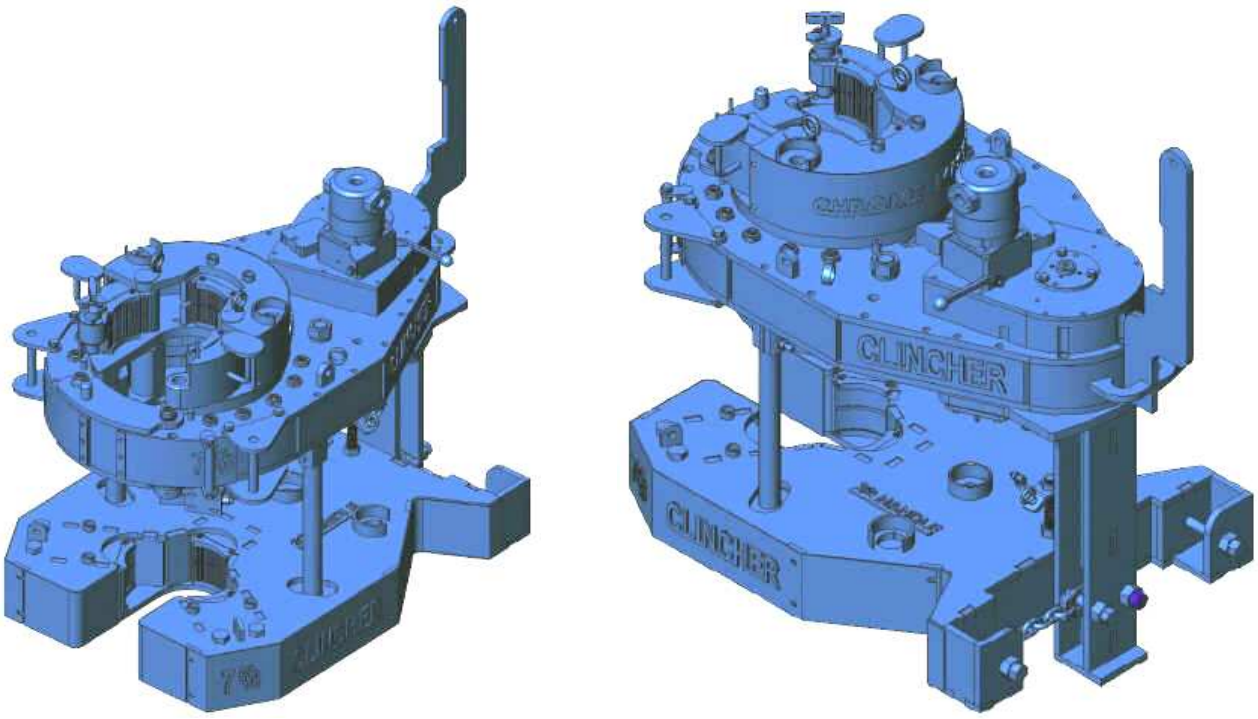
SUPERIOR
Manufacturing & Hydraulics

TECHNICAL MANUAL

CLINCHER
7 5/8" CHROMEMASTER
MOUNTS ON 7 5/8" CLINCHER TONG
& 7 5/8" ECKEL & FARR TONGS



7 5/8" CHROMEMASTER Mounted on
CLINCHER 7 5/8" Tong & Backup

COVERS
CHROMEMASTER MODELS
CM7625
CM7625-E
CM7625-F / CM7625F-02 / CM7625F-03

4225 Highway 90, East
Broussard, Louisiana 70518
Phone: (337) 837-8847
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www.superior-manf.com

Published 052006

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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 7 5/8" CLINCHER CHROME-MASTER, we request you complete this form and return the lower half to SUPERIOR Manufacturing and Hydraulics by mail or facsimile. Access to our manuals can also be acquired through our web site www.superior-manf.com. Select the tab 'CLINCHER Products', select the equipment from the list to get Specs page, select the tab 'Download Manual'.

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

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

7 5/8"CLINCHER CHROMEMASTER
Technical Manual Registration Form

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

CM Model No.: _____ **Serial No.:** _____
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Return To:

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7 5/8" CLINCHER CHROMEMASTER

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, CHROMEMASTERS 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, CHROME-MASTERS 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, CHROMEMASTERS 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, CHROMEMASTERS and Backups are heavy tools. They should be suspended from a secure, high strength 7/8" IWRC 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 and backup 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 1" IWRC minimum diameter wire cable with a 51.7 ton minimum breaking strength or better, 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 and backup movements in all directions when it is in use. Failure to account for its size, weight, movement and the amount of torque developed could result in personnel injury or death.**

CLINCHER Tongs, CHROMEMASTERS and Backups utilize high pressure hydraulic fluids. Portions of the tong, CHROMEMASTER 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, CHROMEMASTER 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 and 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, CHROMEMASTER and backup. 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 operatea cylinder above recommended pressures. Never use a cylinder as a safety device when trans-porting 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 FEATURES

The CLINCHER™ 7 5/8" CM7625 CHROMEMASTER™ can be added to 7 5/8" CLE7625-02 CLINCHER Tong. The CLINCHER 7 5/8" CM7625-E CHROMEMASTER can be added to 7 5/8" Eckel Tong. The CLINCHER 7 5/8" CM7625-F CHROMEMASTER can be added to 7 5/8" Farr Tong with the old style ring gear. The CLINCHER 7 5/8" CM7625F-02 and CM7625F-03 CHROMEMASTER can be added to 7 5/8" Farr Tong with the new style ring gear. The addition of these CHROMEMASTER'S allows the use of smooth, non-marking, non-penetrating dies to run CRA (corrosion resistant stainless steel alloy) or fiberglass tubing strings. These smooth dies are manufactured from aluminum to prevent marking and to avoid contaminating CRA tubing strings with materials which could initiate corrosion problems. Grit Faced Dies may also be used with CRA tubulars to provide high torque performance while protecting these tubulars from damage and contamination. The CHROMEMASTER will also accept fine tooth dies for applications where conventional steel tubulars are being run.

These CHROMEMASTER'S have three wrap around dies which provide up to 340 degrees of pipe coverage. These dies are hydraulically activated by means of a system which transfers hydraulic power from the stationary section of the tong to the rotating section of the CHROMEMASTER. This completely eliminates the need to connect and disconnect hoses every time a joint is made up or broken out.

This transfer of hydraulic energy is accomplished by means of a push cylinder which is fixed to the stationary portion of the tong and operated by the CHROMEMASTER directional control valve. The push cylinder's rod acts against a pump plunger located on the rotating section of the CHROME-MASTER. Every time the rod is extended the pump is stroked to generate pressure within the CHROMEMASTER'S hydraulic circuit. The piston areas in the push cylinder and the pump are sized to cause pressures to be intensified within the CHROMEMASTER to 4,500 psi when the hydraulic power unit pressure is limited to 3,000 psi.

SPECIFICATIONS

The torque capability of CLINCHER CHROMEMASTER, when dressed with fine tooth dies, matches the rating of its companion tong. Ratings for the CLINCHER Tong is tabulated below:

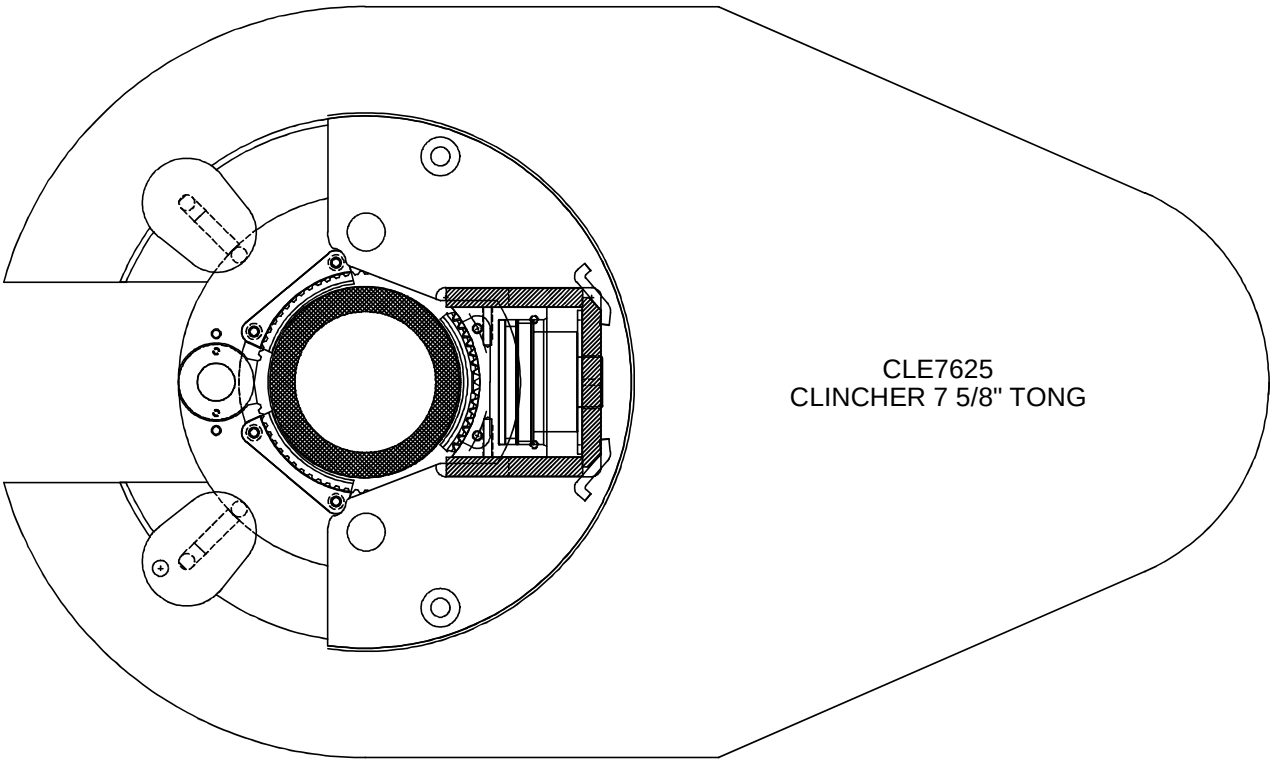
TONG	MAXIMUM TUBING SIZE (INCHES)	MAXIMUM TORQUE RATING (FT./LBS.)
CLE7625-02	7 5/8	30,000

The torque capacity of the smooth CHROMEMASTER die is a function of the radial load applied to the die and the coefficient of friction of the contact interface between the die and the tubing. Extremely small differences in this contact interface caused by pipe varnish, mill scale, eccentricity or pressure of a lubricant such as thread dope, oil or water can cause a large variance in the torque capacity of a non-marking die.

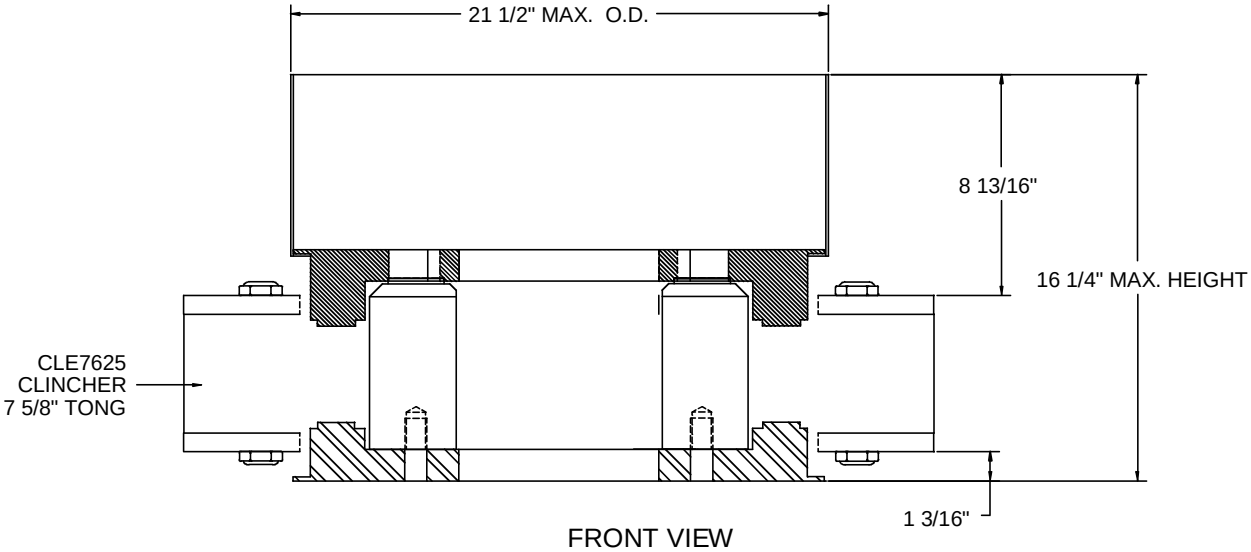
In extreme high torque applications it may be necessary to install silicon carbide paper between aluminum dies and the tubing in the CHROMEMASTER as well as in the CLINCHER Backup. One piece is required for each aluminum jaw. Sheets should be folded along one edge to allow it to be hooked over edge of dies. The sheets of silicon carbide paper should be visually inspected after each joint and replaced when torn or worn.

BACKUP APPLICATION

The CLINCHER Backup's front jaws are hydraulic cylinders. During a jaw closing cycle, the front jaws advance and clamp the pipe against the fixed rear jaw. Once locked on the pipe, pressure is locked in the backup cylinder by a load holding valve. When opening, the front jaws retract to allow the pipe to be removed.



TOP VIEW



FRONT VIEW

7 5/8" CHROMEMASTER DIMENSIONS

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

REV. #	LOG #	DATE
		05/04/06

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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. A partial listing of commonly manufactured sizes is shown below. 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.

DIE Nomenclature for CM7625 CHROMEMASTER and BUCT7625 Backup

BUC7625-xxxx Fine Toothed Steel dies for jaws
(3 reqd per CHROMEMASTER)
(3 reqd per backup)

BUCA7625-xxxx Aluminum dies for jaws
(3 reqd per CHROMEMASTER)
(3 reqd per backup)

BB7625-xxxx Grit Faced dies for jaws
(3 reqd per CHROMEMASTER)
(3 reqd per backup)

ORDERING EXAMPLE: fine toothed steel dies are needed to run 2 7/8" OD tubing
Qty. three (3) BUC7625-2875 dies for CM
Qty. three (3) BUC7625-2875 dies for backup
(replace xxxx with size required in inches)

BUC7625-xxxx: Fine Toothed steel dies for CM & Backup

2.375	2.600	2.700	2.707	2.875	3.000	3.062
3.125	3.230	3.240	3.250	3.375	3.400	3.500
3.625	3.668	3.750	3.862	3.875	3.886	3.900
3.910	3.941	4.000	4.025	4.053	4.125	4.250
4.375	4.460	4.500	4.505	4.530	4.625	4.750
4.767	4.862	4.875	4.892	4.900	4.921	4.935
4.961	5.000	5.005	5.125	5.137	5.150	5.215
5.250	5.290	5.313	5.439	5.470	5.500	5.530
5.563	5.570	5.587	5.620	5.695	5.750	5.780
5.826	5.866	5.875	5.931	6.000	6.035	6.050
6.051	6.075	6.100	6.125	6.150	6.250	6.260
6.325	6.350	6.375	6.400	6.500	6.625	6.650
6.750	6.875	7.000	7.020	7.191	7.250	7.350
7.375	7.380	7.390	7.400	7.413	7.500	7.625
7.656	7.681	7.732	7.750	7.790		

CLINCHER WRAP AROUND DIES

BUCA7625-xxxx: Aluminum dies for CM & Backup

1.900	2.250	2.375	2.400	2.679	2.707	2.735
2.776	2.875	2.910	3.062	3.125	3.130	3.230
2.240	3.300	3.327	3.375	3.400	3.500	3.523
3.590	3.875	3.900	3.950	4.000	4.050	4.053
4.069	4.138	4.200	4.250	4.313	4.375	4.460
4.500	4.600	4.620	4.862	4.968	5.000	5.012
5.150	5.181	5.250	5.350	5.500	5.550	5.563
5.577	5.590	5.650	5.653	5.700	5.750	5.870
5.890	5.960	6.000	6.025	6.050	6.051	6.071
6.075	6.100	6.125	6.135	6.150	6.153	6.156
6.170	6.200	6.250	6.400	6.500	6.625	6.750
6.940	7.000	7.250	7.390	7.430	7.440	7.579
7.625	7.656	7.675	7.681	7.700	7.750	

BB7625-xxxx: Grit Faced dies for CM & Backup

2.375	2.875	3.250	3.500	3.878	3.900	4.000
4.053	4.250	4.500	4.750	4.901	4.950	5.000
5.200	5.500	5.563	5.577	5.736	5.890	6.000
6.045	6.050	6.051	6.075	6.079	6.100	6.150
6.180	6.240	6.248	6.500	6.625	6.750	7.000
7.020	7.191	7.290	7.390	7.413	7.625	7.644
7.681	7.700	7.720	7.731	7.772	7.790	7.852

Contact SUPERIOR Manufacturing & Hydraulics for information concerning availability of stock and special die sizes.

SUPERIOR Manufacturing & Hydraulics

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)*

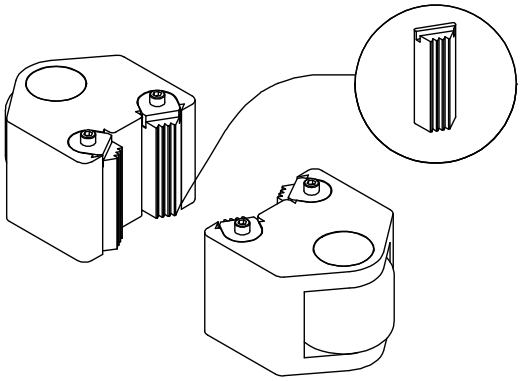

Figure 1

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.

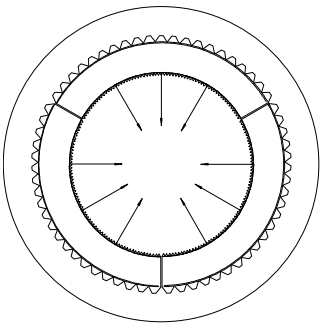

Figure 2

Wrap-Around Die System

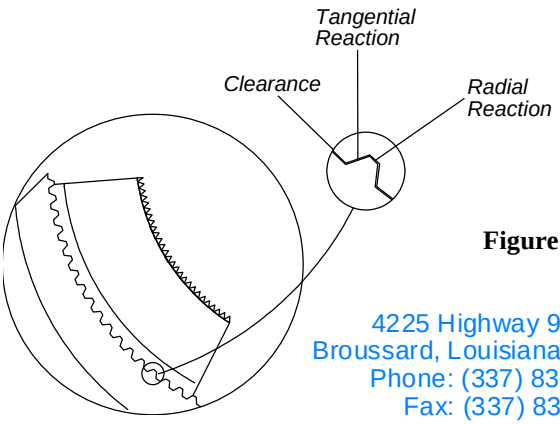

Figure 3

Patented Spline & Die

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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 CHROMEMASTER 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.

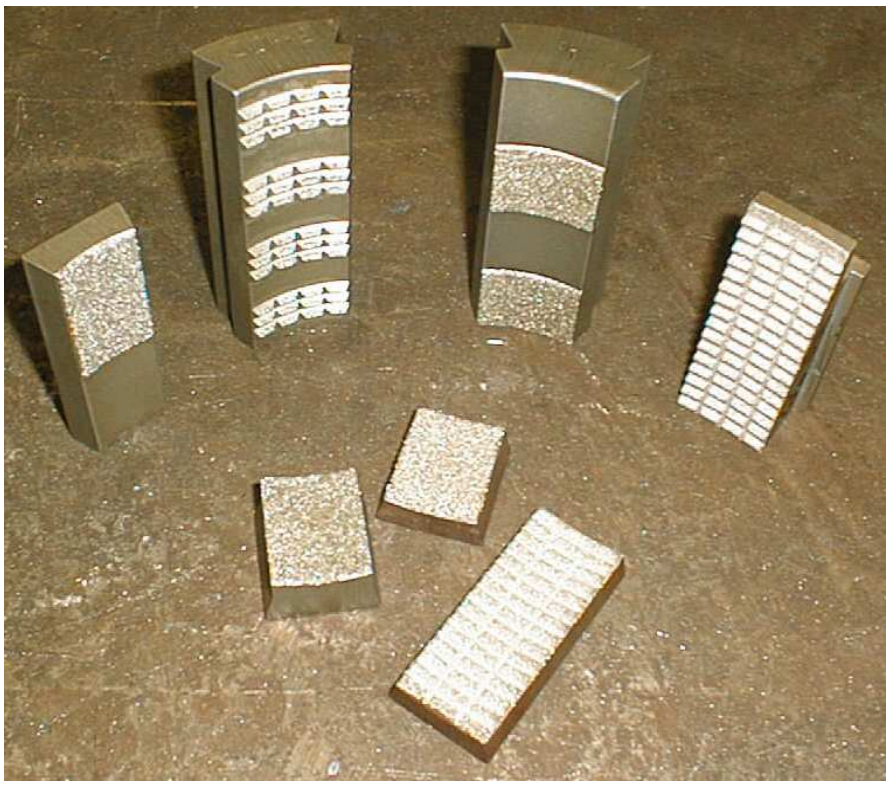
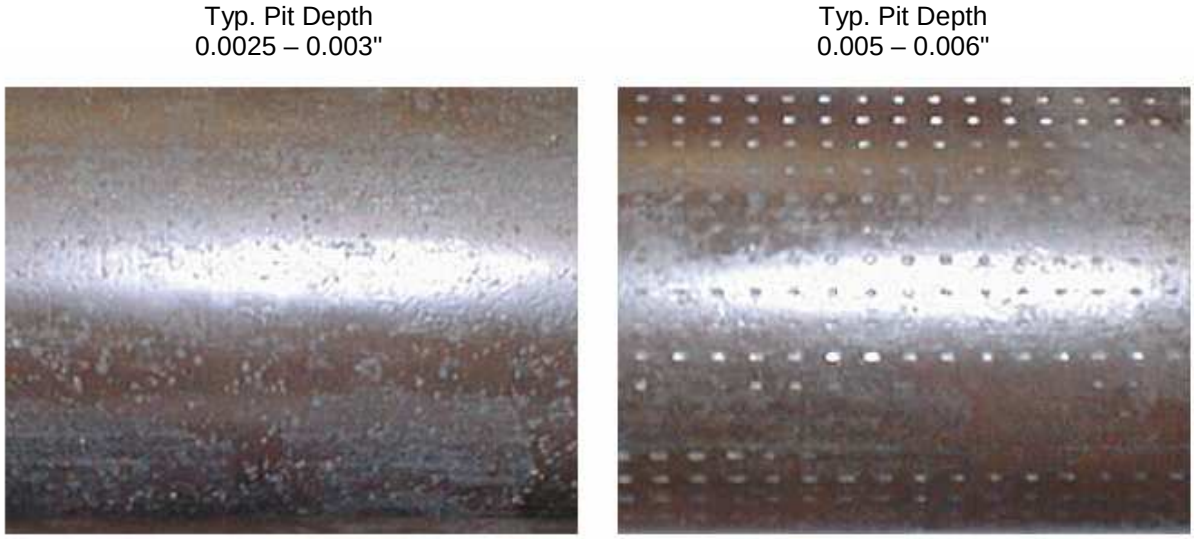


Figure 5

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

CLINCHER Low-Friction Tong Jaw Technology[(1)(4)]

Most traditional power tong designs rely on two opposed jaws to grip the pipe. These jaws utilize hardened dies with sharp teeth to penetrate the surface of the pipe being made up or broken out. The dies are fixed to the jaws by means of a spline arrangement[(2)] which insures proper alignment and uniform distribution of radial loads. The jaws and dies are moved into contact with the tubular by cam surfaces machined in the ID of the ring gear. Tong jaws use a hardened steel pin and roller system to act as the interface between the ring gear's cam surface and the body of the tong jaw.

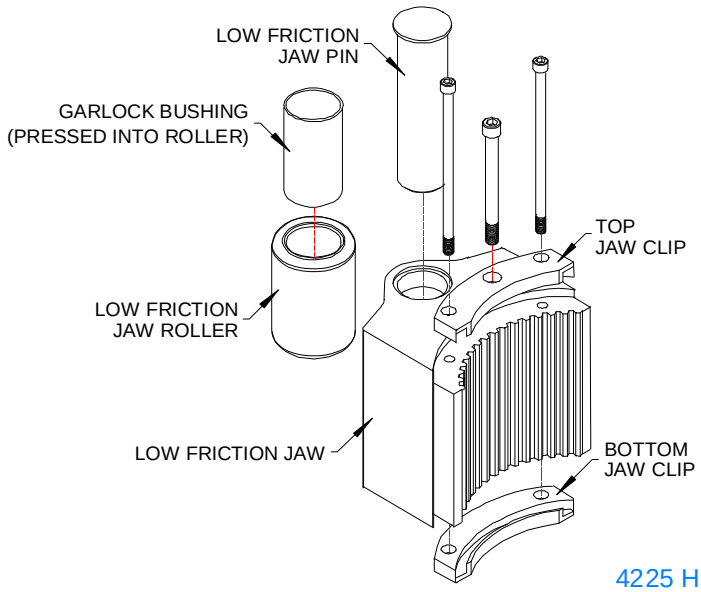
The initial jaw assembly movement from the retracted position to the initial contact position is caused by the tong brake retarding movement of the cage plate relative to the ring gear. The braking force acting on a relatively low (typically between 2 1/2 to 10 degrees) cam angle generates the radial load which causes the tong dies to overcome internal jaw system friction and to initially penetrate the surface of the pipe. If the initial die penetration is adequate, additional torque and die penetration can be developed as torque within the joint increases. If die penetration is inadequate, the die teeth will begin to shear away the surface of the pipe as the dies slip around the OD of the tubular.

While cam angles vary between tongs intended for different applications; *i.e.*, small tubulars versus large tubulars, or low torque applications versus high torque applications, it is important to note the cam angle must be constant over the tong's entire effective gripping ranges. The CLINCHER Constant Cam Angle System[(3)] guarantees the radial loads are adequate regardless of whether the tubular is undersized, is on size, or is oversized. Competitive tong systems utilize cam systems which can provide the correct angle for only a single tubular. Since the angle can only be correct for one size, the jaws may slip on oversized pipe or crush undersized pipe. Therefore, CLINCHER Low Friction Jaws may not be used in any other manufacturer's tongs.

CLINCHER Non-Marking Aluminum Dies are machined with a smooth face. The torque they develop is a function of the radial load applied to the die by the cam and the coefficient of friction between pipe and die. Standard tongs available to the oil industry today do not develop enough radial load to overcome internal jaw system friction and leave enough radial load to allow non-marking dies to function effectively. Since initial radial load is developed as a function of braking force in combination with relatively low cam angle, one might consider reducing the cam angle to increase the radial load. Unfortunately, such modifications can cause the tong to develop so much radial load that the jaws crush tubulars at low to moderate torques. Very shallow angles can also cause the tong to lock on the pipe or induce failures of jaw pins, rollers or ring gears. Increasing braking force is not practical as it reduces tong efficiency, causes overheating and premature wear.

The CLINCHER Low-Friction Jaw Assembly[(1)(4)] attacks the problem of inadequate radial force by reducing the friction between the jaw pin and roller using a special friction reducing bushing. This simple concept allows the radial forces generated by the cam system in standard CLINCHER tongs to be transferred more efficiently. Greater radial loads enable Non-Marking Aluminum Dies to get the "initial frictional bite" required to take torques up to values required to make up and break out high torque tubular connections. **Low-Friction Jaws allow standard CLINCHER power tongs to be readily converted into tongs capable of handling CRA tubulars using non-marking dies. No special tools, other than the jaws, are required. No special operator training is required. Since standard tongs are used, tongs are lighter and easier to handle, jobs run faster with less operator fatigue to reduce costs and increase safety.**

(1) US Patent Number 5,819,605;
(2) US Patent Number 4,649,777;
(3) US Patent Number 4,986,146;
(4) 1998 Winner of *Petroleum Engineering International's* Special Meritorious Award for Engineering



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CLINCHER Grit Faced Die and Insert Coating

The CLINCHER Grit Faced die and insert coating system combines the use of extremely hard grit particles, high strength corrosion resistant brazing materials and application processes which insure optimum dimensional control.

Tungsten Carbide grit particles are graded by size and shape to provide uniform granules with desired geometry. Different particle sizes are selected based upon application. Coatings on smooth faced dies use larger particles than the coatings applied to dies which have machined teeth. Coating thicknesses for small particles are approximately 0.010". Thicknesses for large particle coatings is approximately 0.025" thick.

Use of grade C-4 tungsten carbide refractory material controls the chemistry of the grit particles to prevent iron contamination. The Tungsten Carbide particles are metallurgically bonded to the die substrate using a high strength Nickel/Chrome brazing compound containing 83% nickel, 6.8% Chromium, 4.2% Silicon and 3% Boron. The remaining 3% balance of materials consists of a variety of trace elements including a small percentage of iron. It is important to note these materials are alloyed together at extremely high temperatures so there is no free iron available to contaminate CRA tubulars.

The Tungsten Carbide grit particles and brazing material are applied in controlled quantities using proprietary dispersion processes which align the particles and insure uniform distribution of materials in a single layer. The quantities of materials used insure the particles are securely fixed to the substrate but left with enough exposed surface to precisely grip oilfield tubulars.

Brazing of the components takes place at 1800 degrees Fahrenheit in a controlled atmosphere furnace where temperatures and times are precisely controlled. Mechanical properties of the die or insert substrate are controlled using a combination of pre and post-brazing heat treatment processes.

Covered under US Patent No's 6,378,399 & 6,755,097
Other US and foreign patents pending

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OPERATIONAL INSTRUCTIONS

SUSPENSION

A) Tong should be hung by a 7/8" IWRC 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 tong is suspended in level manner. Both tong and the backup must be level at the point they contact 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.

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 1" IWRC minimum wire cable with a 51.7 ton minimum breaking strength or better, as a tong back up line at 90 degree angle to tong and at 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 Die Installation

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

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 sliding head jaws (2) from cage plate pockets. Insert one jaw with proper dies into pocket assuring the jaw roller pin faces upward. Repeat procedure for other side.

Hydraulic Lines

A) Be sure all power to unit is off and power unit itself 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 attaching the wrong hose to the wrong outlet while at the same time reducing back pressure in your hydraulic system.

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 Tong 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.

OPERATIONAL INSTRUCTIONS

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 cam to close jaws on pipe.

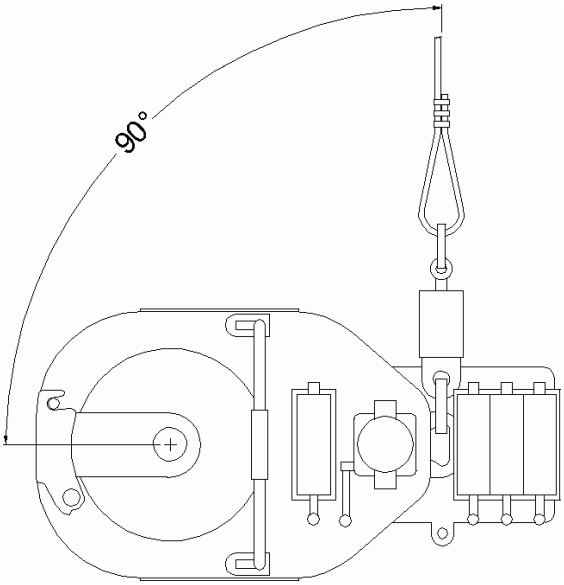
I. Swing tong and backup onto tubing, making sure to align tubing on rear jaw of backup. Close backup jaws by pushing middle control lever forward. The design of the Clincher Integral Backup centers pipe in the backup and tong. Close tong door.

J. 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.

K. 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.

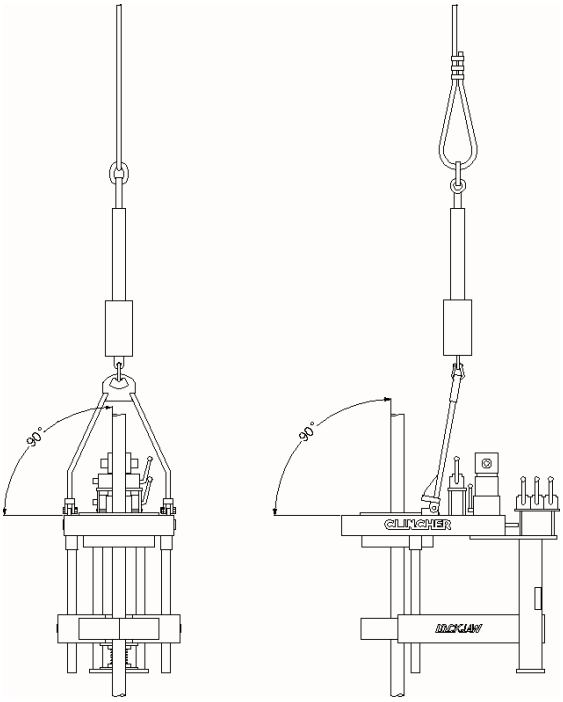
L. Release backup by pulling back on right control lever on rear valve bank assembly until backup jaws are completely retracted.

M. High and low gear is adjusted by use of shifting handle PN 45142, 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.



TYPICAL SNUB LINE INSTALLATION

NOTE: SNUB LINE IS PERPENDICULAR TO AXIS OF TONG



TYPICAL TONG INSTALLATION

NOTE: TONG IS PERPENDICULAR TO TUBING

CAUTION: DO NOT operate cylinders on CLINCHER Backup or Chromemaster without installing proper sized dies or without installing tubing in unit.

1. Refer to Tong Operating Instructions to insure Hydraulic Power Unit is properly rigged up for level operation. Insure load cell and torque gauge are properly filled with fluid. Check hydraulic connections to tong and backup assembly. Set Power Unit's pressure relief valve to 2,500 psi for normal applications. *Note:* This setting can be increased to a maximum of 3,000 psi for applications requiring high makeup or breakout torques.

2. ***IMPORTANT NOTE:*** Insure Chromemaster push cylinder rod is fully retracted. The push cylinder is located on bottom sides of CLE7625-02 or equivalent 7 5/8" Tong. Refer to Step 11 for retraction instructions. Failure to retract rod before rotating will result in severe equipment damage.

   Rotate Chromemaster to align arrows on Tong and Chromemaster head by manipulating tong directional control valve. ***IMPORTANT NOTE:*** These items must be aligned to insure proper operation and to avoid severe equipment damage when the Chromemaster push cylinder is extended.

OPERATIONAL INSTRUCTIONS

3. Pull up Chromemaster latch handle to unlock Chromemaster swing jaws. Spread both jaws to their maximum open position. Open tong door to its fully open position.

4. Insure both backup cylinders (a.k.a. front jaws) are fully retracted by manipulating backup directional control valve.

5. Adjust height of tong and backup assembly to straddle tubing coupling by manipulating lift cylinder directional control valve.

6. Swing tong and backup assembly with Chromemaster onto pipe.

7. Close Chromemaster Swing Jaws and insure Chromemaster latch handle drops down into its fully engaged position.

   Close tong door. *Note:* The tong door incorporates an interlock system, which prevents the hydraulic system from developing significant pressure if the tong door is in the open position. **CAUTION:** Severe personnel hazards and equipment damage will result if the interlock system is deactivated and the tong is operated.

8. Close both valves located on the Chromemaster head.

9. Close the Backup jaws by manipulating backup directional control valve. Monitor backup pressure gauge to insure pressure is at a minimum of 2,500 psi. *Note:* Applications requiring extremely high torque for makeup/breakout, may require higher pressures. Do not exceed 3,000 psi maximum operating pressure.

   In extreme high torque applications it may be necessary to install silicon carbide paper between aluminum dies and tubing in the Clincher backup. One piece is required for each aluminum jaw. Sheets should be folded along one edge to allow it to be hooked over edge of dies. The sheets of silicon carbide paper should be visually inspected after each joint and replaced when torn or worn.

10. Insure proper alignment of Chromemaster and Tong. ***IMPORTANT NOTE:*** Severe equipment damage will result if the Chromemaster push cylinder is actuated when incorrectly aligned.

11. Insure both valves on the Chromemaster head are in the closed and block position.

    For applications using the CLE7625 or equivalent 7 5/8" Tong, activate Chromemaster to grip pipe by manipulating Chromemaster directional control valve. Operating this valve causes the Chromemaster push cylinder rod (located on the bottom side of the tong) to operate the Chromemaster pump (located opposite the push cylinder), which pressurizes the Chromemaster hydraulic system. Pushing the handle away from the operator will extend the push cylinder rod, pulling the handle toward the operator will retract the push cylinder rod. Repeat these operations as many times as required to reach the desired operating pressure range of 4,200 to 4,500 psi. *Note:* A pressure reducing valve which is located near the push cylinder may require adjustment to insure proper operating pressures are achieved. ***IMPORTANT NOTE:*** Insure last action taken fully retracts push cylinder rod. Failure to retract rod will result in severe equipment damage.
    In extreme high torque applications it may be necessary to install silicon carbide paper between aluminum dies and tubing in the Chromemaster. One piece is required for each aluminum jaw. Sheets should be folded along one edge to allow it to be hooked over edge of dies. The sheets of silicon carbide paper should be visually inspected after each joint and replaced when torn or worn.

12. Select tong gear required and rotate tong to makeup/breakout tubular joint as required by manipulating tong directional control valve. Refer to Tong Operating Manual for additional information.

13. Release tong directional control valve after reaching desired makeup torque or breaking out joint.

14. Disengage Chromemaster jaw by opening either one of the two valves located on the Chromemaster Head. These two valves operate in a parallel circuit and are provided for the convenience of the operator. Insure the spring loaded jaw returns to its retracted position.

15. Rotate Chromemaster to align arrows on Tong and Chromemaster head by manipulating tong directional control valve.

16. Release pressure and retract the Backup cylinders (a.k.a. front jaws) to their fully open position by manipulating backup directional control valve.

17. Open Chromemaster swing jaws by pulling up Chromemaster latch handle to unlock Chromemaster swing jaws. Spread both jaws to their maximum open position. Open tong door to its fully open position.

18. Swing tong away from pipe to prepare for next joint.

MAINTENANCE INSTRUCTIONS

Clincher recommends that owners of Clincher Hydraulic Power Tongs, Backups, 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 importantly, 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 and backup. Note any missing or damaged die retainers, and or die retainer bolts.

C) Remove side jaws from tong Chromemaster 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 and jaw pins for damage or excessive wear (cracks, breakage, and uneven wear patterns). Reassemble jaw sections replacing any damaged parts. Lubricate pins and reinstall in tong.

E) Inspect position of the handle and its securing set screw on the Chromemaster Bleeder Valve CM4556. *(See Illustration of Maintenance Instructions.)* If evidence of packing leakage is observed, the packing nut should be tightened using the procedures shown on the illustration. If valve continues to leak after adjustment, it should be replaced.

F) Clean and inspect backup operating cylinder. Insure spline area is free from damage and any rust or dirt is removed. Replace any missing or damaged die retainer clips and die retainer bolts.

G) Inspect all hoses for wear, replace as necessary.

H) 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.)

I) Replace jaw and pins in tong Chromemaster.

J) Lubricate tong's cam followers (upper and lower), dumbell roller shafts (upper and lower zerts), door shaft, idler gear shafts, pinion gear, and secondary gear assemblies (Pinion gear and secondary gear assemblies are sometimes installed with sealed bearings. There is no provisions to grease these bearings. However, if replaced by non-sealed bearings, the 1/8" N.P.T. flush plugs should be replaced with zerts PN 1001 and both gear assemblies should be added to the regular lubrication schedule.), low gear housing, and shift housing, and re-pack tong body cavity. Lubricate zerts in backup plates and pins.

K) 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 or backup and all tools and parts are removed from the tong and backup.

L) Insert test mandrel of the exact same size as the dies which are installed in the tong and backup. **Caution:** Testing the function of the backup without the proper size dies installed and/or without the proper sized mandrel in place, you risk serious damage to the backup cylinder.

M) After power unit has reached operating R.P.M. and temperature, operate the backup control valve and close backup around test mandrel using sufficient flow and pressure to clamp mandrel and maintain pressure to backup. (Recommended operating pressure of 2,500 psi) Backup pressure gauge should match system operating pressure. After release of control valve you may experience a slight drop in backup pressure (up to 300 psi) this is normal. If backup pressure drops more than 300 psi within 2 minutes, you may be experiencing a hydraulic leak.

N) While maintaining pressure on backup visually inspect hoses, stainless steel lines, fittings, etc., for seepage of hydraulic fluid. Repair or replace parts causing leaks. If you see no visible external leaks and your backup is still losing pressure, there may be an internal leak in the operating cylinder or load holding valve allowing fluid to bypass the piston. It is recommended that the backup be returned to the manufacturer for repair.

O) If at this time your backup is functioning correctly, open and close unit several time to insure consistent operation.

P) With the proper dies installed in the tong and backup, and test mandrel locked in the backup, place reversing pin into the make-up position, set tong into low gear and operate tong through several cycles of locking, biting and torquing 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 INSTRUCTIONS

Q) 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.

R) Re-inspect tong and backup hydraulic system for leaks.

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

MAINTENANCE INSTRUCTIONS
CHROMEMASTER BLEEDER VALVE CM4556

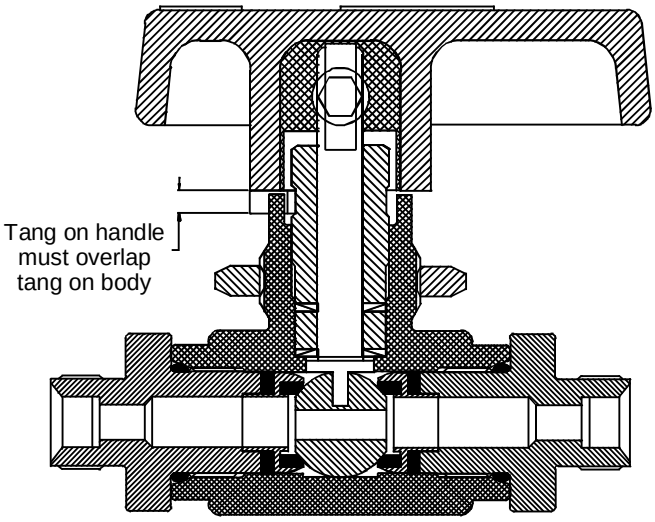


FIGURE 1 – General Two-Way Ball Valve Cross-Sectional Assembly with Standard Teflon Packing

WARNING

Failure or improper selection or improper use of the products and / or systems described herein or related items can cause death, personal injury and property damage.

Maximum Allowable Working Pressure & Temperature

Valve Body Material	
Seat Material	Stainless Steel
Kel-F	6000 psi @ 70°F

Packing Adjustment

(For B-Series Ball Valves with Teflon Stem Packing)

Packing adjustments may be occasionally necessary depending on the many and varied uses for the valve. It is recommended an adjustment be made shortly after initial installation and just prior to flow startup. Always consult Superior if questions arise.

1. Remove the handle by turning the set screw counter-clockwise with a 3/32" size hex-socket wrench.
2. Tighten the packing nut 1/8 to 1/4 turn or to 70 in-lbs. using a 7/16" size hex wrench.
3. Re-install the handle and secure by turning the set screw clockwise and torque to 15 in-lbs.

Valve Connector Make-Up Instructions

CAUTION: Whenever installing or removing a ball valve from a system, always place a back-up wrench on the ball valves end connector. NOT the valve body.

Tube Fitting Connectors

1. Insert the tube into the filter port until the tube bottoms out in the filter body. Care should be exercised to insure the tube is properly aligned with the filter body and port.

2. Normal make-up for port size 4 thru 16 (1/4 thru 1 inch) is 1-1/4 turn from finger tight.

Please follow the above directions for counting the number of turns for proper fitting make-up. Do not make-up the tube fittings by torque or "feel". Variables such as tubing and fitting tolerances, tube wall thickness, and lubricity of nut lubricants can result in an improperly assembled tube fitting connection.

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MAINTENANCE INSTRUCTIONS

Recommended Lubrication Schedule Performed After Completion Of Each Job

Hydraulic Tong

A) Cam followers: upper and lower (all)
B) Dumbell roller shafts: upper and lower (all)
C) Door shaft: upper and lower
D) Outboard Idler shafts (2)
E) Low gear housing
F) Shift housing
G) Re-pack tong cavity
H) Pinion and secondary gear shafts (if sealed bearings have been replaced by non-sealed bearings)
I) Jaw rollers and pins: Remove jaw pins and rollers, clean and lubricate with gear grease
J) Inspect hydraulic fluid for foreign material and contaminants. Filter or replace. Your 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

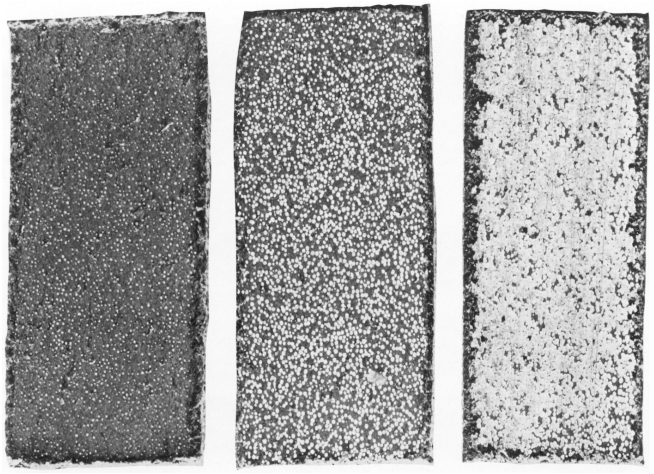
Routine preventative maintenance will significantly extend the operating life of your equipment, reduce operating cost and avoid downtime. CLINCHER recommends a program of frequent routine inspection, and if equipment is suspected to have been damaged during transit or is to be mobilized to a remote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

1. Visually inspect components on power tong or backup which could possibly have been damaged either during operation or transit. *i.e.* Damage to hanger assembly, hydraulic backup, mounting legs, or hydraulic valve assembly.
2. Check test date. Ensure that a load test and inspection was carried out within the last 9 months.
3. Check ring gear. Check for any signs of damage or wear.
4. Remove motor and valve assembly from the tong body.
5. Check motor seal. Apply hydraulic power, run motor and visually check motor seal for any signs of leakage.
6. Check drive gear, high and low pinion gears. Check for excessive sign of wear on motor gear.
7. 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.
8. Check gear selector and shaft. Visually inspect the shifting shaft for alignment and straightness.
9. Check Hi/Low Gear assembly. Visually inspect high and low clutch and gears for any sign of chipped, broken, or worn teeth.
10. Check dumbell rollers, shafts and bushings. Check for excess movement on either bearings, bushings, shafts or dumbells.
11. 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.
12. 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 washers positions for reassembly.
13. 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.
14. 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.
15. 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.
16. Check condition of all hydraulic hoses and fittings. Visually inspect all hydraulic hoses fitted to the tong and in the backup for any signs of leaks, cuts, or wear.
17. Remove Chromemaster doors, paint strip, MPI (magnetic particle inspection). Pull pins out of the Chromemaster doors after releasing grub screws. Paint strip doors overnight by placing in paint strip solution. Doors should then be cleaned and checked before submitting them for MPI testing. All cracks should be noted on the service sheet. Replace doors using grease on pins and ensure securing devices are fitted to the hinge pins.
18. Check Chromemaster cam bolts. Ensure that the bolts which secure the cam lugs on the Chromemaster are tight. These can be reached from inside the bore of the tool.
19. Check Clincher die retaining lugs on Chromemaster and tong. Check condition of bottom lugs on Clincher Backup. These are welded in place and buffed flush, and should show no signs of damage or cracking. The Chromemaster door bottom lugs should be checked during MPI of these items. Ensure all top lugs are present with bolts. Ensure they are not bent and that the threads are clean, free, and greased.
20. Check Chromemaster bottom plate bolts. Check that the bottom plate bolts on the Chrome-master are tight and that there is no sign of movement of the bottom plate relative to the top plate. These bolts hold the Chromemaster together.

MAINTENANCE INSTRUCTIONS

21. Check Chromemaster oil level. Remove the filling/level plug from the side of the reservoir and fill with hydraulic oil level with the plug.
22. Remove bolts securing Clincher side plates and remove plates. Steam clean tong and backup ensuring all foreign material is removed. Take care not to remove lubrication from tong and backup cylinders.
23. Remove retaining bolts at the back of Clincher hydraulic rams (4 total) and check. They should be free from damage, cracks and bends. Replace with grease and ensure they are secure and sufficient threads engage into the nuts.
24. Function test tong ensuring turns counter works. Operate the tong and record the maximum torques in both high and low gears. Ensure turns counter (if installed) registers correct number of turns per revolution.
25. Check front and rear legs for clearance. Fit torque gauge to backup. Connect tong to hydraulic power supply. Position suitable pup-joint in tong and backup. With maximum torque applied in both directions, visually check that there is sufficient clearance between the front and rear legs of the tong and the backup to prevent a false torque reading. Check that the tong and backup are correctly aligned with full torque applied and check that the break out bar fitted is the proper length and does not give false torque readings. The number of the tong should be stamped on the break out bar.
26. Check Chromemaster ram pressure set to 2,500 psi. Pressurize Chromemaster head **WITH** jaws and pipe to grip. Ensure pressure limiting valve is set to restrict the maximum pressure available to 2,500 psi.
27. Check Backup pressure control valve. Adjust valve fully anti-clockwise, then while fully depressing the backup spool handle, adjust the pressure control valve clockwise to increase pressure up to 2,000 psi on the backup gauge. Readjust pressure back down to 1,200 psi. Remove the pressure and then reapply, ensuring only 1,300 psi is applied and that the pressure is held.
28. Check lift cylinder valve. Connect lift cylinder to power tong. If the load valve is operating properly, the tong should rise smoothly and there should be no sudden movements. When lift cylinder is half its stroke, the tong should be left suspended for 2 minutes. The lift cylinder should not be seen to extend during this period.
29. Check for hydraulic leaks. Once the hydraulic oil has reached a temperature of approximately 40°C, operate the backup retract or the lift cylinder while visually checking all components for oil leaks. *i.e.* Spool valve assemblies, hoses, connections and rams in backup.
30. Check case drain oil flow rate. Stall power tong motor at 2000 psi with a flow meter in the case drain line. Measure the volume of oil flowing from the case drain. The flow must not exceed 18 liters per minute.
31. Lubricate tong, backup and chromemaster according to maintenance schedule preceding this section.
32. Paint, remembering to mask off surfaces not intending to paint with grease or masking tape.
33. 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

TROUBLESHOOTING

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.

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.

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.

TROUBLESHOOTING

HYDRAULIC TONG SYSTEM

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.
G)	Damage tong motor	Inspect, repair, or replace.
H)	Restriction of supply line, excessive back pressure	Check to assure couplings are securely fastened.
I)	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.

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/spring plunger on shifting gear PN 55084-02.

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.
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.

TROUBLESHOOTING

HYDRAULIC TONG SYSTEM

Failure to Grip Tubulars:

	Problem	Solution
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 spring plunger.	Replace spring plunger.
H)	Hydraulic fluid leaking from motor. Damaged or worn motor shaft seal.	Replace motor shaft seal.
I)	Chromemaster not holding pressure. Bleeder Valve set screw which retains the handle loosens, allowing the handle to move until no overlap exists between the tang on the handle and the tang on the valve body. Without contact between the tangs, the operator can not properly position the ball valve in the closed position.	Improperly maintained bleeder valve. Follow Maintenance Instructions for Chromemaster Bleeder Valve CM4556.
J)	Chromemaster clamping cylinder fails to retract.	Remove and clean exterior of cylinder and recess where cylinder operates to remove any rust or dirt. Lubricate with clean grease. If everything looks good when you examine the cylinder and recess, you should disassemble the cylinder and check for internal damage and/or seal swelling. Seal swelling is the most likely cause of the problem. If the cylinder continues to fail to retract, replace the springs with new ones. If the cylinder continues to fail to retract, check for restrictions in the hydraulic return lines. Check that the operation of the releasing valve is correct. If the handle is loose, the valve may not fully open which would restrict the flow.

HYDRAULIC BACKUP SYSTEM

Failure to hold tubulars:

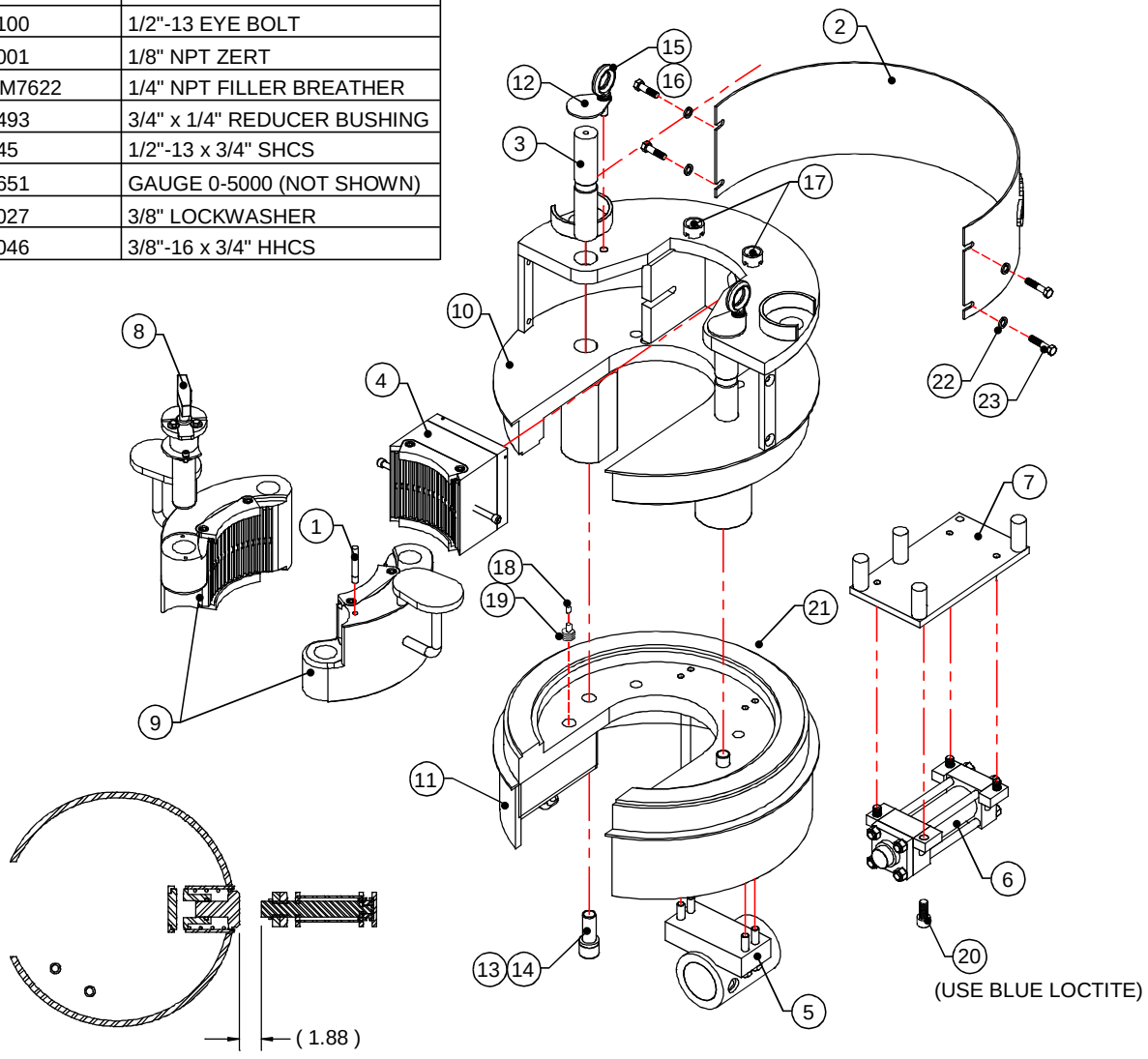
	Problem	Solution
A)	Incorrect die for size tubular	Check pipe OD and match die size to pipe OD.
B)	Dies have material compacted in tooth area; worn teeth.	Clean dies with wire brush and inspect. Replace with new dies if necessary.
C)	Power unit pressure set incorrectly	Inspect relief valve on power unit 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 6 SPARE PARTS RECOMMENDATIONS

Part Number	***Quantity***	***Description***
12501437	1	Seal for Rineer Motor
1001	8	1/8 NPT Zerts
SLV1000-04	1	N. C. Door Valve Assembly
45072	1	Shifting Yoke
CM7656	6	CM Door Jaw Clips & Cylinder Clips
1040-A	20	Clip Bolts 3/8"-16 x 3/4" SHCS
25001375	1	Seal for Pump CM7626
ASAP2312	1	Seal Kit for CM7621 Clamp Cylinder
CM4551	1	Check Valve (Cartridge CKCA-XAN)
CLE1209-B	1	Latch Pin Handle
1028	1	3/8"-16 x 1/4" Set Screw
CM7603-A	1	Latch Pin
CM7649	1	Latch Catch
CM7601-A	1	Shank
CM7602-A	1	Door Spring
CM7651	1	Plunger
CM7653	1	Compression Spring
CM4020	1	Filter SS-6TF2-LE
1651	1	Pressure Gauge BAC-5M-25
CM4554	2	Check Valve
CM7656-01	3	Backup Die Clip
DVG35-HMRV	1	Relief Cartridge

SECTION 7 CHROMEMASTER ILLUSTRATIONS

Item #	Qty.	Part Number	Part Description
1	1	CM4582	STRIKE PIN
2	1	CM7645	CM COVER WELDMENT
3	2	CM7618	DOOR PIN
4	1	CM7621	CYLINDER ASSEMBLY
5	1	CM7626	PUMP CYLINDER ASSEMBLY
6	1	CM7633	CYLINDER
7	1	CM7635	PUSH CYLINDER MOUNT
8	1	CM7652	LATCH ASSEMBLY
9	1	CM7657	DOOR SET ASSEMBLY
10	1	CM7660-S	CM TOP BODY WELDMENT
11	1	CM7661-S	TANK WELDMENT
12	2	CM7696	PIVOT PIN RETAINER
13	2	1181	7/8"-9 x 2 1/4" SHCS
14	2	1182	7/8" HI COLLAR LOCKWASHER
15	2	1103	1/2" LOCKWASHER
16	2	1100	1/2"-13 EYE BOLT
17	2	1001	1/8" NPT ZERT
18	1	CM7622	1/4" NPT FILLER BREATHER
19	1	1493	3/4" x 1/4" REDUCER BUSHING
20	4	245	1/2"-13 x 3/4" SHCS
21	1	1651	GAUGE 0-5000 (NOT SHOWN)
22	4	1027	3/8" LOCKWASHER
23	4	1046	3/8"-16 x 3/4" HHCS



7 5/8" CHROMEMASTER ASSEMBLY

ASSEMBLY NO. CM7625

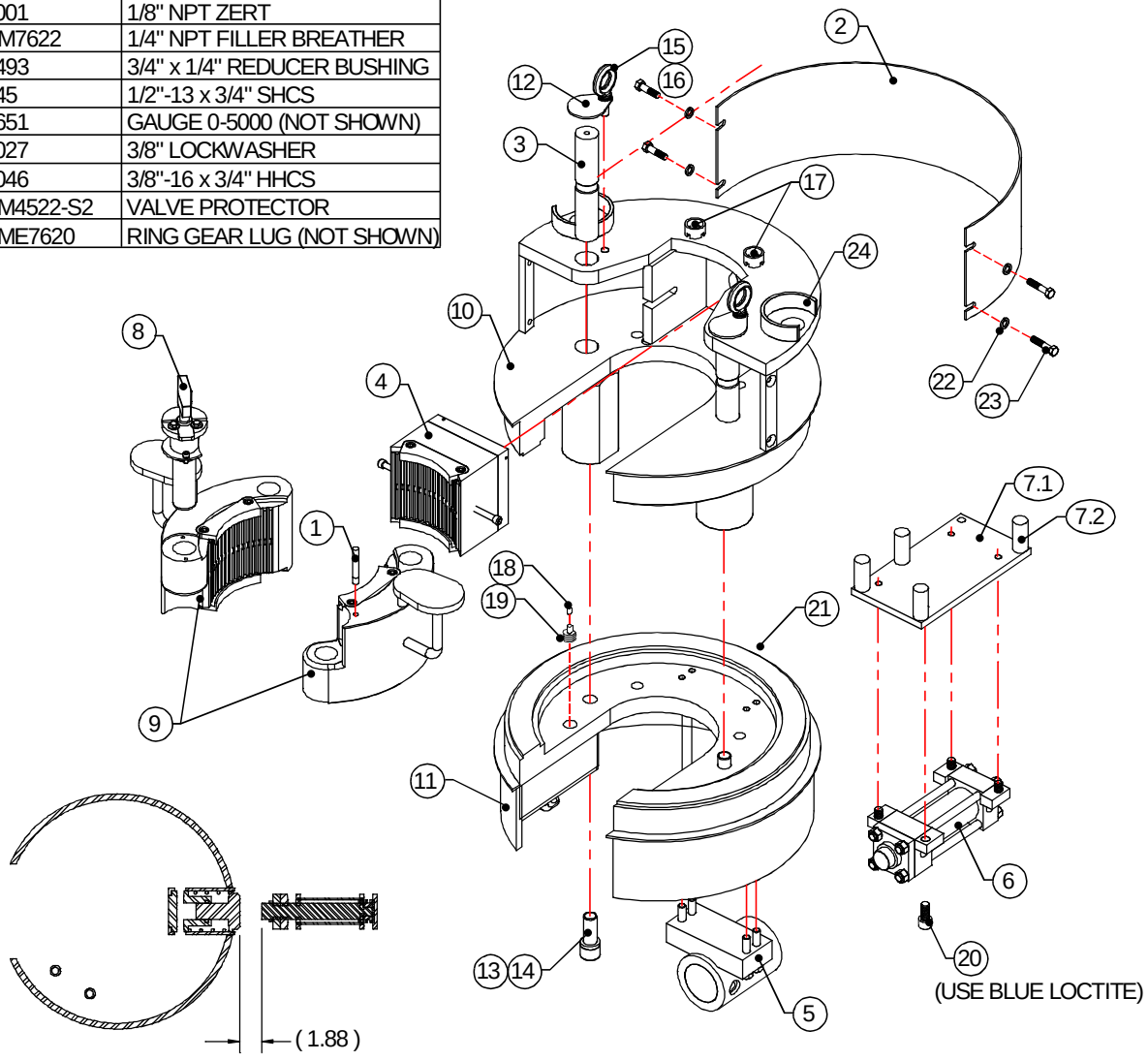
APPROX. WEIGHT (LBS.) = 600

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

REV. #	LOG #	DATE
1		05/08/06

REF: P:\Manuals\Equip Manuals\Dwgs\CM7625\Assembly rev1.wpg

Item #	Qty.	Part Number	Part Description
1	1	CM4582	STRIKE PIN
2	1	CM7638	COVER
3	2	CM7618	DOOR PIN
4	1	CM7621	CYLINDER ASSEMBLY
5	1	CM7626	PUMP CYLINDER ASSEMBLY
6	1	CM7633	CYLINDER
7.1	1	CME7635	PUSH CYLINDER MOUNT
7.2	4	CME7619	PUSH CYLINDER MOUNT LEG
8	1	CM7652	LATCH ASSEMBLY
9	1	CM7657	DOOR SET ASSEMBLY
10	1	CME7617	CM TOP BODY WELDMENT
11	1	CME7621	TANK WELDMENT
12	2	CM7696	PIVOT PIN RETAINER
13	2	1181	7/8"-9 x 2 1/4" SHCS
14	2	1182	7/8" HI COLLAR LOCKWASHER
15	2	1103	1/2" LOCKWASHER
16	2	1100	1/2"-13 EYE BOLT
17	2	1001	1/8" NPT ZERT
18	1	CM7622	1/4" NPT FILLER BREATHER
19	1	1493	3/4" x 1/4" REDUCER BUSHING
20	4	245	1/2"-13 x 3/4" SHCS
21	1	1651	GAUGE 0-5000 (NOT SHOWN)
22	4	1027	3/8" LOCKWASHER
23	4	1046	3/8"-16 x 3/4" HHCS
24	2	CM4522-S2	VALVE PROTECTOR
25	1	CME7620	RING GEAR LUG (NOT SHOWN)



7 5/8" CHROMEMASTER ASSEMBLY

FOR ECKEL TONG
ASSEMBLY NO. CM7625-E

APPROX. WEIGHT (LBS.) = 600

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

		05/08/06
REV. #	LOG #	DATE

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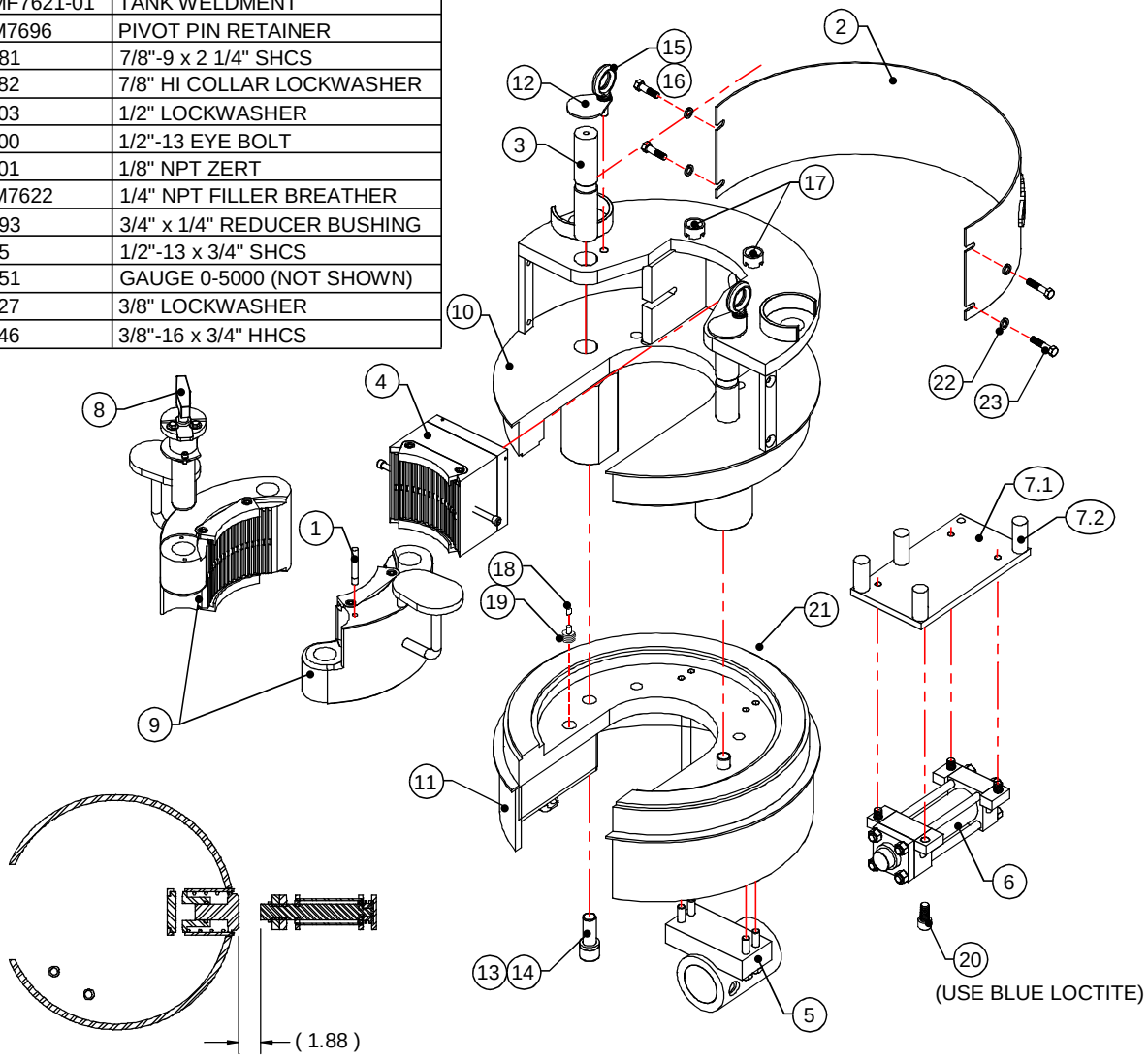
Item #	Qty. CM7625-F	Qty. CM7625F-03	Part Number	Part Description
1	1	1	CM4582	STRIKE PIN
2	1	1	CM7645	CM COVER WELDMENT
3	2	2	CM7618	DOOR PIN
4	1	1	CM7621	CYLINDER ASSEMBLY
5	1	1	CM7626	PUMP CYLINDER ASSEMBLY
6	1	1	CM7633	CYLINDER
7.1	1	1	CMF7635	PUSH CYLINDER MOUNT
7.2	4	4	CMF7619	PUSH CYLINDER MOUNT LEG
8	1	1	CM7652	LATCH ASSEMBLY
9	1	1	CM7657	DOOR SET ASSEMBLY
10	1	0	CMF7617	CM TOP BODY WELDMENT
10	0	1	CMF7617-01	CM TOP BODY WELDMENT
11	1	0	CMF7621	TANK WELDMENT
11	0	1	CMF7621-01	TANK WELDMENT
12	2	2	CM7696	PIVOT PIN RETAINER
13	2	2	1181	7/8"-9 x 2 1/4" SHCS
14	2	2	1182	7/8" HI COLLAR LOCKWASHER
15	2	2	1103	1/2" LOCKWASHER
16	2	2	1100	1/2"-13 EYE BOLT
17	2	2	1001	1/8" NPT ZERT
18	1	1	CM7622	1/4" NPT FILLER BREATHER
19	1	1	1493	3/4" x 1/4" REDUCER BUSHING
20	4	4	245	1/2"-13 x 3/4" SHCS
21	1	1	1651	GAUGE 0-5000 (NOT SHOWN)
22	4	4	1027	3/8" LOCKWASHER
23	4	4	1046	3/8"-16 x 3/4" HHCS



7 5/8" CHROMEMASTER ASSEMBLY

FOR FARR TONG

ASSEMBLY NO. CM7625-F

ASSEMBLY NO. CM7625F-03

APPROX. WEIGHT (LBS.) = 600

SUPERIOR Manufacturing & Hydraulics
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BROUSSARD, LA 70518
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		05/08/06

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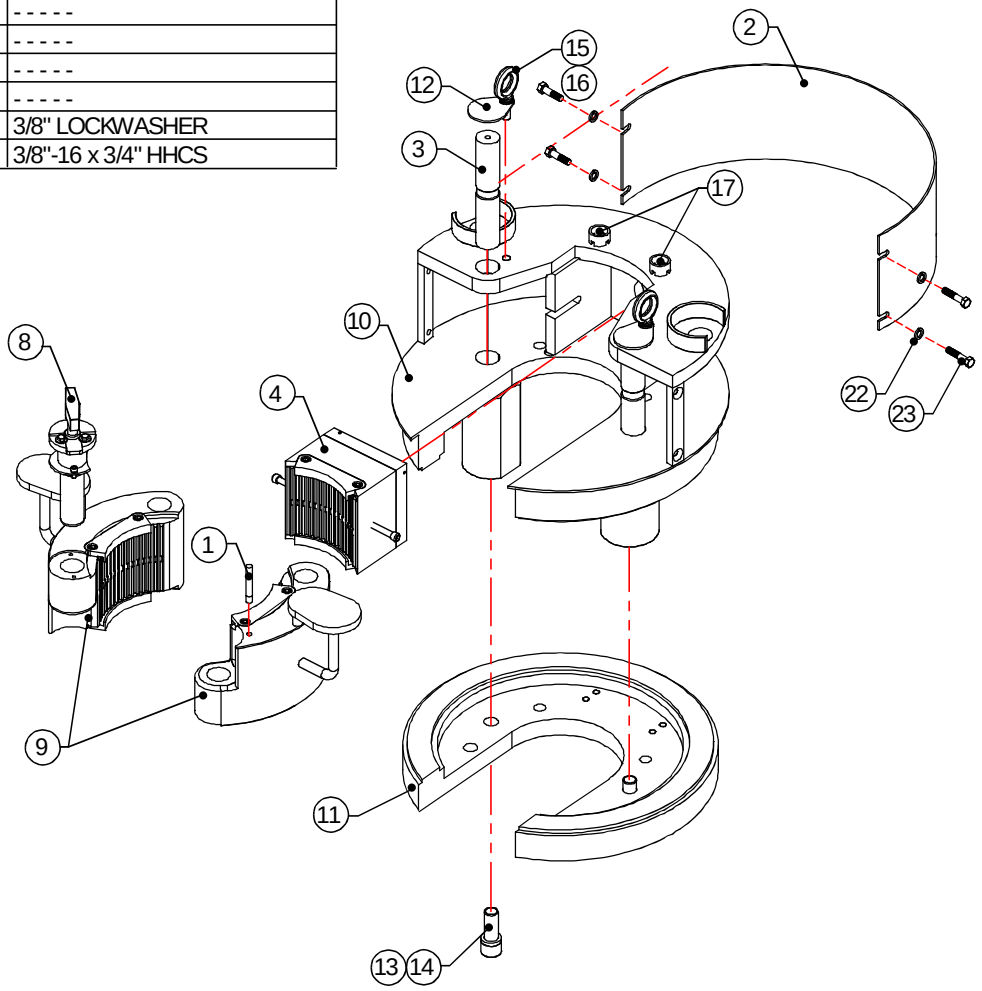
1	1	CM4582	STRIKE PIN
2	1	CM5538	COVER
3	2	CM7618	DOOR PIN
4	1	CM7621	CYLINDER ASSEMBLY
5	--	-----	-----
6	--	-----	-----
7	--	-----	-----
8	1	CM7652	LATCH ASSEMBLY
9	1	CM7657	DOOR SET ASSEMBLY
10	1	CMF7617-01	CM TOP BODY WELDMENT
11	1	CMF7621-S1	BOTTOM PLATE
12	2	CM7696	PIVOT PIN RETAINER
13	2	1181	7/8"-9 x 2 1/4" SHCS
14	2	1182	7/8" HI COLLAR LOCKWASHER
15	2	1103	1/2" LOCKWASHER
16	2	1100	1/2"-13 EYE BOLT
17	2	1001	1/8" NPT ZERT
18	--	-----	-----
19	--	-----	-----
20	--	-----	-----
21	--	-----	-----
22	4	1027	3/8" LOCKWASHER
23	4	1046	3/8"-16 x 3/4" HHCS



7 5/8" CHROMEMASTER ASSEMBLY

FOR FARR TONG
ASSEMBLY NO. CM7625F-02

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

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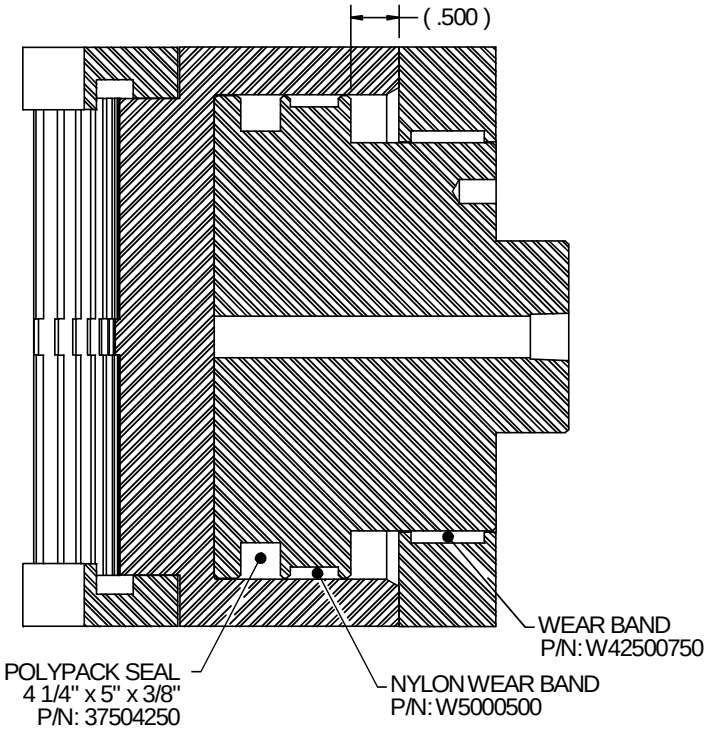
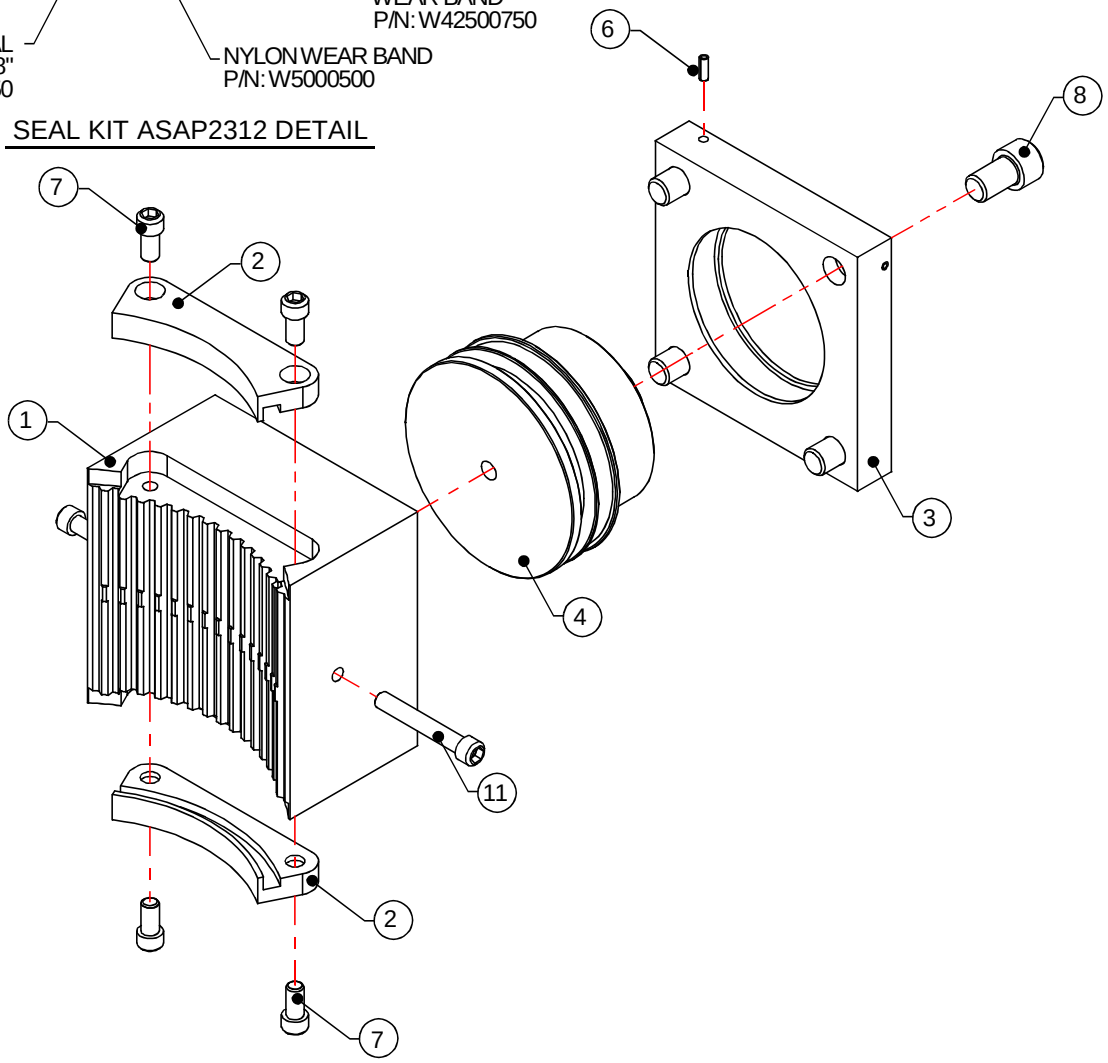


SEAL KIT ASAP2312 DETAIL

Item #	Qty.	Part Number	Part Description
1	1	CM7606	CYLINDER HOUSING
2	2	CM7656	DIE CLIP
3	1	CM7615	GLAND
4	1	CM7613	PISTON ROD
- -	- -	- - - - -	- - - - -
6	4	1005-A	3/16" x 1/2" ROLL PIN
7	4	1040-A	3/8"-16 x 3/4" SHCS
8	4	1153	5/8"-11 x 1" SHCS
9	1	ASAP2312	SEAL KIT
10	4	CM7608	EXTENSION SPRING
11	2	240	3/8"-16 x 2 1/2" SHCS



CYLINDER ASSEMBLY

ASSEMBLY NO. CM7621

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

		03/28/06
REV. #	LOG #	DATE

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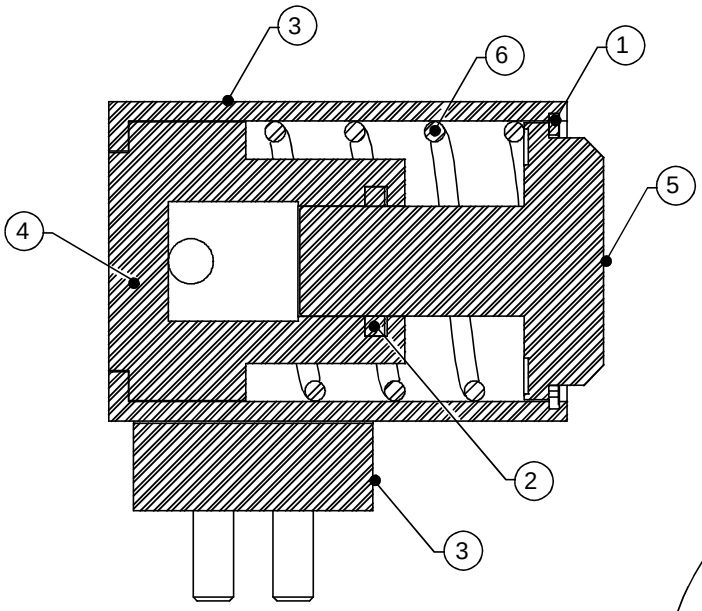
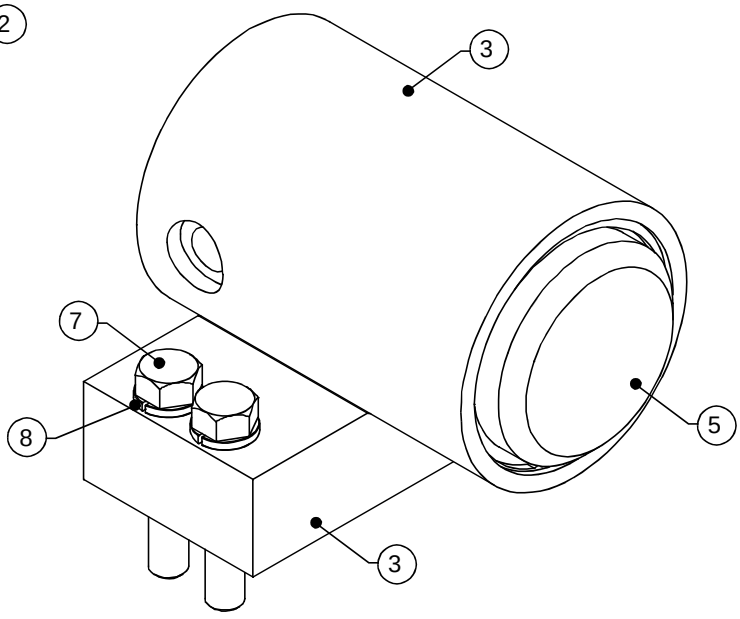
Item #	Qty.	Part Number	Part Description
1	1	1936	SNAP RING
2	1	25001375	POLYPACK SEAL
3	1	CM7627	PUMP HOUSING WELDMENT
4	1	CM7628	INTENSIFIER GLAND
5	1	CM7630	PUMP PLUNGER
6	1	CM7632	SPRING
7	4	175	1/2"-13 x 2 3/4" HHCS
8	4	1103	1/2" LOCKWASHER



SECTION VIEW



PUMP CYLINDER ASSEMBLY

ASSEMBLY NO. CM7626

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

		03/28/06
REV. #	LOG #	DATE

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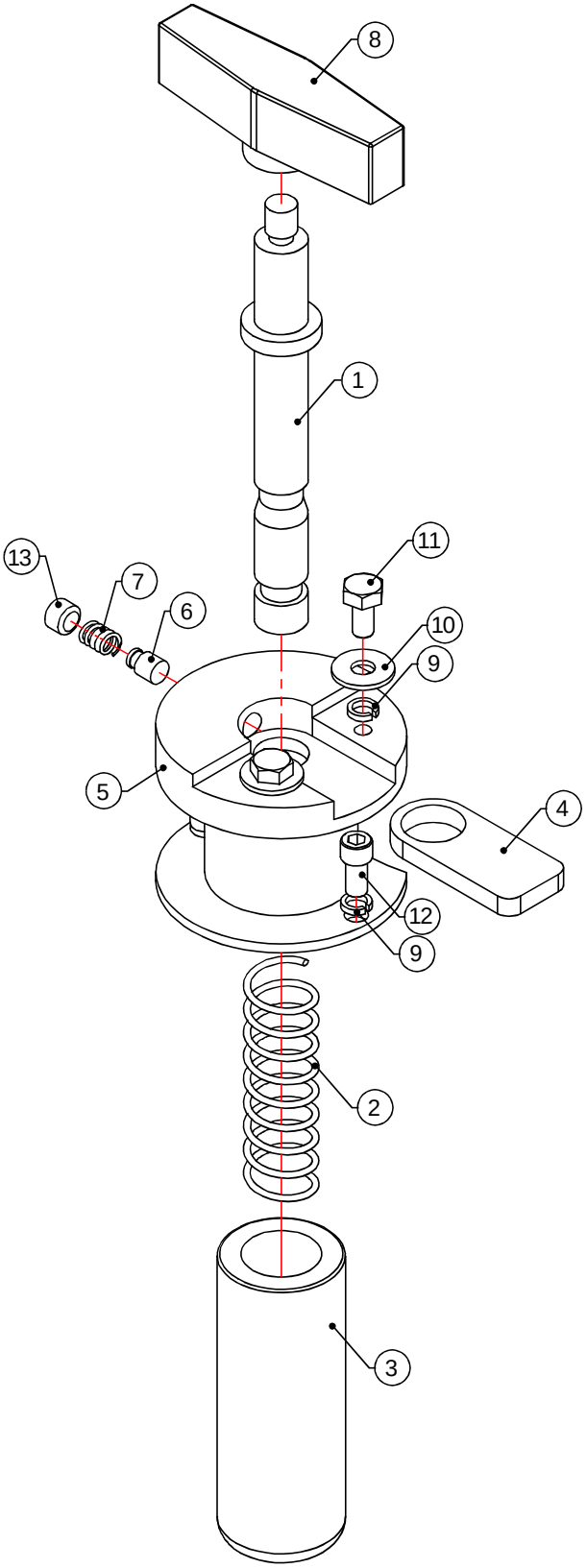
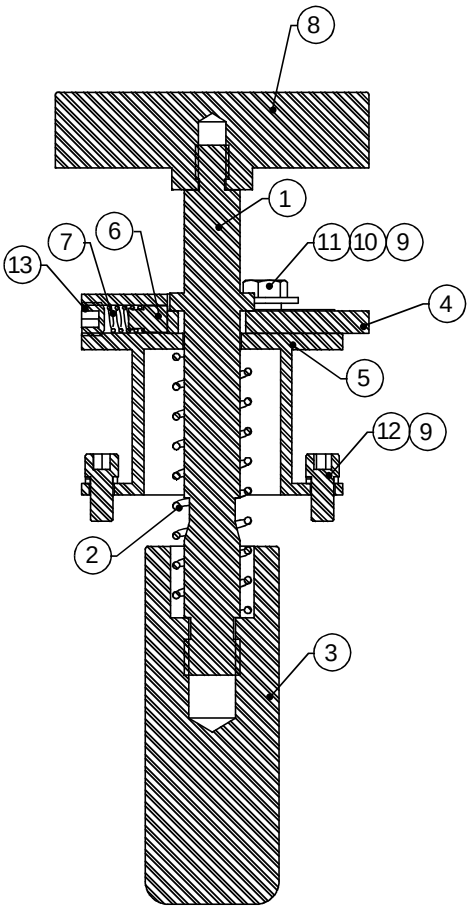
Item #	Qty.	Part Number	Part Description
1	1	CM7601-A	SHANK
2	1	CM7602-A	DOOR SPRING
3	1	CM7603-A	DOOR LATCH PIN
4	1	CM7649	CATCH
5	1	CM7650	LATCH HOUSING
6	1	CM7651	PLUNGER
7	1	CM7653	COMPRESSION SPRING
8	1	CLE1209-B	LATCH PIN HANDLE
9	4	1008-B1	1/4" HI COLLAR LOCKWASHER
10	2	1008-B2	1/4" FLAT WASHER
11	2	1008-B3	1/4"-20 x 1/2" HHCS
12	2	1008-C	1/4"-20 x 1/2" SHCS
13	1	1028	3/8"-16 x 1/4" SET SCREW





SECTION VIEW

LATCH ASSEMBLY

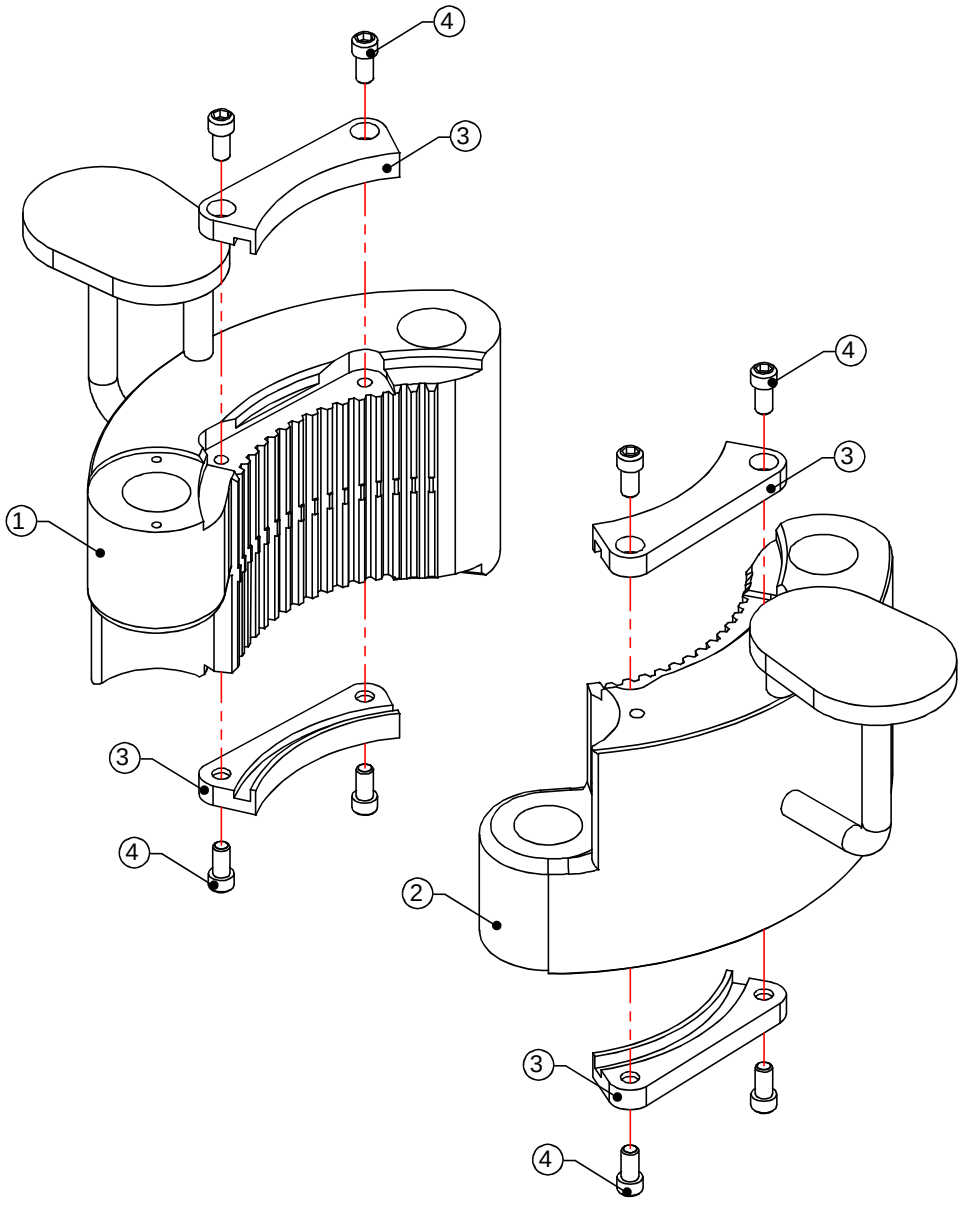
ASSEMBLY NO. CM7652

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

		04/03/06
REV. #	LOG #	DATE

REF: P:\Manuals\Equip Manuals\Dwgs\CM7625\CM7652 Latch.wpg

Item #	Qty.	Part Number	Part Description
1	1	CM7658	LEFT DOOR WELDMENT
2	1	CM7659	RIGHT DOOR WELDMENT
3	4	CM7656	DIE CLIP
4	8	1040-A	3/8"-16 x 3/4" SHCS



DOOR SET ASSEMBLY

ASSEMBLY NO. CM7657

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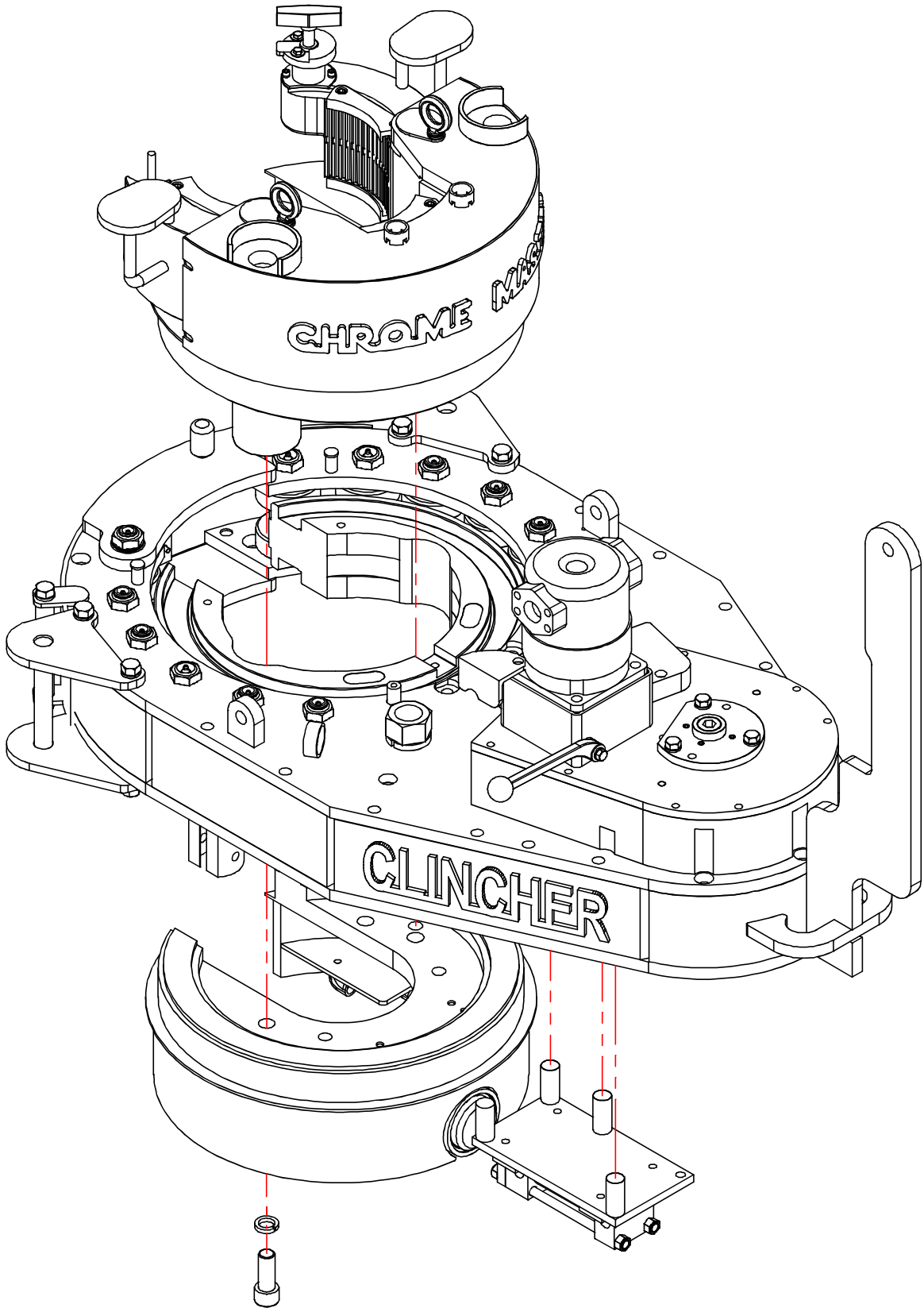
		03/29/06
REV. #	LOG #	DATE

REF: P:\Manuals\Equip Manuals\Dwgs\CM7625\CM7657 Doors.wpg



7 5/8" CHROMEMASTER

INSTALLATION

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4225 HWY. 90 EAST
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		03/29/06
REV. #	LOG #	DATE

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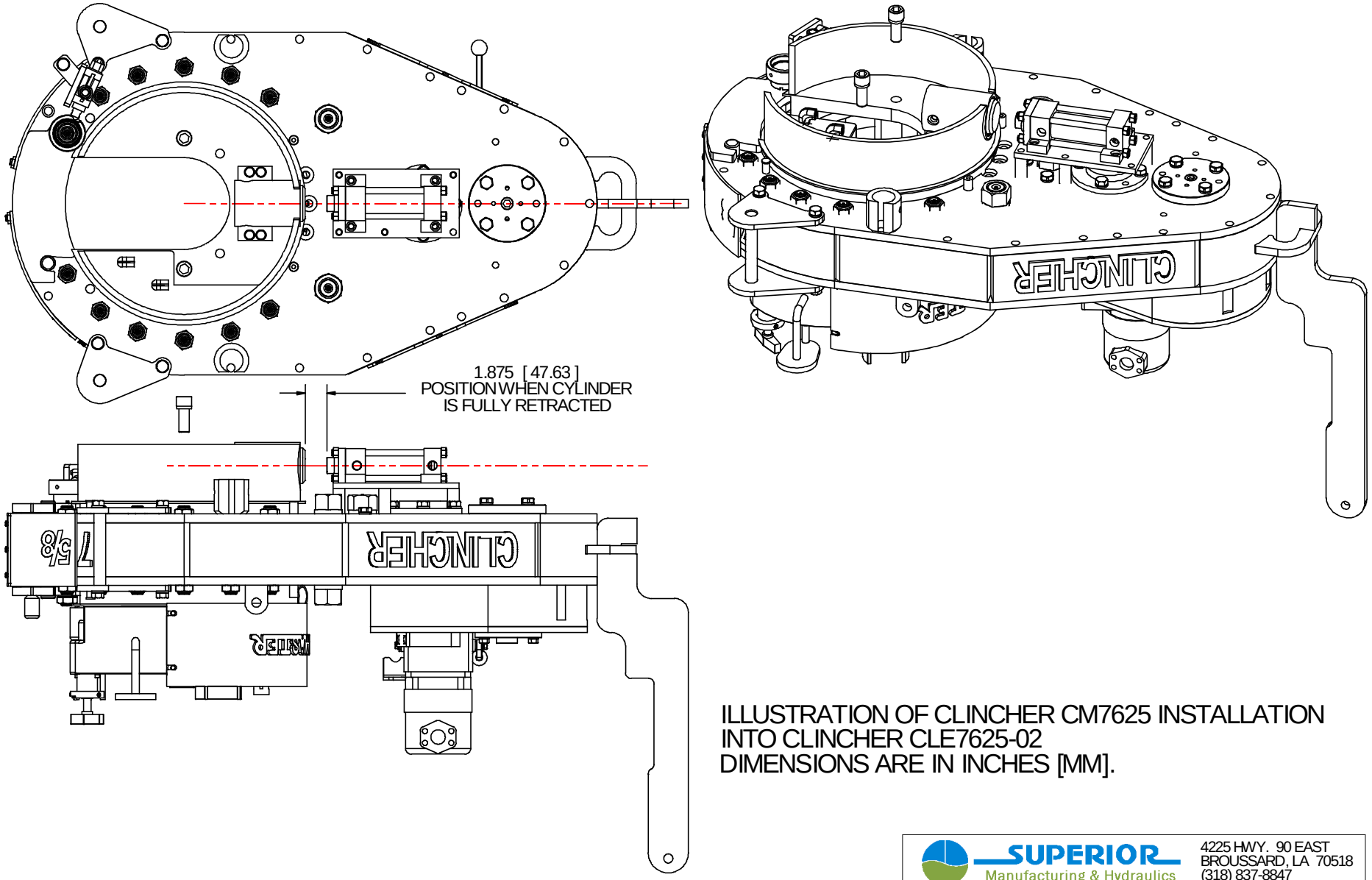

ILLUSTRATION OF CLINCHER CM7625 INSTALLATION
INTO CLINCHER CLE7625-02
DIMENSIONS ARE IN INCHES [MM].

7 5/8" CHROMEMASTER INSTALLATION

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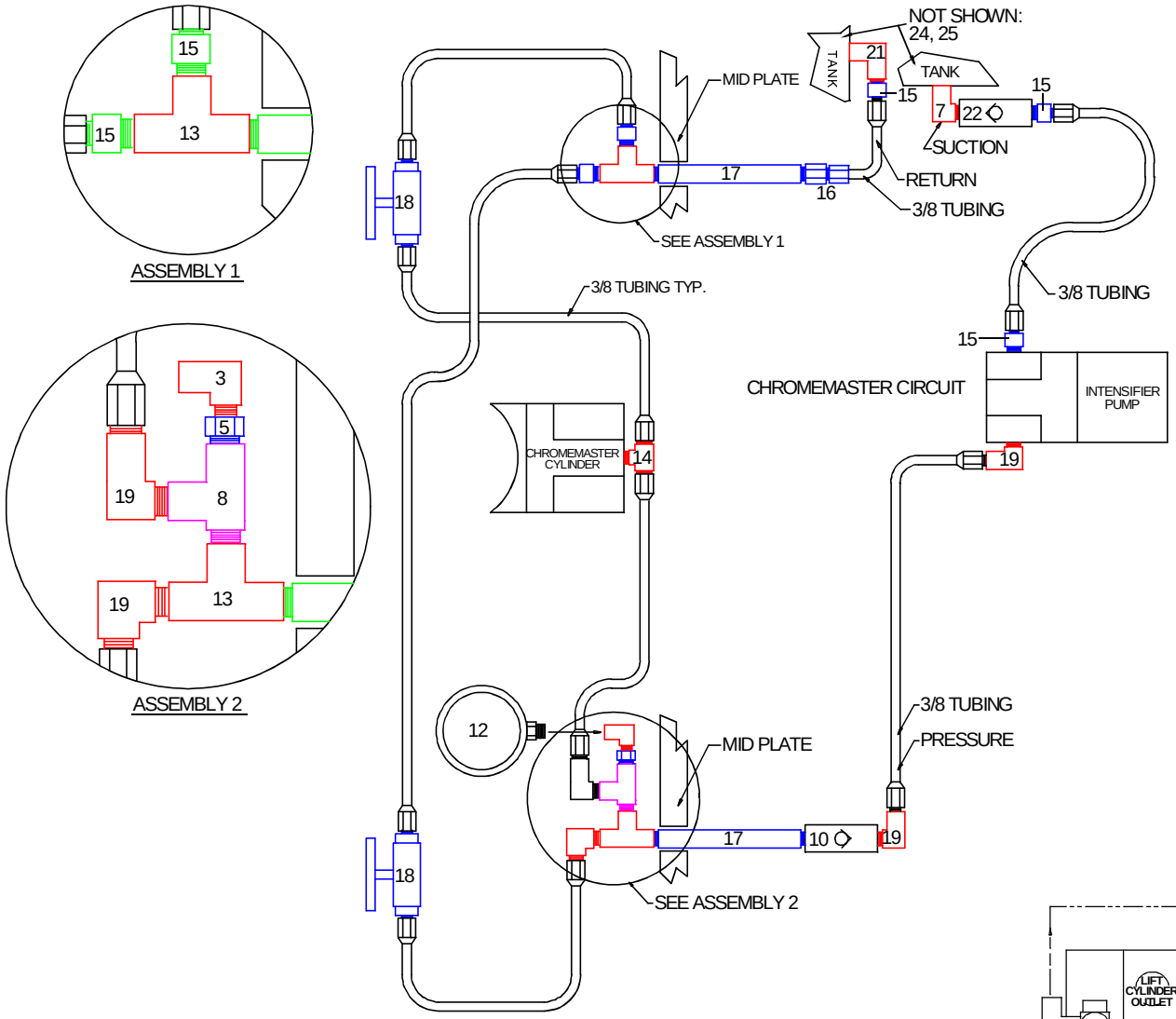
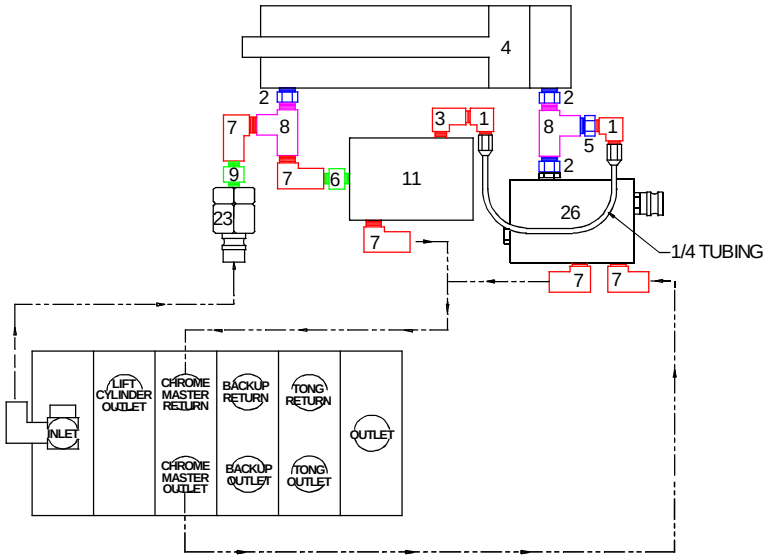
		03/29/06
REV. #	LOG #	DATE

REF: P:\Manuals\Equip Manuals\Dwgs\CM7625\Installation sht1.wpg



ITEM	QTY.	PART NUMBER	PART DESCRIPTION
1	2	1575	1/4" MNPT x M-TUBE 90°
2	3	1491	1/2" x 3/8" REDUCER BUSHING
3	2	1449	1/4" STREET EL
4	1	CM7633	CYLINDER
5	2	1486	3/8" x 1/4" REDUCER BUSHING
6	1	1457	3/8" HEX NIPPLE
7	6	1450	3/8" STREET EL
8	3	1595	3/8" RUN TEE
9	1	CM7648	3/8" HEX NIPPLE W/ 3/32 ORIFICE
10	1	CM4550	CHECK VALVE
11	1	CM4551	PILOT OPR. CHECK VALVE W/CARTRIDGE
12	1	1651	GAUGE 0-5000 PSI
13	2	1599	3/8" TEE
14	1	1563	1/4" MNPT x 3/8" TUBE BRANCH TEE
15	5	1570-A	3/8" MNPT x 3/8" TUBE ADAPTER
16	1	1567	3/8" FNPT x 3/8" M-TUBE ADAPTER
17	2	1425-A	3/8" x 10 1/4" NIPPLE SCH.80 BI
18	2	CM4556	3/8" SS BALL VALVE
19	4	1578	3/8" MNPT x 3/8" M-TUBE 90°
20	--	-----	-----
21	1	1580	3/8" FNPT x 3/8" FNPT 90°
22	1	CM4554	3/8" CHECK VALVE
23	1	1429	3/8" MALE QUICK DISCONNECT
24	1	CM4020	FILTER - SS-6TF2-LE
25	1	CM4021	STRAINER - SS-8F-K4-230
26	1	CM7654	PSI REDUCING VALVE 3/8" NPT PORTS



7 5/8" CHROMEMASTER FITTINGS & VALVES

2ND GENERATION

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
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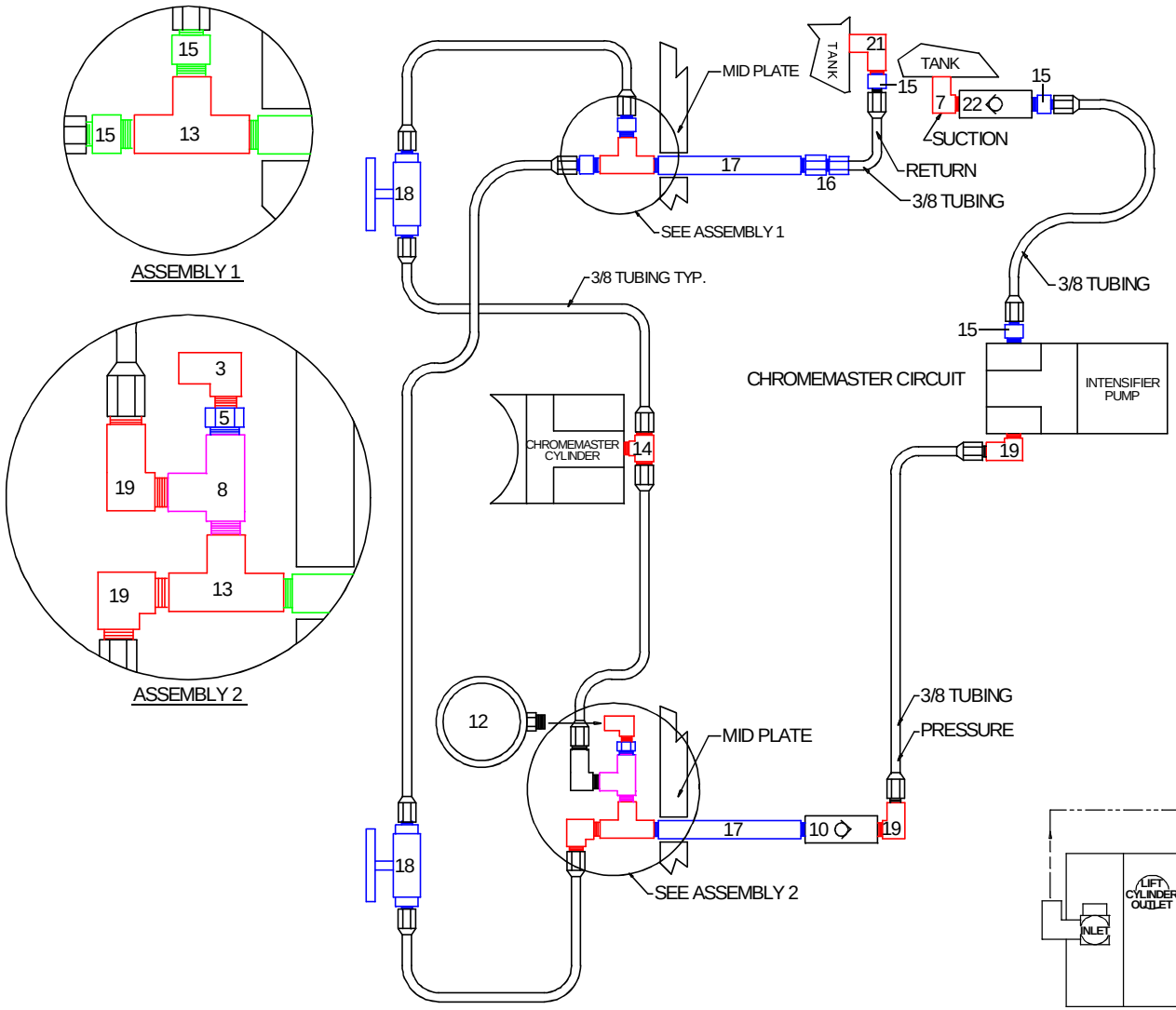
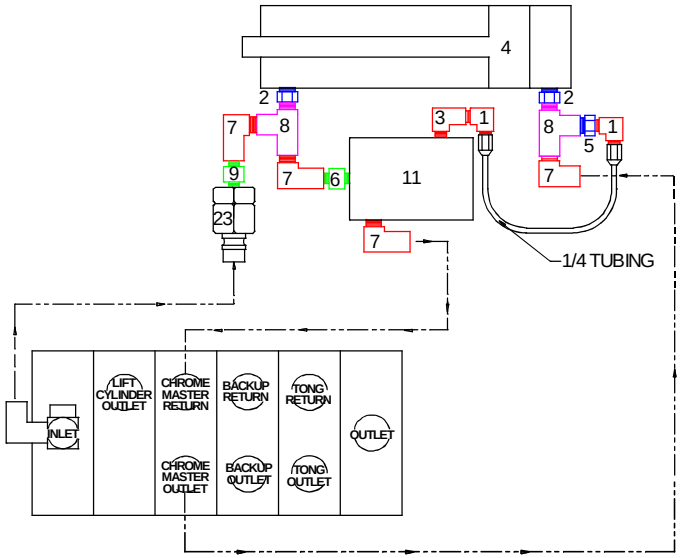
REV. #	LOG #	05/09/06 DATE

REF: P:\Manuals\Equip Manuals\Dwgs\CM7625\Fittings 2nd.wpg





ITEM	QTY.	PART NUMBER	PART DESCRIPTION
1	2	1575	1/4" MNPT x M-TUBE 90°
2	2	1491	1/2" x 3/8" REDUCER BUSHING
3	2	1449	1/4" STREET EL
4	1	CM7633	CYLINDER
5	2	1486	3/8" x 1/4" REDUCER BUSHING
6	1	1457	3/8" HEX NIPPLE
7	5	1450	3/8" STREET EL
8	3	1595	3/8" RUN TEE
9	1	CM7648	3/8" HEX NIPPLE W/ 3/32 ORIFICE
10	1	CM4550	CHECK VALVE
11	1	CM4551	PILOT OPR. CHECK VALVE W/CARTRIDGE
12	1	1651	GAUGE 0-5000 PSI
13	2	1599	3/8" TEE
14	1	1563	1/4" MNPT x 3/8" TUBE BRANCH TEE
15	5	1570-A	3/8" MNPT x 3/8" TUBE ADAPTER
16	1	1567	3/8" FNPT x 3/8" M-TUBE ADAPTER
17	1	CM7655	3/8" x 9 1/2" H.P. NIPPLE
18	2	CM4556	3/8" SS BALL VALVE
19	4	1578	3/8" MNPT x 3/8" M-TUBE 90°
20	1	1400	3/8" x 9 1/2" NIPPLE
21	1	1580	3/8" FNPT x 3/8" FNPT 90°
22	1	CM4554	3/8" CHECK VALVE
23	1	1429	3/8" MALE QUICK DISCONNECT

7 5/8" CHROMEMASTER FITTINGS & VALVES

1ST GENERATION

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
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REV. #	LOG #	DATE
		05/09/06

REF: P:\Manuals\Equip Manuals\Dwgs\CM7625\Fittings 2nd.wpg

SECTION 8 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