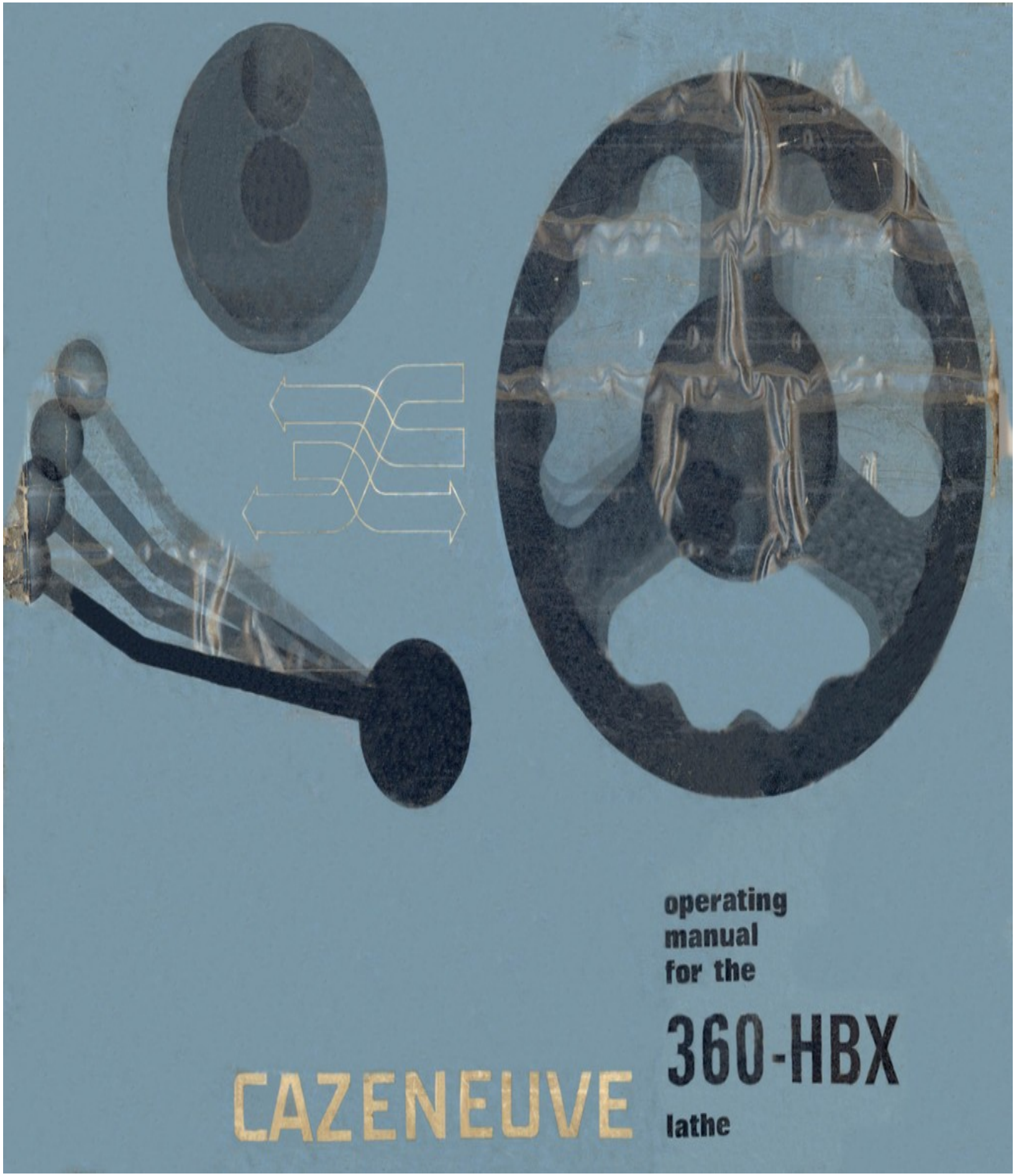

operating
manual
for the

360-HBX

lathe

CAZENEUVE

operating manual for the lathe

1967

INTRODUCTION

You have just received your **HBX** lathe.

This manual will enable you to obtain the maximum of satisfaction from it.

We would draw your attention to the SALMON conditions of acceptance for high-precision toolmaker's lathes. These will enable you to verify that your lathe is as accurate as we claimed it to be.

In the manual you will find details of the precautions to be taken for the installation, starting up, operation, and maintenance of your lathe. The life and accuracy of the machine depend on these precautions. We request you therefore to follow the advice you are given.

In addition the manual contains a large amount of information that will enable you to make the most rational use of the machine.

We would remind you that our sales and engineering departments are at your entire disposal for any further information you may need.

Finally we thank you for the confidence you have shown in us by choosing our make and give you our assurance that we are always at your service.

CAZENEUVE


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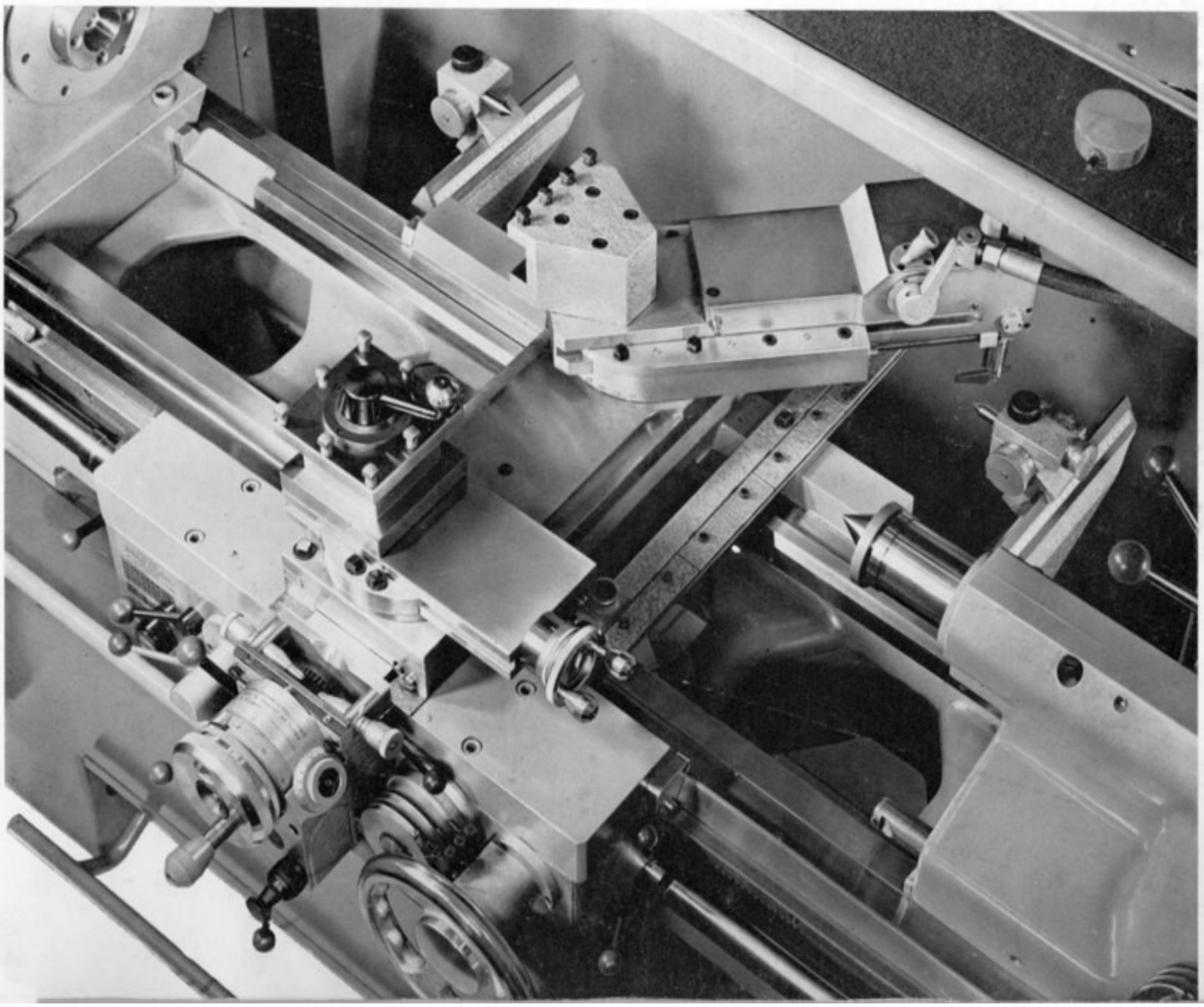
UNIVERSAL HYDRAULIC COPYNG ATTACHMENT

Lathe equipped with a universal hydraulic copying attachment.

For all information kindly refer to the operating manual for this attachment.

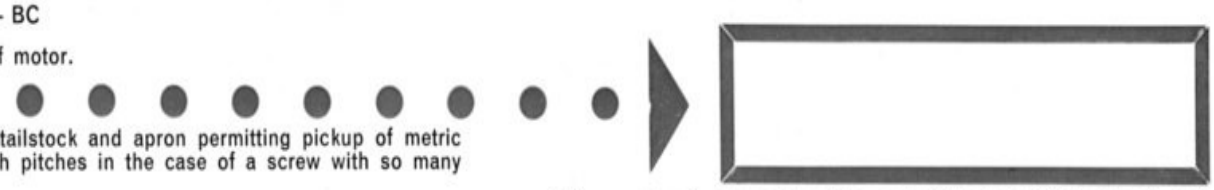


Since the 360 HB-X lathe is made in four different versions, we would request you to give the following particulars whenever you want any information on the machine or wish to order replacement parts for it:

HB-X type A - B - C - BC

Number of speeds of motor.

Number of lathe



(This number is stamped on the end of the bed, tailstock end, and comprises a number of 4 or 5 figures followed by a letter and another figure).

Type A - Standard tailstock and apron permitting pickup of metric pitches (or Whitworth pitches in the case of a screw with so many threads per inch).

Type B - Standard tailstock and apron permitting automatic pickup of metric and English pitches and ensuring change of feed during operation.

Type C - Tailstock with sensitive and automatic feed and apron as on type A.

Type BC - Tailstock as on type C and apron as on type B.

In the event of orders for replacement parts please state the numbers of the parts whenever possible; these can be obtained from the drawings contained in this manual.

DIMENSIONAL CHARACTERISTICS

CAPACITY	mm	inches
Height of centres	180	7.3/32"
Distance between centres . . types A and B	800	31.1/2"
Distance between centres . . types C and BC	750	30"
Maximum length of automatic traversing	730	28.3/4"
Swing over bed	360	14.3/16"
Swing over arms of carriage body	360	14.3/16"
Swing over transverse slide	190	7.15/32"
BED		
Width of bed	330	13"
HEADSTOCK		
Diameter of spindle bore	37	1.7/16"
Internal taper of spindle . . . Morse taper No.	5	
Diameter of spindle nose	70	2.3/4"
Horsepower of motor. hp	5,2	
Infinitely variable spindle speeds / 50 cycles / gearing .rpm	50 to 375	
Infinitely variable spindle speeds / 50 cycles / belt drive .rpm	400 to 3000	
Infinitely variable spindle speeds / 60 cycles / gearing .rpm	40 to 300	
Infinitely variable spindle speeds / 60 cycles / belt drive .rpm	320 to 2500	

It is possible to reduce the low speeds by half by using a 2-speed motor (extra charge).

TAILSTOCK		
Types A and B		
Taper of sleeve . . . . . Morse taper No.	4	
Maximum stroke of sleeve	140	5.1/2"

* Descriptions and characteristics given as a guide and subject to modification.

Types C and BC	mm	inches
Taper of sleeve. . . . Morse taper No.	5	
Reduction sleeves Internal Morse taper No.	4	
Maximum stroke of sleeve.	150	5.7/8"
FEED AND SCREW CUTTING BOX		
Number of pitches obtained / metric.	55	
Number of pitches obtained / Whitworth.	55	
Range of pitches / metric . . . mm	0.5 to 56	
Range of pitches / Whitworth: threads per inch	56 to 1/2	
Numbers of transverse and longitudinal feeds / Apron types A and C	55	
Numbers of transverse and longitudinal feeds / Apron types B and BC	116	
Range of transverse and longitudinal feeds / Apron types A and C	0,05 to 5,6	.0018 to .2000
Range of transverse and longitudinal feeds / Apron types B and BC	0,0125 to 5,6	.00045 to .2000
CARRIAGES		
Maximum stroke of transverse slide	180	7.1/8"
Maximum stroke of tool slide	110	4.5/16"
Tool section	20 × 20	25/32" ×25/32"
On request 16 × 16 mm (5/8 × 5/8")		
OVERALL DIMENSIONS		
Length	2000	6' 7"
Width	1000	3' 3 1/2"
Height	1250	4' 1 1/4"
WEIGHT	kg	lbs
Approximate net weigth	1300	2900

INSTALLATION

Handling

Our lathes are normally supplied with a lifting device fixed to the bed for use in conjunction with a hoist.

Accurate balancing is obtained by moving the carriages.

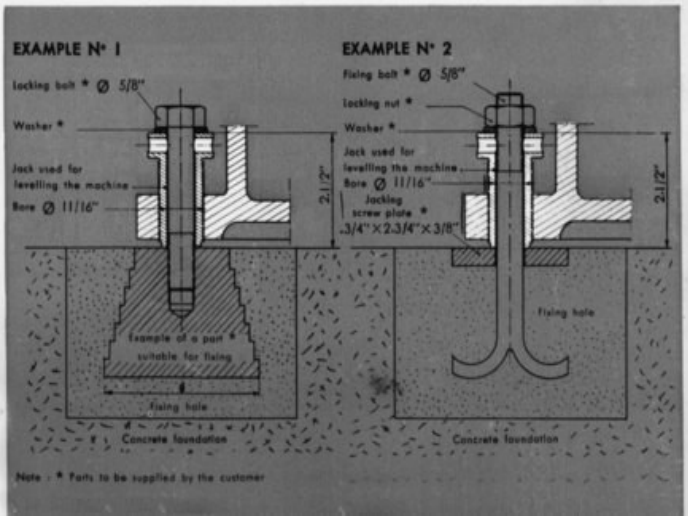
Foundations

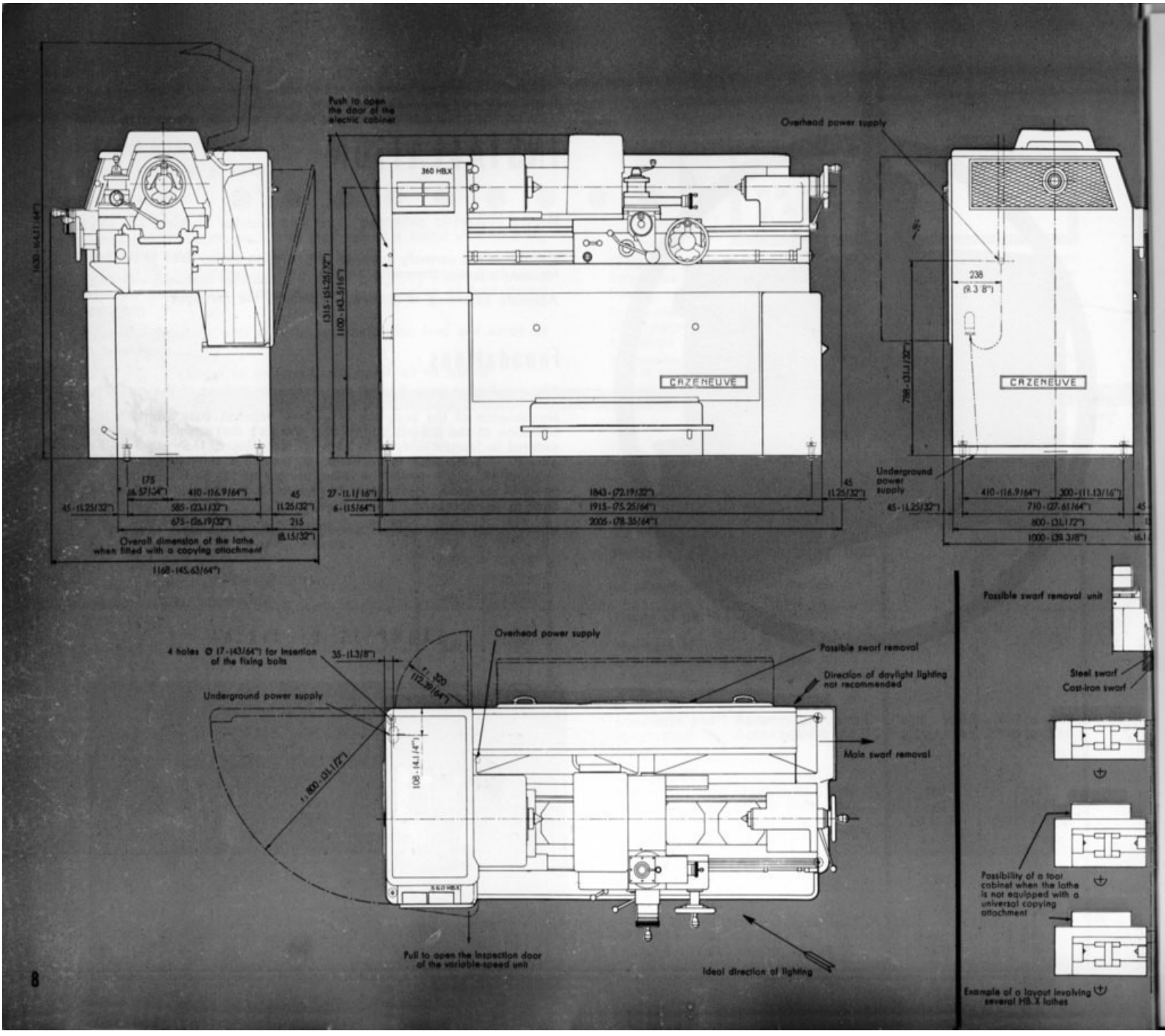
The drawing on page 8 gives the overall dimensions of the machine.

Maintenance of the accuracy of a lathe depends essentially on the condition of the ground on which it stands : the machines must be secured to foundations, these varying according to the nature of the ground. In principle it is necessary to provide a concrete foundation of about 16″ depth under the lathe, projecting 10″ all round the periphery of the base. In the case of very loose ground the depth would have to be increased.

We definitely advise against placing the lathe on vibration dampers.

EXAMPLES OF FIXING




Push to open the door of the electric cabinet
Overhead power supply
360 HBX
CAZENEUVE
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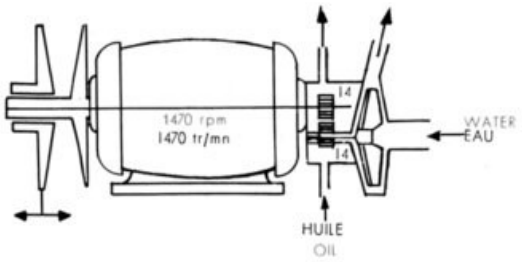
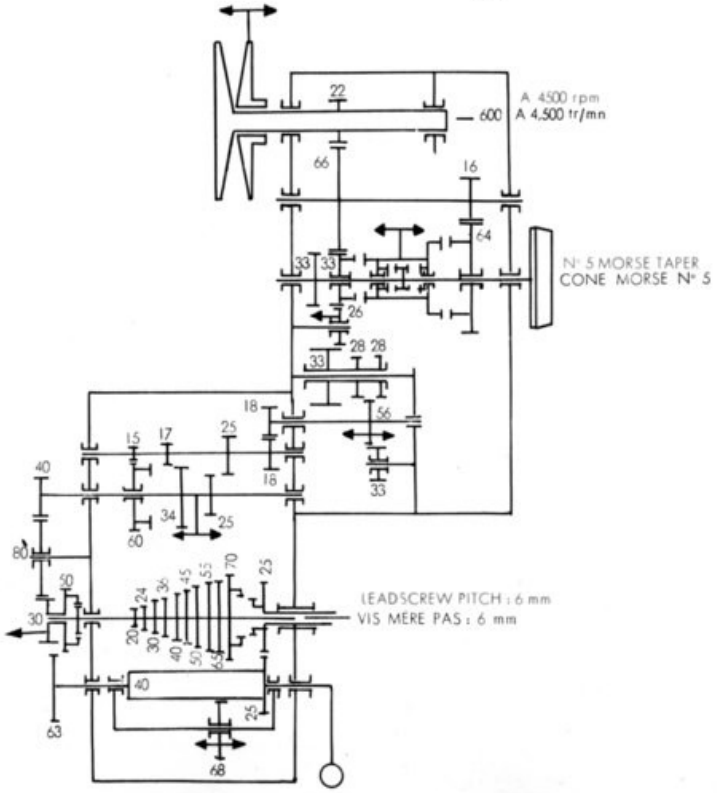
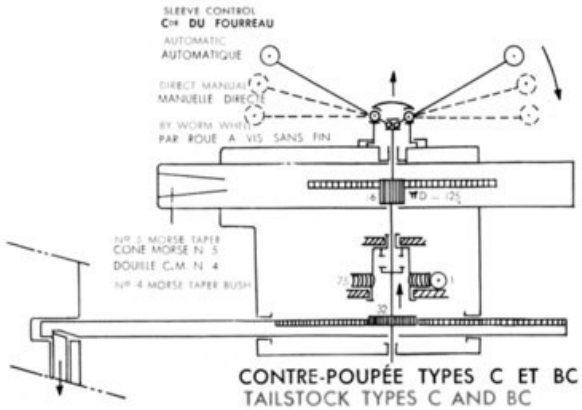
238 (9.3/8")
Underground power supply
Overall dimension of the lathe when fitted with a copying attachment
4 holes Ø 17-143/64") for insertion of the fixing bolts
35-(1.3/8")
Underground power supply
Overhead power supply
Possible swarf removal
Direction of daylight lighting not recommended
Main swarf removal
Pull to open the inspection door of the variable-speed unit
Ideal direction of lighting
Possible swarf removal unit
Steel swarf
Cast-iron swarf
Possibility of a tool cabinet when the lathe is not equipped with a universal copying attachment
Example of a layout involving several HB-X lathes

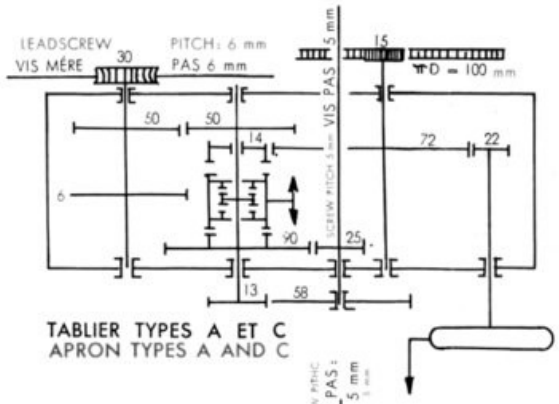
KINEMATIC CHAIN OF THE VARIOUS TYPES



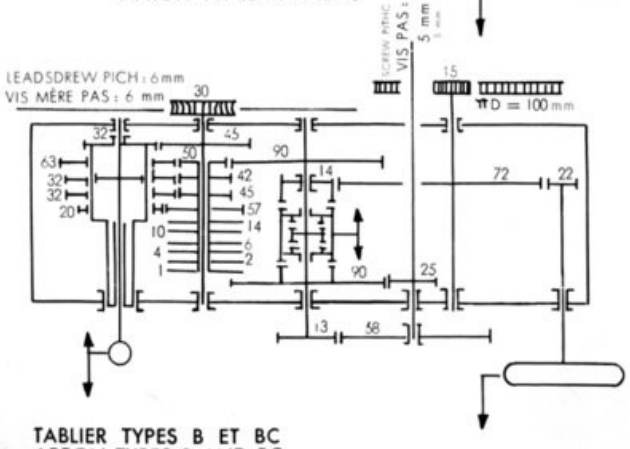




CONTRE-POUPÉE TYPES C ET BC
TAILSTOCK TYPES C AND BC



TABLIER TYPES A ET C
APRON TYPES A AND C



TABLIER TYPES B ET BC
APRON TYPES B AND BC

Positioning

To obtain access to the two jacks situated on the right of the base, lift and remove the front inspection door.

In the case of those situated on the left of the base open the inspection door of the variable-speed unit by pulling the knob situated under the feed box.

After positioning the machine, make a small cement seal between the frame and the ground to prevent swarf from entering the machine.

The supply of current can be arranged in two different ways :

● Underground supply : By a conduit brought to the lefthand rear side of the machine (see installation drawing). In this connection we would draw attention to the advantage of having the current supplied in a steel insulating tube, as the swarf and coolant that all too often stay at the foot of the machines can cause short-circuits.

The length of cable necessary between the foot of the lathe and the connection is 3 Ft. 3 in.

● Overhead supply : In a metal tube brought between the rear guard and the headstock into the electric cabinet through the pipe (see installation drawing). The length of cable necessary between this point and the connection is 3 Ft. 4 in.

Levelling

It is essential that the machine should be made absolutely level in both the transverse and the longitudinal direction, so as to maintain the original accuracy and the stability of the carriages.

This operation is carried out with the aid of the adjusting jacks, and the level must be checked every six months.

Putting into service

● Connect the supply wires to the bar situated at the bottom of the switchgear (see photograph on page 49). To open the door of the electric cabinet, open the door of the variable-speed unit and then pull on the knob situated on the side of the switchgear (see installation drawing).

● Check the oil levels (see paragraph headed "Lubrication").

● Verify that the spindle can be turned freely by hand, with the lever controlling the gear drive and belt drive in the neutral position.

● Set the needle of the speed indicator at the lowest speed.

● Start the motor to prime the oil pump and lubricate all points.

● Start up the lathe and let it run idle for a few minutes at the lowest speed. Then operate the variable-speed unit over its entire range of speeds.

● Stop the lathe, engage first the gear drive and then the belt drive, and carry out the same operations.

● The various movements may then be tried (see pages 4 and 5 for details of the function of the various levers).

Point to observed in the beginning

During the first 40 hours it is recommended that the machine should be run on average power and at an average speed.

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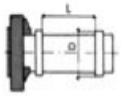
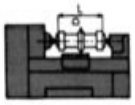
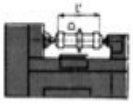
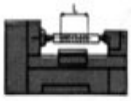
ACCEPTANCE

PRACTICAL TESTS

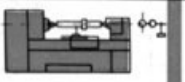
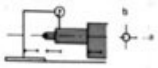
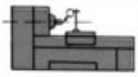
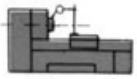
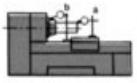
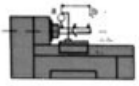
From the work "**Machines-Outils - Réception - Vérification**" by Pierre SALMON (published by Henri François). Tests of this kind, rather than any others, should be applied. In the event of dispute only the results obtained in these tests shall be regarded as valid.

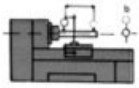
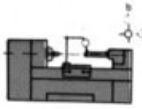
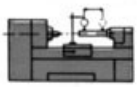
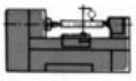
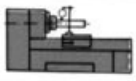
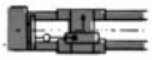
N	DIAGRAMS	Nature of test and dimensions of test piece	Testing conditions	Check made	Equipment and methods recommended	ERRORS ALLOWED in mm High-precision toolroom lathe Height of centres ⩽ 10" Distance between centres ⩽ 60"
1		Machining of cylindrical pieces mounted on face plate D ⩽ 1/4 height of centres L = 1 height of centres	Machining of two bearings of a maximum length of .8" on a cylinder	The bearings machined are round. The bearings machined are cylindrical. The diameter must be maximum at the live-centre end	Micrometer Micrometer	.0002" Inch per foot .0004"
2		Machining of cylindrical pieces mounted on face plate D = 1 height of centre L = 1/4 height of centre max	Machining of a flat face perpendicular to axis of cylinder	The face machined is flat: the error is concave only	Straightedge and feeler gauge	Inch per foot .0004" (1)
3		Machining of cylindrical pieces mounted between centres D = 1/8 L L max = 1 distance between centres	Height of centres ⩽ 10" Machining of three bearings of a maximum length of .8" on a cylinder. Positions of bearings: one as near as possible to each of the centres, one at the middle	The portions machined are cylindrical	Micrometer	.0008"
4		Machining of cylindrical pieces mounted between centres D = 1/8 L' L' max = 1/2 distance between centres	Machining of three cylindrical bearings on a cylinder. The positions of the bearings are the same as above	The portions machined are cylindrical	Micrometer	.0008"
5		Threading a cylindrical piece L = 12" S.I. thread The diameter and pitch are as close as possible to those of the leadscrew	The portion of the thread is taken at any point of the leadscrew	The thread must be clean and free of facets and waves The pitch must be accurate	Special equipment of verified accuracy	Total error inch per foot .0008" Error in any portion of the thread having a length of 2" .0008"

(1) The error must be measured on the diameter.

ACCEPTANCE

GEOMETRIC CHECKS LIST OF CHECKS

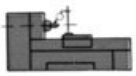
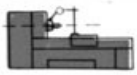
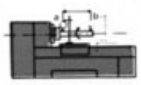
N°	DIAGRAMS	ITEM MEASURED	Measuring instruments recommended	ERRORS ALLOWED High-precision toolroom lathe Height of centres ⩽ 10" Distance between centres ⩽ 60"
1		**A. CHECKING OF POSITIONING.** Parallelism of front and rear slideways of carriage to a horizontal plane	Spirit level and cross piece	nch per foot + .00024" (1)
2		Transverse obliquity of carriage slideways	Spirit level and cross piece	Inch per foot .00036"
3		Parallelism of carriage slideways to a horizontal plane passing through the line of the centres	Dial indicator and arbor	Inch per foot .00024"
4		Parallelism of tailstock slideways to carriage slideways **a)** in the horizontal plane **b)** in the vertical plane	Dial indicator	.0004"
5		**B. LIVE CENTRE.** Eccentricity of live centre only	Dial indicator	.0004"
6		**C. HEADSTOCK SPINDLE.** Eccentricity of faceplate location	Dial indicator	.0002"
7		Axial displacement of headstock spindle under constant pressure due : **a)** to run-out of stops **b)** to run-out of faceplate bearing face	Indicator and special centre Indicator	.0002" for each stop .0004"
8		Eccentricity of axis of live-centre housing : height of centre ⩽ 10" **a)** measured at exit of housing **b)** measured at a distance of 12"	Dial indicator and arbor	.0002" .0004"

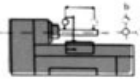
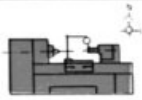
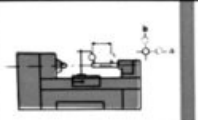
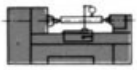
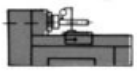
N°	DIAGRAMS	ITEM MEASURED	Measuring instruments recommended	ERRORS ALLOWED High-precision toolroom lathe Height of centres ⩽ 10" Distance between centres ⩽ 60"
9		Parallelism of axis of spindle to longitudinal slideway of carriage : **a)** in the horizontal plane **b)** in the vertical plane	Dial Indicator and arbor	Inch per foot — .0004" + .0004"
10		**D. TAILSTOCK.** Parallelism of axis of outside of sleeve to carriage slideway : **a)** in the horizontal plane **b)** in the vertical plane	Dial indicator	Inch per foot + .0004" — .0004"
11		Parallelism of axis of housing of tailstock centre to carriage slideway : **a)** in the horizontal plane **b)** in the vertical plane	Dial indicator and arbor	Inch per foot + .0004" — .0004"
12		**E. TAILSTOCK CENTRE.** Difference in height between live centre and tailstock centre	Dial indicator and arbor	SALMON tolerance : + .0004" CAZENEUVE tolerances : + .0008" + .0016"
13		**F. CARRIAGE.** Parallelism of longitudinal displacement of tool carriage to spindle axis	Dial indicator and arbor	Inch per foot .0008"
14		Perpendicularity of transverse displacement of tool carriage to spindle axis	Dial indicator and plate	Inch per foot .0004" stroke
15		**G. LEADSCREW.** Axial displacement, under constant pressure, due to run-out of each stop	Dial indicator	.0002" for each stop
16		Parallelism of axis of screw with carriage slideways : **a)** in the horizontal plane **b)** in the vertical plane	Dial indicator and cross piece	.0002" .0002"
17	LEADSCREW	Accuracy of pitch : Total error Error found on any portion of the leadscrew having a length of 3"5/16		Inch per foot .0008" .0008"

NOTE : The sign + indicates the following directions for a turner occupying his working position : left - right, front - back, down - up.

(1) The bed must be convex only.

GEOMETRIC CHECKS METHODS RECOMMENDED FOR CARRYING OUT THE CHECKS

N°	DIAGRAMS	DESCRIPTION OF METHOD
1		**A. CHECKING OF POSITIONING.** Place a cross piece having two bearing surfaces on its upper face on the bed, arranging it so that it rests only on the **front slideway** of the carriage. Place a spirit level graduated in .0008" on the bearing surfaces, positioning it so that it lies in a longitudinal direction. Move the cross piece over the entire length of the slideway and read off the variations indicated on the spirit level. Repeat this operation with the cross piece resting on the **rear slideway** of the carriage.
2		Place a cross piece on the bed, arranging it so that it rests on both slideways of the carriage ; place the spirit level in a transverse direction, move the cross piece over the entire length of the bed, and read off the variations indicated by the spirit level.
3		**a)** Distance between centres ⩽ 10" Place a cylinder of revolution between centres, hollow if possible and of a length approximately equal to 1 distance between centres. Fix an indicator to the carriage and adjust the tailstock centre so that the indicator, exploring a horizontal generator of the cylinder near the headstock centre and near the tailstock centre, gives the same readings. Then explore the generator over its entire length ; repeat the operation, rotating the cylinder through 180° and then reversing the headstock and tailstock ends of the cylinder. Take the average of the readings.
4		**Height of centres ⩽ 10"** Fix a dial indicator on the carriage and explore the tailstock sleeve, bringing the carriage and tailstock gradually nearer and nearer to each other over the entire length of the bed.
5		**B. LIVE CENTRE.** Fix a dial indicator on the carriage and explore the extremity of the effective taper of the centre placed in position, with the stylus perpendicular to the surface of contact and the spindle turning slowly. Repeat the operation, first rotating the centre through 180° in its housing. Take the average of the two readings.
6		**C. HEADSTOCK SPINDLE.** Fix a dial indicator on the carriage and explore the cylindrical portion of the faceplate locating surface.
7		Replace the live centre by a special centre with a surface faced perpendicularly to its axis ; apply a constant pressure at this point. Fix an indicator **A on the carriage** and explore the faced surface with it ; fix an indicator **B on the bed** and explore the chuck bearing face with it. Rotate the spindle slowly ; take the readings given by the indicators.
8		Replace the live centre by a cylindrical arbor or one with two cylindrical bearing surfaces separated by a distance equal to 1 height of centre. Fix a dial indicator on the carriage, **rotate** the spindle slowly, and explore the arbor first near the housing (8a) and then at 1 height of centre from it (8b). Repeat the operations four times, each time rotating the arbor through 90° in relation to the spindle. Take the average of the readings.

N°	DIAGRAMS	DESCRIPTION OF METHOD
9		Same set up as in paragraph 8. **With the spindle stationary,** explore the arbor first near the housing and then at 1 height of centre from it. Repeat the operations, rotating the arbor and the spindle through 180°, and take the average of the readings. In measurement 9a the indicator explores in a horizontal diametrical plane ; in measurement 9b it explores in a vertical diametrical plane.
10		**D. TAILSTOCK.** Fix a dial indicator on the carriage, with the stylus resting on the outside of the tailstock sleeve ; explore over the entire length of the sleeve by moving the carriage. In measurement 10a the indicator explores in a horizontal diametrical plane ; in measurement 10b it explores in a vertical diametrical plane.
11		Replace the tailstock centre by a cylindrical arbor with two cylindrical bearing surfaces separated by a distance equal to 1 height of centre. Fix a dial indicator on the carriage, with the stylus resting on the arbor ; explore the arbor over its entire length (or explore each bearing surface in turn) by moving the carriage. In measurement 11 a the indicator explores in a horizontal diametrical plane ; in measurement 11b it explores in a vertical diametrical plane.
12		**E. TAILSTOCK CENTRE.** Place a precision cylinder between centres ; fix an indicator to the carriage ; explore the top generator at the ends of the cylinder by moving the carriage.
13		**F. CARRIAGE.** Replace the live centre by a cylindrical arbor having an effective length of 1 height of centre ; fix a dial indicator on the tool holder, with the stylus resting on the top generator of the arbor. Explore the arbor over its entire length by moving the top carriage only ; repeat the operation, rotating the tool holder through 180°, and take the average of the readings.
14		Mount on the headstock a plate whose front face is perpendicular to the line of the centres ; fix an indicator on the tool holder, with the stylus resting on this face ; move the stylus by acting on the transverse movement of the carriage ; repeat the operation, rotating the spindle through 180°, and take the average of the readings.
15		**G. LEADSCREW.** Fix a dial indicator at the end of the bed (tailstock end) ; exert a pressure on the leadscrew along its axis ; explore the rear portion of the leadscrew. Repeat the operation, rotating the screw through 180°, and check the difference between the readings. Exert a pressure on the leadscrew in the opposite direction ; repeat the same operations.
16		Place the carriages at the middle of the bed and engage the leadscrew nut ; place on the bed the cross piece used in check 1 and fix a dial indicator on it. By moving the cross piece, explore the two ends and the middle of the leadscrew in turn, on the outside diameter, **a)** in a horizontal diametrical plane, **b)** in a vertical diametrical plane.
17	LEADSCREW	Height of centres ⩽ 10". Make the checks about every 2" ; ensure that the total error on the pitch is not more than or less than .0008" in 12" ; verify that the local error found in any portion of the leadscrew of about 2" length does not exceed .0008".

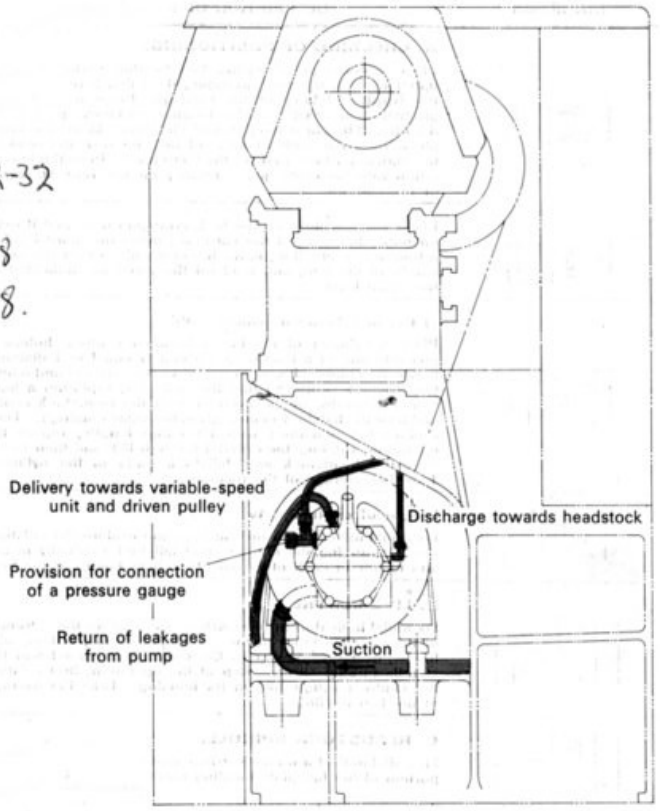
LUBRICATION

GENERAL LUBRICATION

We recommend the following oils :

Units	Characteristics of the oils			Quantity	Type of oil recommended	Manufacturer
	Designation	Engler viscosity				
		at 68 °F	at 122 °F			
Headstock Feed and screwcutting box Variable-speed unit	Hydraulic	10	3	6,6 gallons	Mobil DTE Light	Vacuum Oil
Carriage	Special slideway oil	25	5	1,32 pints	Mpglia B	Antar
Apron Leadscrew Rear rest	Worm and worm wheel couple	25	5	1,76 pints	Moglia B	Antar

The makes of oil indicated are makes with which we have carried out systematic tests, but if you let your supplier know the characteristics we recommend, it is probable that he will be able to supply you with an equivalent oil.



LUBRICATION OF HEADSTOCK, FEED AND SCREWCUTTING BOX, AND VARIABLE-SPEED UNIT

The oil pump is mounted centrally on the rear plate of the electric motor and is driven by this motor.

To fill the tank, it is necessary to open the inspection door of the variable-speed unit. The oil is then poured in through the feed and screwcutting box, which is connected to the tank by a vinyl tube. The level in the tank is checked through the sightglass (transparent vinyl tube situated on the side of the base).

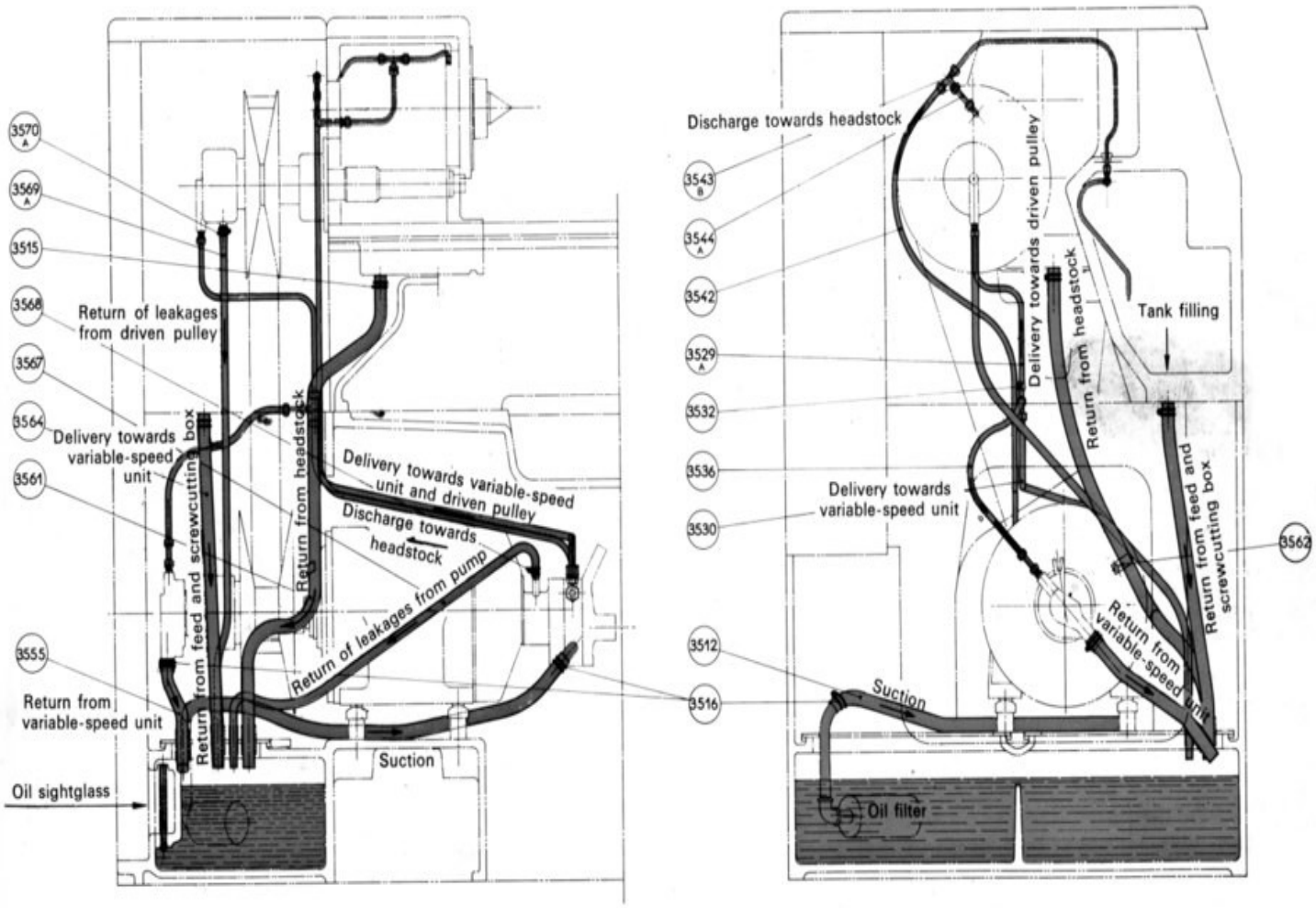
A filtering cartridge ensures that the oil is purified before it leaves the tank. To clean this filter (or to change it), all that is necessary is to disconnect the suction tube situated on the rear cover of the tank. Then remove this cover by loosening the palm-grip knob at the top.

To drain the tank, all that is necessary is to remove the two covers from the tank and use an independent pump or a syringe.

Do not use the lathe pump for draining, otherwise foreign substances may enter the oil circuit.

LUBRICATION OF CARRIAGE

The oil pump is situated at the front of the carriage, on the right of the control box of the transverse-slide screw.


3570 A
3569 A
3515
3568
3567
3564
3561
3555
Return of leakages from driven pulley
Delivery towards variable-speed unit
Return from feed and screwcutting box
Return from headstock
Delivery towards variable-speed unit and driven pulley
Discharge towards headstock
Return of leakages from pump
Return from variable-speed unit
Suction
Oil sightglass
3543 B
3544 A
3542
3529 A
3532
3536
3530
3512
3516
Discharge towards headstock
Delivery towards driven pulley
Return from headstock
Tank filling
Delivery towards variable-speed unit
Return from feed and screwcutting box
3562
Return from variable-speed unit
Suction
Oil filter

This hand pump is operated by a to-and-fro movement of the bell-crank lever until the oil oozes from the slideways.

Lubrication should be carried out every morning or after any prolonged stoppage and also when using coolant.

To fill up with oil, it is necessary to bring the transverse slide right back. This will expose the cavity containing the operating screw, which must be completely covered in oil.

To drain the tank, it is necessary to unscrew the square-headed screw situated on the right under the body of the carriage with the aid of the standard spanner supplied with the machine. Draining is necessary especially if any water gets into the tank.

LUBRICATION OF APRON, LEADSCREW, AND REAR REST

The apron is splash-lubricated.

The leadscrew is protected by telescopic tubes allowing it to work in an oil bath and safeguarding it from abrasive particles. When the leadscrew is rotating, the oil contained in these tubes is carried either towards the feed box or towards the rear rest, which ensures lubrication of the bearings mounted in the latter. A sightglass situated at the rear of the rest makes it possible to check whether the lubrication is correct.

To avoid pressure inside the tubes, a light-alloy tube fixed on the bed is provided to ensure circulation of oil between the rear rest and the feed box.

A LUB lubricator fitted to the hub of the hand wheel permits lubrication of the needle bearings housed therein.

Filling up with oil is effected through the sight glass with the retractable opening mounted on the left of the apron body. This sightglass also enables the level to be checked. When filling, it is necessary to rotate the leadscrew at a slow speed.

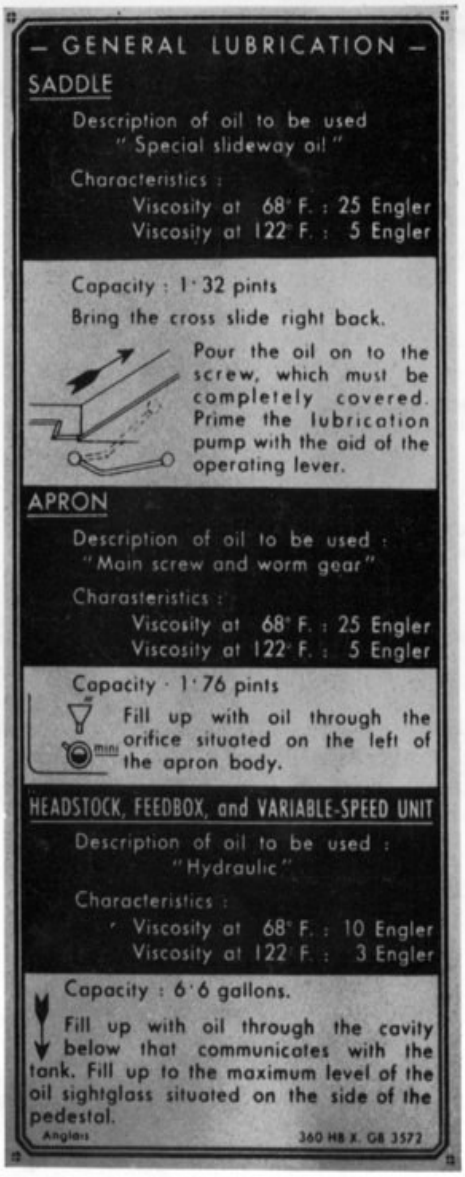
Drainage of the apron tank is effected by unscrewing the square-headed screw situated under the apron body with the aid of the standard spanner supplied with the machine.

OTHER UNITS
(tool slide, tailstock, fixed steady, motor)

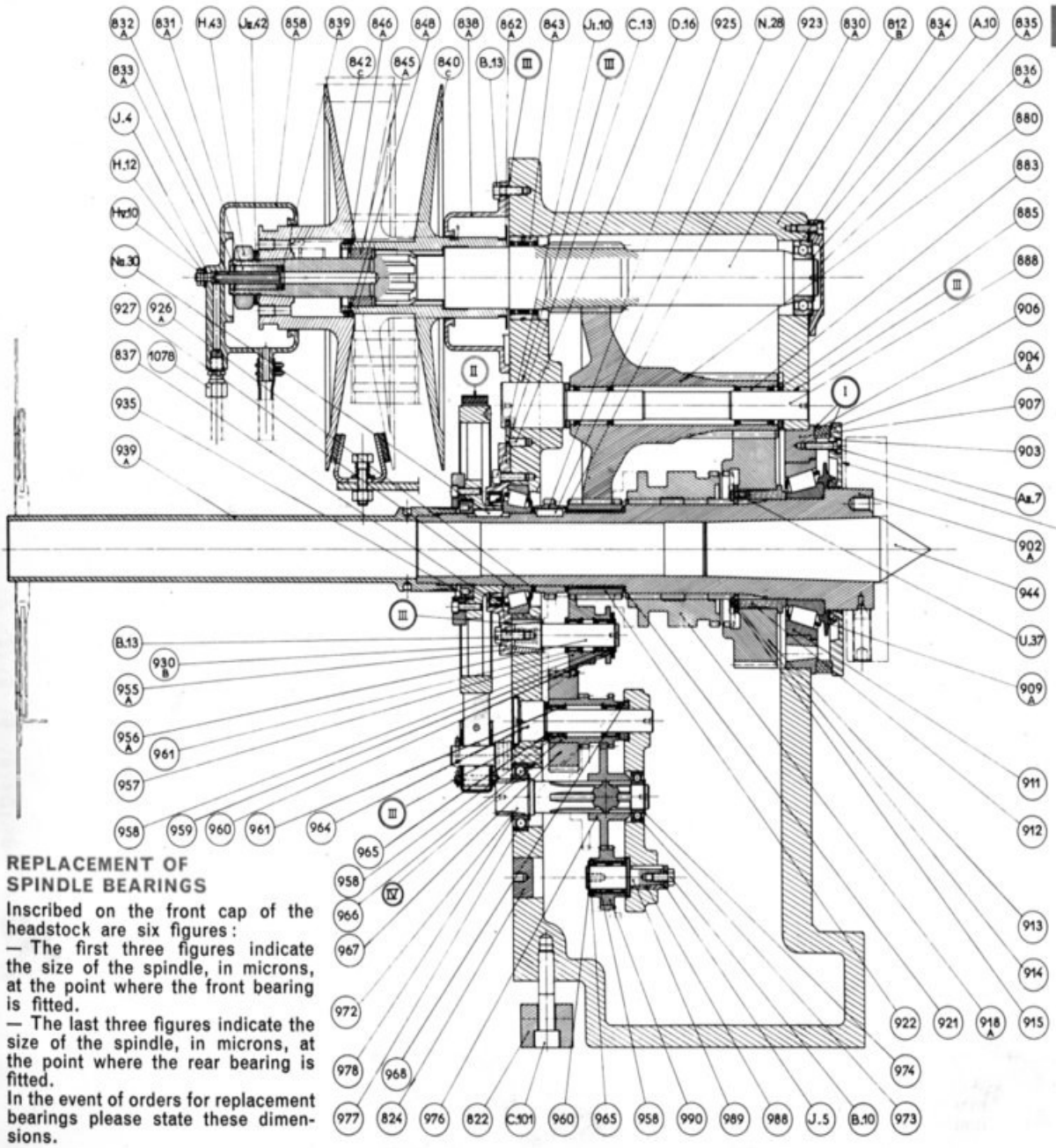
These units are lubricated by means of LUB lubricators. Lubrication of the motor should be carried out every 5000 hours through the lubricators situated on the front and rear plates.

DRAINAGE

In the case of normal operation the machine should be drained at least every 2000 hours, while in the case of intensive operation drainage should be carried out every 1000 hours.



HEADSTOCK



The tolerance of the front and rear bearing surfaces of the spindle is indicated on this face in microns.

Sur cette face est indiquée la tolérance en microns des portées de roulement avant et arrière de la broche

REPLACEMENT OF SPINDLE BEARINGS

Inscribed on the front cap of the headstock are six figures:

— The first three figures indicate the size of the spindle, in microns, at the point where the front bearing is fitted.

— The last three figures indicate the size of the spindle, in microns, at the point where the rear bearing is fitted.

In the event of orders for replacement bearings please state these dimensions.

FEED AND SCREWCUTTING BOX

The design of this box incorporates arrangements permitting rapid and easy handling and direct reading of the pitch or feed required.

The pitch and feed plate, shown on page 25, indicates the various metric and Whitworth pitches obtained directly and the feed values.

Selection of the pitches and feeds is made with the levers 1247 and 1289 situated on the righthand side of the box.

The pitch or feed chosen is indicated by the intersection of the two rectangular needles visible by transparence behind the indicating plate.

The position of the levers A and B on the one hand and H and V on the other is given according to whether the pitch or feed chosen is indicated in red or in white on the indicating plate.

The pitches or feeds indicated in red are given only when the levers are in the positions B and H.

The pitches or feeds indicated in white are given when the levers are in the positions A and H, A and V, or B and V.

Place the **green** window opposite the category chosen (the window shows two colours, green or red).

The machine is supplied with the following standard gears permitting production of all the pitches indicated on the plate : 30, 40, and 80 teeth.

Pitches not given directly by the box can be produced by changing the position of the standard gears on the quadrant (please consult us).

The fairly frequent metric pitches of 0.7 and 0.8 (not given directly) are obtained with the gears mounted as follows :

Pitches of 0.7 and 0.8 : 40-tooth gear on the top stud, 75-tooth gear on the bottom stud, 49-tooth intermediate gear.

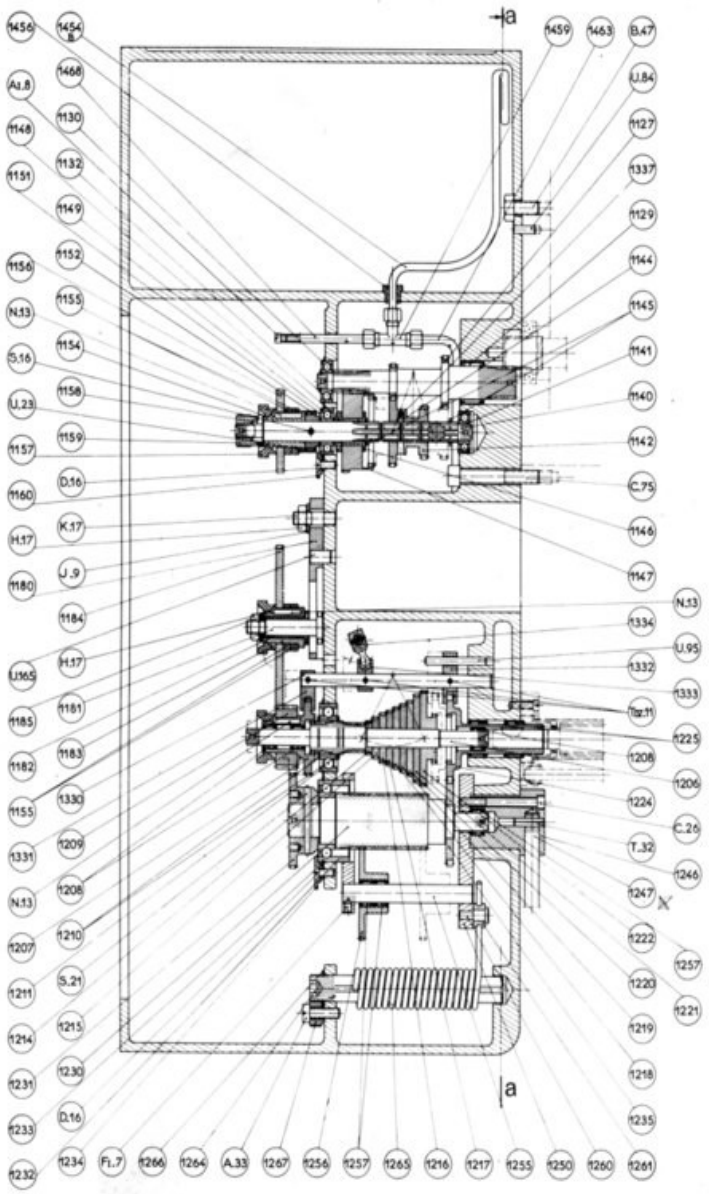
Additional 48- and 75-tooth gears necessary and two spacers No. 1155 For the 0.7 pitch set the 1.75 mm pitch indicated on the plate.

For the 0.8 pitch set the 2 mm pitch indicated on the plate.

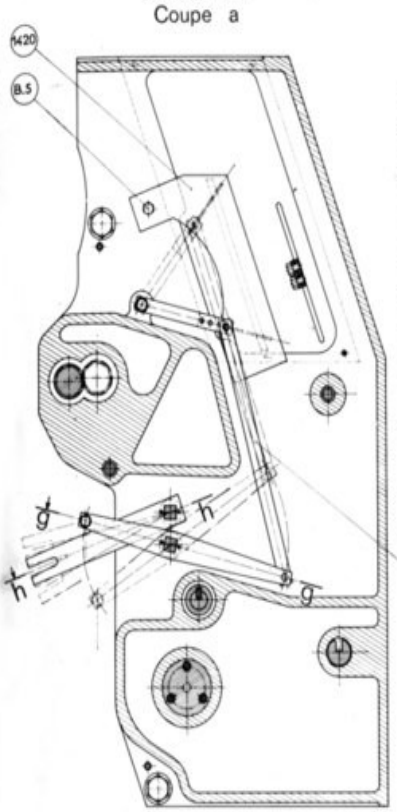
ATTENTION ! The maximum translation speed of the longitudinal carriage must not exceed .08″.

To calculate this speed, all that is necessary is to multiply the pitch to be produced by the number of revolutions per minute of the spindle.

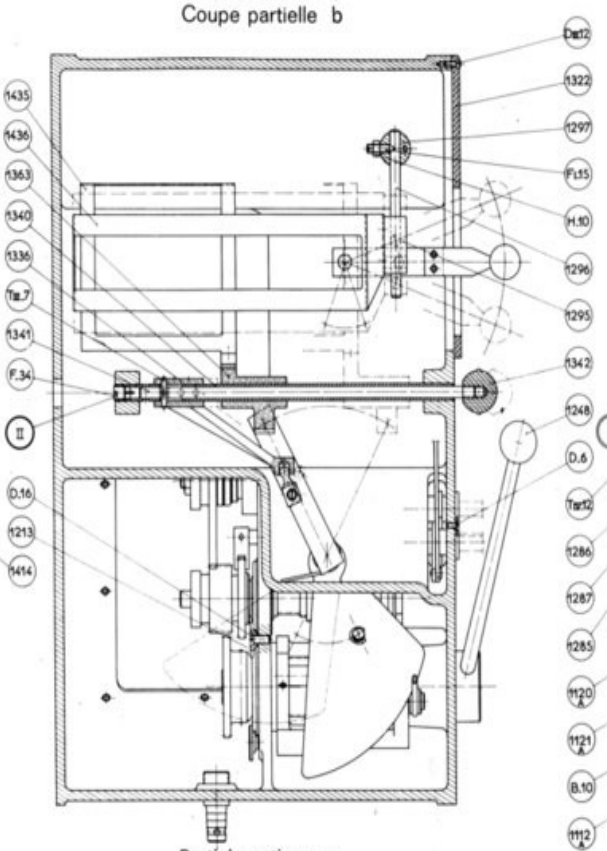
Examples : .04″ pitch × 1600 rpm = translation speed of .064″
.2″ pitch × 400 rpm = translation speed of .080″

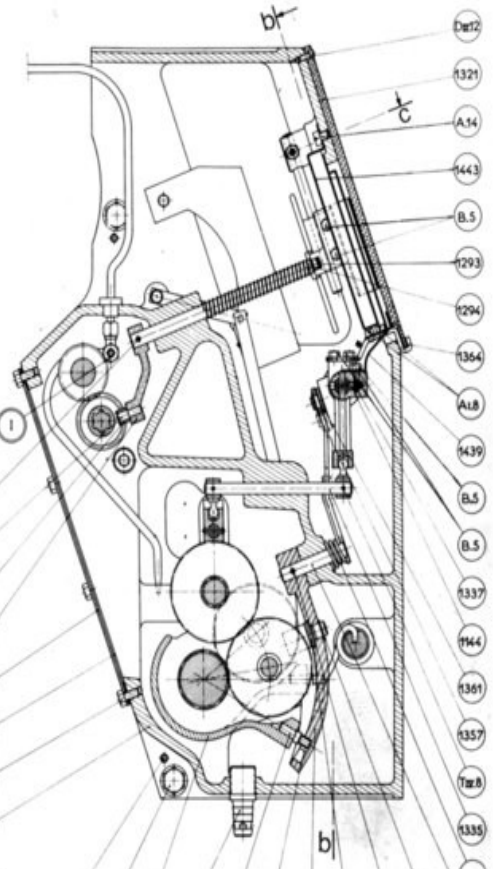


Section : a
Coupe a

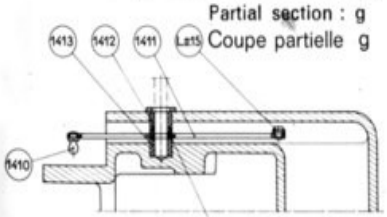


Partial section : b
Coupe partielle b

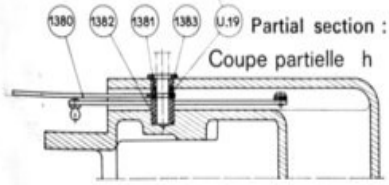




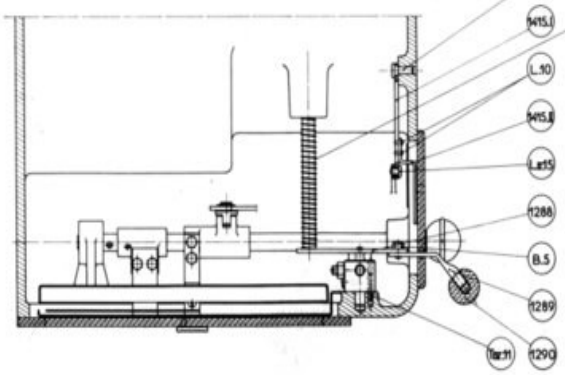
Partial section : g
Coupe partielle g



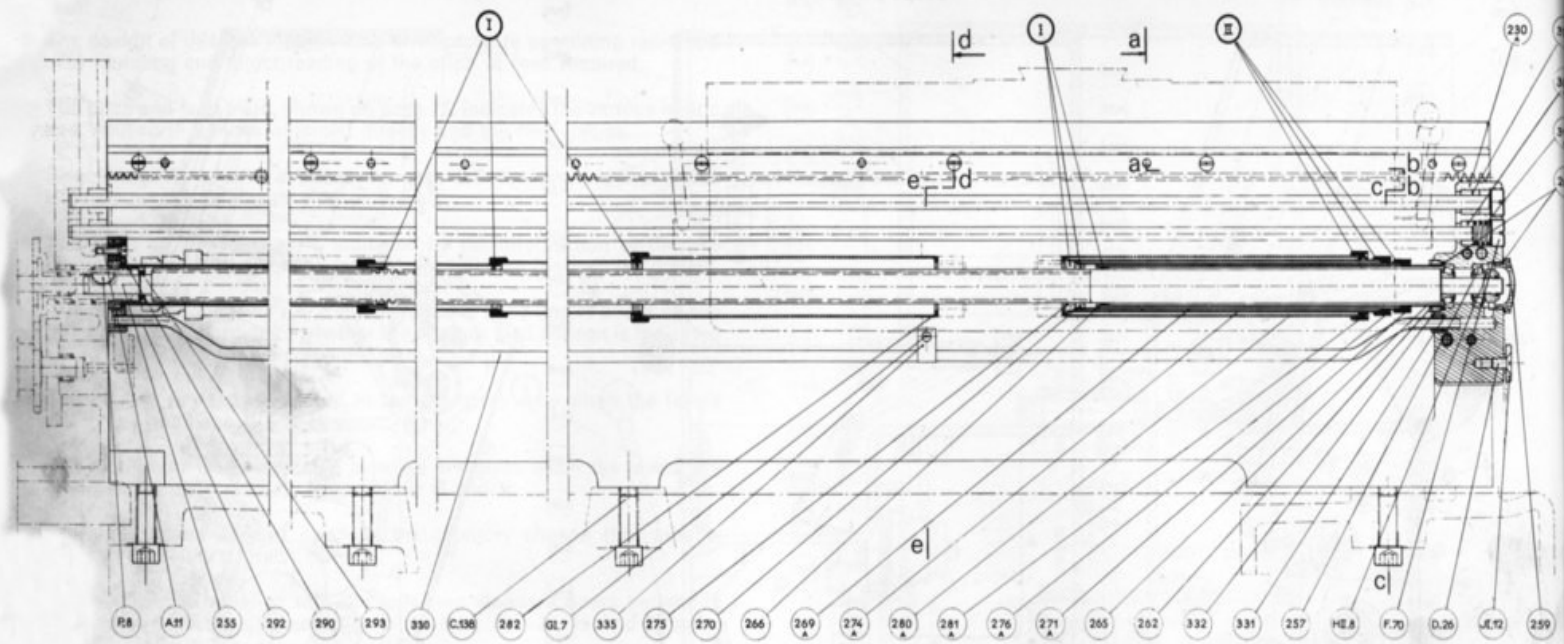
Partial section : h
Coupe partielle h

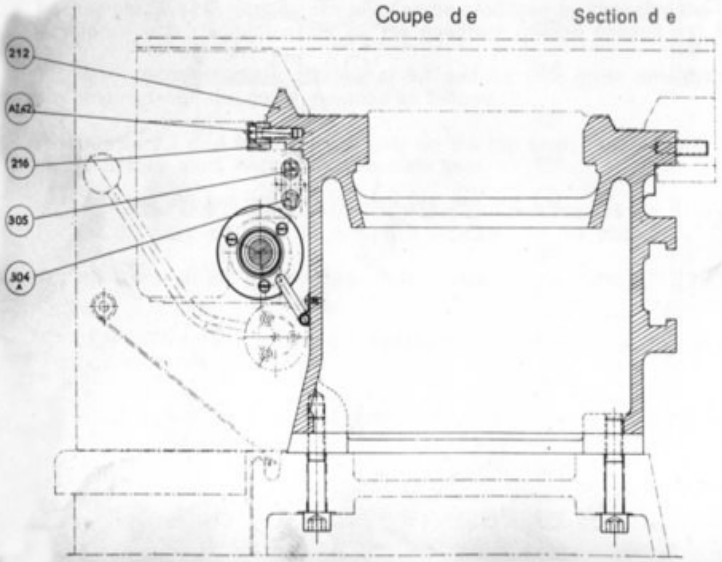


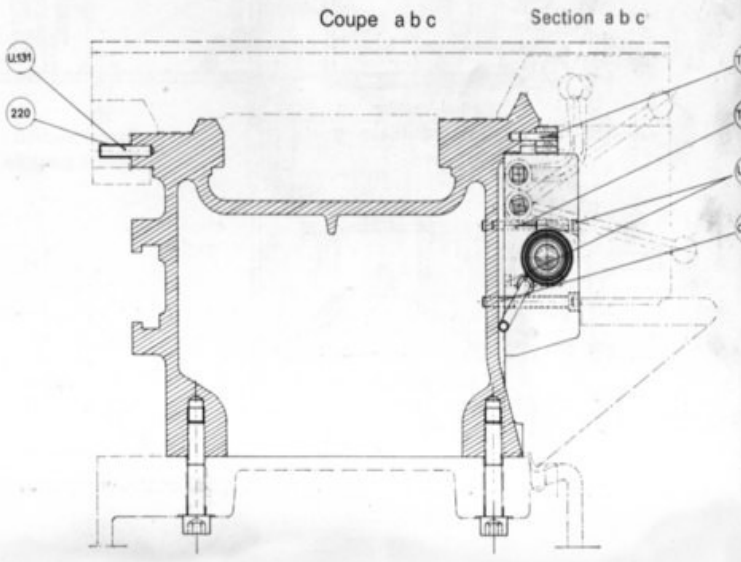
Partial section : c
Coupe partielle c



BED - LEADSCREW - REAR REST







The apron of the 360 HBX lathe is made in two versions:

On models A and C with a metric leadscrew the apron enables the metric threads in the first list (page 30) to be picked up.

On models B and BC the apron is different; it enables the metric threads in the second list (pages 30, 31, 32) and English threads to be picked up and also ensures changing of feeds during operation.

The description below relates to the apron used on types B and BC.

THREAD-PICKUP DEVICE IN THE APRON OF TYPES B and BC

Mounted on the wormwheel shaft and forming an integral part of it is a 45-tooth gear driving a 32-tooth gear integral with a shaft carrying:

one 63-tooth pinion M = 1.25 mm
one 32-tooth pinion M = 1.908 mm
one 32-tooth pinion M = 1.834 mm
one 20-tooth pinion M = 1.834 mm

These four pinions are mounted loosely; four retractable fingers housed in the shaft carrying the pinions are controlled by a circular rack enabling any one of the pinions to be made integral with the shaft. Selection of the pinion required is made by a hub carrying four marks: 1, 6/10, 1/2, and 1/4 (see photograph on page 22).

Each of the four pinions meshes with one of a set of gears driven onto a hub mounted loosely on the wormwheel shaft:

The 63-tooth pinion meshes with a 50-tooth gear (position 1).
The 32-tooth pinion meshes with a 42-tooth gear (position 6/10).
The 32-tooth pinion meshes with a 57-tooth gear (position 1/2).
The 20-tooth pinion meshes with a 57-tooth gear (position 1/4).

Also driven onto this hub is a set of notched discs (with 14 notches, 10 notches, 6 notches, 4 notches, 2 notches, and 1 notch). The discs are selected by a lever that can be moved axially and thus placed opposite one of the discs. Marks inscribed on the lever indicate its position. It is these discs that enable the metric or English threads to be picked up. For any given positions of the hub and selector lever, a plate fixed on the apron indicates the threads picked up.

To pick up a thread, it is therefore necessary to do three things:

1. Place the hub in the position indicated on the plate (page 25).
2. Place the selector lever in the position indicated on the plate (page 25).
3. Press on the engaging lever.

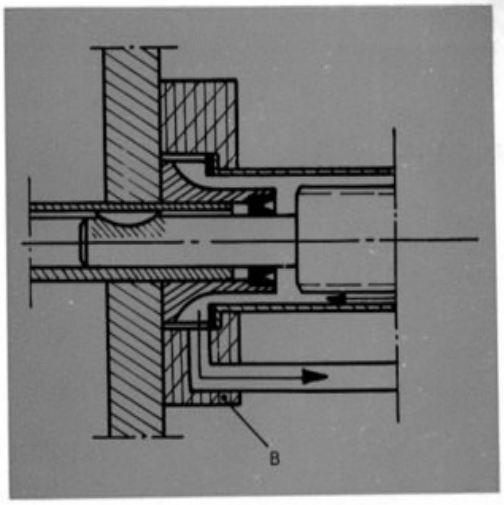
This action will have the effect of locking the wormwheel and thus traversing the apron.

The selector lever carries a tooth of dissymmetrical profile on the one side:

It is possible to thread from right to left or conversely from left to right. Since the angle of friction is added to or deducted from the normal pressure angle and since the disengaging effort is the same in both cases, the two profiles are slightly dissimilar.

On the other side of the selector another tooth drives a lever held in position by a thrust finger when the selector is in the notch of one of the discs. This thrust finger is calibrated by a spring. The lever is sawn over a certain length. Two screws, one pushing, the other pulling, make it possible to vary the position of the disengaging edge in relation to the axis of the thrust finger.

The movements of the apron for screwcutting and traversing are controlled by a wormwheel meshing with the leadscrew (patented arrangement). Two bearings mounted one on each side of the wormwheel and as near as possible to it serve to centre the leadscrew and absorb the stresses tending to separate the leadscrew and wormwheel during operation.



NOTE:

To avoid harming the sealing ring when dismantling the leadscrew, be sure first to remove the Woodruff key by taking off the housing B.

When refitting, take care not to damage the lip of the sealing ring.

OPERATION OF THE METRIC-THREAD PICKUP DEVICE IN THE APRON OF TYPES B AND BC

The leadscrew and wormwheel drive gives a ratio of 1/30. Let us suppose that between the lathe spindle and the leadscrew the feed box gives a ratio of 1/1. For one revolution of the spindle the leadscrew will make one revolution, and if we engage position 1/2, the notched disc will make:

$$\frac{1}{30} \times \frac{45}{32} \times \frac{32}{45} = \frac{1}{30} \text{ of a revolution.}$$

The two ratios are given by the number of teeth in the pinions in mesh as indicated above.

To make one complete revolution of the notched disc, 30 revolutions of the spindle will be necessary, i.e., a movement of the apron of 30 × 6 (pitch of leadscrew) = 180 mm.

If the disc has 10 divisions, we shall pick up the thread of

$$\frac{180}{10} = 18 \text{ mm},$$

which represents 3 revolutions of the spindle. Likewise we shall pick up all the submultiples of this thread:

If we assume that we want to pick up the thread of 4.5 (which is a submultiple of 18), the ratio between the spindle and the leadscrew will have to be 3/4 (3/4 × 6 pitch of leadscrew = 4.5). The spindle will then make 40 revolutions for 30 revolutions of the leadscrew, and the apron will make a movement of 180 mm. Since the disc has 10 divisions, we shall pick up the thread of 4.5 every 4 revolutions of the spindle (1 division = 4 revolutions of the spindle = 3 revolutions of the leadscrew = 18 mm). We likewise pick up the thread of 1.5 (12 revolutions of the spindle × 1.5 = 18 mm) and the thread of 0.9 (20 revolutions of the spindle × 0.9 = 18 mm).

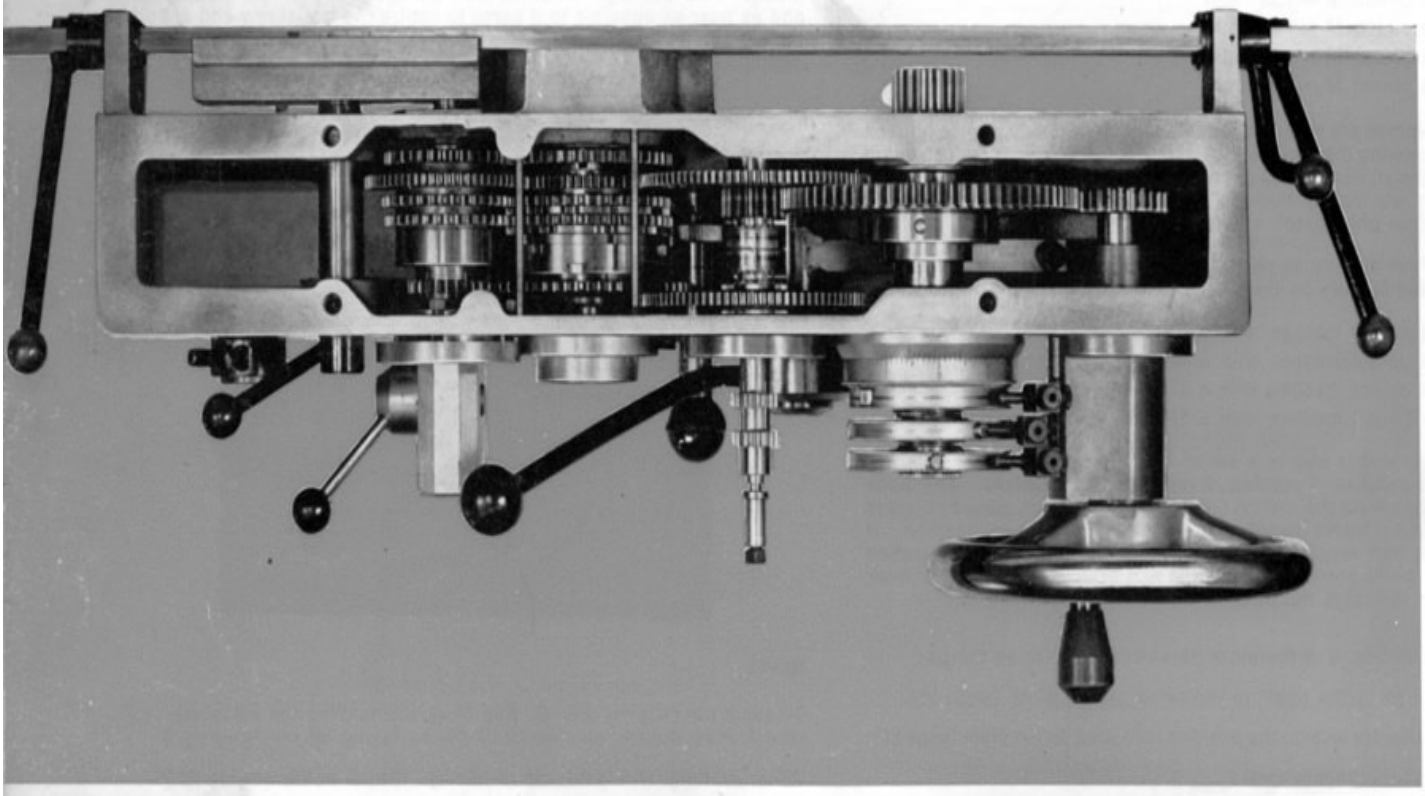
The 10-notch disc thus enables us to pick up all threads that are submultiples of 18.

The 6-notch disc will enable us to pick up all threads that are submultiples of 180/6 × 30 mm.

If we engage position 6/10, the ratio between the lathe spindle and the notched disc is

$$\frac{1}{30} \times \frac{45}{32} \times \frac{32}{42} = \frac{1}{28}.$$

For one revolution of the notched disc the spindle will make 28 revolutions, i.e., the apron will make a movement of 28 × 6 = 168 mm. In this case, if we use the 14-notch disc, we shall pick up all threads that are submultiples of 168/14 = 12 mm, and if we use the 4-notch disc, all threads that are submultiples of 168/4 = 42 mm.



APRON TYPES B and BC

OPERATION OF THE ENGLISH-THREAD PICKUP DEVICE IN THE APRON OF TYPES B AND BC

As shown by the kinematic chain of the lathe, the ratio between the spindle and the leadscrew is

$$\frac{28}{56} \times \frac{40}{30} \times \frac{50}{63} \times \frac{40}{20} = \frac{200}{189}$$

Consequently for one revolution of the spindle the movement of the apron will be $\frac{200}{189} \times 6 = 6.3492$, i.e., a value very close to $\frac{25.4}{4} = 6.35$ mm.

In order that the notched disc may make an exact fraction of a revolution while the leadscrew is making $\frac{200}{189}$ of a revolution, all that is necessary is to arrange two gears in the saddle cancelling the ratio $\frac{50}{63}$ of the feed box. For one revolution of the spindle we shall then have

$$\frac{200}{189} \times \frac{1}{30} \times \frac{45}{32} \times \frac{63}{50} \times \frac{1}{16} \text{ of a revolution.}$$

If the 4-notch disc is then used, 4 revolutions of the spindle will be required to obtain 1/4 of a revolution of the notched disc, i.e., a movement of the apron of $6.3492 \times 4 = 25.3968$, i.e., one inch, which represents the distance covered between two consecutive notches. This disc will thus make it possible to pick up all whole numbers of threads per inch.

If the 2-notch disc is used, this will enable all half-threads per inch and all whole numbers of half-threads per inch to be picked up.

On the 4-notch disc the distance between two consecutive notches was one inch, whereas on the 2-notch disc it will be two inches.

1/2 thread per inch = 1 thread in 2 inches,
1 1/2 threads per inch = 3 threads in 2 inches,
40 1/2 threads per inch = 81 threads in 2 inches,
which are whole numbers of threads in 2 inches.

If the 1-notch disc is used, one revolution of this disc represents 4 inches and 1/4 of a thread per inch = 1 thread in 4 inches,
1/4 of a thread per inch = 1 thread in 4 inches,
1 1/4 threads per inch = 5 threads in 4 inches,
20 1/4 threads per inch = 81 threads in 4 inches.

In this case therefore the threads picked up are the quarters of a thread and the threads and a quarter per inch.

APRON OF TYPES A AND C

This apron has only one disc., i.e., a 6-division disc keyed directly onto the wormwheel shaft and permitting pickup of all metric threads that are submultiples of 30, in accordance with the list on page 30.

Whitworth threads must be produced by reversal, as this model does not incorporate a train of pinions enabling the ratio of $\frac{50}{63}$ of the feed box to be cancelled.

This apron has no device for changing feeds during operation.

TYPES A and C with WHITWORTH leadscrew

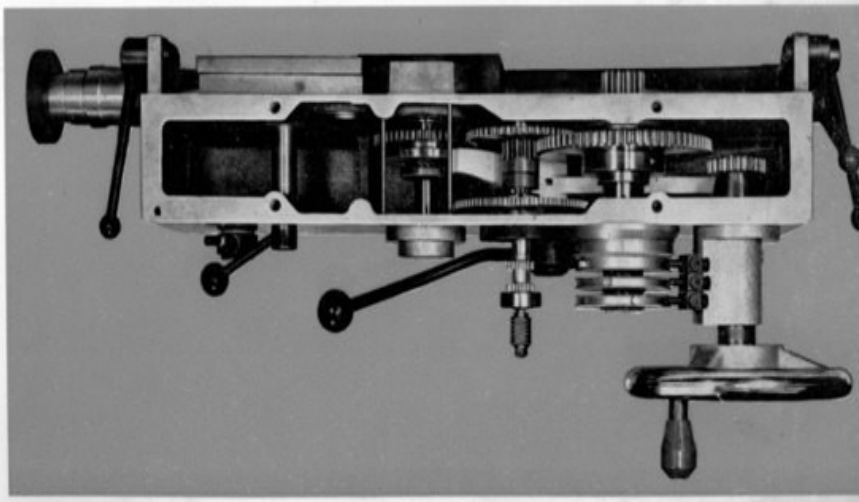
Models A and C can be supplied with a leadscrew having a pitch of 4 threads per inch.
In this case the threads obtainable by automatic pickup are not those on page 30 (which correspond to a metric leadscrew), but all threads expressed as whole or fractional numbers of threads per inch, equal to or less than 1 inch.

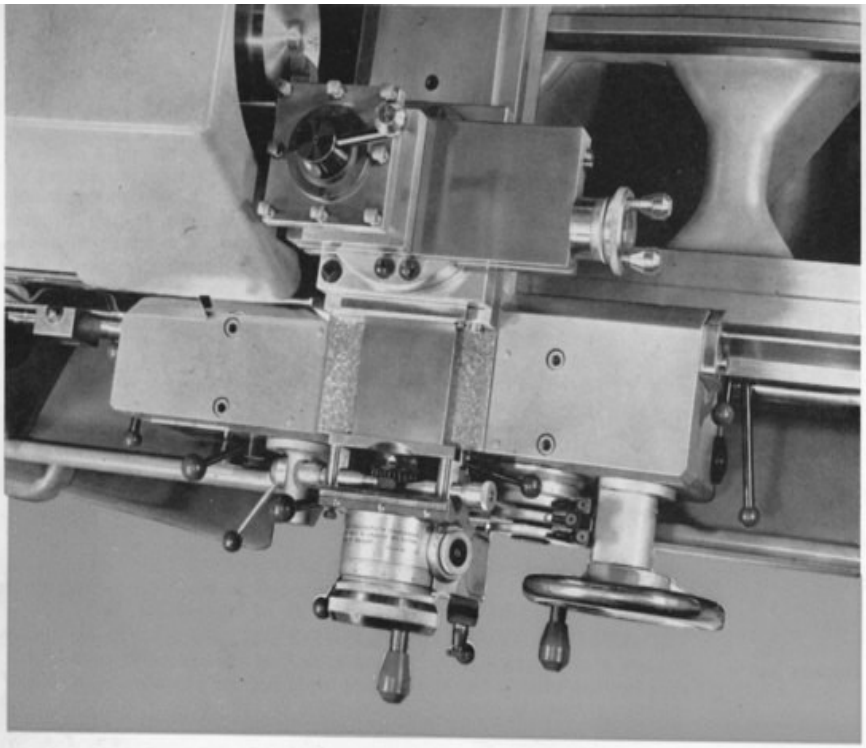
TRAVERSING FEEDS FOR THE APRON OF TYPES B AND BC

The various pinions used on lathes types B and BC for picking up metric and English threads are arranged to enable the feeds to be changed during operation and under load on the apron itself (patented).

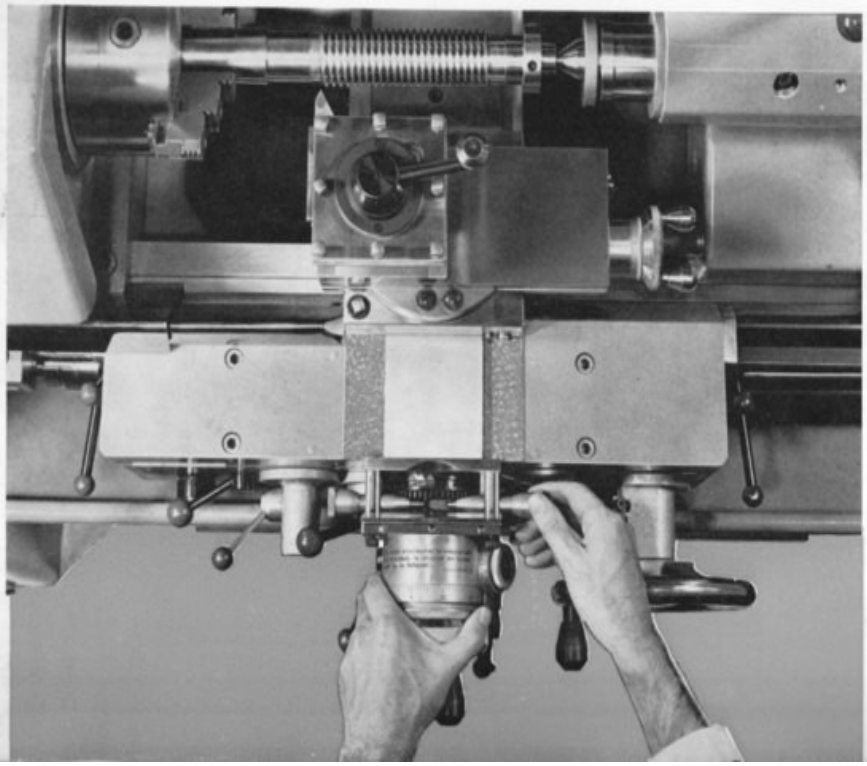
NOTE

The method of screwcutting by automatic pickup is used above all for threads of standard quality. For threads that have to be of exceptional accuracy (as used in the aircraft and moulding industries) it is possible on our machines to rough by this method and finish by the conventional reversal method, but with the added advantage of being able to disengage on the stop.



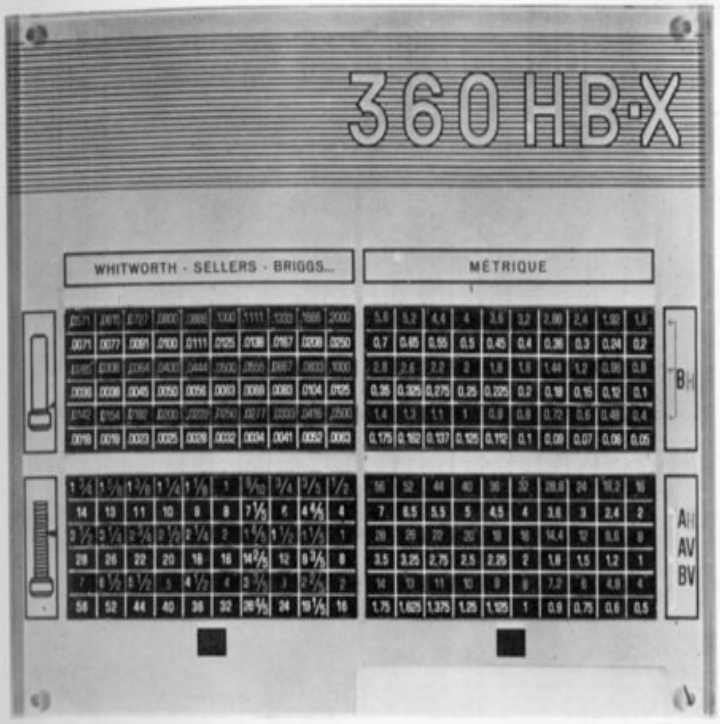


The transverse stop permits automatic disengagement after a movement of the transverse carriage of up to 3.½" (shovel descent for example). The movement can then be continued after the stop has been retracted (for example if it is desired to machine a bore of smaller diameter).

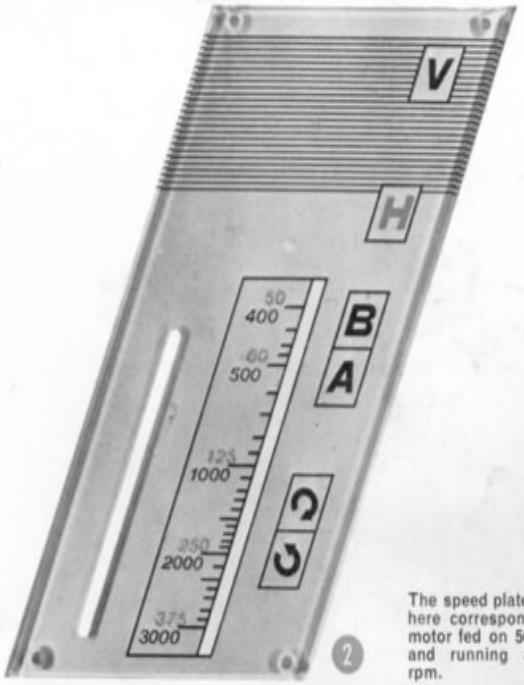


Production of a thread with the transverse stops.

The righthand stop gives the depths of the successive passes. The lefthand stop limits the withdrawal of the transverse carriage in order to make production of the thread faster.

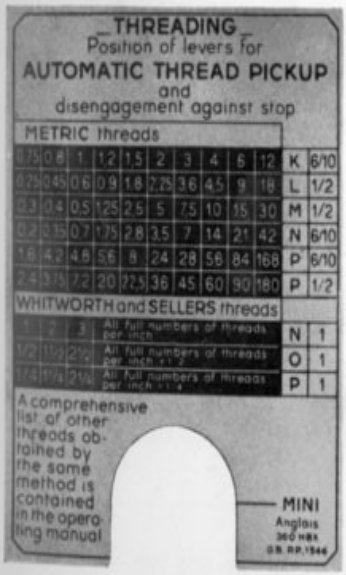


1



2

The speed plate shown here corresponds to a motor fed on 50 cycles and running at 1500 rpm.



3

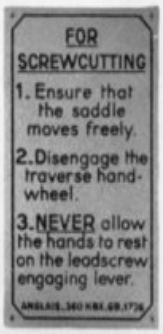
4

NOTE: Before using the cross slide feed. Lock the saddle or engage it against the longitudinal stop.

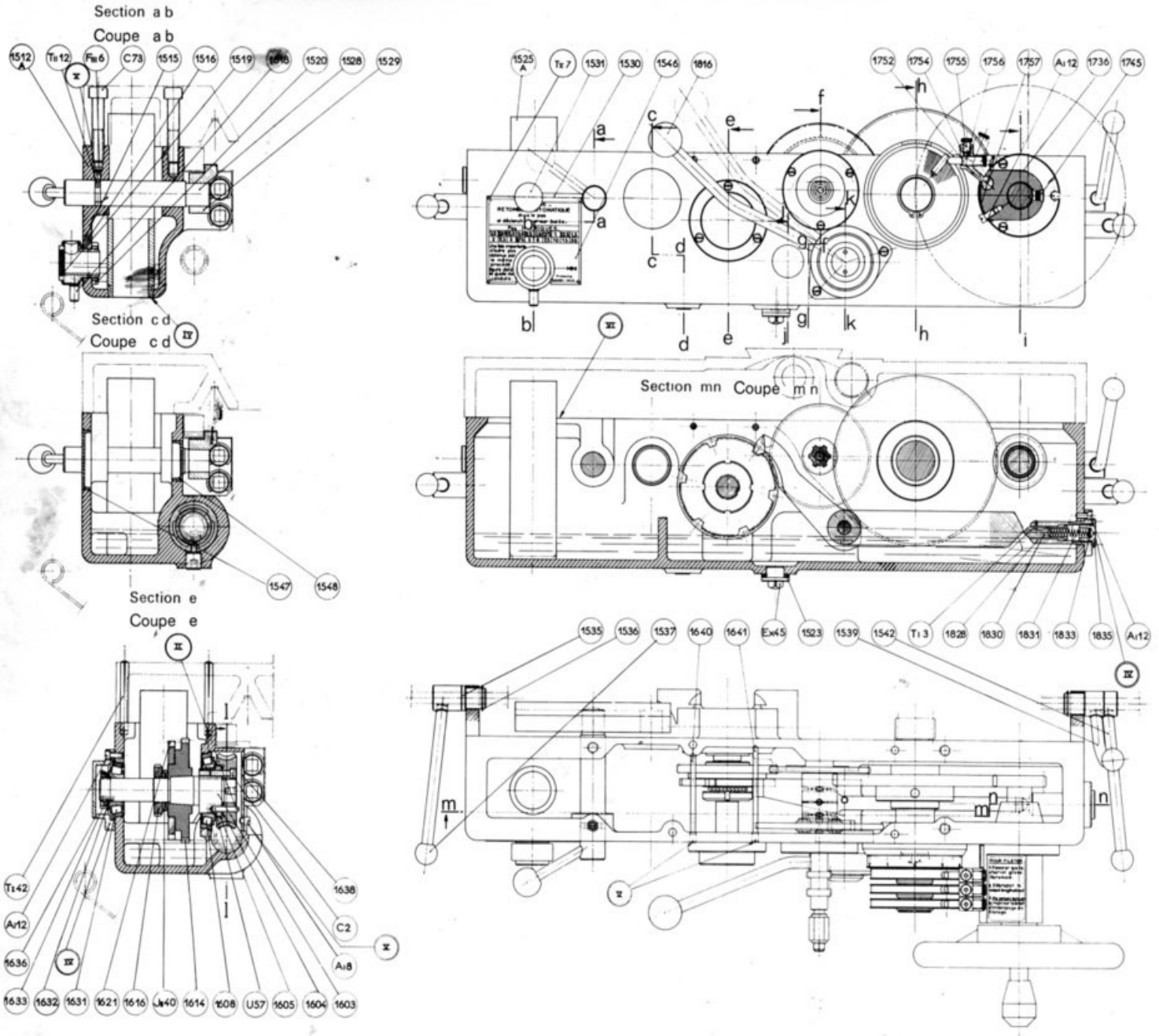
Anglais.360 HBX. GB.1973

5

1. Feed and thread plate
2. Speed plate.
3. Plate on apron types B and BC.
4. Plate on apron types A and C.
5. Instruction plate for transverse movement.
6. Instruction plate for screwcutting.

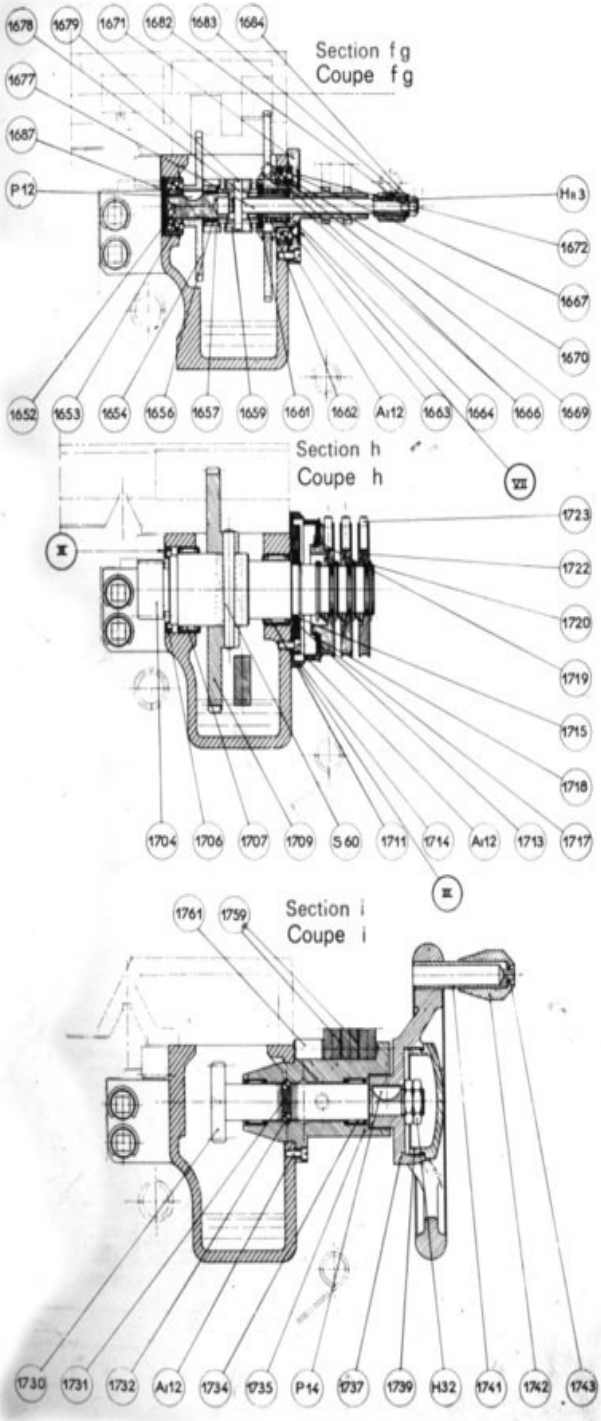


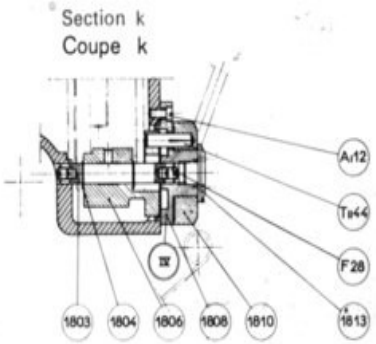
6

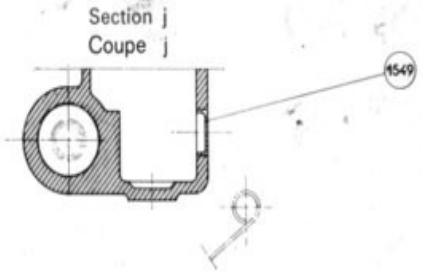

Section a b
Coupe a b
1512 A
Ti 12
Fe 6
C73
1515
1516
1519
1520
1528
1529
Section c d
Coupe c d
1547
1548
Section e
Coupe e
Ti 42
Ar 12
1636
1633
1632
1631
1621
1616
Ja 40
1614
1608
U57
1605
1604
1603
1638
C2
Ar 8
1525 A
Tx 7
1531
1530
1546
1816
1752
1754
1755
1756
1757
Ar 12
1736
1745
Section mn Coupe m n
1535
1536
1537
1640
1641
Ex 45
1523
1539
1542
Ti 3
1828
1830
1831
1833
1835
Ar 12

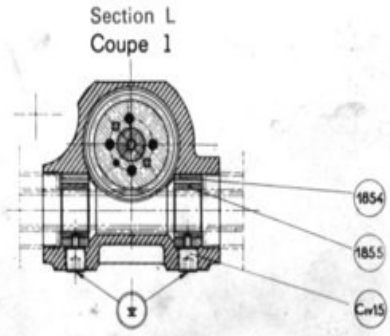
STANDARD APRON

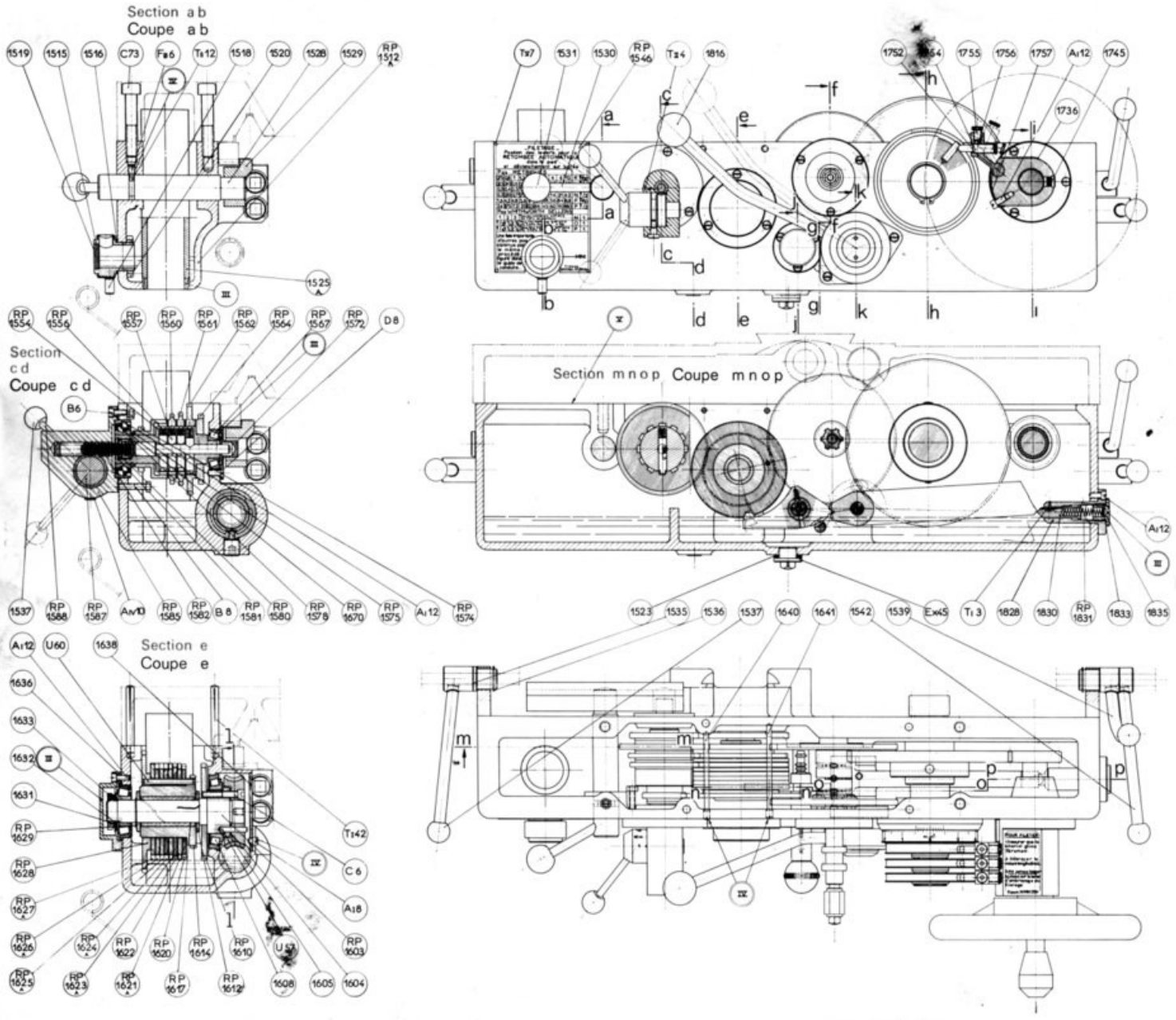
Types A and C







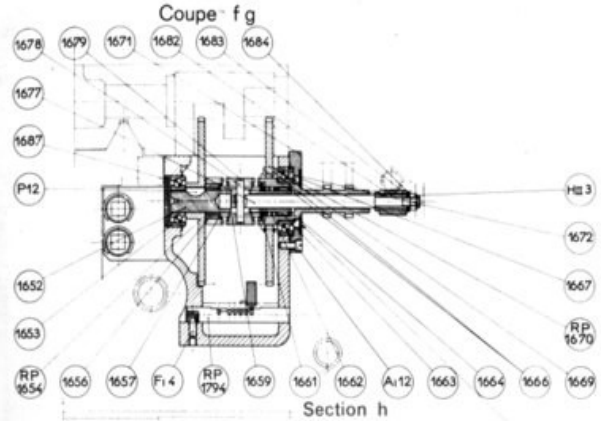



Section a b
Coupe a b
Section c d
Coupe c d
Section m n o p
Coupe m n o p
Section e
Coupe e

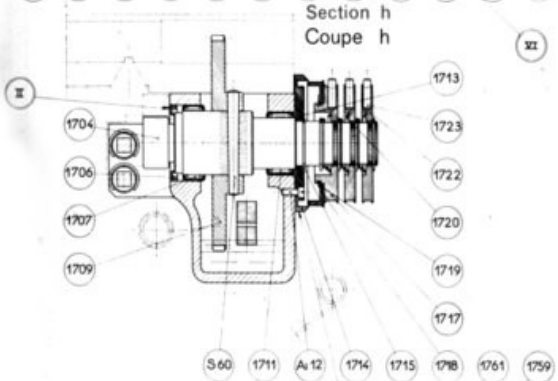
UNIVERSAL APRON

Types B and BC

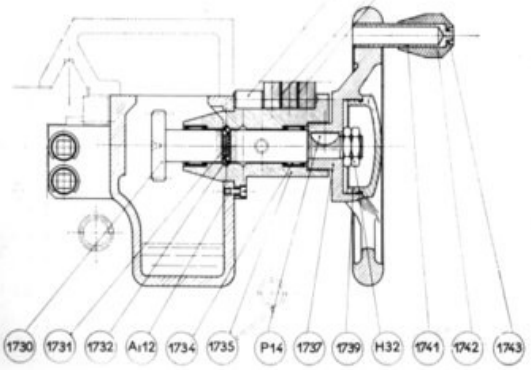
Section f g
Coupe f g

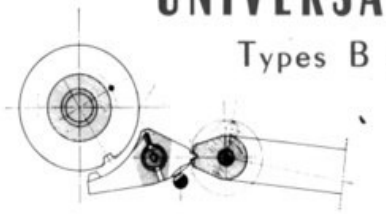


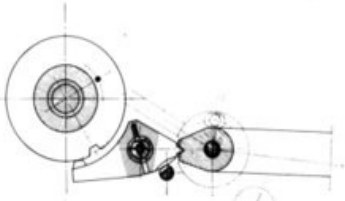
Section h
Coupe h



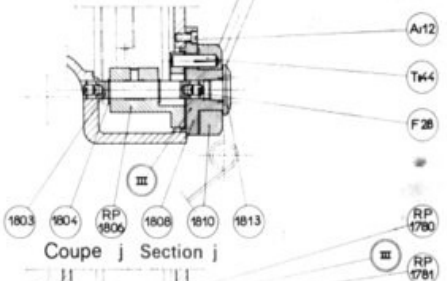
Section i
Coupe i



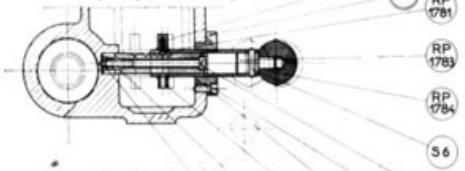




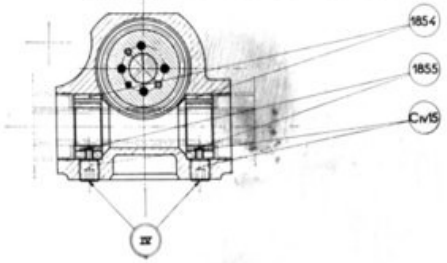
Section k
Coupe k



Coupe j Section j



Section L
Coupe l



COMPLETE LIST OF DECIMAL PITCHES OBTAINABLE BY AUTOMATIC THREAD PICKUP ON LATHES TYPES B and BC

(also indicated is the corresponding value in number of threads per inch)

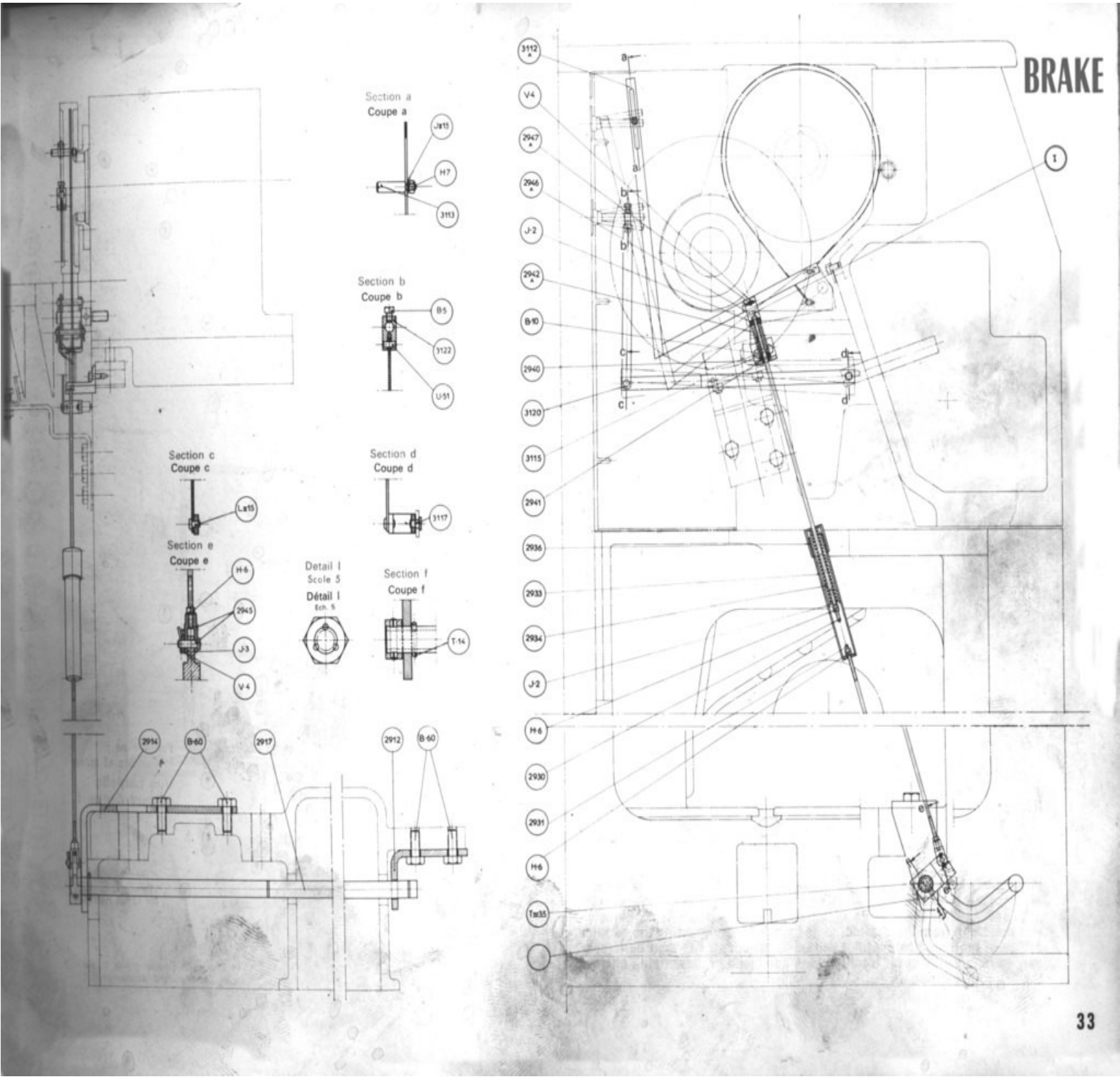
Pitches preceded by an asterisk are obtained likewise on lathes types A and C with a metric leadscrew

PITCH		Position (for lathes types B and BC)	PITCH		Position (for lathes types B and BC)	PITCH		Position (for lathes types B and BC)	PITCH		Position (for lathes types B and BC)	PITCH		Position (for lathes types B and BC)	PITCH		Position (for lathes types B and BC)
Metric	Number of threads per inch		Metric	Number of threads per inch		Metric	Number of threads per inch		Metric	Number of threads per inch		Metric	Number of threads per inch		Metric	Number of threads per inch	
*0,2		N 6/10	0,258		N 6/10	*0,316		K 6/10	0,351		P 6/10	0,388		P 6/10	0,428		P 1/2
*0,201		M 1/2	*0,259		M 1/2	0,317		P 6/10	0,3515	72 1/4	P 1	0,389		M 1/2	0,4286	59 1/4	P 1
0,202		L 1/2	0,260		P 6/10	0,31750	80	N. 1	0,352		P 6/10	0,3892	65 1/4	P 1	*0,429		K 6/10
*0,203		K 6/10	*0,261		K 6/10	0,318		N 6/10	0,3527	72	N 1	*0,390		M 1/2	0,430		P 6/10
*0,204		M 1/2	0,262		P 6/10	*0,319		M 1/2	*0,353		K 6/10	0,3907	65	N 1	0,4305	59	N 1
*0,205		L 1/2	*0,263		M 1/2	0,3194	79 1/2	O. 1	0,354		P 6/10	0,391		L 1/2	0,431		P 6/10
0,206		N 6/10	0,264		N 6/10	0,320		P 6/10	0,355		P 6/10	0,392		P 6/10	0,432		P 6/10
*0,207		K 6/10	*0,265		L 1/2	0,3205	79 1/4	P. 1	0,3552	71 1/2	O 1	0,393		N 6/10	0,433		N 6/10
*0,208		M 1/2	0,266		N 6/10	0,321		L 1/2	0,356		N 6/10	0,3937	64 1/2	O 1	0,434		P 6/10
0,209		L 1/2	0,267		K 6/10	0,3215	79	N. 1	0,3564	71 1/4	P 1	0,394		N 6/10	0,4341	58 1/2	O 1
*0,210		M 1/2	*0,268		M 1/2	0,322		P 6/10	*0,357		M 1/2	*0,395		P 6/10	*0,435		M 1/2
*0,211		K 6/10	0,269		L 1/2	*0,323		M 1/2	0,3577	71	N 1	0,3953	64 1/4	P 1	0,436		P 6/10
0,212		L 1/2	*0,270		M 1/2	0,3235	78 1/2	O. 1	0,358		P 1/2	0,396		N 6/10	0,4360	58 1/4	P 1
*0,213		M 1/2	0,271		N 6/10	0,324		K 6/10	0,359		N 6/10	0,3968	64	N 1	0,437		P 1/2
*0,214		K 6/10	0,272		P 6/10	0,3246	78 1/4	P 1	0,360		L 1/2	0,397		P 6/10	0,4379	58	N 1
0,215		N 6/10	*0,273		K 6/10	0,325		P 6/10	0,3602	70 1/2	O 1	0,398		P 6/10	0,438		N 6/10
*0,216		M 1/2	0,274		P 6/10	0,3256	78	N 1	*0,361		M 1/2	0,399		P 6/10	0,439		L 1/2
*0,217		L 1/2	*0,275		M 1/2	*0,326		M 1/2	0,3615	70 1/4	P 1	*0,4		M 1/2	0,440		P 6/10
0,218		K 6/10	0,276		N 6/10	0,327		L 1/2	0,362		N 6/10	0,400	63 1/2	O 1	*0,441		M 1/2
*0,219		M ´2	0,277		L 1/2	0,3277	77 1/2	O 1	0,3628	70	N 1	0,401		P 6/10	0,4417	57 1/2	O 1
0,220		L 1/2	*0,278		M 1/2	0,328		N 6/10	0,363		P 6/10	0,4015	63 1/4	P 1	0,442		N 6/10
*0,221		M 1/2	0,279		K 6/10	0,3288	77 1/4	P 1	0,364		K 6/10	0,402		P 6/10	0,443		P 6/10
0,222		K 6/10	*0,280		M 1/2	0,329		P 6/10	0,365		N 6/10	0,403		P 6/10	0,4436	57 1/4	P 1
*0,223		N 6/10	0,281		L 1/2	0,3298	77	N 1	0,3654	69 1/2	O 1	0,4031	63	N 1	0,444		K 6/10
*0,224		M 1/2	0,282		N 6/10	*0,330		M 1/2	*0,366		M 1/2	0,404		N 6/10	0,4456	57	N 1
0,225		L 1/2	*0,283		M 1/2	0,331		P 6/10	0,3667	69 1/4	P 1	*0,405		M 1/2	0,446		P 6/10
*0,226		K 6/10	0,284		N 6/10	0,332		P 6/10	0,367		L 1/2	0,406		P 6/10	0,447		N 6/10
*0,227		M 1/2	0,285		P 6/10	0,3320	76 1/2	O 1	0,368		N 6/10	0,4064	62 1/2	O 1	*0,448		M 1/2
0,228		L 1/2	*0,286		K 6/10	*0,333		K 6/10	0,3681	69	N 1	0,407		P 6/10	0,449		P 6/10
*0,229		M 1/2	0,287		P 6/10	0,3331	76 1/4	P 1	0,369		P 6/10	0,408		N 6/10	0,4495	56 1/2	O 1
0,230		N 6/10	*0,288		M 1/2	0,334		P 6/10	*0,370		M 1/2	0,4080	62 1/4	P 1	0,450		L 1/2
*0,231		K 6/10	0,289		P 6/10	0,3342	76	N 1	0,3708	68 1/2	O 1	0,409		L 1/2	0,451		P 1/2
0,232		D 6/10	0,290		L 1/2	0,335		P 6/10	0,371		P 6/10	0,4096	62	N 1	0,4515	56 1/4	P 1
*0,233		M 1/2	*0,291		M 1/2	0,336		N 6/10	0,372		N 6/10	0,410		P 6/10	0,452		N 6/10
*0,234		L 1/2	0,292		N 6/10	0,3364	75 1/2	O 1	0,3721	68 1/4	P 1	*0,411		M 1/2	0,453		P 6/10
0,235		K 6/10	0,293		K 6/10	*0,337		M 1/2	0,373		P 6/10	0,412		N 6/10	0,4535	56	N 1
*0,236		M 1/2	*0,294		M 1/2	0,3375	75 1/4	P 1	0,3735	68	N 1	0,413		P 6/10	*0,454		P 6/10
0,237		L 1/2	0,295		L 1/2	0,338		P 6/10	0,374		P 6/10	0,4130	61 1/2	O 1	0,455		M 1/2
*0,238		M 1/2	0,296		N 6/10	0,3386	75	N 1	*0,375		K 6/10	0,414		K 6/10	0,456		P 1/2
0,239		N 6/10	*0,297		M 1/2	0,339		N 6/10	0,376		P 6/10	0,4146	61 1/4	P 1	0,457		N 6/10
*0,240		K 6/10	0,298		N 6/10	*0,340		L 1/2	0,3762	67 1/2	O 1	0,415		P 6/10	0,4576	55 1/2	O 1
0,241		N 6/10	0,299		P 6/10	0,3409	74 1/2	O 1	0,377		P 6/10	0,416		N 6/10	0,458		P 6/10
*0,242		M 1/2	*0,300		M 1/2	0,341		M 1/2	0,3776	67 1/4	P 1	0,4163	61	N 1	0,4597	55 1/4	P 1
0,243		L 1/2	0,301		P 6/10	0,342		P 6/10	0,378		N 6/10	*0,417		M 1/2	0,4618	55	N 1
*0,244		M 1/2	0,302		N 6/10	0,3420	74 1/4	P 1	0,379		P 6/10	0,418		P 6/10	*0,462		M 1/2
0,245		K 6/10	*0,303		M 1/2	0,343		K 6/10	0,3791	67	N 1	0,419		L 1/2	0,4660	54 1/2	O 1
*0,246		L 1/2	0,304		N 6/10	0,3432	74	N 1	*0,380		M 1/2	0,4198	60 1/2	O 1	0,4682	54 1/4	P 1
0,247		N 6/10	0,305		L 1/2	0,344		N 6/10	0,381		P 6/10	0,420		N 6/10	*0,469		M 1/2
*0,248		M 1/2	*0,306		M 1/2	*0,345		M 1/2	0,3819	66 1/2	O 1	0,421		P 6/10	0,470		P 1/2
0,249		N 6/10	0,307		N 6/10	0,3455	73 1/2	O 1	0,382		N 6/10	0,4215	60 1/4	P 1	0,4703	54	N 1
*0,250		L 1/2	0,308		K 6/10	0,346		L 1/2	0,383		L 1/2	0,422		P 6/10	0,471		P 6/10
0,251		N 6/10	*0,309		M 1/2	0,3467	73 1/4	P 1	0,3833	66 1/4	P 1	*0,423		M 1/2	0,472		N 6/10
*0,252		M 1/2	0,310		L 1/2	0,347		N 6/10	0,384		P 6/10	0,4233	60	N 1	0,473		P 6/10
0,253		N 6/10	0,311		N 6/10	0,3479	73	N 1	0,3848	66	N 1	0,424		N 6/10	0,474		L 1/2
*0,254		N 6/10	0,312		P 6/10	0,348		P 6/10	*0,385		M 1/2	0,425		P 6/10	0,4747	53 1/2	O 1
0,255		K 6/10	*0,313		M 1/2	*0,349		M 1/2	0,386		P 6/10	0,426		P 6/10	0,475		P 6/10
*0,256		M 1/2	0,314		P 6/10	0,350		N 6/10	0,387		K 6/10	0,4268	59 1/2	O 1	*0,476		M 1/2
0,257		L 1/2	0,315		P 6/10	0,3503	72 1/2	O 1	0,3877	65 1/2	O 1	0,427		P 6/10	0,4769	53 1/4	P 1

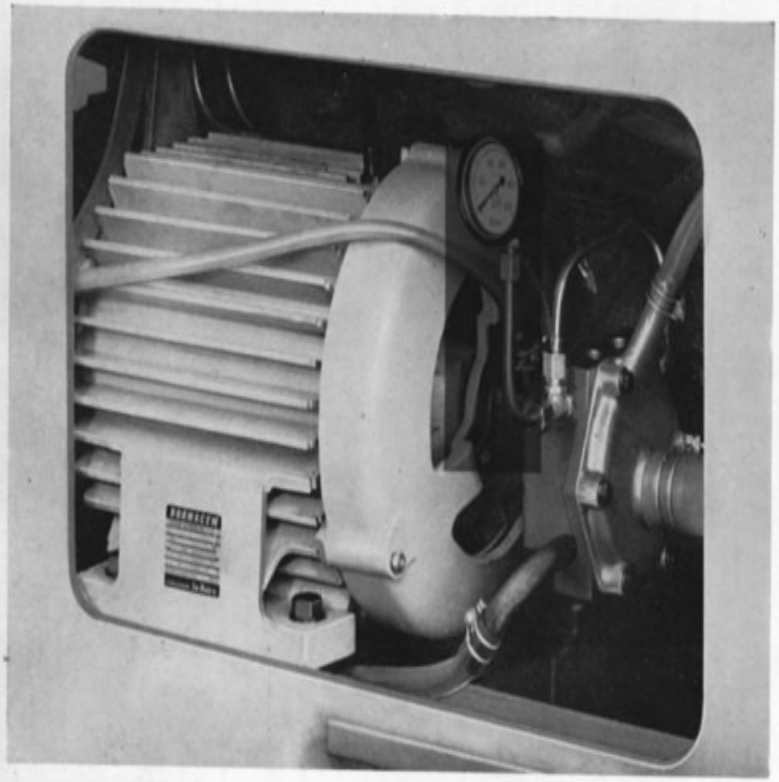
PITCH		Position (for lathes types B and BC)	PITCH		Position (for lathes types B and BC)	PITCH		Position (for lathes types B and BC)	PITCH		Position (for lathes types B and BC)	PITCH		Position (for lathes types B and BC)	PITCH		Position (for lathes types B and BC)
Metric	Number of threads per inch		Metric	Number of threads per inch		Metric	Number of threads per inch		Metric	Number of threads per inch		Metric	Number of threads per inch		Metric	Number of threads per inch	
0,477		N 6/10	*0,535		P 6/10	0,602		P 6/10	0,6818	37 1/4	P 1	0,7696	33	N 1	0,8912	28 1/2	O 1
0,479		P 6/10	0,536		M 1/2	0,604		P 6/10	*0,682		M 1/2	0,771		P 6/10	0,894		N 6/10
0,4792	53	N 1	0,537		P 6/10	0,6047	42	N 1	0,683		P 6/10	0,773		P 1/2	0,896		P 1/2
0,480		K 6/10	0,5375	47 1/4	P 1	0,606		P 6/10	0,684		P 1/2	0,774		P 6/10	0,898		P 6/10
0,481		P 6/10	0,538		N 6/10	0,608		P 1/2	0,686		P 6/10	0,776		P 1/2	0,8991	28 1/4	P 1
0,483		N 6/10	0,539		P 1/2	0,609		N 6/10	0,6864	37	N 1	0,778		N 6/10	0,900		L 1/2
0,4838	52 1/2	O 1	0,540		P 6/10	0,610		P 1/2	0,687		P 1/2	0,779		P 1/2	0,903		P 6/10
*0,484		M 1/2	0,5404	47	N 1	0,611		P 6/10	0,689		M 1/2	0,7815	32 1/2	O 1	0,905		P 1/2
0,485		P 1/2	0,541		P 1/2	*0,612		P 6/10	0,690		P 1/2	0,783		L 1/2	0,9071	28	N 1
0,486		L 1/2	0,542		P 6/10	0,6120	41 1/2	O 1	0,691		P 6/10	0,785		P 6/10	0,908		P 6/10
0,4861	52 1/4	P 1	0,544		P 6/10	0,613		P 6/10	0,692		L 1/2	0,7875	32 1/4	P 1	*0,909		M 1/2
0,487		P 6/10	*0,545		K 6/10	0,614		P 1/2	0,694		P 6/10	*0,789		M 1/2	0,913		N 6/10
0,488		N 6/10	0,5462	46 1/2	O 1	0,615		P 6/10	0,695		P 1/2	0,792		N 6/10	0,914		P 1/2
0,4884	52	N 1	0,547		P 6/10	0,6157	41 1/4	P 1	0,6958	36 1/2	O 1	0,7937	32	N 1	0,918		P 6/10
0,490		P 6/10	0,549		P 6/10	0,616		P 1/2	0,697		P 6/10	0,796		P 6/10	0,923		K 6/10
0,491		P 6/10	0,5491	46 1/4	P 1	0,618		N 6/10	*0,698		M 1/2	0,800		K 6/10	0,9236	27 1/2	O 1
*0,492		M 1/2	0,550		P 1/2	0,619		P 1/2	0,700		N 6/10	0,804		P 6/10	0,928		P 6/10
0,493		P 6/10	0,551		P 6/10	0,6195	41	N 1	0,7006	36 1/4	P 1	0,8063	31 1/2	O 1	0,9321	27 1/4	P 1
0,4932	51 1/2	O 1	0,552		N 6/10	0,620		P 6/10	0,703		P 6/10	0,807		P 1/2	0,933		N 6/10
0,494		N 6/10	0,5521	46	N 1	0,621		L 1/2	0,7055	36	N 1	0,808		N 6/10	*0,938		M 1/2
0,4956	51 1/4	P 1	0,554		P 6/10	0,622		P 6/10	0,706		K 6/10	*0,811		M 1/2	0,939		P 6/10
0,496		P 6/10	*0,555		M 1/2	0,623		P 1/2	0,709		P 6/10	0,812		P 6/10	0,9407	27	N 1
0,497		P 6/10	0,556		P 6/10	*0,625		M 1/2	0,711		P 1/2	0,8128	31 1/4	P 1	0,942		P 1/2
0,4980	51	N 1	0,557		P 1/2	0,627		N 6/10	0,712		N 6/10	0,814		P 1/2	0,944		P 6/10
0,499		P 6/10	0,558		P 6/10	0,6271	40 1/2	O 1	*0,714		M 1/2	0,816		P 6/10	0,947		L 1/2
*0,500		M 1/2	0,5582	45 1/2	O 1	0,629		P 6/10	0,715		P 6/10	0,818		L 1/2	0,949		P 6/10
0,501		P 6/10	0,559		P 1/2	0,6310	40 1/4	P 1	0,7154	35 1/2	O 1	0,8193	31	N 1	0,952		P 1/2
0,5029	50 1/2	O 1	0,560		N 6/10	0,632		K 6/10	0,717		P 1/2	0,820		P 6/10	0,955		N 6/10
0,503		P 6/10	0,561		P 1/2	0,634		K 6/10	0,718		P 6/10	0,822		P 1/2	0,957		P 1/2
0,504		P 1/2	0,5613	45 1/4	P 1	0,6350	40	N 1	0,720		L 1/2	0,824		N 6/10	0,9584	26 1/2	O 1
0,505		P 6/10	0,562		P 6/10	0,636		N 6/10	0,7205	35 1/4	P 1	0,826		P 1/2	0,960		P 6/10
0,5054	50 1/4	P 1	0,563		L 1/2	*0,638		M 1/2	0,721		P 6/10	0,828		P 6/10	0,963		P 1/2
0,506		N 6/10	0,564		P 6/10	0,639		P 6/10	0,723		P 1/2	0,829		P 1/2	0,966		P 6/10
0,507		P 1/2	0,5644	45	N 1	0,641		P 6/10	0,724		N 6/10	0,832		P 6/10	0,9676	26 1/4	P 1
*0,508		M 1/2	*0,566		M 1/2	0,643		L 1/2	0,7257	35	N 1	0,8327	30 1/2	O 1	*0,968		M 1/2
0,5080	50	N 1	0,568		N 6/10	0,6430	39 1/2	O 1	0,726		P 1/2	*0,833		M 1/2	0,971		P 6/10
0,509		P 6/10	0,569		P 6/10	0,644		P 6/10	0,727		P 6/10	0,836		P 6/10	0,973		P 1/2
0,510		P 1/2	0,570		P 1/2	0,645		P 1/2	0,729		P 1/2	0,837		P 1/2	0,9769	26	N 1
0,511		P 6/10	0,5707	44 1/2	O 1	0,647		P 1/2	0,730		P 6/10	0,8396	30 1/4	P 1	0,977		N 6/10
0,512		N 6/10	0,571		K 6/10	0,6471	39 1/4	P 1	*0,732		M 1/2	0,840		N 6/10	0,978		P 1/2
0,513		P 1/2	0,573		P 6/10	0,649		P 6/10	0,734		P 6/10	0,841		P 1/2	0,982		P 6/10
0,5131	49 1/2	O 1	0,5740	44 1/4	P 1	0,650		P 1/2	0,735		P 1/2	0,844		P 6/10	0,984		P 1/2
0,514		L 1/2	0,575		N 6/10	0,651		P 6/10	0,7362	34 1/2	O 1	0,845		P 1/2	0,988		P 6/10
0,515		P 6/10	*0,577		M 1/2	0,6512	39	N 1	0,737		N 6/10	0,8466	30	N 1	0,989		P 1/2
0,5157	49 1/4	P 1	0,5772	44	N 1	*0,652		M 1/2	0,738		P 1/2	0,848		P 6/10	0,994		P 6/10
0,516		P 1/2	0,579		P 6/10	0,654		P 6/10	0,740		P 6/10	0,849		P 1/2	0,9960	25 1/2	O 1
*0,517		M 1/2	0,581		L 1/2	0,655		P 1/2	0,741		P 1/2	0,853		P 6/10	*1,000		K 6/10
0,5183	49	N 1	0,583		N 6/10	0,656		N 6/10	0,7416	34 1/4	P 1	*0,857		K 6/10	1,0059	25 1/4	P 1
0,519		N 6/10	0,5839	43 1/2	O 1	0,657		P 1/2	0,743		P 6/10	0,861		P 1/2	1,006		P 6/10
0,520		P 6/10	0,584		P 1/2	0,659		P 6/10	0,744		P 1/2	0,8610	29 1/2	O 1	1,011		P 1/2
0,522		K 6/10	0,585		P 6/10	0,6597	38 1/2	O 1	0,747		P 6/10	0,862		P 6/10	1,012		P 6/10
0,523		P 6/10	0,586		P 1/2	0,661		P 6/10	0,7470	34	N 1	0,865		P 1/2	1,016	25	N 1
0,5237	48 1/2	O 1	0,587		P 6/10	0,664		P 6/10	*0,750		K 6/10	0,866		P 6/10	1,017		P 1/2
0,525		N 6/10	0,5872	43 1/4	P 1	0,6640	38 1/4	P 1	0,753		P 6/10	0,8683	29 1/4	P 1	1,018		P 6/10
*0,526		M 1/2	*0,588		M 1/2	0,666		K 6/10	0,756		P 1/2	0,870		P 6/10	1,023		P 1/2
0,5264	48 1/4	P 1	0,589		P 6/10	*0,667		M 1/2	0,757		P 6/10	0,874		P 1/2	1,024		N 6/10
0,527		P 6/10	0,590		P 1/2	0,6684	38	N 1	0,7582	33 1/2	O 1	0,875		N 6/10	1,029		P 1/2
0,528		P 6/10	0,5906	43	N 1	0,669		P 6/10	0,759		P 1/2	0,8758	29	N 1	1,031		P 6/10
0,529		L 1/2	0,592		N 6/10	0,672		P 6/10	0,760		P 6/10	0,878		P 1/2	*1,034		M 1/2
0,5291	48	N 1	0,594		P 6/10	0,674		P 1/2	0,763		P 1/2	0,880		P 6/10	1,0367	24 1/2	O 1
0,530		P 6/10	0,596		P 6/10	0,675		P 6/10	0,7639	33 1/4	P 1	*0,882		M 1/2	1,037		P 6/10
0,531		N 6/10	0,5976	42 1/2	O 1	0,677		N 6/10	0,764		N 6/10	0,884		P 6/10	1,040		P 1/2
0,533		P 6/10	0,598		P 6/10	0,6773	37 1/2	O 1	0,766		P 1/2	0,887		P 1/2	1,043		P 6/10
0,534		P 1/2	*0,600		L 1/2	0,679		P 1/2	0,767		P 6/10	0,889		P 6/10	1,047		P 1/2
0,5347	47 1/2	O 1	0,6011	42 1/4	P 1	0,680		P 6/10	*0,769		M 1/2	0,891		P 1/2	1,0474	24 1/4	P 1

PITCH		Position (for lathes types B and BC)	PITCH		Position (for lathes types B and BC)	PITCH		Position (for lathes types B and BC)	PITCH		Position (for lathes types B and BC)	PITCH		Position (for lathes types B and BC)	PITCH		Position (for lathes types B and BC)
Metric	Number of threads per inch		Metric	Number of threads per inch		Metric	Number of threads per inch		Metric	Number of threads per inch		Metric	Number of threads per inch		Metric	Number of threads per inch	
1,050		N 6/10	1,268		P 1/2	1,5875	16	N 1	2,118		P 1/2	3,175		P 1/2	6,720		P 6/10
1,053		P 1/2	1,270	20	N 1	1,593		P 1/2	2,127		P 6/10	3,214		N 6/10	6,923		P 1/2
1,057		P 6/10	1,273		N 6/10	1,600		P 6/10	*2,143		M 1/2	3,231		P 1/2	7,000		N 6/10
1,0583	24	N 1	1,277		P 1/2	1,607		P 1/2	2,154		P 6/10	3,273		P 6/10	7,200		P 1/2
1,059		L 1/2	1,282		P 6/10	1,615		N 6/10	2,169		P 1/2	3,294	8	N 1	7,2571	3 1/2	O 1
1,063		P 6/10	1,286		L 1/2	1,622		P 1/2	2,182		P 6/10	*3,333		M 1/2	7,304		P 6/10
1,065		P 1/2	1,292		P 6/10	1,631		P 6/10	2,195		P 1/2	3,360		P 6/10	*7,500		M 1/2
1,070		P 6/10	1,295		P 1/2	1,636		L 1/2	2,2086	11 1/2	O 1	3,3866	7 1/2	O 1	7,636		P 6/10
*1,071		M 1/2	1,302		P 6/10	1,6387	15 1/2	O 1	2,211		N 6/10	3,396		P 1/2	7,8153	3 1/4	P 1
1,077		N 6/10	1,3025	19 1/2	O 1	1,647		P 6/10	2,222		P 1/2	3,429		P 6/10	7,826		P 1/2
1,078		P 1/2	*1,304		M 1/2	1,651		P 1/2	2,240		P 6/10	3,462		P 1/2	8,000		P 6/10
1,0808	23 1/2	O 1	1,312		N 6/10	1,663		P 6/10	2,250		L 1/2	3,500		N 6/10	8,182		P 1/2
1,084		P 6/10	1,314		P 1/2	1,6655	15 1/4	P 1	2,2577	11 1/4	P 1	3,5034	7 1/4	P 1	8,400		N 6/10
1,091		K 6/10	1,3194	19 1/4	P 1	*1,667		M 1/2	2,270		P 6/10	3,529		P 1/2	8,4666	3	N 1
1,0924	23 1/4	P 1	1,323		P 6/10	1,680		N 6/10	2,278		P 1/2	3,574		P 6/10	8,571		P 1/2
1,098		P 1/2	1,324		P 1/2	1,682		P 1/2	2,301		P 6/10	3,600		L 1/2	8,842		P 6/10
1,104		P 1/2	1,333		K 6/10	1,6933	15	N 1	*2,308		M 1/2	3,6285	7	N 1	9,000		L 1/2
1,1043	23	N 1	1,3368	19	N 1	1,697		P 6/10	2,309	11	N 1	3,652		P 6/10	9,333		P 6/10
1,105		N 6/10	1,344		P 6/10	1,698		P 1/2	2,333		N 6/10	3,673		P 1/2	9,474		P 1/2
*1,111		M 1/2	1,353		P 1/2	1,714		K 6/10	2,338		P 1/2	3,733		P 6/10	9,882		P 6/10
1,113		P 6/10	1,355		N 6/10	1,731		P 1/2	2,366		P 6/10	*3,750		P 1/2	*10,000		M 1/2
1,118		P 1/2	*1,364		M 1/2	1,732		P 6/10	2,368		P 1/2	3,818		N 6/10	10,160	2 1/2	O 1
1,120		P 6/10	1,366		P 6/10	1,748		P 1/2	2,400		P 1/2	3,830		P 1/2	10,500		N 6/10
1,125		L 1/2	1,3729	18 1/2	O 1	1,750		N 6/10	2,4190	10 1/2	O 1	3,9076	6 1/2	O 1	10,588		P 1/2
1,128		P 6/10	1,374		P 1/2	1,7517	14 1/2	O 1	2,432		P 1/2	3,913		P 1/2	11,200		P 6/10
1,1288	22 1/2	O 1	1,377		P 6/10	*1,765		M 1/2	2,435		P 6/10	4,000		K 6/10	11,250		P 1/2
1,132		P 1/2	1,385		L 1/2	1,768		P 6/10	2,466		P 1/2	4,064	6 1/4	P 1	11,288	2 1/4	P 1
1,135		N 6/10	1,388		P 6/10	1,782		P 1/2	2,471		N 6/10	4,091		P 1/2	12,000		K 6/10
1,139		P 1/2	1,3917	18 1/4	P 1	1,7824	14 1/4	P 1	2,4780	10 1/4	P 1	4,098		P 6/10	12,700	2	N 1
1,1415	22 1/4	P 1	1,395		P 1/2	1,787		P 6/10	*2,500		M 1/2	4,186		P 1/2	12,857		P 1/2
1,143		P 6/10	1,400		N 6/10	1,800		L 1/2	2,507		P 6/10	4,200		P 6/10	12,923		P 6/10
1,146		P 1/2	1,406		P 1/2	1,806		P 6/10	2,535		P 1/2	4,2333	6	N 1	13,846		P 1/2
1,151		P 6/10	1,4111	18	N 1	1,814	14	N 1	2,540	10	N 1	*4,286		M 1/2	14,000		N 6/10
*1,154		M 1/2	1,412		P 6/10	1,818		P 1/2	2,545		P 6/10	4,308		P 6/10	*15,000		M 1/2
1,1545	22	N 1	1,417		P 1/2	1,826		N 6/10	2,571		L 1/2	4,390		P 1/2	15,273		P 6/10
1,159		P 6/10	1,424		P 6/10	1,837		P 1/2	2,585		P 6/10	4,421		P 6/10	16,364		P 1/2
1,161		P 1/2	*1,429		M 1/2	1,846		P 6/10	2,609		P 1/2	4,500		L 1/2	16,800		P 6/10
1,167		N 6/10	1,436		P 6/10	1,856		P 1/2	2,625		P 1/2	4,615		P 1/2	16,9333	1 1/2	O 1
1,169		P 1/2	1,440		P 1/2	1,867		P 6/10	2,647		P 1/2	4,6181	5 1/2	O 1	18,000		L 1/2
1,175		P 6/10	1,448		N 6/10	*1,875		M 1/2	2,667		P 6/10	4,667		N 6/10	18,866		P 6/10
1,176		P 1/2	1,4514	17 1/2	O 1	1,8814	13 1/2	O 1	2,6736	9 1/2	O 1	4,737		P 1/2	20,000		P 1/2
1,1813	21 1/2	O 1	1,452		P 1/2	1,888		P 6/10	2,687		P 1/2	4,800		P 6/10	20,320	1 1/4	P 1
1,183		P 6/10	1,461		P 6/10	1,895		P 1/2	2,710		P 6/10	4,8380	5 1/4	P 1	21,000		N 6/10
1,184		P 1/2	1,463		P 1/2	1,909		N 6/10	*2,727		M 1/2	4,941		P 6/10	22,500		P 1/2
1,191		P 6/10	1,4724	17 1/4	P 1	1,915		P 1/2	2,7459	9 1/4	P 1	*5,000		M 1/2	24,000		P 6/10
1,192		P 1/2	1,474		P 6/10	1,9169	13 1/4	P 1	2,754		P 6/10	5,080	5	N 1	25,400	1	N 1
1,1952	21 1/4	P 1	1,475		P 1/2	1,931		P 6/10	2,769		P 1/2	5,091		P 6/10	28,000		P 6/10
*1,200		K 6/10	1,487		P 6/10	1,935		P 1/2	2,800		N 6/10	5,143		P 1/2	*30,000		M 1/2
1,208		P 1/2	1,488		P 1/2	1,953		P 6/10	2,813		P 1/2	5,250		N 6/10	33,600		P 6/10
1,209		P 6/10	1,4941	17	N 1	1,9538	13	N 1	2,8222	9	N 1	5,294		P 1/2	36,000		P 1/2
1,2095	21	N 1	*1,500		K 6/10	1,957		P 1/2	2,847		P 6/10	5,419		P 6/10	42,000		N 6/10
1,216		P 1/2	1,513		P 1/2	1,976		P 6/10	2,857		P 1/2	5,455		P 1/2	45,000		P 1/2
1,217		P 6/10	1,514		P 6/10	1,978		P 1/2	2,897		P 6/10	5,600		P 6/10	50,800	1/2	O 1
1,224		P 1/2	1,525		P 1/2	*2,000		K 6/10	2,903		P 1/2	5,625		P 1/2	56,000		P 6/10
1,226		P 6/10	1,527		P 6/10	2,022		P 1/2	2,947		P 6/10	5,6444	4 1/2	O 1	60,000		P 1/2
1,233		P 1/2	1,538		P 1/2	2,024		P 6/10	2,951		P 1/2	5,793		P 6/10	84,000		P 6/10
1,235		N 6/10	1,5393	16 1/2	O 1	2,0320	12 1/2	O 1	2,9882	8 1/2	O 1	5,806		P 1/2	90,000		P 1/2
1,2390	20 1/2	O 1	1,541		P 6/10	2,045		P 1/2	*3,000		K 6/10	5,9764	4 1/4	P 1	101,600	1/4	P 1
1,241		P 1/2	1,552		P 1/2	2,049		P 6/10	3,051		P 1/2	*6,000		K 6/10	168,000		P 6/10
1,244		P 6/10	1,556		N 6/10	2,069		P 1/2	3,055		P 6/10	6,207		P 1/2	180,000		P 1/2
*1,250		M 1/2	1,5630	16 1/4	P 1	2,0734	12 1/4	P 1	3,0787	8 1/4	P 1	6,222		P 6/10			
1,254		P 6/10	1,565		P 1/2	2,074		P 6/10	3,103		P 1/2	6,350	4	N 1			
1,2543	20 1/4	P 1	1,570		P 6/10	2,093		P 1/2	3,111		P 6/10	6,429		P 1/2			
1,259		P 1/2	*1,579		M 1/2	2,100		N 6/10	3,158		P 1/2	6,462		P 6/10			
1,263		P 6/10	1,585		P 6/10	2,1166	12	N 1	3,170		P 6/10	6,667		P 1/2			

BRAKE


Section a
Coupe a
Jx15
H7
3113
Section b
Coupe b
B5
3122
U51
Section c
Coupe c
Lx15
Section d
Coupe d
3117
Section e
Coupe e
H6
2945
J3
V4
Detail I
Echelle 5
Détail I
Ech. 5
Section f
Coupe f
T14
2914
B60
2917
2912
B60
3112
V4
2947
2946
J2
2942
B10
2940
3120
3115
2941
2936
2933
2934
J2
H6
2930
2931
H6
Tx35
1

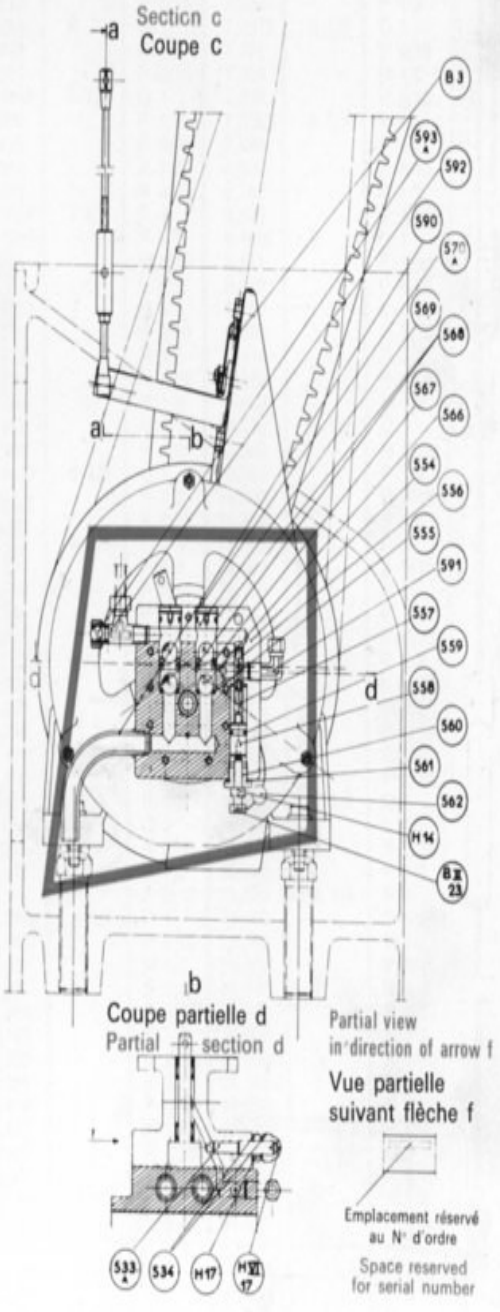
COMBINED LUBRICATION AND VARIABLE-SPEED UNIT PUMP



View showing the gauge fitted for setting and checking the pressure (this gauge is not supplied with the machine).

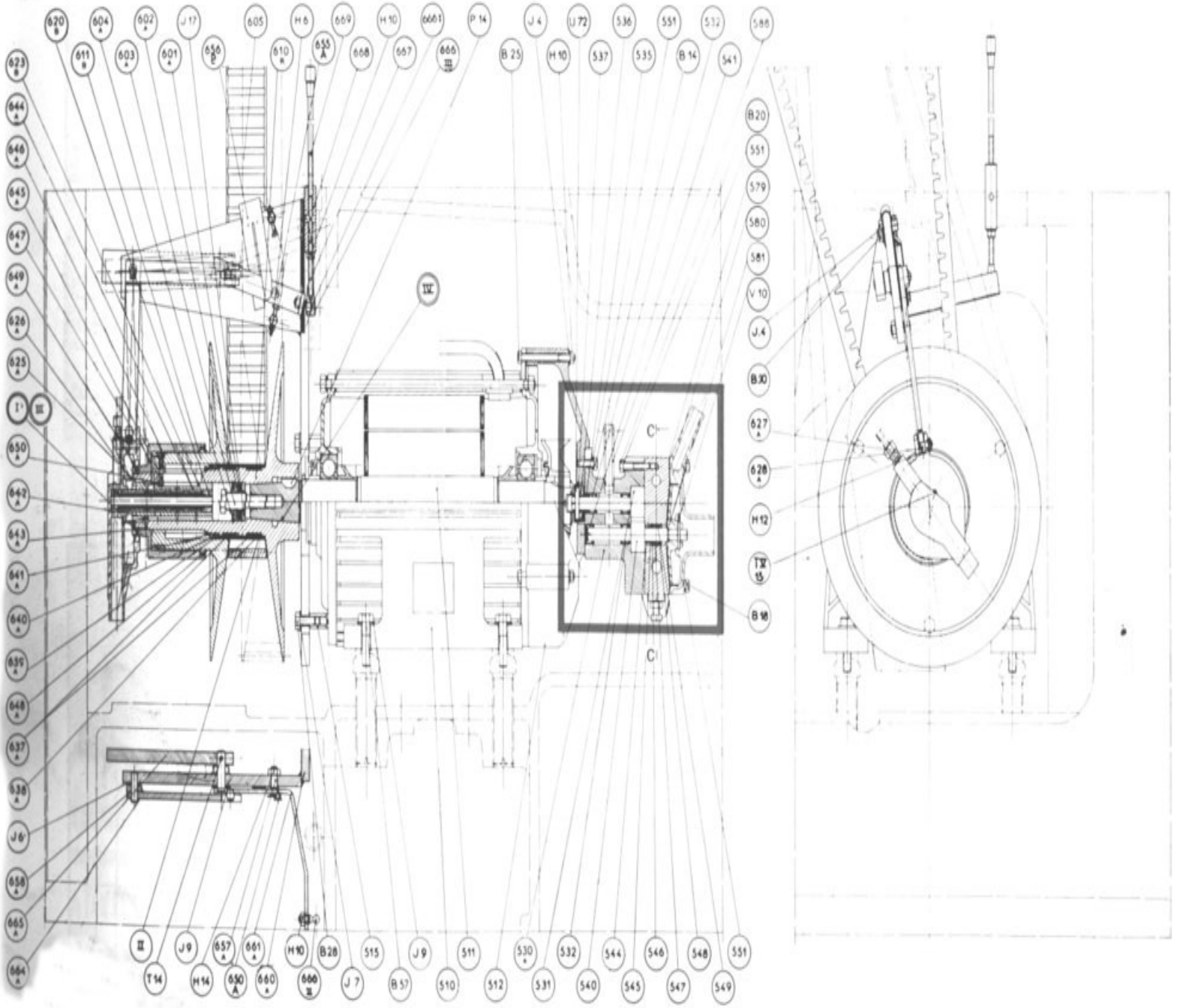
The pump is mounted centrally on the rear plate of the electric motor. It is driven by an Oldham joint. This is pinned on one side on the driven pinion of the pump and driven by a female tenon machined in the end of the drive shaft.

After many hours of operation it is possible that the pump may make a shrill noise and that the variable-speed unit may work more slowly. This means that the filter is clogged. It will be possible to perceive this condition from the outside, as the vinyl tube connecting the suction orifice of the pump to the filter will be flattened. It will then be necessary to remove the cover from the tank and clean or, better still, change the filtering cartridge.



" The parts in the green frame can be standard exchanged ".

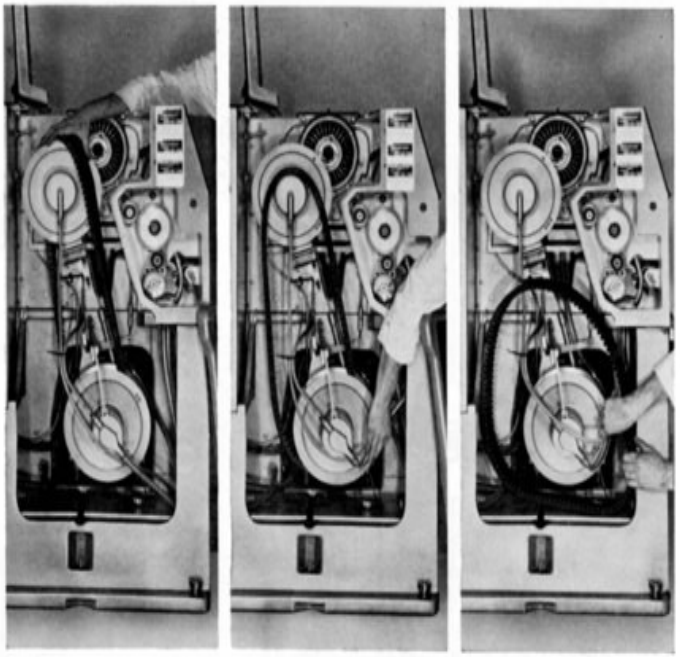
MOTOR ASSEMBLY



" The parts in the green frame can be standard exchanged ".

BELT

The transmission of movement between the motor and the headstock is ensured by a vee belt having a width of 50 mm and an original length of 1800 mm. The belt used on the HB-X lathe serves not only as a device for transmitting power, like all other belts, but also as a device for varying speed, engaging the drive, and **limiting torque.** It is liable to have to be replaced fairly often, especially when heavy work is involved, so provision has been made for quick removal and fitting. It is advisable to keep a spare belt available.



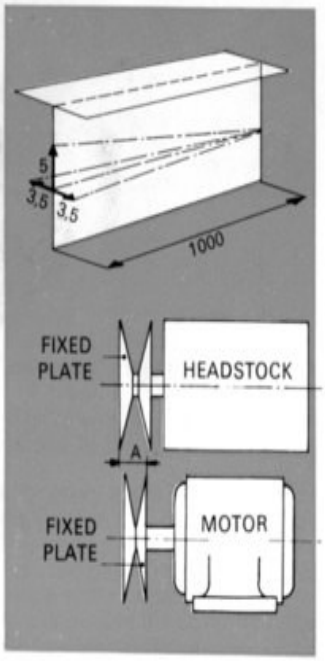
REMOVAL

Remove the rear tube of the spindle and pass the belt over the outside flange of the driven shaft of the headstock. Detach the leakage return pipe and the pipe of the variable-speed unit from the cover of the oil tank. Pass the belt under these pipes and then withdraw it.

FITTING

With the leakage return pipe and the return pipe of the variable-speed unit detached from the tank cover, pass the new belt under these pipes and place it between the lower pulley. Refit the two oil return pipes and then pass the belt over the top pulley of the driven shaft of the headstock. Do not bother about the tension of the belt, as this is obtained automatically when the lathe is started up. Finally refit the rear tube of the spindle (**do not forget** to fit the tube stop).

CHECKS AND ADJUSTMENTS TO BE MADE ON CHANGING THE BELT



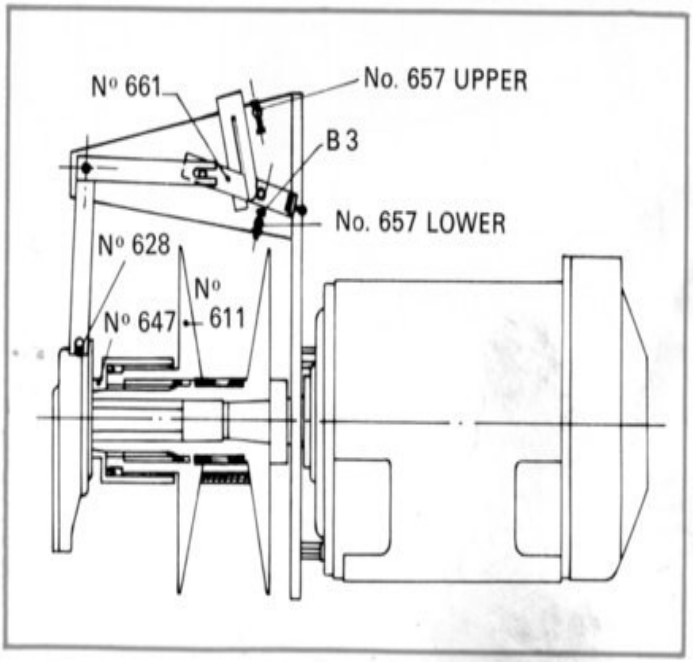
Follow the instructions given above and then :

1°) Check that the shaft of the motor is parallel to the line of the vees of the bed with a maximum deviation of $\begin{matrix}-0\\+5\end{matrix}$ mm per metre in the vertical plane and of ± 3.5 mm per metre in the horizontal plane.

2°) Adjust the position of the motor so that the dimension A is as near as possible to 78 mm.

3°) Fit the belt and run it in at a spindle speed of 1000 rpm for two hours to allow it to reach its maximum stretch.

4°) With the lever No. 661 resting on the screw B 3 of the lower stop No. 657, start up and check whether, in the disengaged position, the movable plate No. 611 of the motor assembly is bearing on the bottom of the cylinder No. 647. If this condition is not fulfilled, adjust the screw B 3 of the lower stop No. 657.



5°) Start up, make a few changes of speed, and check whether the belt projects 2 to 3 mm at the radius of the upper pulley in the stop position. If it projects too much or does not project enough, undo the screws securing the motor and adjust the jacks in the appropriate direction. Make sure that the new position of the motor satisfies the tolerances state din paragraph 1.

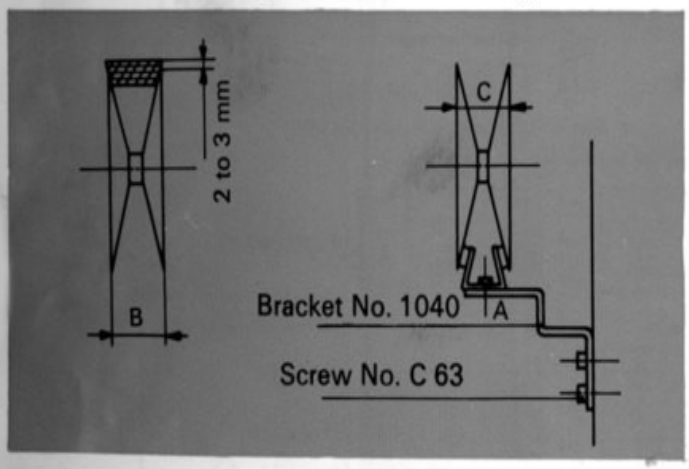
6°) At maximum speed adjust the upper stop No. 657, the belt must lie 1 to 2 mm below the outside diameter of the driving pulley. With the transmission adjusted, make sure that on disengagement the belt does not rub on the driving pulleys ; if it does, adjust the jacks of the motor, maintaining the tolerances indicated in paragraph 1.

BRAKE ADJUSTMENT

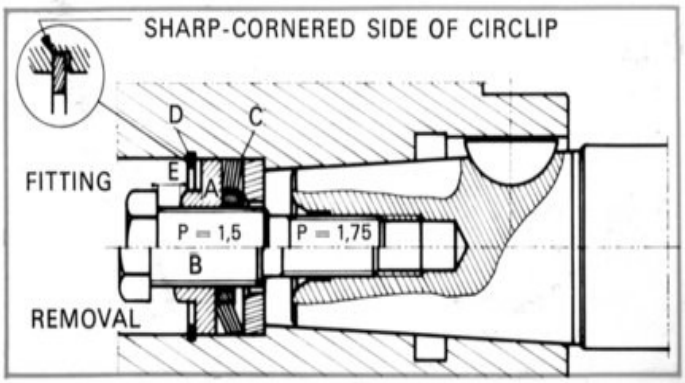
With the motor positioned, the belt in the disengaged position, i.e., projecting 2 to 3 mm from the driven pulleys at the radius, and the **motor assembly running,** take the dimension B from the driven pulleys and mark the place at which it was taken. Then stop the motor assembly, remove the belt, fit the brake bracket, tighten the two plates by hand so that they bear on the brake shoes, and take the dimension C from the place previously marked, this dimension must lie between $C = B + 0.4 \begin{matrix} +0. \\ +0.2 \end{matrix}$

If it does not, adjust the position of the brake. To do this, undo the screws of the brake bracket No. 1040 A and raise or lower the bracket to obtain the correct dimension.

The advice on the checking of the transmission still applies.



VARIABLE-SPEED UNIT TYPE 50.10.7 INSTRUCTIONS FOR FITTING AND REMOVING THE DRIVING PULLEY ON THE DRIVING SHAFT



FITTING

The nut A must be fitted on the screw B at a distance E of between 3 and 5 mm. With a tubular spanner hold the head of the screw and the nut and tighten them together until contact is made with the Belleville washers C. Then withdraw the spanner and lock the driving plate by turning only the head of the screw B.

The pitch of the thread being 1.75 in the driving shaft and 1.5 in the nut A, we shall thus have a tightening movement of 1.75 — 1.5 = 0.25 for every turn of the screw B (this ensures powerful locking of the driving pulley). Then fit the circlip D.

REMOVAL

With a tubular spanner undo only the screw B, the nut A will locate on the circlip D, and by continuing to undo the screw B, the driving plate will be removed from the taper of the driving shaft.

NOTE

The Belleville washers are intended to maintain the grip of the pulley on the taper of the driving shaft in the event of overheating during operation.

Another function of these washers is to lock the nut A when the screw B is being tightened.

ADVICE ON THE CHECKING OF THE TRANSMISSION

In the event of breakdowns with the variable-speed unit check the following points :

1° The grade of oil (this must conform to the specifications given on page 14)

2° The condition of the oil filter

3° The level of the oil in the tank (the level must be 2 or 3 cm above the filter)

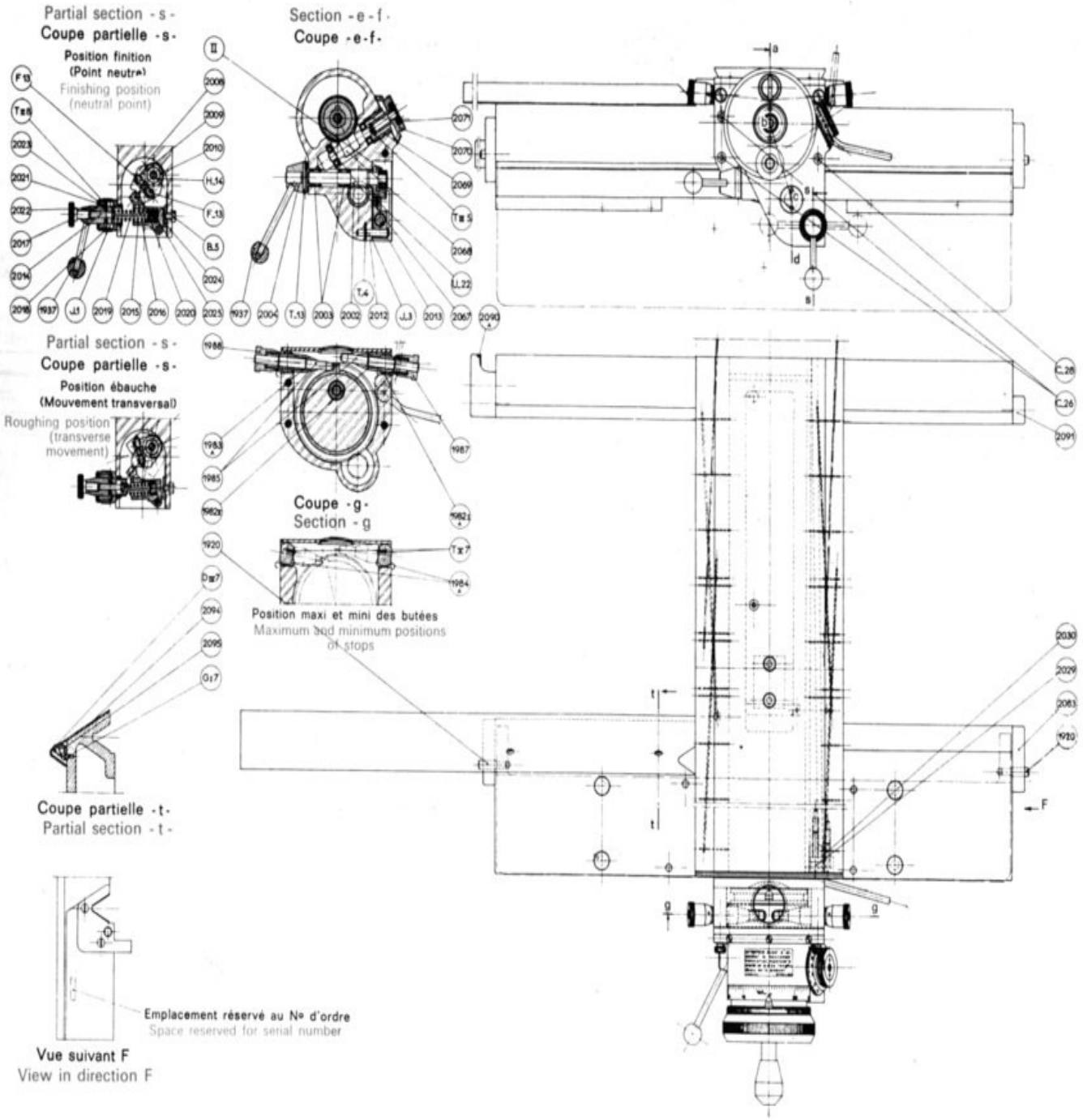
4° The condition of the driving and driven pulleys

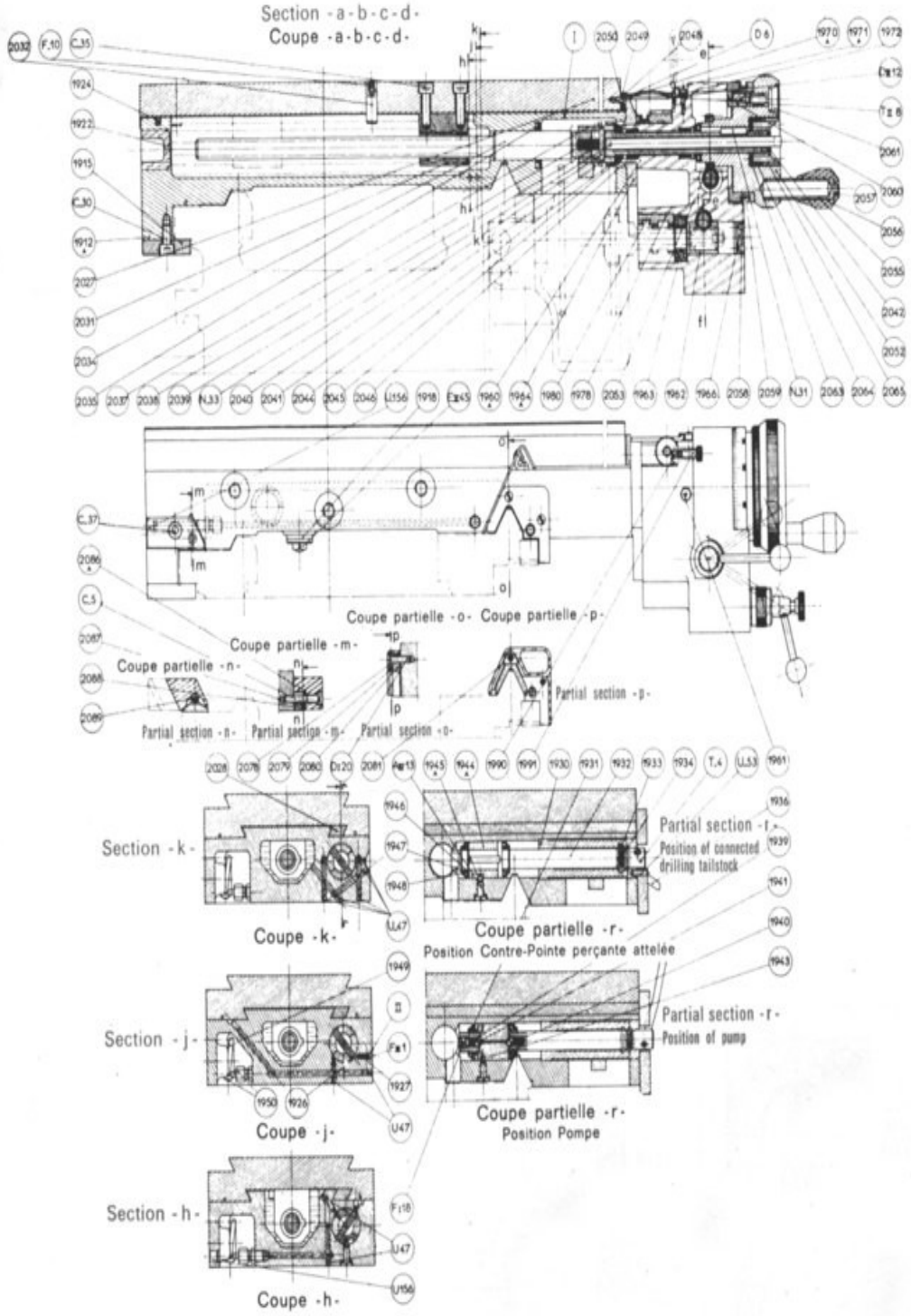
5° The condition of the belt

6° The belt adjustment

7° The oil pressure (which must be 18 to 20 kg)

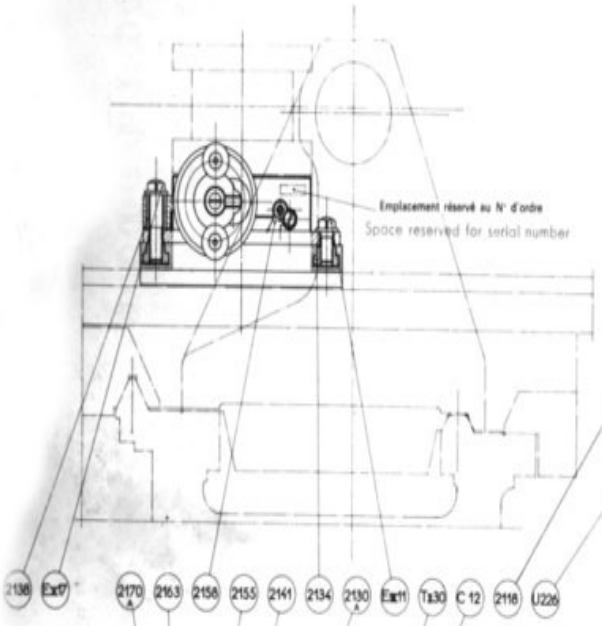
CARRIAGE


Partial section - s -
Coupe partielle - s -
Position finition
(Point neutre)
Finishing position
(neutral point)
Section - e - f -
Coupe - e - f -
Partial section - s -
Coupe partielle - s -
Position ébauche
(Mouvement transversal)
Roughing position
(transverse
movement)
Coupe - g -
Section - g
Position maxi et mini des butées
Maximum and minimum positions
of stops
Coupe partielle - t -
Partial section - t -
Emplacement réservé au N° d'ordre
Space reserved for serial number
Vue suivant F
View in direction F

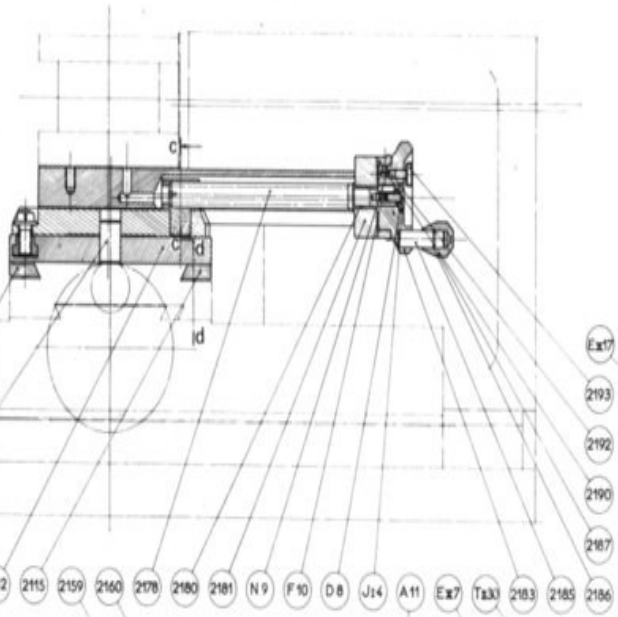

Section -a-b-c-d-
Coupe -a-b-c-d-
Coupe partielle -o-
Coupe partielle -p-
Coupe partielle -m-
Coupe partielle -n-
Partial section -n-
Partial section -m-
Partial section -o-
Partial section -p-
Section -k-
Coupe -k-
Partial section -r-
Position of connected drilling tailstock
Coupe partielle -r-
Position Contre-Pointe perçante attelée
Section -j-
Coupe -j-
Partial section -r-
Position of pump
Coupe partielle -r-
Position Pompe
Section -h-
Coupe -h-

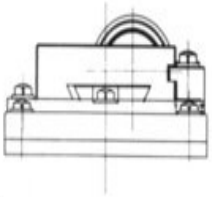
TOOL SLIDE

Partial section f and g
Coupe partielle f et g



Section a b
Coupe a b



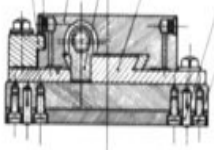


Ex17
2193
2192
2190
2187

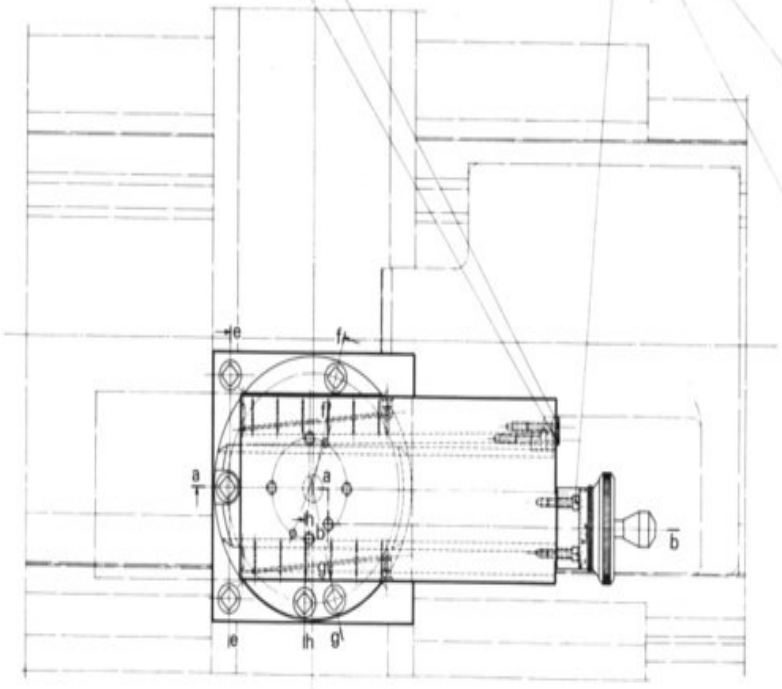
2138 Ex17 2170 2163 2158 2155 2141 2134 2130 Ex11 Ta30 C 12 2118 U226

2112 2115 2159 2160 2178 2180 2181 N 9 F 10 D 8 J14 A 11 Ex7 Ta33 2183 2185 2186

Section partielle h
Partial section h



Coupe c d
Section c d



Section e
Section e

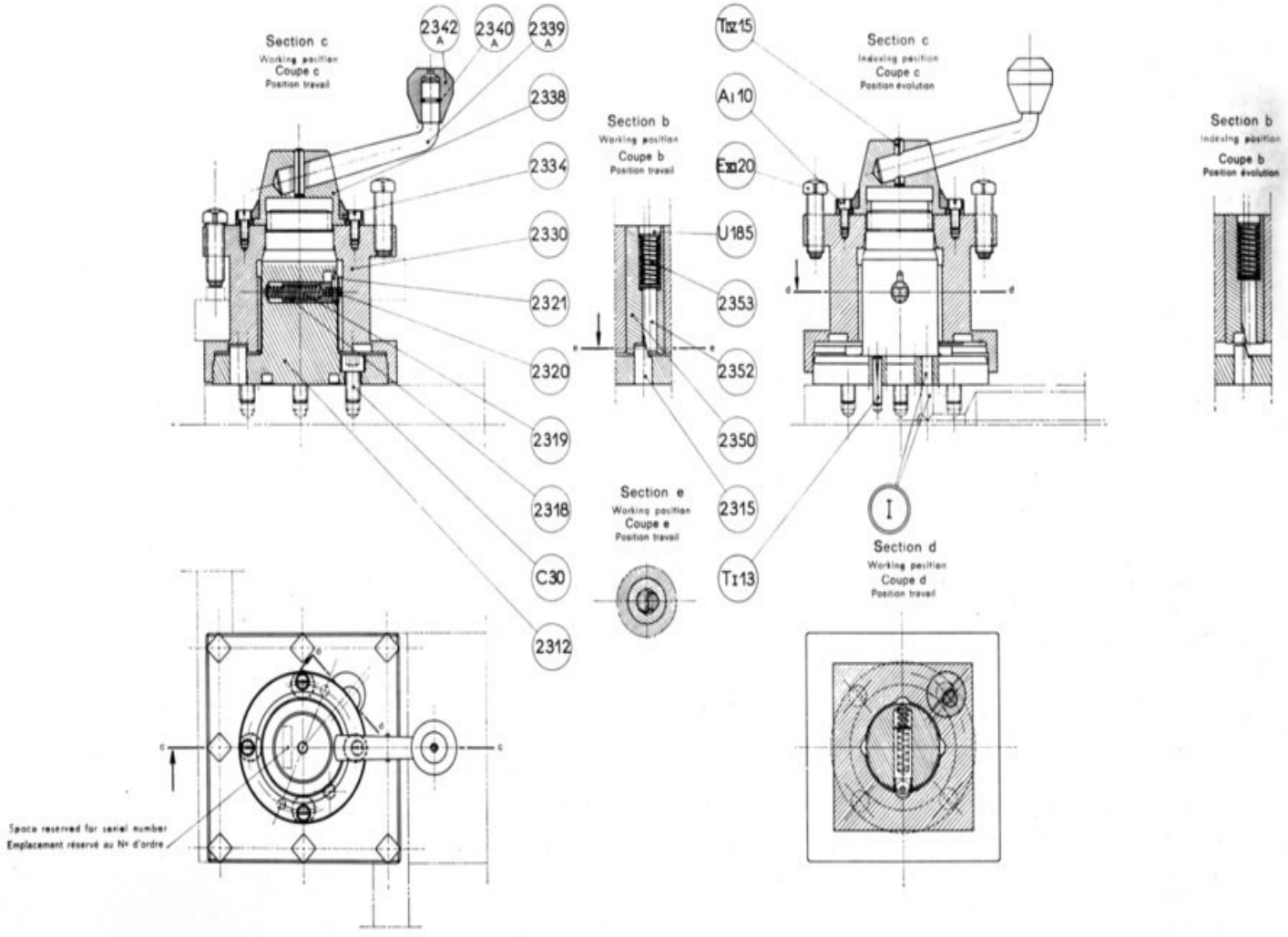
HIGH-PRECISION SQUARE TURRET

The turret itself is dismantled by completely unscrewing the operating lever.

The turret is designed for four fixed positions. If it is used in an intermediate position, it is necessary to remove one of the four locating fingers clamped on the bottom face of the pivot supporting the turret and locate on this the corresponding face on which all the intermediate positions can be obtained within an angle of 125°.

If the four positions are used, do not forget to refit the finger, at the same time maintaining the orientation of its inclined plane, as, without this finger, although the preliminary position and the locking are ensured, the precise positioning is not.

Lubricate the turret whenever it is cleaned. Lubricate each part well, especially the tapers and the thread.



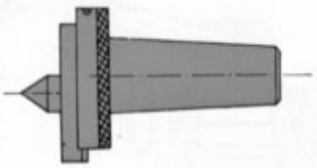
TAILSTOCK

STANDARD TAILSTOCK (PATENTED)

Contrary to conventional tailstocks, which comprise two main parts (the body and the base, which constitute a more or less rigid assembly), the 360 HB X tailstock is a single-piece unit. It is seated on the rear vee way of the bed and on the flat bearing surface at the front.

The transverse movement that enabled tapers to be produced has been eliminated ; this arrangement, which caused loss of rigidity or accuracy in the tailstock and damage to the centres, has been successfully replaced by taper-turning and copying attachments.

Strictly speaking, it is always possible to place in the sleeve taper a centre support capable of being set off centre (conventional boring attachment for example).



The transverse movement has been replaced by the arrangement described below :

The axis of the tailstock sleeve is .12 " below that of the headstock, and the taper portion of the sleeve is in line with the headstock. Rotation of the sleeve will thus enable the headstock and spindle to be aligned. If correct height and parallelism have previously been obtained by scraping, this positioning will be ten times more accurate.

Adjustement of the bush is made by means of two screws locating on a gib guided by a half-round longitudinal slot cut on the outside diameter of the sleeve. Nylon polyamide seals protect it against the possible ingress of swarf and cast-iron dust.

The tailstock body is locked by means of a lever that turns a shaft incorporating an eccentric bearing surface acting on a locking pad.

When the tailstock is locked, an axial effort of 1 ton gross must be exerted to withdraw it.

This withdrawal protects the front bearing of the spindle: when a part is machined between centres, the heat produced by the removal of material creates heavy stresses due to the expansion of the part.

For example, with a steel part of 20 " length and 2 " diameter and a rise in temperature of 30°, there will be a thrust of about 14 tons.

This also explains the rapid deterioration in revolving centres. On the other hand, as it is possible to drill with the tailstock in an abnormal way by inserting a large lever into the tailstock hand wheel, it is preferable to allow the tailstock to swerve rather than to damage the spindle bearings.

SENSITIVE-DRILLING TAILSTOCK WITH AUTOMATIC FEED

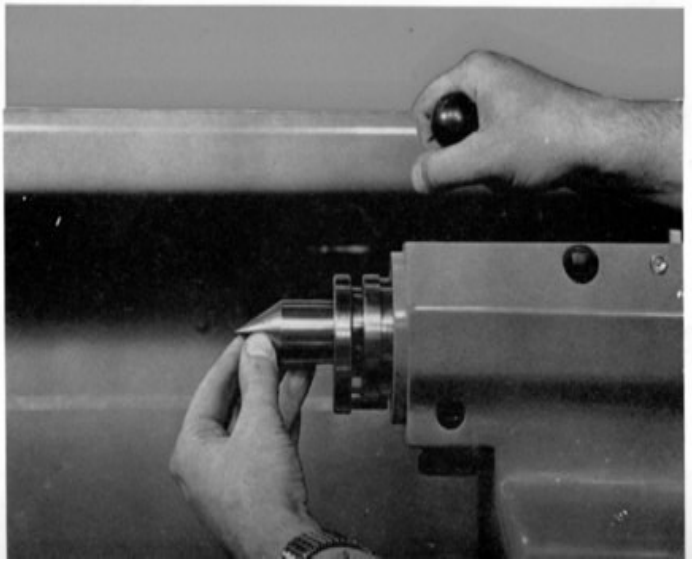
This is a single-piece unit like the standard tailstock. It has the same features and the same facilities for adjustment of the sleeve, but is designed to permit :

- drilling with automatic feeds,
- rapid removal of swarf and parts between centres,
- sensitive drilling of small holes,
- convenient gripping of long parts,
- manual drilling of large holes.

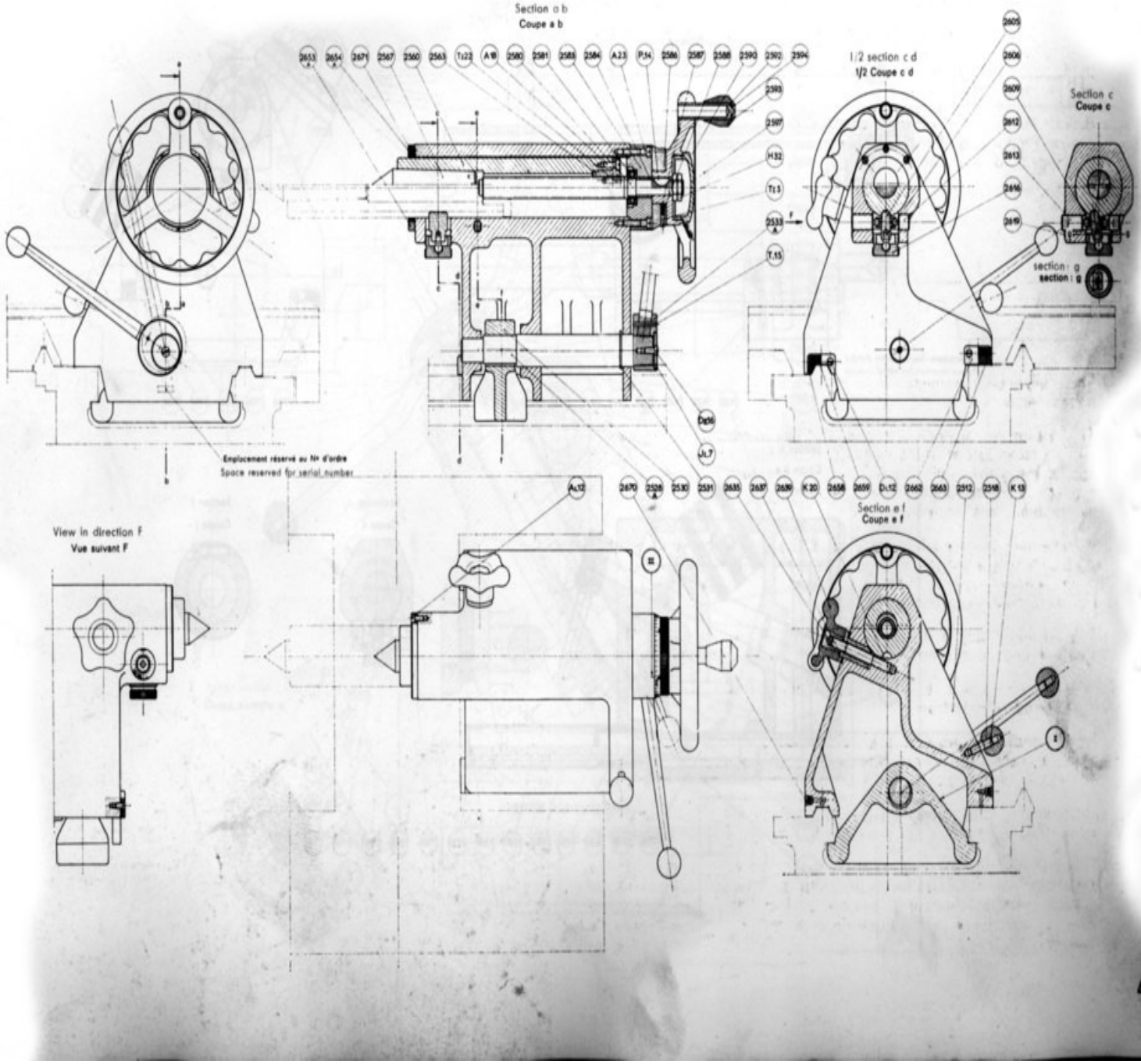
This tailstock is coupled to the saddle by a bar incorporating a rack controlling a pinion integral with a shaft driving the tailstock sleeve. A spring pulls the bar back.

The feeds of the sleeve are then equal to half the feeds given by the saddle, and the force available is "theoretically" doubled.

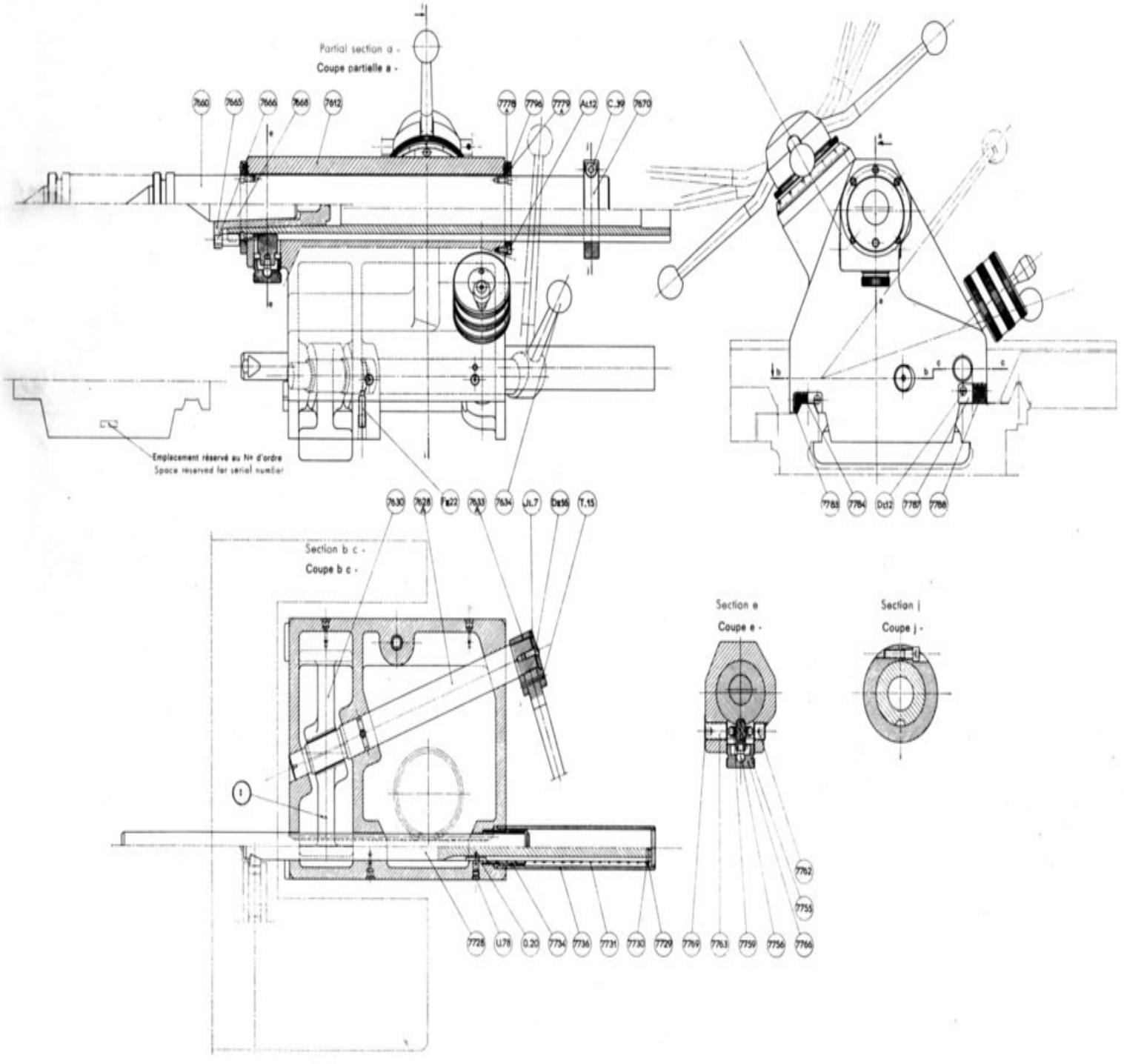
The socket is of the No. 5/4 Morse taper type. A foot fixed on the socket positions it and prevents it from turning. This foot also enables the taper to be driven out quickly by quickly retracting the sleeve (see photograph).



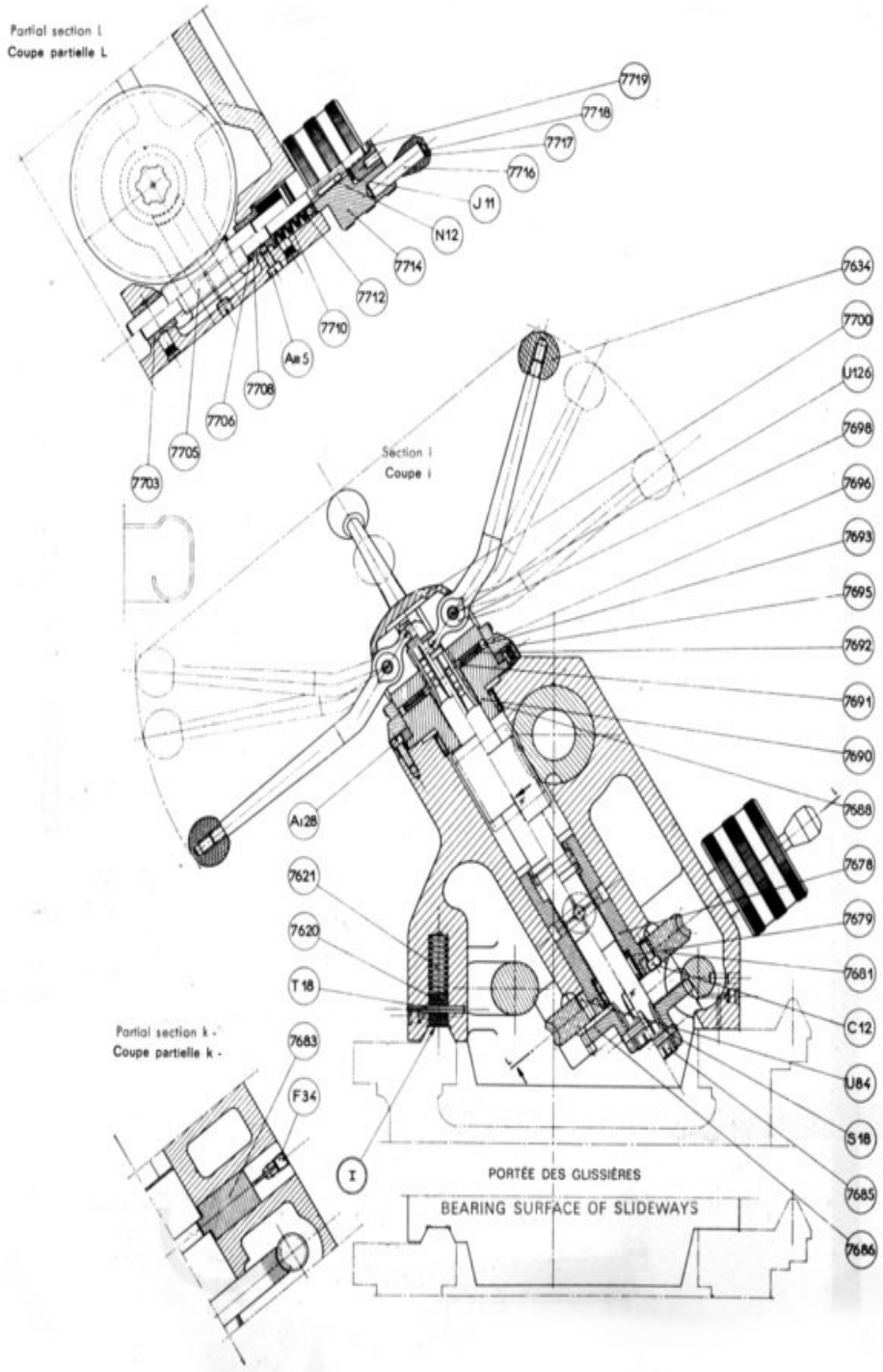
STANDARD TAILSTOCK



DRILLING TAILSTOCK WITH SENSITIVE AND AUTOMATIC FEED



TAILSTOCK


Partial section L
Coupe partielle L
7719
7718
7717
7716
J 11
N12
7714
7712
7710
Ae 5
7708
7706
7705
7703
Section I
Coupe I
7634
7700
U126
7698
7696
7693
7695
7692
7691
7690
7688
7678
7679
7681
C12
U84
S18
7685
7686
Ai 28
7621
7620
T 18
7683
F34
Partial section k -
Coupe partielle k -
I
PORTÉE DES GLISSIÈRES
BEARING SURFACE OF SLIDEWAYS

COOLANT SYSTEM

The coolant pump is situated at the end of the main motor and coupled to the oil pump and the valve box.

Suction is effected through a vinyl tube running from the tank to the pump, while delivery is effected through a vinyl tube of smaller diameter fixed on a rigid tube.

The assembly of taps and fittings is fixed on a carriage sliding on three rollers in the swarf guard. The carriage is moved by hand or can be coupled to the carriage of the machine.

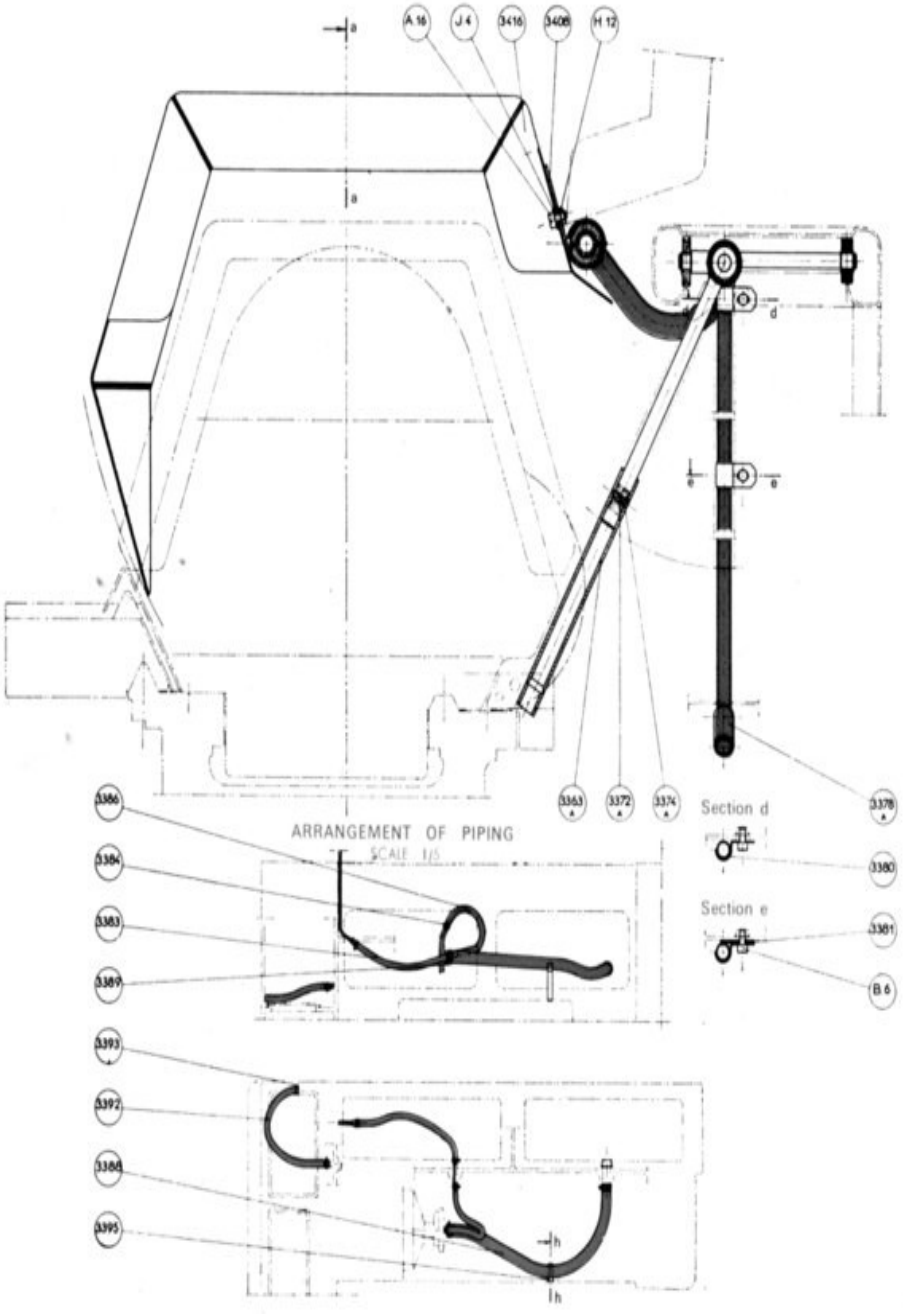
At the suction point we have fitted a check valve to allow instantaneous flow of coolant when the machine is started up.

When unpriming the pump or dealing with an abnormal flow, make sure that the collant tank is full, that the valve plug is not obstructed, and that the valve is in its correct position.

Drainage is effected through a tube situated at the bottom of the tank and accessible through the inspection door of the variable-speed unit.

The capacity of the tank is 2 galls.

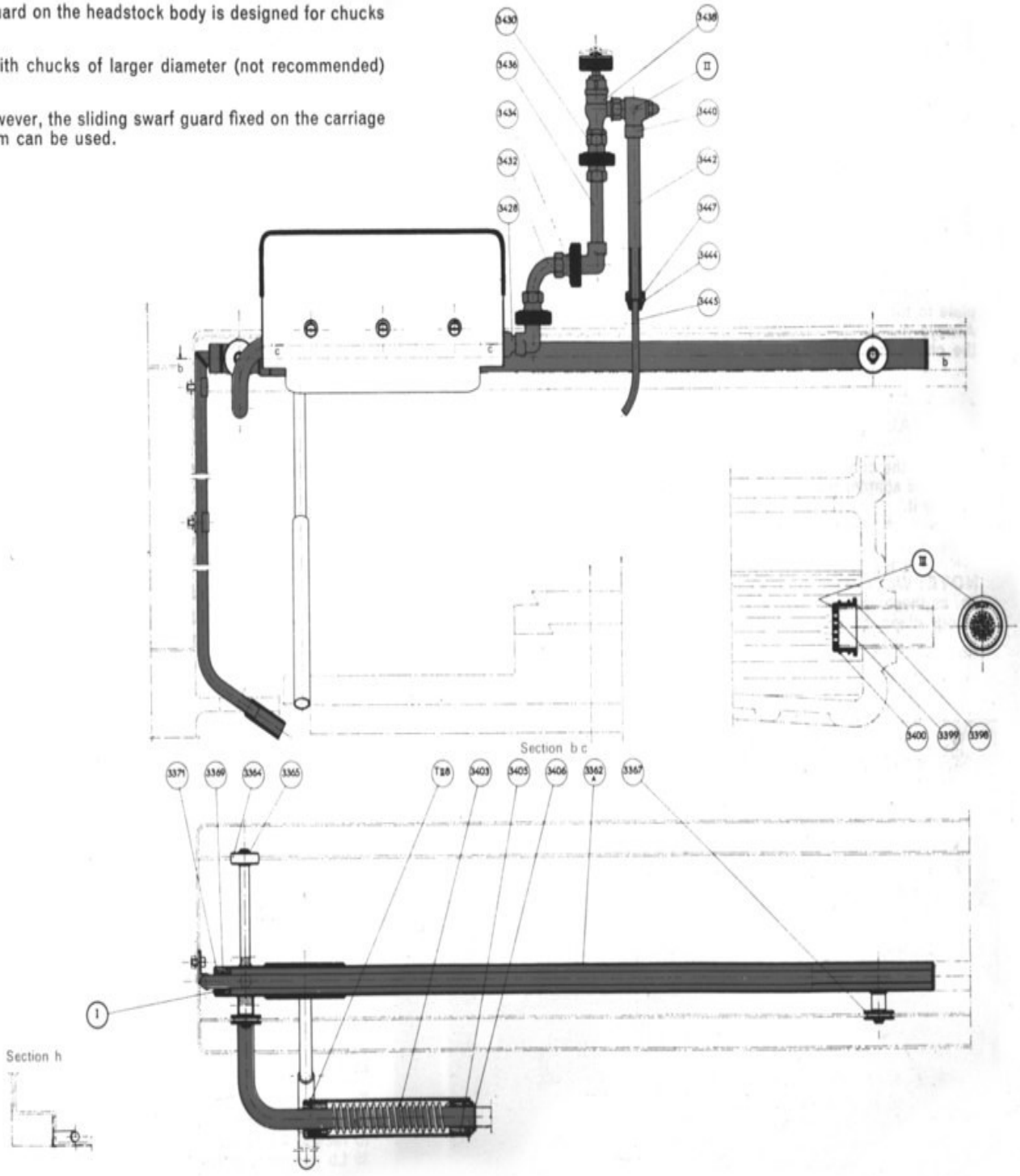
NOTE: The turbine of the coolant pump is driven by a split pin. In the event of seizure (for example as a result of freezing of the coolant) only the pin shears and damage to more important parts is thus avoided.



The sliding chuck guard on the headstock body is designed for chucks of up to 8″.

It cannot be used with chucks of larger diameter (not recommended) or face plates.

In special cases, however, the sliding swarf guard fixed on the carriage of the coolant system can be used.



FIXING THE ADAPTER PLATES

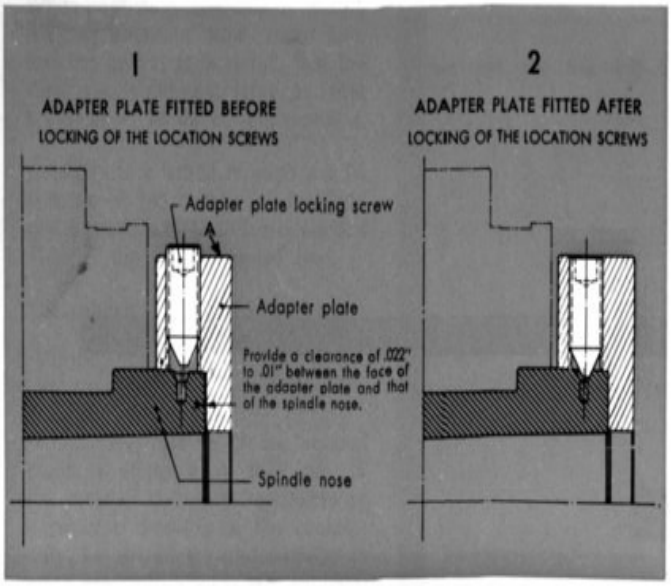
FITTING

As shown in the drawings below, the adapter plate is fixed to the spindle nose by means of three radial screws. These have a sort of cold-shrinking action and, by applying the bottom of the adapter plate to the spindle face, ensure the perpendicularity of the chuck. Always make sure that there is a good wedging action and that the chuck is not held only by the ends of the screws.

REMOVAL

Unscrew the coned location screws as shown in position 1 and then strike the adapter plate at point A with a copper or lead mallet to release it.

NOTE: We advise our customers to order their adapter plates from us, as these are more easily made with the special tooling we have at our disposal.



ELECTRICAL EQUIPMENT

The electrical equipment of the lathe is located at the rear of the headstock in a special, easily accessible compartment and is in accordance with the enclosed diagram (which relates to a three-phase supply of 220 or 380 volts).

It should be noted that the equipment can easily be transformed from 220 to 380 volts and vice versa.

The power cable is connected **to the terminals situated on the right at the bottom.**

It is recommended that the machine be **earthed** to avoid internal currents and as a safety measure for the operator.

An isolator disconnects the switchgear from the mains.

Starting up (forward or reverse) is effected by means of the lever situated on the righthand side of the apron.

The connection must be made in such a way that the normal direction of rotation of the spindle (anticlockwise) is obtained by pushing the lever and reversal by pulling it.

The protective relays incorporate a setting device.

The control circuit operates, in principle, on 220 volts, regardless of whether the supply is 220 or 380 volts.

If the lathe includes a copying attachment, the motor for this attachment is controlled by a special contactor.

If the lathe is fitted with lighting, the equipment includes a step-down transformer.

Large voltage drops often cause irregular operation. The voltage measured must correspond to that of the motor and equipment.

An insufficient voltage on stopping is due to the mains or the supply-transformer.

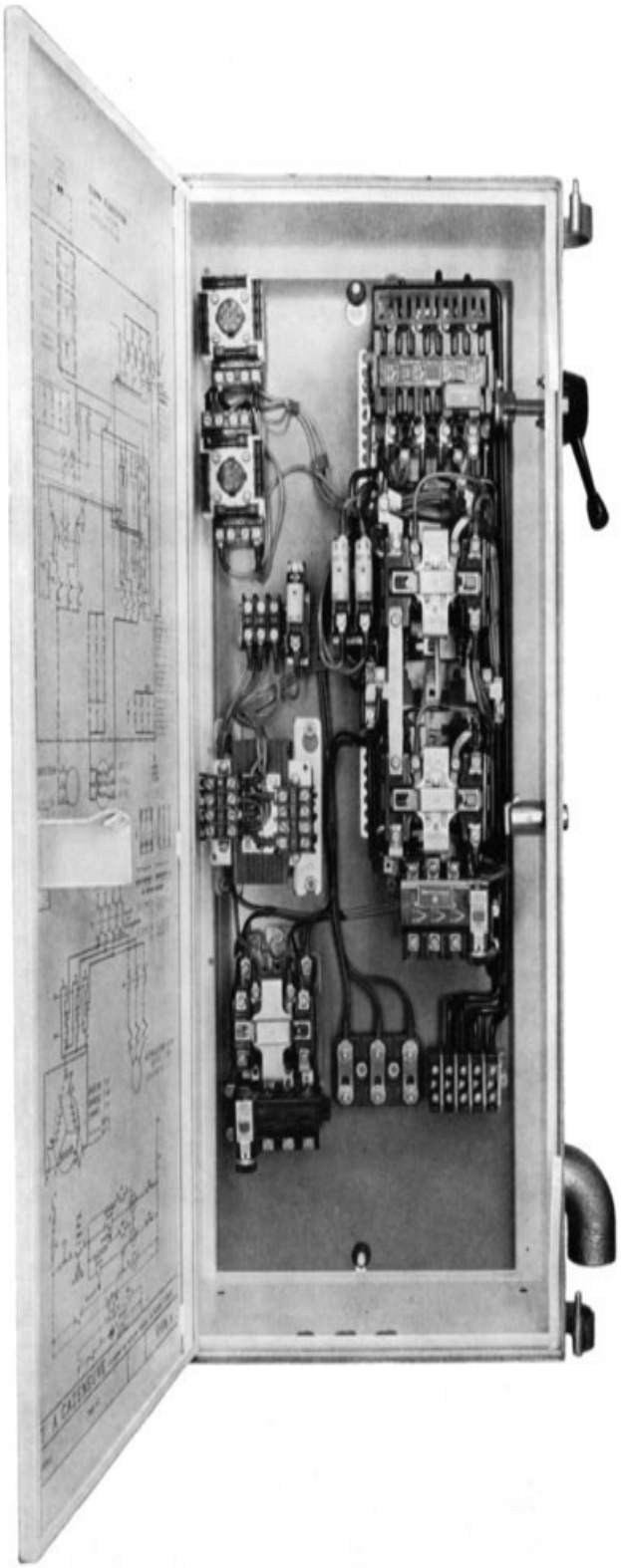
An insufficient voltage on starting is due to insufficient power in the installation or to the use of a power cable of too small a section.

We advise you to use a cable with four conductors (including one for the neutral) 750 S C TH of .008 square mch each cable (75 strands of .012" per phase).

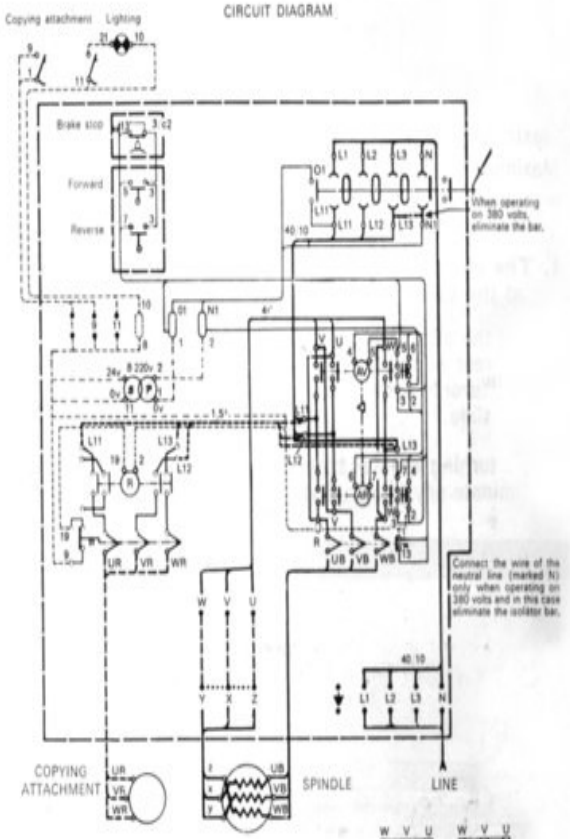
In the event of operating difficulties it is therefore necessary to check the exact voltage at the terminals of the machine on stopping and on starting.

In the event of a breakdown make sure that all contacts are good, especially on the auxiliary contacts, and, if necessary, clean them by rubbing them with a piece of very fine emery cloth.

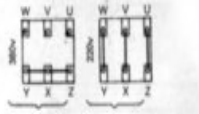
To avoid overloading the motor, it is advisable to know the power required by the work. As an approximate guide, it is necessary to reckon 4.5 hp per mm^2 of chip section in semi-hard steel (25 to 30 Lb per mm^2) at 100 yd/min cutting speed.

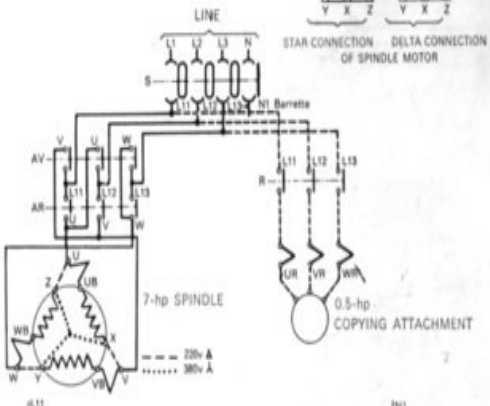


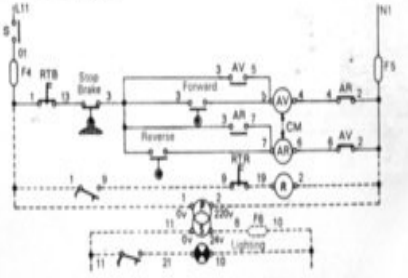
CIRCUIT DIAGRAM



DEVELOPED DIAGRAM







TAPER TURNING ATTACHMENT

Maximum stroke of attachment : 16 "
Maximum angle of inclination : 10° each side of centre line.

1. The attachment is supplied with the lathe (or has been ordered at the same time as the machine).

To put the attachment into service, unscrew the knurled knob situated on the rear support of the transverse screw and withdraw the socket. The transverse slide is then freed. Insert the drive finger into the hole in the slide.

When turning regular tapers, it is necessary, before starting a pass, to eliminate any play that may exist in the attachment.

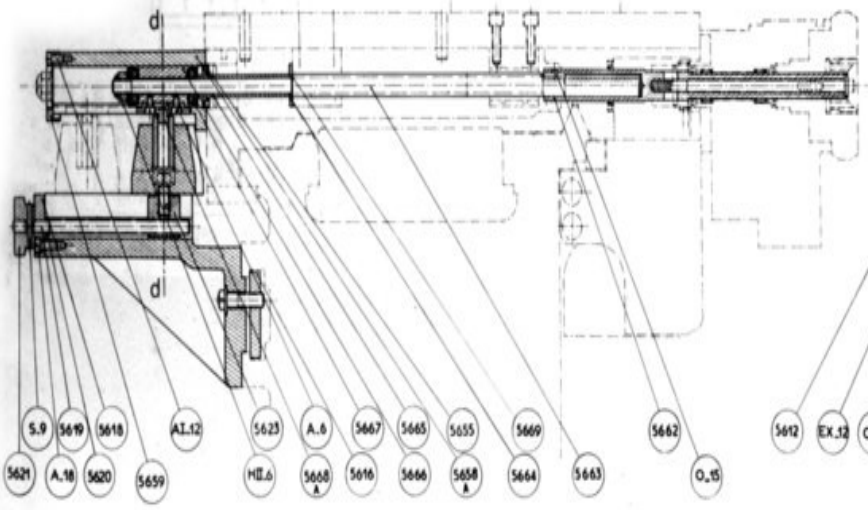
2. The attachment is supplied after the lathe.

In the first place drain the carriage oil tank. Then remove the operating screw of the transverse slide and replace it by the special socket and screw.

Remove also the plug situated at the rear of the carriage and replace it by the complete rear support.

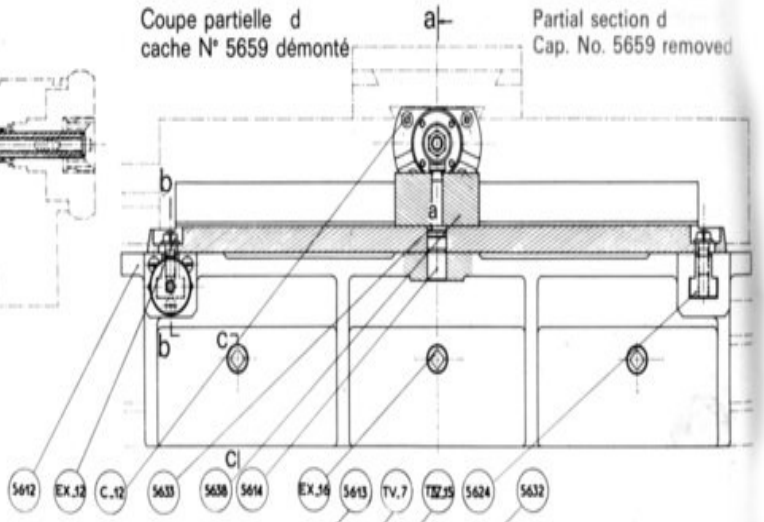
Fill the carriage tank with oil and then proceed as stated in paragraph 1.

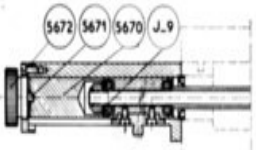
Section a b c
Coupe a b c



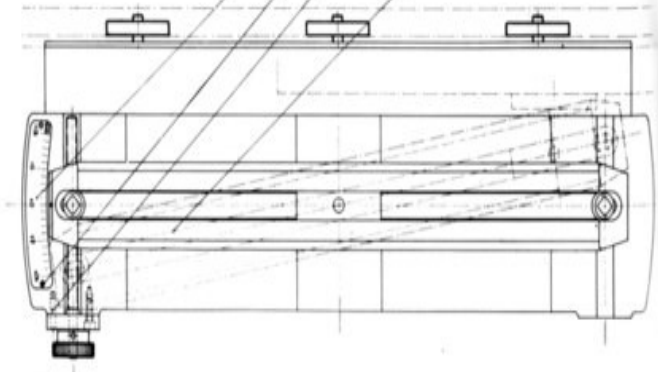
Coupe partielle d
cache N° 5659 démonté

Partial section d
Cap. No. 5659 removed





POSITION
TRAVAIL NORMAL
NORMAL WORKING POSITION



SAFETY

ADVICE ON MATTERS OF SAFETY

The maximum speeds we recommend for the chucks and face plates are as follows :

Universal chucks (steel body)	⌀ 6"	4000 rpm
	⌀ 8"	3200 rpm
	⌀ 10"	2500 rpm
Chucks (cast-iron body) or 4-jaw face plates (cast-iron body)	⌀ 6"	2500 rpm
	⌀ 8"	2000 rpm
	⌀ 10"	1600 rpm
	⌀ 12"	1250 rpm
	⌀ 14"	1000 rpm

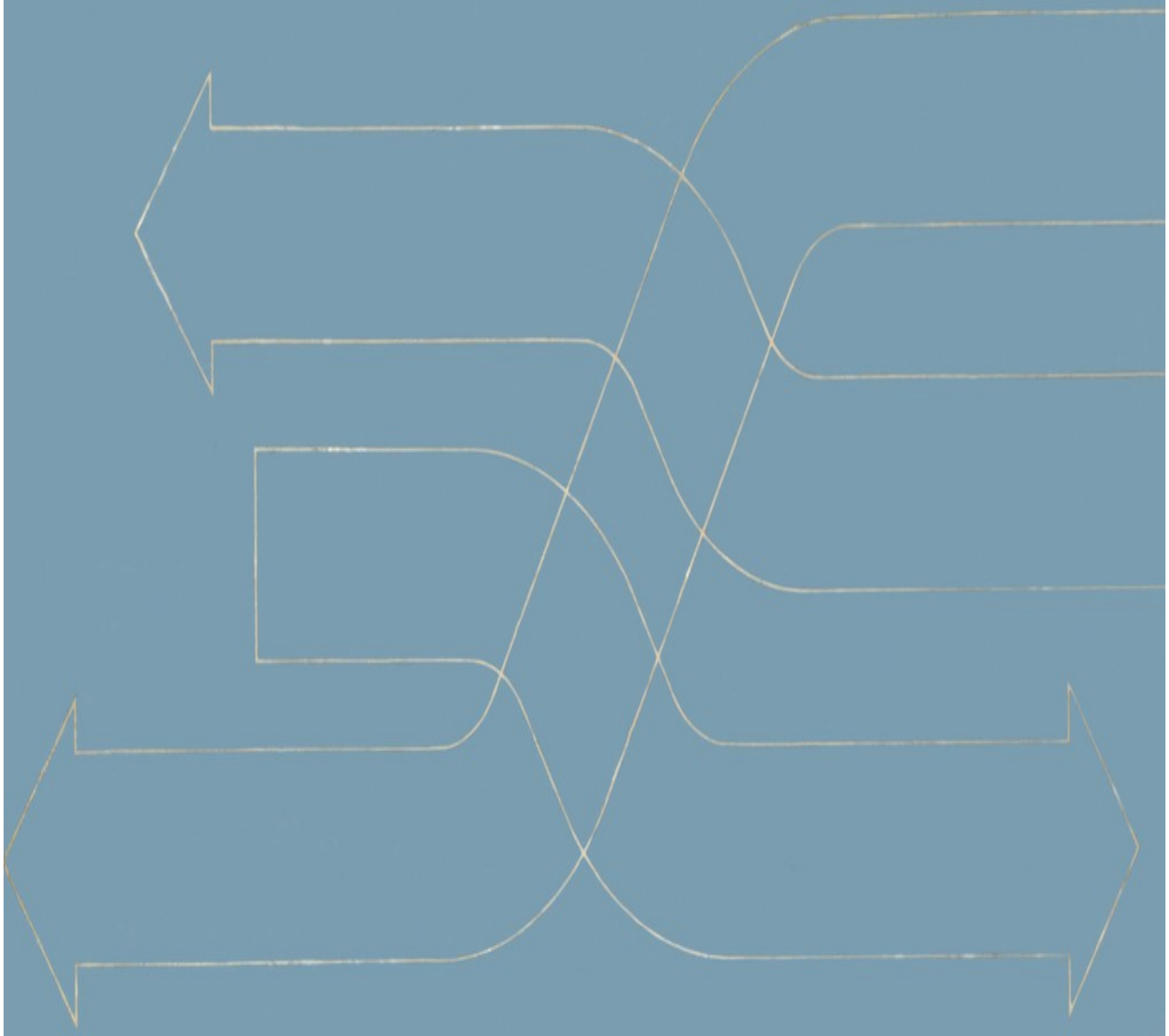
It should be noted moreover that these speeds apply only when the parts are more or less balanced. **It is always preferable to use a chuck of the smallest possible diameter,** as the inertia of the chuck stresses the lathe elements unnecessarily when the machine is started up and stopped.

SAFETY DEVICE

In the quadrant the two sockets situated on the top stud are joined by a Stub's steel shear pin of .08" diameter.

Breakage of this pin indicates that the maximum load has been exceeded. The sockets each have six holes to allow the housing to be changed whenever the pin has to be replaced.

CAZENEUVE



établissements

CAZENEUVE

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