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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, 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 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.

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 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 bare 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 which 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

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The Model 203C is a pipe beveler designed for facing and/or beveling the ends of pipe or tubing in preparation for welding. With a narrow body width, top mounted feed and optional reduced diameter cutting head, the 203C is ideally suited for waterwall applications where space is limited.

Pipe weld end preparations that meet all existing codes including stringent nuclear codes may be machined using the Model 203C.

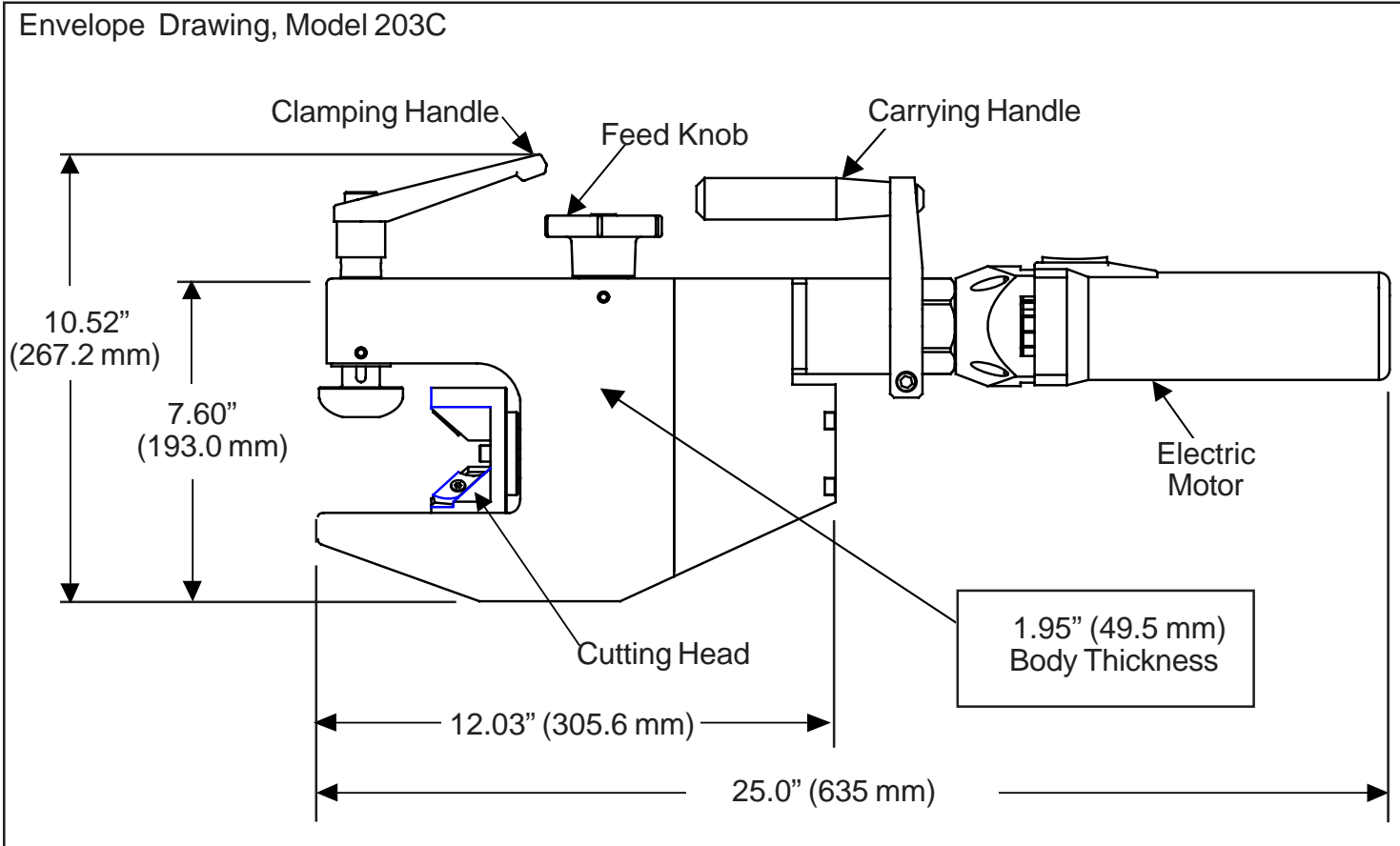
The design features an aircraft alloy housing, heavy duty needle/ball bearings and interchangeable cuttings heads and saddles. The unit is equipped with an in-line electric variable speed motor coupled to a planetary drive reducer for high cutting torque across the size range of the machine. The 203C reacts the torque generated by machining operations through an adjustable clamp and fixed saddles. The clamp and saddle arrangement provides accurate self-centering and alignment to the pipe or tube to be machined.

SPECIFICATIONS

Machine Width:	1.950" (49.5mm)
Weight:	27.7lbs. (12.6kgs)
Power Requirements:	230VAC/50hz, 6 Amps

Machine Capacities:

Pipe:	
Min	1/2" SCH 40
Max	2-1/2" SCH XX
Tubing Dia:	
Min.	.750" (19.1mm)
Max.	3.000" (76.2mm)
Tubing Wall:	
Min.	.125" (3.2mm)
Max.	.560" (14.2mm)
Feed Travel:	1.00" (25.4mm) maximum depending on head style



OPERATION

Read the operating instructions carefully before attempting to operate the Model 203C.

Use eye protection at all times when operating the unit.

Head Selection/Installation/Removal:

The 203C features interchangeable heads for facing and beveling in two size ranges to cover standard and reduced diameter versions for waterwall applications. Cutting Bits are reversible providing two cutting edges per bit and are interchangeable on all heads. Refer to the chart below for the specific application and head recommendation.

Operation	Application	Head OD	Part Number
Facing	Normal	3.10" (78.7mm)	03-0082
Facing	Waterwall	2.05" (52.1mm)	03-0085
Beveling (30°)	Normal	3.10" (7.87mm)	03-0080
Beveling (30°)	Waterwall	2.05" (52.1mm)	03-0084
Beveling (37.5°)	Normal	3.10" (7.87mm)	03-0081
Beveling (37.5°)	Waterwall	2.05" (52.1mm)	03-0083

Each head is installed using two socket head cap screws and the provided wrench. Use caution when installing or removing any head with tool bits in place to avoid injury to the operator.

Ensure that the seating surface on the main shaft is free of chips and/or debris which could cause an off-axis or out of center head condition when installed.

Clamping the Workpiece

Retract the cutting head back toward the housing by rotating the feed knob counter-clockwise. Best results are obtained when a minimum of the main shaft is unsupported.

Position the 203C over the pipe/tube to be machined and rotate the clamp handle clockwise until the machine self-centers over the pipe and is secure. Reposition the unit if necessary to ensure a 1/8" (3mm) gap between the tool bits and the workpiece.

The clamp handle is adjustable and may be rotated as required to clear any obstacles by lifting up while turning.

Machining:

Actual machining will begin when the tool bits contact the workpiece. As unmachined pipe/tube ends are rarely square, a relatively light feed rate is recommended until the tool bits are in continuous contact with the pipe or tube to avoid tool bit damage.

Turn on the motor by depressing the switch and moving it toward the operator. Adjust the cutting speed via the dial on the rear of the motor. Refer to the table below for specific speed and feed recommendations.

Actual OD		RPM	
		300 in/min	350 in/min
Inch	mm	(760 cm/min)	(1000 cm/min)
0.75	19.1	127	148
1.00	25.4	95	111
1.50	38.1	64	74
2.00	50.8	48	56
2.50	63.5	38	44
3.00	76.2	32	37

Use 300 surface inches per minute (760 surface cm/min) for stainless steels and those materials for which no coolant is allowed.

Use 350 surface inches per minute (1000 surface cm/min) for mild steels when coolants are permitted and applied.

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

Reduced feeds and speeds will normally minimize any chatter problems.

Rotate the feed knob clockwise to feed the cutting head into the workpiece.

Continue rotating the feed knob clockwise until the end of the pipe is completely machined.

Discontinue feed and allow the cutting head to make several revolutions to improve the finish of the pipe prep.

Back the cutting head off of the workpiece by rotating the feed knob counter-clockwise one full turn.

Switch off the motor by depressing the switch and sliding it away from the operator.

CUTTING SPEEDS

Material Cutting Capabilities:

The 203C readily machines mild steels, chrome steels (Rc 35 max), stainless steels, copper-nickel and aluminum per the size and wall thickness specified.

Additionally, Inconel and some other high temperature alloys may be machined but require special procedures and/or tooling as a function of wall thickness and end preparation configuration. Consult Tri Tool Engineering for additional information.

Cutting Head Speeds:

Maximum Cutting Head Speed:	190 rpm
Cutting Head Speed at Max. HP:	140 rpm
Functional Speed Range:	45 to 190 rpm

MAINTENANCE

Cleaning:

All components should be cleaned and coated with a light film of oil prior to use.

Use a clean, non-detergent oil, preferably SAE 10 (90SSU) or lighter oil.

If the Model 203C 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 end prep has been completed.

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

Verify that there is adequate grease in the housing and planetary units. A standard grease type fitting is provided on the bottom of the housing cover for this purpose.

Lubrication:

Motor:	Motor main bearing is sealed and requires no additional lubrication.
Housing:	“Chevron, Ultra-Duty grease, EP NLGI 2”
Planetary:	“Chevron, Ultra-Duty grease, EP NLGI 2”

SADDLE SETS

Saddle Selection/Installation/Removal

The 203C utilizes fixed saddles for reliable self-centering and alignment of the workpiece to the machine. Each saddle is stamped with the pipe or tube O.D. and part number. Refer to the chart below for the specific application and saddle recommendation.

Part Number	OD	
	Inch	mm
67-4273	0.750	19.1
67-4274	0.781	19.8
67-4275	0.787	20.0
67-4276	0.813	20.7
67-4277	0.840	21.3
67-4278	0.844	21.4
67-4279	0.854	21.7
67-4280	0.859	21.8
67-4281	0.866	22.0
67-4282	0.875	22.2
67-4283	0.906	23.0
67-4284	0.938	23.8
67-4285	0.969	24.6
67-4286	0.984	25.0
67-4287	1.000	25.4
67-4288	1.024	26.0
67-4289	1.050	26.7
67-4290	1.063	27.0
67-4291	1.071	27.2
67-4292	1.102	28.0

Part Number	OD	
	Inch	mm
67-4293	1.125	28.6
67-4294	1.142	29.0
67-4295	1.181	30.0
67-4296	1.188	30.2
67-4297	1.250	31.8
67-4298	1.260	32.0
67-4299	1.313	33.3
67-4300	1.315	33.4
67-4301	1.327	33.7
67-4302	1.339	34.0
67-4303	1.375	34.9
67-4304	1.378	35.0
67-4305	1.438	36.5
67-4306	1.500	38.1
67-4307	1.563	39.7
67-4308	1.575	40.0
67-4309	1.625	41.3
67-4310	1.660	42.2
67-4311	1.681	42.7
67-4312	1.688	42.9

Part Number	OD	
	Inch	mm
67-4313	1.750	44.4
67-4314	1.752	44.5
67-4315	1.813	46.1
67-4316	1.875	47.6
67-4317	1.900	48.3
67-4318	1.913	48.6
67-4319	1.938	49.2
67-4320	1.969	50.0
67-4321	2.000	50.8
67-4322	2.008	51.0
67-4323	2.047	52.0
67-4324	2.063	52.4
67-4325	2.087	53.0
67-4326	2.125	54.0
67-4327	2.188	55.6
67-4328	2.240	56.9
67-4329	2.244	57.0
67-4330	2.250	57.2
67-4331	2.313	58.8
67-4332	2.375	60.3
67-4333	2.382	60.5
67-4334	2.438	61.9
67-4335	2.480	63.0
67-4336	2.492	63.3
67-4337	2.500	63.5
67-4338	2.559	65.0
67-4339	2.563	65.1
67-4340	2.625	66.7
67-4341	2.640	67.1

Part Number	OD	
	Inch	mm
67-4342	2.688	68.3
67-4343	2.750	69.9
67-4344	2.795	71.0
67-4345	2.813	71.5
67-4346	2.875	73.0
67-4347	2.938	74.6
67-4348	2.992	76.0
67-4349	2.996	76.1
67-4350	3.000	76.2

Each saddle is installed using a single cap screw and the provided wrench.

Ensure that the saddle seating surface on the housing is free of chips an/or debris which could cause an off-axis or out of center condition when installed.

TOOL BITS

Tool Bit Installation/Removal

Use extreme caution when handling tool bits, the edges are very sharp.

Ensure that the two seating surfaces (edge and bottom) for each tool bit are free of chips and/or debris before installing the tool bit.

Two tool bits are required per head to keep the cutting load balanced.

Each tool bit (P/N 99-5560) is held to the head with a single insert-style flat head screw. Use the provide Torx Hex key (T20) to secure the bit in place.

TROUBLE SHOOTING

Problem: The Tool Bit Chatters.

The tool bit is damaged.

The cutting speed is too fast.

The clamping pad is loose on the pipe or tube.

Cutting fluid is required.

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.

Problem: The surface finish is rough.

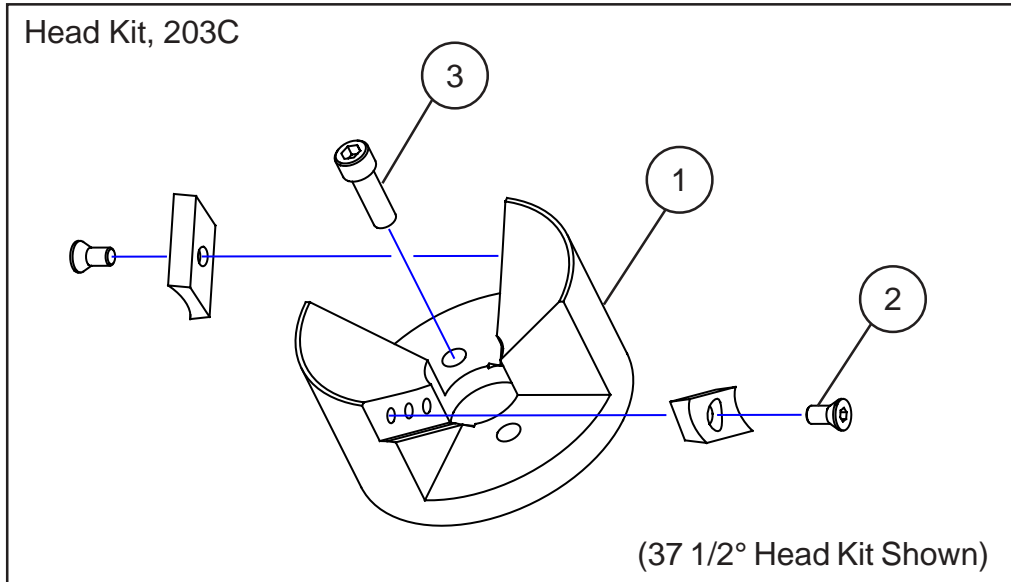
The tool bit is dull, chipped, etc.

Metal build/up on the cutting edge of the tool bit is creating a false cutting edge.

Cutting fluid is required.

The cutting speed is incorrect.

ILLUSTRATED PARTS BREAKDOWN



Parts List, Head Kit, 3.10" Dia x 30° (P/N 03-0080)

Item No.	Part No.	Description	Qty.
1	21-0538	HEAD, BEVEL (3.10" DIA X 30°)	1
2	33-2150	SCREW, CLAMP (5MM)	2
3	33-0038	SCREW, CAP (1/4-20 X 1/2")	2
REF:	36-0241	WRENCH, TORX, T-20	
REF:	99-5560	TOOL BIT	

Parts List, Head Kit, 3.10" Dia x 37 1/2° (P/N 03-0081)

Item No.	Part No.	Description	Qty.
1	21-0537	HEAD, BEVEL (3.10" DIA X 37 1/2°)	1
2	33-2150	SCREW, CLAMP (5MM)	2
3	33-0039	SCREW, CAP (1/4-20 X 5/8")	2
REF:	36-0241	WRENCH, TORX, T-20	
REF:	99-5560	TOOL BIT	

Parts List, Head Kit, Facing, 3.10" Dia (P/N 03-0082)

Item No.	Part No.	Description	Qty.
1	21-0541	HEAD, FACING (3.10" DIA)	1
2	33-2150	SCREW, CLAMP (5MM)	2
3	33-0039	SCREW, CAP (1/4-20 X 5/8")	2
REF:	36-0241	WRENCH, TORX, T-20	
REF:	99-5560	TOOL BIT	

Parts List, Head Kit, 2.05" Dia x 37 1/2° (P/N 03-0083)

Item No.	Part No.	Description	Qty.
1	21-0539	HEAD, BEVEL (2.05" DIA X 37 1/2°)	1
2	33-2150	SCREW, CLAMP (5MM)	2
3	33-0039	SCREW, CAP (1/4-20 X 5/8")	2
REF:	36-0241	WRENCH, TORX, T-20	
REF:	99-5560	TOOL BIT	

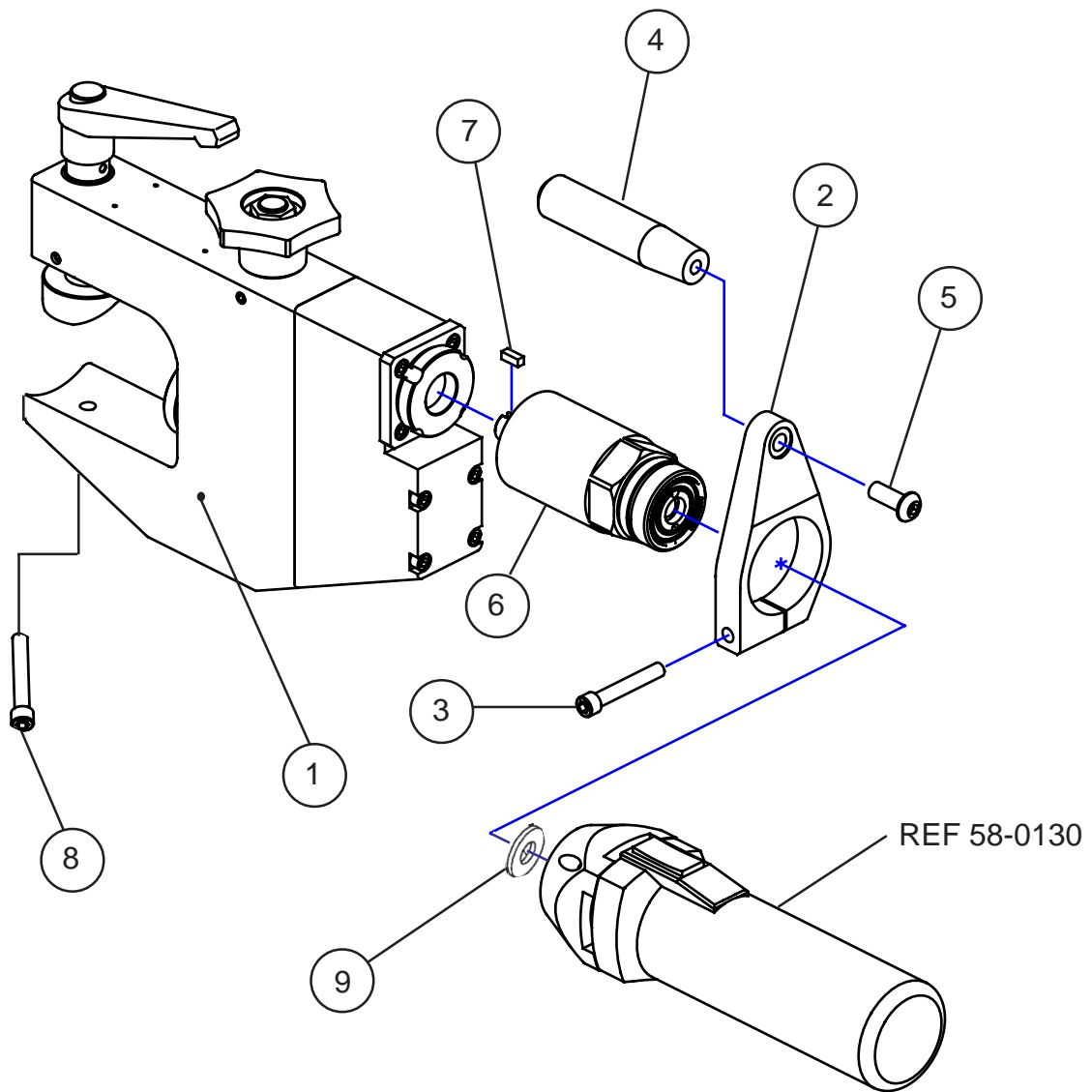
Parts List, Head Kit, 2.05" Dia x 30° (P/N 03-0084)

Item No.	Part No.	Description	Qty.
1	21-0540	HEAD, BEVEL (2.05" DIA X 30°)	1
2	33-2150	SCREW, CLAMP (5MM)	2
3	33-0039	SCREW, CAP (1/4-20 X 5/8")	2
REF:	36-0241	WRENCH, TORX, T-20	
REF:	99-5560	TOOL BIT	

Parts List, Head Kit, Facing, 2.05" Dia (P/N 03-0085)

Item No.	Part No.	Description	Qty.
1	21-0542	HEAD, FACING (2.05" DIA)	1
2	33-2150	SCREW, CLAMP (5MM)	2
3	33-0039	SCREW, CAP (1/4-20 X 5/8")	2
REF:	36-0241	WRENCH, TORX, T-20	
REF:	99-5560	TOOL BIT	

203C Sub Assembly (P/N 02-2304)



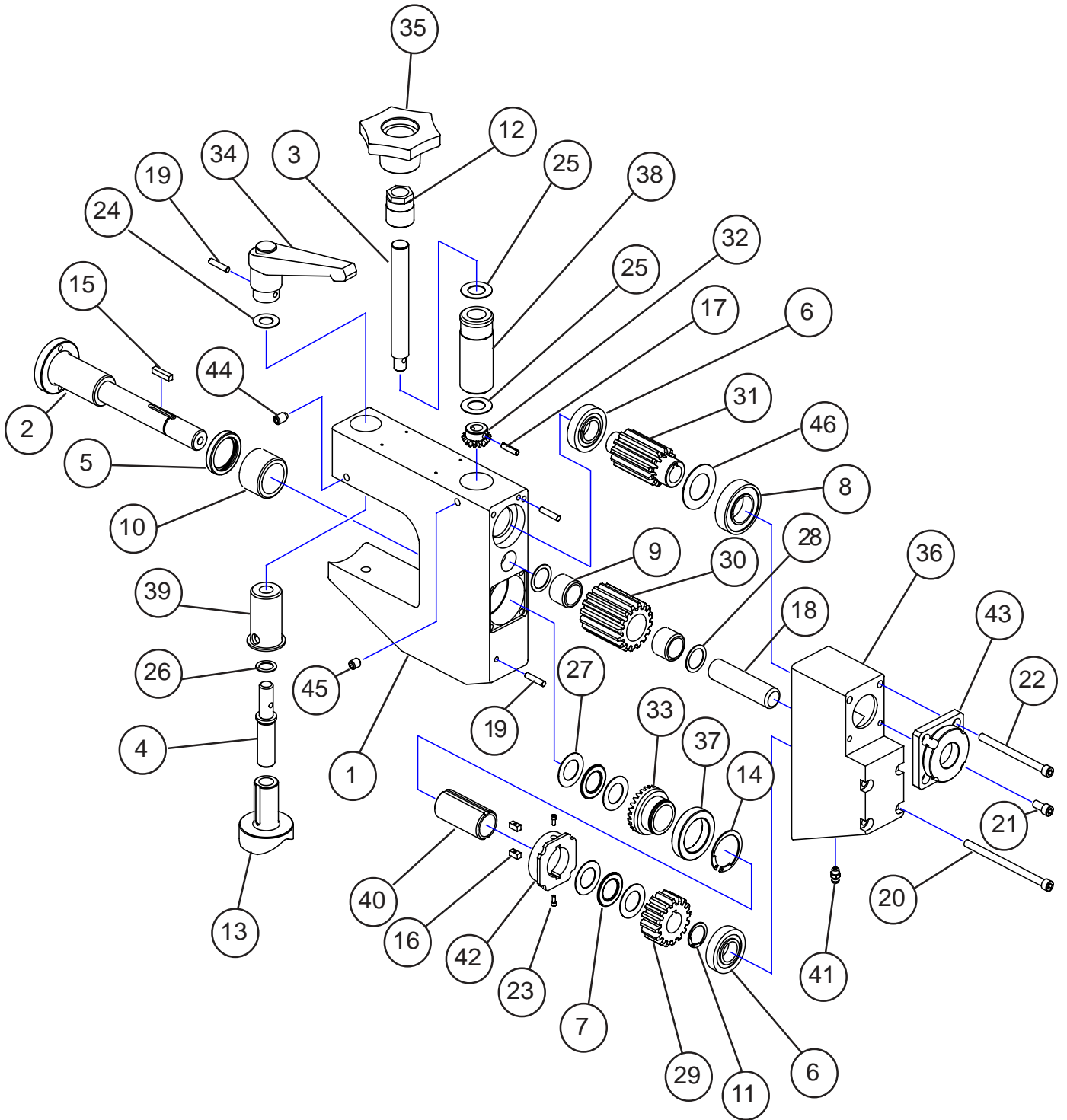
Parts List, 203C Sub Assembly, (P/N 02-2304)

Item No.	Part No.	Description	Qty.
1	19-0856	HOUSING ASSEMBLY	1
2	47-1238	BRACKET, HANDLE	1
3	33-0060	SCREW, CAP (5/16-18 X 2")	1
4	41-0125	HANDLE	1
5	33-0300	SCREW, BUTTON, HALF DOG (3/8-16 X 1")	1
6	59-0012	PLANETARY ASSEMBLY	1
7	31-0051	KEY	1
8	33-0055	SCREW, CAP (5/16-18 X 7/8")	1
9	34-0360	WASHER, THRUST	1

NOT SHOWN:

36-0008	WRENCH, L, (3/16 HEX)	1
36-0010	WRENCH, L, (1/4 HEX)	1
86-0222	CASE, 203C	1

Housing Assembly, (P/N 19-0856)



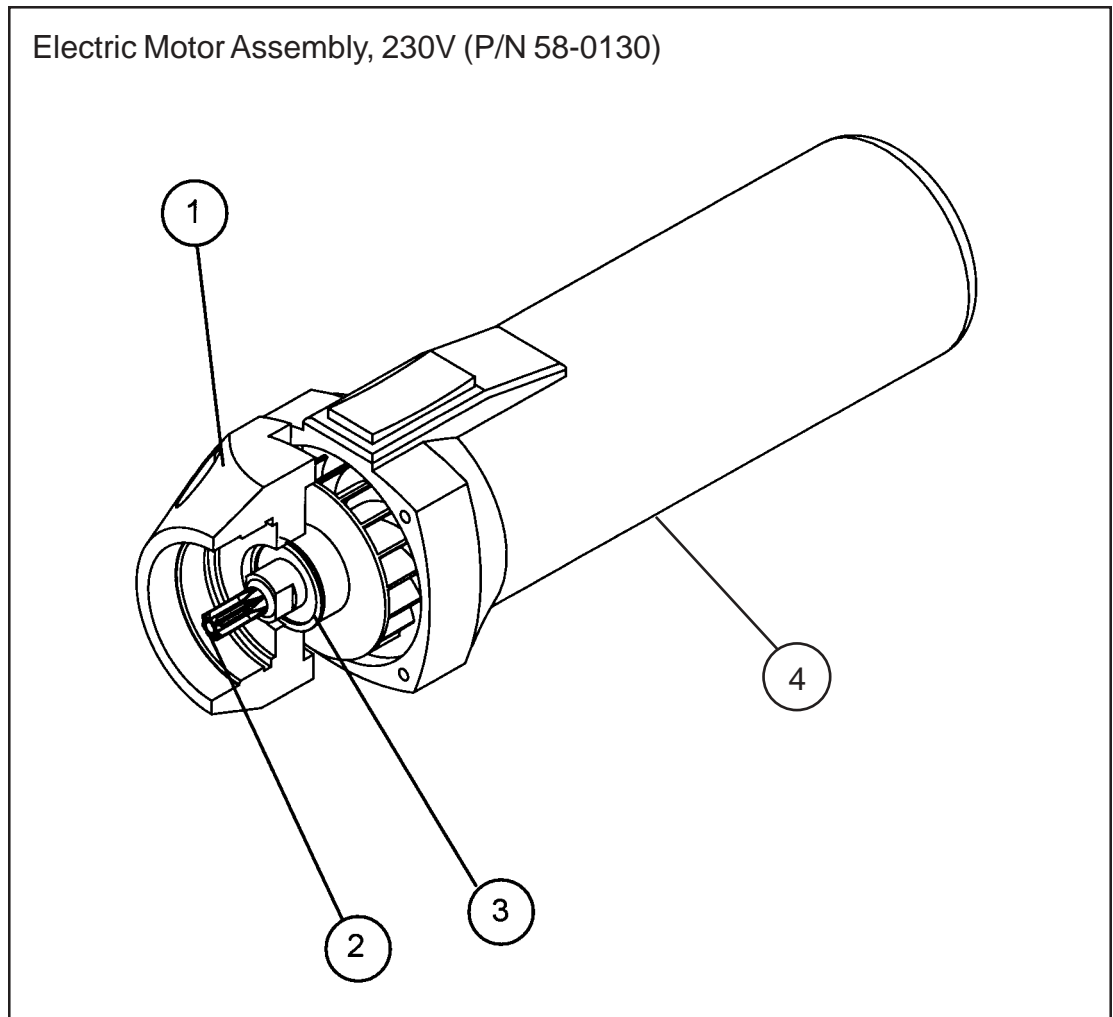
Parts List, Housing Assembly, (P/N 19-0856)

Item No.	Part No.	Description	Qty.
1	19-0855	HOUSING, MAIN	1
2	20-0736	SHAFT, MAIN	1
3	20-0737	SHAFT, FEED	1
4	20-0738	SHAFT, CLAMP	1
5	28-0291	SEAL	1
6	29-0020	BEARING, BALL	2
7	29-0067	BEARING, THRUST	2
8	29-0327	BEARING, BALL	1
9	29-0378	BEARING, NEEDLE, ROLLER	2
10	29-0379	BEARING, NEEDLE, ROLLER	1
11	30-2788	RING, RETAINING, EXT., BOWED	1
12	30-1790	BUSHING, KEYLESS	1
13	20-0742	SHAFT, VEE CLAMP	1
14	30-2787	RING, RETAINING, EXT.	1
15	31-0187	KEY	1
16	31-0188	KEY	2
17	32-0041	PIN, ROLL (3/16" DIA X 3/4")	1
18	32-0186	PIN, DOWEL (3/4" DIA X 3")	1
19	32-0293	PIN, DOWEL (3/16" DIA X 7/8")	3
20	33-1250	SCREW, CAP (1/4-20 X 4")	4
21	33-0037	SCREW, CAP (1/4-20 X 3/8")	2
22	33-1485	SCREW, CAP (1/4-20 X 3 1/4")	2
23	33-0001	SCREW, CAP (#4-40 X 1/4")	2
24	34-0162	WASHER, THRUST, 1/2" ID	1
25	34-0192	WASHER, THRUST, 5/8" ID	2
26	34-0247	WASHER, THRUST, 1/2" ID	1
27	34-0302	WASHER, THRUST, 3/4" ID	4
28	34-0356	WASHER, STRIPPER, 3/4" ID	2
29	39-0874	GEAR, MAIN	1
30	39-0875	GEAR, IDLER	1
31	39-0876	GEAR, DRIVE	1

Parts List, Housing Assembly, (P/N 19-0856)

Item No.	Part No.	Description	Qty.
32	39-0877	GEAR, PINION	1
33	39-0878	GEAR, FEED	1
34	41-0153	HANDLE, ADJUST	1
35	42-0123	KNOB, FEED	1
36	43-0542	COVER, HOUSING	1
37	45-0307	BUSHING, FEED	1
38	46-0484	SLEEVE, FEED	1
39	46-0485	SLEEVE, CLAMP	1
40	46-0486	SLEEVE	1
41	54-0375	FITTING, GREASE	1
42	48-1228	BLOCK, KEY	1
43	27-0636	ADAPTOR, PLANETARY	1
44	33-0996	SCREW, SET, HALF DOG (5/16-18 X 1/2")	1
45	33-0514	SCREW, SET, CUP POINT (5/16-18 X 3/8")	1
46	34-0360	WASHER, THRUST, 25MM ID	1

Electric Motor Assembly, 230V (P/N 58-0130)



Parts List, Motor Assembly, Electric, 230V (P/N 58-0130)

Item No.	Part No.	Description	Qty.
	58-0130	ASSEMBLY, MOTOR, 230V	1
1	27-0637	ADAPTOR, MOTOR	1
2	39-0883	GEAR, INPUT	1
3	30-2792	RING, RETAINING, INT.	1
4	58-0131	MOTOR	1

Disassembly of motor unit not permitted without the express written consent of TRI TOOL Inc. or by an authorized TRI TOOL Inc. repair technician.