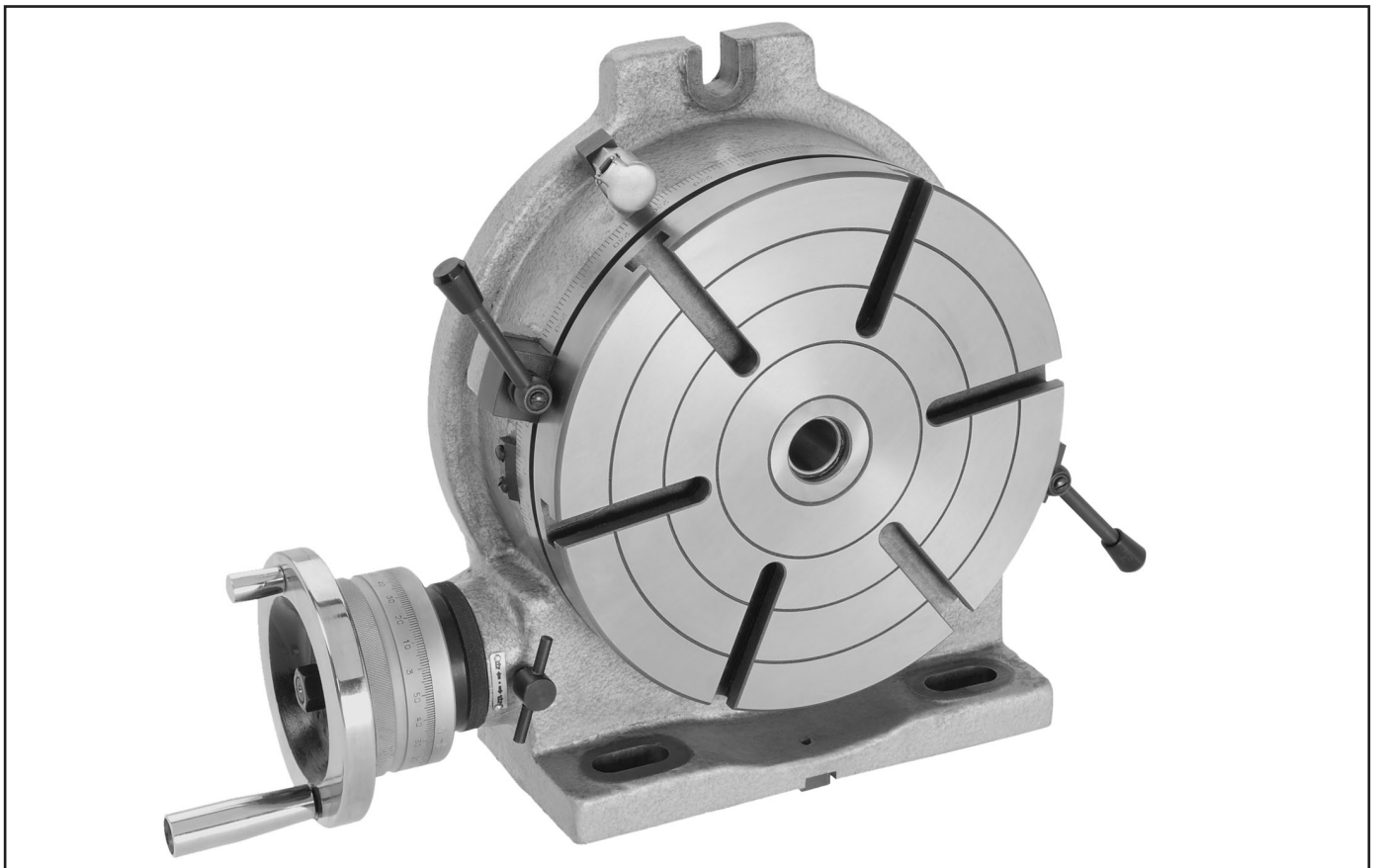


# *Grizzly* *Industrial, Inc.*®

## MODEL G9298/G9299/G9300 HORIZONTAL/VERTICAL ROTARY TABLE OWNER'S MANUAL



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**WARNING: NO PORTION OF THIS MANUAL MAY BE REPRODUCED IN ANY SHAPE  
OR FORM WITHOUT THE WRITTEN APPROVAL OF GRIZZLY INDUSTRIAL, INC.**  
#DDTS11512 PRINTED IN CHINA

# **WARNING!**

**This manual provides critical safety instructions on the proper setup, operation, maintenance and service of this machine/equipment.**

**Failure to read, understand and follow the instructions given in this manual may result in serious personal injury, including amputation, electrocution or death.**

**The owner of this machine/equipment is solely responsible for its safe use. This responsibility includes but is not limited to proper installation in a safe environment, personnel training and usage authorization, proper inspection and maintenance, manual availability and comprehension, application of safety devices, blade/cutter integrity, and the usage of personal protective equipment.**

**The manufacturer will not be held liable for injury or property damage from negligence, improper training, machine modifications or misuse.**

# **WARNING!**

**Some dust created by power sanding, sawing, grinding, drilling, and other construction activities contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm. Some examples of these chemicals are:**

- **Lead from lead-based paints.**
- **Crystalline silica from bricks, cement and other masonry products.**
- **Arsenic and chromium from chemically-treated lumber.**

**Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals: Work in a well ventilated area, and work with approved safety equipment, such as those dust masks that are specially designed to filter out microscopic particles.**

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# INTRODUCTION

## Manual Accuracy

We are proud to offer this manual with your new machine! We've made every effort to be exact with the instructions, specifications, drawings, and photographs of the machine we used when writing this manual. However, sometimes errors do happen and we apologize for them.

Also, owing to our policy of continuous improvement, **your machine may not exactly match the manual**. If you find this to be the case, and the difference between the manual and machine leaves you in doubt, check our website for the latest manual update or call technical support for help.

Before calling, find the manufacture date of your machine by looking at the date stamped into the machine ID label (see below). This will help us determine if the manual version you received matches the manufacture date of your machine.

|   |               |  |  |
|---|---------------|--|--|
|  |               | <b>MODEL GXXXX</b>   |  |
|   |               | <b>MACHINE NAME</b>  |  |
| <b>SPECIFICATIONS</b>   |               | <b>⚠ WARNING!</b>  |  |
| Motor:  |               | <b>Manufacture Date of Your Machine</b><br>ing this machine:<br>operation.<br>s and respirator.<br>sted/setup and<br>suit before starting.<br>4. <b>make sure the motor has stopped and disconnect power before adjustments, maintenance, or service.</b><br>5. <b>DO NOT</b> expose to rain or dampness.<br>6. <b>DO NOT</b> modify this machine in any way.<br>7. <b>DO NOT</b> remove safety guards.<br>8. <b>Never</b> leave machine running unattended.<br>9. <b>DO NOT</b> operate under the influence of drugs or alcohol.<br>10. <b>Maintain</b> machine carefully to prevent accidents. |  |
| Specification:  |               |  |  |
| Specification:  |               |  |  |
| Specification:  |               |  |  |
| Weight:   |               |  |  |
| <input type="text"/>  | Date          |  |  |
| <input type="text"/>  | Serial Number |  |  |
| Manufactured for Grizzly in Taiwan  |               |  |  |

For your convenience, we post all available manuals and manual updates for free on our website at [www.grizzly.com](http://www.grizzly.com). Any updates to your model of machine will be reflected in these documents as soon as they are complete.

## Contact Info

We stand behind our machines. If you have any service questions, parts requests or general questions about the machine, please call or write us at the location listed below.

Grizzly Industrial, Inc.  
1203 Lycoming Mall Circle  
Muncy, PA 17756  
Phone: (570) 546-9663  
Fax: (800) 438-5901  
E-Mail: [techsupport@grizzly.com](mailto:techsupport@grizzly.com)

If you have any comments regarding this manual, please write to us at the address below:

Grizzly Industrial, Inc.  
c/o Technical Documentation Manager  
P.O. Box 2069  
Bellingham, WA 98227-2069  
Email: [manuals@grizzly.com](mailto:manuals@grizzly.com)

## Machine Description

Rotary tables offer the ability to rotate the workpiece for milling operations. These capabilities would be difficult, if not impossible to do, any other way. Circular slots and rounded features composed of any portion of a whole circle can be produced with a rotary table.

Along with this, the rotary table can be used to create circular hole patterns, exactly spaced radial features, and machine facets, and other similar machining operations.

## NOTICE

**If you have never used this type of machine or equipment before, WE STRONGLY RECOMMEND that you read books, review industry trade magazines, or get formal training before beginning any projects. Regardless of the content in this section, Grizzly Industrial will not be held liable for accidents caused by lack of training.**



# Identification

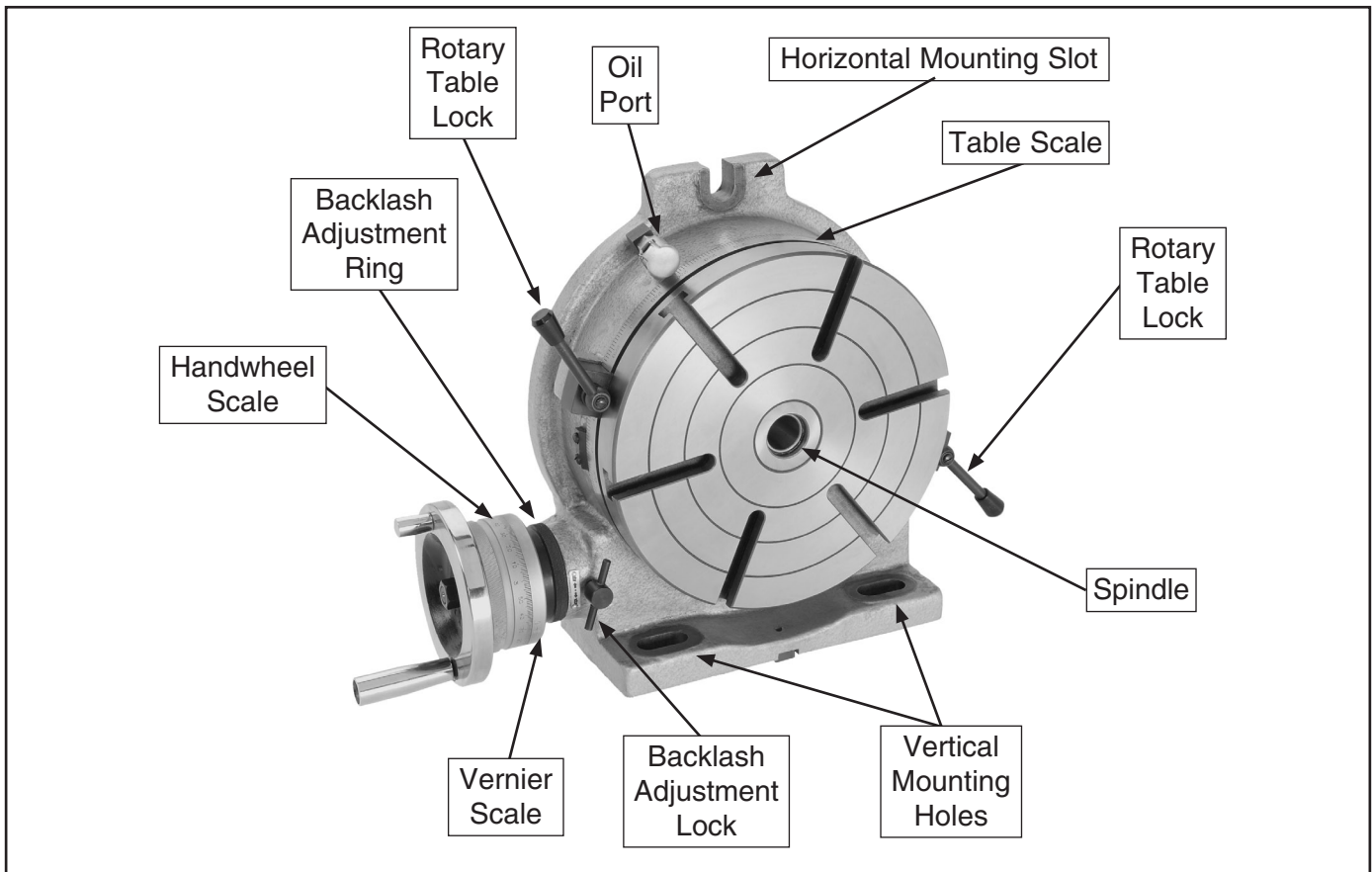


Figure 1. Model G9289/G9299/G9300 identification.

# Specifications

| Description                           | G9298   | G9299    | G9300    |
|---------------------------------------|---------|----------|----------|
| Clamping Surface Flatness (Concave)   | 0.0006" | 0.0006"  | 0.0006"  |
| Cylindrical Center Bore Concentricity | 0.0008" | 0.0008"  | 0.0008"  |
| Taper Center Bore Concentricity       | 0.0008" | 0.0008"  | 0.0008"  |
| Surface to Base Parallelism           | 0.0008" | 0.0008"  | 0.0008"  |
| Surface to Angle Face Squareness      | 0.0004" | 0.0004"  | 0.0004"  |
| Surface to Center Slot Squareness     | 0.0008" | 0.0008"  | 0.0008"  |
| Overall Height (Horizontal)           | 3.944"  | 4.330"   | 4.750"   |
| Height to Center Hole (Vertical)      | 5.985"  | 6.750"   | 8.250"   |
| Morse Taper                           | MT#3    | MT#3     | MT#4     |
| T-Slot Number                         | 4       | 6        | 6        |
| T-Slot Width                          | 0.465"  | 0.465"   | 0.545"   |
| Diameter                              | 8"      | 10"      | 12"      |
| Shipping Weight                       | 75 lbs. | 117 lbs. | 168 lbs. |

# SECTION 1: SAFETY

## WARNING

### For Your Own Safety, Read Instruction Manual Before Operating this Machine

The purpose of safety symbols is to attract your attention to possible hazardous conditions. This manual uses a series of symbols and signal words intended to convey the level of importance of the safety messages. The progression of symbols is described below. Remember that safety messages by themselves do not eliminate danger and are not a substitute for proper accident prevention measures.



Indicates an imminently hazardous situation which, if not avoided, **WILL** result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, **COULD** result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, **MAY** result in minor or moderate injury. It may also be used to alert against unsafe practices.

**NOTICE**

This symbol is used to alert the user to useful information about proper operation of the machine.

## WARNING

### Safety Instructions for Machinery

- 1. READ THE ENTIRE MANUAL BEFORE STARTING MACHINERY.** Machinery presents serious injury hazards to untrained users.
- 2. ALWAYS USE ANSI APPROVED SAFETY GLASSES WHEN OPERATING MACHINERY.** Everyday eyeglasses only have impact resistant lenses—they are NOT safety glasses.
- 3. ALWAYS WEAR A NIOSH APPROVED RESPIRATOR WHEN OPERATING MACHINERY THAT PRODUCES DUST.** Most types of dust (wood, metal, etc.) can cause severe respiratory illnesses.
- 4. ALWAYS USE HEARING PROTECTION WHEN OPERATING MACHINERY.** Machinery noise can cause permanent hearing loss.
- 5. WEAR PROPER APPAREL. DO NOT** wear loose clothing, gloves, neckties, rings, or jewelry that can catch in moving parts. Wear protective hair covering to contain long hair and wear non-slip footwear.
- 6. NEVER OPERATE MACHINERY WHEN TIRED OR UNDER THE INFLUENCE OF DRUGS OR ALCOHOL.** Be mentally alert at all times when running machinery.



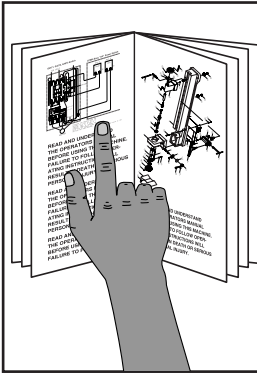
# WARNING

## Safety Instructions for Machinery

7. **ONLY ALLOW TRAINED AND PROPERLY SUPERVISED PERSONNEL TO OPERATE MACHINERY.** Make sure operation instructions are safe and clearly understood.
8. **KEEP CHILDREN AND VISITORS AWAY.** Keep all children and visitors a safe distance from the work area.
9. **MAKE WORKSHOP CHILDPROOF.** Use padlocks, master switches, and remove start switch keys.
10. **NEVER LEAVE WHEN MACHINE IS RUNNING.** Turn power **OFF** and allow all moving parts to come to a complete stop before leaving machine unattended.
11. **DO NOT USE IN DANGEROUS ENVIRONMENTS.** DO NOT use machinery in damp, wet locations, or where any flammable or noxious fumes may exist.
12. **KEEP WORK AREA CLEAN AND WELL LIGHTED.** Clutter and dark shadows may cause accidents.
13. **USE A GROUNDED EXTENSION CORD RATED FOR THE MACHINE AMPERAGE.** Grounded cords minimize shock hazards. Undersized cords create excessive heat. Always replace damaged extension cords.
14. **ALWAYS DISCONNECT FROM POWER SOURCE BEFORE SERVICING MACHINERY.** Make sure switch is in OFF position before reconnecting.
15. **MAINTAIN MACHINERY WITH CARE.** Keep blades sharp and clean for best and safest performance. Follow instructions for lubricating and changing accessories.
16. **MAKE SURE GUARDS ARE IN PLACE AND WORK CORRECTLY BEFORE USING MACHINERY.**
17. **REMOVE ADJUSTING KEYS AND WRENCHES.** Make a habit of checking for keys and adjusting wrenches before turning machinery **ON**.
18. **CHECK FOR DAMAGED PARTS BEFORE USING MACHINERY.** Check for binding or misaligned parts, broken parts, loose bolts, and any other conditions that may impair machine operation. Repair or replace damaged parts before operation.
19. **USE RECOMMENDED ACCESSORIES.** Refer to the instruction manual for recommended accessories. Improper accessories increase risk of injury.
20. **DO NOT FORCE MACHINERY.** Work at the speed for which the machine or accessory was designed.
21. **SECURE WORKPIECE.** Use clamps or a vise to hold the workpiece when practical. A secured workpiece protects your hands and frees both hands to operate the machine.
22. **DO NOT OVERREACH.** Maintain stability and balance at all times.
23. **MANY MACHINES CAN EJECT WORKPIECES TOWARD OPERATOR.** Know and avoid conditions that cause the workpiece to "kickback."
24. **ALWAYS LOCK MOBILE BASES (IF USED) BEFORE OPERATING MACHINERY.**
25. **CERTAIN DUST MAY BE HAZARDOUS** to the respiratory systems of people and animals, especially fine dust. Be aware of the type of dust you are exposed to and always wear a respirator designed to filter that type of dust.

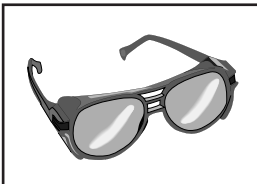


# SECTION 2: SETUP



## **!WARNING**

Read through this entire manual to become familiar with the controls and operations before using this rotary table. Follow all of the safety instructions in the owner's manual for your mill.



## **!WARNING**

Wear safety glasses during the entire setup process!



## **!WARNING**

This rotary table is very heavy. Get lifting help and use proper lifting methods to avoid possible serious personal injury.

## Needed for Setup

| Description                                 | Qty       |
|---|-----------|
| • Safety Glasses .....                      | 1         |
| • Cleaner/Degreaser ( <b>Page 7</b> ) ..... | As Needed |
| • Disposable Shop Rags.....                 | As Needed |
| • Additional People .....                   | As Needed |
| • Wrench or Socket 18mm.....                | 1         |
| • Precision Square* .....                   | 1         |
| • Test Indicator* .....                     | 1         |
| • Edge Finder* .....                        | 1         |

\* Refer to **Accessories** on **Page 15** for options from Grizzly.

## Unpacking

Your machine was carefully packaged for safe transportation. Remove the packaging materials from around your machine and inspect it. If you discover the machine is damaged, *please immediately call Customer Service at (570) 546-9663 for advice.*

Save the containers and all packing materials for possible inspection by the carrier or its agent. *Otherwise, filing a freight claim can be difficult.*

When you are completely satisfied with the condition of your shipment, inventory the contents.





# Inventory

The following is a description of the main components shipped with your machine. Lay the components out to inventory them.

**Note:** If you can't find an item on this list, check the mounting location on the machine or examine the packaging materials carefully. Occasionally we pre-install certain components for shipping purposes.

| Inventory: (Figure 2)        | Qty |
|------------------------------|-----|
| A. Rotary Table .....        | 1   |
| B. Clamping Hardware:        |     |
| —Horizontal Clamp .....      | 1   |
| —T-Bolt M12-1.75 x 80 .....  | 1   |
| —T-Bolts M12-1.75 x 60 ..... | 2   |
| —Flat Washers 12mm .....     | 3   |
| —Hex Nuts M12-1.75 .....     | 3   |

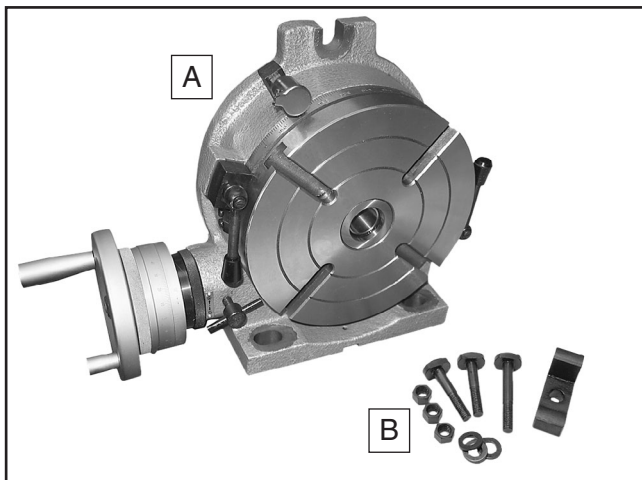
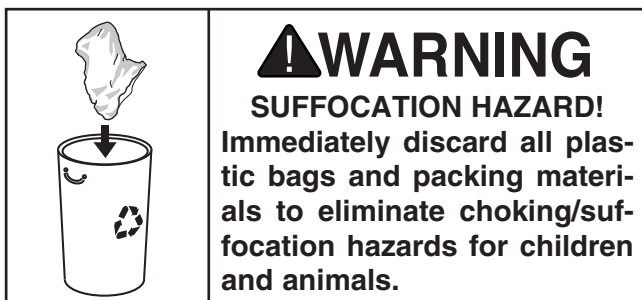


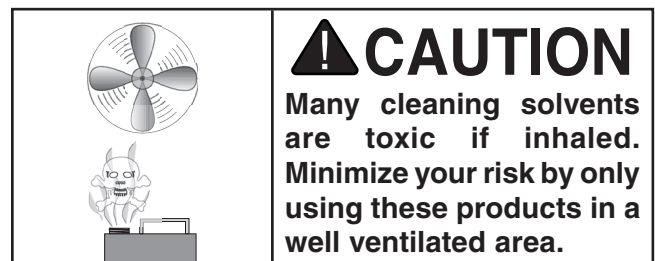
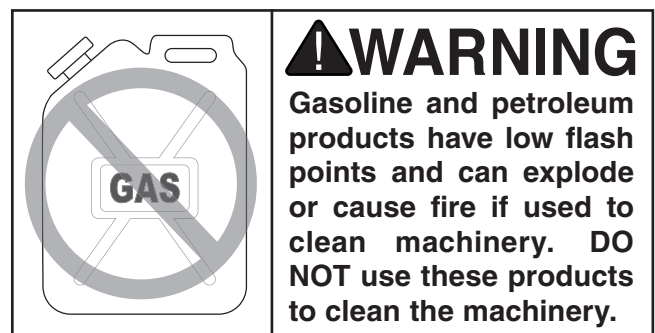
Figure 2. Shipping inventory.

If any nonproprietary parts are missing (e.g. a nut or a washer), we will gladly replace them; or for the sake of expediency, replacements can be obtained at your local hardware store.



# Clean Up

The unpainted surfaces are coated with a waxy oil to prevent corrosion during shipment. Remove this protective coating with a solvent cleaner or degreaser, such as shown in Figure 3. For thorough cleaning, some parts must be removed. **For optimum performance, clean all moving parts or sliding contact surfaces.** Avoid chlorine-based solvents, such as acetone or brake parts cleaner that may damage painted surfaces. Always follow the manufacturer's instructions when using any type of cleaning product.



G2544—Solvent Cleaner & Degreaser

H9692—Orange Power Degreaser

Great products for removing shipping grease.



Figure 3. Cleaner/degreasers available from Grizzly.



# Installation

Before installing your rotary table, make sure that your mill table and spindle are properly aligned as instructed in your mill's owner manual. Also, remove any burrs or scratches from the mating surfaces of the mill and rotary tables by "stoning" them, then thoroughly wipe them clean and dry (refer to the **Surface Care** subsection on **Page 18** for detailed instructions).

## Horizontal Position

1. DISCONNECT MILL FROM POWER!
2. Position the rotary table horizontally on the mill table so that the center mounting slot is aligned with the center T-slot of the table.
3. Insert the M12-1.75 x 80 T-bolt into the mill table T-slot and slide it into the rotary table mounting slot, then install the flat washer and hex nut, but do not tighten them for now.
4. Use the horizontal clamp, M12-1.75 x 60 T-bolt, flat washer, and hex nut to hold the opposite end of the rotary table, but do not tighten it for now.
5. Place a precision square along the front edge of the mill table and the foot of the rotary table, square the rotary table to the mill table, then fully tighten the hex nuts.
6. Perform the **Alignment** procedure as instructed on **Page 9**.

### CAUTION

You **MUST** properly secure the rotary table to the mill table to prevent unexpected movement during operation, which could result in personal injury or damage to the workpiece.

## Vertical Position

It will be necessary to compare the center-to-center distance between the T-slots of your mill table to the vertical mounting holes of the rotary table. If the mounting holes do not intersect the mill table T-slots with sufficient space for the T-bolts, use step blocks and clamps in place of one of the T-bolts.

The alignment keys on the foot of the rotary table measure approximately 0.630" (16mm) and are used to align the rotary table. If they are wider than the mill table T-slots, machine a step into them so that they will fit properly. Otherwise, they can be removed to allow manual alignment.

### To install the rotary table in the vertical position:

1. DISCONNECT MILL FROM POWER!
2. Insert the two M12-1.75 x 60 T-bolts in the outer slots of the mill table.
3. Align the vertical mounting holes of the rotary table with the T-bolts, then place the rotary table onto the mill table with the alignment keys, if used, into the table's center slot.  
  
—If the alignment keys are not used, place a precision square along the mill table front edge and the machined side of the rotary table foot, then square the rotary table to the mill table.
4. Install the flat washers and hex nuts onto the T-bolts to secure the rotary table in place.
5. Perform the **Alignment** procedure as instructed on **Page 9**.

### NOTICE

Make sure the rotary table handwheel is free of obstructions. Depending on your setup, the rotary table may need to be blocked up or mounted so the handle is hanging over the edge of the mill table. After installation, carefully check for any possible obstructions that may interfere with the rotary table or its handwheel.



# Spindle Alignment

Whether the rotary table is mounted horizontally or vertically, you must align the centers of the rotary table and mill spindle to achieve quality results.

There are many ways to align the rotary table, and it is up to the machinist and his capabilities to decide which approach is best.

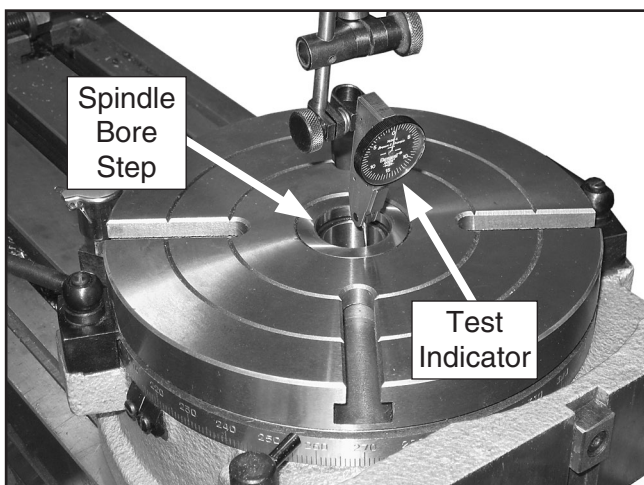
## Horizontal Position Alignment

Two methods are described below for aligning the spindles when the rotary table is mounted horizontally.

**To use a test indicator to align the rotary table:**

1. DISCONNECT MILL FROM POWER!
2. Mount a test indicator on the mill spindle and position the indicator tip on the inside vertical surface of the rotary table spindle bore, as shown in **Figure 4**.

**Note:** Refer to **Accessories** on **Page 15** for test indicator options from Grizzly.



**Figure 4.** Test indicator properly positioned.

3. Turn the mill spindle so that the test indicator is aligned to the X-axis of the mill table.

**Note:** For best results, turn the mill spindle in only one direction.

4. Slowly move the mill table until the test indicator reads zero deviation.
5. Rotate the mill spindle and test indicator 90°, then repeat **Step 4**.
6. Repeat **Step 5** until the test indicator reads zero deviation in all four directions.

**Tip:** Use a mirror to read the indicator when it is facing away from you.

**To use an edge finder to align the rotary table:**

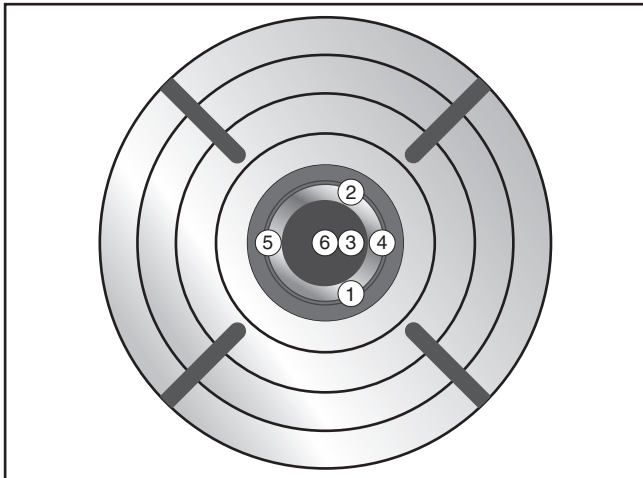
1. Mount an edge finder into the mill spindle, then position it roughly in the center of the rotary table spindle bore and below the rotary table surface.
2. Turn the spindle **ON** and set the speed to 800–1000 RPM, then slowly move the mill table along the X-axis in one direction.
3. When you find the edge of the rotary table spindle bore, note the position of the table on the handwheel dial.

**Note:** When recording the mill table position, take into account the backlash that is usually present in the leadscrew.

4. Slowly move the mill table in the opposite direction until you again find the edge of the spindle bore, then note the table's position on the handwheel dial.
5. Calculate the difference of the mill table positions noted in **Steps 3–4**, then subtract  $\frac{1}{2}$  the diameter of the edge finder.

6. Move the mill table along the X-axis to the position calculated in **Step 5**.
7. Repeat these steps with the mill table Y-axis.

**Note:** Use the pattern illustrated in **Figure 5** to aid in positioning the edge finder for the above procedure.



**Figure 5.** The six positions of the edge finder.

### Vertical Position Alignment

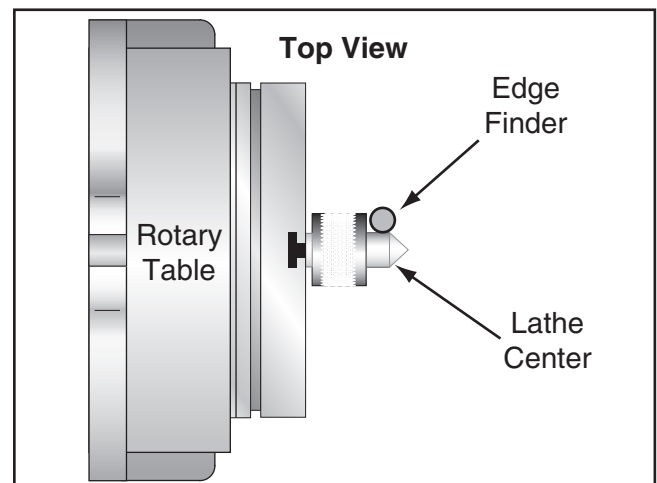
If the alignment keys are not used, it is a good idea to verify the rotary table alignment front-to-back with the mill spindle.

#### To verify the front-to-back alignment of the rotary table:

1. DISCONNECT MILL FROM POWER!
2. Mount a test indicator on the mill spindle and position the indicator tip on one end of the rotary table face.
3. Move the mill table along the Y-axis and note any deviations in the test indicator.
  - If a deviation is found, loosen the rotary table mounting hex nuts, tap the rotary table into the proper position, then re-tighten the mounting hex nuts.
4. Repeat **Step 3** until the entire rotary table face is properly aligned with the mill spindle.

#### To center the rotary table with the mill spindle:

1. Fully seat a lathe center into the rotary table spindle.
  - Note:** Any runout of the center will have to be determined and accounted for in the following steps.
2. Use an edge finder mounted in the mill spindle to find the center's edge (see the illustration in **Figure 6**).



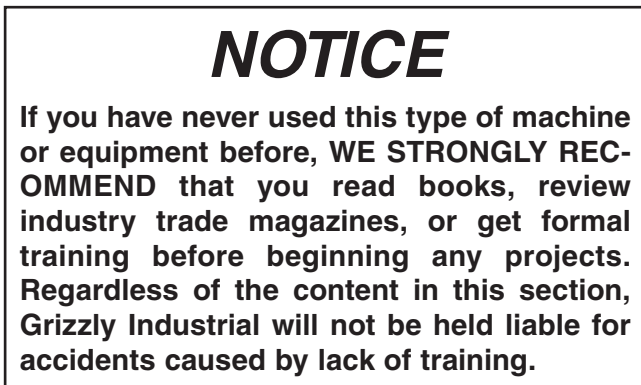
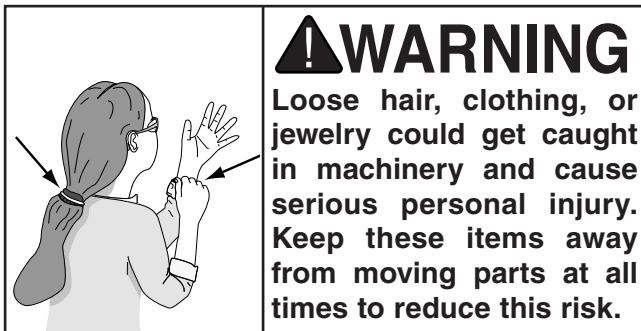
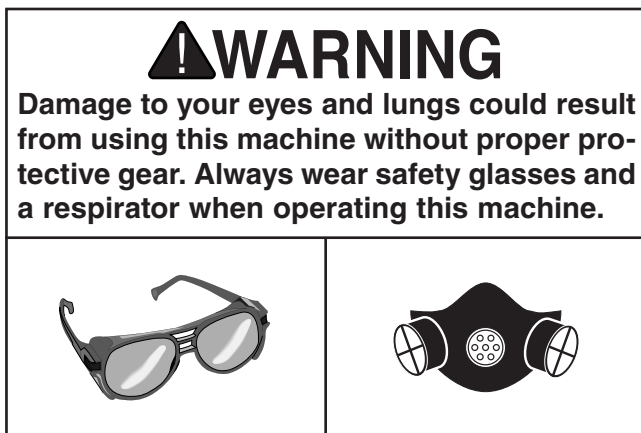
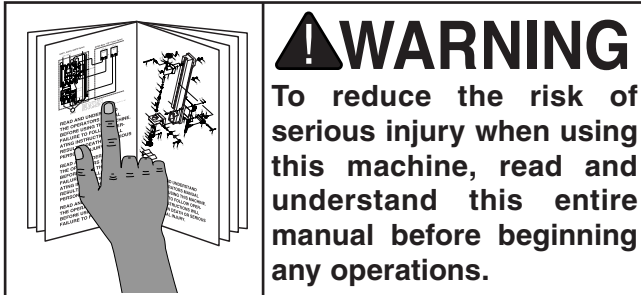
**Figure 6.** Top view of the rotary table with an edge finder and center.

3. Measure the diameter of the center where the edge finder made proper contact, divide this number in half, then add half of the diameter of the edge finder. The result is the amount you need to move the mill table along the Y-axis to center the rotary table with the mill spindle.

**Note:** Be sure to take into account any backlash when moving the mill table.

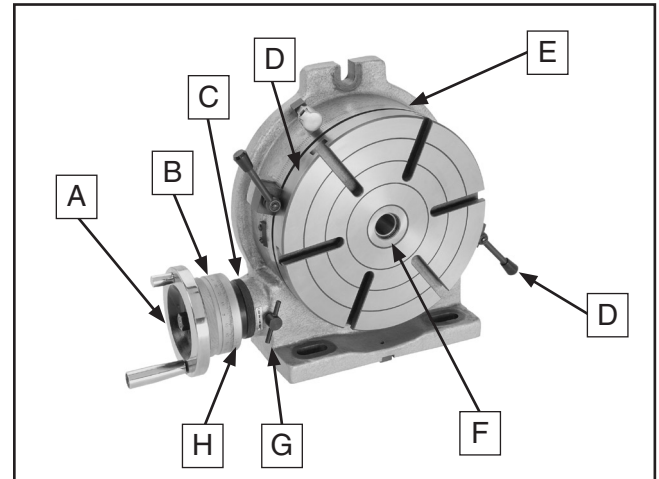


# SECTION 3: OPERATIONS



## Basic Controls

Use **Figure 7** and the following descriptions to become familiar with the basic controls of your rotary table.



**Figure 7.** Basic controls of the rotary table.

- A. Handwheel:** Rotates the table when the gears are engaged.
- B. Handwheel Scale:** Displays the amount of table rotation with a resolution of 1' (1 arc minute), and also has 1° marks. One full turn of the handwheel rotates the table 4°.
- C. Backlash Adjustment Ring:** Allows adjustment of the backlash between the gears. Also, disengages the gears so that the table can be rotated by hand. Loosen the backlash adjustment lock, then rotate the ring clockwise until the worm gears disengage. Reverse the process to re-engage them.
- D. Table Lock:** When fully tightened, keeps the table from rotating to reduce the strain on the gears during operation. When cutting circular slots, a slight drag can be applied with the table locks to help reduce chatter caused by gear backlash.

- E. **Table Scale:** Displays the amount of table rotation in whole degrees.
- F. **Spindle:** Holds a center to support a workpiece for dividing work. Also, used in rotary table alignment with the mill spindle.
- G. **Backlash Adjustment Lock:** Secures the backlash adjustment ring in place.
- H. **Vernier Scale:** Displays the amount of table rotation with a resolution of 10" (10 arc seconds).

- 2. Loosen the screw on the back of the vernier scale and rotate so that the zero mark is in a good viewing position, then re-tighten the screw.
- 3. Rotate the handwheel scale so that its zero mark aligns with the one on the vernier scale.

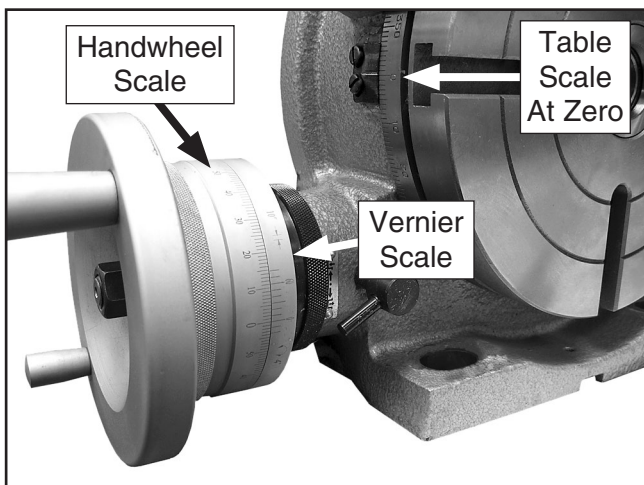
## Adjusting Handwheel Scales

The handwheel scales can be easily adjusted to a good viewing position when the rotary table is installed horizontally or vertically.

| Tools Needed              | Qty |
|---------------------------|-----|
| Standard Screwdriver..... | 1   |

### To adjust the handwheel scales:

1. Rotate the rotary table until the zero on the table scale is aligned with the index mark on the side of the table (see **Figure 8**).



**Figure 8.** Table scale at zero degrees.

## Vernier Scale

Use the vernier scale to rotate the table by 10" (10 arc seconds) at a time.

In the example below, you will be setting the rotary table to 16° 42' 20". This exercise assumes the table position is at zero, and both the handwheel and vernier scales are aligned at zero.

### To set the table at 16° 42' 20":

1. With the table at 0°, rotate the handwheel clockwise four full turns, which will rotate the table 16°.

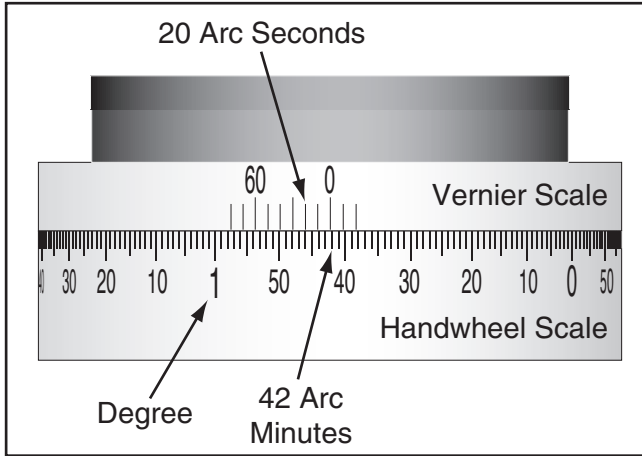
—If you go past zero on the fourth turn, return the table to 0°, then start again.

**Note:** *When changing directions with the handwheel, take into account any backlash.*

*Continued on next page* →



- Slowly continue to turn the handwheel clockwise to 42' as displayed on the handwheel scale (see the illustration in **Figure 9**).



**Figure 9.** Table set at  $16^{\circ} 42' 20''$ .

- Identify the mark on the vernier scale that is two marks or 20" to the left of the zero mark.

**Note:** When the handwheel is turned clockwise, the marks to the left of the zero mark on the vernier scale are used, and when the handwheel is turned counterclockwise, the marks on the right are used.

- Identify the mark on the handwheel scale that is immediately to the left of the vernier scale mark identified in **Step 3**, then slowly rotate the handwheel clockwise to align these two marks. The table is now set  $16^{\circ} 42' 20''$ .

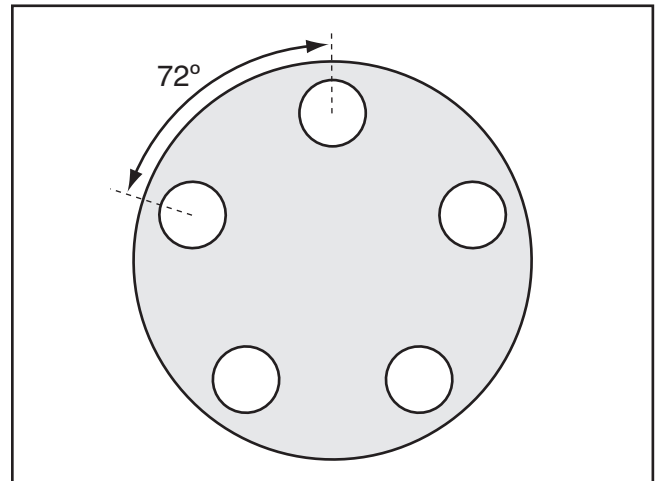
## Basic Operation

In the following two exercises, it is assumed that the following statements are true before beginning the operation:

- The rotary table is properly secured to the mill table in the horizontal position.
- The rotary table is properly centered with the mill spindle.
- The workpiece is centered on the rotary table and elevated for proper machining clearance.
- The workpiece is securely clamped to the rotary table.

### Five Evenly Spaced Holes

In this exercise, you will make five holes spaced  $72^{\circ}$  apart in a circular workpiece, as illustrated in **Figure 10**.



**Figure 10.** Five holes spaced  $72^{\circ}$  apart.

**Tip:** When using the rotary table to machine several locations or with a complicated pattern, make a drawing with measurement details to help visualize the operation. This will reduce the risk of making errors during the operation.

### To make five evenly spaced holes:

1. Use the handwheel to rotate the rotary table to the zero mark on the table scale, then tighten both table locks.

**Note:** Make sure the handwheel and vernier scales also read zero.

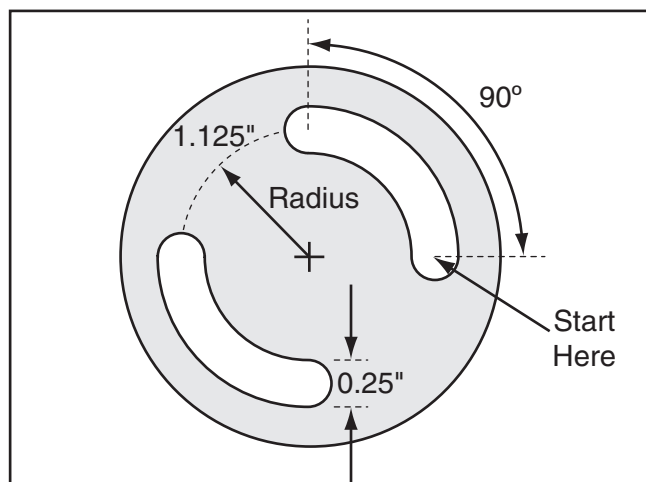
2. Drill the first hole.
3. Unlock the table, then turn the handwheel 18 full turns which will rotate the rotary table to 72° as displayed on the table scale.

**Note:** Be careful not to pass the zero mark on the last turn. If you go past the zero mark, reverse the handwheel one full turn, then try again. This will eliminate any backlash error that occurs when reversing handwheel direction.

4. Lock the table in place and drill the hole.
5. Repeat **Steps 3–4**, which will produce the third hole at 144°, the fourth hole at 216°, and the fifth hole at 288°.

### Two Circular Slots

In this exercise, you will cut two 90° circular slots in a round workpiece, as illustrated in **Figure 11**.



**Figure 11.** Two 90° circular slots.

### To make two circular slots:

1. Use the handwheel to rotate the rotary table to the zero mark on the table scale, then tighten both table locks.

**Note:** Make sure the handwheel and vernier scales also read zero.

2. Move the mill table to the left 1.125" along its X-axis so that the spindle is above the lower end of the upper slot.
3. With a 1/4" end mill installed in the mill spindle, make a 0.083" deep hole (approximately 1/3 of the cutter's diameter).
4. With the end mill continuing to cut, turn the rotary table handwheel *clockwise* 15 full turns, using care not to pass the zero mark on the last turn.
5. Raise the end mill from the workpiece, then turn the rotary table handwheel *counterclockwise* 16 full turns—one full turn past the starting point to eliminate the backlash error.
6. Rotate the rotary table *clockwise* back to the 0° mark, then take an additional 0.083" deep cut.
7. Repeat **Steps 4–6** until the final depth of cut is reached.
8. Raise the end mill from the workpiece, then return the rotary table back to the 0° mark.
9. Move the mill table 2.25" to the right along its X-axis to align the cutter with the end of the second circular slot.
10. Repeat **Steps 3–7** to complete the second circular slot.



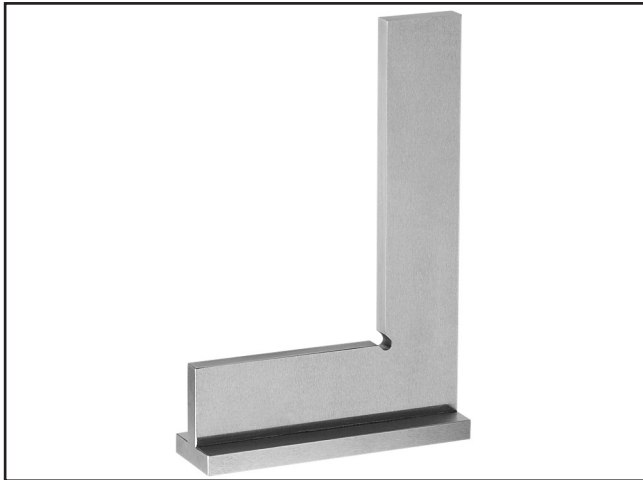
# SECTION 4: ACCESSORIES

**G9640— 90° Wide Base Square 3" x 5"**

**G9641— 90° Wide Base Square 4" x 6"**

**G9642— 90° Wide Base Square 5" x 8"**

Grade 0, heavy-duty stainless steel 90° precision squares feature wide bases for stability. Perfect for all setup and inspection work.



**Figure 12.** 90° Precision Wide-Base Squares.

**G9610—Test Indicator**

0.03" Range/0.001" Resolution

**G9611—Test Indicator**

0.008" Range/0.0001" Resolution

**G9612—Test Indicator**

0.030" Range/0.0005" Resolution

These test indicators have an easy to read dial and a pivoting stylus that moves at right angles to the dial face.

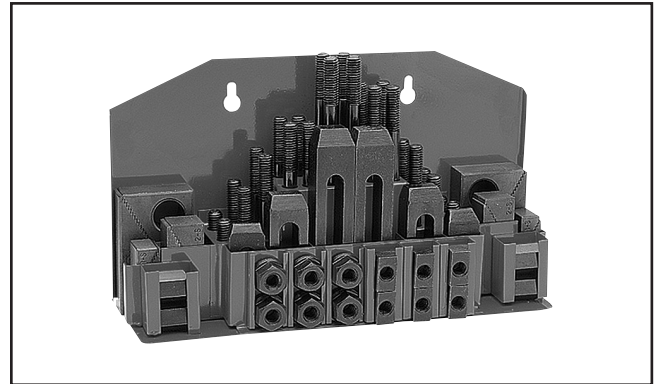


**Figure 13.** Test Indicator.

**G1075—52-PC. Clamping Kit 1/2" T-Nut**

**G1076—52-PC. Clamping Kit 5/8" T-Nut**

This clamping kit includes 24 studs, 6 step block pairs, 6 T-nuts, 6 flange nuts, 4 coupling nuts, and 6 end hold-downs. The rack is slotted so it can be mounted close to the machine for easy access.



**Figure 14.** 52-PC. Clamping Kit.

**G9629—Universal Indicator Holder**

Mount your test indicator right on your mill for guaranteed accurate readings. C-frame holder mounts with a single screw directly on the quill and does not interfere with the cutting tool. Clamping diameter is 1 7/8". The length from the clamping bracket to the indicator is 4 1/2". Suitable for all popular indicators with a 5/32" shank.



**Figure 15.** G9629 Universal Indicator Holder.

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### H2939—4 Piece Edge Finder Set

Four different styles to cover any setup problem! Set includes one each: a  $\frac{3}{8}$ " diameter with a point, a combination  $\frac{3}{8}$ " diameter with a point and a 0.200" shoulder, a  $\frac{1}{2}$ " diameter with a 0.200" shoulder, and a combination  $\frac{1}{2}$ " diameter with a 0.200" shoulder and a 0.500" shoulder.



Figure 16. H2939 4-Pc. Edge Finder Set.

### G9296—Adjustable Tailstock

For 8" and 10" Rotary Tables

### G9297—Adjustable Tailstock

For 12" Rotary Tables

When used with your rotary table and mill, these adjustable tailstocks provide the support you need for those longer workpieces. Clamps to your mill table with standard clamping hardware and allows precise and accurate adjustments.



Figure 17. Adjustable Tailstock.

### G9295—Dividing Plates

When used with your rotary table, these dividing plates provide a higher degree of precision in hole placement, spot facing, and even gear making.



Figure 18. G9295 Dividing Plates.

### H8370—Power Feed for Mills

If you want to get the most out of your mill, you really need a power feed. This power feed comes with everything required to start milling with exact control. Comes supplied with a mounting bracket, gear, auto-stop limit switch with moveable stop pins, gear guard, and motor. Specs: 0–140 RPM, 200 RPM rapid switch, 440 in/lb. maximum torque, 110V 60Hz motor, 4:1 bevel drive gear.



Figure 19. H8370 Power Feed.

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# SECTION 5: MAINTENANCE

## Schedule

For optimum performance from your machine, follow this maintenance schedule and refer to any specific instructions given in this section.

### Daily:

- Clean and lubricate the machine
- Dress the machined surfaces.
- Check/fill the oil reservoir.
- Check/resolve any unsafe condition.

### Monthly:

- Disassembly and clean the machine.

## Cleaning

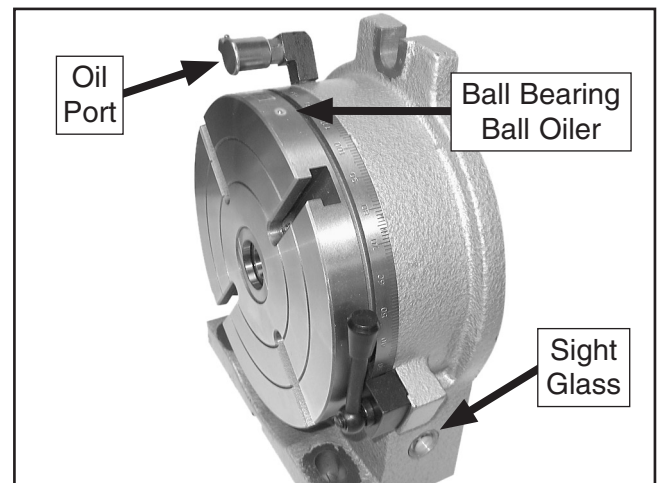
It is essential that the rotary table be cleaned after every use and oiled with a light machine oil to prevent corrosion.

DO NOT use compressed air to clean your rotary table. Chips or debris may become lodged between the moving parts, reducing the life and accuracy of the machine. Instead, use a stiff-bristled brush to remove the chips and swarf, then wipe down the surfaces with a clean shop rag.

Every 80 hours of use, completely disassembly the rotary table, then thoroughly clean each part and re-lubricate.

## Lubrication

Place the rotary table in a horizontal position and check the oil site glass located on the back side of the base (see **Figure 20**). If necessary, add a high-quality 80W–90W gear oil until the oil level reaches half-way in the site glass.



**Figure 20.** Lubrication components.

The ball bearing ball oiler is located on the edge of the rotary table (see **Figure 20**). With the rotary table positioned vertically, use a squirt-gun style oiler to add one or two pumps of 20W non-detergent oil to the ball oiler per day.

# Surface Care

Nicks, dings, and scratches on the surface of the rotary table and base can have an adverse effect on accuracy and may damage the workpiece or mill table.

Prior to use, dress or "stoning" these surfaces with a fine sharpening stone. A few strokes of the stone on the table surface, the machined base and back, and the mill table will help to ensure longevity and accuracy. Make sure to thoroughly wipe these surfaces clean to remove any dust generated from the process.

## Preload

A precision spacer is installed under the keeper on the back of the rotary table to maintain the proper amount of preload. With use, the spacer surface that the keeper rubs against may become worn.

You can test the preload by mounting the rotary table horizontally on the mill table, positioning the tip of a test indicator on the surface of the rotary table, then attempting to lift the table up from the base. The table is properly preloaded when no motion is measured. If motion is detected by the test indicator, perform the procedure below to correct the amount of preload.

| Tools Needed               | Qty |
|----------------------------|-----|
| Hex Wrench 5mm.....        | 1   |
| Fine Sharpening Stone..... | 1   |

### To correct the amount of preload:

1. Turn the rotary table horizontally upside down on a protected surface.

2. Remove the three cap screws shown in **Figure 21** that secure the keeper.

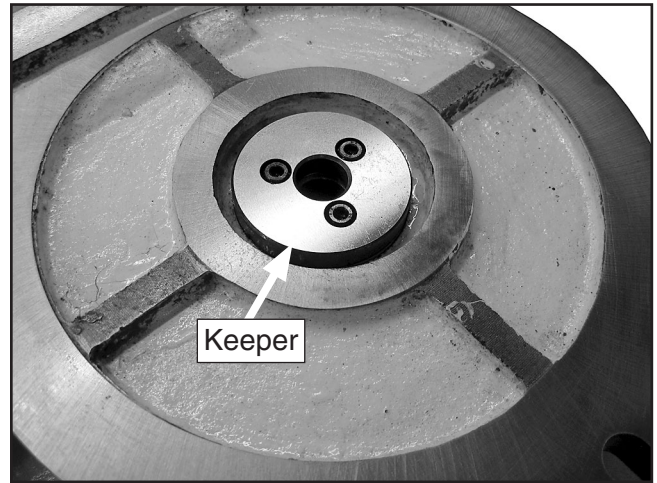


Figure 21. Keeper and cap screws.

3. Remove the keeper and the spacer (see **Figure 22**).

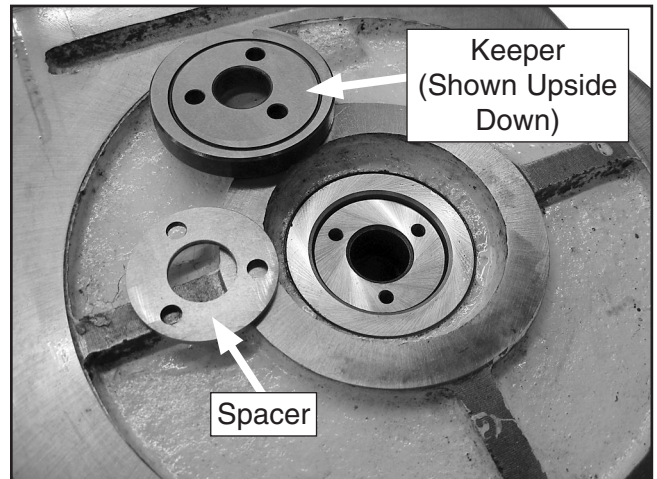


Figure 22. Keeper and spacer removed from the rotary table.

4. Stone the spacer as instructed in the previous **Surface Care** subsection on this page.
5. Thoroughly clean all of the mating surfaces, then apply a thin coat of light machine oil to all parts.
6. Re-assembly the parts and test the preload again. If necessary, repeat this procedure until you have attained the proper amount of preload.





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 50-59                                       60-69                                       70+

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