HIGH SPEED PRECISION LATHE

MODEL : -1330V (13" x 30")
-1340V (13" x 40")

INSTRUCTION
AND
SPARE PARTS MANUAL

Photo shown model : -1340V with front moveable chip tray

SAFETY PRECAUTIONS

1) General Safety Precautions

When operation the machine, think about what you are going to do before you do it. Go over a safety checklist.

1. Do I know how to operate this machine ?
2. What are the potential hazards involved ?
3. Are all guards in place ?
4. Are my procedures safe ?
5. Am I doing something that I probably should not do ?
6. Have I made all the proper adjustments and tightened all locking bolts and clamps ?
7. Is the workpiece secured properly ?
8. Do I have proper safety equipment ?
9. Do I know where the stop switch is ?
10. Do I think about safety in everything I do ?

Clothing, Hair and Jewelry

Wear a short sleeve shirt or roll up long sleeves above the elbow. Keep your shirt tucked in and remove your necktie. It is recommended that you wear a shop apron. A shop coat may be worn as long as you roll up long sleeves. Do not wear fuzzy sweaters.

If you have long hair, keep it secured properly to avoid your hair being entangled in a moving machine.

Remove your wristwatch and rings before operating the machine. These can cause serious injury if they should be caught in a moving part.

Hand Protection

Use a brush to remove chips. Do not use your hands. Resist the temptation to grab chips as they come from a cut. Chips should not be removed with a rag. The metal particles become imbedded in the cloth and they may cut you.
Gloves must not be worn.
If a glove should be caught in a moving part, it will be pulled in along with the hand inside it.

Various cutting oils, coolants, and solvents may affect your skin. The result may be a rash or possible infection. Avoid direct contact with these products as much as possible and wash your hand as soon as possible after contact.

You may be tempted to blow chips from the machine by using compressed air. This is not good practice. The air will propel metal particles at high velocity. They can injure you or someone on the other side of the machine. Do not blow compressed air on your clothing or skin. The air can be dirty and the force can implant dirt and germs into your skin.

Electrical

If you are adjusting the machine or accomplishing maintenance, you should unplug it from the electrical service. If it is permanently wired, the circuit breaker may be switched off and tagged with an appropriate warning.

2) Turning Machine Safety

The machine can be a safe machine only if the machinist is aware of the hazards involved in its operation. Develop safe work habits in the use of setups, chip breakers, guards and other protective devices. Standards for safety have been established as guidelines to help you eliminate unsafe practice. Some of the hazards are as follows:

1. Pinch points due to movement: Keep your hands away from dangerous positions, such as gears, chuck or rotating cutters.

2. Hazards associated with falling components: Heavy chucks workpieces vises, etc. can be dangerous when accidentally dropped. Care must be used when handling them. A chuck wrench left in the chuck can become a missile when the machine is turned on. Always remove the chuck wrench immediately after using it.

3. Hazards resulting from contact with high temperature components: Burns usually result from handling hot chips or a hot workpiece. Gloves may be worn when handling hot workpiece, but never worn when the machine is running.

4. Hazards resulting from contact with sharp edges, corners, and projections: Shields should be used for protection from flying chips and coolant. These shields are usually made of clear plastic. Stringy chips must not be removed with bare hands, wear heavy gloves and use hook tools or pliers but always turn-off the machine before attempting to remove chips. Chips should be broken rather in a stringy mass or long wire. Chip breakers on tools and correct feeds will help to produce safe, easily handled chips. Burred edges must be removed before the workpiece is removed from the machine. Always remove the tool bit when setting up or removing workpieces to avoid cutting yourself.

5. Hazards of workholding devices: When workpieces are clamped, their components often extend beyond the outside diameter of the holding device. Guards, barriers, and warnings such as signs or verbal instructions are all used to make you aware of the hazards. Never run a geared scroll chuck without having something being gripped in the jaws. Centrifugal force on the jaws can cause the scroll to unwind and the jaws to come out of the chuck. Keep tool, files and micrometers off the machine. They may vibrate off into the revolving chuck or workpiece, or cutter.

6. Spindle breaking: The spindle or workpiece should never be slowed or stopped by hand gripping or any other means. Always use the machine controls to stop or slow it.

7. Workpieces extending out of the lathe should be supported by a stock tube: If a slender workpiece is allowed to extend beyond the headstock spindle a foot or so without support, it can fly outward from centrifugal force. The piece will not only be bent, but it will present a very great danger to anyone standing near.

8. Other safety considerations: Hold one end of abrasive cloth strips in each hand when polishing rotating work. Don't let either hand get closer than a few inches from the work. Keep rags, brushes, and fingers away from rotation work, especially when knurling. Roughing cuts tend to quickly drag in and wrap up rags, clothing, neckties, emery clothes and hair. Move the carriage back out of the way and cover the tool with a cloth when checking boring work. When removing or installing chucks or heavy workpieces, use a board on the ways. To lift a heavy chuck or workpiece (larger than an 8-inch diameter chuck) get help or use a crane. Remove the tool or turn it out o the way during this operation. Do not shift gears or try to take measurements while the lathe is running and the workpiece is in motion. Never use a file without a handle as the file tang can quickly cut your hand or wrist if the file is struck by a spinning chuck jaw or lathe dog. Left-hand filing is considered safest in the lathe, that is, the left hand grips the handle while the right hand holds the tip end of the file.

INDEX

CHAPTER 1 GENERAL INSTRUCTION

- MACHINE SPECIFICATIONS ---- 02V
- GENERAL LAYOUT OF LATHE ---- 03V
- FOUNDATION PLAN ---- 04V
- LIFTING THE MACHINE WITH CRANE ---- 05V
- INSTALLATION OF MACHINE ---- 06V
- CLEANING THE MACHINE ---- 06V
- ELECTRICAL SUPPLY CONNECTION ---- 07V
- LAYOUT OF ELECTRICAL BOX ---- 08V
- ELECTRICAL COMPONENT LIST ---- 08V
- ELECTRICAL CIRCUIT DIAGRAM ---- 09V
- LUBRICATION CHECKS ---- 10V
- CHUCK AND CHUCK MOUNTING ---- 11

CHAPTER 2 OPERATION

- LATHE CONTROLS/ELECTRICAL CONTROL PANEL ---- 12V
- HEADSTOCK SELECTORS ---- 13V
- GEARBOX SELECTORS ---- 14V
- APRON CONTROLS ---- 15
- THREADING DIAL INDICATOR ---- 16V
- CROSS SLIDE ---- 17
- TOP SLIDE ---- 18
- TAILSTOCK ---- 19
- END GEAR TRAIN/DRIVING BELTS ---- 20V
- LEADSCREW SHEAR PIN ---- 21
- FEED ROD FRICTION CLUTCH ---- 22
- LIMIT SWITCHES ---- 23
- LATHE ALIGNMENT ---- 24
- GAP BLOCK ---- 25
- TAPER ATTACHMENT ---- 26/27
- 5C COLLET CLOSER ATTACHMENT ---- 28V/29V
- BED STOP ---- 30

CHAPTER 3 TO ACHIEVE MAXIMUM TURNING EFFICIENCY

- THE CUTTING SPEEDS AND FEEDS FOR HIGH SPEED STEEL CUTTING TOOLS ---- C301
- MATERIAL AND SHAPE OF CUTTING TOOLS ---- C302/C303
- APPLICATION OF COOLLANT FLUID ---- C304

CHAPTER 4 TROUBLE SHOOTING

- TROUBLE SHOOTING ---- C401

CHAPTER 5 SPARE PARTS (ILLUSTRATED)

CHAPTER 1 ○MACHINE SPECIFICATIONS

MODEL		ERL−1330V	ERL−1340V
Capacity	Height of centers	171mm (6.73")	
	Swing over bed	ø340mm (13.38")	
	Swing in gap	ø512mm (20")	
	Swing over cross slide	ø210mm (8.26")	
	Distance between centers	760mm (30")	1000mm (40")
	Width of bed	230mm (9")	
	Gap width in front of faceplate	150mm (5")	
Headstock & Main spindle	Spindle nose , Internal taper	D1−4 , MT. No.5	
	Spindle center sleeve	MT. No.5 x MT. No.3	
	Spindle bore	ø40mm (1.57")	
	Spindle speed : Gear steps / Range	2 steps / 4P: L 100 ~ 500 R.P.M., H 500 ~ 3000 R.P.M. Infinitely variable	
Carriage	Length on bed / Width of carriage	400mm (15.748") / 384mm (15.118")	
	Cross slide travel	180mm (7")	
	Top slide travel	100mm (4")	
Threads & Feeds	Whitworth threads : Kinds / Range	45 Kinds / 2 ~ 72 T.P.I.	
	Metric threads : Kinds / Range	39 Kinds / 0.2 ~ 14 mm	
	D.P. threads : Kinds / Range	21 Kinds / 8 ~ 44 D.P.	
	M.P. threads : Kinds / Range	18 Kinds / 0.3 ~ 3.5 M.P.	
	Longitudinal feeds	0.05 ~ 1.7 mm (0.002" ~ 0.067")	
	Cross feeds	0.025 ~ 0.85 mm (0.001" ~ 0.034")	
Tailstock	Quill diameter	ø50mm (1.968")	
	Quill travel	112mm (4.5")	
	Taper of center	MT. No.3	
Motor	Main spindle	AC 2.2kW (3HP), Inverter	
	Coolant pump	1/8 HP	
Measurement	Weight (Net/Gross) Approx.	850kgs / 1000kgs	1000kgs / 1200kgs
	Packing sizes — Length	2000mm (78.8")	2270mm (89.4")
	Packing sizes — Width x Height	Width 965mm (38") X Height 1745mm (68.7")	

*** Specification subject to change without notice ***

○ STANDARD ACCESSORIES :

1. Backplate for 7" chuck
2. Dead center MT.3 made of carbon steel
3. Dead center MT.3 with carbide tip
4. Spindle center sleeve MT.5 x MT.3
5. Level pads ----- 6pcs
6. Toolset & Box
7. Operation manual & parts list

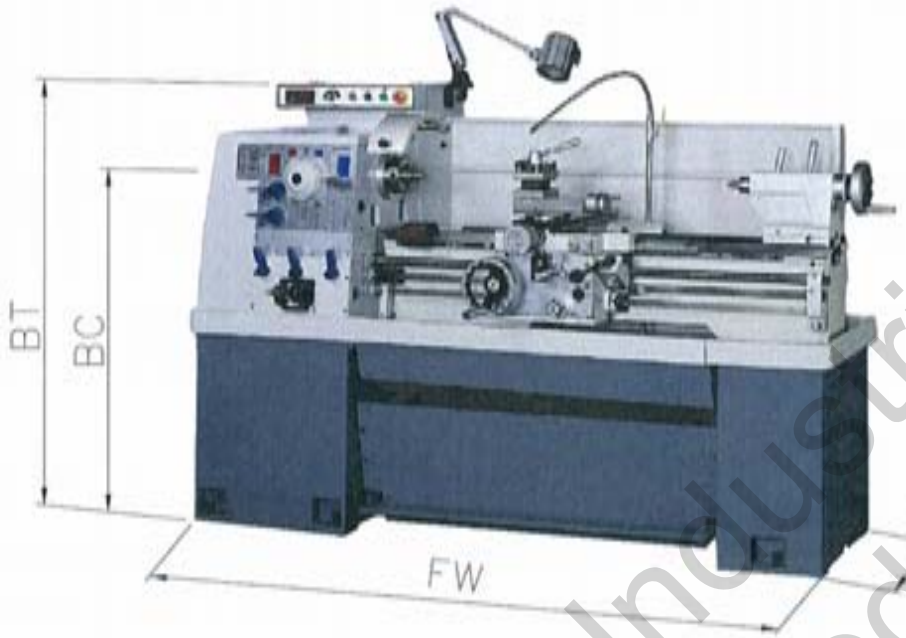
○ OPTIONAL ACCESSORIES :

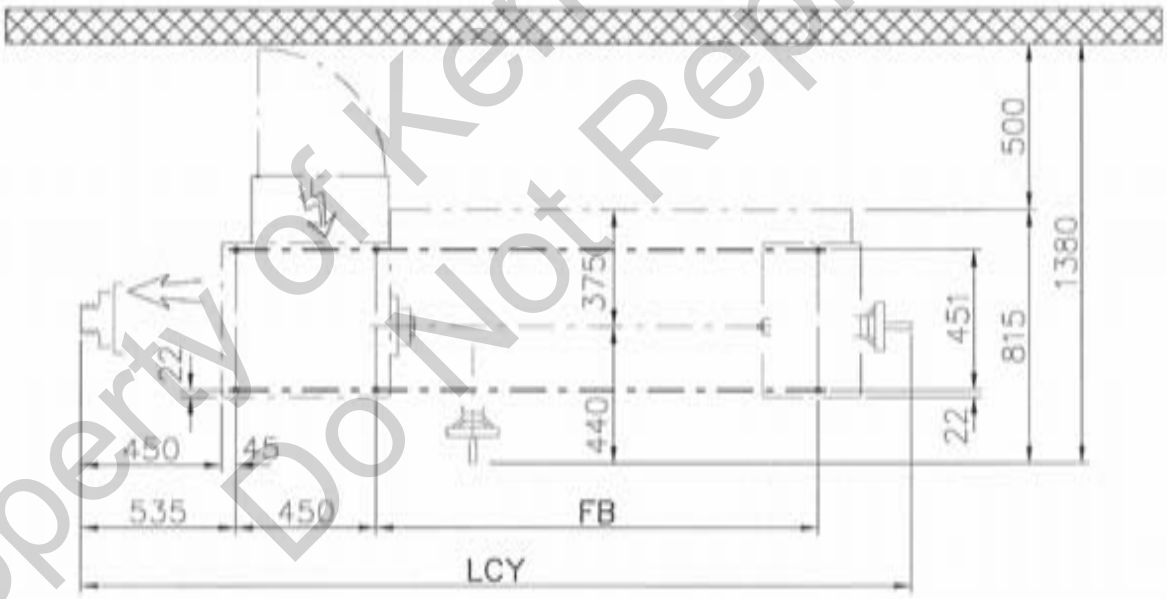
1. 3−Jaws scroll 7" chuck
2. 4−Jaws independent 8" chuck
3. 5C collet closer attachment
4. 5C collets (metric or inch)
5. Driving plate with Dog
6. Chuck safety guard
7. Hydraulic copying attachment
8. Tool post grinder attachment
9. Taper turning attachment
10. Electrical system for CE
11. Protect cover on leadscrew for CE
12. Steady rest w/ ball bearing
13. Follow rest w/bronze tip
14. Faceplate 10"
15. Drill chuck & arbor
16. Rotating center MT.3
17. Halogen lamp
18. Quick change tool post
19. Carriage micro stop set
20. Digital read out system
21. Full length splash guard

CHAPTER 1 ○GENERAL LAYOUT OF LATHE

1. Headstock
2. Chuck guard (optional)
3. Spindle
4. Bed
5. 4–Way tool post
6. Top slide
7. Saddle and Cross slide
8. Splash guard (optional)
9. Tailstock
10. Tail–end Plinth
11. Leadscrew
12. Feed shaft
13. Apron
14. Front moveable chip tray
15. Footbrake
16. Carriage micro stop set (optional)
17. Head–end Plinth
18. Gearbox
19. End Cover (Gear Train)

CHAPTER 1 ◦FOUNDATION PLAN



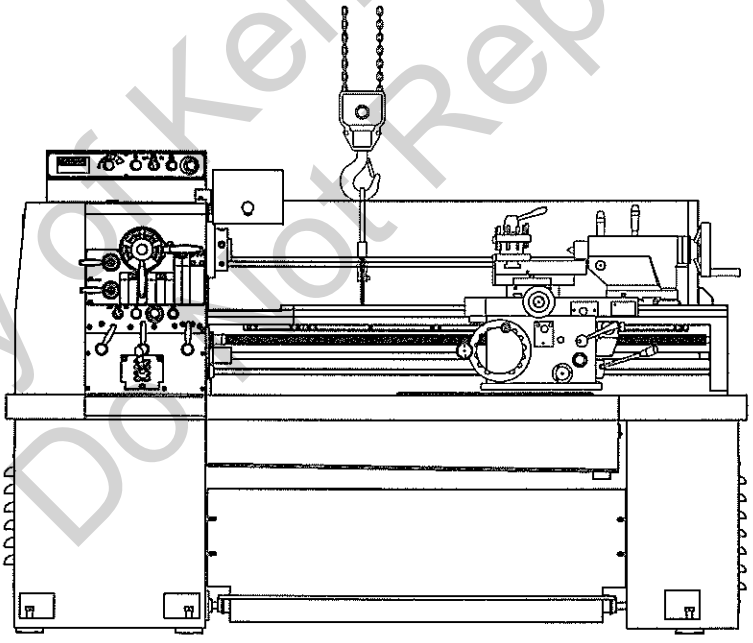


Model	LCY	FB	BC	BT	FW
ERL – 1330V	2360mm	1118 mm	1072 mm	1352 mm	1750 mm
ERL – 1340V	2660mm	1418 mm	1072 mm	1352 mm	2050mm

CHAPTER 1 ∘ LIFTING THE MACHINE WITH CRANE

* PREPARATION

- Machine weight model ERL−1330V about 980kgs.
  ERL−1340V about 1150kgs.
- Make sure that the minimum crane capacity is more than 2 tons for secutity.
- Only an authorized crane operator should use the lift machine.
- Crane work should be cooperatively done by two persons, that is, an operator and a watchman. not to damage projecting on the machine perimeter.
- To put in the jig with wire set inserting to bed way
- Make sure that two hexagon nuts is fixed.
- keep the machine's center of gravity at the center of the crane.



CHAPTER 1 ∘ INSTALLATION OF MACHINE

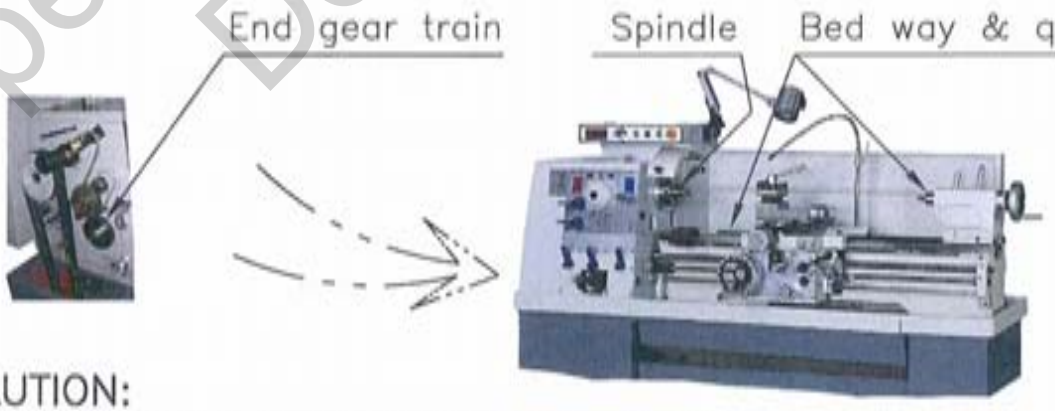
* Notice items:

1. Locate the machine on a solid foundation according to foundation plan as shown in page 4V.
2. There must be sufficient power capacity.
3. The machine must not be adjacent to direct sunlight.
4. Don't pile up things on the floor around the machine and must keep floor dry.
5. Must reserve enough space for opening the door of electric box for maintenance and accessing for operation.
6. Position lathe on foundation and adjust each of the six mounting plinth to take equal share of the load.
7. Using an engineers' precision level on the badways, adjust the plinth to level up machine.
8. Peridically, check bed level to ensure continued lathe accuracy.

∘ CLEANING THE MACHINE

* Notice items:

1. Before operating any controls, remove the anti-rust coating on all slideways and other places.
2. When cleaning. Use spirit or kerosene, instead of cellulose solvents, which may damage the paint finish.
3. Oil all brightly machined surfaces immediately after cleaning. apply machine oil on slideway and heavy oil or grease on the end gears.
4. It is recommended that all slideways, the leadscrew and feed shaft are cleaned (a bristle paint brush is useful for this) and lightly.



CAUTION:

DO NOT USE AIR COMPRESSOR TO CLEANING.

CHAPTER 1 ∘ ELECTRICAL SUPPLY CONNECTION

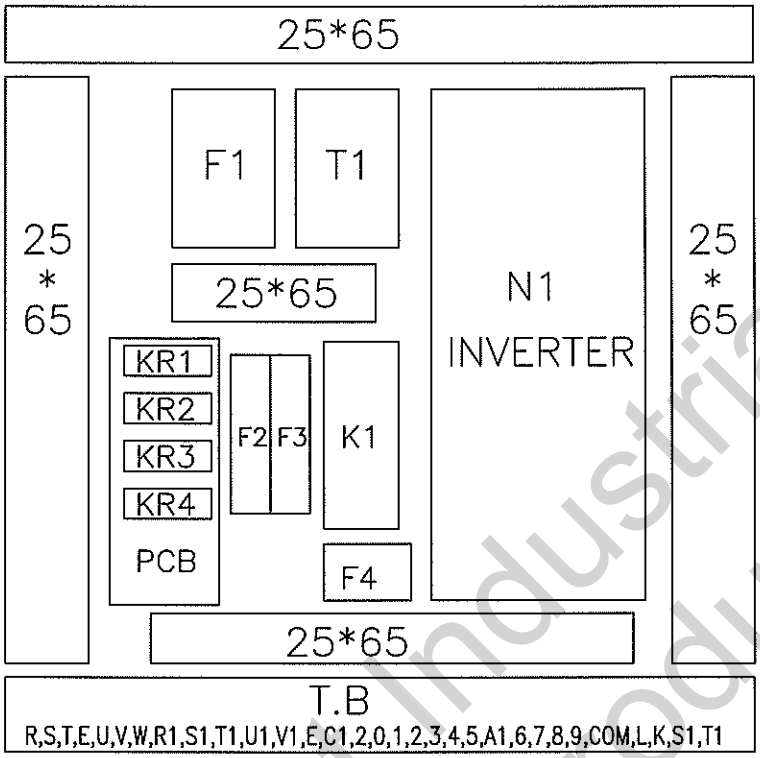
* ELECTRIC BOX INSTRUCTION

∘This lathe is wired according to importer's required electric specification. If it happens that the wiring specification need to be rectified, Please refer to wiring diagram shown in this instruction manual.(page 07V,08V, 09 V)

∘For electrical connection, simply connect R, S, T, of your supply lines to R, S, T, of connect terminals on left bottom of electrical compartment.

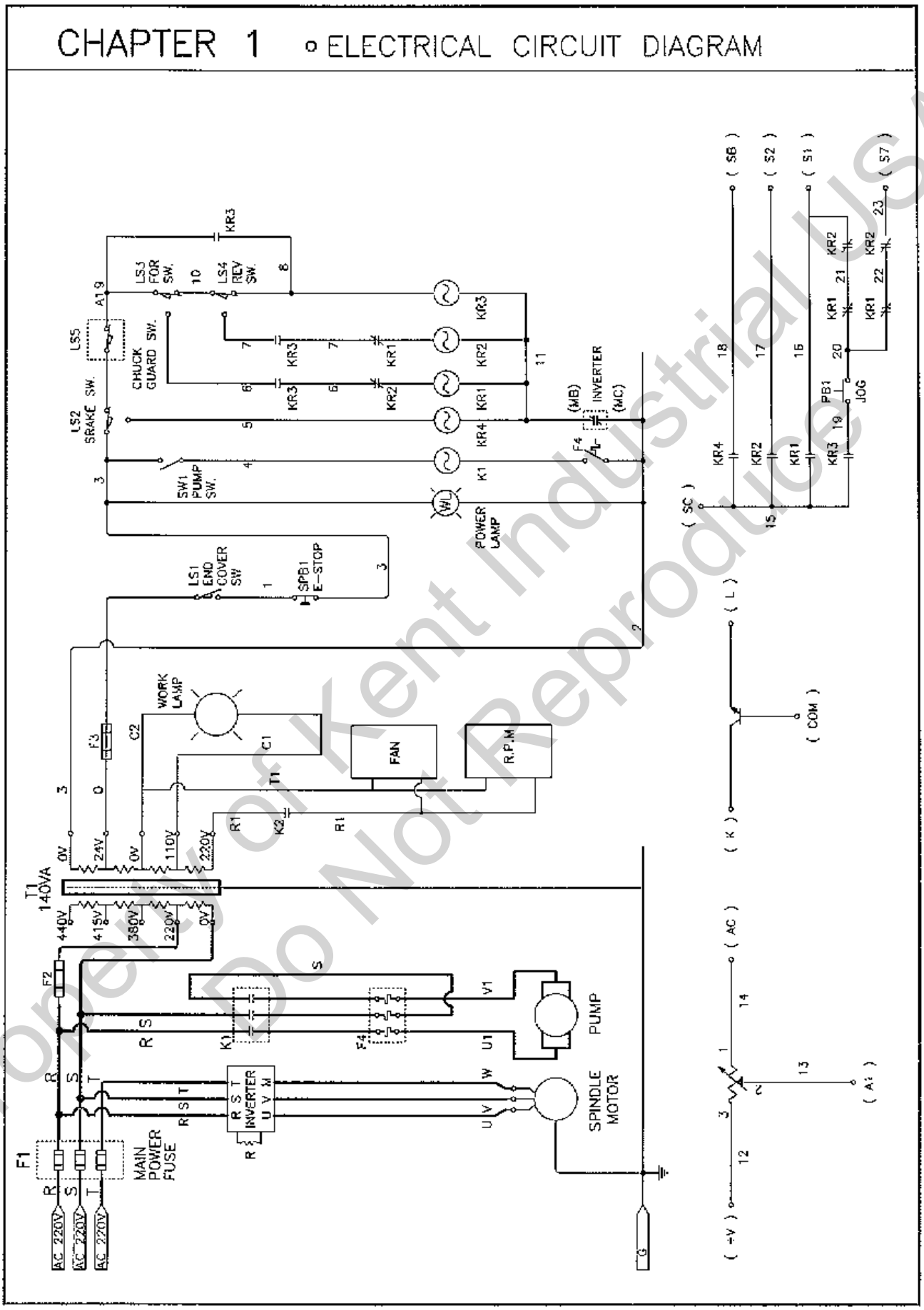
∘Main motor rotation must be clockwise viewed from the pulley end. If motor runs in wrong direction, turn OFF the main power and exchange R and T off the three phase lines.

CHAPTER 1 ∘ LAYOUT OF ELECTRICAL BOX



∘ ELECTRICAL COMPONENT LIST

MODEL	DESCRIPTION	SPECIFICATION	Q'TY	SYMBOL
−1330V	AC Magnetic switch	TENLC1D096B7	1	K1
−1340V	Over relay	TENLR3D046	1	F4
	Main fuse base	TFU−303 3P50A	1	F1
	Fuse base	TFB−102 2P10A	1	F2 , F3
	Terminal board	TBR−20(TEND)	7	T.B
AC 2.2kW	Terminal board	TBR−10(TEND)	24	T.B
3HP 4P	Micro switch	TM−1307(TEND)	1	LS1
Inverter	Micro switch	TM−1704M(TEND)	1	LS2
	Micro switch	TM−1308(TEND)	2	LS3 , LS4
	E−Stop	ALEPB−22−1B	1	E−STOP
	Spindle motor jog	APB−22−1A−G	1	PB1
	Pump run	ASS−22−2P−1A−G	1	SW1
	Power lamp	ALPL−22−30V−W	1	POWER LAMP
	Relay	MY4NJ AC24V	3	KR1,KR2,KR3
	Relay	MY2NJ AC24V	1	KR4
	R.P.M Meter	PF−L® A0603084G1286	1	R.P.M
	Proximity switch	FQP2−1604−A3U2 10~30VDC NPN	1	R.P.M
	Inverter relay pcb	SC−001	1	PCB
	Transformer	140VA	1	T1
	Fan	FAN 4" AC220V	1	FAN
	5HP Inverter	YASKAWA CIMR−G7A23P7	1	INVERTER
	Brake resistance	600W 40 Ω	1	R



CHAPTER 1 ∘ LUBRICATION CHECKS

* HEADSTOCK / GEARBOX / CARRIAGE, APRON / TAILSTOCK

Before operating the machine, make the following important checks:

1. The headstock is filled to level marked on oil sight window with Shell Tellus oil 32 or equivalent. Check oil weekly and change the oil every 6 month.
2. The gearbox is filled to level marked on oil sight window with Shell Tellus oil 68 or equivalent. Check oil weekly and change the oil every year.
3. The carriage apron is filled to level marked on oil sight with Shell Tellus oil 68 or equivalent. Check oil weekly and change the oil every year.

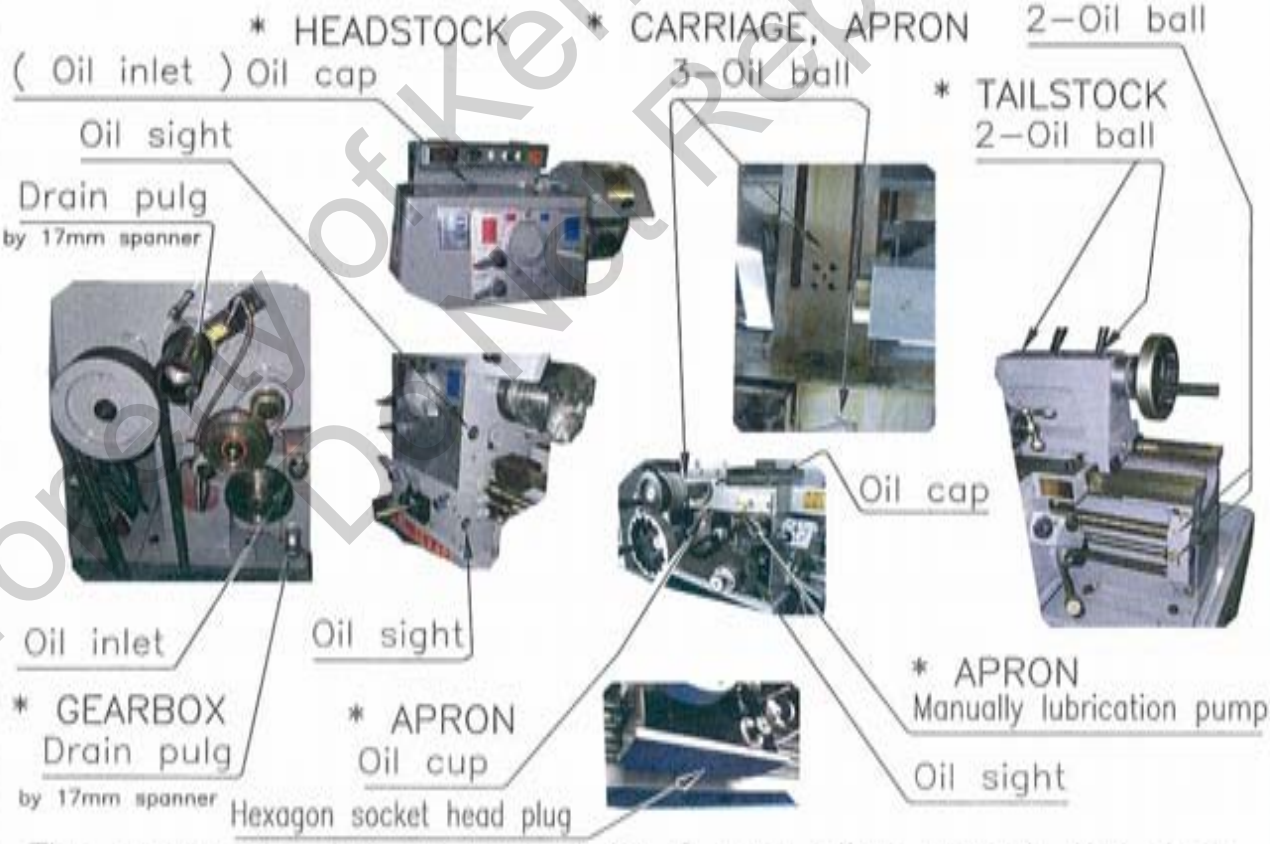
There are two oil ball on the tailstock & a oil cap on the bracket.

4. Please add No.68 oil 3 c.c. to them respectively every day before operating to ensure the smoothness of ways.

There are three oil ball on the cross slide & top slide.

5. Please add No.68 oil 10 c.c. to them respectively every day before operating to ensure the smoothness of leadscrews.

A manually operated one shoot lubrication pump is incorporated into the apron. Drawing oil from the apron reservoir.
It enables the operator to ensure that the slideways are kept adequately lubricated.
The pump should be operated before and occesionally during the work period.



The apron can be unscrewed by 6 mm allen wrench the drain plug in the bottom plate.

CHAPTER 1 ∘CHUCK AND CHUCK MOUNTING(for D1-4 spindle)

* WARNING: USE ONLY HIGH-SPEED CHUCKS WITH THESE MACHINES.

∘When fitting chucks or faceplated, ensure that spindle and chuck tapers are scrupulously clean that all cams lock in the correct positions the first.

∘It may be necessary to re-set the camlock studs(A) when mounting a new chuck. To do this, remove the hexagon socket 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 hold.

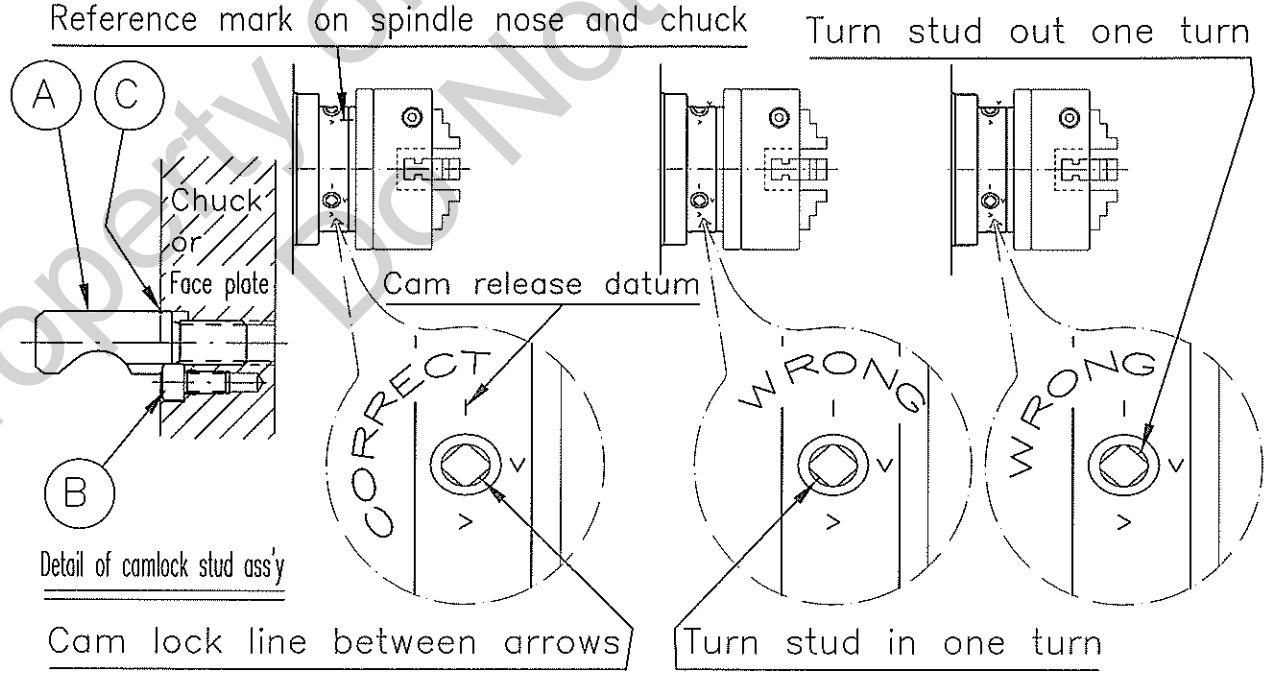
∘Now mount the chuck or faceplate on the spindle nose and tighten the six cams in turn.

∘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. A reference mark should be made on each correctly fitted chuck or faceplate to coincide with the reference scribed on the spindle nose. This will assist subsequent remounting.

DO NOT INTERCHANGE CHUCKS OR FACE PLATES BETWEEN LATHES WITHOUT CHECKING FOR CORRECT CAM LOCKING.

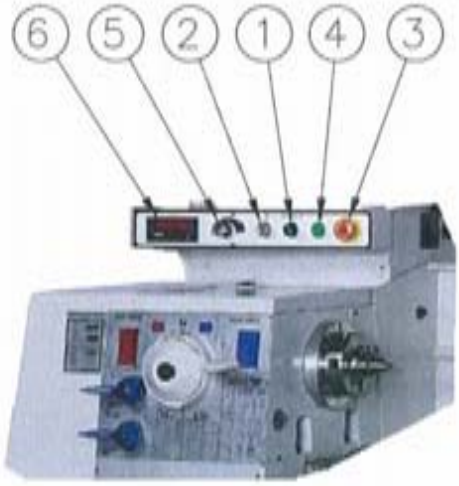
IMPORTANT:
Take careful note of speed limitations when using faceplates; 10 inch faceplates should not be run at speeds higher than 1305 rev/min. and 12 inch faceplates at not higher more than 990 rev/min.



CHAPTER 2 ∘ LATHE CONTROLS

A. Electrical control panel.
B. Headstock selector for L/H 2-section speed.
C. Gearbox (threads and feeds)
D. Apron control units, for surfacing, sliding and threading controls.
E. Swith hande, for spindle rotation, forward, stop and reverse.
F. Footbrake.

∘ELECTRICAL CONTROL PANEL



Except the lathe isolator, all electrical controls are installed on top of headstock.

1. Coolant pump ON / OFF switch.
2. Power ON light. it will glow when the electricity is ON.
3. The emergency stop, serving as electricity ON / OFF switch also.
4. Inching : Push it to move spindle slightly for checking workpiece is clamped tightly and coaxial in the chuck before cutting!
5. Speed adjusting knob.
6. Speed indiccator.

CHAPTER 2 ∘ HEADSTOCK SELECTORS

* (H1) Spindle speed selectors

1. The middle upper selectors on headstock are for spindle speed selection. There are 2 spindle speeds, as shown on speed chart, divided into 2-section speed.
2. L 100~500 R.P.M.
   H 500~3000 R.P.M.
   Infinitely variable

* (H2) H-N-L selector for gearbox

1. Following each feed rate or thread pitch on gearbox thread and feed chart, there is a prefix of either H or L, move
2. H-N-L selector to H or L accordingly for feeding or threading. If this lever is positioned at N, the headstock rotation will not be transmitted to gearbox.

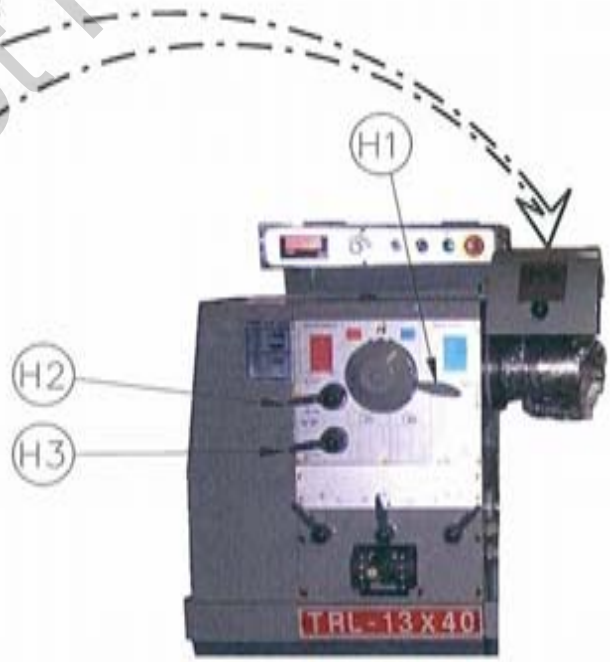
***WARNING:**
HIGH POSITION DO NOT EXCEED SPINDLE SPEED OF 330 R.P.M.

* (H3) Apron orientation selector

1. This selector may affect the rotation orientation of leadscrew, feed rod and henceforth the movement direction of apron.
2. FORWARD(left-hand arrow) is used for cutting right-hand threads. REVERSE(right-hand arrow) is used for cutting left-hand threads.

* HEADSTOCK SELECTORS

(H1) H or L two section speed (H3) Apron orientation selector
(H2) Low-N-High selector for gearbox



* Gearbox, thread and feed selectors

∘All the thread pitches and feeds directly available from the gearbox are shown on the data plate fitted on the front of headstock and the positioning control levers are (G1), (G2), (G3), and (G4).

* End gear trains diagram

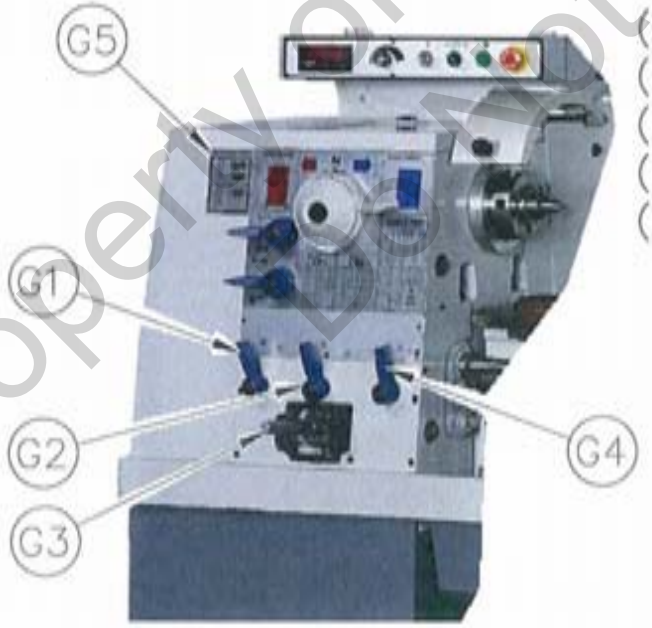
∘The end-gear train should be arranged as in the diagram shown on the dataplate (G5) to meet threading requirements.

* FEEDS:

∘Sliding feeds per spindle revolution range from 0.002 to 0.067 inch. (0.05 to 1.7mm)

∘Surfacing feeds per spindle revolution range from 0.001 to 0.034 inch. (0.025 to 0.85mm)

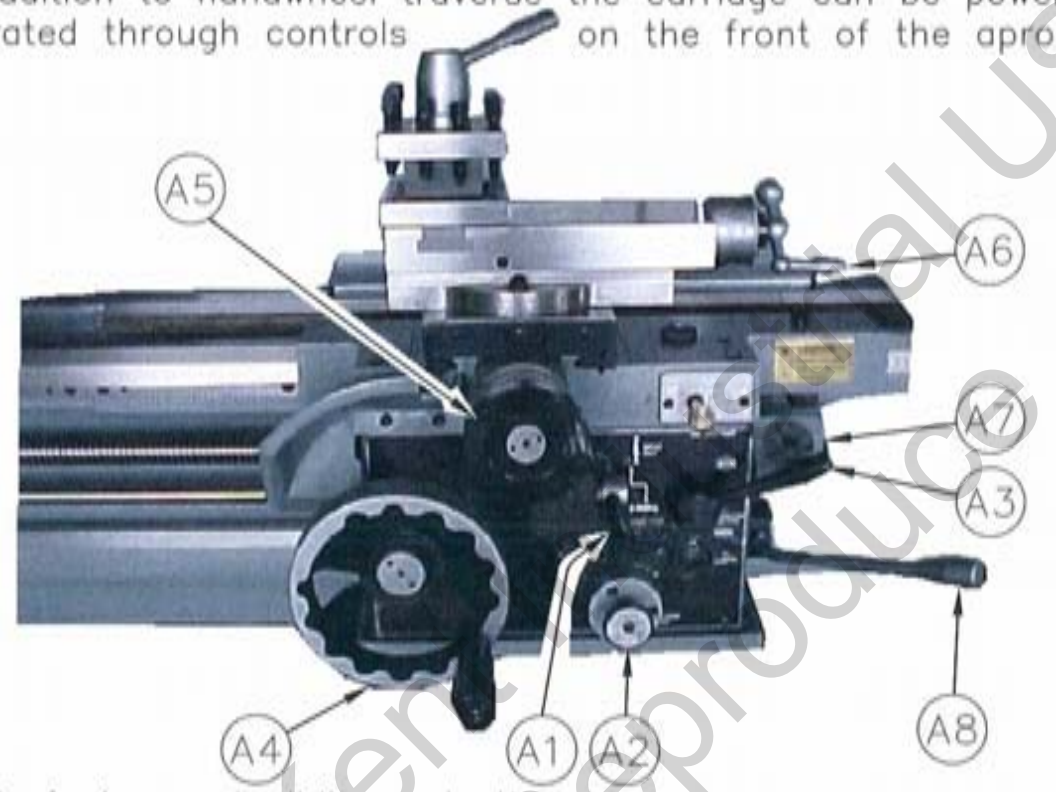
Threads & Feeds	Whitworth threads : Kinds / Range	45 Kinds / 2 ~ 72 T.P.I.
	Metric threads :	39 Kinds / 0.2 ~ 14 mm
	Diametral pitch (D.P.) worm gear	21 Kinds / 8 ~ 44 D.P.
	Module pitch (M.P.) worm gear	18 Kinds / 0.3 ~ 3.5 M.P.
	Longitudinal feeds	0.05 ~ 1.7 mm (0.002" ~ 0.067")
	Cross feeds	0.025 ~ 0.85mm (0.001" ~ 0.034")



* GEARBOX SELECTORS

(G1) A,B,C three section selector
(G2) R,S,T three section selector
(G3) 1~8 eight section selector
(G4) V~Z five section selector
(G5) End gear train diagram

* For surfacing, sliding and thread cutting controls.
In addition to handwheel traverse the carriage can be power-operated through controls on the front of the apron.



(A1). Surfacing and sliding selection lever:
When it is in and is moved downward, surfacing is in operation; When it is pulled out and moved upward, sliding is in operation.

(A2). Direction selection push button:
Either move this push button inward or outward to change direction of carriage movement or cross-slide. With this push button the operator can ignore the direction of spindle or leadscrew.

(A3). Half-nut lever:
When it is pressed downward, the half-nut will be engage with leadscrew for thread cutting. To avoid undue wear, release the nut when not thread cutting. An interlock within the apron prevents inadvertent engagement of this lever when in feeding operation.

(A4). Carriage handwheel.

(A5). Cross slide handwheel.

(A6). Compound rest handwheel.

(A7). Threading dial indicator.

(A8). Spindle Rotation, Forward, Stop and Reverse:
The forward and reverse rotation of spindle is operated by starting lever at right side of apron and controlled by limit switches right-side the bedway.

CHAPTER 2 ∘ THREADING DIAL INDICATOR

* For threads cutting

∘Tighten the handnut to retain indicator in engagement when engaging the indicator with the leadscrew. When not required, realease hand–nut and swing indicator out engagement.

∘To cut threads of even number per inch, the leadscrew nut can be closed as any line on the dial passes the datum mark.

∘To cut threads of odd numbers per inch, close the leadscrew nut at any NUMBERED line.

∘Fractional threads of 1/2 or 1/4 T.P.I. may be cut by closing the nut at the SAME NUMBERED LINE on each pass of the tool.

∘This dial can not be used with an IMPERIAL leadscrew to cut metric threads, D.P., M.P. which are shown on gear box data plate. For the threads being shown, the leadscrew nut must be kept closed. Use apron control lever after each thread cutting when the tool is withdrawn to original start of thread cutting operation.

* Multi–start threads can be cut on a lathe in three ways:

1. By repositioning the compound (top) slide one pitch forward for each start. Note that the slide is normally set at 90 deg. to the axis of the machine cross–slide. The accuracy of this method depends upon the skill of the operator.
2. By using an accurately divided driver plate and turning the work–piece one division forward for each start.
3. By advancing the driver gear a calculated number of turns to advance the spindle by one pitch of the thread to be cut. The accuracy of this method is that of the machine.

∘ With ALL SERIES lathes, two ratios exist between the spindle and driver gear shift, i.e. the LOW range where the ratio is 1:2 and the HIGH range where the ratio is 2:1.

∘ In order to use this method, the number of teeth on the driver gear must be divisible by the number of starts being cut. The driver gear is then advanced by half this number of teeth when in LOW range. and conversely, by twice the number of teeth when in HIGH range.

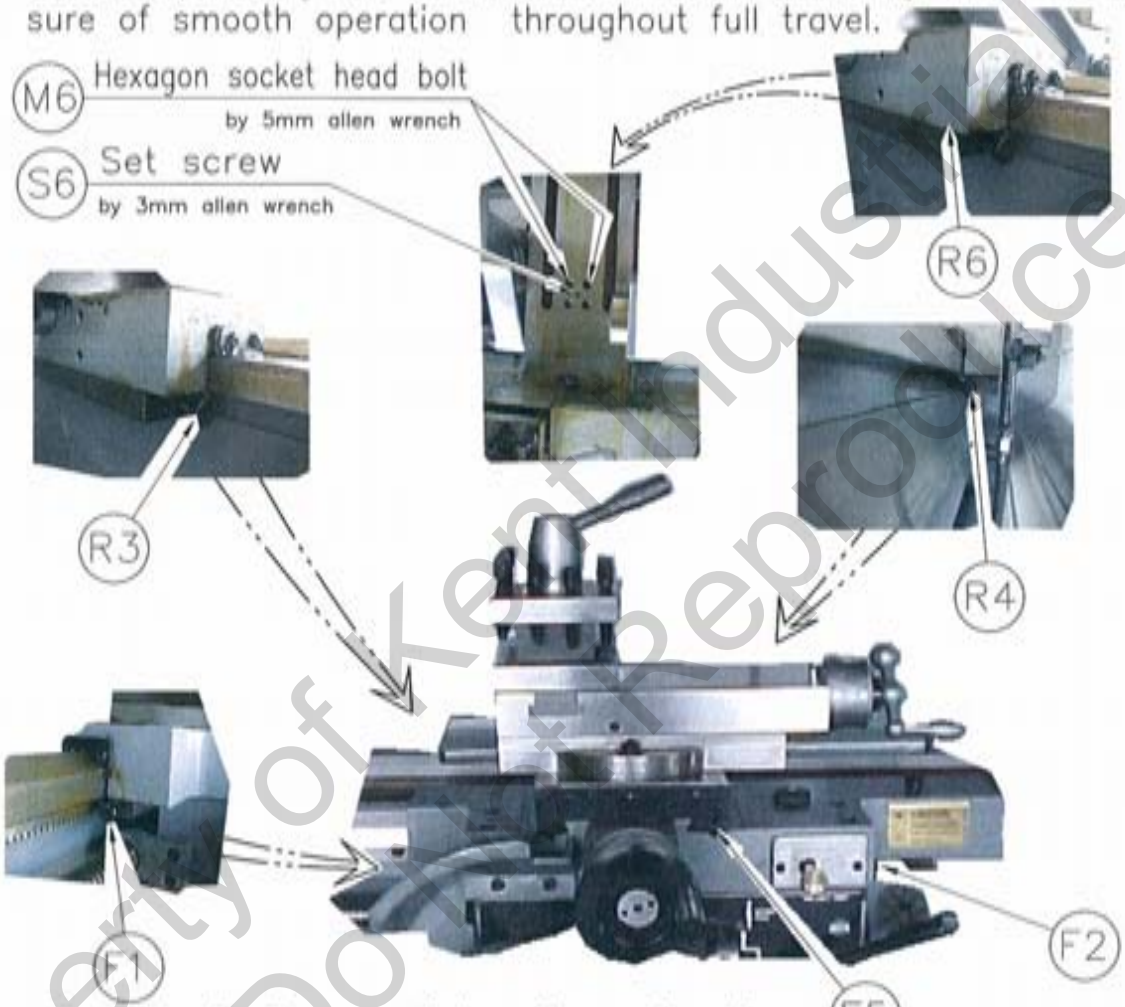
∘ The limitation of this method depends upon whether the number of teeth on the driver gear without a remainder.

∘ On the standard end gear train for this machine the driver gear has 24 teeth; so that two, three or four start threads, can readily be cut. For other odd numbers of start a choice must be made of methods 1 or 2.

* Cross-slide nut adjusting.

∘Reduce backlash by slackening rear hexagon socket head bolt (M6) in top of cross slide, then carefully screw in the center set screw(S6) to adjust a wedge within the split nut.

∘Mark only small adjustment at time and retighten two bolts(M6) before operating the cross slide several times by hand to be sure of smooth operation throughout full travel.



* Saddle & Cross slide gibs adjusting.

∘Tapered gib strip are fitted to slideways of saddle cross-slide and top (compound) slides so that any slackness which may develop can be disminished. Check and adjust them every six months.

∘Ensure that slideways are thoroughly cleaned and lubricated before attempting adjustment. According to the following steps :

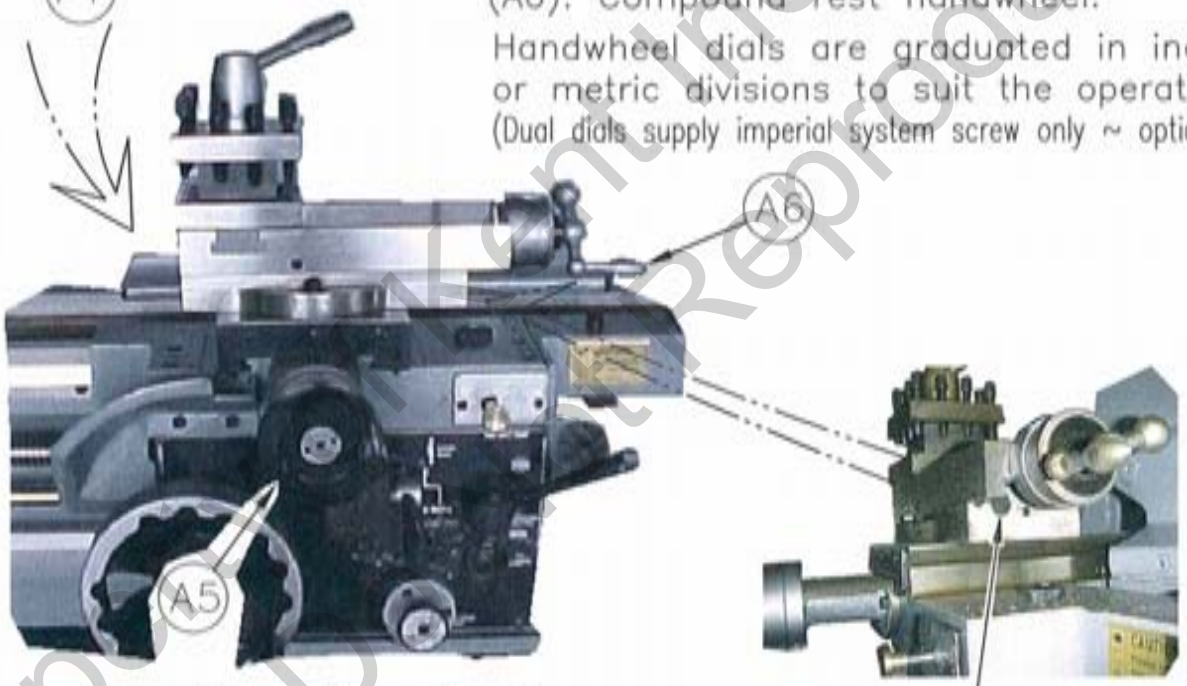
1. Use flat head screw driver to loosen the adjust screw(F1) & (R4), /(R6) about 1/2 circle CCW.
2. Appropriately tighten adjust screw(F2) & (R3) /(F5) about 1/2 circle CW.
3. Move saddle leftward and rightward to satisfied smoothness.
4. Move cross slide forward and backward to satisfied smoothness.

CHAPTER 2 ∘TOP SLIDE

* Top slide indixing

∘A solid top slide is fitted as standard equipment to the cross-slide mounted on a swival base which is marked 0-45-0-45 degree. for normal indexing.

(A5). Cross slide handwheel.
(A6). Compound rest handwheel.
Handwheel dials are graduated in inch or metric divisions to suit the operation
(Dual dials supply imperial system screw only ~ optional)



* Top slide gibs adjusting.

You should regularly check and adjust them every six months.

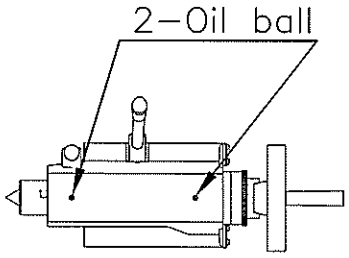
Ensure that slideways are thoroughly cleaned and lubricated before attempting adjustment. According to the following steps :

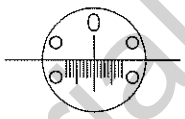
1. Use flat head screw driver to loosen the adjust screw(P1) , about 1/2 circle CCW.
2. Appropriately tighten adjust screw(P2), about 1/2 circle CW.
3. Move top slide leftward and rightward to a satisfied smoothness.

* Quill lubricate

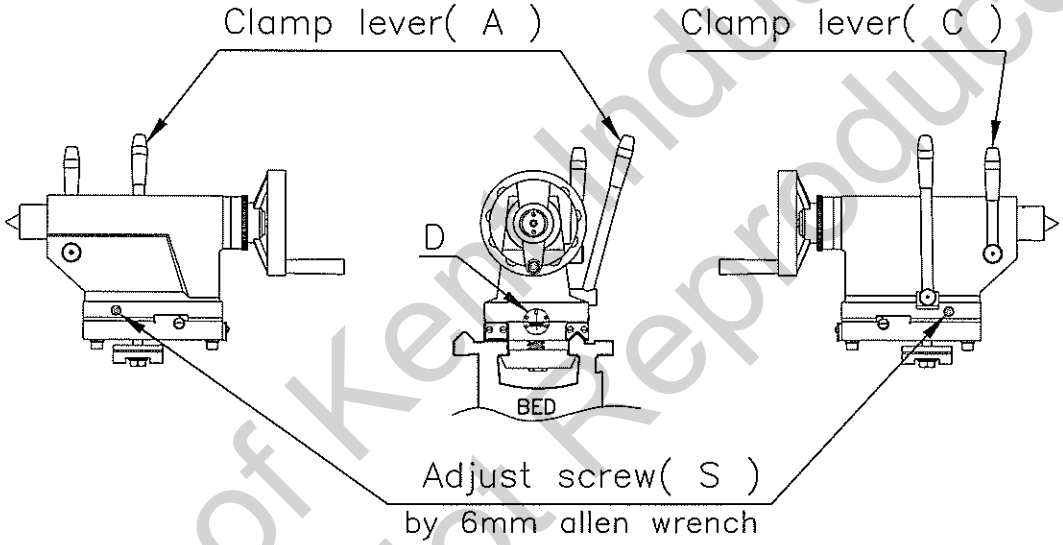
∘There are two oil ball on the tailstock.

∘Please add No.68 oil 3 c.c. to them respectively every day before operating to ensure the smoothness of ways.





Detail of mark D



* Operation

1. The tailstock can be freed for movement along the bed by unlocking clamping lever(A).
2. Release this clamping lever(A) before attempting to move the tailstock after and on completing of the need, lock it again for extra clamping.
3. The tailstock quill can be locked by clamp lever(C).

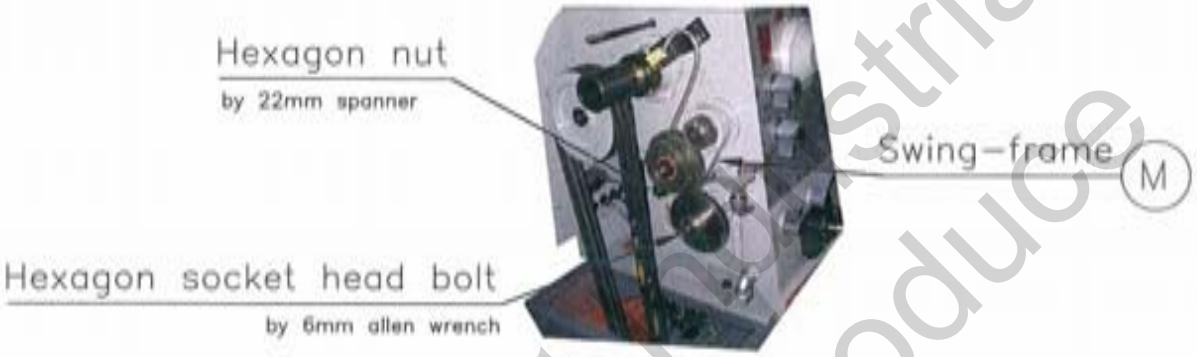
* Adjustment / re-alignment

1. The tailstock also can be set over for turning shallow tapers or for re-alignment.
2. Release the clamping lever(A) and adjust screw(S) at each side of the base to move tailstock laterally across the base.
3. An indication of the set-over is given by the datum mark(D) at the tailstock end face.
4. Tight clamp lever after adjusting set-over.

CHAPTER 2 ∘ END GEAR TRAIN

* Notice items:

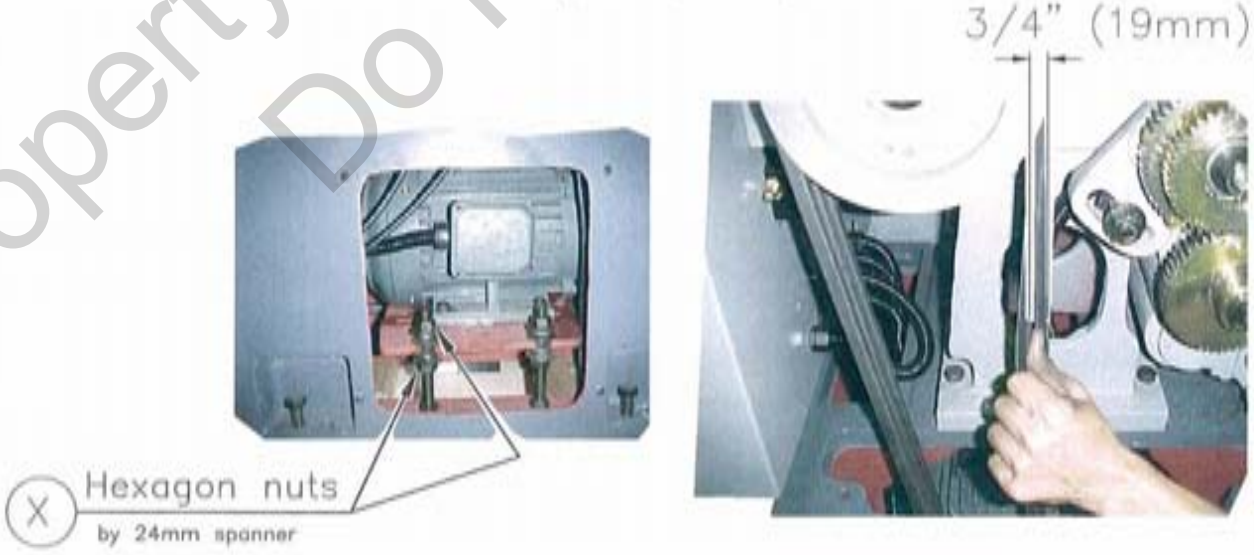
1. Drive from headstock to gear box is transmitted through a enclosed by the headstock end cover. Intermediate gears are carried on an adjustable swing-frame(M).
2. Gears must be thoroughly cleaned before fitting and backlash must be maintained at 0.005"(0.127mm) for correct meshing.
3. Lubricate gear regularly with heavy oil or grease.



∘ DRIVEING BELTS

* Notice items:

1. To adjusting belt tension, remove the cover plate on back of the headstock and adjust the hexagon nuts(X) on the hinged motor platform.
2. Ensure that the motor is correctly aligned with the lathe axis.
3. Apply light finger pressure at a point midway between motor and head-stock pulleys, the resulted depression compare to other belt will be about 3/4" (19mm) when under tension.

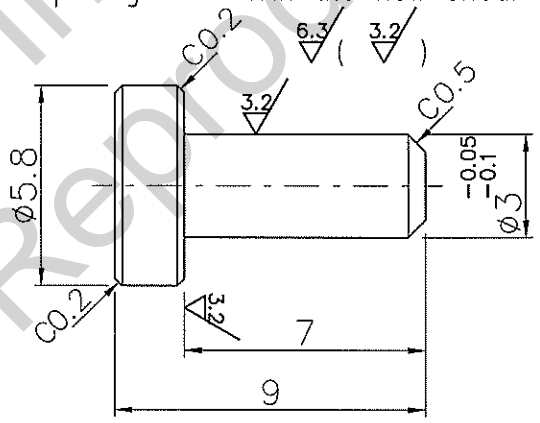


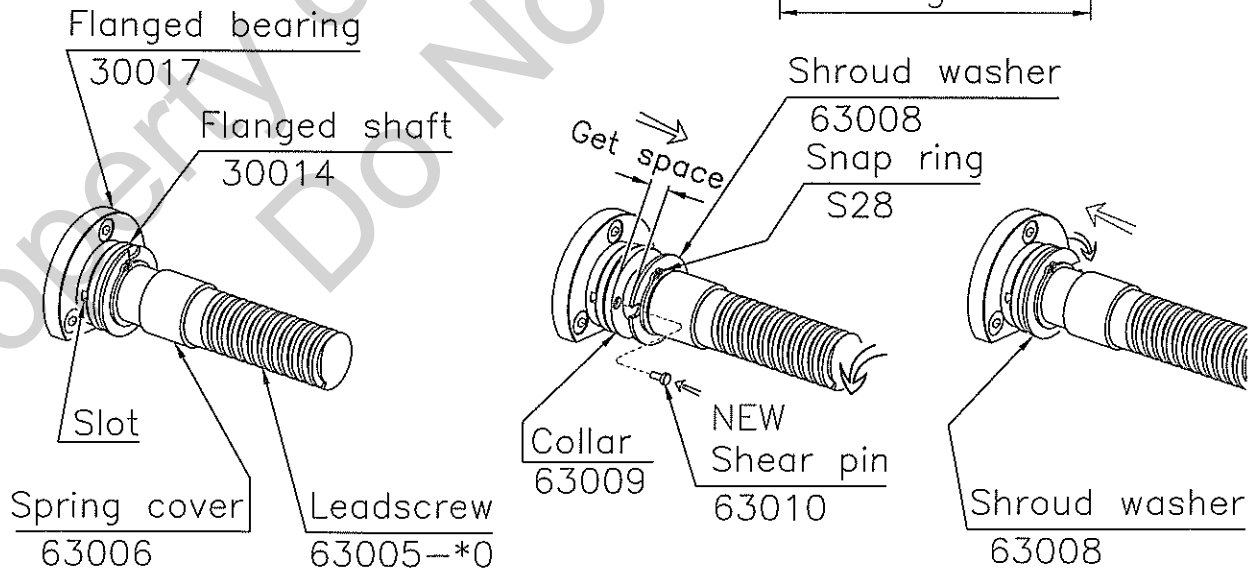
CHAPTER 2 ∘ LEADSCREW SHEAR PIN

* Safety feature

1. ∘ The transmission is protected against severe overload by a shear pin fitted into the leadscrew drive, just beside th right hand of the gearbox.
2. To replace a shear pin:
   - ∘ First disengage drive to the leadscrew(63005−*0) by setting the right−hand lever of the gearbox to the position W or X.
   - ∘ Move the shroud washer(63008) with snap ring rightward to the spring cover(63006).
   - ∘ Then rotate the leadscrew by hand carring the broken pin to the frontview, on same level to the slot of flanged bearing(30017).
   - ∘ By a magnetism screw driver can easy remove the broken pin head from the collar(63009), and other broken pin from gear box housing slot hole.
   - ∘ Align the holes in flanged−shaft(30014), collar(63009) and shroud washer (63008) then insert a new pin(63010) and turn the shroud washer half circle to leftward to the collar(63009) with snap ring for retain the new shear pin.

Part name : Shear pin
Drawing no. : 63010
Material : S45C (SAE 1045)
Scale : 5/1
Unit : mm





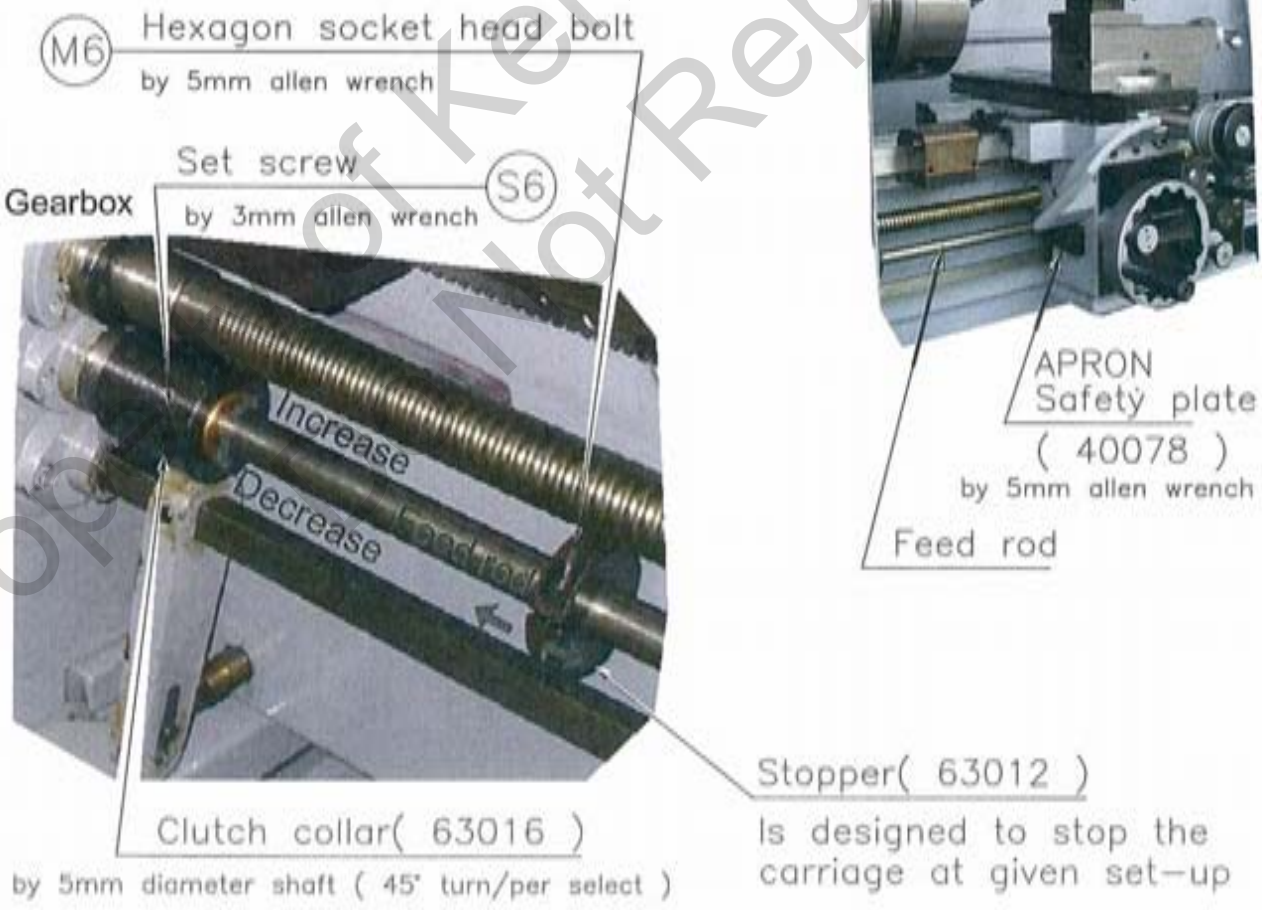
CHAPTER 2 ∘ FEED ROD FRICTION CLUTCH

* Safety feature

1. The friction clutch at left side of feed rod serves as safety device against overload.
2. In case of overload in feeding, the friction clutch will disengage feed rod from transmission and hence the lathe runs freely without any damage.
3. The friction clutch is adjustable to take different cutting loads depending on actual requirement.
4. To increase/decrease cutting load, P/N 63016 clutch collar should be turned reverse/forward. After adjustment, it should be tightened the set screw(S6) into soft again.

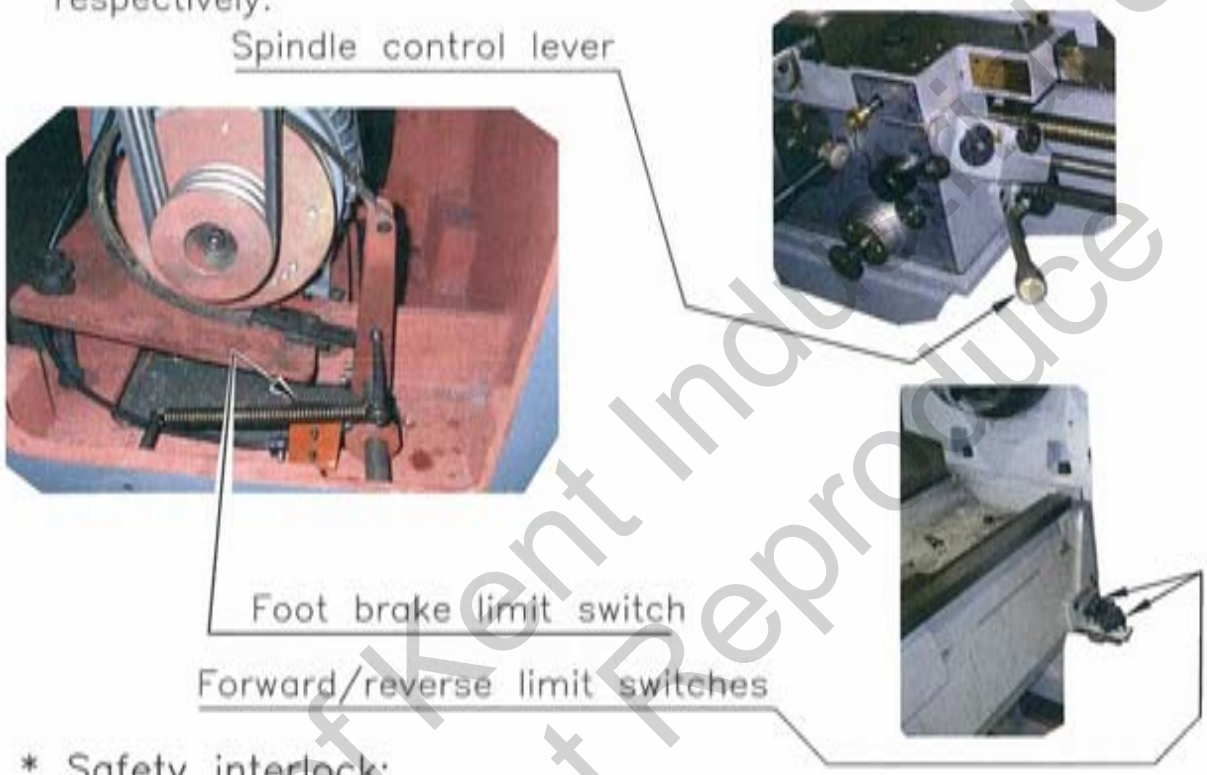
IMPORTANT:

WHEN ADJUSTING OVERLOAD FEED CLUTCH FOR SUITABLE FRICTION TO WORKING, MUST BE CHECKING THE CARRIAGE AUTO-FEEDING TOWARD HEADSTOCK, WHEN THE ARRON SAFETY PLATE(40078) TOUCHING TO STOPPER(63012) IN THIS MOMENT THE CARRIAGE WILL BE STOP.
THIS IS MANUFACTURE NORMALLY TESTING.



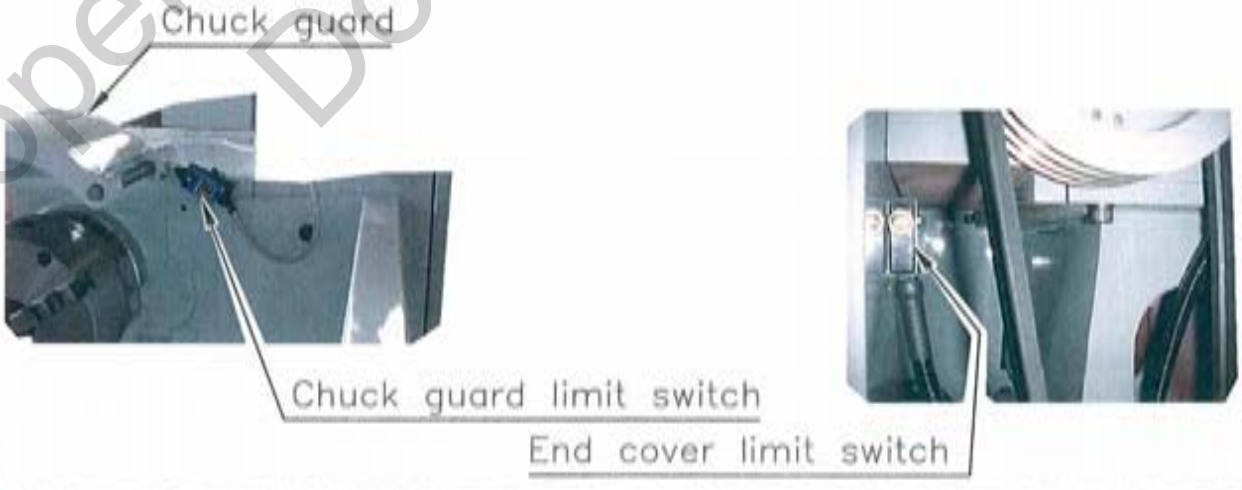
* Foot brake:

1. One limit switch and two limit switches to servo for instant foot brake and spindle forward–reverse rotation respectively.
2. Make sure always the smooth contact of small wheel of limit switch with the cam at end of foot brake and starting lever respectively.



* Safety interlock:

1. IF the end cover is not closed, then the spindle and coolant pump can not rotate and start.
2. IF the chuck guard (optional accessory) is not swivel down, then the spindle and coolant pump can not rotate and start.



CHAPTER 2 ∘ LATHE ALIGNMENT

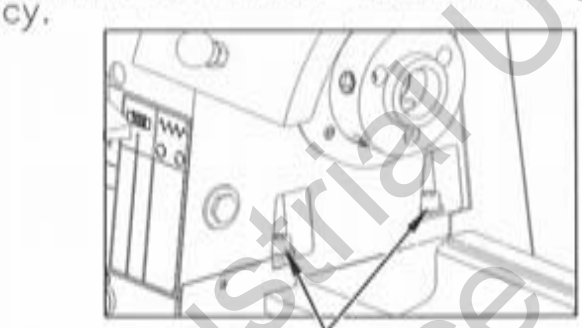
* Lathe alignment :

∘With the lathe installed & running we recommend verification on machine alignement before commending work.

∘Check levelling & machine alignment at regular periods to ensure continued lathe accuracy.

(I) 2–Fixing screws

(K) 2–Adjusting screws



(J) 2–Hex. socket head bolts

* Headstock check :

1. Take a light cut with a cutting tool over a 6" (152mm) length of 2" dia (ø50mm) steel bar gripped in the chuck but not supported at the free end.
2. Micrometer readings at each end of the turned length (at A & B reference Fig. 24–P1) should be the same.
3. To correct a difference in readings, slacken the four headstock hold–down screws(I) behind headstock and (J) under the headstock, then adjust the set–over adjusting screws(K).
4. After adjustment, tighten screw(I) / (J) first then screw(K).
5. Repeat the test–cut / micrometer–reading sequence until micrometer reading are identical, i.e.

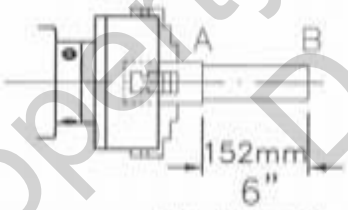


Fig. 24–P1

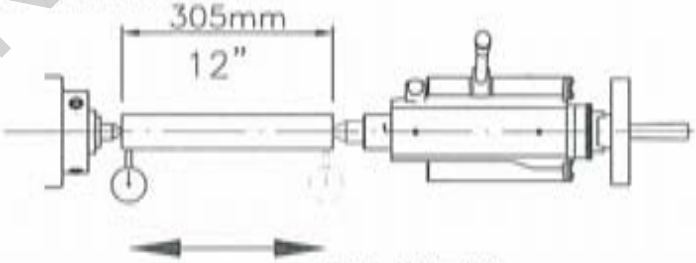


Fig. 24–P2

* Tailstock check : (reference Fig. 24–P2)

1. Using a 12" (305mm) ground steel bar fitted between headstock and tailstock centers, check the alignment by fitting a dial–test indicator to the toolpost and traversing the center line of the bar.
2. To correct error, release the tailstock clamp lever and adjust the set–over screws provided.
3. Continue with checking and correction until alignment is perfect.

CHAPTER 2 ∘ Gap Block(For Gap Bed Type Lathe)

∘When removing the gap block from bedway , be very careful in loosening the five fixing bolts and lift the gap until guiding taper pins seperate from bedway completely.

∘When loosening the fixing bolts and seperating the taper pin , every particular precaution should be paid to prevent any small damage to fixing bolts and taper pins.

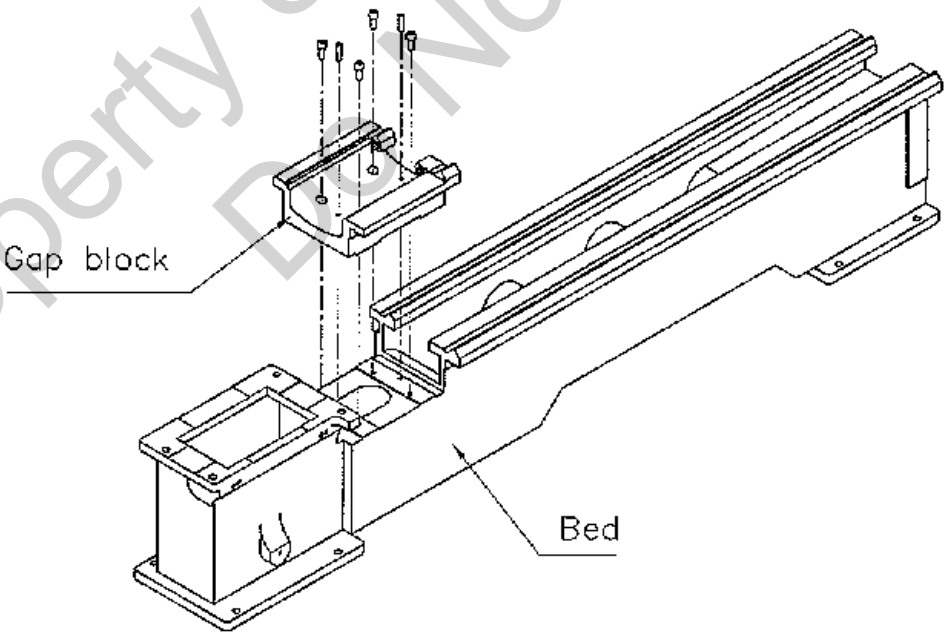
∘The taper pins should be left in the gap portion after removal of the gap block.

∘Removed gap block mut be stored in a very clean and safe piece with every precaution against damage and rust.

∘The taper pins should be greased so as tomake it easy to reset the gap block with optimum original accuracy.

∘Be careful not to have dirt or chipe entering into taper pin hokes , holes for fixing bolts or on the surface where gap block is to be reset.

∘Keep them always very clean.



CHAPTER 2 ∘ TAPER ATTACHMENT

∘1) Release P/N M10 nut, P/N 50026 cap collar, P/N NTB/AS2 1226 trust bearing, then slide P/N 50018 bracket out of saddle (shown on Page F02).

∘2) Release P/N M6 screws and take off P/N 80002 plate on taper attachment.(Shown on page M02).

∘3) Mount P/N 80005 yoke plate on cross slide shaft (P/N 50016 screw) and re-mount P/N M10 nut, P/N 50026 cap collar, P/N NTB/AS2 1226 thrust bearing as shown on diagram on page F02/M02.

∘4) Screw in 2 P/N M6X20 Hex. screws head bolt to connect P/N 80005 yoke plate and P/N 80004 yoke.

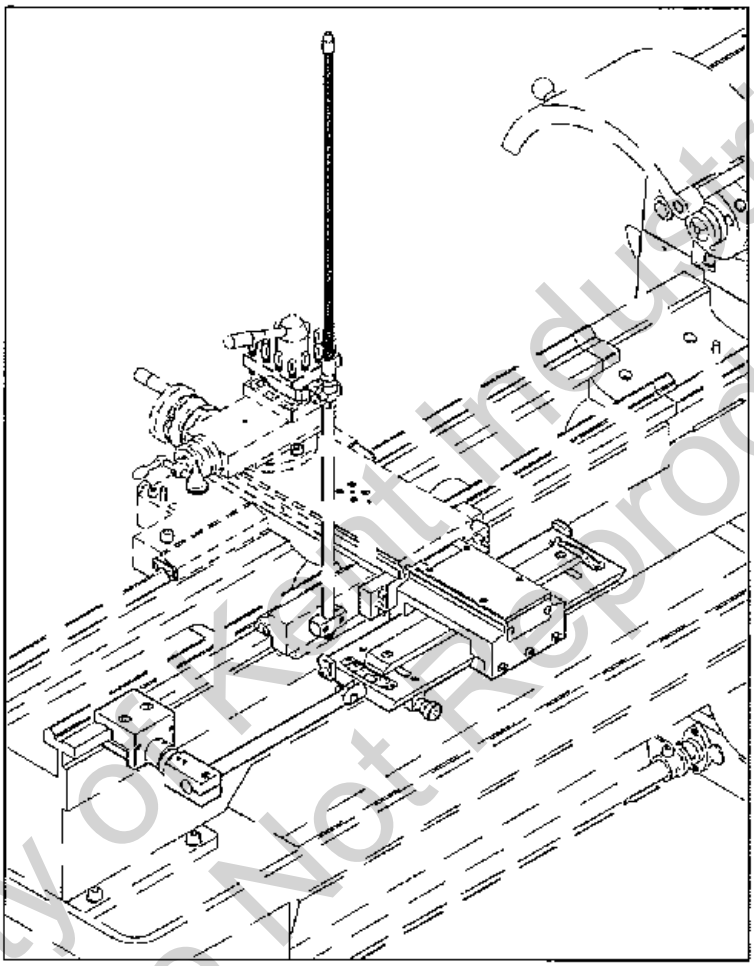
∘5) Align taper attachment to the slide ways of P/N 80005 yoke plate and P/N 80004 yoke , and meet the four holes on mounting face of attachment with those four on back of carriage, screw them tightly.

∘6) Mount the breacket plate on back bedway, adjust the length of connecting rod according to wark condition, then screw tightly.

∘7) Set P/N 80009 swive slide guide to the required angle and then the nuts P/N M8x30 Hex. socket head bolt are tightened. Hence the guide is clamped securely.

∘8) Try a few test cuts on test workpiece until the operation is smooth and taper angle is correct.

∘9) The completed installation is as shown on Page 27/M01/M02



CHAPTER 2 ∘ 5C COLLET CLOSER ATTACHMET

If 5C collet closer attachment is not mounted on lathe when delivered, it is supplied in three seperated assembly; bush, handle rod and main assembly. When mountingthe the attachment, it is better to proceed as follows: (See page 29V/L01V/L02V)

∘ 1) Clear the taper hole of spindle nose and P/N 90026 bush very thoroughly. Then put the bush inside the taper hole of spindle nose. The pin (P/N 90027) inside the bush should be at top side.

∘ 2) Locate the position of P/N 90048 bracket and P/N M5x15 Hex. socket head bolt out of the small hole of end gurard. Then drill and tap the three holes for P/N M6x25 Hex. socket head bolt
NOTE: The three hole for P/N M6x25 Hex. socket head bolt should not be drilled through.

∘ 3) Mount the main assembly by putting P/N 90028 tube though inside headstock spindle, screw in P/N 90023 hub to threaded tail end of spindle.

∘ 4) Screw in P/N M6x25 Hex. socket head bolt to the three hole so as to secure P/N 90048 bracket firmly onto headstock.

∘ 5) Screw in P/N 90045 handle rod to P/N 90044 handle casting.

∘ 6) Put a 5C collet into P/N 90026 bush. The pin (P/N 90027) should be inside the slot of 5C collet. And turn the tail end into the internally threaded end of P/N 90028 tube.

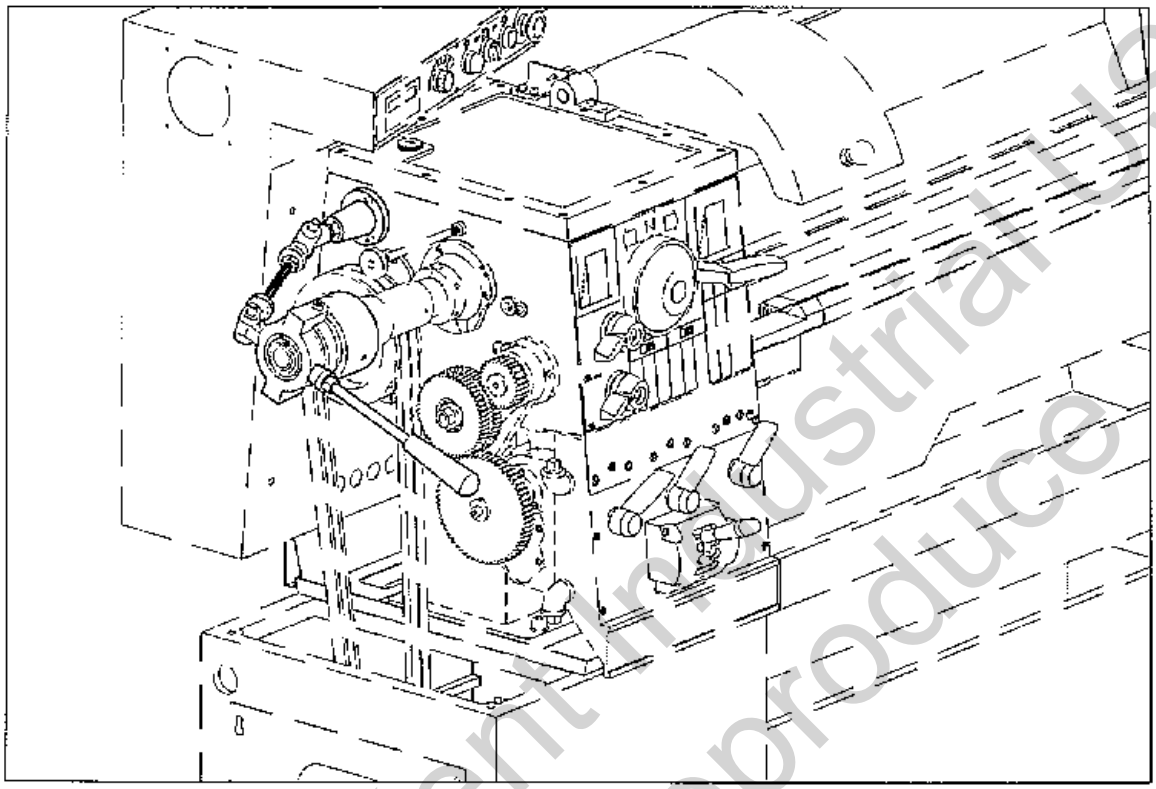
∘ 7) Operate P/N 90046 handle to test whether the chucking operation of collet is smooth and forceful or not. If not, loosen P/N 90035 knob and turn P/N 90043 collar inward or outward until the chucking operation of collet is smooth and forceful, then tighten, P/N 90035 knob again.

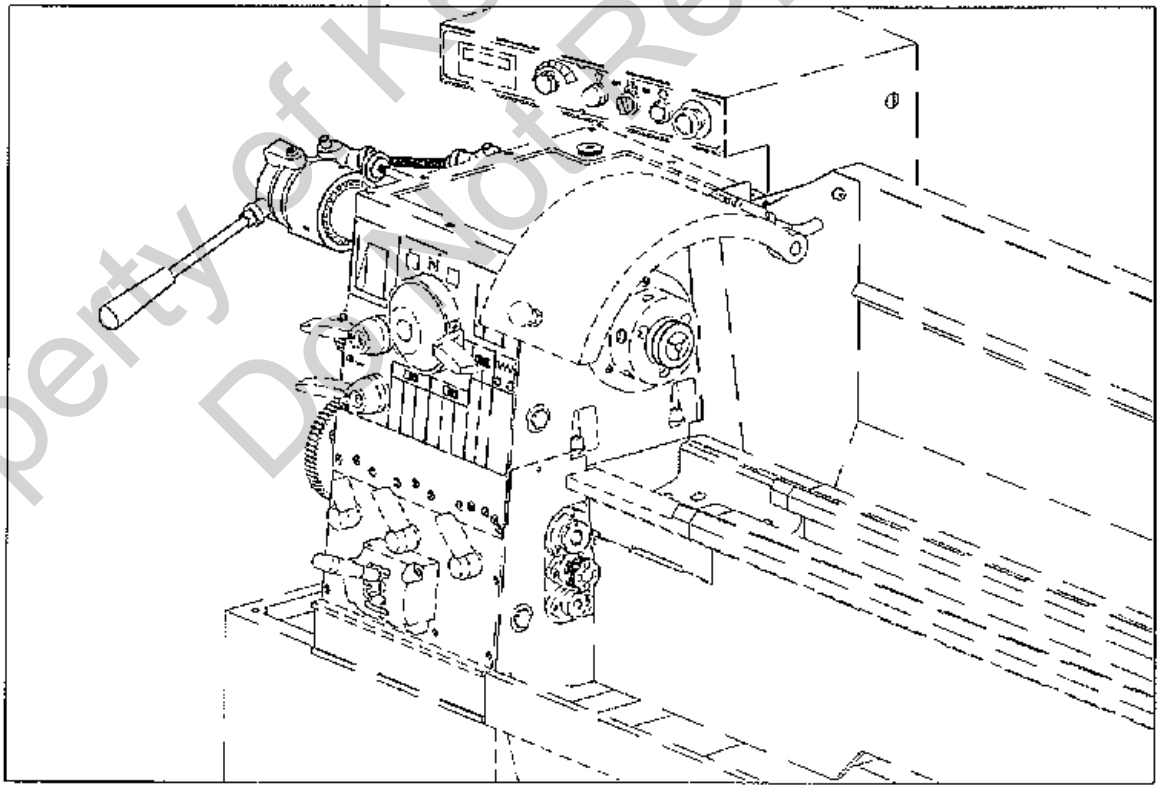
∘ 8) Seperate P/N 90047 connector casting from P/N 90050 screw and remove P/N 90028 tube out of headstock spindle.

∘ 9) Mount end guard into position.
NOTE : P/N 90050 screw should project out of the small hole of end guard.

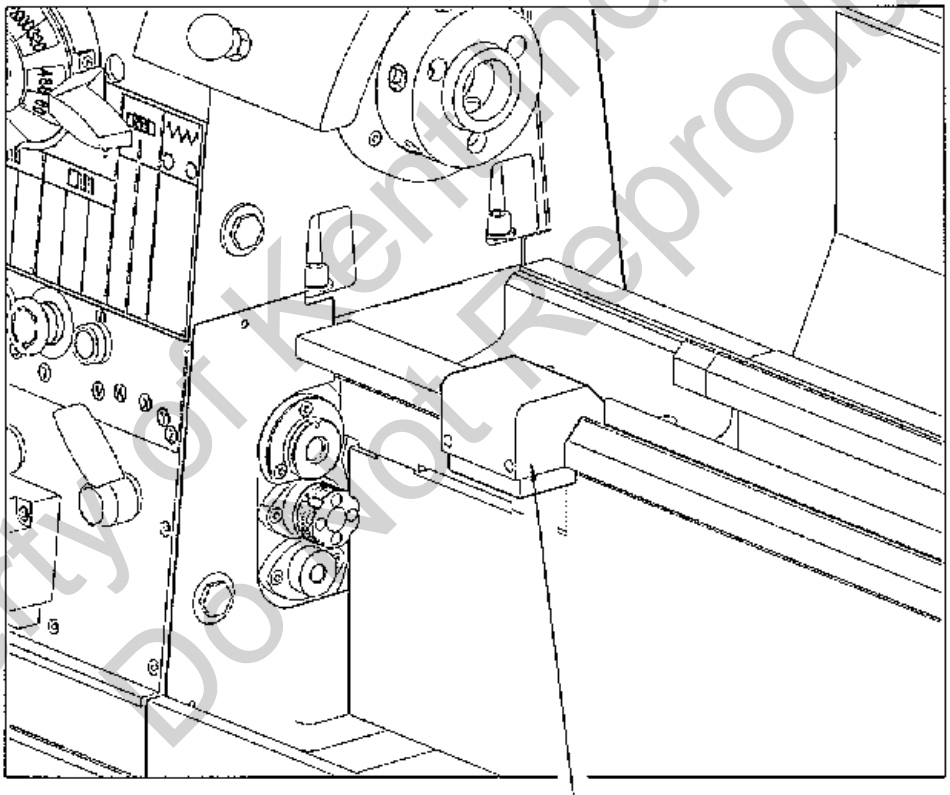
∘ 10) Place P/N 90028 tube inside headstock from outside of end cover and proceed as aforesid steps, then connect the P/N 90050 screw to P/N 90047 connector casting again.

∘ 11) The whole set of 5C collet closer attachment is now ready for operation.





∘NOTE : Refer to page N01/N02, the diagram of bedstop , when P/N 70048-13 body is mounted onto bedway and P/N 18-70059 clamp plate is screwed to P/N 70048-13 body , there is always about 2mm clearance between bottom body and clamp plate. The clearance is to be made up by screwing up two set screws(P/N M10x20 set screw). In this way , the beedstop will be mounted very firmly onto bedway.
(The same way suit for that micrometer bed stop ref to page 001/002)



CHAPTER 3 ○ TO ACHIEVE MAXIMUM TURNING EFFICIENCY

In order to make the most economical use of the lathe and to achieve maximum turning efficiency in surface finish and shortest machining time, the cutting conditions of set–up of cutting tool, cutting speed, feed, depth, and application of coolant fluid should be established. In determining the cutting speed, feed and cutting depth, the material and diameter of workpiece and material and shape of cutting tool are the most important factors. In determining the most efficient speed for various kind of material, the operator is advised to refer to machining handbook.

(1) The Cutting Speeds and Feeds for High Speed Steel Cutting Tools are as Follows:

	Low Carbon Steel	High Carbon Steel Annealed	Alloy Steel Normalized	Aluminum Alloys	Cast Lron	Bronze
Roughing speed SFM	90	50	45	200	70	100
Finishing speed SFM	120	65	60	300	80	130
Feed IPR roughing	.010–.020	.010–.020	.010–.020	.015–.030	.010–.020	.010–.020
Feed IPR finishing	.003–.005	.003–.005	.003–.005	.005–.010	.003–.010	.003–.010

Spindle speeds are determined by using–following formula, which is used in turming between centers as well as in facing

$$RPM = \frac{CSx4}{D}$$

RPM=Spindle speed, revolution per minute
D=Diameter of workpiece
CS=Cutting speed in surface feet per minute(SFM)

EXAMPLE

If the cutting speed is 40 for a certain alloy steel and the workpiece is 2 inches in diameter, find the rpm as follows:

$$RPM = \frac{40x4}{2} = 80$$

After calculating the PRM, use the nearest or next lower speed on the lathe and set the spindle speed.

(2) Material And Shape of Cutting Tools

the most commonly used material for turning tools is hight speed steel, the recommended shape (cutter angle degrees) for high speed steel tools is as follows:

	End Relief	Side Relief	Side Rake	Back Rake
Aluminum	8 to 10	12 to 14	14 to 16	30 to 35
Brass, free cutting	8 to 10	8 to 10	1 to 3	0
Bronze, free cutting	8 to 10	8 to 10	2 to 4	0
Cast iron, gray	6 to 8	8 to 10	10 to 12	3 to 5
Copper	12 to 14	13 to 14	18 to 20	14 to 16
Nickel and monel	12 to 14	14 to 16	12 to 14	8 to 10
Steels, low carbon	8 to 10	8 to 10	10 to 12	10 to 12
Steels, alloy	7 to 9	7 to 9	8 to 10	6 to 8

However, the cutting tool materials such as carbon steels and hight speed steel that served the needs of machining in the past years are not suitable in many application today. Tougher and harder tools are required to machine the tough, hard space age metals and new alloys. The knowledge of carbide cutting tools and ability to select them for specific machinig tasks will affect productivity directly.

The following steps may be used in selecting the correct carbide tool for a job.

Step 1. Establishing the cutting condtions of speed, feed, and depth of cut to establish metal removal rate.

Step 2. Selecting cemented carbide grade. Its grade classification and comparison table with CCPA "C" numbers and manufacturers designations are briefed as follows:

The Grades Listed Are Those Usually Recommended by the Manufacturer for the Categories Shown

APPLICATION			Carmet	Ex-cell-o	Firth Sterling	Greenleaf	Kennametal	Metal Carbides	Sandvik	Valenite
Cast irons	Roughing cuts	C-1	CA3	E8	H HB	G10	K1	C89	H20	VC-1
Nonferrous, Nonmetallic, Hi-Temperature alloys	Generel purpose	C-2	CA4 CA443	E6 XL620	HA HTA	G20 G25	K6 K68	C91	H20	VC-2 VC-28
200&300 series stainless	Light finishing	C-3	CA7	E5	HE HTA	G30	K8 K68	C93	R1P	VC-3
	Precision boring	C-4	CA8	E3	HF	G40	K11	C95	H1P H05	VC-4
	Roughing cuts	C-5	CA721 CA740	10A 945	NTA TXH	G50 G55	K42 K21	S-880	S-6	V-55 VC-125
Carbon steels	General purpose	C-6	CA720	BA 606	T22 T25	G60	K2S K21	S-900 S-901	S-4	VC-6
Alloy steels	Finishing cuts	C-7	CA711	6A XL70 6AX	T25 T31	G70 G74	K45 K5H	S-92 S-900	SM	VC-7 VC-76
400 Series stainless	Precision boring	C-8	CA704	6AX XL88	T31	G80	K7H K165	S-94	F02	XC-8 XC-83
	Hi-velocity	C-80					C06			

Step 3. Select nose radius
Step 4. Select insert shapes
Step 5. Select insert size
Step 6. Select insert thickness
Step 7. Select tool style
Step 8. Select rake angle
Step 9. Select shank size

(3) APPLICATION OF COOLANT FLUID

Coolants are used for heavy duty and production turning. Oil–water emulsions and synthetic coolants are the most commonly used, while sulfurized oils usually are not used for turning operations except for threading. Most job work or single piece work is done dry. Many shop lathes do not have a coolant pump and tank, so, if any coolants and cutting oils for various materials are given in following table.

Coolants and Cutting Oils Used for Turning

Material	Dry	Water Soluble Oil	Synthetic Coolants	Kerosene	Sulfurized Oil	Mineral Oil
Aluminum		x	x	x		
Brass	x	x	x			
Bronze	x	x	x			x
Cast iron	x					
Steel						
Low carbon		x	x			
Alloy		x	x		x	
Stainless		x	x		x	

CHAPTER 4 ○ TROUBLE SHOOTING

	Trouble or Failure	Possible causes	Correction
1	The electricity is on, but the spindle dose not run after the starting lever is moved downwar or upward	1) Fuse is burned 2) Thermal relay is overload	1) Replace fuse 2) Reset thermal relay
2	Outflow of coolant fluid is weak	1) Running orientation of coolant pump is worng 2) The inside of coolant pipe is rusterd or otherwise restricted	1) interchange any two line of 3 phase line 2) Clear the pipe by compressed air or rigid steel rod
3	No coolant fluid comes out of coolant nozzle	The steel ball inside the coolant pipe is stuck to "O" ring	Seperate the steel ball from "O" ring by compressed air
4	Spindle dose not stop instantly even when treadle is fully depressed	The height of treadle is too low	Adjust brake belt to more tight
5	Intermittent noise in headstock	Headstock shift levers are not in position	Stop the machine and re-shift levers to the position where steel ball slips into the concave
6	Headstock and gear train are running and stsrting lever is moved upward or downward, but the feed rod or leadscrew does not rotate	Gearbox shift levers are not in position	Shift levers to correct positions as specified on data plate
7	When turning long workpiece the right end is smaller than the left end in diameter	Tailstock is not in good alignment to headstock	Offset tailstock until the center line between headstock is parallel to carriage movement
8	Chatter line occurs on turned workpiece	1) Lathe cutter is dull 2) Spindle taper roller bearing is too loose	1) Sharpen the cutting angles of lathe cutter 2) Adjust the tightness of P/N 10011 nut.
9	No Oil comes out of one shot lubrication	Too much air is caught oil groove	Keep on pushing one shot lubrication pump until all air is driven out
10	Sharp, shriek noise in braking action	Brake lining has been worn out	Replace the brake lining
11	Carriage vibrates during heavy cutting	P/N 50053/50056 gip is too loose in fitting	Adjust screw cross slide & tool slide to drive the gib slightly inside
12	Oil leaks at right side of gearbox	The lubricant in gearbox is too light	Replace with slightly denser lubricant in gearbox

CHAPTER 5 SPARE PARTS (ILLUSTRATED)

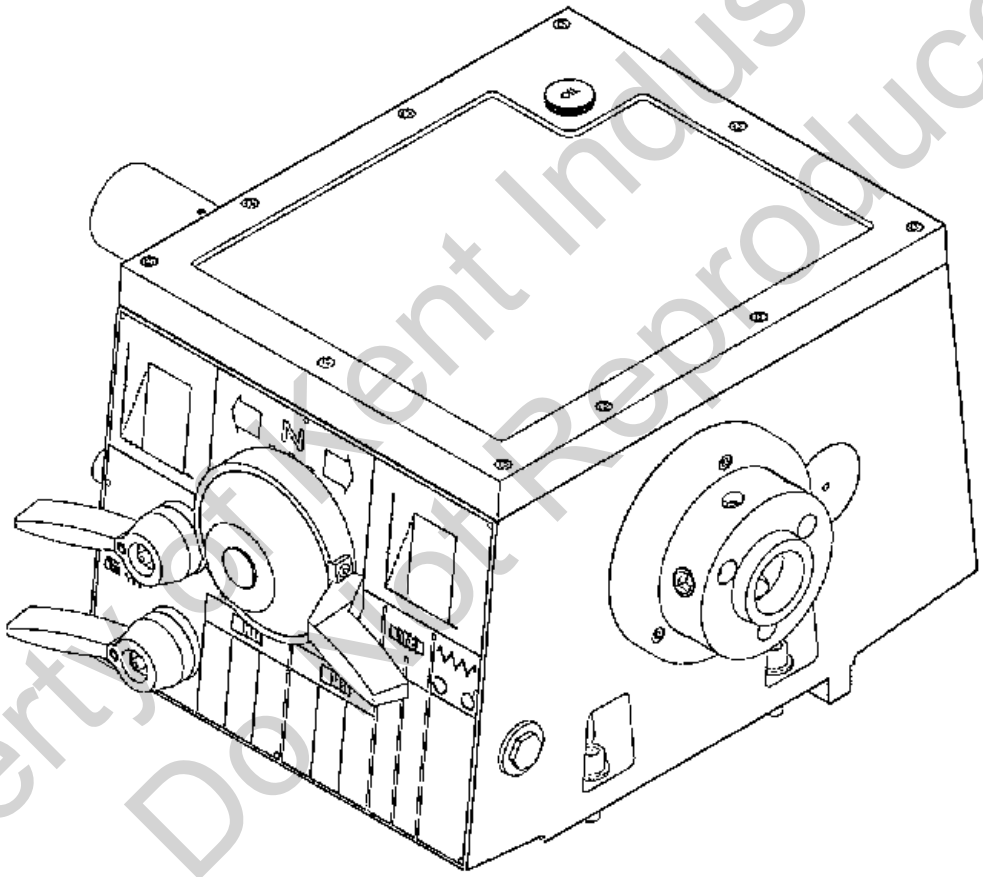
- HEADSTOCK ASSEMBLY (E.V.S. MODEL)..... A01V/A02V/A03V/A04V/A05V
  PARTS LIST..... A06V/A07V
- GEARBOX ASSEMBLY..... B01/B02/B03
  PARTS LIST..... B04/B05
- APRON(L.H) ASSEMBLY..... C01/C02
  PARTS LIST..... C03/C04
- DIAL INDICATOR ASSEMBLY..... D01
  METRIC (LEADSCREW PITCH 6)..... D02
  IMPERIAL (LEADSCREW 4 T.P.I.)..... D03
  PARTS LIST..... D04
- 4 WAY TOOL POST..... E01/E02/E03
  PARTS LIST..... E04
- SADDLES ASSEMBLY..... F01/F02/F03
  PARTS LIST..... F04/F05
- BED & SHAFTS ASSEMBLY..... G01/G02
  PARTS LIST..... G03
- END GEAR ASSEMBLY..... H01V
  METRIC (LEADSCREW PITCH 6) FOR 1330/1340..... H02V
  IMPERIAL (LEADSCREW 4 T.P.I.) FOR 1330/1340..... H03V
- MAIN MOTOR ASSEMBLY
  (E.V.S. MODEL & FRONT MOVEABLE CHIP TRAY)..... I01V/I02V
  PARTS LIST..... I03V
- CABINET AND PANEL
  (E.V.S. MODEL & FRONT MOVEABLE CHIP TRAY)..... J01V/J02V
  PARTS LIST..... J03V
- CONVENTIONAL TAILSTOCK ASSEMBLY..... K01/K02
  PARTS LIST..... K03
- 5C COLLET CLOSER ATTACHMENT
  (E.V.S. MODEL)..... L01V/L02V
  PARTS LIST..... L03V
- TAPER ATTACHMENT..... M01/M02
  PARTS LIST..... M03

CHAPTER 5 SPARE PARTS (ILLUSTRATED)

- BED STOP N01/N02
  - PARTS LIST N03
- BED STOP
  - MICROMETER BEDSTOP O01/O02
  - PARTS LIST O03
- STATIONERY STEADY P01/P02
  - PARTS LIST P03
- TRAVELLING STEADY Q01/Q02
  - PARTS LIST Q03
- CHIP COVER R01/R02
  - PARTS LIST R03

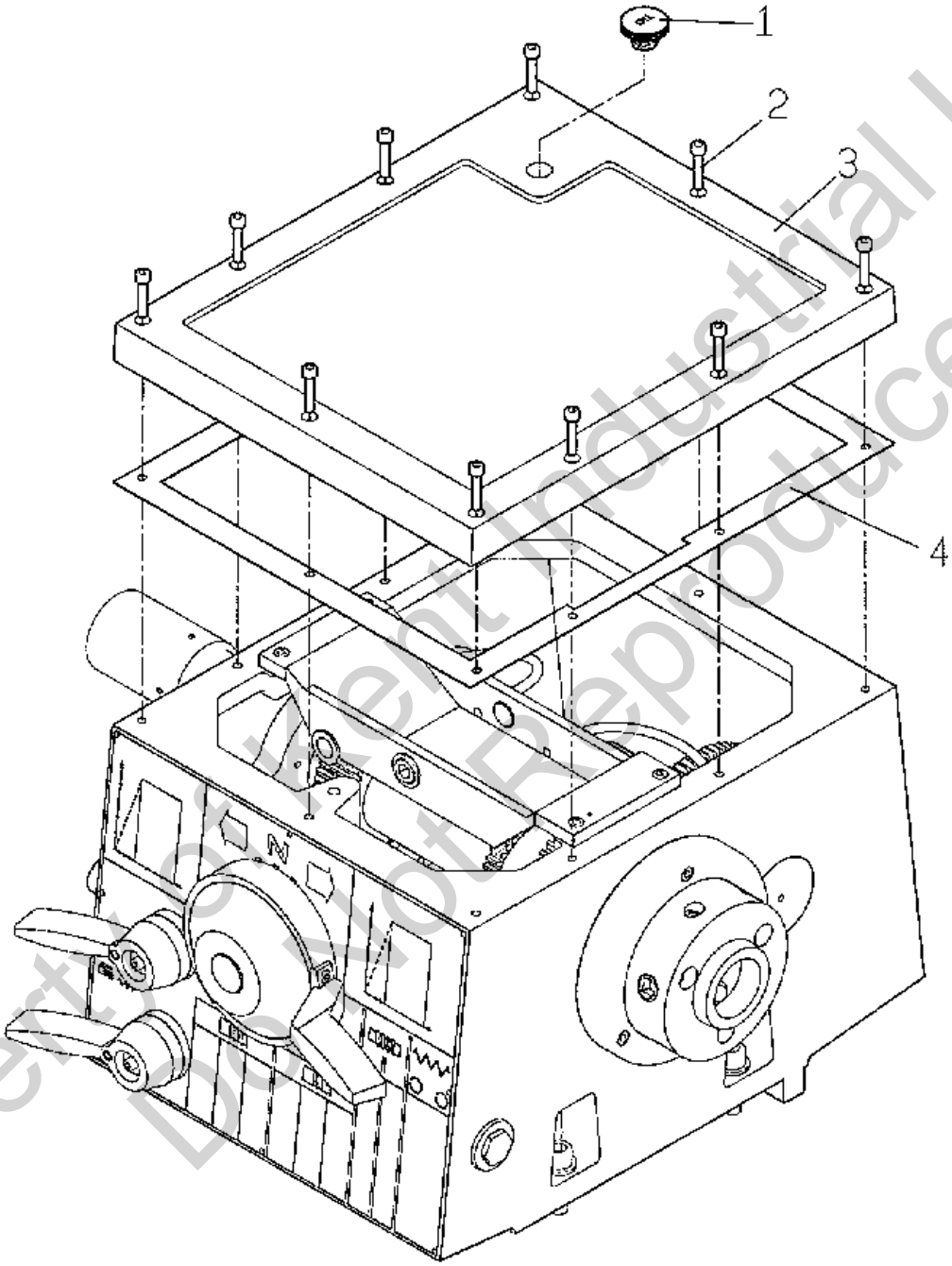
HEADSTOCK ASSEMBLY

(E.V.S. MODEL)



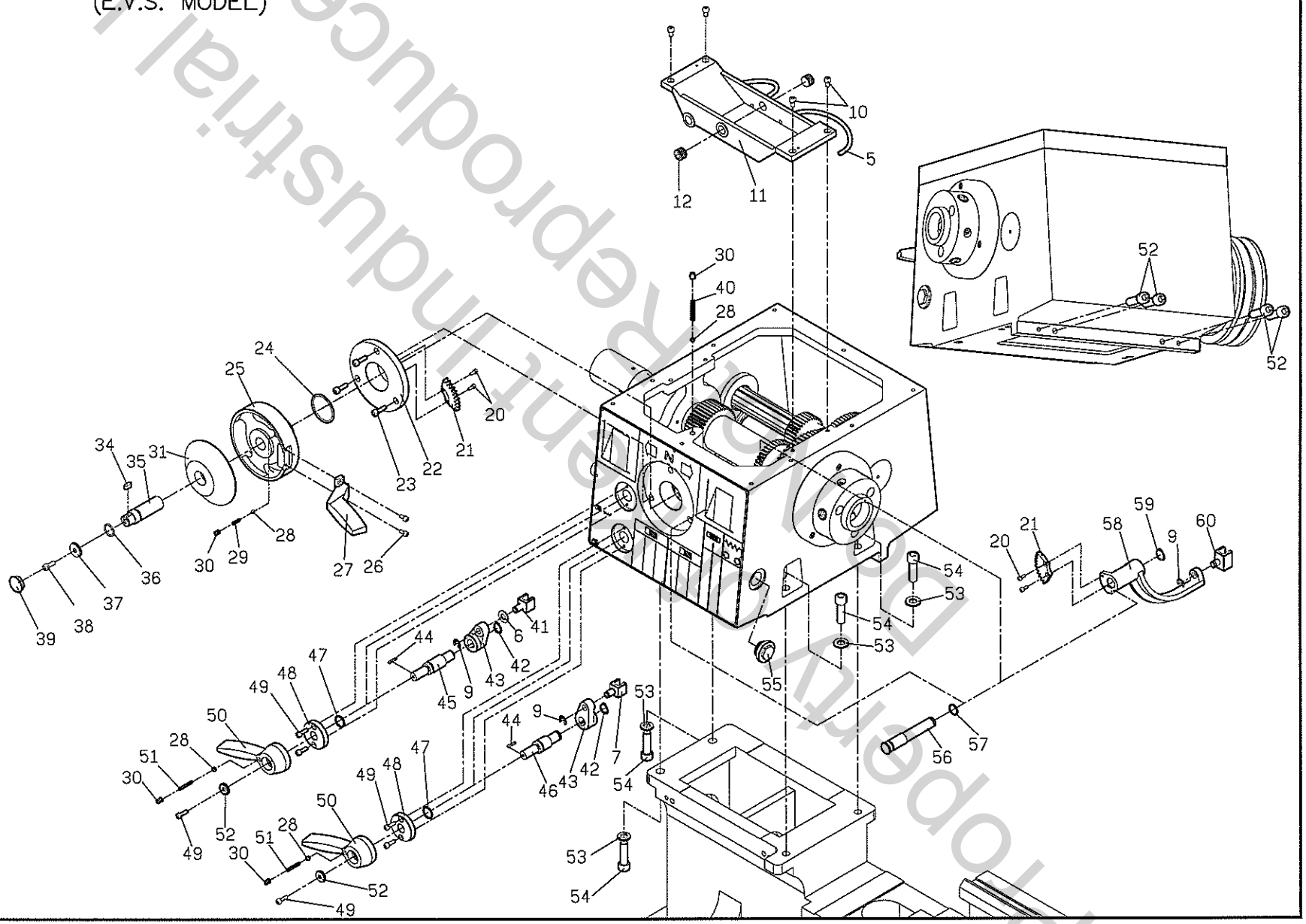
HEADSTOCK ASSEMBLY 1

(E.V.S. MODEL)



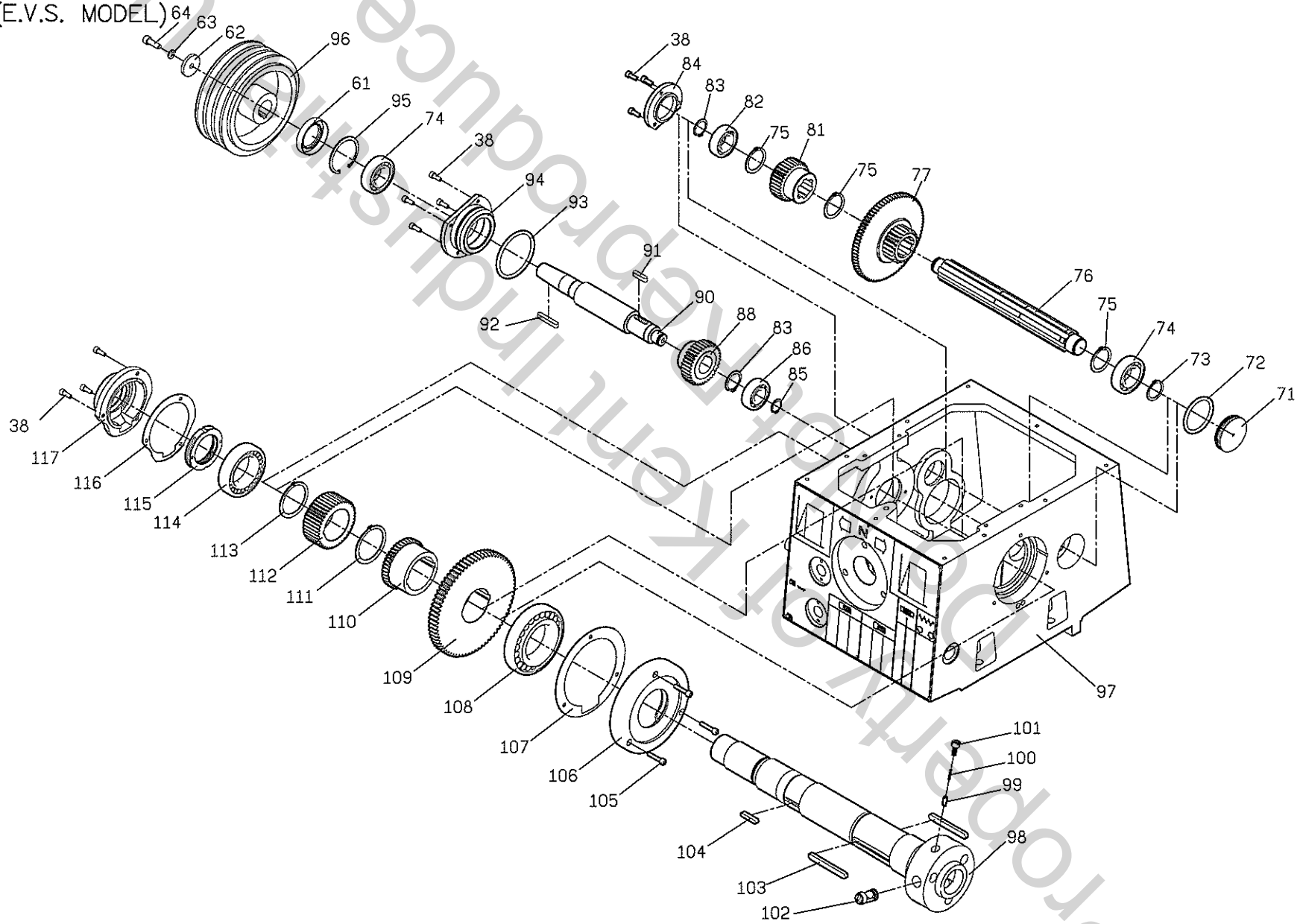
HEADSTOCK ASSEMBLY 2

(E.V.S. MODEL)



HEADSTOCK ASSEMBLY 3

(E.V.S. MODEL)



HEADSTOCK ASSEMBLY 4

(E.V.S. MODEL)

HEADSTOCK ASSEMBLY

(E.V.S. MODEL)

KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK
1		Oil Cover	1	3/4"
2		Hex. socket head bolt	10	CAP 6x40
3	10057	Head stock cover	1	主軸箱蓋
4	10057-P	Packing	1	石棉墊
5		Tube	1	銅管 ϕ 6x270
6		Washer	1	M10
7	20018	Fork	1	撥塊
9		Clip	3	E8 扣環
10		Hex. socket head bolt	7	CAP 6x10
11	20001	Lever frame	1	搖臂支架
12		Set screw	2	PT3/8
20		Hex. socket head bolt	4	CAP 4x10
21	20023	Gear	2	40T 齒輪
22	20002	Housing	1	固定體
23		Hex. socket head bolt	3	CAP6x20
24		"O" ring	2	P44 O形環
25	20003	Range selector	1	目轉盤
26		Hex. socket head bolt	2	CAP 5x10
27	20028	Handle	1	手柄
28		Steel ball	4	ϕ 1/4"
29	20052	Spring	1	彈簧
30		Set screw	6	SET 8x8
31	20004-V	Speed selector	1	速度選擇器
33		Rivet	8	ϕ 2
34		Key	1	6x6x14 鍵
35	20008	Shaft	1	F軸
36		"O" ring	1	P18 O形環
37	20024	Washer	1	墊圈
38		Hex. socket head bolt	16	CAP 6x16
39	40071	Plug	1	蓋子
40	RML-20028	Spring	1	彈簧
41	RML-20044	Fork	1	撥塊
42		Clip	2	S15 扣環

KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK
43	20029	Lever	2	搖臂
44		Key	2	3x3x18 鍵
45	20009	Shaft	1	心軸
46	20005	Shaft	1	心軸
47		"O" ring	2	P16 O形環
48	20017	Collars	2	軸座
49		Hex. socket head bolt	6	CAP 5x15
50	20021	Handle	2	把手
51	RML-20022	Spring	2	彈簧
52	20026	Washer	2	墊圈
53		Spring washer	4	M12彈簧墊圈
54		Hex. socket head bolt	4	M12x40
55		Oil sight	1	3/4"
56	20022	Shaft	1	G軸
57		"O" ring	1	P14 O形環
58	20020	Dever	1	大叉臂
59		Clip	1	S16 扣環
60	20016	Fork	1	撥塊
61		Oil seal	1	油封30x62x12
62	10032	Washer	1	墊圈
63		Spring washer	1	M8彈簧墊圈
64		Hex. socket head bolt	1	CAP 8x25
71	10023	Plug	1	端塞
72		"O" ring	1	P55 O形環
73		Clip	1	S30 扣環
74		Ball bearing	2	6206培林
75		Clip	3	S38扣環
76	10013	Driving shaft	1	B軸
77	10019	Gear(22T)	1	Assembly for replacement
		Key(10x8x20L)	2	
	10020	Gear(76T)	1	
		Clip(S50)	1	

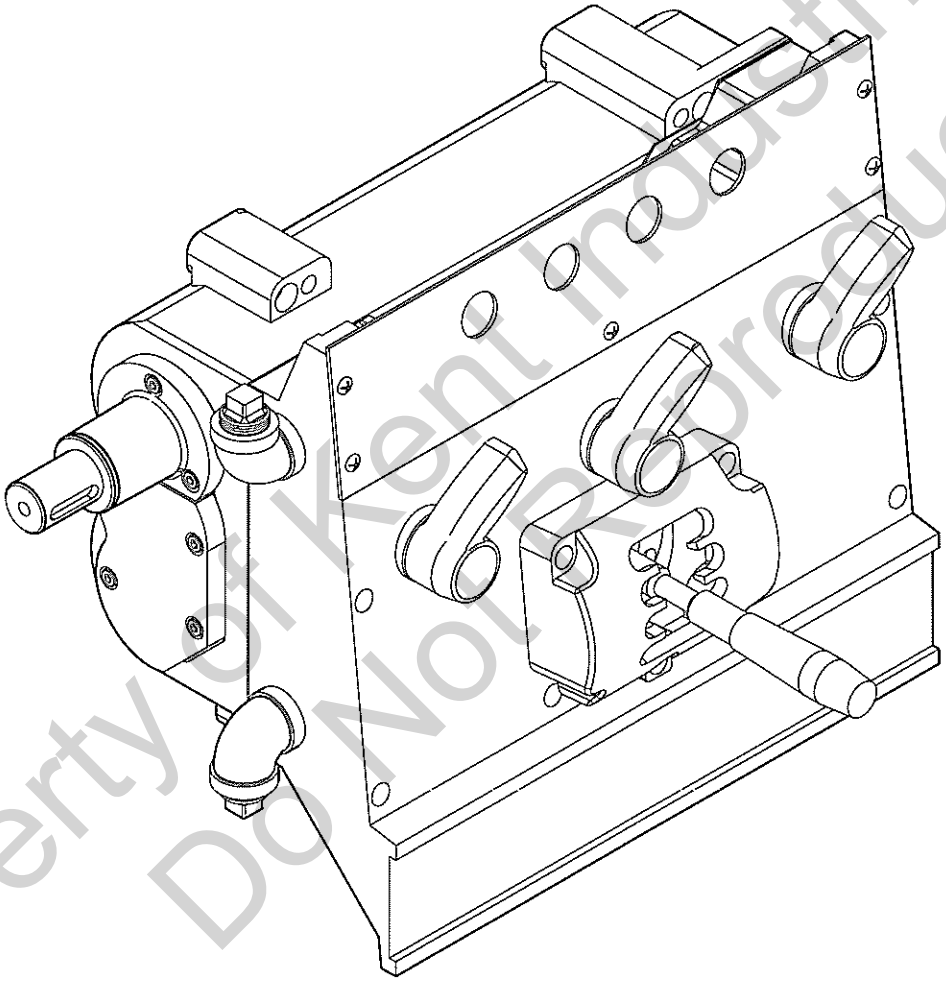
HEADSTOCK ASSEMBLY

(E.V.S. MODEL)

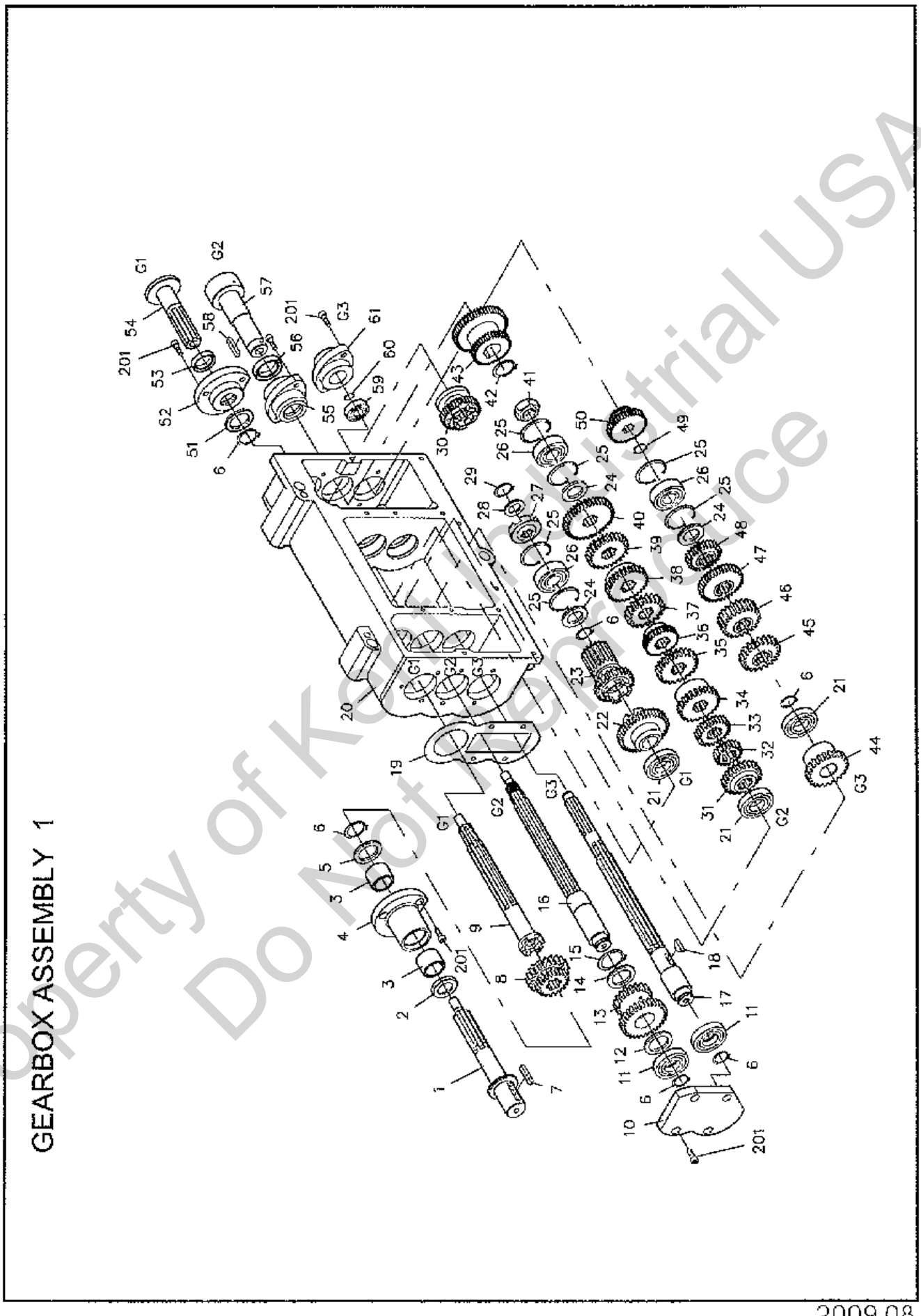
KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK
81	10017-V	Gear	1	33T 齒輪
82		Ball bearing	1	6205 培林
83		Clip	4	S25 扣環
84	10022	Cover	1	端蓋
85		Clip	2	S20 扣環
86		Ball bearing	1	6304 培林
88	10028	Gear	1	38T齒輪
90	10025	Gear Shaft	1	16T A軸
91		Key	1	7x7x104 鍵
92		Key	1	7x7x53 鍵
93		"O" ring	1	P75 O形環
94	10024	Flange bearing	1	承軸殼
95		Clip	1	R62 扣環
96	10031-V	Pulley	1	V型皮帶輪
97	10001	Head stock	1	主軸箱
98	10002	Spindle	1	主軸
99	10003	Plunger	3	固定銷
100	10005	Cam spring	3	壓縮彈簧
101		Hex. socket head bolt	3	5/16"x18x16mm
102	10004	Cams	3	偏心鎖緊銷
103		Key	2	10x6x45 鍵
104		Key	1	7x7x35 鍵
105		Hex. socket head bolt	3	CAP 6x30
106	10007	Front bearing cover	1	前蓋
107	10007-P	Packing F	1	石棉墊
108		Ball bearing	1	30213 培林
109	10008	Gear	1	72T 齒輪
110	10009	Gear	1	41T 齒輪
111		Clip	1	S60 扣環
112	10010	Gear	1	42T 齒輪
113		Clip	1	S56 扣環
114		Ball bearing	1	32011 培林
115	10011	Nut	1	螺帽
116	10012-P	Packing O	1	石棉墊
117	10012	Outside cover	1	後蓋

KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK
121	10077-V	Minor tip	1	檢出端柱
122	10074-V	Balance ring	1	固定環
123		Set screw	1	M10x10L
124		Spring pin	1	Ø3x15L
125	10068	Extend collar	1	軸環
126	RML-10038	Washer	2	墊圈
127		Key(6x6x16L)	1	Assembly for replacement
	10049	Gear(21T)	1	
	10050	Gear(42T)	1	
		Clip(S35)	1	
130		"O" ring	3	P21 扣環
131	10034	Shaft	1	D心軸
132	10039	Washer	3	墊圈
133		Clip(S35)	1	Assembly for replacement
	10048	Gear(21T)	1	
		Key(6x6x15L)	1	
	10047	Gear(42T)	1	
136	10036	Washer	3	墊圈
137	10035	Shaft	1	E心軸
138	RML-10046	Gear	1	21T
139	10033	Shaft	1	F心軸
141	RML-10051	Gear	1	21T齒輪
142	10037	Washer	2	止推圈
143		Needle bearing	2	RNA-6904 培林
144	10041	Flange bearing	1	軸承套
145	RML-10040	Shaft	1	G心軸
147		Oil seal	1	油封28x44x07
148		Square head plug	1	1/2"
149	61001-V	Name plate	1	

GEARBOX ASSEMBLY (For ERL-13")

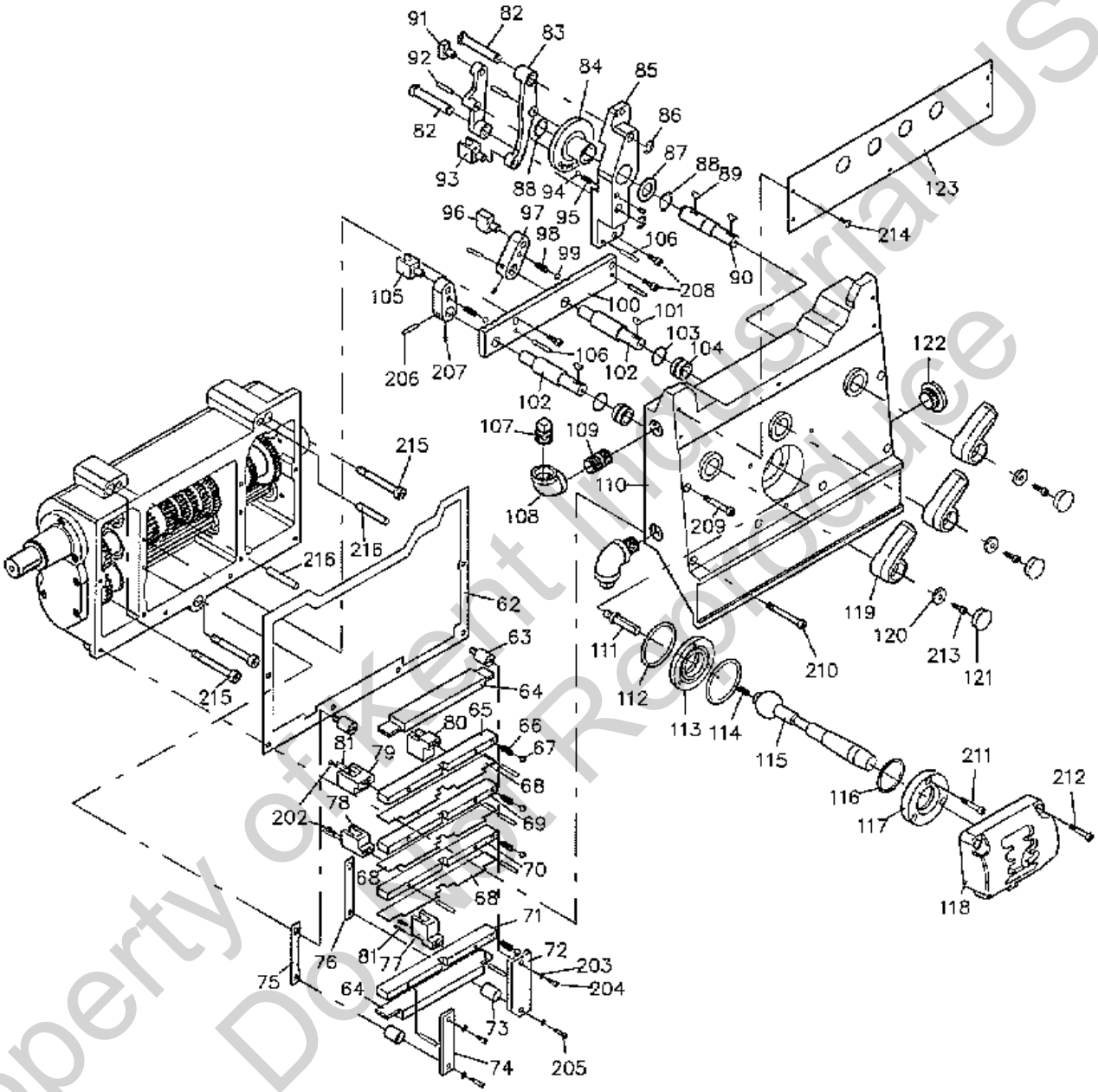


GEARBOX ASSEMBLY 1



2009.08

GEARBOX ASSEMBLY 2 (For ERL-13")



GEARBOX ASSEMBLY

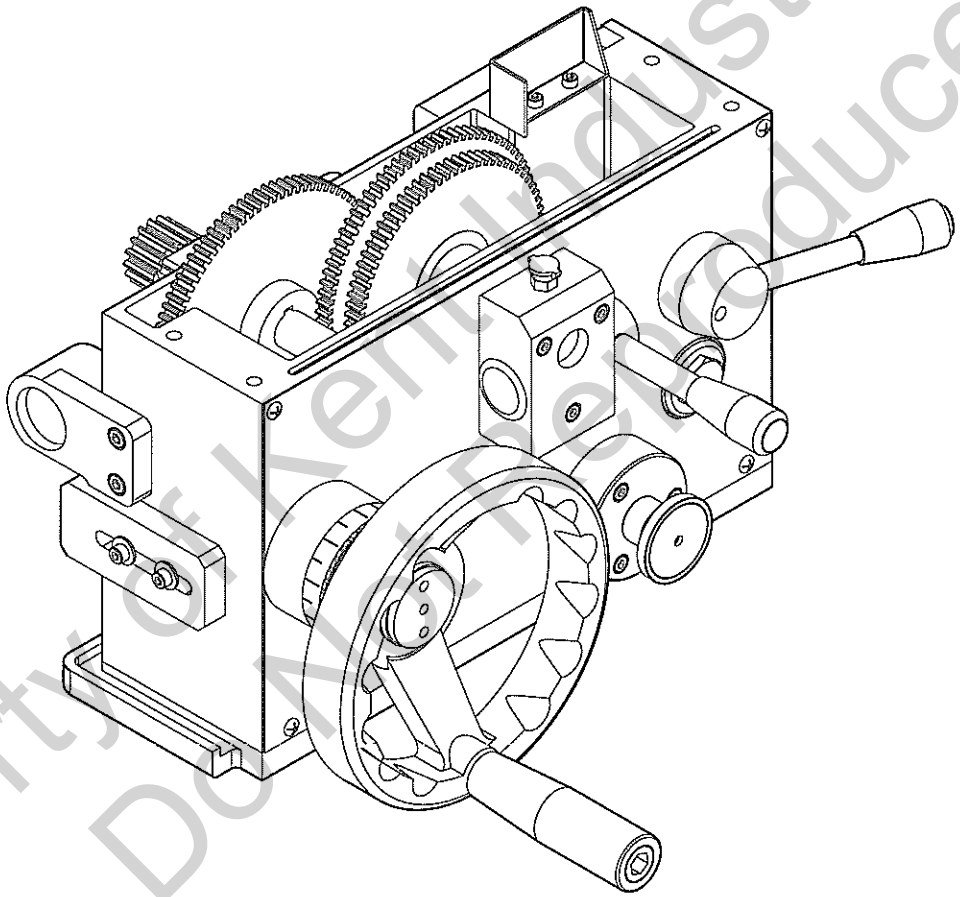
KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK	KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK
1	30003	Shaft	1		38	30029	Gear	1	28T
2		Oil seal	1	20x32x05	39	30030	Gear	1	26T
3		Bearing	2	TAF202820	40	30031	Gear	1	38T
4	30005	Flanged bearing	1		41	30032	Nut	1	
5	30016	Washer	1		42		Clip	1	S22
6		Clip	5	S20	43	30034	Gear	1	36T/50T
7		Key	1	7x7x35	44	30037	Gear	1	22T
8	30007	Gear	1	19T/20T	45	30038	Gear	1	22T
9	30008	Shaft	1		46	30039	Gear	1	22T
10	30018	Cover	1		47	30040	Gear	1	33T
11		Bearing	3	16004	48	30041	Gear	1	22T
12	30006	Washer	1		49		Clip	1	S17
13	30020	Gear	1	19T/30T	50	30042	Gear	1	20T/36T
14	30021	Washer	1		51	30016	washer	1	
15		Clip	1	S25	52	30017	Flanged bearing	1	
16	30019	Shaft	1		53		Oil seal	1	20x32x05
17	30036	Shaft	1		54	30014	Shaft	1	
18		Woodruff key	1	5xψ19	55	30035	Flanged bearing	1	
19	30018-P	Oil seal	1		56		Oil seal	1	24x35x08
20	30001	Gearbox body	1		57	30033	Shaft	1	
21		Bearing	3	16004	58		Key	1	5x5x35
22	30009	Gear	1	38T	59		Bearing	1	6001
23	30010	Gear	1	23T/19T	60		Clip	1	S12
24	30011	Washer	1		61	30043	Flanged bearing	1	
25		Clip	6	R40	62	30002-P	Seal	1	
26		Bearing	3	6203	63	30084	Partition nut	2	
27	30012	Clutch	1		64	30077	Upper plate	2	
28	30013	Washer	1		65	30082	Fort support	1	
29		Clip	1	S16	66	30070	Spring	4	ϕ 4x19
30	30015	Gear	1	35T	67		Steel ball	3	1/4"
31	30022	Gear	1	22T	68	30079	Partition	3	
32	30023	Gear	1	19T	69	30080	Fort support	1	
33	30024	Gear	1	20T	70	30078	Fort support	1	
34	30025	Gear	1	24T	71	30081	Fort support	1	
35	30026	Gear	1	23T	72	30087	Reverse-stop	1	
36	30027	Gear	1	27T	73	30085	Spacer	2	
37	30028	Gear	1	24T	74	30086	Shoulder plate	1	

GEARBOX ASSEMBLY

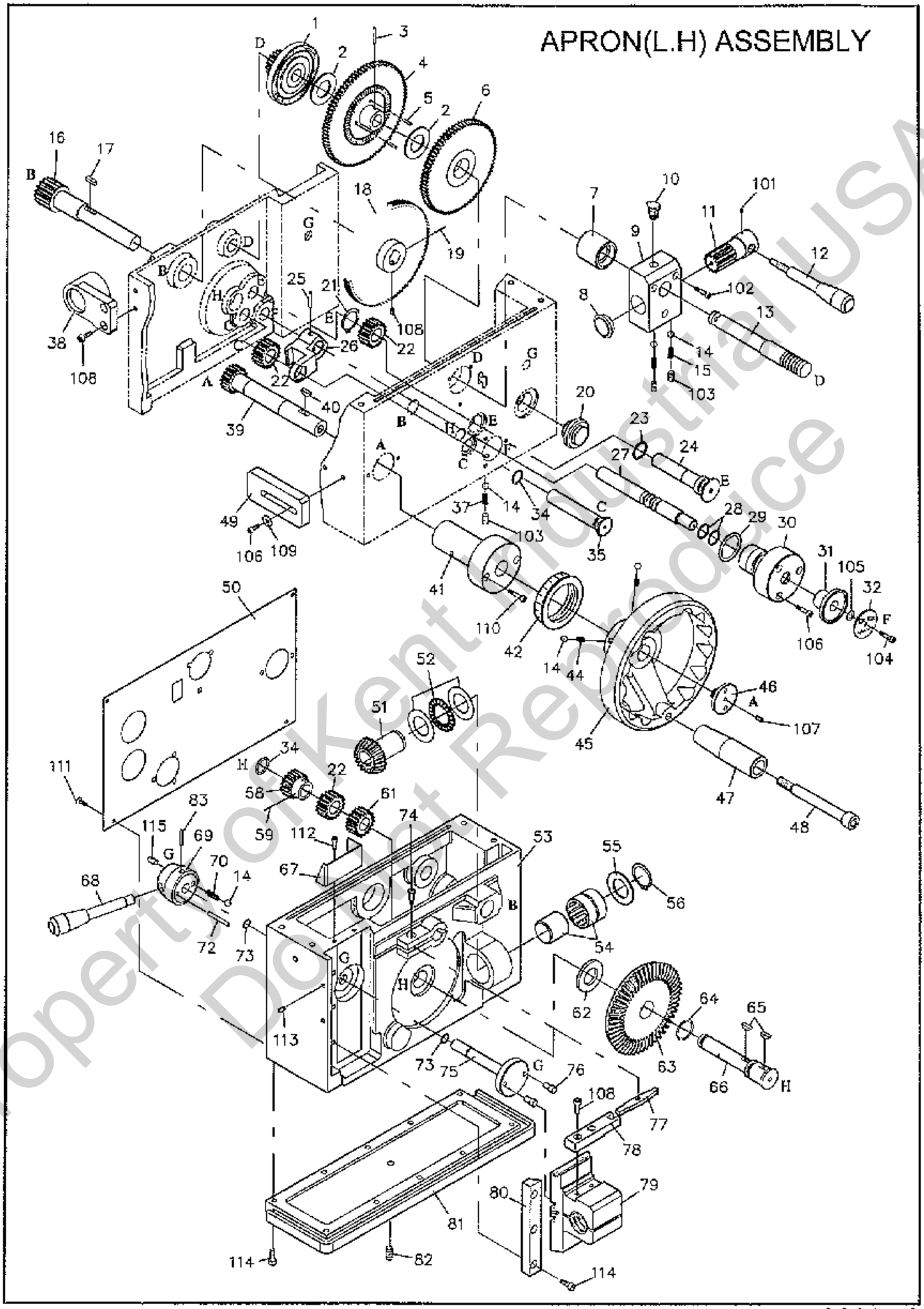
KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK
75	30100	Fixed plate A	1	
76	30083	Fixed plate B	1	
77	30053	Fork	1	
78	30055	Fork	1	
79	30054	Fork	1	
80	30053	Fork	1	
81		Spring pin	8	ϕ 3x16
82	30061	Shaft	1	
83	30065	Arm	1	
84	30060	Cam	1	
85	30059	Support seat	1	
86		Clip	2	E8
87	30058	Washer	1	
88		Clip	2	S17
89		Woodruff key	2	4xψ13
90	30057	Shaft	1	
91	30047	Pad	1	
92	30062	Pin	2	ϕ 5
93	30063	Fork	1	
94		Steel ball	1	1/4"
95	30049	Spring	1	ϕ 4x19
96	30046	Pad	1	
97	30048	Lever	1	
98	30099	Spring	2	ϕ 6x13
99		Steel ball	2	1/4"
100	30052	Selector bar	1	
101		Woodruff key	2	4xψ13
102	30050	Shaft	2	
103		O-ring	2	P18
104	30051	Bush	2	
105	30045	Fork	1	
106		Spring pin	12	ϕ 5x16
107		Square head plug	1	1/2"
108		Elbow	1	1/2"
109		Nipple	1	1/2"x1"
110	30002-A	Gearbox cover	1	

KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK
111	30088	Selector lever	1	
112		O-ring	2	G40
113	30066	Selector lever support	1	
114	30069	Spring	1	ϕ 9x38
115	30068	Selector lever	1	
116		O-ring	1	G30
117	30067	Selector lever cover	1	
118	30076	Specifying base	1	
119	30071	Handle	3	
120	30072	Washer	3	
121	30073	Plug	3	
122		Oil sight	1	
123	61022	Switch plate	1	
201		Hex. socket head bolt	14	M6x12L
202		Hex. socket head bolt	4	M5x20L
203		Spring washer	4	M6
204		Hex. socket head bolt	2	M6x12L
205		Hex. socket head bolt	2	M6x35L
206		Spring pin	2	ϕ 4x24
207		Set screw	2	M6x8L
208		Hex. socket head bolt	4	M6x20L
209		Hex. socket head bolt	6	M6x70L
211		Hex. socket head bolt	3	M5x25L
212		Hex. socket head bolt	3	M6x12L
213		Hex. socket head bolt	3	M5x12L
214		Dome cross screw	5	M4x6L
215		Hex. socket head bolt	4	M8x65L
216		Taper pin	2	#7x3 1/4"L

APRON(L.H) ASSEMBLY



APRON(L.H) ASSEMBLY



2009.03

APPRON(L.H) ASSEMBLY

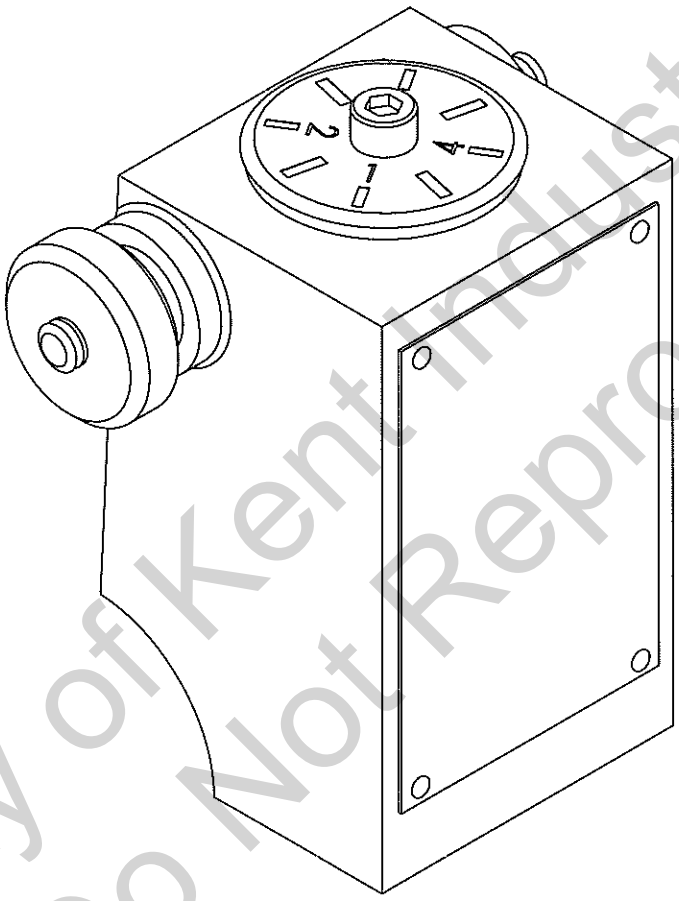
KEY NO.	PARTS NO.	PARTS NAME	QTY	REMARK
1	40014	Gear	1	18T/60T
2		Washer	2	AS3047
3		Spring pin	1	ϕ 4x22
4	40015	Gear	1	81T/60T
5		Pin	3	ϕ 4x17
6	40017	Gear	1	72T/60T
7	40060	Collar	1	
8	40071	Plug	1	
9	40023	Gear bracket	1	
10		Oil cap	1	
11	40019	Cam shaft	1	
12	40020	Handle	1	
13	40018	Shaft	1	
14		Stell ball	7	1/4"
15	40016	Spring	2	ϕ 6x13
16	40013	Gear shaft	1	16T
17		Key	1	5x5x18
18	40012-M	Gear	1	82T(for Metric)
	40012-I			81T(for Imperial)
19		Spring pin	1	ϕ 5x36
20		Oil sight	1	
21		Clip	1	S16
22	40067	Gear	3	18T
23		O-ring	2	P18
24	40068	Shaft	1	
25		Spring pin	1	ϕ 4x24
26	40063-L	Fork(L.H)	1	
	40073-R	Fork(R.H)		
27	40062	Shaft	1	
28		O-ring	2	P16
29		O-ring	1	P26
30	40061	Shaft liner	1	
31	40076	Knob	1	
32	40025-L	Plate(L.H)	1	
	40024-R	Plate(R.H)		
34		O-ring	2	P12
35	40064	Shaft	1	

KEY NO.	PARTS NO.	PARTS NAME	QTY	REMARK
37		Spring	1	ϕ 4x19
38	50015	Bracket	1	
39	40003	Gear shaft	1	18T
40		Woodruff key	1	19x ϕ 5
41	40004-M	Shaft liner	1	for Metric
	40004-I			for Imperial
42	40005-M	Index ring	1	for Metric
	40005-I			for Imperial
44	40016	Spring	3	
45	40007	Handle wheel	1	
46	40011	Plug	1	
47	40009	Handle	1	
48	40017	Screw	1	
49	40078	Safety plate	1	
50	40077	Plate	1	
51	40034	Bevel gear	1	23T
52		Thrust bearing	1	NTB/AS-2542
53	40001-L	Apron(L.H)	1	
	40001-R	Apron(R.H)		
54		Bearing	1	NK29/30
55	40032	Washer	1	
56		Clip	1	S25
58	40066	Gear	1	18T
59		Spring pin	1	ϕ 5x22
61	40065	Gear	1	18T
62	40035	Washer	1	
63	40033	Bevel gear	1	64T
65		Woodruff key	2	4x ϕ 13
66	40031	Shaft	1	
67	49001-L	Oil fence	1	
68	40037	Handle	1	
69	40038	Hub	1	
70		Spring	1	ϕ 6x27

APPRON(L.H) ASSEMBLY

KEY NO.	PARTS NO.	PARTS NAME	QTY	REMARK	KEY NO.	PARTS NO.	PARTS NAME	QTY	REMARK
72		Spring pin	1	ϕ 4x24					
73		O-ring	2	P19					
74	40045	Screw	1						
75	40039	Cam shaft	1						
76	40040	Pin	2						
77	40044	Lever	1						
78	40042	Stopper	1						
79	40041-M	Half nut	1	for Metric					
	40041-I	Half nut	1	for Imperial					
80	40043	Gid	1						
81	40046	Base plate	1						
82		Plug	1	1/8"					
83		Spring pin	1	ϕ 4x36					
101		Set screw	1	SET 5x6					
102		Hex. socket head bolt	3	CAP 5x35					
103		Set screw	4	SET 8x8					
104		Dome hexagon screw	1	M5x12					
105		Washer	1	M6					
106		Hex. socket head bolt	5	CAP 6x25					
107		Set screw	1	SET6x25					
108		Hex. socket head bolt	5	CAP 6x16					
109	40077	Washer	2	M6					
110		Hex. socket head bolt	2	CAP 5x25					
111		Dome cross screw	4	M4x6					
112		Hex. socket head bolt	2	CAP 5x8					
113		Set screw	1	SET 6x6					
114		Hex. socket head bolt	13	CAP 5x16					

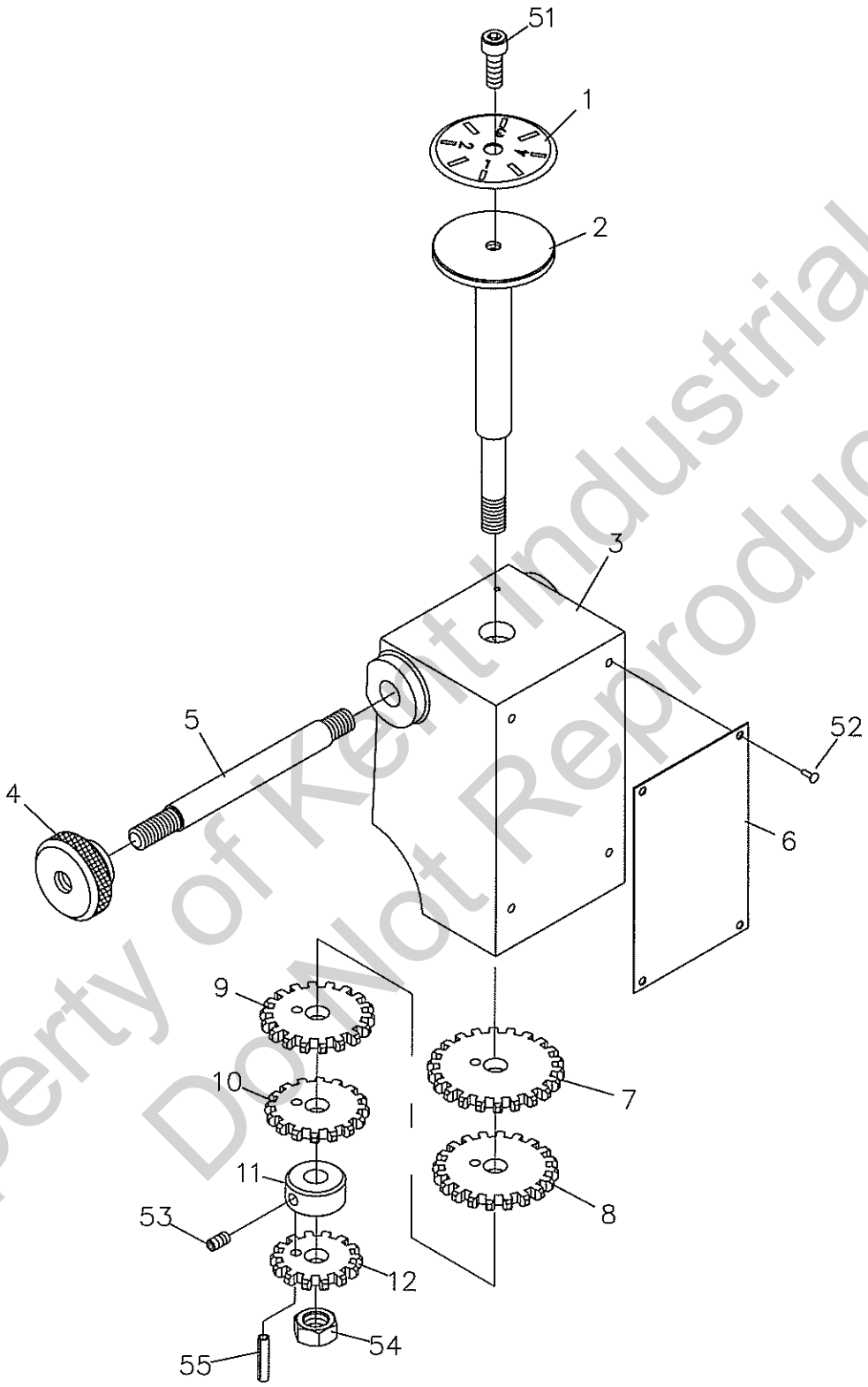
DIAL INDICATOR ASSEMBLY



2009.08

DIAL INDICATOR ASSEMBLY

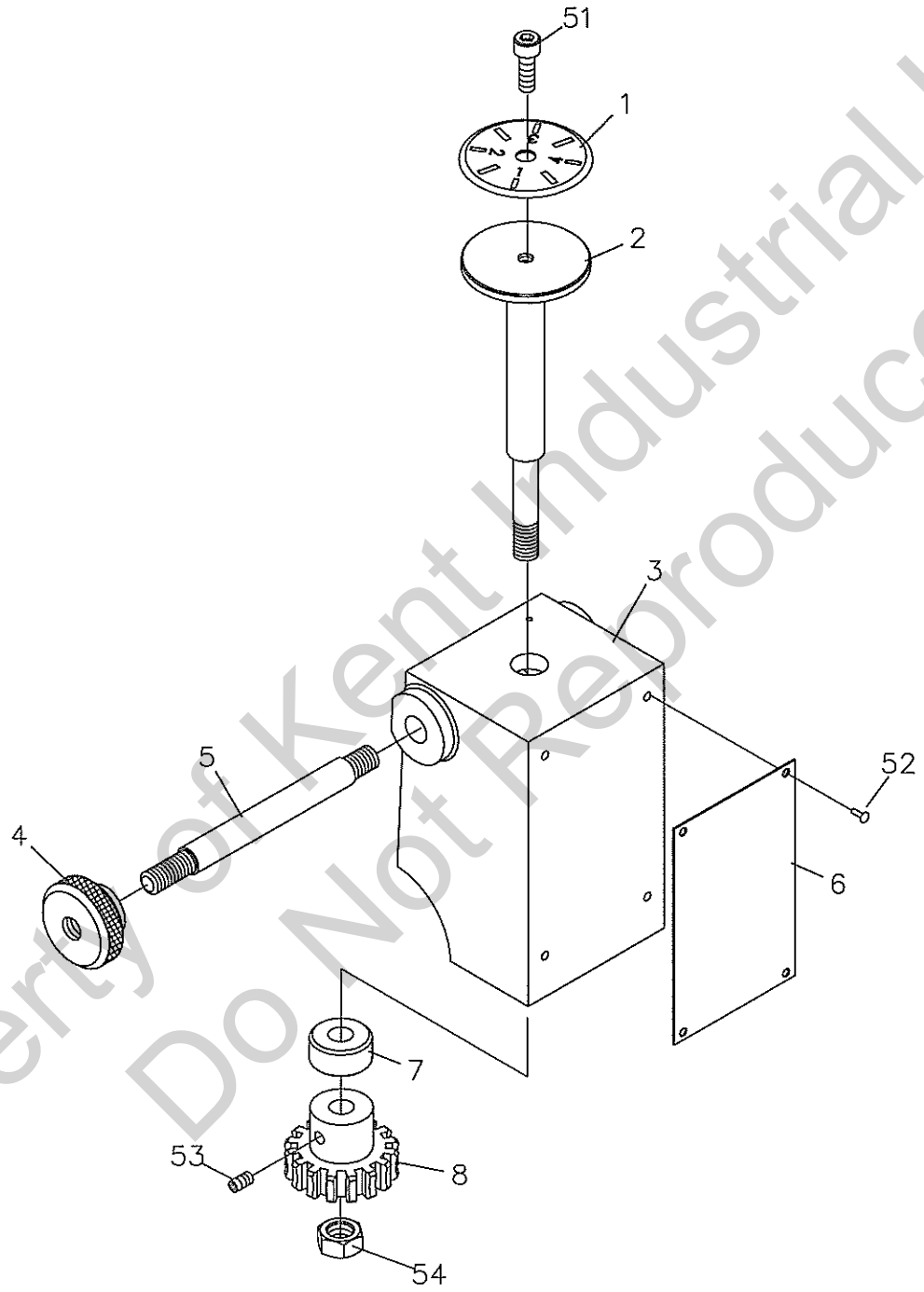
METRIC (LEADSCREW PITCH 6)



2009.08

DIAL INDICATOR ASSEMBLY

IMPERIAL (LEADSCREW 4 T.P.I.)



2009.08

DIAL INDICATOR ASSEMBLY

ERL-13-04

METRIC(LEADSCREW PITCH 6)

KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK
1	40049	Pilot plate	1	
2	40048	Gear pivot	1	
3	40092	Body	1	
4	40094	Nut	1	
5	40052	Stud	1	
6	40074-M	Threading plate	1	for METRIC
7	40058	Gear	1	22T
8	40057	Gear	1	20T
9	40056	Gear	1	18T
10	40055	Gear	1	16T
11	40051	Spacer	1	
12	40054	Gear	1	14T
51		Hex. socket head bolt	1	M6x10L
52		Rivet	4	ϕ2
53		Set screw	1	M6x6L
54		Hexagon nut	1	M8
55		Spring pin	1	Ø3x10L

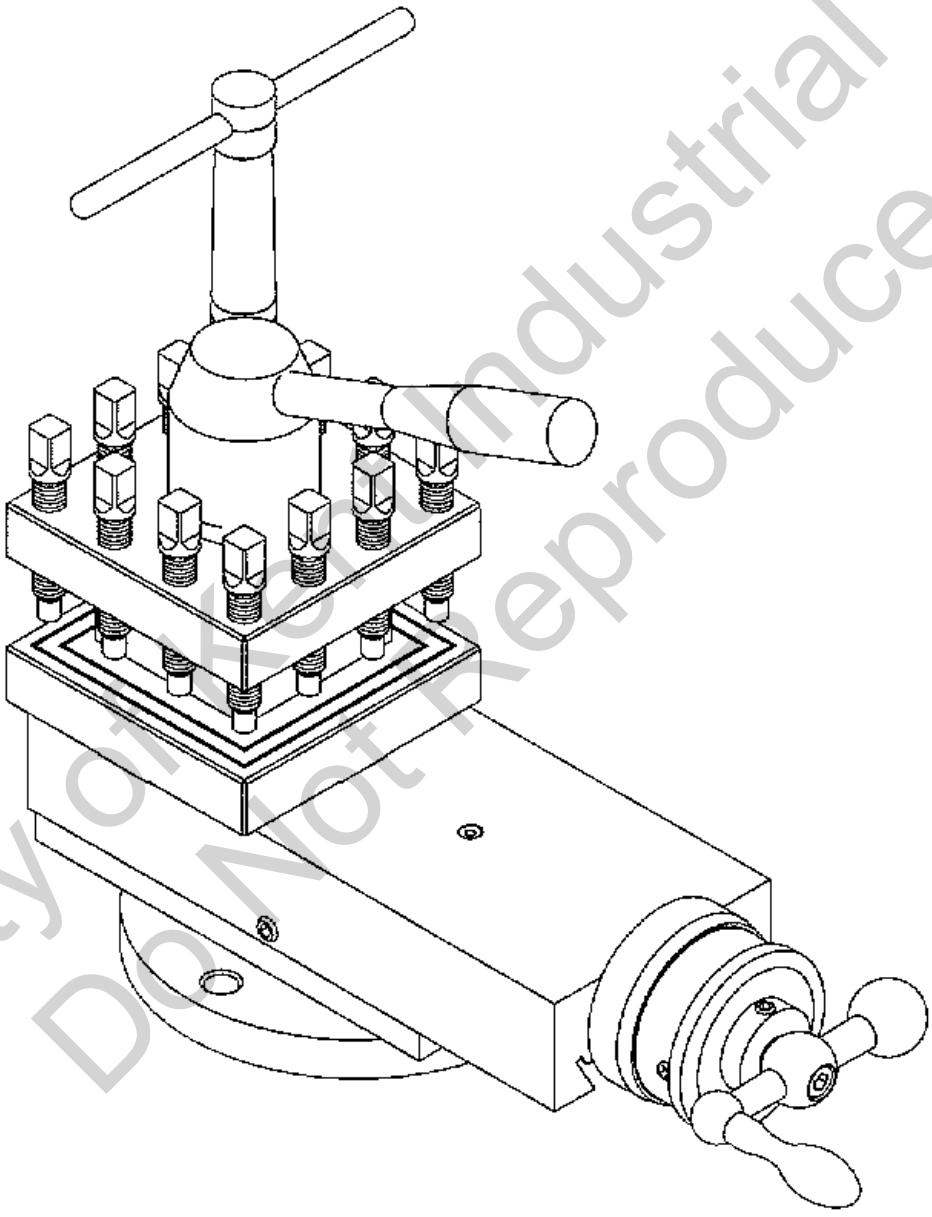
IMPERIAL(LEADSCREW 4 T.P.I.)

Page 1/1

KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK
1	40049	Pilot plate	1	
2	40048	Gear pivot	1	
3	40092	Body	1	
4	40094	Nut	1	
5	40052	Stud	1	
6	40074-I	Threading plate	1	for IMPERIAL
7	40050	Spacer	1	
8	40059	Dial gear	1	16T
51		Hex. socket head bolt	1	M6x10L
52		Rivet	4	
53		Set screw	1	M6x6L
54		Hexagon nut	1	M8

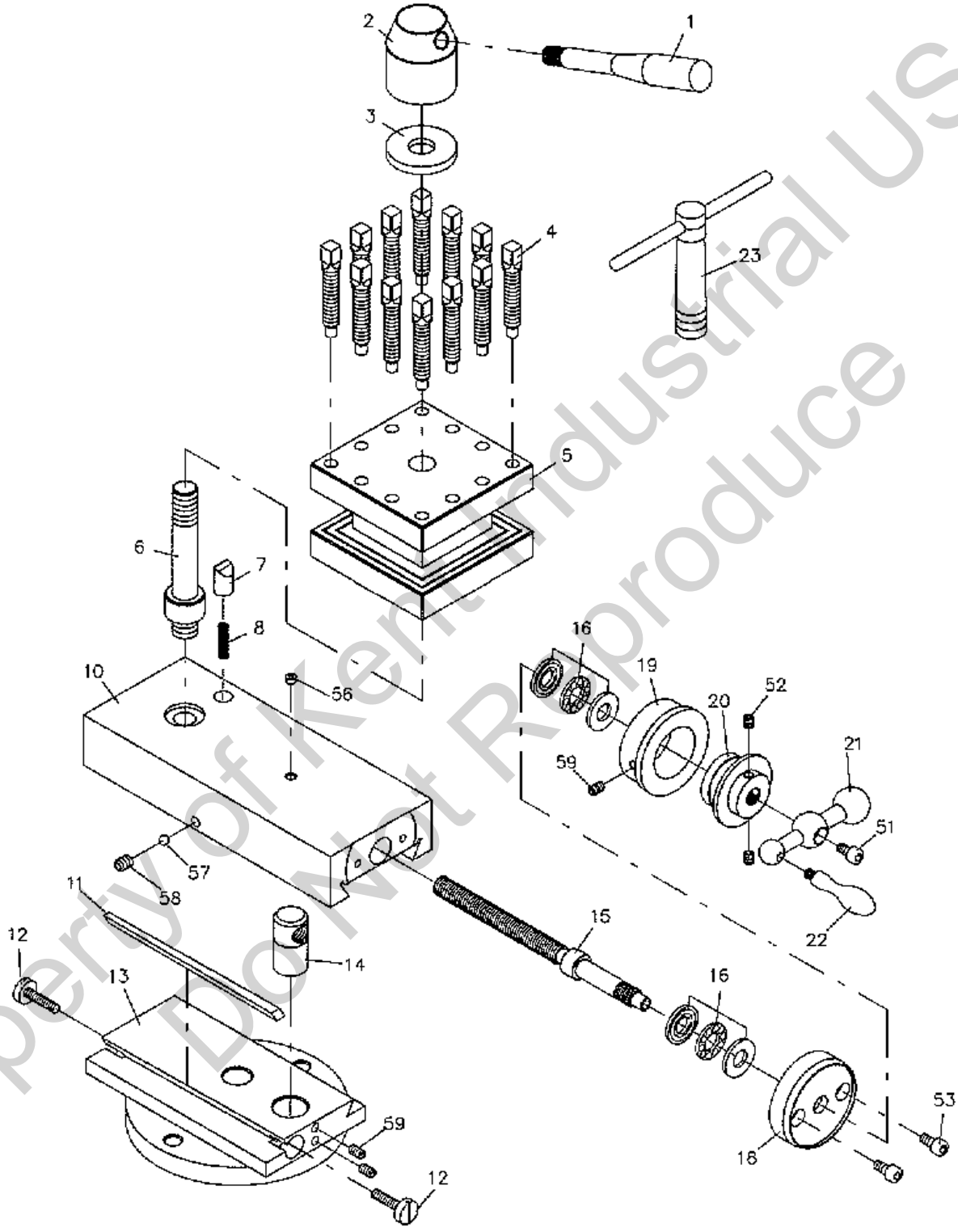
2009.08

4 WAY TOOL POST



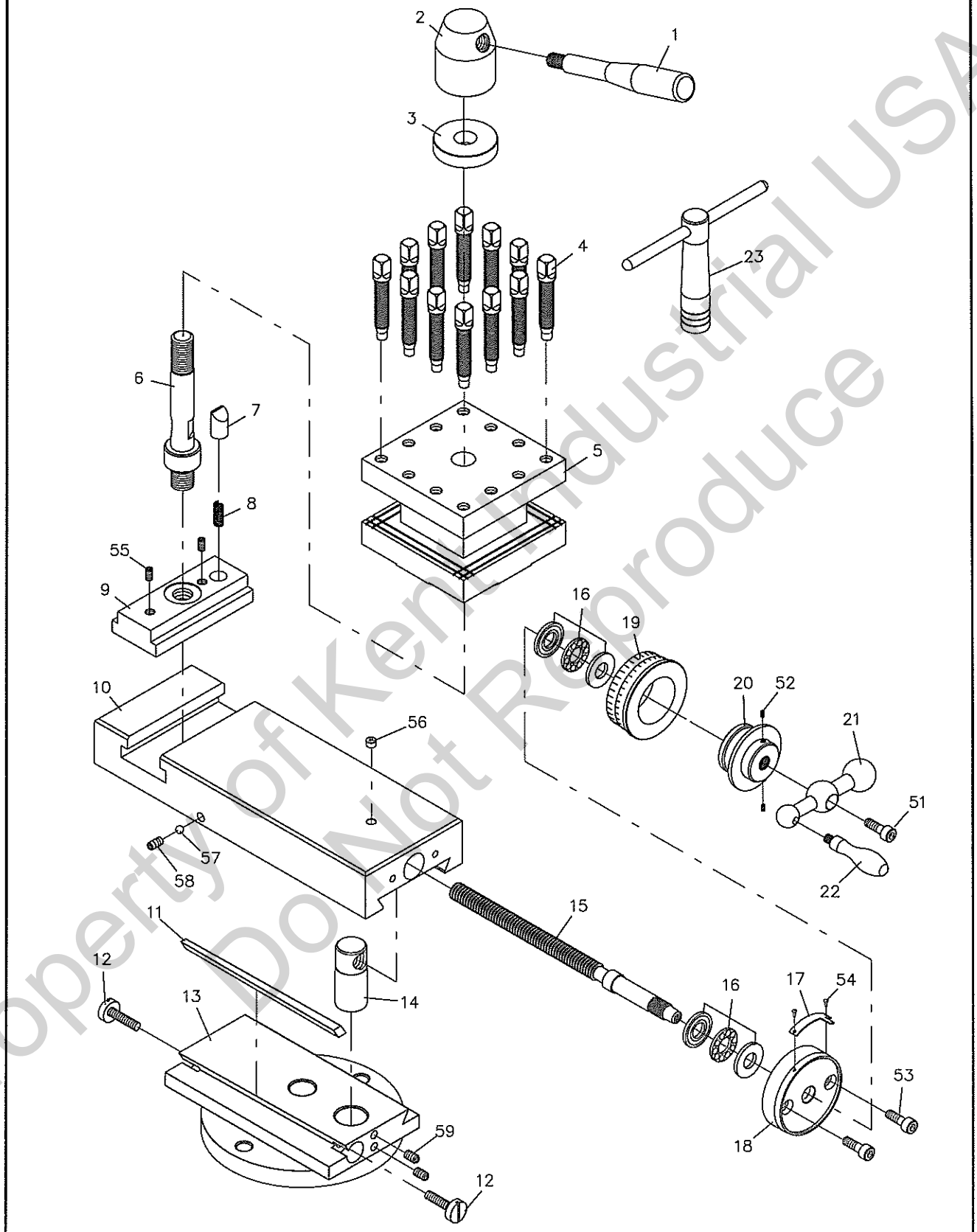
2009.08

4 WAY TOOL POST (METRIC)



2009.08

4 WAY TOOL POST (IMPERIAL)



2009.08

4 Way Tool Post (METRIC)

KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK
1	50067	Handle	1	
2	50066	Turret nut	1	
3	50065	Collar	1	
4	50068	Bolt	12	
5	50060	Turret body	1	
6	50062	Turret shaft	1	
7	50064	Pin	1	
8	50043	Spring	1	Ø6x27
10	50005	Solid topslide	1	
11	50056	Gib	1	
12	50054	Screw	1	
13	14-50004	Swivel slide	1	
14	50038-M	Nut(for METRIC P=2mm)	1	Assembly for
15	50042-M	Screw(for METRIC P=2mm)	1	replacement
16		Trust bearing	2	51101
18	50041	Keep assy	1	
19	50044-M	Dial 100dividing	1	for METRIC
21	50111	Bush	1	
22	50045	Handle wheel	1	
23	50047	Handle	1	
24	50070	T wrench	1	
51		Hex. socket head bolt	1	M6x10L
52		Set screw	2	M6x8L
53		Hex. socket head bolt	2	M6x20L
56		Oil ball	1	1/4"
57		Steel ball	1	1/4"
58		Set screw	1	M8x10L
59		Set screw	3	M6x8L

4 Way Tool Post (IMPERIAL)

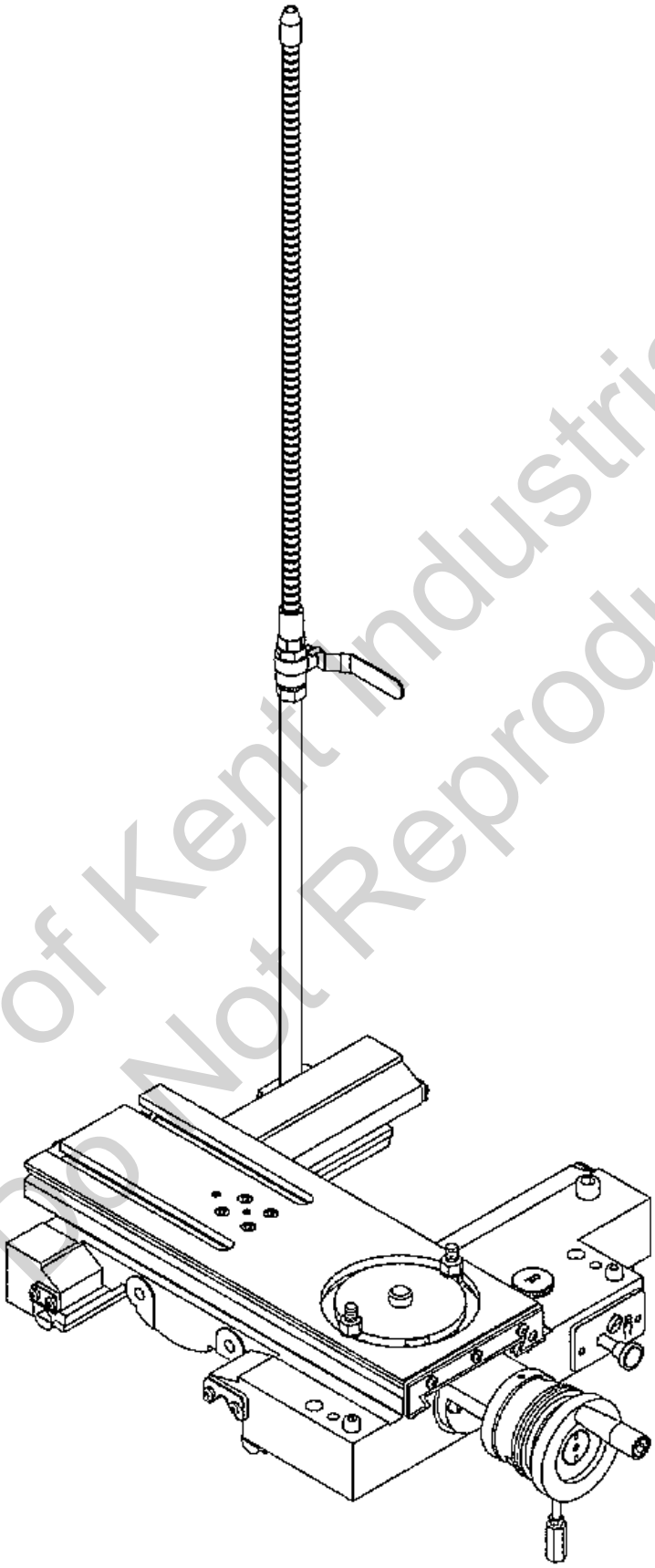
ERL-13-05

Page 1/1

KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK
1	50067	Handle	1	
2	50066	Turret nut	1	
3	50065	Collar	1	
4	50068	Bolt	12	
5	50060	Turret body	1	
6	50062	Turret shaft	1	
7	50064	Pin	1	
8	50043	Spring	1	Ø6x27
9	50061	T Nut	1	
10	50006	Solid topslide	1	
11	50056	Gib	1	
12	50054	Screw	1	
13	14-50004	Swivel slide	1	
14	50038-I	Nut(for INCH P=0.1")	1	Assembly for
15	50042-I	Screwt(for INCH P=0.1")	1	replacement
16		Trust bearing	2	51101
17	50063	Curve pilot	1	
18	50041	Keep assy	1	
19	50044-I	Dual dial 100div/I ,127div/M	1	for INCH
20	50111	Bush	1	
21	50045	Handle wheel	1	
22	50047	Handle	1	
23	50070	T wrench	1	
51		Hex. socket head bolt	1	M6x10L
52		Set screw	2	M6x8L
53		Hex. socket head bolt	2	M6x20L
54		Rivet	2	ϕ 2
55		Set screw	2	M8x12L
56		Oil ball	1	1/4"
57		Steel ball	1	1/4"
58		Set screw	1	M8x10L
59		Set screw	2	M6x8L

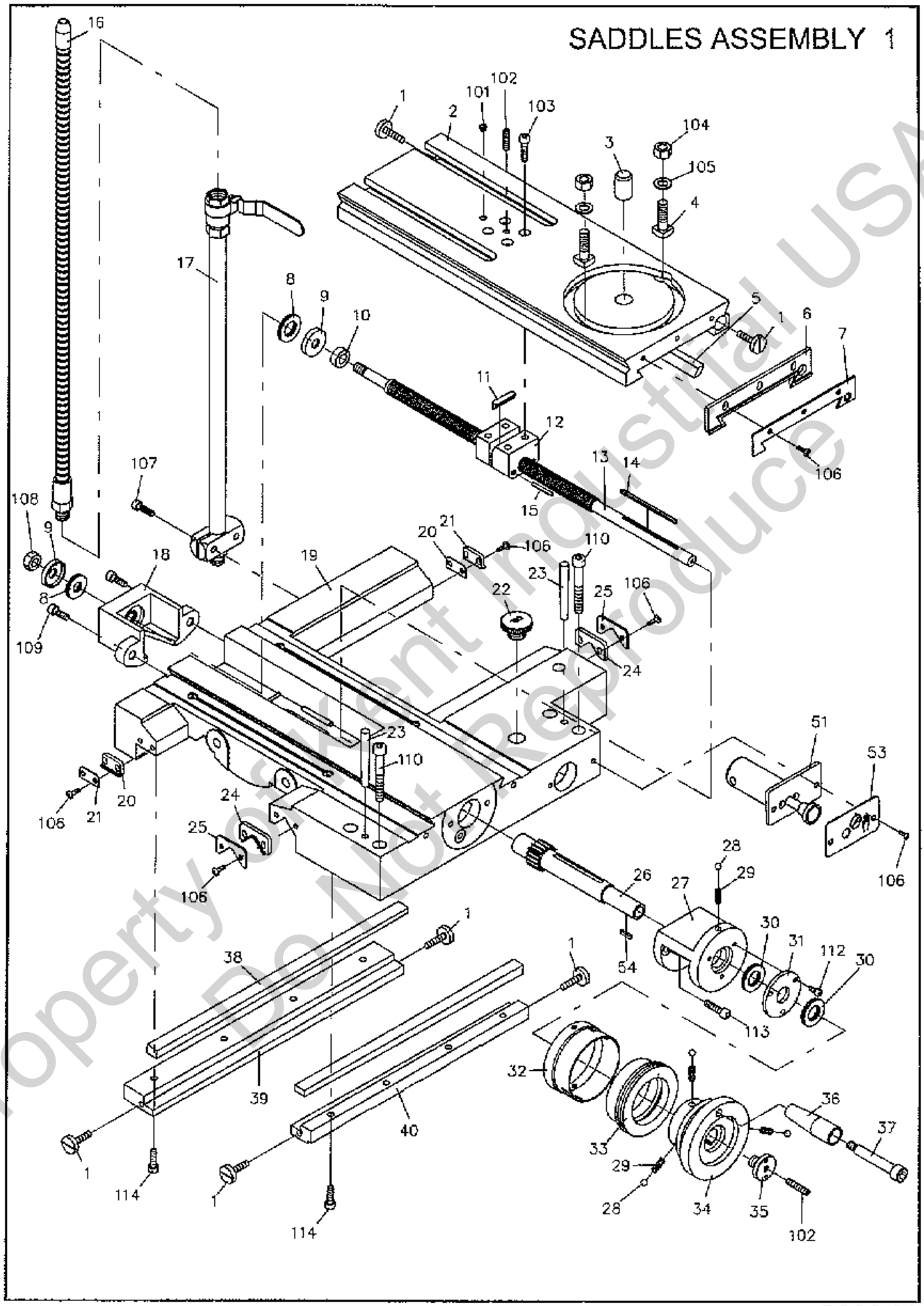
2009.08

SADDLES ASSEMBLY



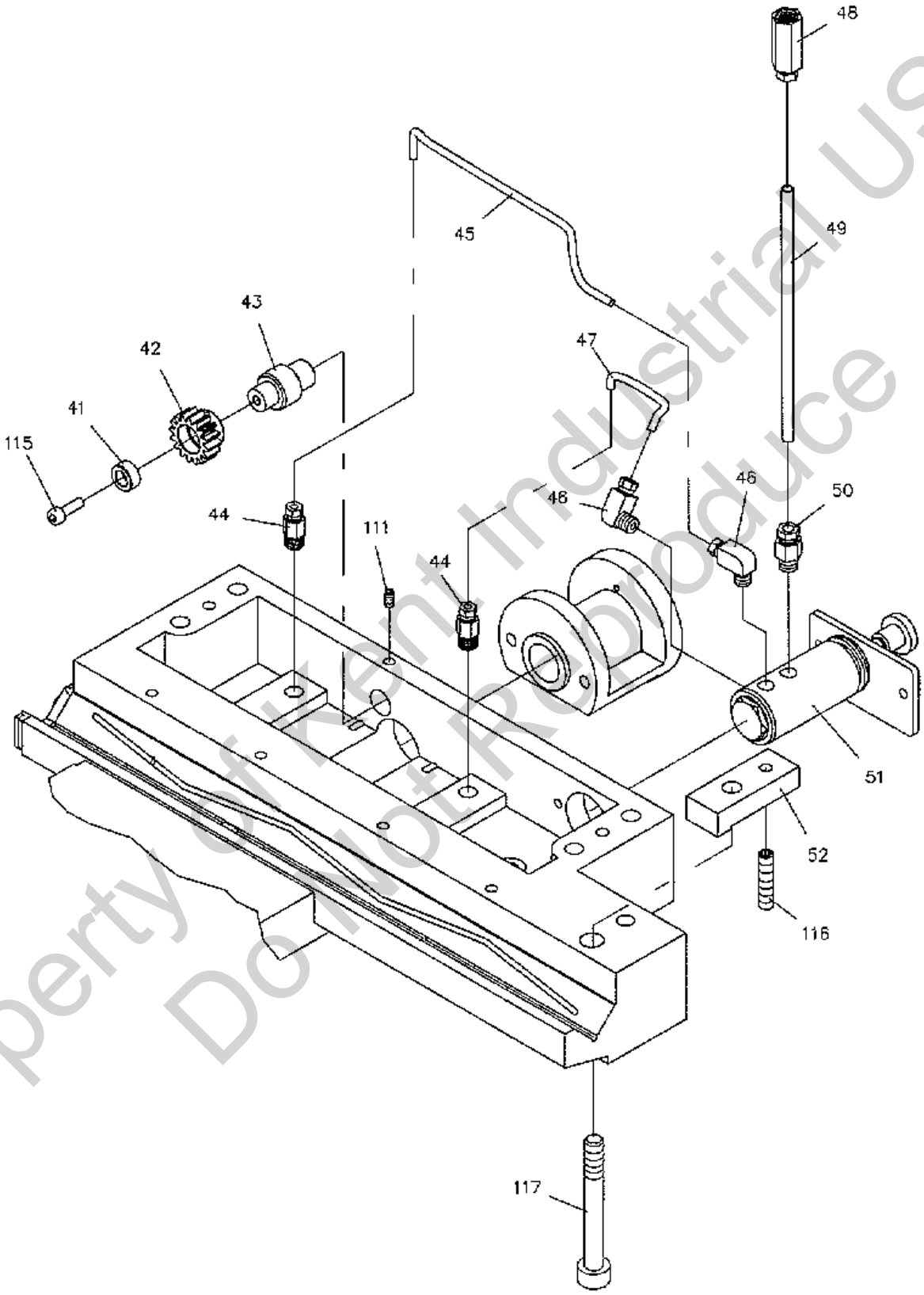
2009.08

SADDLES ASSEMBLY 1



2009.08

SADDLES ASSEMBLY 2



2009.08

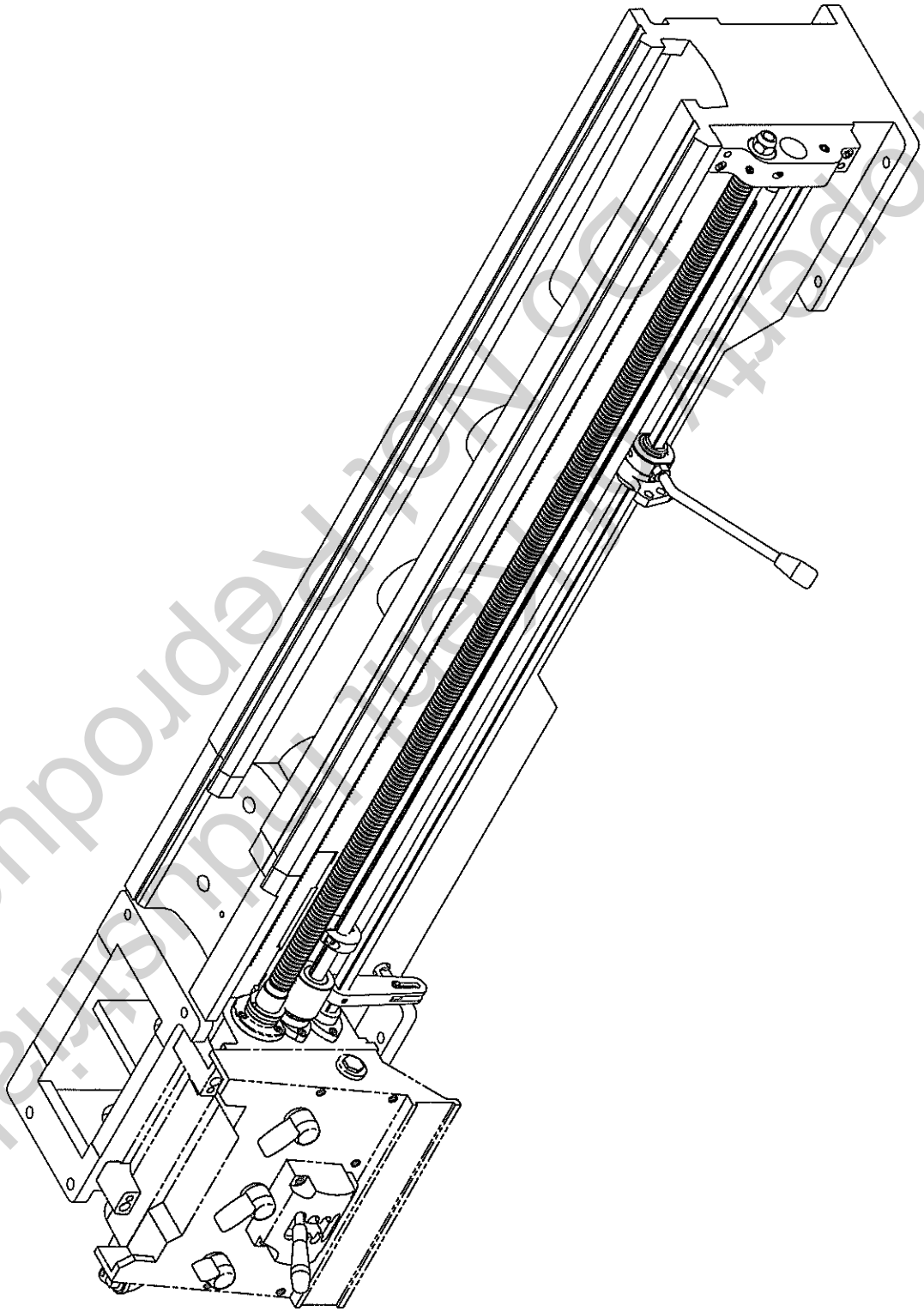
SADDLES ASSEMBLY

KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK	KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK
1	00AS16M6	Adjust screw	6		33	50031-M	Dial 250dividing	1	for METRIC
2	50003	Cross slide 1416	1			50030-I	Dual dial 200div/I , 254div/M	1	for IMPERIAL
3	50036	Pivot	1	ϕ 18x28	34	50029	Hand wheel	1	
4	50037	T bolt	2		35	50033	Fix screw	1	M12xP1.75
5	50023	Gib-X	1		36	50035	Handle	1	
6	50070	Wiper-X	1		37	50034	Bolt	1	
7	50069	Plate -X	1		38	50053	Gib-Z	2	
8		Trust bearing	2	NTB/AS2 1226	39	50052	Front anti-floater	1	
9	50026	Cap collar	2		40	50055	Rear anti-floater	1	
10	50017	Washer	1		41	50013	Washer	1	ϕ 6.5x ϕ 15x3
11	50021	Wedge	1	7x7x30	42	50011	Gear	1	16T
12	50019-M	Nut(for METRIC P=2.5mm)	1	Assembly for	43	50012	Short shaft	1	
13	50016-M	Screw(for METRIC P=2.5mm	1	replacement	44		Straight adapter	2	PT 1/8x ϕ 4
12'	50019-I	Nut(for IMPERIAL P=0.1")	1	Assembly for	45		AL. tube	1	ϕ 4x260
13'	50016-I	Screw(for IMPERIAL P=0.1")	1	replacement	46		Elbow adapter	2	PT 1/8x ϕ 4
14		Key	1	3x3x80	47		AL. tube	1	ϕ 4x120
15		Spring pin	2	ϕ 5x40	48		Oil filter	1	ϕ 6
16		Spraying pipe	1	PT3/8 x 24"	49		AL. tube	1	ϕ 6x160
17		Valve & junction assy.	1	PT3/8	50		Straight adapter	2	PT 1/8x ϕ 6
18	50018	Bracket	1		51		Lubricator assy.	1	
19	50001	Saddle 1416	1		52	50058	Clamp plate	1	
20	50050	Wiper F	2		53	50077	Plate	1	
21	50051	Plate F	2		54		Key	1	3x3x15
22		Oil cover	1	NF 3/4"					
23		Taper Pin	2	#6x2 1/2"L					
24	50048	Wiper V	2						
25	50049	Plate V	2						
26	50014	Pinion	1	160DP 16T					
27	50015	Keep assy.	1						
28		Steel ball	4	1/4"	101		Oil ball	2	1/4"
29	50032	Spring	4	ϕ 6x15 L	102		Set screw	2	M6x30L
30		Trust bearing	2	NTB/AS2 1730	103		Hex. socket head bolt	4	M6x30L
31	50030	Washer	1	ϕ 18x ϕ 52x4	104		Nut	2	M10
32	50027-M	Dial ring	1	for METRIC	105		Washer	2	M10
	50027-I	Dial ring	1	for IMPERIAL	106		Dome cross screw	13	M5x12L

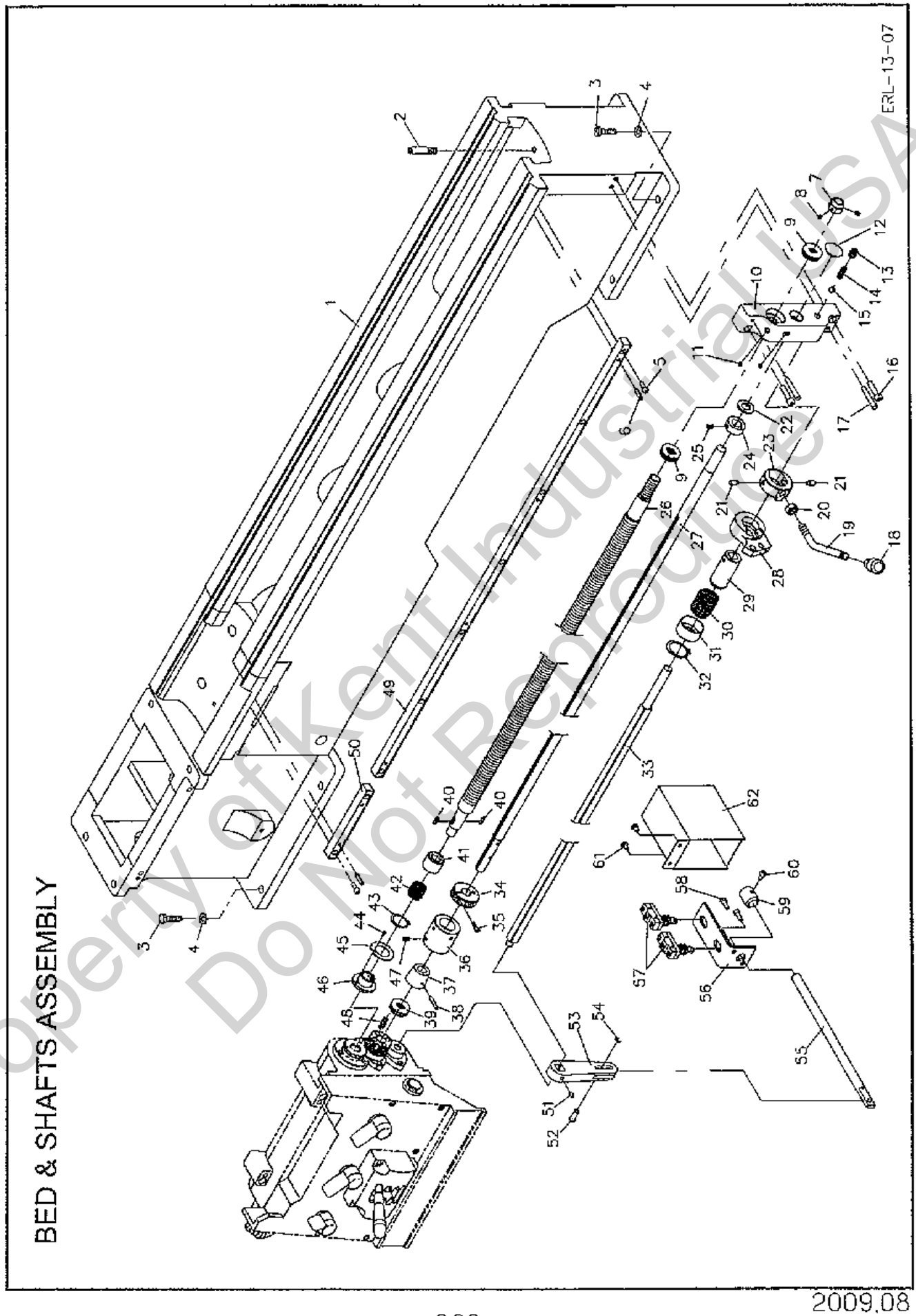
SADDLES ASSEMBLY

KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK	KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK
107		Hex. socket head bolt	2	M6x25					
108		Nut	1	M10					
109		Hex. socket head bolt	2	M6x20L					
110		Hex. socket head bolt	4	M8x60L					
111		Set screw	3	M6x8L					
112		Hex. socket head bolt	3	M4x10L					
113		Hex. socket head bolt	3	M6x20L					
114		Hex. socket head bolt	10	M6x20L					
115		Hex. socket head bolt	1	M5x16L					
116		Set screw	1	M8x35L					
117		Hex. socket head bolt	1	M12x75L					

BED & SHAFTS ASSEMBLY



2009.08

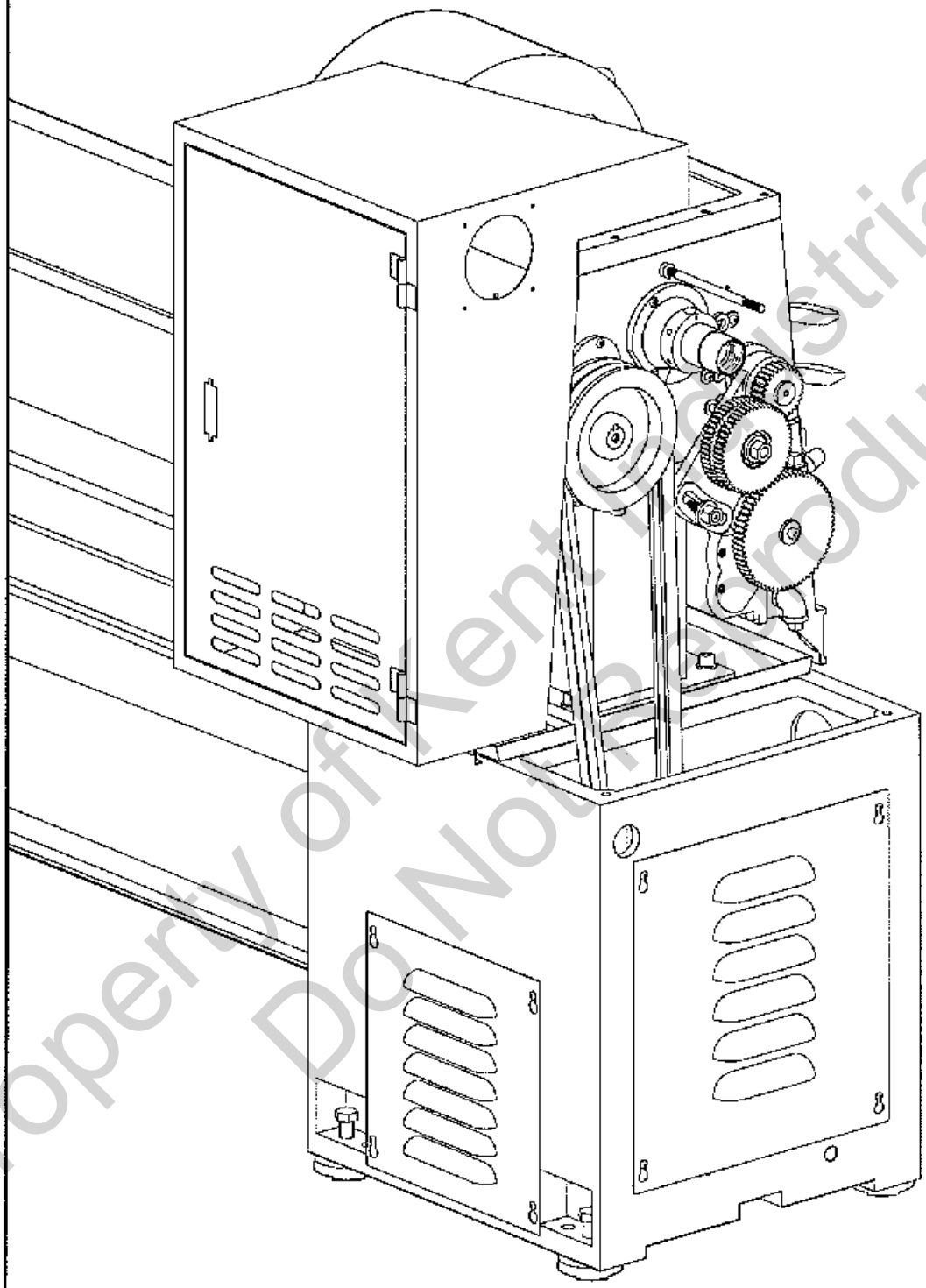


BED & SHAFTS ASSEMBLY

KEY NO	PARTS NO.	PARTS NAME	Q'TY	REMARK
1	63001-30	Bed	1	30"
	63001-40	Bed	1	40"
2	63038	Bolt	1	
3		Hexagon head bolt	8	M12x45L
4		Washer	8	ϕ 12x ϕ 20x3t
5		Hex. socket head bolt	9	M6x20L
6		Spring pin	6	ϕ 6x25L
7	63025	Nut	1	
8		Set screw	2	M6x8L
9		Thrust bearing	2	51203
10	63026	Bracket	1	
11		Oil ball	2	1/4"
12	63037	Plug	1	
13		Set screw	1	M12x12L
14	63041	Spring	1	
15		Steel ball	1	3/8"
16		Hexagon head bolt	2	M8x35L
17		Taper pin	2	#6x2"L
17	63630	Knob	1	
19	63022	Handle	1	
20		Nut	1	M12xP1.75
21	63021	Pin	2	
22		Thrust bearing	1	NTB/AS2 1831
23	63020	Lever assy	1	
24	63043	Collar	1	
25		Set screw	1	M6x8L
26	63005-30M	30"Lead screw	1	for METRIC P=6mm
	63005-30I	40"Lead screw	1	for IMPERIAL 4T.P.I.
	63005-40M	40"Lead screw	1	for METRIC P=6mm
	63005-40I	40"Lead screw	1	for IMPERIAL 4T.P.I.
27	63011-30"	Feed rod	1	
	63011-40"	Feed rod	1	
28	63015	Third rod bracket	1	
29	63019	Sleeve	1	
30	63018	Spring	1	
31	63017	Spring cover	1	

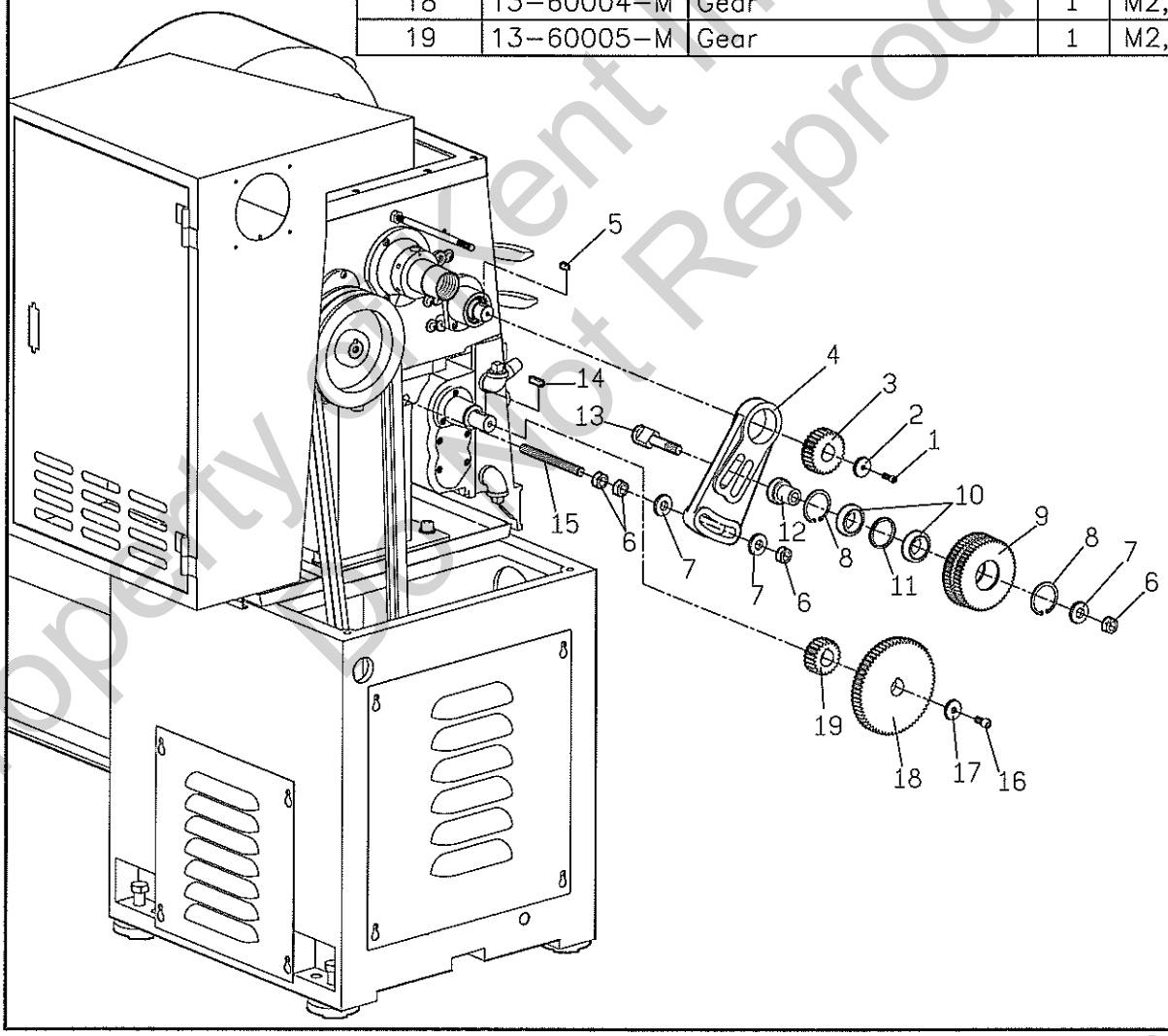
KEY NO	PARTS NO.	PARTS NAME	Q'TY	REMARK
32		Clip	1	S32
33	63014-30	Third rod shaft	1	
	63014-40	Third rod shaft	1	
34	63012	Stopper	1	
35		Hex. socket head bolt	1	M6x20L
36	63016	Clutch collar	1	
37	63013	Bush	1	
38		Taper pin	1	#4x1 1/4"L
39		Thrust bearing	1	51203
40		Key	2	5x5x15
41	63006	Spring cover	1	
42	63007	Spring	1	
43		Clip	1	S32
44	63010	Shear pin	1	
45	63008	Shroud washer	1	
46	63009	Collar	1	
47		Set screw	1	M6x6L
48	63042	Spring	4	ϕ 8x32
49	63023-40	30"Rack	1	
	RML-63023-60	40"Rack	1	
50	63024-GL	30"Rack	1	
		40"Rack	1	
51		Set screw	1	M8x12L
52	60037	Pin	1	
53	60042	Lever	1	
54		Clip	1	E6
55	60036	Shaft	1	
56	17-61044	Switch base	1	
57		Limit switch	2	TM1308
58		Hex. socket head bolt	1	M6x16L
59	60041	Collar	1	
60		Hex. socket head bolt	1	M6x10L
61		Done cross screw	2	M6x10L
62	17-61046	Plate	1	

END GEAR ASSEMBLY



END GEAR -- METRIC (LEADSCREW PITCH 6)

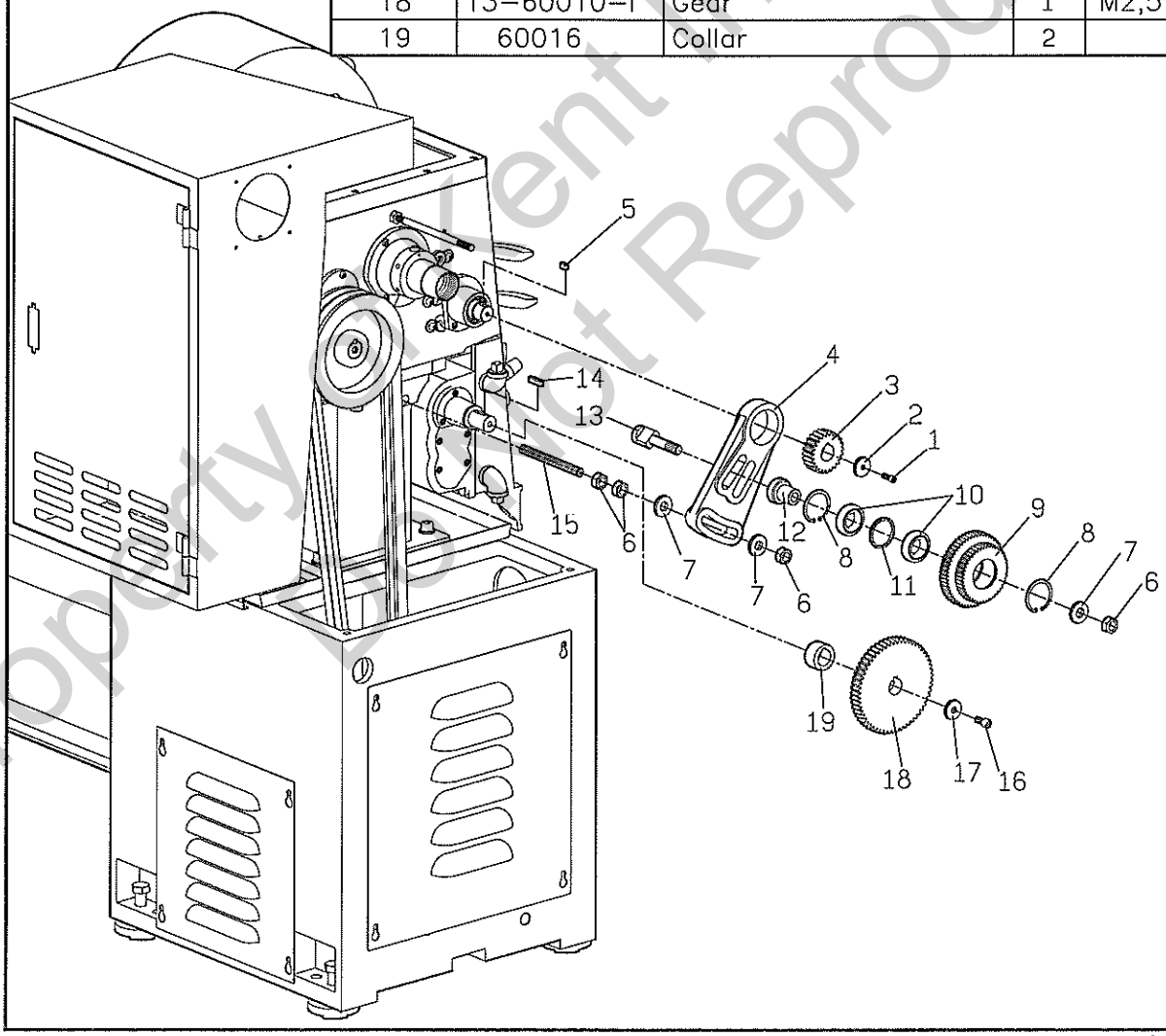
KEY NO.	PARTS No.	PARTS NAME	Q'TY	REMARK
1		Hex. socket head bolt	1	M6x20
2	60022	Washer	1	
3	13-60001-M	Gear	1	M2,28T
4	14-60017	Swing frame	1	
5		Key	2	7x7x15L
6		Nut	2	M14xP2.0
7	60023	Washer	3	
8		Clip	2	R47
9	13-60002-M	Gear	1	M2,54T/5T
10		Ball bearing	2	6005
11	60020	Washer	1	
12	60013	Shaft collar	1	
13	60015	Gear shaft	1	
14		Key	1	7x7x30L
15	60018	Stud	1	
16		Hex. socket head bolt	1	M8x20
17	60021	Washer	1	
18	13-60004-M	Gear	1	M2,64T
19	13-60005-M	Gear	1	M2,22T



2009.08

END GEAR -- IMPERIAL (LEADSCREW 4 T.P.I.)

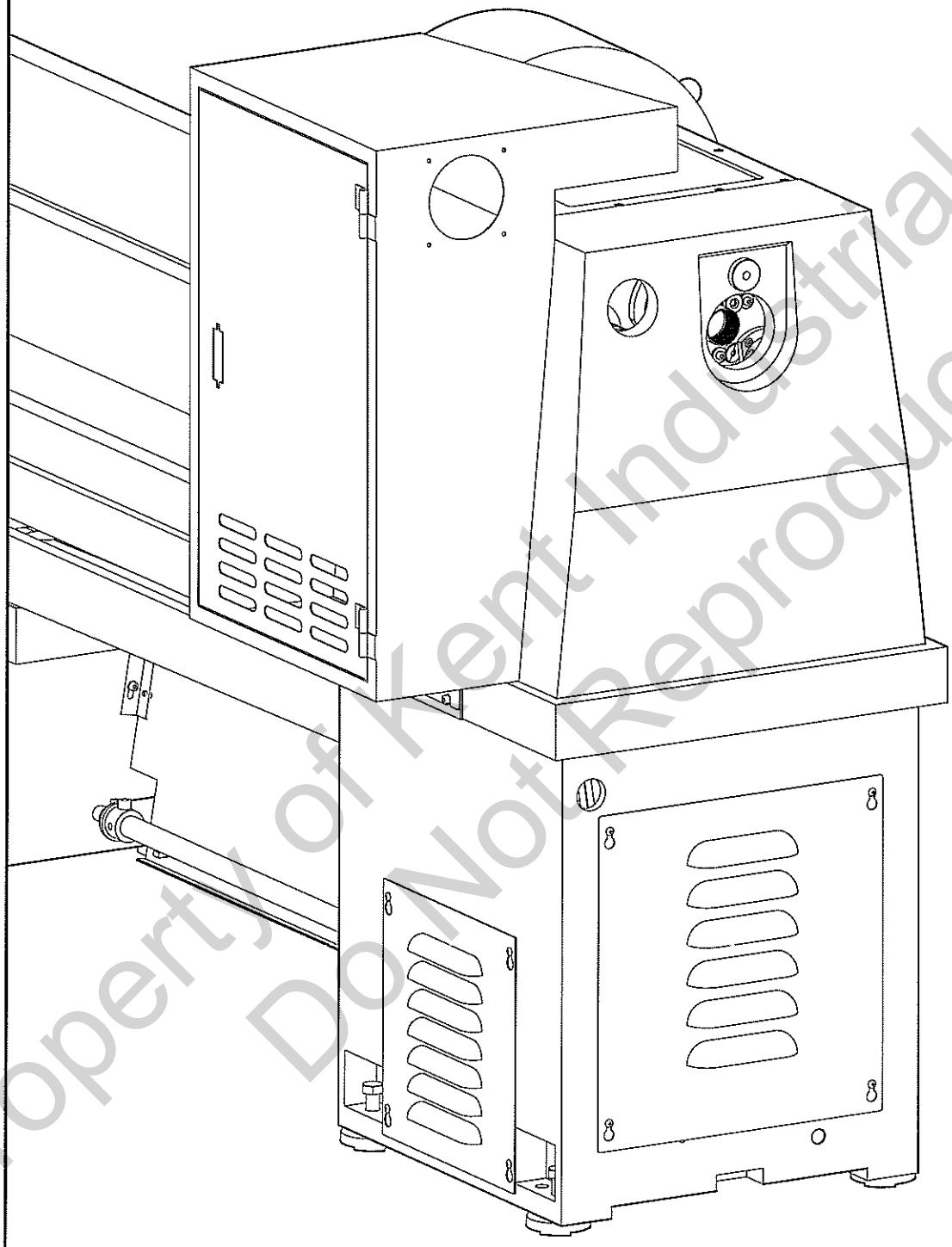
KEY NO.	PARTS No.	PARTS NAME	Q'TY	REMARK
1		Hex. socket head bolt	1	M6x20
2	60022	Washer	1	
3	13-60007-I	Gear	1	M2,24T
4	14-60017	Swing frame	1	
5		Key	2	7x7x15L
6		Nut	2	M14xP2.0
7	60023	Washer	3	
8		Clip	2	R47
9	13-60008-I	Gear	1	M2,44T/56T
10		Ball bearing	2	6005
11	60020	Washer	1	
12	60013	Shaft collar	1	
13	60015	Gear shaft	1	
14		Key	1	7x7x30L
15	60018	Stud	1	
16		Hex. socket head bolt	1	M8x20
17	60021	Washer	1	
18	13-60010-I	Gear	1	M2,57T
19	60016	Collar	2	

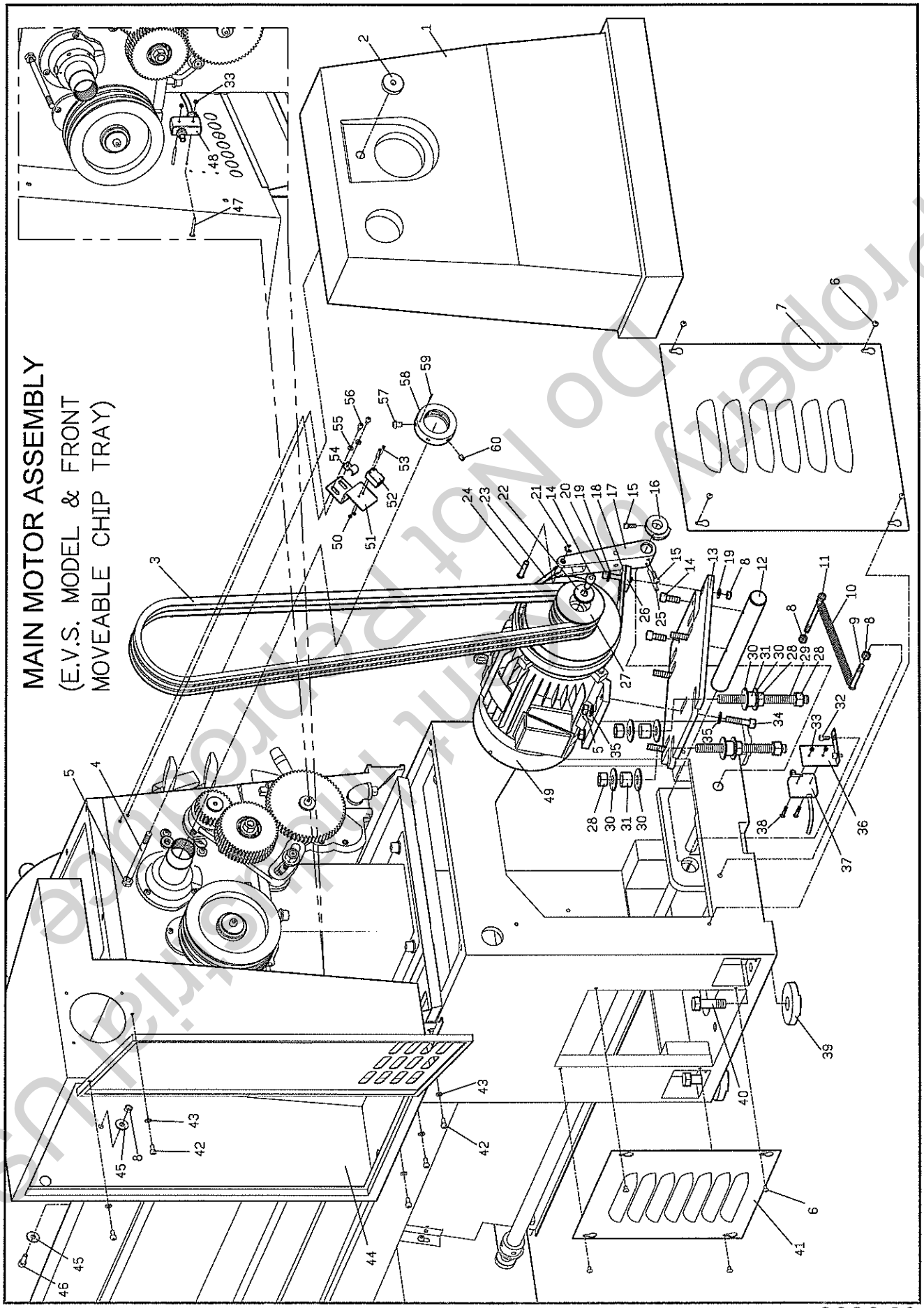


2009.08

MAIN MOTOR ASSEMBLY

(E.V.S. MODEL &
FRONT MOVEABLE CHIP TRAY)





2009.08

MAIN MOTOR ASSEMBLY

ERL-13-09

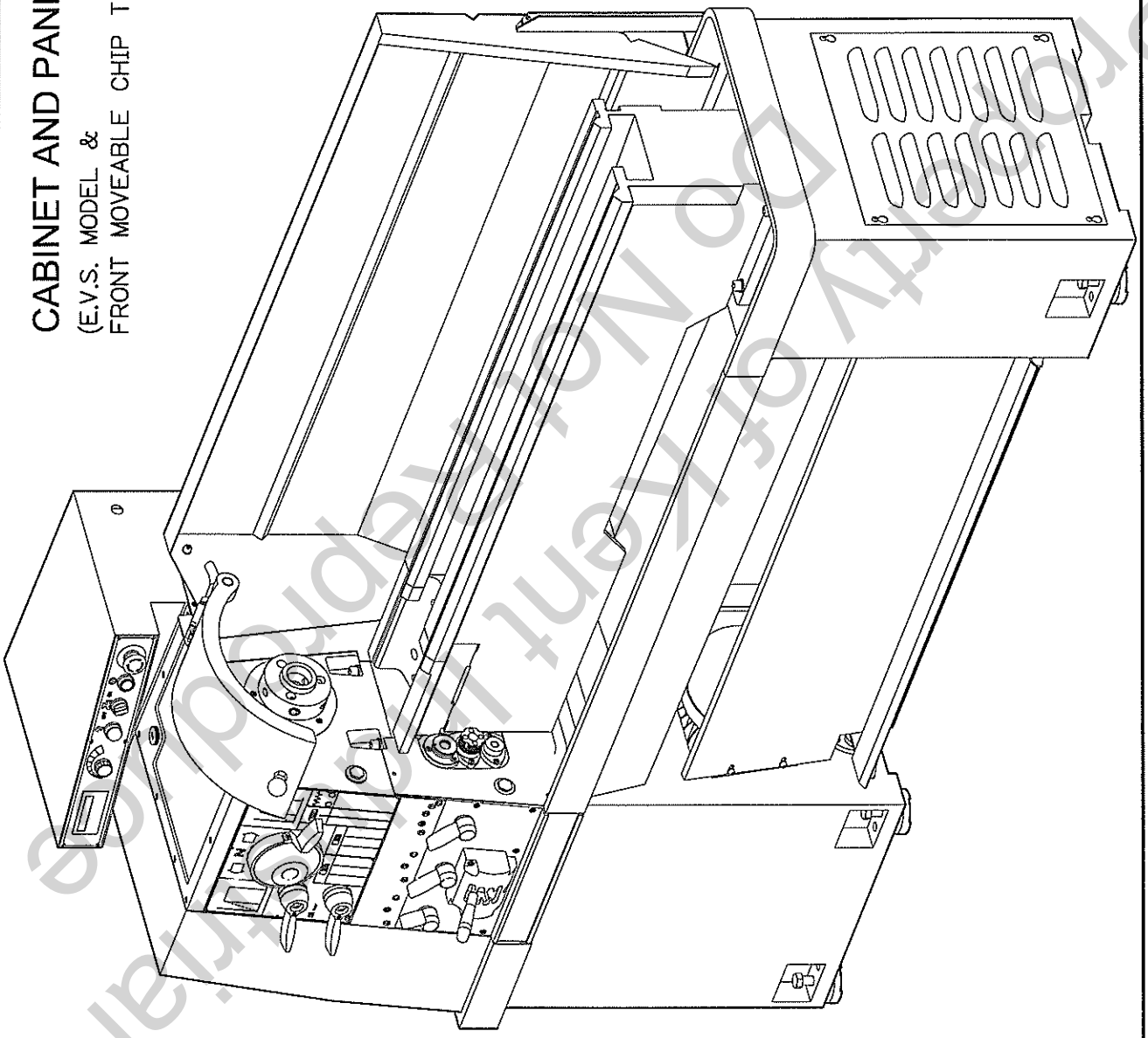
(E.V.S. MODEL & FRONT MOVEABLE CHIP TRAY)

Page 1/1

KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK	KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK
1	61003	Cover	1		37		Limit switch	1	Tm-1704
2	60056	Nut	1		38		Dome cross screw	2	M4x30L
3		V belt	3	B76	39	63043	Block	6	
4	60055	Bolt	1		40		Hexagon head bolt	6	M16x50L
5		Nut	5	M10xP1.5	41	61018	Plate	1	
6		Dome cross screw	8	M6x10L	42		Hex. socket head bolt	5	M6x10L
7	61017	Cover	1		43		Washer	5	Ø6xØ16
8		Nut	4	M8xP1.25	44	61025	Cover	1	
9	60053	Bolt	1				Electrical box	1	
10	60046	Spring	1		45		Washer	2	M8
11		Hex. socket head bolt	1	M8x120L	46		Hex. socket head bolt	1	M8x20L
12	60043	Shaft	1		47		Dome cross screw	2	M4x40L
13	61045TR3	Plate	1		48		Limit switch	1	Tm1307
14		Hex. socket head bolt	3	M10x25L	49		Motor(Inverter)	1	2.2kW(3hp)
15		Hex. socket head bolt	2	M6x16L	50		Hexagon nut	2	M3
16	13-60033	Cam	1		51	61059	Bracket E	1	
17	60047	Lever	1		52		Encoder	1	FQP2-1604N-3U2
18	61061	Fixed plate	1		53		Dome cross screw	2	M3x25L
19		Washer	2	M8	54		Pipe clip	2	Ø10
20		Hex. socket head bolt	1	M8x45L	55		Washer	2	M5
21		Clip	1	E8	56		Hex. socket head bolt	2	M5x10L
22	60044	Washer			57	10077-V	Minor tip	1	
23	60019	Brake belt	1		58	10074-V	Balance ring	1	
24	60028	Pin	1		59		Spring pin	1	Ø3x15L
25		Taper pin	1	#4x1 3/4"L	60		Set screw	1	M8x10L
26	61045TR3	Platform	1						
27	10043-V	Motor pully	1						
28		Nut	8	M16x2.0					
29	60031	Screw	2	M16x170L					
30		Washer	8	Ø16.5xØ40					
31	600048	Rubber ring	4						
32		Hex. socket head bolt	2	M6x12L					
33		Nut	4	M4xP0.7					
34		Hex. socket head bolt	4	M10x45L					
35		Washer	8	M10					
36	61028A	Bracket	1						

CABINET AND PANEL

(E.V.S. MODEL &
FRONT MOVEABLE CHIP TRAY)



2009.08

CABINET AND PANEL

(E.V.S. MODEL &
FRONT MOVEABLE CHIP TRAY)

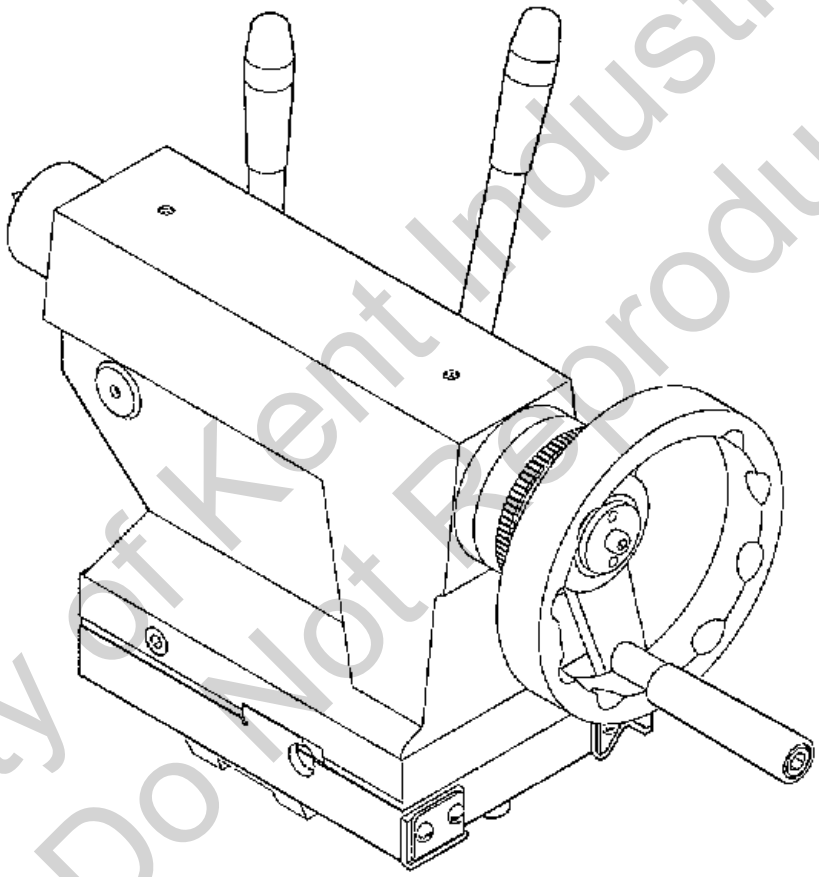
CABINET AND PANEL

ERL-13-10

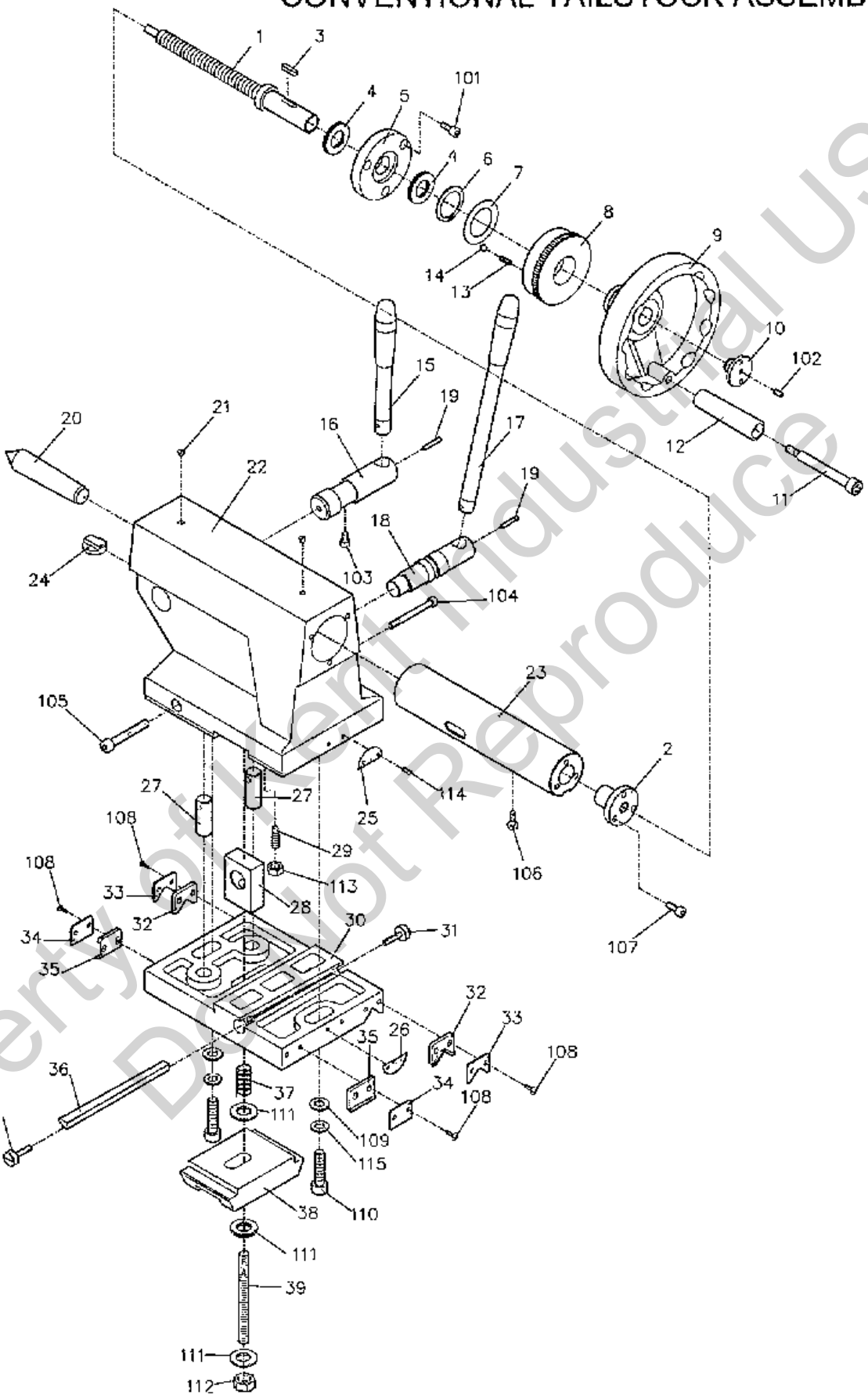
(E.V.S. MODEL & FRONT MOVEABLE CHIP TRAY)

KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK
1	60032-30	Shsft(30")	1	Model 1330
	60032-40	Shsft(40")	1	Model 1340
2	61043-30	Saddle(30")	1	Model 1330
	61043-40	Saddle(40")	1	Model 1340
3	13-60039	Collar	2	
4		Hex. socket head bolt	6	M6x16
5		Hex. socket head bolt	4	M10x20
6		Hex. socket head bolt	10	M6x10
7		Washer	8	M6
8	61011-30	Plate(30")	1	Model 1330
	61011-40	Plate(40")	1	Model 1340
9		Hex. socket head bolt	2	M6x20
10	60030	Flanged Bearing		
11	61009	Bracket	2	
12		Dome cross screw	10	M6x10
13	61008PR1	Bracket	1	
14	61008PL1	Bracket	1	
15		Dome cross screw	3	M5x8
16	61016	Guard	1	
17	61008-30	Sliding tray(30")	1	Model 1330
	61008-40	Sliding tray(40")	1	Model 1340
18		Flat hexagon screw	3	M5x8
19	61020	Plate	1	
20	61053	Small bracket	1	
21		Set screw	2	M8x12
22		Nut	2	M4xP0.7
23		Spring washer	2	M6
24		Hex. socket head bolt	2	M6x12
25	61056	Bracket	1	
26		Limit switch	1	Tz9212
27		Dome cross screw	2	M4x40
28		Nut	3	M8xP1.25
29		Washer	8	M8
30		Hex. socket head bolt	5	M8x20
31	61007-30	Splash guard(30")	1	Model 1330
	61007-40	Splash guard(40")	1	Model 1340
32		Knob	1	
33		Nut	1	M12xP1.75
34		Hex. socket head bolt	1	M12x20
35	13-10102	Piovt	1	
36	14-61053	Chuck safety guard	1	
37		Hex. socket head bolt	1	M6x12
38		Set screw	1	M5x16
39	61035	Chute	1	
40		Coolant conduit	1	CT801x3/8"x72"
41		Nipple	1	3/8"PTx3/8"PH
42		Coolant pump	1	MC6180
43	61015	Coolant tank	1	
44	61019	Cover	1	

CONVENTIONAL TAILSTOCK ASSEMBLY



CONVENTIONAL TAILSTOCK ASSEMBLY



2009.08

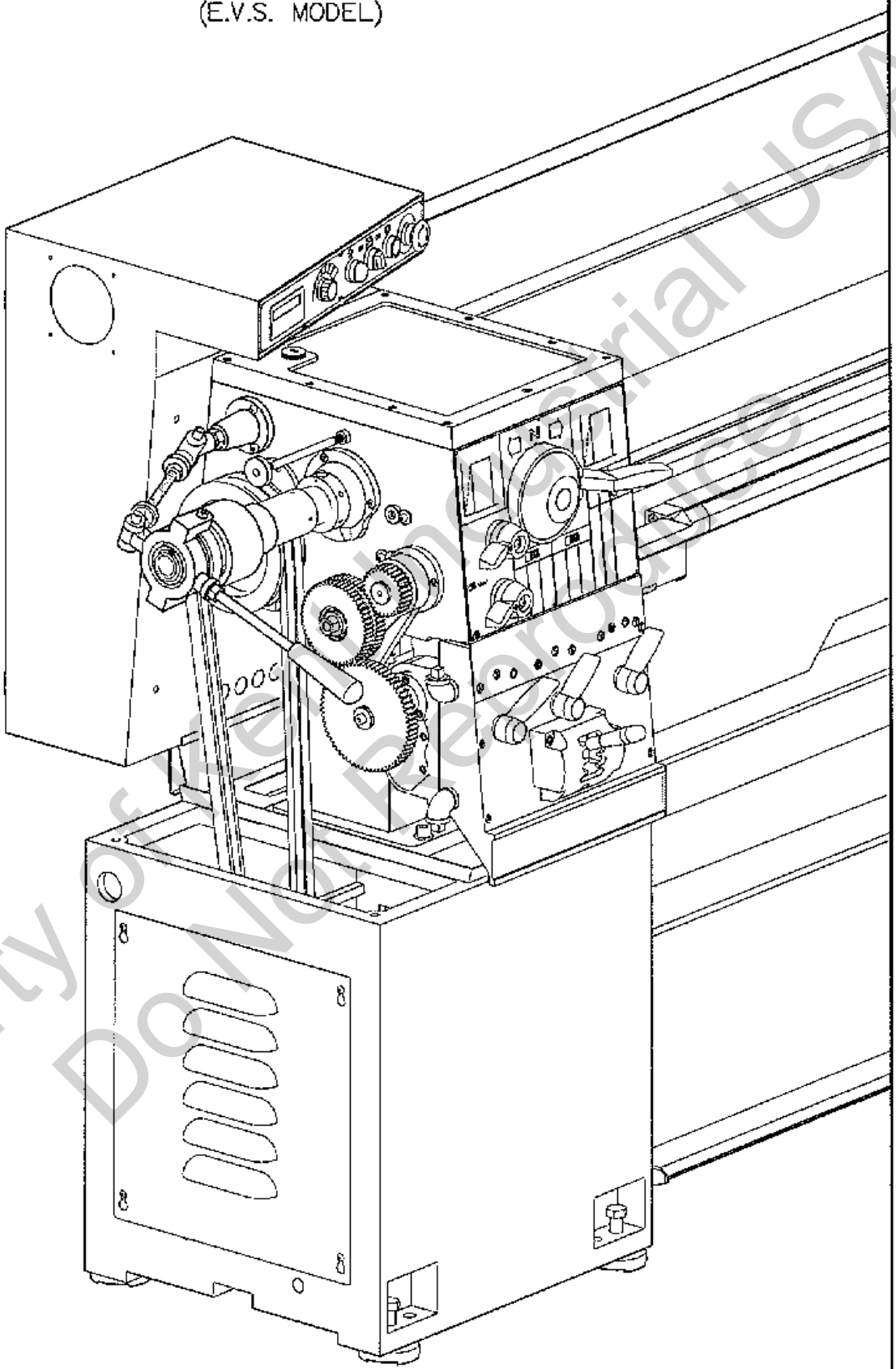
CONVENTIONAL TAILSTOCK ASSEMBLY

KEY NO.	PARTS NO.	PARTS NAME	QTY	REMARK
1	70004-M	Lead screw,P=2.5mm	1	Assembly for
2	70005-M	Nut,P=2.5mm	1	replacement
1'	70004-I	Lead screw,P=0.1"	1	Assembly for
2'	70005-I	Nut,P=0.1"	1	replacement
3		key	1	5x5x20L
4		Thrust bearing	2	NTB/AS2035
5	70007-M	Flange M	1	for METRIC
	70007-I	Flange I	1	for IMPERIAL
6		Snap ring	1	S32
7	70006	washer	1	
8	70008-M	Index ring 125 dividing	1	for METRIC
	70008-I	Index ring 100 dividing	1	for IMPERIAL
9	70009	Handwheel	1	
10	70010	Fixed screw	1	
11	70011	Bolt	1	M8x90L
12	70012	Handle	1	
13	40016	Spring	3	ϕ 6.2x16L
14		Steel ball	3	1/4"
15	70022	Clamp lever L	1	
16	70013	Cam shaft L	1	
17	70021	Clamp lever R	1	
18	70017	Cam shaft R	1	
19		Spring pin	2	ϕ 4x24
20	70057	Dead center	1	MT4
21		Oil ball	2	1/4"
22	70001	Tail stock	1	
23	70003	Quill	1	
24	70014	Guide key	1	
25	70032-U	Marked plate U	1	Assembly for
26	70032-D	Marked plate D	1	replacement
27	70015	Pin nut	2	
28	70016	Pivot block	1	
29	00ST25M8	Set screw	1	
30	70002	Base	1	
31	70019	Gib screw	2	M6x ϕ 16
32	70024	Wiper V	2	

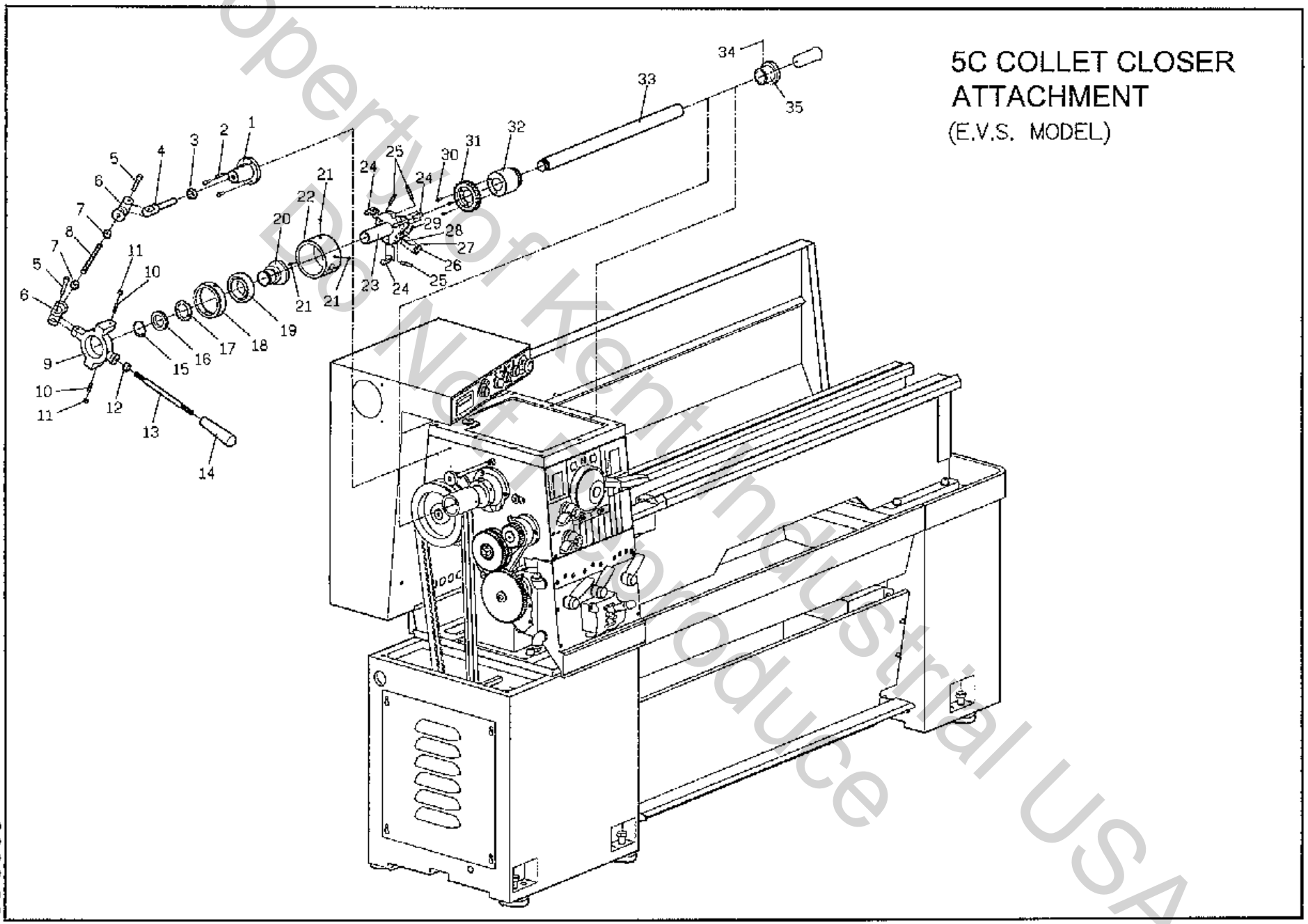
KEY NO.	PARTS NO.	PARTS NAME	QTY	REMARK
33	70025	Plate V	2	
34	70027	Plate F	2	
35	70026	Wiper F	2	
36	70018	Gib C	1	
37	00SP0250	Spring	1	ϕ 25x45L
38	70020	Clamp block	1	
39	70041	Stud	1	M14x110L
101		Hex. socket head bolt	3	M6x16L
102		Set screw	1	M6x12L
103		Hex. socket head bolt	1	M6x12L
104		Hex. socket head bolt	1	M8x70L
105		Hex. socket head bolt	2	S-M8x60L
106		Hex. socket head bolt	1	M6x8L
107		Hex. socket head bolt	3	M6x16L
108		Dome cross screw	8	M5x12L
109		Washer	2	M10
110		Hexagon head bolt	2	M10x40L
111		Washer	3	M14
112		Hexagon nut	1	M14
113		Hexagon nut	1	M8
114		Rivet	4	ϕ 2
115		Spring washer	2	M10

5C COLLET CLOSER ATTACHMENT

(E.V.S. MODEL)



2009.08



5C COLLET CLOSER ATTACHMENT

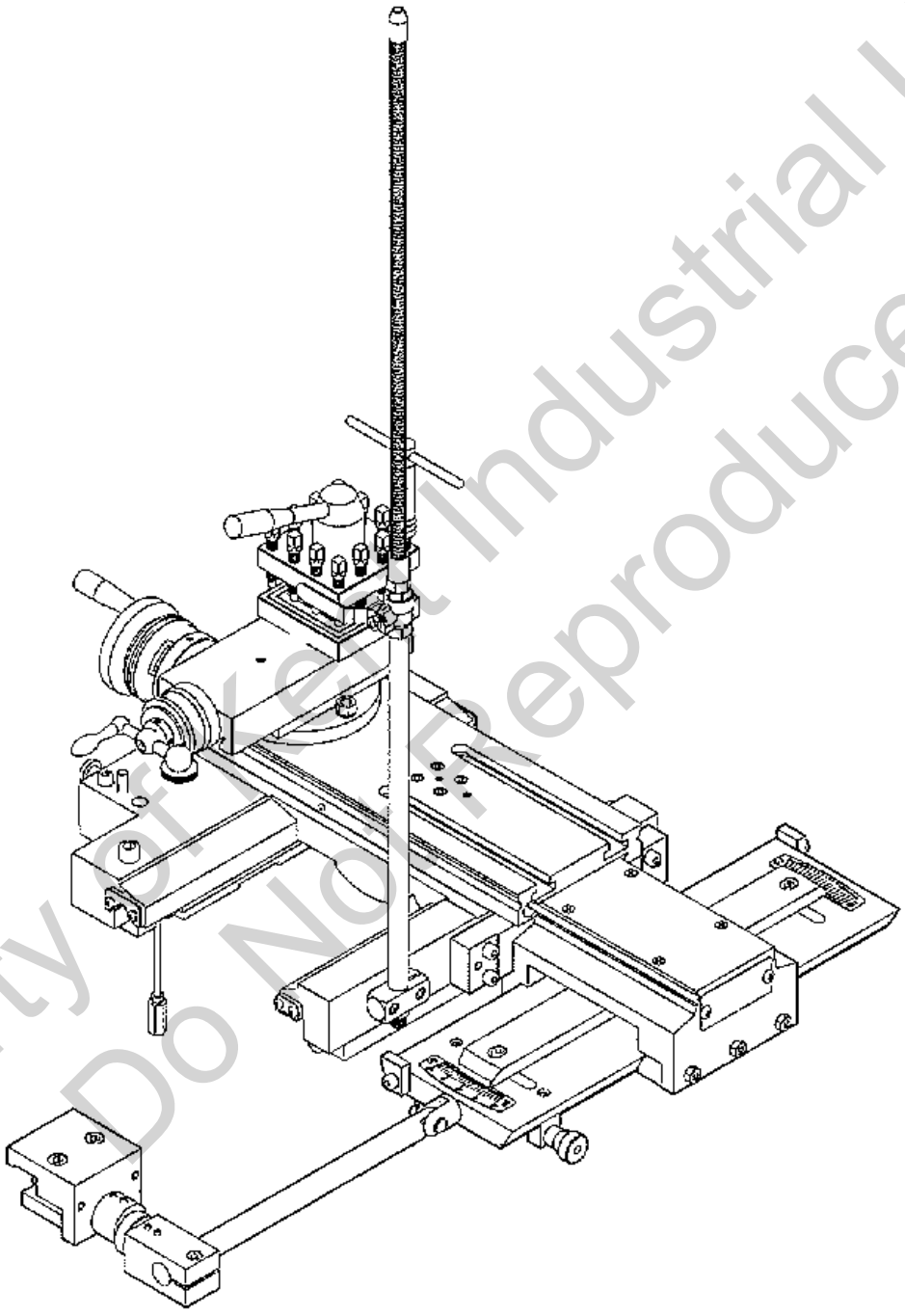
ERL-13-12

(E.V.S. MODEL)

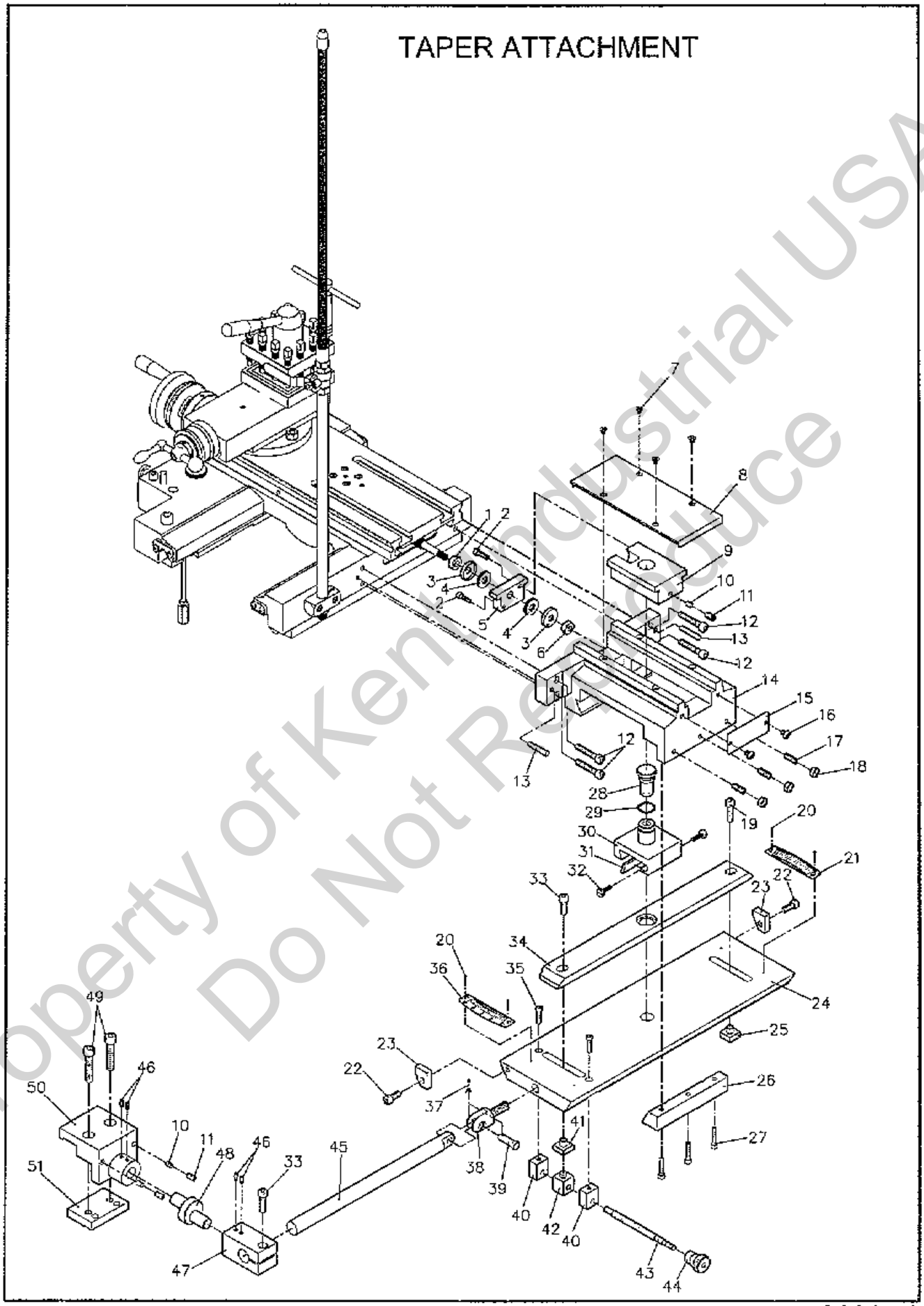
KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK
1		Hex. socket head bolt	3	M6x25
2	90048	Bracket	1	
3		Nut	1	M16
4	90049	Bolt	1	
5	90055	Bolt	1	
6	90047	Connector Casting	1	
7		Nut	2	W1/2"
8	90050	Screw	1	W1/2x155mm
9	90044	Handle Casting	1	
10	00ST30M8	Set screw	2	
11		Nut(M8)	2	
12		Nut(1/2"-12UNC)	1	
13	90045	Handle Rod	1	
14	90046	Handle	1	
15		Clip(S34)	1	
16		Washer(φ52.4xφ34.4x9)	1	
17	90042	Nut	1	
18	90038	Bearing and Retainer	1	Assembly for
19		Ball bearing(6208)	1	replacement
20	90037	Cam	1	
21		Hex. socket head bolt(M4x8)	3	
22	90043	Collar	1	
23	90029	Tube	1	
24	90031	Finger	3	
25	90032	Pivot Pin(φ6x40)	3	
26	90035	Knob	1	
27		Steel ball(φ5mm)	1	
28	90033	Spring	1	
29		Pin(φ5x18)	1	
30		Hex. socket head bolt	3	M5x12
31	90025	Index Ring	1	
32	90023	Hub	1	
33	90028	Tube	1	
34	90027	Pin	1	
35	90026	Bush	1	

2009.08

TAPER ATTACHMENT



TAPER ATTACHMENT

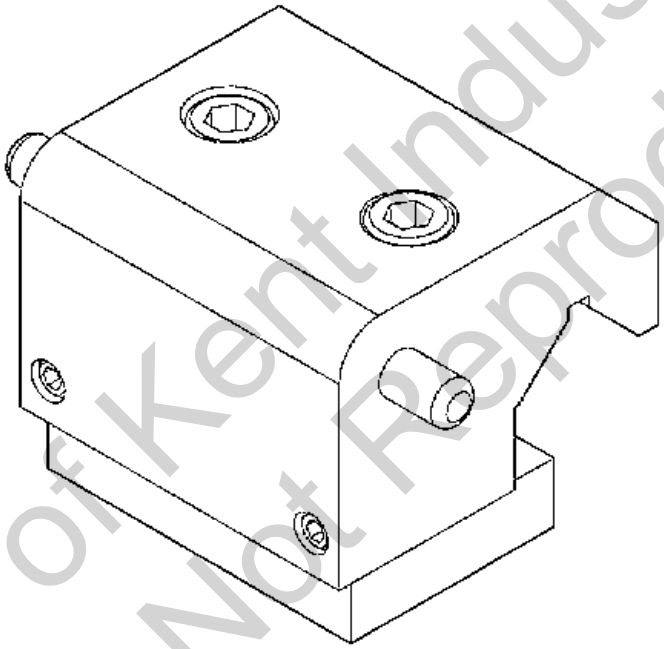


2009.08

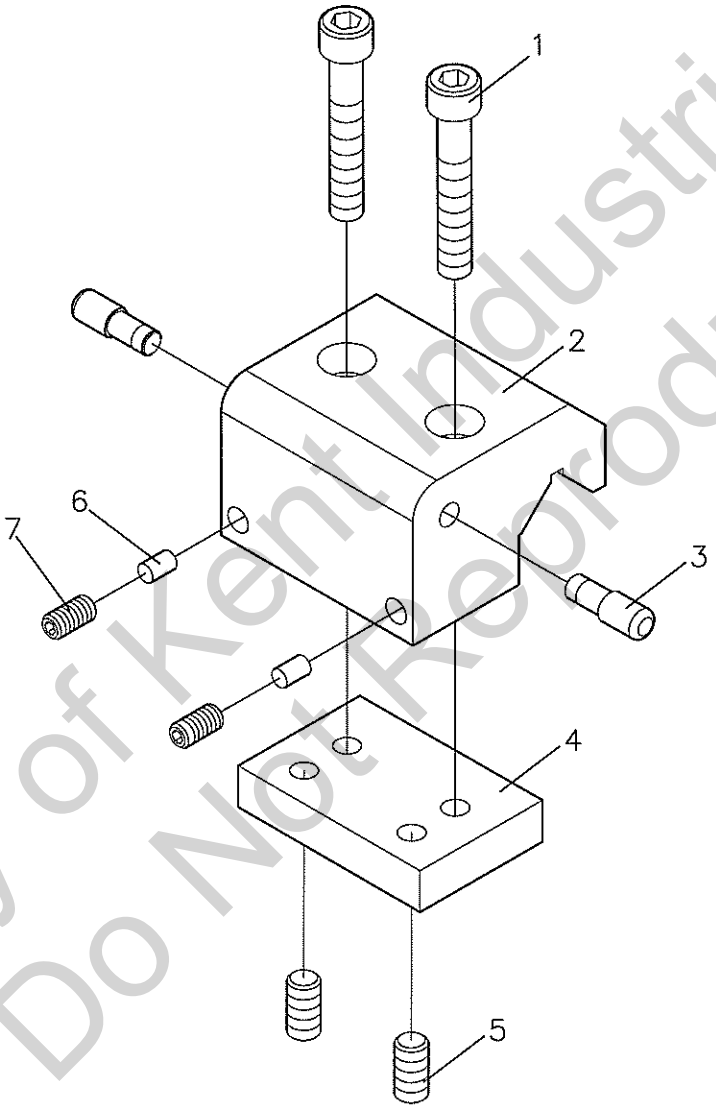
TAPER ATTACHMENT

KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK	KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK
1	50017	Collar	1		37		Split pin	1	ϕ 2.5x16
2		Hex. socket head bolt	2	M6x20	38	18-80031	Bolt	1	
3	50026	Cap collar	2		39	18-80030	Pin	1	
4		Thrust bearing	2	NTB/AS2 1226	40	18-80019	Block	2	
5	80005	Yoke Plate	1		41	18-80016	Nut	1	
6		Nut	1	M10	42	18-80018	Block	1	
7		Flat hexagon screw	4	M6x8	43	18-80015	Screw	1	
8	80002	Cover plate	1		44	18-80014	Knob	1	
9	80004	Yoke	1		45	18-80028	Bolt	1	
10	18-70083	Copper pin	3		46		Set screw	4	M6x12
11		Set screw	3	M8x16	47	18-80021	Bracket	1	
12		Hex. socket head bolt	4	M8x45	48	18-80020	Eccentric pin	1	
13		Taper pin	2	#6x1 1/2"L	49		Hex. socket head bolt	2	M10x50
14	15-80001	Main bracket	1		50	80027	Bracket	1	
15	18-80003	Plate	1		51	18-80023	Hub	1	
16		Done cross screw	2	M6x10					
17		Set screw	3	M8x25					
18		Hexagon nut	3	M8					
19		Hex. socket head bolt	2	M8x30					
20		Rivet	4	ϕ 2					
21	15-80025	Name plate	1						
22		Hex. socket head bolt	2	M8x20					
23	18-80033	Stop	2						
24	15-80010	Plate	1						
25	18-80017	Nut	1						
26	15-80012	Gib	1						
27		Hex. socket head bolt	3	M6x30					
28	18-80011	Slide pivot pin	1						
29		"O" ring	1	P21					
30	18-80006	Side block	1						
31	80008	Gib	1						
32	80007	Screw	1						
33		Hex. socket head bolt	2	M8x25					
34	15-80009	Swive slide	1						
35		Hex. socket head bolt	2	M6x25					
36	15-80024	Name plate	1						

BED STOP



BED STOP



2009.08

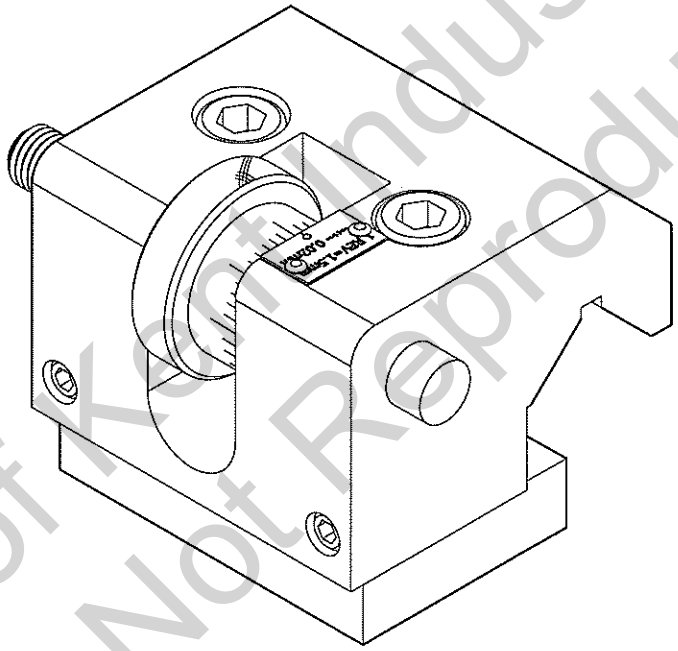
BED STOP

ERL-13-14

KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK	KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK
1		Hex. socket head bolt	2	M10x60					
2	70085-13	Body	1						
3	18-70084	Pad	2						
4	18-70059	Clamp plate	1						
5		Set screw	2	M10x20					
6	18-70083	Copper pin	2						
7		Set SCREW	2	M8x16					

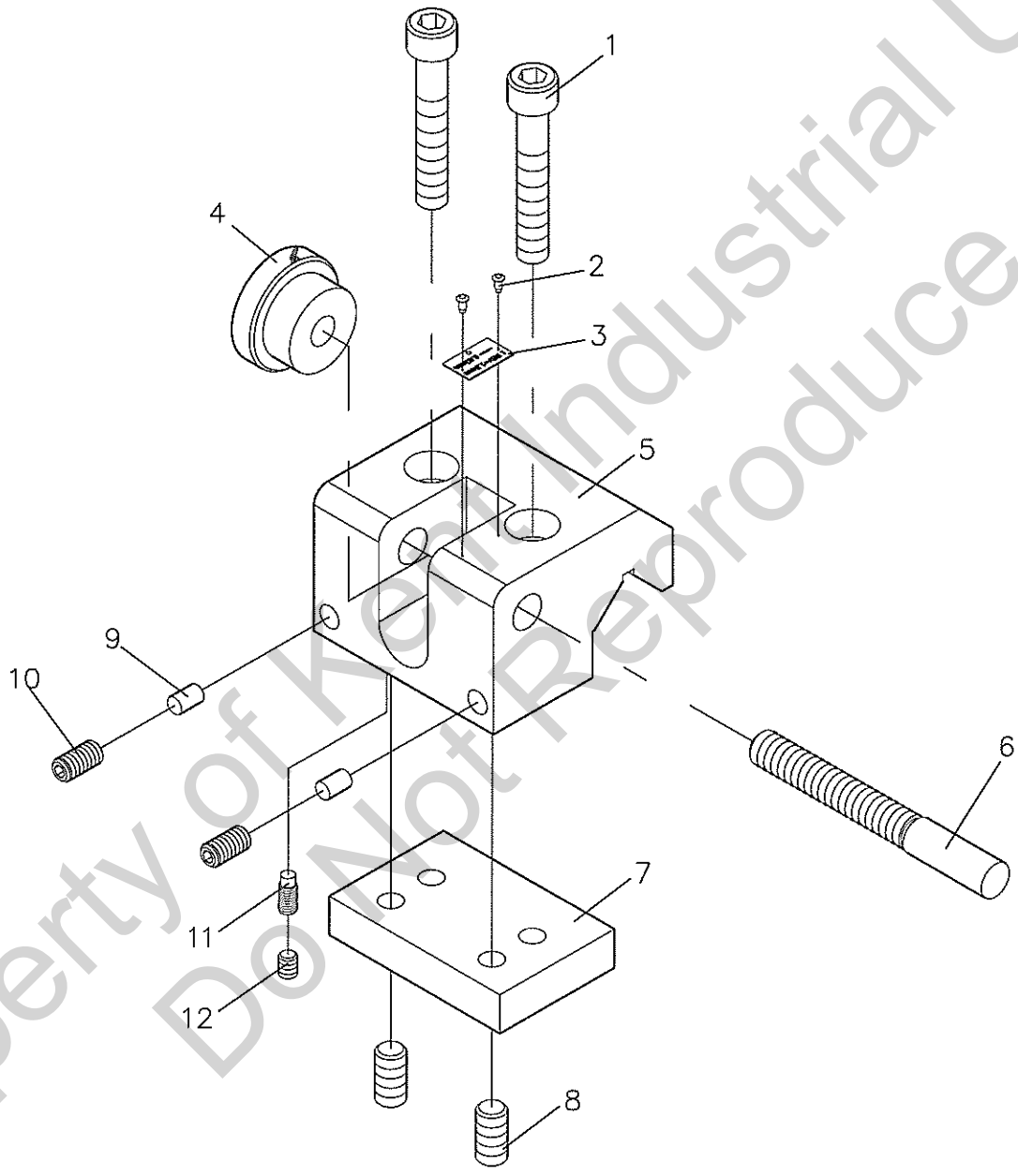
BED STOP

MICROMETER BEDSTOP



SED STOP

MICROMETER BEDSTOP



2009.08

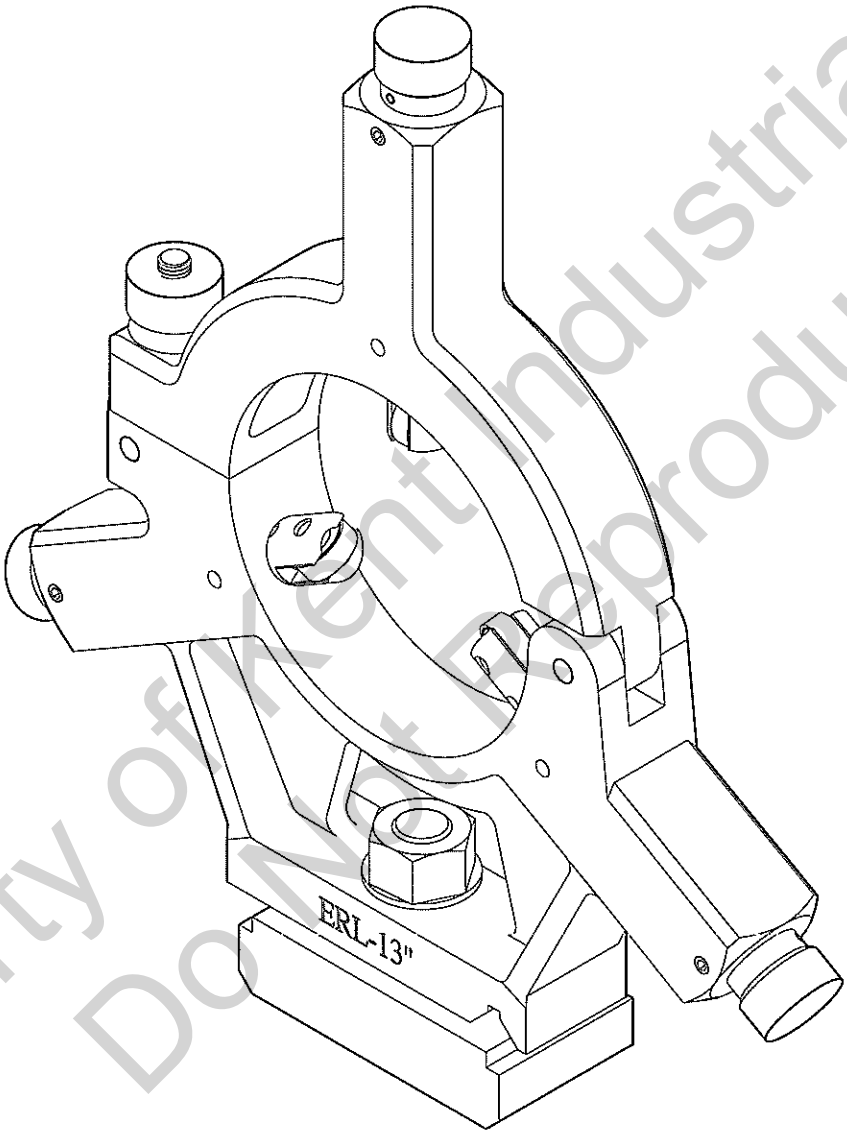
BED STOP

ERL-13-15

MICROMETER BEDSTOP

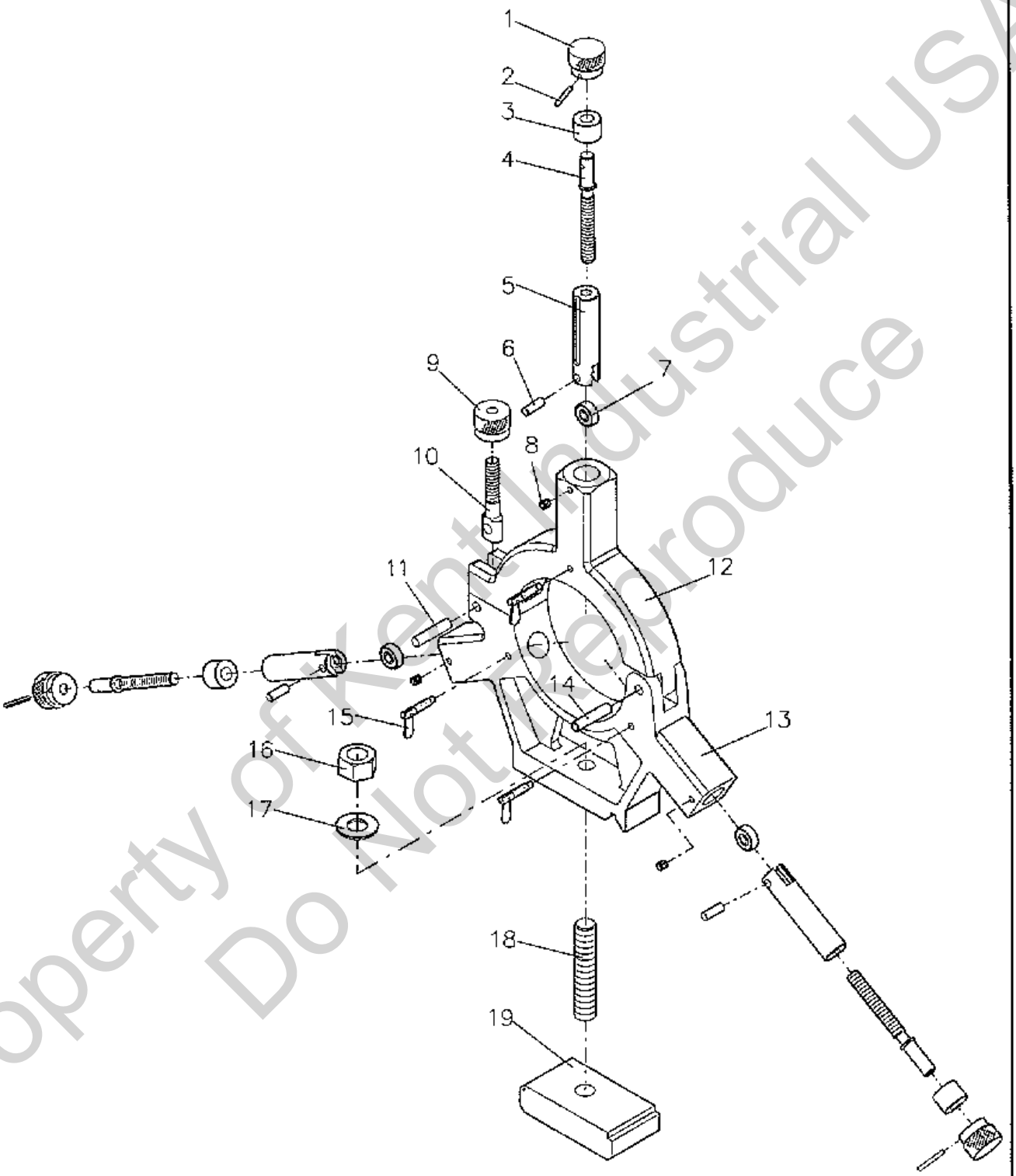
KEY NO	PARTS NO.	PARTS NAME	Q'TY	REMARK	KEY NO	PARTS NO.	PARTS NAME	Q'TY	REMARK
1		Hex. socket head bolt	2	M10x60					
2		Rivet	2	ϕ2					
3	18-70060-M	Name plate	1	for METRIC					
	18-70060-I			for IMPERIAL					
4	18-70057-M	Micro dial	1	for METRIC					
	18-70057-I			for IMPERIAL					
5	70048-13	Body	1						
6	18-70056-M	Rod	1	for METRIC					
	18-70056-I			for IMPERIAL					
7	18-70059	Clamp plate	1						
8		Set screw	2	M10x20					
9	18-70083	Copper pin	2						
10		Set screw	2	M8x16					
11	OOST12M8	Set screw	1	M8x12					
12		Set screw	1	M8x12					

STATIONERY STEADY



2009.08

STATIONERY STEADY



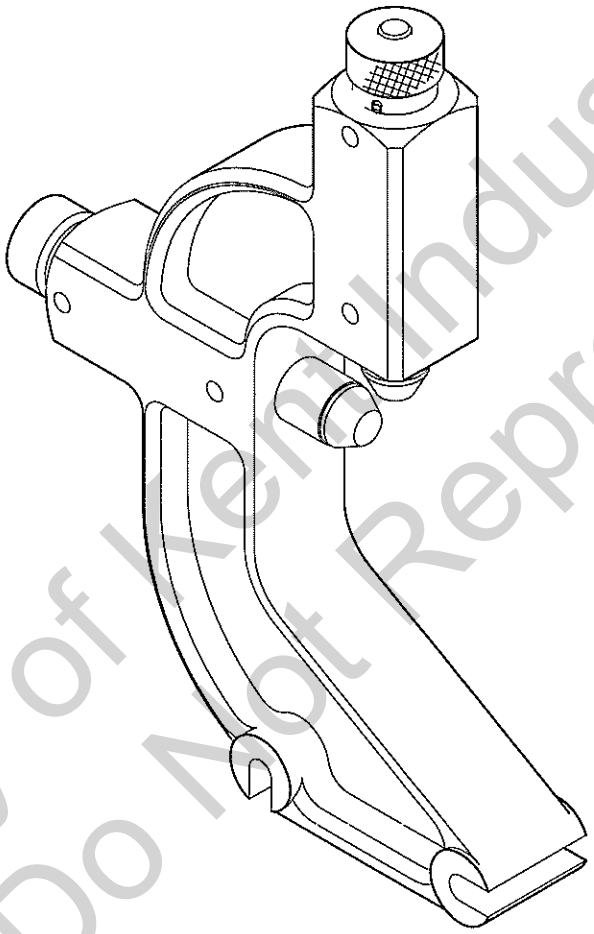
2009.08

STATIONARY STEADY

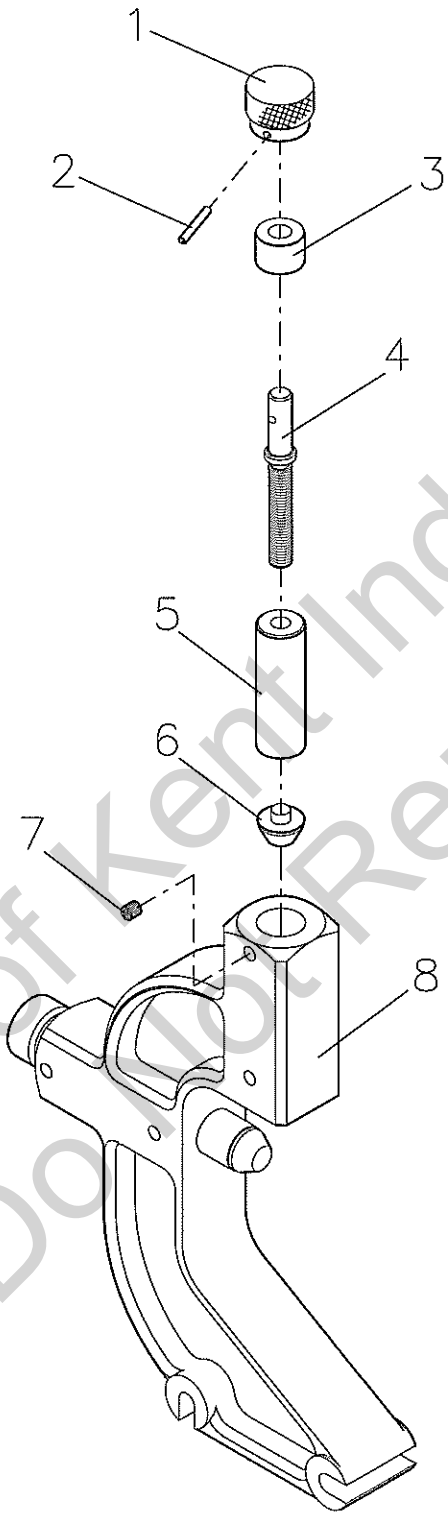
ERL-13-16

KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK	KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK
1	70038	Adjusting knob	3						
2		Spring pin	3	φ4x40L					
3	70062	Collar	3						
4	70035	Screw	3						
5	70037	Finger	3						
6	70040	Pin	3						
7		Ball bearing	2	627					
8		Set screw	3	M8x8L					
9	70064	Knob nut	1						
10	70033	Clamp screw	1						
11	70031	Pin	1						
12	70029	Top casting	1						
13	70030	Base casting	1						
14	70032	Hinge pin	1						
15	70063	Single wing bolt	3						
16		Nut	1	M12xP1.75					
17		Spring washer	1	M12					
18		Hexagon head bolt	1	M12xP1.75x75L					
19	70039	Clamp plate	1						

TRAVELLING STEADY



TRAVELLING STEADY



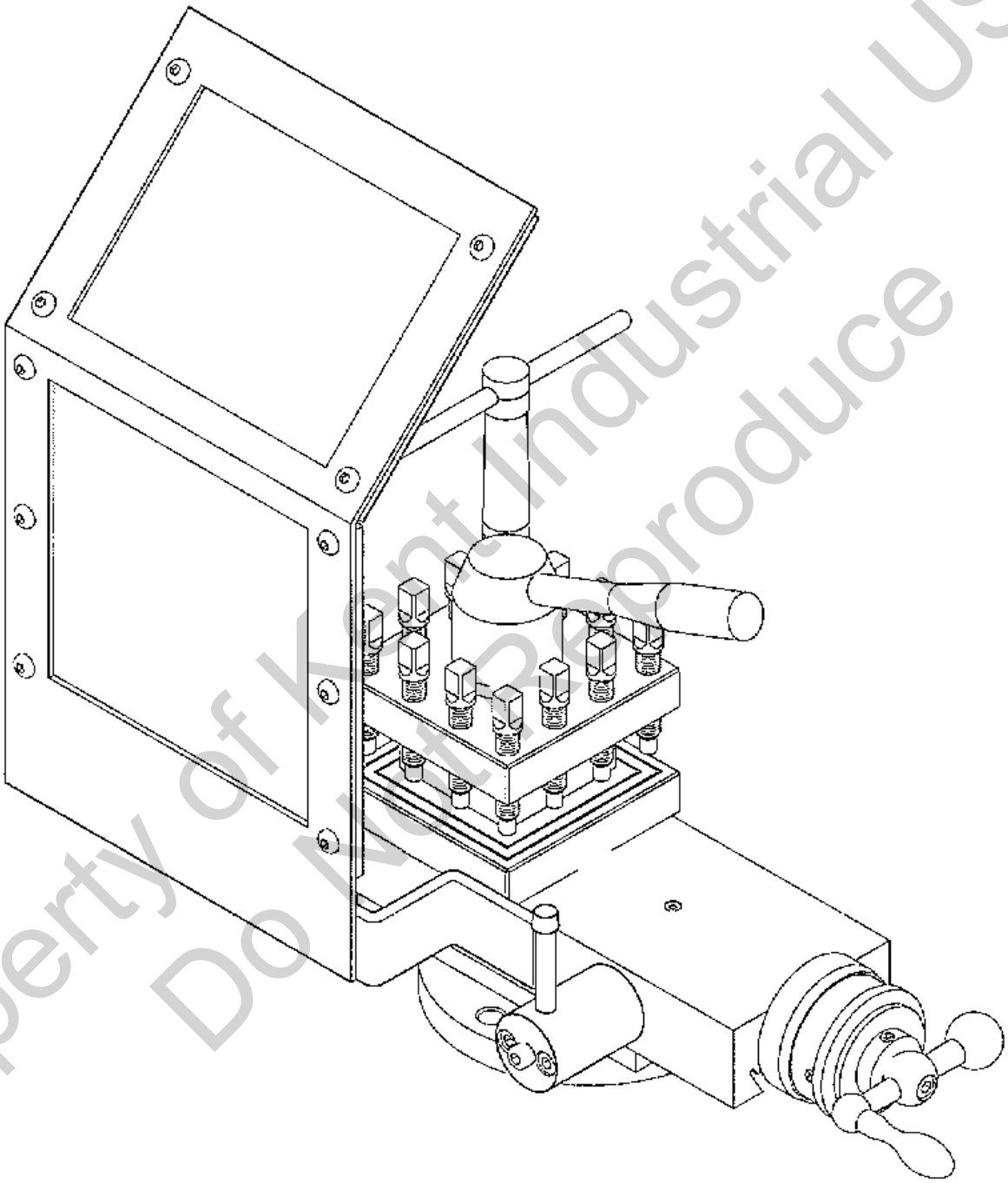
2009.08

TRAVELLING STEADY

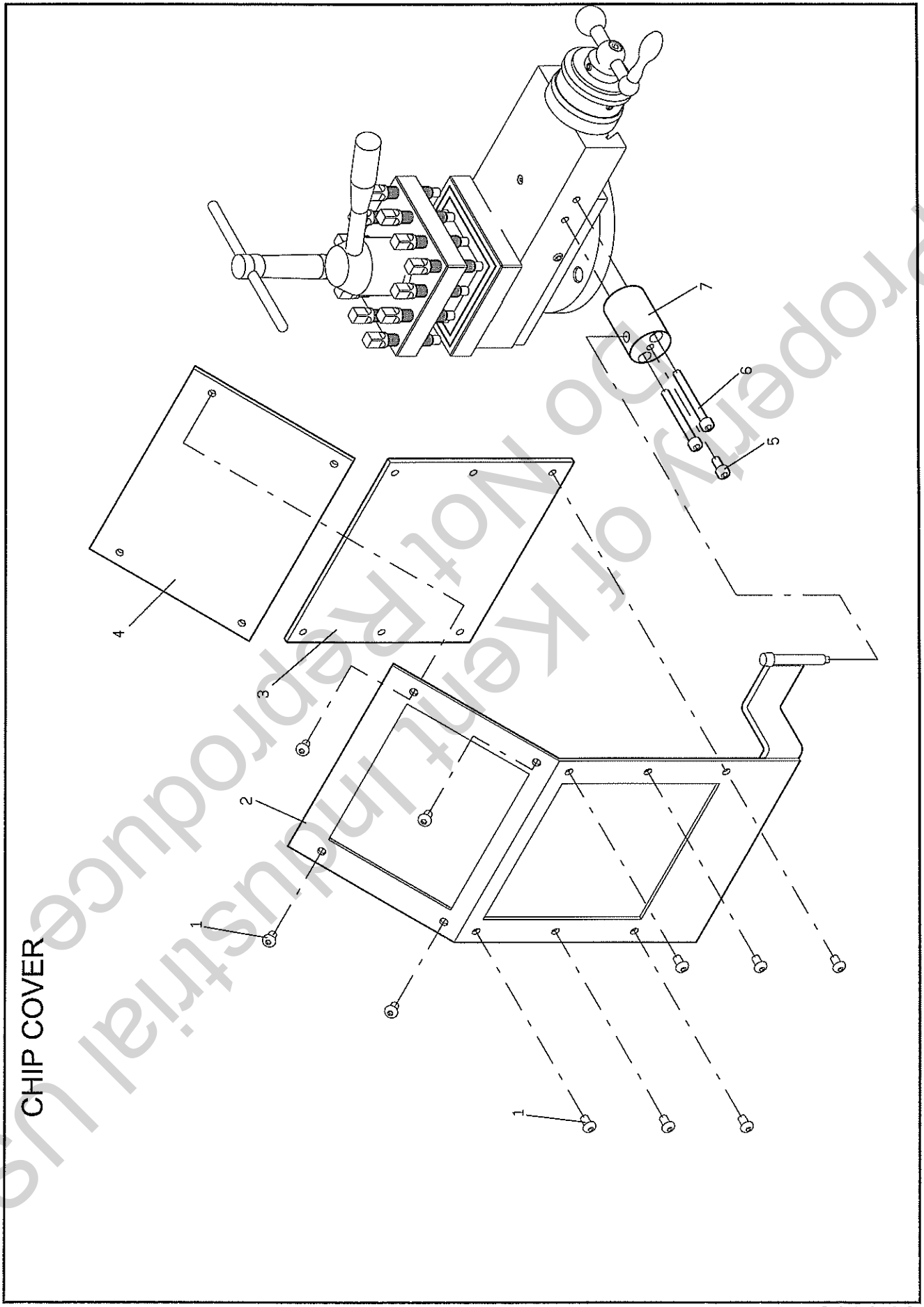
ERL-13-17

KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK	KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK
1	70038	Adjusting screw	2						
2		Spring pin	3	φ4x40L					
3	70062	Collar	3						
4	70045	Screw	2						
5	70044	Finger	2						
6	70047	Bracket	2						
7		Set screw	2	M8x8L					
8	70041	Casting	1						

CHIP COVER



2009.08



2009.08

CHIP COVER

ERL-13-18

Page 1/1

KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK	KEY NO.	PARTS NO.	PARTS NAME	Q'TY	REMARK
1		Dome hexagon screw	10	M6x10L					
2	18-68001	Chip frame	1						
3	18-68004	Plate - down	1	199x175xt4.5					
4	18-68003	Plate - up	1	199x144xt4.5					
5		Hex. socket head bolt	1	M6x12L					
6		Hex. socket head bolt	2	M6x60L					
7	18-68002		1						