

INSTRUCTION MANUAL

AL-960B
Centre Lathe (240V)
305 x 925mm
Includes Cabinet Stand



L237

IMPORTANT

BEFORE OPERATING THE MACHINE PLEASE READ CAREFULLY-
OPERATION INSTRUCTIONS PAGES 6 ~ 19 IN THE MANUAL.

THIS MANUAL APPLIES ONLY TO THE MACHINE HAVING THE
SERIAL NUMBER SHOWN, THIS IS STAMPED ON THE FRONT OF
THE HEADSTOCK AND MUST BE QUOTED IN ALL COMMUNICA-
TIONS

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SPECIFICATION AND ACCESSORIES

— GEAR HEAD TYPE —

SPECIFICATIONS:	INCH				METRIC			
	1216 1224	1236	1336	1340	1216 1224	1236	1336	1340
MODEL								
SWING OVER BED	12"		13"		305		330	
SWING OVER SADDLEEN CENTERS	6"		6 1/2"		153		165	
DISTANCE BETWEEN CENTERS	16" 24"	36"	36"	40"	406 610	915	915	1000
WIDTH OF BEO	7 1/2"				190			
SPINDLE BORE	1 9/16"				40			
TAPER OF SPINDLE NOSE BUSHING	M.T. NO.5							
TAPER OF TAILSTOCK BARREL	M.T. NO.3							
SPINDLE NOSE	D1-4							
TRAVEL OF CROSS SLIDE	6 3/4"				170			
TRAVEL OF TOP SLIDE	3 1/2"				90			
TRAVEL OF TAILSTOCK BARREL	4"				100			
NUMBER OF SPINDLE SPEEDS	12				12			
RANGE OF SPINDLE SPEEDS	70-1400 R.P.M							
NUMBER OF METRIC THREADS	24				23			
RANGE OF METRIC PITCHES	0.25-7.5 MM							
NUMBER OF INCH THREADS	40							
RANGE OF INCH THREADS	4-112 T.P.I.							
LEAD SCREW DISMETER & PITCHES	7/8 × 8 T.P.I				22MM × 4MM			
MOTOR HORSE POWER	1HP OR 1 1/2 HP				0.75KW OR 1.0KW			
MEASUREMENT(WITHOUT STAND)1SET/RATE	56"x30"x30"	70"x30"x30"	73"x30"x30"		1420x750x750	1780x750x750	1855x750x750	
NET WEIGHT kg.	280	300	310	320	280	300	310	320

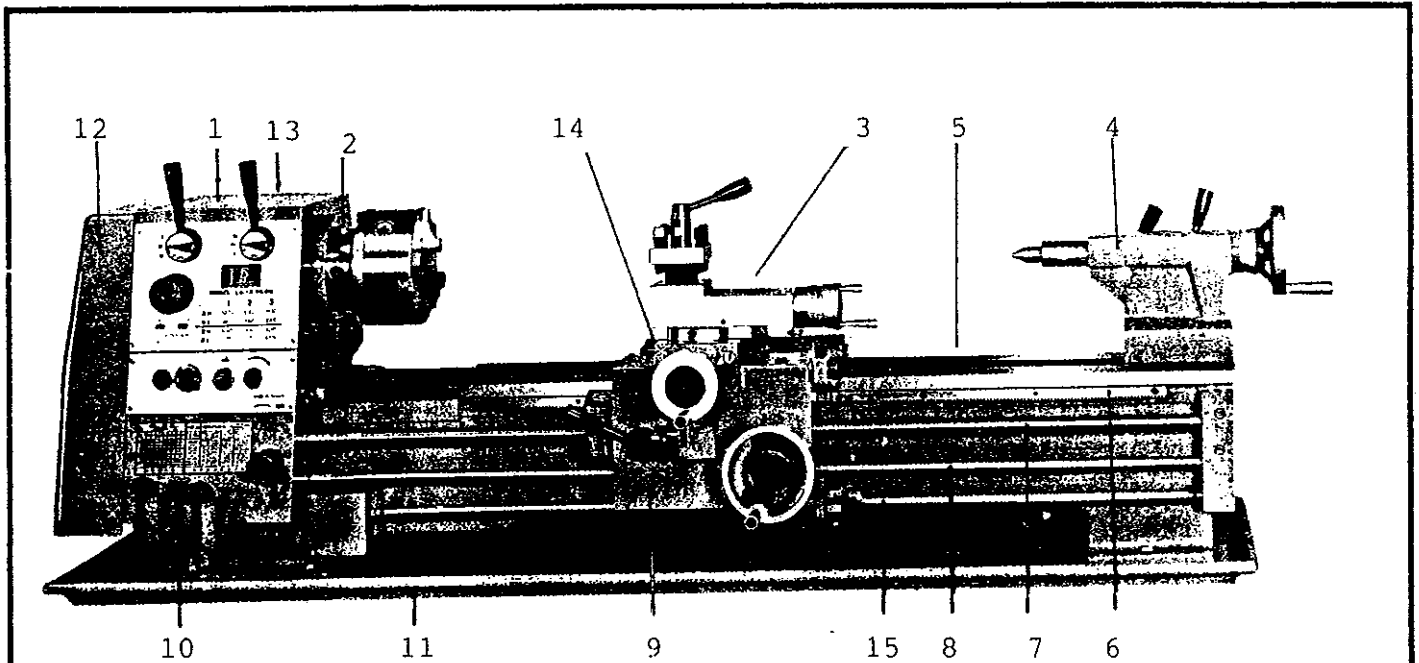
STANDARD ACCESSORIES

1. MOTOR PULLEY-----1pc
2. 3-JAW CHUCK BACKPLATE 6"-----1pc
3. 4-JEW CHUCK BACKPLATE 8"-----1pc
4. CENTER SLEEVE (MT5×MT3)-----1pc
5. CENTER (M.T.3)-----1pcs
6. TOOL BOX-----1pc
7. TOOLPOST WRENCH-----1pc
8. CHANGE GEAR-----2pcs
9. ALLEN WRENCH-----1set
10. OPEN WRENCH-----1pc
11. 4-WAY TOOL POST-----1pc

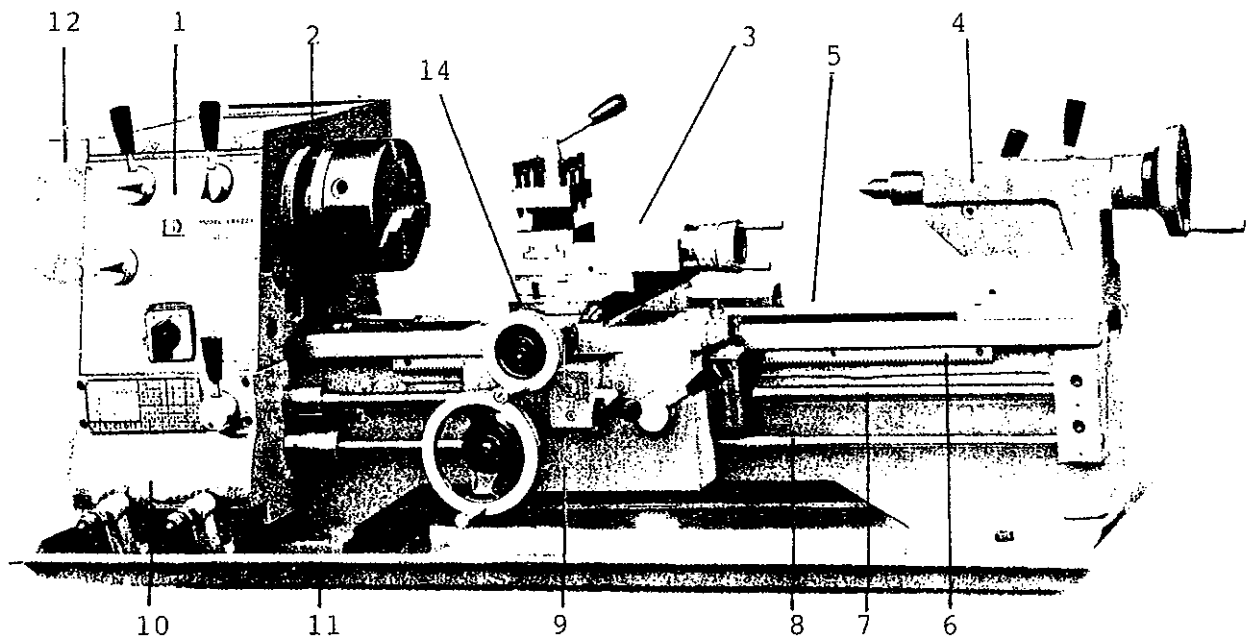
SPECIAL ACCESSORIES

1. MOTOR
2. 3-JAW CHUCK 6"
3. 4-JAW INDEPENDENT CHUCK 8"
4. FACE PLATE 10"
5. DRILL CHUCK 1/2"
6. ROLLING CENTER (M.T.3)
7. FOLLOW REST
8. STEADY REST
9. FLOOR STAND
10. COOLANT PUMP SYSTEM
11. TAPER TURNING ATTACHMENT
12. SINGLE TOOL POST
13. 5C LEVER COLLET CLOSER (HAND WHEEL)
14. MILLING ATTACHMENT

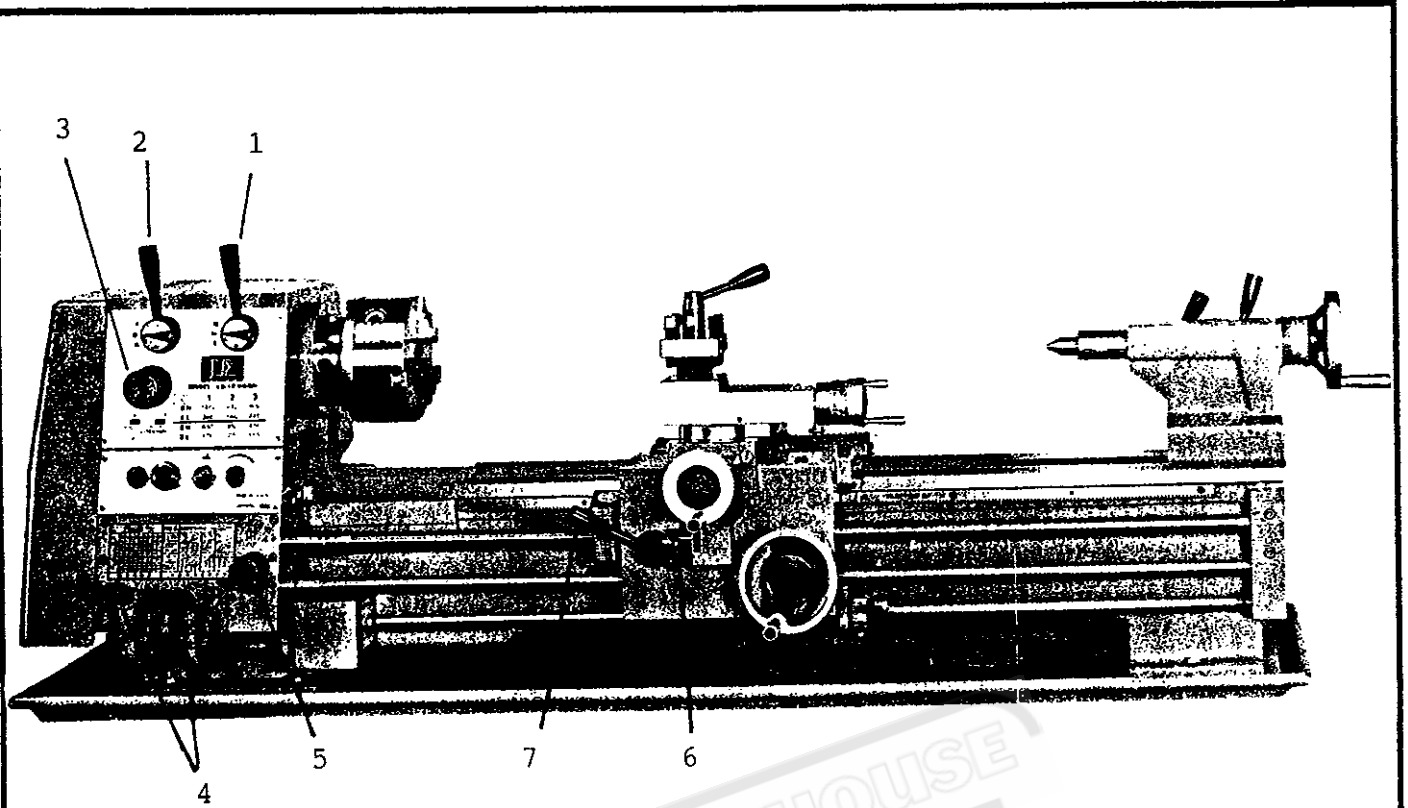
GENERAL LAYOUT OF LATHE



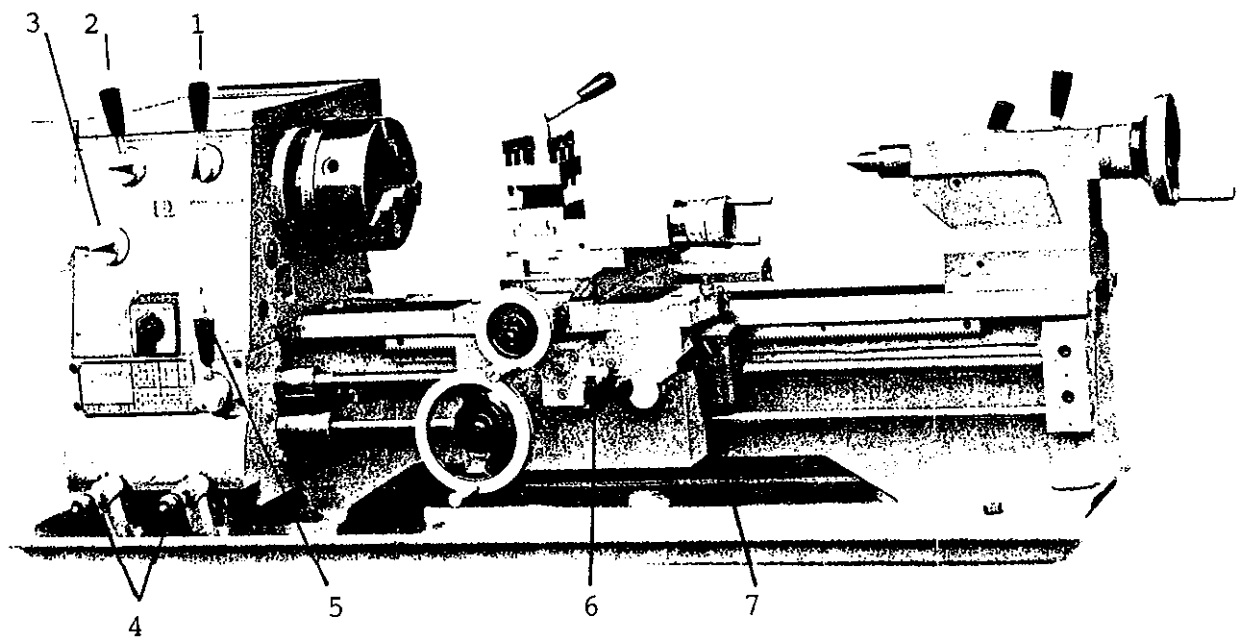
- | | |
|---------------|------------------------------------|
| 1. HEADSTOCK | 9. APRON |
| 2. SPINDLE | 10. GEAR BOX |
| 3. TOP SLIDE | 11. CHIP PAN |
| 4. TAILSTOCK | 12. END COVER |
| 5. BED | 13. ELECTRICAL BOX |
| 6. RACK | 14. SADDLE AND CROSS-SLIDE |
| 7. LEAD SCREW | 15. SPINDLE ROTATION CONTROL LEVER |
| 8. FEED SHAFT | |



CONTROL



CAUTION: DO NOT SHIFT GEARS WHEN THE SPINDLE IS RUNNING

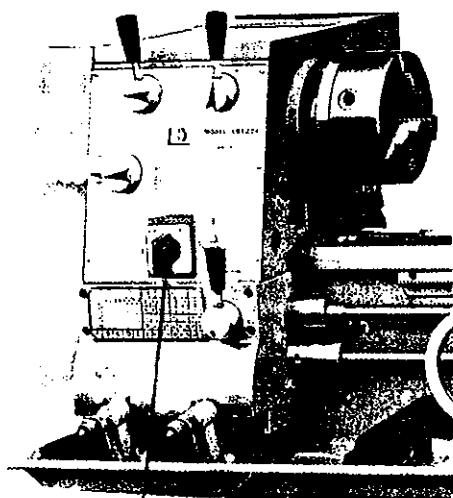


LATHE CONTROL

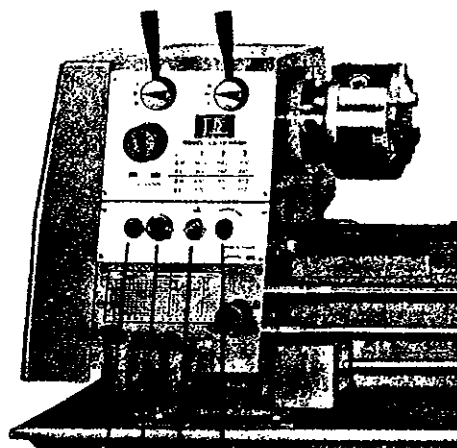
1. SPINDLE SPEED SELECT LEVER
2. SPEED SELECT LEVER
3. CARRIAGE DIRECTION SELECT KNOB
4. GEAR BOX ROTATING SPEED CHANGE LEVER
5. LEAD SCREW OR FEED CHANGE LEVER
6. AUTOMATIC FEED LEVER
7. THREAD CUTTING HALF-NUT LEVER
8. CONTROL V-BELT LEVER (BELT DRIVE TYPE)

MACHINERYHOUSE

ELECTRICAL CONTROL



5



4 3 2 1

ELECTRICAL CONTROL

WITH THE EXCEPTION OF THE LATHE ISOLATOR, ALL ELECTRICAL CONTROLS ARE FITTING INTO THE FRONT FACE OF THE HEADSTOCK:

1. EMERGENCY STOP BUTTON
2. MAIN MOTOR JOGGING BUTTON
(GEAR HEAD TYPE WITH ELECTRIC BOX)
3. COOLANT PUMP SWITCH
4. PILOT LAMP
5. SPINDLE FORWARD AND REVERSE
CHANGEVER SWITCH

INSTALLATION

CLEANING

Before operation any controls, remove the anticorrosion coating from all slideways, and the endgear train, using white suirit or Kero-sene.

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

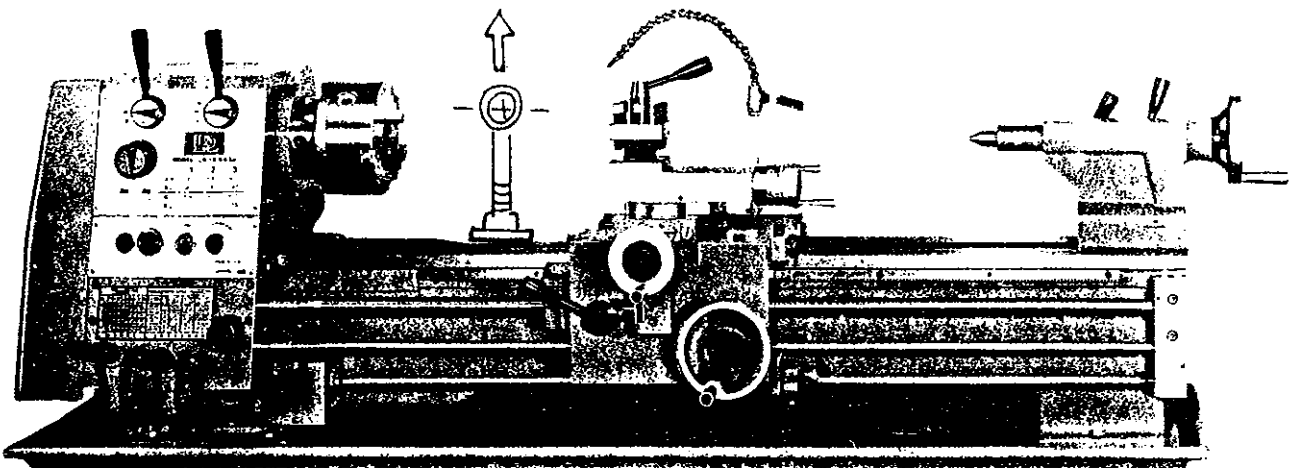
Oil all bright machined surfaces immediately after cleaning using machine oil or slideway LUBRICANT use heavy oil or grease on the end-gears.

LIFTING

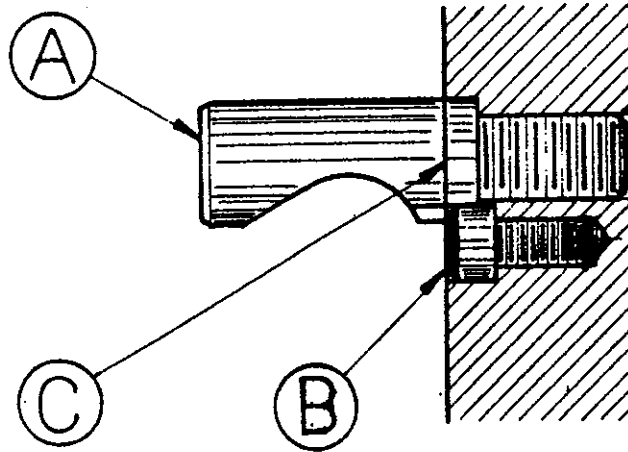
Use the bed-clamping plate and eyebolt to sling the lathe, position the saddle and tailstock along the bed to obtain balance.

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 BE BENT.



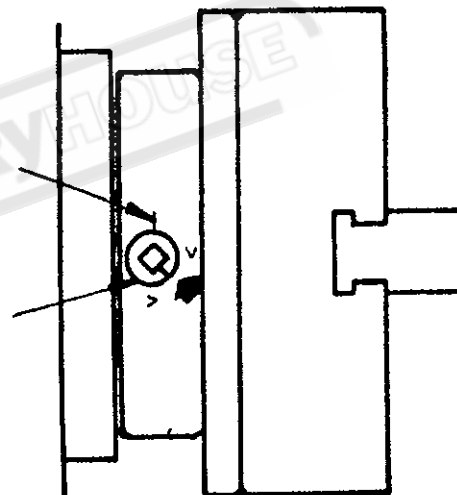
INSTALLATION



CORRECT

CAM RELEASE DATUM

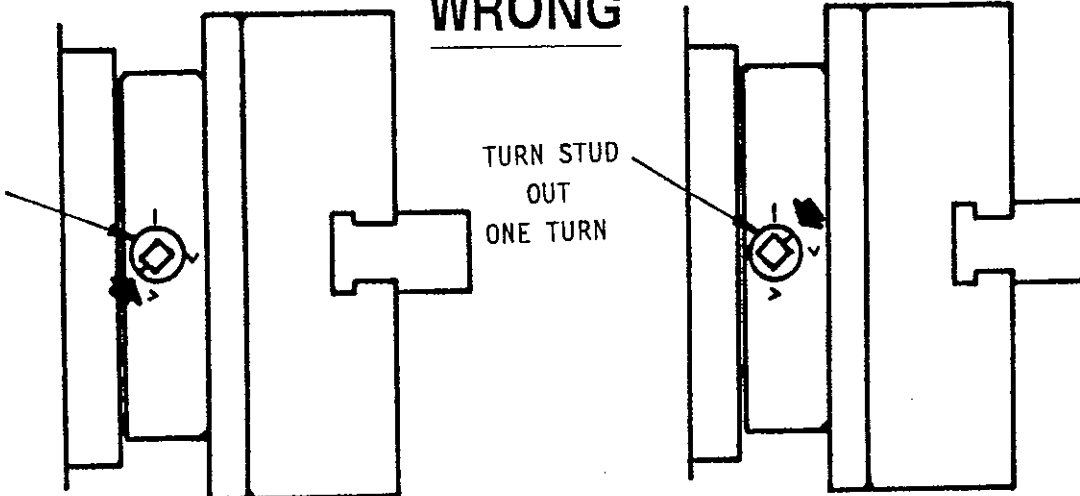
CAM LOCK LINE
BETWEEN ARROWS



WRONG

TURN
STUD
IN
ONE
TURN

TURN STUD
OUT
ONE TURN



INSTALLATION

CHUCKS AND CHUCK MOUNTING(GEAR HEAD TYPE)

When mounting chucks or faceplate, first, ensure that spindle and chuck tapers are scrupulously clean and that all cams lock in the correct positions, see Fig. It may be necessary when mounting a new chuck to re-set the camlock studs (A). To do this, remove the cap-head locking screw (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).

Now mount the chuck or faceplate on the spindle nose and tighten the three 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.

This will assist subsequent remounting.

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

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

LUBRICATION CHECKS

A. HEADSTOCK

THE HEADSTOCK CAN FILL BY THE OIL NOZZEL. BE SURE THAT THE OIL LEVEL IS ALWAYS KEPT AT THE TOP OF THE LEVEL MARK WHICH IS ON THE SIGHT GLASSES IN THE CHUCK-FACE OF THE HEADSTOCK.

✘ CHACK OIL LEVEL WEEKLY AND CHANGE THE OIL EVERY SIX(6) MONTHS.

B. QUICK CHANGE GEAR BOX

OIL TANK IS INSTALLED AT THE UPPER PART OF THE QUICK CHANGE GEAR BOX. IT SENDS THE OIL TO EACH BEARING PART THROUGH THE OIL ROUTH FROM THE LOWER PART OF THE TANK. ONCE THE OIL IS SUPPLIDE, IT WILL NOT BE RETURNED AND THE HAND OILING IS NECESSARY TO DO EVERYDAY.

TOP-UP OR REFILL THE GEAR BOX WITH SHELL TELLUS OIL 27 THROUGH OILING INLET LOCATED ON THE TOP OF THE GEAR BOX.

C. APRON

APRON OILING SHOULD BE MADE THROUGH THE OIL INLET IN THE TOP OF THE SADDLE, BY REMOVING THE CAP OF THE OIL INLET. THE APRON WITH SHELL TONNA OIL 27 LUBRICANT.

D. INTERMEDIATE GEAR

LUBRICATE THE GEARS AND TENSION PULLEY REGULARLY (ONCE A MONTH) WITH THICK MACHINE OIL OR GREASE, THE OIL CAN APPLY TO THE INTERMEDIATE GEAR SHAFTS.

E. OTHER PORTIONS

THERE ARE OIL INLETS IN CROSS SLIDE, COMPOUND REST, FEED SCREW SHAFT BEARING AND BRACKET WHICH HOLDS ROD, LEAD SCREW AND TAILSTOCK, HAND OILING IS REQUIRED FROM TIME TO TIME.

ENSURE THAT THE SLIDEWAYS ARE THOROUGHLY CLEANED AND LUBRICATED BEFORE OPERATING THE LATHE.

MACHINERYHOUSE

OPERATION

APRON CONTROLS

In addition to HAND wheel traverse, the carriage can be power-operated through controls on the front of the apron. Automatic feed lever (A) if move upwards, carriage would do longitudinal-feed operation. If move lever (A) in middle position, it would do manual operation. If move lever (A) downwards, it would do cross-feed operation.

Lever (B) is pressed downward to engage the leadscrew nut for screw-cutting.

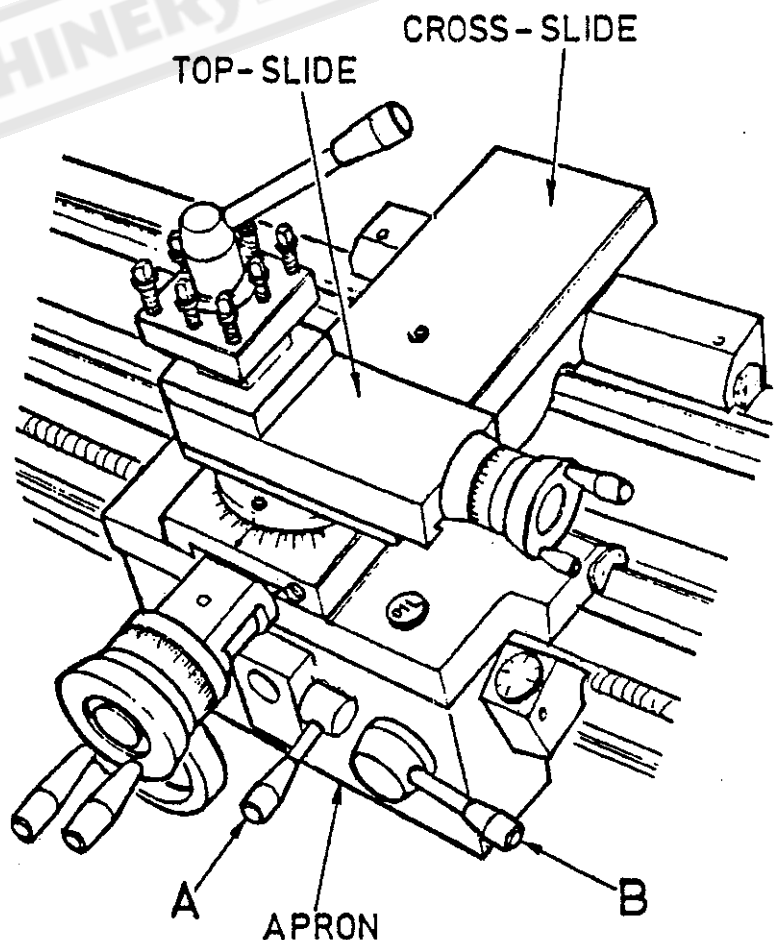
To avoid undue wear, release the nut except when screwcutting. An interlock within the apron prevents in advertent engagement of automatic feed lever (A) and half nut lever (B) at the same time.

CROSS SLIDE AND TOP SLIDE

A solid topslide is fitted as standard to the cross-slide, carried on a rotatable base the cross-slide is marked 45-0-45 deg. For accurate indexing.

Handwheel dials are graduated in inch or metric division to suit the operating screw and nut fitted.

The cross-slide can be power operated by pulled downward the automatic feed lever at half sliding feed per spindle revolution, or if can be hand-operated using the large-diameter dial graduated in either inch or metric divisions to suit the operating screw and nut fitted.



OPERATION

TAILSTOCK

(A) CLAMP LEVER

THE TAILSTOCK SLIDES ALONG THE BEDWAYS AND MAY BE ANCHORED IN ANY POSITION BY MOVING CLAMP LEVER.

(B) QUILL LOCK LEVER

THE QUILL CAN BE LOCKED BY THE QUILL LOCK LEVER.

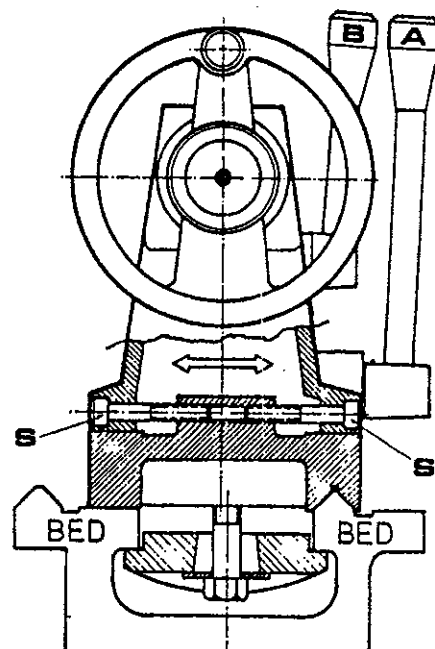
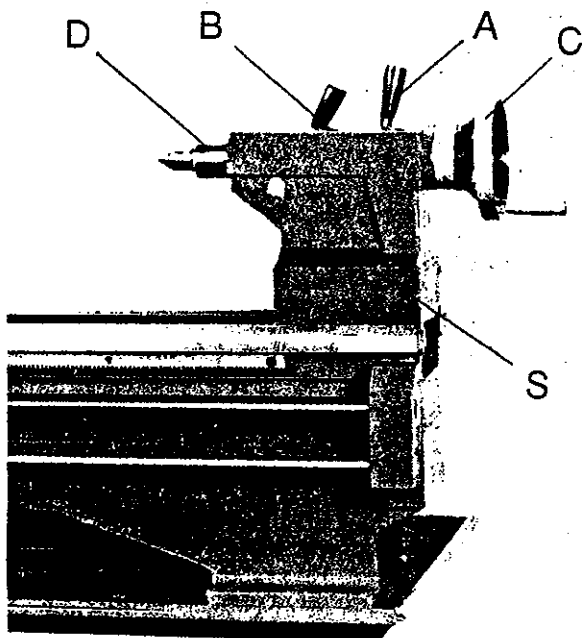
(C) HANDWHEEL

TO SLIDE THE QUILL ROTATE THE TAILSTOCK HANDWHEEL

(D) QUILL

(S) TAPER SET OVER SCREW

FOR SMALL TAPERS, THE TAILSTOCK CAN BE SET OVER BY LOOSING THE CLAMP LEVER AND ADJUSTING THE SET OVER SCREW ON THE FRONT OF AND THE REST OF THE TAILSTOCK BOSE.



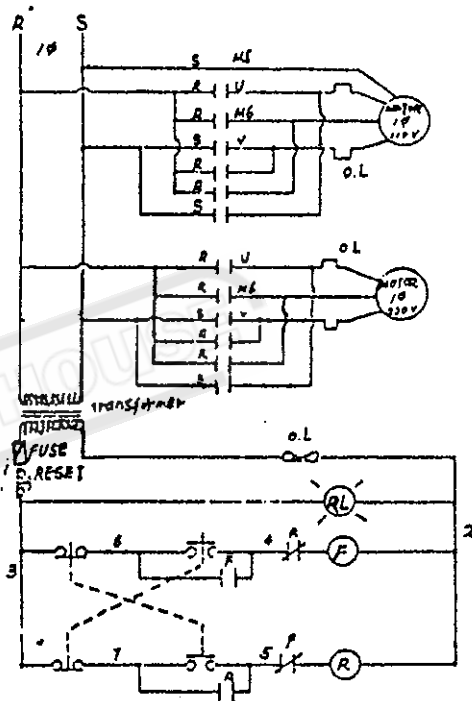
WIRING DIAGRAM

ELECTRIC CONTROL

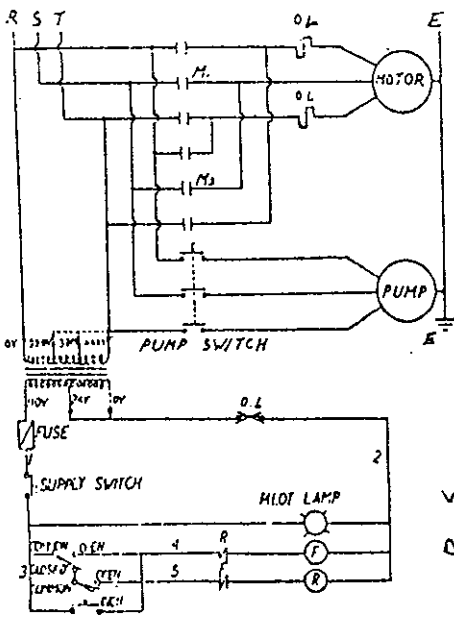
The electric equipment provided is different depend on the basic arrangement of the machine and the requirement which is specified by customers. The machine is ready for installation and connected with three phase or single phase, 50 or 60 cycles motor A.C. supply of standard voltages.

- NOTE:**
- * Make sure the motor type to be fitted in with your power source in voltage and power cycle.
 - * Connect the fuse with the source switch and ground properly.
 - * Motor must go clockwise that can be viewed from the pulley end.
- Interchange any two of the three phasw lines if motor run in wrong direction.

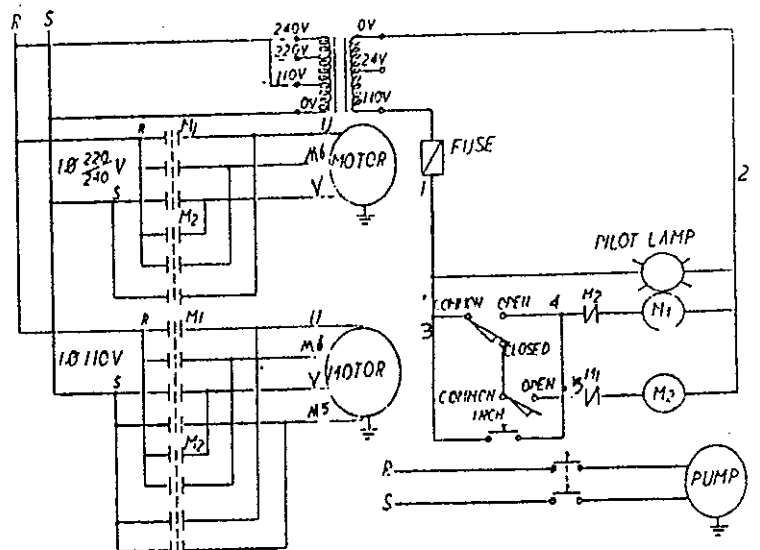
SINGLE PHASE (FIG.7)



THREE PHASE (FIG.9)



SINGLE PHASE (FIG.8)



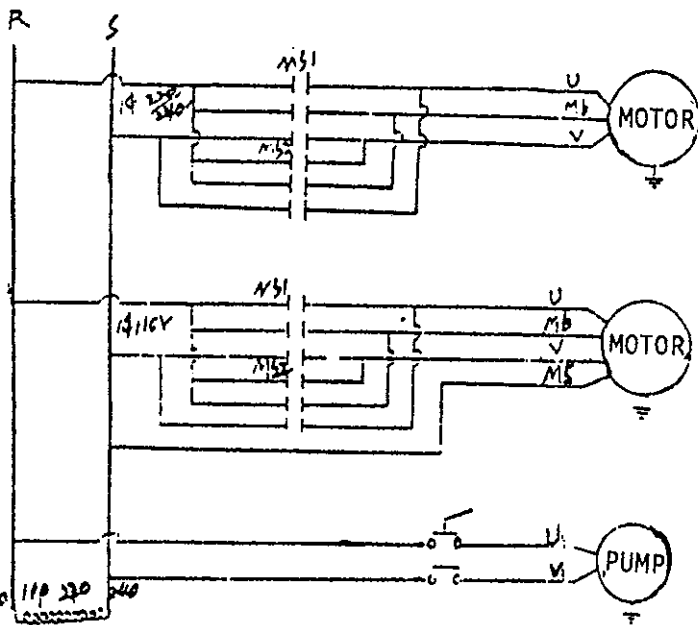


FIG. 7: 110V, 220V, 240V. (1 PH)

FIG. 8: 110V, 220V, 240V. (1 PH)

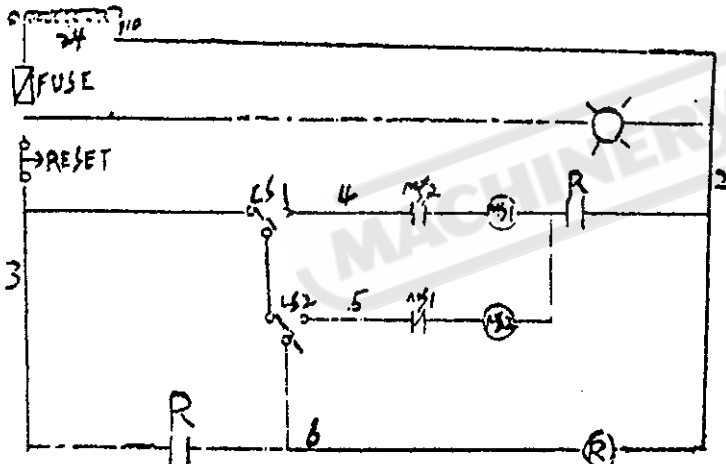
SWITCH SHAFT

FIG. 9: 220V, 380V, 415V. (3 PH)

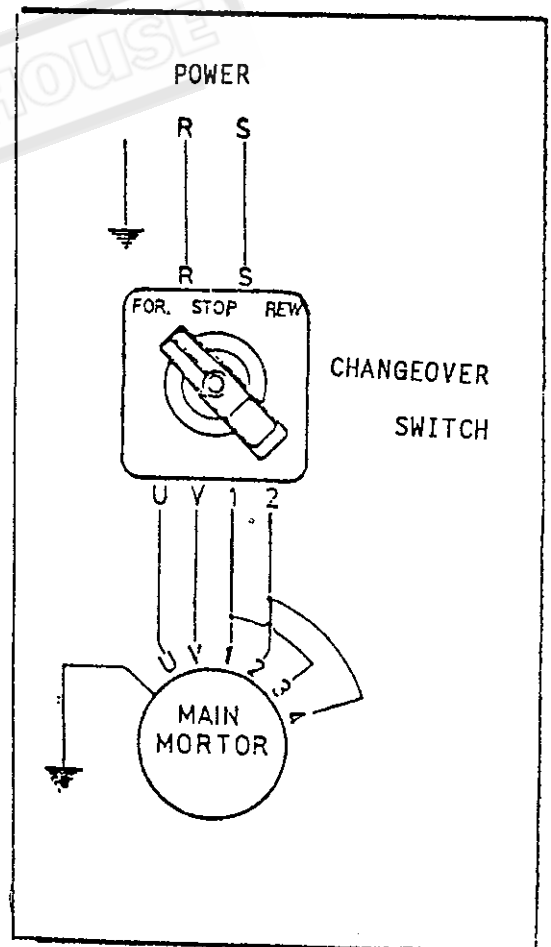
SWITCH SHAFT

FIG.10: 110V, 220V, 240V. (1 PH)

SWITCH SHAFT



SINGLE PHASE (FIG.10)



(single phase)(FIG.11)

OPERATION

IMPERIAL THREADS AND FEEDS DIAGRAM

ins									FEED (in)	METRIC THREAD mm												
LETTER	1	2	3	4	5	6	7	8	1/2													
	A	4	4½	4½	5	5½	6	6½		7	0.082-0.047		1	4	6	1	4	6	1	2	4	6
	B	8	9	9½	10	11	12	13		14	0.041-0.023	A	6	4.8	4	7.5	6	5	4.5	4	3	
	C	16	18	19	20	22	24	26		28	0.02-0.011	B	3	2.4	2	3.75	3	2.5	2.25	2	1.8	1.5
	D	32	36	38	40	44	48	52		56	0.01-0.0055	C	1.5	1.2	1	1.5	1.25	1	0.9	0.75		
	E	64	72	76	80	88	96	104		112	0.005-0.0027	D	0.75	0.6	0.5	0.75		0.5	0.45			
										E		0.3	0.25					0.25				
	A	B	C	D	E					1	2	3	4	5	6	7	8					

THREADS AND FEEDS

* THREAD CUTTING OPERATION

ROTATING LEAD SCREW BY OPERATING GEAR BOX SHIFT LEVER, OPERATE DOWNWARD THREAD CUTTING HALF NUT LEVER, AND IT WILL BE CLUTCHED WITH LEAD SCREW, TO OBTAIN THE LONGITUDINAL TRAVEL, NAMELY, THE THREAD CUTTING FEED.

DIRECTION OF THREAD CUTTING IS DECIDED BY POSITIVE REVERSE LEVER AT THE HEADSTOCK, THE THREAD CUTTING PITCH CAN BE SELECTED BY GEAR BOX SHIFT LEVER AND QUICK CHANGE LEVER.

METRIC THREADS AND FEEDS DIAGRAM

mm							FEED (mm)	tpi													
LETTER	1	2	3	4	5	6	1/2														
	A	6	7	5	4.8	3.6		4	1.560-1.040	E	F	A ₁	4	E	F	D ₆	48	E	F	B ₁	13
	B	3	3.5	2.5	2.4	1.8		2	0.780-0.52			B ₁	8			E ₆	96			C ₁	26
	C	1.5	1.75	1.25	1.2	0.9		1	0.390-0.26			C ₁	16	30	36	A ₁	4½			D ₁	52
	D	0.75			0.6	0.45		0.5	0.195-0.13			D ₁	32			B ₁	9			E ₁	104
	E				0.3	0.25		0.098-0.065				E ₁	64			C ₁	18	30	28	A ₁	3½
	A	B	C	D	E			30	32	A ₂	5			D ₁	36			B ₁	7		
										B ₂	10			E ₁	72			C ₁	14		
										C ₂	20	30	44	A ₁	5½			D ₁	28		
										D ₂	40			B ₁	11			E ₁	56		
										E ₂	80			C ₁	22	30	38	B ₁	9½		
										A _c	6			D ₁	44			C ₁	19		
										B _c	12			E ₁	88			D ₁	38		
										C _c	24	30	52	A ₁	6½			E ₁	76		
	A	B	C	D	E					1	2	3	4	5	6						

OPERATION

THREADING DIAL INDICATOR

A. IMPERIAL THREADS

LOCATED ON RIGHT-HAND SIDE OF THE APRON ON LATHE HAVING AN ENGLISH LEADSCREW, ENGAGE THE INDICATOR PINION WITH THE LEADSCREW AND TIGHTEN THE HANDNUT TO RETAIN INDICATOR IN ENGAGEMENT.

TO CUT THREADS OF AN EVEN NUMBER PER INCH, CLOSE THE LEADSCREW NUT 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 1/4 OR 1/2 T.P.I. MAY BE CUT BY CLOSING THE NUT AT THE SAME NUMBERED LINE ON EACH PASS OF THE TOOL.

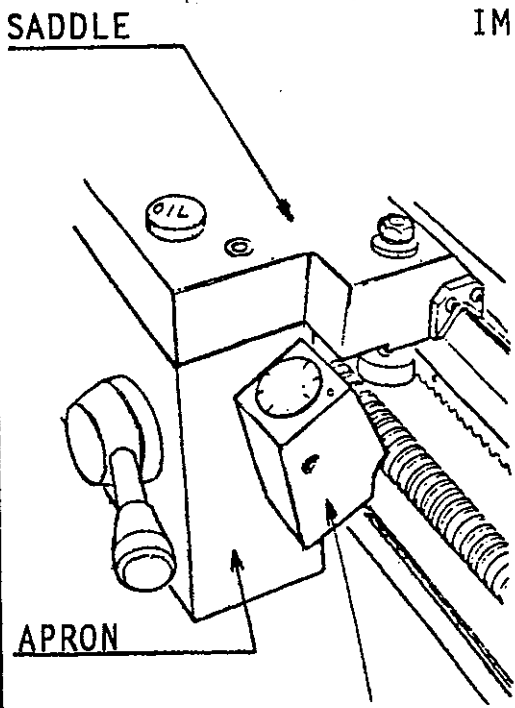
THIS DIAL CANNOT BE USER WITH AN ENGLISH LEADCREW TO CUT METRIC THREADS, OR FRACTIONAL THREADS. FOR THESE THE LEADCREW NUT MUST BE KEPT CLOSED AND THE MACHINE REVERSED BY USE OF THE CHANGE-OVE SWITH, AFTER EACH CUTTING PASS AND TOOL WITH DRAWAL.

B. METRIC THREADS

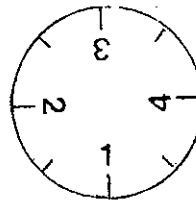
THE THREAD DIAL USED FOR CUTTING METRIC SCREW THREADS ON LATHES EQUIPPED WITH METRIC LEADSCREW, TO PROVIDE FOR THE VARIOUS PITCHES OF METRIC THREADS, SEVERAL GEARS HAVING DIFFERENT NUMBERS OF TEETH ARE MOUNTED ON THE LOWER END OF THE SHAFT. THE VERTICAL POSITION OF THE THREAD DIAL INDICATOR IS CHANGED AS REQUIRED SO THAT THE CORRECT GEAR FOR THE PITCH OF THE THREAD TO BE CUT WILL MESH WITH THE LEADSCREW.

EACH GRADUATION ON THE DIAL IS MARKED WITH A LETTER WHICH INDICATES THE POINTS AT WHICH THE HALFNUTS MAY BE ENGAGED FOR CERTAIN THREADS.

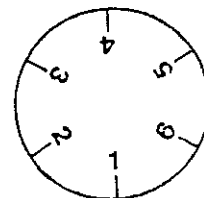
A DIAGRAM IS SUPPLIED WITH THE THREAD DIAL TO SHOW WHICH GEAR AND WHICH GRADUATIONS MUST BE USED FOR EACH PITCH OF METRIC SCREW THREAD.



IMPERIAL
THREAD DIAL



METRIC
THREAD
DIAL

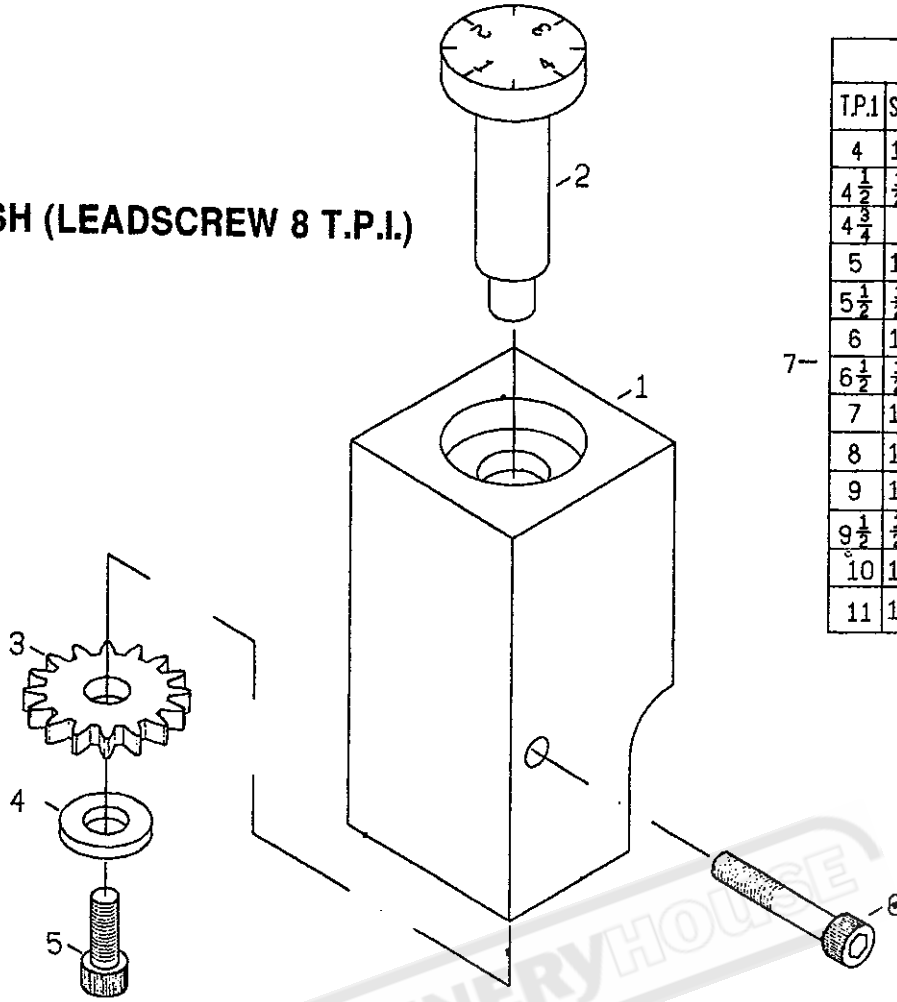


INDICATOR TABLE					
T.P.I.	SCALE	T.P.I.	SCALE	T.P.I.	SCALE
4	1-8	12	1-8	38	
4 1/2	13/24	13	1-4	40	
4 3/4	1	14		44	
5	1-4	16	1-8	48	
5 1/2	13/24	18		52	
6	1-8	19	1-4	56	1-8
6 1/2	13/24	20		64	
7	1-4	22		72	
8	1-8	24	1-8	76	
9	1-4	26		80	
9 1/2	13/24	28		96	
10	1-8	32		104	
11	1-4	36		112	

INDICATOR TABLE		
GEAR	PITCH	SCALE
18 T	0.45	0.9 1, 4
	0.3	0.6 13, 5
	0.25	0.75
	0.5	1.5
	1	3 1-6
	2	6
20 T	1.25	50 1, 4
	2.5	
21 T	1.75	70 1, 3, 5
	3.5	

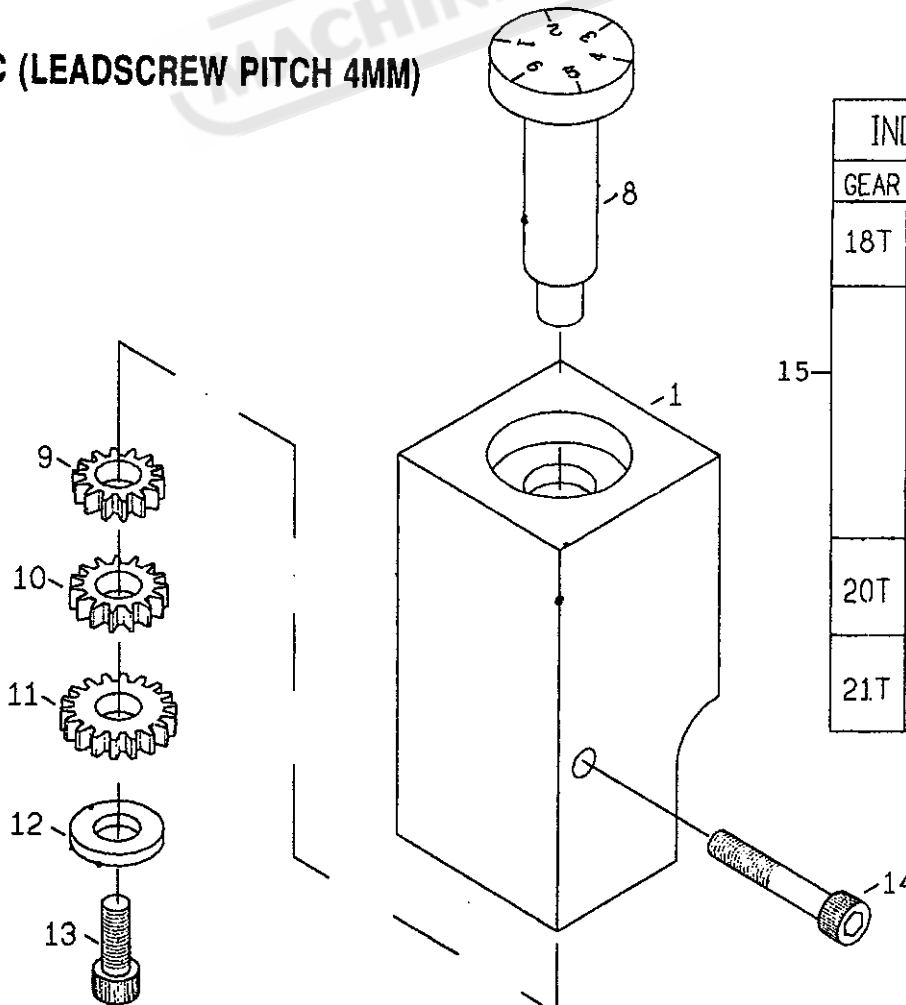
THREADING DIAL INDICATOR

ENGLISH (LEADSCREW 8 T.P.I.)



INDICATOR TABLE					
T.P.1	SCALE	T.P.1	SCALE	T.P.1	SCALE
4	1-8	12	1-8	38	1-8
4 $\frac{1}{2}$	$\frac{1}{2}, \frac{3}{4}$	13	1-4	40	
4 $\frac{3}{4}$	1	14	1-8	44	
5	1-4	16		48	
5 $\frac{1}{2}$	$\frac{1}{2}, \frac{3}{4}$	18		52	
6	1-8	19	1-4	56	
6 $\frac{1}{2}$	$\frac{1}{2}, \frac{3}{4}$	20		64	
7	1-4	22		72	
8	1-8	24		76	
9	1-4	26	1-8	80	
9 $\frac{1}{2}$	$\frac{1}{2}, \frac{3}{4}$	28		96	
10	1-8	32		104	
11	1-4	36		112	

METRIC (LEADSCREW PITCH 4MM)

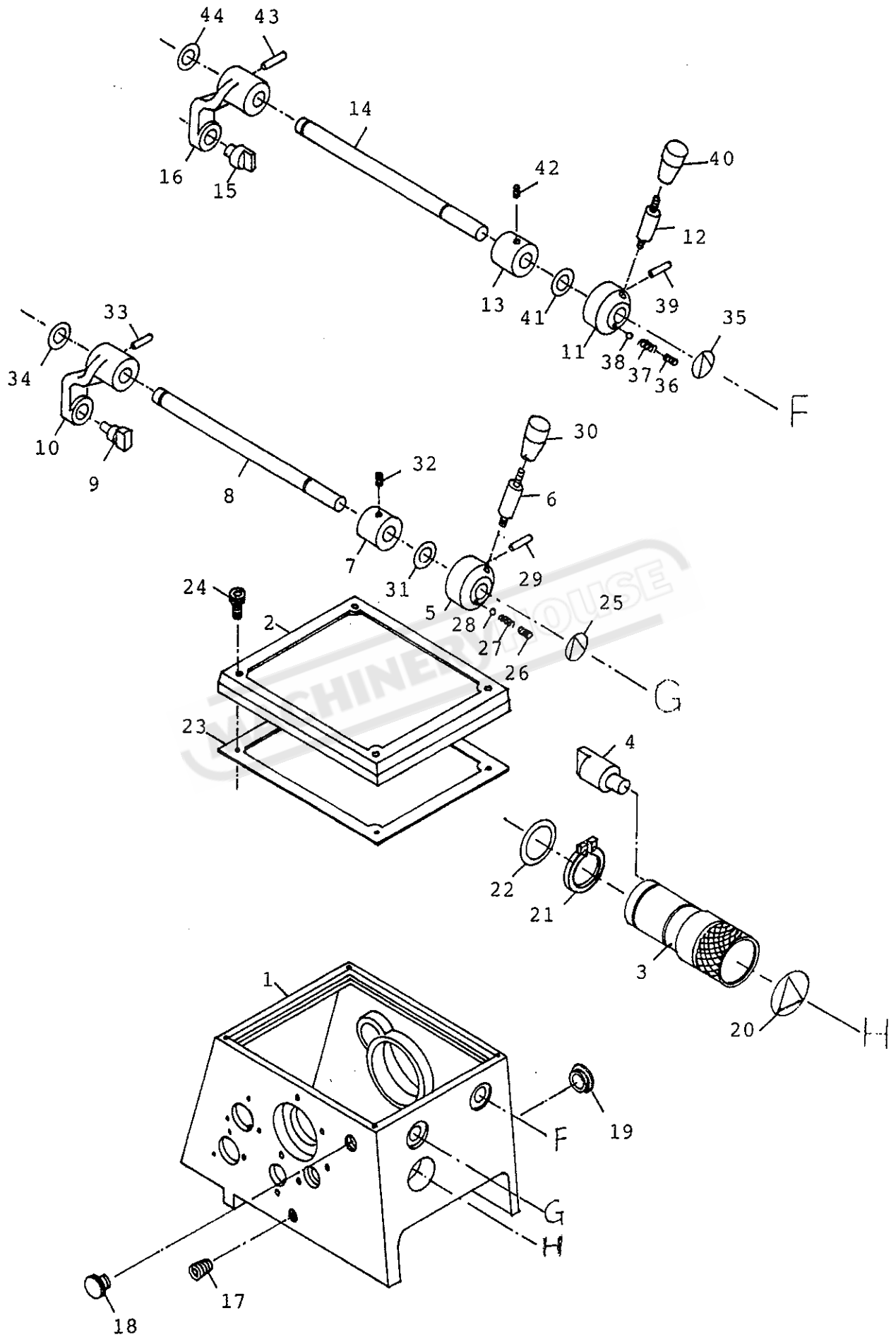


INDICATOR TABLE			
GEAR	PITCH		SCALE
18T	0.45	0.9	1, 4
	0.3	0.6	13, 4
15-	0.25	0.75	1-6
	0.5	1.5	
	1	3	
	2	6	
20T	1.25	50	1, 4
	2.5		
21T	1.75	70	1, 3, 5
	3.5		

THREADING DIAL

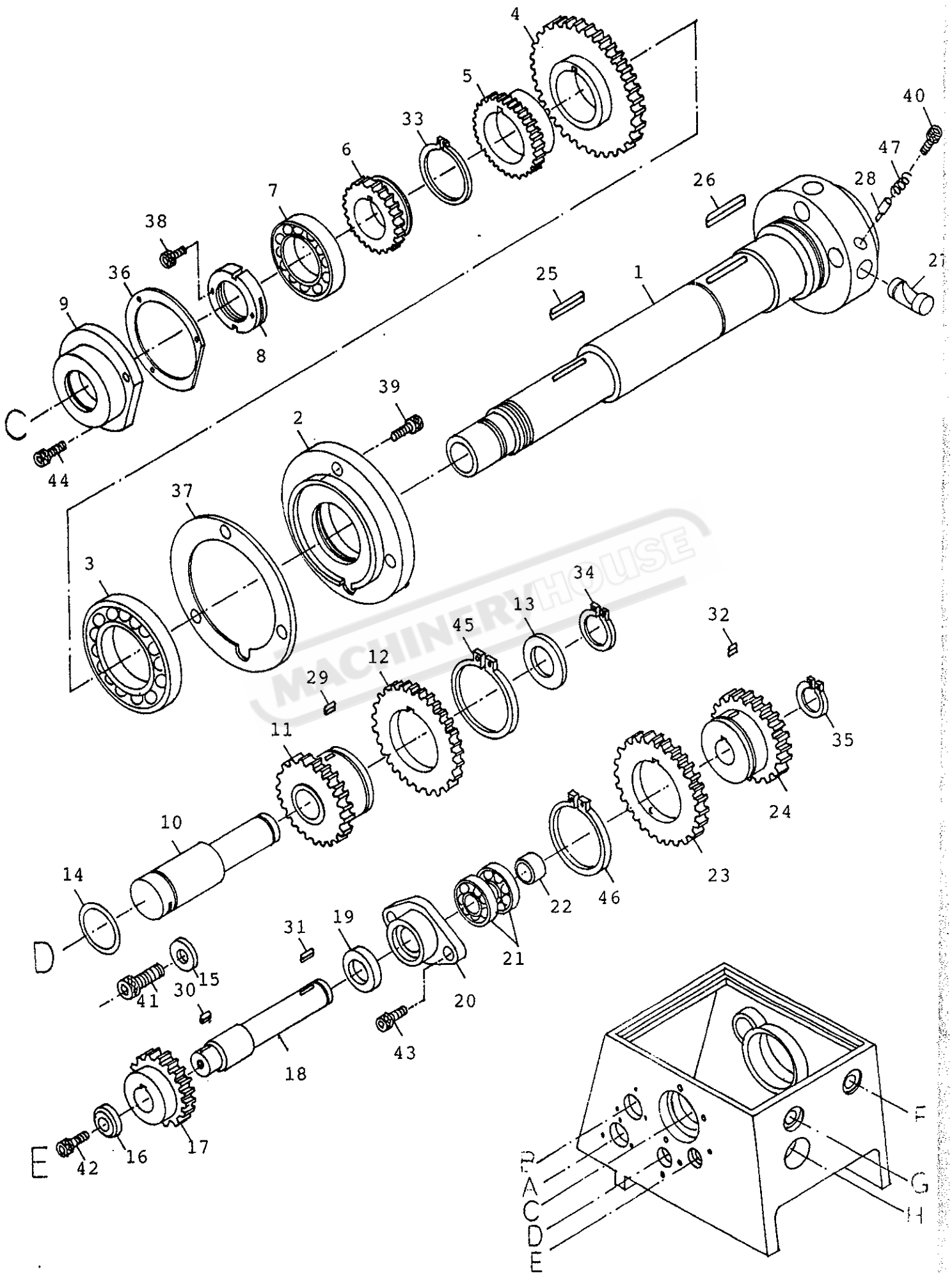
REF.NO.	PART NO.	DESCRIPTION	Q'TY	REMARKS
1	3334	GUARD	1	
2	3335	THREAD DIAL BODY	1	
3	3336	GEAR	1	
4	3375	WASHER	1	
5	3376	SCREW	1	
6	3377	SCREW	1	
7	3378	PLATE	1	
8	3326	THREAD DIAL, BODY	1	
9	3379	GEAR	1	
10	3380	GEAR	1	
11	3381	GEAR	1	
12	3382	WASHER	1	
13	3383	SCREW	1	
14	3384	SCREW	1	
15	3385	PLATE	1	

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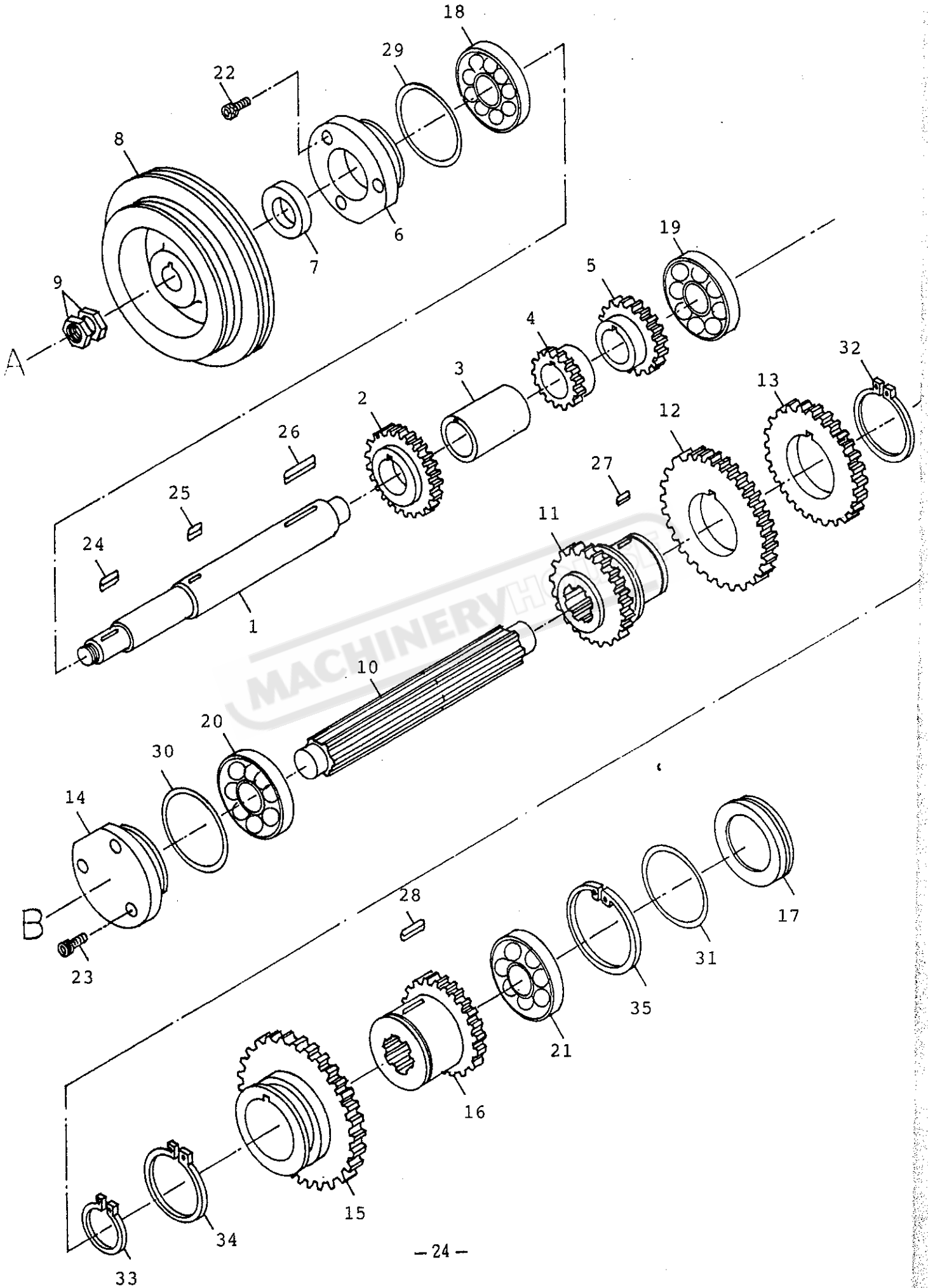
HEADSTOCK CASTING AND CONTROLS (GH TYPE)

REF.NO.	PART NO.	DESCRIPTION	Q'TY	REMARKS
1	A-3101	HEADSTOCK	1	
2	A-3154	COVER	1	
3	A-3156	HANDLE	1	
4	A-3131	SHIFT FORK	1	
5	A-3132	HANDLE	1	
6	A-3133	LEVER	1	
7	A-3137	COLLAR	1	
8	A-3135	SHAFT	1	
9	A-3138	SHIFT FORK	1	
10	A-3136	FORK ARMS	1	
11	A-3132	HANDLE	1	
12	A-3133	LEVER	1	
13	A-3137	COLLAR	1	
14	A-3135	SHAFT	1	
15	A-3138	SHIFR FORK	1	
16	A-3136	FORK ARMS	1	
17	A-3146	SCREW	1	
18	A-3146	SCREW	1	
19	A-3147	OIL SIGHT	1	
20	A-3148	INDEXING PLATE	1	
21	A-3149	CIRCLIP	1	
22	A-3150	OIL RING	1	
23	A-3151	GASKET	1	
24	A-3152	SCREW	4	
25	A-3153	INDEXING PLATE	1	
26	A-3155	SCREW	1	
27	A-3157	SPRING	1	
28	A-3158	STEEL BALL	1	
29	A-3159	SPRING PIN	1	
30	A-3134	PVC KNOB	1	
31	A-3160	OIL RING	1	
32	A-3161	SCREW	1	
33	A-3162	SPRING PIN	1	
34	A-3163	OIL RING	1	
35	A-3164	INDEX PLATE	1	
36	A-3165	SCREW	1	
37	A-3166	SPRING	1	
38	A-3167	STEEL BALL	1	
39	A-3168	SPRING PIN	1	
40	A-3134	PVC KNOB	1	
41	A-3169	OIL RING	1	
42	A-3170	SCREW	1	
43	A-3171	SPRING PIN	1	
44	A-3172	OIL RING	1	



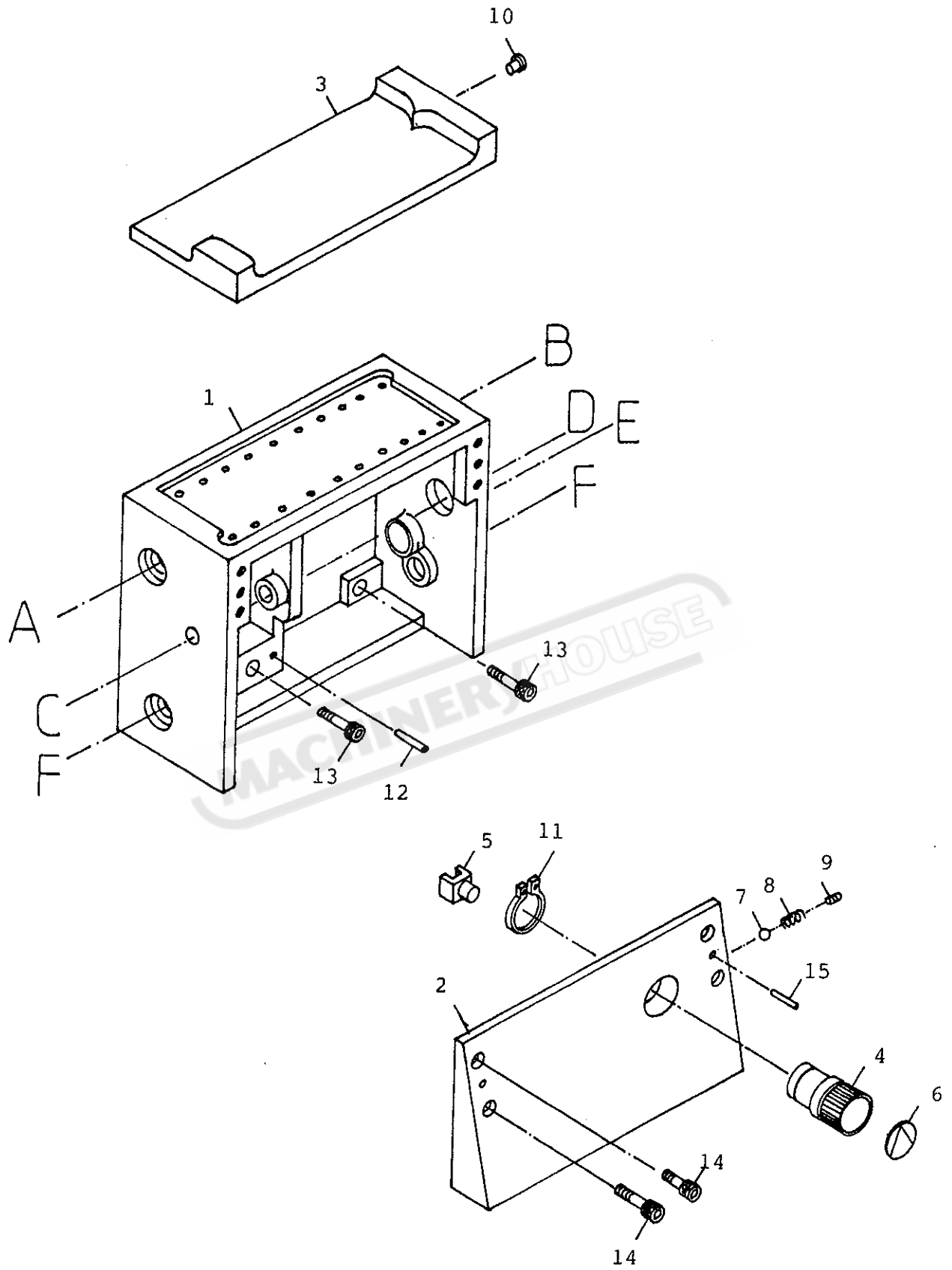
HEADSTOCK SPINDLE AND GEARS (GH TYPE)

REF.NO.	PART NO.	DESCRIPTION	Q'TY	REMARKS
1	A-3101	MAIN SPINDLE	1	
2	A-3103	BEARING CAP	1	
3	A-3173	BEARING	1	
4	A-3104	GEAR	1	
5	A-3105	GEAR	1	
6	A-3106	GEAR	1	
7	A-3174	BEARING	1	
8	A-3107	NUT	1	
9	A-3108	BEARING CAP	1	
10	A-3112	SHAFT	1	
11	A-3113	GEAR	1	
12	A-3110-1	GEAR	1	
13	A-3114	WASHER	1	
14	A-3115	WASHER	1	
15	A-3175	WASHER	1	
16	A-3140	WASHER	1	
17	A-3119	GEAR	1	
18	A-3109	SHAFT	1	
19	A-3176	OIL SEAL	1	
20	A-3111	BEARING CAP	1	
21	A-3177	BEARING	2	
22	A-3141	WASHER	1	
23	A-3110-1	GEAR	1	
24	A-3110	GEAR	1	
25	A-3178	KEY	1	
26	A-3179	KEY	1	
27	A-3180	CAMLOCK	3	
28	A-3181	CAMLOCK STUD	3	
29	A-3182	KEY	1	
30	A-3183	KEY	1	
31	A-3184	KEY	1	
32	A-3185	KEY	1	
33	A-3186	CIRCLIPT	1	
34	A-3187	CIRCLIPT	1	
35	A-3188	CIRCLIPT	1	
36	A-3189	GASKET	1	
37	A-3190	GASKET	1	
38	A-3191	SCREW	2	
39	A-3192	SCREW	3	
40	A-3193	SCREW	3	
41	A-3194	SCREW	1	
42	A-3195	SCREW	1	
43	A-3196	SCREW	2	
44	A-3197	SCREW	3	
45	A-3198	CIRCLIPT	1	
46	A-3199	CIRCLIPR	1	
47	A-3200	SPRING	3	



HEADSTOCK GEARS (GH TYPE)

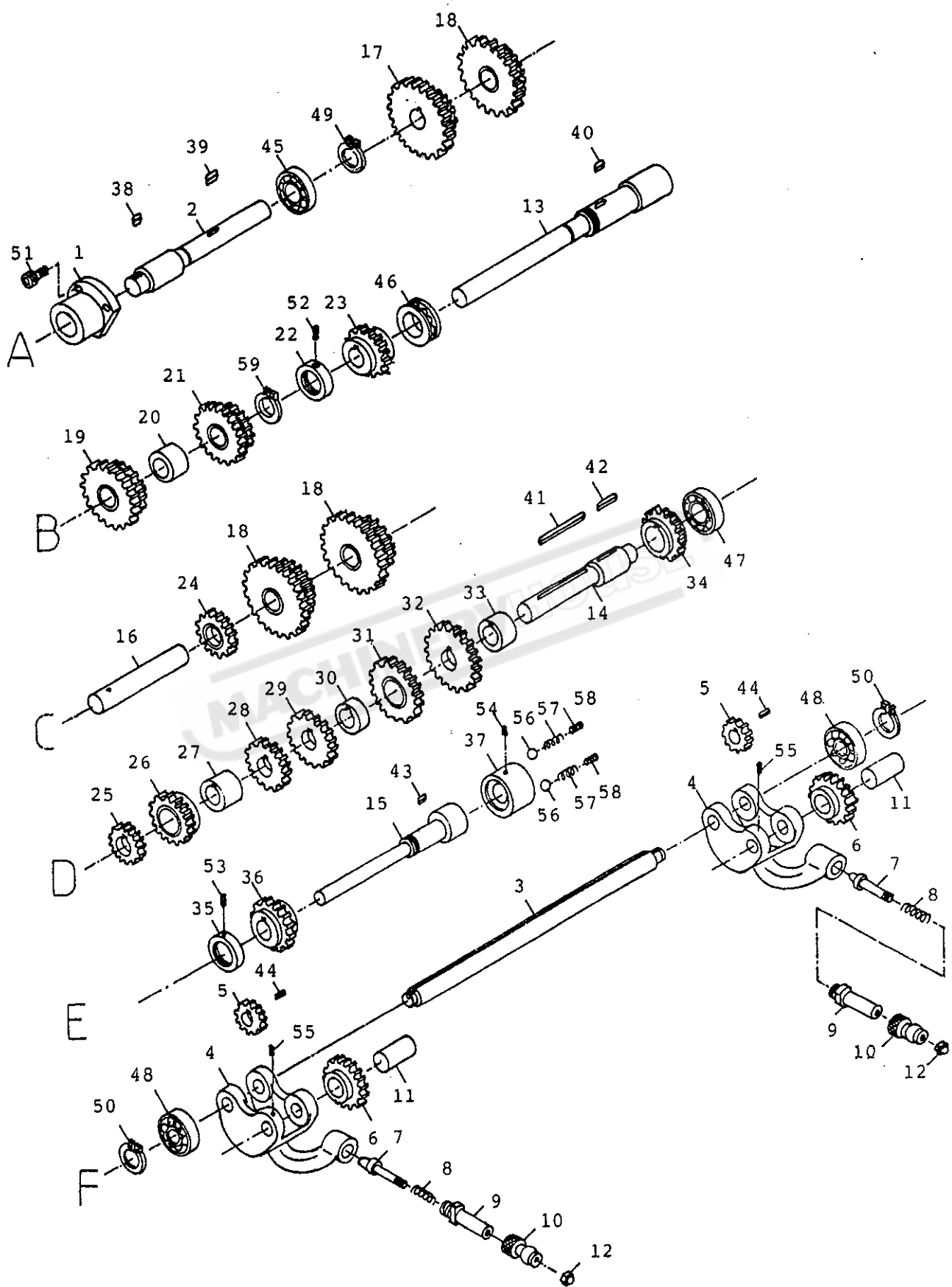
REF.NO.	PART NO.	DESCRIPTION	Q'TY	REMARKS
1	A-3116	SHAFT	1	
2	A-3117	GEAR	1	
3	A-3118	GEAR BUSHING	1	
4	A-3119	GEAR	1	
5	A-3120	GEAR	1	
6	A-3125	BEARING CAP	1	
7	A-3201	FOL SEAL	1	
8	A-3127	V-BELT PULLY	1	
9	A-3128	NUT	2	
10	A-3122	SHAFT	1	
11	A-3124	GEAR	1	
12	A-3124-1	GEAR	1	
13	A-3124-2	GEAR	1	
14	A-3121	BEARING CAP	1	
15	A-3123-1	GEAR	1	
16	A-3123	GEAR	1	
17	A-3126	BEARING CAP	1	
18	A-3202	BEARING	1	
19	A-3203	BEARING	1	
20	A-3204	BEARING	1	
21	A-3205	BEARING	1	
22	A-3206	SCREW	3	
23	A-3207	SCREW	3	
24	A-3208	KEY	1	
25	A-3209	KEY	1	
26	A-3210	KEY	1	
27	A-3211	KEY	1	
28	A-3212	KEY	1	
29	A-3213	OIL RING	1	
30	A-3214	OIL RING	1	
31	A-3215	OIL RING	1	
32	A-3216	CIRCLIPT	1	
33	A-3217	CIRCLIPT	1	
34	A-3218	CIRCLIPT	1	
35	A-3219	CIRCLIPT	1	



METRIC GEAR BOX

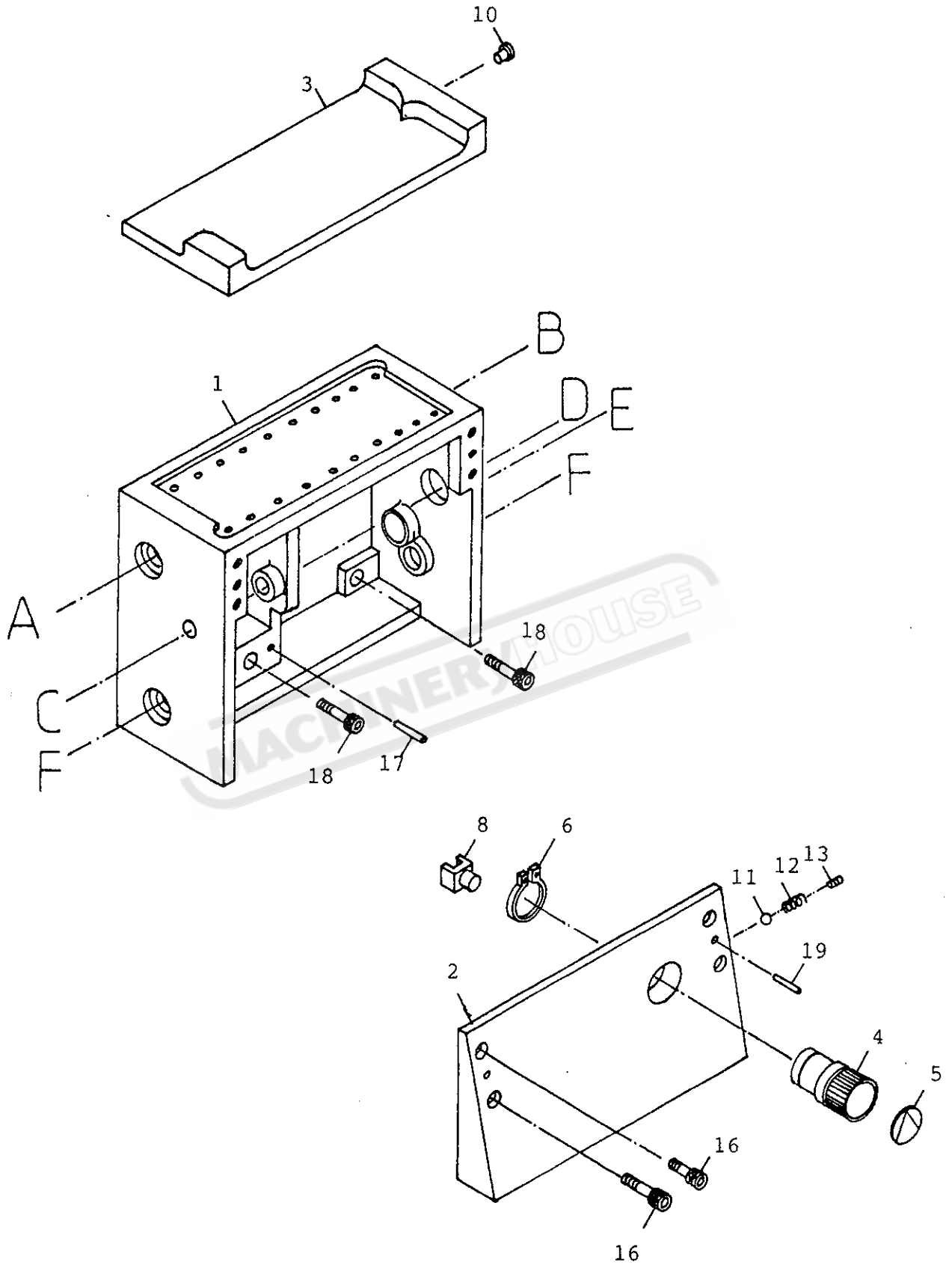
REF.NO.	PART NO.	DESCRIPTION	Q'TY	REMARKS
1	3201-1	GEAR BOX	1	
2	3202-1	FRONT COVER	1	
3	3613	COVER	1	
4	3250	HANDLE	1	
5	3251	SHIFT FORK	1	
6	3264	INDEXING PLATE	1	
7	3255	STEEL BALL	1	
8	3256	SPRING	1	
9	3257	SCREW	1	
10	3254	OIL INLET	1	
11	3265	CIRCLIP	1	
12	3261	SPRING PIN	1	
13	3262	SCREW	2	
14	3260	SCREW	4	
15	3263	SPRING PIN	1	

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METRIC GEAR BOX

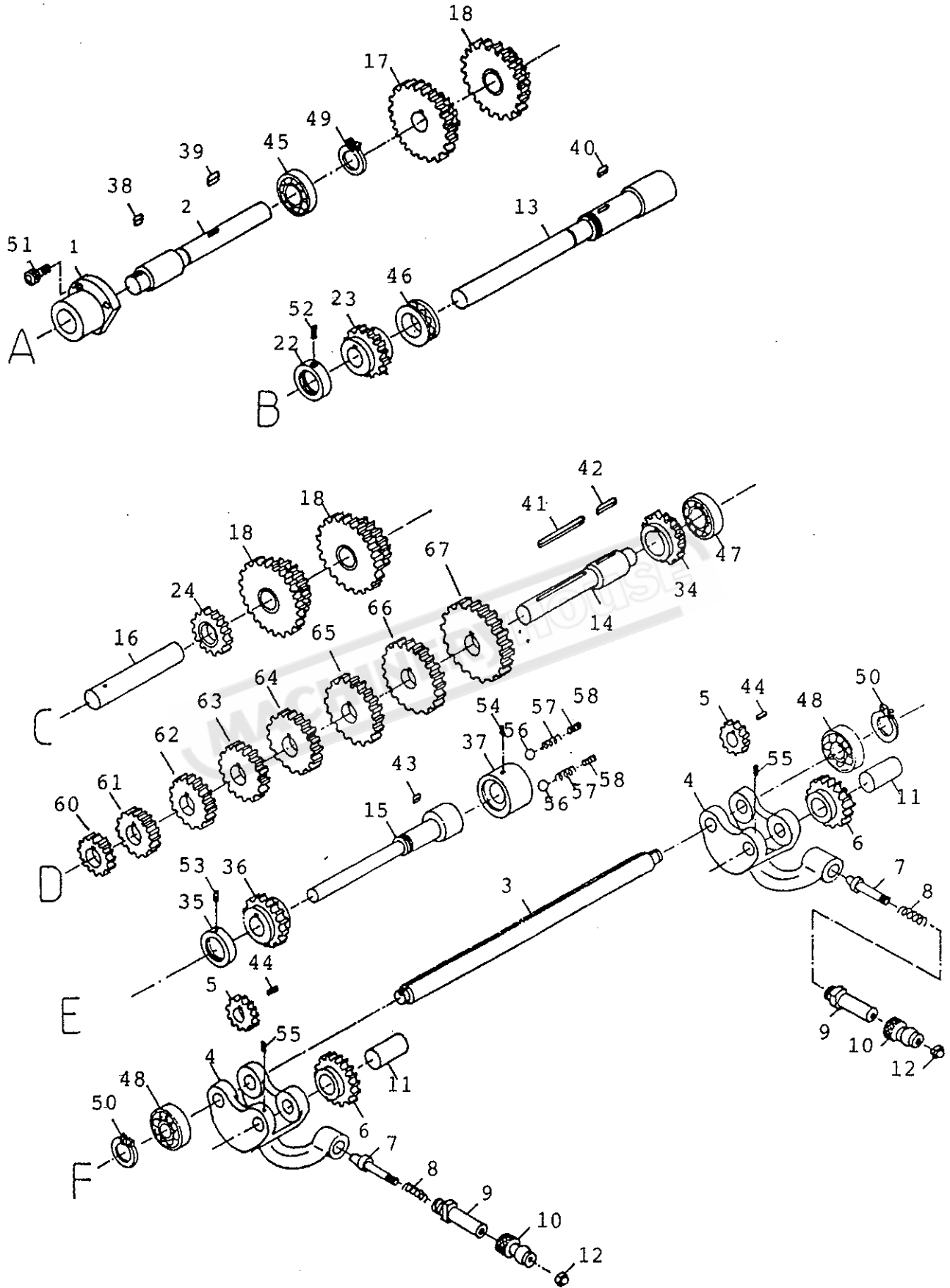
REF.NO.	PART NO.	DESCRIPTION	Q'TY	REMARKS
1	3203	COVER	1	
2	3204	SHAFT	1	
3	3222	SHAFT	1	
4	3223	SHIFT FRAME	2	
5	3224	GEAR	2	
6	3226	GEAR	2	
7	3232	PLUNGER	2	
8	3266	SPRING	2	
9	3233	BUSH	2	
10	3234	KNOB	2	
11	3225	SHAFT	2	
12	3267	NUT	2	
13	3207	SHAFT	1	
14	3209	SHAFT	1	
15	3220	SHAFT	1	
16	3253	SHAFT	1	
17	3205	GEAR	1	
18	3206	GEAR	3	
19	3243	GEAR	1	
20	3242	COLLAR	1	
21	3268	GEAR	1	
22	3240	NUT	1	
23	3208	GEAR	1	
24	3269	GEAR	1	
25	3214	GEAR	1	
26	3244	GEAR	1	
27	3245	COLLAR	1	
28	3216	GEAR	1	
29	3246	GEAR	1	
30	3249	COLLAR	1	
31	3247	GEAR	1	
32	3248	GEAR	1	
33	3245	COLLAR	1	
34	3219	GEAR	1	
35	3240	NUT	1	
36	3208	GEAR	1	
37	3221	COLLAR	1	
38	3270	KEY	1	
39	3271	KEY	1	
40	3272	KEY	1	
41	3273	KEY	1	
42	3274	KEY	1	
43	3275	KEY	1	
44	3276	KEY	2	
45	3277	BEARING	1	
46	3278	BEARING	1	
47	3279	BEARING	1	
48	3280	BEARING	2	
49	3281	CIRCLIP	1	
50	3282	CIRCLIP	2	
51	3283	SCREW	3	
56	3284	STEEL BALL	2	
57	3285	SPRING	2	
58	3286	SCREW	2	
59	3287	CIRCLIP	1	



INCH GEAR BOX (GEAR HEAD TYPE)

REF.NO.	PART NO.	DESCRIPTION	Q'TY	REMARKS
1	3201	GEAR BOX	1	
2	3202	FRONT COVER	1	
3	3613	COVER	1	
4	3230-1	HANDLE	1	
5	3264	INDEXING PLATE	1	
6	3265	CIRCLIP	1	
8	3228	SHIFT FORK	1	
10	3254	OIL INLET	1	
11	3255	STEEL BALL	1	
12	3256	SPRING	1	
13	3257	SCREW	1	
16	3260	SCREW	4	
17	3261	SPRING PIN	1	
18	3262	SCREW	2	
19	3263	SPRING PIN	1	

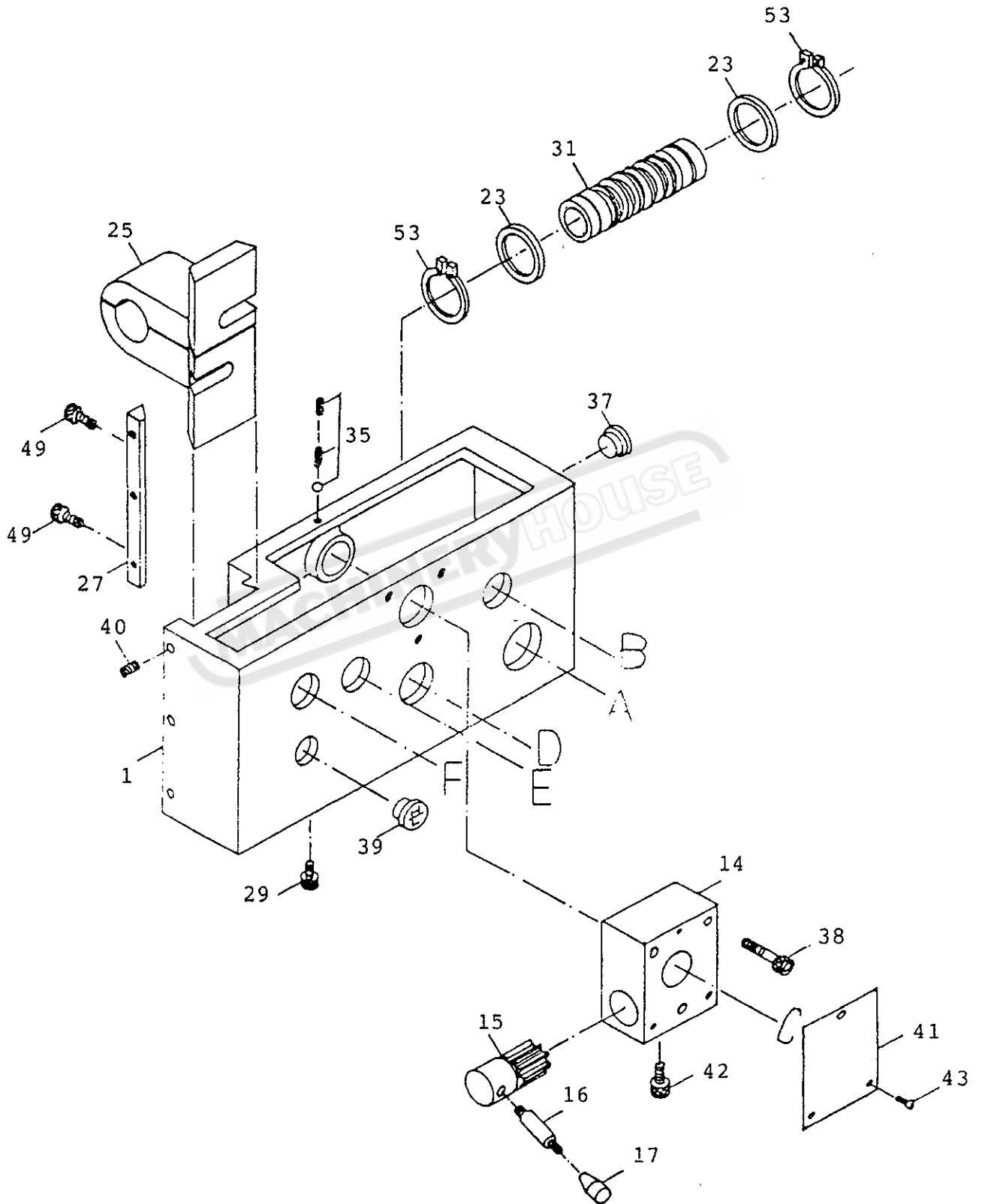
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INCH GEAR BOX (GH TYPE)

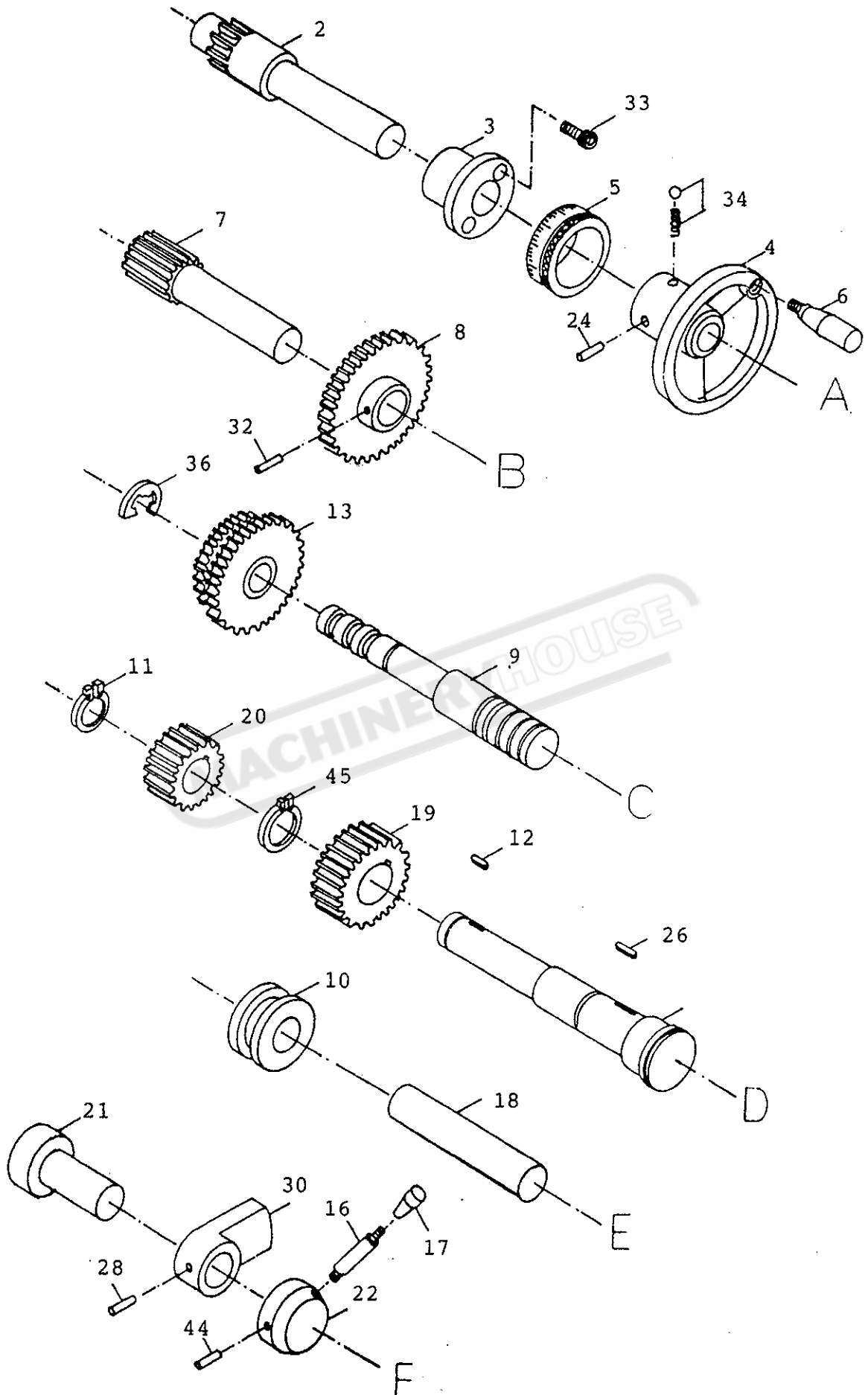
REF.NO.	PART NO.	DESCRIPTION	Q'TY
1	3203	COVER	1
2	3204	SHAFT	1
3	3222	SHAFT	1
4	3223	SHAFT FRAME	2
5	3224	GEAR	2
6	3226	GEAR	2
7	3232	PLUNGER	2
8	3266	SPRING	2
9	3233	BUSH	2
10	3234	KNOB	2
11	3225	SHAFT	2
12	3267	NUT	2
13	3207	SHAFT	1
14	3209	SHAFT	1
15	3220	SHAFT	1
16	3253	SHAFT	1
17	3205	GEAR	1
18	3206	GEAR	3
22	3240	NUT	1
23	3208	GEAR	1
24	3269	GEAR	1
34	3219	GEAR	1
35	3240	NUT	1
36	3208-1	GEAR	1
37	3221	COLLAR	1
38	3270	KEY	1
39	3271	KEY	1
40	3272	KEY	1
41	3273	KEY	1
42	3274	KEY	1
43	3275	KEY	1
44	3276	KEY	2
45	3277	BEARING	1
46	3278	BEARING	1
47	3279	BEARING	1
48	3280	BEARING	2
49	3281	CIRCLIP	1
50	3282	CIRCLIP	2
51	3283	SCREW	3
52	3288	SCREW	1
53	3289	SCREW	1
54	3290	SCREW	1
55	3291	SCREW	2
56	3284	STEEL BALL	2
57	3285	SPRING	2
58	3286	SCREW	2
60	3292	GEAR	1
61	3293	GEAR	1
62	3294	GEAR	1
63	3295	GEAR	1
64	3296	GEAR	1
65	3297	GEAR	1
66	3298	GEAR	1
67	3299	GEAR	1

APRON (Casting)



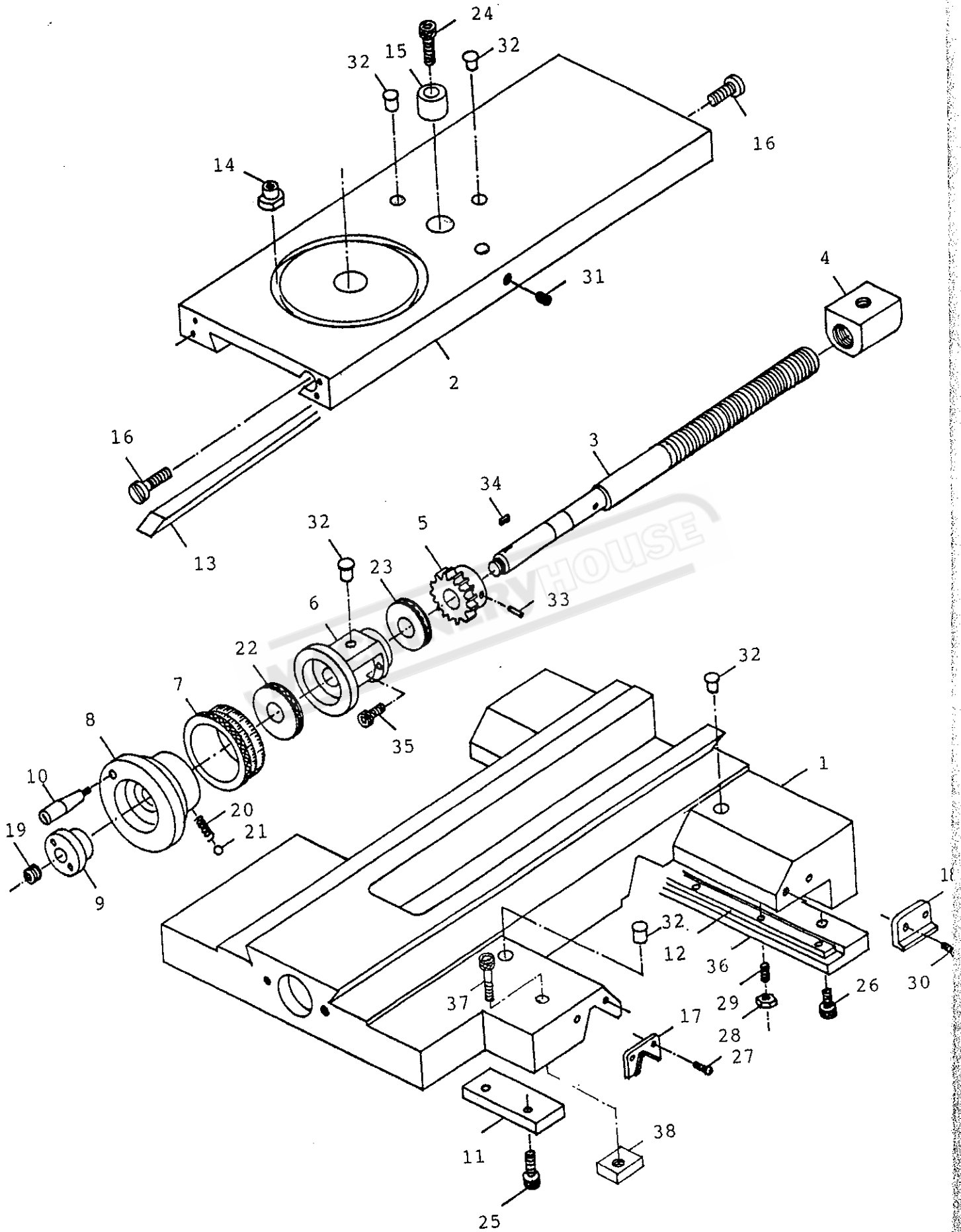
APRON (CASTING & SHAFT)

REF.NO.	PART NO.	DESCRIPTION	Q'TY
1	3301	APRON CASTING	1
14	3316	BRACKET	1
15	3317	GEAR SHAFT	1
16	3318	LEVER	1
17	3319	PVC KNOB	1
23	3325	COLLAR	1
25	3327	HALF NUT CLUTCH	2
27	3329	GIB	1
29	3358	SCREW	1
31	3333	WORM	1
35	3343	STEEL BALL, SPRING AND SCREW	1
37	3359	PLUG	1
38	3342	SCREW	1
39	3360	OIL SIGHT	3
40	3361	SCREW	1
41	3362	PLATE	3
42	3346	SCREW	1
43	3363	SCREW	1
49	3353	SCREW	3
53	3357	CIRCLIP	3
			2



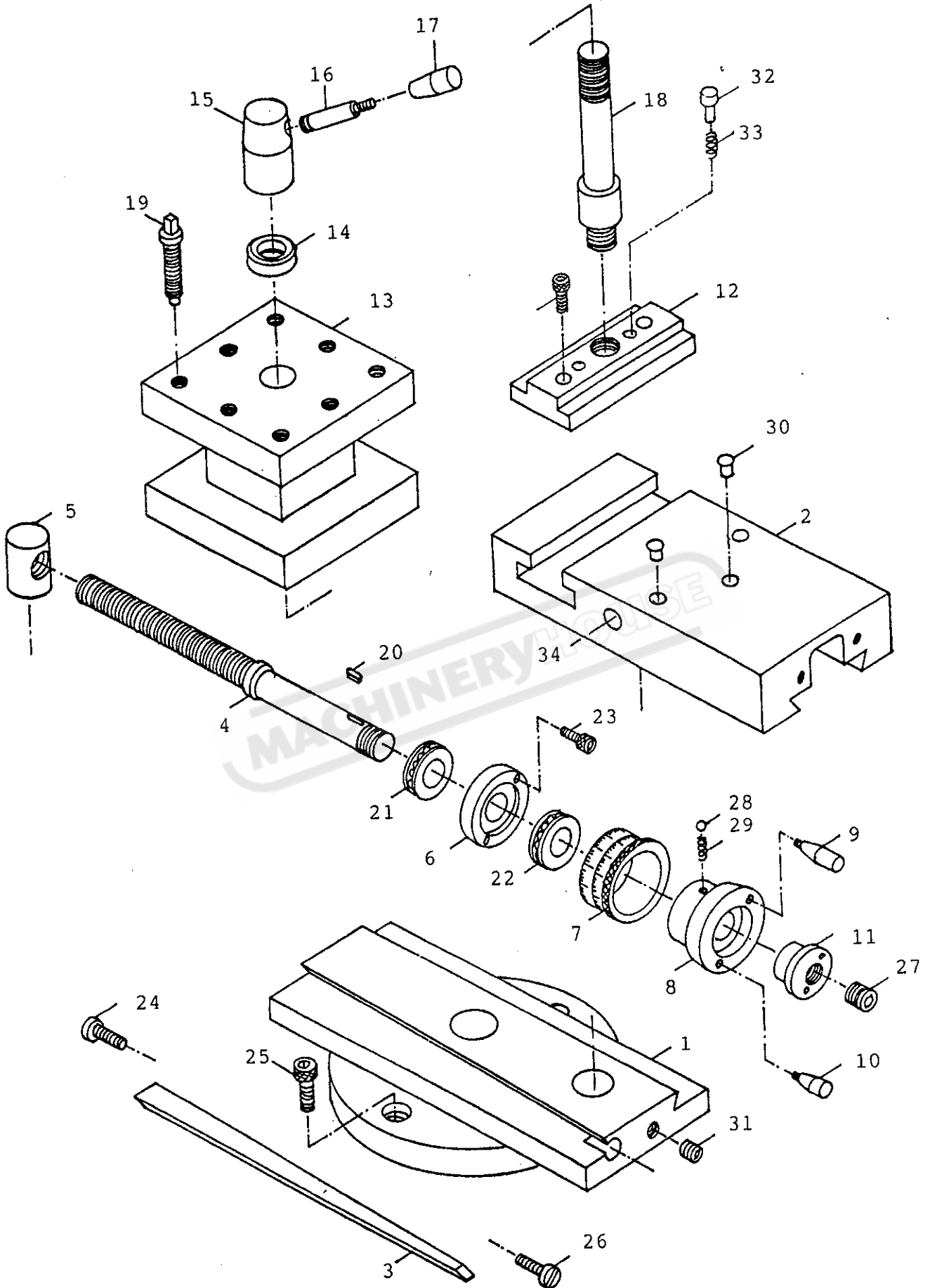
APRON (GEAR & SHAFT)

REF.NO.	PART NO.	DESCRIPTION	Q'TY
2	3303	GEAR SHAFT	1
3	3304	BUSHING	1
4	3305	HANDWHEEL	1
5	3306	DIAL	1
6	3308	HANDLE	1
7	3309	GEAR SHAFT	1
8	3310	GEAR	1
9	3311	SHAFT	1
10	3364	BUSHING	1
11	3365	CIRCLIP	1
12	3366	KEY	1
13	3367	GEAR	1
16	3318	LEVER	1
17	3319	PVC KNOB	1
18	3320	SHAFT	1
19	3368	GEAR	1
20	3369	GEAR	1
21	3323	CAM SHAFT	1
22	3324	HANDLE	1
24	3370	PIN	1
26	3371	KEY	1
28	3372	PIN	1
30	3373	LOCK PLATE	1
32	3307	PIN	1
33	3337	SCREW	1
34	3338	STEEL BALL AND SPRING	1
36	3340	CIRCLIP	1
44	3348	PIN	1
45	3374	CIRCLIP	1



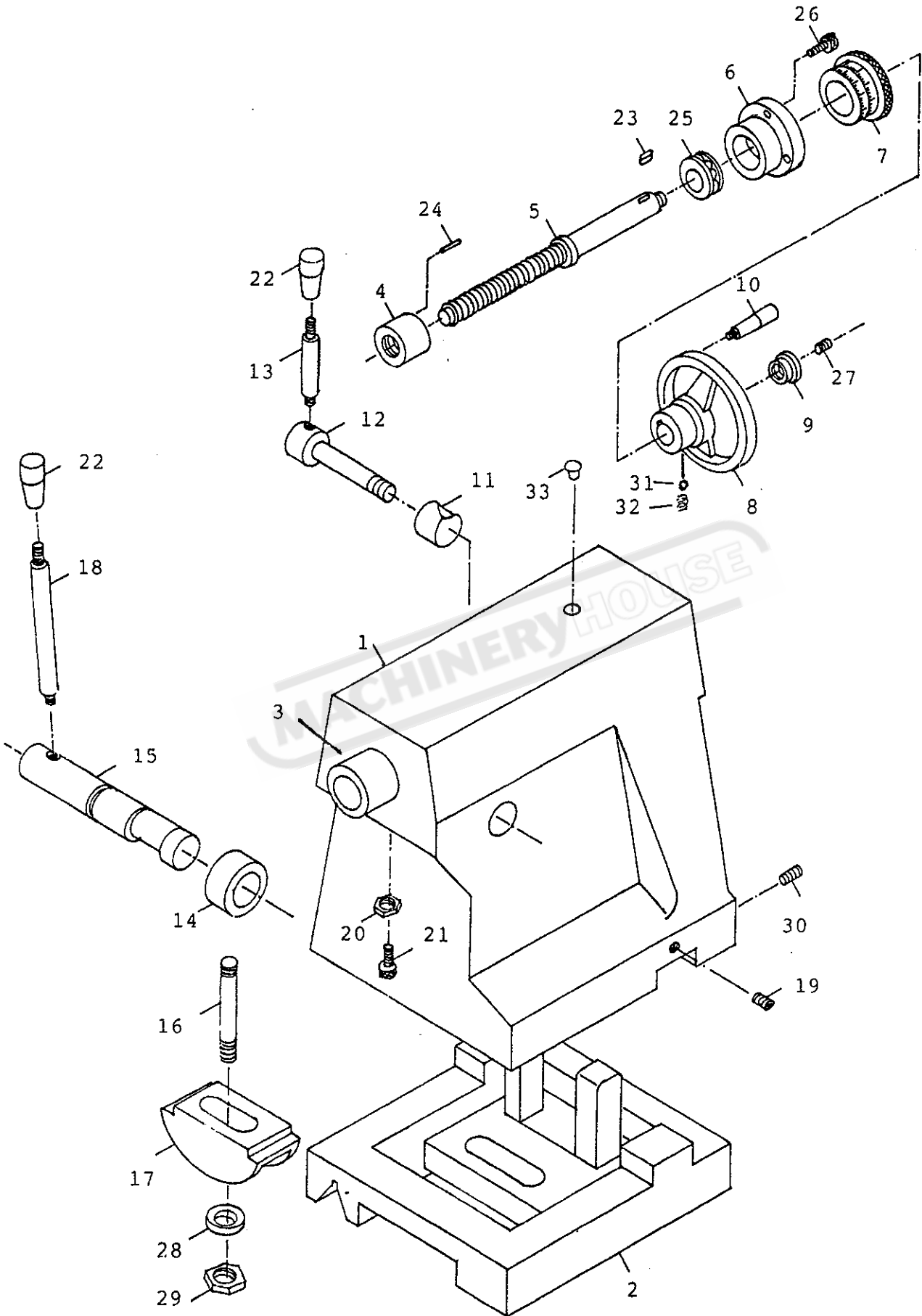
CARRIAGE

REF.NO.	PART NO.	DESCRIPTION	Q'TY	REMARKS
1	3401	SADDLE CASTING	1	
2	3402	CROSS SLIDE	1	
3	3412	CROSS FEED SCREW	1	
4	3413	NUT	1	
5	3411	GEAR	1	
6	3414	BUSHING	1	
7	3415	DIAL	1	
8	3417	HANDLE	1	
9	3416	NUT	1	
10	3418	GRIP	1	
11	3405	CLAMP FRONT	1	
12	3404	GIB	1	
13	3408	GIB	1	
14	3419	NUT	2	
15	3410	BUSHING	1	
16	3409	SCREW	2	
17	3440	WIPER	2	
18	3439	WIPER	2	
19	3452	SCREW	1	
20	3453	SPRING	1	
21	3454	STEEL BALL	1	
22	3455	BEARING	1	
23	3456	BEARING	1	
24	3457	SCREW	1	
25	3458	SCREW	4	
26	3459	SCREW	2	
27	3460	SCREW	4	
28	3461	NUT	1	
29	3462	SCREW	1	
30	3463	SCREW	4	
31	3464	SCREW	1	
32	3465	OIL CAP	4	
33	3466	SPRING PIN	1	
34	3467	KEY	1	
35	3468	SCREW	2	
36	3403	CLAMP REAR	1	
37	3406	SCREW	1	
38	3407	WASHER	1	



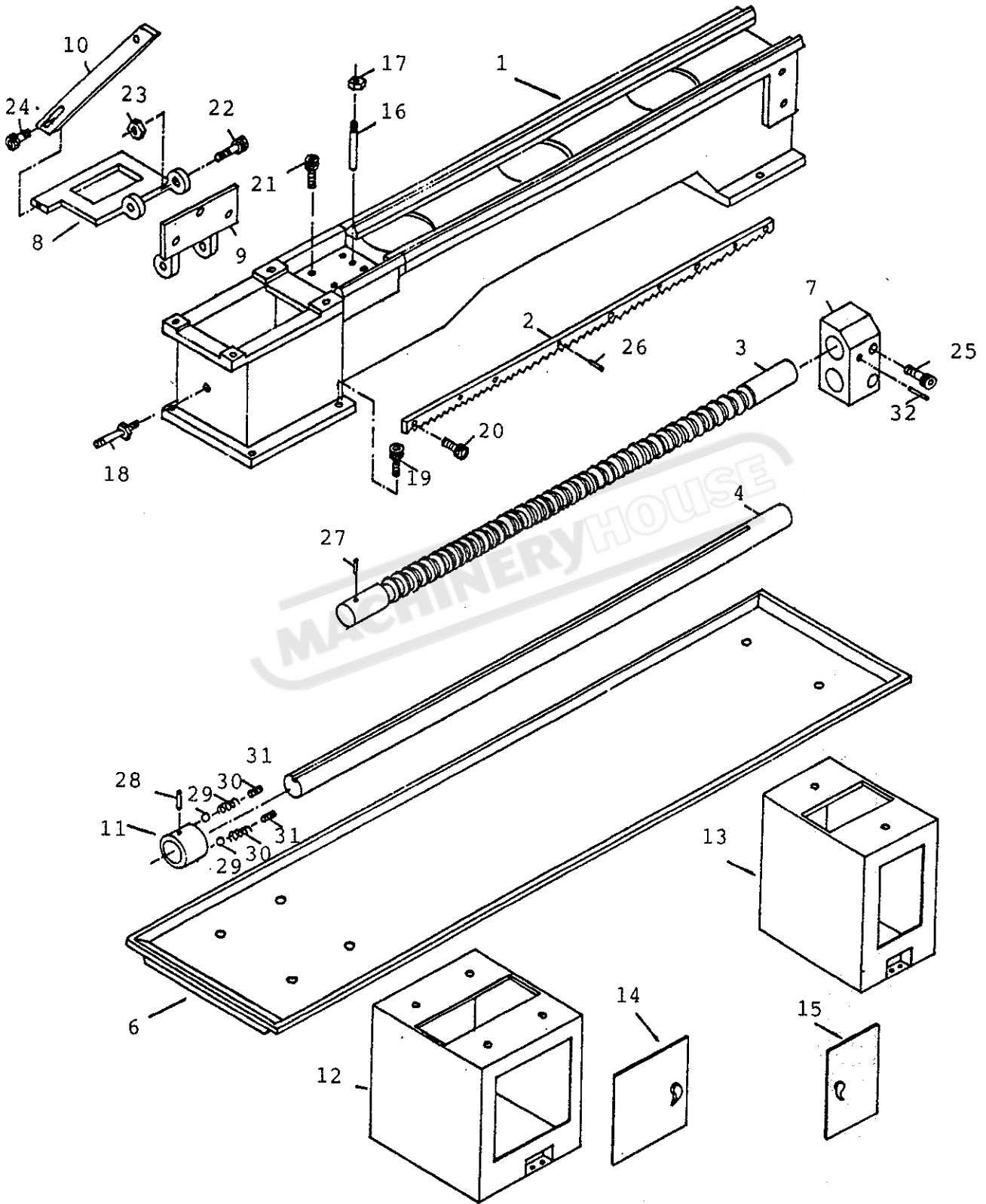
CROSS & COMPOUND SLIDES

REF.NO.	PART NO.	DESCRIPTION	Q'TY	REMARKS
1	3420	SWIVER SLIDE	1	
2	3421	TOP SLIDE	1	
3	3422	GIB	1	
4	3425	LEAD SCREW	1	
5	3424	NUT	1	
6	3426	BRACKET	1	
7	3427	DIAL	1	
8	3428	HANDWHEEL	1	
9	3429	GRIP	1	
10	3430	GRIP	1	
11	3416	NUT	1	
12	3441	NUT	1	
13	3433	TOOL POST	1	
14	3434	WASHER	1	
15	3435	HUB	1	
16	3436	LEVER	1	
17	3437	PVC KNOB	1	
18	3432	BOLT	1	
19	3438	SCREW	8	
20	3442	KEY	1	
21	3443	BEARING	1	
22	3444	BEARING	1	
23	3445	SCREW	2	
24	3423	SCREW	1	
25	3446	SCREW	2	
26	3423	SCREW	1	
27	3447	SCREW	1	
28	3448	STEEL BALL	1	
29	3449	SPRING	1	
30	3450	OIL CAP	1	
31	3451	SCREW	1	
32	3431	PIN	1	
33	3469	SPRING	1	
34	3470	SCREW	1	



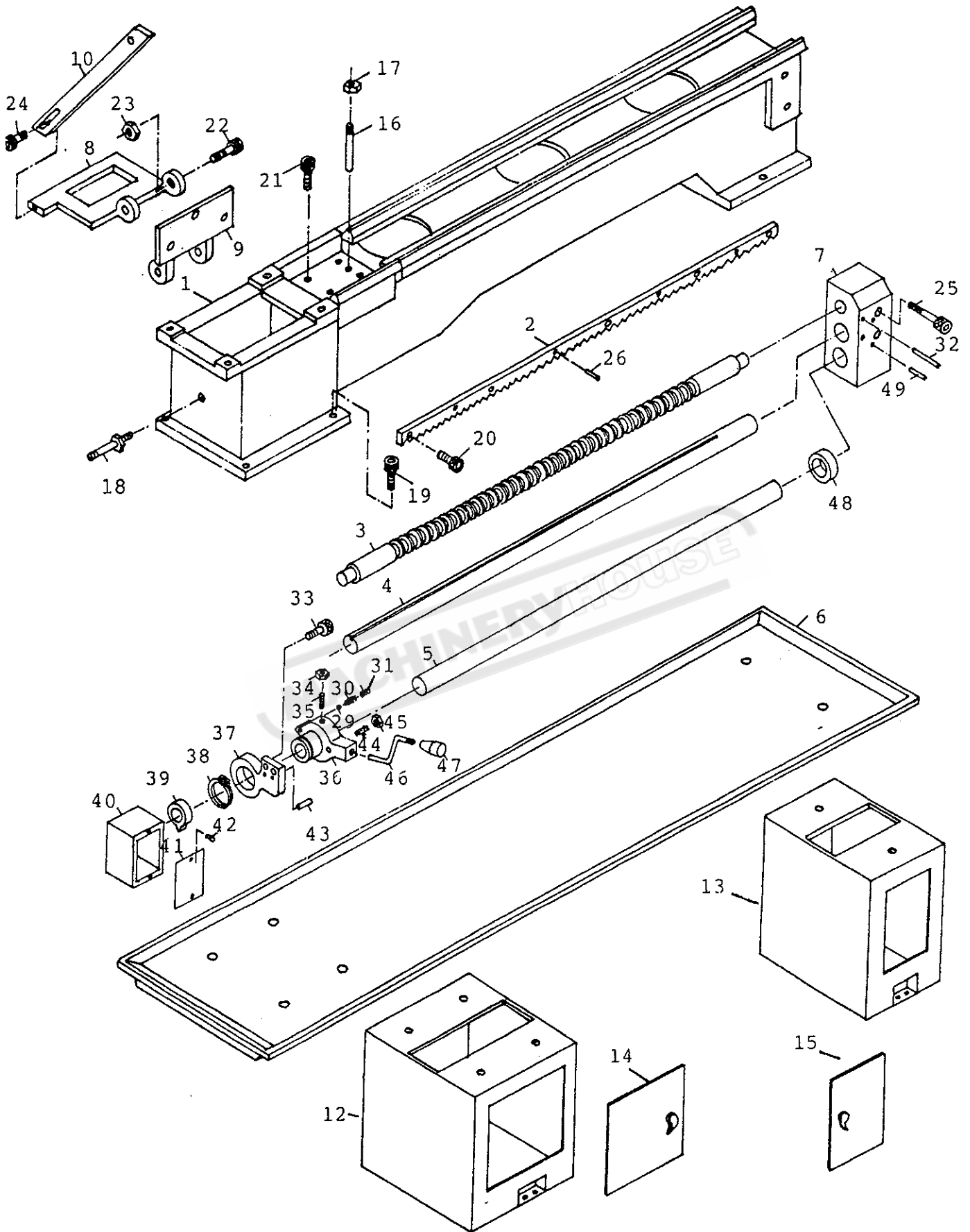
TAILSTOCK

REF.NO.	PART NO.	DESCRIPTION	Q'TY	REMARKS
1	3501	TAILSTOCK TOP	1	
2	3502	BASE	1	
3	3503	BARREL	1	
4	3504	NUT	1	
5	3505	FEED SCREW	1	
6	3506	BRACKET	1	
7	3507	DIAL	1	
8	3508	HANDWHEEL	1	
9	3509	NUT	1	
10	3510	HANDLE	1	
11	3511	NUT	1	
12	3512	SHAFT	1	
13	3513	LEVER	1	
14	3514	COLLAR	1	
15	3515	CAM SHAFT	1	
16	3516	CLAMP BOLT	1	
17	3517	CLAMP PLATE	1	
18	3518	LEVER	1	
19	3519	SCREW	2	
20	3520	NUT	1	
21	3521	SCREW	1	
22	3522	PVC KNOB	2	
23	3523	KEY	1	
24	3524	PIN	1	
25	3525	BEARING	1	
26	3526	SCREW	3	
27	3527	SCREW	1	
28	3528	WASHER	1	
29	3529	NUT	1	
30	3530	SCREW	2	
31	3531	STEEL BALL	1	
32	3532	SPRING	1	
33	3533	OIL CUP	1	



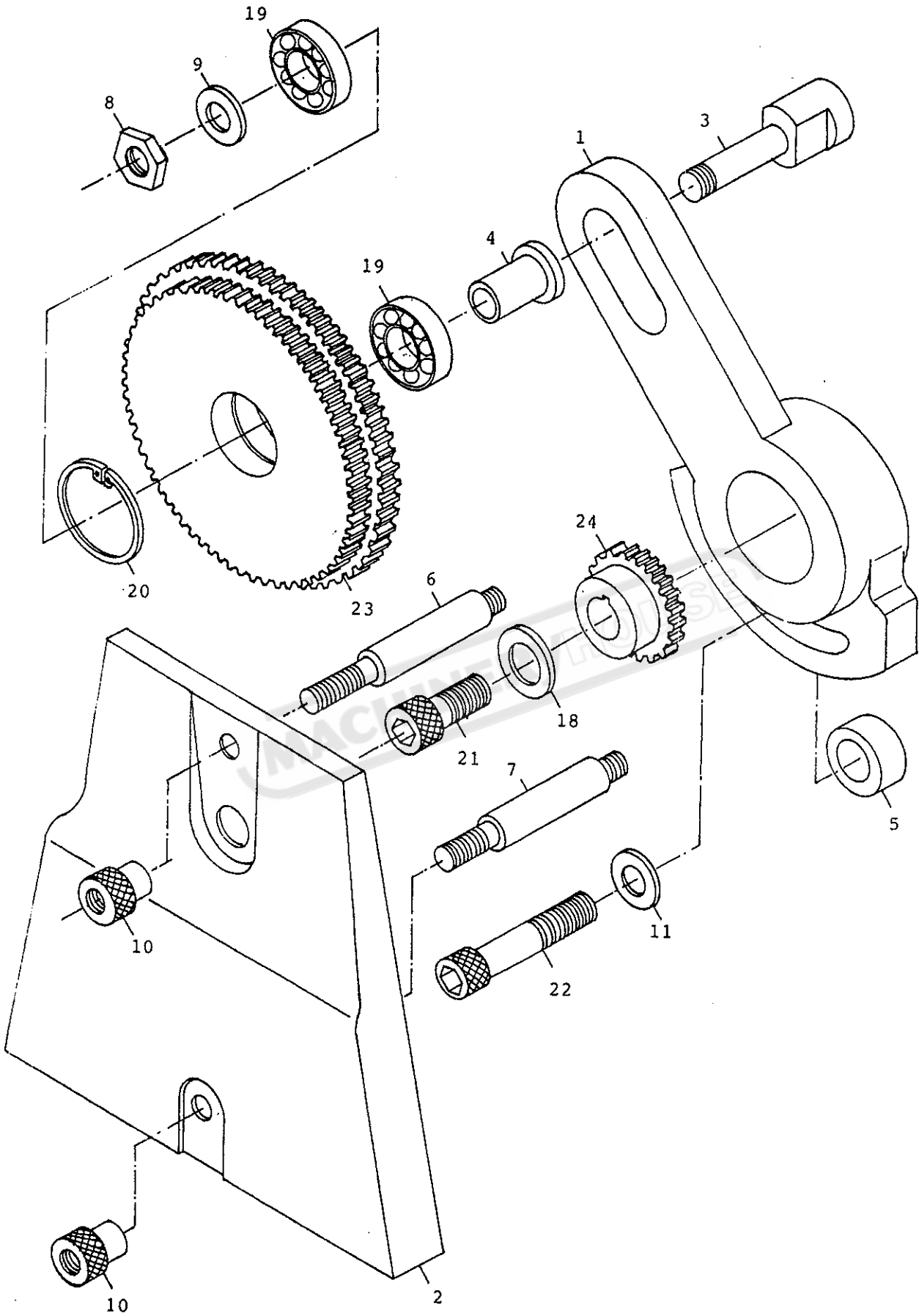
BED & SHAFTS (GEAR HEAD TYPE)

REF.NO.	PART NO.	DESCRIPTION	Q'TY	REMARKS
1	A-3601	BED	1	
2	A-3603	RACK	1	
3	A-3604	LEAD SCREW	1	
4	A-3605	SHAFT	1	
6	A-3608	CHIP PAN	1	
7	A-3602	END BRACKET	1	
8	A-3607	MOTOR PLATE	1	
9	A-3606	MOTOR PLATE	1	
10	A-3615	ROD	1	
11	A-3609	COLLAR(CLUTCH)	1	
12	A-3610	LEFT PEDESTAL	1	
13	A-3611	RIGHT PEDESTAL	1	
14	A-3612	LEFT DOOR	1	
15	A-3613	RIGHT DOOR	1	
16	A-3614	PIN	1	
17	A-3616	NUT	1	
18	A-3622	SCREW	1	
19	A-3623	SCREW	6	
20	A-3624	SCREW	4	
21	A-3625	SCREW	4	
22	A-3626	SCREW	2	
23	A-3627	NUT	2	
24	A-3628	SCREW	1	
25	A-3629	SCREW	2	
26	A-3630	PIN	3	
27	A-3631	SPRING PIN	1	
28	A-3632	SPRING PIN	1	
29	A-3633	STEEL BALL	2	
30	A-3634	SPRING	2	
31	A-3635	SCREW	1	
32	A-3636	SPRING PIN	1	



BED & SHAFTS (GEAR HEAD TYPE)

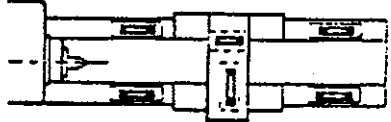

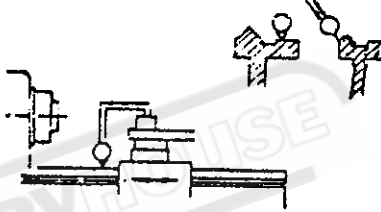
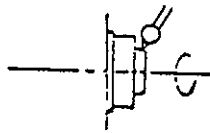

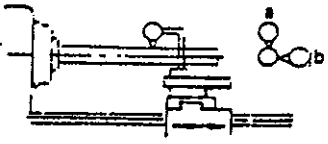
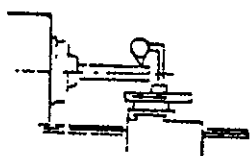
REF.NO.	PART NO.	DESCRIPTION	Q'TY	REMARKS
1	A-3601	BED	1	
2	A-3603	PACK	1	
3	A-3604	LEAD SCREW	1	
4	A-3605	SHAFT	1	
6	A-3608	CHIP PAN	1	
7	A-3602	END BRACKET	1	
8	A-3607	MOTOR PLATE	1	
9	A-3606	MOTOR PLATE	1	
10	A-3615	ROD	1	
11	A-3221	COLLAR	1	
12	A-3701	FLOOR STAND	1	
13	A-3702	FLOOR STAND	1	
14	A-3703	DOOR	1	
15	A-3704	DOOR	1	
16	A-3705	SHAFT	1	
17	A-3706	NUT	1	
18	A-3707	SCREW	1	
19	A-3708	SCREW	6	
20	A-3622	SCREW	4	
21	A-3709	SCREW	4	
22	A-3623	SCREW	2	
23	A-3624	NUT	2	
24	A-3625	SCREW	2	
25	A-3626	SCREW	1	
26	A-3627	PIN	3	
27	A-3628	PIN	1	
28	A-3629	PIN	1	
29	A-3630	STEEL BALL	2	
30	A-3631	SPRING	2	
31	A-3632	SCREW	2	
32	A-3633	SPRING	1	
5	A-3605	SHAFT	1	
33	A-3634	SCREW	1	
34	A-3635	NUT	1	
35	A-3636	SCREW	1	
36	A-3618	ELECTROMOTIVE BUSH	1	
37	A-3617	SPINDLE CONTROL SHAFT BRACKET	1	
38	A-3637	CIRCLIP	1	
39	A-3638	CRANK	1	
40	A-3620	COVER	1	
41	A-3621	COVER	1	
42	A-3639	SCREW	4	
43	A-3640	SPRING PIN	1	
44	A-3641	SCREW	1	
45	A-3642	NUT	1	
46	A-3619	LEVER	1	
47	A-3643	KNOB	1	
48	A-3644	COLLAR	1	
49	A-3645	PIN	1	

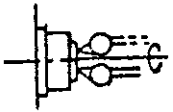
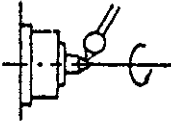
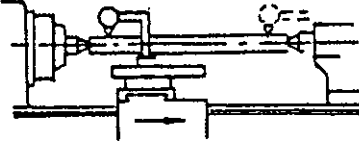
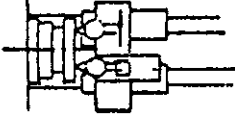


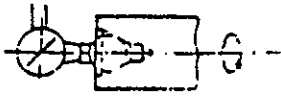
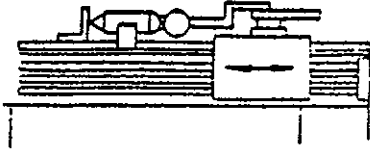
BED GEAR & COVER (GH TYPE)

REF.NO.	PART NO.	DESCRIPTION	Q'TY	REMARKS
1	A-3617	SWING FRAME	1	
2	A-3618	END COVER	1	
3	A-3619	BOLT	1	
4	A-3620	BUSHING	1	
5	A-3621	BUSHING	1	
6	A-3637	SCREW	1	
7	A-3638	SCREW	1	
8	A-3639	NUT	1	
9	A-3640	WASHER	1	
10	A-3641	NUT	2	
11	A-3642	WASHER	1	
22	A-3647	SCREW	1	
23	A-3648	GEAR	1	
21	A-3646	SCREW	1	
24	A-3649	GEAR	1	
19	A-3644	BEARING	2	
20	A-3645	CIRCLIP	1	
18	A-3643	WASHER	1	

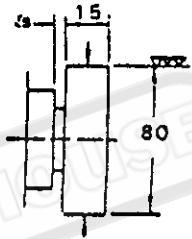
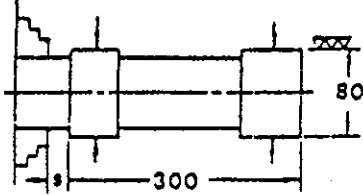
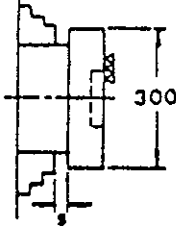
TOLERANCE PERMISSIBLE DIAGRAM

NO.	INSPECTION ITEM		DIAGRAM	TOLERANCE PERMISSIBLE
1	Straightness of bed slideway	a. Longitudinal direction (In vertical plane)		0.04
		b. Transverse direction (In vertical plane)		0.04
2	Parallelism of bed slideways.			0.02
3	Spindle nose runout			0.01
4	Spindle taper hole runout	a. Nearest spindle nose		0.01
		b. At a distance of 300mm.		0.02
5	Parallelism of center line of main spindle to longitudinal motion of carriage	a. In vertical plane		0.025
		b. In horizontal plane		0.025
6	Movement of compound slide parallel with main spindle in vertical plane (Hand feed)			0.01/150

NO.	INSPECTION ITEM	DIAGRAM	TOLERANCE PERMISSIBLE
7	Main spindle for axial slip, measured at 2 points, displaced by 180.		0.015
8	True running of center point of main spindle.		0.015
9	Parallelism of tailstock spindle with bed ways.	a. In vertical plane (Front end rising)	0.015/100
		b. In horizontal plane (Front end inclined towards the direction of tool pressure.)	0.015/100
10	Parallelism of bed ways with center line of tailstock spindle hole.	a. In vertical plane (Free end of mandrel rising)	0.02/300
		b. In horizontal plane (Free end of mandrel inclined towards tailstock end)	0.02/300
11	Difference in center height between headstock and tailstock (Mandrel rising towards tailstock end)		0.025
12	Squarness of motion of cross slide with center line of main spindle		0.02/300
13	Parallelism of center line of lead screw end bearing to carriage slide ways	a. In vertical plane	0.1
		b. In horizontal plane	0.1
14	Deviations in alignment of center line of lead screw end bearing with center line of half nut.	a. In vertical plane	0.15
		b. In horizontal plane	0.15

NO	INSPECTION	DIAGRAM	TOLERANCE PERMISSIBLE
15	Axial displacement of lead screw by turning		0.01
16	Pitch error of lead screw		0.03/300

2.PRACTICAL

NO	TESTING ITEM	DIAGRAM	TOLERANCE PERMISSIBLE
1	Accuracy of outside turning		0.01
2	Accuracy of cylindrical turning		0.025
3	Accuracy of face turning		0.02

3.CHECK OF MOTOR SPECIFICATION

ITEM	HP			Ph		V	Hz		R.P.M.	
	1	1½	2	1	3		50	60	1420	1700
Rating	1	1½	2	1	3		50	60	1420	1700
Actual		✓		✓		240	✓		✓	