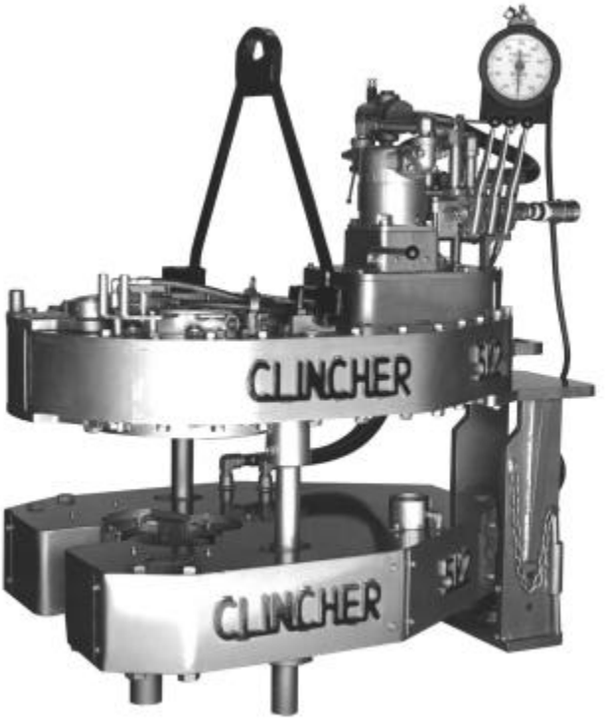
SUPERIOR
Manufacturing & Hydraulics

TECHNICAL MANUAL

5 1/2" STANDARD CLINCHER TONG
AND
5 1/2" STANDARD BACKUP



COVERS
TONG MODEL CLES5500
AND
BACKUP MODEL BUCL5500

ANSI-RAB QMS ACCREDITED BSI REGISTERED
FM 65217

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Broussard, Louisiana 70518
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This manual is not a controlled document and is subject to revision without notice. To receive updates and insure you have access to the latest information concerning the 5 1/2" Standard CLINCHER Tong and 5 1/2" Standard Backup, we request you complete this form and return the lower half to SUPERIOR Manufacturing and Hydraulics by mail or facsimile.

Name: _____
Company: _____
Address: _____
Address: _____
City: _____ **State:** _____
Postal Code: _____ **Country:** _____
Telephone: _____ **Fax:** _____

Tong Model No.: _____ **Serial No.:** _____
Backup Model No.: _____ **Serial No.:** _____
Assembly Date: _____

- -

5 1/2" Standard CLINCHER Tong and 5 1/2" Standard Backup
Technical Manual Registration Form

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Return To:

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5 1/2" STANDARD CLINCHER TONG AND 5 1/2" STANDARD BACKUP

HAZARD WARNING

Nomenclature used in this manual:

WARNING	concerns an operating procedure or practice that, if not strictly observed, can result in injury to personnel or loss of life.
Caution	concerns an operating procedure or practice that, if not strictly observed, can result in damage to or destruction of equipment.
Note	concerns an operating procedure or practice that needs highlighting.

CLINCHER Tongs and Backups are manufactured to provide a means of making up or breaking out high torque tubular connections. They utilize high pressure hydraulic fluid power which can cause the tong to move suddenly and with great force if the tong is not properly rigged up and operated. CLINCHER Tongs and Backups contain rotating and reciprocating parts which can severely or fatally injure personnel who are operating, repairing, or near this equipment during its operation. **WARNING: Tongs and Backups are not to be operated by untrained personnel or personnel with diminished physical or mental capacity. No work of any type, including changing of dies, is to be carried out while the tong and backup are connected to any hydraulic power unit.**

CLINCHER Tongs and Backups are heavy tools. They should be suspended from a secure, high strength 7/8" 1 WRC minimum diameter wire cable with a 31 ton minimum breaking strength. The wire rope should be hung as close to the center of the wellbore as possible, without interfering with drilling equipment operation, to allow the tong to be readily swung into the working position. Vertical position control should be achieved by means of a CLINCHER hydraulically operated lift cylinder/spring hanger. **WARNING: Users must insure the entire suspension system including cables, rig mounting points, lift cylinders, tong lifting brackets/bridles, winches, pulleys, counter weights, etc., are capable of handling the static weight of the tong plus any loads which could be transferred to it during the makeup or breakout process PLUS any shock loads which may be seen during operation. This system must readily allow downward movement equal to a minimum of the thread makeup distance to avoid overloading the suspension system and/or damage to equipment.**

A 3/4" IWRC minimum diameter wire cable with a 29.4 ton minimum or better breaking strength, should be attached at a 90 degree angle to the tong and at the same level to insure proper readout of torque indicator. A SNUBBING LINE should always be attached even when an integral backup is in use to provide additional safety in the event of a backup slippage. **WARNING: Users must provide a means of safely controlling the tong movements in all directions when it is in use. Failure to account for the its size, weight, movement and the amount of torque developed could result in personnel injury or death.**

5 1/2" STANDARD CLINCHER TONG AND 5 1/2" STANDARD BACKUP

HAZARD WARNING

CLINCHER Tongs and Backups utilize high pressure hydraulic fluids. Portions of the tong and backup, control valves, hydraulic lines and cylinders may contain high pressure fluid even when the power unit is de-energized and the fluid supply hoses are disconnected. During normal operation the temperature of the hydraulic fluids as well as hoses, piping, valves, etc., can rise to a level which can cause burns. **WARNING: Personal protective gear including safety glasses, face shields, protective gloves and protective clothing must be worn to guard against the hazards of high pressure fluids. Tight fitting clothing is required to prevent entanglement in rotating components. These tools should be serviced by thoroughly trained and qualified hydraulic technicians using procedures to safely insure hydraulic pressure is bled from these circuits.**

The CLINCHER Tong is equipped with a door interlock system which prevents tong rotation whenever the door is open. This system is to be tested before each mobilization and at every shift change. Should this system be determined to be inoperative, the tong is to be removed from service and tagged as ***in-operative*** until repairs are made. **CAUTION:** Operating the tong with the door in the open position could result in severe damage to the equipment and will void all manufacturer warranties. **WARNING: Operating the tong with the door open by means of a defective or bypassed door interlock system exposes the operator and nearby personnel to potentially fatal hazards.**

No attempt should be made to operate the CLINCHER Tong and Backup for any purpose other than which it is intended. This system is capable of generating very large clamping forces and torsional loads which, if improperly applied or controlled, could result in damage to the tubular, to the tong or backup, or could possibly result in injury or death of personnel. Do not attempt to operate the unit without correct dies and the proper size tubular being in the tong. See Section 3 for more information concerning the selection and use of dies. **CAUTION: Operating this equipment without the correct size, type and orientation of dies can result in damage to the equipment or tubulars being handled.**

HYDRAULIC PRODUCT SAFETY

WARNING: Valve lever (spool) may "stick" (not center) under certain conditions allowing the hydraulic equipment to continue to operate and could cause serious injury, death or equipment failure.

VALVE SAFETY: Read and follow instructions carefully. Failure to observe instructions and guidelines may cause serious injury, death or equipment failure. A sticking valve (spool bind) may be caused by one or more of the following factors:

DIRTY OIL: Oil must be filtered to a minimum of 25 microns. Filters should be changed regularly - spin-on types after 50 hours of initial use and then after every two hundred fifty hours of use. Use of a condition indicator is recommended. Consult your tractor or implement owner's manual for filtration and changing recommendations for internal systems.

OIL REQUIREMENTS: Premium quality anti-wear type oil with a viscosity between 100 and 200 SSU at operating temperatures. Certain synthetic oils may cause spool seals to swell and the valve to stick. If in doubt, call CROSS Engineering.

IMPROPER HOOK UP OR MOUNTING: Always use the proper size fittings. Hook up "in" & "out" as noted on the valve body. Do not overtorque pipe fittings. Mounting surfaces should be flat and care should be used when tightening mounting bolts. Over-tightened bolts can cause spool bind and casting breakage. When hooking a valve in series, always use a power beyond sleeve. Consult your tractor or implement manual to make sure you have the proper quick disconnect line connected to the inlet of the remote valve.

MISAPPLICATION: Always use the proper valve for the job. CONVERTA, CD, CS or CA valves should never be used for metered heavy load lifting - loaders or similar applications. Use an open center valve for open center applications and a closed center valve for closed applications. If in doubt, check with your tractor dealer. Contact CROSS if the valve allows the hydraulic equipment to creep excessively.

MAINTENANCE: Make sure all bolts are tightened and torqued to the recommended specification. Bent or broken parts should not be used. Replace immediately. Always use exact replacements. Always protect valve spool from paint overspray.

Faulty quick disconnects can cause high back pressures and sticking spools. Check quick disconnects periodically to make sure they are functioning properly. If valve spool does not center or appears to stick, do not use!

PUMPS & MOTORS SAFETY:

A relief or bypass in your hydraulic system is necessary to prevent pump from breakage due to overpressurization. Use correct fittings and proper oil as noted in the technical service manual packed with each unit. Change oil as recommended by your implement or tractor manufacturer.

CYLINDER SAFETY:

Check clevis clearances before, during and after extending the cylinder and before using the cylinder under pressure to avoid possible injury, or bent or broken rods caused by binding. Never operate a cylinder above recommended pressures. Never use a cylinder as a safety device when transporting equipment.

PINHOLE LEAKS:

If you observe a pinhole leak, discontinue use of the component. If oil has penetrated your skin or contacted your eye, seek medical attention immediately!

DESCRIPTION and APPLICATION

The CLINCHER Tong and Backup system is an Aopen-throat@ design which can handle tubulars as small as 2 1/16 inches to as large as 5 1/2" inches in diameter. This system features two (2) jaws in the Tong and three (3) jaws in the Backup which encircle the pipe. Wrap Around jaws and dies, combined with our low friction jaw technology and constant radial load cam system and compensating jaw design provide exceptional gripping capabilities with reduced pipe deformation, stress, and marking. Using our non-marking aluminum die system or grit faced dies in the Tong and Backup will now allow stainless steel corrosion resistant alloys (CRA) to be run as quickly and easily as a traditional tong runs conventional steel tubulars.

Notable Features and Benefits

Low Friction Jaws	increases cam angle efficiency to allow use of aluminum dies
Splined Die System	aligns the die with the tubular and more evenly distributes radial load, essentially wrapping the die around the tube reduces pipe stress, deformation, and minimizes marking
Constant Cam Angle	insures an adequate radial load is available regardless of relative rotation to enhance performance on undersized pipe
Die Retention Method	provides an enhanced method of preventing equipment damage and die loss if the pipe is inadvertently moved while the tong is still gripping the pipe
Self Adjusting Brake	eliminates need to manually adjust brake bands to compensate for normal wear

In addition to these unique features listed above, the CLINCHER Tong and Backup System is also equipped with numerous standard features including:

Door Interlock	prevents tong ring gear rotation whenever the tong door is open but allows control and operation of the lift cylinder at all times
Encoder Adapter	accepts customer=s turns encoder to signal to a torque/turn computer
Pressure Control Valve	adjustable pressure control valves allow the customer to limit the amount of pressure applied and torque developed

The features described above are covered by US and foreign patents or pending US and foreign patents.

DESCRIPTION and APPLICATION

Tong Application

After completing the make-up or break-out cycle, the jaws are opened by reversing the tong motor to drive the ring gear and cam surfaces in the opposite direction until the reversing pin contacts the ring gear shoulder. Springs are used to return the jaws to their fully open position.

The Tong=s cage plate braking system is self adjusting to compensate for brake band wear. Field adjustments are not required under normal conditions.

Backup Application

The CLINCHER Backup has an Aopen throat@ design with three jaws that encircle the pipe. The front jaws are operated by cam surfaces on the rear jaw cylinder. During a jaw closing cycle, the front jaws swing in and interlock as the rear die approaches the pipe. Once locked on the pipe, pressure is locked in the backup cylinder by a load holding valve. When opening the backup jaws, the cylinder operation is reversed to retract the rear die and unlock the jaws. Springs move the front jaws to their fully open position.

TONG SPECIFICATIONS

Power Supply Requirements: 3,000 PSI, 45 GPM to 65 GPM	
Maximum Torque	12,000 ft.lbs. / 16,270 Nm
Maximum Operating Pressure	3,000 psi / 20.7 MPa
RPM @ 35 GPM/132 LPM: Manual Gearbox **High Gear** **Low Gear**	 81 RPM 17 RPM
Tong Handle Length	24 1/2" / 62.2 cm
Backup Handle Length	29" / 73.7 cm
Overall Height w/Backup	51" / 129.5 cm
Overall Height w/Backup & Lifting Bracket	63 1/2" / 161.3 cm
Overall Length	38" / 96.5 cm
Overall Width	24 1/2" / 62.2 cm
Weight w/Backup	1,241 lbs. / 564 kg
2 Tong Jaw Capacity	2 1/16" thru 3 1/2 " & 3 1/2" thru 5 1/2"
1 Backup Jaw Size	2 1/16" thru 5 1/2"

Operates using Steel Tooth Wrap Around Dies, Grit Faced Wrap Around Dies, and Aluminum Wrap Around Dies.

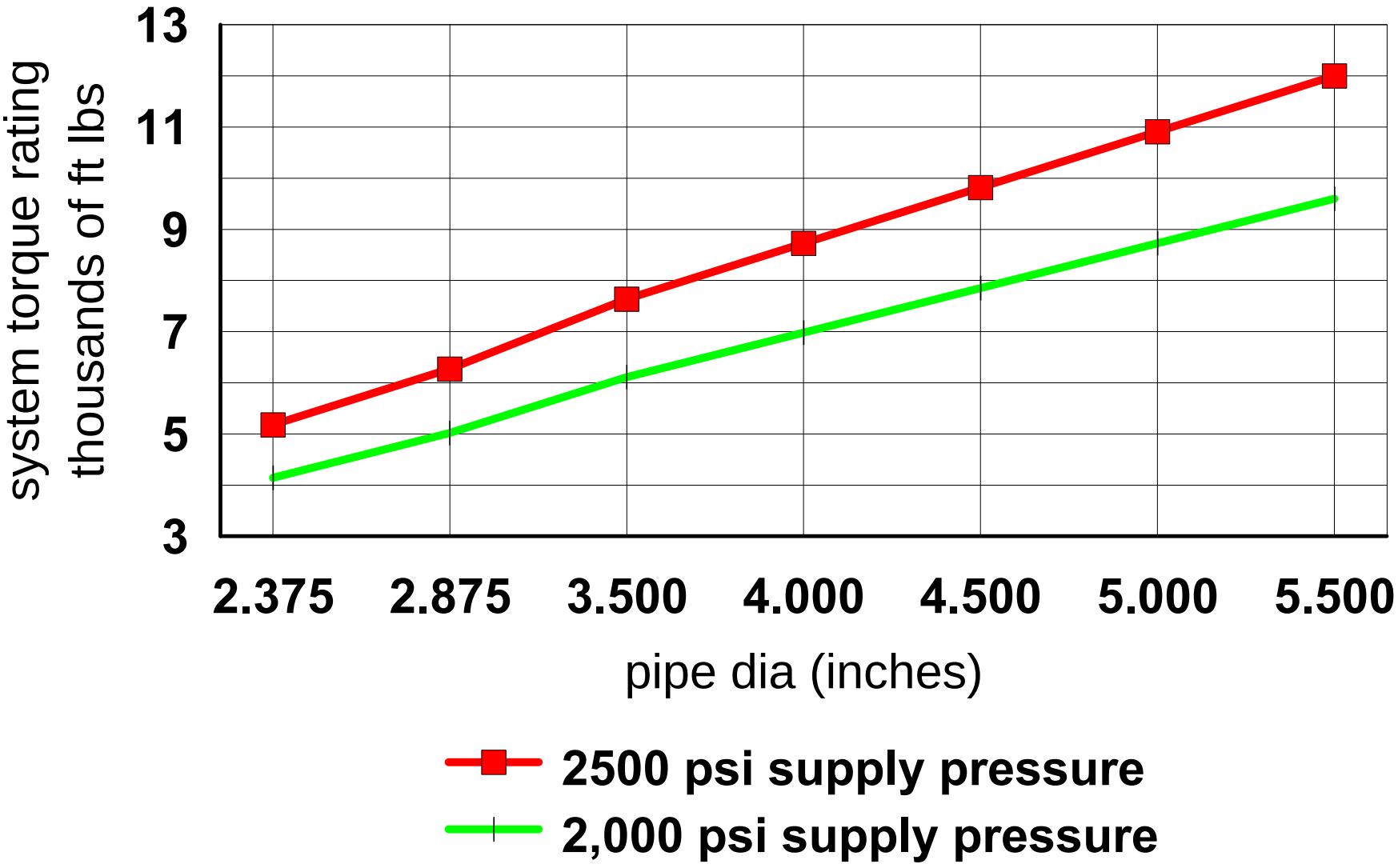
Standard Equipment:

- Door Interlock
- Self Adjusting Brake

Optional Equipment:

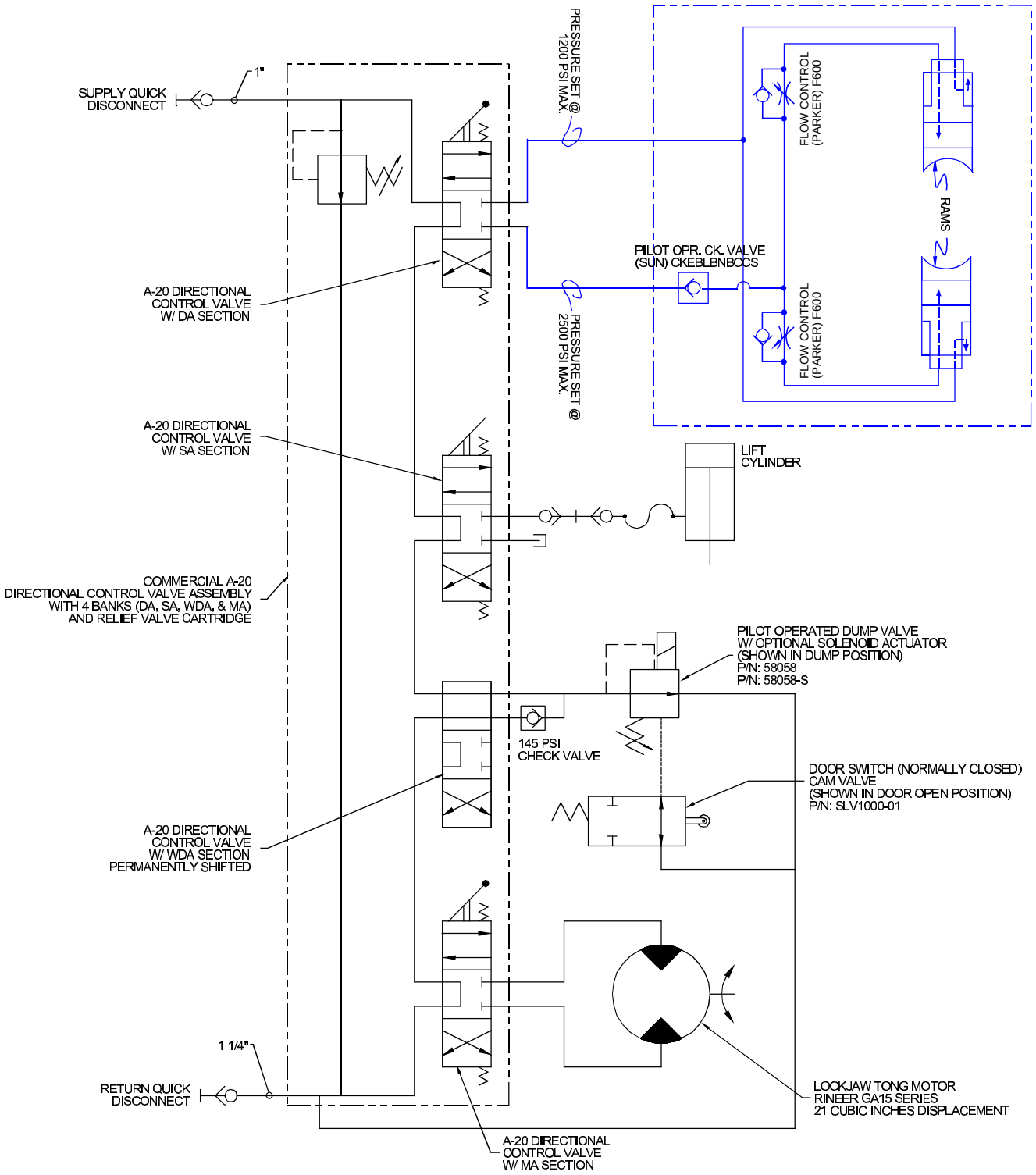
- Two Speed Hydraulic Motor
- Hydraulic Cage Plate Brake System
- Handles - Tong & Backup
- 3 Point Lifting Bridle
- Electronic Solenoid Dump Valve
- Hydraulic Intensifier for Backup
- Shipping Stand, or Skid
- Varying Outlets for Torque Turns Computer Sending Units

CLINCHER CLES5500 Standard Tong and BUCL5500 Backup performance
when dressed with fine tooth wrap-around steel dies



CLES5500 STANDARD TONG **BUCL5500 STANDARD BACKUP**

SPECIAL NOTE: IF VALVE SECTION "COMMERCIAL SHEARING" DA-53 IS TO BE SUBSTITUTED, CYLINDER SPOOL MUST BE USED.



BASIC HYDRAULIC SCHEMATIC

CLES5500 STANDARD TONG
BUCL5500 STANDARD BACKUP

NOTE: NUMEROUS FITTINGS, HOSES, & NIPPLES ARE NOT ILLUSTRATED IN THIS SCHEMATIC

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REV. #	LOG #	DATE

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CLINCHER WRAP AROUND DIES

Clincher Wrap Around Dies are available in three types:

Fine Toothed Steel Dies:	for low to ultra high torque applications on carbon steel tubulars including tubing, casing, and drill pipe
Smooth Faced Aluminum Dies:	for low to moderate torque applications on fiberglass and corrosion resistant alloy (stainless steel) tubulars
Grit Faced Dies:	for low to high torque applications on fiberglass and corrosion resistant alloy (stainless steel) tubulars where the use of steel dies is prohibited as well as on carbon steel tubulars where reduced marking is desired

CLINCHER Dies are designed to match the OD of the tubing, casing, coupling, or accessory being made up or broken out. Each die is stamped on the top or side to identify its size. Using Fine Toothed Steel Dies which are slightly larger than the tubular is acceptable provided the difference in diameters is less than 3/32" (0.093"). Aluminum and Grit Faced Dies should be matched with the specific tubular diameters required. **Note:** The use of improperly sized dies can result in reduced torque capacity, increased pipe marking, and reduced die life.

CAUTION: Do not attempt to grip tubular diameters which are larger than the dies being used. Failure to observe this precaution can result in damage to the tubular or tong jaws.

In emergencies where correct die sizes are unavailable, some operators have successfully used two different sizes of dies to accommodate unusual, nonstandard diameters.

CLINCHER Wrap Around Dies are manufactured in specific diameters to match standard tubing and casing diameters, API coupling diameters, selected work string connection diameters and certain commonly used premium connection coupling diameters. CLINCHER Wrap Around Dies should not be used on tubulars which are larger than the nominal die size. Steel Toothed Dies can be used on tubulars which are no smaller than 3/32" (0.093") less than the nominal die size. Aluminum and Grit Faced Dies should be matched with the specific tubular diameters required.

Note: Fine Toothed Steel Dies are normally stocked in our Broussard, Louisiana facility. Aluminum and Grit Faced Dies are normally made to order although a limited range of sizes and small quantities may be available from stock. Contact SUPERIOR Manufacturing & Hydraulics for information concerning availability of stock and special die sizes.

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TECH UPDATE

A brief explanation of oil field dies, the evolution of the CLINCHER™ Tong Die, and advances in hydraulic power tong technology.

SUPERIOR's CLINCHER line of power tongs, backups, and accessories supplies the oil industry with equipment used when installing oil field tubing, casing, and drill pipe. These products are hydraulically powered wrenches which grip the exterior surface of the pipe and transmit torque to tighten or loosen the pipe's threaded connection.

Traditionally, tongs employing a series of hardened steel dies with sharp teeth were used to grip oil field tubulars. Early steel die designs were made from strips of flat bar stock. These early dies ranged from approximately 3/4" to 1 1/2" in width and were approximately 4" long. They are known as strip dies because of their long narrow geometry. These dies were installed in a holder, known as a jaw, in sets of 2 or 4 and arranged in a v-block configuration. The jaws holding the strip dies are installed in opposed pairs in a power tong. As the tong is operated, a cam system generates radial loads which force the jaws to close on the pipe and cause the teeth of the die to penetrate the pipe's surface. *(ref. Figure 1)*

In high torque applications the pipe is loaded on the leading edges of the jaws while the trailing edges are unloaded. Under these conditions, the strip die can severely mark the pipe because the strip die provides essentially only line contact. The limited contact area associated with strip dies can also lead to permanent pipe deformation under high torque conditions. In an effort to reduce the depth of the marks left by strip dies and increase the contact area, strip dies were modified to provide a contoured surface which matched the radius of the pipe.

In 1985 Superior introduced the CLINCHER Splined Tong Jaw and Wrap-Around Fine Toothed Steel Die system *(ref. Figure 2)*. This wrap around die replaced the two traditional tong jaws and strip dies resulting in an increase in contact area to approximately 230 degrees or 64% of the circumference.

CLINCHER Wrap-Around Dies are fixed to the jaws by means of a patented spline arrangement which insures proper alignment and uniform distribution of radial loads *(ref. Figure 3)*. This causes the torsional loads to be distributed across the entire die unlike the concentrated loading observed in strip dies. The increased contact area combined with the fine tooth pattern significantly reduces the marking of tubulars under high torque conditions when compared to the traditional die system. Simultaneously, the increased contact area reduces the stress in the tubular and the possibility of permanent deformation. In 1987, we introduced the CLINCHER Hydraulic Backup which also uses our Wrap-Around Die. When these dies are installed in CLINCHER Backups, CHROME-MASTER[m] and LOCKJAW[m] Tongs having 3 jaws, this contact area is increased to as much as 340 degrees or 94% of the tubular's circumference.

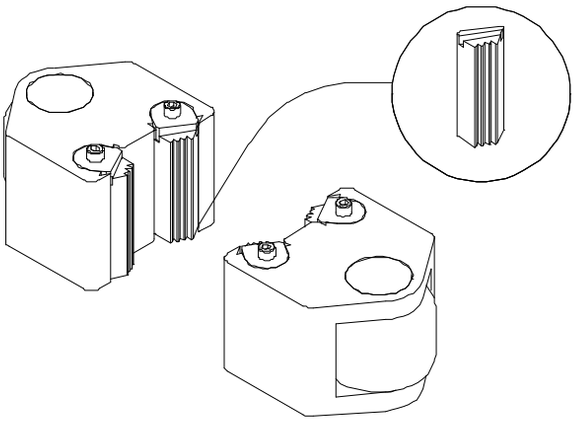
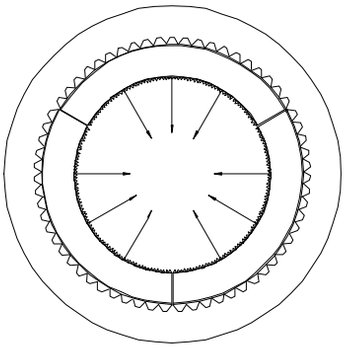
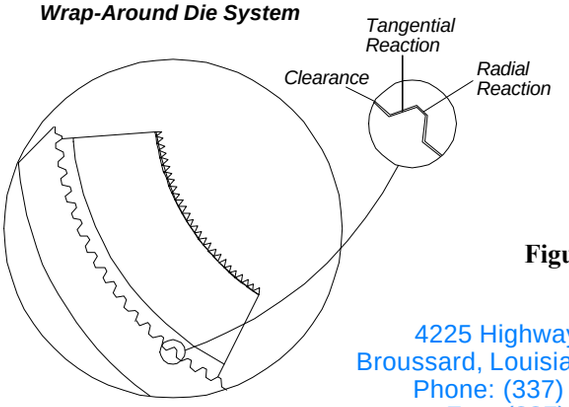


Figure 1



Wrap-Around Die System

Figure 2



Patented Spline & Die

Figure 3

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In the last decade, the use of carbon steel tubulars has declined and the use of exotic stainless steel tubulars has increased. This change is in response to declining reserves of sweet, non-corrosive hydrocarbon reserves and the increase in production from hot, corrosive oil and gas reservoirs. Some of these corrosion resistant alloys (CRA) materials can have their corrosion resistance severely degraded if their surface is damaged and/or contaminated with small particles of iron or steel *(ref. IADC/SPE Paper 36386)*. The marks left behind by traditional slips and elevators used to handle the tubulars or by the tong dies used to tighten the tubulars can also reduce the mechanical strength and lead to premature fatigue failures. Since these exotic CRA tubulars cannot be used with any type of toothed steel die it became necessary to develop a non-marking die.

CLINCHER Non-Marking Wrap-Around Dies are manufactured from a special aluminum alloy and are machined with a smooth face which matches the radius of the tubular. They grip the pipe and transmit torque without penetrating the pipe by using the frictional force developed between the die and the pipe. Standard tongs used by the oil industry do not develop enough radial load to allow non-marking dies to function. CLINCHER developed its CHROMEMASTER to allow non-marking dies to be used with standard tubing and casing tongs. The CHROMEMASTER works by increasing the amount of radial load applied to the pipe. Three wrap-around non-marking aluminum dies virtually encircle the pipe to reduce deformation and stress levels in the tubular. For more information on the CHROME-MASTER as well as the CLINCHER Hydraulic Power Tong which drives it and our CLINCHER Hydraulic Backup, contact Superior Manufacturing and Hydraulics.

For a given radial load, torque values for Non-Marking Dies can vary significantly from tube to tube because they are totally dependent upon the coefficient of friction. The presence of a small amount of varnish, moisture such as dew, or some other type of lubricant can reduce this value substantially. If this occurs, the torque values can be increased by the addition of CLINCHER silicon carbide screen cloth. The particles on this cloth are sized to span the film of lubricant between the pipe and the die to increase the coefficient of friction.

CLINCHER GRIT FACED^{m} Dies were developed to further enhance die torque capabilities for CRA tubulars and eliminate the need to install a new sheet of silicon carbide screen cloth for every connection. The CLINCHER GRIT FACED Dies are available for our CHROMEMASTER, CLINCHER Backups, CLINCHER LOW-FRICTION^{m} Tong Jaws, CLINCHER LOCKJAW Tongs and CLINCHER Bucking Units. GRIT FACED Dies typically provide at least twice the torque which can be achieved using aluminum dies with silicon carbide screen cloth. CLINCHER GRIT FACED Dies do not leave the tooth marks normally seen with conventional steel dies. Like the aluminum dies, GRIT FACED dies do not allow steel, iron, or carbon to contact the pipe body. The absence of teeth greatly reduces stress risers and crevices which have been observed to cause premature failures in CRA tubing strings.

First proven in critical North Sea applications, the CLINCHER GRIT FACED^{m} Die is rapidly becoming the standard die used with CRA strings around the world. When properly used GRIT FACED Dies will not leave any significant marks on the pipe. During recent lab tests the maximum depth of marks left after very high torque applications was 0.004 inches. It is our belief these results are considerably better than competitive systems as they are shallower, are in a random pattern which reduces stress risers in the tubulars, and they do not contaminate the CRA tubing with steel, iron, or carbon. GRIT FACED dies provide another major benefit. Running of the tubulars is faster, safer, and less tiring for operators because they do not have to replace six sheets of carbide paper every joint. Instead, we recommend one die be removed every 10 joints and replaced with a die which has been brushed to remove any accumulated dirt or paint.

The introduction of the GRIT FACED Die brings the number of tong dies available to three as shown in *Figure 4*. The aluminum is a non-marking die used on CRA tubulars at low to moderate torques, GRIT FACED Dies for CRA tubulars at low to high torques, and the fine tooth steel die is used in low to ultra high torque applications on carbon steel tubulars.

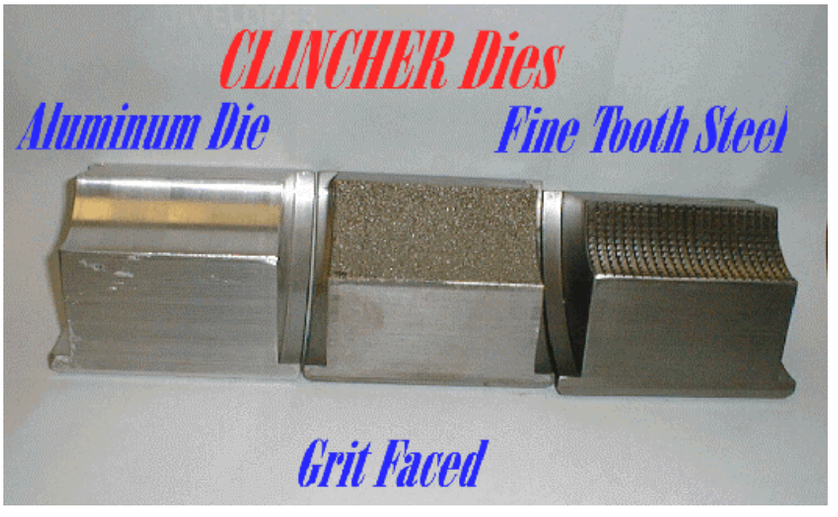


Figure 4

Superior Manufacturing & Hydraulics is committed to continually improving our products and expanding our product lines. In early 1997 we introduced the CLINCHER LOCKJAW Tong. Like our other tongs, the LOCKJAW tong utilizes our Wrap-Around Die system *(ref Figure 2)*. This is where the similarity with all other tongs ends. The LOCKJAW features a three jaw system which provides more than 300 degrees of die coverage to further reduce pipe marking under high torques. It also features our patented constant cam angle and a load control system which generates the radial loads required to use our Non-Marking Aluminum and GRIT FACED Dies without a CHROMEMASTER.

In October 1997, CLINCHER introduced its latest tong innovation to the industry. The CLINCHER LOW-FRICTION Jaw System now allows Non-Marking Aluminum and GRIT FACED Dies to be used in conventional CLINCHER Tongs which are not equipped with CHROMEMASTERS.

These innovations now allow a single tong and backup assembly to be used for running normal steel tubulars, drill pipe, or CRA tubulars. Eliminating the need for separate tong systems reduces capital and spare parts requirements for service companies using the conventional tongs. These mechanical systems will be easier to maintain and less prone to failure than old fashioned hydraulic systems to further reduce operating costs. The simple mechanical system reduces operator training and experience requirements when compared to other systems used with CRA tubulars. The CLINCHER LOCKJAW Tong and the CLINCHER Tong dressed with LOW-FRICTION Jaws are significantly lighter in weight than competitive systems which will reduce operator fatigue and improve safety. GRIT FACED Dies enhance job safety by reducing operator fatigue and eliminating the need to reach inside a tong and backup to replace the silicon carbide screen cloth at every connection. GRIT FACED dies can also reduce overall operating cost by reducing the time required to run casing and tubing strings.

CLINCHER GRIT FACED Die technology was recognized at the 1998 Offshore Technology Conference in Houston, Texas, where Superior Manufacturing & Hydraulics was presented with a Special Meritorious Award for Engineering Innovation by editors of *Petroleum Engineer International.*

GRIT FACED Inserts for Slips, Elevators and Safety Clamps

As part of our ongoing program providing tubular handling innovations to the oil field, SUPERIOR Manufacturing & Hydraulics is pleased to announce we are now providing inserts for slips, elevators, and safety clamps which feature our GRIT FACE Technology *(ref. Figure 5)*. This technology, field proven in tong applications, now provides the industry with handling tool inserts designed to protect CRA tubing and casing strings from the hazards associated with the use of conventional steel toothed inserts. A combination of exotic materials used in these new inserts protect CRA tubulars from contamination associated with conventional steel inserts.

GRIT FACED inserts are offered to fit almost all types of tubular handling tools. We provide our inserts for manual and power slips/elevators used to handle tubing, casing, drill pipe and drill collars. Safety clamp inserts are available for handling drill collars and downhole tools. Inserts are also available for manual tongs used with tubing, casing, and drill pipe.

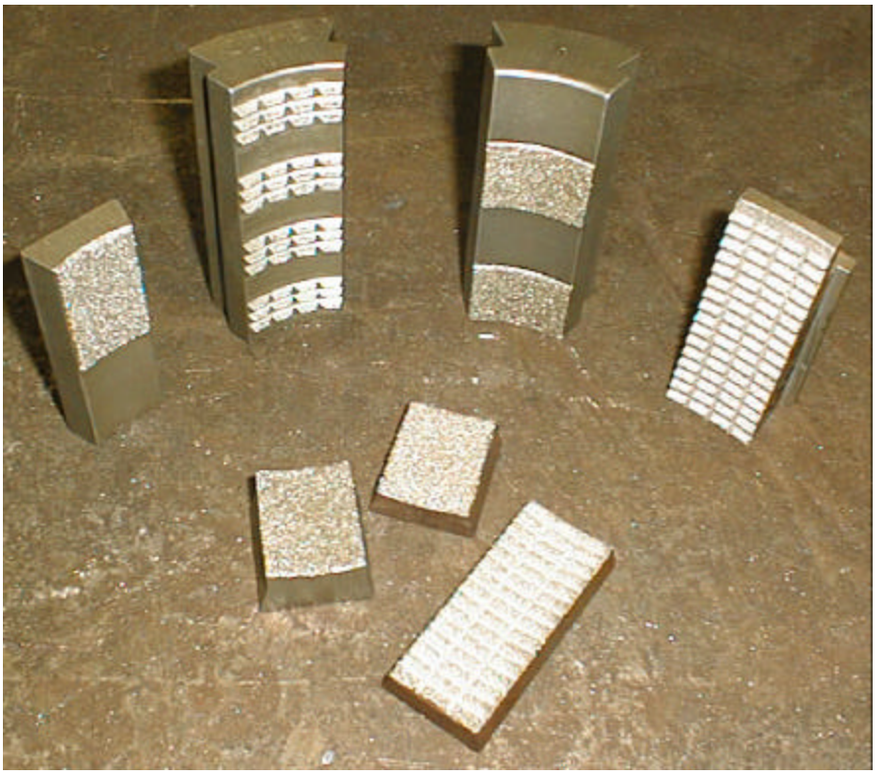
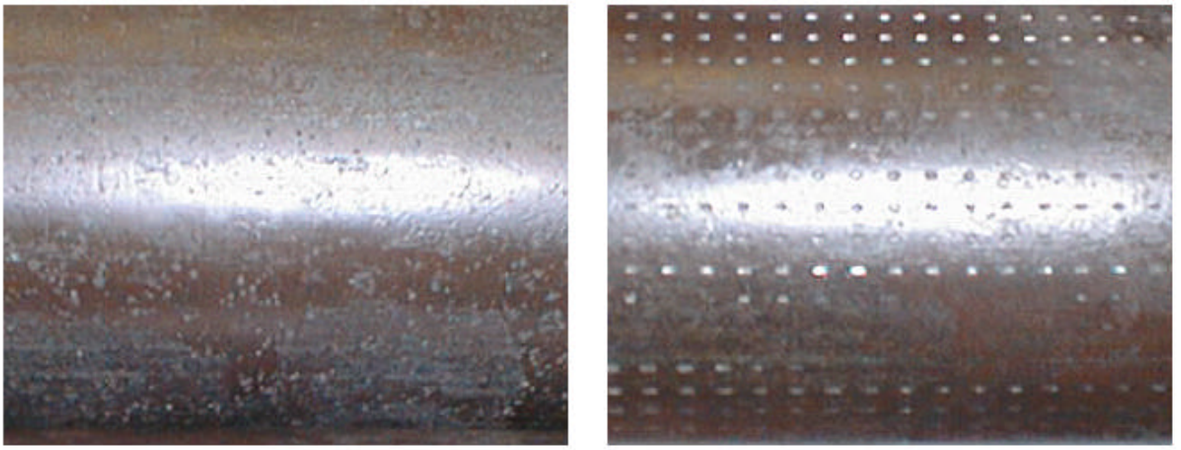


Figure 5

Two different styles of GRIT FACED inserts are available. One has a cylindrical surface which has been coated with our grit material. This style insert, known as a "smooth" insert because it doesn't have any teeth, is used to handle most CRA tubular goods. The "smooth" insert will accommodate tubulars who's OD is coated with moderate amounts of foreign materials such as pipe mill coatings. Our insert style has "teeth" which are coated with our grit material to protect the tubulars from iron contamination. The mud grooves and recesses between the teeth provide room to accommodate large amounts of foreign materials which are often found on the exterior of tubulars when removed from wells.

To insure maximum effectiveness during use, both types of inserts must be periodically inspected and cleaned of foreign materials using a wire brush.

Our in-house laboratory testing, and tests performed by an independent third party have demonstrated the marks left on tubulars by both of our insert styles are almost negligible. While our GRIT FACE insert system is not totally non-marking, the depth of the imprint left on the tubular after the application of very heavy loads is significantly less than the depth of slip marks left by conventional inserts. Smooth style GRIT FACED inserts do not leave aligned "slip marks" which are known to reduce mechanical strength and lead to premature corrosion or fatigue failures in tubular goods. *Figure 6* compares the marks left by "smooth" GRIT FACED inserts with standard toothed inserts. Close examination will show it is almost impossible to distinguish the impressions left by the GRIT FACED insert from the normal pipe mill surface imperfections. It is our belief these results are considerably better than competitive systems as they are shallower, are in a random pattern which reduces stress risers in the tubulars, and they do not contaminate the CRA tubing with steel, iron, or carbon. As an additional benefit, our GRIT FACE insert system does not require specially adapted handling tools so it can be used with almost all handling tools in use today.



Comparison of marks left in 2 3/8" OD - 4.6 ppf 13% Cr 85 ksi Sy tubing by GRIT FACED Inserts (left) and by conventional toothed inserts (right). Unretouched digitial photo at approximately 1X.

Figure 6

ASSEMBLY INSTRUCTIONS

FASTENER LUBRICATION AND MAKE UP TORQUE REQUIREMENTS

Most bolts, nuts, and other threaded components are to be lubricated with Never-Seez or equivalent before assembly. Certain fasteners are to be assembled using permanent or removable Loctite as indicated in the assembly instructions. All tapered pipe threads are to be treated with a Teflon based pipe dope to assist in makeup and prevent leakage.

CAUTION: Do not use teflon tape. Improper application of teflon tape can cause joint failures. Teflon tape can release large particles which can plug small passages in hydraulic equipment.

All standard fasteners used in CLINCHER products are to be GRADE 8 or better. DO NOT SUBSTITUTE lesser grades of fasteners. All fasteners are to be made up to the torque charted below. Failure to properly assemble these fasteners can result in their loss, product malfunction, and ultimately result in situations where personnel can be exposed to dangerous situations.

TONG FASTENERS		
Size	***Application***	***Torque***
1/4 - 20 NC	door switch mounting bolts, backup clip bolts	10 ft lbs
3/8 - 16 Set Screws	bearing caps, door switch adj. sleeve	* [1]
3/8 - 16 NC	top & bottom tong plates, door plates, brake bands, brake guards, front followers, clip bolts	33 ft lbs
1/2 - 13 NC	motor mounts, cage plate spacer bolts, bearing caps, backup jaw bolts	93 ft lbs
5/8 - 18 NF	cam follower nuts	27 ft lbs
3/4 - 10 NC	hanger bolts	317 ft lbs
7/8 - 14 NF	dumbell roller shaft, door shaft	* [2]
1 1/4 - 12 NF	idler shaft	850 ft lbs

* [1] Bearing Caps: Coat with removable Loctite, tighten until screw contacts bearing, back off 1 turn. Door Switch Adj. Sleeve: Tighten by hand until snug.

* [2] Tighten until all slack is removed, but dumbell roller is still free to rotate by hand.

LUBRICATION STANDARDS

Bearings and gears must be lubricated to minimize friction, cool, exclude foreign matter, and prevent corrosion. CLINCHER recommends using Texaco Marfak MP 2 or equivalent for all grease zerts, roller bearings, and bushings. Gears located within the clutch housing or between the tong plates are to be heavily lubricated using PLUSCO 855 or equivalent.

ASSEMBLY INSTRUCTIONS

This section pertains to the physical assembly of the Clincher CLES5500 Standard Tong. Section 9 illustrates the individual sub assemblies in more detail. The purpose of this section is to guide the technician in the order of assembly as we would accomplish in the manufacturing process at our plant. Use this section as a guide to help you familiarize yourself with the component parts of the CLES5500. We have included drawings on the following pages to aid in the assembly. The drawings are laid out in the order in which you would assemble/disassemble the unit.

Order of Assembly:

1. Locate suitable working height. Approximately 6" above your waist. Tong Assembly Stands are available from Superior Manufacturing & Hydraulics, Inc. which are custom made for tong service work.
2. Install Bottom Tong Plate PN 51046A, on Assembly Stand.
3. Bolt CLES5500 Tong Mid Body PN 51047A to Bottom Tong Plate PN 51046A, with (21) 3/8"-16 x 1 3/4" Bolt PN 1049, (21) 3/8" Lockwasher PN 1027, and (2) 3/8"-16 x 1" SHCS PN 1041 and (2) 3/8" Hi Collar Lockwasher PN 1026.
4. Press Bearing PN 1907 into Bottom Pinion Bearing Cap PN 51070.
5. Install Bottom Pinion Bearing Cap Assembly onto Bottom Tong Plate PN 51046A using (3) 1/2"-13 x 1-1/4" Bolt PN 1111 with (3) 1/2" Lockwasher PN 1103, and (2) 3/8"-16 x 1/2" Set Screws PN 1029 (use removable Loctite).
6. Dumbell Roller Assembly:
   a) Install 1/8" NPT Zert PN 1001 on Dumbell Roller Shaft PN 45031.
   b) Install 7/8"-14 Jam Nut PN 1178 onto Dumbell Roller Shaft PN 45031, making certain that it is installed on the end which has the grease port. Tack weld nut to dumbell roller shaft.
   c) Press Dumbell Roller Bushing (Bearing) PN 45055 into each end of Dumbell Roller PN 45032.
   d) Install (2) Thrust Washer PN 45057 onto each end of Dumbell Roller Assembly.
   e) Install (3) Bushing PN 1955 onto Dumbell Roller Shaft PN 45031.
   f) Make up (1) 7/8"-14 Nylock Nut PN 1177 on other end of each Dumbell Shaft PN 45031.
7. Idler Gear Assembly: *(2 Units Required)*
   a) Press Bearing PN 1908 into Idler Gear PN 51095.
   b) Install (2) Internal Snap Rings PN 1937 in Idler Gear PN 51095.
   c) Press Idler Gear Assembly onto Idler Shaft PN 45096.
   d) Install Idler Spacer PN 45097 onto Shaft.
   e) Install large end of Shaft Assembly and Idler Gear Assembly into Bottom Tong Plate PN 51046A and Idler Pad PN 45018 using 1 1/4"-12 Nut PN 1215 with 1 1/4" Lockwasher PN 1216.
8. Install Ring Gear PN 51034 into Tong Body making sure teeth in Idler Gears align with teeth in Ring Gear.
9. Install (9) Dumbell Roller Assemblies around Ring Gear PN 51034 making sure holes in Dumbell Roller Assemblies match up to holes in Bottom Tong Plate PN 51046A.
   Hint: Temporarily install Dumbell Roller Shafts thru Dumbell Roller Assembly and Bottom Tong Plate to control position.

ASSEMBLY INSTRUCTIONS

10. Pinion Gear Assembly:
    a) Install High Gear PN 45101 onto Pinion Gear 45100-01 then press Pinion Gear into Bearing PN 1907 which was previously installed in Bottom Pinion Bearing Cap PN 51070 attached to Bottom Tong Plate.
    b) Install Low Pinion Gear PN 51099 onto Pinion Gear PN 45100-01.
11. Install Top Tong Plate PN 51067A onto Mid Body PN 51047A with (21) 3/8"-16 x 1 3/4" Bolts PN 1049, (21) 3/8" Lockwashers PN 1027, and (2) 3/8"-16 x 1" SHCS PN 1041.
12. Press Bearing PN 1907 into Top Pinion Bearing Cap PN 51070-04. Install Top Pinion Bearing Cap Assembly onto Pinion Gear PN 45100-01. Bolt to Top Tong Plate PN 51067A using (3) 1/2"-13 x 1 1/4" Bolt PN 1111 with (3) 1/2" Lockwasher PN 1103 and (2) 3/8"-16 x 1/2" Set Screw PN 1029 (use Removable Loctite).
    Note: When Encoder is not mounted, install Flush Plug PN 1610 on Bearing Cap PN 51070-04. For optional Encoder mounting, see figure of Pinion Gear with Encoder.
13. Insert Dumbell Roller Shafts PN 45031 with 7/8"-14 Jam Nut PN 1178 through Bottom Tong Plate PN 51046A, through Dumbell Roller Assemblies, and finally through Top Tong Plate PN 51067A. After installing Dumbell Roller Shafts through Top Tong Plate, fasten with 7/8"-14 Nylock Nut PN 1177.
    WARNING: Insure Thrust Washers are correctly positioned.
14. Install Idler Pad PN 45018, 1 1/4" Lockwasher PN 1216 and 1 1/4"-12 Nut PN 1215 onto each Idler Shaft Assembly (2) outside of Top Tong Plate PN 51067A, then install 1/8" NPT Zerts PN 1001.
15. Motor Gear Assembly:
    a) Press Bearing PN 1907 into Bearing Housing PN 51038 and install Ext. Snap Ring PN 1945.
    b) Install Bearing Cap PN 51039 and Bearing Housing Assembly onto Bottom Tong Plate PN 51046A using (3) 1/2"-13 x 1 3/4" HHCS PN 171 with (3) 1/2" Lockwasher PN 1103.
    c) Install 1/8" NPT Flush Plug PN 1607 into Bearing Cap PN 51039.
    d) Install High Shifting Gear PN 45071 and Bushing PN 45071-S1 on Bottom Plate, on top of Bearing Housing.
16. Shifting Gear/Detent Assembly:

    Install Drive Gear PN 51072 over Motor Shaft PN 45077. Install Steel Ball PN 1906 and Plunger Spring PN A20-A1327133 into Drive Gear PN 51072. Apply permanent Loctite to 3/8"-16 x 1/4" Set Screw PN 1028. Install Set Screw in Drive Gear PN 51072, tighten Set Screw until good detent action is achieved. Proper adjustment is confirmed when resistance is encountered when shifting gear across detent groove on shaft.
17. Install Drive Gear PN 51072 with Shifting Shaft Assembly PN 45060, Shifting Yoke Assembly PN 45061 in Clutch Housing Assembly PN 51067-S3, using Washer PN 45068 and 3/16" x 1" Roll Pin PN 1006.
18. Install Polypack Seal PN 12501375 and Motor Seal PN MCN-1377 into Seal Retainer PN 45077-A. Install Seal Retainer Assembly and Motor Shaft Spacer PN 45076 onto Motor Shaft PN 45077. Install Motor PN 45078 with Motor Shaft Assembly in Clutch Housing using (4) 1/2"-13 x 1" Bolt PN 1110 and (4) 1/2" Lockwasher PN 1103.
19. Install A-20 Valve Sections with plumbing on Motor PN 45078.

ASSEMBLY INSTRUCTIONS

20. Cam Follower Assemblies:
    a) Install (13) Cam Followers PN 1965 in Top Cage Plate PN 51008 with (13) 3/16" Drive Zert PN 1004 and fasten with (13) 5/8"-18 Jam Nut PN 1150.
    b) Install (13) Cam Followers PN 1965 in Bottom Cage Plate PN 51033 with (13) 3/16" Drive Zert PN 1004 and fasten with (13) 5/8"-18 Jam Nut PN 1150.
    c) Fit Top Cage Plate Cam Followers into Ring Gear groove. Use crane to raise Bottom Cage Plate and fit Bottom Cage Plate Cam Followers into Ring Gear groove. Fasten Cage Plates together using (4) 1/2"-13 x 3 1/2" SHCS PN 1108.

21. A) Door Assembly and Door Installation: *(For Productions Before 11/2000)*
    1) Press Bushing PN 51036 in top and bottom of Tong Door Assembly PN 51035A.
    2) Install 7/8"-14 Jam Nut PN 1178 on Door Shaft PN 45054.
    3) Install Door Washer PN 45025 and Bottom Door Bushing PN 1955-B onto Door Shaft PN 45054.
    4) Install Tong Door Shaft Assembly through Bottom Door Plate, Bottom Tong Plate, Dumbell Roller Assembly, Top Tong Plate, Door Washer PN 41037, and Top Door Plate.
    5) Slide Top Door Bushing PN 1955-A and Door Washer PN 45025 onto Door Shaft Assembly.
    6) Install 7/8"-14 Nylock Nut PN 1177 and 1/8" NPT Zert PN 1001 onto Tong Door Shaft Assembly.
    7) Install Door Switch Adjustment Sleeve PN 76131 onto top of Door.
    Note: Collar is cut with weld bevel and is to be welded to top of Tong Door.
    8) Install (2) 3/8"-16 x 1/2" Set Screws PN 1029 (use removable Loctite) on Door Switch Adjustment Sleeve.

21. B) Integrated Door Assembly and Door Installation: *(For Productions After 11/2000)*
    1) Assemble Door Handle PN 51041 onto Top Door Plate PN 51043 using 3/8"-16 x 1 1/2" HHCS PN 1049 with 3/8" Lockwasher PN 1027.
    2) Assemble Top Door Plate PN 51043 onto Tong Door Upright PN 51040 using (4) 3/8"-16 x 1 1/2" HHCS PN 1049 with (4) 3/8" Lockwasher PN 1027.
    3) Assemble Bottom Door Plate PN 51037 onto Tong Door Upright PN 51040 using (4) 3/8"-16 x 1 1/2" HHCS PN 1049 with (4) 3/8" Lockwasher PN 1027.
    4) Press Bushing PN 51036 in top and bottom of Tong Door Assembly PN 51035A.
    5) Install 7/8"-14 Jam Nut PN 1178 on Door Shaft PN 45054.
    6) Install Door Washer PN 45025 and Bottom Door Bushing PN 1955-B onto Door Shaft PN 45054.
    7) Install Tong Door Shaft Assembly through Bottom Door Plate, Bottom Tong Plate, Dumbell Roller Assembly, Top Tong Plate, Door Washer PN 41037, and Top Door Plate.

ASSEMBLY INSTRUCTIONS

8) Slide Top Door Bushing PN 1955-A and Door Washer PN 45025 onto Door Shaft Assembly.

9) Install 7/8"-14 Nylock Nut PN 1177 and 1/8" NPT Zert PN 1001 onto Tong Door Shaft Assembly.

10) Install Door Switch Adjustment Sleeve PN 76131 onto top of Door.
Note: Collar is cut with weld bevel and is to be welded to top of Tong Door.

11) Install (2) 3/8"-16 x 1/2" Set Screws PN 1029 (use removable Loctite) on Door Switch Adjustment Sleeve.

22. Door Switch Assembly:

a) Install (1) 1/4" Street Ell PN 1449 in Door Switch PN SLV1000-01.

b) Install (1) 1/4" MNPT x 1/4" MJIC 90 Degree PN 1576.

c) Install (1) 1/4" MNPT x 1/4" MJIC 90 Degree PN 1576 into “tank” port of Door Switch PN SLV1000-01.

d) Mount Door Switch PN SLV1000-01 on Door Switch Base PN 76128 with (4) 1/4"-20 x 2 1/4" Bolt PN 110, and (4) 1/4"-20 Nylock Nut PN 212.

e) Mount Assembly to (2) Door Switch Base Mount PN 45067-S7 (Base Mounts should be welded to Top Tong Plate) with (2) 3/8"-16 x 1" Bolt PN 1047 and (2) 3/8" Lockwasher PN 1027.

23. Door Switch Adjustment Instructions:

a) Loosen 3/8"-16 x 1/2" Set Screws PN 1029 to align recess in Door Switch Adjustment Sleeve PN 76131 with Roller on Door Switch PN SLV1000-01. Tighten Set Screws PN 1029.

b) Loosen 1/4"-20 Nylock Nuts PN 212 and slide Door Switch PN SLV1000-01 forward until fully seated in recess in Door Switch Adjustment Sleeve PN 76131. Tighten Nylock Nuts PN 212.

c) Connect Tong to Power Unit and actuate motor while in low gear. Verify Ring Gear stops rotating when Tong Door is opened.

OPERATION

Suspension

A) Tong should be hung by minimum 7/8" 1 WRC minimum O.D. wire cable with a 31 ton minimum breaking strength. It should be hung as close to the center of the drill rotary without interfering with operation of drill string and lifting equipment. It is recommended the operator make use of the Clincher Lift Cylinder. The Clincher Lift Cylinder incorporates a hydraulic cylinder and manual lift spring. The hydraulic cylinder portion is used to assist in the raising and lowering of the tong and backup while the spring allows for movement during make-up and break-out.

<u>WARNING</u>: The suspension system must allow the tong to easily move down a distance equivalent to the thread make-up length. If significant resistance is encountered the suspension system may be subject to load which could cause its failure, damage equipment, or expose personnel to severe or fatal hazards.

B) Assure that the tong is suspended in level manner. Tong must be level at the point it contacts the tubular. Using adjustment screws and slots in rigid hanger assembly, adjust tong so that it hangs level on horizontal axis and is parallel to tubular on vertical axis. If using 3 point bridle, use turnbuckles to adjust tong so it hangs level.

C) Make certain that floor space is adequate to maneuver tong on and off pipe. The space must be clear of obstructions to allow safe and unrestricted operation.

D) Attach 3/4" IWRC minimum wire cable with a 29.4 ton minimum or better breaking strength, as a tong back up line at 90 degree angle to tong and at the same level to insure proper readout of torque indicator. You should always have snubbing line attached. Use of a integral hydraulic backup is safer than manual backup, but operators should maintain additional safety of snubbing line to prevent injury in case of hydraulic failure or the failure of operator to have backup properly applied to tubular. This equipment generates extreme torque and should be used with caution.

Jaw and Wrap Around Die Installation

A) Be sure all power to unit is off, and power unit is shut down. Disconnect hydraulic hoses.

B) Determine O.D. of tubular to be made-up or broken-out. Use proper dies to bite O.D. of tubular and insert as follows: Remove jaw assembly from tong. Remove upper die retainer clips. Insert die into jaw. Reinstall clips and clip retainer bolts. Reinstall jaws into cage plates, install pivot pins and reattach springs.

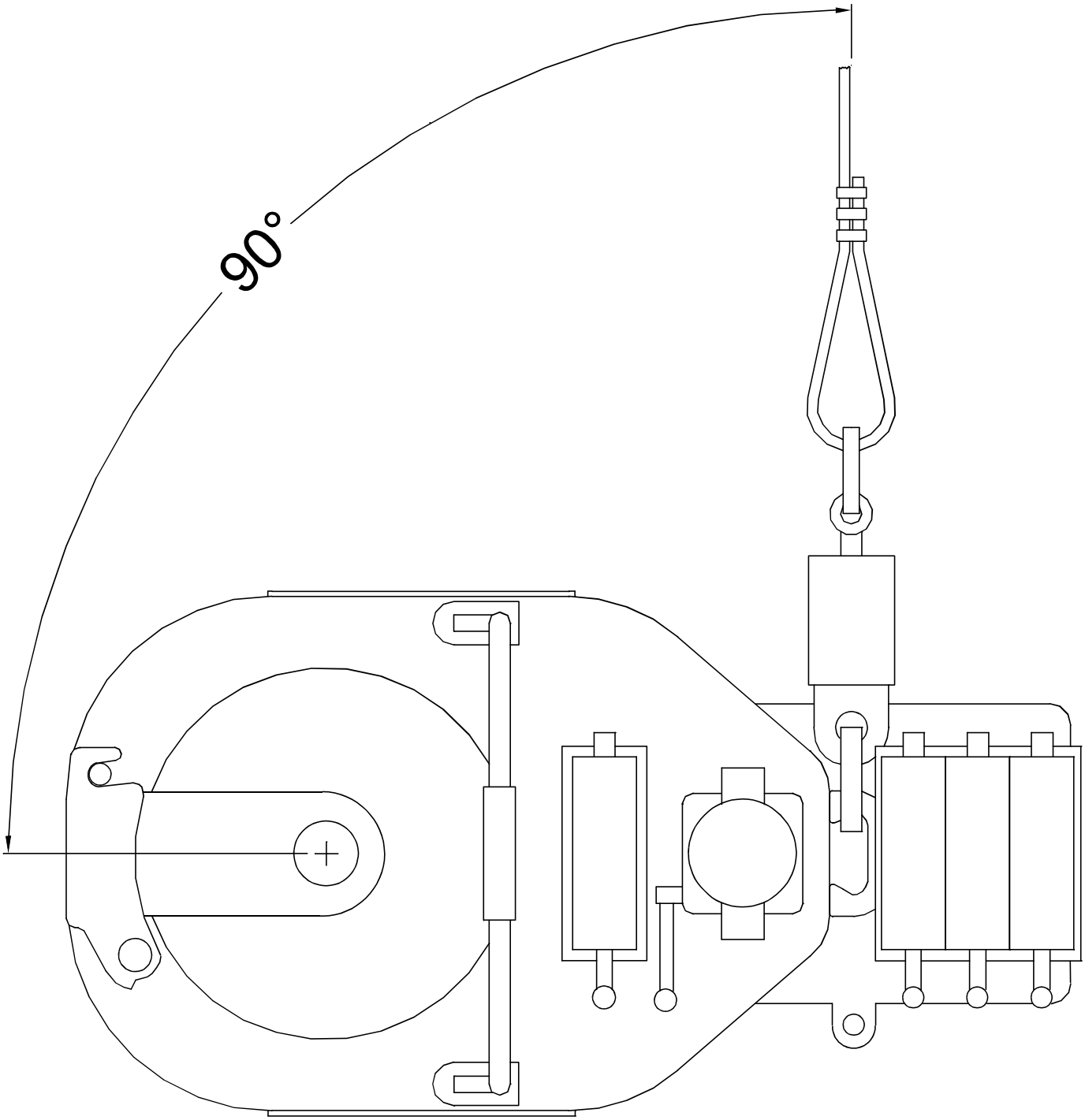
OPERATION

Hydraulic Lines

A) Be sure all power to unit is off, and power unit is shut down.

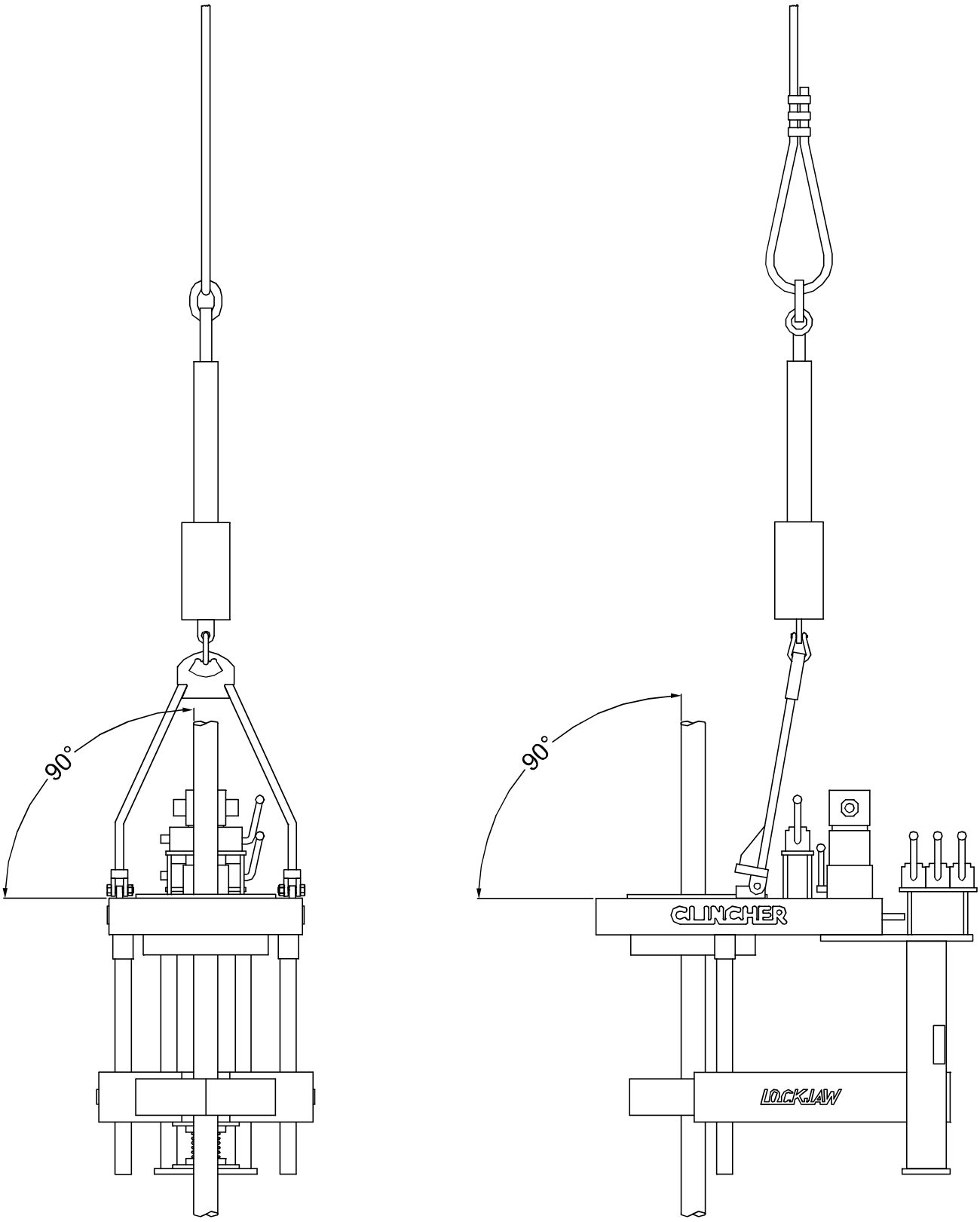
B) Always inspect hoses prior to installation for abrasions, kinks, and other visible damage.

C) Install hydraulic supply hose and hydraulic return hose between tong and hydraulic power unit. Be advised that the standard installation on Clincher tong calls for 1" Hydraulic Supply hose and 1-1/4" Hydraulic Return hose. The differing hoses eliminates the possibility of attaching the wrong hose to the wrong outlet while at the same time reducing back pressure in your hydraulic system.



TYPICAL SNUB LINE INSTALLATION

NOTE: SNUB LINE IS PERPENDICULAR
TO AXIS OF TONG



TYPICAL TONG INSTALLATION

NOTE: TONG IS PERPENDICULAR
TO TUBING

OPERATION

Tong Operation

A. Insure proper dies are installed. Connect hydraulic hoses, verify reservoir is full of hydraulic fluid and insure suction valve is open.

B. Open bypass valve to hydraulic system, then check to make sure all hose connections are secure and hydraulic system is free of leaks.

C. Be certain door is completely closed before operation to insure safe operation. The Clincher CLES5500 is equipped with a door switch, which prevents operation of the tong when door is even partially open.

D. Use power unit to start up procedure as outlined in your owners manual supplied by the manufacturer.

E. In the event hoses are not tightened securely, possible failures to hydraulic system can occur.

   1) If pressure supply hoses are restricted or flow is blocked, pressure will increase in the hydraulic power unit, resulting in increased RPM in the power unit.

   2) If return line hoses are restricted or flow is blocked, pressure will increase in the hydraulic power unit and the hydraulic system to the tong itself, resulting in the tong motor increasing to maximum pressure and possible motor seal failure.

F. After completion of A through E restart the power unit and allow engine to idle for approximately 10 minutes. Slowly close bypass valve to allow circulation of hydraulic oil through tong and hoses. Place shifting lever into low and rotate several times. Repeat in reverse. If correct jaw-die combination is installed, the unit is now ready to run pipe.

G. Adjust height of tong to proper height, using the control valve located all the way to the right of rear valve bank assembly.

H. Stand in the normal operators position, insert the locking pin into the rear cage plate hole (on operators side). This pin allows ring gear to rotate clockwise (make-up) and engage the can to close jaws on pipe.

I. Rotate ring gear clockwise by pushing motor control lever on the front valve bank assembly forward until jaws lock on pipe and continue to rotate until desired amount or torque is applied.

J. After correct amount of torque specific to that connection has been applied, release tong jaws by pulling back on motor control lever until jaws release and throat in cage plate is aligned with door opening. Open door.

K. High and low gear is adjusted by use of shifting lever PN 45060, located to the left side of the shifting housing. With the lever in the upwards position the tong is in high gear. With the shifting lever in the downward position, the tong is in low gear.

MAINTENANCE

Clincher recommends that owners of Clincher Hydraulic Power Tongs, Chromemasters, and accessories adapt a regularly scheduled maintenance program. Implementation of this type of program offers several benefits. First you increase the life of your equipment, secondly, you may find a problem before it escalates to a costly repair or down time on the job, and most important, prevent injury to operating personnel.

A major inspection (described at the end of this section) should be carried out if equipment is suspected to have been damaged during transit or is to be mobilized to a remote location where maintenance operations are difficult to carry out.

Routine Maintenance

Cleaning - Upon return from each and every job:

A) Pre-wash unit to remove majority of dirt and grease build up as to allow removal of dies, and inspection of overall condition of unit.

B) Remove and inspect dies from tong. Note any missing or damaged die retainers and/or die retainer bolts.

C) Remove side jaws from tong and inspect side jaw for missing or broken parts, damaged splines, broken ears (locking hooks on front portion of side jaws).

D) Clean and inspect side jaws, jaw pins, jaw rollers for damage or excessive wear (cracks, breakage, and uneven wear patterns). Reassemble jaw sections replacing any damaged parts. Lubricate pins and rollers, and reinstall in tong.

E) Inspect hanger and all hoses for wear, replace as necessary.

F) Inspect hanger assembly to assure all parts are returned and in operating condition. (*i.e.* H-Plates, spring, leg springs, leg spring caps and pins)

G) Lubricate tong's cam followers (upper and lower), dumbell roller shafts, door shaft, idler gear shafts (2), pinion gear assembly, and shift housing (2 zerts), and re-pack tong body cavity.

H) Install dies of a size needed for testing purposes, and attach hydraulic power unit to tong. Before energizing power unit make certain no one is working on tong and all tools and parts are removed from the tong.

I) With the proper dies installed in the tong, place reversing pin into the make-up position, set tong into low gear and operate tong through several cycles of locking, biting, and torqueing to required torque. Change reversing pin to break-out position and repeat. Repeat same procedure in high gear.

   Note: Torque developed in high gear is considerably less than torque developed in low gear.

MAINTENANCE

J) Test door interlock system by opening door slightly with tong rotating. (Remove test mandrel for this procedure.) The tongs rotation should stop. If tong rotation fails to stop, close door, cease rotation, deactivate power unit, and inspect door interlock switch for damage. Insure that adjustment collar is oriented to allow wheel of door switch to fit into recess on collar.

Warning: If door switch system is not functioning properly tong must not be used.

K) Re-inspect tong hydraulic system for leaks.

L) If at this time the unit is functioning as intended, replace all covers and grease splines in tong, tape or grease spools on control valves (to prevent paint from adhering to polished spool surface), prime and paint unit for storage.

MAINTENANCE

Recommended Lubrication Schedule Performed after Completion of Each Job

Hydraulic Tong

A) Cam followers: upper and lower (all)
B) Dumbell roller shafts: (all)
C) Door shaft
D) Idler shafts (2)
E) Shift housing (2 zerts)
F) Re-pack tong cavity
G) Pinion gear shaft
H) Jaw rollers and pins. Remove jaw pins and rollers, clean and lubricate with gear grease.
I) Inspect hydraulic fluid for foreign material and contaminants. Filter or replace. You must filter or replace entire system including power unit tank and lines along with tong to insure all contaminants are removed.

Annual Major Maintenance

Inspection and Repair

Routine preventative maintenance will significantly extend the operating life of your equipment, reduce operating cost and avoid downtime. CLINCHER recommends a program of frequent routine inspection, and if equipment is suspected to have been damaged during transit or is to be mobilized to a remote location where maintenance operations are difficult to carry out, perform the following:

A) Visually inspect components on power tong which could possibly have been damaged either during operation or transit. *i.e.* Damage to hanger assembly, mounting legs, or hydraulic valve assembly.

B) Check test date. Ensure that a load test and inspection was carried out within the last 9 months.

C) Check ring gear. Check for any signs of damage or wear.

D) Remove motor and valve assembly from tong body.

E) Check motor seal. Apply hydraulic power, run motor and visually check motor seal for any signs of leakage.

F) Check drive gear, high and low pinion gears. Check for excessive sign of wear on motor gear.

G) Check condition of control valve spools. Activate valves and check for any sign of wear, pitting, or scoring of the chrome surface of spools. If spool is damaged in any way, the complete section must be changed out. Spools are not interchangeable.

MAINTENANCE

H) Check gear selector and shaft. Visually inspect shifting shaft for alignment and straightness.

I) Check Hi/Low Gear assembly. Visually inspect high and low clutch and gears for any sign of chipped, broken, or worn teeth.

J) Check dumbell rollers, shafts, and bushings. Check for excess movement on either bearings, bushings, shafts, or dumbells.

K) Check idler gears and center pinion shaft gears and bearings. Check that there are no signs of worn, chipped, or broken teeth on idler and center pinion shaft gears.

L) Check door bearings. Visually check excess movement on bearings at door assembly. If excess movement is found, door must be removed making careful note of bearing washer positions for reassembly.

M) Check door switch system. Visually check that door switch valve has sufficient strength to hold door in closed position. If this is not the case, then repairs are required.

N) Check door safety device. Functionally check tong door safety switch. Engage low gear, open tong door and push rotor control lever forward as if to rotate rotor. If safety device is operational then the rotor will not rotate.

O) Check lifting hanger test date. Check lifting hanger for damage. Ensure that a load test and inspection was carried out within the last 9 months.

P) Check condition of all hydraulic hoses and fittings. Visually inspect all hydraulic hoses fitted to the tong for any signs of leaks, cuts, or wear.

Q) Reinstall all parts which were removed for inspection and/or damage. Connect to hydraulic power supply and function test operation of tong in high, low, forward, and reverse. Torque test utilizing appropriate dies and test mandrel. Test operation of lift cylinder.

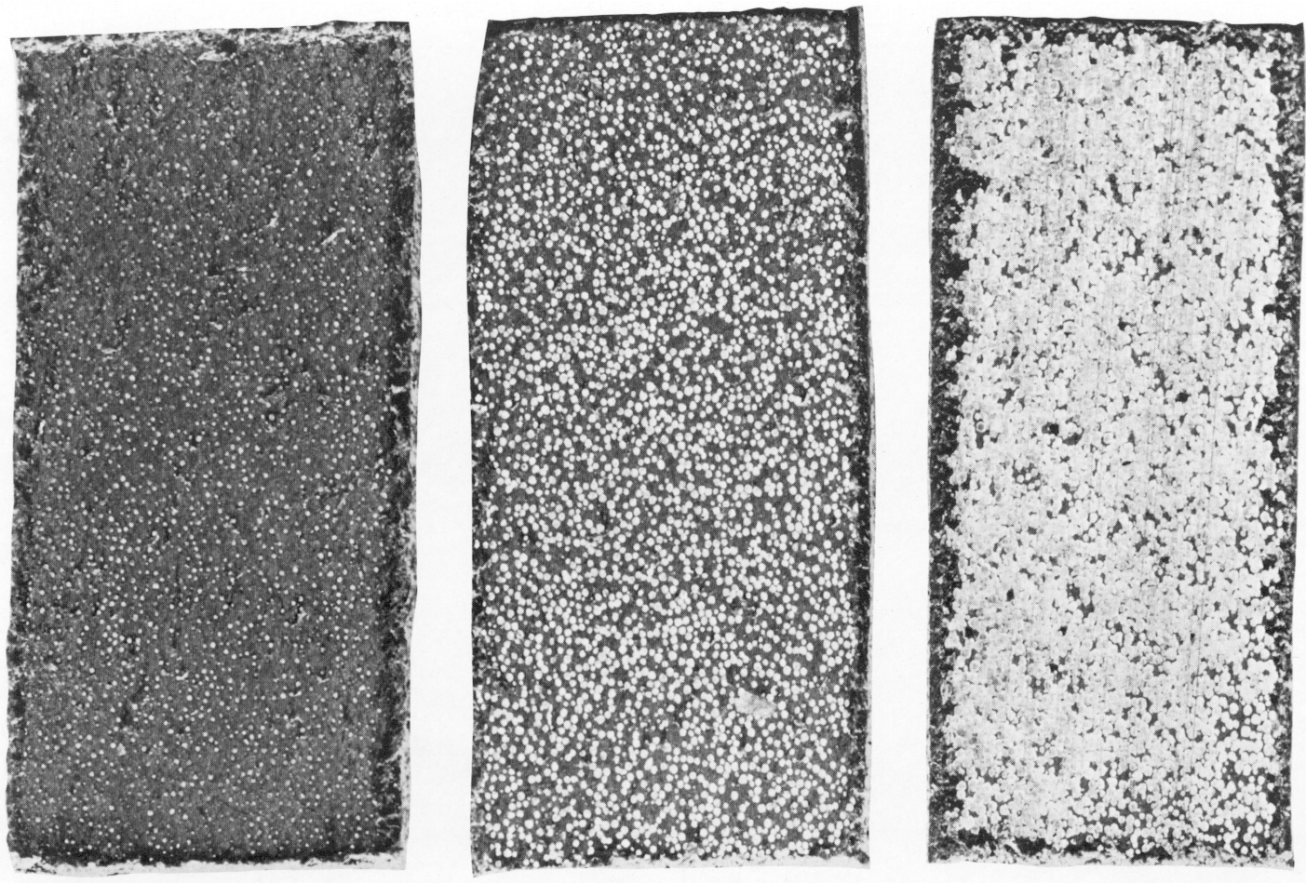
R) Inspect power unit system according to manufactures specifications.

S) Lubricate tong according to maintenance schedule preceding this section.

T) Paint, remembering to mask off surfaces not intending to paint with grease or masking tape.

U) Complete dated inspection report giving details of all duties performed along with complete list of items replaced.

DU® BEARING DRY WEAR PROCESS



1. 2. 3.

1. Running-in completed. Low wear rate starts when up to 10% of the bronze is exposed.

2. Typical surface appearance when DU® bearing approaches its half life with 40% to 50% of the bronze exposed.

3. Bronze is beginning to smear near the end of DU's useful life as a dry bearing. Over 75% of the bronze is visible at the surface.

For additional information about DU bearings, please contact Garlock Bearings Inc,
700 Mid Atlantic Parkway, Thorofare, New Jersey 08086. **(609) 848-3200** FAX: (609) 848-5115

Coltec Industries

Garlock Bearings Inc

Form 9818 5/93

TROUBLE SHOOTING

HYDRAULIC SYSTEM

Hydraulic Pump Making Excessive Noise:

	Problem	Solution
A)	Restricted or clogged intake line	Clean line, check for contamination.
B)	Contaminated fluid	Flush system, change fluid.
C)	Restricted vent	Clean or replace air vent.
D)	Air in fluid	Check for leaks and be certain fluid suction in tank is well below hydraulic fluid in reservoir.
E)	Damaged or worn parts	Repair or replace damaged parts, check fluid for contamination.
F)	Excessive RPM	Check PTO, gears, and recommended speed to assure proper pump is installed for operation.
G)	Increased friction	Make sure pump has been assembled using correct torque valves.
H)	Damaged or worn relief valve.	Replace relief valve.
I)	Damaged or worn check valve.	Replace check valve.
J)	Restricted discharge	Check to make sure relief valve is set to proper pressure.
K)	Valve system restricted	Inspect and repair or replace defective parts, check system for contamination.

TROUBLE SHOOTING

Excessive Wear to Hydraulic Components:

	Problem	Solution
A)	Fluid contamination	Flush fluid system, replace with new fluid.
B)	Components misaligned	Inspect and realign.
C)	High operating pressures	Gauge and set to proper pressure.
D)	Exhausted fluid (depletion of additives)	Flush fluid system, replace with new fluid.
E)	Air in fluid	Check for leaks, and be certain fluid suction in tank is well below hydraulic fluid in reservoir.
F)	Shortened bearing life	Check alignment, insure proper lubrication to non-sealed bearings.

HYDRAULIC TONG SECTION

Slow Tong Speed:

	Problem	Solution
A)	Restricted supply line	Clear supply line and check intake on reservoir.
B)	Low fluid level	Add fluid to proper volume.
C)	Air leak	Locate and repair leak.
D)	Pump speed insufficient	Assure proper pump speed for application.
E)	Damaged or worn equipment	Isolate pump and check pressure to determine whether motor or pump is defective. Repair or replace defective part.
F)	Pump not primed	Check fluid viscosity and restrictions of intake line. Replace fluid if inadequate for operating temperature.
G)	Low or no flow from supply line	Check to assure couplings are securely fastened.
H)	Hydraulic bypass valve malfunction	Inspect. Adjust unloading pressure. Replace or repair as necessary.

TROUBLE SHOOTING

Insufficient Torque:

	Problem	Solution
A)	Door switch malfunctioning	Check to make sure door is completely closed. Inspect door switch and dump valve. Replace or repair door switch and/or dump valve.
B)	Relief valve malfunctioning	Relief set too low, broken valve spring, contamination or defective seals.
C)	Damaged or worn pump parts	Inspect, repair, or replace.
D)	Slow pump speed	Assure proper pump speed for application.
E)	Improper system fluid	Check fluid viscosity and replace fluid if inadequate for operating temperature.
F)	Directional control valve set improperly	Check relief and directional control valve. Neutral should return slightly to reservoir.

Hydraulic Tong System:

	Problem	Solution
A)	Damage to motor	Inspect, repair, or replace.
B)	Restriction of supply line, excessive back pressure	Check to assure couplings are securely fastened.
C)	Defective gauge or load cell	Inspect, repair, or replace. Assure unit has been calibrated to proper arm length. NOTE: When using Clincher integral backup system, it is the length of backup arm, NOT the tong arm length.

TROUBLE SHOOTING

Difficulty Shifting Gears:

	Problem	Solution
A)	Broken key in shifting yoke	Inspect and replace key stock in shifting yoke.
B)	Worn or damaged shifting yoke pins	Inspect and replace broken or worn pins.
C)	Insufficient lubrication	Pump grease into both zerts located on shift housing.
D)	Detent ball bearing spring set too tight	Inspect and relieve pressure by adjusting set screw on shifting gear PN 55084.

Failure to Grip Tubulars:

	Problem	Solution
A)	Jaws move out from neutral, but fail to penetrate pipe. Tong not perpendicular.	Inspect die size and replace with correct dies for pipe. Wrong size dies for tubulars. Assure suspension of tong is perpendicular to tubulars. Adjust hanger as necessary.
B)	Jaws fail to move out of neutral. Brake band not tight enough, faulty cam followers, rust debris or damage to jaws.	Inspect for excessive wear on brake band. Inspect and replace defective cam followers. Remove rust and debris from jaws, and jaw pockets. Inspect jaw rollers and pins for wear, flats, and lubrication. Repair, replace, and lubricate as needed.
C)	Tong will not release from tubular. Brake band not tight enough, defective cam followers in cage plate, insufficient lubrication to jaw pin and roller.	Inspect for excessive wear on brake band. Inspect and replace defective cam followers. Remove rust and debris from jaws, and jaw pockets. Inspect jaw rollers and pins for wear, flats, and lubrication. Repair, replace, and lubricate as needed.

TROUBLE SHOOTING

Failure to Grip Tubulars:

	Problem	Solution
D)	Tong motor runs but ring gear does not rotate. Broken gears or defective shift in hydraulic tongs system.	Inspect and replace defective gears. Inspect and repair or replace defective shifting parts.
E)	Tong binds under light load. Worn or damaged cam followers, dumbell roller bearing, or idler bearing.	Inspect and replace defective parts.
F)	Ring gear rotates while control lever is in neutral.	Replace control valve.
G)	Shift will not stay in set position. Lost detent ball or spring.	Replace detent ball and spring.
H)	Hydraulic fluid leaking from motor. Damaged or worn motor shaft seal.	Replace motor shaft seal.

HYDRAULIC BACKUP SYSTEM

	Problem	Solution
A)	Incorrect die for size tubular	Check pipe OD and match die size to pipe OD.
B)	Dies have material compacted in tooth area; worn teeth.	Clean dies with wire brush and inspect. Replace with new dies if necessary.
C)	Power unit pressure set incorrectly	Inspect relief valve on power unit to make sure enough system pressure is being delivered to backup.
D)	Counter balance valve not holding pressure	Remove side plates on backup. Bench test and replace the defective counter balance valve.
E)	Internal leakage in backup cylinder	Disconnect lines and bench test cylinder. Repair or replace as necessary.
F)	Jaws will not retract. Counter balance valve is stuck.	Replace counter balance valve.
G)	External leakage of cylinder	Repair or replace cylinder.
H)	Control valve set to neutral, but jaws extend.	Inspect control valve for damage and/or incorrect spool. Repair or replace as necessary.

SECTION 7 5 1/2" STD. TONG & BACKUP PARTS LISTS

RECOMMENDED TONG SPARE PARTS LIST

Part Number	***Quantity***	***Description***
12501375	1	Seal for Rineer Motor
51026	2	Standard Jaw Pins
51022	2	Low Friction Jaw Pins
45028	2	Standard Jaw Rollers
51021	2	Low Friction Jaw Rollers
1001	8	1/8 NPT Zerts
45055	10	Dumbell Roller Bushings (Bearings)
SLV1000-01	1	Door Switch Assembly
45061	1	Shifting Yokes
51063-01	1	Long Brake Band Assy.
51063-02	1	Short Brake Band Assy.
2-220	8	Jaw Retract O Ring
A20-MRV-1	1	A-20 Relief Cartridge

SECTION 7 5 1/2" STD. TONG & BACKUP PARTS LISTS

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SECTION 7 5 1/2" STD. TONG & BACKUP PARTS LISTS

CLES5500 / 5 1/2" STANDARD CLINCHER TONG

Part No.	*Qty.*	*Description*
100	4	Nut - 1/4"-20 Gr8
1001	14	Zert, NPT - 1/8"
1004	26	Zert, Drive - 3/16"
1006	1	Pin, Roll - 3/16" x 1"
1007	2	Bolt, U - 1/4"-20 x 1"
1014	1	Bolt, U - 1/4" x 1 1/4"
1024	1	Nut - 3/8"-16
1026	4	Lockwasher - 3/8" Hi Collar
1027	48	Lockwasher - 3/8" (134)
1028	1	Screw, Set - 3/8"-16 x 1/4"
1029	4	Screw, Set - 3/8"-16 x 1/2"
1041	14	SHCS - 3/8"-16 x 1"
1042	1	SHCS - 3/8"-16 x 1 1/4"
1046	2	HHCS - 3/8"-16 x 3/4" Gr8
1047	2	HHCS - 3/8"-16 x 1" Gr8
1049	35	HHCS - 3/8"-16 x 1 1/2" Gr8
1050	7	HHCS - 3/8"-16 x 2"
1072	5	HHCS - 3/8"-16 x 3 3/4" Gr8
110	4	HHCS - 1/4"-20 x 2 1/4" Gr8
1103	15	Lockwasher - 1/2" Gr8
1108	4	SHCS - 1/2"-13 x 3 1/2"
1110	4	HHCS - 1/2"-13 x 1" Gr8
1111	6	HHCS - 1/2"-13 x 1 1/4" Gr8
1150	26	Nut, Jam - 5/8"-18
1151	8	Lockwasher - 5/8" Gr8
1157	8	HHCS - 5/8"-11 x 1 1/2"
1167	2	Nut, Nylock - 3/4"-10
1173	2	HHCS - 3/4"-10 x 1 3/4"
1176	2	HHCS - 3/4"-10 x 3"
1177	9	Nut, Nylock - 7/8"-14
1178	10	Nut, Jam - 7/8"-14
1215	4	Nut - 1 1/4"-12
1216	4	Lockwasher - 1 1/4" Gr8
12501375	1	Polypack 1/8" Cross Section - 1 3/8" x 1 5/8" x 1/8"

SECTION 7 5 1/2" STD. TONG & BACKUP PARTS LISTS

CLES5500 / 5 1/2" STANDARD CLINCHER TONG

Part No.	*Qty.*	*Description*
142	7	HHCS - 3/8"-16 x 2" Gr8
1449	1	El, Street - 1/4"
1576	2	El, 90 - MNPT x MJIC - 1/4"
1607	2	Plug, Flush - 1/8" NPT
1608	1	O Ring, Hex Plug - 3/8"
1610	3	Plug, Flush - 3/4" NPT
171	3	HHCS - 1/2"-13 x 1 3/4" Gr8
1906	1	Ball Bearing - 1/4"
1907	3	Bearing, 307 SZZ
1908	2	Bearing, MRC5208MZZ
1937	4	Ring, Snap - Int. IRR3000X306
1945	1	Ring, Snap - Ext. X97-137
1955	30	Bushing - IR-141816
1965	26	Cam Follower - MGLCFH1-1/8 SB
212	4	Nut, Nylock - 1/4"-20 Gr8
240	1	SHCS - 3/8"-16 x 2 1/2"
41037	1	Washer, Aluminum
45010	1	Pin, Locking
45018	4	Pad, Idler
45031	9	Shaft, Dumbell Roller 1.0" OD Stock
45048	1	Key, Ring Gear
45049	1	Key, Cage Plate
45057	20	Washer, Thrust - Dumbell - 2 3/4" OD Stock
45060	1	Weldment, Shifter Shaft
45061	1	Weldment, Shifting Yoke
450671	1	Piping Brace - 5/8" RB
450673	1	Piping Brace, Large - Flat Bar
45068	1	Washer
45070	1	Gear, Pinion - Assembly
45076	1	Spacer, Motor Shaft
45077	1	Shaft, Motor
45077-A	1	Shaft, Motor Seal Retainer
45078	1	Motor, Rineer GA01561015030 w/57 Seal
45080	2	Flange Kit, Elbow - W168-12-20U

SECTION 7 5 1/2" STD. TONG & BACKUP PARTS LISTS

CLES5500 / 5 1/2" STANDARD CLINCHER TONG

Part No.	*Qty.*	*Description*
45096	2	Shaft, Idler
45097	2	Spacer, Idler
45100-01	1	Gear, Pinion
45101	1	Gear, High
45114	1	Hose - FJIC x FJIC - 1/4" x 24"
45115	1	Hose - FJIC x FJIC - 1/4" x 34"
45122	10	Roller, Dumbell - Assembly
51008	1	Upper Cage Plate
51033	1	Lower Cage Plate
51034	1	Gear, Ring
51035B	1	Door, Integrated - Assembly
51038	1	Bearing Housing
51039	1	Bearing Cap
51047A	1	Mid Body - 5 1/2" Std. Tong
51048	1	Weldment, Top Plate - 5 1/2" Std. Tong
51049	1	Weldment, Bottom Plate - 5 1/2" Std. Tong
51063-01	2	Brake Band, Long - Assembly - 5 1/2" Std. Tong
51063-02	2	Brake Band, Short - Assembly - 5 1/2" Std. Tong
51067-S1	1	Door Jam
51067-S3	1	Weldment, Clutch Housing
51070	1	Bearing Cap
51070-04	1	Bearing Cap, Modified f/Encoder
51072	1	Gear, Drive
51095	2	Gear, Idler w/o Micro Cam
51099	1	Gear, Low
51111	2	Weldment, Side Handle
55151	1	Gauge Mount Ext.
58070	1	Hanger Bracket - Assembly
76128	1	Weldment, Door Switch Base
A20-A1327135	1	Spring, Detent 391-3581-130
A20-V1526K-8	1	Handle, A20 8" (341-9100-002)
MCN-1377	1	Seal for Rineer Motor - 1 3/8" x 1 5/8" x 1/8"
SLV1000-01	1	Assembly, Self Lubricated Valve (N.C.) - Door Switch

SECTION 7 5 1/2" STD. TONG & BACKUP PARTS LISTS

51035B / INTEGRATED DOOR ASSEMBLY
(For Productions After 11/2000)

Part No.	*Qty.*	*Description*
1001	1	Zert, NPT - 1/8"
1027	9	Lockwasher - 3/8" (134)
1029	2	Screw, Set - 3/8"-16 x 1/2"
1049	9	HHCS - 3/8"-16 x 1 1/2" Gr8
1177	1	Nut, Nylock - 7/8"-14
1178	1	Nut, Jam - 7/8"-14
1955-A	1	Door Bushing, Top
1955-B	1	Door Bushing, Bottom
45025	2	Washer
45054	1	Shaft, Door 1.0" OD Stock
51036	2	Door Bushing
51037	1	Door Plate, Bottom - f/CLES5500 Integrated Door
51040	1	Door Upright - f/51035B Tong Door
51041	1	Door Handle - f/CLES5500 Integrated Door
51042	1	Door Switch Collar - f/CLES5500 Integrated Door
51043	1	Door Plate, Top - f/CLES5500 Integrated Door
76131	1	Door Switch Adj. Sleeve

SECTION 7 5 1/2" STD. TONG & BACKUP PARTS LISTS

51048 / TOP TONG PLATE WELDMENT

Part No.	*Qty.*	*Description*
45067-S1	2	Pad Eye
45067-S4	1	Gauge Mount
45067-S5	1	Brake Band Retainer Tab
45067-S7	2	Door Switch Base Mount
45067-S8	1	Door Switch Hose Guide
51067-S2	1	Brake Band Pin
51067A	1	Top Plate - f/5 1/2" Std. Tong

51049 / BOTTOM TONG PLATE WELDMENT

Part No.	*Qty.*	*Description*
45046-S1	2	Leg, Tong - 1 1/4" x 3 1/4"
45046-S2	2	Leg Collar
45067-S5	1	Brake Band Retainer Tab
45067-S7	1	Door Switch Base Mount
51046A	1	Bottom Plate - f/5 1/2" Std. Tong
51067-S2	1	Brake Band Pin

SECTION 7 5 1/2" STD. TONG & BACKUP PARTS LISTS

51063-01 / LONG BRAKE BAND ASSEMBLY *(2 REQD.)*

Part No.	*Qty.*	*Description*
1663	1	Brake Band Material - 1/4" x 2" x 25 Ft Lg Roll
45063-S1	1	Brake Band Eyelet
51063-S3	1	Brake Band, Long
55061-S3	1	Brake Band Gusset

51063-02 / SHORT BRAKE BAND ASSEMBLY *(2 REQD.)*

Part No.	*Qty.*	*Description*
1663	1	Brake Band Material - 1/4" x 2" x 25 Ft Lg Roll
45063-S1	1	Brake Band Eyelet
51063-S4	1	Brake Band, Short
55061-S3	1	Brake Band Gusset

SECTION 7 5 1/2" STD. TONG & BACKUP PARTS LISTS

51074 / ENCODER ADAPTOR ASSEMBLY - STANDARD *(ACCESSORY)*

Part No.	*Qty.*	*Description*
1034	1	Screw, Set - 1/4" #10-32
1041	2	SHCS - 3/8"-16 x 1"
1101	1	Nut - 1/2" Gr8
1276	4	Screw, Machine - 3/8" #6-32 Brass
40034	1	Encoder Cover Plate
51031	1	Encoder Coupling Mount
51075	1	Encoder Mounting Plate
51076	1	Encoder Coupling - Female
51077-01	1	Encoder Coupling - Male
	1	

OR1000 / ENCODER ADAPTOR ASSEMBLY *(ACCESSORY)*
When this assembly is used, it replaces Standard Encoder Assembly 51074.

Part No.	*Qty.*	*Description*
1008-B1	6	Lockwasher - 1/4" Hi Collar
1034	1	Screw, Set - 1/4" #10-32
1040-A	2	SHCS - 3/8"-16 x 3/4"
215	6	SHCS - 1/4"-20 x 3/4"
OR100	1	Encoder Adaptor Base Plate
OR101	2	Encoder Adaptor Clamp
OR102	1	Encoder Coupling
OR103	1	Encoder Adaptor Cover Plate

SECTION 7 5 1/2" STD. TONG & BACKUP PARTS LISTS

51111 / SIDE HANDLE WELDMENT ASSEMBLY *(2 REQD.)*

Part No.	*Qty.*	*Description*
143	4	HHCS - 3/8"-16 x 2 1/4" Gr8
45121	2	Side Handle Plate - 1/2" A-36 Laser Cut
51111-S1	1	Handle Spacer - 3/4" x 4.530 Pipe, Sch40
51111-S2	1	Handle Cover - 5.530 H x 3.375 L

58070 / HANGER BRACKET ASSEMBLY

Part No.	*Qty.*	*Description*
1167	2	Nut, Nylock - 3/4"-10
1173	2	HHCS - 3/4"-10 x 1 3/4"
1176	2	HHCS - 3/4"-10 x 3" Gr8
1613	2	Cap, Threaded - 3/4" BMI
45001-S1	1	Batman Handle - f/all sizes A-36 Plate
45001-S3A	2	Upper Pad Eye Bar
45001-S3B	4	Upper Pad Eye Tab
58163	2	Hanger Bracket Upright

SLV1000-01 / SELF LUBRICATED VALVE (N.C.)

Part No.	*Qty.*	*Description*
2-016	1	O Ring - 5/8" ID 3/4" OD 1/16" Width
40028	1	Sleeve, Protector f/Door Switches (SLV1000-01)
MA10-ACNC-04	1	Valve, Camop 2-Way
SLV1002	1	Spool, N.C. f/SLV1000-01
SLV1003	1	Roller, Door Switch Valve f/SLV1000-01

SECTION 7 5 1/2" STD. TONG & BACKUP PARTS LISTS

CJ-51A / 5 1/2" JAW SET 2 1/16" - 3 1/2" ASSEMBLY

Part No.	*Qty.*	*Description*
1011	4	SHCS - 1/4"-20 x 3/4"
1071	2	HHCS - 3/8"-16 x 3 1/2"
2-222	2	O Ring - 1 1/2" ID 1 3/4" OD 1/8" Width
45027-B	2	Jaw Clip, Bottom - 2 1/16" x 3 1/2"
45027-T	2	Jaw Clip, Top - 2 1/16" x 3 1/2"
45028	2	Jaw Roller
51026	2	Jaw Pin - f/5 1/2" Std. Jaw
51029	2	Jaw, Tong f/CJ-51A Assy. 2 1/16" thru 3 1/2" - f/CLES5500 Std. Tong

CJ-51B / 5 1/2" JAW SET 3 5/8" - 5 1/2" ASSEMBLY

Part No.	*Qty.*	*Description*
1011	4	SHCS - 1/4"-20 x 3/4"
1071	2	HHCS - 3/8"-16 x 3 1/2"
2-222	2	O Ring - 1 1/2" ID 1 3/4" OD 1/8" Width
45028	2	Jaw Roller
51026	2	Jaw Pin - f/5 1/2" Std. Jaw
51027-B	2	Jaw Clip, Bottom - 3 5/8" x 5 1/2"
51027-T	2	Jaw Clip, Top - 3 5/8" x 5 1/2"
51029A	2	Jaw, Tong f/CJ-51B Assy. 3 5/8" thru 5 1/2" - f/CLES5500 Std. Tong

SECTION 7 5 1/2" STD. TONG & BACKUP PARTS LISTS

CJ-LF-51A / 5 1/2" LOW FRICTION JAW SET 2 1/16" - 3 1/2" ASSEMBLY

Part No.	*Qty.*	*Description*
1011	4	SHCS - 1/4"-20 x 3/4"
1071	2	HHCS - 3/8"-16 x 3 1/2"
2-220	2	O Ring - 1 3/8" ID 1 5/8" OD 1/8" Width
22DU28	2	Bushing, Garlock - 22DU28
45027-B	2	Jaw Clip, Bottom - 2 1/16" x 3 1/2"
45027-T	2	Jaw Clip, Top - 2 1/16" x 3 1/2"
51021	2	Jaw Roller (Low Friction)
51022	2	Jaw Pin - f/Low Friction Roller
51023	2	Jaw, Tong f/CJ-LF-51A Assy. 2 1/16" thru 3 1/2" - f/CLES5500 Std. Tong

SECTION 7 5 1/2" STD. TONG & BACKUP PARTS LISTS

BUCL5500 / 5 1/2" STANDARD BACKUP

Part No.	*Qty.*	*Description*
1001	8	Zert, NPT - 1/8"
1027	16	Lockwasher - 3/8" (134)
1040-A	2	SHCS - 3/8"-16 x 3/4"
1041	1	SHCS - 3/8"-16 x 1"
1046	16	HHCS - 3/8"-16 x 3/4" Gr8
1103	3	Lockwasher - 1/2" Gr8
1106	1	SHCS - 1/2"-13 x 1 1/4"
1110	1	HHCS - 1/2"-13 x 1" Gr8
1120	2	HHCS - 1/2"-13 x 3 1/2" Gr8
1210	4	Nut - 1"-8 Gr8
1219	2	Nut, Jam - 1 1/4"-12
1449	1	El, Street - 1/4"
1451	3	El, Street - 1/2" (Forged)
1457	2	Nipple, Hex - 3/8"
1490	1	Bushing, Reducer - 1/2" x 1/4"
1491	3	Bushing, Reducer - 1/2" x 3/8"
1498	1	El, 90 Swivel - MJIC x FJIC - 1/4" x 1/4"
1564	2	Adapter, Straight - MNPT x Tube - 1/4" x 3/8"
1566	4	Adapter, Straight - MJIC x Tube - 3/8" x 3/8"
1570-A	2	Adapter, Straight - MNPT x Tube - 3/8" x 3/8"
1576	2	El, 90 - MNPT x MJIC - 1/4" x 1/4"
1577	1	El, 90 - MNPT x Tube - 1/4" x 3/8"
1578	1	El, 90 - MNPT x Tube - 3/8" x 3/8"
1587	1	El, 90 - MNPT x MNPT - 1/2" x 1/2"
1595	1	Tee, Run - 3/8"
1596	1	Tee, Branch - 1/2"
1598	1	Tee, Run - 1/2"
1609-A	2	Plug, Flush - 1/2"
1650	1	Gauge - 0-3000
1800	2	Valve, Flow Control - Parker F600
BUC4031-S1	1	Gauge Protector
BUC4031-S2	2	Gauge Protector Tab
BUC4502-S11	3	Legs, Backup - 2" Sch40 Pipe x 4 1/2" Long
BUC4556	4	Bolt, Backing - 1211

SECTION 7 5 1/2" STD. TONG & BACKUP PARTS LISTS

BUCL5500 / 5 1/2" STANDARD BACKUP

Part No.	*Qty.*	*Description*
BUC5524-A	1	Valve Cartridge - Sun CKEB LBN
BUC5524-B	1	Valve Body, Aluminum - Pilot Opr. Check Valve-BCC (3000 psi)
BUC5569	1	El, Street - Mod. 1/2" Sq. Body
BUCL5502	1	Weldment, Backup Body
BUCL5519-01	1	Jaw, Fixed - Assembly - 5 1/2" Std. Backup
BUCL5523	2	Cylinder - Assembly - 5 1/2" Std. Backup
BUCM4551	1	Hose - MNPT x FJIC - 3/8" x 27"
BUCM4552	1	Hose - MNPT x FJIC - 3/8" x 43"
BUCM4553	1	Hose - MNPT x FJIC - 3/8" x 8"
BUCST7623	2	Connector, Bulkhead - 1/2" NPT
CLEBU9602S10	8	Zert Protector
CM4577	1	Hose - MNPT x FJIC - 3/8" x 38"
H-1610	1	Hose - FJIC x FJIC - 1/4" x 20"
T-BUCL5500	1	Tags, Backup

BUCL5519-01 / FIXED JAW ASSEMBLY

Part No.	*Qty.*	*Description*
1020	2	SHCS - 1/4"-20 x 4 1/4"
BUCL5519-S1	1	Jaw, Fixed - Weldment
BUCL5520	1	Jaw Clip, Top

BUCL5519-S1 / FIXED JAW WELDMENT

Part No.	*Qty.*	*Description*
BUCL5519	1	Jaw, Fixed - 5 1/2" Std.
BUCL5531-S1	1	Jaw Clip, Bottom

SECTION 7 5 1/2" STD. TONG & BACKUP PARTS LISTS

BUCL5523 / 5 1/2" BACKUP CYLINDER ASSEMBLY *(2 REQD.)*

Part No.	*Qty.*	*Description*
1008-B	1	Screw, Set - 1/4"-20 x 1/4"
1020	2	SHCS - 1/4"-20 x 4 1/4"
246	4	SHCS - 1/2"-13 x 1"
ASAP2186	1	Seal Kit - f/4 1/2" & 5 1/2" BUC
BUC4525	1	Piston - f/4 1/2" BU Jaw & 5 1/2" Std.
BUC4526	1	Rod w/Backing Plate - Weldment
BUC4528	1	Gland f/4 1/2" Jaw
BUCL5520	1	Jaw Clip, Top
BUCL5530	1	Weldment, Cylinder Housing - f/5 1/2" Std. Backup

ASAP2186 / SEAL KIT F/4 1/2" & 5 1/2" BUC

Part No.	*Qty.*	*Description*
12501875	1	Polypack 1/8" Cross Section - 1 7/8" x 2 1/8" x 1/8"
18703625	1	Polypack 3/16" Cross Section - 3 5/8" x 4" x 3/16"
25003000	1	Polypack 1/4" Cross Section - 3" x 3 1/2" x 1/4"
25003500	2	Polypack 1/4" Cross Section - 3 1/2" x 4" x 1/4"
959-29	1	Rod Wiper - 3"
W32500500	1	Wear Band, Nylon - 3 1/4" OD

SECTION 7 5 1/2" STD. TONG & BACKUP PARTS LISTS

MK5100 / 5 1/2" STD. MOUNTING KIT & VALVE PACKAGE

Part No.	*Qty.*	*Description*
1151	8	Lockwasher - 5/8" Gr8
1157	8	HHCS - 5/8"-11 x 1 1/2"
BUCL5511	1	Hanger Assembly - f/BUCL5500
BUCL5570	2	Leg Assembly - f/CLES5500, BUCL5500
VP5800	1	Valve Package Assembly - f/5 1/2" Lockjaw

BUCL5511 / 5 1/2" STD. HANGER ASSEMBLY

Part No.	*Qty.*	*Description*
BUC4509	1	Halo (Loadcell Bracket)
BUC4511	1	H-Plate Spring - 1/4" Wire
BUC4512	2	H-Plate Assembly
BUCL5508	1	Hanger Weldment - 5 1/2" Std.

BUCL5570 / 5 1/2" STD. LEG ASSEMBLY

Part No.	*Qty.*	*Description*
165	1	Nut - 1/2"-13 Gr8
166	1	Lockwasher - 1/2" Gr8
BUC4514	1	Leg
BUC4515	1	Leg Spring - 4" OD x 7 1/2" Lg, 3/8" Wire 119 lbs/in 7 Turns Sqd & Grnd Ends
BUC4516-B	1	Spring Cap, Bottom - Weldment
BUC4516-P	1	Spring Retainer Pin
BUCS5571	1	Spring Cap, Top - Weldment
X2-94	1	HHCS - 1/2"-13 x 4" Gr8

SECTION 7 5 1/2" STD. TONG & BACKUP PARTS LISTS

VP5800 / VALVE PACKAGE 5 1/2" LOCKJAW & STANDARD

Part No.	*Qty.*	*Description*
1027	2	Lockwasher - 3/8" (134
1072	2	HHCS - 3/8"-16 x 3 3/4" Gr8
1371	2	Nipple, Pipe - 3/4" x Close Sch80
1372	2	Union - 3/4" 3000#
1400-A	2	Nipple, Pipe - 1/2" x 3" Sch80
1401	2	Nipple, Pipe - 3/4" x 3" Sch80
1403	1	Nipple, Pipe - 1/2" x 7 1/4" Sch80
1404-A	2	Nipple, Pipe - 3/4" x 7" Sch80
1405-A	1	Nipple, Pipe - 3/4" x 4 1/2" Sch80
1406	1	Nipple, Pipe - 3/4" x 5" Sch80
1418	2	Nipple, Pipe - 1" x 3" Sch80
1421	1	Nipple, Pipe - 1" x 10" Sch80
1431	1	Quick Disconnect, Male - 1/2" Snaptite (VHN8-8F)
1441	1	Quick Disconnect, Male - 1" Wing Type
1442	1	Quick Disconnect Cap - 1" - 78DC-16
1443	1	Quick Disconnect Cap - 1 1/4" - 78DC-20
1446	1	Quick Disconnect, Male - 1 1/4" Wing Type
1451	1	El, Street - 1/2" (Forged)
1452	2	El, Street - 3/4"
1459	1	El, 90 - FNPT x FNPT - 1/2" x 1/2"
1460	1	Nipple, Hex - 1/2"
1461	5	Nipple, Hex - 3/4"
1492	2	Bushing, Reducer - 1" x 3/4"
1495	3	Bushing, Reducer - 3/4" x 1/2"
1499	1	Bushing, Reducer - 1 1/4" x 1"
1576	2	El, 90 - MNPT x MJIC - 1/4" x 1/4"
1586	2	El, 90 Swivel - FNPT x FNPT - 3/4" x 3/4" - Forged - Parker
1588	3	El, 90 - FNPT x FNPT - 3/4" x 3/4"
1591	1	El, 90 - FNPT x FNPT - 1" x 1"
1603	1	El, 45 - MNPT x MNPT - 1" x 1"
1611	2	Plug, Flush - MNPT - 1"
1616	1	Tee, Run - 1"
1625	2	El, 90 - FNPT x MJIC - 1/2" x 1/2"
1627	1	Tee, Run - 3/4"

SECTION 7 5 1/2" STD. TONG & BACKUP PARTS LISTS

VP5800 / VALVE PACKAGE 5 1/2" LOCKJAW & STANDARD

Part No.	*Qty.*	*Description*
1655	1	El, 45 - MNPT x FNPT - 1 1/4" x 1 1/4"
20006	1	El, 90 - FNPT x FNPT - 1" x 1" - w/ 1/4" Half Collar Welded
58058	1	Valve, Dump - Denison - R4V06-5A9-10A1 w/o Sel. Vent Valve
58099	1	Valve, Check High Pressure - CVH145-1000N
A20-AN1311	1	Cap, End - 341-6000-100
A20-DET. KIT	1	Kit, Detent A-20 - Pt. #17,18,19,20 - 391-1873-020
A20-V1526K-8	3	Handle A20 8" - 341 9100 002
VA20-AA440	1	Valve, Inlet w/Relief
VA20-DA3	1	Valve, Work Section
VA20-ECS	2	Valve, End Cap Screw - CS391-1433-020
VA20-MA3	1	Valve, Work Section
VA20-SA3	1	Valve, Work Section
VA20-TR44	1	Valve, Outlet Section
VA20-WDA3	1	Valve, Work Section - Parallel Circuit

ACCESSORIES AND OPTIONS

Several different accessory items are available for the CLINCHER Tong to allow them to be customized to provide a system most appropriate for the inducer's application.

CLES5500 Tong Accessories

Compression Load Cell and Torque Gauge	directly measures applied torque
Tension Load Cell and Torque Gauge	directly measures applied torque
Tong Handles with closed covers	protects operators hands
Solenoid Operated Module for Dump Valve	allows computer to limit torque applied
Adapter for Turns Proximity Switch	allows computer to sense rotation
3 Point Lifting Bridle	alternative lifting system
Lift Cylinder with Integral Spring Hanger	controls vertical position
TSP-80 Tong Speed Control	allows slow speed rotation with full torque
2 Speed Motors	
Alternate Motor Displacements	

BUCL5500 Backup Accessories

Backup Handles	Simplifies manipulation
Shipping Skids and Cages	Simplify handling, transport and help guard against damage

SECTION 9 5 1/2" STD. TONG ILLUSTRATIONS

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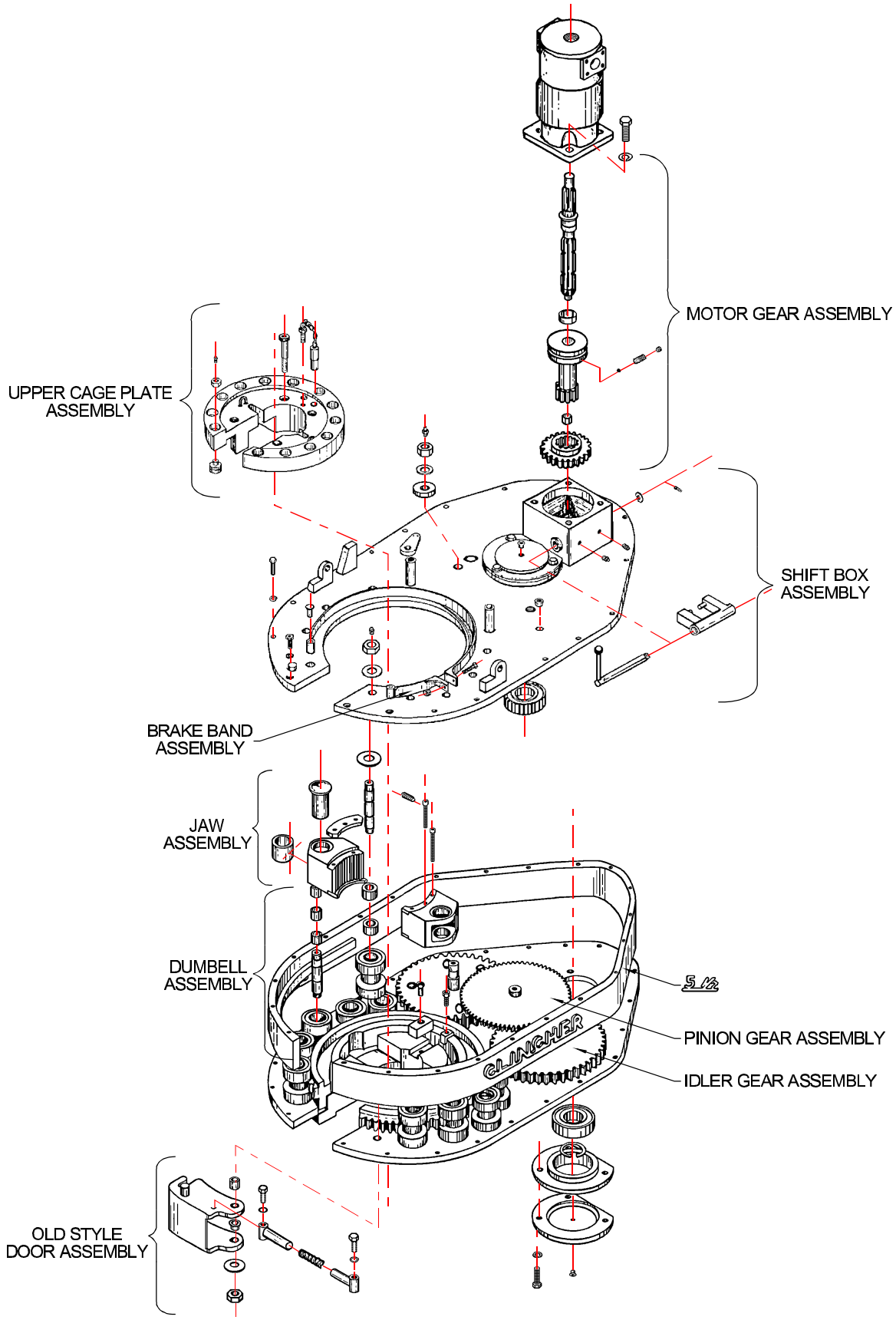

5 1/2" STANDARD TONG ASSEMBLY

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

		10/25/00
REV. #	LOG #	DATE

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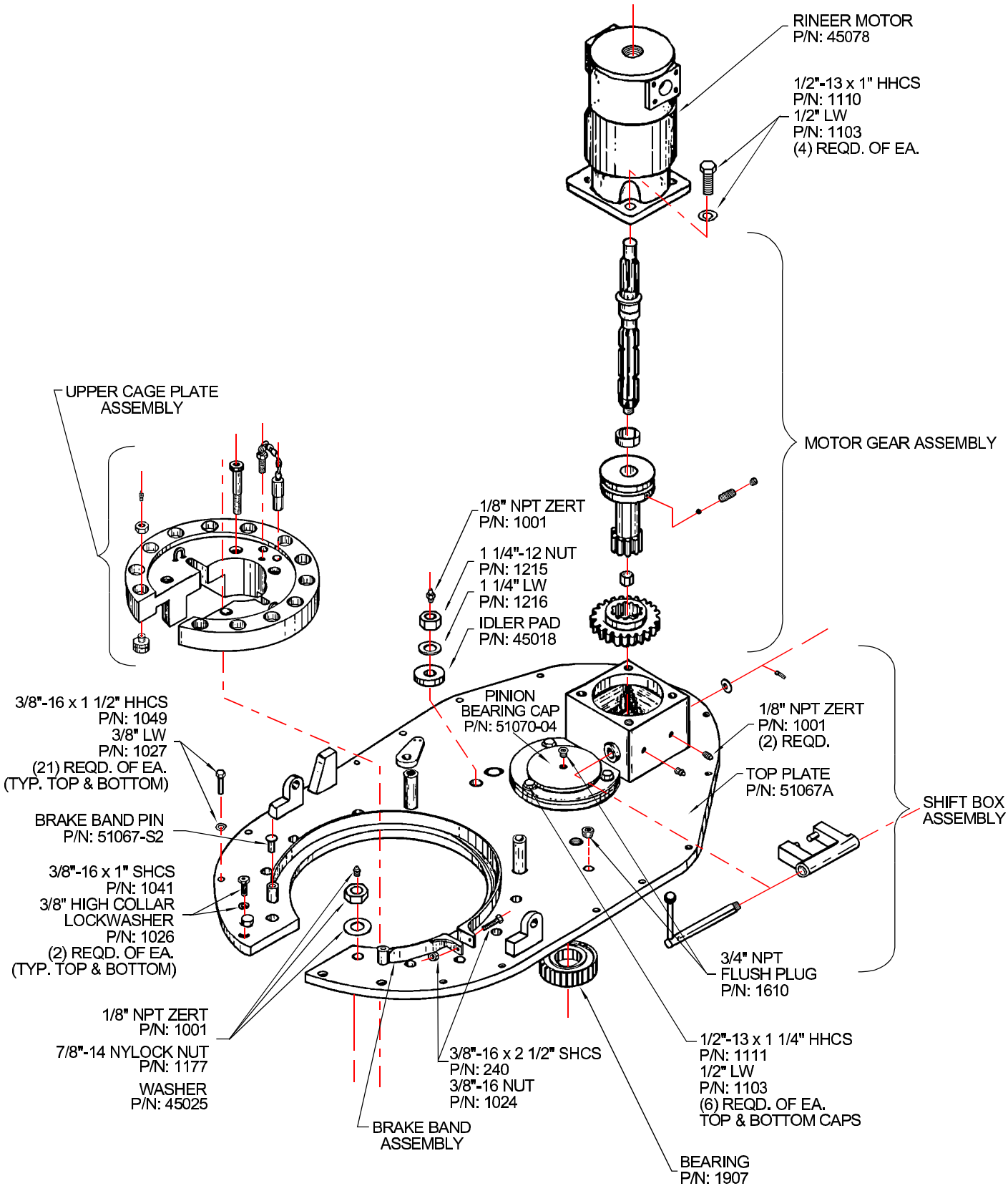

5 1/2" STANDARD TONG ASSEMBLY

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

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		11/30/00

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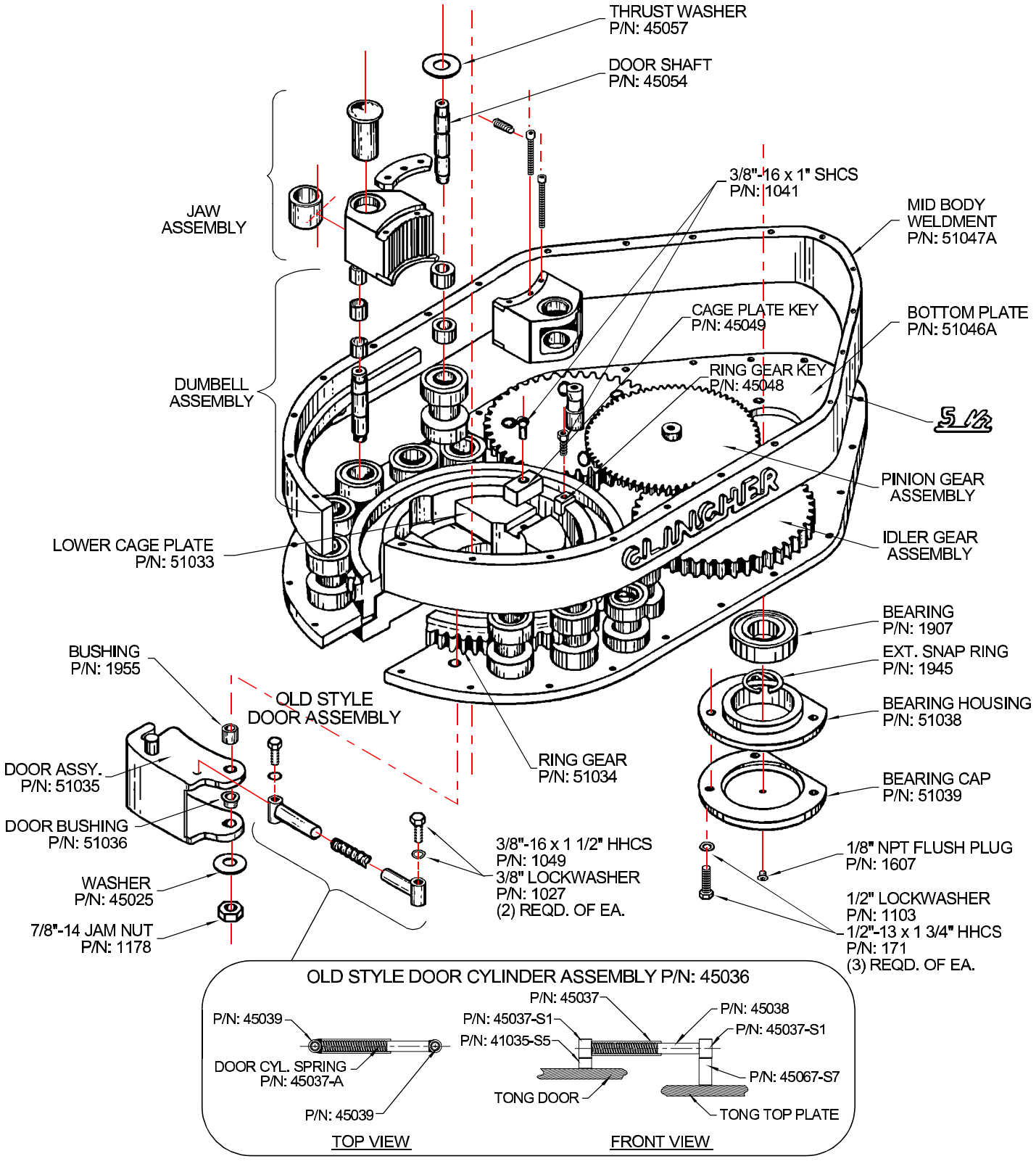

5 1/2" STANDARD TONG ASSEMBLY

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

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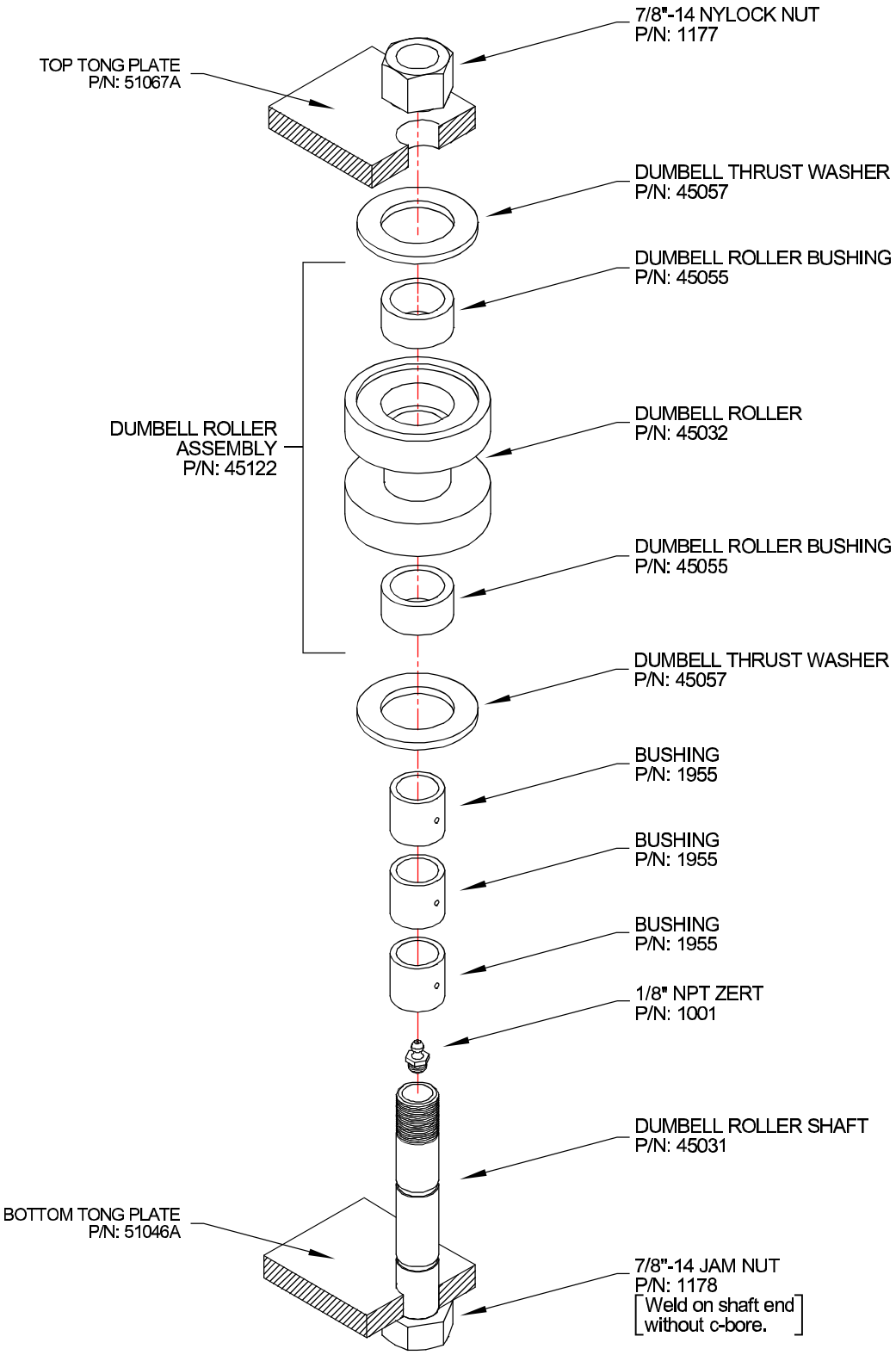

DUMBELL ROLLER ASSEMBLY

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

		10/26/00
REV. #	LOG #	DATE

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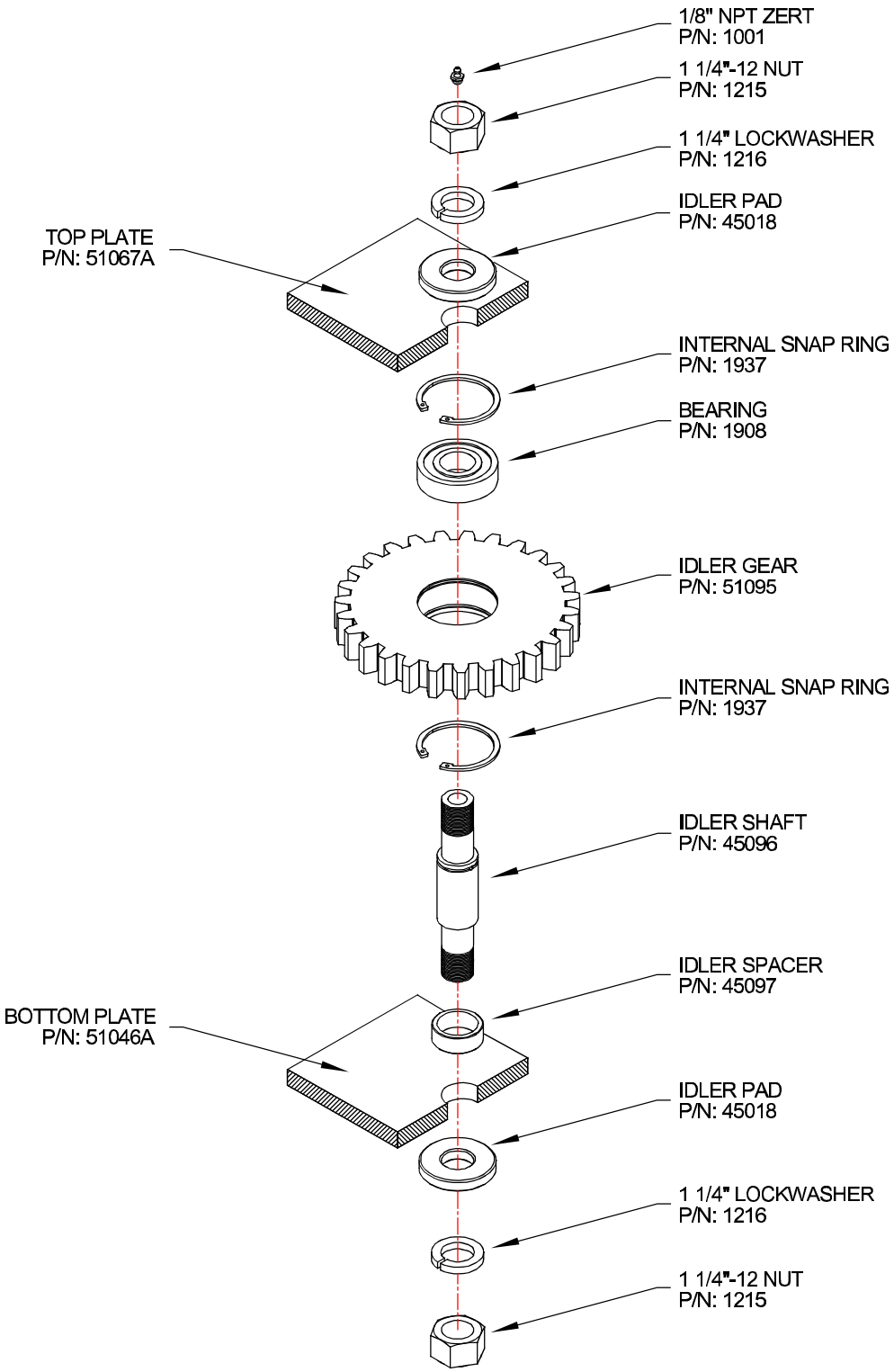

IDLER GEAR ASSEMBLY

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

		10/27/00
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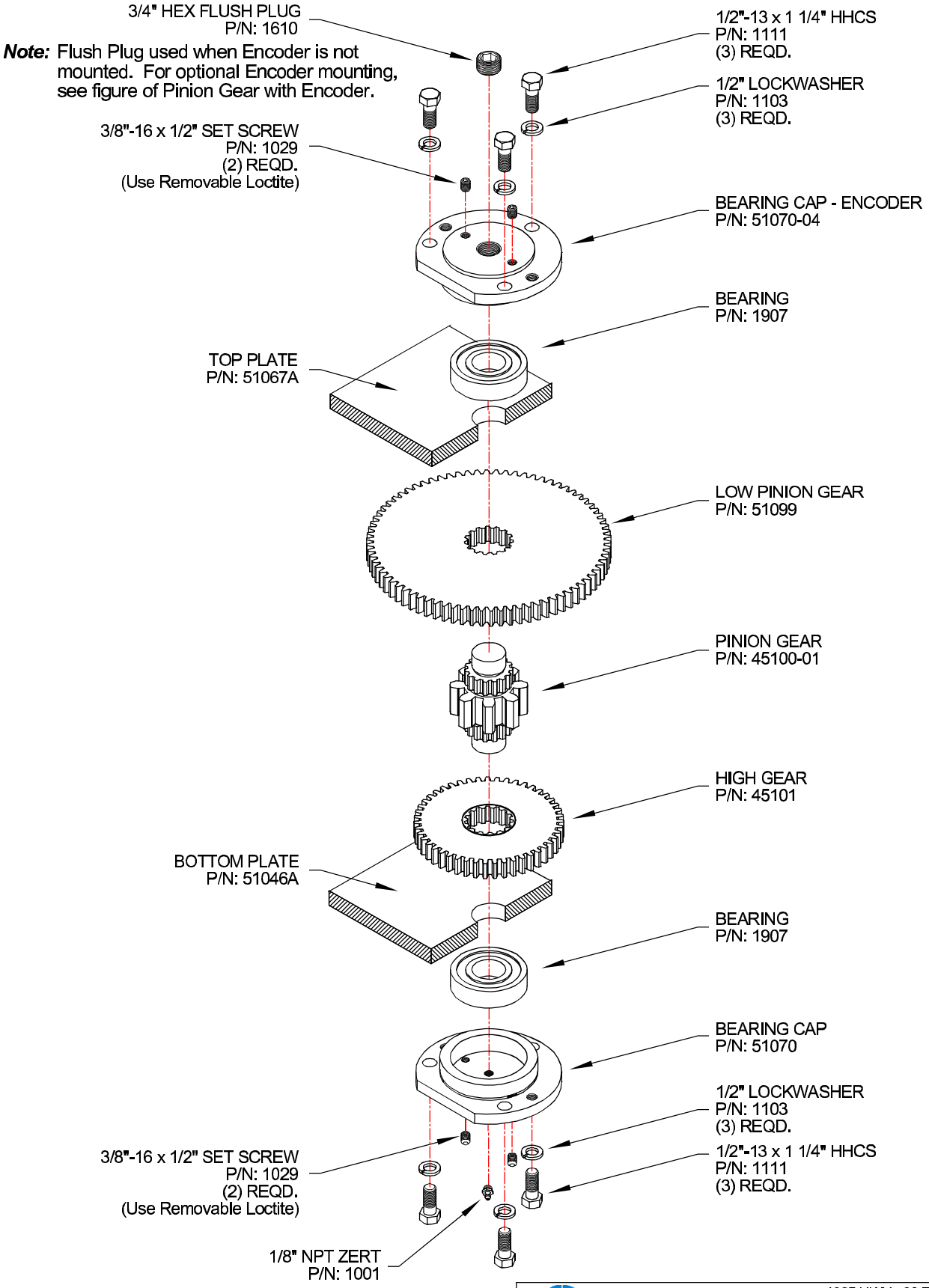

PINION GEAR ASSEMBLY

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4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

		11/30/00
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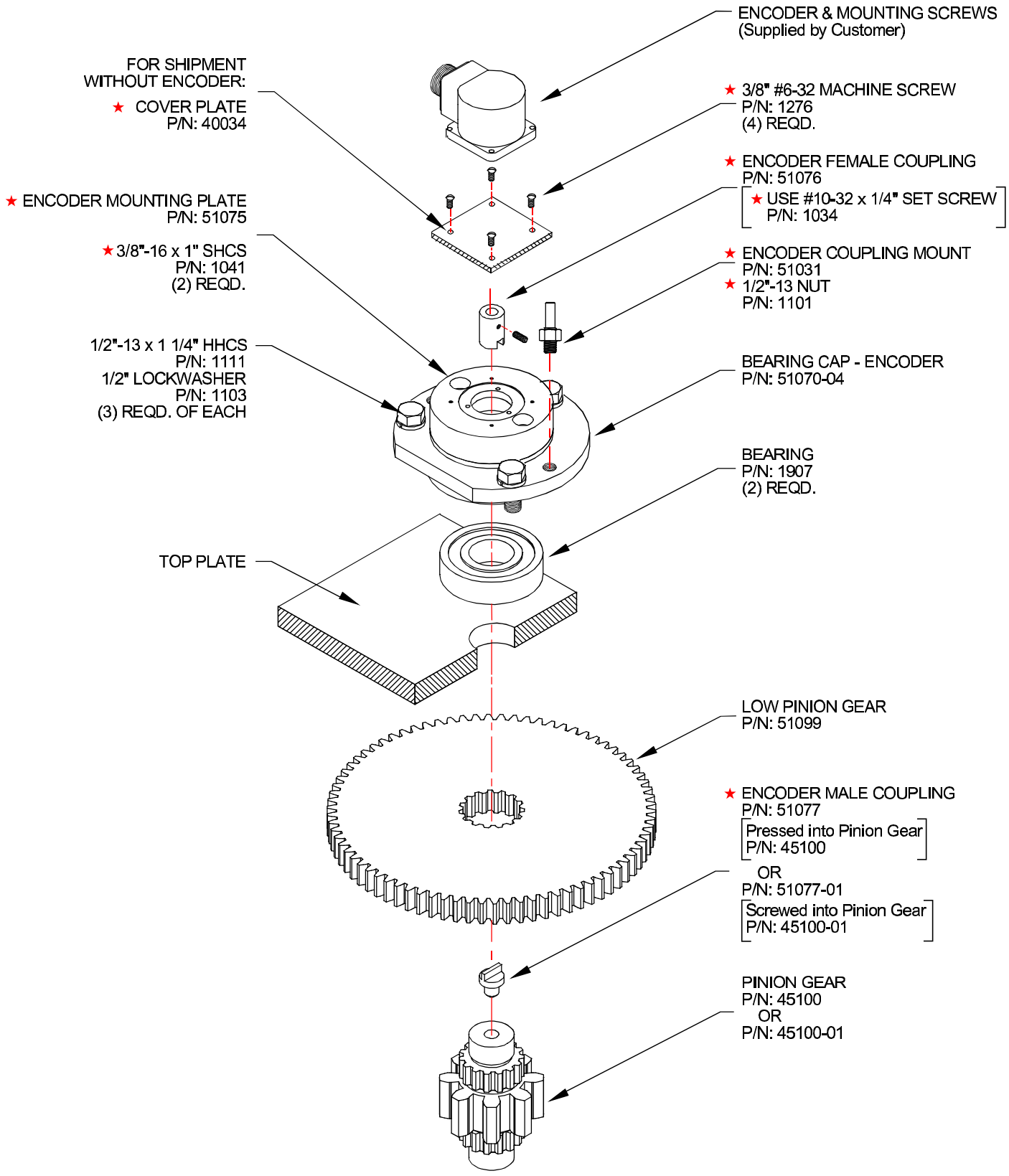

PINION GEAR ASSEMBLY WITH STD. ENCODER

ENCODER ASSEMBLY NO. 51074 ★

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

		12/05/00
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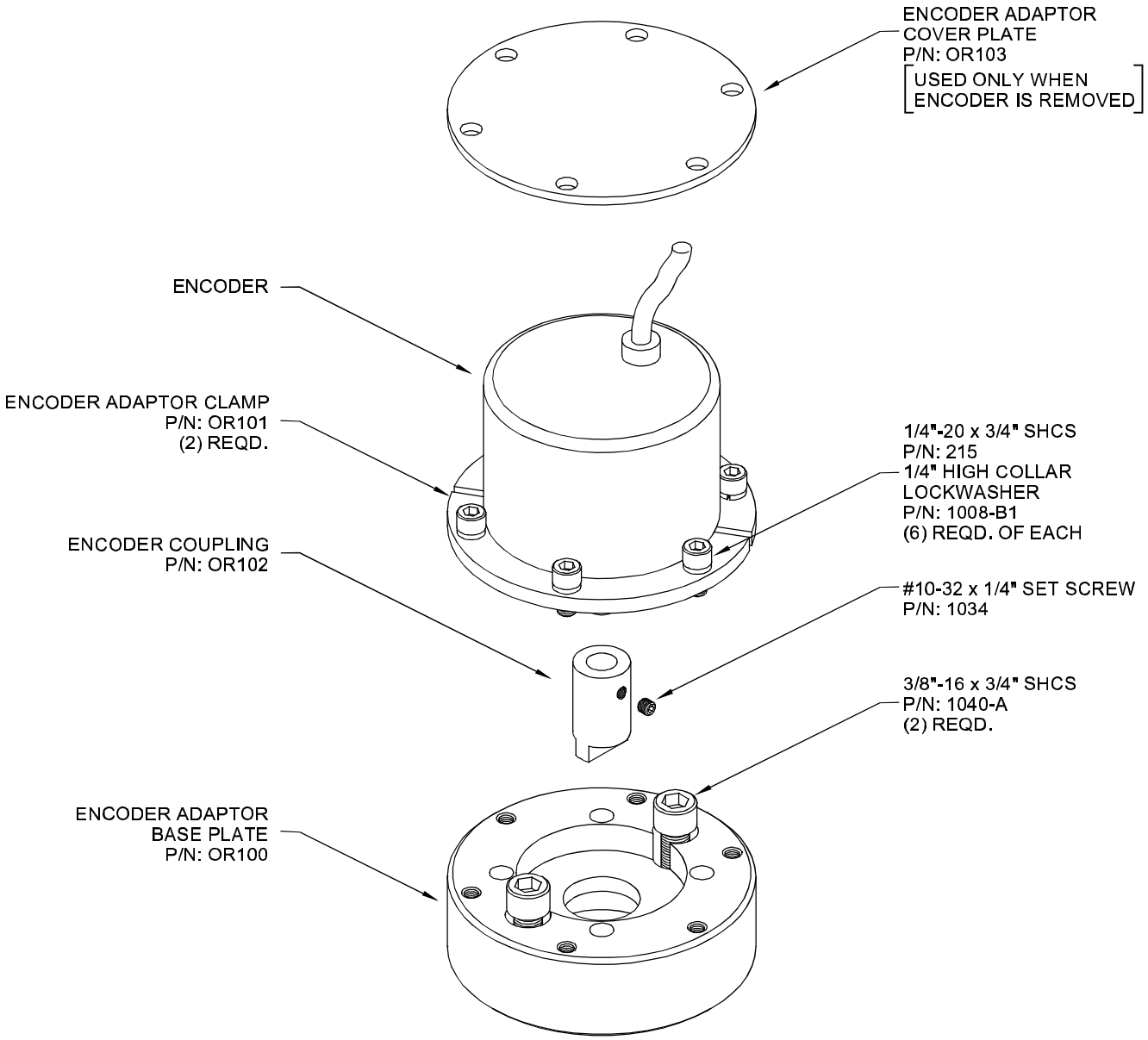

ENCODER ADAPTOR ASSEMBLY

ASSEMBLY NO. OR1000

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

		12/05/00
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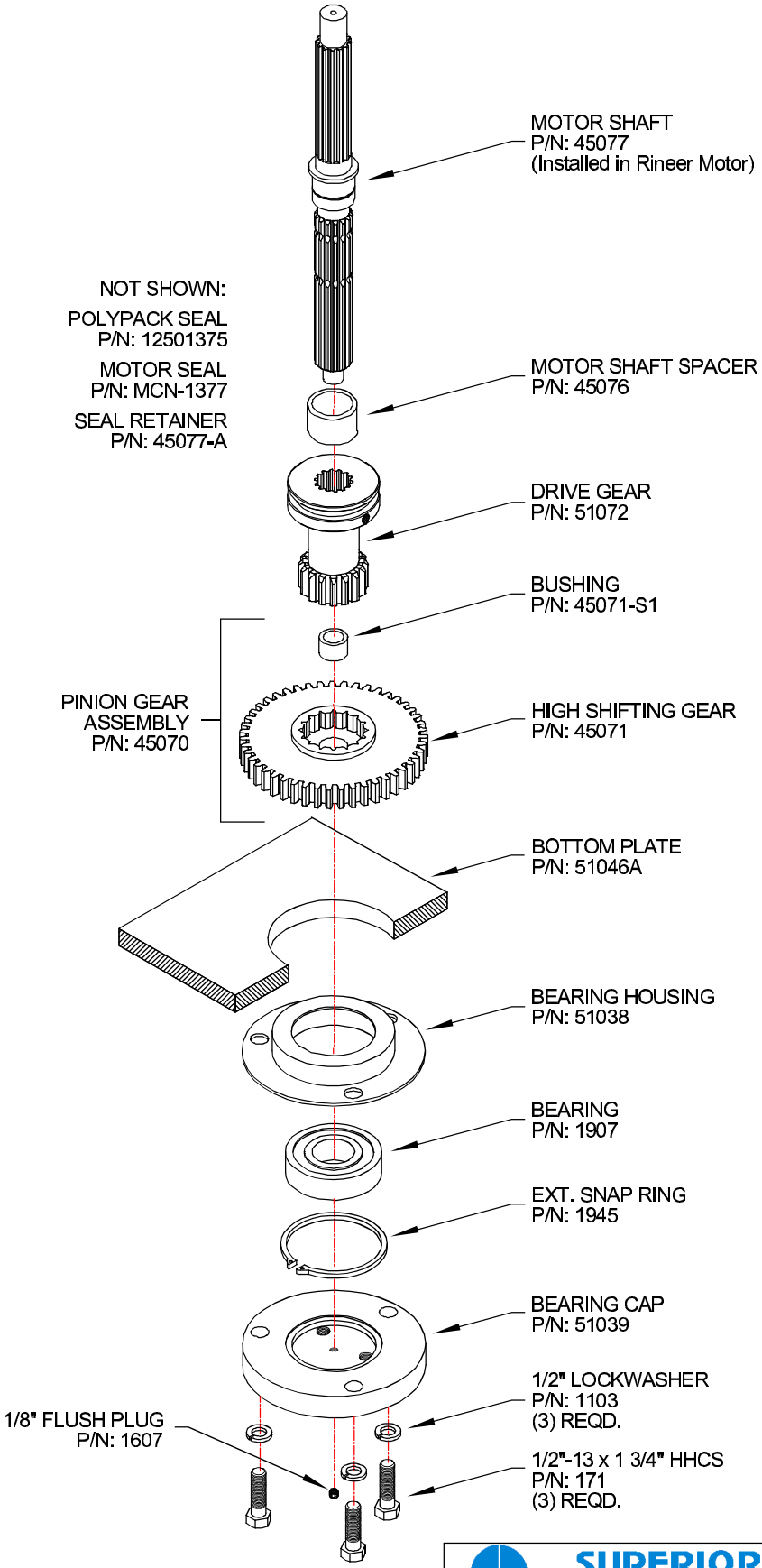

MOTOR GEAR ASSEMBLY

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

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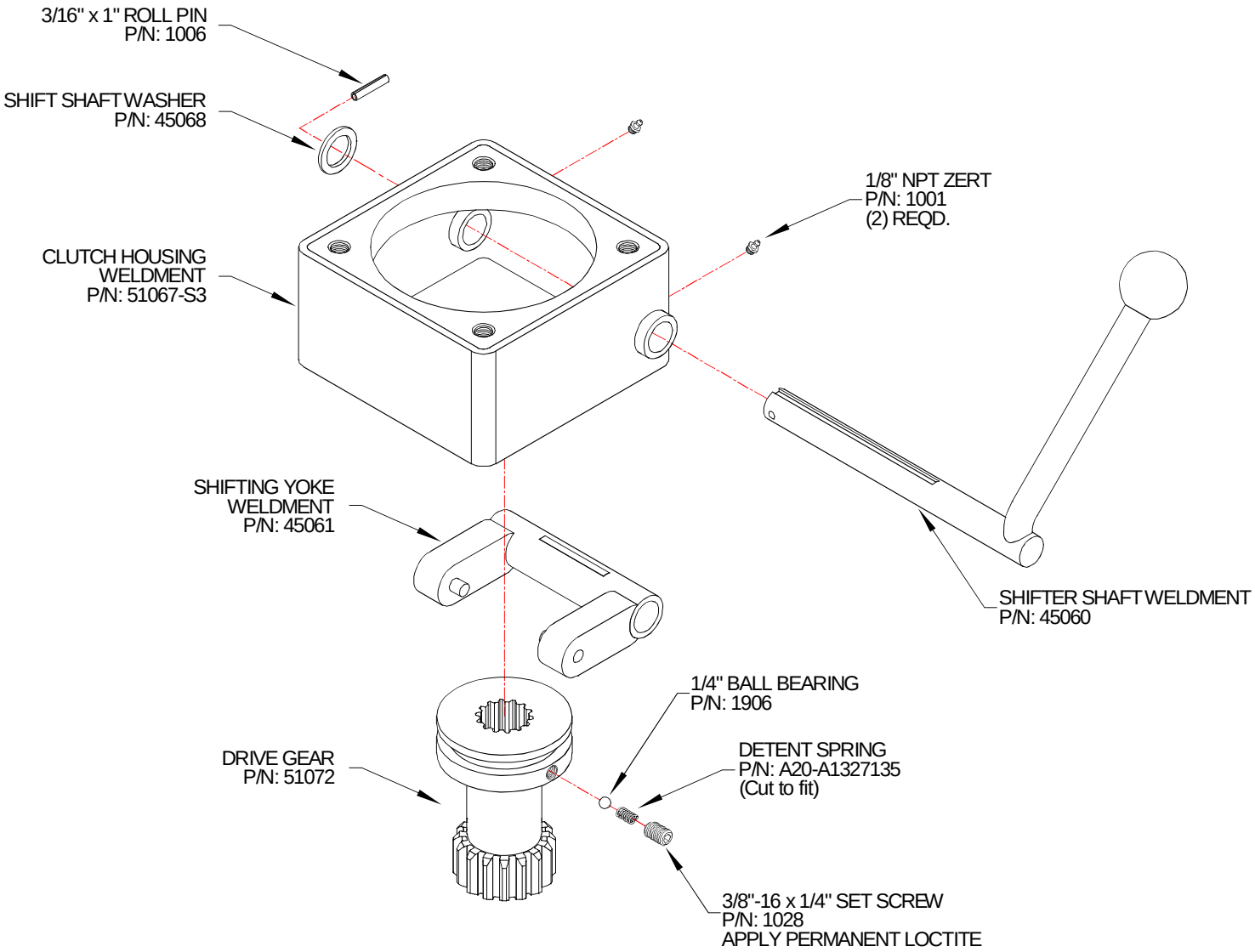

SHIFT BOX ASSEMBLY

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

		10/30/00
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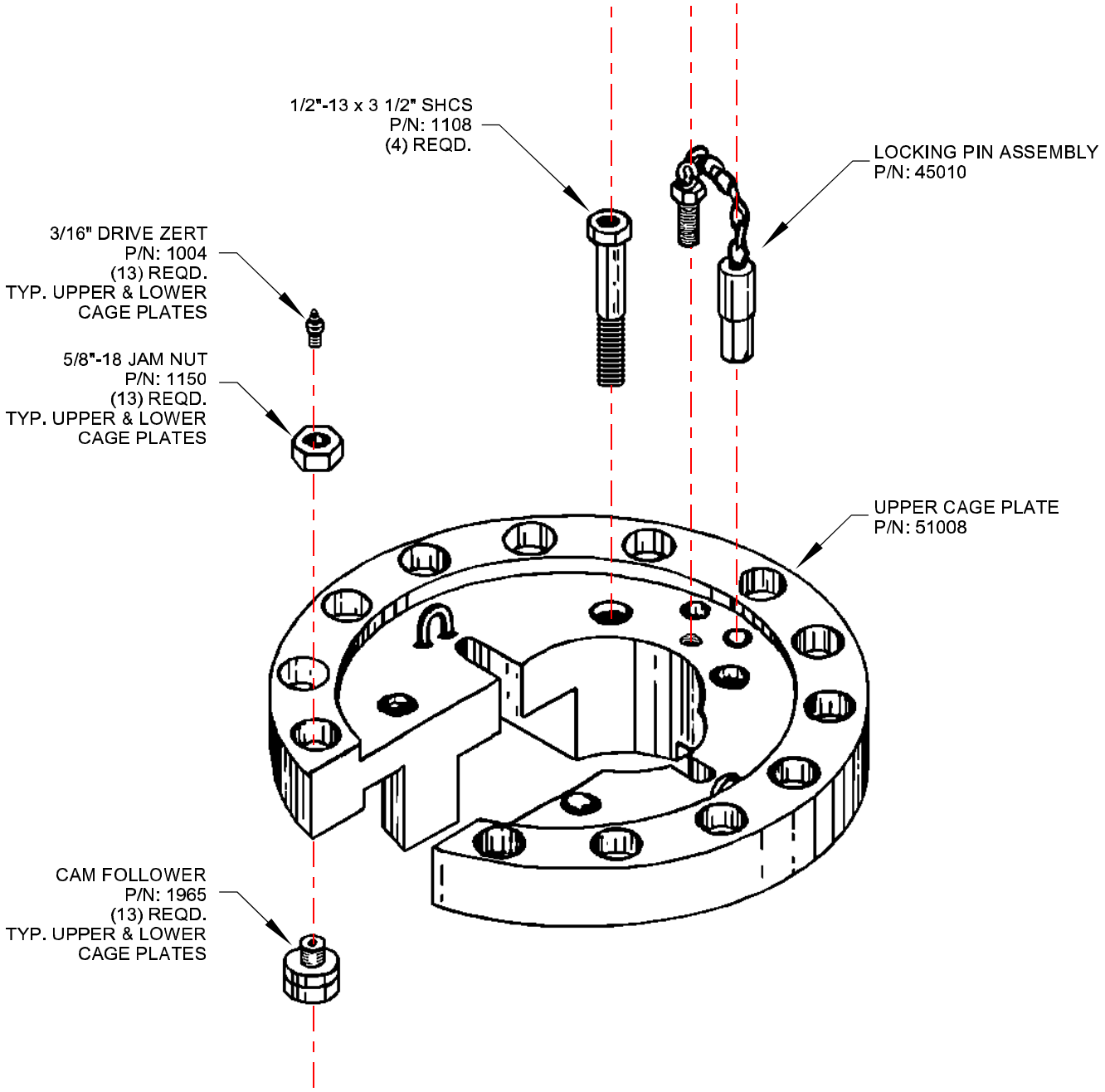

UPPER CAGE PLATE ASSEMBLY

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

REV. #	LOG #	DATE
		10/25/00

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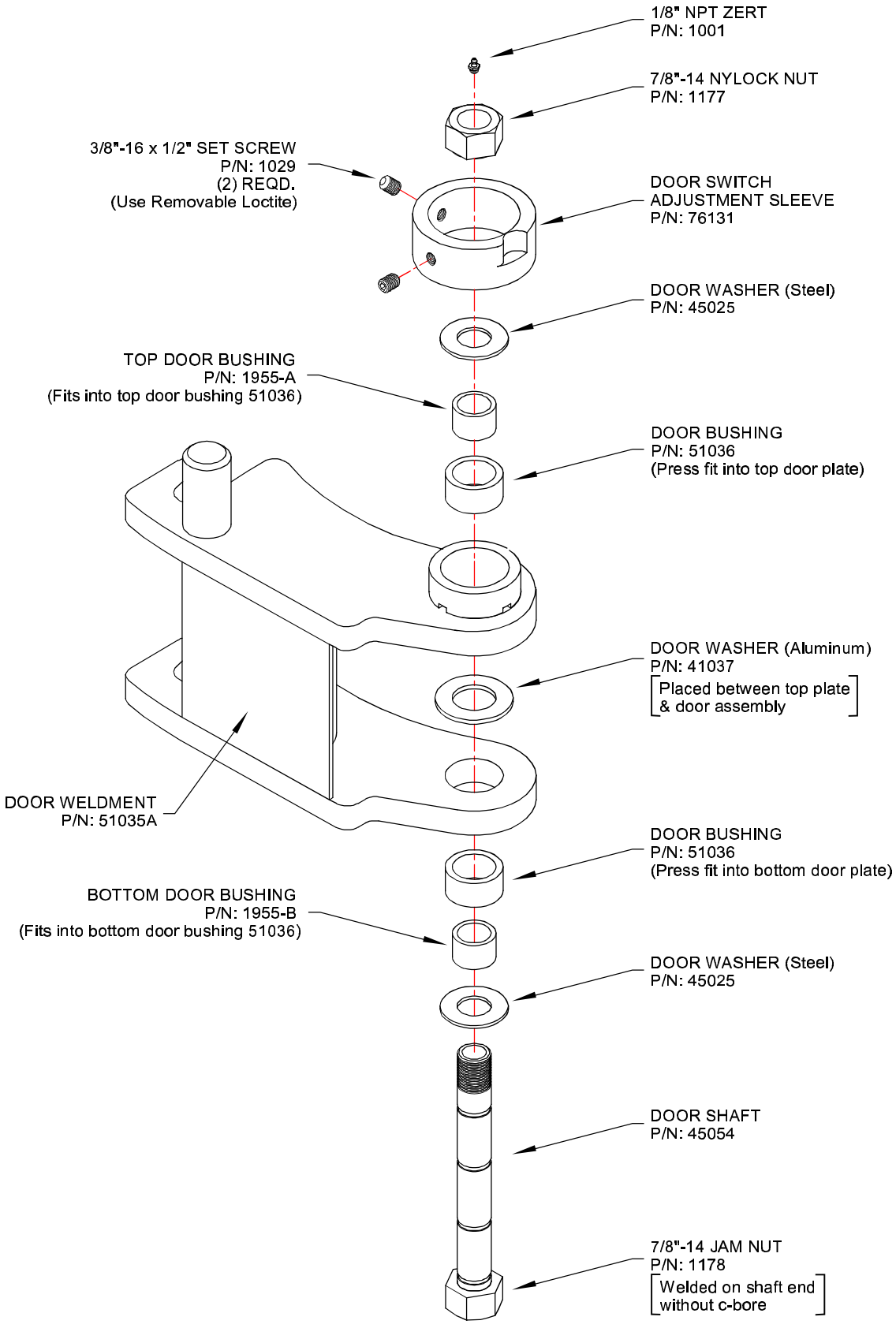

TONG DOOR ASSEMBLY

FOR PRODUCTIONS BEFORE 11/2000

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

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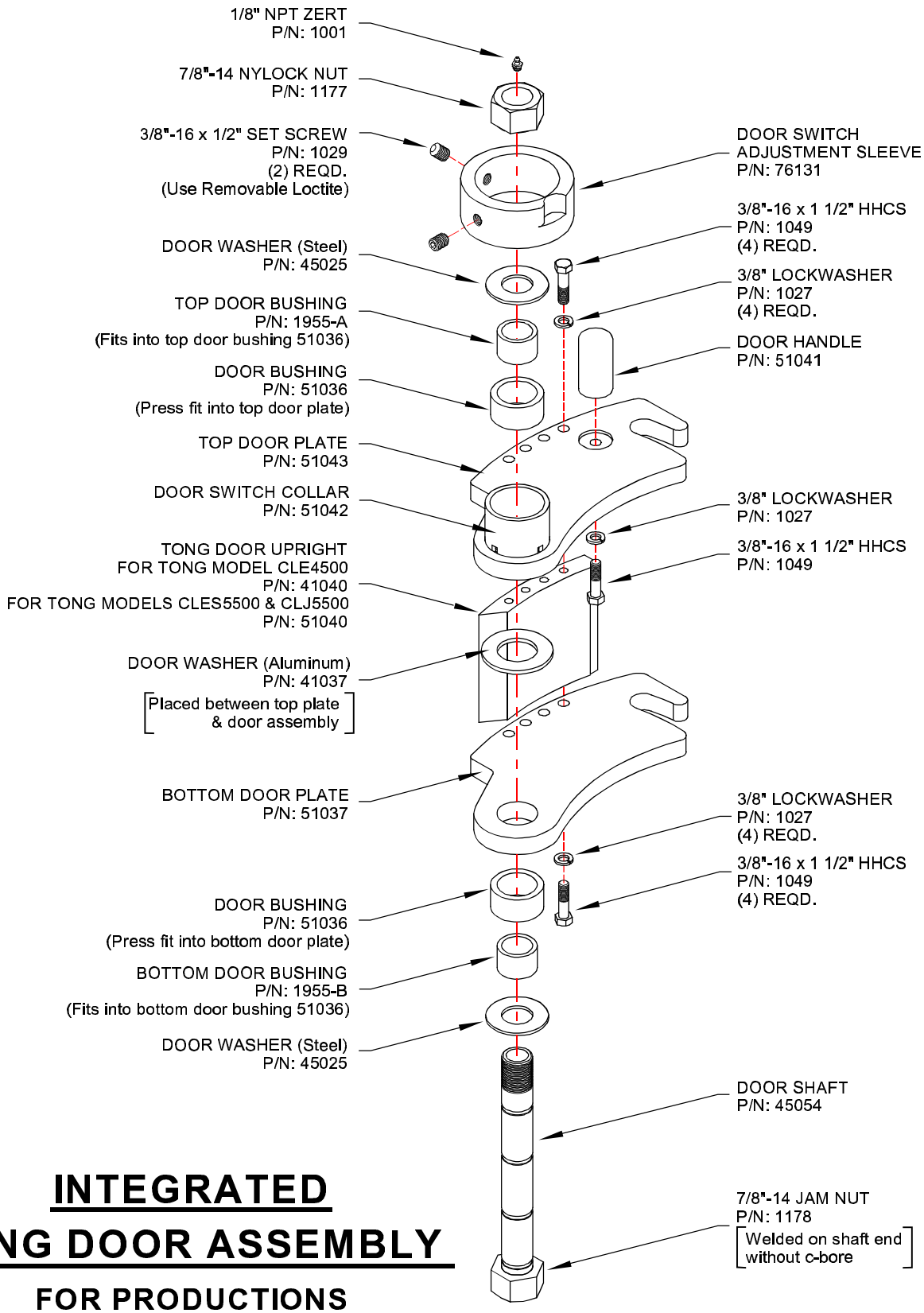

INTEGRATED
TONG DOOR ASSEMBLY

FOR PRODUCTIONS AFTER 11/2000

FOR TONG MODEL CLE4500
DOOR ASSEMBLY NO. 41035B
FOR TONG MODELS CLES5500 & CLJ5500
DOOR ASSEMBLY NUMBER 51035B

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

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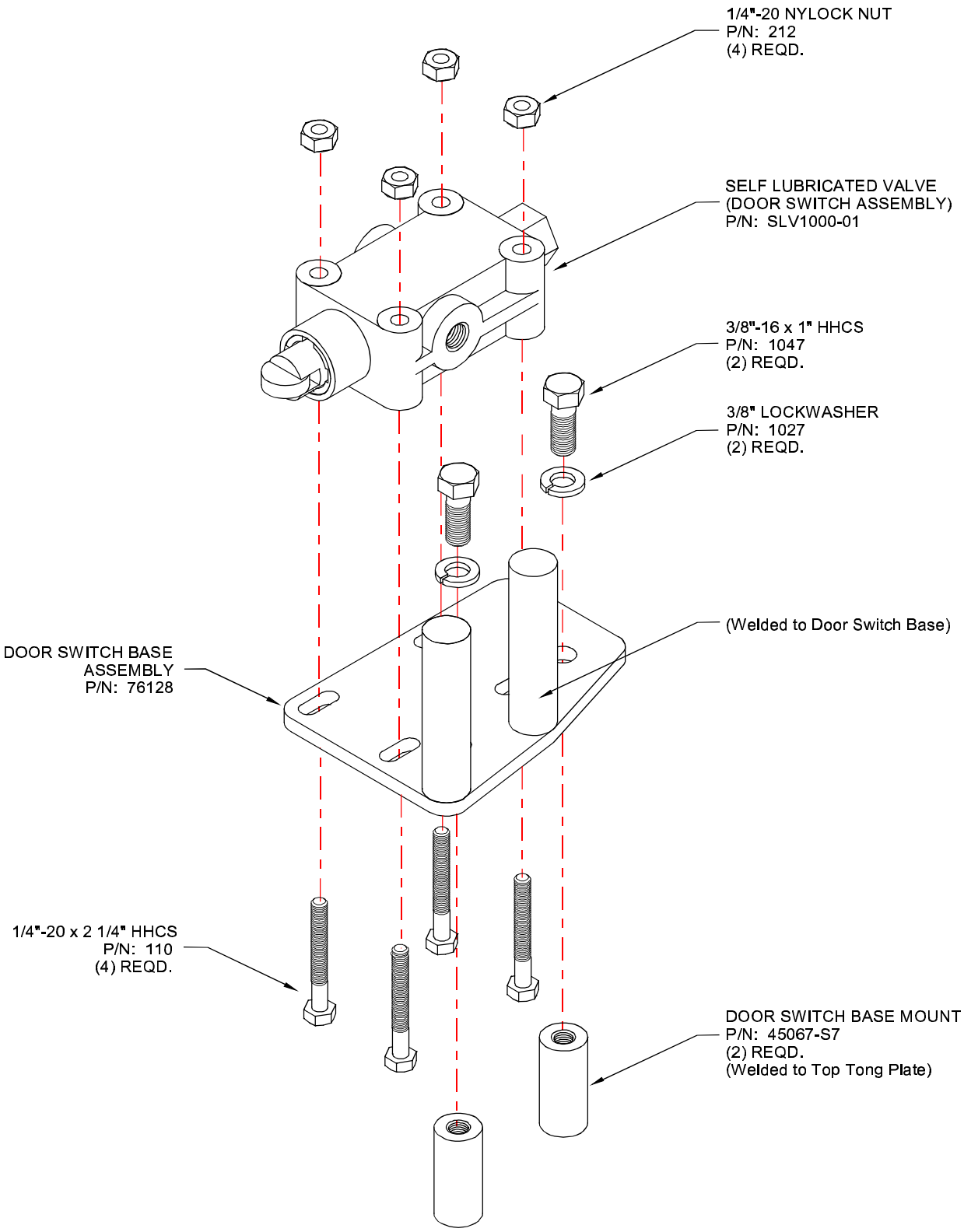

DOOR SWITCH ASSEMBLY

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

		06/22/00
REV. #	LOG #	DATE

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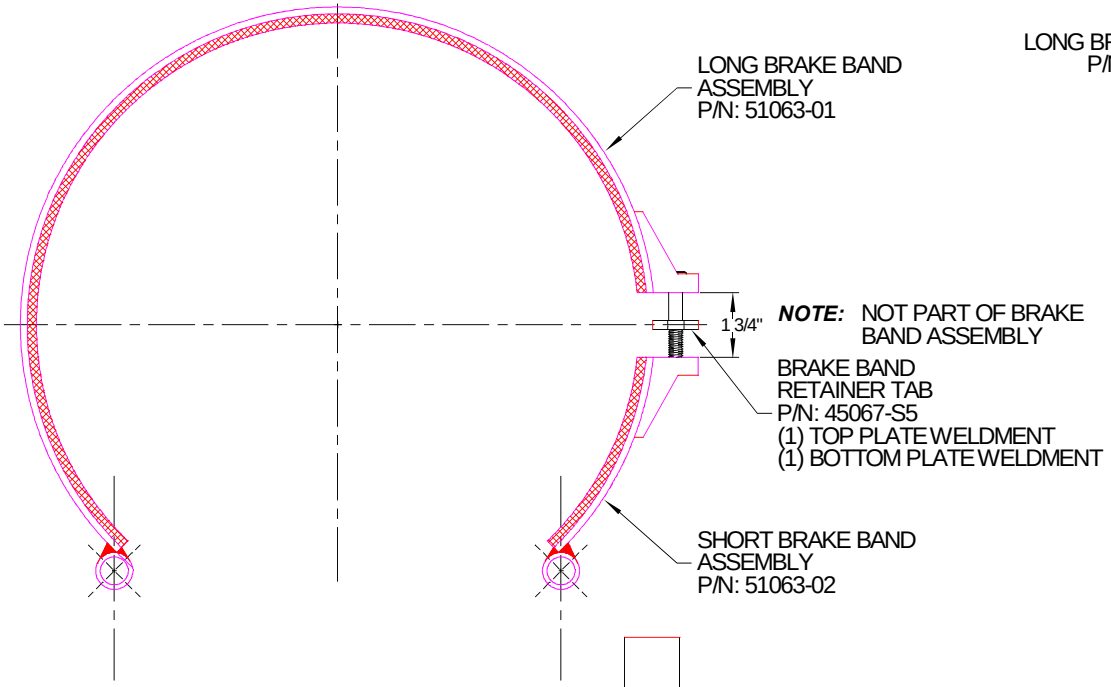
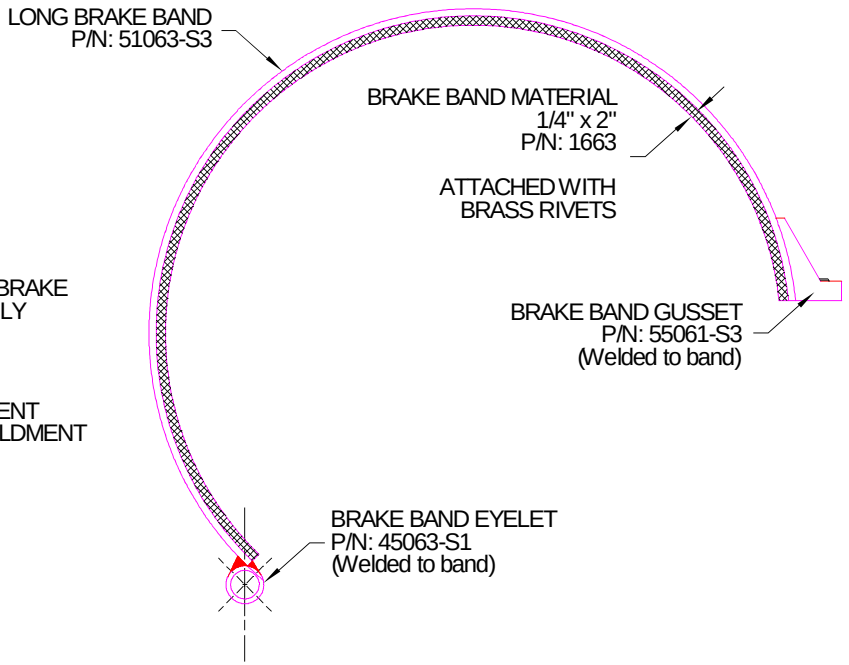
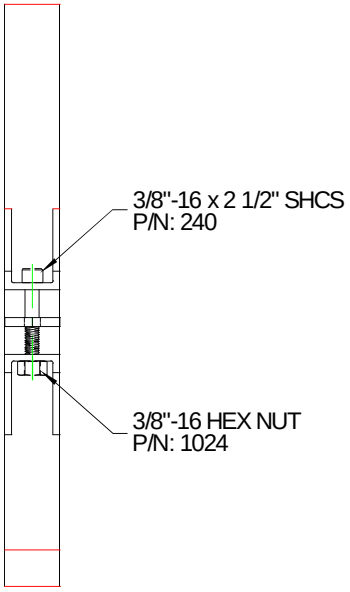


LONG BRAKE BAND ASSEMBLY
ASSEMBLY NO. 51063-01

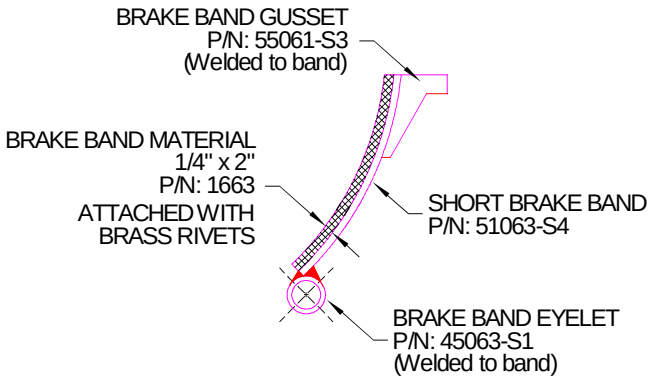




NOTE: CAP SCREW & NUT ARE NOT PART OF BRAKE BAND ASSEMBLY. THEY ARE PART OF TONG ASSY.

NOTE: CAP SCREW AND NUT ARE SHOWN AS BOTTOM VIEW, REVERSE FOR TOP BRAKE BAND.

SHORT BRAKE BAND ASSEMBLY
ASSEMBLY NO. 51063-02



BRAKE BAND ASSEMBLY

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

		10/31/00
REV. #	LOG #	DATE

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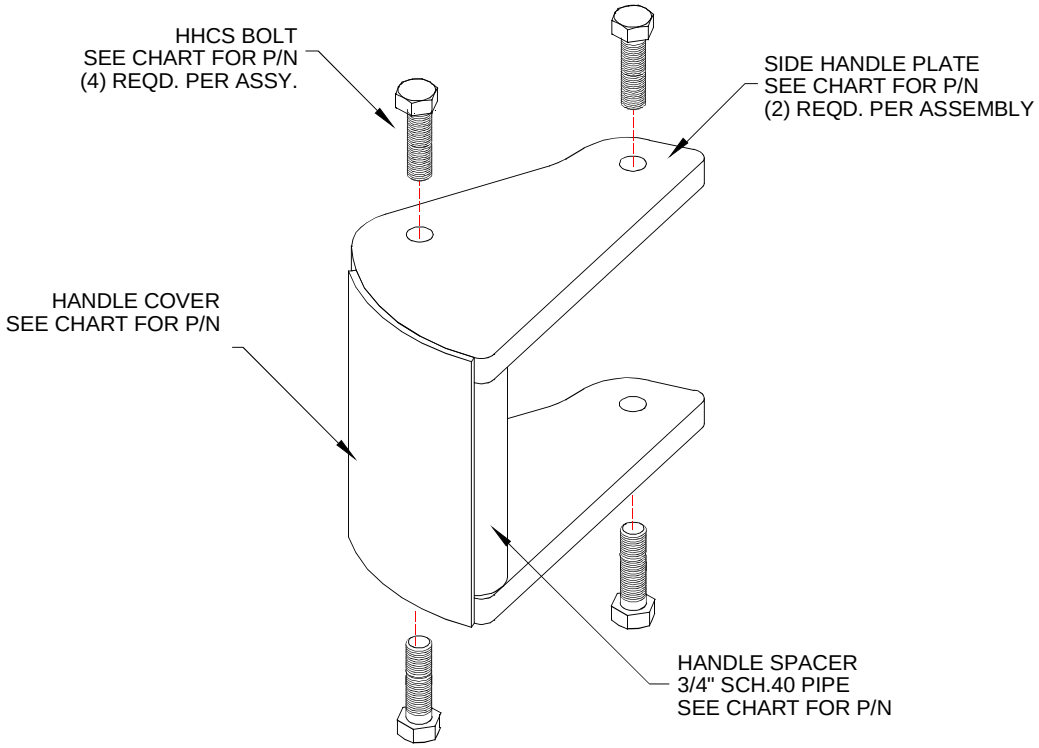
TONG	ASSEMBLY NUMBER	HANDLE SPACER PIPE PART NO.	HANDLE COVER PLATE PART NO.	SIDE HANDLE PLATE PART NO.	HHCS BOLT	
					PART NO.	SIZE
4 1/2 STANDARD	41111	41111-S1	41111-S2	45121	143	3/8"-16 x 2 1/4"
5 1/2 STANDARD	51111	51111-S1	51111-S2	45121	143	3/8"-16 x 2 1/4"
5 1/2 LOCKJAW	58086	51111-S1	51111-S2	45121	143	3/8"-16 x 2 1/4"
5 1/2 UHT	55141	73017-S1	55141-S2	45121	201	5/8"-11 x 2 1/4"
7 5/8 STANDARD	76133	73017-S1	76133-S2	45121	201	5/8"-11 x 2 1/4"
7 5/8 DRILL PIPE	73017	73017-S1	73017-S2	14035	201	5/8"-11 x 2 1/4"
8 5/8 DRILL PIPE	73095	73095-S1	73095-S2	14035	201	5/8"-11 x 2 1/4"



SIDE HANDLE ASSEMBLY

SEE CHART FOR ASSEMBLY NUMBER

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

		12/15/00
REV. #	LOG #	DATE

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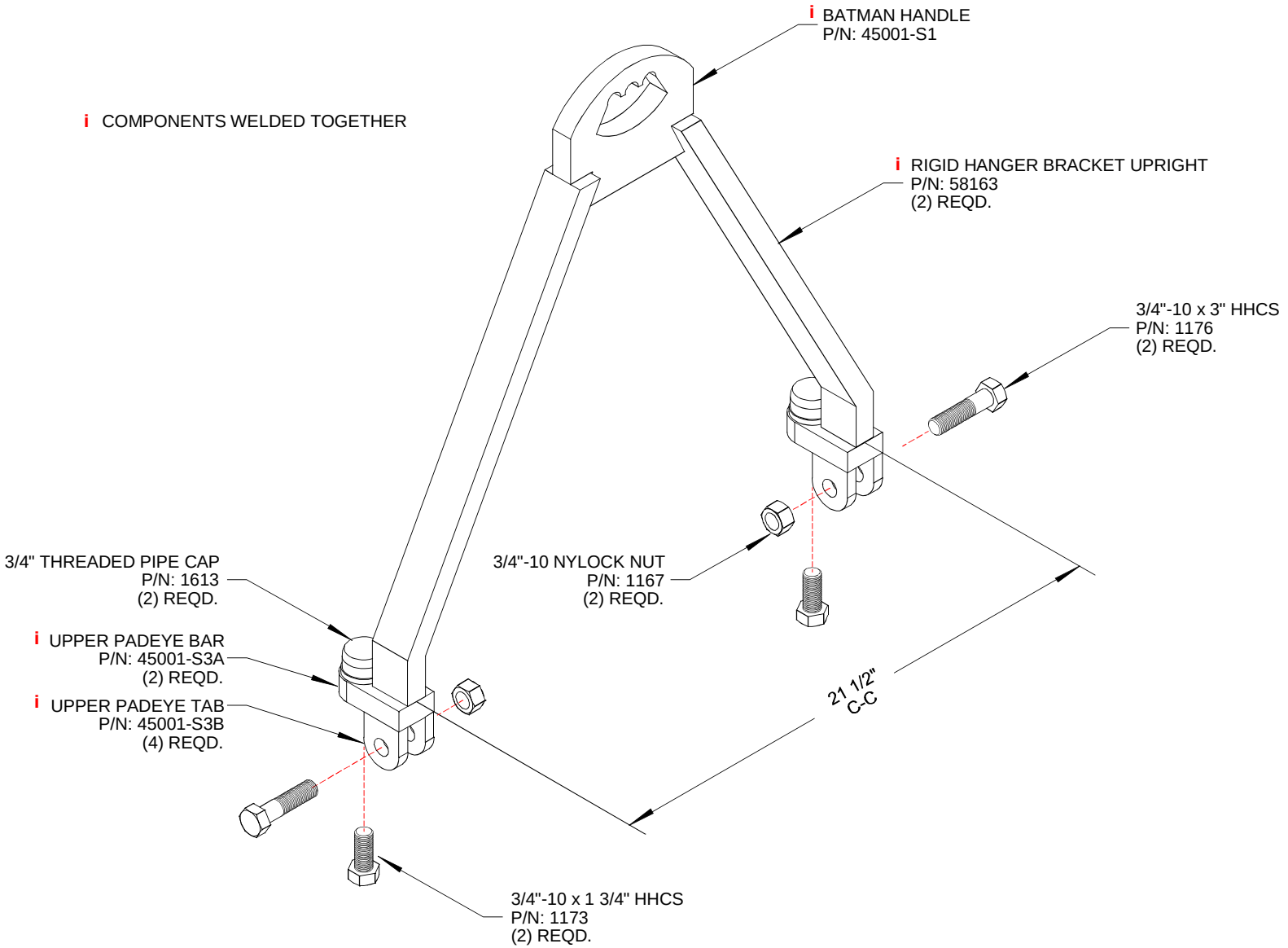

HANGER BRACKET ASSEMBLY

ASSEMBLY NO. 58070

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

		12/21/00
REV. #	LOG #	DATE

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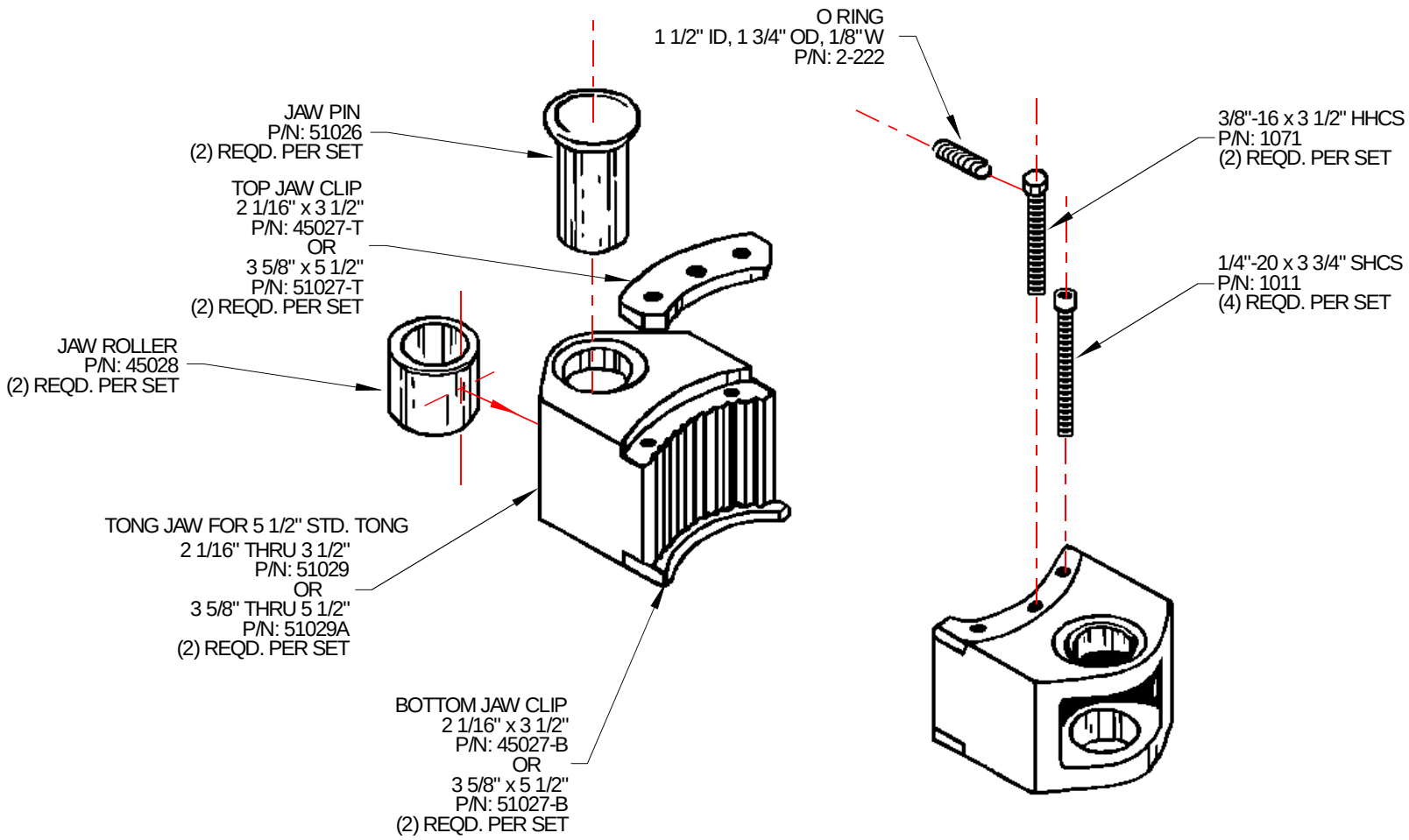

5 1/2" STANDARD TONG JAW ASSEMBLY

2 1/16" - 3 1/2" ASSEMBLY NO. CJ-51A
3 5/8" - 5 1/2" ASSEMBLY NO. CJ-51B

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

		10/25/00
REV. #	LOG #	DATE

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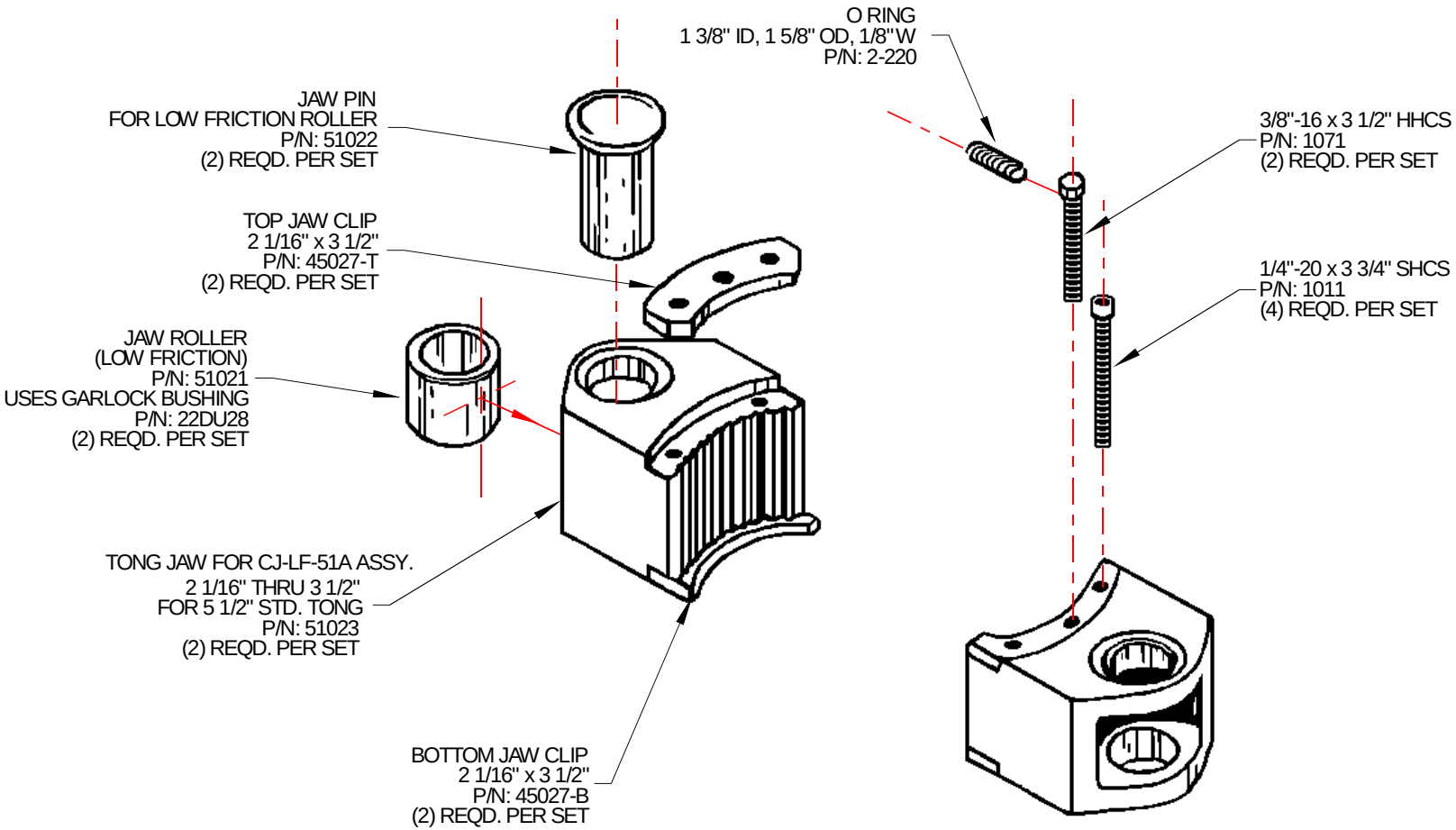

5 1/2" STANDARD TONG
LOW FRICTION JAW ASSEMBLY

2 1/16" - 3 1/2" ASSEMBLY NO. CJ-LF-51A

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
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REV. #	LOG #	DATE
		10/25/00

REF: S:\Equip Manuals\Dwgs\CLES5500\Jaw LF.wpg

SECTION 10 BACKUP ILLUSTRATIONS

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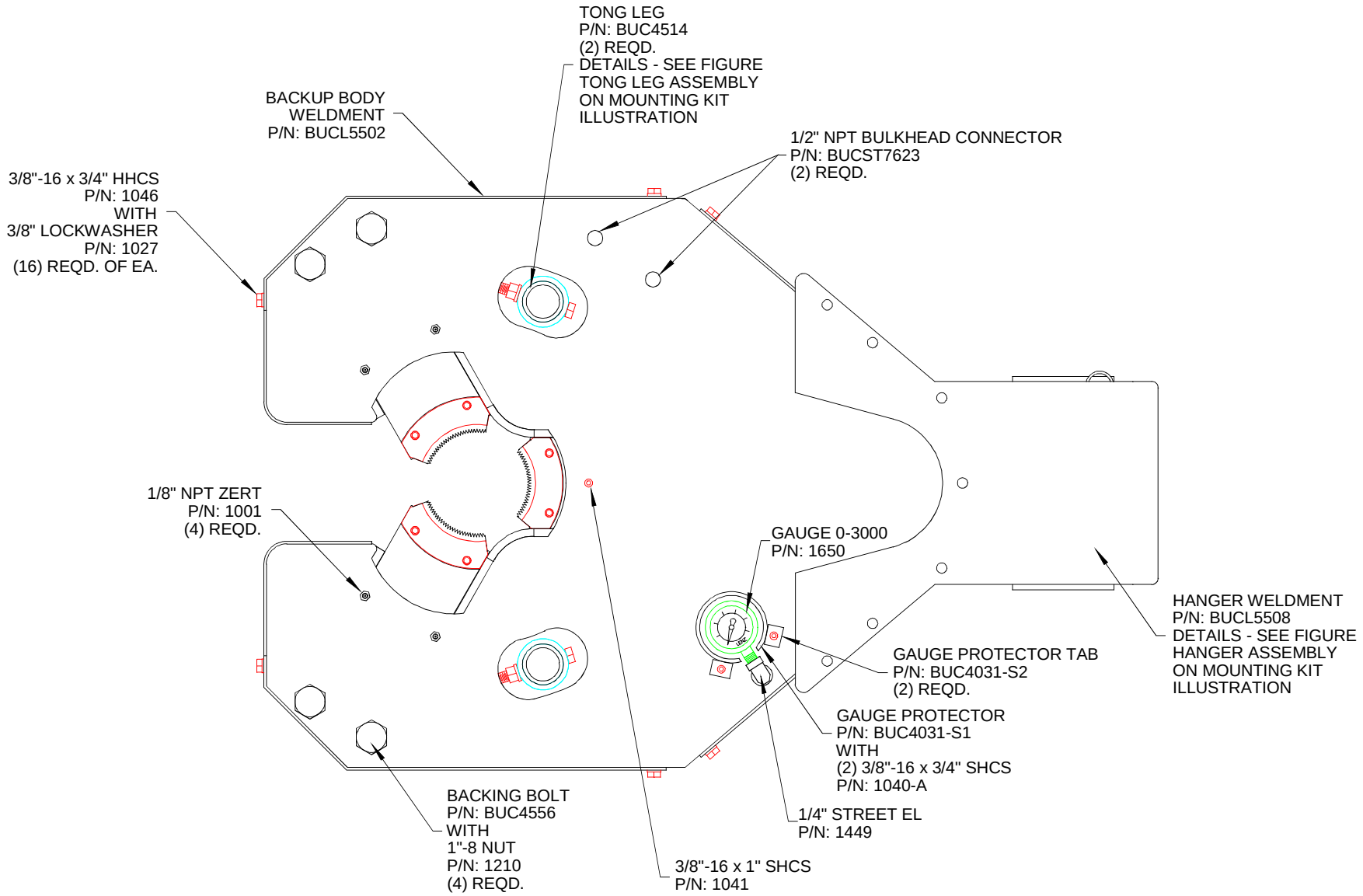

5 1/2" STANDARD BACKUP
TOP VIEW

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

		12/22/00
REV. #	LOG #	DATE

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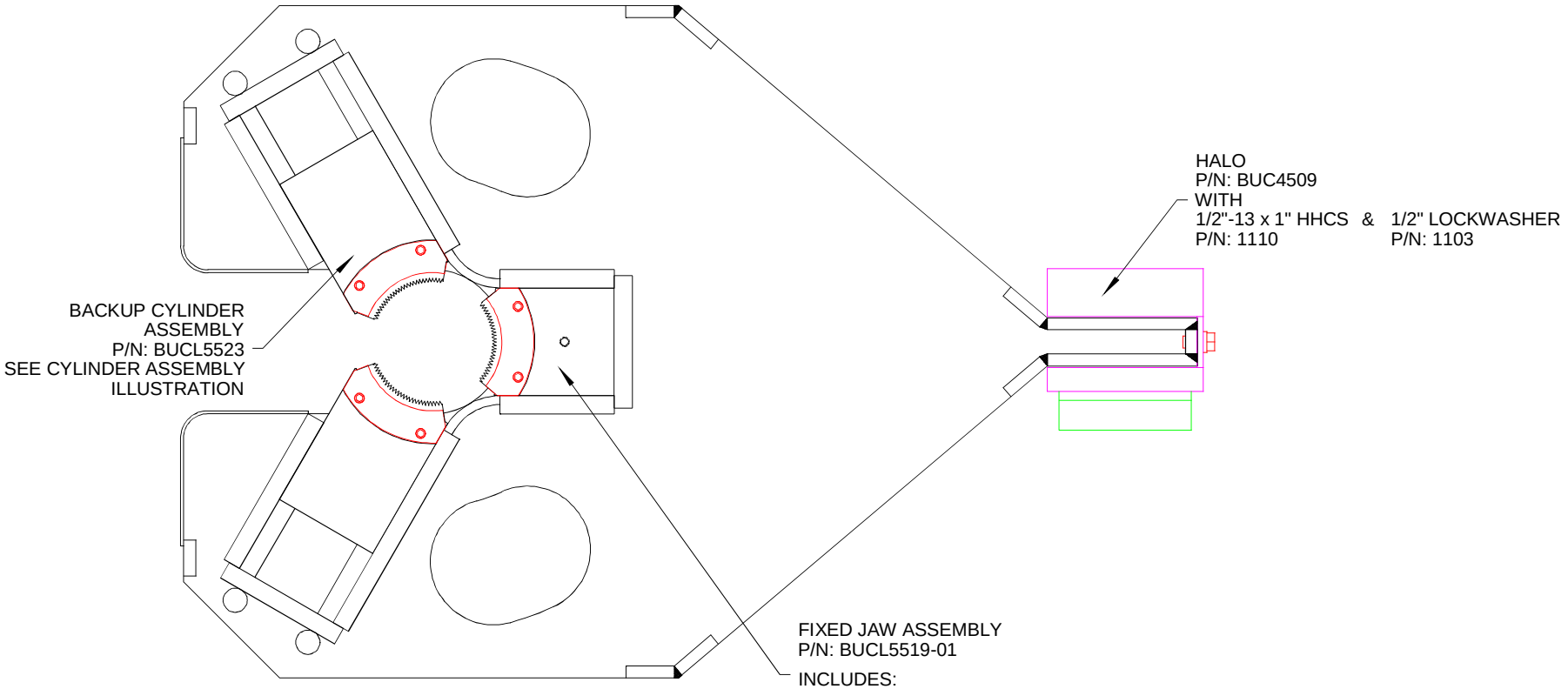

5 1/2" STANDARD BACKUP
TOP VIEW WITHOUT TOP PLATE

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

		12/22/00
REV. #	LOG #	DATE

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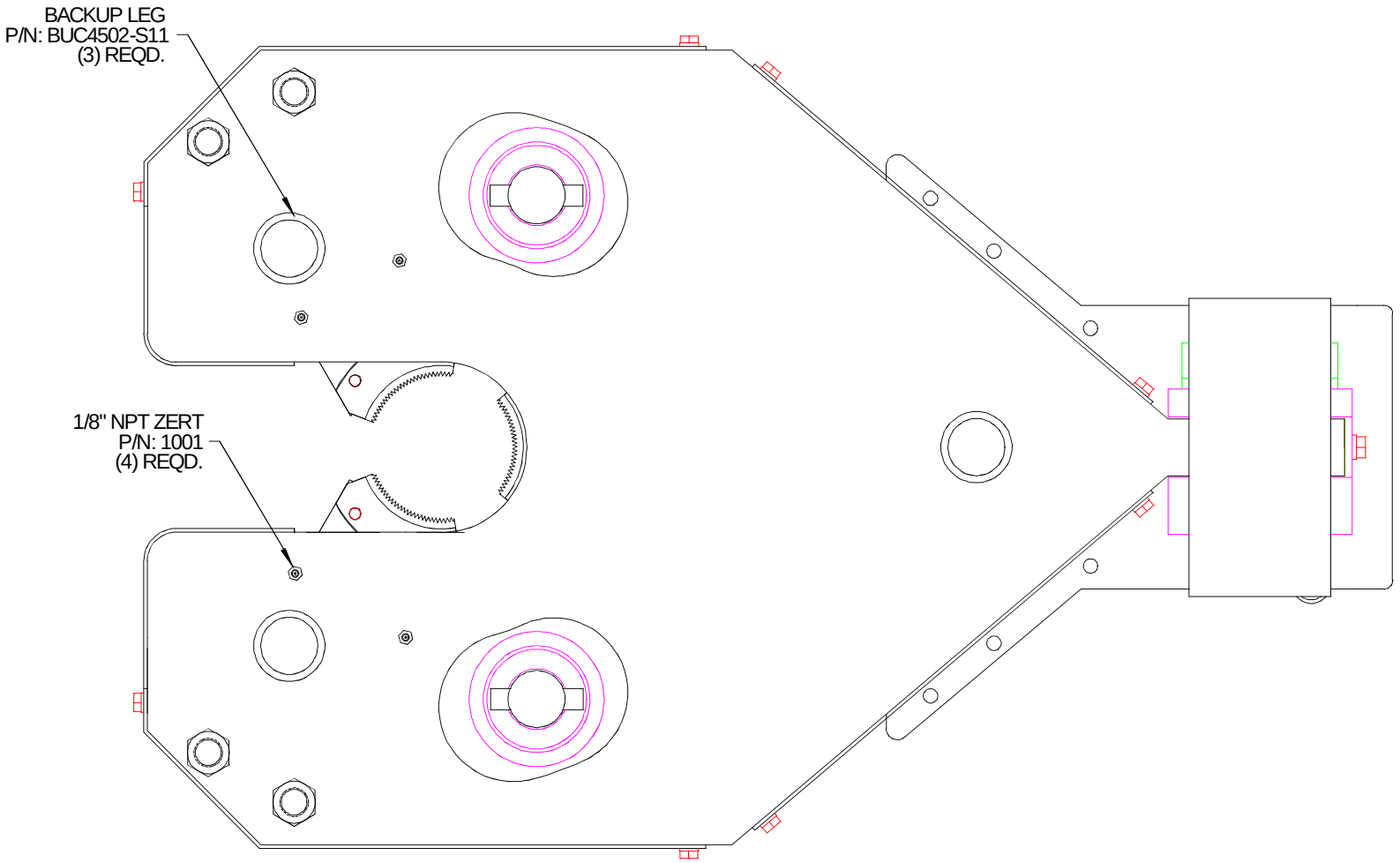


5 1/2" STANDARD BACKUP
BOTTOM VIEW

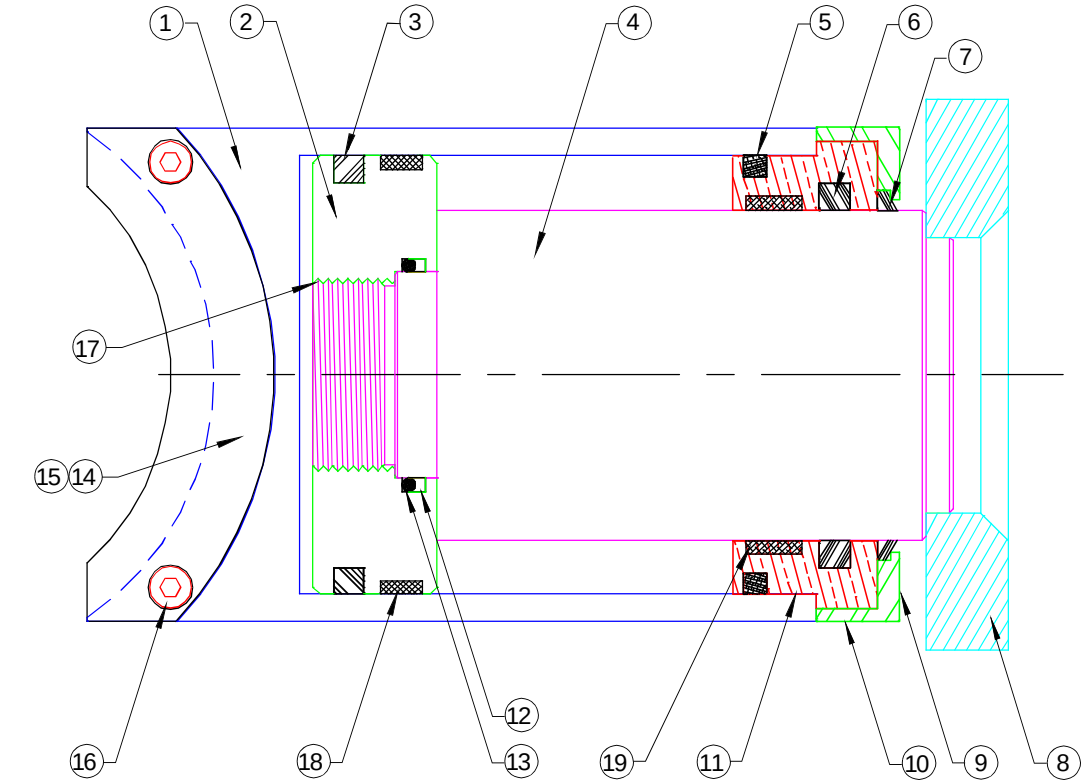
SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

		11/06/00
REV. #	LOG #	DATE

REF: S:\Equip Manuals\Dwgs\BUCL5500\Bottom View.wpg

i SEAL KIT NO. ASAP2185

	BILL OF MATERIALS			
	Item	*Qty.*	*P/N*	*Description*
	1	1	BUCL5531	Cylinder Housing
	2	1	BUC4525	Piston
i	3	1	25003500	Polypack 3 1/2" x 4" x 1/4"
	4	1	BUC4526-S2	Rod
i	5	1	18703625	Polypack 3 5/8" x 4" x 3/16"
i	6	1	25003000	Polypack 3 x 3 1/2" x 1/4"
i	7	1	D3000	Rod Wiper 3"ID,3 1/2"OD,3/8"HT,1/4"TH
	8	1	BUC4527	Backing Plate (Welded to Item 4)
	9	4	247	1/2"-13 x 1 1/4" SHCS
	10	1	BUC4529	Gland Cap
	11	1	BUC4528A	Gland
i	12	1	8-225	Backup Ring
i	13	1	2-225	O-Ring 1 7/8"ID,2 1/8"OD,1/8"W
	14	1	BUCL5520	Top Jaw Clip
	15	1	BUCL5531-S1	Bottom Jaw Clip (Welded to Item 1)
	16	2	1020	1/4"-20 x 4 1/4" SHCS
	17	1	1008-B	1/4"-20 x 1/4" Set Screw
i	18	1	W40000375	Wearband
i	19	1	W32500500	Wearband



For Item 14 Only

5 1/2" BACKUP CYLINDER ASSEMBLY OLD STYLE

ASSEMBLY NO. BUCL5523-01

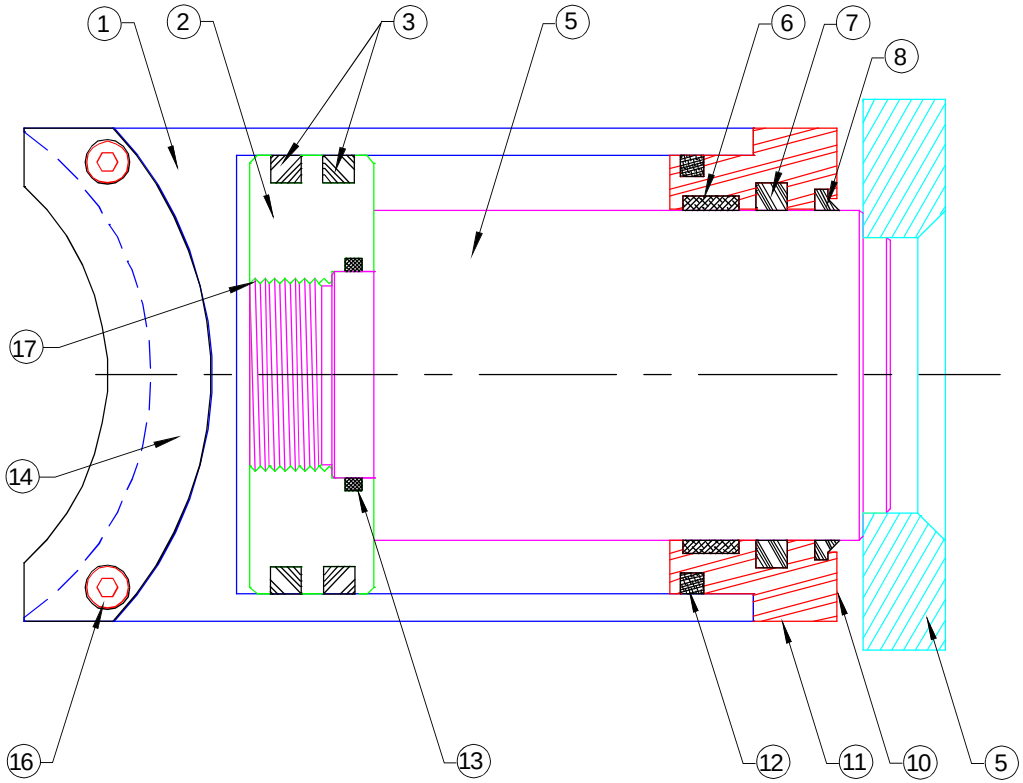
SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

		12/20/00
REV. #	LOG #	DATE

REF: S:\Equip Manuals\Dwgs\BUCL5500\Cylinder-Old Style.wpg

i SEAL KIT NO. ASAP2186

	BILL OF MATERIALS			
	Item	*Qty.*	*P/N*	*Description*
	1	1	BUCL5530	Cylinder Housing Weldment
	2	1	BUC4525	Piston
i	3	2	25003500	Polypack 3 1/2" x 4" x 1/4"
	4	---	-----	-----
	5	1	BUC4526	Rod w/Backing Plate Weldment
i	6	1	W32500500	Wearband
i	7	1	25003000	Polypack 3 x 3 1/2" x 1/4"
i	8	1	959-29	Rod Wiper 3"
	9	---	-----	-----
	10	4	246	1/2"-13 x 1" SHCS
	11	1	BUC4528	Gland
i	12	1	18703625	Polypack 3 5/8" x 4" x 3/16"
i	13	1	12501875	Polypack 1 7/8" x 2 1/8" x 1/8"
	14	1	BUCL5520	Top Jaw Clip
	15	---	-----	-----
	16	2	1020	1/4"-20 x 4 1/4" SHCS
	17	1	1008-B	1/4"-20 x 1/4" Set Screw



5 1/2" BACKUP CYLINDER ASSEMBLY NEW STYLE

ASSEMBLY NO. BUCL5523

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4225 HWY. 90 EAST
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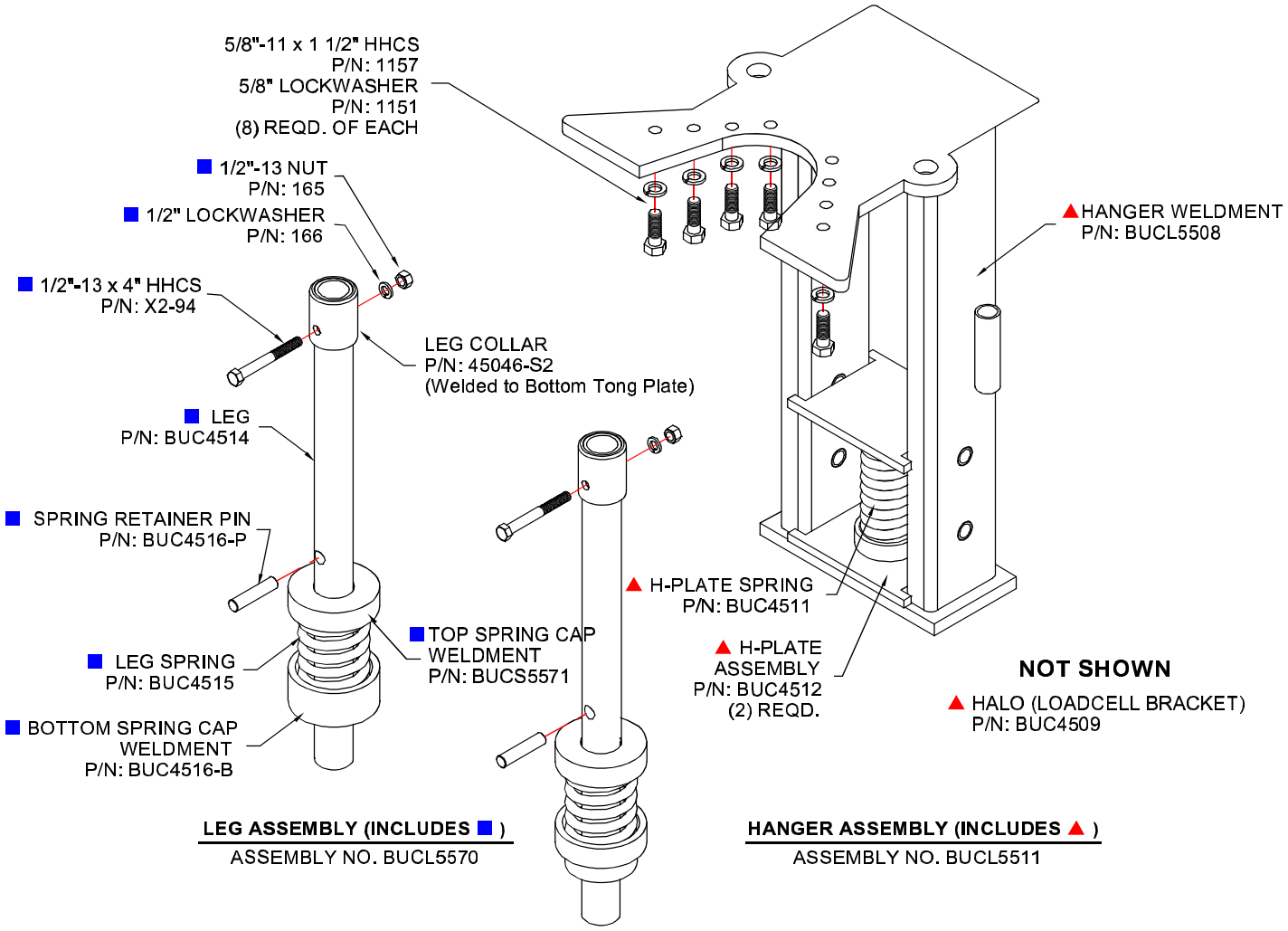
REF: S:\Equip Manuals\Dwgs\BUCL5500\Cylinder-New Style.wpg

NOT SHOWN

VALVE PACKAGE
P/N: VP5800



NOT SHOWN

▲ HALO (LOADCELL BRACKET)
P/N: BUC4509

LEG ASSEMBLY (INCLUDES ■)
ASSEMBLY NO. BUCL5570

HANGER ASSEMBLY (INCLUDES ▲)
ASSEMBLY NO. BUCL5511

BUCL5500 / 5 1/2" STD. BACKUP MOUNTING KIT ASSEMBLY

ASSEMBLY NO. MK5100

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
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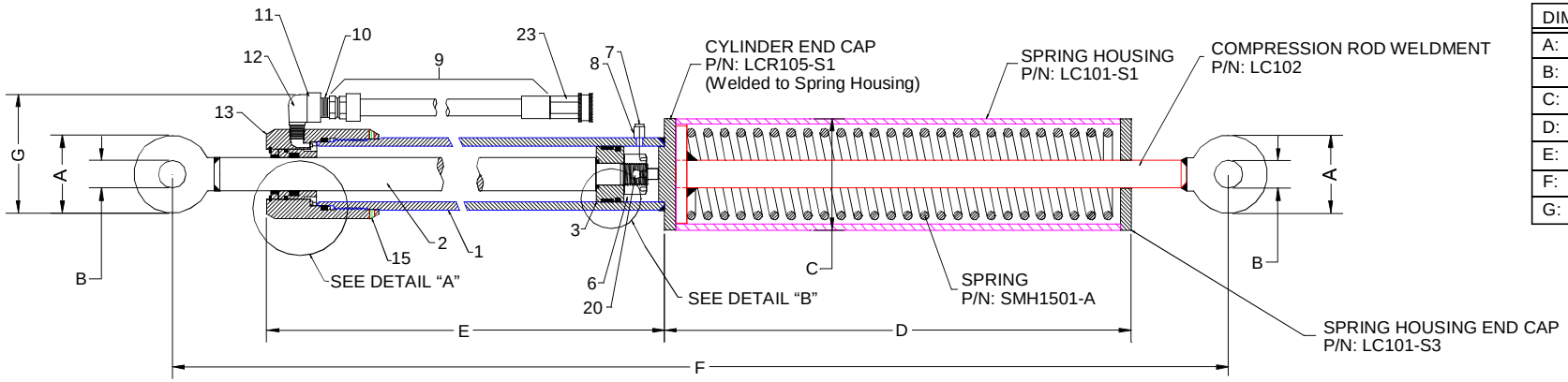
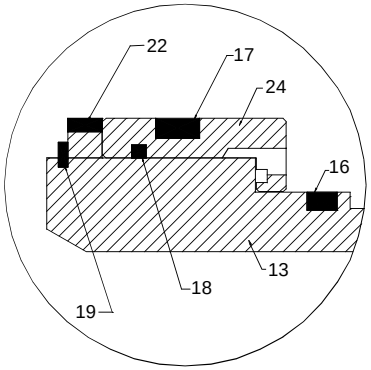


DIMENSIONAL DATA
A: 3 1/2" x 3/4"
B: 1 1/4"
C: 5"
D: 21"
E: 40 1/4"
F: 70"
G: 5 5/16"

BILL OF MATERIALS

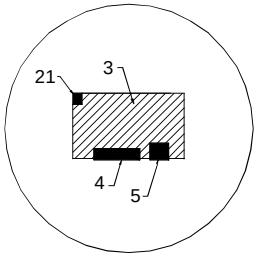
Item	Qty.	Description	P/N
1	1	HYD/AIR CYLINDER BARREL	LCR105
2	1	CYLINDER ROD WELDMENT	LCR112
3	1	PISTON	LCR106
4	1	WEARBAND	W25000500
5	1	POLYPACK 2 1/8" x 2 1/2" x 3/16"	18702125
6	1	1"-12 SLOTTED HEX NUT	1209
7	1	1/2" FLUSH PLUG W/ 1/8" ORIFICE	1657
8	1	1/2" HALF COLLAR	1380
9	1	1/2" x 120" HOSE ASSY. MNPT x FJIC	LCR107-A
10	1	3/8" MNPT x 1/2" MJIC ADAPTER	1466
11	1	3/8" STREET EL W/ORIFICE	LCR109
12	1	3/8" STREET EL	1450
13	1	GLAND CAP	LCR119
14	---	----------	----------
15	2	1/4"-20 x 3/8" SET SCREW	1015
16	1	O RING 2 7/8"ID, 3 1/4"OD, 3/16"W	2-336
17	1	POLYPACK 1 1/2" x 1 7/8" x 3/8"	18701500-375
18	1	O RING 2"ID, 2 1/4"OD, 1/8"W	2-226
19	1	INTERNAL SNAP RING (N-1300-225)	1947
20	1	1/4" x 1 1/2" ROLL PIN	1008-A
21	1	O RING 1"ID, 1 1/4"OD, 1/8"W	2-214
22	1	SEAL NP CR14938	CR14938
23	1	1/2" FEMALE SNAPTITE Q.D.	1430
24	1	GLAND	LCR113



DETAIL "A"
SCALE: 3X

SPECIFICATIONS - A

MAXIMUM SPRING TRAVEL (PRELOAD TO SOLID)	8.0 in.
MAXIMUM ALLOWABLE LOAD (SPRING FULLY COMPRESSED)	3.043 lbs.
PRESSURE REQUIRED TO LIFT MAXIMUM ALLOWABLE LOAD	969 psi
MAXIMUM ALLOWABLE INTERNAL PRESSURE	3,000 psi
CYLINDER I.D.	2.50 in.
ROD O.D.	1.5 in.
STROKE	34.94 in.



DETAIL "B"
SCALE: 3X

LIFT CYLINDER ASSEMBLY

ASSEMBLY NUMBER LCR100-A

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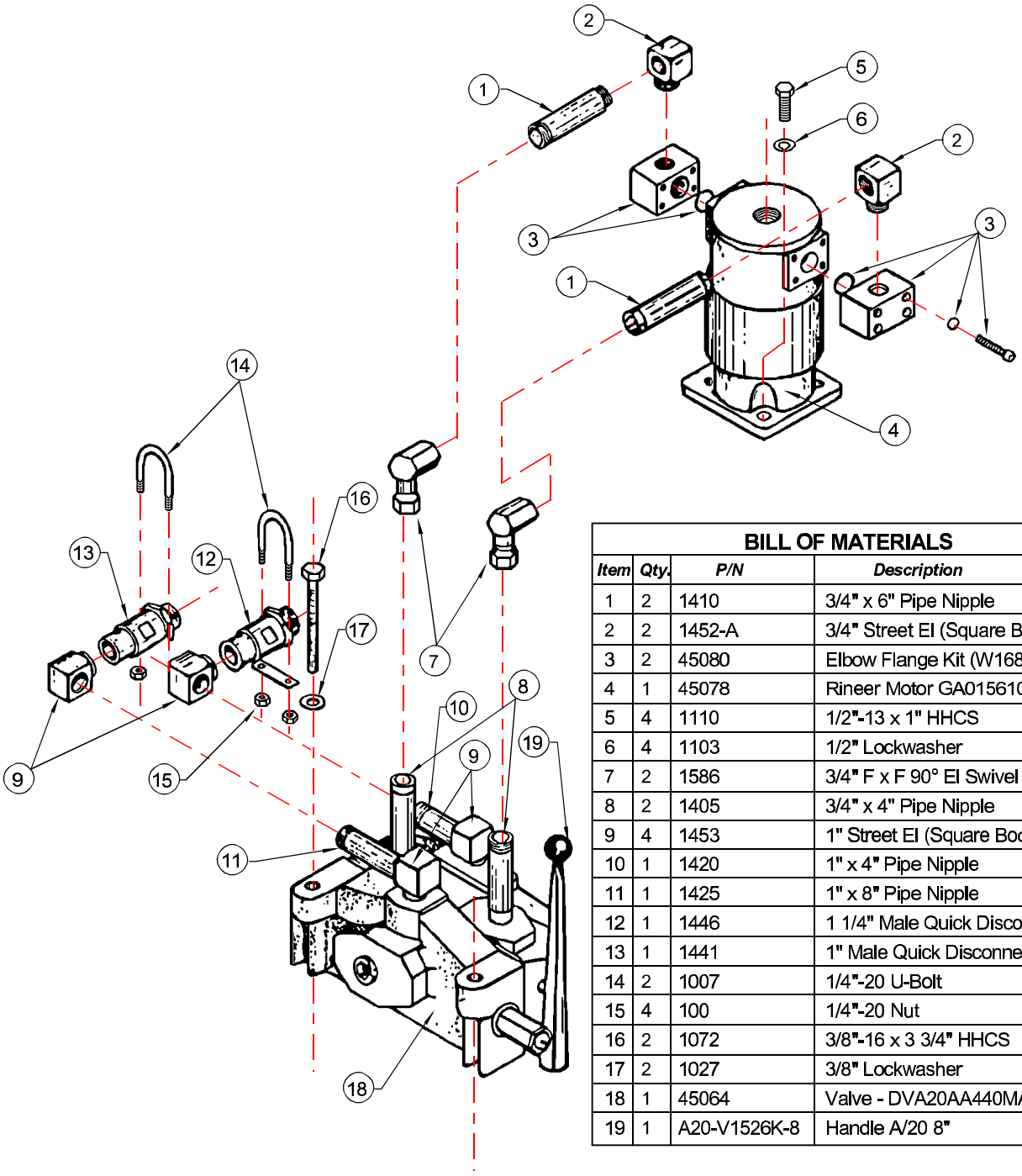
SECTION 11 PLUMBING ILLUSTRATIONS

TABLE OF CONTENTS

5 1/2" STANDARD BACKUP STANDARD FITTINGS
PRESENTLY UNAVAILABLE
WILL DISTRIBUTE WHEN PUBLISHED



BILL OF MATERIALS			
Item	*Qty.*	*P/N*	*Description*
1	2	1410	3/4" x 6" Pipe Nipple
2	2	1452-A	3/4" Street El (Square Body)
3	2	45080	Elbow Flange Kit (W168-12-20U)
4	1	45078	Rineer Motor GA01561015030
5	4	1110	1/2"-13 x 1" HHCS
6	4	1103	1/2" Lockwasher
7	2	1586	3/4" F x F 90° El Swivel
8	2	1405	3/4" x 4" Pipe Nipple
9	4	1453	1" Street El (Square Body)
10	1	1420	1" x 4" Pipe Nipple
11	1	1425	1" x 8" Pipe Nipple
12	1	1446	1 1/4" Male Quick Disconnect
13	1	1441	1" Male Quick Disconnect
14	2	1007	1/4"-20 U-Bolt
15	4	100	1/4"-20 Nut
16	2	1072	3/8"-16 x 3 3/4" HHCS
17	2	1027	3/8" Lockwasher
18	1	45064	Valve - DVA20AA440MA3TR44
19	1	A20-V1526K-8	Handle A/20 8"

5 1/2" STANDARD TONG
OLD STYLE PLUMBING

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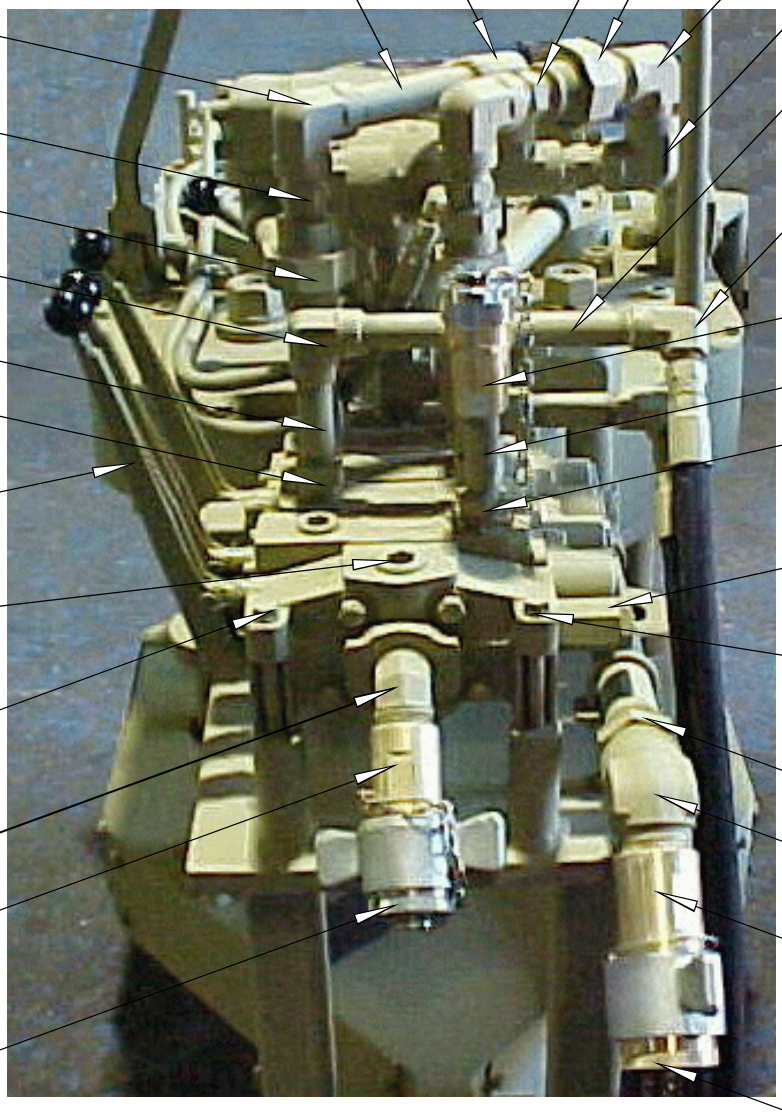

5 1/2" STANDARD TONG
STANDARD FITTINGS

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		12/12/00
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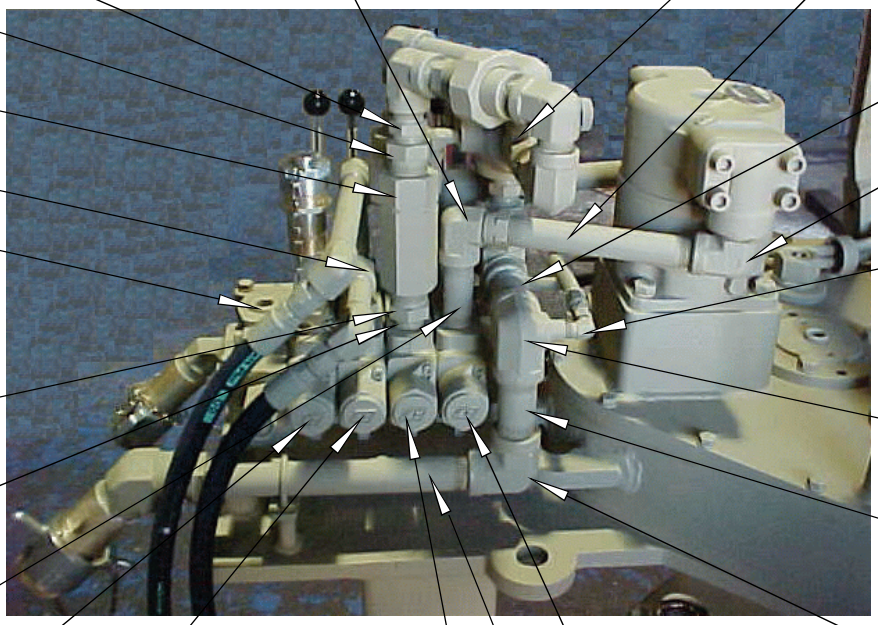

5 1/2" STANDARD TONG

STANDARD FITTINGS

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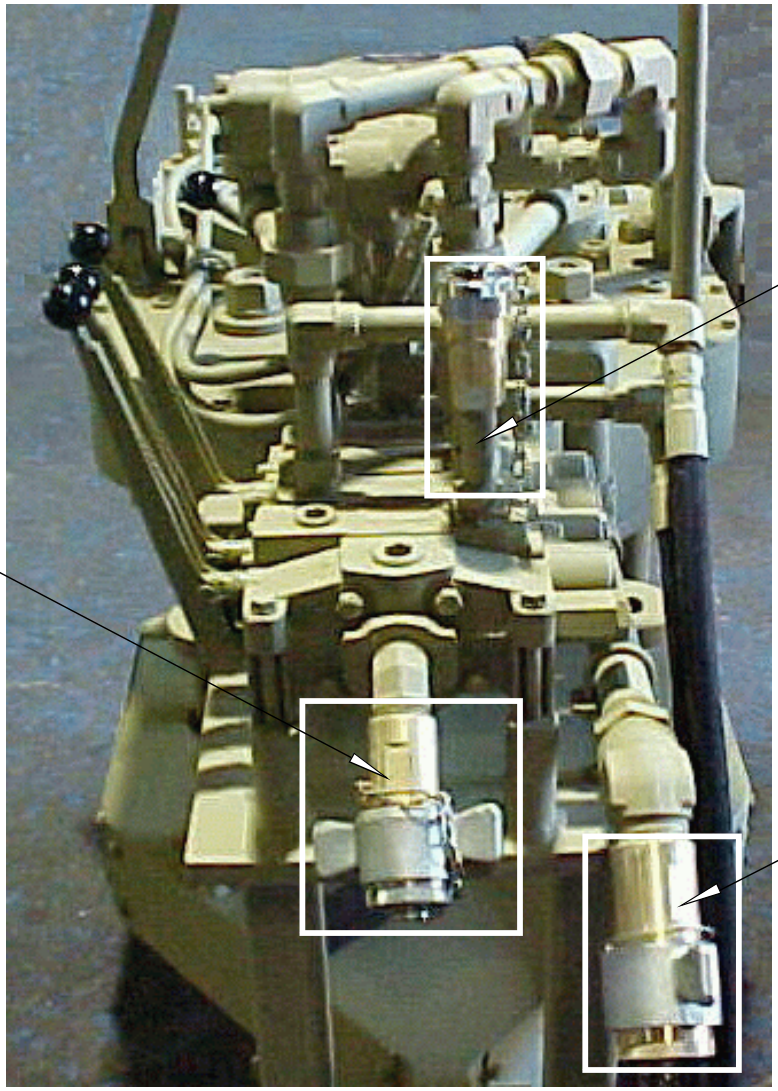

1/2" MALE SNAPTITE
QUICK DISCONNECT
P/N: 1431

1/2" x 3" PIPE NIPPLE
P/N: 1400-A

3/4" x 1/2" REDUCER
BUSHING
P/N: 1495

1" FEMALE WING TYPE
QUICK DISCONNECT
P/N: 1440

1" Q.D. PLUG
P/N: 1666

1 1/4" FEMALE WING TYPE
QUICK DISCONNECT
P/N: 1455

1 1/4" Q.D. PLUG
P/N: 1670

5 1/2" STANDARD TONG SPECIAL FITTINGS FOR REBEL RENTALS

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		12/12/00
REV. #	LOG #	DATE

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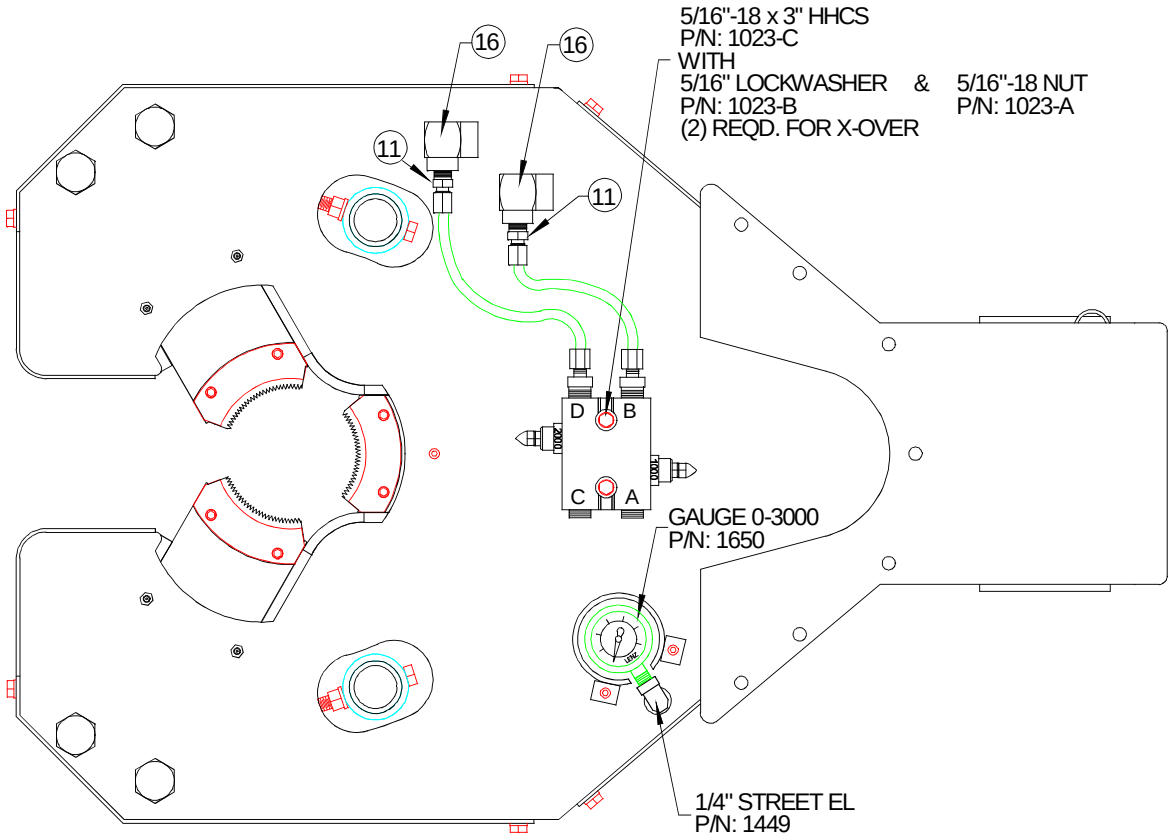

5 1/2" STANDARD BACKUP
OLD STYLE PLUMBING

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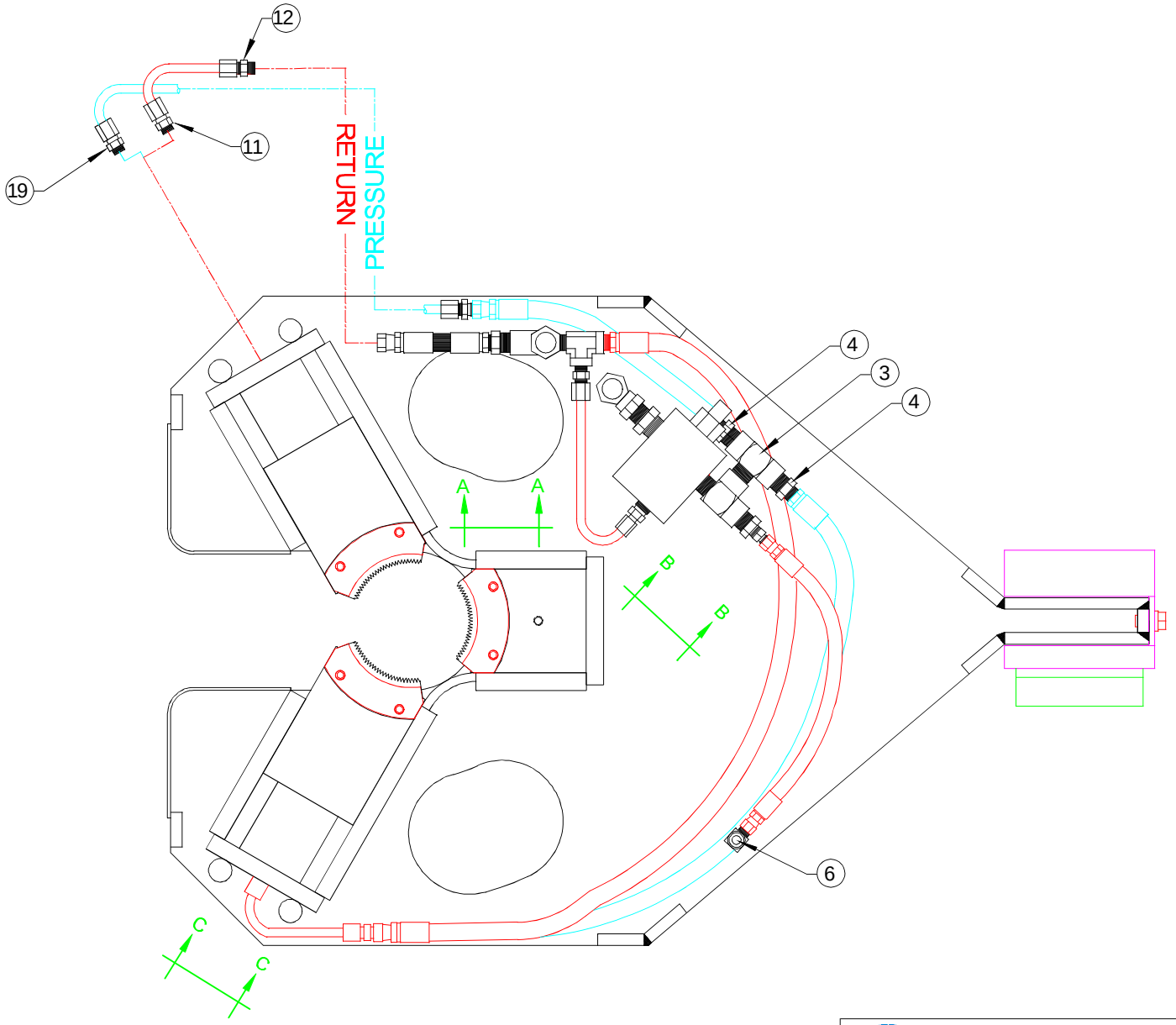

5 1/2" STANDARD BACKUP
OLD STYLE PLUMBING

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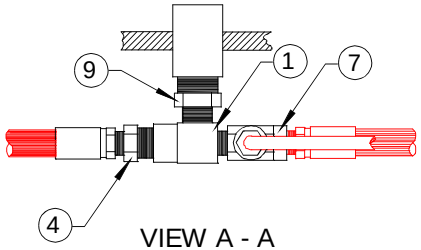
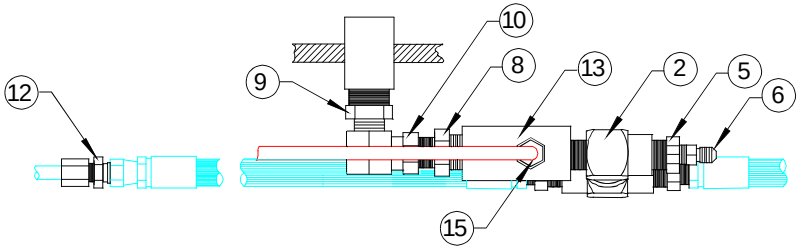
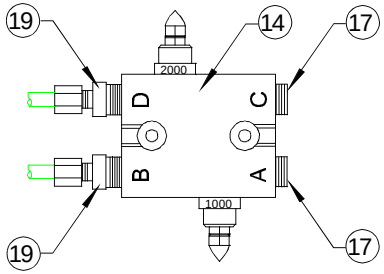


VIEW A - A

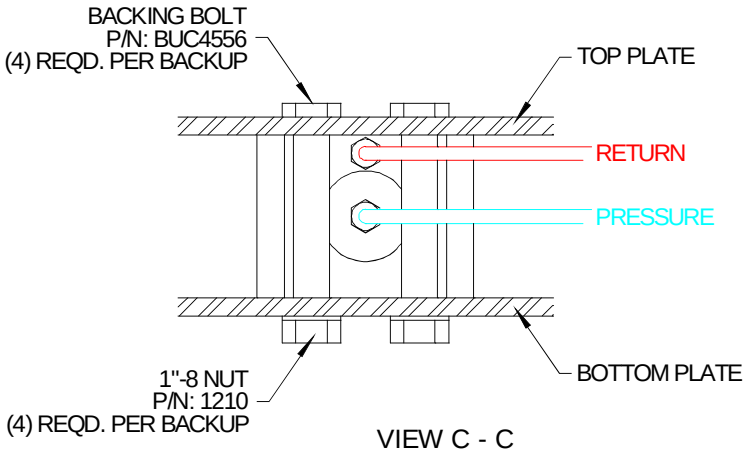


VIEW B - B

BILL OF MATERIALS			
Item	*Qty.*	*P/N*	*Description*
1	1	1450-B	1/2" Street El (Square Body)
2	1	1598	1/2" Run Tee
3	1	1596	1/2" Branch Tee
4	3	1491	1/2" x 3/8" Reducer Bushing
5	1	1490	1/2" x 1/4" Reducer Bushing
6	2	1576	1/4" MNPT x MJIC 90° El
7	1	1595	3/8" Run Tee
8	1	1460	1/2" Hex Nipple
9	2	1495	3/4" x 1/2" Reducer Bushing
10	1	1583	1/2" M x FNPT 90° Swivel Adapter
11	3	1570-A	3/8" MNPT x 3/8" Tube Adapter
12	2	1570	3/8" MNPT x MJIC Adapter
13	1	MHB030LEAH08	Pilot Opr. Counter Balance Valve
14	1	1801	X-Over Relief - 127025
15	1	1564	1/4" MNPT x 3/8" Tube Adapter Str.
16	2	1452-A	3/4" Street El (Square Body)
17	2	1657	1/2" Flush Plug
18	1	1562	1/4" MNPT x MJIC Tube Adapt. Str.
19	3	1571-A	1/2" MNPT x 3/8" Tube Adapter



TOP VIEW OF X-OVER VALVE



VIEW C - C

5 1/2" STANDARD BACKUP
OLD STYLE PLUMBING

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SECTION 12 CLINCHER LOADCELL and TORQUE GAUGE

The CLINCHER Tong and Backup are available in versions which accommodate compression load cells or tension style load cells. All information contained in this Technical Manual refers to products which utilize compression load cells. Contact SUPERIOR for information concerning products using tension load cells.

Part Number	SM15-29 C or SM20-29C
Torque Rating	15,000 ft lbs or20,000 ft lbs
Handle Length	29 inches
Loadcell Type	Compression
Loadcell Manufacturer	SUPERIOR MANUFACTURING & HYDRAULICS
Loadcell Part Number	CLC200
Torque Gauge Mfr.	TOTCO or equivalent
Torque Gauge Size	6"
Gauge Mount	“L” Bracket
Hose Length	6 ft.
Assembly Documentation	Calibration Certificate

CLINCHER Load cells and Torque Gauges are produced by several manufacturers. The information provided by MD TOTCO or Acadiana Oilfield Instruments may not be applicable to all torque gauges or load cells. This reference information is provided with the permission of MD TOTCO and Acadiana Oilfield Instruments.

SECTION 12 CLINCHER LOADCELL and TORQUE GAUGE

To request copy of TOTCO Instruction Manual No. 26-61 - Joint Torque System, please contact:

Superior Manufacturing & Hydraulics
4225 Hwy. 90 East
Broussard, LA 70518
Phone: 337-837-8847
Fax: 337-837-8839
www.superior-manf.com

SECTION 13 MOTOR SERVICE MANUALS

To request copy of Rineer Motor Service Manuals, please contact:

Superior Manufacturing & Hydraulics
4225 Hwy. 90 East
Broussard, LA 70518
Phone: 337-837-8847
Fax: 337-837-8839
www.superior-manf.com

SECTION 14 VALVE TECHNICAL DATA

To request copy of Valve Technical Data, please contact:

Superior Manufacturing & Hydraulics
4225 Hwy. 90 East
Broussard, LA 70518
Phone: 337-837-8847
Fax: 337-837-8839
www.superior-manf.com