

Operation Manual

92-0630 Rev. 190612
Model 301 Tube Squaring Machine



ABOUT TRI TOOL INC.

Tri Tool's extensive experience in the design, development and manufacture of portable machine tools and welding equipment has resulted in machinery that is designed to meet the highest standards of quality, safety, and performance. Our products are backed by a company totally committed to service, integrity, and customer satisfaction.

Tri Tool Services has developed a solid reputation as a trusted provider of dependable and cost-effective on-site service solutions including turnkey project management, machining services, and mechanized and manual code welding services using experienced and well-trained machinists and welders.

In addition to developing industry leading machining and welding equipment, Tri Tool's engineering team provides custom equipment design and manufacturing solutions to suit the most rigorous requirements of our customers' special applications.

Please contact us for more information on any of our products or services. Company representatives are available for demonstrations of most of our products at your facility.

Printed in the USA

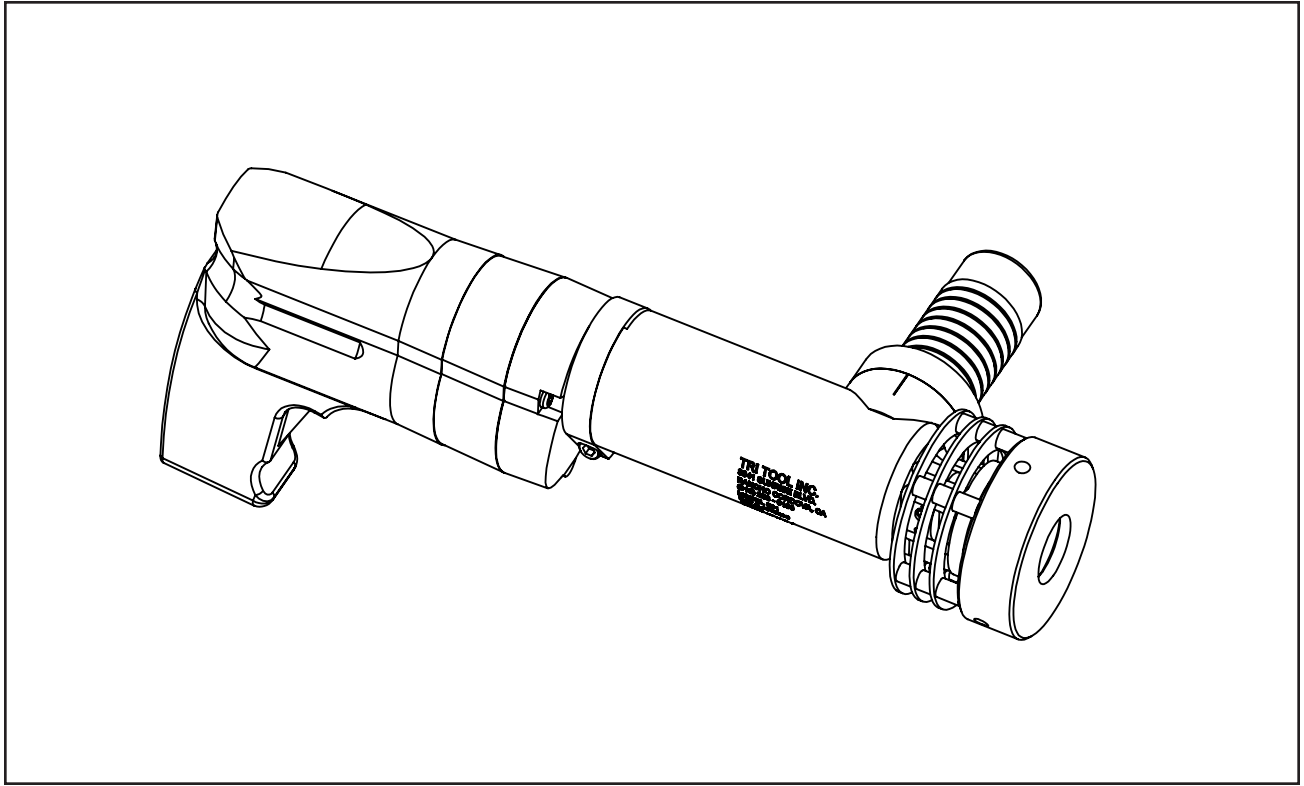


TABLE OF CONTENTS

1.	ABOUT THE MANUAL	3
2.	SAFETY	3
3.	GENERAL DESCRIPTION	7
4.	SPECIFICATIONS	8
5.	MAINTENANCE	10
6.	OPERATION	11
7.	INSTALL THE QL	20
8.	CUTTING SPEEDS AND FEEDS	21
9.	100 SERIES COLLETS	23
10.	TOOL BITS	26
11.	TROUBLE SHOOTING	28
12.	ACCESSORIES	30
13.	ILLUSTRATED PARTS BREAKDOWN	31
14.	DEWALT SAFETY INSTRUCTIONS	39

TRI TOOL INC. Warranty

All products manufactured by Tri Tool Inc., except for tool bits and for other consumable items, are warranted to the original purchaser to be free from defects in materials and workmanship under normal use for a period of one year from the date of purchase.

The purchaser shall bear all shipping, packing and insurance costs and all other costs to and from a designated repair service center. The product will be returned to the purchaser freight prepaid and billed to the purchaser.

The warranty will not apply to those products that have been misused, abused, or altered without the express permission in writing by Tri Tool Inc.

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 purchasers. This warranty gives the purchaser specific legal rights. Other rights vary from state to state.

Tool Bit Resharpener Policy

Tri Tool Inc. can not sharpen badly gouged, chipped, or broken tool bits. Check the tool bits before you send them and package them well. Within two working days of receipt, the tool bits are evaluated and the customer is contacted for authorization.

The customer will receive a price and a scheduled return shipment date. The price structure is available from your Tri Tool Inc. sales representative.

Tool bits that are not suitable for sharpening are returned with the tool bits that were sharpened, unless Tri Tool Inc. is instructed otherwise.

The customer is responsible for shipping charges to and from Tri Tool Inc.

This policy only covers tool bits manufactured by Tri Tool Inc.

1. ABOUT THE MANUAL

1.1 COPYRIGHT

Copyright 2016. 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.

1.2 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.

2. SAFETY

2.1 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 which, if not avoided, will result in death or serious injury.



WARNING

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



CAUTION

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

2.2 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.
- Secure long hair.



DANGER: Do not wear gloves when you use operate the equipment. If you are using the index trip mechanism, a glove may be caught or pulled into the pinch point created by the equipment head. This will result in serious personal injury.

2.3 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.

2.4 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.

2.5 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.

2.6 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.

2.7 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 301, Tube Squaring Machine is a lightweight portable machine. It is designed for facing and squaring .125" to 1.102" (3.2 mm to 28.0 mm) outside diameter tubing with an ability to handle up to .125" (3.2 mm) thick wall.

The Model 301 Tube Squaring Machine has several Motor options.

- Integral, variable speed Air Motor.
- Integral, variable speed 110 VAC, 500 watt Electric Motor.
- Integral, variable speed 220 VAC, 500 watt Electric Motor.
- Battery supported DC Electric Motor.

Precision inside diameter Collets hold the tubing round to accurately square and face the tubing with a minimum burr.

The portable version uses a Nut to retain the Collet.

A Quick Lock Clamp System (QL) that retains the Collet is available.

This Machine accepts its own torque through the Collet clamping system.

The Cutting Head accepts Squaring Tool Bits or combinations of Squaring, Beveling or ID deburring Tool Bits.

All the required tools for operation of the Model 301 are supplied with the Machine or with the accessory Collet Adapters.

DESIGNATIONS FOR THE MODEL 301

Model No.	Part No.	Description
301A	01-1203	Tube Squaring Machine powered by an Air Motor
301AQL	01-1322	Tube Squaring Machine with a Quick Lock attachment powered by an Air Motor
301BDC	01-1325	Tube Squaring Machine with 14.4 V battery powered Motor
301E110	01-1205	Tube Squaring Machine with a 110 VAC Electric Motor
301E110QL	01-1323	Tube Squaring Machine with a Quick Lock attachment with a 110 VAC Electric Motor
301E220	01-1207	Tube Squaring Machine with a 220 VAC Electric Motor
301E220QL	01-1324	Tube Squaring Machine with a Quick Lock attachment with a 220 VAC Electric Motor

4. SPECIFICATIONS

4.1 MODEL 301A TUBE SQUARING MACHINE WITH AIR MOTOR

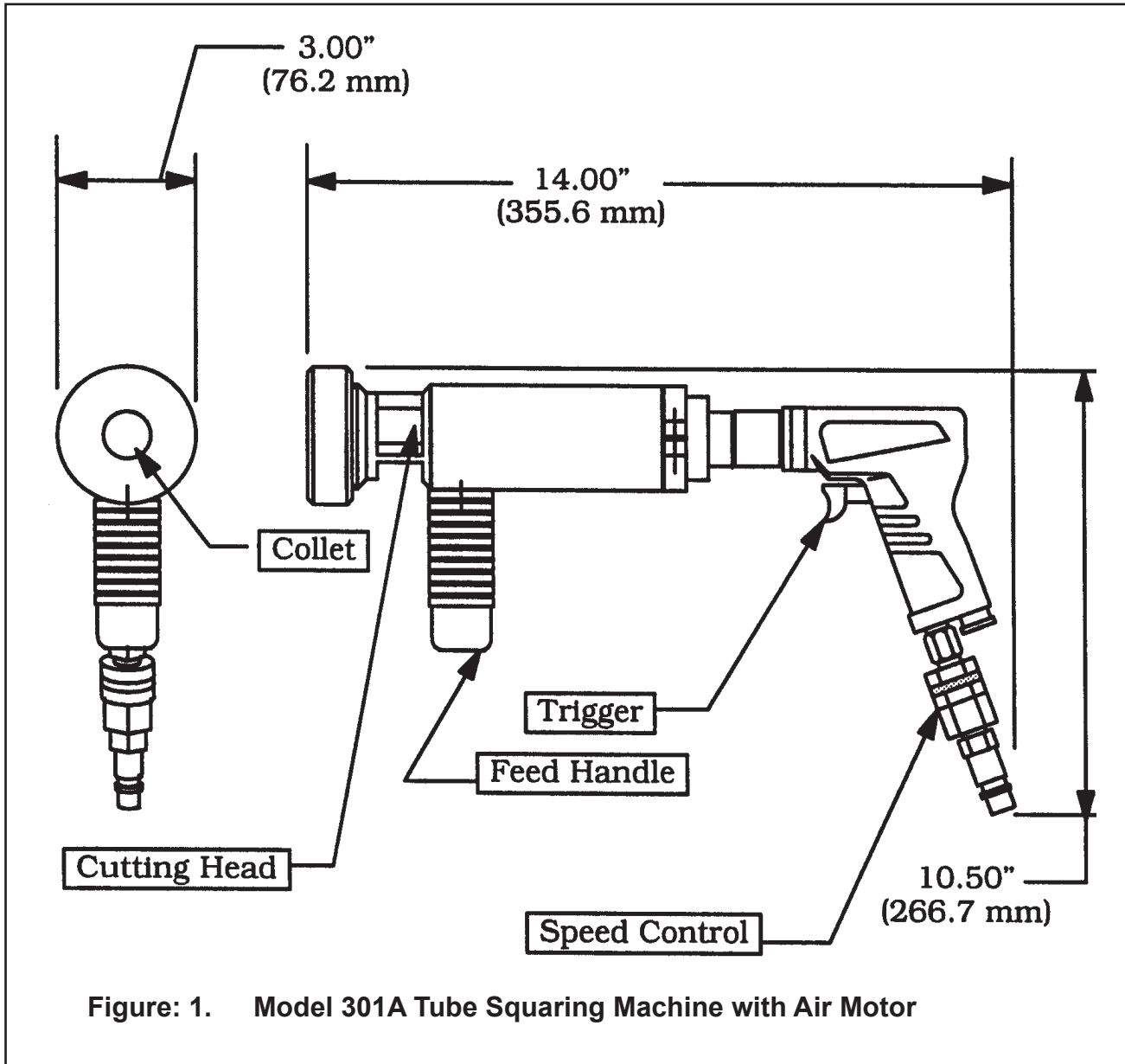
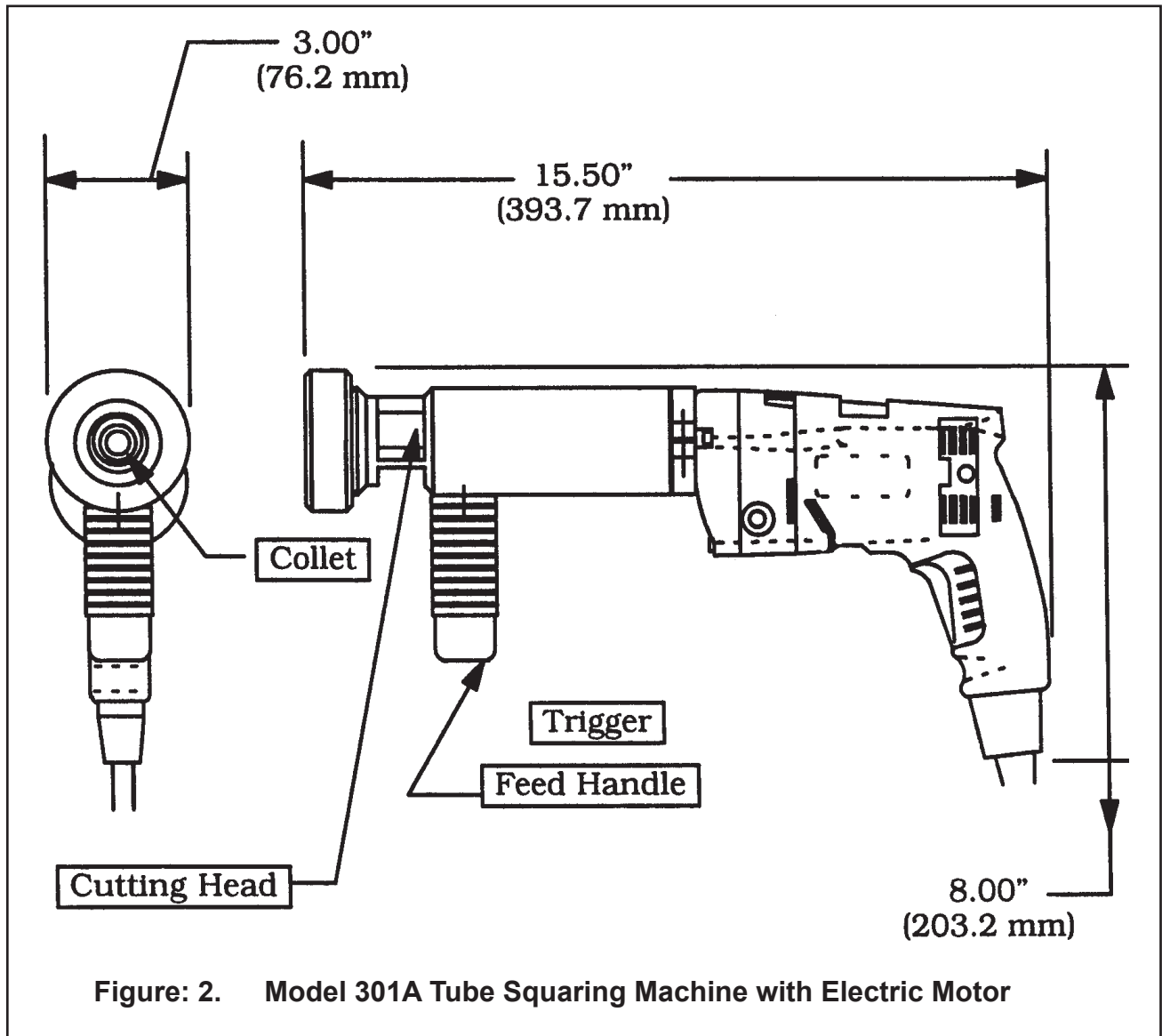


Figure: 1. Model 301A Tube Squaring Machine with Air Motor

Weight (Approx.): Weight: 6.75 lbs. (3.1 kg) (varies slightly with Collet size)
Power Requirements: 22 cfm at 90 psi (10 L/s at kPa)

4.2 MODEL 301A TUBE SQUARING MACHINE WITH ELECTRIC MOTOR



Weight: 6.8 lbs. (3/1 kg) (varies slightly with Collet size)

Power Requirements:

Model 301E110 115 VAC +10%, 25 to 60 Hz

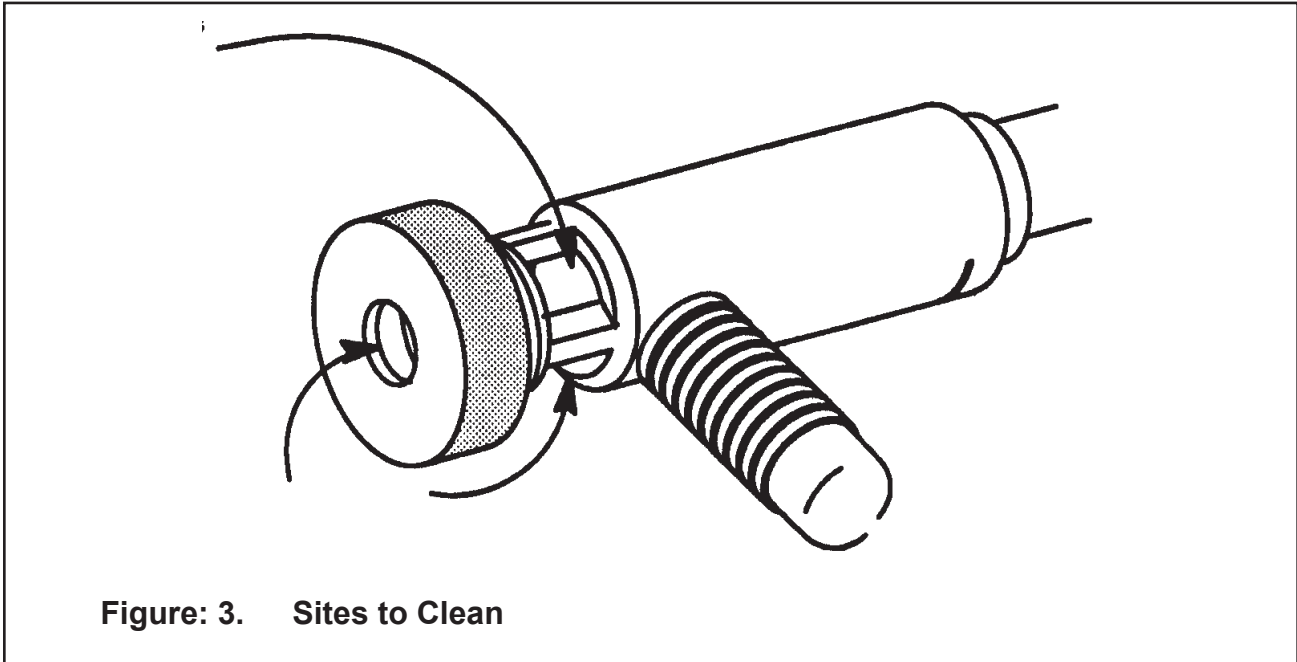
Model 301E220 220 VAC +10%, 25 to 50 Hz

5. MAINTENANCE

BEFORE USE

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.



GENERAL COMMENTS

If the Model 301 is operated in the vertical position (Cutting Head up), turn it upside down and remove the chips and/or other debris, after each bevel is completed.

Tool life may be severely shortened, unless chips and/or other debris on the Cutting Head are removed

Disassembly of a power unit voids warranty, except when performed by a TRI TOOL Inc. designated repair technician.

6. OPERATION



DANGER

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

6.1 SELECT A TOOL BIT



CAUTION

CAUTION: Use of dull or improperly designed 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.

Select Tool Bit according to the tubing material, the tubing size, and how critical a near burr free end is.

Use standard entrance angle Tool Bit for carbon steel.

- These Tool Bits also work well with some stainless steel applications if a near burr free end is not a critical requirement.

Use a high entrance angle Tool Bit for most stainless steels.

- Generally this is the most suitable edge geometry for about 90 % of all of the stainless steel tubing applications.

Use an extra hook angle Tool Bit for stainless steels which are very soft.

- These stainless steels include materials like 316L, which have been bright hydrogen annealed, vacuum annealed or annealed and electro-polished.
- Electro-polished stainless steel has a micro-thin surface, which is high in Cr and Ni which makes it very soft, but tough and difficult to cut without a burr.

Use a .969" (24.6 mm) tall Tool Bit for 3/16" (4.7 mm) diameter or less tubing.

- The tall Tool Bit may provide some advantages for wall thicknesses less than .020" (.5 mm).
- The tall Tool Bit will cut very close to the Collet face, which minimizes flexing of the tubing from the cutting pressure.
- The tall Tool Bit will require more time to adjust the tubing position for cutting and there is some risk of crashing the Tool Bit into the Collet on larger OD tubing.

Use the M-42 Tool Bits with the exotic alloys if high heat resistance is required to avoid burning the cutting edge of the Tool Bit.

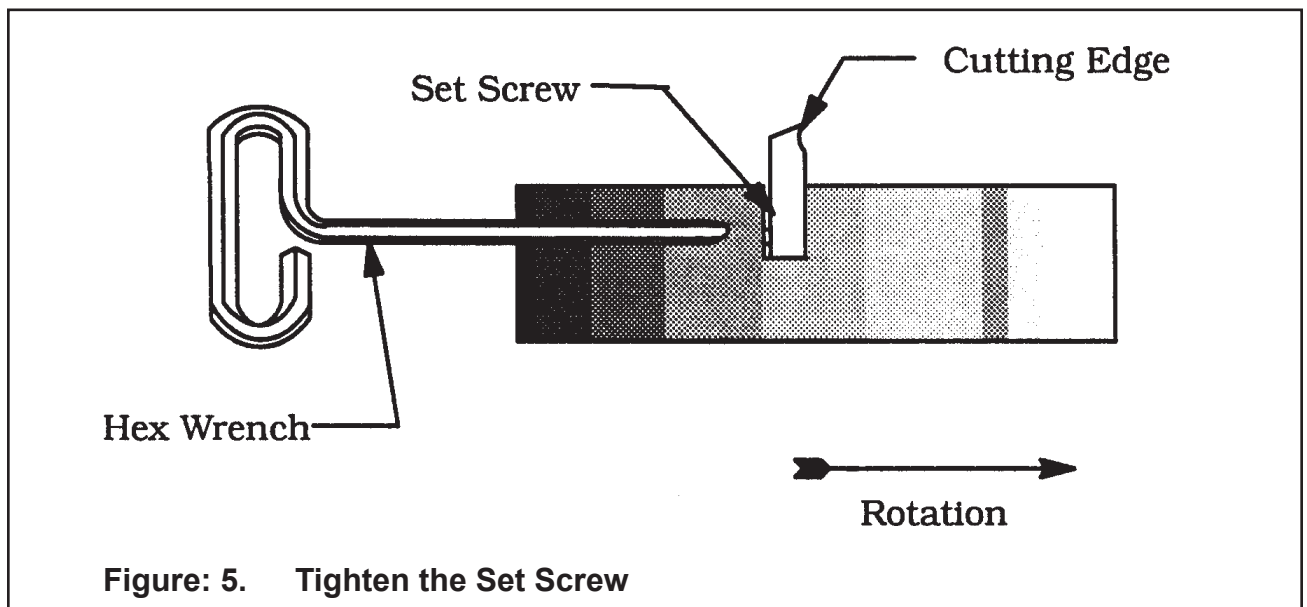
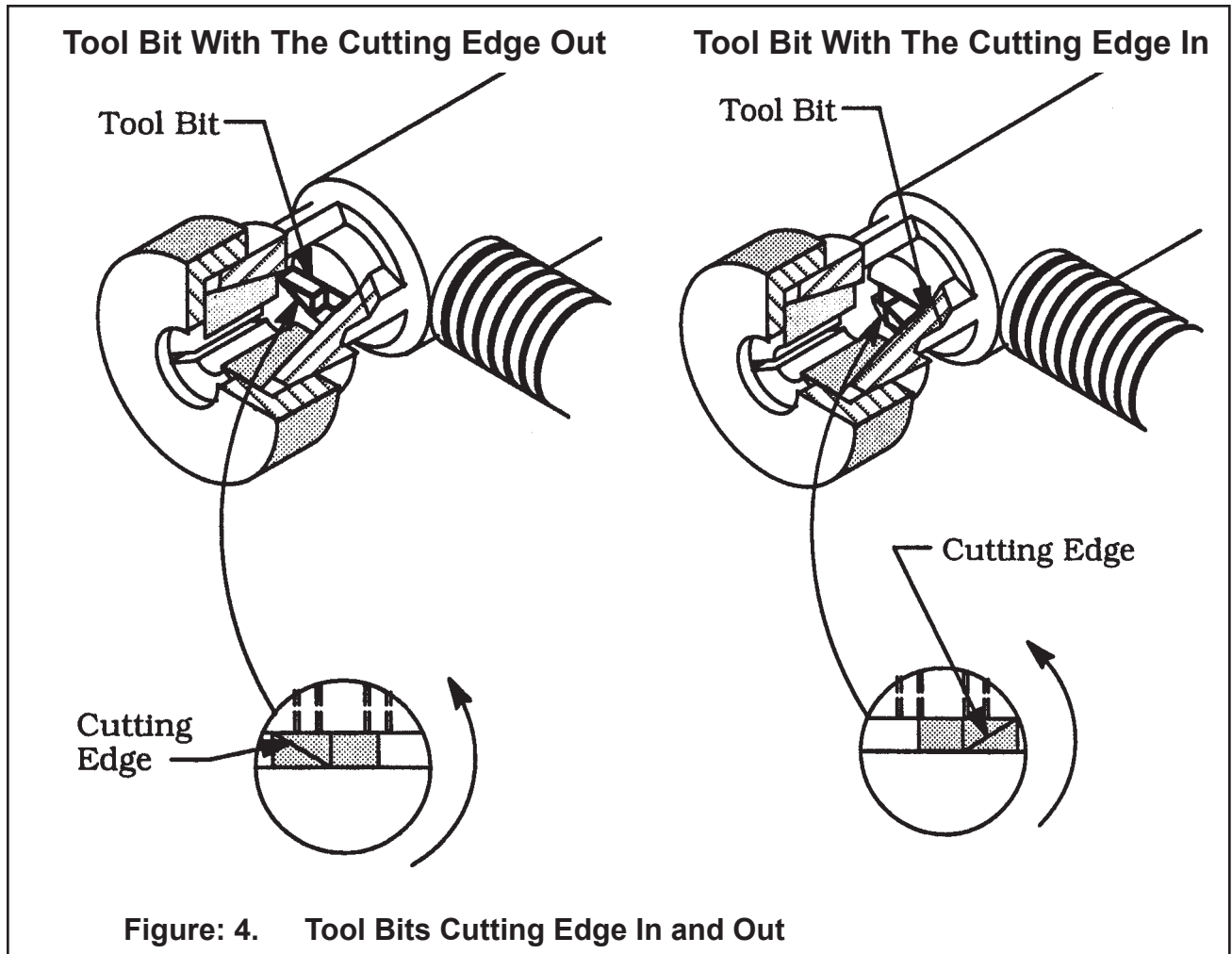
- M-42 can improve the life expectancy of the Tool Bit under some conditions on stainless steel.
- M-42 Tool Bits are more brittle than the M-2 Tool Bits, therefore there is a much greater risk of damaging the M-42 Tool Bit when installing the tubing in the Tube Squaring Machine.

Loss of Tool Bits from damaged edges may not off-set the improved cutting life that those Tool Bits promise.

Some exotic alloys may require Tool Bits with both the extra hook angle as well as the M-42 tool steel for heat resistance.

6.2 INSTALL A TOOL BIT

1. Ensure that the Model 301 is disconnected from the power source before installing a Tool Bit.
2. Insert the Tool Bit into the slot in the Cutting Head. Refer to Fig. 4. This position is used for .50" (12.7 mm) and smaller diameter tubing. This is the designed working position of the Tool Bit and will leave virtually no burr with standard tubing.
 - When working with electro-polished stainless steel tubing, use slow cutting speeds to minimize the ID burr.
 - The Tool Bit (P/N 99-1445) may be reversed. Refer to Fig. 4. Use the reversed position for tubing with an ID greater than .50" (12.7mm).
 - With the extreme shear cutting action, the burr on the ID will be virtually eliminated.
 - Minimum burr may be obtained with a slow RPM and a slow feed, which will cut a continuous chip.
 - Terminate the cut with one or two revolutions without feed to square the end of the tubing.
 - The cutting edge of the Tool Bit must be located on the radial centerline.
3. Tighten the Set Screws to secure the Tool bit to the Cutting Head. Refer to Fig. 5.



6.3 INSTALL A COLLET IN THE MODEL 301

1. Select the proper size Collet for the outside diameter of the tube or pipe to be squared. The size of the Collet is determined by the outside diameter of the tube or pipe to be squared.
2. Do not drop the Collet.
3. Always place a hand under the Collet when installing or removing it from the Model 301.
4. Remove the Knurled Nut from the end of the Model 301.
5. Insert the Collet into the tapered end of the Model 301.
6. Screw the Knurled Nut back onto the Model 301.
7. Be sure that there is a light film of grease on Knurled Nut threads at all times to prevent them from galling or freezing during use.
8. Back the Knurled Nut off just enough to allow insertion of the tube or pipe into the Collet.
9. Partially tighten the Knurled Nut until the tube or pipe may still be moved into position.
10. Move the tube or pipe approximately 1/16" (1.6 mm) from the Tool Bit.
11. As the Collet closes, the tube is drawn toward the Tool Bit.
12. Do not let the Tool Bit touch the tube or pipe. If it touches it will cause damage to the Tool Bit or the Tube Squaring Machine when power is applied.
13. Tighten the Knurled Nut to prevent the rotation of the tube or pipe during machining.

6.4 INSTALL A COLLET IN THE MODEL 301QL

1. Select the proper size Collet for the outside diameter of the tube or pipe to be squared. The size of the Collet is determined by the outside diameter of the tube or pipe to be squared.
2. Do not drop the Collet.
3. Remove the Ball Lock Pin from the Collet Clamping Assy of the Model 301QL by pulling it straight out.
4. Be sure that the Toggle Clamp Lever is in the up position to allow the pin to be pulled out.
5. Swing the Clamping Head Assy upward to allow the Collet slide into place.
6. Insert the Collet into the tapered Collet Clamping Model 301QL.
7. Swing the Collet Clamping Assy down into position.
8. Insert the Ball Lock Pin completely into the hole provided for it in the Collet Clamping Assy.
9. Be sure that the Toggle Clamp Lever is in the up position in order to permit the pin to be pushed into the Collet Clamping Assy.
10. Insert the pipe or tube to be machined into the Collet.
11. Verify a clearance of 1/16" (1.6 mm) between the Tool Bits(s) and the pipe or tube face as held by the Collet.
12. As the Collet closes, the tube is drawn toward the Tool bit. Do not let the Tool Bit touch the pipe or tube at this time. To do so will cause damage to the Tool Bit or the Tube Squaring Machine when power is applied.
13. Lock the tube or pipe in position by pushing the Toggle Clamp Lever all of the way down.
14. Attach the power supply to the Model 301QL and pull the Trigger to start the rotation of the Cutting Head.

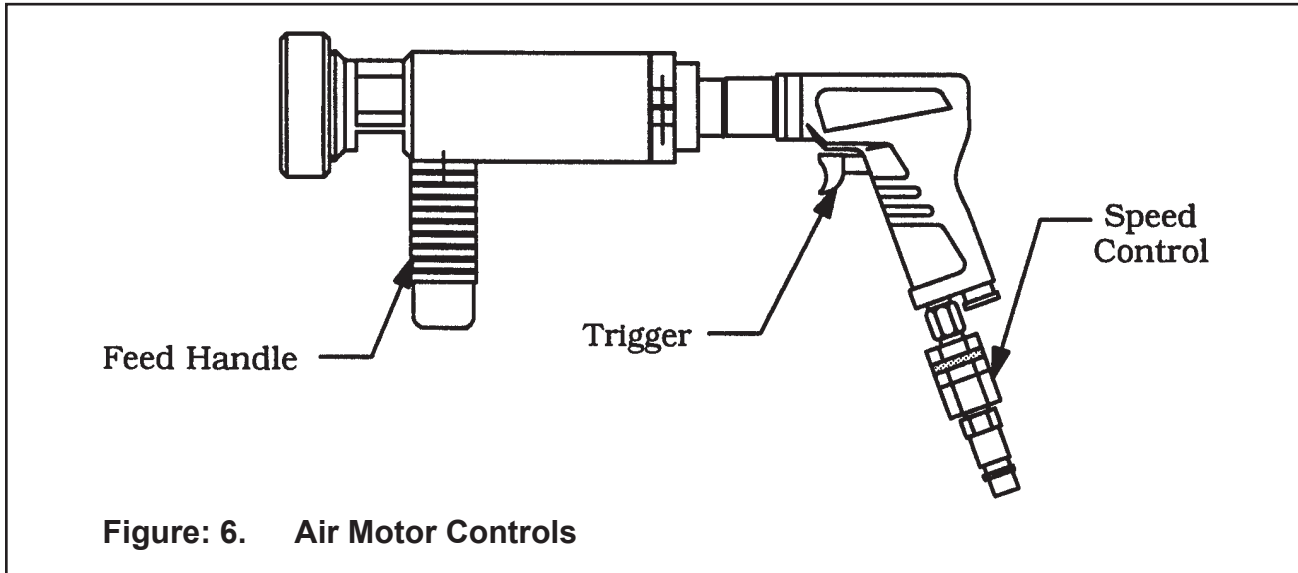
6.5 POWER REQUIREMENTS

Power requirements for a Model 301 with an Air Motor

The air supply should be 22 cfm at 90 psi (10 L/s at 621 kPa).

Connect the Model 301 to the air supply and pull the trigger to start rotation of the Cutting Head.

Ensure that the air supply has an adequate FRL (filter/regulator/lubricator) installed and adjusted properly.

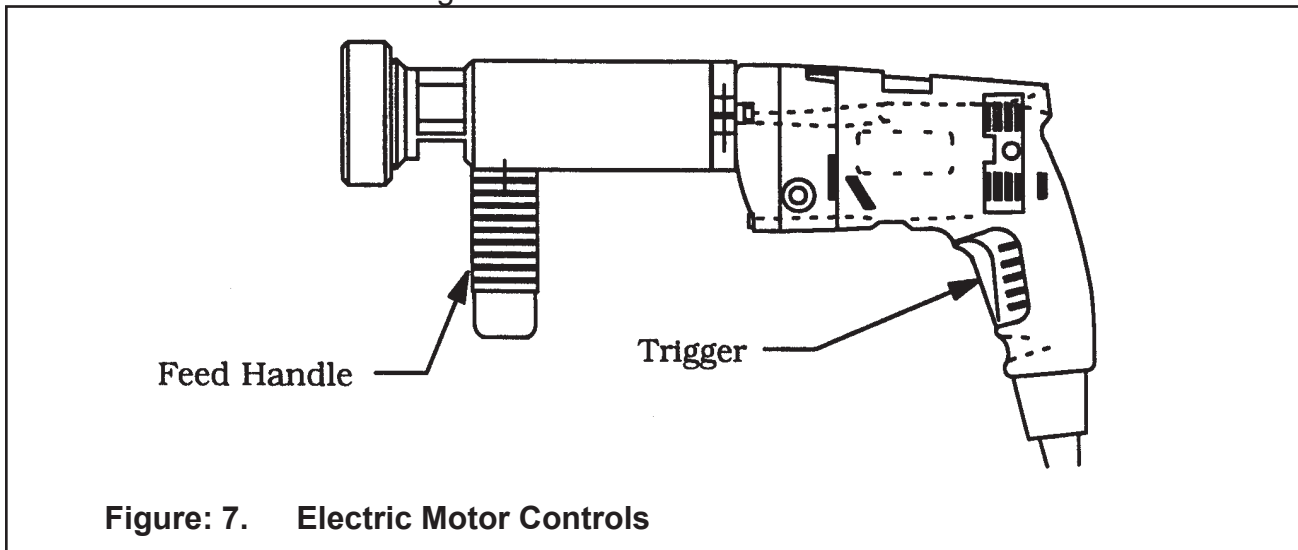


Power requirement for a Model 301 with an Electric Motor

The 110 VAC version will require a 110 VAC outlet.

The 220 VAC version will require a 220 VAC outlet.

Connect the Model 301 to the required power supply and pull the trigger to start rotation of the Cutting Head.



6.6 ADJUST THE CUTTING SPEED

Use the Speed Control to adjust the cutting speed. Refer to section 8, Cutting Speeds and Feeds, for the recommended cutting speeds.

To obtain a minimum burr tube end, avoid heat build up. When either the tube or the Tool Bit gets hot, the tube material starts to flow or push away from the Tool Bit edge in the form of a burr. If the cut is done without heat build up, it is a clean cut with a minimum burr.

Avoid the conditions, which generate excessive heat by:

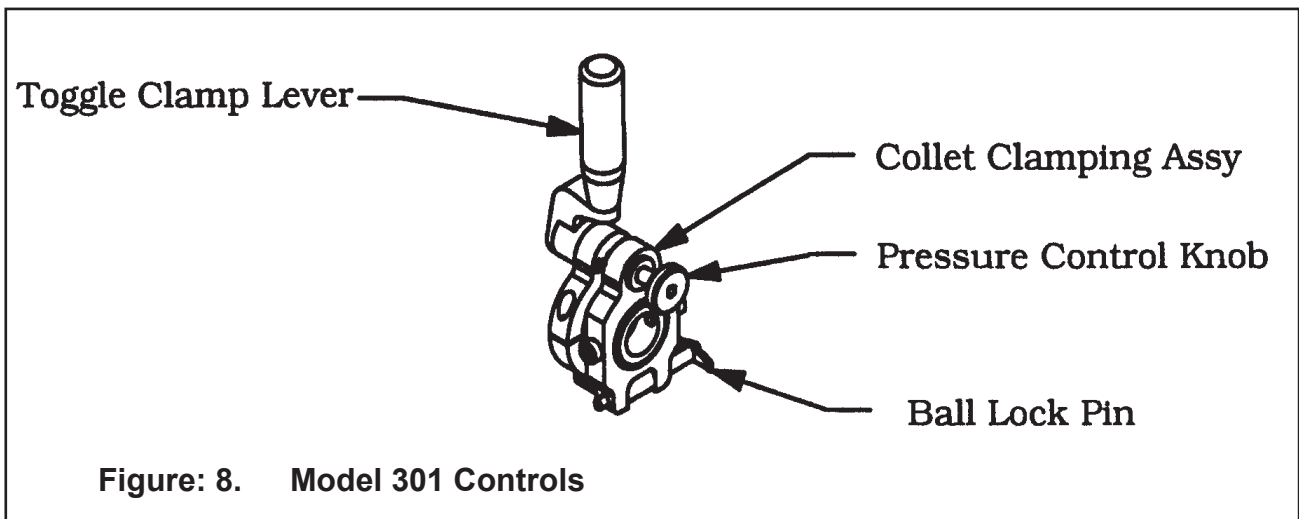
- Keep the RPM's low; excessive cutting speed will generate unwanted heat.
- Keep the chip curling loose; avoid excessive depth of cut.
- Use a sharp Tool Bit.

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.

If the tube end is not square to the tube axis, the Tool Bit will contact only a small segment of the pipe during each revolution.

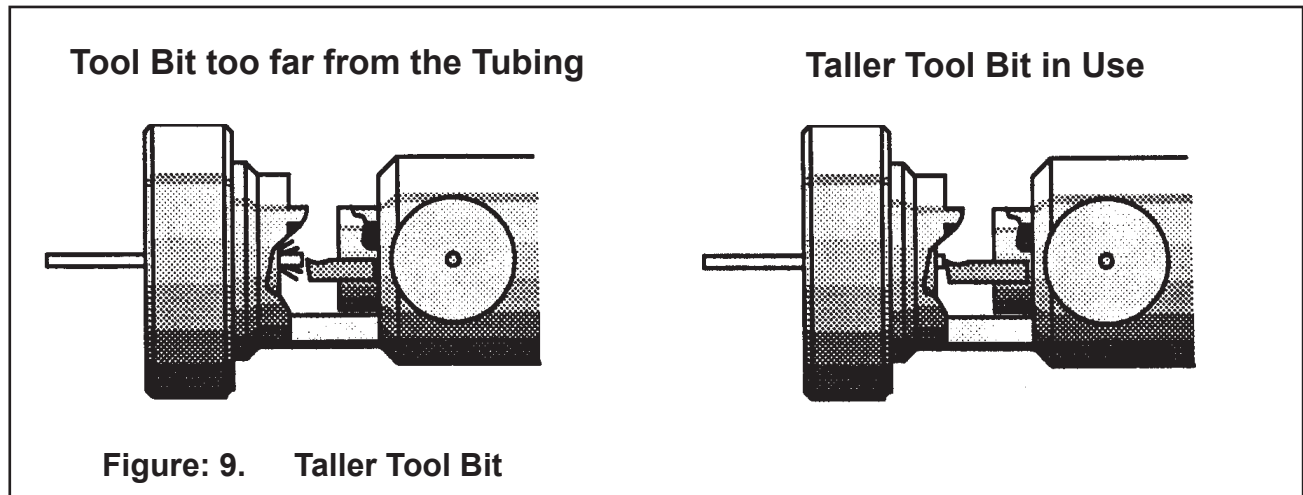
To avoid Tool Bit damage, the feed rate should be very slow until the Tool Bit is contacting the pipe continually during at least one revolution.



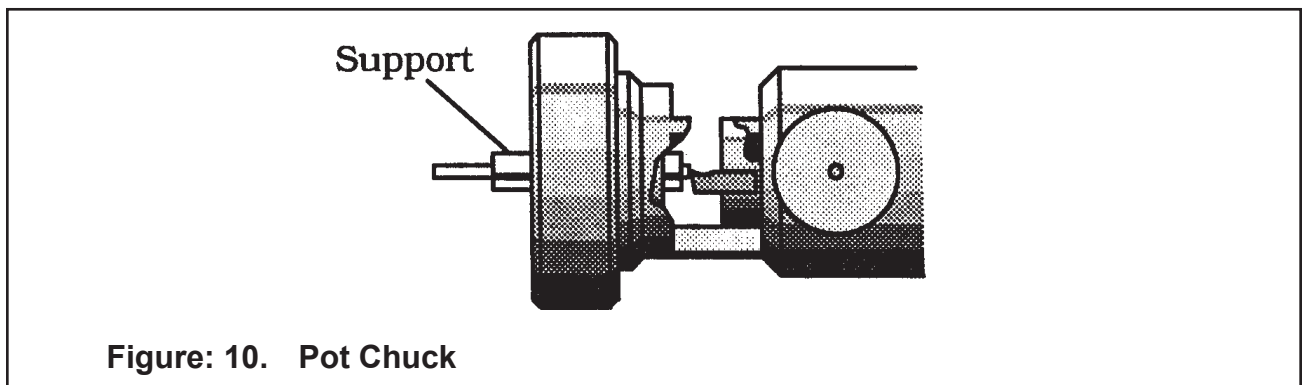
1. Adjust the cutting RPM with the Speed Control to just above the required cutting speed as the Tool Bit enters the cut.
2. The Tool will slow down slightly as the cutting load increases, apply additional power to hold the cutting speed.
3. Observe the chip as the machine is cutting.
 - The ideal chip will come off in a loose pig tail spiral.
 - A chip that is coming off in a tight straight spiral normally indicates that the feed is too heavy.
 - A straight or slightly curled chip normally indicates that the feed is too light.
4. Back off the feed as required to break the chips and let them fall away.
5. If a significant amount of stock must be removed, occasionally back out of the cut and let the Tool Bit spin free in the air to cool.
6. Continue rotating the Feed Handle clockwise until the end of the pipe is completely machined. Do not to let the Tool Bit cut into the Collet or the Collet Adapter.
7. Discontinue feed and allow the Cutting Head to rotate one time for stainless steel and up to three times for other materials to improve the finish of the prep surface. Never let a Tool Bit 'rub' the surface of a stainless steel tube without cutting. This will work harden the material and it will be difficult for the Tool Bit to get under the material in order to finish the cut. This will also cause excessive Tool Bit wear.
8. Rotate the Feed Handle counter-clockwise to separate the Cutting Head and the pipe.
9. Stop the Cutting Head rotation.
10. Release the Trigger.
11. Rotate the Feed Knob counter-clockwise until the Cutting Head clears the tube or pipe by at least 1/8" (3.2 mm) or more.
12. On the Model 301 loosen the Collet Nut to release the tube or pipe.
13. On the Model 301QL pull the Toggle Clamp Lever back to release the tube or pipe.
14. If the next cut is to be identical to the previous cut, then follow the sequence starting with section 6.3, Install a Collet in the Model 301 or section 6.4 Install a Collet in the Model 301L
15. If the next cut is to be different than the previous cut, disconnect the power cord and then follow the sequence starting with section 6.1, Select a Tool Bit.
16. End squaring of 1/8" (3.2 mm) diameter or smaller tubing with the Model 301. End squaring of small tubing with the Model 301 can be difficult due to the cutting force causes the tube to flex. Another problem is that it is difficult to

get the tip of the Tool Bit into the bore of the tube.

17. Resharpener Tool Bits will not work as the cutting edge has been moved away from the center and therefore the cutting edge cannot be positioned in the bore of the tube.
 - Use a taller Tool Bit to minimize the length of the tubing, which is not supported by the Collet. This will reduce the flexing of the tubing and in turn provide a cleaner cut with less smearing or burr. Tool Bit (P/N 99-2448) is a taller Tool Bit, which has extra hook to provide a very low force cutting action. This Tool Bit allows the tubing to be positioned in the Collet so that only 1/16" (1.6 mm) to 1/8" (3.2 mm) is unsupported by the Collet at the cut line.



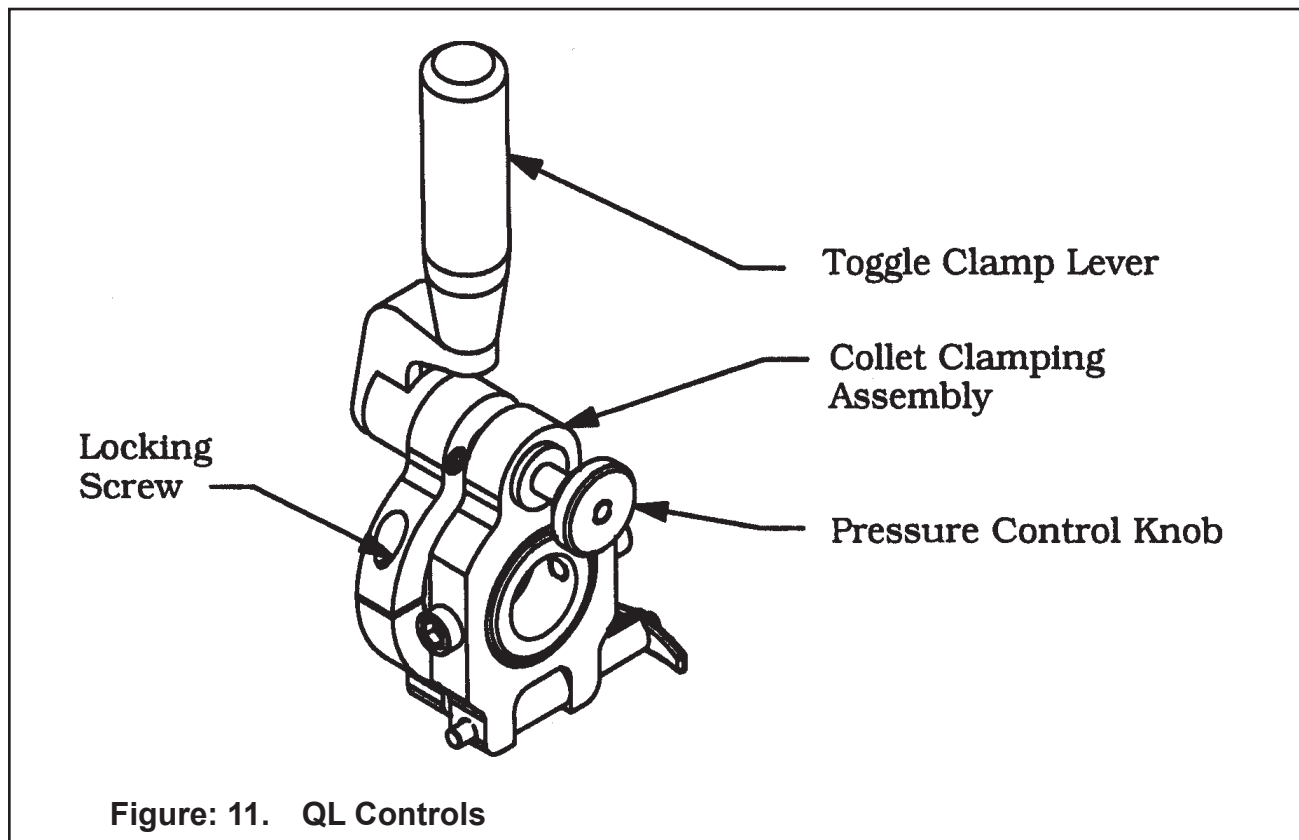
- Another method is to use a consumable aluminum “pot chuck” made from approximately 6” (152 mm) lengths of 3/16” (4.8 mm), or 1/4” (6.4 mm) aluminum rod or tubing. The rod or tubing is then bored and or reamed to match the OD of the tubing to be squared. A very fine longitudinal slit is cut in the consumable pot chuck, to allow the Collet to clamp on the product tubing. The product tubing along with the pot chuck are loaded into the Model 301 and both are squared. The tube is supported and a clean burr free end is obtained.



7. INSTALL THE QL

7.1 PREPARE MODEL 301 FOR THE QL KIT

1. Disconnect the Model 301 from its power source.
2. Remove the Knurled Nut from the end of the Model 301 Beveling Head Assembly.
3. The Knurled Nut is not used in the QL operation, however, retain the Knurled Nut for future use.



7.2 INSTALL THE QL KIT ON THE MODEL 301

1. Screw the QL Collet Clamping Assy onto the end of the Model 301 Tube Squaring Machine until one thread of the Model 301 protrudes from the opposite end of the Collet Clamping Assembly.
2. Tighten the Locking Screw to secure the QL Clamp Kit on the front of the Model 301.

8. CUTTING SPEEDS AND FEEDS

8.1 CUTTING SPEEDS

Use the following chart to determine the RPM needed for a specific Tool Bit cutting speed.

CUTTING SPEEDS					
Outside Diameter of the Pipe or Tube		RPM for 200 in/min (508 cm/min)	RPM for 250 in/min (635 cm/min)	RPM for 300 in/min (762 cm/min)	
.13"	3.2 mm	509	637	764	
.25"	6.4 mm	255	318	382	
.38"	9.5 mm	239	209	251	
.50"	12.7 mm	127	159	191	
.75"	19.1 mm	85	106	127	
1.00"	25.4 mm	64	80	86	

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.

CUTTING SPEEDS FOR TUBE SQUARING			
Outside Diameter of the Pipe or Tube		RPM Range	Time per Head Revolution
.25"	6.4 mm	30 to 60	1 to 2 seconds
.50"	12.7 mm	20 to 40	1.5 to 3 seconds
.75"	19.1 mm	15 to 30	2 to 4 seconds
1.00"	25.4 mm	15 to 25	2.4 to 4 seconds

8.2 CUTTING FEEDS

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

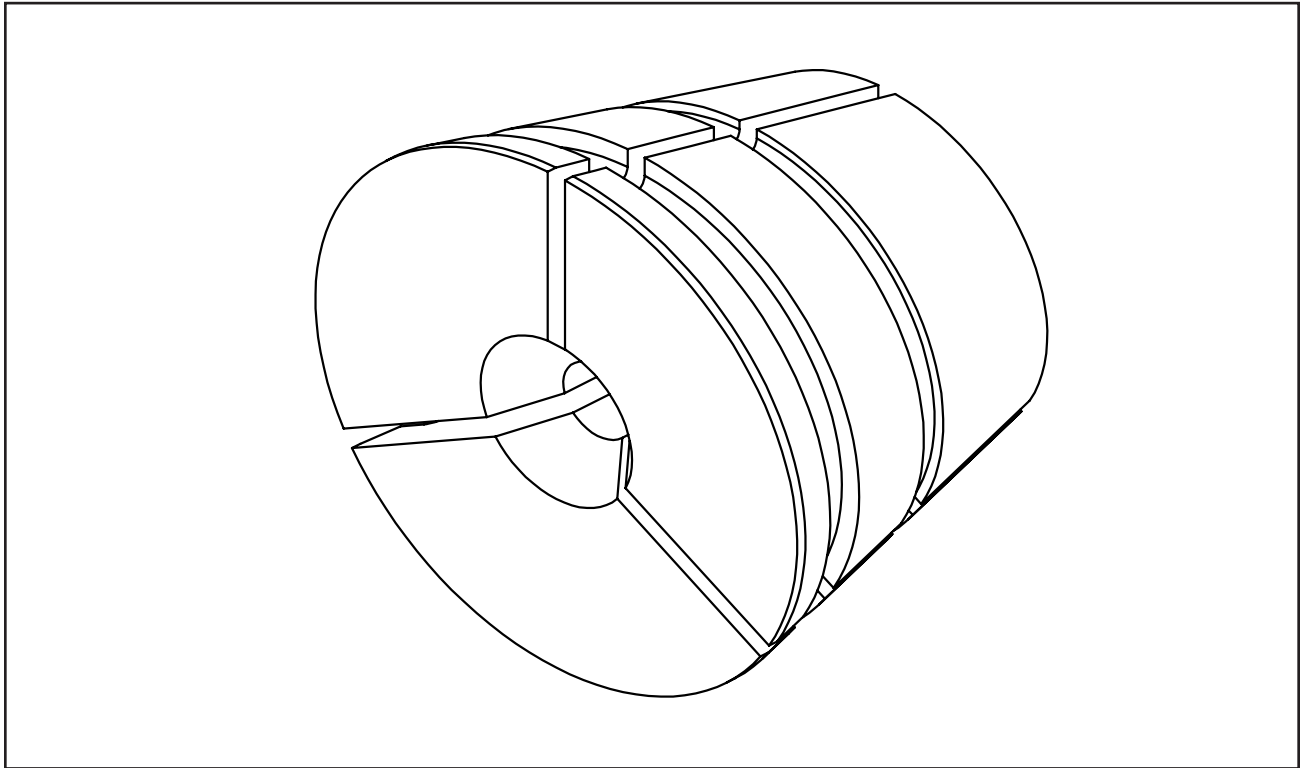
Use adequate feed, .003" to .006" (.08 mm to .15 mm) per revolution thereafter to establish a continuous chip cut.

- 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 edge or rough appearance.
- Stainless steel, which work hardens, must be worked with a heavy enough feed to stay under the work hardened surface [.003" to .006"(.08 mm to .15 mm) feed].

Never allow the tool bit to burnish the surface.

Reduced feeds and speeds to minimize chatter problems.

9. 100 SERIES COLLETS



100 SERIES COLLETS

Pipe Size	Diameter			Collet P/N
	Fraction	Decimal	Metric	
	1/8"	.125"	3.18 mm	30-2083
	3/16"	.188"	4.76 mm	30-2086
		.236"	6.00 mm	30-2090
	1/4"	.250"	6.35 mm	30-1819
		.276"	7.00 mm	30-1820
	9/32"	.281"	7.14 mm	30-1821
	5/16"	.313"	7.95 mm	30-1822
		.315"	8.00 mm	30-1823
	11/32"	.344"	8.74 mm	30-1824
		.354"	9.00 mm	30-1825
	23/64"	.359"	9.13 mm	30-1826
	3/8"	.375"	9.53 mm	30-1827
		.394"	10.00 mm	30-1828
		.400"	10.16 mm	30-1829

100 SERIES COLLETS

Pipe Size	Diameter			Collet P/N
	Fraction	Decimal	Metric	
1/8"	13/32"	.406"	10.31 mm	30-1830
		.413"	10.50 mm	30-1831
	27/64"	.422"	10.72 mm	30-1832
		.433"	11.00 mm	30-1833
	7/16"	.438"	11.13 mm	30-1834
	15/32"	.469"	11.91 mm	30-1835
		.472"	12.00 mm	30-1836
	1/2"	.500"	12.70 mm	30-1837
		.512"	13.00 mm	30-1838
17/32"	.531"	13.50 mm	30-1839	
1/4"		.540"	13.72 mm	30-1840
		.543"	13.80 mm	30-1841
	35/64"	.547"	13.89 mm	30-1842
		.551"	14.00 mm	30-1843
	9/16"	.563"	14.30 mm	30-1844
		.591"	15.00 mm	30-1845
	19/32"	.594"	15.08 mm	30-1846
		.602"	15.29 mm	30-1847
	5/8"	.625"	15.88 mm	30-1848
		.630"	16.00 mm	30-1849
	41/64"	.641"	16.27 mm	30-1850
21/32"	.656"	16.66 mm	30-1851	
3/8"		.669"	17.00 mm	30-1852
		.675"	17.15 mm	30-1853
	11/16"	.677"	17.20 mm	30-1854
		.681"	17.30 mm	30-1855
		.688"	17.48 mm	30-1856
		.709"	18.00 mm	30-1857
	23/32"	.718"	18.24 mm	30-1858
	3/4"	.750"	19.05 mm	30-1859
	25/32"	.781"	19.84 mm	30-1860
		.787"	20.00 mm	30-1861

Model 301 Tube Squaring Machine

100 SERIES COLLETS

Pipe Size	Diameter			Collet P/N
	Fraction	Decimal	Metric	
1/2"	13/16"	.813"	20.65 mm	30-1862
		.840"	21.34 mm	30-1863
	27/32"	.844"	21.44 mm	30-1864
		.854"	21.70 mm	30-1865
	55/64"	.859"	21.83 mm	30-1866
		.866"	22.00 mm	30-1867
	7/8"	.875"	22.23 mm	30-1868
	29/32"	.906"	23.00 mm	30-1869
	15/16"	.938"	23.83 mm	30-1870
	31/32"	.969"	24.61 mm	30-1871
63/64"	.984"	25.00 mm	30-1872	
3/4"	1"	1.000"	25.40 mm	30-1873
	1 1/16"	1.050"	26.67 mm	30-1874
		1.063"	27.00 mm	30-1875
		1.071"	27.20 mm	30-1876
		1.102"	28.00 mm	30-1877

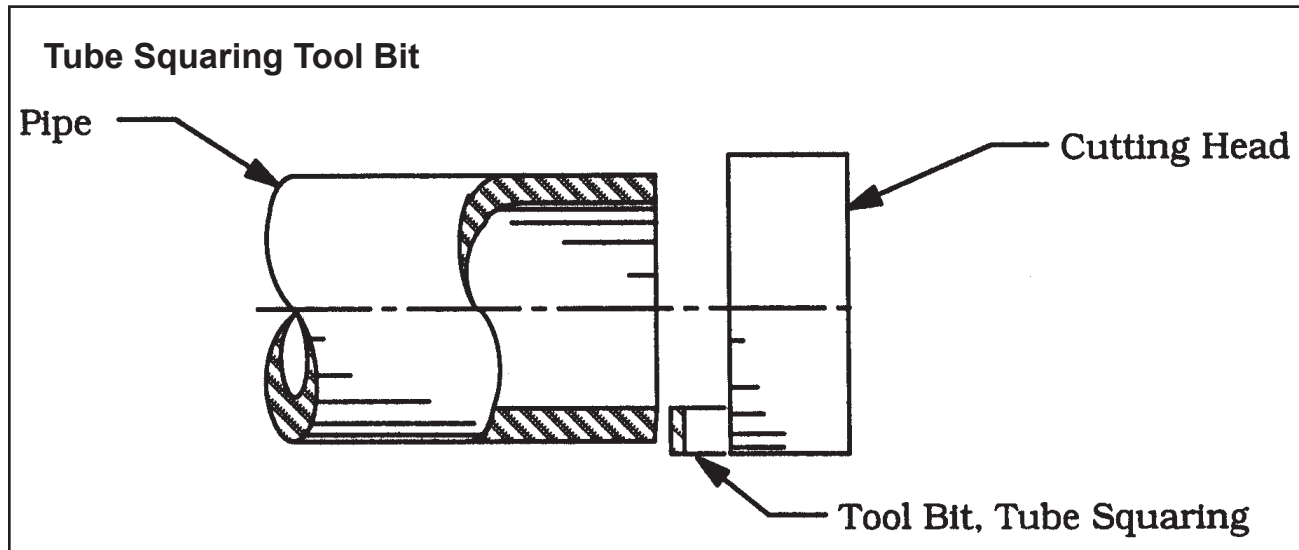
Contact TRI TOOL Inc. for sizes not listed

Replacement Spring (P/N 40-0229) 3 each required per Collet.

Replacement O-Rings (P/N 28-0252 and P/N 28-0253) 1 each required per Collet.

10. TOOL BITS

10.1 TUBE SQUARING TOOL BITS



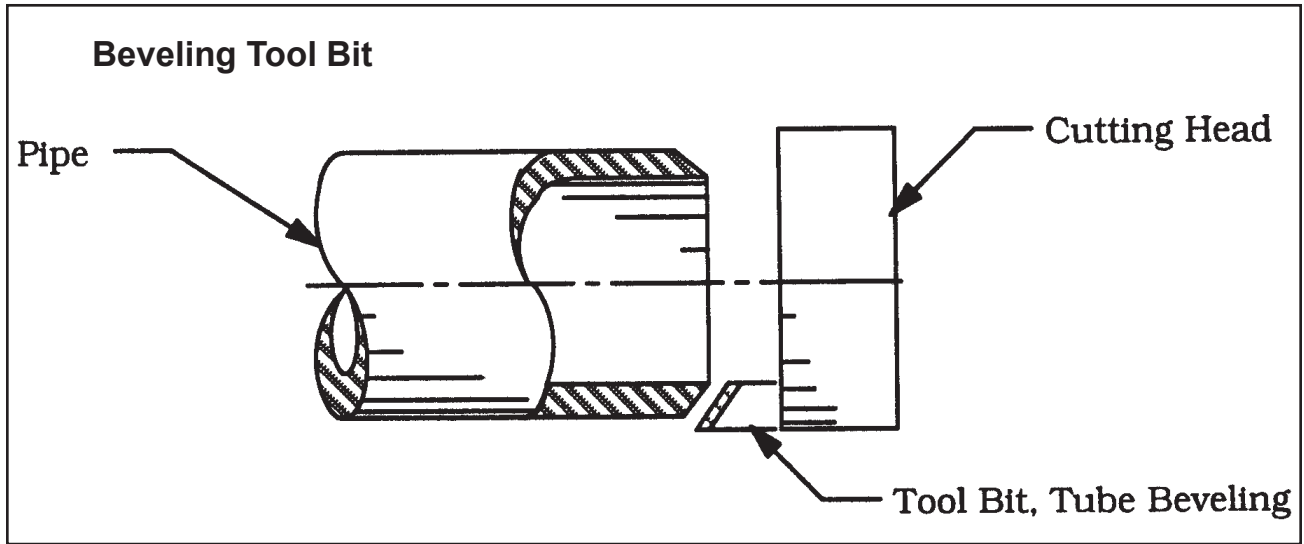
TUBE SQUARING TOOL BITS

Range	Max. Wall Thickness	Pipe or Tube Material	Tool Bit Height	Squaring Tool Bit P/N
.125" OD thru 1.05" OD	.125"	CS	.750"	99-1480
		SS	.750"	DURABIT 1
				99-1445
				99-1506
		99-1331*		
SS	.969"	DURABIT 2		
99-2448				
99-1529				
Inconel	.750"	99-3650*		
Incolly	.969"	99-3834*		

*M42

Note: Use the .969" high Tool Bits for 1/8" to 1/4" dia tubing, also for wall thickness of .030" or less. These Tool Bits cut closer to the Collet face for less tube flexing during cutting.

10.2 BEVELING TOOL BITS



BEVELING TOOL BITS

Range	Max. Wall Thickness	Pipe or Tube Material	37.5 Degree Angle Beveling Tool Bit P/N
1/2" thru 3/4"	sch 40	CS	99-1382
Tube: .625" thru 1.05" (OD's)	.125"	SS	99-1219

11. TROUBLE SHOOTING

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: 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 the Work

Incorrect tool blocks are installed for the size of the pipe or tube being worked on.

Incorrect tool bit is installed.

Problem: The hydraulic motor does not Start

The hydraulic power supply is shut off.

The hydraulic motor is damaged and will not run free.

12. ACCESSORIES

The following accessories are recommended for use with the Model 301 Tube Facing Machine and are available from TRI TOOL INC.

A portable Air Filter Caddy (P/N 75-0115).

- A FRL is required to protect the warranty and tool on all Tri Tool air driven tools.

An Pneumatic Foot Pedal

An Electric Foot Pedal

A Bench Top Stand (P/N 60-0022)

Collets (Refer to section 9, 100 Series Collets)

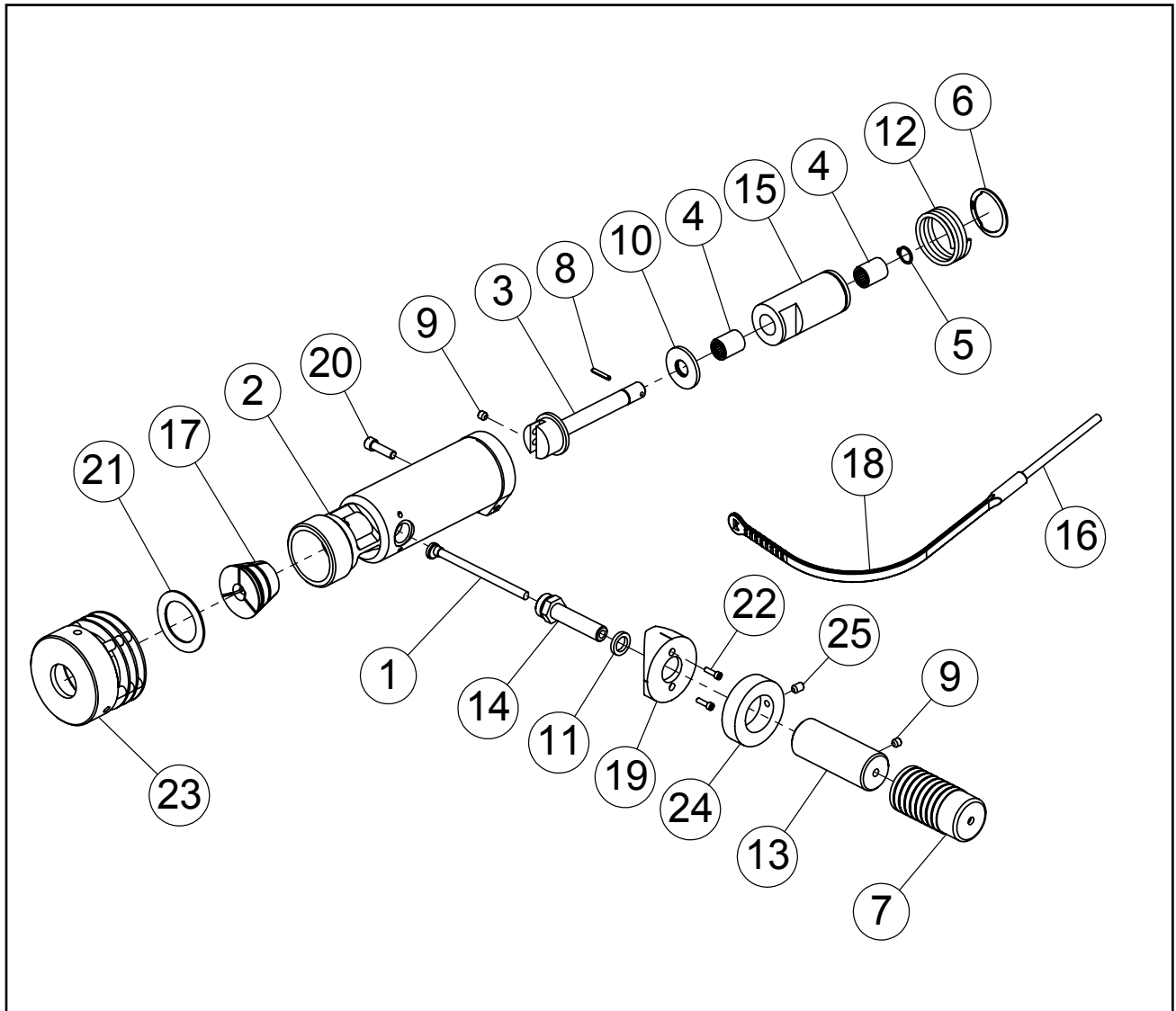
Tool Bits (Refer to section 10, Tool Bits)

Battery Charger Assy:

- 110V Standard (30-6143)
- 220V Optional (30-6144)

13. ILLUSTRATED PARTS BREAKDOWN

MODEL 301 TUBE SQUARING MACHINE

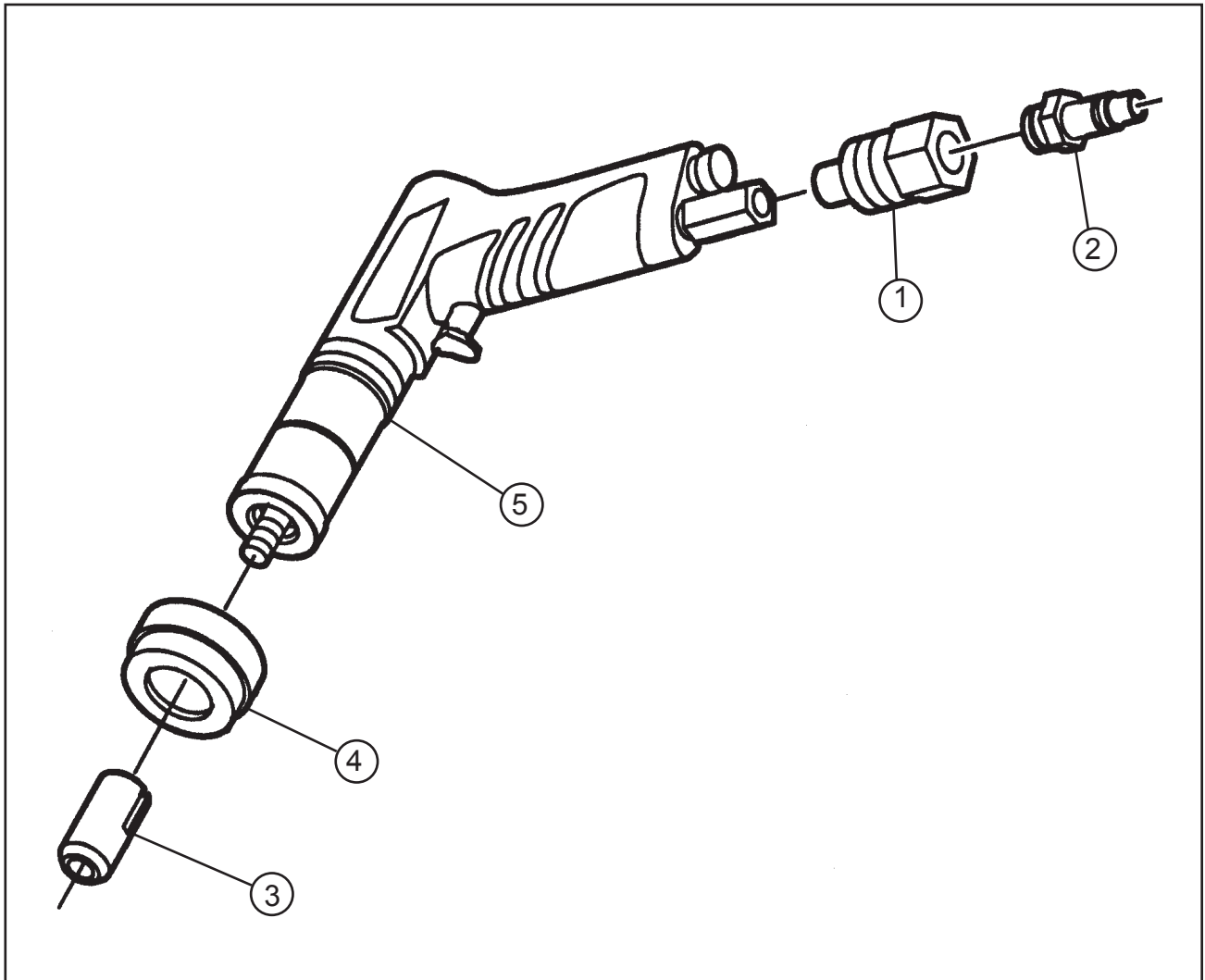


TRI TOOL INC.

Parts List, Model 301 Tube Squaring Machine

Item No	Part No.	Description	Qty
	03-0010	HEAD ASSY, BEVELING	
1.	14-0006	SHAFT ASSY	1
2.	19-0011	HOUSING	1
3.	20-0016	SHAFT ASSY	1
4.	29-0028	BEARING, ROLLER	2
5.	30-0062	RING, RETAINING, EXTERNAL	1
6.	30-0063	RING, RETAINING, EXTERNAL	1
7.	30-2278	HANDLE, GRIP	1
8.	32-0026	PIN, ROLL, 1/8 DIA. X 3/4"	1
9.	33-0499	SCREW, SET, 1/4-20 X 1/4", CUP PT	3
10.	34-0059	WASHER, FLAT, DELRIN	1
11.	34-0060	WASHER, FLAT, DELRIN	1
12.	40-0035	SPRING, COMPRESSION	1
13.	41-0018	HANDLE, GRIP	1
14.	46-0014	SLEEVE	1
15.	46-0016	SLEEVE	1
16.	23-0023	ROD	1
17.		COLLET, 100 SERIES (SEE SECTION 9)	REF
18.	30-0873	HOLDER, FLEX RUBBER KEY	1
19.	27-0614	ADAPTER, INDICATOR	1
20.	33-0041	SCREW, CAP, 1/4-20 X 7/8"	1
21.	34-0232	WASHER, THRUST	1
22.	33-0013	SCREW, CAP, #6-32 X 1/2"	2
23.	35-1061	NUT, ASSY W/GUARD	1
24.	46-0480	SLEEVE, INDICATOR	1
25.	33-0501	SCREW, SET, 1/4-20 X 3/8", CUP PT	1
	NOT SHOWN		
	05-1003	SHIPPING KIT	1
	36-0008	WRENCH, L, 3/16", HEX	1
	36-0010	WRENCH, L, 1/4", HEX	1
	36-0018	WRENCH, T, 1/8", HEX	1
	86-0048	CARRYING CASE, ELECTRIC	REF
	86-0070	CARRYING CASE, AIR	REF

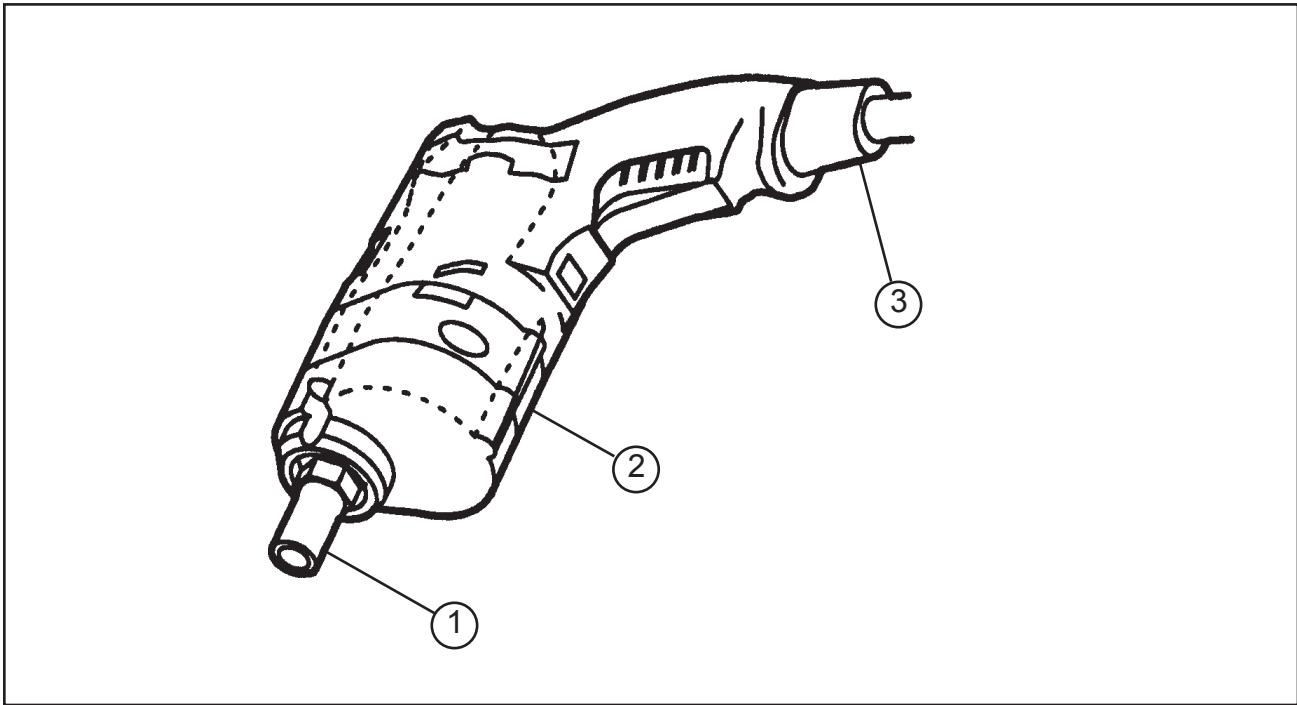
AIR MOTOR ASSEMBLY



Parts List, Air Motor Assembly

Item No	Part No.	Description	Qty
1.	53-0045	VALVE, FLOW CONTROL	1
2.	54-0149	COUPLING, MALE, QD	1
	57-0199	MOTOR ASSY, AIR	1
3.	27-0019	ADAPTER	1
4.	46-0377	SLEEVE	1
5.	57-0198	MOTOR, AIR	1

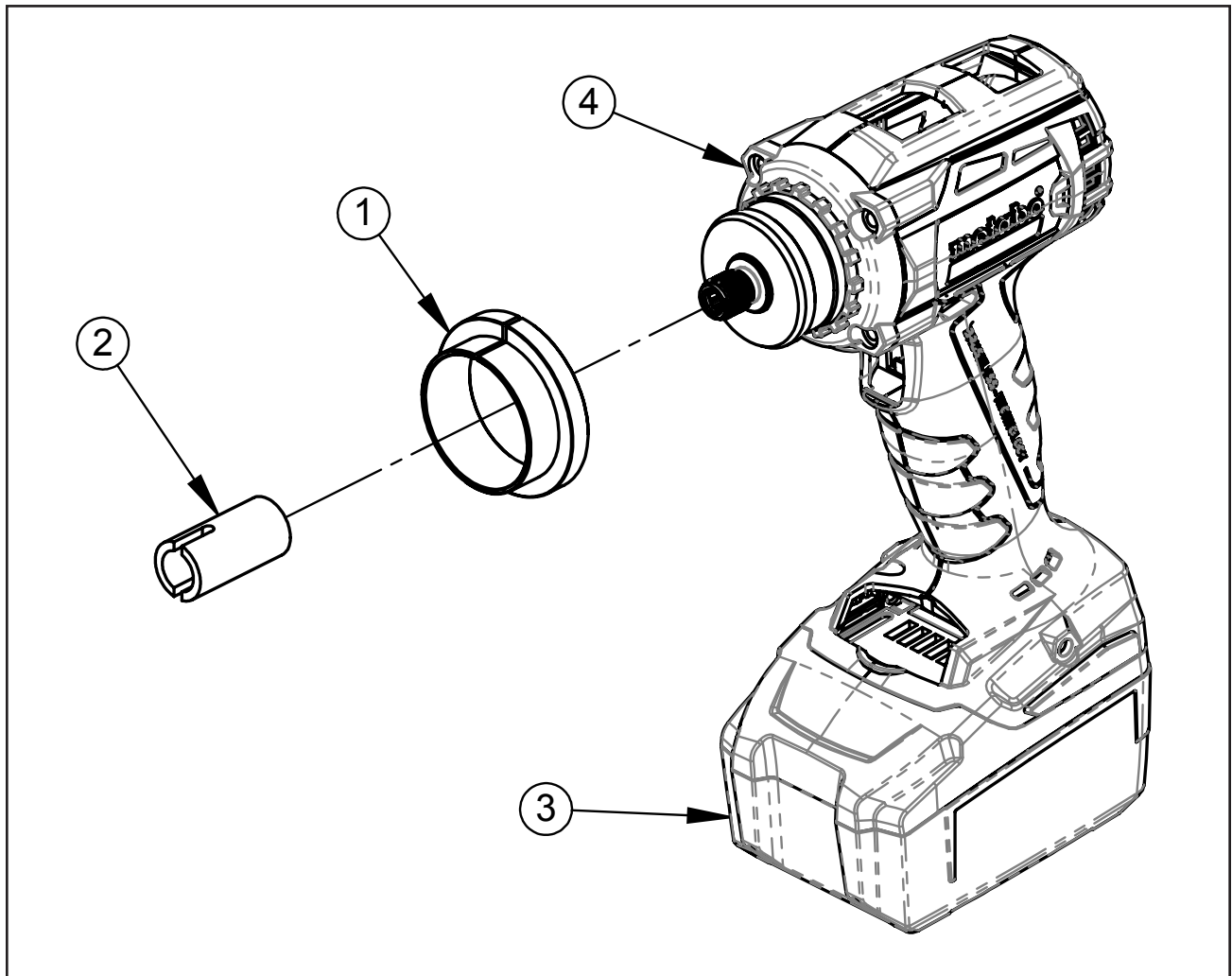
ELECTRIC MOTOR ASSEMBLY



Parts List, Electric Motor Assembly

Item No	Part No.	Description	Qty
	58-0004	MOTOR ASSY, ELECTRIC, 110 VAC Milwaukee	1
1.	27-0018	ADAPTER	1
3.	58-0003	MOTOR, ELECTRIC, 110 VAC (Milwaukee)	1
	58-0277	MOTOR ASSY, ELECTRIC, 110 VAC Metabo	1
1.	27-0018	ADAPTER	1
2.	27-0060	ADAPTER	1
3.	58-0274	MOTOR, ELECTRIC, 110 VAC (Metabo)	1
		MOTOR ASSY, ELECTRIC, 220 VAC Bosch	1
1.	27-0018	ADAPTER	1
2.	27-0060	ADAPTER	1
3.	58-0323	MOTOR, ELECTRIC, 220 VAC (Bosch)	1
		MOTOR ASSY, ELECTRIC, 100VAC	
1.	27-1541	ADAPTER	1
2.	27-0060	ADAPTER	1
3.	58-0331	MOTOR, ELECTRIC, 100 VAC (Makita)	1

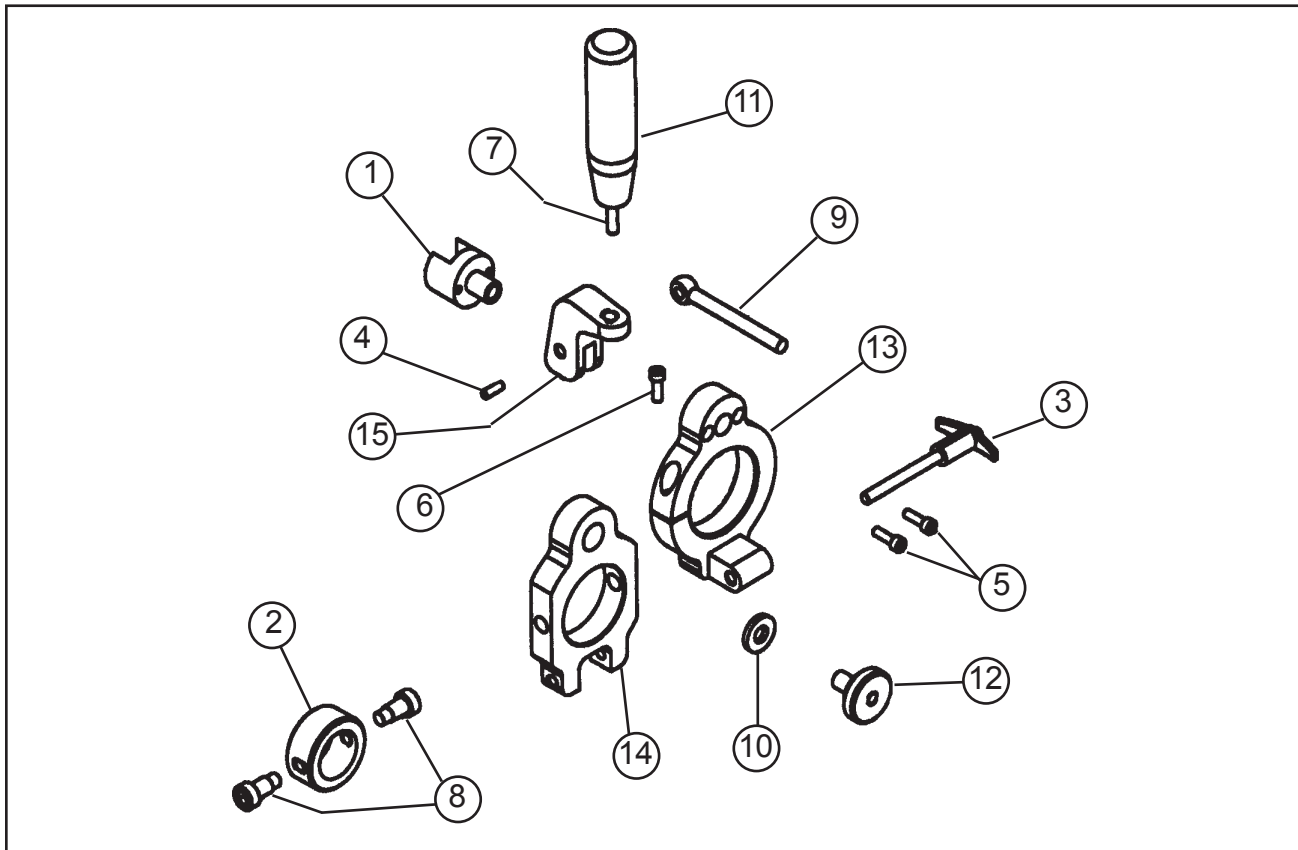
MOTOR ASSEMBLY, CORDLESS, 18V, METABO (P/N 58-0361)



Parts List, Motor Assembly, Cordless, 18V, Metabo (P/N 58-0361)

Item No	Part No.	Description	Qty
1.	27-1561	ADAPTER, SLEEVE	1
2.	27-1562	ADAPTER, DRIVE	1
3.	30-6142	BATTERY, METABO, 18V 5.2AH	1
4.	58-0317	MOTOR, CORDLESS, 18V, METABO	1
NOT SHOWN			
	30-6143	CHARGER, METABO, 18V 5.2AH, 120V	1

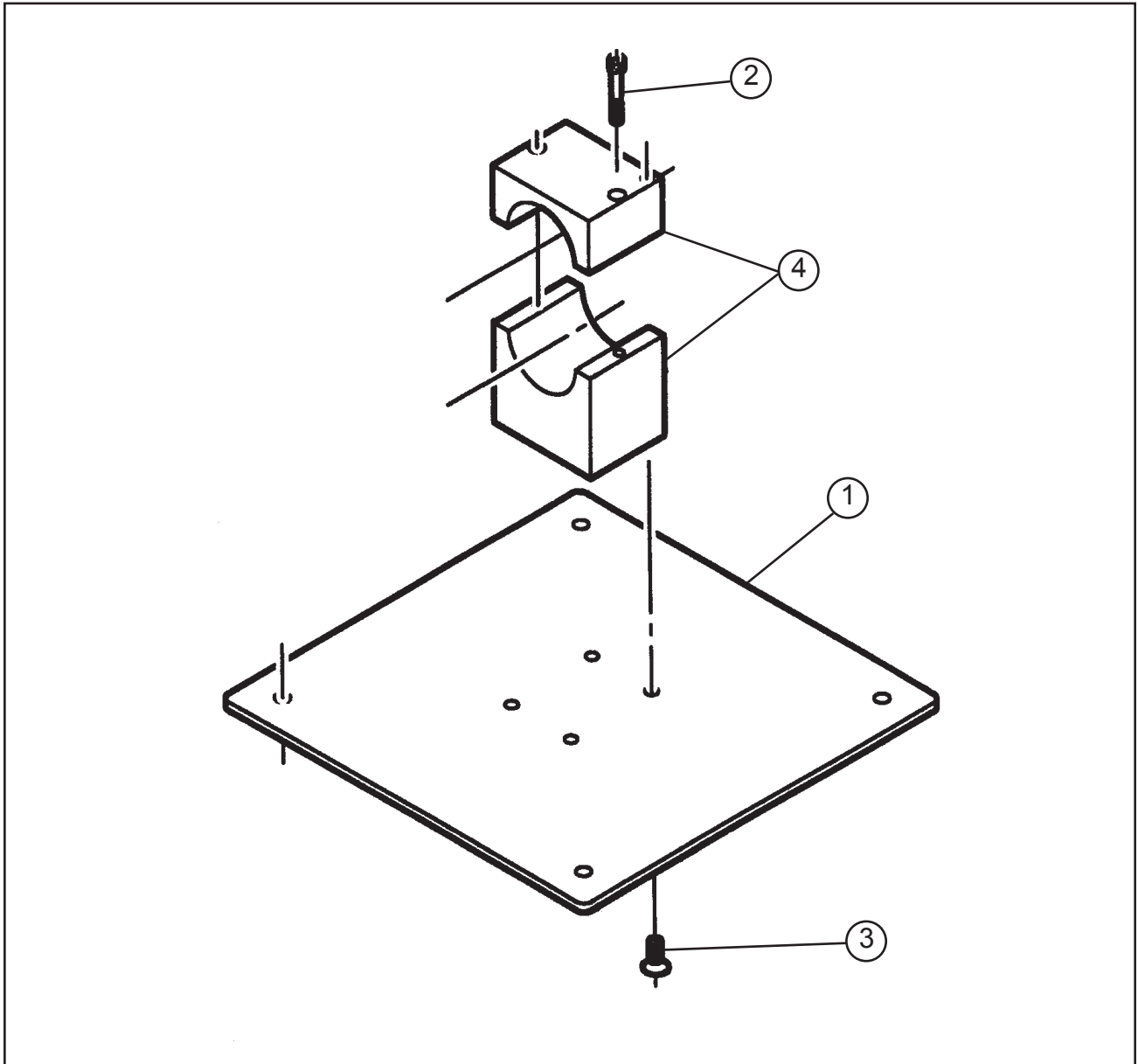
COLLET QUICK LOCK SYSTEM FOR THE MODEL 301



Parts List, Collet Quick Lock System for the Model 301 (05-0240)

Item No	Part No.	Description	Qty
1.	20-0629	SHAFT	1
2.	27-0534	ADAPTER	1
3.	32-0089	PIN, BALL LOCK, T-HANDLE	1
4.	32-0140	PIN, DOWEL, 1/4 DIA X 3/4"	1
5.	33-0029	SCREW, CAP, #10-24 X 5/8", ZP	2
6.	33-0040	SCREW, CAP, 1/4-20 X 3/4", ZP	1
7.	33-0533	SCREW, SET, 3/8-16 X 1", CUP PT	1
8.	33-1961	SCREW, SHOULDER	2
9.	33-1962	BOLT, EYE	1
10.	34-0134	WASHER, SELF ALIGNING	1
11.	41-0125	HANDLE	1
12.	42-0162	KNOB	1
13.	47-1095	BRACKET	1
14.	47-1083	BRACKET, HINGE	1
15.	62-0103	CAM	1

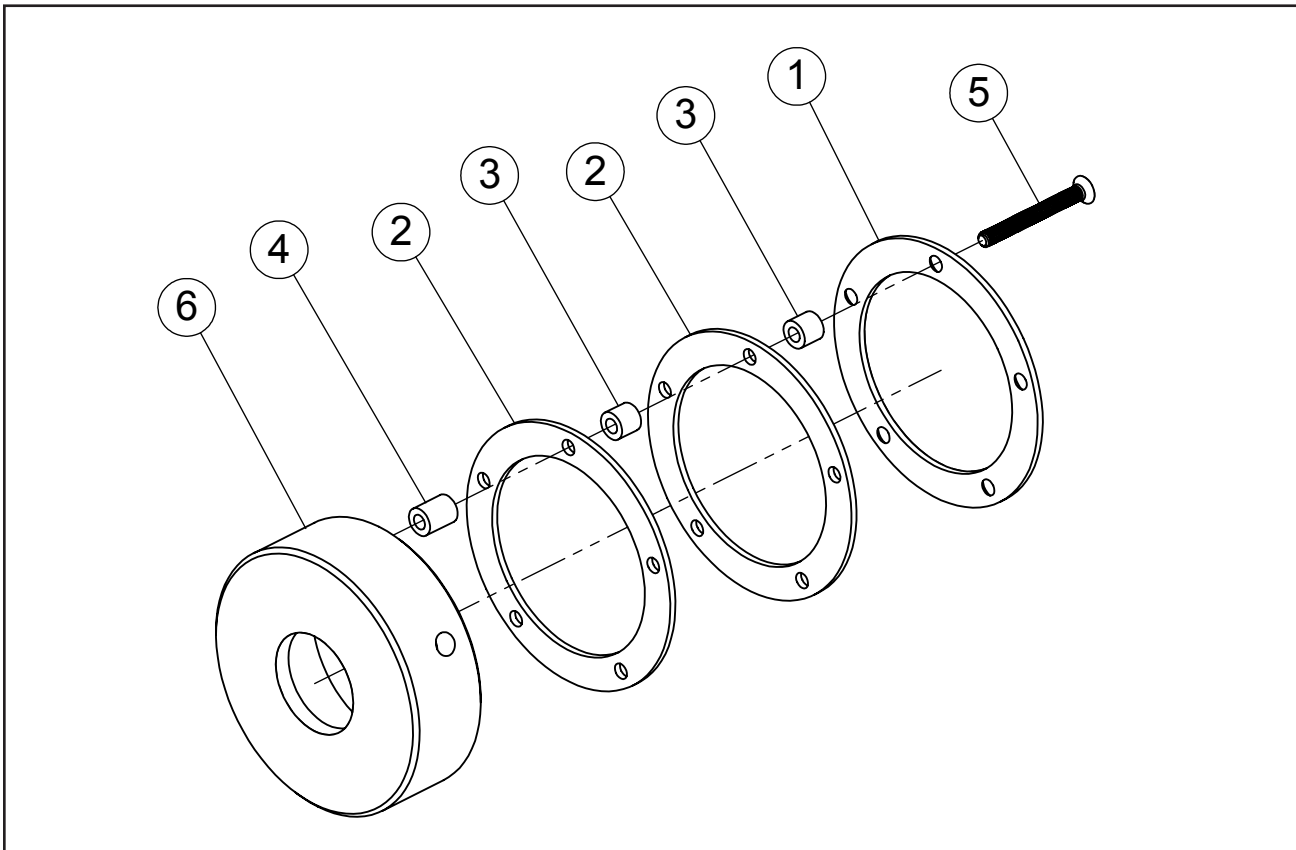
BASE STAND ASSEMBLY (P/N 60-0022)



Parts List, Stand Assy, Base (P/N 60-0022)

Item No	Part No.	Description	Qty
1.	24-0326	PLATE, BASE	1
2.	33-0045	SCREW, CAP, 1/4-20 X 1 3/4", ZP	2
3.	33-0369	SCREW, FLAT, 5/16-18 X 3/4"	4
4.	48-0173	BLOCK, RETAINING	1

NUT ASSEMBLY WITH GUARD FOR THE MODEL 301



Parts List, Nut Assembly with Guard (35-1061)

Item No	Part No.	Description	Qty
1.	24-4522	PLATE #1, CHIP GUARD, 301	1
2.	24-4523	PLATE #2, CHIP GUARD, 301	2
3.	30-6430	SPACER, ROUND, 5/16" DIA X 9/32" X .166 ID	10
4.	30-6431	SPACER, ROUND, 5/16" DIA X 13/32" X .166 ID	5
5.	33-4362	SCREW, FLAT HD, TORX, #8-32 X 1-1/2"	5
6.	35-0411	NUT, COLLET, 301	1

14. METABO SAFETY INSTRUCTIONS

Refer to the instruction manual that comes with the Metabo Cordless Drill/Driver for all safety and operating procedures.



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 safety triggers on the machine.



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!



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