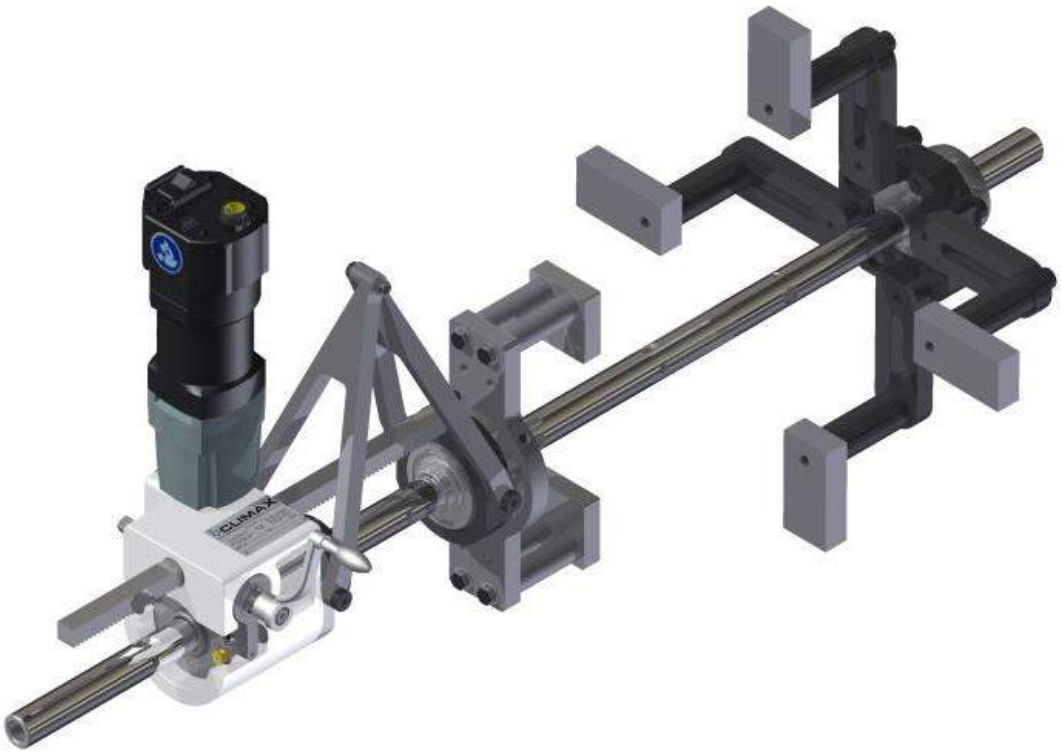
CE

BB3000

OPERATING MANUAL



P/N 37390
May 2019
Revision 4

CLIMAX | BORTECH CALDER H&S TOOL

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- Your name
- Shipping address
- Telephone number
- Machine model
- Serial number (if applicable)
- Date of purchase

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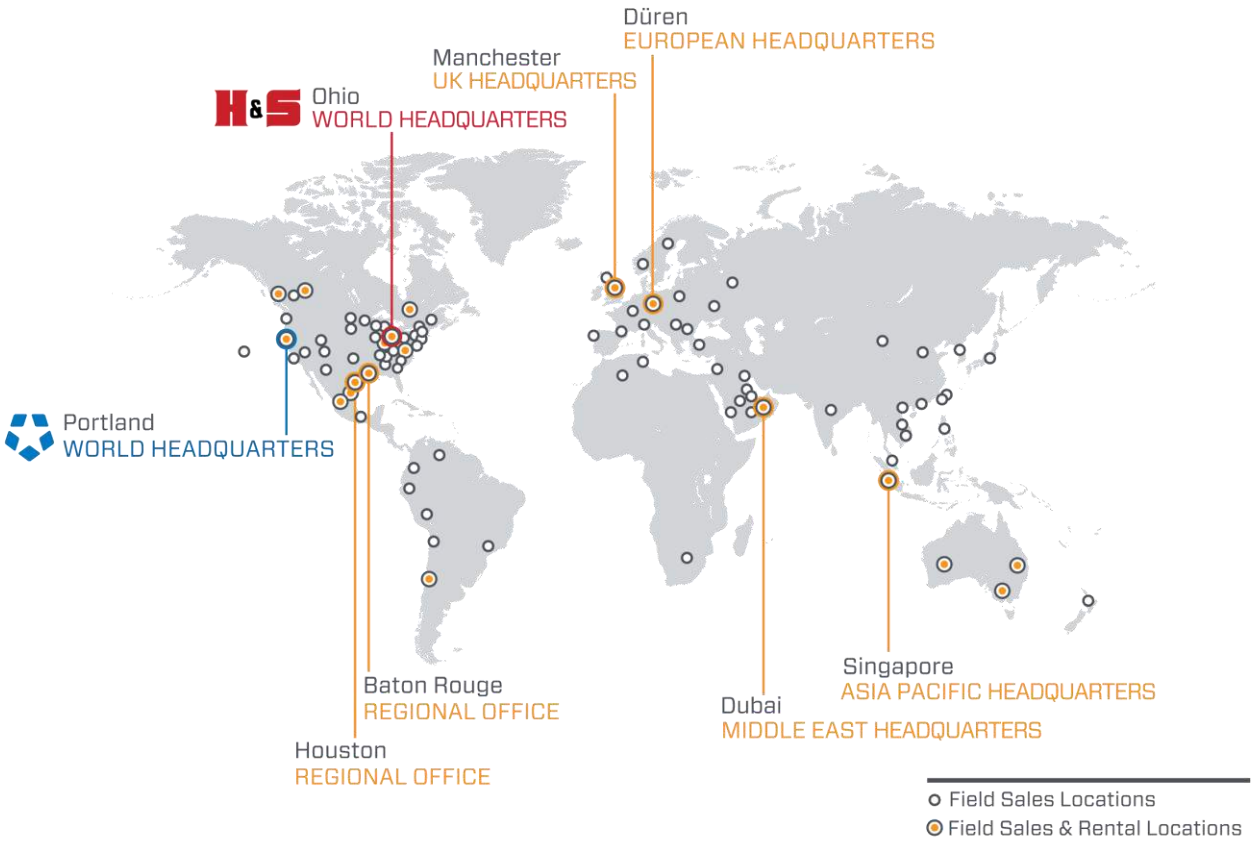
CLIMAX WORLDWIDE LOCATIONS



CE DOCUMENTATION

DECLARATION OF CONFORMITY

2006/42/EC Machine Directive
2014/30/EU EMC Directive

Name of manufacturer or supplier
Climax Portable Machining And Welding Systems

Full postal address including country of origin
2712 E Second Street
Newberg, OR 97132
USA

Description of product
Portable Boring Bar Machine

Name, type or model, batch or serial number

BB3000	Serial Number Range
Electric 230V and Pneumatic	15000498 - 20000000

Standards used, including number, title, issue date and other relative documents
EN ISO 3744:2010, BS EN ISO 4414:2010, EN ISO 11201:2010, EN ISO 12100:2010, EN 13128:2001+A2:2009, EN ISO 13732-1:2008, EN ISO 13849-1:2008, EN ISO 13857:2008, EN 60204-1:2006/AC:2010, EN 61000-6-2:2005, EN 61000-6-4:2011

Full postal address if different from manufacturers
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52353 Duren, Germany

Declaration

I declare that as the Manufacturer, the above information in relation to the supply / manufacture of this product, is in conformity with the stated standards and other related documents following the provisions of the above Directives and their amendments.

Signature of Manufacturer: _____

Position Held: Prod Engineering

Date: 9/11/2019

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1 OVERVIEW

1.1 Limited Warranty

Climax Portable Machine Tools, Inc. (hereafter referred to as “Climax”) warrants that all new machines are free from defects in materials and workmanship. This warranty is available to the original purchaser for a period of one year after delivery. If the original purchaser finds any defect in materials or workmanship within the warranty period, the original purchaser should contact its factory representative and return the entire machine, shipping prepaid, to the factory. Climax will, at its option, either repair or replace the defective machine at no charge and will return the machine with shipping prepaid.

Climax warrants that all parts are free from defects in materials and workmanship, and that all labor has been performed properly. This warranty is available to the customer purchasing parts or labor for a period of 90 days after delivery of the part or repaired machine or 180 days on used machines and components. If the customer purchasing parts or labor finds any defect in materials or workmanship within the warranty period, the purchaser should contact its factory representative and return the part or repaired machine, shipping prepaid, to the factory. Climax will, at its option, either repair or replace the defective part and/ or correct any defect in the labor performed, both at no charge, and return the part or repaired machine shipping prepaid.

These warranties do not apply to the following:

- Damage after the date of shipment not caused by defects in materials or workmanship
- Damage caused by improper or inadequate machine maintenance
- Damage caused by unauthorized machine modification or repair
- Damage caused by machine abuse
- Damage caused by using the machine beyond its rated capacity

All other warranties, express or implied, including without limitation the warranties of merchantability and fitness for a particular purpose are disclaimed and excluded.

Terms of Sale

Be sure to review the terms of sale which appear on the reverse side of your invoice. These terms control and limit your rights with respect to the goods purchased from Climax.

About This Manual

Climax provides the contents of this manual in good faith as a guideline to the operator. Climax cannot guarantee that the information contained in this manual is correct for applications other than the application described in this manual. Product specifications are subject to change without notice.

1.2 How to Use This Manual

Alerts

Pay careful attention to the alertsappearing in this manual. Alert types are defined in the following examples.

DANGER

concerns a condition, procedure, or practice that, if not avoided or strictly observed, **WILL** result in injury or loss of life.

WARNING

concerns a condition, procedure, or practice that, if not avoided or strictly observed, COULD result in injury or loss of life.

CAUTION

concerns a condition, procedure, or practice that, if not avoided or strictly observed, could result in minor or moderate injury.

NOTICE

concerns a condition, procedure, or practice worthy of special attention.

TIP:

A tip provides additional information that can aid in completion of a task.

1.3 Safety Precautions

Climax Portable Machining and Welding Systems leads the way in promoting the safe use of portable machine tools. Safety is a joint effort. You, the machine operator, must do your part by being aware of your work environment and closely following the operating procedures and safety precautions contained in this manual, as well as your employer's safety guidelines.

Observe the following safety precautions when operating or working around the machine.

Training – Before operating this or any machine tool, you should receive instruction from a qualified trainer. Contact Climax for machine-specific training information.

Intended Use – Use this machine in accordance with the instructions and precautions in this manual. Do not use this machine for any purpose other than its intended use as described in this manual.

Personal Protective Equipment – Always wear the appropriate personal protective gear when operating this or any other machine tool. Eye and ear protection are required when operating or working around the machine. Flame-resistant clothing with long sleeves and legs is recommended when operating the machine, as hot flying chips from the workpiece may burn or cut bare skin.

Work Area – Keep the work area around the machine clear of clutter. Keep all cords and hoses away from the work area when operating the machine. Cords and hoses pose a tripping hazard.

Moving Parts – Except for operating controls, avoid contact with moving parts by hands or tools during machine operation. Secure, hair, clothing, jewelry, and pocket items to prevent them from becoming entangled in moving parts.

1.4 Risk assessment and hazard mitigation

Machine Tools are specifically designed to perform precise material-removal operations.

Stationary Machine Tools include lathes and milling machines and are typically found in a machine shop. They are mounted in a fixed location during operation and are considered to be a complete, self-contained machine. Stationary Machine Tools achieve the rigidity needed to accomplish material-removal operations from the structure that is an integral part of the machine tool.

In contrast, Portable Machine Tools are designed for on-site machining applications. They typically attach directly to the workpiece itself, or to an adjacent structure, and achieve their rigidity from the structure to which it is attached. The design intent is that the Portable Machine Tool and the structure attached to it become one complete machine during the material-removal process.

To achieve the intended results and to promote safety, the operator must understand and follow the design intent, set-up, and operation practices that are unique to Portable Machine Tools.

The operator must perform an overall review and on-site risk assessment of the intended application. Due to the unique nature of portable machining applications, identifying one or more hazards that must be addressed is typical.

When performing the on-site risk assessment, it is important to consider the Portable Machine Tool and the workpiece as a whole.

1.5 Risk assessment checklist

Use these checklists as part of your on-site risk assessment and include any additional considerations that may pertain to your specific application.

TABLE 1. RISK ASSESSMENT CHECKLIST BEFORE SET-UP

Before Set-up	
☐	I took note of all the warning labels on the machine.
☐	I removed or mitigated all identified risks (such as tripping, cutting, crushing, entanglement, shearing, or falling objects).
☐	I considered the need for personnel safety guarding and installed any necessary guards.
☐	I read the Machine Assembly instructions and took inventory of all the items required but not supplied.
☐	I created a lift plan, including identifying the proper rigging, for each of the setup lifts required during the setup of the support structure and machine.
☐	I located the fall paths involved in lifting and rigging operations. I have taken precautions to keep workers away from the identified fall path.
☐	I considered how this machine operates and the best placement for the controls, cabling, and the operator.
☐	I evaluated and mitigated any other potential risks specific to my work area.

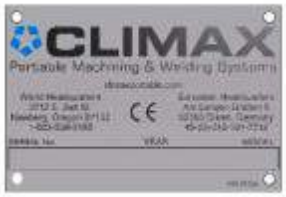
TABLE 2. RISK ASSESSMENT CHECKLIST AFTER SET-UP

After Set-up	
☐	I checked that the machine is safely installed and the potential fall path is clear. If the machine is elevated, I checked that the machine is safeguarded against falling.
☐	I identified all possible pinch points, such as those caused by rotating parts, and informed the affected personnel.
☐	I planned for containment of any chips or swarf produced by the machine.
	I followed the Maintenance Intervals with the recommended lubricants.
☐	I checked that all affected personnel have the recommended personal protective equipment, as well as any equipment required by the site or other regulations.
☐	I checked that all affected personnel understand the danger zone and are clear of it.
☐	I evaluated and mitigated any other potential risks specific to my work area.

1.6 Warning labels

The following warning labels should be on your machine. If any are defaced or missing, contact Climax immediately for replacements.

TABLE 3 WARNING LABELS

	P/N 29154 Climax serial number, year and model number plate.		
	P/N 59044 Label safety warning cirlce read the manual		P/N78741 Label safety warning hand crush
	P/N 78742 Label safety warning entanglement of hand, or rotating shaft warning		P/N 78748 Label safety warning eye protection
	P/N 78824 Label saftey warning do not expose to water		P/N 80510 label safety warning cutting of fingers, or rotating blade
	P/N 78593 Label safety warning electrical shock or electrocution		

1.6.1 Position of warning labels

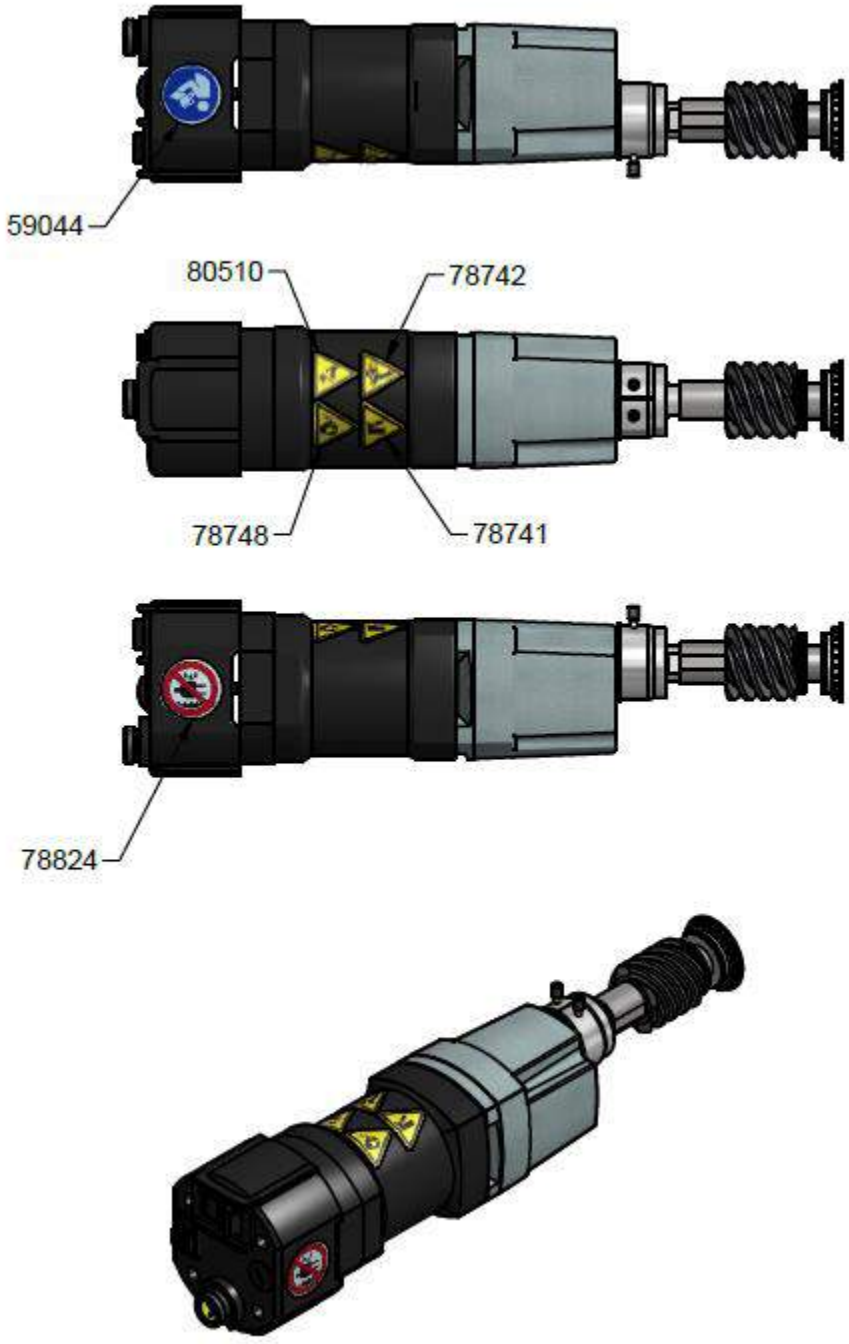


FIGURE 1 P/N 37460 DRIVE ASSY 230 V 2-SPD 780/1500 RPM LABEL PLACEMENT

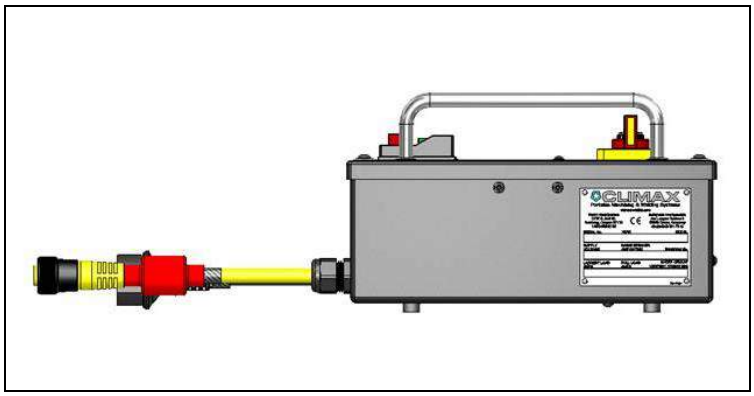


FIGURE 2 P/N 72918 WELDON SPINDLE 230V CONTROLLER SIDE LABEL LOCATIONS

FIGURE 3 P/N 79218 WELDON SPINDLE 230V CONTROLLER TOP LABEL LOCATIONS

2 INTRODUCTION

The Climax BB3000 Portable Boring Machine performs on-site refurbishment and servicing of machines and equipment at chemical plants, public utilities, steel and paper mills, mines, power stations, fluid transmission and distribution systems. Modular design and diverse setup options allow innovative solutions to difficult on-site maintenance problems. Bores are machined with a tool bit mounted at one of many positions along the boring bar. The BB3000 can be used in many ways including blind boring, line boring, drilling, and facing. The electric, or pneumatic, rotational drive unit features manual or automatic variable feed extending over a 10” range. The machine can be set up to operate in either a horizontal or vertical attitude.

Figure 4 provides a general view of the BB3000 with an electric motor. Both the electric motor and the pneumatic motor are reversible. Details of your machine may differ from this illustration.

NOTICE

Moving machine parts can cause serious injury. Read and understand these instructions before operating the machine.

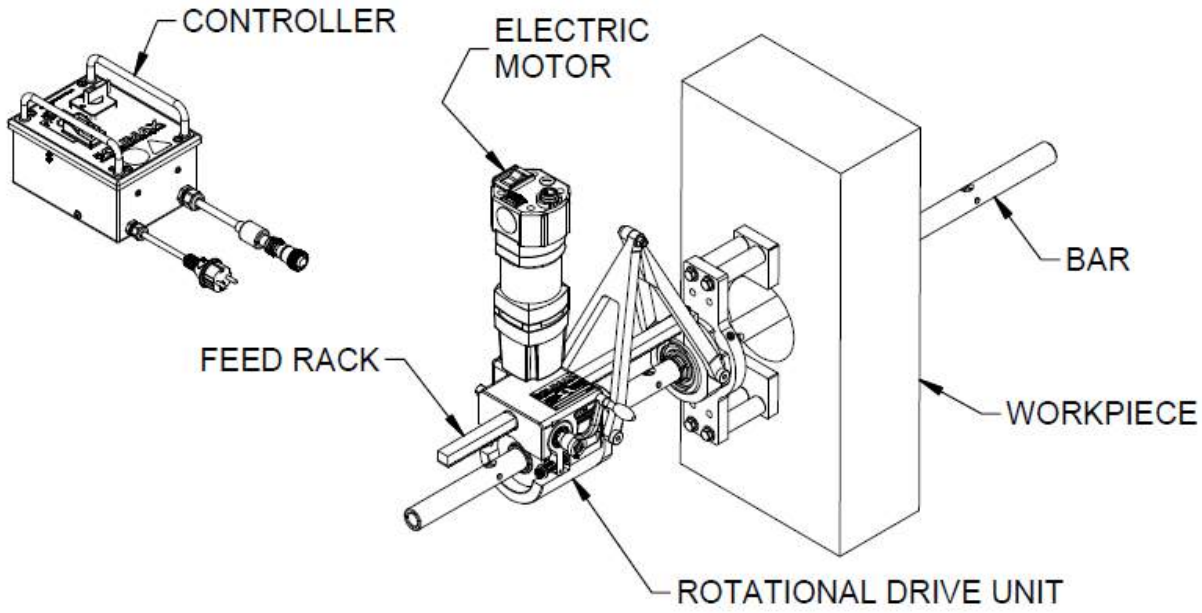


FIGURE 4 - MODEL BB3000 WITH ELECTRIC MOTOR

The BB3000 will line-bore internal diameters from 1-1/2" to 5" (38 to 127 mm). The machine has a 10" (254 mm) stroke and provision for mounting the cutting tool at several positions along the 72” boring bar.

2.1.1 Weights of sub-assemblies

TABLE 4 SUB-ASSEMBLY WEIGHTS

Sub-assembly	Weight
Motor and RDU assembly	**59 lbs (27 kg)**
Controller	**7 lbs (3 kg)**
Double Arm Bearing Mount	**14 lbs (6 kg)**
Universal Bearing Mount	**36 lbs (16 kg)**

2.2 About this manual

This manual describes the use and maintenance of your Model BB3000 Portable Boring Machine. For maximum safety and performance, read the entire manual before operating this machine. Exploded-view drawings and parts lists are provided toward the back of this manual.

2.3 Receipt and Inspection

Your Climax product was inspected and tested prior to shipment, and packaged for normal shipment conditions. Climax does not guarantee the condition of your machine upon delivery. When you receive your Climax product, perform the following receipt checks.

Inspect the shipping container(s) for damage.

Check the contents of the shipping container(s) against the included invoice to make sure that all components have been shipped.

Inspect all components for damage.

Contact Climax immediately to report damaged or missing components.

2.4 Audible Noise Levels

Electric Drive Option:

- Declared Sound Power Level is 80 dBA
- Declared Operator Sound Pressure Level is 79 dBA
- Declared Bystander Sound Pressure Level is 74 dBA

2.5 Integrated RDU

The RDU (Rotational Drive Unit), a combination drive and feed unit, features 7.5:1 gear reduction and infinitely variable feed up to .018" (.46 mm) per revolution. The feed operates manually or automatically, is reversible, and has an auto stop.

2.5.1 Electric Motors

Electric motors complete with mounting accessories are available in 120VAC and 230VAC versions.

The standard product offers two electric motor options:

- Variable speed, 2-speed gearbox, 120 VAC, 7.4 amps.
  Free speed range at the bar: Low 88-114 RPM. High 170-120 RPM
- Variable speed, 2-speed gearbox, 230 VAC, 3.5 amps.
  Free speed range at the bar: Low 94-114 RPM. High 180-220 RPM
  The 230 VAC motor is CE approved.

WARNING

Due to the risk of electrical shock do not use this motor where it is exposed to moisture.

2.5.2 Electric control circuit

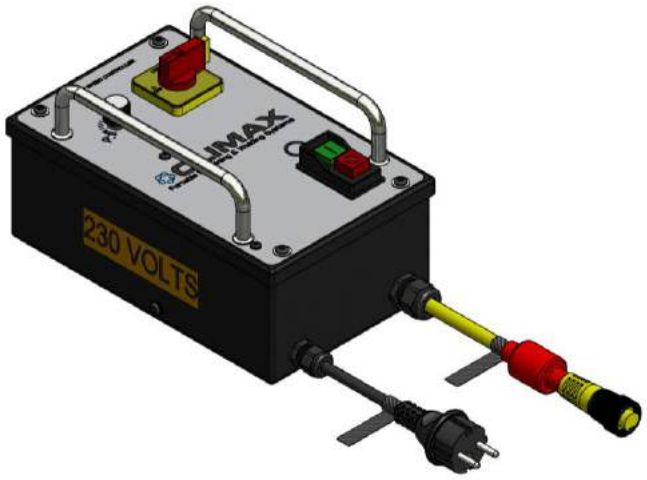


FIGURE 5 P/N 79218 CONROLLER BB3000

2.5.3 Pneumatic motor

The Stanley 1.22 hp pneumatic motor will deliver 42 ft-lb of torque at the bar at 100 rpm. At this speed, the motor is operating at optimum efficiency and the machine removes metal at its maximum rate. The air motor requires air flow of 30 ft^3/min at 90 psi.

For your added safety and protection, the BB3000 Portable Boring Machine is equipped with an air control valve having a brightly colored oval handle which clearly indicates airflow direction.

Quick disconnects between the incoming air supply line and the machine enables the operator to quickly shut down the machine if necessary.

CAUTION

The air filter and lubricator supplied with the machine must be used to protect the pneumatic systems and maintain the machine warranty. The lubricator is set to deliver oil at a rate of 2-4 drops per minute.

CAUTION

If the machine stops moving unexpectedly, lock out the pneumatic safety valve located at the filter lubricator assembly before performing any troubleshooting.

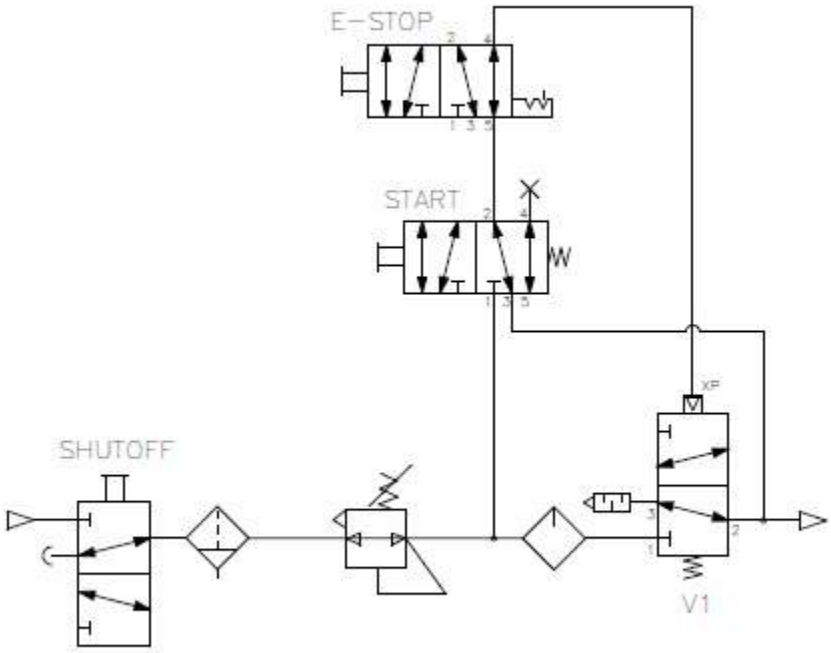


FIGURE 6 PNEUMATIC CONDITIONING UNIT P/N 78264

2.5.4 Boring bar

The 1-1/4" (31.8 mm) diameter, 72" (1829 mm) long boring bar is chrome plated 1045.

CAUTION

A nicked or gouged boring bar can damage mating parts. Protect the bar and exercise caution when handling or sliding it through the work piece.

Standard bars come in 48, 72, 96 lengths with either 10" or 6" hole spacing. Custom lengths and holes spacing can be ordered on request.

On standard machines, these tool-bit holes are 3/8” square. For the metric version, tool-bit holes are 10mm square.

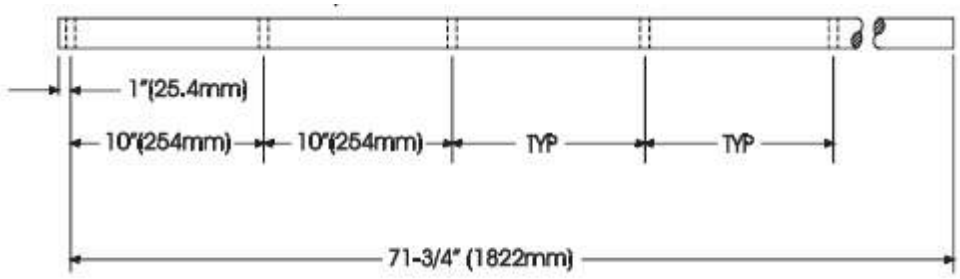


FIGURE 7 – BORING BAR WITH SQUARE HOLES FOR STANDARD TOOL BITS

TIP

Other bar lengths to suit your special requirements are available by calling Climax toll free at 1-800-333-8311

Self-aligning spherical bearings allow for as much as five degrees out of alignment. They attach to brackets for securing the boring bar to the work during operation. In most applications, spacers and tack plates are welded or clamped in place to facilitate mounting.

3 SETUP

3.1 Recommended tools

When setting up the BB3000 Portable Boring Machine, you may want to have the following tools and equipment on hand.

- Dial indicator with magnetic base
- Large C-clamps
- Portable welder
- Rubber mallet
- Pedestal or bench grinder

3.2 Common setups

TIP

Before proceeding, make it a habit to check the bar for nicks, cuts, or abrasions. Dress the bar smooth if necessary and Wipe it clean with solvent to remove dirt and chips.

Figure 8 is a typical setup arrangement using spacers at both the left and mid spherical mounts and no spacer at the right mount. This setup provides rigidity for many job configurations. Spherical bearing mounts allow for some self-alignment of the boring bar.

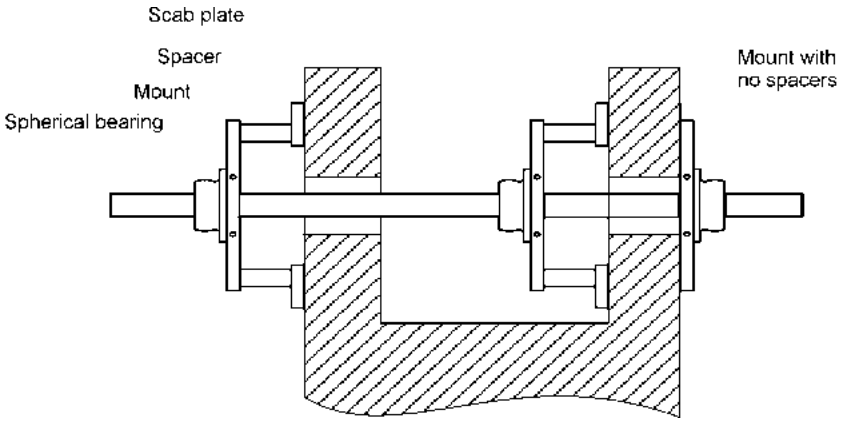


FIGURE 8 – TYPICAL SETUP WITH AND WITHOUT SPACERS

Jobs where the in-line holes are less than 12” apart overall are set as shown in Figure 9. Spacers clear the work at each end to allow boring all the way through.

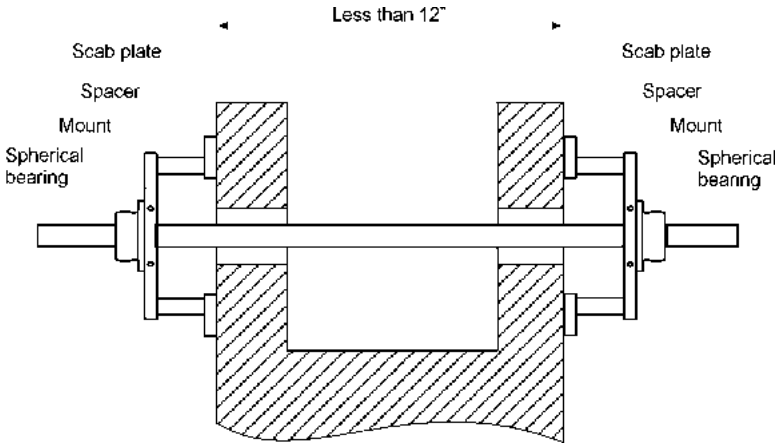


FIGURE 9 - SPACERS ON OPPOSING ENDS

A typical setup for machining a blind hole is shown in Figure 10. You will require longer screws for this special setup using 3” spacers.

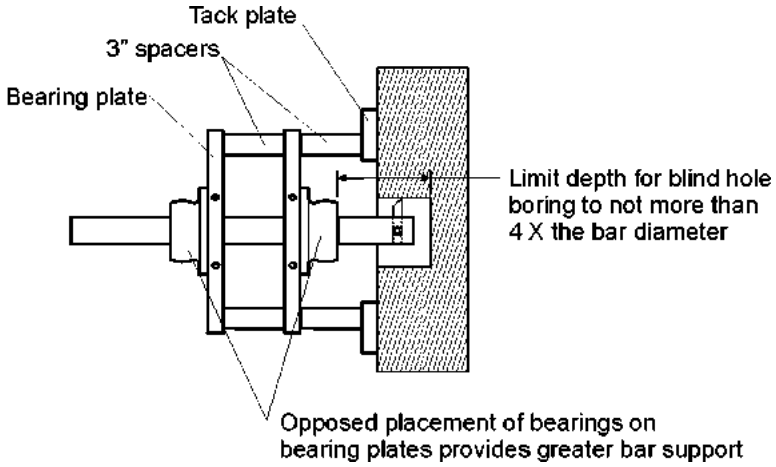


FIGURE 10 - SETUP FOR MACHINING BLIND HOLES

TIP

You may require longer screws for special setups such as shown in Figure 10 using 3” spacers

3.3 Setup over long distances

Because long lengths of unsupported bar will sag, intermediate bearing supports may be required. Any additional support results in a rigid set-up with reduced bar sag and tool chatter to machine more accurately.

The following table shows how much bend can be expected from an unsupported boring bar:

TABLE 5 BORING BAR BENDING MEASUREMENTS

Spacing between supports	1 FT	2 FT	3 FT	4 FT	5 FT	6 FT
Bar sag at mid-span	.00005"	.0004"	.002"	.007"	.016"	.034"

Allowing for other considerations, to reduce sag and minimize tool chatter, mount bearing supports as close as possible to the bores being machined.

To determine how many bearing supports are needed do the following proceedure:

- Use one bearing support at each end of the bar.
- Add extra intermediate bearing supports if in-line holes being bored are more than 18" (457 mm) apart overall.
- If any section of unsupported bar length is greater than 30" (457 mm), mount additional intermediate bearing supports onto the bar.

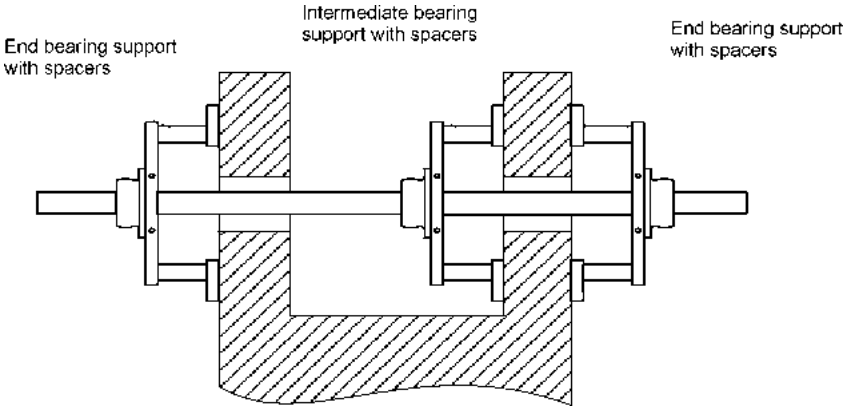


FIGURE 11 – AN INTERMEDIATE BEARING SUPPORT GIVES RIGIDITY

3.4 Setup cones

Setup cones enable the rough alignment of the boring bar within the work piece. These aluminum cones approximately center the bar until bearing supports and brackets can be secured with clamps or welds, as appropriate. Sets of cones in two sizes cover a wide range of application and are supplied as standard equipment with the BB3000. These cones are particularly effective when holes in the work piece are not excessively out-of-round.

Setup cones support the boring bar in place until clamping or welds on tack plates can be completed. Cones are then removed and precise adjustments are made to accurately center the supported bar.

CAUTION

Wooden devices are at risk when placed next to a hot work piece. Allow welded work to cool before setting up the machine.

3.4.1 Setup guidelines

TIP

These guidelines specifically discuss the use of Climax's standard setup cones. Of course, the same setup principles can be adapted to work just as well with your own improvised rough-aligning methods

1. Clean the work piece with solvent to remove grease, oil, and dirt.
2. Carefully slide the bar through the holes to be bored.
3. Slide a setup cone onto each end of the bar.
4. Slide the standard clamp collar on one end of the bar and lock it in place behind the setup cone
5. Retract the set screws in the other clamp collar until the tips are below flush. Slide it on the bar with the setscrew tips facing the back of the cone.
6. Pull on the bar from the other end while guiding both cones snuggly into the bore.
7. Using the 2 setscrews in the clamp collar, push the cone into the bore until there is no movement in the bar or the cones.
8. Holding both cones close to the bore, lock the second clamp collar on the bar.
9. As shown in Figure 12, center the bearings in the bearing supports:
    a. Loosen the hex bolts holding the bearing to the bracket.
    b. Adjust the four setscrews to center the bearing.
    c. Tighten the hex bolts.

3.4.2 Centering the bearings

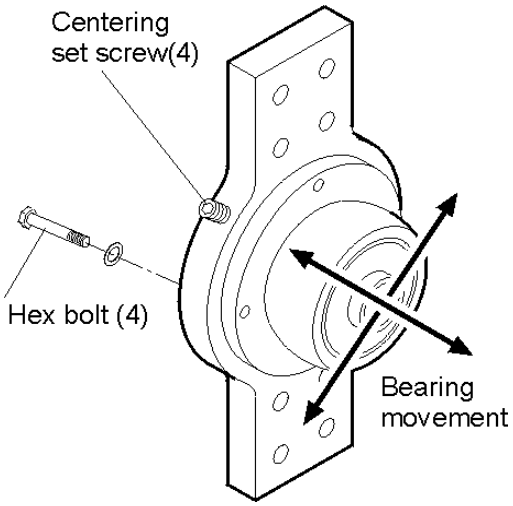


FIGURE 12 - CENTERING THE BEARINGS

1. Slide outer bearings onto the bar, one from each end.
2. Mount spacers and tack plates to the bearing supports.

3.4.3 Spacers and tack plates

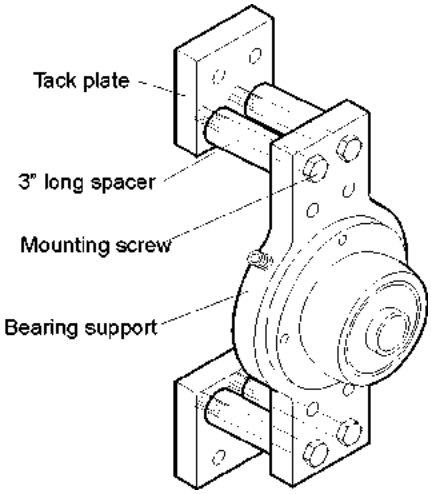


FIGURE 13 - SPACERS AND TACK PLATES MOUNTED TO BEARING SUPPORTS

1. Secure the bearing supports and tack plates to the work piece with clamps or by tack welding as indicated in Figure 14.

WARNING

The tack plate welds must be strong enough to support 1200 lbs. Failure to secrure tack weld plates with recommended load could result in serious injury.

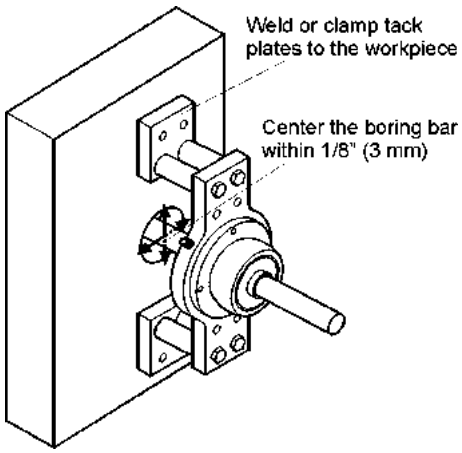


FIGURE 14 - SECURING TACK PLATES TO THE WORK PIECE

2. If welding is your preferred method, for each bearing support, mark the location where tack plates contact the work surface.
3. Slide the bearing supports clear of the work piece and grind away any rust or paint to prepare a clean surface for welding.
4. Protect the bar and supports from any weld splatter.
5. Weld tack plates to the work piece, ½" x ½" in two or more places.
6. With bearing supports securely attached by clamps or by welding, loosen the screws holding the setup cones in place.
7. Make sure that the bar slides freely through all bearing supports before removing the setup cones.
8. Remove the temporary clamps, if used.
9. Loosen clamp collars holding the setup cones.
10. Remove the bar from the brackets and remove the setup cones and clamp collars.
11. Carefully reinstall the bar through the brackets.

3.4.4 Centering the bar

1. To precisely center the bar in the bore do the following proceedure:
2. Loosen the hex bolts holding the bearing to the bracket.
3. With a dial indicator mounted on the bar, touch the stylus to the wall of the bore. Rotating the bar, adjust the setscrews to center the bar.
4. Tighten the hex bolts to hold the bearing and bar in place.
5. Again, make sure that the boring bar slides freely through all bearing supports.

3.5 Rotational drive unit

The RDU (Rotational Drive Unit), with either an air or electric motor features manual or automatic variable feed extending over a 10" range.

WARNING

Avoid personal injury by disconnecting the pneumatic or electrical power before setting or adjusting the machine.

1. Crank the feed rack through the RDU main body, and secure it with the socket head cap screw to the clamp collar at the loose end of the torque scissors.
2. Tighten the setscrew on the rack. Turn the crank handle while tightening the socket head set screw until moderate resistance is felt.
3. Slide the RDU onto the bar and bearing support until the clamp collar fits over the spherical bearing. Tighten the socket-head cap screw in the clamp collar to 35-40 ft-lbs (48-54 N m).

WARNING

Remove crank handle when using auto-feed.

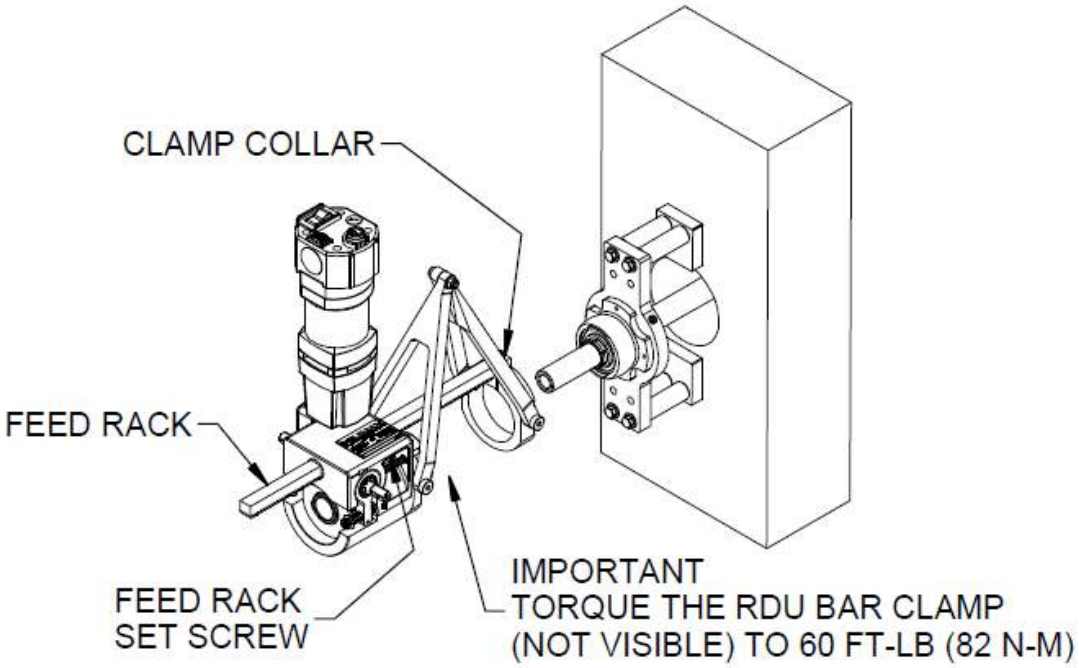


FIGURE 15 - RDU ASSEMBLY WITH TORQUE SCISSORS AND CLAMP COLLAR

4. The rotational drive unit includes a clamp collar that grips the bar. Tighten its cap screw to at least 60 ft-lbs (82 N•m).

3.6 Setting the feed rate

Axial feed is fully adjustable from .002" to .018" (.05 to .46 mm) per revolution in either direction. The feed rate may decrease under the load when making very heavy cuts.

To adjust the feed rate, turn the knurled nuts on the rotational drive unit shown in Figure 16.

3.7 Setting auto feed

The boring bar can feed automatically in either direction. Pushing the feed shaft in on one side or the other will feed in the direction of the arrow engraved on that side of the body (See Figure 16). Be sure the feed shaft engagement pins are fully engaged.

WARNING

To prevent personal injury, or damage to the machine do not reverse the direction of the motor while running.

To feed away from the bearing support, push the feed shaft on the side of the main body with the arrow pointing away from the torque scissors.

To feed toward the bearing support, push the feed shaft on the side of the main body with the arrow pointing toward the torque scissors.

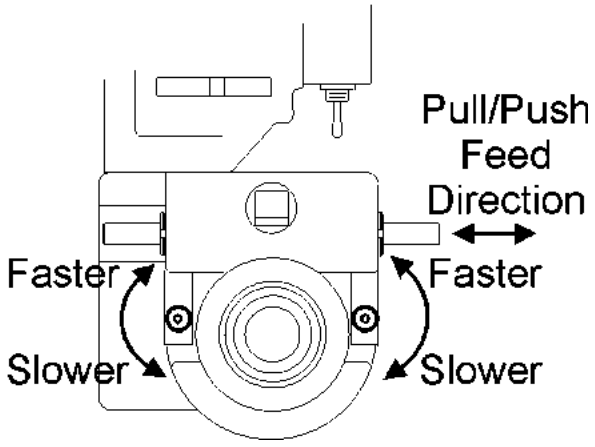


FIGURE 16 - SETTING FEED RATE AND DIRECTION

TIP

With both shaft pins totally disengaged from their detent slots, the feed system is in NEUTRAL and can be hand cranked in either direction.

3.8 Tool bits

Having a ready supply of properly ground tool bits is important. The Climax BB3000 Portable Boring Machine is delivered with a selection of high-speed steel cutting tools properly ground for roughing and finishing operations.

As it becomes necessary to re-sharpen your tool bits, refer to Figure 17 for an indication of basic cutting tool geometry. Depending upon various factors, your application could merit some variance from this standard.

Replacement tool bits are readily available by calling Climax toll free at 1-800-333-8311.

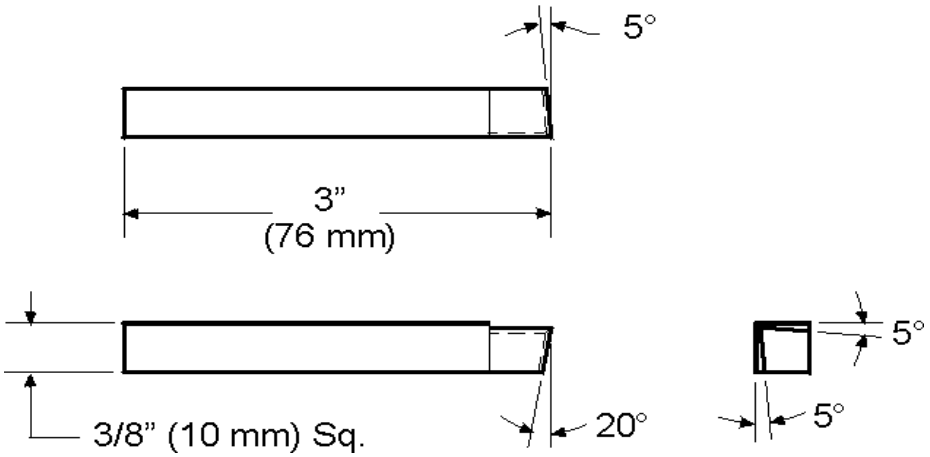


FIGURE 17 – HSS TOOL BITS WITH RECOMMENDED RAKE AND CLEARANCE ANGLES

4 OPERATION

4.1 Horizontal or Vertical Boring

The BB3000 portable boring bar can be set to operate in either a horizontal or a vertical position. Setups are essentially the same except, with vertical operation, tighten the setscrew in the side of the rotational drive unit sufficient to keep the rack from sliding downward. Do not over tighten or the feed system will be locked.

In addition, it is generally better to feed in an upward direction to prevent problems concerning normal backlash with the rack and pinion.

WARNING

When setting up, or servicing the machine disconnect the power source.

For smaller bores, 1-1/2" to 3-1/4" (38 to 83 mm), the tool bit is mounted directly in the boring bar as shown in Figure 18. Larger inside diameters require the use of a boring head as illustrated in Figure 19.

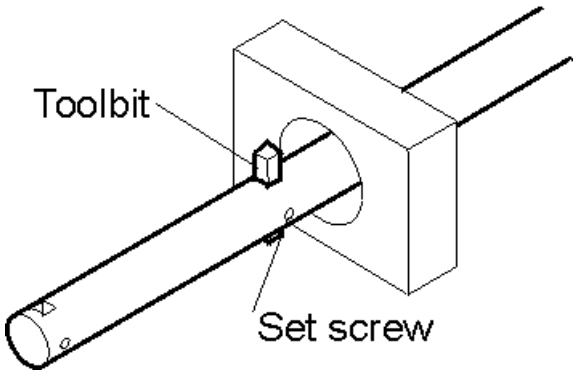


FIGURE 18 - SQUARE HOLES IN THE BORING BAR ACCEPT TOOL BITS

For diameters 3-1/4" to 5" (83 to 127 mm), use the tool head with tool bit shown in Figure 19. Secure the tool head on the bar with the socket-head cap screw.

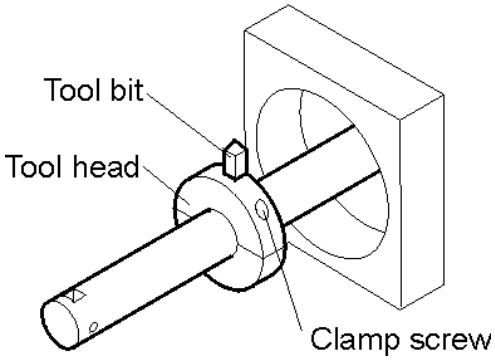


FIGURE 19 - A TOOL HEAD ACCEPTS TOOL BITS FOR LARGER IDS

1. Insert a tool bit into the bar or tool head. Be sure the cutting edge is facing the direction of bar rotation.
2. With the RDU feed shaft in NEUTRAL, position the bar so the tool bit is near the work to be bored.
3. Adjust the setting of the tool bit to obtain the bore diameter required.

TIP

Climax offers a bore-measuring device especially for setting the tool bit height and checking the actual bore diameter.

Call Climax toll free at 1-800-333-8311 for more information on this very useful tool.

4. Tighten the setscrew to secure the tool bit then make sure accuracy of the setting.
5. Select the auto feed direction. See “Setting auto feed” for detailed information.

WARNING

Electrical equipment can shock or cause an explosion if used near wet or flammable materials. Do not operate the motor if it is damp or exposed to combustible materials.

6. Reconnect the pneumatic or electric power and start the motor.

CAUTION

For machines with air motors, if the machine stops moving unexpectedly, lock out the pneumatic safety valve located at the filter lubricator assembly before performing any troubleshooting

7. Set the feed rate. See “Setting the feed rate” for information.
8. After machining the bore, turn off the motor.
9. If necessary, adjust the tool bit cutting depth and repeat the preceding steps as required.

5 MAINTENANCE

5.1 Approved lubricants

TABLE 6 RECCOMENDED LUBRICANTS

Lubricant	Brand	Where used
Gear grease	Polytac EP #2	Gear box, thrust bearings
Light oil	LPS 2	Unpainted surfaces
Cutting fluid	UNOCAL KOOLKUT	Tool bits, work piece
Lubricating oil	Almo 525	Air lubricator
Rust inhibitor	LPS 3	Long term storage

5.2 Rotational drive unit

Under normal use, the RDU is maintenance-free. To prevent corrosion, apply a thin layer of oil to the rack before and after using the machine.

5.3 Boring bar assembly

Lightly lubricate the bar before and after using the machine.

5.4 Electric motor

- Always unplug the motor before carrying out any maintenance.
- Inspect the power cord at frequent intervals.
- Clean the motor with dry compressed air to keep the cooling passages operational.
- Replace the gear lubricating grease every 300 hours.
- Replace brushes when they have worn down to 1/4". Always replace brushes in sets.

5.5 Air motor

To maintain the air motor do the following:

- Route the air supply through the specified lubricator and air filter.
- Drain the air filter before and after using the machine.
- Fill the lubricator oil cup before using the machine. Lubricate at a rate of 2-4 drops of oil per minute.
- Use nonrestrictive air lines and fittings. Check the air system periodically to be sure the air pressure is 90 psi (620 kPa).
- Adjust air motor speed only by turning the air control valve.

TIP

DO NOT attempt to control motor speed by adjusting air line pressure.

6 STORAGE

Proper storage of the BB3000 will prolong its usefulness and prevent undue damage. Before storing, clean the machine with solvent to remove grease, metal chips, and moisture. Spray the machine with WD-40 for short-term storage and LPS 3 for long-term storage.

- Place the boring bar with tools and accessories in the case provided.
- Make sure there are no parts missing.
- Include desiccant or vapor wrap to absorb moisture.

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APPENDIX A TOOLS AND RECCOMENDED SPARE PARTS

The following table lists items most frequently replaced due to wear, loss, or damage. You can avoid unscheduled downtime by maintaining an inventory of these critical parts

Part No.	Description	Qty	Where used
19472	Screw 1/4-28 x 1-1/4 HHCS	8	Boring bar assembly
18231	Screw 1/4-20 x 3/8 SSSCPNI	4	
11756	Screw 3/8-16 x 7/8 SHCS	1	Rotational drive unit
12213	Screw 1/2-13 x 5/8 SSSHD	2	
16502	Ball nylon 7/16 dia.	2	
78976	Motor brushes	2	Electric motor
32461	Tool bit 3/8 x 1.8 LH finish	3	Tool bits
32456	Tool bit 3/8 x 1.8 LH rough	3	
32460	Tool bit 3/8 x .98 LH finish	3	
32454	Tool bit 3/8 x .98 LH rough	3	
31854	Tool bit 3/8 x 1.3 LH finish	3	
31863	Tool bit 3/8 x 1.3 LH rough	3	

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APPENDIX B EXPLODED VIEWS AND PARTS

The following diagrams and parts lists are for your reference purposes only. The machine Limited Warranty is void if the machine has been tampered with by anyone who has not been authorized in writing by Climax Portable Machining & Welding Systems to perform service on the machine.

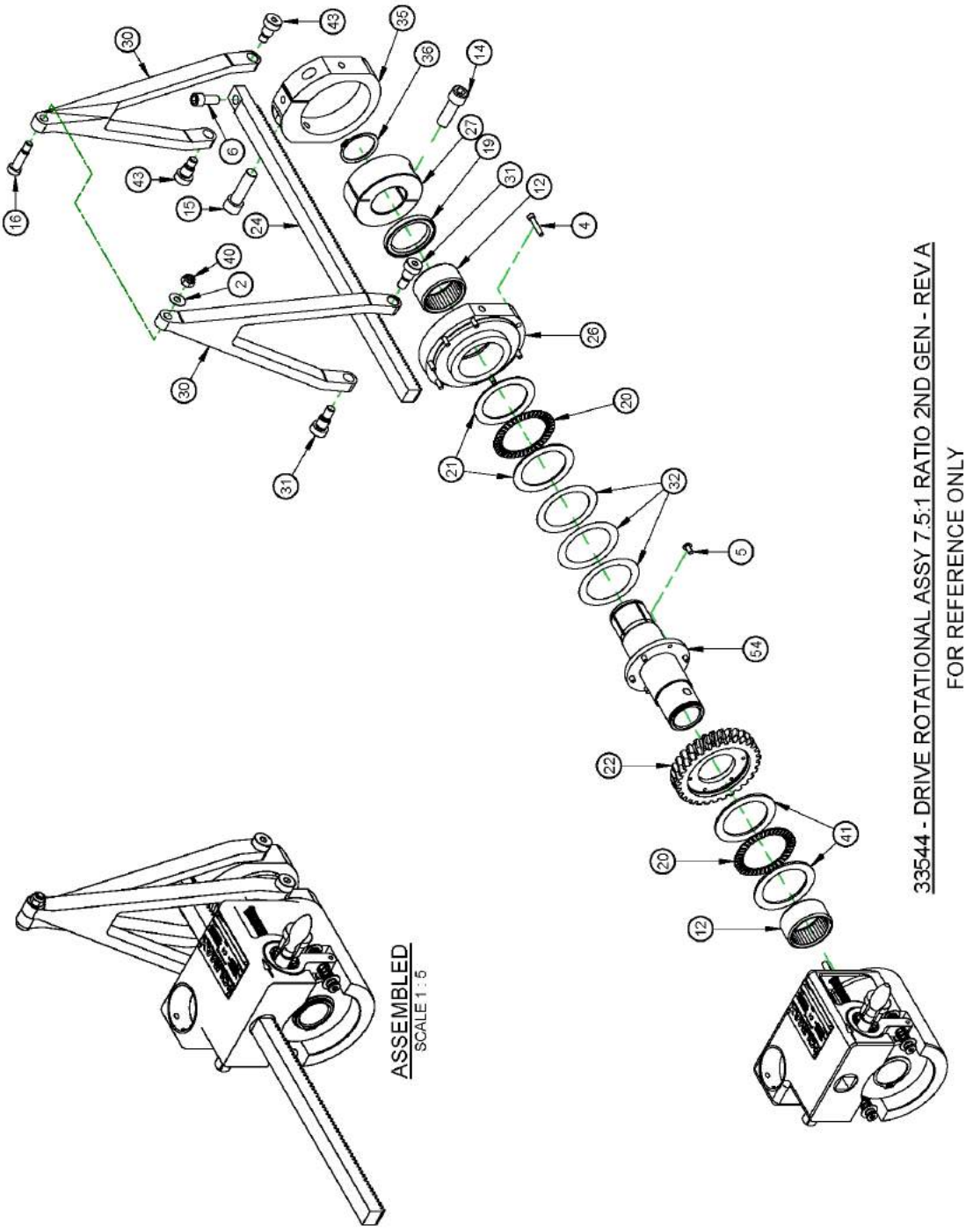


FIGURE 20 P/N 33544 DRIVE ROTATIONAL ASSY

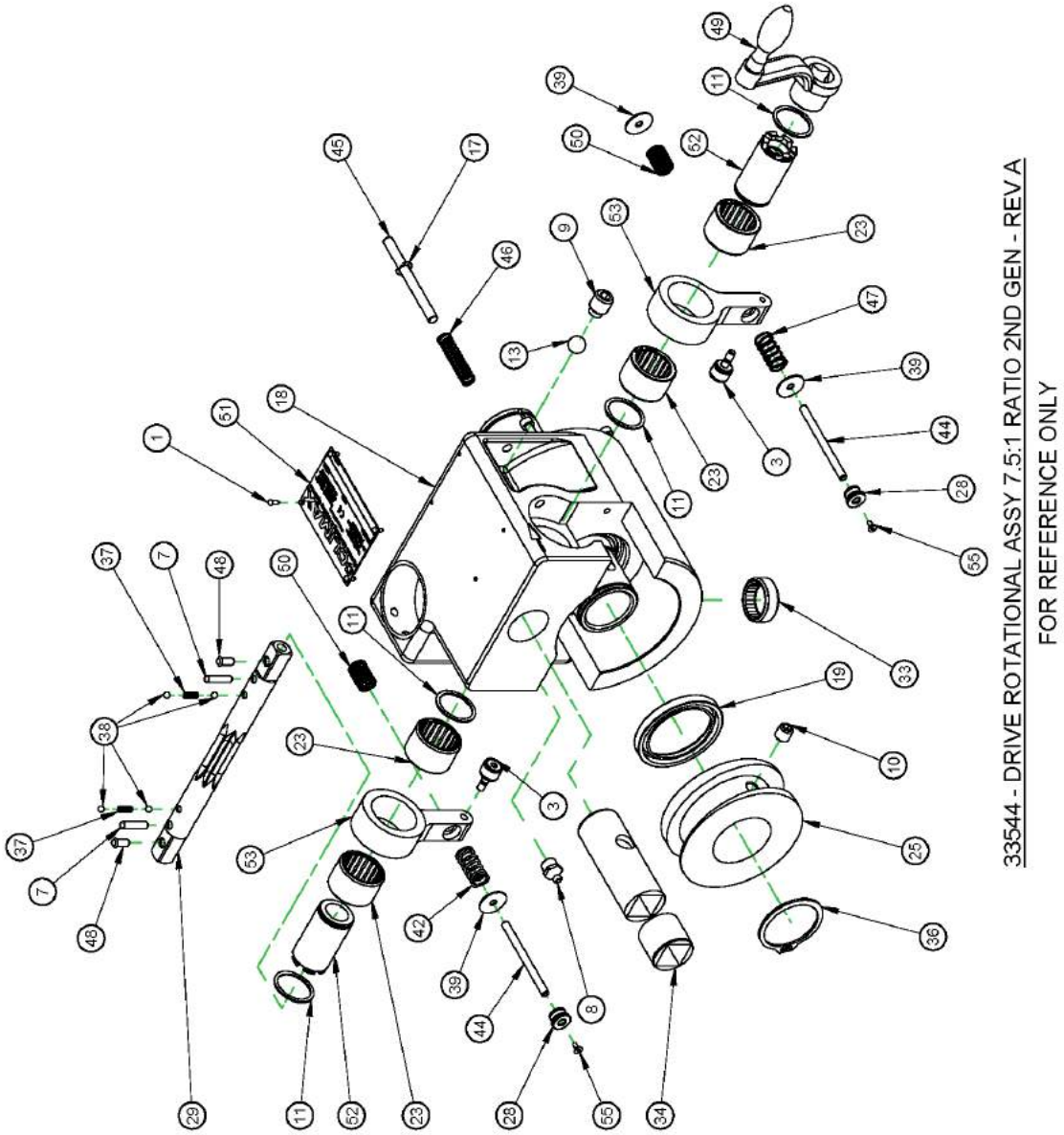


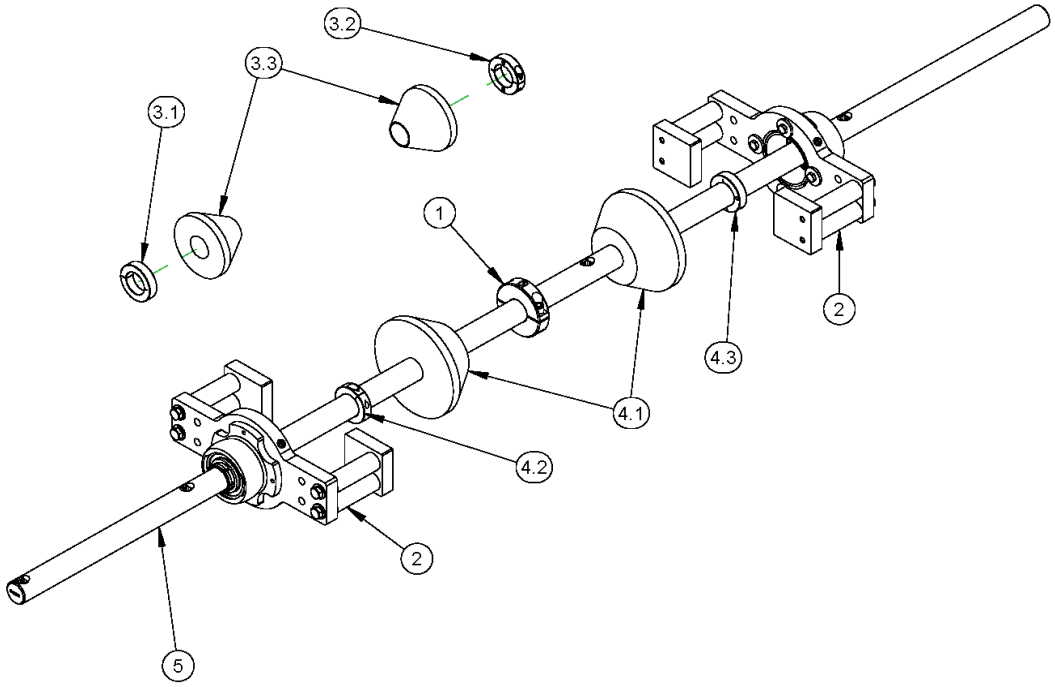
FIGURE 21 P/N 33544 DRIVE ROTATIONAL ASSY

PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089
2	1	10770	WASHER THRUST .75 OD X .312 ID X .03
3	2	10836	BRG CAM FOLLOW .500 X .344
4	7	10935	SCREW 10-32 X 1 SHCS
5	6	11678	SCREW 10-32 X 3/8 BHSCS
6	1	11756	SCREW 3/8-16 X 7/8
7	2	11763	PIN DOWEL 3/16 x 3/4
8	1	11898	FTG GREASE 1/8 NPTM
9	1	12213	SCREW 1/2-13 X 5/8 SSSHDP
10	1	12957	SCREW 3/8-16 X 3/8 SSSFP
11	4	14241	RING SNAP 1 OD SPIRAL HEAVY DUTY
12	2	15603	BRG NEEDLE 1-3/4 ID X 2-1/8 OD X 1.000 OPEN
13	1	16502	BALL NYLON 7/16 DIA
14	1	16559	SCREW 1/2-20 X 1-1/2 SHCS
15	1	18225	SCREW 1/2-20 X 1-3/4 SHCS
16	1	19074	SCREW 3/8 DIA X 1 X 5/16-18 SHLDCS
17	1	19180	RING SNAP 7/32 ID E-RING
18	1	19301	BOX GEAR BB3000
19	2	19303	SEAL 1.750 ID X 2.374 OD X .250
20	2	19304	BRG THRUST 2.125 ID X 2.875 OD X .0781
21	2	19305	WASHER THRUST 2.125 X 2.874 X .062
22	1	19306	GEAR MODIFIED 30T 8DP 3.75 PD RH QUAD
23	4	19307	BRG ROLLER CLUTCH .984 ID 1.26 OD X .787
24	1	19310	RACK MODIFIED 18.8 INCH LONG
25	1	19329	CAM FEED BB3000
26	1	19330	SUPPORT TORQUE ARM
27	1	19338	CLAMP COLLET BB3000 RDU
28	2	19342	NUT THUMB KNURLED 10-32 X 1/2OD X 21/64 BRASS
29	1	19344	SHAFT PINION AXIAL FEED BB3000 PL2000
30	2	19346	SCISSORS TORQUE
31	2	19368	SCREW 1/2 DIA X 1/2 X 3/8-16 SHLDCS
32	1	19371	SHIM SET 2.13 ID X 2.88 OD
33	1	19372	BRG NEEDLE 7/8 ID X 1-1/8 OD X .375 OPEN
34	1	19452	SLEEVE MODIFIED SET
35	1	19454	CLAMP COLLAR BEARING CLAMP BB3000
36	2	19505	RING SNAP 1-5/8 OD .062 WIDE
37	2	19561	SPRING COMP .148 OD X .023 WIRE X .50 LONG SS
38	4	19562	BALL STEEL 5/32 DIA
39	3	19604	WASHER FENDER 3/16 ID X 3/4 OD
40	1	19729	NUT 5/16-18 NYLON INSERT LOCKNUT
41	2	19742	WASHER THRUST 2.125 X 2.875 X .090
42	1	19806	SPRING COMP .48 OD X .055 WIRE X 1.00 LONG
43	2	19811	SCREW - MODIFIED SHLDCS
44	2	19812	SCREW FEED ADJUSTMENT BB3000
45	1	19981	PIN STOP
46	1	19982	SPRING COMP .36 OD X .032 WIRE X 2.25 LONG
47	1	24324	SPRING COMP .48 OD X .042 WIRE X 1.00 LG 13 LBS/IN
48	2	26828	PLUNGER BALL PUSHFIT
49	1	26850	HANDLE CRANK MODIFIED
50	2	26920	SPRING COMP .48 OD X .038 WIRE X 1.50 LONG
51	1	29154	PLATE SERIAL YEAR MODEL CE 2.0 X 3.0
52	2	43219	BUSHING FEED DIRECTION BB FACING HEAD
53	2	43274	LEVER FEED BB3000
54	1	77125	COLLET 3RD GEN
55	2	77309	SCREW 3-48 X .25 FHSCS SS

33544 - DRIVE ROTATIONAL ASSY 7.5:1 RATIO 2ND GEN - REV A

FOR REFERENCE ONLY

FIGURE 22 P/N 33544 DRIVE ROTATIONAL ASSY PARTS LIST



P/N 27803 SET CONE SETUP 1-1/2 TO 5 CONTAINS SETS P/N 26236 & 26254

82117 - CHART BAR BORING SETUP ASSY 2ND GEN - REV A

FOR REFERENCE ONLY

FIGURE 23 P/N 82117 SET CONE SET UP

PARTS LIST P/N 33712 BAR BORING ASSY METRIC 2ND GEN			
ITEM	QTY	P/N:	DESCRIPTION
1	1	33713	TOOL HEAD METRIC 3-1/4 TO 5 DIA
2	4	24756	ASSY MOUNT DOUBLE ARM 1-1/4 BAR BB3000 STD
3	1	26263	SET CONE SETUP 1-1/2 TO 3-1/4 DIA AL
3.1	1	57398	COLLAR SPLIT1-1/4 ID X 2-1/16 OD X 1/2
3.2	1	57400	CLAMP COLLAR JACKING 1-1/4 ID X 2-1/16 OD X 1/2
3.3	2	26030	CONE SETUP 1-1/2 TO 3-1/4 DIA
4	1	26264	SET CONE SETUP 3-1/4 TO 5 DIA AL
4.1	2	26031	CONE SETUP 3-1/4 TO 5 DIA AL
4.2	1	57398	COLLAR SPLIT1-1/4 ID X 2-1/16 OD X 1/2
4.3	1	57400	CLAMP COLLAR JACKING 1-1/4 ID X 2-1/16 OD X 1/2
5	1	33541	BBAR 1-1/4 X 78 SPCL 3/8 1/4-20 SPCL

PARTS LIST P/N 33545 BAR BORING SETUP ASSY INCH 2ND GEN			
ITEM	QTY	P/N:	DESCRIPTION
1	1	19449	HEAD TOOL 3-1/4 TO 5 DIA 1-1/4 BAR
2	4	24756	ASSY MOUNT DOUBLE ARM 1-1/4 BAR BB3000 STD
3	1	26263	SET CONE SETUP 1-1/2 TO 3-1/4 DIA AL
3.1	1	57398	COLLAR SPLIT1-1/4 ID X 2-1/16 OD X 1/2
3.2	1	57400	CLAMP COLLAR JACKING 1-1/4 ID X 2-1/16 OD X 1/2
3.3	2	26030	CONE SETUP 1-1/2 TO 3-1/4 DIA
4	1	26264	SET CONE SETUP 3-1/4 TO 5 DIA AL
4.1	2	26031	CONE SETUP 3-1/4 TO 5 DIA AL
4.2	1	57398	COLLAR SPLIT1-1/4 ID X 2-1/16 OD X 1/2
4.3	1	57400	CLAMP COLLAR JACKING 1-1/4 ID X 2-1/16 OD X 1/2
5	1	32860	BBAR 1-1/4 X 78 SPCL 3/8 1/4-20 SPCL

82117 - CHART BAR BORING SETUP ASSY 2ND GEN - REV A

FOR REFERENCE ONLY

FIGURE 24 P/N 33712 PARTS LIST

36961 MOUNT UNIVERSAL BB3000		
BALLOON	**PART**	**DESCRIPTION**
1	36964	MOUNT BEARING RING 1-1/4
2	36965	EXTENSION ARM MOUNT
3	36966	TACK BLOCK 4 INCH
4	37599	ASSY STAND OFF TUBE 5.3 INCH
5	22662	WASHER 1/2 FLTW HARDENED 1-1/8 OD X 1/8 THICK
6	14036	SCREW 1/2-13 X 2 SHCS
7	26653	MOUNT BRG SPHERICAL 1-1/4 ID W/ CLAMP COLLAR
8	11223	SCREW 1/2-13 X 7 SHCS
9	21798	WASHER 5/16 FLTW HARDENED
10	19472	SCREW 1/4-28 X 1-1/4 HHCS GRADE 8
11	27273	SCREW 1/2-20 X 3/4 SSSFP
12	37598	ASSY STAND OFF TUBE 3.3 INCH
13	11879	SCREW 1/2-13 X 5 SHCS

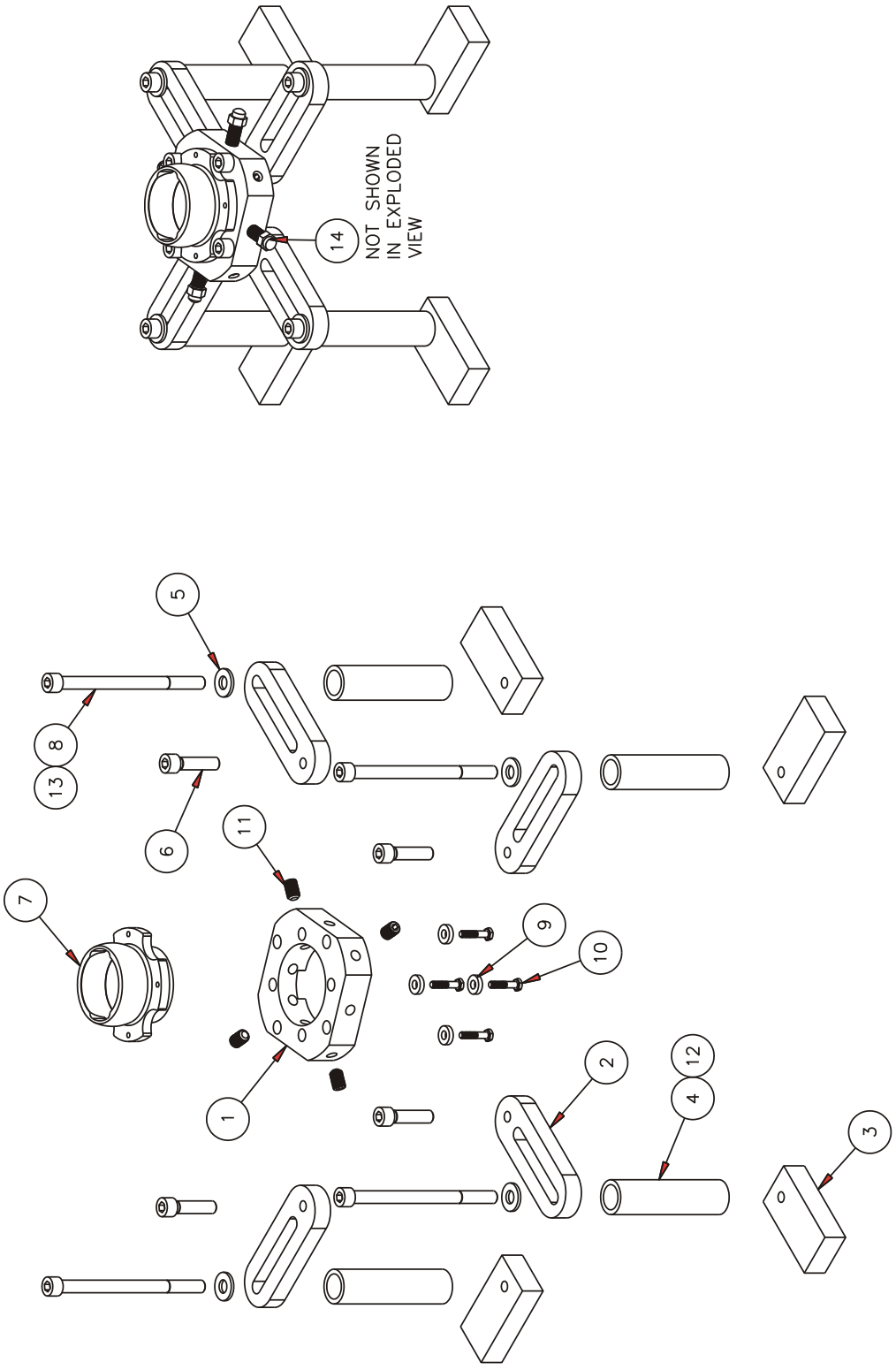
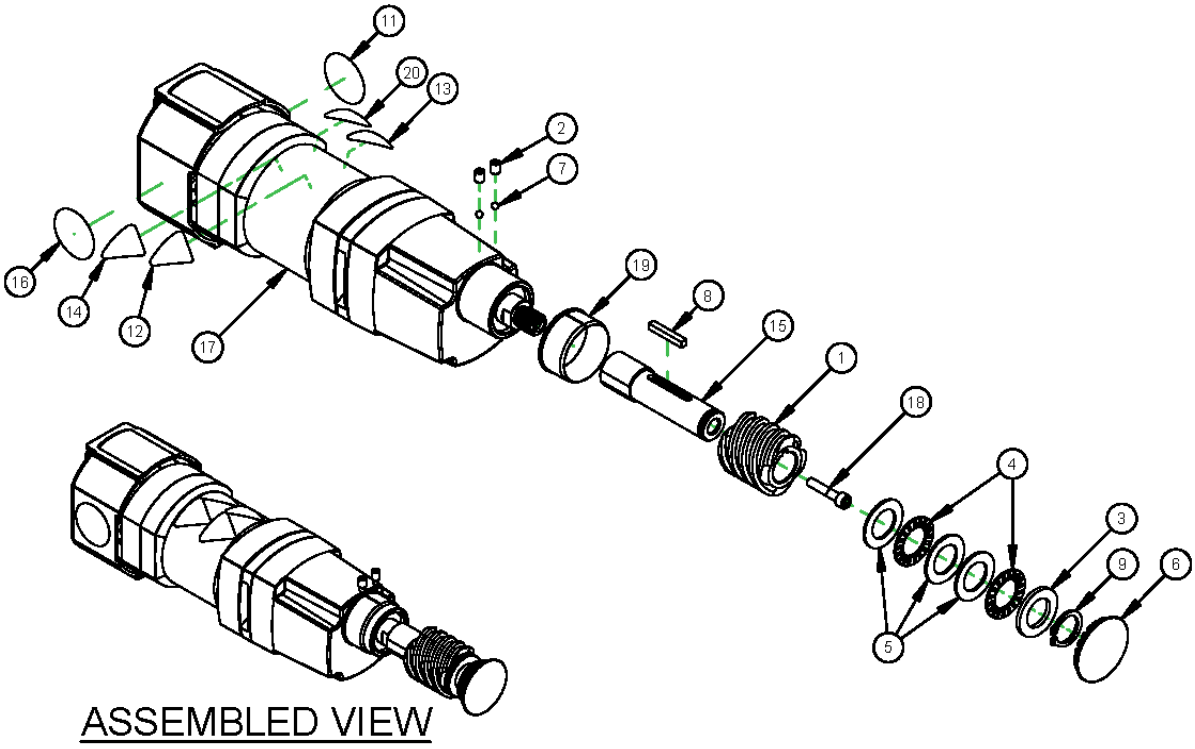


FIGURE 25 P/N 36961 MOUNT UNIVERSAL

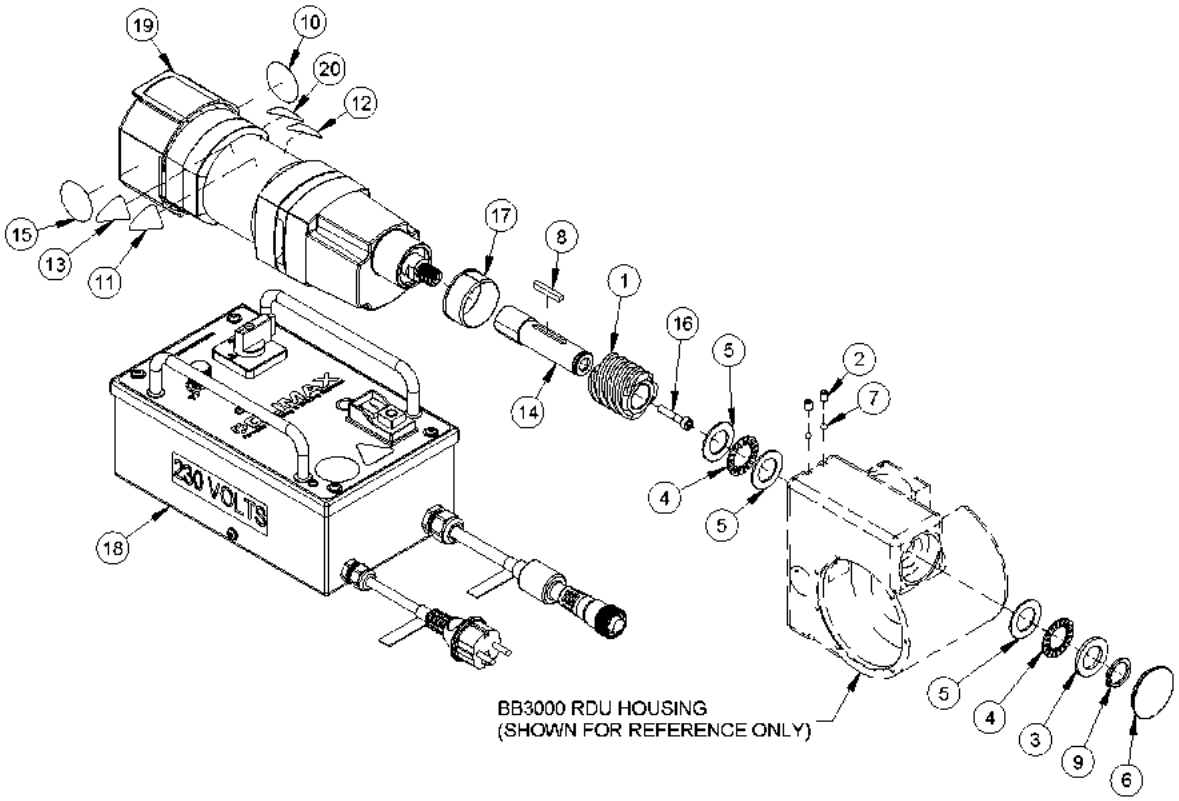


ASSEMBLED VIEW

PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	10858	WORM 8DP QUAD RH 1.75 14.5PA STEEL HARDENED
2	2	11325	SCREW 1/4-20 X 3/8 SSSCP
3	1	12631	WASHER THRUST .875 ID X 1.437 OD X .123
4	2	13174	BRG THRUST .875 ID X 1.437 OD X .0781
5	3	13175	WASHER THRUST .875 ID X 1.437 OD X .060
6	1	15999	PLUG HOLE 1-3/4 DIA MODIFIED
7	2	16594	BALL NYLON 3/16 DIA
8	1	16937	KEY 3/16 X 1.25 SQ BOTH ENDS
9	1	19602	RING SNAP 7/8 OD X .078 TH HEAVY DUTY
10	1	36549	CONTROL SPEED ASSY KM3000 120V 4TH GEN DOM (NOT SHOWN)
11	1	59044	LABEL WARNING - CONSULT OPERATOR'S MANUAL
12	1	78741	LABEL WARNING CRUSH FOOT GRAPHIC 1.13 TALL TRIANGLE YELLOW
13	1	78742	LABEL WARNING ENTANGLEMENT OF HAND/ROTATING SHAFT GRAPHIC 1.13 TALL TRIANGLE YELLOW
14	1	78748	LABEL WARNING - FLYING DEBRIS/LOUD NOISE GRAPHIC 1.13" TRIANGLE YELLOW
15	1	78750	SHAFT WORM 5/8-16 BB3000 INPUT
16	1	78824	LABEL WARNING - DO NOT EXPOSE TO WATER
17	1	78867	MOTOR MODIFIED 120V 1050 WX 780/1500 RPM FS REVERSIBLE
18	1	78903	SCREW M6 X 1.0 X 30MM SHCS LH CL 12.9
19	1	78904	SLEEVE MOTOR BB3000
20	1	80510	LABEL WARNING ENTANGLEMENT OF HAND/ROTATING SHAFT GRAPHIC 1.13 TALL TRIANGLE YELLOW

37459 Rev A - DRIVE ASSY 120V 2-SPD 780 / 1500 RPM FS

FIGURE 26 P/N DRIVE ASSY 120 V



PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	10858	WORM 8DP QUAD RH 1.75 14.5PA STEEL HARDENED
2	2	11325	SCREW 1/4-20 X 3/8 SSSCP
3	1	12631	WASHER THRUST .875 ID X 1.437 OD X .123
4	2	13174	BRG THRUST .875 ID X 1.437 OD X .0781
5	3	13175	WASHER THRUST .875 ID X 1.437 OD X .060
6	1	15999	PLUG HOLE 1-3/4 DIA MODIFIED
7	2	16594	BALL NYLON 3/16 DIA
8	1	16937	KEY 3/16 X 1.25 SQ BOTH ENDS
9	1	19602	RING SNAP 7/8 OD X .078 TH HEAVY DUTY
10	1	59044	LABEL WARNING - CONSULT OPERATOR'S MANUAL 1.5 DIA
11	1	78741	LABEL WARNING CRUSH FOOT GRAPHIC 1.13 TALL TRIANGLE YELLOW
12	1	78742	LABEL WARNING ENTANGLEMENT OF HAND/ROTATING SHAFT GRAPHIC 1.13 TALL TRIANGLE YELLOW
13	1	78748	LABEL WARNING - FLYING DEBRIS/LOUD NOISE GRAPHIC 1.13" TRIANGLE YELLOW
14	1	78750	SHAFT WORM 5/8-16 BB3000 INPUT
15	1	78824	LABEL WARNING - DO NOT EXPOSE TO WATER
16	1	78903	SCREW M6 X 1.0 X 30MM SHCS LH CL 12.9
17	1	78904	SLEEVE MOTOR BB3000
18	1	79218	CONTROLLER BB3000 230V 50/60 HZ CE
19	1	79272	MOTOR MODIFIED 230V 1050W X 780/1500 RPM FS REVERSIBLE
20	1	80510	LABEL WARNING ENTANGLEMENT OF HAND/ROTATING SHAFT GRAPHIC 1.13 TALL TRIANGLE YELLOW

FIGURE 27 P/N 37460 DRIVE ASSEMBLY 230V

ITEM	PART No.	DESCRIPTION
1	45489	YOKE FEED TRIP 1-1/4 DIA FACING HEAD
2	45491	CAP FEED TRIP YOKE 1-1/4 DIAM FACING HEAD
3	45492	ACTUATOR FEED DIRECTION SELECTOR
4	12957	SCREW 3/8-16 X 3/8 SSSFP
5	11877	PIN DOWEL 1/4 DIA X 2
6	45493	ROD ACTUATOR FEED DIRECTION SELECTOR SHORT
7	10441	SPRING PLUNGER 3/8-16 HEAVY FORCE
8	27913	COLLAR 1-1/4 HINGED CLAMP

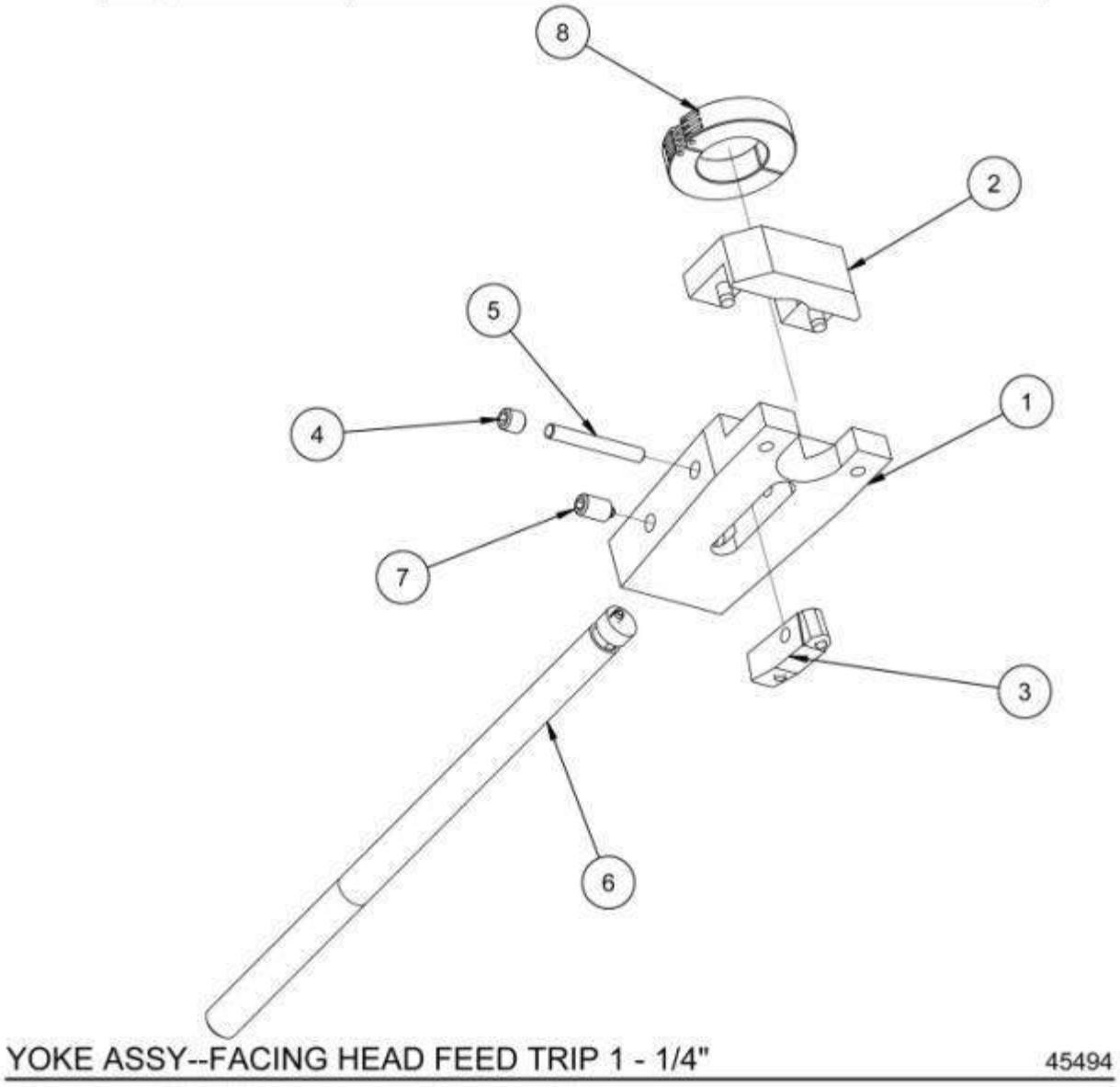


FIGURE 28 P/N 45494 YOKE ASSEMBLY FOR FACING HEAD FEED TRIP

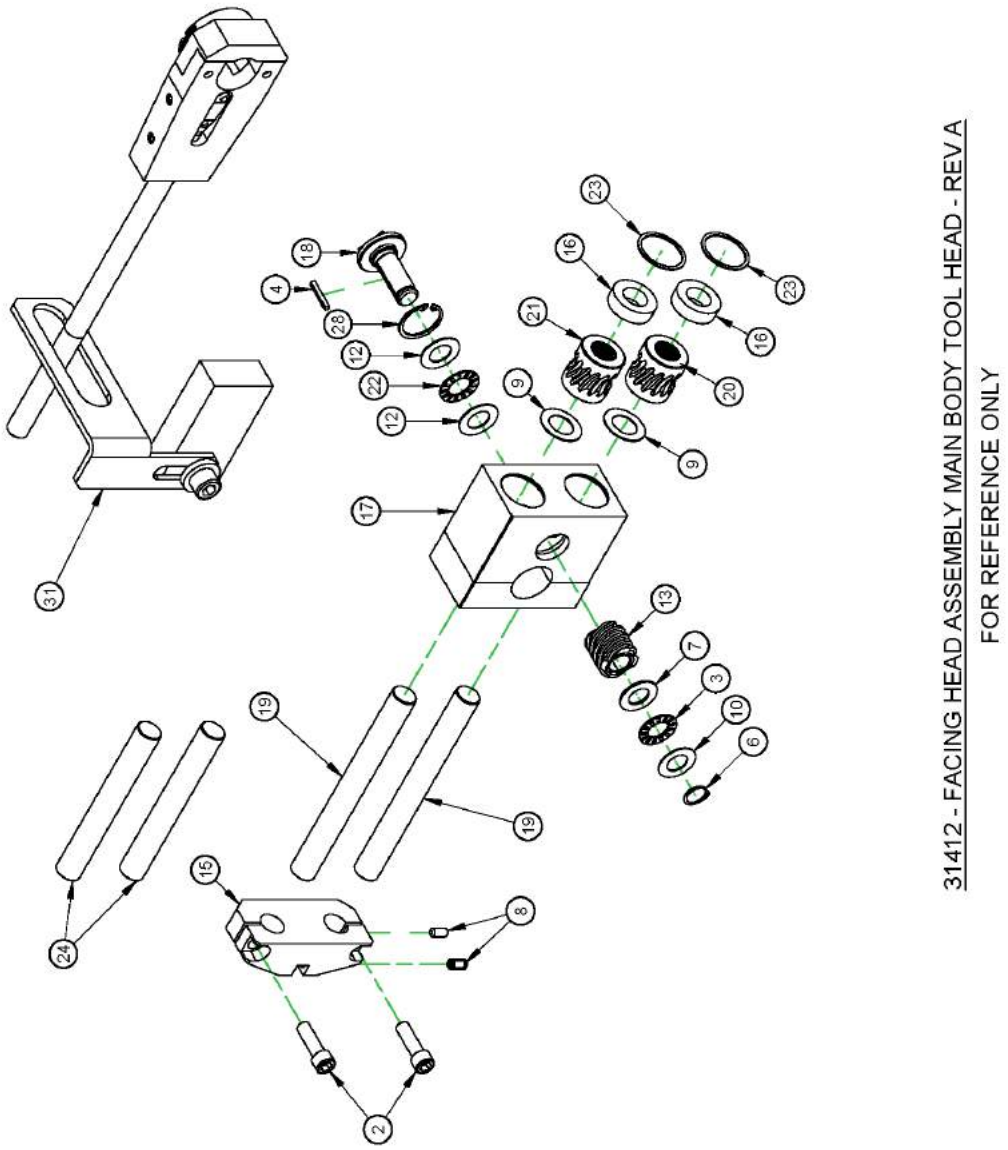


FIGURE 29 P/N 31412 FACING HEAD ASSY

PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	10113	(NOT SHOWN) WRENCH HEX 1/8 X 6 T-HANDLE
2	2	10453	SCREW 3/8-16 X 1 1/4 SHCS
3	1	10538	BRG THRUST .625 ID X 1.125 OD X .0781
4	1	10678	KEY 1/8 SQ X 1.00 SQ BOTH ENDS
5	1	10901	(NOT SHOWN) WRENCH HEX 1/4 X 6 T-HANDLE
6	1	11019	RING SNAP 5/8 OD X .035 THICK
7	1	11165	WASHER THRUST .625 ID X 1.125 OD X .060
8	2	11685	SCREW 1/4-20 X 1/2 SSSCP
9	2	11739	WASHER THRUST .750 ID X 1.250 OD X .0312
10	1	11823	WASHER THRUST .625 ID X 1.125 OD X .030
11	1	14649	(NOT SHOWN) WRENCH HEX 3/16 X 6 T-HANDLE
12	2	15666	WASHER THRUST .669 ID X 1.181 OD X .039
13	1	16183	WORM 12 DP QUAD THREAD .652 BORE
14	1	16807	(NOT SHOWN) WRENCH HEX 5/16 X 6 T-HANDLE TEXTURED GRIP
15	1	30914	TOOL HEAD SMALL FACING HEAD
16	2	30915	BUSHING WORM GEAR RETAINING
17	1	30919	BODY- SMALL FACING HEAD
18	1	30921	SHAFT - DRIVE STAR FEED
19	1	30944	SET LEADSCREW R/L HAND X 7
20	1	30947	GEAR WORM 12DP 14T QUAD RH 14.5PA BRONZE
21	1	30948	GEAR WORM 12DP 14T QUAD LH 14.5PA BRONZE
22	1	31198	BRG THRUST .6693 ID X 1.181 OD X .0787
23	2	31200	RING SNAP 1-3/8 ID SPIRAL MEDIUM DUTY
24	1	31413	SET LEADSCREW R/L HAND X 5.6
25	1	31865	(NOT SHOWN) BIT TOOL HSS 3/8 X 3.0 LH ROUGHING SINGLE
26	1	31913	(NOT SHOWN) BIT TOOL CARBIDE 3/8 X 2.5 LH ROUGHING
27	1	32050	(NOT SHOWN) MANUAL INSTRUCTION FACING HEAD BB3000
28	1	33777	RING SNAP 1-3/16 ID (30MM)
29	1	33999	(NOT SHOWN) SET HEX WRENCH .050 - 3/8 BONDHUS BALL END
30	1	40742	(NOT SHOWN) CONTAINER SHIPPING COMPLETE BB3000 FACING HEAD
31	1	45494	YOKE ASSY--FACING HEAD FEED TRIP 1 - 1/4"

FIGURE 30 P/N 31412 FACING HEAD ASSY PARTS LIST

30785 PNEUMATIC POWER ASSY 175 RPM		
BALLOON	**PART**	**DESCRIPTION**
1	36864	VALVE BALL 3/8 OVAL HANDLE ASSY W/ LABEL
2	29305	FTG SWIVEL 3/8 NPTM X 3/8 NPTF
3	15397	FTG QUICK COUPLER 3/8B 3/8 NPTMALE AIR
4	19297	FTG QUICK COUPLER 3/8B 1/2 NPTF FEMALE AIR
5	24293	ADAPTER STANLEY AIR MOTOR
6	24292	SHAFT PNEUMATIC 883000
7	16937	KEY 3/16 SQ X .125 SQ BOTH ENDS
8	10858	GEAR WORM 8DP 1.5PD 1.75 FACE QUAD LEAD
9	13175	WASHER THRUST .875 ID X 1.437 OD X 060
10	13174	BRG THRUST .875 ID X 1.437 OD X .0781
11	16594	BALL NYLON 3/16 DIA
12	11325	SCREW 1/4-20 X 3/8 SSSCP
13	12631	WASHER THRUST .875 ID X 1.437 OD X .123
14	19602	RING SNAP 7/8 OD HEAVY DUTY
15	15999	PLUG HOLE 1-3/4 DIA MODIFIED
16	10828	MOTOR AIR STANLEY 1600 RPM FS 820 RPM LS
17	16616	FTG BREATHER VENT
Not Shown	34736	LABEL WARNING 1-7/8 X 3
Not Shown	34866	AIRTOOL OIL COMPLETE
Not Shown	78264	PNEUMATIC CONDITIONING UNIT 1/2 IN

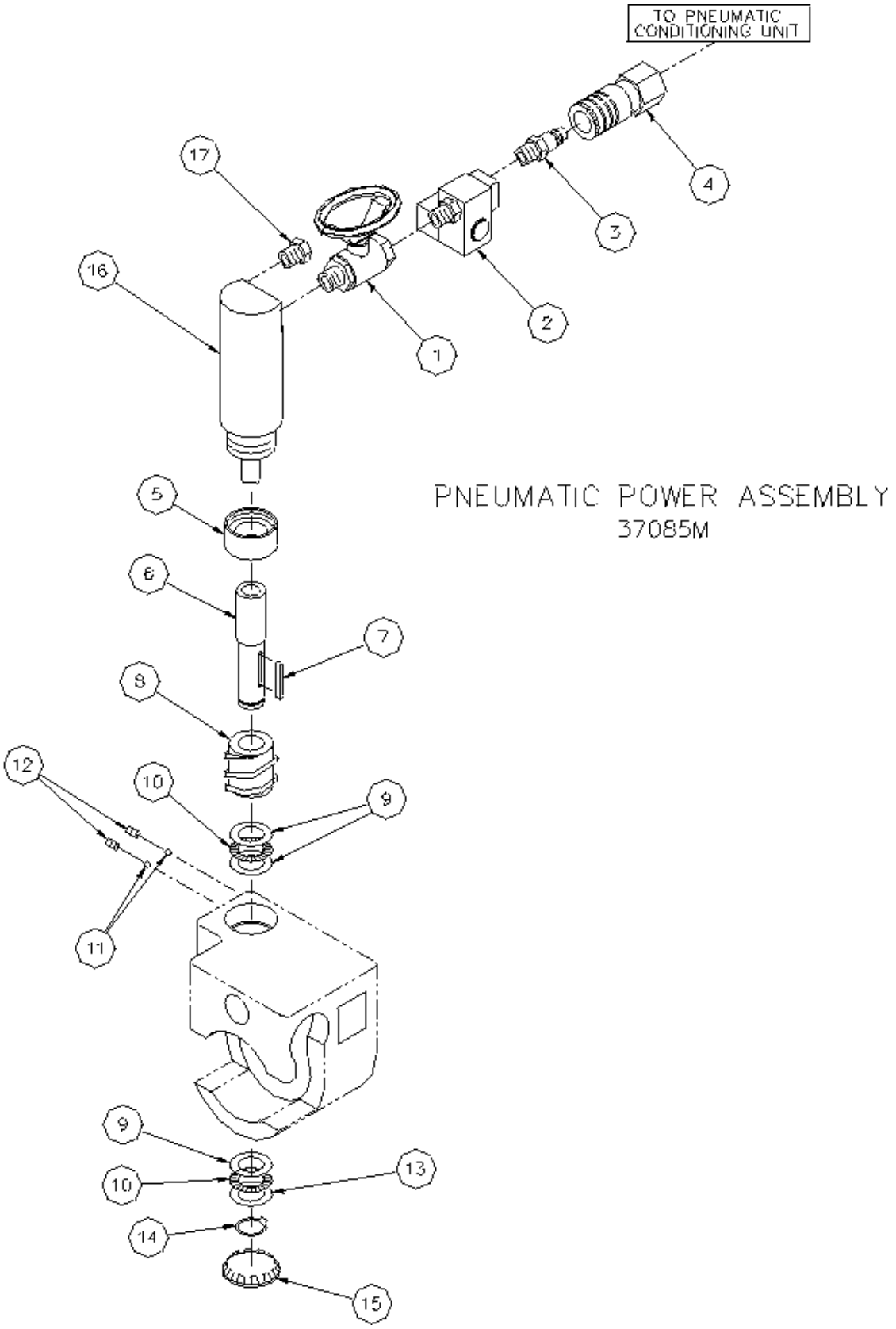


FIGURE 31 P/N 37085 PNEUMATIC POWER ASSY

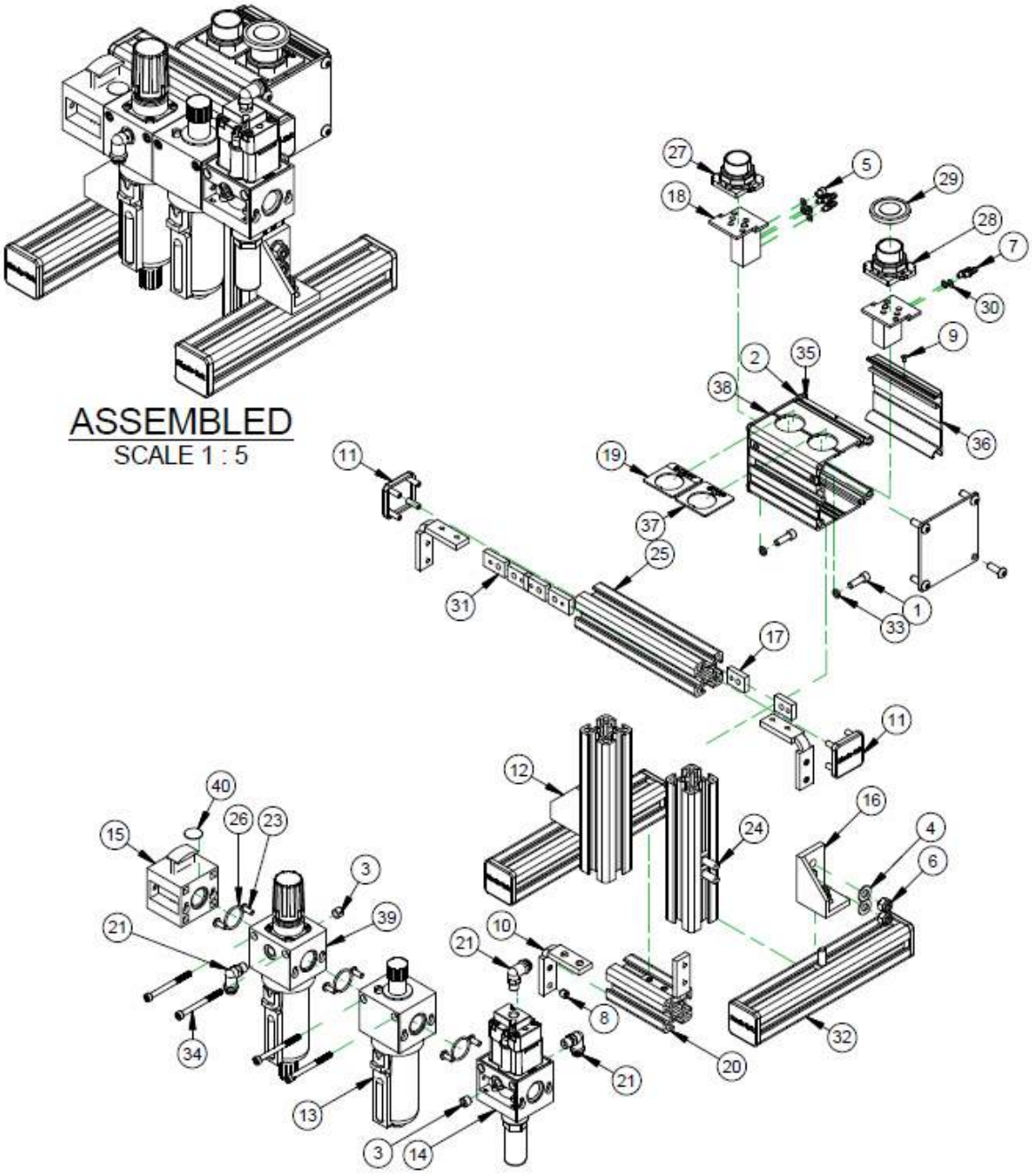


FIGURE 32 P/N 78264 PNEUMATIC CONDITIONING UNIT

PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	2	10160	SCREW 1/4-20 X 3/4 SHCS
2	8	11365	SCREW 1/4-20 X 3/4 BHSCS
3	2	12616	FTG PLUG 1/8 NPTM SOCKET
4	6	13489	WASHER 5/16 FLTW SAE
5	1	14726	SCREW 10-32 X 1/4 SHCS
6	6	19729	NUT 5/16-18 NYLON INSERT LOCKNUT
7	5	22235	FTG BARB #10-32 X 1/8 HOSE
8	16	27895	SCREW 5/16-18 X 5/16 SSSFP
9	1	35857	SCREW 4-40 X 1/4 FHSCS
10	4	46761	BRACKET 90DEG JOINER MODU-TEK
11	6	46764	ENDCAP 1 X 1 FOR 1.63SQ MODU-TEK EXTRUSION
12	1	46765	BRACKET 1X2 SLOT HALF WEB LEFT MODU-TEK
13	1	46768	LUBRICATOR AIR 1/2 NPTF 3.8oz BOWL W/SIGHT
14	1	46769	VALVE EXHAUST QUICK PILOT 1/2NPTF MUFFLER
15	1	46777	VALVE SHUT OFF VS22 SERIES
16	1	46783	BRACKET 1X2 SLOT HALF WEB RIGHT MODU-TEK
17	2	46784	NUT SQUARE 5/16-18 AND 1/4-20
18	2	46785	VALVE PUSHBUTTON 5 PORT PNEUMATIC
19	1	46797	LEGEND PLATE START 10250 SERIES
20	1	46802	1.63 X 1.63 X 3.375L MODU-TEK EXTRUSION
21	3	48648	FTG ELBOW 1/8 NPTM X 1/4 TUBE PRESTOLOK
22	60	48650	TUBING 1/4 OD POLYURETHANE (INCH) (NOT SHOWN)
23	6	53617	SCREW M5 X 0.8 X 12MM BHCS BLACK FINISH
24	6	59436	SCREW 5/16-18 X 3/4 T-BOLT
25	3	59437	1.63 X 1.63 X 7.00L MODU-TEK EXTRUSION
26	3	59442	O-RING 2mm X 23mm ID X 25mm OD
27	1	59458	PUSHBUTTON GREEN FLUSH
28	1	59459	PUSH BUTTON PUSH PULL MAINTAINED (M-M)
29	1	59462	PUSH BUTTON OPERATOR RED 1-5/8
30	6	59480	WASHER #10 FLTW PLASTIC .32 OD .025 THICK
31	4	59705	NUT PLATE M5 X .08 AND 5/16-32 .75 X 1.25 X .25
32	2	59739	EXTRUSION 1.63 X 1.63 X 8.75 MODU-TEK
33	2	59745	WASHER 1/4 LOCW .37 OD .07 THICK
34	4	59754	SCREW M5 X 0.8 X 40MM SHCS
35	1	59820	ENCLOSURE PNEUMATIC CONTROL VALVE 3.38 X 3.435 X 3.9
36	1	59821	COVER PNEUMATIC CONTROL VALVE ENCLOSURE 3.38 X 3.435 X 3.9
37	1	59825	LEGEND PLATE STOP 10250SERIES YELLOW BACKGROUND
38	2	68644	PLATE COVER EXTRUDED WIREWAY
39	1	78054	FILTER/REGULATOR PARTICULATE 1/2NPTF METAL BOWL GLASS
40	1	81132	LABEL WARNING - INSERT SAFETY LOCK

FIGURE 33 P/N 78264 PNEUMATIC CONDITIONING UNIT PARTS LIST

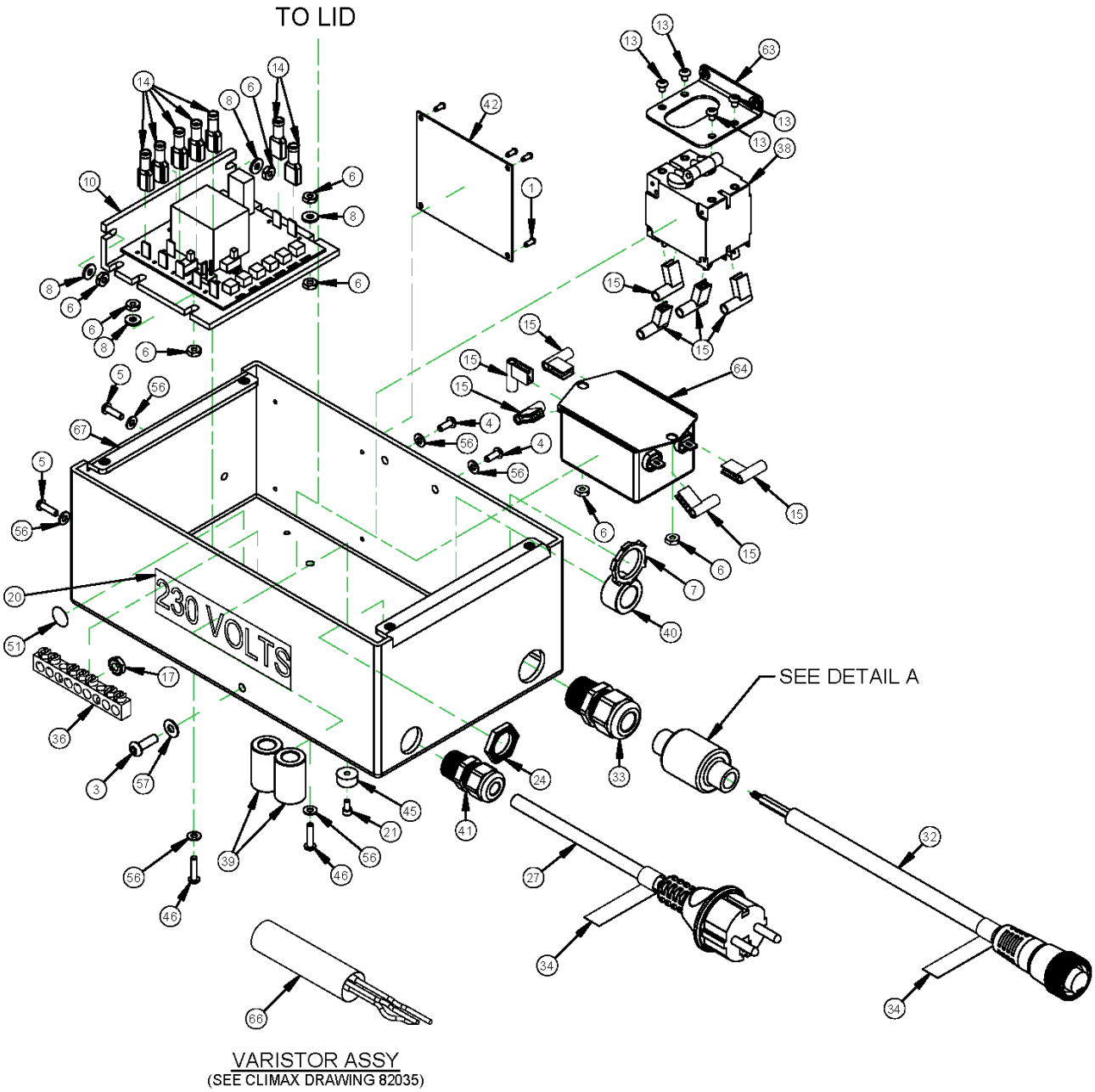


FIGURE 34 P/N 79218 WELDON CONTROLLER 230V

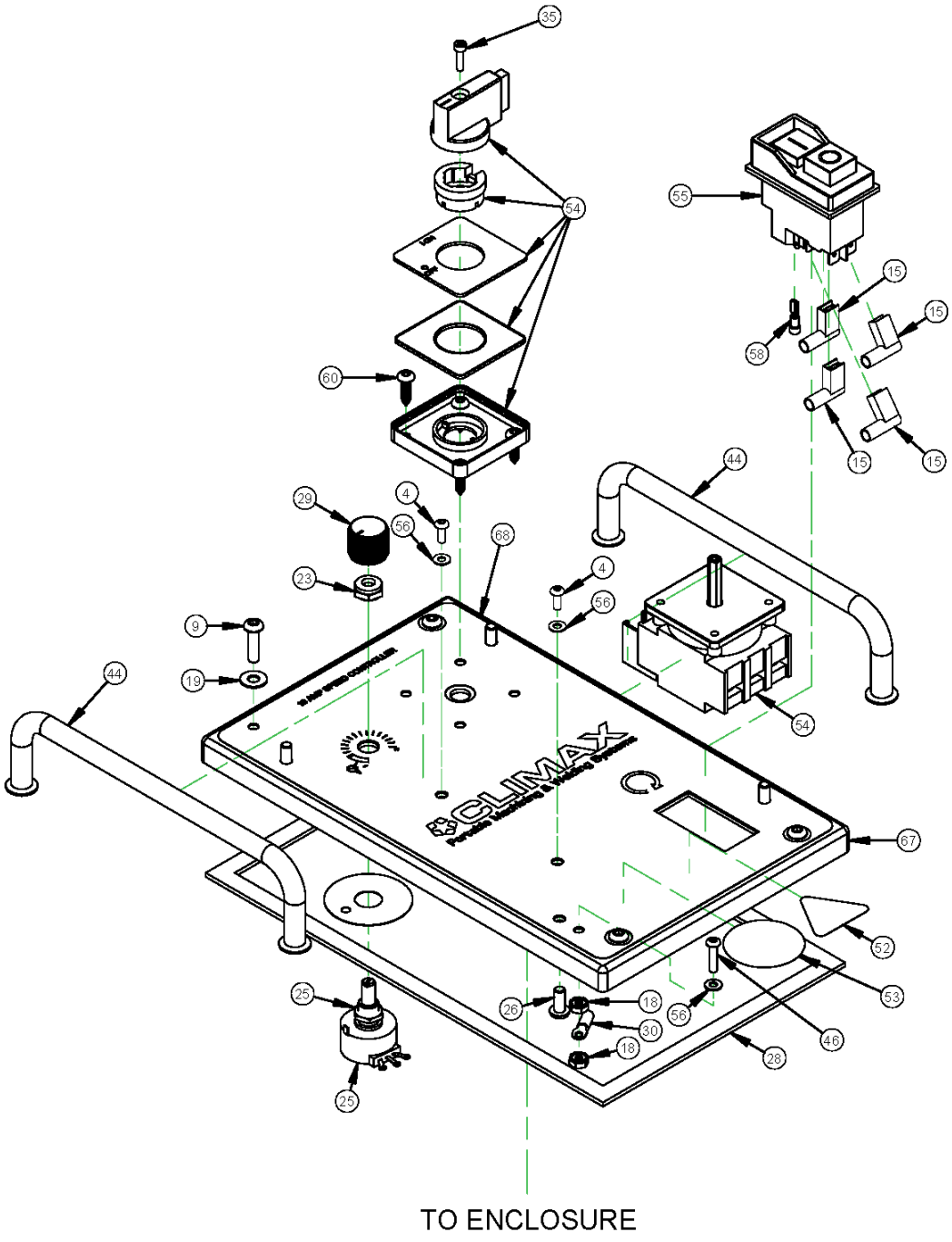


FIGURE 35 P/N 79218 WELDON CONTROLLER 230V

PARTS LIST				PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION	ITEM	QTY	P/N	DESCRIPTION
1	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089	38	1	42798	CIRCUIT BREAKER 20 AMP DOUBLE POLE
2	10	10673	(NOT SHOWN) WIRE TIE SMALL .09 X 3.5	39	2	45158	FERRITE BEAD TUBULAR .398 ID X .735 OD X 1.125 LG
3	1	11674	SCREW #10-32 x 5/8 BHSCS	40	1	45159	FERRITE BEAD TUBULAR .545 ID X .88 OD X .50
4	4	11677	SCREW 6-32 X 3/8 BHSCS	41	1	46383	CORD GRIP .105-.312 DIA 3/8 NPT
5	2	11686	SCREW 6-32 X 1/2 BHSCS	42	1	47981	NAMEPLATE ELECTRICAL CONTROL PANELS CE
6	8	11687	NUT 6-32 STDN ZINC PLATED	43	1	48778	CHOKE FERRITE 1.02 OD X 0.505 ID X 1.125 125 OHM @25MHZ
7	1	12574	CONDUIT NUT 1/2 NPT				
8	4	12621	WASHER #6 FLTW SAE BLACK OXIDE	44	2	52160	HANDLE 180MM X 43MM U-SHAPED CHROME
9	4	18902	SCREW 10-32 X 3/4 BHSCS	45	4	55771	BUMPER 1/2 OD X 1/4 TALL X 1/8 CENTER HOLE
10	1	20557	CONTROL SPEED SCR MM23001C	46	3	62944	SCREW 6-32 X 5/8 BHSCS
11	2	22351	(NOT SHOWN) WIRE 18 AWG 600V RED TYPE MTW	47	3	70657	TUBING HEAT SHRINK .75 ID 2:1 SHRINK RATIO CLEAR 50 FT SPOOL
12	9	22800	(NOT SHOWN) TUBE SHRINK .125 DIA BLACK				
13	4	26406	SCREW 6-32 X 3/16 BHSCS	48	2	70901	TUBING HEAT SHRINK .19 ID 2:1 SHRINK RATIO
14	7	26629	TERMINAL SPADE 16-14 AWG .250 X .032 FEMALE INSULATED	49	20	71021	(NOT SHOWN) WIRE 18 AWG BLUE TYPE MTW MIN 600V 0.1 OD
15	13	27377	TERMINAL SPADE 90DEG 16-14AWG .250 FM INSUL	50	2	73782	(NOT SHOWN) VARISTOR 420VAC RMS 560VDC 4.5KA PEAK CURRENT 14MM DIA
16	29	27571	(NOT SHOWN) WIRE 16 AWG GRN/YEL TYPE MTW				
17	1	28060	NUT, 10-32 UNF KEPS	51	1	77568	LABEL PROTECTIVE EARTH 1/2" DIA
18	2	29450	NUT 6-32 LOCKING STAR WASHER	52	1	78593	LABEL WARNING - ELECTRICAL SHOCK/ELECTROCUTION 1.13" TRIANGLE
19	4	29458	WASHER #10 FLTW NYLON .031 THICK				
20	1	30081	LABEL VOLTAGE 230V (KB)	53	1	78824	LABEL WARNING - DO NOT EXPOSE TO WATER
21	4	30625	SCREW 5-40 X 1/4 SHCS	54	1	78953	DISCONNECT SWITCH DOOR MOUNT IP55 16 AMP RED/YELLOW HANDLE
22	4	32304	(NOT SHOWN) TERMINAL PIN 14-16 AWG				
23	1	32926	SEAL POTENTIOMETER HEXNUT .25 SHAFT 3/8-32 TH	55	1	79231	SWITCH 230V LOW-VOLTAGE DROPOUT
24	1	33099	NUT CONDUIT 3/8 STEEL	56	9	79316	WASHER #6 NYLON .15 ID X .32 OD X .03 BLACK
25	1	33162	POTENTIOMETER 10K LIN 1/4 SHAFT 3/8 BUSHING	57	1	79348	WASHER #10 NYLON .19 ID X .44 OD X .03 BLACK
26	4	34451	SCREW M5 X 0.8 X 12 mm BHSCS	58	1	79574	TERMINAL SPADE 22-18 AWG .110 X .032 FEMALE INSULATED RED
27	1	34829	CORDSET CEE 7/7 STRAIGHT MOLDED PLUG 250V 16AMP 2.5M	59	11	79605	(NOT SHOWN) HOLDER CABLE TIE 3/4 X 3/4 3/16 CABLE TIE
28	34	35655	SEAL NEOPRENE SPONGE 3/8 X 5/32 ADHESIVE BACK				
29	1	35766	KNOB POTENTIOMETER AL .75 DIA .25 SHAFT	60	4	79643	SCREW #8 X 5/8 SHEET METAL #2 SQUARE DRIVE
30	1	35799	TERMINAL RING 22-16 #6/M3.5 STUD	61	80	79864	(NOT SHOWN) WIRE 14 AWG BRN TYPE MTW
31	11	36428	(NOT SHOWN) WIRE 16 AWG GRY TYPE MTW	62	80	79867	(NOT SHOWN) WIRE 14 AWG LT BLU TYPE MTW
32	1	36718	CORDSET 3-POLE 13A FEMALE CONNECTOR 144 IN	63	1	80091	BRACKET CIRCUIT BREAKER CE SPEED CONTROLLER
33	1	37739	CORD GRIP NONMETALLIC .17-.47 DIA X 1/2 NPT	64	1	80337	FILTER RFI/EMI 16AMP 120/250VAC 50/60HZ
34	2	37749	WIRE TIE VELCRO 11 LONG	65	2.5	81002	TUBING HEAT SHRINK 3:1 ADHESIVE 1.1 ID SHRINK TO .38 RED
35	1	37817	SCREW M3 X 0.5 X 12mm SHCS				
36	1	38444	GROUND BUSS 7 POLE COPPER CE CERTIFIED	66	1	82035	ASSEMBLY VARISTOR BW3000 CONTROLLERS
37	2	38324	(NOT SHOWN) TERMINAL SPADE FEMALE 90 DEG 12-10 AWG	67	1	82961	ENCLOSURE 230V BB3000 PL2000 CONTROLLER CE
				68	1	82984	LEGEND PLATE BB3000 120/230V SPEED CONTROLLER

FIGURE 36 P/N 79218 WELDON CONTROLLER 230V PARTS LIST

19697 KIT TOOL BB3000	
PART	**DESCRIPTION**
32460	BIT TOOL HSS 3/8 X .98 LH FINISH SINGLE TC
32454	BIT TOOL HSS 3/8 X .98 LH ROUGHING SINGLE
31854	BIT TOOL HSS 3/8 X 1.3 LH FINISH SINGLE TC
31863	BIT TOOL HSS 3/8 X 1.3 LH ROUGHING SINGLE
32461	BIT TOOL HSS 3/8 X 1.8 LH FINISH SINGLE TC
32456	BIT TOOL HSS 3/8 X 1.8 LH ROUGHING SINGLE
34103	LABEL BAG #4 BB3000
37390	MANUAL OPERATING - BB3000 BORING BAR
19698	WRENCH END 7/16
16479	WRENCH END 9/16 COMBINATION LONG
33999	WRENCH HEX SET .050 - 3/8 BONDHUS BALL END
33784	WRENCH TORX T-27

APPENDIX C MSDS

Safety Data Sheet

Section 1: Identification of the substance or mixture and of the supplier

Product Name: Polytac® EP
SDS Number: 778593

Synonyms/Other Means of Identification: Polytac® EP No. 2

Intended Use: Lubricating Grease

Manufacturer: Phillips 66 Company
P.O. Box 4428
Houston, Texas 77210

Emergency Health and Safety Number: Chemtrec: 800-424-9300 (24 Hours)

Customer Service: U.S.: 1-800-822-6457 or International: +1-83-2486-3363

Technical Information: 1-877-445-9198

SDS Information: Phone: 800-762-0942
Email: SDS@P66.com
URL: www.Phillips66.com

Section 2: Hazard(s) Identification

This material is not considered hazardous according to OSHA criteria.

Section 3: Composition / Information on Ingredients

Component	CASRN	Concentration[1]
Lubricant Base Oil (Petroleum)	VARIOUS	>80
Calcium Carbonate	471-34-1	<15
Additives	Proprietary	<10

[1] All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

Section 4: First Aid Measures

Eye Contact: If irritation or redness develops from exposure, flush eyes with clean water. If symptoms persist, seek medical attention.

Skin Contact: Remove contaminated shoes and clothing and cleanse affected area(s) thoroughly by washing with mild soap and water or a waterless hand cleaner. If irritation or redness develops and persists, seek medical attention. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician. (see Note to Physician)

Inhalation (Breathing): First aid is not normally required. If breathing difficulties develop, move victim away from source of exposure and into fresh air in a position comfortable for breathing. Seek immediate medical attention.

Ingestion (Swallowing): First aid is not normally required; however, if swallowed and symptoms develop, seek medical attention.

Notes to Physician: When using high-pressure equipment, injection of product under the skin can occur. In this case, the casualty should be sent immediately to hospital. Do not wait for symptoms to develop. High-pressure hydrocarbon injection injuries may produce substantial necrosis of underlying tissue despite an innocuous appearing external wound. These injuries often require extensive emergency surgical debridement and all injuries should be evaluated by a specialist in order to assess the extent of injury. Early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

Medical Conditions Aggravated by Exposure: Conditions which may be aggravated by exposure include skin disorders.

Section 5: Fire-Fighting Measures

NFPA 704 Hazard Class

Health: 0 **Flammability:** 1 **Instability:** 0 (0-Minimal, 1-Slight, 2-Moderate, 3-Serious, 4-Severe)

Unusual Fire & Explosion Hazards: This material may burn, but will not ignite readily. If container is not properly cooled, it can rupture in the heat of a fire.

Extinguishing Media: Dry chemical, carbon dioxide, foam, or water spray is recommended. Water or foam may cause frothing of materials heated above 212°F / 100°C. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam.

Fire Fighting Instructions: For fires beyond the initial stage, emergency responders in the immediate hazard area should wear protective clothing. When the potential chemical hazard is unknown, in enclosed or confined spaces, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done safely. Move undamaged containers from immediate hazard area if it can be done safely. Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done safely. Avoid spreading burning liquid with water used for cooling purposes.

Hazardous Combustion Products: Combustion may yield smoke, carbon monoxide, and other products of incomplete combustion. Oxides of sulfur, nitrogen or phosphorus may also be formed.

See Section 9 for Flammable Properties including Flash Point and Flammable (Explosive) Limits

Section 6: Accidental Release Measures

Personal Precautions: This material may burn, but will not ignite readily. Keep all sources of ignition away from spill/release. Stay upwind and away from spill/release. Avoid direct contact with material. For large spillages, notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Wear appropriate protective equipment, including respiratory protection, as conditions warrant (see Section 8). See Sections 2 and 7 for additional information on hazards and precautionary measures.

Environmental Precautions: Stop spill/release if it can be done safely. Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Use water sparingly to minimize environmental contamination and reduce disposal requirements. If spill occurs on water notify appropriate authorities and advise shipping of any hazard. Spills into or upon navigable waters, the contiguous zone, or adjoining shorelines that cause a sheen or discoloration on the surface of the water, may require notification of the National Response Center (phone number 800-424-8802).

Methods for Containment and Clean-Up: Notify relevant authorities in accordance with all applicable regulations. Immediate cleanup of any spill is recommended. Dike far ahead of spill for later recovery or disposal. Absorb spill with inert material such as sand or vermiculite, and place in suitable container for disposal. If spilled on water remove with appropriate methods (e.g. skimming, booms or absorbents). In case of soil contamination, remove contaminated soil for remediation or disposal, in accordance with local regulations.

Recommended measures are based on the most likely spillage scenarios for this material; however local conditions and regulations may influence or limit the choice of appropriate actions to be taken. See Section 13 for information on appropriate disposal.

Section 7: Handling and Storage

Precautions for safe handling: Keep away from flames and hot surfaces. Wash thoroughly after handling. Use good personal hygiene practices and wear appropriate personal protective equipment (see section 8).

High pressure injection of hydrocarbon fuels, hydraulic oils or greases under the skin may have serious consequences even though no symptoms or injury may be apparent. This can happen accidentally when using high pressure equipment such as high pressure grease guns, fuel injection apparatus or from pinhole leaks in tubing of high pressure hydraulic oil equipment.

Spills will produce extremely slippery surfaces. Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. Do not wear contaminated clothing or shoes.

Conditions for safe storage: Keep container(s) tightly closed and properly labeled. Use and store this material in cool, dry, well-ventilated area away from heat and all sources of ignition. Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1, and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

Section 8: Exposure Controls / Personal Protection

Component	ACGIH	OSHA	Other
Lubricant Base Oil (Petroleum)	TWA: 5mg/m^3 STEL: 10 mg/m^3 as oil mist, if generated	TWA: 5 mg/m^3 as Oil Mist, if generated	---
Calcium Carbonate	TWA: 10 mg/m^3	15 mg/m^3 (Total) TWA 5 mg/m^3 (Resp) TWA	---

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

Engineering controls: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits, additional engineering controls may be required.

Eye/Face Protection: The use of eye/face protection is not normally required; however, good industrial hygiene practice suggests the use of eye protection that meets or exceeds ANSI Z.87.1 whenever working with chemicals.

Skin/Hand Protection: The use of skin protection is not normally required; however, good industrial hygiene practice suggests the use of gloves or other appropriate skin protection whenever working with chemicals. Suggested protective materials: Nitrile

Respiratory Protection: Respiratory protection is not normally required under intended conditions of use. Emergencies or conditions that could result in significant airborne exposures may require the use of NIOSH approved respiratory protection. An industrial hygienist or other appropriate health and safety professional should be consulted for specific guidance under these situations.

Suggestions provided in this section for exposure control and specific types of protective equipment are based on readily available information. Users should consult with the specific manufacturer to confirm the performance of their protective equipment. Specific situations may require consultation with industrial hygiene, safety, or engineering professionals.

Section 9: Physical and Chemical Properties

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm). Data represent typical values and are not intended to be specifications.

Appearance:	Green
Physical Form:	Semi-Solid
Odor:	Petroleum
Odor Threshold:	No data
pH:	Not applicable
Vapor Density (air=1):	> 5
Initial Boiling Point/Range:	No data

Melting/Freezing Point:	No data
Solubility in Water:	Insoluble
Partition Coefficient (n-octanol/water) (Kow):	No data
Bulk Density:	8.57 lb/gal @ 60 °F / 15°C 1.0292 kg/m^3
Evaporation Rate (nBuAc=1):	<1
Flash Point:	> 400 °F / > 204 °C
Test Method:	Cleveland Open Cup (COC), ASTM D92
Lower Explosive Limits (vol % in air):	No data
Upper Explosive Limits (vol % in air):	No data
Auto-ignition Temperature:	No data

Section 10: Stability and Reactivity

Stability: Stable under normal ambient and anticipated conditions of use.

Conditions to Avoid: Extended exposure to high temperatures can cause decomposition. Avoid all possible sources of ignition.

Materials to Avoid (Incompatible Materials): Avoid contact with strong oxidizing agents and strong reducing agents.

Hazardous Decomposition Products: Not anticipated under normal conditions of use.

Hazardous Polymerization: Not known to occur.

Section 11: Toxicological Information

Information on Toxicological Effects of Substance/Mixture

Acute Toxicity	Hazard	Additional Information	LC50/LD50 Data
Inhalation	Inhalation is not anticipated		No Data
Skin Absorption	Unlikely to be harmful		> 2 g/kg (estimated)
Ingestion (Swallowing)	Unlikely to be harmful		> 5 g/kg (estimated)

Aspiration Hazard: Not expected to be an aspiration hazard.

Skin Corrosion/Irritation: Not expected to be irritating. Repeated exposure may cause skin dryness or cracking.

Serious Eye Damage/Irritation: Not expected to be irritating.

Signs and Symptoms: Inhalation of oil mists or vapors generated at elevated temperatures may cause respiratory irritation. Accidental ingestion can result in minor irritation of the digestive tract, nausea and diarrhea.

Skin Sensitization: No information available on the mixture, however none of the components have been classified for skin sensitization (or are below the concentration threshold for classification).

Respiratory Sensitization: No information available.

Specific Target Organ Toxicity (Single Exposure): No information available on the mixture, however none of the components have been classified for target organ toxicity (or are below the concentration threshold for classification).

Specific Target Organ Toxicity (Repeated Exposure): No information available on the mixture, however none of the components have been classified for target organ toxicity (or are below the concentration threshold for classification).

Carcinogenicity: No information available on the mixture, however none of the components have been classified for carcinogenicity (or are below the concentration threshold for classification).

Germ Cell Mutagenicity: No information available on the mixture, however none of the components have been classified for germ cell mutagenicity (or are below the concentration threshold for classification).

Reproductive Toxicity: No information available on the mixture, however none of the components have been classified for reproductive toxicity (or are below the concentration threshold for classification).

Information on Toxicological Effects of Components

Lubricant Base Oil (Petroleum)

Carcinogenicity: The petroleum base oils contained in this product have been highly refined by a variety of processes including severe hydrocracking/hydroprocessing to reduce aromatics and improve performance characteristics. All of the oils meet the IP-346 criteria of less than 3 percent PAH's and are not considered carcinogens by NTP, IARC, or OSHA.

Section 12: Ecological Information

Toxicity: Experimental studies on the base oil component of lubricating greases show that acute aquatic toxicity values are greater than 1000 mg/L. These values are consistent with the predicted aquatic toxicity of these substances based on their hydrocarbon compositions. However, there is insufficient information available on the toxicity of the thickening agents used in greases. They should be regarded as capable of causing long term adverse effects in the aquatic environment. Classification: No classified hazards.

Persistence and Degradability: The base oil constituents of greases are expected to be inherently, but not readily biodegradable. Some of the thickening agents may be readily biodegradable.

Bioaccumulative Potential: Log Kow values measured for the hydrocarbon components of this material range from 4 to greater than 6, and therefore are regarded as having the potential to bioaccumulate. In practice, metabolic processes may reduce bioconcentration.

Mobility in Soil: Volatilization to air is not expected to be a significant fate process due to the low vapor pressure of this material. Components may behave differently in the aquatic environment with soaps dispersing and dissolving to some extent in water while the hydrocarbons will float on the surface due to their low water solubility. The hydrocarbon portion would be expected to show low mobility in soil and water. The major environmental fate would be expected to be biodegradation.

Other Adverse Effects: None anticipated.

Section 13: Disposal Considerations

The generator of a waste is always responsible for making proper hazardous waste determinations and needs to consider state and local requirements in addition to federal regulations.

This material, if discarded as produced, would not be a federally regulated RCRA "listed" hazardous waste and is not believed to exhibit characteristics of hazardous waste. See Sections 7 and 8 for information on handling, storage and personal protection and Section 9 for physical/chemical properties. It is possible that the material as produced contains constituents which are not required to be listed in the MSDS but could affect the hazardous waste determination. Additionally, use which results in chemical or physical change of this material could subject it to regulation as a hazardous waste.

This material under most intended uses would become "Used Oil" due to contamination by physical or chemical impurities. Whenever possible, Recycle used oil in accordance with applicable federal and state or local regulations. Container contents should be completely used and containers should be emptied prior to discard.

Section 14: Transport Information

U.S. Department of Transportation (DOT)

Shipping Description: ***Not regulated***
Note: ***If shipped by land in a packaging having a capacity of 3,500 gallons or more, the provisions of 49 CFR, Part 130 apply. (Contains oil)***

International Maritime Dangerous Goods (IMDG)

Shipping Description: ***Not regulated***
Note: ***U.S. DOT compliance requirements may apply. See 49 CFR 171.22, 23 & 25.***

International Civil Aviation Org. / International Air Transport Assoc. (ICAO/IATA)

UN/ID #: ***Not regulated***
Note: ***U.S. DOT compliance requirements may apply. See 49 CFR 171.22, 23 & 24.***

	LTD. QTY	Passenger Aircraft	Cargo Aircraft Only
Packaging Instruction #:	---	---	---
Max. Net Qty. Per Package:	---	---	---

Section 15: Regulatory Information

CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs (in pounds):
This material does not contain any chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372.

CERCLA/SARA - Section 311/312 (Title III Hazard Categories)

Acute Health:	No
Chronic Health:	No
Fire Hazard:	No
Pressure Hazard:	No
Reactive Hazard:	No

CERCLA/SARA - Section 313 and 40 CFR 372:
This material does not contain any chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372.

EPA (CERCLA) Reportable Quantity (in pounds):
This material does not contain any chemicals with CERCLA Reportable Quantities.

California Proposition 65:
Warning: This material may contain detectable quantities of the following chemicals, known to the State of California to cause cancer, birth defects or other reproductive harm, and which may be subject to the warning requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):

Component	Type of Toxicity
Silica-Crystalline (Quartz)	Cancer

International Hazard Classification

GHS Classification
None

Canada:
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the Regulations.

WHMIS Hazard Class:
None

National Chemical Inventories
All components are either listed on the US TSCA Inventory, or are not regulated under TSCA
All components are either on the DSL, or are exempt from DSL listing requirements

U.S. Export Control Classification Number: EAR99

Section 16: Other Information

Date of Issue:	19-Jul-2012
Status:	FINAL
Previous Issue Date:	30-Jul-2009
Revised Sections or Basis for Revision:	Manufacturer (Section 1) Format change Physical Properties (Section 9) Toxicological (Section 11) Regulatory information (Section 15)
SDS Number:	778593

Guide to Abbreviations:
ACGIH = American Conference of Governmental Industrial Hygienists; CASRN = Chemical Abstracts Service Registry Number; CEILING = Ceiling Limit (15 minutes); CERCLA = The Comprehensive Environmental Response, Compensation, and Liability Act; EPA = Environmental Protection Agency; GHS = Globally Harmonized System; IARC = International Agency for Research on Cancer; INSHT = National Institute for Health and Safety at Work; IOPC = International Oil Pollution Compensation; LEL = Lower Explosive Limit; NE = Not Established; NFPA = National Fire Protection Association; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; PEL = Permissible Exposure Limit (OSHA); SARA = Superfund Amendments and Reauthorization Act; STEL = Short Term Exposure Limit (15 minutes); TLV = Threshold Limit Value (ACGIH); TWA = Time Weighted Average (8 hours); UEL = Upper Explosive Limit; WHMIS = Worker Hazardous Materials Information System (Canada)

Disclaimer of Expressed and implied Warranties:
The information presented in this Material Safety Data Sheet is based on data believed to be accurate as of the date this Material Safety Data Sheet was prepared. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license.

MATERIAL SAFETY DATA SHEET
LPS® 2 (Bulk)

Revision Date: May 15, 2012 **Supersedes:** May 14, 2009

Section 1 • Product and Company Identification

Product Name: LPS® 2 (Bulk)

Part Number(s): 00222, 02128, 00205, 00255, C00222, C02128, C00205, C00255

Chemical Name: Petroleum Distillates

Product Use: An industrial lubricant designed to displace moisture from equipment, provide heavy-duty lubrication and rust prevention.

Manufacturer Information: LPS Laboratories, 4647 Hugh Howell Road, Tucker, GA, USA 30084
TEL: USA & Canada: 1 800 241-8334
Outside USA and Canada: +1 770 243-8800
FAX: USA & Canada: 1 800 543-1563
Outside USA and Canada: +1 770 243-8899

Emergency Telephone Number: Chemtrec: USA & Canada: 1 800 424-9300
Outside USA and Canada: +1 703 527-3887

Website: http://www.lpslabs.com

Section 2 • Hazards Identification

This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200). This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

Emergency Overview:

Aerosol: Not applicable

Bulk: DANGER: Combustible. Keep away from heat and flame. Harmful or fatal if swallowed.

Primary route(s) of entry: Skin and eye contact. Inhalation.

Potential Acute Health Effects:

Eyes: Irritating to eyes.

Skin: Repeated exposure may cause skin dryness or cracking.

Inhalation: Excessive inhalation of vapors can cause irritation of the respiratory tract, nausea, dizziness or headache.

Ingestion: Product has a low order of acute oral toxicity, but ingestion of large quantities may cause nausea, vomiting, and gastrointestinal irritation. May cause injury if aspirated into lungs.

Potential Chronic Health Effects:

Carcinogenic Effects: **NTP:** No **IARC:** No **OSHA:** No **ACGIH:** No

Mutagenic Effects: None

Teratogenic Effects: None

Target Organs: None

MATERIAL SAFETY DATA SHEET
LPS® 2 (Bulk)

Revision Date: May 15, 2012 **Supersedes:** May 14, 2009

Medical conditions aggravated by exposure:
Persons with pre-existing central nervous system (CNS) disease, neurological conditions, skin disorders, chronic respiratory diseases, or impaired liver or kidney function should avoid exposure.

Signs and Symptoms
Stinging in eyes. Repeated or prolonged skin contact can cause redness, irritation, and scaling of the skin (dermatitis). Breathing of high vapor concentrations may cause headaches, stupor, irritation of throat and eyes, and kidney effects.

Section 3 • Composition / Information on Ingredients

Component	CASRN	Weight Percent
Distillates (Petroleum), Hydrotreated Light	64742-47-8	70 - 80%
Mineral Seal (Petroleum) Oil	64742-47-8 / 64742-52-5	20 - 30%

Section 4 • First Aid Measures

Eyes: Check for and remove contact lenses. If irritation or redness develops, flush eyes with cool, clean, low pressure water for at least 15 minutes. Hold eyelids apart to ensure complete irrigation of the eye and eyelid tissue. DO NOT use eye ointment. Seek medical attention immediately.

Skin: Remove contaminated shoes and clothing. Clean affected area thoroughly with mild soap and water. DO NOT use ointments. Seek medical attention if irritation persists.

Inhalation: Immediately move victim to fresh air. If victim is not breathing, immediately begin rescue breathing. If heart has stopped, immediately begin cardiopulmonary resuscitation (CPR). If breathing is difficult, seek medical attention immediately.

Ingestion: DO NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If spontaneous vomiting is about to occur, place victim's head below knees. If victim is drowsy or unconscious, place on the left side with head down. DO NOT leave victim unattended. Seek medical attention immediately.

Notes to Physician: This material is an aspiration hazard. Potential danger from aspiration must be weighed against possible oral toxicity (See Section 2 - Ingestion) when deciding whether to induce vomiting. Inhalation of high concentrations of this material, as could occur in enclosed spaces or during deliberate abuse, may be associated with cardiac arrhythmias.

Section 5 • Fire Fighting Measures

Products of Combustion: Carbon monoxide and carbon dioxide.

General Fire Hazards: High heat will cause product to boil, evolving vapor that could cause explosive rupture of closed containers.

Firefighting media: SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use CO2, water spray, fog or foam. Cool containing vessels with water jet in order to prevent pressure build-up, auto-ignition or explosions.

Sensitivity to Impact: None **Sensitivity to Static Discharge:** None

Protection Clothing (Fire): Firefighters must use full bunker gear including NIOSH-approved positive pressure self-contained breathing apparatus to protect against potential hazardous combustion or decomposition products and oxygen deficiencies. Evacuate area and fight the fire from a maximum distance or use unmanned hose holders or monitor nozzles.

Special Remarks on Explosion Hazards:
High heat will cause product to boil, evolving vapor that could cause explosive rupture of closed containers.

Section 6 • Accidental Release Measures

Containment Procedures:
Small Spill and Leak: Absorb with an inert material and dispose of properly.
Large Spill and Leak: Secure the area and control access. Dike far ahead of a liquid spill to ensure complete collection. Pick up free liquid for disposal using absorbent pads, sand, or other inert non-combustible absorbent materials. Place into appropriate waste containers for later disposal.

Clean-Up Procedures: Contain and recover spilled material when possible.

Evacuation Procedures: Ventilate area of leak or spill. Keep unnecessary and unprotected people away.

Special Procedures: Remove all sources of ignition. Ventilate area. Wear personal protective equipment during cleanup.

Section 7 • Handling and Storage

Handling: DO NOT spray into or around ignition sources. DO NOT allow material to come in contact with eyes or skin. Wear appropriate protective equipment during handling. Keep container closed. Avoid breathing vapors or mists. Use only with adequate ventilation. Wash thoroughly after handling.

Storage: Keep container in a cool, well-ventilated area. Avoid all sources of ignition (spark or flame). Store between 40°F and 120°F (4.4°C and 49°C).

Precautions to be taken in handling and storage:
Store all materials in a dry, well-ventilated area. Avoid breathing vapors.

MATERIAL SAFETY DATA SHEET
LPS® 2 (Bulk)

Revision Date: May 15, 2012 **Supersedes:** May 14, 2009

Section 8 • Exposure Controls / Personal Protection

Exposure Guidelines:

Component	CASRN	OSHA	ACGIH	NIOSH	Supplier
Distillates (Petroleum), Hydrotreated Light	64742-47-8	5 mg/m3 (oil mist) PEL	5 mg/m3 (oil mist) TLV 10 mg/m3 (oil mist) STEL	5 mg/m3 (oil mist) TWA 10 mg/m3 (oil mist) STEL	100 ppm TWA 525 mg/m3 TWA
Mineral Seal (Petroleum) Oil	64742-47-8 / 64742-52-5	5 mg/m3 PEL	5 mg/m3 (oil mist) 10 mg/m3 (oil mist)	5 mg/m3 (oil mist) TWA 10 mg/m3 (oil mist) STEL	None reported

Engineering Controls: Provide general and/or local exhaust ventilation to keep exposures below the exposure guidelines listed above.

Personal protective equipment

Eye protection: Safety glasses with side shields conforming to appropriate regulations. Eye wash fountain and emergency shower facilities are recommended.

Hand protection: Normally no hand protection is required; however, if product will be sprayed for an extended period, "overspray" onto skin may occur. If so, wear chemical resistant gloves conforming to appropriate regulations. Please observe the instructions regarding permeability and breakthrough time that are provided by the supplier of the gloves.

Respiratory protection: Typical use of this product under normal conditions does not require the use of respiratory protection. If airborne concentrations are above the applicable exposure limits (listed above), use NIOSH approved respiratory protection (i.e. organic vapor cartridge).

General Hygiene Considerations: Wash thoroughly after handling. Have eye-wash facilities immediately available.

MATERIAL SAFETY DATA SHEET
LPS® 2 (Bulk)

Revision Date: May 15, 2012 **Supersedes:** May 14, 2009

Section 9 • Physical and Chemical Properties

Appearance:	Liquid	**Color:**	Brown
Odor:	Petroleum / Cherry	**Evaporation Rate:**	< 0.1 (BuAc = 1)
Solubility Description:	< 3% in water	**Flash Point:**	79°C (175°F) - dispensed liquid
Boiling Point:	195°C (383°F)	**Flash Point Method:**	Tag-Closed Cup
Specific Gravity (H2O=1):	0.82 - 0.86 @ 20°C	**Decomposition Temperature:**	Not established
Vapor Density (air = 1):	4.7	**Auto ignition temperature:**	> 228°C (442ºF)
Vapor Pressure:	< 0.05 mm Hg @ 20ºC	**Flammable limits (estimated):**	LOWER: 0.6% UPPER: 7.0%
Rule 1171 PPc:	Not applicable	**Partition Coefficient (octanol/water):**	< 1
V.O.C. Content:	Aerosol: Not applicable Bulk: 0% per State & Federal Consumer Product Regulations	**Odor Threshold:**	Not established
Melting Point:	< -50ºC (-58ºF)	**Viscosity:**	< 7 cSt @ 25ºC
pH:	Not applicable	**Volatiles:**	92 - 95%
Heat of combustion:	Aerosol: Not applicable Bulk: > 30 kJ/g		

Section 10 • Stability and Reactivity

Chemical Stability:	Product is stable under recommended storage conditions.
Conditions to Avoid:	Keep away from heat and ignition sources.
Incompatibility:	Reactive or incompatible with oxidizing agents.
Hazardous Decomposition:	Combustion will generate smoke, possibly thick and choking, resulting in zero visibility and combustion products include carbon monoxide and carbon dioxide.
Hazardous Polymerization:	Will not occur.

MATERIAL SAFETY DATA SHEET
LPS® 2 (Bulk)

Revision Date: May 15, 2012 **Supersedes:** May 14, 2009

Section 11 • Toxicological Information

Acute and Chronic Toxicity

A: General Product Information
An acute toxicity study of this product has not been conducted. Information given in this section relates only to individual constituents contained in this preparation.

B: Component Analysis

Component	CASRN	LC-50	LD-50
Distillates (Petroleum), Hydrotreated Light	64742-47-8	> 6.8 mg/L*	> 5 g/kg*
Mineral Seal (Petroleum) Oil	64742-47-8 / 64742-52-5	Not established	Not established

* Supplier Data

Section 12 • Ecological Information

Mobility: Semi-volatile. Readily absorbed into soil. **Persistence / Degradability:** Only slightly biodegradable

Bioaccumulative potential: No bioaccumulation potential **Other adverse effects:** See below

Ecological studies have not been conducted for this product. The following information is available for component(s) of this product.

Ecotoxicity

Effects on Organisms	Component	CASRN	Test	Species	Results
Acute Toxicity on Fishes	Distillates (Petroleum), Hydrotreated Light	64742-47-8	96-hr LC50	Oncorhynchus Mykiss	3,200 µg/L*
Acute Toxicity on Daphnia	No data available				
Bacterial Inhibition					
Growth inhibition of algae					
Bioaccumulation in fish					

* Supplier Data

For the 64742-47-8 component, no toxicity has been observed in water due to extremely low water solubility. However, hydrocarbon and petroleum distillates are potentially toxic to freshwater and saltwater ecosystems. If material is spilled on soil, some potential toxic effects could occur before biodegradation could remove material.

If spilled, the 64742-46-7 constituent may kill grasses and small plants by interfering with transpiration. Spilled material may coat gill structures of fish resulting in suffocation if spilled in shallow, running water. This product may be toxic to amphibians by preventing dermal respiration. This product may also cause gastrointestinal distress to birds and mammals through ingestion. Biodegradation of this product is possible within 90 to 120 days in aerobic environments at temperatures above 21°C.

Section 13 • Disposal Considerations

Waste Status: In its purchased form, this material does not meet the definition of a RCRA hazardous waste (40 CFR 261).

Disposal: Waste must be disposed of in accordance with any and all applicable environmental control rules and/or regulations.

Note: Chemical additions to, processing of, or otherwise altering this material may make this waste management information inaccurate, incomplete, or otherwise inappropriate. Furthermore, state and local waste disposal requirements may be more restrictive than federal laws and regulations.

Section 14 • Transport Information

Non-aerosol versions of this product are not regulated by any mode of transportation.

The preceding information is subject to change and must be verified prior to shipment. It is the responsibility of anyone offering hazardous materials for shipment to ensure compliance with all applicable regulations.

Section 15 • Regulatory Information

U.S. Federal Regulations

RCRA Hazardous Waste No.: None

Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA):
None

Toxic Substances Control Act (TSCA):
All components of this product are TSCA inventory listed and/or are exempt.

Superfund Amendments and Reauthorization Act (SARA) Title III SARA Section 311/312 (40 CFR 370) Hazard Categories:
Fire Hazard, Immediate (Acute) Health Hazard, Delayed (Chronic) Health Hazard

This product contains the following toxic chemical(s) subject to reporting requirements of SARA Section 313 (40 CFR 372):
No individual section 313 component is present at or above 1%.

Section 112 Hazardous Air Pollutants (HAPs): None

State Regulations

California: This product does not contain chemical(s) known to the State of California to cause cancer, birth defects or other

California and OTC States: This product conforms to consumer product regulations.

New Jersey Right to Know:
Aerosol: Not applicable
Bulk: Distillates (Petroleum), Hydrotreated Light 64742-47-8 ● Mineral Seal (Petroleum) Oil 64742-46-7 / 64742-52-5 ● Proprietary NJ TS RN 800959-5152P ● Proprietary NJ TS RN 800959-5153P ● Alkyd Acid Phosphate 68307-94-8

MATERIAL SAFETY DATA SHEET
LPS® 2 (Bulk)

Revision Date: May 15, 2012 **Supersedes:** May 14, 2009

International Regulations

Canadian Environmental Protection Act (CEPA):
All of the components of this product are included on the Canadian Domestic Substances list (DSL).

Canadian Workplace Hazardous Materials Information System WHMIS:
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

WHMIS Classification:
Bulk: Class B3, Class D2B

Other Regulations:

Montreal Protocol listed ingredients:	None
Stockholm Convention listed ingredients:	None
Rotterdam Convention listed engredients:	None
RoHS Compliant:	Yes

Section 16 • Other Information

MSDS#: 10222
MSDS Preparation Responsible Name:
Elena Badiuzzi
Compliance Manager
Telephone: +1 770 243-8800

HMIS 1996		HMIS III	
Health:	1	Health:	[/] 1
Flammability:	2	Flammability Aerosol:	NA
		Flammability Bulk:	2
Reactivity:	0	Physical Hazard Aerosol:	NA
		Physical Hazard Bulk:	0

NFPA
Flammability

Health Reactivity
Special

Notice to Reader:
To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Elena Badiuzzi, Compliance Manager
LPS Laboratories, a division of Illinois Tool Works

Koolkut® Spectrum

Material Safety Data Sheet

1. Product and Company Identification

Product Name:	Koolkut® Spectrum
MSDS Number:	778731
Intended Use:	Metalworking Fluid
Manufacturer/Supplier:	ConocoPhillips Lubricants 600 N. Dairy Ashford Houston, Texas 77079-1175
Emergency Health and Safety Number:	Chemtrec: 800-424-9300 (24 Hours)
Customer Service:	888-766-7676
Technical Information:	800-255-9556
MSDS Information:	Internet: http://w3.conocophillips.com/NetMSDS/

2. Hazards Identification

Emergency Overview

May be harmful to breastfed babies

NFPA

Appearance: Amber
Physical Form: Liquid
Odor: Petroleum

Potential Health Effects

Eye: Contact may cause mild eye irritation including stinging, watering, and redness.

Skin: Contact may cause mild skin irritation including redness and a burning sensation. Prolonged or repeated contact can defat the skin, causing drying and cracking of the skin, and possibly dermatitis (inflammation). No information available on skin absorption.

Inhalation (Breathing): No information available on acute toxicity.

Ingestion (Swallowing): Low to moderate degree of toxicity by ingestion.

Signs and Symptoms: Effects of overexposure may include irritation of the digestive tract, nausea and diarrhea. Inhalation of oil mist or vapors at elevated temperatures may cause respiratory irritation.

Pre-Existing Medical Conditions: Conditions which may be aggravated by exposure include skin disorders.

See Section 11 for additional Toxicity Information.

3. Composition / Information on Ingredients

Component	CASRN	Concentration*
Lubricant Base Oil (Petroleum)	VARIOUS	>90
Chlorinated Paraffins (C14-C17)	61788-76-9	<5
Additives	PROPRIETARY	<5

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First Aid Measures

Eye Contact: If irritation or redness develops from exposure, flush eyes with clean water. If symptoms persist, seek medical attention.

Skin Contact: Remove contaminated shoes and clothing and cleanse affected area(s) thoroughly by washing with mild soap and water or a waterless hand cleaner. If irritation or redness develops and persists, seek medical attention.

Inhalation (Breathing): If respiratory symptoms develop, move victim away from source of exposure and into fresh air in a position comfortable for breathing. If symptoms persist, seek medical attention.

Ingestion (Swallowing): If swallowed, seek emergency medical attention. If victim is drowsy or unconscious and vomiting, place on the left side with the head down and do not give anything by mouth. If victim is conscious and alert and ingestion occurred within the last hour, vomiting should be induced for ingestions of large amounts (more than 5 ounces in an adult) preferably under direction from a physician or poison center. Do not leave victim unattended and observe closely for adequacy of breathing.

Notes to Physician: Acute aspirations of large amounts of oil-laden material may produce a serious aspiration pneumonia. Patients who aspirate these oils should be followed for the development of long-term sequelae. Inhalation exposure to oil mists below current workplace exposure limits is unlikely to cause pulmonary abnormalities.

5. Fire-Fighting Measures

NFPA 704 Hazard Class

Health: 0 **Flammability:** 1 **Instability:** 0 (0-Minimal, 1-Slight, 2-Moderate, 3-Serious, 4-Severe)

OSHA Flammability Category: None

Unusual Fire & Explosion Hazards: This material may burn, but will not ignite readily. If container is not properly cooled, it can rupture in the heat of a fire.

Extinguishing Media: Dry chemical, carbon dioxide, foam, or water spray is recommended. Water or foam may cause frothing of materials heated above 212°F. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces.

Fire Fighting Instructions: For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear protective clothing. When the potential chemical hazard is unknown, in enclosed or confined spaces, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done safely. Move undamaged containers from immediate hazard area if it can be done safely. Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done safely. Avoid spreading burning liquid with water used for cooling purposes.

Hazardous Combustion Products: Combustion may yield smoke, carbon monoxide, and other products of incomplete combustion. Oxides of sulfur, nitrogen or phosphorus may also be formed.

See Section 9 for Flammable Properties including Flash Point and Flammable (Explosive) Limits

6. Accidental Release Measures

Personal Precautions: This material may burn, but will not ignite readily. Keep all sources of ignition away from spill/release. The use of explosion-proof electrical equipment is recommended. Stay upwind and away from spill/release. Notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Wear appropriate protective equipment, including respiratory protection, as conditions warrant (see Section 8). See Sections 2 and 7 for additional information on hazards and precautionary measures.

Environmental Precautions: Stop spill/release if it can be done safely. Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Use water sparingly to minimize environmental contamination and reduce disposal requirements. Spills into or upon navigable waters, the contiguous zone, or adjoining shorelines that cause a sheen or discoloration on the surface of the water, may require notification of the National Response Center (phone number 800-424-8802).

Methods for Containment and Clean-Up: Notify relevant authorities in accordance with all applicable regulations. Immediate cleanup of any spill is recommended. Dike far ahead of spill for later recovery or disposal. Absorb spill with inert material such as sand or vermiculite, and place in suitable container for disposal.

7. Handling and Storage

Precautions for safe handling: Wash thoroughly after handling. Use good personal hygiene practices and wear appropriate personal protective equipment.

Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. Do not wear contaminated clothing or shoes.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1, and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

Conditions for safe storage: Keep container(s) tightly closed. Use and store this material in cool, dry, well-ventilated area away from heat and all sources of ignition. Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage.

8. Exposure Controls / Personal Protection

Component	US-ACGIH	OSHA	Other
Lubricant Base Oil (Petroleum)	TWA: 5mg/m^3 STEL: 10 mg/m^3 as Oil Mist, if generated	TWA: 5 mg/m^3 as Oil Mist, if generated	---

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

Engineering controls: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits, additional engineering controls may be required.

Eye/Face Protection: The use of eye protection that meets or exceeds ANSI Z.87.1 is recommended to protect against potential eye contact, irritation, or injury. Depending on conditions of use, a face shield may be necessary.

Skin/Hand Protection: The use of gloves impervious to the specific material handled is advised to prevent skin contact. Users should check with manufacturers to confirm the breakthrough performance of their products. Suggested protective materials: Nitrile.

Respiratory Protection: Where there is potential for airborne exposure above the exposure limit a NIOSH certified air purifying respirator equipped with R or P95 filters may be used.

A respiratory protection program that meets or is equivalent to OSHA 29 CFR 1910.134 and ANSI Z88.2 should be followed whenever workplace conditions warrant a respirator's use. Air purifying respirators provide limited protection and cannot be used in atmospheres that exceed the maximum use concentration (as directed by regulation or the manufacturer's instructions), in oxygen deficient (less than 19.5 percent oxygen) situations, or under conditions that are immediately dangerous to life and health (IDLH).

Suggestions provided in this section for exposure control and specific types of protective equipment are based on readily available information. Users should consult with the specific manufacturer to confirm the performance of their protective equipment. Specific situations may require consultation with industrial hygiene, safety, or engineering professionals.

9. Physical and Chemical Properties

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm). Data represent typical values and are not intended to be specifications.

Appearance:	Amber
Physical Form:	Liquid
Odor:	Petroleum
Odor Threshold:	No data
pH:	Not applicable
Vapor Pressure:	<1 mm Hg
Vapor Density (air=1):	>1
Boiling Point/Range:	No data
Melting/Freezing Point:	<-4°F / <-20°C
Solubility in Water:	Insoluble
Partition Coefficient (n-octanol/water) (Kow):	No data
Specific Gravity:	0.89 @ 60ºF (15.6ºC)
Bulk Density:	7.4 lbs/gal
Viscosity:	5.4 cSt @ 100°C; 32 cSt @ 40°C
Evaporation Rate (nBuAc=1):	No data
Flash Point:	>399°F / >204°C
Test Method:	Cleveland Open Cup (COC), ASTM D92
LEL (vol % in air):	No data
UEL (vol % in air):	No data
Autoignition Temperature:	No data

10. Stability and Reactivity

Stability: Stable under normal ambient and anticipated conditions of use.

Conditions to Avoid: Extended exposure to high temperatures can cause decomposition.

Materials to Avoid (Incompatible Materials): Avoid contact with strong oxidizing agents and strong reducing agents.

Hazardous Decomposition Products: Not anticipated under normal conditions of use.

Hazardous Polymerization: Not known to occur.

11. Toxicological Information

Chronic Data:

A mortality study sponsored by General Motors and the United Auto Workers suggested a link between cutting oils or machining fluids and various forms of cancer (e.g., esophageal, laryngeal,and rectal) The study evaluated workplace exposures from 1940-1984. Since the composition of these materials has changed substantially since 1940, and because the most notable effects were seen among those with work histories dating back to that time, the relevance of these findings to present-day exposures is uncertain. Cutting oils or machining fluids have not been identified as carcinogens by NTP, IARC, or OSHA.

Lubricant Base Oil (Petroleum)

Carcinogenicity: The petroleum base oils contained in this product have been highly refined by a variety of processes including severe hydrocracking/hydroprocessing to reduce aromatics and improve performance characteristics. All of the oils meet the IP-346 criteria of less than 3 percent PAH's and are not considered carcinogens by NTP, IARC, or OSHA.

Chlorinated Paraffins (C14-C17)

Carcinogenicity: Certain Chlorinated paraffins mixtures have caused an increase in tumors when given in very high oral doses to mice and rats. This particular chlorinated paraffin has not been identified as a carcinogen by NTP, IARC or OSHA.

Target Organs: Administration of intermediate length chlorinated paraffins has demonstrated limited evidence of liver toxicity in experimental animals. Effects seen include increased liver:body weight ratios and hepatocellular hypertrophy.

Reproductive: Animal studies in both rats (up to 5000 mg/kg, orally) and rabbits (up to 100 mg/kg), orally did not demonstrate effects on the developing fetus. However, the rat studies found increased mortality in pups exposed to chlorinated paraffins via lactation.

Acute Data:

Component	Oral LD50	Dermal LD50	Inhalation LC50
Lubricant Base Oil (Petroleum)	>5 g/kg	>2 g/kg	No data
Chlorinated Paraffins (C14-C17)	>4 g/kg (rat)	>10 ml/kg (rabbit)	No Data

12. Ecological Information

Ecotoxicity: Experimental studies show that acute aquatic toxicity values are greater than 1000 mg/l. These values are consistent with the predicted aquatic toxicity of these substances based on their hydrocarbon compositions.

Mobility: Volatilization to air is not expected to be a significant fate process due to the low vapor pressure of this material. In water, base oils will float and spread over the surface at a rate dependent upon viscosity. There will be significant removal of hydrocarbons from the water by sediment adsorption. In soil and sediment, hydrocarbon components will show low mobility with adsorption to sediments being the predominant physical process. The main fate process is expected to be slow biodegradation of base oil components in soil and sediment.

Persistence and degradability: The hydrocarbons in this material are not readily biodegradable, but since they can be degraded by microorganisms, they are regarded as inherently biodegradable.

Bioaccumulation Potential: Log Kow values measured for the hydrocarbon components of this material range from 4 to over 6, and therefore regarded as having the potential to bioaccumulate. In practice, metabolic processes may reduce bioconcentration.

13. Disposal Considerations

The generator of a waste is always responsible for making proper hazardous waste determinations and needs to consider state and local requirements in addition to federal regulations.

This material, if discarded as produced, would not be a federally regulated RCRA "listed" hazardous waste and is not believed to exhibit characteristics of hazardous waste. See Sections 7 and 8 for information on handling, storage and personal protection and Section 9 for physical/chemical properties. It is possible that the material as produced contains constituents which are not required to be listed in the MSDS but could affect the hazardous waste determination. Additionally, use which results in chemical or physical change of this material could subject it to regulation as a hazardous waste.

This material under most intended uses would become "Used Oil" due to contamination by physical or chemical impurities. Whenever possible, Recycle Used Oil in accordance with applicable federal and state or local regulations. Container contents should be completely used and containers should be emptied prior to discard.

14. Transportation Information

U.S. Department of Transportation (DOT)

Shipping Description: *Not regulated*
Note: *If shipped by land in a packaging having a capacity of 3,500 gallons or more, the provisions of 49 CFR, Part 130 apply. (Contains oil)*

International Maritime Dangerous Goods (IMDG)

Shipping Description: *Not regulated*
Note: *U.S. DOT compliance requirements may apply. See 49 CFR 171.22, 23 & 25.*

International Civil Aviation Org. / International Air Transport Assoc. (ICAO/IATA)

UN/ID #: *Not regulated*
Note: *U.S. DOT compliance requirements may apply. See 49 CFR 171.22, 23 & 24.*

	LTD. QTY	Passenger Aircraft	Cargo Aircraft Only
Packaging Instruction #:	---	---	---
Max. Net Qty. Per Package:	---	---	---

15. Regulatory Information

CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs (in pounds):
This material does not contain any chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372.

CERCLA/SARA - Section 311/312 (Title III Hazard Categories)

Acute Health: No

Chronic Health:	No
Fire Hazard:	No
Pressure Hazard:	No
Reactive Hazard:	No

CERCLA/SARA - Section 313 and 40 CFR 372:
This material does not contain any chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372.

EPA (CERCLA) Reportable Quantity (in pounds):
This material does not contain any chemicals with CERCLA Reportable Quantities.

California Proposition 65:
This material does not contain any chemicals which are known to the State of California to cause cancer, birth defects or other reproductive harm at concentrations that trigger the warning requirements of California Proposition 65.

Canadian Regulations:
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the Regulations.

WHMIS Hazard Class
None

National Chemical Inventories:
All components are either listed on the US TSCA Inventory, or are not regulated under TSCA.
All components are either on the DSL, or are exempt from DSL listing requirements.

U.S. Export Control Classification Number: EAR99

16. Other Information

Date of Issue:	15-Oct-2008
Status:	Final
Previous Issue Date:	20-Jun-2007
Revised Sections or Basis for Revision:	Emergency Overview (Section 2) Toxicological (Section 11)
MSDS Number:	778731

Guide to Abbreviations:
ACGIH = American Conference of Governmental Industrial Hygienists; CASRN = Chemical Abstracts Service Registry Number; CEILING = Ceiling Limit (15 minutes); CERCLA = The Comprehensive Environmental Response, Compensation, and Liability Act; EPA = Environmental Protection Agency; IARC = International Agency for Research on Cancer; LEL = Lower Explosive Limit; NE = Not Established; NFPA = National Fire Protection Association; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; PEL = Permissible Exposure Limit (OSHA); SARA = Superfund Amendments and Reauthorization Act; STEL = Short Term Exposure Limit (15 minutes); TLV = Threshold Limit Value (ACGIH); TWA = Time Weighted Average (8 hours); UEL = Upper Explosive Limit; WHMIS = Worker Hazardous Materials Information System (Canada)

Disclaimer of Expressed and implied Warranties:
The information presented in this Material Safety Data Sheet is based on data believed to be accurate as of the date this Material Safety Data Sheet was prepared. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license.

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: MOBIL ALMO 525
Product Description: Base Oil and Additives
Product Code: 603183-00, 970924
Intended Use: Lubricant

COMPANY IDENTIFICATION

Supplier: **EXXON MOBIL CORPORATION**
3225 GALLOWS RD.
FAIRFAX, VA. 22037 USA

24 Hour Health Emergency	609-737-4411
Transportation Emergency Phone	800-424-9300
ExxonMobil Transportation No.	281-834-3296
MSDS Requests	713-613-3661
Product Technical Information	800-662-4525, 800-947-9147
MSDS Internet Address	http://www.exxon.com, http://www.mobil.com

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

No Reportable Hazardous Substance(s) or Complex Substance(s).

SECTION 3 HAZARDS IDENTIFICATION

This material may be considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

POTENTIAL HEALTH EFFECTS

This product may be used in certain applications where misting can occur. Excessive exposure to liquids and mists may cause skin and eye irritation. In addition, excessive exposure to mists may cause respiratory irritation and damage and aggravate pre-existing emphysema or asthma. Low order of toxicity. High-pressure injection under skin may cause serious damage.

NFPA Hazard ID:	Health:	0	Flammability:	1	Reactivity:	0
HMIS Hazard ID:	Health:	0	Flammability:	1	Reactivity:	0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 4 FIRST AID MEASURES

INHALATION

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use

adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

SKIN CONTACT

Wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

First aid is normally not required. Seek medical attention if discomfort occurs.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Unusual Fire Hazards: Pressurized mists may form a flammable mixture.

Hazardous Combustion Products: Aldehydes, Oxides of carbon, Smoke, Fume, Sulfur oxides, Incomplete combustion products

FLAMMABILITY PROPERTIES

Flash Point [Method]: >188C (370F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0
Autoignition Temperature: N/D

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry

creeks. The National Response Center can be reached at (800)424-8802.

SPILL MANAGEMENT

Land Spill: Stop leak if you can do it without risk. Recover by pumping or with suitable absorbent.

Water Spill: Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Remove from the surface by skimming or with suitable absorbents. Seek the advice of a specialist before using dispersants.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Large Spills: Dike far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Avoid breathing mists or vapors. Prevent small spills and leakage to avoid slip hazard.

Static Accumulator: This material is a static accumulator.

STORAGE

Do not store in open or unlabelled containers.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure limits/standards for materials that can be formed when handling this product: When mists / aerosols can occur, the following are recommended: 5 mg/m³ - ACGIH TLV, 10 mg/m³ - ACGIH STEL, 5 mg/m³ - OSHA PEL.

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

No special requirements under ordinary conditions of use and with adequate ventilation.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use

with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:
Particulate air-purifying respirator approved for dust / oil mist is recommended.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Work conditions can greatly affect glove durability; inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:
No protection is ordinarily required under normal conditions of use.

Eye Protection: If contact is likely, safety glasses with side shields are recommended. Chemical type goggles should be worn during misting operations.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:
No skin protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid skin contact.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS
See Sections 6, 7, 12, 13.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Typical physical and chemical properties are given below. Consult the Supplier in Section 1 for additional data.

GENERAL INFORMATION
Physical State: Liquid
Color: Amber
Odor: Characteristic
Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION
Relative Density (at 15 C): 0.883
Flash Point [Method]: >188C (370F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0
Autoignition Temperature: N/D
Boiling Point / Range: > 316C (600F)
Vapor Density (Air = 1): > 2 at 101 kPa

Vapor Pressure: < 0.013 kPa (0.1 mm Hg) at 20 C
Evaporation Rate (n-butyl acetate = 1): N/D
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): > 3.5
Solubility in Water: Negligible
Viscosity: 46 cSt (46 mm2/sec) at 40 C | 7.3 cSt (7.3 mm2/sec) at 100C
Oxidizing Properties: See Sections 3, 15, 16.

OTHER INFORMATION

Freezing Point: N/D
Melting Point: N/A
Pour Point: -24°C (-11°F)
DMSO Extract (mineral oil only), IP-346: < 3 %wt

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Excessive heat. High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks
Inhalation	
Toxicity (Rat): LC50 > 5000 mg/m3	Minimally Toxic. Based on test data for structurally similar materials.
Irritation: No end point data.	Elevated temperatures or mechanical action may form vapors, mist, or fumes which may be irritating to the eyes, nose, throat, or lungs. Based on assessment of the components.
Ingestion	
Toxicity (Rat): LD50 > 2000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Skin	
Toxicity (Rabbit): LD50 > 2000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Irritation (Rabbit): Data available.	Negligible irritation to skin at ambient temperatures. Based on test data for structurally similar materials.
Eye	
Irritation (Rabbit): Data available.	May cause mild, short-lasting discomfort to eyes. Based on test data for structurally similar materials.

CHRONIC/OTHER EFFECTS

For the product itself:

Oil Mist (highly refined oils): Animals exposed to high concentrations of mist developed oil retention, inflammation, and oil granulomas in the respiratory tract. Oils exposed to high temperatures, cracking conditions, or mixing with tramp / used oils may introduce polycyclic aromatic compounds or microbial contaminants that could result in cancer or severe respiratory hazards.
Contains:
Base oil severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitizing in test animals.

Additional information is available by request.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = NTP CARC	3 = IARC 1	5 = IARC 2B
2 = NTP SUS	4 = IARC 2A	6 = OSHA CARC

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY
Material – Not expected to be harmful to aquatic organisms.

MOBILITY
Base oil component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY
Biodegradation:
Base oil component -- Expected to be inherently biodegradable

BIOACCUMULATION POTENTIAL
Base oil component – Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS
Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

REGULATORY DISPOSAL INFORMATION

RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrositivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND (DOT) : Not Regulated for Land Transport

LAND (TDG) : Not Regulated for Land Transport

SEA (IMDG) : Not Regulated for Sea Transport according to IMDG-Code

AIR (IATA) : Not Regulated for Air Transport

SECTION 15 REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: Under some use conditions, this material may be considered to be hazardous in accordance with OSHA 29 CFR 1910.1200.

NATIONAL CHEMICAL INVENTORY LISTING: TSCA

EPCRA: This material contains no extremely hazardous substances.

SARA (311/312) REPORTABLE HAZARD CATEGORIES: None.

SARA (313) TOXIC RELEASE INVENTORY: This material contains no chemicals subject to the supplier notification requirements of the SARA 313 Toxic Release Program.

The Following Ingredients are Cited on the Lists Below:

Chemical Name	CAS Number	List Citations
CHLORINE (ELEMENTAL ANALYSIS)	7782-50-5	1, 4
PHOSPHORODITHOIC ACID, O,O-DI C1-14-ALKYL ESTERS, ZINC SALTS (2:1) (ZDDP)	68649-42-3	15

ExxonMobil

–REGULATORY LISTS SEARCHED–

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK
5 = TSCA 4	10 = CA P65 CARC	15 = MI 293	

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16 OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:
Revision Changes:
Section 13: Empty Container Warning was modified.
Section 09: Boiling Point C(F) was modified.
Section 08: Hand Protection was modified.
Section 09: Vapor Pressure was modified.
Section 11: Inhalation Lethality Test Data was modified.
Section 06: Accidental Release - Spill Management - Water was modified.
Section 09: Relative Density - Header was modified.
Section 09: Flash Point C(F) was modified.
Section 09: Viscosity was modified.
Section 09: Viscosity was modified.
Section 08: Respiratory Protection was modified.
Section 15: SARA (313) TOXIC RELEASE INVENTORY - Header was modified.
Section 15: National Chemical Inventory Listing was modified.
Section 06: Notification Procedures was modified.
Section 12: Bioaccumulation - Header was added.
Section 12: Ecological Information - Bioaccumulation was added.
Section 12: Ecological Information - Bioaccumulation was added.
Section 15: SARA (313) TOXIC RELEASE INVENTORY - Table was deleted.
Section 15: SARA 313 - Chemical Name - Header was deleted.
Section 15: SARA 313 - CAS Number - Header was deleted.
Section 15: SARA313 - Typical Value - Header was deleted.

PRECAUTIONARY LABEL TEXT:
Caution! Excessive exposure to mist may cause skin and eye irritation. In addition, excessive exposure to mist may cause respiratory irritation and damage, and aggravate pre-existing emphysema and asthma. Use with adequate ventilation. If inhaled and symptoms develop, remove to fresh air and get medical attention.

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affiliates in which they directly or indirectly hold any interest.

Internal Use Only

MHC: 0, 0, 0, 0, 0, 1 PPEC: A

DGN: 2008031XUS (545270)

SAFETY DATA SHEET

1. Identification

Product identifier LPS® 3 (Aerosol)

Other means of identification

Part Number 00316

Recommended use A specialized soft-film spray coating designed to prevent rust and corrosion on steel, aluminum and other metals.

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Manufacturer

Company name LPS Laboratories, a division of Illinois Tool Works, Inc.

Address 4647 Hugh Howell Rd.
Tucker, GA 30084

Country (U.S.A.)

Tel: +1 770-243-8800

In Case of Emergency 1-800-424-9300 (inside U.S.)
+001 703-527-3887 (outside U.S.)

Website www.lpslabs.com

E-mail sds@lpslabs.com

2. Hazard(s) identification

Physical hazards	Flammable aerosols	Category 1
	Gases under pressure	Compressed gas
Health hazards	Skin corrosion/irritation	Category 2
	Serious eye damage/eye irritation	Category 2A
	Specific target organ toxicity, single exposure	Category 3 narcotic effects

Environmental hazards Not classified.

OSHA defined hazards Not classified.

Label elements

Signal word Danger

Hazard statement Extremely flammable aerosol. Contains gas under pressure; may explode if heated. Causes skin irritation. Causes serious eye irritation. May cause drowsiness or dizziness.

Precautionary statement

Prevention Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Do not spray on an open flame or other ignition source. Do not pierce or burn, even after use. Avoid breathing dust/fume/gas/mist/vapors/spray. Wash thoroughly after handling. Use only outdoors or in a well-ventilated area. Wear protective gloves. Wear eye/face protection.

Response If on skin: Wash with plenty of water/soap. Take off contaminated clothing and wash it before reuse. Specific treatment (see this label). If skin irritation occurs: Get medical advice/attention. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. If inhaled: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell.

Storage Protect from sunlight. Do not expose to temperatures exceeding 50°C/122°F. Store locked up. Store in a well-ventilated place. Keep container tightly closed.

Disposal Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC)	None known.
Supplemental information	54.8% of the mixture consists of component(s) of unknown long-term hazards to the aquatic environment. 54.8% of the mixture consists of component(s) of unknown acute hazards to the aquatic environment.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
Light Mineral Spirits		64742-88-7	40 - 50
1-butoxy-2-propanol		5131-66-8	1 - 10
Acetone		67-64-1	1 - 10
Distillates Petroleum Hydrotreated Heavy		64742-54-7	1 - 10
Distillates Petroleum, Hydrotreated Light		64742-47-8	1 - 10
Carbon Dioxide		124-38-9	1 - 5

4. First-aid measures

Inhalation	Remove victim to fresh air and keep at rest in a position comfortable for breathing. Oxygen or artificial respiration if needed. Do not use mouth-to-mouth method if victim inhaled the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Call a POISON CENTER or doctor/physician if you feel unwell.
Skin contact	In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention if irritation develops and persists.
Eye contact	Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Get medical attention if irritation develops and persists.
Ingestion	Call a physician or poison control center immediately. Only induce vomiting at the instruction of medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.
Most important symptoms/effects, acute and delayed	Irritant effects. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Defatting of the skin. Rash. Symptoms of overexposure can include shortness of breath, drowsiness, headaches, confusion, decreased coordination, visual disturbances and vomiting, and are reversible if exposure is stopped.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. In case of shortness of breath, give oxygen. Keep victim under observation. Symptoms may be delayed.
General information	In the case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media	Powder. Alcohol resistant foam. Carbon dioxide (CO2).
Unsuitable extinguishing media	Do not use a solid water stream as it may scatter and spread fire.
Specific hazards arising from the chemical	Contents under pressure. Pressurized container may explode when exposed to heat or flame.
Special protective equipment and precautions for firefighters	Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.
Fire-fighting equipment/instructions	Move containers from fire area if you can do so without risk. Containers should be cooled with water to prevent vapor pressure build up. Water runoff can cause environmental damage.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials. Move container from fire area if it can be done without risk. In the event of fire and/or explosion do not breathe fumes.
General fire hazards	Extremely flammable aerosol.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Keep out of low areas. Wear appropriate personal protective equipment. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. Local authorities should be advised if significant spillages cannot be contained. Use personal protection recommended in Section 8 of the SDS.

Methods and materials for containment and cleaning up

Refer to attached safety data sheets and/or instructions for use. Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Keep combustibles (wood, paper, oil, etc.) away from spilled material. The product is immiscible with water and will spread on the water surface. Stop leak if you can do so without risk. Move the cylinder to a safe and open area if the leak is irreparable. Isolate area until gas has dispersed. Collect spillage. Use water spray to reduce vapors or divert vapor cloud drift. Prevent entry into waterways, sewer, basements or confined areas. Following product recovery, flush area with water. For waste disposal, see section 13 of the SDS.

Environmental precautions

Avoid release to the environment. Contact local authorities in case of spillage to drain/aquatic environment. Prevent further leakage or spillage if safe to do so. Do not contaminate water. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling

Pressurized container: Do not pierce or burn, even after use. Do not use if spray button is missing or defective. Do not spray on a naked flame or any other incandescent material. Do not smoke while using or until sprayed surface is thoroughly dry. Do not cut, weld, solder, drill, grind, or expose containers to heat, flame, sparks, or other sources of ignition. All equipment used when handling the product must be grounded. Avoid breathing gas. Avoid contact with skin. Avoid contact with eyes. Avoid prolonged exposure. Use only in well-ventilated areas. Wear appropriate personal protective equipment. Observe good industrial hygiene practices. Wash hands thoroughly after handling. Avoid release to the environment. Do not empty into drains.

Conditions for safe storage, including any incompatibilities

Level 3 Aerosol.

Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50°C/122 °F. Do not puncture, incinerate or crush. Do not handle or store near an open flame, heat or other sources of ignition.

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
Acetone (CAS 67-64-1)	PEL	2400 mg/m3 1000 ppm
Carbon Dioxide (CAS 124-38-9)	PEL	9000 mg/m3 5000 ppm

US. ACGIH Threshold Limit Values

Components	Type	Value
Acetone (CAS 67-64-1)	STEL	750 ppm
	TWA	500 ppm
Carbon Dioxide (CAS 124-38-9)	STEL	30000 ppm
	TWA	5000 ppm

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
Acetone (CAS 67-64-1)	TWA	590 mg/m3 250 ppm
Carbon Dioxide (CAS 124-38-9)	STEL	54000 mg/m3 30000 ppm
	TWA	9000 mg/m3 5000 ppm

Biological limit values

ACGIH Biological Exposure Indices

Components	Value	Determinant	Specimen	Sampling Time
Acetone (CAS 67-64-1)	50 mg/l	Acetone	Urine	*

* - For sampling details, please see the source document.

Appropriate engineering controls Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear safety glasses with side shields (or goggles). Eye wash fountain is recommended.

Skin protection

Hand protection Chemical resistant gloves are recommended.

Other Avoid contact with clothing. Wear suitable protective clothing. Chemical resistant gloves.

Respiratory protection No personal respiratory protective equipment normally required. Use a positive-pressure air-supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air-purifying respirators may not provide adequate protection.

Thermal hazards Not applicable.

General hygiene considerations When using, do not eat, drink or smoke. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance Cloudy. Liquid.

Physical state Gas.

Form Aerosol.

Color Brown.

Odor Mild. Cherry.

Odor threshold Not available.

pH Not applicable

Melting point/freezing point Not available.

Initial boiling point and boiling range 320 - 392 °F (160 - 200 °C)

Flash point 73.4 °F (23.0 °C) Tag Closed Cup dispensed liquid

Evaporation rate 0.2 (BuAc = 1)

Flammability (solid, gas) Flammable gas.

Upper/lower flammability or explosive limits

Flammability limit - lower (%) 0.6 %

Flammability limit - upper (%) 6 %

Explosive limit - lower (%) Not available.

Explosive limit - upper (%) Not available.

Vapor pressure 2.6 mm Hg @ 20ºC

Vapor density 4.8 (air = 1)

Relative density Not available.

Solubility(ies)

Solubility (water) insoluble

Partition coefficient (n-octanol/water) Not available.

Auto-ignition temperature 446 °F (230 °C)

Decomposition temperature Not available.

Viscosity	200 - 800 cP
Other information	
Density	6.82 lb/gal
Percent volatile	78.45 %
Specific gravity	0.81
VOC (Weight %)	75.58 % per U.S. State and Federal Consumer Product Regulations

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	Hazardous polymerization does not occur.
Conditions to avoid	Avoid temperatures exceeding the flash point.
Incompatible materials	Strong oxidizing agents.
Hazardous decomposition products	Upon decomposition this product emits acrid dense smoke with carbon dioxide, carbon monoxide, water and other products of combustion.

11. Toxicological information

Information on likely routes of exposure

Ingestion	May cause discomfort if swallowed. However, ingestion is not likely to be a primary route of occupational exposure.
Inhalation	May cause irritation to the respiratory system. Vapors have a narcotic effect and may cause headache, fatigue, dizziness and nausea.
Skin contact	Causes skin irritation.
Eye contact	Causes serious eye irritation.
Symptoms related to the physical, chemical and toxicological characteristics	Irritating to eyes, respiratory system and skin. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Vapors have a narcotic effect and may cause headache, fatigue, dizziness and nausea.

Information on toxicological effects

Acute toxicity Narcotic effects.

Components	Species	Test Results
1-butoxy-2-propanol (CAS 5131-66-8)		
Acute		
Dermal		
LD50	Rabbit	1400 mg/kg
		1.59 ml/kg
	Rat	> 2000 mg/kg
Inhalation		
LC50	Rat	> 651 ppm
		> 5.83 mg/l
Oral		
LD50	Rat	> 2000 mg/kg
		2.83 ml/kg
Acetone (CAS 67-64-1)		
Acute		
Dermal		
LD50	Rabbit	> 15800 mg/kg
		20 ml/kg
Inhalation		
LC50	Rat	55700 ppm
		76 mg/l, 4 Hours
		50.1 mg/l

Components	Species	Test Results
		50.1 mg/l, 8 Hours
Oral		
LD50	Mouse	3000 mg/kg
	Rabbit	5340 mg/kg
	Rat	5800 mg/kg
		2.2 ml/kg
Other		
LD50	Mouse	1297 mg/kg
	Rat	5500 mg/kg
Distillates Petroleum Hydrotreated Heavy (CAS 64742-54-7)		
Acute		
Dermal		
LD50	Rabbit	> 2000 mg/kg
Inhalation		
LC50	Rat	> 2.5 mg/l
Oral		
LD50	Rat	> 2000 mg/kg
Distillates Petroleum, Hydrotreated Light (CAS 64742-47-8)		
Acute		
Dermal		
LD50	Rabbit	> 2000 mg/kg
Inhalation		
LC50	Cat	> 6.4 mg/l
	Rat	> 0.1 mg/l
Oral		
LD50	Rat	> 5000 mg/kg
Light Mineral Spirits (CAS 64742-88-7)		
Acute		
Dermal		
LD50	Rabbit	> 2000 mg/kg
Inhalation		
LC50	Cat	> 6.4 mg/l
	Rat	> 0.1 mg/l
Oral		
LD50	Rat	> 5000 mg/kg

Skin corrosion/irritation Causes skin irritation.

Serious eye damage/eye irritation Causes serious eye irritation.

Respiratory or skin sensitization

Respiratory sensitization Not a respiratory sensitizer.

Skin sensitization This product is not expected to cause skin sensitization.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

ACGIH Carcinogens

Acetone (CAS 67-64-1) A4 Not classifiable as a human carcinogen.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure	Narcotic effects.
Specific target organ toxicity - repeated exposure	Not classified.
Aspiration hazard	Not likely, due to the form of the product.
Chronic effects	Prolonged inhalation may be harmful.

12. Ecological information

Ecotoxicity Not expected to be harmful to aquatic organisms.

Components		Species	Test Results
Acetone (CAS 67-64-1)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	10294 - 17704 mg/l, 48 hours
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	4740 - 6330 mg/l, 96 hours
Distillates Petroleum, Hydrotreated Light (CAS 64742-47-8)			
Aquatic			
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	2.9 mg/l, 96 hours

Persistence and degradability	Not inherently biodegradable.
Bioaccumulative potential	No data available for this product.
Partition coefficient n-octanol / water (log Kow)	
Acetone	-0.24
Mobility in soil	Not available.
Other adverse effects	None known.

13. Disposal considerations

Disposal instructions	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Contents under pressure. Do not puncture, incinerate or crush. This material and its container must be disposed of as hazardous waste. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazardous waste code	D001: Waste Flammable material with a flash point <140 F D003: Waste Reactive material
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied. Do not re-use empty containers.

14. Transport information

DOT

UN number	UN1950
UN proper shipping name	Aerosols, flammable
Transport hazard class(es)	
Class	2.1
Subsidiary risk	-
Label(s)	2.1
Packing group	Not applicable.
Environmental hazards	
Marine pollutant	No
Special precautions for user	Not available.
Special provisions	N82
Packaging exceptions	306
Packaging non bulk	None
Packaging bulk	None

IATA

UN number	UN1950
UN proper shipping name	Aerosols, flammable
Transport hazard class(es)	
Class	2.1
Subsidiary risk	-
Label(s)	2.1
Packing group	Not applicable.
Environmental hazards	No.
Special precautions for user	Not available.
Other information	
Passenger and cargo aircraft	Allowed.
Cargo aircraft only	Allowed.

IMDG

UN number	UN1950
UN proper shipping name	Aerosols, flammable
Transport hazard class(es)	
Class	2.1
Subsidiary risk	-
Label(s)	2.1
Packing group	Not applicable.
Environmental hazards	
Marine pollutant	No
EmS	Not available.
Special precautions for user	Not available.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code This substance/mixture is not intended to be transported in bulk.

DOT

IATA; IMDG

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Acetone (CAS 67-64-1) Listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - Yes
Pressure Hazard - Yes
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

Drug Enforcement Administration (DEA). List 2, Essential Chemicals (21 CFR 1310.02(b) and 1310.04(f)(2) and Chemical Code Number

Acetone (CAS 67-64-1)	6532

Drug Enforcement Administration (DEA). List 1 & 2 Exempt Chemical Mixtures (21 CFR 1310.12(c))

Acetone (CAS 67-64-1)	35 % weight/volumn

DEA Exempt Chemical Mixtures Code Number

Acetone (CAS 67-64-1)	6532

US state regulations

US. Massachusetts RTK - Substance List

Acetone (CAS 67-64-1)
Carbon Dioxide (CAS 124-38-9)

US. New Jersey Worker and Community Right-to-Know Act

Acetone (CAS 67-64-1)
Carbon Dioxide (CAS 124-38-9)

US. Pennsylvania Worker and Community Right-to-Know Law

Acetone (CAS 67-64-1)
Carbon Dioxide (CAS 124-38-9)

US. Rhode Island RTK

Acetone (CAS 67-64-1)

US. California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	No
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	No
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	No

Country(s) or region	Inventory name	On inventory (yes/no)*
New Zealand	New Zealand Inventory	No
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	No

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date	08-29-2013
Revision date	08-04-2014
Version #	02
Disclaimer	The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.
Revision Information	Product and Company Identification: Product and Company Identification Hazard(s) identification: <INDENT>Prevention Hazard(s) identification: GHS Symbols Composition / Information on Ingredients: Disclosure Overrides Toxicological information: Acute toxicity Toxicological information: Aspiration hazard Toxicological information: Reproductivity Toxicological information: Respiratory sensitization Toxicological information: Ingestion Toxicological information: Skin contact HazReg Data: North America GHS: Classification


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