

PALMGREN[®]

14" × 40" VARIABLE SPEED LATHE



Read carefully and follow all safety rules and operating instructions before first use of this product.

GETTING STARTED

Please save this manual, along with a copy of your invoice for your records.

STRUCTURAL REQUIREMENTS

Make sure all supporting structures and load attaching devices are strong enough to hold your intended loads. If in doubt, consult a qualified structural engineer.

TOOLS NEEDED:

Standard mechanic's hand tool set.

UNPACKING

CONTENTS

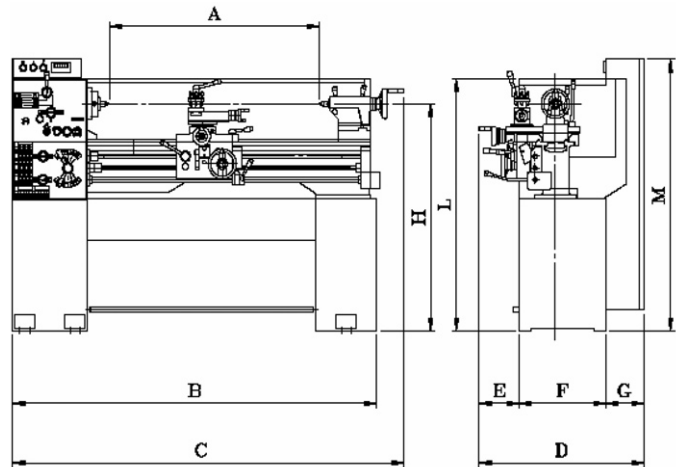
Contents of the crate should be removed individually and checked for any damage or missing parts. If damage is found or there are missing parts, please contact and file a claim with the carrier immediately.

- Set of change gears - 1 set
- Center sleeve (taper adaptor) M.T. No. 5x3 - 1 pc.
- Two centers M.T. No. 3 - 2 pcs.
- Toolbox: 12x14mm wrench; 17x19mm wrench; Hex key (allen) wrench set; Phillips screwdriver; Flathead screwdriver; Chuck key - 2 pcs.
- 4-ways turret toolpost - 1 pc.
- Toolpost wrench - 1 set
- 6 in. (150mm) dia. backplate - 1 pc.
- DRO
- Oil can
- Leveling pads - 6 pcs

SPECIFICATIONS

Swing over bed	14"
Swing over cross slide	8-5/8"
Height of center	7"
Distance between centers	40"
Bedway Width	7 1/2"
Total bed length	66"
Swing of gap	20"
Length of gap	9"
face plate width	5 1/4"
Spindle nose mounting	D1-4 Camlock
Spindle bore	1-9/16"
spindle bore taper	MT No. 5
Number of spindle speeds	3 STEPS
Range of spindle speeds	HIGH: 2000 – 400 R.P.M
	MIDDLE: 540 – 108 R.P.M
	LOW: 145 – 29 R.P.M
Total cross slide travel	6 1/2"
Total top speeds travel	3 1/2"
Max. size cutting tool	7/8"
Total barrel travel	4-3/8"
Taper in barrel	MT No.3
Diameter of barrel	1-9/16"
Leadscrew diameter & pitch	0.875" 8 TPI
Number of Inch threads	32
Inch thread range	4 - 56 TPI

Number of Metric pitches	32
Range of Metric pitches	0.4 – 7.0 mm
Number of Diametral pitches	32
Range of Diametral pitches	8 – 112 D.P. (4 TPI)
Number of Module pitches	27 (inch leadscrew)
Range of Module pitches	0.2 – 3.5 Mod.
Feed rod diameter	Dia. 3/4"
Number of feed change	40
Range of longitudinal feeds	0.0033 – 0.0736 in./rev.
Range of cross feeds	0.0011 – 0.0245 in./rev.
Main spindle motor	3 HP
Coolant pump motor	1/8 HP
Machine net weight	1653.5 lbs



A	40 in	F	17 in
B	72 in	G	7.50 in
C	77 in	H	42 in
D	33 in	L	47 in
E	8 in	M	50 in

Figure 1 - Dimensions.

CHUCKS AND CHUCK MOUNTING

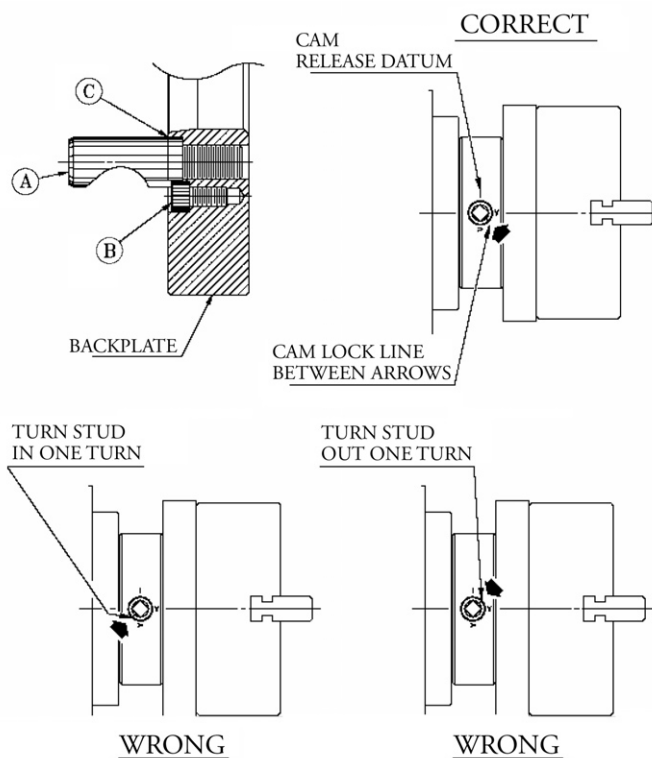
When mounting chucks or faceplate, first, ensure that spindle and chuck tapers are scrupulously clean and that all came lock in the correct positions, see Fig. 2. It may be necessary when mounting a new chuck to re-set the cam lock studs (A). To do this, remove the cap – head locking screws (B) and set each stud so that the scribed ring (C) is flush with the rear face of the chuck – with the slot lining up with the locking screw hole (see Fig. 2).

Now mount the chuck or faceplate on the spindle nose and tighten the three came in turn. When fully tightened, the cam lock 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 limit marks, remove the chuck or faceplate, and re-adjust the stud as indicated in the illustration. Fit and tighten the locking screw (B) at each stud before remounting the chuck for work. This will assist subsequent remounting.

DO NOT INTERCHANGE CHUCKS OR FACEPLATES BETWEEN LATHES WITHOUT CHECKING FOR CORRECT CAM LOCKING FIRST.

IMPORTANT: Take careful note of speed limitation when using faceplate; 10 in. faceplates should not be run at speeds greater than 1000 rev/min. 12 in. faceplates at not more than 770 rev/min.

SPECIFICATIONS (CONTINUED)**Figure 2 - Chucks and chuck mounting.****SAFETY RULES**

WARNING: For your own safety, read operating instructions manual before operating tool.

PROPOSITION 65 WARNING: Some dust created by using power tools contain chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.

Some examples of these chemicals are:

- Lead from lead-based paints
- Crystalline silica from bricks and cement and other masonry products.
- Arsenic and chromium from chemically treated lumber.

Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals; work in a well ventilated area and work with approved safety equipment. Always wear **OSHA/NIOSH** approved, properly fitting face mask or respirator when using such tools.

WARNING: Always follow proper operating procedures as defined in this manual even if you are familiar with the use of this or similar tools. Remember that being careless for even a fraction of a second can result in severe personal injury.

BE PREPARED FOR JOB

- Wear proper apparel. Do not wear loose clothing, gloves, neckties, rings, bracelets or other jewelry which may get caught in moving parts of machine.
- Wear protective hair covering to contain long hair.
- Wear safety shoes with non-slip soles.
- Wear safety glasses complying with United States ANSI Z87.1. Everyday glasses have only impact resistant lenses. They are **NOT** safety glasses.
- Wear face mask or dust mask if operation is dusty.
- Be alert and think clearly. Never operate power tools when tired, intoxicated or when taking medications that cause drowsiness.

PREPARE WORK AREA FOR JOB

- Keep work area clean. Cluttered work areas and work benches invite accidents.
- Do not use power tools in dangerous environments. Do not use power tools in damp or wet locations. Do not expose power tools to rain.
- Work area should be properly lighted.
- Proper electrical plug should be plugged directly into properly grounded, three-prong receptacle.
- Extension cords should have a grounding prong and the three wires of the extension cord should be of the correct gauge.

INSTALLATION

Use the bed-clamping plate and eyebolt to sling the lathe, position the saddle and tailstock along the bed to obtain balance (see Fig. 3).

Raising and lowering the machine should be done carefully, especially when you lower the machine, be sure not to bump the machine against the floor.

IMPORTANT: DO NOT USE SLINGS AROUND BED AS LEADSCREW AND FEEDSHAFT MAY BEND.

Locate the machine on a solid foundation, allowing sufficient area all round for easy and maintenance. The lathe may be used free-standing or bolted to the foundation.

Free-standing: Position lathe on foundation and adjust each of the six mounting feet to take equal share of the load. Then using an engineer precision level on the bed ways adjust the feet to level up machine. Periodically check bed level to ensure continued lathe accuracy.

Fixed installation: Position lathe over six bolts (½ in. or 12mm. dia.) set into the foundation to correspond with holes in the mounting feet, accurately level the machine, then tighten down bolts. Re-check bed level.

CLEANING

Before operation any controls, remove the anticorrosion coating from all slide ways, and the end gear train, using white spirit or Kerosene.

DO NOT USE CELLULOSE SOLVENTS FOR CLEANING AS THEY WILL DAMAGE THE PAINT FINISH.

Oil all bright machined surfaces immediately after cleaning using machine oil or slide way lubricant, use heavy oil or grease the end – gears.

Finally check lubrication and oil levels listed in the “Lubrication checks” section of the maintenance section.

INSTALLATION (CONTINUED)

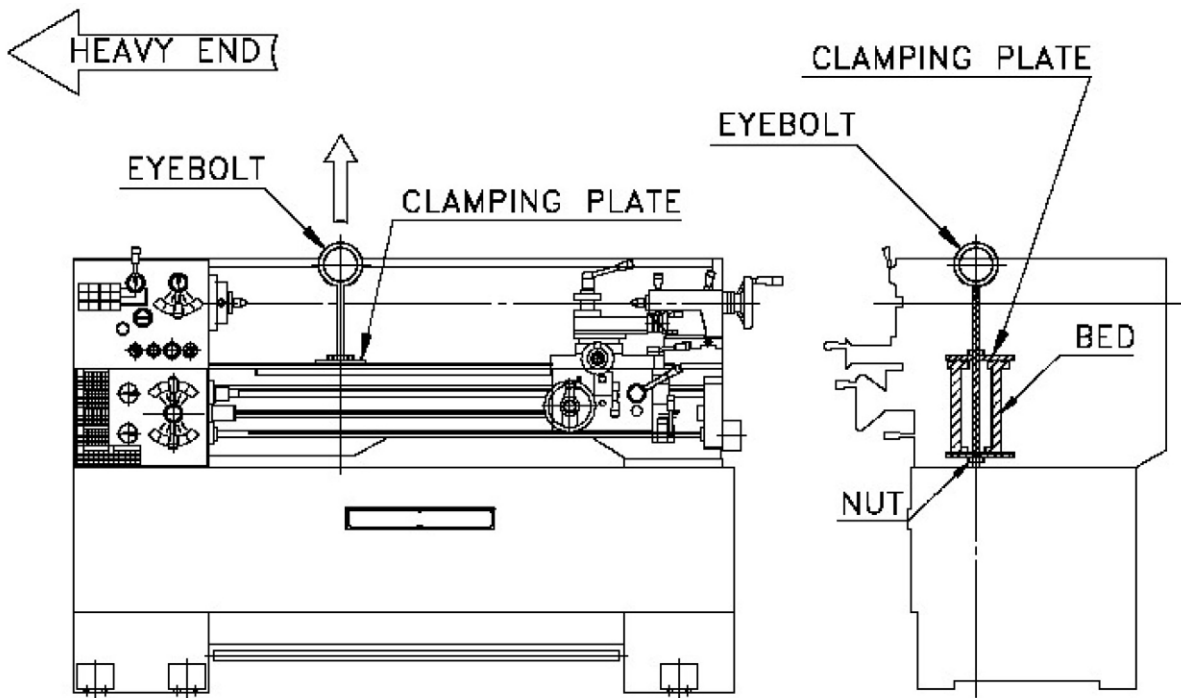


Figure 3 - Installation.

OPERATION

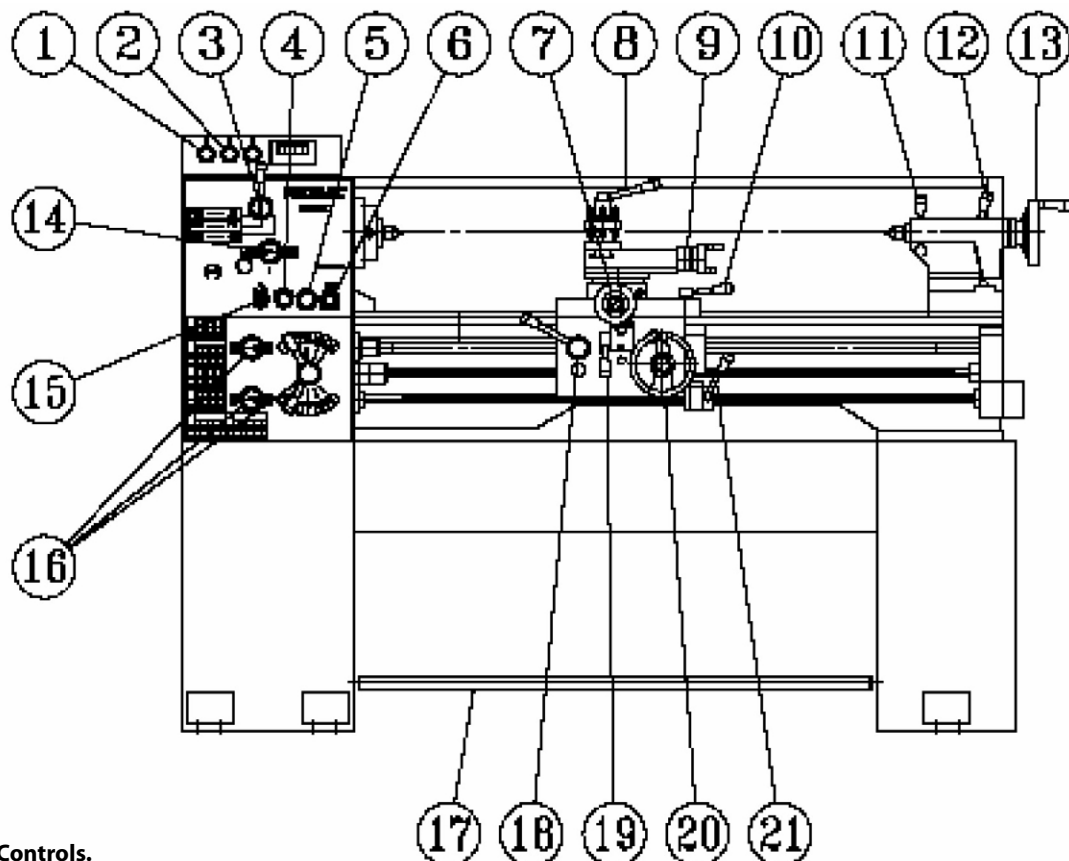


Figure 4 - Controls.

OPERATION (CONTINUED)**CONTROLS**

Refer to Figure 4, page 4

1. Power Switch ON
2. Power Switch OFF
3. Spindle speeds selector
4. Inching button
5. Emergency stop switch
6. Variable speed selectors
7. Slide cross feed handwheel
8. Toolpost clamping lever
9. Top slide handwheel
10. Saddle clamping lever
11. Tailstock barrel clamping lever
12. Tailstock clamping lever
13. Tailstock handwheel
14. Positive-Reverse lever
15. Coolant pump ON/OFF button
16. Threads and feeds selectors
17. Foot brake
18. Apron longitudinal feed handwheel
19. Automatic feed lever
20. Thread cutting half-nut lever
21. Spindle rotation (Forward and Reverse)

ELECTRICAL CONTROLS

The main power switch is found on the front of the electrical box behind the lathe (head-end). All electrical controls are found on the front face of the head stock and top of the electrical box, which is itself found on top of the head stock.

1. Power On the Green (ON) button activates the power
2. Power Off, the Red (OFF) button deactivates power.
3. Pilot lamp, glows when electricity is live.
4. Emergency stop button, cuts all power, and stops the main motor and coolant pump.
5. Inching button, moves the spindle slightly, allowing ease of speed selection (while spindle rotation lever is set in the neutral position)
6. Variable speed selectors, allow spindle speed selection.
7. Spindle speed meter, shows the current RPM
8. Coolant pump On/Off button
9. End cover sensor, if activated by opening the end cover, it will automatically stop all rotational movement.

MAIN MOTOR CONTROLS

- A. Main motor rotation: selected by the lever controls (the located on the right-hand side of the apron). Move lever out and upward to engage forward rotation. Move the lever out and down to engage reverse rotation. Return lever to the central position to disengage drive.
- B. Foot brake: a foot pedal between plinths operates the spindle brake.

SPINDLE SPEED SELECTORS

Main spindle can be variably controlled, from 30 RPM to 2000 RPM, divided into three groups, HIGH: 400–2000 RPM, MEDIUM: 110–540 RPM, LOW: 30–145 RPM. Firstly, put the upper left-hand handles (A) on the headstock to the desired speed range.

WARNING: Do not change handle position while spindle is in motion. Spindle must be motionless when change handle's position.

Next, adjust variable speed selectors (B) to needed spindle speed. Selectors (B) can change speed while spindle is rotating. Spindle speed chart (C) equipped on the top of headstock shows the RPM while spindle rotating.

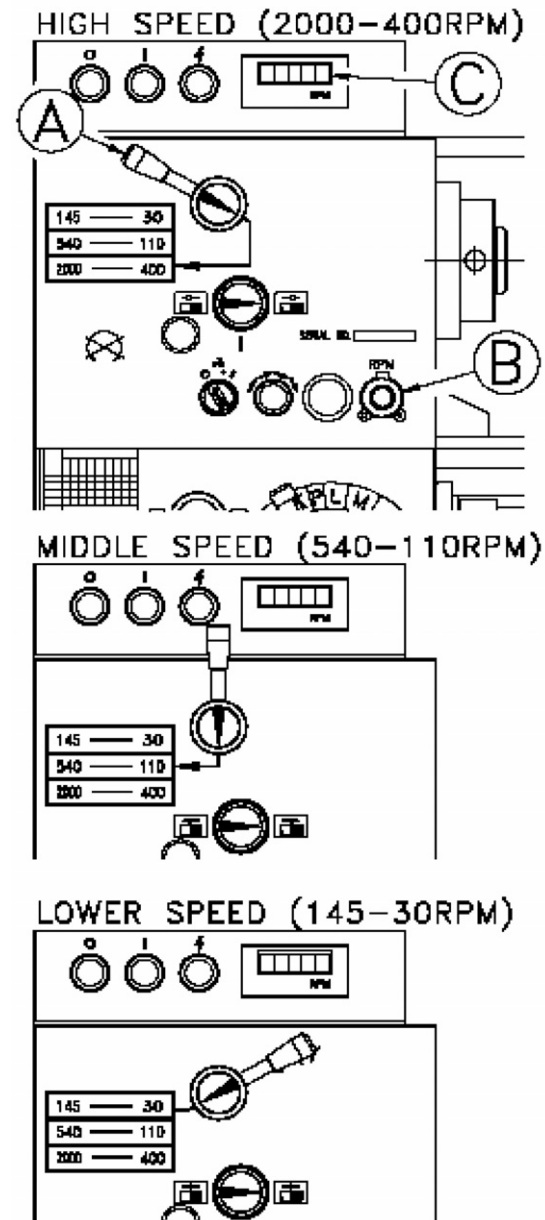


Figure 5 - Spindle Speed Selectors.

OPERATION (CONTINUED)**THREADS AND FEEDS**

All the threads and feeds directly available from the gearbox are shown on the data plate mounted on the front of the end cover, with

the setting of control levers. Threads and feeds direction can be changed by the Forward-Reverse knob on the headstock and positioning the control knobs and levers on the gear box. The end gear train should be arranged as shown in the diagrams shown on the data plate.

For
Leadscrew
Pitch
4 MM

PITCH										M.M.									
M	L	K	L	N	K	J	N	J		M	L	K	L	N	K	J	N	J	
AC	3.2	3.6	4.0	4.5	4.8	5.0	5.6	6.0	7.0										
BC	1.6	1.8	2.0	2.25	2.4	2.5	2.8	3.0	3.5										
AD	0.8	0.9	1.0		1.2	1.25	1.4	1.5	1.75										
BD	0.4	0.45	0.5		0.6		0.7	0.75											
T. P. I.										INCH									
N	M	M	M	M	M	M	M	M		N	M	M	M	M	M	M	M	M	
AC	4	4.5	5	5.5	6	6.5	7	7.5											
BC	8	9	10	11	12	13	14	15											
AD	16	18	20	22	24	26	28	30											
BD	32	36	40	44	48	52	56	60											
MODULE										D. P.									
M	L	K	L	N	K	J	N	J		M	L	K	L	N	K	J	N	J	
AC	3.2	3.6	4.0	4.5	4.8	5.0	5.6	6.0	7.0										
BC	1.6	1.8	2.0	2.25	2.4	2.5	2.8	3.0	3.5										
AD	0.8	0.9	1.0		1.2	1.25	1.4	1.5	1.75										
BD	0.4	0.45	0.5		0.6		0.7	0.75											
FEED MM/O										FEED INCH/O									
U	T	S	V	R						U	T	S	V	R					
PAC	0.936	0.832	0.749	0.624	0.535														
PBC	0.468	0.416	0.374	0.312	0.267														
PAD	0.234	0.208	0.187	0.156	0.134														
PBD	0.117	0.104	0.094	0.078	0.067														

For
Leadscrew
Pitch
6 MM

PITCH										M.M.									
M	L	K	L	N	K	J	N	J		M	L	K	L	N	K	J	N	J	
AC	3.2	3.6	4.0	4.5	4.8	5.0	5.6	6.0	7.0										
BC	1.6	1.8	2.0	2.25	2.4	2.5	2.8	3.0	3.5										
AD	0.8	0.9	1.0		1.2	1.25	1.4	1.5	1.75										
BD	0.4	0.45	0.5		0.6		0.7	0.75											
T. P. I.										INCH									
N	M	M	M	M	M	M	M	M		N	M	M	M	M	M	M	M	M	
AC	4	4.5	5	5.5	6	6.5	7	7.5											
BC	8	9	10	11	12	13	14	15											
AD	16	18	20	22	24	26	28	30											
BD	32	36	40	44	48	52	56	60											
MODULE										D. P.									
M	L	K	L	N	K	J	N	J		M	L	K	L	N	K	J	N	J	
AC	3.2	3.6	4.0	4.5	4.8	5.0	5.6	6.0	7.0										
BC	1.6	1.8	2.0	2.25	2.4	2.5	2.8	3.0	3.5										
AD	0.8	0.9	1.0		1.2	1.25	1.4	1.5	1.75										
BD	0.4	0.45	0.5		0.6		0.7	0.75											
FEED MM/O										FEED INCH/O									
U	T	S	V	R						U	T	S	V	R					
PAC	1.960	1.743	1.569	1.307	1.120														
PBC	0.980	0.872	0.784	0.654	0.560														
PAD	0.490	0.436	0.392	0.326	0.280														
PBD	0.245	0.218	0.196	0.163	0.140														

For
Leadscrew
Pitch
8 TPI

T. P. I.										INCH									
N	M	M	M	M	M	M	M	M		N	M	M	M	M	M	M	M	M	
AC	4	4.5	5	5.5	6	6.5	7	7.5											
BC	8	9	10	11	12	13	14	15											
AD	16	18	20	22	24	26	28	30											
BD	32	36	40	44	48	52	56	60											
PITCH										METRIC									
M	L	K	L	N	K	J	N	J		M	L	K	L	N	K	J	N	J	
AC	3.2	3.6	4.0	4.5	4.8	5.0	5.6	6.0	7.0										
BC	1.6	1.8	2.0	2.25	2.4	2.5	2.8	3.0	3.5										
AD	0.8	0.9	1.0		1.2	1.25	1.4	1.5	1.75										
BD	0.4	0.45	0.5		0.6		0.7	0.75											
D. P.										MODULE									
N	M	M	M	M	M	M	M	M		M	L	K	L	N	K	J	N	J	
AC	4	4.5	5	5.5	6	6.5	7	7.5											
BC	8	9	10	11	12	13	14	15											
AD	16	18	20	22	24	26	28	30											
BD	32	36	40	44	48	52	56	60											
FEED INCH/O										FEED INCH/O									
U	T	S	V	R						U	T	S	V	R					
PAC	0.0736	0.0656	0.0590	0.0492	0.0420														
PBC	0.0368	0.0328	0.0295	0.0246	0.0210														
PAD	0.0184	0.0164	0.0147	0.0123	0.0105														
PBD	0.0092	0.0082	0.0073	0.0062	0.0053														

For
Leadscrew
Pitch
4 TPI

		T. P. I.										INCH									
		N	M	M	M	M	M	M	M	M	M	N	M	M	M	M	M	M	M		
		60	60	60	60	66	69	60	68	70	60	60	60	60	66	69	60	68	70		
AC		4	4	5	5	5	5	6	6	7	7										
BC		8	9	10	11	11	11	12	13	14	14										
AD		16	18	20	22	23	24	26	28	30	30										
BD		32	36	40	44	46	48	52	56	60	60										
		PITCH										METRIC									
		M	L	K	L	N	K	J	N	J	J	M	L	K	L	N	K	J	J		
		AC	3.2	3.6	4.0	4.5	4.8	5.0	5.6	6.0	7.0	AC	3.2	3.6	4.0	4.5	4.8	5.0	5.6		
BC		1.6	1.8	2.0	2.25	2.4	2.5	2.8	3.0	3.5	BC	1.6	1.8	2.0	2.25	2.4	2.5	2.8	3.0		
AD		0.8	0.9	1.0		1.2	1.25	1.4	1.5	1.75	AD	0.8	0.9	1.0		1.2	1.25	1.4	1.5		
BD		0.4	0.45	0.5		0.6		0.7	0.75		BD	0.4	0.45	0.5		0.6		0.7	0.75		
		D. P.																			
		N	M	M	M	M	M	M	M	M	M	N	M	M	M	M	M	M	M		
		60	60	60	60	66	69	60	68	70	60	60	60	60	66	69	60	68	70		
AC		8	9	10	11	11	11	12	13	14	14										
BC		16	18	20	22	23	24	26	28	30	30										
AD		32	36	40	44	46	48	52	56	60	60										
BD		64	72	80	88	92	96	104	112												
		MODULE																			
		M	L	K	L	N	K	J	N	J	J	M	L	K	L	N	K	J	J		
		AC	1.6	1.8	2.0	2.25	2.4	2.5	2.8	3.0	3.5	AC	1.6	1.8	2.0	2.25	2.4	2.5	2.8		
BC		0.8	0.9	1.0		1.2	1.25	1.4	1.5	1.75	BC	0.8	0.9	1.0		1.2	1.25	1.4	1.5		
AD		0.4	0.45	0.5		0.6		0.7	0.75		AD	0.4	0.45	0.5		0.6		0.7	0.75		
BD		0.2		0.25		0.3		0.35			BD	0.2		0.25		0.3		0.35			
		FEED INCH/O																			
		U										T									
		PAC	0.0368	0.0328	0.0294	0.0246	0.0210					PAC	0.0368	0.0328	0.0294	0.0246	0.0210				
PBC		0.0184	0.0164	0.0147	0.0123	0.0105						PBC	0.0184	0.0164	0.0147	0.0123	0.0105				
PAD		0.0092	0.0082	0.0074	0.0061	0.0052						PAD	0.0092	0.0082	0.0074	0.0061	0.0052				
PBD		0.0046	0.0041	0.0037	0.0030	0.0026						PBD	0.0046	0.0041	0.0037	0.0030	0.0026				
		FEED INCH/O																			
		U										T									
		PAC	0.0232	0.0206	0.0186	0.0154	0.0132					PAC	0.0232	0.0206	0.0186	0.0154	0.0132				
PBC		0.0116	0.0103	0.0093	0.0077	0.0066						PBC	0.0116	0.0103	0.0093	0.0077	0.0066				
PAD		0.0158	0.0051	0.0046	0.0038	0.0033						PAD	0.0158	0.0051	0.0046	0.0038	0.0033				
PBD		0.0029	0.0026	0.0023	0.0019	0.0016						PBD	0.0029	0.0026	0.0023	0.0019	0.0016				

To exchange the transmission shaft gear with another gear, loosen the clamping nut on the swivel casting arm. Do the same when adjusting clutching for screw cutting work. To change the drive gear, loosen the 120T/127T gear's clamping nuts. Slight backlash is necessary to intermediate the gear in both cases. Safety limit switch is shown in the lower side and activates when the end cover is to open. All movement is stopped.



Located on right-hand side of the apron on lathes having an English lead screw. Engage the indicator pinion with the lead screw and tighten the half nut to retain indicator in engagement.

To cut threads of an even number per inch, close the lead screw nut as ANY line on the dial passes the datum mark. To cut threads of odd numbers per inch, close the lead screw nut at any NUMBERED line.

Fractional threads of 1/2 or 1/4 TPI may be cut by closing the nut at the SAME numbered line on each pass of the tool.

This dial cannot be used with an English lead screw to cut metric threads, or fractional threads. For these the leads crew nut must be kept closed and the machine reversed by use of the Changeover switch, after each cutting pass and tool with drawl.

The thread dial used for cutting metric screw threads on lathes equipped with metric lead screw. To provide for the various pitches of metric threads, several gears having different numbers of teeth are mounted on the lower end of the shaft. The vertical position of the thread dial indicator is changed as required so that the correct gear for the pitch of the thread to be cut will mesh the lead screw.

Each graduation on the dial is marked with a letter which indicates the points at which the half nuts may be engaged for certain threads.

A diagram is supplied with the thread dial to show which gear and graduations must be used for each pitch of metric screw thread.

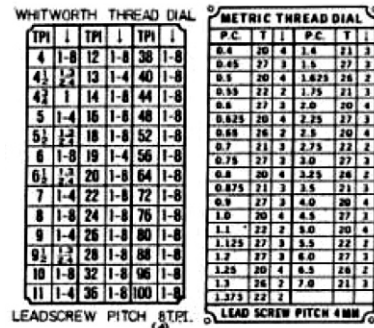


Figure 8 - Threading dial indicator.

In addition to hand wheel traverse, the carriage can be automated, through controls on the front of the apron. Automatic feed lever (A) If move upwards. (A) upwards, carriage would do longitudinal-feed operation. Set lever (A) to the middle position for manual operation. Set lever (A) downwards for cross-feed operation.



OPERATION (CONTINUED)

Lever (B) is pressed downward to engage the lead screw nut for screw cutting. To avoid undue wear. Release the nut except when screw cutting.

An interlock within the apron prevents in advertent engagement of automatic feed lever (A) and half nut lever (B) at the same time

CROSS-SLIDE AND TOP-SLIDE CONTROLS

Refer to Figure 9.

A solid top-slide is fitted as standard to the cross-slide. Carried on a rotatable base, the cross-slide is marked 45–0–45 degree for accurate indexing. Hand wheel dials are graduated in inch and metric divisions to suit the operating screw and fitted. The cross-slide can be power operated by pulled downward the automatic at half sliding feed per spindle revolution, or if can be hand-operated using the large – diameter dial graduated in either inch or metric division to suit the operating screw and nut fitted.

TAILSTOCK CONTROLS

Can be freely moved along the bed, by unlocking the clamp lever (A). The tailstock barrel is locked by lever (B).

The tailstock can be set-over for production of shallow tapers or for re-alignment. Release the clamping lever (A) and adjust screws (S) at each sild of the base to move Tailstock laterally across the base. Retightening and checking after adjustment of set-over.

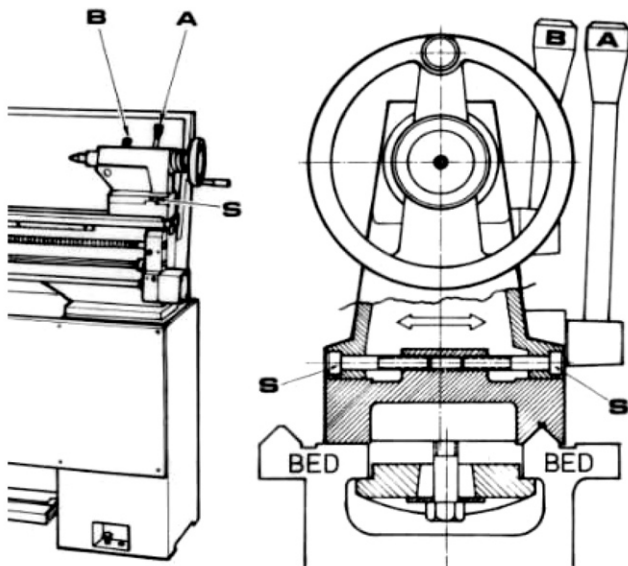


Figure 10 - Tailstock controls.

MAINTENANCE

LUBRICATION CHECKS

Before operating the machine, make the following important check:

1. The headstock is filled to level marked on oil sight window with Shell Tellus Oil 27.
2. The gearbox is filled to level marked on oil sight window with Shell Tellus Oil 27.
3. The carriage apron is filled to level marked on oil sight window with Shell Tonne 33.
4. In addition, apply an oil can to the points shown on lubrication diagram which require daily oiling. Use light machine oil or way lubricant.

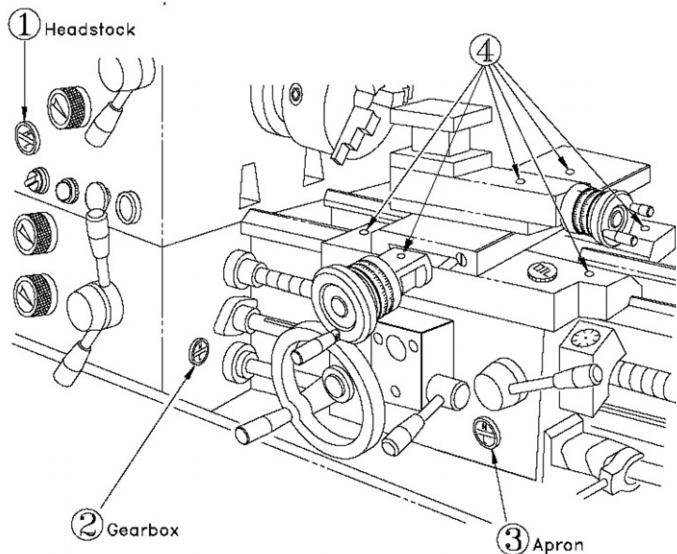


Figure 11 - Lubrication checks.

CROSS-SLIDE WAYS

Tapered gib strips are fitted to slide ways of saddle cross-slide and top (compound) slides so that any slackness which may develop can be rectified.

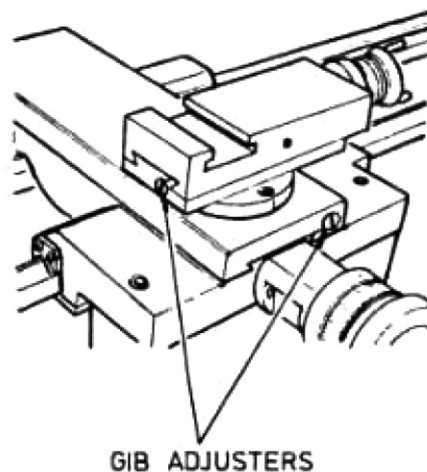


Figure 12 - Cross-slide ways.

Ensure that slide ways are thoroughly cleaned and lubricated before attempting adjustment. Then reset the gibs by slackening the rear gib screw and tightening the front screw, a little at a time. Check constantly for smooth action throughout full slide travel. Avoid over adjustment which can result in increased wear-rate and stiff or jerky action.

MAINTENANCE (CONTINUED)**CROSS-SLIDE NUT**

This is adjustable for elimination of slackness which may develop in service. Reduce backlash by the cap-head screw rear of the nut, then in the rear of the nut. Then make only small adjustment by the cap-head screw. Before operating the cross-slide several times by hand to be sure of smooth operation throughout travel.

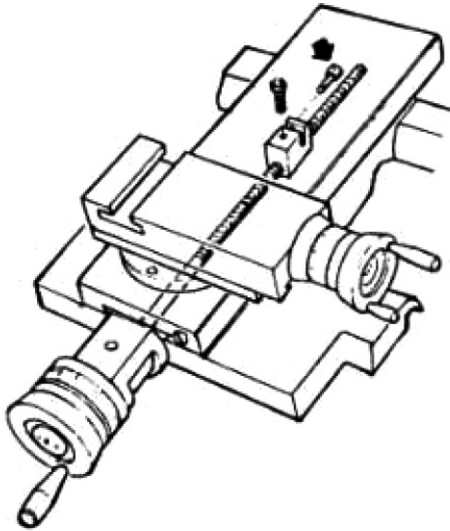


Figure 13 - Cross-slide nut.

ADJUSTMENT OF SLIPPING CLUTCH

Apron has an overload protection device by means of slipping clutch. This adjustment can be accomplished by adjusting screws (B) and (D).

In the feed. The slipping clutch and apron will stop when cutting over the limit. This will prevent damage to the lathe, if overloading the cutter.

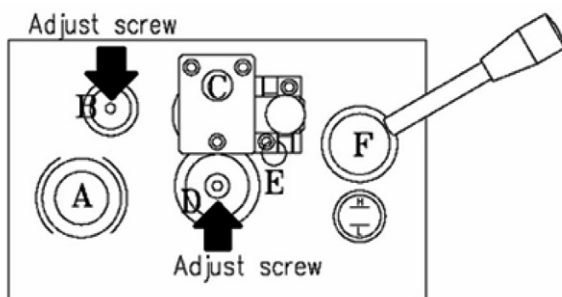


Figure 14 - Adjust slipping clutch.

In the thread, if the hand wheel has obstructed, clutch (B) may slip. The hand wheel will not turning but the thread is keeping. That can protect the gear shaft and lead screw.

Be sure do not adjust this screw so frequently because slipping clutch does not wear co much even for a long period of use.

SPINDLE BEARING ADJUSTMENT

When we find the spindle bearings are too tight or loose, open the headstock cover (A) and loose the set screw (B) on the spindle bearing thrust nut (C) and then adjust the thrust nut (C) and then adjust the thrust nut by loosen or fastening it. The proper adjustment is finished by fastening the set screw again.

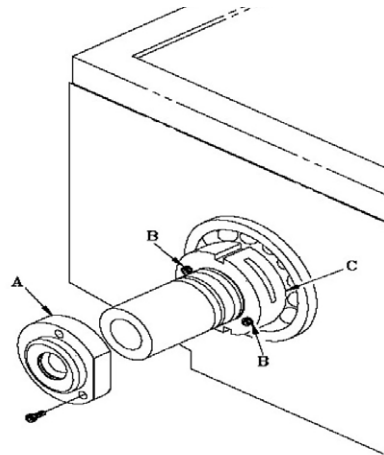


Figure 15 - Adjust spindle bearing.

END GEAR TRAIN

Power is transmitted from the headstock to the gearbox through the gear train. Intermediate gears are mounted on an adjustable swing frame (M), shown above. Gears must be thoroughly cleaned before fitting and backlash, maintained at 0.005 in. to mesh well. Lubricate gears regularly with oil or grease every month.

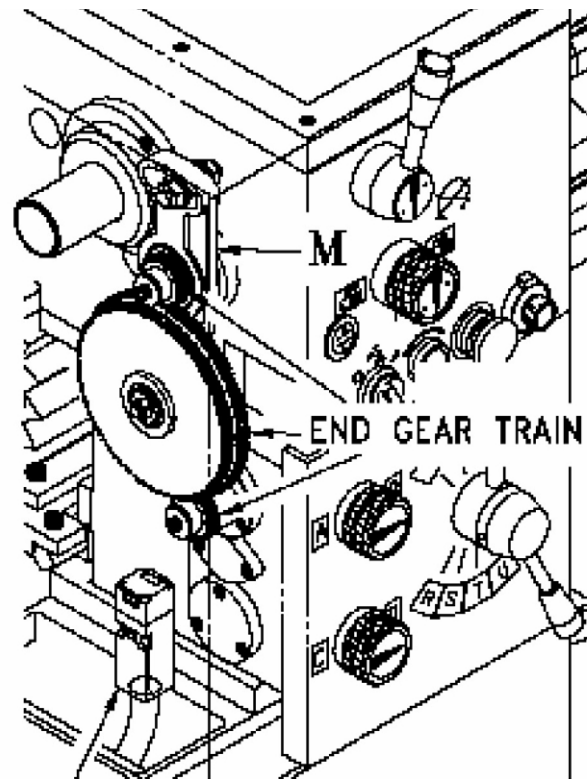
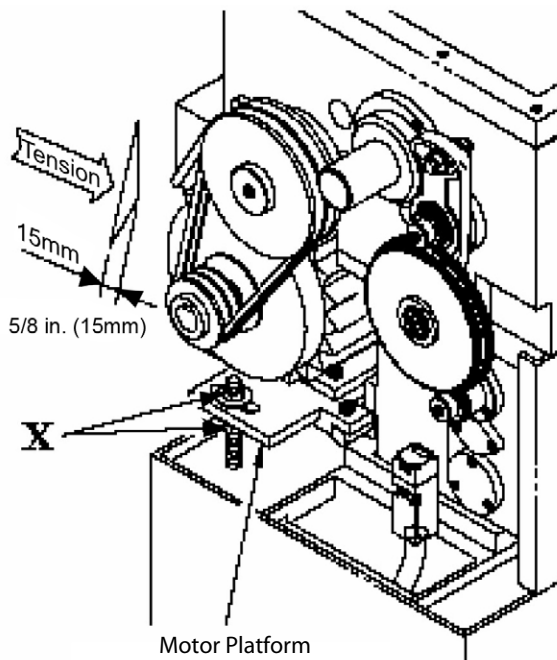


Figure 16 - End gear train.

OPERATION (CONTINUED)**DRIVE BELTS**

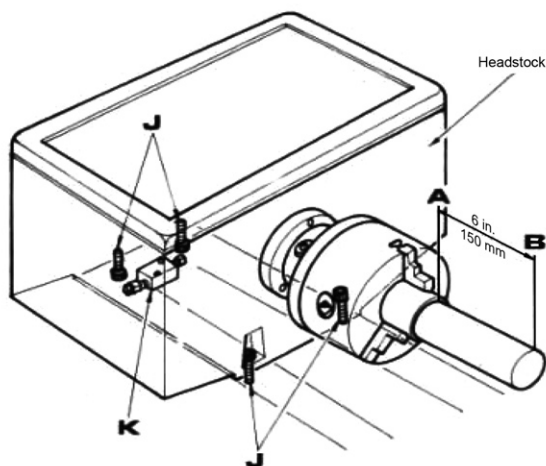
To alter the belt tension, remove the end cover and adjust the screws identified by the "X" (Fig. 17). Ensure that the motor is correctly aligned with the lathe axis. Apply light finger pressure at the midpoint between the pulleys, it should deflect by 5/8 in. at most when at the correct tension.

**Figure 17 - Adjust drive belt.****LATHE ALIGNMENT (PART 1)**

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

A. Headstock check

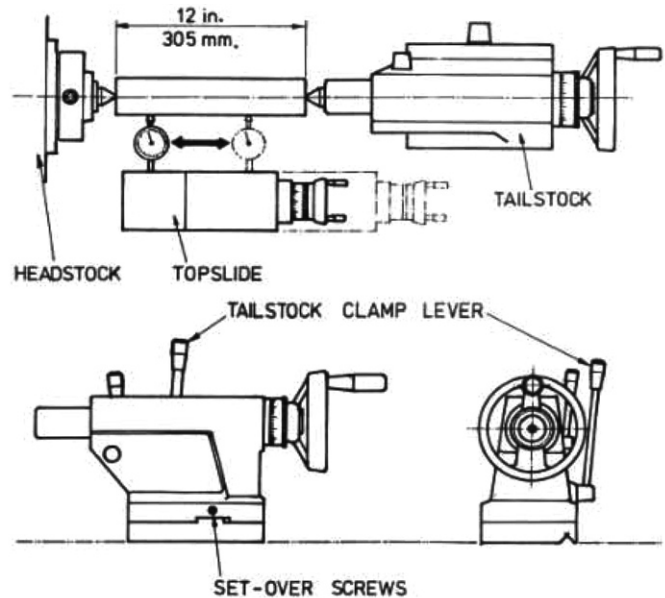
Take a light cut with a keen tool over a 6 in. (150mm.) length of 2 in. dia. (50mm.) steel bar gripped in the chuck but not supported at the free end. Micrometer readings at each end of the turned length (at A and B) should be the same.

**Figure 18 - Headstock check.**

To correct a difference in readings, slacken the four headstock hold-down screws (S) and adjust the set-over pad (P) beneath the bead stock. To pivot the headstock about the dowel (D). Tighten all screws, after adjustment and repeat the test-cut/micrometer-reading sequence until micrometer readings are identical so machine now cutting parallel.

B. Tailstock check

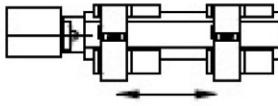
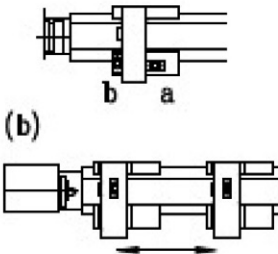
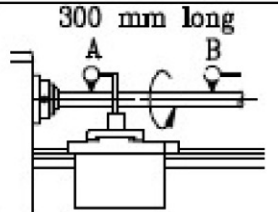
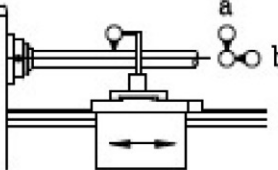
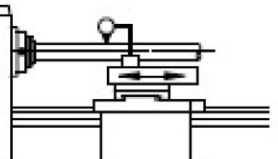
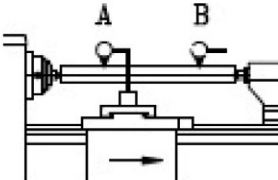
Using a 12 in. (305mm) ground steel bar fitted between headstock and tailstock centers, check the alignment by fitting a dial-test indicator to the top slide and traversing the center line of the bar.

**Figure 19 - Tailstock check.**

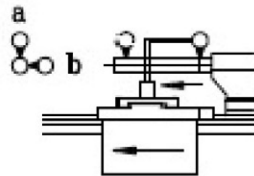
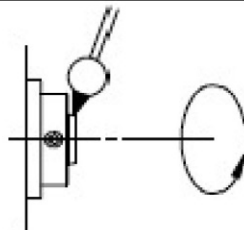
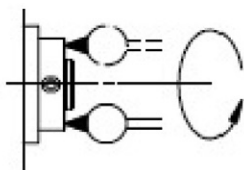
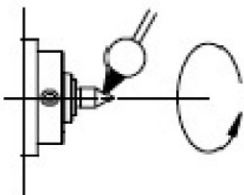
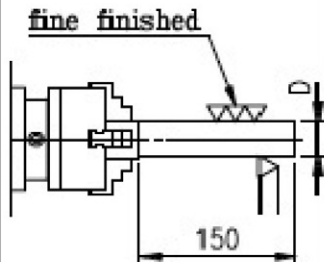
To correct any error release the tailstock clamp lever and adjust the two set-over screws provided continue checking and correction until the alignment is perfect.

OPERATION (CONTINUED)
STATICS ACCURACY TEST

CNS

TYPE:			MACHINE SERIAL NO.		
NO.	SUBJECT OF MEASUREMENT		ILLUSTRATION	PERMISSIBLE ERROR	MEASURED ERROR
1.	levelling of machine	(a) in longitudinal direction	(a) 	$\pm 0.04 \text{ mm/m}$ (convex)	
		(b) in transverse direction	(b) 	$\pm 0.04 \text{ mm/m}$	
2.	Taper of spindle runs true			Position A : 0.01 mm	
				Position B : 0.02 mm	
3.	Spindle parallel with traverse of carriage	(a) in vertical plane		(a) 0.02/ 300 mm	
		(b) in horizontal plane		(b) 0.02/ 300 mm	
4.	Upper Slide (Parallelism of the Slide Longitudinal Movement to the Spindle Axis)			0.01/150 mm	
5.	Axis of centres parallel with bed in vertical plane			0.02/ 300 mm	

OPERATION (CONTINUED)**STATICS ACCURACY TEST (CONTINUED)**

6.	Tailstock spindle parallel with carriage guides (carriage traverse)	(a) in vertical plane		(a) 0.02/ 150 mm	
		(b) in horizontal plane		(b) 0.01/ 150 mm	
7.	Centring register of spindle runs true		0.01 mm		
8.	Spindle for axial float and true running of face of spindle flange		0.015 mm		
9.	Centre runs true		0.015 mm		
10.	Working accuracy of lathe on cylindrical turning	 <p><u>fine finished</u></p> <p>150</p>	0.015mm (cylindricity) (D=25mm ~50mm)		
CHIEF ENGINEER :			INSPECTING ENGINEER :		

MAINTENANCE

LUBRICATION

Headstock bearing and gears are splash lubricated. Ensure that oil level is kept between H-L level marks on the sight glass in the front of head stock. After long time of operation, when the headstock lubrication oil becomes unclean, it should be drained out to refill fresh lubrication oil.

To change oil in headstock, set apron control lever to central position and stop the main motor. Unscrew the drain plug beside headstock, then the oil tank can be easily drained out for changing oil. A filler plug is fitted beside the left end of the headstock accessible after removal of the end guard.

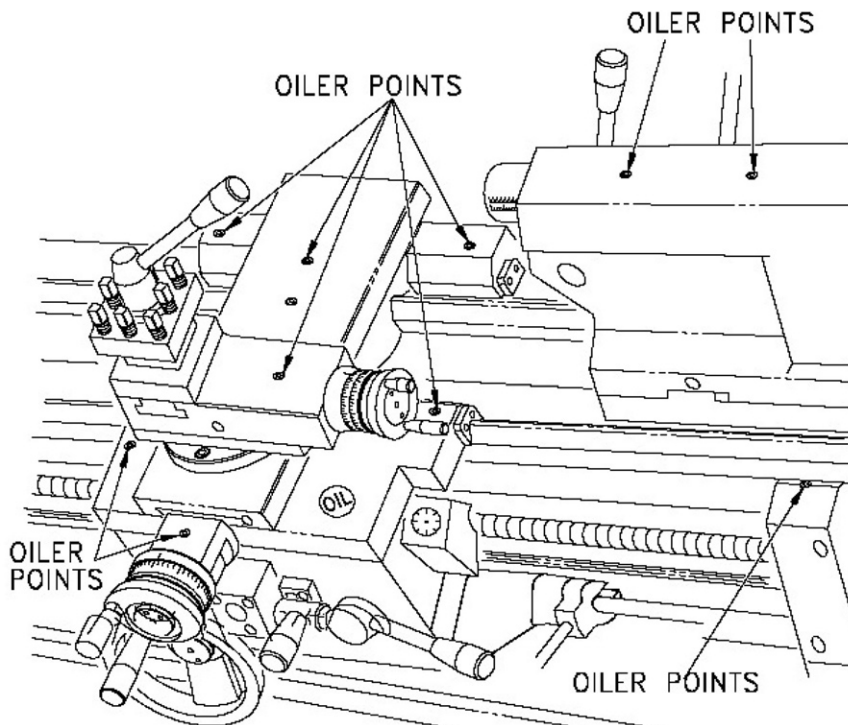
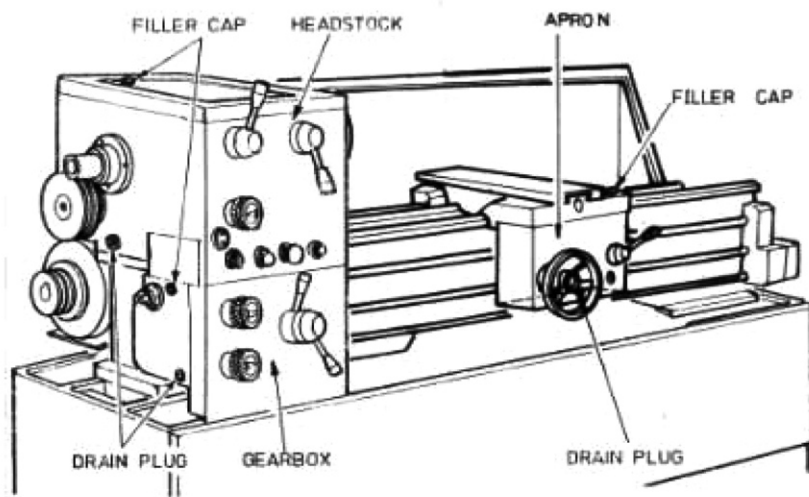
The gearbox and apron are splash lubricated from an internal reservoir of oil. Check the oil level constantly to the mark on the oil sight window at the right side face of the gear box; a weekly check is recommended, with the oil changed every year. Fill oil through a filler

cap in the top of the gear box, enclosed by the end-guard. Drain from a drain plug in the bottom of the gearbox. The apron can be drained by unscrewing a hex-headed drain plug in the bottom.

In addition to pump-fed lubricated, oiler points are provided for the saddle, cross-slide, cross – slide nut and using a standard pump-type can with light machine oil or way lubricant, see Fig

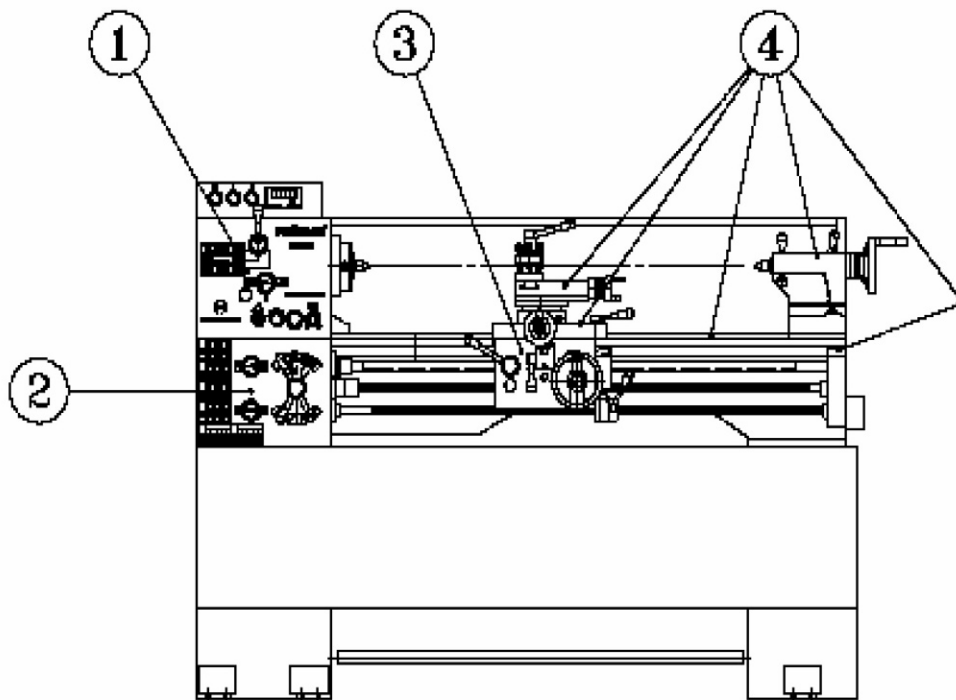
On the tailstock, tail end of lead screw oiler points are provided for daily attention from a standard oil can.

It is recommended that all slide ways, the lead screw and feed shaft are cleaned off (a bristle paint brush is useful for this) and lightly oiled after each period of work. NOTE: Use of incorrect graded of can cause damage.



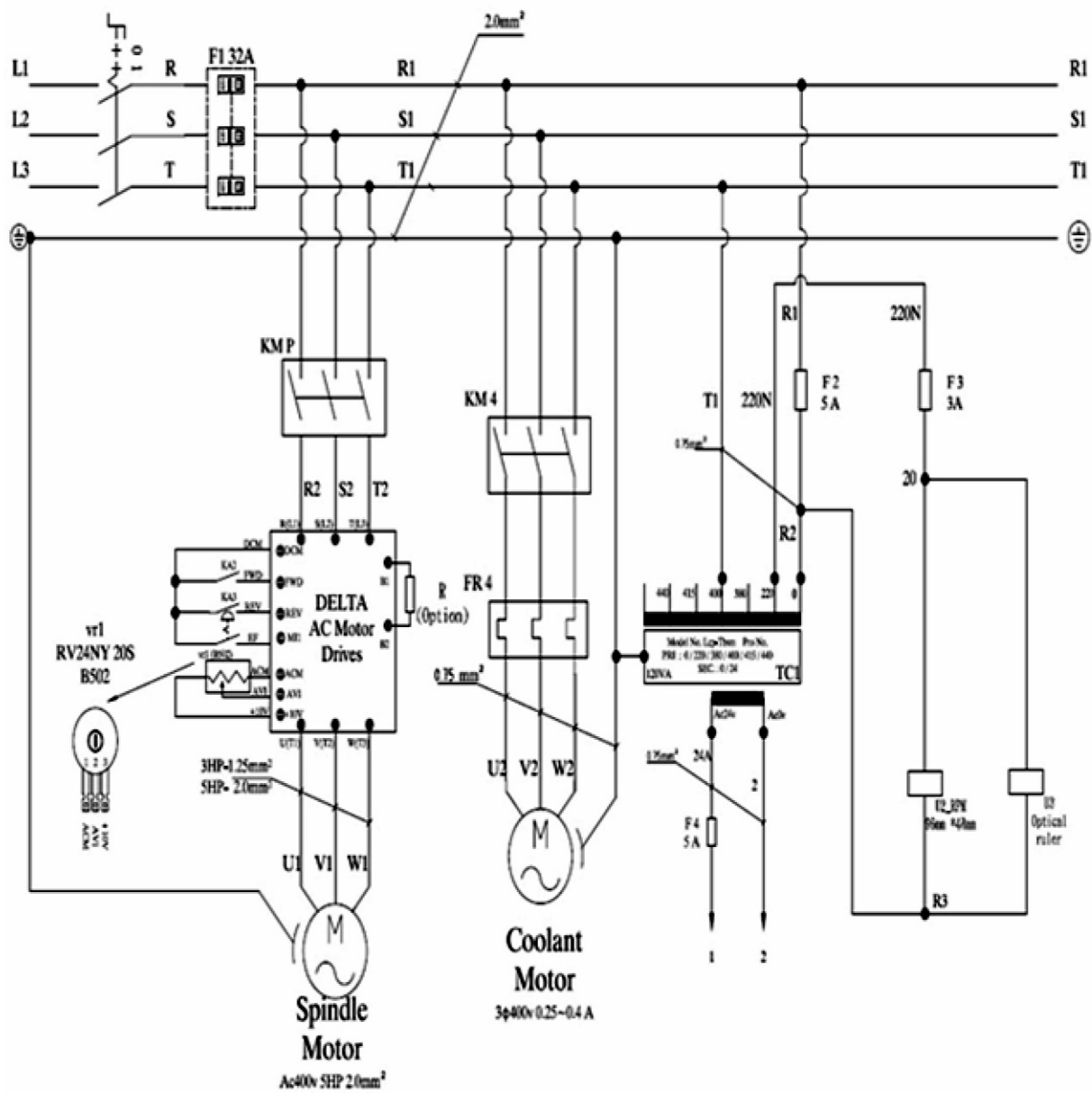
MAINTENANCE (CONTINUED)**LUBRICATION (CONTINUED)**

LUBRICATING OIL & GREASE LIST					
Part to be lubricated		①	②	③	④
		HEADSTOCK	GEARBOX	APRON	SLIDE & TAILSTOCK
Recommendable lubricant		SHELL; TELLUS OIL 27	SHELL; TELLUS OIL 27	SHELL; TELLUS OIL 33	SHELL; TELLUS OIL 33 ~ 41
Filling method		OIL JUG	OIL JUG	OIL JUG	OIL GUN
Initial charge quantity		4.5 liter	1.5 liter	0.9 liter	
Make up	Interval	3 Month	3 Month	1 Month	1 Day
	Quantity	0.5 liter	0.5 liter	0.2 liter	A little
Exchange	Interval	1 Year	1 Year	1 Year	
	Quantity	4.5 liter	1.5 liter	0.9 liter	



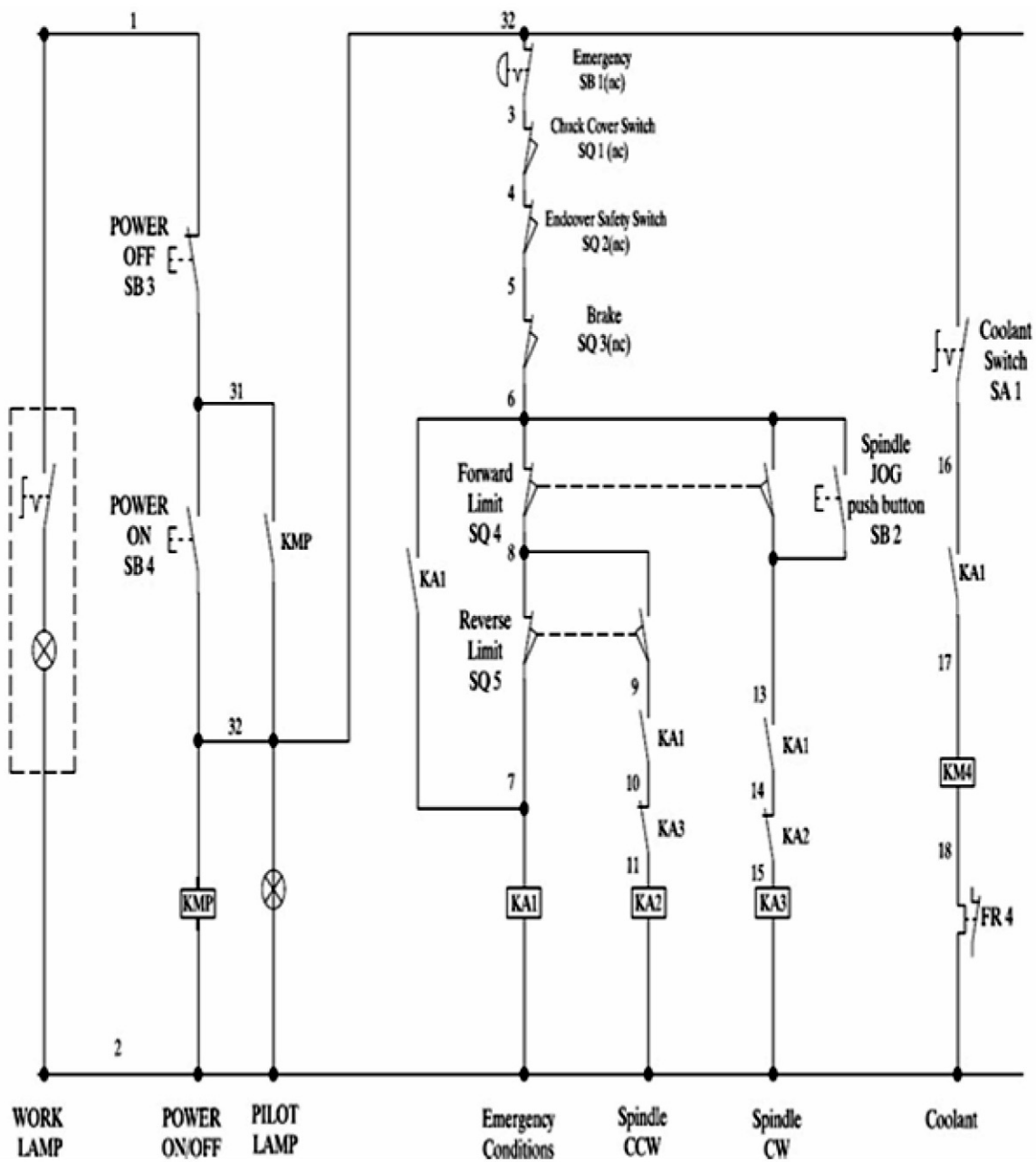
MAINTENANCE (CONTINUED)

ELECTRICAL DIAGRAMS



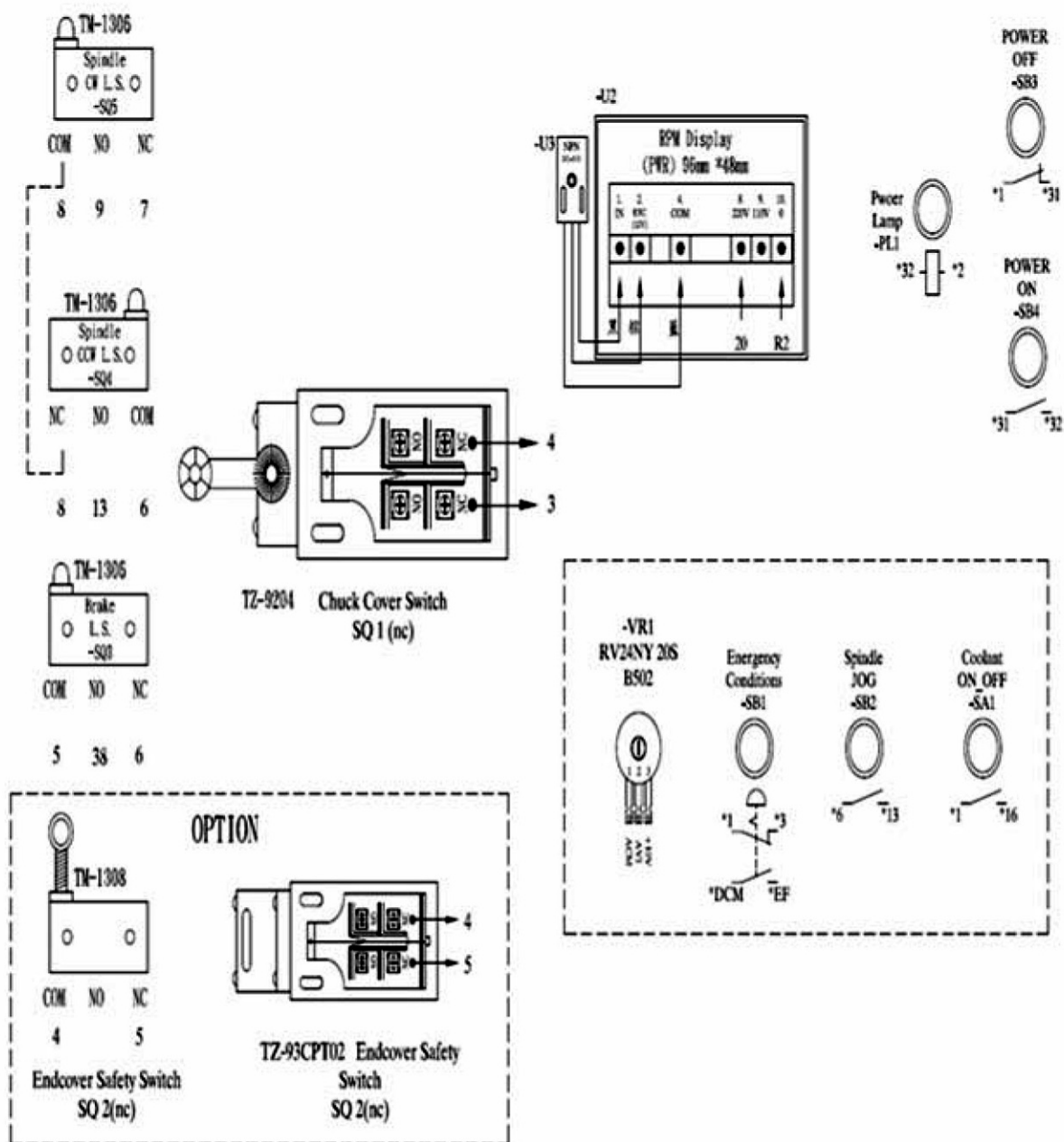
MAINTENANCE (CONTINUED)

ELECTRICAL DIAGRAMS (CONTINUED)



MAINTENANCE (CONTINUED)

ELECTRICAL DIAGRAMS (CONTINUED)



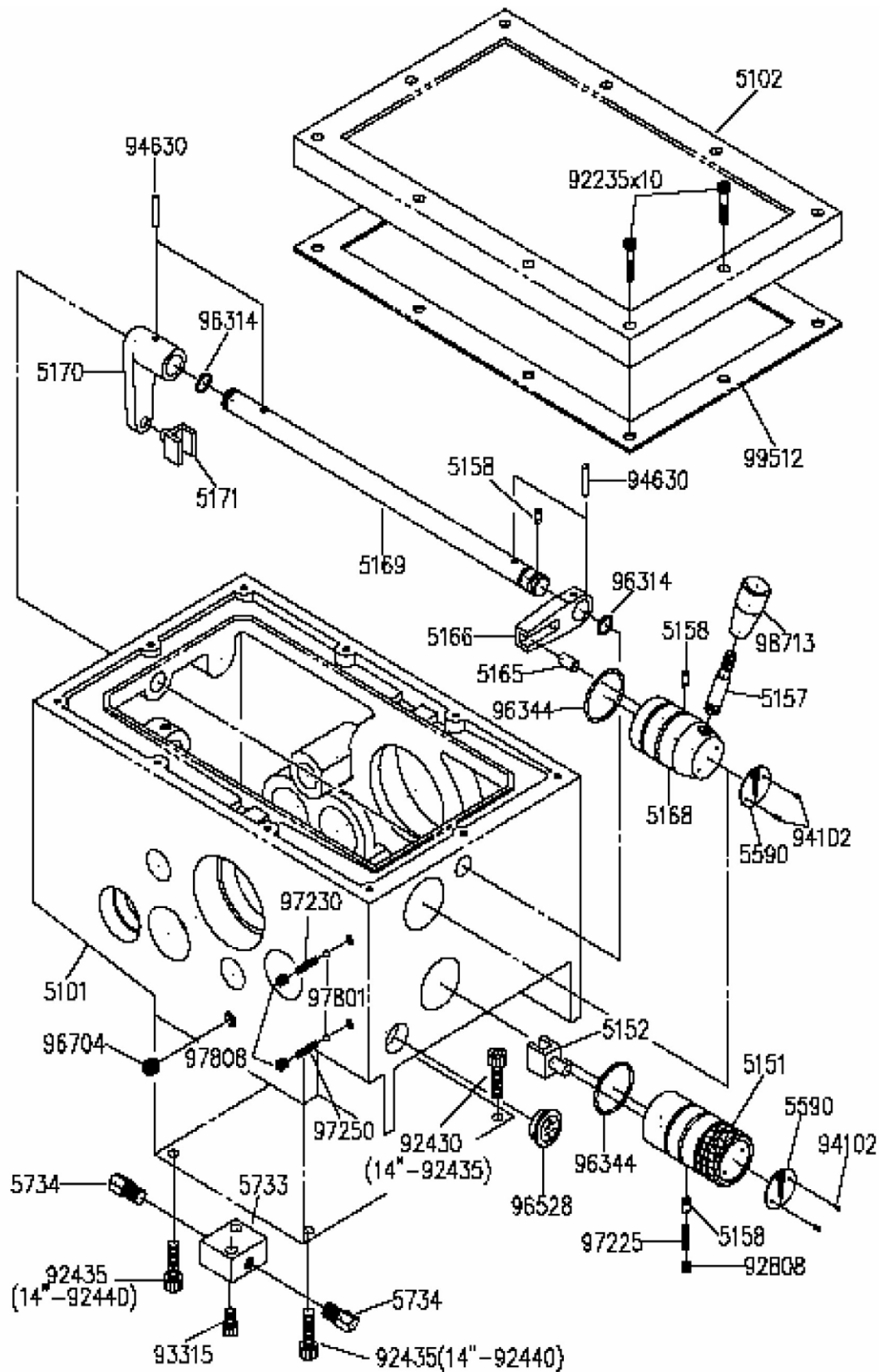
MAINTENANCE (CONTINUED)**ELECTRICAL EQUIPMENT**

Symbol	Name	Specification	Qty
KM1	Magnetic contactor for main motor reverse	CN-16	1
KM2	Magnetic contactor for main motor forward	CN-16	1
KM3	Magnetic contactor for coolantpump	CN-11	1
KA1	Magnetic contactor for brake	RAN-4	1
FU1	Fuse boxs	133-10	1
FU2	Fuse boxs	133-10	1
FU3	Fuse boxs	133-10	1
FU4	Fuse boxs	282-122	1
FU5	Fuse boxs	282-122	1
FU6	Fuse boxs	282-122	1
FR1	Thermal overload rela for main motor	RHN-10	1
FR2	Thermal overload relay for coolantpump	RHN-10	1
QS1	Main power switch	P1-25/V/SVB	1
HL1	Pilot light	XB2-BV63	1
TC1	Control circuit Transformer	120VA	1
SA1	Selecting switch	XB2-BD21	1
SB1	Off hand switch Emergeney	XB2-BS542	1
M1	Main motor	3HP	1
M2	Coolant pump	1/8HP	1

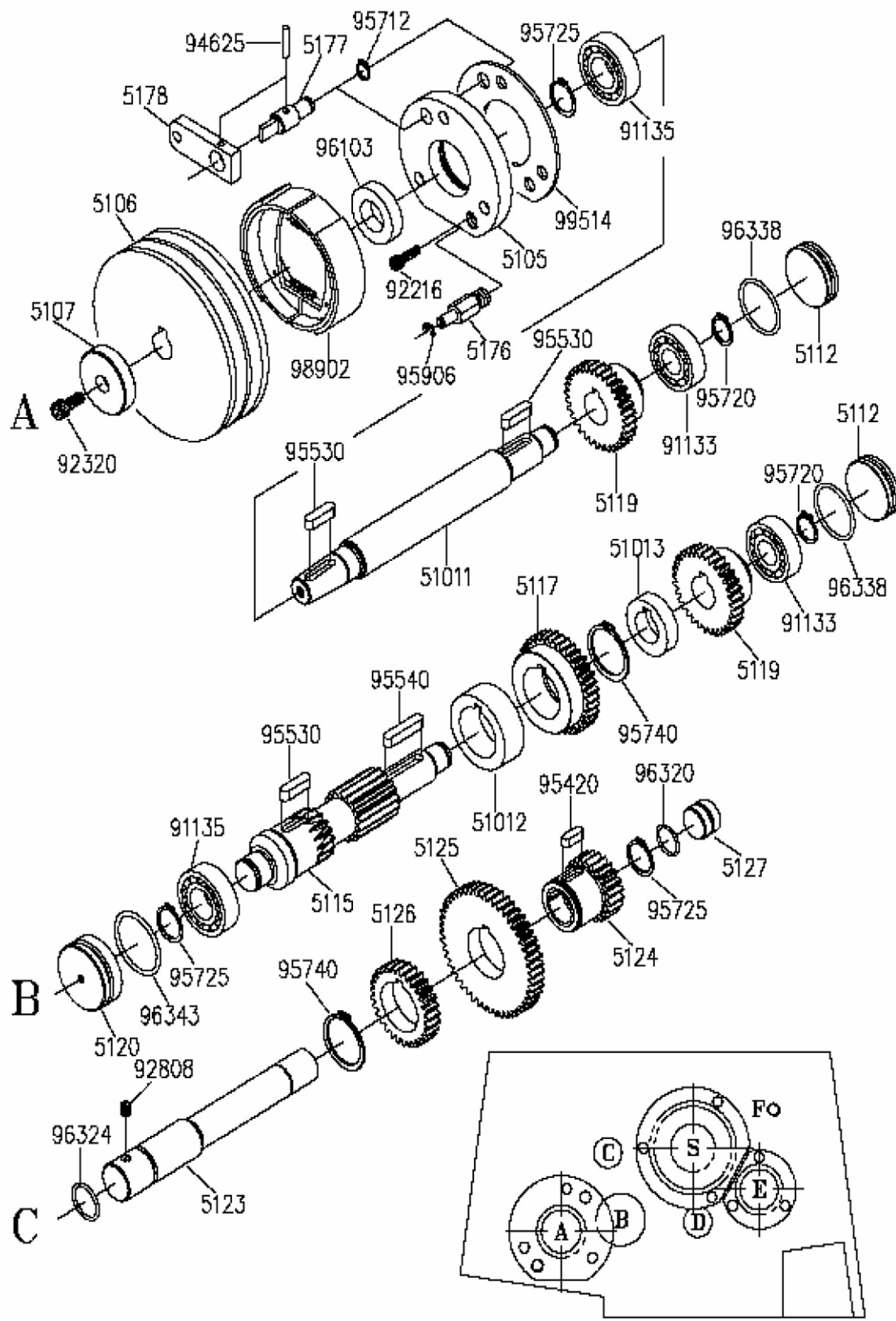
NOTES

Lined area for notes.

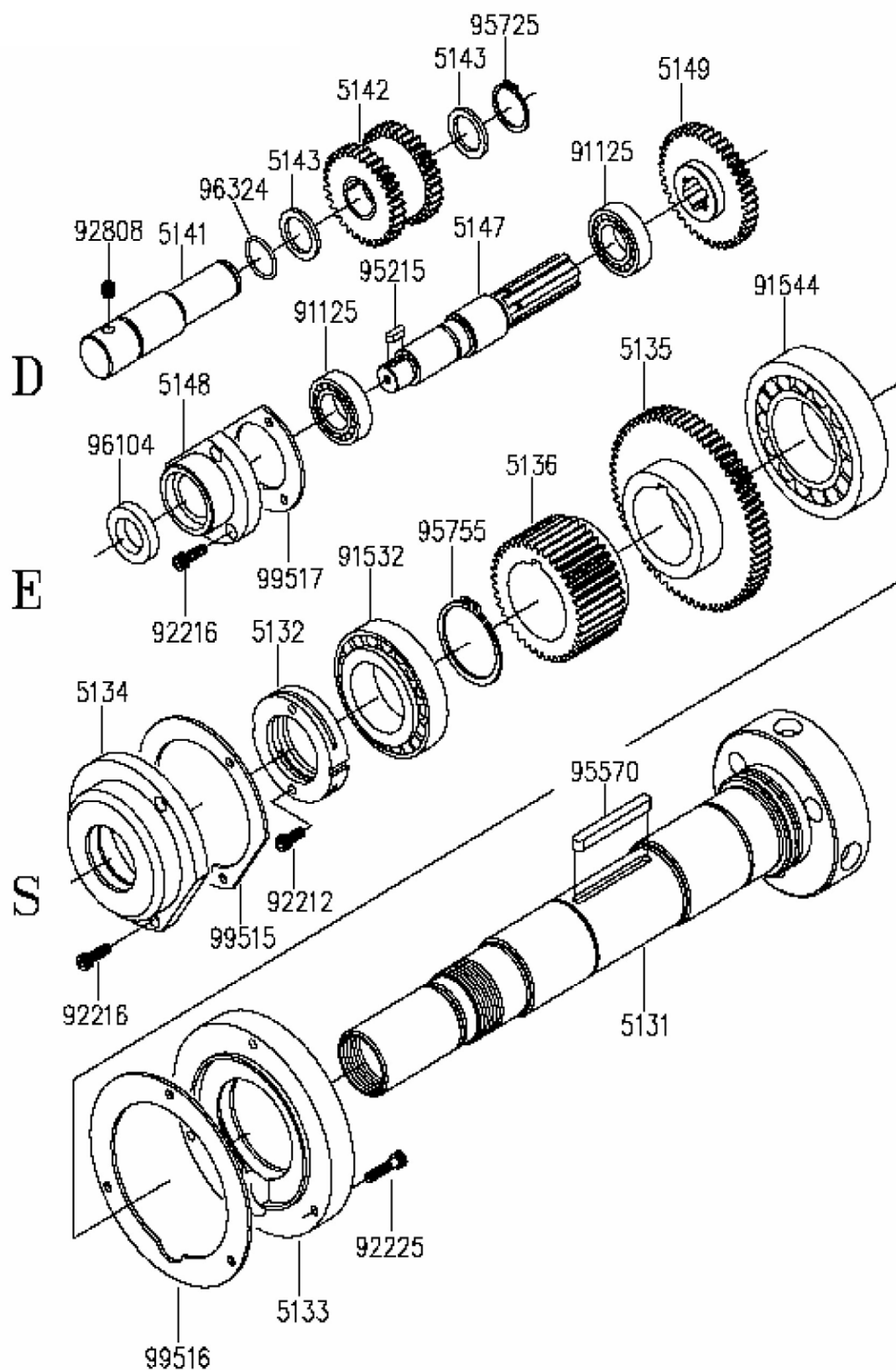
REPAIR PARTS ILLUSTRATION FOR HEADSTOCK ASSY. (CASTING & CONTROLS)



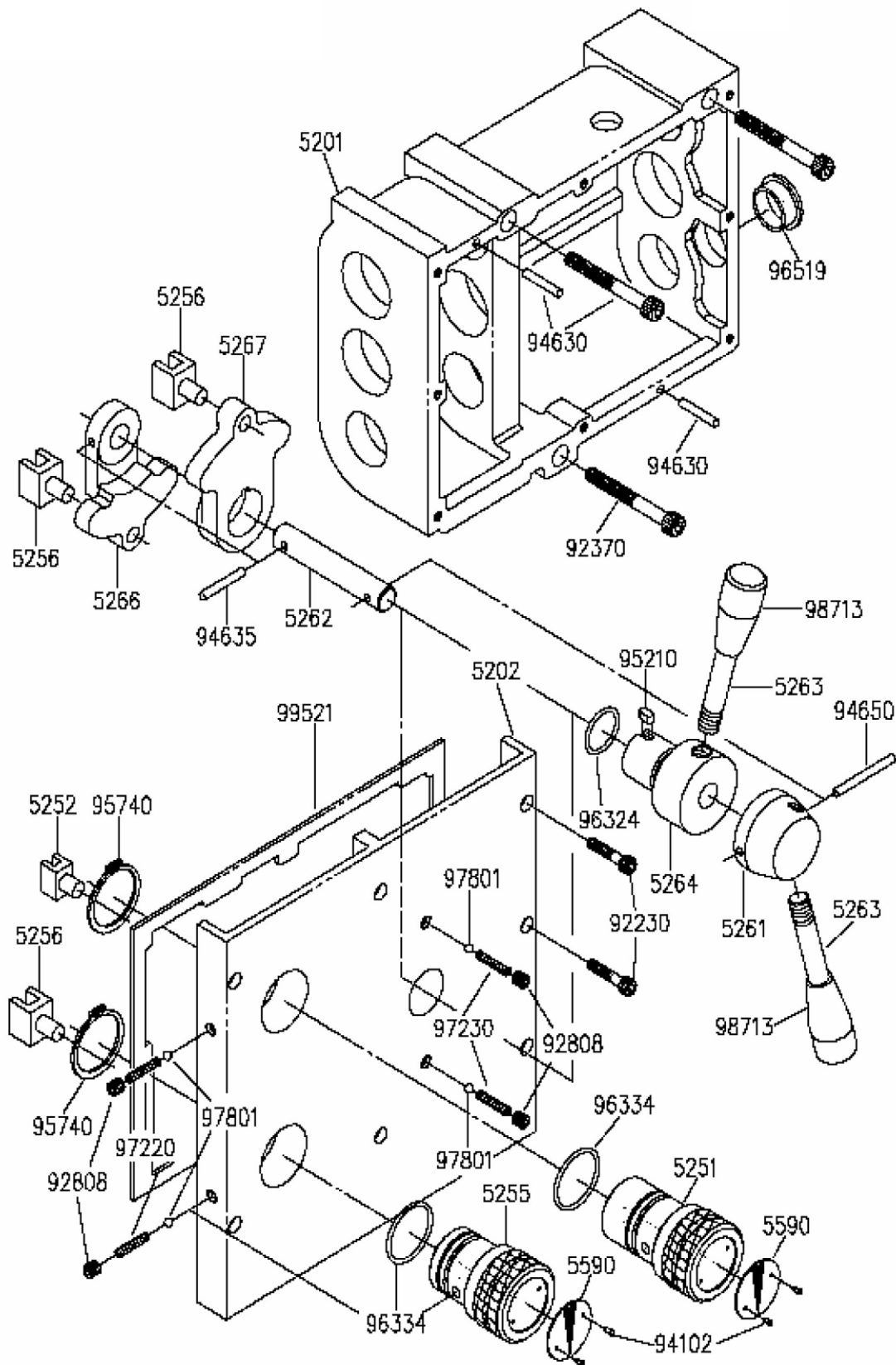
REPAIR PARTS ILLUSTRATION FOR HEADSTOCK ASSEMBLY (GEARS)



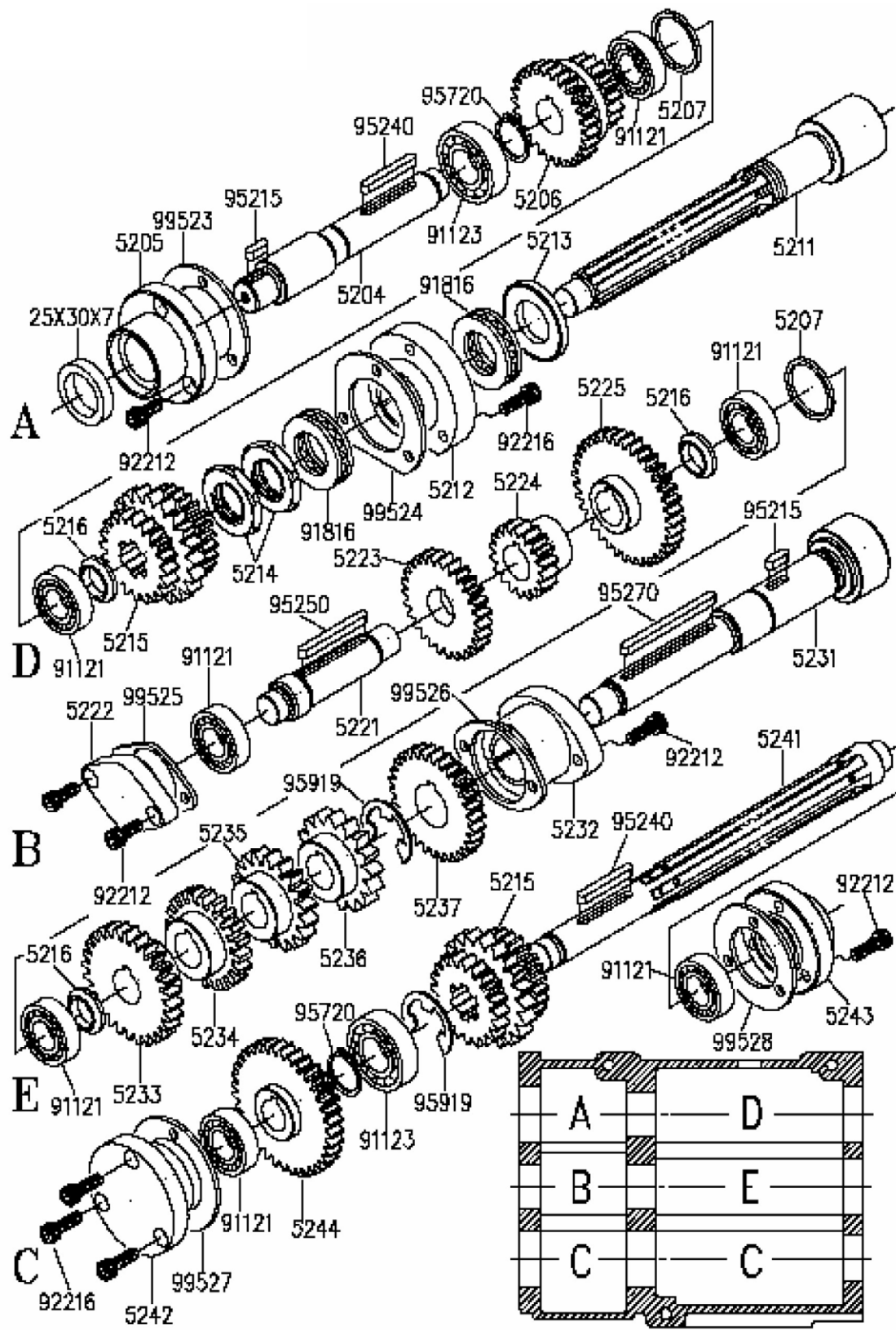
REPAIR PARTS ILLUSTRATION FOR HEADSTOCK ASSY. (SPINDLE & GEARS)



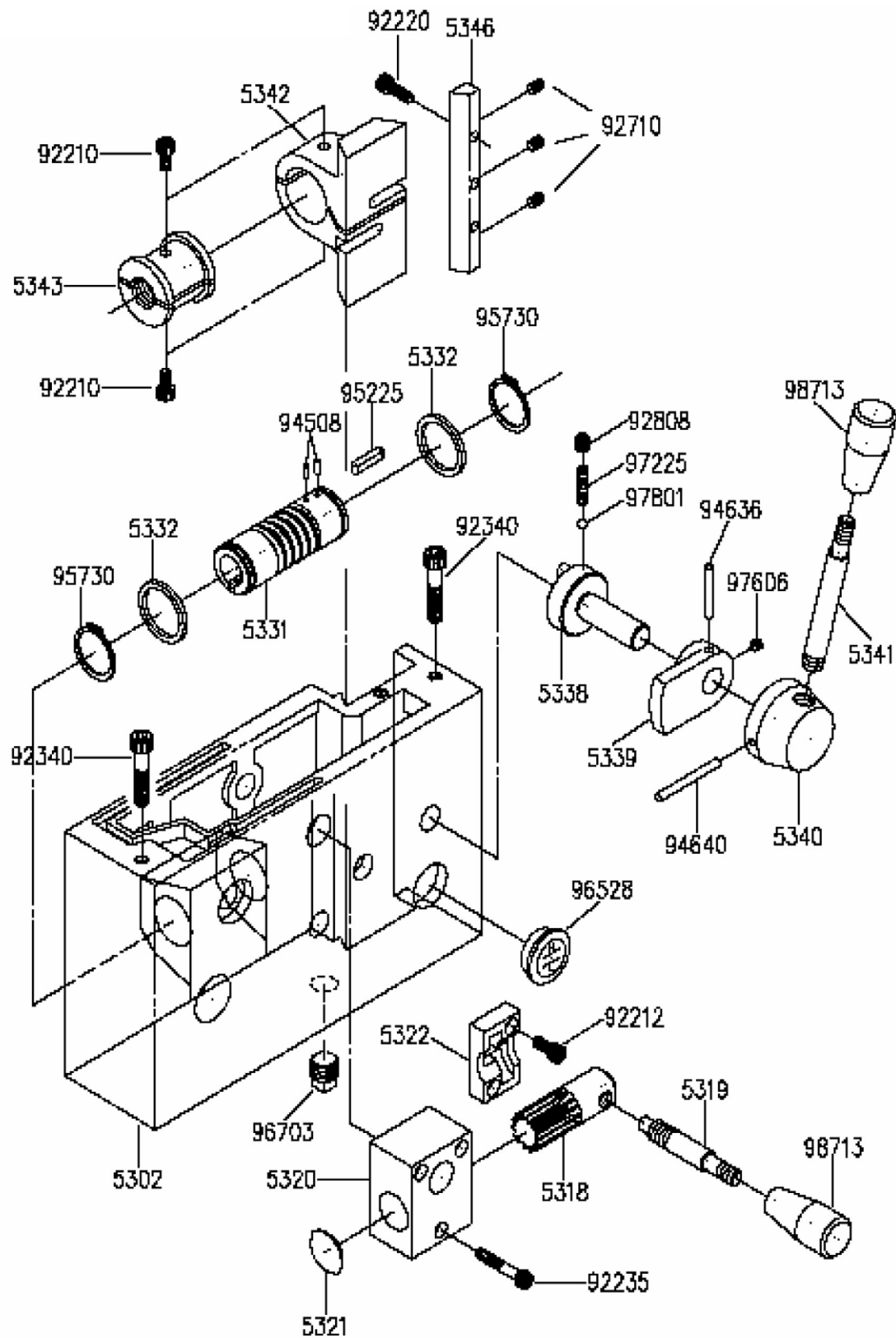
REPAIR PARTS ILLUSTRATION FOR GEARBOX ASSY. (CASTING & CONTROLS)



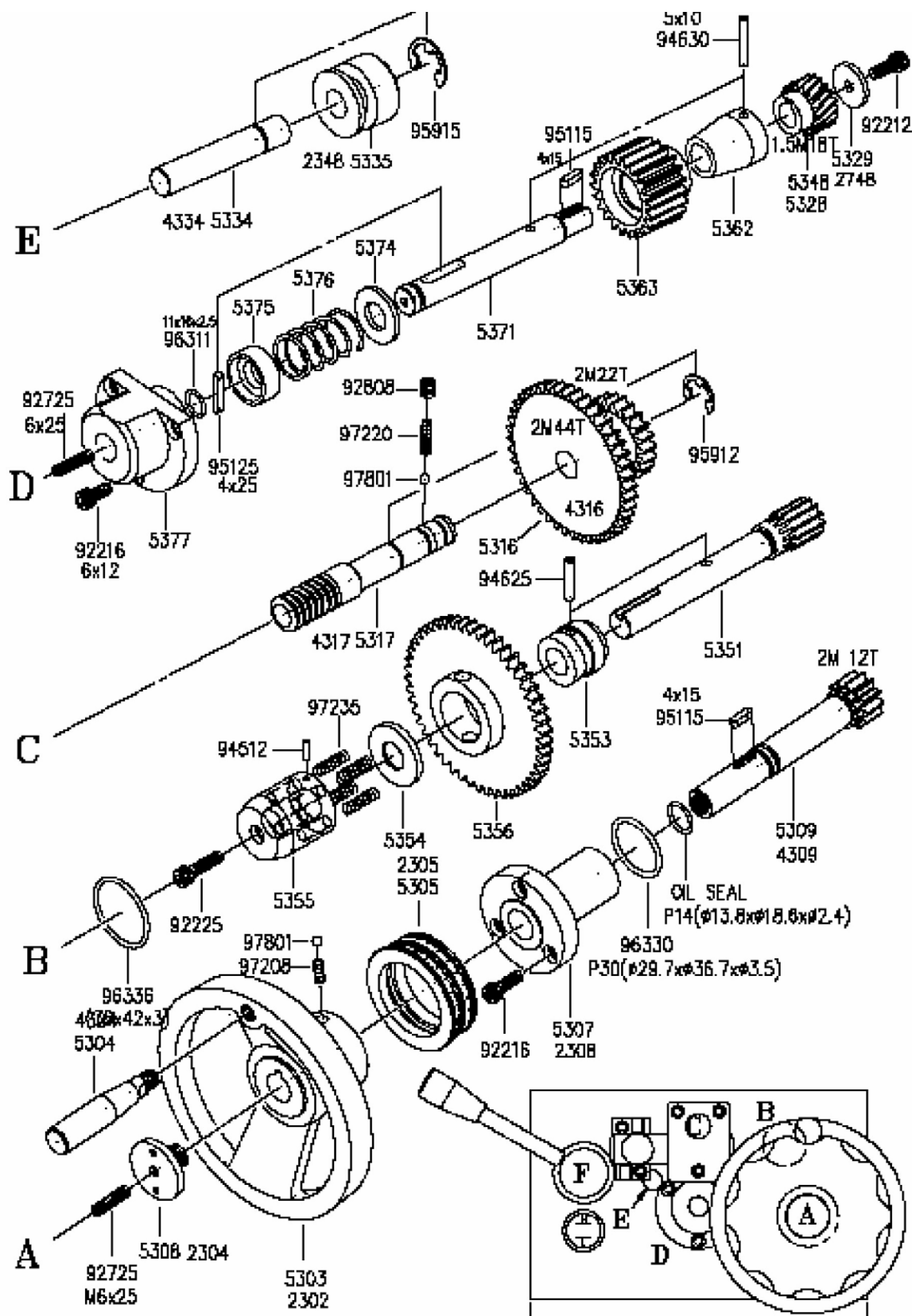
REPAIR PARTS ILLUSTRATION FOR GEARBOX ASSEMBLY (GEARS & SHAFT)



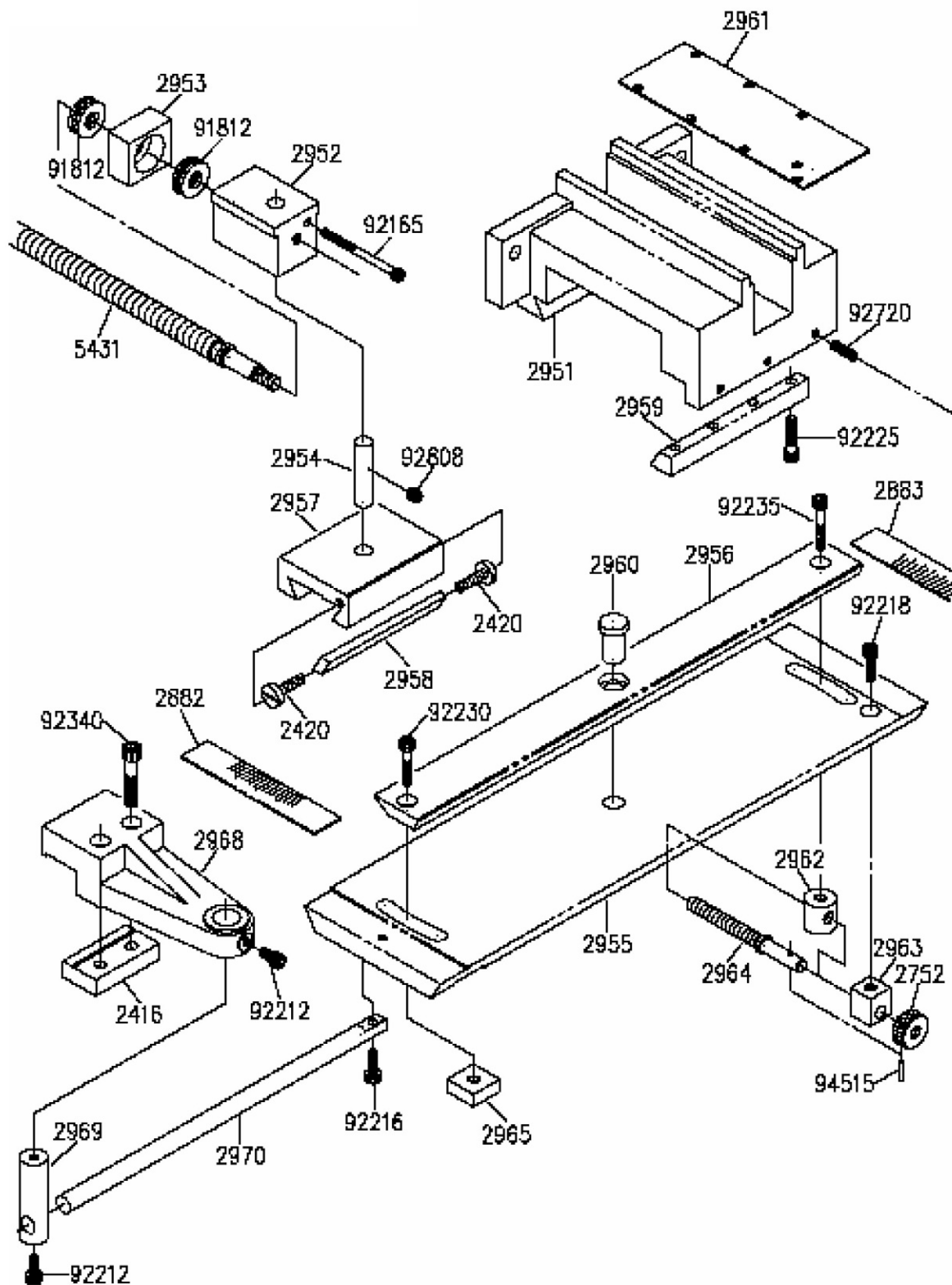
REPAIR PARTS ILLUSTRATION FOR APRON ASSEMBLY (CASTING)



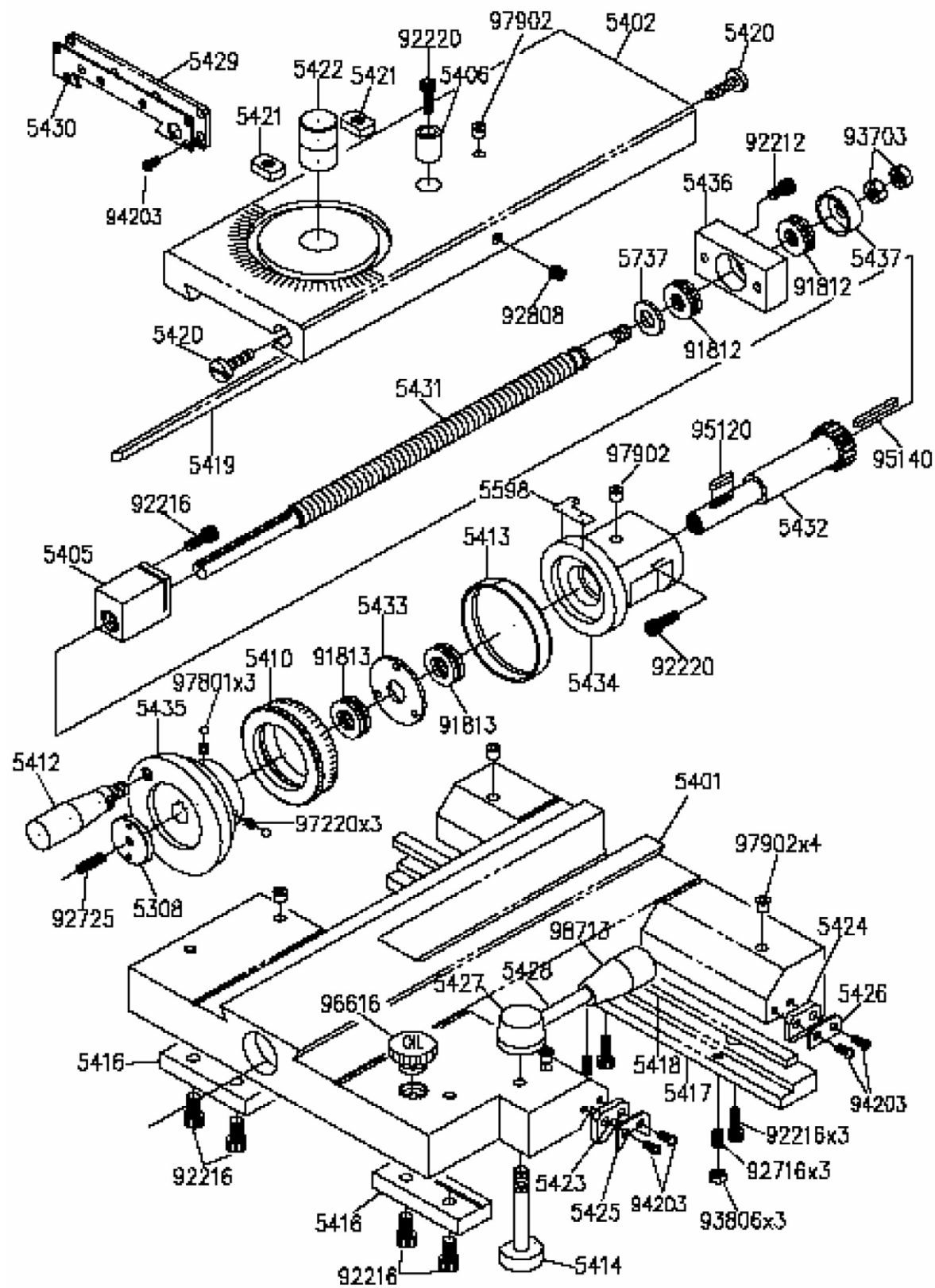
REPAIR PARTS ILLUSTRATION FOR APRON ASSEMBLY (CASTING)



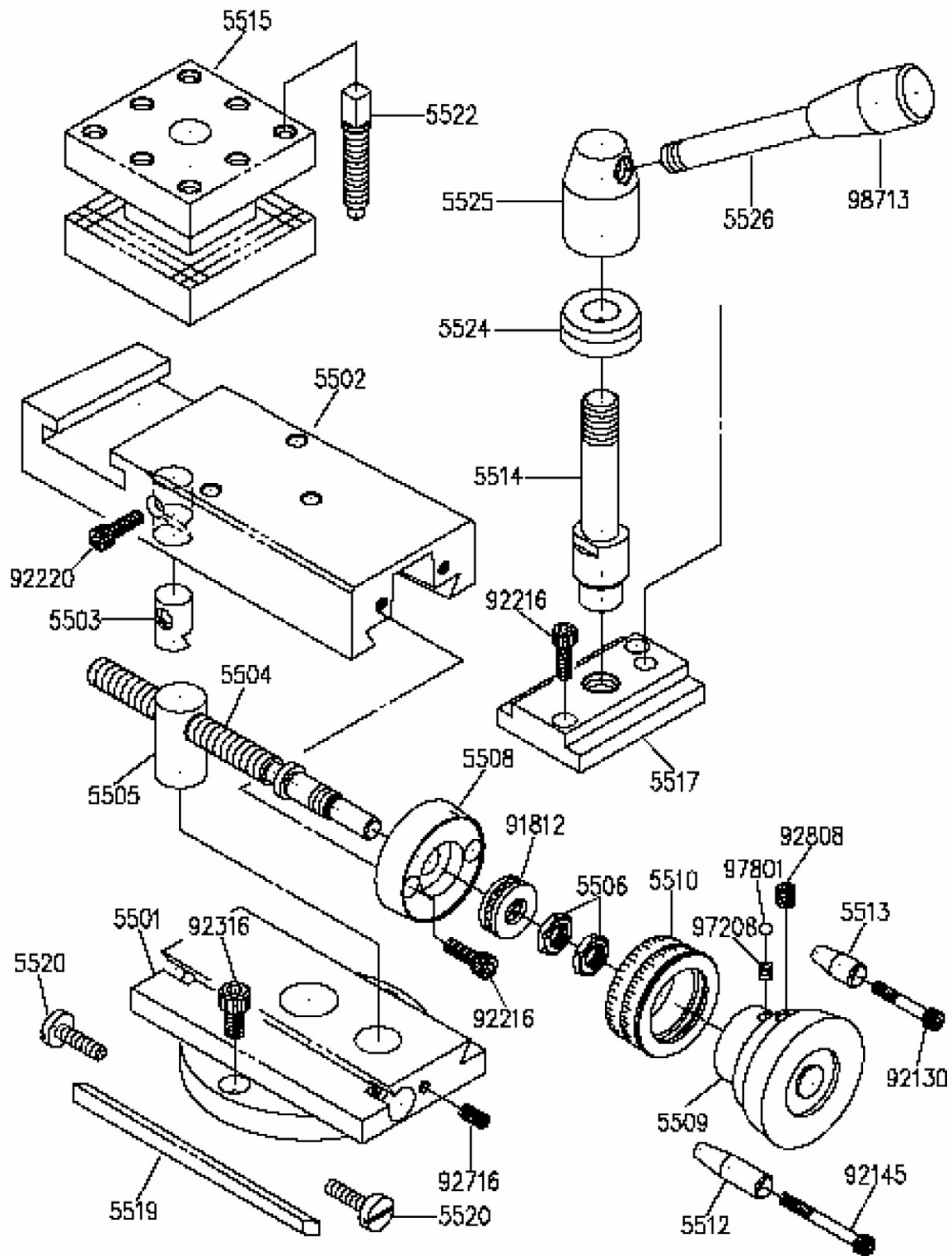
REPAIR PARTS ILLUSTRATION FOR TAPER ATTACHMENT



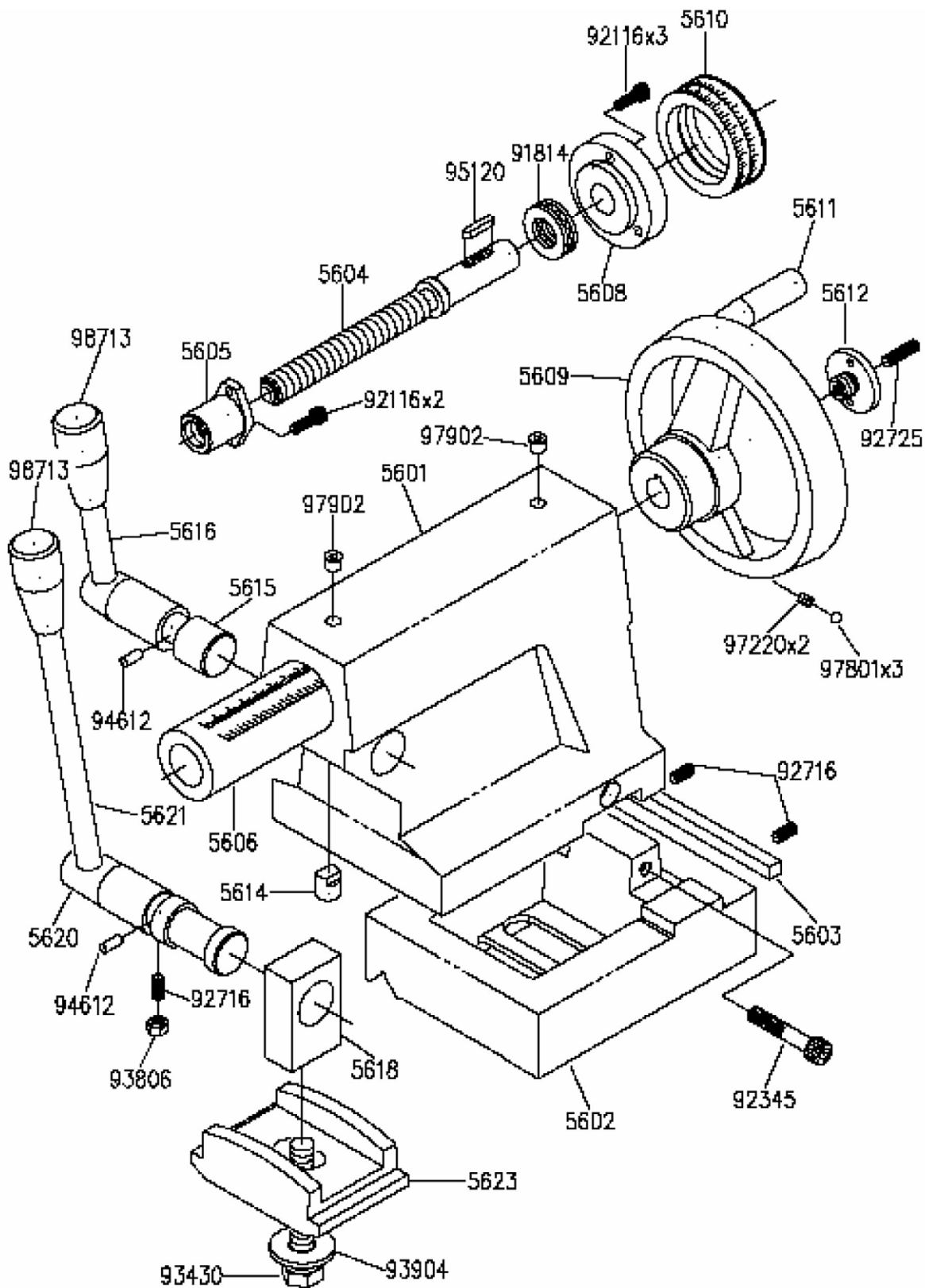
REPAIR PARTS ILLUSTRATION FOR SADDLE & CROSS-SLIDE ASSEMBLY



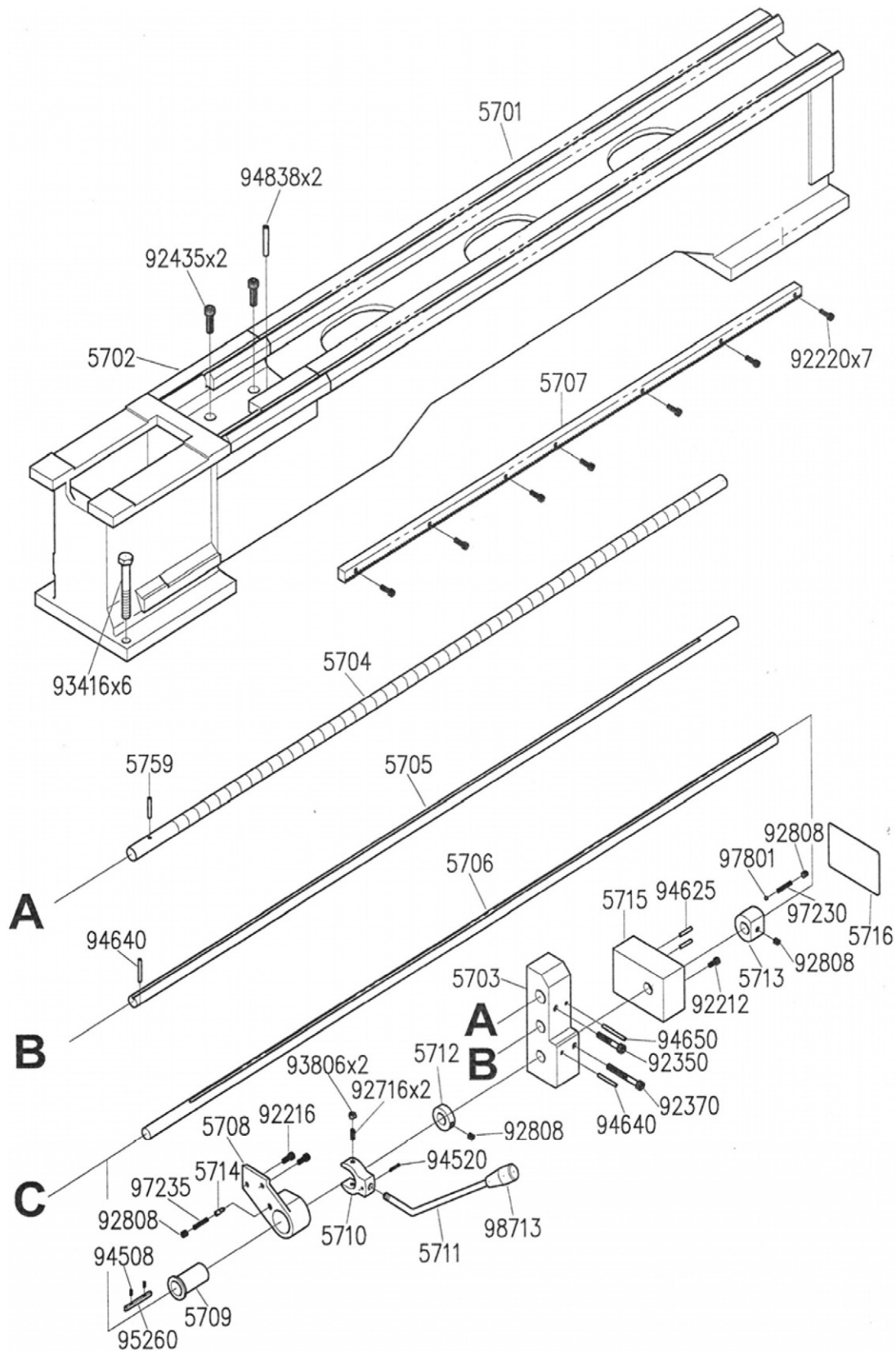
REPAIR PARTS ILLUSTRATION FOR TOP-SLIDE ASSEMBLY



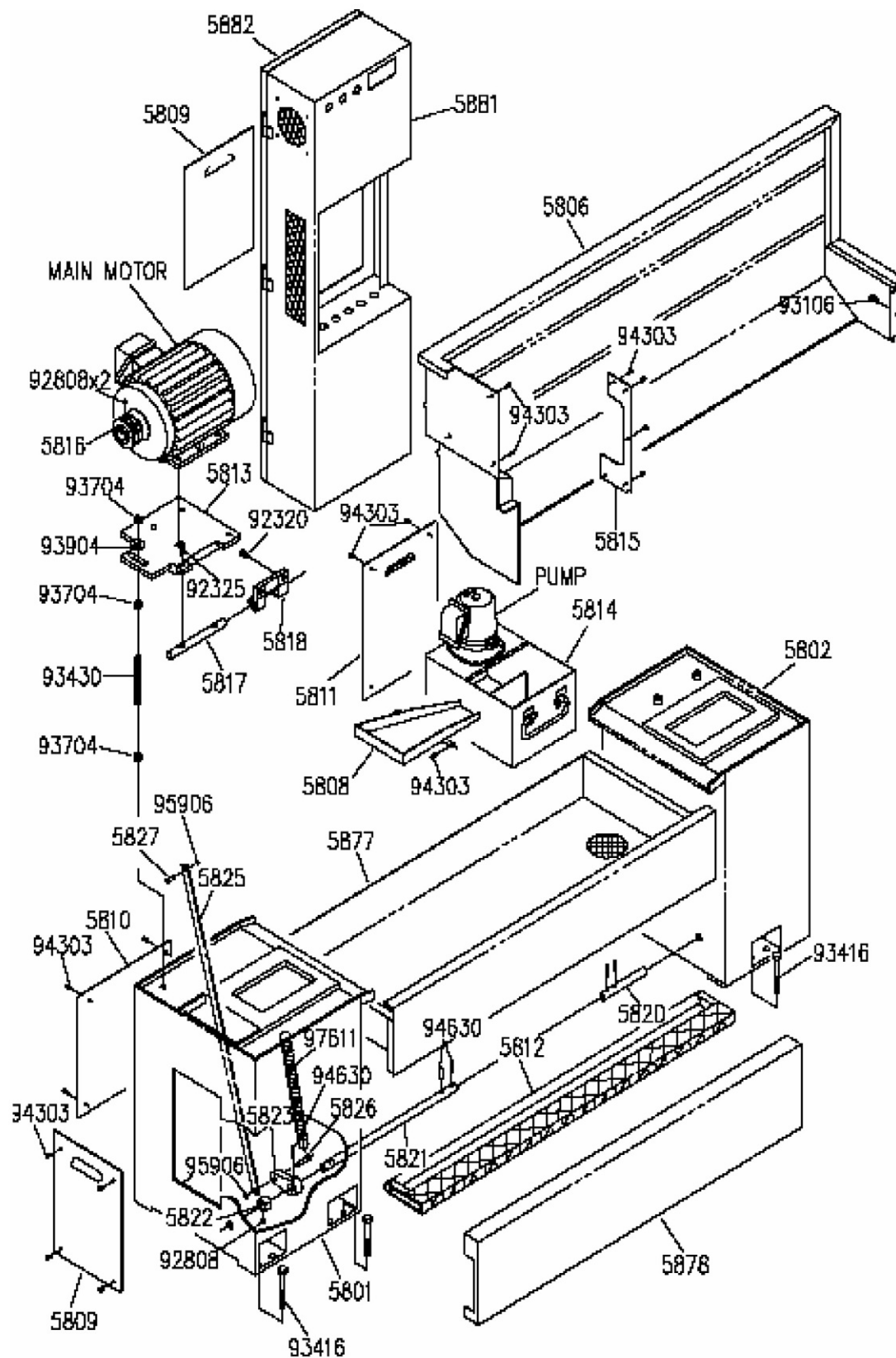
REPAIR PARTS ILLUSTRATION FOR TAILSTOCK ASSEMBLY



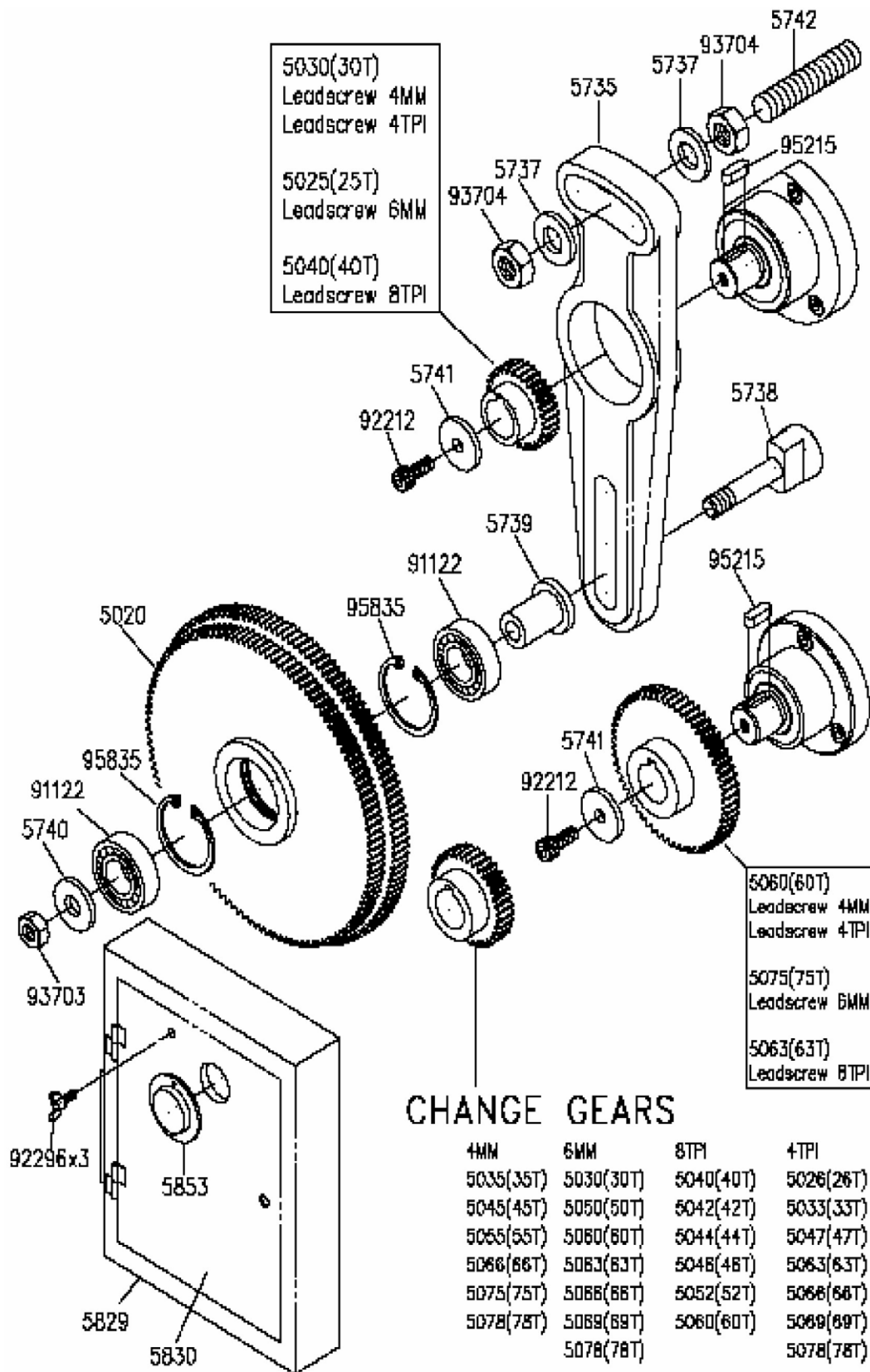
REPAIR PARTS ILLUSTRATION FOR BED SHAFTS ASSY. (W/ DOUBLE CHUCK)



REPAIR PARTS ILLUSTRATION FOR CABINET & PANELS ASSEMBLY

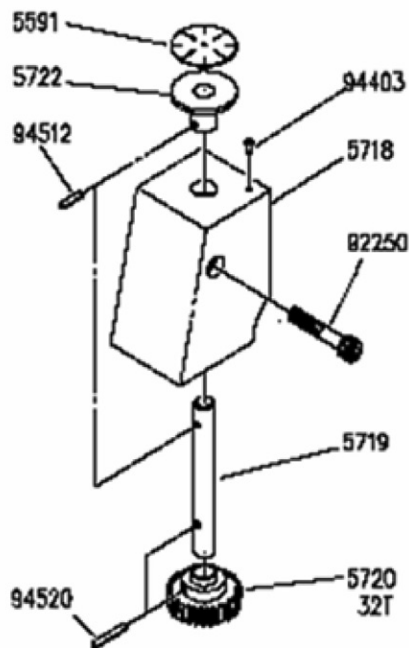


REPAIR PARTS ILLUSTRATION FOR SWING FRAME & END GEARS ASSEMBLY

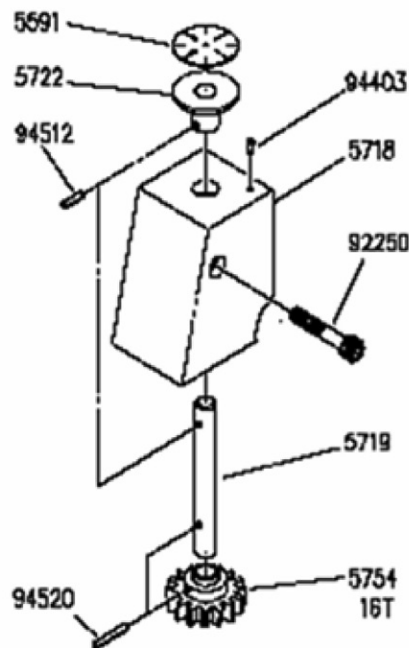


REPAIR PARTS ILLUSTRATION FOR THREADING DIALS ASSEMBLY

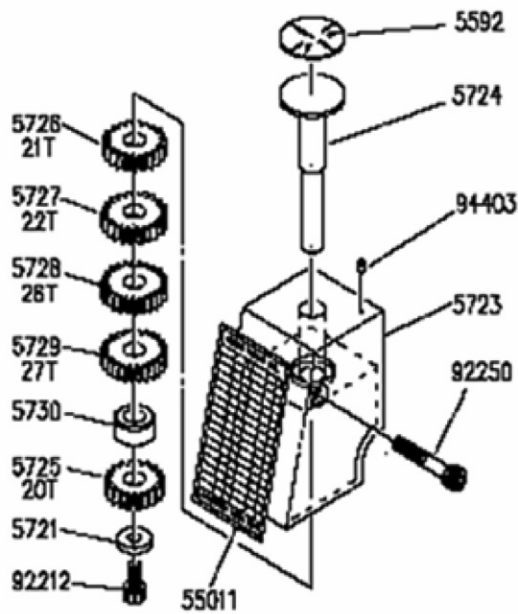
LEADSCREW PITCH 8TPI



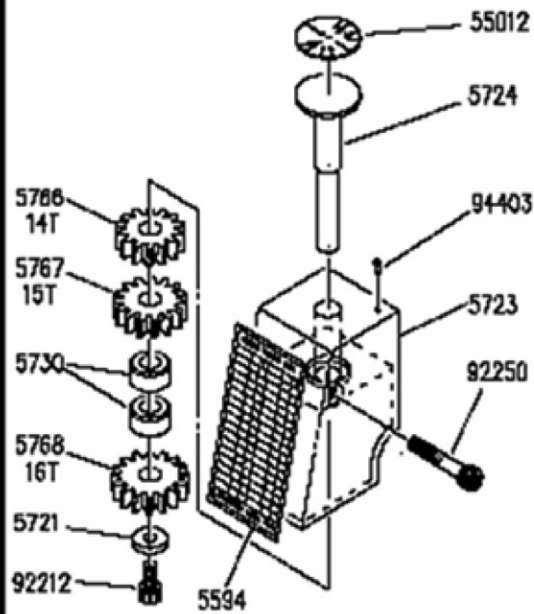
LEADSCREW PITCH 4TPI



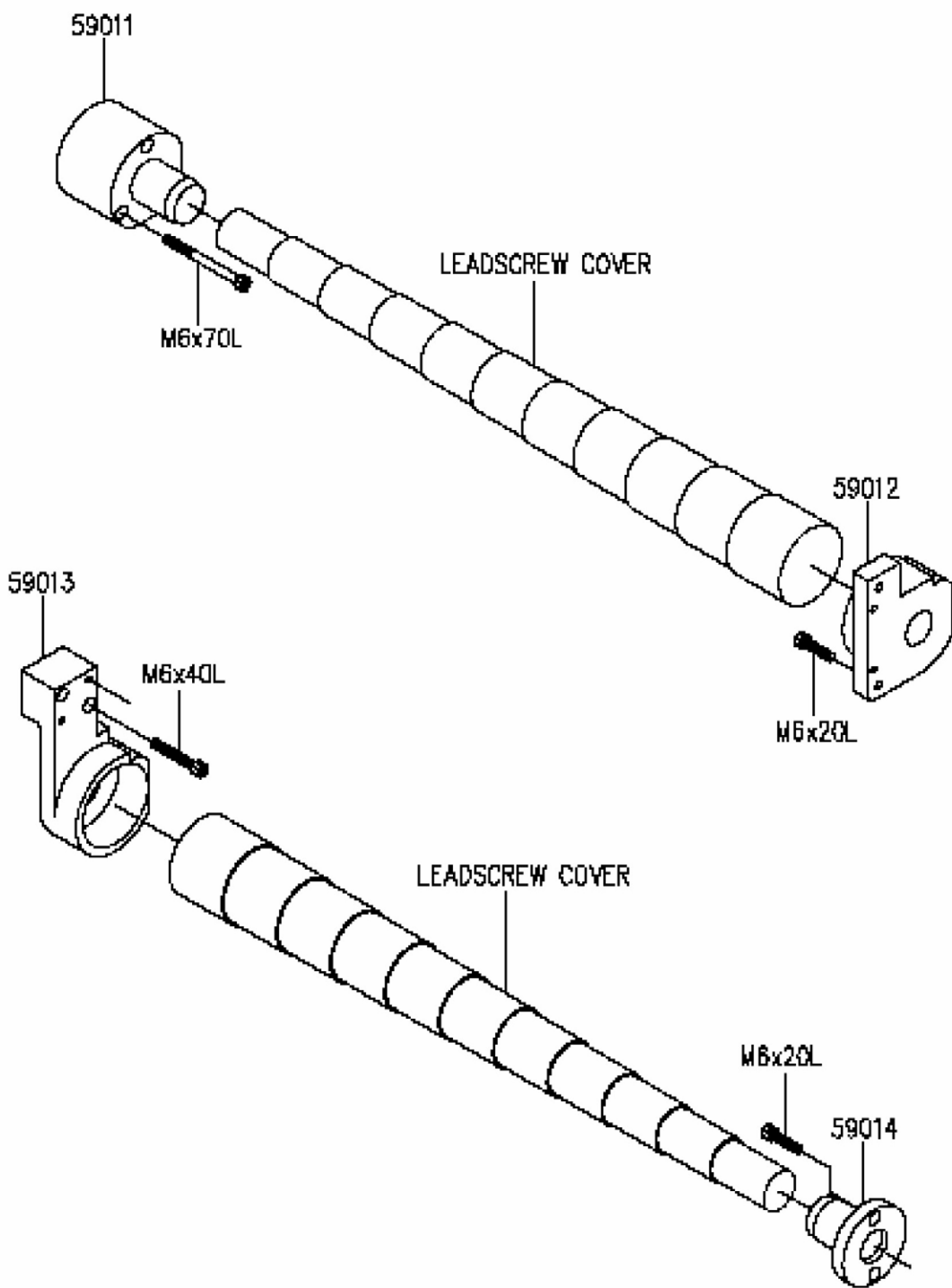
LEADSCREW PITCH 4MM



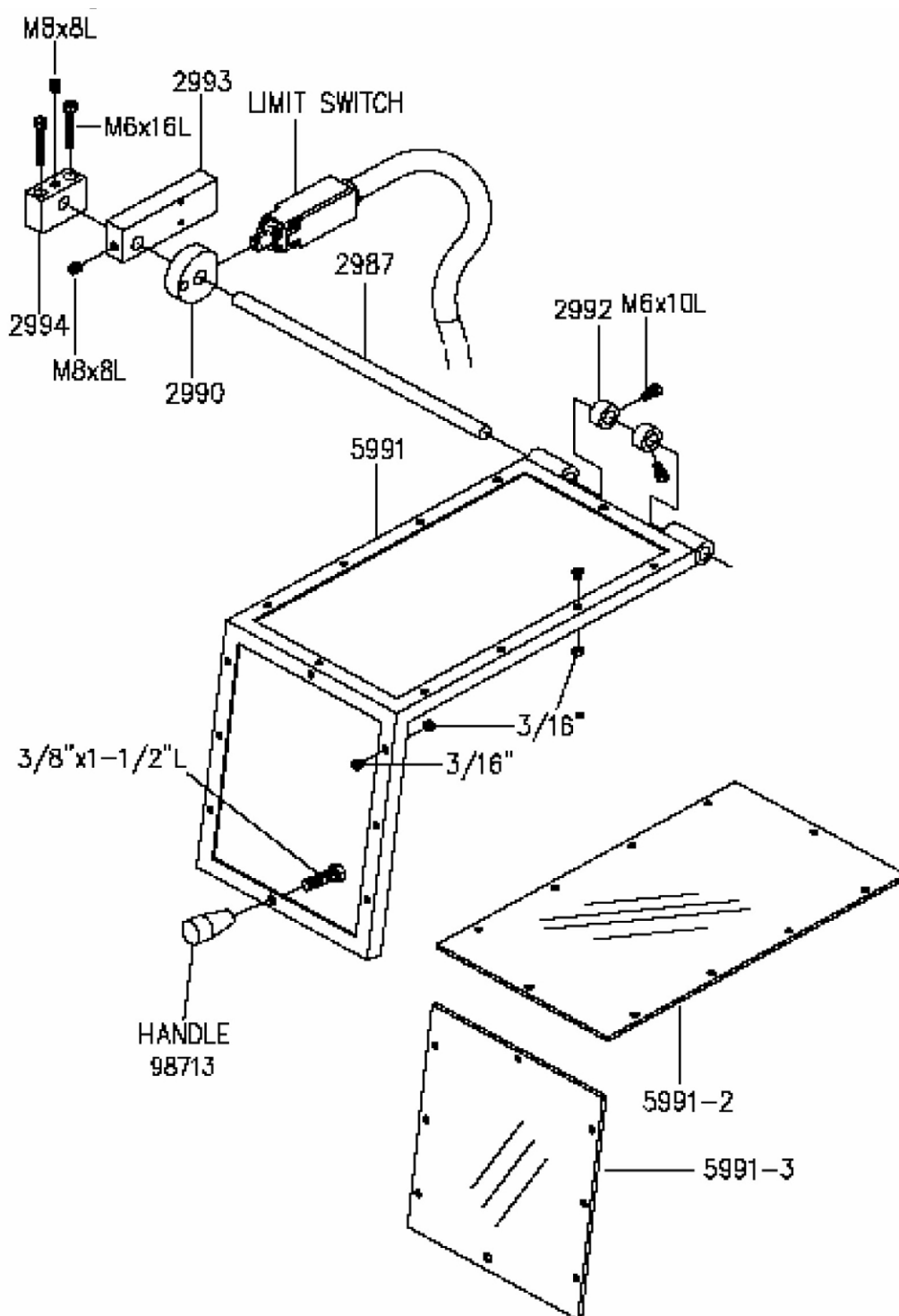
LEADSCREW PITCH 6MM



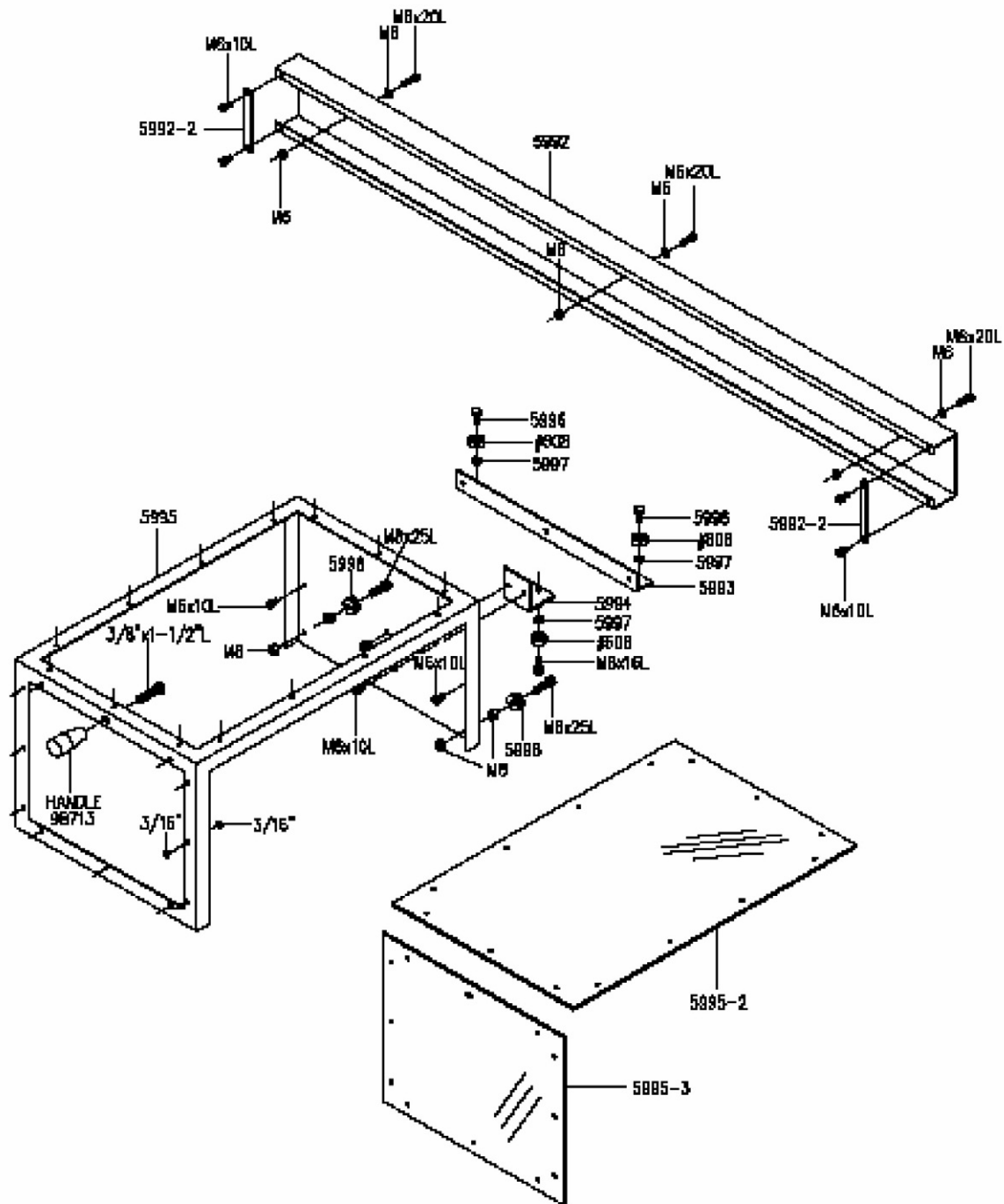
REPAIR PARTS ILLUSTRATION FOR LEADSCREW COVER (GUARD)



REPAIR PARTS ILLUSTRATION FOR CHUCK GUARD



REPAIR PARTS ILLUSTRATION FOR TOOLPOST GUARD



REPAIR PARTS LIST FOR HEADSTOCK GEARBOX

Ref. No.	Description	Part No.	Qty.	Ref. No.	Description	Part No.	Qty.
ASM1	Gearbox Assembly	9646464.01		42092	Gear 2M, 301	9646476.01	1
4110	Cover	See gearbox ASM1	1	42093	Gear 2.75M, 201	9646477.01	1
4117	Collar	See gearbox ASM1	1	42094	Gear 2.75M, 181	9646478.01	1
4118	Gear 1.75M, 451	See gearbox ASM1	1	42095	Gear 2.75M, 161	9646479.01	1
4119	Collar	See gearbox ASM1	1	42096	Gear 2.25M, 281	9646480.01	1
4124	Collar	See gearbox ASM1	1	42012	Cover	9646481.01	1
4126	Gear 1.75M, 35/451	See gearbox ASM1	1	42013	Collar	9646482.01	1
4129	Shaft	See gearbox ASM1	1	42022	Cover	9646483.01	1
4130	Gear 1.75M, 35/451	See gearbox ASM1	1	42032	Cover	9646484.01	1
4131	Collar	See gearbox ASM1	1	42033	Gear 2M, 381	9646485.01	1
4134	Lever	See gearbox ASM1	1	42037	Gear 2M, 401	9646486.01	1
4135	Shift fork	See gearbox ASM1	1	42038	Gear 2M, 301	9646487.01	1
2125	Gear 2M, 21T	See gearbox ASM1	1	42042	Cover	9646488.01	1
2126	Gear 2M, 601	See gearbox ASM1	1	42044	Gear 2M 241	9646489.01	1
2127	Plug	See gearbox ASM1	1	42045	Collar (2231)	9646490.01	1
2132	Nut	See gearbox ASM1	1	42046	Gear 2M 161	9646491.01	1
2136	Gear 2M, 821	See gearbox ASM1	1	42048	Gear 2M 161	9646492.01	1
2137	Gear 2M, 431	See gearbox ASM1	1	42049	Nut	9646493.01	2
2172	Shift fork	See gearbox ASM1	2	42051	Lever	9646494.01	2
5886	Index ring	See gearbox ASM1	1	42052	Handle	9646495.01	2
641732	Collar	See gearbox ASM1	1	42053	Shift lever	9646496.01	2
4160	Headstock casting	See gearbox ASM1	1	42055	Shift fork	9646497.01	1
4162	Cover	See gearbox ASM1	1	42065	Shift fork	9646498.01	1
4163	Cover	See gearbox ASM1	1	42071	Shaft	9646499.01	1
4164	Cover	See gearbox ASM1	1	42072	Gear 2M 321	9646500.01	1
4165	Shaft	See gearbox ASM1	1	42081	Shaft	9646501.01	1
4166	Shaft	See gearbox ASM1	1	42082	Shaft	9646502.01	1
4167	Shaft	See gearbox ASM1	1	42085	Gear 2M 201	9646503.01	1
4173	Main Spindle	9646465.01	1	4173	Main Spindle	9646504.01	1
4175	Shaft	9646466.01	1	4175	Shaft	9646505.01	1
4176	Cover	9646467.01	1	4176	Cover	9646506.01	1
4177	Shift fork	9646468.01	1	4177	Shift fork	9646507.01	1
4192	Collar	9646469.01	1	4192	Collar	9646508.01	1
4196	Washer	9646470.01	1	4195	Pulley	9646509.01	1
4197	Pulley	9646471.01	1	42093	Gear 2.75M, 201	9646510.01	1
4198	Pulley	9646472.01	1	4196	Washer	9646511.01	1
42087	Gear 2.75M	9646473.01	1	4197	Pulley	9646512.01	1
42088	Gear 2M, 251	9646474.01	1	4198	Pulley	9646513.01	1
42091	Shaft	9646475.01	1				

REPAIR PARTS LIST FOR LEADSCREW COVER

Ref. No.	Description	Part No.	Qty.	Ref. No.	Description	Part No.	Qty.
49011	Support	9646514.01		92220	Socket Head Cap Screw M6x20	*	
59012	Bracket	9646515.01		92240	Socket Head Cap Screw M6x40	*	
59013	Bracket	9646516.01		92270	Socket Head Cap Screw M6x70	*	
59014	Support	9646517.01					

(Δ) Not shown. (N/A) Not available as repair part. (*) Standard hardware item, available locally.

REPAIR PARTS LIST FOR CHUCK GUARD

Ref. No.	Description	Part No.	Qty.	Ref. No.	Description	Part No.	Qty.
2987	Support Rod	9646518.01		92808	Set Screw M8x8	*	
2992	Collar	9646519.01		93700	Nut 3/16"	*	
2993	Bracket	9646520.01		93808	Nut M8	*	
2994	Support	9646521.01		94203	Screw 3/16"x3/8	*	
5991	Chuck Guard	9646522.01		98751	Handle	9646525.01	
5991-2	Chuck Guard Shield	9646523.01					
5991-3	Chuck Guard Shield	9646524.01					
92210	Socket Head Cap Screw M6x10	*					
92316	Socket Head Cap Screw M6x 16	*					

REPAIR PARTS LIST FOR TOOLPOST GUARD

Ref. No.	Description	Part No.	Qty.	Ref. No.	Description	Part No.	Qty.
5992	Guide Rod Guide	9646526.01		92220	Socket Head Cap Screw M8x16	*	
5992-2	Plate Toolpost	9646527.01		92316	Socket Head Cap Screw M8x25	*	
5995	Guard Toolpost	9646528.01		92325	Nut 3/16"	*	
5995-2	Guard Toolpost	9646529.01		93700	Nut 3/16"	*	
5995-3	Guard Roller	9646530.01		93806	Nut MG	*	
5988	Collar	9646531.01		93808	Nut MB	*	
5997	Bearing 608	9646532.01		94203	Screw 3/16"x3/8	*	
91112	Socket Head Cap Screw M6x10	*		98751	Handle	9646534.01	
92210	Socket Head Cap Screw M6x20	*					

REPAIR PARTS LIST FOR MISCELLANEOUS & HARDWARE

Ref. No.	Description	Part No.	Qty.	Ref. No.	Description	Part No.	Qty.
99411	Gasket for Headstock Cover 4163	9646535.01		91815	Thrust Bearing 51104	*	
99412	Gasket for 4162	9646536.01		91816	Thrust Bearing 51105	*	
99413	Gasket for 4110	9646537.01		91823	Thrust Bearing 51202	*	
99414	Gasket for 4164	9646538.01		91824	Thrust Bearing 51203	*	
99421	Gasket for Gearbox Cover 42002	9646539.01		91841	Thrust Bearing 2901	*	
99422	Gasket for Gearbox 42001	9646540.01		91842	Thrust Bearing 2902	*	
99424	Gasket for 42045	9646541.01		91843	Thrust Bearing 2903	*	
99425	Gasket for 2205	9646542.01		91844	Thrust Bearing 2904	*	
99426	Gasket for 42032	9646543.01		92116	Socket Head Cap Screw M5x16	*	
99471	Gasket for 4715	9646544.01		92130	Socket Head Cap Screw M5x30	*	
91011	Bearing 608	*		92145	Socket Head Cap Screw M5x45	*	
91121	Bearing 6003	*		92210	Socket Head Cap Screw M6x10	*	
91122	Bearing 60032	*		92212	Socket Head Cap Screw M6x12	*	
91123	Bearing 6004	*		92216	Socket Head Cap Screw M6x16	*	
91125	Bearing 6005	*		92220	Socket Head Cap Screw M6x20	*	
91131	Bearing 6202	*		92225	Socket Head Cap Screw M6x25	*	
91133	Bearing 6204	*		92230	Socket Head Cap Screw M6x30	*	
91135	Bearing 6205	*		92235	Socket Head Cap Screw M6x35	*	
91532	Bearing 30210	*		92240	Socket Head Cap Screw M6x40	*	
91544	Bearing 32212	*		92245	Socket Head Cap Screw M6x45	*	
91812	Thrust Bearing 51101	*		92250	Socket Head Cap Screw M6x50	*	
91813	Thrust Bearing 51102	*		92255	Socket Head Cap Screw M6x55	*	
91814	Thrust Bearing 51103	*		92296	Butterfly Screw M6x16	*	

(Δ)Not shown. (N/A) Not available as repair part. (*) Standard hardware item, available locally.

REPAIR PARTS LIST FOR MISCELLANEOUS & HARDWARE (CONTINUED)

Ref. No.	Description	Part No.	Qty.	Ref. No.	Description	Part No.	Qty.
92312	Socket Head Cap Screw M8x12	*		94102	Screw 1/8x1/4"	*	
92316	Socket Head Cap Screw M8x16	*		94103	Screw 1/8x3/8"	*	
92320	Socket Head Cap Screw M8x20	*		94202	Screw 3/16x1/4"	*	
92325	Socket Head Cap Screw M8x25	*		94203	Screw 3/16x3/4"	*	
92330	Socket Head Cap Screw M8x30	*		94303	Screw 1/4x3/8"	*	
92335	Socket Head Cap Screw M8x35	*		94308	Screw 5/32x3/16"	*	
92340	Socket Head Cap Screw M8x40	*		94403	Nail M2	*	
92345	Socket Head Cap Screw M8x45	*		94409	Screw 1/4x1mm	*	
92350	Socket Head Cap Screw M8x50	*		94508	Pin M3x8	*	
92370	Socket Head Cap Screw M8x70	*		94512	Pin M3x12	*	
92425	Socket Head Cap Screw M10x25	*		94520	Pin M3x20	*	
92430	Socket Head Cap Screw M10x30	*		94524	Pin M3x24	*	
92435	Socket Head Cap Screw M10x30	*		94612	Pin M5x12	*	
92440	Socket Head Cap Screw M10x40	*		94616	Pin M5x12	*	
92445	Socket Head Cap Screw M10x45	*		94625	Pin M5x12	*	
92525	Socket Head Cap Screw M12x25	*		94630	Pin M5x12	*	
92535	Socket Head Cap Screw M12x35	*		94634	Pin M5x12	*	
92540	Socket Head Cap Screw M12x40	*		94635	Pin M5x12	*	
92706	Set Screw M6x6	*		94636	Pin M5x12	*	
92708	Set Screw M6x8	*		94640	Pin M5x12	*	
92710	Set Screw M6x10	*		94645	Pin M5x12	*	
92712	Set Screw M6x12	*		94650	Pin M5x12	*	
92716	Set Screw M6x16	*		94660	Pin M5x12	*	
92720	Set Screw M6x20	*		94830	Taper Pin M4x30	*	
92725	Set Screw M6x25	*		94838	Taper Pin M4x38	*	
92808	Set Screw M8x8	*		95110	Key M4x10	*	
92814	Set Screw M8x14	*		95115	Key M4x15	*	
92012	Set Screw M12x12	*		95120	Key M4x20	*	
93112	Cap Screw 1/4x1-1/4"	*		95140	Key M4x40	*	
93114	Cap Screw 3/8x1-1/2"	*		95210	Key M5x10	*	
93320	Cap Screw 3/8x2"	*		95212	Key M5x12	*	
93324	Cap Screw 3/8x2-1/2"	*		95215	Key M5x15	*	
93330	Cap Screw 3/8x3"	*		95220	Key M5x20	*	
93406	Cap Screw 1/2x3/4"	*		95225	Key M5x25	*	
93412	Cap Screw 1/2x1-1/4"	*		95230	Key M5x30	*	
93414	Cap Screw 1/2x1-1/2"	*		95235	Key M5x35	*	
93416	Cap Screw 1/2x1-3/4"	*		95240	Key M5x40	*	
93420	Cap Screw 1/2x2"	*		95244	Key M5x44	*	
93424	Cap Screw 1/2x1-1/2"	*		95245	Key M5x45	*	
93430	Cap Screw 1/2x3"	*		95250	Key M5x50	*	
93700	Nut 3/16"	*		95260	Key M5x60	*	
93701	Nut 1/4"	*		95270	Key M5x70	*	
93703	Nut 3/8"	*		95310	Key M6x10	*	
93704	Nut 1/2"	*		95315	Key M6x15	*	
93806	Nut M6	*		95325	Key M6x25	*	
93808	Nut M8	*		95375	Key M6x75	*	
93903	Washer 3/8"	*		95390	Key M6x90	*	
93904	Washer 1/2"	*		95420	Key M7x20	*	
93906	Washer 3/4"	*		95440	Key M7x40	*	
93912	Washer M6	*		95450	Key M7x50	*	
93942	Lock Washer M6	*		95460	Key M7x60	*	
93913	Washer M8	*		95520	Key M8x20	*	
93943	Lock Washer M8	*		95530	Key M8x30	*	

(Δ)Not shown. (N/A) Not available as repair part. (*) Standard hardware item, available locally.

REPAIR PARTS LIST FOR MISCELLANEOUS & HARDWARE (CONTINUED)

Ref. No.	Description	Part No.	Qty.	Ref. No.	Description	Part No.	Qty.
95540	Key M8x40	*		96344	O-Ring 44x50x3.0mm	*	
95550	Key M8x50	*		96358	O-Ring 58x64x3.0mm	*	
95560	Key M8x60	*		96519	Oil Sight 3/4"	9646545.01	
95570	Key M8x70	*		96528	Oil Sight 1-1/8"	9646546.01	
95712	Circlip S-12mm	*		96603	Plug 3/8" GP	9646547.01	
95715	Circlip S-15mm	*		96616	Plug 3/4" (PVC)	9646548.01	
95716	Circlip S-16mm	*		96703	Plug 3/8" GP	9646549.01	
95718	Circlip S-18mm	*		96704	Plug 1/2" GP	9646550.01	
95720	Circlip S-20mm	*		96803	Elbow 3/8" GP	9646551.01	
95725	Circlip S-25mm	*		97115	Spring 3/16"x15mm	9646552.01	
95730	Circlip S-30mm	*		97208	Spring 1/4"x8mm	9646553.01	
95738	Circlip S-38mm	*		97210	Spring 1/4"x10mm	9646554.01	
95740	Circlip S-40mm	*		97220	Spring 1/4"x20mm	9646555.01	
95750	Circlip S-50mm	*		97225	Spring 1/4"x25mm	9646556.01	
95755	Circlip S-55mm	*		97230	Spring 1/4"x30mm	9646557.01	
95835	Circlip R-35mm	*		97235	Spring 1/4"x35mm	9646558.01	
95847	Circlip R-47mm	*		97250	Spring 1/4"x50mm	9646559.01	
95906	Circlip E-6mm	*		97420	Spring 3/8"x20mm	9646560.01	
95912	Circlip E-12mm	*		97430	Spring 3/8"x30mm	9646561.01	
95915	Circlip E-15mm	*		97435	Spring 3/8"x35mm	9646562.01	
95919	Circlip E-19mm	*		97440	Spring 3/8"x40mm	9646563.01	
96103	Oil Seal TC 25x45x11mm	*		97460	Spring 3/8"x60mm	9646564.01	
96104	Oil Seal TC 25x40x8mm	*		97611	Spring	9646565.01	
96308	O-Ring 8x12x12mm	*		97621	Spring	9646566.01	
96309	O-Ring 8.8x12.6x1.9mm	*		97801	Ball Steel 1/4" Dia	*	
96311	O-Ring 11x16x2.5mm	*		97803	Ball Steel 3/8" Dia	*	
96314	O-Ring 14x19x2.5mm	*		97901	Oiler 1/4"	9646567.01	
96316	O-Ring 15.8x20.6x2.4mm	*		97902	Oiler 5/16"	9646568.01	
96320	O-Ring 20x25x2.5mm	*		98128	V-Belt A28	9646569.01	
96324	O-Ring 24x30x3.0mm	*		98713	Handle 3/8" Black	9646570.01	
96325	O-Ring 25x31x3.0mm	*		98723	Handle 3/8" Red	9646571.01	
96334	O-Ring 34x40x3.0mm	*		98733	Handle, Black	9646572.01	
96338	O-Ring 38x45x3.5mm	*		98902	Brake Shoe Assembly	9646573.01	
96343	O-Ring 43x51x4.0mm	*					

(Δ) Not shown. (N/A) Not available as repair part. (*) Standard hardware item, available locally.

NOTES

Lined area for notes.

NOTES

Lined area for notes, consisting of multiple horizontal lines.

PALMGREN WARRANTY

C.H. Hanson / Palmgren warrants their products to be free of defects in material or workmanship. This warranty does not cover defects due directly or indirectly to misuse, abuse, normal wear and tear, failure to properly maintain the product, heated, ground or otherwise altered, or used for a purpose other than that for which it was intended.

The warranty does not cover expendable and/or wear part (i.e. v-belts, screws, abrasives, jaws), damage to tools arising from alteration, abuse or use other than their intended purpose, packing and freight. The duration of this warranty is expressly limited to the terms noted below beginning from the date of delivery to the original user.

The Palmgren branded items carry the following warranties on parts:

All arbor presses, vises, clamps, positioning tables, tombstones, jack screws and vise accessories - LIFETIME.

All bench grinders, drill presses, tapping machines, band saws, lathes, milling machines, abrasive finishing machines and work stands - 3 YEARS.

The obligation of C.H. Hanson / Palmgren is limited solely to the repair or replacement, at our option, at its factory or authorized repair agent of any part that should prove inoperable. Purchaser must lubricate and maintain the product under normal operating conditions at all times. Prior to operation become familiar with product and the included materials, i.e. warnings, cautions and manuals.

Failure to follow these instructions will void the warranty.

This warranty is the purchaser's exclusive remedy against C.H. Hanson for any inoperable parts in its product. Under no circumstances is C.H. Hanson liable for any direct, indirect, incidental, special or consequential damages including loss of profits in any way related to the use or inability to use our products. This warranty gives you specific legal rights which may vary from state to state.

PALMGREN®

Palmgren - a C.H. Hanson Company
2000 N. Aurora Rd., Naperville, IL 60563 U.S.A.
or call 1-800-827-3398