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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.

Model 306 Tube Squaring Machine

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. 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.

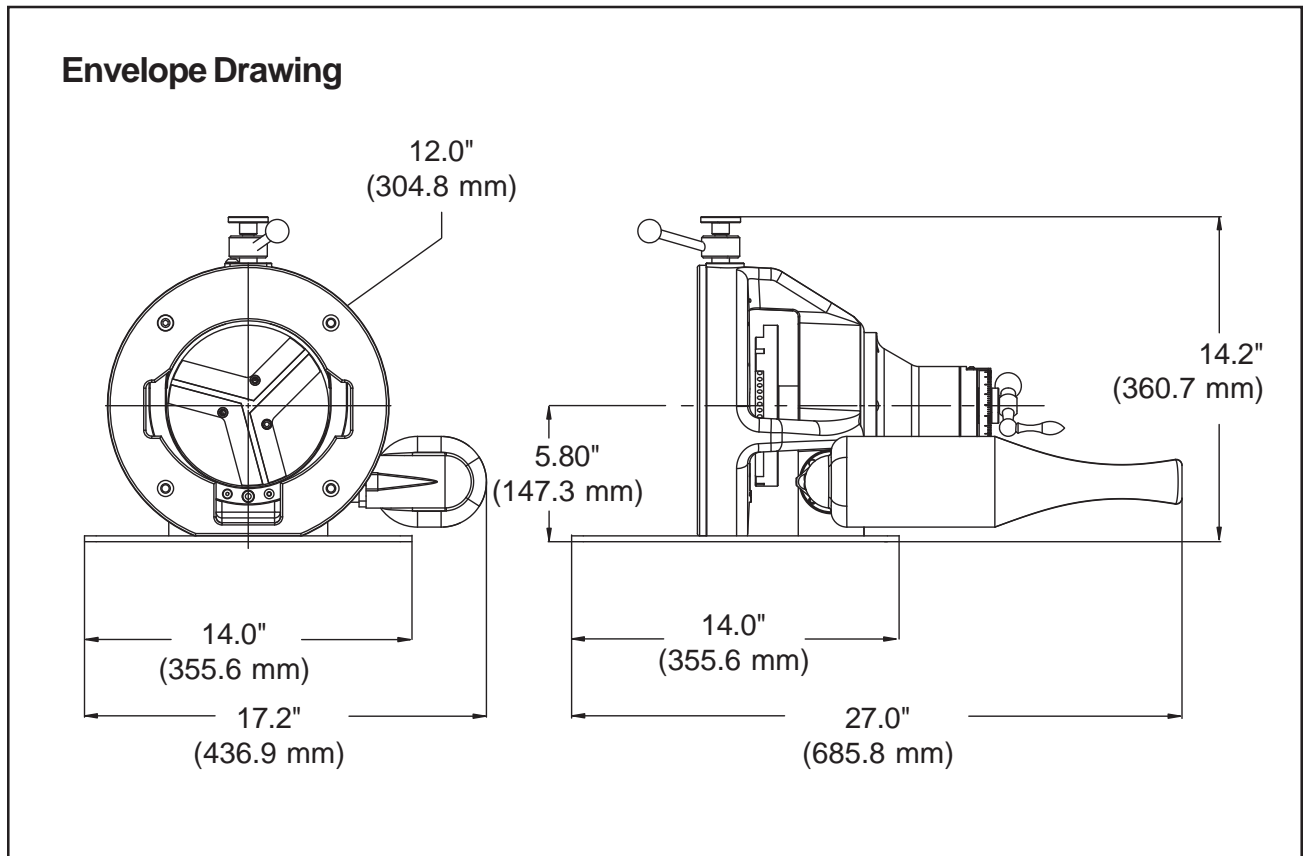
Store idle tools properly. Disconnect tools from the power source and store in a safe place. Remove tool bits for safe handling of the tool.

GENERAL DESCRIPTION

The Model 306E Tube Squaring Machine is a lightweight portable machine design for facing and squaring 1.00" (25.4 mm) to 6.63" (168.3 mm) outside diameter. The Model 306E features an integral, variable-speed electric (110V) motor.

SPECIFICATIONS

Weight	70 lbs. (31.8 kg) with saddle set installed.
Height	14.2" (360.7 mm)
Width	17.2" (436.9 mm)
Length	27.0" (685.8 mm)
Tube Size	1.0" (25.4 mm) to 6.63" (168.3 mm)
Pipe Size	1" sch 80 to 6"sch 40
Feed	1.00" (25.4 mm)



MATERIALS

Mild steel, Chrome steel (Rc 35 max.), Stainless steel, Copper-nickel and Aluminum. 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.

MAINTENANCE

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) or oil which is specified for air motor.

If the Model 306E 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 cut is completed.

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

Bearings and gears are to be lubricated using a lithium-based grease.

CAUTION: Disassembly of the power unit voids warranty, except when performed by a TRI TOOL Inc. designated repair technician. (Letter of designation is required.)

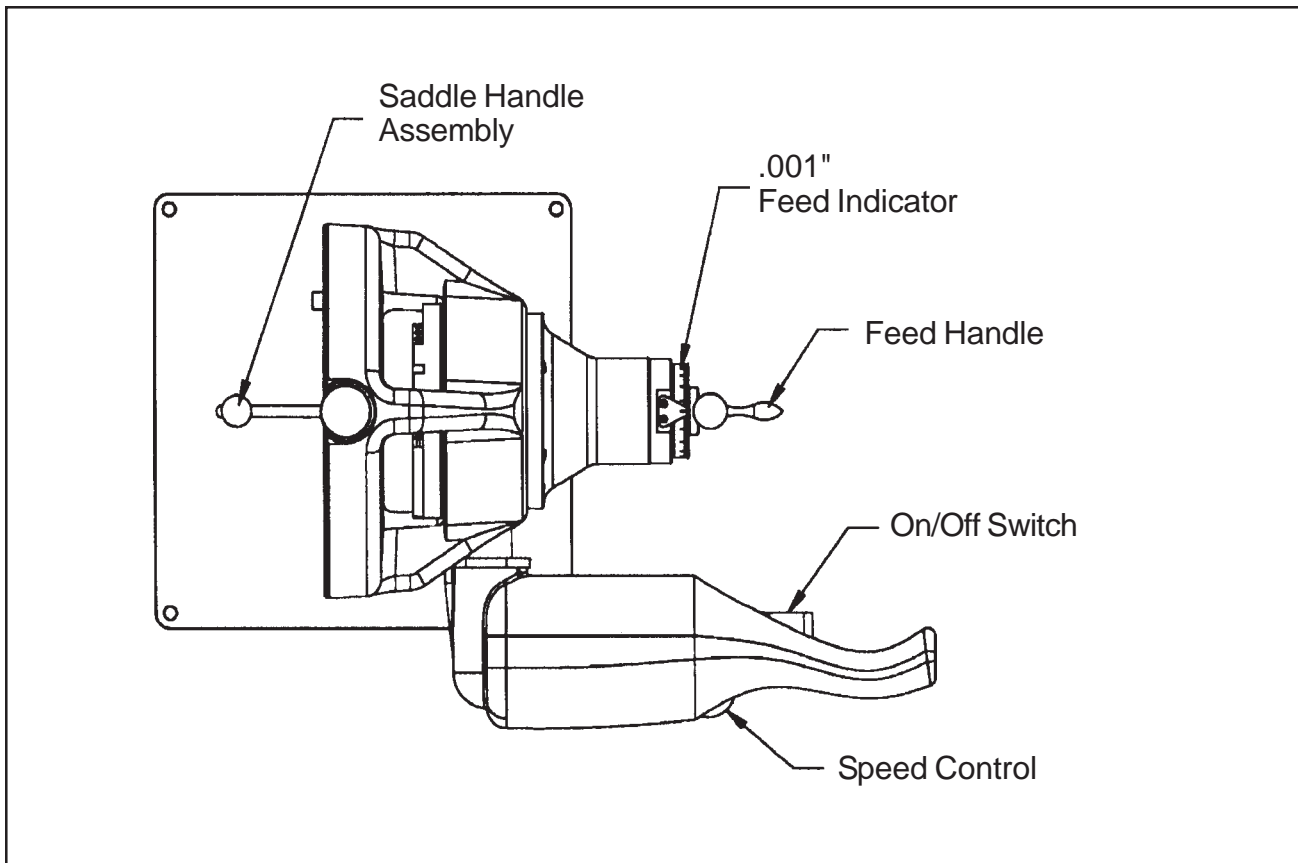
OPERATION

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 three Cutting Head slots.

When performing any separate machining operation such as facing, beveling or counter-boring, the Tool Bit(s) may be installed in any one of three Cutting Head slots.

When performing any multiple machining operation such as facing, beveling or counterboring, the Tool Bit(s) should be installed with one in each slots.



CAUTION:

The use of dull Tool Bits or Tool Bits not manufacture 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.

CAUTION: The cutting edge of the Tool Bit(s) must be located on the radial centerline. Do NOT install Tool Bit(s) 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.

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 Saddle.

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

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

CAUTION: Be sure that 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.

Connect electrical line to 110 VAC, 60 Hz.

Adjust the cutting speed.

Rotate the Feed Knob clockwise to bring the Cutting Head and pipe closer together.

CAUTION: The actual machining operation will begin when the Tool Bit contacts the tube or pipe.

If the pipe end is not square to the pipe 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.

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

CAUTION: Be careful not to let the Tool Bit(s) cut into the Saddles or the Saddle.

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

Rotate the Feed Knob counter-clockwise to separate the Cutting Head and the pipe.

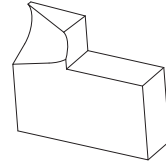
Stop the tool rotation by releasing the Trigger Switch.

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

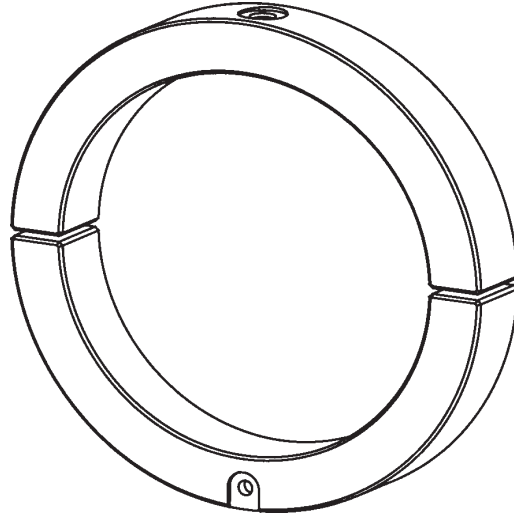
Loosen the Saddle by rotating Saddle Handle Assembly to release the pipe.

TOOL BIT

DURABIT 1®
Squaring Tool Bit



SADDLE SETS



Part No.	Inch	(mm)
	1.000	25.4
	1.071	27.2
67-4176	1.339	34.0
67-4570	1.500	38.1
67-4177	1.681	42.7
67-4178	1.913	48.6
67-4150	2.000	50.8
67-4151	2.250	57.2
67-4152	2.375	60.3
67-4179	2.382	60.5
67-4153	2.500	63.5
67-4154	2.750	69.9
67-4155	2.875	73.0
67-4156	3.000	76.2
67-4180	3.004	76.3
67-4157	3.250	82.6
67-4158	3.500	88.9

Part No.	Inch	(mm)
67-4181	3.508	89.1
67-4159	3.750	95.3
67-4160	4.000	101.6
67-4161	4.250	108.0
67-4162	4.500	114.3
67-4163	4.750	120.7
67-4164	5.000	127.0
67-4165	5.250	133.4
67-4166	5.500	139.7
67-4182	5.504	139.8
67-4167	5.563	141.3
67-4168	5.750	146.1
67-4169	6.000	152.4
67-4170	6.250	158.8
67-4171	6.500	165.1
67-4172	6.625	168.3

CUTTING SPEED AND FEED

Pipe Size	True DIA	RPM for 200 in/min (5080 mm/min)	RPM for 250 in/min (6350 mm/min)	RPM for 300 in/min (7620 mm/min)
2"	2.375" (60.3 mm)	27	34	40
3"	3.500" (88.9 mm)	18	23	27
4"	4.500" (114.3 mm)	14	18	21
5"	5.563" (141.3 mm)	11	14	17
6"	6.625" (168.3 mm)	10	14	14
Cutting Speed (Approximately)				

Use 200 surface inches per minute (5080 surface millimeters per minute) for:

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

Use 250 surface inches per minute (6350 surface millimeters per minute) for:

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

Use 300 surface inches per minute (7620 surface millimeters per minute) for:

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

BASIC FEED RECOMMENDATION

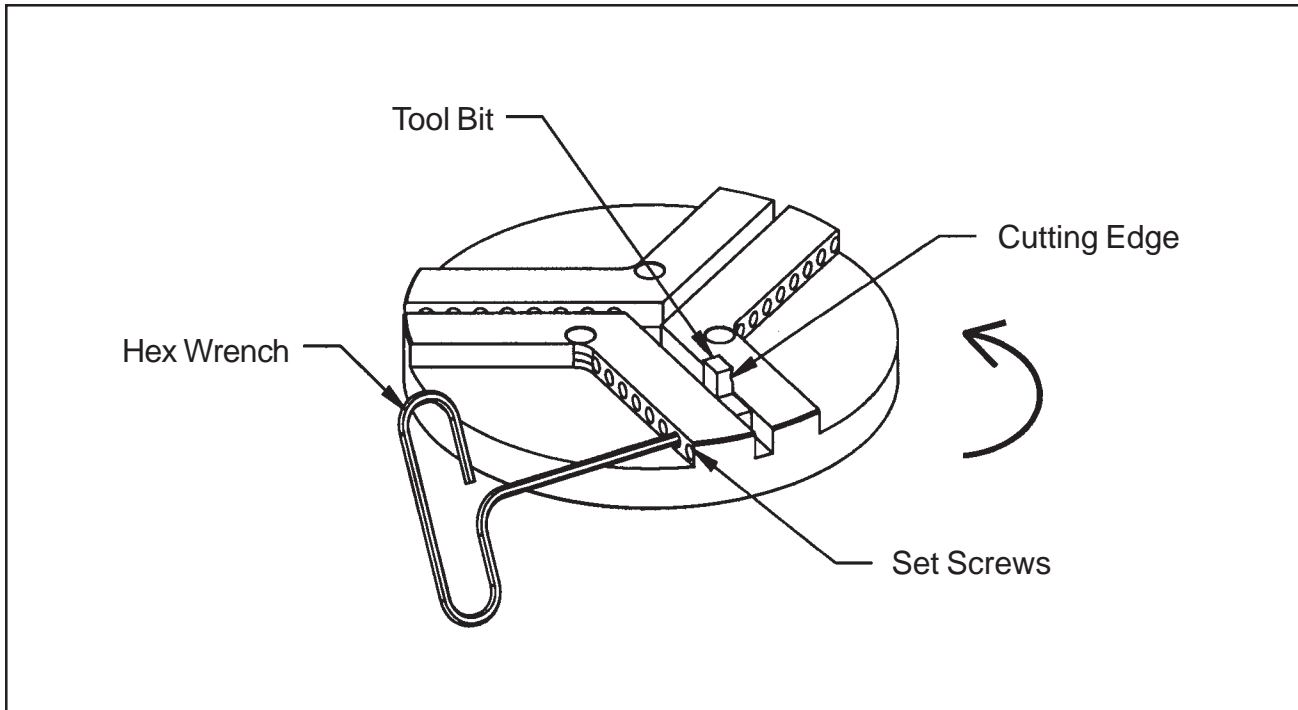
Use very light feed for initial beveling or until a continuous cut is established.

This is very important for longer tool bit life when cutting through flame cut or out of square pipe ends.

Use adequate feed, .003" (.08 mm) to .006" (.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, .003" (.08 mm) to .006" (.15 mm) feed.

Never allow the Tool Bit to burnish the surface.

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 measure.

One revolution of the feed handle advances the Cutting Head .100" (2.5 mm)

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's 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 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's 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's 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 Air Motor Will Not Start

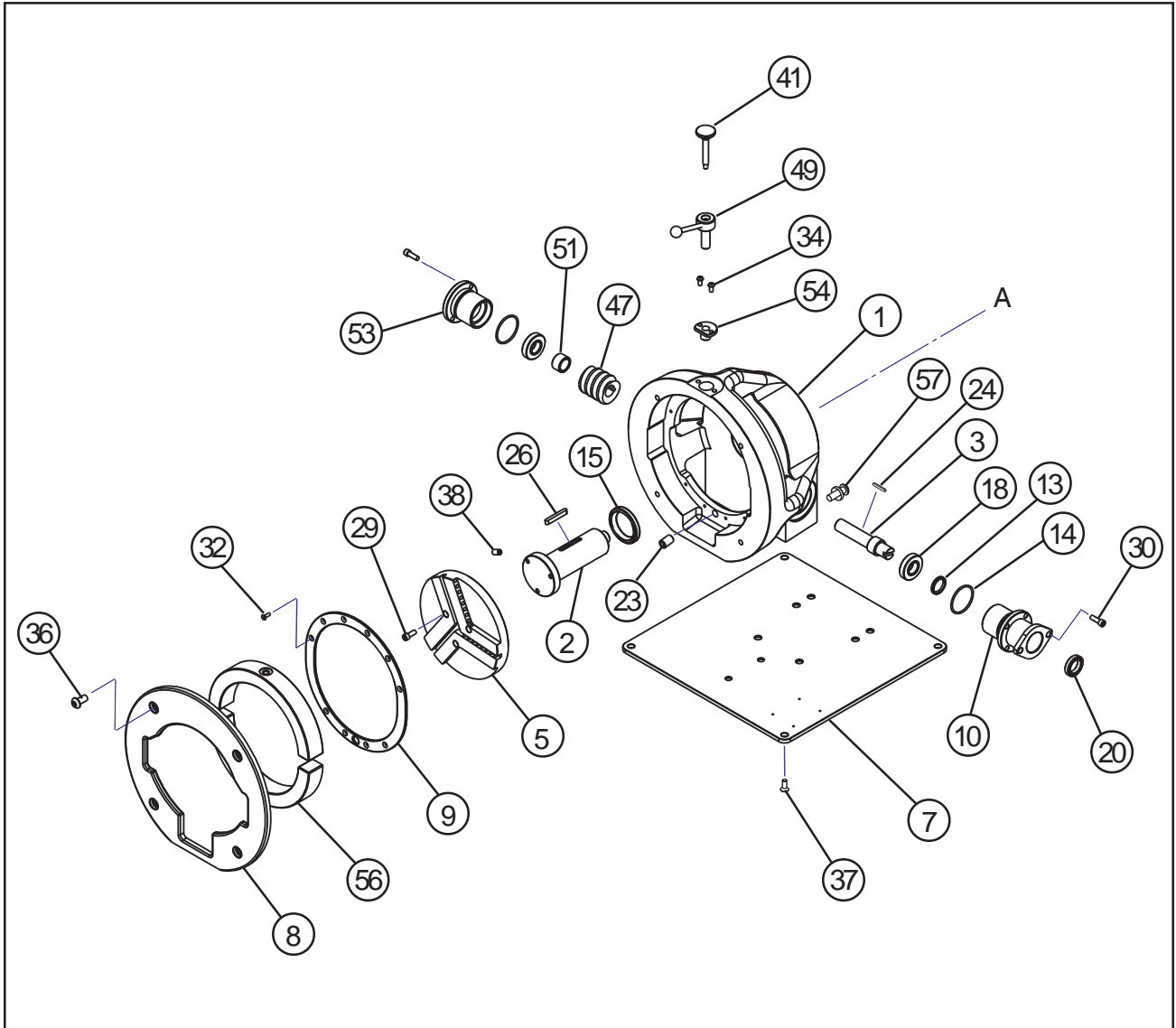
The air power supply is shut off.
The air motor is damaged and will not run free.
The air motor needs lubrication.
Add lubrication and do not run the air motor for a few minutes, then try running the motor.
Tap on the side of the air motor casing lightly with a piece of wood or with a soft rubber mallet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

Problem: The Hydraulic Motor Will Not Start

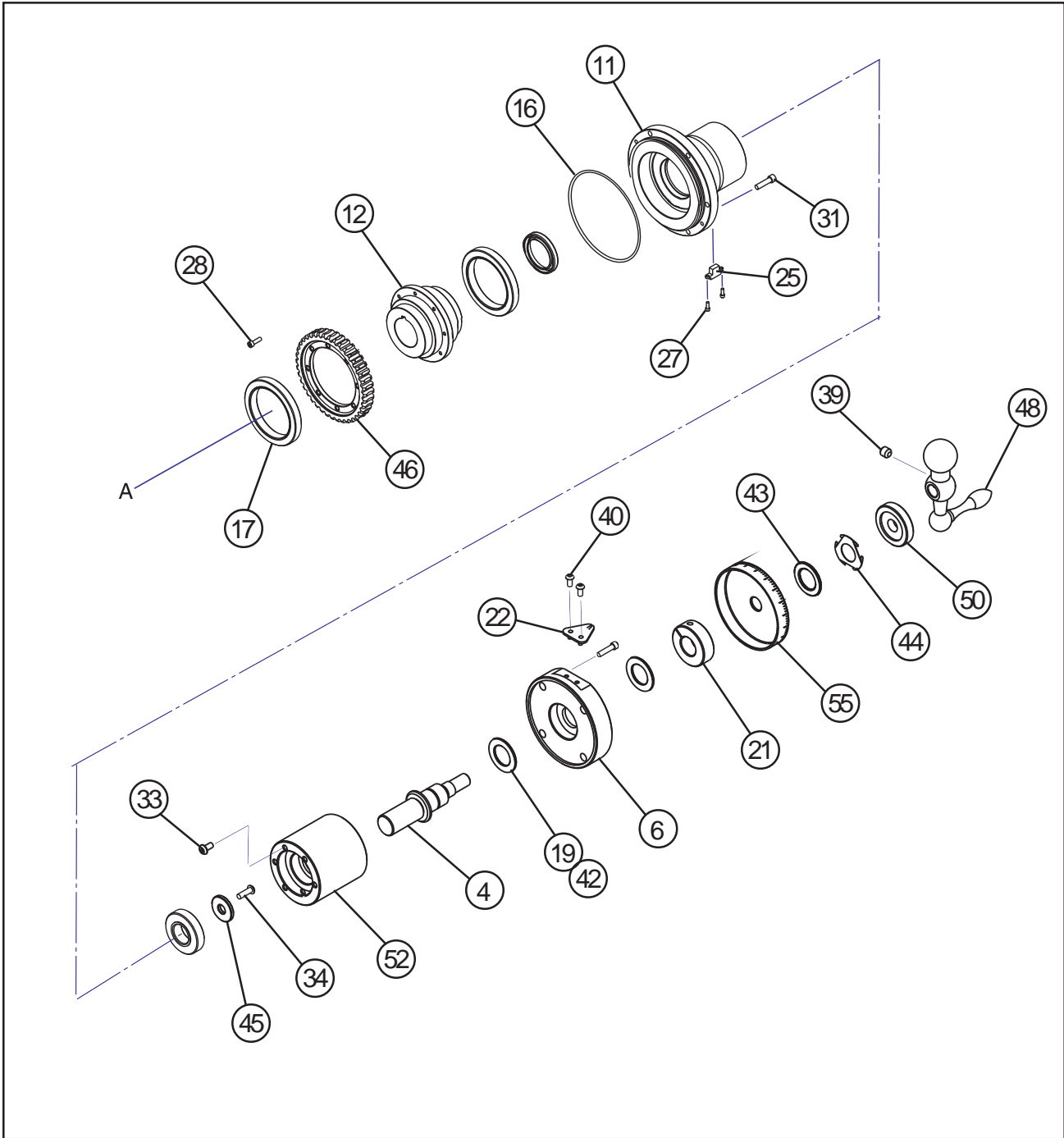
The hydraulic power supply is shut off.
The hydraulic motor is damaged and will not run free.

ILLUSTRATED PARTS BREAKDOWN

TUBE SQUARING MACHINE (P/N 02-2507) 1 OF 2



TUBE SQUARING MACHINE (P/N 02-2507) 2 OF 2



Model 306 Tube Squaring Machine

Parts List, Tube Squaring Machine (P/N 02-2507)

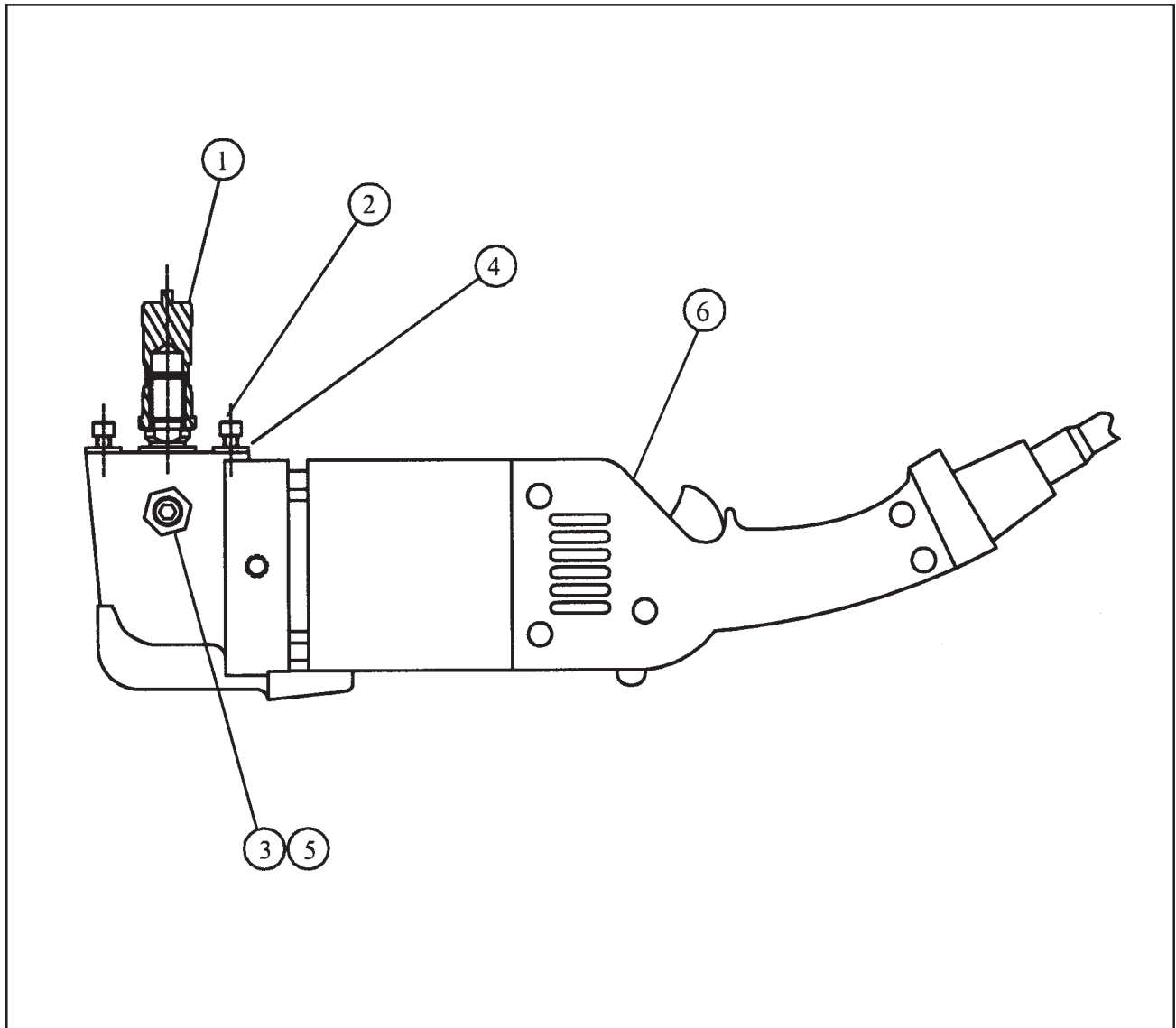
Item No.	Part No.	Description	Qty
1.	19-0841	HOUSING, MAIN	1
2.	20-0684	SHAFT, MAIN	1
3.	20-0685	SHAFT, DRIVE	1
4.	20-0687	SHAFT, FEED	1
5.	21-0498	HEAD	1
6.	24-1524	COVER, FEED	1
7.	24-1560	PLATE, BASE	1
8.	24-1605	PLATE, COVER, SADDLE	1
9.	24-1619	PLATE, SADDLE BACKING	1
10.	27-0575	ADAPTER, MOTOR	1
11.	27-0590	ADAPTER, FEED	1
12.	27-0594	ADAPTER, SLEEVE	1
13.	28-0245	SEAL, GREASE	1
14.	28-0264	O-RING, 1.688 ID x .094 THK	2
15.	28-0277	SEAL, GREASE	2
16.	28-0282	O-RING, 5.00 ID x .13 THK	1
17.	29-0002	BEARING, BALL	2
18.	29-0020	BEARING, BALL	3
19.	29-0067	BEARING, THRUST ROLLER	2
20.	29-0096	BEARING, BALL	1
21.	30-2544	COLLAR, SHAFT	1
22.	30-2621	INDEX, POINTER	1
23.	30-2745	PLUNGER, BALL, .50-13 x .75 LG	1
24.	31-0142	KEY, .188 x .188 x 1.50 LG	1
25.	31-0169	KEY, .25 Wide x .50 LG	1
26.	31-0173	KEY, .25 x .249 x 1.75 LG	1
27.	33-0012	SCREW, CAP, #6-32 UNC x .38 LG	2
28.	33-0029	SCREW, CAP, #10-24 UNC x .63 LG	8
29.	33-0039	SCREW, CAP, .25-20 UNC x .63 LG	3
30.	33-0040	SCREW, CAP, .25-20 UNC x .75 LG	4
31.	33-0042	SCREW, CAP, .25-20 UNC x 1.00 LG	10
32.	33-0298	SCREW, BTTN HD, .375-16 UNC x .75 LG	4
33.	33-0278	SCREW, BTTN HD, #10-24 UNC x .38 LG	6

TRI TOOL INC.

Parts List, Tube Squaring Machine (P/N 02-2507) Continued

Item No.	Part No.	Description	Qty
34.	33-0292	SCREW, BTTN HD, 5/16-18 UNC x .63 LG	3
35.	—		
36.	33-0352	SCREW, FLAT, #10-24 X .50"	10
37.	33-0380	SCREW, FLAT, .38-16 UNC x 1.00 LG	6
38.	33-0503	SCREW, SET, .25-20 UNC x .50 LG	24
39.	33-0513	SCREW, SET, 5/16-18 UNC x .31 LG, CUP PT.	1
40.	33-1448	SCREW, BTTN, #5-40 UNC x .25 LG	2
41.	33-2108	SCREW, SADDLE LOCKING	1
42.	34-0106	WASHER, THRUST, .75 ID x 1.25 OD x .063 THK	4
43.	34-0163	WASHER, THRUST	1
44.	34-0325	WASHER, SPRING	1
45.	34-0344	WASHER, CAPTURE	1
46.	39-0838	GEAR, WORM	1
47.	39-0839	WORM	1
48.	41-0142	HANDLE, FEED	1
49.	41-0149	SADDLE HANDLE ASSEMBLY	1
50.	42-0172	KNOB, LOCK	1
51.	44-0478	SPACER, DRIVE	1
52.	44-0479	SPACER, FEED	1
53.	46-0446	SLEEVE, MOTOR	1
54.	46-0465	SLEEVE, FEED HANDLE	1
55.	50-0022	DIAL, INDICATOR	1
56.	67-xxxx	SADDLE SET	A/R
57.	54-0375	FITTING, GREASE	1
NOT SHOWN			
	36-0018	WRENCH, 'T' HEX	1

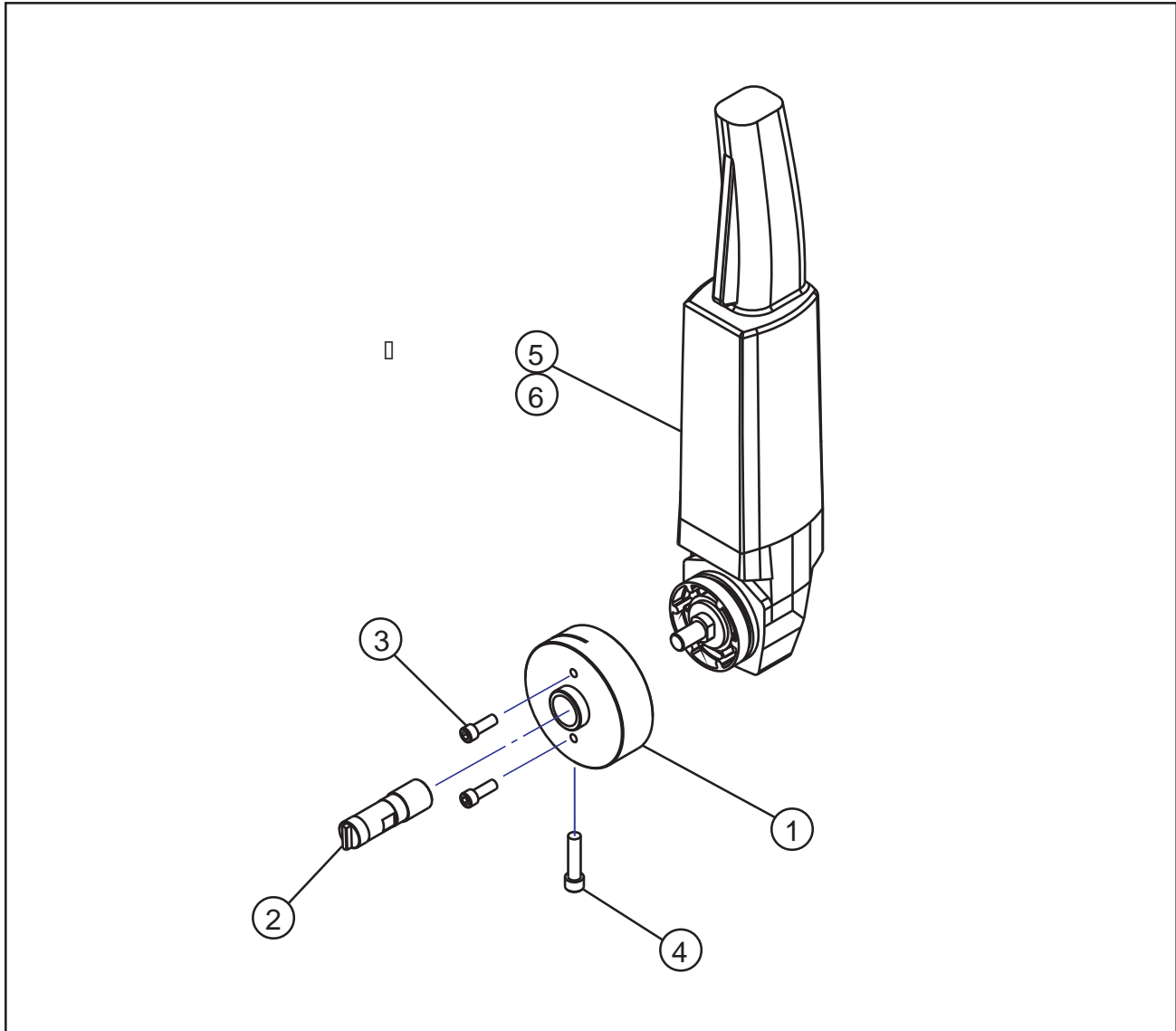
MOTOR ASSEMBLY, ELECTRIC, 110V (P/N 58-0112)



Parts List, Electric Motor Assembly, 110V (P/N 58-0112)

Item No.	Part No.	Description	Qty
1.	27-0576	ADAPTER, DRIVE	1
2.	33-0041	SCREW, CAP, 1/4-20 x .88"	2
3.	33-0660	SCREW, SET, 1/2-20 x .50", CUP PT.	2
4.	34-0026	WASHER	2
5.	35-0117	NUT, JAM, 1/2-20	1
6.	58-0111	MOTOR, ELECTRIC, 110 VAC	1

MOTOR ASSEMBLY, ELECTRIC, 220V (P/N 58-0125)



Parts List, Electric Motor Assembly, 220V (P/N 58-0125)

Item No.	Part No.	Description	Qty
1.	27-0601	ADAPTER, MOTOR	1
2.	27-0602	ADAPTER, DRIVE	1
3.	33-0054	SCREW, CAP, 5/16-18 x .75"	2
4.	33-0072	SCREW, CAP, 3/8-16 x 1.25"	1
5.	33-2294	SCREW, STEEL, HEX	1
6.	58-0123	MOTOR, ELECTRIC	1