

OPERATION MANUAL

92-0749 Rev. 210701
Model 304 Tube Squaring Machine



ABOUT TRI TOOL TECHNOLOGIES

A thick red horizontal line spans the width of the page. On the left side, it turns downwards at a 45-degree angle, then turns back to horizontal, creating a stepped effect.

At Tri Tool, we are committed to your success through relentless innovation and powerful partnership. We insist on developing tools and equipment that exceed your expectations of performance, precision, safety, and durability. As a full-service engineering firm, we are here to support you every step of the way.

For more information on engineered solutions, products, and trainings, visit tritool.com or contact our engineers at +1(916) 288-6100.

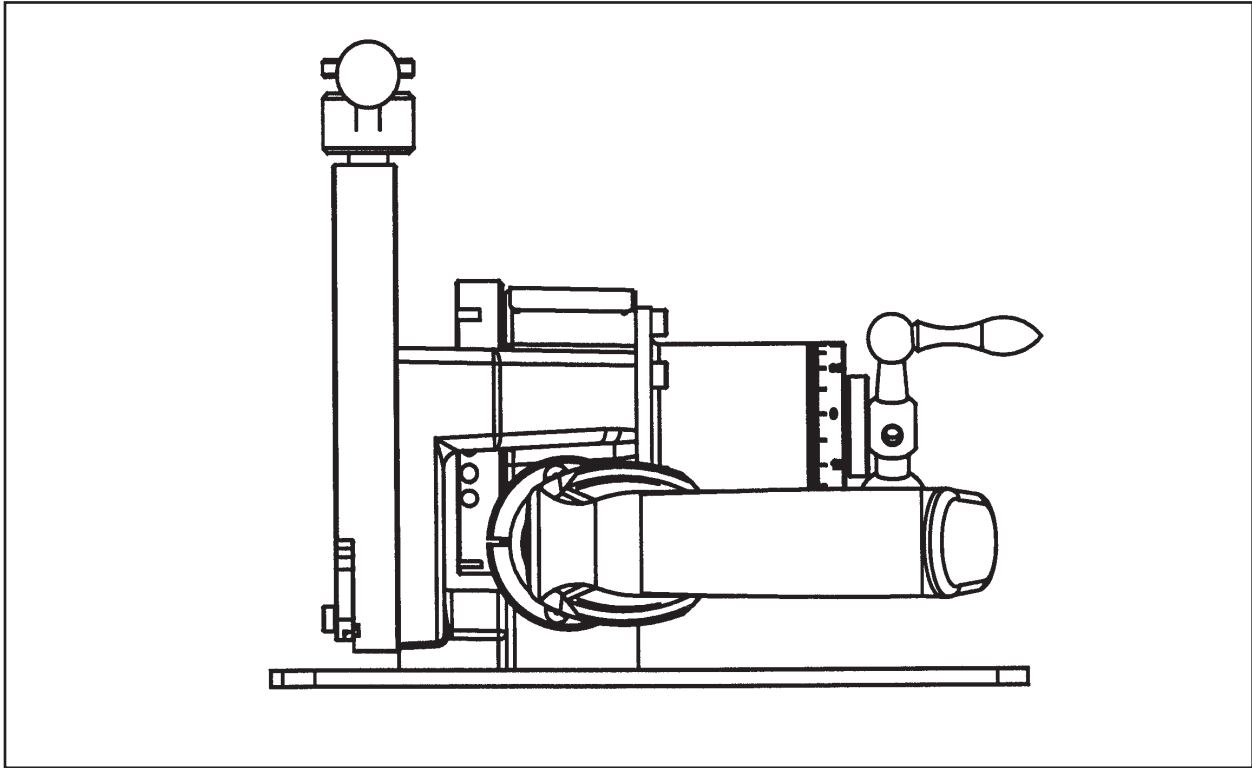


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TRI TOOL INC. Warranty

LIMITED WARRANTY: All products manufactured by Seller are warranted to be free from defects in materials and workmanship under normal use. The period of this warranty shall be three years from the date of shipment for all products, except for welding and Non-Standard Products which shall be one year from the date of shipment. The Buyer shall bear all shipping, packing and insurance costs and all other costs to and from a designated repair service center. All return goods must be authorized in advance and communicated upon issuance of a Return Material Authorization (RMA) by Seller. The product will be returned to the Seller accompanied by a RMA number and associated paperwork, freight prepaid and billed to the Buyer. This warranty is not transferable and will not apply to tool bits or other consumables, or to any Goods to have been (i) mishandled, misused, abused or damaged by Buyer or any third party; (ii) altered without the express permission in writing by Seller, (iii) repaired by a party other than Seller without Seller's prior written approval; or (iv) improperly stored, installed, operated, or maintained in a manner inconsistent with Seller's instructions. This warranty does not apply to defects attributed to (i) normal wear and tear or (ii) failure to comply with Seller's safety warnings.

No warranty for any parts or other supplies provided to seller by buyer, whether or not they are incorporated into goods. Goods supplied by seller which are designed or manufactured by a third party are subject strictly to the third party's warranty for those goods. Seller makes no warranty and disclaims all statutory or implied warranties for these goods, including the implied warranties of merchantability, freedom from patent infringement and fitness for a particular purpose.

Neither this warranty nor any other warranty, expressed or implied, including implied warranties of mechanical ability, fitness for a particular use, or merchantability, shall extend beyond the warranty period. No responsibility is assumed for any incidental or consequential damages. Some states do not allow limitations on how long an implied warranty lasts and some states do not allow the exclusion or limitations incidental or consequential damages, so the above limitation of exclusion does not apply to all Buyers. This warranty gives the Buyer specific legal rights. Other rights vary from state to state.

Warranty Claims and Remedies

Buyer must promptly notify Seller in writing during the applicable warranty period, of any defective Goods covered by Seller's warranties under the Limited Warranty section herein, and no later than fifteen (15) calendar days after discovery of the defect. Seller has no obligation to honor any warranty claim made after the expiration of the warranty period. However, despite the expiration of the warranty period, Seller, at its reasonable discretion, may accept warranty claims submitted up to fifteen (15) calendar days after the expiration of the warranty period provided that Buyer provides Seller with credible and persuasive documentary evidence that the defect was discovered during the warranty period. No warranty claims submitted after this fifteen (15) day calendar period will be considered by Seller.

Buyer's notice of a defective Goods must identify the specific Goods affected, and the nature of the defect. It is required when returning the defective Goods, that it is suitably packed, fully insured, and transportation and insurance prepaid in accordance with instructions issued by Seller. Seller, at its sole option, will either repair or replace any Goods authorized for return to Seller. Such repair, replacement, or credit shall be Buyer's sole remedy for defective Goods. Buyer must promptly provide Seller with all information requested regarding the identified defect.

If the defect claimed by Buyer cannot be reproduced or otherwise verified by Seller, the Goods will be returned to Buyer unmodified at Buyer's expense.

The warranty period for repaired or replaced Goods shall be (i) ninety (90) days or (ii) the unexpired portion of the original warranty period. Under no circumstances is Seller liable for recall, retrieval, removal, dismantling, re-installation, redeployment, or re-commissioning of any defective Goods or any costs associated therewith.

Tool Bit Resharpener Policy

Buyer is required to check all tool bits prior to returning and ensure they are packaged well for shipment. The price structure is available from the Seller's sales coordinator. Seller cannot sharpen badly gouged, chipped, or broken tool bits. Seller will return tool bits that are not suitable for sharpening with the tool bits that were sharpened upon Buyer's request. Buyer is responsible for all shipping charges to and from Seller.



1. ABOUT THE MANUAL

Copyright

©Copyright Tri Tool Inc. Proprietary property of Tri Tool Inc. No reproduction, use, or duplication of the information shown hereon is permitted without the express written consent of Tri Tool Inc.

Disclaimer

The instructions and descriptions in this manual were accurate when the manual was written. However, the information in the manual is subject to change without notice. Check for updated information before you start any job. The Tri Tool Inc. web site has the most current information.

Do not operate or work on this equipment unless you have read and understood the instructions in this Manual. Failure to follow the instructions or follow the safety instructions could result in serious injury or death. This manual describes conditions and hazards that are common and anticipated during equipment operation. No manual can address all conditions which may occur.

Safety Symbols

The manual may contain one or more safety symbols. These symbols and the associated text warn you of potentially hazardous conditions. Examples of the safety symbols and the associated text follow:



DANGER

DANGER: Indicates a hazardous situation that, if not avoided, will result in serious injury or death.



WARNING

WARNING: Indicates a hazardous situation that, if not avoided, could result in serious injury or death.



CAUTION

CAUTION: Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury, or cause property damage.



GLASSES

SAFETY GLASSES: Indicates a hazardous situation that requires the use of safety glasses.



HOT SURFACE

HOT SURFACE: Indicates a hazardous situation that hot surfaces may be present.



GLOVES

GLOVES: Indicates a hazardous situation that requires gloves.



SHOCK HAZARD

ARC FLASH & SHOCK HAZARD: High voltage. Entry by authorized personnel only. Appropriate PPE and tools required when working on this equipment.

2. SAFETY PRECAUTIONS

In General

Use standard safety equipment such as: hard hats, safety shoes, safety harnesses, protective clothes, and other safety devices when appropriate.

Operate this tool only in accordance with specific operating instructions.



WARNING: Do not override the dead-man switch on the power unit. Locking down, obstructing, or in any way defeating the dead-man switch on the power drive unit may result in serious injury.

Personal Protective Equipment

Use standard safety equipment such as: hard hats, safety shoes, safety harnesses, protective clothes, and other safety devices when appropriate.

Wear safety glasses.

Do not wear loose clothing or jewelry.

Wear nonskid footwear.

Put long hair in a cap or a net to make sure hair does not get tangled in equipment.

Personnel

Only personnel who are trained or are being trained may operate the equipment.

Keep the operation manual available where the equipment is used.

The operator must read the operation manual before using the equipment.

The equipment must be operated in accordance with the manual information.

The operator must follow the safety precautions in this manual and good engineering practices to reduce the risk of injury.

Before using the equipment, the operator must ensure that all safety messages on the equipment are legible.

Work Area

Keep the work area clean.

Keep the area well lit.

Keep items such as electrical cords, cables, rags, rigging straps, away from rotating equipment.

Do not use power-cutting tools in the presence of flammable liquids and gases.

Do not let visitors or untrained personnel near tools that are in use.

Ensure all observers wear eye protection.

Keep proper footing at all times.

Area Equipment

Secure the pipe with clamps, vises, chains or straps.

Ensure that both sides of the pipe at the cut site is fully supported so that the pipe will not move after the cut is completed. Long lengths of pipe may be under load and the separation of the pipe can release pressure. This pressure can cause both sides of the pipe to move.

Tool Care

Keep tools in good operating condition. Sharp tool bits perform better and are safer than dull tool bits.

Do not use damaged tools. Always check your tools for damage especially if a tool has malfunctioned, been dropped or hit, check it for damage.

Before you start operating the equipment, do no-load tests and feed function checks.

Tool Use

Use the right tool and tool bit for the job. Contact Tri Tool to help with your application.

Keep the tool bits fully engaged in the tool bit holders. Loose bits are sharp and can cause cuts or punctures.

Disconnect power supply during setup and maintenance. Use all 'Stop' or Shut off' features available when changing or adjusting tool bits, maintaining the tool, or when the tool is not in use.

Remove adjusting keys and wrenches before applying power to the equipment. Check the tool before turning it on to make sure that all keys and wrenches have been removed.

Do not force tools. Tools and tool bits function better and safer when used at the recommended speeds.

Do not reach into rotating equipment.

Do not reach into the rotating head stock to remove chips, to make adjustments, or to check the surface finish.

Handle chips with care. Chips have very sharp edges and are hot. Do not try to pull chips apart with bare hands.

Store tools properly. Disconnect tools from the power source, remove the tool bits, and store in a safe place.

3. GENERAL DESCRIPTION

The Model 304 Tube Squaring machine is a lightweight, portable machine designed for facing and squaring .25" (6.35 mm) to 4.50" (114.30 mm) outside diameter tubing up to .250" (6.35 mm) wall thickness.

Design and Operation Features

The Model 304 is available with

- A 110VAC or 220VAC integral, dual range, variable speed electric drive motor
- or a pneumatic drive motor.

The Model 304 features quick changing Saddle Sets (no tools required) and a .001" (.025 mm) graduated feed dial.

The precision inside diameter saddles hold the tubing round to accurately square and face the tubing with minimum burr.

The Model 304 accepts its torque through the Saddle Clamping System.

The cutting head accepts up to three tool bits for a combination of squaring, beveling, counterboring, or facing operations simultaneously.

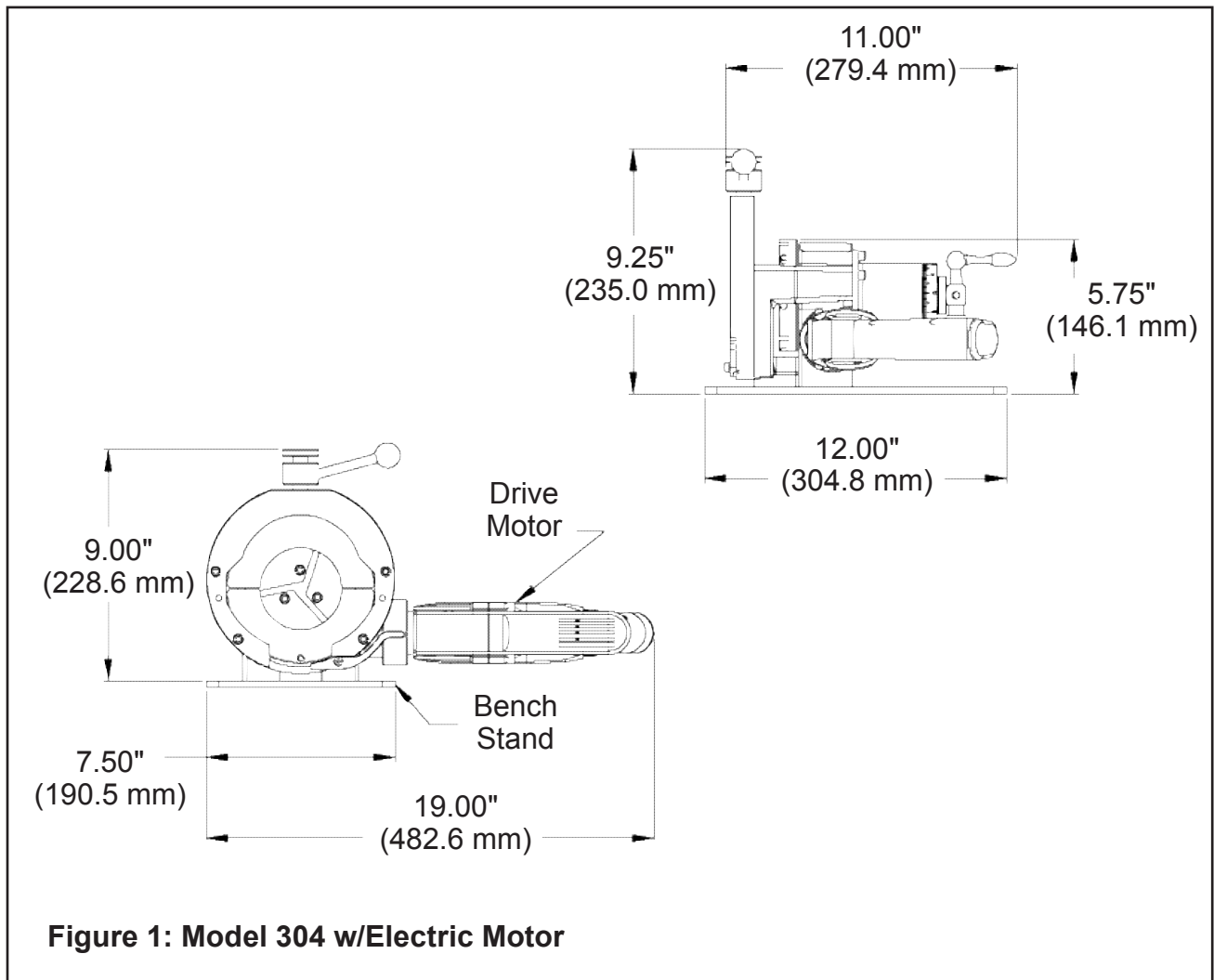
The Saddle Sets are made from stainless steel for durability and to avoid carbon contamination of high purity tubing.

All required wrenches for operation are supplied with the machine.

The Model 304 may be removed from the stand and used as a portable machine.

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4. SPECIFICATIONS



Weight (Approx.): 18.25 lbs. (8.28 Kg)

Clearance and Dimensions Refer to Fig.1

Drive System

- Variable Speed Electric Drive Motor
- Variable Speed Pneumatic Drive Motor

Power Requirements

- Electric Drive Motor
 - 115 VAC \pm 10%, 50/60 Hz, 9.6 Amp.
 - 220 VAC \pm 10%, 50/60 Hz, 2.5 Amp.

Pneumatic Drive Motor

- 55 cfm at 90 psi (26 lt/sec at 621 kPa)

Feed The manual feed handle is mounted at rear of tool. It providing .560" (14.2mm) of axial feed.

Mounting Manual saddle clamping system

Speeds

Speed Control

Electric Drive: Dual range, variable speed.

Pneumatic Drive: On/Off trigger and twist type air flow control valve.

Electric Drive Motor Free Speed

900 RPM (Low)

2800 RPM (High)

Cutting Head Speeds: 75 RPM Max.

Functional Speed Range: 0 to 70 RPM

Cutting Capacities

Basic Pipe Sizes

1/8" through 3/8" pipe - All schedules

1/2" through 1 1/4" pipe- Schedule 5 through schedule 160

1 1/2" through 2" pipe - Schedule 5 through schedule 80

1 1/2" through 4" pipe - Schedule 5 through schedule 40

Basic Tube Sizes - .250" (6.35 mm) to 4.50" (114.30 mm) OD

Wall Thickness Capacity - Basic Tubing with a maximum wall thickness of .250" (6.35 mm)

Material Cutting Capabilities

Mild steels, chrome steels (Rc 35 max.), stainless steel, copper-nickel and aluminum without limitations other than size and wall thickness as specified.

Inconel and some other high-temperature alloys may require special procedures as a function of wall thickness and type of end preparation. Contact the Engineering Department at TRI TOOL INC. for details.

5. OPERATION



WARNING: DO NOT OVERRIDE THE DEADMAN SWITCH. Locking down, obstructing, or in any way defeating the deadman switch on this unit may result in serious injury.

General Comments

A FRL (Filter/Regulator/Lubricator) is required to protect the warranty on all TRI TOOL INC. air or hydraulic driven tools. The motor warranty is void if damage occurs from contaminated air or lack of lubrication.

The FRL unit must be maintained as required. The frequency depends on the air supply. Keep the water trap drained, the filter cleaned, and the lubricator oil reservoir filled so there is a drop of oil every two to five seconds.

If the unit is to be left idle for 24 hours or more after being run on 'wet' air, squirt oil directly into the air motor inlet and run the motor for two to three seconds. This will prevent rusting and the rotor vanes from freezing.

For Hydraulic Motors, refer to the Operator's Manual' for specifics.

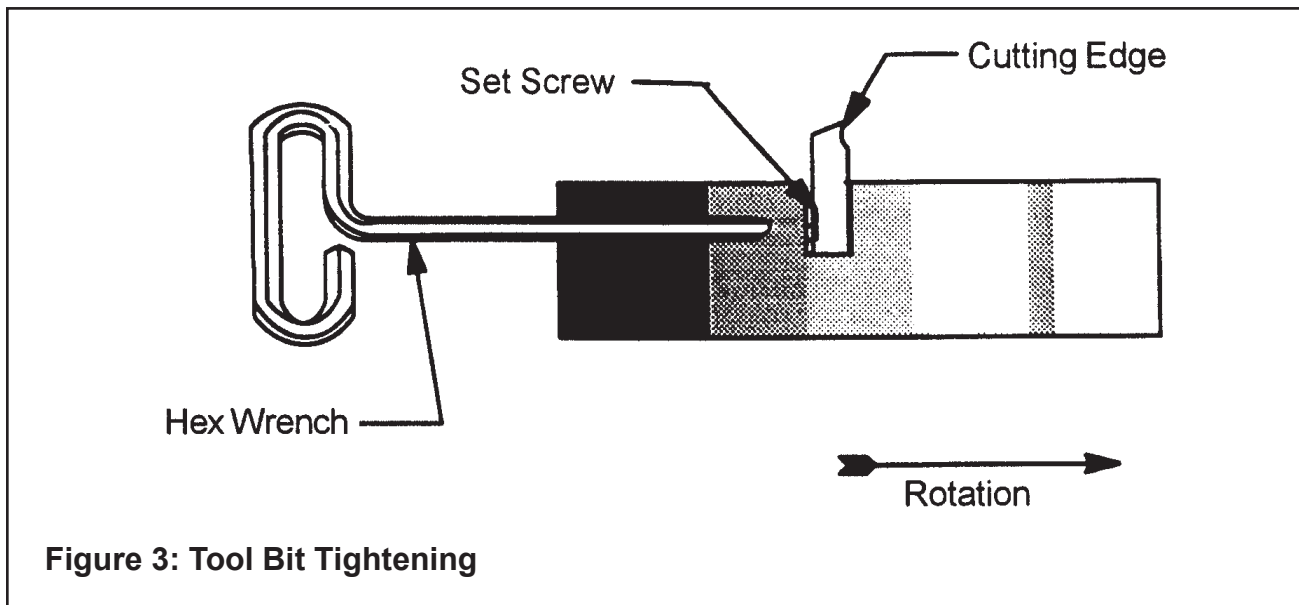
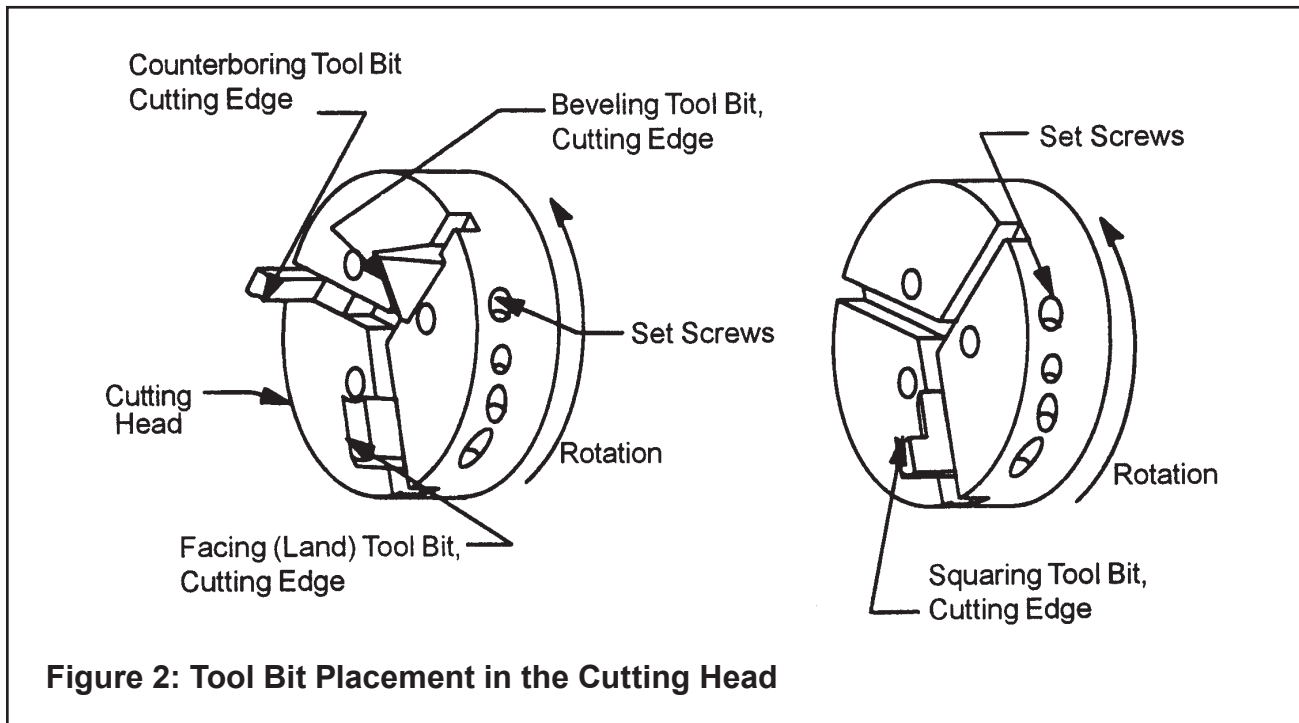
When the unit is operated in the vertical position, cutting head up, turn it upside down and remove the chips and/or other debris after each cutting operation. Tool life may be severely shortened, unless chips and/or other debris are removed.

Placement of Tool bits

1. Loosen the cap screw in the clamp bracket and rotate the motor handle to the desired position.
2. Tighten the cap screw before turning the motor on.
3. Select the tool bit(s) required to machine the end configuration desired, refer to section 7, Tool Bits. When performing a tube squaring operation, install the tool bit in any of the three Cutting Head slots.
 - When performing any separate machining operation such as facing, beveling, or counterboring, install the tool bit in any one of the three Cutting Head slots.
 - When performing any multiple machining operation such as facing, beveling or counter-boring, install the tool bit with one in each slot.

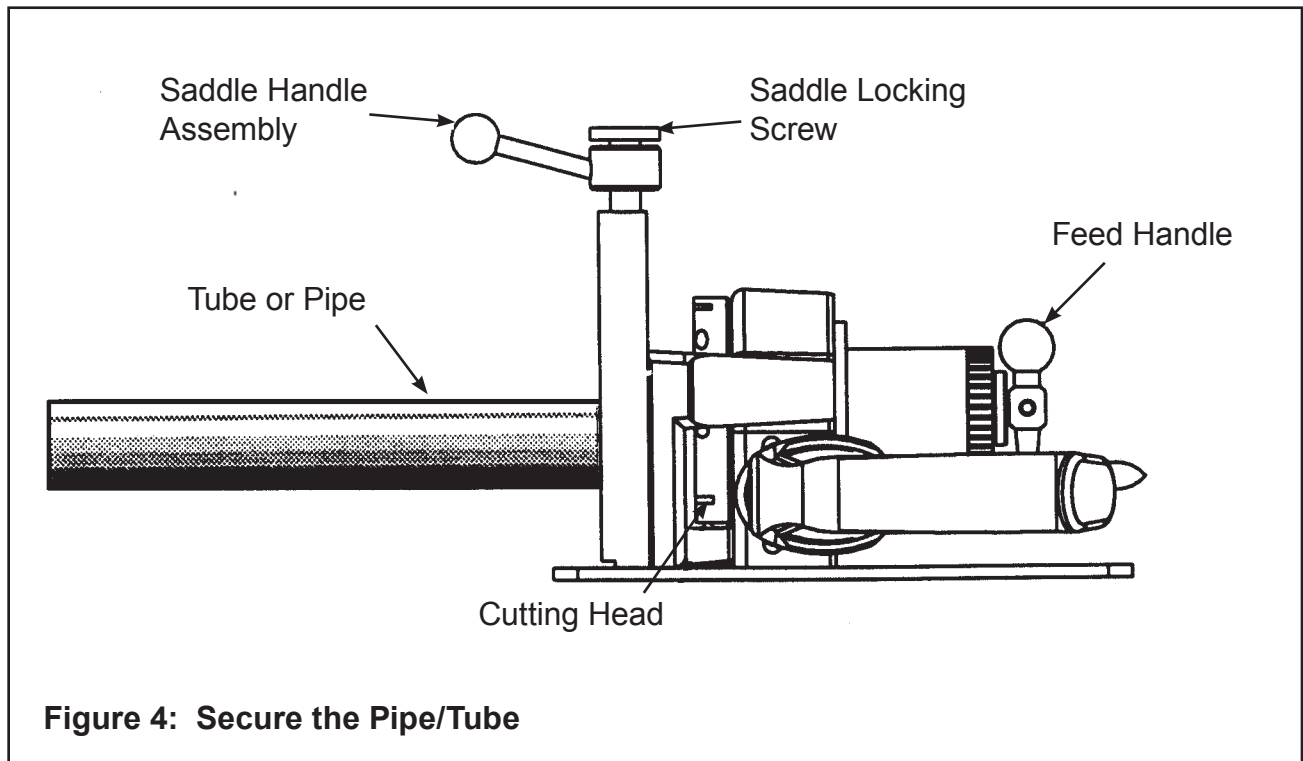
The use of dull tool bits or tool bits not manufactured by TRI TOOL Inc. may result in poor performance and may constitute abuse of this machine and therefore voids the TRI TOOL Inc. factory warranty.

4. Insert the tool bit(s) into the slot(s) in the Cutting Head.
5. The cutting edge of the tool bit(s) must be located on the radial centerline. Do not install the tool bits backwards.
6. Tighten the set screws to secure the tool bit(s) to the Cutting Head.
7. Adjust the counterbore tool bit radially to control the counterbore diameter.



Install The Saddles

1. Select the desired Saddle size for the pipe or tube, Refer to section, 8, Saddle Sets.
2. Insert the upper Saddle half into the machine and thread the Saddle Locking Screw into the Saddle.
3. Raise the top Saddle using the Saddle Handle Assembly.
4. Insert the lower Saddle half and snap into place.
5. Place the pipe or tube into the Saddles.
6. Verify a clearance of 1/8" (3 mm) between the tool bit(s) and the pipe or tube face as held by the saddles.
7. Tighten the upper Saddle using the Saddle Handle Assembly to secure the pipe or tube once the proper clearance has been verified.
8. Make sure there is a light film of grease on the Saddle Handle Assembly threads at all times to prevent them from galling or freezing during use.



Make the Cut

1. Connect the proper power supply.
2. Use the variable speed control knob on the top of the motor (on electric motor drives) to adjust the cutting speed.
3. Rotate the feed Handle clockwise to bring the Cutting Head and tube closer together. The machining operation begins when the tool bit contacts the tube or pipe.
4. If the tube end is not square to the tube axis, the tool bit will contact only a small segment of the tube during each revolution.
5. To avoid tool bit damage, use a slow feed rate until the tool bit is contacting the pipe continually during at least one revolution. Refer to section 6, Cutting Speeds and Feeds.
6. Continue rotating the Feed Handle clockwise until the end of the pipe is completely machined. Do not let the tool bit(s) cut into the Saddles or the Saddle Adapter.
7. Discontinue the feed and allow the Cutting Head to rotate one to three revolutions to improve the finish of the prep surface.
8. Rotate the Feed handle counter-clockwise to separate the Cutting Head from the tube.
9. Stop the tool rotation by releasing the Motor Trigger Switch.
10. Rotate the Feed Handle counter-clockwise until the Cutting Head clears the tube or pipe by at least 1/8" (3 mm) or more.
11. Loosen the upper Saddle by rotating the Saddle Handle Assembly. This will release the tube.

6. CUTTING SPEEDS AND FEEDS

Use the following table to select an RPM to obtain specified Tool Bit surface cutting speed on the surface of the pipe.

Tube Size		RPM for 200 in/min (5080 mm/min)	RPM for 250 in/min (6350 mm/min)	RPM for 300 in/min (7620 mm/min)
1.00"	25.4 mm	64	79	95
2.00"	50.8 mm	32	40	48
3.00"	76.2 mm	21	27	32
4.00"	101.6 mm	16	20	24
4.50"	114.3 mm	14	18	21

Use 200 surface inches per minute (508 surface centimeters per minute) for:

- Stainless steels in general when no coolant is allowed, all heavy-wall tube and some of the chrome/molybdenum steels.

Use 250 surface inches per minute (635 surface centimeters per minute) for:

- Mild steels and some thin wall stainless steels when coolants are permitted and applied.

Use 300 surface inches per minute (762 surface centimeters per minute) for:

- Aluminum and thin-wall mild steel and tube with coolants.

Basic Feed Recommendations

Use very light feed for initial cutting or until a continuous cut is established. This is important for longer Tool Bit life when cutting through flame cut or out of square tube ends.

Use a feed rate .003" to .006" (.08 mm to .15 mm) per revolution afterwards, to establish a continuous chip cut.

- If the feed is too light, only light stringer chips will be removed.
- If the feed is too heavy, the drive will start to overload and the chip will start to have a rough or torn appearance.

Stainless, which work hardens, must be worked with a heavy enough feed to stay under the work hardened surface.

One revolution of the feed handle advances the cutting head .100" (2.5 mm).

Never allow the tool bit to burnish the surface.

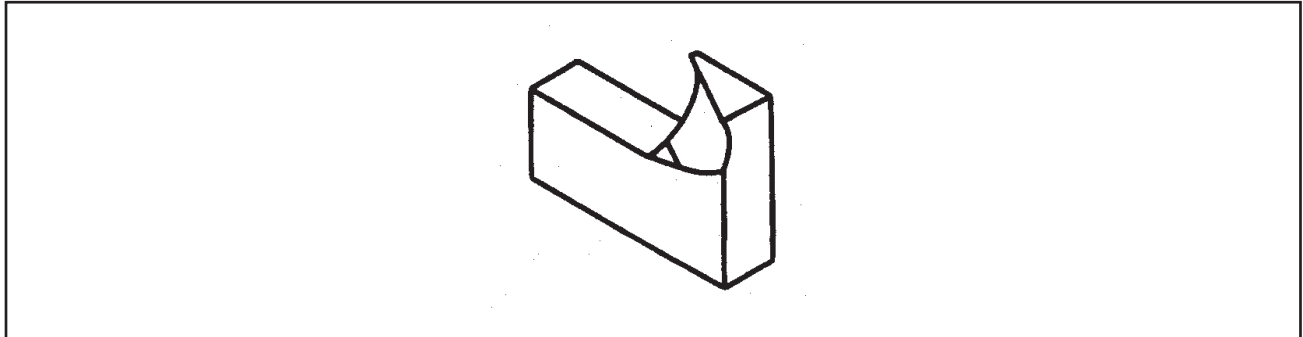
Reduce feeds and speeds will normally minimize any chatter problems.

A good rule of thumb for calculation purposes is a .0025" (.064 mm) thick chip per revolution.

Actual measurements will show a pseudo thickness of .006" (.15 mm) unless a pin micrometer is used for measuring.

7. TOOL BITS

TUBE SQUARING TOOL BIT

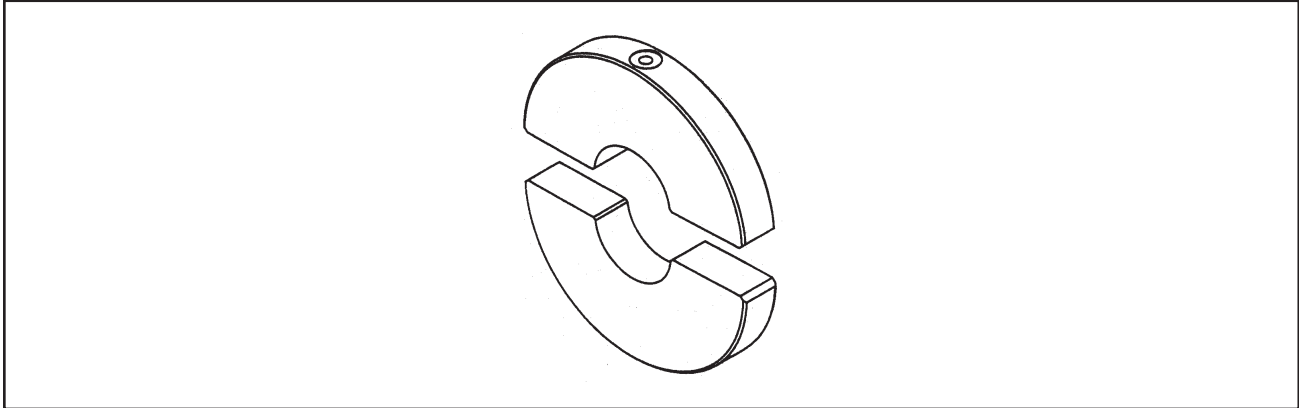


Range	Max Wall	Pipe or Tool Bit Material	Squaring Tool Bit P/N
.25" (6.35 mm) OD Thru 2.60" (66.04 mm) OD	0.250	C.S.	99-1479
	0.250	S.S.	99-2490
1.35" (34.29 mm) OD Thru 4.50" (114.30 mm) OD	0.250	C.S.	99-1480
	0.250	S.S.	DURABIT 1

Bevel, facing and special prep tool bits are available from TRI TOOL Inc. Contact the factory for information.

8. SADDLE SETS

STANDARD SADDLES (MATERIAL - STAINLESS STEEL)



Decimal	Metric	Saddle P/N
.250"	6.35 mm	67-3997
.276"	7.00 mm	67-3998
.281"	7.14 mm	67-3999
.313"	7.95 mm	67-4000
.315"	8.00 mm	67-4001
.344"	8.74 mm	67-4002
.354"	9.00 mm	67-4003
.359"	9.13 mm	67-4004
.375"	9.53 mm	67-4005
.394"	10.00 mm	67-4006
.400"	10.16 mm	67-4007

Decimal	Metric	Saddle P/N
.406"	10.31 mm	67-4008
.413"	10.50 mm	67-4009
.422"	10.72 mm	67-4010
.433"	11.00 mm	67-4011
.438"	11.13 mm	67-4012
.469"	11.91 mm	67-4013
.472"	12.00 mm	67-4014
.500"	12.70 mm	67-4015
.512"	13.00 mm	67-4016
.531"	13.50 mm	67-4017
.540"	13.72 mm	67-4018
.543"	13.80 mm	67-4019
.547"	13.89 mm	67-4020
.551"	14.00 mm	67-4021
.563"	14.30 mm	67-4022
.591"	15.00 mm	67-4023
.594"	15.08 mm	67-4024
.602"	15.29 mm	67-4025
.625"	15.88 mm	67-4026
.630"	16.00 mm	67-4027
.641"	16.27 mm	67-4028
.656"	16.66 mm	67-4029
.669"	17.00 mm	67-4030
.675"	17.15 mm	67-4031
.677"	17.20 mm	67-4032
.681"	17.30 mm	67-4033
.688"	17.48 mm	67-4034
.709"	18.00 mm	67-4035
.718"	18.24 mm	67-4036
.750"	19.05 mm	67-4037
.781"	19.84 mm	67-4038
.787"	20.00 mm	67-4039
.813"	20.65 mm	67-4040

Decimal	Metric	Saddle P/N
.840"	21.34 mm	67-4041
.844"	21.44 mm	67-4042
.854"	21.70 mm	67-4043
.859"	21.83 mm	67-4044
.866"	22.00 mm	67-4045
.875"	22.23 mm	67-4046
.906"	23.00 mm	67-4047
.938"	23.83 mm	67-4048
.945"	24.00 mm	67-4049
.969"	24.61 mm	67-4050
.984"	25.00 mm	67-4051
1.000"	25.40 mm	67-4052
1.024"	26.00 mm	67-4053
1.050"	26.67 mm	67-4054
1.063"	27.00 mm	67-4055
1.071"	27.20 mm	67-4056
1.102"	28.00 mm	67-4057
1.125"	28.58 mm	67-4058
1.142"	29.00 mm	67-4059
1.181"	30.00 mm	67-4060
1.188"	30.18 mm	67-4061
1.250"	31.75 mm	67-4062
1.260"	32.00 mm	67-4063
1.313"	33.35 mm	67-4064
1.315"	33.40 mm	67-4065
1.327"	33.70 mm	67-4066
1.339"	34.00 mm	67-4067
1.375"	34.93 mm	67-4068
1.378"	35.00 mm	67-4069
1.438"	36.53 mm	67-4070
1.496"	38.00 mm	67-4071
1.500"	38.10 mm	67-4072
1.563"	39.70 mm	67-4073
1.575"	40.00 mm	67-4074
1.625"	41.28 mm	67-4075
1.645"	41.78 mm	67-4076

Decimal	Metric	Saddle P/N
1.660"	42.16 mm	67-4077
1.669"	42.40 mm	67-4078
1.681"	42.70 mm	67-4079
1.688"	42.88 mm	67-4080
1.750"	44.45 mm	67-4081
1.752"	44.50 mm	67-4082
1.813"	46.05 mm	67-4083
1.875"	47.63 mm	67-4084
1.900"	48.26 mm	67-4085
1.902"	48.30 mm	67-4086
1.904"	48.36 mm	67-4087
1.913"	48.60 mm	67-4088
1.938"	49.23 mm	67-4089
1.969"	50.00 mm	67-4090
2.000"	50.80 mm	67-4091
2.008"	51.00 mm	67-4092
2.063"	52.40 mm	67-4093
2.125"	53.98 mm	67-4094
2.188"	55.58 mm	67-4095
2.240"	56.90 mm	67-4096
2.244"	57.00 mm	67-4097
2.250"	57.15 mm	67-4098
2.313"	58.75 mm	67-4099
2.362"	60.00 mm	67-4100

Decimal	Metric	Saddle P/N
2.375"	60.33 mm	67-4101
2.382"	60.50 mm	67-4102
2.438"	61.93 mm	67-4103
2.480"	63.00 mm	67-4104
2.492"	63.30 mm	67-4105
2.500"	63.50 mm	67-4106
2.563"	65.10 mm	67-4107
2.625"	66.68 mm	67-4108
2.688"	68.28 mm	67-4109
2.750"	69.85 mm	67-4110
2.795"	71.00 mm	67-4111
2.813"	71.45 mm	67-4112
2.875"	73.03 mm	67-4113
2.938"	74.63 mm	67-4114
2.953"	75.00 mm	67-4115
2.992"	76.00 mm	67-4116
2.996"	76.10 mm	67-4117
3.000"	76.20 mm	67-4118
3.004"	76.30 mm	67-4119
3.125"	79.38 mm	67-4120
3.250"	82.55 mm	67-4121
3.375"	85.73 mm	67-4122
3.500"	88.90 mm	67-4123
3.508"	89.10 mm	67-4124
3.625"	92.08 mm	67-4125
3.750"	95.25 mm	67-4126
3.875"	98.43 mm	67-4127
3.937"	100.00 mm	67-4128
3.988"	101.30 mm	67-4129
4.000"	101.60 mm	67-4130
4.125"	104.78 mm	67-4131
4.250"	107.95 mm	67-4132
4.375"	111.13 mm	67-4133
4.500"	114.30 mm	67-4134

9. MAINTENANCE

General maintenance information

Keep all equipment in good working condition and inspect it regularly.

If the equipment is not in good working condition, promptly repair it or withdraw it from service.

Use only Tri Tool replacement parts for repairs.

Daily / Starting shift / Installation

- Clean all components.
- Coat all components with a light film of oil. Use a clean, non-detergent oil, preferably SAE 10 (90 SSU) or lighter.
- Report defects.

10. TROUBLESHOOTING

Problem: Tool Bit Chatters

- The tool bit is loose or overextended.
 - The tool bit is damaged.
 - The tool holder is too loose in the slides.
 - The cutting speed is too fast.
 - The clamping pads are loose on the pipe or tube.
 - Cutting fluid is required.
 - The main bearing pre-load is loose.
-

Problem: Excessive Tool Bit Wear

- The pipe or tube material is too hard or abrasive.
 - The cutting speed is too fast.
 - Cutting fluid is required.
 - A dull Tool Bit is causing surface hardening conditions (Stainless pipe or tubing).
 - There is scale or other foreign matter on the pipe or tube, which is dulling the tool bit at the start of the cut.
 - The tool bit is incorrect for the material being cut.
-

Problem: Rough Surface Finish

- The tool bit is dull, chipped, etc.
 - Metal build-up on the cutting edge of the tool bit is creating a false cutting edge.
 - Cutting fluid is required.
 - The cutting speed is incorrect.
-

Problem: Tube or Pipe is Slipping in the Saddles

- The saddles are not in full contact with the pipe or tube.
- The clamping pressure is too light.
- Scale and/or other foreign material is present on the pipe or tube.
- Weld seams, swelling, or bumps under the saddles are preventing full contact.
- Dull tool bits are causing extra force in the axial and/or radial direction.

Problem: Tool Holder is not Feeding

The feed pin is broken or out of position.
The feed sprocket shear pin is broken.
The feed screw is stripped.
The feed nut is stripped.
The slide rails are too tight.

Problem: Loss of Air Power

The air supply pressure is too low.
The air filter is plugged.
The air line size is insufficient.
The air line is too long.

Problem: Loss of Hydraulic Power

The hydraulic supply pressure is too low.
The hydraulic filter is plugged.
The hydraulic line size is insufficient.
The hydraulic line is too long.

Problem: Tool Bit does not Reach Work

Incorrect tool blocks are installed.
Incorrect tool bit is installed.

Problem: Hydraulic Motor does not Start

The hydraulic power supply is shut off.
The hydraulic motor is damaged and will not run free.

Problem: Air Motor does not Start

The air power supply is shut off.
The air motor is damaged and will not run free.
The air motor needs lubrication. Add lubrication and do not run the air motor for a few minutes, then try running the motor.
Sand or other foreign material may be in the vanes of the air motor. Tap on the side of the air motor casing lightly with a piece of wood or with a soft rubber mallet just in case the vanes may be sticking.

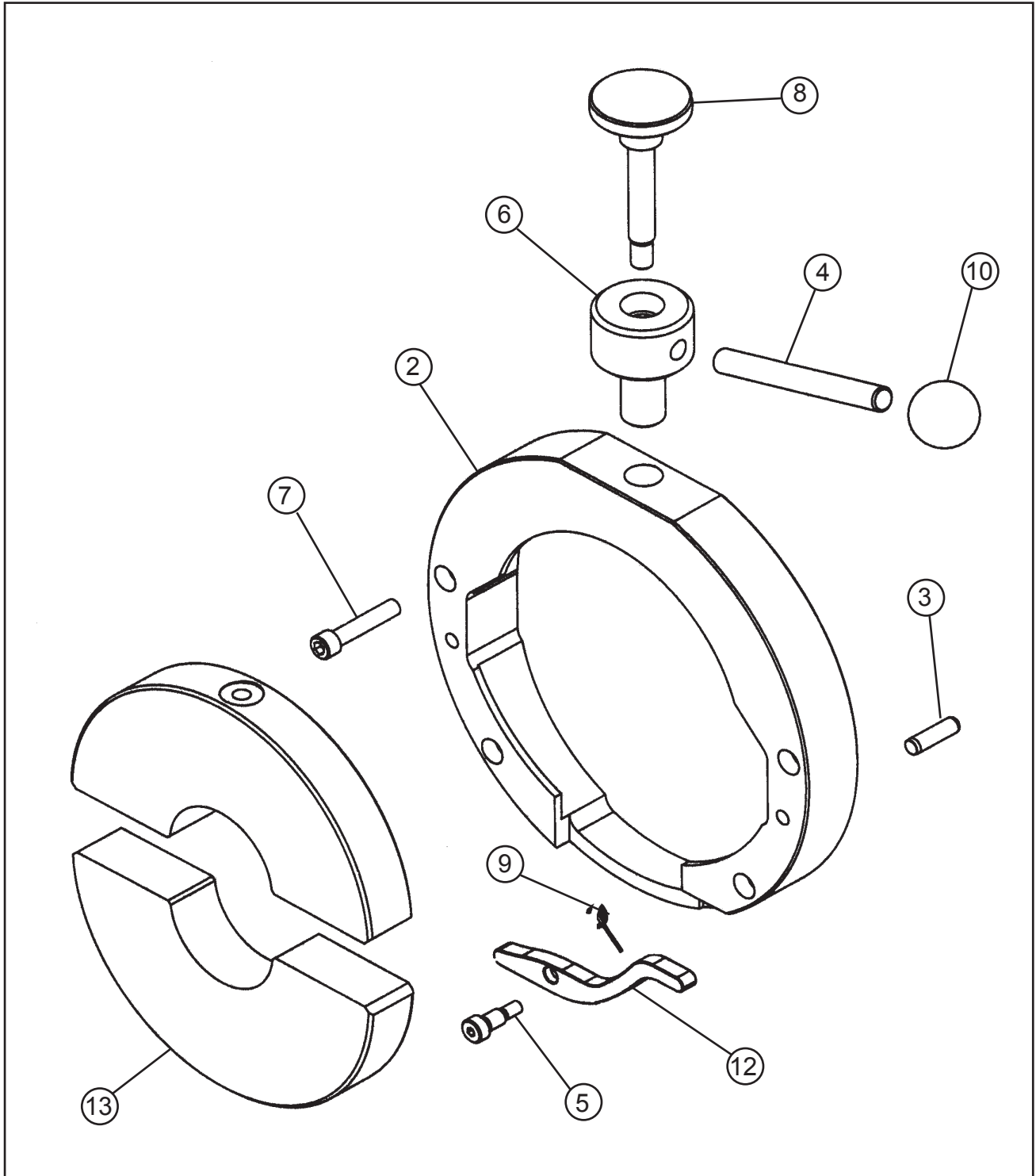
11. ACCESSORIES

The following accessories are recommended for use with the Model 304 Tube Squaring Machine and are available from TRI TOOL INC.

- Electric Foot Pedal
- Short Perch Saddle Sets
- Tool Bits
- Collet Adapter Kit (for use with 400 Series Collets)
- Air Caddy, FRL (A portable Air Filter Caddy [P/N 75-0115] FRL is required to protect the warranty and tool on all TRI TOOL Inc. air driven tools.)

12. ILLUSTRATED PARTS BREAKDOWN

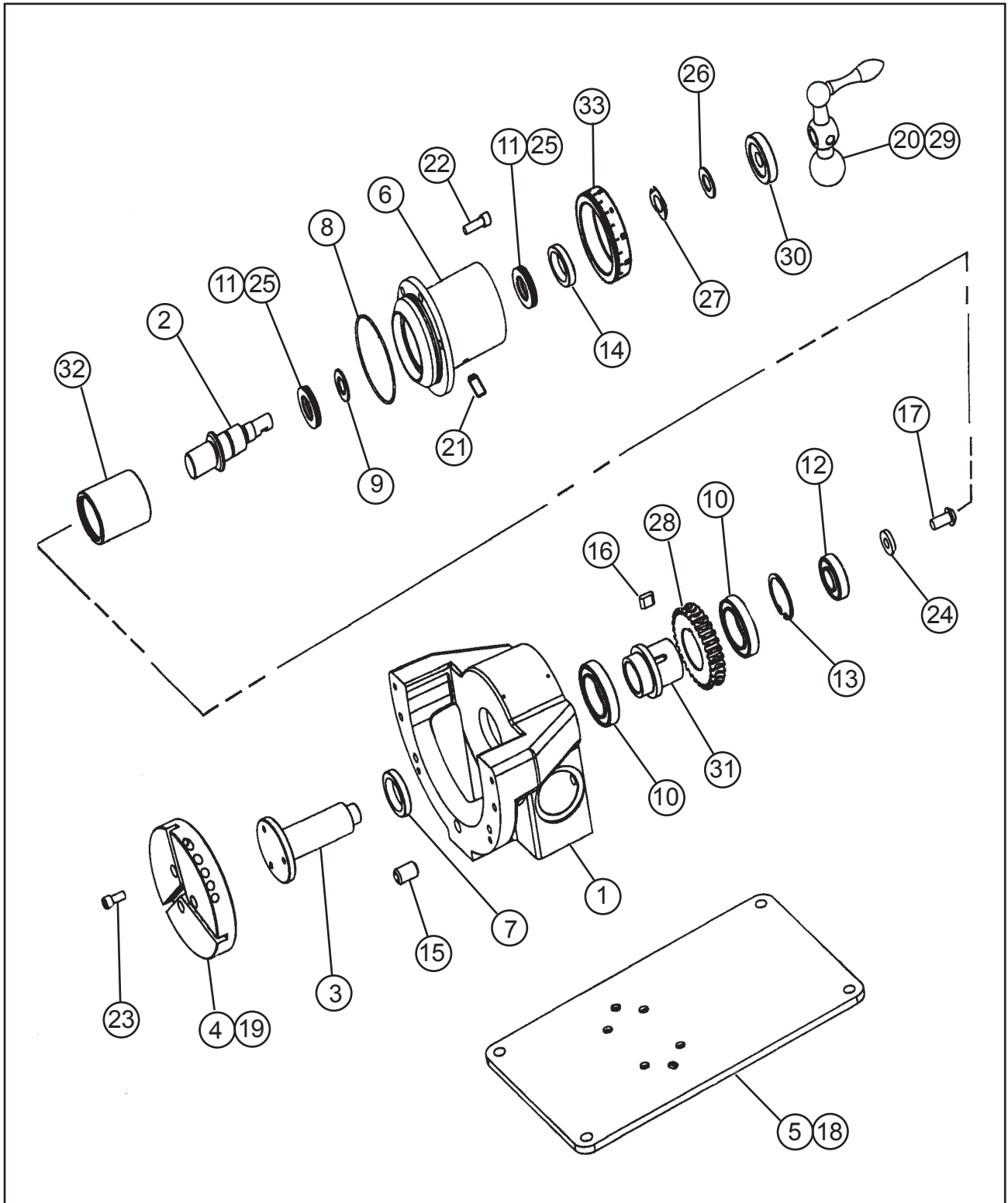
MODEL 304 110V (P/N 01-1684) AND 220V (P/N 01-1694)



Parts List, Model 304 110V (P/N 01-1684) and 220V (P/N 01-1694)

Item No	Part No.	Description	Qty
1.	02-2290	MODEL 304 SUB-ASSY	1
2.	27-0611	ADAPTER, SADDLE, 304	1
3.	32-0140	PIN, DOWEL, 1/4 DIA X 3/4"	2
4.	33-1424	STUD, HANDLE	1
5.	33-1457	SCREW, SHOULDER, 1/4 DIA X 3/8"	1
6.	33-1839	SCREW, ASSY, ADJUST	1
7.	33-2003	SCREW, CAP, 1/4-20 X 1 1/4", SS	4
8.	33-2062	SCREW, SADDLE, LOCKING	1
9.	40-0261	SPRING, TORSION	1
10.	42-0076	KNOB, BALL	1
11.	58-0278	MOTOR, ASSY, METABO, 110V (01-1684)	1
	58-0127	MOTOR, ASSY, BOSCH, 220V (01-1694)	1
12.	63-0148	ARM, SADDLE REMOVAL	1
13.	67-XXXX	SADDLE SET	REF
NOT SHOWN			
	05-1343	WRENCH KIT	1
	36-0005	WRENCH, L, 1/8" HEX	1
	36-0008	WRENCH, L, 3/16" HEX	1
	36-0018	WRENCH, T, 1/8" HEX	1
	86-0219	CASE	1

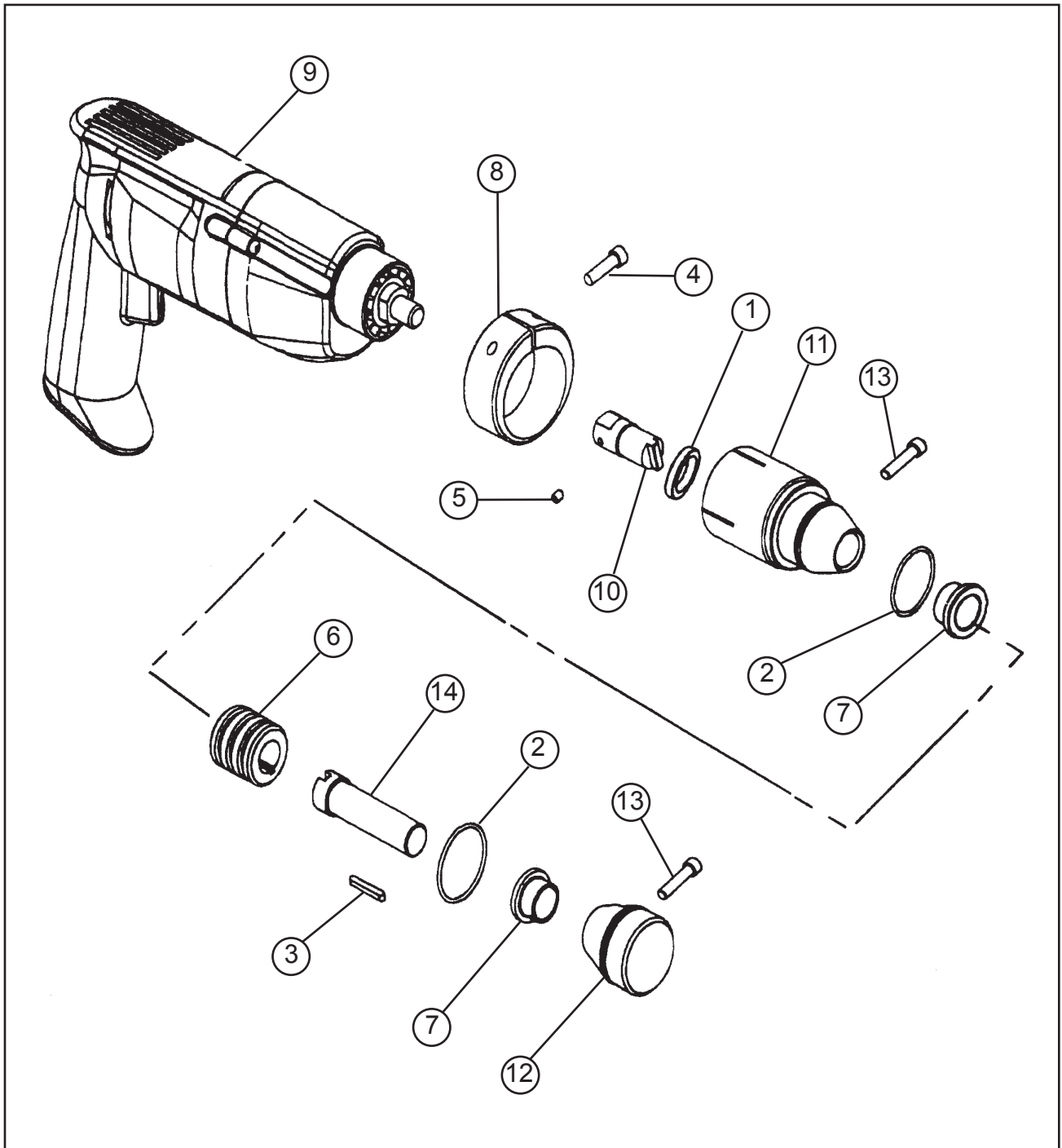
MODEL 304 SUB-ASSEMBLY (P/N 02-2290)



Parts List, Model 304 Sub-Assembly (P/N 02-2290)

Item No	Part No.	Description	Qty
1.	19-0818	HOUSING, MAIN, 304	1
2.	20-0654	SHAFT, FEED	1
3.	20-0693	SHAFT, MAIN	1
4.	21-0500	HEAD	1
5.	24-1569	PLATE, BASE	1
6.	27-0600	ADAPTER, FEED	1
7.	28-0278	SEAL, 1" ID	1
8.	28-0279	O-RING	1
9.	28-0281	O-RING	1
10.	29-0011	BEARING, BALL	2
11.	29-0067	BEARING, THRUST	2
12.	29-0141	BEARING, BALL	1
13.	30-2358	RING, RETAIN, INTERNAL, 1 3/8"	1
14.	30-2544	COLLAR, SHAFT	1
15.	30-2745	PLUNGER, BALL	1
16.	31-0174	KEY	1
17.	33-0292	SCREW, BUTTON, 5/16-18 X 5/8"	1
18.	33-0369	SCREW, FLAT, 5/16-18 X 3/4"	4
19.	33-0504	SCREW, SET, 1/4-20 X 5/8", CUP PT	15
20.	33-0513	SCREW, SET, 5/16-18 X 5/16", CUP PT	1
21.	33-0927	SCREW, SET, 1/4-20 X 1/2", HDOG	1
22.	33-0040	SCREW, CAP, 1/4-20 X 3/4"	5
23.	33-0038	SCREW, CAP, 1/4-20 X 1/2"	3
24.	34-0027	WASHER, FLAT, 5/16" ID	1
25.	34-0106	WASHER, THRUST, 3/4" ID	4
26.	34-0163	WASHER, THRUST, 1/2" ID	1
27.	34-0325	WASHER, SPRING	1
28.	39-0840	GEAR, WORM, 30T	1
29.	41-0142	HANDLE, FEED	1
30.	42-0172	KNOB, LOCK	1
31.	46-0468	SLEEVE, SHAFT	1
32.	46-0469	SLEEVE, FEED	1
33.	50-0024	DIAL	1

**MOTOR ASSEMBLY 110V (P/N 58-0278)
AND 220V (P/N 58-0127)**



Parts List, Motor Assembly 110V (P/N 58-0278)

Item No	Part No.	Description	Qty
1.	28-0245	SEAL, GREASE	1
2.	28-0233	O-RING	2
3.	31-0115	KEY	1
4.	33-0041	SCREW, CAP, 1/4-20 X 7/8"	1
5.	33-0619	SCREW, SET, #10-32 X 1/4", CUP PT	2
6.	39-0841	WORM	1
7.	45-0258	BUSHING, FLANGE, 5/8" ID	2
8.	47-1111	BRACKET, CLAMP	1
9.	58-0277	MOTOR, CW, Elec, Metabo, 110v	1
10.	20-1468	SHAFT, DRIVE, 1/2-20 UNF	1
11.	46-0411	SLEEVE, MOTOR	1
12.	54-0347	PLUG	1
13.	33-0056	SCREW, CAP, 5/16-18 X 1"	2
14.	20-0617	SHAFT, DRIVE	1

Parts List, Motor Assembly 220V (P/N 58-0127)

Item No	Part No.	Description	Qty
1.	28-0245	SEAL, GREASE, .875" ID	1
2.	28-0233	O-RING, 1.364" ID X .070" W	2
3.	31-0115	KEY, 1/8" SQ X 15/16, ROUND ENDS	1
4.	33-0041	SCREW, CAP, 1/4-20 X 7/8	1
5.	33-0619	SCREW, SET, #10-32 X 1/4, CUP PT	2
6.	39-0841	WORM, RH, 12DP 2T, 1.00PD	1
7.	45-0258	BUSHING, FLG, 5/8" ID	2
8.	47-1111	BRACKET, CLAMP	1
9.	58-0323	MOTOR, MOD, ELECTRIC, BOSCH, 220V	1
10.	20-0619	SHAFT, DRIVE	1
11.	46-0411	SLEEVE, MOTOR	1
12.	54-0347	PLUG	1
13.	33-0056	SCREW, CAP, 5/16-18 X 1"	2
14.	20-0617	SHAFT, DRIVE	1



WARNING



Read the manual and be familiar with all safety precautions before operating equipment. The following are general warnings for industrial equipment with moving parts. Refer to the manual for specific warnings applicable to your equipment.



EYE HAZARD - Always wear appropriate eye protection while operating the equipment.



PINCH HAZARD - Keep your hands and clothing away from moving parts.



CRUSH HAZARD - The machinery, pipe, or work piece can shift, separate, lurch, or fall.



CHIP HAZARD - Metal chips may be hot and sharp. Be careful when you clear the tooling path or clean up chips.



TIE DOWN HAZARD - Deliberate overriding of safety triggers can result in serious injury. Never lock or tie down any safety triggers.



SHOCK HAZARD - Ensure that the equipment is properly installed and grounded. Ensure that the equipment is not damaged and that the power cord is intact.

OTHER HAZARDS

- Tool bits are sharp and can cause serious injury.
 - Do not defeat or modify safety features.
- Disconnect power sources before servicing or moving the equipment.
- Remove all loose articles of clothing and jewelry before operating the equipment.

Be Safety Conscious!