Elliott offers a complete line of precision tube tools, including:

tube expanders

- Boiler Expanders
- Heat Exchanger Expanders
- Condenser Expanders
- Refinery Expanders

tube rolling motors & torque controls

- Electric
- Pneumatic

tube cleaners

- Air & Water Driven Motors (Internal/External Drives)
- Jiffy Guns (“Shoot-Thru” Devices)
- Roto-Jet (Rotating Flex Shaft)

additional products

- Tube and Joint Testers
- Tube Plugs (High & Low Pressure)

retubing tools

- Tube Gauges
- Tube Cutters
- Manual Tools
- Spear Type Tube Pullers
- Collet-Type Tube Pullers
- CYCLGRIP Tube Extractors
- Grooving Tools
- End-Prep Tools

metal working products

- Back Chamfering Tools
- Carbide Roller Burnishing Tools
- Diamond Burnishing Tools
- Elliptical Deburring Tools
- Fine Boring Tools
- Internal Recessing Tools
- Magic Vise
- Mechanical Joining Tools
- Roller Burnishing Tools
- Single Blade Reamers

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9050 Series
Pneumatic Torque Controls

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 9050 Series Torque Controls are pneumatic rolling motors for tube expansion applications. The torque control feature allows for uniform tube to tube sheet tightness, regardless of sheet hole tolerances.

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 9050 Series Torque Control will provide many years of trouble free operation.

PARTS LIST

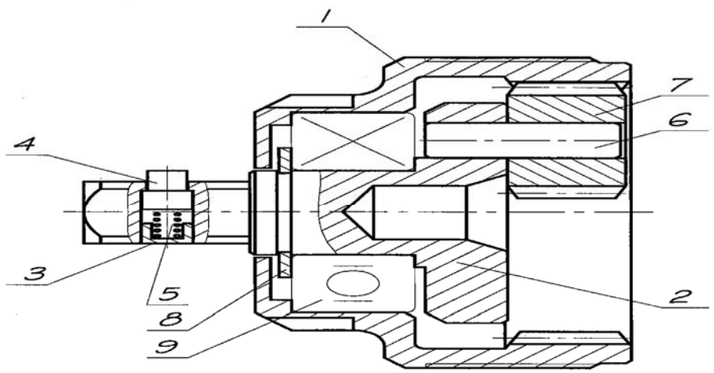

Fig. 5 GEAR ASSEMBLY

NO.	NAME OF PART	QTY.
1	Gear Case	1
2	Spider	1
3	Sleeve	1
4	Pin	1
5	Spring	1
6	Idler Gear Pin	3
7	Idler	3
8	Ring	1
9	Ball Bearing	1

SAFETY

Every effort has been made to ensure the operation of the Elliott 9050 Series Torque Control 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 9050 Series Torque Control, read this Operation Manual thoroughly before use.

2. Always wear OSHA approved protective equipment and clothing when operating these torque controls.

3. Do not allow other people in the area of the machine unless they are wearing OSHA approved equipment and clothing.

4. Ensure all pneumatic connections are properly made and that the air hoses are in good condition.

5. Maintain operator balance at all times. Reaction torque forces will be developed by these motors.

6. Before the tool is connected to the air supply, check the throttle for proper operation (throttle moves freely and returns to closed position). Clear the air hose of accumulated dust and moisture. Ensure the air line is shut off and drained of air before removing a tool from service or changing sockets, to ensure the tool does not operate if the throttle is accidentally engaged.

7. Do not operate the machine if there appears to be damage to the machine or if performance appears to be unsatisfactory.

8. Never use the Elliott 9050 Series Torque Control or any other power tool when under the influence of medication, drugs or alcohol that decrease concentration and impair operator control.

CAUTION!
Tools with clutches may stall rather than shut off if adjusted over maximum power output of tool or if there is a drop in air pressure. The operator must then resist stall torque until the throttle is released.

REMEMBER!
Use minimum handgrip force.
Keep body and hands warm and dry.
Avoid continuous exposure to vibration.
Keep wrists straight.
Avoid repeated bending of wrists and hands.
Keep wrists in a neutral position and avoid stressful postures.

SPECIFICATIONS

Models	SPEED AND TORQUE 90 PSIG PRESSURE								
	Free Speed	Maximum Torque		Minimum Torque		Overall Length		Weight	
	(RPM)	In lbs.	Nm	In lbs.	Nm	Inches	mm	Lbs.	Kg.
9050-1250	1250	108	12.20	12	1.35	10	255	8.8	4
9050-700	700	210	23.70	20	2.26	10	255	8.8	4
9050-500	500	319	36	44	5	10	270	8.8	4

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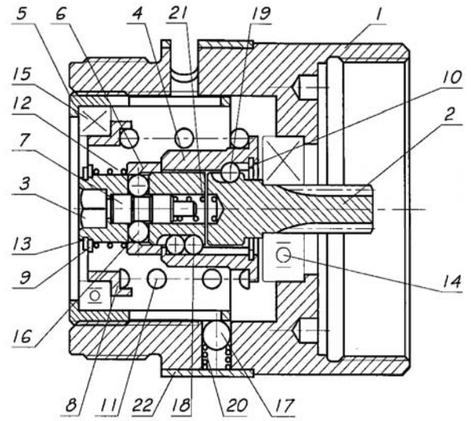

Fig. 4 CLUTCH

NO.	NAME OF PART	QTY.
1	Clutch Housing	1
2	Driven Shaft	1
3	Driving Shaft	1
4	Ball Retainer	1
5	Adjusting Nut	1
6	Trip Sleeve	1
7	Trip Plunger	1
8	Torque Spring Plate	1
9	Retainer Ring	1
10	Cam Retainer Ring	1
11	Torque Spring	1
12	Trip Sleeve Spring	1
13	Retainer Ring	1
14	Ball Bearing	1
15	Ball Bearing	1
16	4.5mm Steel Ball	2
17	6mm Steel Ball	1
18	4mm Steel Ball	6
19	4mm Steel Ball	3
20	Ball Spring	1
21	Trip Plunger Spring	1
22	Adjustment Cover	1

PARTS LIST

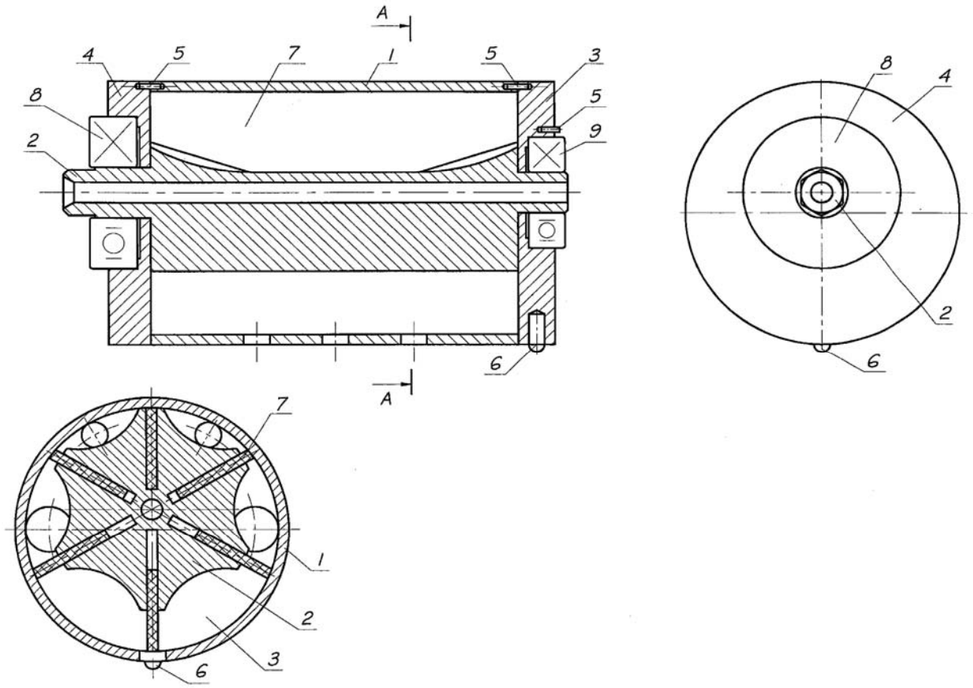

Fig. 3 MOTOR

NO.	NAME OF PART	QTY.
1	Cylinder	1
2	Rotor	1
3	Rear Bearing Plate	1
4	Front Bearing Plate	1
5	Motor Alignment Pin	1
6	Rotor Blade	6
7	Cylinder Pin	3
8	Rotor Bearing	1
9	Rotor Bearing	1

START UP AND OPERATION

The Elliott 9050 Series Torque Controls are designed to operate on 90 PSIG air pressure, but do not depend on controlled air pressure to maintain accurate torque. Accurate torque is achieved by setting the clutch to the desired torque for the application. The tool will shut off automatically at this torque. Releasing the throttle will allow the tool to reset for the next cycle.

Only use sockets approved for power tool service.

Important: Before operation, spray WD40 or equal into the inlet bushing and start the throttle. This cleans and pre-lubricates the tool prior to operation.

Clutch Adjustment
Rotate the adjustment cover until the adjustment slot is uncovered. With the adapter facing away, use the clutch adjustment pin to rotate the adjusting nut clockwise to increase the torque setting and anti-clockwise to decrease the setting. After adjustment, rotate the cover over the slot to lock the nut in place.

Caution! If the clutch is adjusted over the maximum power output of the tool, the clutch 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 clutch not to function due to a loss of motor power and the tool will function like a stall-type tool. Grip tool securely and be prepared to counteract stall torque in case clutch is improperly adjusted.

Air Supply
An automatic in-line filter lubricator is highly recommended to supply the tool with clean, lubricated air, this will increase tool life. For maximum performance use a 1/2" I.D. air hose no longer than 8' in length. If additional length is required a 3/4" or larger hose should be connected to the 1/2" hose. The air hose should be cleared of accumulated dust and moisture and one teaspoonful of a good grade of 10W machine oil should be poured into the machine before connecting the hose to the tool.

Lubrication
Application of the tool should govern how often it is greased. The right angle gears should receive a generous amount of grease, such as **Retinax EPX2** through the grease plug after every 40 hours of operation.

TORQUE SETTING

First you must calculate the expanded inside diameter (De) of the tube when fitted into the tube sheet. This will vary depending on the tube sheet hole size, tube outside diameter, tube wall thickness, material and percentage of wall thinning that is required.

The formula and an example are shown below.

$$De = (Do - Dt) + Di + S$$

Where: –

De = Final expanded ID
Do = Tube sheet hole lD
Dt = Tube OD
Di = Tube ID
A = Wall thickness
S = % of wall thickness x 2

Example:

Do = 52mm (2.047”)
Dt = 51mm (2.008”)
Di = 45mm (1.771”)
A = 3mm (.118”)
S = % of wall thickness x 2

$$De = (52 – 51) + 45 + O.36$$
$$(2.047” – 2.008”) + 1.771” + .014”$$

$$De = 46.36mm\ (1.825”)$$

Adjust the clutch to its minimum setting as described in the “Start Up” section.

A. Expand the tube until the clutch operates, switch into reverse and remove expander.
B. Measure the expanded diameter (De) and compare with the calculation.
C. If the measured diameter is less than the calculated value, increase the clutch setting and re-expand the tube.
D. Re-measure and repeat C above until the correct expanded value (De) is achieved.
E. After correct adjustment of the clutch, rotate the cover over the clutch adjusting slot to avoid accidental clutch adjustment and stop the ingress of dirt.

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Fig. 2 GEAR ASSEMBLY

NO.	NAME OF PART	QTY.
1	Handle	1
2	Plate	1
3	Motor Spacer	1
4	Reverse Valve	1
5	Spacer	1
6	Gasket	1
7	Shut-Off Valve	1
8	Rod	1
9	Sleeve	1
10	Dowel Pin	2
11	Lock Nut	1
12	Sleeve	1
13	Rod	1
14	Sleeve of the Reverse Ring	1
15	Reverse Valve Screw	1
16	Reverse Ring	1
17	Throttle Return Spring	1
18	Throttle Valve Seat	1
19	Throttle Valve	1
20	Spring	1
21	Handle Sleeve	1
22	Screen Sleeve	1
23	Throttle	1
24	Inlet Bushing	1
25	Exhaust Handle	1
26	Silencer Diffuser	1
27	Silencer Outlet	1
28	“O” - Ring	1
29	6mm Ball	1

PARTS LIST

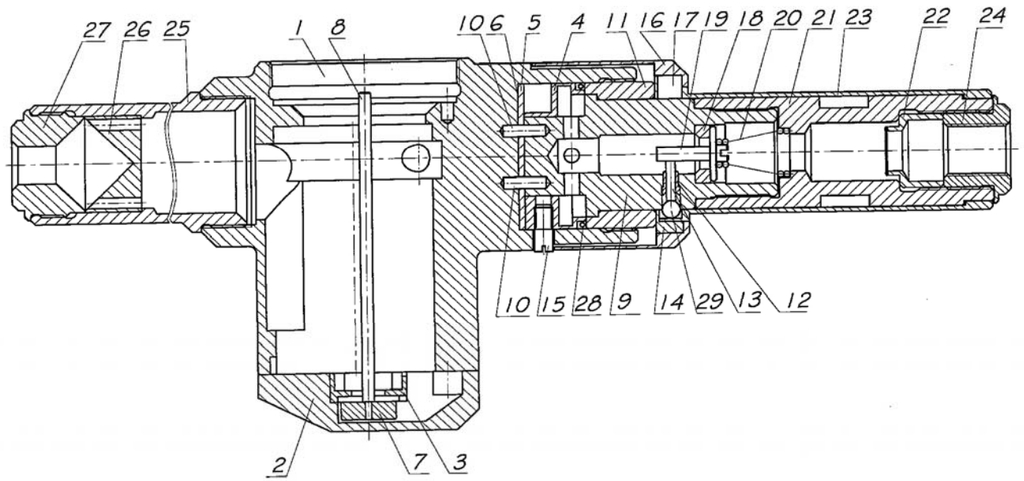

Fig. 2
MOTOR HOUSING AND THROTTLE ASSEMBLY

MAINTENANCE

The Elliott 9050 Series Torque Controls consist of the following main units and parts:
Handle, pneumatic reversing motor, limiting torque clutch and gear case.

The pneumatic drive works as follows:
When the starting handle is turned, compressed air is released into the rotor chamber of the motor and turns the rotor. This rotation transfers through the torque clutch and the planetary gear transfers to the tube expander fixed on the spindle. When the set torque is reached the clutch stops the motor in forward gear. In order to restart the motor the pneumatic drive must be switched into reverse.

The Handle

When the throttle (Item 23, Fig. 2) is turned:

- through the reverse ring (Item 16, Fig. 2), the reverse valve screw (Item 15, Fig. 2) and reversing valve (Item 4, Fig. 2) open the channel for forward or reverse motor rotation.
- through the ball (Item 29, Fig. 2) and rod (Item 13, Fig. 2), the throttle valve (Item 19, Fig. 2) opens for the airflow.

The throttle is equipped with a return spring (Item 17, Fig. 2) for emergency shut-off of the pneumatic drive. If the throttle is released while in use it will automatically return to the neutral position.
In forward drive the air passes through the shut-off valve (Item 7, Fig. 2). When the clutch operates into action, air is not supplied to the motor.
The used air is released through the exhaust handle (Item 25, Fig. 2) into the atmosphere.

The Motor

The rotationary motor consists of the rotor (Item 2, Fig. 3), the cylinder (Item 1, Fig. 3), six blades (Item 6, Fig. 3), front (Item 4, Fig. 3) and rear (Item 3, Fig. 3) bearing plates, bearings (Item 8 and 9, Fig. 3). The pins (Item 7, Fig. 3) are used to position the plates in relation to the cylinder, and the alignment pin (Item 5, Fig. 3) is used to position the motor inside the handle.

The Limiting Torque Clutch

The rotation of the rotor is transferred through the driving shaft (Item 3, Fig. 4) and steel balls (Item 18, Fig. 4) to the ball retainer (Item 4, Fig. 4), which then transfers the rotation via the steel balls (Item 19, Fig. 4) positioned in special notches, to the driven shaft (Item 2, Fig. 4).

The trip sleeve (Item 6, Fig. 4) and steel balls (Item 16, Fig. 4) keep the plunger (Item 7, Fig. 4) in the working position. The shut-off valve (Item 7, Fig. 2), under the action of the compressed air, puts permanent pressure on the plunger (Item 7, Fig. 4) via the rod (Item 8, Fig. 4). While the trip sleeve (Item 6, Fig. 4) is in the working position, the shut-off valve (Item 7, Fig. 2) is immobile.

When torque is increased the ball retainer (Item 4, Fig. 4) begins, overcoming the resistance of the spring (Item 11, Fig. 4), to move in relation to the driven shaft (Item 2, Fig. 4) and thus alters the position of the sleeve (Item 6, Fig. 4). When the balls (Item 16, Fig. 4) reach the fluted section of the sleeve (Item 6, Fig. 4), the valve and rod are moved to the side of the gear case and are pushed into the motor spacer (Item 3, Fig. 2), shutting off the air flow to the motor. The valve remains in this position while the throttle (Item 23, Fig. 2) is kept in forward drive.

When the throttle is switched to neutral the airflow to the motor is shut off by the throttle valve (Item 19, Fig. 2) and the pressure on the shut-off valve (Item 7, Fig. 2) is released. The ball retainer (Item 4, Fig. 4), under the action of the torque spring (Item 11, Fig. 4), and the trip sleeve (Item 6, Fig. 4) under the action of the trip sleeve spring (Item 12, Fig. 4), return to the starting position. At the same time the trip plunger spring (Item 21, Fig. 4) returns the plunger (Item 7, Fig. 4), rod (Item 8, Fig. 2) and valve (Item 7, Fig. 2) to the starting position.

The Gear Case

The one-step planetary gears consist of:
Gear case (Item 1, Fig. 5), spider (Item 2, Fig. 5) and idlers (Item 7, Fig. 5) positioned on the gear pins (Item 6, Fig. 5). On the spindle there is a space for an adapter for securing tube expanding tools.

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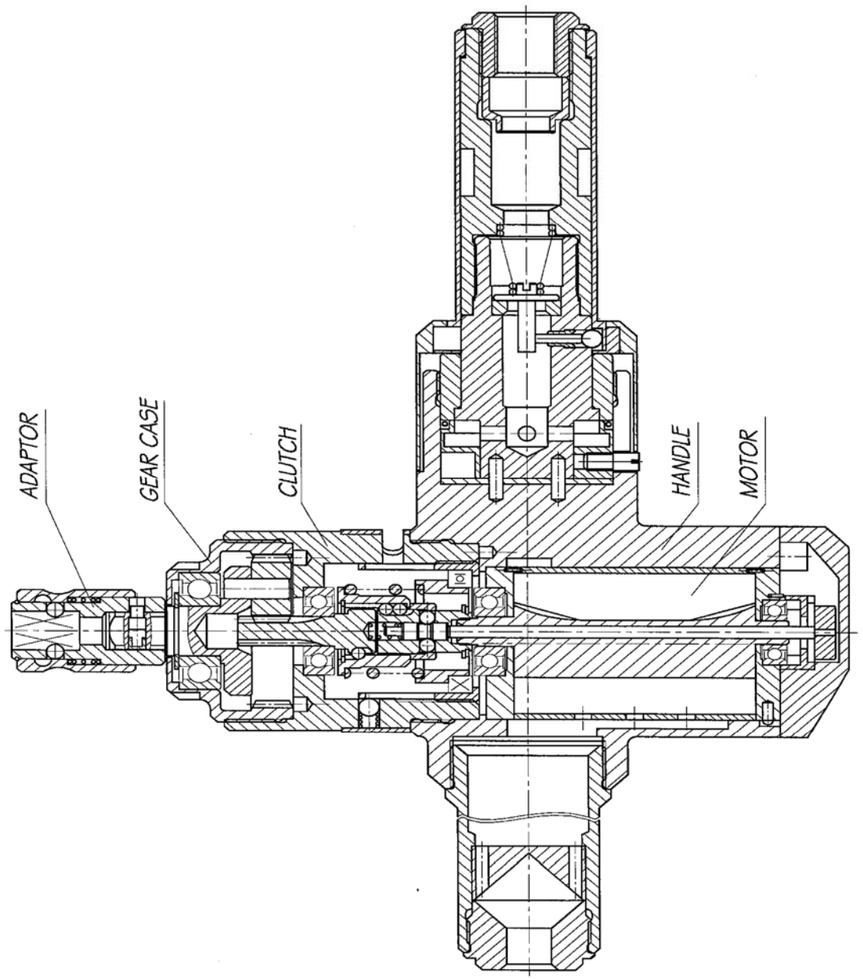

Fig. 1