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**tube
expanders**

Boiler Expanders
Heat Exchanger Expanders
Condenser Expanders
Refinery Expanders

**tube rolling motors
& torque controls**

Electric
Pneumatic

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Air & Water Driven Motors
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Single Blade Reamers



“TUBE-AUGER®”
Tube End Prep Machine Kit
For 3/4” – 3” Tube ID
(EP443010)



Operating and Maintenance Instructions

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INTRODUCTION

Thank you for purchasing this Elliott product. The design and manufacture of this machine, represents 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.

The Elliott Tube-Auger® is a portable tube end preparation machine suitable for removing tube end welds, flared or beaded tube ends, trimming tube ends as well as preparing tube ends for welding.

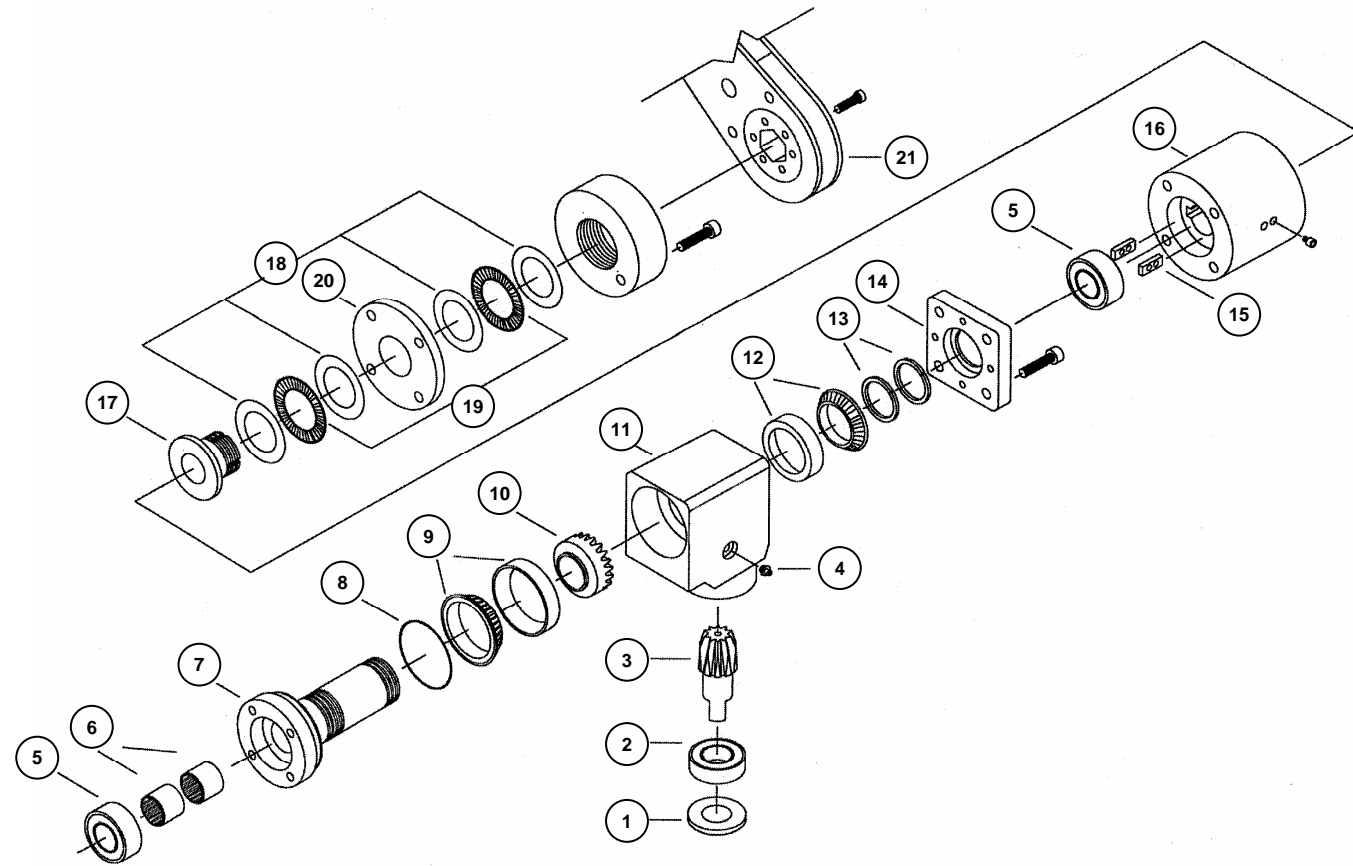
We at Elliott would like you to be completely satisfied with this machine and therefore recommend that this instruction manual be thoroughly read prior to use.

This machine has been designed and manufactured to the highest standards, using the latest in materials and technology. If the guidelines and maintenance schedules in this manual are followed, the Elliott Tube-Auger will provide many years of trouble free operation.

Tube-Auger Gear Box Parts Listing			
Item Number	Part Number	Description	Qty
1	EP440019	Pinion Lock Ring	1
2	EP024403	Bearing	1
3	EP440018	Pinion Gear	1
4	EP100001	Grease Nipple M10 x 1.5 Pitch	1
5	EP024404	Bearing	2
6	EP025019	Bearing	2
7	EP440013	Bevel Gear Shaft	1
8	EP050049	O-Ring 58 x 3	1
9	EP024401	Bearing Taper Roller	1
10	EP440017	Bevel Gear	1
11	EP440010	Gear Case	1
12	EP024402	Bearing Taper Roller	1
13	EP440015	Gear Shaft Locknut	2
14	EP440023	Torque Housing Mounting Plate	1
15	EP440016	Reaction Key	2
16	EP440020	Torque Housing	1
17	EP440021	Feed Nut	1
18	EP024405	Thrust Washer	4
19	EP024406	Thrust Bearing	2
20	EP440022	Feed Thrust Ring	1
21	EP440011	Feed Ratchet	1

Elliott Tool Technologies Ltd shall not be liable for errors contained herein or for incidental or consequential damage in connection with the furnishing, performance, or use of this material.

TUBE-AUGER GEAR BOX PARTS LISTING



SAFETY

Every effort has been made to ensure the operation of the Elliott **TUBE-AUGER** is safe, although it is impossible to remove all possibilities of accidents.

It is very important that **all operators** of this machine are fully aware of the following safety considerations.

1. If you are unfamiliar with the Elliott Tube-Auger, read this Operation Manual thoroughly before use.
2. Chips produced are hot, sharp and can be thrown some distance.
3. Always wear safety glasses, protective gloves, safety shoes and protective clothing.
4. Do not allow other people in the area of the machine unless they are wearing suitable protective clothing and equipment.
5. The Elliott Tube-Auger is fitted with a dead-man hand throttle. Always ensure the machine stops as soon as the throttle is released.
6. Ensure all air connections are properly made and that the air hose is in good condition.
7. Always be aware of air shutoff valve points.
8. Always ensure that cutter screws and mandrel assembly are fully tightened before use.
9. Always disconnect air supply before changing cutters and after use.
10. Do not operate the machine if there appears to be damage to the machine, if screws are missing, or if performance appears to be unsatisfactory.
11. The Elliott Tube-Auger is a rotating cutter. Avoid wearing loose clothing and jewelry. Wear protective hair covering to prevent long hair from getting caught in the machine.
12. Never use the Tube-Auger, or any other power tool when under the influence of medication, drugs or alcohol that decrease concentration and impair operator control.

START-UP

Unpacking

The Elliott Tube-Auger is shipped in a steel tool case, complete with all accessories listed. On arrival, check for external damage to the box. If damage is found, notify the carrier and the supplier so insurance inspectors can examine the box before it is unpacked. When opened, check the contents against the packing and parts list. Report any damage or shortage to Elliott.

Ensure that there is no packaging material inside the openings of the machine, especially the air inlet.

Connecting to Air Supply

The Elliott Tube-Auger must always be used with an airline lubricator. An air hose of not less than 1/2" (3/8" hose can be used up to maximum distance of 20 ft) should be attached to the opposite side of the lubricator. The Elliott 6070 pressure actuated, one quart capacity lubricator is recommended. It is important that 90 psi air pressure is maintained at the machine while it is in operation.

Factors affecting flow rate are:

1. Efficiency and output of compressor.
2. Proximity to compressor.
3. Inside Diameter of air hose.
4. Moisture and temperature; If moisture is high and temperature is low, icing may occur.

Ensure that the lubricator is correctly set-up (use ISO VG 32 grade light hydraulic oil or equal). The air motor is shipped full of oil. It is normal for this oil to be blown out of the air exhaust on first operation.

Air Motor Gearing Parts Listing (EP440100)			
Item Number	Part Number	Description	Qty
1	EP440101	Spindle Nut	1
2	EP440102	Internal Gear And Nose	1
3	EP440103	Felt Washer	1
4	EP440104	Bearing	1
5	EP440105	Washer	1
6	EP440106	Planet Gear Cage	1
7	EP440107	Planet Wheel Gear	2
8	EP440108	Roller (Bearings)	2
9	EP440109	Planet Gear Retaining Pin	2
10	EP4401010	Bearing	1
11	EP4401011	Gear Ring	1
12	EP4401012	Bearing	1
13	EP4401013	Planet Gear Cage	1
14	EP4401014	Planet Wheel Gear	2
15	EP4401015	Bearing	2
16	EP4401016	Planet Gear Retaining Pin	2
17	EP4401017	Bearing	1
18	EP4401018	Front Bearing Housing	1
19	EP4401019	Spring Pin	1
20	EP4401020	Bearing	1
21	EP4401021	Front Bearing Plate	1
22	EP4401022	Cylinder Sleeve	1
23	EP4401023	Rotor	1
24	EP4401024	Rotor Blade	5
25	EP4401025	Rear Bearing Plate	1
26	EP4401026	Bearing	1
27	EP4401027	Rear Bearing Housing	1
28	EP4401028	Spring Pin	1
29	EP4401029	End Cap	1
30	EP4401030	Main Motor Body	1
31	EP4401031	Muffler Sleeve	1
32	EP4401032	O-Ring 40 X 3	1
33	EP4401033	Air Throttle Housing	1
34	EP4401034	Throttle Lever	1

TUBE-AUGER AIR MOTOR PARTS LISTING

QUICK REFERENCE DIAGRAM

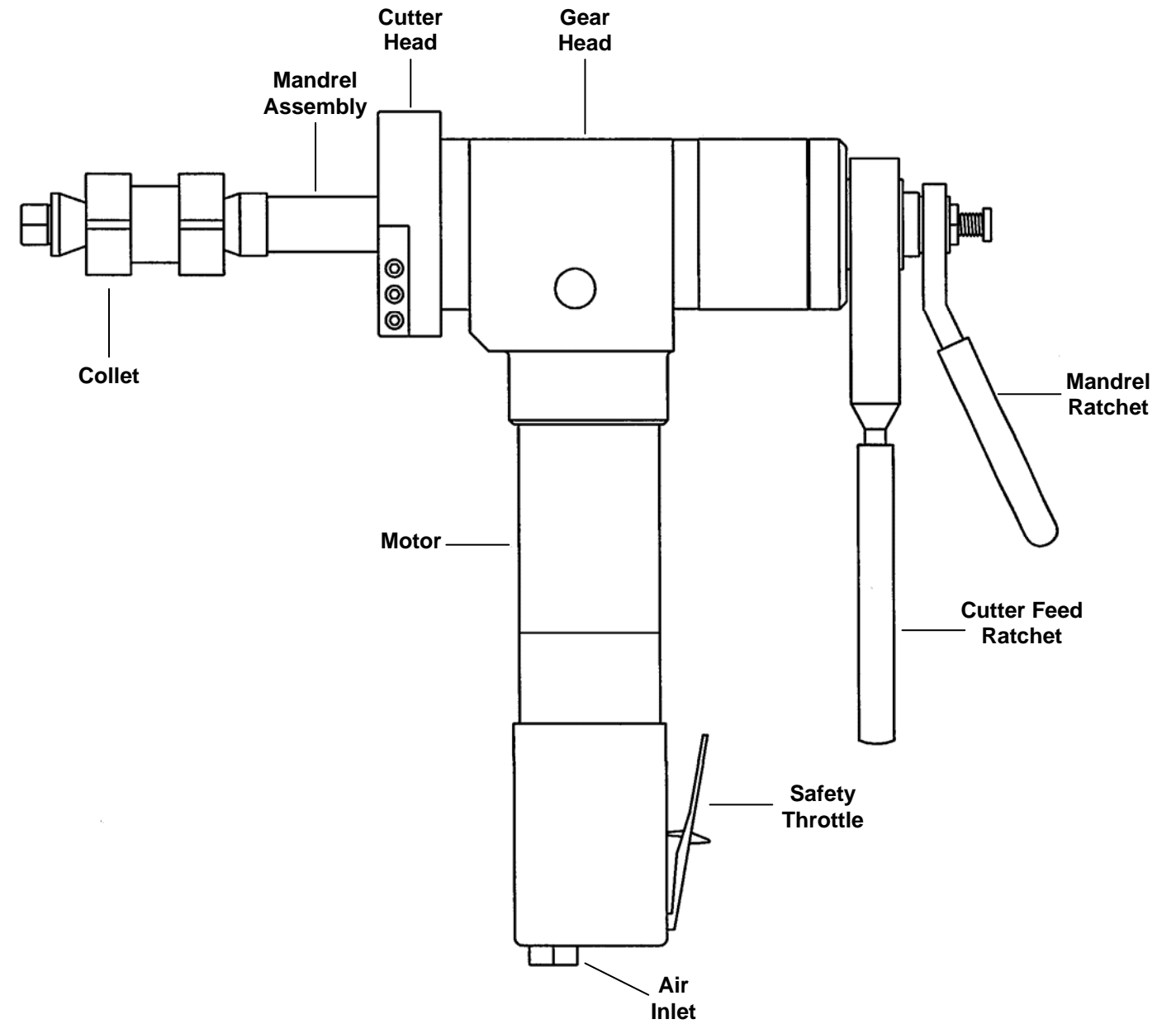
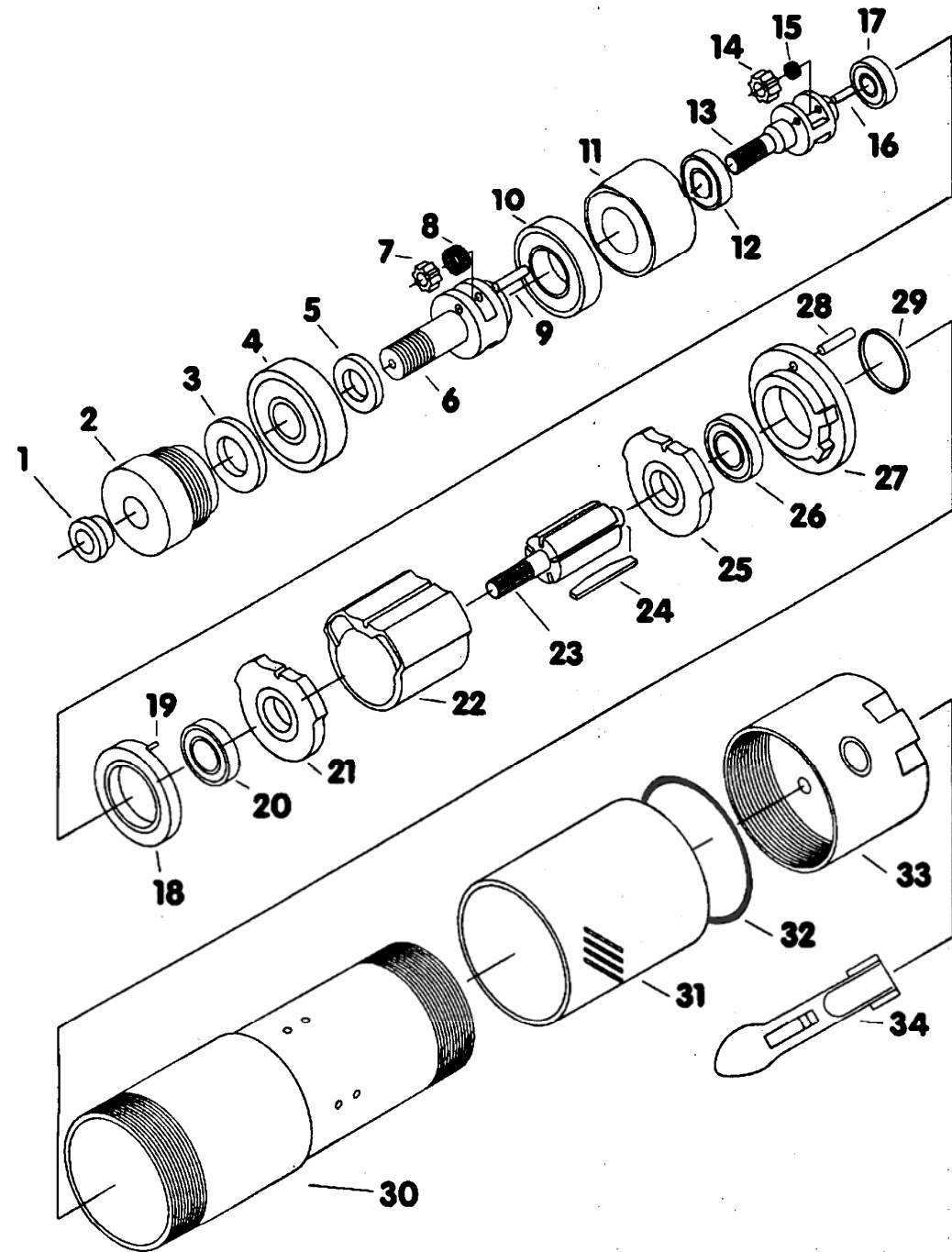
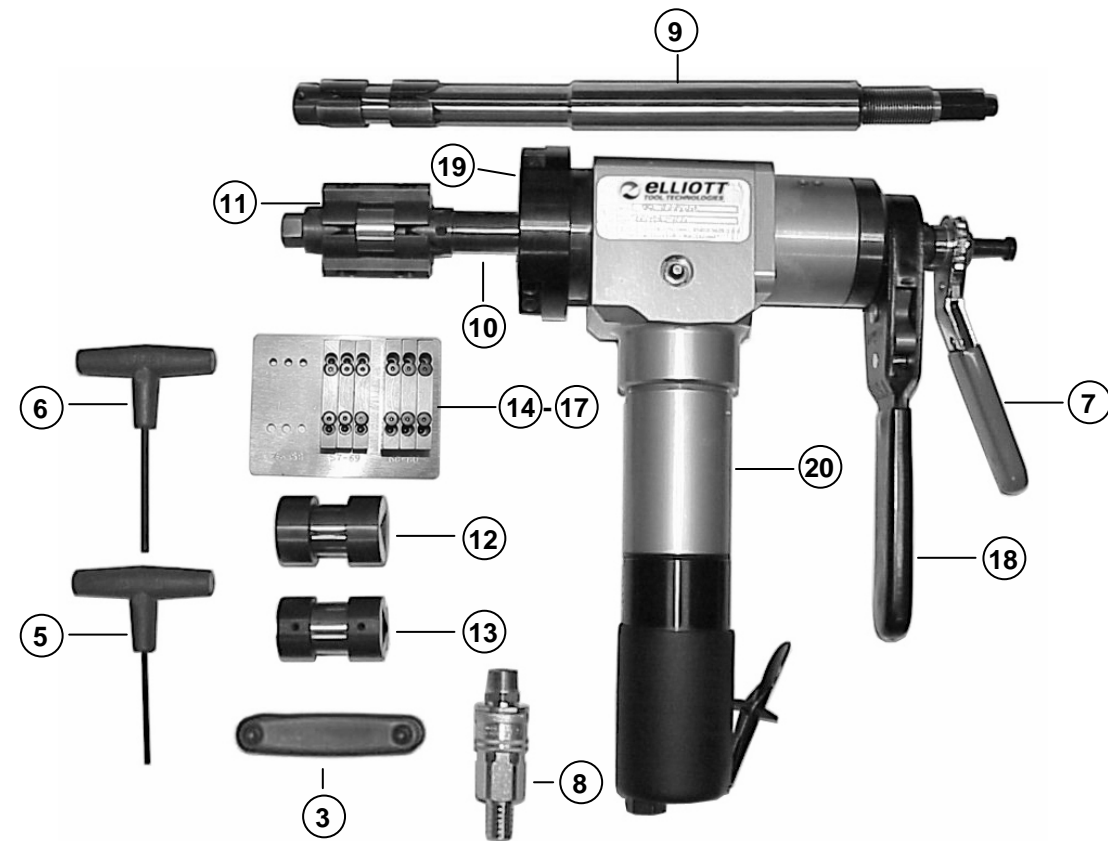


Fig. 1 Quick Reference

TUBE-AUGER 3/4" – 3" I.D. CAPACITY COMPLETE KIT (EP443010) PARTS LISTING



Item #	Part Number	Description	Quantity
	EP440150	Tube-Auger Machine Assembly	1
2	EP440030	Tool Box (Not Shown)	1
3	EP120026	Allen Key Set	1
4	EP120032	Wrench 16mm A/F Open Ended (Not Shown)	1
5	EP120015	T-Key 3mm	1
6	EP120016	T-Key 4mm	1
7	EP120030	Mandrel Ratchet	1
8	EP030002	Quick Change Coupler –Hose Insert	1
9	EP440300	3/4" – 1" Mandrel Assembly	1
10	EP440250	Center Shaft Assembly (1 – 3" Range)	1
11	EP440230	Collet #1 .98" – 1.50" Dia (25 – 38mm)	1
12	EP440235	Collet #2 1.50" – 1.97" Dia (38 – 50mm)	1
13	EP440237	Collet #3 (Segment Carrier)	1
14	EP440225	Clamping Segment 1.85" – 2.28" Dia (47 – 58mm)	3
15	EP440226	Clamping Segment 2.24" – 2.72" Dia (57 – 69mm)	3
16	EP440227	Clamping Segment 2.68" – 3.15" Dia (68 – 80mm)	3
17	EP440241	Clamping Segment Storage Plate	1
18	EP440050	Feed Ratchet	1
19	EP440028	Cutter Head 3-1/2"	1
20	EP440100	Pneumatic Motor	1

ROUTINE MAINTENANCE

Before every use

1. Check operation of safety air throttle.
2. Check condition of air hose and fittings.
3. Check for signs of wear in head bearings or signs of damage and abuse.
4. Ensure that airline lubricator is full and delivering oil. Use ISO VG 32 grade light hydraulic oil or equal.

Every 40 hours

1. Flush the air motor with a solution of three parts cleaning solvent with one part light oil. Following flushing, inject a small amount of air motor oil into the air inlet, reconnect the air supply, and run free for one minute to re-lubricate the motor.
2. Grease the gear head housing using high pressure grease. Caution: Do not over-grease, as performance will be lost.
3. Thoroughly clean the exterior of the unit and check for wear or damage.
4. Check all threads for damage and the tightness of all fasteners.

Every 2000 hours or Annually

(We recommend that the machine be returned to Elliott for the work below).

1. Strip, washout and inspect all parts of the gear head for wear or damage. Rebuild and re-grease with recommended lubricant.
2. Strip, washout and inspect all parts of the air motor and air motor gearbox for wear or damage. Rebuild and re-grease with recommended lubricant.

CUTTERS AND CUTTER HEAD

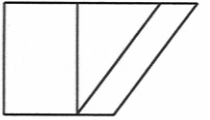
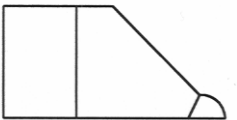
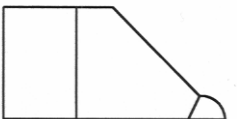
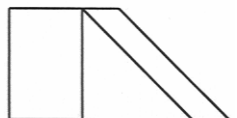
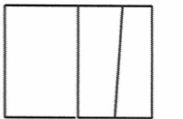
Boiler And Heat Exchanger Cutters		
Cutter Description	Part Number	Profile
37-1/2° OD Bevel	EP163037	
1/4" Radius Boiler Plate Cutter	EP163010	
3/16" Radius Heat Exchanger Cutter	EP163012	
37° ID Bevel Cutter	EP163137	
90° Face Cutter	EP163090	

Table 3

This is a list of standard cutters available. Other special cutters can be furnished on request.

An optional, small diameter cutter head is available for use in restricted areas, in water wall panels or with edge tubes. The diameter of this low profile head is 2-5/8 (67mm), the same as the width of the Tube-Auger itself. To change cutter heads, remove the mandrel assembly, remove the four mounting bolts from the cutter head face. Replace the cutter head and mounting bolts, reinstall the mandrel assembly. The part number for the 2-5/8" diameter cutter head is EP440024.

SPECIFICATIONS

	Elliott TUBE-AUGER Specifications	
	Inch	Metric
Standard Tube I.D. Range	1" to 3"	25-76 mm
Additional Range w/ Small Mandrel	3/4" to 1"	19-25 mm
Maximum Machining Diameter	3"	75 mm
Rotational Clearance	3-1/2"	90 mm
Minimum Gripping Diameter	3/4"	19 mm
Weight	14 lb	6.5 kg
Power	0.7 hp	0.54 kW
Torque @ 40rpm	60 ft-lb	82 Nm
Air Pressure	90 psi	6 bar
Air Consumption	34 cfm	936 litre/min
Air Hose ID Diameter	1/2"	--
Air Fitting	3/8" NPT	--
Noise Level	<80dBA	--
Free Speed	100 rpm	--
Feed Travel	1-1/2"	40 mm
Shipping Dimensions	20"x18"x5"	500x460x127 mm
Shipping Weight	38 lb	17 kg

Chart 1

Note:

Please note that it is essential that an air pressure of 90 psi be maintained at this tool while the machine is in operation, pressures below this will affect the operation and quality of the finished part.

OPERATION

The Elliott Tube-Auger has been designed to optimize productivity, and is equipped to allow easy setup.

The Elliott Tube-Auger uses a collet and mandrel bore locking device, which is retained in the machine.

Two mandrel sizes are available, enabling the machine to cover two tube ID diameter ranges; from ¾" to 1" and from 1" to 3" ID.

The smaller of the two mandrels covers inside diameters from ¾" to 1". This mandrel comes pre-assembled with one collet to cover the full range. (See Page 10, Fig. 2)

The larger mandrel covers inside diameters from 1" to 3". This range is achieved by using three interchangeable collets. (See Page 11)

For a description of the mandrel assembly and installation, see Page 11.

MACHINING GUIDE

1. It is not critical, but it is beneficial to secure the work piece prior to machining.
2. Whenever possible, use a cutting fluid or coolant to improve cutter life and surface finish.
3. Avoid stalling the machine. Stalling may damage the motor and drive gears.
4. It is advisable to use two cutters when machining. This will balance the cutter head and prevent "side loading" of the Mandrel. (See 6 below for setting more than one cutter)
5. To obtain the best possible results, it is necessary to balance the speed of the cutter head with the feed rate. Allowing the cutter to rub (not feeding hard enough and head speed too fast) will cause chatter, which can dull the cutting edge. Feeding too hard may stall the motor and may cause the cutter to chip or break. As a guide, even ribbons of chips indicate that the feed rate and head speed are correct.
6. It is possible to machine two different cuts simultaneously. The extra time taken to set cutters correctly for this procedure will save a great deal of time in repeating the setup. It will also allow consistency in machining.
7. Once the cutting depth is attained, allow the cut to "run out" to remove all uneven surfaces. Before stopping the cutter head rotation, back the cutter off the workpiece by quickly reversing the feed ratchet.

The following procedure is recommended for setting up simultaneous cutting:

- A. Start by machining a bevel using one cutter only.
- B. When a small bevel has been created completely around the tube, allow the cut to "run out" without reversing the feed. You will now have a partial bevel and one bevel cutter lightly touching the tube end.
- C. Without moving the feed ratchet, slide a second bevel cutter into the opposite cutter slot. Press the cutter, with light finger pressure, against the existing bevel and lightly tighten the cutter-clamping screws.
- D. Turn the feed ratchet counterclockwise two turns to clear the cutters from the workpiece and fully tighten the cutter-clamping screws. Both cutters should now be set evenly.
- E. Continue machining until a feather edge is created around the tube.
- F. Remove both bevel cutters and replace with one facing cutter. Machine the required landing edge onto the beveled end and allow the cut to "run out". Without moving the feed ratchet, replace one bevel cutter as in step C and D.
- G. The bevel cutter and facing cutter should now be set correctly in relation to one another.

ASSEMBLY OF 1” – 3” MANDREL

1. Measure the inside diameter of the tube.
2. Select the correct mandrel components to suit tube I.D., using chart 2. (Below or Figure 2)
3. Remove the wedge nut from the mandrel. Next, remove the collet wedge from the drawbolt. (Ref. page 11, Mandrel Assembly).
4. Slide the collet over the draw bolt, ensuring the collet engaging keys locate correctly with the collet.
5. Replace the collet wedge and the wedge nut onto the drawbolt. Tighten with the Wrench provided.
6. If gripping segments are required, select the correct set using Chart 2. Using the allen wrench set provided, remove the gripping segment set from the holder by lossening the recessed set screws. The top set screws retain these, there is no need to remove them.
7. Install each gripping segment in a slot of collet 3. Tighten the allen screws into the collet.

Collet And Segment Set Sizing Chart For 1” – 3” (25 –80 mm)

Size Range Inch	Size Range mm	Mandrel Assembly Components Collets and Segments
1.00 – 1.50	25 - 38	Collet 1
1.50 – 1.97	38 - 50	Collet 2
1.85 – 2.28	47 - 58	Collet 3 + Gripping Segment Set 1
2.24 – 2.68	57 - 68	Collet 3 + Gripping Segment Set 2
2.64 – 3.15	67 - 80	Collet 3 + Gripping Segment Set 3

Chart 2

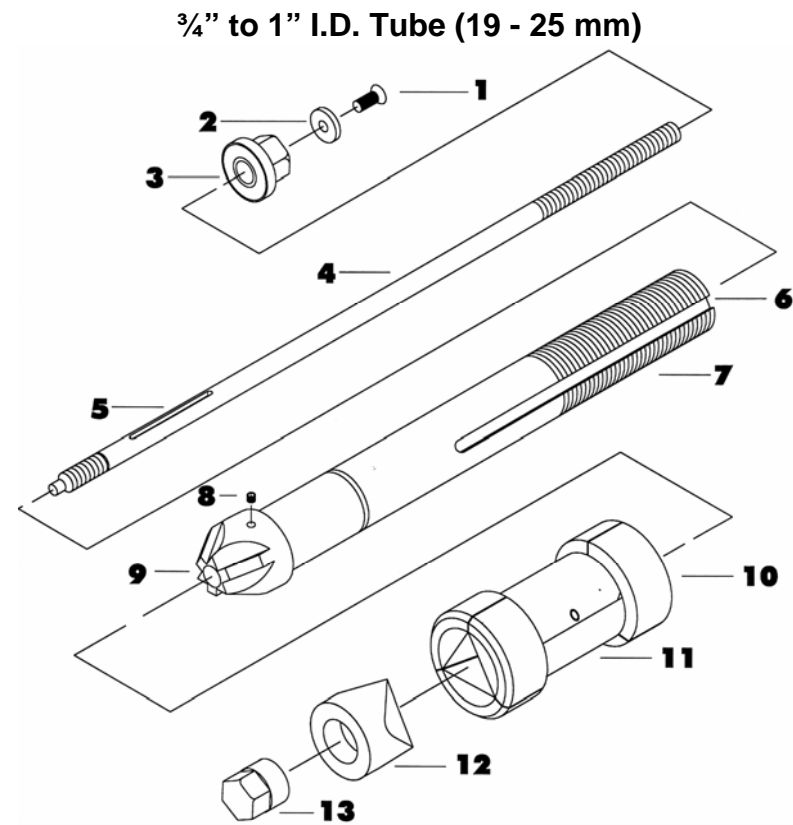
Mandrel Change

1. To remove the mandrel assembly from the machine, remove the drawbolt nut retaining screw (item 1) and washer (item 2) from the end of the drawbolt clamping nut (item 3). (ref-Page 10 and 11, Mandrel Assembly)
2. Unscrew the drawbolt clamping nut, which also has the ratchet-spanner wrench attached.
3. Turn the feed ratchet counterclockwise until the mandrel shaft becomes free.
4. Pull the mandrel assembly out of the gear head.
5. Line up the torque reacting grooves of the mandrel assembly with the keys inside the gear head. Insert the mandrel assembly into the gear head. Repeat procedure in reverse to reinstall the mandrel, ensuring torque reaction grooves engage with key in the head of the machine.

PREPARING MACHINE FOR OPERATION

1. Measure the inside diameter of the tube to be machined.
2. Referring to Figure 2, Figure 3 or Chart 2, select and assemble the mandrel and mandrel components required to fit the measured ID.
Note: Please refer to Page 12. (Mandrel Assembly) for details on how to insert and fix the mandrel assembly into the machine if required.
3. Insert the collet end of the mandrel approximately 1” into the workpiece.
4. Lock the mandrel assembly into the workpiece using the attached mandrel ratchet. Take care not to over tighten the nut.
Note: The machine can be mounted in any position to suit the operator. This can be done by holding the machine in the desired position, and then locking the collet assembly into the tube.
5. Insert the cutters into the cutter head with the cutting edge towards the retaining screws. (See Page 13)
6. Turn the feed ratchet clockwise to feed the cutting head toward the workpiece.
Note: Machining must not be started with cutter blades resting against the work piece.
7. Connect the air supply to the machine, see “Specifications” Page 7 for stated minimum working air pressure.
8. See Page 13. (Machining Guide).
9. To remove the machine from the tube, loosen the lock collet nut by reversing the mandrel ratchet.

MANDREL ASSEMBLY (EP440300)



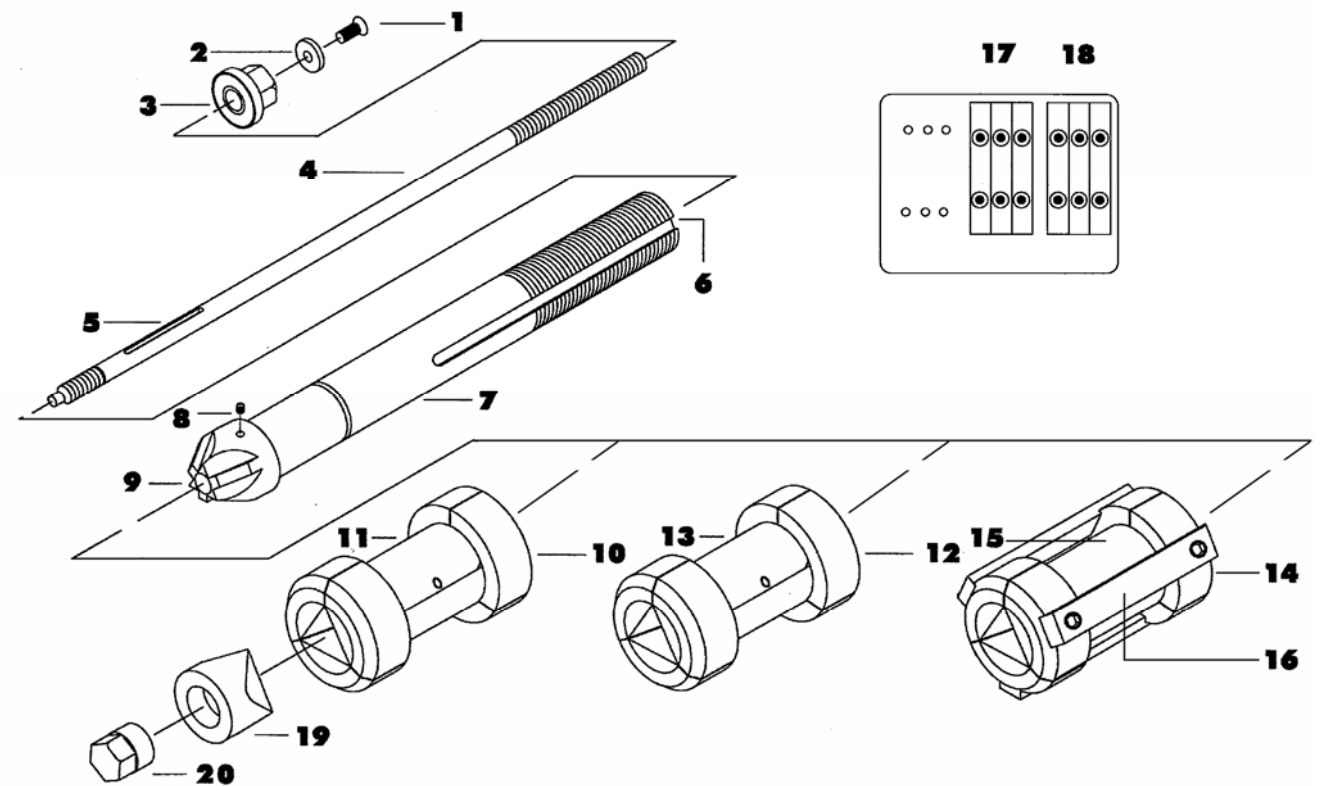
Item No.	Description	Part No.
1	Drawbolt Nut Retaining Screw	EP013577
2	Drawbolt Nut Retaining Washer	EP440239
3	Drawbolt Clamping Nut	EP440222
4	Drawbolt	EP440306
5	Drawbolt Retaining Groove	N/A
6	Torque Reacting Grooves, (One Each Side Of Mandrel)	N/A
7	Mandrel Shaft	EP440305
8	Set Screw: Locates Drawbolt Retaining Groove (Item 5)	EP010058
9	Collet Engaging Keys	N/A
10	Three Piece Collet	EP232209
11	Collet Retaining Spring	EP440041
12	Collet Wedge	EP440307
13	Wedge Nut	EP440308

Fig. 2 Mandrel Assembly 3/4" – 1"

There is no assembly required for this mandrel. The 3/4" – 1" collet is supplied assembled to the mandrel. Apart from maintenance and cleaning, the collet does not need to be removed from the mandrel.

MANDREL ASSEMBLY (EP440250)

1" to 3" I.D. Tube (25 - 75 mm)



Item No.	Description	Part No.
1	Drawbolt Nut Retaining Screw	EP013577
2	Drawbolt Nut Retaining Washer	EP440239
3	Drawbolt Clamping Nut	EP440222
4	Drawbolt	EP440221
5	Drawbolt Retaining Groove	N/A
6	Torque Reacting Grooves (One Each Side Of Mandrel)	N/A
7	Mandrel Shaft	EP440200
8	Set Screw: Locates In Drawbolt Retaining Groove (Item 5)	EP010058
9	Collet Engaging Keys	N/A
10	Collet 1 .980" – 1.500" (25 – 38 mm)	EP440230
11	Collet Retaining Spring	EP440042
12	Collet 2 1.500" – 1.970" (38 – 50)	EP440235
13	Collet 2 Spring	EP440042
14	Collet 3	EP440237
15	Collet 3 Spring	EP440042
16	Gripping Segment Set 1.85" – 2.28" (47 – 58 mm)	EP440225
17	Gripping Segment Set 2.24" – 2.72" (57 – 69 mm)	EP440226
18	Gripping Segment Set 2.68" – 3.15" (68 – 80 mm)	EP440227
19	Collet wedge	EP440240
20	"C" End Retaining Nut	EP440238

Fig. 3 Mandrel Assembly 1" – 3"