

# INSTRUCTION MANUAL

**AL-540**

**Centre Lathe (415V)**

**356 x 1000mm - 38mm Bore**

**Includes Digital Readout & Quick Change  
Toolpost**

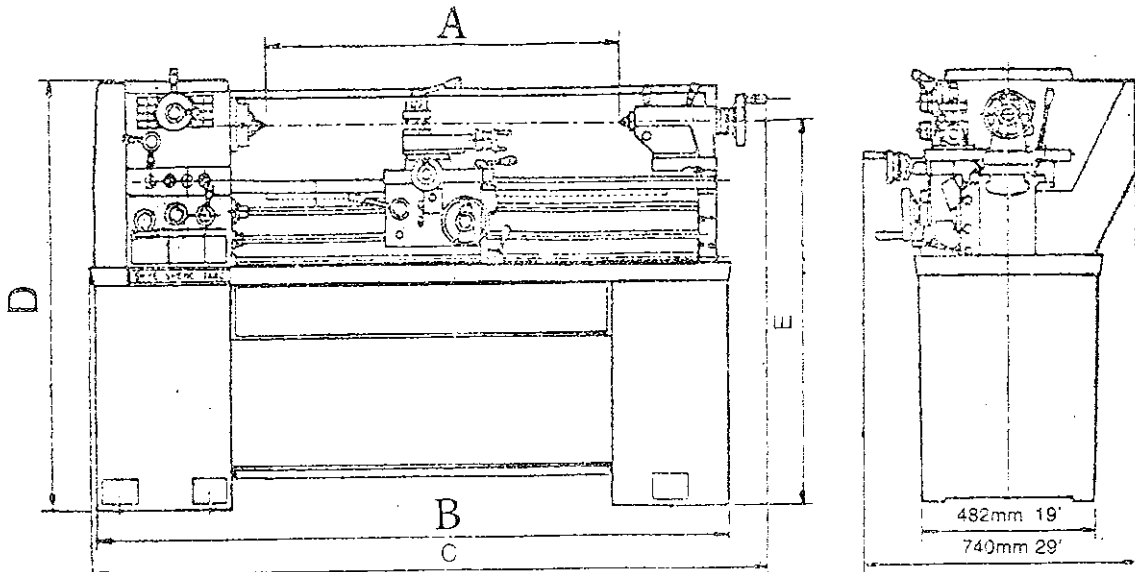


**L186D**

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## BRIEF SPECIFICATION

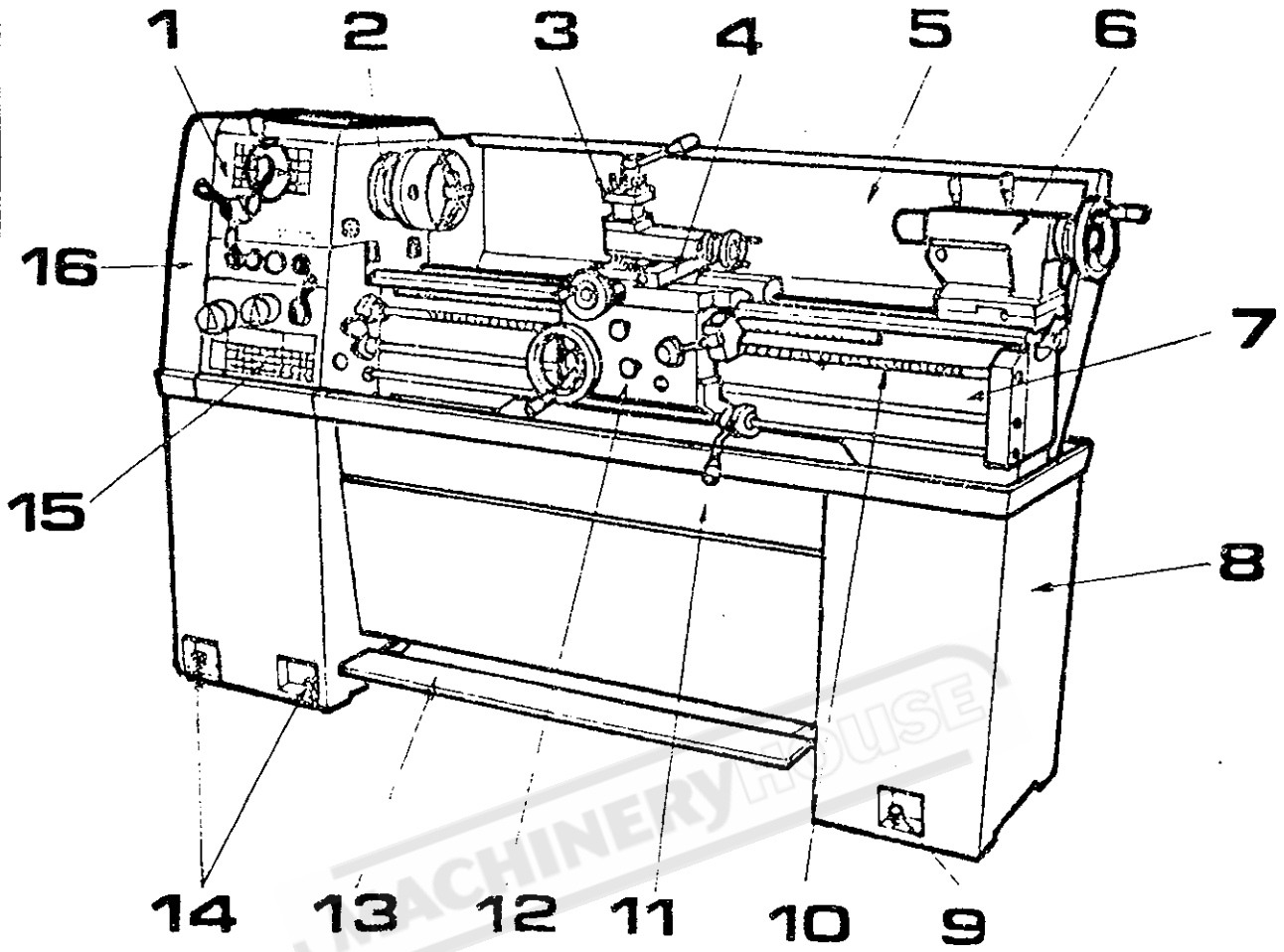


MODEL	SIZE	A	B	C	D	E
1340		1000mm 40in	1800mm 71in	1920mm 75 1/2in	1160mm 46 1/8in	1054mm 41 1/2in
1440		1000mm 40in	1800mm 71in	1920mm 75 1/2in	1164mm 47 1/8in	1067mm 42in

## SPECIFICATIONS

DESCRIPTION	INCH SYSTEM		METRIC SYSTEM	
MODEL	1340	1440	1340	1440
SWING OVER BED	13	14	330	356
SWING OVER CROSS SLIDE	7-5/8	8-5/8	195	220
DISTANCE BETWEEN CENTERS	40	40	1000	1000
SWING OVER GAP	19"	20"	480	506
WIDTH OF BED	8-1/9	8-1/9	206	206
NUMBERED OF SPINDLE SPEEDS	8 or 16 (2 speed motor)		8 or 16 (2 speed motor)	
RANGE OF SPINDLE SPEEDS	90 or 45 - 1800 RPM		90 or 45 - 1800 RPM	
HOLE THROUGH SPINDLE	1-1/2"		38	
SPINDLE NOSE	D1-4 Camlock		D1-4 Camlock	
TAPER OF SPINDLE BORE	M.T.No.5		M.T.No.5	
TAILSTOCK QUILL TAPER	M.T.No.3		M.T.No.3	
TAILSTOCK QUILL TRAVEL	4-1/2"		115	
CROSS SLIDE TRAVEL	6-1/2"	7"	165	180
COMPOUND REST TRAVEL	3-1/2"	4"	90	100
NUMBER OF METRIC THREADS	22		37	
RANGE OF METRIC THREADS	0.45-7.5MM		0.4-7.0MM	
NUMBER OF INCH THREADS	40		28	
RANGE OF INCH THREADS	4-112 TPI		4-56 TPI	
LONGITUDINAL FEEDS	(40) 0.0012 - 0.0294 in/rev.		(42) 0.043 - 0.653 mm/rev.	
CROSS FEEDS	(40) 0.0003 - 0.0100 in/rev.		(42) 0.015 - 0.220 mm/rev.	
MACHINE NET WEIGHT	1540 lb	1650 lb	700 kg	750 kg
GROSS WEIGHT	1810 lb	1936 lb	820 kg	880 kg

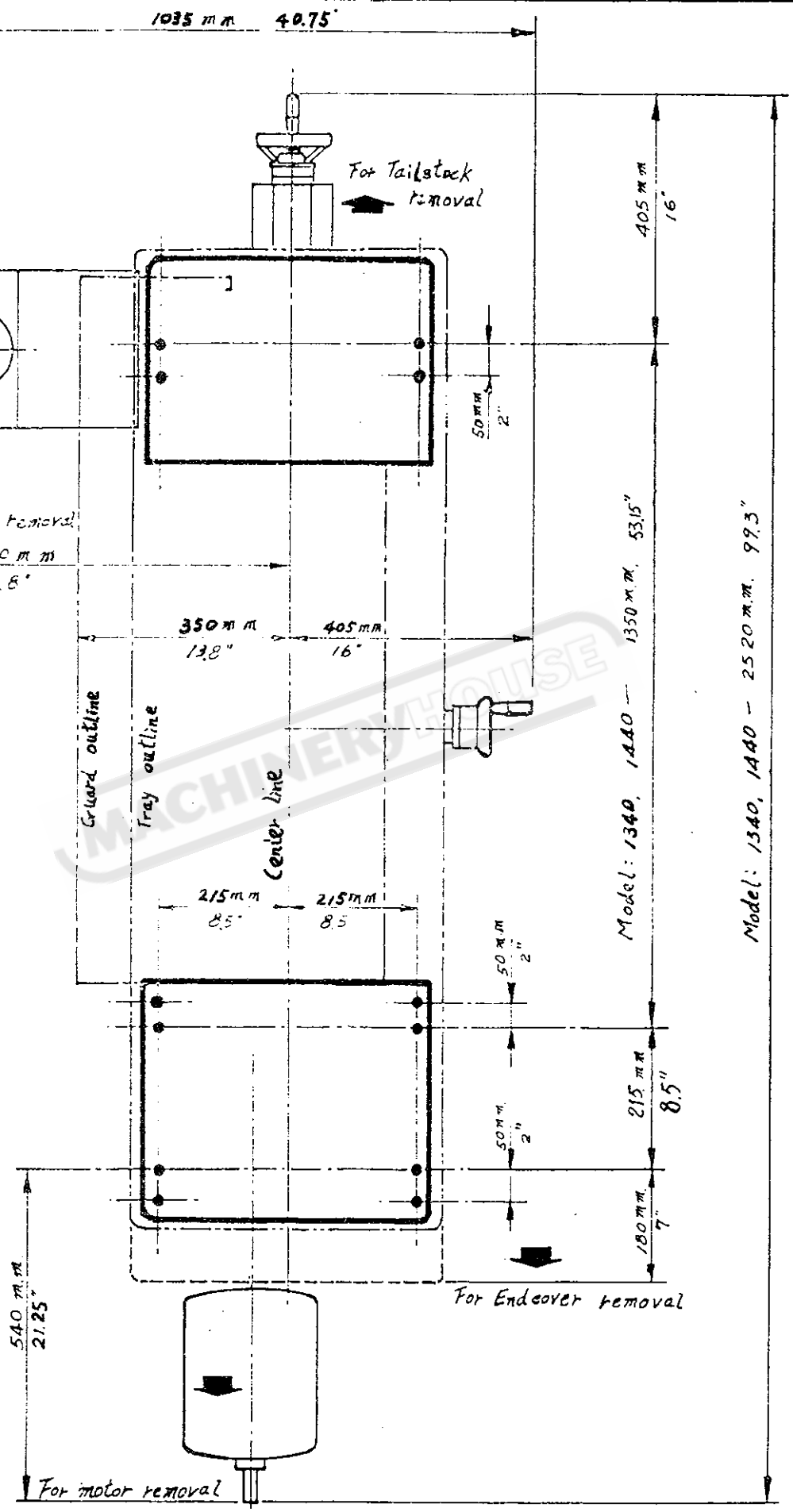
### GENERAL LAYOUT OF LATHE



- |                         |                     |
|-------------------------|---------------------|
| 1. Headstock            | 9. Tail-end plinth  |
| 2. Spindle              | 10. Lead screw      |
| 3. Top slide            | 11. Chip pan        |
| 4. Saddle & cross-slide | 12. Apron           |
| 5. Splash guard         | 13. Foot brake      |
| 6. Tailstock            | 14. Head-end plinth |
| 7. Bed                  | 15. Gear box        |
| 8. Mounting feet        | 16. End cover       |

# FOUNDATION PLAN

- —  $\frac{5}{8}$ " Hole
- — M12 Bolt



## LIFTING

Use the sling-chain to sling Lathe showed as in fig 4 position the saddle and tailstock along the bed to obtain balance.

**IMPORTANT: DO NOT USE SLINGS AROUND BED AS LEADSCRW AND FEEDSHAFT MAY BE U BENT.**

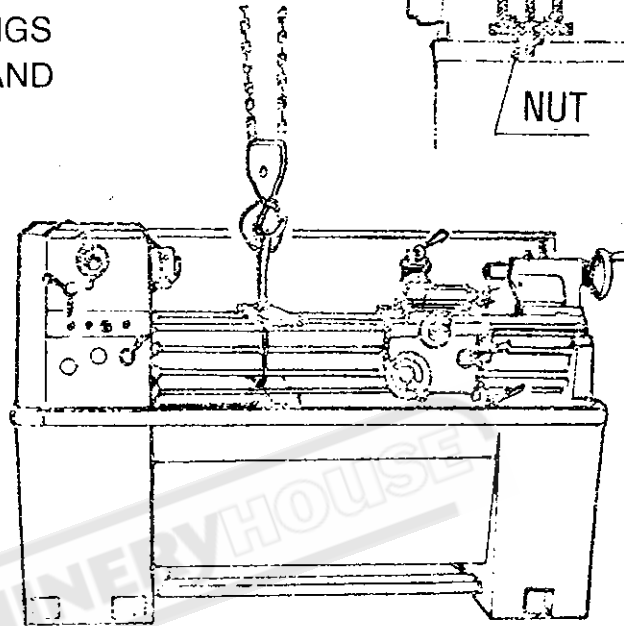
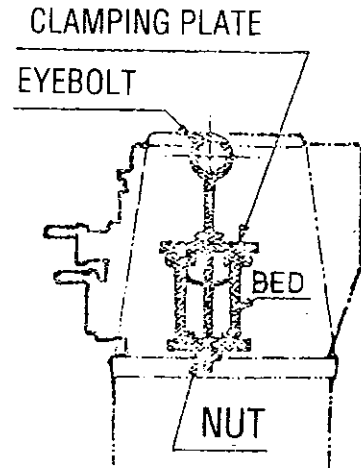


Fig 4

## CLEANING

Before operating any controls, use white spirit or kerosene to remove the anticorrosion coating from all slideways and the endgear train.

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

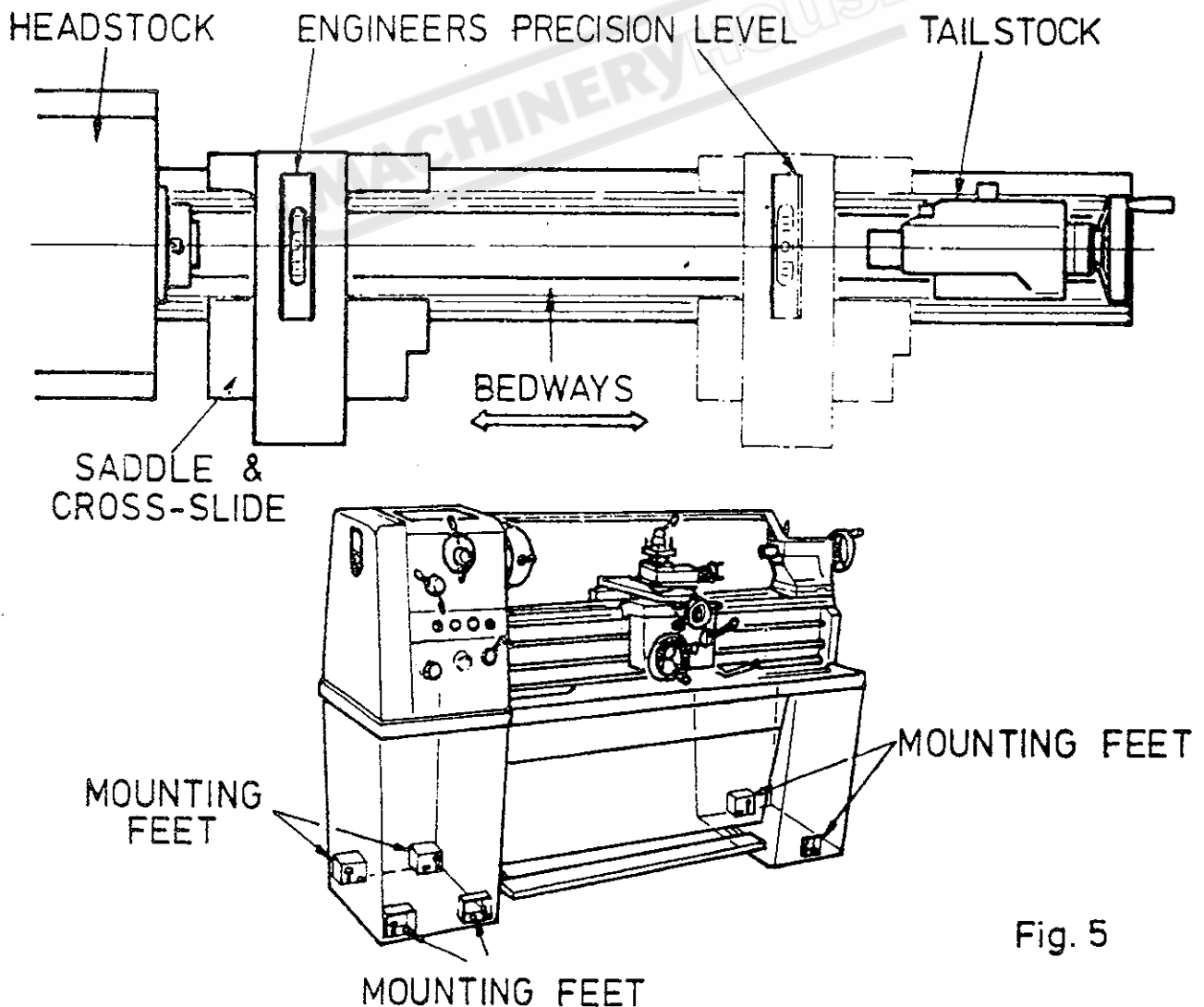
Machine surface becomes bright immediately after cleaning using machine oil or slideway lubricant. Use heavy oil or grease on the end gears.

# INSTALLING

Located the machine on a solid foundation, allowing sufficient area all round for easy working and maintenance(see Foundation Plan). The lathe may be used free-standing or bolted to the foundation.

Free-standing: Position lathe on foundation and adjust each of the six mounting feet to take equal share of the load. Then using an engineers precision level on the bedways (as in Fig 5) adjust the feet to level up machine. periodically check bed level to ensure continued lathe accuracy.

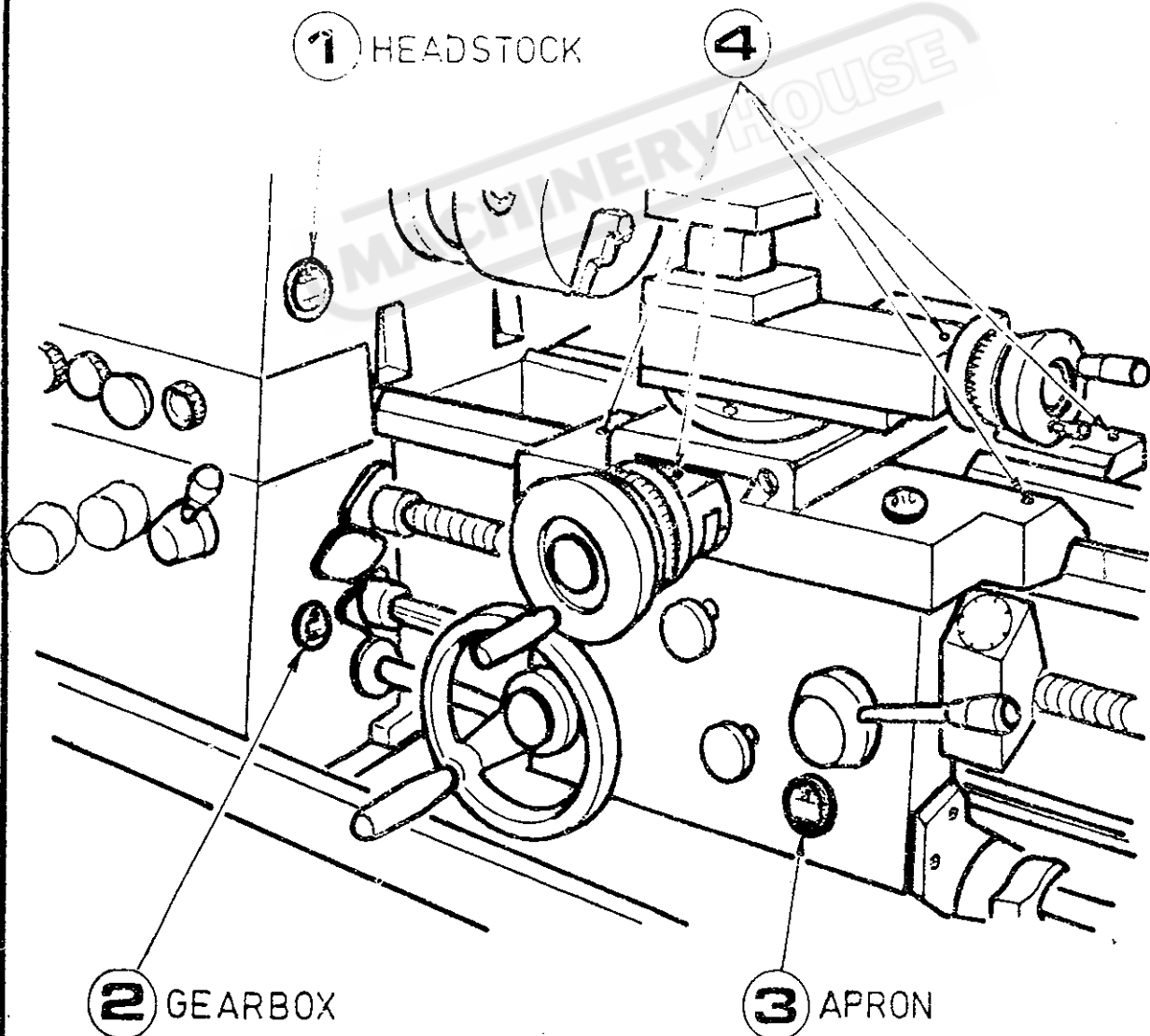
Fixed installation: Position lathe over six bolts (1/2 in. or 12 mm. diam.), set into the foundation to correspond with holes in the mounting feet. Accurately level the machine as in Fig 5, then tighten hold-down bolts and recheck bed level.



## LUBRICATION CHECKS

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





## CHUCKS AND CHUCK MOUNTING

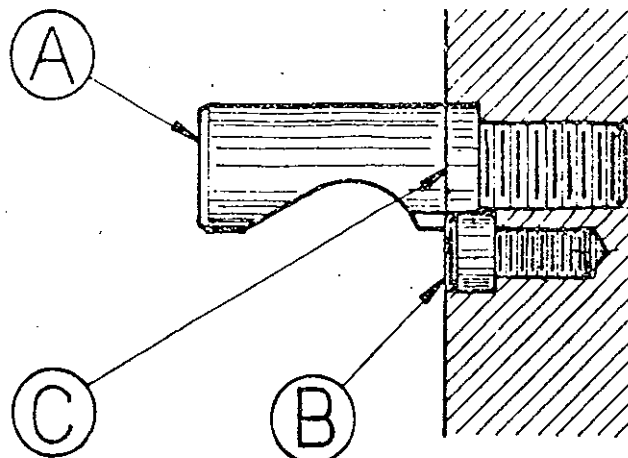
**WARNING: GREY-IRON CHUCKS MUST NOT BE FITTED ON THIS HIGH-SPEED LATHE. USE ONLY DUCTILE IRON CHUCKS.**

When fitting chucks or faceplate, first ensure that spindle and chuck tapers are scrupulously clean and that all cams lock in the correct positions. See Fig 7, it may be necessary when mounting a new chuck to re-set the camlock studs(A) to do this. Remove the cap-head locking screws(B) and set each stud so that the scribed ring(C) is flush with the rear face of the chuck-with the slit lining up with the locking screw hole (see Fig 7).

Now mount the chuck or faceplate on the spindle nose and tighten the three cams in turn. It must be fully tightened. If any of the cams do not tighten fully remove the chuck or faceplate and re-adjust the stud. Fit and tighten the locking screw (B) at each stud before remounting the chuck for work.

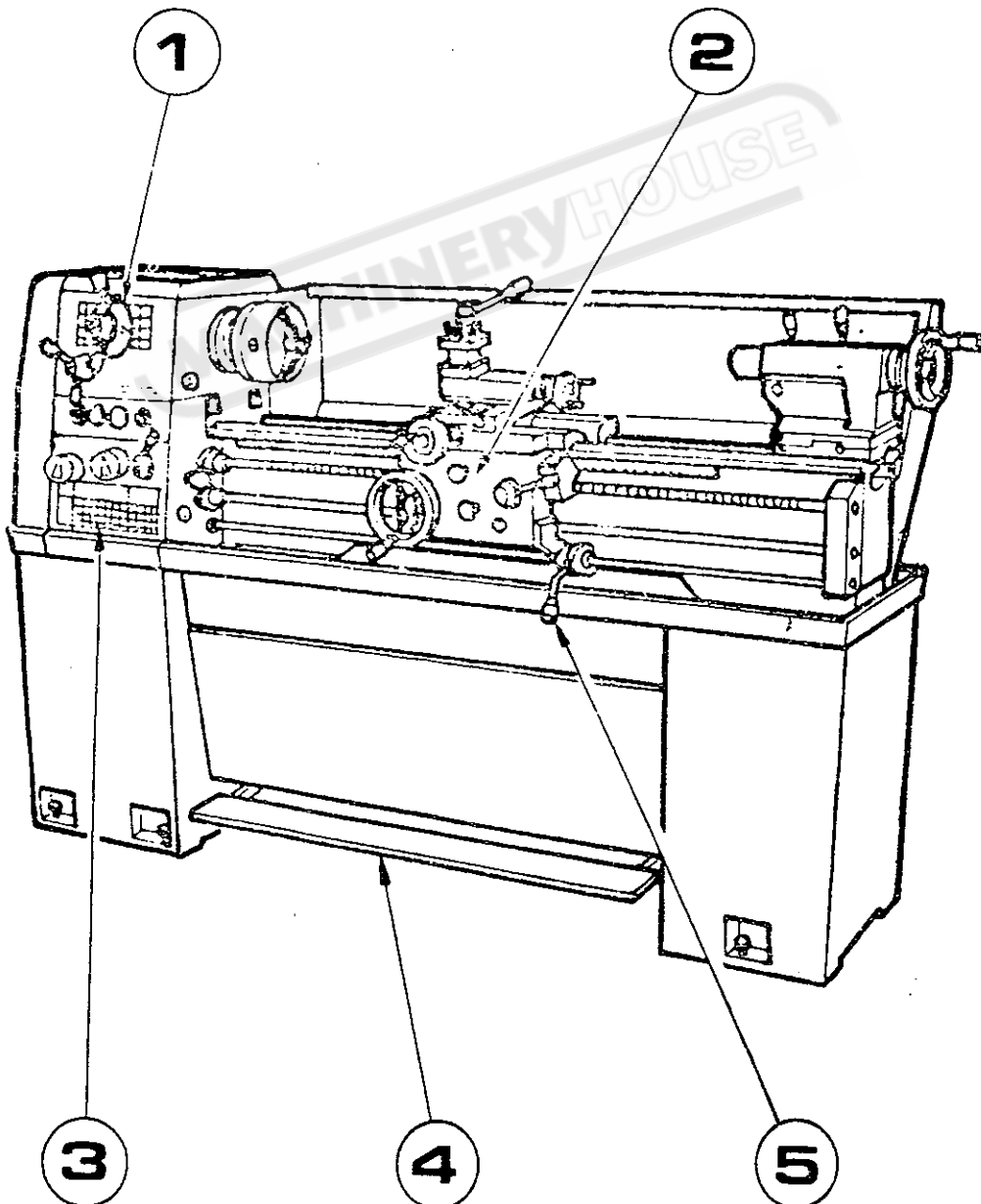
This will assist subsequent remounting. Do NOT INTERCHANGE CHUCKS OR FACE PLATES IF LATHE WITHOUT CHECKING UP CORRECT CAMLOCKING.

**IMPORTANT:** Take care note of speed limitations when using faceplate. 10 in. faceplates should not be run at speeds greater than 770 rev/min.



## LATHE CONTROLS

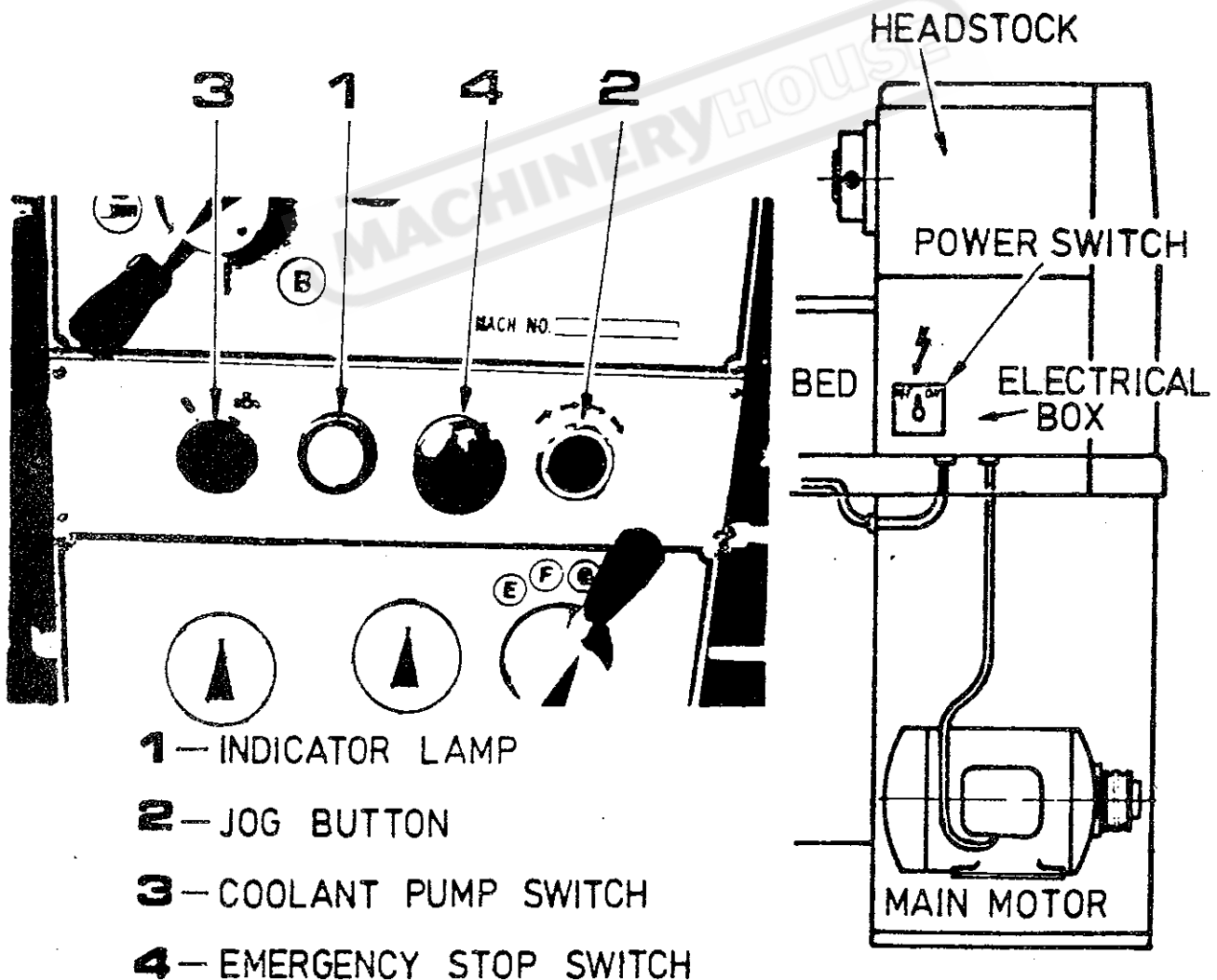
1. Spindle speed selector.
2. Apron, surfacing or sliding feeds.
3. Gearbox, threads and feeds.
4. Footbrake.
5. Main motor rotation (forward and revers).



## ELECTRICAL CONTROLS

The power switches are fitted on the face of electrical box in back of the bed and below the headstock. Except the main switch, all electrical controls are fitted in the front of the headstock.

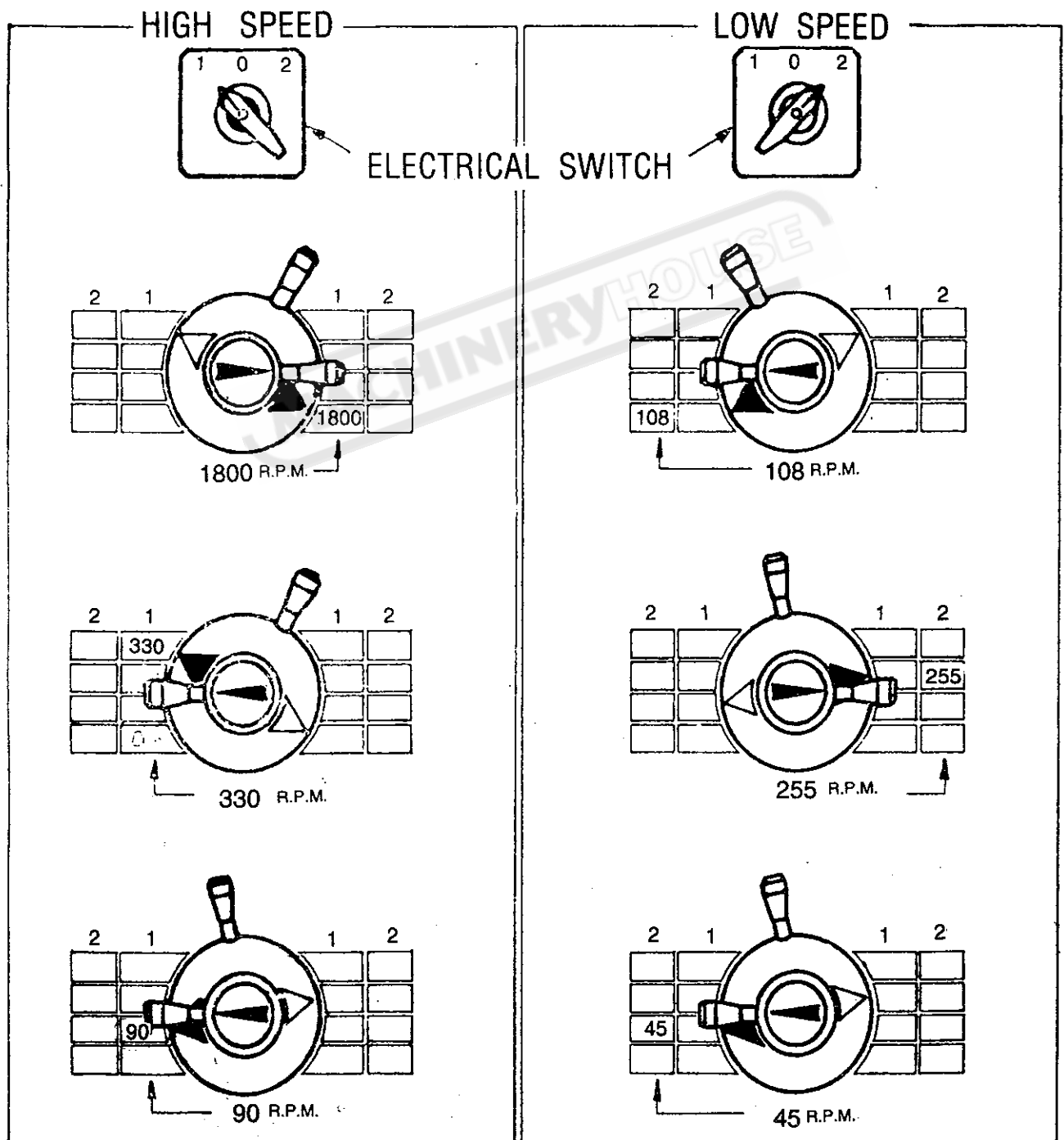
1. Move the power switch set at ON position then the indicator lamp glows.
2. Press the GREEN button. The main drive motor can be running with a moment. (While the main motor rotation lever is set in the neutral position.)
3. Coolant pump ON/OFF push button.
4. Press the RED button to stop the main motor and coolant pump.



# SPEED CONTROLS ( 2 SPEED MOTOR )

Spindle speeds: Selected by the two lever controls and an electrical switch, on the headstock and stand. The sixteen available speeds are shown directly on the data plate. While the electrical switch set at (1) position, the small lever rotated right-hand side, it provides speeds from 1800-510 r.p.m., and rotated to left-hand side, it provides speeds from 330-90 r.p.m. Then move the large lever to the appropriately coloured arrow aligned with the required speed on the data plate. While the electrical switch set at (2) position, it provides speeds from 900-255 r.p.m. and 165-45 r.p.m.

When the small lever set at upper or bottom position, the spindle is free for hand rotation.

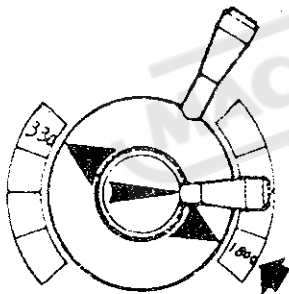


## SPEED CONTROLS

Spindle speeds: Selected by the two lever controls on the head-stock. The eight available speeds are shown directly on the data plate. Rotate the small lever to right-hand side, speeds can run from 1800-510 r.p.m. and rotate to left-hand side, provided speeds can be from 330-90 r.p.m. Then move the large lever until the appropriately coloured arrow is aligned with the required speed on the data plate.

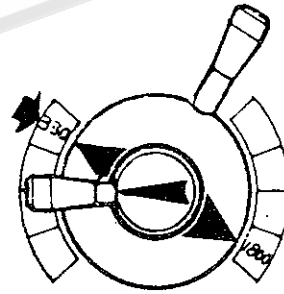
When the small lever set at upper or bottom position the spindle is free for hand rotation.

### HIGH SPEED

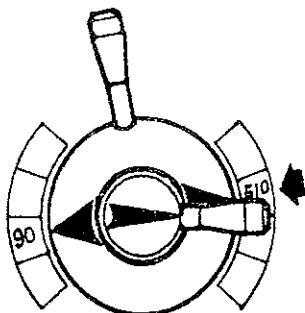


1800 r.p.m.

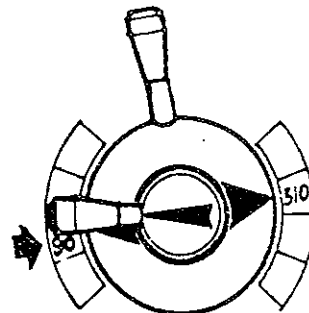
### LOW SPEED



330 r.p.m.



510 r.p.m.



90 r.p.m.

# THREADS AND FEEDS ( Metric Gearbox )

All the threads and feeds directly available from the gear box are shown in the data plate fitted on the front of the gear-box. The setting of control levers is shown in bellow.

The B position of lever (Y) can provide a range of fine threads: the A position a coarse thread range. Do not select the range (A position) at spindle speeds higher than 770 rev min.

### THREADS AVAILABLE

37 Metric threads 0.4 to 7.0 mm.pitch

28 Whitworth threads 4 to 56 t.p.i.

The endgear train should be arranged as in the diagrams shown on the data plate to suit threading requirements.

Feeds: longitudinal feeds per spindle revolution range from 0.043 to 0.653 mm.

cross feeds per spindle revolution range from 0.015 to 0.220 mm.

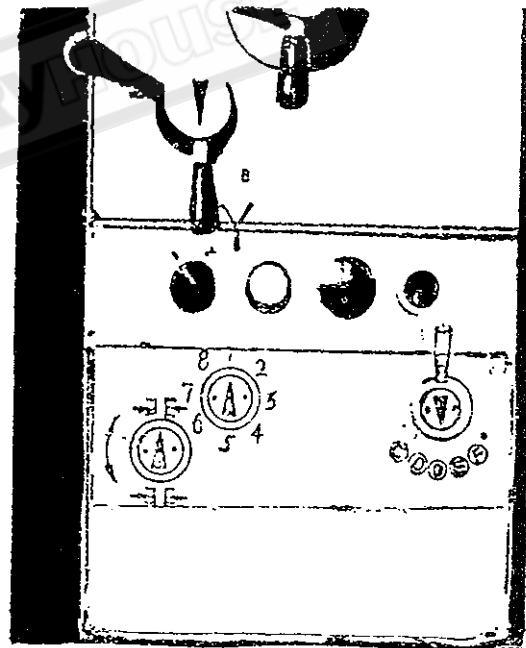


Fig.12

		MM								MM								TPI									
		1	2	3	4	6	7	8	1	2	3	4	6	7	8	2	1	2	2	1	1	1					
20T 127T 60T	C	A	4.0	4.5	5.0	5.5	6.0	6.5	7.0	D	A	0.373	0.422	0.466	0.513	0.561	0.608	0.653	120T 131T	40	40	32	32	30	30	30	
		B	2.0	2.25	2.5	2.75	3.0	3.25	3.5	B	0.168	0.214	0.233	0.256	0.280	0.303	0.327	60		60	60	66	60	65	70		
	E	A	1.0	1.125	1.25	1.375	1.5	1.625	1.75	F	A	0.109	0.122	0.135	0.149	0.163	0.177	0.190	C	A	4	4½	5	5½	6	6½	7
		B	0.5		0.625		0.75		0.875	B	0.054	0.060	0.067	0.074	0.081	0.088	0.095	B		8	9	10	11	12	13	14	
127T 60T	E	A	0.8	0.9	1.0	1.1	1.2	1.3	1.4	F	A	0.087	0.098	0.109	0.119	0.131	0.141	0.152	E	A	16	18	20	22	24	26	28
		B	0.4	0.45	0.5	0.55	0.6	0.65	0.7	B	0.043	0.049	0.054	0.059	0.065	0.071	0.076	B		32	36	40	44	48	52	56	

# THREADS AND FEEDS (Inch Gearbox)

All the threads and feeds directly available from the gear box are shown on the data plate fitted on the front of the gear—box. The setting of control levers is shown in Fig 13.

The B position of lever (Y) can provide a range of fine threads; the A position a coarse thread range. Do not select the range (A position) at spindle speeds higher than 770 rev/min.

## THREADS AVAILABLE

40 Whitworth threads 4.0 to 112 t.p.i.

22 Metric threads 0.45 to 7.5 mm. pitch

The endgear train should be arranged as in the diagrams shown on the data plate to suit threading requirements.

Feeds: longitudinal feeds per spindle revolution range from .0012 to .0294 in (0.0030 to 0.746 mm.)

cross feeds per spindle revolution range from .0004 to .0108 in. (0.010 to 0.271 mm.)

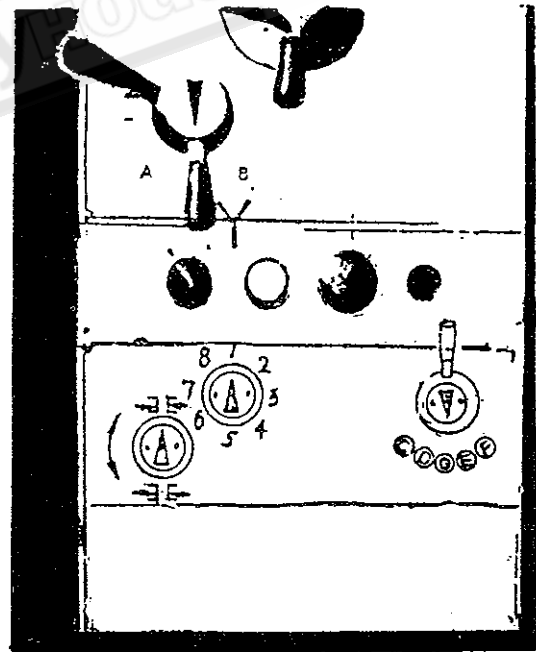


Fig.13

Inch		1	2	3	4	5	6	7	8	mm												
127 10	A	C	4	4 1/2	5	5 1/2	5 3/4	6	6 1/2	7	127 40											
		D	.0294	.0251	.0235	.0211	.0205	.0196	.0181	.0169	120 31											
127 15	A	C	8	9	10	11	11	12	13	14	127 40											
		D	.0147	.0131	.0117	.0107	.0102	.0098	.0090	.0084	120 40											
127 20	B	C	16	18	20	22	23	24	26	28	127 30											
		D	.0073	.0065	.0058	.0053	.0051	.0049	.0045	.0042	120 40											
127 25	A	E	32	36	40	44	46	48	52	56	127 40											
		F	.0042	.0038	.0034	.0031	.0030	.0028	.0025	.0021	120 40											
127 30	B	E	64	72	80	88	92	96	104	112	127 40											
		F	.0021	.0019	.0017	.0015	.0015	.0014	.0013	.0012	120 40											
											7	3	6	3	1	2	3					
											AC	7.5	6.0	5.0	4.8	4.5	4.0					
											BC	3.75	3.0	2.5	2.4	2.25	2.0	1.8				
											AE		1.5	1.25	1.2		1.0	0.9				
											BE		0.75		0.6		0.5	0.45				

# THREADING DIAL INDICATOR

## A. Whitworth threads

Located on right-hand side of the apron on lathes 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  $\frac{1}{2}$  or  $\frac{1}{4}$  t.p.i. may be cut by closing the nut at the SAME numbered line on each pass of the tool.

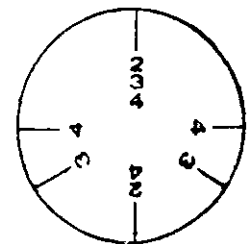
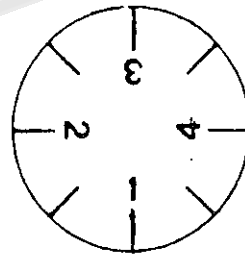
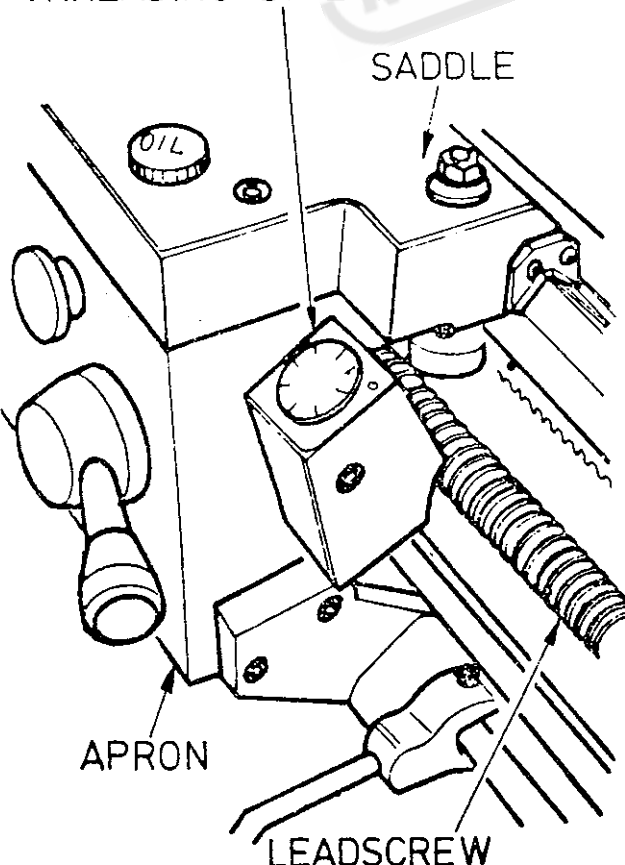
This dial cannot be used with an English leadscrew to cut metric threads, or fractional threads. For these the leadscrew nut must be kept closed and the machine reversed by use of the Change-over switch, after each cutting pass and tool with drawal.

## 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.

## THREADING DIAL INDICATOR



WHITWORTH THREAD DIAL

TPI ↓	TPI ↓	TPI ↓	TPI ↓	TPI ↓	TPI ↓
4	1-8	12	1-8	38	1-8
4½	1.3 2.4	13	1-4	40	1-8
4¾	1	14	1-8	44	1-8
5	1-4	16	1-8	48	1-8
5½	1.3 2.4	18	1-8	52	1-8
6	1-8	19	1-4	56	1-8
6½	1.3 2.4	20	1-8	64	1-8
7	1-4	22	1-8	72	1-8
8	1-8	24	1-8	76	1-8
9	1-4	26	1-8	80	1-8
9½	1.3 2.4	28	1-8	88	1-8
10	1-8	32	1-8	96	1-8
11	1-4	36	1-8	100	1-8

LEADSCREW PITCH 8TPI.

METRIC THREAD DIAL

P.C.	T ↓	P.C.	T ↓
0.4	20 4	1.4	21 3
0.45	27 3	1.5	27 3
0.5	20 4	1.625	26 2
0.55	22 2	1.75	21 3
0.6	27 3	2.0	20 4
0.625	20 4	2.25	27 3
0.65	26 2	2.5	20 4
0.7	21 3	2.75	22 2
0.75	27 3	3.0	27 3
0.8	20 4	3.25	26 2
0.875	21 3	3.5	21 3
0.9	27 3	4.0	20 4
1.0	20 4	4.5	27 3
1.1	22 2	5.0	20 4
1.125	27 3	5.5	22 2
1.2	27 3	6.0	27 3
1.25	20 4	6.5	26 2
1.3	26 2	7.0	21 3
1.375	22 2		

LEAD SCREW PITCH 4MM



## APRON CONTROLS

In addition to handwheel traverse, the carriage can be power-operated through controls on the front of the apron, see Fig 16 knob(A). If move handle(A) upwards, carriage would do longitudinal-feed operation. If move handle(A) in middle position, it would do manual operation. If move handle (A) downwards, it would do cross-feed operation.

Lever (B) is pressed downward to engage the leadscrew nut for screwcutting. To avoid-undue wear. Release the nut except when screwcutting.

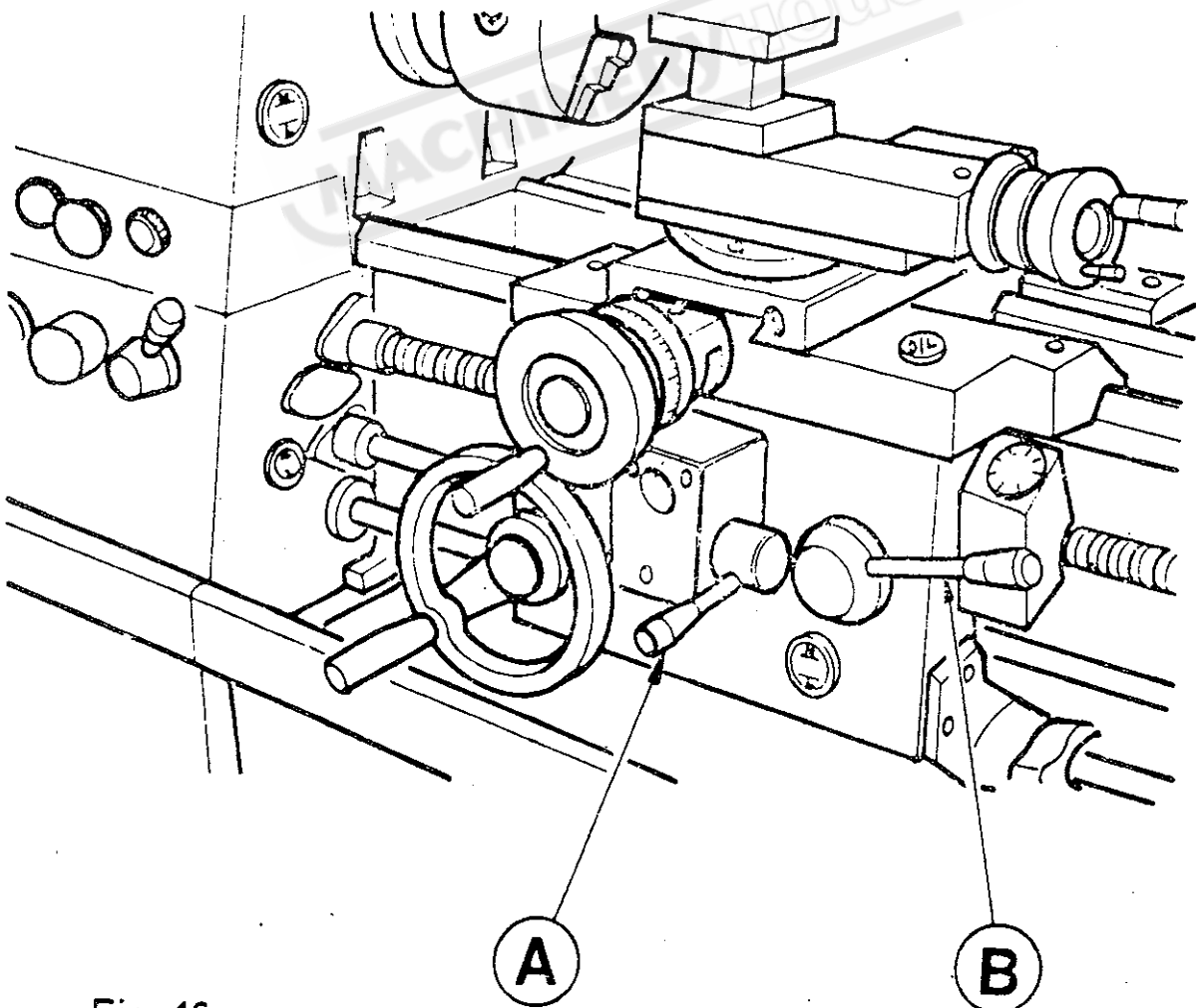


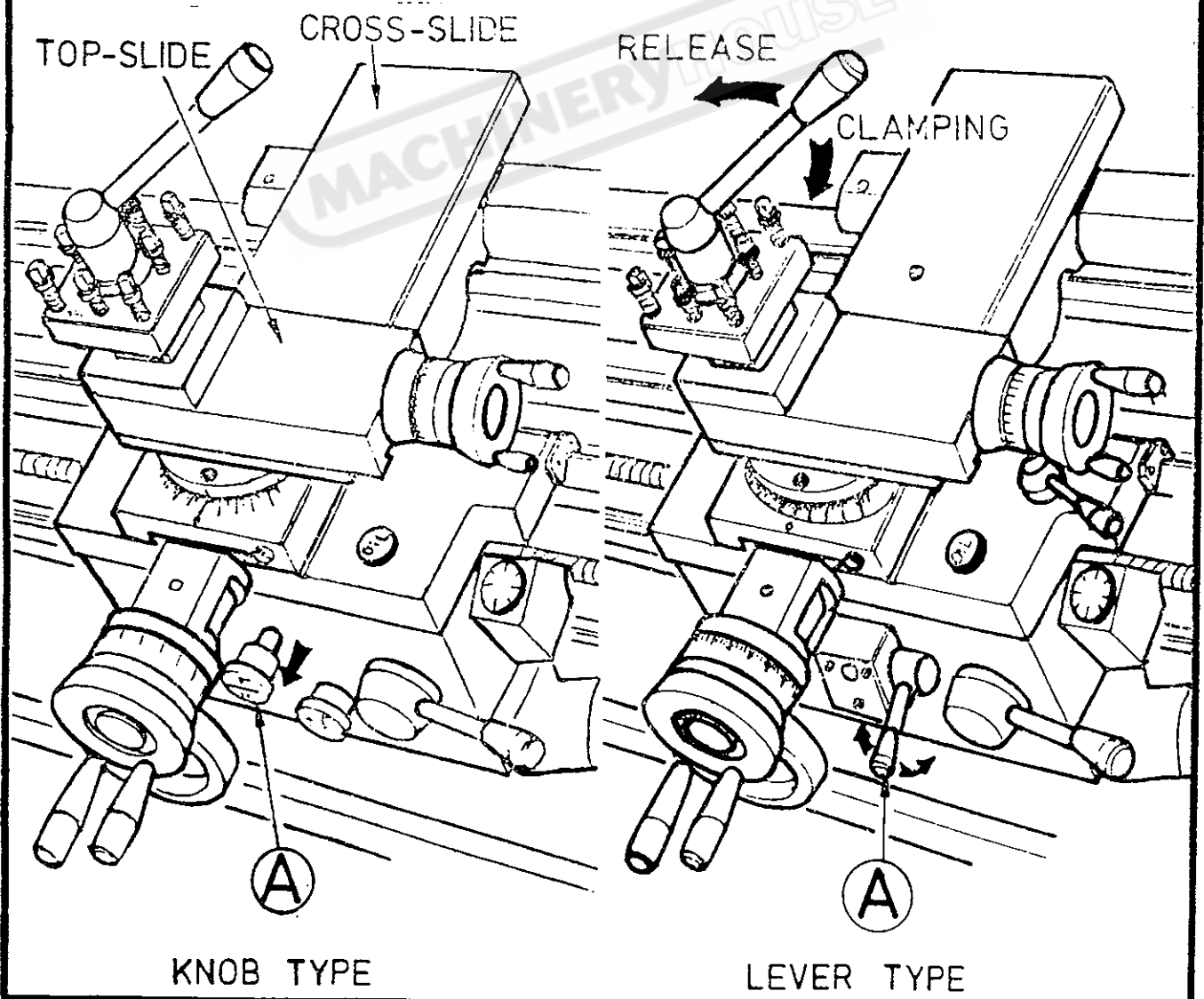
Fig. 16

## 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 divisions to suit the operating screw and nut fitted.

The cross-slide can be power operated by pulling out the hand knob (A), at one-third sliding feed per spindle revolution, or it can be hand-operated using the large-diameter dial graduated in either inch or metric division to suit the operating screw and nut fitted.



## TAIL STOCK

Can be free movement along the bed by unlocking the clamp lever (A).

The tailstock barrel is locked by lever (B).

The tailstock can be set-over for production of shallow tapers or for re-alignment. Release the clamping lever and adjust screws (S) at each side of the base to move tailstock laterally across the base. An indication of the setover is given by the datum mark (C) at the tailstock end face, as shown in Fig 18. Apply clamp lever after adjustment of set-over.

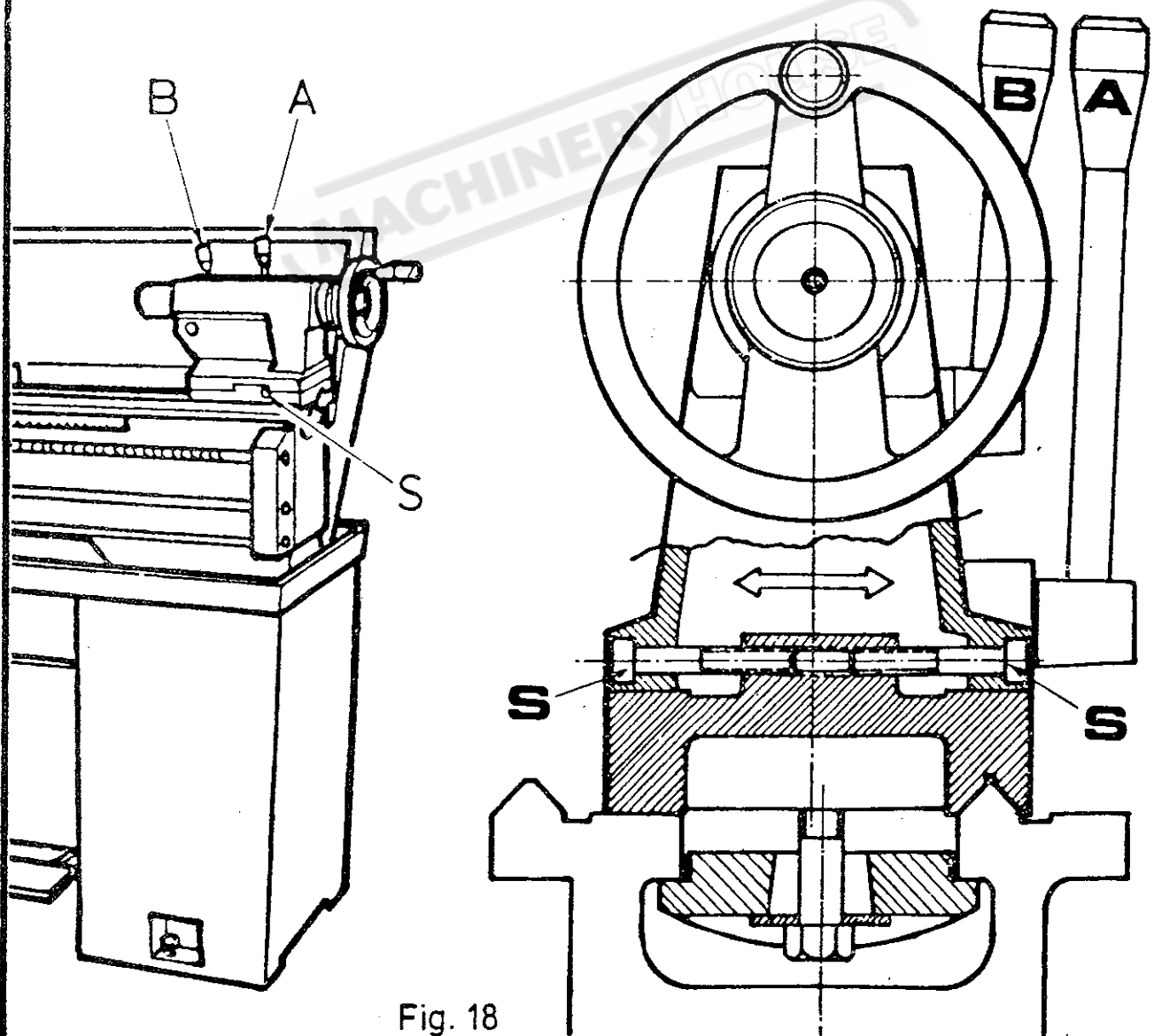


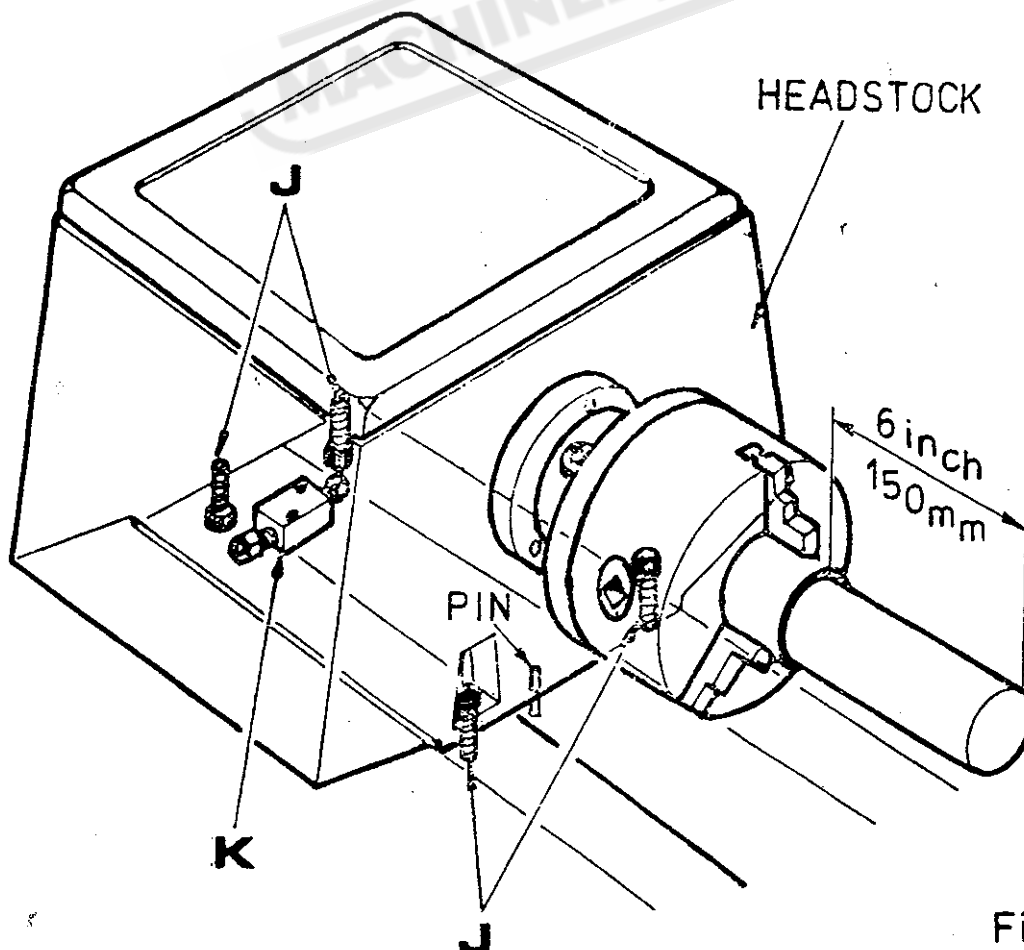
Fig. 18

## LATHE ALIGNMENT (part 1)

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

Headstock check: Take a light cut-with a keen tool over a 6 in. (150mm.) length of 2 in. dia. (50mm.) steel bar gripped in the chuck but not supported at the free end. Micrometer readings at each end of the turned length (at A and B of Fig 19) should be the same.

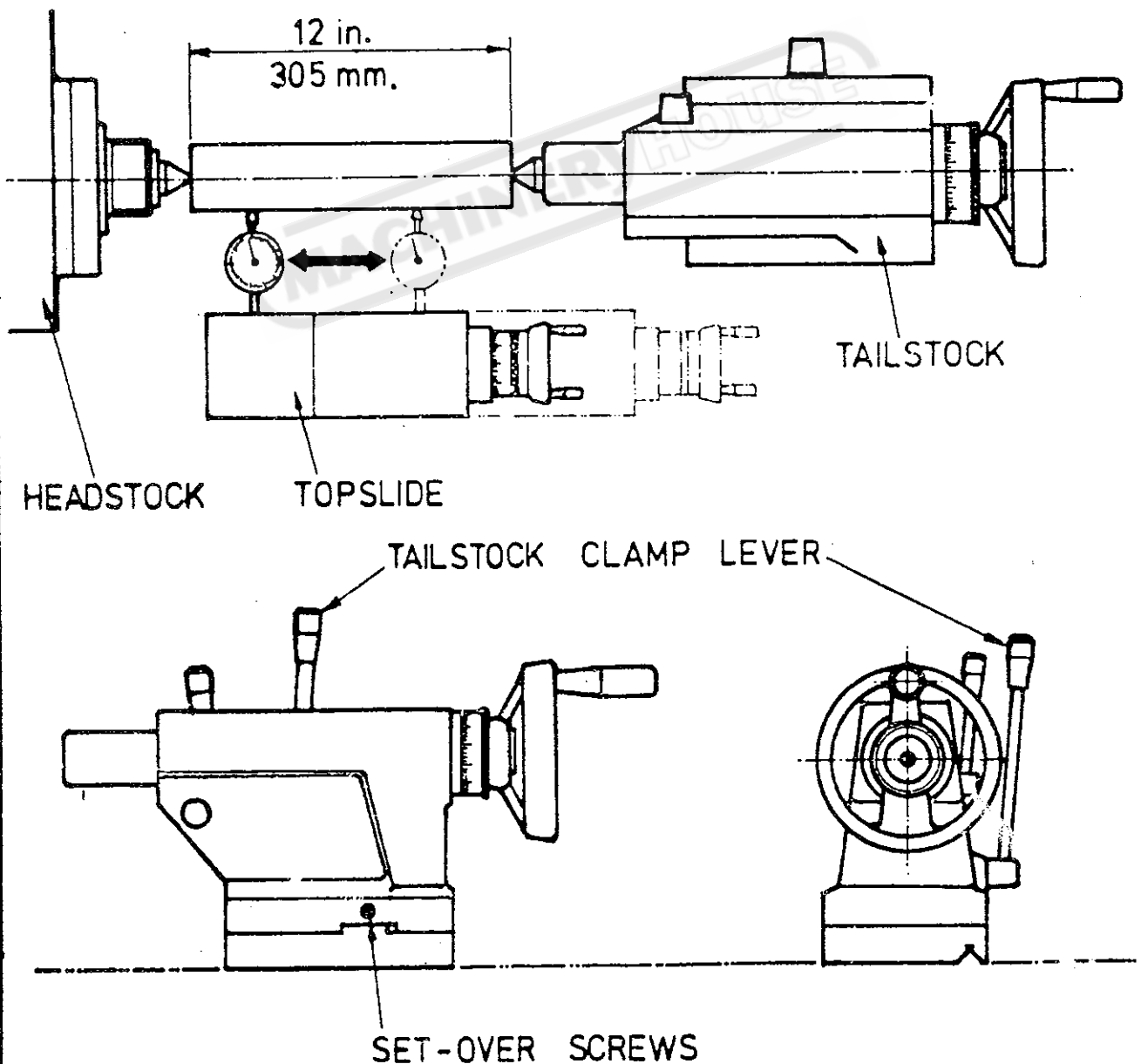
To correct a difference in readings, slacken and release the four headstock hold-down screws (J) shown in Fig 19 and adjust the set-over pad (K) beneath the headstock. Then tighten all screws. After adjustment, repeat the test-cut/micrometer-reading until micrometer readings are identical so that machine cutting will be absolutely parallel.



## LATHE ALIGNMENT (part 2)

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

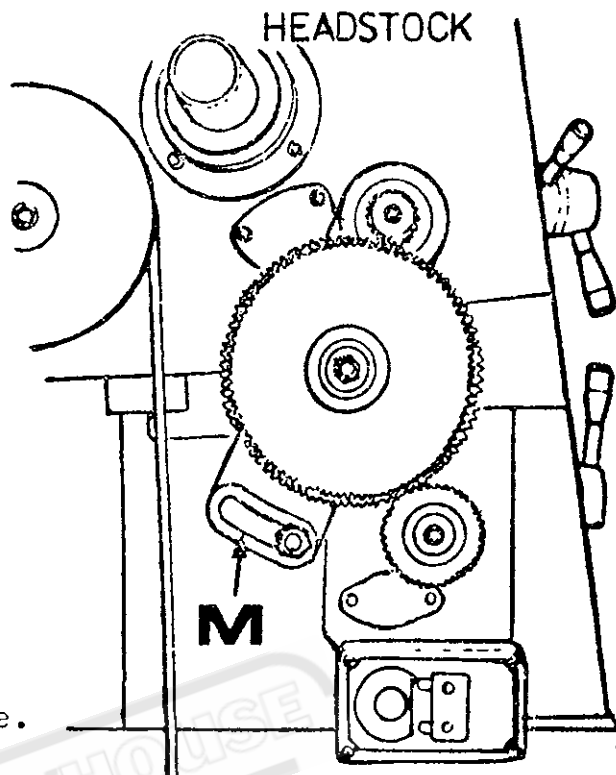
To correct error, release the tailstock clamp lever and adjust the two set-over screws provided. Continuously check and correct until the alignment is perfect.



## END GEAR TRAIN

Drive from headstock to gear-box is transmitted through a gear train enclosed by the headstock end-guard. Intermediate gears are carried on an adjustable swing frame (M).

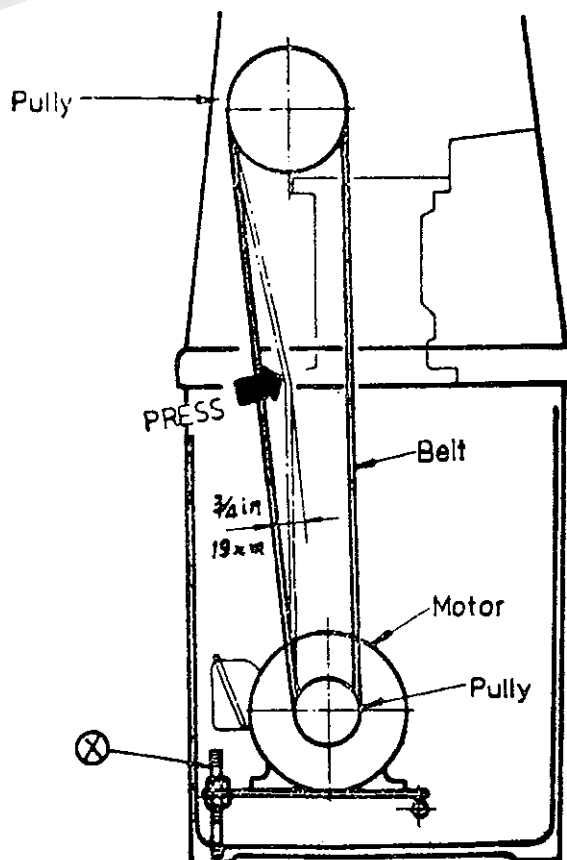
Gears must be thoroughly cleaned before fitting and backlash maintained at .005in. (.127 mm.) Lubricate gears regularly with thick oil or grease.



## DRIVING BELTS

To alter belt tension, remove the coverplate in back of the headstock plinth and adjust the two screws (X) on the hinged motor platform. Ensure that the motor is correctly aligned with the lathe axis.

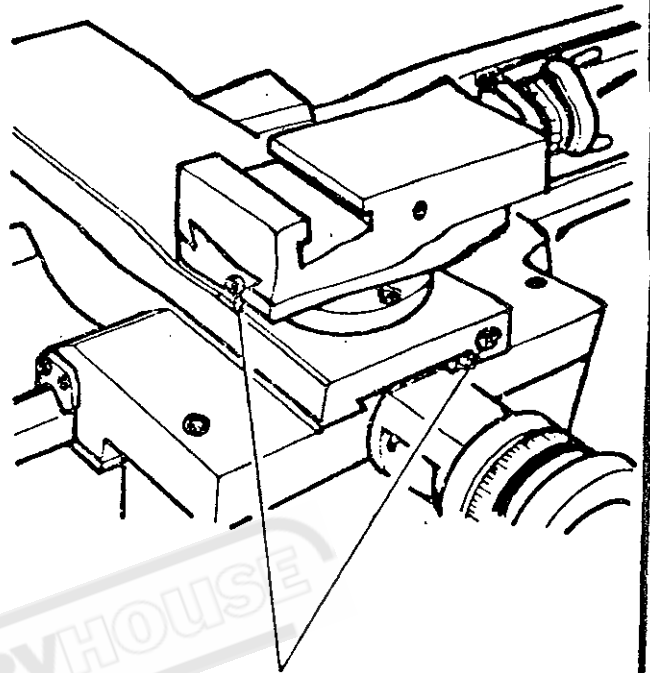
Light finger pressure at a point midway between motor and headstock pulleys should produce about 3/4 in. (19mm.) movement of each belt when under correct tension.



## SLIDE WAYS ATTENTION

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

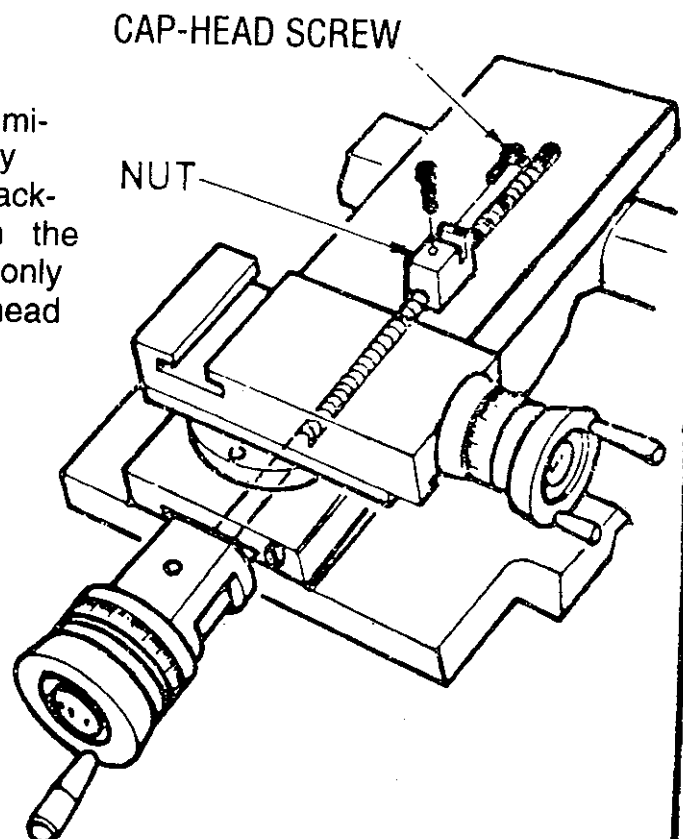
Ensure that slideways are thoroughly cleaned and lubricated before attempting adjustment. Then reset the gibs by slackening the rear gib screw and tightening the front screw. Check constantly for smooth action throughout full slide travel. Avoid over-adjustment which can result in increased wear-rate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



GIB ADJUSTERS

## CROSS-SLIDE NUT

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



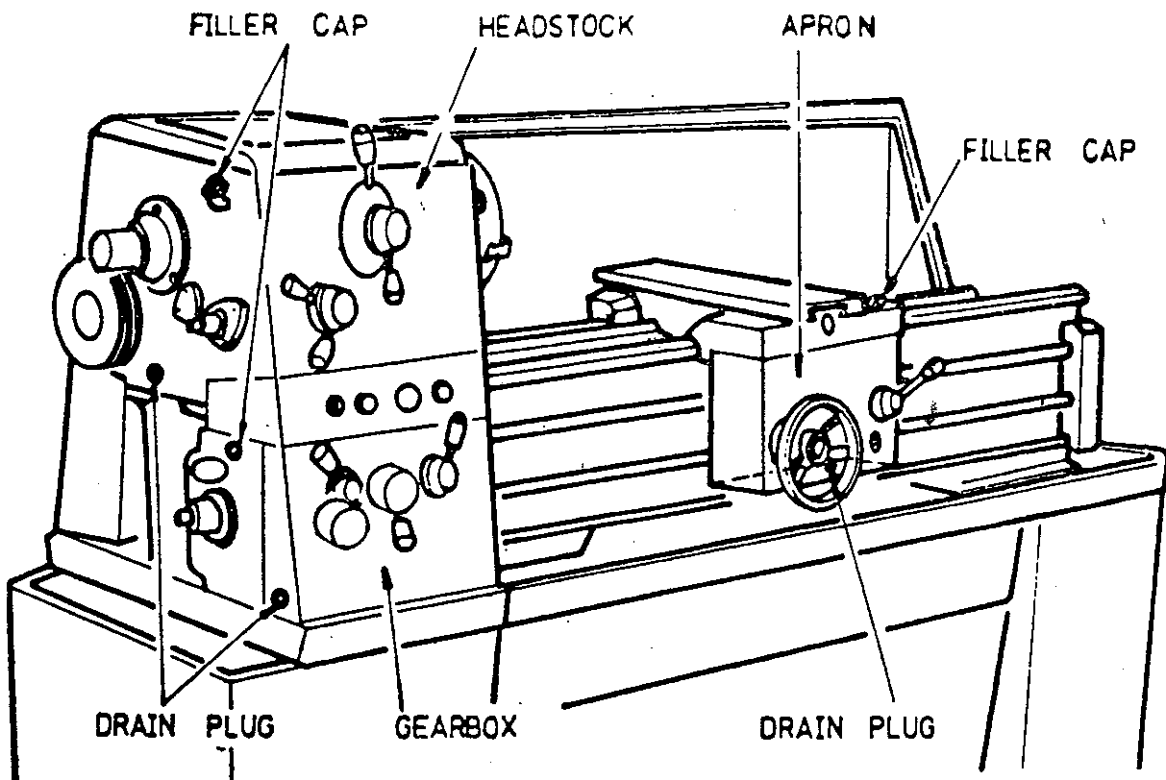
CAP-HEAD SCREW

NUT

## LUBRICATION ( part 1 )

The headstock and gearbox are splash-lubricated from an internal reservoir of oil (Shell Tellus 27). Check the oil level constantly to the mark on the oil sight window in the front end face of the headstock and gearbox. A weekly check is recommended. The oil need be changed every year. Oil through a filler cap in the top of the headstock and gearbox is covered by the end-guard. Drain from a drain plug in the bottom of the headstock and gearbox.

The apron is lubricated from an internal reservoir of oil. The oil sight window is in the front of the apron. A filler cap is in the top of the saddle. Refill the reservoir to the level of the oilsight with Shell Tonna oil 33. The apron can be drained by unscrewing a hexheaded drain plug in the bottom.





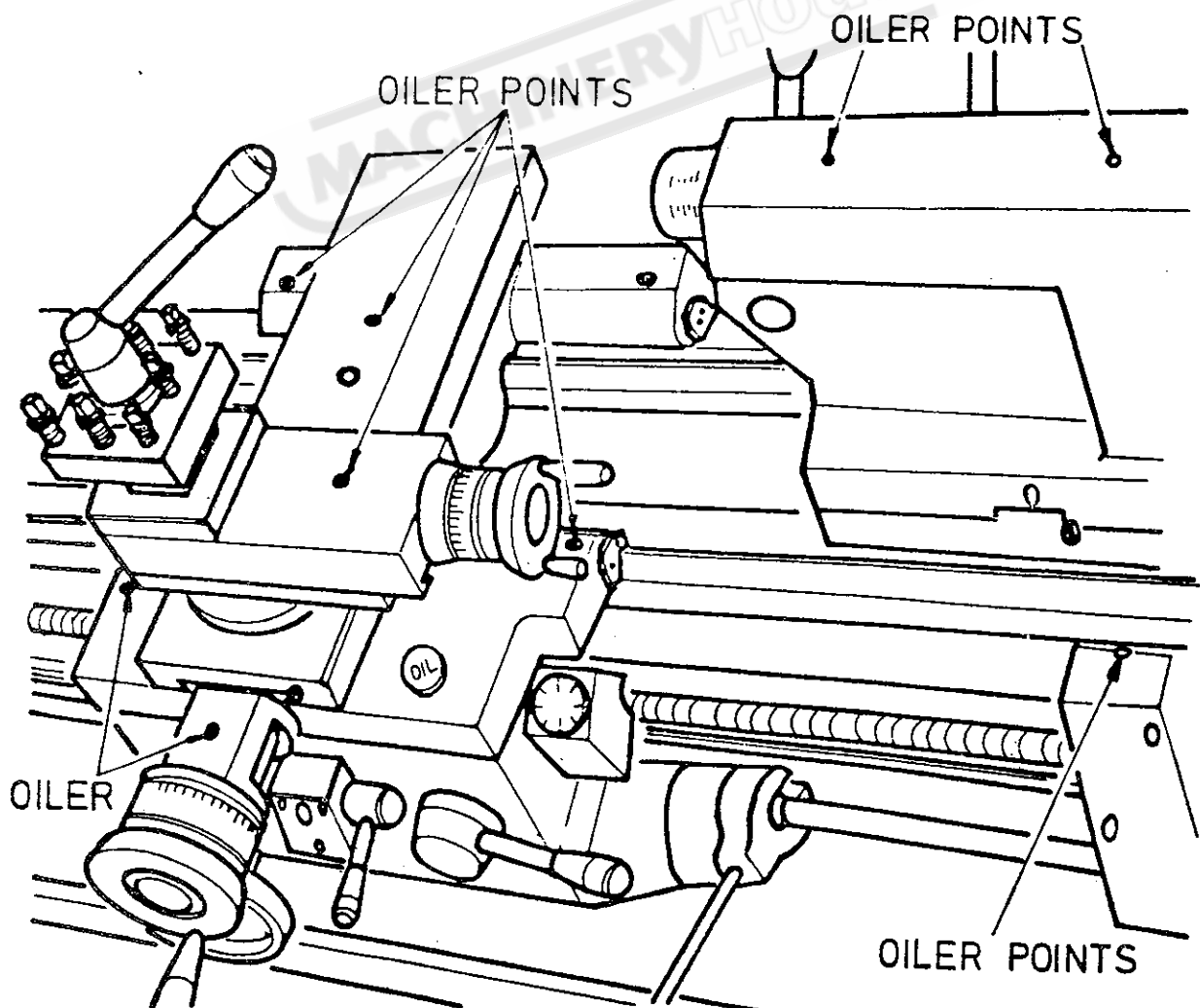
## LUBRICATION (part 2)

In addition, oil gun is provided for the saddle, cross-slide, crossslide nut and top-slide(compound slide) to oil. Leadscrew using a oil gun can be oiled with light machine oil or way lubricant.

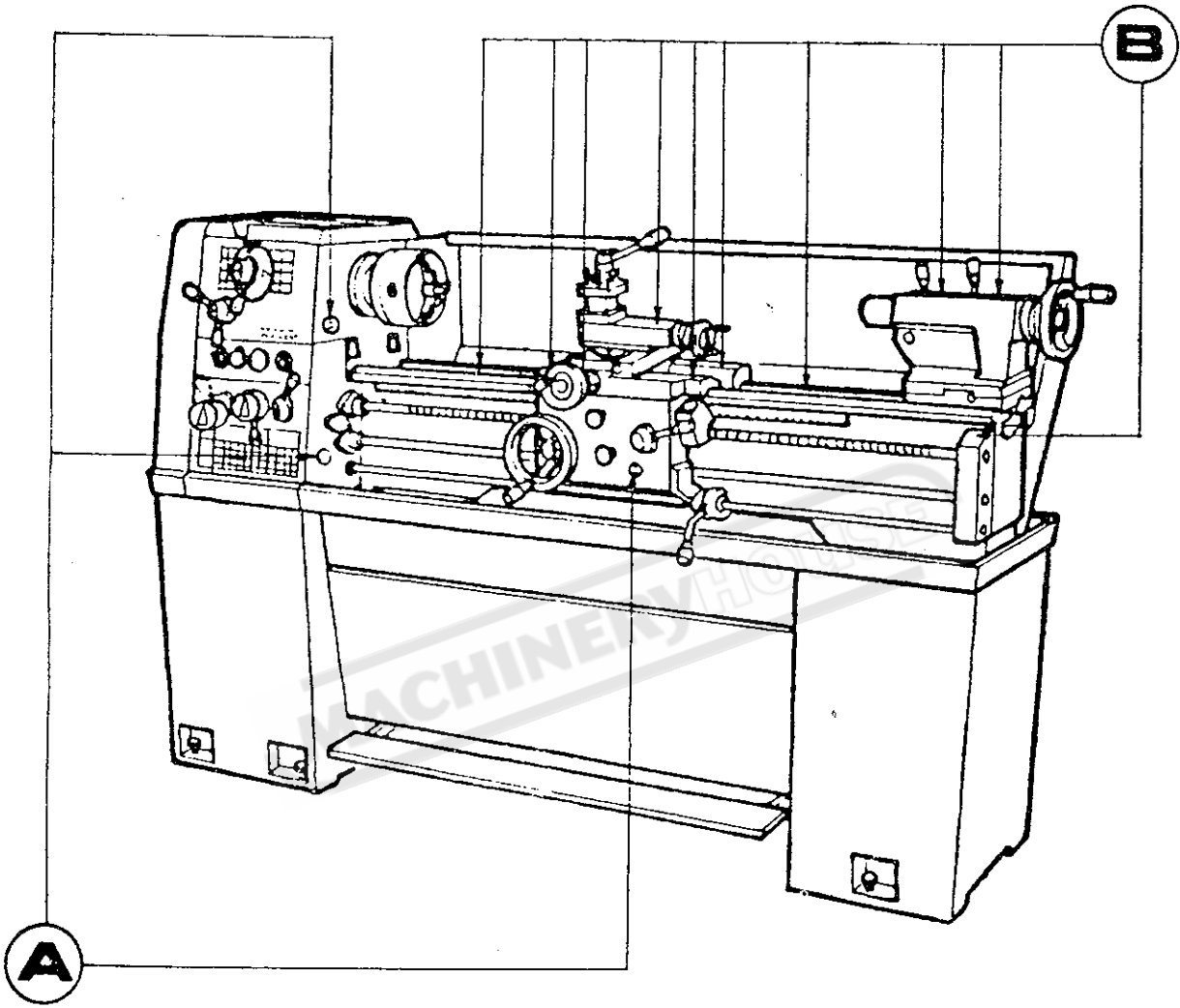
On the tailstock, oil points are provided for daily attention from a standard oil can.

It is recommended that all slideways, leadscrew and feed shaft are cleaned off (a bristle paint brush is useful for this) and lightly oiled after each period of work.

NOTE: Using incorrect grades of oil can cause damage.

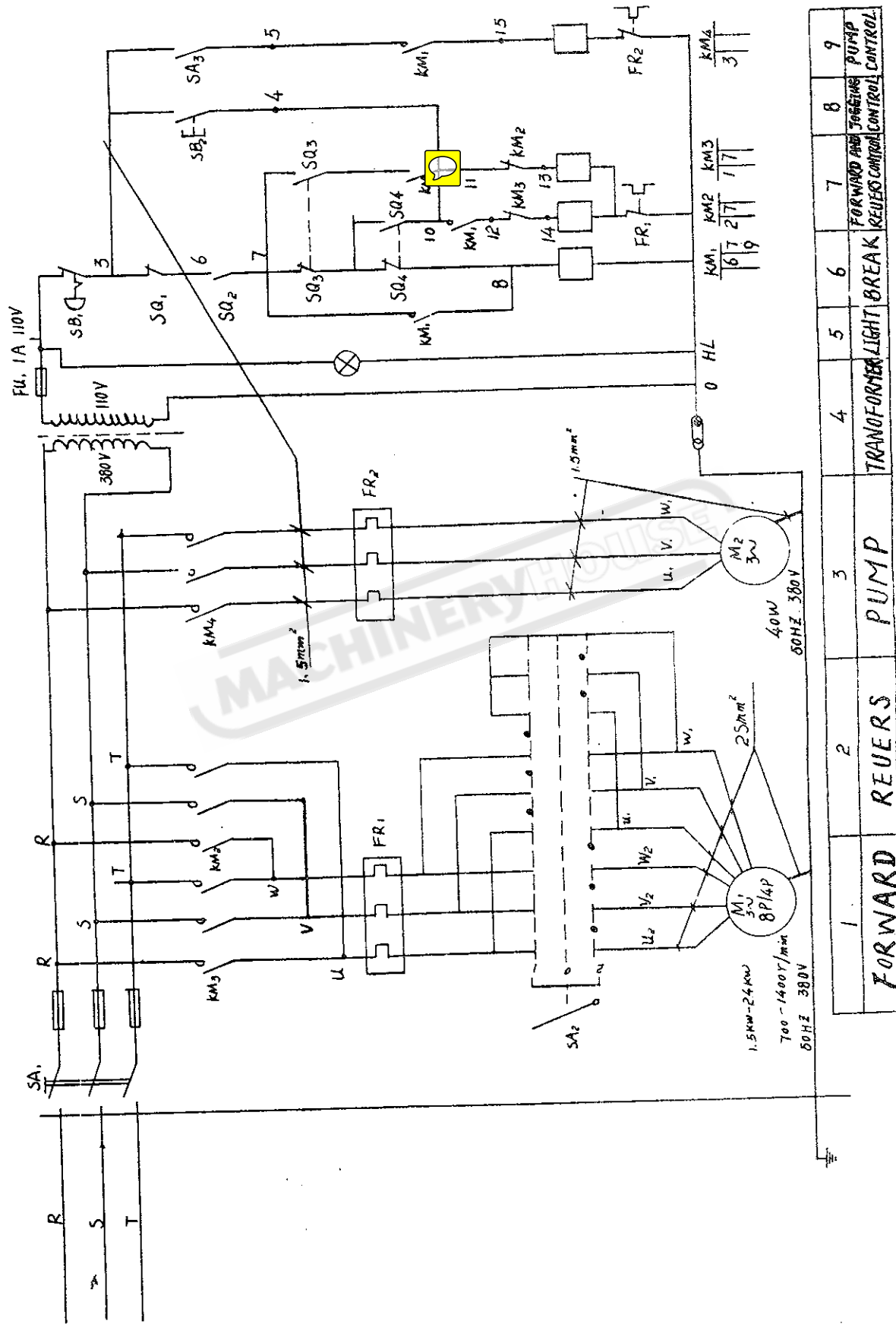


# LUBRICATION DIAGRAM

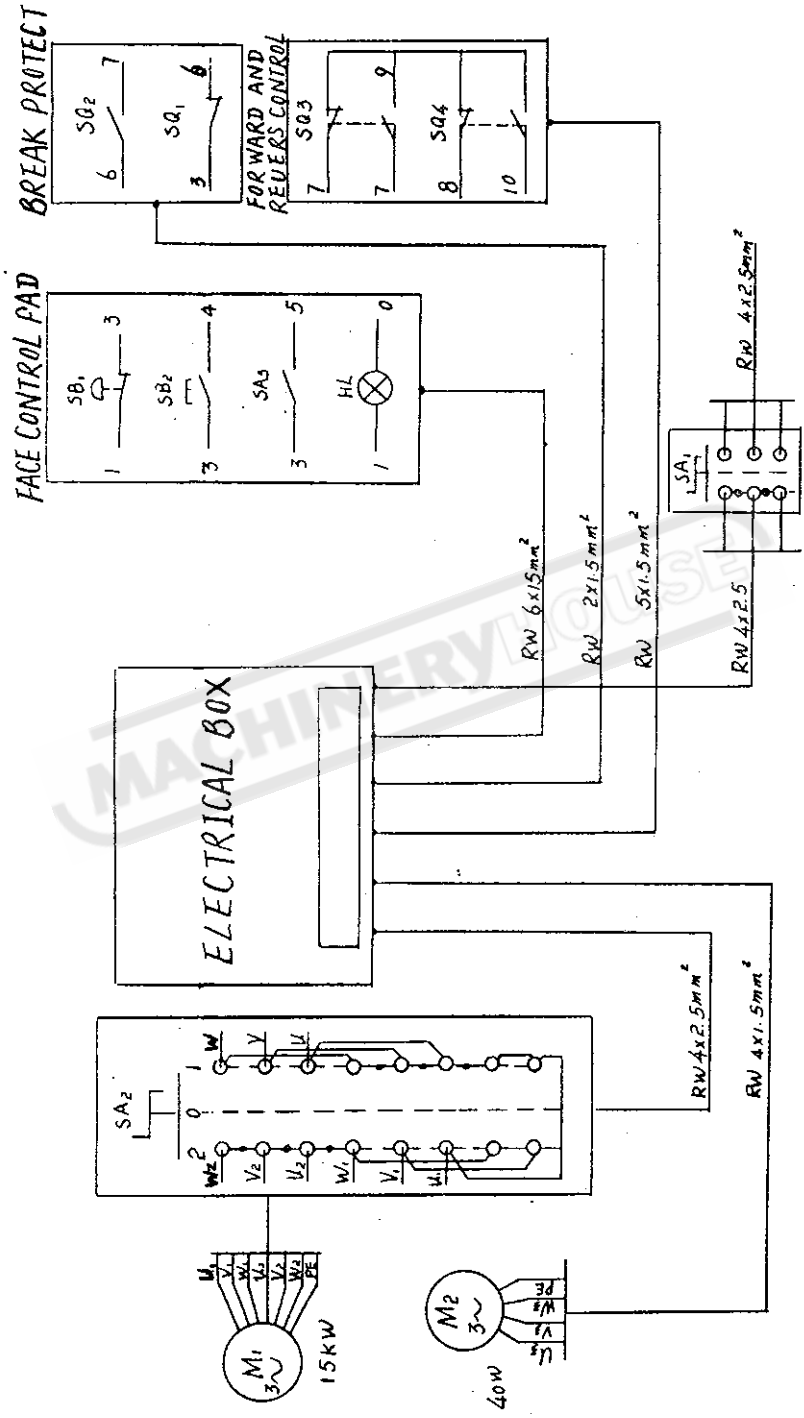


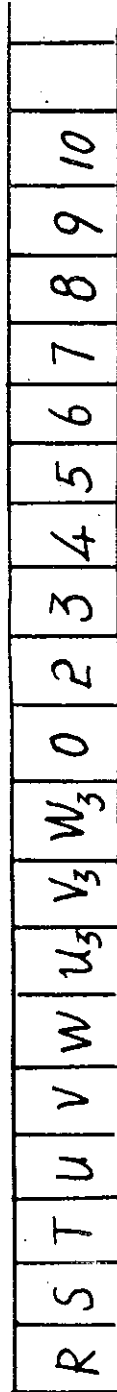
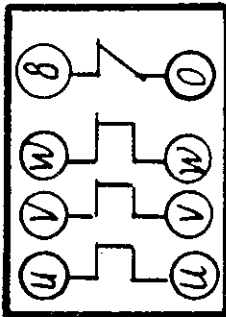
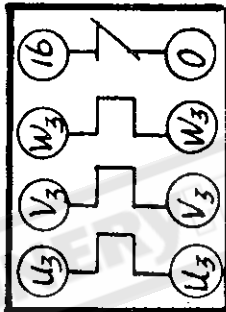
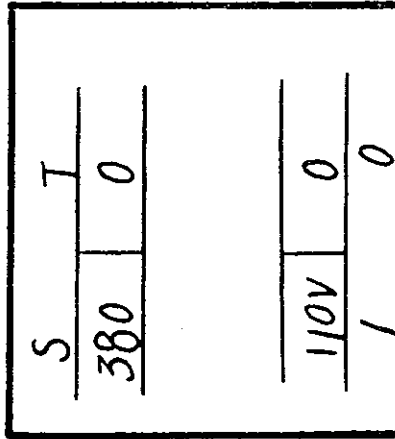
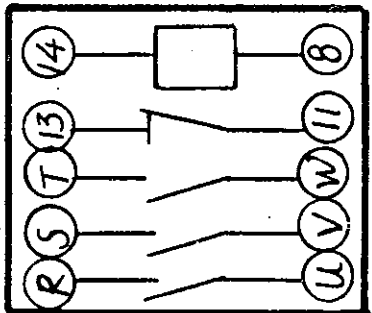
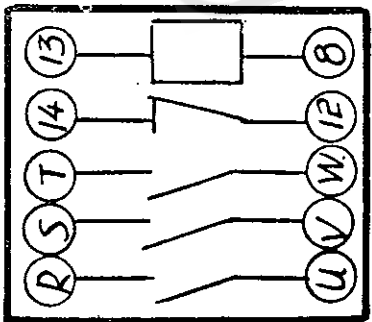
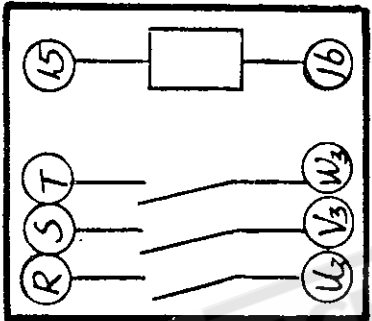
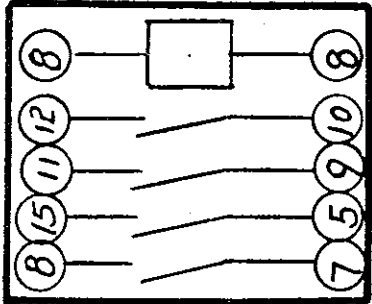
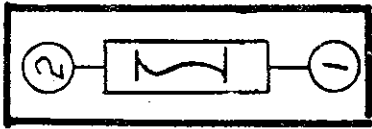
**A** — TOP-UP EVERY WEEK

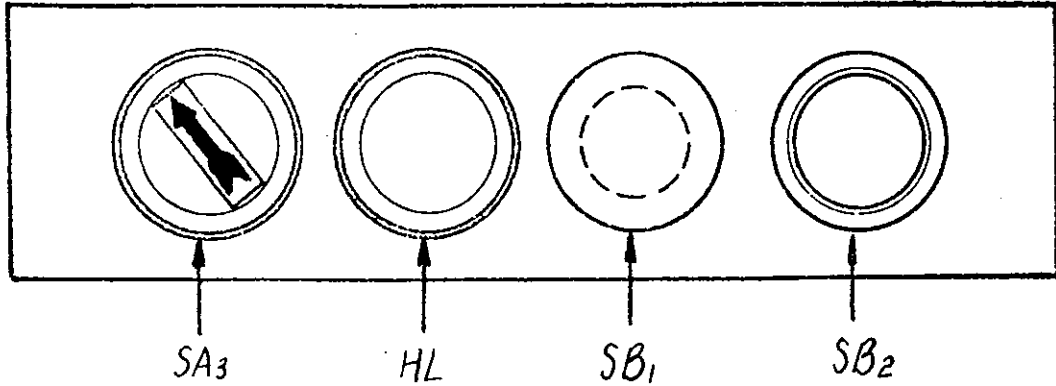
**B** — OIL EVERY DAY



1	2	3	4	5	6	7	8	9
FORWARD	REVERS	PUMP	TRANSFORMER LIGHT BREAK	FORWARD AND JOGGING PUMP	REVERS CONTROL CONTROL			







*SA1*: Power switch 3 $\phi$  3w 10A.

*T*: Control circuit Transformer 100VA.

*M1*: Main Motor.

*M2*: Pump motor.

*SB2*: Push button switch(jogging switch)type SB 3051A.

*SB1*: Flate type push button type SB 3091B.

*HL*: Pilot light type.SP 301,110V/15V, color:white.

*SA3*: Selecting switch. type ST 3021A.

*FU1*: Fuse base 600V, 30A, type SR—833.

*FU2*: Grass tube fuse 1A.

*KM4*: For main motor Reverse AC magnetic contactor coil AC 110V. type c—11G3A1B.

*KM3*: For main motor Forward AC magnetic contactor coil AC110V. type c—11G3A1B.

*KM2*: For pump motor AC magnetic contactor coil AC 110V. type c—11G3A1a.

*FR1*: Thermal overload relay for main motor. type RH—18M.

*FR2*: Thermal overload relay for pump motor. type RH—10E.

*KM1*: AC magnetic contactor coil AC 110V. type c—11G3A1a.

*SQ1*: Limit switch End cover safety switch type 15G 22—B.

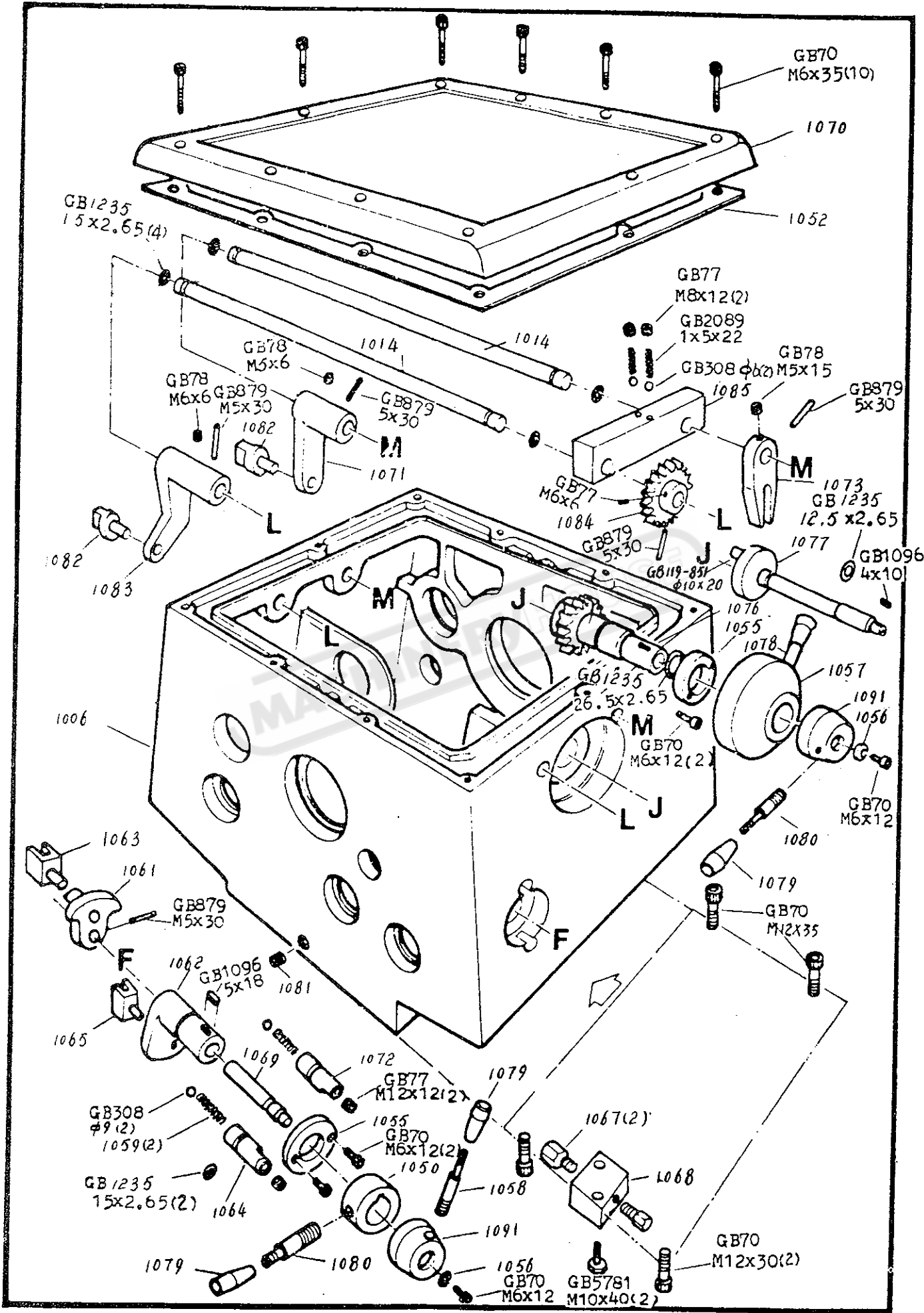
*SQ2*: Limit switch Brake precision. type 15GD—B.

*SQ3*: Limit switch Reverse precision. type 15GD—B.

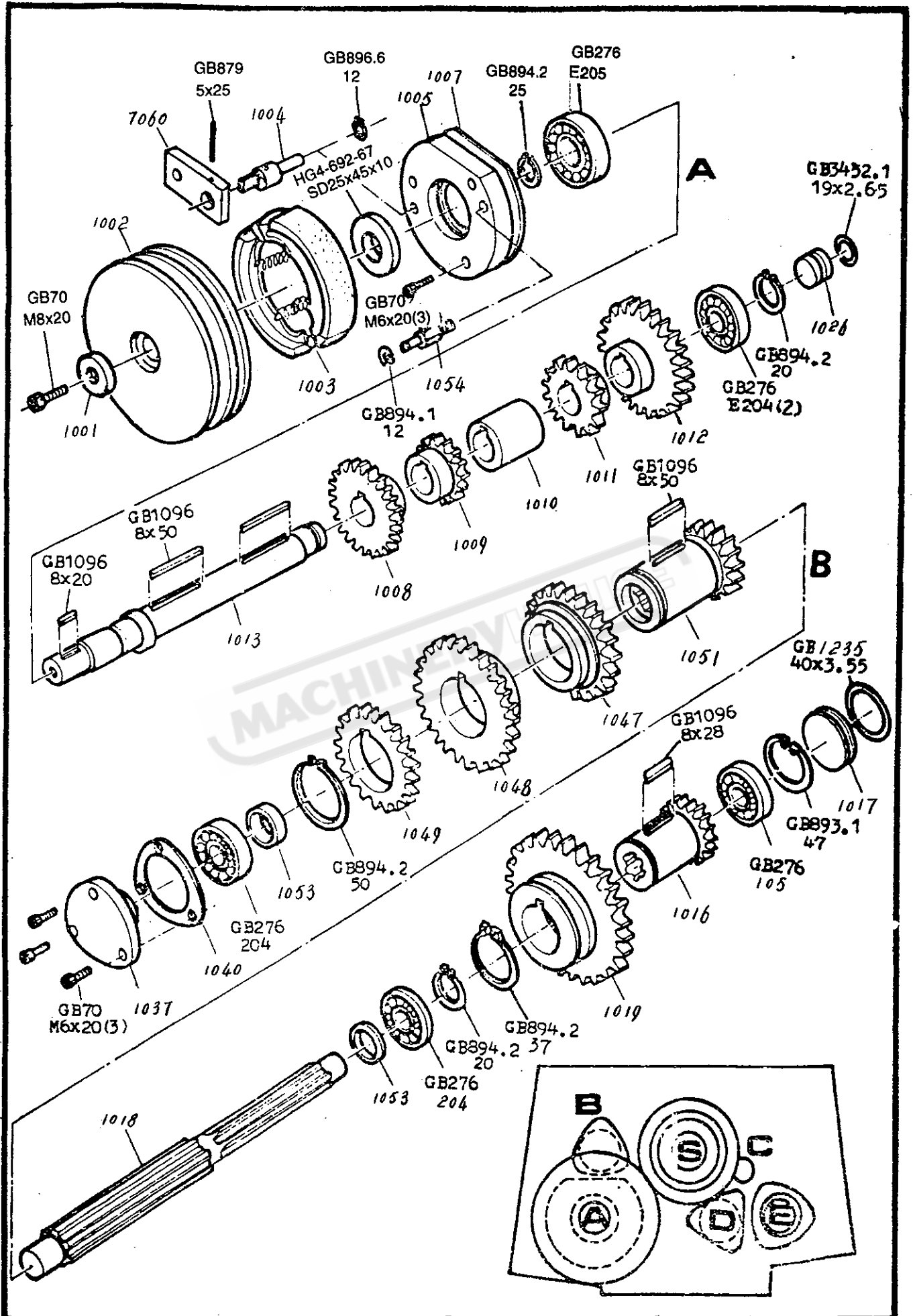
*SQ4*: Limit switch Forward precision. type 15GD—B.

*SA2*: 2 Speed Motor switch.

# HEADSTOCK

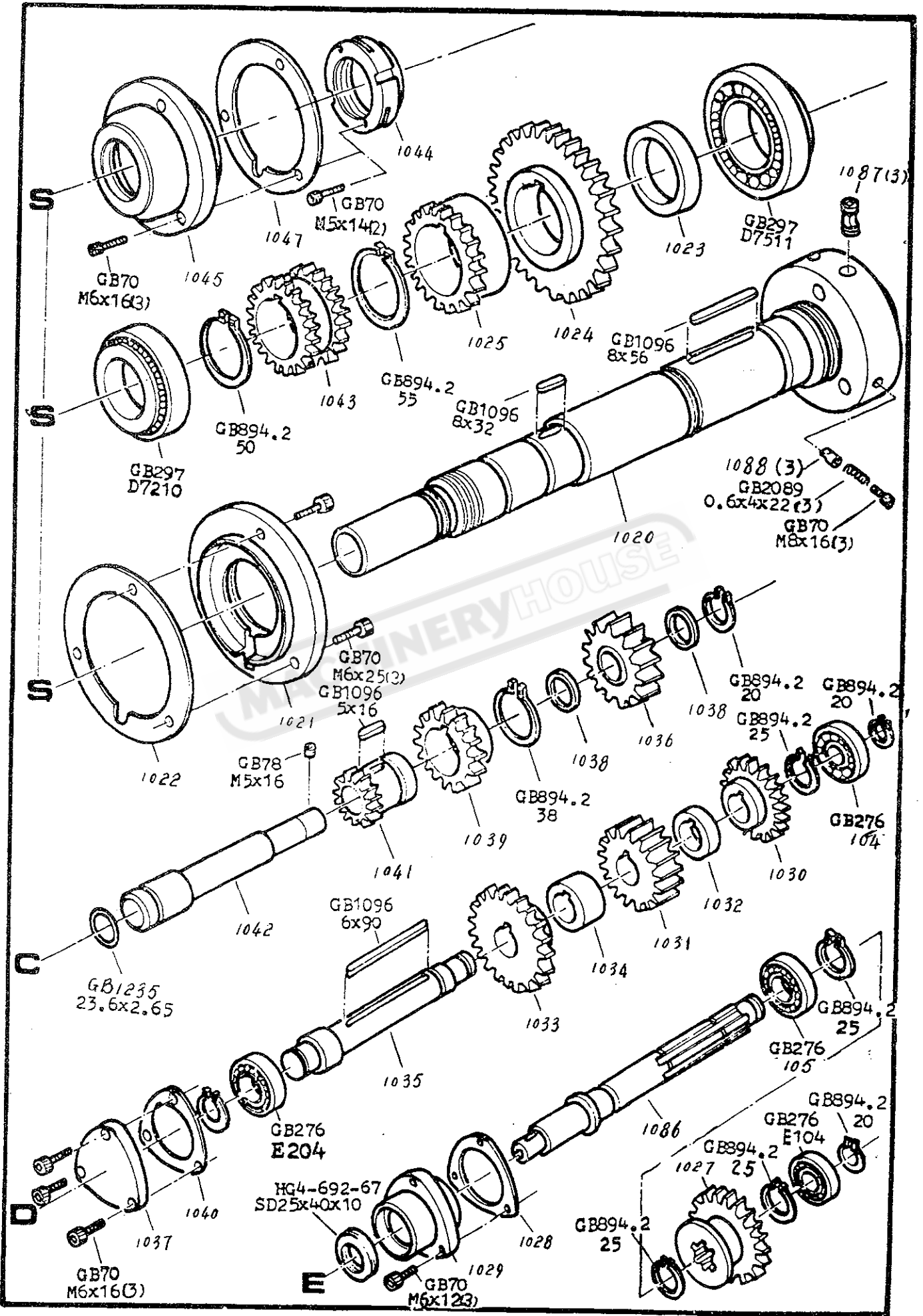


# HEADSTOCK

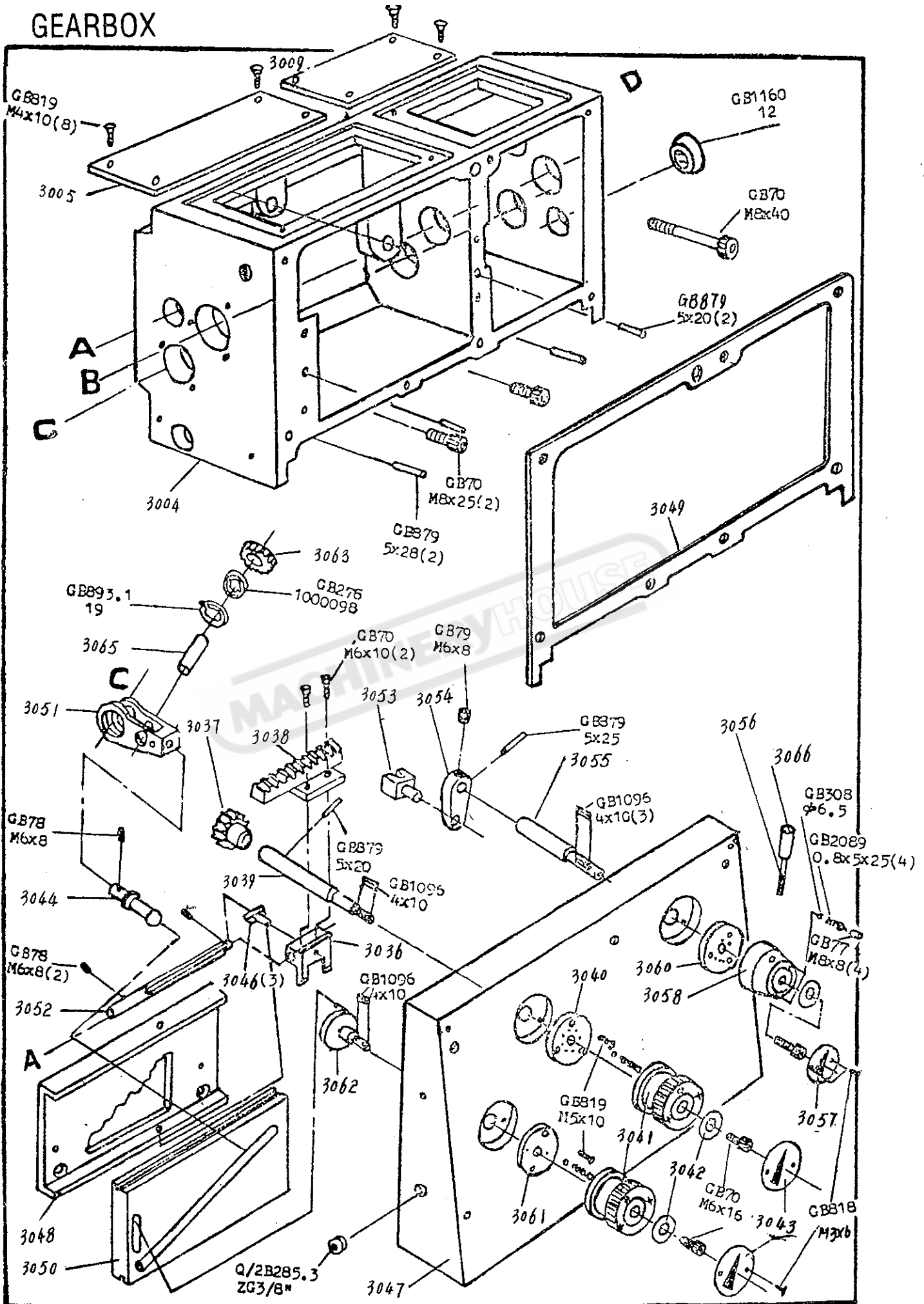




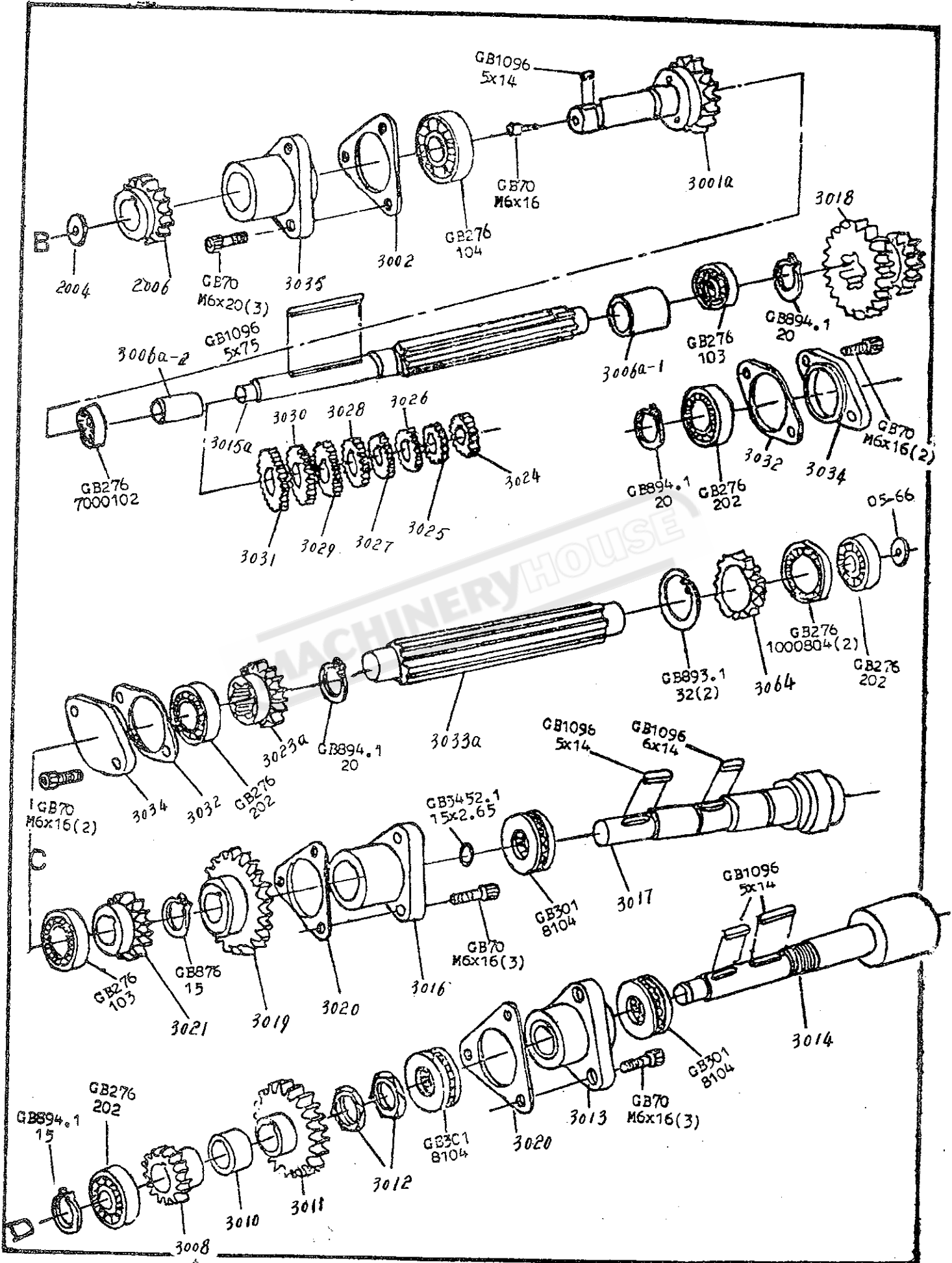
# HEADSTOCK



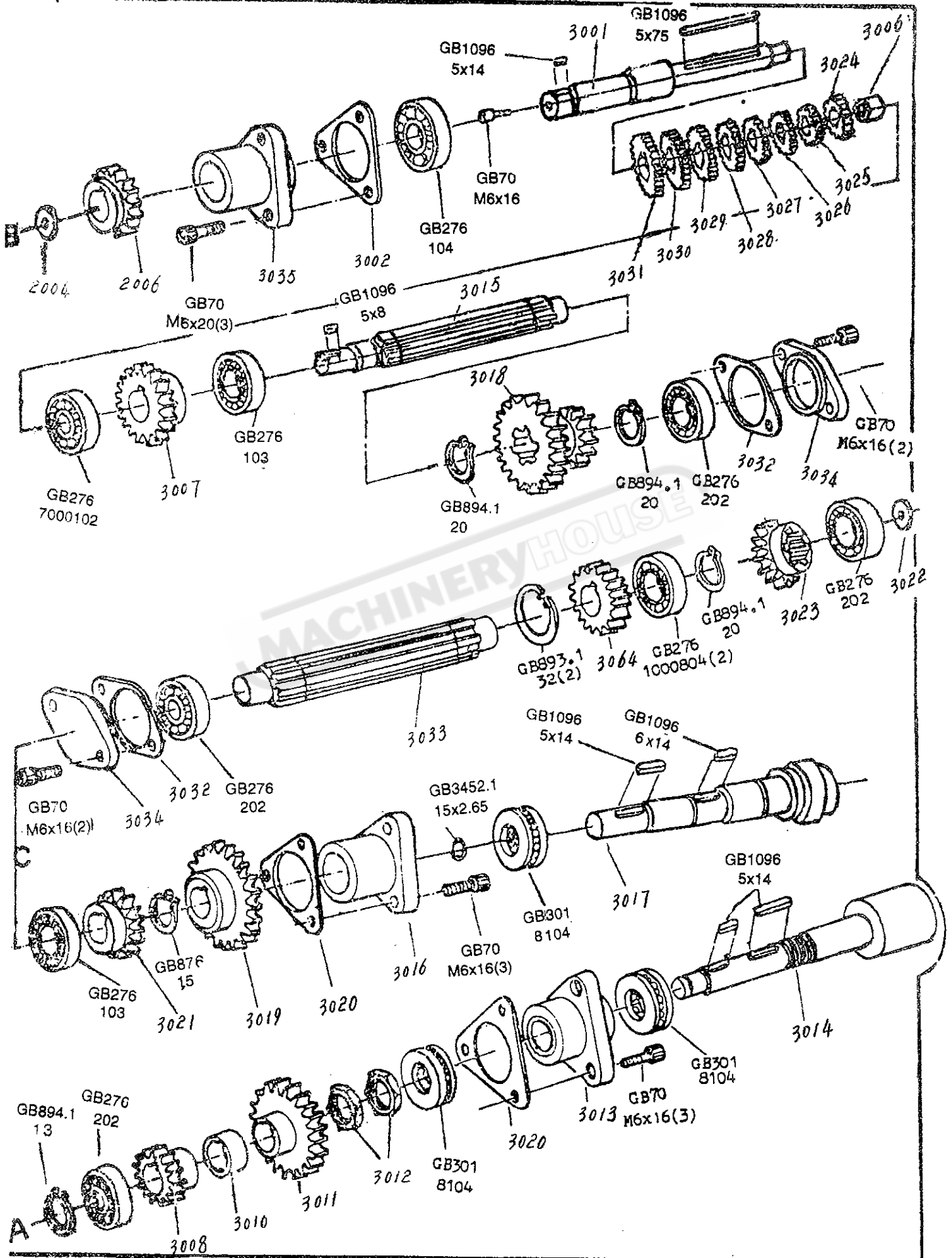
# GEARBOX



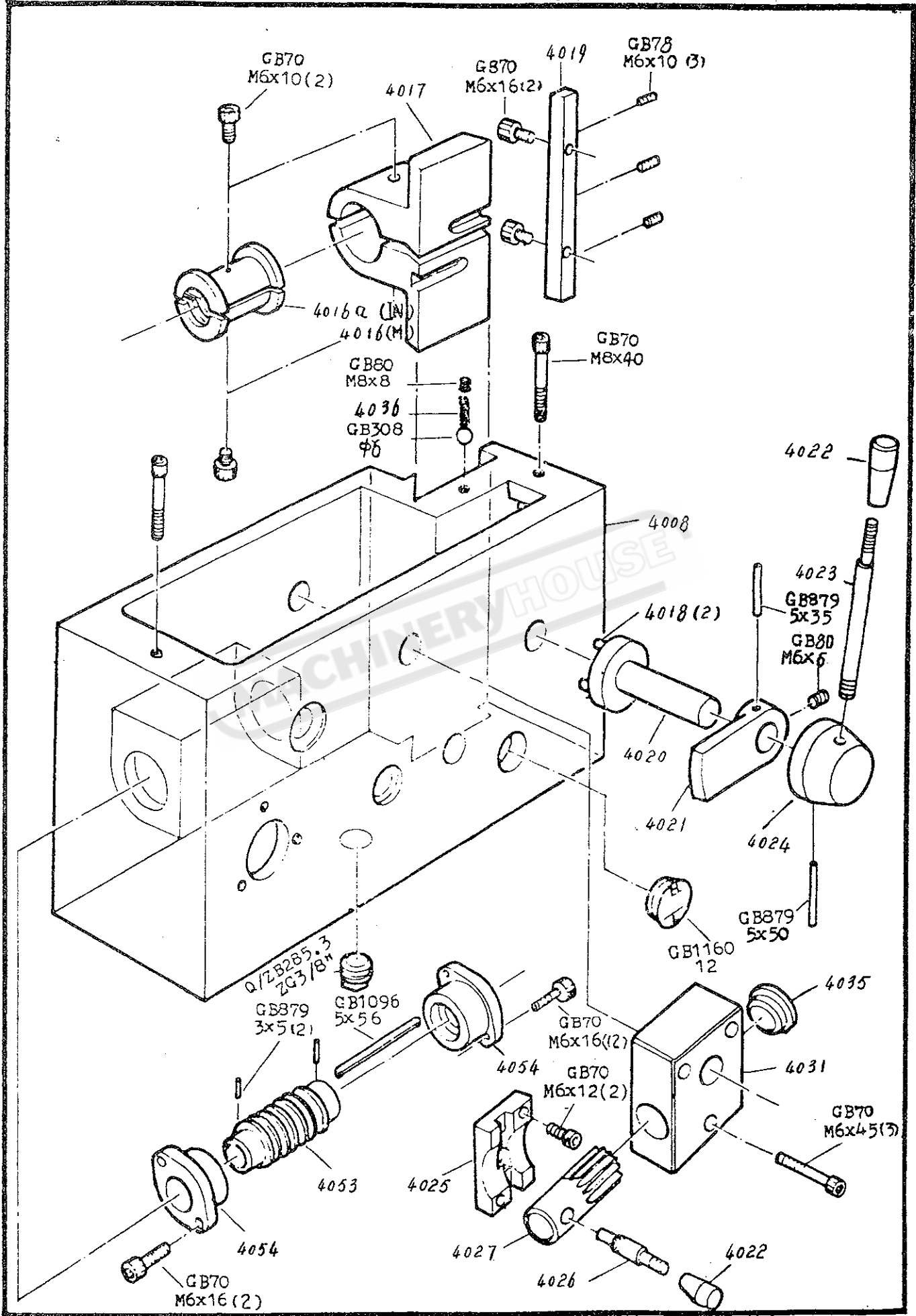
# GEARBOX Inch system



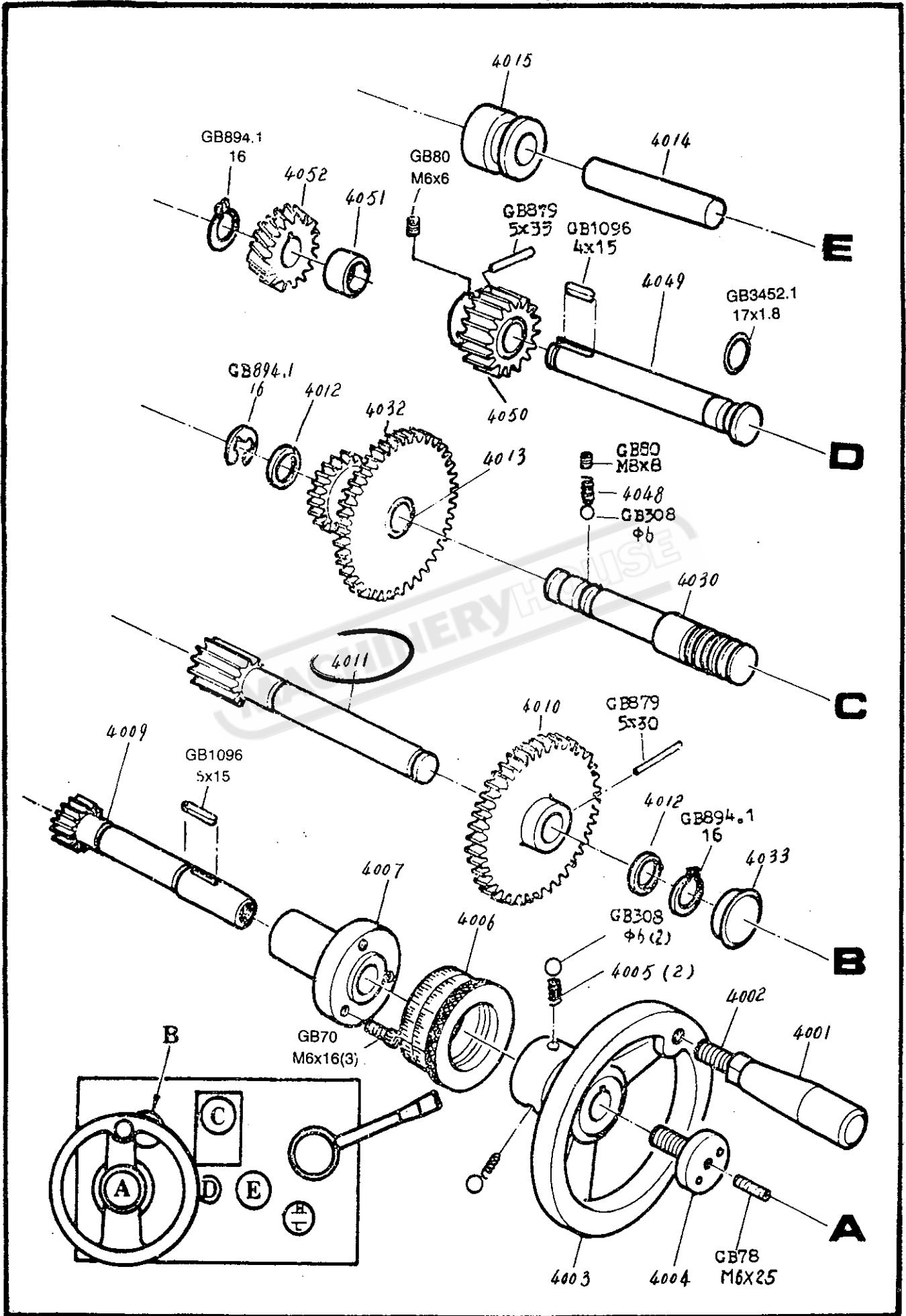
# GEARBOX Metrit system



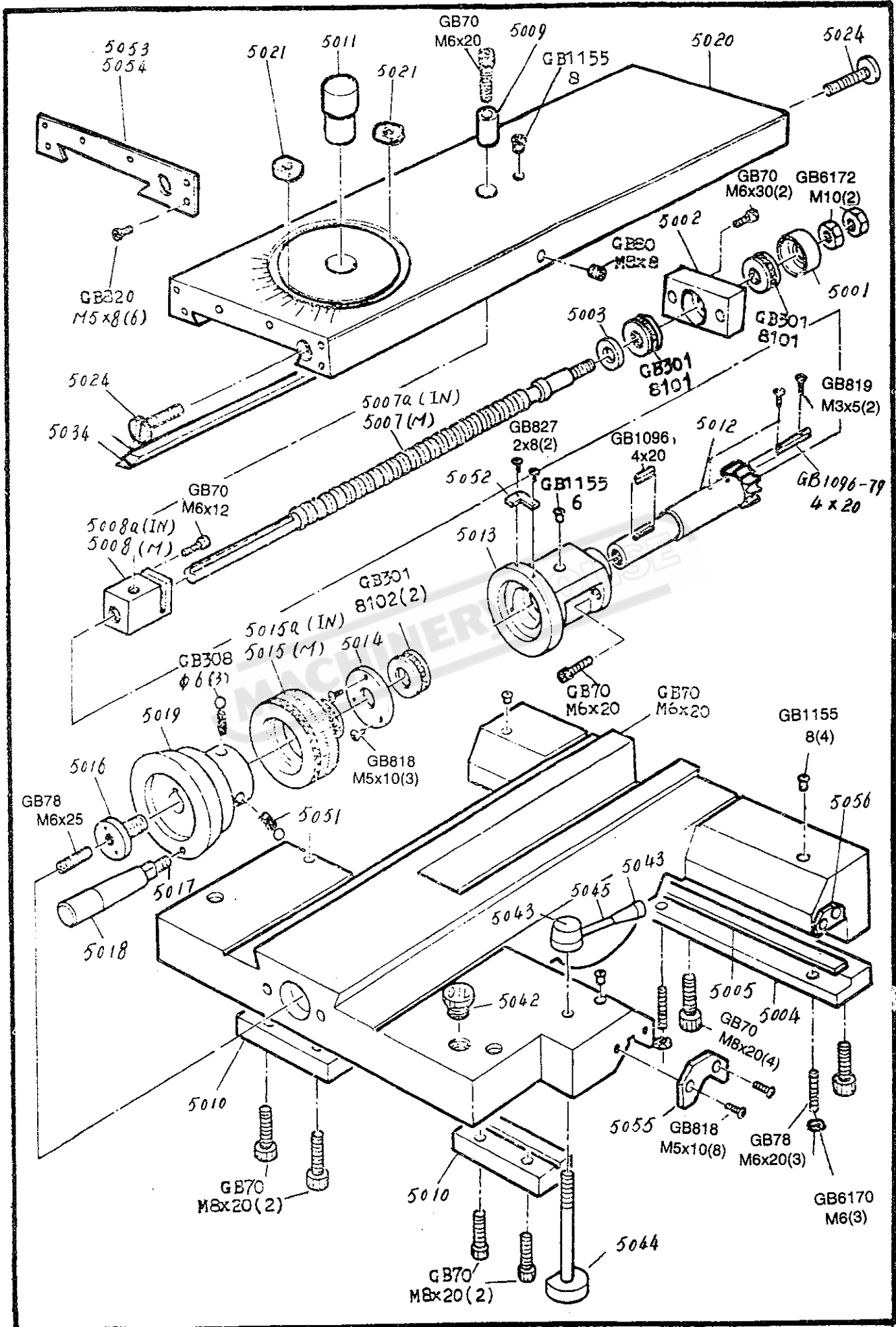
# APRON Left hand, Lever type



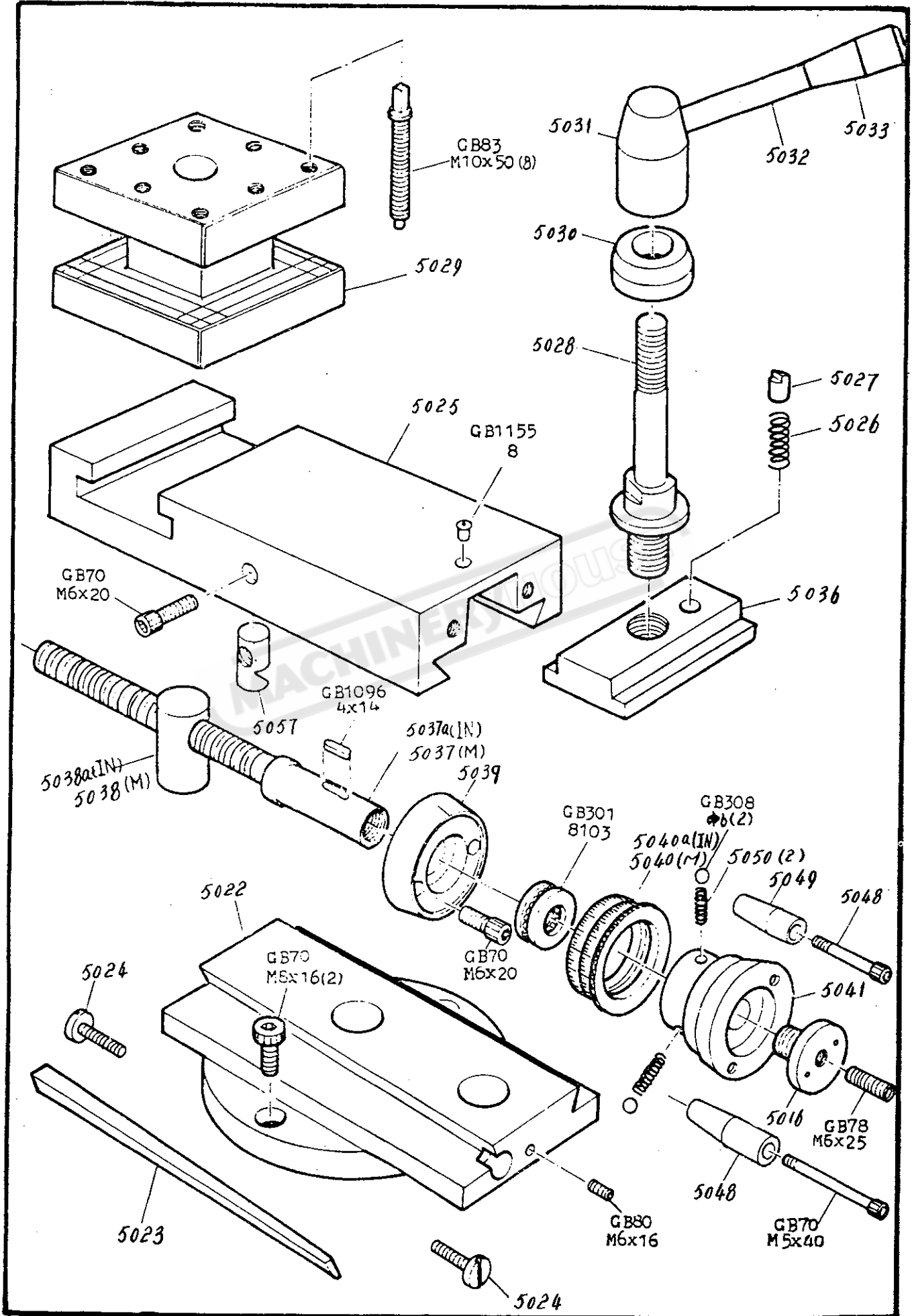
# APKUN Left hand, Lever type



# SADDLE & CROSS-SLIDE Telescopic type

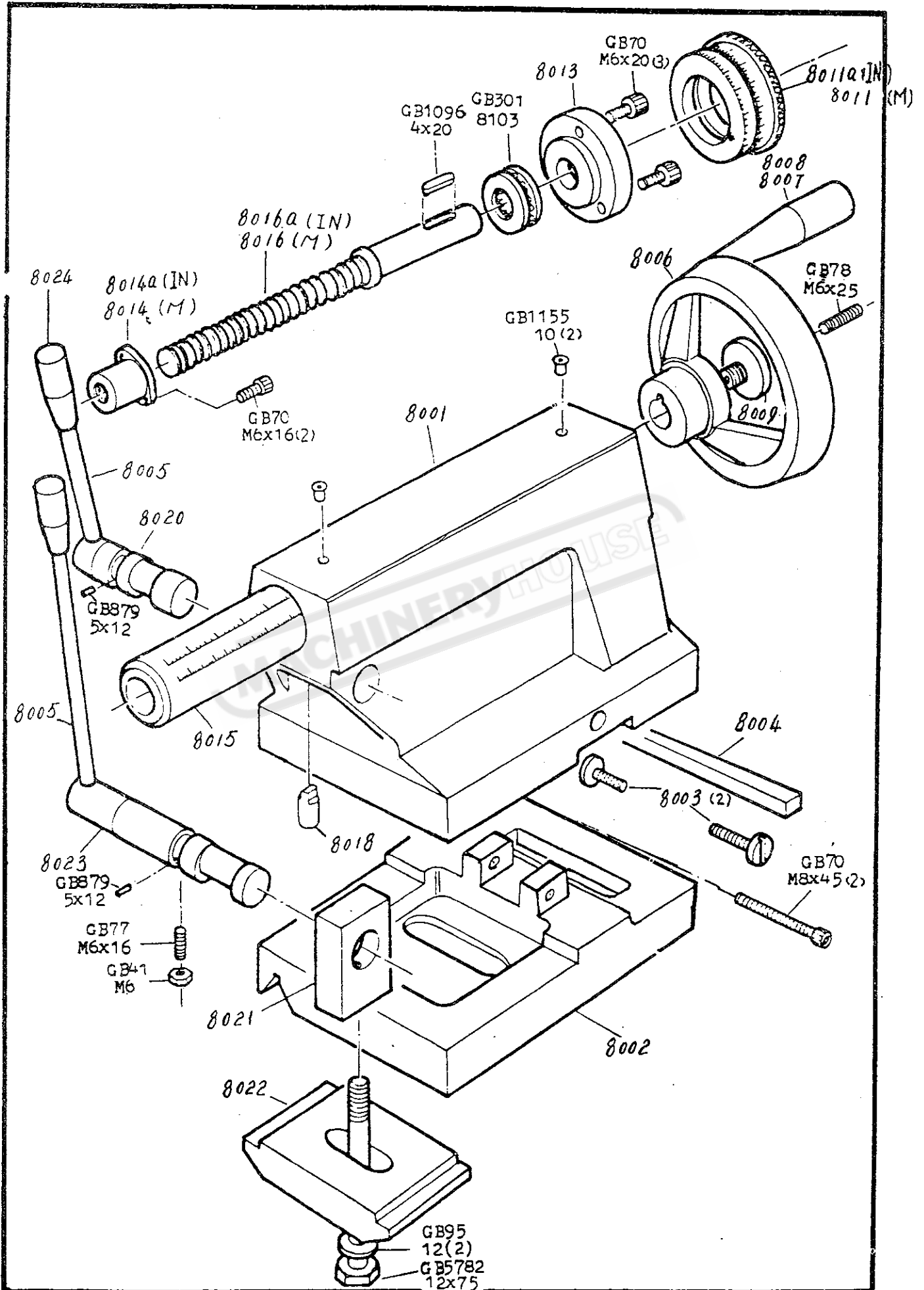


# TOP SLIDE, TOOL POST

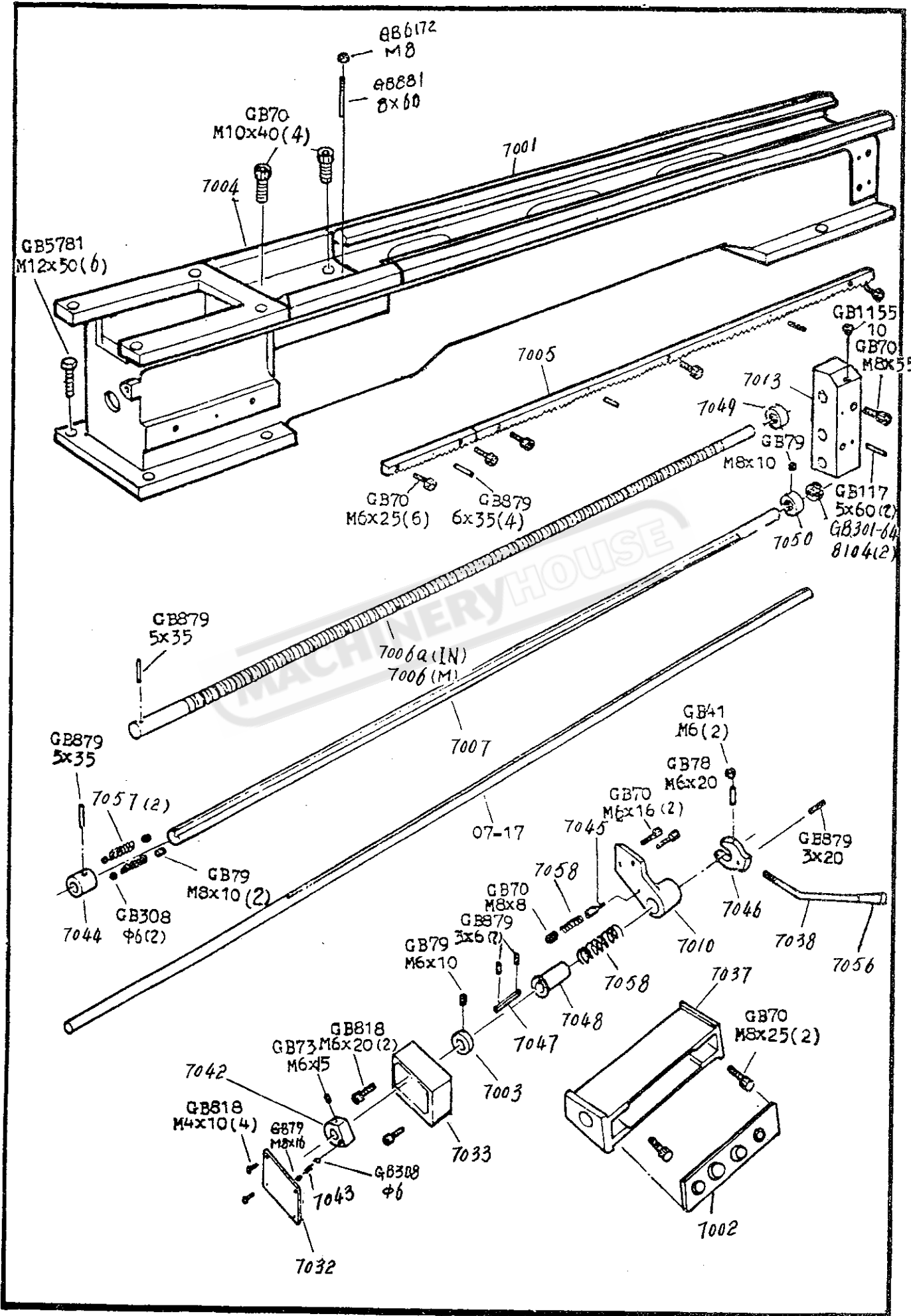




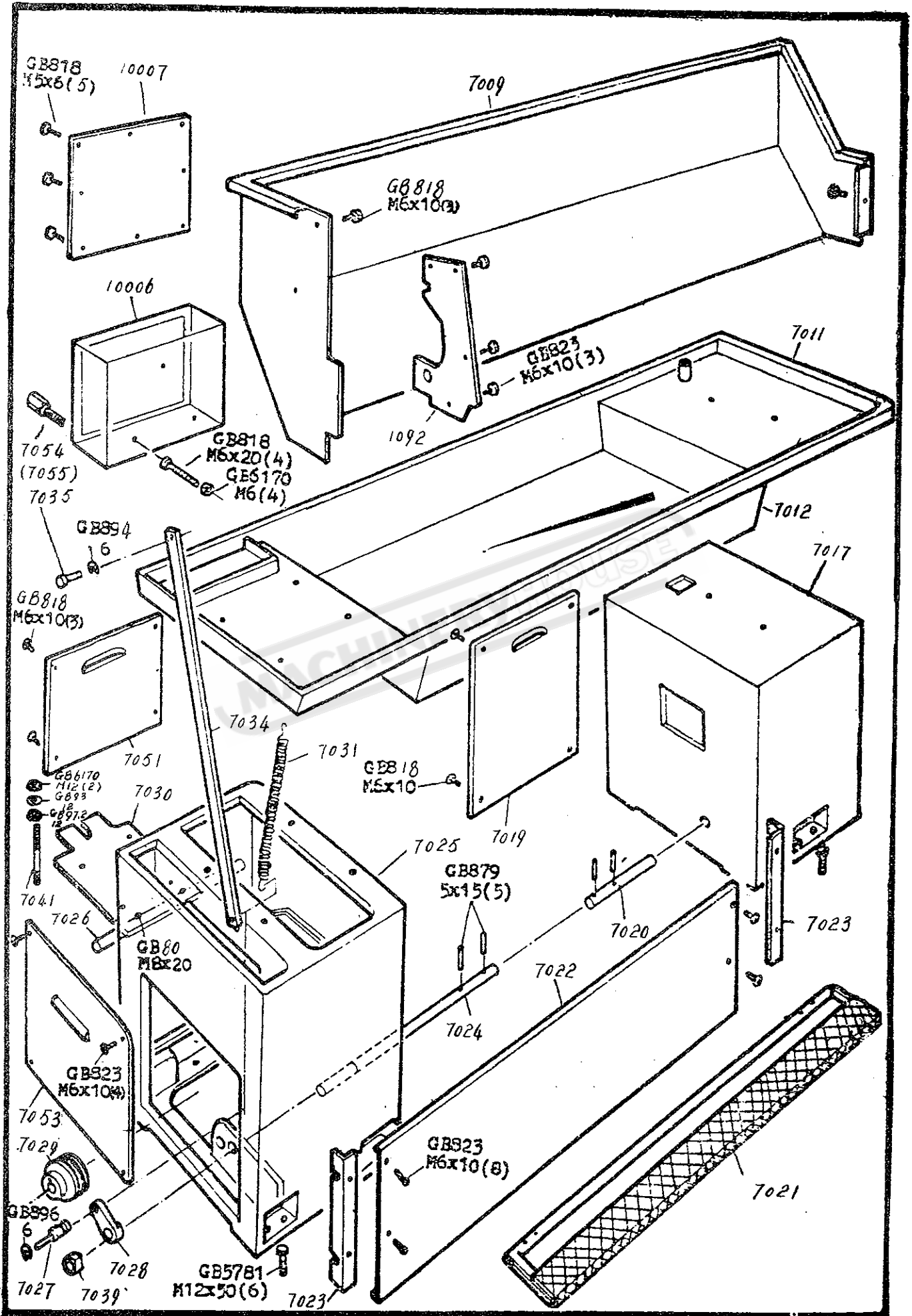
# TAIL STOCK



# BED & SHAFTS

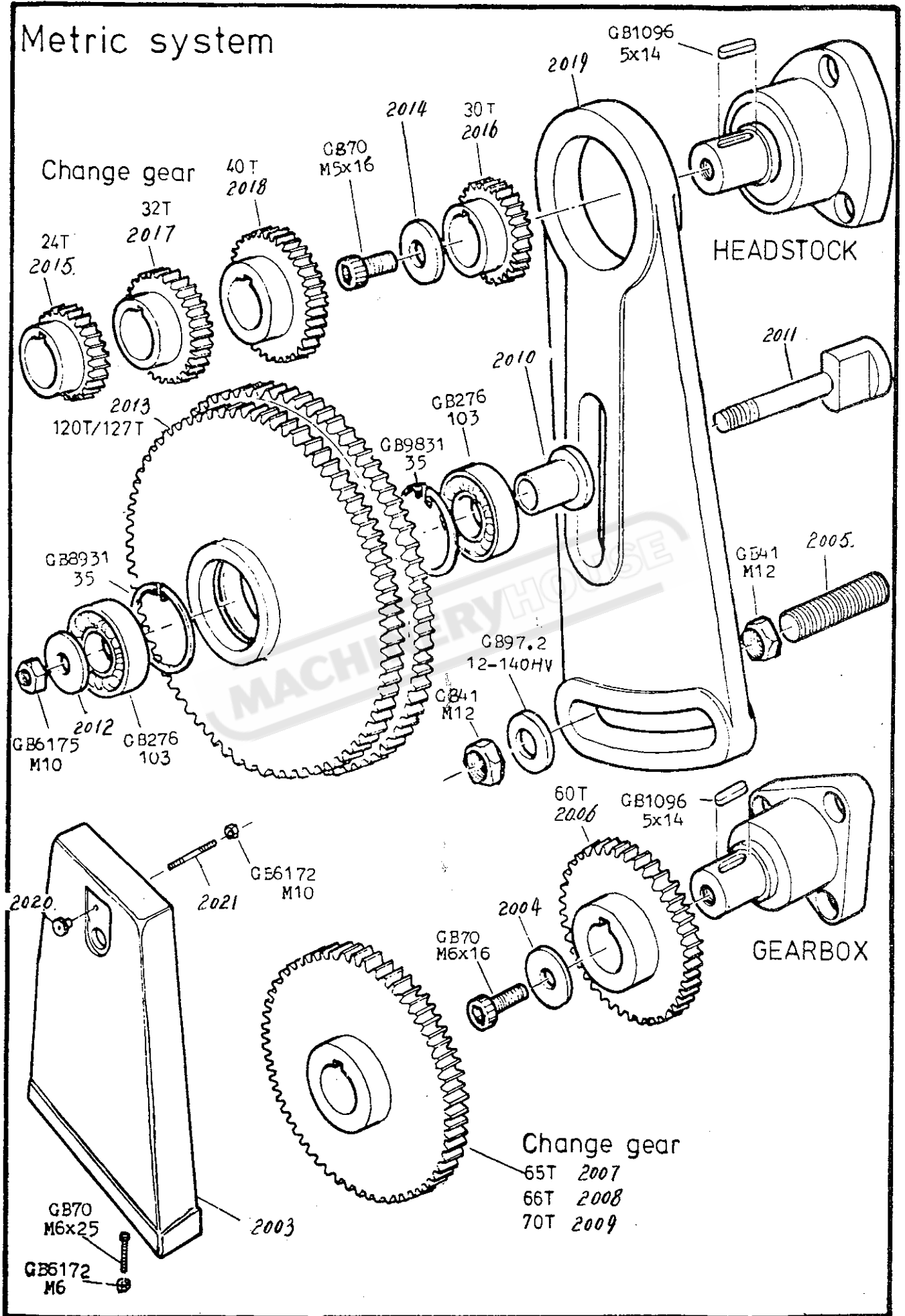


# CABINET & PANELS



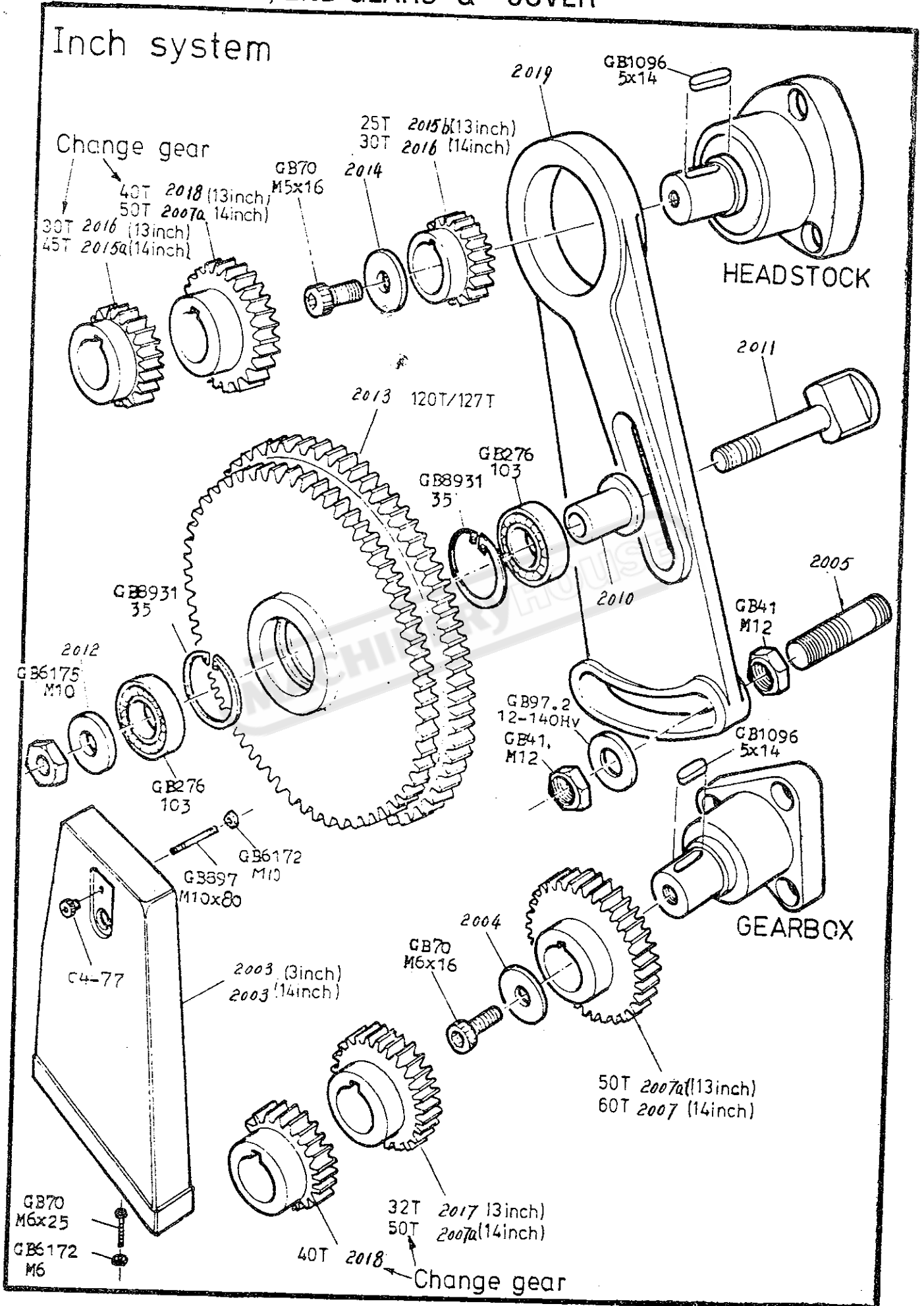
# SWING FRAME, END GEARS & COVER

## Metric system



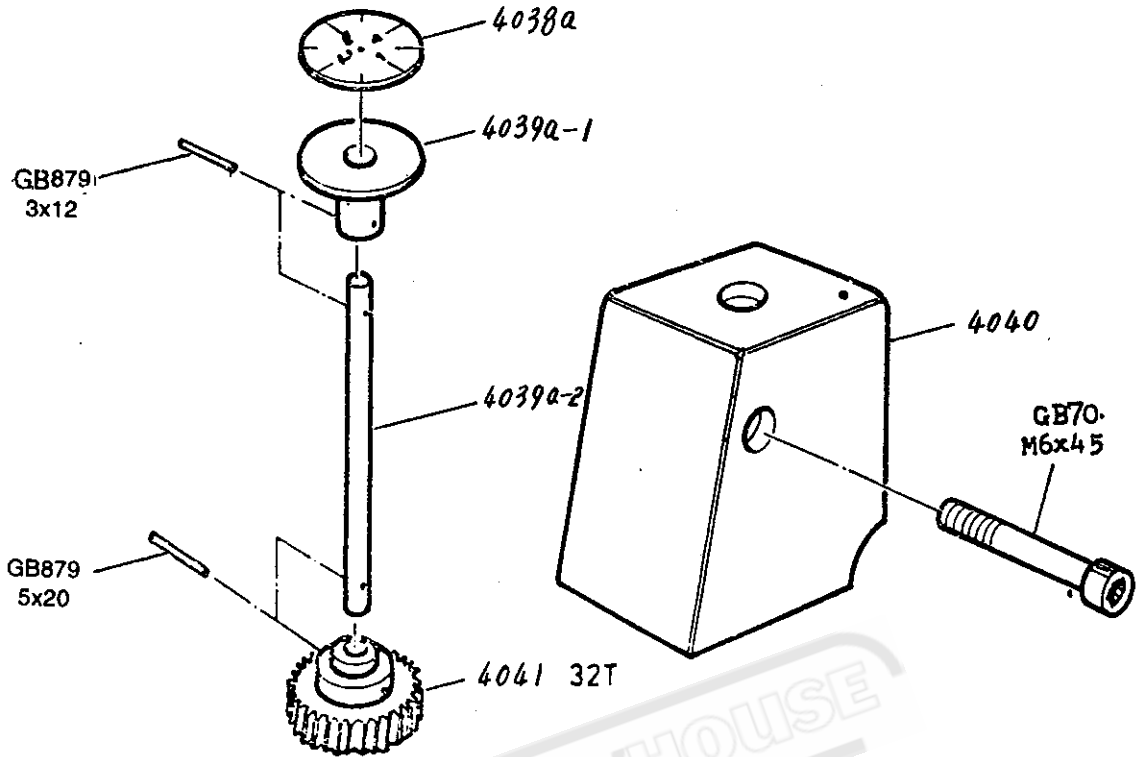
# SWING FRAME, END GEARS & COVER

## Inch system



# THREADING DIALS

## INCH



## MM

