HAFCO METALMASTER

MILL DRILL
OPERATION MANUAL

Model.
HM-48

Edition No	*:GHMD001*
Date of Issue	*: 01/17*

HAFCO METALMASTER

OPERATION MANUAL

MACHINE DETAILS

MACHINE	GEARED HEAD MILL DRILL
MODEL NO.	HM-48
SERIAL NO.	
DATE OF MANF.	

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Note:
This manual is only for your reference. Owing to the continuous improvement of the machine, changes may be made at any time without obligation or notice. Please ensure the local voltage is the same as listed on the specification plate before operating this electric machine.

NOTE:
In order to see the type and model of the machine, please see the specification plate. Usually found on the back of the machine. See example (Fig.1)

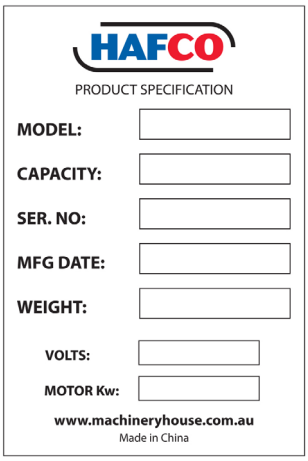


Fig.1

HAFCO METALMASTER

OPERATION MANUAL

CONTENTS:

1.1. SPECIFICATIONS

Table Size	820 x 240mm
Column Type	Dovetail Slide
Spindle Taper	3MT
Longitudinal Travel (X-Axis)	540mm
Cross Travel (Y-Axis)	185mm
Vertical Travel (Z-Axis)	410mm
Type of Slides	Dovetail
Spindle to Table	490mm
Quill Travel / Diameter	120mm / 75mm
Throat Depth (max)	273mm
Tilting Head (Left~Right)	± 90°
Tilting Head (Front~Back))	Fixed
Drilling Capacity	28mm
End Mill Capacity	22mm
Face Mill Capacity	80mml
Power Feed~Longitudinal (X-Axis)	Variable Speed
Motorized~Vertical Travel (Z Axis)	Single Speed
Table T-Slot	14mm
Work Table Load Capacity	50kg
Spindle Speeds (Steps/RPM)	12 (100~2150)
Motor Power	1.5kW / 2hp
Motor Voltage	240Volts
Overall Height	1100mm
Weight	430kgs

1.2. STANDARD EQUIPMENT

3 Axis digital readout system
Coolant system
Motorized vertical head motor
Digital tilting head gauge
Drill chuck & arbor
Safety cutter guard
Heavy duty fabricated stand
X-Axis power feed unit
Digital depth display
Halogen light
Face mill cutter & arbor
Hex Keys and spanner

1.3 IDENTIFICATION

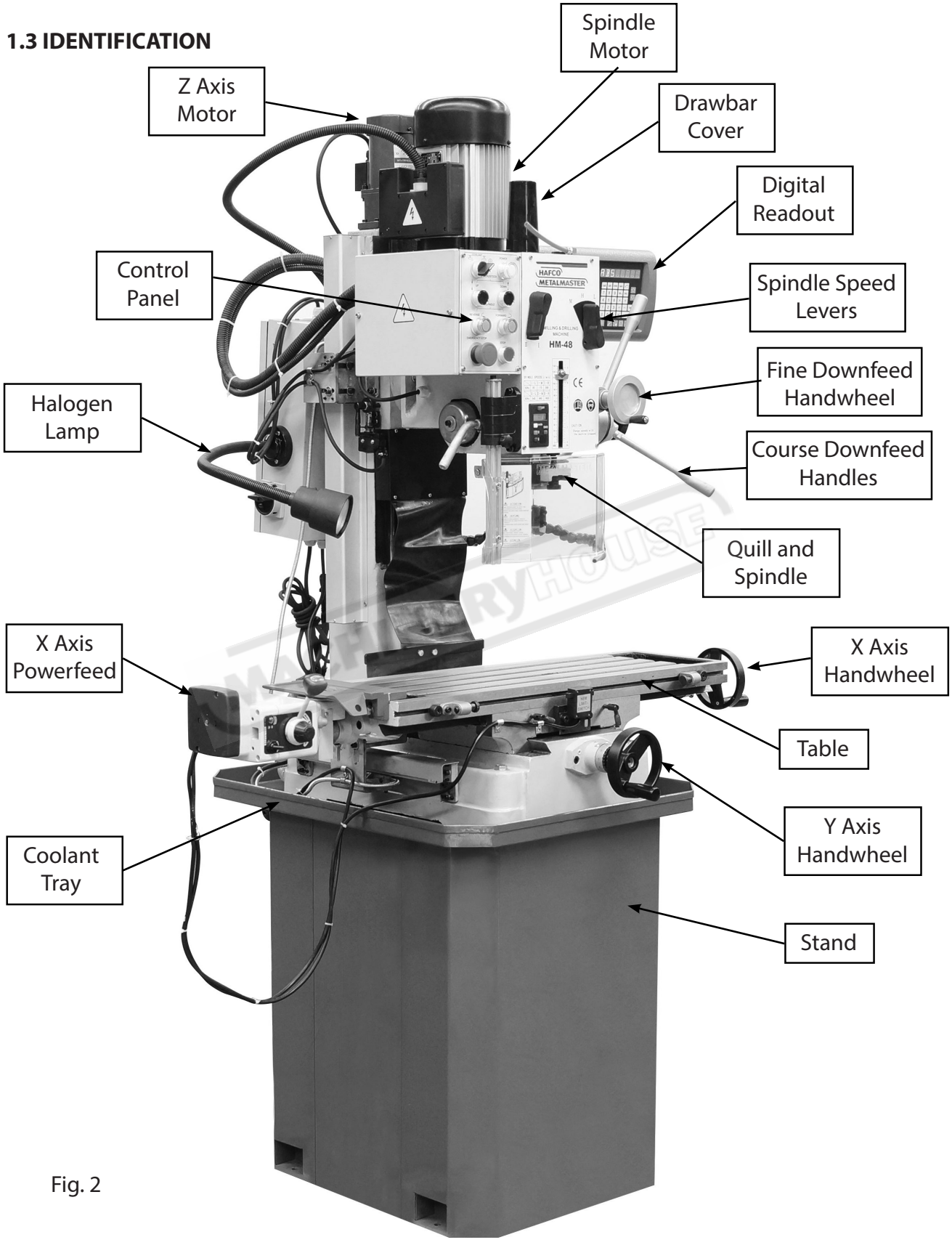
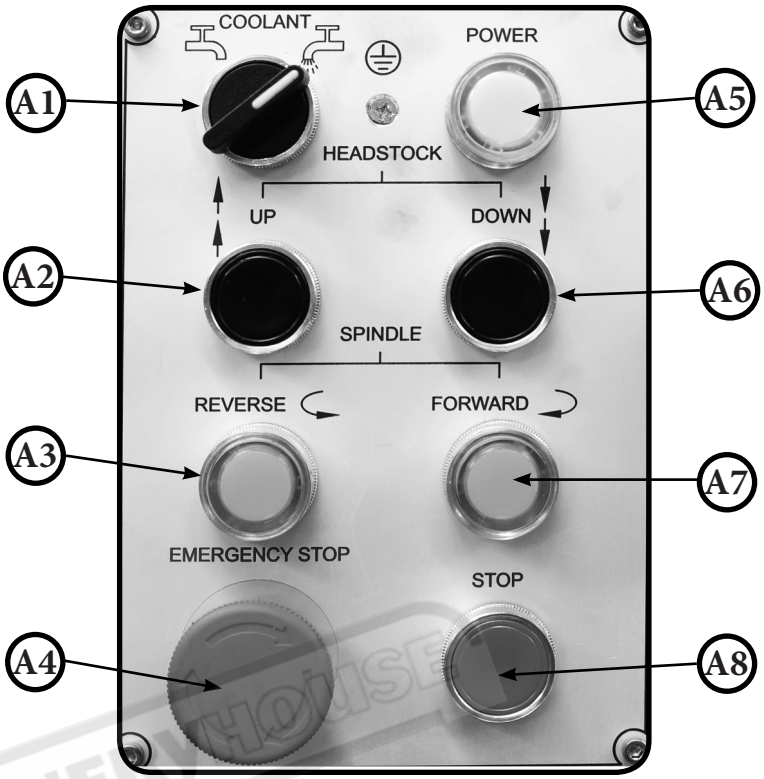


Fig. 2

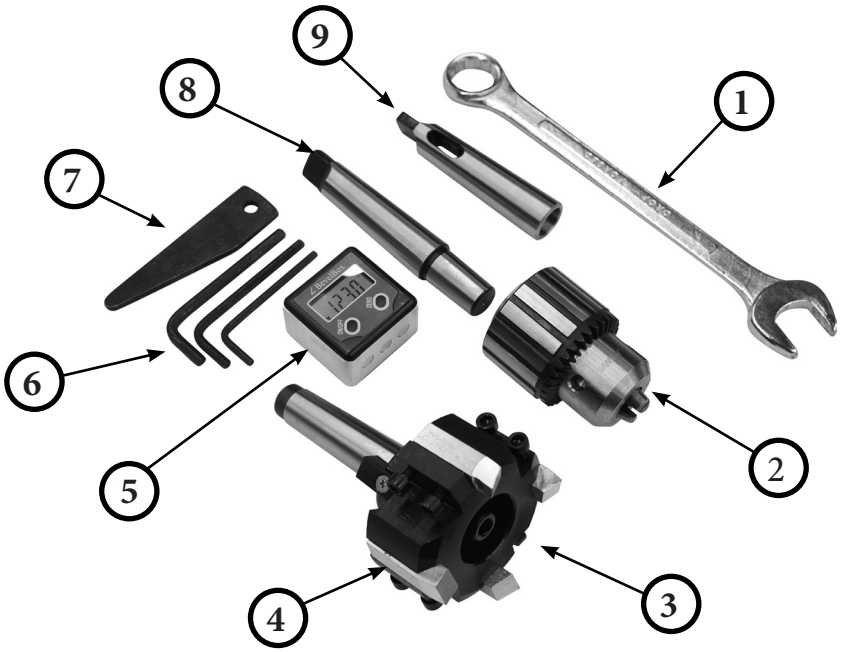
1.4 ELECTRICAL CONTROLS

A1. Coolant Pump ON/OFF
A2. Head Rapid Power UP
A3. Spindle Start Button - Reverse
A4. Emergency Stop Button
A5. Illuminated Power Light
A6. Head Rapid Power DOWN
A7. Spindle Start Button - Forward
A8. Spindle Stop Button



1.5 ACCESSORIES

1. Spanner
2. Drill Chuck
3. Face Mill Cutter
4. Cutters
5. Digital Tilting Head Gauge
6. Hex Keys
7. Drill Drift
8. Drill Chuck Arbour
9. 3mt - 2mt Drill Sleeve



2. SAFETY

2.1 SAFETY REQUIREMENTS

OWNER'S MANUAL. Read and understand this owner's manual before using the machine.

TRAINED OPERATORS ONLY. Untrained operators have a higher risk of being hurt or killed. Only allow trained/supervised people to use this machine. When the machine is not being used, disconnect the power, remove switch keys (if fitted), or isolate the machine to prevent unauthorized use—especially around children. Make the workshop kid proof!

DANGEROUS ENVIRONMENTS. Do not use the machinery in areas that are wet, cluttered, or have poor lighting. Operating machinery in these areas greatly increases the risk of accidents and injury.

MENTAL ALERTNESS REQUIRED. Full mental alertness is required for safe operation of the machinery. Never operate under the influence of drugs or alcohol, when tired, or when distracted.

ELECTRICAL EQUIPMENT INJURY RISKS. You can be shocked, burned, or killed by touching live electrical components or improperly grounded machinery. To reduce this risk, only allow qualified service personnel to do electrical installation or repair work, and always disconnect power before accessing or exposing electrical equipment.

EYE PROTECTION. Always wear approved safety glasses or a face shield when operating or observing machinery to reduce the risk of eye injury or blindness from flying particles. Everyday eyeglasses are not approved safety glasses. Only use approved safety glasses.

WEARING PROPER APPAREL. Do not wear clothing, or jewelry that can become entangled in moving parts. Always tie back or cover long hair. Wear non-slip footwear to avoid accidental slips.

HEARING PROTECTION. Always wear hearing protection when operating or observing loud machinery. Extended exposure to this noise without hearing protection can cause permanent hearing loss.

REMOVE ADJUSTING TOOLS. Tools left on machinery can become dangerous projectiles upon startup. Never leave drill chuck keys, wrenches, or any other tools on machine. Always make sure they are removed before starting!

USE CORRECT TOOL FOR THE JOB. Only use this machine for its intended purpose. Do not force it or an attachment to do a job for which it was not designed. Never make unapproved modifications. Modifying tools or using it not as it was intended may result in malfunction or mechanical failure that can lead to personal injury or death!

AWKWARD POSITIONS. Keep proper footing and balance at all times when operating the machine. Do not overreach! Avoid awkward hand positions that make workpiece control difficult or increase the risk of injury.

GUARDS & COVERS. Guards and covers reduce accidental contact with moving parts or flying debris. Make sure they are properly installed, undamaged, and working correctly.

2.1 SAFETY REQUIREMENTS Cont.

WARNING

FORCING MACHINERY. Do not force the machine. It will do the job safer and better at the rate for which it was designed.

NEVER STAND ON MACHINE. Serious injury may occur if machine is tipped or if the cutting tool is unintentionally contacted.

STABLE MACHINE. Unexpected movement during operation greatly increases the risk of injury or loss of control. Before starting, verify the machine is stable and mobile base (if used) is locked.

USE RECOMMENDED ACCESSORIES. Consult this owner's manual or the manufacturer for recommended accessories. Using improper accessories will increase the risk of serious injury.

UNATTENDED OPERATION. To reduce the risk of accidental injury, turn the machine OFF and ensure all moving parts are completely stopped before walking away. Never leave the machine running while unattended.

CHILDREN & BYSTANDERS. Keep children and bystanders at a safe distance from the work area. Stop using the machine if they become a distraction.

MAINTAIN POWER CORDS. When disconnecting machines from the power, grab and pull the plug and not the cord. Pulling the cord may damage the wires inside. Do not handle cord/plug with wet hands. Avoid cord damage by keeping it away from heated surfaces, high traffic areas, harsh chemicals, and wet/damp locations.

MAINTAIN WITH CARE. Follow all maintenance instructions and lubrication schedules to keep the machine in good working condition. Improperly maintained machine can malfunction and could cause serious personal injury.

CHECK DAMAGED PARTS. Regularly inspect the machine for any condition that may affect a safe operation. Immediately repair or replace damaged parts before operating the machine.

DISCONNECT POWER FIRST. Always disconnect the machine from the power supply before making adjustments, changing tooling, or servicing the machine. This prevents an injury risk from unintended startup or contact with live electrical components.

2.1 SAFETY REQUIREMENTS Cont.

UNDERSTANDING CONTROLS. Make sure you understand the use and operation of all controls.

SAFETY ACCESSORIES. Always use a chip guard in addition to your safety glasses when milling to prevent injury to the body.

WORK HOLDING. Before starting the machine, be certain the workpiece has been properly clamped to the table. NEVER hold the workpiece by hand when using the mill.

CHUCK KEY SAFETY. Always remove your chuck key, drawbar wrench, and any service tools immediately after use.

CLEAN-UP. DO NOT Clear chips by hand. Use a brush, and never clear chips while the mill is operating.

CUTTING TOOL INSPECTION. Inspect drills and end mills for sharpness, chips, or cracks before each use. Replace dull, chipped, or cracked cutting tools immediately. Handle new cutting tools with care. Leading edges are very sharp and can cause lacerations.

SPINDLE SPEEDS. Select the spindle speed that is appropriate for the type of work and material. Allow the mill/drill to gain full speed before beginning a cut.

POWER DISRUPTION. In the event of a local power outage during use of the mill, turn OFF all switches to avoid possible sudden start up once power is restored.

SPINDLE DIRECTION CHANGES. Never reverse spindle direction when milling, boring, or facing a workpiece.

STOPPING SPINDLE. DO NOT stop the mill/drill using your hand against the chuck.

DISCONNECT POWER. Make sure the mill is turned off, disconnected from its power source, and all moving parts have come to a complete stop before starting any inspection, adjustment, or maintenance procedure.

TOOL HOLDING. Always use the proper tools for the material you are milling. Make sure they are held firmly in the proper tool holder for the job.

2.2 POWER SUPPLY

Availability

Before installing the machine, consider the availability and proximity of the required power supply circuit. If an existing circuit does not meet the requirements for this machine, a new circuit must be installed. To minimize the risk of electrocution, fire, or equipment damage, installation work and electrical wiring must be done by an electrician or qualified service personnel in accordance with all applicable codes and standards.

Electrical Requirements

Nominal Voltage.....240V
Cycle.....50 Hz
Phase..... Single-Phase
Power Supply Circuit.....10Amps
Full Load Amps.....8.8 Amps
Motor Speed.....1400 RPM
Motor Power.....1.5kW/2HP

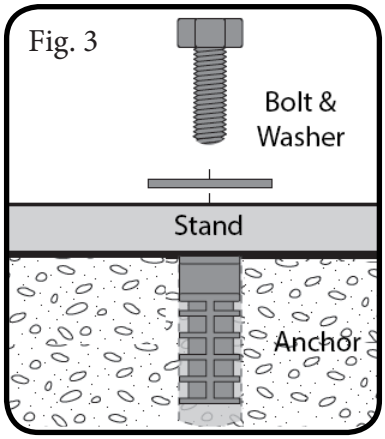
Extension Leads

It is not recommend to use an extension cord with this machine. If you must use an extension cord, only use it if absolutely necessary and only on a temporary basis.
Extension cords cause voltage drop, which may damage electrical components and shorten motor life. Voltage drop increases as the extension cord size gets longer and the gauge size gets smaller. Any extension cord used with this machine must be approved.
It is recommended that the machine be plugged directly into a power point

2.3 SITE PREPARATION

When selecting the site for the machine, consider the largest size of workpiece that will be processed through the machine and provide enough space around the machine for operating the machine safely. Consideration should be given to the installation of auxiliary equipment. Leave enough space around the machine to open or remove doors/covers as required for the maintenance and service as described in this manual.
It is recommended that the machine be anchored to the floor to prevent tipping or shifting. It also reduces vibration that may occur during operation, Use the holes in the bottom of the cabinet as a guide for drilling holes in the floor. Then mount the stand.

The machine is mounted on the stand bolted to the floor or concrete slab (Fig. 4)
Masonry anchors with bolts are the best way to anchor machinery, because the anchors sit flush with the floor surface, making it easy to unbolt and move the machine later, if needed. (Fig. 3)



STAND

2.4 LIFTING

Before lifting ensure that only certified slings and equipment is used with sufficient capacity to lift the load.
Place the web lifting sling around the head of the machine, as shown in Fig. 5, then connect it to the lifting hook. Be sure that the sling connected to the hook is under any cables or tubing so as not to crush any parts.
To help balance the machine during moving, position the table as close to the column as possible, and adjust the headstock to its lowest position.
With the help of additional people to steady load, slowly lift the machine, from the pallet, then lower the machine into position.
Before lowering the machine onto the drip tray place a bead of silastic around the 4 mounting holes between the machine and drip tray.
Lift the machine and carefully place it onto the cabinet or workbench.

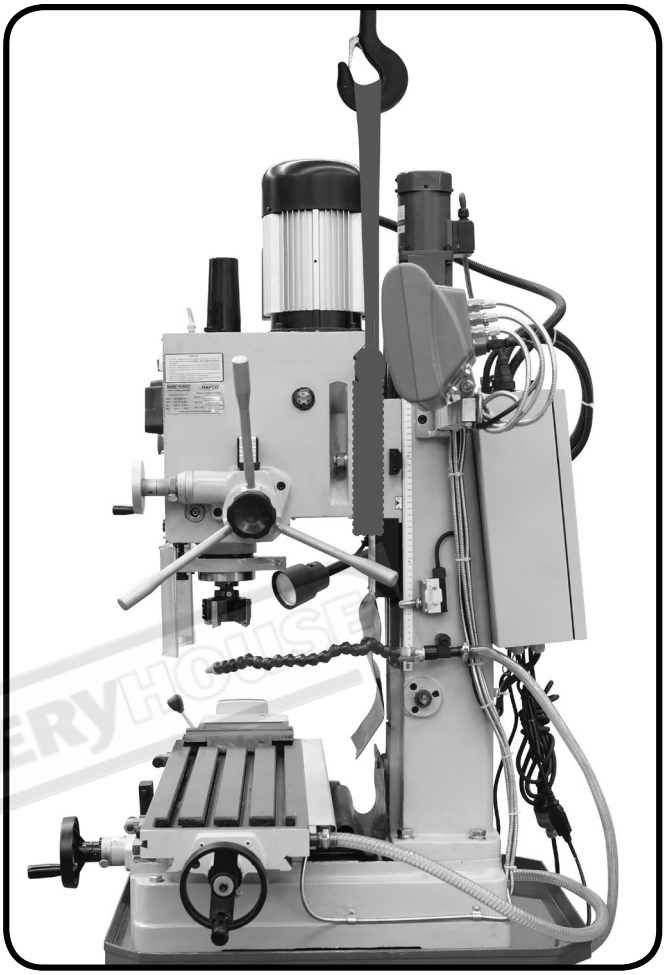


Fig. 5

3. SETUP

3.1 BOLTING THE MILL DRILL ON THE STAND

Before you place your machine on the floor, it is recommended that you consider the following options.
When bolting down the machine, consider using Hafco M0015 machine mounts to make it easy for leveling and eliminate vibration.
Bolting the machine to the floor prevents tipping or shifting and reduces vibration that may occur during operation, resulting in a machine that runs slightly quieter and feels more solid.
If the machine is to be installed in a commercial or workplace setting, or if it is permanently connected (hardwired) to the power supply, then it should be anchored to the floor.

Order Code M0015

3.2 ASSEMBLY

Except for the handwheel handles, the mill/drill was fully assembled at the factory. Use a slotted screwdriver to attach the handwheel handles, as shown in Fig. 6

3.3 LEVELING

Whether you mount your machine to the cabinet stand or to an existing workbench, it must be leveled. If you mounted your machine to an existing workbench, use a precision level and metal shims as needed under the machine base to make sure the machine table is level from side-to-side and from front-to-back. If you mounted your machine to the cabinet, use a precision level on the table and adjust the machine mounts or place shims under the corners of the cabinet to make sure the machine table is level from side-to-side and from front-to-back. (Fig. 6)

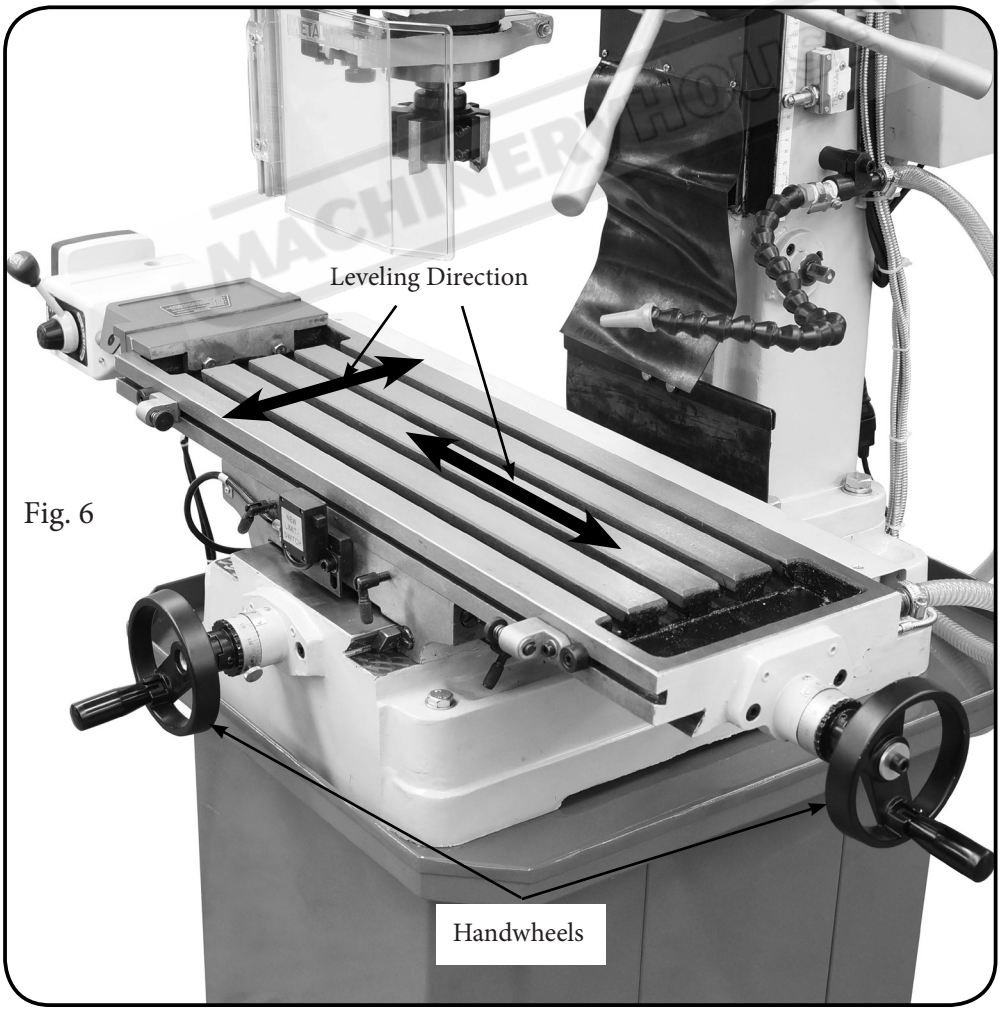


Fig. 6

4. OPERATION & TEST RUN

Once the assembly is complete, test run your machine to make sure it runs properly and is ready for regular operation. The test run consists of checking the following:

1) The motor powers up and runs in the correct direction
2) the stop button safety feature works correctly.

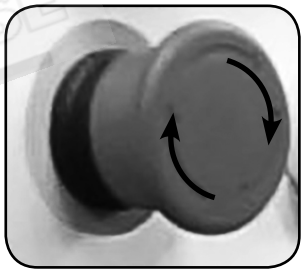
If, during the test run, you cannot easily locate the source of an unusual noise or vibration, stop using the machine immediately, then review Troubleshooting on Page 19.

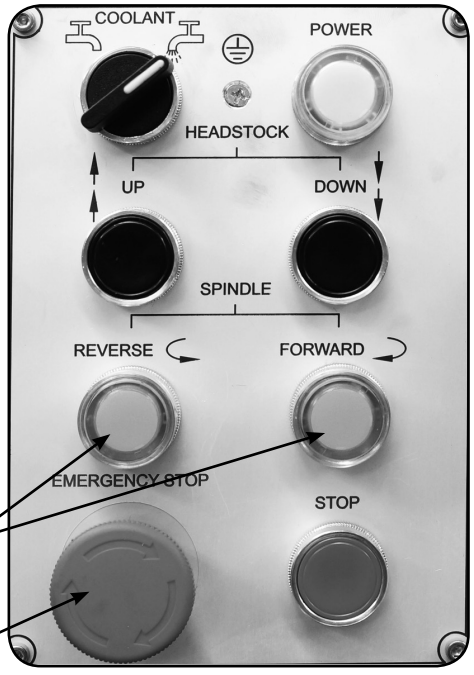
4.1 TEST RUN THE MACHINE

1. Make sure you understand the safety instructions at the beginning of the manual and that the machine is set up properly.
2. Make sure all tools and objects used during setup are cleared away from the machine.
3. Connect the machine to the power source.
4. Push the EMERGENCY STOP button in, then rotate the emergency stop button clockwise (see Fig. 7) so that it pops out. When the EMERGENCY STOP button has popped out, the machine is now ready for operation.
5. Verify that the machine is operating correctly by pressing the Forward button (Fig. 8) When operating correctly, in a clockwise direction. the machine will run smoothly with little or no vibration or rubbing noises. Any strange or unusual noises or vibrations need to be investigated before operating the machine further. .
6. Press the large red EMERGENCY STOP button to stop the machine. Then disconnect the machine from power and investigate or correct any potential problems. Allow the spindle to stop rotating before proceeding.
7. Repeat Step 5 with the Reverse button to select reverse The spindle should now rotate in the opposite direction.
8. Press the large red EMERGENCY STOP button to stop the machine. Allow the spindle to stop rotating before proceeding.
9. With the EMERGENCY STOP button pushed in, press the forward button then the reverse button.

If the machine does not start, the EMERGENCY STOP button safety feature is working correctly. The Test Run is complete

Fig. 7





Forward & Reverse Buttons

Emergency Stop Button

Fig. 8

4.2 CHANGING SPINDLE SPEEDS

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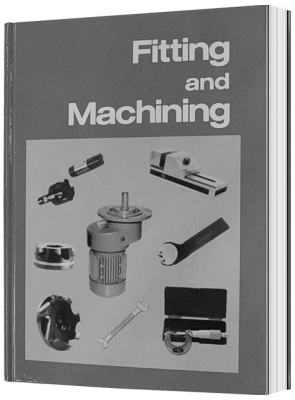


L341

The Model HM-48 is capable of six speed settings. Different types of cuts and materials require varying speeds. For the correct speed refer to publication such as Hafco L341 Fitting and Machining

Determining Spindle Speed

Many variables affect the optimum spindle speed of any given operation, but the two most important factors are the recommended cutting speed for the workpiece material and the diameter of the cutting tool,

The head of the machine, houses the spindle speed gearbox so the changing of spindle speeds is very easy. (Fig. 10)

To change spindle speeds:

1. The spindle must be stationary before any change can be made
2. Adjust the levers according to the chart below (Fig. 9)

NOTE !

If the levers will not move to the desired position, rotate the spindle by hand while applying pressure on the lever. When the gear teeth align, the lever will move into place..

SPINDLE SPEEDS	
I-L	95
I-M	170
I-H	280
II-L	540
II-M	960
II-H	1600

Fig. 9

Fig. 10

4.3 BASIC CONTROLS

Listed below are the machines basic controls and their description. The operator should be familiar with these items and the terminology.

Depth Stop: When set this stops the spindle travel at a predetermined depth. This is set by turning the knurled knob at the bottom of the scale. (Fig. 11)

Digital Counter: Can be set to display the spindle movement. Can be set on "0" in any position. Can display in inch or mm

Fig. 11

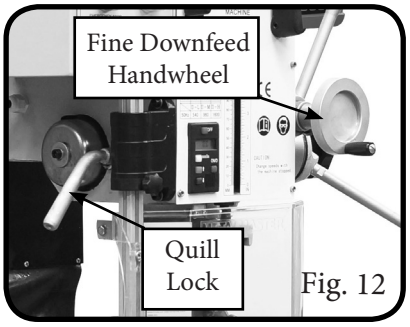


Fig. 12

Fine Downfeed Handwheel: Provides manual hand fine feed control of the vertical spindle travel. (Fig. 12)_

Quill Lock: Locks the quill in any position

Locking Knob: Engages/disengages the fine feed handwheel. (Fig. 13)

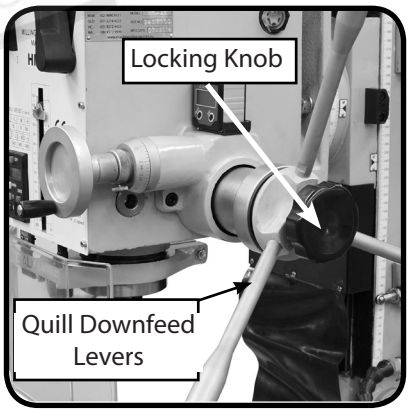


Fig. 13

Quill Downfeed Levers: Provide coarse control over vertical spindle travel.

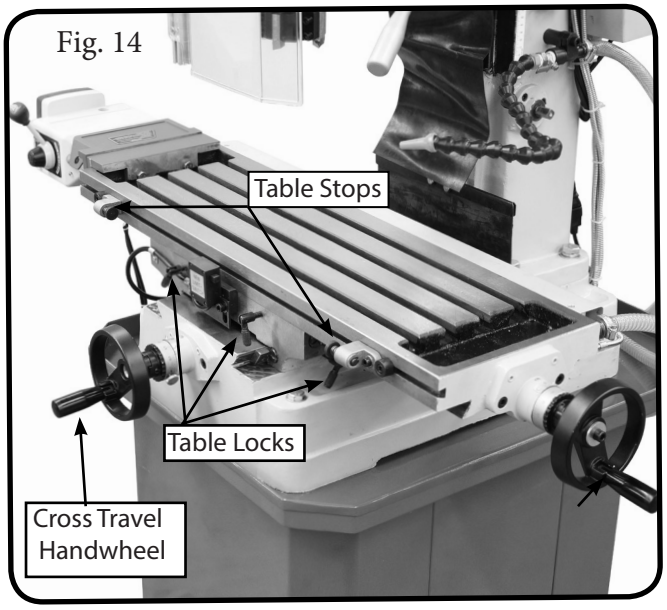


Fig. 14

Longitudinal Travel Handwheels: Control longitudinal (X-Axis) travel of the table.

Cross Travel Handwheel: Controls cross (Y-Axis) travel of the table.

Table Locks: Lock the table in position along their respective axes. (Fig.14)

Travel Stops: Limit longitudinal table travel.

4.4 POWER FEED OPERATION.

View Figures 15, and 16 and the following descriptions to become familiar with the power feed controls.

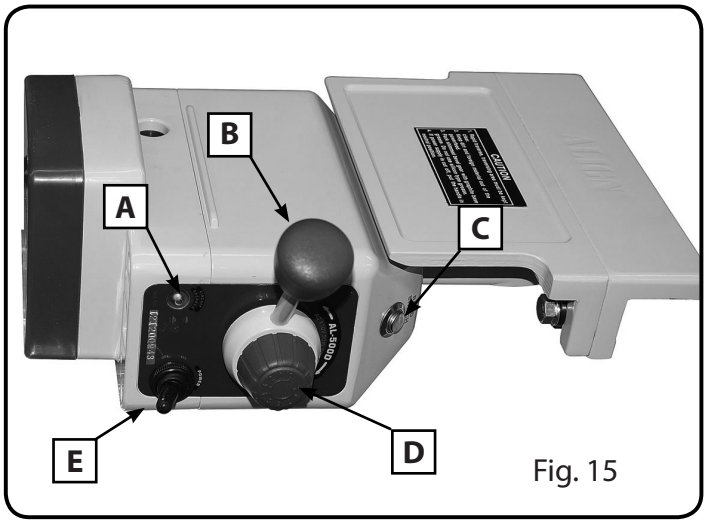


Fig. 15

A. Circuit Breaker : The button pops up when the feed needs overload protection. The feed motor is reset when the button is pressed in

B. Direction Lever: Controls direction of powered table travel. (Fig. 15)

C. Rapid Switch: When held down, moves the table rapidly in chosen direction.

D. Speed Dial: Controls rate of the power feed.

E. ON/OFF Switch: Switches the power on to the power feed

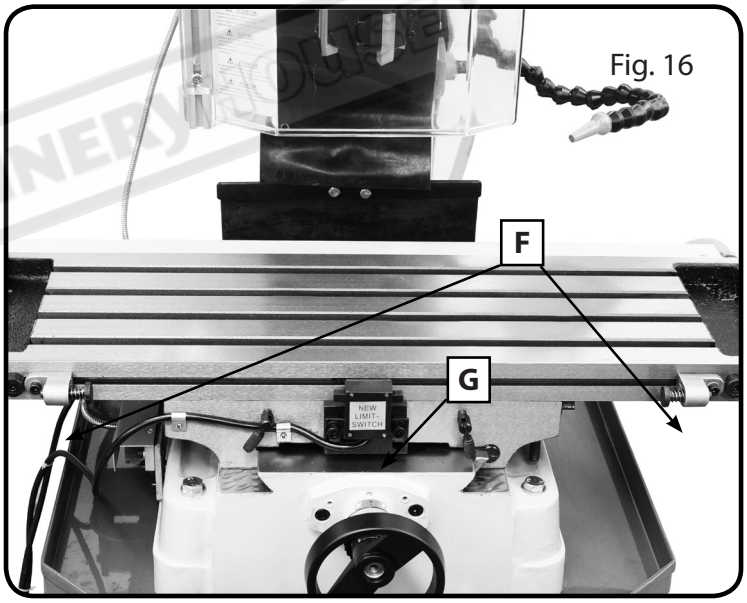


Fig. 16

F. X-Axis Limit Stops: Adjustable along front of table to restrict X-axis table movement, particularly when using the power feed. (Fig. 16)

G. Limit Switch: Stops the power feed when contacted by a limit stop.

HEAD MOVEMENT

The head travels up and down the column by a dovetail slide. The head also tilts 90° left and right relative to the table.

5.1 RAISING & LOWERING THE HEAD

The head vertical motor can not be activated until the micro switches on the locks have been released. Loosen the lock handles shown (Fig. 17) then use the Elevation (Z-Axis) buttons (Fig. 18) on the control panel to raise or lower the head.

Fig. 18

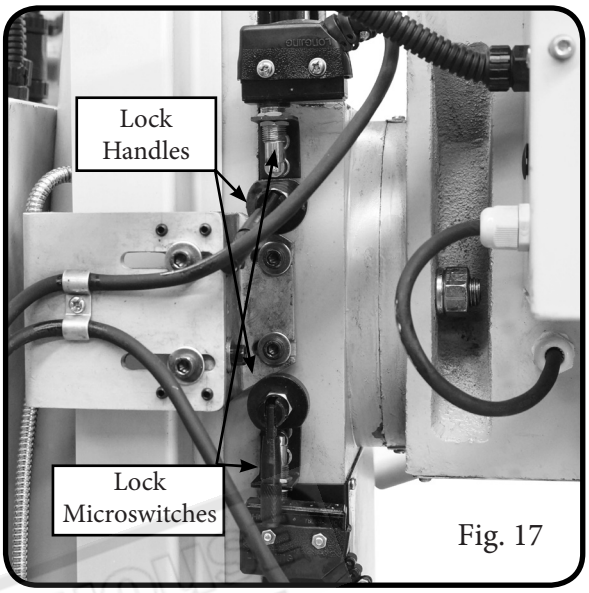


Fig. 17

The limit stop shown in Fig. 19 stops the head travel when limit block contacts the limit switch.

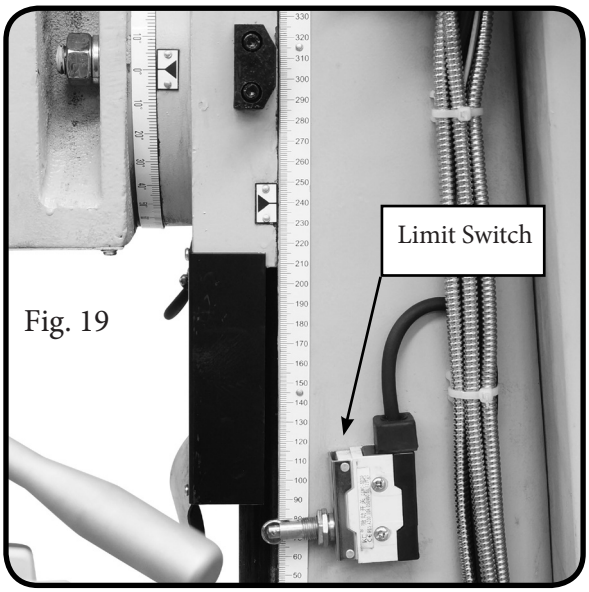


Fig. 19

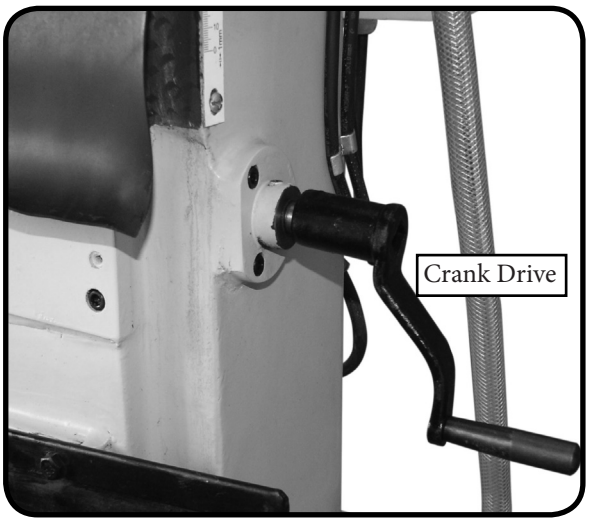


Fig. 20

The headstock can also be raised/lowered by hand using the crank drive as shown in Figure 20. The crank is stored in the toolbox.

5.2 TILTING THE HEADSTOCK

The Metalmaster HM - 48 has the facility for the head to be tilted to the left or to the right up to 90 degrees. (Fig.21)

NOTE!
The head must be supported when tilting. Support with a sling or seek assistance from a workmate to support the head.

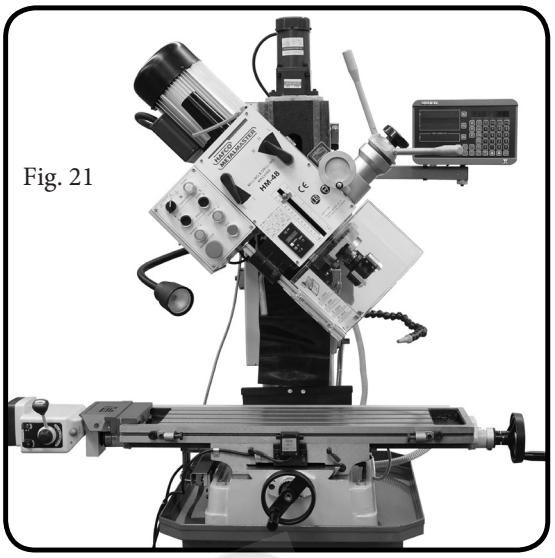


Fig. 21

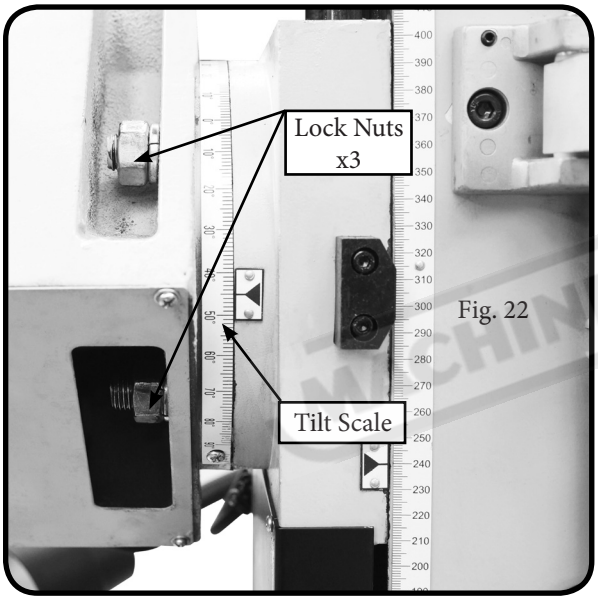


Fig. 22

Use a 24mm spanner to loosen the three locking hex nuts, one either side of the head and one under the head (see Figures 22), then tilt the headstock to desired angle on the tilt scale or the digital scale provided. (Fig. 23)

Fig. 23

When returning the head to the upright position the spindle needs to be set square to the table
Install an indicator holder into spindle or onto quill, then mount the indicator so that the point is touching the table. Rotate and check the difference from side to side. Adjust the head accordingly.
(see the illustration in Figure 24)

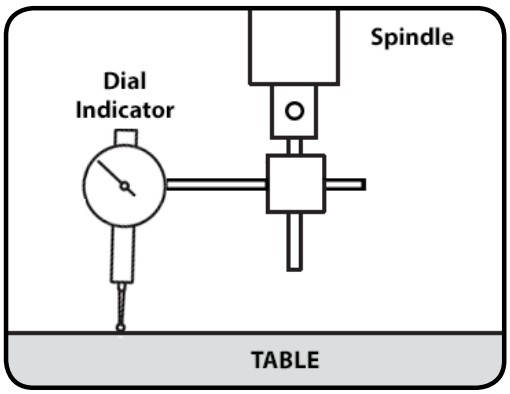


Fig. 24

6. MAINTENANCE

6.1 TROUBLESHOOTING

SYMPTOMS	POSSIBLE CAUSE	POSSIBLE SOLUTION
Machine does not start	1. Wall fuse or circuit breaker has been tripped	1. Reset circuit breaker or change fuse
	2. Plug faulty or wired incorrectly	2. Ensure plug is not damaged and is wired correctly
	3. Motor wired incorrectly	3. Ensure motor is wired correctly
	4. Machine power switch faulty	4.Test and replace if faulty
	5. Faulty motor	5. Test and replace if faulty
Machine stalls or is over-loaded	1. Feed rate too fast or cutting speed to slow	1. Adjust feed rate or cutting speed
	2. Wrong cutter type	2. Use the correct cutter for the job
	3. Motor is overheated	3. Clean motor, let cool and reduce workload
	4. Motor bearings are faulty	4. Test by rotating the shaft. Replace bearings if faulty.
Machine has vibrations or noisy operation	1.Motor or machine component is loose	1. Inspect for loose bolts , tighten or replace
	2. Excessive depth of cut	2. Decrease the depth of cut.
	3. Cutter tool loose or dull	3. Reinsert the tool or replace if dull.
	4. Quill is over extended.	4. Retract the quill and lower the head

6.2 HEADSTOCK LUBRICATION

An important part of lubrication is to clean the components, before adding any oil or grease. This step is critical because dirt and grime along with swarf, builds up on the components to be lubricated, which makes them hard to move. Simply adding more lubricant will not result in smooth moving parts.
Clean all exterior components in this section with rags and brushes soaked in mineral spirits, before lubricating.

HEADSTOCK RESERVOIR

The headstock has the proper amount of oil when the sight glass is halfway full.
(see Figure 25).

Fig. 25

To change the headstock oil:

1. Run the spindle at 540 RPM for approximately 10 minutes to warm the oil.

2. DISCONNECT THE MACHINE FROM POWER!

3. Remove the fill plug (see Figure 26).

4. Place a drain pan large enough to collect the old oil on the table under the head.

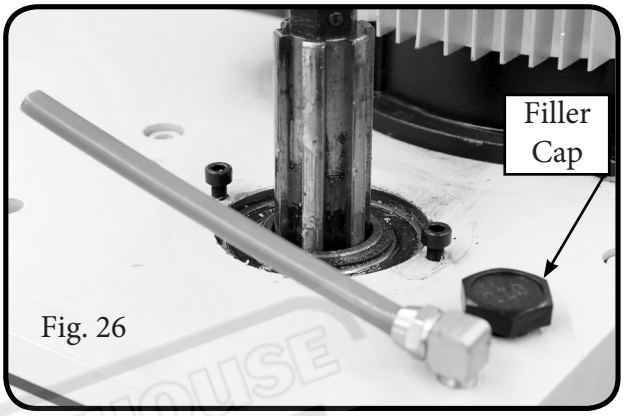
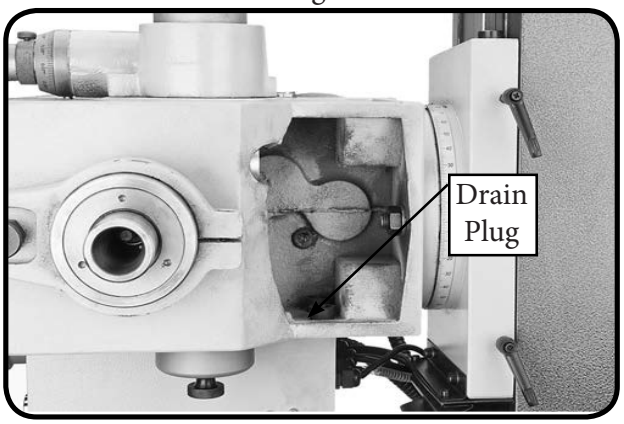


Fig. 26

5. Remove the drain plug (see Figure 27) from underneath the headstock. Allow the oil to completely drain into the pan.

Fig. 27



6. Replace the drain plug.

7. Add oil until the sight glass is halfway full, then replace the fill plug.

8. Clean up any spilled oil to prevent slipping hazards.

6.3 PARTS LUBRICATION

Points requiring periodic lubrication are: (Fig. 28, 29)
A. Column. A light film of oil (ISO VG-68) will smooth action and prevent rust and corrosion.

B. Column Rack. Lubricate every 90 days with a general purpose industrial NLGI 2 grease

C. Quill. A light coating of oil (Mobil Vactra 2) will ensure smooth movement. (Fig. 29)

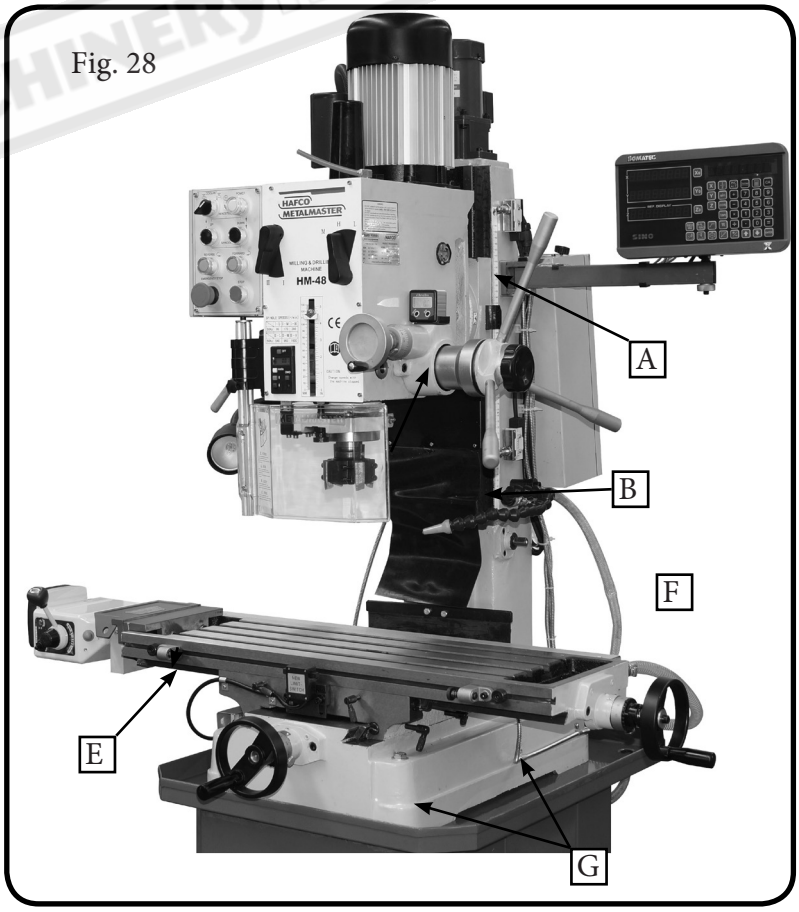
D. Quill Rack. Lubricate every 90 days with a general purpose industrial and NLGI 2 grease

E. Table Leadscrews. Lubricate once a week with several drops of Mobil Vactra 2 or equivalent way oil.

F. Ball Oilers. Wipe the outer surface of the ball fitting with a clean cloth to remove contaminants. Press the ball of the fitting with the tip of the oiler. Press a few drops of Mobil Vactra 2 or equivalent way oil into the ball fitting, then clean up any residue with a cloth.

G. Ways. Periodically lubricate the ways with Mobil Vactra 2 or way oil. (Fig. 28)

Fig. 28



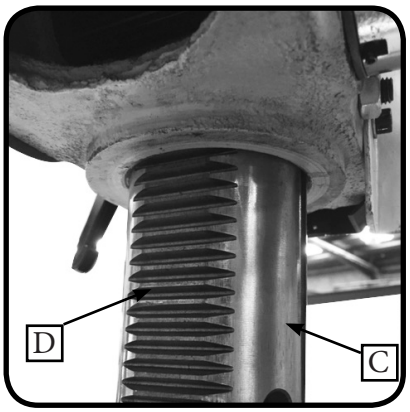


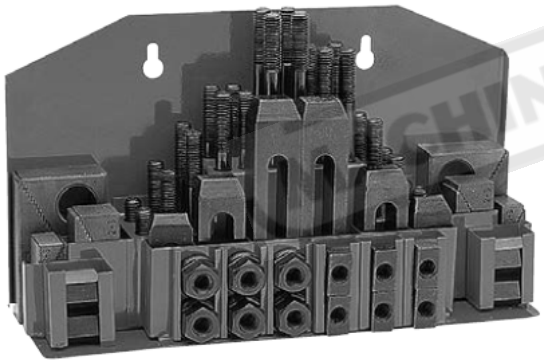
Fig. 29

6.4 OPTIONAL ACCESSORIES

The **HM-32** Mill Drill is supplied with some basic tooling. Below is a list of quality tooling that may be needed to enhance the scope of the machine.

TOOLMASTER C922B—3MT Chuck & Collet Set
An affordable quick change collet system with ultra precision. These spring collets are hardened and ground to exacting tolerances and offer incredible holding power. This set includes an 3MT x ER32 collet chuck, spanner wrench, plastic carrying case and collets sized 7-6mm, 8-7mm, 10-9mm, 13-12mm, 16-15mm and 20-19mm. These collets can also be used for imperial sizes. Drawbar size 1/2" whitworth.

(Order Code C922B)



HAFCO C0965 —14MM 52-PC . Clamping Kit
This clamping kit includes 24 studs, six step block pairs, six T-nuts, six flange nuts, four coupling nuts, and six end hold-downs. The rack is slotted so it can be mounted.

(Order Code C0965)

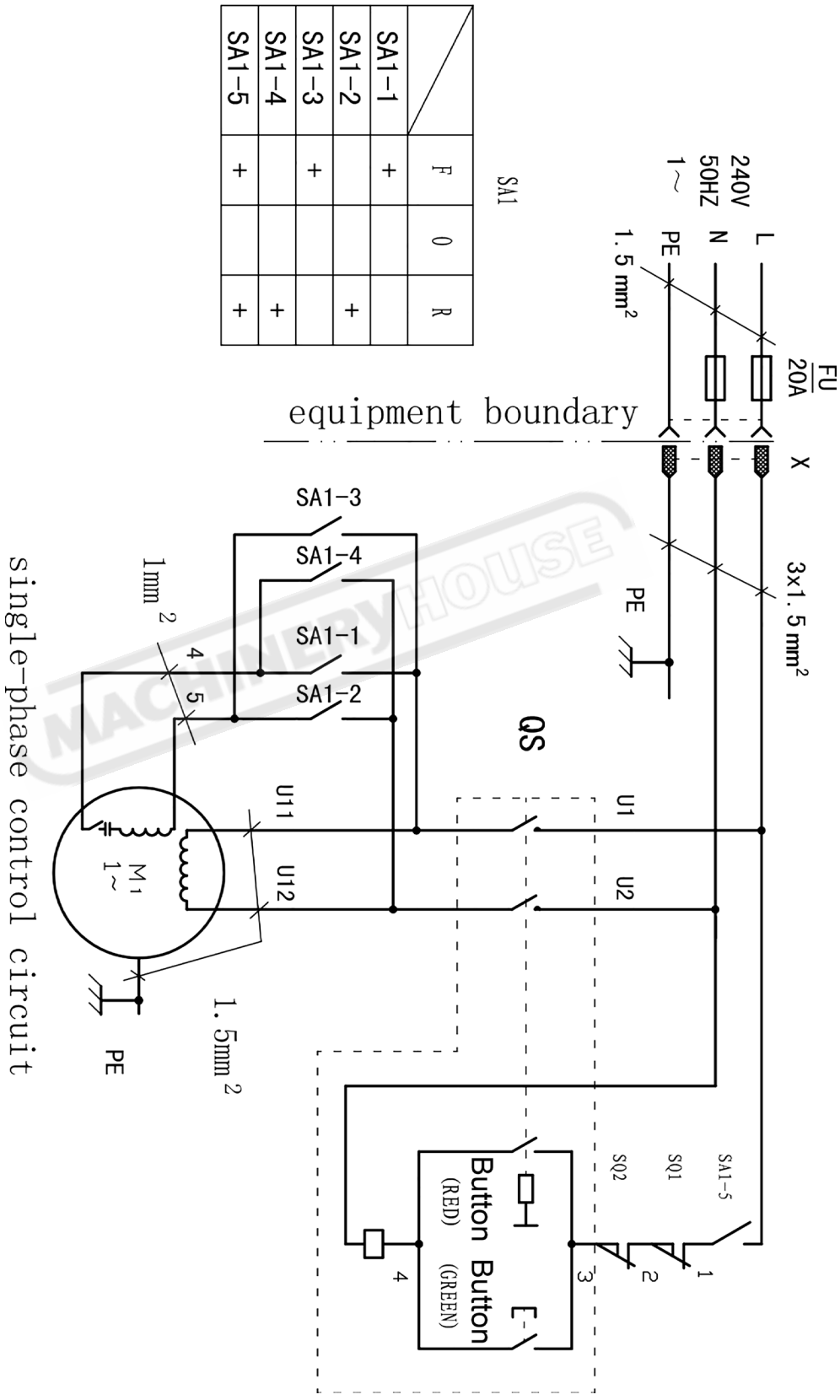
alcock
tools that stand the test of time

Always use quality Alcock Cutters

TM M529—Carbide Insert Face Mill
This 50mm Face Mill accepts four carbide inserts (not included).
Comes with an 3MT arbor.
Uses Inserts TPKN1603 (L0661)

(Order Code M529)

A. ELECTRICAL DIAGRAM



SPARE PARTS SECTION

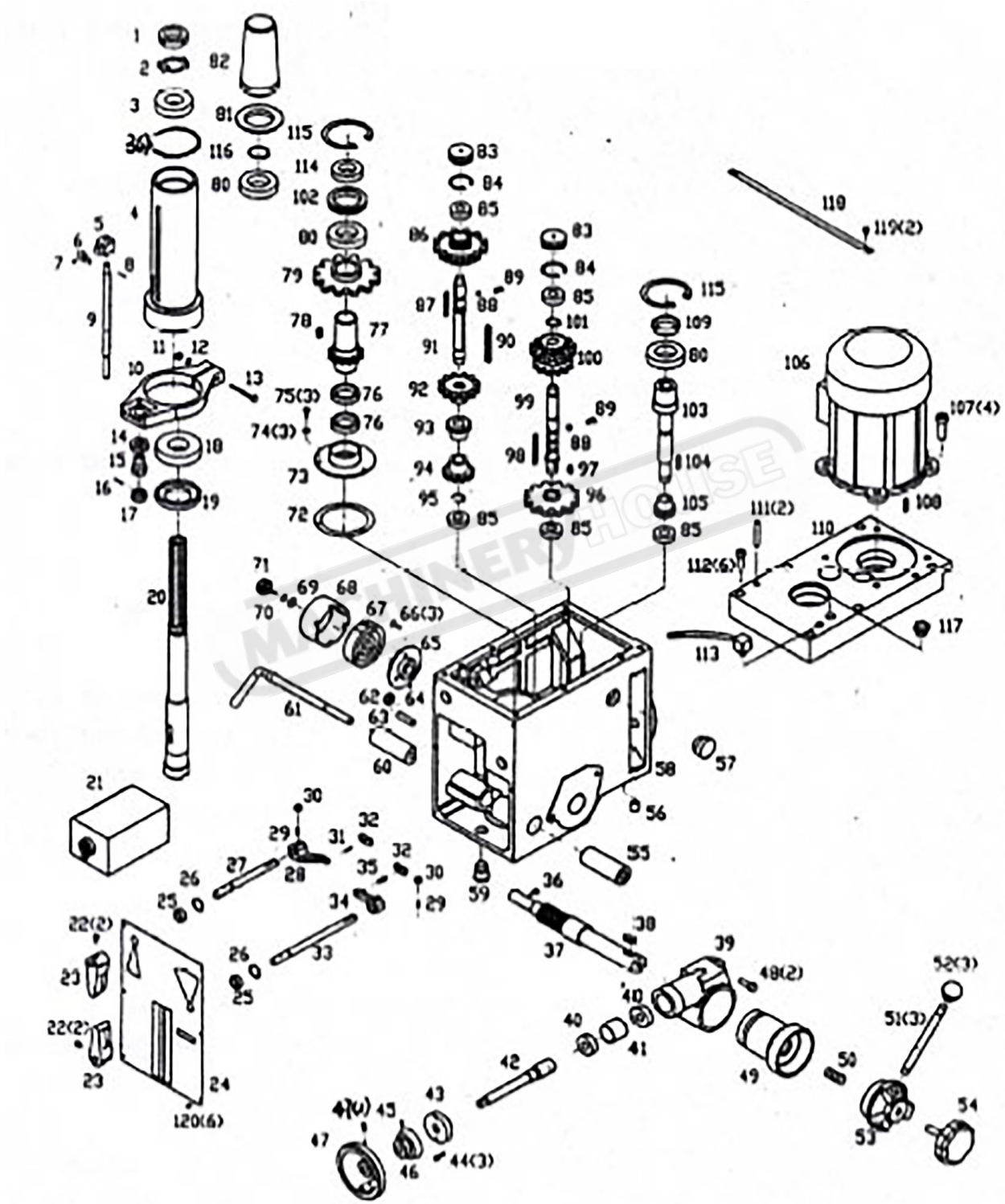
The following section covers the spare parts diagrams and lists that were current at the time this manual was originally printed. Due to continuous improvements of the machine, changes may be made at any time without notification.

HOW TO ORDER SPARE PARTS

1. Have your machines **model number, serial number & date of manufacture** on hand, these can be found on the specification plate mounted on the machine
2. A scanned copy of your parts list/diagram with required spare part/s identified
3. Go to www.machineryhouse.com.au/contactus and fill out the enquiry form attaching a copy of scanned parts list.

CONTENTS

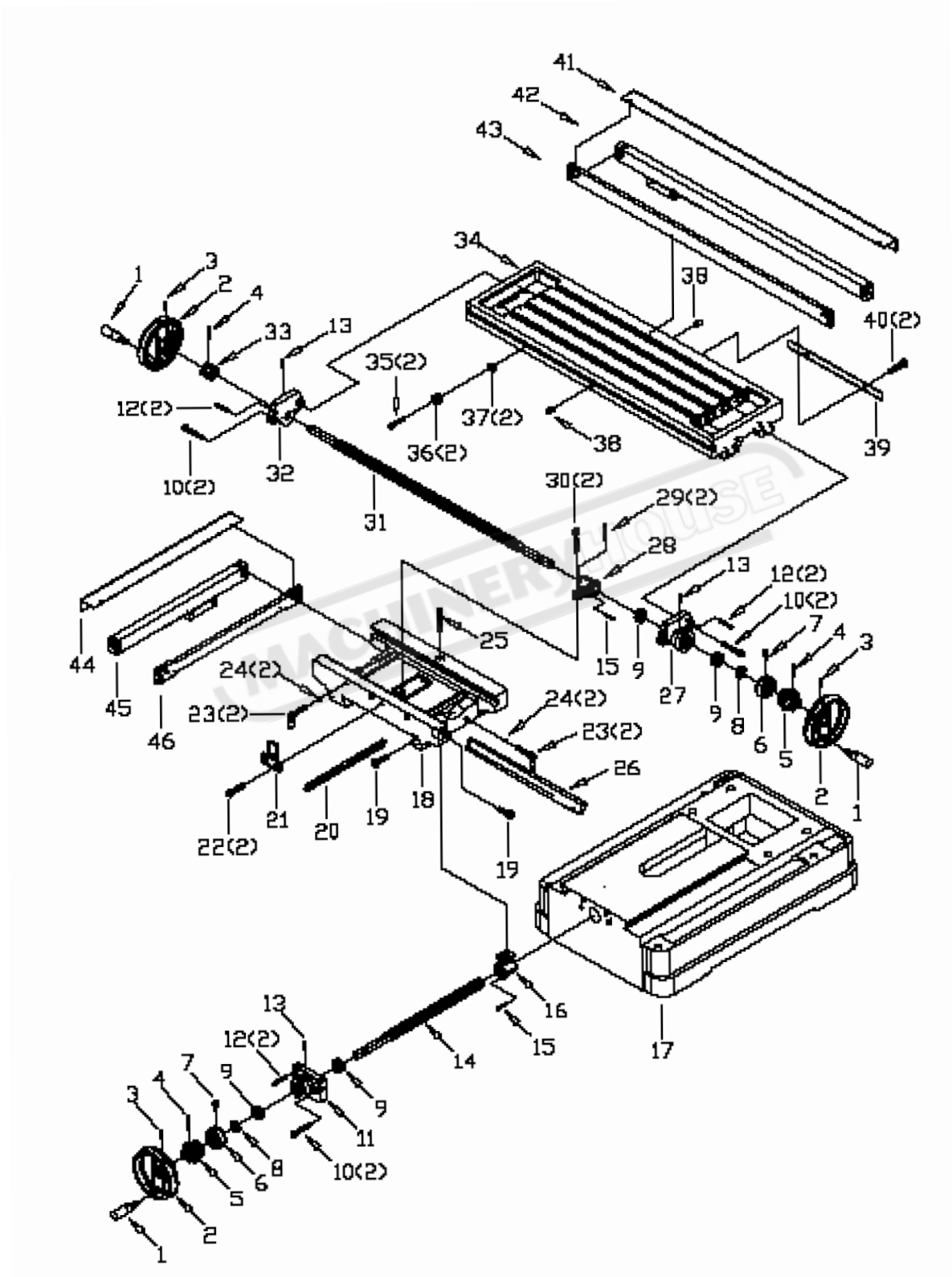
B. HEAD BODY PARTS



B. HEAD BODY PARTS LIST

1 lock nut
2 lock washer
3 ball bearing
3 (1) washer
4 sleeve
5 fixed bolt
6 scale-board
7 screw
8 pin
9 graduated rod
10 feed base
11 nut
12 washer
13 screw
14 nut
15 support
16 pin
17 knob
18 ball bearing
19 bearing cup
20 spindle
21 electric box
22 screw
23 speed lever
24 name plate
25 oil seal
26 retaining ring
27 lever shaft(left)
28 lever(left)
29 screw
30 nut
31 pin
32 lever bracket
33 lever shaft(right)
34 lever(right)
35 pin
36 screw
37 pinion shaft
38 key
39 feed cover
40 ball bearing
41 separating ring
42 worm shaft
43 worm cover
44 screw
45 screw
46 graduation plate
47 handle wheel
47(1) screw
48 screw
49 worm gear
50 spring
51 handle rod
52 handle ball
53 handle body
54 big ripple handle
55 fixed tight collar
56 oil cover
57 oil pointer
58 head body
59 fixed nut
60 fixed tight collar
61 handle rod
62 nut
63 screw
64 pin
65 spring base
66 washer 1
67 spring plate
68 spring cap
69 washer
70 washer
71 small ripple handle
72 airtight ring
73 airtight base
74 washer
75 screw
76 oil seal
77 gear
78 key
79 gear
80 ball bearing
81 arbor bolt cover base
82 arbor bolt cover
83 cap
84 retaining ring
85 ball bearing
86 gear
87 key
88 steel ball
89 spring
90 key
91 shaft
92 gear
93 gear
94 gear
95 retaining ring
96 gear
97 key
98 key
99 shaft II
100 gear
101 retaining ring
102 separating ring
103 motor
104 key
105 gear
106 motor
07 screw
108 key
109 oil seal
110 head body cover
111 pin
112 screw
113 pipe radiator
114 oil seal
115 retaining ring
116 retaining ring
117 oil cap
118 degree-meter
119 screw
120 screw

C. BASE PARTS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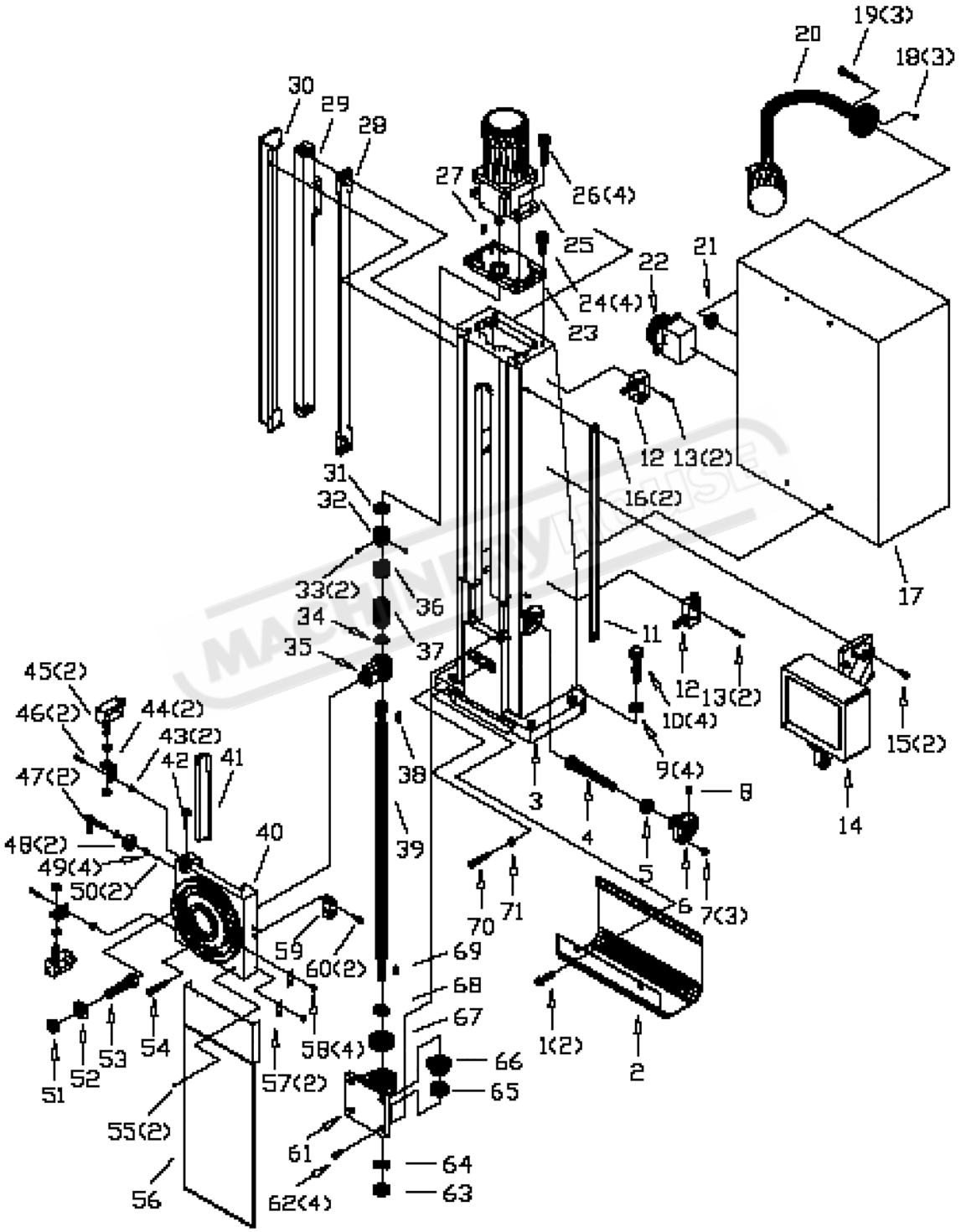
C. COLUMN AND SUPPORTS PARTS



C. BASE PARTS LIST

1 handle
2 wheel
3 screw
4 pin
5 scale base
6 graduation plate
7 screw
8 adjust washer
9 ball bearing
10 screw
11 short guide screw support
12 pin
13 oil cup
14 short guide screw nut
15 screw
16 short guide screw nut
17 base
18 table
19 gib strip screw
20 short gib strip
21 limited board
22 bolt
23 lock screw
24 steel ball
25 screw
26 long gib strip
27 bolt
28 long guide screw nut
29 oil cup
30 screw
31 long guide screw nut
32 left guide screw support
33 dial clutch
34 table
35 screw
36 limited board
37 ladder shaped nut
38 oil cup
39 protect board slice
40 screw
41 X shield
42 X the grating ruler
43 X plate
44 Y shield
45 Y the grating ruler
46 Y plate

COLUMN AND SUPPORT PARTS

1 screw
2 protect board
3 column
4 gear shaft
5 ball bearing
6 head raise bracket
7 screw
8 oil cup
9 washer
10 bolt
11 scale
12 limit switch
13 screw
14 digital display box
15 screw
16 rivet
17 Electric box
18 nut
19 screw
20 working lamp
21 retainer
22 the power switch
23 lifting motor seat
24 screw 48 the press block
25 column lifting motor
26 screw
27 key
28 Z plate
29 Z the grating ruler
30 Z shield
31 ball bearing
32 secure clutch
33 screw
34 the pressure spring seat
35 column nut
36 sliding clutch
37 A pressure spring
38 key
39 guide screw
40 Raise and lower
41 gib strip
42 screw
43 nut
44 switch frame
45 limit switch
46 screw
47 lock handle
49 nut
50 steel ball
51 nut
52 washer
53 bolt
54 screw
55 screw
56 artidust plate
57 indicator
58 rivet
59 the press block
60 screw
61 head raise bracket
62 screw
63 round nut
64 tab washer for found nut
65 ball bearing
66 gear
67 ball bearing
68 retaining ring
69 key
70 screw
71 nut

⚠WARNING

General Machinery Safety Instructions

Machinery House
requires you to read this entire Manual before using this machine.

1. **Read the entire Manual before starting machinery.** Machinery may cause serious injury if not correctly used.
2. **Always use correct hearing protection when operating machinery.** Machinery noise may cause permanent hearing damage.
3. **Machinery must never be used when tired, or under the influence of drugs or alcohol.** When running machinery you must be alert at all times.
4. **Wear correct Clothing.** At all times remove all loose clothing, necklaces, rings, jewelry, etc. Long hair must be contained in a hair net. Non-slip protective footwear must be worn.
5. **Always wear correct respirators around fumes or dust when operating machinery.** Machinery fumes & dust can cause serious respiratory illness. Dust extractors must be used where applicable.
6. **Always wear correct safety glasses.** When machining you must use the correct eye protection to prevent injuring your eyes.
7. **Keep work clean and make sure you have good lighting.** Cluttered and dark shadows may cause accidents.
8. **Personnel must be properly trained or well supervised when operating machinery.** Make sure you have clear and safe understanding of the machine you are operating.
9. **Keep children and visitors away.** Make sure children and visitors are at a safe distance for you work area.
10. **Keep your workshop childproof.** Use padlocks, Turn off master power switches and remove start switch keys.
11. **Never leave machine unattended.** Turn power off and wait till machine has come to a complete stop before leaving the machine unattended.
12. **Make a safe working environment.** Do not use machine in a damp, wet area, or where flammable or noxious fumes may exist.
13. **Disconnect main power before service machine.** Make sure power switch is in the off position before re-connecting.
14. **Use correct amperage extension cords.** Undersized extension cords overheat and lose power. Replace extension cords if they become damaged.
15. **Keep machine well maintained.** Keep blades sharp and clean for best and safest performance. Follow instructions when lubricating and changing accessories.
16. **Keep machine well guarded.** Make sure guards on machine are in place and are all working correctly.
17. **Do not overreach.** Keep proper footing and balance at all times.
18. **Secure workpiece.** Use clamps or a vice to hold the workpiece where practical. Keeping the workpiece secure will free up your hand to operate the machine and will protect hand from injury.
19. **Check machine over before operating.** Check machine for damaged parts, loose bolts, Keys and wrenches left on machine and any other conditions that may effect the machines operation. Repair and replace damaged parts.
20. **Use recommended accessories.** Refer to instruction manual or ask correct service officer when using accessories. The use of improper accessories may cause the risk of injury.
21. **Do not force machinery.** Work at the speed and capacity at which the machine or accessory was designed.
22. **Use correct lifting practice.** Always use the correct lifting methods when using machinery. Incorrect lifting methods can cause serious injury.
23. **Lock mobile bases.** Make sure any mobile bases are locked before using machine.
24. **Allergic reactions.** Certain metal shavings and cutting fluids may cause an ellergic reaction in people and animals, especially when cutting as the fumes can be inhaled. Make sure you know what type of metal and cutting fluid you will be exposed to and how to avoid contamination.
25. **Call for help.** If at any time you experience difficulties, stop the machine and call you nearest branch service department for help.

⚠WARNING

Milling Machine Safety Instructions

Machinery House
requires you to read this entire Manual before using this machine.

1. **Maintenance.** Make sure the mill is turned off and disconnect from the main power supply and make sure all moving parts have come to a complete stop before any inspection, adjustment or maintenance is carried out.

2. **Mill Condition.** Mill must be maintained for a proper working condition. Never operate a mill that has damaged or worn parts. Scheduled routine maintenance should performed on a scheduled basis.

3. **Leaving a Mill Unattended.** Always turn the mill off and make sure all moving parts have come to a complete stop before leaving the mill. Do not leave mill running unattended for any reason.

4. **Avoiding Entanglement.** Remove loose clothing, belts, or jewelry items. Never wear gloves while machine is in operation. Tie up long hair and use the correct hair nets to avoid any entanglement with the mill spindle or moving parts.

5. **Chuck key safety.** Always remove your chuck key, draw bar wrench, and any service tools immediately after use. Chuck keys left in the chuck can cause serious injury.

6. **Understand the machines controls.** Make sure you understand the use and operation of all controls.

7. **Tooling selection & holding.** Always use the correct cutting tool for the job you are milling. Make sure it is sharp and held firmly in place.

8. **Cutting Tool inspection.** Inspect Drill and end mills for sharpness, chips, or cracks before use. Replace any cutting tools immediately if dull, chipped or cracked. Handle new cutting tools with care. Cutting edges are very sharp and can cause lacerations.

9. **Reversing the spindle.** Make sure the spindle has come to a complete stop before changing the direction of the spindle. Do not slow or stop the spindle by using you hand.

10. **Stopping the spindle.** Do not slow or stop the spindle by using you hand.

11. **Speed selection.** Select the appropriate speed for the type of work, material, and tool bit. Allow the mill to reach full speed before beginning a cut.

12. **Clearing chips.** Always use a brush to clear chips. Never clear chips when the mill is running.

13. **Power outage.** In the event of a power failure during use of the mill, turn off all switches to avoid possible sudden start up once power is restored.

14. **Clean work area.** Keep the area around the mill clean from oil, tools and chips.

15. **Tilting head.** Use an assistant to help support the head correctly. Make sure bolts that secure the head for tilting are not loosened to much as head can slip and cause serious injury. Please refer to Mill head Tilting Instructions for correct procedure.

16. **Call for help.** If at any time you experience difficulties, stop the machine and call you nearest branch service department for help.

PLANT SAFETY PROGRAM

NEW MACHINERY HAZARD IDENTIFICATION, ASSESSMENT & CONTROL

Milling Machine

Developed in Co-operation Between A.W.I.S.A and Australia Chamber of Manufactures
This program is based upon the Safe Work Australia, Code of Practice - Managing Risks of Plant in the Workplace (WHSA 2011 No10)

Item No.	Hazard Identification	Hazard Assessment	Risk Control Strategies (Recommended for Purchase / Buyer / User)
A	ENTANGLEMENT	HIGH	Eliminate, avoid loose clothing / Long hair etc.
B	CRUSHING	LOW	Secure & support workpiece on mill table.
B	CRUSHING	HIGH	Mill head tilting adjustment - please refer to mill head tilting instruction sheet for correct procedure. Incorrect adjustment may result in the head becoming detatched and a crushing hazard
C	CUTTING, STABBING, PUNCTURING	MEDIUM	Isolate power to machine prior to any checks or maintenance being carried out. Do not adjust or clean machine until the machine has fully stopped.
D	SHEARING	MEDIUM	Make sure all guards are secured shut when machine is on. Isolate power to machine prior to any checks or maintenance.
F	STRIKING	MEDIUM	Ensure tooling is secure in chuck. Wear safety glasses. Stand clear of moving parts on machine. Remove all loose objects around moving parts. Ensure correct spindle direction when milling.
H	ELECTRICAL	MEDIUM	All electrical enclosures should only be opened with a tool that is not to be kept with the machine. Machine should be installed & checked by a Licensed Electrician.
M	HIGH TEMPERATURE	LOW	Wear appropriate protective clothing to prevent hot swarf.
O	OTHER HAZARDS, NOISE.	LOW	Wear hearing protection as required.
Plant Safety Program to be read in conjunction with manufactures instructions			

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Authorised and signed by:
Safety officer:.....
Manager:.....

Revised Date: 12th March 2012