MCCOY GLOBAL

TECHNICAL MANUAL

80-350-650-000-000-30-00

Assembly Includes:
CLE3500 3 1/2 in (8.8 cm) 6,500 ft-lbs (8,812 Nm) Hydraulic Power Tong
MK3500-04 Mounting Kit
VP3500-320A Valve Package

SPECIFICATIONS | OPERATION | MAINTENANCE | PARTS

MCCOYGLOBAL.COM

ORIGINAL INSTRUCTIONS

THIS TECHNICAL DOCUMENT APPLIES TO THE FOLLOWING MODELS:			
OVERALL MODEL: 80-350-650-000-000-30-00			
TONG MODEL	**MOUNTING KIT**	**REV**	**DESCRIPTION**
CLE3500	MK3500-04	A	3 1/2 in, 6,500 ft-lbs tong and mounting kit

THIS EQUIPMENT IS EQUIPPED WITH A "SAFETY DOOR" ROTATION INTERLOCK SYSTEM. SEE SECTION 4 FOR PROPER TESTING PROCEDURES.

McCoy has made an effort ensure that all illustrations are accurate, but please note that some illustrations used in this manual may not exactly visually match the equipment provided.

MCCOY GLOBAL MOVING GLOBAL ENERGY FORWARD

EC DECLARATION OF CONFORMITY

Manufacturer Information:

McCoy Global USA, INC

4225 Highway 90 East, Broussard, LA 70518, USA

Product Identification:	Product Description:	Serial Number:
80-350-650-000-000-30-00	Tong Assembly (Top Level)	
CLE3500	3 1/2" McCoy Tong	
MK3500-04	Mounting Kit	
VP3500-320A	VA-20 Valve Package	

The above listed equipment consists of a hydraulically powered tong and backup complete with valve system and means of mounting in order to make up or break out tubular connections to the following specifications:

Technical Specification Overview

Maximum Torque	6,500 ft. lbs. / 8,813 Nm
Maximum Operating Pressure	3,000 psi / 207 bar
Max Recommended Flow Rate 40 GPM / 151 LPM	for A-20 Valve package
Rotational Speed at 35 GPM/132 LPM	
High Gear	52 RPM
Low Gear	26 RPM
Tong Handle Length	24" / 62.5 cm
Overall Length of Tong	33.2" / 84.4 cm
Overall Width of Tong, & MK	20.7" / 52.6 cm
Tong Width	17.3" / 43.8 cm
Weight – Tong, & MK	800 lbs/ 363 kg
Tong Jaw Sizes	1.660" – 3 ½"

This Declaration of Conformity declares that the equipment indicated above fulfills the requirements of Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on Machinery as stated in the Instructions for Completion of Equipment.

CLE3500 Declaration of Conformity – Page 1 of 2

4225 HIGHWAY 90 EAST
BROUSSARD LA 70518 USA
TEL +1.337.837.8847
FAX +1.337.837.8839
www.mccoyglobal.com

MCCOY GLOBAL MOVING GLOBAL ENERGY FORWARD

The equipment as provided has been found in accordance with Directive 94/9/EC of the European Parliament and the Council of 23 March 1994 on the Approximation of the Laws of the Member States Concerning Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres.

The equipment has been assessed and found to be in accordance with the following European Harmonised Standards:

EN ISO 12100:2010	Safety of Machinery. General Principles for Design. Risk Assessment and Risk Reduction.
ISO 4413:2010	Hydraulic fluid power – General Rules and Safety Requirements for systems and their components.
ISO 14121-2	Safety of machinery – Risk assessment – Part 2: Practical guidance and examples of methods
EN61310-3:2008	Safety of Machinery – Indication, marking, and actuation – Part 3: Requirements for the location and operation of actuators
BS EN 349	Safety of Machinery. Min. Gaps to Avoid Crushing of Parts of the Human Body
BS EN 13463-1	Non-Electrical Equipment for Use in Potentially Explosive Atmospheres. Basic Method and Requirements
BS EN 13463-5	Non-Electrical Equipment Intended For Use in Potentially Explosive Atmospheres. Protection By Constructional Safety 'c'

This equipment has been classified as suitable for use within a potentially explosive atmosphere as follows:

CE Ex II 2G c IIB T6

I hereby declare that the equipment described in this document was found to have been designed and manufactured in compliance with the relevant sections and essential health and safety requirements of the aforementioned Standards, codes and Directives/Regulations.

Signed for and on behalf of:

McCoy Drilling & Completions

Name **Product Line Manager** **Company**

Signature and date

CLE3500 Declaration of Conformity – Page 2 of 2

4225 HIGHWAY 90 EAST
BROUSSARD LA 70518 USA
TEL +1.337.837.8847
FAX +1.337.837.8839
www.mccoyglobal.com

Illustration: CE Declaration of Conformity

PATENTED & PATENTS PENDING

This page intentionally
left blank

McCoy has made every effort to ensure the information contained in this document is accurate and current. This manual is intended to provide equipment operation and safety instructions for your equipment. However, McCoy does not warrant or guarantee that the information is either complete or accurate in every respect and the user of the manual should consult with its McCoy sales representative for any clarifications and updates.

The user of the manual shall protect, indemnify, and hold harmless McCoy and its directors, officers, employees, and agents from and against all liability for personal injury, death, or property damage resulting directly or indirectly from the use of the information contained in this manual.

Observance of all descriptions, information and instructions set out in this manual is the full responsibility of the user. This manual is intended for guidance and informational purposes and must be used in association with adequate training and on-the-job supervision to provide safe and effective equipment use.

It is the responsibility of the user to conform to all regulations and requirements issued by an authority or agency which may affect the operation, safety or equipment integrity, that may overrule the content of this documentation.

The user will acknowledge and obey any general legal or other mandatory regulation in force relating to accident prevention, safety, and equipment integrity.

This page intentionally
left blank

Summary Of Revisions (Continued)				
Date	**Section**	**Page**	**Description Of Revision**	**Approved**
MAY 2015	ALL	ALL	Updated manual to new template	

This page intentionally
left blank

This page intentionally
left blank

SECTION 1: INTRODUCTION

This page intentionally
left blank

1.0 INTRODUCTION & CONTACT INFORMATION

Congratulations, and thank you for purchasing quality tubular connection equipment from McCoy Global. This unit will provide years of outstanding performance. Proper maintenance and care will extend its life and ensure years of excellent performance and reliability. The installation and commissioning, operating, and maintenance instructions in this manual will assist you in giving your equipment the care it requires. Please read the manual before installing and using your equipment. Replacement parts are readily available from McCoy Global. Should you need replacement parts, or should you experience any difficulty not covered in this manual, please contact:

McCoy Global Canada

14755 121A Avenue
Edmonton, Alberta, Canada
T5L 2T2

Phone: 780.453.3277
Fax: 780.455.2432

McCoy Global USA - Tongs & Bucking Units

4225 HWY 90 East
Broussard, LA, USA
70518

Phone: 337.837.8847
Fax: 337.837.8839

McCoy Global USA - Service

6530 Petropark Drive
Houston, TX, USA
77041

Phone: 281.377.4264
Fax: 281.377.4278

McCoy Global UK Ltd.

Units 9/10 Ocean Trade Center
Minto Avenue, Altens Industrial Estate
Aberdeen, AB12 3JZ
United Kingdom

Phone: +44.1224.245140
Fax: +44.1224.890176

McCoy Global Singapore PTE Ltd.

49 Tuas View Loop
Singapore, 637701
Republic of Singapore

Phone: +44.1224.245140
Fax: +44.1224.890176

McCoy Global S.A.R.L

Warehous No. FZS1BJU03
Jebel Ali Free Zone - South Zone
Dubai, United Arab Emirates

Phone:
Fax:

Email Sales: dcsales@mccoyglobal.com

www.mccoyglobal.com

Technical manuals are produced and published by McCoy Global Inc.. McCoy Global has made an effort ensure that all information in this document is accurate, but please note that some illustrations used in this manual may not visually match actual purchased equipment. If you believe information in this publication is missing or erroneous, please contact one of our Technical Publications Departments at McCoy Global Canada or McCoy Global USA Tongs & Bucking Units.

Standard Terms and Conditions of Sale (including warranty information):

http://www.mccoyglobal.com/tcs.pdf

This page intentionally
left blank

1.1 SCOPE

This technical manual is the main document supplied by McCoy Global for the equipment identified on Page iii of the preamble. The intent of this document is to provide descriptions of the systems, installation, commissioning and operating instructions, maintenance guidelines, spare parts information, and technical drawings and schematics (where applicable).

The OEM-recommended installation, commissioning, operation, maintenance, and troubleshooting instructions are to be regarded as guidelines, and are not intended to be a comprehensive operating guide for user specific application. Due to the wide variety of operating conditions it remains the responsibility of each equipment owner to use these guidelines together with an experienced manager to develop safe operating procedures that conform to American Petroleum Institute (or equivalent) standards, applicable State/Province or local regulations, and any corporate regulations/operating practices.

This page intentionally
left blank

1.2 GENERAL HEALTH AND SAFETY

AUTHORIZED USE ONLY!

READ THIS MANUAL BEFORE USING EQUIPMENT

Only authorized, trained, and competent personnel shall operate, maintain, and repair this equipment.

Fully review this manual and comply with all safety and environmental protection instructions before operating equipment.

1.2.1 Hazard Labels

McCoy Global uses four levels of hazard / notice labels to describe items of four levels of importance:

DANGER is represented by a hazard symbol coupled with a "**DANGER**" signal word, and identifies items of the highest level of risk. Failure to heed information identified by a **DANGER** symbol may result in severe bodily injury or death.

⚠ DANGER

THIS IDENTIFIES AN EXTREME HAZARD OF PERSONAL INJURY OR DEATH

A **WARNING** is represented by a hazard symbol coupled with a bold "**WARNING**" signal word, and identifies items of medium risk. Failure to heed information identified by a **WARNING** symbol may result in significant injury to personnel, catastrophic equipment failure, or harmful environmental contamination.

⚠ WARNING

THIS IDENTIFIES A WARNING REGARDING POTENTIAL INJURY OR CATASTROPHIC EQUIPMENT DAMAGE

A **CAUTION** is represented by a hazard symbol coupled with a bold "**CAUTION**" signal word, and identifies items of low risk. Failure to heed information identified by a **WARNING** symbol may result in injury to personnel or equipment damage.

⚠ CAUTION

THIS IDENTIFIES A CAUTION REGARDING SAFE OPERATION OR THE POTENTIAL OF EQUIPMENT DAMAGE

A **NOTICE** highlights information or items of importance unrelated to personal injury that may aid the user during installation, commissioning, assembly, or operation of your equipment.

NOTICE

THIS HIGHLIGHTS ITEMS OF IMPORTANCE UNRELATED TO PERSONAL INJURY

1.2.2 General Safe Operating Guidelines

Only authorized personnel shall operate equipment delivered by McCoy Global. Equipment shall be in a proper technical condition prior to use, and shall be used only for the purpose for which it is intended. Malfunctions or damages must be rectified before operation to ensure personnel safety and avoid equipment damage.

The user is responsible for ensuring the safety of all personnel while operating any McCoy Global product. McCoy Global is not responsible for injuries or equipment damage that arises from improper use of the equipment.

McCoy Global recommends that a hazard assessment of the work area be performed by a designated safety representative before commencing operations. A designated safety representative is responsible for verifying that all operators have adequate equipment and safety training.

1.2.2 General Safe Operation Guidelines (Continued):

The area surrounding the equipment operating area must be clutter-free and free from tripping hazards, or protruding objects that may snag hoses or cables. Operating surface or drill floor must be kept free of slipping hazards like grease, oil, water, etc.

Adequate lighting of the work area is required. All warnings, labels, gauges, and signs must be clearly visible.

Equipment components painted green are safe for continuous handling. Areas painted yellow and any other equipment components that rotate or move are designated as hazardous areas. Contact with those areas must be avoided during operation.

Illustration 1.2.1: Equipment Handling Warnings

Always wear all personal protective equipment (PPE) specified by established HSE policies. Follow all safety guidelines.

Do not open the tong door while the tong is rotating or under load. Doing so may generate a shock load that could result in catastrophic equipment failure not covered by the manufacturer's warranty, and may present a hazard to personnel on the drill floor.

⚠ WARNING

DO NOT OPEN TONG DOOR WHEN TONG IS ROTATING OR UNDER LOAD

See Section 4 for the correct, safe procedure for testing the door sensor/tong shutdown system on a McCoy Global power tong.

Never attempt to clamp to a tubular using incorrectly sized dies. Operators must always use the correct jaw size equipped with the proper dies. Use of incorrectly size dies poses a hazard to personnel and may damage equipment. Please see Section 3 of this manual for a list of compatible jaw die kits and replacement dies.

⚠ WARNING

NEVER ATTEMPT TO CLAMP ONTO TUBULARS WITH INCORRECTLY SIZED DIES

⚠ WARNING

BY NATURE, STEEL MACHINERY WITH ROTATING AND MOVING PARTS HAS THE POTENTIAL TO GENERATE IGNITION SOURCES, IE. SPARKS. AS OUTLINED IN THIS MANUAL, SCHEDULED MAINTENANCE, LUBRICATION, TIMELY REPLACEMENT OF WORN COMPONENTS AND MOST IMPORTANTLY, ON-SITE RISK ASSESSMENTS WITH STRINGENT STANDARD OPERATING PROCEDURES ARE ALL REQUIRED TO PREVENT THE POTENTIAL OF SPARK GENERATION.

⚠ WARNING

FAILURE TO FOLLOW THE EQUIPMENT PLACEMENT/RIG-UP PROCEDURES OUTLINED IN THIS MANUAL MAY LEAVE EQUIPMENT UNGROUNDED AND AT RISK FOR BUILDING A STATIC CHARGE. ASSESSMENT FOR PROPER GROUNDING MUST BE PERFORMED PRIOR TO OPERATION IN ORDER TO MITIGATE THE SPARK RISKS ASSOCIATED WITH STATIC DISCHARGE.

1.2.3 Rigging and Overhead Lifting

McCoy Global recommends following an industry-accepted standard such as OSHA, ASME B30.9-2006, or manufacturer's guidelines when performing any rigging and overhead lifting. Use by untrained persons is hazardous. Improper use will result in serious injury or death. Do not exceed rated capacity. Slings will fail if damaged, abused, misused, overused, or improperly maintained. Never stand beneath a suspended load.

⚠ DANGER

NEVER STAND BENEATH A SUSPENDED LOAD

1.2.4 Maintenance Safety

All personnel are responsible for performing maintenance tasks in a manner that ensures worker, equipment, and environmental safety, and may require taking additional steps that are not identified in this section.

Maintenance of equipment shall be performed only by designated qualified maintenance personnel. Do not begin a maintenance task without the proper tools or materials on hand, or the proper drawings and documentation necessary.

Isolate the location of the maintenance under way to prevent unaware personnel from inadvertently exposing themselves to a hazard. Use tape, rope, or signage to clearly indicate "off-limits" area.

Where applicable ensure electrical circuits within the affected equipment are deactivated or de-energized by an authorized, qualified person and locked out if necessary. Do not disconnect a live electrical circuit unless location is known to be non-hazardous.

⚠ DANGER

ALWAYS MEASURE ELECTRICAL CIRCUITS TO CONFIRM DEACTIVATION BEFORE PROCEEDING WITH MAINTENANCE

⚠ WARNING

WHEN REPAINTING EQUIPMENT, THE PAINT COAT BEING APPLIED SHOULD NEVER EXCEED 2MM IN THICKNESS. EXCEEDING THIS THICKNESS MAY FACILITATE STATIC CHARGE BUILDUP AND PRESENT A POSSIBLE SPARK RISK ASSOCIATED WITH STATIC DISCHARGE.

1.2.5 Replacement Parts

All consumable and replacement parts must meet or exceed OEM specifications in order to maintain equipment integrity. Do not replace protective equipment such as hydraulic switches, circuit breakers, and fuses without first consulting with McCoy Global. Do not replace electrical or control hardware without consulting with McCoy Global. Using non-OEM replacement parts without the approval of McCoy Global may void equipment warranty.

1.2.6 Environmental Impact

McCoy Global equipment uses materials that may be harmful to the environment if improperly disposed of (hydraulic fluid, grease, fuel, electrical components, etc.). Dispose of all materials according to established environmental protection regulations in conjunction with published federal, state, provincial, and civic legislation.

In all cases observance of the following is the full responsibility of the user:

- **all descriptions, information and instructions set out in this manual**
- **any regulation or requirement issued by an authority or agency which may influence operation, safety or integrity of the equipment that overrules the content of this document.**
- **any legal or other mandatory regulation in force governing accident prevention or environmental protection.**

1.3 ACRONYMS AND TERMINOLOGY

1.3.1 Acronyms and Definitions

ACRONYM	DEFINITION
ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
ATEX	Appareils destinés à être utilisés en **AT**mosphères **EX**plosibles
BDC	Bottom dead centre
CBU	**CLINCHER**®-style backup
CE	Conformité Européenne
CCW	Counter-clockwise
COG	Centre of gravity
CW	Clockwise
DS	Driller's side
EU	European Union
HMI	Human-machine interface
HPU	Hydraulic power unit
HSE	Health, Safety, and Environmental (context: protection)
ID	Inside diameter
ISO	International Organization for Standardization
JDK	Jaw die kit
JSA	Job safety assessment
LH	Left-hand
LJBU	LOCKJAW™ backup
MBU	"McCoy style" backup
N/A	Not applicable or Not available (context-dependant)
NLGI	National Lubricating Grease Institute
ODS	Off-driller's side
OEM	Original equipment manufacturer
OSHA	Occupational Safety and Health Administration
OD	Outside diameter
PLC	Programmable Logic Controller
PPE	Personal Protective Equipment
PSI	Pounds per square inch (pressure)
RH	Right-hand
VAC	Volts, alternating current
VDC	Volts, direct current

1.3.2 Terms and Definitions

TERM	DEFINITION
ATEX-certified	Conforms with the EU “ATEX” directive for equipment operated within an explosive atmosphere.
Backup	The component of a tong-backup arrangement that mechanically attaches to the stationary side of a tubular connection and provides resistance to the tong when making up or breaking out a joint.
Box	The female side of a pipe connection
Break Out	Loosening, un-threading, and disconnecting a connection (typically a tubular connection). The term may also apply to a general threaded connection.
CE-marked	CE compliant. Conforms with the essential requirements of the applicable Conformité Européenne directives.
Clamp	To grasp the stationary side of a pipe joint with a backup.
Die	A component of a jaw die kit that provides the mechanical contact between the tong and the tubular.
Joint	Also called a “pipe joint”. A threaded tubular connection.
Load Cell	A hydraulic device that transmits a proportional signal to a torque gauge for the purpose of measuring connection torque.
Make Up	Threading together a connection (typically a tubular connection) and tightening to a specified torque. The term may also apply to a general threaded connection.
Pin	The male side of a pipe connection
Ring Gear	The rotating component, mechanically coupled to a hydraulic motor through a gear train, which provides rotation to the pin-side of a tubular connection through the use of jaw assemblies
Safety Door	A device mechanically connected to the door of a hydraulic power tong that uses hydraulic switching to prevent rotation of the cage plates when the tong door is open.
Sling	A rigid or non-rigid device used to hoist a piece of equipment using a crane.
Tank	Hydraulic fluid reservoir
Tong	The component of a tong-backup arrangement that mechanically attaches to the tubular connection and rotates the tubular to make up or break out a connection
Un-clamp	To release the stationary side of a pipe joint with a backup.
WINCATT®	Data acquisition and torque/turns management system manufactured by McCoy Global
Headstock	The tong assembly on a horizontal bucking unit
Tailstock	The backup assembly on a horizontal bucking unit

This page intentionally
left blank

SECTION 2: EQUIPMENT & LUBRICATION SPECIFICATIONS

This page intentionally
left blank

2.0 EQUIPMENT DESCRIPTION

The McCoy 80-350-650-000-000-30-00 is a hydraulically operated power tong capable of making up and breaking out tubular connections of varying sizes at a wide range of torques (see page 2.8 for equipment specifications).

Features of the McCoy 80-350-650-000-000-30-00 3 1/2 in Power Tong include:

- Safety Door Switch
- Engineered Shipping Stand for ease of handling
- Splined Die System

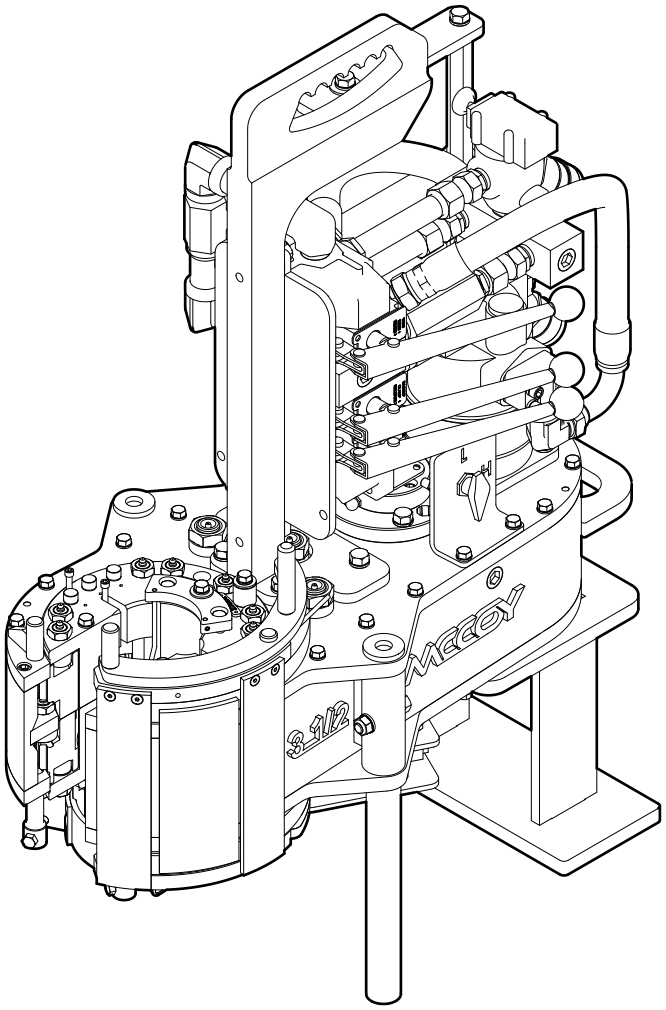


Illustration 2.0.1: 80-350-650-000-000-30-00 Power Tong & Mounting Kit

This page intentionally
left blank

2.0 EQUIPMENT DESCRIPTION (CONTINUED):

⚠ WARNING

IN ADDITION TO THE HAZARD AREAS OF THIS EQUIPMENT THAT ARE COATED YELLOW, THE ROTATING CAGE PLATE ASSEMBLY POSES A SIGNIFICANT HAZARD WHEN THE EQUIPMENT IS ACTIVE. KEEP HANDS CLEAR OF THE CAGE PLATE WHEN EQUIPMENT IS ENERGIZED. SAFE AREAS TO HANDLE WHILE THE EQUIPMENT IS ENERGIZED ARE INDICATED BY GREEN COATING

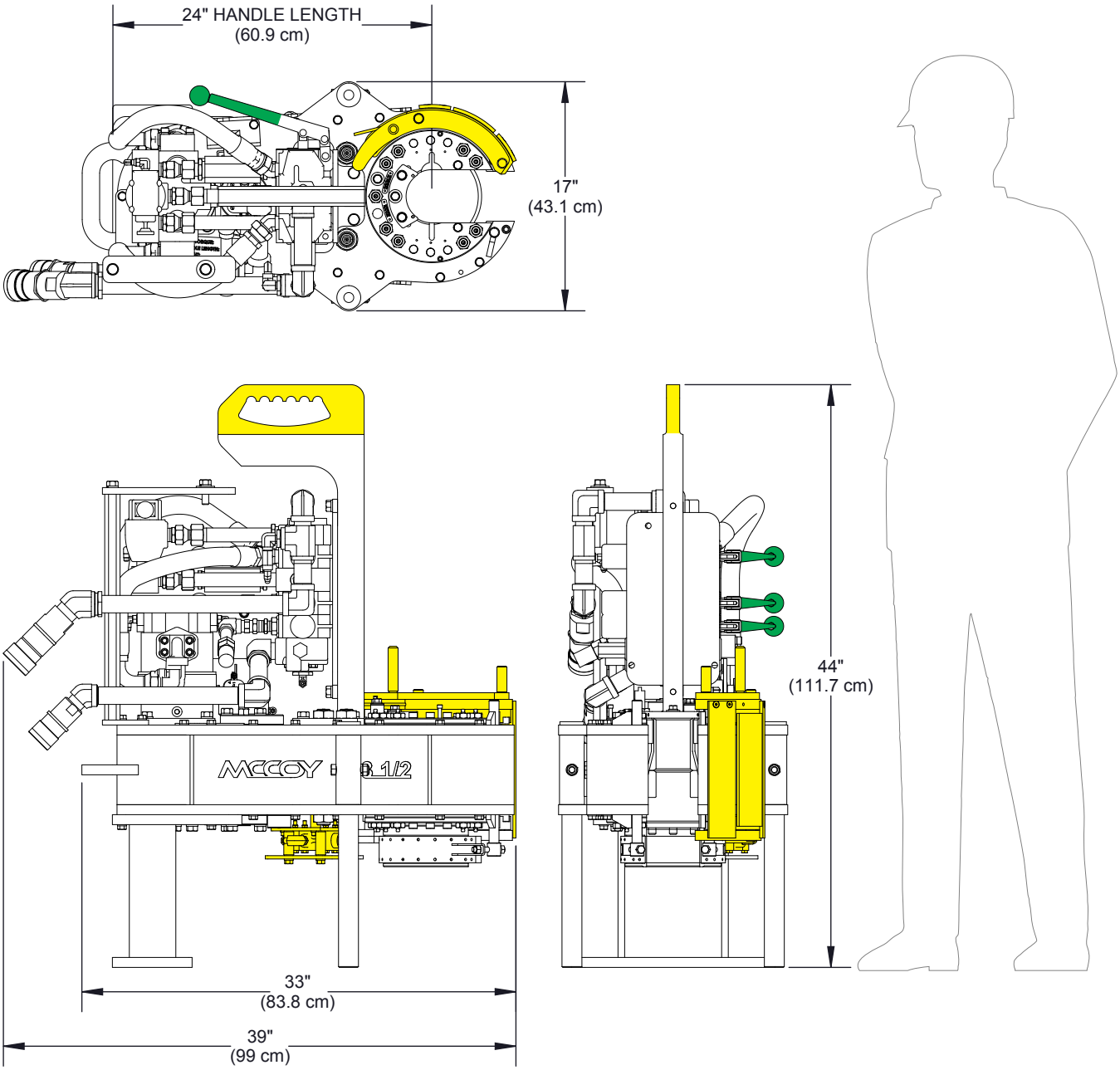
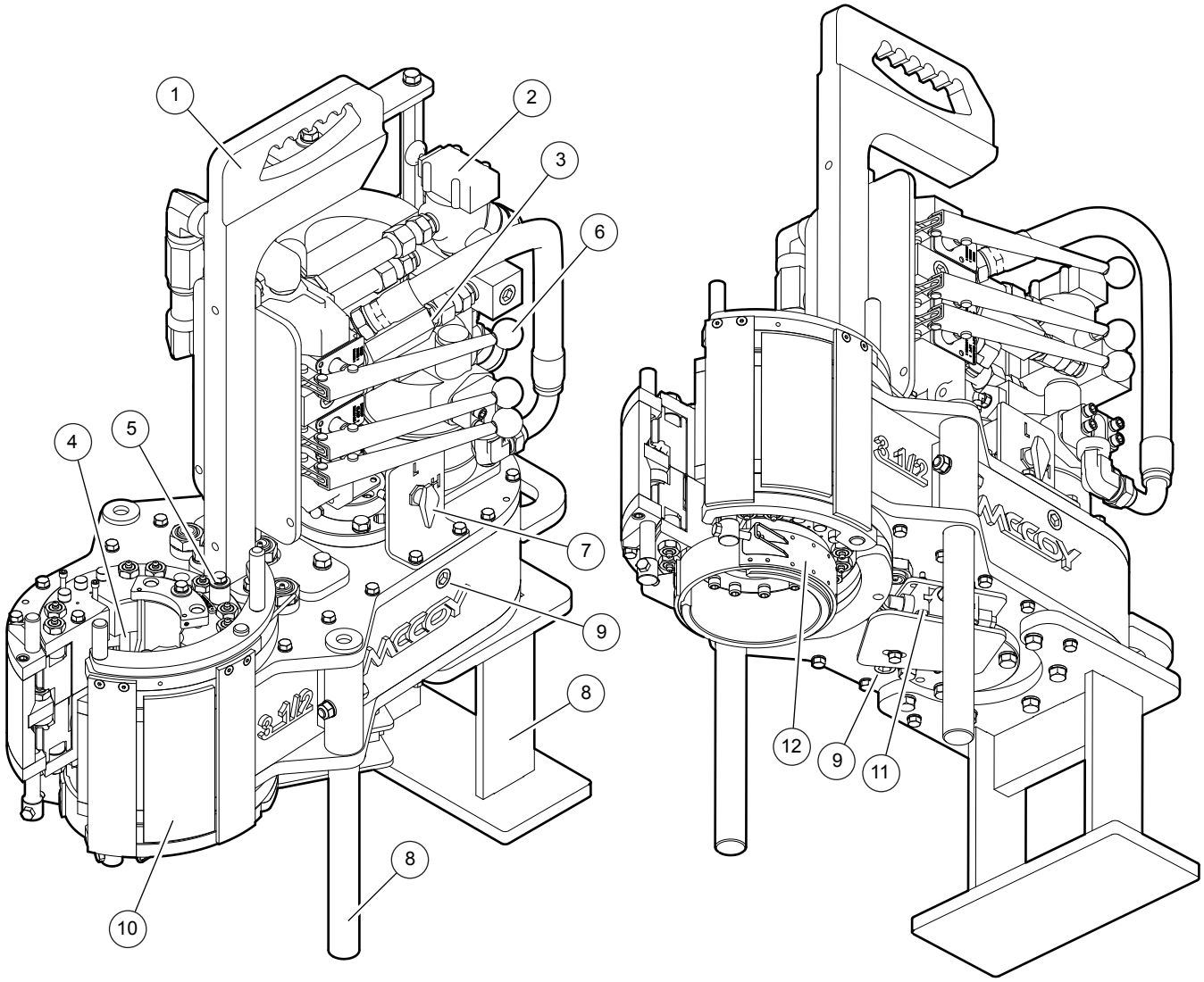


Illustration 2.0.2: 80-350-650-000-000-30-00 Power Tong & Mounting Kit Dimensions & Hazard Areas

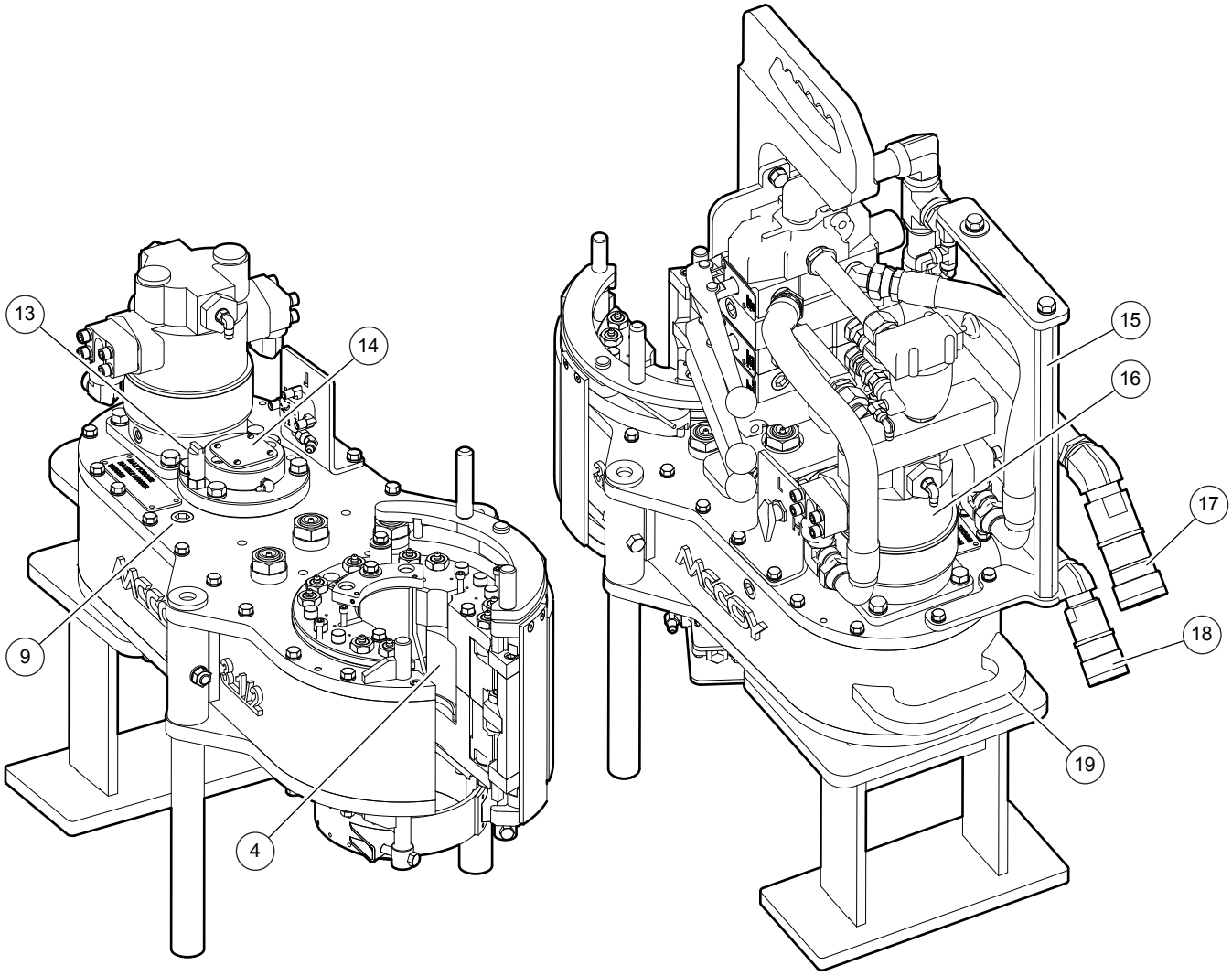
2.1 MAJOR COMPONENT IDENTIFICATION



Item	Description
1	Rigid Bail Lifting Point
2	Dump Valve
3	Valve Package
4	Jaw & Jaw Die
5	Backing Pin
6	Valve Lever
7	High/Low Speed Switch
8	Mounting Kit
9	Proximity Sensor Port
10	Tong Door
11	Safety Door Switch
12	Brake Band

Illustration 2.1.1: Major Component Identification 01

2.1 MAJOR COMPONENT IDENTIFICATION (CONTINUED):



Item	Description
13	Encoder Blade
14	Encoder Mount
15	Torque Gauge Mount
16	Hydraulic Motor
17	Hydraulic Return
18	Hydraulic Supply
19	Snub Line / Load Cell Attachment Handle

Illustration 2.1.2: Major Component Identification 02

2.2 EQUIPMENT SPECIFICATIONS

Torque Table

Please note that these are ideal values. Actual achieved torque is highly dependant upon tong efficiency and final position of rotary gear when full torque load is reached. Maximum torque is only available in low gear and full motor displacement.

Pressure	Half Displacement (High)		Full Displacement (Low)	
PSI / MPa	ft-lbs	Nm	ft-lbs	Nm
1000 / 6.89	1200	1626	2400	3253
1300 / 8.96	1600	2169	3200	4338
1600 / 11.03	1900	2576	3900	5287
2000 / 13.79	2400	3253	4900	6643
2650 / 18.27	3200	4338	6500	8812
MAXIMUM RATED TORQUE: 6,500 FT-LBS (8,812 Nm)				
MAXIMUM SYSTEM PRESSURE: 3000 PSI (20.684 MPa)				

Speed Table (RPM - Theoretical Estimates)

	Displacement	
Flow (GPM / LPM)	Full	Half
10 / 37.9	7	15
20 / 75.7	15	31
35 / 132.4	27	55

Maximum Hydraulic Requirements	35 GPM (132.4 LPM)
	3000 PSI (20.684 MPa)
Dimensions	See page 2.5
Maximum Elevator Diameter	Unlimited (tong comes off pipe)
Space Required On Pipe	3 1/4 in (8.2 cm) die height
Torque Handle Length (Pipe center to anchor center)	24 in (60.9 cm)
Dead Weight (Approximate)	800 lbs (362.8 kg)
Gear Reduction Ratio, Turns Encoder Mount to Ring Gear	4:4:1
Noise Emissions	A-weighted: 93 dB
Gripping Capacity	1.660 in (4.2 cm) through 3 1/2 in (8.8 cm)
Recommended Spring Hanger	55-0000021

2.3 RECOMMENDED LUBRICANT SPECIFICATIONS

2.3.1 Hydraulic Fluid

McCoy Global recommends using high-quality hydraulic fluid containing rust & oxidation inhibitors and foam suppressant that meets the following requirements. Operating this equipment using hydraulic fluid that does not meet these requirements greatly accelerates equipment damage due to (but not limited to) premature component wear, premature seal failure, cavitation, and fluid starvation.

⚠ CAUTION

OPERATING THIS EQUIPMENT USING HYDRAULIC FLUID THAT DOES NOT MEET THE LISTED REQUIREMENTS GREATLY ACCELERATES EQUIPMENT DAMAGE.

Hydraulic Fluid Standards	
Characteristic	**Requirement**
Maximum viscosity at cold startup	<1000 cSt (<4600 SUS)
Operating viscosity range	100 to 16 cSt (170 to 80 SUS)
Minimum viscosity (intermittent periods only)	10 cSt (60 SUS)
Operating temperature range	86 - 140°F (30 - 60°C)
Maximum fluid temperature	180°F (82°C)
Fluid cleanliness	Filtered to ISO 4406:1999 (22/18/13)

Hydraulic fluid should be chosen with due regard to expected climactic conditions and equipment load. Note that this equipment may have been tested using hydraulic fluid that does not meet operational requirements beyond those specified in the above table. Therefore, McCoy recommends purging and flushing the equipment's hydraulic system before connecting to a hydraulic supply.

NOTICE

MCCOY GLOBAL RECOMMENDS PURGING AND FLUSHING THE EQUIPMENT'S HYDRAULIC SYSTEM BEFORE CONNECTING TO A HYDRAULIC SUPPLY.

2.3.2 Gear Fluid

McCoy Global recommends using a high-quality universal gear fluid in gearbox and torque hub assemblies. This equipment is shipped with gear fluid meeting VG150/VG220 or AGMA 4EP/5EP specifications. However, in more extreme operating conditions it may be necessary to fill the gearboxes on the equipment with gear fluid more suitable to the ambient operating environment. Refer to the following table to determine McCoy Global's recommendations for gear fluid selection.

Gear Fluid Standards	
Operating Condition	**Requirement**
-4°F to 41°F (-20°C to 5°C)	meets ISO VG100 or AGMA 3EP specifications
41°F to 104°F (5°C to 40°C)	meets VG150/VG220 or AGMA 4EP/5EP specifications
greater than 104°F (40°C)	meets VG320 or AGMA 6EP specifications

2.3.3 Grease

McCoy Global recommends use of a high-quality EP multi-purpose grease with an NLGI consistency grade of "2" and an NLGI performance grade of "GC-LB" for general lubrication of bearings and metal-to-metal contact.

McCoy Global recommends thoroughly greasing the equipment before first use as per the lubrication instructions in Section 5.

This page intentionally
left blank

SECTION 3: INSTALLATION & COMMISSIONING

This page intentionally
left blank

Adequate setup and proper hydraulic connections are essential in ensuring reliable operation of McCoy equipment. For best results and long term reliability, read and obey the installation and commissioning instructions in this section.

3.0 RECEIPT, INSPECTION, AND HANDLING OF EQUIPMENT

⚠ CAUTION

THIS EQUIPMENT HAS BEEN THOROUGHLY TESTED AND INSPECTED AT THE FACTORY. HOWEVER, MCCOY ADVISES INSPECTING EQUIPMENT FOR SHIPPING DAMAGE UPON RECEIPT AND TESTING EQUIPMENT BEFORE RELEASING TO AN OPERATIONAL ENVIRONMENT.

Upon receipt inspect packaging materials for shipping damage. Shipping damage may include (but not be limited to) perforation of a crate, misshapen crate, crushed corners, missing hardware, scraped or bent metal, and impact or orientation indicators (like a “tip’n’tell”). Record all shipping damage on the shipping manifest and ensure shipping company and McCoy are immediately contacted.

Remove all protective shipping materials including plastic wrap, desiccant packs, padding, etc and perform a visual inspection of the equipment. Check structural components for bending or buckling indicative of vertical impact. Immediately identify any shipping damage to the shipping company, and correct all damage before connecting equipment to a hydraulic power source.

McCoy recommends connecting the equipment to a hydraulic power source and testing complete functionality of the equipment in a controlled environment before releasing to an operational environment.

⚠ CAUTION

MCCOY GLOBAL RECOMMENDS TESTING THIS EQUIPMENT BEFORE RELEASING TO AN OPERATIONAL ENVIRONMENT.

This equipment is provided with a shipping stand which must be used during transport and when setting the equipment on the ground. The shipping stand must be removed from the equipment during commissioning of the equipment prior to operation.

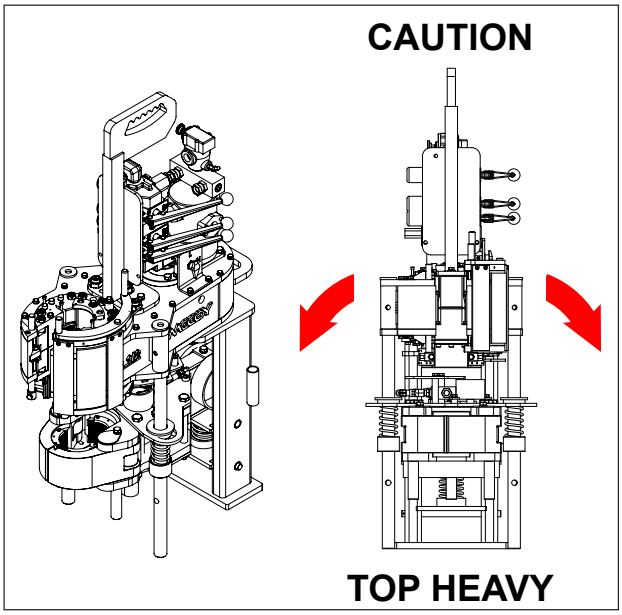


Illustration 3.0.1: Equipment Notice

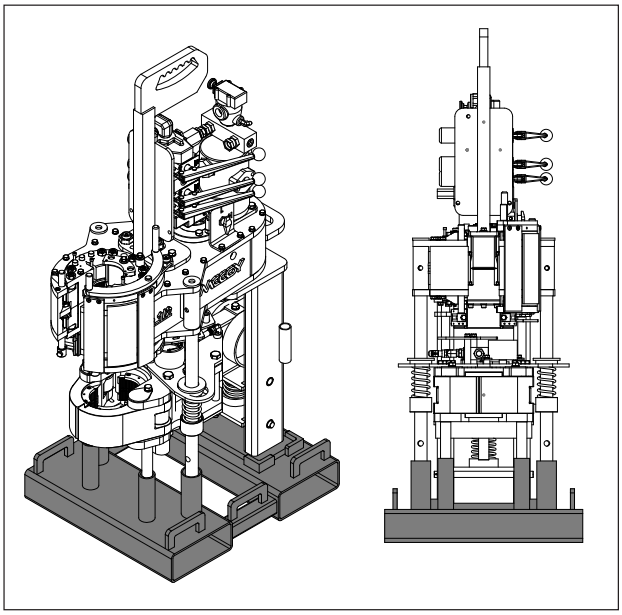


Illustration 3.0.2: Equipment Shipping Stand

⚠ WARNING

DUE TO THE INHERENTLY NARROW FOOTPRINT OF THIS TOOL, A SHIPPING STAND IS PROVIDED WHICH MUST BE USED DURING TRANSPORT AND WHEN SETTING THE EQUIPMENT ON THE GROUND. THE SHIPPING STAND MUST BE REMOVED FROM THE EQUIPMENT DURING COMMISSIONING OF THE EQUIPMENT PRIOR TO OPERATION.

3.1 SLING / LOAD BEARING DEVICE SAFETY

DANGER

A "LOAD-BEARING DEVICE" IS A CHAIN SLING, RIGID SLING, SPREADER BAR ASSEMBLY, FRAME, OR ANY OTHER DEVICE THAT BEARS THE PARTIAL OR TOTAL WEIGHT OF THE EQUIPMENT FOR WHICH THIS MANUAL HAS BEEN PRODUCED

THE LOAD-BEARING DEVICE SUPPLIED BY MCCOY GLOBAL IS DESIGNED TO SUPPORT THE EQUIPMENT DESCRIBED IN THIS MANUAL. MCCOY GLOBAL WILL NOT GUARANTEE THE ABILITY OF THE LOAD-BEARING DEVICE TO SUPPORT ANY OTHER PART, ASSEMBLY OR COMBINATION OF PARTS AND ASSEMBLIES. MCCOY GLOBAL WILL NOT GUARANTEE THE ABILITY OF THE LOAD-BEARING DEVICE TO LIFT OR SUPPORT THE EQUIPMENT DESCRIBED IN THIS MANUAL IF THERE ARE ANY MODIFICATIONS TO THE LOAD-BEARING DEVICE, OR ANY ADDITIONS TO THE EQUIPMENT DESCRIBED IN THIS MANUAL THAT ADD WEIGHT TO THE EQUIPMENT, UNLESS SUPPLIED BY MCCOY GLOBAL.

WARNING

WHEN RE-ASSEMBLING LOAD-BEARING DEVICES (CHAIN SLINGS, RIGID SLINGS, BACKUP LEGS, ETC.) NOTE THAT THE ASSOCIATED FASTENERS MUST BE TIGHTENED TO THE CORRECT TORQUE SPECIFIED FOR THAT SIZE OF FASTENER (SEE MAINTENANCE SECTION). ANY THREADED FASTENER IN A LOAD-BEARING DEVICE MUST BE SECURED WITH RED OR BLUE LOCTITE™.

REPLACEMENT FASTENER (BOLTS, NUTS, CAP SCREWS, MACHINE SCREWS, ETC.) USED DURING MAINTENANCE OR OVERHAUL MUST BE GRADE 8 OR EQUIVALENT UNLESS OTHERWISE SPECIFIED.

McCoy Global recommends following an industry-accepted standard such as OSHA, ASME B30.9-2006, or manufacturer's guidelines when performing any rigging and overhead lifting. Use by untrained persons is hazardous. Improper use will result in serious injury or death. Do not exceed rated capacity. Slings will fail if damaged, abused, misused, overused, or improperly maintained.

- Use only Grade 80 or Grade 100 alloy chain for overhead lifting applications.
- Working Load Limit (WLL) is the maximum allowable load in pounds or kilograms which may be applied to the load-bearing device, when the device is new or in "as new" condition, and when the load is uniformly and directly applied. The WLL must never be exceeded.
- The Working Load Limit or Design factor may be affected by wear, misuse, overloading, corrosion, deformation, intentional alterations, sharp corner cutting action and other use conditions.
- Shock loading and extraordinary conditions must be taken into account when selecting alloy chain slings.

See OSHA Regulation for Slings 1910.184, ANSI/ASME B30.9-"SLINGS", ANSI/ASME B30.10-"HOOKS" and ANSI/ASME B30.26 "RIGGING HARDWARE" for additional information.

3.1.1 Inspection Of Load-Bearing Devices and Structures

McCoy strongly recommends the following practices:

A complete inspection of new load-bearing devices and attachments shall be performed by a qualified, designated person prior to initial use. Each component shall be examined individually, taking care to expose and examine all surfaces including the inner link surface. In addition, daily inspection of fastenings and attachments shall be performed by a designated person. If damage or defects are found at either inspection, the damaged or defective component shall be quarantined from service until it can be properly repaired or replaced.

Removal Criteria:

A load-bearing device shall be removed from service if conditions such as the following are present:

- Cracks or breaks
- Evidence of tampering is seen - for example, tamper-proof nuts are missing.
- Signs of impact on load-bearing components, including spreader bars, lifting lugs, rigid slings & rigid sling weldments, and legs & leg mounts.
- Broken or damaged welds.
- Excessive wear, nicks, or gouges.
- Excessive pitting of the components due to rust and/or corrosion

3.1.1 Inspection Of Load-Bearing Devices and Structures (Continued):

Inspect all lugs and fixing points for signs of elongation and/or bending, or for material build-up around the hole. Repair or replace components that appear distorted. Ensure all hardware is tight and in good condition. Replace missing hardware if necessary. All hardware must be free of rust and corrosion. Additional inspections shall be performed where service conditions warrant (a maritime environment, for instance). Periodic inspection intervals shall not exceed one year. The frequency of periodic inspections should be based on:

- Frequency of use of the load-bearing device.
- Severity of service conditions
- Experience gained on the service life of load-bearing devices used in similar circumstances.

General guidelines for the interval are:

- Normal Service - yearly
- Severe Service - monthly to quarterly
- Special Service - as recommended by a qualified person

McCoy recommends that all users of lifting or load-bearing assemblies establish inspection criteria, or adopt a relevant inspection standard. McCoy recommends an inspection schedule similar to that listed in the following table.

Test / Examination			
Time / Interval	**Lifting Test(s)[1]**	**Non-Destructive Examination (NDE) of Lifting Points**	**Thorough Visual Examination**
Initial Certification By McCoy	YES	YES	YES
Interval Not Exceeding 12 Months	At the discretion of inspection body	At the discretion of inspection body	YES
Interval Not Exceeding 60 Months	At the discretion of inspection body	YES	YES
Following Substantial Repair or Alteration[2]	YES	YES	YES

1. Lifting test as established by end user's inspection criteria
2. For the purposes of this standard, a substantial repair or modification is defined as any repair and/or modification that has been carried out which may, in the opinion of the inspection body, affect the load-bearing elements of the container or lifting device, or elements that contribute directly to its structural integrity.

⚠ WARNING

IF THE LOAD-BEARING DEVICE HAS BEEN MECHANICALLY DAMAGED OR OVERLOADED, IT MUST BE IMMEDIATELY REMOVED FROM SERVICE AND QUARANTINED UNTIL IT HAS BEEN RECERTIFIED.

Record the inspection dates and results in a visible location, including a description of the condition of the load-bearing equipment. To avoid confusion, do not list the date of the next test or examination, only the most recent.

⚠ DANGER

THIS INFORMATION IS TO BE USED AS A GENERAL GUIDELINE ONLY. DETERMINING SITE SPECIFIC INSPECTION FREQUENCY AND METHODOLOGY IS ULTIMATELY THE RESPONSIBILITY OF THE END USER.

3.1.2 Proper Use Of Load-Bearing Devices

Whenever any load-bearing device is used, the following practices shall be observed.

- Load-bearing devices that are damaged or defective shall not be used.
- Slings shall not be shortened with knots or bolts or other makeshift devices.
- Sling legs shall not be kinked.
- Load-bearing devices shall not be loaded in excess of their rated capacities.
- Slings shall be securely attached to their load.
- Load-bearing devices shall be protected from snagging, and shall not be further obstructed by any object.
- Suspended loads shall be kept clear of all obstruction.
- All employees shall be kept clear of loads about to be lifted and of suspended loads.
- Hands or fingers shall not be placed between the sling and its load while the sling is being tightened around the load.
- Shock loading is prohibited.

Do not stand directly under a load during lifting.

3.1.3 Storage Of Load-Bearing Devices

Proper storage of out-of-service load bearing devices is important to ensure full integrity of the device once it is returned to service. McCoy recommends observing the following practices.

- Wipe off all excess grease. Use a solvent-based cleaner on rags to wipe all external surfaces to remove residual grease or hydraulic fluid. Once the outside surfaces have been de-greased, wipe all external surfaces with clean water to remove residual solvent.
- McCoy recommends that an anti-corrosive agent such as Tectyl® 506 be applied to all external surfaces. Refer to manufacturer data sheets for proper application and safety information. Allow the anti-corrosive coating ample time to dry - refer to manufacturer data sheets for drying times at room temperature.
- Store in a clean, dry location. When returning to service, note that a full inspection of the device must be performed.

3.2 LIFT CYLINDER INSTALLATION AND SAFETY

The lift cylinder is not orientation-specific; that is, the lift cylinder will function the same way independent of which end is connected to the crane and which end is connected to the main lifting lug of the tong (or the spring hanger, if used). However, McCoy recommends orienting the lift cylinder with the hydraulic hose connection at the bottom of the cylinder to ensure the hose is not stressed when cylinder is at full extension, to prevent water and debris from gathering around the shaft seal (see illustration 3.2.1).

⚠ WARNING

TEST LIFT CYLINDER BEFORE INSTALLATION. REFER TO THE LIFT CYLINDER TECHNICAL MANUAL FOR DETAILED TESTING AND OPERATING PROCEDURES, AND DETAILED SAFETY GUIDELINES.

IF USING A SPRING HANGER ITS WEIGHT MUST BE ACCOUNTED FOR WHEN CALCULATING TOTAL SUSPENDED WEIGHT.

3.2.1 Installation Procedure

1. Use a crane to hoist the lift cylinder by the shackle, ensuring the lift cylinder is oriented so that the hydraulic hose connection is at the bottom of the cylinder when it is hoisted.
2. Remove the two R-clips securing the clevis pin, and remove the clevis pin.
3. Orient the spring hanger so the piston will extend down during thread make-up, preventing water and debris from gathering around the seal.
4. Place the welded U-connection inside the clevis. Replace the clevis pin, and secure the clevis pin with the two R-clips.
5. Hoist the lift cylinder and spring hanger.
6. Place a 1” shackle around the master lifting link on the tong sling. Secure the shackle to the extending end of the spring hanger using the 1-⅛” UNC x 4-¾” modified hex bolt and 1-⅛” UNC hex jam nut. Secure the jam nut to the bolt using a $^{3}/_{16}$” x 1-¼” cotter pin.

3.2.2 Lift Cylinder Hydraulic Connection

Inspect the hydraulic hose before connection, ensuring the line is free of ruptures, cracks, cuts, or other damage. Inspect the female quick-connect fitting to ensure it is free from damage. Connect the female quick-connect on the lift cylinder hydraulic hose to the male quick-connect fitting attached to the needle valve on the tong valve bank. Once the fitting has snapped into place give the hydraulic line a light tug upwards to ensure the fitting is securely seated.

If not already done, connect the main hydraulic supply to the power tong (see sub-section 3.3.2 for proper hydraulic connection procedure). Energize the hydraulic supply to the power tong.

Lift the power tong approximately three inches off the work surface, and suspend the tong for approximately thirty seconds. Following the suspension alternately lift and lower the tong slightly to confirm that lift and lower functions each operate correctly.

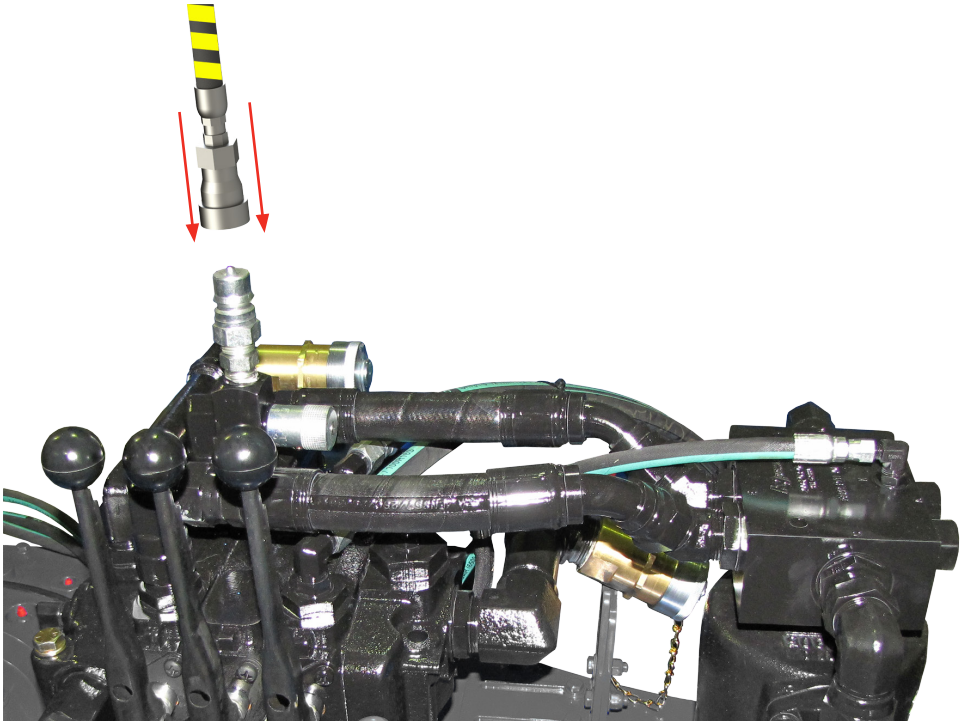


Illustration 3.2.2: Lift Cylinder Hydraulic Connection

3.2.3 Lift Cylinder Safety

⚠ WARNING

A CLEARLY IDENTIFIED REMOTE POWER PACK EMERGENCY STOP MUST BE INSTALLED IN THE IMMEDIATE VICINITY OF THE TONG OPERATOR.

McCoy Global recommends following an industry-accepted standard such as OSHA, ASME B30.9-2006, or manufacturer's guidelines when performing any rigging and overhead lifting. Use by untrained persons is hazardous. Improper use may result in serious injury or death. Do not exceed rated capacity.

Working Load Limit (WLL) is the maximum allowable load in pounds or kilograms which may be applied to the load-bearing device, when the device is new or in "as new" condition, and when the load is uniformly and directly applied. The WLL must never be exceeded.

The Working Load Limit or Design factor may be affected by wear, misuse, overloading, corrosion, deformation, intentional alterations, sharp corner cutting action and other use conditions.

See OSHA Regulation for Slings 1910.184, ANSI/ASME B30.9-"SLINGS", ANSI/ASME B30.10-"HOOKS" and ANSI/AMSE B30.26 "RIGGING HARDWARE" for additional information.

The flexible line providing hydraulic power to the lift cylinder has been equipped with abrasion-resistant, high visibility protective wrap. The high visibility wrap allows operators to easily see monitor the position of the hydraulic line at all times, and can easily see if the line appears to become entangled or snagged.

3.2.3 Lift Cylinder Safety (continued):

⚠ WARNING

IMMEDIATELY CEASE LIFT CYLINDER OPERATION IN THE EVENT OF ENTANGLEMENT OF THE HYDRAULIC LINE WITH FIXED RIG COMPONENTS OR TONG SUPERSTRUCTURE.

The protective wrap also prevents wear of the hydraulic line though abrasion. Do not remove the protective wrap from the lift cylinder line, and replace protective wrap if it is missing, torn, or split. Regardless of use or condition, the hydraulic line supplying the lift cylinder must be replaced every two years.

⚠ WARNING

REPLACE LIFT CYLINDER HYDRAULIC LINE EVERY TWO YEARS

The control valve section on the power tong is equipped with an internal check valve, preventing sudden drop of the tong in the event of hydraulic power failure. A speed-limiting orifice is installed directly in the hydraulic inlet port of the lift cylinder. The orifice limits flow of hydraulic fluid from the lift cylinder through the control valve, preventing sudden drop of the lift cylinder in the event of a ruptured hydraulic line. Do not remove the speed-limiting orifice, and only replace with an identical orifice supplied by McCoy.

⚠ WARNING

DO NOT REMOVE THE SPEED-LIMITING ORIFICE FROM THE LIFT CYLINDER HYDRAULIC INLET PORT

McCoy recommends orienting the lift cylinder with the hydraulic hose connection at the bottom of the cylinder to ensure the hose is not stressed when cylinder is at full extension, and to prevent water and debris from gathering around the shaft seal.

NOTICE

MCCOY RECOMMENDS ORIENTING THE LIFT CYLINDER SO THAT THE PISTON EXTENDS DOWN TO HELP PREVENT STRESS OF THE HYDRAULIC HOSE.

The working load limit (WLL) is clearly stenciled on to the side of the lift cylinder. Do not use lift cylinder if the WLL stencil has been rubbed off or intentionally removed. Locate the test certificate that accompanied the cylinder to the job site or, if necessary, obtain a copy of the test certificate from the location at which the original certificate has been stored. The lift cylinder must be clearly re-marked with the WLL before it is released to an operating environment.

⚠ WARNING

DO NOT USE A LIFT CYLINDER WITH A MISSING OR DEFACED WLL STENCIL.

McCoy Global cautions its customers to use proper placement of equipment positioning systems when moving tubular connection equipment on and off well center.

Application of lateral force against any component of the lift cylinder, or any other rigid component of the hanging system, may impart an over-turning moment to the lift cylinder rod end at the connection point to the clevis. This over-turning moment has the potential to introduce stress fractures.

McCoy Global recommends inspection of the lift cylinders at the beginning of each shift prior to hoisting to ensure that the integrity of the rod ends has not been compromised. Lift cylinders found to have fractures or deformations must immediately be quarantined until repaired and recertified (see illustration 3.2.3).

3.2.3 Lift Cylinder Safety (continued):

Inspect this area of the rod end to ensure that it is free of cracks, fractures, or deformed components

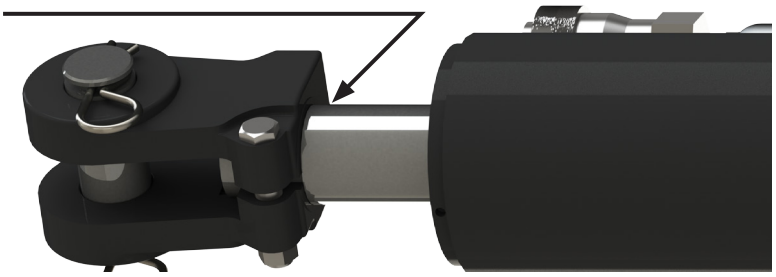


Illustration 3.2.3: Lift Cylinder Clevis Inspection

Do not attach any device capable of exerting a lateral (side-to-side) load to any component of the lift cylinder or spring hanger. Do not place a lateral (side-to-side) load on any component of a lift cylinder or spring hanger while a load is suspended.

Positioning system or device must be placed against the hanging line in order to maintain vertical orientation of the suspended equipment.

⚠ DANGER

DO NOT PLACE LATERAL FORCE AGAINST ANY COMPONENT OF THE LIFT CYLINDER OR SPRING HANGER WHEN MOVING YOUR TUBULAR CONNECTION EQUIPMENT ON AND OFF WELL CENTRE.

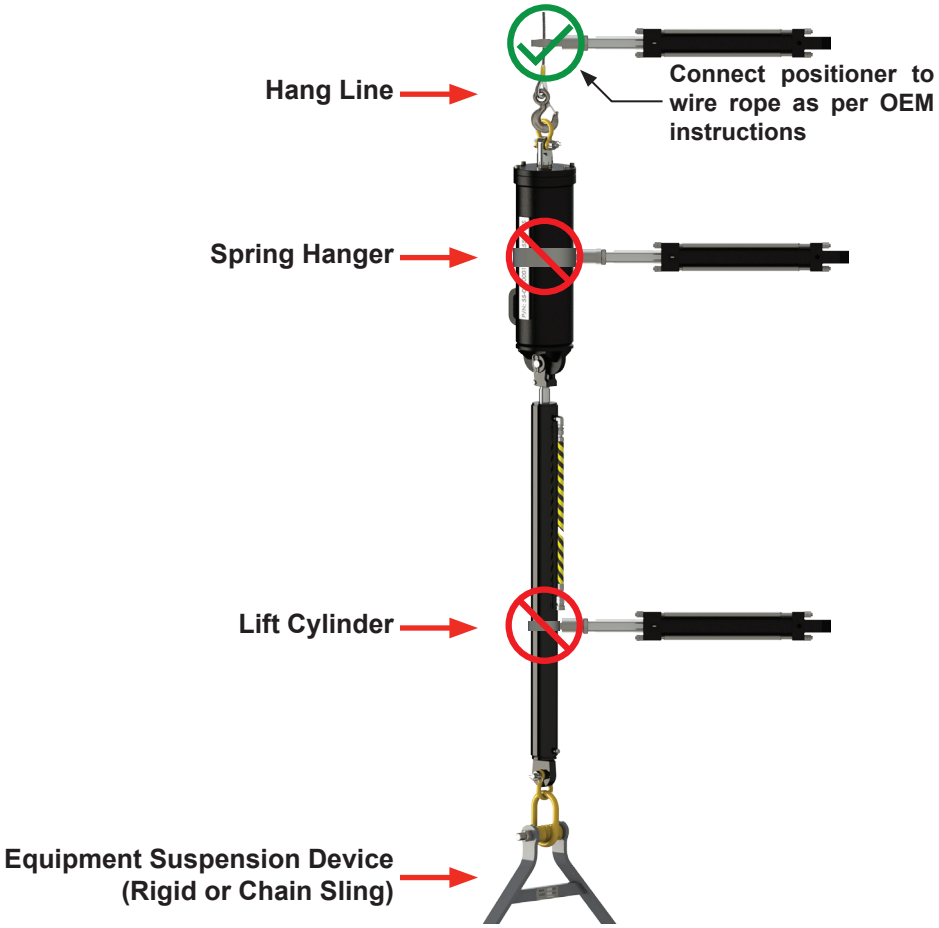


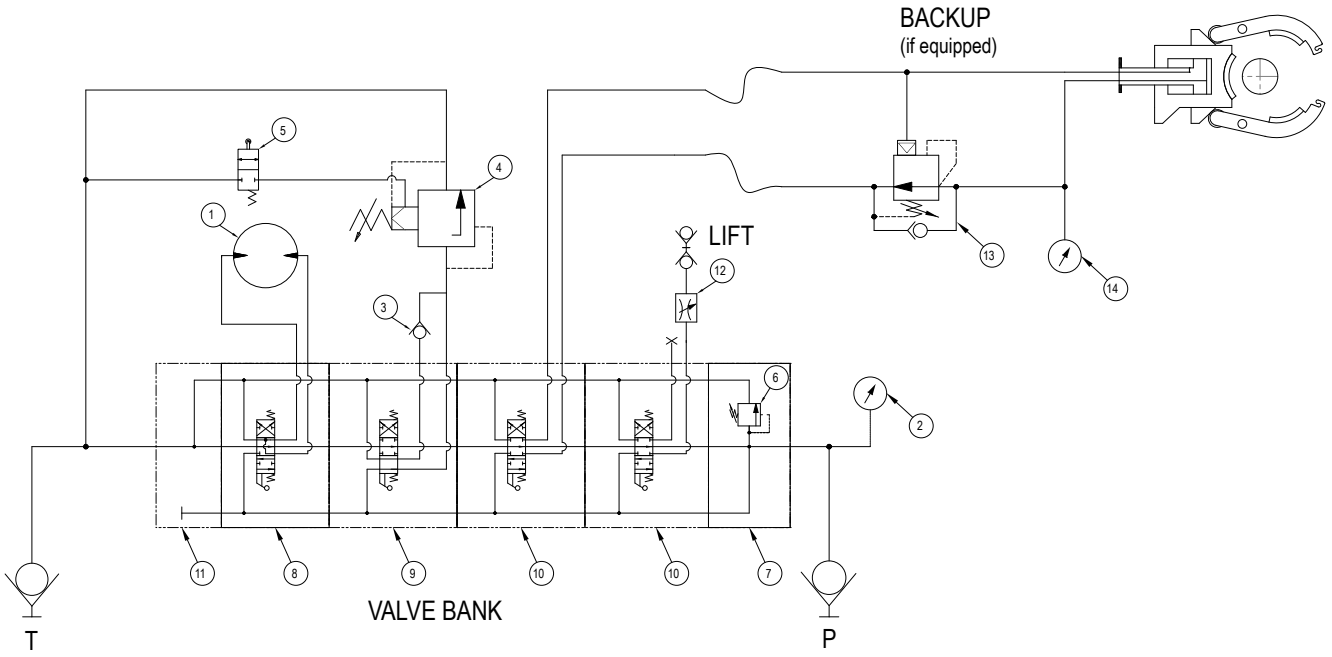
Illustration 3.2.4: Correct Installation of Positioning System

NOTICE

CONTINUED USE OF A LIFT CYLINDER THAT SUBJECTS IT TO LOADS OUTSIDE OF ITS INTENDED APPLICATION (VERTICAL LOADS ONLY) SHALL BE AT THE CUSTOMER'S SOLE RISK AND LIABILITY

3.3 HYDRAULICS

3.3.1 Hydraulic Schematic



ITEM NO.	QTY.	PART NUMBER	DESCRIPTION	LOCATION
1	1	15-65-015-31	15 SERIES RINEER MOTOR/13 CU.INCH	TONG
2	2	BAC-5M25RCFF	0-5000 PSI GAUGE	TONG/BACKUP
3	1	58099	1" NPT CHECK VALVE	TONG
4	1	58058	DUMP VALVE, 3/4"	TONG
5	1	SLV1000-01	NC SELF LUBRICATED VALVE NORMALLY CLOSED	TONG
6	1	VA20-MRV-1	RELIEF VALVE 2500 PSI	TONG
7	1	VA20-AA440	INLET W/O RELIEF VALVE	TONG
8	1	VA20-MA3	VA-20 MOTOR SECTION ASSEMBLY	TONG
9	1	VA20-MOD	VA-20 DOOR SECTION	TONG
10	2	VA20-DA3	WORK SECTION (W/CYLINDER SPOOL)	TONG
11	1	VA20-TR44	A-20 OUTLET VALVE SECTION	TONG
12	1	08-9062	VALVE CONTROL FLOW N800S	TONG
13	1	MHB030LEAH52E	COUNTERBALANCE VALVE	BACKUP
14	1	1651	GAUGE, 5000 PSI	BACKUP

Illustration 3.3.1: Hydraulic Schematic

3.3 HYDRAULICS (CONTINUED):

3.3.2 Main Hydraulic Connections

Supply hydraulic pressure to your equipment through the 1” hydraulic supply connection. A 1-¼” return connection provides a return path to the power unit, and a ⅜” female quick-connect fitting allows motor case drain to tank. The different sizes of the supply and return lines eliminates the possibility of accidental cross-connections.

Ancillary devices (hydraulic motors, hydraulic cylinders, etc.) are connected through the hydraulic control valve block.

Inspect all connectors for damage, debris, or other contaminants before performing hydraulic connections. Clean connectors using compressed air, or an approved cleaning solvent and lint-free cloth. Always cover disconnected fittings with a clean brass or plastic dust cap, typically attached to each connector with a lightweight chain or flexible line. These caps provide significant protection from dust, dirt, other contaminants, and impact damage.

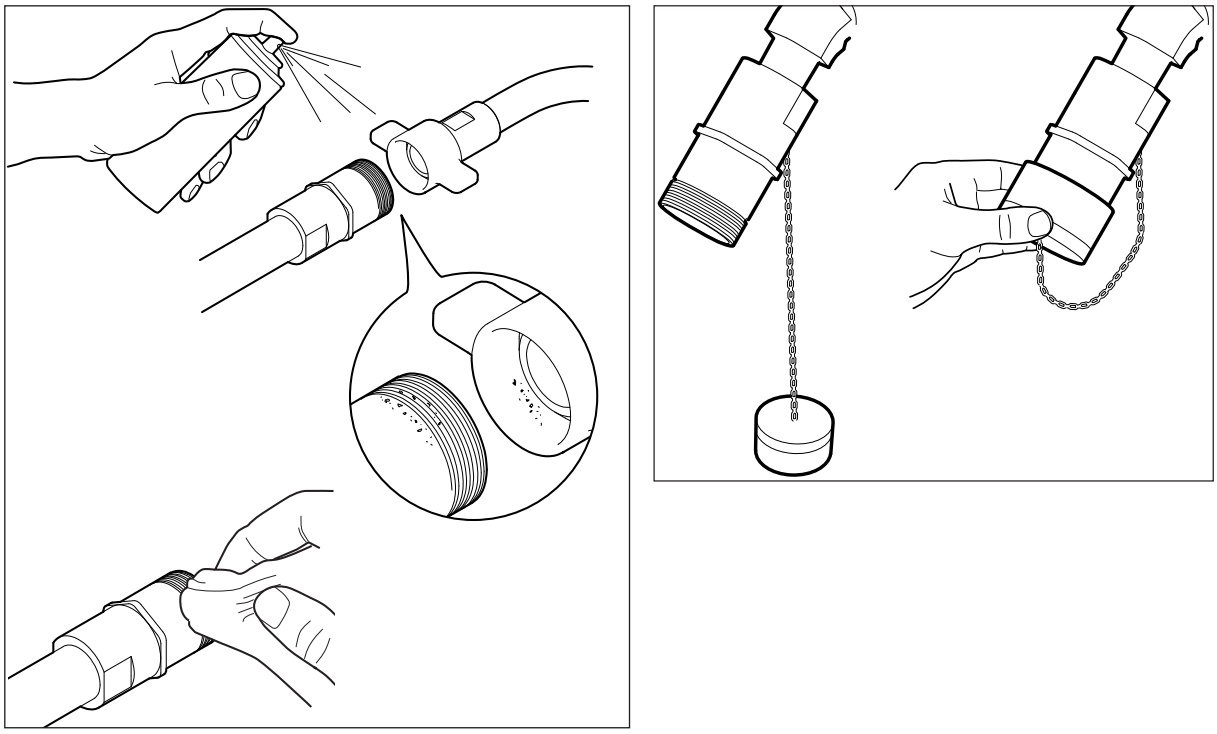


Illustration 3.3.2: Hydraulic Connections

3.3.3 Main Hydraulic Connections (Continued):

Perform hydraulic connection when the power unit is not running, or when the hydraulic pump is disengaged. Wing-type connections are self-sealing, and must always be made up to the connection line on the male connector to prevent partial closure of the integral check valve.

Self-sealing wing-type hydraulic disconnects should always be fully made up to the “fully engaged” indicator line on the male side of the connection. Inspect all hydraulic connections before energizing hydraulic power to ensure secure connections have been made. Supply of full hydraulic pressure without ensuring an established return line may result in system damage.

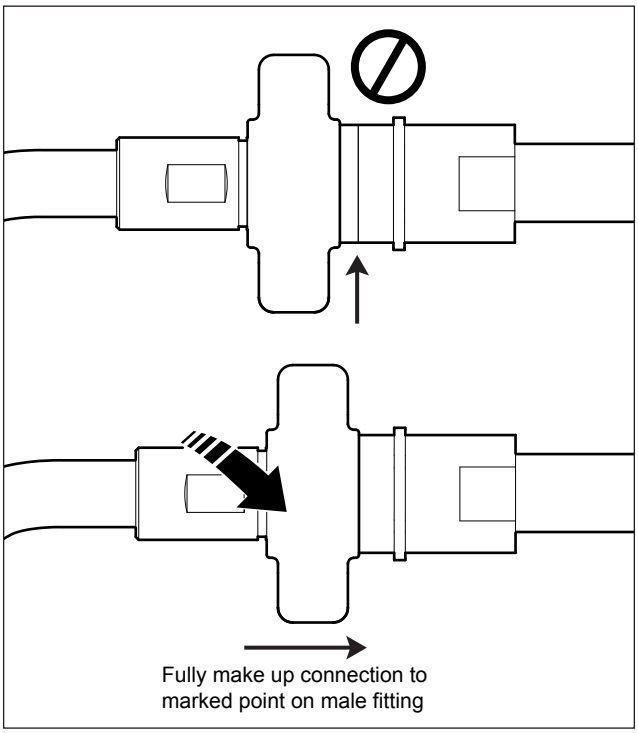


Illustration 3.3.3: Hydraulic Connections 02

⚠ WARNING

A CLEARLY IDENTIFIED REMOTE POWER PACK EMERGENCY STOP MUST BE INSTALLED IN THE IMMEDIATE VICINITY OF THE TONG OPERATOR.

Inspect these connections upon activation of the power unit. Leaking components must be repaired before releasing the tong to the operational environment. Deactivate the power unit and de-pressurize the hydraulic system according to the procedure on page 5.5. Disconnect the main hydraulic connections and inspect all four connectors (two male, two female) for damage or debris. If the connectors cannot be cleaned or easily repaired, McCoy recommends replacement of the leaking connector. Note that damage to one of the connectors may have caused damage to its mate.

Turn off power unit and depressurize hydraulic system before disconnecting the main hydraulic lines under normal working conditions. See page 5.5 for hydraulic system depressurization. McCoy recommends placing protective caps over the exposed connectors to protect them from water and impact damage.

⚠ WARNING

ALWAYS TURN OFF HYDRAULIC POWER AND DEPRESSURIZE HYDRAULIC SYSTEM BEFORE DISCONNECTING MAIN HYDRAULIC LINES.

3.4 TONG JAW AVAILABILITY & INSTALLATION

3.4.1 Jaw Availability

The following table lists all jaw die kits that are available as standard stocked sizes for this model of tong. McCoy Global offers a good selection of standard jaw sizes. However, please note that we can custom-engineer and manufacture any size of jaw within the range of the tong. Jaw systems are available to allow use of die inserts intended for specialized applications. Call our sales office for information on jaw and die systems designed for higher or lower grip, or non-marking applications.

The table lists standard contoured, flat and wraparound die inserts that are available as spare parts. However, a wide variety of diamond-tooth, GRITFACE®, aluminium, and wrap-around fine-tooth dies are available for specialized applications. Please refer to our website for complete information:

http://www.mccoyglobal.com/dies-inserts

⚠ WARNING

NEVER ATTEMPT TO CLAMP ONTO TUBULARS WITH INCORRECTLY SIZED DIES. OPERATORS MUST BE AWARE OF THE SIZE OF TUBULAR TO BE GRIPPED AND THAT THE JAW AND DIE SYSTEM IN USE IS PROPERLY SIZED. USE OF INCORRECTLY SIZE DIES POSES A HAZARD TO PERSONNEL AND EQUIPMENT.

⚠ DANGER

USE OF ALUMINUM DIES IS FORBIDDEN ON CE-MARKED EQUIPMENT

Standard Jaw Die Kits For CLE3500		
Description	**Part Number**	**Approximate Weight (Per Single Jaw)**
1.66” - 3 1/2” Jaw Die Kit	CJ-35B	4 lbs (1.8 kg)
1.66” - 3 1/2” Low Friction Jaw Die Kit	CJ-LF-35	4 lbs (1.8 kg)

3.4.2 Tong Jaw/Jaw Die Installation & Removal

Tong jaws often require removal to change jaw size or replace worn jaw die inserts. Follow these instructions to remove tong jaws.

1. Remove hydraulic power from the tool. Although opening the tong door inhibits rotation, McCoy recommends completely isolating the tool from hydraulic power in order to prevent accidental rotation in the event of component failure.

⚠ DANGER

ISOLATE TONG FROM HYDRAULIC POWER BEFORE PROCEEDING WITH JAW OR JAW DIE REPLACEMENT.

2. Remove one jaw at a time. Support the jaw being removed from the bottom. If required use a temporary lifting sling and crane to support the jaw assembly.

3.4.2 Tong Jaw/Jaw Die Installation & Removal (Continued):

3. Remove the jaw retention springs as shown in the illustration below.
4. Slide the jaw assembly toward the centre of the cage plate assembly, and, once clear of the cage plates, remove and transport to a secure location.
5. Extract the keeper fasteners and, if required, use a hammer to tap the worn dies from the top or bottom (depending on orientation) to remove.
6. Clean the jaw and die splines using a metal brush.
7. Treat the new dies with anti-seize compound before installing.
8. Insert the new jaw dies in to the jaw(s), and secure in place using the keeper fasteners.

⚠ CAUTION

JAWS MAY PRODUCE METAL SLIVERS. WEAR STURDY WORK GLOVES WHEN HANDLING JAW DIE KITS.

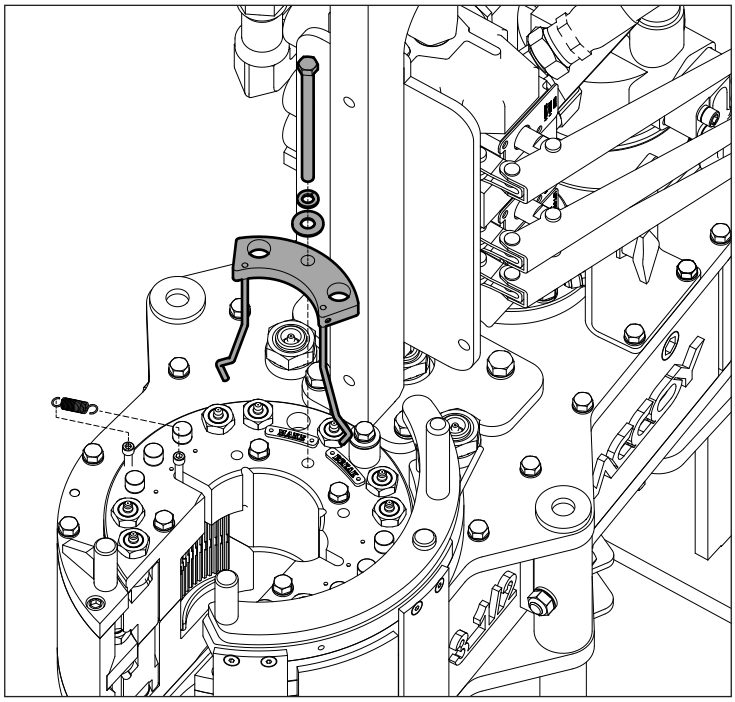


Illustration 3.4.1: Jaw Removal / Installation

9. Inspect each of the two incoming jaw assemblies:

- Inspect each jaw weldment or casting for cracks or other damage, including (but not limited to) chipped metal and missing welds. Do not use cracked or otherwise damaged jaws. Cracked or otherwise damaged jaws must be clearly tagged and quarantined. Subcomponents of each jaw assembly (rollers, roller pins, jaw dies) may be removed and re-used, providing the subcomponents are free of damage.

3.4.2 Tong Jaw/Jaw Die Installation & Removal (Continued):

- Place the jaw face down (roller up) on a sturdy surface. Wearing a leather work glove, attempt to rotate the roller with the palm of your hand. Jaw rollers must spin freely to ensure proper camming action against rotary gear during engagement with the tubular. If the roller turns freely, proceed directly to step 7. Rollers that are jammed or otherwise “frozen” must be freed before installing and using jaw assemblies:
  i. Extract the fasteners retaining the jaw roller pin. In most cases this will be a keeper screw, but in some cases the jaw pin is secured using a retaining ring. Occasionally the jaw pin is secured using a weld bead. In these instances the weld bead must be ground away before the jaw pin can be removed.
  ii. Extract the roller pin. If necessary use a soft metal drive and hammer to tap the jaw pin out of its seat. Removing the jaw pin allows the jaw roller to come free.

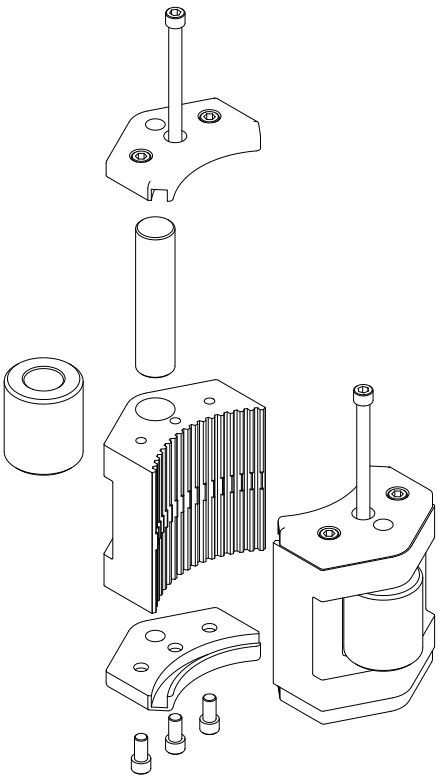


Illustration 3.4.2: Jaw Disassembly

  iii. Inspect the jaw pin and jaw roller for damage which may include (but is not limited to) distortion of shape (out of round), corrosion, cracks, flat spots, or chips. Damaged components must be replaced.
  iv. Thoroughly clean the jaw components using a solvent-based cleaner. If necessary use a stiff brush to clean the jaw weldment/casting, including the jaw pivot through holes and the jaw roller pin through holes. A stiff brush may also be required to clean retaining ring grooves on the jaw pin (where applicable).
  v. Apply a liberal coating of grease to the jaw pin and all surfaces of the jaw roller. Re-install the jaw pin and roller, and secure the jaw pin in the jaw weldment/casting with the appropriate fastener. **NOTE:** jaw pins secured by a weld bead must have the weld bead re-applied by an authorized, skilled welder.
  vi. Re-check the jaw roller to ensure that it turns freely.

8. Apply a generous coating of grease to the jaw roller & pin. Rotate the roller several times to distribute the grease.
9. Install the jaw assemblies one at a time. Liberally coat each jaw pivot bolt with a layer of grease before installing.

3.5 EQUIPMENT CONFIGURATION & LEVELING

3.5.1 Suspension & Restraint

Suspend the tong from a location as near to the centre of the drill rotary as possible, and from a location high enough on the mast to ensure easy handling. Suspending the equipment lower in the rig increases the effort required to move the tong to and from the connection point.

The suspension line may be extended over a pulley and balanced by a counterweight equal to the weight of the tong, or simply tied off in the derrick to form a dead line. When using a dead line arrangement it is necessary to use a McCoy spring hanger assembly (see specification page for recommended spring hanger). The spring hanger compensates for the downward movement of the casing as the thread is made-up, and imparts additional force to the suspension cable as the internal spring(s) is (are) deflected.

Refer to the specification page in this manual for information on the recommended spring hanger for this application. McCoy Global will not guarantee or specify spring hangers other than what has been supplied by McCoy.

Many applications use a lift cylinder for adjusting the height of the tong. Ensure the weight of the lift cylinder is known if it has not been included in the total weight of the tong.

All forces acting upon the suspension line must be considered when calculating necessary strength of the suspension line. The weight of the tong, the weight of the lift cylinder, the weight of the spring hanger, and the force imparted on the suspension line by the spring hanger must all be added together in order to arrive at the total force supported by the suspension line. Select your suspension line based upon the total force and the margins of safety dictated by the policies of your company and by established engineering practices. Ultimately, calculating the force on the suspension line and selection of the suspension line is the complete responsibility of the customer.

McCoy Global recommends using backup (snub) lines on each side of your assembly to restrict motion in either direction of rotation. Snub lines must be of sufficient strength to withstand the force imparted by the maximum rated torque of the tubular connection equipment in use. Calculate the force on the snub lines by dividing the maximum torque of the tong by the tong's torque arm (expressed in feet). For example, a 35,000 lbs-ft tong with a 36 inch (3 ft) torque arm will generate 11667 lbs (5300 kg) of force against a snub line connected 90° to the longitudinal axis of the equipment. Select your snub lines based upon the total force and the margins of safety dictated by the policies of your company and by established engineering practices. Ultimately, calculating the force on the snub line and selection of the snub line is the complete responsibility of the customer.

Snub lines must be securely connected to the rear of the tong, and tied off to a suitable anchor. One snub line must be secured to the load cell, which is then secured to the rear of the tong. The side of the tong the load cell connects to is dependant upon whether make-up or break-out activities are underway. To ensure accurate torque measurement, the torque measurement line must be connected perpendicular to the lengthwise axis of the tong, and perpendicular to the hang line. Connect the second snub line on the opposite side of the load cell, perpendicular to the lengthwise axis of the tong and perpendicular to the vertical. Installed snub lines should have as little slack as possible when not under load.

⚠ DANGER

MCCOY GLOBAL ACCEPTS NO RESPONSIBILITY FOR DESIGNING AND SELECTING AN ADEQUATE SUSPENSION AND RESTRAINT SYSTEM FOR DRILLING EQUIPMENT. THE INSTRUCTIONS IN THIS SECTION ARE PROVIDED FOR INFORMATION PURPOSES ONLY.

ALL SELECTED FASTENERS, SHACKLES, CLAMPS, ETC. USED FOR CONSTRUCTING THE SUSPENSION AND SNUB LINES MUST BE RATED FOR THE CALCULATED FORCES.

3.5.2 Tong Leveling

The tong must be leveled side-to-side and front-to-rear at well-center before placing into service. The following guidelines will assist you when leveling your tong.

⚠ CAUTION

FAILURE TO ENSURE TONG IS LEVEL AT WELL-CENTER MAY RESULT IN JAW SLIPPAGE OR FAILURE OF JAW COMPONENTS

1. Position the equipment with the center of the rotary assembly over well center (in the correct operating position for making or breaking connections).

⚠ WARNING

ONLY USE THE MASTER LINK TO SUSPEND THE TONG ASSEMBLY. THE RIGID SLING IS DESIGNED FOR VERTICAL LIFTING ONLY.

2. Place a level side to side across the tong as near to well center as possible, ensuring the level remains parallel with the top plate of the tong. Note whether the side-to-side level requires adjustment, and move the equipment back to the drill floor.
3. Lower the equipment and set the suspension shackle in the appropriate leveling notch as required.

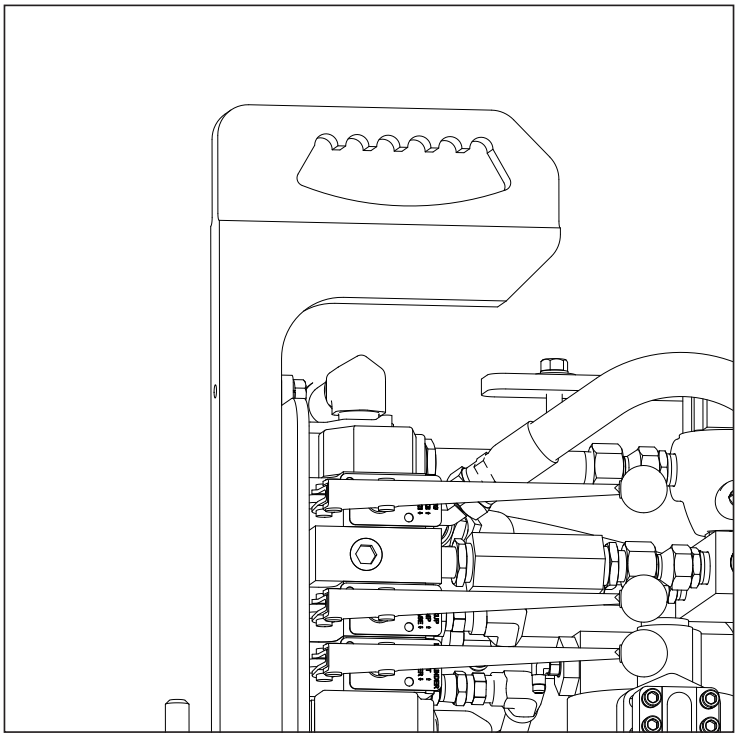


Illustration 3.5.1: Leveling Notches

⚠ CAUTION

FAILURE TO PROPERLY LEVEL TONG AT WELL CENTER MAY RESULT IN JAW SLIPPAGE OR FAILURE OF JAW COMPONENTS

3.5.3 Load Cell Configuration

The tension load cell, coupled to the backup assembly and the frame weldment using shackles, provides the hydraulic signal to the calibrated torque indicator. The load cell attaches to the backup body and the frame weldment using shackles. A “breakout chain”, used for arresting motion of the backup when breaking out a connection, connects the opposite side of the backup body to the frame weldment.

Reference the illustration below for how to correctly configure the load cell for make-up and break-out operations.

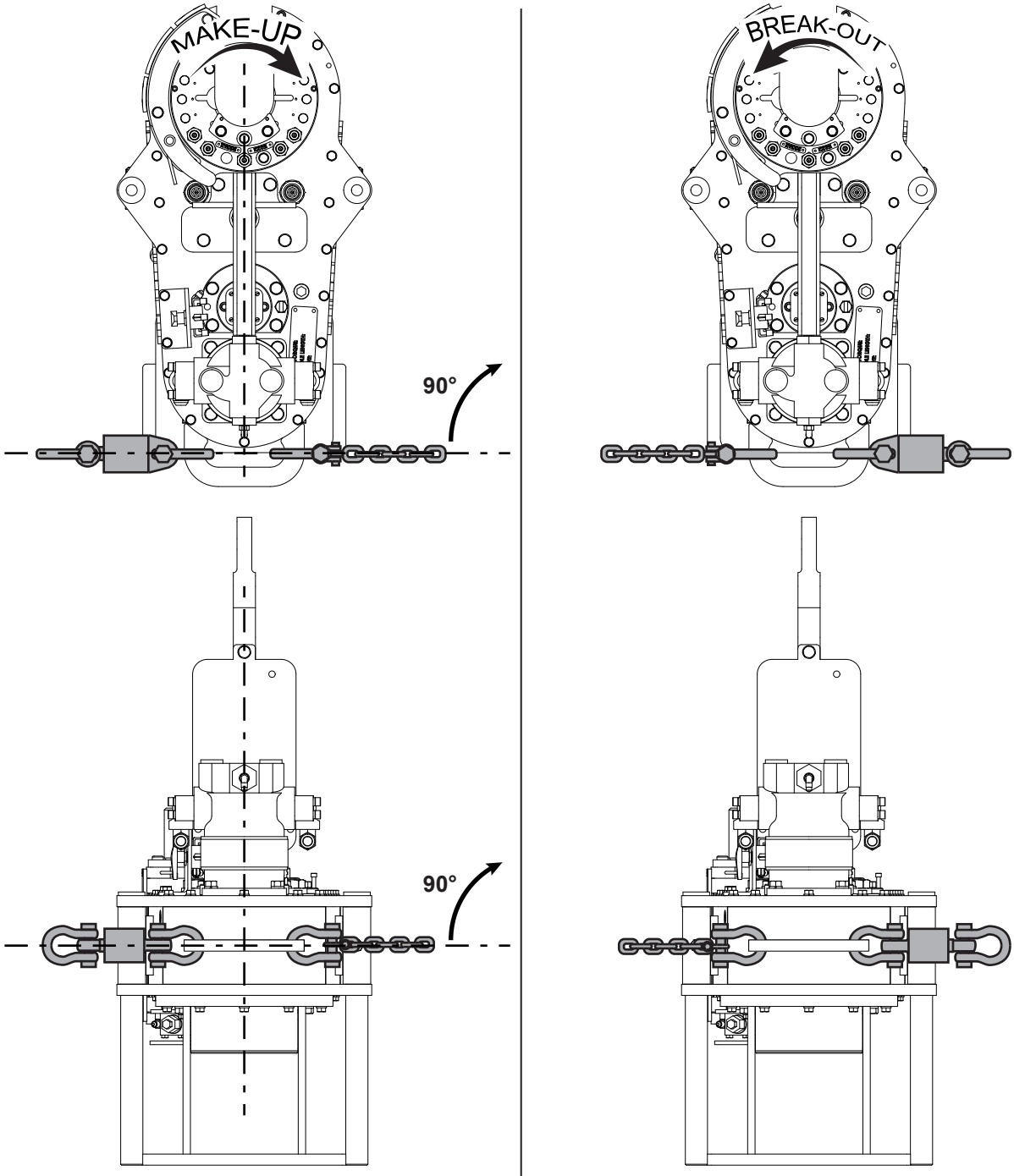


Illustration 3.5.2: Load Cell Configuration

This page intentionally
left blank

SECTION 4: OPERATION

This page intentionally
left blank

4.0 TONG OPERATION

4.0.1 Operator Training

Many companies set qualification standards that must be met before equipment may be operated without supervision. McCoy Global recommends operator training, which typically consists of operation of the equipment under the supervision of a trained equipment operator until a satisfactory level of competence is achieved. Typical operator training should include:

- Introduction to and general description of equipment
- Technical specifications and performance data
- Operating instructions
- Control systems and interlocks
- Operating hazards
- Checks and inspections

4.0.2 Operator Safety

McCoy recommends that a hazard assessment of the work area be performed by a designated safety representative before commencing operations. A designated safety representative is responsible for verifying that all operators have adequate equipment and safety training.

This tong is provided without a safety door system. A safety door system must be provided and installed by the end user. A safety door system is the primary device protecting the tong operator and nearby personnel from the rotary gear when the tong door is opened. Confirm the correct operation of the safety door before every job. Never disable the safety door device.

⚠ DANGER

NEVER DISABLE OR BYPASS THE TONG SAFETY DOOR SYSTEM

The area surrounding the tong operating area must be clutter-free and free from tripping hazards, or protruding objects that may snag hydraulic hoses on the tong, backup, lift cylinder, or torque measurement system. Operating surface or drill floor must be kept free of slipping hazards like grease, oil, water, etc.

Adequate lighting of the work area is required. All warnings, labels, gauges, and signs must be clearly visible

The components of the tong commonly manipulated or requiring control input are painted green, and are safe for continuous handling. Areas painted yellow are designated as hazardous areas, and contact with those areas must be avoided during operation. Always wear all personal protective equipment (PPE) specified by your company's HSE policy, and follow all of your company's safety guidelines.

⚠ CAUTION

ALWAYS WEAR APPROVED PERSONAL PROTECTIVE EQUIPMENT (PPE) WHEN OPERATING HYDRAULICALLY-POWERED EQUIPMENT.

Ensure hydraulic power is deactivated and tong hydraulics are de-pressurized before disconnecting the main hydraulic lines. McCoy recommends depressurizing the tong hydraulic system before connecting or disconnecting quick-connect fittings.

⚠ WARNING

DEPRESSURIZE EQUIPMENT BEFORE DISCONNECTING MAIN HYDRAULIC LINES.

4.0.3 Remote Operation

This tong is designed with features to allow for remote operation of the tong. Shifting of gears, operation of the backing pin, and opening/closing of the tong door are all controlled by hydraulic cylinders. The end user is responsible for setting up any associated hydraulic plumbing and control consoles in order to operate the equipment.

4.0.4 Shifting Gears

Shifting between high and low gear is controlled remotely by means of a remote hydraulic shift cylinder.

Note that the high clutch gear or the low clutch gear may not be exactly aligned when shifting, so the operator may need to “bump” the motor control handle slightly to turn the main clutch gear shaft and shifting collar into alignment. This is most effective when applying a small amount of pressure on the gear shift lever in the direction you want to shift the tong, ensuring the shifting collar will “catch” when the main clutch gear aligns with either the high or low clutch gear.

⚠ WARNING

SHIFTING TONG WHILE ROTATING THE MOTOR AND CAGE PLATE MAY RESULT IN CATASTROPHIC GEAR TRAIN FAILURE

4.0.5 Backing Pin Operation

The backing pin must be engaged in either the MAKE or BREAK position to make up or break out a connection. The backing bin can only be engaged when the tong is rotated to the ‘open throat’ position and no rotating components of the tong are in motion.

4.0.6 Pre-Operational Checks

McCoy recommends that the following pre-operating tests be performed prior to releasing the tong assembly to a operational environment:

1. Connect the tong to a hydraulic power source in a controlled environment. Ensure the power unit’s operating parameters are within the specifications as identified on page 2.8, and the hydraulic connections from the power source are properly and securely made up see page 3.12. Do not neglect to connect the motor drain line.
2. Energize hydraulic power to the tool. Inspect all hydraulic connections. Be aware that a restriction in the pressure supply hose will result in high pressure within the power unit hydraulic system, which may activate a hydraulic governor in a stand-alone power unit and increase the engine speed to as high as maximum RPM. A restriction in the return line will result in high pressure within both the power unit and the tong hydraulic system, and may cause failure of the motor seal.

⚠ WARNING

A CLEARLY IDENTIFIED REMOTE POWER PACK EMERGENCY STOP MUST BE INSTALLED IN THE IMMEDIATE VICINITY OF THE TONG OPERATOR.

3. If using a stand-alone hydraulic power unit allow hydraulic system to warm by circulating fluid for about 10 minutes, then slowly close the bypass valve to allow hydraulic fluid to circulate through the hoses and tong. Ensure circulating pressure does not exceed 200 psi.
4. Inspect all hydraulic hoses and connections on the tong. Immediately correct any hydraulic fluid leaks.
5. Inspect all gauges. Replace leaking or cracked gauges, or any gauge not registering a reading.
6. Confirm that all load-bearing pins and R-clip retainers are installed and in good condition (rigid sling pins, lift cylinder pins).
7. Confirm all hydraulic hoses (with the exception of the supply & return to the backup) are securely fastened to the tong, and are not in contact with the cage plate or creating a snagging hazard.

A rotating tong potentially stores a large amount of kinetic energy in the gear train. Suddenly opening the tong door to stop rotation will generate a shock load that could result in catastrophic equipment failure not covered by the manufacturer’s warranty, and may present a hazard to personnel on the drill floor.

⚠ WARNING

SUDDENLY OPENING THE TONG DOOR TO STOP ROTATION WILL GENERATE A SHOCK LOAD THAT COULD RESULT IN CATASTROPHIC EQUIPMENT FAILURE NOT COVERED BY THE MANUFACTURER’S WARRANTY, AND MAY PRESENT A HAZARD TO PERSONNEL ON THE DRILL FLOOR

4.0.7 General Operational Comments

1. Full break-out torque is only achievable when the rotary gear is in full contact with both idler gears. Position rotary gear in contact with both idler gears when preparing to break connections or collars where high torques are required. Do not apply break-out torque if, for any reason (slippage, for example), the rotary gear rotates past 90 degrees without gripping the tubular. Applying full torque to break out a joint when the rotary gear is not in full contact with both idler gear assemblies presents a significant hazard of catastrophic tong failure.

⚠ WARNING

DO NOT APPLY BREAK-OUT TORQUE IF THE ROTARY GEAR IS NOT IN FULL CONTACT WITH BOTH IDLER GEAR ASSEMBLIES.

2. When making-up integral (shouldered) joints, it is essential to make up the last turn of the threads in low gear. This reduces the tendency of an instant stop or a sudden increase in torque, which induces extremely high stresses on the gear train.
3. DO NOT employ the “snap break” method of breaking-out joints when pulling a string. The extremely high stress placed on the gear train frequently causes gear breakage.

⚠ WARNING

THE “SNAP-BREAK” METHOD OF BREAKING CONNECTIONS IS HAZARDOUS TO RIG PERSONNEL AND EQUIPMENT

4. Consider the following when operating your equipment in temperatures below 0°C (32°F)
   - Select gear and bearing lubricants that are compatible with expected climatic conditions.
   - Select hydraulic fluid that is compatible with expected climatic conditions.
   - Allow sufficient time for hydraulic fluid to warm to operating temperature following a power unit cold start prior to activating the bypass valve to allow fluid to circulate to tong.
   - Allow for adequate drying of moisture (prior to lubricating) when cleaning tong parts in cold weather.

4.1 MAKING AND BREAKING CONNECTIONS

NOTICE

THESE OPERATING PROCEDURES ASSUME THE USER HAS PROPERLY SET UP AND PREPARED THE EQUIPMENT FOR OPERATION AS PER SECTION 3 OF THIS MANUAL.

Set up and prepare your equipment for operation as per Section 3 of this manual.

Your tong and backup assembly should be properly suspended, connected to a hydraulic power source, and ready to make or break connections at this point.

4.1.1 Making A Connection

1. Ensure hydraulic power supply to the tong is energized.
2. Ensure the backing pin is in the “makeup” position. From the front of the tong, the backing pin correctly configured for makeup will be in the 10 o’clock position (see Illustration 4.1.2). If it is not, simply lift up and place in the correct position. The cage plate opening must be aligned with the door opening when setting the backing pin position.
3. Properly configure the load cell and snub line(s) for making up connections. The “snub line” is a length of wire rope or chain connecting the rear of the tong body opposite to the load cell to a sturdy anchor on the drill floor (see page 3.21) which arrests unanticipated and uncontrolled rotation of the assembly. The load cell and snub line(s) must be rated for the applied torque plus whatever safety margins stated by your own operating policies. The load cell and snub line connection point(s) on the drill floor must be sturdy enough to absorb all applied forces generated by tong rotation. When making up joints connect the load cell to the the driller’s side of the tong, which is the left side of the tong as seen from the rear. For accurate torque measurement the load cell connection line must be perpendicular to the vertical, and perpendicular to the centre-line of the tong
4. Use the rig’s pipe-handling equipment to position the fresh tubular in position over the stump. Where possible manually engage the connection, and ensure the connection is not cross-threaded.
5. Open the tong door.
6. Lift the tool from the drill floor and adjust the height of the tool as necessary. Position the tool over the connection.

⚠ CAUTION

RIG PERSONNEL MUST STABILIZE THE TOOL AS IT IS LIFTED FROM THE DRILL FLOOR

7. Close the tong door. Ensure the door latch has properly and securely engaged.
8. Shift the tong to high gear to thread the connection at high speed. Do not shift gears while the tong is rotating.

⚠ WARNING

SHIFTING TONG WHILE ROTATING THE MOTOR AND CAGE PLATE MAY RESULT IN CATASTROPHIC GEAR TRAIN FAILURE

9. Rotate the tong in the make-up direction to cam the jaws on to the tubular.
10. As the joint becomes fully made up the increasing torque demand will stall the motor, and displayed torque will rapidly begin to increase.
11. Stop rotation, and shift to low gear (low speed/high torque). This will enable the tong to produce adequate torque for making up the joint to specification. Do not shift gears while the tong is rotating.

⚠ WARNING

SHIFTING TONG WHILE ROTATING THE MOTOR AND CAGE PLATE MAY RESULT IN CATASTROPHIC GEAR TRAIN FAILURE

12. Complete the connection at low speed/high torque. Monitor the torque gauge during rotation, and stop rotation upon reaching the specified make-up torque. Reverse the rotation control valve to release the tong jaws from the tubular. **OPERATING NOTE:** releasing the tong jaws may release compression energy stored in the spring hanger springs during make-up, causing the tong to "jump" upwards to its pre-connection level.

⚠ CAUTION

COMPRESSION ENERGY STORED IN THE SPRING HANGER SPRINGS MAY CAUSE THE TONG TO "JUMP" SLIGHTLY WHEN TONG JAWS ARE RELEASED.

13. When tong jaws are free, align the opening in the rotary gear with the mouth of the tong, and open the tong door.
14. Free the tool from the drill string. Note that rig personnel may be required to stabilize the tool as it completely releases from the drill string. Guide the tool away from the string and lower it to the drill floor if desired.
15. Repeat steps 4 through 14 until the desired number of connections are made up.

4.1.2 Breaking A Connection

NOTICE

YOUR TONG SHOULD BE PROPERLY SUSPENDED, CONNECTED TO A HYDRAULIC POWER SOURCE, EQUIPPED WITH PROPERLY SIZED JAWS, AND READY TO BREAK CONNECTIONS.

1. Ensure hydraulic power supply to the tong and backup is energized. The master link on the rigid sling must be used to suspend the tong. Do not suspend the tong from any other point. See Illustration 4.1.1.
2. Set the backing pin for "Breakout" operation, indicated on the front of the remote reversing pin cylinder assembly. The opening in the rotary gear must be aligned with the tong door opening in order to properly set the backing pin (see Illustration 4.1.3).
3. Properly configure the load cell for breaking out connections (see Section 3.5.3). The load cell must be transferred to the off-driller's side (the right hand side as seen from the rear of the tong), and the snub line must be transferred to the driller's side to perform break-out operations. Load cell and snub lines must be rated for the applied torque plus whatever safety margins stated by your own operating policies. The load cell and snub line connection points on the drill floor must be sturdy enough to absorb all applied forces.
4. Open the tong door.
5. If necessary, lift the tool from the drill floor.

⚠ CAUTION

RIG PERSONNEL MUST STABILIZE THE TOOL AS IT IS LIFTED FROM THE DRILL FLOOR

6. Move the tool on to the tubing joint. Ensure the tong is level and perpindicular in relation to the tubular.
7. Close the tong door.
8. Breakout torque is only available when the tong is in low gear. Shift the tong to low gear. Do not shift gears while the tong is rotating.

⚠ WARNING

SHIFTING TONG WHILE ROTATING THE MOTOR AND CAGE PLATE MAY RESULT IN CATASTROPHIC GEAR TRAIN FAILURE

9. Rotate the cage plate in the break-out direction, and cam the jaws on to the tubular. **OPERATIONAL NOTE:** Do not apply break-out torque if, for any reason (slippage, for example), the rotary gear rotates past 90 degrees without gripping the tubular. Applying full torque to break out a joint when the rotary gear is not in full contact with both idler gear assemblies presents a significant hazard of catastrophic tong failure.

⚠ WARNING

DO NOT APPLY BREAK-OUT TORQUE IF THE ROTARY GEAR IS NOT IN FULL CONTACT WITH BOTH IDLER GEAR ASSEMBLIES.

10. Stop rotation when the connection breaks, and shift to high gear. This will enable the tong to completely un-thread the connection at high speed.
11. Release the tong jaws from the tubing by reversing rotational direction when connection has been completely unthreaded.
12. When the tong jaws disengage, align the opening in the rotary gear with the mouth of the tong, and open the tong door.
13. Free the tool from the drill string. Note that rig personnel may be required to stabilize the tool as it completely releases from the drill string. Guide the tool away from the string and use the lift cylinder control to lower it to the drill floor if desired.

⚠ CAUTION

RIG PERSONNEL MUST STABILIZE THE TOOL AS IT IS FREED FROM THE TUBULAR.

14. Use standard pipe handling procedures to remove and rack the freed tubing stand.
15. Repeat steps 5 through 14 as many times as necessary to break out and un-thread the desired number of connections.

This page intentionally
left blank

SECTION 5: MAINTENANCE

This page intentionally
left blank

McCoy Global recognizes that minor on-site repairs and modifications are required to maintain peak operating condition of this equipment, or to reconfigure the equipment to suit the operating environment. Examples of minor repairs are:

- replacement of damaged hoses, cables, and fittings
- replacement of malfunctioning pressure gauges and valves
- replacement of fasteners

Any replacement component must be an identical component supplied by McCoy Global. Fasteners must be Grade 8 or equivalent, unless otherwise specified by McCoy Global. All repairs must be performed by authorized, skilled personnel. Any attempt to make unauthorized repairs to equipment beyond the minor repairs described above exposes personnel to potential hazards and may cause catastrophic equipment failure. Contact McCoy Global if any question about the nature of repairs arises.

⚠ DANGER

UNAUTHORIZED REPAIRS TO EQUIPMENT EXPOSES PERSONNEL TO POTENTIAL HAZARDS AND MAY CAUSE CATASTROPHIC EQUIPMENT FAILURE.

By nature, steel machinery with rotating and moving parts have the potential to generate ignition sources, ie. sparks. As outlined in this manual, scheduled maintenance, lubrication, timely replacement of worn components and most importantly, on-site risk assessments with stringent standard operating procedures are all required to prevent the potential of spark generation.

⚠ WARNING

USE THE MAINTENANCE INFORMATION IN THIS MANUAL TO DEVELOP AND IMPLEMENT PROCEDURES TO HELP ELIMINATE SPARK GENERATION

5.0 GENERAL MAINTENANCE SAFETY PRACTICES

The practices identified here are intended as a guideline. All personnel are responsible for performing their tasks in a manner that ensures worker, equipment, and environmental safety, and may require taking additional steps that are not identified in this section.

Equipment maintenance shall be performed only by designated qualified maintenance personnel. Wear approved eye wear and footwear, and follow all safety guidelines. Do not begin a maintenance task without the proper tools or materials on hand, or the proper drawings and documentation necessary.

Schedule planned maintenance with operators to avoid conflicts, unnecessary downtime, and the danger of accidental equipment activation. Notify operations when maintenance procedures are complete and equipment functionality is restored.

Isolate the location of the maintenance under way to prevent unaware personnel from inadvertently exposing themselves to a hazard. Use tape, rope, or signage to clearly indicate “off-limits” area.

Replacement of large, heavy individual parts and/or heavy structural components must be performed using an approved lifting device of sufficient lifting capacity. Use care when attaching the lifting device. Safeguard area to avoid endangering personnel or equipment.

All spare parts must meet or exceed OEM specifications in order to maintain equipment integrity, especially protective equipment.

Ensure equipment is isolated from hydraulic power before commencing maintenance operations.

⚠ WARNING

DO NOT PERFORM MAINTENANCE UNTIL TUBULAR CONNECTION EQUIPMENT HAS BEEN COMPLETELY ISOLATED FROM HYDRAULIC POWER

This equipment uses materials that may be harmful to the environment if improperly disposed of (hydraulic fluid, grease, etc.). Dispose of all materials according to environmental protection regulations.

5.1 CLEANING

Clean equipment thoroughly with a high quality petroleum-based cleaning agent after each job, prior to storage. McCoy Global recommends that the equipment be periodically partially disassembled so that internal components can be properly cleaned. Ensure that cleaning solvents and chemicals are captured to prevent environmental contamination. Dispose of all materials according to environmental protection regulations.

5.2 PREVENTIVE MAINTENANCE PRACTICES

Regular maintenance programs must be established to assure safe, dependable operation of this equipment and to avoid costly repairs. The following maintenance procedures provide information required to properly maintain your equipment. This equipment may require more or less maintenance depending upon the frequency of use and the operational field conditions.

These maintenance procedures are designed for equipment operating at normal operating temperatures for 10 hours per day. McCoy Global recommends that the inspection and maintenance procedures in this section be performed as recommended in the maintenance checklists, or in conjunction with a qualified technician's best estimates of when this equipment is due for this maintenance.

OEM component manufacturers (for example: motors, valves, etc.) may specify maintenance tasks and intervals over and above what McCoy Global recommends as part of their recommended procedures. These additional tasks may be performed or ignored at the user's discretion.

McCoy Global recommends tracking all maintenance activity including the lubrication schedule and replacement of hoses or cables. A maintenance log is a valuable tool that can be used for easily retrieving maintenance history or identifying trends that require correction.

5.3 HYDRAULIC SYSTEM MAINTENANCE

Poor hydraulic fluid maintenance is a leading cause of hydraulic equipment failure. Contaminants are introduced to the hydraulic system through several sources including dirty hydraulic connections, dirty hydraulic cylinder rods, and through the wear of internal components. Failure to remove contaminants through the use of a maintained filtration system will contribute to rapid wear of system components. McCoy recommends protecting equipment by filtering to ISO 4406:1999 standards.

Premature fouling of particulate filters within the prime mover or ancillary hydraulic power unit indicates a high level of contaminants, and requires immediate hydraulic fluid laboratory analysis to identify the contaminants. High levels of wear metals in the fluid may be symptomatic of impending failure of a component in the hydraulic system. Early identification of the potential failure enables the user to schedule preventive repairs, preventing costly breakdown maintenance.

Fluid that has been repeatedly and consistently overheated will provide much poorer response and overall performance than fluid in a temperature-managed hydraulic system. McCoy recommends the use of hydraulic heaters and/or coolers to maintain the fluid temperature within the operating temperature range specified in Section 2. Maintaining adequate fluid level in the hydraulic reservoir helps dissipate heat in the hydraulic system. Fluid repeatedly heated to high temperatures (above 80°C) is subject to rapid depletion of the additives that prevent oxidation and water emulsification, leading to the build-up of sludge, gum, and varnish. These contaminants will build up on internal surfaces of the hydraulic system causing "sticky" operation or clogging orifices and small passages. Water entrained in the fluid will react with components in the hydraulic system to produce rust and increase the rate of oxidation of the fluid.

Schedule hydraulic fluid analysis regularly as part of a preventive maintenance routine. Test particulate content using a portable fluid analysis kit and compare the fluid sample to new hydraulic fluid. Fluid that is discolored or has a strong odor should be sent to a qualified laboratory for detailed analysis. Hydraulic fluid that is no longer capable of operating within the parameters specified by this manual must be replaced in conjunction with a complete hydraulic system flush.

Fluid that is unused for a long period of time should be tested before circulating through the hydraulic system. Hydraulic systems operated in environments experiencing extreme temperature variances are susceptible to condensation within in the oil reservoir. Over a period of time, the condensation will accumulate in the bottom of the reservoir. This condensation should be drawn off as required, or at six month intervals.

5.4 HYDRAULIC SYSTEM DEPRESSURIZATION

McCoy Global recommends that the hydraulic system be depressurized prior to maintenance on any hydraulic component. Perform the following steps to ensure the dangers posed by hydraulic fluid under pressure are minimized.

⚠ CAUTION

ENSURE ADEQUATE CONTAINMENT IS IN PLACE TO PREVENT ENVIRONMENTAL CONTAMINATION FROM RESIDUAL HYDRAULIC FLUID

1. Rotate the tong to the “open throat” position. Ensure tong and backup doors (if equipped) are closed. Fully extend the lift cylinder
2. De-energize the power unit.
3. Repeatedly actuate the tong motor control valve lever IN BOTH DIRECTIONS to dissipate any residual pressure in the valve and motor.
4. Remove the hydraulic SUPPLY line from the equipment.
5. Repeatedly actuate the remaining control valve levers IN BOTH DIRECTIONS to dissipate any residual pressure in the remainder of the hydraulic control system.

⚠ WARNING

HYDRAULIC PRESSURES AS HIGH AS OPERATING PRESSURE MAY REMAIN TRAPPED IN SMALL AREAS OF THE EQUIPMENT. ENSURE ALL MAINTENANCE IS CARRIED OUT BY A QUALIFIED SERVICE TECHNICIAN, AND THAT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT IS USED TO GUARD AGAINST PRESSURE INJURIES

6. Disconnect the hydraulic RETURN line from the equipment.
7. Disconnect remaining hoses such as case drains, or lines connected to the turns counter encoder.

5.5 LUBRICATION INSTRUCTIONS

Use a quality multipurpose bearing lubricant that will remain within its viscosity range at expected operating temperatures. In addition, McCoy recommends the following lubrication procedure at the completion of each job prior to storage.

McCoy recommends that a liberal coating of grease be applied to the cam surface of the rotary drive gear prior to jaw installation. Also, the clutch inspection plate should periodically be removed, and a liberal coating of grease applied to the clutch, drive gears and shifting shaft.

Coat the jaw pins and rollers with a liberal amount of anti-seize compound when installing new jaw die kits.

5.5.1 Recommended Lubrication Amounts

McCoy recommends lubricating your equipment before beginning each shift, and immediately following operation prior to storage. The grease amounts listed in the table below are estimated minimums, and should be used as a guideline when establishing a lubrication routine as part of a maintenance schedule.

McCoy recommends liberally coating the cam surface of the rotary drive gear with grease prior to jaw installation. Periodically remove the clutch inspection plate and apply grease generously to the clutch, drive gears and shifting shaft. Coat the jaw pins and rollers with a liberal amount of anti-seize compound when installing new jaw die kits.

5.5 LUBRICATION INSTRUCTIONS (CONTINUED):

Item No.	Lubrication Location	Min. Lubrication Amount (Each Location)	Number of Locations
1	Cam Follower (top and bottom)	2 shots	19
2	Idler Gear	2 shots	6
3	Short Idler Gear	2 shots	1
4	Pinion Gear	2 shots	1

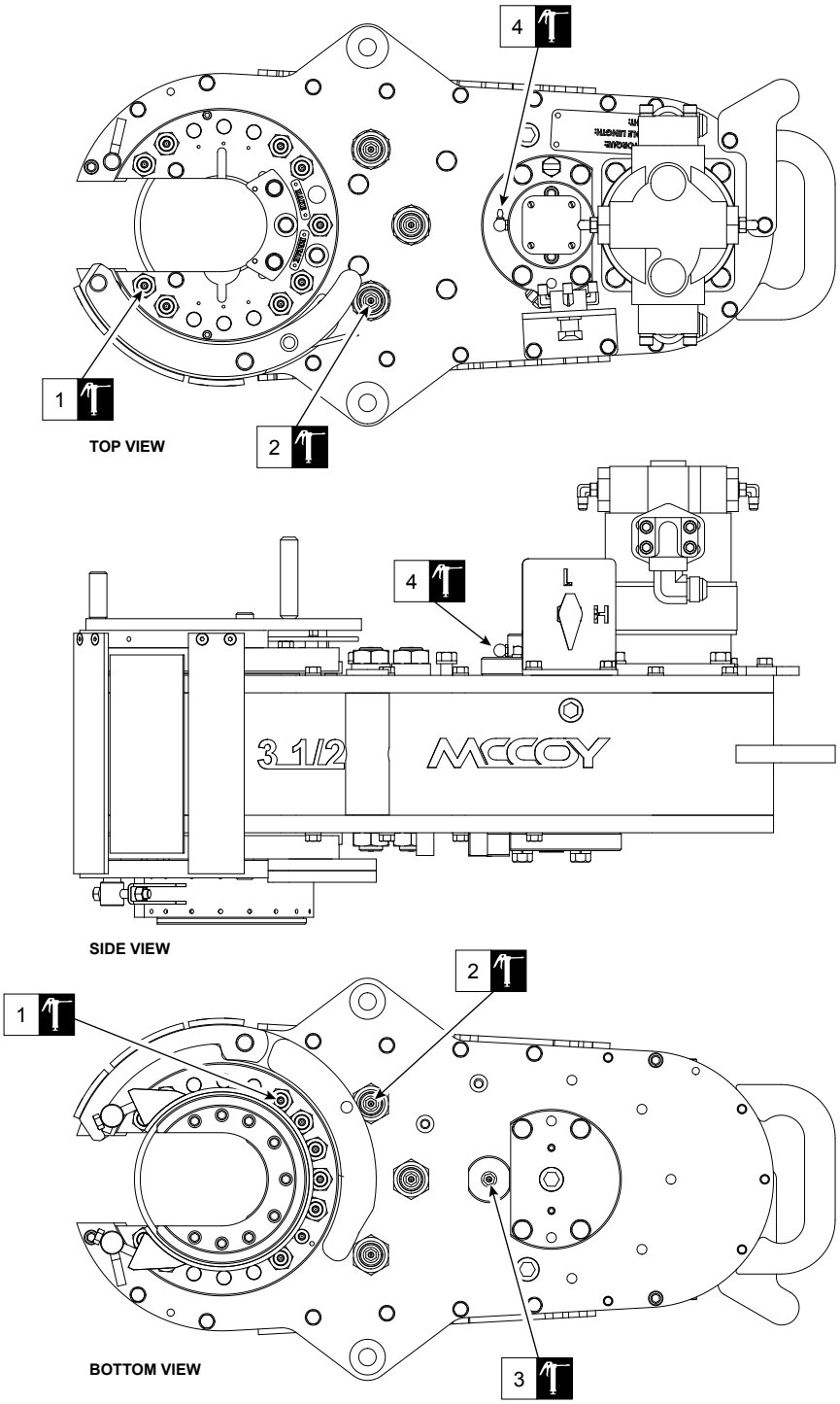


Illustration 5.5.1: Tong Lubrication Diagram

5.6 ADJUSTMENTS

5.6.1 Brake Band Adjustment

Periodically adjust the brake bands to compensate for brake lining wear, ensuring continued smooth and efficient jaw cam action. Inadequate cage plate tension will allow the cage plate to rotate with the rotary gear, resulting in poor gripping of the pipe or casing due to improper “camming” action of the tong jaws. Tightening the brake band against the cage plates will increase frictional resistance, allowing jaws to cam properly and grip the casing. Adjust the brake band using the adjustment nut and bolt set as shown in the illustration below, using the following procedure:

1. Rotate the cage plate until it faces the rear of the tong.
2. Tighten the top and bottom brake bands a quarter turn each. Ensure both brake bands are adjusted simultaneously and equally.
3. Rotate the cage plate in the make-up direction. If the jaws cam out, the procedure is complete. If jaws do not cam out, repeat steps 1 & 2.
4. Continue to repeat steps 1 through 3 until the jaws properly cam.

Over-tightening will cause excessive wear to the brake bands. Do not over-tighten brake bands.

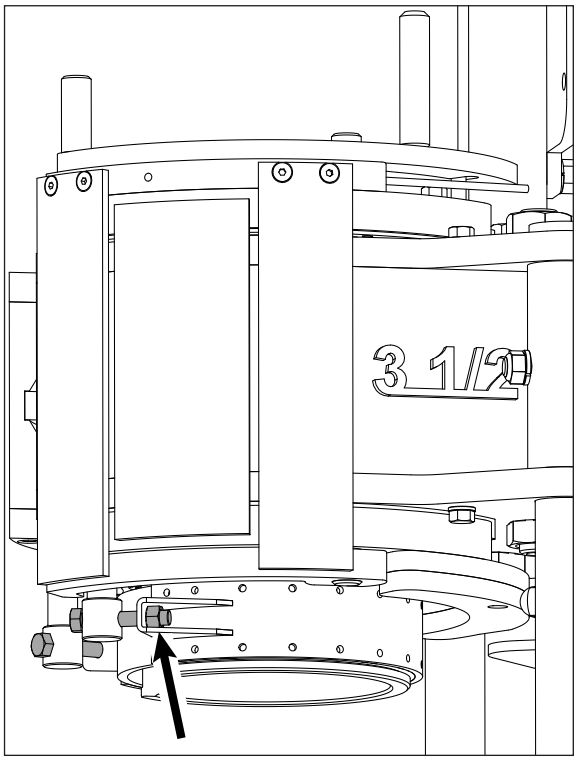


Illustration 5.6.1: Brake Band Adjustment

5.7 ASSEMBLY PRACTICES

Although the assembly of McCoy hydraulic power tongs is straightforward and can be accomplished without the use of special tools, the instructions in this subsection are presented as a guide only and are similar to the assembly sequence our technician would use while assembling the tong in our plant.

NOTE ON INSTALLATION PRACTICES: Ensure all bearings are liberally greased before installing over a shaft or into gears or bearing caps. When inserting a shaft through a support roller assembly ensure shaft is greased. Also ensure all metal-to-metal contact in the gear train is adequately greased. Please refer to the relevant exploded diagrams in Section 7 when assembling components in this power tong and backup.

⚠ WARNING

ALL FASTENERS USED DURING REASSEMBLY OF LOAD-BEARING COMPONENTS (CHAIN SLINGS, RIGID SLINGS, BACKUP LEGS) MUST BE TIGHTENED TO THE CORRECT TORQUE. THREADED FASTENERS USED IN LOAD-BEARING DEVICES MUST BE SECURED WITH RED LOCTITE™.

REPLACEMENT FASTENER (BOLTS, NUTS, CAP SCREWS, MACHINE SCREWS, ETC.) USED DURING MAINTENANCE OR OVERHAUL MUST BE GRADE 8 OR EQUIVALENT UNLESS OTHERWISE SPECIFIED.

5.7 ASSEMBLY PRACTICES (CONTINUED):

TIGHTENING TORQUE GUIDE (DRY)			
SAE GRADE 8 - FINE THREAD			
SIZE	CLAMP LOAD	PLAIN	PLATED
¼ - 28 (.250)	3,263	14 ft. lbs.	10 ft. lbs.
5/16- 24 (.3125)	5,113	27 ft. lbs.	20 ft. lbs.
⅜ - 24 (.375)	7,875	49 ft. lbs.	37 ft. lbs.
7/16 - 20 (.4375)	10,650	78 ft. lbs.	58 ft. lbs.
½ - 20 (.500)	14,400	120 ft. lbs.	90 ft. lbs.
9/16 - 18 (.5625)	18,300	172 ft. lbs.	129 ft. lbs.
⅝ - 18 (.625)	23,025	240 ft. lbs.	180 ft. lbs.
¾ - 16 (.750)	33,600	420 ft. lbs.	315 ft. lbs.
⅞ - 14 (.875)	45,825	668 ft. lbs.	501 ft. lbs.
1 - 12 (1.000)	59,700	995 ft. lbs.	746 ft. lbs.
1 - 14 (1.000)	61,125	1019 ft. lbs.	764 ft. lbs.
1-⅛ - 12 (1.125)	77,025	1444 ft. lbs.	1083 ft. lbs.
1-¼ - 12 (1.125)	96,600	2012 ft. lbs.	1509 ft. lbs.
1-⅜ - 12 (1.375)	118,350	2712 ft. lbs.	2034 ft. lbs.
1-½ - 12 (1.500)	142,275	3557 ft. lbs.	2668 ft. lbs.
SAE GRADE 8 - COARSE THREAD			
SIZE	CLAMP LOAD	PLAIN	PLATED
¼ - 20 (.250)	2,850	12 ft. lbs.	9 ft. lbs.
5/16- 18 (.3125)	4,725	25 ft. lbs.	18 ft. lbs.
⅜ - 16 (.375)	6,975	44 ft. lbs.	33 ft. lbs.
7/16 - 14 (.4375)	9,600	70 ft. lbs.	52 ft. lbs.
½ - 13 (.500)	12,750	106 ft. lbs.	80 ft. lbs.
9/16 - 12 (.5625)	16,350	153 ft. lbs.	115 ft. lbs.
⅝ - 11 (.625)	20,325	212 ft. lbs.	159 ft. lbs.
¾ - 10 (.750)	30,075	376 ft. lbs.	282 ft. lbs.
⅞ - 9 (.875)	41,550	606 ft. lbs.	454 ft. lbs.
1 - 8 (1.000)	54,525	909 ft. lbs.	682 ft. lbs.
1-⅛ - 7 (1.125)	68,700	1288 ft. lbs.	966 ft. lbs.
1-¼ - 7 (1.125)	87,225	1817 ft. lbs.	1363 ft. lbs.
1-⅜ - 6 (1.375)	103,950	2382 ft. lbs.	1787 ft. lbs.
1-½ - 6 (1.500)	126,450	3161 ft. lbs.	2371 ft. lbs.

NOTICE

IMPORTANT ASSEMBLY INFORMATION

DO NOT TORQUE NYLOCK NUTS. NYLOCK NUTS ARE NOT USED FOR CLAMPING PURPOSES AND SHOULD ONLY BE TIGHTENED UNTIL METAL-TO-METAL CONTACT IS MADE AND VERTICAL MOTION IS ELIMINATED. OVER-TIGHTENING WILL RESULT IN PREMATURE BUSHING FAILURE AND WILL INHIBIT ROTATION, AND MAY IMPART EXCESS STRESS ON ROTATING COMPONENTS.

NYLOCK NUTS ARE A ONE-TIME USE ITEM AND MUST BE DISCARDED & REPLACED AFTER USE.

5.8 DAILY INSPECTION & MAINTENANCE CHECKLIST

McCoy recommends that the following inspection and maintenance procedures be performed before each use, and at least once per day when the tong is in steady use, in the order in which they are listed.

1. ☐ Rotate cage plate/rotary gear until the opening in the rotary gear faces towards the rear of the tong.

⚠ WARNING

DO NOT PERFORM ANY FURTHER ACTIONS OR MAINTENANCE WHILE THE TONG IS CONNECTED TO ANY HYDRAULIC POWER SUPPLY. MCCOY RECOMMENDS THAT ALL HYDRAULIC LINES ARE FULLY DISCONNECTED, AND RESIDUAL HYDRAULIC PRESSURE IS BLED OFF. ENSURE ADEQUATE CONTAINMENT IS IN PLACE TO PREVENT ENVIRONMENTAL CONTAMINATION FROM RESIDUAL HYDRAULIC FLUID.

DEPRESSURIZE HYDRAULIC SYSTEM IN PREPARATION FOR MAINTENANCE:

2. ☐
   1. Rotate the tong to the “open throat” position. Ensure tong and backup doors (if equipped) are closed. Fully extend the lift cylinder
   2. De-energize the power unit.
   3. Repeatedly actuate the tong motor control valve lever IN BOTH DIRECTIONS to dissipate any residual pressure in the valve and motor.
   4. Remove the hydraulic SUPPLY line from the equipment.
   5. Repeatedly actuate the remaining control valve levers IN BOTH DIRECTIONS to dissipate any residual pressure in the remainder of the hydraulic control system.
   7. Disconnect the hydraulic RETURN line from the equipment.
   8. Disconnect remaining hoses such as case drains, or lines connected to the turns counter.

⚠ WARNING

HYDRAULIC PRESSURES AS HIGH AS OPERATING PRESSURE MAY REMAIN TRAPPED IN SMALL AREAS OF THE EQUIPMENT. ENSURE ALL MAINTENANCE IS CARRIED OUT BY A QUALIFIED SERVICE TECHNICIAN, AND THAT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT IS USED TO GUARD AGAINST PRESSURE INJURIES

3. ☐ Remove the majority of dirt and grease build-up from the tong, backup, and frame assembly using a hose with spray nozzle, or a pressure washer set to the “low pressure” mode. Ensure adequate containment is in place to prevent environmental contamination from residual hydraulic fluid and dirty grease.

4. ☐ Remove the access panel on the side of the tong directly adjacent to the shifter mechanism.

5. ☐ Use a flashlight to perform a visual inspection of the gear train through the opening of the rotary gear. If gear damage or chips of metal are seen, the tong should be removed from service and overhauled to avoid further damage.

6. ☐ Perform a visual inspection of all fasteners and protruding body pieces (example: hydraulic valve mounts, inlet & outlet line supports, tong legs, shifter handle pivot lugs). Tighten or replace loose or missing fasteners. McCoy recommends that damaged or missing body parts be repaired or replaced as soon as possible.

7. ☐ Inspect the jaws and dies on the tong and backup. Inspect the jaw roller pins for signs of damage - replace pins if necessary. If the pins are welded in place, replace the entire jaw assembly. Ensure dies are secure in the jaw - replace worn dies if necessary. Ensure that the jaw rollers rotate freely. Check to ensure the size of the loaded jaws match the size of casing or pipe you are running.

8. ☐ Perform a visual inspection of all lifting points - if visible damage is seen, including cracks, broken lugs, distorted metal, etc. replace damaged part(s) before placing tong in service. Also inspect all chains, master links, and turnbuckles - again, if any damage is noted replace the damaged part(s) before placing the tong in service.

9. ☐ Inspect tong for signs of premature wear, or moving parts that are rubbing (bare metal where there used to be paint is a good indication of wear).

5.8 DAILY INSPECTION & MAINTENANCE CHECKLIST (CONTINUED):

10. ☐ Inspect backing pin(s). If cracked, broken, or bent it (they) must be replaced.
11. ☐ Inspect top and bottom brake band linings - replace if necessary. Unequal wear of the brake bands indicates that the brake band tension is not evenly adjusted. Refer to the maintenance section of the manual for instructions on properly adjusting brake bands.
12. ☐ Perform a visual inspection of all hydraulic lines. Replace flexible lines if they appear to be cracked, fatigued, or have visible signs of wear from contact with a rigid object.
13. ☐ Perform a complete lubrication of the tong. Refer to Maintenance section of this technical manual.
14. ☐ Ensure main supply and return connections to the tong are fully made up. Reconnect the remainder of the hydraulic lines, and, if applicable, the electrical line to the turns counter.

⚠ WARNING

FAILURE TO ENSURE THAT THE SELF-SEALING SUPPLY AND RETURN LINES ARE FULLY MADE UP MAY RESULT IN CATASTROPHIC EQUIPMENT FAILURE.

If using a stand-alone power unit, start it now. Refer to the power unit technical manual for startup procedures. Listen to power unit for a moment to see if there are any unusual mechanical sounds (rubbing, grinding, excessive pump noise). If using a diesel unit, allow sufficient time for the engine to reach operating temperature before increasing engine RPM. Once engine is warm, gradually increase engine RPM until operating speed is reached.

15. ☐ Ensure that supply pressure is at or above the tong's specified operating pressure, and that the return pressure is less than 350 psi.
16. ☐ Perform a visual inspection of pressurized hydraulic lines. Document and correct any hydraulic fluid leaks.
17. ☐ Perform a full functional test of the tong (see Operation Section). Report and correct any hydraulic leaks from the hydraulic valve bank, or from any hydraulic cylinders that are used.
18. ☐ Perform a visual inspection of the load cell. If using a tension load cell, replace any cracked, broken, or distorted components including links and chains.
19. ☐ If applicable, inspect the load cell anchor pins (tension load cell only). Replace the anchor pins if cracking or metal distortion is seen.
20. ☐ While rotating the cage plate, ensure that the jaws properly cam. If the jaws do not cam properly, the brake bands need to be tightened. Incrementally adjust the brake band until proper cam action is achieved (see "Illustration 5.6.1: Brake Band Adjustment" on page 5.7).

5.9 MONTHLY MAINTENANCE CHECKLIST

The following maintenance checklist is intended as a guideline rather than a definitive maintenance schedule. More or less maintenance may be required depending upon the frequency of use, the percentage of maximum torque that the equipment is routinely subjected to, and the field conditions under which the equipment operates. McCoy Global recommends that the following inspection and maintenance procedures be performed monthly under normal operating conditions.

1. ☐ Rotate cage plate/rotary gear until the opening in the rotary gear faces towards the rear of the tong.

⚠ WARNING

DO NOT PERFORM ANY FURTHER ACTIONS OR MAINTENANCE WHILE THE TONG IS CONNECTED TO ANY HYDRAULIC POWER SUPPLY. MCCOY RECOMMENDS THAT ALL HYDRAULIC LINES ARE FULLY DISCONNECTED, AND RESIDUAL HYDRAULIC PRESSURE IS BLED OFF. ENSURE ADEQUATE CONTAINMENT IS IN PLACE TO PREVENT ENVIRONMENTAL CONTAMINATION FROM RESIDUAL HYDRAULIC FLUID.

DEPRESSURIZE HYDRAULIC SYSTEM IN PREPARATION FOR MAINTENANCE:

2. ☐
   1. Rotate the tong to the “open throat” position. Ensure tong and backup doors (if equipped) are closed. Fully extend the lift cylinder
   2. De-energize the power unit.
   3. Repeatedly actuate the tong motor control valve lever IN BOTH DIRECTIONS to dissipate any residual pressure in the valve and motor.
   4. Remove the hydraulic SUPPLY line from the equipment.
   5. Repeatedly actuate the remaining control valve levers IN BOTH DIRECTIONS to dissipate any residual pressure in the remainder of the hydraulic control system.
   7. Disconnect the hydraulic RETURN line from the equipment.
   8. Disconnect remaining hoses such as case drains, or lines connected to the turns counter.

⚠ WARNING

HYDRAULIC PRESSURES AS HIGH AS OPERATING PRESSURE MAY REMAIN TRAPPED IN SMALL AREAS OF THE EQUIPMENT. ENSURE ALL MAINTENANCE IS CARRIED OUT BY A QUALIFIED SERVICE TECHNICIAN, AND THAT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT IS USED TO GUARD AGAINST PRESSURE INJURIES

3. ☐ Clean the exterior of the tool thoroughly, using either a water hose with a spray nozzle or a pressure washer using a low-pressure wash wand, or an appropriate solvent-based grease-cutting cleaner such as Varsol. Ensure adequate containment is in place to prevent environmental contamination from residual hydraulic fluid, dirty grease, and cleaning agents.

4. ☐ Clean the interior spaces of the tool thoroughly, using either a water hose with a spray nozzle (do not use a pressure washer), or an appropriate solvent-based grease-cutting cleaner such as Varsol. Ensure adequate containment is in place to prevent environmental contamination from residual hydraulic fluid, dirty grease, and cleaning agents. Make a note if any metal shavings or metal pieces are flushed out of the gear train cavity - if shavings or metal pieces are seen the tong must be overhauled before it is returned to service.

5. ☐ Inspect all fasteners and fastener safety wires (if equipped). Replace any missing fasteners - use Grade 8 bolts only unless otherwise specified. Re-torque all external fasteners to SAE specifications.

6. ☐ Repair or replace any damaged or missing external body parts, such as torque gauge mounts, hydraulic supports, safety door protectors, etc.

7. ☐ Perform a visual inspection of all protruding body pieces (example: hydraulic valve mounts, inlet & outlet line supports, tong legs, shifter handle pivot lugs). Tighten or replace loose or missing fasteners. McCoy recommends that damaged or missing body parts be repaired or replaced as soon as possible.

5.9 MONTHLY MAINTENANCE CHECKLIST (CONTINUED):

8. ☐ Inspect tong for signs of premature wear, or moving parts that are rubbing (bare metal where there used to be paint is a good indication of wear.
9. ☐ Inspect all paint - locations in which the paint has been damaged must be repaired prior to the tong being returned to service. Prepare areas to be painted to ensure they are free of grease, dirt, or solvent. Touch up using a solvent-based acrylic paint. Allow sufficient time for paint to dry before proceeding.
10. ☐ Inspect all external welds. Any weld that is cracked or separating must be repaired and repainted before returning the tong to service.
11. ☐ Perform a visual inspection of all lifting points - if visible damage is seen, including cracks, broken lugs, distorted metal, etc. replace damaged part(s) before placing tong in service. Also inspect all chains, master links, and turnbuckles - again, if any damage is noted replace the damaged part(s) before placing the tong in service. Refer to Section 3 of this technical manual for information on recommended testing and recertification.
12. ☐ Inspect all jaws and dies used since the last monthly inspection. Inspect jaw roller pins for signs of damage - replace pins if necessary. If damaged pins are welded in place, remove and quarantine the jaw until the weld is repaired. Ensure dies are secure in the jaw - replace worn dies if necessary. Ensure that the jaw rollers rotate freely.
13. ☐ Inspect backing pin(s). Replace cracked, broken, or bent pins.
14. ☐ Inspect brake band lining. Replace if necessary. Unequal wear of the brake bands indicates that the brake band tension is not evenly adjusted. Refer to “Illustration 5.6.1: Brake Band Adjustment” on page 5.7 for instructions on properly adjusting brake bands.
15. ☐ Test the door latching mechanism. Ensure the latch fully engages the tong body when the door is closed.
16. ☐ Perform a visual inspection of all hydraulic lines. Replace flexible lines if they appear to be cracked, fatigued, or have visible signs of wear from contact with a rigid object. If your tong is equipped with rigid hydraulic lines, replace any line that is dented or appears to be stressed or cracked.
17. ☐ Generously fill the gear train housing with grease. Perform a full lubrication per Section 5 of this manual.
18. ☐ Ensure main supply and return connections to the tong are fully made up. Reconnect the remainder of the hydraulic lines, and, if applicable, the electrical line to the turns counter.

⚠ WARNING

FAILURE TO ENSURE THAT THE SELF-SEALING SUPPLY AND RETURN LINES ARE FULLY MADE UP MAY RESULT IN CATASTROPHIC EQUIPMENT FAILURE.

If using a stand-alone power unit, start it now. Refer to the power unit technical manual for startup procedures. Listen to power unit for a moment to see if there are any unusual mechanical sounds (rubbing, grinding, excessive pump noise). If using a diesel unit, allow sufficient time for the engine to reach operating temperature before increasing engine RPM. Once engine is warm, gradually increase engine RPM until operating speed is reached.

19. ☐ Ensure that supply pressure is at or above the tool’s specified operating pressure, and that the return pressure is less than 350 psi.
20. ☐ Perform a visual inspection of pressurized hydraulic lines. If any hydraulic fittings or hoses are leaking they must be repaired or replaced before proceeding.
21. ☐ Rotate tong for one minute, stop, and reverse the direction of rotation for another minute, finishing with the opening of the rotary gear facing the gear train. De-energize the power unit, and perform another generous lubrication of the gear train, including the gear housing.
22. ☐ Energize power unit. Rotate tong for one minute, stop, and reverse the direction of rotation for another minute, ending with the opening of the rotary gear facing the gear train.
23. ☐ De-energize the power unit, and perform a third generous lubrication of the gear train, including the gear housing.
24. ☐ Rotate tong at low speed for 5 minutes while monitoring pressurized seals and hydraulic lines. If a seal, line, or fitting begins to leak while tong is rotating, it must be replaced before the equipment is returned to service.

5.9 MONTHLY MAINTENANCE CHECKLIST (CONTINUED):

25. ☐ Rotate tong at high speed for 5 minutes while monitoring temperature of top and bottom bearing caps. If the bearing caps are hot to the touch (higher than approximately 50°C) replace the applicable bearings. Note any unusual sounds (grinding, rubbing) may be indicative of damaged bearings (see section 7 for exploded views for all bearing locations). Monitor hydraulic inlet and outlet lines to ensure operating temperature of the hydraulic fluid does not exceed the specifications stated in the Description & Specifications Section.

26. ☐ Install load cell. Perform a visual inspection of the load cell components and replace any cracked, broken, or distorted items including links and chains. Check oil level in load cell and fill if necessary (refer to Section 8 of the technical manual).

27. ☐ Inspect the load cell anchor pins. Replace the anchor pins if cracking or metal distortion is seen.

28. ☐ While rotating the cage plate, ensure that the jaws properly cam. If the jaws do not cam properly, the brake bands need to be tightened. Incrementally adjust both the top and bottom brake bands EQUALLY until proper cam action is achieved. Refer to the Maintenance Section for instructions on properly adjusting brake bands.

29. ☐ Perform a full functional test of the tong including, if applicable, backup components, lift cylinder, and float frame components. Report and correct any hydraulic leaks from the hydraulic valve bank, or from any hydraulic cylinders that are used.

30. ☐ McCoy recommends that an anti-corrosive agent such as Tectyl® 506 be applied to all external unpainted surfaces (and chain slings) EXCEPT cylinder rods, jaw rollers, and rotary gear camming surfaces. Refer to manufacturer data sheets for proper application and safety information.

Once all of the above maintenance checklist items have been satisfactorily completed the tool may be returned to service.

5.10 TUBULAR CONNECTION EQUIPMENT DE-COMMISSIONING & SHIPPING

Perform the following decommissioning procedures when removing tubular connection equipment from service, with the intent of short to long-term storage. These procedures are essential for ensuring proper protection of the equipment from environmental attack, and to aid in the quick turnaround when returning the equipment to service.

Store all o-rings, seals, packings, gaskets, etc. in strong moisture proof, airtight containers. Ensure that these items are not crushed, nicked, or otherwise damaged.

Do not perform any further actions or maintenance while the tong is connected to any hydraulic power supply. McCoy Global recommends that all hydraulic lines are fully disconnected, and residual hydraulic pressure is bled off. Ensure adequate containment is in place to prevent environmental contamination from residual hydraulic fluid.

NOTICE

IN ORDER TO MAINTAIN THE INTEGRITY OF INSTALLED SEALS, MCCOY RECOMMENDS THAT THE MAXIMUM STORAGE INTERVAL NOT EXCEED ONE YEAR. AT LEAST ONCE PER YEAR ALL TUBULAR CONNECTION EQUIPMENT IN LONG-TERM STORAGE SHOULD BE RECOMMISSIONED AS PER SECTION 4.L. IF FURTHER STORAGE IS REQUIRED, THE EQUIPMENT SHOULD THEN BE PUT THROUGH ANOTHER DE-COMMISSIONING PROCEDURE.

De-pressurization Procedure In Preparation For Storage:

1. Rotate the tong so that the opening in the rotary gear faces the gear train (towards the rear of the tong). Ensure tong and backup doors are closed.
2. De-energize the hydraulic power supply.
3. Repeatedly actuate the tong motor control valve lever IN BOTH DIRECTIONS to dissipate any residual pressure in the valve and motor.
4. Remove the hydraulic SUPPLY line from the equipment.
5. Repeatedly actuate the remaining control valve levers IN BOTH DIRECTIONS to dissipate any residual pressure in the remainder of the hydraulic control system.
7. Disconnect the hydraulic RETURN line from the equipment.
8. Disconnect all remaining quick-connect hoses.
9. Disconnect all remaining connections from the equipment - for example, load cell connections, turns counter connections, dump valve connections. Ensure the tool is completely free of all connections before beginning storage preparations.

⚠ WARNING

HYDRAULIC PRESSURES AS HIGH AS OPERATING PRESSURE MAY REMAIN TRAPPED IN SMALL AREAS OF THE EQUIPMENT. ENSURE ALL MAINTENANCE IS CARRIED OUT BY A QUALIFIED SERVICE TECHNICIAN, AND THAT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT IS USED TO GUARD AGAINST PRESSURE INJURIES

1. ☐ Perform an initial wash of the tool in order to remove the majority of dirt and grease build-up. Ensure adequate containment is in place to prevent environmental contamination from residual hydraulic fluid and dirty grease.
2. ☐ Clean the interior of the tong thoroughly, using either water (do not use a pressure washer), or an appropriate solvent-based grease-cutting cleaner such as Varsol. Ensure adequate containment is in place to prevent environmental contamination from residual hydraulic fluid, dirty grease, and cleaning agents. Make a note if any metal shavings or metal pieces are flushed out of the gear train cavity - if shavings or metal pieces are seen the tong must be overhauled before it is returned to service.
3. ☐ Clean the exterior of the tool thoroughly, using either water (do not use a pressure washer), or an appropriate solvent-based grease-cutting cleaner such as Varsol. Ensure adequate containment is in place to prevent environmental contamination from residual hydraulic fluid, dirty grease, and cleaning agents.
4. ☐ Inspect all fasteners and fastener safety wires (if equipped). Replace any missing fasteners - use Grade 8 bolts only. Re-torque all external fasteners to SAE specifications.
5. ☐ Inspect backing pin(s). Replace cracked, broken, or bent pins.

5.10 TUBULAR CONNECTION EQUIPMENT DE-COMMISSIONING & SHIPPING (CONTINUED):

6. ☐ Repair or replace any damaged or missing external body parts

7. ☐ Inspect all paint - locations in which the paint has been damaged must be repaired prior to the tong being returned to service. Prepare areas to be painted to ensure they are free of grease, dirt, or solvent. Touch up using a solvent-based acrylic paint - “McCoy Grey” is paint color number RAL7015, “McCoy Yellow” (hazard areas) is RAL1007, and McCoy Green is RAL6029 (contact McCoy sales for paint number for custom paint applications). Allow sufficient time for paint to dry before proceeding.

8. ☐ Perform a liberal lubrication of the equipment - refer to the Maintenance Section of this manual to determine lubrication points. Generously fill the gear train housing with grease through the opening in the rotary gear.

9. ☐ Connect the equipment to a hydraulic power unit. Ensure all quick-connect control lines are securely connected to prevent equipment damage from excessive back pressure. Do not neglect to connect the motor drain.

10. ☐ Energize hydraulic power to the tool.

11. ☐ Rotate tong for one minute, stop, and reverse the direction of rotation for another minute, ending with the opening of the rotary gear facing the gear train. De-energize the power unit, and perform another generous lubrication of the gear train, including the gear housing.

12. ☐ Energize hydraulic power to the tool. Rotate tong for one minute, stop, and reverse the direction of rotation for another minute, ending with the opening of the rotary gear facing the gear train.

13. ☐ De-energize the power unit, and perform a third generous lubrication of the gear train, including the gear housing.

14. ☐ Energize hydraulic power to the tool, and rotate the tong for a final time, one minute in one direction, stop, and reverse the direction of rotation for another minute, this time ending with the rotary gear in the “open throat” position.

15. ☐ Extend all hydraulic cylinders, and inspect cylinder rods for signs of mechanical damage, flaking, or rust. McCoy recommends that damaged cylinders be replaced prior to storage.

16. ☐ Depresurize the equipment in preparation for storage

1. Rotate the tong to the “open throat” position.
2. Exercise each hydraulic cylinder several times - open the tong and backup doors, retract and extend the reversing pins, retract and extend the float cylinders. Finish with all cylinders except for the door cylinders in their fully retracted position. The general idea is to have as little of the chrome cylinder rods exposed as possible.
3. De-energize the power unit.
4. Repeatedly actuate the tong motor control valve lever IN BOTH DIRECTIONS to dissipate any residual pressure in the valve and motor.
5. Remove the hydraulic SUPPLY line from the equipment.
6. Repeatedly actuate the remaining control valve levers IN BOTH DIRECTIONS to dissipate any residual pressure in the remainder of the hydraulic control system.
7. Connect a low-pressure air supply line (10 PSI or less) to the hydraulic supply line, and force a small amount of the remaining hydraulic fluid from the valve assembly - this will allow for thermal expansion of the hydraulic fluid if the equipment is stored or transported in high ambient temperatures. Failure to do this may result in damaged or destroyed seals in the equipment.
8. Disconnect the hydraulic RETURN line from the equipment.
9. Disconnect all remaining quick-connect hoses.
10. Disconnect all remaining connections from the equipment - for example, load cell connections, turns counter connections, dump valve connections. Ensure the tool is completely free of all connections before beginning storage preparations.

⚠ WARNING

HYDRAULIC PRESSURES AS HIGH AS OPERATING PRESSURE MAY REMAIN TRAPPED IN SMALL AREAS OF THE EQUIPMENT. ENSURE ALL MAINTENANCE IS CARRIED OUT BY A QUALIFIED SERVICE TECHNICIAN, AND THAT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT IS USED TO GUARD AGAINST PRESSURE INJURIES

5.10 TUBULAR CONNECTION EQUIPMENT DE-COMMISSIONING & SHIPPING (CONTINUED):

17. ☐ Repair or replace all leaking hydraulic fittings or hoses before proceeding.

18. ☐ Use a solvent-based cleaner on rags to wipe all external surfaces to remove all residual grease or hydraulic fluid. Once the exterior surfaces have been de-greased, wipe all external surfaces with clean water to remove residual solvent.

19. ☐ McCoy recommends that an anti-corrosive agent such as Tectyl® 506 be applied to all external surfaces EXCEPT cylinder rods (including chain slings). Refer to manufacturer data sheets for proper application and safety information. Allow the anti-corrosive coating ample time to dry - refer to manufacturer data sheets for drying times at room temperature.

⚠ CAUTION

DO NOT ALLOW ANTI-CORROSIVE AGENTS TO CONTACT CYLINDER RODS. CYLINDER ROD DAMAGE WILL OCCUR.

20. ☐ Apply grease or heavy oil to all exposed cylinder rods.

21. ☐ Allow the anti-corrosive coating ample time to dry - refer to manufacturer data sheets for drying times at room temperature.

22. ☐ Wrap entire assembly in 100 gauge (1 mil) corrosion-inhibiting wrap, at least 3 layers thick. Attempt to ensure that the tool is well-sealed within the wrapping, including the bottom.

If possible, store in a sealed, climate controlled environment. If isolated storage is not available, McCoy recommends storing your wrapped equipment in a secure, out-of-the-way location, using silica gel desiccant to reduce the humidity within the wrapping. As a guideline, use 125 g. of desiccant for each cubic meter of space, or 3.5 g. per cubic foot.

Calculation Of Required Desiccant:

1. Calculate the trapped air volume by measuring the outside dimensions of the tool to be stored, and treat that as the volume to be stored. For example, the approximate external dimensions of this tool are 102” x 92” x 67.5”, which calculates to an approximate volume of 633420 in^3, or 367 ft^3 (10.392 m^3).
2. Multiply the calculated air volume, in cubic feet, by the recommended amount of desiccant per cubic foot. Carrying forth the example used in the previous step, the required desiccant charge would be 3.5 g. x 367 ft^3, equaling 1.285 kg. Several manufacturers offer silica gel desiccant in packaged quantities of 125 grams per bag, so ten to eleven packages of desiccant would be required. Please keep in mind that this is a guideline only - more or less desiccant may be required in extreme environmental conditions.

For best corrosion resistance the equipment should be removed from storage and exercised on a regular basis, depending on the storage environment. McCoy recommends that for equipment stored in a salt-water maritime or exposed dusty environment, repeat steps 9 through 24 monthly. For equipment stored in isolated storage in a non-maritime environment, repeat steps 9 through 24 quarterly. Replace desiccant packs at this time - depleted desiccant packs may be treated as regular dunnage.

Shipping Instructions:

The following procedure lists the steps to be followed to prepare your tong for shipping.

1. If not already done remove accessories (tong jaws, load cell, torque gauge, etc.) McCoy recommends wrapping these items in protective wrap and placing in a separate wooden crate.
2. Secure the equipment onto the provided shipping stand.
3. Place the equipment on a sturdy pallet constructed of 4” x 4” cross-members and 2” x 4” flooring. Ensure the pallet is large enough to accommodate the wooden crate containing the tong accessories.

5.10 TUBULAR CONNECTION EQUIPMENT DE-COMMISSIONING & SHIPPING (CONTINUED):

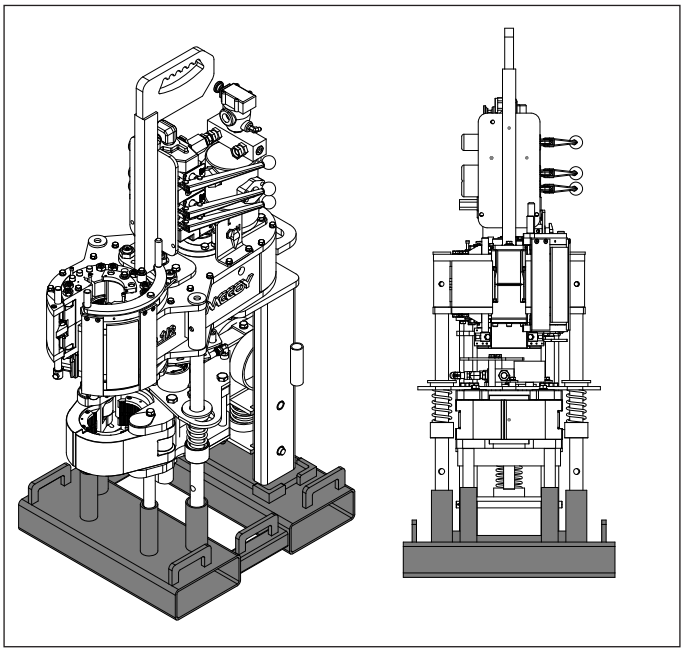


Illustration 5.10.1: Shipping Instructions - Shipping Stand

4. Securely strap the equipment in place using metal strapping. Place strapping as close to the cross-members under the equipment legs as possible, and use caution not to entrap any flexible hydraulic hoses beneath the strapping (guide strapping through beneath the hydraulic hoses). Use the following guidelines to determine the strapping requirements:

   Assemblies weighing 1000 lbs. (454 kg.) or less:

   3/4” x 0.029” metal strapping, 3320 lbs. (1509 kg.) tensile strength
   Minimum two straps

   Assemblies weighing more than 1000 lbs. (454 kg.) or less:

   1-1/4” x 0.031” metal strapping, 5500 lbs. (2500 kg.) tensile strength
   Minimum two straps for assemblies weighing less than 5000 lbs. (2273 kg.)
   Minimum three straps for assemblies weighing more than 5000 lbs. (2273 kg.)

   Before tightening strapping, place strapping protectors wherever the metal strapping comes into contact with the equipment.

   Place the wooden crate containing the tong accessories on the crate next to the equipment. Strap the crate to the pallet using 3/4” x 0.029” metal strapping. If it is not practical to place larger loose items in a wooden crate, ensure they are also securely strapped to the pallet using 3/4” x 0.029” metal strapping.

5. Use a large polyethylene shipping bag (sometimes called a pallet cover) to completely enclose the equipment. Seal polyethylene bag to the pallet using 1 mil polyethylene wrap. Use the wrap to conform the plastic cover to the general shape of the equipment, but do not wrap so tight that sharp edges on the equipment perforate the cover.
6. McCoy recommends enclosing the equipment in a sturdy shipping crate which is securely fastened to the pallet.

5.11 TUBULAR CONNECTION EQUIPMENT RE-COMMISSIONING PROCEDURE

Perform the following recommissioning procedures when removing tubular connection equipment from short or long-term storage back into regular service. These procedures are essential for ensuring proper equipment preparation and operation. The following procedures also assume that the decommissioning and storage procedures recommended by McCoy have been strictly observed.

1. ☐ Remove all protective plastic wrapping. Exhausted desiccant packs within the wrapping may be disposed of with the regular garbage. Remove all remaining shipping and/or storage material including straps, blocks, plugs, wire-ties, etc. Ensure the backup floats freely on its suspension chains.
2. ☐ Wipe excess grease or heavy oil from exposed cylinder rods.
3. ☐ Perform a visual inspection of all lifting points - visibly damaged components (cracks, broken lugs, distorted metal, etc.)must be replaced or repaired before placing tong in service. Inspect all chains, master links, and turnbuckles. Damaged components must be replaced before placing the tong in service. If your company requires yearly certification of lifting equipment, ensure that the most recent test date falls within the past year. Perform recertification if necessary.
4. ☐ Perform a liberal lubrication of the equipment - refer to lubrication diagrams on page 5.6. Generously fill the gear train housing with grease through the opening in the rotary gear.
5. ☐ Connect the equipment to a hydraulic power unit. Ensure all lines are fully made up to prevent equipment damage from excessive back pressure. Do not neglect to connect the motor drain.

⚠ WARNING

FAILURE TO ENSURE THAT THE SELF-SEALING SUPPLY AND RETURN LINES ARE FULLY MADE UP MAY RESULT IN CATASTROPHIC EQUIPMENT FAILURE.

6. ☐ Energize hydraulic power to the tool. Ensure that supply pressure is at or above the tong's specified operating pressure, and that the return pressure is less than 350 psi.
7. ☐ Perform a thorough inspection of pressurized hydraulic lines and fittings. Leaking hydraulic fluid lines or fittings must be replaced before returning the equipment to service.
8. ☐ Perform a thorough inspection of all seals. Any seal that is leaking or "weeping" must be replaced before returning the equipment to service.
9. ☐ Rotate tong at low speed for 5 minutes while monitoring pressurized seals and hydraulic lines. If a seal, line, or fitting begins to leak while tong is rotating, it must be replaced before returning the equipment to service. Finish this step with the rotary gear opening facing the gear train. De-energize the power unit.
10. ☐ Inspect all flexible hydraulic lines for signs of wear, blistering, or any other signs of potential failure - replace if signs of potential failure are identified.
11. ☐ Inspect the gear train housing. If the amount of grease is inadequate, liberally grease the gear train through the access panel, and through the opening in the rotary gear.
12. ☐ Inspect the brake band lining. Replace if necessary. Unequal wear of the brake band indicates that the brake band tension is not evenly adjusted. Refer to "Illustration 5.6.1: Brake Band Adjustment" on page 5.7 for instructions on properly adjusting brake bands. Ensure that all grease is wiped from brake band linings and the parts of the cage plate that come into contact with the brake band linings are free from debris.
13. ☐ Install a set of pre-inspected jaws that are the correct size for the pipe or casing being run.
14. ☐ Install load cell. Perform a visual inspection and replace any cracked, broken, or distorted components including links and chains.
15. ☐ Inspect the load cell anchor pins. Replace the anchor pins if cracking or metal distortion is seen.
16. ☐ Re-energize hydraulic power to the tool.

Continued on next page...

5.11 TUBULAR CONNECTION EQUIPMENT RE-COMMISSIONING PROCEDURE (CONTINUED):

17. ☐ Perform a full functional test of the equipment including, if applicable, backup components and float frame components. Report and correct any hydraulic leaks from the hydraulic valve bank, or from any hydraulic cylinders that are used.

18. ☐ While rotating the cage plate, ensure that the jaws properly cam. If the jaws do not cam properly, the brake bands require tightening. See page 5.7 for instructions for adjusting the brake bands.

19. ☐ When all of the previous steps are completed, the re-commissioned equipment may be returned to service.

SECTION 6: TROUBLESHOOTING

This page intentionally
left blank

Adequate maintenance and proper fluid selection is essential for minimizing hydraulic-related failures. All troubleshooting must be performed by a technician trained in hydraulic systems, and familiar with the equipment design, assembly and operation.

The following troubleshooting instructions are intended to be guidelines only. Any faults not solved through the use of this guide should be referred to our engineering department for their evaluation and recommendations.

6.0 TONG WILL NOT DEVELOP SUFFICIENT TORQUE

	POSSIBLE PROBLEM	SOLUTION(S)
1	Malfunctioning relief valve on tong hydraulic circuit	Troubleshoot relief valve as per subsection 6.1 or OEM instructions.
2	Directional valve is leaking	Check directional valve. Neutral position should return fluid directly to the reservoir. Replace or repair valve to ensure correct operation
3	Power unit is not producing adequate pressure	Troubleshoot power unit (see user's manual for your particular unit)
4	Poor hydraulic pressure at the tong despite adequate pressure at the power unit, or excessive back pressure in the return line.	Restrictions exist in line between power unit and tong. Inspect integrity of self-sealing couplings to ensure they are allowing full fluid flow. Check to ensure no other restrictions exist (contaminated catch screens or filters, for example)
5	Fluid viscosity is not appropriate (too high or too low)	Ensure hydraulic fluid being used is the viscosity recommended by McCoy Global. Power unit pump may not prime if fluid is too heavy, and the hydraulic system will overheat if fluid is too light. Replace with proper viscosity fluid
		Hydraulic fluid viscosity is affected by environmental conditions. Ensure the fluid being used is suitable for high or low temperatures. Replace with proper viscosity fluid for the operating conditions if necessary
6	Worn or damaged tong motor causing slippage	Replace or repair worn or damaged motor
7	Damaged bearings or gears causing excessive drag	Replace or repair worn or damaged gears or bearings
8	Jaws slipping on pipe	Ensure jaw dies are not worn to the point that they cannot grip. Ensure the correct sized jaws are in use
9	Torque gauge is indicating incorrectly	Incorrect gauge is being used. Ensure gauge is the proper range, and has been properly calibrated for the arm length of the equipment in use
		Gauge has been damaged. Check gauge operation and calibration on independent system
		Gauge has mistakenly been married to an incorrect load cell
10	Load cell is measuring incorrectly	Incorrect load cell is being used
		Air is trapped in torque measuring circuit (load cell, hydraulic line, or gauge). Refer to torque measurement troubleshooting in Section 8.1 of this manual
		Load cell has been damaged. Replace load cell, or return to McCoy for repair and re-calibration

NOTICE

MCCOY GLOBAL GUARANTEES CALIBRATION OF A LOAD CELL/TORQUE GAUGE ASSEMBLY FOR A PERIOD OF ONE YEAR. MCCOY SUGGESTS THAT THE LOAD CELL/TORQUE GAUGE ASSEMBLY BE RETURNED TO THE FACTORY FOR RE-CALIBRATION ON A YEARLY BASIS.

	POSSIBLE PROBLEM	SOLUTION(S)
11	Incorrect motor speed selected (applies to 2-speed motors only)	Maximum torque can only be developed when LOW motor speed (maximum hydraulic displacement) is selected.
12	Incorrect tong gear selected	Maximum torque can only be developed when LOW motor gear is selected

6.1 TONG RUNNING TOO SLOWLY

	POSSIBLE PROBLEM	SOLUTION(S)
1	Obstruction in tong hydraulic circuit preventing adequate flow	Inspect self-sealing couplings to ensure they are properly engaged
		The main hydraulic lines (supply and discharge) to the tong are obstructed. Remove and clean if required
2	Power unit is not producing adequate flow or pressure	Troubleshoot power unit (see user's manual for your particular unit)
3	Tong motor is excessively worn and is leaking hydraulic fluid past the vanes	Replace motor or rebuild as per OEM instructions
4	Bearings in gear train and rotary section are excessively worn	Overhaul tong. See Section 5.8 of this manual for instructions for exposing the gear box and support roller assemblies.
5	Shifter has malfunctioned and the tong is not shifting to high gear	Inspect and repair shift mechanism as necessary
6	Hydraulic fluid viscosity too high	Ensure hydraulic fluid meets McCoy specifications
		Ensure hydraulic fluid is appropriate for climatic conditions, especially during cold-weather operation
7	Bypass valve not functioning	Check and repair

6.2 FAILURE OF JAWS TO GRIP PIPE

	POSSIBLE PROBLEM	SOLUTION(S)
1	Dies have become too dull to provide adequate grip	Replace dies
2	Incorrect jaws are being used	Double-check jaw size to ensure they are rated for the diameter of pipe or casing being run
3	Incorrect dies are being used	Ensure dies loaded in the jaws are appropriate for the type of pipe or casing being run
4	Brake band(s) is (are) insufficiently adjusted, not allowing jaws to cam properly	Adjust brake bands to give proper resistance to cage plates
5	Jaw roller broken or worn	Remove jaw assembly and inspect. Replace rollers that are visibly "flat-spotted" or otherwise damaged

6.3 FAILURE OR DIFFICULTY OF TONG TO SHIFT

	POSSIBLE PROBLEM	SOLUTION(S)
1	Bent or broken shifter yoke	Inspect components through inspection door. Replace shifter yoke if necessary.
2	Bent or broken shifter shaft	Replace shifting shaft.
3	Locking nuts on shifting shaft have loosened and position of yoke has changed	Reposition yoke and re-tighten locking set screws.
4	Shifting yoke has come loose from shifting shaft	Inspect yoke and inspect for damage. If free of damage, replace on shaft and tighten locking nuts
5	Shifting mechanism requires adjustment	Adjust shifting mechanism - see Section 5.6.4

6.4 GENERAL COMMENTS

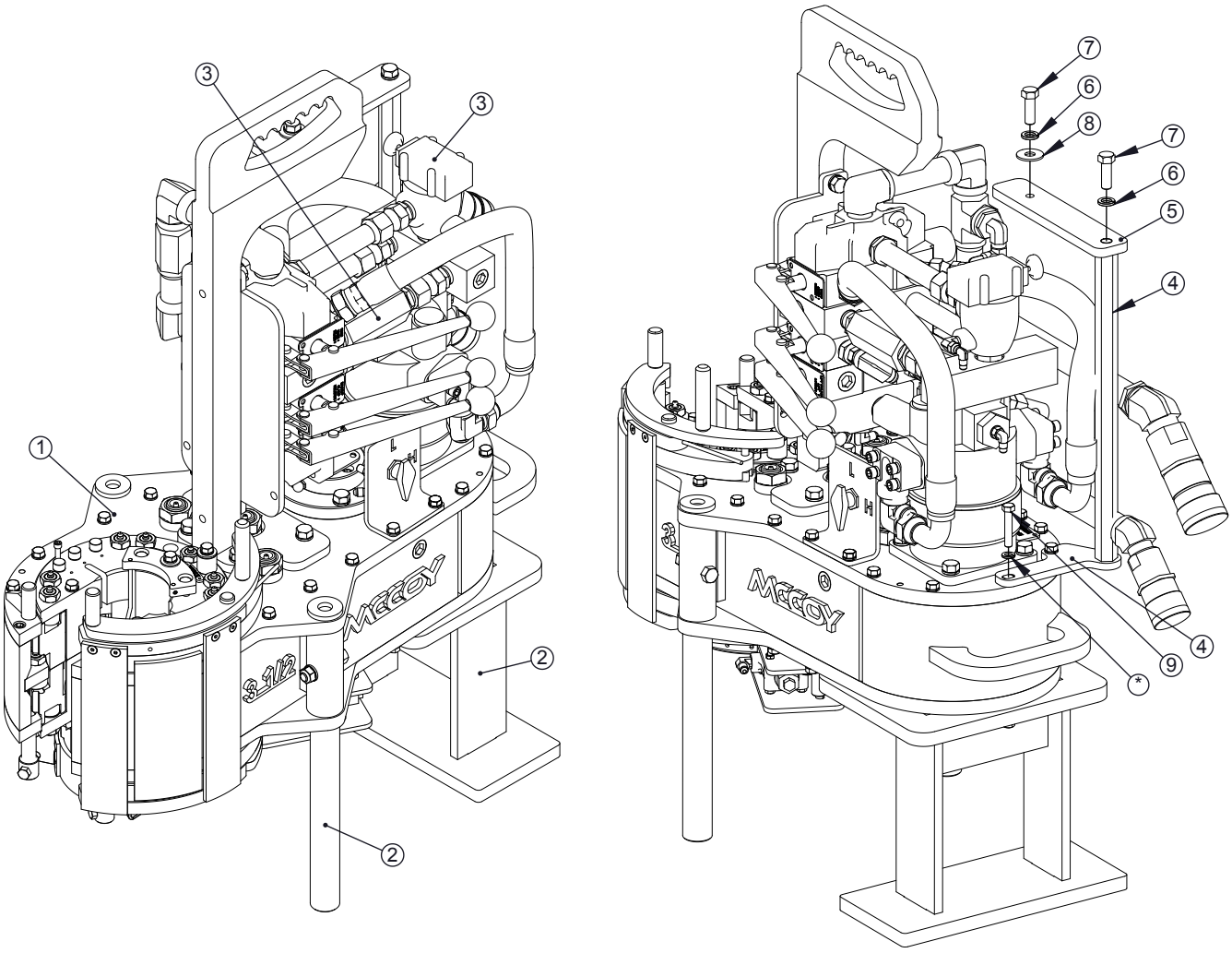
The following factors generally contribute to poor hydraulic operation and premature wear of equipment:

1. Contaminated hydraulic fluid due to overuse, overheating, or inadequate fluid filtration.
2. Unsuitable hydraulic fluid, especially in extreme climatic conditions.
3. Defective packing or seals in components of the hydraulic system.
4. Poor or incomplete hydraulic system training. Users must be fully qualified to operate the equipment, and have complete understanding of the hydraulic system.

If your hydraulic troubleshooting procedures involve flow and pressure tests at the power unit, McCoy Global recommends construction of a test rig that can easily be connected to the main suction and discharge ports of the power unit.

SECTION 7: PARTS & ASSEMBLIES

This page intentionally
left blank



NOTES:
1. TONG MUST BE SECURED TO SHIPPING STAND SS3500-01 AT ALL TIMES WHILE NOT IN USE

ITEM	QTY	P/N	DESCRIPTION
1	1	CLE3500	ASSEMBLY, TONG, 3 1/2-6K5
2	1	MK3500-04	ASSEMBLY, MOUNTING KIT
3	1	VP3500-320A	ASSEMBLY, VALVE PACKAGE, VA20
4	1	1002981	WELDMENT, MOUNT, GAUGE
5	1	55151-S1	PLATE, MOUNT, GAUGE
6	2	1103	WASHER, LOCK, 1/2
7	2	1112	SCREW, CAP, HEX HEAD, 1/2-13 X 1 1/2, GR8
8	1	1102	WASHER, FLAT, 1/2, STEEL, GR08
9	2	1050	SCREW, CAP, HEX HEAD, 3/4-10 X 7 1/2, GR8

Illustration 7.1: 80-350-650-000-000-30-00 Tong & Mounting Kit Assembly

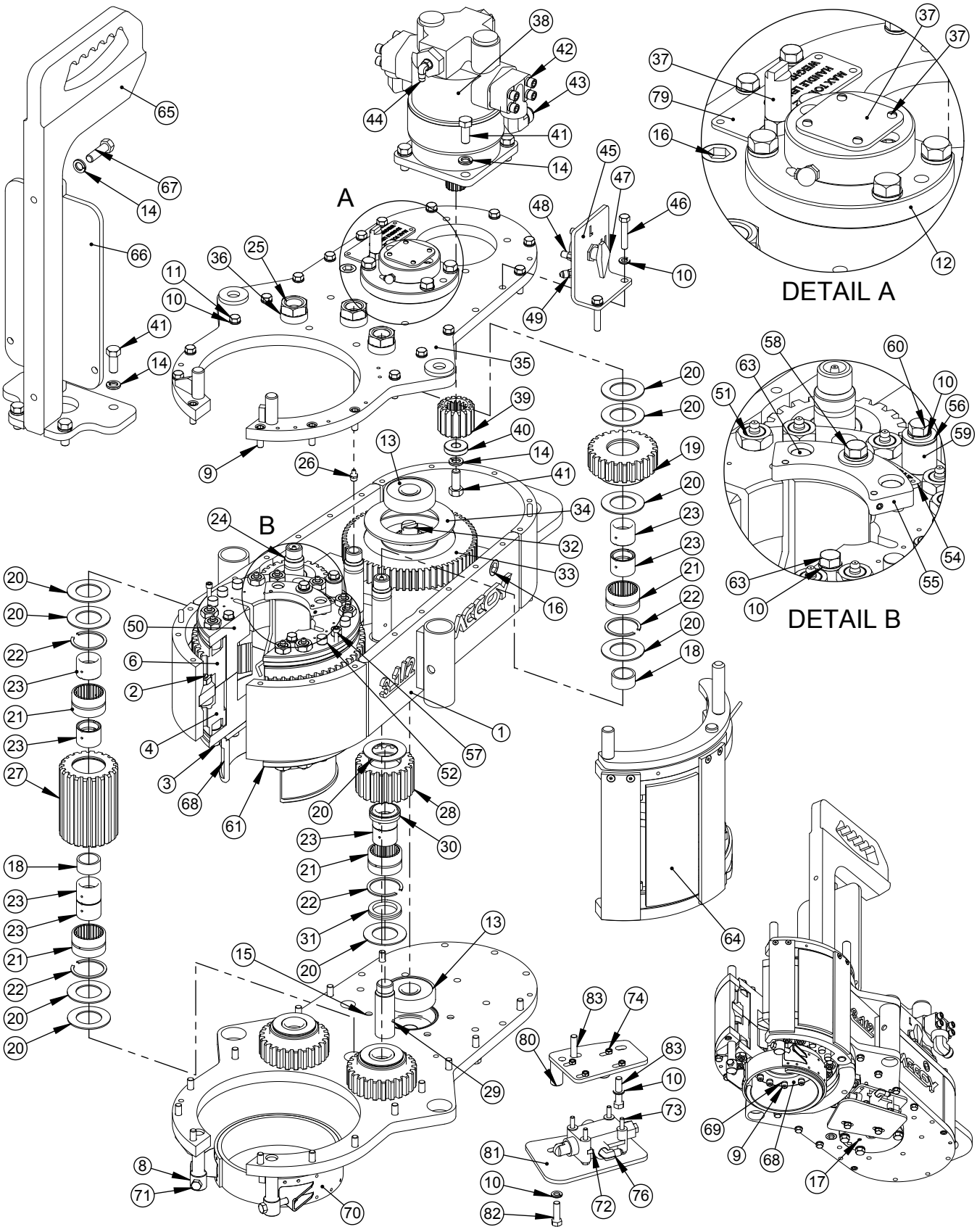
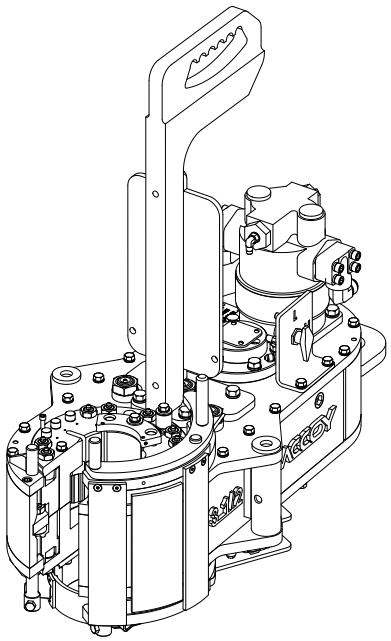


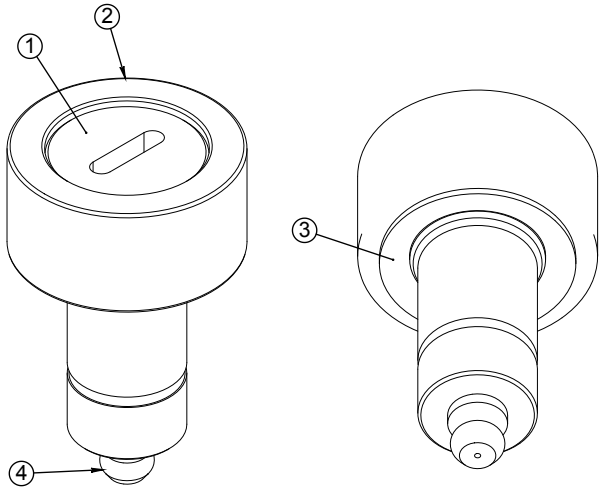
Illustration 7.2: CLE3500 Tong Assembly



ITEM	QTY.	PART NUMBER	DESCRIPTION
1	1	35203-02	WELDMENT, MID BODY
2	19	SSCF1250	ASSEMBLY, CAM FOLLOWER
3	38	1285	NUT, NYLOCK, 5/8-18
4	1	35211	GEAR, RING, BOTTOM
5	8	1023-M	DOWEL PIN, 3/8" X 1
6	1	35210	GEAR, RING, TOP
7	8	240	SCREW, SOCKET HEAD, 3/8-16 X 2 1/2
8	1	35201	WELDMENT, PLATE, BOTTOM, TONG
9	19	1041	SCREW, SOCKET HEAD CAP, 3/8 - 16, 1 1/4, STEEL,GR08
10	39	1027	WASHER, LOCK, 3/8, STEEL, GR8
11	25	1049	SCREW, HEX, 3/8 - 16, 1 1/2, GR08
12	2	35223	CAP, BEARING
13	2	1961	BEARING
14	19	1103	WASHER, LOCK, 1/2
15	8	1112	SCREW, HEX, 1/2-13, 1 1/2
16	4	1610	FITTING, 3/4 MNPT, PLUG
17	2	1029	SCREW, SET, 3/8 - 16, 1/2, STEEL, GR08
18	3	35276	SPACER, IDLER, OUTER
19	4	35207	GEAR, IDLER
20	22	35251	BUSHING, IDLER, OUTER
21	7	MR-24	BEARING, CAGEROL
22	7	RRN-206	RING, SPIROLOX, 2 1/16
23	14	35277	RACE, INNER
24	3	35208	SHAFT, IDLER
25	7	1323	NUT, NYLOCK, 1-14, GR8
26	7	1001	FITTING, GREASE, 1/8 NPT
27	1	35218	GEAR, IDLER, MID, LONG
28	1	35205	GEAR, IDLER, MIDDLE
29	1	35222	SHAFT, IDLER, SHORT
30	1	35291	SEAL, TOP, BEARING
31	1	35292	SEAL, BOTTOM, BEARING
32	1	35221	GEAR, PINION
33	1	35220	GEAR, PINION
34	1	55047-1	PLATE, BUSHING
35	1	35202	WELDMENT, PLATE, TOP, TONG
36	3	35248-S5	RING
37	1	35072	ASSEMBLY, ADAPTER, ENCODER
38	1	15-65-015-31	MOTOR, 13 CU. IN.
39	1	51109	GEAR, MOTOR
40	1	51110	RETAINER, MOTOR
41	9	1111	SCREW, HEX, 1/2-13, 1 1/4, STEEL, GR8, ZINC
42	2	45080	FITTING, 1 1/4 CD 61, 3/4 FNPT, ELBOW

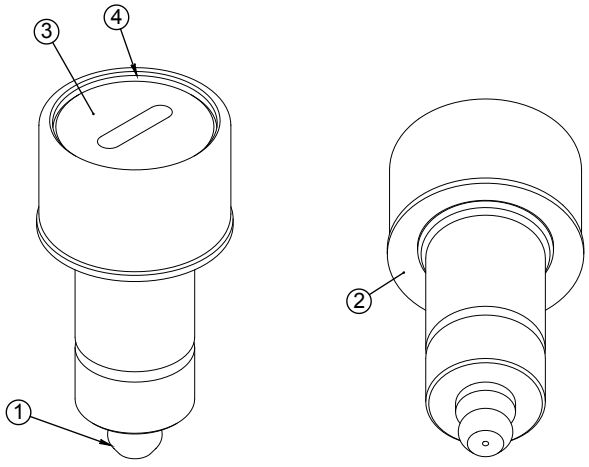
ITEM	QTY.	PART NUMBER	DESCRIPTION
43	2	1590	FITTING, 3/4MJIC X 3/4MNPT, ELBOW
44	2	1486-A	FITTING, O-RING, 1/4 x 1/4 MJIC, 90
45	1	35269	BRACKET, SHIFT, H/L
46	3	1050	SCREW, CAP, HEX HEAD, 3/4-10 X 7 1/2, GR8
47	1	73028	VALVE, 4 WAY BALL, 1/8 FNPT
48	4	1588-L	FITTING, 1/8 MNPT, 1/4 MJIC, ELBOW
49	1	1500	FITTING, 1/4 FJIC X 1/4 MJIC, 45
50	1	35212	PLATE, CAGE, TOP
51	19	SSCF1000-01	ASSEMBLY, CAM FOLLOWER
52	12	35098	CAM FOLLOWER
53	1	CE-MAKE-TAG-2	PLATE, TAG, MAKE
54	1	CE-BREAK-TAG-2	PLATE, TAG, BREAK
55	1	35280	ASSEMBLY, SPRING, JAW
56	2	1025	WASHER, FLAT, 3/8, STEEL, GR 8
57	2	217	SCREW, SOCKET HEAD, 1/4-20 X 1 1/4
58	1	1053	SCREW, CAP, HEX HEAD, 3/8-16 X 5 1/2, GR8
59	1	35241	PIN, REVERSING
60	1	1046	SCREW, HEX, 3/8 - 16, 3/4, STEEL, GR8
61	1	35214	PLATE, CAGE, BOTTOM
62	1	SSCF1000-02	ASSEMBLY, CAM FOLLOWER, LOCKING PIN
63	4	1076	SCREW, HEX HEAD, 3/8-16 X 4 3/4
64	1	35240	ASSEMBLY, DOOR
65	1	35248-02	WELDMENT, HANDLE, LIFTING
66	1	35248-S3	PLATE, MOUNT, VALVE
67	2	171	SCREW, HEX, 1/2-13, 1 3/4, STEEL, GR8, ZINC
68	1	35213	WELDMENT, BRAKE HUB
69	9	1026	WASHER, LOCK, HIGH COLLAR, 3/8, STEEL, GR08
70	1	35257	WELDMENT, BRAKE BAND
71	2	1055	SCREW, HEX, 3/8-16 X 2 1/4, GR8
72	1	SLV1000-04	SWITCH, DOOR, NORMALLY CLOSED
73	4	110	SCREW, HEX, 1/4 - 20, 2 1/4, STEEL, GR08
74	4	212	NUT, NYLOCK, 1/4 - 20
75	2	35201-S3	TUBE
76	1	1576	FITTING, 1/4 MNPT, 1/4 MJIC, ELBOW
77	1	1653	FITTING, 1/4 FNPT, 1/4 MJIC, ELBOW
78	1	1456	FITTING, 1/4 MNPT, 1/4 MNPT, STRAIGHT
79	1	CE-SPEC-TAG-2	PLATE, TAG, SPECIFICATION
80	1	35209	WELDMENT, MOUNT, DOOR SWITCH
81	1	35206	PLATE, COVER, DOOR SWITCH
82	2	1048	SCREW, HEX, 3/8 - 16, 1 1/4, STEEL, GR8
83	2	141	SCREW, HEX HEAD, 3/8-16, 1 3/4, GR8

Illustration 7.3: CLE3500 Tong Assembly BOM



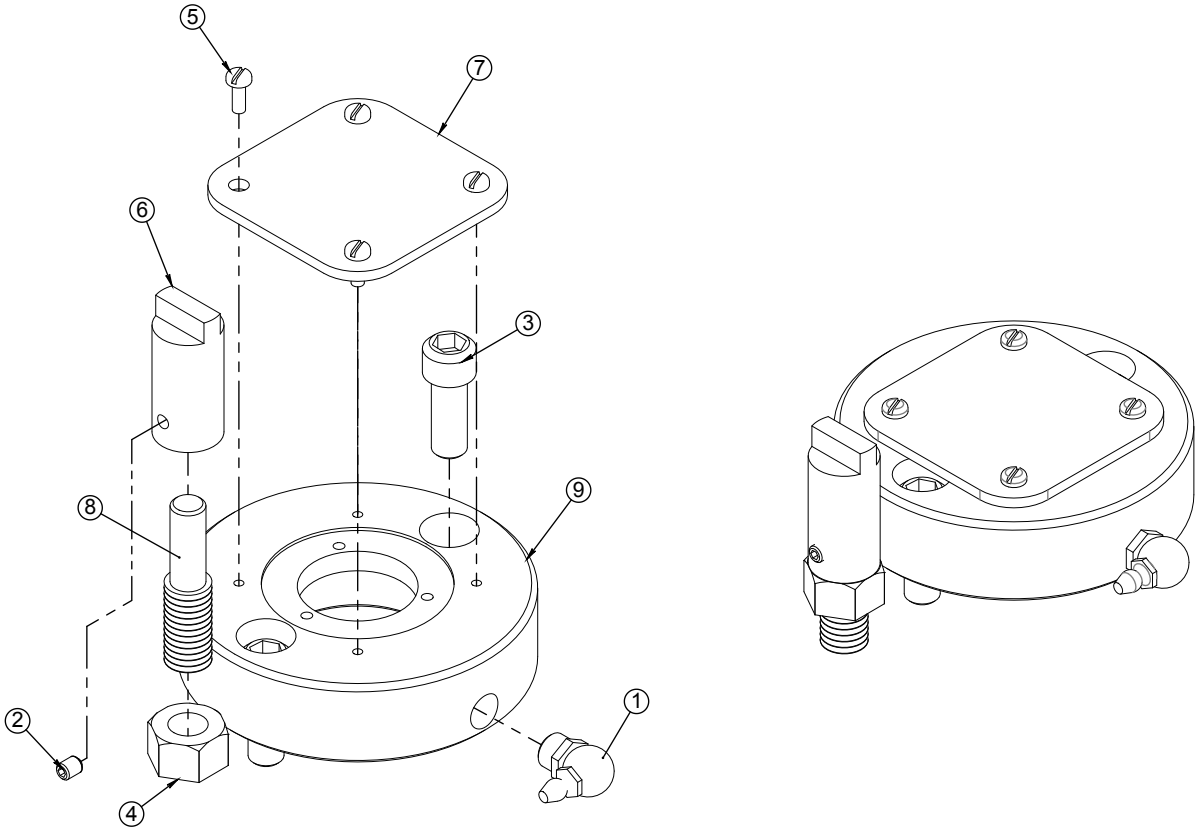
ITEM	QTY.	PART NUMBER	DESCRIPTION
1	1	SSCF1001-01	STUD, CAM FOLLOWER
2	1	SSCF12502	RACE, CAM FOLLOWER
3	1	SSCF1003	BUSHING, DU, FLANGED, 1812DU
4	1	1004	GREASE ZERT, 3/16" DRIVE

Illustration 7.4: SSCF1250 Cam Follower Assembly



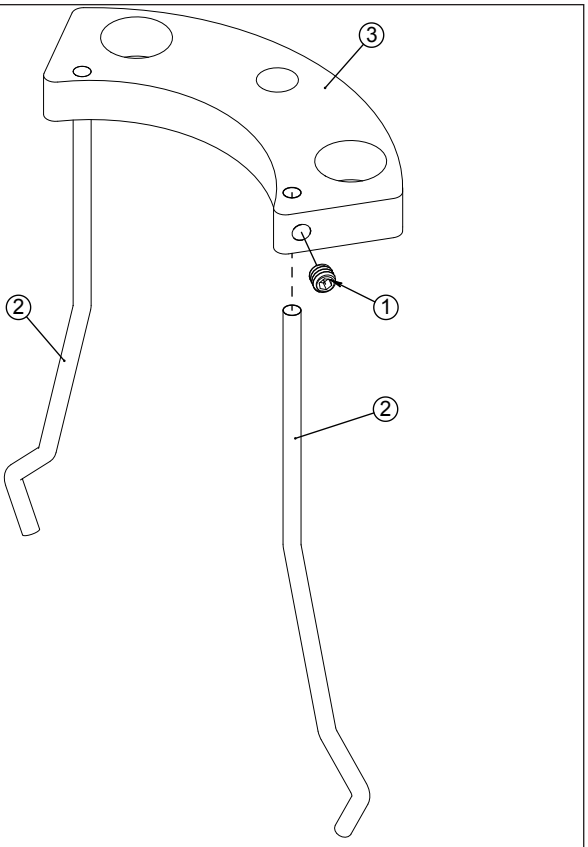
ITEM	QTY.	PART NUMBER	DESCRIPTION
1	1	1004	GREASE ZERT, 3/16" DRIVE
2	1	SSCF1003	BUSHING, DU, FLANGED, 1812DU
3	1	SSCF1001-01	STUD, CAM FOLLOWER
4	1	SSCF1002	RACE, CAM FOLLOWER

Illustration 7.6: SSCF1000-01 Cam Follower Assembly



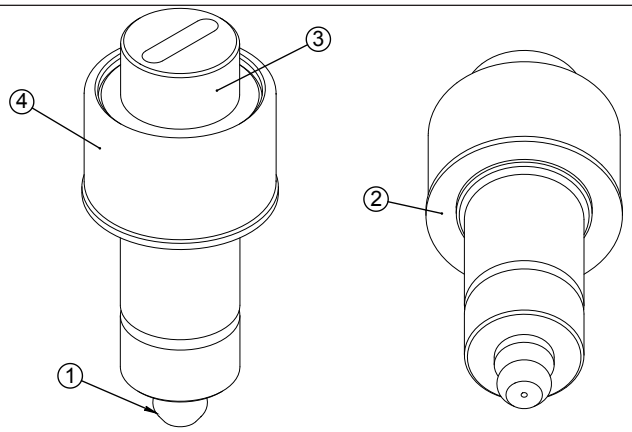
ITEM	QTY.	PART NUMBER	DESCRIPTION
1	1	1002	FITTING, ZERT, 1/8 MNPT, ELBOW
2	1	1034	SCREW, SET, #10-32, 1/4, STEEL, ZINC
3	2	1041	SCREW, SOCKET HEAD CAP, 3/8 - 16, 1 1/4, STEEL,GR08
4	1	1101	NUT, HEX HEAD, 1/2-13
5	4	1276	SCREW, MACHINE, 6-32 X 3/8
6	1	35271	COUPLING, MALE, ENCODER
7	1	40034	PLATE, COVER
8	1	51031	MOUNT, COUPLING, ENCODER
9	1	51075-01	PLATE, MOUNT,ENCODER

Illustration 7.7: 35072 Encoder Adapter Assembly



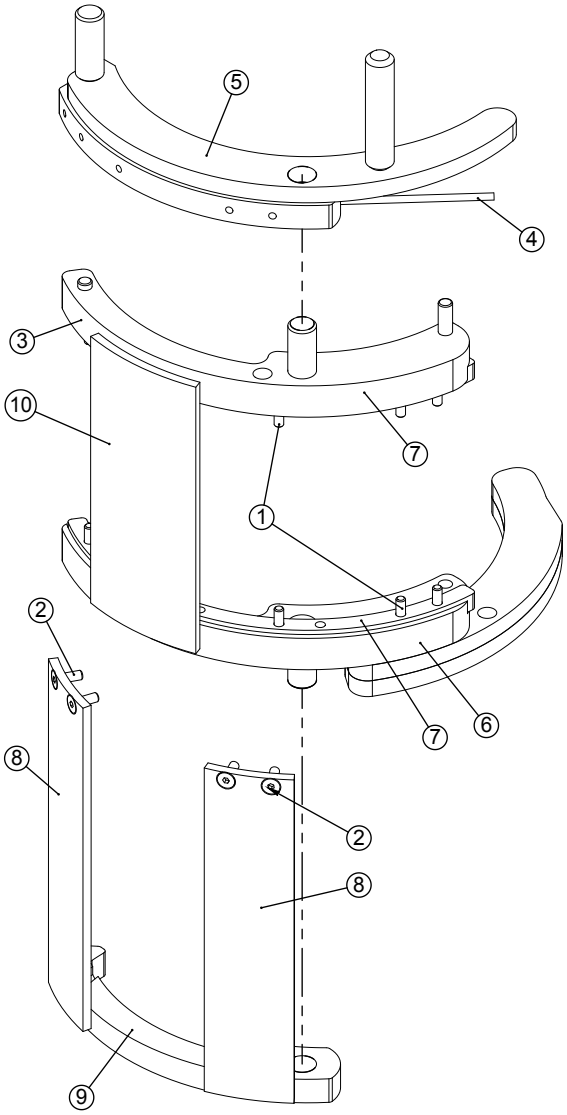
ITEM	QTY.	PART NUMBER	DESCRIPTION
1	2	1008-B	SCREW, SET, 1/4 - 20 X 1/4
2	2	35281	SPRING, JAW
3	1	35279	CLIP, SPRING, JAW

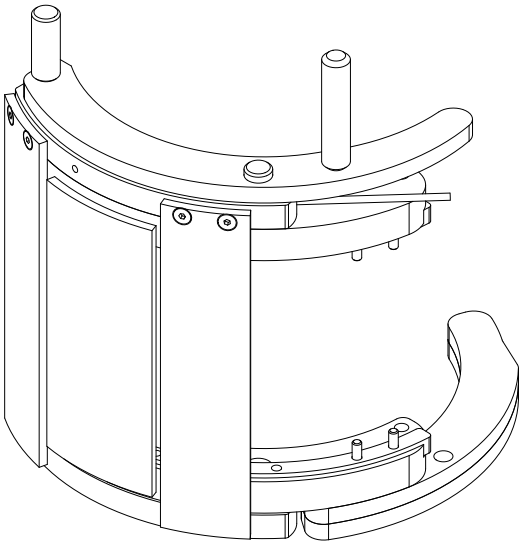
Illustration 7.8: 35280 Jaw Spring Assembly



ITEM	QTY.	PART NUMBER	DESCRIPTION
1	1	1004	GREASE ZERT, 3/16" DRIVE
2	1	SSCF1003	BUSHING, DU, FLANGED, 1812DU
3	1	SSCF1001-02	STUD, CAM FOLLOWER
4	1	SSCF1002	RACE, CAM FOLLOWER

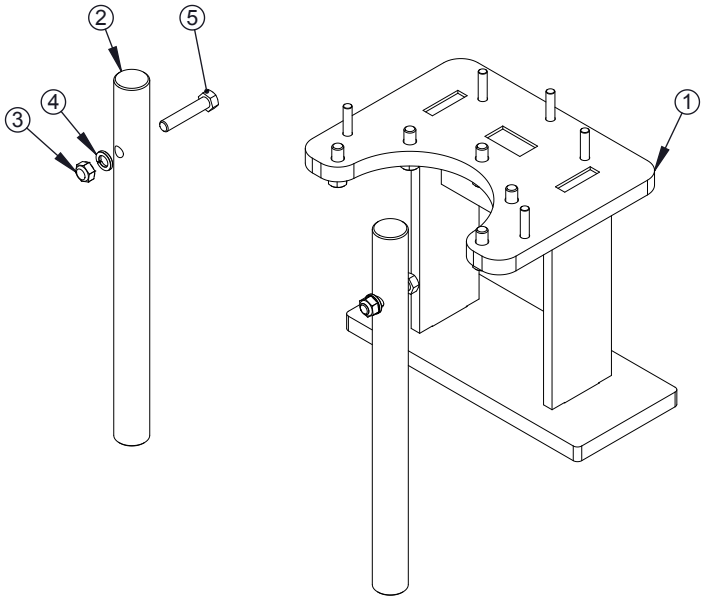
Illustration 7.9: SSCF1000-02 Cam Follower Pocking Pin Assembly





ITEM	QTY.	PART NUMBER	DESCRIPTION
1	12	215	SCREW, SOCKET HEAD, 1/4-20 X 3/4
2	4	1324	SCREW, COUNTERSUNK, 1/4-20 X 3/4
3	1	35235	WELDMENT, DOOR GUIDE, TOP
4	1	35237	SPRING, DOOR
5	1	35238	WELDMENT, DOOR LATCH, TOP
6	1	35250	WELDMENT, GUIDE, BOTTOM, DOOR
7	2	35264	RAIL, BOTTOM, DOOR
8	2	35266	PLATE, COVER, DOOR
9	1	35267	LATCH, BOTTOM, DOOR
10	1	35268	PLATE, COVER, DOOR

Illustration 7.10: 35240 Door Assembly



ITEM	QTY.	PART NUMBER	DESCRIPTION
1	1	1002900	ASSEMBLY, HANGER, REAR
2	2	1002903	LEG, FRONT
3	2	1087	NUT, NYLOCK, 1/2-13
4	2	1103	WASHER, LOCK, 1/2
5	2	1113	SCREW, HEX, 1/2-13, 2 1/2, STEEL, GR8

Illustration 7.11: MK3500-04 Mounting Kit Assembly

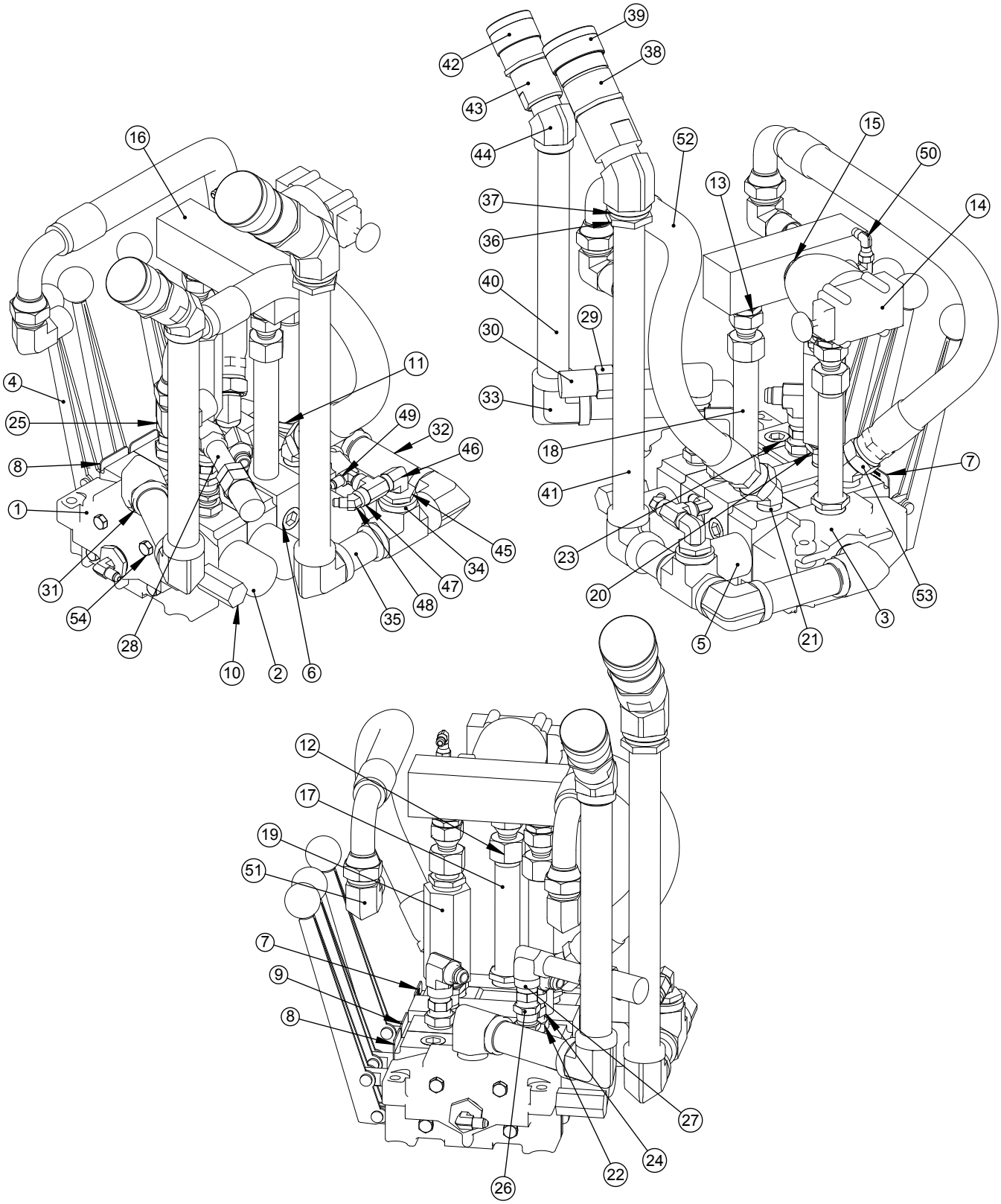
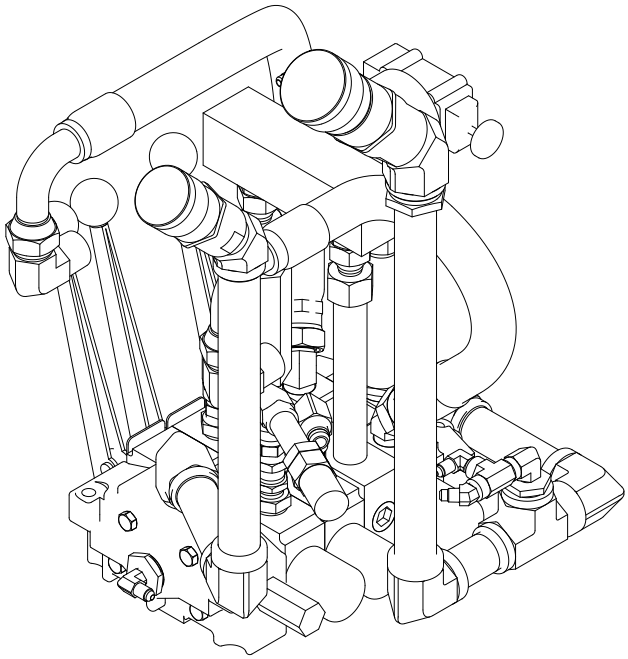


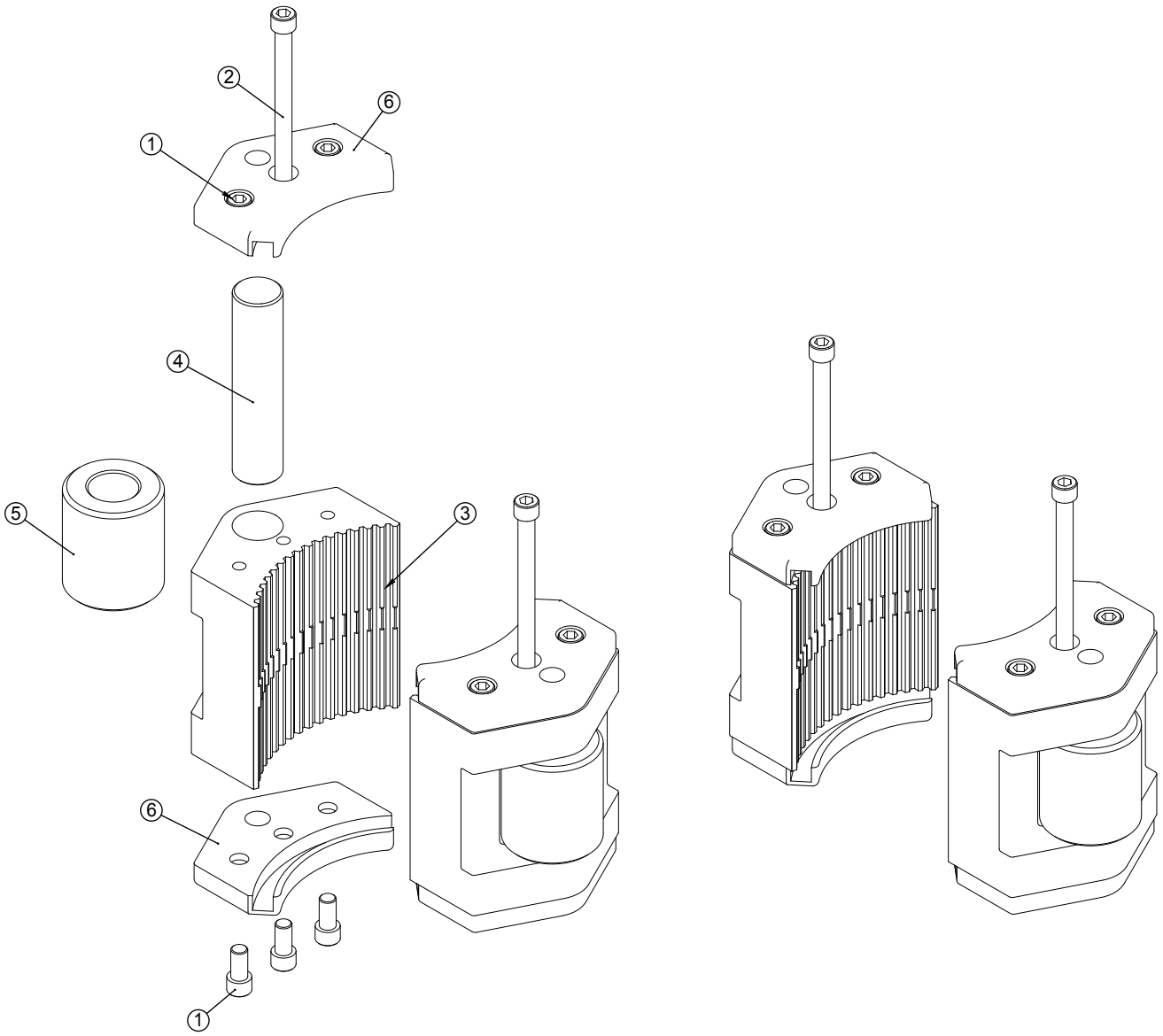
Illustration 7.12: VP3500-320A Valve Package Assembly



ITEM	QTY.	PART NUMBER	DESCRIPTION
1	1	VA20-AA440	VALVE, INLET SECTION
2	2	VA20-DA3	VALVE, WORK SECTION, DA3
3	1	VA20-TR44	VALVE, OUTLET SECTION
4	3	A20-V1526K-8	HANDLE, VALVE, A20, 8 IN
5	1	VA20-MA3	VALVE, MOTOR SECTION, MA3
6	1	VA20-MOD	ASEMBLY, DOOR SECTION, VA-20
7	1	VA20-TAG-1	TAG, TONG, MAKE/BRAKE
8	1	VA20-TAG-2	TAG, LIFT CYLINDER, LIFT/LOWER
9	1	VA20-TAG-3	TAG, BACKUP, CLAMP/RELEASE
10	1	VA20-MRV-1	VALVE, CARTRIDGE, RELIEF
11	1	1492	FITTING, REDUCER BUSHING, 1 X 3/4
12	3	12G6X	FITTING, SWIVEL, 3/4 FNPT X 3/4 FJIC, STRAIGHT
13	3	1467	ADAPTER, 3/4MNPT X 3/4MJIC, STRAIGHT
14	1	58058	VALVE, RELIEF (DUMP), 3/4
15	1	1461-A	FITTING, 3/4 MNPT, 3/4 MNPT, STRAIGHT, MODIFIED
16	1	35272	MANIFOLD, VALVE
17	1	1410	FITTING, 3/4 MNPT, 3/4 MNPT, 6, STRAIGHT, SCH80
18	1	1404-B	FITTING, 3/4 MNPT, 3/4 MNPT, 7.5, STRAIGHT, SCH80
19	1	58099	VALVE, CHECK, 1 NPT
20	2	1679	NIPPLE, HEX, 1 X 3/4
21	2	1617-A	FITTING, 3/4MNPT, 3/4MJIC, 45
22	3	1495	BUSHING, REDUCER, 3/4 X 1/2
23	2	1610	FITTING, 3/4 MNPT, PLUG
24	3	1460	FITTING, NIPPLE, HEX, 1/2 MNPT, 1/2 MNPT
25	2	1625	FITTING, 1/2 FNPT, 1/2 MJIC, ELBOW
26	1	1597	ADAPTER, SWIVEL, STRAIGHT, 1/2MNPT, 1/2FNPT
27	1	1459	FITTING, 1/2FNPT, 1/2FNPT, ELBOW

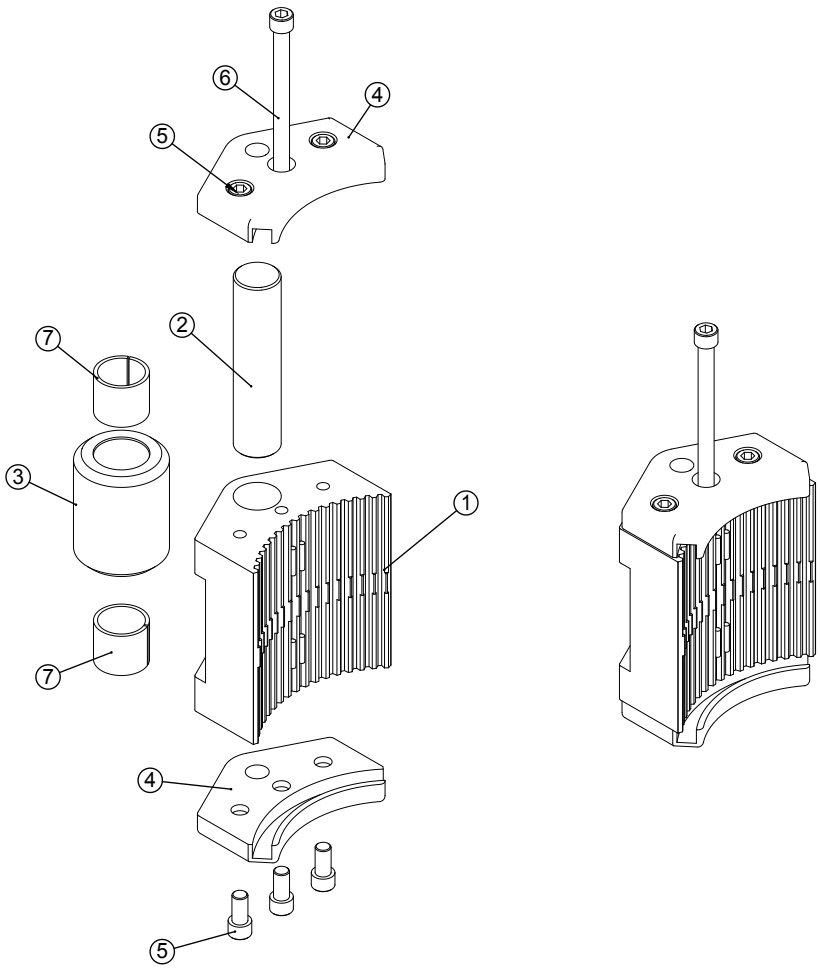
ITEM	QTY.	PART NUMBER	DESCRIPTION
28	1	1400-A	NIPPLE, 1/2X3, SCH.80
29	1	1431	FITTING, 1/2 MALE, QUICK DISCONNECT
30	1	1431-C	CAP, QUICK DISCONNECT, 1/2
31	2	1453-A	FITTING, 1MNPT, 1FNPT, ELBOW
32	2	1426	NIPPLE, 1/5, SCH.80
33	3	1591	FITTING, 1 FNPT, 1 FNPT, ELBOW
34	1	1616	FITTING, 1 FNPT, 1 MNPT, 1 FNPT, TEE
35	1	1418	NIPPLE, 1/3, SCH.80
36	1	1499	FITTING, REDUCER BUSHING, 1 1/4 X 1
37	1	1655	FITTING, 1 1/4 FNPT, 1 1/4 MNPT, 45
38	1	1446	FITTING, QD, 1 1/4 M
39	1	1443	CAP, QUICK DISCONNECT, 1 1/4
40	1	1422	NIPPLE, 1/12, SCH.80
41	1	PN16-15000	FITTING, 1 MNPT, 1 MNPT, 15, STRAIGHT, SCH 80
42	1	1442	CAP, QUICK DISCONNECT, 1
43	1	1441	FITTING, 1 MALE, QUICK DISCONNECT
44	1	1604	FITTING, 1 MNPT, 1 FNPT, 45
45	2	1454	FITTING, 1 MNPT, 1/4 FNPT, STRAIGHT
46	1	1449	FITTING, 1/4 FNPT,1/4 MNPT, ELBOW
47	1	1594	FITTING, 1/4, TEE
48	1	1474	FITTING, 1/4 MNPT, 1/4 MJIC, 45
49	3	1576	FITTING, 1/4 MNPT, 1/4 MJIC, ELBOW
50	1	1498	SWIVEL, 1/4MJIC, 1/4FJIC, ELBOW
51	2	1617	FITTING, 1 MNPT, 1 MJIC, ELBOW
52	1	H12-1937-FJFJ9	HOSE, ASSEMBLY, 3/4, 1937, 3K, FJIC, FJIC90
53	1	H12-1937-FJFJ9	HOSE, ASSEMBLY, 3/4, 1937, 3K, FJIC, FJIC90
54	1	4BANK	ASSEMBLY, KIT, BOLT

Illustration 7.13: VP3500-320A Valve Package Assembly BOM



ITEM	QTY	P/N	DESCRIPTION
1	10	1008-C	SCREW, SOCKET, 1/4-20, 1/2
2	2	222	SCREW, SOCKET, 1/4-20, 3 1/2
3	2	35231	JAW, TONG
4	2	35232-02	PIN, JAW
5	2	35233	ROLLER, JAW
6	4	35239	CLIP, JAW

Illustration 7.14: CJ-35B Jaw Assembly



ITEM	QTY	P/N	DESCRIPTION
1	1	35231-01	JAW, TONG
2	1	35232-02	PIN, JAW
3	1	35233-01	ROLLER, JAW
4	2	35239	CLIP, JAW
5	5	1008-C	SCREW, SOCKET, 1/4-20, 1/2
6	1	222	SCREW, SOCKET, 1/4-20, 3 1/2
7	2	12DU12	SLEAVE, BEARING, 3/4 X 3/4

Illustration 7.15: CJ-LF-35 Jaw Assembly

This page intentionally
left blank

SECTION 8: TORQUE/TURNS MANAGEMENT

This page intentionally
left blank

8.0 BASIC TORQUE MEASUREMENT

Basic torque measurements are performed using a simple hydraulic measurement system. A hydraulic load cell connects to a calibrated torque gauge through a reinforced flexible hydraulic hose. The torque gauge is factory-calibrated to display accurate torque measurements for a tong or tong and backup assembly with a particular arm length. The arm length is a measurement from the centre of the pipe or casing to the centre of the force being applied to the load cell.

Two load cell options are available. A tension load cell is typically used with a suspended stand-alone tong. This application requires that the load cell be attached to the rear of the tong as part of the restraint line that opposes the force generated when the tong makes up or breaks out a joint. A compression load cell is used in a tong and backup assembly, and is typically located on the rear of the backup between the backup and a stationary frame. The load cell must be located in the centre of the compression force vector generated between the backup and the frame.

Hydraulic force generated by a load cell is transmitted to the torque gauge via a reinforced flexible hydraulic line. The hydraulic force is displayed as torque in units of Ft.-Lbs. The torque gauge has a red “peak torque” indicator that tracks with the torque gauge needle to the point of highest torque, and remains at the point of highest torque until manually reset. Note that every model of tong and tong and backup assembly has a unique arm length, and the torque gauge must be calibrated for that arm length. Torque gauges that are not calibrated for the arm length of the tool in service will not display correct torque. To ensure correct torque measurement, ensure the arm length or “handle” as displayed on your torque gauge matches the arm length of the tool in service as listed on the specifications page of the technical manual.

The images on this page are for illustration purposes only and may not accurately represent the torque gauge and load cell that have been supplied with your equipment.

NOTICE

THE IMAGES DISPLAYED ARE SUPPLIED FOR ILLUSTRATION PURPOSES ONLY

Illustration 8.0.1: Torque Gauge (For Illustration Purposes Only)

Illustration 8.0.2: Tension Load Cell

Torque gauges and load cells are supplied as a matched calibrated pair. Substituting one or the other will render the calibration inaccurate even if the actual model numbers appear to be identical. The serial numbers of matching load cell and torque gauges are clearly identified on the calibration certificate. Should you suspect the accuracy of your torque measurements, or wish to replace either component the pair should be returned to the factory for re-calibration before placing into service.

⚠ CAUTION

TORQUE GAUGES AND LOAD CELLS ARE FACTORY-SUPPLIED SUPPLIED AS MATCHED CALIBRATED PAIRS. IF REPLACING EITHER COMPONENT THE LOAD CELL AND TORQUE GAUGE MUST BE RETURNED TO THE FACTORY FOR RE-CALIBRATION BEFORE PLACED INTO SERVICE.

8.0 BASIC TORQUE MEASUREMENT (CONTINUED:)

The images on the preceding page are for illustration purposes only and may not accurately represent the torque gauge and load cell that have been supplied with your equipment. Please note that the parts listed in the following table are correct for accurate torque measurement while using the equipment for which this manual is supplied.

NOTICE

THE TORQUE GAUGE USED IS FULLY DEPENDANT UPON THE ARM LENGTH AND TORQUE RANGE OF THE EQUIPMENT IN USE. THE PART NUMBERS LISTED IN THE FOLLOWING TABLE ARE CORRECT FOR ACCURATELY MEASURING TORQUE USING THE EQUIPMENT FOR WHICH THIS MANUAL IS SUPPLIED.

NOTICE

LOAD CELLS ARE NOT USER SERVICEABLE. DAMAGED TORQUE MEASUREMENT COMPONENTS MUST BE RETURNED TO THE FACTORY FOR REPAIR AND RE-CALIBRATION.

8.1 TROUBLESHOOTING

Under normal operating conditions, and with proper maintenance, the torque gauge and load cell system are designed to give lasting trouble-free performance. Faulty indication on the gauge will very often define a fault within the gauge.

NOTICE

IF TROUBLESHOOTING REVEALS THAT THERE IS INSUFFICIENT FLUID IN THE SYSTEM, BEFORE RECHARGING, CHECK THAT ALL SYSTEM COMPONENTS ARE FREE FROM DAMAGE. THIS WILL ENSURE THAT FLUID LOSS WILL NOT CONTINUE AFTER RELOADING

1	SYMPTOM: NO INDICATION ON TORQUE GAUGE	
	POSSIBLE PROBLEM	**SOLUTION(S)**
	Hydraulic hose is obstructed	Check hydraulic hose for kinks
		Replace hydraulic hose
	Loss of hydraulic fluid	Recharge hydraulic fluid (see Section 8.2). NOTE: Ensure any breaches in the hydraulic system between the load cell and torque gauge are repaired to prevent further fluid loss.
	Internal mechanism of torque gauge is damaged	Replace gauge
2	SYMPTOM: GAUGE INDICATION UNEXPECTEDLY HIGH	
	POSSIBLE PROBLEM	**SOLUTION(S)**
	Excessive hydraulic fluid	Completely drain hydraulic fluid from torque gauge/load cell system. Recharge following the procedure in Section 8.2
	Internal mechanism of gauge is damaged	Replace gauge
	Incorrect torque gauge in use (not part of the original torque gauge/load cell pair)	Replace gauge with gauge properly calibrated for the load cell in service
3	SYMPTOM: GAUGE INDICATION UNEXPECTEDLY LOW	
	POSSIBLE PROBLEM	**SOLUTION(S)**
	Insufficient hydraulic fluid	Recharge hydraulic fluid (see Section 8.2). NOTE: Ensure any breaches in the hydraulic system between the load cell and torque gauge are repaired to prevent further fluid loss
	Obstruction in hydraulic hose	Check hydraulic hose for kinks
		Replace hydraulic hose
	Snub line not at right-angle to tong handle	Check angle of snub line and correct if necessary
	Internal mechanism of gauge is damaged	Replace gauge
	Incorrect torque gauge in use (not part of the original torque gauge/load cell pair)	Replace gauge with gauge properly calibrated for the load cell in service
4	SYMPTOM: GAUGE INDICATION IS ERRATIC OR SLUGGISH	
	POSSIBLE PROBLEM	**SOLUTION(S)**
	Insufficient hydraulic fluid in torque measurement section	Recharge hydraulic fluid (see Section 8.2). NOTE: Ensure any breaches in the hydraulic system between the load cell and torque gauge are repaired to prevent further fluid loss
	Loss of damping fluid in torque gauge	Top up or refill damping fluid (NOTE: Ensure leakage points in gauge are identified and repaired to prevent further loss of damping fluid)
	Air bubbles in hydraulic fluid in the torque measurement system	Bleed air from load cell and torque gauge and top up fluid (if necessary) as per Section 8.2
	Internal mechanism of gauge is damaged	Replace gauge

8.2 PERIODIC INSPECTION AND MAINTENANCE

NOTICE

ONLY QUALIFIED, DESIGNATED PERSONNEL ARE PERMITTED TO PERFORM MAINTENANCE ON THE TORQUE MEASUREMENT SYSTEM.

8.2.1 Inspection

The torque measurement system supplied with your equipment is designed and built to provide years of trouble-free service with minimum maintenance. Periodic inspections of the load cell, hydraulic lines and fittings are recommended in order to keep the system in top operating condition. A thorough inspection should be made at each rig-up.

8.2.2 Fluid Recharge

Recharge hydraulic system with W15/16 fluid through the check valve on the torque indicating gauge. Recharging must only be performed when there is no load on the load cell. Refer to the illustrations on pages 6.3 & 6.4 for guidance if required.

a. Place the torque indicating gauge higher than the load cell. Remove the brass 1/4” cap from the fitting on the check valve on the top of the gauge.

b. Connect the hand pump to the check valve fitting.

c. Elevate the load cell so it is higher than the torque gauge and hand pump.

⚠ CAUTION

UNCONTAINED SPILLAGE OF THE HYDRAULIC FLUID IN THIS SYSTEM MAY CONTRAVENE GOVERNMENTAL ENVIRONMENTAL REGULATIONS, OR THE ENVIRONMENTAL REGULATIONS AND POLICIES OF YOUR COMPANY. MCCOY GLOBAL HIGHLY RECOMMENDS PLACING YOUR LOAD CELL IN A CONTAINMENT BASIN BEFORE PROCEEDING WITH THE BLEEDING & REFILLING PROCESS.

d. Fill hand pump bowl with W15/16 hydraulic fluid.

NOTICE

MAINTAIN GREATER-THAN HALF FULL FLUID LEVEL IN THE HAND PUMP BOWL TO AVOID PUMPING AIR INTO THE SYSTEM. DO NOT ALLOW THE LEVEL TO FALL BELOW ONE-HALF FULL

e. Remove the vent plug screw and Stat-O-Seal (items 1 and 2 on Illustration 8.0.3) to allow trapped air to escape.

f. Pump fluid into the system until no more air is seen escaping from the vent port.

g. Replace the vent plug screw and Stat-O-Seal and tighten securely.

h. Remove load cell from containment vessel and wipe clean. Reclaim the hydraulic fluid (if it is clean) or dispose of all waste materials according to governmental or your company’s proscribed environmental protection regulations.

i. Disconnect the hand pump from the torque gauge.

j. Replace the brass cap on the torque gauge check valve fitting.

8.2.3 Reference Checking Your Torque Measurement System

The following steps define a process for determining if your torque measurement system is correctly measuring and indicating within an expected range. This procedure is best suited for performing in a shop or location removed from the drill floor, within range of a crane. This is a reference check and not a calibration. Calibrations must be performed at an authorized calibration facility.

Tension Load Cell

a. Locate a known weight in the range of approximately 500 to 1000 lbs (227 to 455 kg), and move the weight next to the tong and backup assembly.

b. Remove the tension load cell from the tong, but do not disconnect from the torque gauge.

Continued on next page...

8.2.3 Reference Checking Your Torque Measurement System (Continued):

Tension Load Cell (continued):

c. Suspend the load cell, piston side up, from a crane capable of supporting the known weight in Step 3a.

d. Connect the rod side of the load cell to the known weight, and use the crane to hoist the weight from the surface to be suspended freely.

e. Perform a simple calculation to determine the expected indication on the torque gauge based on the known hoisted weight. This is a calculation that must be performed using imperial units (eg., pounds and feet). The calculation is: [KNOWN WEIGHT] x [ARM LENGTH (in feet)]. For example, if the arm length is 36 inches and the hoisted weight is 1000 lbs the calculation is:

1000 x (36/12) = 3000

Therefore, the expected indication on the torque gauge should be 3000 lbs-ft.

8.2.4 Repair And Calibration

Return the load cell and indicator gauge to the authorized repair facility for repairs and calibration.

This page intentionally
left blank

SECTION 9: OEM DOCUMENTATION

The manufacturer information contained in this section has been obtained from publicly available web sites and has been provided for information purposes only. McCoy Global does not guarantee the accuracy of the information contained in this section. All original copyrights claimed by the manufacturer(s) apply.

This page intentionally
left blank

9.0 OEM DOCUMENTATION INTERNET LINKS

Rineer Hydraulic Motor:

hhttp://www.rineer.com/WEBPAGES_2005/13SERIES_TS_2K5.html