OPERATOR'S MANUAL

SUPER MAJOR

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WARNING:FAILURE TO FOLLOW THESE RULES MAY RESULT IN SERIOUS PERSONAL INJURY

As with all machinery there are certain hazards involved with operation and use of the machine. Using the machine with respect and caution will considerably lessen the possibility of personal injury. However, if normal safety precautions are overlooked or ignored, personal injury to the operator may result.

This machine was designed for certain applications only. We strongly recommends that this machine. NOT be modified and/or used for any application other than for which it was designed. If you have any questions relative to its application DO NOT use the machine until you have had detail instruction from your dealer.

SAFETY RULES FOR ALL TOOLS

1.FOR YOUR OWN SAFETY ,READ THIS INSTRUCTION MANUAL BEFORE OPERATING THE TOOL. Learn the tool's application and limitations as well as the specific hazards peculiar to it.

2.KEEP GUARDS IN PLACE and in working order .

3.GROUND ALL TOOLS .If tool is equipped with three-prong plug, it should be plugged into a three-hole electrical receptacle. If an adapter is used to accommodate a two-prong plug receptacle, the adapter lug must be attached to a know ground. Never remove the third prong.

4.REMOVE ADJUSTING AND WRENCHES.

Form habit of checking to see that keys and adjusting wrenches are removed from tool before turning it"on."

5.KEEP WORK AREA CLEAN. Cluttered areas and benches invite accidents.

6.DON'T USE IN DANGEROUS ENVIRONMENT .Don't use power tools in damp or wet locations, or expose them to rain. Keep work area well- lighted.

7.KEEP CHILDRE AND VISITORS AWAY. All children and visitors should be keep a safe distance from work area.

8.MAKE WORKSHOP CHILDROOF -with padlocks, master switches, or by removing starter keys.

9.Don't force tool. It will do the job better and be safer at the rate for which it was designed.

10.USE RIGHT TOOL .Don't force tool or attachment to do a job for which it was not designed.

11.WEAR PROPER APPAREL. No loose clothing,gloves,neckties,rings, bracelets,or other jewelry to get caught in moving parts. Nonslip foot wear is recommended. Wear protective hair covering to contain long hair.

12.ALWAYS WEAR EYE PROTECTION. Refer to ANSIZ87.1 Standard for appropriate recommendations. Also use face or dust mask if cutting operation is dusty.
13.SECURE WORK. Use clamps or a vise to hold work when practical.
It's safer than using your hand and frees both hands to operate tool.
14.DON'T OVERREACH. Keep proper footing and balance at all times.
15.MAINTAIN TOOLS IN TOP CONDITION.
Keep tools sharp and clean for best and safest performance. Follow instructions for lubricating and changing accessories.
16.DISCONNECT TOOLS before servicing and when changing accessories such as blades,bits,cutters,ect.
17.USE RECOMMENDED ACCESSORIES.
Consult the owner's manual for recommended accessories .The use of improper accessories may cause hazards.
18.AVOID ACCIDENTAL STARTING. Make sure switch is in "OFF" position before plugging in power cord.
19.NEVER STAND ON TOOL. Serious injury could occur if the tool is tipped or if the cutting tool is accidentally contacted
20.CHECK DAMAGED PARTS. Before further use of the tool, a guard or other part that is damaged should be carefully checked to ensure that it will operate properly and perform its intended function check for alignment of moving parts binding of moving parts, breakage of parts mounting, and any other conditions that may affect its operation. A guard or other part that is damaged should be properly repaired or replaced.
21.DIRECTION OF FEED. Feed work into a blade or cutter against the direction of rotation of the blade or cutter only.
22.NEVER LEAVE TOOL RUNNING UNATTENDED.TURN POWER OFF.
Don't leave tool until it comes to a complete stop.
23.DRUGS,ALCOHOL ,MEDICATION. Do not operate tool while under the influence of drug, alcohol or any medication.
24.MAKE SURE TOOL IS DISCONNECTED FROM POWER SUPPLY while motor is being mounted, connected or reconnected.

ADDITIONAL SAFETY RULES FOR MILL DRILL

1. BE SURE drill bit or cutting tool is securely locked in the chuck.
2. BE SURE chuck key is removed from the chuck before turning on power.
3. Adjust the table or depth stop to avoid drilling into the table.
4. SHUT OFF the power ,remove the drill bit or cutting tool, and clean the table before leaving the machine.
5. CAUTION. When practical , use clamps or a vise to secure workpiece to keep the workpiece from rotating while the drill bit or cutting tool.
6. WARNING: FOR Your Own Safety Don't wear gloves when operating a mill/drill.

SPECIFICATIONS:

Drilling	40mm
Face Milling	80mm
End Milling	32mm
Table Size	240x800mm
T-Slot Size	16mm
Quill Diameter	75mm
Spindle Taper	R8
Max Distance Spindle to Table	460mm
Spindle Stroke	125mm
Longitudinal Travel	560mm
Cross Travel	230mm
Spindle Speeds (RPM)	75 ~ 1600rpm
Horsepower	1.1 KW
Phase / Voltage	1Ph / 240V

WARNING:CHANGE SPEED ONLY WHEN MACHINE IS STOPPED

3. When the auto feed and the clamping bracket are secured together, set the assembly on the end of the table, so the gears mesh. The clamping bracket will fit over the top of the table, allowing the bolts on the inboard side of the bracket to be tightened against the table's cast iron surface. Mark the point on the table's trough where the mounting bolts contact the table and spot drill to give the mounting bolts a surface to "bite" without slipping on the rough cast surface.

NOTE: Use care when aligning the leadscrew gears with the gearing on the power feeder. The fit is correct when you can just slightly wiggle one gear without moving the other. If there is too much space between the gears, teeth can be stripped under heavy loads. If the teeth mesh too tightly, the supporting bearings in the power feeder will wear out prematurely.

An alternative method for attaching the power feed is to eliminate the clamping bracket and mount the power feed directly to the table. As with the other method, you want to be certain that the gears are properly aligned. Once aligned, mark, drill and tap holes in the end of the table casting. Bolt the power feed to the casting.

In many ways, this method of attachment is much better than the other method. The removal of the clamping bracket provides more secure mounting and provides a greater area of flat table space.

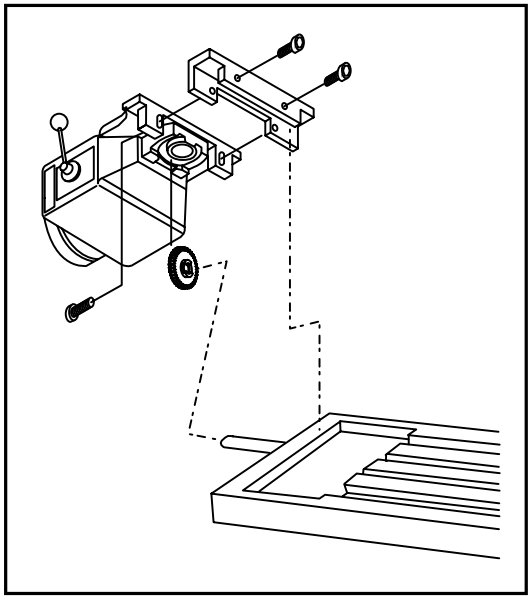

Figure 2

4. Replace the center travel stop at the front of the table with the microswitch. The switch, when used with the adjustable stops, automatically limits table movement.

Caution: Before operating the Machine, make sure the placement of the auto feed's power cord and the control cord for the microswitch are both clear of any movements which could pinch or crush either cord. Before operating the power feed, mark the maximum distance the table can move before the power feed comes in contact with the machine's base. Use that as a reference mark each time you re-adjust your table stops to avoid possible damage to the power feed.

ASSEMBLY

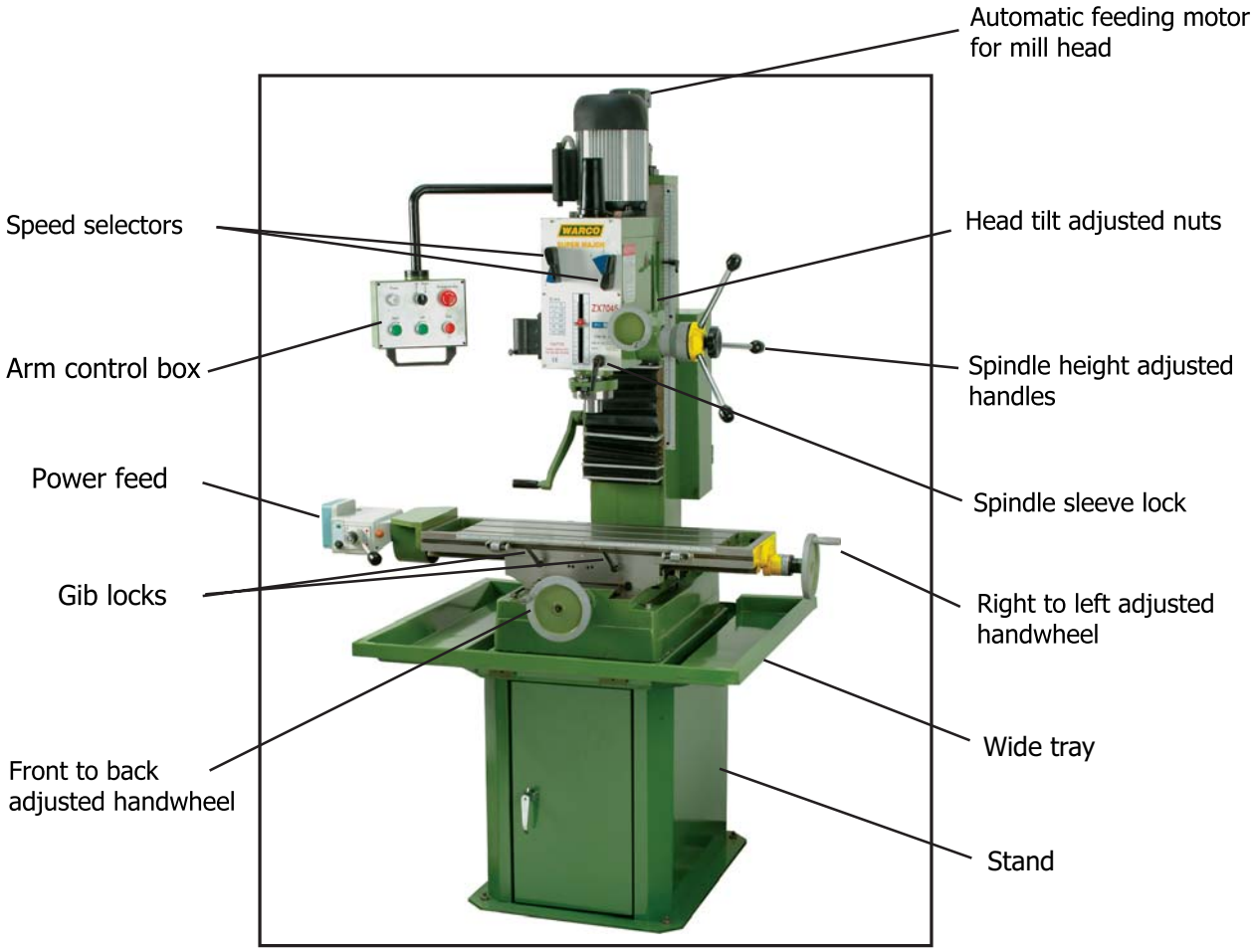

Figure 2

The HBM 45-A is largely pre-assembled at the factory, so very little actual assembly is required. The motor is already mounted and all wiring is in place. The remaining parts which require assembly are:

A. Power Feed
B. Handwheels
C. Cutter / Arbor Installation

The necessary assembly can be accomplished with a few hand tools. You'll need a 12mm wrench, a 14mm wrench, metric Allen wrenches and a Phillips head screwdriver. An adjustable wrench and a metric socket set are helpful, but not essential, for assembly.

A. POWER feed

The Machine features a 400V auto-feed mechanism, allowing hands-free right-to-left passes while milling. The variable-speed feed control ensures greater consistency when milling large, flat surfaces. To install the auto-feed mechanism:

1. Attach the drive gear to the end of the table screw, using the attached setscrew. The gear couplers will lock in place with the matching coupler on the end of the table screw.

2. Attach the clamping bracket provided with the auto-feed mechanism, as shown in Figure 3.

B. HANDWHEELS

When the auto-feed mechanism is in place, attach the handwheel to the other end of the leadscrew. The handwheel coupling will lock, like the auto-feed mechanism, with the coupling on the leadscrew. Tighten the setscrew once the handwheel is in place.

Attach the other handwheel to the leadscrew at the front of the base casting. When the handwheel locks in place, tighten the setscrew.

C. CUTTER / ARBOR INSTALLATION

The Machine features an ISO30 spindle which accepts all industrial collets and arbors. To install a collet or arbor:

1. Remove the spindle cap from the top of the mill head.

2. Insert the collet or cutting tool's arbor in the spindle housing, making sure to line up the keyway with the matching pin in the spindle opening.

3. Turn the hex head at the top of the drawbar clockwise until the threads at the bottom of the drawbar mesh with the female threads in the top of the collet or arbor. See Figure 3.

4. If you're using a collet with a bit or cutting tool, place the bit in the hole at the bottom of the collet and continue to tighten the drawbar until both the collet and bit are tightly in place.

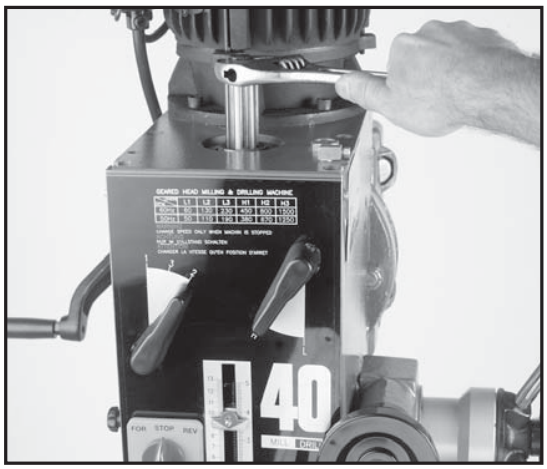

Figure 3

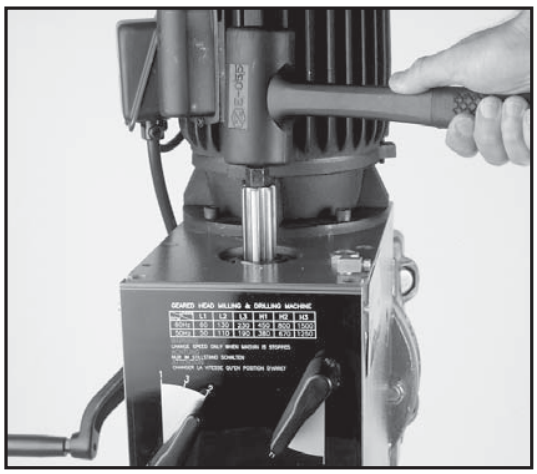

Figure 4

To remove a collet or arbor:

1. Loosen the drawbar (2 or 3 turns).

2. Tap on the top of the drawbar with a mallet. See Figure 4.

3. Once the collet or arbor is loosened from the taper, continue to turn the drawbar counterclockwise until the drawbar and the female threads of the arbor or collet are unattached. Hold the collet or arbor as you loosen the drawbar. Once loose, remove and replace with your desired cutter. **Remove cutting tools from arbor when not in use.**

OPERATION

The bench-mounted Machine Gear-Head Mill / Drill is a fundamental metalworking machine capable of most standard milling and drilling operations. In order to effectively use the machine, it's necessary to understand the various adjustments the Machine features. This section deals with the specific adjustments required to operate the Machine.

A. TABLE

The Machine's table rides on precision dovetail ways. Adjustment from side to side is accomplished by turning the handwheel at the end of the table, or by using the power feed. Movement from front to back is controlled by the handwheel at the front of the machine's base. The mill / drill's tables can be locked to eliminate unwanted movement in either direction by using the locking levers located just below the table. The side-to-side locks are located on either side of the power feed microswitch. The locks restricting movement from front to back are located on the drill / mill's base, just below the table. See Figure 5.

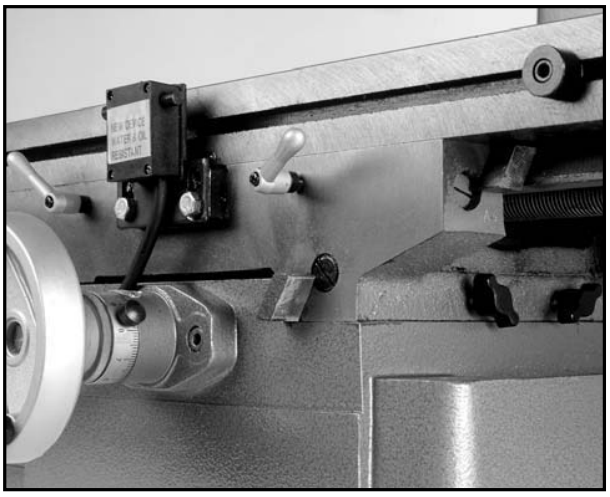

Figure 5

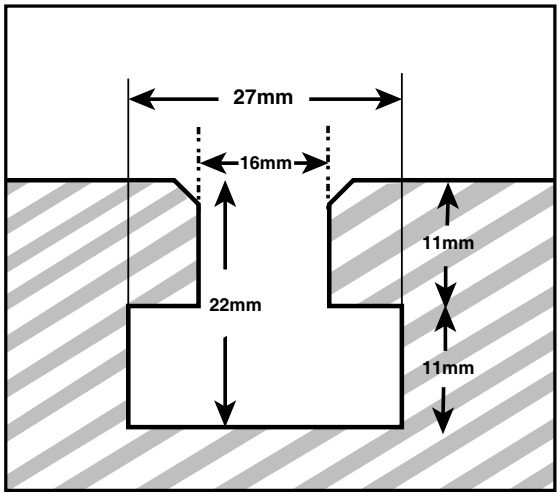

Figure 6

The table on your Machine Gear-Head Mill / Drill is equipped with 16mm T-slots, which allow you to mount fixtures, such as vises, rotary tables and dividing heads to your machine. The T-slots are designed to accept 12mm T-bolts to anchor the optional equipment mentioned above. Keep in mind that T-bolts are measured at the thread, not at the head, so you'll want to use care when sizing T-bolts for use with the Machine. See Figure 6 for specific measurements.

B. POWER FEED

The power feed supplied with your Machine features a variable speed control, which allows you to adjust feed speed to fit specific materials you choose to mill. The power feed is activated by a switch mounted on the outboard end of the power feed gearbox.

A microswitch mounted on the front of the table casting allows you to limit table travel and also functions as an "auto pilot" for hands-free multiple passes.

Establishing proper speeds for you power feed is just part of a complex equation that encompasses a number of variables, including; spindle speed, metal hardness, feed rate, cutting depth and cutter type. Because of the complexity of the equations necessary to determine optimum spindle speeds and feed rates, we suggest you obtain one of many good machinist's guides on the market. Community colleges and vocational schools are often good places to obtain informative textbooks which go into the necessary mathematics of machining in detail.

A number of fine consumer publications dealing specifically with metalworking and machining are also readily available. Check your local library or newsstand for availability in your area.

C. COLUMN HEIGHT

The Machine is capable of reaching a maximum spindle-to-table distance of 460mm, making it an ideal choice for a wide variety of milling operations. Column height is adjusted by a large crank handle on your left side, when facing the front of the machine. To make height adjustments:

1. Loosen the two clamping nuts at the back of the mill head body with the lug wrench provided. See Figure 8.

2. Turn the cranking handle clockwise to raise the mill head or counterclockwise to lower it, until you reach the proper height for your project.

3. Re-tighten the clamping nuts.

4. Ensure that the lug wrench is removed from the machine before proceeding with milling operations.

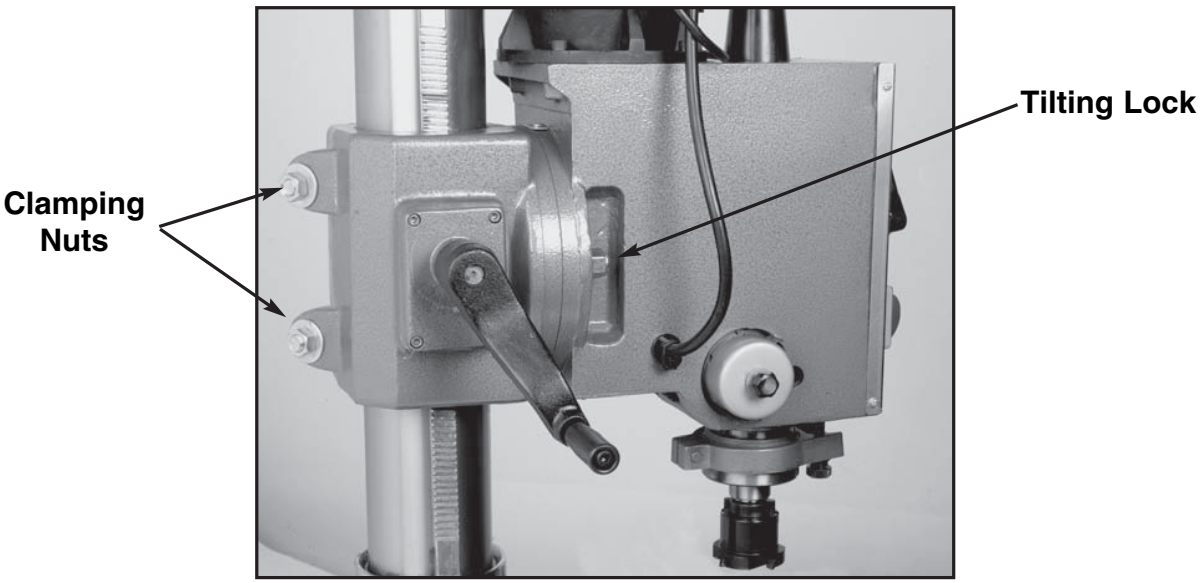

Figure 7

REMEMBER: The mill head can be top-heavy in its fully-raised position. Be sure to mount the Machine securely to your bench. Always make sure the clamping nuts are tightly secured before operating this machine.

D. SPINDLE SPEED

The Machine features an internally-geared head which offers six speeds, both in forward and reverse. Speed selection levers are located on the front of the mill head. See the chart below for specific spindle speeds in each gear range.

Gear Ranges – Machine						
Levers	L1	L2	L3	H1	H2	H3
	75	180	280	600	1000	1600

Fig. 8

Establishing proper spindle speed is just part of the same complex equation that determines power feed rates. Like we noted before, the equation encompasses a number of variables, including; spindle speed, metal hardness, feed rate, cutting depth and cutter type. Because of the complexity of the equations necessary to determine optimum spindle speeds and feed rates, we suggest once again you obtain one of many good machinist's guides on the market. Community colleges and vocational schools are often good places to obtain informative textbooks which go into the necessary mathematics of machining in detail.

REMEMBER: Do not attempt to change gear speeds while the machine is running. Allow all moving parts to come to a full stop before making any adjustments.

CAUTION: Even at low spindle speeds, metal fragments from the cutting process can be expelled by the mill / drill. Always wear ANSI-approved eyewear and protective clothing when operating the machine. Be sure that all observers are safely away from the machine while it is being operated.

E. ON/OFF and FORWARD/REVERSE ELECTRICAL CONTROLS

Always make sure the cutter is rotating in the direction required by your cutting tool. While most bits and cutters are designed to operate in a clockwise rotation, some are designed to work counterclockwise. Make sure the spindle direction is correct for your application.

CAUTION: Do not reverse the spindle direction while the machine is running. Allow the machine to come to a full stop before changing directions.

F. SPINDLE HEIGHT

The Machine uses rack-and-pinion gearing to control spindle height adjustment. The operator has two options for adjustment – a 3-handled downfeed control and a handwheel-operated micro adjustment control. See Figure 9.

To operate the micro-adjustment handwheel, tighten the locking knob on the 3-handled downfeed control. Once locked, the adjustment of spindle height will be transferred to the handwheel.

The calibration dial can be adjusted for individual applications by loosening the setscrew on the knurled surface and turning the indicator to “zero out” the dial. Once in place, tighten the setscrew.

A certain amount of backlash or play is typical in pinion gearing so keep in mind, while setting the measurement dial, to make your adjustments while there is downward pressure against the micro adjustment handwheel.

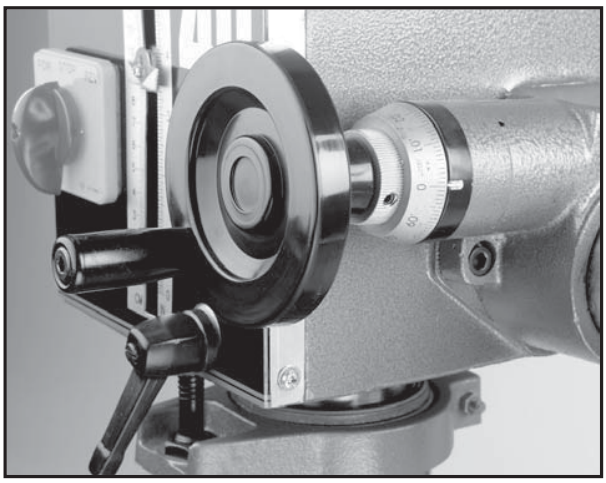

Figure 9

G. DOWNFEED LIMITER

The downward movement of the spindle assembly can be limited by using the adjusting knob mounted on the forward portion of the feed base, just below the depth stop gauge on the front of the mill head. See Figure 10. Limiter distance can be set by using the indicator on the front of the milling head.

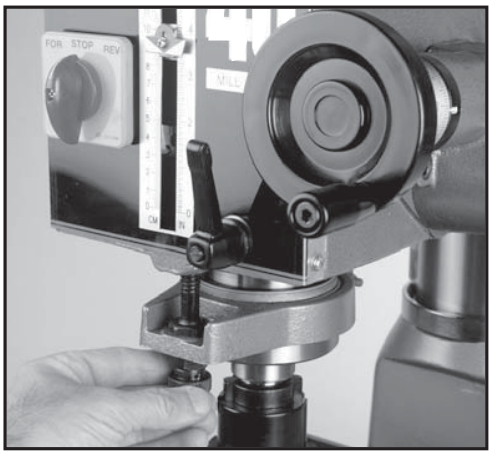

Figure 10

H. HEAD ROTATION

The milling head on the Machine is designed to swing up to 90° either left or right at the mill head, enabling it to perform tasks such as angled drilling or horizontal slotting. To rotate the head:

1. Loosen the lock nuts on either side of the milling head. See Figure 11.

NOTE: Make sure to provide support for the milling head so it doesn't unexpectedly rotate on its own. Always maintain control of the milling head.

2. Rotate the milling head to its desired position, using the reference guides provided on the right side of the machine.

3. Once in place, re-tighten the locking nuts.

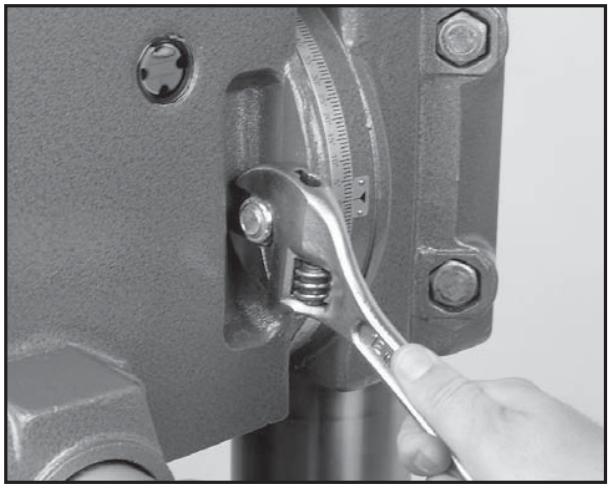

Figure 11

Keep in mind that the head must be dialed in when it's returned to the "zero" position if high levels of accuracy are required. If you are able to use an angled vise to accomplish your milling operation without tilting the milling head, you will save yourself a good amount of set-up time.

I. GIB AND LEADSCREW

After sustained use, the table on your Machine may develop excessive play in the gibs and/or in the leadscrews. Keep in mind that some play is normal, particularly in the leadscrews. But, should you find the need to make adjustments, use the following guidelines:

The gibs are easily tightened by turning the large slotted screwheads in the front and right side of the table base until you feel a slight drag when you turn the handwheels. The screw at the front of the machine affects movement from front to back, while the screw under the right side of the table affects longitudinal movement. You can loosen the screws if your table seems excessively stiff.

The leadscrew adjusters require a bit more effort. To adjust leadscrew tightness from front to back, it's necessary to provide access to the underside of the base. A hole in the bench under the Model G1126's base will make adjustment fairly simple. The adjuster can be found midway along the lead-screw, inside the base. To eliminate excess leadscrew movement tighten the Allen head setscrew

on the adjuster midway along the leadscrew. The longitudinal leadscrew adjuster can be tightened with a long Allen wrench reached under the table. Once again, the setscrew in the tension adjuster is located just above the longitudinal leadscrew. These adjusters may require you to fabricate extensions for your hex wrenches. Make adjustments in small increments. Over-adjustment can add unnecessary wear to both the leadscrews and the adjusters.

EQUIPMENT MAINTENANCE

Your Model DM45 Gear Head Mill / Drill requires very little maintenance. A thorough cleaning, now and again, will increase the machine's durability and efficiency, by removing dust and grime that can gum up moving parts. Sharp cutters are essential for top performance. If you find that the machine cuts less efficiently than usual, inspect the cutters and repair or replace them as necessary. An occasional application of a protective spray coating will keep the Model WMD45's table and other bare metal parts from rusting and pitting.

REMEMBER: When performing maintenance or repairs on shop equipment, always disconnect the machine from its power supply.

The Model HBM 45-A features factory-sealed bearings. A sealed bearing requires no lubrication during its lifetime. Should a bearing fail, your mill / drill will probably develop a noticeable rumble, which will increase when the machine is put under load. If allowed to get worse, overheating of the journal containing the bad bearing could occur. If the bad bearing is not replaced, it will eventually seize – possibly doing damage to other parts of the machine. Bearings are standard sizes and can be replaced through Weiss.

Points requiring periodic lubrication are:

1. *The internal spline drive assembly*. Insert top-quality non-hardening grease into the hole at the top of the spindle pulley spline once every six months.

2. The main column. A light film of oil will smooth action and prevent rust and corrosion.

3. The quill. A light coating of oil will ensure smooth movement.

4. The quill return spring. Oil annually with a light lubricant (SAE 20). Apply with a brush or squirt can.

5. The gear box. Replace lubricant annually with non-detergent SAE 30 oil.

6. The quill pinion. Lubricate every 90 days with non-hardening grease.

Note: Use care when performing maintenance. Never attempt maintenance procedures on the machine while it's running.

ADJUSTMENT OF THE MILL HEAD

(a) To raise and lower the head, loosen the leaf screw located on the right side of the raise and lower base. When the desired height is reached tighten leaf screw to avoid vibration.

(b) Unscrew 3 nuts while the workpiece needs to be bevel turn to the degrees you wish on the scale ,then screw the 3. see Fig. 12.

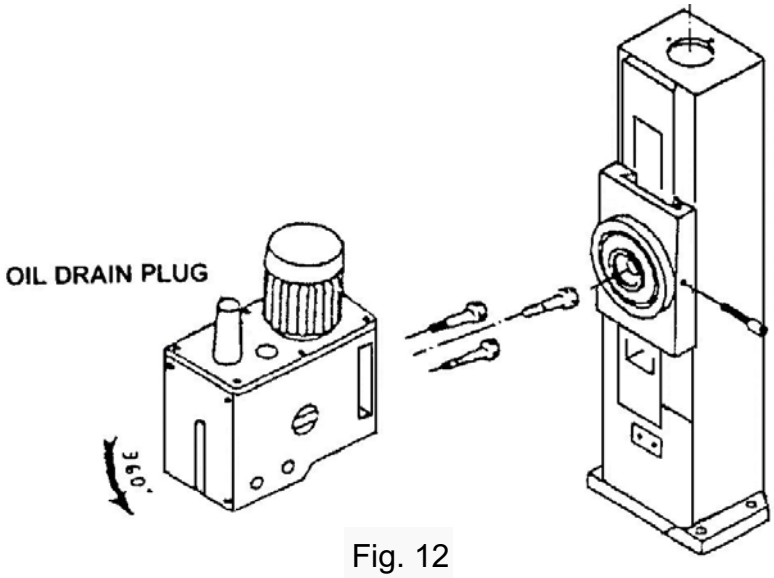

Fig. 12

QUILL RETURN SPRING ADJUSTMENT:

Spring tension for return of spindle, after hole drilling, has been pre-set at the factory .No further adjustment should be attempted unless absolutely necessary. Adjustment will probably be required if a multiple spindle drilling or tapping head is used .If adjustment is necessary ,loosen lock screw while holding quill spring housing .Do not allow the housing to turn in your hand,or spring will unwind. Turn entire housing assembly clockwise the number of turns necessary to cause the quill to return to its up position.(NOTE: The flat of the spring housing pilot is lined up with the spring loading hole on the body

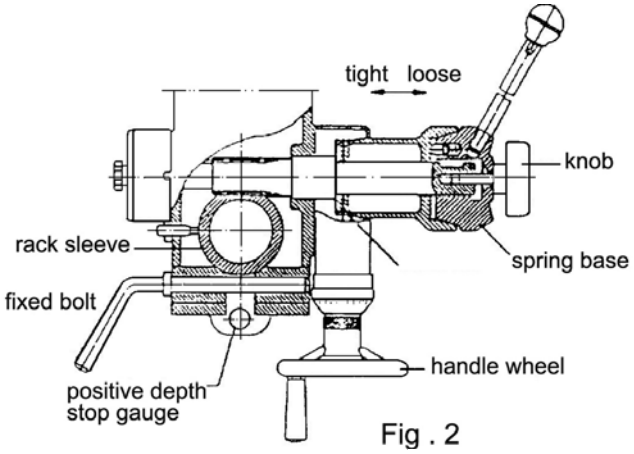

Fig . 2

Fig. 13

of the spring housing.)Reset lockscrew make sure point of screw mates the flat on the housing journal.

(1)Preparing for Drilling(see fig.13)(Except addition power feedsystem).
Turn of the knob make loose the taper body of worm gear and spring base. Then we decide spindle stroke setting the positive depth stop gauge for drilling blind hole or free state for pass hole.

(2)Preparing for Milling (see fig.13)(Except addition power feed system).
(a)Adjust the positive depth stop gauge to highest point position.
(b)Turn tight of the knob be use to taper friction force coupling the worm gear and spring base. Then turning the handle wheel by micro set the spindle of work piece machining height.
(c)Lock the rack sleeve at the desired height with fixed bolt.

ADJUSTING TABLE SLACK AND COMPENSATE FOR WEAR(see fig.14)

(1) Your machine is equipped with jib strip adjustment to compensate for wear and excess slack on cross and longitudinal travel.
(2) Clockwise rotation the job strip bolt with a big screw for excess slack otherwise a little counter clockwise if too tight.
(3) Adjust the jib strip bolt until feel a slight drag when shifting the table.

CLAMPING TABLE BASE AND MACHINE BASE(See Fig.3)

(1) When milling longitudinal feed. It is advisable to lock the cross feed table travel to insure the accuracv of vour work. To do this, tighten the

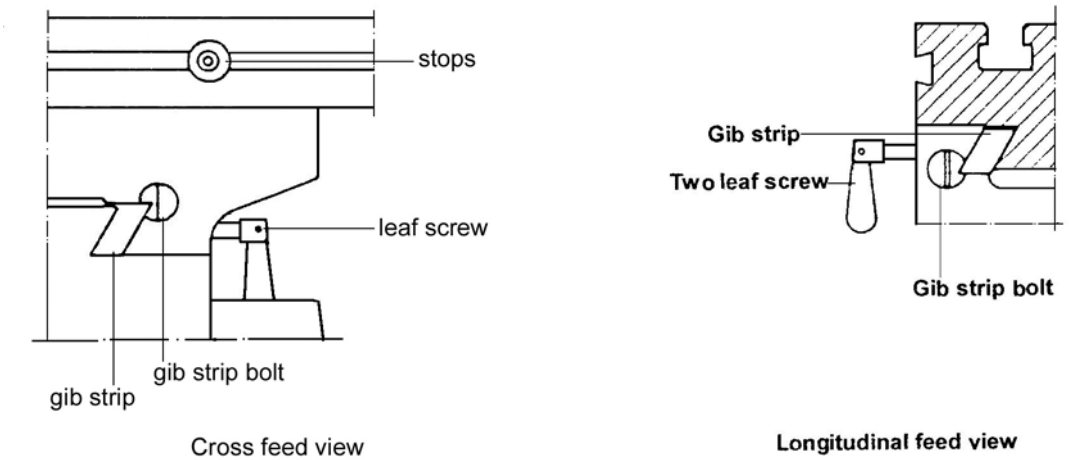

Fig.14

small leaf screw located on the right side of the table base.

(2) To tighten the longitudinal feed travel of the table for cross feed milling, tighten the two small leaf screw on the front of the table base.
(3) Adjustable travel stops are provided on the front of the table for control of cross trable and desired milling length

Maintenance instructions

TROUBLE SHOOTING HINTS

TROUBLE	PROBABLE CAUSE	REMEDY
Excessive Vibration	1.Motor out of balance 2.Bad motor	1.Balance or replace problem motor. 2.Replace motor
Motor stalls	1.Over feeding. 2.Dull drill. 3.Motor not building up to running speed 4.Bad motor	1.Reduce feed rate. 2.Sharpen drill and keep sharp. 3.Replace or repair motor. Check fuses in all three legs on three phase motors and replace if necessary. 4.Replace motor.
Noisy Operation	1.Excessive vibration. 2.Improper quill adjustment. 3.Nosiy spline 4.Noisy motor	1.Check remedy under excessive vibration. 2.Adjust quill. 3.Lubricate spline. 4.Check motor bearings or for loose motor fan.
Drill or Tool heats up or burns work.	1.Excessive speed. 2.Chips not clearing. 3.Dull tool. 4.Feed reate too slow. 5.Rotation of drill incorrect. 6.Failure to use cutting oil or coolant(on steel)	1.Reduce speed. 2.Use pecking operation to clear chips. 3.Sharpen tool or replace. 4.Incresase feed enough to clear chips. 5.Reverse motor rotation. 6.Use cutting oil or coolant on steel
Drill leads off	1.No drill spot. 2.Cutting lips on drill off center. 3.Quill loose in head. 4.Bearing play.	1.Center punch or center drill workpiece. 2.Regrind drill. 3.Tighten quill. 4.Check bearings and reseat or replace if necessary.
Excessive drill runout or wobble	1.Bent drill. 2.Bearing play. 3.Drill not seated properly in chucks.	1.Replace drill. Do not attempt to straighten 2.Replace or reseat bearings. 3.Loosen,reseat and tighten chuck.
Work or fixture comes loose or spins	1.Failure to clamp workpiece or work holding device to table.	1.Clamp workpiece or work holding device to table surface.

SUPER MAJOR

PARTS LIST

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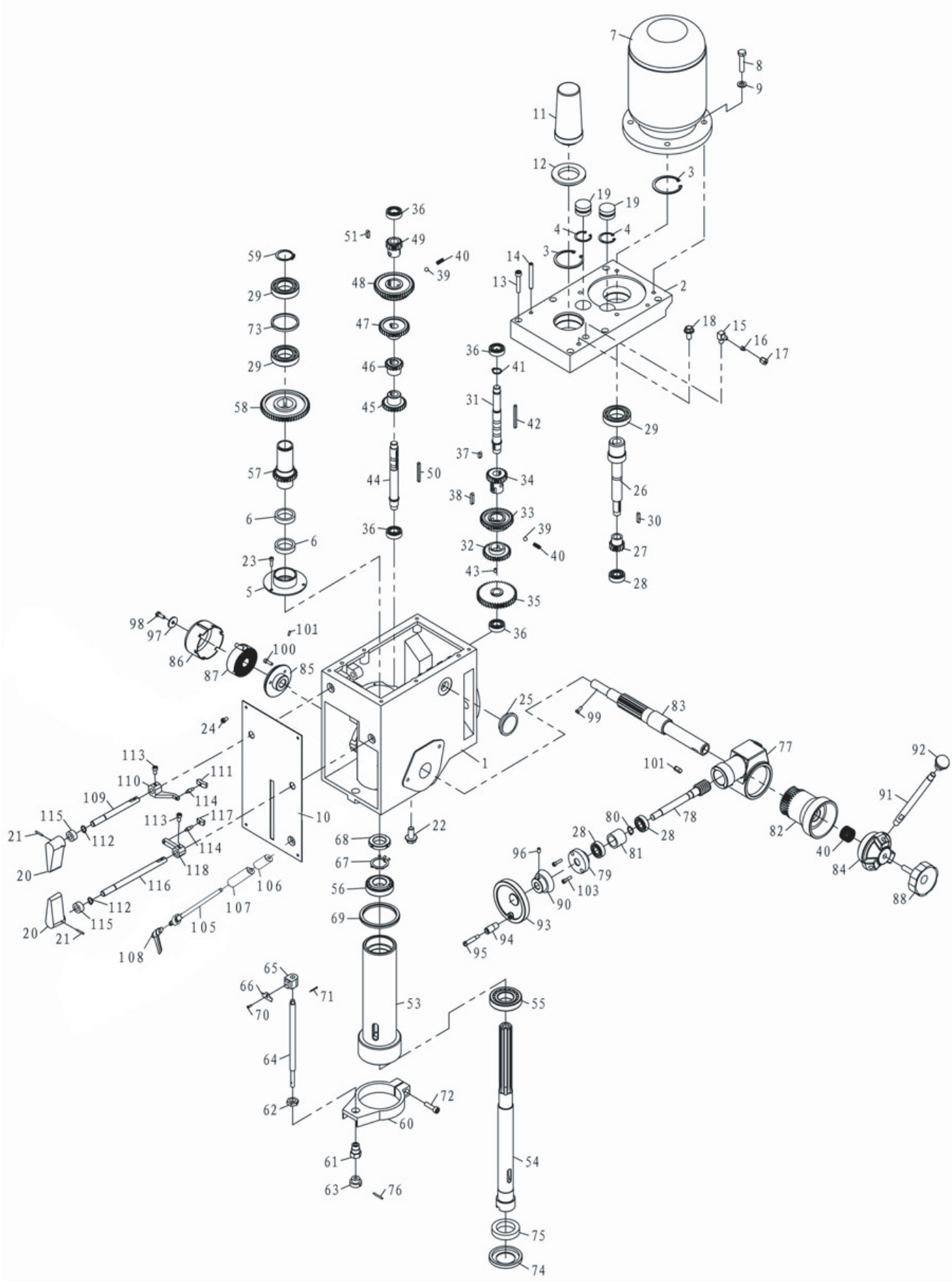
SUPER MAJOR - Mill Head Assebly - I



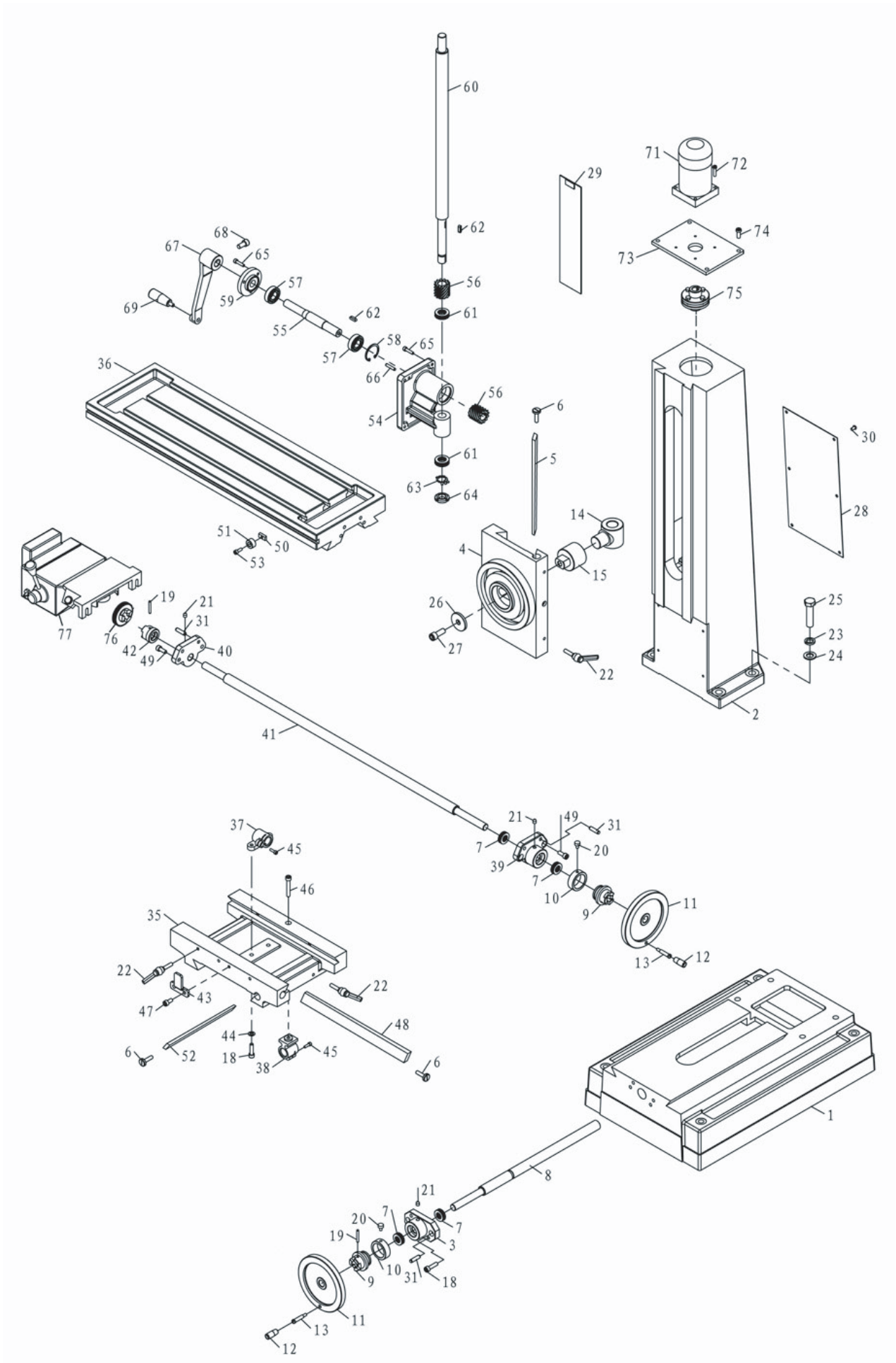
SUPER MAJOR - Mill Head Assebly - II

No.	Qty.	Code	Name	No.	Qty.	Code	Name
1	1	20010B	head body	37	1		key
2	1	20011B	head body cover	38	1		key
3	2		retaining ring	39	2		ball
4	2		retaining ring	40	1		spring
5	1	20018B	airtight base	40/1	1		spring
6	2		airtight ring	41	2		retaining ring
7	1		motor	42	1		key
8	1		screw	43	4		screw
9	1		washer	44	1	20107B	III shaft
10	1	20201	plate	45	1	20109-B	gear
11	1	20304-1B	arbor bolt cover	46	1	20110-2-B	gear
12	1	20304-2B	arbor bolt cover base	47	1	20112-B	gear
13	1		screw	48	1	20113-B	gear
14	1		pin	49	1		gear
15	1	20025B	joint	50	1		key
16	1	20026B	sleeve	52	1		key
17	1	20027B	nut	53	1	20019	spindle sleeve
18	1		bolt	54	1	20104B	spindle
19	2	20020B	cap	55	1		bearing
20	2	20307B	speed lever	56	1		bearing
21	2		pin	57	1	20114-B	splined sleeve
22	1		oil plug	58	1	20116-B	gear
23	1		screw	59	1		retaining ring
24	1		screw	60	1	20012	feed base
25	1		oil pointer	61	1	20128	support base
26	1	20105B	I shaft	62	1	20129	nut
27	1	20105-1-B	gear	63	1	20130	knob
28	3		bearing	64	1	20131	graduated rod
29	3		bearing	65	1	20021	fixed bolt
30	1		key	66	1	20132	scale board
31	1	20106B	II shaft	67	1		lock washer
32	1	20108-B	gear	68	1		lock nut
33	1	20110-1-B	gear	69	1	20308	rubber washer
34	1	20111-B	gear	70	1		screw
35	1	20106-1-B	gear	71	1		split pin
36	4		bearing	72	1		bolt

SUPER MAJOR - Mill Head Assebly - III

No.	Qty.	Code	Name
73	1	20024B	separating ring
74	1	20133B	oil tight cover
75	1	62*42*12	air tight
76	1		pin
77	1	20015	worm wheel box
78	1	20119	worm shaft
79	1	20302	worm cover
80	1		retaining ring
81	1	20120	separating ring
82	1	20016	worm wheel
83	1	20117	pinion shaft
84	1	20013	handle body
85	1	20118	spring base
86	1	20123	spring cap
87	1	20122	spring plate
88	1	20303	big ripple handle
90	1	20017	graduated plate
91	1	20121B	handle rod
92	1	20301B	handle ball
93	1	20306B	handle wheel
94	1	20305-1B	turn handle
95	1	20305-2B	screw
96	1		screw
97	1	20102	washer
98	1		bolt
99	1		screw
100	1		screw
101	2		pin
102	1		key
104	2		screw
105	1	20124B	fixed bolt
106	1	20203B	fixed tight block
107	1	20202B	fixed tight block
108	1		adjust handle
109	1	20125B	lever shaft
110	1	20022-1B	lever
111	1	20204-2B	lever bracket
112	2		retaining ring
113	2		screw
114	2	20204-3B	lever rod
115	2		oil seal
116	1	20126B	long lever shaft
117	1	20204-1B	lever bracket
118	1	20022-2B	lever

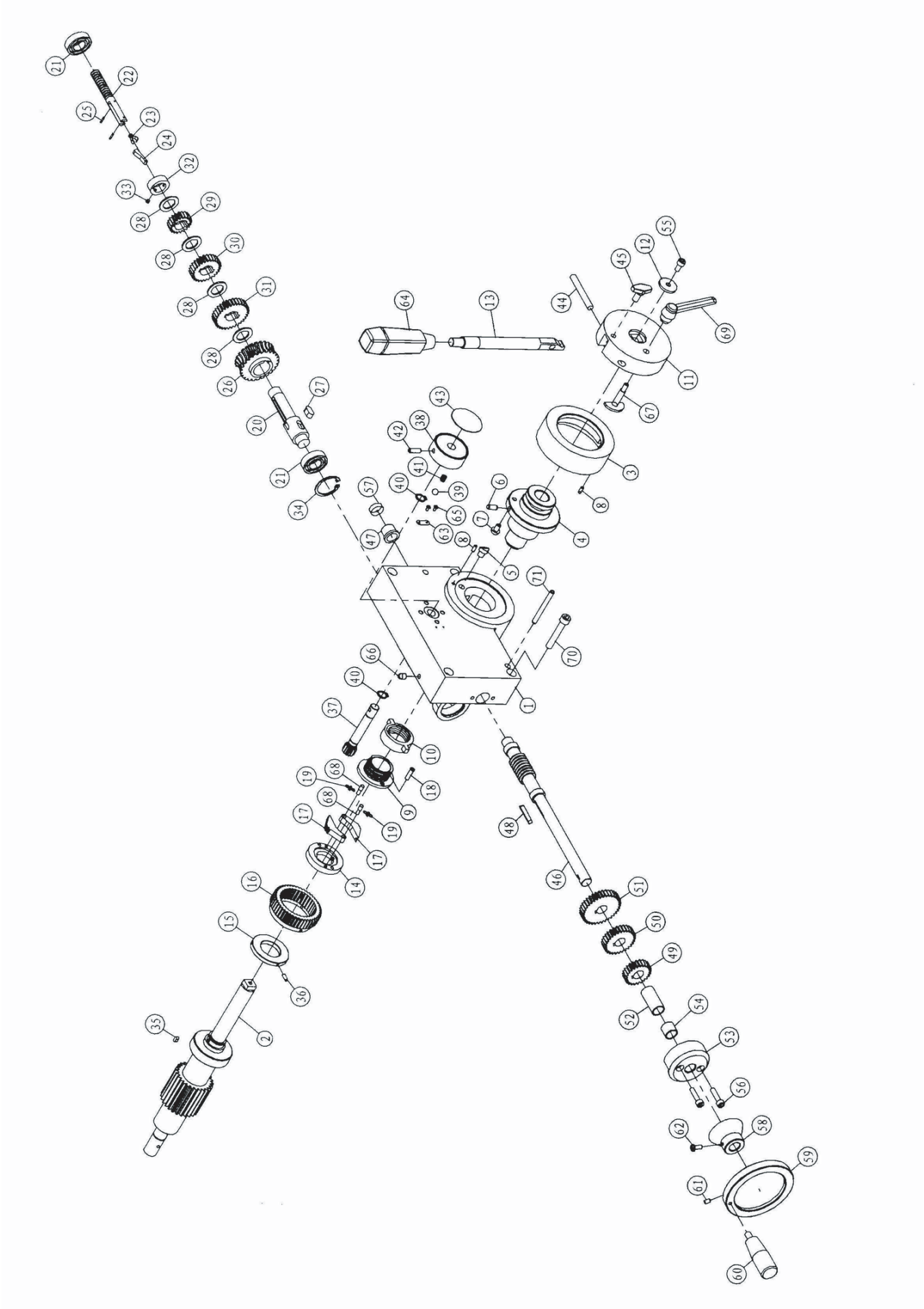
SUPER MAJOR Mill Base Assebly - I



SUPER MAJOR - Mill Base Assebly - II

No.	Qty.	Code	Name
1	1	10010	base
2	1	10013	column
3	1	10021	square flange
4	1	10016	raise and lower base
5	1	10025	gib strip
6	3	10106	screw
7	4		bearing
8	1	10104	table screw
9	2	10102	dial clutch
10	2	10111	graduated plate
11	2	10301	wheel
12	2	20305-1B	turn handle
13	2	20305-2B	screw
14	1	10024	nut
15	1	10117	nut bracket
18	4		screw
19	3		pin
20	2	10107	screw
21	3	8	oil cup
22	6		fixed handle
23	4		washer
24	4		washer
25	4		bolt
26	1	10120	washer
27	1		screw
28	1	10119	plate
29	1	10124	protecting cover
30	6		screw
31	6		pin
35	1	10011	center base
36	1	10012	table
37	1	10202	table nut
38	1	10203	table base nut
39	1	10020	right flange
40	1	10019	left flange
41	1	10103	table screw
42	1	10105	dial clutch
43	1		fixed block
44	2		washer
45	2		screw
46	1		screw
47	2		screw
48	1	10022	gib strip
49	4		screw
50	2	10108	movable fixed block
51	2	10109	fixed block support
52	1	10023	gib strip
53	2		screw M6X16
54	1	10017	raise and lower base
55	1	10113	shaft
56	2	20109	gear
57	2		bearing
58	1		retaining ring
59	1	10015	flange
60	1	10116	raise and lower screw
61	2		bearing
62	2		key6X20
63	1		lock washer
64	1		lock nut
65	7		screw M6X25
66	2		pin 6X30
67	1	10018	head handle
68	1		screw M10X20
69	1		turn handle
71	1		motor
72	4		screw
73	1		cover
74	4		screw
75	1		clutch
76	1		gear
77	1		power feed

SUPER MAJOR - Power Down Feed Assembly I



SUPER MAJOR - Power Down Feed Assembly II

No.	Code	Qty.	Name
1	20102	1	Feed box
2	20234	1	Pinion shaft
3	20243	1	Spindle stroke dial
4	20242	1	Clutch bushing set
5	20241	1	Backing pin
6		1	Pin 6×12
7	20247	1	Ball head pin
8		2	Pin4×10
9	20239	1	Square thread set
10	20240	1	Square thread nut
11	20244	1	Handle body
12	20245	2	Washer
13	20203	1	Handle
14	20237	1	Clutch key base set
15	20236-2	1	Bush
16	20236-1	1	Worm gear
17	20231	2	Clutch screw set
18	20235	2	Screw
19	20232	2	Spring
20	20223	1	II Shaft
21		2	Bearing 6003
22	20215	1	Change gear lever set
23	20220	1	spring
24	20222	1	Pull key
25		2	Pin 2×10
26	20304	1	Worm gear
27		1	Key 8×16
28	20217	4	Bushing
29	20218	1	Gear
30	20219	1	Gear
31	20221	1	Gear
32	20216	1	Bushing bracket
33		2	ScrewM4×6
34		1	Retainer ring 35
35		2	Key 4×8
36		3	Screw M4×12
37	20202	1	Gear
38	20201	1	Speed lever
39		1	Steel ball 8
40		2	Retainer ring 12
41		1	Spring
42		1	Screw M6×20
43	20303	1	Plate
44	20206	1	Knurled pin
45	20204	1	Limited screw
46	20233	1	Worm shaft
47	20306	1	Bush
48		1	Key
49	20228	1	Gear
50	20229	1	Gear
51	20230	1	Gear
52	20106	1	Bush
53	20227	1	Worm cover
54	20305	1	Bush
55		1	Screw M6×12
56		2	ScrewM6×25
57	20107	1	Bushing
58	20226	1	Mirco feed dial
59	20105	1	Hand wheel
60		1	Handle
61		1	Screw M5×8
62		1	Locked screw M5×12
63	20307	1	"0"Scale
64	20301	2	Knob
65		2	Rivet 2×5
66		1	Oil cup
67	20246	1	Screw
68	20308	2	Pin
69		1	Locked handle
70		4	Screw M6×50
71		2	Taper pin6x60

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