

# Quackenbush®

## 136SC-150 SELF-COLLETING DRILLS



**Houston Operation**  
7007 Pinemont  
Houston, TX 77040

**Recoules Operation**  
Zone industrielle - B.P. 28  
Avenue Maurice Chevalier  
77831 Ozoir-la-Ferriere Cedex France

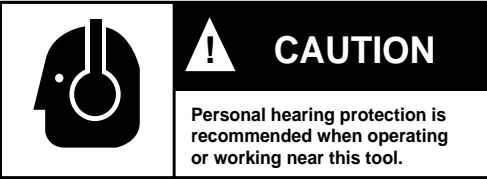
# Safety Recommendations

For your safety and the safety of others, read and understand the safety recommendations and operating instructions before operating any drill motor.

Always wear protective equipment:



For additional information on eye protection, read the latest edition of ANSI Z87.1, Occupational and Educational Eye and Face Protection. This standard is available from the American National Standards Institute, Inc., 11 West 42nd Street, New York, N.Y. 10036.



Hearing protection is recommended in high noise areas (above 85dBA). Close proximity of additional tools, reflective surfaces, process noises, etc., can contribute substantially to the sound level experienced by the operator.



Follow good machine shop practices. Rotating shafts and moving components entangle and entrap, and may result in serious injuries. Never wear long hair, loose-fitting clothes, gloves, ties, or jewelry when working with or near a drill of any type.

Quackenbush drills are designed to operate on 90psig (6.2 bar) maximum air pressure using the proper hose. Excessive air pressure increases the loads and stresses on tool parts and drills, and may result in breakage. The installation of a filter-regulator-lubricator in the air supply line ahead of the tool is highly recommended.

## CAUTION

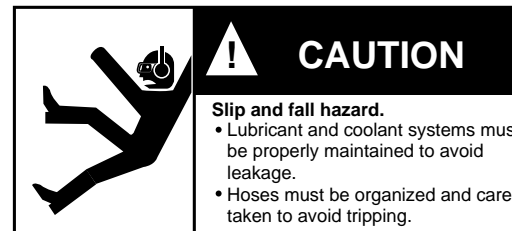
- Before the tool is connected to the air supply, the throttle should be checked for proper operation (i.e., throttle valve moves freely and returns to closed position).
- Before removing a tool from service or changing drill bits, make sure the air line is shut off and drained of air. This will prevent the tool from operating if the throttle is accidentally engaged.
- Cutting tools used with these drill motors are sharp. Handle them carefully to avoid injury.
- The collet and mandrel must be inserted into a properly sized pre-drilled hole before starting the tool. An improperly sized pre-drilled hole prevents the mandrel from engaging the collet and could result in slippage of the tool. An improperly selected collet and mandrel can also result in slippage of the tool.



Drilling or other use of this tool may produce hazardous fumes and/or dust. To avoid adverse health effects utilize adequate ventilation and/or a respirator. Read the material safety data sheet of any cutting fluids or materials involved in the drilling process.

## CAUTION

Some non-ferrous metal chips (or dusts) are combustible. Examples: Aluminum, magnesium, Titanium, and Zirconium. See the material safety data sheets for combustibility of materials drilled. Never collect spark generating material with combustible material. Examples: Collecting both steel and aluminum or steel and titanium.



Quackenbush drills are often used with lubricant or cooling systems which must be properly maintained to avoid leakage. Failure to do so can result in serious injuries from slipping on oily surfaces.

# Safety Recommendations



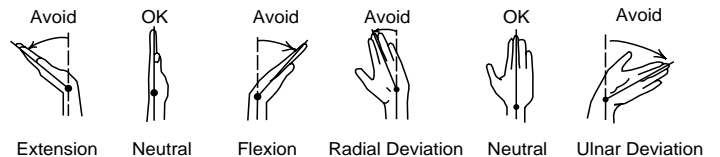
Due to the number and variety of tooling applications, the user's methods engineering departments, ect., must consider any hazards that may be associated with each specific application of this product and provide adequate operator protection from inadvertent contact with any moving components. The clamping and feed mechanisms of self-colleting drill motors are exposed for visibility and can move when the air supply is connected or disconnected. To avoid injury, keep fingers and hands away from these areas when handling or operating this tool.



Some individuals are susceptible to disorders of the hands and arms when exposed to vibration and/or tasks which involve repetitive work motions. Those individuals predisposed to vascular or circulatory problems may be particularly susceptible. Cumulative trauma disorders such as carpal tunnel syndrome and tendinitis can be caused or aggravated by repetitious, 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, hyperextended, or turned side to side. Stressful postures should be avoided and can be controlled through tool selection and work location.

Any tool operator should be aware of the following warning signs and symptoms so that a problem can be addressed before it becomes a debilitating injury. Any user suffering from prolonged symptoms of tingling, numbness, blanching of fingers, clumsiness or weakened grip, inability to hold objects, nocturnal pain in the hand, or any other disorder of the shoulders, arms, wrists, or fingers should notify their employer so that a review of what steps

might be taken to prevent further occurrences. These steps might include but are not limited to, repositioning the workpiece or redesigning the workstation, reassigning tool users to other jobs, rotating jobs, changing worker pace, and/or changing the type of tool used so as to minimize stress on the operator. Some tasks may require more than one type of tool to obtain the optimum operator/ tool/ task relationship.



The following recommendations will help reduce or moderate the effects of repetitive work motions. The operator of any drill should:

- Use a minimum hand grip force consistent with proper control and safe operation
- Keep body and hands warm and dry
- Avoid anything that inhibits blood circulation
  - Smoking Tobacco
  - Cold Temperatures
  - Certain Drugs
- Avoid awkward postures
- Keep wrists as straight as possible
- Interrupt work, activities, or rotate jobs to provide periods free from repetitive work motions.

# Introduction and General Information

The 136SC-150 is an air operated, hydraulically controlled tool that automatically clamps to the material, drills and countersinks close tolerance holes in one operation. This drill will produce high quality holes in aluminum, steel, titanium and petroleum hybrid materials primarily found in the aircraft/aerospace industries. This drill motor has been designed using state-of-the-art technology that provides maximum power, minimum weight and the highest degree of accuracy for demanding hole preparation requirements.

## Technical Data

**Feed Stroke:** Feed stroke of the 136SC-150 is 1.50 inches to drill and countersink in 1.3125 inch stacked material. The feed stroke is unaffected by the collet stroke.

**Collet Stroke:** The 136SC-150 will clamp throughout its .56 inch stroke. Collet stroke is unaffected by feed stroke.

**Spindle Adjustment:** The spindle adjustment of .312 inch allows for drill length variations. See Spindle Adjustment information.

**Countersink Depth Control:** A micrometer adjustment provides for countersink stop repeatability within .001 inch.

**Cutter Sizes:** The 136SC-150 will accommodate .312 diameter drills without countersink and .250 diameter drills with .505 countersink diameter.

**Feed Rate:** An adjustable drill feed rate mechanism enables the 136SC-150 to drill from 5 seconds per inch to 1 minute per inch. See Feed Rate Adjustment information.

**Cutter to Collet Spacing:** The cutter to collet distance is adjustable between .500 inch minimum to 2.75 inch maximum.

**Coolant:** The 136SC-150 has a drill point coolant port in the pressure foot. A coolant mist lubricator is available (See Accessories).

**Air Motor:** The air motor develops .88 horsepower when supplied with air at 90 p.s.i.

**Air Consumption:** Air consumption of the 136SC-150 is 35 c.f.m. at 90 p.s.i. dynamic.

**Weight:** Tool weight with the steel pressure foot is 8.0 pounds.

**Spindle Speeds:** Eight geared spindle speeds are available: 400, 950, 2100, 3100, 6000, 7800, 11500, and 22500 RPM. Any gear set can be used with the 136SC-150 tool.

**Trigger Lock:** A trigger lock is provided which allows the tool to be locked in the "Operate" position. With the lock activated, the tool will run through the clamp, feed and retract cycles, but it will not unclamp or stop the motor until the trigger lock is manually released.

## Tool Start-Up

The 136SC-150 drill is shipped from the factory equipped to the customer's specifications: spindle RPM, spindle to accommodate cutter type desired, pressure foot type, collet guide to accommodate collet desired and optional booster pump (if required).

After unpacking, examine the customer-specified equipment on the tool to verify type and speed of components.

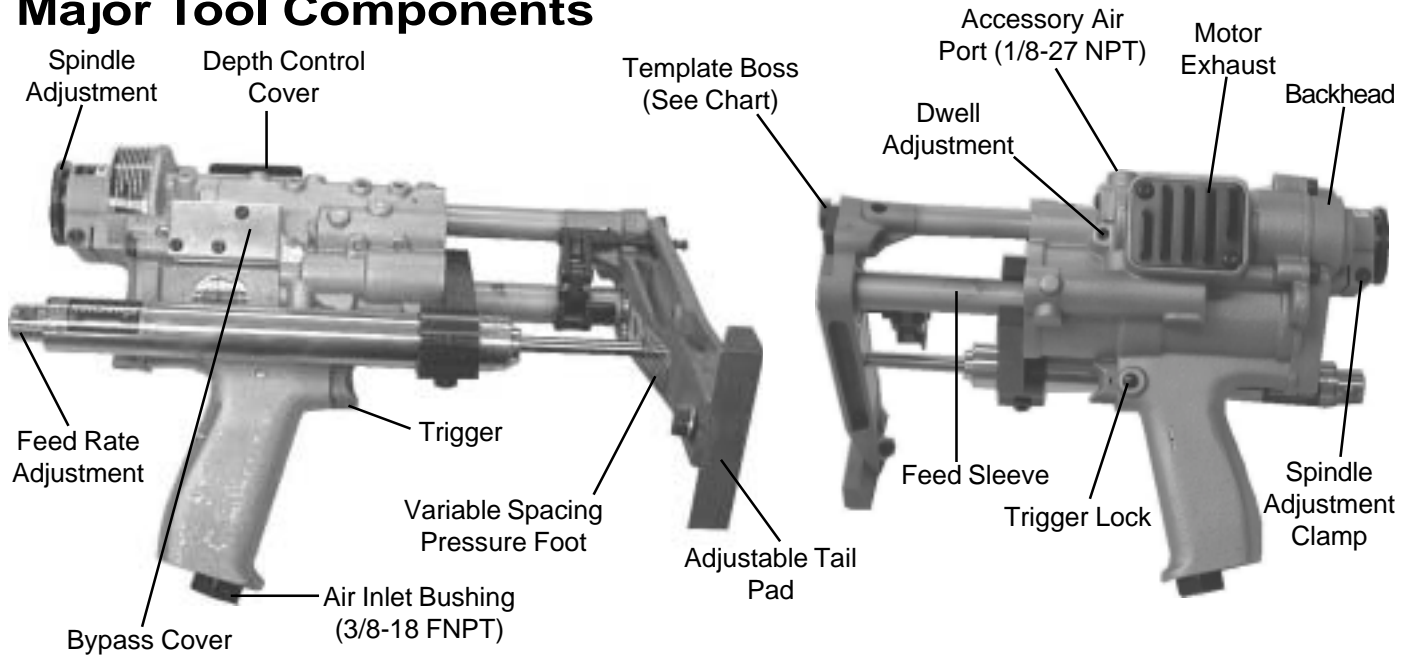
Attach air line to 3/8-18 NPT inlet bushing. If quick disconnect fittings are used, 3/8 in. ID are minimum. The 136SC-150 drill requires a supply of clean 90-100 PSI air. Air consumption is 35 CFM at 90 PSI. The use of the in-line lubricator will provide the proper lubrication for the air motor and will significantly increase the tool life expectancy.

Because O-rings are extensively used to seal systems within the tool, the elimination of foreign particles and other contaminants will reduce the possibility of damage to these parts. Always inspect O-rings for damage or wear and replace as required. The use of silicone O-ring lubricant is strongly recommended during reassembly. The addition of oil in the air line will also increase motor and valve life as well as the life of the O-rings.

## 136SC-150 DRILL MOTOR SPECIFICATIONS

|                     |   |
|---------------------|---|
| WEIGHT              | 8.0 LBS. MAX. W/ALUMINUM FOOT   |
| AIR CONSUMPTION     | 35 C.F.M. @ 90 P.S.I. DYNAMIC   |
| HORSE POWER         | APPROX. .88 @ 90 P.S.I.   |
| O/A LENGTH          | 10.5 IN. MAX WITH SPINDLE ADJUST AT FULL EXTENSION  |
| STROKE              | 1.50 IN. (DRILL & C/SINK 1.31 IN. STACK)  |
| COLLET STROKE       | .56 IN. (NO LOSS OF FEED STROKE)  |
| COUNTERSINK         | COUNTERSINK STOP REPEATS WITHIN .001 IN.  |
| FEED RATE           | MIN. 5 SEC. PER INCH, MAX 1 MIN. PER INCH   |
| SPINDLE SPEEDS      | 400, 950, 2100, 3100, 6000, 7800, 11,500 & 22,500 RPM                                     |
| DRILLING THRUST     | 197 LBS. MAX. (UNREGULATED AIR)   |
| CLAMP FORCE         | 325 LBS. START CLAMP FORCE (UNREGULATED AIR)  |
| SPINDLE ADJUSTMENT  | .312 IN. ADJUSTMENT TO ALLOW FOR DRILL LENGTH VARIATIONS                                  |
| MAX. DRILL SIZES    | .312 (NO C/SINK), .250(.505 C/SINK DIA.)  |
| COLLET FOOT SPACING | .500 IN. MIN.-2.75 IN. MAX.   |
| SPINDLE             | .375 IN. DIA. W/1/4-28 THR'D FOR I.D.<br>THREAD TYPE DRILLS OR 1/4-28 MALE THD. DRILLS    |
| COOLANT             | AIR BLAST PORT & DRILL POINT PORT IN TEMPLATE STD.,<br>COOLANT MIST LUBRICATOR AVAILABLE. |

## Major Tool Components



## Tool Adjustments

**WARNING:** Disconnect air-supply before servicing. Clamp mechanism moves when connecting or removing air supply. Keep hands and fingers away from clamping and feed mechanism.

### Spindle Stroke Adjustment

Loosen spindle adjustment lock, then turn spindle adjustment. Right hand rotation advances cutter forward; left hand rotation returns cutter. Correct cutter point position is flush with face of template boss. When cutter is properly adjusted, lightly tighten spindle adjustment clamp to hold adjustment.

### Micrometer Depth Adjustment

Loosen depth adjustment set screws and rotate depth adjustment nut. Clockwise rotation decreases depth; counterclockwise increases depth. Graduations scribed on barrel are in .001" increments. When proper depth is achieved, lightly tighten set screws.

### Feed Rate Adjustment

With appropriate tool, turning feed rate adjustment counterclockwise, increases feed rate. Turning the screw clockwise decreases feed rate. Feed rate can be measured by using the following formula:

$$\text{Time} = \frac{60 \text{ seconds}}{\text{Feed Rate} \times \text{Spindle Speed (rpm)}}$$

### Dwell Adjustment

Insert appropriate size hex wrench into dwell adjustment valve opening. Rotate wrench clockwise until valve seats lightly. Rotate valve counterclockwise 1/4 turn to obtain base setting.

Note: If adjustment valve is opened too far, drill motor will not cycle, and feed cycle cannot be obtained. To correct, turn valve clockwise to seat valve and set according to instructions above.

If valve is closed too far, retract cycle cannot be obtained. To correct, turn valve counterclockwise and set according to instructions.

Closing valve increases countersink dwell time; opening valve decreases countersink dwell time.

### Tail Pad Adjustment

The purpose of the tail pad is to compensate for slight surface curvature of the workpiece being drilled and to assure that the hole being drilled is perpendicular to the surface.

To adjust to a flat plane for drilling flat surfaces, use a straight edge between the tail pad and face of template boss and adjust the tail pad until the straight edge is flush with the face of the template boss.

An optional tail pad is available for high curvature surfaces. (See Accessories for additional information.)

# TROUBLE SHOOTING

| SYMPTOM  | REASON  | SOLUTION   |
|--|---|--|
| Air motor and/or clamp and feed functions do not start when trigger is depressed.        | Trigger or pilot valves clogged with foreign matter.                            | Remove trigger and pilot valves (separately) and inspect for rust or debris. Inspect O-rings and replace if necessary.                                 |
| Air motor does not run when trigger is depressed, but feed and clamp functions properly. | Gears damaged or jammed with debris.  | With air line disconnected check for free spindle rotation with hex key wrench in end of spindle. Remove backhead, clean and inspect gears for damage. |
|  | Foreign matter in motor inlet.  | Remove motor and clean debris from motor inlet.  |
|  | Broken rotor blades, rotor or gear bearings.                                    | Remove motor and inspect rotor blades and bearings. Replace if necessary.  |
| Air motor "idles" when trigger valve is released.  | Pilot valve or retract and dwell valve sticky (not fully reset), or bad O-ring. | Remove and check valves for debris and free movement of spool. Inspect O-rings, lubricate and reassemble.  |
|  | Leaking O-ring on air motor rear bearing support.                               | Remove and inspect O-rings. Replace if necessary and reassemble.   |
| Motor runs, but clamp & feed functions do not start.                                     | Unclamp check valve doesn't shift when trigger is depressed.                    | Remove unclamp check valve and inspect for debris, free movement and damaged O-rings. Lubricate and reassemble.  |
| Motor runs, clamps but doesn't feed.   | Feed control valve "closed"   | Back off feed control valve counter-clockwise until feed commences.  |
| Lunge during feed or variation in feed rate.   | Defective feed control cylinder.  | Replace feed control cylinder.   |
| Tool doesn't retract at end of feed stroke.  | Dwell valve seated too tightly.   | Back dwell valve off from seat 1/8 turn to 1-1/2 turn.   |
|  | Retract and dwell valve doesn't shift.  | Remove retract and dwell valve and inspect for debris, free movement and damaged O-rings. Lubricate and reassemble.                                    |
|  | Depth control adjusted out of the max. range of the tool.                       | Readjust depth control nut within the feed stroke of the tool (ref.: 1.50 max. stroke).  |
| Tool retracts shortly after trigger depressed.   | Dwell valve opened too far off of seat.   | Turn dwell valve clockwise (should be 1/8 to 1-1/2 turns of seat).   |
| Tool "pulses" on retract (rapid "feed retract-feed retract").                            | Damaged O-rings on retract and dwell valve.                                     | Remove retract and dwell valve, inspect O-rings and replace as necessary. Lubricate and reassemble.  |

## MAINTENANCE KIT - 621953

| PART NO. | NAME OF PART  | QTY. |
|----------|---|------|
| 382370   | Tool box  | 1    |
| 622849   | Assembly tool                                       | 1    |
| 623014   | Assembly tool, press. Foot nut                      | 1    |
| 623015   | Assembly tool, trigger lock                         | 1    |
| 623334   | Assembly tool, pressure hydraulic & front enclosure | 1    |
| 623515   | Assembly tool, pressure foot nut                    | 1    |
| 623520   | Assembly tool, bulkhead removal                     | 1    |
| 623647   | Assembly tool, depth stop                           | 1    |
| 632424   | Removal tool, valve                                 | 1    |
| 624759   | Slide hammer puller                                 | 1    |
| 624760   | Assembly fixture                                    | 1    |
| 624761   | Wrench, spindle bearing locknut                     | 1    |
| 624762   | Bearing installer                                   | 1    |
| 624763   | Removal tool, feed control valve                    | 1    |
| 624764   | Removal tool, pilot valve                           | 1    |
| 624765   | Arbor press fixture                                 | 1    |
| 624766   | Valve installation tool                             | 1    |
| 624767   | Wrench, feed control valve                          | 1    |
| 624768   | Tee wrench, foot body                               | 1    |

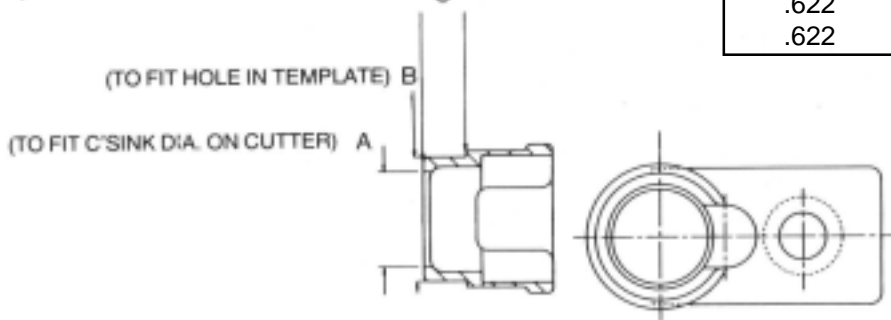
# Accessories

## Template Boss



Template Boss  
NOTE: Template bosses are optional and are to be specified by customer if required.

(TEMPLATE BOSS LENGTH IS .150.)



| APPLICATION          |               | TEMPLATE BOSS CODE NO. |
|----------------------|---------------|------------------------|
| B TEMPLATE HOLE DIA. | A CUTTER DIA. |                        |
| .434                 | .271          | 623573                 |
| .434                 | .286          | 623574                 |
| .434                 | .317          | 623575                 |
| .497                 | .271          | 623576                 |
| .497                 | .286          | 623577                 |
| .497                 | .317          | 623578                 |
| .497                 | .349          | 623579                 |
| .497                 | .380          | 623580                 |
| .622                 | .317          | 623581                 |
| .622                 | .349          | 623582                 |
| .622                 | .380          | 623583                 |
| .622                 | .411          | 623584                 |
| .622                 | .489          | 623585                 |
| .622                 | .505          | 623586                 |

## Jig Collet Foot Attachments

### Depth Sensing Jig Collet Foot (Pictured)

Depth sensing jig collet foot is used for accurately drilling and countersinking hole layouts utilizing a simple fixture plate. The cutter passes centrally through the drillmotor collet to produce holes concentric with the fixture plate holes. The depth sensing sleeve will drill and accurately countersink with fixture-to-workpiece variations of up to .125". Coolant and air blast port is fitted to the foot.

User must specify template hole and drill-countersink size as well as drill-countersink configuration.

### Non Depth Sensing Jig Collet Foot

Non-depth sensing jig collet foot is similar to the above foot without depth sensing capability. This foot is used for straight drilling applications where "rough" depth sensing only is required. This foot grips straight shank drills utilizing an "O-W" type collet (not supplied).

User must specify template hole and drill size.

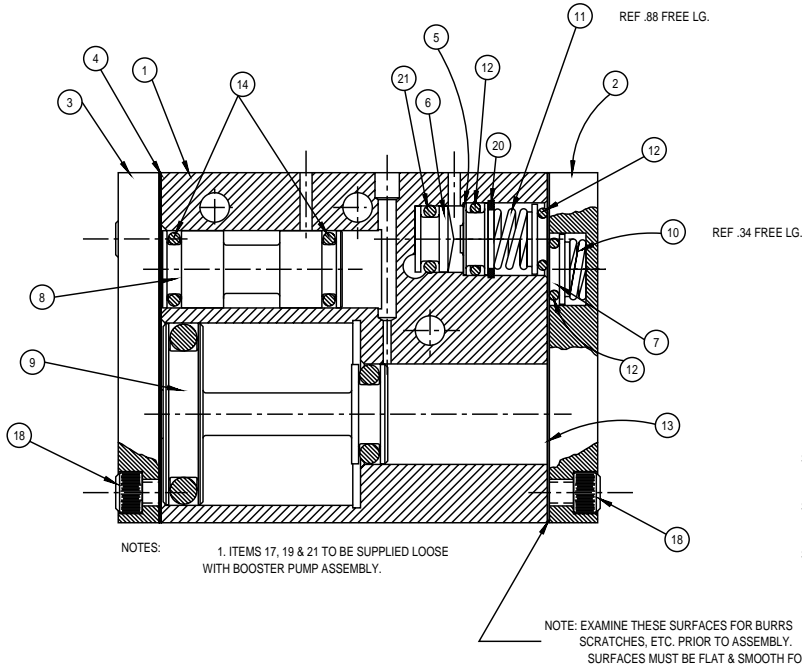
### High Curvature Pad Assembly

A high curvature pad (Part No.621522) is available for use in place of the standard pressure foot pad. The high curvature pad enables the drill to be used on surfaces with a greater curvature than the standard pad is capable of handling.



# Accessories

## Booster Pump Assembly



| ITEM NO.   | NO. REQ'D. | CODE NUMBER | DESCRIPTION                   |               |
|------------|------------|-------------|-------------------------------|---------------|
| 1          | 1          | 621500      | ASSY, BODY                    |               |
| 2          | 1          | 621501      | ASSY, END PLATE (HIGH PRESS.) |               |
| 3          | 1          | 622660      | END PLATE (LOW PRESS.)        |               |
| 4          | 1          | 622792      | GASKET, END PLATE             |               |
| 5          | 1          | 622662      | VALVE, PRESS. RELIEF          |               |
| 6          | 1          | 622663      | PISTON, PRESS. RELIEF         |               |
| 7          | 2          | 622664      | VALVE, CHECK                  |               |
| 8          | 1          | 622665      | VALVE, SHUTTLE                |               |
| 9          | 1          | 622666      | PISTON                        |               |
| 10         | 1          | 622652      | SPRING, COMPRESSION           |               |
| 11         | 1          | 622653      | SPRING, COMPRESSION           |               |
| 12         | 3          | 844304      | O-RING                        |               |
| 13         | 1          | 625112      | GASKET                        |               |
| 14         | 2          | 622654      | O-RING                        |               |
| 15         | 1          | 844308      | O-RING                        |               |
| 16         | 1          | 844315      | O-RING                        |               |
| SEE NOTE 1 | 17         | 2           | 847710                        | O-RING        |
| SEE NOTE 1 | 18         | 10          | 863337                        | SCREW         |
| SEE NOTE 1 | 19         | 3           | 617245                        | SCREW         |
| SEE NOTE 1 | 20         | 1           | 622845                        | RETAINER RING |
| SEE NOTE 1 | 21         | 3           | 844303                        | O-RING        |



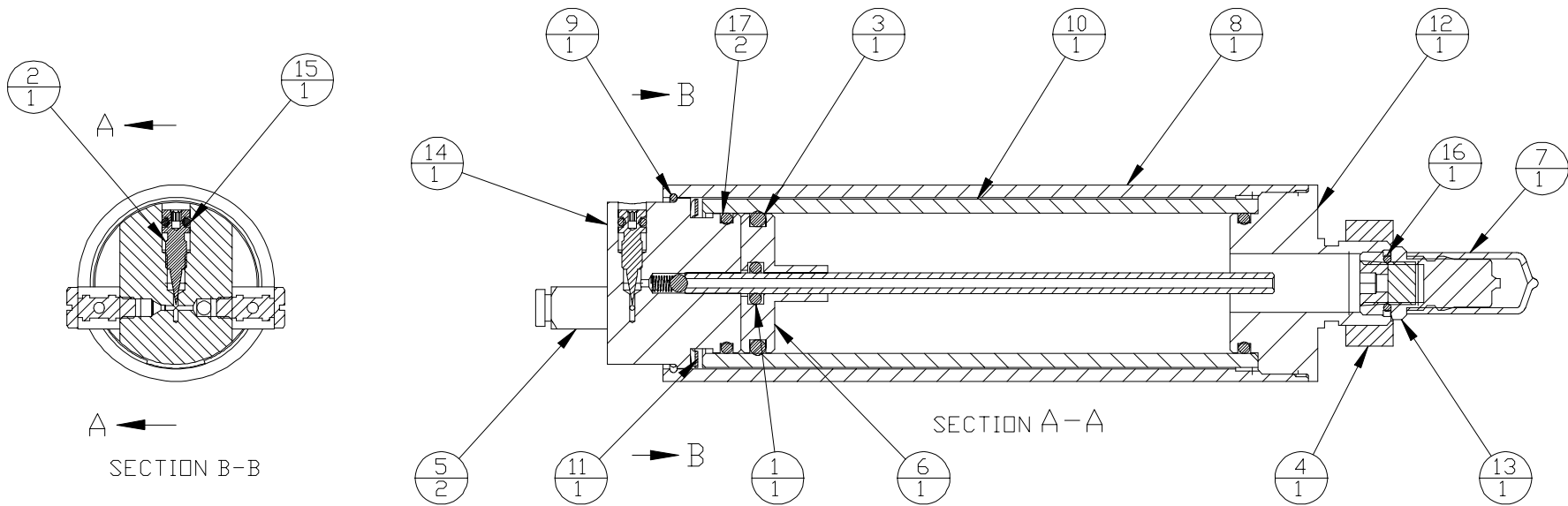
For increased clamping force or feed pressure, an optional Booster Pump (621482) is available. The pump provides extra clamp and feed pressures when drilling Titanium or taper drilling applications. The Booster Pump assembly will increase both clamp and feed forces by a factor of 2.5. The pump is easily installed on the Q-Matic Drill by replacing the cover supplied with the tool with the Booster Pump using the three screws supplied with the pump.

## Mist Lubricator Assembly

The mist lubricator assemblies are available to introduce coolant and an air blast to the cutter. The lubricator is actuated by air from the accessory air tap on the motor side and only functions when the motor is running. The following three pages show the three different types available. The mist lubricators and mounting brackets can be purchased as complete subassemblies using these numbers: Manual fill small capacity - 631878, Pressure fill small capacity - 631879, Pressure fill large capacity - 631880. The reservoirs and individual parts can be ordered using numbers listed on drawings.



**PRESSURE FILL MIST LUBRICATOR**



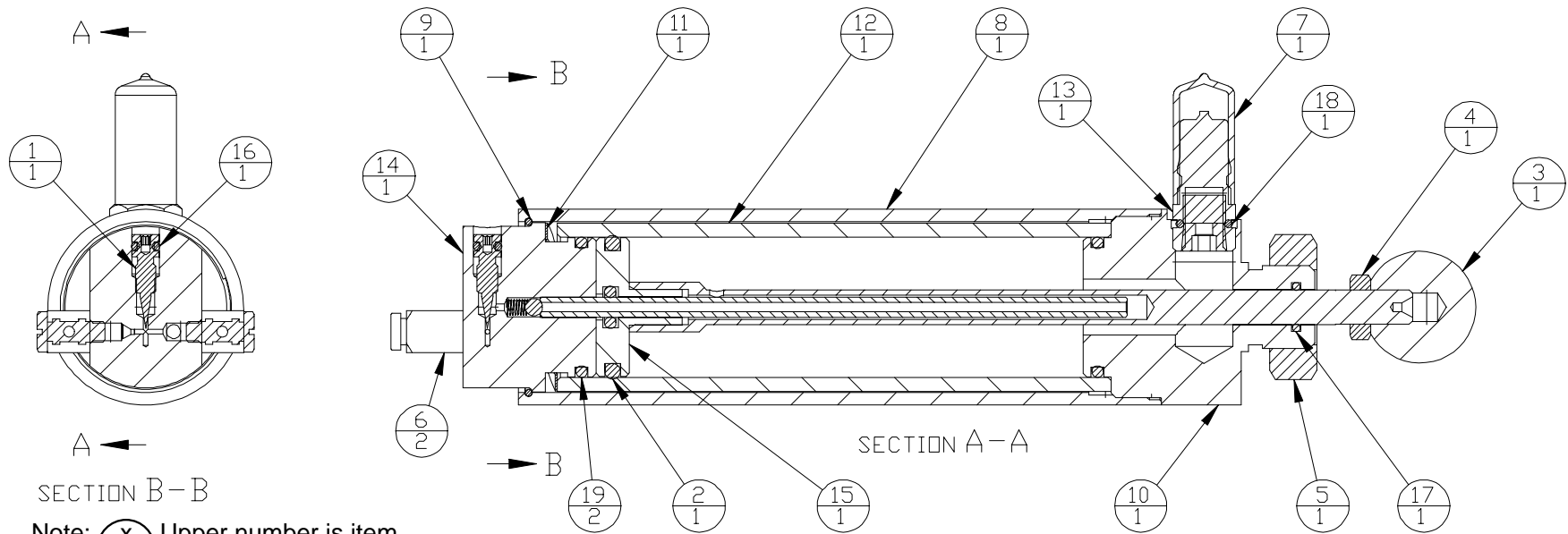
Note:  $\frac{x}{x}$  Upper number is item.  
 $\frac{x}{x}$  Lower number is quantity required.

631802 PRESSURE FILL LARGE CAPACITY

| ITEM | PART NO. | PART NAME                  | QTY. |
|------|----------|----------------------------|------|
| 1    | 203568   | RING, O                    | 1    |
| 2    | 622026   | VALVE, NEEDLE              | 1    |
| 3    | 622881   | RING, O                    | 1    |
| 4    | 624903   | NUT, JAM HEX               | 1    |
| 5    | 624905   | FITTING                    | 2    |
| 6    | 624914   | PISTON                     | 1    |
| 7    | 625015   | S-CAP                      | 1    |
| 8    | 629086   | COVER, LARGE CAPACITY      | 1    |
| 9    | 629093   | WIRE, RETAINING            | 1    |
| 10   | 629090   | CYLINDER, LARGE CAPACITY   | 1    |
| 11   | 629148   | SPRING, WAVE               | 1    |
| 12   | 629095   | CAP, MOUNT (PRESSURE FILL) | 1    |
| 13   | 631586   | FILTER ASSEMBLY            | 1    |
| 14   | 631756   | END CAP ASSEMBLY (LARGE)   | 1    |
| 15   | 844301   | RING, O                    | 1    |
| 16   | 844307   | RING, O                    | 1    |
| 17   | 869025   | RING, O                    | 2    |

631801 PRESSURE FILL SMALL CAPACITY

| ITEM | PART NO. | PART NAME                  | QTY. |
|------|----------|----------------------------|------|
| 1    | 203568   | RING, O                    | 1    |
| 2    | 622026   | VALVE, NEEDLE              | 1    |
| 3    | 622881   | RING, O                    | 1    |
| 4    | 624903   | NUT, JAM HEX               | 1    |
| 5    | 624905   | FITTING                    | 2    |
| 6    | 624914   | PISTON                     | 1    |
| 7    | 625015   | S-CAP                      | 1    |
| 8    | 629097   | COVER, SMALL CAPACITY      | 1    |
| 9    | 629093   | WIRE, RETAINING            | 1    |
| 10   | 629094   | CYLINDER, SMALL CAPACITY   | 1    |
| 11   | 629148   | SPRING, WAVE               | 1    |
| 12   | 629095   | CAP, MOUNT (PRESSURE FILL) | 1    |
| 13   | 631586   | FILTER ASSEMBLY            | 1    |
| 14   | 631757   | END CAP ASSEMBLY (SMALL)   | 1    |
| 15   | 844301   | RING, O                    | 1    |
| 16   | 844307   | RING, O                    | 1    |
| 17   | 869025   | RING, O                    | 2    |



Note:  $\frac{x}{x}$  Upper number is item.  
 $\frac{x}{x}$  Lower number is quantity required.

631799 MANUAL FILL LARGE CAPACITY

631800 MANUAL FILL SMALL CAPACITY

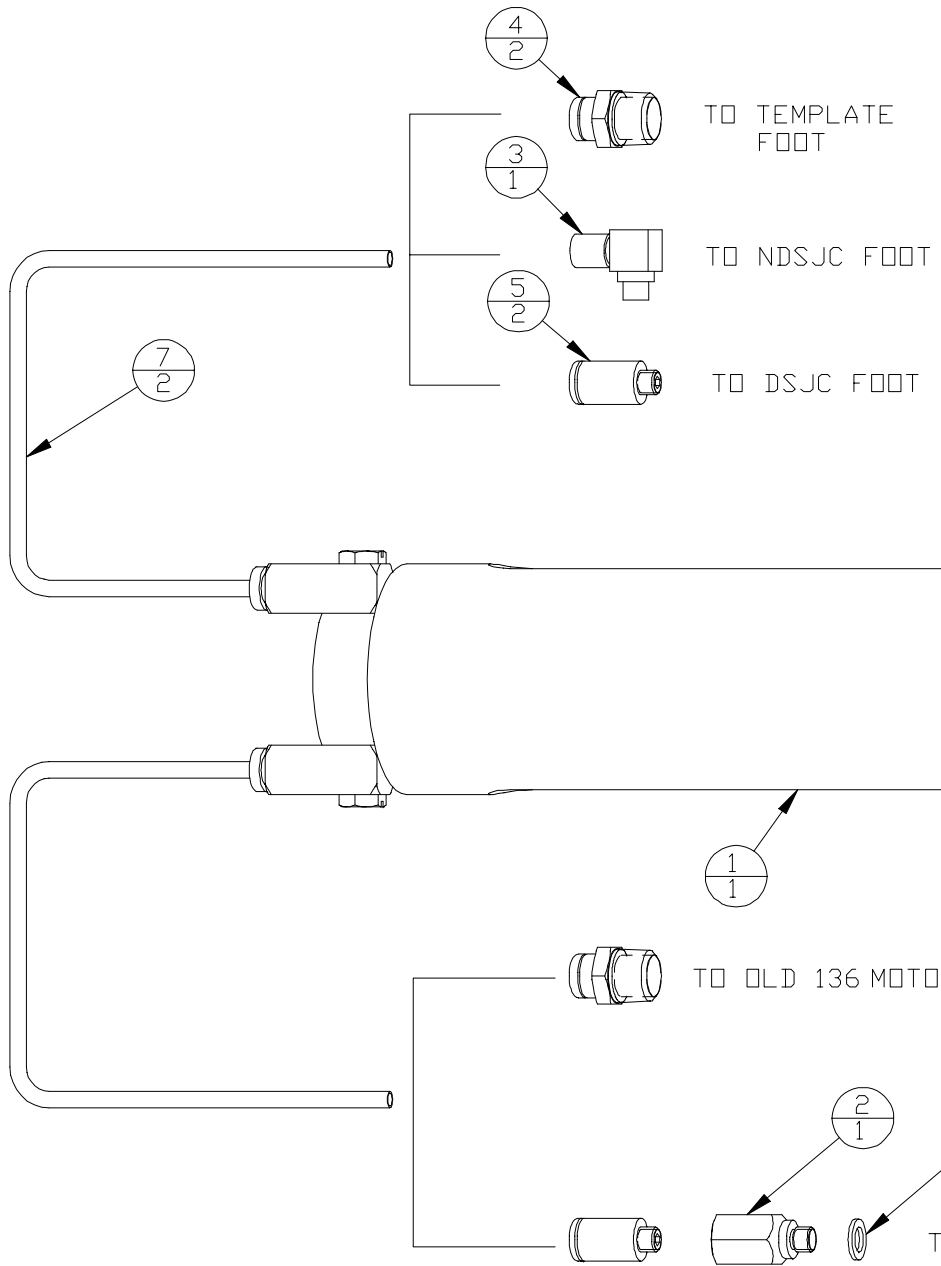
| ITEM | PART NO. | PART NAME                   | QTY. |
|------|----------|-----------------------------|------|
| 1    | 622026   | VALVE, NEEDLE               | 1    |
| 2    | 622881   | RING, □                     | 1    |
| 3    | 623422   | KNOB                        | 1    |
| 4    | 624902   | NUT, JAM HEX                | 1    |
| 5    | 624903   | NUT, JAM HEX                | 1    |
| 6    | 624905   | FITTING                     | 2    |
| 7    | 625015   | S-CAP                       | 1    |
| 8    | 629086   | COVER, LARGE CAPACITY       | 1    |
| 9    | 629093   | WIRE, RETAINING             | 1    |
| 10   | 629088   | CAP, MOUNT (PUMP FILL)      | 1    |
| 11   | 629148   | SPRING, WAVE                | 1    |
| 12   | 629090   | CYLINDER, LARGE CAPACITY    | 1    |
| 13   | 631586   | FILTER ASSEMBLY             | 1    |
| 14   | 631756   | END CAP ASSEMBLY (LARGE)    | 1    |
| 15   | 631759   | PISTON ROD ASSEMBLY (LARGE) | 1    |
| 16   | 844301   | RING, □                     | 1    |
| 17   | 844306   | RING, □                     | 1    |
| 18   | 844307   | RING, □                     | 1    |
| 19   | 869025   | RING, □                     | 2    |

| ITEM | PART NO. | PART NAME                   | QTY. |
|------|----------|-----------------------------|------|
| 1    | 622026   | VALVE, NEEDLE               | 1    |
| 2    | 622881   | RING, □                     | 1    |
| 3    | 623422   | KNOB                        | 1    |
| 4    | 624902   | NUT, JAM HEX                | 1    |
| 5    | 624903   | NUT, JAM HEX                | 1    |
| 6    | 624905   | FITTING                     | 2    |
| 7    | 625015   | S-CAP                       | 1    |
| 8    | 629097   | COVER, SMALL CAPACITY       | 1    |
| 9    | 629093   | WIRE, RETAINING             | 1    |
| 10   | 629088   | CAP, MOUNT (PUMP FILL)      | 1    |
| 11   | 629148   | SPRING, WAVE                | 1    |
| 12   | 629094   | CYLINDER, SMALL CAPACITY    | 1    |
| 13   | 631586   | FILTER ASSEMBLY             | 1    |
| 14   | 631757   | END CAP ASSEMBLY (SMALL)    | 1    |
| 15   | 631758   | PISTON ROD ASSEMBLY (SMALL) | 1    |
| 16   | 844301   | RING, □                     | 1    |
| 17   | 844306   | RING, □                     | 1    |
| 18   | 844307   | RING, □                     | 1    |
| 19   | 869025   | RING, □                     | 2    |

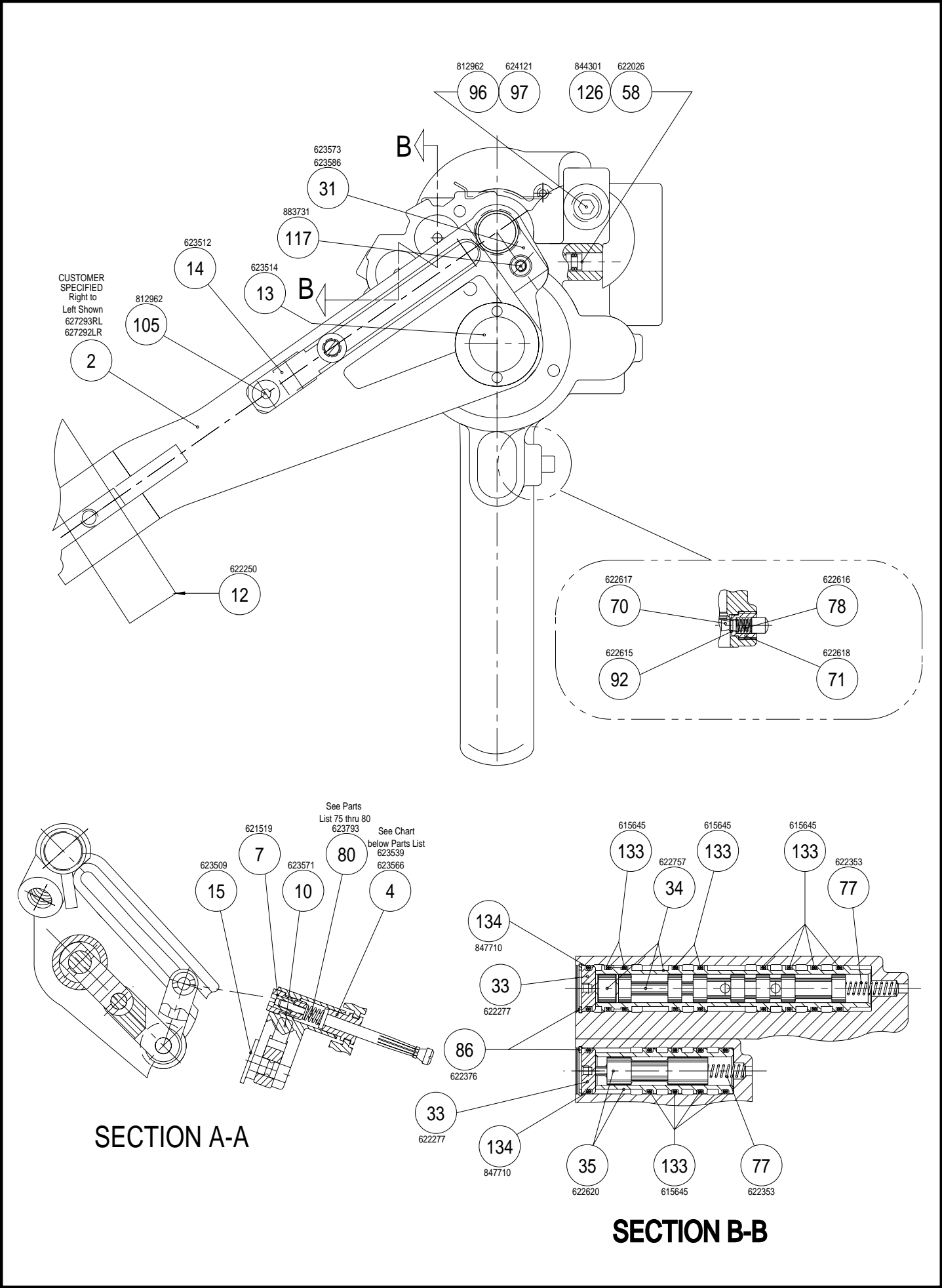
# 136SC MIST LUBRICATOR MOUNTING

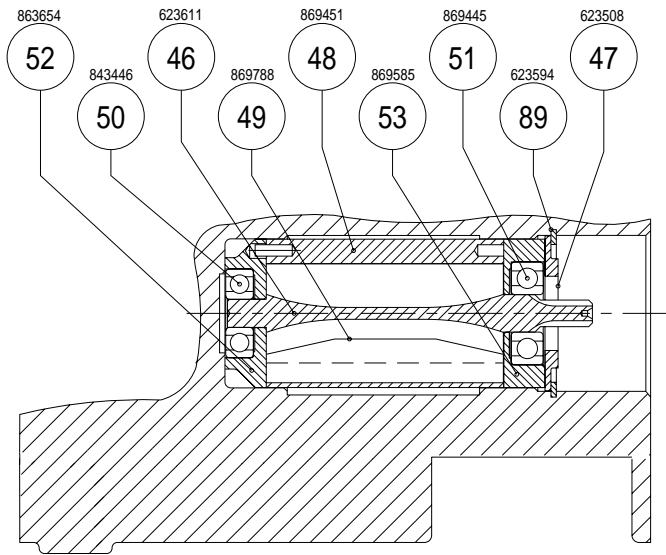
| ITEM | PART NO. | PART NAME                    | QTY. |
|------|----------|------------------------------|------|
| 1    | 631800   | RESERVOIR, LUBRICATOR (MFSC) | 1    |
| 1    | 631801   | RESERVOIR, LUBRICATOR (PFSC) | 1    |
| 1    | 631802   | RESERVOIR, LUBRICATOR (PFLC) | 1    |
| 2    | 625469   | CHECK VALVE                  | 1    |
| 3    | 627357   | ELBOW                        | 1    |
| 4    | 624911   | FITTING                      | 2    |
| 5    | 624906   | FITTING, MALE PUSH-IN        | 2    |
| 6    | 624121   | GASKET                       | 1    |
| 7    | 624910   | NYLON TUBING                 | 2    |
| 8    | 629092   | PLATE, MOUNTING              | 1    |
| 9    | 865123   | SCREW, SHC                   | 2    |

MIST LUBRICATORS & MOUNTS COMPLETE SUBASSEMBLIES:  
 MFSC - 631878, PFSC - 631879, PFLC - 631880.

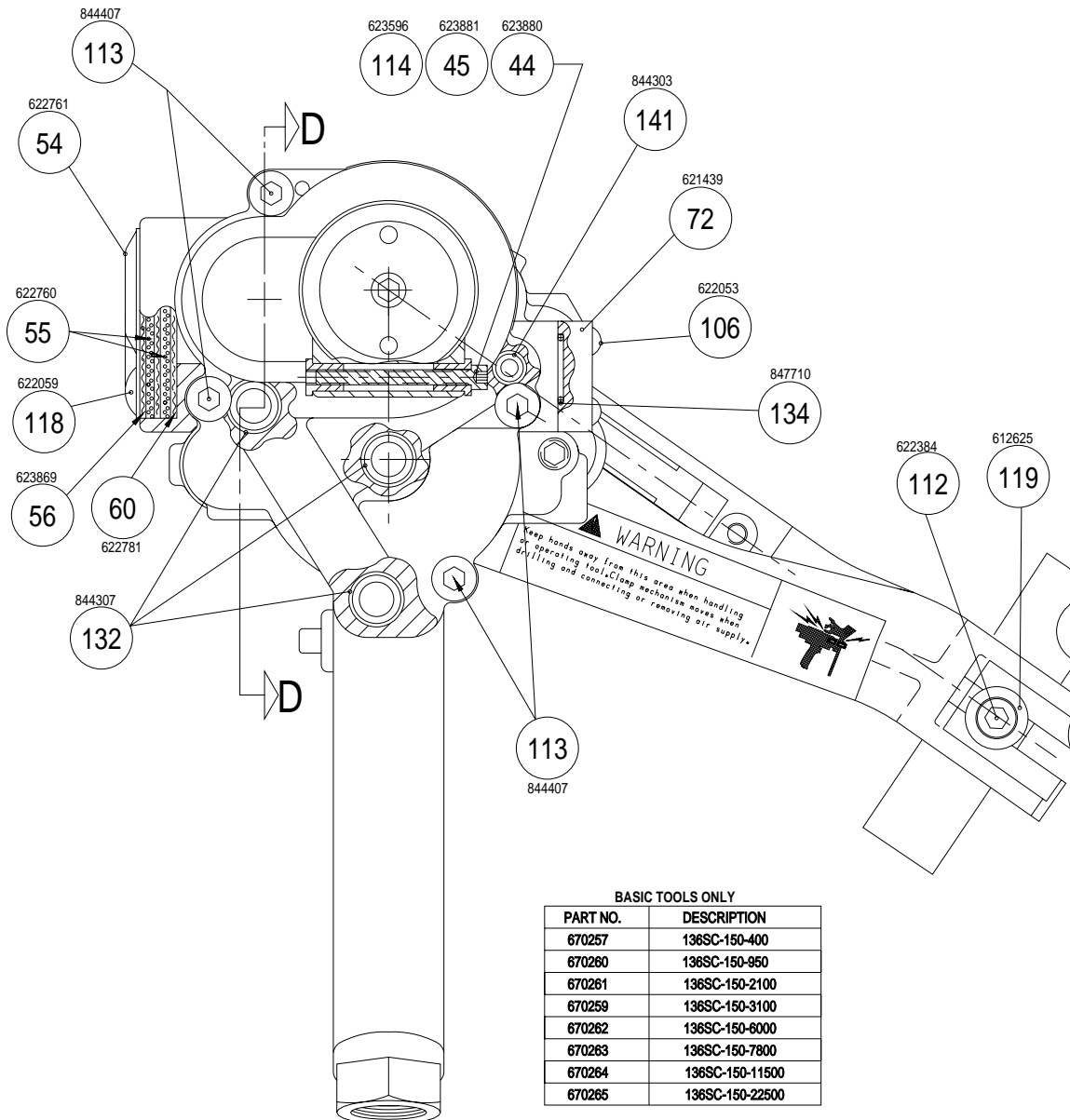


Note:  $\frac{x}{x}$  Upper number is item.  
 $\frac{x}{x}$  Lower number is quantity required.





SECTION D-D



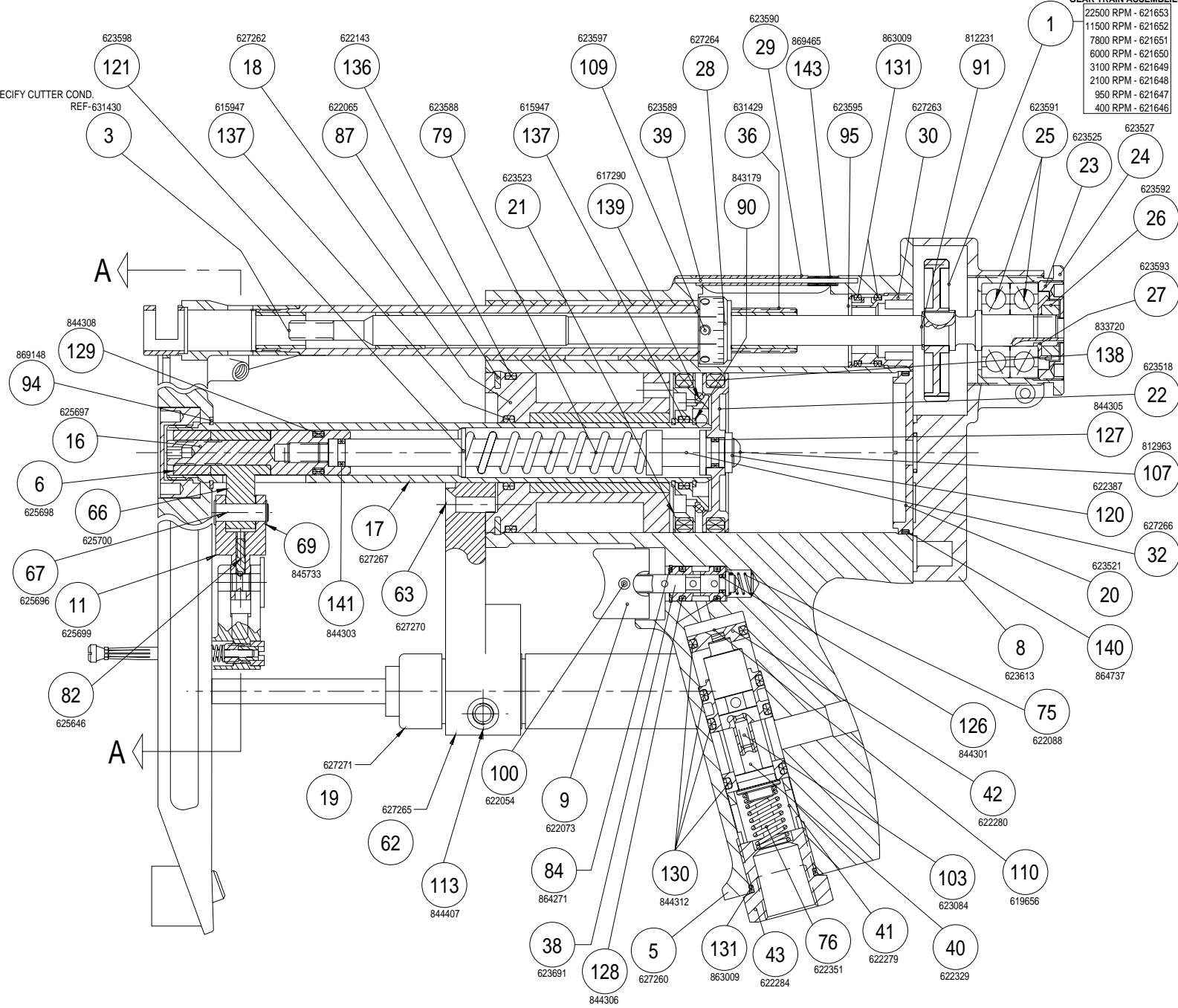
BASIC TOOLS ONLY

| PART NO. | DESCRIPTION     |
|----------|-----------------|
| 670257   | 136SC-150-400   |
| 670260   | 136SC-150-950   |
| 670261   | 136SC-150-2100  |
| 670259   | 136SC-150-3100  |
| 670262   | 136SC-150-6000  |
| 670263   | 136SC-150-7800  |
| 670264   | 136SC-150-11500 |
| 670265   | 136SC-150-22500 |

SPECIFY CUTTER COND.  
REF-631430

GEAR TRAIN ASSEMBLIES

- 22500 RPM - 621653
- 11500 RPM - 621652
- 7800 RPM - 621651
- 6000 RPM - 621650
- 3100 RPM - 621649
- 2100 RPM - 621648
- 950 RPM - 621647
- 400 RPM - 621646



A ←

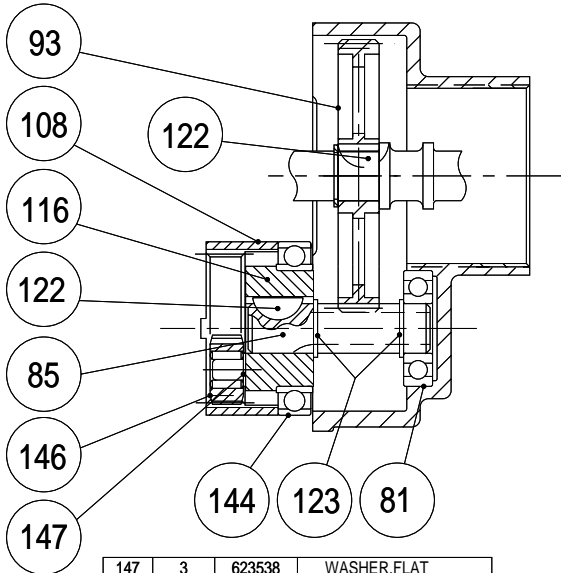
A ←

| ITEM NO. | QTY. | CODE NUMBER | DESCRIPTION                   | ITEM NO. | QTY. | CODE NUMBER | DESCRIPTION                |
|----------|------|-------------|-------------------------------|----------|------|-------------|----------------------------|
| 1        | 1    | 621646      | Assy, Gear Set, 400rpm        | 62       | 1    | 627265      | Bracket                    |
| 1        | 1    | 621647      | Assy, Gear Set, 950 rpm       | 63       | 3    | 627270      | Screw                      |
| 1        | 1    | 621648      | Assy, Gear Set, 2100 rpm      | 65       | 1    | 843434      | Plug                       |
| 1        | 1    | 621649      | Assy, Gear Set, 3100 rpm      | 66       | 1    | 625700      | Lift Lever                 |
| 1        | 1    | 621650      | Assy, Gear Set, 6000 rpm      | 67       | 1    | 625696      | Pin, Lift Lever            |
| 1        | 1    | 621651      | Assy, Gear Set, 7800 rpm      | 69       | 1    | 845733      | Ring, Retaining            |
| 1        | 1    | 621652      | Assy, Gear Set, 11500 rpm     | 70       | 1    | 622617      | Pin, Trigger Lock          |
| 1        | 1    | 621653      | Assy, Gear Set, 22500 rpm     | 71       | 1    | 622618      | Bushing, Trigger Lock      |
| 2        | 1    | 627293      | Pressure Foot R-L             | 72       | 1    | 621439      | Cover, Assy.               |
| 2        | 1    | 627292      | Pressure Foot L-R             | 75       | 1    | 622088      | Spring, Compression        |
| 3        | 1    | 631430      | Assy, Spindle Set             | 76       | 1    | 622351      | Spring, Compression        |
|          |      | 623539      |                               | 77       | 2    | 622353      | Spring, Compression        |
| 4        | 1    | thru        | Guide Collet (see list below) | 78       | 1    | 622616      | Spring, Compression        |
|          |      | 623566      |                               | 79       | 1    | 623588      | Spring, Compression        |
| 5        | 1    | 627260      | Handle                        | 80       | 1    | 623793      | Spring, Compression        |
| 6        | 1    | 625698      | Bushing                       | 82       | 1    | 625646      | Plunger                    |
| 7        | 1    | 621519      | Assy, Bushing                 | 84       | 1    | 864271      | Ring, Retaining, Internal  |
| 8        | 1    | 623613      | Backhead                      | 86       | 2    | 622376      | Ring, Retaining, Internal  |
| 9        | 1    | 622073      | Trigger                       | 87       | 1    | 622065      | Ring, Retaining, Internal  |
| 10       | 1    | 623571      | Holder, Collet                | 89       | 1    | 623594      | Ring, Retaining, Internal  |
| 11       | 1    | 625699      | Linkage, Lever Lift           | 90       | 2    | 843179      | Ring, Retaining, External  |
| 12       | 1    | 622250      | Pad, Pressure Foot            | 91       | 1    | 812231      | Ring, Retaining, External  |
| 13       | 1    | 623514      | Nut, Pressure Foot            | 92       | 1    | 622615      | Ring, Retaining, External  |
| 14       | 1    | 623512      | Clip, Collet Guide            | 94       | 1    | 869148      | Ring, Retaining, External  |
| 15       | 1    | 623509      | Pin, Lift Lever               | 95       | 1    | 623595      | Ring, Retaining, External  |
| 16       | 1    | 625697      | Pull Rod, Clamp-Unclamp       | 96       | 1    | 843434      | Plug, Pipe                 |
| 17       | 1    | 627267      | Sleeve, Feed                  | 100      | 1    | 622054      | Screw, Socket Set          |
| 18       | 1    | 627262      | Bulkhead, Front               | 103      | 1    | 623084      | Screw, Orifice             |
| 19       | 1    | 627271      | Control, Feed                 | 105      | 1    | 812962      | Screw, Button Head Cap     |
| 20       | 1    | 623521      | Bulkhead, Rear                | 106      | 3    | 622053      | Screw, Button Head Cap     |
| 21       | 1    | 623523      | Piston, Feed                  | 107      | 1    | 812963      | Screw, Button Head Cap     |
| 22       | 1    | 623518      | Piston, Clamp-Unclamp         | 109      | 6    | 623597      | Screw, Socket Set          |
| 23       | 1    | 623525      | Nut, Bearing Retainer         | 110      | 1    | 619656      | Screw, Flat Head           |
| 24       | 1    | 623527      | Nut, Spindle Adjust           | 112      | 1    | 622384      | Screw, Hex Socket Cap      |
| 25       | 1    | 623591      | Bearing Ball (Duplex Pair)    | 113      | 4    | 844407      | Screw, Hex Socket Cap      |
| 26       | 1    | 623592      | Nut, Bearing Lock             | 114      | 1    | 623596      | Screw, Hex                 |
| 27       | 1    | 623593      | Washer, Bearing Lock          | 117      | 1    | 883731      | Screw, Hex Socket Cap      |
| 28       | 1    | 627264      | Nut, Depth Control            | 118      | 2    | 622059      | Screw, Button Head Cap     |
| 29       | 1    | 623590      | Cover, Depth Control          | 119      | 1    | 612625      | Washer, Flat               |
| 30       | 1    | 627263      | Stop Depth                    | 120      | 1    | 622387      | Washer, Flat               |
|          |      | 623573      |                               | 121      | 1    | 623598      | Washer, Flat               |
| 31       | 1    | thru        | Template Boss                 | 126      | 2    | 844301      | O-Ring                     |
|          |      | 623586      |                               | 127      | 1    | 844305      | O-Ring                     |
| 32       | 1    | 627266      | Shaft, Clamp-Unclamp          | 128      | 2    | 844306      | O-Ring                     |
| 33       | 2    | 622277      | Plug, Valve Retaining         | 129      | 1    | 844308      | O-Ring                     |
| 34       | 1    | 622757      | Assy, Retract/Dwell Valve     | 130      | 4    | 844312      | O-Ring                     |
| 35       | 1    | 622620      | Assy, Unclamp Check Valve     | 131      | 3    | 863009      | O-Ring                     |
| 36       | 1    |             | Assy, Quill                   | 132      | 3    | 844307      | O-Ring                     |
| 38       | 1    | 623691      | Sleeve & Spool, Trigger       | 133      | 12   | 615645      | O-Ring                     |
| 39       | 1    | 623589      | Pin, Cover                    | 134      | 4    | 847710      | O-Ring                     |
| 40       | 1    | 622329      | Assy, Pilot Valve             | 136      | 1    | 622143      | O-Ring                     |
| 41       | 1    | 622279      | Spacer, Pilot Valve           | 137      | 2    | 615947      | O-Ring                     |
| 42       | 1    | 622280      | Shaft, Piston                 | 138      | 2    | 849931      | O-Ring                     |
| 43       | 1    | 622284      | Bushing, Inlet                | 139      | 1    | 617290      | O-Ring                     |
| 44       | 1    | 623880      | Bushing, Clamp                | 140      | 1    | 864737      | O-Ring                     |
| 45       | 1    | 623881      | Nut, Clamp                    | 141      | 2    | 844303      | O-Ring                     |
| 46       | 1    | 623611      | Rotor                         | 143      | 1    | 869465      | Spring                     |
| 47       | 1    | 623508      | Spacer                        |          |      |             |                            |
| 48       | 1    | 869451      | Cylinder                      |          |      |             |                            |
| 49       | 4    | 869788      | Blade, Rotor                  |          |      |             |                            |
| 50       | 1    | 843446      | Bearing, Ball, Rear           |          |      |             |                            |
| 51       | 1    | 869445      | Bearing, Ball, Front          |          |      |             |                            |
| 52       | 1    | 863654      | Plate, Rear Bearing           |          |      |             |                            |
| 53       | 1    | 869585      | Plate, Front Bearing          |          |      |             |                            |
| 54       | 1    | 622761      | Cover, Exhaust                |          |      |             |                            |
| 55       | 2    | 622760      | Muffler, Insert               |          |      |             |                            |
| 56       | 1    | 623869      | Pad, Muffler                  |          |      |             |                            |
| 58       | 1    | 622026      | Valve, Needle                 |          |      |             |                            |
| 60       | 1    | 622781      | Pad, Muffler                  |          |      |             |                            |
|          |      |             |                               |          |      |             | <b>ITEMS NOT SHOWN</b>     |
|          |      |             |                               |          | 1    | 203245      | Warning Label (Backhead)   |
|          |      |             |                               |          | 1    | 202902      | Warning Label (Pres. Foot) |
|          |      |             |                               |          | 1    | 203246      | Warning Label (Backhead)   |
|          |      |             |                               |          | 1    | 624242      | Warning Label              |
|          |      |             |                               |          | 1    | 624243      | Warning Label              |
|          |      |             |                               |          | 1    | 623232      | Tubing 1/8 Dia. Clear      |
|          |      |             |                               |          | 1    | 623222      | Fitting Adapter 1/8 NPT    |
|          |      |             |                               |          | 1    | 623870      | Fitting Elbow 1/8 NPT      |

**COLLET GUIDE**

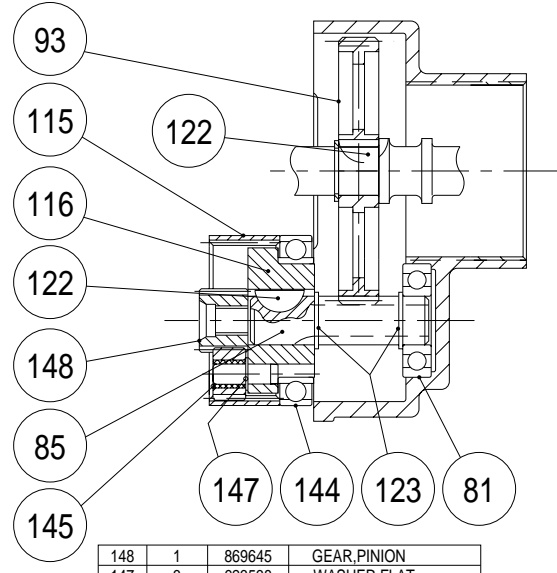
| PART NO. | DESCRIPTION         | PART NO. | DESCRIPTION         |
|----------|---------------------|----------|---------------------|
| 623539   | COLLET, GUIDE .123  | 623553   | COLLET, GUIDE .1915 |
| 623540   | COLLET, GUIDE .125  | 623554   | COLLET, GUIDE .157  |
| 623541   | COLLET, GUIDE .130  | 623555   | COLLET, GUIDE .202  |
| 623542   | COLLET, GUIDE .135  | 623556   | COLLET, GUIDE .2075 |
| 623543   | COLLET, GUIDE .140  | 623557   | COLLET, GUIDE .2125 |
| 623544   | COLLET, GUIDE .145  | 623558   | COLLET, GUIDE .218  |
| 623545   | COLLET, GUIDE .150  | 623559   | COLLET, GUIDE .223  |
| 623546   | COLLET, GUIDE .155  | 623560   | COLLET, GUIDE .228  |
| 623547   | COLLET, GUIDE .1605 | 623561   | COLLET, GUIDE .2335 |
| 623548   | COLLET, GUIDE .1655 | 623562   | COLLET, GUIDE .2385 |
| 623549   | COLLET, GUIDE .171  | 623563   | COLLET, GUIDE .244  |
| 623550   | COLLET, GUIDE .176  | 623564   | COLLET, GUIDE .249  |
| 623551   | COLLET, GUIDE .1815 | 623565   | COLLET, GUIDE .254  |
| 623552   | COLLET, GUIDE .1815 | 623566   | COLLET, GUIDE .2595 |

400 RPM GEAR SET ASS'Y  
621646



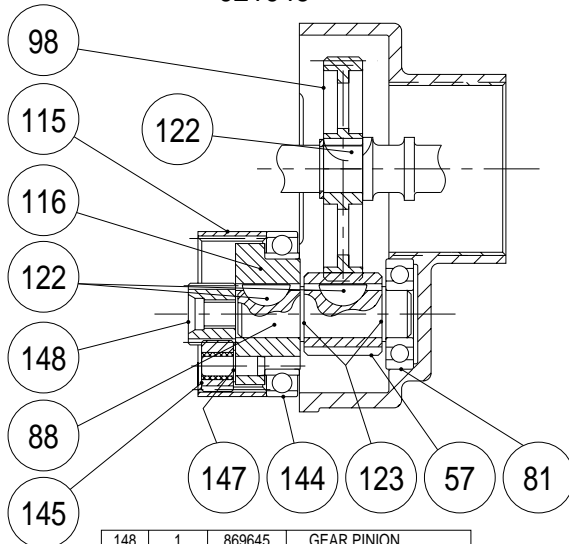
|          |           |          |                      |
|----------|-----------|----------|----------------------|
| 147      | 3         | 623538   | WASHER,FLAT          |
| 146      | 3         | 869254   | GEAR,IDLER,1-ST RED. |
| 144      | 1         | 623572   | BEARING              |
| 123      | 2         | 812231   | RING,RETAINING       |
| 122      | 2         | 622134   | KEY,WOODRUFF         |
| 116      | 1         | 623507   | CARRIER,PLANET       |
| 108      | 1         | 623536   | GEAR,INTERNAL        |
| 93       | 1         | 623535   | GEAR,SPINDLE         |
| 85       | 1         | 623504   | GEAR,REDUCTION       |
| 81       | 1         | 847095   | BEARING,BALL         |
| ITEM NO. | QTY REQ'D | CODE NO. | DESCRIPTION          |

950 RPM GEAR SET ASS'Y  
621647



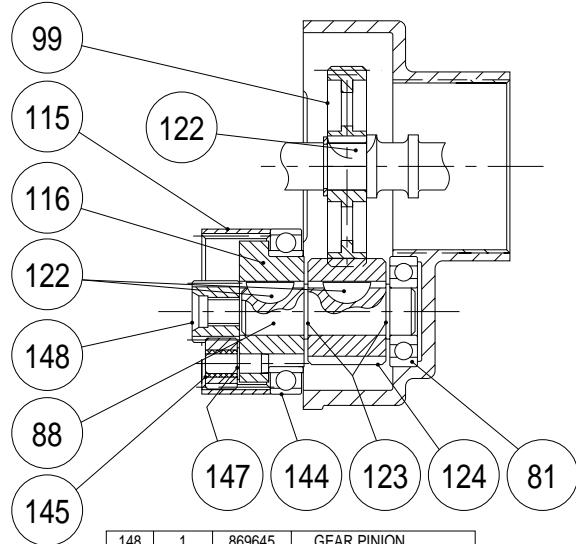
|          |           |          |                      |
|----------|-----------|----------|----------------------|
| 148      | 1         | 869645   | GEAR,PINION          |
| 147      | 3         | 623538   | WASHER,FLAT          |
| 145      | 3         | 869637   | GEAR,IDLER,1-ST RED. |
| 144      | 1         | 623572   | BEARING              |
| 123      | 2         | 812231   | RING,RETAINING       |
| 122      | 2         | 622134   | KEY,WOODRUFF         |
| 116      | 1         | 623506   | CARRIER,PLANET       |
| 115      | 1         | 623537   | GEAR,INTERNAL        |
| 93       | 1         | 623535   | GEAR,SPINDLE         |
| 85       | 1         | 623504   | GEAR,REDUCTION       |
| 81       | 1         | 847095   | BEARING,BALL         |
| ITEM NO. | QTY REQ'D | CODE NO. | DESCRIPTION          |

2100 RPM GEAR SET ASS'Y  
621648



|          |           |          |                      |
|----------|-----------|----------|----------------------|
| 148      | 1         | 869645   | GEAR,PINION          |
| 147      | 3         | 623538   | WASHER,FLAT          |
| 145      | 3         | 869637   | GEAR,IDLER,1-ST RED. |
| 144      | 1         | 623572   | BEARING              |
| 123      | 2         | 812231   | RING,RETAINING       |
| 122      | 3         | 622134   | KEY,WOODRUFF         |
| 116      | 1         | 623506   | CARRIER,PLANET       |
| 115      | 1         | 623537   | GEAR,INTERNAL        |
| 98       | 1         | 623534   | GEAR,SPINDLE         |
| 88       | 1         | 623505   | SHAFT,GEAR           |
| 81       | 1         | 847095   | BEARING,BALL         |
| 57       | 1         | 623529   | GEAR,REDUCTION       |
| ITEM NO. | QTY REQ'D | CODE NO. | DESCRIPTION          |

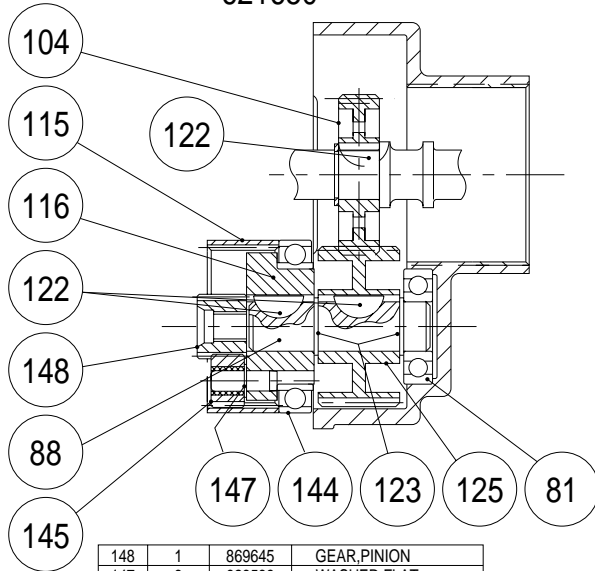
3100 RPM GEAR SET ASS'Y  
621649



|          |           |          |                      |
|----------|-----------|----------|----------------------|
| 148      | 1         | 869645   | GEAR,PINION          |
| 147      | 3         | 623538   | WASHER,FLAT          |
| 145      | 3         | 869637   | GEAR,IDLER,1-ST RED. |
| 144      | 1         | 623572   | BEARING              |
| 124      | 1         | 623530   | GEAR,REDUCTION       |
| 123      | 2         | 812231   | RING,RETAINING       |
| 122      | 3         | 622134   | KEY,WOODRUFF         |
| 116      | 1         | 623506   | CARRIER,PLANET       |
| 115      | 1         | 623537   | GEAR,INTERNAL        |
| 99       | 1         | 623533   | GEAR,SPINDLE         |
| 88       | 1         | 623505   | SHAFT,GEAR           |
| 81       | 1         | 847095   | BEARING,BALL         |
| ITEM NO. | QTY REQ'D | CODE NO. | DESCRIPTION          |

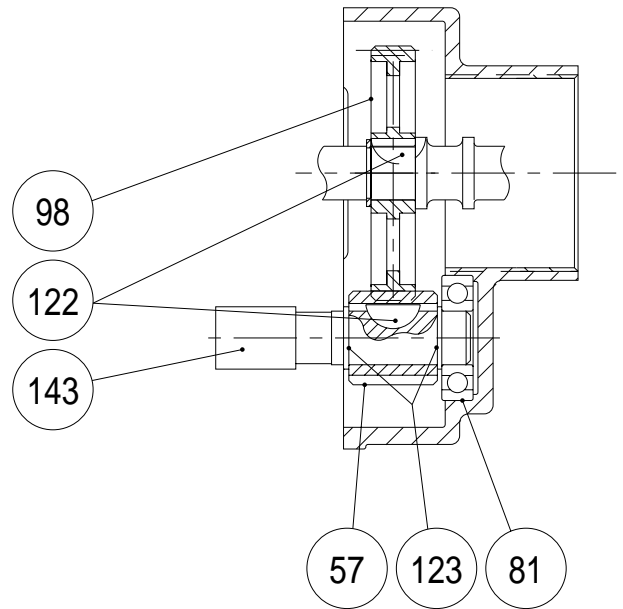


6000 RPM GEAR SET ASS'Y  
621650



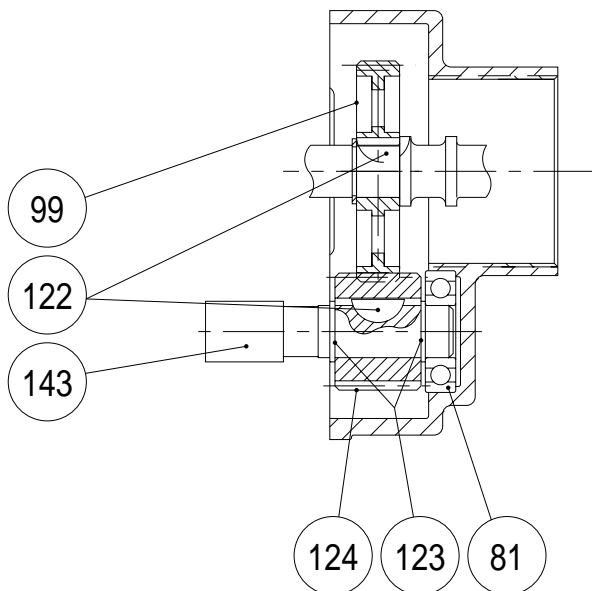
|          |            |          |                      |
|----------|------------|----------|----------------------|
| 148      | 1          | 869645   | GEAR,PINION          |
| 147      | 3          | 623538   | WASHER,FLAT          |
| 145      | 3          | 869637   | GEAR,IDLER,1-ST RED. |
| 144      | 1          | 623572   | BEARING              |
| 125      | 1          | 623531   | GEAR,REDUCTION       |
| 123      | 2          | 812231   | RING,RETAINER        |
| 122      | 3          | 622134   | KEY,WOODRUFF         |
| 116      | 1          | 623506   | CARRIER,PLANET       |
| 115      | 1          | 623537   | GEAR,INTERNAL        |
| 104      | 1          | 623532   | GEAR,SPINDLE         |
| 88       | 1          | 623505   | SHAFT,GEAR           |
| 81       | 1          | 847095   | BEARING,BALL         |
| ITEM NO. | Q'TY REQ'D | CODE NO. | DESCRIPTION          |

7800 RPM GEAR SET ASS'Y  
621651



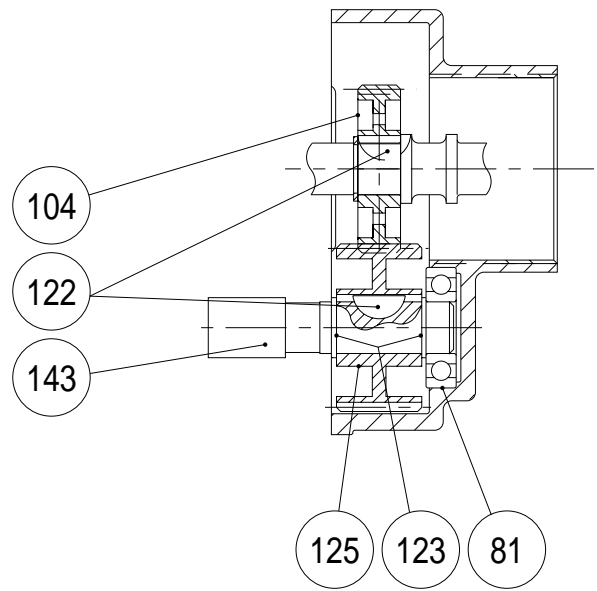
|          |            |          |                |
|----------|------------|----------|----------------|
| 143      | 1          | 623612   | SHAFT,GEAR     |
| 123      | 2          | 812231   | RING,RETAINING |
| 122      | 2          | 622134   | KEY,WOODRUFF   |
| 98       | 1          | 623534   | GEAR,SPINDLE   |
| 81       | 1          | 847095   | BEARING,BALL   |
| 57       | 1          | 623529   | GEAR,REDUCTION |
| ITEM NO. | Q'TY REQ'D | CODE NO. | DESCRIPTION    |

11500 RPM GEAR SET ASS'Y  
621652



|          |            |          |                |
|----------|------------|----------|----------------|
| 143      | 1          | 623612   | SHAFT,GEAR     |
| 124      | 1          | 623530   | GEAR,REDUCTION |
| 123      | 2          | 812231   | RING,RETAINING |
| 122      | 2          | 622134   | KEY,WOODRUFF   |
| 99       | 1          | 623533   | GEAR,SPINDLE   |
| 81       | 1          | 847095   | BEARING,BALL   |
| ITEM NO. | Q'TY REQ'D | CODE NO. | DESCRIPTION    |

22500 RPM GEAR SET ASS'Y  
621653



|          |            |          |                |
|----------|------------|----------|----------------|
| 143      | 1          | 623612   | SHAFT,GEAR     |
| 125      | 1          | 623531   | GEAR,REDUCTION |
| 123      | 2          | 812231   | RING,RETAINING |
| 122      | 2          | 622134   | KEY,WOODRUFF   |
| 104      | 1          | 623532   | GEAR,SPINDLE   |
| 81       | 1          | 847095   | BEARING,BALL   |
| ITEM NO. | Q'TY REQ'D | CODE NO. | DESCRIPTION    |

# 1. DIAGRAM OF AIR SYSTEM IN STANDBY CONDITION. Trigger released, compressed air attached, collet unclamped, cutter fully retracted, air motor stopped.

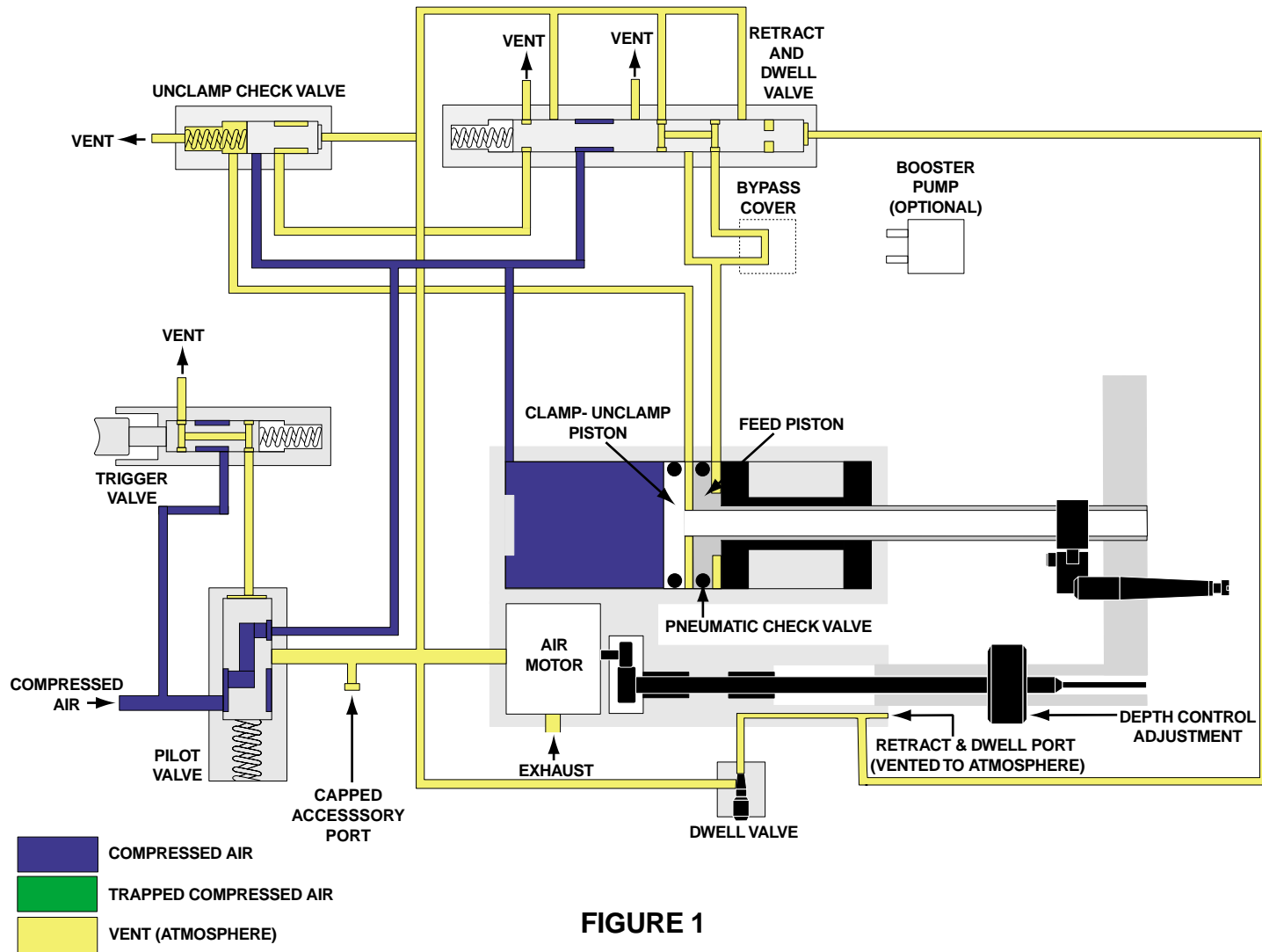
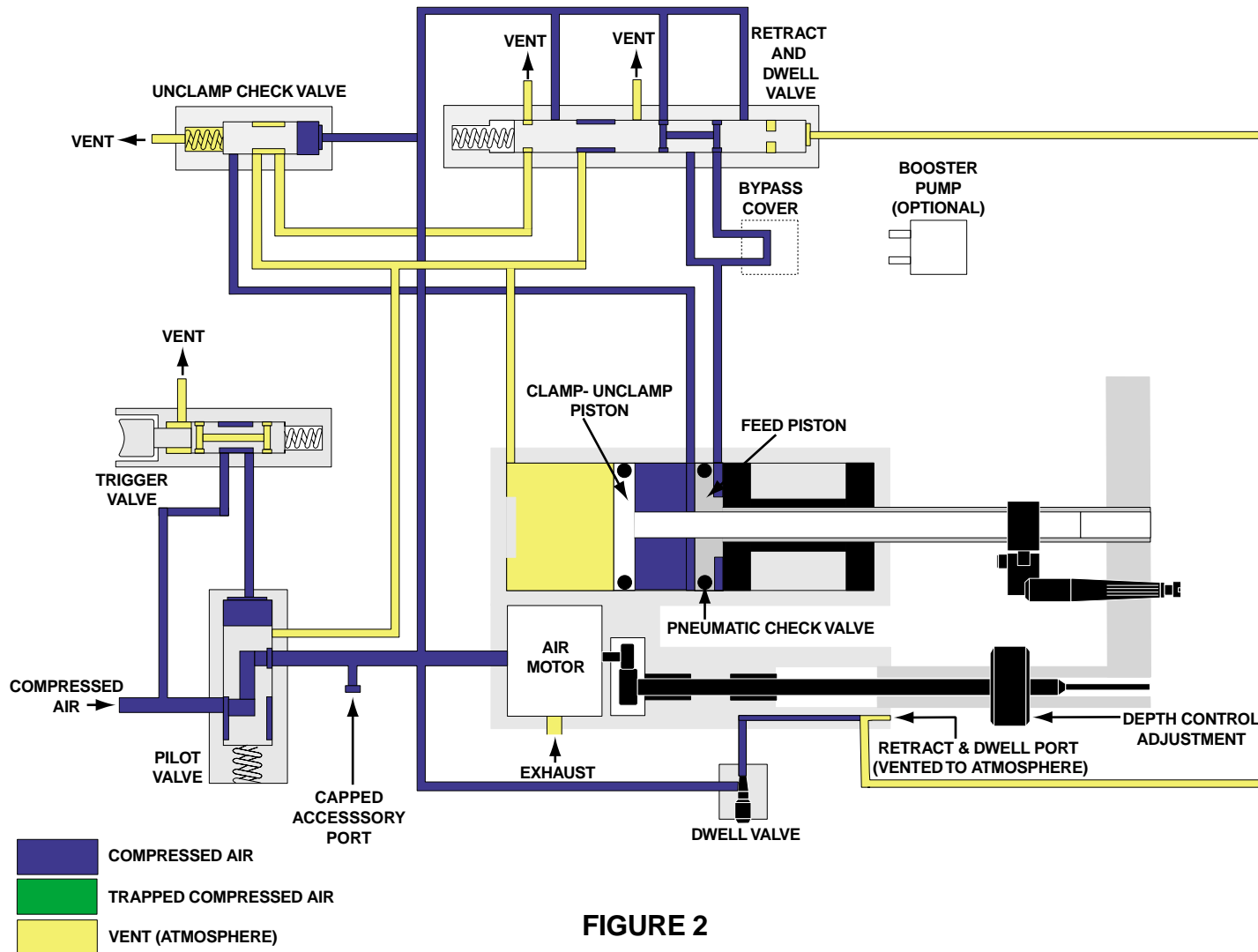


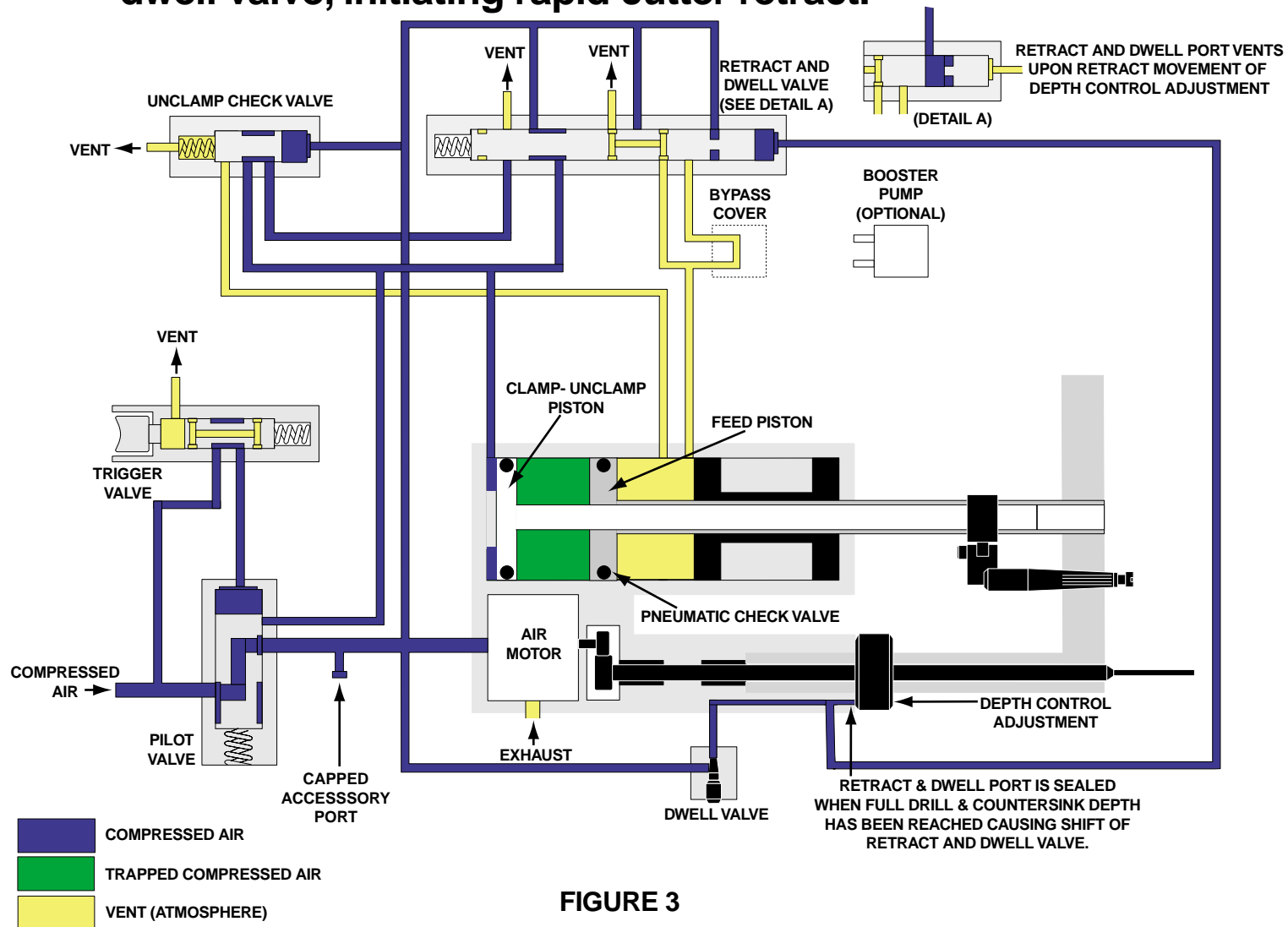
FIGURE 1

**2. DIAGRAM OF AIR SYSTEM AT FULL COLLET STROKE AND START OF CUTTER FEED.** Trigger depressed, pilot and unclamp check valves shift, air motor starts, collet first clamps fully, then cutter starts feeding and continues to feed until pre-set depth has been reached (See Figure 3).



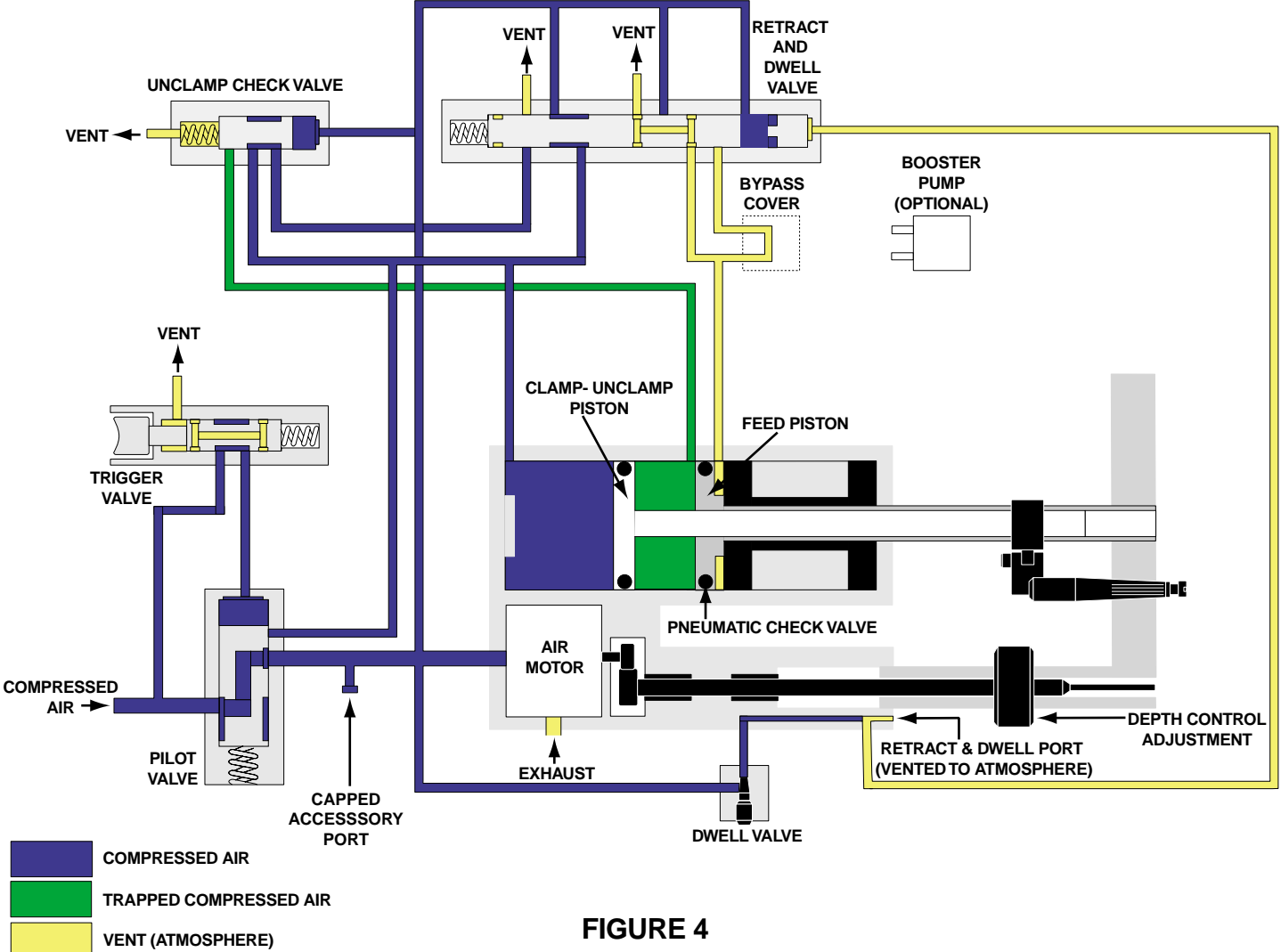
**FIGURE 2**

**3. DIAGRAM OF AIR SYSTEM AT PRE-SET CUTTER DEPTH AND START OF RETRACT.** Trigger depressed, air motor running collet clamped, cutter continues feeding until depth control adjustment covers retract and dwell port, shifting retract and dwell valve, initiating rapid cutter retract.



**FIGURE 3**

**4. DIAGRAM OF AIR SYSTEM AT COMPLETION OF RETRACT STROKE.** Trigger depressed, collet clamped, air motor running.  
**NOTE:** Release trigger causes shifting of pilot, clamp- unclamp and retract valves, collet unclamps and air motor stops (See Figure 1).



**FIGURE 4**

**NOTES**

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[www.cooperindustries.com](http://www.cooperindustries.com)