



Harrison M390

15"x50" Geared Head Lathe



**ORIGINAL INSTRUCTIONS
AND
SPARE PARTS MANUAL**

M390 15" Swing, 50" Swing Centre Lathe *The Ultimate Turning Machines*

HARRISON geared head lathes have earned their position as the standard of the industry, offering performance and quality at a reasonable cost. The new geared head lathes extends that reputation with new models designed to give you increased productivity into the 21st century. Like all Harrison lathes the new geared head lathes are guaranteed to turn within .0001". But, beyond the accuracy you expect from Clausing/Harrison, the new geared head lathes are built rugged for durability and long-lasting quality.

Features

All Harrison V Machines Feature:

- All head stock gears are ground and hardened
- Spindle bearings, gears, and shafts are lubricated by a pumped bath of oil
- An easy-to-read index plate makes it simple to select the proper feed or thread
- The apron has hardened gears and oil bath lubrication
- Extra wide bed provides accuracy and minimal wear
- Easy access pull-out rolling chip bin
- Precision Gamet spindle bearings
- Backed by the Clausing Service Center, the industry leader
- Equipped with chuck guard and lead screw cover
- Maximum Spindle T.I.R. .0001"

Specifications

	15" x 50"
Swing over bed	15.7"
Swing over cross	9.7"
Center distance	50"
Bed width	12.5"
Swing in gap	23"
HEADSTOCK	
Spindle nose	D1-6
Spindle through hole	2.125
Spindle speed (RPM)	25 – 2000
Number of speeds	16
Spindle center	4MT
FEED AND THREADING	
Longitudinal feed range	.0007"-.048"
Cross feed range	.00035"-.024"
Range of English threads	2-56 TPI
Number of English threads	56
Range of Metric threads	.2-14 mm
Number of Metric threads	51
Leadscrew diameter	1.25" - 4 TPI
CARRIAGE	
Cross slide travel	9.8"
Compound rest travel	5.1"
Power rapid traverse	
Tailstock quill diameter	2.8"
Center	5 MT
Quill travel	6.1"
Drive motor	7.5 Hp
Weight	3300 lbs.

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OPERATING SAFETY

HEALTH AND SAFETY

GUIDANCE NOTES

**PLEASE READ CAREFULLY
BEFORE OPERATION
OF YOUR LATHE**

OPERATING SAFETY

OPERATOR SAFETY

These Lathes are fast, powerful machines which can be dangerous if used under improper circumstances.

Read the following Health and Safety Guidance Notes and observe before and during the use of the machine.

HEALTH AND SAFETY AT WORK ACT 1974 (U.K. ONLY)

In accordance with the requirements of the Health and Safety at Work etc. Act 1974 this manual contains the necessary information to ensure that the machine tool can be operated properly and with safety. It is assumed that the operator has been properly trained, has the requisite skill and is authorised to operate the machine, or, if undergoing training, is under the close supervision of a skilled and authorised person.

Attention is drawn to the importance of compliance with the various statutory regulations which may be applicable, such as "The Protection of Eyes Regulations". It is further stressed that good housekeeping, common sense and the maintenance of good established work shop practice is essential.

Adequate information is also provided to enable the machine to be properly serviced and maintained by persons with the necessary skills and authority.

ON MACHINES WITH VARIABLE SPEED DRIVE.

NOTE THAT THESE MACHINES ARE DESIGNED TO ALLOW FAST AND EASY CHANGE OF THE SPINDLE SPEED. TAKE CARE TO ENSURE THAT THE WORK PIECE IS SECURE AND THE MAXIMUM SAFE SPEED FOR ANY OPERATION IS NOT EXCEEDED.

ALL MACHINES

BECAUSE OF THE POSSIBILITY OF BODILY CONTACT AND WHIPPING, ESPECIALLY WHEN SMALL DIAMETERS OF MATERIAL ARE USED, BAR STOCK MUST NOT, UNDER ANY CIRCUMSTANCES, BE ALLOWED TO EXTEND BEYOND THE END OF THE HEADSTOCK SPINDLE WITHOUT THE USE OF SPECIAL GUARDING AND ADEQUATE SUPPORT.

OPERATING SAFETY

OPERATING SAFETY PRECAUTIONS

1. Keep the machine and work area neat, clean and orderly.
2. Keep all guards and cover plates in place and all machine cabinet doors closed.
3. Never lay anything on the working surfaces of the machine, where it may foul with rotating or moving parts.
4. Do not touch or reach over moving or rotating machine parts.
5. ENSURE YOU KNOW HOW TO STOP THE MACHINE BEFORE STARTING IT.
6. Do not operate the machine in excess of its rated capacity.
7. Do not wear rings, watches, ties or loose sleeved clothing.
8. STOP MACHINE IMMEDIATELY ANYTHING UNEXPECTED HAPPENS.
9. DO NOT interchange chucks or other spindle mounting items without checking for correct locking.
10. Do not use other workholding devices without checking for compatability with 600 Lathes Ltd. and workholding manufacturer.
11. Check load capacity of revolving centres for current application.
12. Isolate machine when leaving it unattended.

OPERATING HAZARDS

When using the machine be FULLY AWARE of the following operating hazards detailed under the following instructions:

a) *METAL CUTTING FLUIDS*

Cancer of the skin may be produced by continuous contact with oil; particularly with straight cutting oils, but also with soluble oils. The following precautions should be taken:

1. Avoid unnecessary contact with oil.
2. Wear Protective clothing.
3. Use protective shields and guards.
4. Do not wear oil soaked or contaminated clothing
5. After work thoroughly wash all parts of the body that have come into contact with oils.
6. Avoid mixing different types of oils.
7. Change oils regularly.
8. Dispose of oils CORRECTLY.

b) *SAFE OPERATION OF LATHE CHUCKS*

All workholding devices must be clearly marked indicating the maximum safe RPM. This must not be exceeded. It must be noted that the maximum RPM marking usually assumes ideal working conditions. Lower maximum speeds should be used typically for the following reasons.

They apply only to chucks in sound condition.

If a chuck has sustained damage, high speeds may be dangerous. This applies particularly to chucks with grey cast iron bodies wherein fractures may occur.

The gripping power required for any given application is not known in advance.

The strength of the component being gripped, the area of the grip, the balance of the workpiece etc. will all have a major effect on the safe maximum RPM that can be used

OPERATING SAFETY

There is the possibility of the workpiece becoming insecurely gripped due to the influence of centrifugal force under certain conditions. The factors involved include:-

- (a) Too high a speed for a particular application.
- (b) Weight and type of gripping jaws if non-standard.
- (c) Radius at which gripping jaws are operating.
- (d) Condition of chuck - inadequate lubrication.
- (e) State of balance.
- (f) The gripping force applied to the workpiece in the static condition.
- (g) Magnitude of the cutting forces involved.
- (h) Whether the workpiece is gripping externally or internally.

Careful attention must be paid to these factors. As they vary with each particular application, a manufacturer cannot provide specific figures for general use, the factors involved being outside his control.

GENERAL PRINCIPLES CONCERNING OPERATOR SAFETY FOR ALL TURNING MACHINES

- (1) Do not grip a component with grease or oil on it.

Grip all components firmly.

Do not attempt to hold components that are too awkward or too difficult to hold.
Do not hold components that are too heavy for the machine.

Know how to hold components properly when lifting.

- (2) Be sure to clean oil or grease from hand tools, levers and handles.

Be sure there is enough texture on the surface of the hand tool or lever handle for proper safe hand contact.

- (3) Grip hand tools and lever handles firmly.

Always choose the proper hand tool and appropriate grip position on the lever handle.

Do not use hand tools or lever handles in an awkward position.

Do not apply excessive force.

- (4) Always use the recommended gripping position to grasp hand tools and lever handles.

- (5) Do not allow turning of hand tools to be caught in the chuck or other holding device.

- (6) Do not use broken, chipped or defective tools.

- (7) Be sure work piece cannot move in chuck or other holding device.

- (8) Beware of irregular shaped work pieces.

- (9) Beware of large burrs on work pieces.

- (10) Always select the correct tool for the job.

- (11) Do not run the machine unattended.

- (12) Do not use tools without handles.

- (13) Always support the work piece as necessary using chucks, steadies and centres.

- (14) Correctly locate tool in socket heads and screw slots.

- (15) Beware of obstructions that prevent complete tightening of screws - ensure screw is tight.

- (16) Do not rush work.

OPERATING SAFETY

- (17) Never substitute the wrong size tools if the correct sized tool is not available or cannot be located in the shop.
- (18) Do not move guards while lathe is under power.
- (19) Do not place hand or body in path of moving objects.
 - Beware of moving lathe parts that can fall.
 - Be aware of where you are moving your hand or body in relationship to the lathe.
 - Beware of holding a tool or other parts inserted in or attached to the chuck or work piece.
 - Be aware of hands or other parts of the body that may in position to be hit by a chuck or work piece.
- (20) Beware of accidentally moving levers, clutches (where applicable) or turning the power on.
- (21) Know the function of each and every control.
- (22) Never place hand on chuck or work piece to stop rotation of the spindle.
- (23) On machines with clutch drive make sure clutch is completely disengaged on stopping, and kept properly adjusted.
- (24) Make sure power has been turned off when lathe is unused for sometime.
- (25) Allow chuck to stop before operating it.
- (26) Always check chuck area for chuck keys and loose items.
- (27) Never start spindle with chuck key in the chuck.
- (28) Do not allow distractions to interfere with lathe operations.
 - Do not operate lathe whilst talking.
- (29) Beware of lathe dangers when attending to other aspects of lathe operation. eg. whilst operating tailstock.
- (30) Beware of loose clothing near the rotating parts of the lathe.
- (31) Beware of loose hair near the rotating parts of the lathe.
- (32) Beware of performing another operation while in close proximity to rotating parts on the lathe.

- (33) Always attend to filing and deburring operations.

Always pay attention to file or deburring tools close to the chuck.

Files and deburring tools may catch on chuck.

- (34) Beware of clutch (where applicable) position when jogging the spindle to different positions for gauging .

- (35) Beware of hands resting on clutch levers.

- (36) Be sure lathe is in neutral position when placing gauges on components gripped in the chuck.

- (37) Be sure motor (on machines with clutches) is not running when using gauges on the machine.

- (38) Always wear protection before operating the lathe.

Always wear the correct protection before operating the lathe.

Never remove protection for even a short time when operating the lathe.

Wear protective devices correctly.

Know the correct way to wear protective devices.

- (39) Beware of material flying from the lathes.

- (40) Keep protective guards at the point of operation.

Know how to set or attach protective guards properly.

Never use the wrong protective guard.

Know how to select the proper guards.

- (41) a) When the chuck and workpiece are in motion never reach over, under or around a work piece to make an adjustment.
- b) Never reach over, under or around a work piece to retrieve anything.
- c) Beware of where you leave your tools during set up.
- d) Never reach over, under or around work piece to move hand tool/lathe to another position.
- e) Never reach over, under or around the work piece to tighten a lathe part.
- f) Never reach over, under or around work piece to remove swarf.

OPERATING SAFETY

(42) Know the proper procedure for applying loads.

Never apply force from an awkward position.

(43) Never mount a work piece too large for the lathe.

(44) Never mount a workpiece too large for the operator to handle.

(45) Use the equipment necessary for handling workpieces.

(46) Never apply undue force on the accessory or control lever.

(47) Secure all work pieces.

(48) Secure all jaws, nuts, bolts and locks.

(49) Always use the correct equipment.

(50) Never take cuts beyond machine's capability.

(51) Never use excessive force in polishing, filling and deburring.

(52) Always use the proper hand tool to remove swarf.

Never hurry to remove swarf.

Beware of swarf wrapped around the chuck or workpiece.

(53) Never change gears by moving them with your hands.

(54) Beware of tools/lathe parts falling on controls.

CHUCK GUARDS

The lathe is supplied with a fully interlocked chuck guard which is suitable only for use with the standard chucks normally supplied with the machine.

This chuck guard must be in the fully closed position before the spindle is permitted to run.

- a) In the event of larger chucks being fitted to the machine an alternative chuck guard must be used which is appropriate to the chuck diameter.

Note:

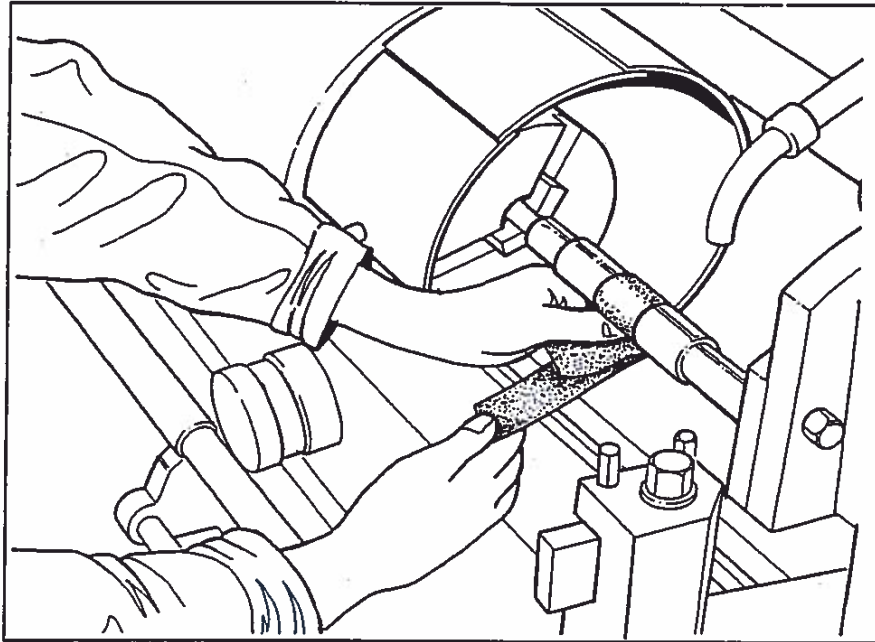
It is not recommended that chuck jaws extend beyond the outside diameter of the chuck and in these cases interference with chuck guards may occur.

For safe operating practices always ensure that chuck jaws do not extend beyond the outside diameter of the chuck.

- b) In the event of a faceplate being used on the machine the normal chuck guard must be removed from its mounting and if deemed necessary by the user alternative safe guarding facilities provided which are appropriate to the particular situation.

This can only be determined on a case by case basis when using faceplates and is therefore the responsibility of the user.

Accidents at Metalworking Lathes using Emery Cloth



Danger: Even with long strips of cloth there is a danger of trapping.

Hazards

A high proportion of all accidents at metalworking lathes involve the use of emery cloth and result in injuries such as broken and, occasionally, amputated fingers.

Emery cloth is used to deburr, polish or size a wide range of cylindrical, tapered and threaded metal components while they are rotating in lathes.

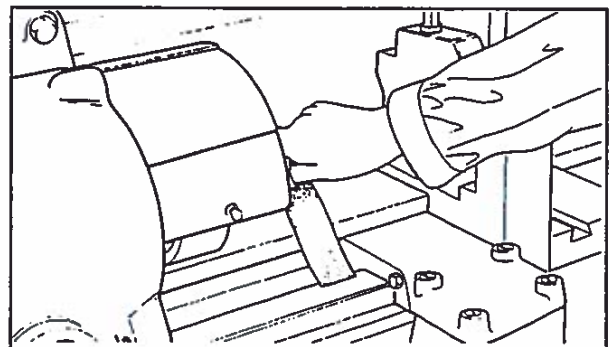
Most accidents happen when each end of a strip of emery cloth is held in separate hands and passed around the back of the component being finished. If the cloth is wrapped around the fingers and/or becomes snagged on the component while it is tightly gripped, then a serious injury is the likely result.

Precautions

Emery cloth should NEVER be used at CNC lathes. Employers should assess the need to use emery cloth on components rotating in a lathe.

Such operations may not be necessary if :-

- (a) the finish being sought is only cosmetic. For such finishes the component may be held in one hand and polished by emery cloth held in the other. Alternatively a finishing belt or machine may be used;
- (b) a sizing operation can be successfully performed either by turning or by further operations in a dedicated polishing, finishing or grinding machine.



Danger : Emery cloth should never be held loose in the hand.

If the required tolerance is only achievable by the use of emery cloth against rotating components, then the emery cloth should be applied using either:

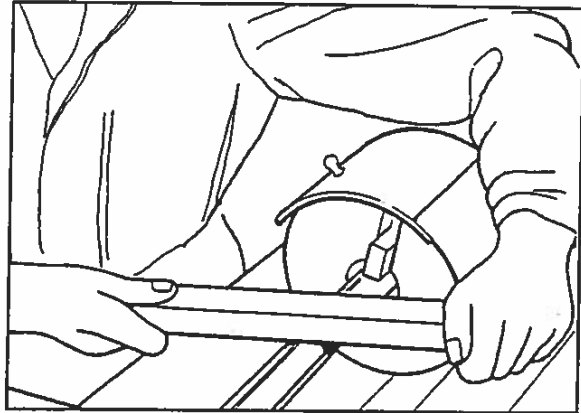
- (a) a backing board of good quality wood;
- or
- (b) a tool post onto which the emery cloth may be placed;
- or
- (c) a 'nutcracker' consisting of two backing boards which are lined with emery cloth and joined at end and shaped so that they may encompass the surface to be finished;
- or
- (d) hand-held, abrasive-impregnated wire brushes.

Where none of the above methods is reasonably practicable and it is necessary to use emery cloth for polishing the outside diameters of components, the emery cloth should be used in long strips with one end passed beneath the component.

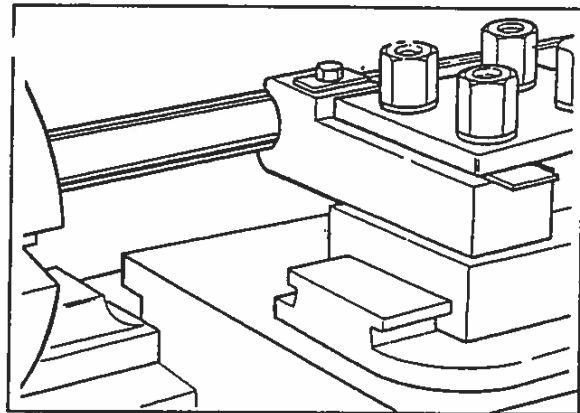
Force should be applied by pulling both ends of the cloth upwards, never allowing the cloth to go slack or to wrap around either the operator's finger or the components.

For polishing the ends of components, only very short lengths or pads of cloth should be used which are incapable of causing entanglements.

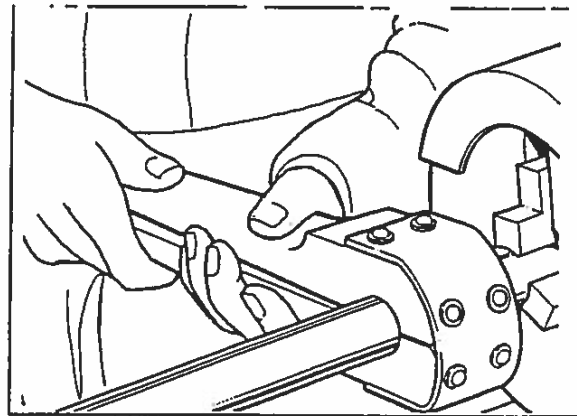
Gloves should never be worn when polishing is being carried out.



(a) *Sticks used in this way must be strong and of good material.*



(b) *The use of a toolpost completely removes all risk of injury to the hands.*



(c) *Using the 'nutcracker' method - a much better way of polishing.*

INSTALLATION

MACHINE SPECIFICATION

Centres

Height	195mm (7.68")
Admits between	1250mm (50")

Swing

Over bed (saddle wings)	400mm (15.7")
Over cross-slide	246mm (9.7")
In gap	585mm (23")
Width in front of faceplate	165mm (6.5")

Spindle

Bored to pass	54mm (2.125")
Nose Type	D1-6" Camlock
Morse taper in bush	No.4 M.T.

Spindle Speeds

Selected in 4 ranges of 4 speeds in each range

25	33	45	60
80	108	140	190
260	350	470	625
840	1120	1500	2000

<u>Motor (main)</u>	5.5Kw (7.5HP)
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Bed

Width of ways	318mm (12.5")
Type of ways	Vee and flat

Cross-Slide

Width and length	180mm (7") - 850mm (33.5")
Travel	250mm (9.8")

Top Slide

Width	100mm (4")
Travel	130mm (5.1")
Tool section	25 x 25mm (1" x 1")
Quick change tooling	Dickson No.2 E

Tailstock

Quill diameter (nominal)	73mm (2.8")
Travel	140mm (5.5")
Morse taper	No.5 M.T.
Set over	±10mm (0.4")

Leadscrew

Diameter	32mm (1.25")
Thread	6mm pitch or 4 T.P.I.

Threads

Metric pitches	0.2-14mm (51)
Imperial T.P.I.	2-56 (56)
Module pitches	0.2 - 3.5 (20)
Diametral pitches	8-56 (20)

Feeds

Metric (R10) Series)	0.036 - 2.4mm/rev
Imperial (R10 Series)	0.0014 - 0.096in/rev
Cross feeds = half longitudinal values (approx.)	

Height of Machine

Floor to spindle centre	1070mm(42.1")
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<u>Overall Length</u>	2500mm (98.4")
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<u>Overall Width</u>	1100mm (43.3")
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<u>Overall Height</u>	1300mm (51.2")
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<u>Weight</u>	1500kg (3300 lb)
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For other dimensions see foundation plan

Coolant Pump

Flow	25 Litre/min @ 2 Metre Head
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NOISE LEVEL

The maximum noise level at the operators position (Fig.1) is within 85 dB(A) and the maximum mean noise level is within 85 dB(A).

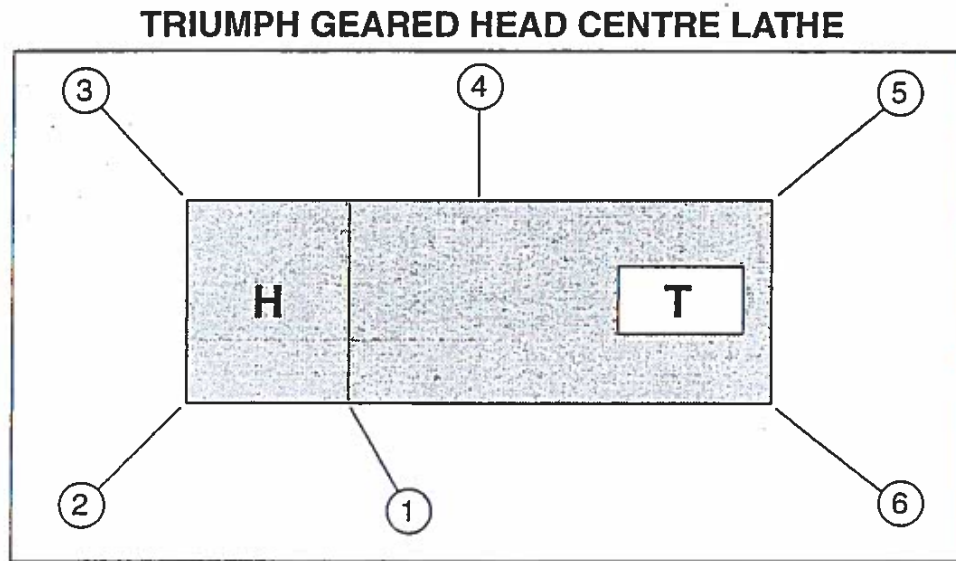


Fig.0

NOTE:

The operators position is position 1 and the mean is taken from the readings at all 6 positions.

The conditions of measurement are with the spindle running at top speed, with a standard chuck fitted, with no feed engagement.

These measurements are in accordance with **BS4813 : 1972**

INSTALLATION

The approximate weight of the machine is -

1250mm - 50" between centres 1500Kg - 3300 lb

Always ensure capacity of equipment is adequate before attempting lift.

Preparation and Safety Checks

1. Remove all items of loose equipment.
2. Clamp tailstock securely at the tailend of the bed.
3. Clamp saddle to bed.
4. Ensure eyebolts, shackle pins and securing screws of lifting equipment are correctly tightened.
5. Only use the correct equipment.
6. **DO NOT SLING AROUND BED.**
Leadscrew and splineshaft may be bent or damaged.

LIFTING

1. Position sling complete with protective sleeve into cutaway at the bottom of the first angled web nearest to the headstock. (Fig.1A)

To ensure better balance the sling should be away from the front of the machine.

2. Carefully lift the lathe clear of ground and if necessary reposition the saddle to achieve better balance before lifting further.

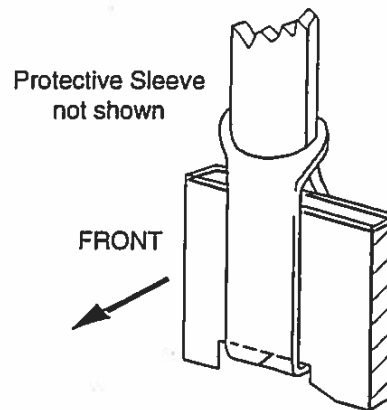


Fig. 1A

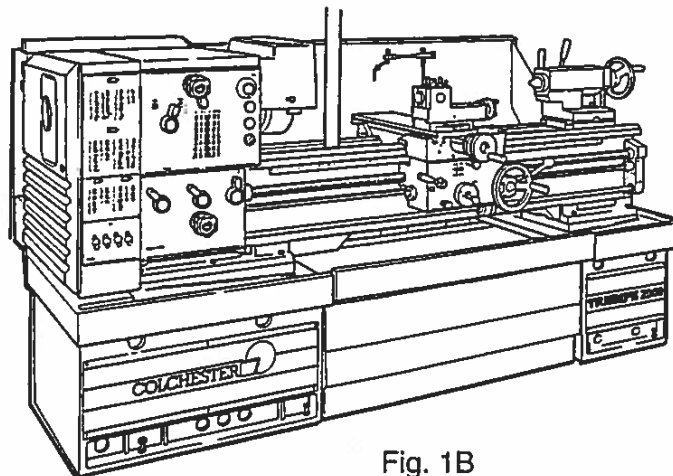


Fig. 1B

TEN RULES FOR SAFE LIFTING

1. Never overload the equipment.
2. Never use damaged slings.
3. Position the sling correctly. The sling must not be placed round sharp edges, do not let it slide over corners or along edges.
4. Do not drag goods in the sling.
5. Position sling correctly to ensure easy removal after use.
6. Use smooth-rounded hooks having an inside radius of not less than 50mm.
7. Avoid placing more than one sling on the same hook.
8. Keep away from alkalis and acids.
9. When lifting heavy loads with more than one sling, remember that the total weight may not be evenly distributed.
10. Remember that vibration during transport can cause friction between sling and machine - use protective sleeves.

Sling are made from 100% polyester.

Each sling is clearly labelled with the safe working load and the safety factor is 6:1.

All slings are colour coded for increased safety.

For lifting rough or sharp edged loads we recommend the use of protective sleeves.

SAFETY REQUIRES PERMANENT SUPERVISION

We recommend the following procedure

1. All equipment should be examined by one person only.
2. Lay sling on a flat surface in a well lit area.
3. Examine both sides of the sling.
4. Slings must be examined over the whole length and in the eyes.

INSTALLATION

INSTALLING

Locate the machine on a flat, level solid foundation, allowing sufficient area for easy working and maintenance. The lathe may be used when free standing but for maximum performance it should be bolted to the foundation.

FOUNDATION PLATES

Whether the machine is to be a free standing or fixed installation the eight jacking bolts **MUST BE POSITIONED** on eight steel plates.

The dimensions of the plates should be 15mm (5/8") depth and of approximately 50mm (2") diameter.

FREE STANDING

Position the lathe on the foundation and adjust each of the eight jacking bolts in the plinths to take an equal share of the load. Then level the machine using a precision level.

FIXED INSTALLATION

Position the lathe over eight bolts (5/8" or 16mm dia) set into the foundation corresponding to the dimensions in the plinths as shown on the foundation plan Fig.5.

Adjust each of the jacking bolts to take an equal share of the load, level the machine then tighten onto the holding down bolts. Re-check the bed level.

LUBRICATION CHECKS

Ensure that both the headstock lubrication system and gearbox are filled with Shell T37 (ISO VG 37) oil, to correct level and that the apron reservoir is filled to the level of the sight window with Shell Tonna TX 68 (ISO VGT 68) oil.

Oil compound slide and tailstock through oilers furnished.

Before each working shift, operate the manual lubrication pump to ensure adequate lubrication of carriage slideways.

Refer to Lubrication Chart in Service and Maintenance Section for further information.

HEADSTOCK SPINDLE BEARINGS

All headstock spindles have been submitted to a running in procedure during assembly. It is however recommended that further running in is performed of the headstock bearings before any prolonged high speed rotation is undertaken.

Recommended speeds and duration:-
15% of Maximum Speed for 1 hour.
50% of Maximum Speed for 30 Minutes.
80% of Maximum Speed for 30 Minutes.

CLEANING

Before operating the machine remove the anti - corrosion coating, from all slideways, the leadscrew feed shafts and the end train gear, (see Fig. 2) using only white spirit or parafin.

Do **NOT** use non-approved solvents i.e. Cellulose solvents or petrol; as they are hazardous and will damage the paint finish.

Oil all bright, machined surfaces immediately after cleaning; use heavy oil or grease on the end-train gears.

Operate the slideways lubrication pump, mounted on the front of the apron several times to ensure that the last traces of anti-corrosion coating are removed from under the bedway wipers and slide edges.

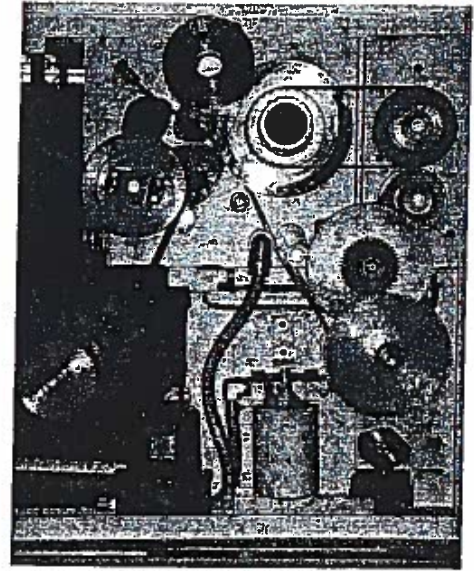


Fig. 2

LEVELLING

Using an engineers precision level (typical sensitivity 0.05mm/m) mounted on the cross-slide (Fig. 3) level the machine end-to-end and front-to-back by adjusting the relevant jacking bolts. Align transversely as shown in Test No. G1 in the accuracy chart in order to eliminate "twist".

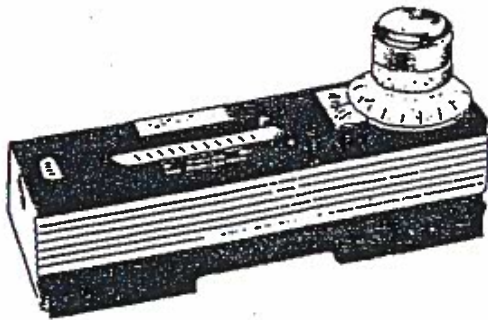
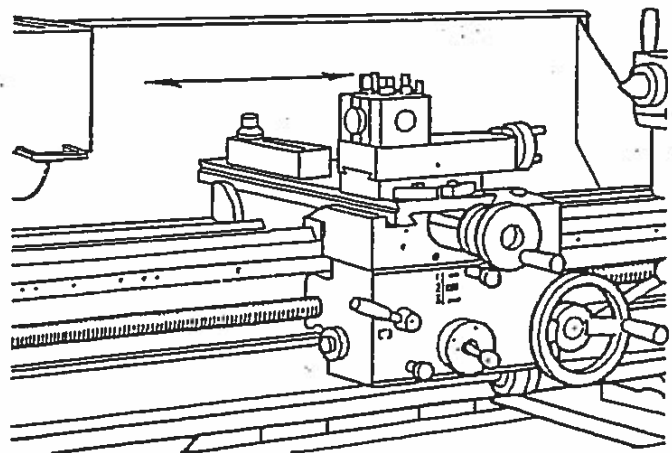


Fig. 3



INSTALLATION

ELECTRIC SUPPLY CONNECTIONS

INPUT VOLTAGES

Three phase 220/440vAC $\pm 10\%$ and 380/415vAC $\pm 10\%$, 50/60 Hz.

Recommended Fuses:-

220 volts supply –**35 amps**

380/415/460 volts supply –**20 amps**

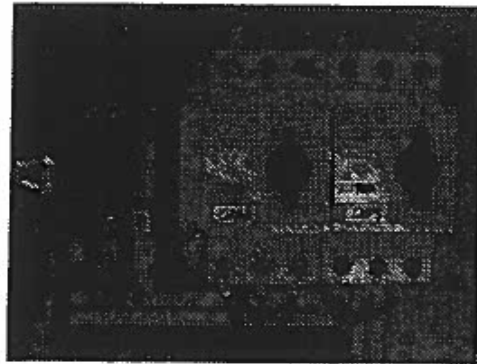


Fig.4

Power should be supplied from a separate external fused isolator, the line entering the electrical cabinet at the base of the cabinet and connected to the terminals of the machine isolator. An earth lead must be used. (Fig.4)

Main motor rotation must be counterclockwise, viewed from the motor pulley end. The correct direction of spindle rotation may also be confirmed by engaging the forward clutch. With the clutch lever up the spindle should turn in the conventional forwards direction should the motor be running in the wrong direction switch off mains at the external fused isolator and interchange any two of the three phase-lines into the machine isolator. A wiring diagram is included in the servicing and maintenance section.

The coolant motor is left electrically disconnected for transportation. This must be re-connected into the terminals marked U3, V3 and W3 in the electrical cabinet.

FOUNDATION PLAN

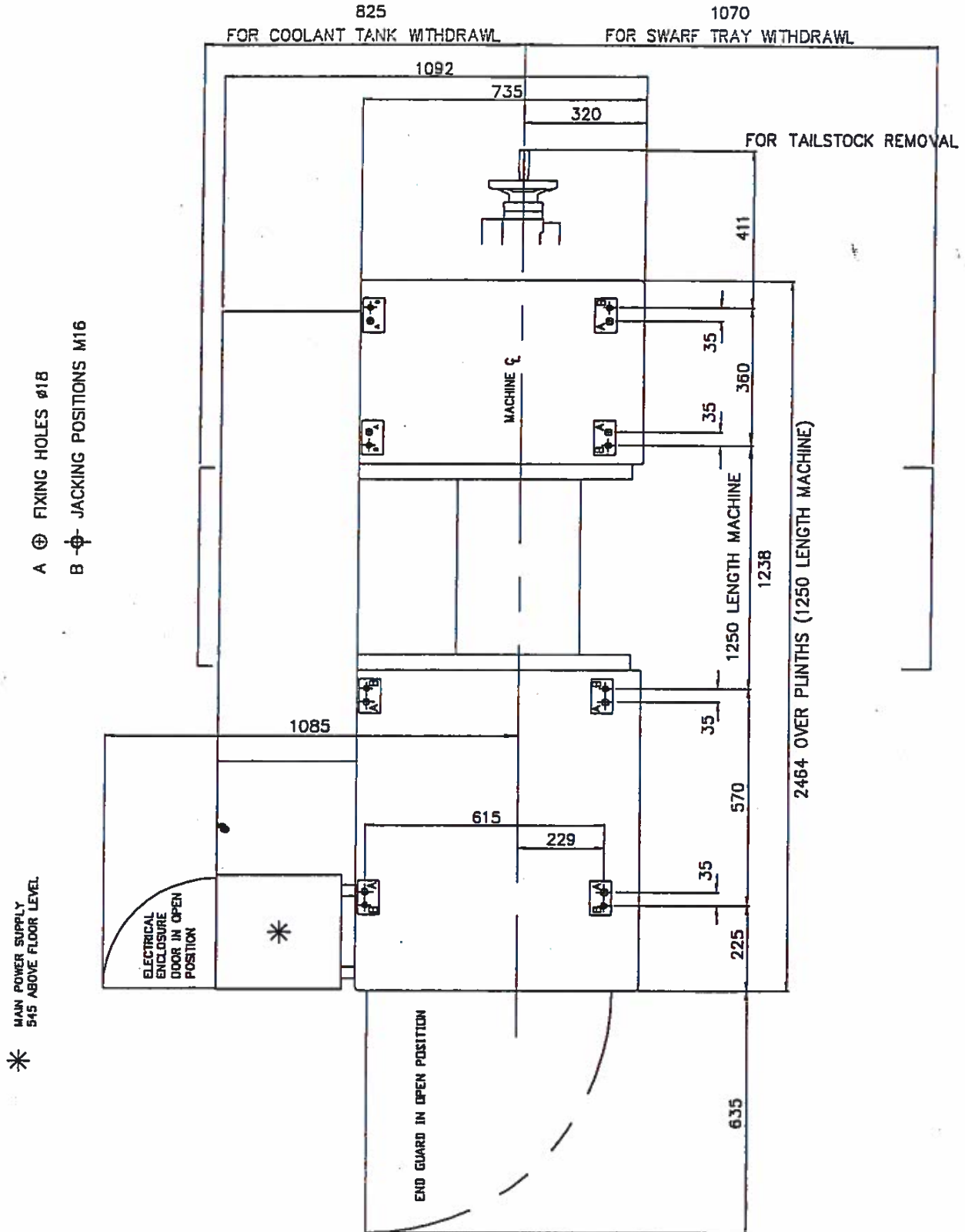


Fig. 5

INSTALLATION

CHUCKS AND CHUCK MOUNTING

When fitting chucks or faceplates, first ensure that the spindle nose and chuck tapers are clean; mount the chuck and ascertain that the cams lock in the correct position. When mounting a new chuck it may be necessary to reset the camlock studs (A). To do this, remove the caphead locking screws (B) and set each stud so that the scribed ring (C) is flush with the rear face of the chuck and with the circular scallop in line with the locking screw hole (see inset).

Now remount the chuck or faceplate on the spindle nose and tighten the six cams in turn. When correctly tightened the camlock line on each cam should be between the two "V" marks on the spindle nose.

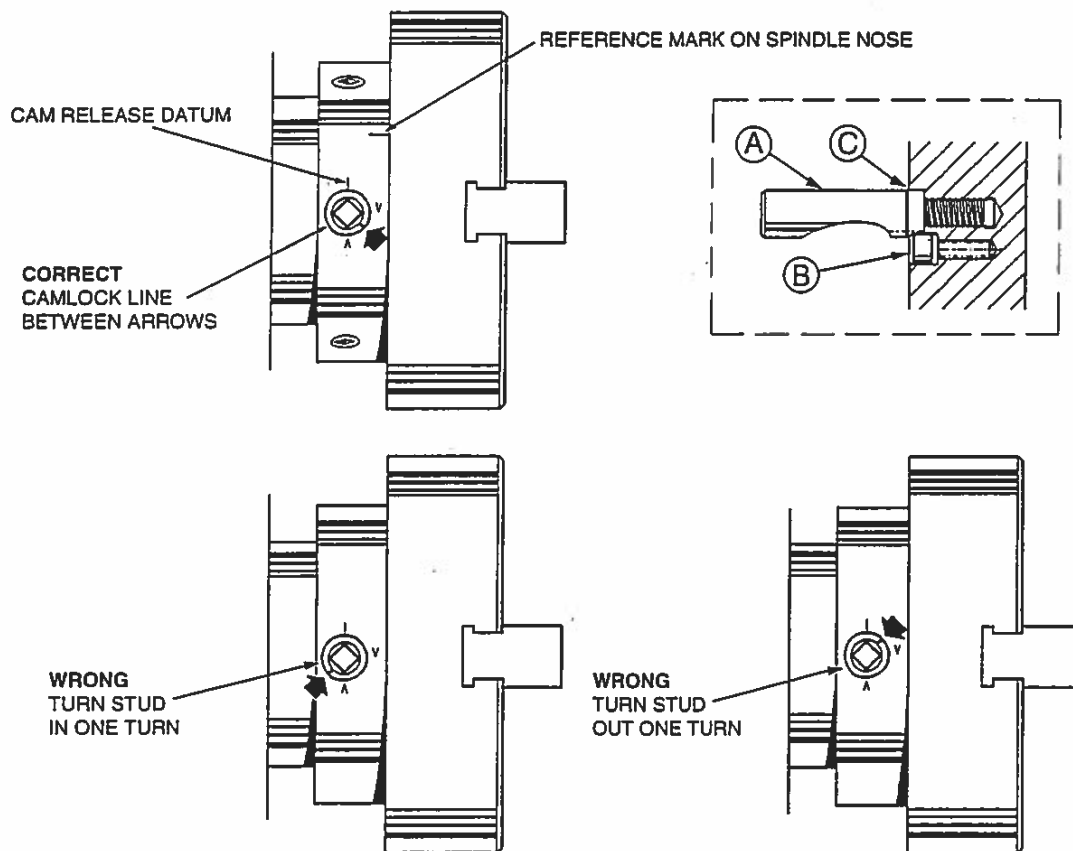
If any of the cams do not tighten fully within these marks, remove the chuck or faceplate and re-adjust the stud as indicated in the diagram.

Once a chuck has been correctly fitted it may be stamped to align with the spindle reference mark for subsequent re-mounting in the same position.

WARNING

Only high speed chucks to be used with this machine.

Take careful note of **speed limitations** when using face-plates. The 534mm (21") diameter face plate for gap bed use should not be run at more than 470 rev/min, and the 356mm (14") diameter faceplate should not be run at more than 670 rev/min.



LATHE SAFETY

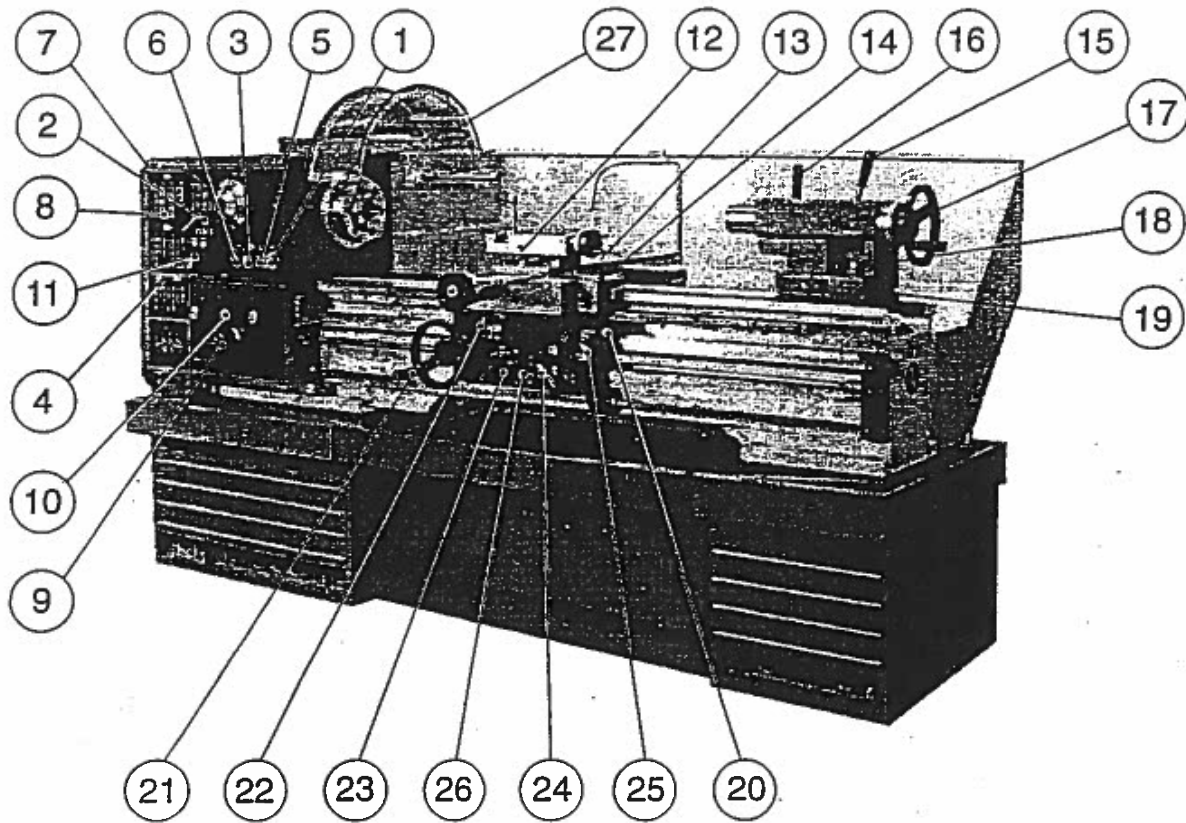
BEFORE ATTEMPTING TO START THE MACHINE READ CAREFULLY THE LATHE OPERATING INSTRUCTIONS ON PAGES 10 TO 17 OF THIS MANUAL.

IN THE INTERESTS OF SAFETY PLEASE READ THE OPERATOR HEALTH AND SAFETY GUIDANCE NOTES AT THE BEGINNING OF THIS MANUAL.

Some of the key points are:-

1. Ensure you know how to stop the machine before starting it.
2. Stop machine immediately anything unexpected happens.
3. Ensure speeds, feeds and depths of cut are compatible with the component and the holding devices.
4. Do not touch tooling, chuck or workpiece when spindle is revolving.
5. Wear and utilise suitable protective clothing and equipment.

CONTROL LAYOUT



- | | |
|---|---|
| 1. Emergency Stop Button | 15. Tailstock Locking Handle |
| 2. Spindle Speed Selectors | 16. Tailstock Barrel Locking Handle |
| 3. Main Motor Push Button | 17. Tailstock Handwheel |
| 4. Threading Data Plate | 18. Tailstock Clamp Bolt |
| 5. Brake Release Push Button | 19. Tailstock Set Over Screws |
| 6. Coolant Pump ON/OFF Switch | 20. Thread Dial Indicator |
| 7. Main Isolator (at rear of machine). | 21. Saddle Traverse Handwheel |
| 8. Feed Data Plate | 22. Feed Direction (Axis) Selector |
| 9. Feed Selector Dial | 23. Feed Engagement Lever |
| 10. Feed Selector Levers | 24. Leadscrew Engagement Lever |
| 11. Leadscrew/Feedshaft Reversing Lever | 25. Spindle Control Lever |
| 12. Top -Slide Locking Screw | 26. Manual Centralised Lubrication System |
| 13. Cross-Slide Locking Screw | 27. Interlocked Chuck Guard |
| 14. Carriage Locking Bolt | |

ELECTRICAL CONTROLS (Fig. 6)

Apart from the main isolator all electrical controls are fitted to the front face of the headstock. To start the main motor, switch on the main isolator, reset the emergency stop (A) then ensuring that the clutch lever is in neutral, press the main motor button (B). The motor will start running and the indicator lamp will light.

The spindle brake may be released by pressing the brake release button (C) continuously. The coolant pump may be switched on by turning switch (D).

To stop the main motor, the emergency stop button is pushed in.

Reset to allow starting by normal sequence.

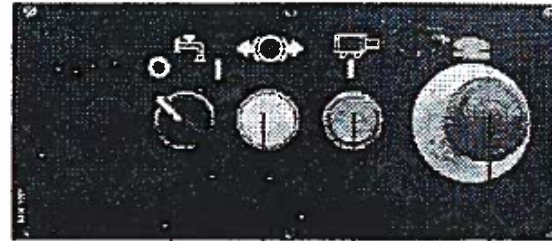


Fig.6

(D) (C) (B) (A)

SPINDLE ROTATION (Fig. 7)

Selected by means of the apron mounted clutch engagement lever is moved to the right and up for forward rotation. Returning to the neutral (central) position operates the spindle brake. Reverse spindle rotation is obtained by moving the lever downwards.

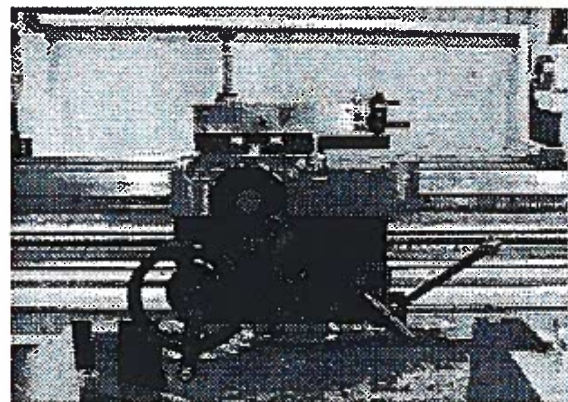


Fig. 7

SPINDLE BRAKE

A fail safe electromagnetic brake is provided and braking is automatically provided when the clutch lever is returned to the neutral position or power is lost to the machine.

SPINDLE SPEEDS (Fig. 8)

Spindle speeds are selected by means of the lever and knob Assembly mounted on the headstock, the 16 available speeds are shown directly on the dial face (A).

CAUTION: DO NOT MOVE SPEED SELECTOR CONTROLS WHILST THE SPINDLE IS MOVING.

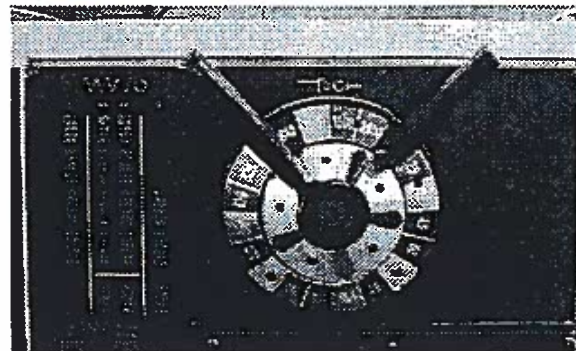


Fig. 8

(A)

OPERATING

THREAD AND FEED SELECTION

All threads and feeds directly available from the gearbox are shown on the data plates fitted to the headstock and change gear cover (Fig. 9) together with the relevant end gear train combinations and lever settings.

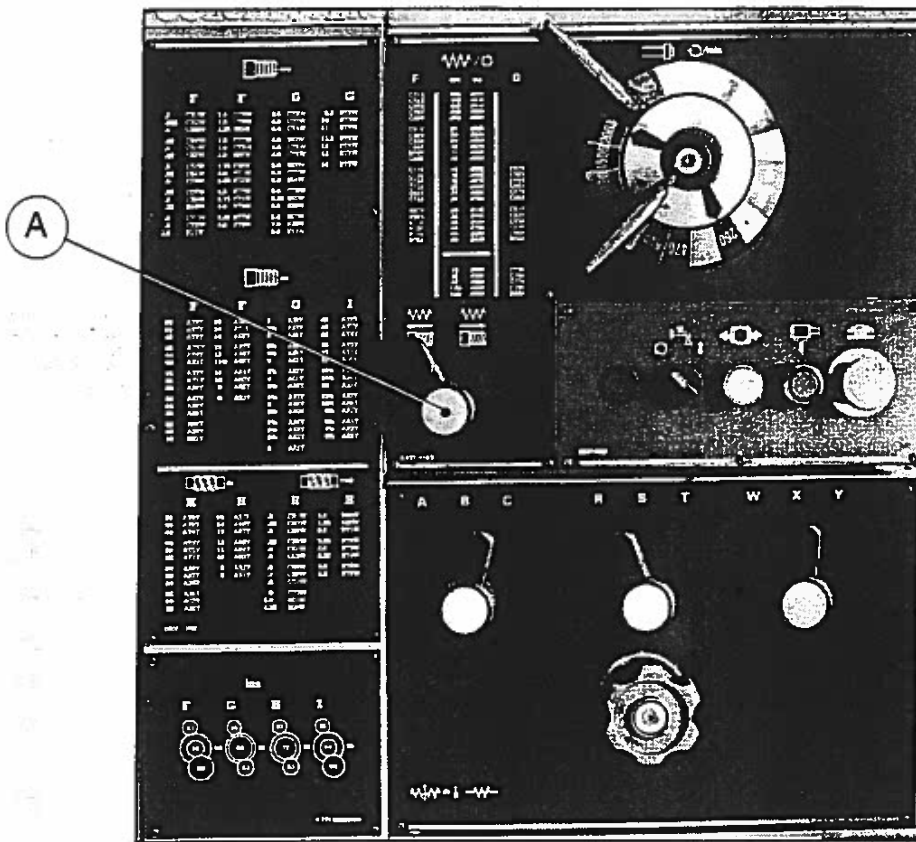


Fig. 9

CAUTION :

The coarse thread ranges of G and H should not be selected when using the high spindle speed range. The end gear trains should be arranged as in the diagrams shown on the data plate.

For any other threads or pitches not shown on the data plate our Technical Department is available to specify the most convenient change gearing required.

LEADSCREW REVERSING

Using lever (A) on the headstock (Fig. 9) the direction of rotation of both leadscrew and feedshaft may be reversed.

This allows the leadscrew nut to be permanently engaged during screw cutting and the direction of both feed and threads to be reversed whilst the spindle is running.

CAUTION :

When using the reversing lever the spindle speed should not exceed 175 R.P.M.

METRIC THREAD DIAL INDICATOR (Fig. 10)

This is supplied when the machine is fitted with a metric leadscrew and allows the majority of metric pitches shown on the data plate to be cut by engaging and disengaging the leadscrew nut for each pass.

The correct pinion must be meshed with the leadscrew and engagement of the leadscrew is made at the dial number to suit the pitch of thread to be cut.

Metric pitches not divisible into the pinions supplied, D.P., module and inch threads must be cut with the leadscrew left **permanently engaged** and changing direction by reversing the main spindle.

The information plate on the dial indicator shows:-

1. Pitch to be cut in mm.
2. The number of teeth on the pinion gear which engages with the leadscrew.
3. The dial lines at which the leadscrew may be engaged.

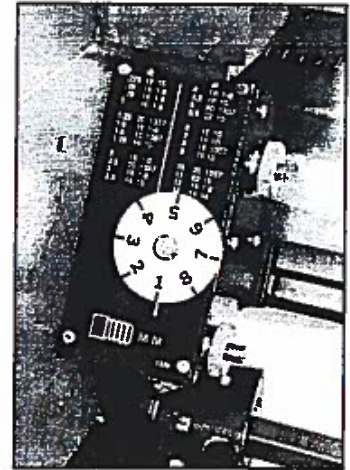


Fig. 10

INCH THREAD DIAL INDICATOR (Fig. 11)

This is supplied when the machine is fitted with an imperial leadscrew.

The plate (Fig. 11) shows the T.P.I. to be cut and the dial lines at which the leadscrew may be engaged. For metric threads, D.P., module and certain fractional inch threads the dial cannot be used. These threads must be cut with the leadscrew left **permanently engaged** and reversing direction by reversing the main spindle. See previous section.

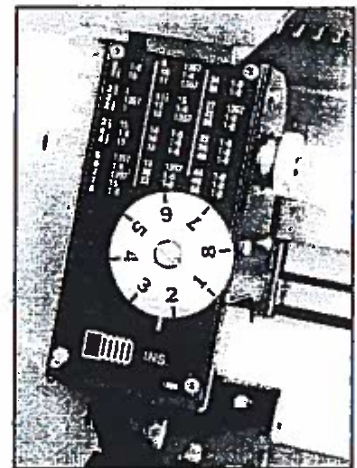


Fig. 11

MULTI-START THREADS

A multistart thread can be cut on a lathe in three basic ways.

1. By repositioning the compound (top) slide one pitch forward for each start. Note the slide is normally set at 90 degrees to the axis of the cross-slide. The accuracy of this method depends on the skill of the operator
2. By using an accurately divided driver plate and turning the workpiece one division for each start. With camlock mounted chucks two three and six start threads may be cut by indexing the chuck on the camlock studs.
3. By advancing the driver gear a calculated amount to advance the spindle by one pitch of the thread to be cut.

APRON AND SLIDE CONTROLS

Apron and slide controls (Fig. 12). In addition to the manual operation of the saddle by rotating apron handwheel (A), the cross-slide handwheel (B) and the topslide by handwheel (C), power feed is available to the saddle and cross-slide, by engaging lever (E).

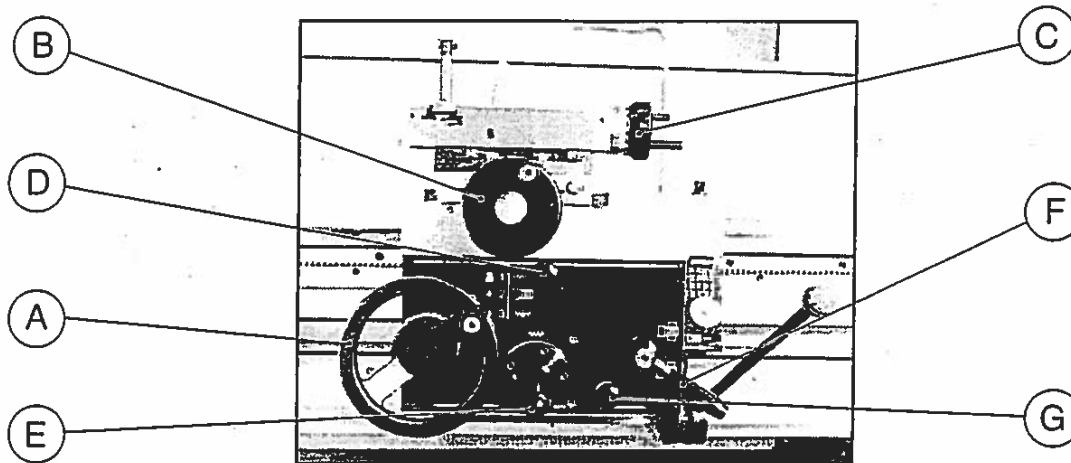


Fig. 12

1. Push pull knob (D) selects surfacing or sliding feeds. Push in for surfacing and pull out for sliding feeds.
2. Feed engage lever (E) is raised to engage whichever direction of feed is selected.
3. Lever (F) is used to engage the leadscrew nut for screw cutting.
4. For reversal of feed and thread directions there is a lever mounted on the headstock.

FEED TRIP ADJUSTMENT - A trip mechanism is incorporated in the apron enabling the saddle to power feed up to fixed stops. The loading at which the apron trips out has been pre-set during construction and should not be altered.

The apron handwheel (A) can be disengaged from its gearing during power operation or when screwcutting by pulling the handwheel out.

It is recommended that the automatic feed trip mechanism is **NOT** used below spindle speeds of 500RPM.

SADDLE LUBRICATION - Knob (G) operates the apron and slideways lubrication pump, which ensures that the bedways, cross-slide ways and nut are adequately lubricated. To ensure that the system is primed operate the pump until oil can be seen on the bedways and small tell-tale hole on the saddle. Under normal use the pump should be operated twice before commencing work.

CROSS-SLIDE AND TOPSLIDE - The handwheels carry dials graduated in either inch or metric dimensions. The cross-slide dial is graduated to indicate changes in workpiece diameter and topslide is graduated to indicate actual movement.

SADDLE LOCK SCREW - This enables the saddle to be locked to the bed for facing or parting off operations.

CROSS-SLIDE LOCK SCREW - This enables the cross-slide to be locked in a fixed position.

TOP-SLIDE LOCK SCREW - This enables the top-slide to be locked in position.

TAILSTOCK (Fig. 13)

The tailstock may be clamped to the bed by means of clamp lever (A) additional clamping may be obtained by tightening nut (B) located in the tailstock casting. This clamping nut should be released before attempting to move the tailstock and after the need for additional clamping. The tailstock barrel is locked by means of lever (C).

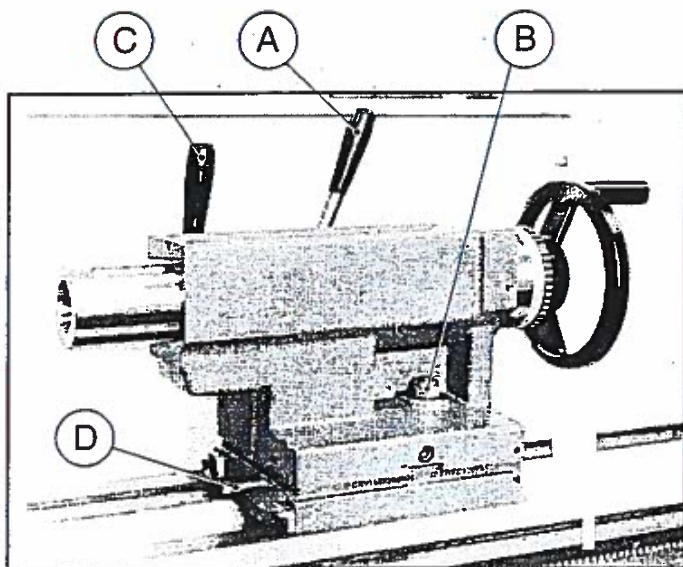


Fig.13

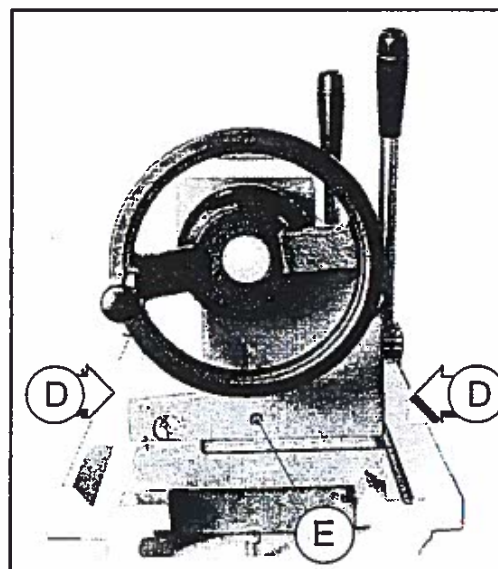


Fig.14

The tailstock can be set over for the production of shallow tapers or for re-alignment. Set over adjustment is achieved by unclamping tailstock lever (A) and nut. Slacken rear location screw (E) one turn (Fig. 14). Adjust screws (D) at each side of base by slackening one and tightening the other to laterally move tailstock across the base.

Re-tighten the rear location screw.

The barrel is graduated in inch and metric dimensions.

The dial on the tailstock handwheel is graduated in either inch or metric dimensions.

COOLANT

The coolant pump is operated by an ON and OFF switch located on the headstock.

The flow of coolant is controlled by means of the tap fitted to the standpipe.

The coolant tank is located at the back of the machine and has a capacity of 32 litres (8.5 US gallons).

Any commercially available coolant may be used - suitable for the tooling and type of material being cut.

GAP PIECE REMOVAL (Fig. 15)

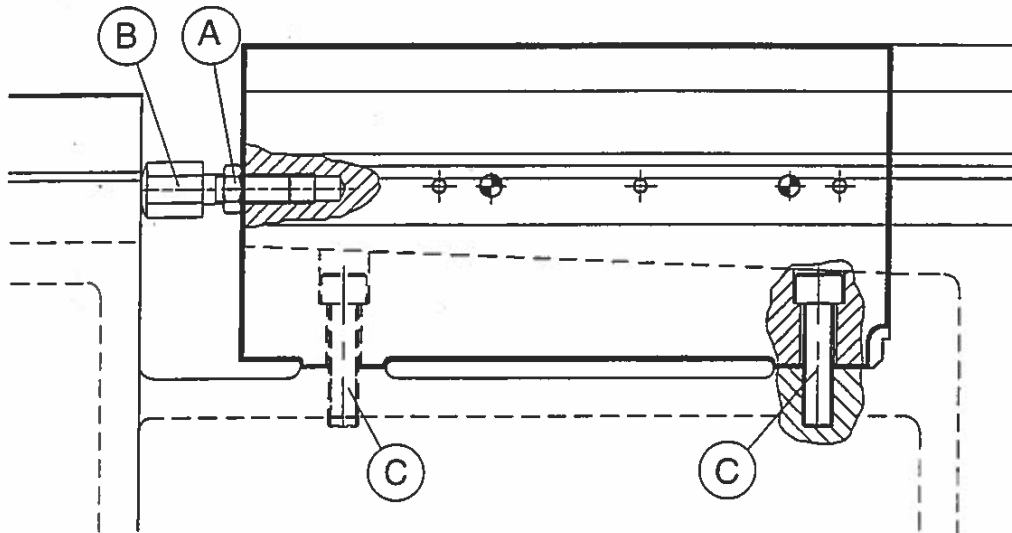


Fig. 15

REMOVAL PROCEDURE

- 1) Clean area around gap.
- 2) Remove chuck or any work holding device.
- 3) Release alignment bolt locknuts (A).
- 4) Fully retract alignment bolts (B).
- 5) Release holding down bolts (C).
- 6) Protect leadscrew
- 7) Carefully remove the gap piece avoiding damaging the leadscrew and gap piece mating surfaces.

REFITTING PROCEDURE

- 1) Clean area around gap.
- 2) Ensure machine is level.
- 3) Ensure all mating surfaces are clean.
- 4) Carefully slide gap piece back into position.
- 5) Lightly bolt into position, aligning the ways by hand and lightly tapping the gap with a hide hammer.
- 6) Finally position the gap by means of the alignment bolts (B), being careful not to overtighten (maximum torque 5 ft-pounds or 7 NM).
- 7) Tighten holding down bolts (C).

NOTE:

The two soft taper dowels included in the gap piece are provided to give an initial location only when refitting the gap piece.

They should be only 'lightly' fitted into their holes when the refitting procedure is undertaken, as detailed above. Only after re-machining of the holes using a taper reamer should the pins be tapped home firmly into position. (This is an optional process when refitting the gap piece and under normal circumstances it is not necessary).

LATHE ALIGNMENT

With the lathe installed and in running condition we recommend a check on machine alignments before commencing work. Check alignment and levelling at regular periods to assure continued accuracy.

HEADSTOCK CHECK (Fig. 16)

(Only to be carried out after checking machine level). Take a light cut over a 150mm (6") length of 50mm (2") diameter steel bar held in a chuck (but not supported at the free end). Micrometer readings at each end of the turned bar A and B should be within 0.01 mm.(0.0004").

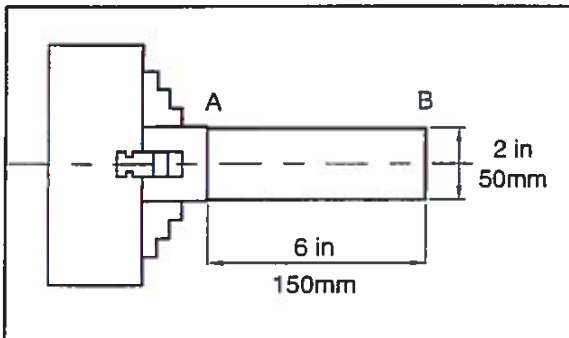


Fig. 16

To correct a greater difference in readings loosen the four headstock screws (A) shown in Fig. 17 then adjust the set over pad C to pivot the headstock about the dowel B. Tighten all securing screws after each adjustment. Repeat the test cut and alignment check until the micrometer readings are within tolerancel.

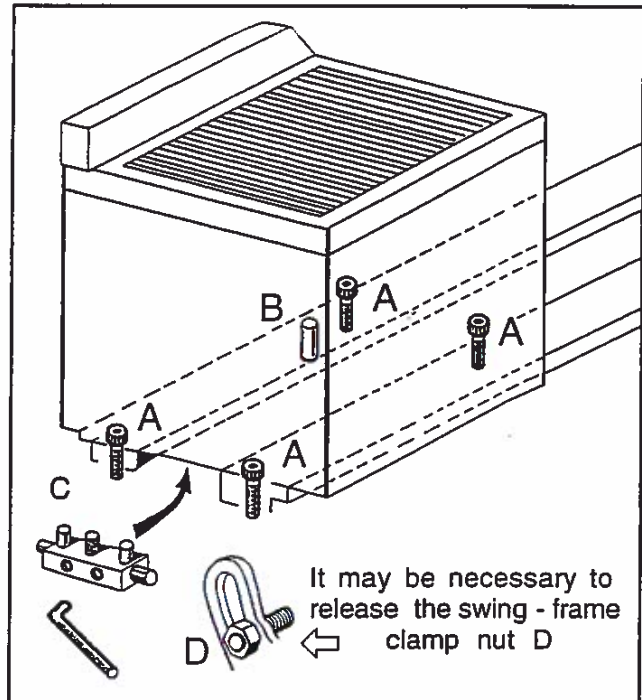


Fig. 17

TAILSTOCK CHECK (Fig.18)

Using a 300mm (12") long ground steel bar mounted between centres, check the tailstock alignment by traversing a dial test indicator along the centre line of the bar.

To correct any error use the set over adjustment procedure as shown in Figs. 13 and 14 on page 15 of this manual

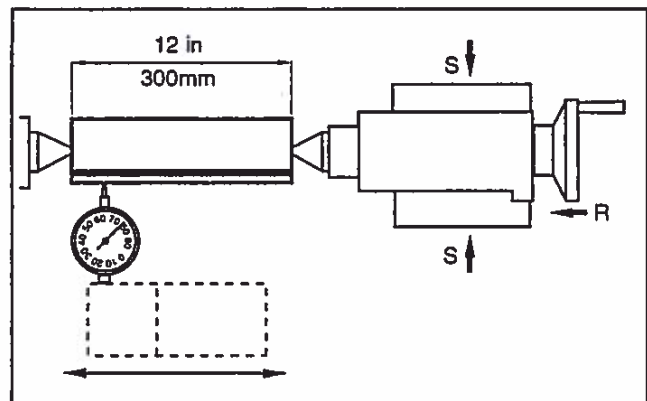


Fig. 18

SERVICING AND MAINTENANCE

END GEAR TRAIN (Fig. 19)

Drive from the Headstock to the Gearbox is transmitted through a Gear train enclosed by the Headstock End Guard. Intermediate Gears are carried on the adjustable Swing Frame (A). Gears must be thoroughly cleaned before fitting and backlash should be maintained at 0.127mm (0.005 in.) for correct mesh.

Lubricate Gears regularly with thick Machine Oil and apply Oil Can to the intermediate Gear Spindle.

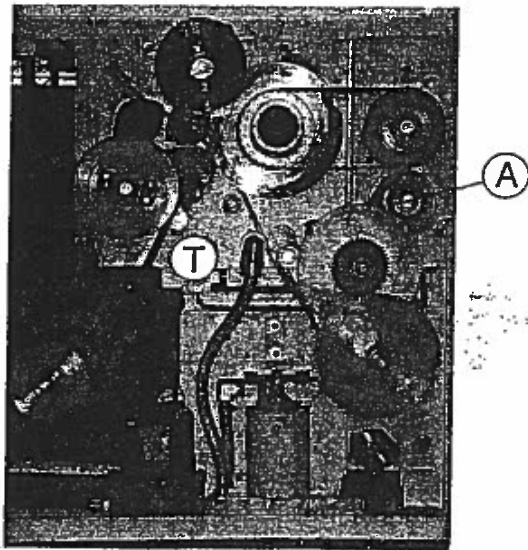


Fig. 19

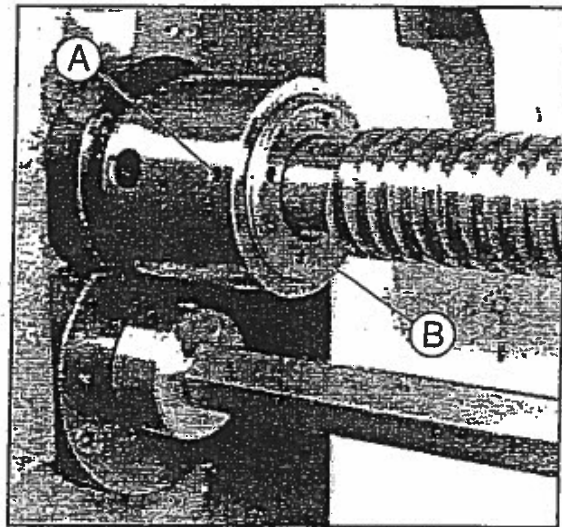


Fig. 20 (without leadscrew cover)

DRIVING BELT

The Vee Belt tension may be assessed by applying finger pressure to each belt in turn at point T midway between the two pulleys (Fig.19).

For correct tension a deflection of about 10mm should be possible in each Belt.

To adjust the Vee Belt tension - release the Lock Nuts on the Motor Platform Adjusting Screws and alternatively slacken one Screw and tighten the other against the Motor Platform until the correct tension is obtained then re-tighten the two Lock Nuts.

LEADSCREW TORQUE LIMITING DEVICE (Fig. 20)

The transmission is protected against severe overload by a torque limiting device fitted to the left hand end of the leadscrew. This is set to a pre-determined slipping torque before the machine leaves our works. In normal usage the user is advised not to alter this setting but to consult our Service Department in case of a problem.

Adjustment may be achieved by:

1. Loosening the two locking screws (A) on the O.D. of the device.
2. Turning the inner adjusting ring (B) (by means of the two holes in the R.H. face of the unit) clockwise to increase slipping torque.
3. Re-tightening the two locking screws.

To "feel" the slipping torque hold the apron handwheel to stop saddle movement whilst the leadscrew is engaged.

CAUTION :

Keep cutting tool well clear of workpiece and spindle at a low number of rev/min, when making adjustments.

DRIVE CLUTCHES

Two multi-plate clutches on the headstock clutch shaft provide drive for forward and reverse spindle rotation.

When correctly set, clutches should accelerate the spindle from rest to 2000 rev/min. within 3 to 4 seconds when fitted with the standard 250mm(10 in.) diameter 3-jaw chuck

Before adjusting clutches ensure that the main drive belts are correctly tensioned.

ACCESS

1. Switch off power supply at Mains Isolator.
Disengage Clutches with Spindle Forward/Reverse Control Lever in neutral position.
2. Remove Headstock Cover as follows:-
Remove Rubber Mat.
Remove Fixing Screws.

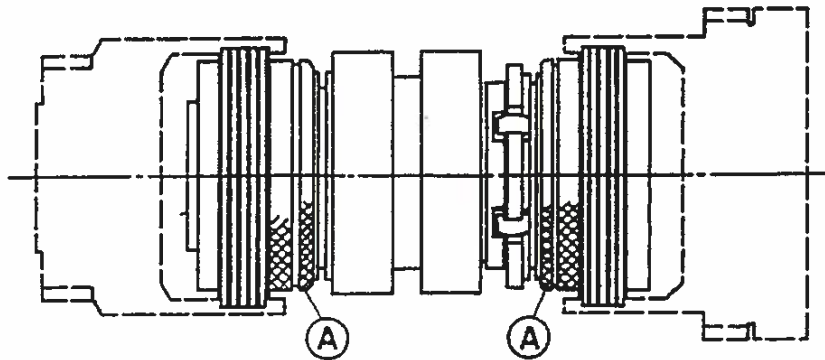


Fig. 21

ADJUSTMENT (Fig. 21 and 22)

1. Select Clutch to be adjusted, i.e. R.H. for forward L.H. for reverse.
2. Slide back Knurled Lock Ring (A) and rotate one notch at a time in direction of arrow to tighten.
3. Reset lock ring.

NOTE: OVER ADJUSTMENT MAY CAUSE SERIOUS DAMAGE TO CLUTCHES.

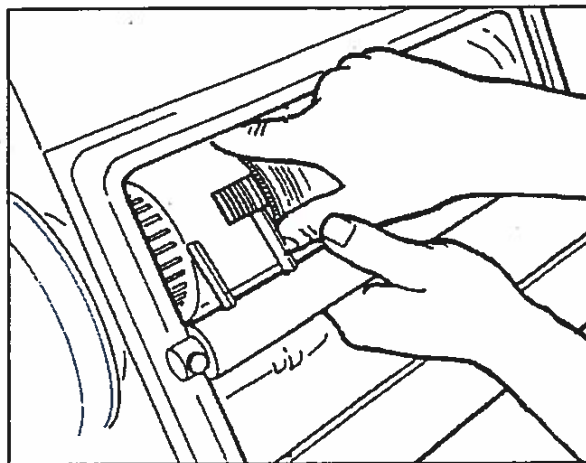


Fig. 22

SERVICING AND MAINTENANCE

CALIPER BRAKE UNIT

A considerable life expectancy is assured from the fail to safety caliper operated spindle brake, depending on the duty cycle imposed upon it, and the attention to prescribed maintenance.

BRAKE MAINTENANCE

The two most important features being the Air Gap Setting and the Free Floating condition of the brake on its two mounting pins (B).

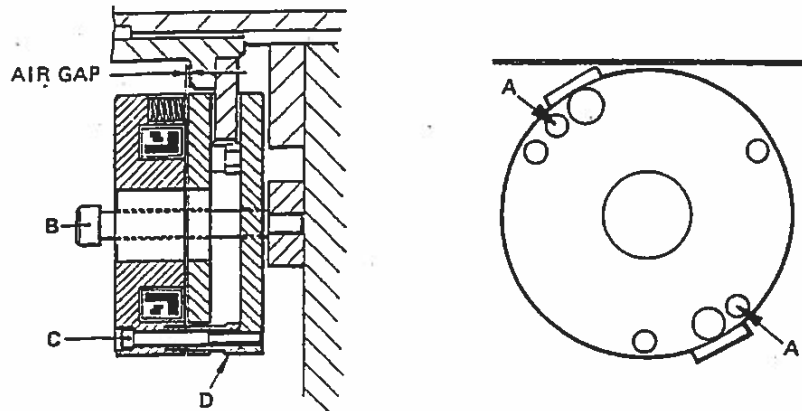


Fig. 23

The Air Gap is factory set at 0.25mm (0.010"). This gap should be checked at regular intervals of approximately 3 months. As the brake pads wear this gap will gradually increase, when the gap has reached 0.75mm (0.030") the brake should be adjusted as follows:—

ADJUSTING AIR GAP (Fig. 23)

- (a) Stop spindle and isolate machine.
- (b) Remove change wheel guard.
- (c) Check air gap
If adjustment is required proceed as follows:—
- (d) Fit two M6 x 45mm socket head transit screws (A) in position shown and tighten.
- (e) Before proceeding, take note of brake body float on mounting pins (B).
This should be of an easy rattle fit.
- (f) Release by two turns, each of the three brake body locking screws (C).
Next turn each of the hexagon spacers (D) anti-clockwise by equal amounts,
i.e. screw pitch = 1.75mm, 1/6 turn (one flat) = approx. 0.3mm.
Retighten locking screws, slacken transit screws and check gap. This should be
between 0.2 and 0.3mm. If not repeat the process.
Finally tighten all three locking screws (C) to 9NM.
- (g) Check that the brake is still a free floating fit on its mounting pins (B) and has not been
misaligned when retightening the three locking screws.
If necessary release screws and re-align.
This is IMPORTANT, check again for free play of brake on mounting pins.
- (h) Remove the transit screws (A).

CHANGE GEAR SHEAR PIN (Fig. 24)

Additional protection is provided by means of a shear pin fitted between the final driven change gear and the gearbox input shaft.

To replace shear pin isolate electrical supply and open end guard.

Remove driven gear A exposing bushes B and C. Withdraw pin head and push remainder of shear pin through bush D. Replace bush B, insert new pin and refit driven gear.

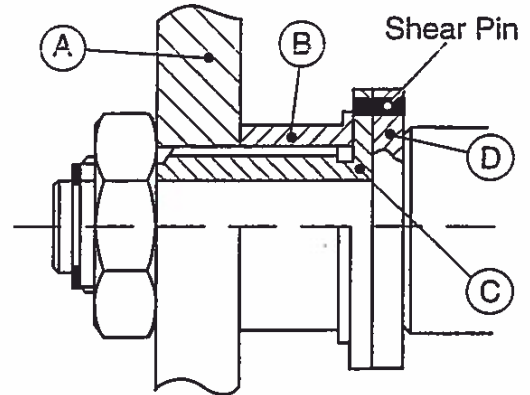


Fig. 24

CAUTION:-

Use only replacement shear pins of 3.175mm(1/8") dia. mild steel, 45kg/ ²mm. (30 tons / ² in.) tensile strength.

SLIDEWAYS (Fig.25)

Tapered gib strips are fitted to the slideways of the cross and compound slides to eliminate the effects of wear.

To adjust the cross-slide, slacken the rear screw and then tighten the front screw A, making only slight alterations at a time, and constantly check for a smooth action. Finally re-tighten rear screw.

The topline is adjusted by means of a single screw B.

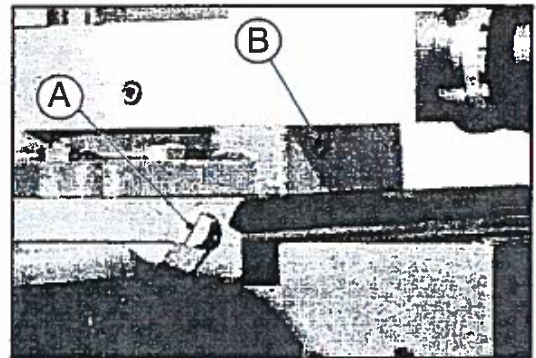


Fig. 25

Tapered gibs are fitted to each wing of the saddle and are adjusted by means of the single screws front and back.

Ensure that the slideways are cleaned and lubricated before making any adjustment.

Turn screws clockwise to take up any play avoiding over adjustment, which will result in stiff jerky action on the slide.

CROSS-SLIDE NUT (Fig. 26)

The cross-slide nut is of the backlash eliminator type. To remove undue slackness or backlash in the nut assembly first remove the socket head grubscrew G adjacent to the nut fixing screws on the top face of the slide. Insert a strong screwdriver through the grubscrew hole and carefully turn the nut adjusting worm in a clockwise direction until tight.

Slacken back slightly, and operate the cross-slide repeatedly through full travel, making small adjustments until smooth action is obtained.

Replace grubscrew into top of cross-slide to prevent ingress of dirt and swarf.

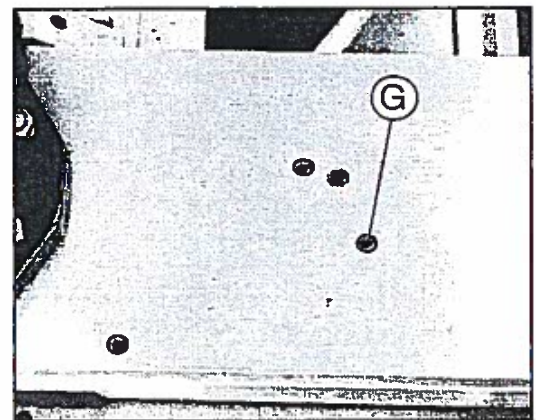


Fig. 26

SERVICING AND MAINTENANCE

LUBRICATION

HEADSTOCK (Fig.27)

Spindle Bearing, Headstock Gearing and Shafts are lubricated continuously from a distributor box located beneath the headstock top cover. This is supplied by a driven pump and is not related to spindle speed. Evidence of supply is shown in an Oil Sight Glass located on the Headstock front face.

N.B. The lathe should not be operated unless oil can be seen to be flowing.

A pipe returns oil from the bottom of the headstock to the oil pump. Ensure that the oil level in the system is kept topped up, through the filler (A). Do not fill through Headstock Cover. Check oil level weekly and change the oil every year using Shell Tellus Oil 37 (ISO VG37). The headstock may be drained via the drain plug on the headstock face just below the return pipe (B) Fig.27. System capacity is approximately 16 litres (28 pints.)

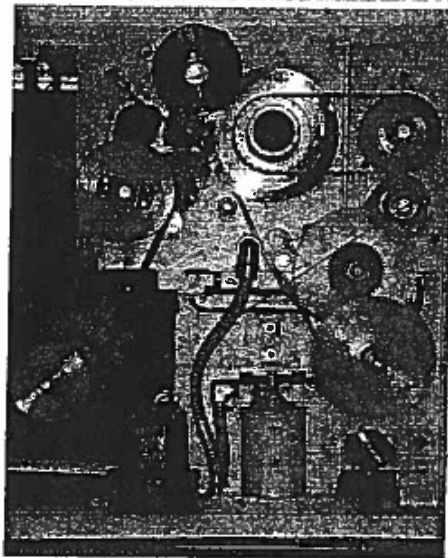


Fig. 27

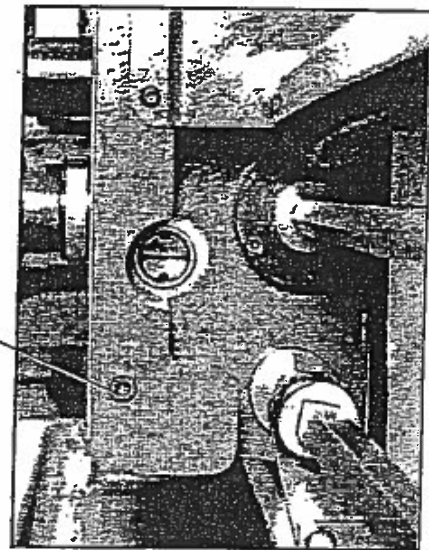


Fig. 28

GEARBOX (Fig. 28)

All gears are splash lubricated from an integral oil bath. An oil sight window is situated on the right hand end face of the gearbox. Top up or refill gearbox with Shell Tellus T37 (ISO VG 37) through filler elbow on L.H. side of gearbox casting. To drain the gearbox unscrew drain plug C in the gearbox casting. The capacity of the gear box is approximately 2.6 litres (4.5 pints).

APRON (Fig. 29)

The apron gears are splash lubricated from an integral oil bath. The apron also acts as a reservoir for the oil for the manually operated pump, which lubricates the bedways, cross side ways and nut. When the oil level falls below the mark on the oil sight glass the system should be topped up through the filler plug in the saddle with Shell Tonna TX68 (ISO VGT 68). The capacity is approximately 1.2 litres (2.8 pints). A drain plug is provided underneath the apron casting.

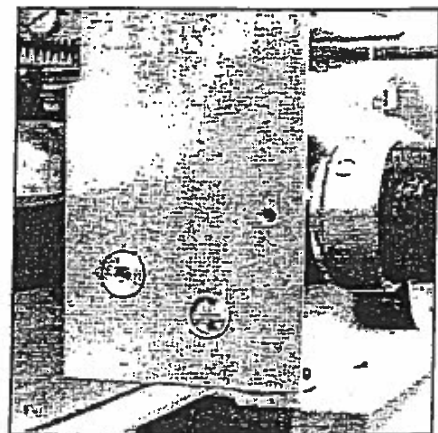
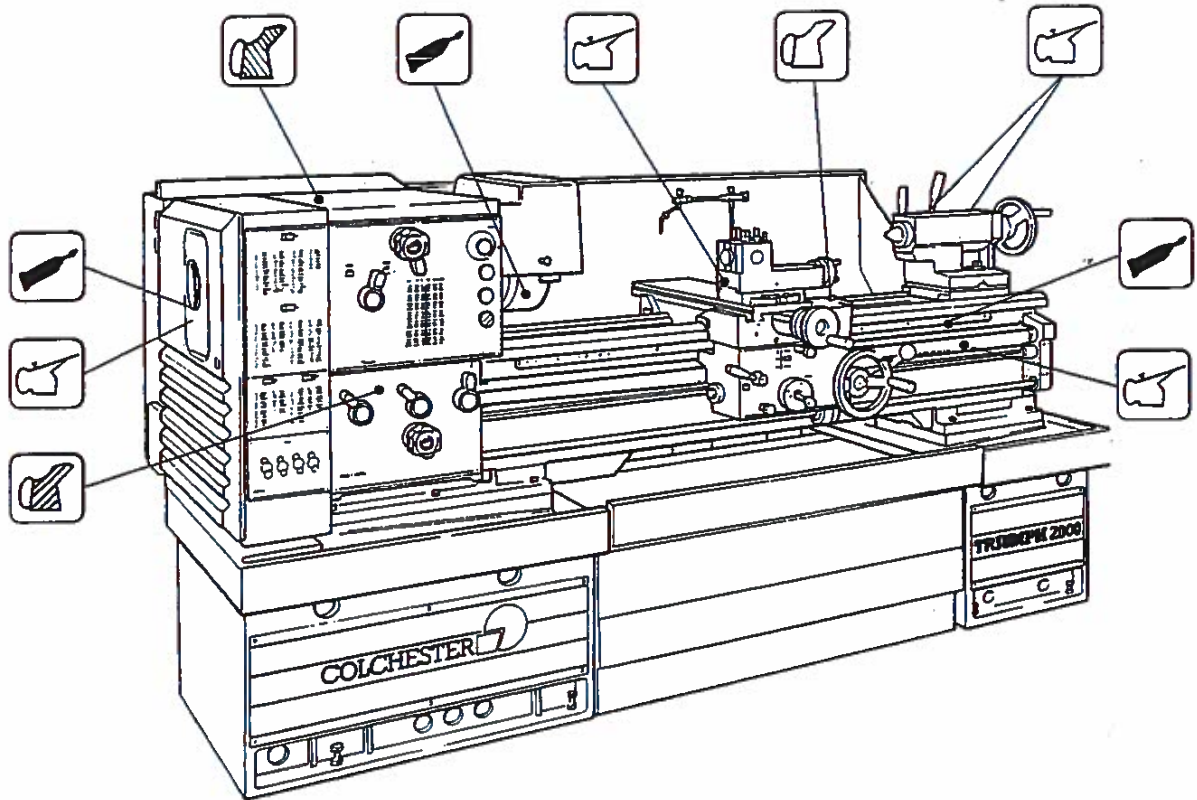


Fig. 29

LUBRICATION CHART



Grease Each Week - Rack and End Train Gears (Change wheels). Shell Alvania RA.
- Chuck (manual). Molycote "D"



Oil Each Week - Tailstock, Leadscrew, Endgear Bushes and Topside. Shell Tellus T32 (ISO HV 32)



Apron. Check Level and top up Each Week - Shell Tonna TX68 (ISO VGT 68). Total Capacity 1.2 litres.



Headstock. Check Level and top up Each Week - Shell Tellus T 32 (ISO HV 32). Total Capacity 16 litres.



Gearbox. Check Level and top up Each Week - Shell Tellus T 32 (ISO HV 32) Total Capacity 2.6 litres.

REGULAR ATTENTION

For trouble free operation keep the lathe clean and regularly maintained.

Where Oil Nipples are provided lubrication should be carried out as indicated on the Lubrication Chart.

DO NOT MIX LUBRICANTS.-

When alternative lubricants are to be used, the system or reservoir should be drained and flushed out before refilling with the equivalent grade

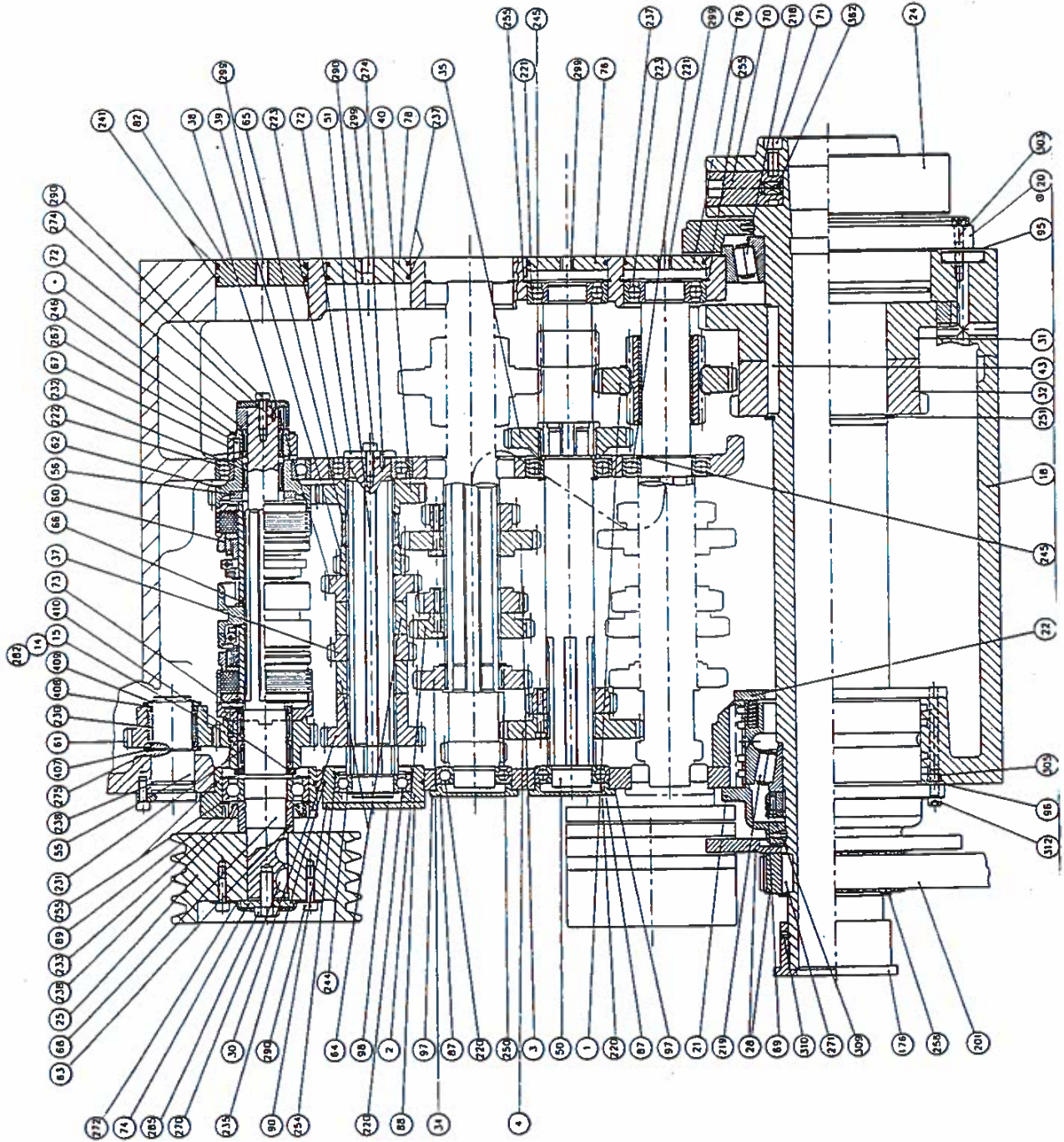
SPARE PARTS INDEX

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<i>STANDARD EQUIPMENT</i>	
HEADSTOCK ASSEMBLY	1
MOTOR MOUNTING ASSEMBLY	2
CHANGEWHEEL ASSEMBLY	3
GEARBOX ASSEMBLY	4
APRON ASSEMBLY	5
SADDLE / SLIDE ASSEMBLY	6
TOPSLIDE ASSEMBLY	7
TAILSTOCK ASSEMBLY	8
THIRD ROD LINKAGE ASSEMBLY	9
LEADSCREW COVER ASSEMBLY	10
GAP BED, PLINTH AND RACK ASSEMBLY	11
HEADEND GUARD ASSEMBLY	12
INTERLOCKED CHUCK GUARD ASSEMBLY	13
BELTS AND PULLEYS ASSEMBLY	14
HEADSTOCK LUBRICATION ASSEMBLY	15
COOLANT ASSEMBLY	16
NAMEPLATES ASSEMBLY	17
TRIMMINGS ASSEMBLY	18
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ACCESSORIES

ELECTRICS

HEADSTOCK ASSEMBLY (1)



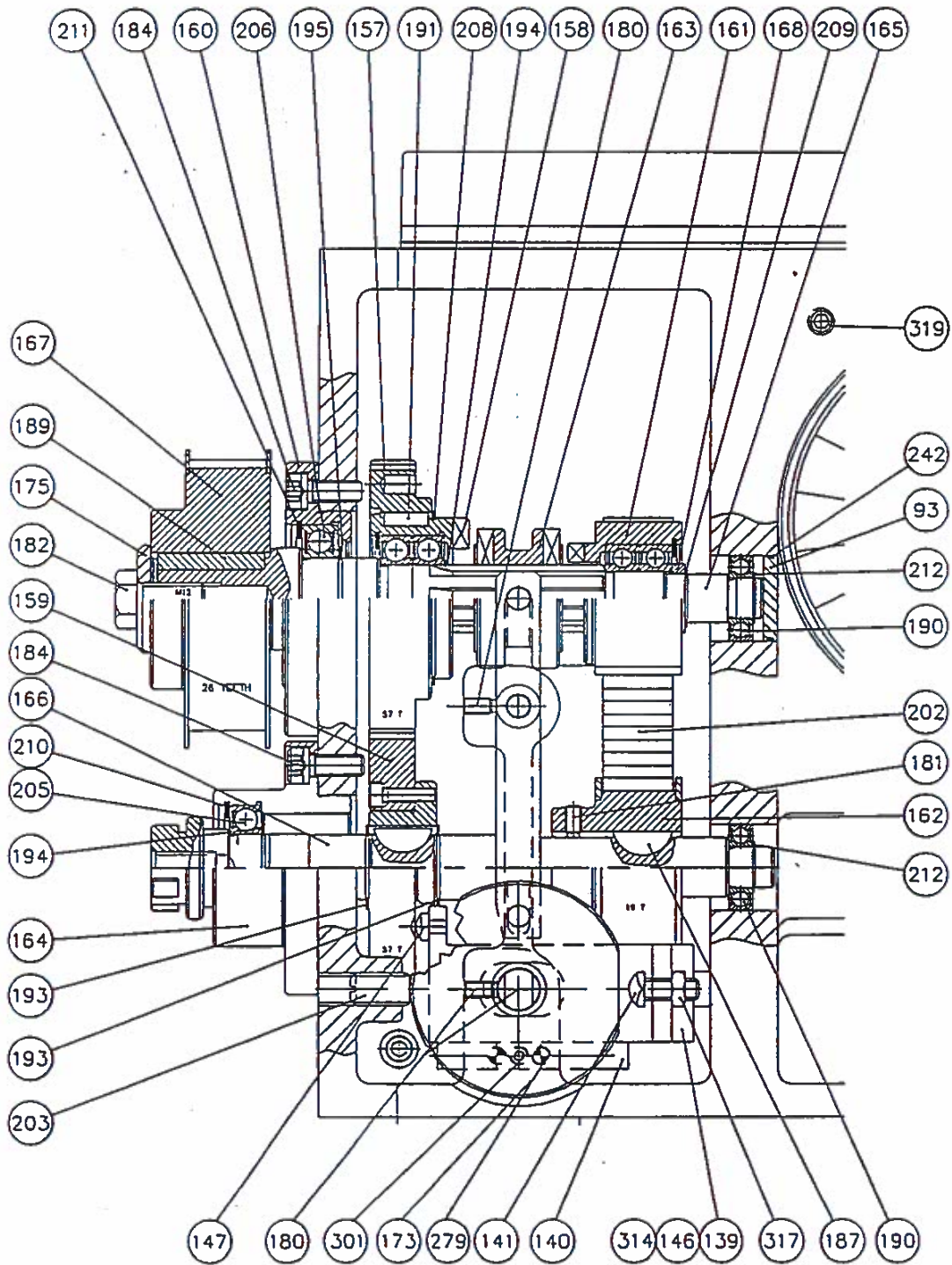
ASSEMBLY : A100 - 0515G : ISSUE 7 : 13/3/97 : SERIAL NO.

HEADSTOCK ASSEMBLY

Item	Part Number	Description	Qty
1	A806-0590A	40T & 21T GEAR	1
2	A832-0060A	30/34T GEAR	1
3	A832-0059A	26/38T GEAR	1
4	A832-0061A	25/40T GEAR	1
5	A879-0008A	RH BRAKET GEAR SHIFT	1
6	A879-0006A	LH GEAR SHIFT BRAKET	1
7	A879-0005A	RH GEAR SHIFT LEVER	1
8	A879-0007A	LH LEVER GEAR SHIFT	1
9	A879-0009A	RH ROD	1
10	A879-0004A	LH ROD	1
11	A852-0095A	CLUTCH SHIFT LEVER	1
14	D129-0039	CLUTCH DRIVING DOG	1
15	D344-1373	27T CLUTCH GEAR	1
18	D384-0053	HEADSTOCK CASTING	1
19	D132-0892	HEADSTOCK COVER	1
20	D132-1100	FRONT BEARING COVER	1
21	D132-0610	BACK BEARING COVER	1
22	D132-0691	COVER INNER BACK BEARING	1
23	D297-0052	C FRAME LEVERS	1
24	D709-0068	HEADSTOCK SPINDLE	1
25	D570-0383	HEADSTOCK PULLEY	1
26	D343-0218	GASKET	1
28	A824-0043A	26T PULLEY/BRAKE DISC	1
29	JB-0060	CALIPER BRAKE	1
30	D344-0926	27T GEAR	1
31	D344-1358	75T SPINDLE GEAR	1
32	D344-1359	56T SPINDLE GEAR	1
34	D344-0937	32T GEAR	1
35	D344-0936	35T GEAR	1
37	D344-0935	23T GEAR	1
38	D344-0722	27T GEAR	1
39	D344-0831	19T GEAR	1
40	D344-0724	31T GEAR	1
41	B433Y0806	TUBE NUT ENOTS 34-0279-06	1
43	D441-0089	12 X 8 X 80 KEY	1
44	D562-0178	LUBE PIPE	1
45	D562-0177	LUBE PIPE	1
46	D562-0176	OIL SIGHT FEED PIPE	1
47	D004-0093	ADAPTOR	1
49	D699-0855	2ND SHAFT	1
50	D699-0854	3RD SHAFT	1
51	D699-0853	SHAFT	1
55	D699-0876	SHAFT IDLER	1
56	D931-0226	THRUST WASHER	1

ASSEMBLY : A100 - 0515G : ISSUE 7 : 13/3/97 : SERIAL NO.

HEADSTOCK ASSEMBLY (2)



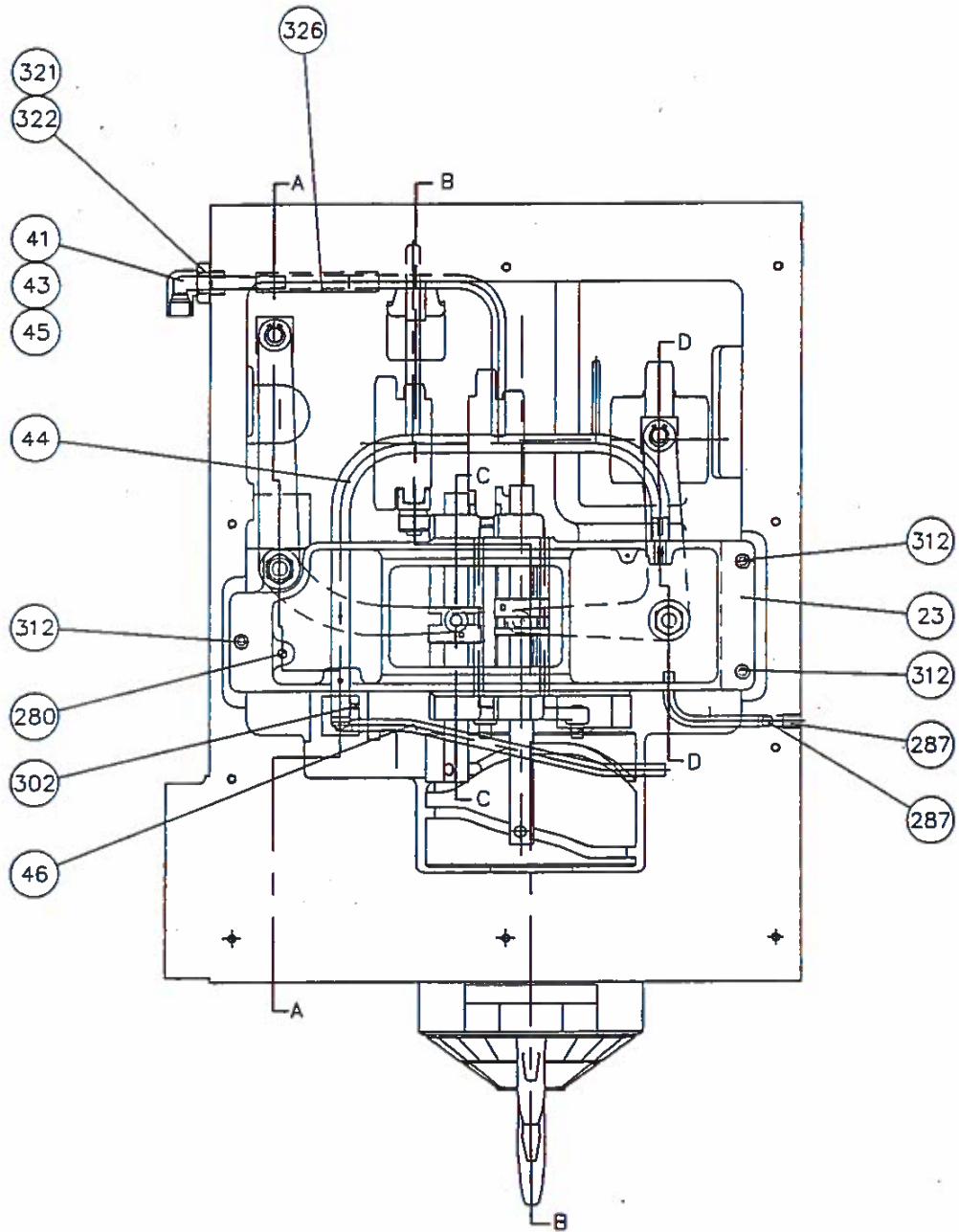
ASSEMBLY : A100 - 0515 : ISSUE 2 : 08.10.96 : SERIAL NO.

HEADSTOCK ASSEMBLY

Item	Part Number	Description	Qty
60	D129-0023	CLUTCH-MATRIX ZC25DGDW/04	1
61	D344-1366	26T GEAR IDLER	1
62	D344-1368	31T CLUTCH	1
63	D708-0543	PULLEY SPACER	1
64	D708-0150	SPACER 2X1-1/4"	2
65	D708-0151	SPACER 1-5/8X1-3/16"	1
66	D708-0152	SPACER CLUTCH	1
67	D708-0544	SPACER	1
68	D699-0877	SHAFT CL.DRIVING	1
69	D536-0341	NUT BACK BEARING	1
70	CE-0090	CAM	6
71	FS-0254	3/8" UNC X 3/4" CAP SCREW (SPECIAL)	6
72	D931-0362	WASHER RETAINING	2
73	D931-0393	THRUST WASHER	1
74	D931-0282	WASHER 1-1/2X7/16"	1
76	D566-0212	PLUG 62MM DIA	2
78	D566-0211	PLUG 62MM DIA.	1
82	D566-0187	PLUG	1
87	D132-0767	COVER-SMALL BEARING	2
88	D388-0153	BEARING HOUSING	1
89	D388-0152	BEARING HOUSING	1
90	D132-0175	BEARING HOUSING COVER	1
93	D566-0186	PLUG	1
95	D343-0111	GASKET FRONT BEARING COVER	1
96	D343-0164	GASKET REAR BEARING COVER	1
97	D343-0048	GASKET	2
98	D343-0049	GASKET	1
103	D123-0123	C CAM DRUM	1
104	D123-0122	R CAM FACE	1
105	D452-0285	LEVER CLUTCH CENTRE	1
106	D565-1256	PIVOT PLATE - CLUTCH LEVER	1
107	D041-0254	BAR EXT.SPRING	1
108	D049-0354	BUSH/CLUTCH LEVER	1
109	D049-0352	BUSH LEVER PIVOT	1
111	D647-0029	ROLLER	1
112	D560-0332	HINGE PIN	1
115	D560-0336	PIN SPRING	1
116	D931-0368	WASHER	1
119	D699-0856	SHAFT DRUM CAM	1
120	D699-0850	SHAFT FACE CAM	1

ASSEMBLY : A100 - 0515G : ISSUE 7 : 13/3/97 : SERIAL NO.

HEADSTOCK ASSEMBLY (3)



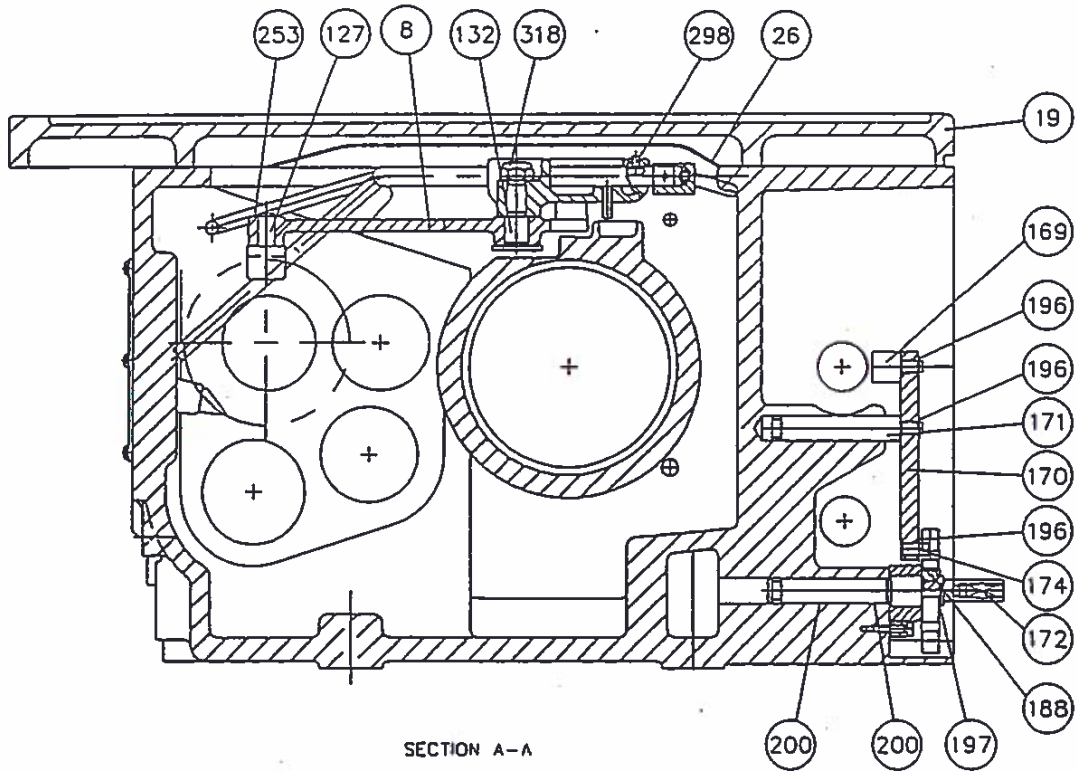
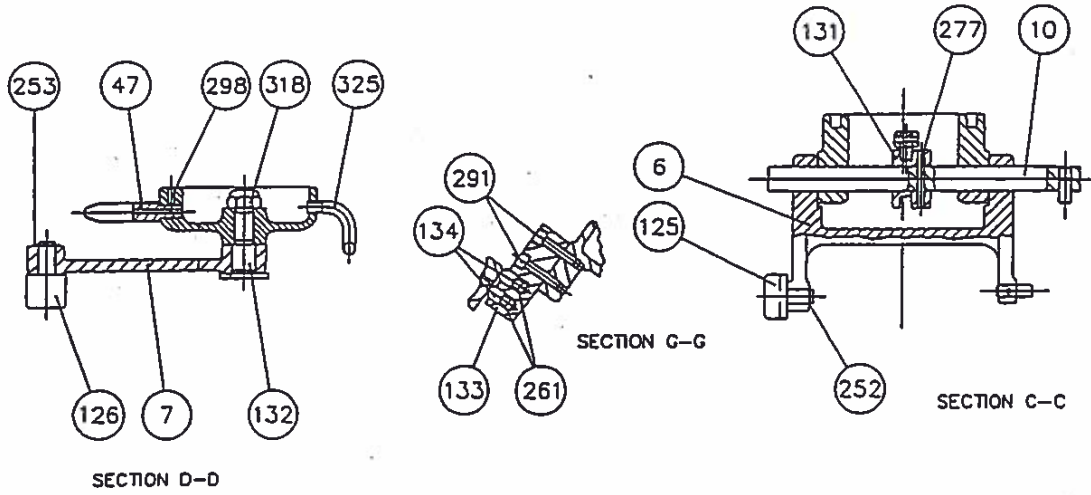
ASSEMBLY : A100 - 0515 : ISSUE 2 : 08.10.96 : SERIAL NO.

HEADSTOCK ASSEMBLY

Item	Part Number	Description	Qty
122	D648-0050	ROD GUIDE	2
124	D557-0158	CLUTCH SHIFT PAD	1
125	D299-0077	GEAR SHIFT FORK	2
126	D299-0078	RH GEAR SHIFT FORK	1
127	D299-0079	LH GEAR SHIFT FORK	1
131	D133-0261	COLLAR GUIDE	2
132	D711-0209	STUD PIVOT	2
133	D050-0801	BRACKET PLUNGER	1
134	D567-0062	PLUNGER CAMS.	2
135	D704-0139	SLEEVE CLUTCH SHIFTER	1
136	D343-0056	GASKET	1
137	D726-0043	SPEED SELECTOR	1
138	D931-0194	WASHER	3
139	D047-0175	BLOCK REVERSE BOX	1
140	D047-0105	BLOCK REVERSE BOX	1
141	D697-0360	ADJUSTING SCREW-REVERSE BOX	1
142	D132-0176	COVER DIAL	1
143	D047-0147	BLOCK-DISC BRAKE MOUNTING	1
146	D560-0303	PIN - REVERSE BOX	1
147	D560-0304	PIN - REVERSE BOX	1
148	D232-0038	SPEED SELECT DIAL	1
149	D537-0582	NAMEPLATE INDICATOR	1
150	D537-0583	NAMEPLATE SPEED RANGE	1
151	D537-0584	NAMEPLATE SPEED SELECTOR	1
152	D004-0094	ADAPTOR	1
153	D132-0701	COVER CLUTCH ACCESS	1
154	D343-0180	GASKET CLUTCH COVER	1
157	D344-1257	GEAR REVERSE BOX	1
158	A806-0558A	SPACER SUB ASSY REV BOX	1
159	A806-0560A	GEAR SUB ASSY REVERSE BOX	1
160	D388-0127	HOUSING INPUT SHAFT REVERSE	1
161	A806-0559A	HOUSING ASSEMBLY REVERSE BOX	1
162	A824-0031A	19T PULLEY SUB-ASSY REVERSE BOX	1
163	D051-0006	CLUTCH BOBBIN REVERSE BOX	1
164	D388-0128	HOUSING OUTPUT SHAFT REVERSE BOX	1
165	D699-0788	INPUT SHAFT	1
166	D699-0789	OUTPUT SHAFT	1
167	A824-0028A	26T PULLEY SUB-ASSY REVERSE BOX	1
168	D708-0459	SPACER SHAFT A REVERSE BOX	1
169	D299-0067	SHIFTER PAD REVERSE BOX	1
170	D041-0230	SHIFTER BAR REVERSE BOX	1
171	D699-0779	SHIFTER PIVOT SHAFT	1
172	D699-0781	SHIFTER REVERSE LEVER	1
173	D233-0023	SHIFTER DISC REVERSE BOX	1
174	D560-0295	SHIFTER PIN REVERSE BOX	1
175	D708-0468	SPACER REVERSE BOX	1
176	D646-0067	COOLANT THROWER	1
179	B163-1781	M12X16 SOCKET SET SCREW DOG POINT	3

ASSEMBLY : A100 - 0515G : ISSUE 7 : 13/3/97 : SERIAL NO.

HEADSTOCK ASSEMBLY (4)



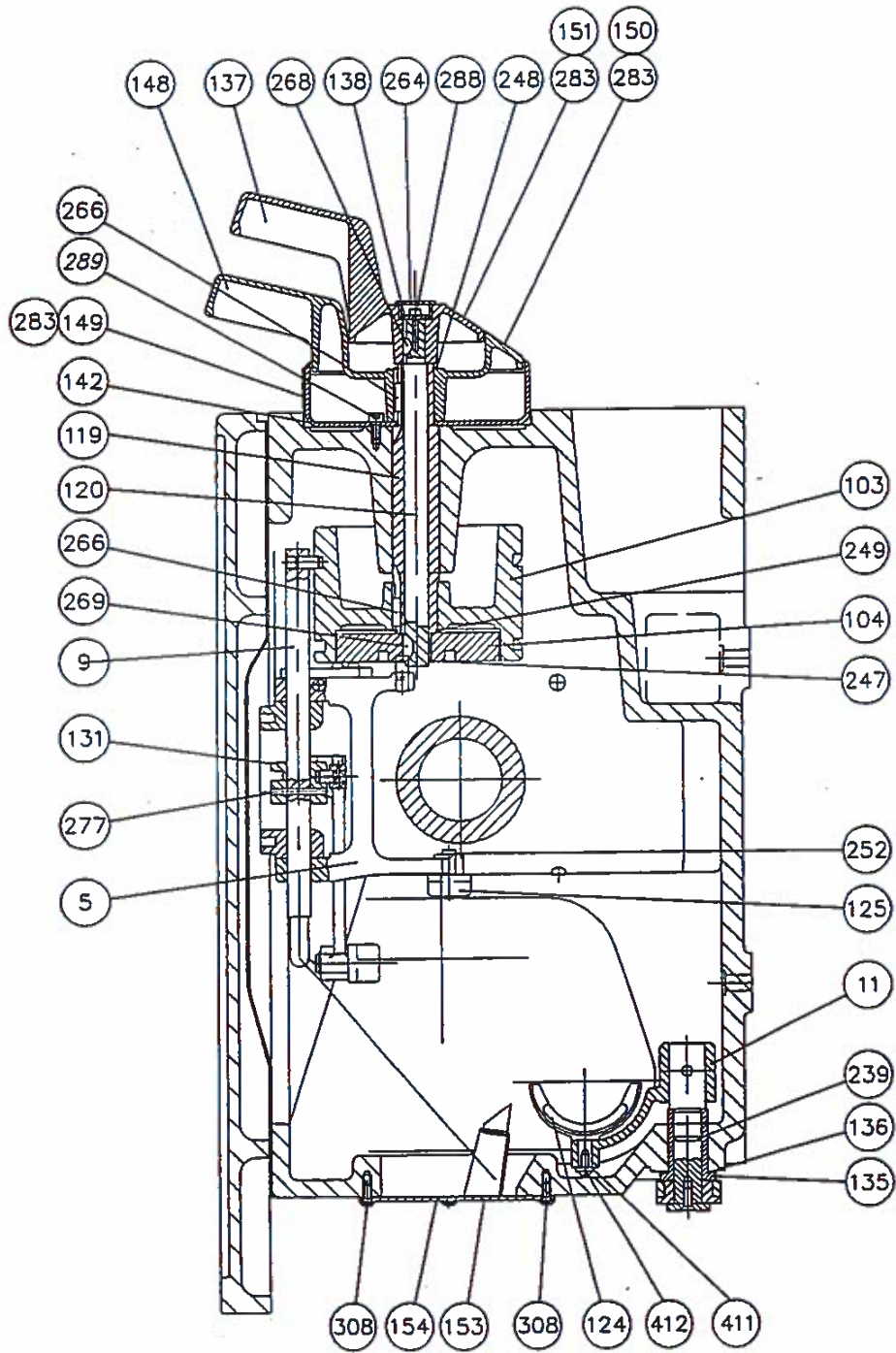
ASSEMBLY : A100 - 0515 : ISSUE 2 : 08.10.96 : SERIAL NO.

HEADSTOCK ASSEMBLY

Item	Part Number	Description	Qty
180	FS-0346	M6 X 8 FULL DOG POINT SOC. SET SCREW	2
181	FS-0500	M6 X 10 SOCKET CUP POINT SET SCREW	1
182	FS-0600	M12 X 25 HEXAGON HEAD SCREW	1
183	PB-0110	1/2" BSPT SOCKET PLUG	1
184	FS-0162	M8 X 20 SOCKET HEAD CAP SCREW	6
185	FS-0092	M4 X 10 SOCKET HEAD CAP SCREW	2
187	KA-0190	6 X 9 X 22 WOODRUFF KEY	2
188	B343-5041	6 X 6 X 10 KEY	1
189	KA-0340	8 X 7 X 40 KEY	1
190	BG-0275	6002 2Z BALL BEARING	2
191	B343-5031	5 X 5 X 16 KEY	1
193	RA-0160	CIRCLIP DIN1400-24 EXTERNAL	2
194	RA-0170	CIRCLIP DIN1400-25 EXTERNAL	2
195	RA-0190	CIRCLIP DIN1400-30 EXTERNAL	1
196	RA-0070	CIRCLIP DIN1400-8 EXTERNAL	3
197	RA-0140	CIRCLIP DIN1400-20 EXTERNAL	1
200	BF-0010	MB14 20 DU BEARING	2
201	B346-1338	TIMING BELT REF 270H100	1
202	B346-1337	TIMING BELT REF 150L100	1
203	FS-0050	(M12 DETENT) BALL DETENT SCREW	1
205	BG-0465	6005-ZZ DEEP GROOVE BALL BEARING	1
206	BG-0470	6006-2Z DEEP GROOVE BALL BEARING	1
208	B363-0060	CIRCLIP DIN1400-60 EXTERNAL	1
209	RA-0125	CIRCLIP DIN1400-18 EXTERNAL	1
210	B363Y0447	CIRCLIP 1300-47 INTERNAL	1
211	B363-0455	CIRCLIP 1300-55	1
212	RA-0110	CIRCLIP DIN1400-15 EXTERNAL	2
218	B336-1228	BEARING 131093X/131152XC GAMET	1
219	B336-1322	BEARING 133075/133130P X1162A GAMET	1
220	B313-0416	6006 BALL BEARING	3
221	B313-0418	6007 BALL BEARING	2
222	BG-0340	6008 BALL BEARING	1
223	BG-0090	6206 BALL BEARING	4
230	B337-2035	BEARING INA REF NK28/30	2
231	B337-2040	BEARING INA REF NK30/20	1
232	B337-2022	BEARING INA REF NK22/20	2
233	B414-3224	OIL SEAL	1
235	B412-3013	O RING	2
237	B412-0140	O RING	4
238	OA-0155	O RING	2
239	OA-0080	O RING	1
241	B412-0229	O RING	2
242	OA-0170	O RING	1

ASSEMBLY : A100 - 0515G : ISSUE 7 : 13/3/97 : SERIAL NO.

HEADSTOCK ASSEMBLY (5)



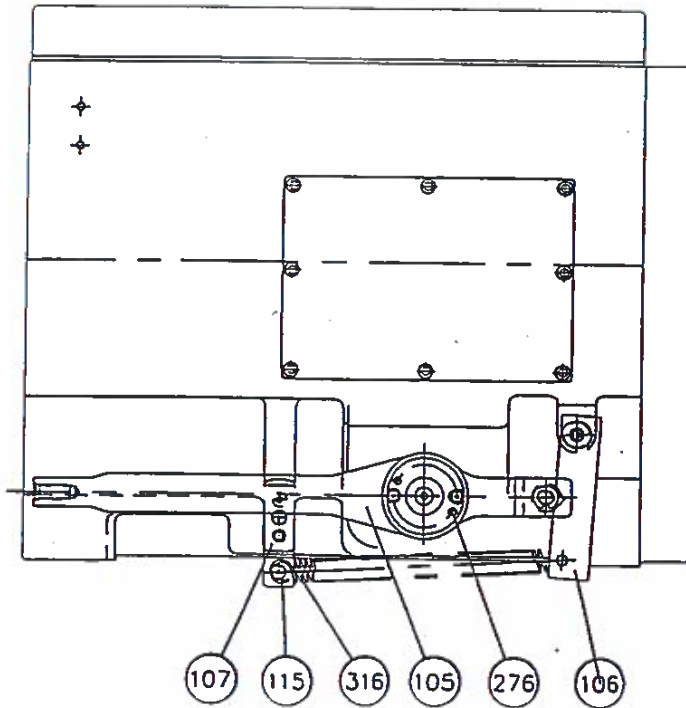
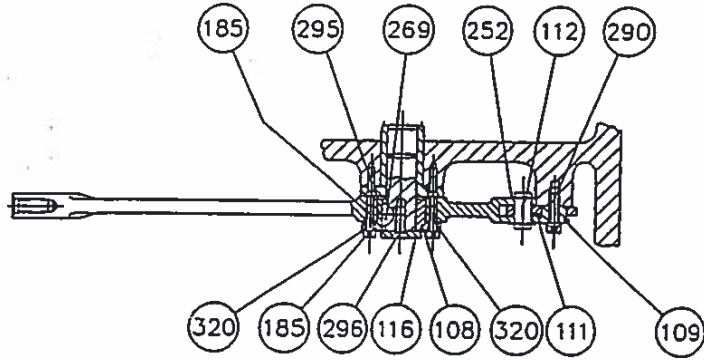
ASSEMBLY : A100 - 0515 : ISSUE 2 : 08.10.96 : SERIAL NO.

HEADSTOCK ASSEMBLY

Item	Part Number	Description	Qty
244	RA-0190	CIRCLIP DIN1400-30 EXTERNAL	1
245	RA-0260	CIRCLIP 1400-35 EXTERNAL	2
246	B363-0038	CIRCLIP 1400-38	1
247	RA-0120	CIRCLIP DIN1400-16 EXTERNAL	1
248	B362-0024	CIRCLIP 15/16IN DIA EXTERNAL	1
249	B362-0028	CIRCLIP 1 1/8IN DIA EXTERNAL	1
250	B363-0042	CIRCLIP DIN 1400	1
251	B363-0085	CIRCLIP 1400-85 EXTERNAL	1
252	RA-0085	CIRCLIP 1400-0100 EXTERNAL	4
253	RA-0090	CIRCLIP DIN1400-12 EXTERNAL	2
254	B361-5046	CIRCLIP INTERNAL 55MM BORE	1
255	B361-5052	CIRCLIP INTERNAL 62MM BORE	4
256	B363-0070	CIRCLIP DIN 1400	1
261	B365-1171	SPRING FLEXO 123204	2
262	FR-0300	SG300 CAM SPRING	6
264	LD-0230	BLANKING PLUG.	1
266	KA-0012	5 X 5 X 18 KEY	2
267	B343-0012	3/16" X 3/16" X 5/8" KEY	1
268	KA-0170	3 X 5 X 13 WOODRUFF KEY	1
269	KA-0320	4.0 X 6.5 X 16 WOODRUFF KEY	2
270	KA-0180	5 X 7.5 X 19 WOODRUFF KEY	2
271	B343-5130	12 X 8 X 28 KEY	1
272	D931-0370	TAB WASHER INPUT SHAFT	1
274	FT-0060	M3 X 12 SPIROL PIN	2
275	B111-5039	M2.5 X 10 SPIROL PIN	1
276	B111-2486	3/16 X 3/4 SPIROL PIN	2
277	B111-5082	M4 X 35 SPIROL PIN	2
279	FT-0374	M6 X 30 SPIROL PIN	2
280	B111-2516	1/4" X 7/8" SPIROL PIN	1
282	FS-0096	M4 X 16 SOCKET HEAD CAP SCREW	4
283	B123-2267	M2 X 3 SELFTAP SCREW	10
284	FS-0502	M6 X 12 CUP POINT SOCKET SET SCREW	2
285	FS-0584	M10 X 20 HEXAGON HEAD SCREW	1
287	FS-0373	M10 X 12 DOG POINT SCREW	3
288	FS-0110	M5 X 10 SOCKET HEAD CAP SCREW	1
289	FS-0132	M6 X 12 SOCKET HEAD CAP SCREW	4
290	FS-0136	M6 X 20 SOCKET HEAD CAP SCREW	5
291	FS-0138	M6 X 25 SOCKET HEAD CAP SCREW	5
293	FS-0164	M8 X 25 SOCKET HEAD CAP SCREW	3
295	FS-0426	M4 X 10 SOCKET COUNTERSUNK HEAD SCREW	2
296	FS-0442	M6 X 16 SOCKET SCREW COUNTERSUNK	1
297	B163-1761	M10X10 HEXAGON SOCKET DOG POINT SCREW	2
298	FS-0342	M5 X 6.1/2 DOG POINT SOCKET SCREW	2
299	FS-0378	M12 X 12 DOG POINT SCREW	4

ASSEMBLY : A100 - 0515G : ISSUE 7 : 13/3/97 : SERIAL NO.

HEADSTOCK ASSEMBLY (6)



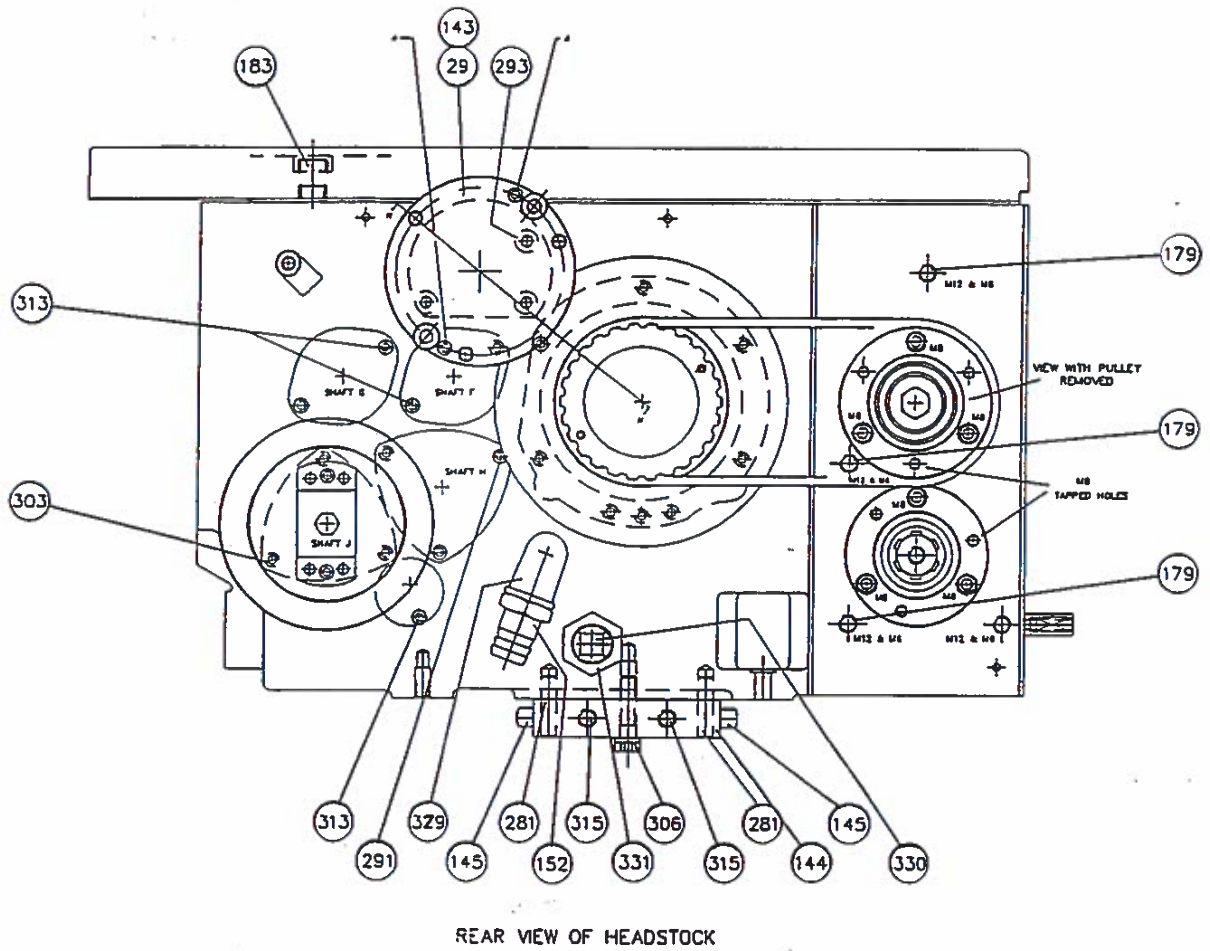
ASSEMBLY : A100 - 0515 : ISSUE 2 : 08.10.96 : SERIAL NO.

HEADSTOCK ASSEMBLY

Item	Part Number	Description	Qty
301	FS-0098	M4 X 20 SOCKET HEAD CAP SCREW	1
302	B163-1634	M4X 5 SOCKET SET SCREW CONE POINT	1
303	FS-0140	M6 X 30 SOCKET HEAD CAP SCREW	6
304	FS-0146	M6 X 45 SOCKET HEAD CAP SCREW	10
305	FS-0151	M6 X 70 SOCKET HEAD CAP SCREW	3
308	FS-0294	M6 X 12 BUTTON HEAD CAP SCREW	11
309	FS-0436	M5 X 12 SOCKET SCREW COUNTERSUNK	2
310	B163-1642	M5 X 6 SET SCREW	3
312	FS-0136	M6 X 20 SOCKET HEAD CAP SCREW	11
313	FS-0134	M6 X 16 SOCKET HEAD CAP SCREW	5
314	FR-0520	COMPRESSION SPRING	1
316	B365-4336	SPRING	1
317	FS-1040	M8 LOCKNUT	1
318	FS-0973	M12 LOCKNUT	2
319	B424-3200	1/8 BSPT HEXAGON SOCKET PLUG	1
320	FP-0030	M5 WASHER	2
321	B433-0892	3/8" ENOTS NUT 34-0155-03	1
322	PA-0060	3/8" SEAL 34-0156-03	1
323	B454-1001	OIL SIGHT	1
325	R827-4105	NYLON TUBE	0.11
326	R827-4107	NYLON TUBE	0.1
329	PB-0040	3/4"BSPT MALE/FEMALE 90° ELBOW	1
330	PB-0030	3/4" BSPT DRAIN PLUG	1
331	D004-0128	ADAPTOR	2
333	D931-0404	WASHER THRUST (AS REQUIRED)	1
334	D931-0405	WASHER THRUST (AS REQUIRED)	1
335	D931-0406	WASHER THRUST (AS REQUIRED)	1
407	D931-0392	THRUST WASHER	1
408	D931-0391	THRUST WASHER	1
409	B363-0028	CIRCLIP DIN 1400-28	1
410	D931-0400	THRUST WASHER CLUTCH SHAFT	1
411	B117-0048	M6 WASHER	1
412	FS-0272	M4 X 8 BUTTON HEAD CAP SCREW	1

ASSEMBLY : A100 - 0515G : ISSUE 7 : 13/3/97 : SERIAL NO.

HEADSTOCK ASSEMBLY (7)



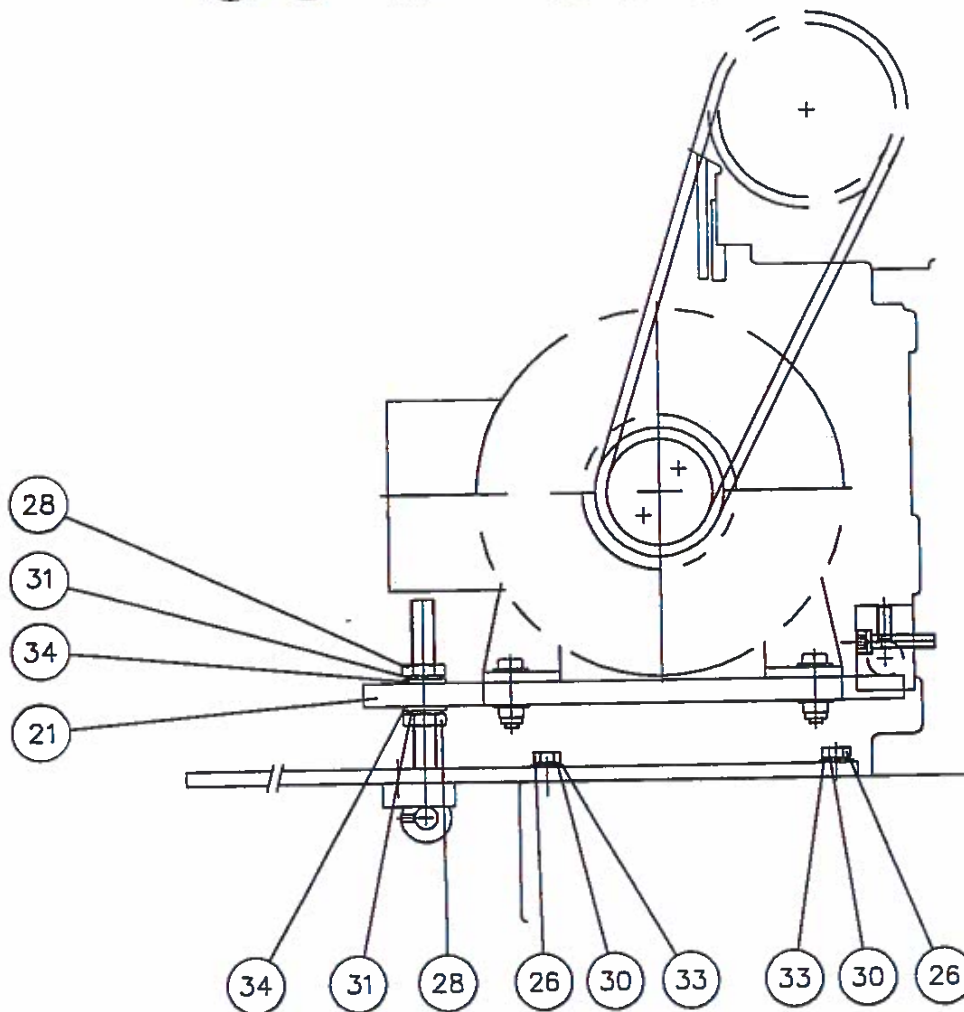
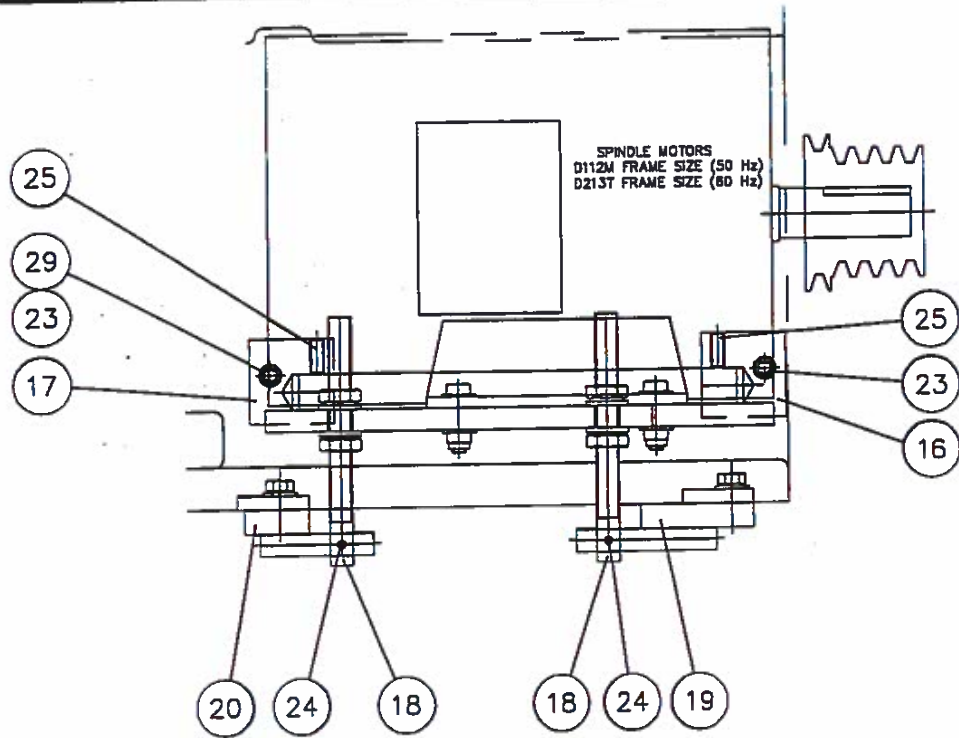
ASSEMBLY : A100 - 0515 : ISSUE 2 : 08.10.96 : SERIAL NO.

HEADSTOCK ASSEMBLY

Item	Part Number	Description	Qty

ASSEMBLY : A100 -0515G : ISSUE 7 : 13/3/97 : SERIAL NO.

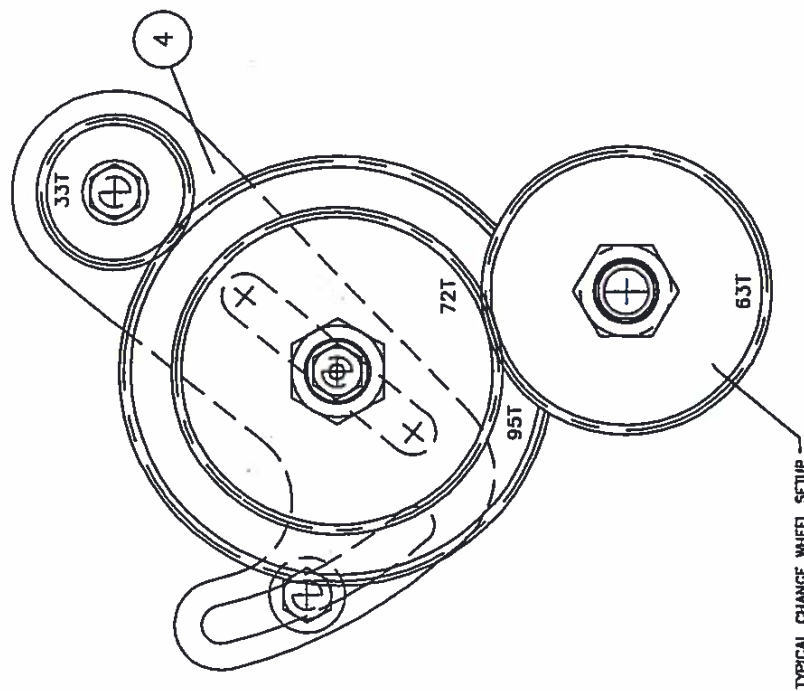
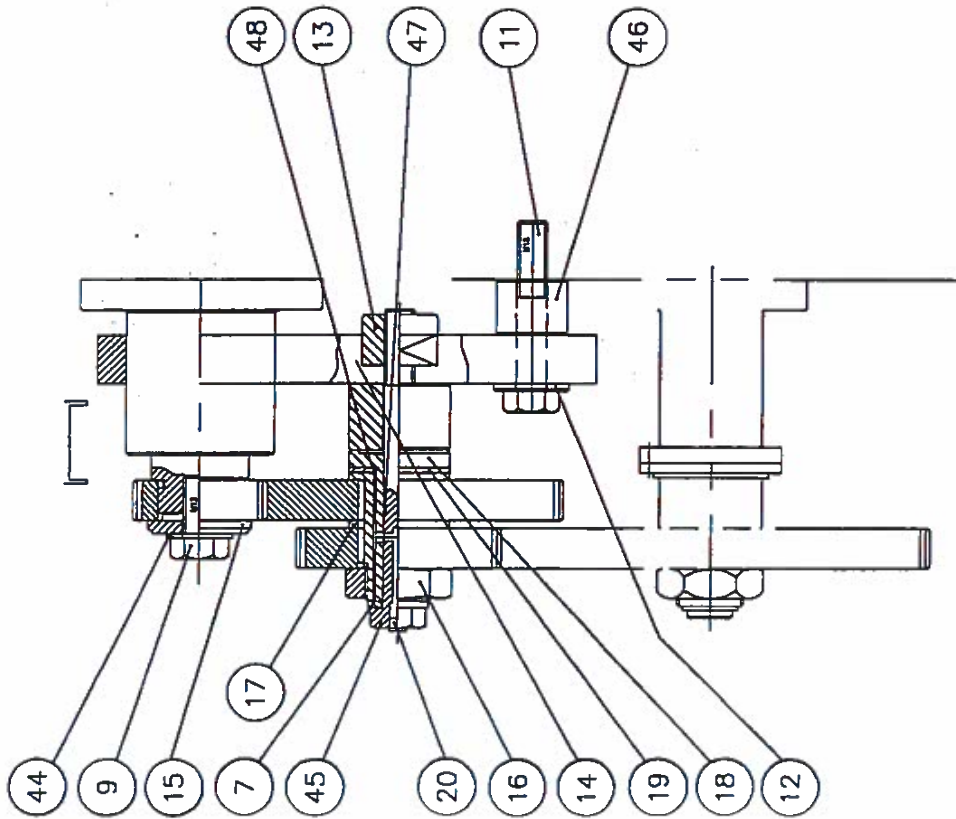
MOTOR MOUNTING ASSEMBLY



**A175 - 0501G
MOTOR MOUNTING ASSEMBLY**

ITEM NO.	DESCRIPTION	PART NO.
11	BRIGHT WASHER M10	FP - 0165
16	MOTOR MOUNTING BLOCK	D04 7- 0109
17	MOTOR MOUNTING BLOCK	D047 - 0110
18	SWING BOLT	D697 - 0361
19	SUPPORT BAR	D041 - 0238
20	SUPPORT BAR	D041 - 0239
21	PLATE 60 Hz	D565 - 0979
22	ELECTRICAL PANEL BAR	D041 - 0240
23	HEXAGON SOCKET CAP HEAD SCREW M10 X 45	FS - 0192
24	HEXAGON SOCKET CUP POINT SCREW M6 X 10	FS - 0500
25	SET SCREW W/POINT M10 x 25	B163 - 1588
26	HEXAGON SOCKET CAP HEAD SCREW M12 X 35	FS - 0604
27	HEXAGON HEAD SET SCREW M10 X 40	FS - 0590
28	LOCK NUT M16	FS - 0976
29	SAFETY WASHER M10	FO - 0010
30	SAFETY WASHER VS-12	FO - 0030
31	SAFETY SPRING WASHER M16	B116 - 2316
32	NYLOC NUT M10	FS - 1010
33	BRIGHT WASHER M12	FP - 0070
34	BRIGHT WASHER M16	FP - 0090

CHANGEWHEEL ASSEMBLY



TYPICAL CHANGE WHEEL SETUP

NOTES

Customer Service, Parts and Sales, call 800-575-2843

info@harrisonlathe.com



www.harrisonlathe.com