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SAFETY PRECAUTIONS

IN GENERAL

When using rotating head cutting equipment, basic safety precautions should always be followed to reduce the risk of personal injury.

Operate this tool only in accordance with specific operating instructions.

WARNING:

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.

DRESS CONSIDERATIONS

Use standard safety equipment. Hard hats, safety shoes, safety harnesses, protective clothes, and other safety devices should always be used when appropriate.

Use safety glasses. Do not operate cutting tools without eye protection.

Dress properly. Do not wear loose clothing or jewelry. They can be caught in rotating and moving parts. Avoid slippery floors or wear nonskid footwear. If you have long hair, wear protective hair covering to contain it.

WORK AREA

Keep the work area clean. Cluttered work areas and benches invite injuries.

Consider the work area environment. Keep the area well lit. Keep electrical cords, cables, rags, rigging straps, and etc. clear of rotating equipment. Do not use power-cutting tools in the presence of flammable liquids and gasses.

Keep visitors away. Do not let visitors or untrained personnel at or near operating tools. Enforce eye protection requirements for all observers.

Do not over reach. Keep proper footing at all times.

Stay alert. Watch what you are doing. Use common sense. Do not operate tools when you are tired.

TOOL CARE

Maintain tools with care. Keep tools in good operating condition. Sharp tool bits perform better and safer than dull tool bits. Well maintained tools function properly when needed.

Check for damaged parts. If a tool has malfunctioned, been dropped or hit, it must be checked for damage. Run no-load tests and feed function checks. Do a complete visual inspection.

Electric motors. Use only with proper AC voltage power sources and observe all normal electric shock hazard procedures.

Do not abuse power and control cords. Pulling or running over cords and cables can result in electrical shock hazards and malfunctions. Keep control and power cords out of all cutting fluids and water.

Hydraulic drives. Observe proper procedures for electrically driven power sources. Avoid damage to hydraulic lines. Keep quick-disconnects clean. Grit contamination causes malfunctions.

Air tools. Check the exhaust muffler. Broken or damaged mufflers can restrict air flow or cause excessive noise. Use air motors only with a filtered, lubricated and regulated air supply. Dirty air, low-pressure air or over pressure air will cause malfunctions, including delayed starting.

AREA EQUIPMENT

Secure work. Whenever possible use clamps, vises, chains and straps to secure pipe.

Make sure the tool is secured; it is safer to have both hands free to operate the tool.

TOOL USE

Use the right tool and tool bit for the job. Do not use a tool, which is incorrect for the job you are doing.

Keep the tool bits fully engaged in the tool bit holders. Loose bits are a safety hazard.

Disconnect the 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. Develop a habit of checking 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 feed and speed rate for which they were designed.

Do not reach into rotating equipment. Do not reach into the rotating head stock to clear chips, to make adjustments, or to check surface finish. A machine designed to cut steel will not stop for a hand or an arm.

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

Avoid unintentional starts. Do not carry or handle tools with your hand on the operating switches or levers. Do not lay the tool down in a manner that will start the drive. Do not allow the tool to flip around or move when adjusting or changing tool bits.

Store idle tools properly. Disconnect tools from the power source and store in a safe place. Remove tool bits for safe handling of the tool.

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.

SPECIFICATIONS

DESIGN AND OPERATING FEATURES

The Model 304 is available with an integral, dual range, variable speed 110VAC or 220VAC 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 (3) 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 for use as a portable machine.

IN SPECIFIC

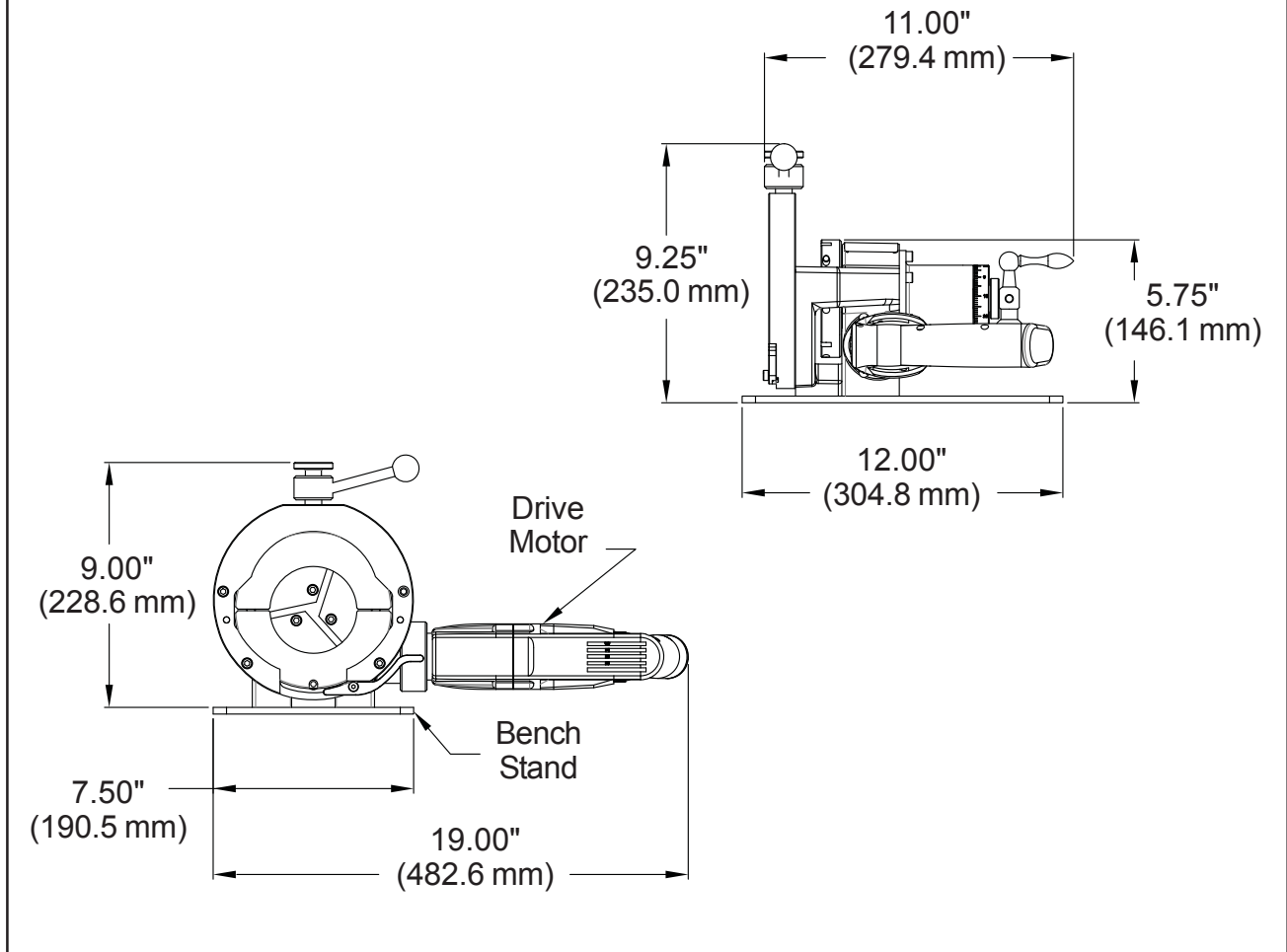
Weight

18.25 lbs. (8.28 Kg)

Clearance and Dimensions

Reference Envelope drawing.

Model 304 w/Electric Motor Envelope Drawing



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 TRI TOOL's Engineering Department for details.

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

Feeds

Manual feed handle is mounted at rear of tool, providing .560" (14.2mm) of axial feed.

Mounting

Manual saddle clamping system.

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)

OPERATION

Always read the operating instructions carefully/completely before attempting to operate the Model 304 Tube Squaring Machine.

When operating any/all Tri Tool Inc. equipment follow the 'NOTE' statements through the manual for equipment safety/warranty voids and 'WARNING' and/or 'CAUTION' notes for operator safety.

A FRL (Filter/Regulator/Lubricator) is required to protect the warranty on all TRI TOOL INC. air or hydraulic driven tools.

NOTE:

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 will depend on the basic air supply. Keep the water trap drained, filter cleaned and the lubricator oil reservoir filled so there's a drop of oil every two (2) to five (5) seconds.

If the unit is to be left idle for 24 hours or more after being run on 'wet' air, it is advisable to squirt oil directly into the air motor inlet and run the motor for two (2) to three (3) seconds.

This will prevent rusting and 'freezing' of the rotor vanes.

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

When the unit is operated in the vertical position, cutting head up, it should be turned upside down and the chips and/or other debris removed after each cutting operation has been completed.

Tool life may be severely shortened, unless chips and/or other debris that have been deposited on the cutting head during the machining operation are removed.

NOTE:

Disassembly of the power unit voids the warranty, except when performed by a TRI TOOL Inc. designated repair technician (Letter of designation is required). The handle of the motor may be rotated to another position as necessary to fit into some situations.

All components should be clean and coated with a light film of oil prior to use. Use a clean, non-detergent oil, preferably SAE 10 (90 SSU) or lighter.

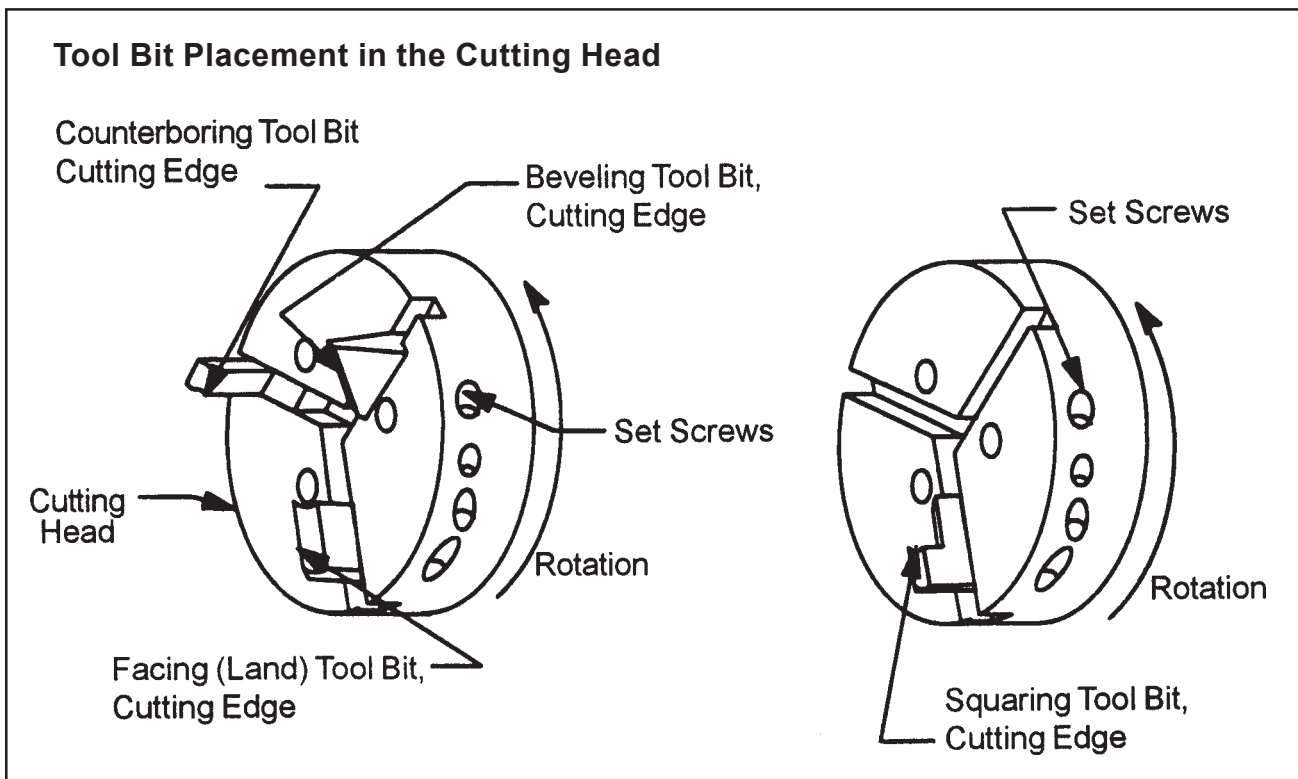
Loosen the cap screw in the clamp bracket and rotate the motor handle to the desired position.

Tighten the cap screw before turning the motor on.

Select the tool bit(s) required to machine the end configuration desired.

When performing a tube squaring operation the tool bit may be placed in any one of the three Cutting Head slots.

When performing any separate machining operation such as facing, beveling or counterboring, the tool bit may be installed in any one of the three Cutting Head slots.



When performing any multiple machining operation such as facing, beveling or counter-boring, the tool bit(s) should be installed with one in each slot.

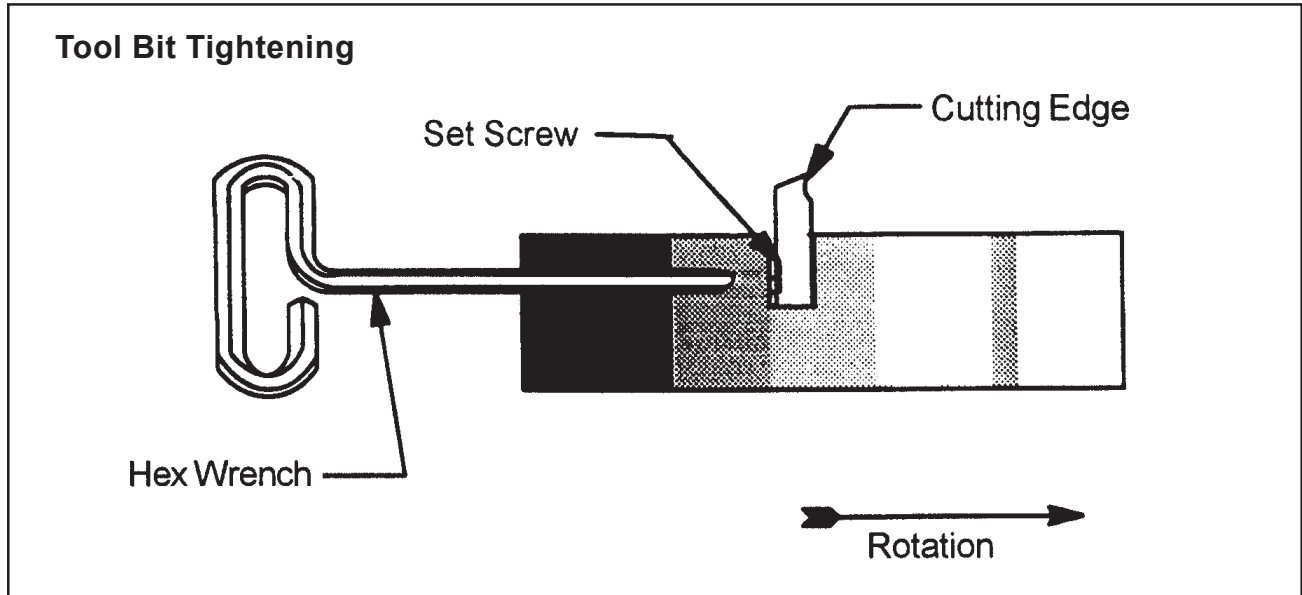
NOTE:

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.

Insert the tool bit(s) into the slot(s) in the Cutting Head.

The cutting edge of the tool bit(s) must be located on the radial centerline.

NOTE: Do NOT install the tool bits backwards.



Tighten the set screws to secure the tool bit(s) to the Cutting Head.

Adjust the counterbore tool bit radially to control counterbore diameter.

Adjust the bevel tool bit radially to control counterbore depth to the bevel relationship.

Select the desired Saddle size for the pipe or tube to be worked on.

Reference the 'Saddle Sets' section.

Insert the upper Saddle half into the machine and thread the Saddle Locking Screw into the Saddle.

Raise the top Saddle using the Saddle Handle Assembly.

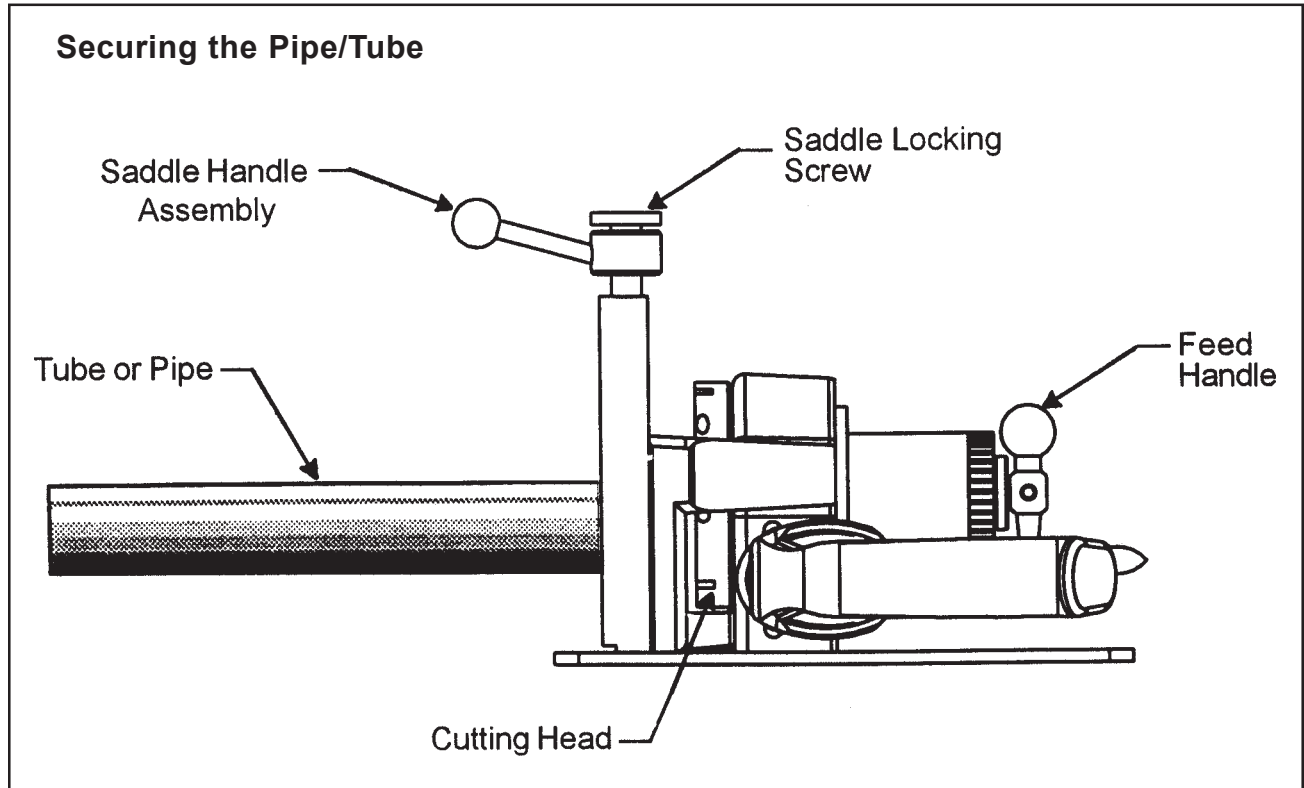
Insert the lower Saddle half and snap into place.

Place the pipe or tube into the Saddles.

Verify a clearance of 1/8" (3 mm) between the tool bit(s) and the pipe or tube face as held by the saddles.

Tighten the upper Saddle using the Saddle Handle Assembly to secure the pipe or tube once the proper clearance has been verified.

NOTE: *Make sure there's a light film of grease on the Saddle Handle Assembly threads at all times to prevent them from galling or freezing during use.*



Connect the proper supply.

Adjust the cutting speed by using the variable speed control knob on the top of the motor (on electric motor drives).

Rotate the feed Handle clockwise to bring the Cutting Head and tube closer together.

The actual machining operation will begin when the tool bit contacts the tube or pipe.

NOTE: *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.*

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.

Reference the 'Cutting Speeds and Feeds' section.

Continue rotating the Feed Handle clockwise until the end of the pipe is completely machined.

NOTE:

Be careful not to let the tool bit(s) cut into the Saddles or the Saddle Adapter.

Discontinue feed and allow the Cutting Head to rotate one (1) to three (3) revolutions to improve the finish of the prep surface.

Rotate the Feed handle counter-clockwise to separate the Cutting Head and the tube.

Stop the tool rotation by releasing the Motor Trigger Switch.

Rotate the Feed Handle counter-clockwise until the Cutting Head clears the tube or pipe by at least 1/8" (3 mm) or more.

Loosen the upper Saddle by rotating the Saddle Handle Assembly to release the tube.

CUTTING SPEEDS AND FEEDS

The following table shows 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 very 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 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 or torn appearance.

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

Feed at a rate of at least .003" (.08 mm) to .006" (.15 mm) per revolution.

NOTE:

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

Never allow the tool bit to burnish the surface.

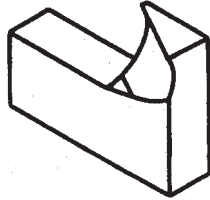
Reduce feeds and speeds will normally minimize any chatter problems.

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.

TOOL BITS

Tube Squaring Tool Bit

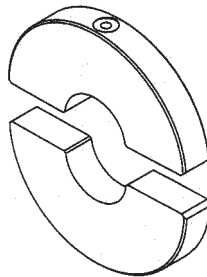


Range	Max Wall	Pipe or Tool Bit Mat'l	Squaring Tool Bit P/N
.25" (6.35 mm) OD Thru	.250	C.S.	99-1479
2.60" (66.04 mm) OD	.250	S.S.	99-2490
1.35" (34.29 mm) OD Thru	.250	C.S.	99-1480
4.50" (114.30 mm) OD	.250	S.S.	DURABIT 1

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

SADDLE SETS

**Standard Saddles
(Material - Stainless Steel)**



Pipe Size	Fraction	Decimal	Metric	Saddle P/N
	1/4"	.250"	6.35 mm	67-3997
		.276"	7.00 mm	67-3998
	9/32"	.281"	7.14 mm	67-3999
	5/16"	.313"	7.95 mm	67-4000
		.315"	8.00 mm	67-4001
	11/32"	.344"	8.74 mm	67-4002
		.354"	9.00 mm	67-4003
		.359"	9.13 mm	67-4004
	3/8"	.375"	9.53 mm	67-4005
		.394"	10.00 mm	67-4006
		.400"	10.16 mm	67-4007
1/8"	13/32"	.406"	10.31 mm	67-4008

Pipe Size	Fraction	Decimal	Metric	Saddle P/N
		.413"	10.50 mm	67-4009
		.422"	10.72 mm	67-4010
		.433"	11.00 mm	67-4011
	7/16"	.438"	11.13 mm	67-4012
	15/32"	.469"	11.91 mm	67-4013
		.472"	12.00 mm	67-4014
	1/2"	.500"	12.70 mm	67-4015
		.512"	13.00 mm	67-4016
	17/32"	.531"	13.50 mm	67-4017
1/4"		.540"	13.72 mm	67-4018
		.543"	13.80 mm	67-4019
		.547"	13.89 mm	67-4020
		.551"	14.00 mm	67-4021
	9/16"	.563"	14.30 mm	67-4022
		.591"	15.00 mm	67-4023
	19/32"	.594"	15.08 mm	67-4024
		.602"	15.29 mm	67-4025
	5/8"	.625"	15.88 mm	67-4026
		.630"	16.00 mm	67-4027
		.641"	16.27 mm	67-4028
	21/32"	.656"	16.66 mm	67-4029
		.669"	17.00 mm	67-4030
3/8"		.675"	17.15 mm	67-4031
		.677"	17.20 mm	67-4032

Model 304 Tube Squaring Machine

Pipe Size	Fraction	Decimal	Metric	Saddle P/N
		.681"	17.30 mm	67-4033
	11/16"	.688"	17.48 mm	67-4034
		.709"	18.00 mm	67-4035
	23/32"	.718"	18.24 mm	67-4036
	3/4"	.750"	19.05 mm	67-4037
	25/32"	.781"	19.84 mm	67-4038
		.787"	20.00 mm	67-4039
	13/16"	.813"	20.65 mm	67-4040
1/2"		.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
	7/8"	.875"	22.23 mm	67-4046
		.906"	23.00 mm	67-4047
	15/16"	.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"	1.000"	25.40 mm	67-4052
		1.024"	26.00 mm	67-4053
3/4"		1.050"	26.67 mm	67-4054
	1 1/16"	1.063"	27.00 mm	67-4055
		1.071"	27.20 mm	67-4056

Pipe Size	Fraction	Decimal	Metric	Saddle P/N
		1.102"	28.00 mm	67-4057
	1 1/8"	1.125"	28.58 mm	67-4058
		1.142"	29.00 mm	67-4059
		1.181"	30.00 mm	67-4060
	1 3/16"	1.188"	30.18 mm	67-4061
	1 1/4"	1.250"	31.75 mm	67-4062
		1.260"	32.00 mm	67-4063
	1 5/16"	1.313"	33.35 mm	67-4064
1"		1.315"	33.40 mm	67-4065
		1.327"	33.70 mm	67-4066
		1.339"	34.00 mm	67-4067
	1 3/8"	1.375"	34.93 mm	67-4068
		1.378"	35.00 mm	67-4069
	1 7/16"	1.438"	36.53 mm	67-4070
		1.496"	38.00 mm	67-4071
	1 1/2"	1.500"	38.10 mm	67-4072
	1 9/16"	1.563"	39.70 mm	67-4073
		1.575"	40.00 mm	67-4074
	1 5/8"	1.625"	41.28 mm	67-4075
		1.645"	41.78 mm	67-4076
1 1/4"		1.660"	42.16 mm	67-4077
		1.669"	42.40 mm	67-4078
		1.681"	42.70 mm	67-4079
	1 11/16"	1.688"	42.88 mm	67-4080

Model 304 Tube Squaring Machine

Pipe Size	Fraction	Decimal	Metric	Saddle P/N
	1 3/4"	1.750"	44.45 mm	67-4081
		1.752"	44.50 mm	67-4082
	1 13/16"	1.813"	46.05 mm	67-4083
	1 7/8"	1.875"	47.63 mm	67-4084
1 1/2"		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 15/16"	1.938"	49.23 mm	67-4089
		1.969"	50.00 mm	67-4090
	2"	2.000"	50.80 mm	67-4091
		2.008"	51.00 mm	67-4092
	2 1/16"	2.063"	52.40 mm	67-4093
	2 1/8"	2.125"	53.98 mm	67-4094
	2 3/16"	2.188"	55.58 mm	67-4095
		2.240"	56.90 mm	67-4096
		2.244"	57.00 mm	67-4097
	2 1/4"	2.250"	57.15 mm	67-4098
	2 5/16"	2.313"	58.75 mm	67-4099
		2.362"	60.00 mm	67-4100
2"	2 3/8"	2.375"	60.33 mm	67-4101
		2.382"	60.50 mm	67-4102
	2 7/16"	2.438"	61.93 mm	67-4103
		2.480"	63.00 mm	67-4104

Pipe Size	Fraction	Decimal	Metric	Saddle P/N
		2.492"	63.30 mm	67-4105
	2 1/2"	2.500"	63.50 mm	67-4106
	2 9/16"	2.563"	65.10 mm	67-4107
	2 5/8"	2.625"	66.68 mm	67-4108
	2 11/16"	2.688"	68.28 mm	67-4109
	2 3/4"	2.750"	69.85 mm	67-4110
		2.795"	71.00 mm	67-4111
	2 13/16"	2.813"	71.45 mm	67-4112
2 1/2"	2 7/8"	2.875"	73.03 mm	67-4113
	2 15/16"	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"	3.000"	76.20 mm	67-4118
		3.004"	76.30 mm	67-4119
	3 1/8"	3.125"	79.38 mm	67-4120
	3 1/4"	3.250"	82.55 mm	67-4121
	3 3/8"	3.375"	85.73 mm	67-4122
3"	3 1/2"	3.500"	88.90 mm	67-4123
		3.508"	89.10 mm	67-4124
	3 5/8"	3.625"	92.08 mm	67-4125
	3 3/4"	3.750"	95.25 mm	67-4126
	3 7/8"	3.875"	98.43 mm	67-4127
		3.937"	100.00 mm	67-4128

Model 304 Tube Squaring Machine

Pipe Size	Fraction	Decimal	Metric	Saddle P/N
		3.988"	101.30 mm	67-4129
3 1/2"	4"	4.000"	101.60 mm	67-4130
	4 1/8"	4.125"	104.78 mm	67-4131
	4 1/4"	4.250"	107.95 mm	67-4132
	4 3/8"	4.375"	111.13 mm	67-4133
4"	4 1/2"	4.500"	114.30 mm	67-4134

MAINTENANCE

Inspect for wear and tear and replace parts as necessary.

Bearings and gears are to be lubricated using Chevron Ultra Duty Grease, EP, NLGI2 or equivalent.

TROUBLE SHOOTING

Problem: The 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: There is 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: The surface finish is rough

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.

Problem: The 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: The 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: There is a 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: There is a 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: The tool bit will 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 will not start

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

Problem: The air motor will 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.

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.

Sand or other foreign material may be in the vanes of the air motor.

ACCESSORIES

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

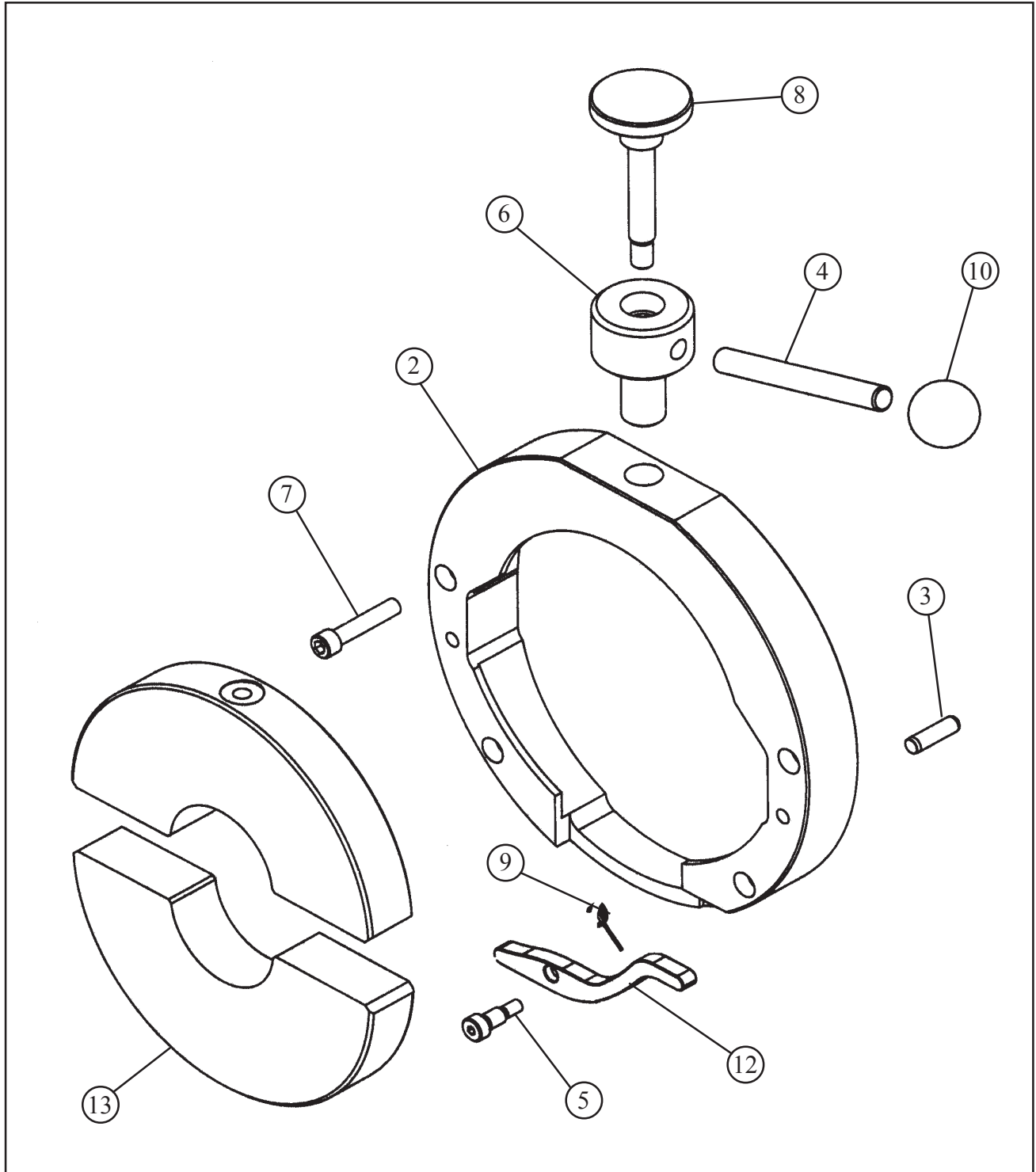
1. Electric Foot Pedal
2. Short Perch Saddle Sets
3. Tool Bits
4. Air Caddy, FRL
5. Collet Adapter Kit (for use with 400 Series Collets)

NOTE:

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.

ILLUSTRATED PARTS BREAKDOWN

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

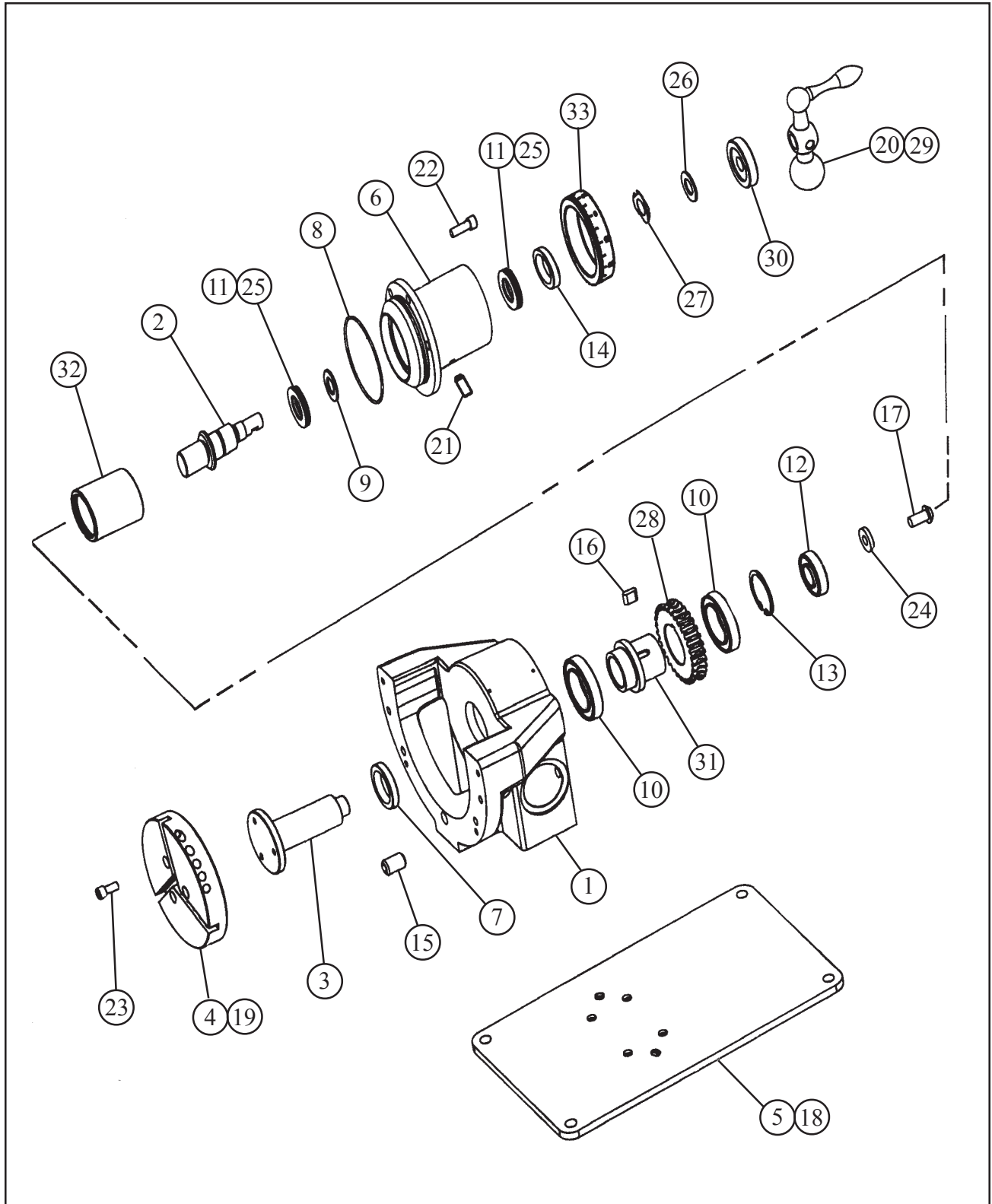


TRI TOOL INC.

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)

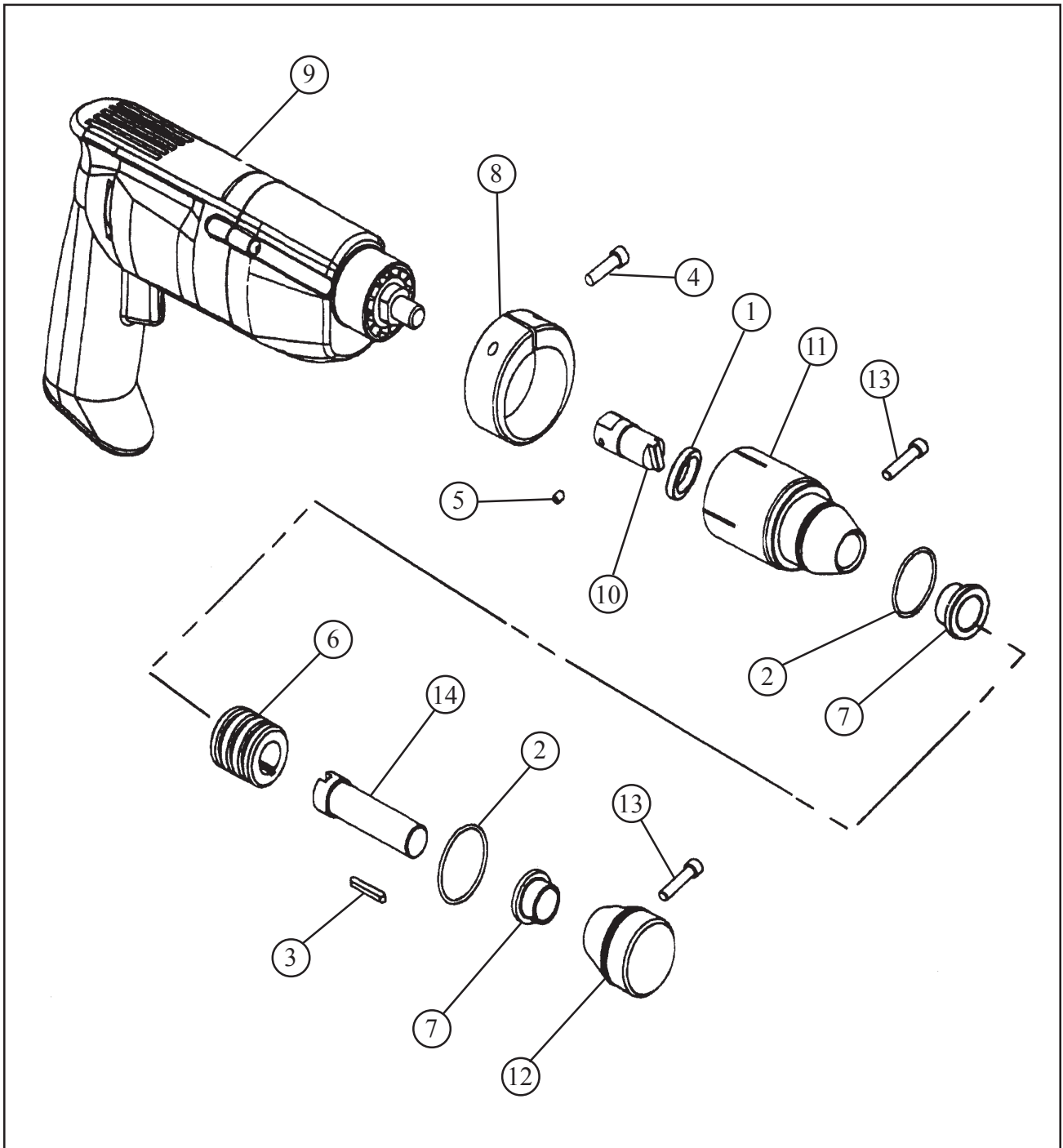


TRI TOOL INC.

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)



TRI TOOL INC.

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.	58-0006	MOTOR, 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