



Operation Manual & Parts List For MB12

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30 taper spindle
MPZ-162
40 taper spindle
MPZ-163

INSTRUCTION MANUAL

PRELIMINARY INFORMATION

UNCRATING:

Carefully remove the protective crating and skid so that the machine and parts are not marred, scratched or otherwise damaged. In the event of any damage in transit, notify our representative at once as well as the transportation company making final delivery. The machine should be lifted from the base of the crate by placing a sling under the overarm.

SHORTAGES:

Inspect the complete shipment carefully against the itemized packing list to make sure that all items are present. In the event damage or shortages are noticed they should be reported immediately to the delivering carrier and to the representative from whom the machine was purchased with a clear indication as to which parts have not been received.

CLEANING:

Thoroughly clean the rust preventive materials from the machine with mineral spirits, or other suitable solvents. Do not move the table, saddle, knee or other moving parts until all of the sliding way surfaces have been well cleaned and lubricated. After cleaning carefully move to a limit stop in one direction the table, saddle and knee, and clean and lubricate the exposed way surfaces. Then move each of these units to the opposite limit stop and similarly clean and lubricate the exposed way surfaces. Loosen the two locks to unlock the overarm and move this forward and backward to the extreme position in order to clean and lubricate.

FOUNDATION:

For best performance it is important that the machine be placed on a solid foundation and that it be level. A solid concrete floor is desirable, but a firm wooden floor, freed from vibration, may be suitable. If the machine is to be located on an upper floor or balcony it should be placed as close as possible to a strong supporting pillar or column.

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LEVELING:

The machine is provided with four bolt holes one at each corner of the base. Steel wedges or steel plates should be used for leveling. A good machinist's level should be used in the leveling process and the bubble should have adequate time to come to rest. The level should be placed both lengthwise and crosswise on the machine table.

VERTICAL HEAD ON OVERARM: (EXPORT ONLY)

When the machine leaves the factory the vertical head is positioned on the overarm with the spindle up and the motor down. Before operating the machine it is necessary that the head be returned to its normal operationing position by loosening the hexagonal units located at the head end of the overarm. It will then be possible to tilt the head into normal operating position by using a crank on the 1/2" stud located on the right side of the front end of the overarm. Because of the heavy overhung weight involved, the tilting of the head back to its normal position will be greatly facilitated if a second person can help push it into position. The head may then be trammed in as described.

VERTICAL HEAD ON OVERARM:

When the machine leaves the factory the vertical head is tilted back on the overarm. Before operating the machine it is necessary that the head be returned to its normal operating position and trammed in as described.

HANDLES:

When crating, the three ball crank handles are turned facing each other. The handles should be reversed during installation.

LUBRICATION:

Do not operate machine until properly lubricated. Follow the instructions given in fig. 3, Page 6, and Lubrication plate, Page 7.

INSPECTION:

Machine is carefully inspected and lined up before it leaves our factory. Figures # 1 and 2 shows the way your machine is lined up.

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ALIGNMENT OF HEAD

In case of precision boring or work of that nature, where it is necessary to have head perfectly square with the table, use method prescribed below. For normal milling, graduations on turret, and head are accurate enough. To set head perfectly square with table see Figures # 1 & # 2. This may be done with head and adapter on overarm, by adjusting adapter through worm gear on adapter. Loosen three binding bolts but leave drag on same for fine adjustment. Mount indicator in spindle nose as shown in Figure # 1 and 2, and indicate parallel.

NOTE: When indicating as in Figures 1, it should be noted that the table is fitted to be slightly high in front, usually about .0005.

TABLE SQUARE WITH SPINDLE THRU
TRANSVERSE AXIS

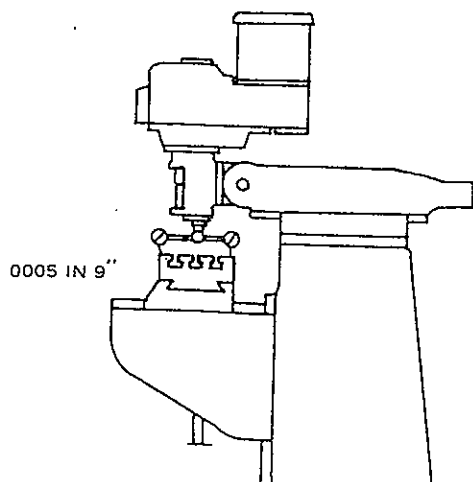


Fig. 1

TABLE SQUARE WITH SPINDLE THRU
LONGITUDINAL AXIS

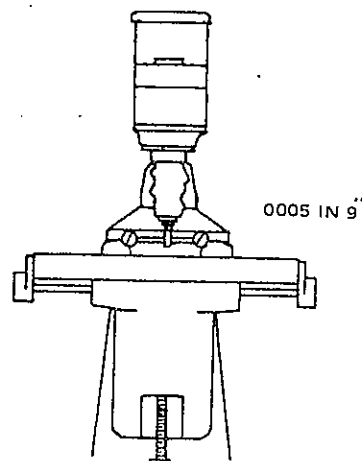


Fig. 2

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FOR CORRECT LUBRICATION WE RECOMMEND THE FOLLOWING
MOBIL PRODUCTS OR THEIR EQUIVALENT

VERTICAL SPINDLE BEARINGS	MOBILTEMP SHC 32
VERTICAL SPINDLE POWER FEED GEAR BOX	MOBILPLEX 45
PULLEY BEARINGS, TABLE LEAD SCREW BEARINGS & KNEE ELEVATOR THRUST BEARINGS	MOBILUX EP 2
KNEE ELEVATOR BEVEL GEARS	MOBILUX EP 2
VERTICAL SPINDLE OIL CUP CRANKSHAFT BEARINGS, WAYS, SLIDES, SPINDLE QUILL TRIP MECHANISM & AUTOMATIC LUBRICATOR	MOBIL VACTRA OIL No. 2
ELEVATING SCREWS & SPINDLE SPLINES	MOBILUX EP 2
OVERARM ARBOR SUPPORT	MOBIL VACTRA OIL No. 4

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ADJUSTMENT OF TABLE GIB

The table is provided with a full length tapered gib in the saddle, with an adjusting screw on the left side. To take up gib, tighten large screw slightly and repeat until a slight drag is felt when moving the table by hand. (Fig. 4)

Fig. 4

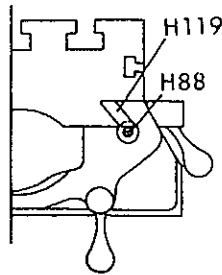
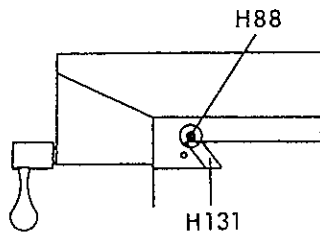


Table-saddle gib

ADJUSTMENT OF SADDLE AND KNEE GIBS

A tapered gib is used for adjusting the saddle bearing on the knee. This forms a guide for the saddle. To tighten gib same principal as described above is used; however, chip wiper must be removed first. (Fig. 5)

Fig. 5

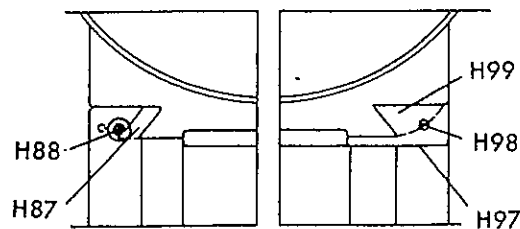


Saddle-knee gib

ADJUSTMENT OF KNEE GIB

Remove chip wiper and adjust screw until smooth movement is attained. (Fig. 6)

Fig. 6



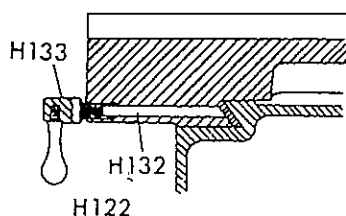
Knee-Column gib

INSTRUCTION MANUAL

CLAMPING TABLE SADDLE

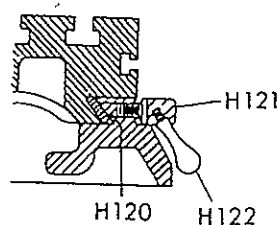
When milling with longitudinal table feed only, it is advisable to clamp the knee to the column and the saddle to the knee to add rigidity to these members and provide for heavier cuts with a minimum of vibration. The saddle locking lever is located on the left-hand side of saddle. (Fig. 7) Excessive Pressure can cause slight table bind. Use moderate clamping pressure, as this will hold saddle sufficiently.

Fig. 7



The table clamping levers are located on front of saddle and should always be clamped when longitudinal movement is not required. (Fig. 8)

Fig. 8



REMOVING OF TABLE

Remove as follows: Ball crank handles, dial holders, bearing brackets. Screw will then turn all the way so that it can be removed. When this is accomplished, the table can easily be taken off merely by sliding from saddle.

REMOVING OF SADDLE

Follows along the same lines as removing table; however, it is necessary to remove entire front bracket assembly completely. Then remove nut bracket which has become accessible after table has been removed.

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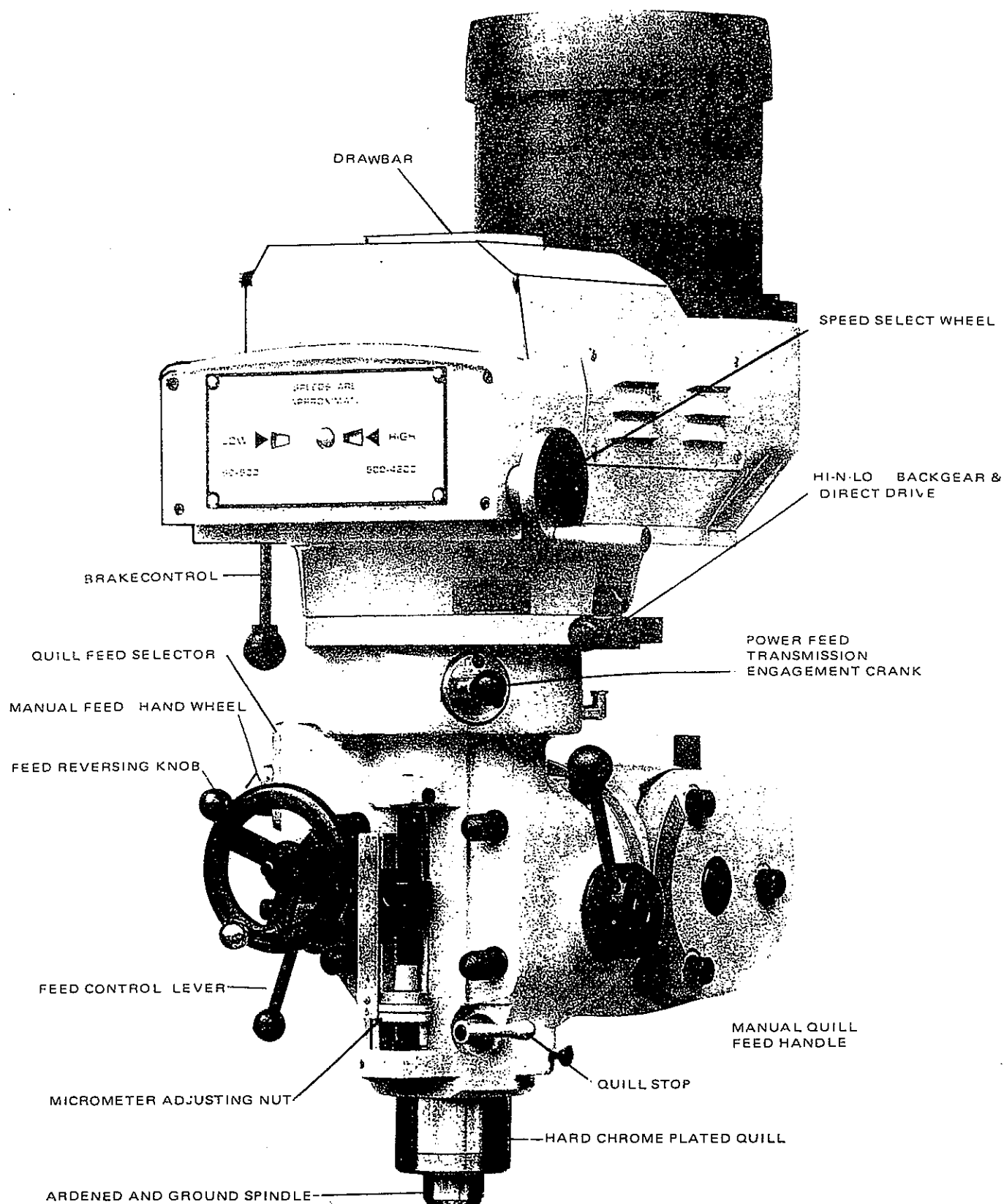


Fig. 9

INSTRUCTION MANUAL

INSTALLATION

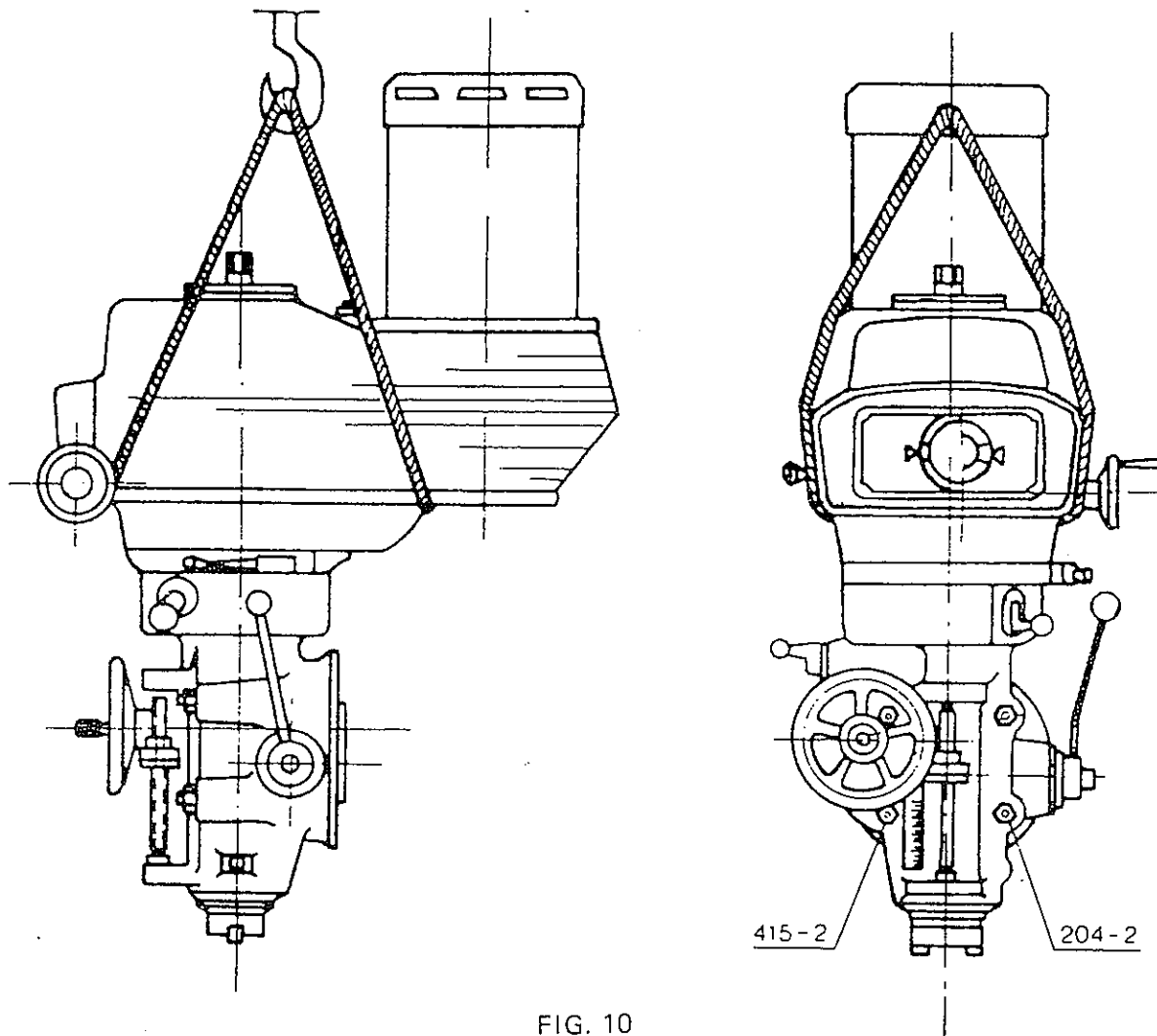


FIG. 10

HEAD REMOVAL/INSTALLATION

We recommend use of a nylon strap for transporting variable speed head, as shown above.

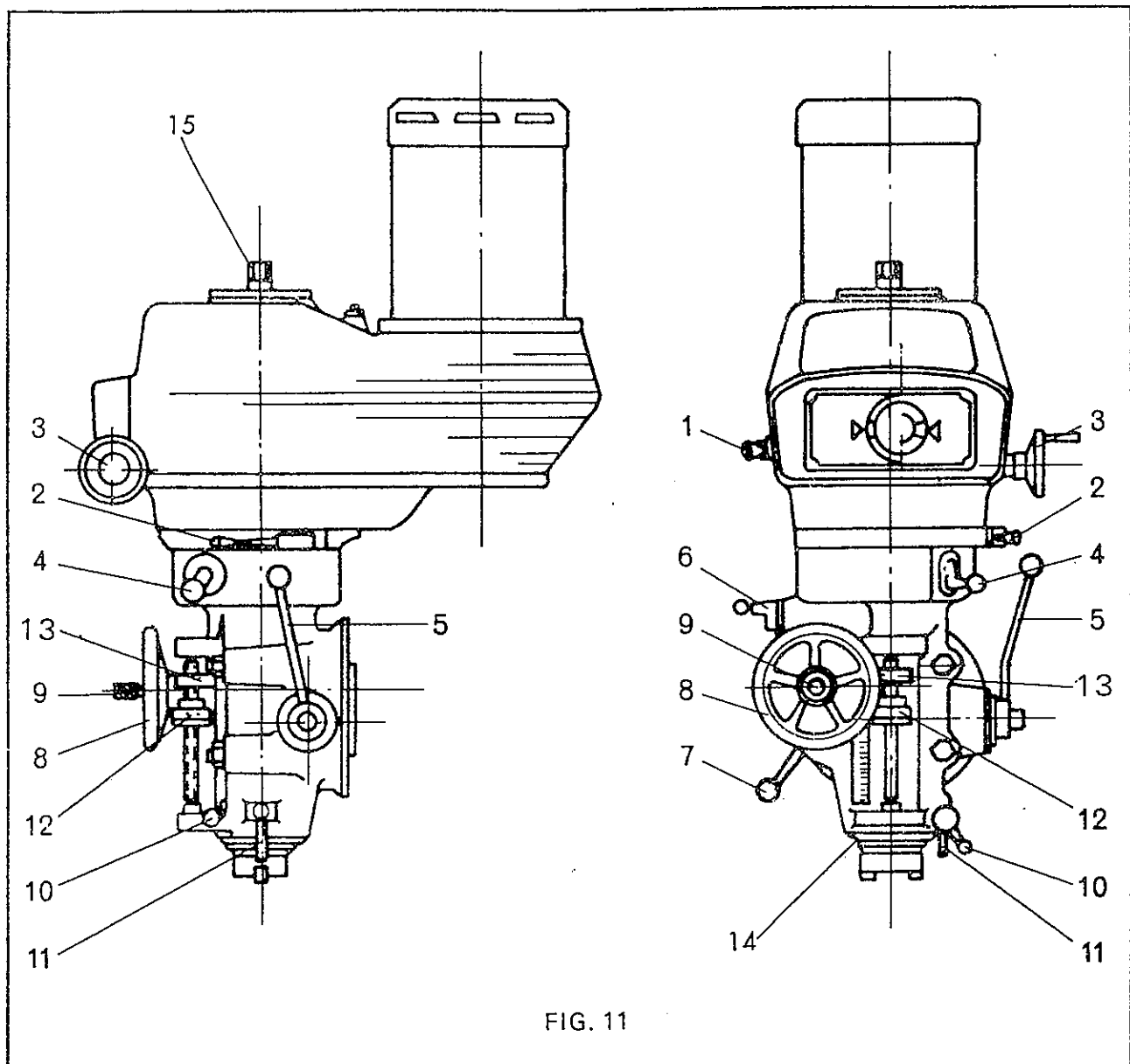
INSTALLATION

Place screws Nos. 204-2 and 415-2 into the four holes of head. Then, tighten by means of four nuts corresponding to screws mentioned above.

CAUTION: OVER TIGHTENING THE NUTS COULD CAUSE DAMAGE TO THE HEAD OR STRIP THE BOLTS.

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GENERAL DESCRIPTION OF VARIABLE SPEED HEAD



1. Brake Control.
2. Speed Range Selection Lever.
3. Speed Selection Handwheel.
4. Power Feed Transmission Engagement Lever.
5. Quill Feed Handle.
6. Quill Feed Selector.
7. Quill Feed Control Lever.
8. Hand Wheel for Manual Feed (by hand) of Quill.
9. Quill Feed Reversing Knob.
10. Quill Lock
11. Indicator Mounting Rod.
12. Adjustable Micrometer Depth Stop.
13. Quill Stop.
14. Quill
15. Draw Bar

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CAUTION: DO NOT ATTEMPT TO CHANGE (SPINDLE) R.P.M.'S WHILE SPINDLE MOTOR IS NOT RUNNING.

SPINDLE SPEEDS (R.P.M.'S) marked on the dial are approximate. Spindle speed (R.P.M.'S) are changed by turning handwheel (No. 3 fig. 11) located on the right side of head. Rotating this hand wheel in the clockwise direction will increase spindle speed (R.P.M.'S). Rotating this handwheel in the counter-clockwise direction will lower spindle speed (R.P.M.'S)

CAUTION: DO NOT ATTEMPT TO CHANGE SPINDLE SPEEDS (R.P.M.'S) UNLESS SPINDLE MOTOR IS RUNNING. THIS IS IMPORTANT AS ATTEMPTING TO CHANGE WHILE SPINDLE MOTOR IS NOT RUNNING WILL DAMAGE THE MECHANISM.

DRAWBAR (fig. 9) (Manual draw bar only)

Use spindle brake to restrict spindle rotation when Tightening or loosening drawbar.

1. To install collet or tool holder in spindle-first remove drawbar by pulling it out os spindle from top. Then place collet or tool holder into spindle. Put drawbar back into spindle and tighten into collet or tool holder, using discretion.
2. To remove tool from spindle-loosen draw bar 3 or 4 turns and tap on top of draw bar to free tool.

CAUTION: DO NOT LOOSEN DRAWBAR LESS THAN 3 TURNS OR MORE THAN 5 TURNS WHEN REMOVING TOOL. IF DRAWBAR IS TOO LOOSE THE THREADS MAY BE STRIPPED WHEN TAPPING ON END.

SPINDLE BRAKE

For Spindle Braking (Spindle motor in the off position only) use brake lever (No. 1 fig. 11) located on the left side of head moving Forward/Backward to stop a coasting spindle.

CAUTION: BE SURE THAT MANUAL BRAKE IS DISENGAGED BEFORE ATTEMPTING TO START SPINDLE MOTOR. This is very important, as failure to disengage brake may damage the motor on variable speed belt as well as other parts.

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SELECTION OF HIGH AND LOW RANGES (Direct Drive (High), Back gear (Low), (This lever has three position high, neutral, low) Range Selection (High or low) is obtained by lever (No. 2 fig. 11) located on the right side of head. Forward position of this lever is High range. (500 to 4200 R.P.M.'S) Rear position of this lever is low range (60 to 500 R.P.M.'S).

NOTE: 1 Because of back gear construction, when machine is running in low speed range spindle rotation is opposite to that of high speed range. Therefore, forward on reversing switch becomes reverse when in low speed range.

NOTE: 2 When shifting from NEUTRAL to HIGH or LOW, turn spindle by hand while pushing back gear lever into position. This allows gears to line up in low speed and dog clutch to line up in high speed.

NOTE: 3 The head has a neutral position to allow free rotation of the spindle for traming, positioning and inspection operations, etc.

CAUTION: DO NOT TO ATTEMPT TO CHANGE HIGH AND LOW RANGES WHILE SPINDLE MOTOR IS RUNNING.

NOTE: Do not change speed range (High-Low) when spindle automatic quill feed is engaged (No. 4 fig. 11).

POWER FEED TRANSMISSION ENGAGEMENT

The Power Feed Engagement lever (No. 4 fig. 11) is located directly below back gear lever. This lever has 2 positions; "IN", to engage spindle power feed transmission and "OUT" to disengage spindle power feed transmission.

CAUTION: ALWAYS BE SURE SPINDLE MOTOR IS STOPPED BEFORE ATTEMPTING TO MOVE THIS LEVER TO THE "IN" OR ENGAGED POSITION.

NOTE: Disengage spindle power feed transmission. When it is not being used. This will stop unnecessary wear on power feed worm gear.

CAUTION: DO NOT USE THE POWER FEED SYSTEM AT SPEEDS (R.P.M.'S) HIGHER THAN 3000 R.P.M.

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QUILL (NO. 14 fig. 11)

1. The quill may be locked in a given vertical location by turning the quill lock in a clockwise direction. Lever is located at the bottom of right side of head.

CAUTION: DO NOT ENGAGE QUILL FEED WITH QUILL-LOCK LEVER FULLY TIGHTENED.

2. The quill (or spindle) hand feed lever (No. 5 fig. 11) can be adjusted to any one of several operating positions by moving outwards (To the right on the lever hub and rotating to desired position. The hand feed lever can be pulled off when not in use.

3. Any one of three power feeds (in either an upward or downward direction) may be selected by moving the feed shift lever, located on right side of head, to the desired feed (0015, .003, 0008) per spindle revolution. If power feed is not being used it is wise to place (NO. 4 fig. 11) in the disengagement position. It may be some what easier to change the position of (No. 6 fig. 11) Quill feed selector when the spindle is rotating.

4. The fine feed handwheel (No. 8 fig. 11) is placed in operation condition by locating the feed transmission engagement lever in the (No. 4 fig. 11) "OUT" (disengaged) position and engaging the feed control lever (No. 7 fig. 11) the fine feed handwheel is held on by a spring plunger and can be pulled off when not in use.

5. The knob on the shaft located in the center of the feed handwheel (NO. 8 fig. 11) is used to select downfeed (Pushed-in position), neutral (mid-position) or upfeed (pulled-out position) for either the power feed or the hand wheel feed.

6. Micrometer depth stop (No. 12 fig. 11) is used for setting of depths. Each graduation on nut indicates .001" of depth, it reads directly to scale mounted along side of it. Depths may be obtained by setting micrometer nut in conjunction with quill stop.

NOTE: Position noted are for clockwise rotation of spindle. Counter clockwise rotation reverses these position.

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HEAD

1. Tilting of the head in a front to back plane is readily accomplished by loosening the three nuts at the right hand side of the head (at joint) and applying crank to Forward head tilting worm stud (top center of joint).

CAUTION: WHEN RETURNING HEAD TO VERTICAL POSITION, SWEEP THE TABLE WITH AN INDICATOR ATTACHED TO SPINDLE TO MAKE SURE HEAD IS SQUARE TO TABLE.

2. To tilt head from side to side, loosen the (4) hex nuts (front of head). Then tilt head the desired amount by applying crank to the sidewise tilting worm stud located at the right side of joint and to the rear of the spindle head.

CAUTION: WHEN RETURNING HEAD TO VERTICAL POSITION, SWEEP THE TABLE WITH AN INDICATOR ATTACHED TO SPINDLE TO MAKE SURE HEAD IS SQUARE TO TABLE.

OVERARM OR RAM

The back to front position of the head and overarm is readily changed by loosening the 2 overarm locks (located left side of turret). Move the overarm by adjustment handle (located on right side of turret). To desired position.

TURRET

To Index the entire turret-overarm-head assembly loosen the 4 hex nuts, 2 on either side of the overarm which clamp the turret to the top of the column. Then swing the turret to the desired position and reclamp.

NOTE: It is highly recommended that all clamping nuts bolts and locks (Turret to column, overarm to turret, head side-wise tilt and head forward-back tilt) be securely tightened before any machining cuts are taken. Always check these points before starting a cut. Also, when returning overarm to normal position attach an indicator to the overarm, and slide the overarm in and out, with the indicator riding against a square which has been squared to front of table to make sure overarm is square with table.

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INSPECTIONS:

1. Inspect taper of spindle for cleanliness and freedom from chips of foreign matter. Frequency-Each time tool holder is inserted.

Inspection by machine operator.

No special equipment required.

2. Inspect and adjust gibs of slide ways.

Frequency-every 160 hours. Oftener if looseness is noted by operator. Inspection and adjustment by machine operator or machine maintenance man. No special equipment required other than allen wrench.

3. Inspect for general cleanliness of machine, paying particular attention to keep dirt and chips from slide ways. DO NOT USE AIR TO REMOVE SUCH DIRT AND CHIPS-- BUT WIPE OFF WAYS OR KEEP THEM COVERED. Flood ways with light oil and work slide movements back and forth to wash out foreign matter. Then re-lubricate machine according to lubrication instructions.

Frequency-Constantly, as far as wiping off chips and dirt are concerned. Every 40 hours ways should be flooded with oil and cleaned as above. No special equipment required.

4. Inspect drive belts for wear, hard spots at splice etc.

Frequency-Every 40 hours.

Inspection by machine operator or machine maintenance man.

No special equipment required.

5. Inspect to see if vertical head is square with table, by mounting indicator on spindle and sweeping table.

Frequency-every 80-120 hours, or after head has been tilted.

Inspection by machine operator or machine maintenance man.

Special equipment required consists of (1) A short accurate arbor to insert in spindle. (2) A clamp for use in clamping a 6" bar to above arbor in a horizontal position. (3) 6" bar approximately 1/2" in diameter. (4) An accurate dial indicator to clamp to above 6" bar in position so when spindle is revolved by hand, nib of indicator in contact with table, sweeps table in a full circle and indicates out of squareness.

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NOTE: Table is intentionally left .0005" high in front. This will gradually decrease as machine is used.

6. Inspect electrical equipment.

Frequency-In accordance with standard plant policy.

Inspection by machine maintenance man.

No special equipment required.

PARTS REPLACEMENT:

None except as indicated by wear or malfunction.

Frequency or replacement only as above.

LUBRICATION - (See Lubrication Sheet Page 7)

TROUBLE SHOOTING

NOTE: Ordinarily trouble will not manifest itself except when actually working machine.

1. Slide ways working hard or binding.

- a. Cause-gibs out of adjustment, either too tight or too loose. in latter case causing gib to "wedge".

Remedy-Adjust gibs.

- b. Cause-Dirt in slide ways.

Remedy-Wash out slide ways with light oil.

CHATTER OR VIBRATION WHEN CUTTING.

- a. Cause-Dirt in spindle taper, causing bad fit between tool holder shank and spindle taper.

Remedy-Clean spindle taper and shank of tool holder.

- b. Cause-Faulty shank on tool holder.

Remedy-Replace shank or dress off burrs, if due to nicks or burrs.

- c. Gibs poorly adjusted on slide ways, or dirty.

Remedy-Adjust gibs

- d. Work improperly clamped to table of machine.

Remedy-Check for rocking or movement, and correct by proper clamping.

- e. Improper grind on cutting tool.

Remedy-Replace or re-grind tool.

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- f. Hard spot at splice of drive belts or worm belts.
Remedy-Replace belts.
- g. Spindle quill worn in quill head lock slightly.
Remedy-Tighten quill head lock slightly.
- h. Incorrect spindle speed, table feed, or both.
Remedy-Ordinarily increase spindle speed and/or increase or decrease feed to break up vibration period. Experiment by using hand feed to feed table.

BORING OR MILLING OUT SQUARE OR AT AN ANGLE.

- a. Cause-Head not properly aligned with table.
Remedy-Check head for alignment and correct.
- b. Work improperly set up; i.e. not square and flat.
Remedy-Check and re-align work.

FAILURE TO HOLD CENTER DISTANCE WHEN LOCATING FOR BORING.

Cause-Failure to take back-off tension on lead screw after coming up to indicator reading, causing table to "creep", or failure to lock up slide ways with same amount of tension tension after moving table to new position.

SPARE PARTS RECOMMENDED

SET OF DRIVE BELTS FOR ALL DRIVES: (See Parts List)

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GENERAL SPEED RECOMMENDATIONS

Material to be Cut	Feet Per Minute		
	Rough Cut	Rough and Finish	Light and Finish Cut
Cast Iron-Soft-(Under 200 Brinnell)	70	80-90	120
Cast Iron-Med.-(200-300 Brinnell)	55	60-70	90
Cast Iron-Hard-(Over 200 Brinnell)	40	50-60	70
Steel (Chrome Nickel 40-45 Shore)	30	40	50
Steel (Stainless)	60	80	90
Steel (Low Carbon)	80	90	140
Steel (High Carbon)	40	50	70
Bronze (Medium)	90	120	150
Bronze (Hard)	65	90	130
Brass (Hard)	100	150	200
Copper	150	200	300
Duraluminum	400		600
Aluminum	600		1000

TABLE OF CUTTING SPEEDS AND FEEDS

Feet Per Minute	15	20	25	30	40	50	60	70	80	90	100
Diameter, Inches	Revolutions Per Minute										
1/16"	917	1222	1528	1833	2445	3056	3667	4278	4889	5500	6112
1/8"	458	611	764	917	1222	1528	1833	2139	2445	2750	3056
3/16"	306	407	509	611	815	1019	1222	1426	1630	1833	2037
1/4"	229	306	382	458	611	764	917	1070	1375	1375	1528
5/16"	183	244	306	367	489	611	733	856	978	1100	1222
3/8"	153	204	255	306	407	509	611	713	815	917	1019
7/16"	131	175	218	262	349	437	524	611	698	786	873
1/2"	115	153	191	229	306	382	458	535	611	688	764
5/8"	91	122	153	183	244	306	367	428	489	550	611
3/4"	76	102	127	153	204	255	306	357	407	458	509
7/8"	65	87	109	131	175	218	262	306	349	393	437
1"	57	76	95	115	153	191	229	267	306	344	382
1 1/8"	50	67	84	102	136	170	204	238	272	306	340
1 1/4"	45	61	76	91	122	153	183	214	244	275	306
1 3/8"	41	55	69	83	111	139	167	194	222	250	278
1 1/2"	38	50	63	76	102	127	153	178	204	229	255
1 5/8"	35	47	58	70	94	118	141	165	188	212	235
1 3/4"	32	43	54	65	87	109	131	153	175	196	218
1 7/8"	30	40	50	61	81	102	122	143	163	183	204
2"	28	38	47	57	76	95	115	134	153	172	191

The foregoing should be regarded as approximate, as many factors control the efficient operation of end mills. Always keep cutters sharp, and a steady flow of oil or compound directly on the working point will allow much higher cutting speed. Keep rate of feed consistent with finish required.

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INSTRUCTIONS FOR REPLACEMENTS

Motor replacement

1. Set spindle speed at its lowest point, for high-speeds as well as for low-speed range. Motor pulleys are in the most adequate position to dismantling of motor. Remove power from the lines.

2. Then, Unfasten lower back cover (No. 705) and take it off.

By means of screws (No. 847) lock sliding pulley of motor shaft (No. 709) with the spring holder washer. Fit those screws into washer holes and screw them to the pulley, until fastening elastic washer (No. 849) is free.

After performing previous operation, bring speed plate to the point of highest revolutions (according to range); this will loosen the belt and will make easier the subsequent operation.

3. Now, unfasten both screws (No. 839) fixing the motor to the framework, and take off the fastening elastic washer from the inside pulley-spring assembly (No. 849) Then take the motor out from the pulley guard.

To install in the new motor, reverse above operation.

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REPLACEMENT OF VARIABLE SPEED BELT

- (1) With spindle motor running set R.P.M. to 4200 (Turn Spindle motor off)
- (2) Remove four No 10 x 20 1½ hex head cap screws which hold the motor over the pulley guard.
- (3) Disassemble back cover below motor pulley.
- (4) Slide motor as far as possible toward the spindle and work the belt over the motor pulley.
- (5) Remove the motor from the pulley guard housing.
- (6) Dismantle upper cover of framework (No.725). Then, unfasten screws (No.833) fixing the balance beam No.718 and take out bushings (No.719.) Unfasten the six screws (No.876) fixing framework to check or gearbox. The framework is now fixed only by two locating pins, and it may come off with a light blow.
- (7) Change the variable transmission belt (No.830) for a new one, if possible of the same trademark.

IMPORTANT: The use of a defective or worn out belt may cause a vibration and an excessive temperature.

REPLACEMENT OF REDUCTION TIMING BELT (503)

1. Perform previous operations, as for changing the variable speed belt.
2. Take off the assembly formed by lower pulley and its support (No.703), by unfastening the six screws (No.853)

Once this assembly has been taken off, change the belt, we recommend that the belt should always be provided by BUFFALO MACHINERY.

IMPORTANT: All these replacement operations will be easier if the variable speed framework is separated from the head itself. For that purpose, unfasten the three nuts (No. 851) and remove variable speed framework.

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FINAL RECOMMENDATIONS

LUBRICATION

Long life, accuracy and warranty of this variable speed head are conditioned by an adequate use and lubrication. Therefore, please follow strictly the greasing indications shown on lubrication. Therefore, please follow strictly the greasing indications shown on lubrication plate, and avoiding the use of different lubricants.

Bearings in this assembly are watertight and are greased for life.

WORK

The feeds can be used to drill holes up to a 3/8" dia. Use manual feeds for holes that are larger than the mentioned one.

The clutch is adjusted to approx. 200 Lbs. of downwards pressure on the quill which allows drilling of 3/8" dia. in mild steel.

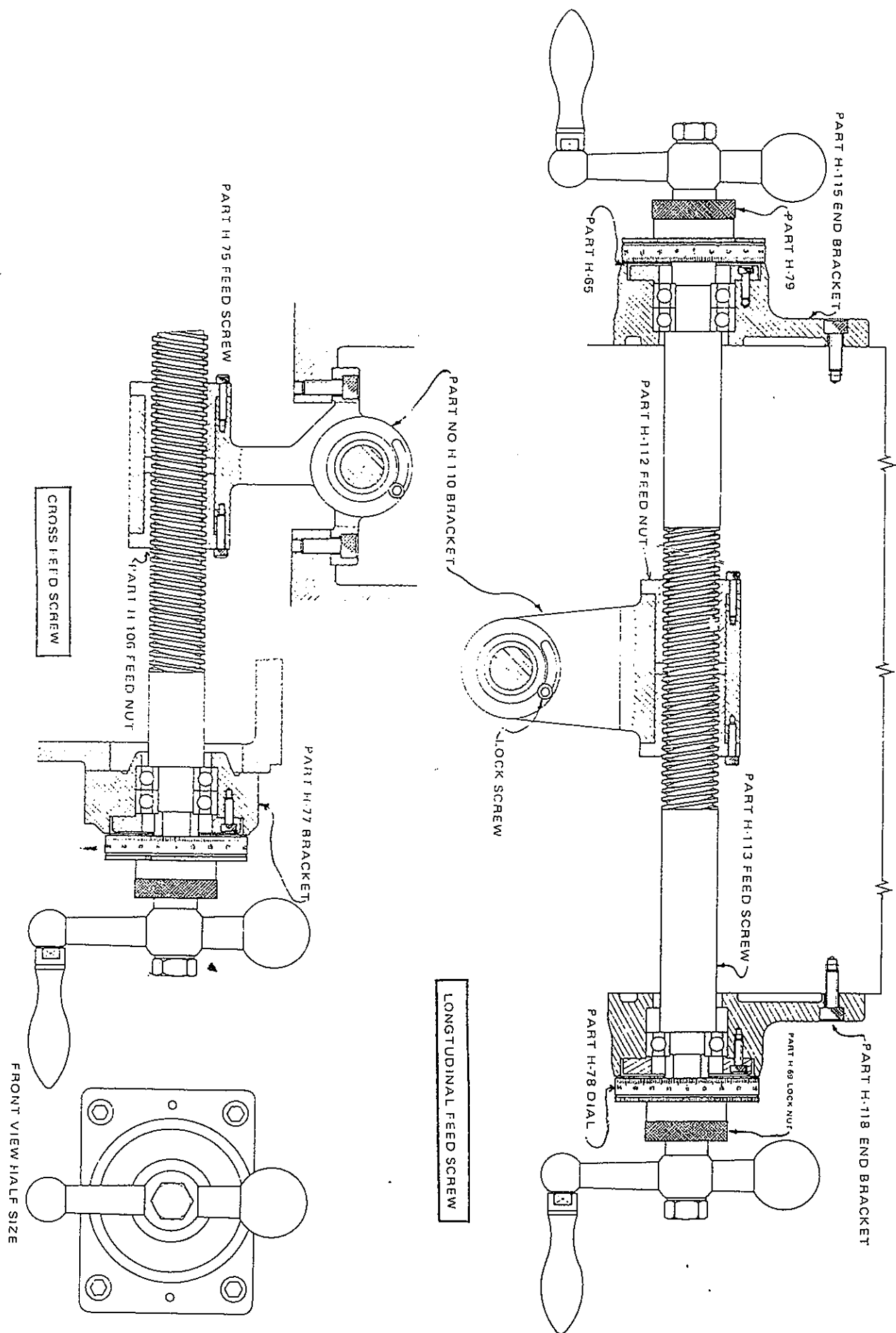
CAUTION: THIS CLUTCH IS TO BE USED ONLY WHEN IT IS ABSOLUTELY NECESSARY.

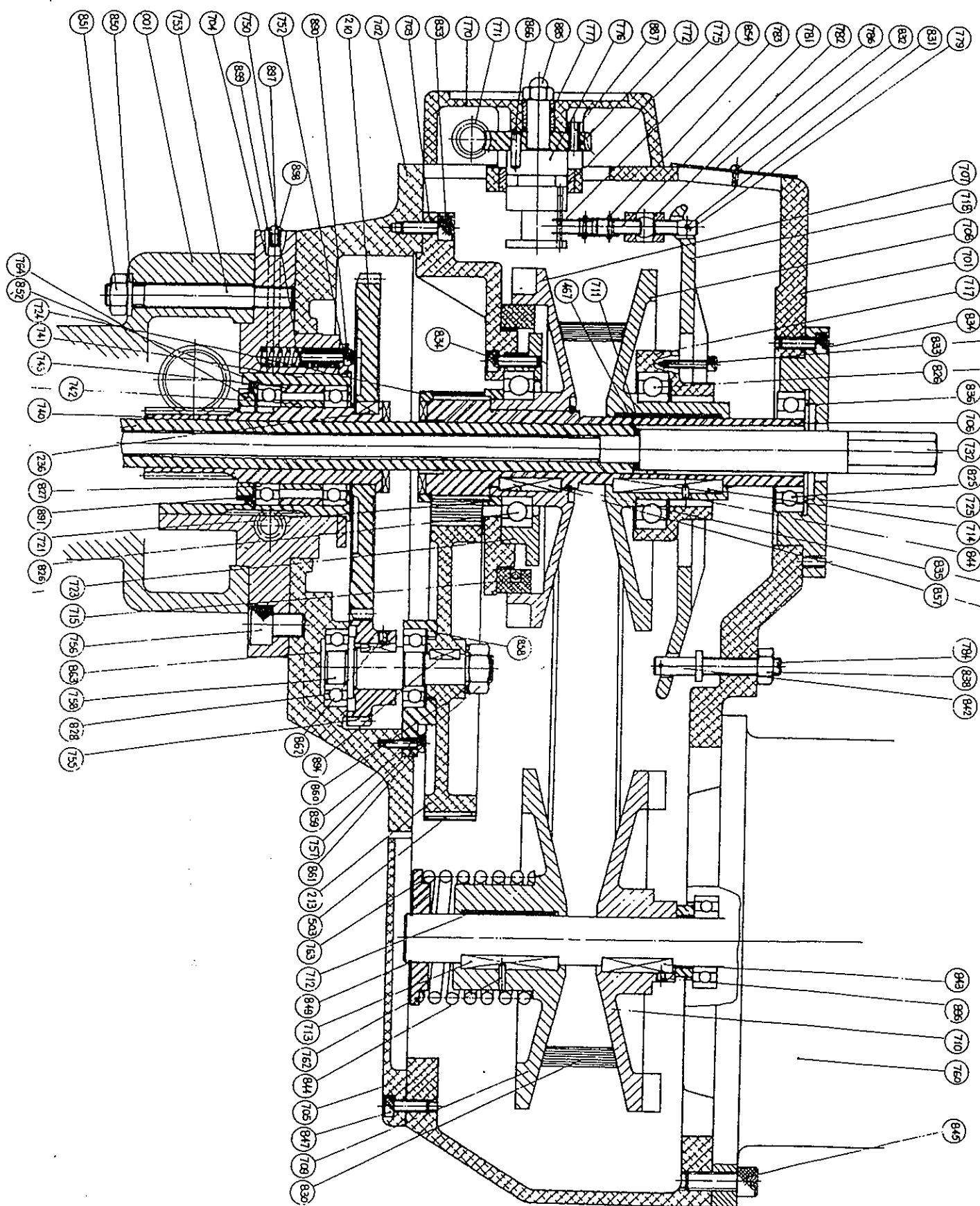
WARNING: IN HEAVY DUTY MILLING OPERATIONS, HOLD THE HEAD AS CLOSE TO THE COLUMN FACE AS POSSIBLE, IN ORDER TO OBTAIN A MAXIMUM RIGIDITY.

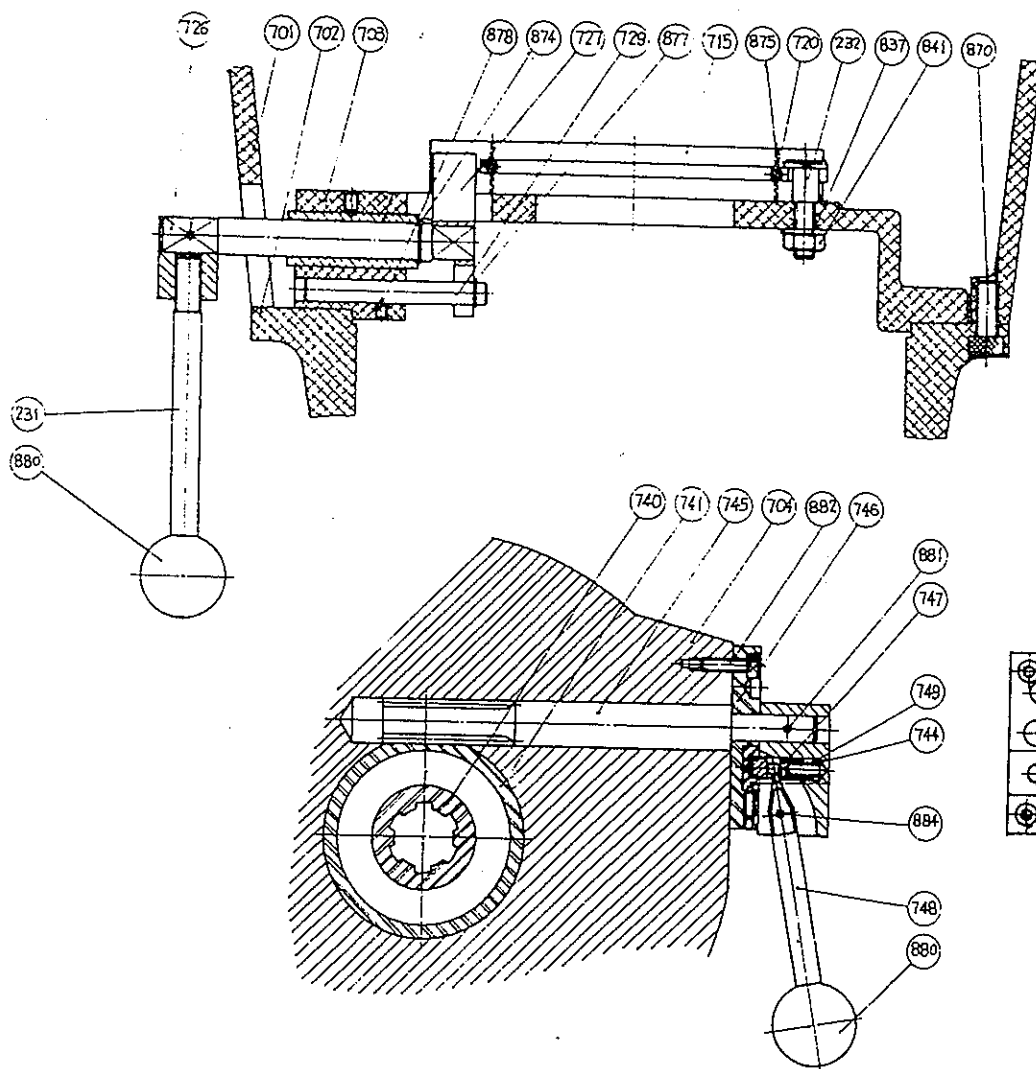
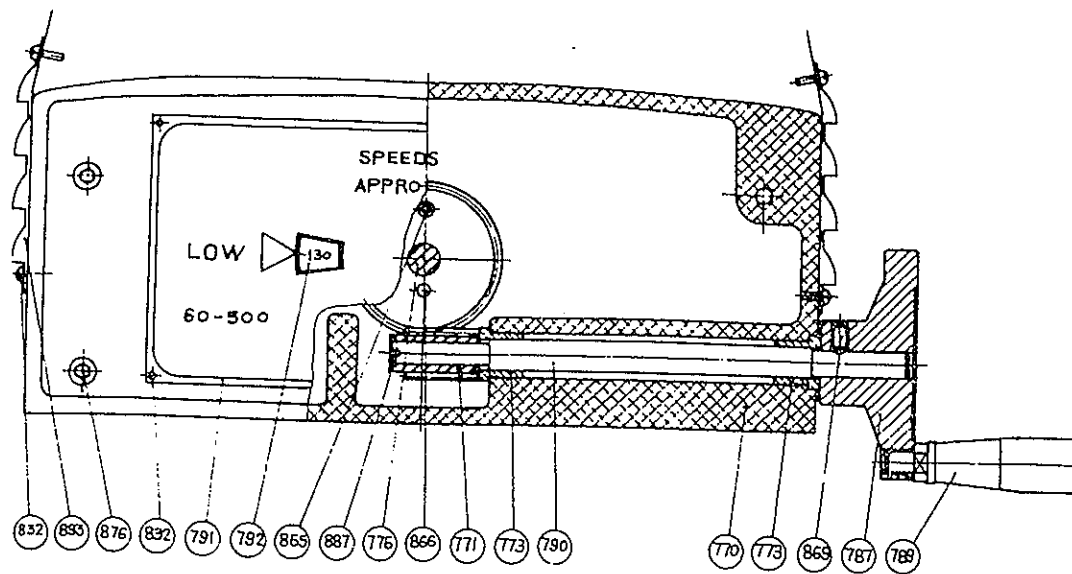
HIGH SPEED

In high speed position, spindle is directly driven by means of a tapered tooth drive. If this clutch is not tightened enough, a light noise may be produced: this can be corrected by changing position of position plate No. 718 upwards, until noise disappears. When positioning plate has a long displacement, this operation needs to reverse this plate.

CAUTION. Do not change high and low speeds direct drive/BACKGEAR WHEN MOTOR IS RUNNING.

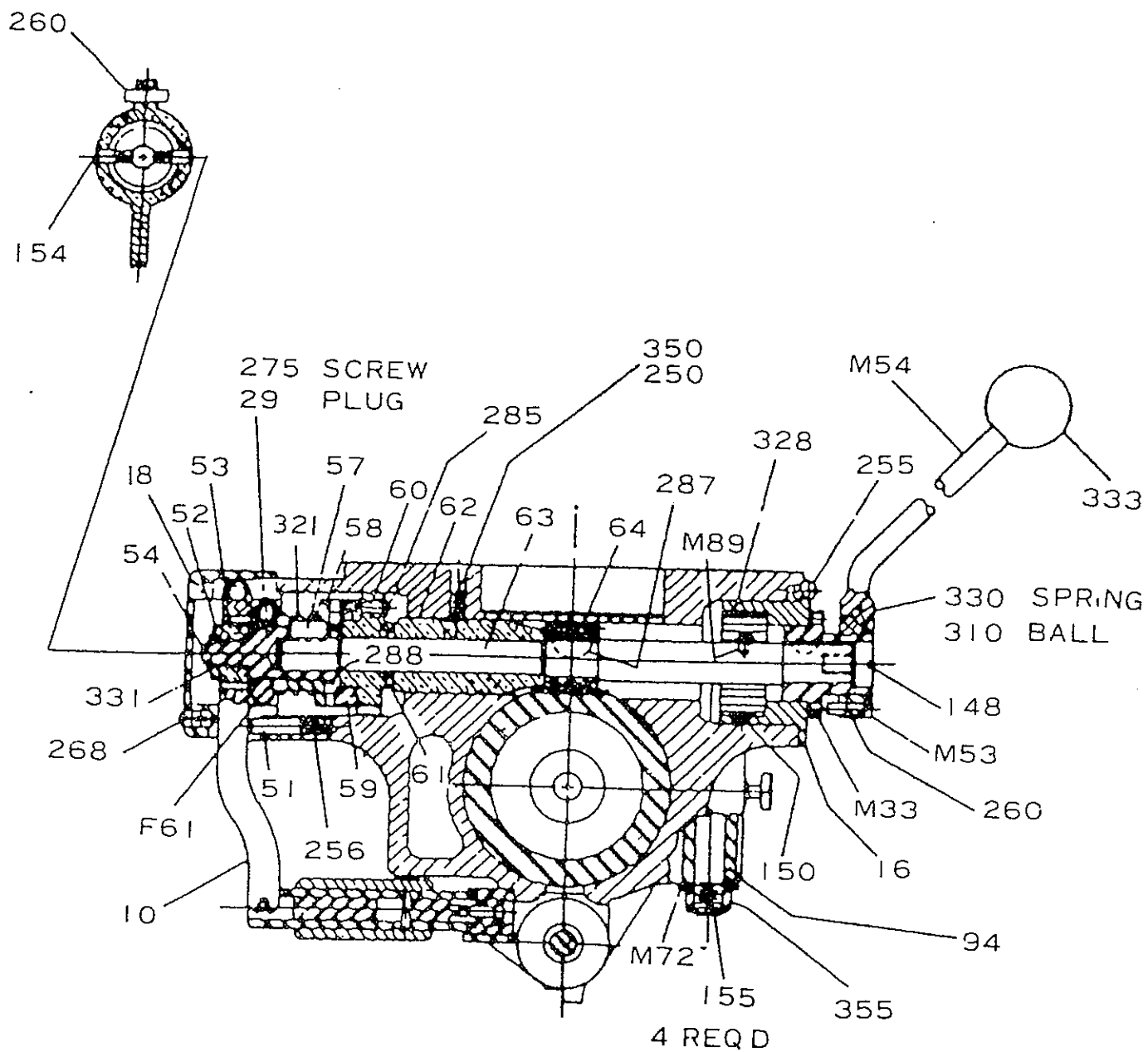


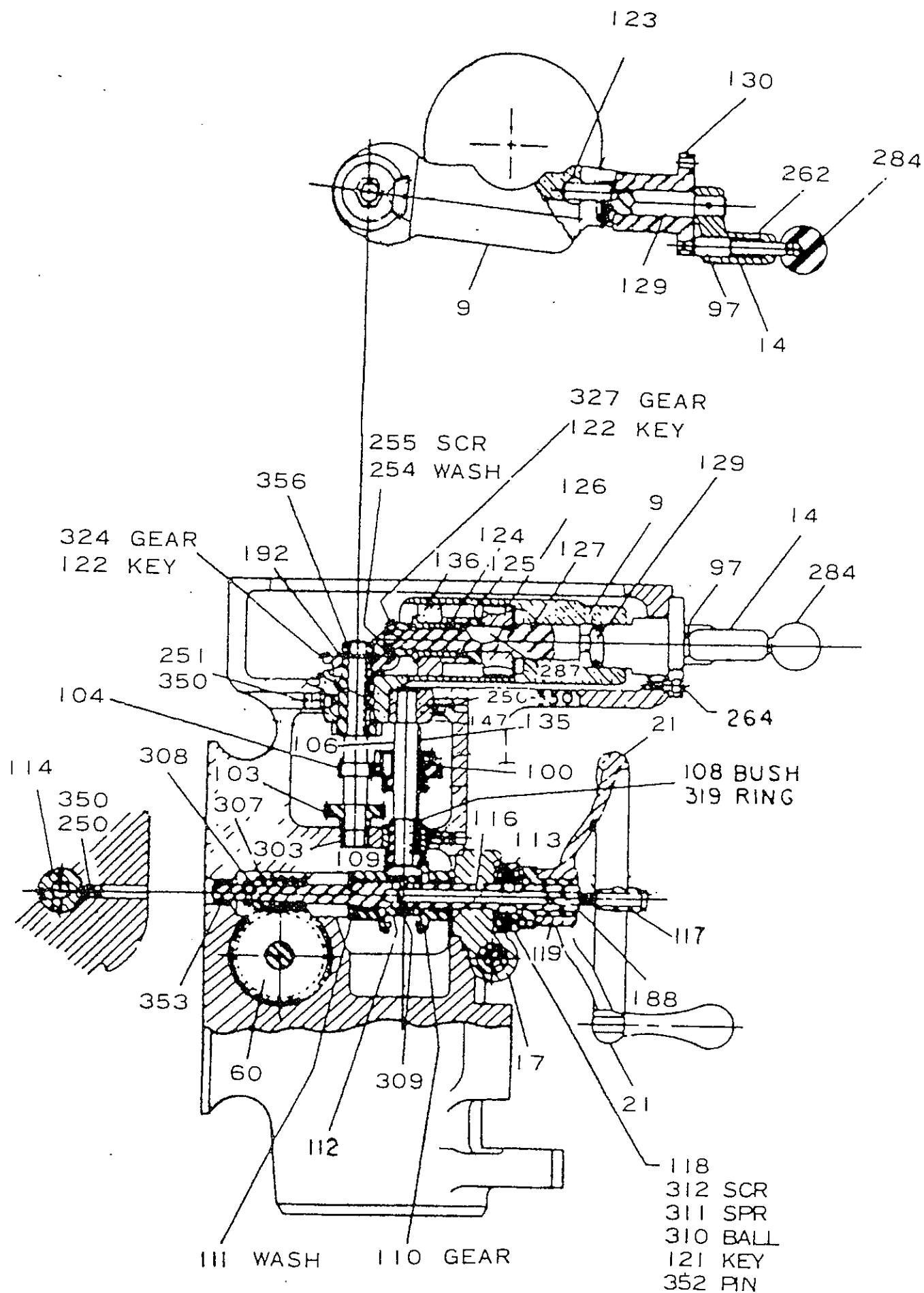


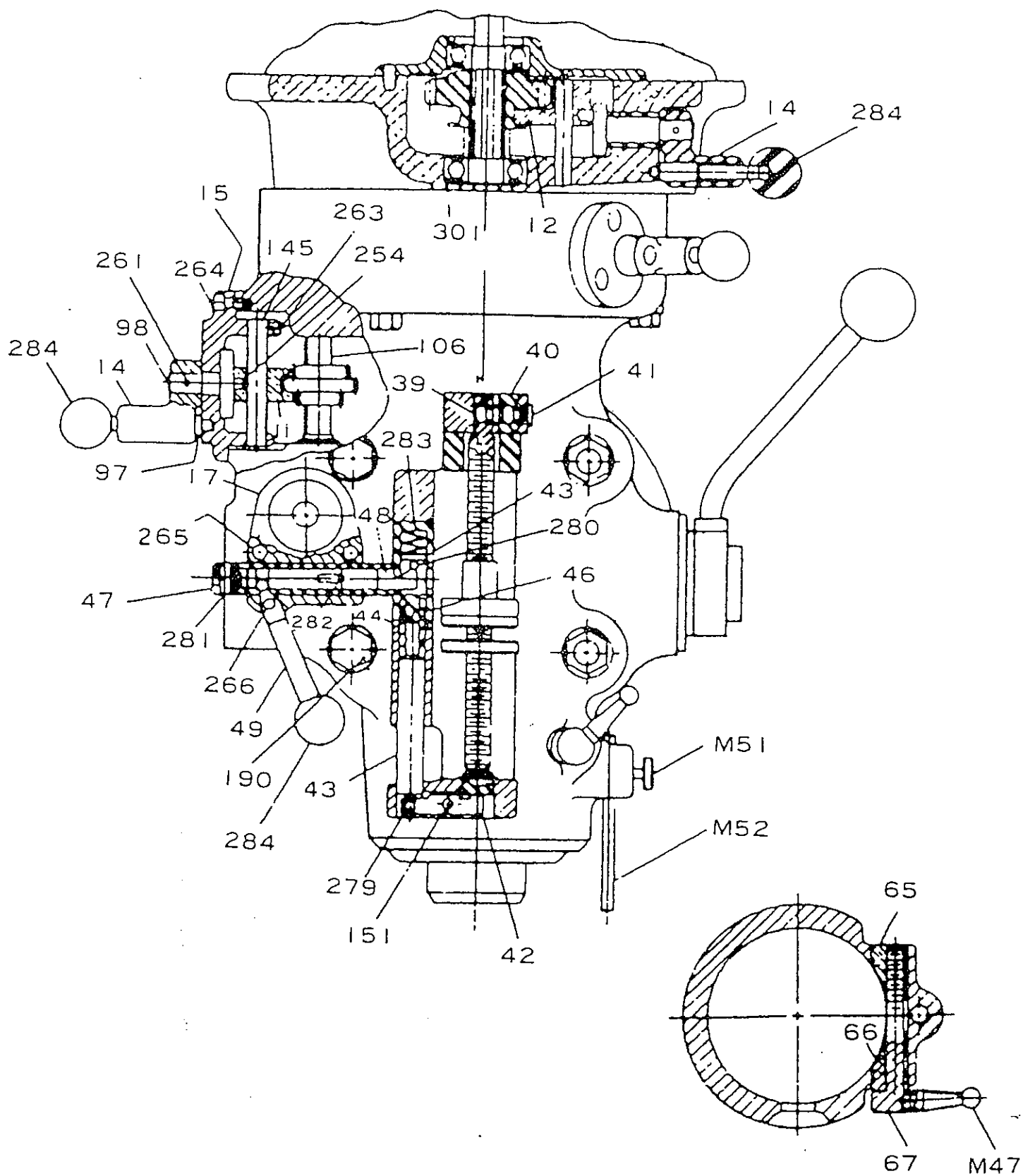


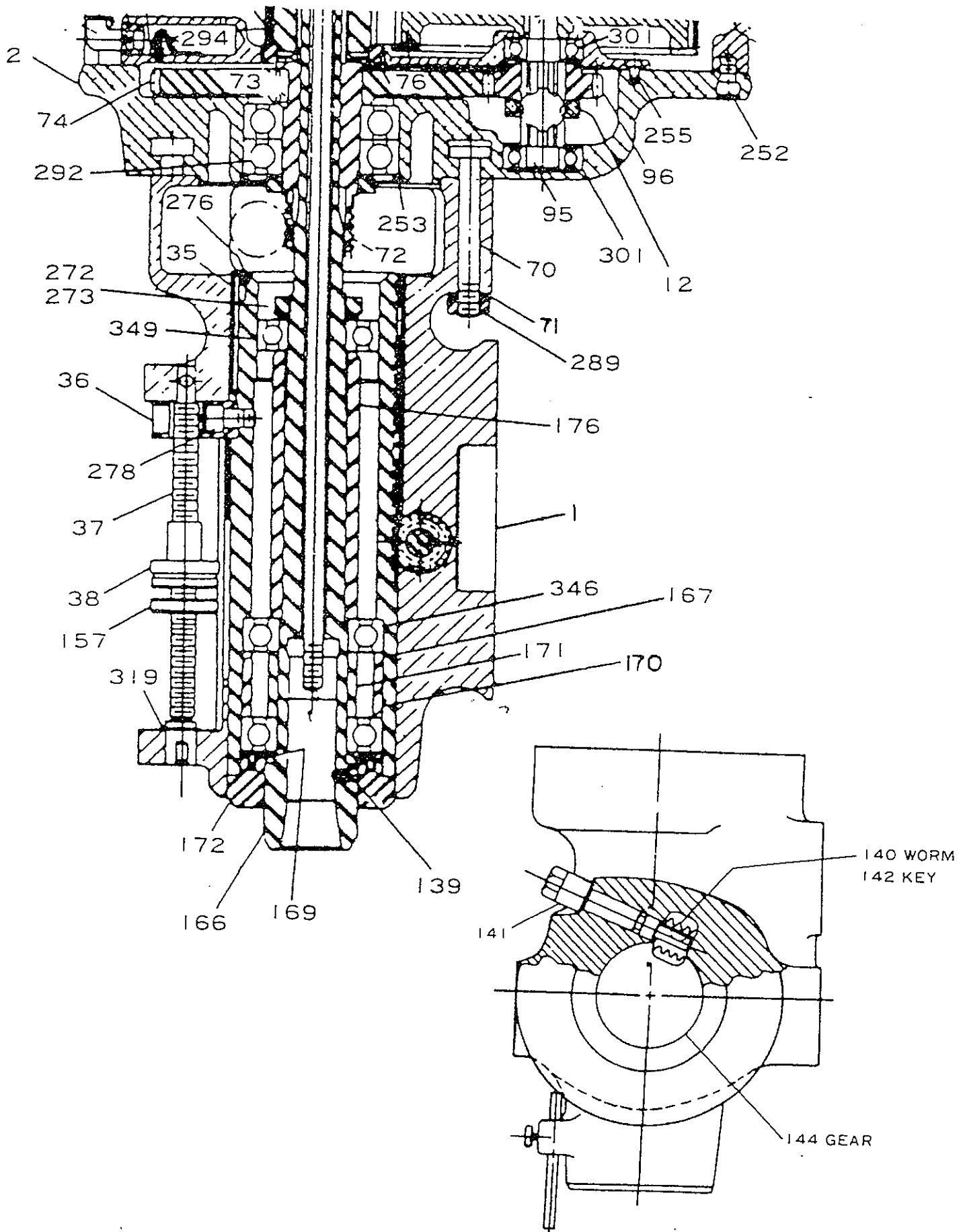
JV-210 SPINDLE BULL GEAR
 JV-213 TIMING BELT PULLEY
 JV-231 BRAKE LOCK & HANDLE
 JV-232 BRAKE RING SCREW
 JV-236 BULL GEAR KEY
 JV-298 SET SCREW
 JV-456 LEVER SHAFT
 JV-467 DRAWBAR WASHER
 JV-949 KEY
 JV-503 TIMING BELT
 JV-504 GIGS OIL CUP
 JV-565 ALUMINUM ELBOW
 JV-701 BELTS COVER
 JV-702 GEARBOX
 JV-703 MAIN SPINDLE SUPPORT
 JV-704 SUPPORT PLATE
 JV-705 DOWN COVER OF FRAMEWORK
 JV-706 PULLEY SHAFT CLUTCH
 JV-707 MAIN SPINDLE PULLEY
 JV-708 MAIN SLIDING PULLEY
 JV-709 SLIDING MOTOR PULLEY
 JV-710 FIXED MOTOR PULLEY
 JV-711 MAIN PULLEY BUSHING
 JV-712 MOTOR PULLEY BUSHING
 JV-713 MOTOR SHAFT COTTER
 JV-714 MAIN SPINDLE COTTER
 JV-715 MAIN SPINDLE BRACKET
 JV-717 DRIVE PAN
 JV-718 BALANCING BEAM
 JV-718 BALANCING BEAM BUSHING
 JV-720 TRACTION SPRINGS
 JV-722 PULLEY FASTENING
 JV-723 COVE FOR MAIN SPINDLE BEARING
 JV-724 CLUTCH RING
 JV-725 UPPER COVER OF FRAMEWORK
 JV-726 SHAFT FOR BRAKE OPERATION
 JV-727 BRAKE CAMS
 JV-729 BRAKE ROTATION BOLT
 JV-730 BRAKE BUSHING
 JV-731 BRAKE SHAFT BUSHING
 JV-732 FASTENING DRAW BAR
 JV-740 TWO-ADMISSION CLUTCH
 JV-741 SLIDING BEARING BOX
 JV-742 BUSHING
 JV-743 SPACING BUSHING
 JV-744 LEVER HUB
 JV-745 TOOTH CHANGE SHAFT
 JV-746 ROTATION PLATE
 JV-747 LOCKING NOZZLE
 JV-748 CONTROL LEVER
 JV-749 SPRING
 JV-750 CLUTCH SPRING
 JV-751 GUIDEWAY FLANGES
 JV-752 DRIVE RING
 JV-753 PINS
 JV-754 PROTECTING SHEET
 JV-755 DRIVING GEAR
 JV-756 SQUARE-HEAD SCREWS
 JV-757 COVER
 JV-758 GEAR SHAFT
 JV-760 MAIN MOTOR
 JV-761 MOTOR BUSHING
 JV-762 SPRING REST
 JV-763 OPERATING SPRING
 JV-764 SAFETY NUT
 JV-770 OPERATING SUPPORT
 JV-771 WORMGEAR
 JV-772 GEAR
 JV-773 BUSHING
 JV-774 BUSHING
 JV-775 OPERATING SHAFT BUSHING
 JV-776 OPERATING SHAFT
 JV-777 BUSHING
 JV-778 RING
 JV-779 ADJUSTING SPINDLE
 JV-780 METAL SHEET FOR AIR PIPING
 JV-781 PIN

JV-782 REGULATING NUT
 JV-783 CHAIN
 JV-784 REGULATING SPINDLE
 JV-786 FIRM PLATE
 JV-787 HANDWHEEL
 JV-788 HANDWHEEL HUB
 JV-789 CONTROL HANDLE
 JV-790 OPERATING SHAFT
 JV-791 SPEED PLATE
 JV-792 SPEED DISK
 JV-825 BEARING
 JV-826 BEARING
 JV-827 BEARING
 JV-828 BEARING
 JV-829 BEARING
 JV-830 CONTINEN BELT
 JV-831 ELASTIC PIN
 JV-832 PHILIPS SCREWS
 JV-833 ALLEN SCREWS
 JV-834 ALLEN SCREWS
 JV-835 ELASTIC RING
 JV-836 WAY WASHER
 JV-837 WASHER
 JV-838 NUT
 JV-839 WASHER
 JV-840 WASHER
 JV-841 NUT
 JV-842 COTTER PIN
 JV-843 COTTER
 JV-844 ALLEN SETSCREW
 JV-845 ALLEN SCREWS
 JV-846 NUTS
 JV-847 ALLEN SCREWS
 JV-848 WAVY WASHER
 JV-849 RING
 JV-850 WASHER
 JV-851 NUT
 JV-852 ELASTIC RING
 JV-853 ALLEN SCREWS
 JV-854 ELASTIC PIN
 JV-855 ELASTIC PIN
 JV-856 ELASTIC
 JV-857 COTTER
 JV-858 WAVY WASHER
 JV-859 NUT
 JV-860 WASHER
 JV-861 HEXAGON-HEAD SCREWS
 JV-862 ALLEN SETSCREWS
 JV-863 COTTER
 JV-865 ELASTIC PIN
 JV-866 COTTER (KEY)
 JV-867 ALLEN SCREWS
 JV-868 ELASTIC PIN
 JV-869 ALLEN SETSCREW
 JV-870 ALLEN SETSCREW
 JV-871 SPRING
 JV-872 STEEL BALL
 JV-873 ALLEN SETSCREW
 JV-874 ELASTIC RING
 JV-875 ELASTIC PINS
 JV-876 ALLEN SCREWS
 JV-877 ELASTIC
 JV-878 ALLEN SETSCREW
 JV-879 SAFETY JOINT
 JV-880 KNOB
 JV-881 TAPERED PIN
 JV-882 ALLEN SCREWS
 JV-884 CYLINDRICAL PIN
 JV-885 BLIND NUT
 JV-886 SCREW
 JV-887 ELASTIC PIN
 JV-888 ALLEN SETSCREW
 JV-889 ALLEN SCREWS
 JV-890 SHAFT
 JV-891 WASHER
 JV-893 SCREW
 JV-894 KEY
 JV-895 BEARING SPACER









J-1	QUILL HOUSING	J-65	QUILL LOCK SLEEVE	J-136	WORM CRADLE BUSHING
J-2	GEAR HOUSING	J-66	QUILL LOCK SLEEVE	J-138	PIN
J-3	GEAR HOUSING COVER	J-67	QUILL LOCK BOLT	J-139	COLLET ALIGNING SCREW
J-4	BELT HOUSING	J-70	VERTICAL TEE BOLT	J-140	WORM GEAR
J-5	SPINDLE PULLEY	J-71	VERTICAL TEE BOLT WASHER	J-141	SHAFT, TILTING WORM
J-6	MOTOR PULLEY	J-72	SPLINED GEAR HUB	J-142	KEY
J-7	TIMING BELT PULLEY	J-73	BULL GEAR KEY	J-143	SOCKET SET SCREW
J-8	TIMING BELT PULLEY	J-74	SPINDLE BULL GEAR	J-144	GEAR
	FLANGE	J-75	SPINDLE PULLEY HUB	J-145	FEED SHIFT ROD
J-9	WORM GEAR CRADLE	J-76	PULLEY COLLAR	J-147	CLUSTER GEAR SHAFT UPPER
J-10	OVERLOAD CLUTCH TRIP	J-77	QUILER TUBE		BEARING
	LEVER	J-78	OIL PLUG	J-148	PINION SHAFT HUB SCREW
J-11	FEED GEAR SHIFTER FORK	J-79	SPINDLE PULLEY KEY	J-149	DRAWBAR WASHER
J-12	BACK GEAR SHIFTER FORK	J-80	UPPER BEARING SPACER	J-150	OUTSIDE CLOCK SPRING PIN
J-13	SPINDLE PULLEY BEARING		(LARGE)	J-151	TRIP LEVER PIN
	SLEEVE	J-81	UPPER BEARING SPACER	J-152	BACKGEAR SHIFT BUSHING
J-14	SHIFT CRANK		(SMALL)	J-153	BACKGEAR SHIFT CRANK
J-15	CLUSTER GEAR COVER	J-82	BEARING SLEEVE LOCKNUT	J-154	CLUTCH RING PIN
J-16	SPRING COVER	J-83	UPPER BEARING LOCKNUT	J-155	BOLT
J-17	FEED TRIP BRACKET	J-84	CAM RING	J-157	QUILL MICRO STOP NUT
J-18	CLUTCH ARM COVER	J-85	SPINDLE CLUTCH LEVER	J-159	KEY FOR #30 STD TAPER
J-19	KEY	J-86	SPINDLE CLUTCH CAM RING		SPINDLE
J-20	MOTOR SWITCH BRACKET		PIN	J-166	SPINDLE
J-21	HANDWHEEL	J-87	BRAKE BLOCK	J-167	QUILL SET SCREW
J-23	FELT RETAINER RING	J-88	BRAKE RING SCREW	J-169	SPINDLE DIRT SHIELD
J-24	MICRO SCREW JAM NUT	J-89	BRAKE LOCK STUD	J-170	BEARING SPACER LARGE
J-27	BEARING SPACER	M-89	CLOCKSPRING STUD	J-171	BEARING SPACER SMALL
J-29	SPINDLE LOCKNUT BINDING	J-91	BRAKE LOCK WASHER	J-172	NOSEPIECE
J-33	PINION SHAFT HUB SLEEVE	J-92	BRAKE LOCK & HANDLE	J-176	SLEEVE
J-34	QUILL NOSEPIECE	M-72	NUT	J-188	FEED WORM SHAFT SHARTED
J-35	QUILL SKIRT	J-93	BRAKE LOCK PIN		WITH SERIAL NO. 5500
J-36	QUILL STOP KNOB	J-94	LOWER CLAMPING BOLT	J-190	SPECIAL HEX NUT OPTIONAL
J-37	QUILL STOP MICRO SCREW		SPACER		EQUIP
J-38	MICROMETER NUT	J-95	COUNTERSHAFT	J-192	WASHER
J-39	REVERSE TRIP BALL LEVER	J-96	COUNTERSHAFT GEAR	J-193	PLUG FOR 5/8 HOLE
J-40	FEED REVERSE TRIP	J-97	GEARSHIFT PLUNGER	J-250	SOCKET SET SCREW KP
	PLUNGER	J-98	CLUSTER GEAR SHIFT CRANK	J-251	SOCKET CAP SCREW
J-41	REVERSE TRIP BALL LEVER	J-100	FEED DRIVE CLUSTER GEAR	J-252	SOCKET CAP SCREWS
	SCREW		(CENTER)	J-253	SNAP RING
J-42	FEED TRIP LEVER	J-103	FEED DRIVE GEAR	J-254	WASHER
J-43	FEED TRIP PLUNCER	J-104	CLUSTER GEAR INPUT SHAFT	J-255	R. HEAD SCREW
J-44	TRIP PLUNGER BUSHING	J-106	CLUSTER GEAR SHAFT	J-256	COMPRESSION SPRING
J-45	TRIP PLUNGER	J-108	BEVEL GEAR BEARING	J-257	K.P. SOCKET SET SCREWS
J-46	FEED TRIP PLUNGER	J-109	BEVEL GEAR THRUST SPACER	J-258	V BELT
	BUSHING	J-110	FEED REVERSE BEVEL GEAR	J-259	FLAT HEAD SCREWS
J-47	CAM ROD SLEEVE ASSEMBLY	J-111	FEED WORM SHAFT THRUST	J-261	ROLL PIN
J-48	CAM ROD		WASHER	J-262	COMPRESSION SPRING
J-49	TRIP HAND	J-112	FEED REVERSE CLUTCH	J-263	SET SCREW
J-50	LOCKNUT BINDING PLUG	J-113	HANDWHEEL CLUTCH SPRING	J-264	CAP SCREW
J-51	OVERLOAD CLUTCH LEVER		SCREW	J-265	CAP SCREW
	SPRING PLUNGER	J-114	FEED WORM SHAFT BUSHING	J-166	PIN
M-51	INDICATOR ROD SCREW	J-116	REVERSE CLUTCH ROD	J-163	SCREW
J-52	OVERLOAD CLUTCH WASHER	J-117	REVERSE KNOB	J-267	CAP SCREW
M-52	INDICATOR ROD	J-118	HANDWHEEL CLUTCH	J-268	SOCKET SET SCREWS
J-53	CLUTCH RING	J-119	HANDWHEEL BUSHING	J-269	SOCKET HEAD CAP SCREW
M-53	PINION SHAFT HUB	J-121	WORM SHAFT KEY	J-272	LOCK NUT
J-54	OVERLOAD CLUTCH SLEEVE	J-122	FEED DRIVING GEAR KEY	J-273	LOCKWASHER
M-54	PINION SHAFT HUB WANDLE	J-124	FEED WORM GEAR SHAFT	J-274	LOCKWASHER
J-57	OVERLOAD CLUTCH SLEEVE		SLEEVE	J-274	SOCKET SET SCREW KP
	KEY	J-125	WORM GEAR SPACER		
J-58	OVERLOAD CLUTCH	J-126	FEED DRIVE WORM GEAR		
J-59	OVERLOAD CLUTCH RING	J-127	FEED DRIVE WORM GEAR		
J-60	OVERLOAD CLUTCH WORM		SHAFT		
	GEAR	J-128	FEED ENGAGE PIN		
J-61	PINION SHAFT WORM GEAR	J-129	WORM GEAR CRADLE THROW OUT		
	SPACER	J-130	SHIFTS SLEEVE		
J-61	OVERLOAD CLUTCH	J-131	MOTOR LOCKNUT		
	LOCKNUT	J-132	MOTOR LOCKNUT HANDLE		
J-62	QUILL PINION SHAFT BUSHING	J-133	MOTOR MOUNING STUDS		
J-63	QUILL PINION SHAFT	J-134	MOTOR MOUNINT STUD		
J-64	QUILL PINION		WASHER		
		J-135	CLUSTER GEAR KEY		

J-275 SOCKET SET SCREW	J-358 SOCKET SET SCREW
J-276 SCREW	J-359 JAM NUT
J-278 SCREW	J-362 JAM NUT
J-279 SOCKET SET SCREW	J-363 EXTERNAL LOCK WASHER
J-280 ROLL PIN	J-365 ROLL PINS
J-281 DOWEL PIN	J-366 NAME PLATE
J-282 ROLL PIN	J-368 OIL STRAINER FOR QUILL
J-283 ROLL PIN	BRG
J-283 COMPRESSION SPRING	J-389 SWITCH BRACKET
J-284 BLACK PLASTIC BALL	M-72 WASHER
HANDLES DIM	J-369 SHAFT
J-285 SCREW	J-313 SCREW
J-286 WOODRUFF KEY	J-401 MOTOR
J-287 WOODRUFF KEY	J-408 COVER
J-288 SNAP RING	J-369 SHAFT
J-289 HEX NUT HARDENED	
(AMERICAN STD REGULAR)	
J-290 BEARING LOCKNUT	
J-291 LOCKWASHER	
J-292 BEARING	
J-293 BEARING	
J-294 WICK	
J-295 GITS OIL CUP	
J-296 ROLL PIN	
J-197 SPRING	
J-298 SOCKET SET SCREWS	
J-299 WOODRUFF KEY	
J-300 HEX JAM	
J-301 DOUBLE SEAL BEARING	
J-303 NEEDLE BEARING	
J-304 HEX JAM NUT	
J-305 QUILL BEARING	
J-308 PIN	
J-307 BOSTON WORM	
J-308 PIN	
J-309 ROLL PIN	
J-310 STEEL BALL	
J-311 COMPRESSION SPRING	
J-312 SET SCREW	
J-313 SEW SCREW	
J-318 LOCKWASHER	
J-319 WALDES SNAP RING	
J-321 SAFETY CLUTCH SPRING	
J-322 MICROMETER SCALE	
J-323 SCREW	
J-324 FEED REVERSE BEVEL GEAR	
J-326 WRENCH	
J-327 STEEL PINION	
J-328 CLOCK SPRING	
J-330 COMPRESSION SPRING	
J-331 KOHINOOR SNAP RING	
J-333 BLACK PLASTIC BALL	
HANDLES	
J-334 DOWEL PIN	
J-335 SPLIT LOCKWASHER	
J-338 GITS OIL CUP	
J-339 SPINDLE SPEED PLATE	
J-340 OPERATING INSTRUCTION	
PLATE	
J-345 SOCKET SET SCREWS	
J-348 BEARING	
J-349 BEARING	
J-350 LOCKSCREW	
J-351 LOCKSCREW	
J-352 DOWEL PINS	
J-353 BUSHING	
J-355 STD. HEX NUT	
J-356 FLOPLOC STOP & LOCKNUT	

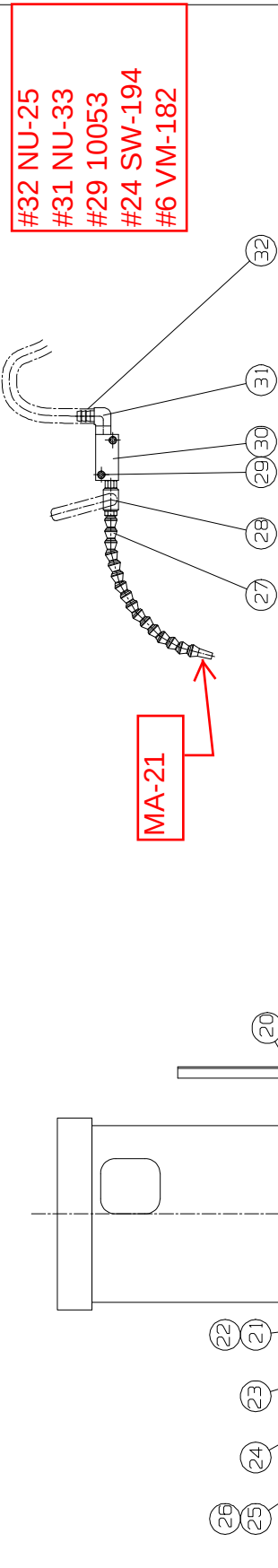
Capacitor for the
Strong flood pump
CA-71
Pump MA-266

MB-RH-RW/11-12 Series belts and pulleys

For belted models (A-B Versions)

	X Axis	Y axis	Z axis
Ballscrew pulley / bushing	PY-126* / PY-34	PY-126* / PY-34	PY-31 / PY-32
	20 tooth / .625"	20 tooth / .625"	24 tooth / .625"
Motor pulley / bushing	PY-126* / PY-95	PY-126* / PY-95	PY-61 / PY-95
	20 tooth / 19mm	20 tooth / 19mm	18 tooth / 19mm
Drive belt	BT-09	BT-30	BT-09
	187L075	322L075	187L075
Spindle Drive Belt, RH&RW – BT-79			
Spindle Drive Belt, MB12B rev2 – BT-100 (2 piece split)			
* PY-126 can be replaced with aluminum pulley (PY-239) to avoid rust issues			

MB11-12 Head / Bolster Assembly

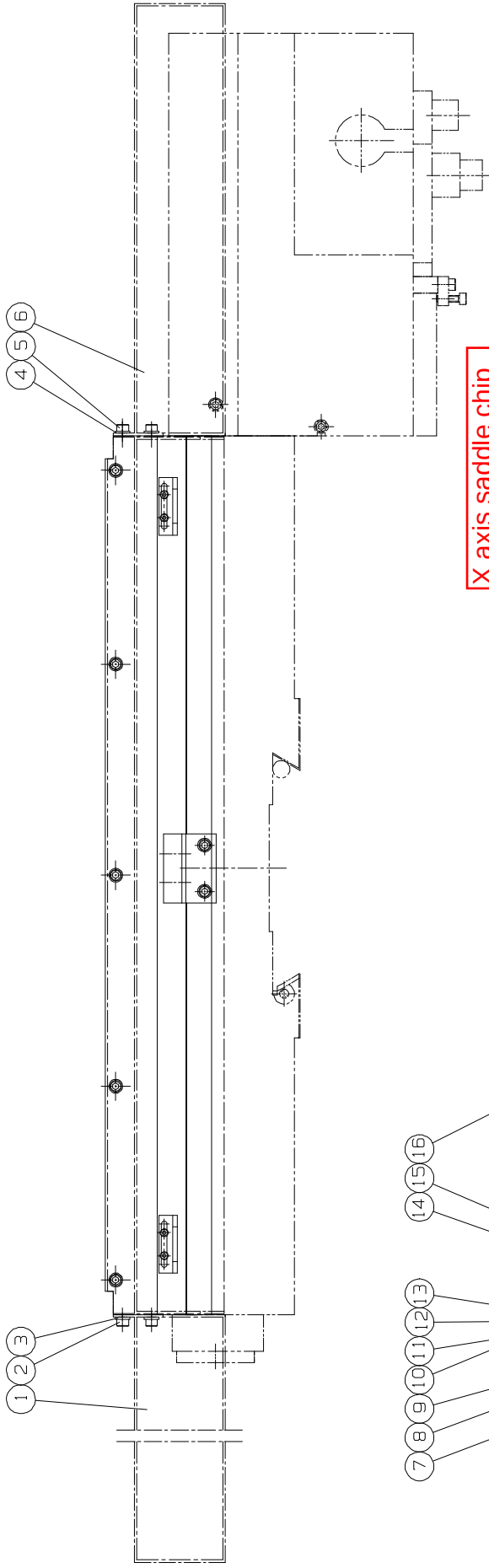


No.	Description	Parts No.	Material	Qty	Spec
	App'd	Check	Design	Drawn	Mode
	Leon	Scale	1:4	Title	Head Assembly
	90073	Unit	MM	Dwg No	2101-00-A
32	Tube	-		2	
31	Elbow Fitting	-		1	PT1/4XØ13
30	Block	2101-00006-400		1	
29	Screw	5001-B06100030		2	M6XP1.0X30L
28	Level	-		1	PT1/4
27	Nozzel	-		1	PT1/4
26	Screw	5001-A050800012		2	M5XP0.8X12L
25	Hi/Low Switch Lever	2103-00012-400		1	
24	Limit Switch	-		1	
23	Screw	5001-B04070025		2	M4XP0.7X25L
22	Screw	5001-B04070012		2	M4XP0.7X12L
21	Switch Plate	2103-00011-400		1	
20	Guard	2101-00015-400		1	
19	Screw	5001-A050800012		2	M5XP0.8X12L
18	Dog Bracket	2323-10011-400		1	
17	Screw	5001-B050800012		2	M5XP0.8X12L
16	Screw	5001-B050800012		4	M5XP0.8X12L
15	Dog	2003-56029-400		2	
14	Screw	5001-B050800015		2	M5XP0.8X15L
13	Limit Switch	-	SW-193	1	HoneyWell 914CE2
12	Bolster	2323-00002-202		1	
11	Screw	5001-B08125025		4	M8XP1.25X25L
10	Screw	5010-A08125020		2	M8XP1.25X20L
9	Fix Block	2323-00006-400		2	
8	Flat Washer	5071-A00000016		6	#16
7	Screw	5001-B16200055		6	M16XP2.0X55L
6	Intermediate Bolster	2101-00002-201		1	
5	T-Bolt	-		4	
4	Hex. Screw	-		4	
3	Worn Gear	-		1	
2	Scale	-		1	
1	Head	-		1	3HP/5HP

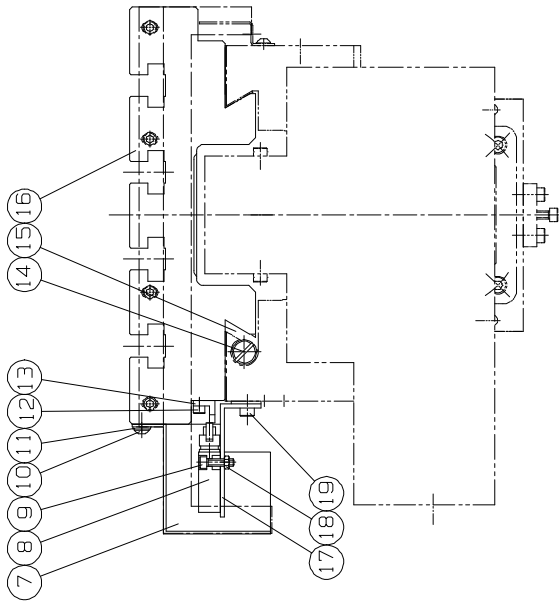


FRONT WAY COVER BRACKET MPS-324

[illegible]

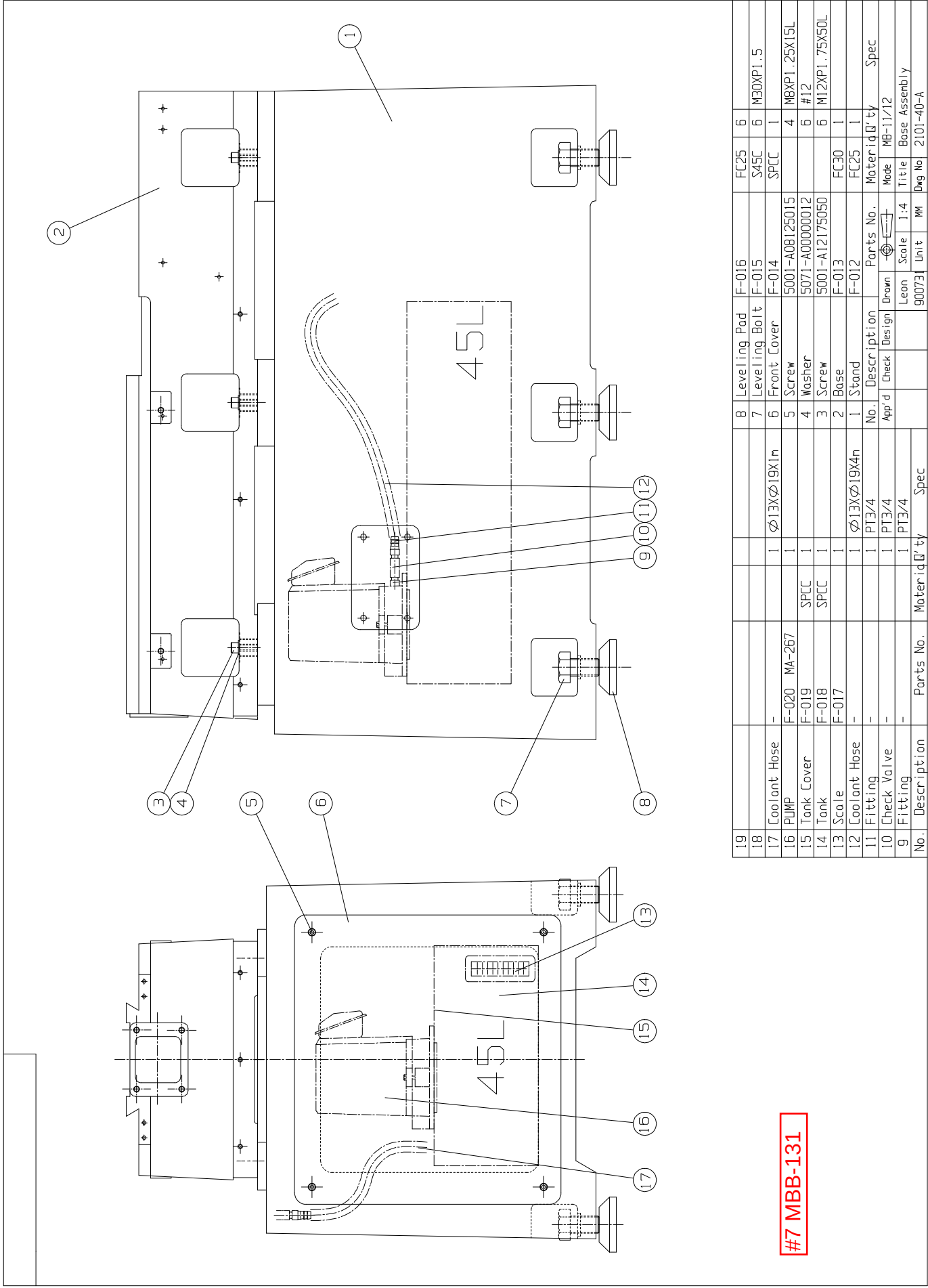


X axis saddle chip
guard MPS-315

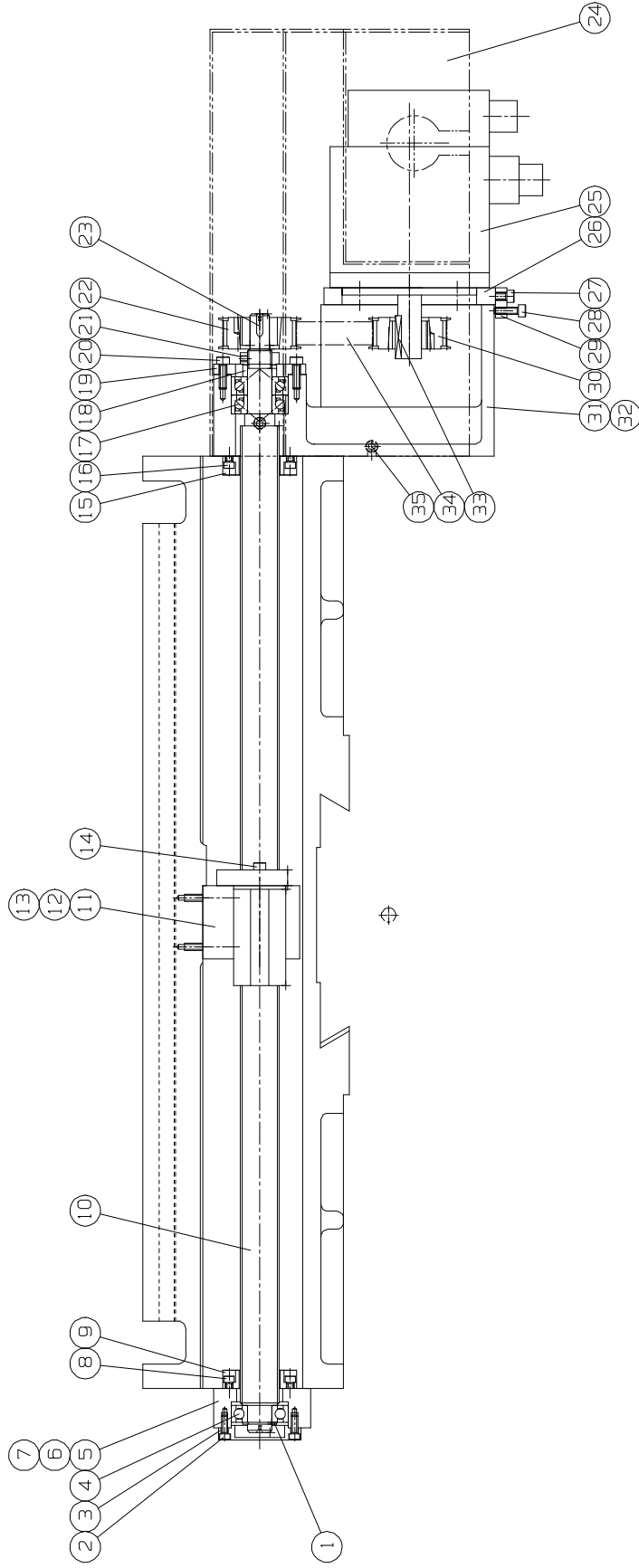


#3 & #4 SP-66

19	Screw	5001-B06100012	2	M6XP1.0X12L
18	Nut	5051-A00005080	1	M5XP0.8
17	Switch Plate	2323-20013-400	SPCC	1
16	Table	2323-30100-102	FC30	1
15	Gig	F-011	FC30	1
14	Adjusting Screw	F-010	-	2
13	Dog	2003-56029-400	S45C	2
12	Screw	5001-A05080012		4
11	Washer	5071-B00000006	#6	5
10	Screw	5005-B06100012		5
9	Screw	5001-B05080020		2
8	Limit Switch	-	SW-193	1
7	Front Cover	2101-30006-300	MPS-299	1
6	X-Way Cover-Right	2101-30010-400		1
5	Screw	5001-B06100012		6
4	Washer	5071-B00000006	#6	6
3	Washer	5071-B00000006	#6	6
2	Washer	5001-B06100012		6
1	X-Way Cover-Left	2101-30011-401		1
No.	Description	Parts No.	Material	Qty
	App'd	Check	Design	Drawn
		Leon	Scale	1:2.5
		Unit	MM	Dwg No
		900731		2101-30-A
				Title
				Table Assembly
				Mode
				MB-11/12
				Spec



19								8	Leveling Pad	F-016		FC25	6	
18								7	Leveling Bolt	F-015		S45C	6	M30XP1.5
17	Coolant Hose	-				1	Ø13XØ19X1in	6	Front Cover	F-014		SPCC	1	
16	PUMP	F-020	MA-267			1		5	Screw	5001-A08125015			4	M8XP1.25X15L
15	Tank Cover	F-019				1		4	Washer	5071-A00000012			6	#12
14	Tank	F-018				1		3	Screw	5001-A12175050			6	M12XP1.75X50L
13	Scale	F-017				1		2	Base	F-013		FC30	1	
12	Coolant Hose	-				1	Ø13XØ19X4in	1	Stand	F-012		FC25	1	
11	Fitting	-				1	PT3/4	No.	Description	Parts No.		Material	Qty	Spec
10	Check Valve	-				1	PT3/4	App'd	Check Design	Drawn		Mod	MB-11/12	
9	Fitting	-				1	PT3/4	Scale	1:4	Unit	Leon	Title	Base Assembly	
No.	Description	Parts No.	Material	Qty	Spec			Unit	MM	Dwg No	2101-40-A			



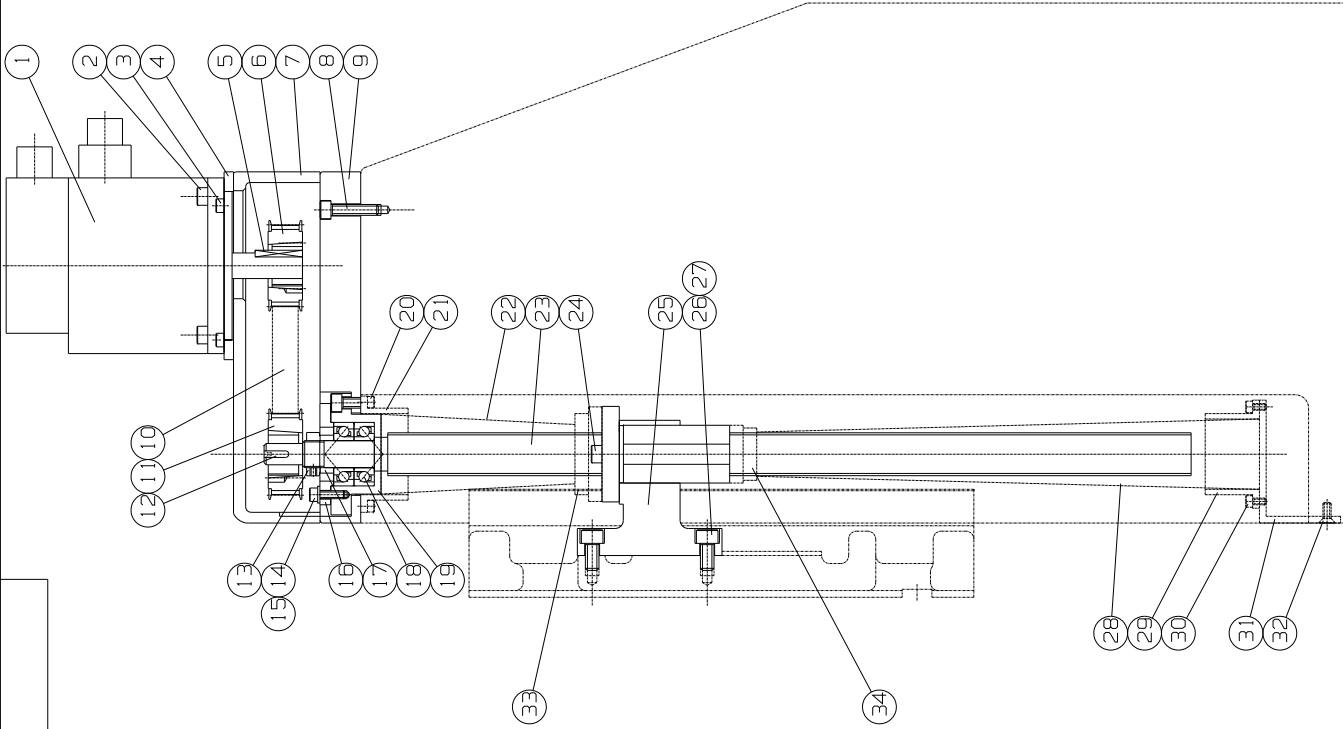
#15 & #9 MP-718
#13 MPL-918

35	Screw	5005-B06100012	2	M6XP1.0X12L	16	Screw	5001-A05080012			2	M5XP0.8X12L	
34	Belt	2323-51020-400	1	165L075	15	Ruber Stop	2323-51015-400		PDM	1		
33	Key	5121-A05005035	1	5X5X35L	14	Screw	5001-A08125025			4	M8XP1.25X25L	
32	Taper Pin	-	2	#5	13	Taper Pin	-			2	#6	
31	Motor Bracket Housing	2323-51010-300	FC25	1	12	Screw	5001-A06100025			4	M6XP1.0X25L	
30	Pulley-Motor	2323-51006-400	PY-126	1	20L075	11	Carrier	2323-51009-401	FC25	1		
29	Adjusting Plate	2323-51017-400	S45C	1		10	Ball Screw	2323-51100-400	MPB-02	1	Ø31.75XP10	
28	Screw	5001-A06100020		1	M6XP1.0X20L	9	Rubber Stop	2323-51015-400	PDM	1		
27	Screw	5001-A06100020		2	M6XP1.0X20L	8	Screw	5001-A05080012		2	M5XP0.8X12L	
26	Motor Plate	2323-51011-401	S45C	1		7	Taper Pin	-		2	#5	
25	Servo Motor	-		1	YASKAWA 05A	6	Screw	5001-A08125030		2	M8XP1.25X30L	
24	Motor Cover	2323-51018-301	SPCC	1		5	Bracket	2323-51016-300	FC20	1		
23	Key	-		1	3/16X3/16X18	4	Ball Bearing	-	BG-02	1	6204	
22	Pulley-Ball Screw	2323-51007-400	PY-126	1	20L075	3	Cover-Left End	2323-51012-400	S45C	1		
21	Nut	-		1	YSR M20X1.0	2	Screw	5001-A05080015		4	M5XP0.8X15L	
20	Screw	5001-A06100020		4	M6XP1.0X20L	1	C-Snap	5141-A00000020		1	#20	
19	Bearing Cup	2323-51013-400	S45C	1		No.	Description	Parts No.	Material	Qty	Spec	
18	Spacer	2323-51014-400	S45C	1		App'd	Check	Design	Drawn	Mode	MB-11/12	
17	Ball Bearing	-	BG-102	2	20TAC47B	Leon	Scale	1:2.5	Title	X-Axis Assembly		
No.	Description	Parts No.	Material	Qty	Spec				Unit	MM	Dwg No	2101-51-A



#25 and #20 MP-718

[illegible]



#23 Cut MPB-02 to 26.58" length before shipping replacement ballscrew.

March 6, 2001 - Changed motor and ballscrew pulleys to 18:24 tooth, belt remains 18L075
All machines to date have been shipped this way.

#15 SP-66

35	Tube	-		S45C	1	
34	Tube	-		S45C	1	
33	Screw	5007-A06100012		M6XPI.0X12L	4	
32	Bracket	F-030		SS41	1	
30	Tube	F-029		S45C	1	
29	Spring Hood-Lower	F-028			1	
27	Taper Pin	-		#6	2	
26	Screw	5001-A10150025		M10XPI.5X25L	4	
25	Yoke	2323-53002-401		FC25	1	
24	Screw	5001-A08125025		M8XPI.25X25L	2	
23	Ball Screw	2323-53100-400	See Note #23	MPB-02	1	
22	Spring Hood-Upper	F-027			1	
21	Tube	F-026		S45C	1	
20	Screw	-				
19	Bearing Seat	F-025		S45C	1	
18	Ball Bearing	-		BG-102	2	20TAC47B
17	Spacer	2323-51014-400		S45C	1	
16	Bearing Cup	2323-51013-400		S45C	1	
15	Washer	5071-A00000006		#6	4	
14	Screw	5001-A06100020		M6XPI.0X20L	4	
13	Nut	-		YSR M20XPI.0	1	
12	Key	-		3/16X3/16X18	1	
11	Pulley-Ball Screw	2323-51007-400		PY-148	1	24L075
10	Belt	2323-53020-400		BT-09	1	18L075
9	Bracket	F-024		FC25	1	
8	Screw	5001-A08125035		M8XPI.25X35L	6	
7	Motor Bracket Housing	F-023		FC25	1	
6	Pulley-Motor	2323-51006-400		PY-61	1	18L075
5	Key	5121-A05005035		5X5X35L	1	
4	Motor Plate	F-022		S45C	1	
3	Screw	5001-A06100015		M6XPI.0X15L	6	
2	Screw	5001-B08125025		M8XPI.25X25L	4	
1	Servo Motor	-		MO-126	1	YASKAWA 09A
No.	Description	App'd	Check	Design	Drawn	Parts No.
						Material
						Spec
						Mode
						MB-11/12
						Title
						Z-Axis Assembly
						Dwg No
						2101-53-A

Lubricating VK Machines:

Z AXIS RAILS:

Using Mobilux EP lubricant (see spec. sheet), grease the Z-axis rails monthly. Grease fitting can be located on the top and bottom of the rails on both sides.

Head:

Using Mobilux EP lubricant (see spec. sheet) grease the head monthly. There is a grease fitting on the right side of the head near the High/Low gear and on the left side of the head near the quill feed selector. The *oil cups* can be filled periodically. One oil cup can be found on the front of the head, the other cup is near the High/Low gear.

AUTO LUBRICATOR:

The auto oiler should be checked weekly. Make sure the oiler is filled and is working properly.

DISCHARGE VOLUME PER CYCLE:

Adjustable from 2.5 CC minimum to 5.0 CC maximum. To reduce oil delivery remove the lock screw, measure A (Fig. 1), turn Adjusting screw clockwise increasing dimension A in the increment (corresponding to the desired discharge) as shown. (Table 1)

IN.	DISCHARGE	NOTES:
.400	2.5 c.c.	
.320	3.0 c.c.	
.240	3.5 c.c.	
.160	4.0 c.c.	
.080	4.5 c.c.	
0.00	5.0 c.c.	Break In Value

(Table 1)

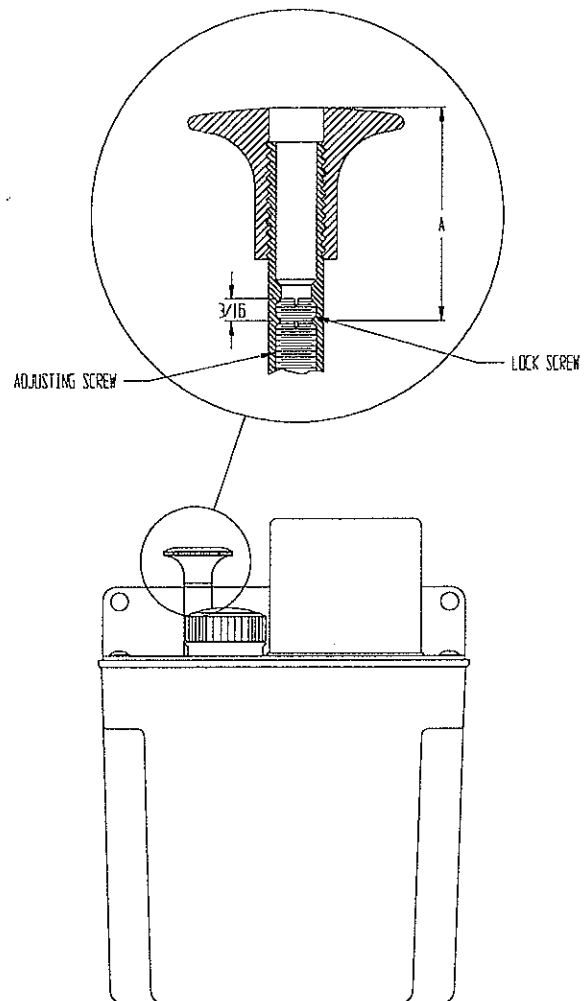
DISCHARGE PRESSURE: 60 psi Maximum.

Peak system Pressure will decrease when:

- (a) Discharge volume decreases.
- (b) Number of Meter-Units in system increases.
- (c) Oil viscosity decreases.

OIL VISCOSITY RANGE: See specification sheet

RECOMMENDED OIL: Mobil Vactra Oil No. 2



(Fig. 1)

Procedure to adjust CESD (MA-219) Lubrication Unit

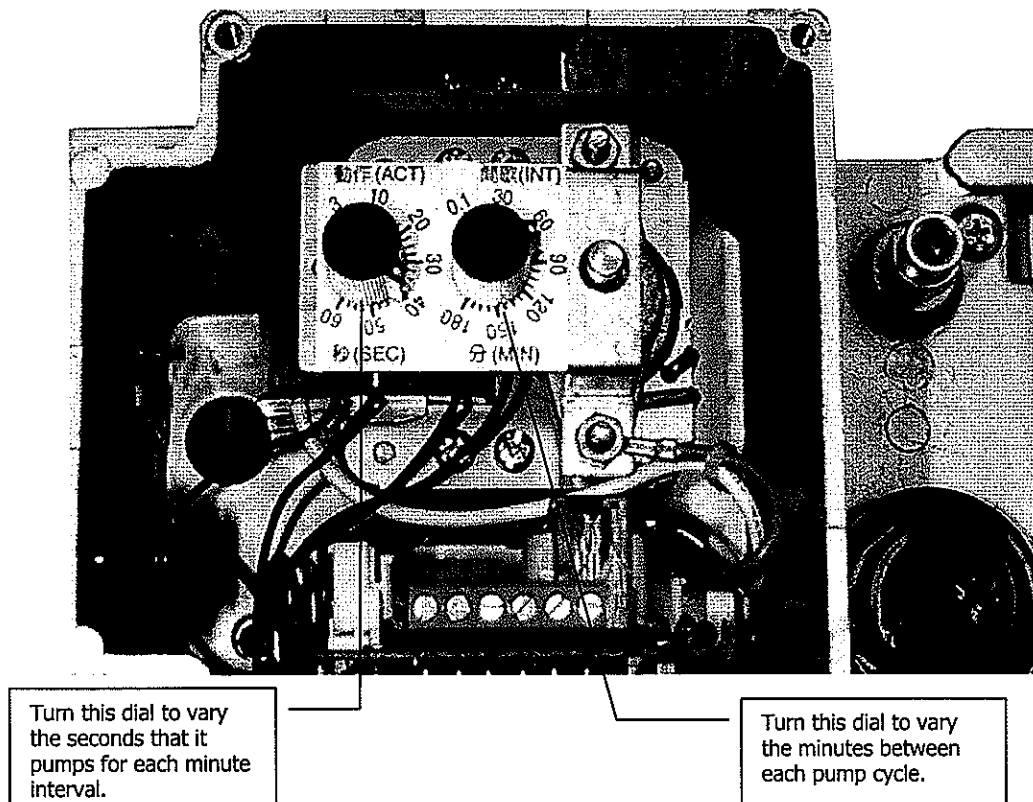
As long as the machine is reset the oiler will be pumping. In the event that the tank falls below the **MIN** line on the tank an audible alarm will sound. The machine will not let a program start with a low lube alarm (**451 Low Lube Fault**)

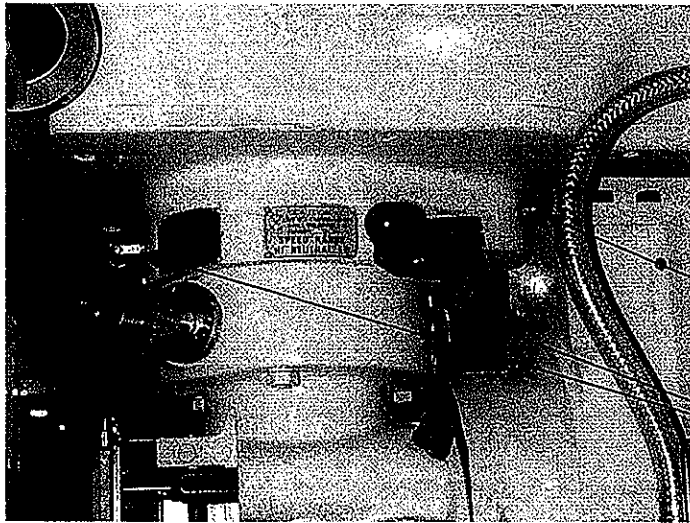
The **MA-219** has the ability to set the time between each pump cycle. It will pump the same amount of way lube (**.13 Liters/Min**) each pump cycle. We are not varying the amount of oil but the interval between each pump cycle. A new machine shipped from Milltronics will have the oiler pumping Aprox. 5 seconds every 25 to 30 minutes.

Adjusting the Seconds knob (left) will change the length of time in seconds the pump cycle for (.13 Liters/Min). Adjusting the Minute knob (right) will change the time between each pump interval. It will always pump the same amount

To adjust the intervals between each cycle of the pump:

1. Remove the 4 screws holding the top cover.
2. Adjust the two knobs shown below.
3. The dials are very sensitive. Turn them very slowly.

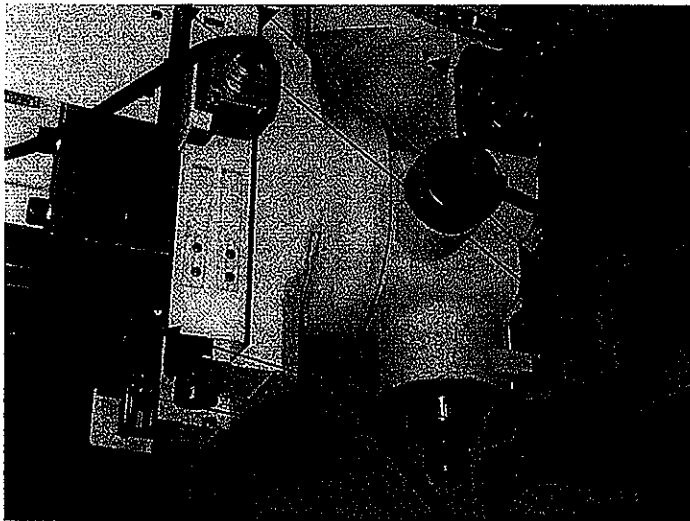




Grease Fitting for Head (Multipurpose EP)
Frequency- once a month

Oil Cups (A few drops weekly)

Right Side



Grease Fitting for Head (Multipurpose EP)
Frequency- once a month

Z-Axis Rails (Multipurpose EP)
Frequency- once a month

Left Side

<i>MOBILITH AW SERIES, MULTIPURPOSE EP GREASE</i>	
PRODUCT NUMBER	64352-8
NLGI GRADE	1
COLOR	GREEN
STRUCTURE	SMOOTH/TACKY
SOAP TYPE	LITHIUM COMPLEX
MINERAL OIL VISCOSITY	
cST AT 40°C	150
cST AT 100°C	13
SUS AT 100°F	750
SUS AT 210°F	70
ISO VISCOSITY GRADE	150
PENETRATION AT 23°C (77°F), WORKED	325
DROPPING POINT, ASTM D 2265, F°	475
TIMKEN OK LOAD, ASTM D 2509, lb	40
FOUR-BALL EP TEST, ASTM D 2596,	
WELD LOAD, kg	250
LOAD WEAR INDEX	40
FOUR-BALL WEAR TEST, ASTM D 2266,	
SCAR DIAMETER, mm, MAX	0.5
CORROSION PREVENTION, ASTM D 1743	PASS
WHEEL BEARING TEST, ASTM D 4290	
MODIFIED, LEAKAGE, GRAM	5

<i>MOBIL VACTRA OIL No. 2</i>	
PRODUCT NUMBER	60049-4
SPECIFIC GRAVITY, 60/60F	0.88
POUR POINT, °C (°F), max.	-9 (16)
FLASH POINT, °C(°F), min.	244 (472)
VISCOSITY	
cST AT 40°C	68
cST AT 100°C	8.6
SUS AT 100°F	356
SUS AT 210°F	55
VISCOSITY INDEX	97
ISO VG	68
COLOR, ASTM D 1500	4
FZG, PASS STAGES	11
4 BALL WELD, kg, ASTM D 2783	160
4 BALL WEAR, mm, ASTM D 4172	0.22
COPPER CORROSION, ASTM D 130	1B
RUST, D665A	PASS
VICKERS V-104C, mg D 2882 (MOD)	-
CMCO, P-SPEC, APPROVAL	P-47
BIJUR PT 37-1 APPROVAL	PASS
OKUMA APPROVAL	PASS

Checking and Adjusting Backlash

Use a good solid magnetic base and a .0005 Inch indicator. Install the magnetic base on the machine table in close proximity to the spindle. Clean the area that the indicator will be in contact with.

Go into PARAMETERS/AXIS arrow down to BACKLASH press F1 EDIT and set X, Y and Z to zero. *(Before setting them to zero note original settings)*

Find the high spot on the spindle by moving the indicator back and forth and set indicator to zero. *(See point A on Fig. 4)*

The next step is easiest if done in jog mode. *(Select distance and 1 inch increments)*
You may have to press the jog key several times for the desired direction to clear the spindle.

Press the jog key for the desired direction for A to move towards D *(see Fig. 4)* and then back to A, the indicator may have moved, adjust it back to zero and repeat this step until it stays at zero.

Jog the desired axis or tool *(see Fig. 4)* from point A to B to C back to B then back to the start point A. The reading on the indicator is backlash and should be put into the backlash parameter under PARAMS-SETUP-AXIS.

After putting the backlash into the table, repeat the procedure to ensure the numbers took affect. If the indicated error seems to increase this is addlash, and you may have to subtract the indicated number from the backlash chart.

The X axis procedure is shown, repeat procedure for Y and Z.
Remember to save these new changes to your parameter disk.

(The diagram below is an example of checking your backlash in the X-axis.)

