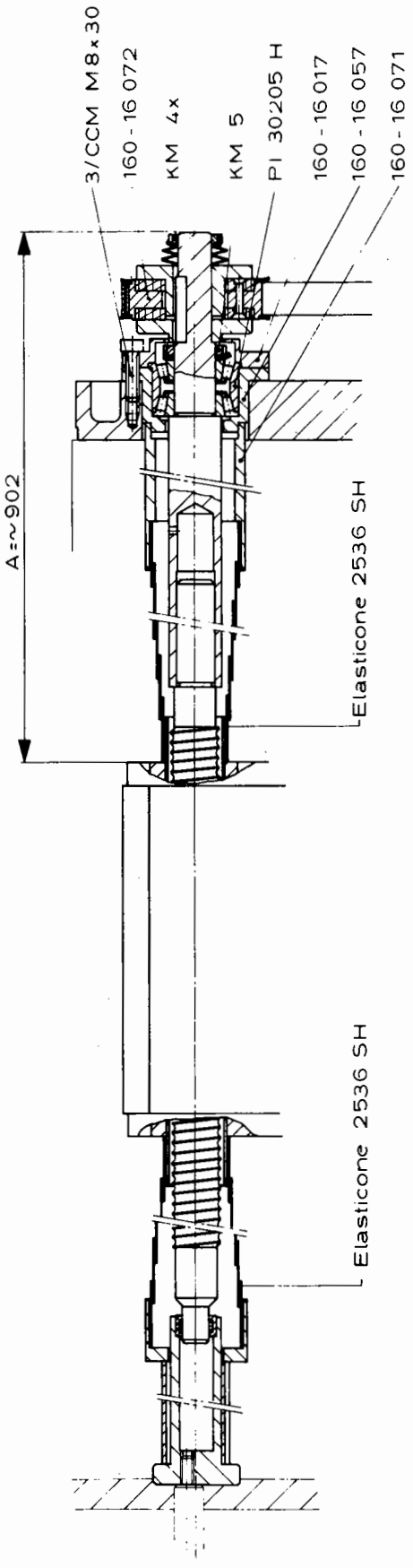
2. Hold firmly the farthest ends of the protection in order to fighter the coils and withdraw the protection.

For reassembly, proceed as above but vice versa, commencing from headstock side.
Lightly oil the coils.

Adjustment of play of the cross slide screw

1. Remove the guard 135-45.105.
2. Unscrew the oil sighter 160-45.105.
3. Unlock the nut 135-45.143 held by two screws CCM M4x10.
4. Adjust it so as to eliminate the play.
5. Reassemble and fill oil bath with the hand gun (see page 10).


135 - 45.105
2 VIS CCM M4x10
135- 45.143
160 - 45.105
2 SKF 51201


3/CCM M8x30
160 - 16 072
KM 4x
KM 5
PI 30205 H
160 - 16 017
160 - 16 057
160 - 16 071
A=~902
Elasticone 2536 SH
Elasticone 2536 SH

Replacement of the variator driving belts

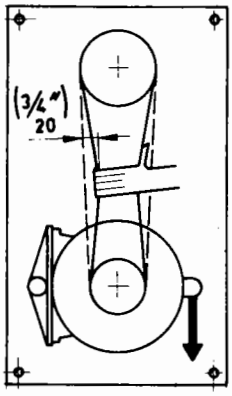
1. Loosen the screw CCM M8x25.
2. Withdraw the shaft 160-84.158 from the bearing so as to provide sufficient clearance to remove the belts.

To change the spindle belt, dismantle the headstock rear bearing as follows (see sectional view page 33).

1. Remove the cover plate 160-12.040 held by three screws CCM M6x18 and three screws CCM M10x30.
2. Disconnect the pipes 160-80.045 and -80.047.
3. Unscrew the four screws CCM M8x20 holding the plate 135-21.075 and take it off using the two holes tapped M8.
4. Unscrew the three screws CCM M6x30 holding the half pulley 160-21.098 and take it off using the two holes tapped M6.
5. Take out the belt from the rear of the spindle.

Tension of the variator belts

1. Unlock the two nuts 0,5d M14.
2. Adjust the tension of the belt using the tensioner 135-80.051.



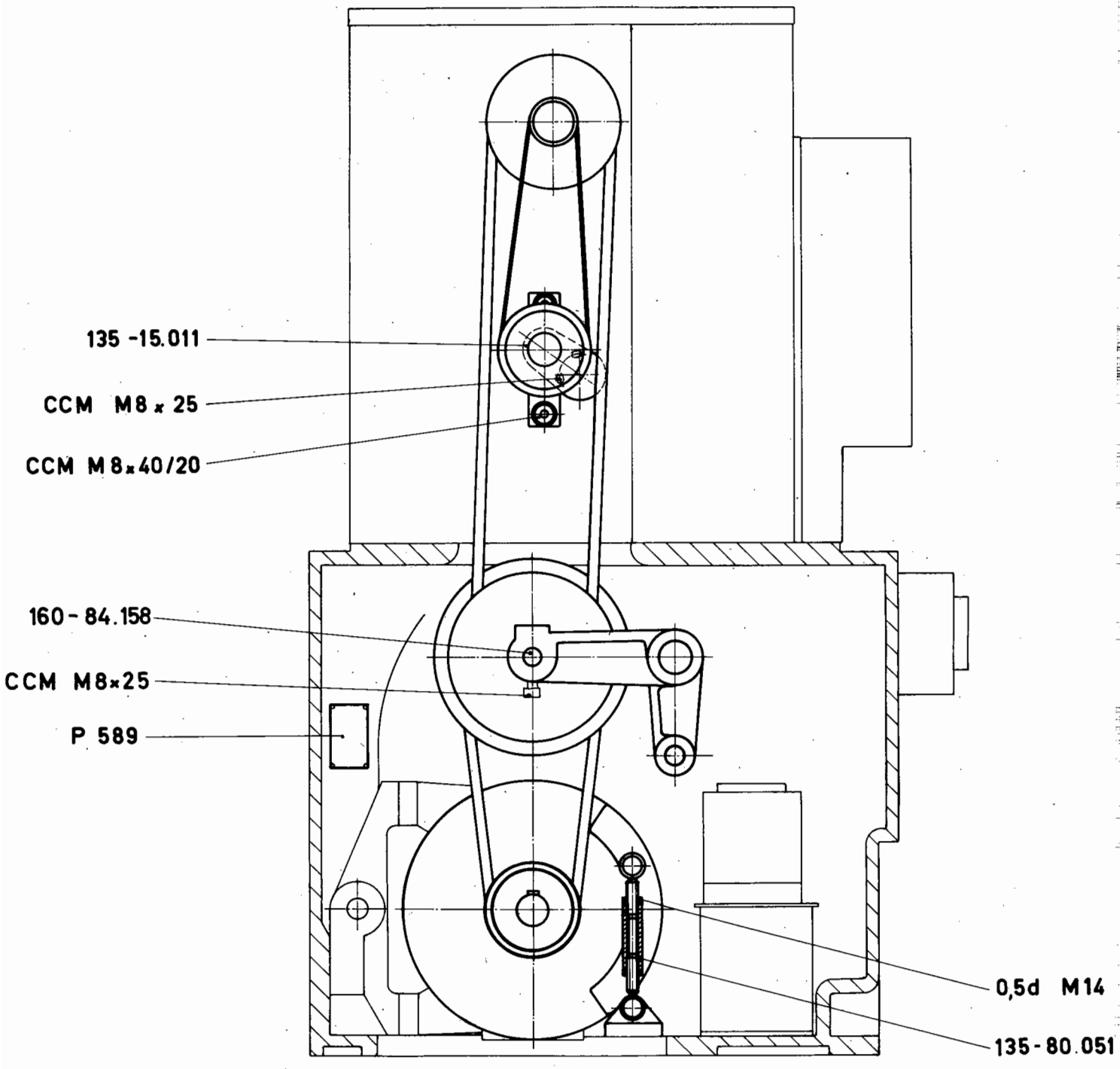
Important!

Do not stretch too much the belts. Both must be allowed to be deflected approximately 20 mm ($\frac{3}{4}$") by hand.
See plate fixed inside.
Exaggerated tension of the belts may provoke the overheating of the variator bearings and their seizing.

3. Lock the two nuts 0,5d M14.

Tension of the feed gear box driving belt.

1. Loosen 2 screws CCM M8×40/20 and 2 screws CCM M8×25.
2. Adjust the tension of the belt by tilting the plate 135-15,011 about its pivoting point
3. Tighten the 4 screws mentioned above.


135 -15.011
CCM M8 x 25
CCM M8x40/20
160 - 84.158
CCM M8x25
P 589
0,5d M14
135 - 80.051

Tension of the rapid displacement driving belt

1. Loosen both nuts 0,5d M14.
2. Adjust the tension of the belt by tilting the motor supporting plate 160-16.082 using the sleeve 160-16.079.
3. Lock both nuts 0,5d M14.

Adjustment of the gibs

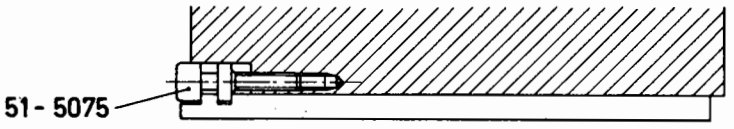
A. Tool slide gib.
Cross slide gib.
Apron gib.
Adjust by means of screw 51-5075.

B. Carriage rear gib.
Unlock the gib by tightening the screw 135-45.135.
Adjust by means of screw 51-5075.
Lock the gib by unscrewing the screw 135-45.135.

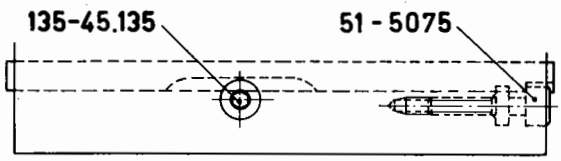
Adjustment of the friction drive of the variator

When the speed changes controlled by the push-buttons 55 and 56 take place too slowly, proceed to their adjustment as follows :

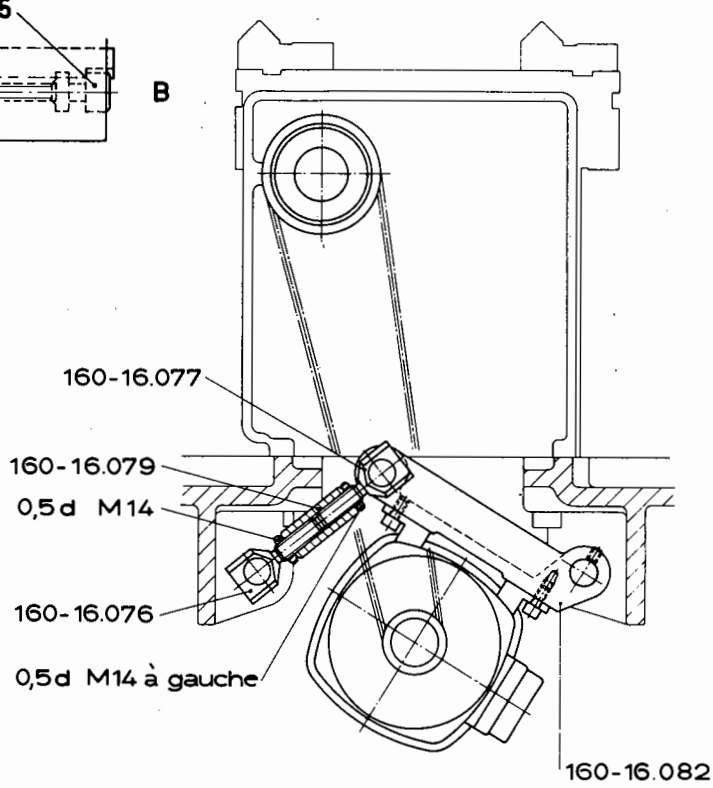
1. Drain the housing 160-84.301.
2. Remove the cover plate held by four screws CCM M8x18.
3. Loosen the screw DCMB M6x8 and adjust by rotating the nut 160-84.330.
4. Lock the screw DCMB M6x8.
5. Reassemble the cover plate 160-84.302, and fill the oil bath.

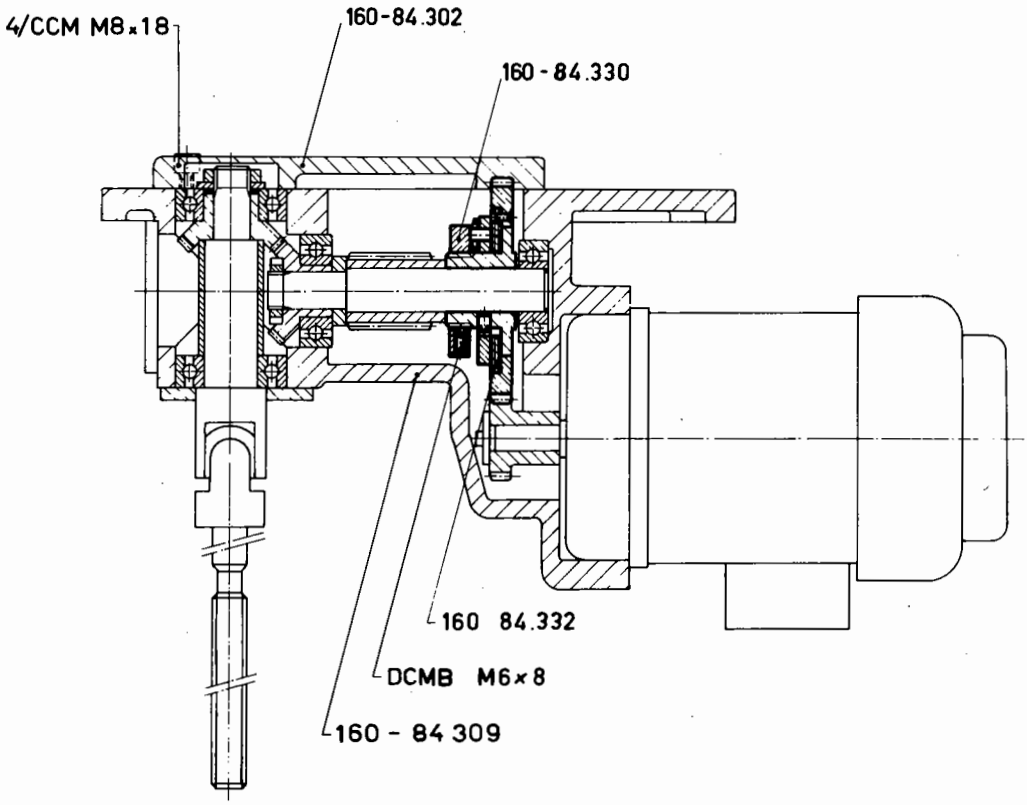

51 - 5075

A


135-45.135
51 - 5075

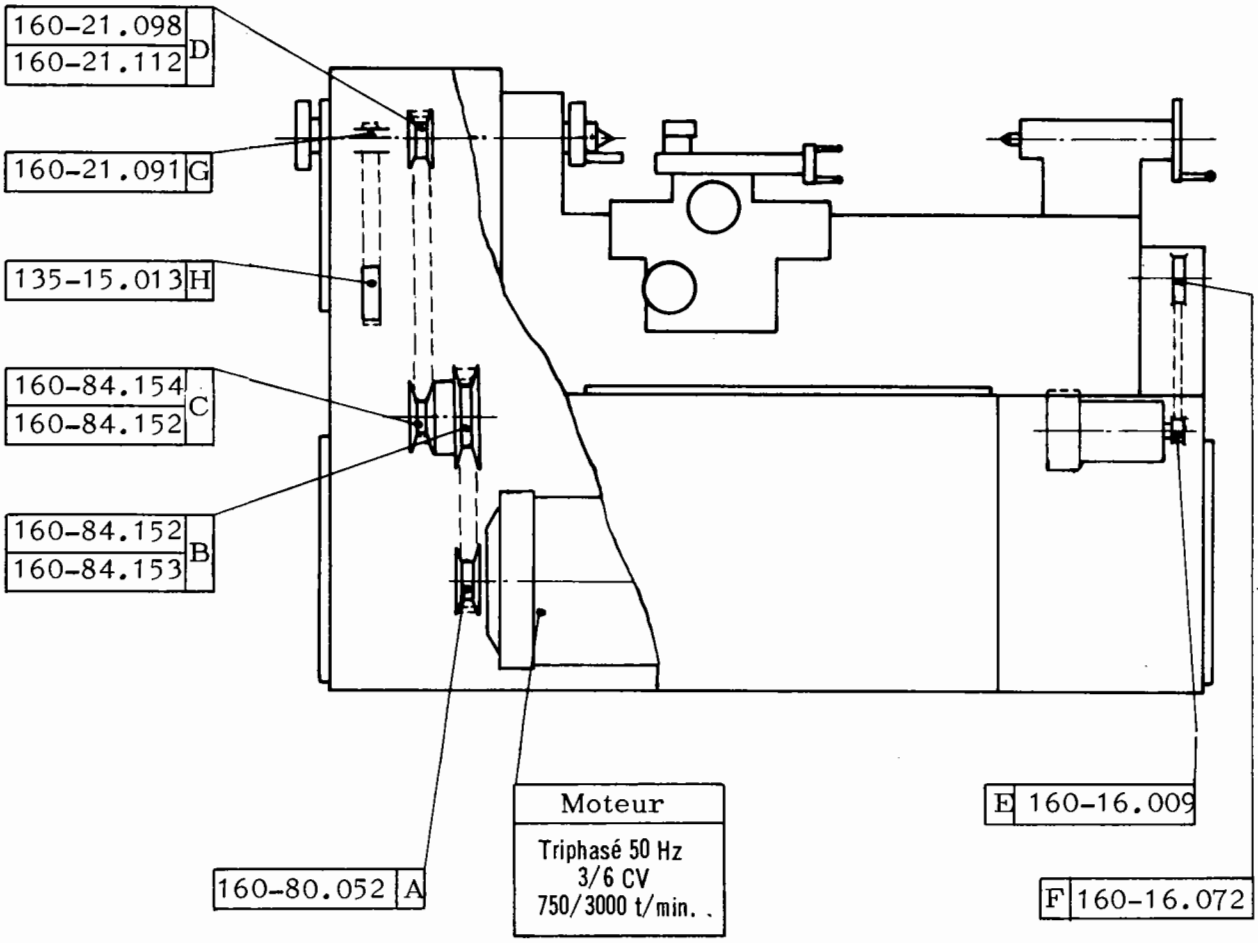
B


160-16.077
160-16.079
0,5d M14
160-16.076
0,5d M14 à gauche
160-16.082

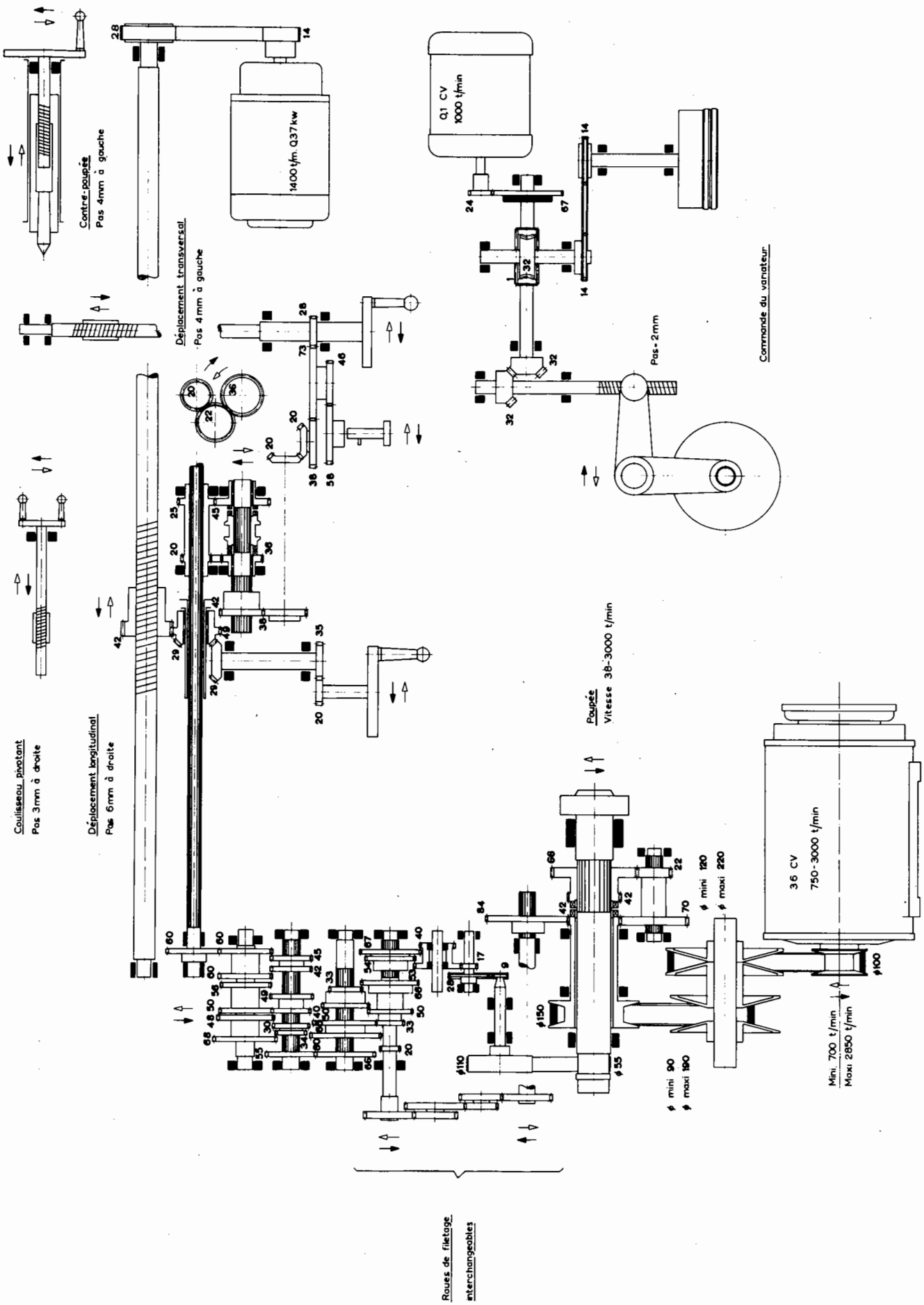

4/CCM M8x18
160-84.302
160 - 84.330
160 84.332
DCMB M6x8
160 - 84 309

ORGANES DE TRANSMISSION

TOUR SCHAUBLIN 160



Poulies	Courroies				
Ø prim.	Liaison	Largeur ou profil mm	Longueur mm	Marque	Désignation
A 100 B 120 - 220	A/B	38 x 13 ∢ 32°	int. 1010	Continental	Variflex FZ 30° (Schaublin)
C 90 - 190 C 150	C/D	38 x 13 ∢ 32°	int. 1730	Continental	Variflex Fz 30° (Schaublin)
E 14 dents F 28 dents	E/F	19 (3/4")	moyenne 990 (39") 104 dents	US Rubber Timing Belt	390 L 075
G 55 H 110	G/H	20	830	Siegling	Extremultus type L 1B


Contre-poupée
Pas 4mm à gauche
1400 t/m. 0,37 kw
Q1 CV
1000 t/min
Déplacement transversal
Pas 4mm à gauche
Commande du variateur
Pas - 2mm
Coulisseau pivotant
Pas 3mm à droite
Déplacement longitudinal
Pas 6mm à droite
Poupée
Vitesse 38-3000 t/min
36 CV
750-3000 t/min
mini 120
maxi 220
mini 90
maxi 180
Mini. 700 t/min
Maxi 2850 t/min
Roues de filetage
interchangeables

TOUR SCHAUBLIN 160

PIECES DE RECHANGE - ERSATZTEILE - REPAIR PARTS

Banc - Wange - Bed

	2	Elasticone Covers 2536 SH		

Poupée - Spindelstock - Headstock

160-21.099	1	Clé de serrage	Gegenmutter	Locking nut
160-21.044	1	Ecrou	Stellmutter	Nut
160-21.090	3	Excentrique	Klemmexzenter	Eccentric
160-21.561	3	Tirant	Nutenschraube	Bolt

Chariot - Kreuzschlitten - Carriage

135-45.282	1	Crémaillère	Zahnstange	Rack
135-45-366	1	Cliquet	Klinke	Trigger

Vis de chariot - Kreuzschlittenschraube - Carriage screw

160-45.039	1	Ecrou	Stellmutter	Nut
160-45.036	1	Vis	Schraube	Screw

Vis transversale - Quergewindespindel - Cross slide screw

160-45.171	1	Vis	Schraube	Screw
160-45.167	1	Ecrou	Stellmutter	Nut

Contre-poupée à vis - Reitstock - Tailstock

135-65.006	1	Vis	Schraube	Screw
135-65.038	1	Ecrou	Stellmutter	Nut
160-65.084	1	Excentrique	Klemmexzenter	Eccentric
135-65.028	1	Tirant	Nutenschraube	Bolt
160-65.024	1	Excentrique	Klemmexzenter	Eccentric
20-50.026	1	Tirant	Nutenschraube	Bolt

Contre-poupée à croisillon - Reitstock mit Kreuzrad - Starwheel-operated tailstock

135-65.013	1	Excentrique	Klemmexzenter	Eccentric
20-50.026	1	Tirant	Nutenschraube	Bolt
135-65.026	1	Excentrique	Klemmexzenter	Eccentric
135-65.028	1	Tirant	Nutenschraube	Bolt

Lunette fixe à charnière - Aufklappbare Lünette - Hinged steady

160-90.010	3	Chien	Spannklaue	Clamping dog

Lunette à suivre - Mitlaufende Lünette - Travelling steady

160.90.010	2	Chien	Spannklaue	Clamping dog

Frein - Bremse - Brake

1 jeu de lamelles LB 50 Bremslamellen LB 50 Friction discs LB 50

Boîte de chariotage et filetage - Gewindeschneid- und Vorschubkasten - Turning and threading control box

135-15.084	1	Tourillon court	Achsbolzen kurz	Short gudgeon
135-15.085	1	Tourillon long	Achsbolzen lang	Long gudgeon
102VM-1710	2	Ecrou	Stellmutter	Nut
102VM-1711	2	Rondelle	Scheibe	Disc

COURROIES - RIEMEN - BELTS

Poupée - Spindelstock - Headstock

1 Courroie Siegling Extremultus, type L 1B
20 mm / 830 mm

Variateur - Variator - Variator

1 Courroie Continental, type Variflex FZ
LR maxi 0,5 mm
profil 38 x 13 mm angle 32° long. int. 1730 mm

2 Courroie Continental, type Variflex FZ
LR maxi 0,5 mm
profil 38 x 13 mm angle 32° long. int. 1010 mm

JOINTS - DICHTUNGSRINGE - JOINTS

Groupes Gruppe Groups	Boîte de chariotage et filetage Gewindeschneid- und Vorschubkasten Turning and threading control box	Poupée Spindelstock Headstock	Tablier - chariot Bettschlitten - Kreuzsupport Carriage - apron	Accessoires de chariot Zubehör zu Kreuzsupport Carriage accessories	Socle Kasrenfuss Base	Variateur Variator Variator	Réducteur Reduziergetriebe Speed reduction unit	
Gaco MIM 816	1							
Gaco MIM 1630	1							
Gaco MIM 2035/10			1					
Gaco MIM 2540	3							
Gaco MIM 2540/10			1					
Gaco MIM 2847/10			1					
Gaco MIM 3040	1							
Gaco MIM 3050/10			1					
Gaco MIM 3052/10			1					
Gaco MIM 3446/10			2					
Gaco MIM 3547/7			1					
Gaco MIM 4562/10							1	
Gaco MIM 4565/10							1	
Gaco OR 149						2		
Gaco OR 187				1				
Aéroquip VI 107			2					
Stefa AA 305512						2		

JOINTS - DICHTUNGSRINGE - JOINTS

Groupes Gruppe Groups	Boîte de chariotage et filetage Gewindeschneid- und Vorschubkasten Turning and threading control box	Poupée Spindelstock Headstock	Tablier - chariot Bettschlitten - Kreuzsupport Carriage - apron	Accessoires de chariot Zubehör zu Kreuzsupport Carriage accessories	Socle Kastenfuss Base	Variateur Variator Variator	Réducteur Reduziergetriebe Speed reduction unit	
Simrit N 12-34				1				
Simrit N 35-106				1				
Simrit AS 12-20-4/6				1				
Simrit AS 55-63-7/10				1				
Simrit AS 65-75-7/10				1				
Simrit AS 125-140-9/12				1				
"O"-Ring 009				2				
"O"-Ring 010		1						
"O"-Ring 012			2		2			
"O"-Ring 013			1					
"O"-Ring 014			1					
"O"-Ring 017			1					
"O"-Ring 111			1		2			
"O"-Ring 113			1					
"O"-Ring 114				1				
"O"-Ring 115			1					
"O"-Ring 132				1				
"O"-Ring 216			1					
"O"-Ring HN 340 65x2,5		1						
"O"-Ring HN 340 94x2,5		2						
"O"-Ring HN 340 109x2		1						

ROULEMENTS - KUGELLAGER - BEARINGS

Groupes Gruppe Groups	Boîte de chariotage et filetage Gewindeschneid- und Vorschubkasten Turning and threading control box	Poupée Spindelstock Headstock	Dispositif de retour rapide Eilrücklauf Vorrichtung Rapid return system	Tablier - chariot Bettschlitten - Kreuzsupport Carriage - apron	Coulisse transversale Querschlitten Transversal slide	Contre-poupée à vis Reitstock Tailstock	Contre-poupée à croisillon Reitstock mit Kreuzrad Starwheel-operated tailstock	Variateur Variator Variator	Réducteur Reduziergetriebe Speed reduction unit	Accessoires de poupée Zubehör zu Spindelstock Headstock accessories	Accessoires de chariot Zubehör zu Kreuzsupport Carriage accessories	Serrage rapide par levier Handrad Schnellspannung Quick-closing attachment
6005 2RS				1								
6006 2RS				1								
6007				2								
6007 2RS								2				
6008				2								
6009									2			
6015 P4		2										
6015 Z												2
6203	10			2								
6204	5			2	2			2				
6204 2RS				2				1				
6205	1							2				
6205 2RS			2	1				1				
6206	2						2		1			
6206 2RS				1								
6207									1			
6208							1					
6209									2			
6305							1					
6306									1			
6306 P6		2										

ROULEMENTS - KUGELLAGER - BEARINGS

Groupes Gruppe Groups	Boîte de chariotage et filetage Gewindeschneid- und Vorschubkasten Turning and threading control box	Poupée Spindelstock Headstock	Dispositif de retour rapide Eilrücklauf Vorrichtung Rapid return system	Tablier - chariot Bettschlitten - Kreuzsupport Carriage - apron	Coulisse transversale Querschlitten Transversal slide	Contre-poupée à vis Reitstock Tailstock	Contre-poupée à croisillon Reitstock mit Kreuzrad Starwheel-operated tailstock	Variateur Variator Variator	Réducteur Reduziergetriebe Speed reduction unit	Accessoires de poupée Zubehör zu Spindelstock Headstock accessories	Accessoires de chariot Zubehör zu Kreuzsupport Carriage accessories	Serrage rapide par levier Handrad Schnellspannung Quick-closing attachment
INA K 10/13							2					
INA K 12x15x9				2								
INA K 18/13				2								
INA K 20/10				2								
INA K 20/13				4								
INA K 22x28x17	2											
INA K 25x30x20											1	
INA K 26/13				4								
INA K 30x35x26 zw									1			
INA K 35x40x30 zw				1								
INA NK 20/16	1											
INA NK 26/16	1											
INA AXK 3047											1	
INA WR 18				1								
INA WR 60							1					
INA BR 60		1					2			1		
INA BR 95		1										
Hoffmann 315 CDE				1								
Hoffmann 320 CDE						1						
Feinprüf SN 3332 dw				1								

ROULEMENTS - KUGELLAGER - BEARINGS

Groupes Gruppe Groups	Boîte de chariotage et filetage Gewindeschneid- und Vorschubkasten Turning and threading control box	Poupée Spindelstock Headstock	Dispositif de retour rapide Eilrücklauf Vorrichtung Rapid return system	Tablier - chariot Bettschlitten - Kreuzsupport Carriage - apron	Coulisse transversale Querschlitten Transversal slide	Contre-poupée à vis Reitstock Tailstock	Contre-poupée à croisillon Reitstock mit Kreuzrad Starwheel-operated tailstock	Variateur Variator Variator	Réducteur Reduziergetriebe Speed reduction unit	Accessoires de poupée Zubehör zu Spindelstock Headstock accessories	Accessoires de chariot Zubehör zu Kreuzsupport Carriage accessories	Serrage rapide par levier Handrad Schnellspannung Quick-closing attachment
Nadella AX 1528						1	1					
Nadella AX 2035				2			1					
Nadella AX 3553				1								
Nadella RAX 445				2								
Nadella PN 1230											4	
RIV AL 12	1											
RIV AL 17	2											
NN 3012-K/SP		1										
NN 3014-K/UP		1										
234414/UP		1										
SKF 30205											1	
SKF 30207											1	
51106									1			
51201				2								
Dürkopp K65x73x15 F											1	

Erection and maintenance instructions for motors types 37 to 41 and 143 to 157 with grease-lubricated ball or roller bearings

Mounting: The form of the motor, given on the rating plate, determines how the motor shall be mounted. (Eg: B 3, V 1; see figure). Ensure that cooling-air entry and exit are unimpeded. External vibrations acting on the stationary motor should be avoided to prevent ball marks.

Connection: Check voltage and connection given on the rating plate and on the diagram inside the terminal cover. **Tighten well terminal nuts and earthing screw.**

Direction of rotation: According to the diagram inside the terminal cover.

Maintenance: The bearings are already filled with ball-bearing grease and are ready for service. To change the grease, remove the end shield by loosening the cover and shield screws. Wash out the old grease with cleaning petroleum (containing 4 ... 5 % oil). The grease should be renewed after the following intervals:

Types 37 ... 41: c. every 10 000 running hours, but at least every 5 years
Types 143 ... 149: c. every 8 000 running hours, but at least every 4 years
Types 151 ... 157: c. every 6 000 running hours, but at least every 3 years

For speeds over 1800 rpm, these intervals should be halved.

For **direct coupling** about 50 % longer intervals are permissible.

If the conditions under which the motor operates are tropical (humidity continuously around 100 %), or if it is of the P 44 type and is mounted without protecting cover in the open or in a very dusty atmosphere, then these maintenance intervals must be halved.

Grease quality: Use ball bearing grease Hotz-Exalin Olyt A 20. Should this not be available, Aseol Litea 6—077, SKF 28, BP Energrease LS 2, Gulfcrown-Grease No. 2, Shell Alvania Grease 2, Valvoline LB Grease, Mobilax Grease 2 and 3, or Esso Beakon M 200 or M 285 may also be used.

Quantity of grease per bearing:

Type of motor	37	39	41	143	145	147	149	151	153	155	157
Grams	1,5	1,7	2	5	15	25	32	50	75	100	150

Mounting pulleys or couplings:

Pulleys or couplings after machining must be **dynamically balanced** (without the wedge, as the motor has been balanced with the full wedge) and carefully mounted. Otherwise the smooth running of the bearings will suffer. Ball bearings are adversely affected by blows and vibration, and therefore

a) the driving organs must be pressed on using a suitable jig and the thread in the shaft end,

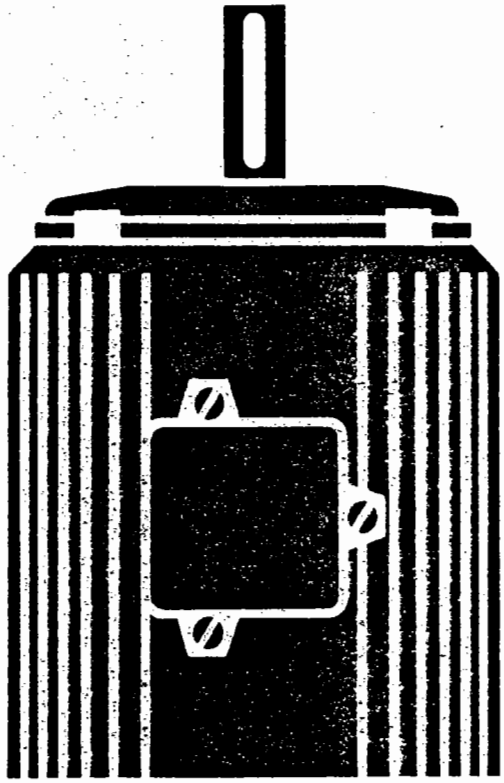
b) if such a jig is not available, the motor can be placed upright, **resting on the opposite shaft end,** and the driving organ moderatly tapped on.

Important: Keep cooling air openings and ventilated external surfaces clean. Dirt and blockages in the air flow cause overheating.

Maschinenfabrik Oerlikon
8050 Zürich / Schweiz

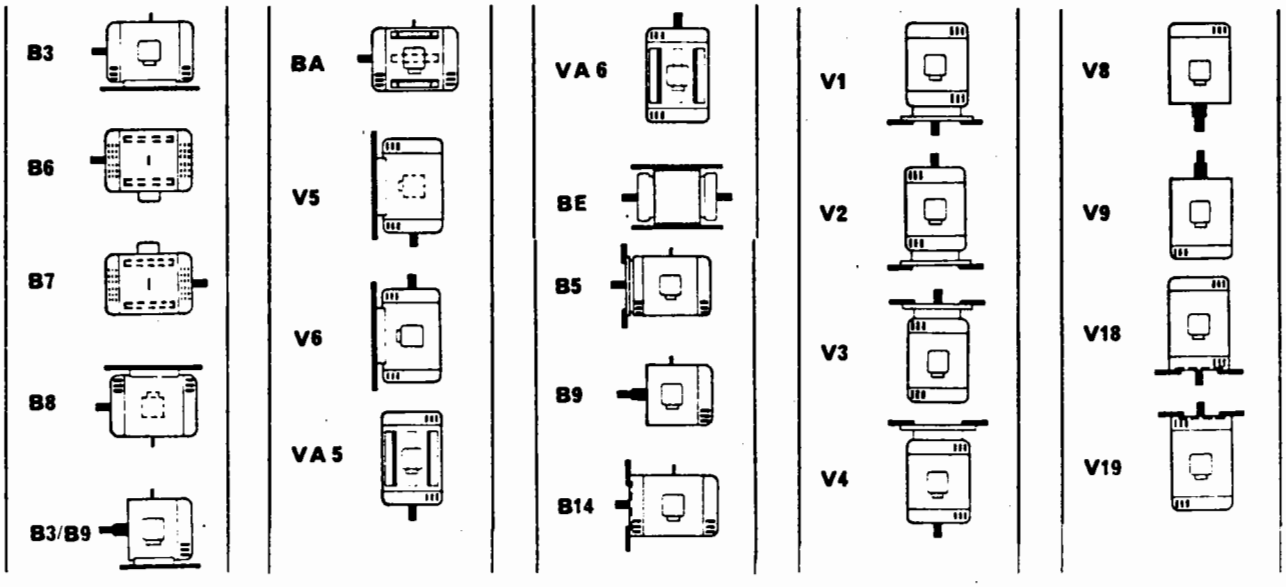
Oerlikon Engineering Company
8050 Zurich / Switzerland

Ateliers de Construction Oerlikon
8050 Zurich / Suisse



2054/6801

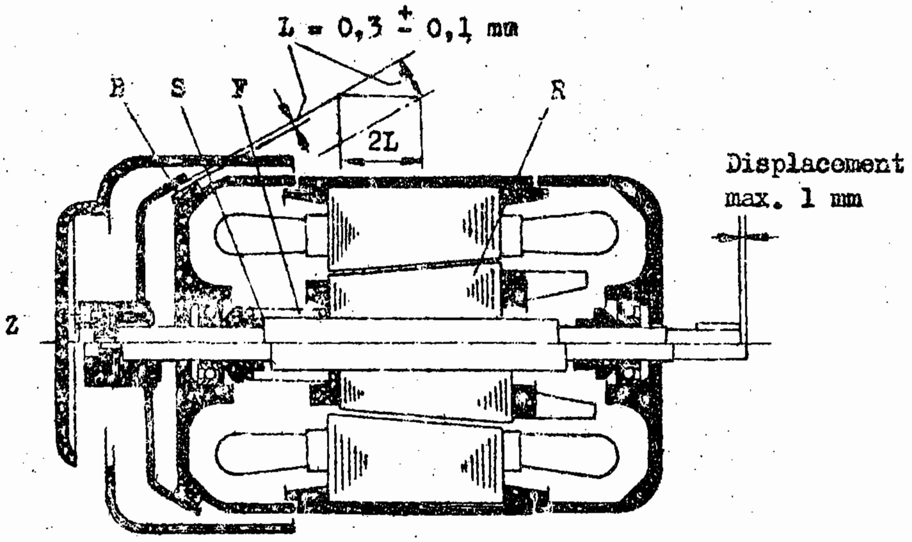
Typ 37-157



Supplementary Instructions for Light-Metal Stop Motors
Typ Mv, MUv 80 - 125a

K 404471

Motor on, brake B off.



Motor off brake B on

1.) Made of Operation:

Upon the motor being switched on its rotor R is slightly displaced (in the sketch to the left) by the resul ing magnetic force, until the shoulder S of the shaft lies up against the stop. Spring F is compressed. Brake B is released. The conical form of the stator bore and rotor results in a sufficiently strong magnetic pull to release the brake.

Upon the motor being witched out spring F forces the rotor back to its original position, brake B is ppl ed and remains applied under the pressure of the spring as long as the motor is switched off. The rotor ist thus held in the brakedposition.

2.) Adjusting the brake:

If the brake clearance L has become greater than 0,5 mm, due to wear, it must be readjusted to 0,3 ± 0. mm. After removing the protective cover, draw off the brake disc and remove the in ermediate rings Z of 0,5 or 0,1 mm thickness. This reduces the braking air gap L y 0,25 or 0,5 mm. After mounting the brake disc, look the screws and lamp the over in position.

Ersatzt durch:	Aen. 14. 5 Text & Bild revidiert	Dat.: 1.10. 1954
Ersatz für:		Vis:
		K 404471

INSTRUCTIONS FOR INSTALLATION AND OPERATION

Three-Phase Squirrel-Cage Motors with Ball Bearings

BROWN BOVERI

K 90011 E
(4. 69 - 10 000)

Printed in Switzerland

Three-Phase Squirrel-Cage Motors with Ball Bearings

Installation and Commissioning

Before installing the motor, check it for any damage which it may have suffered in transport. The motor should stand on a solid foundation, and be aligned and fixed down with great care. When installation is complete, the rotor should be easy to turn by hand.
It is important to have an adequate supply of air, otherwise there is a risk of overheating.

Pulleys and couplings

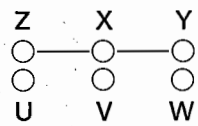
When fitting the pulleys, couplings or other drive parts, avoid impact of any kind liable to affect the bearings.
The thread in the shaft end can be used to put on couplings or pulleys.

Belt drive

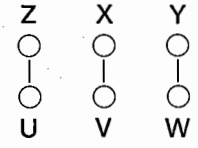
For belt drive the motor and pulley of the machine must be carefully aligned.
Tightening the belt up too tight may cause the rotor to foul, it also lowers the efficiency of the drive and imposes additional strain on the shaft and bearings. We decline to accept any responsability for damage resulting from non-observance of this point.

Mains leads

The motors can be supplied for direct connection to two voltages in the ratio 1:1.73. For the higher of the two voltages given on the rating plate the leads on the terminal block should be connected in star:



For the lower voltage connect in delta:



A corresponding circuit diagram will be clinched inside the cover of the terminal box for any other kind of connections.

Always connect the mains to UVW

The terminal box can be turned through intervals of 90°, so that the cable can be brought in from the required side.
To change the direction of rotation, interchange any two stator leads.

Earthing

The motor must be earthed in accordance with local regulations, using the yellow painted screw in the terminal box.

Balancing

All motors are balanced with a full kye, therefore the transmission-parts are to be balanced without any kye.

Irregularities and Faults

If, with motor switched on, the rotor stops rotating or refuses to start, the stator switch must be immediately opened.

Refusal to start

Provided there is no break in the supply, examine the terminals to see that they are all tight, check the mains fuses. Also check whether the rotor can be turned by hand, whether the motor is overloaded and whether the mains supply has the stated voltage.

Humming

If the motor hums, a phase lead is probably interrupted. This interruption may be due to a blown fuse, a damaged lead, a poor contact due to oxidization of the motor terminal, or in the control gear, or it may be due to interturn leakage.

Bearing defects

Difficulty in starting, bearing noise and overheating of the bearings are a sign of faulty bearings.
The causes may be excessive belt tension, dirt in the bearings, the use of the wrong lubricant, running dry or an overlubrication. New bearings are to be heated at about 90 °C in an oil bath and then shall be put in place very carefully.

Lubrication

The motors are supplied ready filled with grease and do not need any special attention in service. The lapse of time between greasing varies from 3 to 5 years depending on the kind of work, the surrounding temperature, the size of the motor, and the rev/min. It is recommended to check regularly the bearings. If some strange noise or an overtemperature is noticed, it will be necessary to clean up the bearing or to replace it by a new one.
Only first class grease for rolling bearings may be used for topping up. By greasing it is advisable to turn slowly the bearing and to take care that just ⅓ of the ballroom is filled up. The periodical topping up of the grease packing must be observed for motors equipped with lubricating device.

Re-greasing shall be carried out only when the motor is running.
The advisable intervalls for re-greasing, according to our experience, are given in the table below. The intervalls are expressed in running hours of the motor.

Speed range rev/min		up to 1500	up to 3000
Bearing bore	40 mm	10000 →	5000
	↓	↓ hours of operation	↓
Bearing bore	100 mm	4000 →	1500

The arrows indicate the range of variation in which values are to be interpolated.

The maximum amount of grease to be added is:

Bearing bore	40 mm	20 cm³ or grammes
	↓	↓
Bearing bore	100 mm	40 cm³ or grammes

According to the formula $0.005 \times D \times B$, where D is the outside diameter and B the breadth of the bearing.

INSTRUCTIONS FOR INSTALLATION AND OPERATION

Plastics Fan Shroud for Three-phase Squirrel-Cage Motors Type QU 63 to 132

BROWN BOVERI
Baden

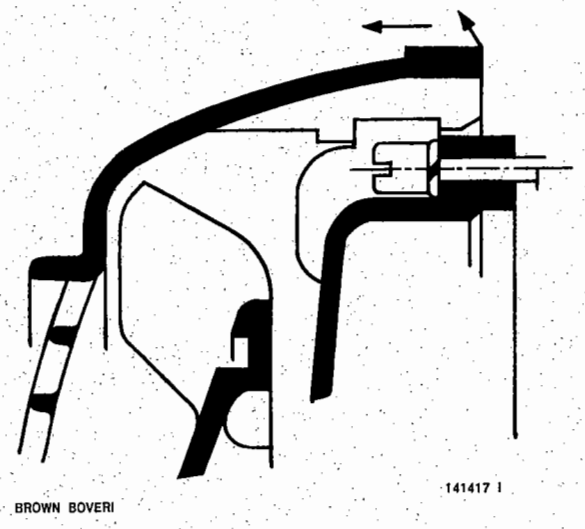
K 90012 E
(2.69 - 2000)

Printed in Switzerland

Plastics Fan Shroud for Three-phase Squirrel-Cage Motors Type QU 63 to 132

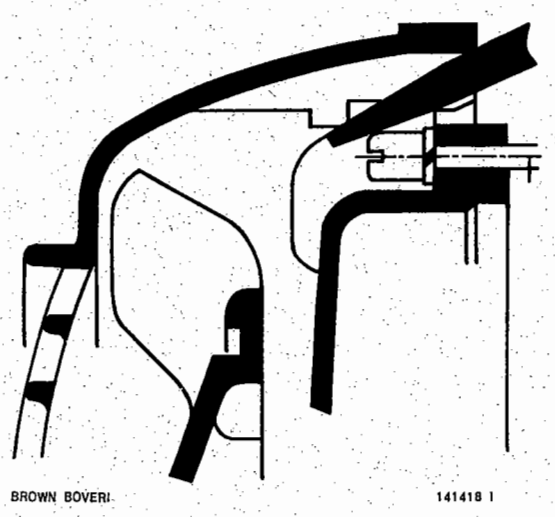
Fan Shroud

The fan shroud is of high quality plastics material with thermal stability between —20 and +80°C.
It grips specially designed fins on the end shield at the non-driving end and is held in position by the inherent elasticity of the material.
It has a sound-deadening effect but is not suitable for coarse conditions or textile mills.



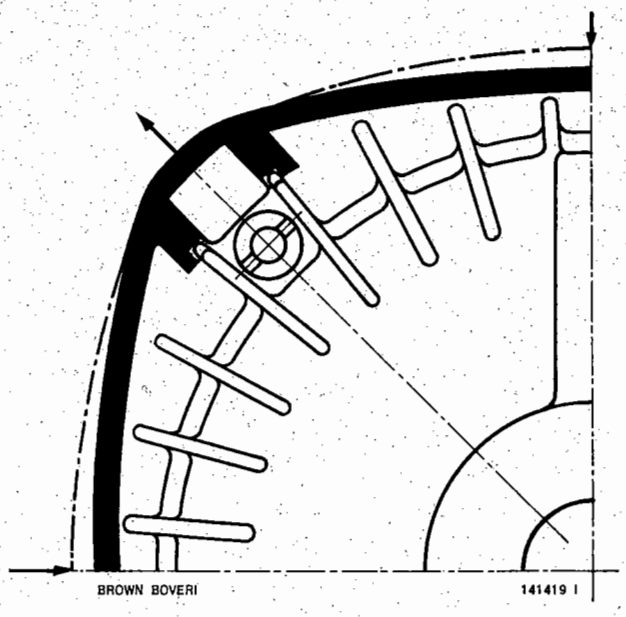
Removing

Using a suitable tool, e.g. a screwdriver, lift the shroud at each of the four corners in turn until the register is released and the shroud can be removed.

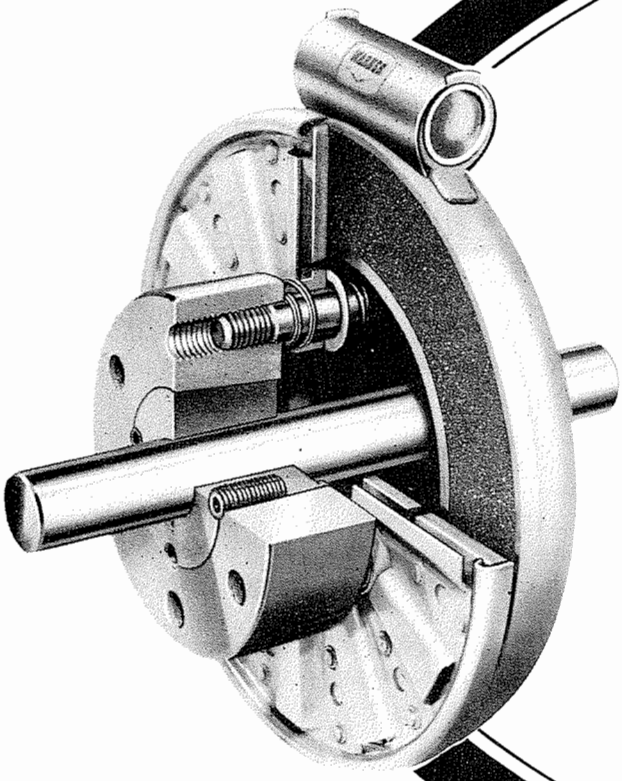


Fitting

The simplest way to fit the cover is to squeeze in the sides as illustrated and ensure that the four corners are correctly located. The shroud can now be slid forwards until the seal engages.
Check that the shroud is correctly seated.



SERVICE MANUAL



PRIMARY ELECTRIC BRAKES

APPLIES TO MODEL

PB 825

WARNER ELECTRIC

1. If the armature is fixed to the shaft first, then back off the magnet until there is 1/16 inch between the two faces and fix to the machine member.

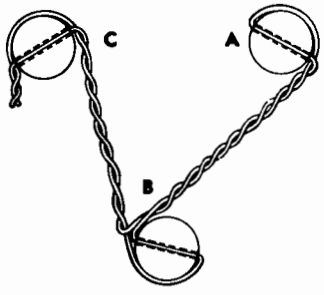
2. If the magnet is fixed to the shaft or to a machine member first, then back off the armature until there is 1/16 inch between the two faces.

D. The armature and armature hub are mounted on the shaft by a taperlock bushing. All parts mu be clean and free from burrs or chips before assembly. Place the bushing into the hub and inse the key. The key is a side to side fit and should not contact the top of the keyway. Lubricate t locking setscrews, insert them into the bushing and slide the assembly onto the shaft. Tighten drawing up on each screw alternately with a torque wrench. During the tightening process, the bus ing should be tapped lightly from time to time to make certain that it seats-in properly.

The assembly should be checked by pressing the armature into contact with the friction face and th releasing the armature. The armature should spring back approximately 3/64 inch. This gap w be automatically maintained throughout the life of the unit.

SAFETY WIRING INSTRUCTIONS

After the autogap assembly has been completed, the drive pins must be safety wired. The follow steps should be taken.



1. Check the pins to see if they are securely tightened.
2. Use a soft annealed #19 (.041) to #21 (.032) W & M gauge ste wire. NOTE: Wiring must be tight throughout assembly.
3. Insert the wire into pin A as shown until the ends of the wire a even.
4. Twist the wire together until pin B is reached. NOTE: A loose ing action on pin B would be resisted by a tightening action on pi A and C.
5. Insert one end of the wire into pin B and pull tight. NOTE: loosening action on pin B would be resisted by a tightening acti pins A and C.
6. Wrap the inserted wire around pin B and twist both wires togeth until pin C is reached. NOTE: A loosening action on pin C wou be resisted by a tightening action on pin B.
7. Insert one wire into pin C and wrap the other wire around the p
8. Complete the wiring by twisting the ends together on pin C. T four pin safety wiring is done in the same manner as above.

COIL DATA

UNIT SIZE	O D mm	CURRENT (A) 6V	24V	90V	RESISTANCE Ω AT 20° C 6V	24V	90V
500	128	3,42	1,05	0,41	1,76	22,8	218
825	218	4,30	1,22	0,37	1,39	19,7	242
1000	262	4,17	1,12	0,34	1,44	21,4	264
1225	322	4,16	1,11	0,34	1,44	21,5	262
1525	398	4,18	1,12	0,34	1,43	21,4	261

PB BRAKE, SIZE 825
WITH PIN DRIVE ARMATURE

MAINTENANCE

When a Warner Electric Brake is properly assembled and installed, no further servicing, lubrication or maintenance should be required throughout the life of the unit. As with any friction-type device, some initial care should be given to wear rate, as minor adjustments in actuation time can sometimes greatly extend the life of the unit.

Slight changes in torque, made with the control potentiometer may greatly and easily extend the life of your unit by increasing the actuation time. Keep the input voltage to the magnet as low as possible when maximum capacity is not required. Once the right speed has been established, precautions should be taken to prevent machine operators, or other personnel not familiar with wear characteristics, from changing the potentiometer setting arbitrarily for effecting minor operating changes. A good rule to remember is the quicker the stop, the shorter the life.

WEAR PATTERN: Wear grooves appear on the armature and magnet surfaces. This is a normal wear condition, and does not impair functioning of the unit. Never machine either the armature or magnet contact surfaces to remove grooves or score marks resulting from wear.

Remachining the face of a worn armature is not recommended. If a replacement armature is to be used with a used magnet, it is necessary to remachine the worn magnet face. In refacing a magnet: (1) machine only enough material to clean up the complete face of the magnet; (2) hold the face within .005" of parallel with the mounting plate; and (3) undercut the molded facing material .002" - .004" below the metal poles. Normally the magnet and armature, as a mating pair, will wear at the same rate. It is the usual recommendation that both components be replaced at the same time.

HEAT: Excessive heat and high operating temperatures are causes of rapid wear. Units, therefore, should be ventilated as efficiently as possible, especially if the application requires fast, repetitive cycle operation.

FOREIGN MATERIALS: If units are used on machinery where fine, abrasive dust, chips or grit are dispelled into the atmosphere, shielding of the brake may be necessary if maximum life is to be obtained. Where units are used near gear boxes or transmissions requiring frequent lubrication, means should be provided to protect the friction surfaces from oil and grease to prevent serious loss of torque. Oil and grease accidentally reaching the friction surfaces may be removed by wiping with a rag dampened with trichlorethylene. In performing this operation, do not drench the friction material. If the friction material has been saturated with oil or grease no amount of cleaning will be completely effective. Once such a unit has been placed back in service, heat will cause the oil to be boiled to the surface resulting in further torque loss.

TORQUE LOSS: If a brake slips or loses torque completely, the initial check should be the input voltage to the magnet as follows:

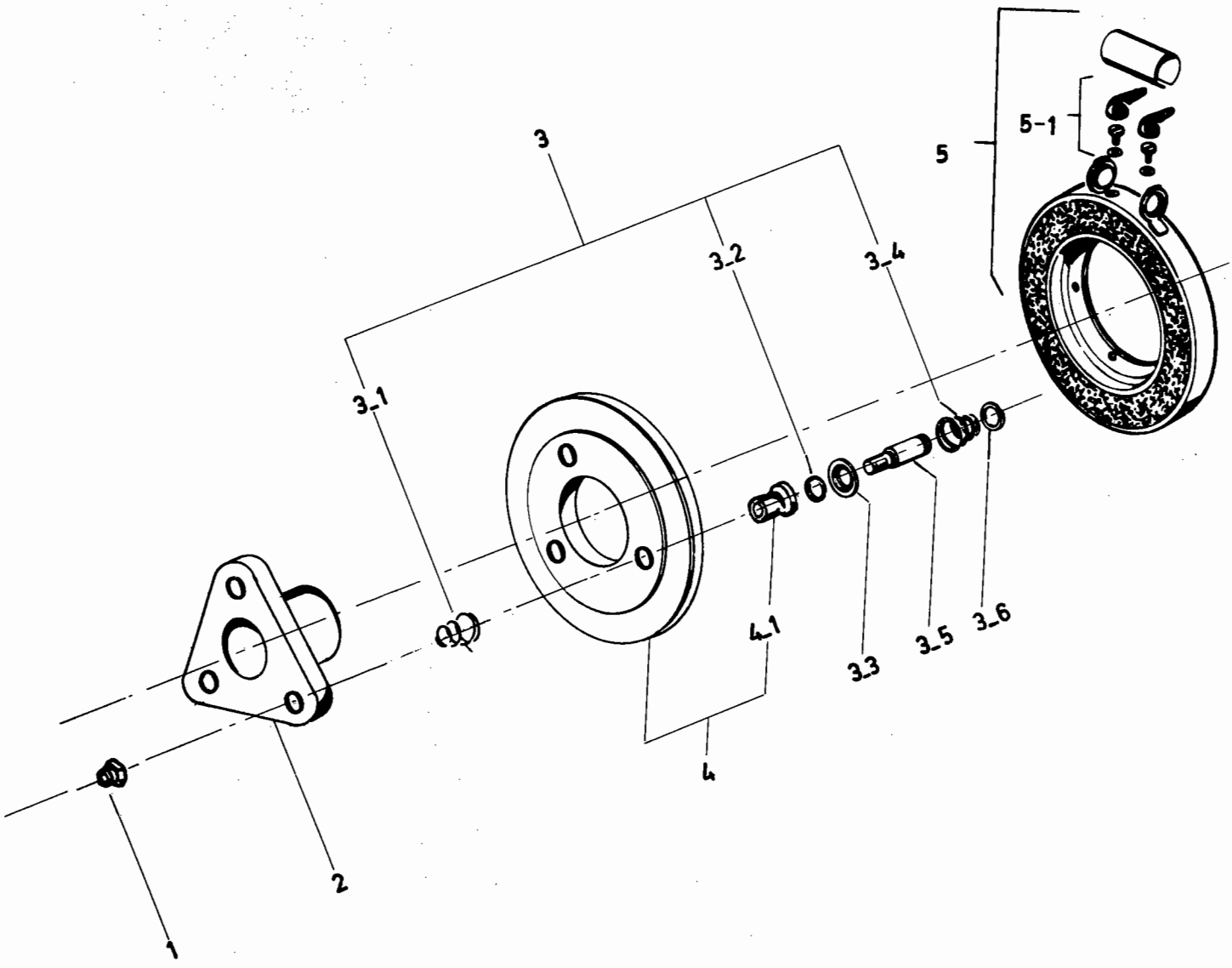
90 VOLT SERIES: Connect a DC voltmeter with a range of 0-100 or more directly across the magnet terminals. With the power on and the potentiometer turned up, a normal reading is 90 volts, although 85 to 95 is satisfactory. The reading should drop as the potentiometer control is adjusted counter-clockwise.

For 6 volt magnets use a DC voltmeter of approximately 0-15 volt range. A normal reading is from 5.5 to 6.5 volts depending on the power supply.

The above checks normally are sufficient. Further checks may be made as follows: a low range ammeter, when connected in series with one magnet lead, will normally indicate approximately .35 amperes for the 90 volt units and 4.0 amperes for the 6 volt series. These readings are with the power on and the potentiometer control in the maximum position.

Ohmmeter checks should be made with the power off and the circuit open (to be certain, disconnect one lead to the magnet). Average resistance for the 90 volt series is 260 ohms, for the 6 volt series, 1.5 ohms. A very high or infinite resistance reading would indicate an open coil.

If the above checks indicate that the proper voltage and current is being supplied to the magnet, mechanical parts should be checked to assure that they are in good operating condition and properly installed.



Item No.	Description	Part No.	No. Req.
1	Nut	661-0005	3
2	Armature hub	MFO	1
3	Mounting accessory	5301-101-003-01	1
3-1	Follow-up spring	808-0008	3
3-2	Detent spring	SW 16	3
3-3	Detent spring retainer	748-0329	3
3-4	Release spring	808-0042	3
3-5	Drive pin	413-0002	3
3-6	Retainer	748-0014	3
4	Armature	5301-111-006	1
4-1	Sleeve	166-0004	3
5	Magnet	5311-631-025	1
5-1	Terminal accessory	5311-101-001	1