

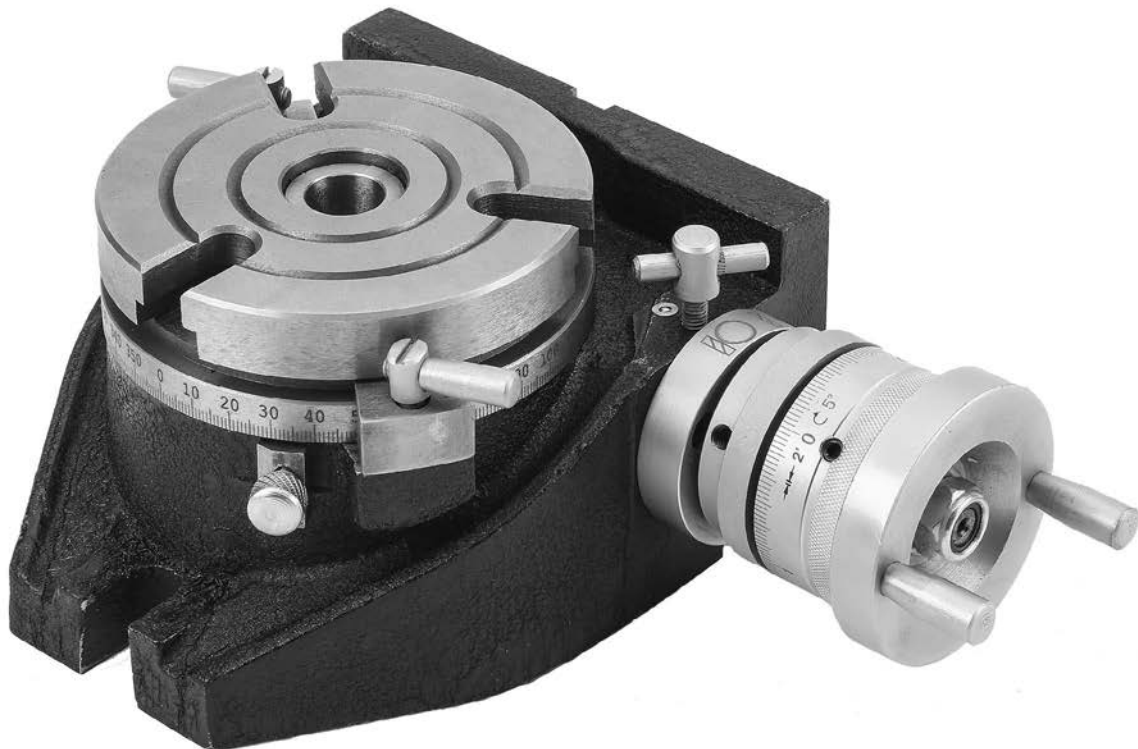


MODEL T1190/T1191/T1192

4³/₈" ROTARY TABLE

OWNER'S MANUAL

(For models manufactured since 03/17)



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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.**

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V1.02.18



WARNING!

This manual provides critical safety instructions on the proper setup, operation, maintenance, and service of this machine/tool. Save this document, refer to it often, and use it to instruct other operators.

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

The owner of this machine/tool 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, cutting/sanding/grinding tool 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 document 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 we still make an occasional mistake.

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, immediately call our technical support for updates or clarification.

For your convenience, we post all available documentation on our website at **www.grizzly.com**. Any updates to this document will be reflected on our website as soon as complete.

Contact Info

We stand behind our machines! If you have questions or need help, contact us with the information below. Before contacting, make sure you get the **serial number** and **manufacture date** from the machine ID label. This will help us help you faster.

Grizzly Technical Support
1815 W. Battlefield
Springfield, MO 65807
Phone: (570) 546-9663
Email: techsupport@grizzly.com

We want your feedback on this manual. What did you like about it? Where could it be improved? Please take a few minutes to give us feedback.

Grizzly Documentation Manager
P.O. Box 2069
Bellingham, WA 98227-2069
Email: manuals@grizzly.com



MACHINE DATA SHEET

Customer Service #: (570) 546-9663 · To Order Call: (800) 523-4777 · Fax #: (800) 438-5901

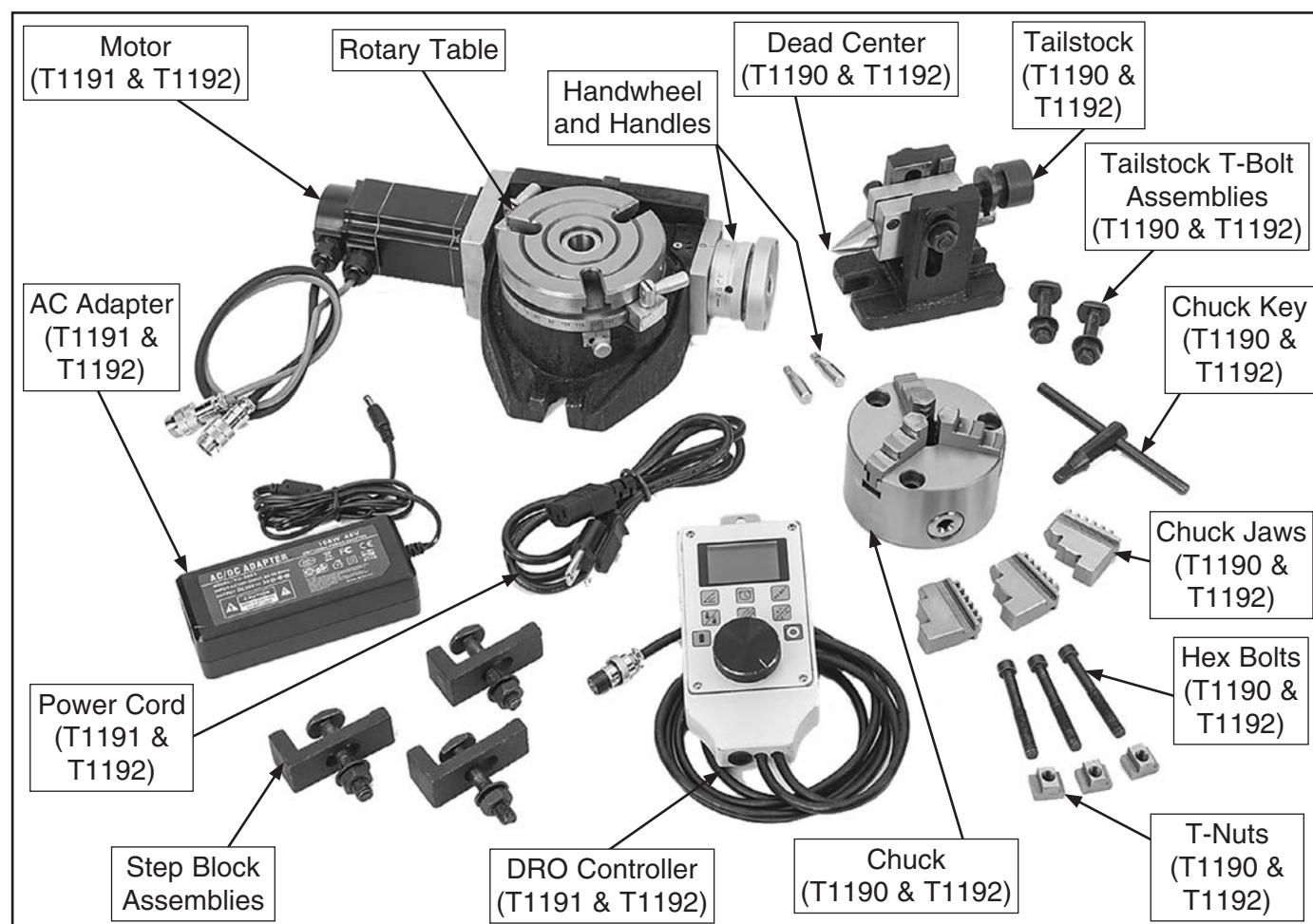
MODELS T1190/T1191/T1192 4³/₈" ROTARY TABLES

Model Number	T1190	T1191	T1192
Worm Gear Ratio	72:1	72:1	72:1
Table Diameter	4.375"	4.375"	4.375"
Table Height	3.82"	3.82"	3.82"
Base Dimensions	0	0	0
Vertical Base Holes	0	0	0
Center Sleeve	MT#2	MT#2	MT#2
Weight	31.0 lbs	24.3 lbs	40.0 lbs
Includes Chuck and Tailstock	Yes	No	Yes
Includes DRO Controls	No	Yes	Yes



Identification

Become familiar with the names and locations of the controls and features shown below to better understand the instructions in this manual.





! WARNING

To reduce your risk of serious injury, read this entire manual **BEFORE** using machine.



Controls & Components



Refer to **Figures 1–2** and the following descriptions to become familiar with the basic controls and components of this machine. Understanding these items and how they work will help you understand the rest of the manual and stay safe when operating this machine.

Table Controls and Components

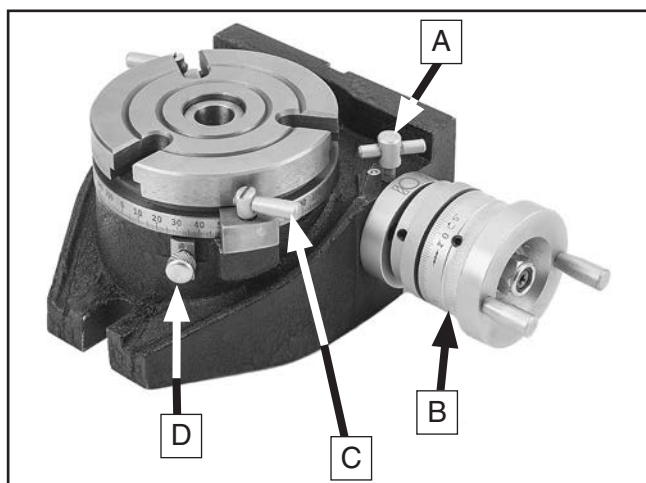


Figure 1. Table controls and components.

- A. Backlash Adjustment Lever & Lock:** When the worm gear and handwheel are disengaged, these allow the operator to turn the table by hand without using the handwheel. The backlash lever also allows adjustment of the backlash between the worm gear and worm wheel. Loosen the lock, then rotate the lever to adjust the backlash. To disengage the gear and wheel, rotate the lever clockwise until they disengage.
- B. Handwheel Scale:** Has a resolution of 2' (2 arc minutes) and displays whole degree marks. A full rotation of the handwheel turns the rotary table 4°.

- C. Rotary Table Lock (1 of 2):** Lock the table/chuck in place. This reduces the stress on the worm and worm gear interface and helps ensure the table does not change position during heavy machining operations. When cutting circular slots, a slight drag can be applied with the table lock to increase preload and prevent chatter caused by any backlash in the worm gear.
- D. Degree Scale:** Displays a quick reference for table positioning. It is graduated in whole degrees.

Tailstock Controls and Components

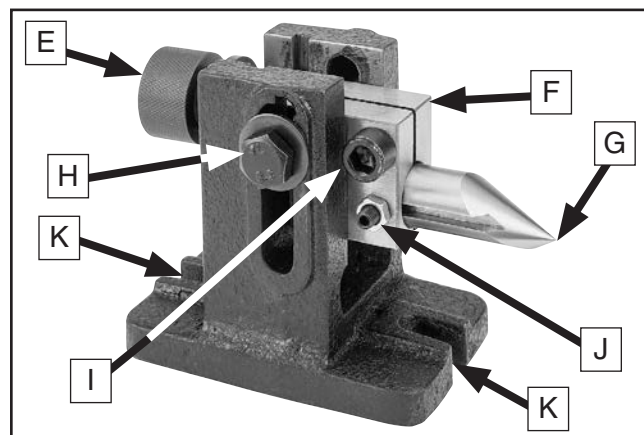


Figure 2. Tailstock controls and components.

- E. Adjustment Knob:** Moves dead center forward and backward in tailstock body.
- F. Tailstock Block:** Houses dead center. Mounts to mill table using T-bolts.
- G. Dead Center:** Used in combination with rotary table and chuck to support long, slender workpieces.
- H. Height Adjustment Bolt (1 of 2):** Allow tailstock body to be adjusted vertically.
- I. Dead Center Lock Screw:** Secures position of dead center.
- J. Dead Center Guide Screw:** Prevents dead center from spinning inside tailstock block. Also, helps secure adjustment knob setting.
- K. T-Bolt Slots:** Allow the tailstock to be mounted using M10-1.5 x 50 hex bolts.



DRO Controls and Components

The T1191 and T1192 Rotary tables use a DRO controller operating system.

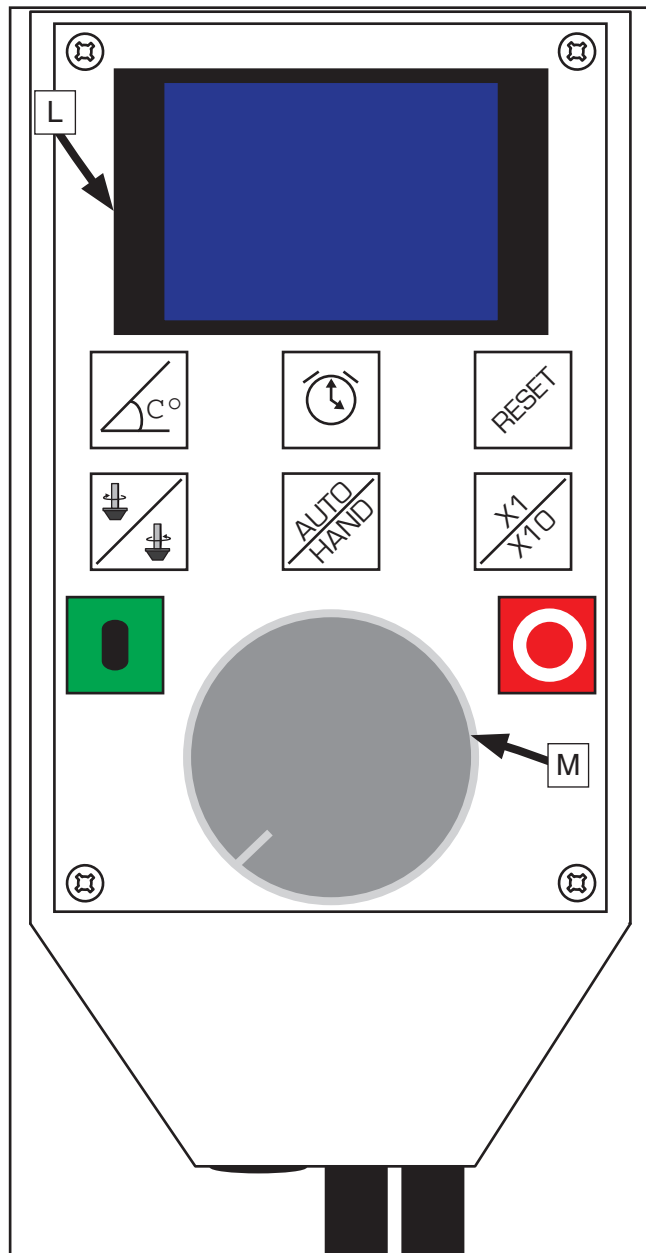


Figure 3. DRO identification.

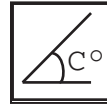
- L. Digital Readout Screen:** Shows operations and functions of DRO as they happen.
- M. Control Dial:** Used to control speed, direction, and other variables when operating the DRO. Dial controls are dependent on the user-selected function.



Start: Starts the motor.



Stop: Stops the motor.



Angle: After pressing this button, use the control dial to set the angle between 0°–360°.

Note: Button will not work if motor is running.

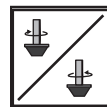


Time: After pressing this button, use the dial to set the timer to run for a specified period of time between 0–60 minutes.

Note: Button will not work if motor is running.



Reset: Reset the values entered in Angle, Time, and Rate by pressing this button.



Forward/Reverse: This button switches the machine between forward (clockwise) and reverse (counterclockwise) rotations.



Auto/Handle: This button switches the machine between Auto and Handle settings. See **Page 20** for more information about these settings.



Rate: This button toggles between two different rate settings: 1x and 10x.



SECTION 1: SAFETY

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. Always use common sense and good judgment.



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.

Safety Instructions for Machinery



OWNER'S MANUAL. Read and understand this owner's manual **BEFORE** using 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 machine is not being used, disconnect power, remove switch keys, or lock-out machine to prevent unauthorized use—especially around children. Make your workshop kid proof!

DANGEROUS ENVIRONMENTS. Do not use 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 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.

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

EYE PROTECTION. Always wear ANSI-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.



WARNING

WEARING PROPER APPAREL. Do not wear clothing, apparel or jewelry that can become entangled in moving parts. Always tie back or cover long hair. Wear non-slip footwear to reduce risk of slipping and losing control or accidentally contacting cutting tool or moving parts.

HAZARDOUS DUST. Dust created by machinery operations may cause cancer, birth defects, or long-term respiratory damage. Be aware of dust hazards associated with each workpiece material. Always wear a NIOSH-approved respirator to reduce your risk.

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 chuck keys, wrenches, or any other tools on machine. Always verify removal before starting!

USE CORRECT TOOL FOR THE JOB. Only use this tool 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 tool or using it differently than 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 machine. Do not overreach! Avoid awkward hand positions that make workpiece control difficult or increase the risk of accidental injury.

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

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

FORCING MACHINERY. Do not force 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 risk of injury or loss of control. Before starting, verify 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 machine **OFF** and ensure all moving parts completely stop before walking away. Never leave machine running while unattended.

MAINTAIN WITH CARE. Follow all maintenance instructions and lubrication schedules to keep machine in good working condition. A machine that is improperly maintained could malfunction, leading to serious personal injury or death.

DAMAGED PARTS. Regularly inspect machine for damaged, loose, or mis-adjusted parts—or any condition that could affect safe operation. Immediately repair/replace **BEFORE** operating machine. For your own safety, **DO NOT** operate machine with damaged parts!

MAINTAIN POWER CORDS. When disconnecting cord-connected machines from power, grab and pull the plug—**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.

EXPERIENCING DIFFICULTIES. If at any time you experience difficulties performing the intended operation, stop using the machine! Contact our Technical Support at (570) 546-9663.



SECTION 2: SETUP

Unpacking

This machine was carefully packaged for safe transport. When unpacking, separate all enclosed items from packaging materials and inspect them for shipping damage. ***If items are damaged, please call us immediately at (570) 546-9663.***

IMPORTANT: Save all packaging materials until you are completely satisfied with the machine and have resolved any issues between Grizzly or the shipping agent. *You MUST have the original packaging to file a freight claim. It is also extremely helpful if you need to return your machine later.*



!WARNING
SUFFOCATION HAZARD!
Keep children and pets away from plastic bags or packing materials shipped with this machine. Discard immediately.

Machine Differences

- Models T1190, T1191, and T1192 are similar machines with several differences.
- Model T1190 is the basic rotary table with a chuck and a tailstock.
- Model T1191 is a motorized table with a DRO.
- Model T1192 is a motorized table with a chuck, a tailstock, and a DRO.

Needed for Setup

The following items are needed, but not included, for the setup/assembly of this machine.

Description	Qty
• Hex Wrench 5mm.....	1
• Hex Wrench 3mm.....	1
• Hex Wrench 2.5mm.....	1
• Open-End Wrench 17mm.....	1



Inventory

The following is a list of items shipped with your machine. Before beginning setup, lay these items out and inventory them.

If any non-proprietary 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.

T1190 Box Inventory (Figure 4)

	Qty		
A. Tailstock.....	1	F. T-Nuts	3
B. Rotary Table	1	G. Chuck	1
C. T-Bolt Assemblies (Tailstock)	2	H. Chuck Wrench.....	1
—T-Bolts M10-1.5 x 50	2	I. Step Block Assemblies.....	3
—Flat Washers 20mm	2	—T-Bolts M10-1.5 x 50	3
—Hex Nuts 10mm.....	2	—Hex Nuts 10mm.....	3
D. Table Handwheel Bolts.....	2	—Flat Washers 10mm.....	3
E. Hex Bolts M6-1 x 60.....	3	—Clamping Plates.....	3
		J. Chuck Jaws	3

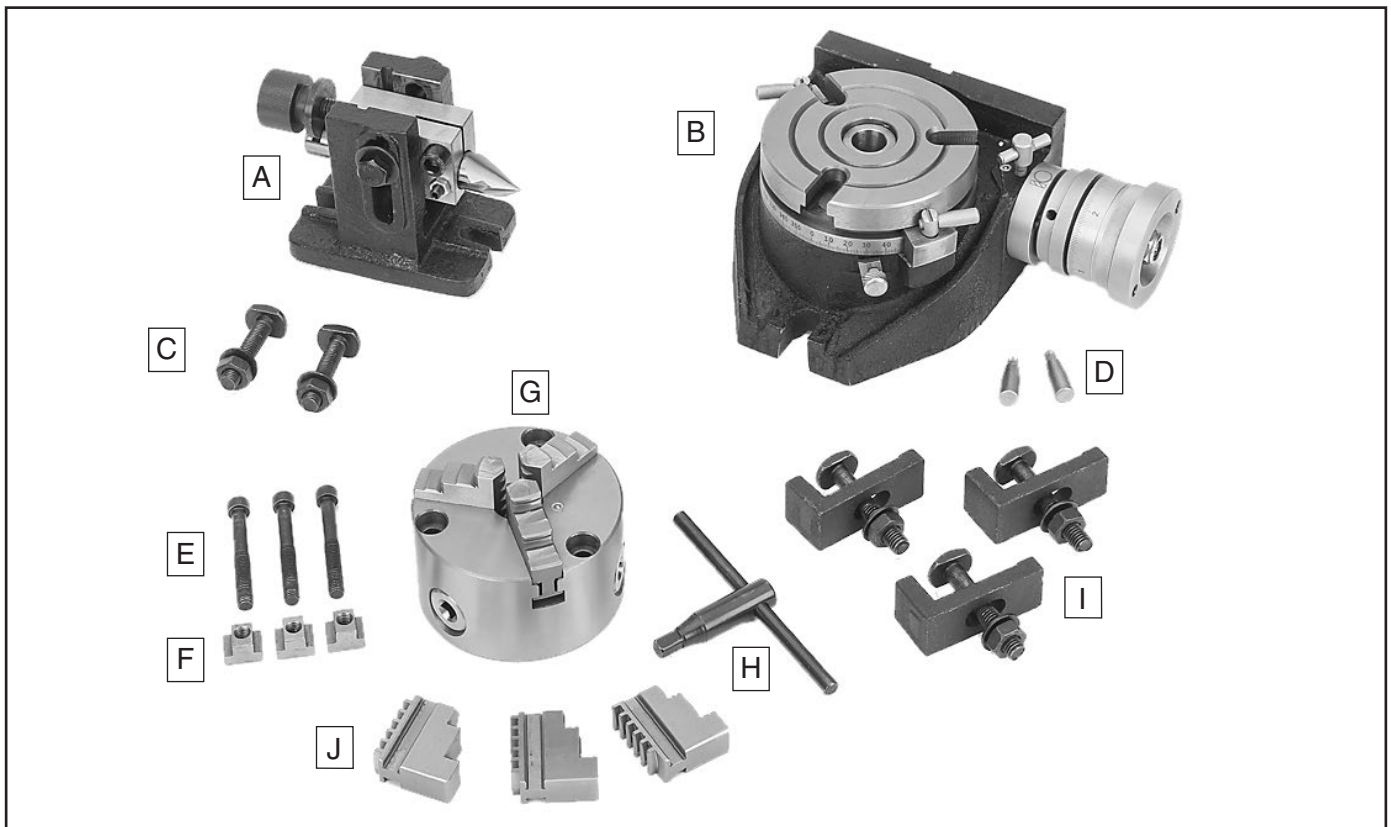


Figure 4. T1190 Inventory.



T1191 Box Inventory (Figure 5)

	Qty
A. Rotary Table	1
B. Table Handwheel Bolts.....	2
C. AC Adapter	1
D. Power Cord.....	1
E. DRO Controller.....	1

F. Step Block Assemblies

—T-Bolts M10-1.5 x 50	3
—Hex Nuts 10mm	3
—Flat Washers 10mm.....	3
—Clamping Plates.....	3

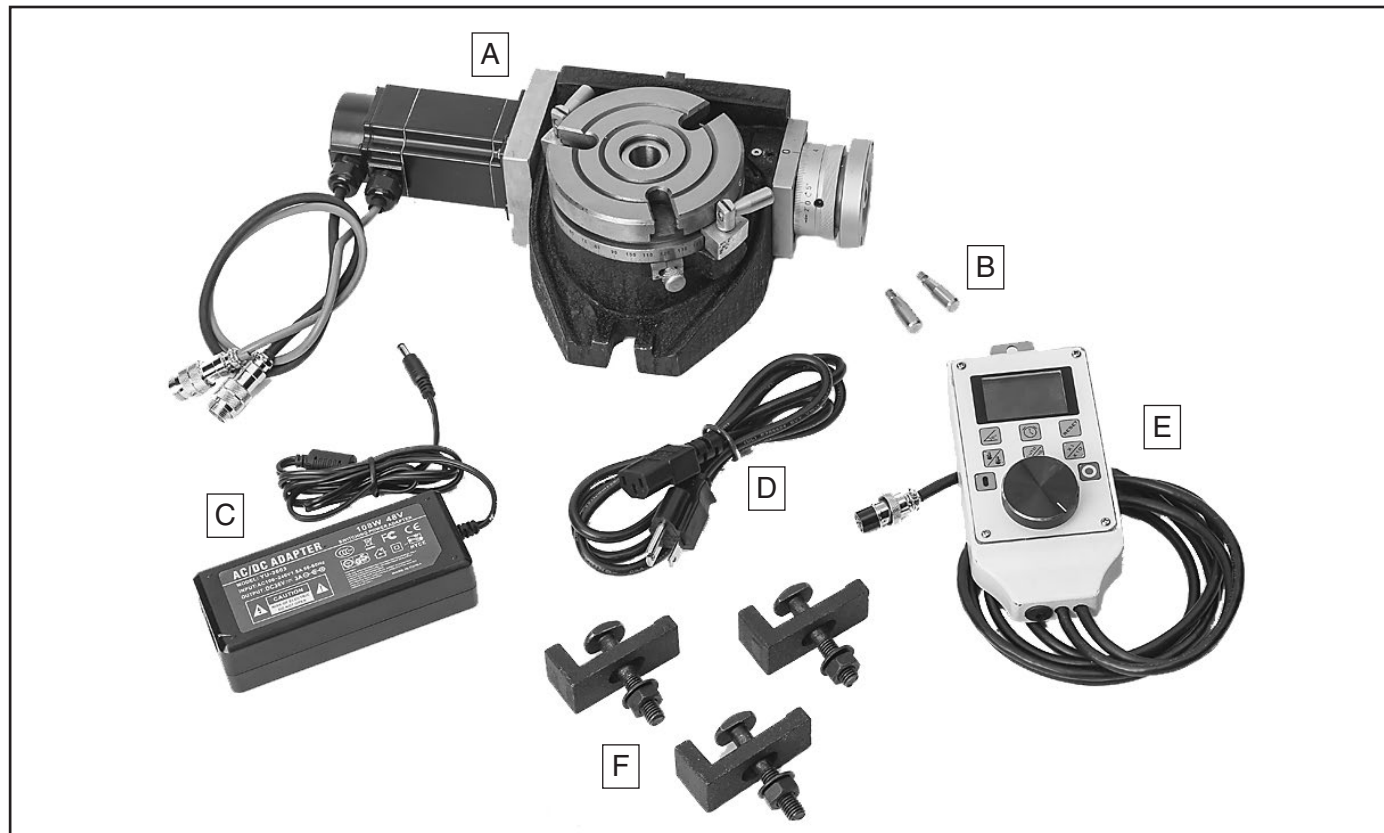


Figure 5. T1191 Inventory.



T1192 Box Inventory (Figure 6)		Qty	
A.	Rotary Table	1	
B.	Tailstock.....	1	
C.	Table Handwheel Bolts.....	2	
D.	T-Bolt Assemblies (Tailstock)	2	
	—T-Bolts M10-1.5 x 50	2	
	—Flat Washers 20mm	2	
	—Hex Nuts 10mm.....	2	
E.	AC Adapter	1	
F.	Power Cord.....	1	
G.	Chuck	1	
H.	Chuck Wrench.....	1	
I.	Step Block Assemblies		
	—T-Bolts M10-1.5 x 50	3	
	—Hex Nuts 10mm.....	3	
	—Flat Washers 10mm.....	3	
	—Clamping Plates.....	3	
J.	DRO Controller.....	1	
K.	Chuck Jaws	3	
L.	Hex Bolts M6-1 x 60.....	3	
M.	T-Nuts	3	

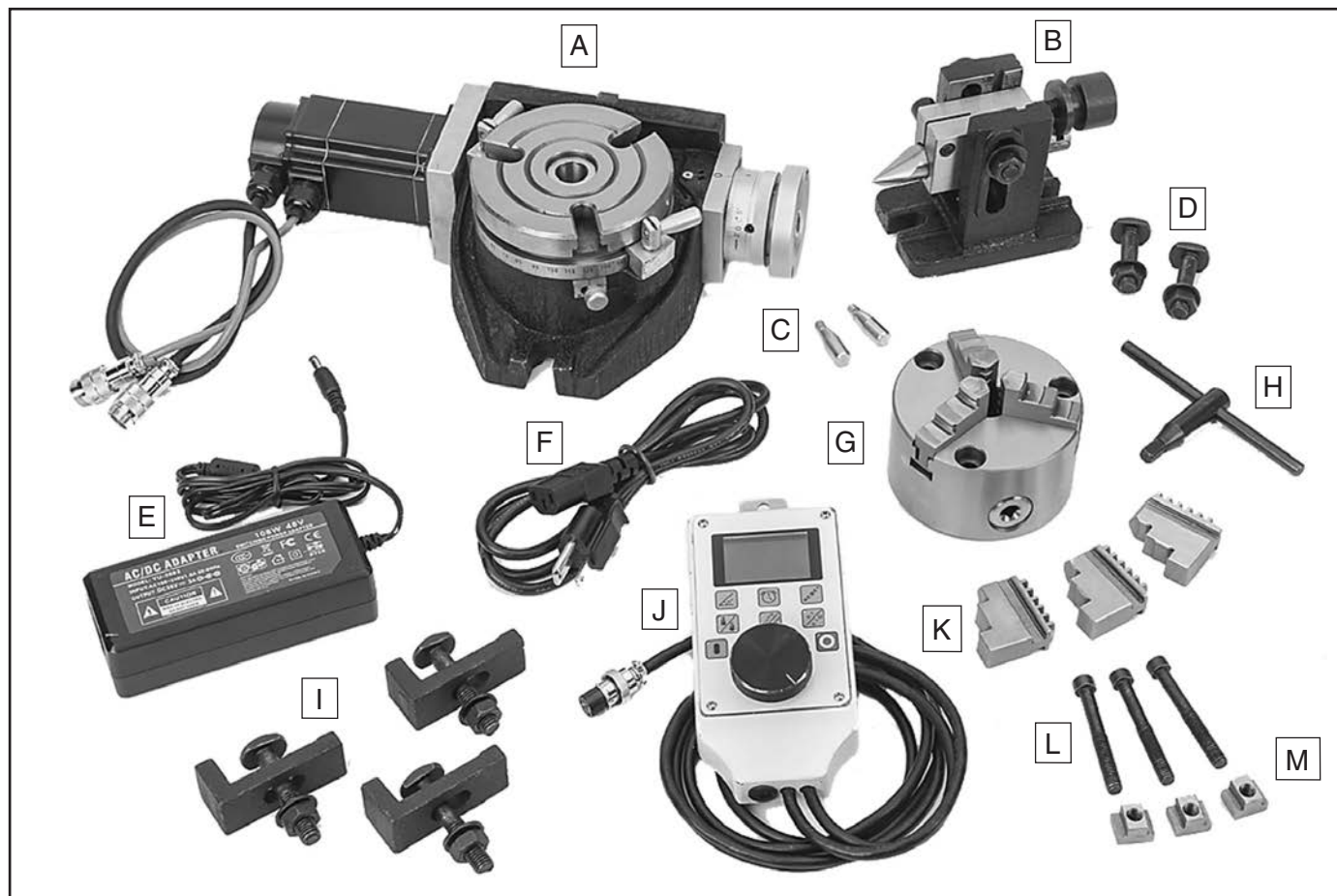


Figure 6. T1192 Inventory.



Hardware Recognition Chart

USE THIS CHART TO MATCH UP
HARDWARE DURING THE INVENTORY
AND ASSEMBLY PROCESS.

MEASURE BOLT DIAMETER BY PLACING INSIDE CIRCLE

#10

1/4"

5/16"

3/8"

7/16"

1/2"

4mm

5mm

6mm

8mm

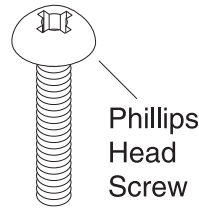
10mm

12mm

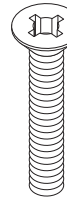
16mm



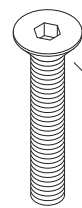
Hex
Wrench



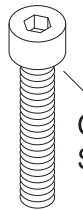
Phillips
Head
Screw



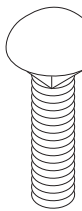
Flat
Head
Screw



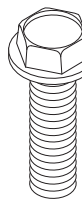
Flat
Head
Cap
Screw



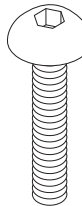
Cap
Screw



Carriage
Bolt



Flange
Bolt



Button
Head
Screw



Tap
Screw



External
Retaining
Ring



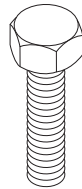
Internal
Retaining
Ring



E-Clip



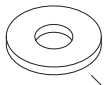
Set
Screw



Hex
Bolt



Key



Flat Washer

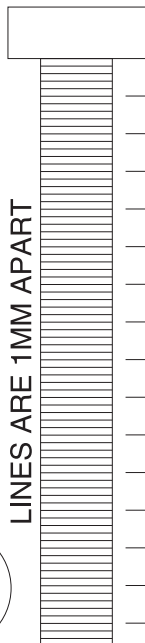


Lock
Washer



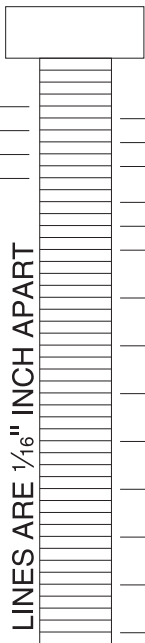
Hex
Nut

LINES ARE 1MM APART



5mm
10mm
15mm
20mm
25mm
30mm
35mm
40mm
45mm
50mm
55mm
60mm
65mm
70mm
75mm

LINES ARE 1/16" INCH APART



1/4"
3/8"
1/2"
5/8"
5/16"
7/16"
9/16"
3/4"
7/8"
1"
1 1/4"
1 1/2"
1 3/4"
2
2 1/4"
2 1/2"
2 3/4"
3

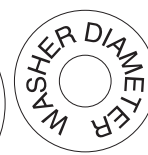
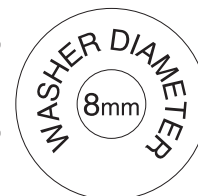
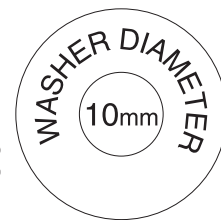
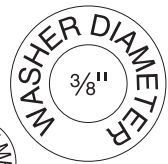
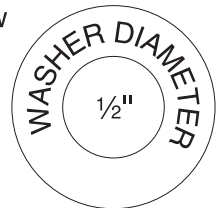
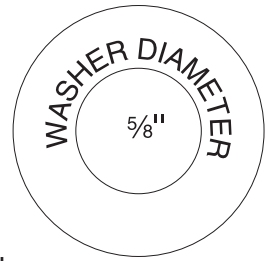
WASHERS ARE MEASURED BY THE INSIDE DIAMETER



Lock
Nut



Wing
Nut

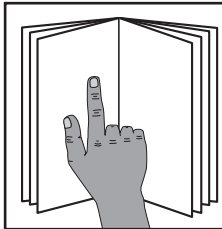


SECTION 3: OPERATIONS

Operation Overview

The purpose of this overview is to provide the novice machine operator with a basic understanding of how the machine is used during operation, so the machine controls/components discussed later in this manual are easier to understand.

Due to the generic nature of this overview, it is **not** intended to be an instructional guide. To learn more about specific operations, read this entire manual, seek additional training from experienced machine operators, and do additional research outside of this manual by reading "how-to" books, trade magazines, or websites.



!WARNING

To reduce your risk of serious injury, read this entire manual **BEFORE** using machine.



!WARNING

Eye injury hazard! Always wear safety glasses when using this machine.

NOTICE

If you are not experienced with this type of machine, WE STRONGLY RECOMMEND that you seek additional training outside of this manual. Read books/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.

Table Movement & Lock Lever

The rotary table rotates by turning the handwheel, which is attached to a precision worm gear engaged with a worm wheel. The ratio between these gears is 1:72, which means one complete turn of the handwheel rotates the table 5°.

Besides rotating the table in precise increments, the worm gear and wheel can be disengaged and the table can be rotated by hand. To do this, loosen the backlash adjustment lock and rotate the backlash adjustment lever clockwise (see **Figure 7**).

To help maximize rigidity during operation, the rotary table has two table lock levers (see **Figure 7**). Tightening the levers locks the table in place.

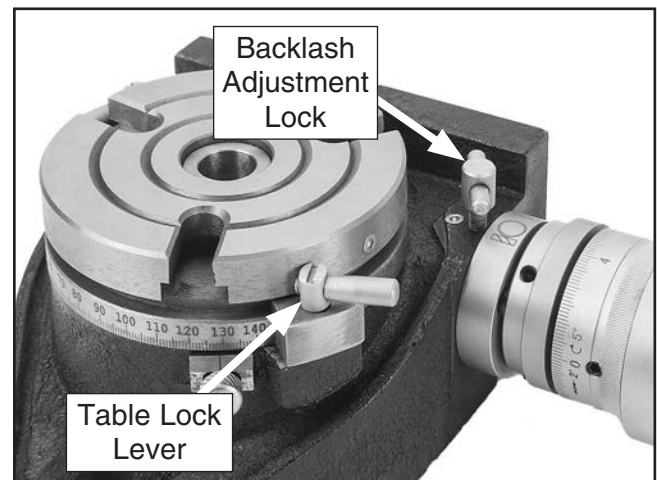


Figure 7. Backlash adjustment and table lock levers.

To minimize finish problems associated with gear backlash when cutting circular slots, lightly tighten the lock levers to create extra drag.



Adjusting Handwheel Scale

The handwheel scale (see **Figure 8**) can be repositioned without rotating the handwheel. This helps when aligning all of the zeroes at the beginning of a job.

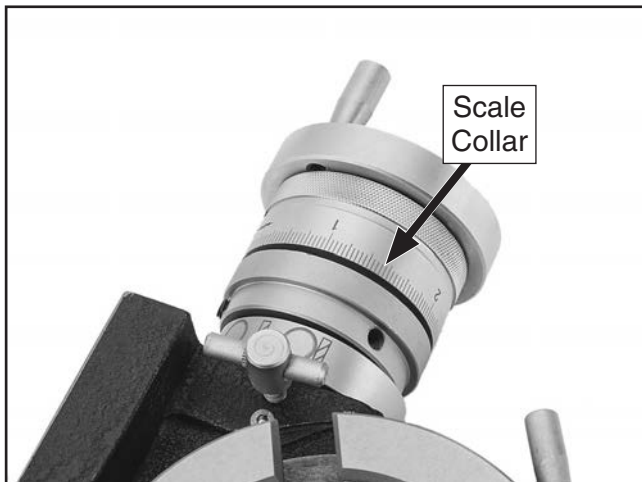


Figure 8. Adjusting the handwheel scale.

The scale collar is marked in whole degrees and has a resolution of 2' (2 arc minutes). For every full rotation of the handwheel, the indexing scale on the rotary table moves 5°.

Tool Needed

Qty

Hex Wrench 3mm..... 1

1. To adjust the collar, loosen set screw (see **Figure 9**) securing collar to handwheel, then rotate collar to desired alignment.

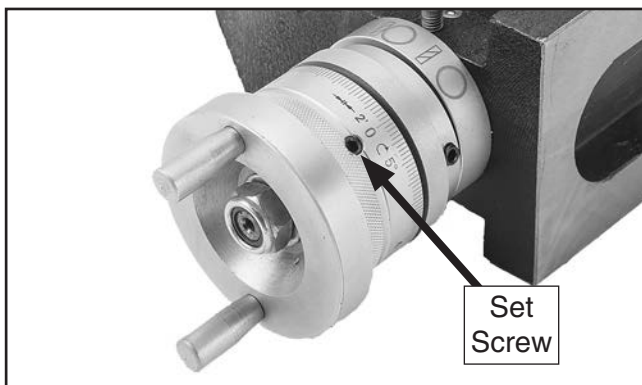


Figure 9. Location of collar set screw.

2. Tighten set screw to secure collar.

Adjusting Indexing Scale

The degree scale is marked on the edge of the rotary head in 1° increments (see **Figure 10**). The zero point can be synchronized with the handwheel to start the table indexing at 0° by using the index marker as a starting point.

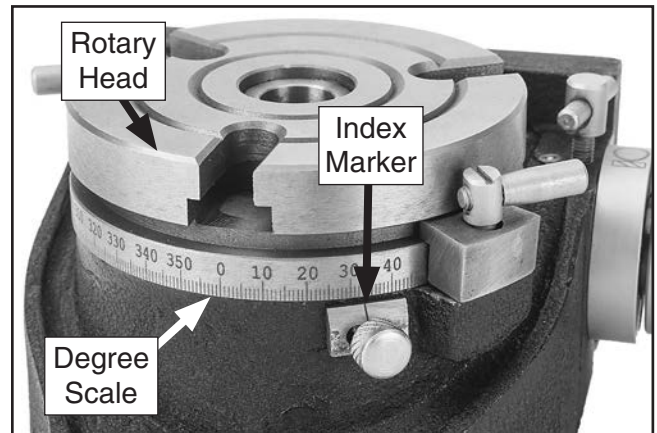


Figure 10. Location of degree scale.



Mounting Rotary Table Horizontally

Before mounting the Rotary Table to your mill table, make sure your mill table and mill spindle are correctly aligned with each other. Refer to your mill manual for this procedure.

Models T1190, T1191, and T1192 come with (3) M10-1.5 x 50 T-slot bolts, (3) 10mm hex nuts, (3) 10mm flat washers, and (3) clamping plates for mounting the rotary table. (1) T-slot bolt assembly is needed to mount the table horizontally and (2) T-slot bolt assemblies are needed to mount the table vertically.

Use shop rags and mineral spirits to thoroughly clean the mating surfaces of the rotary table and the mill table, including the boss and socket.

Components and Hardware Needed	Qty
T-Slot Bolts M10-1.5 x 50mm	3
Hex Nuts M10-1.5	3
Flat Washers 10mm	3
Clamping Plates	3

Tools Needed	Qty
Open-End Wrench 17mm	1

⚠ CAUTION

Make sure rotary table is secured to milling table. Check T-slot bolt assemblies before each cutting operation. If rotary table is not secured, serious personal injury and damage to your mill and rotary table could result.

To mount rotary table in horizontal position:

1. DISCONNECT MACHINE FROM POWER!
2. Position T-slot bolts on rotary table over T-slots in milling table (see **Figure 11**).
3. Insert (3) T-slot bolts into each milling table T-slot, then install (3) clamping plates, (3) 10mm flat washers, and (3) M10-1.5 hex nuts onto each T-slot bolt (see **Figure 11**).
4. Secure rotary table using hex nuts. Ensure rotary table is rigid to increase accuracy, efficiency, and safety (see **Figure 11**).

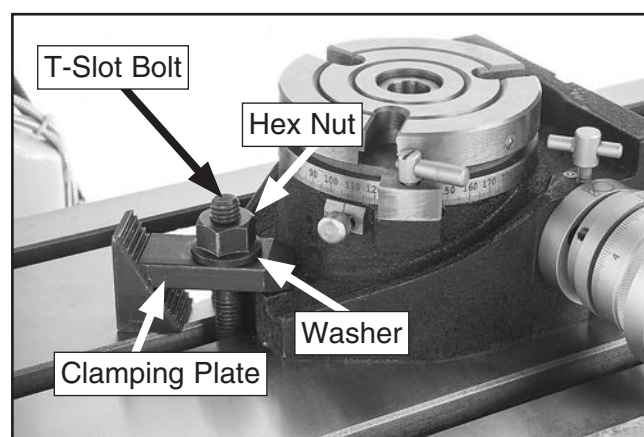


Figure 11. Rotary table mounted using T-slot bolt assemblies.

Note: Rotary table may also be installed using T-bolts, washers, and hex nuts (not included), as shown in **Figure 12**.

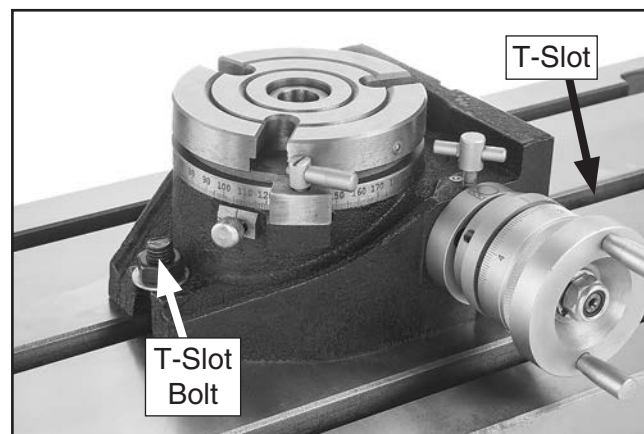


Figure 12. Rotary table mounted using T-bolts, washers, and hex nuts.



Mounting Rotary Table Vertically

The T-slots for the vertical setup of the rotary table are at the center of the mill table. You will need to have two matching center T-slots on your milling table to use T-bolts. If your milling table has a different T-slot center, you will need to use step blocks and clamps to secure the rotary table. See **Figure 13** for an example of this type of setup.

Models T1190, T1191, and T1192 do not include fasteners to secure the rotary table to a milling table in the vertical position. The instructions below are included to provide an example of how the table can be mounted.

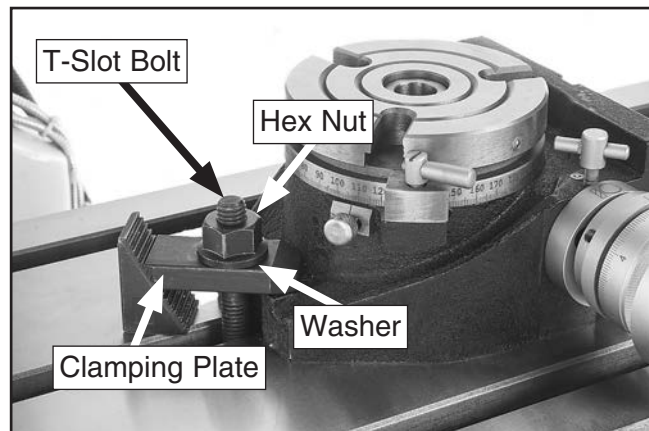


Figure 13. Setup example for rotary table mounting.

Components and Hardware Needed	Qty
T-Bolts	2
Hex Nuts.....	2
Flat Washers	2
Clamping Plates	2

To mount rotary table in vertical position:

1. DISCONNECT MACHINE FROM POWER!
2. Insert T-bolt in milling table T-slot.
3. Install rotary table in vertical position on (1) T-bolt (see **Figure 14**).
4. Install (1) clamping plate, (1) flat washer, and (1) hex nut on T-bolt (see **Figure 14**), then tighten securely. Holding table rigid will help with accuracy, efficiency, and general safety.

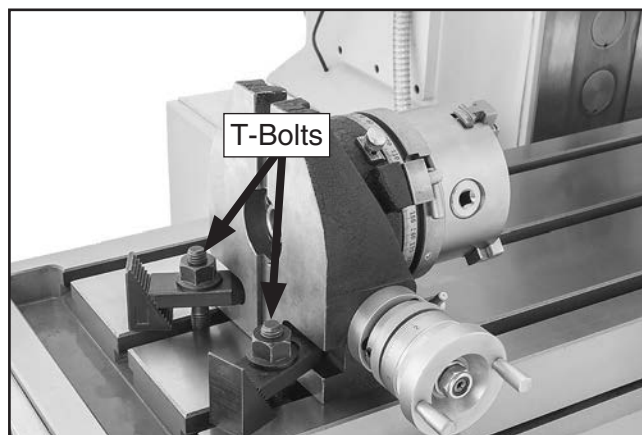


Figure 14. Example of rotary table mounted in vertical position using T-bolts, clamping plates, flat washers, and hex nuts.

5. Repeat with second T-bolt, clamping plate, flat washer, and hex nut.

⚠ CAUTION

Make sure rotary table is secured to milling table. Check T-slot bolts, washers, and nuts before each cutting operation. If rotary table is not secured, serious personal injury and damage to your mill and rotary table could result.



Mounting Chuck on Rotary Table

The chuck will need to be centered each time it is mounted on the rotary table. This ensures the highest degree of precision during milling operations.

Items Needed	Qty
Dial Indicator w/Magnetic Base	1
Dead-Blow Hammer	1
Open-End Wrench 17mm	1
6" Round Piece of Stock	1

To center and mount chuck on rotary table:

1. Place chuck on rotary table and attach with (3) M6-1 x 60 hex bolts and (3) fixed keys (see **Figure 15**).



Figure 15. Mounting chuck to rotary table.

2. Insert piece of straight round stock into chuck jaws to act as indexing point (see **Figure 16**).

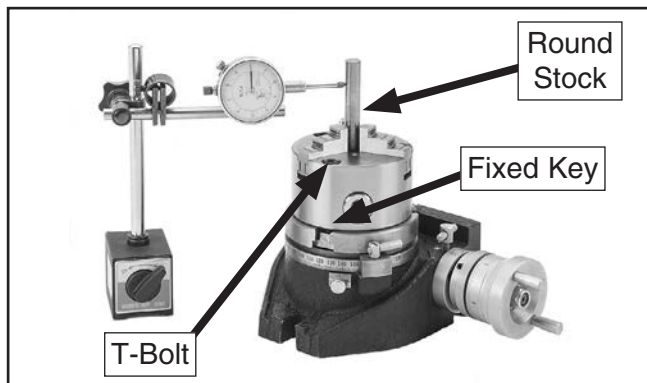


Figure 16. Magnetic base dial indicator placed next to rotary table.

Note: Indicator needle should be perpendicular to rotary table and touching outside edge of round stock in chuck jaws (see **Figure 16**).

3. Position dial indicator with magnetic base next to rotary table.
4. Loosen (3) M6-1 x 60 hex bolts securing chuck to rotary table (see **Figure 17**). Make sure there is a little tension on the bolts so chuck cannot shift on its own.

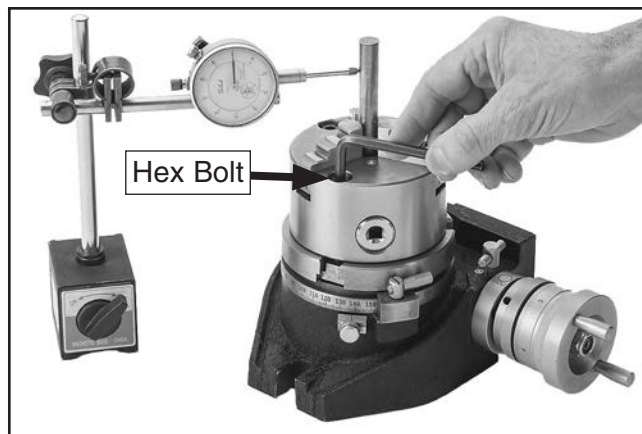


Figure 17. Loosening M6-1 x 60 hex bolts securing chuck.

5. Loosen rotary table locks (if engaged) and rotate handwheel clockwise. Take note of total runout indicated on dial, and stop at low side of measured runout.

Note: Rotate chuck at least one full revolution for best reading.

6. Use a dead-blow hammer to lightly tap on edge of chuck opposite from indicator until $\frac{1}{2}$ of indicated runout is corrected.
7. Repeat **Steps 3–6** until runout is adjusted to your satisfaction.
8. Tighten all hex bolts completely, then check runout again. If necessary, repeat **Steps 2–6**, then tighten hex bolts.



Aligning Workpiece with Mill Spindle

There are many ways to align the mounted workpiece with the mill spindle. Review the suggestions below, then use your best judgment based on your experience and skills to select the correct method for your operation.

Tools Needed	Qty
Test Indicator with Magnetic Base	1
Precision Mandrel or Drill Rod	1
Edge Finder	1
Precision Square	1

Workpiece Mounted to T-Slot Table in Horizontal Position

1. Position test indicator with magnetic base beside rotary table, as shown in **Figure 18**.

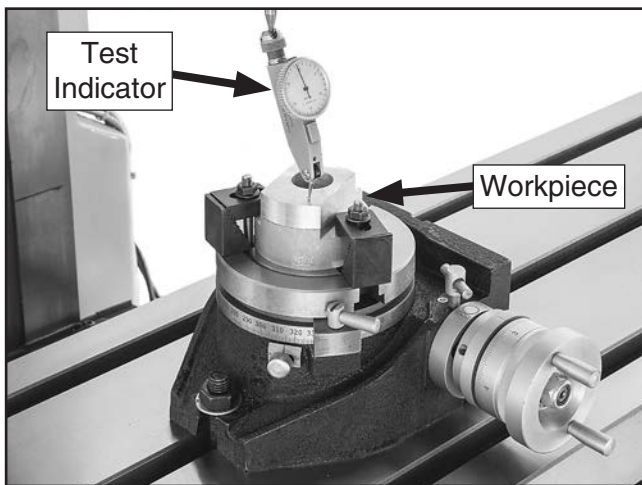


Figure 18. Example of aligning workpiece using a test indicator.

2. Indicate inside or outside of workpiece, then rotate rotary table handwheel while watching indicator dial.

Note: For accurate indicator results, rotate rotary table handwheel in just one direction to eliminate any pinion backlash.

3. Adjust workpiece on rotary table until there is zero runout when table and workpiece are rotated, then securely clamp workpiece to T-slot table.

4. Mount test indicator in mill spindle using a collet or chuck.
5. Indicate workpiece key feature, then rotate mill spindle by hand in just one direction while watching indicator dial.

Tip: Use a mirror to aid in reading test indicator as it rotates away from you.

6. Adjust mill table until indicator dial reads zero runout throughout rotation of spindle.

Note: If your workpiece is large enough, it may be easier to use an edge finder instead of a test indicator.

Workpiece Mounted with Chuck in Horizontal Position

1. Mount a precision mandrel or quality drill rod in chuck, as shown in **Figure 19**.

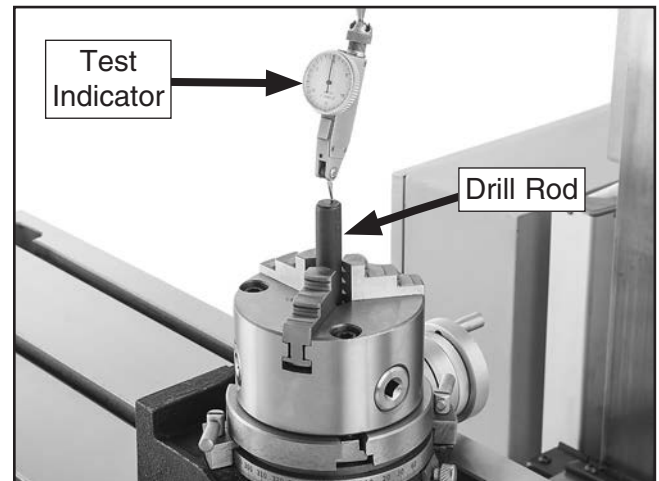


Figure 19. Example of horizontally aligning chuck.

2. Mount test indicator in mill spindle, then indicate outside of precision mandrel or drill rod, as shown in **Figure 19**.
3. Rotate mill spindle by hand in just one direction while watching indicator dial.
4. Adjust mill table position until indicator dial reads zero runout.



Workpiece Mounted with Chuck in Vertical Position

1. Mount an edge finder in mill spindle (see **Figure 20**).
2. Accurately measure workpiece diameter, then mount it in chuck, as shown in **Figure 20**.

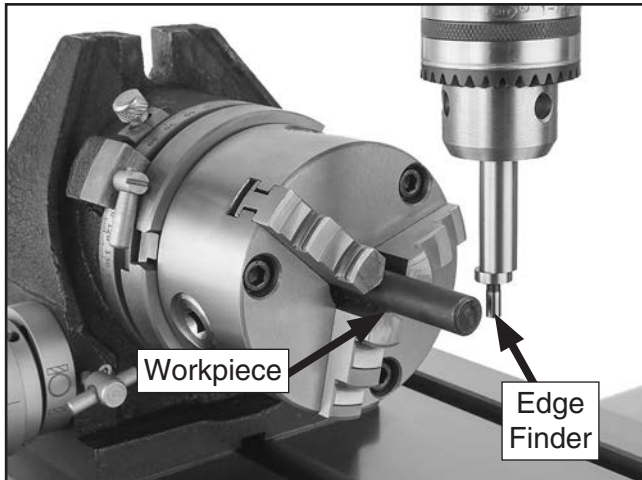


Figure 20. Example of using an edge finder to align workpiece.

3. Find one side of workpiece with edge finder, then note Y-axis position of mill table.
4. Remove edge finder from mill spindle, then move mill table $\frac{1}{2}$ the diameter of workpiece plus $\frac{1}{2}$ the diameter of edge finder.

Note: Make sure you account for any backlash when moving mill table.

Aligning Table with Mill X-Axis

The rotary table should be aligned with the X-axis of the mill. The rotary table can be mounted to the mill table using the supplied T-slot bolt assemblies or step clamps.

To align rotary table with mill X-axis:

1. Place rotary table with chuck on mill table.
2. Position a precision square across front edge of mill table and adjust rotary table flat against square, as shown in **Figure 21**, then clamp rotary table in place.

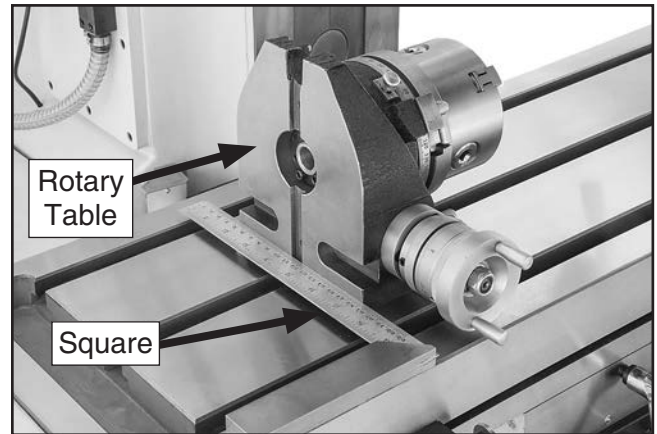


Figure 21. Using a precision square to align with X-axis.

3. Use a test indicator mounted in mill spindle to indicate one side of face or back of a workpiece mounted in chuck jaws.
4. Move mill table in and out to indicate across full width of rotary table.
5. If necessary, loosen clamps and lightly tap rotary table into position so indicator reads zero runout across full width of rotary table, then reclamp it.



DRO Auto & Handle Settings

There are two different modes for machine operation using the DRO: Auto and Handle. It is important to know the difference between the two for proper machine operation and safety.

To operate in Auto Mode:

1. Motor starts running after pressing Start button.
2. Motor stops when the Angle value reaches the same as the preset value.
3. Motor will run again when the Time value reaches the preset value. It will then run the same angle as the preset value.
4. After the cycle repeats, rotary table will stop running when the angle is infinitely near 360°.

To operate in Handle Mode:

1. Rotary table starts running after pressing the control dial. Hold down the dial to adjust the angle of the table.
2. Working presets are the same as in Auto Mode from here.
3. To reset the values, press the Stop button.

Angular Indexing

Angular indexing is the process used to create evenly spaced holes in a round workpiece. Always ensure your rotary table is properly aligned on the X-axis of the mill before beginning angular indexing.

Basic Example:

You are making a flange and need to place six holes 60° apart for the bolt pattern in **Figure 22**.

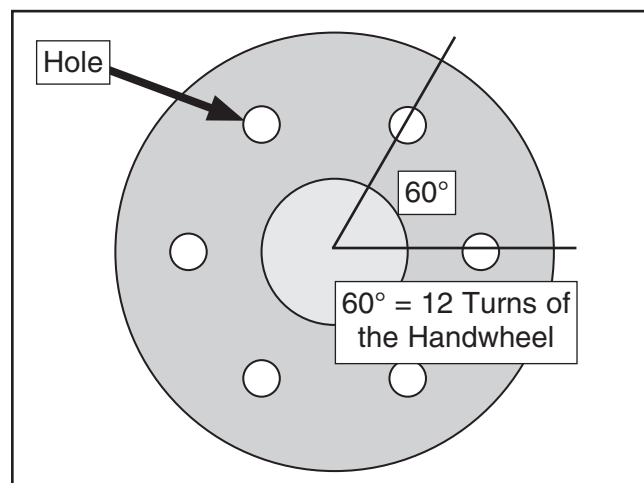


Figure 22. Example of flange layout.

$$\text{Handwheel Rotations} = \frac{72}{N}$$

N = the desired division number (6).

$$\frac{72}{6} = 12 \text{ full handwheel turns}$$

$$12 \text{ turns} = 60^\circ$$

1. Rotate handwheel before making first hole to take up any play in worm gear.
2. Make your first hole, then rotate handwheel 12 times.

Note: If you rotate handwheel too far, do not back up to the number. You must back up one revolution and dial back to the desired number, then lock table in place to locate the second hole. This procedure eliminates errors due to backlash in worm gear.



Mounting Tailstock

Models T1190 and T1192 come with a tailstock. The tailstock supports larger workpieces when the rotary table is in the vertical position, while maintaining a high level of accuracy.

Tools Needed	Qty
Dial Indicator	1

To install tailstock onto mill table:

1. Ensure chuck is installed on rotary table, then secure rotary table to mill table in vertical position.
2. Install tailstock on mill table so dead center of tailstock is roughly in line with center of rotary table.

3. Mount center-drilled, parallel workpiece between chuck and tailstock (see **Figure 23**).

Note: Workpiece should be checked for parallelism and concentricity.

4. Mount a dial indicator in mill spindle and indicate off of a horizontal center line of workpiece near tailstock (see **Figure 23**).

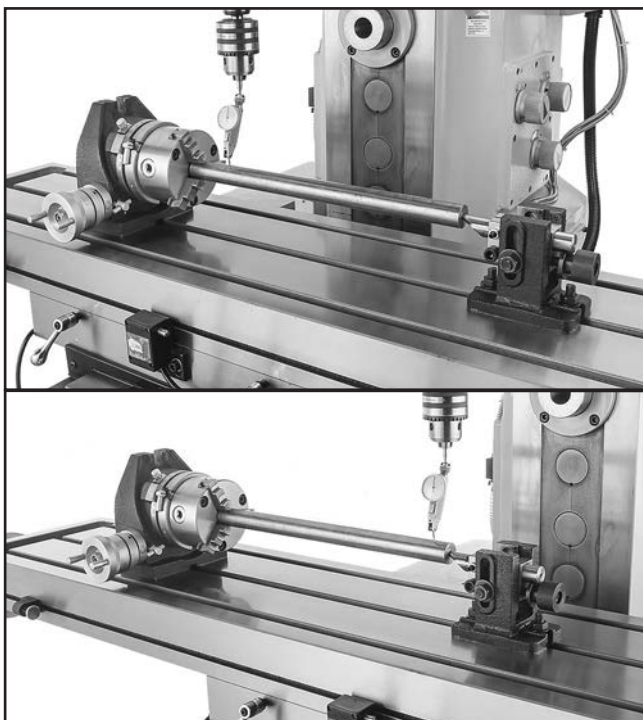


Figure 23. Determining offset of surface.

5. Move table along X-axis and indicate horizontal centerline of workpiece near rotary table. If there is an offset, adjust position of tailstock half the distance of the offset and recheck (see **Figure 24**).

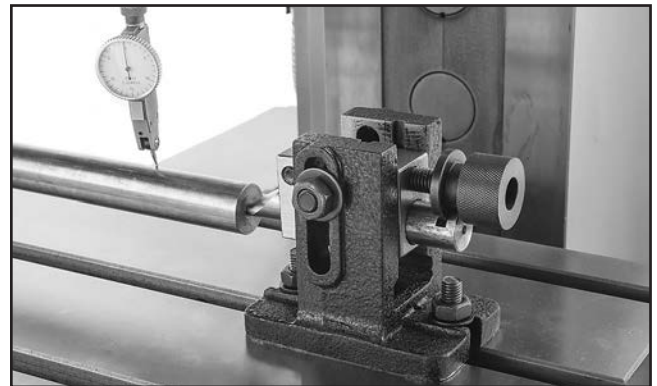


Figure 24. Adjusting tailstock for offset.

6. Continue to make this adjustment until zero movement is indicated all along the travel.
7. Tighten tailstock mounting bolts and recheck.

To align Z-axis:

1. Repeat **Steps 5–7** from above, only this time indicate off vertical center line of workpiece.
2. Make your adjustments by slightly loosening adjustment bolt and raising or lowering tailstock dead center in appropriate direction (see **Figure 25**).

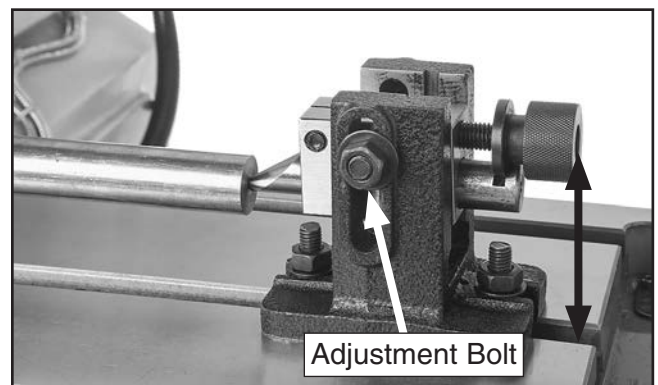


Figure 25. Vertical tailstock adjustment.

3. Tighten bolts and recheck.



SECTION 4: ACCESSORIES

! WARNING

Installing unapproved accessories may cause machine to malfunction, resulting in serious personal injury or machine damage. To reduce this risk, only install accessories recommended for this machine by Grizzly.

NOTICE

Refer to our website or latest catalog for additional recommended accessories.

T24804—1" Universal Dial with Magnetic Base

Includes iGaging dial indicator, fine adjustment magnetic base, and a protective case. Dial indicator has a range of 0–1", with an accuracy of within 0.001". Fine adjustment magnetic base is a strong magnet with 85 lbs. of pull power and a V-shaped bottom so the base can be mounted at any angle.



Figure 26. T24804 Universal Dial with Magnetic Base.

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 27. 90° Precision wide-base squares.

H7978—Fractional Digital Caliper

This Digital Caliper features a large LCD readout that converts to decimal inch, fractional inch, and millimeters with the push of a button. Measure internal, external dimensions, depth, steps and differential measurements. Features thumb roll and stainless steel construction. Range: 0-6", 0-150mm. Resolution: 0.0005", 0.01mm, 1/128".

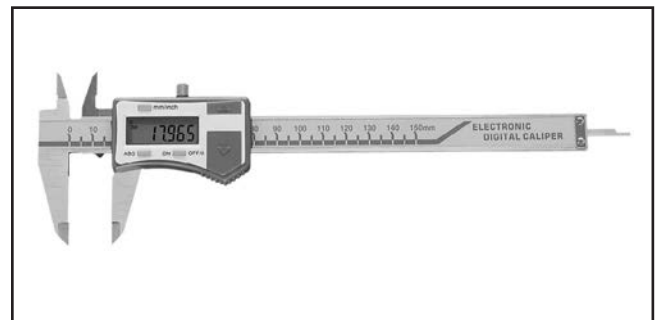


Figure 28. H7978 6" Digital Caliper.

order online at www.grizzly.com or call 1-800-523-4777



G1075—58-Pc. Clamping Kit 1/2" T-Nut**G1076—58-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.

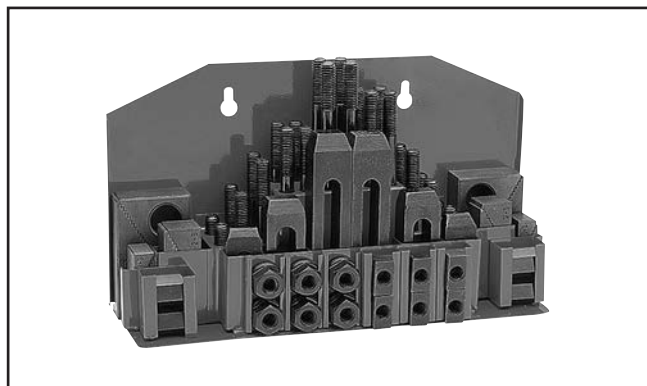


Figure 29. 58-Pc. clamping kits.

H2939—4-Pc. Edge Finder Set

This is a must have set for any shop. 4 different styles to cover any setup problem! Set includes 1 each: 3/8" diameter with point, 3/8" dia. combination with a point and .200" shoulder, 1/2" dia. with a point, and 1/2" dia. with .200" shoulder.

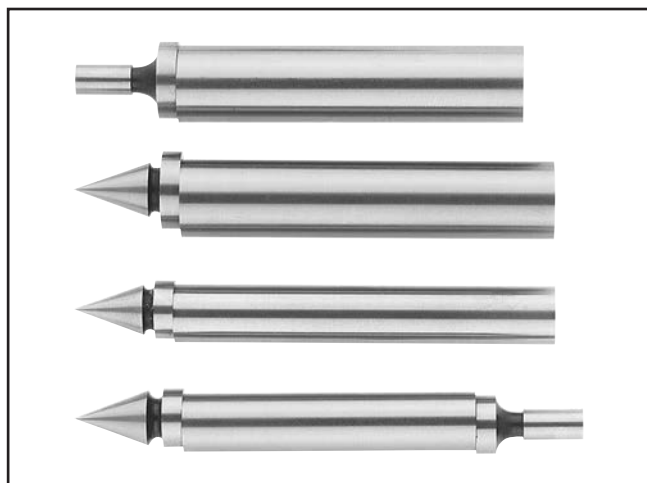


Figure 30. H2939 4-Pc. Edge Finder Set.

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 31. G9629 Universal Indicator Holder.

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.

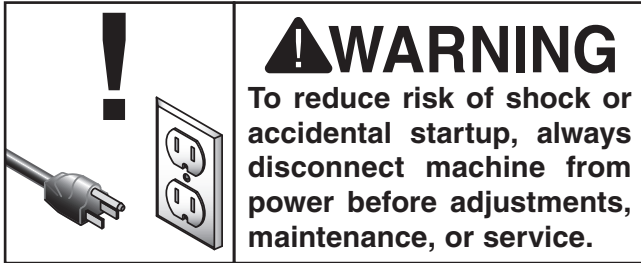


Figure 32. Test indicators.

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SECTION 5: MAINTENANCE



Schedule

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

Daily:

- Clean and lubricate the rotary table.
- Dress the machined surfaces.
- Check/resolve any unsafe condition.

Monthly:

- Disassemble and clean the rotary table.

Cleaning & Protecting

It is essential that the rotary table be cleaned after every use, and the surfaces 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 device. 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 disassemble the rotary table, then thoroughly clean each part and relubricate.

Lubrication

Ball Oilers

Oil Type Grizzly T26685 or ISO 32 Equivalent
Oil Amount.....1 or 2 Squirts
Lubrication Frequency..... Daily

This rotary vise has 2 ball oilers that should be oiled on a daily basis before beginning operation. Refer to **Figure 33** for their locations.

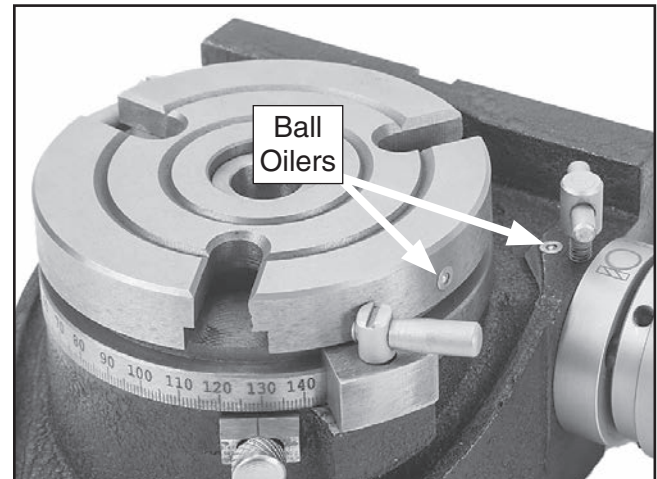


Figure 33. Location of ball oilers.

Ball Oilers

Proper lubrication of ball oilers is done with a pump-type oil can that has a plastic or rubberized cone tip. We do not recommend using metal needle or lance tips, as they can push the ball too far into the oiler, break the spring seat, and lodge the ball in the oil galley.

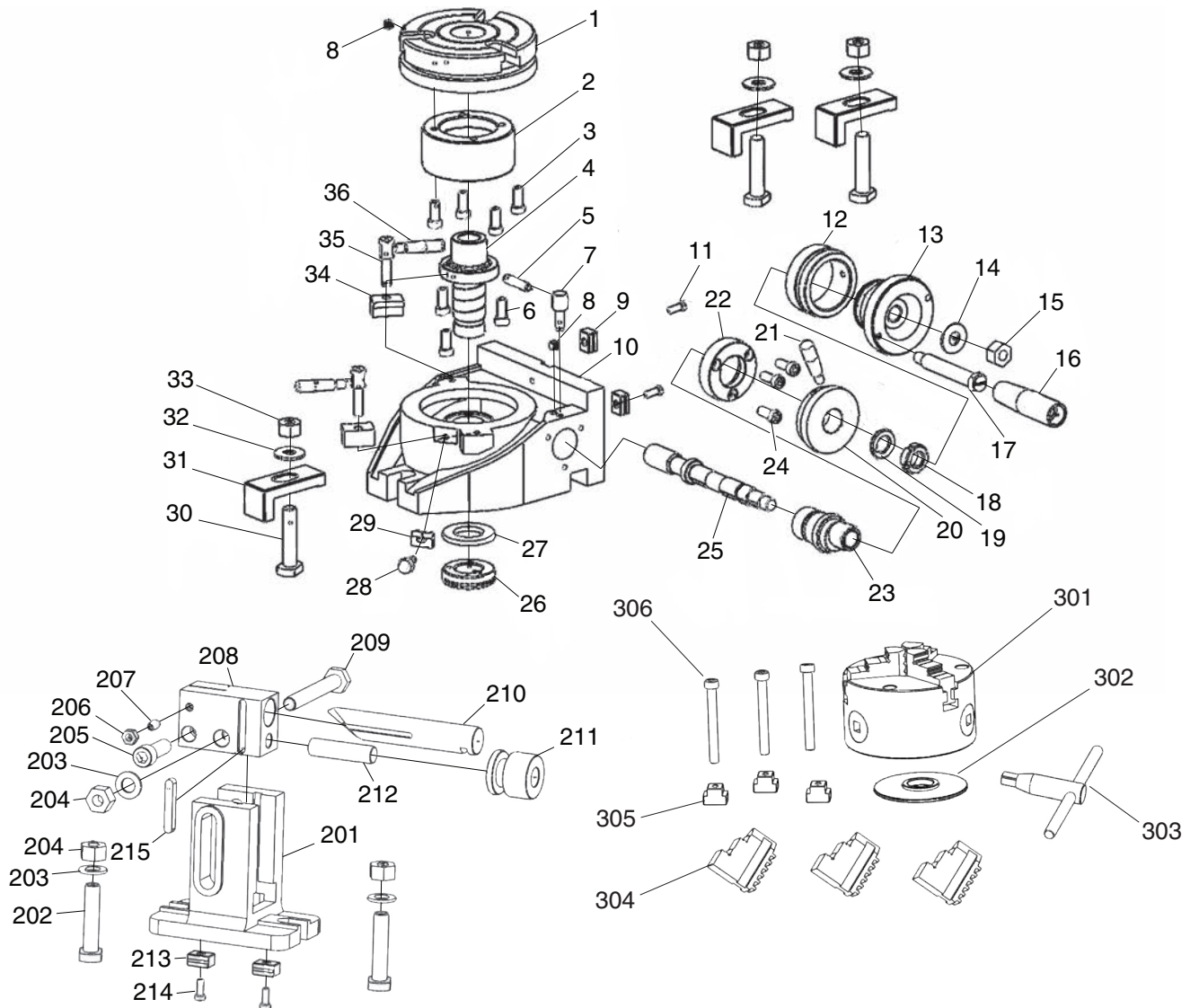
Lubricate the ball oilers before and after machine use, and more frequently under heavy use. When lubricating ball oilers, first clean the outside surface to remove any dust or grime. Push the rubber or plastic tip of the oil can nozzle against the ball oiler to create a hydraulic seal, then pump the oil can once or twice. If you see sludge and contaminants coming out of the lubrication area, keep pumping the oil can until the oil runs clear. When finished, wipe away any excess oil.



SECTION 6: PARTS

We do our best to stock replacement parts when possible, but we cannot guarantee that all parts shown are available for purchase. Call (800) 523-4777 or visit www.grizzly.com/parts to check for availability.

T1190 Parts Breakdown



T1190 Parts List

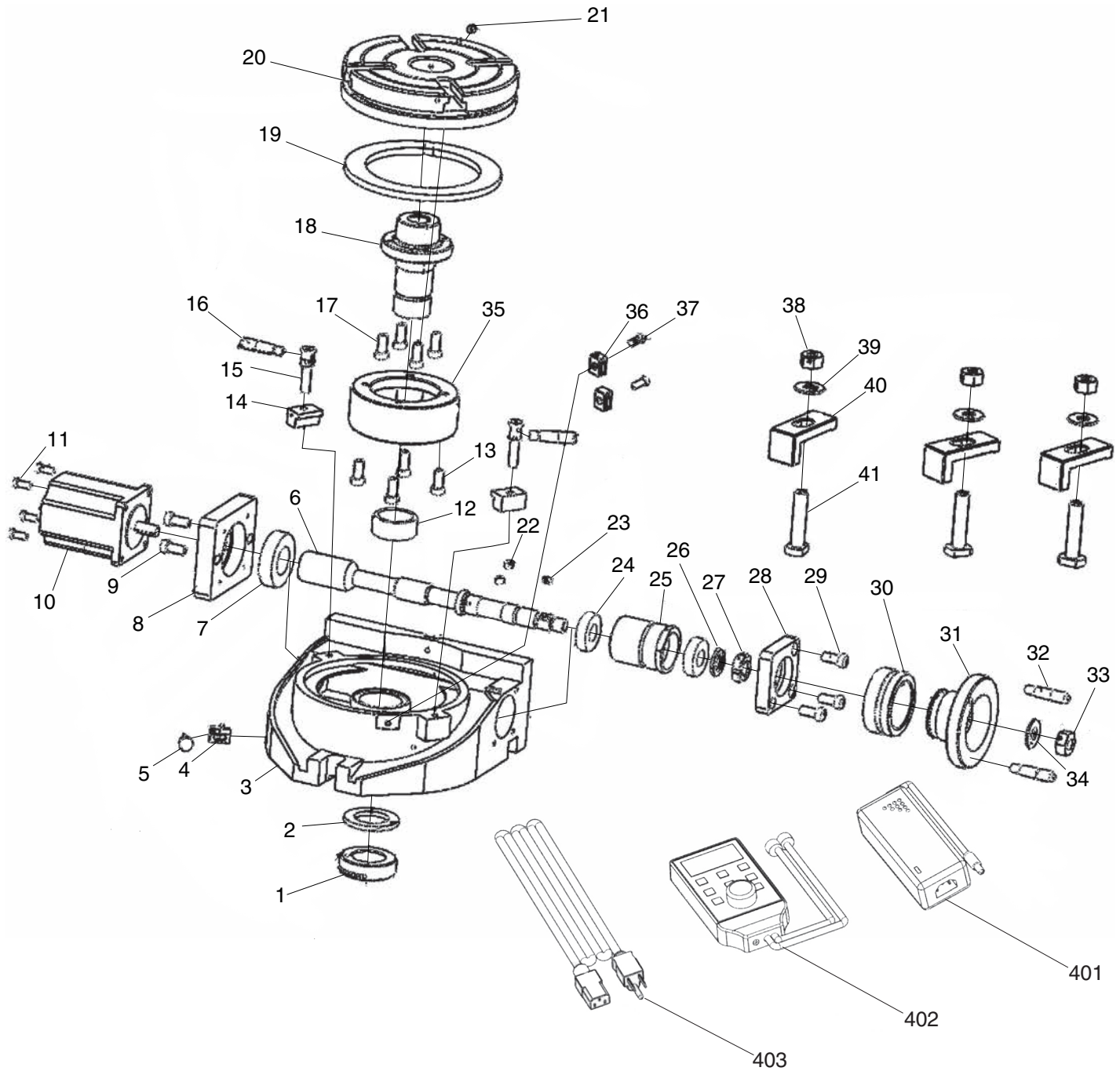
REF	PART #	DESCRIPTION
1	PT1190001	ROTARY TABLE
2	PT1190002	WORM WHEEL
3	PT1190003	HEX BOLT M5-.8 X 20
4	PT1190004	CENTER SHAFT
5	PT1190005	LOCK HANDLE
6	PT1190006	HEX BOLT M5-.8 X 12
7	PT1190007	LOCK LEVER
8	PT1190008	BALL OILER 6MM
9	PT1190009	KEY 16 X 12 X 9
10	PT1190010	ROTARY TABLE BASE
11	PT1190011	HEX BOLT M5-.8 X 10
12	PT1190012	GRADUATED DIAL
13	PT1190013	HANDWHEEL
14	PT1190014	FLAT WASHER 12MM
15	PT1190015	HEX NUT M12-1.75
16	PT1190016	FIXED HANDLE M6-1 X 8, 10 X 25
18	PT1190018	WORM SHAFT LOCK NUT M14-2
19	PT1190019	WORM SHAFT DOTTLE PIN
20	PT1190020	CLUTCH DISC
21	PT1190021	HANDLE M6-1 X 40
22	PT1190022	HANDWHEEL BASE
23	PT1190023	ECCENTRIC SLEEVE
24	PT1190024	SET SCREW M6-1 X 6
25	PT1190025	WORM SHAFT
26	PT1190026	LOCK NUT M24-3
27	PT1190027	THRUST BEARING AS2542
28	PT1190028	KNOB BOLT M5-.8 X 8
29	PT1190029	POINTER

REF	PART #	DESCRIPTION
30	PT1190030	T-BOLT M10-1.5 X 50
31	PT1190031	CLAMPING PLATE
32	PT1190032	FLAT WASHER 10MM
33	PT1190033	HEX NUT M10-1.5
34	PT1190034	LOCK BLOCK
35	PT1190035	LOCK SHAFT
36	PT1190036	FIXED HANDLE M6-1 X 9, 8 X 21
37	PT1190037	SET SCREW M6-1 X 8 DOG-PT
201	PT1190201	TAILSTOCK BASE
202	PT1190202	T-BOLT M10-1.5 X 50
203	PT1190203	FLAT WASHER 20MM
204	PT1190204	HEX NUT M10-1.5
205	PT1190205	HEX BOLT M10-1.5 X 30
206	PT1190206	HEX NUT M6-1
207	PT1190207	SET SCREW M6-1 X 15
208	PT1190208	TAIL BLOCK
209	PT1190209	HEX BOLT M10-1.5 X 80
210	PT1190210	QUILL
211	PT1190211	KNOB
212	PT1190212	SET SCREW M12-1.75 X 50
213	PT1190213	KEY 16 X 12 X 9
214	PT1190214	HEX BOLT M5-.8 X 10
301	PT1190301	THREE JAW CHUCK
302	PT1190302	CONNECTING FLANGE
303	PT1190303	CHUCK KEY
304	PT1190304	THREE JAW CHUCK BOTTOM JAW SET
305	PT1190305	T-NUT M6-1 14 X 18 X 12
306	PT1190306	HEX BOLT M6-1 X 60

Please Note: We do our best to stock replacement parts whenever possible, but we cannot guarantee that all parts shown here are available for purchase. Call (800) 523-4777 or visit our online parts store at www.grizzly.com to check for availability.



T1191 Parts Breakdown



Please Note: We do our best to stock replacement parts whenever possible, but we cannot guarantee that all parts shown here are available for purchase. Call (800) 523-4777 or visit our online parts store at www.grizzly.com to check for availability.

Models T1190-92 (Mfd. Since 3/17)



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Scan QR code to visit our Parts Store.



T1191 Parts List

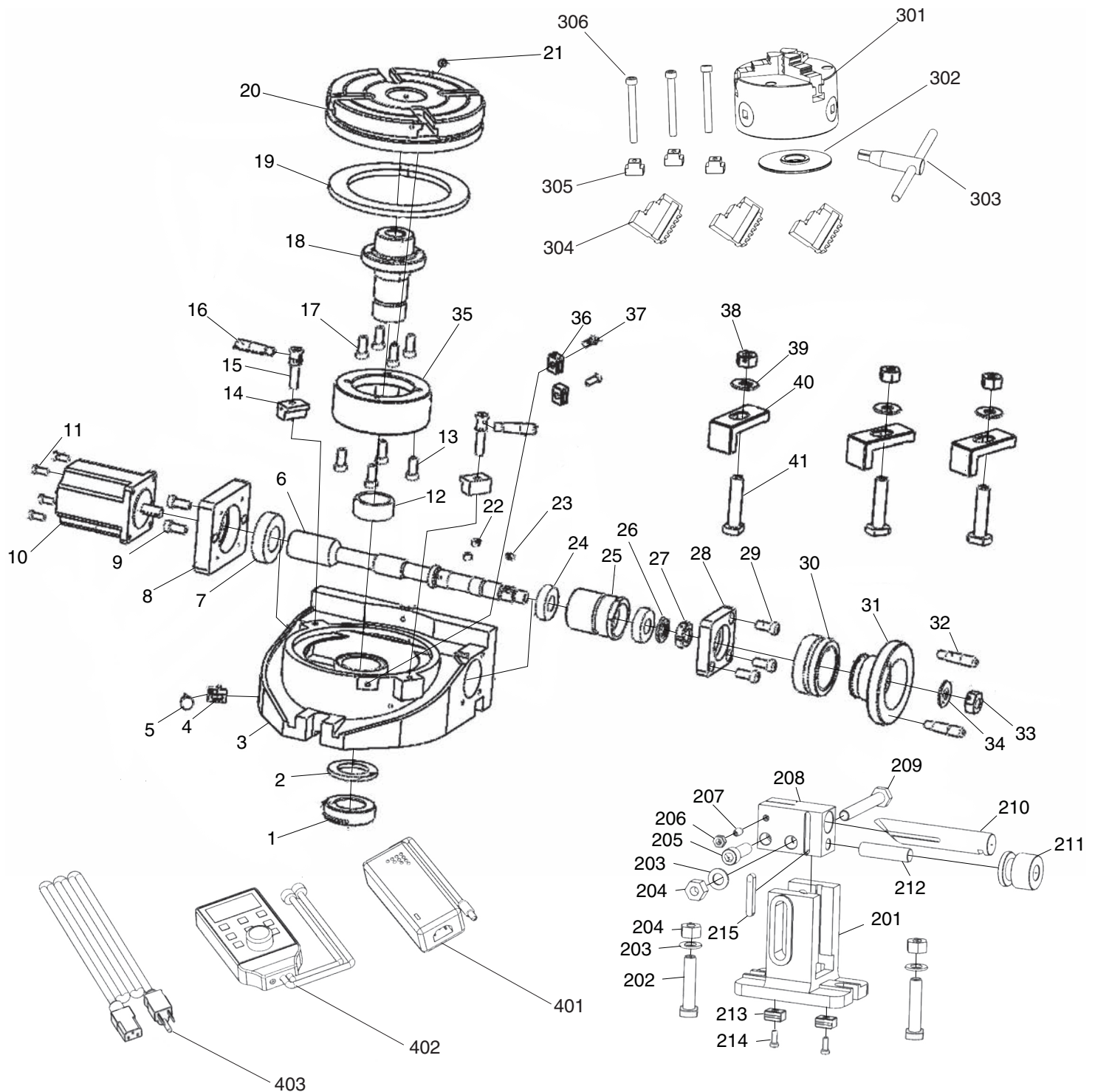
REF	PART #	DESCRIPTION
1	PT1191001	LOCK NUT M24-3
2	PT1191002	THRUST BEARING AS2542
3	PT1191003	ROTARY TABLE BASE
4	PT1191004	POINTER
5	PT1191005	KNOB BOLT M5-.8 X 8
6	PT1191006	WORM SHAFT
7	PT1191007	BALL BEARING 6005ZZ
8	PT1191008	MOTOR DEAD PLATE
9	PT1191009	HEX BOLT M6-1 X 18
10	PT1191010	MOTOR 2NM TORQUE, 3A
11	PT1191011	HEX BOLT M4-.7 X 12
12	PT1191012	BEARING BK2516
13	PT1191013	HEX BOLT M4-.7 X 12
14	PT1191014	LOCK BLOCK
15	PT1191015	LOCKING LEVER
16	PT1191016	LOCKING LEVER HANDLE M6-1 X 8
17	PT1191017	HEX BOLT M5-.8 X 16
18	PT1191018	CENTER SHAFT
19	PT1191019	THRUST BEARING AS75100
20	PT1191020	ROTARY TABLE
21	PT1191021	BALL OILER 6MM
22	PT1191022	LOCK SCREW M6-1 X 6
23	PT1191023	KEY 4 X 8

REF	PART #	DESCRIPTION
24	PT1191024	ANGULAR CONTACT BEARING 7002AC
25	PT1191025	WARM SHAFT SPACER TUBE
26	PT1191026	WORM SHAFT DOTTLE PIN
27	PT1191027	LOCK NUT M14-1.25
28	PT1191028	HANDWHEEL BASE
29	PT1191029	HEX BOLT M6-1 X 14
30	PT1191030	GRADUATED DIAL
31	PT1191031	HANDWHEEL
32	PT1191032	FIXED HANDLE M6-1 X 8, 10 X 26
33	PT1191033	HEX NUT M10-1.5
34	PT1191034	FLAT WASHER 12MM
35	PT1191035	WORM GEAR
36	PT1191036	KEY 16 X 12 X 9
37	PT1191037	HEX BOLT M5-.8 X 10
38	PT1191038	HEX NUT M10-1.5
39	PT1191039	FLAT WASHER 10MM
40	PT1191040	CLAMPING PLATE
41	PT1191041	T-BOLT M10-1.5 X 50
42	PT1191042	SET SCREW M6-1 X 8 DOG-PT
401	PT1191401	POWER TRANSFORMER
402	PT1191402	CONTROLLER
403	PT1191403	POWER LINE

Please Note: We do our best to stock replacement parts whenever possible, but we cannot guarantee that all parts shown here are available for purchase. Call (800) 523-4777 or visit our online parts store at www.grizzly.com to check for availability.



T1192 Parts Breakdown



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Models T1190-92 (Mfd. Since 3/17)



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T1192 Parts List

REF	PART #	DESCRIPTION
1	PT1192001	LOCK NUT M24-3
2	PT1192002	THRUST BEARING AS2542
3	PT1192003	ROTARY TABLE BASE
4	PT1192004	POINTER
5	PT1192005	KNOB BOLT M5-.8 X 8
6	PT1192006	WORM SHAFT
7	PT1192007	BALL BEARING 6005ZZ
8	PT1192008	MOTOR DEAD PLATE
9	PT1192009	HEX BOLT M6-1 X 18
10	PT1192010	MOTOR 2NM TORQUE, 3A
11	PT1192011	HEX BOLT M4-.7 X 12
12	PT1192012	BEARING BK2516
13	PT1192013	HEX BOLT M4-.7 X 12
14	PT1192014	LOCK BLOCK
15	PT1192015	LOCKING LEVER
16	PT1192016	FIXED HANDLE M6-1 X 8, 10 X 25
17	PT1192017	HEX BOLT M5-.8 X 16
18	PT1192018	CENTER SHAFT
19	PT1192019	THRUST BEARING AS75100
20	PT1192020	ROTARY TABLE
21	PT1192021	BALL OILER 6MM
22	PT1192022	LOCK SCREW M6-1 X 6
23	PT1192023	KEY 4 X 8
24	PT1192024	ANGULAR CONTACT BEARING 7002AC
25	PT1192025	WARM SHAFT SPACER TUBE
26	PT1192026	WORM SHAFT DOTTLE PIN
27	PT1192027	LOCK NUT M14-1.25
28	PT1192028	HANDWHEEL BASE
29	PT1192029	HEX BOLT M6-1 X 14
30	PT1192030	GRADUATED DIAL
31	PT1192031	HANDWHEEL
32	PT1192032	FIXED HANDLE M6-1 X 8, 10 X 26
33	PT1192033	HEX NUT M10-1.5

REF	PART #	DESCRIPTION
34	PT1192034	FLAT WASHER 12MM
35	PT1192035	WORM GEAR
36	PT1192036	KEY 16 X 12 X 9
37	PT1192037	HEX BOLT M5-.8 X 10
38	PT1192038	HEX NUT M10-1.5
39	PT1192039	FLAT WASHER 10MM
40	PT1192040	CLAMPING PLATE
41	PT1192041	T-BOLT M10-1.5 X 50
42	PT1192042	SET SCREW M6-1 X 8 DOG-PT
201	PT1192201	TAILSTOCK BASE
202	PT1192202	T-BOLT M10-1.5 X 50
203	PT1192203	FLAT WASHER 20MM
204	PT1192204	HEX NUT M10-1.5
205	PT1192205	HEX BOLT M10-1.5 X 30
206	PT1192206	HEX NUT M6-1
207	PT1192207	SET SCREW M6-1 X 15
208	PT1192208	TAIL BLOCK
209	PT1192209	HEX BOLT M10-1.5 X 80
210	PT1192210	QUILL
211	PT1192211	KNOB
212	PT1192212	SET SCREW M12-1.75 X 50
213	PT1192213	KEY 16 X 12 X 9
214	PT1192214	HEX BOLT M5-.8 X 10
301	PT1192301	THREE JAW CHUCK
302	PT1192302	CONNECTING FLANGE
303	PT1192303	CHUCK KEY
304	PT1192304	THREE JAW CHUCK BOTTOM JAW SET
305	PT1192305	T-NUT M6-1 14 X 18 X 12
306	PT1192306	HEX BOLT M6-1 X 60
401	PT1192401	POWER TRANSFORMER
402	PT1192402	CONTROLLER
403	PT1192403	POWER LINE

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WARRANTY CARD

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Model # _____ Order # _____ Serial # _____

The following information is given on a voluntary basis. It will be used for marketing purposes to help us develop better products and services. **Of course, all information is strictly confidential.**

1. How did you learn about us?

_____ Advertisement _____ Friend _____ Catalog
_____ Card Deck _____ Website _____ Other: _____

2. Which of the following magazines do you subscribe to?

_____ Cabinetmaker & FDM	_____ Popular Science	_____ Wooden Boat
_____ Family Handyman	_____ Popular Woodworking	_____ Woodshop News
_____ Hand Loader	_____ Precision Shooter	_____ Woodsmith
_____ Handy	_____ Projects in Metal	_____ Woodwork
_____ Home Shop Machinist	_____ RC Modeler	_____ Woodworker West
_____ Journal of Light Cont.	_____ Rifle	_____ Woodworker's Journal
_____ Live Steam	_____ Shop Notes	_____ Other: _____
_____ Model Airplane News	_____ Shotgun News	
_____ Old House Journal	_____ Today's Homeowner	
_____ Popular Mechanics	_____ Wood	

3. What is your annual household income?

_____ \$20,000-\$29,000 _____ \$30,000-\$39,000 _____ \$40,000-\$49,000
_____ \$50,000-\$59,000 _____ \$60,000-\$69,000 _____ \$70,000+

4. What is your age group?

_____ 20-29 _____ 30-39 _____ 40-49
_____ 50-59 _____ 60-69 _____ 70+

5. How long have you been a woodworker/metalworker?

_____ 0-2 Years _____ 2-8 Years _____ 8-20 Years _____ 20+ Years

6. How many of your machines or tools are Grizzly?

_____ 0-2 _____ 3-5 _____ 6-9 _____ 10+

7. Do you think your machine represents a good value?

_____ Yes _____ No

8. Would you recommend Grizzly Industrial to a friend?

_____ Yes _____ No

9. Would you allow us to use your name as a reference for Grizzly customers in your area?

Note: We never use names more than 3 times.

_____ Yes _____ No

10. Comments: _____

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Grizzly Industrial, Inc. warrants every product it sells for a period of **1 year** to the original purchaser from the date of purchase. This warranty does not apply to defects due directly or indirectly to misuse, abuse, negligence, accidents, repairs or alterations or lack of maintenance. This is Grizzly's sole written warranty and any and all warranties that may be implied by law, including any merchantability or fitness, for any particular purpose, are hereby limited to the duration of this written warranty. We do not warrant or represent that the merchandise complies with the provisions of any law or acts unless the manufacturer so warrants. In no event shall Grizzly's liability under this warranty exceed the purchase price paid for the product and any legal actions brought against Grizzly shall be tried in the State of Washington, County of Whatcom.

We shall in no event be liable for death, injuries to persons or property or for incidental, contingent, special, or consequential damages arising from the use of our products.

To take advantage of this warranty, contact us by mail or phone and give us all the details. We will then issue you a "Return Number," which must be clearly posted on the outside as well as the inside of the carton. We will not accept any item back without this number. Proof of purchase must accompany the merchandise.

The manufacturers reserve the right to change specifications at any time because they constantly strive to achieve better quality equipment. We make every effort to ensure that our products meet high quality and durability standards and we hope you never need to use this warranty.

Please feel free to write or call us if you have any questions about the machine or the manual.

Thank you again for your business and continued support. We hope to serve you again soon.



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