### **ET850 Series**

Torque Controlled Pneumatic Rolling Motors



Tube & Pipe Cleaners  $\circ$  Tube Testers  $\circ$  Tube Plugs  $\circ$  Tube Removal  $\circ$  Tube Installation



**Operating and Maintenance Instructions** 



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### **INTRODUCTION**

Thank you for purchasing this Elliott product. More than 100 years of experience have been employed in the design and manufacture of this control, representing the highest standard of quality, value and durability. Elliott tools have proven themselves in thousands of hours of trouble-free field operation.

If this is your first Elliott purchase, welcome to our company; our products are our ambassadors. If this is a repeat purchase, you can rest assured that the same value you have received in the past will continue with all of your purchases, now and in the future.

Elliott's ET850 Torque Controlled Pneumatic Rolling Motor has been designed for the following types of equipment:

#### Heat Exchangers

#### Chillers

#### **Fin Fan Coolers**

#### **Other Heat Transfer Vessels**

If you have any questions regarding this product, manual or operating instructions, please call Elliott at +1 800 332 0447 toll free (USA only) or +1 937 253 6133, or fax us at +1 937 253 9189 for immediate service.



### **SAFETY GUIDELINES**

Read and save all instructions. Before use, be sure everyone using this machine reads and understands this manual, as well as any labels packaged with or attached to the machine.

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Caution: Impact resistant eye protection must be worn while operating or working near this tool.

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Caution: Personal hearing protection is highly recommended when operating or working near this tool.

- Know Your Elliott Tool. Read this manual carefully to learn your tool's application and limitations as well as the potential hazards specific to this tool.
- Avoid Dangerous Environments. Do not use power tools in damp or wet locations
- Keep Work Area Clean and Well Lit. Cluttered, dark work areas invite accidents.
- Dress Properly. Do not wear loose clothing or jewelry. Wear a protective hair covering to contain long hair. It is recommended that the operator wear safety glasses with side shields or a full face shield eye protection. Gloves and water repellent, nonskid footwear are also recommended. Keep hands and gloves away from moving parts.
- Use Safety Equipment. Everyone in the work area should wear safety goggles or glasses with side shields complying with current safety standards. Wear hearing protection during extended use, respirator for a confined space and a dust mask for dusty operations. Hard hats, face shields, safety shoes, respirators, etc. should be used when specified or necessary. Keep a fire extinguisher nearby.
- Before tool is connected to pressurized air, check that the throttle operates freely in both directions and returns to the "OFF" position when released. Before changing sockets or performing service on the motor, make sure that the air line is shut off and drained to prevent operation if the throttle is engaged.
- Use The Right Tools. Do not force a tool or attachment to do a job or operate at a speed it was not designed for.
- Use Proper Accessories. Use Elliott accessories only. Be sure accessories are properly installed and maintained.
- Check for Damaged Parts. Inspect guards and other parts before use. Check for misalignment, binding of moving parts, improper mounting, broken parts or any other conditions that may affect operation. If abnormal noise or vibration occurs, turn the tool off immediately and have the problem corrected before further use. Do not use a damaged tool. Tag damaged tools "Do Not Use" until repaired. A damaged part should

### **SAFETY GUIDELINES**

be properly repaired or replaced by an Elliott service facility. For all repairs, insist on only identical replacement parts.

- Keep Hands Away from All Moving Parts.
- Do Not Overreach. Maintain Control. Keep proper footing and balance at all times.
- Stay Alert. Watch what you are doing, and use common sense. DO NOT use a tool when you are tired, distracted or under the influence of drugs, alcohol or any medication causing decreased control.
- Maintain Tool Carefully. Keep tools clean for best and safest performance. Follow instructions for lubrication, maintenance and changing accessories.
- Maintain Labels and Nameplates. These carry important information and will assist you in ordering spare and replacement parts. If unreadable or missing, contact an Elliott service facility for a replacement.
- Some individuals are susceptible to disorders of the hands and arms when exposed to task which involve highly repetitive motions or vibration. Those individuals predisposed to vasculatory or circulation problems may be particularly susceptible. Cumulative trauma disorders such as Carpal Tunnel Syndrome and Tendonitis can be caused by repetitions, forceful exertions of the hands and arms. These disorders develop gradually over periods of weeks, months and years.
- Tasks should be performed in such a manner that the wrists are maintained in a neutral position, which is not flexed, hyper extended, or turned side to side.
- Stressful postures should be avoided and can be controlled through tool selection and work location. Any user suffering from prolonged symptoms of tingling, numbness, clumsiness or weakened grip, nocturnal pain in the hand or any other disorder of the shoulders, arms, wrists or fingers is advised to consult with a physician.
- The following recommendations will help reduce or moderate the effects of repetitive work motions and/or extended vibration exposure.
  - a.) Use a minimum hand grip force consistent with proper control and safe operation.
  - b.) Keep body and hands warm and dry.
  - c.) Avoid anything that inhibits blood circulation (ie. Smoking Tobacco, Cold Temperatures, etc)
  - d.) Avoid highly repetitive movements of hands and wrists, and continuous vibration exposure.
- Work gloves with vibration reducing liners and wrist supports are available from some manufactures of industrial work gloves. Tool wraps and grips are also available from a number of different manufacturers. WARNING! Proper fit gloves are important. Improperly fitted gloves may restrict blood flow to the fingers and can substantially reduce grip strength.

# **OPERATION INSTRUCTIONS**

The ET850 is a push-pull type torque controlled rolling motor. It is designed for use with regulated, filtered and lubricated 90 psig air (measured at the tool inlet). The tool expands to a preset torque, and then stops. The handle is then pulled away from the tubesheet, operating the motor in reverse and allowing tool removal from the tubesheet. Any time the operator releases the handle, the motor stops.

#### **A**CAUTION

Caution: If the torque control is adjusted over the maximum power output of the tool, the torque controlled shut off will not function and the tool will operate like a stall type tool. Also, if the tool is being operated at its upper torque limits, a drop in air pressure could cause the torque controlled shut off not to function due to a loss of motor power and the tool will function like a stall type tool. Operational Check: Grip tool securely and be prepared to counteract stall torque in case the torque control is improperly adjusted.

#### Air Supply

The tool is designed to operate on 90-125 psig maximum air pressure. Optimal range is 90-100 psig. Using 100-125 psig will increase speed but may result in faster wear of expander consumables. The air pressure should be checked at the tool's inlet when the tool is running. An automatic in-line filter-lubricator is required. This will supply tool with clean, lubricated air for optimal performance and tool life.

The air hose should be cleared of accumulated dirt and moisture. Then pour one half (1/2) teaspoon of 10W machine oil into the tool's air inlet before connecting the hose to the tool. A new hose should be similarly lubricated before placing in service. The tool should be cycled several times to disperse the oil before rolling tubes.

#### Lubricating The Motor

The in-line lubricator should be regularly checked and kept filled with a good grade of SAE 10W machine oil. Application of the tool should govern how frequently it is greased.

The gear assembly can be lubricated through an external grease fitting. Using a hand-held grease gun, apply two shots of NLGI No. 2 Moly grease roughly every four weeks. CAUTION: DO NOT OVER-LUBRICATE. If too much grease is applied, excess grease will be forced into the motor section and cause poor operation.

#### Tube Rolling Procedure

NOTE: Always clean the tube sheet hole before inserting the tubes. Use a proper size expander to ensure that all tubes are expanded to the same wall reduction.

Set the torque setting ring of the control to the correct torque setting for the type and size of tubes to be rolled. Insert the expander into the quick change chuck on the motor. The motor is turned on or off by the means of a quick operating sleeve type valve. The direction of rotation of the spindle is controlled by the position of the lever handle at the rear of the tool. Pushing forward on the lever handle causes the spindle to turn in a clockwise direction, and pulling back on the lever handle causes it to run in reverse. The lever handle also acts as a torque reaction handle to assist in absorbing the torque of the tool.

### **TECHNICAL INFORMATION**

Tube OD Range	Motor	Free Speed RPM	Torque Range	Weight	Air Usage	Air Supply Hose	Male Spindle Drive	Standard Quick Change Chuck	Spares Kit
5/8" - 3/4" (15.9 - 19.1mm)	ET850-1250	1,100	22 - 115 in lbs (2.5 - 13.0 Nm)					3/8" Fem Sq	ET850SK-1
3/4" - 1" (19.1 - 25.4mm)	ET850-600	500	31 - 192 in lbs (3.5 - 21.7 Nm)	11lbs (5.0kg)	48 cfm (1274 l/min)	1/2" (12mm)	3/8" (9.5mm)	available)	
1" - 1-1/4" (25.4 - 31.8mm)	ET850-400	400	5 - 26.5 ft lbs (6.8 - 35.9 Nm)					1/2" Fem Sq (optional 3/8" available)	ET850SK-2

\*Tube size range may vary due to tube wall thickness, material, tube sheet thickness, lubrication, operation condition, and/or operator technique.

Operating Noise Level: 95 dBA

#### **Spares Kit**

- Shim
- Trip Spring
- Paddle Set (4)
- O-Rings
- Retaining Rings
- Radial Bearing

Torque Range			Motor Reference Setting & Estimated Output				
Min	Max	Model	0.5 (25% motor output)	1.0 (50% motor output)	1.5 (75% motor output)	2.5 (100% motor output)	
22	115	ET850-1250	28.75	57.50	86.25	115	
in Ibs	in Ibs		in lbs	in lbs	in lbs	in Ibs	
31	192	ET850-600	48	96	144	192	
in lbs	in Ibs		in Ibs	in Ibs	in Ibs	in Ibs	
5	26.5	ET850-400	6.625	13.25	19.875	26.5	
ft lbs	ft lbs		ft lbs	ft lbs	ft lbs	ft lbs	

\* The above values should be used as a guideline only. Actual torque output can be affected by air pressure, volume of incoming air, and motor condition. \*\* Results should be validated by using Elliott's Tube Hole Gauge and calculating wall reduction.



literes	0	, Part Number		Description	ltom	0	Part Number			Description	
ntem	uty	ET850-1250	ET850-600	ET850-400	Description	Item	uty	ET850-1250 ET85	60-600	ET850-400	Description
1	1	810-03	37-037	810-050-037	Quick Change Chuck	17	1	ET850	04000		Directional Valve / Lever Sub-Assembly
2	1	ET8502001	ET8502002	ET8502003	Cam Case Sub-Assembly	18	1	P8302	2-101		Socket Head Cap Screw,
3	2		P8302-109		Socket Head Cap						1/4-28 x 2-1/4
			10002 100		Screw, 10-32 x 7/8"	19	1	171	1AA		Hex Nut, 1/4-28
4	4		133Q		Lock Washer, #10	20	2	13:	3G		Lock Washer, #6
5	1	ET3219700		Bracket	21	2	P830	02-76		Socket Head Cap Screw, #6-32 x 3/8	
6	2	P8302-145		Socket Head Cap Screw, #10-32 x 5/8	22	1	ET321	14456		Trip Cover	
7	1	41-98870A090		Key, 1/8 x 1/8 x 1/4	23	1	ET34	15282		Trip Gauge	
8	1	P8309-33		O-Ring, 1/16 x 2	24	1	P837	75-62		Retaining Ring, External 5/8	
9	1		580-40	1	Dowel Pin, 7/64 x 5/8	05	-1	ET20	14465		Look Nut
10	1	ET8503001	ET8503002	ET8503003	Gear Package Sub-Assembly	25	1	PC56-	-1792B		Zerk Fitting
11	1	ET8501001	ET8501002		Motor Sub-Assembly	27	1	/1_653	346433		Fitting Male 1/2 NPT
		210001001		01002	Wotor Oub 7(33cmbry	21		+1 000	541(400		
12	1		ET8501250		Motor Case	28	1	ET840	04450		Muffler Assembly
13	2	41-3867T365		1/2 NPT Plug	29	1	P83	369E		Hex Key 1/8 (not shown)	
14	1	ETTLBL1800A		ETTLBL1800A Elliott Logo Label 30 1 P8		P83	869C		Hex Key 5/64 (not shown)		
15	1	ET850LBL1	ETT850LBL2	ET850LBL3	Serial Number Label	31	1	TTP250	00-300		Case (not shown)
16	1		41-3867T364		3/8 NPT Pipe Plug	32	1	ETTLBI	L4000A		Case Label (not shown)
						33	1	41-65	36K51		Quick Disconnect (not shown)

#### ET850-1250 Motor Sub-Assembly



Item	Qty	Part Number	Description
1	1	ET3230500	Rotor
2	2	PC80R6ZZ	Radial Ball Bearing
3	1	ET3215200	Front Thrust
4	1	ET3230100	Cylinder w/ Pin
5	1	ET3230200-4	Paddle Set
6	1	ET3230600	Rear Thrust
7	1	P8375-37	Retaining Ring, External



ET850-600 & ET850-400 Motor Sub-Assembly



Item	Qty	Part Number	Description
1	1	ET3230400	Rotor
2	1	PC80-6901Z	Radial Ball Bearing
3	1	ET3215300	Front Thrust
4	1	ET3230100	Cylinder w/ Pin
8	1	ET3230200-4	Paddle Set
5	1	ET3230600	Rear Thrust
7	1	PC80R6ZZ	Radial Ball Bearing
6	1	P8375-37	Retaining Ring, External

#### ET850-1250 Cam Case Sub-Assembly



Item	Qty	Part Number	Description
1	1	ET3214800	Spindle
2	1	P8374-112	Retaining Ring
3	2	138C	Nylon Tip Set Screw, #8-32 x 3/16
4	1	ET3214600	Cam Case
5	1	ET3215500	Pressure Pad w/ Pins
6	1	ET3215700	Spring Guide
7	1	ET3218500	Compression Spring
8	1	P8375-62	Retaining Ring, External
9	1	ET3218700	Lock Collar
10	1	128KK	Cup Point Set Screw, #8-32 x 3/16
11	3	ET3218900	Compression Spring
12	15	109CA	Ball, Steel, 5/32
13	1	P8374-187	Retaining Ring
14	1	P8375-50	Retaining Ring, External
15	1	ET3218400	Adjusting Nut

Item	Qty	Part Number	Description
16	1	PC80R8ZZ	Radial Ball Bearing
17	1	PC80SCE105	Radial Bearing
18	1	P1067-4	Thrust Bearing
19	1	128AY	Cup Point Set Screw, #6-32 x 3/8
20	1	171T	Hex Nut, #6-32
21	1	580-39	Dowel Pin, 1/8 x 7/8
22	1	ET3216100	Follower
23	1	ET3223500	Trip Spring
24	1	ET3214462	Trip
25	1	ET3219100	Operating Cam
26	1	ET3219400	Inner Retainer
27	1	ET3227600	Outer Retainer
28	1	ET3219600	Drive Cam
29	6	109DAS	Ball, Stainless Steel, 3/16



ET850-600 & ET850-400 Cam Case Sub-Assembly



ltow	05-	Part N	umber	Description
Item	Uty	ET850-600	ET850-400	Description
1	1	ET32	14800	Spindle
2	1	P837	4-112	Retaining Ring
3	2	13	8C	Nylon Tip Set Screw, #8-32 x 3/16
4	1	ET32	14600	Cam Case
5	1	ET32	15500	Pressure Pad w/ Pins
6	1	ET32	15700	Spring Guide
7	1	ET3214498	ET8502113	Compression Spring
8	1	P837	75-62	Retaining Ring, External
9	1	ET32	18700	Lock Collar
10	1	128	3KK	Cup Point Set Screw, #8-32 x 3/16
11	3	ET3218900		Compression Spring
12	15	109CA		Ball, Steel, 5/32
13	1	P8374-187		Retaining Ring
14	1	P837	75-50	Retaining Ring, External
15	1	ET32	18400	Adjusting Nut

ltere	0	Part Number		Description
ntem	ųty	ET850-600	ET850-400	Description
16	1	PC80	R8ZZ	Radial Ball Bearing
17	1	PC80S	CE105	Radial Bearing
18	1	P10	67-4	Thrust Bearing
19	1	128	BAY	Cup Point Set Screw, #6-32 x 3/8
20	1	17	1T	Hex Nut, #6-32
21	1	580	)-39	Dowel Pin, 1/8 x 7/8
22	1	ET32	16100	Follower
23	1	ET322	23500	Trip Spring
24	1	ET32	14462	Trip
25	1	ET32	19100	Operating Cam
26	1	ET32	19400	Inner Retainer
27	1	ET322	27600	Outer Retainer
28	1	ET32	19600	Drive Cam
29	6	109	DAS	Ball, Stainless Steel, 3/16

ET850-1250 Gear Package Sub-Assembly



Item	Qty	Part Number	Description
1	1	ET3216900	Output Spider
2	1	ET3219800	Bearing Support
3	1	PC80R12ZZ	Radial Ball Bearing
4	2	580-38	Dowel Pin, 1/8 x 1-1/4
5	2	ET3215600	Planet Gear
6	1	ET3216400	Gear Housing
7	1	PC80R14	Radial Ball Bearing



#### ET850-600 & ET850-400 Gear Package Sub-Assembly



Item	Qty	Part Number	Description
1	1	ET3217000	Output Spider
2	1	P8375-62	Retaining Ring, External
3	1	PC80R10ZZ	Radial Ball Bearing
4	1	ET3219900	Bearing Support
5	3	ET3164200	Planet Gear
6	3	580-24	Dowel Pin, 1/8 x 3/4
7	1	ET3216500	Gear Housing
8	2	ET3164100	Planet Gear
9	1	PC80-6906ZZ	Radial Ball Bearing
10	1	ET3217100	Gear Spider
11	2	580-3	Dowel Pin, 1/8 x 1

Lever Sub-Assembly



Item	Qty	Part Number	Description
1	1	ET8567183	Valve Spindle
2	1	P8375-43	Retaining Ring, External
3	1	ET8567184	Directional Valve
4	1	P8309-6	O-Ring, 1/16 x 5/16
5	2	P8309-021	O-Ring, 1/16 x 15/16
6	1	P8309-932	O-Ring, 0.059 x 0.295
7	1	37-71655S	Compression Spring
8	1	ET8567185	Shaft Seal
9	1	P8309-016	O-Ring, 1/16 x 5/8
10	1	ET3214477	Сар
11	1	P8309-7	O-Ring, 1/16 x 3/8
12	1	ET3214486	Lever Pin
13	1	ET3214459	Lever Handle

### **MAINTENANCE INSTRUCTIONS**

The proper performance and service life of every machine depends on how well it is maintained. The following should become a regular routine of operations.



Warning: Remove air supply prior to disassembly or service.

#### Shut-Off Adjustment

If consistent torque cannot be maintained, check the Shut-Off Trip mechanism. Remove the Trip Cover (pg 9) to expose the mechanism. During forward operation, the Trip abuts the Valve Spindle as shown. This abutment should be set using the included Trip Gage as shown to 0.062" of engagement with the Valve Spindle. This allows shut-off to occur midway through the total travel of the Trip, ensuring repeatable torque. This procedure should be completed with the torque setting at "5".

#### Cam Case Subassembly (pgs 12-13)

Remove entire assembly by removing socket head cap screws. Remove Internal Retaining Ring (13). Carefully remove Drive Cam (28) and Operating Cam (25), avoiding loss of the bearing balls in the assembly. Remove, clean, and examine Spindle (1). If there is wear or dimpling in the ball spline grooves, the Spindle should be replaced. Check Bearing for wear and replace if necessary. Check Follower (22) for wear and replace if necessary.

To reassemble, install Spindle (1) and secure with External Retaining Ring (14). Place Operating Cam (25) on spindle and align the grooves. Place one Guide Spring (6) and five precision 5/32" balls (12) in each groove (due to precision, no substitution should be made). Install Ball Retainers and using grease place two larger balls on each helical face of the Operating Cam (25). Install the Drive Cam (28) carefully without dislodging the balls from the helical faces. Install the Internal Retaining Ring (13).

Reassembly to Motor Case requires depressing the trip to avoid interference with the Spindle until Socket Head Cap Screws are installed.

#### Motor And Gear Package Subassemblies (pgs 10-11, 14-15)

After removing Cam Case Subassembly (above), slide out the Motor and Gear Package Subassembly. Disassemble the motor by removing the Front Thrust and check for wear in the Cylinder. Inspect the Paddles and replace if worn. To reassemble, perform the reverse ensuring proper placement and movement of Paddles. Slide Motor into Motor Case placing the protruding pin into the locating hole in the bottom of the Motor Case.

The ET850-600 Gear Package Subassembly is a two stage planetary gear set. Slide gears from the Gear Case, clean, and inspect for wear. Grease gears before reassembly into Gear Case. Insert the Gear Package Subassembly into the Motor Case and insert Dowel Pin.



### **MAINTENANCE INSTRUCTIONS**

The ET850-1250 Gear Package Subassembly is a planetary gear set with a stepped planet gear. Slide gears from the Gear Case, clean, and inspect for wear. Grease gears before reassembly into Gear Case. To reassemble, ensure marked teeth are aligned opposite each other and match the scribed lines on the Gear Case. Insert the Gear Package Subassembly into the Motor Case and insert Dowel Pin.

Ensure adequate lubrication of all parts during reassembly.

#### Safety Check

After repair or replacement of parts, servicing or prolonged storage, the tool should be checked to verify that the Directional Valve Subassembly is functioning properly. This test should be completed without air pressure. With Trip Cover removed, push forward on the Lever Handle. The handle and valve should move freely and the valve should return to the "OFF" position readily when handle is released. Then, with handle pushed forward, depress the trip by hand, to simulate reaching preset torque. The Spindle should move forward to simulate the shut off of air. When pulling the handle back, the Valve should move into its reverse position before the Spindle inside moves. If the Spindle moves with the Valve in the forward position, then the motor will engage forward instead of reverse when the handle is pulled back, which will cause over-rolling of joints.

## **TROUBLESHOOTING**

	Air Leakage	Air Strainers Clogged	Air Pressure Too Low	Dirty Air	Water In Air	Incorrect Lubrication	Insufficient Lubrication	Hose Too Small	Long Paddles	Worn Paddles	Rotor Rubbing	Worn Bearing Plates	Worn O-Rings	Handle Contact With Directional Valve	Too Much Grease, Clogs Motor/Paddles	Worn Trip	Misadjusted Trip
Motor Will Not Run		Х	Х				Х		Х		Х				Х		
Lack Of Power	Х	Х	Х			Х		Х		Х	Х	Х			Х		
Speed Too Low		Х	Х					Х			Х						
High Air Consumption	Х									Х		Х					
Excessive Paddle Wear				Х		Х	Х										
Excessive Bearing Wear				Х		Х	Х										
Rusting Of Parts					Х	Х	Х										
Delamination Of Paddles				Х	Х	Х											
Paddles Chipping				Х		Х	Х										
Motor Continues To Run, Throttle Off													Х	Х			
Inconsistent Trip																Х	Х
No Trip (Motor Stalls)																	Х

#### **MOTORS:**

**Pneumatic motors** have assemblies built to very close tolerances. Under constant use and with the possibility of foreign parts moving through the air line, these tolerances have a tendency to suffer. Air motor maintenance is critical. Dirt should not be allowed to collect around exhaust ports or fitting connections.

### WARRANTY

Should any part, of Seller's own manufacture, prove to have been defective in material or workmanship when shipped (as determined by Seller), Seller warrants that it will, at its sole option, repair or replace said part f.o.b., point of manufacture, provided that Buyer notifies, in writing, of such defect within twelve (12) months from date of shipment from the manufacturing plant.

On request of Seller, the part claimed to be defective will be returned, transportation, insurance, taxes and duties prepaid, to the factory where made, for inspection. Any item, which has been purchased by Seller, is warranted only to the extent of the original manufacturer's warranty to Seller. Seller shall not be liable for any damages or delays caused by defective material or workmanship.

No allowance will be made for repairs or alterations made by others without Seller's written consent or approval. If repairs or alterations are attempted without Seller's consent, Seller's warranty is void.

THE WARRANTIES PROVIDED IN THE OBLIGATIONS AND LIABILITIES OF SELLER HEREUNDER, AND THE RIGHTS AND REMEDIES OF BUYER HEREUNDER ARE EXCLUSIVE AND IN SUBSTITUTION FOR, AND BUYER HEREBY WAIVES ALL OTHER WARRANTIES, GUARANTEES, OBLIGATIONS, CLAIMS FOR LIABILITIES, RIGHTS AND REMEDIES, EXPRESS OR IMPLIED, ARISING BY LAW OR OTHERWISE, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTY FOR MERCHANTABILITY AND FITNESS FOR PURPOSE.

Seller's total liability is limited to the lower of the cost of repair or replacement.



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#### **Contact Us**

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Elliott Tool offers a complete line of precision tube tools to meet your needs. Contact us or your local support.

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