Smithy

MI-329M Operator's Manual



Smithy Ind.

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While every precaution has been taken in the preparation of this manual, Smithy Ind. shall not have any liability to any person or entity with respect to any loss or damage caused or alleged to be caused directly or indirectly by the instructions contained in this manual. Please see section on warranty and safety precautions before operating the machine.

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Introduction

Welcome

Smithy MI-329M Mill. It will teach you about the parts of the machine and how to take care of your investment. This manual is complete and current at the time of printing*. In our continuing effort to bring you the best in machine tools, changes may be made - please visit us at **www.smithy.com** for the latest updates.

This manual—and any other manuals associated with this Smithy machine—should remain with the machine. If ownership changes, please include the Operating Manual with the machine.

Please read the operating manual carefully and closely. Follow the procedures described. If you don't understand how your machine works, you risk injury to yourself or others. Misuse can cause damage to the machine or to your project. To learn more about general machining practices you can turn to a number of sources. The Smithy website has a series of Machinist Training Videos under the Machining Helps section of website heading. Smithy also offers books that meet the needs of Congratulations on the purchase of your Smithy Milling Machine. We welcome you to the Smithy family of quality machine owners. Smithy strives to provide you with the best in machines and service. Please read through this manual carefully to ensure that you achieve maximum performance from your MI-329M Mill machine.

We also suggest your local library as a resource. Enrolling in a machining class will give you the best opportunity to learn about machining from professionals in a supportive environment.

Suggestions or Comments

We are interested in any suggestions you might have to improve our products and services. Feel free to contact us with your suggestions by phone or in writing. If you have comments about this operator's manual, or if you have a project you'd like to share with other Smithy owners, contact Smithy Industries, P.O. Box 1517, Ann Arbor, MI 48106-1517. You can also send an e-mail to: info@smithy.com

Questions?

If you have questions not covered in the manuals, please call our toll-free number:

1-800-476-4849

Our friendly service technicians are available Monday through Friday from 8:00 am. to 5:00 pm. Eastern Standard Time. You can also e-mail your questions 24 hours a day to **info@smithy.com.**

Customer Information

Please record the information below about your Smithy machine. Having this information readily available will save time if you need to contact Smithy for questions, service, accessories, or replacement parts.

Model Number:	
Serial Number:	
Purchase Date:	
Delivery Date:	
Customer Number	

We look forward to a long working relationship with you, and thank you again for putting your trust in Smithy.

Safety

Overview

Smithy machines are proven to be safe and reliable; however, if abused or operated improperly, any machine can cause injury. Please read this manual carefully before you start machining. Proper use will create a safe working environment and prolong the life of your machine.

Symbols Used In This Manual

In this manual, the symbols below draw attention to specific operating issues:



Potential hazard, unsafe situation, or potential equipment damage that may result in injury to yourself or damage to your machine.



Hazardous situation which if not avoided could result in series injury or death.

WARNING

Potential hazard, unsafe situation, or equipment damage could result in death or serious injury.

! NOTICE!

Alerts user to helpful and proper operating instructions.

Shop Safety Rules

Your workshop is only as safe as you make it. Take responsibility for the safety of those who use or visit it. This list of rules is by no means complete, so remember that common sense is a must.



Smithy strongly discourages the use of casters or wheels on metal-working machine benches. The weight of the machine could result in the bench tipping while being moved. Once the machine is mounted, consider your workbench to be permanent. If you must move the machine, first remove it from the bench.

WARNING - Preparing to Operate Machine

1. Read this manual thoroughly before operating your machine. Don't try to do more than you or your machine can handle. Understand the hazards of operating a machine tool. In particular, remember never to change speeds or setups until the machine is completely stopped and never operate it without first rolling up your sleeves.

MAXIMUM TOOL SIZE		
Model MI-329M		
Drill	1"	
Face Mill	3"	
End Mill	1"	
Tapping	1/2"	

- **2. Wear proper clothing.** Avoid loose-fitting clothes, gloves, neckties, or jewelery that could get caught in moving parts. If you have long hair, tie it up or otherwise keep it from getting into the machine. Always wear non-slip footwear.
- 3. Protect yourself. Use ANSI approved safety glasses, goggles, or a face

shield at all times. Use safety glasses designed for machinery operation; regular glasses will not do. Have extras available for visitors. Know when to wear a face mask or earplugs as well.

- **4. Keep your work area clean and organized.** Cluttered work areas and benches invite accidents. Have a place for everything and put everything in its place.
- **5.** Childproof your work area and keep children away from the machine while it is in use. Childproof your shop with padlocks, master switches, and starter keys or store the machine where children do not have access to it.
- 6. Never operate your machine under the influence of drugs and alcohol.
- **7. Keep track of tools.** Remove adjusting keys and wrenches from the machine before operating. A chuck key or misplaced Allen wrench can be a safety hazard.
- **8. Avoid accidental starts.** Turn the switch to the OFF position before plugging in the machine. Turn the speed dial to zero, if you have a variable speed drive, before starting your machine.
- **9. Ground your machine.** The machine has a three-conductor cord and three-prong, grounding-type plug. Never connect the power supply without proper grounding
- **10. Keep your mind on your work.** By paying attention to what you are doing and avoiding distractions you will spend many safe, enjoyable hours in your workshop.
- 11. Never leave your machine running unattended!

Attention! - Machine Operation Safety Rules

- **1. Stop the machine before servicing.** Stop the machine before making changes, removing debris, or measuring your work.
- **2. Don't over reach.** Don't reach over the machine when it's operating. Keep your hands out of the way.
- **3. Turn the switch OFF.** Turn the switch to off before plugging in the machine. If your machine is equipped with variable speed control, turn the

speed dial to zero before starting your machine.

- **4. Use proper tooling.** Use only recommended accessories and understand how they should be used before trying them out. Don't try to make a tool into something it isn't or attempt to use a tool in inappropriate ways. Remember to always use the proper tooling for the material you are cutting. Reference a general machining guide such as <u>Machinist Ready Reference</u> for recommended tooling for your material.
- **5. Secure your work.** Before starting your machine, be certain that your work piece is properly and securely mounted. Flying metal is dangerous!
- **6. Do not run you machine beyond its limits of travel.** Before starting your project, ensure that your work area does not go beyond the limits of travel on your machine. Going beyond the limits of travel will cause serious damage to your machine which will not be covered by your warranty.
- **7. Run your machine at recommended spindle speeds and feed rates.** Always cut at the recommended speed and feed rates for the type of metal that you are cutting for optimum performance. Do not begin your cut until the machine has reached the full and proper speed.
- **8.** Do not change the direction of the spindle rotation or lead screw rotation while your machine is running. Changing the rotation direction of the spindle or lead screw while your machine is running could cause serious damage to your machine.
- **9. Do not stop the spindle by hand.** Always use your on/off switch to stop the spindle from rotating.
- **10. Do not clear chips by hand.** Metal chips are very sharp and can easily cut your hand. Use a brush to clear chips.
- **11. Protect bed ways.** When removing or installing tooling from your lathe spindle, place a piece of wood or other material across the bed to protect the ways from being damaged if the tooling is dropped.
- **12. Keep your machine maintained.** Always replace worn or damaged parts before using your machine to prevent damage to your machine or the operator. Follow the maintenance schedule outline in this manual for peak performance.

MIDAS MI-329M MILL SPECIFICATIONS

ELECTRICAL SPECIFICATIONS			
Model	MI-329M		
Power Requirements	110V, Single Phase, 60 Hz		
Prewired Voltage	110V A/C		
Phase	Single		
Plug	5-15P (Included)		
Outlet	5-15R (Not Included)		
Connection Type	Plug & Cord		
SPINDLE MOTOR	R SPECIFICATIONS		
Model	MI-329M		
Horse Power	1.5 HP		
Motor Voltage	110V		
Motor Current	A/C		
Motor Amperage	16 Amps/8 Amps		
Motor Type	A/C Constant Speed Induction		
PRODUCT I	DIMENSIONS		
Model	MI-329M		
Weight	716 lbs.		
Depth	34"		
Width	48"		
Height	56"		
Footprint	25" x 16"		
SHIPPING	DIMENSIONS		
Model	MI-329M		
Shipping Weight	827 lbs.		
Depth	35"		
Width	30.5"		
Height	48"		
Content	Machine		
Туре	Wood Crate		
Must Ship Upright	Yes		

MAIN SPECIFICATIONS			
Model	MI-329M		
Work Area Requirements	73" x 50-1/2"		
T-Slot Size	5/8"		
Table Size	31.5" x 9.3"		
Column	Dovetail Ways		
Draw Bar Size	7/16-20		
Drill Chuck Size (Included)	1/2"		
Drill Chuck Arbor (Included)	R8/JT33		
Rotating Mill Head	90 Degrees (Left and Right)		
Head Travel	15"		
Quill Travel	5"		
Quill Diameter	3"		
X-Axis Travel	22"		
Y-Axis Travel	7.25"		
Spindle Taper	R8		
Spindle Speeds	95, 175, 310, 450, 850,150095, 175, 310, 450, 850,1500		
Spindle to Table (Distance)	3.25" to 18.25"		
Spindle Center to Column	9.5"		
Dial Calibration Drill - Coarse Feed	N/A		
Dial Calibration Mill - Fine Feed	.001"		
Dial Calibration X-Axis	.001"		
Dial Calibration Y-Axis	.001"		
Powerfeed (X Axis)	Optional		
Powerfeed (Z Axis)	None		
Oiled Gear Boxes	Yes		
Oil Type	SAE 30		
MAXIMUN	л TOOL SIZE		
Model	MI-329M		
Drill	1"		
Face Mill	3"		
End Mill	1"		
Tapping	1/2"		

Setting Up the MI-329M Mill

Overview

Moving a machine tool can be dangerous. Improper techniques and methods may injure you and/or damage the machine. To find a professional to move and site your Smithy machine to look in your local Yellow Pages under "Machine Tools, Moving and/or Rigging." If there is no such listing or your community does not have a rigging specialist, a local machine shop or machinist may be able to provide a referral.

Remember to use caution when moving your new Smithy.

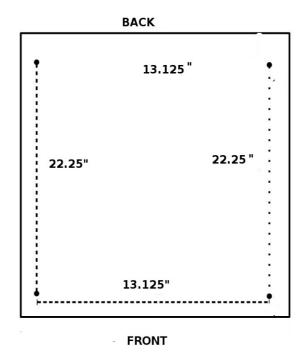
Mounting the Machine

- 1. Before mounting the machine, install the headstock positioning motor with the provided screws.
- 2. Ensure the headstock is as low as possible, and locked before moving machine.
- 3. Don't mount the machine in direct sunshine in order to avoid heat expansion, resulting in the deformity of machine and the loss of accuracy.
- 4. Mount machine to a sturdy table or a solid concrete foundation. Smithy's 80-055 with optional chip tray, item 80-056, has through holes drilled to accommodate the hole pattern of the MI-329M mill.

If your plans are to make your own stand, please reference the hole pattern below and note that all holes are measured center to center.

5. Before mounting your machine, make sure that the location is adequately suited for the machine. Allow enough clearance in the back to access the electrical box and enough clearance on the sides of the machine to allow for full X-Axis travel. Use the figures below as a general recommendation.

30" Clearance on each side of the stand 18-24" For accessing the rear of the unit



6. Once you have found a suitable location for your new mill, you will need a mechanical lifting device, such as a engine hoist or fork lift, to remove the machine from the pallet and to place it on the stand. There are four 5/8"

holes in the base of the machine. Insert steel rods through these holes so that they extend out far enough on either side of the machine to be able to attach tow ropes or chains.

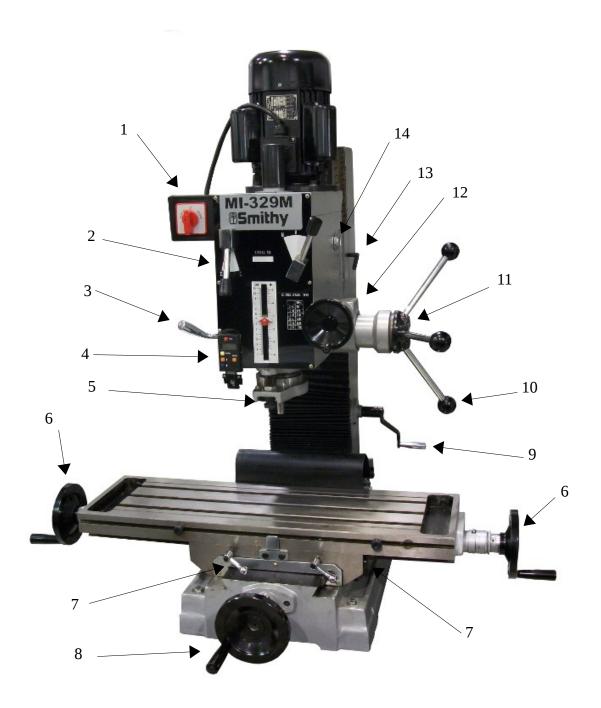
- 7. Remove the bolts, securing the machine to the pallet and any loose boxes or parts that may fall off the machine while moving it.
- 8. Attach appropriately rated chains or tow ropes to the machine and hook them to the mechanical lifting device.
- 9. Slowly lift the machine slightly off the pallet to see if the machine is properly balanced. If machine is not balanced, lower the machine back to the pallet and reposition the chains or tow ropes, until a good balance is achieved.
- 10. Once the machine is balanced, slowly lift the machine off the pallet. Do not rise the machine up until it is ready to place it on the stand.
- 11. When at the machine stand, raise the mill up to place it on the stand. Before completely lowering the machine onto the stand, use a couple of pieces of all-thread, steel rod or long bolts to align the holes in the machine base to the holes in the machine stand.
- 12. With machine in place, secure it to the base.

Machine Overview

Overview

This chapter will help you to familiarize yourself with the Smithy MI-329M Mill machine. The figure below identifies the major controls for your machine.

MAJOR CONTROLS



CONTROL DESCRIPTION

1. SPINDLE MOTOR SWITCH.

 Rotate clockwise for forward and counter clockwise for reverse. Center position is off.

2. SPINDLE SPEED SELECTOR HANDLES.

 Two control levers give a total of 6 speeds. The speed chart is on the front of the mill head.

3. QUILL DEPTH LOCK.

Use to lock the quill in the desired vertical position.

4. DEPTH GAUGE STOP KNOB.

 Use to set the depth gauge for stopping the quill at a desired amount of travel. The scale is directly above the adjustment knob

5. Z AXIS DRO.

Gives a digital position of the quill.

6. X AXIS FEED HANDLES.

• The dial behind the handle is graduated in .001" increments for precise movement.

7. Y AND X AXIS LOCK HANDLES.

Locks the X or Y axis in place to prevent unwanted movement.

8. Y AXIS FEED HANDLE.

• The dial behind the handle is graduated in .001" increments for precise movement.

9. MILL HEAD VERTICAL CRANK.

 Used to raise or lower the entire mill head. Be sure to lock the Z axis lock #13 before using the mill.

10. Z AXIS COARSE FEED.

Use to feed quill like a drill press.

11. FINE FEED ENGAGEMENT KNOB.

• Turn the knob all the way clockwise to engage the fine feed for the quill. Turn the knob counter clockwise to disengage the fine feed and use as a drill press.

12. QUILL FINE FEED HANDLE.

• Use to feed the quill in a precision manner for milling operations. Dial is calibrated in .001" per division.

13. MILL HEAD TRAVEL LOCK.

• Locks the mill head in the desired vertical position.

14. OIL SITE GAUGE.

• Indicates the oil level in the mill head. It should be about $\frac{1}{2}$ way up the site gauge. Oil is added through the vent cap on top of the mill head.

NOTICE: Check all parts and safety precautions for proper condition before operation.

Preparing the MI-329M for Operation

Overview

Before using your new machine, it is important to make sure it is top working condition and is properly lubricated. The section of the manual, will walk you through lubrication and gib adjustments.

Cleaning and lubricating the machine

Smithy machines are shipped with a protective grease coating. To remove it, spray on WD-40, let it sit for a few minutes, and wipe it off with rags. Use a brush and noncorrosive kerosene or white mineral spirits to clean hard to reach places.

Give special attention to the lead screw. Use a brush or cotton string to clean down into the threads.

Once it's cleaned, your Smithy is ready for lubricating. Do this carefully and thoroughly before starting the machine. There are oil buttons located in numerous locations on the machine. Use pressure oil can and good quality SAE No. 20 or 30 weight machine oil.

The mill head has an oil site gauges on the right side of the mill head. The oil level should be half way up the site gauge. SAE 30 oil is recommended for the headstock. The oil is added through the vent plug on the top of the mill head.

When the machine is not in use, it is recommended that a thin coat of oil be applied to all exposed metal parts to protect the surfaces from corrosion.

Adjusting the mill gibs when needed.

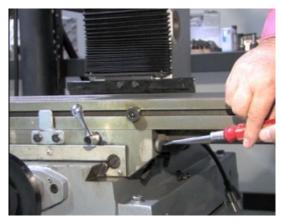
The objective of adjusting the gibs is to eliminate as much play in the X, Y, and Z axis as possible without having the tightness of the gib interfere with their movement and cause a decrease in the accuracy and performance of the machine due to excessive friction.

Before beginning, make sure the ways are clean and well-oiled.

X Axis Gib Adjustment

There are two adjustment screws for X, Y and Z axis. One on the left and the other one on the right end which shown in the images below. Turning in the right screw will adjust the gib tighter and turning in the left screw will makes everything loose. Have both of them loose, and then start turning the right screw a little bit of a time to make it tighter. When you fill drag on the hand wheel that's the time to stop and tighten the other screw on the left. You tighten both screws to hold the device.





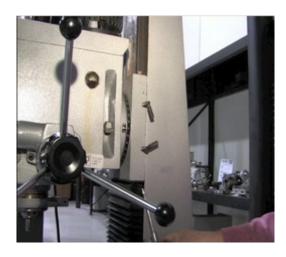
Y Axis Gib Adjustment

There are also two adjustment screws. One in the front and the other one on the back end which also shown in the image below. To loosen the gib for Yaxis, screw out the front screw and screw in the rear screw. While screw in the front screw and screw out the rare screw will tighten the gib.



Z Axis Gib Adjustment

Images below will show the location of the adjustment screw. The process is also the same with the X and Y axis gib adjustment. Screw out the upper screw and screw in the lower screw will loosen the gib while screw in the upper screw and screw out the lower screw will tighten the gib.





Chapter 8

Running-in

The MI-329M milling machine is put through a initial run-in procedure at the factory before the machine is packaged for shipment.

- **1.** Once you have your mill setup, Smithy recommends that the spindle motor be run for about 5 minutes at each of the spindle speeds starting with the slowest speed.
- 2. When the machine has set for some period of thin without being run or if the machine is in a cold environment, it is recommended to run the spindle for about 5 minutes at a medium speed before beginning and cutting operations.

Mill Operations

Simple instruction for Operating Machine

- 1. Raise and lower the headstock on its rack and pinion mechanism by using the crank. When the desired height is reached, tighten the locking bolts to avoid vibration.
- 2. Head may be rotated 90° in either direction. Loosen the three lock nuts. Adjust the head to the desired angle, and then tighten the heavy duty head lock nuts.

<u>NOTE:</u> The oil fill plug on the top of the mill head is also a vent to allow the head to breath. When the head is tilted it is possible for some oil to drip out of the vent. This is normal. Reposition the head to the normal vertical position will stop this drip!!

- 3. Move the table from side to side by using the longitudinal handwheel, and from front to back by using the cross handwheel .
- 4. Adjust the positive depth stop gauge according to desired working depth.

Turning Machine On

1. The only electrical switch is the Forward?Reverse switch for turning on the spindle motor.

Changing Spindle Speed

- 1. Turn the spindle motor off.
- 2. To select the proper speed, move the handles to the desired position as indicated positions as shown of the speed chart on the front of the mill head.
- 3. If the gears are not engaging easily, remove the arbor bolt cover. Rotate the spindle slightly to engage the gears, and then replace the arbor bolt cover.
- 4. Recheck the handle setting, and then turn the power on.

Spindle speeds and travel

Determining Speeds for Milling

Speeds

Milling cutting rates vary according to the machinability of the material being cut; whether cutting fluid is used and, if so, what kind; the type, size, and material of the cutter and the coarseness of its teeth; and the amount of metal being removed. Cutting speed for milling is the distance the cutting edge of a tooth travels in one minute. If cutting speed is too high, the cutter overheats and becomes dull. If it's too low, production is inefficient and rough.

There is no exact right cutting speed for milling a particular material. Machinist usually start with an average speed, then increase or decrease it as needed. For light cuts, use the upper end. Use the lower end for heavy cuts and when you don't use cutting fluid.

Determining rpm. To set the spindle speed, you have to know the cutter rpm (revolutions per minute).

For inch measurements, use this formula:

rpm = 12 x CS (fpm) / D" x π

where:

CS - cutting speed fpm -feet per minute

D" - diameter of the cutter in inches

 $\pi=3.14$ You can use an rpm chart for selected diameters of cutting tools at different cutting speeds.

For metric measurement, use this formula:

rpm = CS (rpm) x 1000 / D (mm) x π

where:

CS - cutting speed mpm - meters per minute D (mm) - diameter of the cutter in millimeters

 π = 3.14. You can use an rpm chart for selected diameters of cutting tools at different cutting speeds.

Up Milling

In up milling, forces on the work piece tend to pull it out of the vise or fixture holding it, so fasten it securely. These forces also push the work piece away from the cutter, which eliminates backlash. Up milling is advised for milling cast iron, softer steels, and other ductile materials. In general, it's how you should perform milling operations.

Down Milling

Down milling usually produces good surface finishes because chips do not sweep back into the cut. Setups are more rigid, an advantage when cutting thin work pieces held in a vise or work pieces held in a magnetic chuck. Down milling also produces straighter cuts. We recommend down milling when using carbide cutters because there is less wear on the cutting tool. In general, however, avoid it because of the backlash problems associated with it.

Using the Depth Gauge



- **1.** Place the cutter or the drill onto the surface to be machined.
- 2. Use the knob on the bottom of the depth gauge to set the depth you wish the quill to stop.
- **3.** When the quill is advanced into the material, it will stop at the pre-set depth.

Using the Z Axis DRO



- 1. The OFF button turns the DRO off.
- 2. The ON /) button turns the DRO on and will reset it to zero at whatever location the quill is at the time.
- **3.** The mm/in switches between inch and metric measurements.
- **4.** The up and down arrows can be used to set a specific travel.
- Place the guill in the desired start location.
- Press the 0 button to zero the DRO.
- Use the up or down buttons to set the desired travel.
- The display count down to zero as the quill is moved.

Tooling Installation and Work Holding

Installing and Changing Tools

WARNING: Be sure the power is turned off and the machine unplugged before installing or changing tool bits

Aligning Tooling - Use the procedure below to align your tooling in the R-8 spindle:

- **1.** Select the appropriate tool or fixture.
- **2.** Wipe the surfaces of the tooling and spindle interior to ensure a proper fit. Grease or debris on either surface will cause misalignment.
- **3.** align the keyway in your tooling with the key inside the mill spindle and insert the fixture in the lower mill spindle opening.

You can feel the key in the mill spindle with your finger. It is located just beyond the tapered portion of the spindle.

Securing R-8 Tooling with the Drawbar - Use the procedure below for attaching and securing the drawbar:

- **1.** Remove the arbor bolt cover located on the top of the mill belt cover and insert a drawbar (SAE standard 7/16-20) from the top of the spindle.
- **2.** Tighten the drawbar clockwise into the fixture or tooling that is inserted into the mill spindle opening. Use the spanner wrench to stabilize the spindle while tightening the drawbar.
- **3.** Use a wrench to apply torque to the drawbar. This will draw the fixture firmly into the spindle.
- **4.** Reinstall the arbor bolt cover when the fixture/tooling is in place.

Removing R-8 Tooling from the Drawbar

Use the procedure below to remove tooling using the drawbar method:

- **1.** Stabilize the drawbar with the spanner wrench and use a wrench to apply force counter clockwise to the drawbar nut.
- 2. Loosen the drawbar two to three turns counter clockwise.
- **3.** Use a dead blow or brass hammer to strike a downward blow on the top of the drawbar to loosen the fixture from the spindle. Unscrew the drawbar only two to three turns before striking. Unscrewing it further before striking the drawbar can damage the threads on the drawbar or the fixture.
- **4.** Continue turning the drawbar until it unscrews from the tooling.
- **5.** After the tool is free from the spindle, hold the fixture with your free hand or use a catch box to prevent the tooling from dropping onto your machine or work piece.

A common catch box consists of a cardboard or wooden box eight to ten inches square with four- to six-inch high sides. Rags loosely thrown in the bottom of the box provide padding for the tool to land in when the drawbar is removed from the fixture and the fixture falls from the mill spindle.

Holding Milling Cutters

There are several ways to hold milling cutters: in arbors, with collets and special holders, and in adapters.

Arbors

Arbors come in different sizes and lengths, with one end tapered to fit the bore in the end of the machine spindle. The MI-329M mill arbor, which has an MT4 taper, is driven by spindle. The arbor stays in place by means of a drawbar screwed into the end of the arbor from the top of the spindle.

Take good care of your arbors. Store them in a rack or bin. If you won't be using them for several days or longer, oil them to prevent rusting, especially in damp weather.

Collets and Holders

Straight-shank end mills fit into spring collets or end mill holders. Their precision-ground shanks go into the mill spindle. When you tighten a spring collet, its hole reduces and the collet grips the end of the end mill shank evenly. Tighten the end mill securely with the setscrew against the flat surface of the end mill, or it may slip out and damage the work piece, the cutter or you.

Adapters

Adapters mount various types and sizes of cutters on the spindle. Arbor adapters mount face mills on the spindle. Collet adapters mount end mills on the spindle. Taper-shank end mills mount in adapters that have holes with matching tapers. If the taper shank on the tool is smaller than the hole in the adapter, put a reducing sleeve into the adapter. Shell end mill adapters come in different sizes to accept different sized shell end mills.

To remove arbors or adapters held with a drawbar, follow these steps:

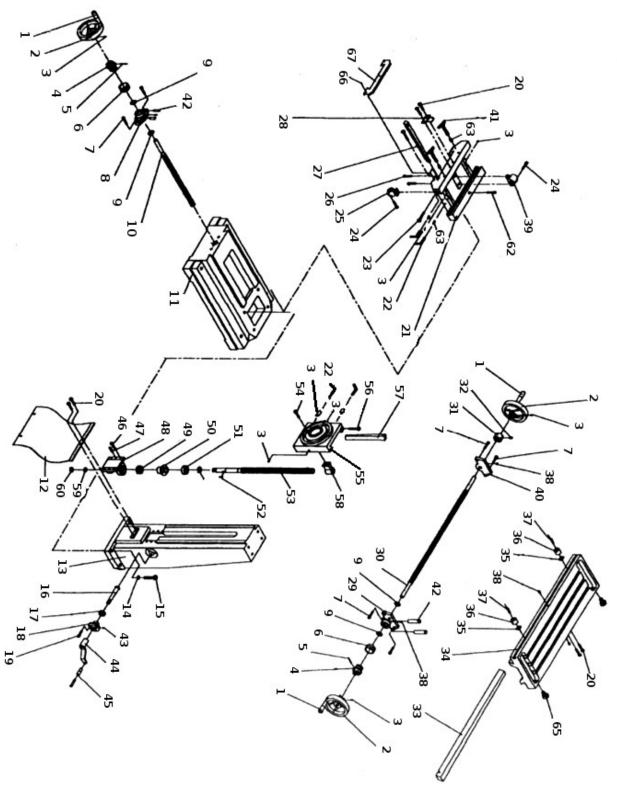
- 1. Loosen the locknut on the drawbar about two turns.
- 2. Hit the end of the drawbar with a dead-blow hammer, releasing the arbor or adapter from the spindle hole.
- 3. Hold the arbor or adapter so it won't fall out of the spindle when the drawbar is removed.
- 4. Unscrew the drawbar and remove the arbor or adapter.
- 5. Your machine includes a tapered drift for removing tapers. Follow these steps:

- 6. Remove the drawbar.
- 7. Extend the mill spindle to expose the outer taper drift slot.
- 8. Rotate the spindle to align outer and inner taper drift slots. You will be able to see the end of the adapter through both slots.
- 9. Insert the drift in the slot.
- 10. Holding the adapter with one hand, use a non marring hammer (rubber, dead-blow, or brass) to drive the drift into the slot. The taper on the tool will release and the adapter drop out.

Cutters mounted in the spindle must fit accurately. There are two ways to make sure they do. For small cutters, fit the shank of the arbor that carries the cutter directly into the taper hole at the end of the spindle. A drawbar holds the arbor in place. For large cutters, bolt the cutter directly to the end of the spindle.

Ordering Machining Accessories: To order machining accessories for your MI-329M mill refer to the accessories section of the Smithy website at www.smithy.com.

Diagrams and Parts Listings

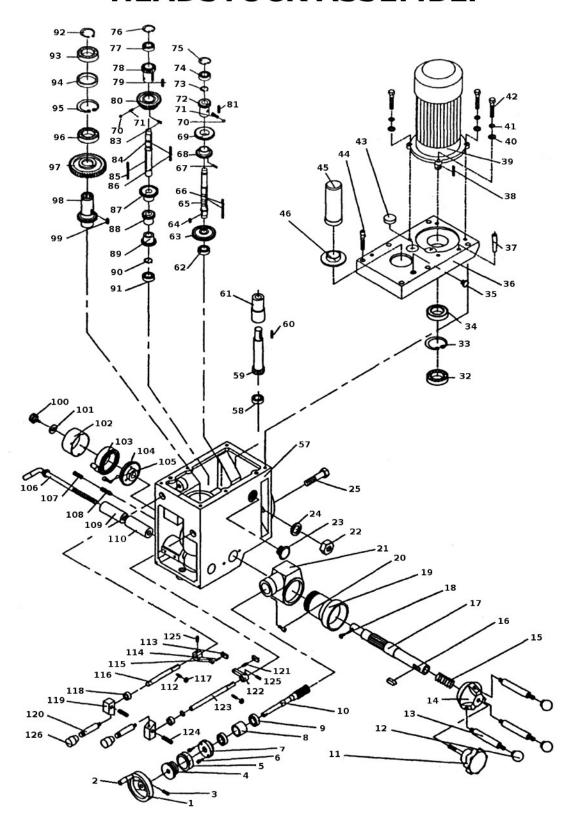


BED, TABLE & COLUMN

	BED, TABLE & COLUMN ASSEMBLY			
ITEM	SMITHY #	MFG #	DESCRIPTION	QTY
1	LX01022	GB/T7270.4	Handle M10 x 80	3
2	LX01021	Z32-01-028	Handwheel	3
3	S11981	GB/T77-85	SCREW M6 x 8 Flat point set	3
4	LX01019	ZX32-01-023	Dial Clutch Y	2
5	S22260	GB/T879-86	Pin, Spring M5 x 35	2
6	LX01018	ZX32-01-022	Dial Ring	2
7	S12271	GB/T70-85	Screw M8 x 16 Allen head cap	6
8	CX01008	ZX32-01-027	Flange C	1
9	CX01009	GB/T301-94	Bearing, Thrust 51103 17x30x9	4
10	CX01010	ZX32-01-024	Screw, Cross Feed Y	1
11	CX01011	ZX32-01-016	Base	1
12	LX01096	ZX32-01-010	Plate, Anti-Dust	1
13	CX01013	ZxX32W-01-004	Column	1
14	CX01014	GB/T93-87	Washer, Locking M16	4
15	CX01015	GB/T5780-86	Bolt M16 x 60	4
16	CX01016	ZX32W-01-008	Gearshaft	1
17	CX01017	GB/T301-94	Bearing, thrust 51103 17x30x9	1
18	CX01018	ZX32W-01-009	Seat, Gearshaft	1
19	S11991	GB/T70-85	Screw M6 x 20 Allen head cap	3
20	CX01020	GB/T5781-86	Bolt M8 x 12	2
21	CX01021	ZX32-01-015(1)	Saddle	1
22	CX01022	ZX32-01-020	Lock Screw, Gib Y	4
23	CX01023	ZX32-01-004	Screw, Gib Adj	4
24	S12215	GB/T70-85	Screw M5 x 12 Allen head cap	1
25	CX01025	ZX32-01-025	Nut, Cross Feed Y	1
26	CX01026	GB/T70-85	Screw M8 x 16 Allen head cap	2
27	CX01027	ZX32-10-019	Gib Y	1
28	CX01028	ZX32-01-005	Stop Plate X	1
29	CX01029	ZX32-01-002	Flange A	1
30	CX01030	ZX32-01-021	Screw, Long Feed X	1
31	CX01031	ZX32-01-014	Dial Clutch X	1
32	S11101	GB/T77-85	SCREW M10 x 10 flat point set	1
33	CX01033	ZX32-01-003	Gib X	1
34	CX01034	ZX32-01-001(3)	Table	1
35	CX01035	ZX32-01-012	Stop Pin Block X	2
36	CX01036	ZX32-01-011	Stop Pin X	2

37	S11951	GB/T70-85	SCREW M6 x 12 socket head cap	2
38	C30050	GB/T1155-79	Oiler M6	5
39	CX01039	ZX32-01-026	Nut, Long Feed X	1
40	CX01040	ZX32-01-013	Flange B	1
41	CX01041	GB/T270.12-94	Lock Screw, Gib X 10 x 32	2
42	S22830	GB/T118-86	Pin, Taper M8 x 30	4
43	C30050	GB/T1155-79	Oiler M6	1
44	LX01013	ZX32W-01-018	Crank	1
45	CX01045	GB/T7272.1-94	Handle 6 x 63 x 12	1
46	S22830	GB/T118-96	PIN, Taper M8 x 30	2
47	S12291	GB/T70-85	Screw M8 x 20 Allen head cap	4
48	LX01101	ZX32W-01-006	Support Seat	1
49	CX01049	GB/T301-95	Bearing Thrust 51103 17x30x9	1
50	LZ01103	ZX32W-01-007	Bevel Gear	1
51	S20290	GB/T276-94	Bearing 6204 ball 20x47x14	1
52	CX01052	GB/T1096-79	Key m5 x 12	1
53	CX01053	ZX32W-01-005	Screw. Z Axis feed	1
54	CX01054	GB/T70-85	Screw M8 x 40 Allen head cap	1
55	CX01055	ZX32W-01-001(A)(1)	Carriage, Vertical	1
56	CX01056	ZX32W-01-014	Screw, Gib Adjusting Z	2
57	CX01057	ZX32W-01-003	Gib Z	1
58	CX01058	ZX32W-01-002	Nut, Feed Screw Z	1
59	CX01059	GB/T858-76	WASHER, LOCK TAB M16	1
60	CX01060	GB/T810-88	NUT, SPANNER M16 x 1.5	1
61	S23120	GB/T894.1-86	SNAP RING,EXTERNAL M20	1
62	CX01062	GB/T70-85	SCREW M8 x 45 Allen head cap	1
63	CX01063	HQ400-11-015	Pin, Clamping	4
64	CX01064	ZX32W-01-013	Pin, Clamping	2
65	CX01065	??	Plug	2
66	CX01066	GB/T818-85	SCREW, M5 x 10 pan head	3
67	CX01067	ZAY7532-01-017	Way wiper	1

HEADSTOCK ASSEMBLY

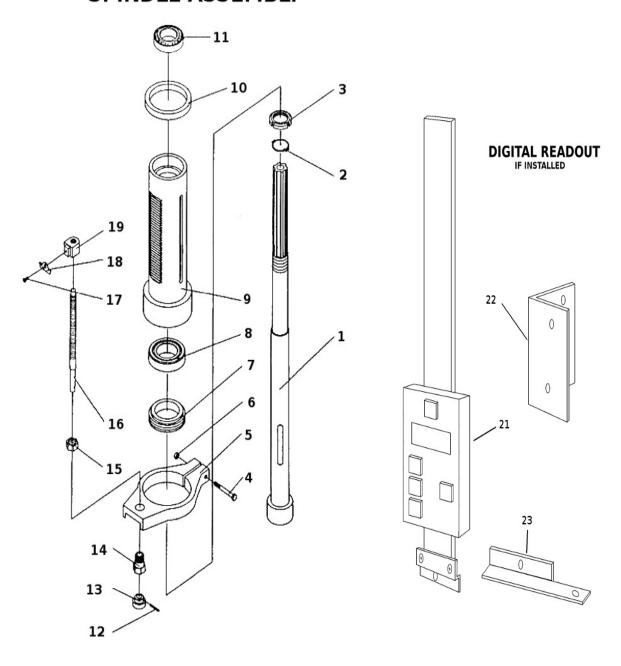


		HEADSTO(CK ASSEMBLY	
ITEM	SMITHY #	MFG #	DESCRIPTION	QTY
1	CX02001	JB/T7272.2	Handwheel 12x100	1
2	CX02002	JB/T7270.4	Handle M6x32	1
3	S11088	GB/T77-85	Screw, Set Flat Point M8x8	1
4	CX02004	ZX32-05-002	Dial Seat	1
5	CX02005	ZX32-01-022	Dial	1
6	S12516	GB/T70-85	Screw, Cap Sock Head M5x15	6
7	CX02007	ZX32G-04-009	Cover	1
8	CX02008	ZX32G-04-008	Spacer, Bearing	1
9	CX02009	GB/T276-94	Bearing 6007 Ball 35x62x14	2
10	CX02010	ZX32G-04-007	Worm Shaft	1
11	CX02011	ZX32G-04-006	Knob & Lock Bolt	1
12	CX02012	JB/T7271.1-94	Knob	3
13	CX02013	JB/T7271.6-94	Handle Lever	3
14	CX02014	ZX32G-04-004	Hub, Handle	1
15	CX02015	ZX32G-04-005	Spring	1
16	S21800	GB/T1096	Key M8x22	1
17	CX02017	ZX32G-04-001	Gear Shaft	1
18	S11335	GB/T818-85	Screw, Pan head M4x8	1
19	CX02019	ZX32G-04-003	Worm	1
20	S12291	GB/T70-85	Screw, Cap Sock Head M8x20	2
21	CX02021	ZX32G-04-002	Feed Box Casting	1
22	CX02022	GB/T6182-86	Nut, Lylock M16	2
23	CX02023	GB/T1160.2-89	Gauge, Oil site	1
24	CX02024	GB/T93-87	Washer, Spring Locking M16	2
25	CX02025	GB/T5782-86	Bolt, Grade A or B M16x60	2
32	CX02026	GB/T276-94	Bearing, 6007 Ball 35x62x14	3
33	CX02033	GB/T893.2-86	Snap Ring, Internal M62	2
34	CX02034	GB/T9877.1-88	Seal, Oil 35x62x12	1
35	CX02035	ZX32G-02-045	Oil Fill & Vent Plug	1
36	CX02036	ZX32G-02-011	Head Top Plate	1
37	CX02037	GB/T118-86	Pin, taper M10x50	2
38	S21650	GB/T1096	Key, Parallel M6x32	1
39	CX02039		Motor USE CX20118 FOR NOW	1
40	S18170	GB/T95-85	Washer, Flat M10	4
41	CX02041	GB/T93-87	Washer, Spring Locking M10	4
42	CX02042	GB/T5782-86	Bolt, Grade A or B M10x35	4
43	CX02043	ZX32G-02-015	Cap	2

44	CX02	GB/T70-85	Screw, Cap Sock Head M8x55	6
45	CX02045	HQ400-24-021	Cover, Drawbar	1
46	CX02046	ZX32G-02-013	Plate, Drawbar Cover	1
57	CX02057	ZX32G-02-001	Casting, Headstock	1
58	CX02058	GB/T276-94	Bearing 6003 Ball 17x35x10	3
59	CX02059	ZX32G-02-023(2)	Gear Shaft	1
60	S21650	GB/T1096	Key, Parallel M6x32	1
61	CX02061	ZX32G-02-023(1)	Bushing	1
62	CX02062 ▼	GB/T276-94	Bearing 6003 Ball 17x35x10	1
63	CX02063	ZX32G-02-024	Gear	1
64	S21424	GB/T1096	Key, Parallel M6 x 12	1
65	CX02065	ZX32G-02-017	Shaft	1
66	S21740	GB/T1096	Key, Parallel M5x60	1
67	S11613	GB/T73-85	Screw, Set Flat Point M5x8	1
68	CX02068	ZX32G-02-020	Gear	1
69	CX02069	ZX32G-02-019	Gear	1
70	CX02070	GB/T308-84	Ball, Steel M8	2
71	CX02071	GB/T2089	Spring	2
72	CX02072	ZX32G-02-018	Gear	1
73	S23215	GB/T894.1-94	Snap Ring, External M18	2
74	S20015	GB/T276-94	Bearing 6202 Ball 15x35x11	3
75	CX02075	GB/T893.2	Snap Ring Internal M35	1
76	CX02075	GB/T893.2	Snap Ring Internal M35	1
77	S20015	GB/T276-94	Bearing 6202 Ball 15x35x11	1
78	CX02078	ZX32G-02-016	Gear	1
79	S1110	GB/T1096	Key, Parallel M6x14	1
80	CX02080	ZX32G-02-014	Gear	1
81	CX02081	GB/T1096	Key, Parallel M6x28	1
83	S11613	GB/T73-85	Screw, Set Flat Point M5x6	1
84	CX02084	ZX32G-02-003	Shaft	1
85	CX02085	GB/T1096	Key, Parallel M6x75	1
86	CX02085	GB/T1096	Key, Parallel M6x75	1
87	CX02087	ZX32G-02-006	Gear	1
88	CX02088	ZX32G-02-005	Gear	1
89	CX02089	ZX32G-02-004	Gear	1
90	S23215	GB/T894.1-86	Snap Ring, External M18	1
91	S20015	GB/T276-94	Bearing 6202 Ball 15x35x11	1
92	CX02092	GB/T894.2-94	Snap Ring, External M35	1
0.2	CX02026	GB/T276-94	Bearing, 6007 Ball 35x62x14	1
93	CX02026	GB/1270-94	Dearing, 0007 Daii 33x02x14	+

95	CX02095	GB/T893.2-86	Snap Ring, Internal M62	1
96	CX02026	GB/T276-94	Bearing, 6007 Ball 35x62x14	1
97	CX02097	ZX32G-02-010	Gear	1
98	CX02098	ZX32G-02-009	Sleeve Gear	1
99	S12592	GB/T1096	Key, Parallel M6x18	1
100	CX02100	ZX32G-02-041	Knob	1
101	CX02101	ZX32G-02-042	Washer	1
102	CX02102	ZX32G-02-043	Cover, Spring	1
103	CX02103	ZX32G-02-047	Spring	1
104	CX02104	ZX32G-02-040	Spring Base	1
105	S12510	GB/T70-85	Screw, Cap Sock Head M5x10	3
106	CX02106	ZX32G-02-034	Handle, Locking	1
107	S13512	GB/T77-85	Screw, Set Flat Point M10x12	1
108	S12618	GB/T79-85	Screw, Set Dog Point M10x25	1
109	CX02109	ZX32G-02-038	Locking Collar A	1
110	CX02110	ZX32G-02-038	Locking Collar B	1
112	S11938	GB/T73-85	Screw, Set Flat Point M6x10	2
113	CX02113	ZX32G-02-025	Fork	2
114	S22421	GB/T879-86	Pin, Spring M4x12	1
115	CX02115	ZX32G-02-030	Lever	1
116	CX02116	ZX32G-02-028	Shaft (short)	1
117	S23110	GB/T894.1-86	Snap Ring, External M12	2
118	CX02118	GB/T9877.1-88	Seal, Oil 12x22x7	2
119	CX02119	ZX32G-02-029A	Handle Base	2
120	CX02120	ZX32G-02-009B	Handle	2
121	CX02121	ZX32G-02-027	Shaft	1
122	CX02122	ZX32G-02-030	Lever	1
123	CX02122	ZX32G-02-028	Shaft (long)	1
124	S22442	GB/T879-86	Pin, Spring M4x25	2
125	S11691	GB/T70-85	Screw, Cap Sock Head M5x20	2
126	CX02126	JB/T7270.4	Handle Knob M8x32	2
127				

SPINDLE ASSEMBLY



	SPINDLE ASSY & OPTIONAL DRO			
ITEM	SMITHY #	MFG #	DESCRIPTION	QTY
1	CX03001	ZX32G-03-001	Spindle	1
2	G05099	GB/T858-88	Washer, Locking Tab M30	1
3	CX03G05098	GB/T810-86	Nut, Spanner M30x1.5	1
4	CX03004	GB/T5780-86	Bolt, Hex Head M6x50	1
5	CX03005	ZX32G-03-003	Flange, Depth Gauge	1
6	S18331	GB/T41-86	Nut, Hex M6	1
7	CX03007	ZX32G-03-002	Anti-Dust Ring	1
8	LX03238	GB/T297-94	Bearing, Tapered Roller 30207/P6	1
9	CX03009	ZX32G-03-002	Quill Housing	1
10	CX03010	ZX32G-03-004	Washer, Rubber	1
11	LX03241	GB/T297-94	Bearing, Tapered Roller 30206/P6	1
12	S22316	GB/T879-86	Pin, Spring 3x16	1
13	CX03013	ZX32G-03-010	Knob, Depth Gauge	1
14	CX03014	ZX32G-03-009	Bushing, Depth Gauge	1
15	S18061	GB/T6172-86	Nut, Jam M16	1
16	CX03016	ZX32G-03-006	Rod, Depth Gauge	1
17	S11046	GB/T818-85	Screw, Pan Head M4x6	1
18	CX03018	ZX32G-03-008	Indicator, Depth Gauge	1
19	CX03019	ZX32G-03-007	Traveling Block, Depth Gauge	1
21	CX03021	??	DRO, Z axis	1
22	CX03022	???	Mount Plate, Upper	1
23	CX03023	????	Mount Plate, Lower	1

Chapter 14 Electrical Diagrams