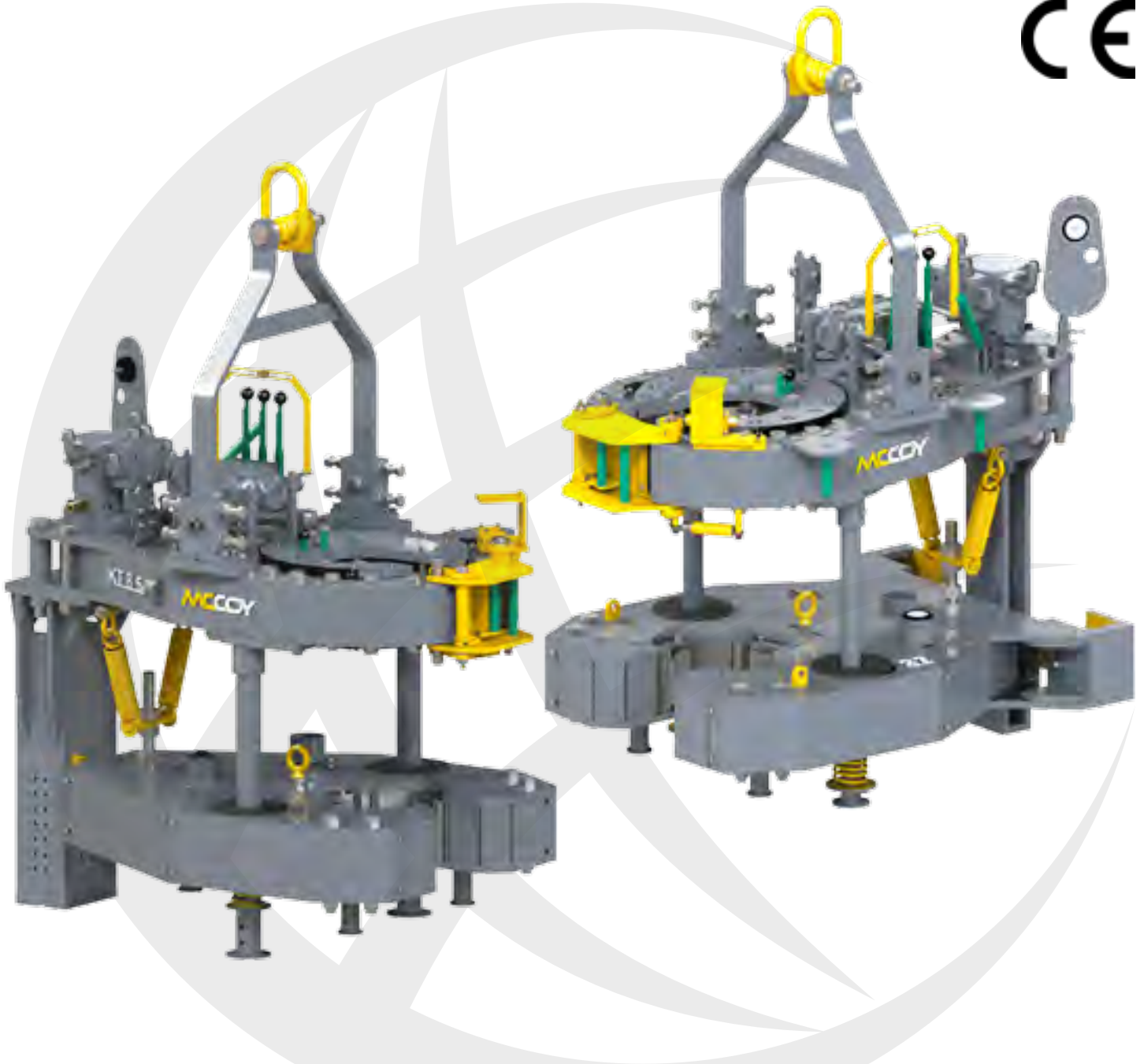


80-0615-X

8⁵/₈ in 25K Hydraulic Power Tong
7⁵/₈/8⁵/₈ in CLINCHER® Backup
Mounting Kit



SPECIFICATIONS | OPERATION | MAINTENANCE | PARTS

TECHNICAL MANUAL #12058

MCCOYGLOBAL.COM



ORIGINAL INSTRUCTIONS

This technical document applies to the following models:

OVERALL MODEL	TONG MODEL	BACKUP MODEL	REV	DESCRIPTION
80-0615-10	80-0609-14	85-0604	0	Tong is equipped with hydraulic motor, motor valve, lift cylinder valve, backup valve, rigid sling, and safety door. 7-5/8" CLINCHER® compression load cell-style backup.
80-0615-12	80-0609-14	85-0606	0	Tong is equipped with hydraulic motor, motor valve, lift cylinder valve, backup valve, rigid sling, and safety door. 7-5/8" CLINCHER® tension load cell-style backup.
80-0615-14	80-0609-14	85-0607	0	Tong is equipped with hydraulic motor, motor valve, lift cylinder valve, backup valve, rigid sling, and safety door. 8-5/8" CLINCHER® compression load cell-style backup.

THIS EQUIPMENT USES A DOOR SWITCH SYSTEM DESIGNED TO INTERRUPT TONG ROTATION WHEN TONG DOOR IS OPENED

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 your equipment.

PATENTED & PATENTS PENDING



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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.



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Summary Of Revisions						
Date	Section	Page	Description Of Revision	Approved		
Sep 2007	N/A	N/A	Initial Release			
July 2008	All		Added information for 7585 tension-style CLINCHER® backup			
Aug 2008	1	1.3	Corrected arm length for system with compression backup			
May 2010	All		Corrected incorrect page references throughout, added proper CLINCHER® trademarks, revised logos/design, corrected TOC			
June 2010	N/A	N/A	Re-badged tong as KT8625			
Jan. 2011	All		Added improved warning symbology throughout	SH		
	Intro	iii	Added model 80-0615-6			
		v	Added detailed warning page			
		viii	Updated table of contents			
		ix	Added list of illustrations			
	2	2.1	Added Sling / Load Bearing Device safety section			
		2.8	Consolidated multiple hydraulic schematics into one			
		2.9 - 2.11	Replaced all hydraulic component identification images			
		2.15	Added list of available jaws for 8-5/8" backup			
		2.17	Added tong rig-up and leveling section			
		2.21 - 2.22	Replaced all valve operation images			
		2.23	Added instructions for properly shifting gears			
		2.24	Added detailed instructions for making and breaking connections			
	3	3.1	Added section "General Maintenance Safety Practices"			
		3.1	Added section "Preventive Maintenance"			
		3.9	Added section "Shifter Detent Force Adjustment"			
		3.10 - 3.12	Revised and corrected "Overhaul Procedures - Disassembly"			
		3.12 - 3.22	Revised and corrected "Overhaul Procedures - Assembly"			
	4	All	Removed inapplicable troubleshooting instructions & added detail to relevant instructions			
	5	All	Removed section "Storage Recommendations"			
		All	Re-numbered "Parts & Assemblies" - this is now Section 5			
		5.2	Replaced graphics			
		5.3	Replaced graphics			
		5.4 - 5.5	Replaced old-style support roller with new style			
		5.6 - 5.7	Replaced old-style door pivot support roller with new style			
		5.22 - 5.23	Replaced body graphic with correct "backup-ready", corrected parts list.			
		5.24 - 5.25	Added detailed graphics and parts list for hydraulic supports			
		5.34 - 5.35	Replaced door assembly graphics to reflect current assembly, corrected parts list.			
		5.40 - 5.41	Added rear leg drawing and parts list for model 80-0615-6			
		5.46 - 5.47	Added information for model 85-0607 8-5/8" CLINCHER® backup			
	5.52 - 5.53	Added information for BUC8623-01 8-5/8" CLINCHER® cylinder				
	6	All	Re-numbered "Torque Measurement" - this is now Section 6			
		6.1	Corrected part numbers for tension load cell assembly			
	7	All	Re-numbered "Hydraulic Section" - this is now Section 7			
		7.27 - 7.37	Added maintenance instructions for DVA valves			
	Continued on next page					

Summary Of Revisions (Continued)				
Date	Section	Page	Description Of Revision	Approved
Mar 2011	2	2.15 - 2.16	Added jaw availability for 8-5/8" backup	DB
	5	5.46 - 5.47	Corrected 8-5/8" CLINCHER® backup details	
	5	5.52 - 5.53	Added drawing & BOM for 8-5/8" CLINCHER® Cylinders	
MAY 2012	Intro	iii	Corrected list of applicable tong models	SH
		vii	Modified liability & copyright information	
		xv	Added CE Marked modifier statement and identification symbol	
	1	1.2	Corrected dimension diagram for compression load cell-style backups	
		1.3	Inserted dimension diagram for tension load cell-style backups	
		1.4	Inserted illustration of additional hazard areas	
		1.5	Inserted illustration & identification of FARR CE Nameplate	
		1.6	Corrected specifications	
	2	2.1	Inserted new section 2.A, "Initial Receipt & Inspection of Equipment"	
		2.1	Renumbered section 2.B, "Major Component Identification"	
		2.5	Renumbered section 2.C, "Sling & Load-Bearing Device Safety"	
		2.8	Inserted new section 2.D, "Lift Cylinder Installation"	
		2.11	Renumbered section 2.E, "Hydraulic Schematic & Component Identification"	
		2.12	Inserted CE-applicable hydraulic schematic	
		2.15	Renumbered and revised section 2.F, "Hydraulic Connections"	
		2.17	Renumbered and revised section 2.G, "Tong Jaw Availability & Installation". Added CE-specific information & added weights to list of available tong jaw die kits	
		2.21	Renumbered section 2.H, "Tong Rig-Up & Leveling"	
		2.24	Inserted new subsection 2.H.5, "Adjusting Backup Height"	
		2.25	Inserted new subsection 2.H.6, "Adjusting Backup Clamp Pressure"	
		2.26	Renumbered section 2.I, "Tong Operation"	
		2.26	Inserted new subsection 2.I.1, "Operator Training"	
		2.26	Inserted new subsection 2.I.2, "Operator Safety"	
		2.27	Renumbered and revised subsection 2.I.3, "Valve Operation"	
		2.28	Added CE-specific information to lift cylinder valve operation	
		2.29	Renumbered subsection 2.I.4, "Shifting Gears"	
		2.30	Inserted new subsection 2.I.5, "Pre-Operational Checks"	
		2.31	Renumbered subsection 2.I.6, "General Comments"	
		2.32	Renumbered section 2.J, "Making and Breaking Connections"	
		2.34	Added CE-specific information to lift cylinder valve operation	
		2.37	Added CE-specific information to lift cylinder valve operation	
		2.38	Added CE-specific information to lift cylinder valve operation	
	2.40	Renumbered section 2.K, "Extreme Cold Weather Operations"		
	3	3.1	Revised section 3.A, "General Maintenance Safety Practices"	
		3.1	Revised section 3.C, "Preventive Maintenance Practices"	
		3.2	Inserted new section 3.D, "Hydraulic System De-Pressurization"	
		3.2	Renumbered section 3.E, "Lubrication Instructions"	
		3.2-3.8	Replaced illustrations Section 3.E, "Lubrication Instructions"	
		3.7	Inserted lubrication instruction 3.E.10, "Door Stop Cylinder"	
		3.9	Renumbered section 3.F, "Adjustments"	

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Summary Of Revisions (Continued)				
Date	Section	Page	Description Of Revision	Approved
MAY 2012		3.9	Revised subsection 3.F.1, "Brake Band Adjustment"	SH
		3.10	Replaced illustration, subsection 3.F.2, "Door Latch Cam Adjustment"	
		3.11	Replaced illustration, subsection 3.F.3, "Door Latch Adjustment"	
		3.11	Inserted new subsection 3.F.4, "Safety Door Adjustment"	
		3.12	Renumbered section 3.G, "Recommended Periodic Checks"	
		3.13	Renumbered & revised section 3.H, Overhaul Procedures - Disassembly. Corrected disassembly procedures and added CE-specific information and warnings.	
		3.15-3.27	Renumbered & revised section 3.I, Assembly Procedures. Corrected assembly procedures and added CE-specific information and warnings.	
		3.28	Moved "Daily Inspection & Maintenance Checklist (Power Tong)" from appendices and numbered as new section 3.J. Added CE-Specific information.	
		3.30	Moved "Daily Inspection & Maintenance Checklist (Backups)" from appendices and numbered as new section 3.K.	
		3.31	Moved "Monthly Inspection & Maintenance Checklist (Power Tong)" from appendices and numbered as new section 3.L.	
		3.32	Moved "Tubular Connection Equipment De-Commissioning" from appendices. Revised section to add packaging and shipping instructions and retitled "Tubular Connection Equipment De-Commissioning & Shipping". Numbered as new section 3.M.	
		3.39	Moved "Tubular Connection Equipment Re-Commissioning" from appendices and numbered as new section 3.N.	
	4	4.1	Revised section 4.A, Troubleshooting - Tong Will Not Develop Sufficient Torque	
		4.2	Inserted new section 4.B, Troubleshooting - Relief Valve	
		4.4	Inserted new section 4.C, Troubleshooting - Safety Door	
		4.5	Renumbered section 4.D, Troubleshooting - Tong Running Too Slowly	
		4.6	Renumbered section 4.E, Troubleshooting - Failure of Jaws to Grip Pipe	
		4.7	Renumbered section 4.F, Troubleshooting - Shifting	
	5	5.2	Inserted list of critical spare parts	
		5.3	Inserted list of recommended spare parts	
		5.4	Inserted list of parts needed for complete overhaul	
		5.10-5.11	Replaced illustration & corrected B.O.M., Support Roller - Door Pivot	
		5.12-5.13	Replaced illustration, Rotary Idler	
		5.14-5.15	Replaced illustration & revised B.O.M., Pinion Idler	
		5.16-5.17	Replaced illustration, Pinion	
		5.18-5.19	Replaced illustration & revised B.O.M., Clutch	
		5.20-5.21	Replaced illustration & revised B.O.M., Shifter	
		5.22-5.23	Replaced illustration & revised B.O.M. to reflect changes to backing pin, Rotary Assembly	
			Removed illustration & B.O.M., Tong Jaws	
		5.26-5.27	Replaced illustration & revised B.O.M., Hydraulic Valve Mounts. Added illustration for CE-specific guard.	
		5.28-5.29	Replaced illustration & revised B.O.M., Brake Bands	
		5.30-5.31	Replaced illustration & revised B.O.M., Motor & Motor Mount Assembly	
			Removed illustration & B.O.M., Hydraulic Assembly	
	Removed illustration & B.O.M., Safety Door Hydraulics			
5.32-5.33	Replaced illustration & revised B.O.M., Tong Door			

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Summary Of Revisions (Continued)				
Date	Section	Page	Description Of Revision	Approved
MAY 2012	5	5.34-5.35	Replaced illustration & revised B.O.M., Safety Door Components. Added addition B.O.M. for CE-specific components.	SH
		5.52-5.53	Replaced illustration & revised B.O.M., Rigid Sling. Added addition illustration and B.O.M. for CE-specific components.	
	6	6.1-6.8	Complete revision of torque measurement section	
JUN 2015	Preamble	iii	Updated model numbers	D. Sonnier
		iv-v	Inserted EC Declaration of Conformity	
		vi	Inserted warnings regarding spark generation	
	1	1.3	Updated company contact information	
		1.7	Updated CE label illustration	
APR 2016	All	All	Complete revision to new technical manual standard. Updated all illustrations and BOMs to include latest equipment revisions and ECNs.	M. Gerwing R. Rahman B. Baldock



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EC DECLARATION OF CONFORMITY

Manufacturer Information

McCoy Global Canada
 14755 – 121A Avenue, Edmonton, AB, T5L 2T2, Canada

Product Description

Product Identification: Model: 80-0615-14 Serial Number:

Product Description: KT 8625 CBU

McCoy Global Technical Construction File Reference: T105

Hydraulically powered tong, with/without backup provided as a means of making up, or breaking out, high torque tubular connections within the following specifications:

Specification	Imperial Unit	Metric Unit
Maximum Torque	<u>25000</u> Ft/lbs	<u>33900</u> Nm
Arm Length	<u>36.0</u> Inch	<u>91.4</u> Cm
Mass	<u>2640</u> Lbs	<u>1197</u> Kg
	<i>Torque (Ft Lbs/N M, Estimated)</i>	
At Pressure	<u>2300</u> Psi	<u>159</u> Bar
	<u>5000</u> Hi	<u>6780</u> Full
	<u>25000</u> Lo	<u>33900</u> Full
	<i>Speed (Rpm, Estimated)</i>	
At flow rate	<u>60</u> GPM	<u>227</u> LPM
	<u>54.9</u> Hi	<u>54.9</u> Full
	<u>11.0</u> Lo	<u>11.0</u> Full
<i>Jaw size range (Inch)</i>	<u>2 3/8</u> From	<u>8 5/8</u> to
Overall Length	<u>57.1</u> In	<u>145.0</u> Cm
Overall Width	<u>36.8</u> In	<u>93.5</u> Cm
Overall Height	<u>76.7</u> In	<u>194.8</u> Cm

Noise Information

Current Rev:	Author:	Created Date:	Approved by:	Approved Date:
01	C. SANCHEZ	11/27/2014	W.MONDRAGON	03/03/2015

A noise survey was performed on a McCoy Global Canada KT 8625 hydraulically powered Tong and/or Backup.

The following readings were recorded at a distance of 1.0 metres from the equipment’s rotating element;

“A” weighted reading of 94.7 dB

“C” weighted reading of 94.6 dB

An “A” weighted reading is an average noise level. The “A” weighted reading above was recorded over a 1 minute of continuous maximum rotation.

A “C” weighted reading is a peak or impact noise level. The “C” weighted reading above occurred when the Tong door assembly was forcibly closed.

This Declaration of Conformity is issued under the sole responsibility of the manufacturer.

I hereby declare that the equipment described in this document is in conformity with the essential requirements of the European Machinery Directive 2006/42/EC and the European Directive on Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres (ATEX) 94/9/EC.

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

BS EN ISO 12100:2010 Safety of Machinery – General Principle for Design – Risk Assessment and Risk Reduction

BS EN 13463 Part 1 Non Electrical Equipment Intended for Use in Potentially Explosive Atmospheres – Basic Method and Requirement

BS EN 13463 Part 5 Non Electrical Equipment Intended for Use in Potentially Explosive Atmospheres – Protection by Constructional Safety “c”.

BS EN 982 Safety of Machinery – Safety Requirements for Fluid Power Systems and Their Components – Hydraulics

BS EN 1127 Part 1 Explosive Atmospheres. Explosion Prevention and Protection. Basic Concepts and Methodology.

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



Authorized representative:

Rajiur Rahman	Engineering Supervisor
Name	Title
Signature and date	May 21, 2015

Current Rev:	Author:	Created Date:	Approved by:	Approved Date:
01	C. SANCHEZ	11/27/2014	W.MONDRAGON	03/03/2015



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SECTION 1: INTRODUCTION



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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

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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.mccoysglobal.com/tcs.pdf>

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.



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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 switch 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.**



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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
Door Switch	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



SECTION 2: EQUIPMENT & LUBRICATION SPECIFICATIONS



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2.0 EQUIPMENT DESCRIPTION

This technical document applies to the following models:

OVERALL MODEL	TONG MODEL	BACKUP MODEL	REV	DESCRIPTION
80-0615-10	80-0609-14	85-0604	0	Tong is equipped with hydraulic motor, motor valve, lift cylinder valve, backup valve, rigid sling, and safety door. 7-5/8" CLINCHER® compression load cell-style backup.
80-0615-12	80-0609-14	85-0606	0	Tong is equipped with hydraulic motor, motor valve, lift cylinder valve, backup valve, rigid sling, and safety door. 7-5/8" CLINCHER® tension load cell-style backup.
80-0615-14	80-0609-14	85-0607	0	Tong is equipped with hydraulic motor, motor valve, lift cylinder valve, backup valve, rigid sling, and safety door. 8-5/8" CLINCHER® compression load cell-style backup.

The equipment listed in the preceding table uses hydraulic power to energize a rotating section enabling make-up (thread a connection) and breakout (un-thread a connection) of oil field casing tubulars between 2-3/8 inches (60.3 mm) to 8-5/8 inches (219 mm) in diameter.

The hydraulic backup component (85-060X) clamps and stabilizes the stationary (box) section of tubular. The hydraulic power tong component (80-0609-14) grips the incoming casing section (the "pin") and threads the pin section in to the stationary box section until the threading force reaches a predetermined rotational torque value, which is measured by a tension load cell and indicated on the torque indicator.

The control valve assembly mounted to the power tong allows user control of all manual hydraulic control inputs (tong make/break rotation, backup clamp/un-clamp, lift cylinder raise/lower).

Hydraulic interlock switches mounted in proximity with the tong door automatically inhibits tong rotation if the doors on the power tong is not completely closed.

⚠ CAUTION

THIS EQUIPMENT IS EQUIPPED WITH A DOOR SWITCH SYSTEM DESIGNED TO INTERRUPT TONG ROTATION WHEN DOOR IS OPENED. SEE SECTION 4 FOR PROPER TESTING PROCEDURES.



Illustration 2.0.1: KT8-5/8+CBU (Models 80-0615-10 & 80-0615-12 Shown)

2.0 EQUIPMENT DESCRIPTION (CONTINUED):

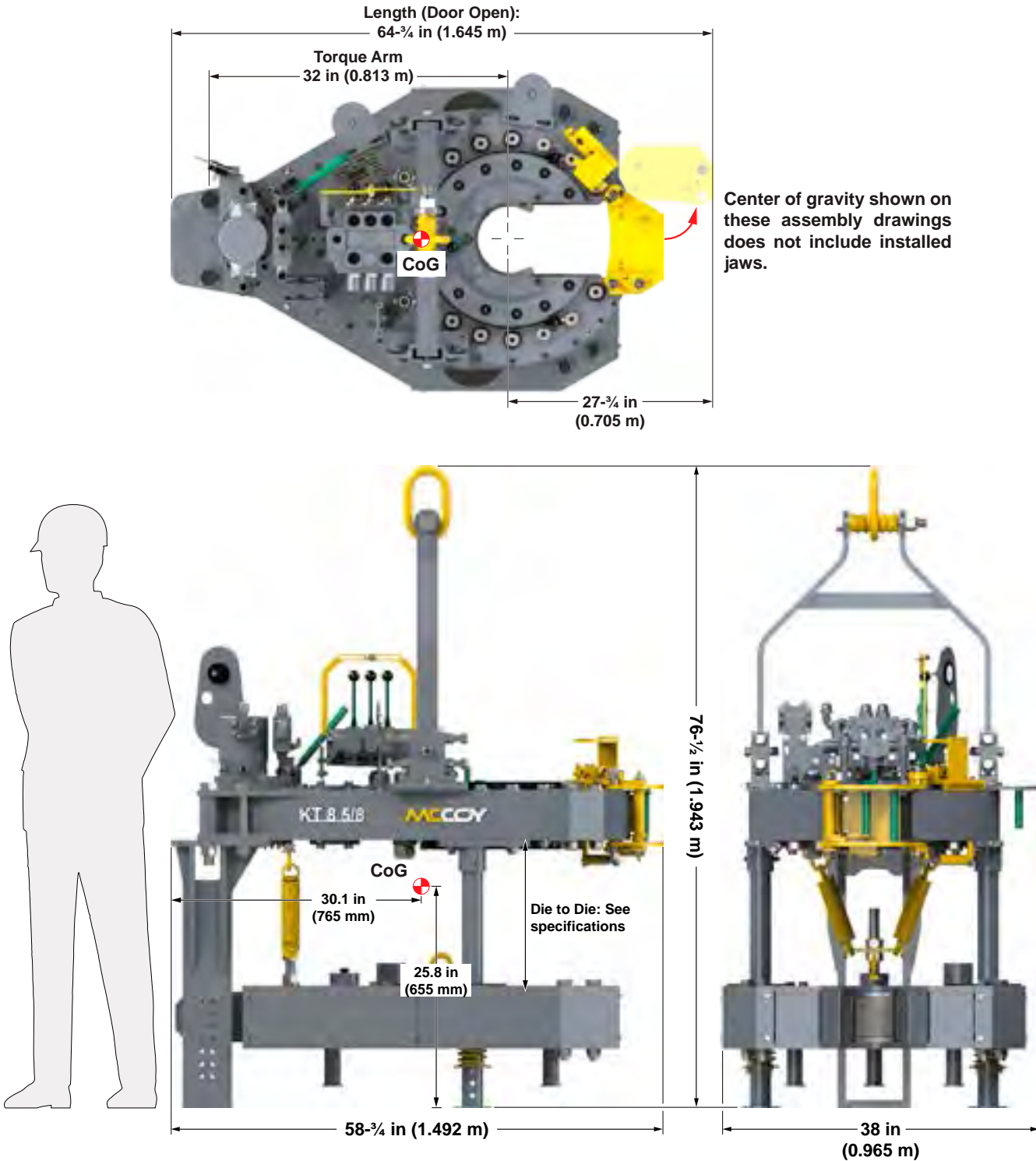


Illustration 2.0.2: KT8^{5/8} Tong & CLINCHER® Backup Dimensions (Models 80-0615-10 & 80-0615-14)

2.0 EQUIPMENT DESCRIPTION (CONTINUED):

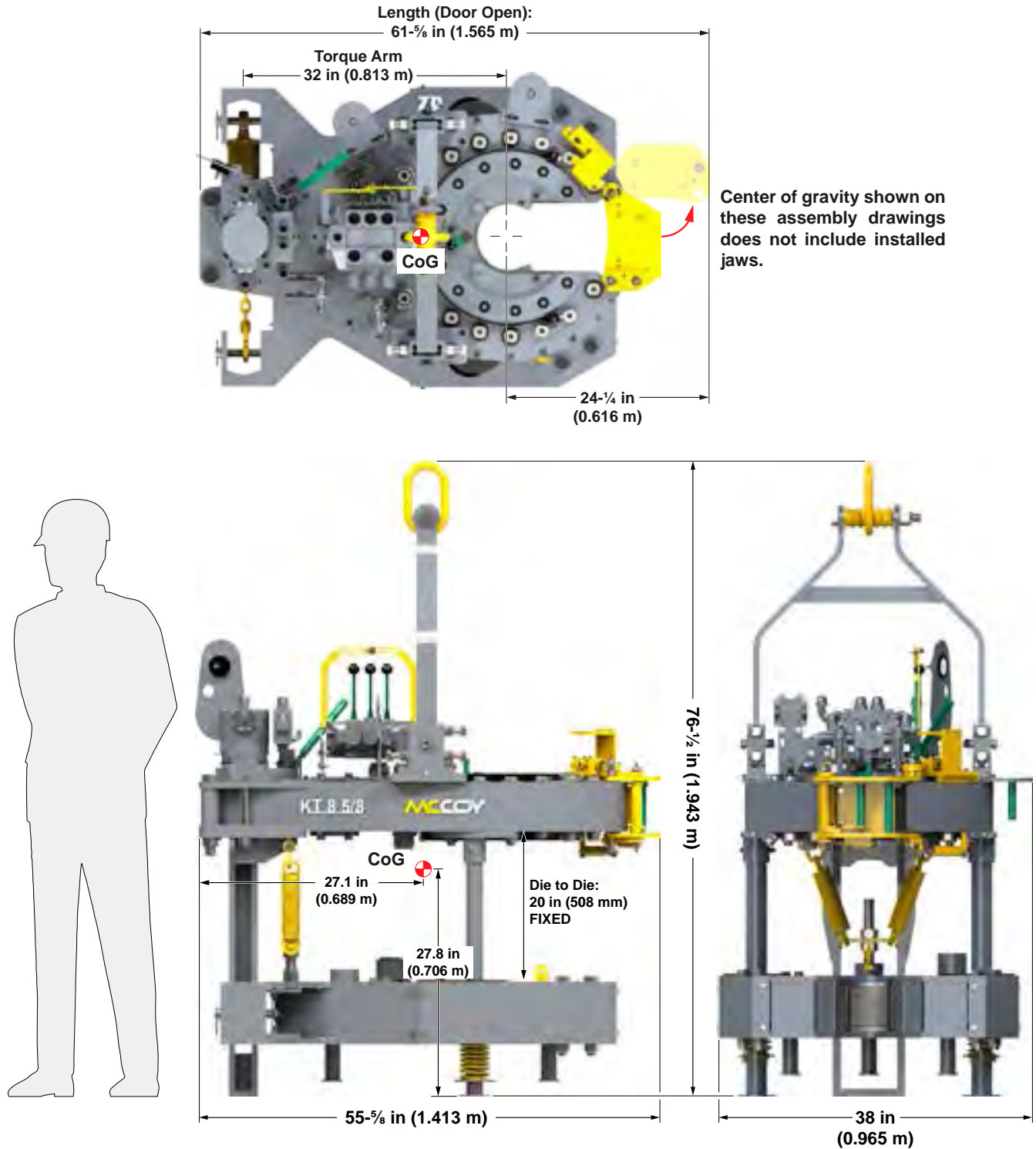
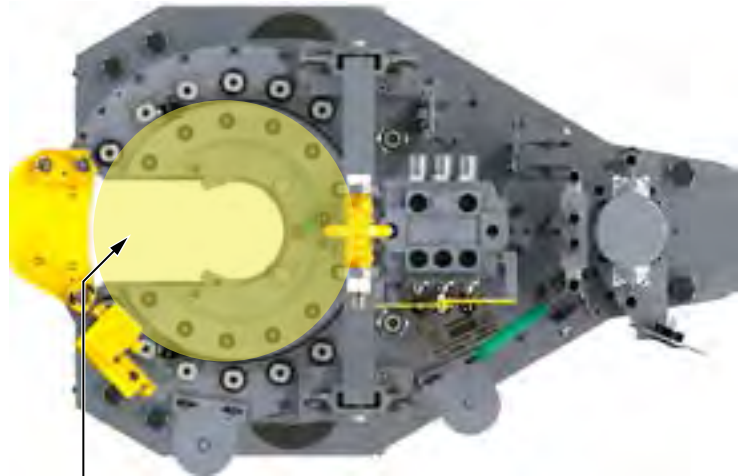


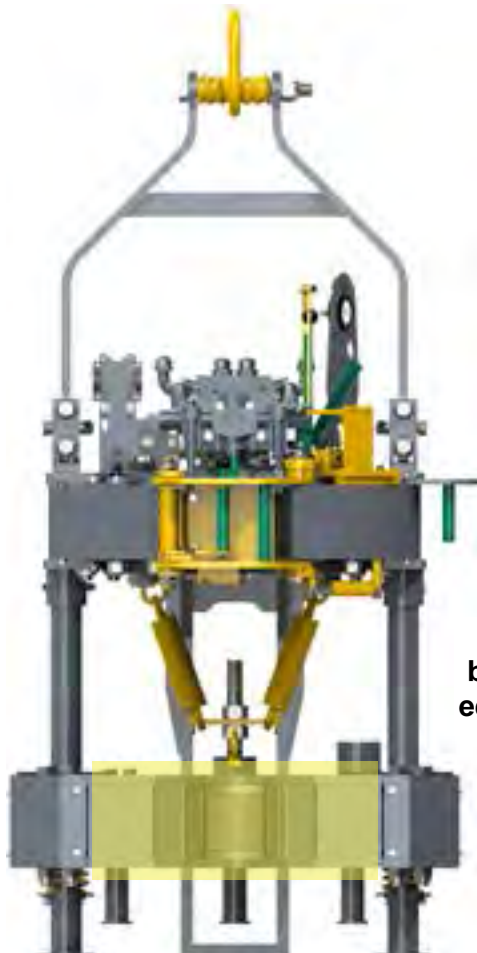
Illustration 2.0.3: KT8⁵/₈ Tong & CLINCHER® Backup Dimensions (Model 80-0615-12 Shown)

2.0 EQUIPMENT DESCRIPTION (CONTINUED):

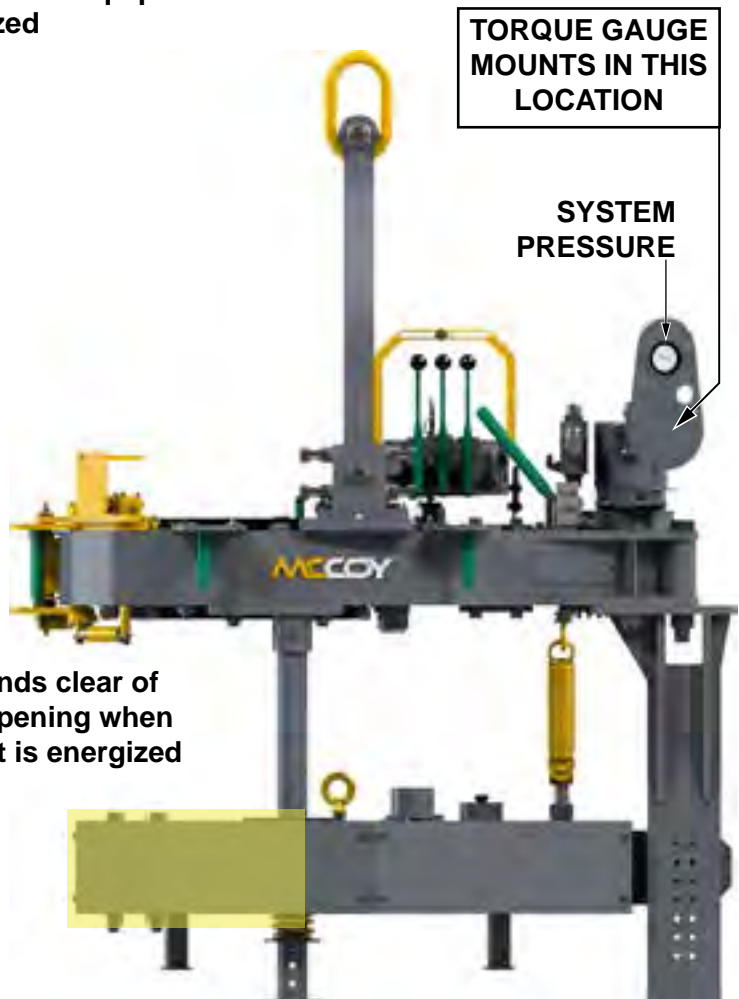
In addition to the **HAZARD** areas of this equipment that are coated **YELLOW**, a rotating cage plate assembly and backup clamp cylinders pose significant hazards when the equipment is active. Keep hands clear of the cage plate and backup clamp cylinders when equipment is energized. **SAFE** areas to handle while the equipment is energized are indicated by **GREEN** coating



Keep hands clear of cage plate when equipment is energized



Keep hands clear of backup opening when equipment is energized



TORQUE GAUGE MOUNTS IN THIS LOCATION

SYSTEM PRESSURE

Illustration 2.0.4: KT8⁵/₈ Tong & CLINCHER® Backup Hazard Areas (CE-Marked Model Shown)

2.1 MAJOR COMPONENT IDENTIFICATION

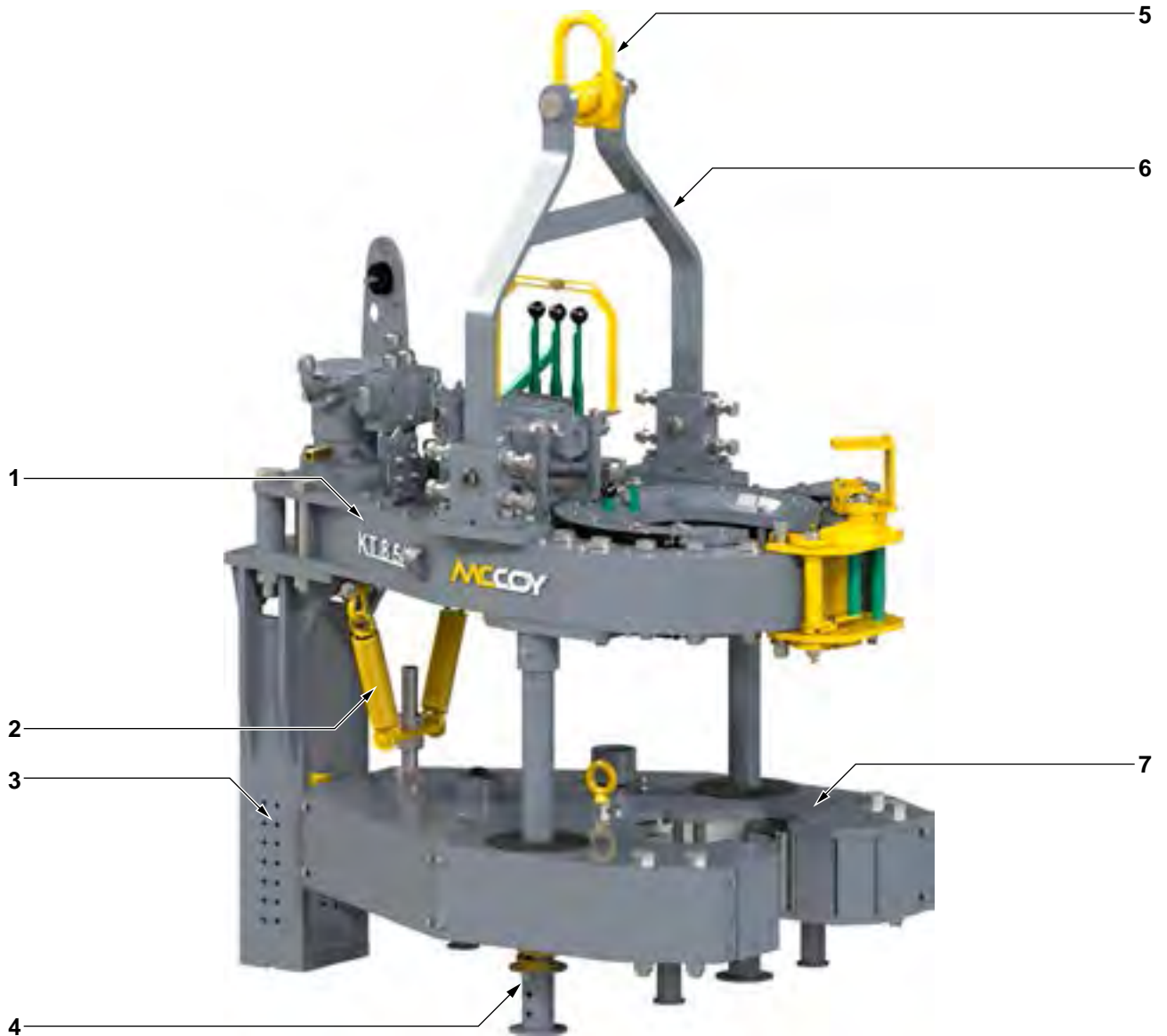


Illustration 2.1.1: KT8.625+CBU Component Identification 01 (Model 80-0615-10 Shown)

Item	Description
1	80-0609-14 hydraulic power tong
2	Backup rear spring suspension assembly (models 80-0615-10 & 80-0615-12 only)
3	1302-908-00 rear leg weldment (compression load cell configuration)
	101-2031 rear leg weldment (tension load cell configuration)
4	Front leg assembly
5	Master lifting link
6	Rigid sling
7	85-0604 7% in compression load cell style CLINCHER® backup
	85-0606 7% in tension load cell style CLINCHER® backup (not shown)
	85-0607 8% in compression load cell style CLINCHER® backup (not shown)

2.1 MAJOR COMPONENT IDENTIFICATION (CONTINUED):

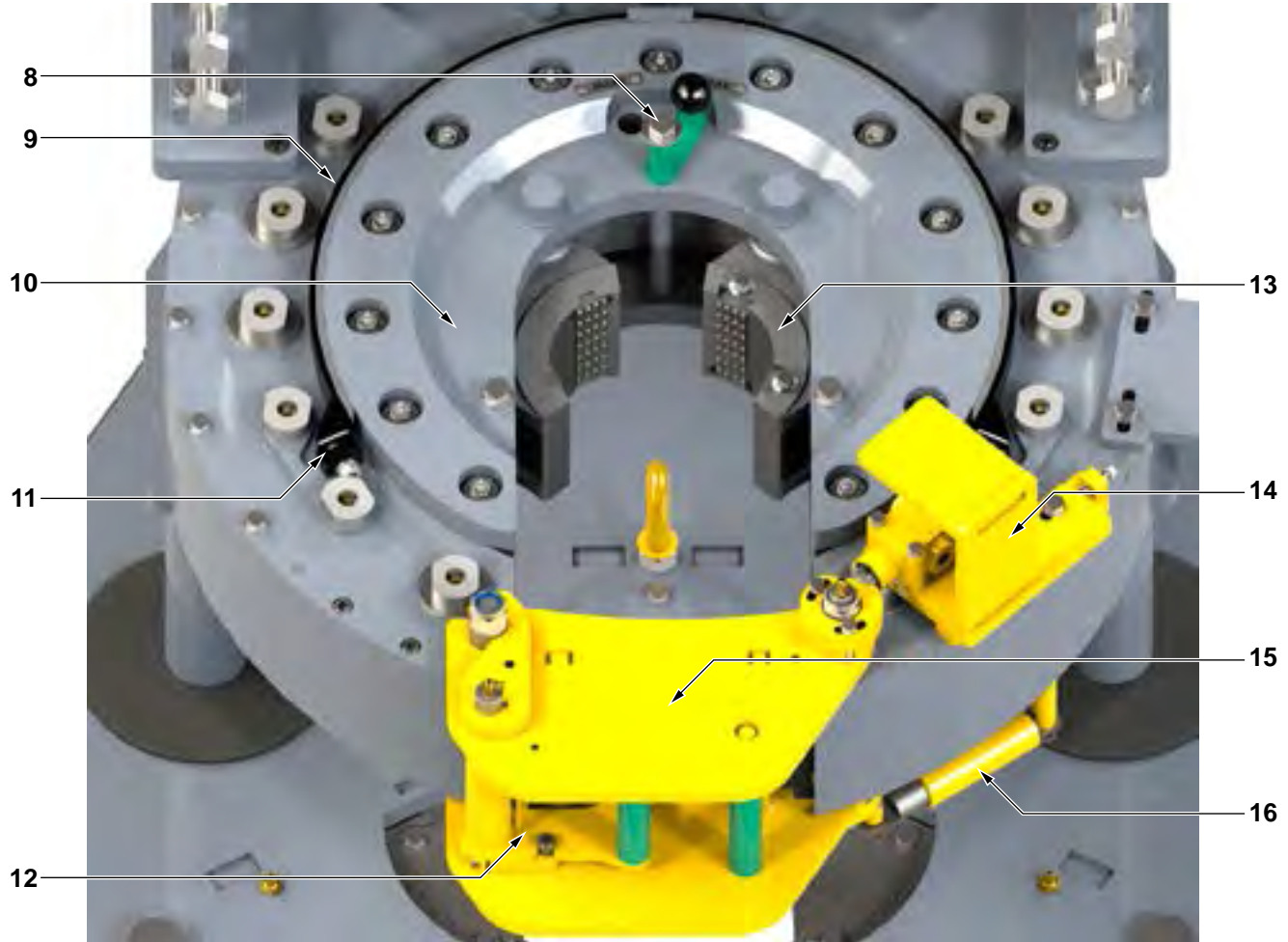


Illustration 2.1.2: KT8.625+CBU Component Identification 02 (Model 80-0615-10 Shown)

Item	Description
8	Backing pin assembly
9	Brake band
10	Cage plate assembly
11	Brake band adjustment
12	Door latch
13	Tong jaw with die inserts
14	Door switch & guard assembly
15	Door assembly
16	Door spring stop cylinder

2.1 MAJOR COMPONENT IDENTIFICATION (CONTINUED):

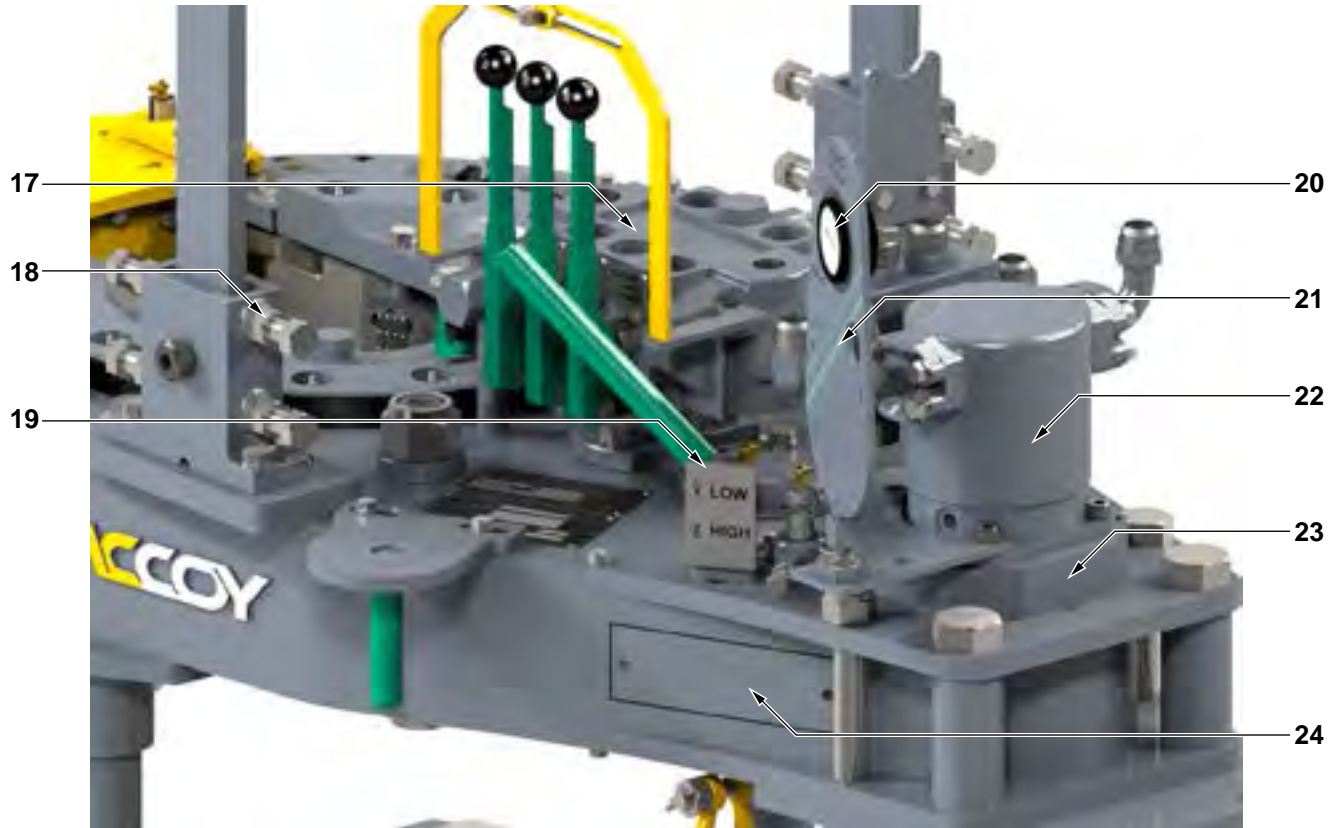


Illustration 2.1.3: KT8.625+CBU Component Identification 03 (Model 80-0615-10 Shown)

Item	Description
17	Hydraulic control valve assembly
18	Tong longitudinal level adjustment
19	Manual shifter
20	Tong system pressure indicator
21	Torque gauge mounting plate
22	Hydraulic motor
23	Motor mount
24	Shifting shaft/clutch access panel

2.1 MAJOR COMPONENT IDENTIFICATION (CONTINUED):

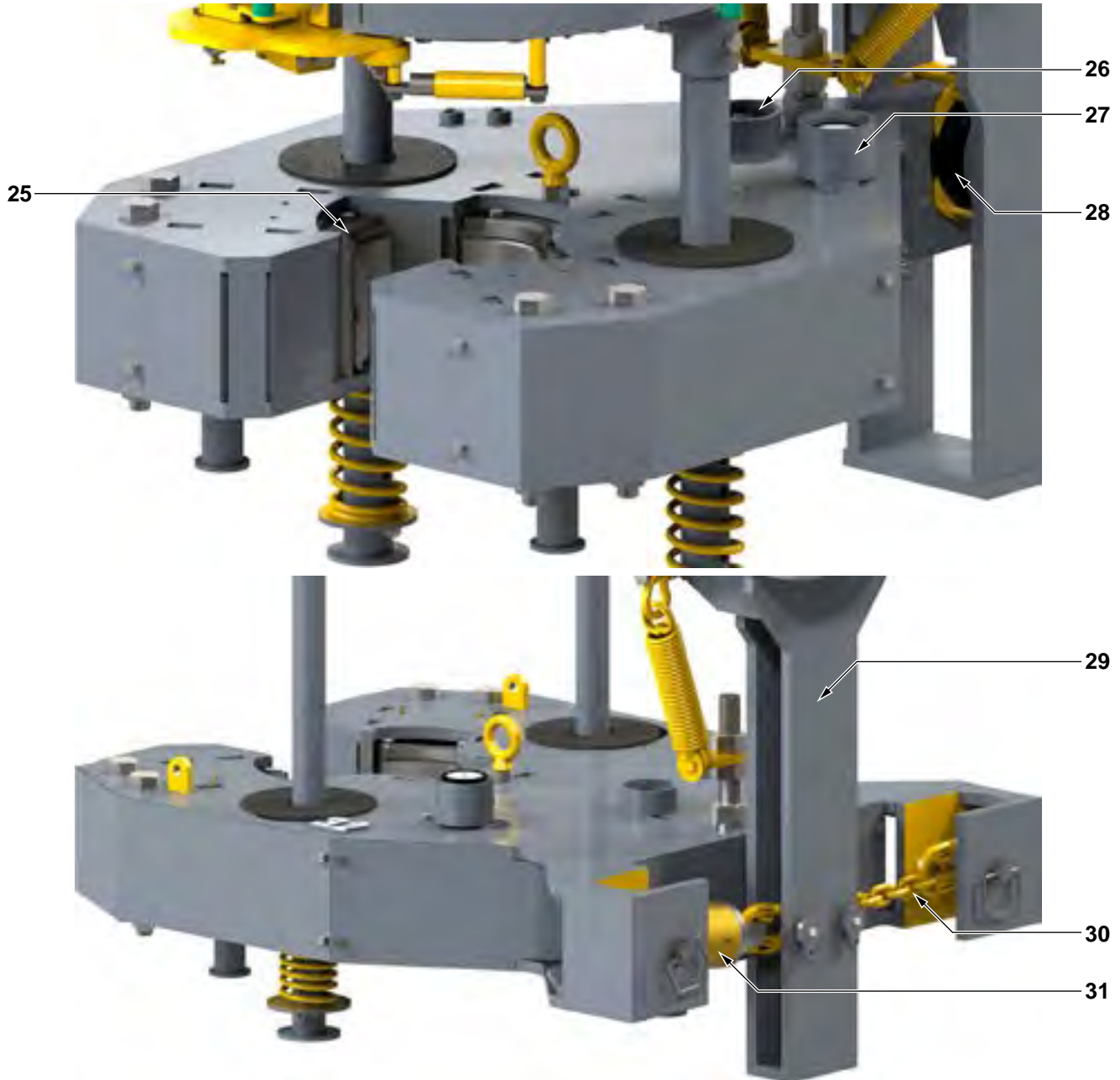


Illustration 2.1.4: KT8.625+CBU Component Identification 04

Item	Description
25	CLINCHER® cylinder with wraparound insert
26	CLINCHER® backup pressure adjustment
27	CLINCHER® backup pressure indicator
28	Compression load cell
29	Rear leg weldment, tension load cell configuration
30	Breakout chain assembly
31	Tension load cell

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	Gear			
	HI		LO	
PSI / MPa	lb-ft	Nm	lb-ft	Nm
1000 / 6.89	1800	2440	8900	12067
1500 / 10.34	3100	4203	15300	20744
2000 / 13.79	4400	5966	21600	29286
2285 / 15.75	5100	6915	25000	33895

MAXIMUM RATED TORQUE: 25,000 LB-FT / 33895 Nm

Speed Table

Flow (GPM/LPM)	Low Gear (RPM)	High Gear (RPM)
10 / 37.9	2.0	10.0
20 / 75.71	4.0	19.0
40 / 151.4	8.0	39.0
60 / 227.1	12.0	58.0

 **DANGER**

DO NOT EXCEED MAXIMUM SPECIFIED FLOW OR PRESSURE

HYDRAULIC REQUIREMENTS		Required hydraulic system pressure	2285 psi (15.75 MPa)
		Max allowable system pressure	2500 psi (17.25 MPa)
		Max allowable system flow	60 USGPM (227.1 LPM)
		Max allowable hydraulic return line pressure	200 psi (200 PSI (1.378 MPa)
Maximum dimensions	Length	Models 80-0615-10 & 80-0615-14	53- ³ / ₄ in (1.365 m)
		Model 80-0615-12	55- ⁵ / ₈ in (1.413 m)
	Length, door open	Models 80-0615-10 & 80-0615-14	64- ³ / ₄ in (1.664 m)
		Model 80-0615-12	61- ⁵ / ₈ in (1.565 m)
	Height	All models	76- ¹ / ₂ in (1.943 m)
	Width	All models	38 in (0.965 m)
Clearance, tong die to backup die		Model 80-0615-10	10- ¹ / ₂ in to 18 in (267 to 457 mm)
		Model 80-0615-12	20 in (508 mm) fixed
		Model 80-0615-14	12- ¹ / ₂ in to 20 in (318 to 508 mm)
		Maximum elevator diameter	Unlimited (tong comes off pipe)
		Space required on pipe	8 in (203.2 mm)
Torque arm length, pipe centre to anchor centre		Models 80-0615-10 & 80-0615-14	36 in (0.914 m)
		Model 80-0615-12	32 in (0.813 m)
		Gear reduction ratio, turn counter encoder to ring gear	1:10.67
Dead Weight (Approximate)		Model 80-0615-10	2,580 lb (1,172 kg), jaws not included
		Model 80-0615-12	2,610 lb (1,186 kg), jaws not included
		Model 80-0615-14	2,550 lb (1,159 kg), jaws not included
		Maximum rigid sling load	3,000 lb / 1,363 kg
		Sound level (dBA)	97 dBA @ 1m / 96 dBA @ 1m
		Tong/backup jaw availability	See Section 3.4
		Recommended spring hanger	85-0106HDS (Max Capacity = 5900 lb / 2681 kg)

 **DANGER**

ONLY USE SPRING HANGERS SUPPLIED BY MCCOY GLOBAL.

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)
Hydraulic fluid operating temperature range	86 - 140°F (30 - 60°C) - measured in main reservoir
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. If required, the gear fluid should meet 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.

2.4 CE NAMEPLATES

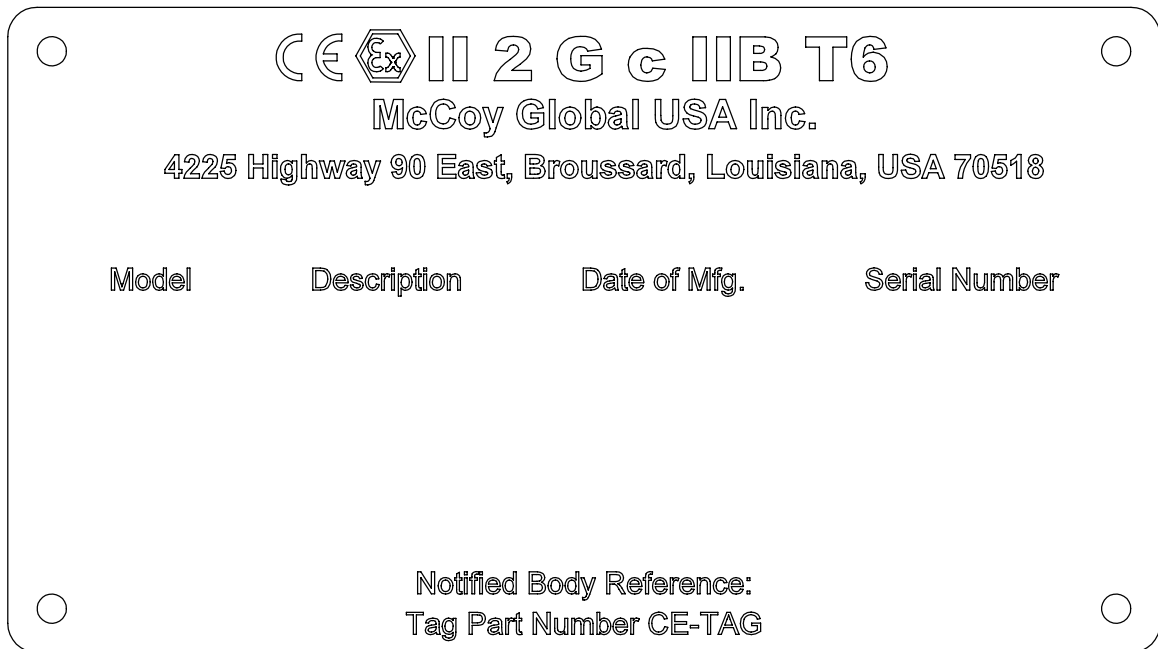
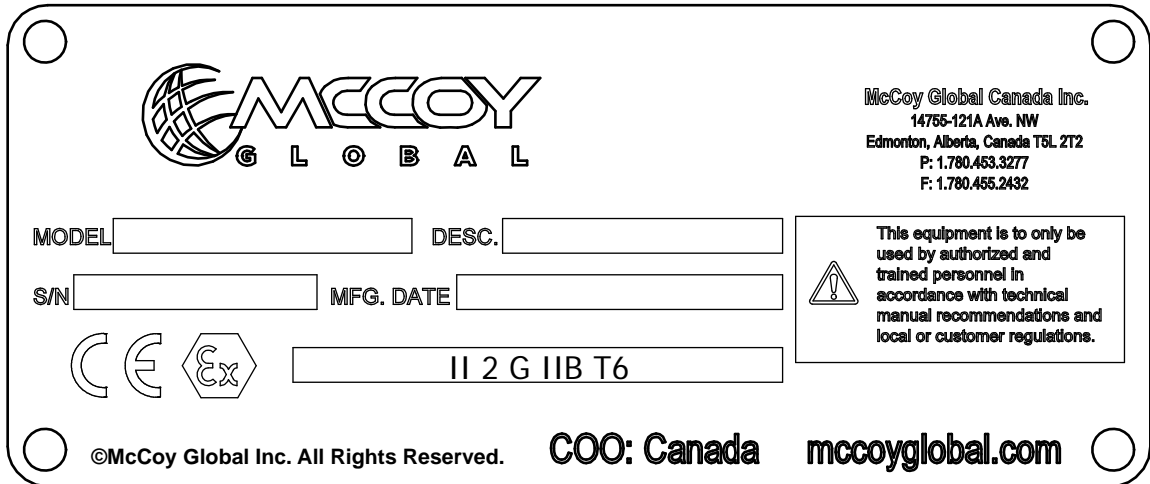


Illustration 2.4.1: CE Nameplates

CE CE compliant. Conforms with the essential requirements of the applicable Conformité Européenne directives.

Ex EU Explosive Atmosphere certified

II Equipment Group (surface, non-mining)

2 Equipment Category - high level of protection

GC Gas Group (Acetylene & Hydrogen) - Certified for use in an acetylene / hydrogen environment

T6 Maximum surface temperature of 85 °C.



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SECTION 3: INSTALLATION AND COMMISSIONING



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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 may have been factory-tested using hydraulic fluid that does not meet operational requirements of the end user, and variances in ambient temperature may have an effect on factory-adjusted components. McCoy Global recommends purging and flushing the hydraulic system before connecting to aftermarket hydraulic power systems.

Perform a complete lubrication of the equipment as outlined in section 5.5 “Lubrication Instructions”.

Test the rotation interlock (safety door) function. See section 4.2 “Pre-operational Checks” for instructions on properly testing the safety door and, if required, sub-section 5.6.3 “Safety Door Switch Adjustment” for instructions to properly adjust the safety door switch.

Test and (if required) adjust the operation of the brake bands. See sub-section 5.6.1 “Brake Band Adjustment” for instructions to properly test and adjust the brake bands.

Perform a complete functional test of the equipment. Note that rotating the power tong(s) without an applied load does not accurately reflect the performance of the tong. McCoy Global recommends performing a “stump test” in order to determine full functionality of the equipment under load before releasing to an operational environment, including successfully reaching the specified torque of the equipment.

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 assigned to a competent inspection body. McCoy recommends an inspection schedule similar to that listed in the following table.

Time / Interval	Test / Examination		
	Proof Load Test(s) ¹	Non-Destructive Examination (NDE) of Lifting Points	Thorough Visual Examination
Initial Certification By McCoy	YES	YES	YES
Interval Not Exceeding 6 Months	NO	At discretion of inspection body	YES
Interval Not Exceeding 12 Months	NO	YES	YES
Interval Not Exceeding 24 Months	YES	YES	YES
Following Substantial Repair or Alteration ²	YES	YES	YES

1. Load test(s) as established by end user's inspection criteria. McCoy recommends testing to two times MGW (maximum gross weight) or in the case of spring hangers, as indicated in Section 5.
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.

Refer to the following table to determine proper test load when pull-testing spring hangers,

Model Number	WLL (lbs)	WLL (kg)	Test Load (lbs)	Test Load (kg)
85-0106X (SX)	1200	544	2500	1133
85-0106XXH	2400	1088	5000	2267
85-0106HDS	5900	2676	7900	3583
85-0106HD	11500	5216	15500	7030
55-0000030	13,000	5906	36,000	16,356

! 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

Follow these instructions for safely and securely installing the lift cylinder. Where not supplied, use shackles that are safely rated for the maximum lifting capacity of the spring hanger.

! 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. Attach an appropriate shackle to the fixed end of the spring hanger. Ensure the nut securing the shackle bolt is secondarily retained by a cotter pin.
2. Use a crane to hoist the spring hanger by the shackle installed in the previous step. Install a second shackle to the rod end of the spring hanger. Ensure the nut securing the shackle bolt is secondarily retained by a cotter pin.
3. Lay the lift cylinder on its side near the hoisted spring hanger. Remove the two R-clips securing the clevis pin in the clevis of the lift cylinder, and remove the clevis pin.
4. Insert the shackle on the bottom of the spring hanger inside the lift cylinder clevis, and secure it in the clevis with the clevis pin. Replace the two R-clips in the clevis pin.
5. Hoist the lift cylinder and spring hanger.
6. If not already done, remove the supplied shackle from the lift cylinder.
7. Place the shackle around the master lifting link on the tong sling, and re-attach the shackle to the lift cylinder. Ensure the nut securing the shackle bolt is secondarily retained by a cotter pin.

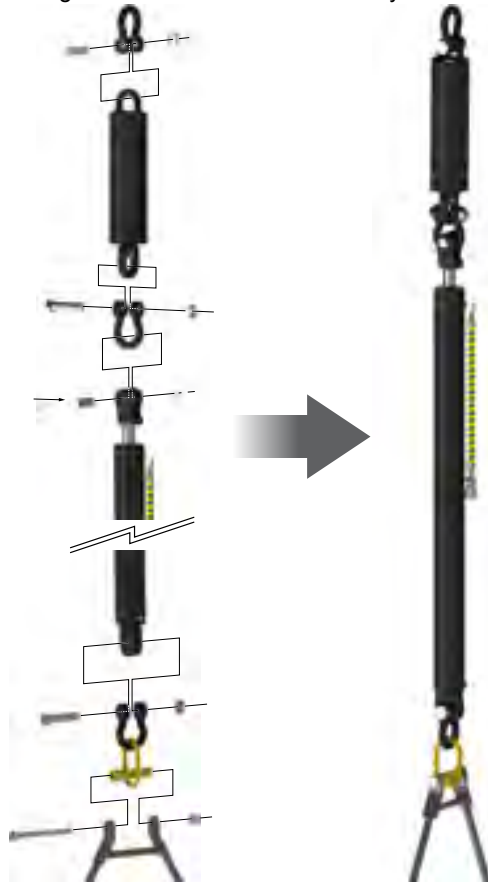


Illustration 3.2.1: Lift Cylinder & Spring Hanger Installation

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.

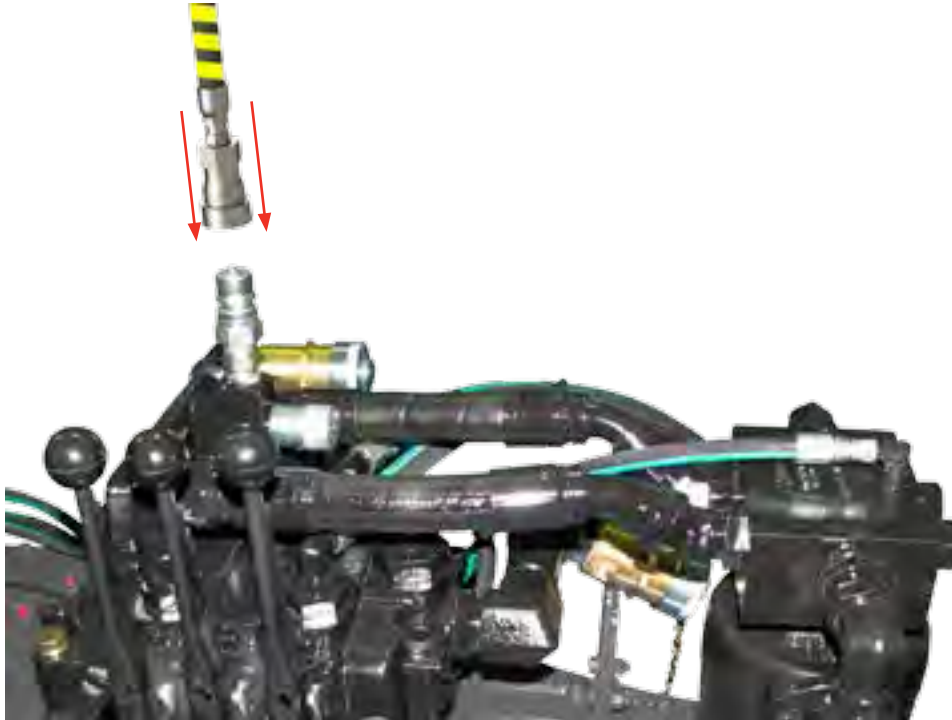


Illustration 3.2.2: Lift Cylinder Hydraulic Connection

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 through 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

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

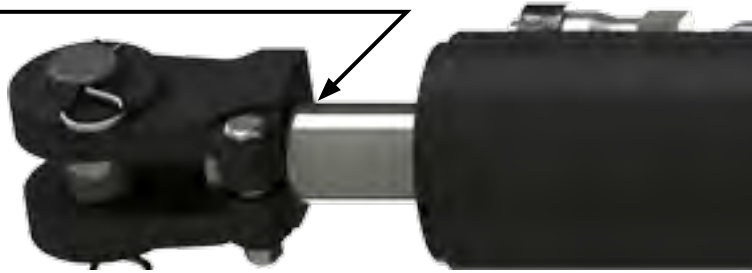


Illustration 3.2.3: Lift Cylinder Clevis Inspection

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 TUBULAR CONNECTION EQUIPMENT ON AND OFF WELL CENTRE.

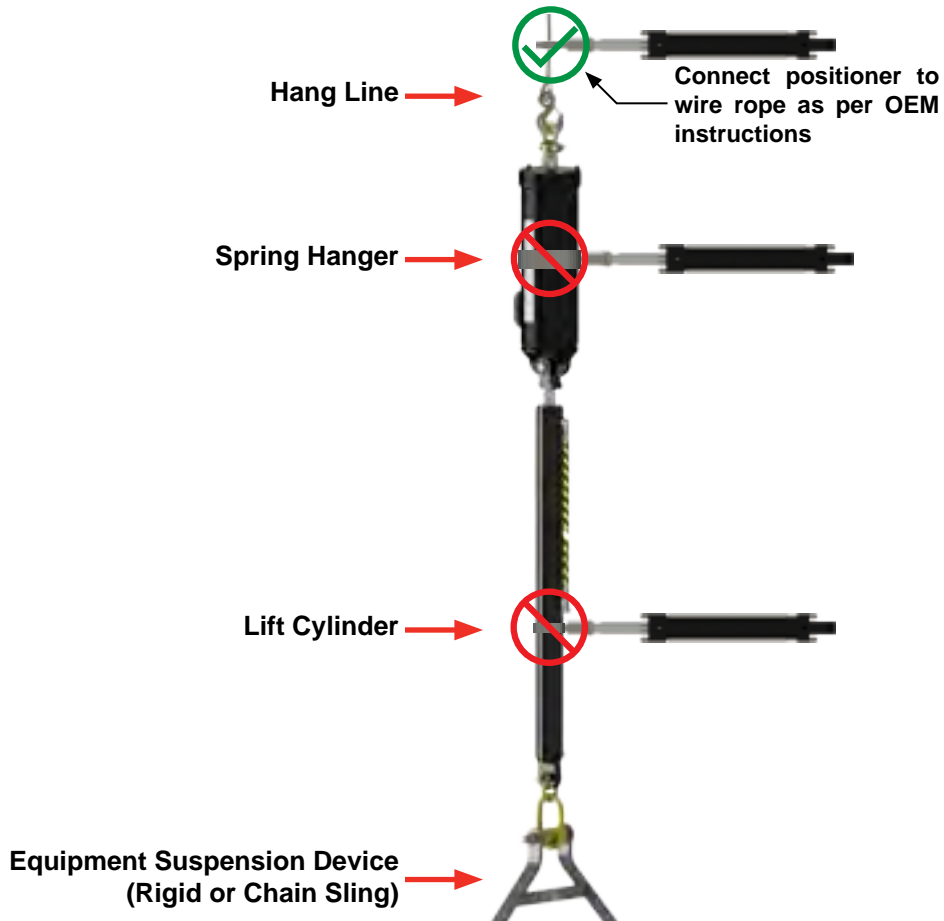


Illustration 3.2.4: Correct Installation of Positioning System

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 Schematics

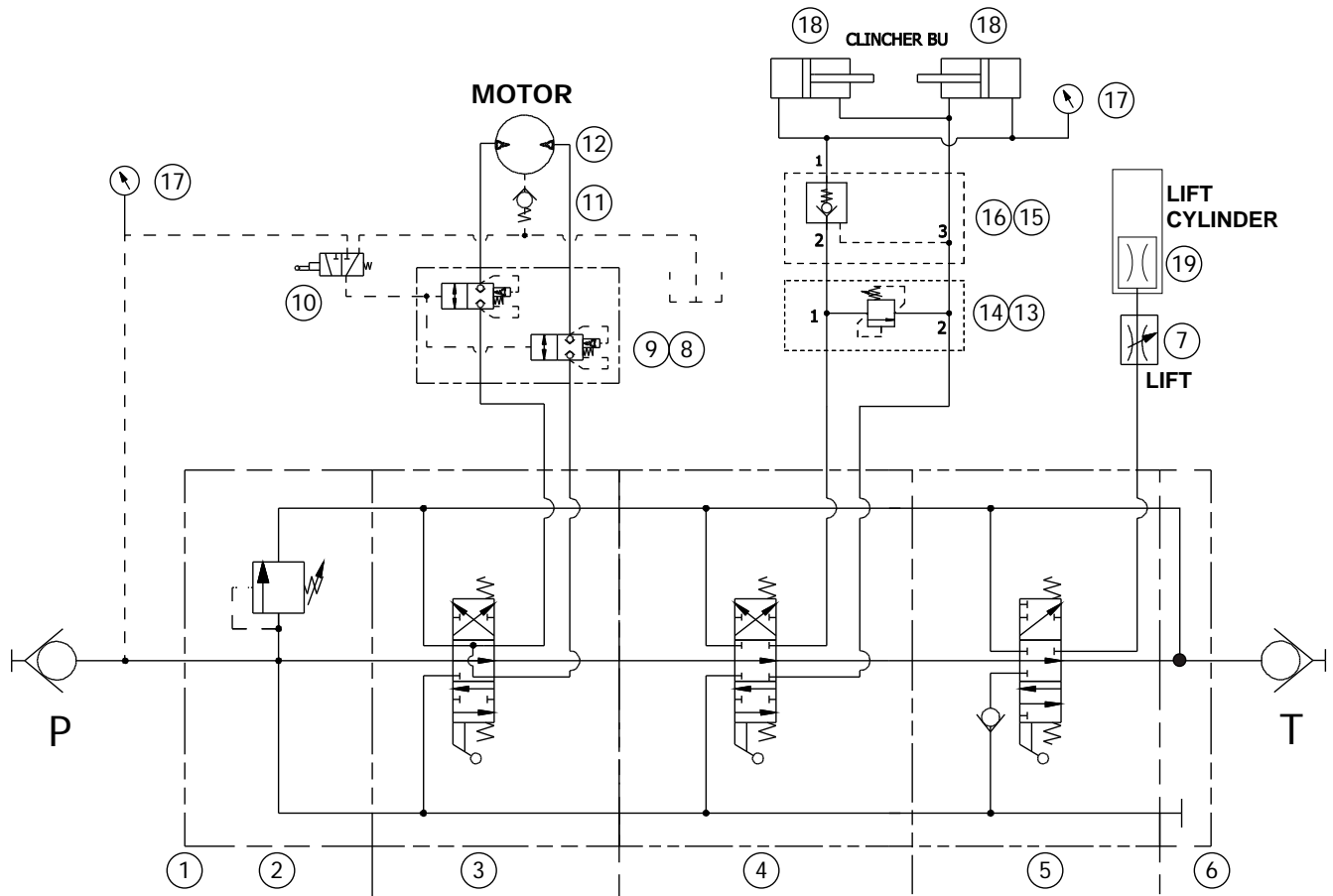


Illustration 3.3.1: KT8.625+CBU Hydraulic Schematic

! DANGER

DO NOT EXCEED MAXIMUM SPECIFIED FLOW OR PRESSURE. REFER TO THE SPECIFICATIONS IN SECTION 2

Item	Description	Part #	Item	Description	Part #
1	Inlet valve section	10-9016	11	Check valve	02-9022
2	Relief valve	10-0010R	12	Hydraulic Motor	87-0110
3	Motor valve section	10-9014	13	Relief Valve, Backup	08-1180
4	Backup clamp/unclamp valve section	10-9019	14	Relief Valve Block, Backup	08-1839
5	Lift cylinder valve section	10-9019	15	Check Valve, Backup	08-0481
6	Outlet section, SAE PORT	10-0086	16	Check Valve Block, Backup	08-1327
7	Flow control valve	08-9062	17	3000 psi Pressure Gauge	02-0245
8	Pilot-to-operate cartridge valve	08-1625	18	CLINCHER® Backup Cylinder	1403-00-00B
9	Door switch valve block	101-0727	19	Lift cylinder orifice	CE-ORIFICE
10	Door switch	02-E0190			

3.3.2 Hydraulic Component Identification



Illustration 3.3.2: Hydraulic Component ID 01



Illustration 3.3.3: Hydraulic Component ID 02

3.3.2 Hydraulic Component Identification (Continued):

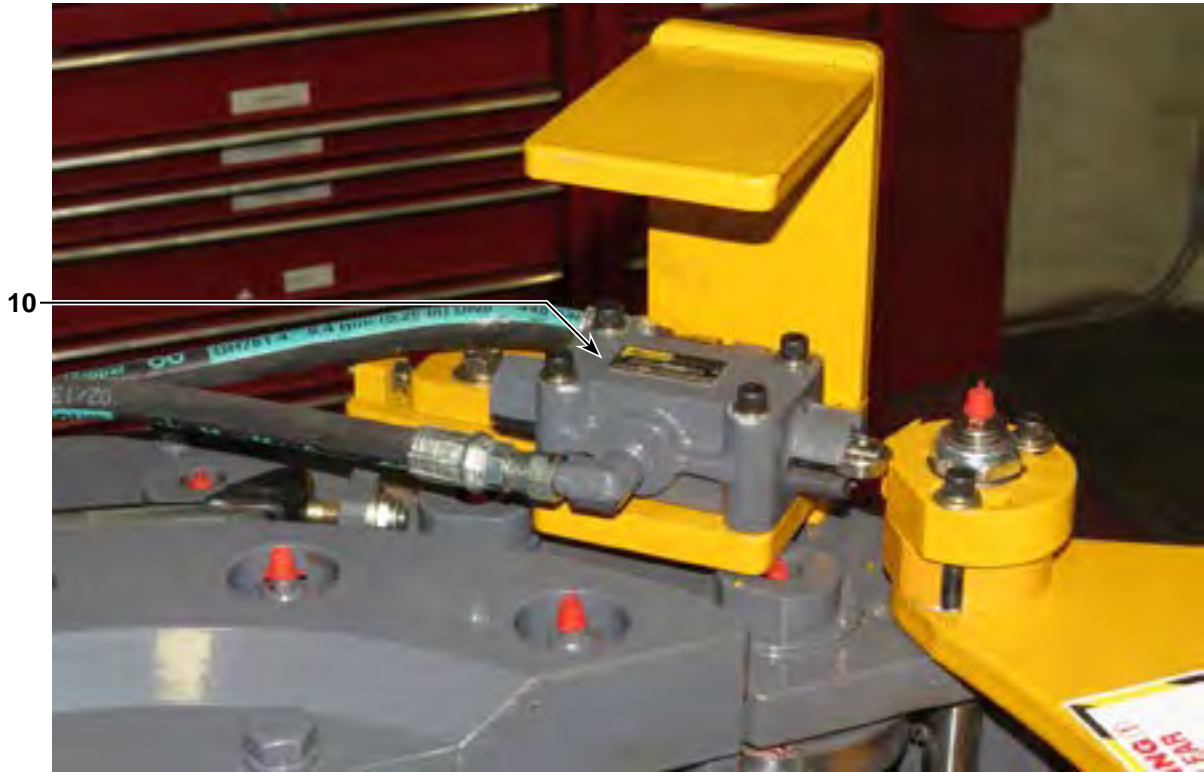


Illustration 3.3.4: Hydraulic Component ID 03

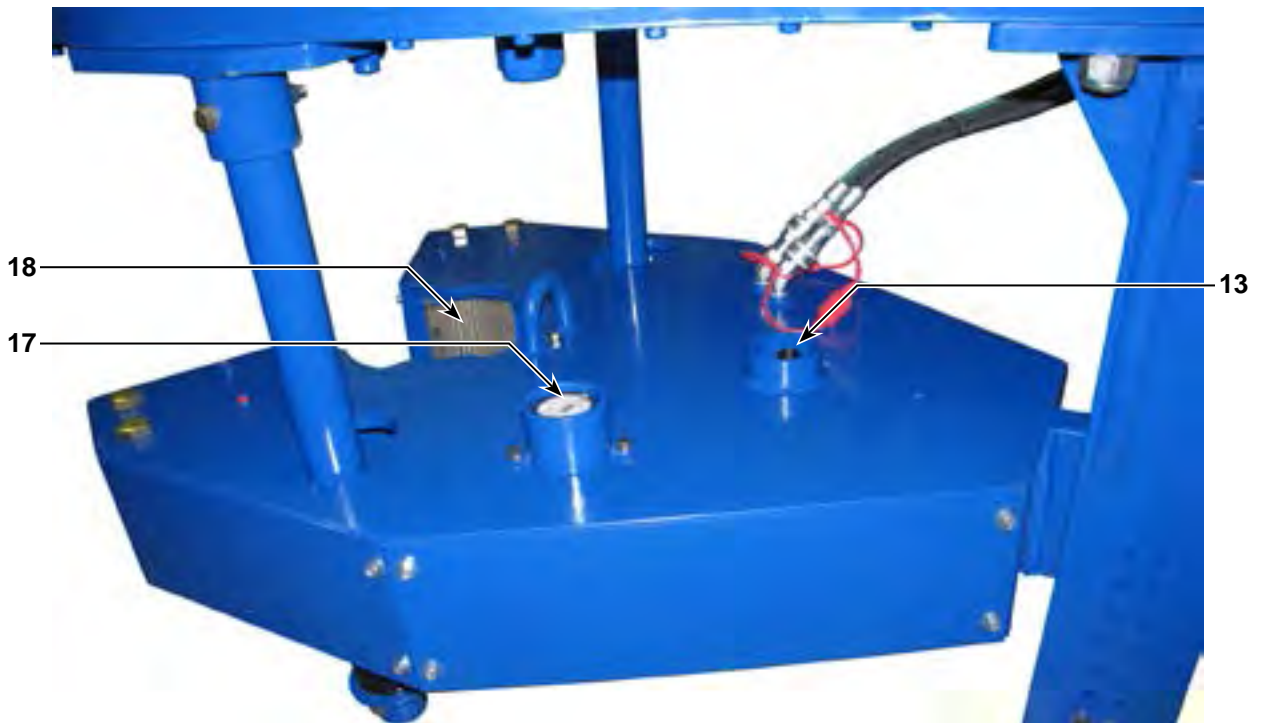


Illustration 3.3.5: Hydraulic Component ID 04

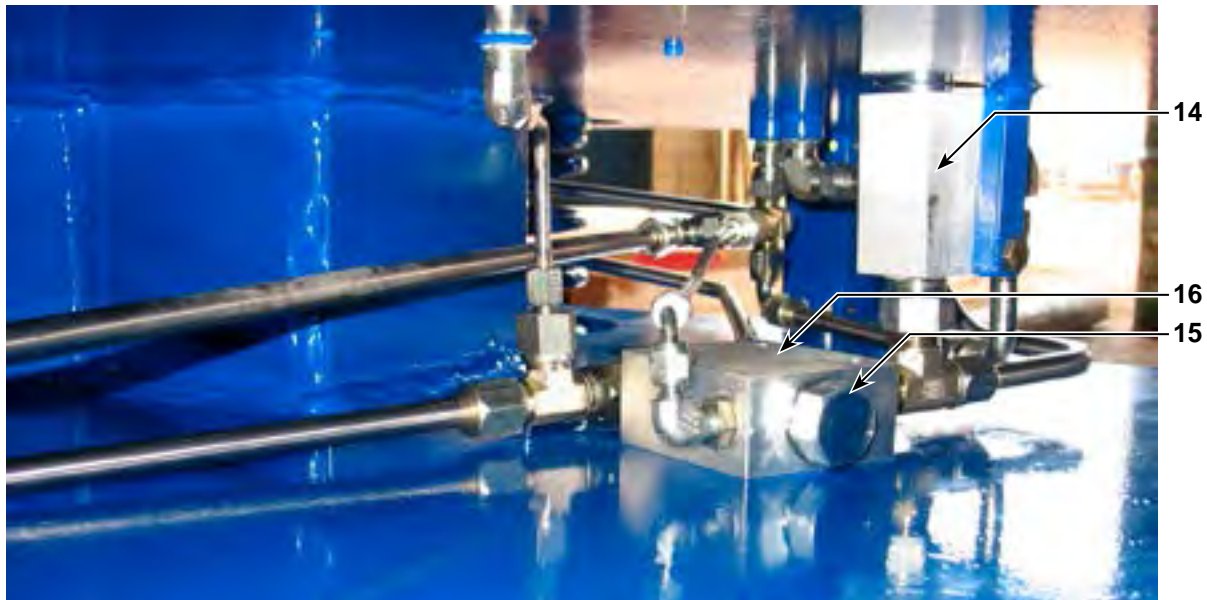


Illustration 3.3.6: Hydraulic Component ID 05

3.3.3 Main Hydraulic Connections

Supply hydraulic pressure to your equipment through the 1" hydraulic supply connection. A 1-1/4" return connection provides a return path to the power unit. Typically a 3/8" or 1/2" 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.

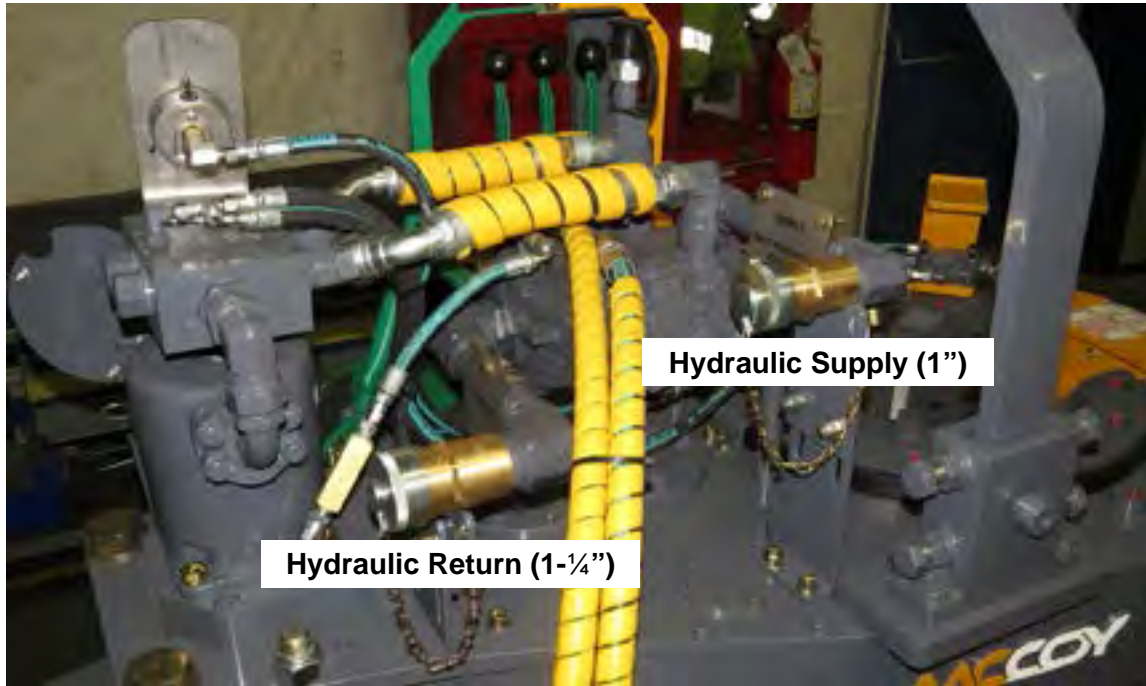


Illustration 3.3.7: Hydraulic Connections 01

3.3.3 Main Hydraulic Connections (Continued):

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.

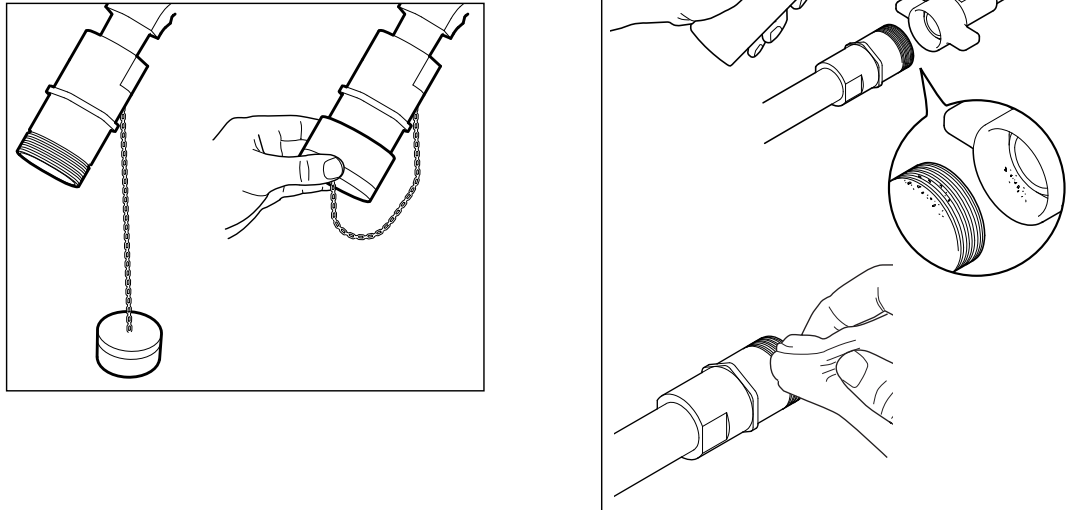


Illustration 3.3.8: Hydraulic Connections 02

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 (refer to illustration 3.3.9). 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.

3.3.3 Main Hydraulic Connections (Continued):

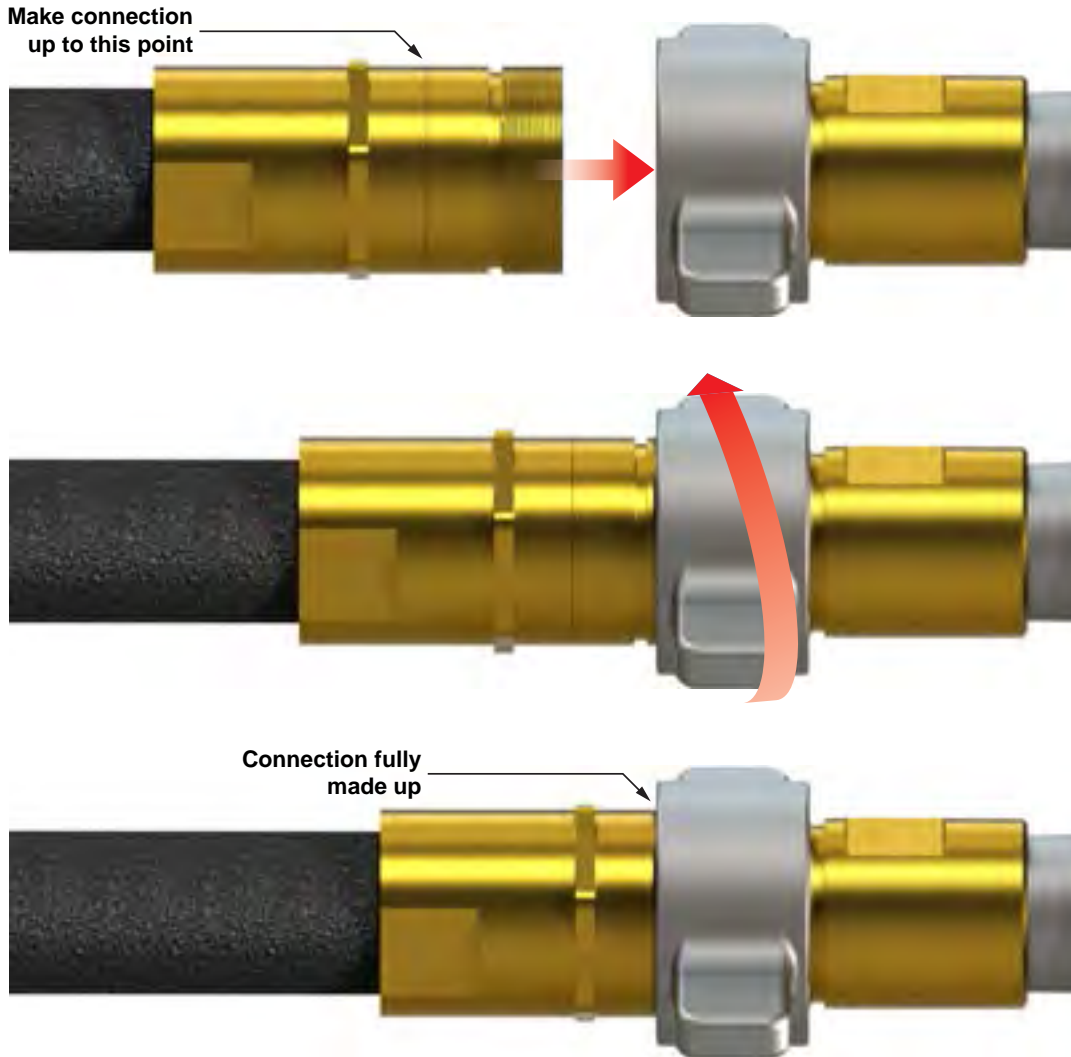


Illustration 3.3.9: Hydraulic Connections 03

⚠ CAUTION

MCCOY GLOBAL RECOMMENDS INSTALLATION OF A CLEARLY MARKED EMERGENCY STOP 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 in Section 5.4. 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 Section 5.4 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.

3.3.4 Hydraulic Circuit Description

Refer to the hydraulic schematic in section 3.3.1 for assistance identifying components described in this circuit description. Refer to the labels on the hydraulic control valve assembly to determine the proper direction of handle deflection required to achieve the desired hydraulic action.

The main hydraulic power source supplies hydraulic fluid to the hydraulic valve block inlet section through a 1" threaded positive-shutoff connection. Hydraulic fluid circulates through the inlet section, the motor control section, the optional lift section, and the outlet section at maximum tong pressure before returning to the hydraulic fluid reservoir (the "tank") through a 1-¼" threaded positive-shutoff connection. The system relief valve is factory adjusted to limit the maximum operating pressure of the tong to that which will allow maximum torque. Maximum operating pressure and maximum torque are listed in the specifications in Section 2.

The motor control valve section features proportional control. Actuating the valve handle on the motor control section directs hydraulic fluid to the hydraulic motor through the door switch cartridge integrated into the inlet valve causing rotation of the motor. During normal operation pilot pressure from the door switch directs pilot pressure to actuate the door switch cartridge, allowing full hydraulic power to the motor. The configuration of the plumbing between the motor valve section and the motor determines the direction of rotation for a given valve action. Moving the valve control handle to the "make" position supplies hydraulic pressure to the "clockwise rotation" side of the motor, which is the desired direction of rotation for making up a tubular connection. Conversely, moving the valve control handle to the "break" position supplies hydraulic pressure to the "counter-clockwise rotation" side of the motor, which is the desired direction of rotation for breaking out a tubular connection. Releasing the valve handle enables the valve to go to a neutral position, directing all hydraulic fluid to the outlet section and "back to tank". The proportional nature of the valve allows the motor speed to be controlled depending on the position of the valve, regardless whether the motor is being run in the make-up or break-out direction, or whether the motor is in the high speed or low speed state.

A check valve installed on the case drain line between the motor and the main tank return line, or the internal case drain, protects the motor from excess pressure in the event of blockage in the tank line.

The lift cylinder connects to the lifting string between the spring hanger and the master link on the equipment sling, and raises or lowers the equipment. Although the lift cylinder is designed to be a double-acting cylinder, normally only the "lift" side is connected to hydraulic pressure from the lift cylinder valve. Moving the valve control handle to the "lift" position supplies hydraulic pressure to the lift cylinder, causing the cylinder to retract and providing a lifting action. Moving the valve control handle towards the "lower" position allows a path back to tank through the control valve, allowing gravity to extend the cylinder and lower the equipment. However, in all cases users must check the direction labels on the hydraulic control valve to determine the valve deflection direction required to perform the desired hydraulic operation. Allowing the handle to go to neutral stops all hydraulic fluid movement to or from the lift cylinder. The position of the lift cylinder valve handle controls the rate at which the cylinder lowers the tong and backup assembly.

An internal check valve in the lift control valve section on the power tong prevents sudden drop of the tong in the event of hydraulic power failure. A speed-limiting orifice installed directly in the hydraulic inlet port of the lift cylinder 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.

Actuating the valve handle on the backup control section directs hydraulic fluid to the double-acting backup clamping cylinder. This is not proportional control, meaning that actuating the control valve enables a fixed hydraulic output to the cylinder. Moving the valve control handle to the "clamp" position extends the CLINCHER® cylinders to clamp the tubular for make-up or break-out operations. Moving the valve control handle toward the "release" position retracts the CLINCHER® cylinders, releasing the tubular from the backup jaws. Note that this is a "clamp-and-release" system. Releasing the control handle after extending and clamping the cylinders does not release the clamping pressure. The cylinders remain extended, pressurized and clamped to the tubular until the control valve is actuated in the opposite direction.

Hydraulic fluid at maximum tong pressure flows to the door switch. Fully closing the tong door allows the plunger in the door switch to fully extend, blocking the hydraulic path to tank and allowing a hydraulic pilot signal to the door switch element. The pilot pressure actuates the door switch cartridge, allowing full system pressure to the motor when the motor control valve is manipulated. Opening the door depresses the plunger on the door switch, diverting all hydraulic pressure at the door switch to the tank line, interrupting pilot pressure to the door switch cartridge valve. The door switch cartridge valve closes and inhibits system pressure to the motor. Full hydraulic power to the motor cannot be restored until the plunger on the door switch is extended by fully closing tong door.

Units equipped with a dump valve are monitored by the torque management system, which is connected to the dump valve by an electrical cable. Achieving user-specified torque during connection operations causes the torque management system to generate an electrical signal, energizing the solenoid in the dump valve body and opening the dump valve to "dump" system pressure directly to tank.

3.4 JAW AVAILABILITY & INSTALLATION

3.4.1 Jaw Availability

The following tables list 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 McCoy Global 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. Contact the McCoy Global 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®, 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. USE OF JAWS NOT SUPPLIED BY MCCOY MAY CAUSE JAW SLIPPAGE OR FAILURE, AND MAY RESULT IN DAMAGE TO THE TONG. THE USE OF REDUCER DIES IS NOT RECOMMENDED

 **DANGER**

USE OF ALUMINIUM DIES IN CE-MARKED EQUIPMENT IS FORBIDDEN

STANDARD JAW DIE KITS, 2-3/8" to 5"					
Description	Part Number	Weight (Per Single Jaw)	Jaw Pin	Jaw Roller	Jaw Die
2-3/8" Jaw Die Kit	1050-JDK-105	18 lb / 8.2 kg	1050-JP	SEE PP 7.22 - 7.23	12-0004
2-7/8" Jaw Die Kit	1050-JDK-110	18 lb / 8.2 kg	1050-JP		12-0007
3" Jaw Die Kit	1050-JDK-111	18 lb / 8.2 kg	1050-JP	1050-JR-2125	12-0011
3-1/8" Jaw Die Kit	1050-JDK-112	18 lb / 8.2 kg	1050-JP	1050-JR-2125	
3-3/8" Jaw Die Kit	1050-JDK-114	18 lb / 8.2 kg	1050-JP	1050-JR-2125	
3-1/2" Jaw Die Kit	1050-JDK-115	18 lb / 8.2 kg	1050-JP	1050-JR-2125	
3-5/8" Jaw Die Kit	1050-JDK-117	18 lb / 8.2 kg	1050-JP	1050-JR-2125	
3-7/8" Jaw Die Kit	1050-JDK-119	18 lb / 8.2 kg	1050-JP	1050-JR-2125	13-0008-314-0
4" Jaw Die Kit	1050-JDK-120	18 lb / 8.2 kg	1050-JP	1050-JR-2125	
4-1/8" Jaw Die Kit	1050-JDK-121	17.25 lb / 7.8 kg	1050-JP	1050-JR-2125	
4-1/2" Jaw Die Kit	1050-JDK-130	18 lb / 8.2 kg	1050-JP	1050-JR-2125	
4-3/4" Jaw Die Kit	1050-JDK-132	17.25 lb / 8 kg	1050-JP	1050-JR-2125	
5" Jaw Die Kit	1050-JDK-135	17 lb / 7.7 kg	1050-JP	1050-JR-2125	

 **DANGER**

1050-JDK-105 (2-3/8") AND 1050-JDK-110 (2-7/8") ARE TORQUE-LIMITED TO 5,500 LB-FT (7,457 NM). DO NOT EXCEED 5,500 LB-FT OF TORQUE WHEN USING THESE JAW DIE KITS.

 **DANGER**

1050-JDK-111 (3") TO 1050-JDK-135 (5") INCLUSIVE ARE TORQUE-LIMITED TO 10,500 LB-FT (14,236 NM). DO NOT EXCEED 10,500 LB-FT OF TORQUE WHEN USING THESE JAW DIE KITS.

3.4.1 Jaw Availability (Continued):

STANDARD JAW DIE KITS, 5- $\frac{1}{2}$ " to 8- $\frac{5}{8}$ "				
Description	Part Number	Weight (Per Single Jaw)	Jaw Roller Retainer	Jaw Roller
5- $\frac{1}{2}$ " Jaw Die Kit	1050-JDK-140-S	20.5 lb / 9.3 kg	101-6178	101-6177
5- $\frac{3}{4}$ " Jaw Die Kit	1050-JDK-142-S	19 lb / 8.6 kg	101-6178	101-6177
6" Jaw Die Kit	1050-JDK-143-S	19 lb / 8.6 kg	101-6178	101-6177
6- $\frac{1}{2}$ " Jaw Die Kit	1050-JDK-144-S	17 lb / 7.7 kg	101-6178	101-6177
6- $\frac{5}{8}$ " Jaw Die Kit	1050-JDK-145-S	16.5 lb / 7.5 kg	101-6178	101-6177
7" Jaw Die Kit	1050-JDK-150-S	15 lb / 6.8 kg	101-6178	101-6177
7- $\frac{1}{2}$ " Jaw Die Kit	1050-JDK-153-S	14 lb / 6.4 kg	101-6178	101-6177
7- $\frac{5}{8}$ " Jaw Die Kit	1050-JDK-155-S	13.25 lb / 6 kg	101-6178	101-6177
7- $\frac{3}{4}$ " Jaw Die Kit	1050-JDK-160-S	12.75 lb / 5.8 kg	101-6178	101-6177
8- $\frac{5}{8}$ " Jaw Die Kit	1050-JDK-165-S	13 lb / 5.9 kg	101-5840	101-5839
All jaw die kits 3- $\frac{5}{8}$ " and up use flat die PN 13-0008-314-0				

NOTICE

MCCOY JAW DIE KITS ARE DESIGNED TO GRIP DESIGNATED SIZES WITHIN API MAX/MIN TOLERANCES ONLY

3.4.2 Tong Jaw Die Replacement

Worn jaw dies can usually be replaced without removing the tong jaws. Replacement of dies is simple and straightforward, and may be performed on the drill floor in a few simple steps.

1. Remove hydraulic power from the equipment. Although opening the tong door inhibits rotation, McCoy Global recommends completely isolating the equipment 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. Rotate the jaw towards pipe centre to fully expose jaw die keeper fasteners. **NOTE:** die keeper fasteners may be located on the bottom of the jaw, depending upon jaw orientation at installation.
3. Extract the keeper fasteners and, if required, use a hammer and soft metal drive to lightly tap the worn dies from the top or bottom (depending on orientation) to remove.
4. Use a metal brush to clean the dovetail die slots.
5. Treat the new dies with anti-seize compound before installing.
6. Insert the new jaw dies in to the jaw(s), and secure in place using the keeper fasteners.

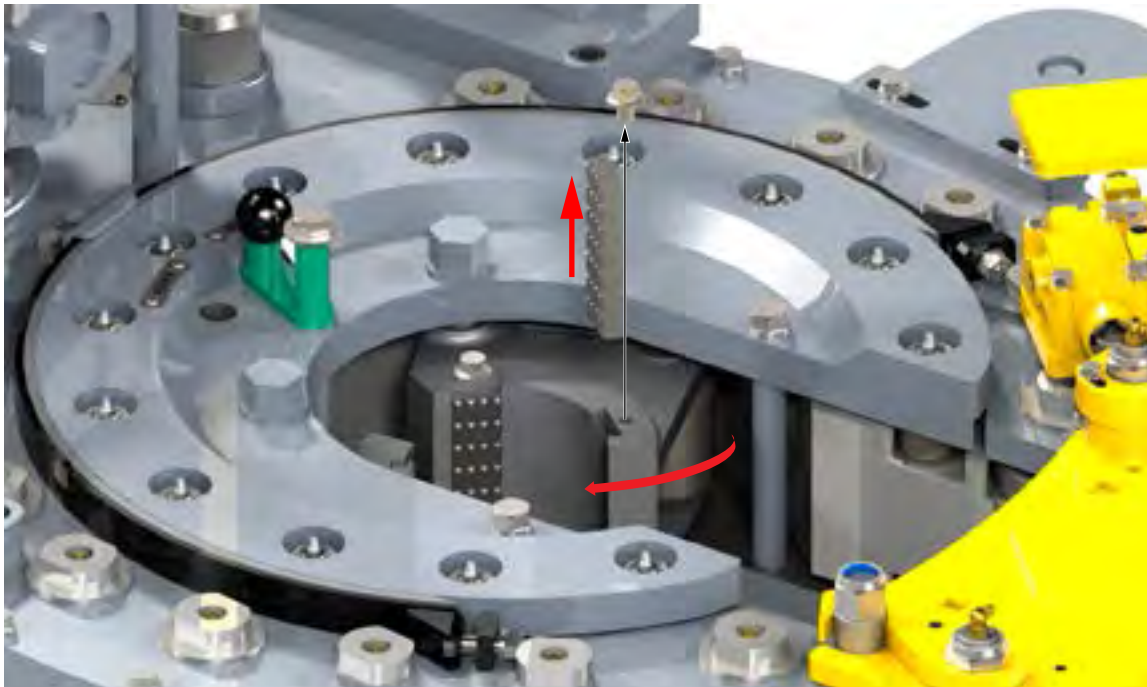


Illustration 3.4.1: Jaw Die Removal

3.4.3 Tong Jaw Installation & Removal

Tong jaws often require removal to change jaw size or replace worn jaw die inserts that are "stuck" in place. Follow these instructions to remove the tong jaws.

⚠ CAUTION

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

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

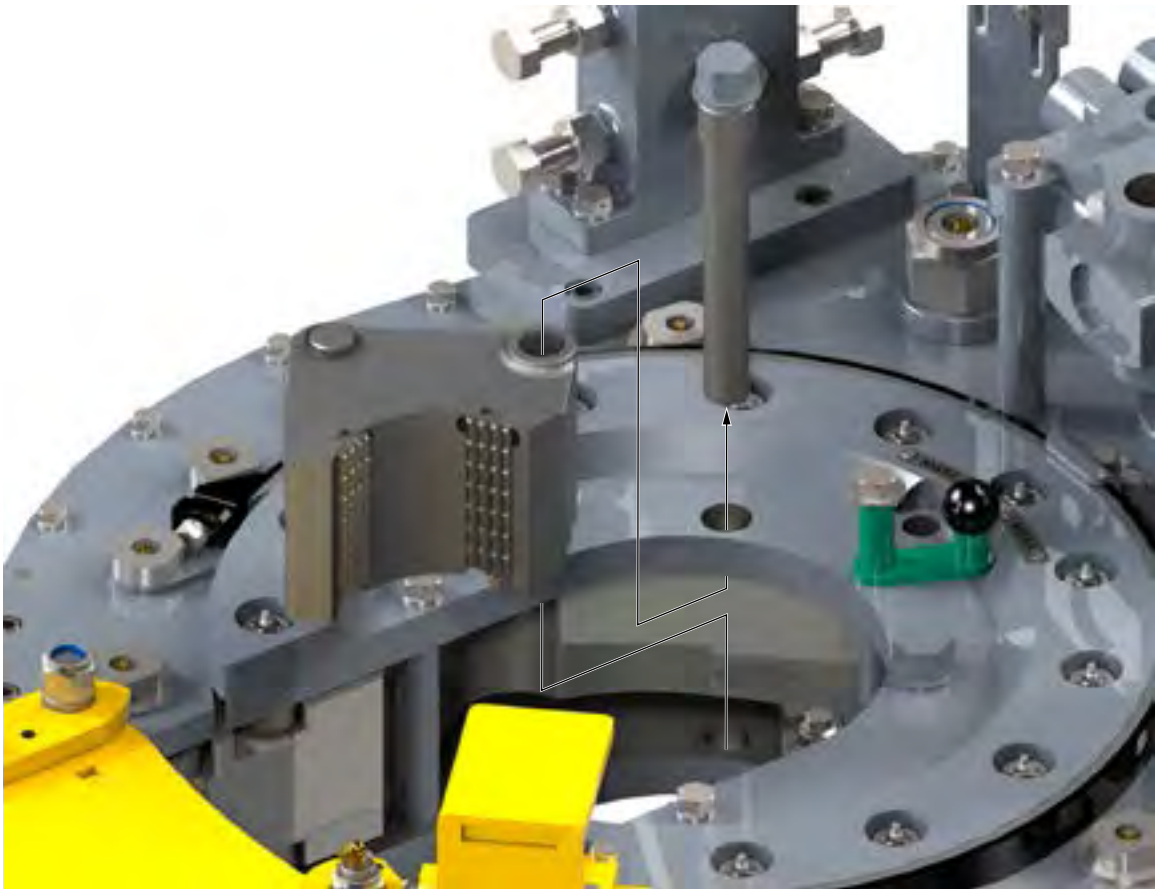


Illustration 3.4.2: Jaw Removal

5. Repeat steps 2 through 4 for the second jaw.
6. 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, and bearings, where applicable) may be removed and re-used, providing the subcomponents are free of damage. McCoy recommends referring to the illustrations of the exploded assemblies in section 7 for each type of jaw die kit under undergoing inspection and/or maintenance.

3.4.3 Tong Jaw Installation & Removal (Continued):

7. 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 the rotary gear during engagement with the tubular. If the roller turns freely, proceed directly to step 12. Rollers that do not freely rotate or are jammed must be freed before installing and using jaw assemblies.
8. 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.
9. 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.
10. Confirm all rotating components are undamaged and free from "flat spots".
11. 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.
12. Re-check the jaw roller to ensure that it turns freely.
13. Tong jaws are clearly marked with the size. Ensure the jaw to be installed is the proper size for the pipe to be run. Over-sized or under-sized jaws may result in jaw slippage, or cause the jaws to leave the end of the cam surface on the inside of the rotary gear. Additionally, incorrectly sized jaws will cause the pipe to be off-centre relative to the backup, resulting in eccentric rotation and potential pipe thread damage.

 **WARNING**

NEVER ATTEMPT TO CLAMP TUBULARS WITH INCORRECTLY SIZED JAWS. OPERATORS MUST BE AWARE OF THE SIZE OF TUBULAR TO BE GRIPPED AND THAT CORRECTLY SIZED JAWS AND DIES ARE INSTALLED. USE OF INCORRECTLY SIZED JAWS POSES A HAZARD TO PERSONNEL AND EQUIPMENT.

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

 **WARNING**

USE OF JAWS NOT MANUFACTURED BY MCCOY IS NOT RECOMMENDED, AND MAY RESULT IN JAW SLIPPAGE JAW FAILURE, OR DAMAGE TO THE CAMMING SURFACES OF THE ROTARY GEAR.

3.4.4 Backup Jaw Insert Availability

The following table lists all inserts that are available as standard sizes for all versions of the 7-⁵/₈ CLINCHER® backups. If your desired size is not listed, McCoy Global can engineer custom jaw sizes - contact sales for further information.

Description	Part Number	Description	Part Number
2.375" CLINCHER® Backup Insert	BUC76252375	4.50" CLINCHER® Backup Insert	BUC76254500
2.875" CLINCHER® Backup Insert	BUC76252875	4.75" CLINCHER® Backup Insert	BUC76254750
3" CLINCHER® Backup Insert	BUC76253000	5" CLINCHER® Backup Insert	BUC76255000
3.0625" CLINCHER® Backup Insert	BUC76253065	5.50" CLINCHER® Backup Insert	BUC76255500
3.125" CLINCHER® Backup Insert	BUC76253125	6" CLINCHER® Backup Insert	BUC76256000
3.230" CLINCHER® Backup Insert	BUC76253230	6.051" CLINCHER® Backup Insert	BUC76256051
3.25" CLINCHER® Backup Insert	BUC76253250	6.075" CLINCHER® Backup Insert	BUC76256075
3.375" CLINCHER® Backup Insert	BUC76253375	6.150" CLINCHER® Backup Insert	BUC76256150
3.40" CLINCHER® Backup Insert	BUC76253400	6.25" CLINCHER® Backup Insert	BUC76256250
3.4375" CLINCHER® Backup Insert	BUC76254375	6.375" CLINCHER® Backup Insert	BUC76256375
3.50" CLINCHER® Backup Insert	BUC76253500	6.40" CLINCHER® Backup Insert	BUC76256400
3.668" CLINCHER® Backup Insert	BUC76253668	6.5" CLINCHER® Backup Insert	BUC76256500
3.75" CLINCHER® Backup Insert	BUC76253750	6.625" CLINCHER® Backup Insert	BUC76256625
3.830" CLINCHER® Backup Insert	BUC76253830	6.75" CLINCHER® Backup Insert	BUC76256750
3.875" CLINCHER® Backup Insert	BUC76253875	7" CLINCHER® Backup Insert	BUC76257000
3.90" CLINCHER® Backup Insert	BUC76253900	7.5" CLINCHER® Backup Insert	BUC76257500
3.965" CLINCHER® Backup Insert	BUC76253965	7.565" CLINCHER® Backup Insert	BUC76257565
4" CLINCHER® Backup Insert	BUC76254000	7.625" CLINCHER® Backup Insert	BUC76257625
4.125" CLINCHER® Backup Insert	BUC76254125	7.656" CLINCHER® Backup Insert	BUC76257656
4.187" CLINCHER® Backup Insert	BUC76254187	7.75" CLINCHER® Backup Insert	BUC76257750
4.25" CLINCHER® Backup Insert	BUC76254250	8" CLINCHER® Backup Insert	BUC76258000

The following table lists all inserts that are available as standard sizes for the 8-⁵/₈" CLINCHER® backups used on model number 80-0615-14. If your desired size is not listed, Farr can engineer custom jaw sizes - contact sales for further information.

Description	Part Number	Description	Part Number
2.375" CLINCHER® Fine Tooth Die Insert	BUC86252375	5" CLINCHER® Fine Tooth Die Insert	BUC86255000
2.707" CLINCHER® Fine Tooth Die Insert	BUC86252708	5.5" CLINCHER® Fine Tooth Die Insert	BUC86255500
2.875" CLINCHER® Fine Tooth Die Insert	BUC86252875	6.075" CLINCHER® Fine Tooth Die Insert	BUC86256075
3.125" CLINCHER® Fine Tooth Die Insert	BUC86253125	6.5" CLINCHER® Fine Tooth Die Insert	BUC86256500
3.240" CLINCHER® Fine Tooth Die Insert	BUC86253240	6.625" CLINCHER® Fine Tooth Die Insert	BUC86256625
3.5" CLINCHER® Fine Tooth Die Insert	BUC86253500	7" CLINCHER® Fine Tooth Die Insert	BUC86257000
3.9" CLINCHER® Fine Tooth Die Insert	BUC86253900	7.413" CLINCHER® Fine Tooth Die Insert	BUC86257413
4" CLINCHER® Fine Tooth Die Insert	BUC86254000	7.625" CLINCHER® Fine Tooth Die Insert	BUC86257625
4.5" CLINCHER® Fine Tooth Die Insert	BUC86254500	7.681" CLINCHER® Fine Tooth Die Insert	BUC86257681
4.75" CLINCHER® Fine Tooth Die Insert	BUC86254750	8.625" CLINCHER® Fine Tooth Die Insert	BUC86258625
4.862" CLINCHER® Fine Tooth Die Insert	BUC86254862		

3.4.5 CLINCHER® Backup Jaw Removal/Installation

1. Extend CLINCHER® cylinders enough so that the hex flat-head cap screws securing the die retainer tabs are well exposed. Turn off or disconnect hydraulic power.

! DANGER

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

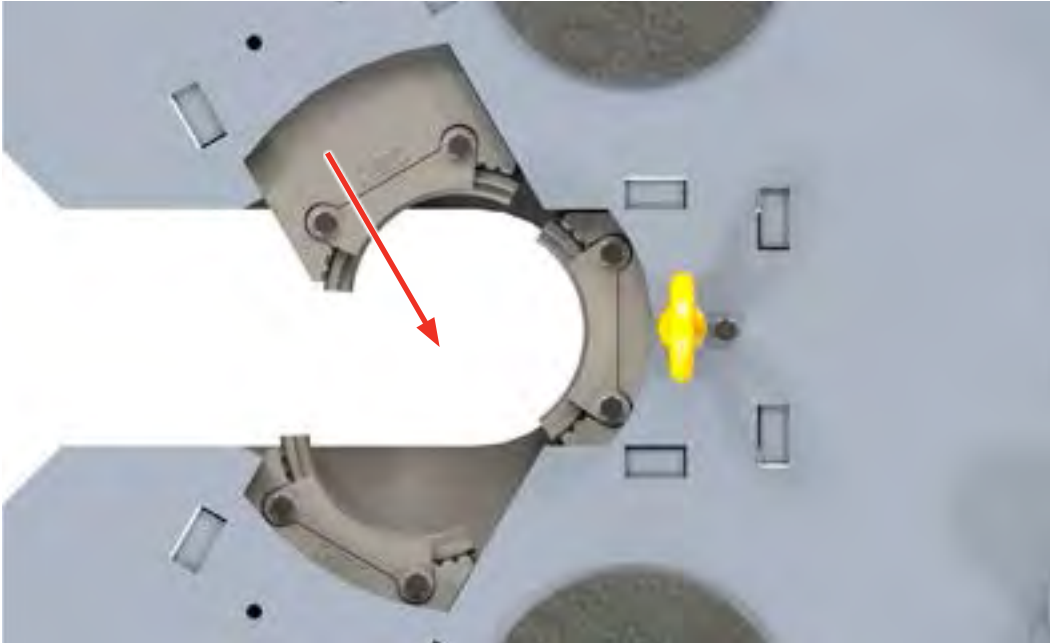


Illustration 3.4.3: CLINCHER® Cylinder Extension

2. Remove the two hex flat-head cap screws securing the die retainer tab on the top of the CLINCHER® die.
3. Remove the top die retainer tabs.
4. Slide the die straight up, and remove.

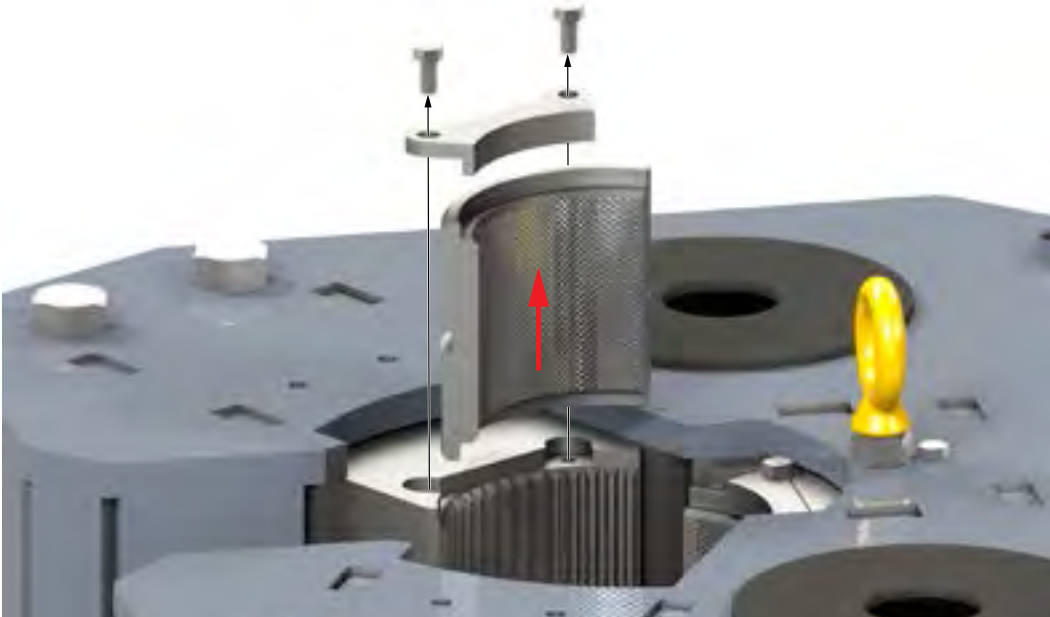


Illustration 3.4.4: CLINCHER® Backup Wraparound Die Removal / Installation

3.4.5 CLINCHER® Backup Jaw Removal/Installation (Continued):

5. Remove the die from the rear jaw by removing the single hex bolt securing the rear jaw assembly and sliding the rear jaw forward enough so that the die retainer fasteners are exposed.. Remove the die following the same procedures as for the CLINCHER® cylinders.

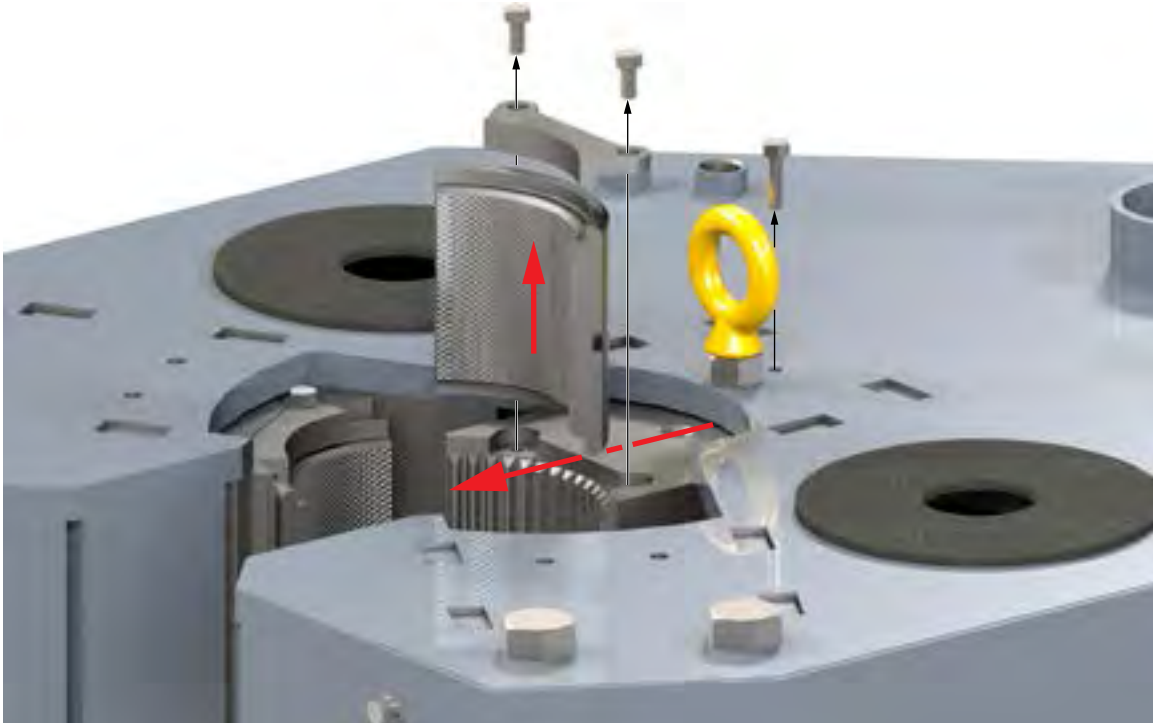


Illustration 3.4.5: CLINCHER® Backup Rear Jaw Extension

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. The following table lists the working load limit (WLL) and test load for McCoy spring hangers. In all cases hang lines must be rated to support the total weight of the suspended equipment PLUS the additional force imparted as a result of spring hanger deflection. **For application purposes consider the “test loads” listed below as being the maximum total weight of equipment plus spring hanger deflection force.**

Model Number	WLL (lbs)	WLL (kg)	Test Load (lbs)	Test Load (kg)
85-0106X (SX)	1200	544	2500	1133
85-0106XXH	2400	1088	5000	2267
85-0106HDS	5900	2676	7900	3583
85-0106HD	11500	5216	15500	7030
55-0000030	13,000	5906	36,000	16,356

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 tong and backup assembly in use. Snub lines will arrest uncontrolled movement of the tong and backup in the event slipping of the backup jaws. 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 25,000 lb-ft. tong with a 36 inch (3 ft) torque arm will generate 8,333 lb 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 backup assembly, and tied off to a suitably rated anchor. When properly installed the snub line should be taut enough to allow very little movement, preventing the tong from generating excessive force on the lines by “snapping” tight when rotation is applied.



MCCOY GLOBAL ACCEPTS NO RESPONSIBILITY FOR DESIGNING AND SELECTING AN ADEQUATE SUSPENSION AND RESTRAINT SYSTEM FOR YOUR 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

Leveling the tong side-to-side and front-to-rear at well-center is essential 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 axially (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. Use a thin wrench on the flat of the adjusting helix to rotate the helix in the direction required for side-to-side leveling of the tong, forcing the lift link to move in the appropriate direction toward the outer supports of the sling. The $\frac{3}{4}$ " nylock nut on the pin may have to be slightly loosened to allow the helix to rotate.

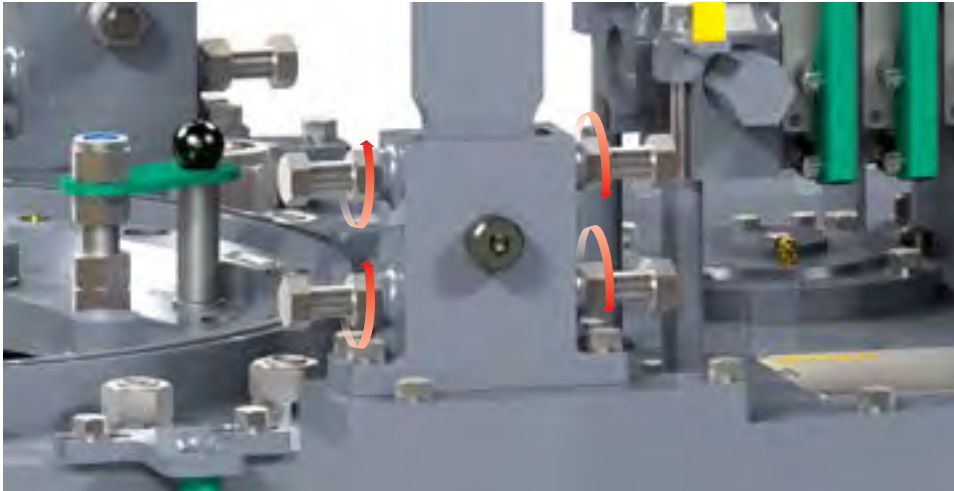


Illustration 3.5.1: Tong Leveling 01

4. Repeat steps 1 through 3 until the level shows that the tong is level side-to-side at well-center.
5. Position the equipment with the center of the rotary assembly over well center (in the correct operating position for making or breaking connections).
6. Place a level lengthwise (front to back) along the tong as near to well center as possible, ensuring that it remains parallel with the top plate of the tong. Note whether the front-to-back level requires adjustment, and move the equipment back to the drill floor.

3.5.2 Tong Leveling (Continued):

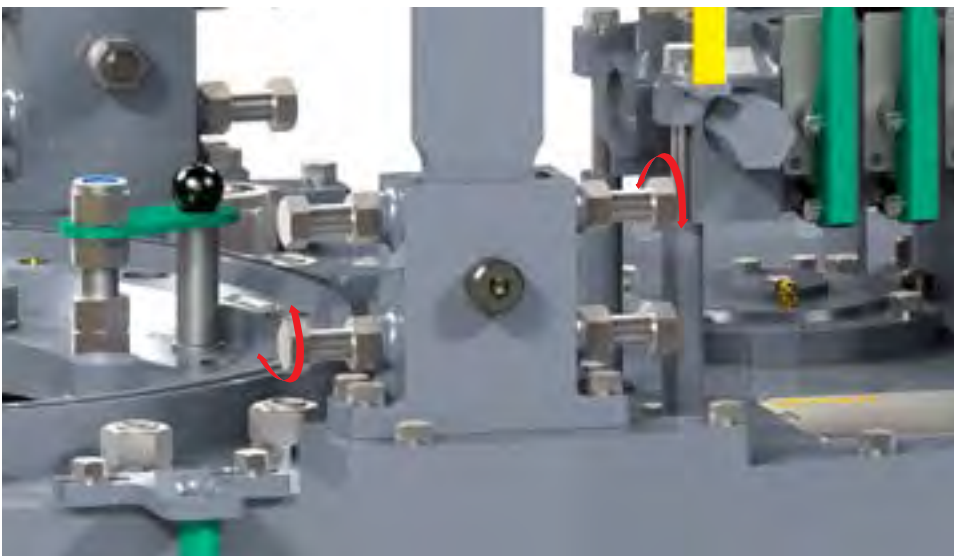
7. Loosen the four $\frac{3}{4}$ " locking nuts on the adjusting bolts on both rigid sling brackets (total of eight nuts). Completely loosen all four adjusting bolts in each bracket (total of eight bolts - see illustration 3.5.2).

**Illustration 3.5.2: Tong Leveling 02**

8. Adjust the appropriate pair of adjustment bolts on each bracket to level the top plate. For example, adjusting the top rear and the bottom front adjustment bolts (as shown in illustration 3.5.3) raises the nose of the tong, while adjusting the top front and bottom rear adjustment bolts lowers the nose of the tong. Adjust the bolts in each rigid sling bracket simultaneously and equally. Tighten the locking nuts on the four bolts used for adjustment

⚠ CAUTION

ADJUST LEFT AND RIGHT RIGID SLING LEVELING ADJUSTMENTS SIMULTANEOUSLY AND EQUALLY

**Illustration 3.5.3: Tong Leveling 03**

9. Thread the remaining four adjustment bolts (two per side) in to the adjustment brackets until they make contact with the rigid sling weldment with the brackets. Tighten the remaining four locking nuts.
10. Repeat steps 5 through 9 until the equipment is level front-to-rear at well center. Double-check that the equipment has remained level side-to-side.

3.5.3 Compression Load Cell Configuration

The backup is directly coupled to the compression load cell via the backup body paddle. The load cell hanger is simply hung on the paddle and secured through the top of the “U” by a bolt and washer set, and in normal operation does not need to be adjusted or removed. The assembly in the first of the following two illustrations has been configured in the “make-up” configuration; to convert the assembly to the “break-out” configuration remove the bolt and washer set securing the load cell holder to the paddle, and move the entire assembly to the other side of the paddle.

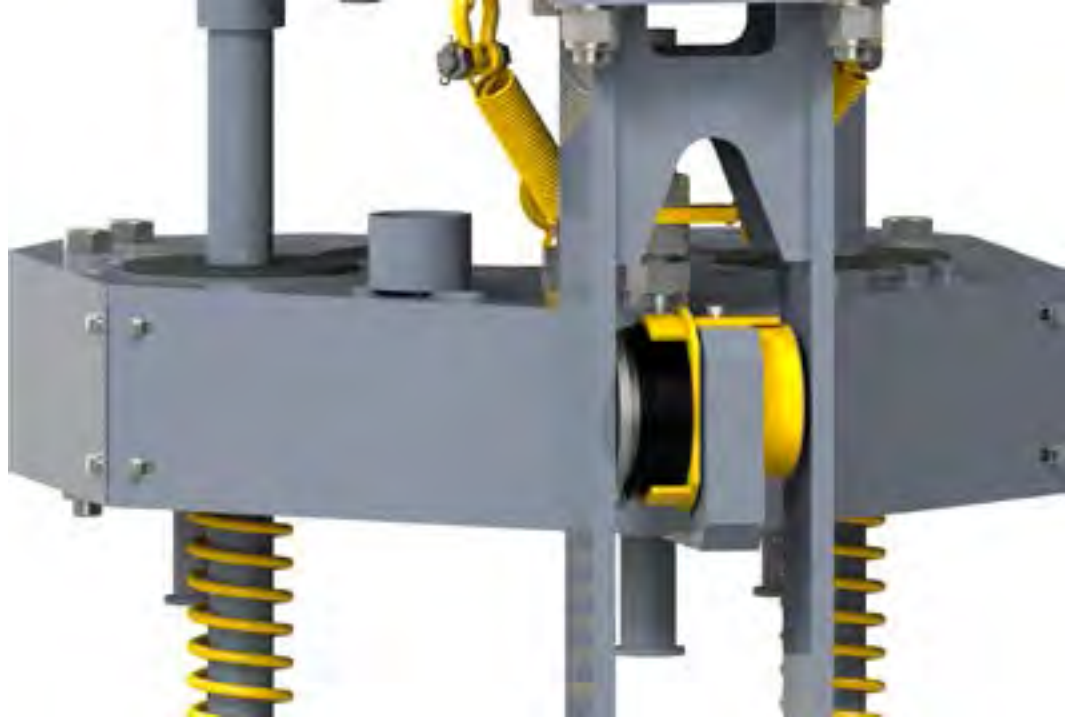


Illustration 3.5.4: Load Cell Configuration, Make-Up

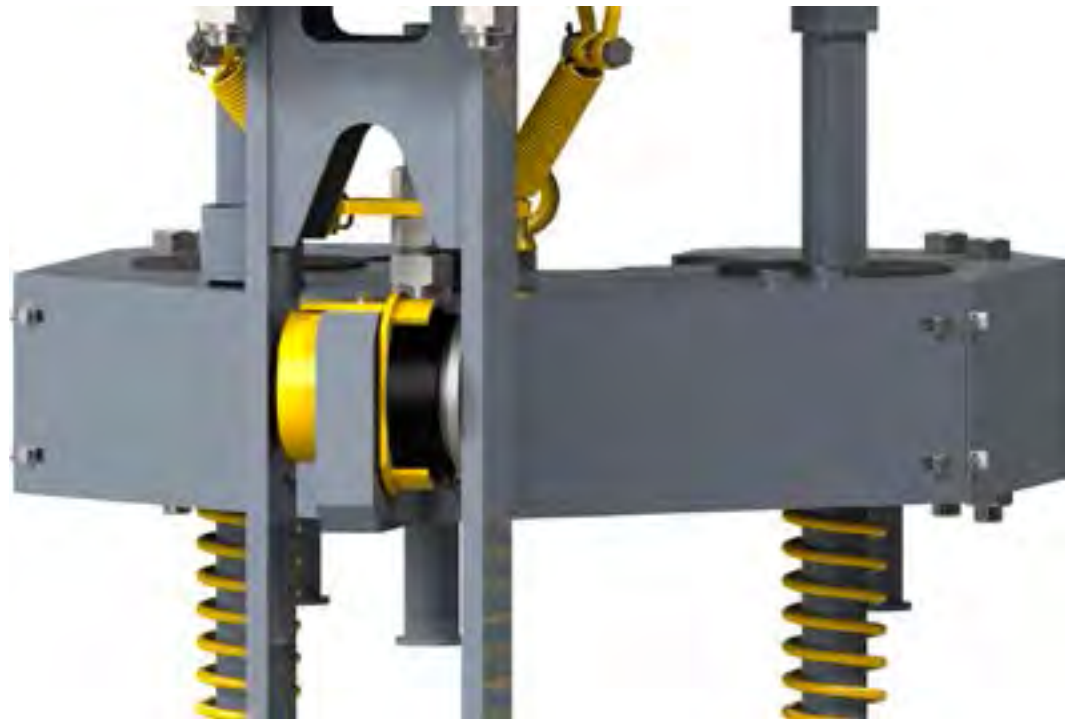


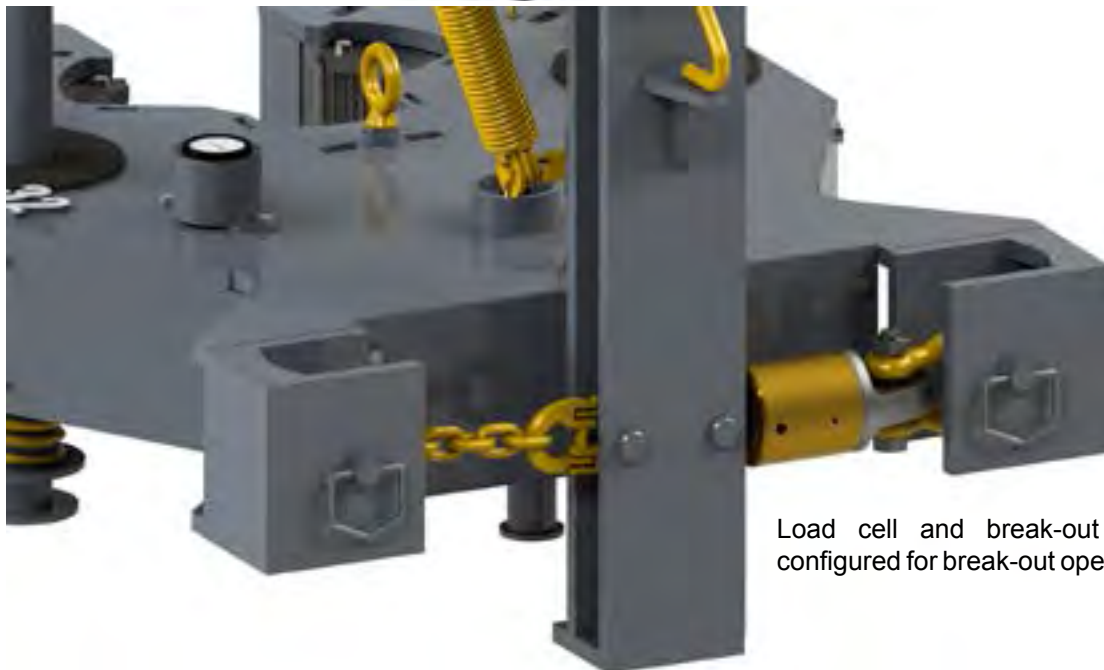
Illustration 3.5.5: Load Cell Configuration, Break-Out

3.5.4 Tension 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.

To change the torque measurement configuration (make up to break out or visa versa) remove the pins anchoring each on of the load cell or break-out chain assemblies, move each assembly to the opposite side. Replace all four anchor pins, ensuring the break-out chain and load cell assemblies are each secured to the rear leg assembly and backup assembly. For your reference Illustration 3.5.6 shows how to correctly configure the load cell for make-up and break-out operations.

Load cell and break-out chain configured for make-up operations



Load cell and break-out chain configured for break-out operations

Illustration 3.5.6: Tension Load Cell Configuration

3.5.5 Backup Height Adjustment

Occasionally the height of the CLINCHER® requires adjustment. This simple procedure is accomplished without special tools. Note that the height of backup model number 85-0606, equipped with a tension load cell, is fixed and cannot be changed.

NOTICE

THE HEIGHT OF BACKUP MODEL NUMBER 85-0606, EQUIPPED WITH A TENSION LOAD CELL, IS FIXED AND CANNOT BE ADJUSTED.

1. Determine the distance the backup requires raising or lowering.
2. Identify the holes (one per leg) in the front leg to which the support bolt must be moved to accommodate the distance determined in step 1. If your assembly is equipped with the 8- $\frac{5}{8}$ " CLINCHER™ backup (model number 85-0507), new position holes in the rear leg must also be identified at this time
3. Construct a sturdy structure that will support the entire weight of the backup (weight = 875 lbs / 398 kg). The height of the structure must be high enough to remove all compression from the front leg springs, but not too high that the structure on top of the backup will impact the bottom of the tong.
4. Use a crane to hoist the tong and backup. Lower on to the support structure constructed in Step 5c until the legs of the tong are on the work surface and the backup is fully supported.
5. Support the front leg springs (weight = 7.5 lb / 3.4 kg) and remove the bottom support bolt and nut set from each front leg.
6. Slide the bottom spring support washers and the leg springs so they are just above the hole identified in Step 2, and insert the support bolts through the new holes. Secure with the nylock nuts.
7. Adjust the rear height of the backup:

7- $\frac{5}{8}$ " BACKUP MODEL 85-0604

- use a crane to hoist the tong and backup assembly straight up and off the support, and place on the work surface next to the support.
- to raise the rear of the backup loosen the bottom 1- $\frac{1}{4}$ " nut on the rear backup spring support assembly (see Pp 7.50 - 7.51) and thread it approximately one inch down the threaded support rod. Use a box end or crescent wrench to turn the top 1- $\frac{1}{4}$ " nut clockwise, forcing the spring suspension bracket down, lifting the rear of the backup. When the backup is level, thread the lower nut up to the bottom of the spring suspension bracket and tighten in place.
- to lower the rear of the backup loosen the bottom 1- $\frac{1}{4}$ " nut. Use a box end or crescent wrench to turn the top 1- $\frac{1}{4}$ " nut counter-clockwise, allowing the rear of the backup to lower. When the backup is level thread the lower nut up to the bottom of the spring suspension bracket and tighten in place.

8- $\frac{5}{8}$ " BACKUP MODEL 85-0607

- support the rear spring assembly (weight = 8.5 lbs / 3.9 kg) and remove the bottom support nut and bolt sets securing the assembly within the rear leg.
- slide the rear spring support assembly up or down until the bolt holes align with the adjustment holes identified in Step 5b.
- insert the bottom support bolts through those holes and the support assembly, and secure with nylock nuts.
- use a crane to hoist the tong and backup assembly straight up and off the support, and place on the work surface next to the support. Install the backup die inserts. If the front and rear leg spring support bolts have been equally adjusted the backup will remain level, and the adjustment procedure is complete.

NOTICE

THE BACKUP MUST BE LEVEL WHEN PERFORMING TUBULAR CONNECTIONS

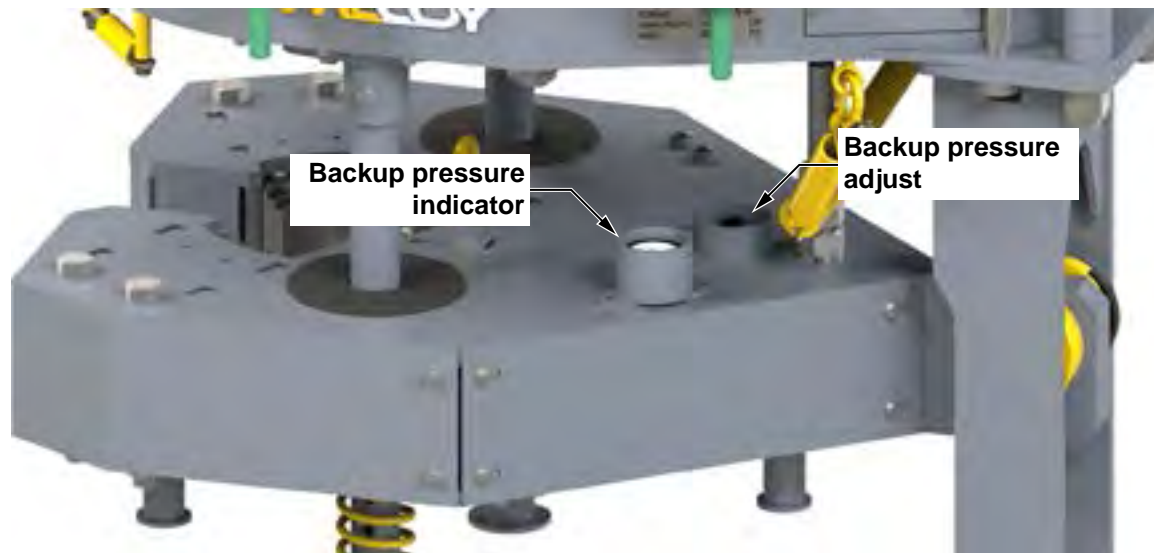
3.5.6 Adjusting Backup Clamping Pressure

The clamping pressure of the backup requires occasional adjustment to compensate for wear of the backup jaw die inserts and for re-setting the backup pressure to factory specification when new die inserts are installed. Occasional lowering of the backup clamping pressure may be required for thin-walled pipe or tubing, or if you are using the backup in non-marking applications.

A wide variety of operating conditions prevents McCoy from recommending an ideal backup pressure for any one type of pipe or joint; rather, the ideal pressure is only identified through a combination of “trial and error” and the operating manager’s best estimate based on their own experience.

Use this procedure to check and adjust the backup pressure:

1. Connect the equipment to an active hydraulic fluid power source to perform this procedure.
2. Use the backup clamp control valve to fully extend the backup clamp cylinders (see section 4 for valve operating procedures). When the cylinders are fully extended **do not** release the valve handle - maintain hydraulic pressure on the cylinders.
3. The backup pressure indicator displays current backup clamping pressure. Rotate the relief valve handle clockwise to increase the backup pressure, and rotate the relief valve handle counter-clockwise to decrease the backup pressure.



Maximum backup pressure is the system pressure (as displayed on the system pressure indicator on the tong), or 2500 PSI (17.232 MPa), whichever is lower. Never exceed a clamping pressure of 2500 PSI (17.232 MPa).

WARNING

BACKUP CLAMPING PRESSURE MUST NEVER EXCEED 2500 PSI (17.237 MPA)

4. When the desired pressure has been set release the pressure to the backup cylinders, and use the backup clamping valve to retract the cylinders.
5. Perform enough test connections to determine that the backup pressure is adequate for making up and breaking out joints within the current application. If pipe slippage or crushing is observed repeat the backup pressure adjustment procedure.



SECTION 4: OPERATION



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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. Contact McCoy Global to learn what operator training is available for this equipment. 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 Global recommends that a hazard assessment of the work area and affected equipment 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.

The door switch system is the primary device protecting the tong operator and nearby personnel from the rotary gear. Confirm the correct operation of the door switch before every job. Never disable the door switch.



DANGER

NEVER DISABLE OR BYPASS THE TONG DOOR SWITCH 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. The 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 Valve Operation

4-way proportional valves control operation of hydraulic devices on the tong assembly such as hydraulic motors and cylinders. When any one valve is "centered" or in the detent position, there is no hydraulic output from the valve. When the valve is pushed forward there is an effect, and when the valve is pulled back, there is an opposite effect. These valves feature proportional control, which means that further extension of the valve handle (thereby further opening the valve orifice) results in proportionally higher hydraulic output to the controlled device. McCoy Global recommends checking the labels attached to the control valves to determine the hydraulic effect caused by a specific deflection of the control valve handles.

The following illustrations demonstrate the type and normal effect of the hydraulic valves with which this tong may be equipped.

4.0.3 Valve Operation (Continued):**TONG MOTOR**

This is a proportional valve. Pushing the valve handle forward will cause the tong motor to rotate in a clockwise direction (as seen from the top of the tong). This is the desired direction of rotation for making up a joint. Pulling the valve handle in the opposite direction results in counter-clockwise rotation, which is the desired direction of rotation for breaking out a joint. Releasing the valve handle will cause the tong to immediately stop rotation.



Illustration 4.0.1: Hydraulic Control - Tong Motor

LIFT CYLINDER

This is a direct-acting valve. Moving the lift cylinder control valve handle in the “LIFT” direction retracts the lift cylinder, causing the equipment to lift. Moving the valve handle in the “LOWER” directions opens a hydraulic path through a check valve installed in the lift cylinder control valve section back to tank, allowing gravity to lower the equipment. An orifice installed in the connected lift cylinder hydraulic port limits the maximum speed the equipment can lower in the event of a ruptured hydraulic line or a failure of a hydraulic component.

A needle valve mounted on the lift cylinder hydraulic line allows the operator to manually adjust the raising and lowering speed of the equipment within the permanent equipment limitations.

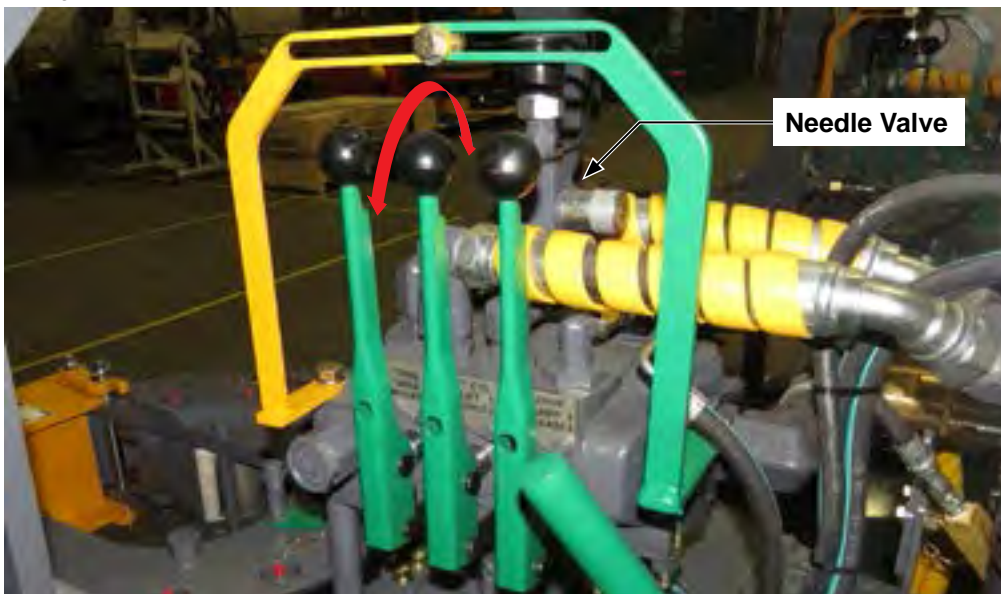


Illustration 4.0.2: Lift Cylinder Control Valve

4.0.3 Valve Operation (Continued):**BACKUP**

Moving the backup control handle in the “CLAMP” direction extends the backup cylinders and clamps on to the tubular. This is a “clamp and release” action, meaning that the control handle does not require constant deflection in the “CLAMP” direction to maintain backup clamping force. Moving the control handle in the “RELEASE” direction retracts the backup clamp cylinders, releasing the tubular.



Illustration 4.0.3: Backup Control Valve

4.0.4 Shifting Gears

The shifting shaft has three “detent” positions identifying the low speed/high torque position, the “neutral” or free-spinning position, and the high speed/low torque position. The detent strength may be adjusted by releasing the locknut on the detent tube and increasing or relaxing pressure on the detent spring. Ensure the locknut is tightened once the desired detent pressure has been set.

To shift to the high-speed gear, move the shifting handle DOWN from neutral position. To shift to the low-speed gear, move the shifting handle UP through the neutral detent to its HIGHEST position. 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. The most effective way of achieving this is to apply a small amount of pressure on to 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

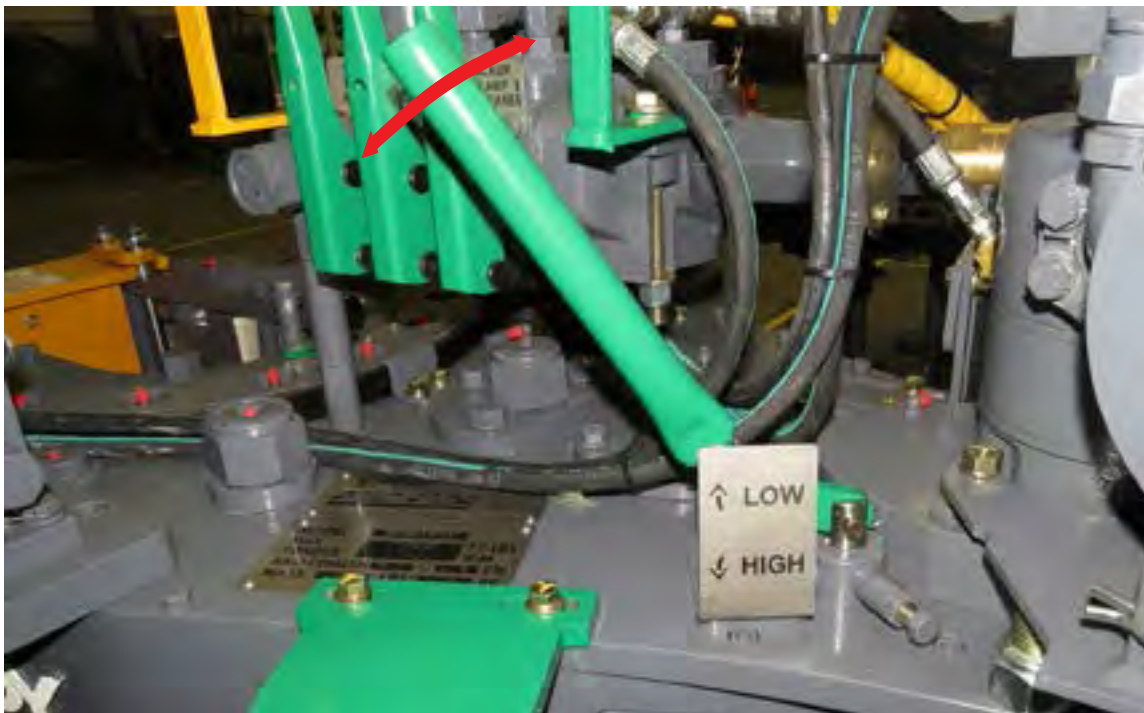


Illustration 4.0.4: Shifting Gears

4.0.5 Pre-Operational Checks

McCoy Global 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 Pg. 2.10., and the hydraulic connections from the power source are properly and securely made up (see sub-section 3.3.2). Do not neglect to connect the motor drain line.
2. Energize hydraulic power to the equipment. 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.

CAUTION

MCCOY GLOBAL RECOMMENDS INSTALLATION OF A CLEARLY MARKED EMERGENCY STOP 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.
8. Test the tong door sensor/shutdown (door switch) system. The door switch system is an integral safety feature that must not be bypassed or disabled. Operating the power tong with a malfunctioning or non-operating door sensor/shutdown system exposes the operator and rig personnel to potentially fatal injury. Do not operate tong with a malfunctioning or non-operating door sensor/shutdown system. Routinely testing the sensor/shutdown system operation before mobilizing and at each shift change ensures protection of drill floor personnel.

A rotating tong potentially stores a large amount of kinetic energy in the gear train. Testing the sensor/shutdown system by 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

TESTING THE SENSOR/SHUTDOWN SYSTEM BY 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

The following procedure outlines the correct, safe procedure for testing the door sensor/tong shutdown system on a McCoy Global power tong. Using the correct testing procedure ensures the sensor/shutdown system is fully functional without exposing the equipment to a shock load or personnel to a potential hazard. The tests also verify that the shut down valve is positively sealing and rules out the possibility that contaminated hydraulic fluid or erosion is preventing the valve from completely shutting off the motor's supply of hydraulic fluid.

- i. Stop all tong rotation.
- ii. Shift the tong to low gear (see sub-section 4.0.4).
- iii. Open the tong door.

Continued on next page....

4.0.5 Pre-Operational Checks (Continued):

- iv. Gradually attempt to turn the tong using the rotation control handle. Continue to gradually move the handle until the valve is fully stroked, and hold for 30 seconds. Verify the ring gear does not rotate while the rotation control is engaged. **PROCEDURAL NOTE:** a very small amount of ring gear movement is acceptable as the cartridge valve seats to stop rotation.
- v. Release the valve handle and allow the valve to go to the neutral position. Gradually attempt to turn the tong in the opposite direction until the valve is fully stroked, and hold the handle in the fully stroked position for 30 seconds. Verify the ring gear does not rotate while the rotation control is engaged. **PROCEDURAL NOTE:** a very small amount of ring gear movement is acceptable as the cartridge valve seats to stop rotation.
- vi. Ensure tong door is fully opened. Move the rotation control handle to approximately 50% of its full stroke. Have an assistant slowly close the tong door while continuing to hold the directional control valve at 50%. Rotation should commence only once tong door is fully closed.

If the door switch system does not operate as designed, the door switch may require adjustment, or further troubleshooting of the door switch system may be required. See Section 5.6.5 for door switch adjustment procedures, and Section 6.2 for door switch troubleshooting instructions.

**DANGER**

DO NOT OPERATE TONG WITH A MALFUNCTIONING OR NON-OPERATING DOOR SWITCH SYSTEM.

The door switch is protected from impact by a sturdy metal guard, painted yellow. This guard must be inspected before each use of the tong. All components of the guard must be in place, and all fasteners securing the guard must be intact and tight. Ensure wire ties (where applicable) on door switch components are present and secure, and do not show signs of tampering.

4.0.6 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.

3. 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.
4. DO NOT employ the “snap break” method of breaking-out joints when pulling a string. The extremely high stress placed on the gear train causes gear breakage.

**WARNING**

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

5. Considerations when operating your equipment in temperatures below 0°C (32°F) or above 40°C (104°F):
 - Consult the power unit engine operator’s manual for operating procedures and precautions when operating in extreme temperatures.
 - Select gear and bearing lubricants and hydraulic fluids that are 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. Refer to the following sections:
- 3.2 - Lift Cylinder Installation
- 3.3.4 - Hydraulic Connections
- 3.4 - Tong & Backup Jaw Installation
- 3.5 - Equipment Configuration and Leveling
- 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. The master link on the rigid sling must be used to suspend the tong. Do not suspend the tong from any other point.

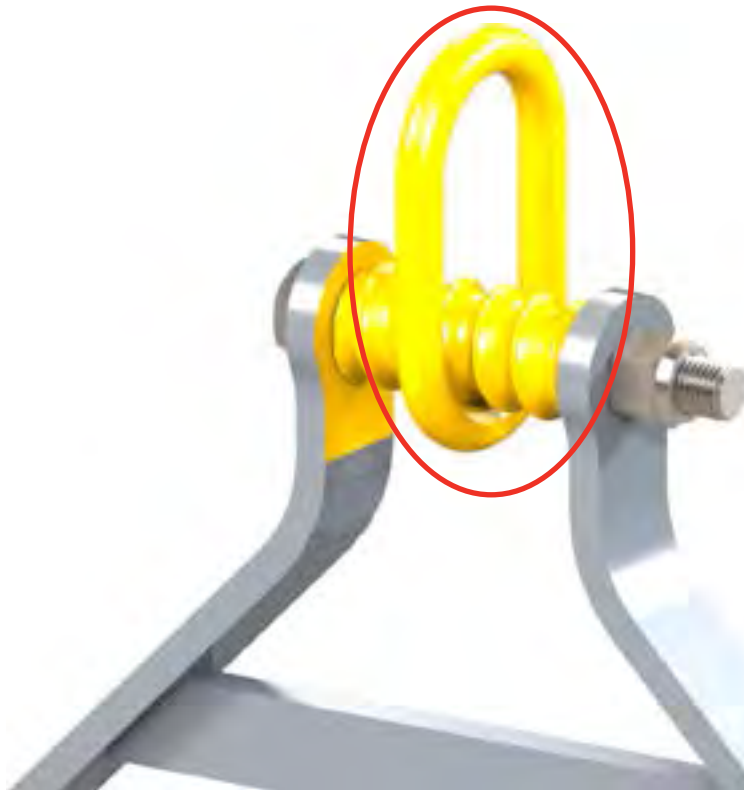


Illustration 4.1.1: Master Lifting Link

**WARNING**

THE MASTER LINK MUST BE USED TO SUSPEND THE TONG ASSEMBLY

4.1.1 Making A Connection (Continued):

2. Refer to the label on the “MAKE/BREAK” control valve handle to determine the direction of handle deflection required for making or breaking a connection. Rotate the cage plate until aligned with the tong opening. If necessary manually move the reversing pin to the clearly-marked “Make” position. From the front of the tong, the backing pin correctly configured for makeup operations 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. **OPERATING NOTE:** The backing pin must be fully engaged with the matching slot in the rotary gear for proper operation of the tong.



Illustration 4.1.2: Setting Backing Pin To “Make-up” Position

3. Properly configure the load cell for making up connections (see Section 3.5.3). Connect snub lines to the rear of the tong to arrest uncontrolled rotation of the assembly in the event of backup jaw slippage. The snub lines must be rated for the applied torque plus whatever safety margins stated by your own operating policies. The snub line connection points on the drill floor must be sturdy enough to absorb all applied forces.
4. Use the rig's pipe-handling equipment to position the new tubular in position over the “stump”.
5. Grasp the latch handle on the door assembly and pull the handle until the door is fully open. Opening the tong door activates the door switch system and prevents rotation of the cage plate.
6. If necessary use the lift cylinder hydraulic control to lift the equipment from the drill floor. Refer to the label on the control valve handle to determine the direction of handle deflection required for lifting action. Note that rig personnel are required to stabilize the equipment as it is being lifted so it does not swing and collide with other rig equipment.

⚠ CAUTION

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

Position the equipment over the connection. Use the lift cylinder hydraulic control to properly adjust the height of the tong and backup jaws on either side of the connection.

4.1.1 Making A Connection (Continued):

7. Refer to the label on the backup control valve to determine the direction of handle direction required to clamp the backup jaws. Use the control handle to clamp the backup jaws on to the tubing below the connection point. Note that the backup control is “clamp and release”, meaning that once the backup jaws are clamped, the jaws remain under clamping pressure until the operator manipulates the backup control handle to release the tubular.

⚠ CAUTION

SET BACKUP CLAMPING PRESSURE WITHIN THE RANGE PRESCRIBED BY THE PIPE SIZE AND WALL THICKNESS. SEE SECTION 3.5 FOR BACKUP PRESSURE SETTING INSTRUCTIONS.

8. Firmly close the tong door against the latch post. Tug on the door handle to ensure the door latch has engaged.
9. Shift the tong to high gear (see subsection 4.0.4) 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

10. Slowly push the motor hydraulic control valve in the make-up direction to rotate the tong to cam the jaws on to the tubular.
11. When the tong jaws cam on to the tubular push the rotation control handle in the make-up direction to its limit to thread the connection together at high speed. As the joint becomes fully made up the increasing torque demand will stall the motor, and displayed torque will rapidly begin to increase.
12. Stop rotation, and shift to low gear (low speed/high torque). See Section 4.0.4 for instructions for shifting to low gear. 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

13. Push the rotation control handle all the way in the make-up direction to 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.

14. When tong jaws are free align the opening in the rotary gear with the mouth of the tong, and open the tong doors.
15. Use the backup clamp/release hydraulic control to release the backup clamp cylinders and free the equipment from the drill string. Note that rig personnel may be required to stabilize the equipment as it completely releases from the drill string. Guide the equipment away from the string and use the lift cylinder control to lower it to the drill floor if desired.
16. Repeat steps 4 through 15 until the desired number of connections are made up.

4.1.2 Breaking A Connection

NOTICE

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

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. Refer to the label on the “MAKE/BREAK” control valve handle to determine the direction of handle deflection required for making or breaking a connection. Rotate the cage plate until aligned with the tong opening. If necessary manually move the reversing pin to the clearly-marked “Break” position. From the front of the tong, the backing pin correctly configured for break-out operations will be in the 2 o’clock position (see Illustration 4.1.3). If it is not, simply lift up and place in the correct position. **OPERATING NOTE:** The backing pin must be fully engaged with the matching slot in the rotary gear for proper operation of the tong.



Illustration 4.1.3: Backing Pin Set To “Break-Out” Position

3. Properly configure the load cell for breaking out connections (see Section 3.5.3). Connect snub lines to the rear of the tong to arrest uncontrolled rotation of the assembly in the event of backup jaw slippage. The snub lines must be rated for the applied torque plus whatever safety margins stated by your own operating policies. The snub line connection points on the drill floor must be sturdy enough to absorb all applied forces.
4. Grasp the tong door handle and pull the door to release the latch and open the door. Opening the tong door activates the door switch system and prevents rotation of the cage plate.
5. If necessary use the lift cylinder hydraulic control to lift the equipment from the drill floor. Refer to the label on the control valve handle to determine the direction of handle deflection required for lifting action. Note that rig personnel are required to stabilize the equipment as it is being lifted so it does not swing and collide with other rig equipment.

⚠ CAUTION

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

6. Move the equipment on to the tubing joint. Use the lift cylinder to ensure the tong and backup are at the correct locations above and below the connection joint.

4.1.2 Breaking A Connection (Continued):

7. Refer to the label on the backup control valve to determine the direction of handle direction required to clamp the backup jaws. Use the control handle to clamp the backup jaws on to the tubing below the connection point. Note that the backup control is “clamp and release”, meaning that once the backup jaws are clamped, the jaws remain under clamping pressure until the operator manipulates the backup control handle to release the tubular.

 **CAUTION**

SET BACKUP CLAMPING PRESSURE WITHIN THE RANGE PRESCRIBED BY THE PIPE SIZE AND WALL THICKNESS. SEE SECTION 3.5 FOR BACKUP PRESSURE SETTING INSTRUCTIONS.

8. Firmly close the tong door against the latch post. Tug on the door handle to ensure the door latch has engaged.
9. Breakout torque is only available when tong is in low gear. See Section 4.0.4 for instructions on shifting your 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

10. Move the motor control valve in the “Break” direction to 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.

11. When the connection breaks stop rotation and shift to high gear (see Section 4.0.4 to shift to high gear). This will enable the tong to completely un-thread the connection at high speed.
12. Move the rotation control handle fully in the “Break” direction to completely un-thread the connection. Reverse the rotation control (move the handle in the “Make” direction) to release the tong jaws from the tubing.
13. When the tong jaws disengage align the opening in the rotary gear with the mouth of the tong, and open the tong door.
14. Use the backup clamp/release hydraulic control to retract the clamp cylinders and free the equipment from the drill string. Note that rig personnel may be required to stabilize the equipment as it completely releases from the drill string. Guide the equipment 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 EQUIPMENT AS IT IS LIFTED FROM THE DRILL FLOOR

15. Use your rig's standard pipe handling procedures to remove and rack the freed tubing stand.
16. Repeat steps 6 through 15 as many times as necessary to break out and un-thread the desired number of connections.



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SECTION 5: MAINTENANCE



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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, Farr 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 Cage Plate Cam Followers

Apply grease to the cam followers through the grease fittings recessed into the top and bottom cage plates (thirteen locations top, thirteen locations bottom).

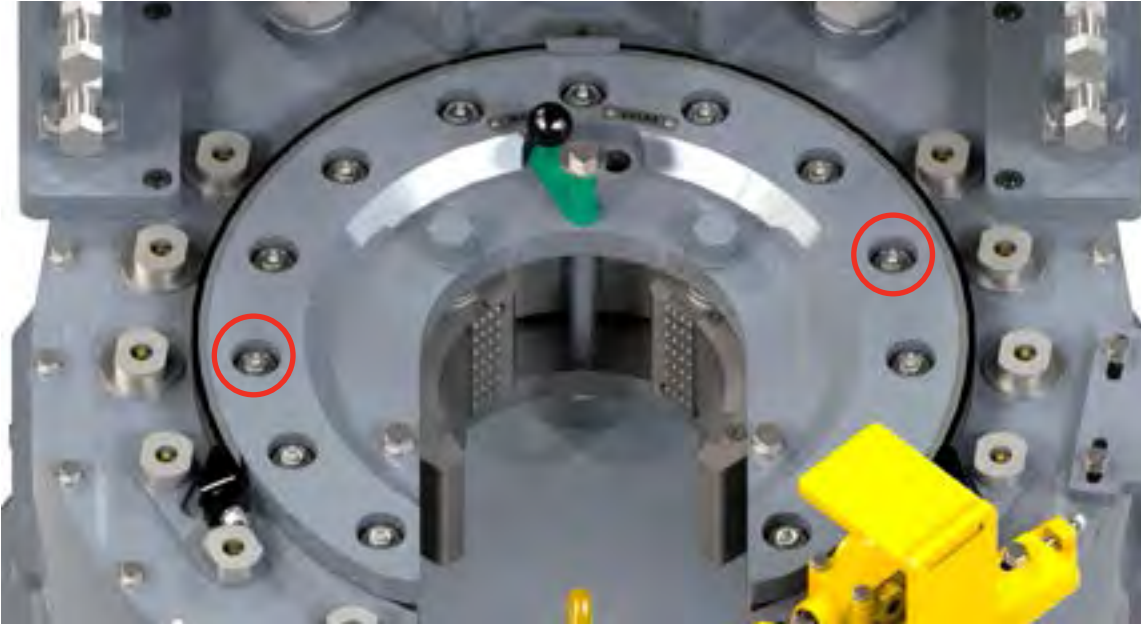


Illustration 5.5.1: Cam Follower Lubrication

5.5.2 Support Rollers

Apply grease to the support roller bearings through the grease fittings recessed into the top and bottom of each support roller shaft (12 locations total).

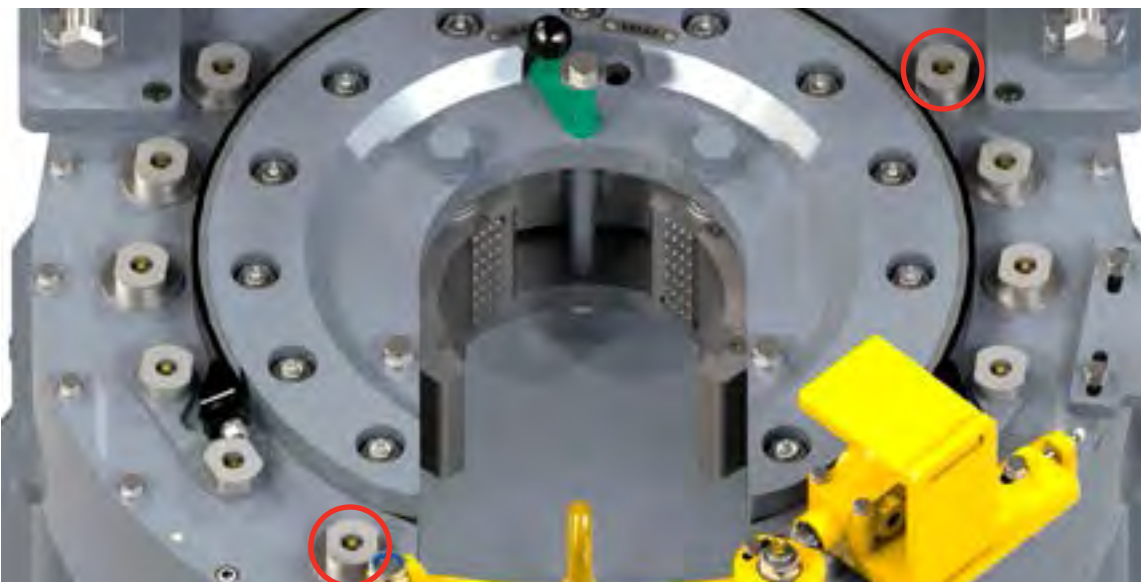


Illustration 5.5.2: Support Roller Lubrication

5.5.3 Rotary Idlers

Apply grease to the rotary idler bearings through the grease fittings recessed into the top of each shaft on the top of the tong (two locations total).

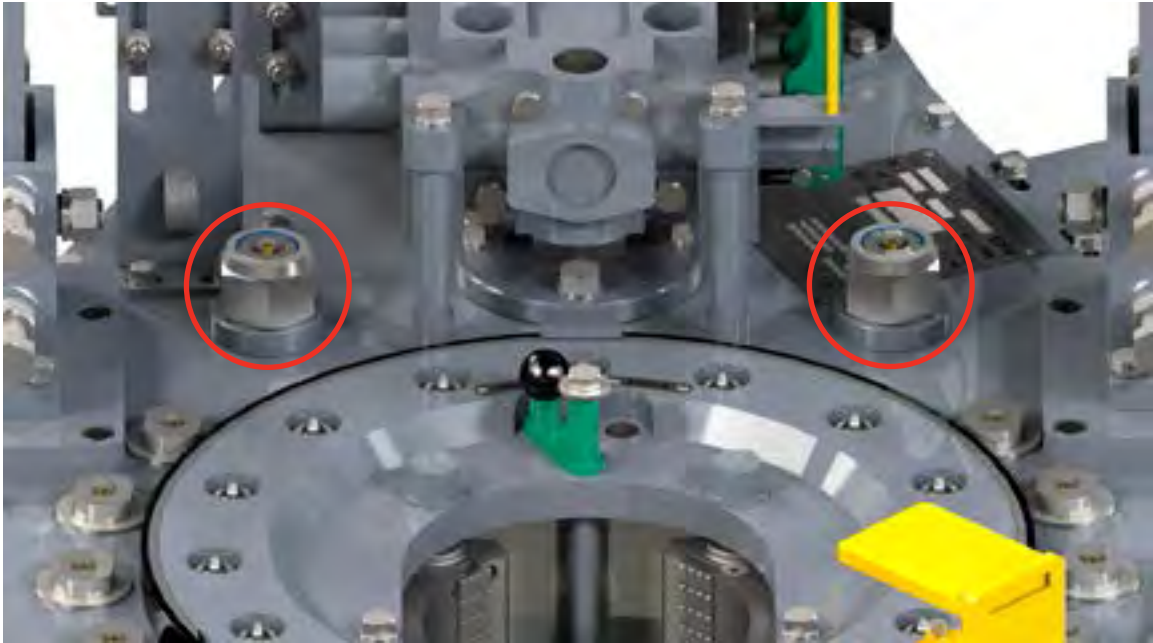


Illustration 5.5.3: Rotary Idler Lubrication

5.5.4 Pinion Idler

Apply grease to the pinion idler bearing through the grease fitting located on the top face of the tong under the valve bank (one location only).



Illustration 5.5.4: Pinion Idler Lubrication Point

5.5.5 Pinion

Apply grease to the pinion bearings through the grease fittings located on the bearing caps on the top and bottom faces of the tong (two locations top, two locations bottom).

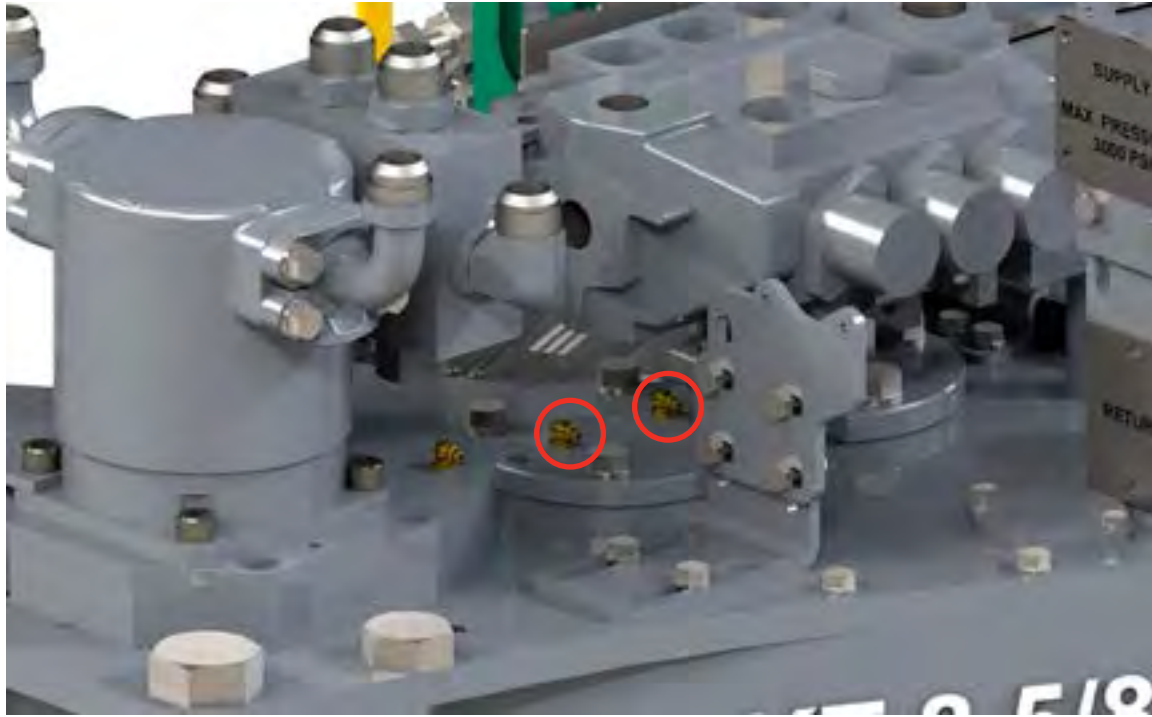


Illustration 5.5.5: Pinion Bearing Lubrication Points

5.5.6 Clutch

Apply grease to the clutch bearings through the two grease fittings located on the clutch bearing cap on the bottom face of the tong, and the single grease fitting recessed into the end of the clutch shaft. (three locations total).



Illustration 5.5.6: Clutch Lubrication Points

5.5.7 Motor Mount

Apply grease to the motor gear/clutch drive gear through the grease fitting located on the top of the motor mount (one location only).

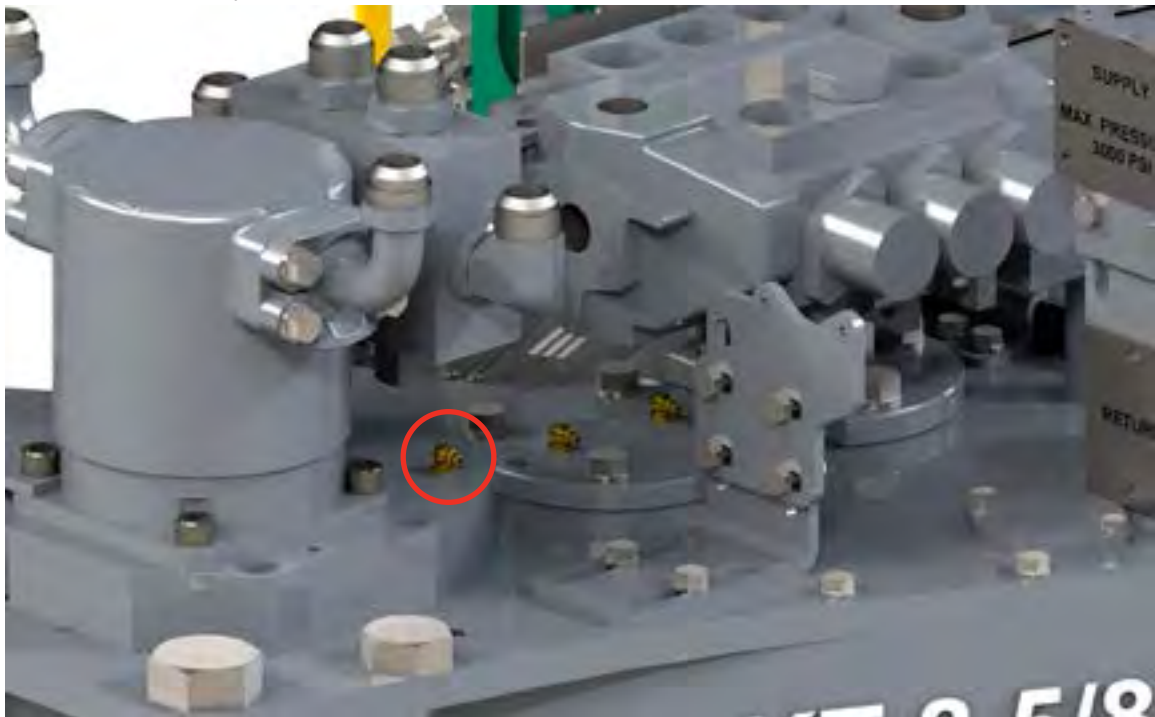


Illustration 5.5.7: Motor Mount Lubrication Point

5.5.8 Shifting Shaft

Apply grease to the shifting shaft and top shifting shaft bushing. The shaft and shifting yoke can be accessed through the cover plate on the side of the tong.

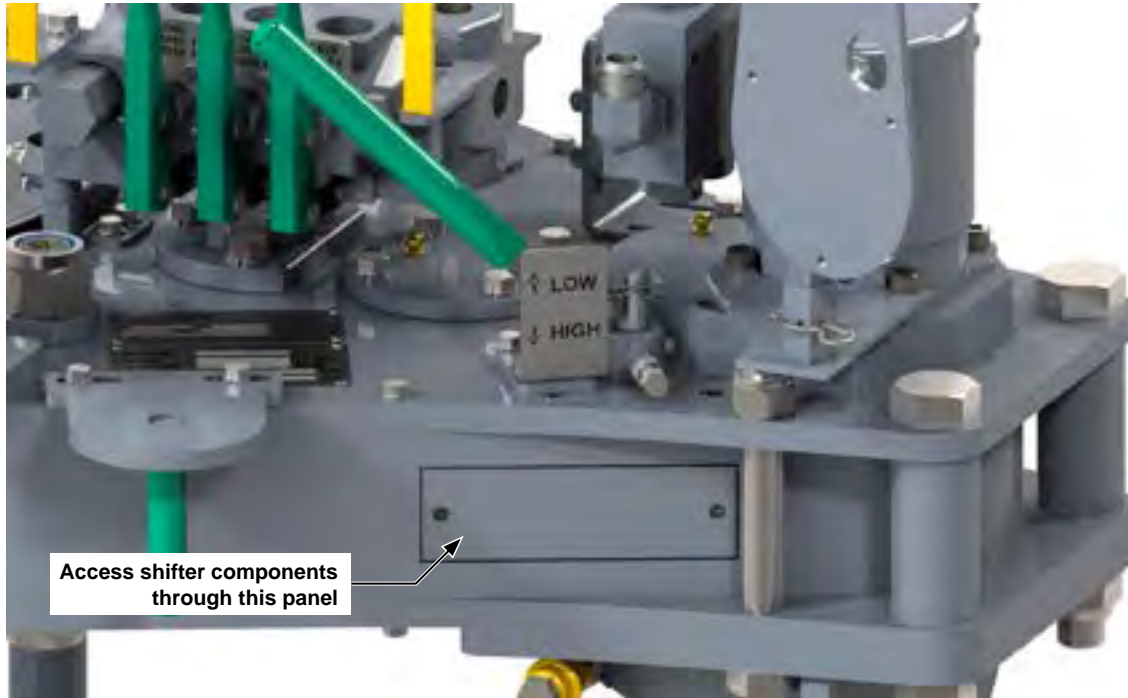


Illustration 5.5.8: Shifter Shaft Lubrication

5.5.9 Door Latch

Apply grease to the door latch pivot bushings shaft through the grease fittings located on the top of the door latch pivot shaft (2 locations total). Also take the opportunity to grease the door latch post where it is in contact with the latch claws.

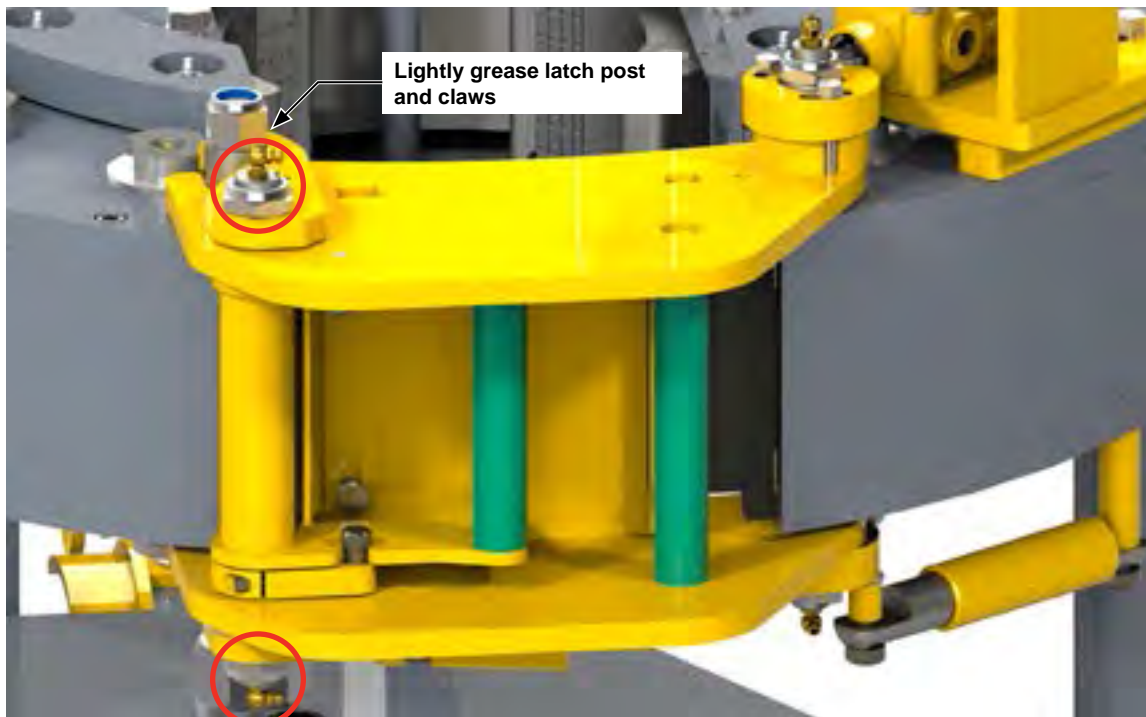


Illustration 5.5.9: Door Latch Lubrication

5.5.10 Door Pivot

Apply grease to the door pivot bushings shaft through the grease fittings located on the top of the door pivot shaft (two locations total).

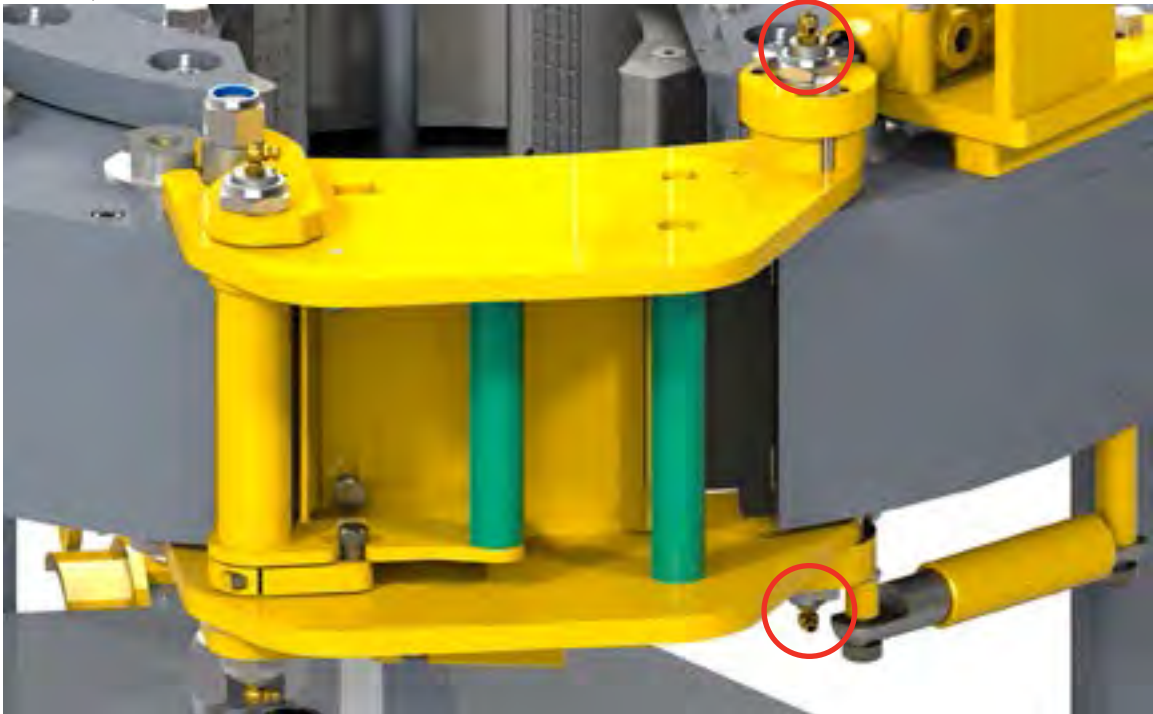


Illustration 5.5.10: Door Pivot Shaft Lubrication

5.5.11 Door Spring Stop Cylinder

Periodically disassemble the door stop cylinders and coat the spring and cylinder with a general purpose lubricating oil.



Illustration 5.5.11: Door Spring Stop Cylinder

WARNING

THE DOOR STOP CYLINDER SPRING MAY RETAIN ENERGY FROM BEING COMPRESSED. USE A CLAMP TO CONTAIN THE ENDS OF THE CYLINDER BEFORE IT IS REMOVED, AND RELIEVE THE SPRING TENSION GRADUALLY.

5.5.12 CLINCHER® Cylinders

Apply grease to the external surfaces of the clincher cylinders through the grease fittings in the top and bottom body plates (eight locations total).

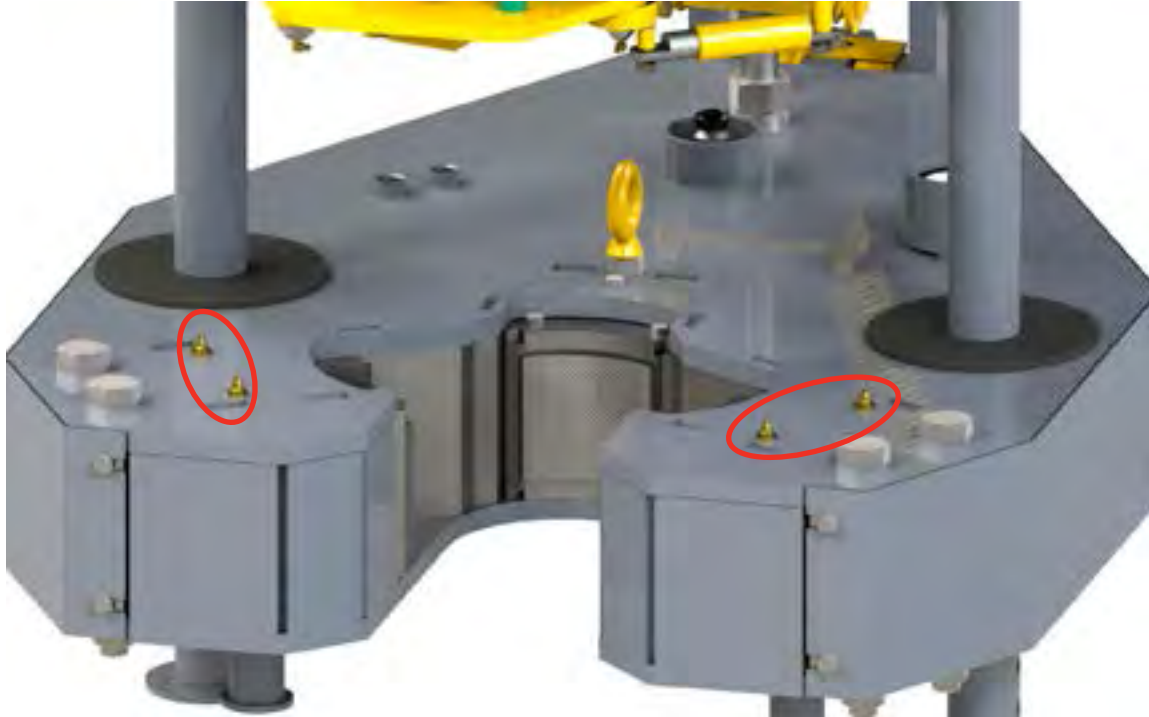


Illustration 5.5.12: CLINCHER® Cylinder Lubrication

5.5.13 Compression Load Cell (Compression Load Cell Style Backups Only)

Apply grease to the flat surfaces of the compression load cell where contact is made with the rear leg and the paddle of the backup.

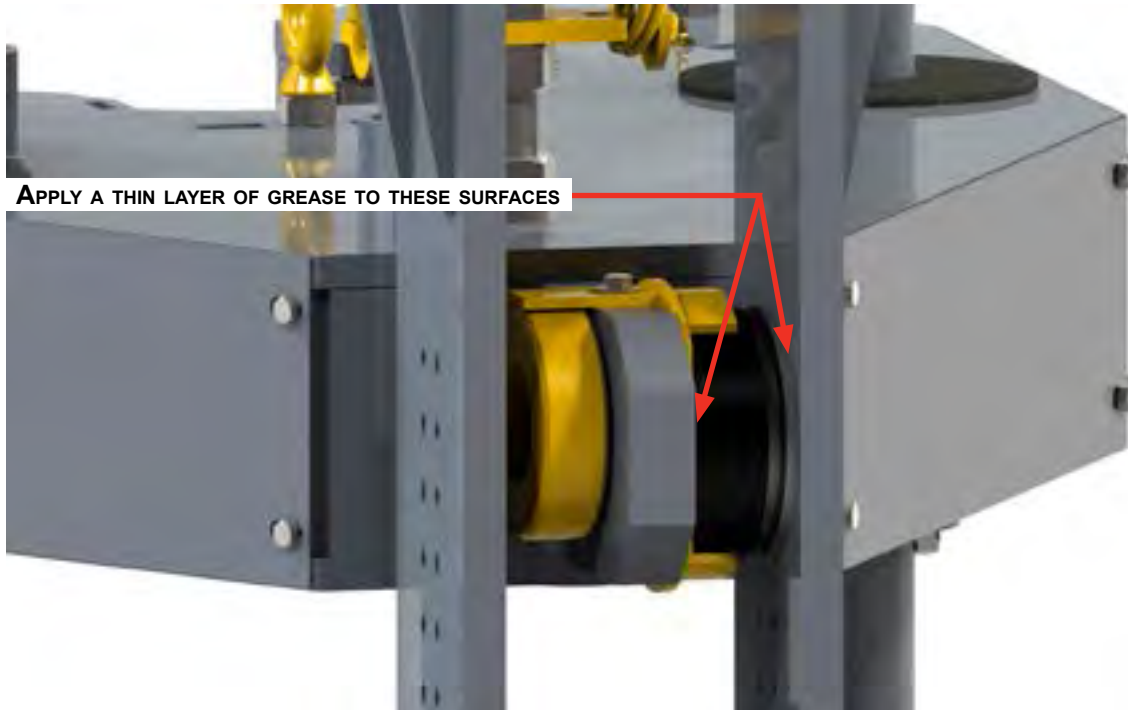


Illustration 5.5.13: Load Cell Lubrication

5.5.14 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.

Greasing Location	Minimum Grease Amount (Each Location)
Cage plate cam followers	3 shots
Support roller bearings (upper and lower)	3 shots
Rotary idler bearings	4 shots
Pinion idler bearings	4 shots
Pinion gear bearings	4 shots
Clutch bearing (bearing cap)	3 shots
Clutch bearing (centre shaft)	6 shots
Motor mount/gear box	8 shots
Shifting shaft	As required
Door latch pivot shaft	4 shots
Door pivot shaft bushings	4 shots
Door spring stop cylinder	As required
CLINCHER® cylinders	4 shots
Compression load cell	As required

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.

5.6 ADJUSTMENTS

5.6.1 Brake Band Tension Adjustment:

The top and bottom brake bands must be periodically adjusted to continue to provide smooth and efficient jaw cam action. If the cage plate turns with the rotary gear, the jaws will not cam properly and, therefore, will not bite on the tubing or casing. 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. Use caution, as over-tightening will cause excessive wear to the brake bands.

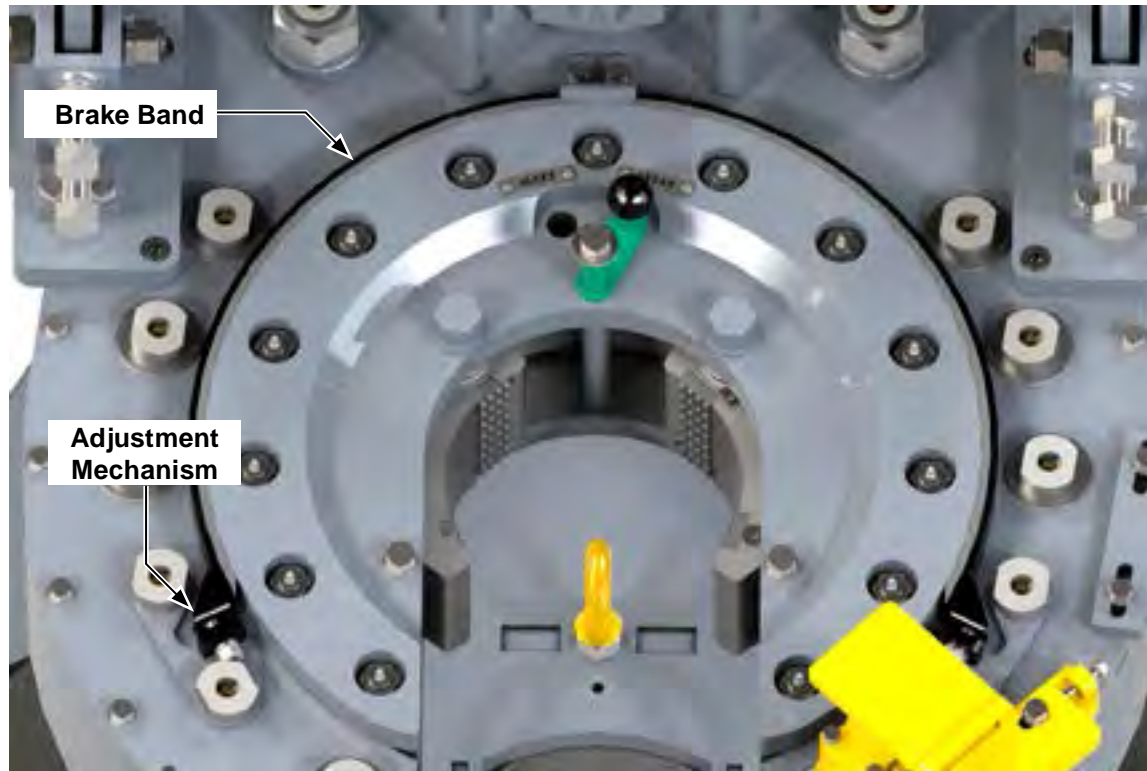


Illustration 5.6.1: Brake Band Adjustment

⚠ CAUTION

TOP AND BOTTOM BRAKE BANDS MUST BE ADJUSTED SIMULTANEOUSLY AND EQUALLY

5.6.2 Shifter Detent Force Adjustment:

Over time wear to the shifting shaft, wear to the detent ball, and loss of spring tension in the detent spring may result in a loose or "sloppy" fit within the top shifter bushing. The detent pressure may be increased or otherwise adjusted by loosening the 7/16" UNF locking jam nut, and turning the 7/16" UNF detent bolt. Should adequate detent action not be achieved, the shifting shaft, detent ball, or detent spring (or possibly all three) may need to be replaced (see Pp. 7.20 - 7.21).

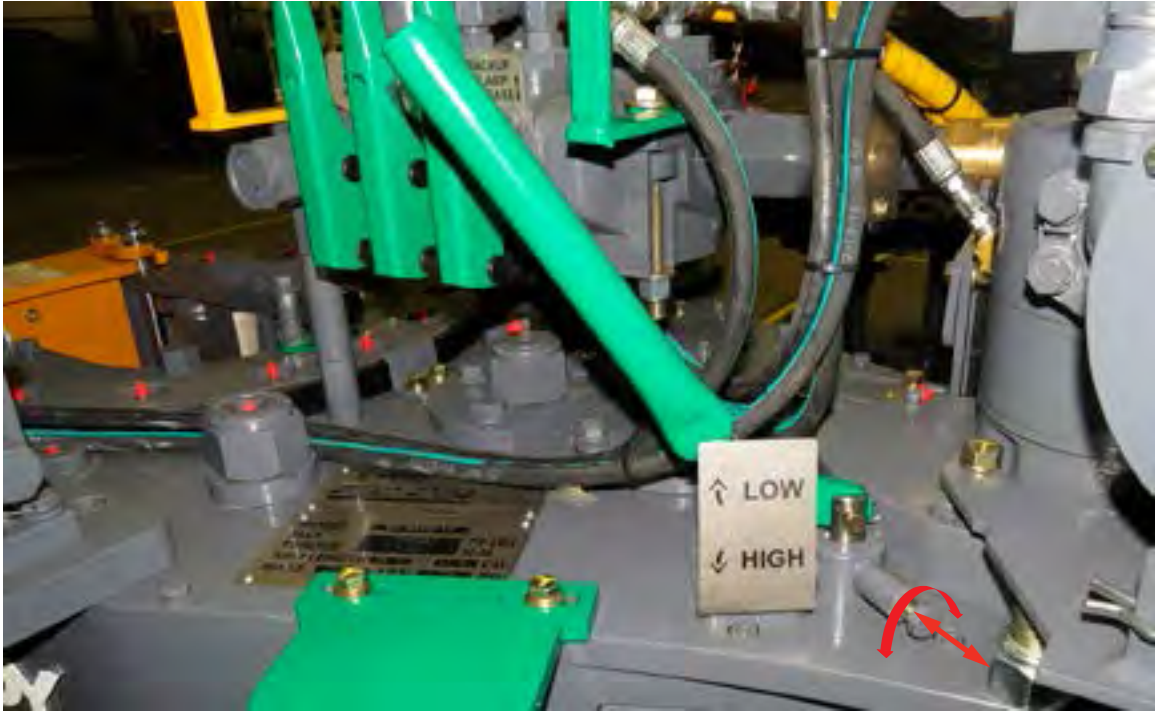


Illustration 5.6.2: Shifter Detent Force Adjustment

5.6.3 Door Switch Adjustment

The door switch interrupts hydraulic power to the motor when the tong door is opened, or even slightly ajar. This is a critical safety system. Over time, normal use of the equipment results in a worn switch plunger or worn cam where it contacts the switch plunger, allowing enough clearance between the switch plunger and the door that the door switch system does not inhibit operation as designed when the door opens. This procedure enables the equipment user to restore the proper tolerances between the switch and the door to allow the door switch system to operate as designed.

1. Set the tong up in a controlled testing environment. Do not connect hydraulic power at this time.
2. Keep the tong door closed. Loosen the bolts securing the door switch to the mounting plate just enough to move the switch, and slide the switch and mounting plate away from the cam on the door assembly.

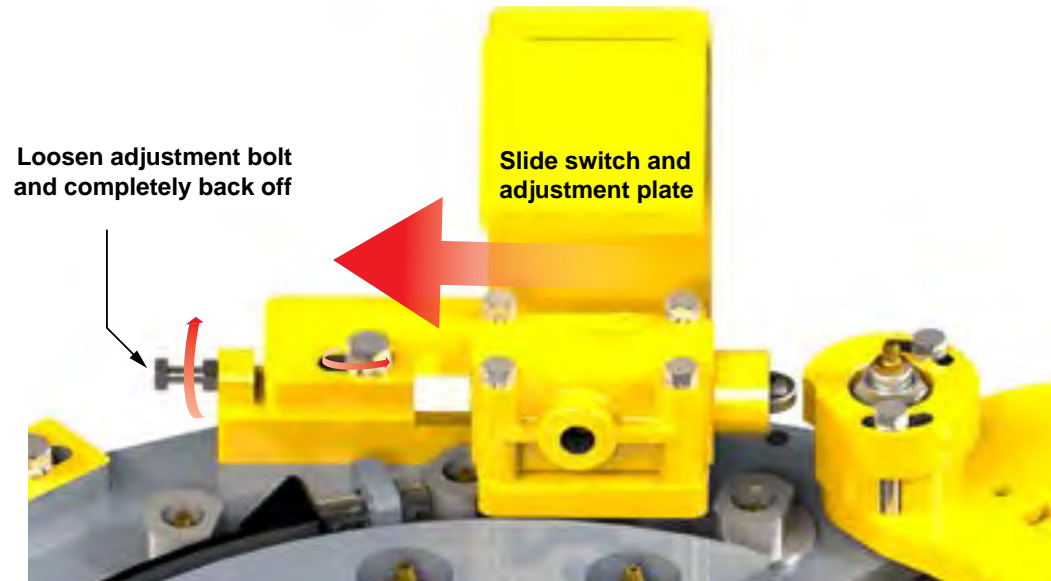


Illustration 5.6.3: Door Switch Adjustment 01

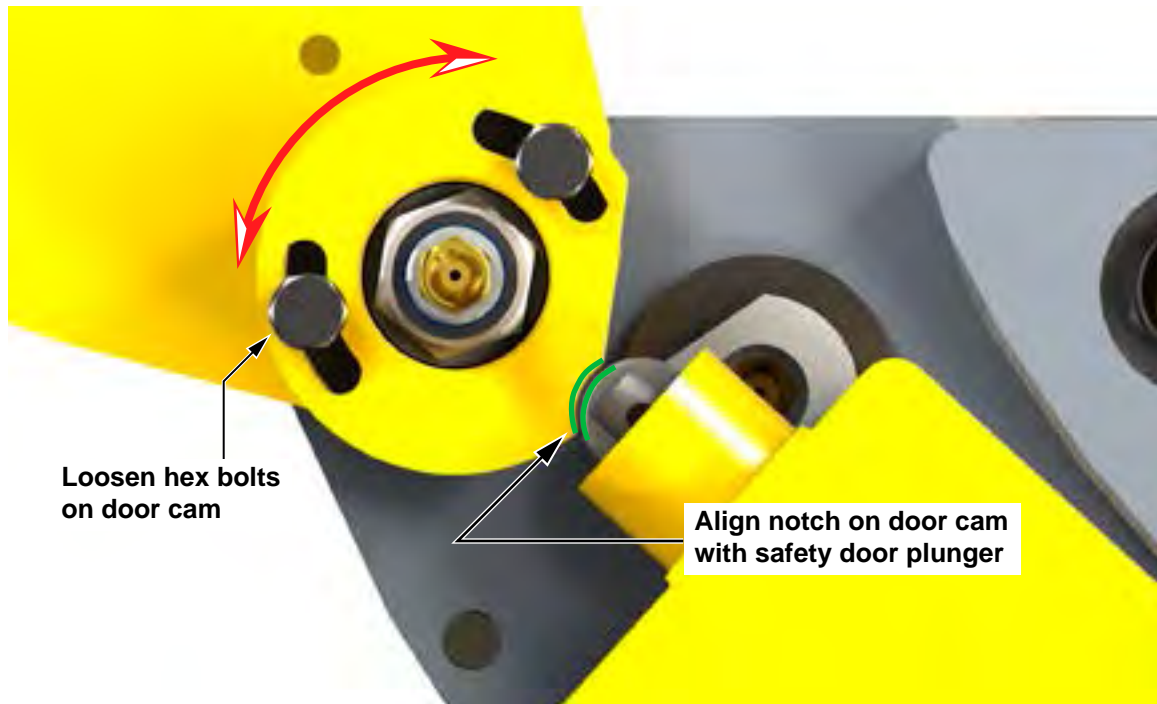
3. Check operation of the hydraulic switch plunger. Depress and allow it spring back several times to ensure smooth operation (see illustration 5.6.4). If the plunger binds or jams, replace the door switch.



Illustration 5.6.4: Door Switch Adjustment 02

5.6.5 Door Switch Adjustment (continued):

3. If necessary, align (or re-align) the notch on the door switch cam with the door switch plunger. Loosen the hex head bolts securing the cam to the door weldment, and rotate until the notch in the cam is centered with the plunger of the door switch (see illustration 5.6.8). When the cam has been satisfactorily aligned re-tighten the hex bolts.

**Illustration 5.6.5: Door Switch Adjustment 03**

4. Slide the door switch toward the cam until the roller on the switch is in contact with the rounded notch on the cam. If the cam is not exactly centered with the roller, repeat step 3. Ensure that the roller on the switch is in contact with the cam without depressing the plunger. Tighten the hex bolts to securely fasten the door switch in place on the mounting plate.
5. Thread the adjustment bolt in until the end of the bolt comes in to contact with the adjustment plate. Double-check to ensure the roller on the door switch plunger remains in contact with the door switch cam. Use the locking nut to lock the adjustment bolt in place.
6. Test the tong door switch system. Using the correct testing procedure ensures the door switch system is fully functional without exposing the equipment to a shock load or personnel to a potential hazard. The tests also verify that the shut down valve is positively sealing.

⚠ 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

- i. Set the tong to rotate at low speed.
- ii. Stop all tong rotation.
- iii. Open the tong door.
- iv. Gradually attempt to turn the tong using the rotation control handle. Continue to gradually move the handle until the valve is fully stroked, and hold for 30 seconds. Verify the ring gear does not rotate while the rotation control is engaged. **PROCEDURAL NOTE:** a very small amount of ring gear movement is acceptable as the cartridge valve seats to stop rotation.

5.6.3 Door Switch Adjustment (Continued):

7. Test the tong door switch system (continued):
 - vi. Ensure tong door is fully opened. Move the rotation control handle to approximately 50% of its full stroke. Have an assistant slowly close the tong door while continuing to hold the directional control valve at 50%. Rotation should commence only once tong door is fully closed and latched.
8. Any cage plate rotation with the door in any position except closed and latched indicates that further adjustment of the door switch is necessary. Remove hydraulic power from the tong.
9. Slightly loosen the bolts securing the switch adjustment plate to the switch mounting plate. Loosen the locking nut on the adjustment bolt. Rotate the adjustment bolt clockwise to move the switch and mounting plate towards the door cam approximately 1/32" (1 mm). Immediately secure the adjustment plate to the mounting plate, then tighten the locking nut on the adjustment bolt.
10. Repeat step 6. If the door switch mechanism operates correctly and no further adjustment is required this procedure is complete. If further adjustment is required, repeat steps 6 through 8 until the door switch mechanism operates correctly. If your equipment reaches the adjustment limits before correct operation of the door switch mechanism is achieved contact the engineering department at McCoy Global for further technical advice.

 **DANGER**

DO NOT OPERATE TONG WITH A MALFUNCTIONING OR NON-OPERATING DOOR SWITCH SYSTEM.

5.6.4 Door Latch Adjustment

McCoy provides two latch adjustments.

Adjust the position of the latch claws when the door is closed. Loosen the locking nut on the adjustment bolt on the rear of the door assembly. Rotate the adjustment bolt clockwise or counter-clockwise to move the latch claws. Adjust the claws so that they touch, but do not place any force on the latch post. When adjustments are complete, tighten the locking nut on the adjustment bolt to lock the adjustment.

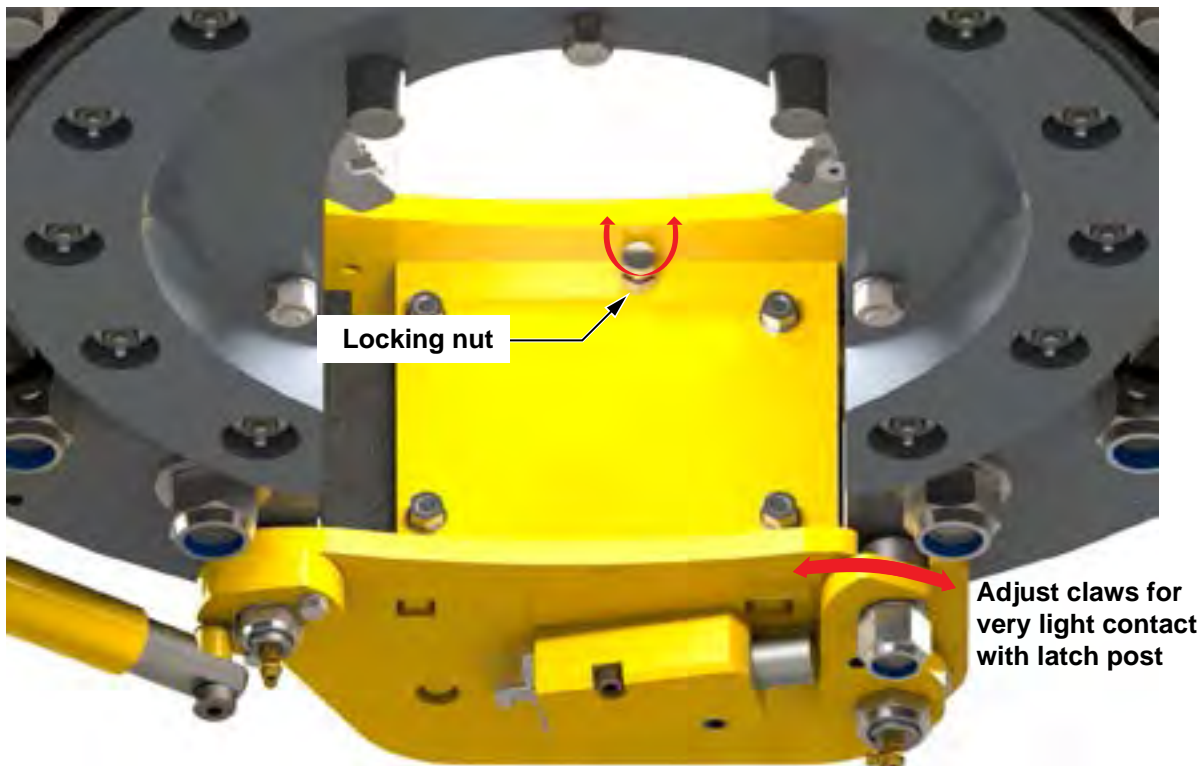


Illustration 5.6.6: Door Latch Adjustment 01

5.6.4 Door Latch Adjustment (Continued):

Adjust the latch return spring force so that the latch claws always return to the “closed” position when the latch handle is released, but still allows for easy opening of the door. If contamination, wear, or a combination of both creates friction in the latch assembly that overcomes reasonable return spring adjustment the latch assembly must be overhauled (see Pp. 7.30 - 7.31).

Adjust the return spring tension by loosening the locking nut and rotating the adjustment bolt. Clockwise rotation of the adjustment bolt provides higher return spring force, while counter-clockwise rotation lessens the return spring force.



Illustration 5.6.7: Door Latch Adjustment 02

5.7 RECOMMENDED PERIODIC INSPECTIONS

5.7.1 Door Stop Spring

The springs inside the spring stop cylinders must be of sufficient strength to hold the doors in the open position when opened. Replace the spring inside the cylinder when the door stop cylinder is no longer of sufficient strength to hold the door open.

⚠ CAUTION

THE DOOR STOP CYLINDER SPRINGS MAY RETAIN ENERGY FROM BEING COMPRESSED. USE A CLAMP TO CONTAIN THE ENDS OF THE CYLINDERS WHEN THEY ARE REMOVED, AND RELIEVE THE SPRING TENSION GRADUALLY.

5.7.2 Backing Pin

Perform a visual inspection of the backing pin after each job. Replace the pin if stress cracks or excessive wear is found, or if the pin is bent.

5.7.3 Shifting Shaft

The shifting yoke is secured to the shifting shaft by one hex jam nut below the yoke. Check the nuts after each job. Do this by removing the clutch inspection plate and ensuring a snug fit prior to lubrication.

5.7.4 Torque Gauge Assembly

Periodic calibration of the torque gauge is recommended to assure accurate torque readings. When having the torque gauge serviced and calibrated, it is critical to note the arm length of the tong, as indicated in the "Specifications" section. McCoy Global recommends that the torque gauge assembly be calibrated annually. Periodically check to ensure the load cell is filled with oil (see Section 8).

5.7.5 Lifting and Load-Bearing Devices (including Spring Hanger)

Proper inspection and maintenance is essential to assure the integrity of load-bearing and lifting components. See subsection 3.1 for information on load-bearing and lifting component safety, including McCoy Global recommended inspection procedures and intervals.

5.8 REMOVAL OF TOP PLATE FOR OVERHAUL

Separate the tong and backup using the disassembly instructions specified in the following procedure. Following separation of the tong and backup the gear train is accessed by removing the top plate of the tong.

CAUTION

ALL MAINTENANCE AND OVERHAUL SHOULD BE PERFORMED FROM THE TOP. THE BOTTOM PLATE OF THE TONG IS TYPICALLY WELDED TO THE SIDE BODY AND CANNOT BE REMOVED.

WARNING

WHERE APPLICABLE, REPLACEMENT FASTENERS MUSED DURING MAINTENANCE OR OVERHAUL MUST BE GRADE 8 OR EQUIVALENT. ALL FASTENERS MUST BE TIGHTENED TO THE PROPER TORQUE

1. Remove the load cell and, if using tension load cell-style equipment, the breakout chain.
2. Suspend tong assembly with crane. Construct a sturdy support structure with a minimum height of 30 inches (0.76 m) that is capable of supporting the entire weight of the backup (920 lb / 418 kg). Lower the tong/backup assembly onto the constructed support. Stop lowering when all weight comes off the front leg springs, and continue to support the rest of the weight with the overhead crane.
3. Disconnect the hydraulic lines from the backup. Cover the quick-connect fittings to keep them free from debris or damage.
4. Remove the front leg assemblies. Support each front leg/spring/lower cap assembly (weight = approximately 25 lb / 11.4 kg) and remove the nylock nut and bolt sets securing the front leg assemblies to the front leg mount weldments. Slide the leg weldments, lower spring caps and front leg through, and out the bottom of the backup. Note that the top spring caps will remain within the backup body assembly.
5. Remove the shackles connecting the two rear backup support springs to the bottom of the tong or the rear leg weldment.
6. Hoist tong and rear leg away from the backup. Lower the tong and backup on to a flat surface until the rear leg makes contact. Continue to support the weight of the tong with the overhead crane.
7. Remove two 1- $\frac{1}{4}$ " x 9" hex bolt and nut sets and two 1" x 8" hex bolt and nut sets. When using the tension load cell-style backup and 101-2031 rear leg weldment, complete removal of the rear leg by removing four $\frac{3}{8}$ " x 2- $\frac{3}{4}$ " hex bolts and two eye bolts fastening the rear leg to the bottom of the tong. **DISASSEMBLY NOTE:** Ensure the rear leg is stabilized to prevent it from toppling when fasteners are removed.
8. Hoist the tong away from the rear leg and set on a stationary support capable of supporting at least 1425 lb / 647.4 kg, ensuring that the bottom body plate remains accessible. A pair of sturdy metal horses works well for this application.
10. Use a temporary lifting sling and overhead crane to move the rear leg weldment (weight = 157 lb / 71.3 kg) to a location where it will not be damaged.
11. Support the rigid sling with a crane. Remove the shoulder bolts and nylock nuts securing the rigid sling weldment to each rigid sling hanger bracket weldment. **DISASSEMBLY NOTE:** The rigid sling leveling bolts may require loosening to completely free the rigid sling hanger weldment within each bracket. Use a crane to lift the rigid sling away from the tong. Store in a secure location safe from welding debris, moisture, and impact.

5.8 REMOVAL OF TOP PLATE FOR OVERHAUL (CONTINUED):

12. The heads of some fasteners securing the rigid sling hanger brackets are drilled, and are constrained to the brackets using wire ties. Wire ties must be removed before extracting the fasteners and removing the rigid sling hanger bracket. Remove both rigid sling hanger bracket weldments.
13. Disconnect all flexible hydraulic lines running from the door switch and motor at the motor side i.e. leave the lines connected to the door switch. Disconnect both 1" hydraulic lines at the motor. Cap or plug exposed connections to prevent damage or contamination.
14. Clearly label the backup hydraulic pressure/return lines, then disconnect the lines at the hydraulic valve bank. Cap or plug exposed connections to prevent damage or contamination.
15. Clearly label the lift cylinder pressure line, then disconnect the line at the hydraulic valve bank. Cap or plug exposed connections to prevent damage or contamination.
16. Label, disconnect, and remove any remaining hydraulic lines from the hydraulic valve bank. Cap or plug exposed connections to prevent damage or contamination.
17. Support the hydraulic valve bank with a temporary lifting sling and overhead crane. Remove the bolts securing the hydraulic valve bank to the hydraulic valve supports. Remove any further restraints or obstructions preventing the valve bank from being lifted away from the power tong.
18. Use the temporary lifting sling and overhead crane to hoist the valve assembly and transport to a clean surface. Seal all exposed connections, and store in a safe location.
19. Remove the hydraulic valve support weldments.
20. Remove the door switch and switch guard assembly as one complete assembly. Store door switch in a protected location.
21. Remove door switch mounting plate/guard from the top plate
22. Remove the tong door stop cylinder.

 **CAUTION**

THE DOOR STOP CYLINDER SPRINGS MAY RETAIN ENERGY FROM BEING COMPRESSED. USE A CLAMP TO CONTAIN THE ENDS OF THE CYLINDERS WHEN THEY ARE REMOVED, AND RELIEVE THE SPRING TENSION GRADUALLY.

23. Remove the door switch cam and the bottom door pivot spacer.
24. Remove the thin nylock nut from one end of the door pivot roller shaft. Open the tong door. Support door assembly (weight = 41 lb / 18.6 kg) and remove the roller shaft. If necessary use a soft alloy material (e.g. brass rod, etc.) to lightly tap the shaft from the bottom through the support roller components until it comes free at the top. Use caution that the threads on the ends of the support roller shafts are not damaged. Do not lose the door shoulder bushings.
25. Remove the top or bottom nylock nut from the door latch post. Slide the latch spacer and washer off the end of the post, and extract the post from the tong.
26. Remove the top and bottom brake band weldments.
27. If not already done remove the jaw pivot bolts and the jaw assemblies.
28. Ensure the bottom cage plate is supported before beginning this step. Remove the two front cage plate bolt and nut sets. Remove the backing pin assembly and the rear cage plate bolt, and the cage plate spacers. The top and bottom cage plates may now be removed - note that the cam followers are fastened to the top and bottom cage plates, so use caution not to damage them.

 **WARNING**

THE CAGE PLATE BOLTS ARE THE ONLY ITEMS FASTENING THE BOTTOM CAGE PLATE TO THE TONG. SUPPORT THE BOTTOM CAGE PLATE FROM BELOW PRIOR TO REMOVING CAGE PLATE BOLTS IN ORDER TO PREVENT DAMAGE TO THE BOTTOM CAGE PLATE OR PERSONAL INJURY TO THE MECHANIC

5.8 REMOVAL OF TOP PLATE FOR OVERHAUL (CONTINUED):

29. Remove the four hex socket head cap screws securing the motor and the torque gauge mount weldment. Remove the torque gauge mount weldment, then lift the motor up and away from the motor mount. Inspect the motor gear, located at the bottom of the motor shaft, for gear clashing or tooth damage. Also, ensure that the motor gear is securely attached to the motor shaft.
30. Remove the cotter pin and clevis pin connecting the shifter handle to the shifter shaft (it is not necessary to disconnect the handle from the pivot lug weldment).
31. Unbolt the pivot lug weldment from the top plate, and remove the pivot lug and handle assembly.
32. Remove the four hex socket head cap screws securing the motor mount to the top plate. Use care not to dislodge and lose the two positioning dowels.
33. Remove the snap ring securing the drive gear to the top of the clutch shaft. Carefully remove the drive gear from the clutch shaft.
34. Remove the two ¼" x ½" hex socket head cap screws securing the top clutch bearing retainer to the top plate.
35. Remove the top clutch bearing retainer, and bearing retainer spacer. The top clutch bearing and clutch bearing bushing may come off with the bearing retainer.
36. Pull the top bearing cap and spacer for the pinion drive gear by removing the four ½" bolts which secure the bearing cap. Thread two of the removed bolts into the extra holes on top of the bearing cap, and use them as lifting lugs to lift the bearing cap out of place.

NOTICE

IF THE BEARING REMAINS ATTACHED TO THE GEAR SHAFT AFTER THE BEARING CAP IS PULLED, MCCOY GLOBAL SERVICE PERSONNEL RECOMMENDS LEAVING IT IN PLACE UNTIL THE TOP TONG PLATE IS REMOVED.

37. Remove the top nuts and pads for the rotary idler gears.
38. Remove the remaining top roller shaft nuts. Note that the top brake band adjustment lug weldments are removed at this point.
39. Loosen, but do not remove the detent bolt on the top shifter lug weldment. Once the force from the detent ball has been removed from the shifter shaft, the top shifter bushing can be un-threaded from the top plate. Take care not to lose the detent ball when the bushing comes free of the shaft.
40. Remove the hex head bolts and hex flat head cap screws around the perimeter of the tong that secure the top plate.
41. With all the above steps taken, the top tong plate can be lifted off providing access to the inside of the gear case.

NOTICE

LIFT THE TOP PLATE STRAIGHT UP TO AVOID SNAPPING THE DOWEL PINS. A SNAPPED, BENT, OR OTHERWISE DAMAGED DOWEL PIN CAN BE EXTREMELY DIFFICULT TO REMOVE.

5.9 ASSEMBLY PROCEDURES

- Although the assembly of McCoy Global 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. **When graphics are not used in the assembly process, please refer to the relevant exploded diagrams in Section 7.**

 **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™.

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.
³ / ₈ - 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.
⁵ / ₈ - 18 (.625)	23,025	240 ft. lbs.	180 ft. lbs.
³ / ₄ - 16 (.750)	33,600	420 ft. lbs.	315 ft. lbs.
⁷ / ₈ - 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- ¹ / ₈ - 12 (1.125)	77,025	1444 ft. lbs.	1083 ft. lbs.
1- ¹ / ₄ - 12 (1.125)	96,600	2012 ft. lbs.	1509 ft. lbs.
1- ³ / ₈ - 12 (1.375)	118,350	2712 ft. lbs.	2034 ft. lbs.
1- ¹ / ₂ - 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.
³ / ₈ - 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.
⁵ / ₈ - 11 (.625)	20,325	212 ft. lbs.	159 ft. lbs.
³ / ₄ - 10 (.750)	30,075	376 ft. lbs.	282 ft. lbs.
⁷ / ₈ - 9 (.875)	41,550	606 ft. lbs.	454 ft. lbs.
1 - 8 (1.000)	54,525	909 ft. lbs.	682 ft. lbs.
1- ¹ / ₈ - 7 (1.125)	68,700	1288 ft. lbs.	966 ft. lbs.
1- ¹ / ₄ - 7 (1.125)	87,225	1817 ft. lbs.	1363 ft. lbs.
1- ³ / ₈ - 6 (1.375)	103,950	2382 ft. lbs.	1787 ft. lbs.
1- ¹ / ₂ - 6 (1.500)	126,450	3161 ft. lbs.	2371 ft. lbs.

5.9 ASSEMBLY PROCEDURES (CONTINUED):

1. Position the tong body gear case (weight = 400 lbs/ 182 kg) on a stationary support capable of supporting at least 1500 lbs / 682 kg, ensuring that the bottom body plate remains accessible. A pair of sturdy metal horses works well for this application.
2. Slide a support roller shaft spacer (PN 1037-C-134) into each support roller (PN 1037-135) (total of 12).
3. Press support roller bearings (PN 02-0094) into each side of the support rollers. Assemble five support roller assemblies as shown on Pp. 7.10 - 7.11.
4. Install five support roller assemblies along one side of the body case. Insert shafts through assemblies, but do not install the bottom nylock nuts or, where used, the top washers.
5. Thread two rated ½" UNC eye bolts in to the rotary gear (weight = 200 lb/91 kg) to serve as temporary lifting points. Install rotary gear, making sure the backing pin slots are on the side facing up. Keep fingers clear of pinch points as rotary gear is positioned in the tong opening. Ensure one side is supported by the support rollers installed in Step 4, and have the opening in the rotary gear oriented as shown in the following illustration.



Illustration 5.9.1: Tong Assembly - Rotary Gear Installation

6. Install support roller assemblies in the locations exposed by the opening in the rotary gear. Continue to rotate the rotary gear, supporting the rotary gear with the support rollers and installing new support roller assemblies in the rotary gear opening as it is rotated. Finish with the rotary gear aligned with the opening in the bottom plate and completely supported by the support rollers.
7. Press pinion bearing (PN 02-0007) into bottom pinion bearing cap (PN 1050-89), and install bearing cap into bottom plate of tong using four ½" UNC x 1-½" hex bolts and ½" lock washers.
8. Press lower clutch bearing (PN 02-0004) into clutch bearing cap (PN 1050-C1-54), and install bearing cap into bottom plate of tong using four ¾" UNC x 1-½" hex bolts and ¾" lock washers.
9. Install a retainer clip (PN 02-0009) into both rotary idler gears (PN 997-A2-119). Press an idler bearing (PN 02-0011) into each gear and secure with a second retainer clip.
10. Lightly grease the larger circumference of the two rotary idler shafts (PN 1050-D5-117) and slide them through the bearing and gears assemblies, centering the gear on the shaft.
11. Slide two bearing seals (PN 02-0010) over each end of the idler shafts and press against the retainer clips (see Pp. 7.12 - 7.13 for correct orientation).

5.9 ASSEMBLY PROCEDURES (CONTINUED):

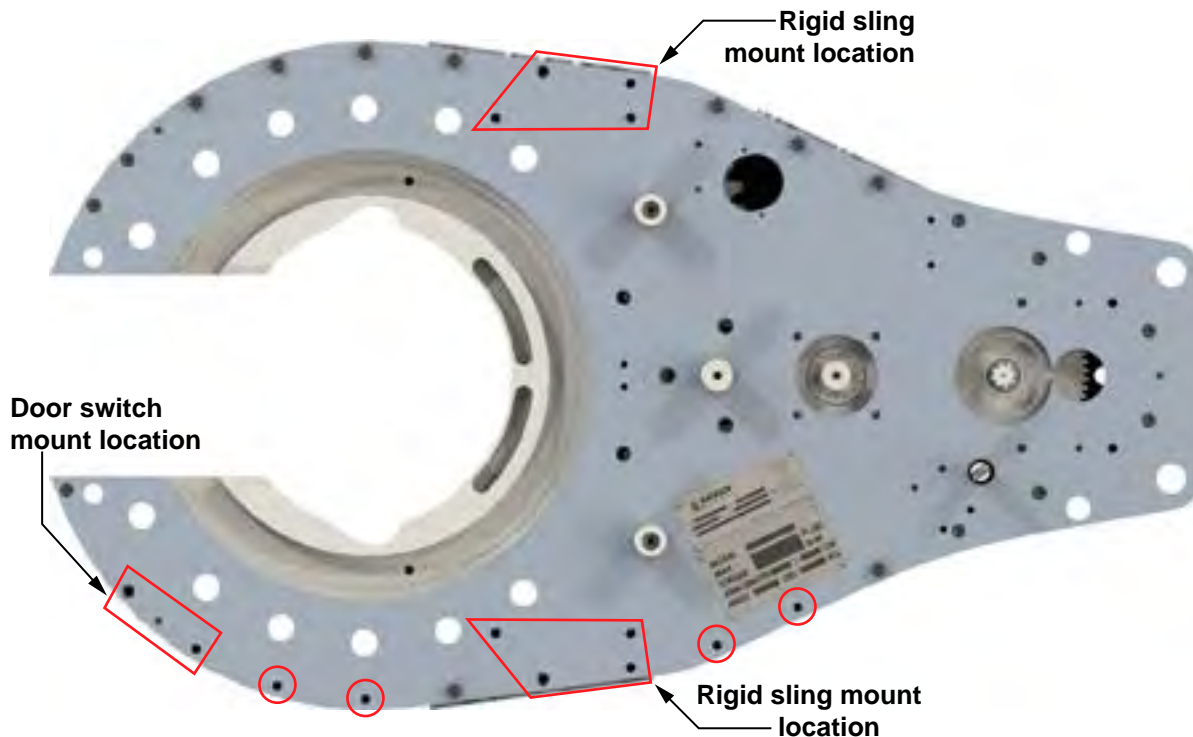
12. Slide a bearing spacer (PN 1050-D5-121) over each end of the rotary idler shafts.
13. Place each rotary idler assembly through the bottom plate, ensuring the ends of the shafts with the threaded hole for the grease fitting are pointed upward and the rotary idler gears mesh with the rotary gear.
14. Place an idler pad (PN 997-D20-125) over the bottom side of each rotary idler shaft, and secure each with a 1-½" UNF nylock nut.
15. The low pinion gear (PN 997-A5-88) is machined with shoulders around the centre spline on both sides of the gear. Place the side of the low pinion gear with the smaller shoulder over the lower bearing and bearing cap, centering as best as able.
16. Install pinion gear shaft (PN 997-A7-86) into the spline of the bottom pinion gear and the lower pinion bearing.
17. Slide 2 needle bearings (02-02-0003) over each end of the clutch shaft (PN 997-A8-50), and press up against centre gear. Slide low clutch gear (PN 997-A1-52) over the bottom end of the clutch shaft (the bottom end of the clutch shaft can be identified by the threads for the grease fitting machined into the end) onto the two needle bearings. Ensure the smaller diameter of the low clutch gear is directly adjacent to the centre gear on the clutch shaft. Place lower end of clutch shaft into the lower clutch bearing that has been pre-mounted in the lower body plate.
18. Install shifting collar (PN 997-A9-62) over the top of the clutch shaft and mesh with low clutch gear and the centre gear on the clutch shaft.
19. Treat the threads on the bottom of the shifting shaft (101-8485) with red Loctite™. Slide the shifting fork weldment (PN 101-6166) over the threaded end of the shifting shaft and secure against the shoulder of the shaft with a ½" UNF hex nut and ⅝" lock washer. See Pp. 7.20 - 7.21 for correct shifting fork orientation on the shifting shaft. Place the end of the shifting shaft in the lower shifting bushing (welded to the bottom plate) and mesh the shifting fork with the shifting collar.
20. Install a retainer clip (PN 02-0009) into the pinion idler gear (PN 997-A2-119). Press an idler bearing (PN 02-0011) into the gear, and secure with the second retainer clip.
21. Slide the pinion idler half-shaft (PN 1050-D5-105) through the pinion idler gear assembly. Slide the bearing seal (PN 02-0010) over the end of the half-shaft, and secure to the half-shaft with a shaft retainer clip (PN 02-0008).
22. Place pinion idler assemblies, less the idler pads and top fasteners, on top of the lower pinion gear and place them as best as possible - their position may have to be adjusted slightly as the top plate is attached (see illustration 5.9.2).



Illustration 5.9.2: Tong Assembly - Gear Assembly Positioning

5.9 ASSEMBLY PROCEDURES (CONTINUED):

23. The high pinion gear (PN 997-A4-87) is machined with shoulders around the centre spline on both sides of the gear. Place the side of the high pinion gear with the larger shoulder over the top of the splined pinion shaft and press against the centre gear on the pinion shaft.
24. Install high clutch gear (PN 997-A1-51) on to the clutch shaft, ensuring the smaller diameter is directly adjacent to the centre gear on the clutch shaft.
25. Carefully remove all support roller shafts, using caution not to shift the position of the installed support roller assemblies or to damage the threads on the end of the shafts.
26. Locate the three un-threaded holes in the side body of the tong, one in the rear centre and one just to either side of the front opening. If old dowel pins are in place, remove them before installation of the top plate. If the dowel pins are in any way damaged or deformed McCoy recommends replacing them with new $\frac{3}{8}$ " x 1- $\frac{1}{2}$ " hardened dowel pins. If necessary clean the dowel pin holes, and do not insert dowel pins until after the top plate has been installed.
27. Use a temporary lifting sling and crane to maneuver the top plate (PN 1050-7TP) into position, and place on to the side body. Insert the three positioning dowel pins (PN 09-0092) through the top plate into their respective holes in the side body. Use a hammer to tap the dowel pins until they are flush with the top plate. Secure the top plate with 14 $\frac{3}{8}$ " UNC x 1- $\frac{1}{2}$ " hex bolts and $\frac{3}{8}$ " lock washers, and ten $\frac{3}{8}$ " UNC x 1" hex socket head cap screws as shown in illustration 5.9.3. Do not install fasteners at the tong handle mounting locations indicated by the red circles, or the rigid sling hanger mount and door switch mounting locations as indicated by illustration 5.9.3.

**Illustration 5.9.3: Tong Assembly - Top Fastener Locations**

28. Install half-moon idler pad (PN 997-D17-109) over the end of the pinion idler shaft and secure with three $\frac{5}{8}$ " UNC x 2- $\frac{3}{4}$ " hex bolts and $\frac{5}{8}$ " lock washers, followed by a 1- $\frac{1}{2}$ " UNF nylock nut.
29. Slide the remaining rotary idler pads over the rotary idler shafts and secure with 1- $\frac{1}{2}$ " UNF nylock nuts.
30. Press the remaining pinion bearing (PN 02-0007) into the top pinion bearing cap and install over the top of the pinion gear shaft - secure with four $\frac{1}{2}$ " UNC x 1- $\frac{1}{2}$ " hex bolts and $\frac{1}{2}$ " lock washers.
31. Install top clutch bearing retainer (PN 997-D11-59) over the clutch shaft into the cutout in the top plate and secure with two 10-24 x $\frac{3}{4}$ " hex socket head cap screws.
32. Insert top clutch bearing (PN 02-0002), followed by the clutch bearing bushing (PN 997-60).
33. Install clutch drive gear (PN 997-A3-61) and secure with retaining snap ring (PN 1234-00-04).

5.9 ASSEMBLY PROCEDURES (CONTINUED):

34. Install support roller shafts:

- a) Install support roller shafts (PN 101-3939) in four locations where they are coincidental with the top and bottom brake band retainer weldments as shown in illustration 5.9.6. These support rollers do not use top or bottom washers.



Illustration 5.9.4: Tong Assembly - Brake Band Coincidental Roller Shaft Installation

- b) Slide 1- $\frac{1}{8}$ " narrow flat washers over the remaining four "short" shafts and install in the locations indicated by the green circles in illustration 5.9.5. Secure on the bottom plate using 1" narrow flat washers and 1" UNF nylock jam nuts. At this time do not install longer roller shafts in the areas indicated by the red circles.

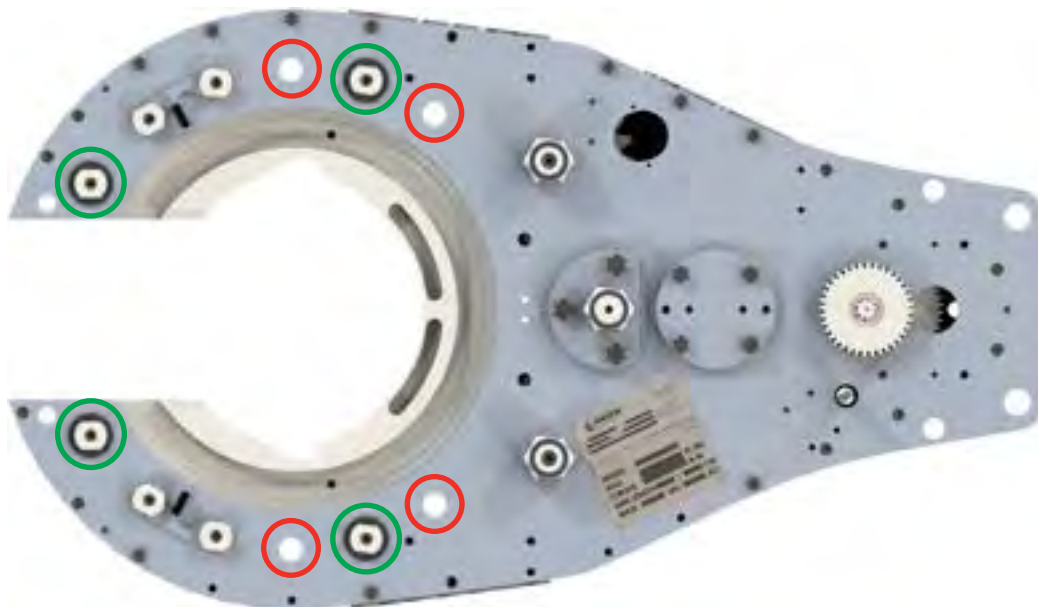


Illustration 5.9.5: Tong Assembly - Roller Shaft Installation

35. Slide the top shifter bushing (PN 101-0020) over the shifting shaft and thread in to the top plate until snug.
36. Apply permanent Loctite® to the threads of the shifter detent tube (PN 101-0019). Thread the shifter detent tube in to the top shifter bushing until the shoulder of the detent tube comes in to contact with the side of the top shifter bushing, and use an adjustable wrench to tighten the shifter detent tube $\frac{1}{8}$ turn past finger tight. Over-tightening the detent tube exerts torque that will cause failure at the threads (see illustration 5.9.6).
37. Thread three $\frac{5}{8}$ " UNC x $\frac{5}{8}$ " hex socket set screws into the remaining three ports in the top shifter bushing - do not bottom out the set screws on the shifting shaft, or the shaft will not move.
38. Insert the detent ball (PN 02-0018) through the end of the detent tube attached to the top shifter bushing, followed by the detent spring (PN 997-0-64). Apply a small amount of grease to a $\frac{7}{16}$ " UNF x 1- $\frac{1}{4}$ " hex adjustment bolt, and thread a $\frac{7}{16}$ " UNF jam nut all the way on to the adjustment bolt. Do not apply Loctite® to the threads of the adjustment bolt or locking nut (see Illustration 5.9.6).

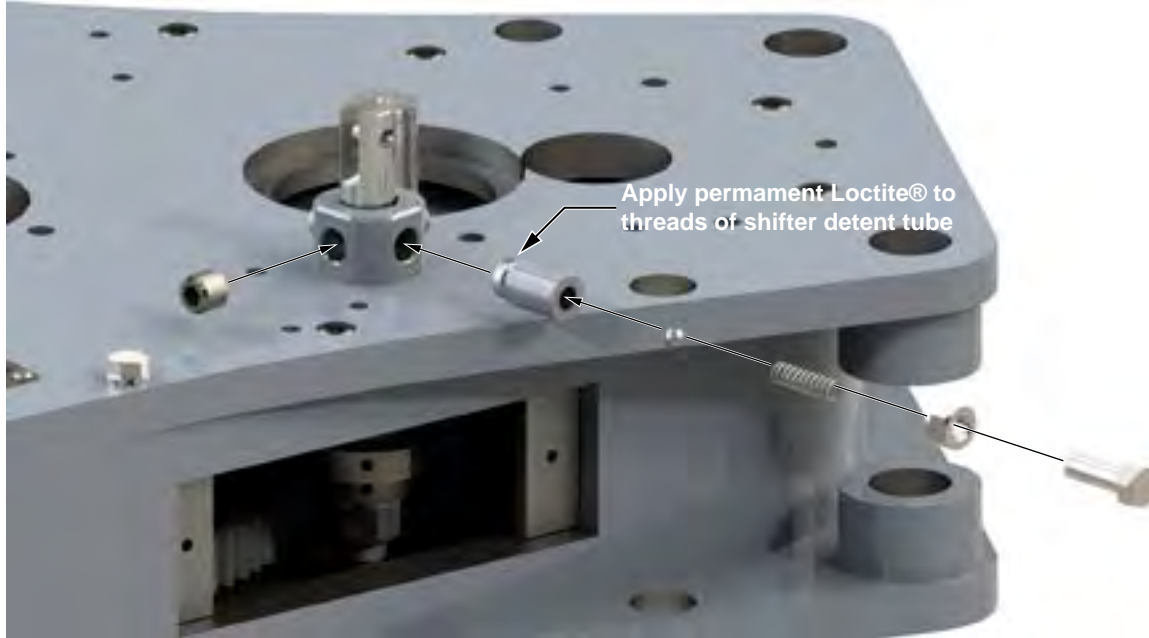


Illustration 5.9.6: Tong Assembly - Shifter Detent Tube Installation

39. Insert two $\frac{5}{16}$ " x $\frac{3}{4}$ " dowel pins (PN 09-0170) into the un-threaded holes in the rear of the tong, behind the clutch drive gear on either side of the cutout in the top plate.
40. Place motor mount (PN 1050-150) on to top plate over the dowel pins installed in the previous step, and secure with four $\frac{1}{2}$ " UNC x 1- $\frac{1}{2}$ " hex socket head cap screws.
41. Bolt the shifter lug weldment (PN 101-0016) onto the top plate with four $\frac{3}{8}$ " UNC x 1- $\frac{1}{4}$ " hex bolts and $\frac{3}{8}$ " lock washers. Use two of the fasteners to attach the shift direction label (PN 101-5600) to the front of the shifter lug.
42. Insert a $\frac{5}{16}$ " x $\frac{5}{16}$ " x 1- $\frac{1}{2}$ " square key (PN 01-0317) into the key slot on the motor shaft. Secure the motor gear (PN 997-A10-149) to the hydraulic motor shaft using two $\frac{3}{8}$ " UNC x $\frac{5}{8}$ " flat point hex socket set screws. Ensure that the motor gear is oriented so that the machined end of the motor gear (the end in which the set screws are threaded) is flush with the end of the motor shaft.
43. Install the motor (PN 87-0112) onto the motor mount. Secure the RH (off-driller's) side of the motor to the motor mount with two $\frac{1}{2}$ " UNC x 1" hex socket head cap screws and $\frac{1}{2}$ " lock washers.
44. Secure the torque gauge holder weldment (PN 1500-09-04A) to the driller's side of the motor and motor mount using two $\frac{1}{2}$ " UNC x 1- $\frac{1}{4}$ " hex socket head cap screws and $\frac{1}{2}$ " lock washers.
45. Attach the two #20 (1- $\frac{1}{4}$ ") x JIC 1" flange elbows (PN 02-9216) to the motor ports using two #20 split flange kits (PN 02-9217).
46. Install shifting handle (PN 1037-D-20B). Secure the handle to the shifter shaft and shifter pivot lug weldment with $\frac{5}{16}$ " x 1- $\frac{1}{2}$ " clevis pins. Use a hitch pin on each clevis pin to ensure they do not become dislodged.
47. Install thirteen cam followers (PN 02-0015) in the top cage plate (PN 1050-21), and secure each a with $\frac{5}{8}$ " UNF hex jam nut and $\frac{5}{8}$ " lock washer. Once installed the cam followers will ride in the top groove in the rotary gear.

5.9 ASSEMBLY PROCEDURES (CONTINUED):

48. Install thirteen cam followers (PN 02-0015) in the bottom cage plate (PN 1050-22), and secure each a with $\frac{5}{8}$ " UNF hex jam nut and $\frac{5}{8}$ " lock washer. Once installed the cam followers will ride in the bottom groove in the rotary gear.
49. Support the bottom cage plate assembly (weight - 80 lbs / 36.4 kg) against the bottom of the rotary gear, with the cam followers in the groove in the bottom of the rotary gear and the opening of the cage plate aligned with the opening in the tong body.
50. Place the top cage plate assembly (weight - 80 lbs / 36.4 kg) on the top of the rotary gear, with the cam followers in the groove in the top of the rotary gear and the opening of the cage plate aligned with the opening in the tong body.
51. Insert two cage plate spacers (PN 1050-C3-38) between the cage plates at the front of the cage plates next to the rotary gear. Secure the cage plates through the spacers using $\frac{1}{2}$ " UNC x 7- $\frac{1}{2}$ " hex bolts, $\frac{1}{2}$ " narrow flat washers (on the bottom) and $\frac{1}{2}$ " UNC nylock nuts.

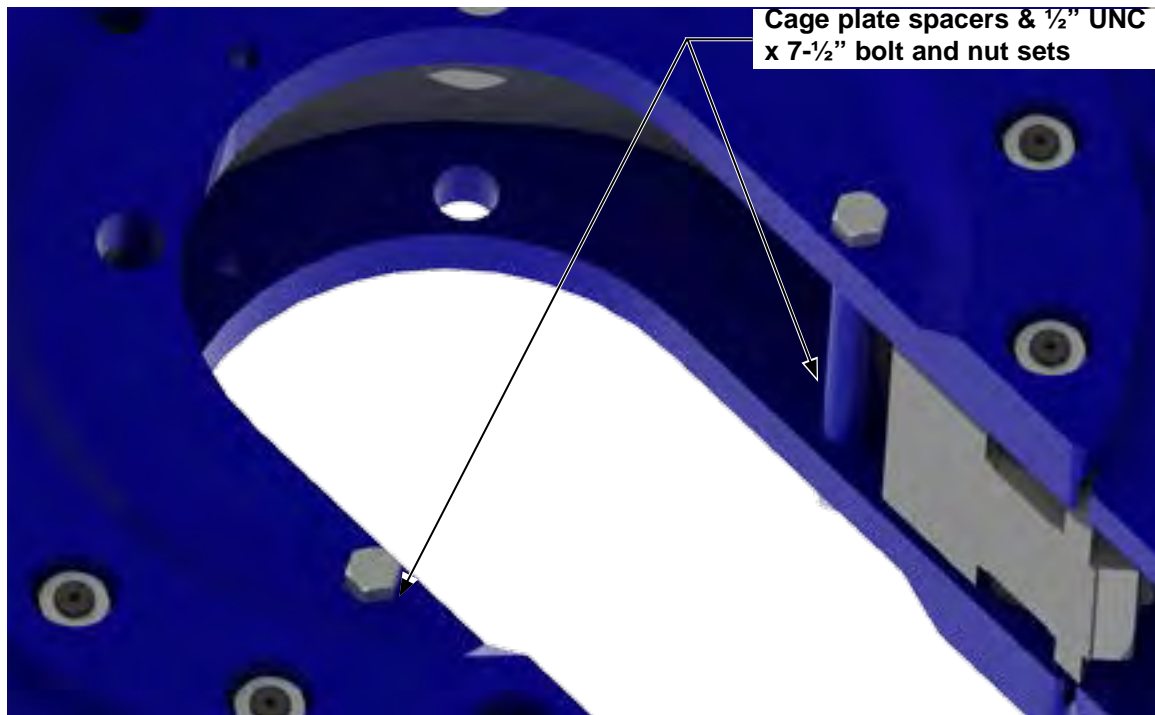


Illustration 5.9.7: Tong Assembly - Front Cage Plate Spacers

52. Slide a $\frac{1}{2}$ " flat washer on to a $\frac{1}{2}$ " UNC x 9- $\frac{1}{2}$ " hex bolt, followed by the long backing pin spacer (PN 101-4186). Slide the larger diameter hole in the backing pin retainer link (PN 101-4187) over the end of the 9- $\frac{1}{2}$ " hex bolt, and over the long backing pin spacer.
53. Coat half of the threaded connecting dowel pin (PN 101-4097) with removable Loctite® and screw in to the backing pin (PN 101-4188).
54. Insert the exposed half of the threaded dowel pin through the smaller diameter hole of the backing pin retainer link. Slide the short backing pin spacer (PN 101-4096) over the threaded dowel against the backing pin retainer link. Thread the backing pin knob (PN 02-0017) on to the exposed threaded dowel and tighten against the short spacer.
55. Position the remaining cage plate spacer (PN 1050-C3-38) between the cage plates at the rear of the opening. Insert the bolt of the backing pin assembly through the cage plates and cage plate spacer, and the backing pin in to one of the backing pin holes at the rear of the top cage plate. Secure the bolt with a $\frac{1}{2}$ " narrow washer and a $\frac{1}{2}$ " UNC nylock nut.
56. Install the top and bottom lined brake band lug weldments (1050-D4-29). Secure the brake bands to the top and bottom plates using one brake band retainer (PN 101-0140) and two $\frac{3}{8}$ " UNC x $\frac{3}{4}$ " hex bolts and $\frac{3}{8}$ " lock washers at the rear of each brake band, and a $\frac{3}{8}$ " UNF x 2" hex bolt and $\frac{3}{8}$ " UNF hex nylock nut at each brake band lug weldment. These nut and bolt sets are used for adjusting the brake band tension.

5.9 ASSEMBLY PROCEDURES (CONTINUED):

57. Slide 1- $\frac{1}{8}$ " narrow flat washers over the four "long" roller shafts (PN 101-3941) and install in the remaining four roller locations around the cage plate. Install the front leg mount weldments (part numbers vary depending on the model of your equipment) over the roller shafts and secure using 1" narrow flat washers and 1" UNS thin nylock nuts.

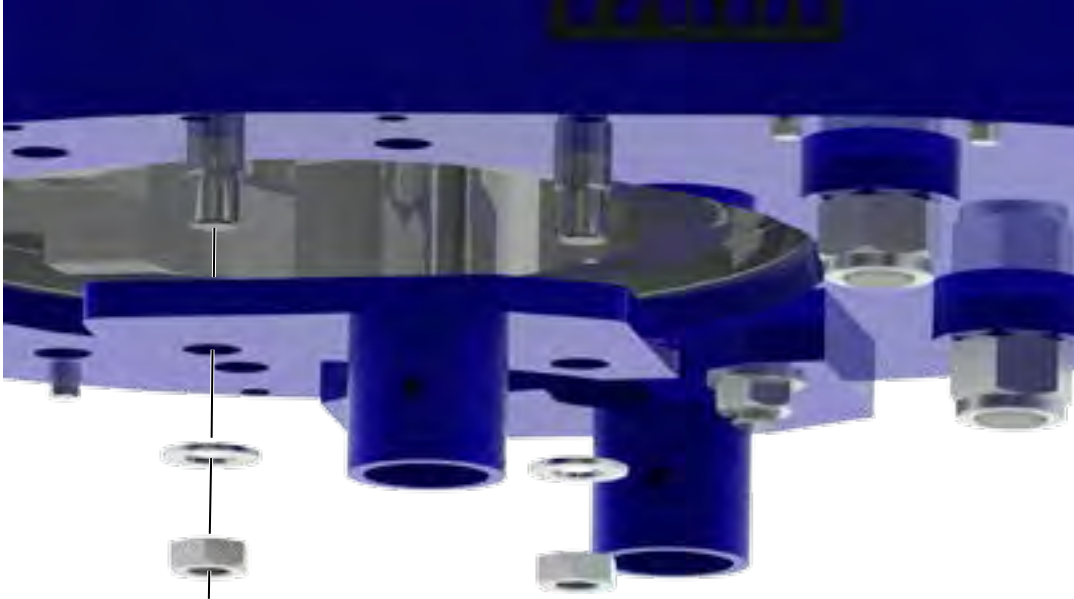


Illustration 5.9.8: Tong Assembly - Long Roller Shaft and Leg Mount Installation

58. Install the door latch assembly in to the door weldment. See Pp. 7.30 - 7.31 for detailed assembly drawings. Install a $\frac{3}{8}$ " x $\frac{3}{8}$ " hex socket head UNC shoulder bolt in to the bottom of the top door plate in front of the latch actuator to act as a latch handle stop.
59. Press a bronze shouldered door bushing (PN 101-6123) in to the top and bottom plates of the door weldment (refer to exploded diagram on pages 7.32 - 7.33).
60. Attach the bottom door pivot sleeve (PN 101-6128) to the bottom door plate over the shoulder bushing using two $\frac{1}{4}$ " UNC x 1" hex bolts and $\frac{1}{4}$ " lock washers.
61. Thread a $\frac{3}{4}$ " UNC thin hex nylock nut on to one end of the door pivot shaft (PN 101-6217). Hold the shaft and continue to rotate the nut on to the shaft until it comes in to contact with the shoulder on the shaft.
62. Slide the top door shaft spacer sleeve (PN 101-6126) over the opposite end of the door pivot shaft, and slide along the shaft until the spacer contacts the nut on the shaft.
63. Align the door assembly with the body plates of the tong. Insert a flat door bushing (PN 101-6125) between the top and bottom plates of the tong door weldment and the top and bottom plates of tong (see exploded illustration on page 7.32).
64. Insert the door pivot shaft through the door assembly and the top and bottom plates of the tong until the door shaft spacer sleeve contacts the bushing installed in the previous step.
65. Slide the bottom door shaft spacer sleeve (PN 101-6127) over the bottom of the door pivot shaft until it contacts the lower flat bushing. Secure the bottom of the door pivot shaft with a second $\frac{3}{4}$ " UNC thin hex nylock nut and a $\frac{3}{4}$ " narrow flat washer. Tighten the nylock nut so all vertical motion of the door shaft is eliminated. Swing the door open and closed a few times to ensure the door moves smoothly.
66. Mount the door switch cam (101-6146) and top door pivot sleeve (101-6124) to the top door plate over the door shaft and door shaft spacer sleeve using two $\frac{1}{4}$ " UNC x 2" hex bolts and $\frac{1}{4}$ " lock washers. ASSEMBLY NOTE: mount the switch and switch cam spacer so that the flats on each are oriented towards the inside of the door, and the notch on the cam is approximately oriented toward the door switch mount location (see illustration 5.9.9).

5.9 ASSEMBLY PROCEDURES (CONTINUED):

**Illustration 5.9.9: Tong Assembly - Door Switch Cam Installation**

67. Thread a $\frac{3}{4}$ " UNC hex nylock nut on to one end of the door latch post (101-6218). Slide a door latch spacer (PN 101-6127) over the latch post, and slide the post through both tong body plates in the latch post location next to the tong opening. Refer to the exploded diagrams on page 7.32 if required. Slide the second latch spacer over the bottom of the latch post and secure with another $\frac{3}{4}$ " UNC hex nylock nut.
68. Install door spring stop cylinder (PN 101-0069). Attach the front of the cylinder to the bottom door sleeve using the front mounting lug (PN 101-6058) and a $\frac{1}{2}$ " x $1\frac{1}{4}$ " hex socket head UNC shoulder bolt, and attach the rear of the cylinder to the bottom plate using the rear door cylinder mounting lug (PN 101-6060) and a $\frac{1}{2}$ " x $2\frac{3}{4}$ " hex socket head UNC shoulder bolt.

**Illustration 5.9.10: Tong Assembly - Door Spring Stop Cylinder Installation**

5.9 ASSEMBLY PROCEDURES (CONTINUED):

69. Attach the door switch adjustment plate weldment (PN 101-6220) to the top plate of the tong adjacent to the pivot corner of the tong door using two $\frac{3}{8}$ " UNC x 1- $\frac{3}{4}$ " hex socket head cap screws.
70. Attach the hydraulic door switch (PN 02-E0190) to the door switch guard weldment (PN 101-6141) using four $\frac{1}{4}$ " UNC x 2" hex bolts and $\frac{1}{4}$ " lock washers.
71. Mount the hydraulic door switch/guard weldment to the adjustment plate using two $\frac{3}{8}$ " UNC x 1- $\frac{1}{4}$ " hex bolts and two $\frac{3}{8}$ " lock washers.
72. Install the rigid sling mounting plates (off-driller's side = PN 101-6894, driller's side = PN 101-6895) to the top plate of the tong using two $\frac{1}{2}$ " UNC x 1- $\frac{1}{4}$ " hex socket head cap screws on the inside mounting locations, and two $\frac{3}{8}$ " UNC x 2" hex socket head cap screws on the outside mounting location, threaded in to the side body of the tong.
73. Mount the inlet coupling support assembly (PN 101-1138) to the off-driller's side of the top plate between the RH rigid sling mounting plate and the turns counter encoder access hole using two $\frac{3}{8}$ " UNC x 1" hex bolts and $\frac{3}{8}$ " lock washers. Attach the adjusting plate (PN 101-0022) to the support base using two $\frac{3}{8}$ " UNC x 1" hex bolts, two $\frac{3}{8}$ " flat washers, and two $\frac{3}{8}$ " UNC nylock nuts.
74. Attach the outlet coupling support base (PN 101-0023) to the top plate on the off-driller's side of the pinion bearing cap and motor mount using two $\frac{3}{8}$ " UNC x 1" hex bolts and $\frac{3}{8}$ " lock washers. Attach the adjusting plate (PN 101-0277) to the support base using four $\frac{3}{8}$ " UNC x 1" hex bolts, four $\frac{3}{8}$ " flat washers, and four $\frac{3}{8}$ " UNC nylock nuts.
75. Coat the threads of both hydraulic valve mount posts (PN 101-0116) with permanent Loctite® and thread in to the top plate on either side of the brake band retainer. Use a wrench on the flat on each post to ensure the posts are tight.
76. Use a crane and temporary lifting sling to move the hydraulic valve assembly (weight = 80 lb/36.3 kg) on to the two valve mount posts, and secure to the posts using two $\frac{1}{2}$ " UNC x 5" hex bolts and $\frac{1}{2}$ " narrow flat washers. Use the hex bolt on the operator's side of the valve assembly to attach the front half of the valve handle protector weldment (PN 101-6860) to the top of the valve assembly.
77. Attach the rear half of the valve handle protector weldment (PN 101-6861) to the top rear of the valve assembly using a $\frac{1}{2}$ " UNC x 5" hex bolt, two $\frac{1}{2}$ " narrow flat washers, and a $\frac{1}{2}$ " UNC thin nylock nut. Secure the halves of the valve protector weldment to one another using a $\frac{3}{8}$ " UNC x 1- $\frac{1}{4}$ " hex bolt, three flat washers (position two flat washers between the two weldment halves), and one $\frac{3}{8}$ " UNC hex nylock nut.
78. Mount the rigid sling feet (PN 101-6393) to each rigid sling mounting plate using four $\frac{1}{2}$ " UNC x 1- $\frac{3}{4}$ " drilled hex bolt (PN 101-6459) and four $\frac{1}{2}$ " lock washers per side.
79. Slide the master lifting link (PN 02-9128) over the adjustment helix (PN 1095-220), and install the adjustment helix in the rigid sling weldment (PN 101-6887) using the main rigid sling lifting bolt (PN 02-E0267) and a 1- $\frac{1}{4}$ " UNC hex nylock nut.
80. Use a crane to hoist the rigid sling weldment by the master lifting link (weight = 60 lbs/27.3 kg). Connect the rigid sling weldment to the rigid sling feet using a 1" x 2- $\frac{1}{2}$ " hex socket head UNC shoulder bolt, $\frac{3}{4}$ " UNC hex nut, and $\frac{3}{4}$ " lock washer per side.
81. Thread a $\frac{3}{4}$ " UNC hex nut on to each of eight $\frac{3}{4}$ " UNC x 2- $\frac{3}{4}$ " hex bolts. Thread four bolts in to each rigid sling foot to act as leveling adjustments, and roughly adjust them so the rigid sling is approximately perpendicular to the top plate of the tong.
82. Use a crane and temporary sling to hoist the backup assembly onto a support structure next to the assembly location of the tong. Minimum height for the backup supports must be 36" in order to allow clearance for installing the front legs.
83. **Model 80-0615-10 using 7- $\frac{5}{8}$ " compression load cell-style backup assembly 85-0604 and model 80-0615-12 using 7- $\frac{5}{8}$ " tension load cell-style backup assembly 85-0606:** if using either of these backups ensure they are properly prepared for mating with the tong and rear leg assembly.
 - a. Thread a 1- $\frac{1}{4}$ " UNC heavy hex nut on to the 1- $\frac{1}{4}$ " UNC x 8" threaded rod (PN 997-500-03).
 - b. Coat approximately 2" of thread on the bottom of the threaded rod with semi-permanent Loctite®. Slide a 1- $\frac{1}{4}$ " lock washer over the coated end of the threaded rod. Screw the coated part of the threaded rod into the top plate of the backup until the end of the rod is flush with the inside of the top plate. Lock the threaded rod in place using the heavy hex nut threaded on to the rod in the previous step.
 - c. Coat approximately 5" of thread at the top of the threaded rod with semi-permanent Loctite®. Thread a second 1- $\frac{1}{4}$ " UNC heavy hex nut on to the threaded rod, and continue to thread until the limit of the Loctite® is reached.

5.9 ASSEMBLY PROCEDURES (CONTINUED):

83. Ensure 7- $\frac{5}{8}$ " backups are properly prepared for mating with the tong and rear leg assembly (continued):
- d. Slide the suspension spring bracket (PN 1483-500-00-04) on to the 1- $\frac{1}{4}$ " threaded rod, and lock it in to place with a third 1- $\frac{1}{4}$ " UNC heavy hex nut.



Illustration 5.9.11: Tong Assembly - Rear Backup Spring Support Bracket Installation

84. **Model 80-0615-14 using 8- $\frac{5}{8}$ " backup assembly 85-0607:** install the rear backup support spring assembly in the rear leg (see Pp. 7.40 - 7.41):
- a. Place two springs (PN 991-13) inside the nubs of the bottom spring plate weldments (PN 101-4495). Place the top spring plate weldment (PN 101-4496) over the springs and use four $\frac{1}{2}$ " UNC hex nuts and four $\frac{1}{2}$ " lock washers to fasten the assembly together.



Illustration 5.9.12: Rear Leg Spring Support Installation (Model 80-0615-14)

5.9 ASSEMBLY PROCEDURES (CONTINUED):

84. **Model 80-0615-14 using 8- $\frac{5}{8}$ " backup assembly 85-0607:** install the rear backup support spring assembly (continued):
- b. Install the spring support weldment in a low position in the rear leg weldment (PN 1302-908-00) using two $\frac{1}{2}$ " UNC x 9- $\frac{1}{2}$ " hex bolts, $\frac{1}{2}$ " lock washers, and $\frac{1}{2}$ " UNC hex nuts. The location of the support can be changed as required when leveling the backup.
85. Attach the rear leg assembly to the tong:
- a. Position rear leg weldment on a flat surface near the tong assembly location.
 - Models 80-0615-10 and 80-0615-14 use rear leg weldment PN 1302-908-00
 - Model 80-0615-12 uses rear leg weldment PN 101-2031
 - b. Use a crane to hoist the tong assembly off the assembly surface. Bring the tong into contact with the rear leg, ensuring the crane continues to support the entire weight of the tong. Attach the rear leg weldment to the tong using two 1- $\frac{1}{4}$ " UNC x 8" hex bolts, four 1- $\frac{1}{4}$ " narrow flat washers, and two 1- $\frac{1}{4}$ " UNC hex nylock nuts, and two 1" UNC x 7" hex bolts, and two 1" UNC hex nylock nuts. **INSTALLATION NOTE:** Insert the 1" heavy hex bolt on the driller's side from the bottom, through the leg and tong, and secure on top with the nylock nut.
- Leg weldment 101-2031 also uses four $\frac{3}{8}$ " UNC x 2- $\frac{1}{4}$ " hex bolts and $\frac{3}{8}$ " lock washers inserted from the bottom, through the leg weldment, and in to the side wall of the tong assembly
- Do not neglect to install two rear tong body spacers (PN 101-1546) at the rear of the tong between the top and bottom plate weldments (see illustration 5.9.13).



Illustration 5.9.13: Tong Assembly - Rear Leg Installation

5.9 ASSEMBLY PROCEDURES (CONTINUED):

86. Remove the side panels from the backup.
87. Use a crane to hoist the tong and rear leg assembly and place in position over the backup. If using the 85-0604 or 85-0607 compression load cell-style backups the rear leg must be guided so that the “paddle” on the backup sits between the vertical plates of the rear leg when the tong and rear leg assembly is in position over the backup.
88. Install a ½” UNC x 3-½” hex bolt and ½” UNC nylock nut in to the bottom height adjustment location on each front leg weldment (PN 101-5732).
89. Slide a bottom leg washer (PN 1302-905-03A) over the top of each leg weldment and rest on top of the bolt and nut installed in the previous step.
90. Slide a front leg spring (PN 1302-905-08) over the top of each front leg weldment.
91. Place a rubber washer/guard (PN 101-5733) on the top plate of the backup over the cutouts for the front legs.
92. Hold a top spring cap (PN 1302-905-03B) under the top plate of the backup, and insert a front leg weldment assembly from the bottom of the backup, through the spring cap, and in to the leg mount weldment on the tong. Secure the leg tube in the leg mount weldment with a ½” UNC x 4” hex bolt and ½” UNC nylock nut. Repeat for the other front leg assembly.

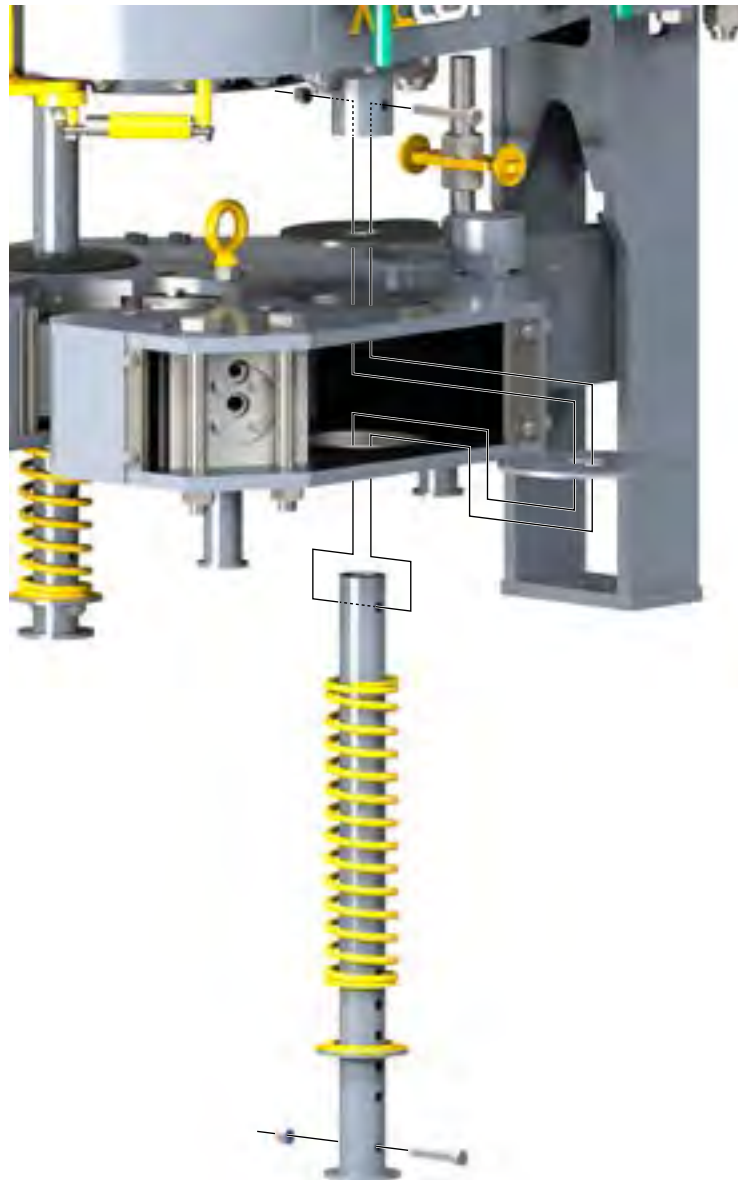


Illustration 5.9.14: Tong Assembly - Front Leg Installation

93. **80-0615-10 assemblies only (using 85-0604 compression load cell-style backups):** Thread a $\frac{3}{8}$ " UNC shouldered eye bolt (PN 02-0262) in to the bottom plate/side wall of the tong body from the bottom of the top plate of the rear leg weldment, directly in front of the top plate of the rear leg weldment.
94. Connect the rear suspension springs:

80-0615-10 assemblies using 85-0604 compression load cell-style backups:

- Remove the retainer plates (PN 1483-500-00-4B) from the spring suspension bracket at the rear of the backup.
- Connect one end of each backup rear suspension spring (PN E2188-0250-11750) to the spring suspension bracket. Re-install the retainer plates, and secure each retainer plate with a cotter pin.
- Use a $\frac{1}{2}$ " shackle assembly (PN 02-9063) to connect the top of each backup rear support spring to the eye bolts installed in Step 93.



Illustration 5.9.15: Rear Backup Support Spring Installation (Compression LC-Style Backups)

80-0615-12 assemblies using 85-0606 tension load cell-style backups:

- Remove the retainer plates (PN 1483-500-00-4B) from the spring suspension bracket at the rear of the backup.
- Connect one end of each backup rear suspension spring (PN E2188-0250-11750) to the spring suspension bracket. Re-install the retainer plates, and secure each retainer plate with a cotter pin.
- Use a $\frac{1}{2}$ " shackle assembly (PN 02-9063) to connect the top of each backup rear support spring to the hooks welded to the bottom of the top plate of the rear leg weldment.



Illustration 5.9.16: Rear Backup Support Spring Installation (Tension LC-Style Backups)

95. Hoist tong and backup assembly off the backup supports, and lower assembly so that it sits on its legs.
96. Replace the backup side panels.
97. Install grease fittings:
 - a) Install one 1/4" straight thread grease fitting (PN 02-0097) into the top side of each support roller shaft, including the door pivot rollers (12 locations total).
 - b) Install one 1/4" straight thread grease fitting (PN 02-0097) into the top side of the latch adjustment cam.
 - c) Install one 1/8" NPT grease fitting (PN 02-0005) into the top of each idler shaft or half-shaft (three locations total).
 - d) Install one 1/8" NPT grease fitting (PN02-0005) into the end of the clutch shaft, in the centre of the clutch bearing cap.
 - e) Install two 1/8" NPT 90° grease fittings (PN 02-0093) in each pinion bearing cap (four locations total).
 - f) Install two 1/8" NPT 90° grease fittings (PN 02-0093) in clutch bearing cap (two locations total).
 - g) Install one 1/8" NPT 90° grease fitting (PN 02-0093) or one 1/8" NPT 45° grease fitting (PN 02-0006) in the top of the motor mount.
 - h) Install two 1/8" NPT 90° grease fittings (PN 02-0093) into the top plate of the backup directly above each clamping cylinder, and two into the bottom backup plate directly beneath each of the clamping cylinders (eight locations total).
 - i) Install drive-in grease fittings (PN 02-0012) into the ends of each cage plate cam follower (26 locations total).
98. Connect the door switch valve block (PN 101-0727) directly to the flange elbows on the hydraulic motor (the block will sit on top of the motor following installation). Connect the rotation control valve on the DVA35 valve assembly to the door switch valve block.
99. Connect the safety door switch to the safety door block and hydraulic valve assembly. Refer to hydraulic schematic, or call McCoy Global service department for assistance.
100. Install desired jaw die kit in the tong using the jaw pivot bolts (PN 1050-C5-28).
101. Install matching jaw die kits in the backup.
102. Perform a complete pre-operational check before releasing equipment to an operating environment. See subsection 4.0.5 for complete testing procedures.

5.10 DAILY INSPECTION & MAINTENANCE CHECKLIST

McCoy Global 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.

 **WARNING**

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.

DEPRESSURIZE HYDRAULIC SYSTEM IN PREPARATION FOR MAINTENANCE:

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. Use a flashlight to perform a visual inspection of the gear train through the access panel and 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.
5. Remove at least one of the side panels on the backup. Perform a visual inspection of the interior of the backup - use a flashlight if necessary. Premature wear where there are moving parts (bare metal where there used to be paint, and metal shavings in the grease are good indicators) may show where a component needs to be adjusted, or if necessary, replaced.
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. 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.
8. Check to see if backup is parallel to the tong - if the backup is resting at an angle side-to-side, one of the front leg springs is likely broken or fatigued to the point it must be replaced.
9. Inspect exterior moving component of the equipment for signs of premature wear, or parts that are rubbing (bare metal where there used to be paint is a good indication of wear).

5.10 DAILY INSPECTION & MAINTENANCE CHECKLIST (CONTINUED):

10. 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.
11. Inspect backing pin(s). If cracked, broken, or bent it (they) must be replaced.
12. 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.
13. 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.
14. Perform a complete greasing of the tong and backup - refer to Maintenance section of the technical manual
15. Ensure main supply and return connections to the tong are fully made up. Re-connect 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.

16. Ensure that supply pressure is at or above the tong's specified operating pressure, and that the return pressure is less than 350 psi.
17. Perform a visual inspection of pressurized hydraulic lines. Document and correct any hydraulic fluid leaks.
18. Perform a full functional test of the tong (see subsection 4.0.5). Report and correct any hydraulic leaks from the hydraulic valve bank, or from any hydraulic cylinders that are used.
19. 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.
20. If applicable, inspect the load cell anchor pins (tension load cell only). Replace the anchor pins if cracking or metal distortion is seen.
21. Test door switch system. Refer to door switch testing procedure in subsection 4.0.5, "Pre-operational Checks".


DANGER

DO NOT OPERATE TONG WITH A MALFUNCTIONING OR NON-OPERATING DOOR SWITCH SYSTEM.

22. 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 (see section 5.6.1).

5.11 MONTHLY MAINTENANCE CHECKLIST

- The following maintenance checklist is intended as a guideline rather than a definitive maintenance schedule. Your equipment may require more, or less, maintenance depending upon the frequency of use, the percentage of maximum torque that your equipment is routinely subjected to, and the field conditions under which your equipment operates. McCoy Global recommends that the following inspection and maintenance procedures be performed monthly, or in conjunction with your maintenance foreman's experience and best estimate of when your equipment is due for this maintenance.

- 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:

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

- Clean the exterior of the equipment 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.
- Remove the access panel on the side of the tong directly adjacent to the shifter mechanism.
- Clean the interior spaces of the equipment 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.
- 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.
- Repair or replace any damaged or missing external body parts, such as torque gauge mounts, hydraulic supports, door switch protectors, etc.

5.11 MONTHLY MAINTENANCE CHECKLIST (CONTINUED):

8. 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.
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).
10. 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.
11. Inspect all external welds. Any weld that is cracked or separating must be repaired and repainted before returning the tong to service.
12. 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 3.1 of the technical manual for information on recommended testing and recertification.
13. 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.
14. Inspect backing pin(s). Replace cracked, broken, or bent pins.
15. 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.
16. Test the door stop spring cylinder(s). Ensure the springs retain sufficient strength to be able to assist the opening of the door, and to keep the door open. The springs should also help to "snap" the door shut.
17. Extend all hydraulic cylinders, and where possible inspect cylinder rods for signs of mechanical damage, flaking, or rust. McCoy recommends that damaged cylinders be replaced prior to storage.
18. 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.
19. Generously fill the gear train housing with grease. Perform a full lubrication per section 5.5 of this manual.
20. Ensure main supply and return connections to the tong are fully made up. Re-connect 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.

21. Ensure that supply pressure is at or above the equipment's specified operating pressure, and that the return pressure is less than 350 psi.
22. Perform a visual inspection of pressurized hydraulic lines. If any hydraulic fittings or hoses are leaking they must be repaired or replaced before proceeding.
23. 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.
24. 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.

5.11 MONTHLY MAINTENANCE CHECKLIST (CONTINUED):

25. De-energize the power unit, and perform a third generous lubrication of the gear train, including the gear housing.
26. 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.
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 Section 2.3.
27.
28. 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).
29. Inspect the load cell anchor pins. Replace the anchor pins if cracking or metal distortion is seen.
30. 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 subsection 5.6 for instructions on properly adjusting brake bands.
31. 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.
32. Test door switch feature. Refer to door switch testing procedure in subsection 4.0.5, "Pre-operational Checks".

**DANGER****DO NOT OPERATE TONG WITH A MALFUNCTIONING OR NON-OPERATING DOOR SWITCH SYSTEM.**

33. McCoy Global 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 equipment may be returned to service.

5.12 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 5.12. 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 equipment 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 equipment 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. Perform an initial wash of the equipment 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.
3. 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.
4. Clean the exterior of the equipment 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.

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

5. 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.
6. Inspect backing pin(s). Replace cracked, broken, or bent pins.
7. Repair or replace any damaged or missing external body parts, such as torque gauge mounts, hydraulic supports, door switch protectors, etc.
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 section 5.5 in this manual to determine lubrication points. Generously fill the gear train housing with grease through the opening in the rotary gear.
10. 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.
11. Energize hydraulic power to the equipment.
12. 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.
13. Energize hydraulic power to the equipment. 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.
14. De-energize the power unit, and perform a third generous lubrication of the gear train, including the gear housing.
15. Energize hydraulic power to the equipment, 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.
16. 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.
Depressurize 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.
17.
 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 equipment is completely free of all connections before beginning storage preparations.

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

 **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

18. Repair or replace all leaking hydraulic fittings or hoses before proceeding.
19. 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.
20. McCoy Global 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.

21. Apply grease or heavy oil to all exposed cylinder rods.
22. Allow the anti-corrosive coating ample time to dry - refer to manufacturer data sheets for drying times at room temperature.
23. Wrap entire assembly in 100 gauge (1 mil) corrosion-inhibiting wrap, at least 3 layers thick. Attempt to ensure that the equipment 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 equipment to be stored, and treat that as the volume to be stored. For example, the approximate external dimensions of this equipment are 102" x 92" x 67.5", which calculates to an approximate volume of 633420 in³, or 367 ft³ (10.392 m³).
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 ft³, 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 Global recommends that for equipment stored in a salt-water maritime or exposed dusty environment, repeat steps 9 through 23 monthly. For equipment stored in isolated storage in a non-maritime environment, repeat steps 9 through 23 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. 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.

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

3. Do not allow the backup to “float” on its support springs during shipping. Build a sturdy wooden support structure under the front and back of the backup to support the weight of the backup and release the compression on the springs. Strap the backup to the support blocks and pallet independent of the tong, using minimum 3/4” x 0.029” metal strapping in at least two locations. Place strapping as close to the backup supports as possible, and use caution not to entrap any flexible hydraulic hoses beneath the strapping. Before tightening strapping, place strapping protectors wherever the metal strapping comes into contact with the equipment (see illustration 5.11.1).



Illustration 5.11.1: Shipping Instructions - Backup Support

4. Securely strap the equipment in place using metal strapping (see Illustration 5.11.2). 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.

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



Illustration 5.11.2: Shipping Instructions - Strapping Equipment To Pallet

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.

5.13 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 Global have been strictly observed.

- 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.
- Remove the access panel on the side of the tong directly adjacent to the shifter mechanism.
- Wipe excess grease or heavy oil from exposed cylinder rods.
- 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.
- Perform a liberal lubrication of the equipment - refer to section 4.E to determine lubrication requirements. Generously fill the gear train housing with grease through the opening in the rotary gear.
- 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.

- Energize hydraulic power to the equipment. Ensure that supply pressure is at or above the tong's specified operating pressure, and that the return pressure is less than 350 psi.
- 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.
- Perform a thorough inspection of all seals. Any seal that is leaking or "weeping" must be replaced before returning the equipment to service.
- 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.
- 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.
- 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.
- 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. Ensure that all grease is wiped from brake band linings and the parts of the cage plates that come into contact with the brake band linings.
- Re-install access panel. Install a set of pre-inspected jaws that are the correct size for the pipe or casing being run.
- Install load cell. Perform a visual inspection and replace any cracked, broken, or distorted components including links and chains.
- Inspect the load cell anchor pins. Replace the anchor pins if cracking or metal distortion is seen.
- Re-energize hydraulic power to the equipment.

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

18. 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.
19. Test door switch feature. Refer to door switch testing procedure in subsection 4.0.5, "Pre-operational Checks".

**DANGER**

DO NOT OPERATE TONG WITH A MALFUNCTIONING OR NON-OPERATING DOOR SWITCH SYSTEM.

20. While rotating the cage plate, ensure that the jaws properly cam. If the jaws do not cam properly, the brake bands require tightening. Incrementally adjust both the top and bottom brake bands EQUALLY until proper cam action is achieved.
21. When all of the previous steps are completed, you may return your re-commissioned equipment to service.



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SECTION 6: TROUBLESHOOTING



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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 Global for repair and re-calibration

NOTICE

MCCOY GLOBAL GUARANTEES CALIBRATION OF A LOAD CELL/TORQUE GAUGE ASSEMBLY FOR A PERIOD OF ONE YEAR. MCCOY GLOBAL 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 RELIEF VALVE IS INCORRECTLY SET OR NOT FUNCTIONING

	POSSIBLE PROBLEM	SOLUTION(S)
1	Relief pressure set too low, resulting in insufficient tong torque Relief pressure set too high, resulting in crushed pipe or gear train failure	Adjust setting (See following procedure):

- a. If your tong is equipped with a system pressure indicator proceed to step “f”. If your tong does not have a system pressure indicator, a temporary 0 - 3000 PSI indicator must be installed on the hydraulic inlet.
- b. Isolate your tong from hydraulic power, and depressurize following the procedure in section 5.4.
- c. Tee in a temporary indicator at the door switch supply pressure port. Ensure all hydraulic connections are performed by a qualified hydraulic technician.

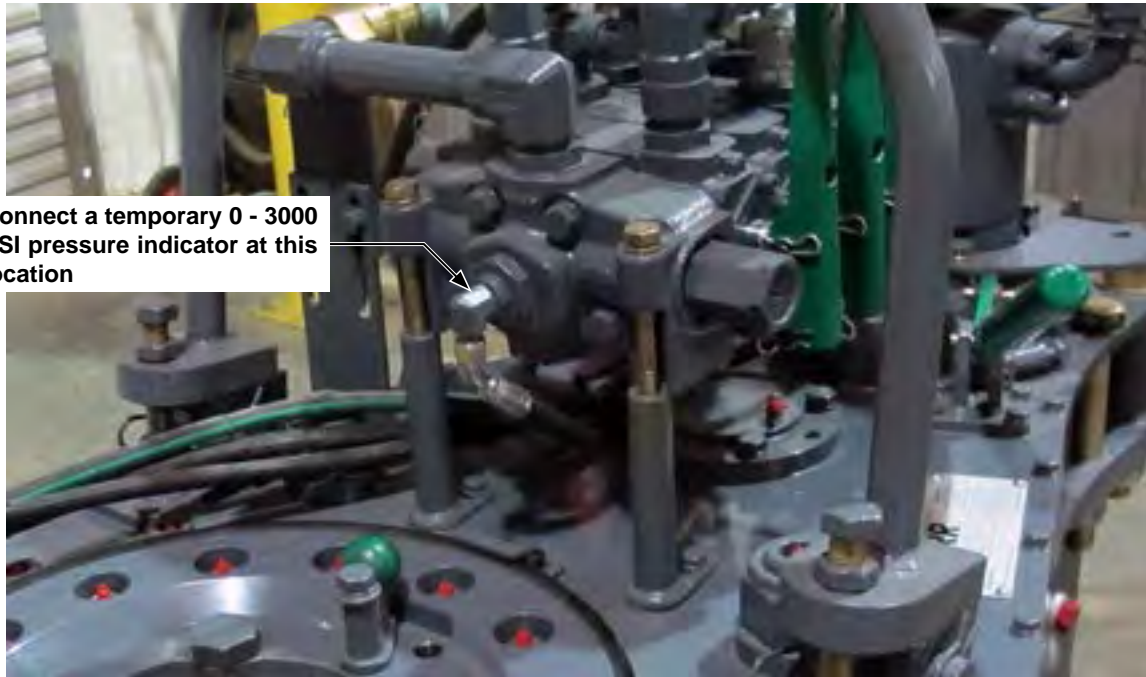


Illustration 6.1.1: Relief Valve Troubleshooting - Temporary Gauge Installation

- d. Re-establish hydraulic power to your tong. Ensure that no equipment functions are active.
- e. Loosen the locking nut on the pressure relief valve.
- f. Open the tong door to activate the door switch system and inhibit tong rotation.
- g. Activate motor control valve. Observe the pressure displayed on the pressure indicator. Adjust the relief valve until the pressure indicated is at the maximum system pressure specified on the specifications page (maximum system pressure is the pressure at which your tong achieves its specified torque).

⚠ WARNING

DO NOT ADJUST PRESSURE RELIEF TO A SETTING THAT ALLOWS HIGHER THAN MAXIMUM SYSTEM PRESSURE AS LISTED IN THE SPECIFICATIONS. DOING SO CREATES A POTENTIAL FOR SERIOUS INJURY OR DEATH, AND MAY CAUSE CATASTROPHIC EQUIPMENT FAILURE.

- h. Release the motor control valve and tighten the locking nut on the pressure relief valve.
- i. Isolate your tong from hydraulic power, and depressurize following the procedure in section 5.4
- j. Close the tong door, and remove the temporary pressure indicator. Restore the door switch pressure supply line to factory specifications. Verify that door switch is operating correctly (see subsection 4.0.5, step #8).

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6.1 RELIEF VALVE IS INCORRECTLY SET OR NOT FUNCTIONING (CONTINUED):

	POSSIBLE PROBLEM	SOLUTION(S)
2	Relief cannot be adjusted to maximum system pressure (high fluid bypass results in low system pressure)	Debris on valve seat
		Valve spring is broken
		Valve spring has lost spring force due to continuous tension

PROCEDURE:

- a. Isolate tong from hydraulic power, and depressurize following the procedure in section 5.4
- b. Loosen the locking nut on the pressure relief valve.
- c. Use a large flat-head screwdriver to completely un-thread the poppet and spring from the relief assembly.
- d. Inspect the relief valve spring, poppet, and valve seat.
- e. If no debris is found in relief valve and if seat and poppet are undamaged, replace relief valve spring.
- f. Reassemble relief valve.
- g. Relief valve must be re-set to allow maximum system pressure. Follow the procedure in Step 1 of this section to properly adjust relief valve.
- h. If maximum system pressure still cannot be reached, replace the entire relief valve assembly.

6.2 DOOR SWITCH DOES NOT OPERATE OR IS MALFUNCTIONING

	POSSIBLE PROBLEM	SOLUTION(S)
1	Door switch requires adjustment.	Adjust switch as per subsection 5.6.5.
2	Door switch has failed	Test door switch for proper function and replace if necessary
3	Contamination in hydraulic lines	Ensure all three flexible hydraulic lines to door switch are free-flowing
4	Pilot-to-open valve in door switch valve block is malfunctioning.	Remove each valve. Inspect seats and springs. Replace valve(s) if damage is seen on valve seats, or if spring appears to be damaged or broken.

6.3 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 Global specifications
		Ensure hydraulic fluid is appropriate for climatic conditions, especially during cold-weather operation
7	By-pass valve not functioning	Check and repair

6.4 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

6.5 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 subsection 5.6.4

6.6 BACKUP WILL NOT ENGAGE PIPE, OR DOES NOT PROVIDE ADEQUATE GRIP

	POSSIBLE PROBLEM	SOLUTION(S)
1	Hydraulic clamp cylinder failure or malfunction	Rebuild hydraulic cylinder(s) - disassemble, clean, and install new seal kit. Replace all damaged components (see Pp. 7.46 - 7.47)
		Install new hydraulic cylinder(s)
2	Inadequate lubrication of clamping cylinder	Grease cylinder as per instructions in Section 5.5
3	Metal fragment has become lodged between clamping cylinder and a fixed piece of the backup (top plate, bottom plate, or slider plate).	Thoroughly inspect area around clamp cylinder and remove the metal fragment if it is accessible. NOTE: Removal of trapped metal fragments may require removal of the top plate of the backup. Following removal of the fragment inspect moving components to ensure the metal has not been gouged or chipped. Damaged components may require replacement to ensure smooth cylinder movement.

 **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

	POSSIBLE PROBLEM	SOLUTION(S)
4	Incorrect size of die holders / jaws are being used	Double-check jaw size to ensure they are rated for the diameter of pipe or casing being run
5	Dies have become too dull to provide adequate grip	Replace dies
6	Incorrect dies are being used	Ensure dies loaded in the jaws are appropriate for the type of pipe or casing being run
7	Backup door is not closing properly	Ensure door weldments are not deformed, especially at the “locking” point.
		Ensure mechanisms attaching door weldments to clamp cylinder are intact.
		Backup door pivots or door/cylinder attachment pins require lubrication.
		Clamp cylinder is malfunctioning - see steps 1 & 2.

6.7 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.
- McCoy Global's recommended 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.



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SECTION 7: PARTS AND ASSEMBLIES



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CRITICAL SPARE PARTS

This list of critical spare parts identifies those parts that, if missing or damaged, results in one of the following possibilities:

- the operator(s) is exposed to a hazard while operating the equipment
- the equipment cannot be operated in a safe manner
- the equipment is inhibited from operating at all



ITEMS ON THE CRITICAL SPARE PARTS LIST MARKED IN RED INDICATE ESSENTIAL HEALTH & SAFETY ITEMS. FAILURE TO REPLACE DAMAGED ESSENTIAL HEALTH & SAFETY ITEMS WILL PRESENT IMMEDIATE DANGER TO PERSONNEL OR EQUIPMENT. HAVE THESE ITEMS ON HAND AT ALL TIMES. STOP WORK AND QUARANTINE TONG UPON DISCOVERY OF DAMAGED OR DEFECTIVE HEALTH AND SAFETY COMPONENTS UNTIL PARTS CAN BE REPLACED.

The quantities listed in this critical spare parts list are **total** quantities that McCoy Global recommends having on hand at all times. See individual parts & assemblies pages to see the quantity of each part required for each assembly.

MISC TONG & BACKUP PARTS		
Description	Part Number	Qty. Required
Clutch drive gear	997-A3-61	1
Shifting shaft	101-8485	1
Shifting fork weldment	101-6166	1
Jaw pivot bolt	1050-C5-28	2
Backing pin	101-4188	1
Lined brake band weldment	1050-D4-29	2
Motor gear	997-A10-149	1
Latch claw	101-8798	1
Latch pivot shaft	101-8797	1
Door guard, latch side	101-8839	1
Rubber guard (door)	101-8796	1
Door switch cam	101-6146	1
Rubber guard (front legs)	101-5733	1
Rear backup suspension spring (models 80-0615-10 & 80-0615-12)	E2188-0250-11750	1
Rear backup support springs (model 80-0615-14)	997-13	2
Front leg spring (all models)	1302-905-08	1
Rear backup jaw, 7-5/8" backup	1401-08	1
Rear backup jaw, 8-5/8" backup	101-5756	1
Backup top die retainer, 7-5/8" backup	101-2982	3
Backup bottom die retainer, 7-5/8" backup	101-2291	3
Backup die retainer, 8-5/8" backup	73064	4
Master lifting link	02-9128	1
Rigid sling adjustment helix	1095-220	1
BEARINGS & BUSHINGS		
Description	Part Number	Qty. Required
Cam follower (cage plate)	02-0016	5
FASTENERS & FITTINGS		
Description	Part Number	Qty. Required
5/8" UNF thin nylock nut (cage plate cam followers)	09-5915	5
Square 5/16" x 5/16" x 1-1/2" key (motor gear)	01-0317	1
Continued on next page...		



FASTENERS & FITTINGS (CONTINUED):		
Description	Part Number	Qty. Required
Square ¼" x ¼" x ½" key (door latch)	101-8718	2
½" UNC x 1-¾" drilled-head hex bolt (rigid sling)	101-6459	8
¾" UNC x 2" hex socket head cap screw (rigid sling)	09-2054	4
¾" UNC x 1-½" hex socket head cap screw (rigid sling)	09-2051	6
¾" UNC hex nut (rigid sling)	09-5806	6
Rigid sling helix bolt	02-E0267	1
1-¼" UNC nylock nut (rigid sling)	09-1484	1
1" x 2-½" hex socket head shoulder bolt, UNC (rigid sling)	09-9991	2
HYDRAULIC COMPONENTS (Continued)		
Description	Part Number	Qty. Required
Relief Valve (Backup)	08-1180	1
Check Valve (Backup)	08-0481	1
Relief Cartridge (DVA35)	10-0084	1
Relief Cartridge (Safety Door)	08-1625	1
Seal Kit, hydraulic motor	87-7110	1
DVA35 Seal Kit	07-0004	1
7-⅝" CLINCHER® cylinder seal kit	1401-00-00B-SK	1
8-⅝" CLINCHER® cylinder seal kit	BUC8623-01-SK	1
Door Switch	02-E0190	1
Hydraulic Hose - Lift Cylinder Supply	02-0934H	1
High-Visibility Protective Wrap, Lift Cylinder Hydraulic Hose	02-E0203	1
Hydraulic Hose Assembly - Backup 44" "A" Side	02-1011	1
Hydraulic Hose Assembly - Backup 40" "B" Side	02-1012	1
High-Visibility Protective Wrap, Backup Hydraulic Hose	02-E0204	1
JAW COMPONENTS		
Description	Part Number	Qty. Required
Jaw pin, 2-⅜" to 5"	1050-JP	2
Jaw pin retaining ring, 2-⅜" to 5"	02-0697	2
Jaw roller, 2-⅜" & 2-⅞"	1050-JRMOD-2125	2
Bearing, jaw roller, 2-⅜" & 2-⅞"	02-0296	4
O-ring, jaw roller, 2-⅜" & 2-⅞"	02-0518	4
O-ring seal body, jaw roller, 2-⅜" & 2-⅞"	997-J-3500-C	4
Jaw roller, 3" to 5"	1050-JR-2125	2
Jaw roller, 5-½" to 7-¾"	101-6177	2
Jaw roller, 8-⅝"	101-5839	2
Jaw roller retainer, 5-½" to 7-¾"	101-6178	2
Jaw roller retainer, 8-⅝"	101-5840	2
Jaw die, contoured, for 2-⅜" jaw die kit only	12-0004	◆
Jaw die, contoured, for 2-⅞" jaw die kit only	12-0007	◆
Jaw die, 3" to 3-½"	12-0011	◆
Jaw die, flat, for 3-⅝" through 8-⅝" jaw die kits	13-0008-314-0	◆◆
Backup die insert - see subsection 3.4.4 for a complete list of standard backup jaw dies		◆◆

◆ Stock 48 spare die inserts for each size of standard jaw used

◆◆ Stock 2 spare dies for each size of backup jaw used

RECOMMENDED (ONE YEAR) SPARE PARTS

McCoy suggests stocking the spare parts listed in the table on page 7.5. Even though these are not critical spares, stocking these components may significantly decrease repair time in the event of long lead times from the factory

The quantities listed in the table on page 7.5 are **total** quantities of each part that McCoy recommends stocking. See individual parts & assemblies pages to see the quantity of each part required for each assembly.

MISC TONG & BACKUP PARTS		
Description	Part Number	Qty. Recommended
Threaded shifter detent tube	101-0019	1
Shifter detent ball	02-0018	1
Shifter detent spring	997-0-64	1
Backing pin knob	02-0017	1
Backing pin spacer	101-4186	1
Backing pin retainer	101-4187	1
Cage plate spacer	1050-C3-38	3
Split clamp assembly (door latch shaft)	101-8805	1
Latch post spacer	101-6127	2
Door switch cam spacer	101-6124	1
Door spring stop cylinder	101-0069	1
Door latch spring	02-E0393	1
Backup rear spring retainer (models 80-0615-10 & 80-0615-12)	1483-500-00-04B	2
Top front leg spring cap (models 80-0615-10 & 80-0615-14)	1302-905-03B	1
Bottom front leg spring cap (models 80-0615-10 & 80-0615-14)	1302-905-03A	1
Top front leg spring cap (model 80-0615-12)	101-8216	1
Bottom front leg spring cap (model 80-0615-12)	101-8278	1
BEARINGS & BUSHINGS		
Description	Part Number	Qty. Recommended
Self-aligning ball bearing (support rollers)	02-0094	10
Pinion bearing (upper and lower)	02-0007	2
Top clutch bearing	02-0002	1
Bottom clutch bearing	02-0004	1
Cam follower (cage plate)	02-0015	5
Latch shaft bushing	101-8874	2
Shouldered door bushing	101-6123	2
Flat door bushing	101-6125	2
FASTENERS & FITTINGS		
Description	Part Number	Qty. Recommended
$\frac{5}{16}$ " x 1" clevis pin (shifting handle)	02-0020	1
$\frac{5}{16}$ " x 1- $\frac{1}{2}$ " clevis pin (shifting handle)	09-0256	1
$\frac{7}{16}$ " UNF x 1- $\frac{1}{4}$ " hex bolt (detent spring adjustment)	09-1608	1
$\frac{7}{16}$ " UNF hex jam nut (detent spring adjustment)	09-5508	1
$\frac{3}{8}$ " UNC x 1- $\frac{1}{2}$ " threaded stud (backing pin)	101-4097	1
$\frac{1}{2}$ " x 1- $\frac{1}{4}$ " hex socket head UNC shoulder bolt (door cylinder mount)	09-0117	1
$\frac{1}{2}$ " x 2- $\frac{3}{4}$ " hex socket head UNC shoulder bolt (door cylinder mount)	09-0155	1
$\frac{1}{2}$ " shackle (backup rear spring connection (models 80-0615-10 & 80-0615-12)	09-9063	1

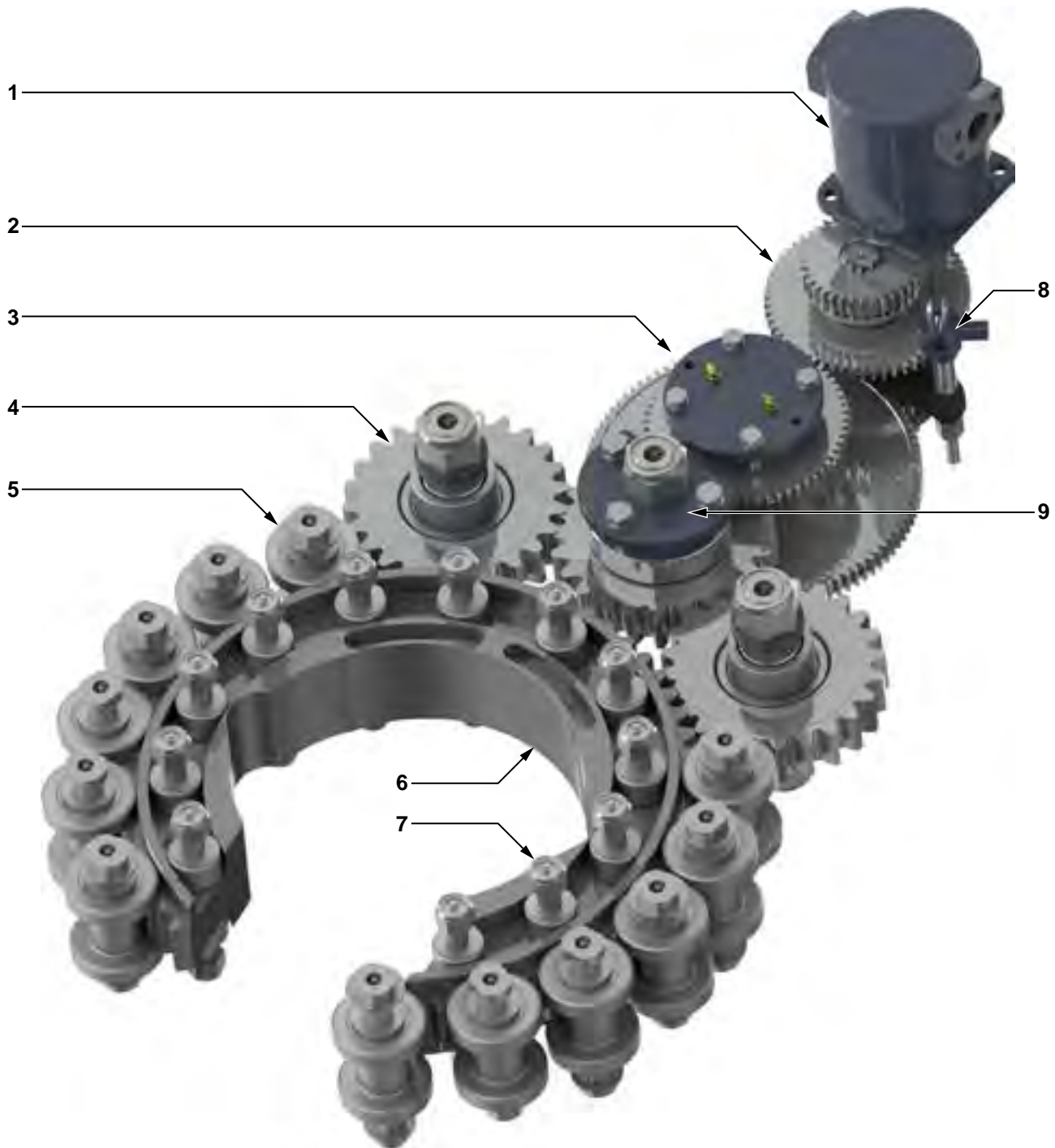


Illustration 7.1: 80-0607-1 KT8⁵/₈ Gear Train ISO View

ITEM	TYPE	DESCRIPTION	QTY	PART NUMBER
1	Part	Hydraulic motor	1	87-0112
2	Assembly	Clutch assembly (see Pp. 7.16 - 7.17)	1	
3	Assembly	Pinion assembly (see Pp. 7.14 - 7.15)	1	
4	Assembly	Rotary idler assembly (see Pp. 7.10 - 7.11)	2	
5	Assembly	Support roller assembly (see Pp. 7.8 - 7.9)	12	
6	Part	Rotary gear	1	1172-D1
7	Assembly	Cam follower assembly (see Pp. 5.18 - 5.19)	24	
8	Assembly	Shifter assembly (see Pp. 5.18 - 5.19)	1	
9	Assembly	Pinion idler assembly (see Pp. 7.12 - 7.13)	1	
10	Part	Motor gear	1	997-A10-149

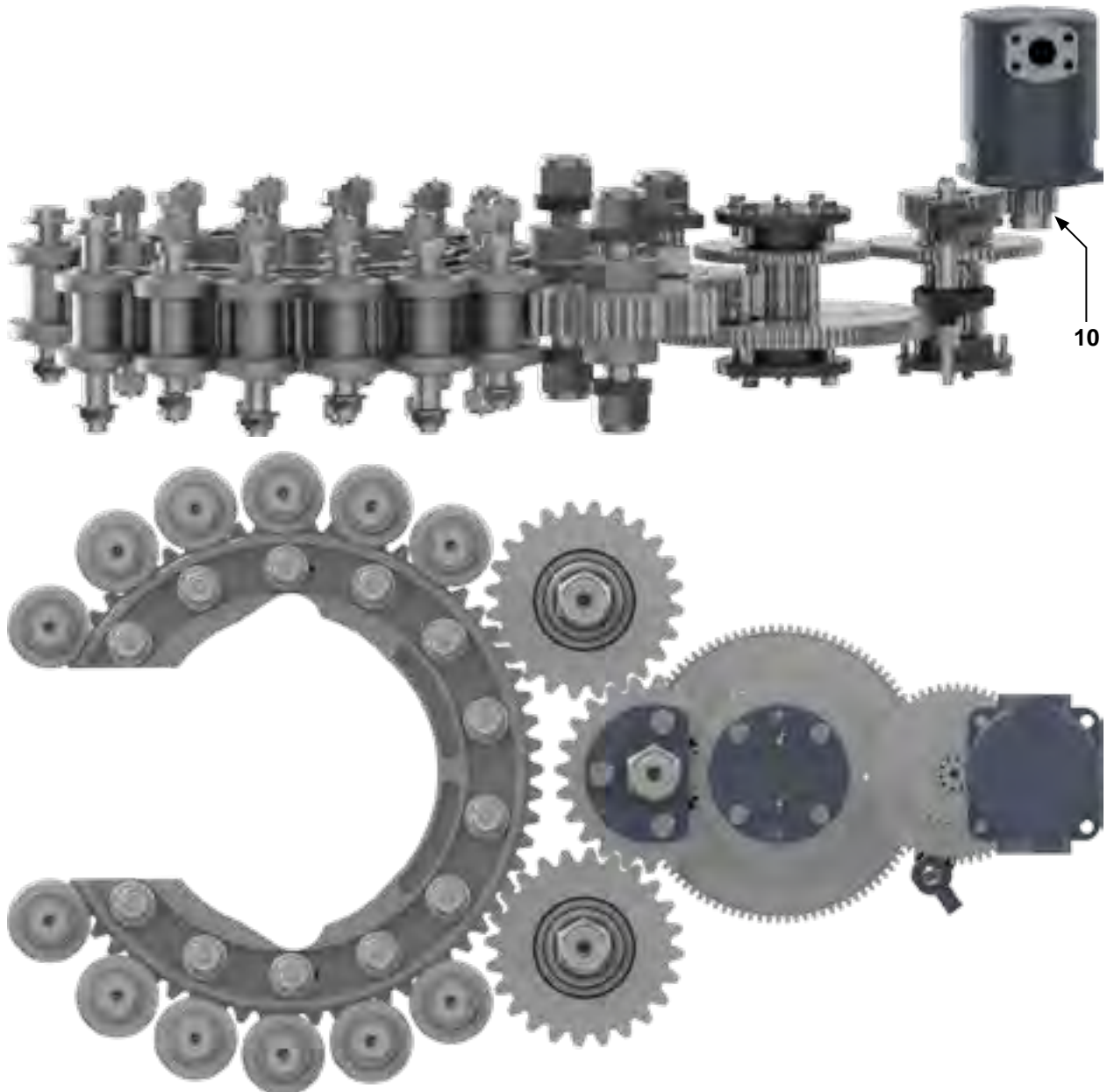


Illustration 7.2: 80-0607-1 KT8 1/2 Gear Train Side/Top View

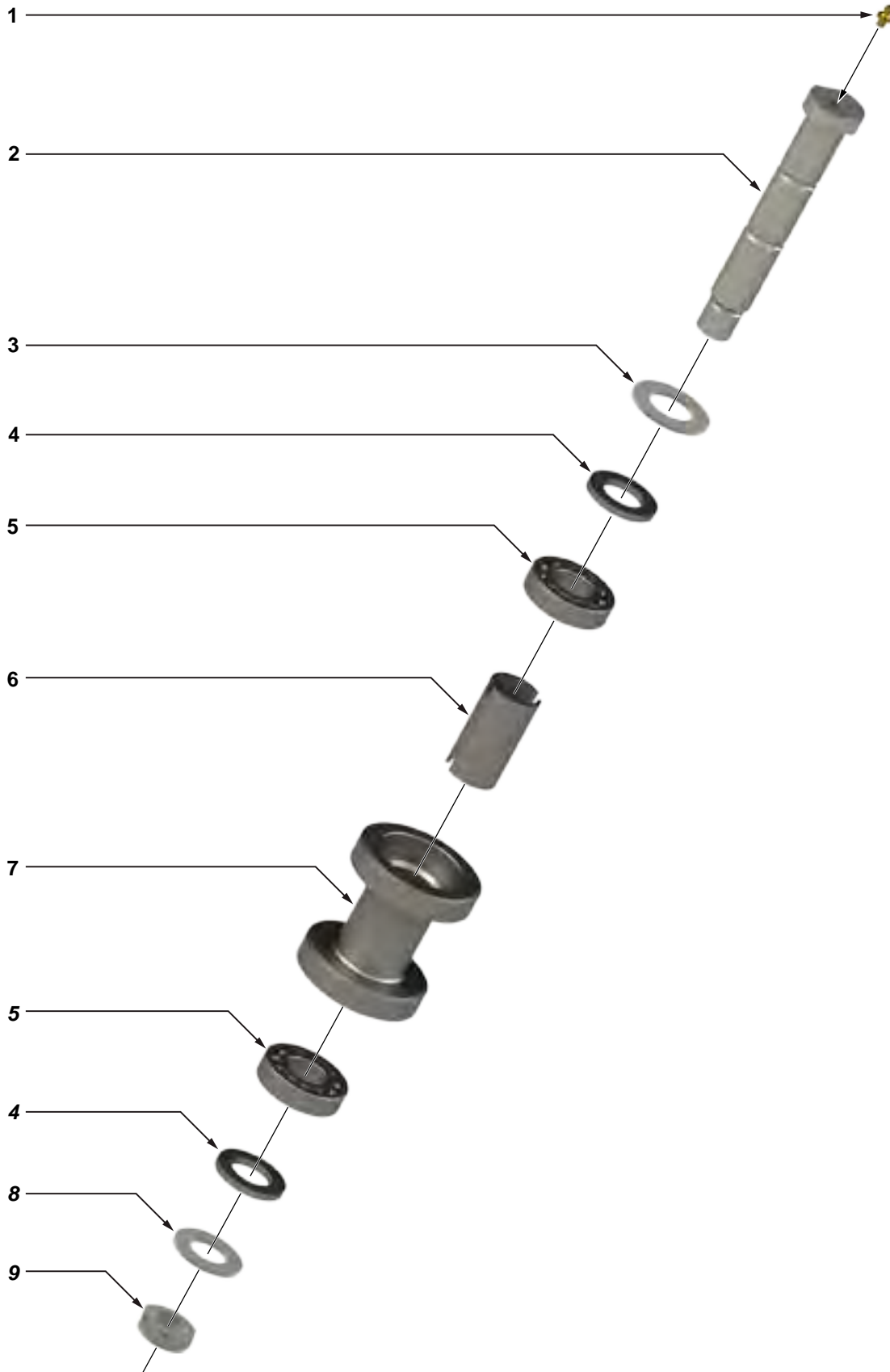


Illustration 7.3: 80-0607-1 KT8⁵/₈ Support Roller Exploded



Illustration 7.4: 80-0607-1 KT8⁵/₈ Support Roller

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Assembly)		
					Critical	One-Year	Overhaul
1	Part	¼" UNF straight-thread grease fitting	1	02-0070			1
2	Part	Support roller shaft	1	101-3939			1
	Part	Support roller shaft (coincident with front leg mounts) ⁽¹⁾	1	101-3941			1
3	Part	1-½" narrow flat washer ⁽²⁾	1	02-0471			2
4	Part	Roller bearing spacer	2	101-3871			2
5	Part	Self-aligning ball bearing	2	02-0094		2	2
6	Part	Support roller shaft spacer	1	1037-C-134			1
7	Part	Support roller	1	1037-135			1
8	Part	1" narrow flat washer ⁽²⁾	1	09-5120			1
9	Part	1" UNS thin nylock nut	1	09-9167			

(1) Use "long" support roller shafts (PN 101-3941) in four locations where coincident with the front leg mount weldments.

(2) Top and bottom flat washers are not used where the support roller shaft is coincidental with the brake band lug weldments.

NOTICE

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. OVERTIGHTENING WILL RESULT IN PREMATURE BUSHING FAILURE AND WILL INHIBIT ROTATION, AND MAY IMPART EXCESS STRESS ON ROTATING COMPONENTS.

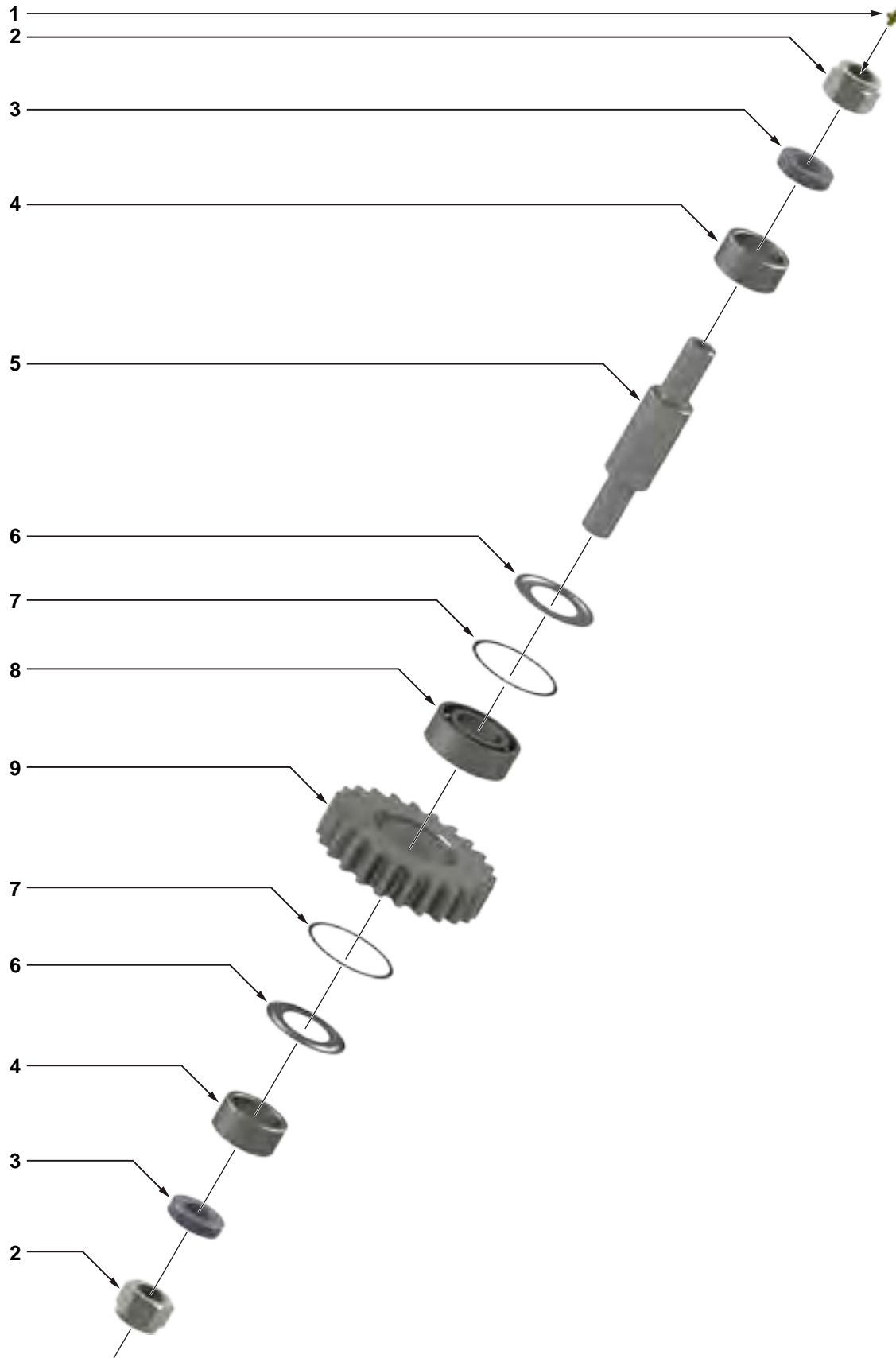


Illustration 7.5: 80-0607-1 KT8^{5/8} Rotary Idler Exploded



Illustration 7.6: 80-0607-1 KT8⁵/₈ Rotary Idler

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Assembly)		
					Critical	One-Year	Overhaul
1	Part	Grease fitting, 1/8" NPT	1	02-0005			1
2	Part	1-1/2" UNF nylock nut	2	09-5740			
3	Part	Rotary idler pad	2	997-D20-125			
4	Part	Idler bearing spacer	2	1050-D5-121			2
5	Part	Rotary idler shaft	1	1050-D5-117			
6	Part	Bearing seal	2	02-0010			2
7	Part	Retaining ring	2	02-0009			2
8	Part	Bearing	1	02-0011			1
9	Part	Rotary idler gear	1	997-A2-119			

NOTICE

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. OVERTIGHTENING WILL RESULT IN PREMATURE BUSHING FAILURE AND WILL INHIBIT ROTATION, AND MAY IMPART EXCESS STRESS ON ROTATING COMPONENTS.

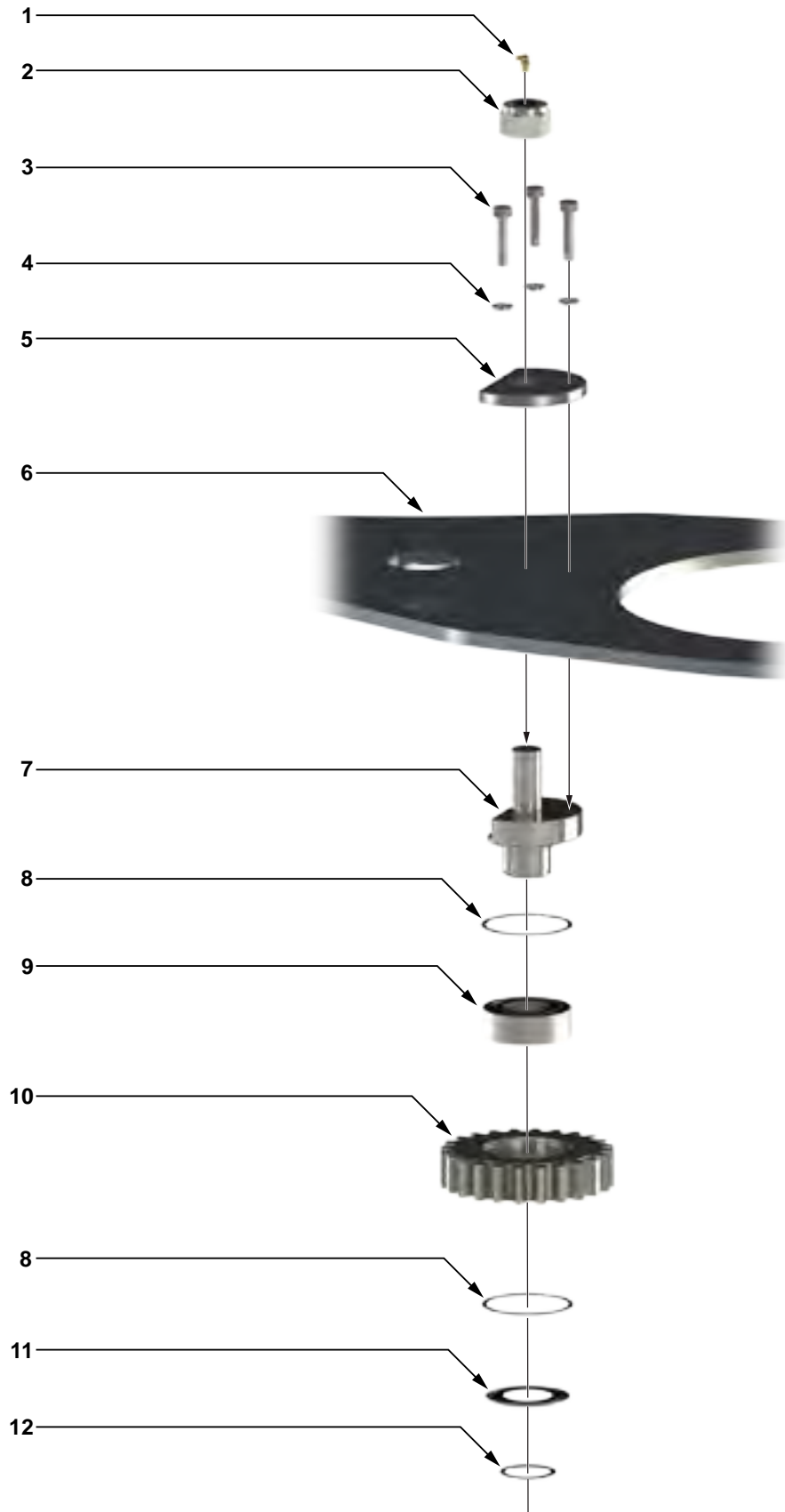


Illustration 7.7: 80-0607-1 KT8^{5/8} Pinion Idler Exploded



Illustration 7.8: 80-0607-1 KT8⁵/₈ Pinion Idler

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Assembly)		
					Critical	One-Year	Overhaul
1	Part	90° 1/8" NPT grease fitting	1	02-0093			
2	Part	1-1/2" UNF hex nylock nut	1	09-5740			
3	Part	5/8" UNC x 2-1/2" hex bolt	3	09-0081			
4	Part	5/8" lock washer	3	09-5114			
5	Part	Idler pad	1	997-D17-109			
6	Part	Top plate (for illustration purposes only)	1				
7	Part	Pinion idler half shaft	1	1050-D5-105			
8	Part	Retaining ring	2	02-0009			2
9	Part	Bearing	1	02-0011			1
10	Part	Pinion idler gear	1	997-A2-119			
11	Part	Bearing seal	1	02-0010			1
12	Part	Bearing retainer	1	02-0008			1

NOTICE

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. OVERTIGHTENING WILL RESULT IN PREMATURE BUSHING FAILURE AND WILL INHIBIT ROTATION, AND MAY IMPART EXCESS STRESS ON ROTATING COMPONENTS.

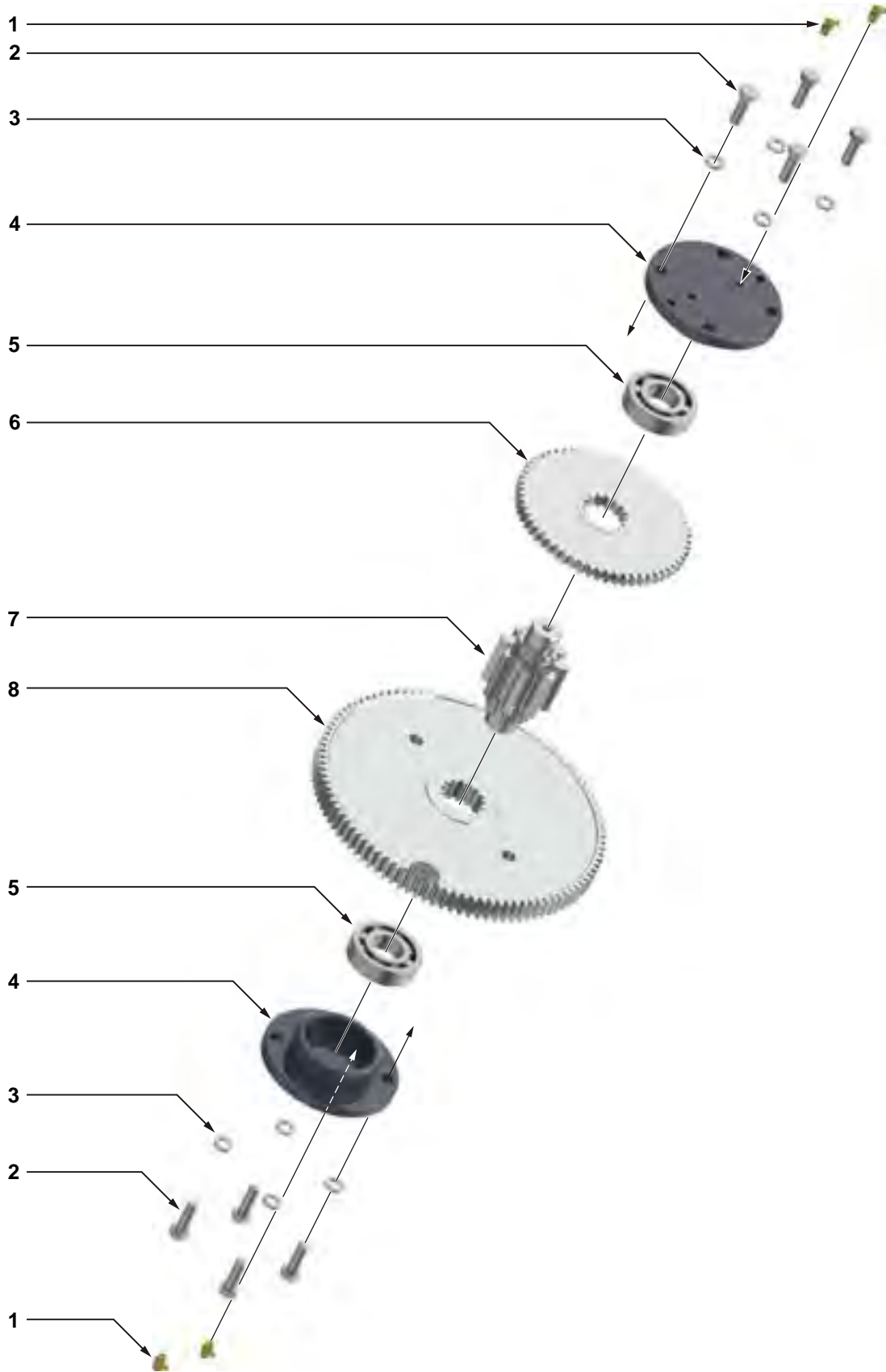


Illustration 7.9: 80-0607-1 KT8 7/8 Pinion Exploded



Illustration 7.10: 80-0607-1 KT8⁵/₈ Pinion

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Assembly)		
					Critical	One-Year	Overhaul
1	Part	1/8" NPT 90° grease fitting	4	02-0093			4
2	Part	1/2" UNC x 1-1/2" hex bolts	8	09-1170			
3	Part	1/2" lock washers	8	09-5110			
4	Part	Pinion bearing cap	2	1050-89			
5	Part	Pinion bearing	2	02-0007		2	2
6	Part	High pinion gear	1	997-A4-87			
7	Part	Pinion gear shaft	1	997-A7-86			
8	Part	Low pinion gear	1	997-A5-88			

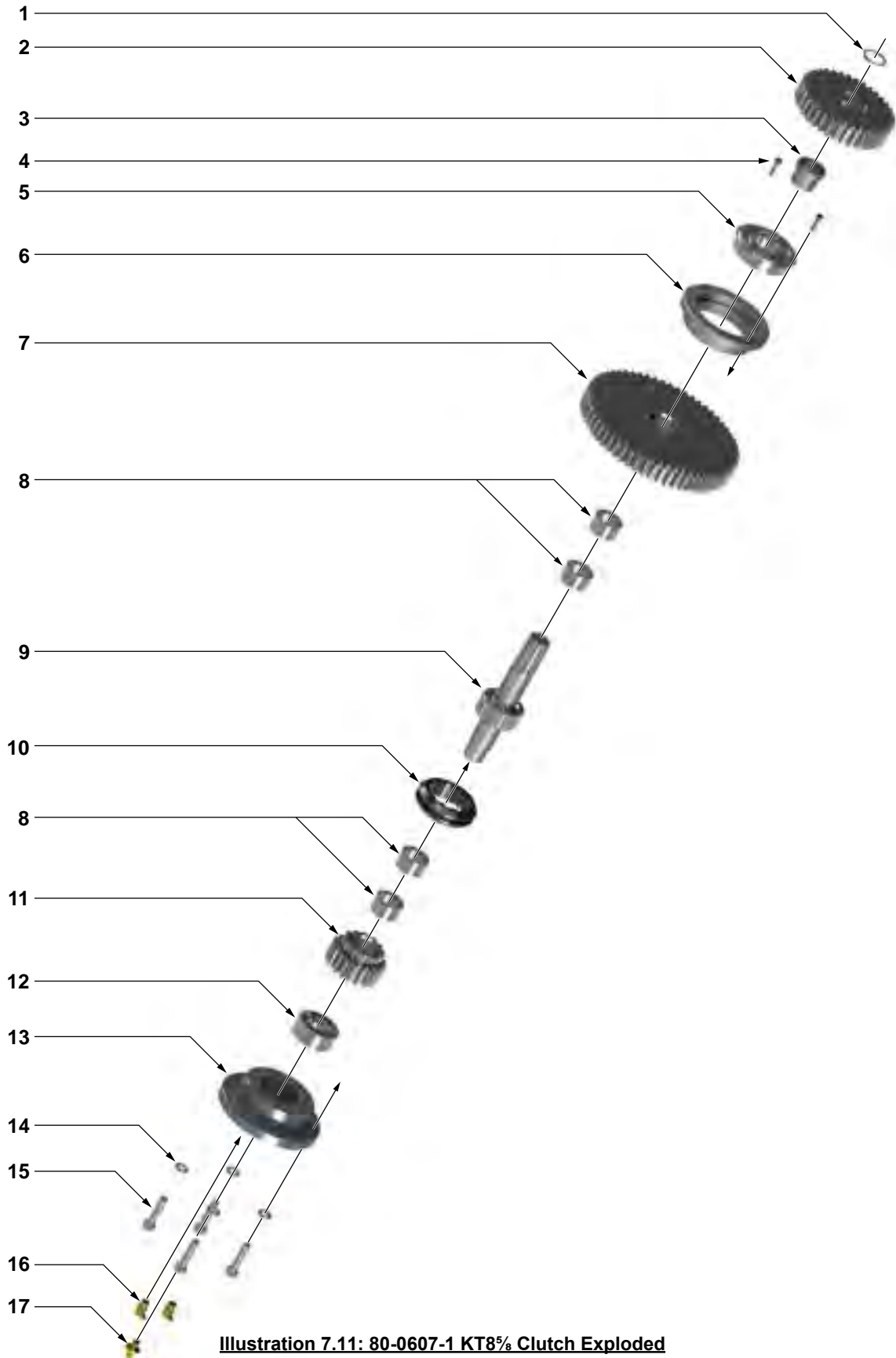


Illustration 7.11: 80-0607-1 KT8⁵/₈ Clutch Exploded



Illustration 7.12: 80-0607-1 KT8⁵/₈ Clutch

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Assembly)		
					Critical	One-Year	Overhaul
1	Part	Outside snap ring	1	1234-00-04			1
2	Part	Drive gear	1	997-A3-61	1		1
3	Part	Top clutch bearing spacer	1	997-60			1
4	Part	#10-24 x 3/4" hex SHCS	2	09-0001			
5	Part	Top clutch bearing	1	02-0002		1	
6	Part	Top bearing retainer	1	997-D11-59			
7	Part	High clutch gear	1	997-A1-51			1
8	Part	Needle roller bearing	4	02-0003			4
9	Part	Splined clutch shaft	1	997-A8-50			1
10	Part	Shifting collar	1	997-A9-62			1
11	Part	Low clutch gear	1	997-A1-52			1
12	Part	Bottom clutch bearing	1	02-0004		1	1
13	Part	Clutch bearing cap	1	1050-C1-54			
14	Part	3/8" lock washer	4	09-5106			
15	Part	3/8" UNC x 1-1/4" hex bolt	4	09-1048			
16	Part	1/8" NPT grease fitting	1	02-0005			1
17	Part	1/8" NPT 90° grease fitting	2	02-0093			2

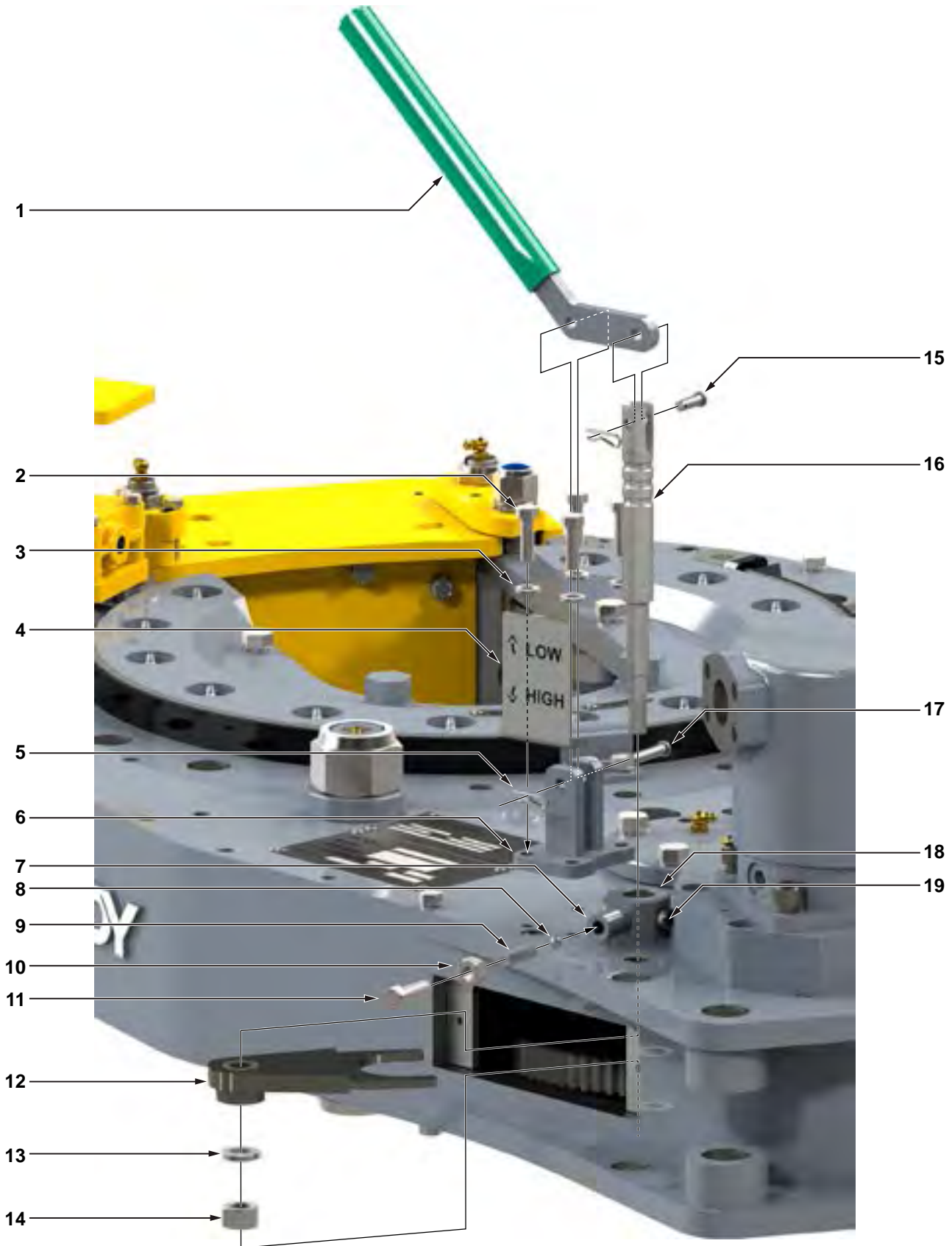


Illustration 7.13: 80-0607-1 KT8^{5/8} Shifting Assembly Exploded



Illustration 7.14: 80-0607-1 KT8⁵/₈ Shifting Assembly

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Assembly)		
					Critical	One-Year	Overhaul
1	Weldment	Shifting handle weldment	1	1037-D-20B			
2	Part	³ / ₈ " UNC x 1- ¹ / ₄ " hex bolt	4	09-1048			
3	Part	³ / ₈ " lock washer	4	09-5106			
4	Part	Shifter direction label	1	101-5600			
5	Part	Hitch pin, .0930 X 1- ¹ / ₈	2	02-0274			2
6	Weldment	Shifter lug weldment	1	101-0016			
7	Part	Shifter detent tube	1	101-0019		1	1
8	Part	Detent ball	1	02-0018		1	1
9	Part	Detent spring	1	997-0-64		1	1
10	Part	⁷ / ₁₆ " UNF hex jam nut	1	09-5508		1	1
11	Part	⁷ / ₁₆ " UNF x 1- ¹ / ₄ " hex bolt	1	09-1608		1	1
12	Weldment	Shifting fork weldment	1	101-6166	1		1
13	Part	⁵ / ₈ " lock washer	1	09-5114			
14	Part	⁵ / ₈ " UNF hex nut	1	09-5914			
15	Part	⁵ / ₁₆ " x 1" clevis pin	1	02-0020		1	
16	Part	Shifting shaft	1	101-8485	1		1
17	Part	⁵ / ₁₆ " x 1- ¹ / ₂ " clevis pin	1	09-0256		1	
18	Part	Top shifter bushing	1	101-0020			1
19	Part	⁵ / ₈ " UNC x ⁵ / ₈ " hex socket set screw	3	70-0723			

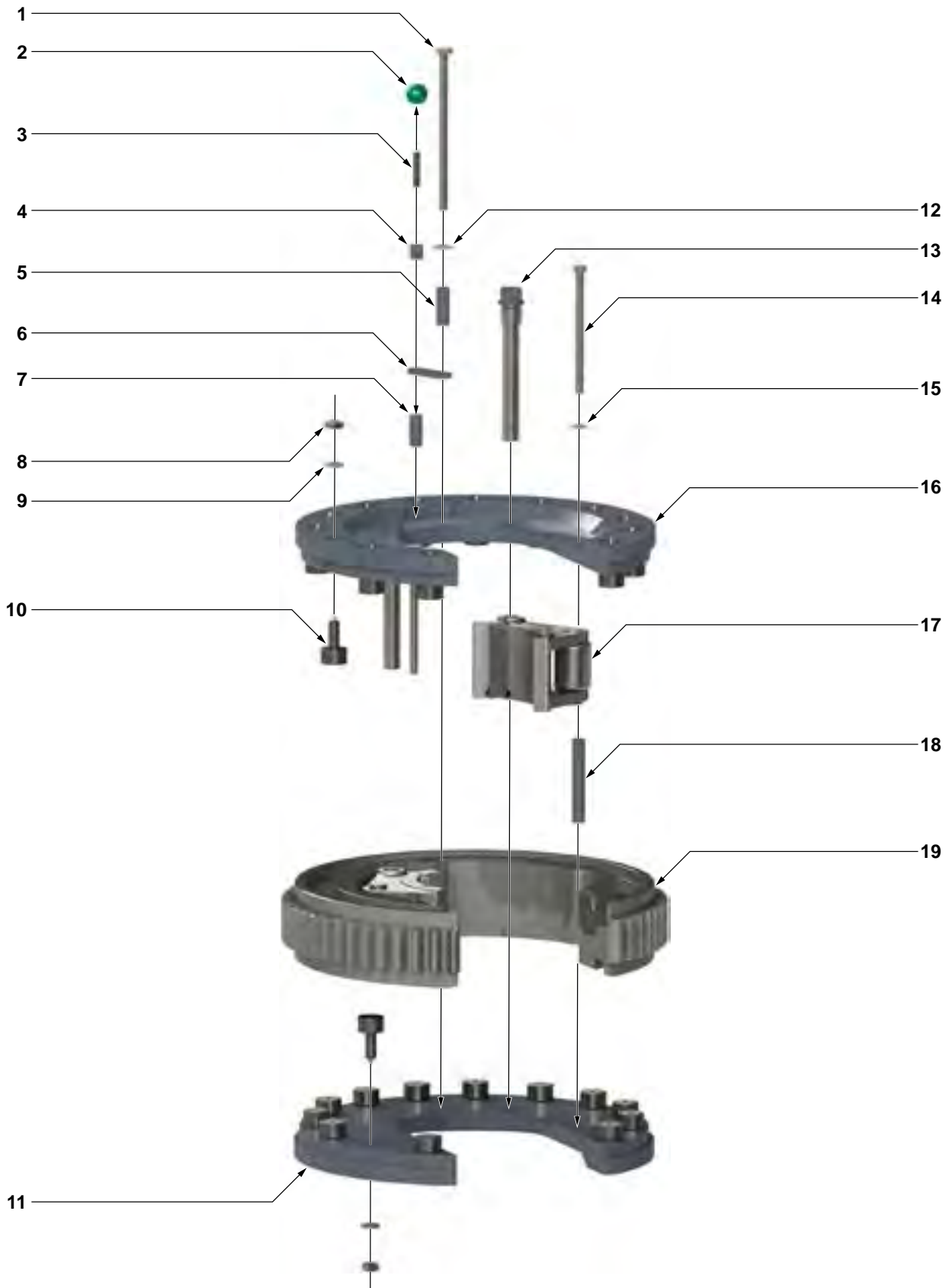


Illustration 7.15: 80-0607-1 KT8 5/8 Cage Plate Exploded



Illustration 7.16: 80-0607-1 KT8^{5/8} Cage Plate

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Assembly)		
					Critical	One-Year	Overhaul
1	Part	1/2" UNC x 9-1/2" hex bolt	1	09-1203			
2	Part	Backing pin knob	1	02-0017		1	
3	Part	5/8" UNF x 2" threaded stud	1	101-4097			
4	Part	Backing pin spacer	1	101-4096			1
5	Part	Backing pin spacer	1	101-4186		1	
6	Part	Backing pin retainer	1	101-4187		1	
7	Part	Backing pin	1	101-4188	1		
8	Part	5/8" UNF hex jam nut	26	09-5514			26
9	Part	5/8" lock washer	26	09-5114			26
10	Part	Cam follower	26	02-0015		5	26
11	Part	Cage plate - BOTTOM	1	1050-22			
12	Part	1/2" regular flat washer	1	09-5010			
13	Part	Jaw pivot bolt	2	1050-C5-28	2		2
14	Part	1/2" UNC x 7-1/2" hex bolt	2	09-1196			
15	Part	1/2" lock washer	3	09-5110			
16	Part	Cage plate - TOP	1	1050-21			
17	Assembly	Jaw die kit (5-1/2" shown - see subsection 3.4)	2				
18	Part	Cage plate spacer	3	1050-C3-38		3	
19	Part	Rotary gear	1	1172-D1			

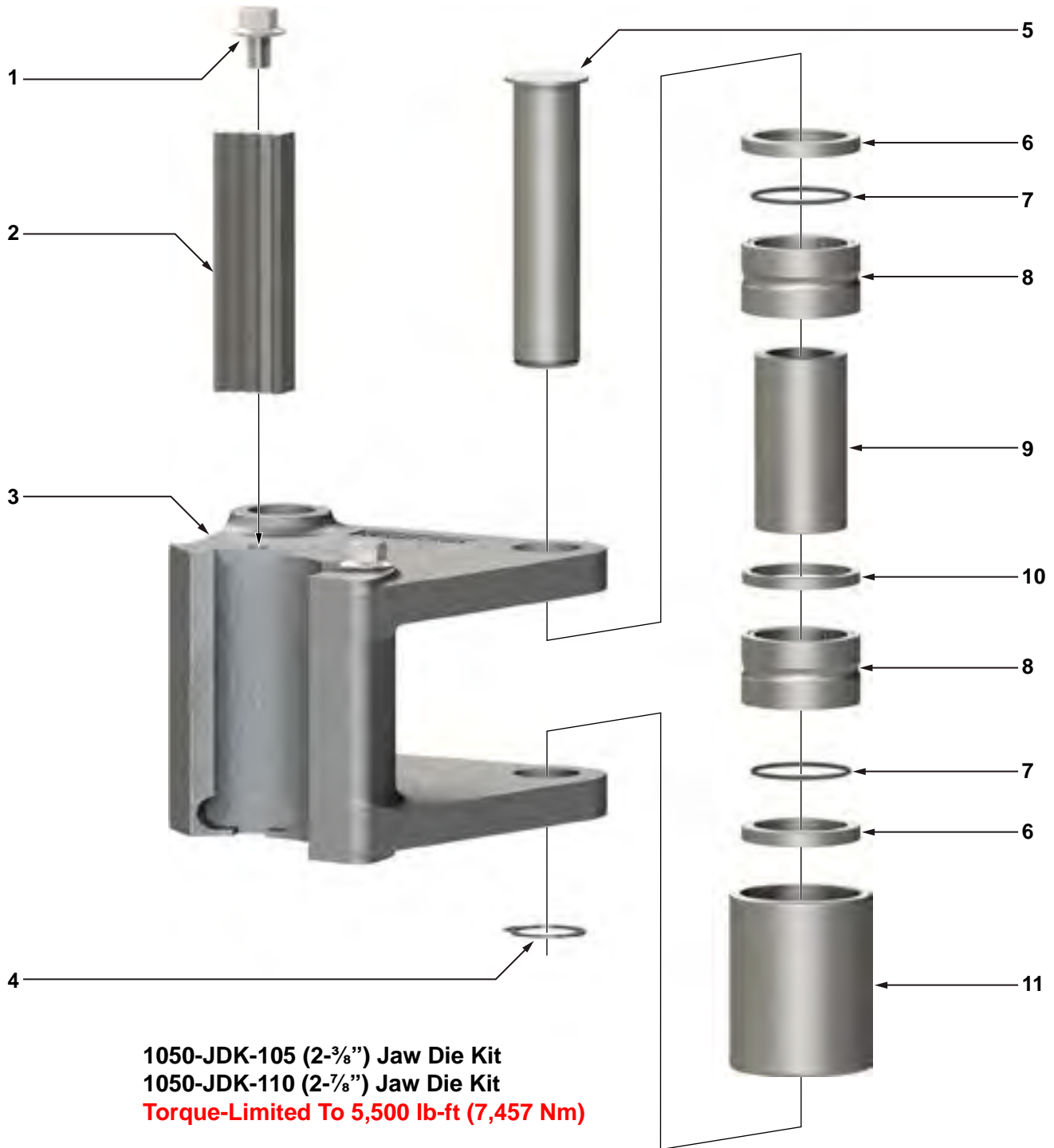


Illustration 7.17: 1050-JDK-105 (2-3/8") / 1050-JDK-110 (2-7/8") Jaw Die Kit Exploded



Illustration 7.18: 1050-JDK-105 (2-³/₈") / 1050-JDK-110 (2-⁷/₈") Jaw Die Kit

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Assembly)		
					Critical	One-Year	Overhaul
1	Part	$\frac{3}{8}$ " UNC x $\frac{1}{2}$ " flange bolt	2	02-9292		2	
2	Part	Contoured die (1050-JDK-105 only)	2	12-0004	◆		
	Part	Contoured die (1050-JDK-110 only)	2	12-0007	◆		
3	Jaw, 2- $\frac{3}{8}$ " & 2- $\frac{7}{8}$ " (not available as a spare part - shown for illustration purposes only)						
4	Part	Jaw pin retaining ring	1	02-0697	1		
5	Part	Jaw pin	1	1050-JP	1		
6	Part	O-ring seal body	2	997-J-3500-C	2		
7	Part	O-ring	2	02-0518	2		
8	Part	Bearing	2	02-0296	2		
9	Part	Inner sleeve	1	1050-JRMOD-B			
10	Part	Inner bearing spacer	1	101-4111			
11	Part	Jaw roller	1	1050-JRMOD-2125	1		

◆ Stock one complete set of contour jaw dies (2 dies per set) for every size in use

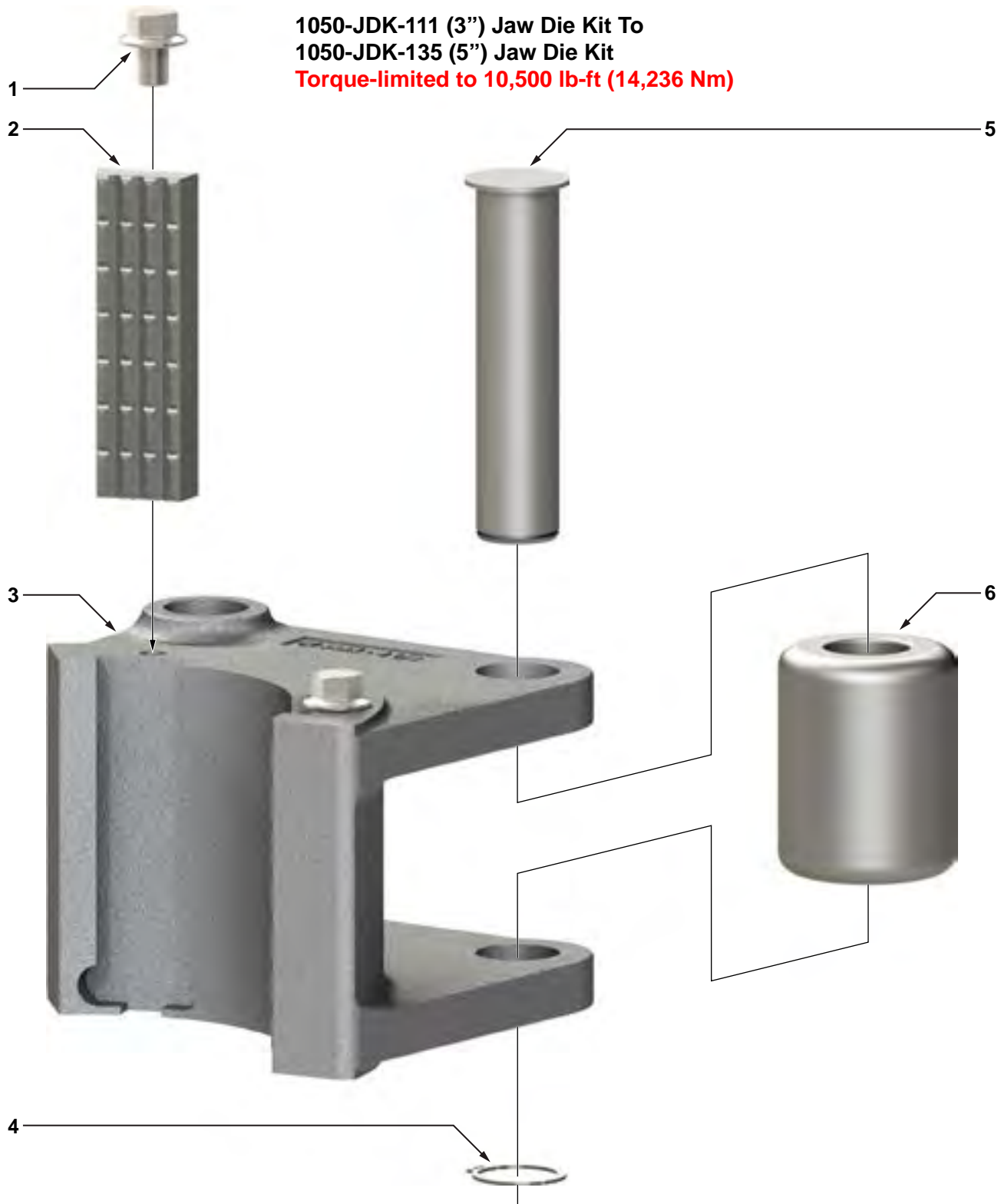


Illustration 7.19: 1050-JDK-111 (3") TO 1050-JDK-135 (5") Jaw Die Kits Exploded



Illustration 7.20: 1050-JDK-111 (3") TO 1050-JDK-135 (5") Jaw Die Kits

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Assembly)		
					Critical	One-Year	Overhaul
1	Part	3/8" UNC x 1/2" flange bolt	2	02-9292		2	
2	Part	Contoured die (3" to 3-1/2" only)	2	12-00011	◆		
	Part	Strip die (3-5/8" to 5")	2	13-0008-314-0	◆		
3	Jaw, 3" to 5" (not available as a spare part - shown for illustration purposes only)						
4	Part	Jaw pin retaining ring	1	02-0697	1		
5	Part	Jaw pin	1	1050-JP	1		
6	Part	Jaw roller	1	1050-JR-2125	1		

◆ Stock one complete set of contour jaw dies (2 dies per set) for every size in use

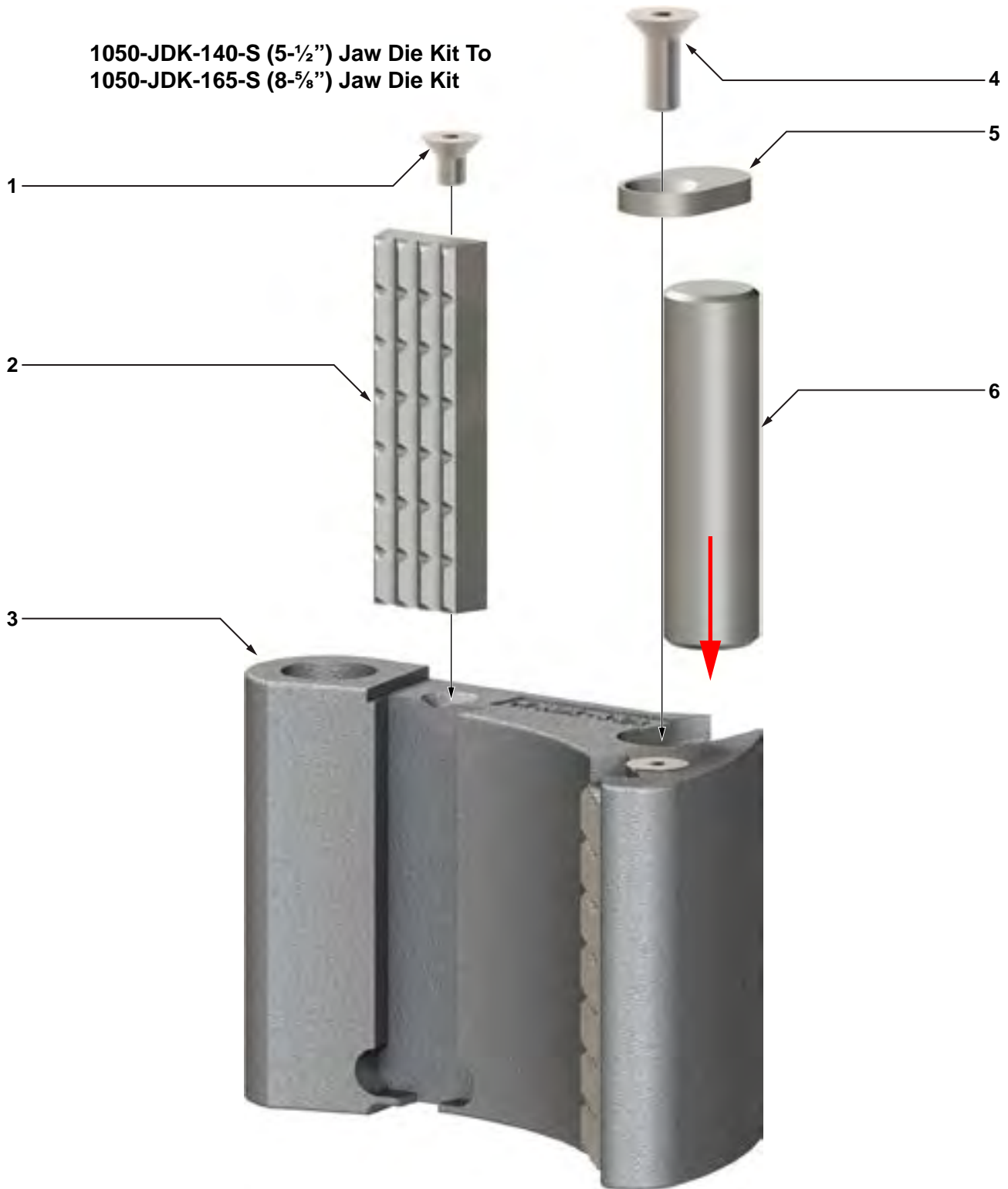


Illustration 7.21: 1050-JDK-140-S (5-1/2") TO 1050-JDK-165-S (8-5/8") Jaw Die Kits Exploded



Illustration 7.22: 1050-JDK-140-S (5-¹/₂") TO 1050-JDK-165-S (8-⁵/₈") Jaw Die Kits

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Assembly)		
					Critical	One-Year	Overhaul
1	Part	⁵ / ₁₆ " UNC x ¹ / ₂ " flat head countersunk machine screw	2	09-1338		2	
2	Part	Strip die	2	13-0008-314-0	◆		
3	Jaw, 5- ¹ / ₂ " to 8- ⁵ / ₈ " (not available as a spare part - shown for illustration purposes only)						
4	Part	³ / ₈ " UNC x 1" flat head countersunk machine screw	1	09-4046		1	
5	Part	Jaw roller retainer		101-6178	1		
	Part	Jaw roller retainer (8- ⁵ / ₈ " only)		101-5840	1		
6	Part	Jaw roller	1	101-6177	1		
	Part	Jaw roller (8- ⁵ / ₈ " only)		101-5839	1		

◆ Stock one complete set of contour jaw dies (2 dies per set) for every size in use

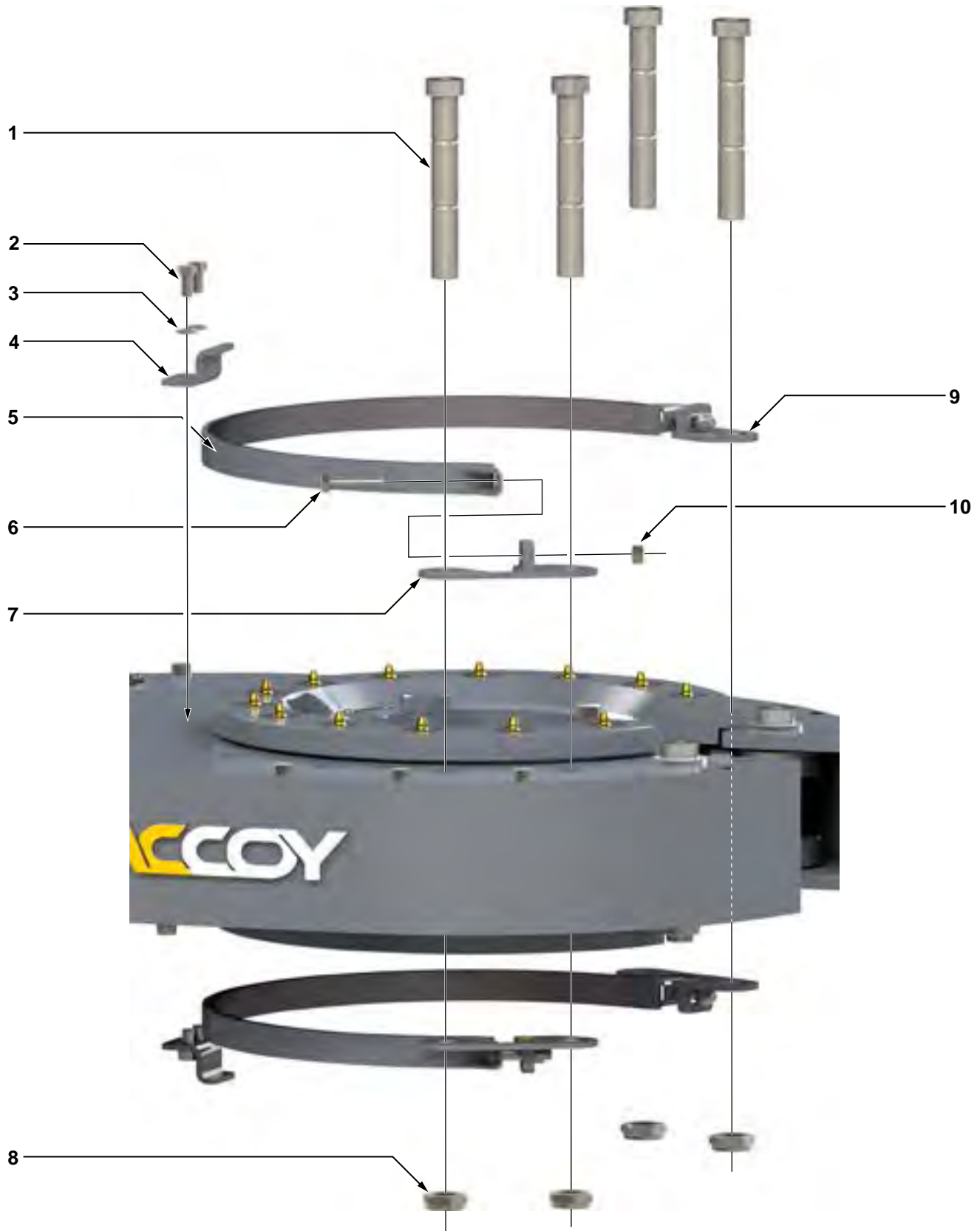


Illustration 7.23: 80-0607-1 KT8 1/2 Brake Bands Exploded



Illustration 7.24: 880-0607-1 KT8⁵/₈ Brake Bands

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Assembly)		
					Critical	One-Year	Overhaul
1	Part	Support roller shaft (shown for illustration purposes)	4	101-3939			
2	Part	3/8" UNC x 1" hex bolt	4	09-1046			
3	Part	3/8" lock washer	4	09-5106			
4	Part	Brake band retainer	1	101-0140			
5	Weldment	Lined brake band weldment	2	1050-D4-29	2		2
6	Part	3/8" UNC x 1-3/4" hex bolt	4	09-1557			
7	Weldment	Top RH/bottom LH brake band lug weldment	2	101-0096			
8	Part	1" UNF narrow nylock nut (shown for illustration purposes)	4	09-5627			
9	Weldment	Top LH/bottom RH Brake band lug weldment	2	101-0083			
10	Part	3/8" UNC hex nylock nut	4	09-5607			

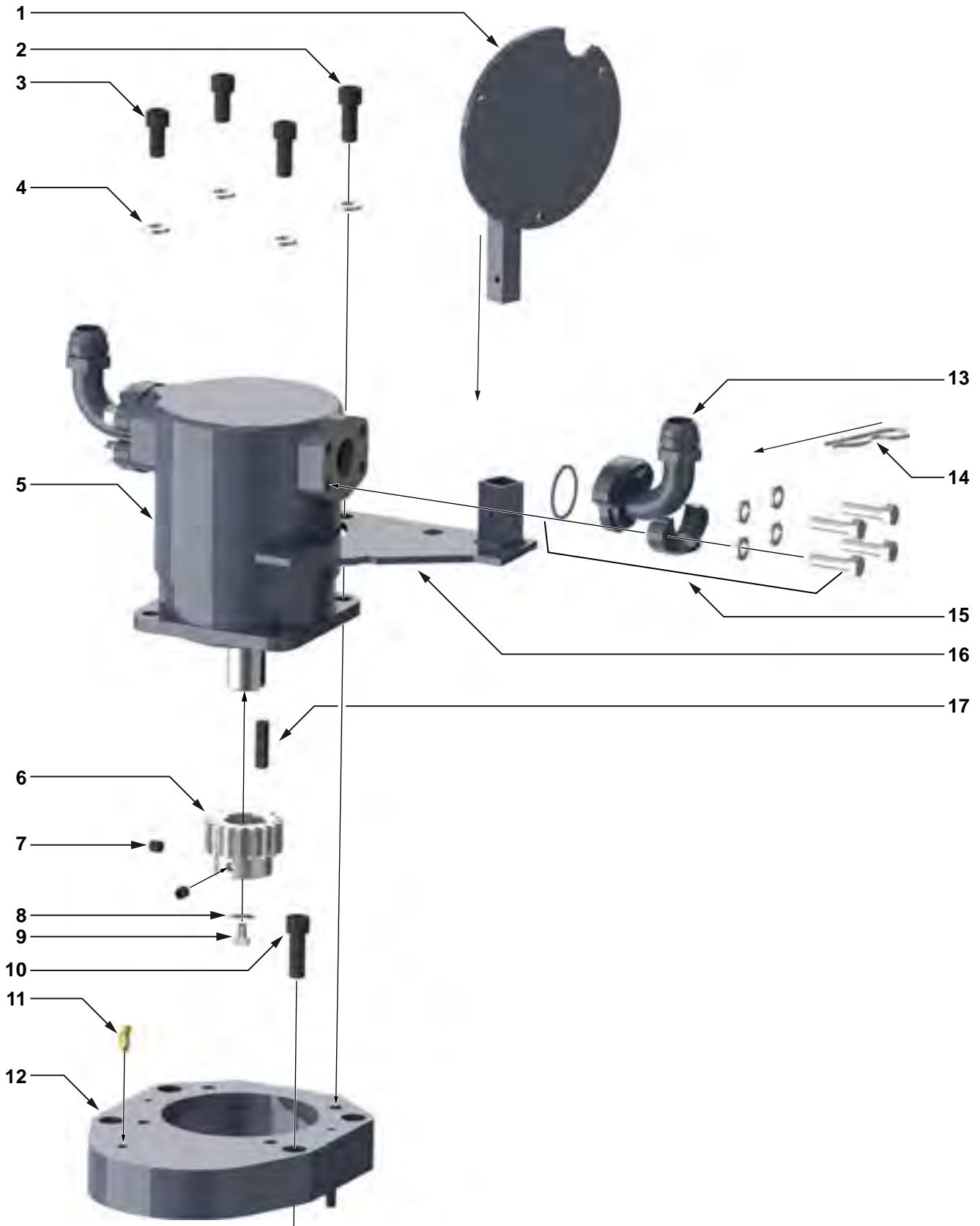


Illustration 7.23: 80-0607-1 KT8^{5/8} Motor & Mount Exploded



Illustration 7.24: 80-0607-1 KT8^{5/8} Motor & Mount

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Assembly)		
					Critical	One-Year	Overhaul
1	Weldment	Gauge mount weldment (torque gauge only)	1	1500-09-03A			
		Gauge mount weldment (torque & pressure gauge)	1	101-6122			
2	Part	1/2" UNC x 1-1/4" hex socket head cap screw	2	09-2168			
3	Part	1/2" UNC x 1" hex socket head cap screw	2	09-2166			
4	Part	1/2" Lock washer	4	09-5110			
5	Part	Hydraulic motor	1	87-0112			
6	Part	Motor gear	1	997-A10-149	1		1
7	Part	3/8" UNC x 3/8" hex socket set screw	2	09-0106			
8	Part	1/2" narrow flat washer	1				
9	Part	1/2" UNC x 3/4" hex cap screw	1				
10	Part	1/2" UNC x 1-1/2" hex socket head cap screw	4	09-2170			
11	Part	1/8" NPT 90° grease fitting	1	02-0093			
12	Part	Motor mount	1	1050-150			
13	Part	#20 (1-1/4")/JIC 1" flange elbow	2	02-9216			
14	Part	0.148 X 2.938 hitch pin	1	09-0090			
15	Part	#20 (1-1/4") split flange kit (one kit contains 1 o-ring, 1 #20 (1-1/4") split flange, 4 7/16" UNC x 1-1/2" hex bolts, and 4 7/16" lock washers)	2	02-9217			
16	Weldment	Torque gauge holder weldment	1	101-8160			
17	Part	Square 5/16" x 5/16" x 1-1/2" key	1	01-0317	1		1
18	Kit	Motor seal kit		87-7110	1		1

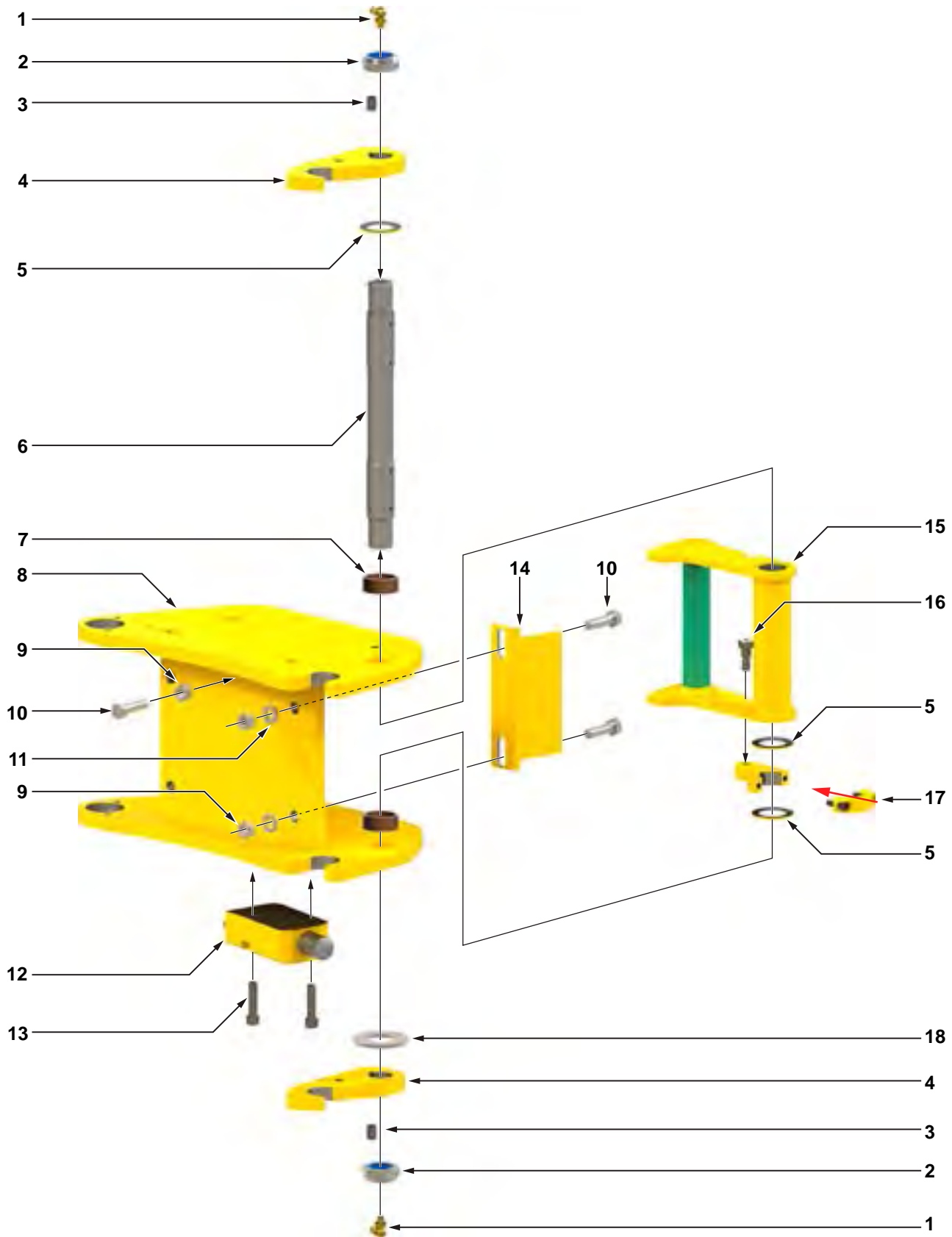


Illustration 7.25: 80-0609-1 KT8^{5/8} Door Latch Exploded

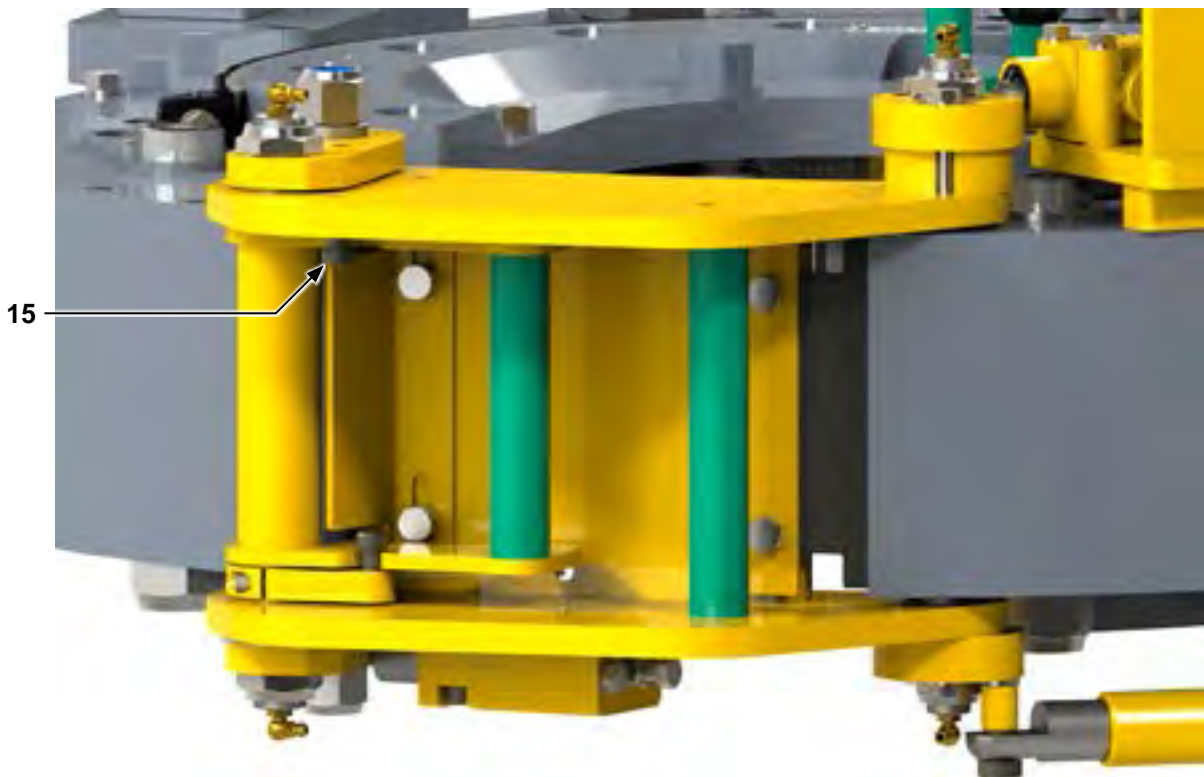


Illustration 7.26: 80-0609-1 KT8^{5/8} Door Latch

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Assembly)		
					Critical	One-Year	Overhaul
1	Part	1/8" NPT 90° grease fitting	2	02-9272			
2	Part	7/8" UNC thin nylock nut	2	09-5721			
3	Part	Square 1/4" x 1/4" x 1/2" key	2	101-8718	2		
4	Part	Latch claw	2	101-8798	2		
5	Part	Latch shaft spacer	3	02-E0472			
6	Part	Latch pivot shaft	1	101-8797	1		
7	Part	Latch shaft bushing	2	101-8874		2	
8	Weldment	Door weldment	1	101-6214			
9	Part	3/8" UNC hex nut	3	09-5806			
10	Part	3/8" UNC x 1-1/4" hex bolt	3	09-1048			
11	Part	3/8" lock washer	2	09-5106			
12	Assembly	Latch spring return assembly	1	101-8731			
13	Part	7/16" UNC x 1-1/4" hex socket head cap screw	2	09-2108			
14	Part	Guard	1	101-8839	1		
15	Weldment	Latch handle weldment	1	101-8791			
16	Part	3/8" x 3/8" hex socket head UNC shoulder bolt	2	09-9079			
17	Assembly	Split clamp assembly	1	101-8805		1	
18	Part	1" narrow flat washer	1	09-5120			

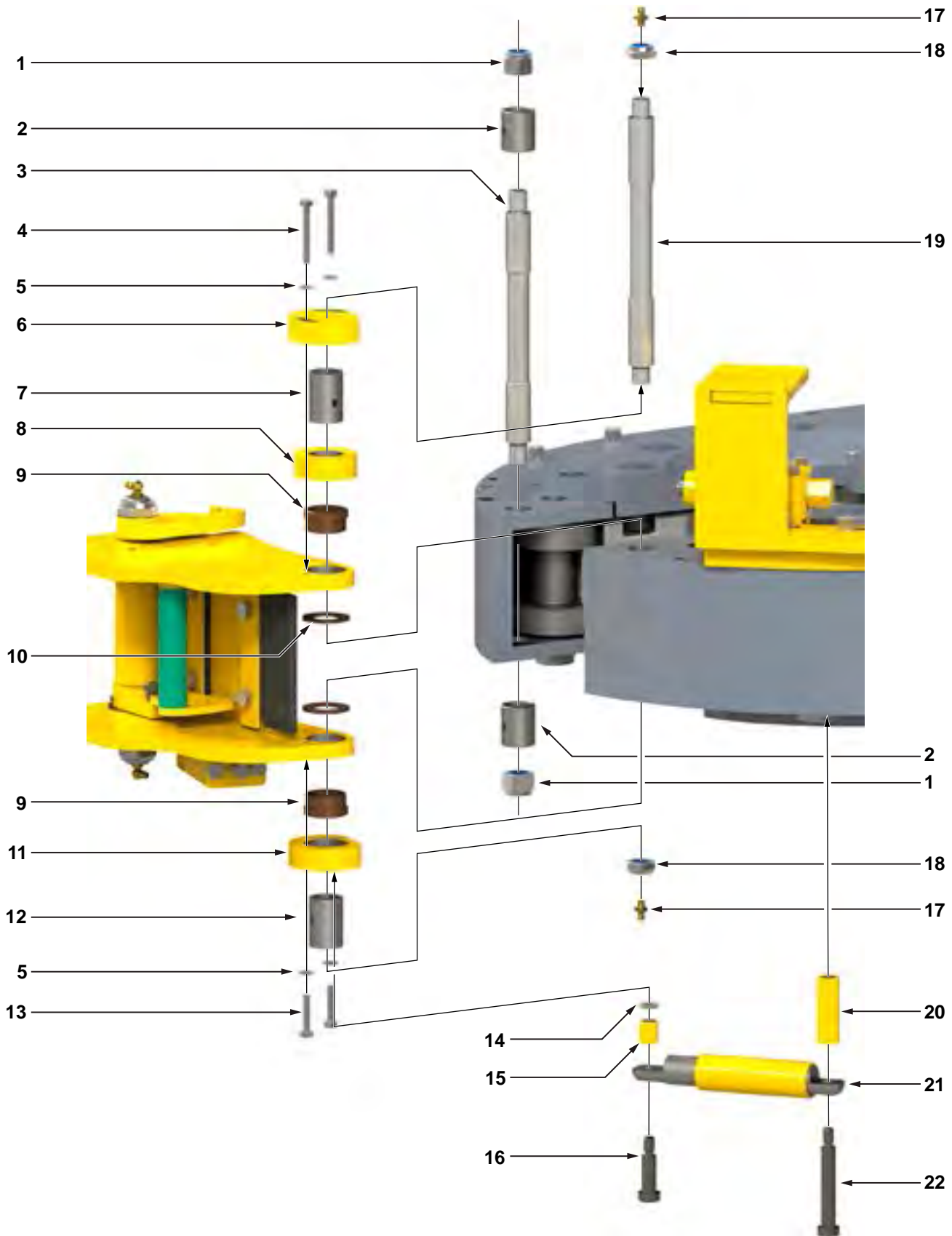


Illustration 7.27: 80-0609-1 KT8% Door Exploded

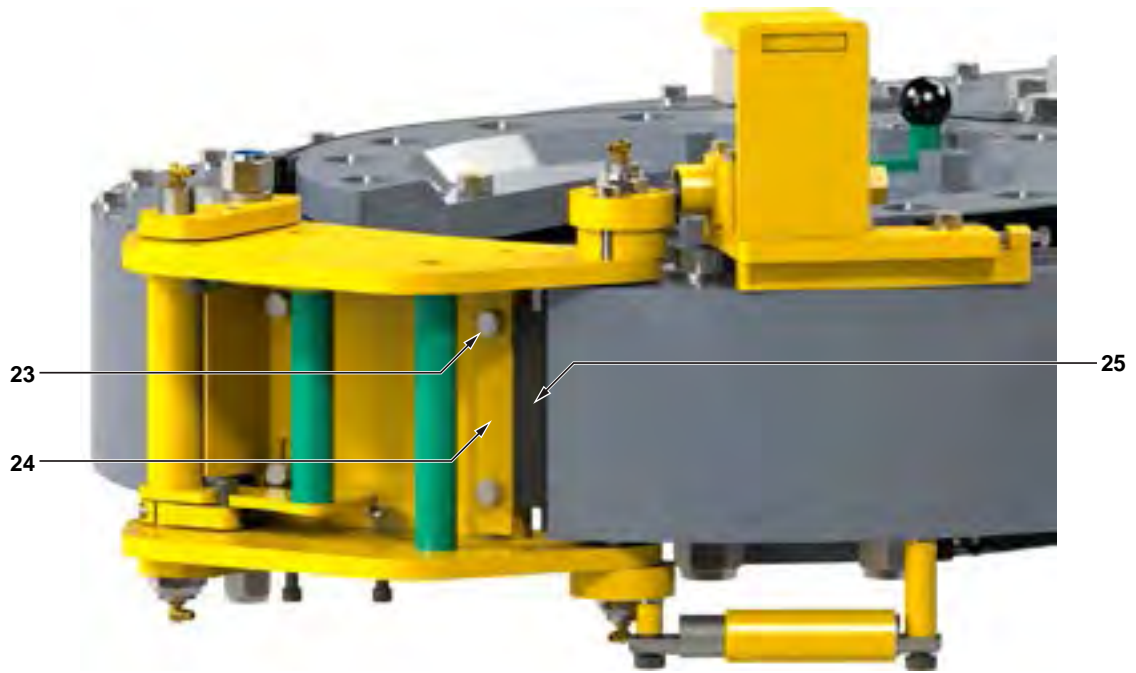


Illustration 7.28: 80-0609-1 KT8 1/2 Door Exploded

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Assembly)		
					Critical	One-Year	Overhaul
1	Part	3/4" UNC hex nylock nut	2	09-0365			
2	Part	Latch post spacer	2	101-6127		2	2
3	Part	Latch post	1	101-6218			
4	Part	1/4" UNC x 2" hex bolt	3	09-1015			
5	Part	1/4" lock washer	5	09-5102			
6	Part	Door switch cam	1	101-6146	1		1
7	Part	Door pivot shaft spacer, top	1	101-6126			
8	Part	Door switch cam spacer	1	101-6124		1	
9	Part	Shouldered door bushing	2	101-6123		2	2
10	Part	Flat door bushing	2	101-6125		2	2
11	Part	Bottom door spacer	1	101-6128			
12	Part	Door pivot shaft spacer, bottom	1	101-6126			
13	Part	1/4" UNC x 1-1/4" hex bolt	2	09-1009			
14	Part	3/8" lock washer	3	09-5106			
15	Part	Spring stop cylinder short mounting spacer	1	101-6058			
16	Part	1/2" x 1-1/4" hex socket head UNC shoulder bolt	1	09-0117		1	
17	Part	1/4"-28 straight thread grease fitting	2	02-0097			
18	Part	3/4" UNC hex thin nylock nut	2	09-5718			
19	Part	Door pivot shaft	1	101-6217			
20	Part	Spring stop cylinder long mounting spacer	1	101-6060			
21	Assembly	Door spring stop cylinder	1	101-0069		1	
22	Part	1/2" x 2-3/4" hex socket head UNC shoulder bolt	1	09-0155		1	
23	Part	3/8" UNC x 1-1/4" hex bolt	2	09-1048			
24	Part	Guard retainer	1	101-8184			
25	Part	Rubber guard	1	101-8796	1		1
26	Part	3/8" UNC hex jam nut (not shown)	2	09-5505			

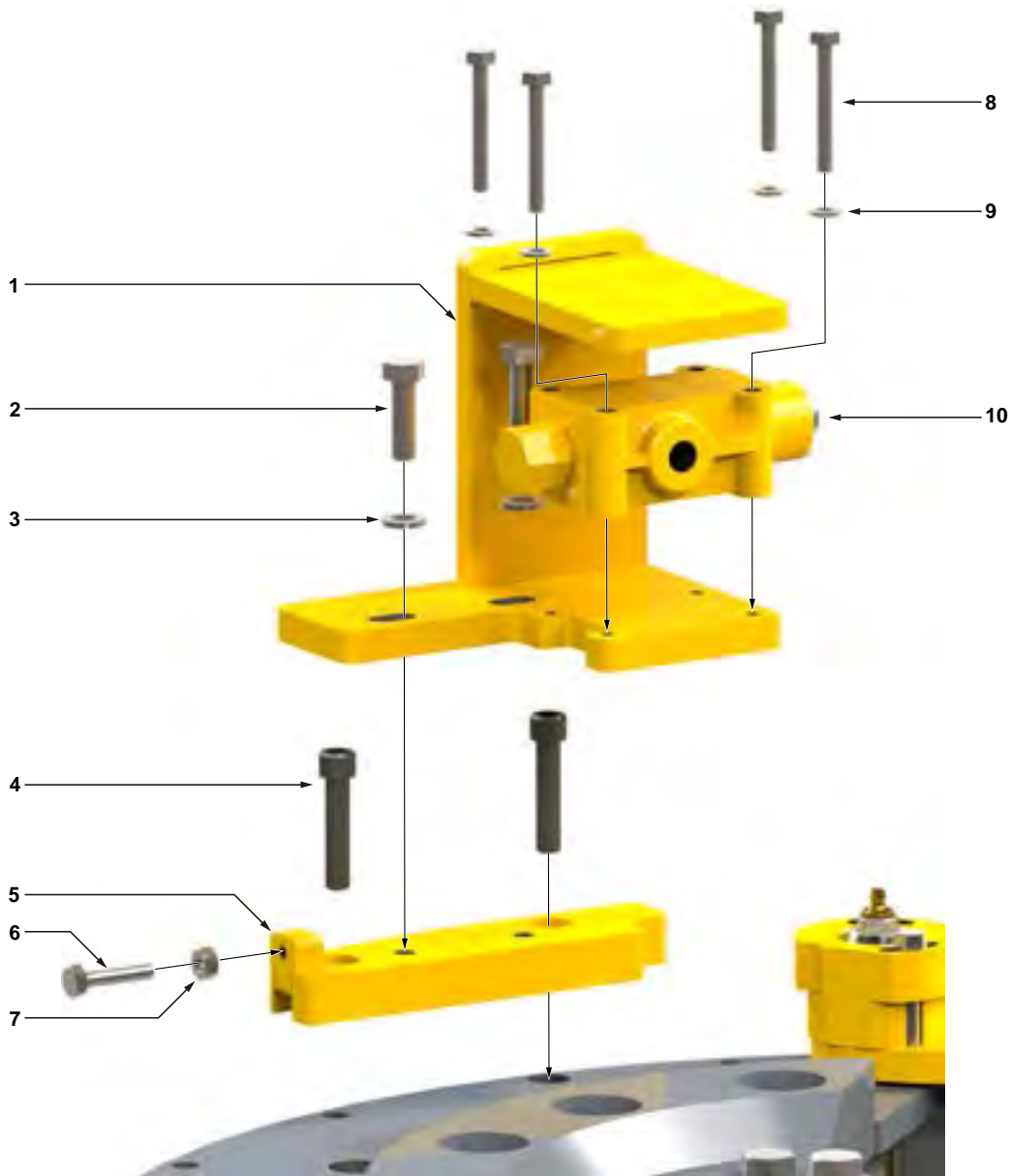


Illustration 7.29: KT8^{5/8}" Door Switch Assembly

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Assembly)		
					Critical	One-Year	Overhaul
1	Weldment	Door switch guard weldment	1	101-6141			
2	Part	3/8" UNC x 1-1/4" hex bolt	2	09-1048			
3	Part	3/8" lock washer	2	09-5106			
4	Part	3/8" UNC x 1-3/4" hex socket head cap screw	2	09-2052			
5	Weldment	Adjustment plate weldment	1	101-6220			
6	Part	1/4" UNC x 1-1/4" hex bolt	1	09-1009			
7	Part	1/4" UNC hex nut	1	09-5802			
8	Part	1/4" UNC x 2" hex bolt	4	09-1015			
9	Part	1/4" lock washer	4	09-5102			
10	Part	Door switch	1	02-E0190	1		1

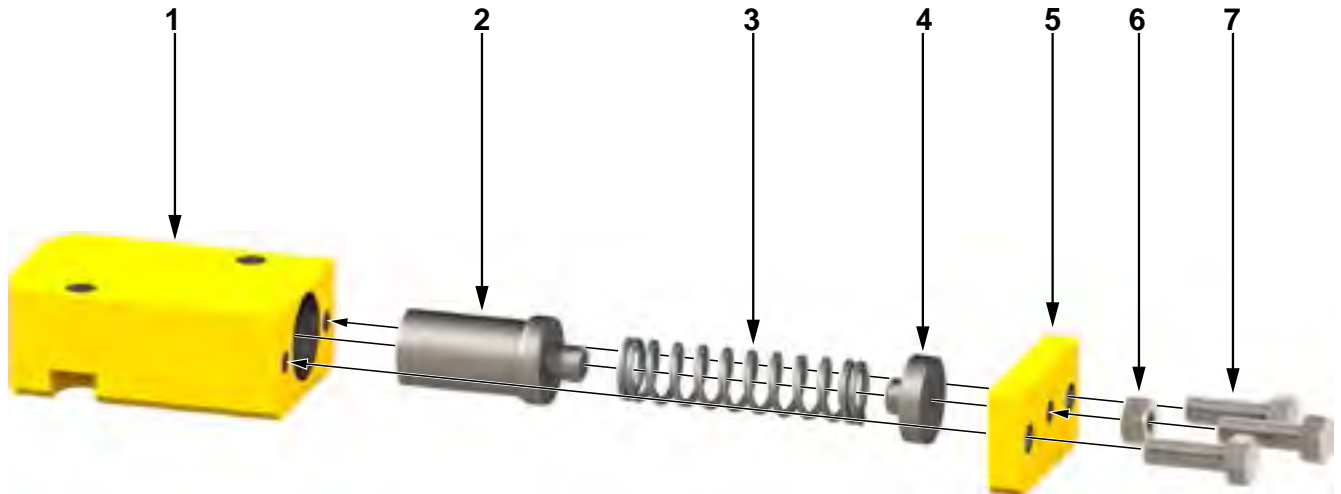


Illustration 7.30: 101-8732 Door Latch Return Assembly

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Assembly)		
					Critical	One-Year	Overhaul
1	Part	Door latch spring housing	1	101-8732			
2	Part	Door latch spring plunger	1	101-8734			
3	Part	Door latch spring	1	02-E0393		1	1
4	Part	Door latch plunger plug	1	101-8735			
5	Part	Door latch spring retainer plate	1	101-8733			
6	Part	5/16" UNC hex nut	1	09-6016			
7	Part	5/16" UNC x 1" hex nut	3	09-1026			

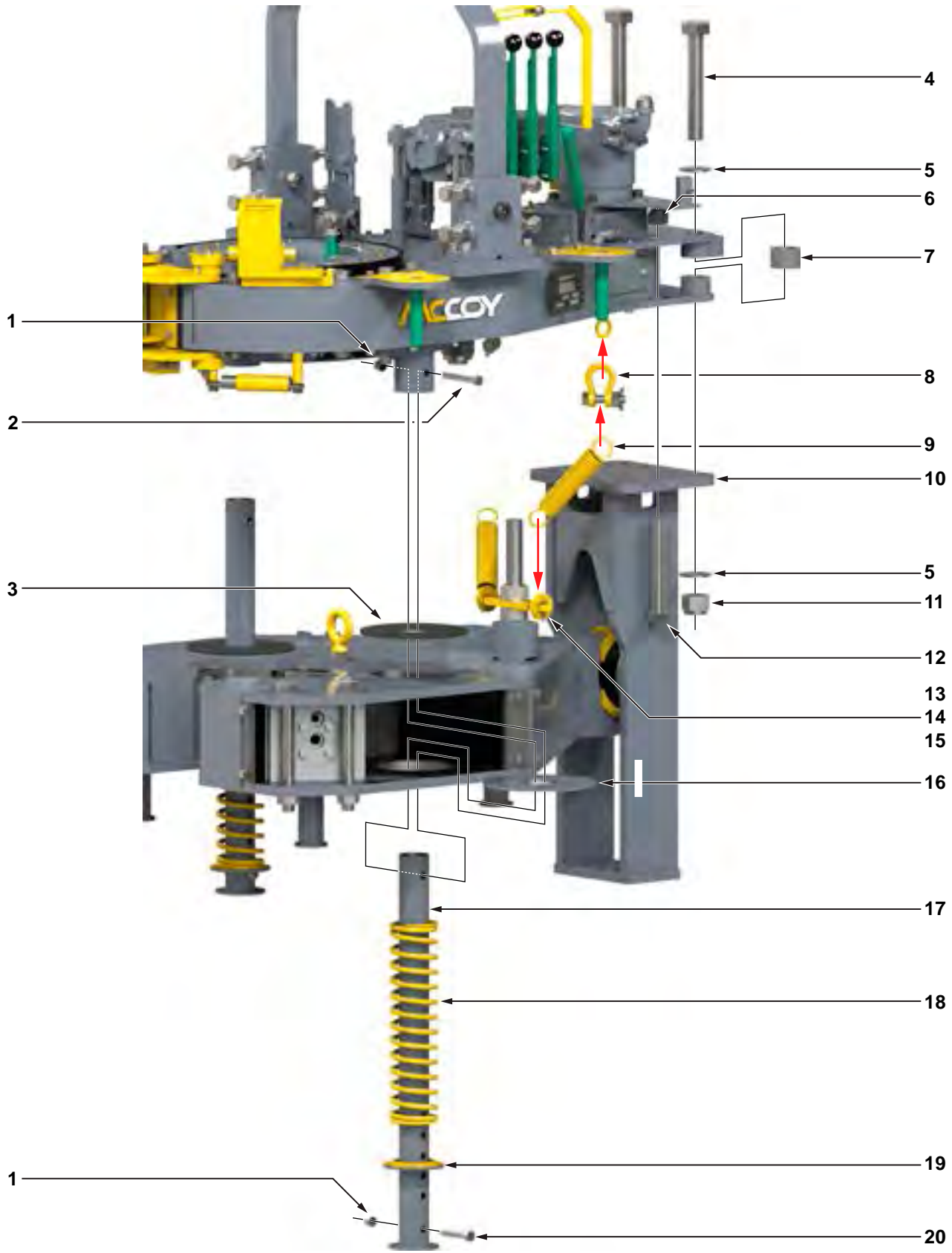


Illustration 7.33: 80-0615-10 KT8.625+CBU Leg Assemblies



Illustration 7.34: 80-0615-10 KT8.625+CBU Front Leg Mounts

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Assembly)		
					Critical	One-Year	Overhaul
1	Part	½" UNC hex nylock nut	4	09-5610			
2	Part	½" UNC x 4" hex bolt	2	09-1182			
3	Part	Rubber guard	2	101-5733	1		2
4	Part	1-¼" UNC x 9" hex bolt	2	09-0289			
5	Part	1-¼" narrow flat washer	4	09-0345			
6	Part	1" UNC hex nylock nut	2	09-5725			
7	Part	Rear body spacer	2	101-1378			
8	Part	½" shackle	2	09-9063		1	2
9	Part	Rear backup suspension spring	2	E2188-0250-11750	1		2
10	Weldment	Rear leg weldment	1	1302-908-00			
11	Part	1-¼" UNC hex nylock nut	2	09-1484			
12	Part	1" UNC x 8" hex bolt	2	09-0286			
13	Part	Spring hanger bracket	1	1483-500-00-04			
14	Part	Spring retainer	2	1483-500-00-4B		2	
15	Part	Cotter pin	2				
16	Part	Top spring cap	2	1302-905-03B		1	
17	Weldment	Front leg weldment	2	101-5732			
18	Part	Front leg spring	2	1302-905-08	1		2
19	Part	Bottom spring cap	2	1302-905-03A		1	
20	Part	½" UNC x 3-½" hex bolt	2	09-1177			
21	Part	1" UNF hex thin nylock nut	4	09-5627			
22	Weldment	Front leg mount weldment, LH	1	101-0878			
23	Weldment	Front leg mount weldment, RH	1	101-0879			

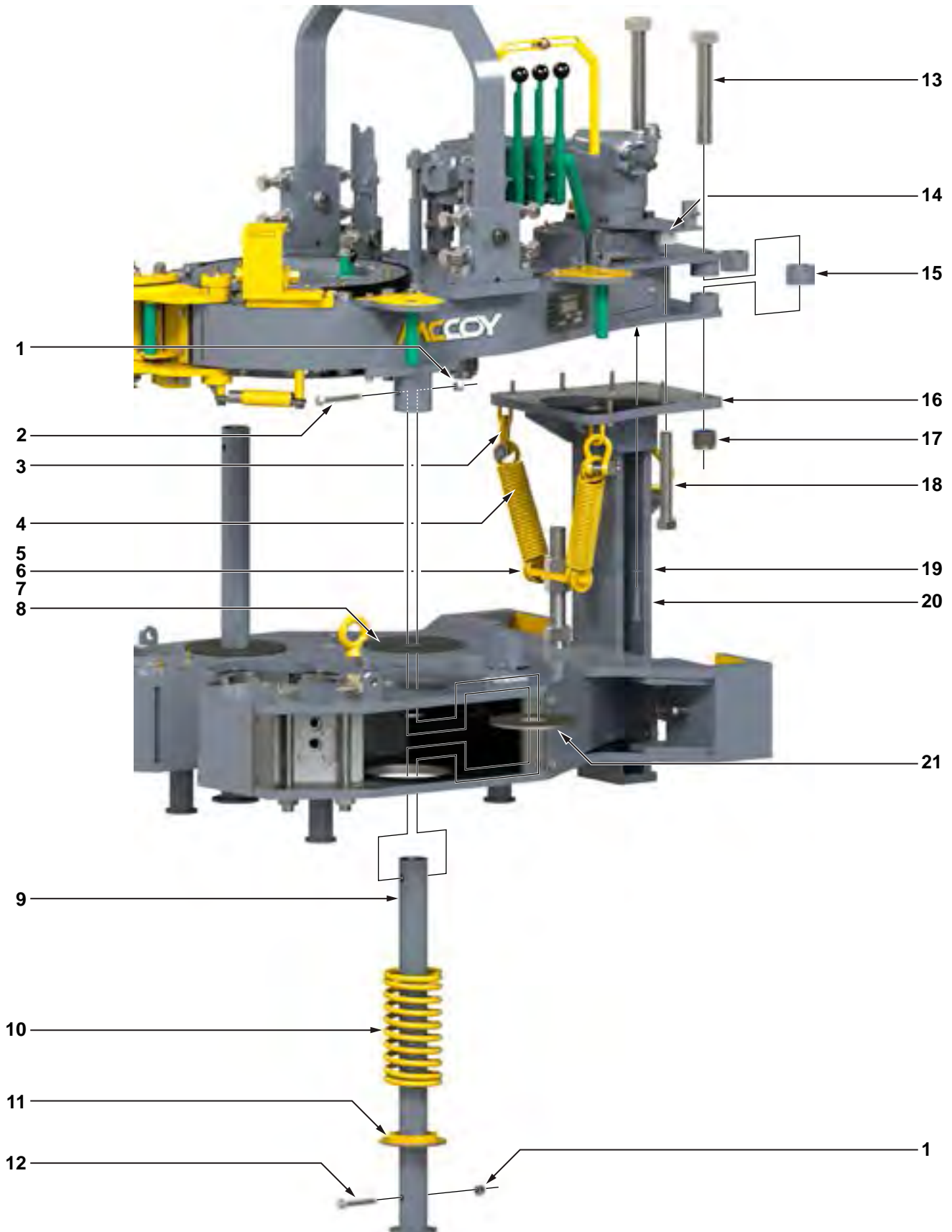


Illustration 7.37: 80-0615-12 KT8.625+CBUT Leg Assemblies



Illustration 7.38: 80-0615-12 KT8.625+CBUT Front Leg Mounts

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Assembly)		
					Critical	One-Year	Overhaul
1	Part	½" UNC hex nylock nut	4	09-5610			
2	Part	½" UNC x 4" hex bolt	2	09-1182			
3	Part	½" shackle	2	09-9063		1	2
4	Part	Rear backup suspension spring	2	E2188-0250-11750	1		2
5	Part	Spring hanger bracket	1	1483-500-00-04			
6	Part	Spring retainer	2	1483-500-00-4B		2	
7	Part	Cotter pin	2				
8	Part	Rubber guard	2	101-5733	1		2
9	Weldment	Front leg weldment	2	101-8273			
10	Part	Front leg spring	2	1302-905-08	1		2
11	Part	Bottom spring cap	2	101-8278		1	
12	Part	½" UNC x 3" hex bolt	2	09-1178			
13	Part	1-¼" UNC x 9" hex bolt	2	09-0289			
14	Part	1" UNC hex nylock nut	2	09-5725			
15	Part	Rear body spacer	2	101-1378			
16	Weldment	Rear leg weldment	1	101-2031			
17	Part	1-¼" UNC hex nylock nut	2	09-1484			
18	Part	1" UNC x 8" hex bolt	2	09-0286			
19	Part	¾" lock washer	4	09-5106			
20	Part	¾" UNC x 2-¼" hex bolt	4	09-1055			
21	Part	Top spring cap	2	101-8216		1	
22	Weldment	Front leg mount weldment, RH	1	101-8276			
23	Weldment	Front leg mount weldment, LH	1	101-8275			
24	Part	1" UNF hex thin nylock nut	4	09-5627			

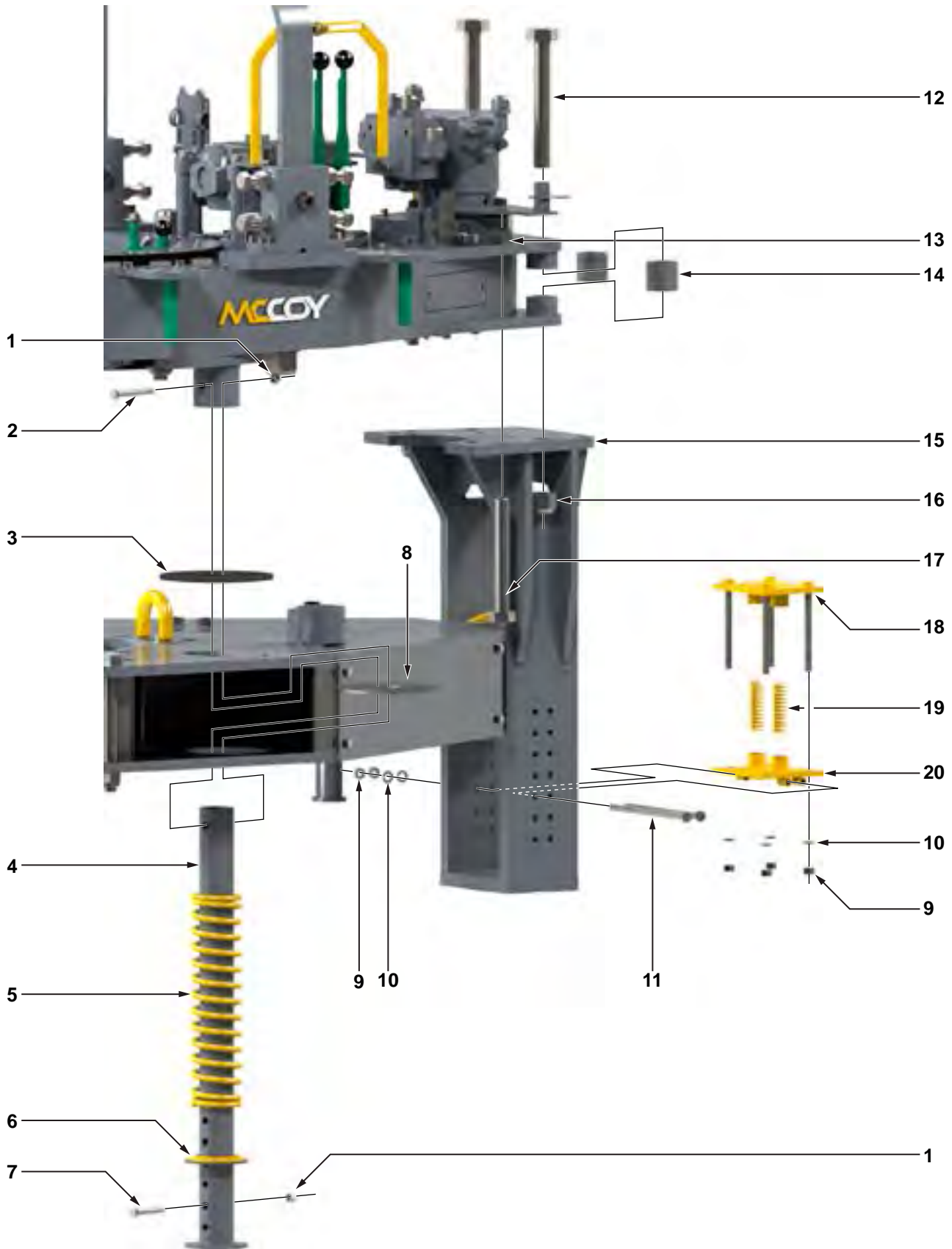


Illustration 7.35: 80-0615-14 KT8.625+CBU Leg Assemblies



Illustration 7.36: 80-0615-14 KT8.625+CBU Front Leg Mounts

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Assembly)		
					Critical	One-Year	Overhaul
1	Part	½" UNC hex nylock nut	4	09-5610			
2	Part	½" UNC x 4" hex bolt	2	09-1182			
3	Part	Rubber guard	2	101-5733	1		2
4	Weldment	Front leg weldment	2	101-5732			
5	Part	Front leg spring	2	1302-905-08	1		2
6	Part	Bottom spring cap	2	1302-905-03A		1	
7	Part	½" UNC x 3" hex bolt	2	09-1178			
8	Part	Top spring cap	2	1302-905-03B		1	
9	Part	½" UNC hex nut	6	09-9124			
10	Part	½" lock washer	6	09-5110			
11	Part	½" UNC x 9-½" Hex Bolt	2	09-1203			
12	Part	1-¼" UNC x 9" hex bolt	2	09-0289			
13	Part	1" UNC hex nylock nut	2	09-5725			
14	Part	Rear body spacer	2	101-1378			
15	Weldment	Rear leg weldment	1	1302-908-00			
16	Part	1-¼" UNC Hex Nylock Nut	2	09-1484			
17	Part	1" UNC x 8" Hex Bolt	2	09-0286			
18	Weldment	Spring holder weldment, top half	1	101-4496			
19	Part	Rear backup support spring	2	997-13	2		2
20	Weldment	Spring holder weldment, bottom half	1	101-4495			
21	Weldment	Front leg mount weldment, LH	1	1302-917B-00RH			
22	Part	1" narrow flat washer	4	09-5120			
23	Part	1" UNF thin nylock nut	4	09-5627			
24	Weldment	Front leg mount weldment, RH	1	1302-917B-00LH			

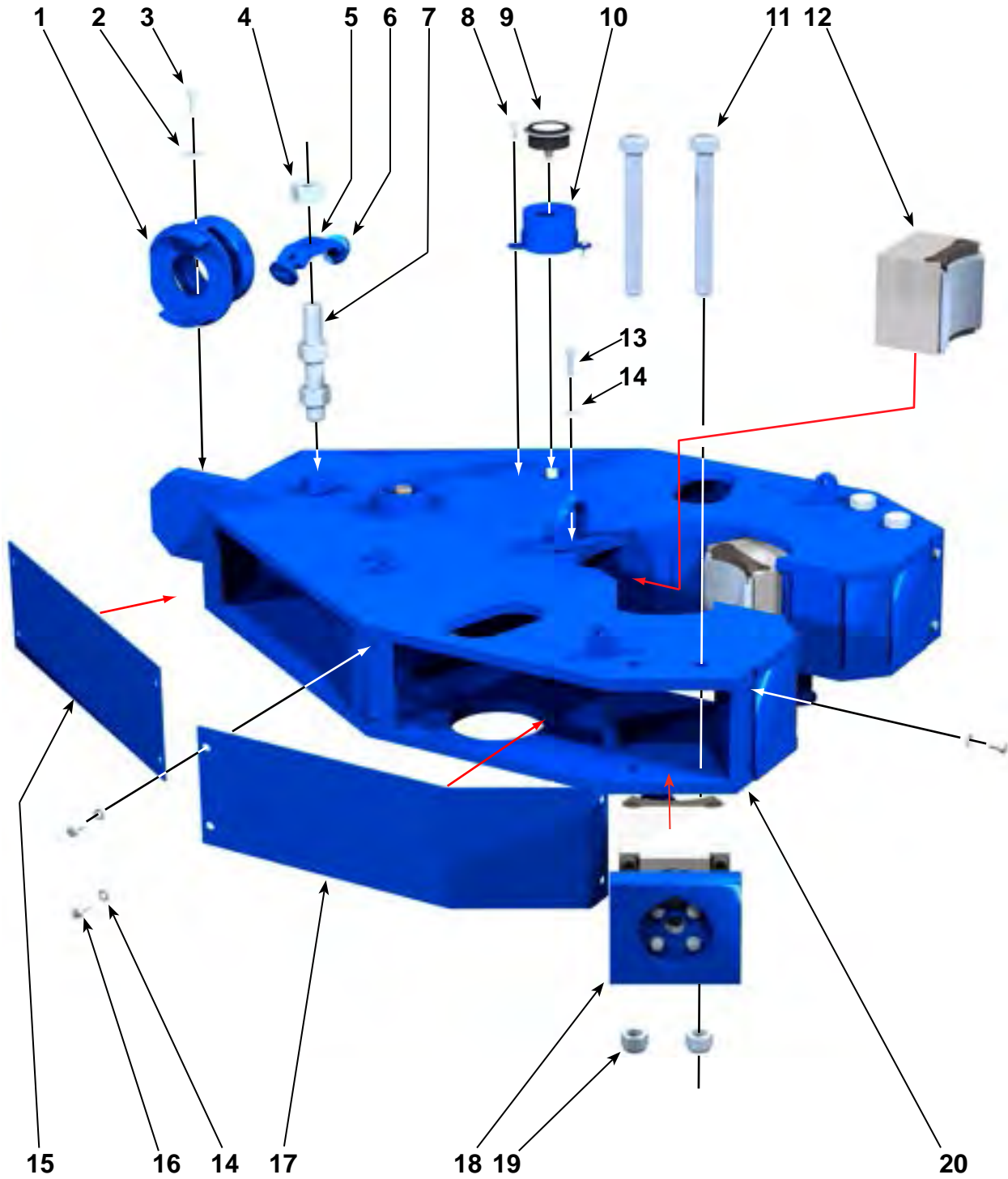


Illustration 7.37: 85-0604 7-⁵/₈" Backup Assembly Exploded

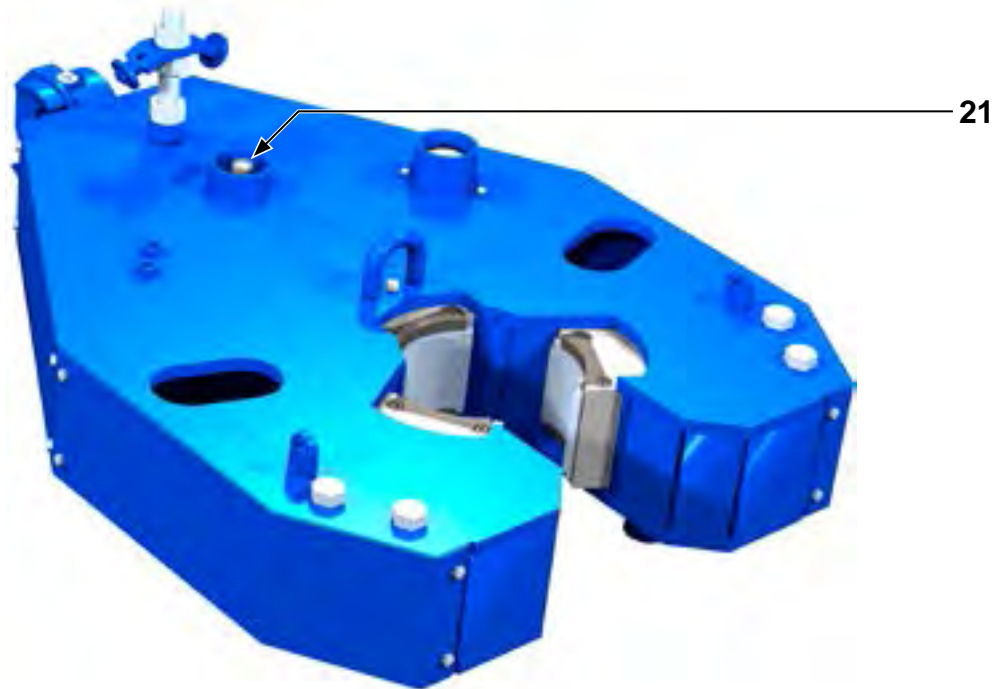


Illustration 7.38: 85-0604 7-⁵/₈" Backup Assembly Exploded

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Assembly)		
					Critical	One-Year	Overhaul
1	Weldment	Load cell holder weldment	18	01-9116B			
2	Part	3/8" regular flat washer	1	09-5006			
3	Part	3/8" UNC x 1-1/4" hex bolt	1	09-1048			
4	Part	1-1/4" UNC hex nut	3	09-5832			
5	Part	Suspension spring v-bracket	1	1483-500-00-04			
6	Part	Suspension spring retainer	2	1483-500-00-4B			
7	Part	1-1/4" UNC x 8" threaded rod	1	997-500-03			
8	Part	1/4" UNC x 3/4" hex bolt	2	09-1005			
9	Part	2-1/2" Face 0-3000 PSI 1/4" NPT gauge	1	02-0246		1	
10	Weldment	Gauge protector weldment	1	1483-500-18			
11	Part	1" UNC x 8-1/2" hex bolt	4	09-0287			
12	Part	Rear jaw	1	1401-08	1		1
13	Part	3/8" UNC x 1-1/2" hex bolt	1	09-1050			
14	Part	3/8" lock washer	1	09-5006			
15	Part	Rear-side cover plate	2	1389-801-12			
16	Part	3/8" UNC x 3/4" hex bolt	16	09-1044			
17	Part	Side cover plate	2	1391-7-1			
18	Assembly	CLINCHER® cylinder assembly	2	1401-00-00B			
19	Part	1" UNC nylock nut	4	09-5725			
20	Weldment	Backup body weldment	1	1389-801			
21	Part	Relief valve	1	08-1180	1		1
22	Part	Relief valve manifold (not shown)	1	08-1839			
23	Part	Check valve (not shown)	1	08-0481	1		1
24	Part	Check valve body (not shown)	1	08-1327			

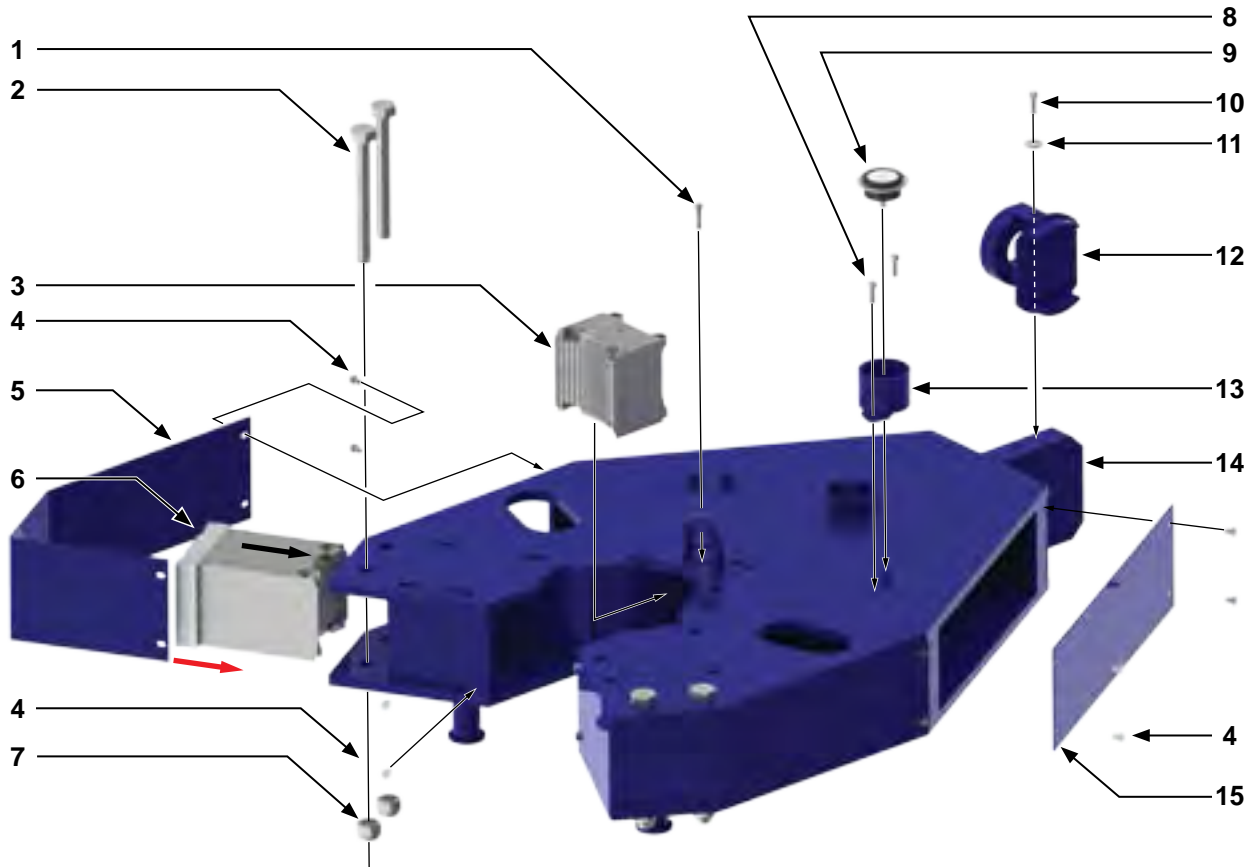


Illustration 7.39: 85-0607 8-⁵/₈" Backup Assembly Exploded

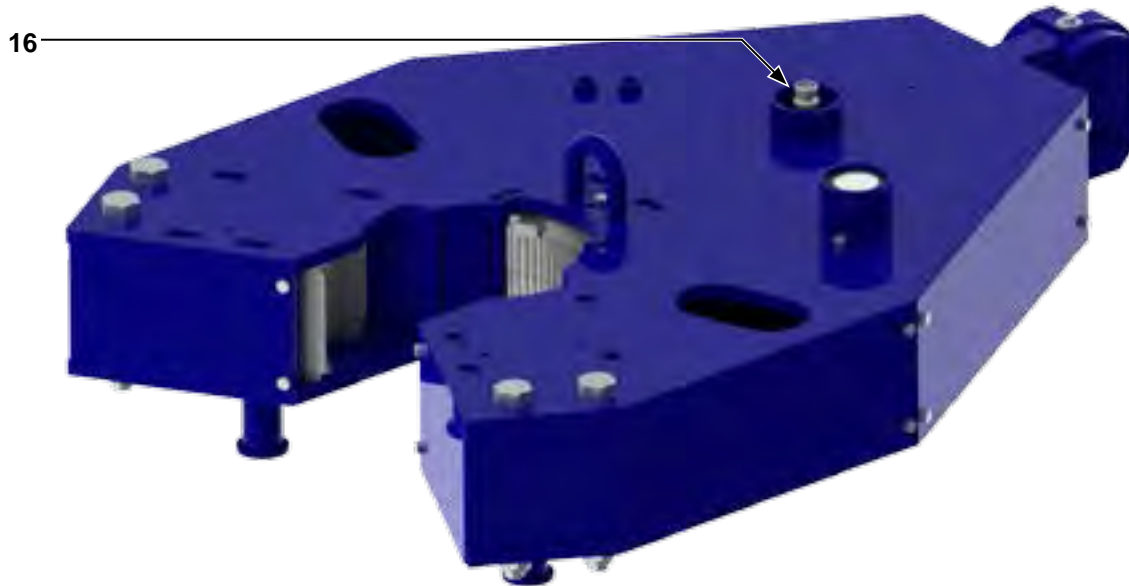


Illustration 7.40: 85-0607 8-5/8" Backup Assembly Exploded

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Assembly)		
					Critical	One-Year	Overhaul
1	Part	3/8" UNC x 1-1/2" Hex Bolt	1	09-1050			
2	Part	1" UNC x 8" Hex Bolt	4	09-0288			
3	Part	Rear Jaw	1	101-5756	1		1
4	Part	3/8" UNC x 3/4" Hex Bolt	16	09-1044			
5	Part	Backup Side Plate	2	101-5079			
6	Assembly	CLINCHER® 8-5/8" Cylinder Assembly	2	101-5755			
7	Part	1" UNC Nylock Nut	4	09-5725			
8	Part	3/8" UNC x 1-1/4" Hex Bolt	3	09-1048			
9	Part	2-1/2" Face 0-3000 PSI 1/4" NPT Gauge	1	02-0246		1	
10	Part	3/8" Lock Washer	17	09-5106			
11	Weldment	Load Cell Holder Weldment	1	01-9116D			
12	Weldment	Gauge Protector Weldment	1	1483-500-18			
13	Weldment	Backup Body Weldment	1	101-5076			
14	Part	Backup Side Plate	2	1389-801-12			
15	Part	Relief Valve	1	08-1180	1		1
16	Part	Relief Valve Manifold (Not Shown)	1	08-1839			
17	Part	Check Valve (Not Shown)	1	08-0481	1		1
18	Part	Check Valve Body (Not Shown)	1	08-1327			

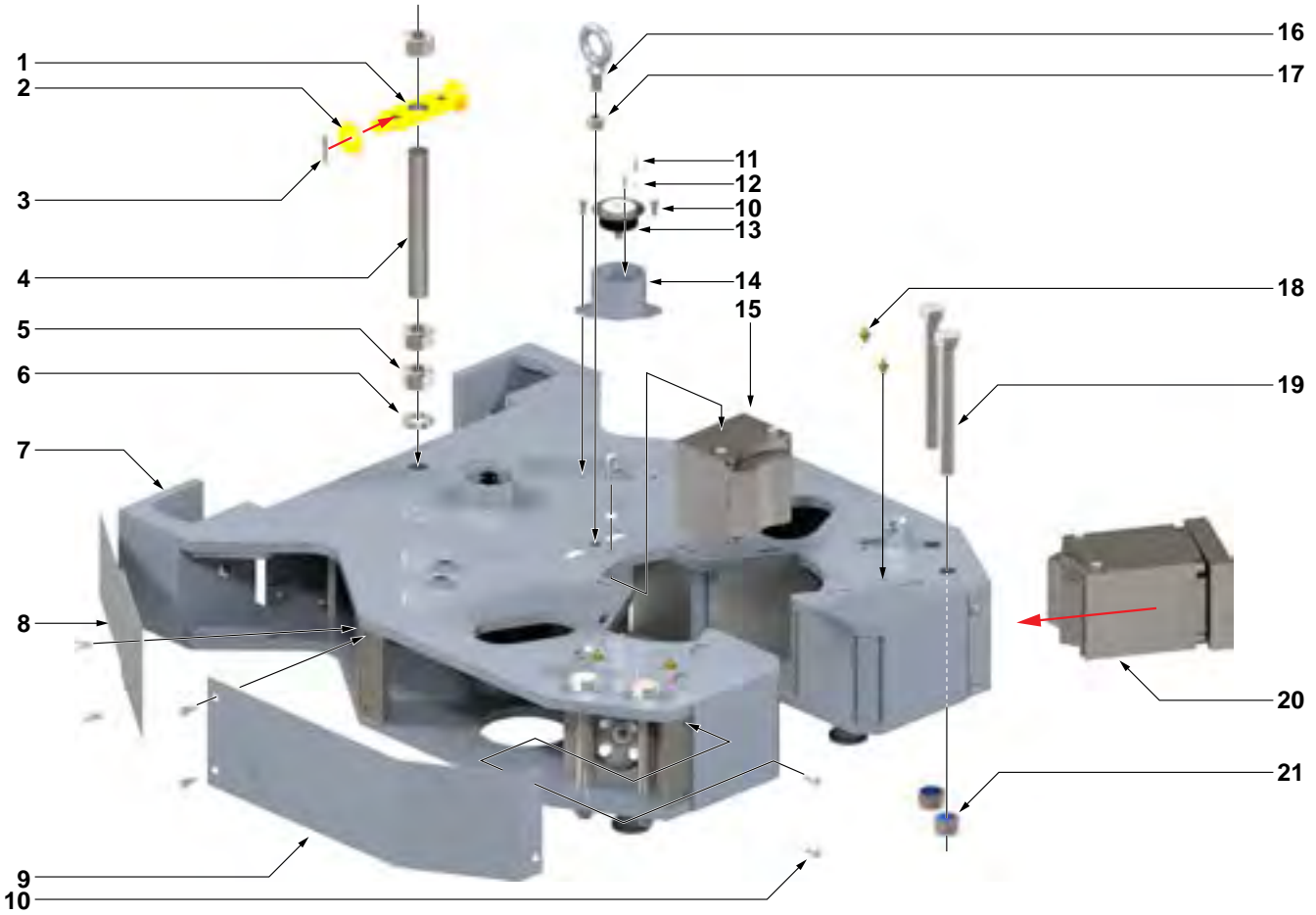


Illustration 7.41: 85-0606 7-⁵/₈" Backup Assembly Exploded



Illustration 7.42: 85-0606 7-5/8" Backup Assembly

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Ass'y)		
					Critical	One-Year	Overhaul
1	Part	Suspension spring bracket	1	1483-500-00-04			
2	Part	Suspension spring retainer	2	1483-500-00-4B		2	
3	Part	Cotter pin	2				
4	Part	1-1/4" UNC x 10" threaded rod	1	997-500-03			
5	Part	1-1/4" UNC heavy hex nut	3	09-5832			
6	Part	1-1/4" lock washer	1	09-5132			
7	Weldment	Backup body weldment	1	1391B-500-00			
8	Part	Side panel 1	2	101-2433			
9	Part	Side panel 2	2	1391-7-1			
10	Part	3/8" UNC x 3/4" hex bolt	18	09-1044			
11	Part	#10 x 3/4" machine screw	3				
12	Part	#10 lock washer	3				
13	Part	0-3000 PSI 1/4" NPT gauge	1	02-0245		1	
14	Weldment	Gauge protector weldment	1	1483-500-18			
15	Part	Rear jaw	1	1401-08	1		
16	Part	3/4" UNC eye bolt	1	101-5915			
17	Part	3/4" UNC hex nut	1	09-5818			
18	Part	1/8" NPT grease fitting	8	02-0005			
19	Part	1" UNC x 9" hex bolt	4	09-0288			
20	Assembly	CLINCHER® cylinder assembly	2	1401-00-00B			
21	Part	1" UNC nylock nut	4	09-5725			
22	Part	Relief valve	1	08-1180	1		1
23	Part	Relief valve manifold (not shown)	1	08-1839			
24	Part	Check valve (not shown)	1	08-0481	1		1
25	Part	Check valve body (not shown)	1	08-1327			

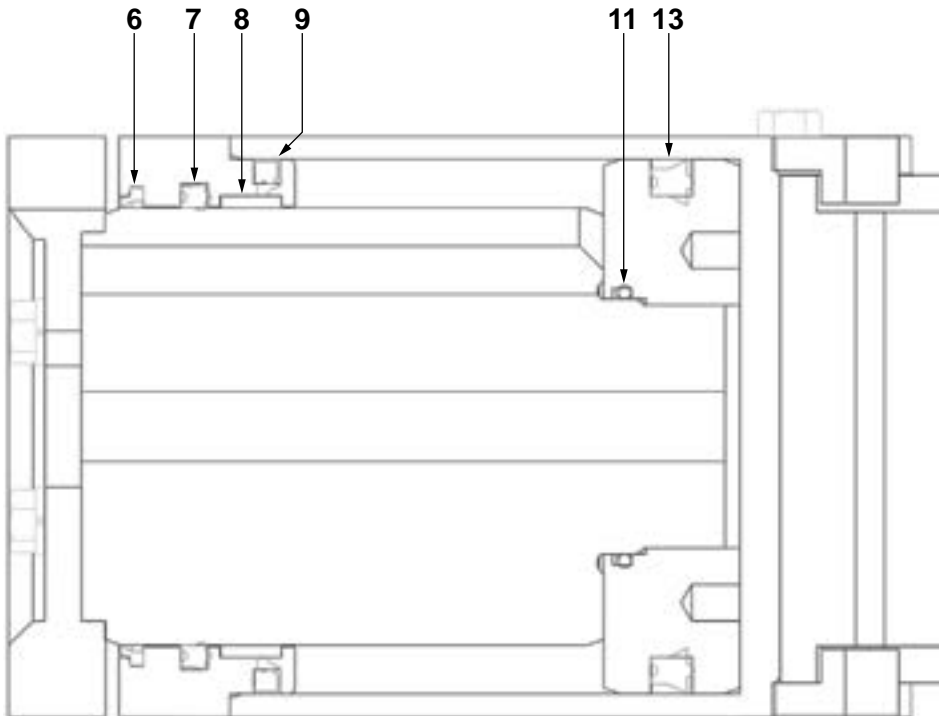
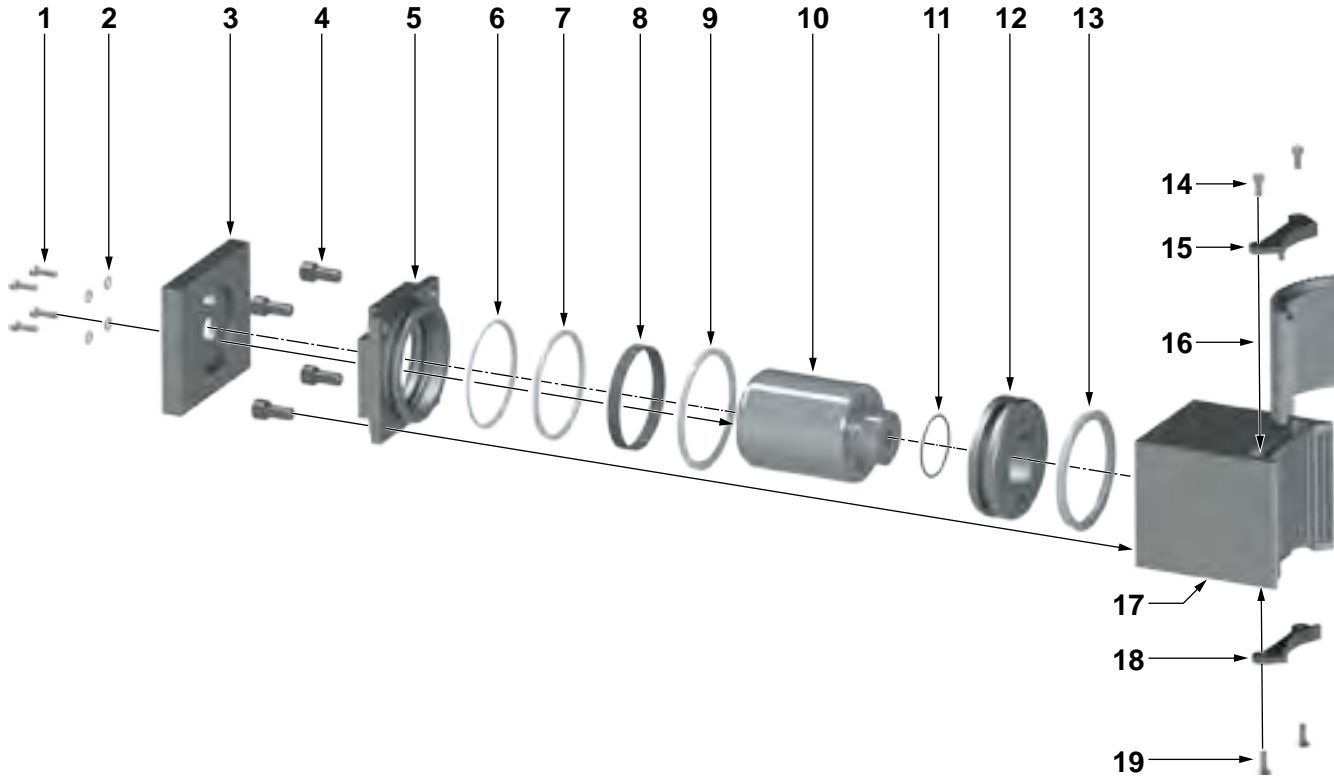


Illustration 7.43: 1401-00-00B 7-5/8" Clincher Cylinder Exploded



Illustration 7.44: 1401-00-00B 7-5/8" Clincher Cylinder

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Ass'y)		
					Critical	One-Year	Overhaul
	Part	7-5/8" CLINCHER® cylinder (complete)	2	1401-00-00B			
1	Part	3/8" UNC x 1" hex bolt	4	09-1170			
2	Part	3/8" lock washer	4	09-5106			
3	Part	Backing plate	1	1401-03B			
4	Part	5/8" UNC x 1-1/4" hex socket head cap screw	4	09-0240			
5	Part	Cylinder gland	1	1401-06B			
10	Part	Cylinder rod	1	1401-04B			
12	Part	Cylinder piston	1	1401-05B			
14	Part	3/8" UNC x 1" hex bolt	2	09-1046			
15	Part	Die retainer (top)	3	101-2982	3		3
16	Part	Wraparound insert (See Pp. 3.23)	1				
17	Part	Cylinder housing	1	1401-01B			
18	Part	Die retainer (bottom)	3	101-2291	3		3
19	Part	3/8" UNF x 3/4" hex socket flat head cap screw	2	09-2044			
	Kit	CLINCHER® Cylinder Seal Kit		1401-00-00B-SK	1		1
6	Seal	Wiper	1				
7	Seal	Polypak	1				
8	Seal	Wear ring	1				
9	Seal	Polypak	1				
11	Seal	O-ring	1				
13	Seal	Polypak	1				

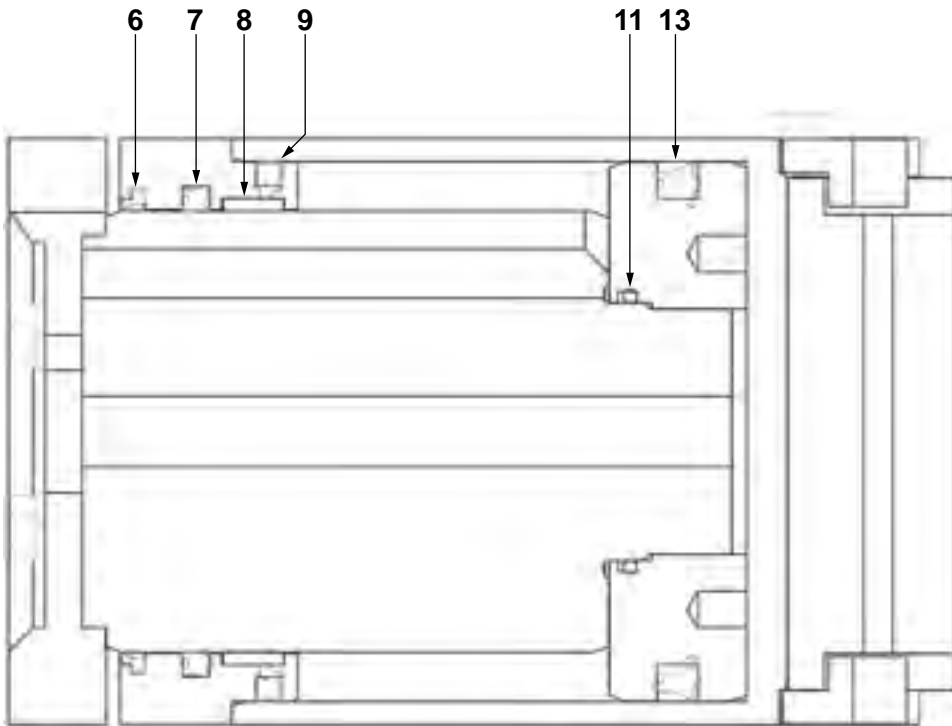
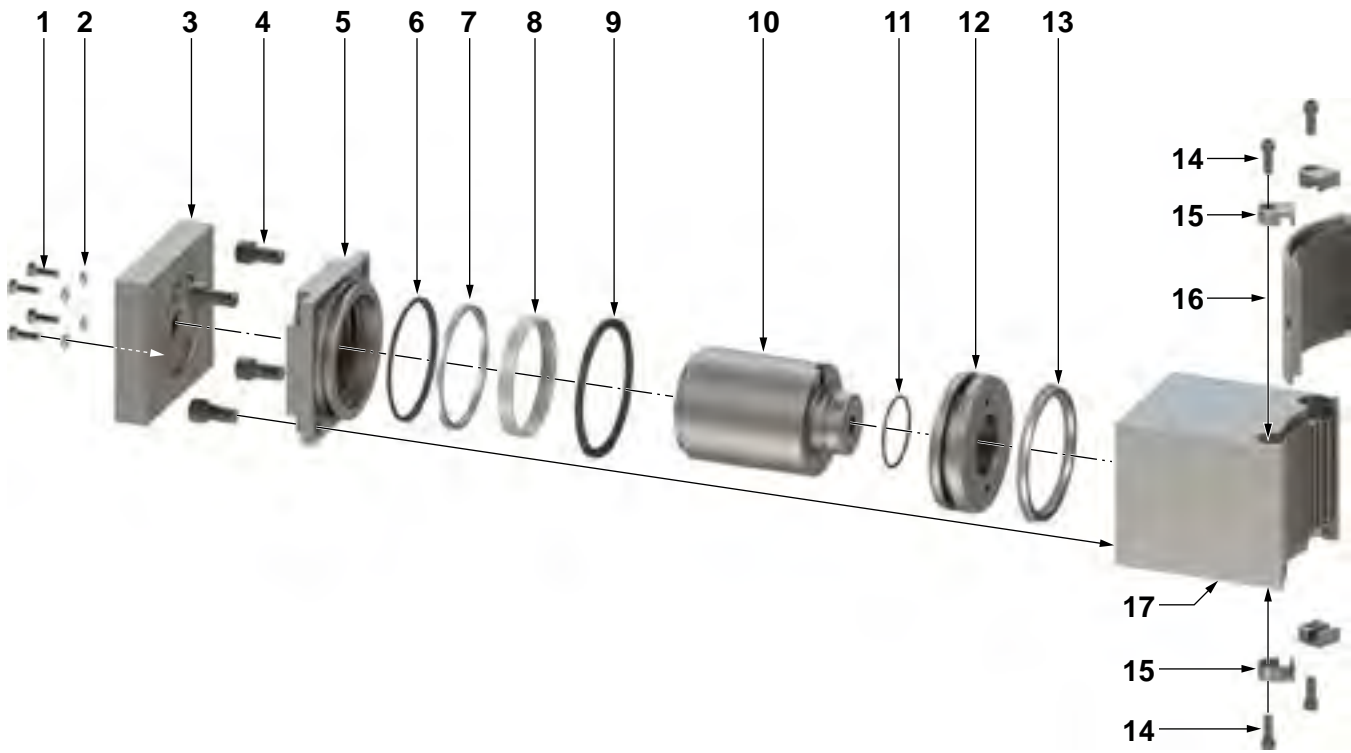


Illustration 7.45: 101-5755 8-5/8" Clincher Cylinder Exploded



Illustration 7.46: 101-5755 8-5/8" Clincher Cylinder

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Ass'y)		
					Critical	One-Year	Overhaul
	Part	8-5/8" CLINCHER® cylinder (complete)	2	101-5755			
1	Part	3/8" UNC x 1" hex bolt	4	09-1170			
2	Part	3/8" lock washer	4	09-5106			
3	Part	Backing plate	1	101-5759			
4	Part	5/8" UNC x 1-1/4" hex socket head cap screw	4	09-0240			
5	Part	Cylinder gland	1	1401-06B			
10	Part	Cylinder rod	1	1401-04B			
12	Part	Cylinder piston	1	1401-05B			
14	Part	3/8" UNC x 1" hex socket head cap screw	4	09-1738			
15	Part	Die retainer	4	73064	4		4
16	Part	Wraparound insert (See Pp. 3.23)	1				
17	Part	Cylinder housing	1	101-5758			
	Kit	CLINCHER® Cylinder Seal Kit		BUC8623-01-SK	1		1
6	Seal	Wiper	1				
7	Seal	Polypak	1				
8	Seal	Wear ring	1				
9	Seal	Polypak	1				
11	Seal	O-ring	1				
13	Seal	Polypak	1				

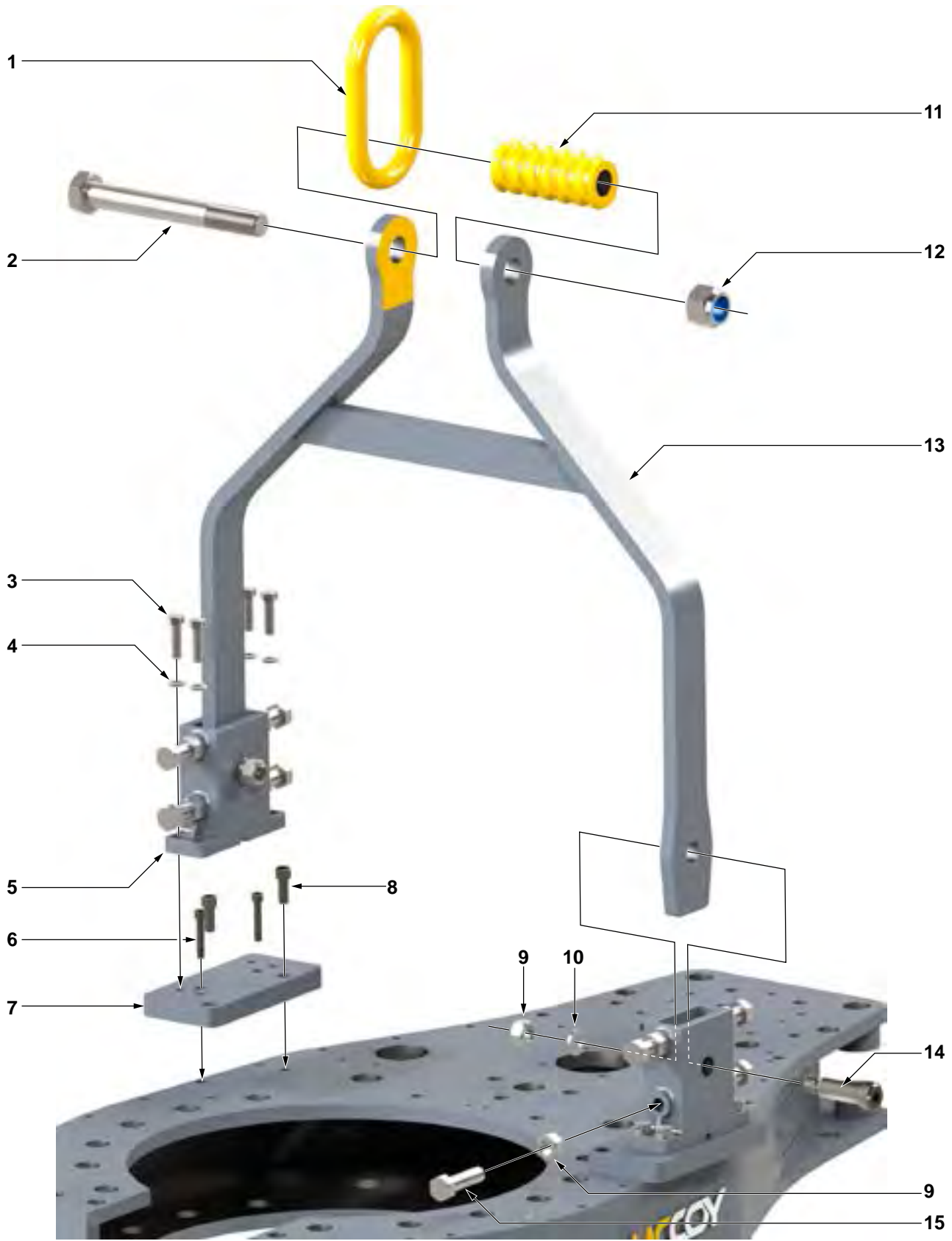


Illustration 7.47: 101-6896 Rigid Sling Exploded


DANGER

ITEMS ON THE CRITICAL SPARE PARTS LIST MARKED IN **RED** INDICATE ESSENTIAL HEALTH & SAFETY ITEMS. FAILURE TO REPLACE DAMAGED ESSENTIAL HEALTH & SAFETY ITEMS WILL PRESENT IMMEDIATE DANGER TO PERSONNEL OR EQUIPMENT. HAVE THESE ITEMS ON HAND AT ALL TIMES. STOP WORK AND QUARANTINE TONG UPON DISCOVERY OF DAMAGED OR DEFECTIVE HEALTH AND SAFETY COMPONENTS UNTIL PARTS CAN BE REPLACED.

Item	Type	Description	Qty	Part Number	Recommended Spares (Per Ass'y)		
					Critical	One-Year	Overhaul
1	Part	Master lifting link	1	02-9128	1		1
2	Part	Rigid sling helix bolt	1	02-E0267	1		1
3	Part	½" UNC x 1-¾" drilled-head hex bolt	8	101-6459	8		8
4	Part	½" lock washer	8	09-5110			
5	Part	Rigid sling mounting foot	2	101-6393			
6	Part	¾" UNC x 2" hex socket head cap screw	4	09-2054	4		4
7	Part	Rigid sling mounting plate, right	1	101-6894			
		Rigid sling mounting plate, left	1	101-6895			
8	Part	½" UNC x 1-¼" hex socket head cap screw	4				
9	Part	¾" UNC hex nut	10	09-5818			
10	Part	¾" lock washer	2	09-5118			
11	Part	Rigid sling adjustment helix	1	1095-220	1		1
12	Part	1-¼" UNC nylock nut	1	09-1484	1		1
13	Weldment	Rigid sling weldment	1	101-6893			
14	Part	1" x 2-½" hex socket head shoulder bolt, UNC	2	09-9991	2		2
15	Part	¾" UNC x 2-¾" hex bolt	8				


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™.



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SECTION 8: TORQUE / TURNS MANAGEMENT



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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.

Tension style and compression style load cells are available. Stand-alone tongs only use tension load cells, which are 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. Tong and backup assemblies use either tension load cells or compression load cells. Tension load cells in a tong/backup arrangement are coupled between a stationary leg or frame and the rear of the backup using load-rated shackles. A compression load cell is mounted on the rear of the backup in direct contact with a stationary rear leg or frame. In all installation configurations the load cell must be located in the centre of, and 90° to the force vector generated between the backup and the stationary leg or frame, or between the load cell and the point of restraint.

Hydraulic force generated by a load cell is transmitted to the torque gauge via a reinforced flexible hydraulic line. The gauge displays hydraulic force as torque in units of Ft.-Lbs. Use the red “peak torque” indicator to aid the operator when manually torquing joints. Set the red indicator at the desired maximum torque number, and cease rotation of the tong when the torque gauge indicator reaches the preset. 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. Assure correct torque measurement by ensuring the arm length or “handle” displayed on your torque gauge matches the arm length of the equipment in service as listed in the specifications section of the technical manual. Inaccurately calibrated or uncalibrated torque gauges may not display correct torque.

NOTICE

FOR CORRECT TORQUE MEASUREMENT THE TORQUE HANDLE INDICATED ON THE TORQUE GAUGE MUST MATCH THE TORQUE HANDLE FOR THE EQUIPMENT IN USE AS LISTED IN THE SPECIFICATIONS SECTION



**Illustration 8.0.1: Torque Gauge
(For Illustration Purposes Only)**



Illustration 8.0.2: Load Cell Types

NOTICE

THE IMAGES DISPLAYED ARE SUPPLIED FOR ILLUSTRATION PURPOSES ONLY

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.

Type	Description	Qty	Part #
Assembly	36" Arm-30K Compression Load Cell and Gauge	1	10-0017C
Part	8 in2 Compression Load Cell (c/w 5' hose & quick-disconnect)	1	10-0008C
Part	Torque Gauge, 30,000 Lbs-Ft. 36" Arm	1	10-0017G
Part	5 Ft. Hydraulic Hose Assembly	1	02-0069

Type	Description	Qty	Part Number
Assembly	32" Arm 30K Tension Load Cell and Torque Gauge Assembly	1	10-0022T
Assembly	Tension Load Cell	1	10-0008T
Part	Torque Gauge, 30000 Lbs-Ft. 32" Arm	1	10-0022G
Part	5 Ft. Hydraulic Hose Assembly	1	02-0069

NOTICE

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

8.1 TURNS COUNTER ENCODER

McCoy Global a rotary encoder in conjunction with a torque/turns management computer to measure the number of revolutions of a hydraulic power tong. A rotating component of the equipment drives the encoder, which emits a preset number of pulses per revolution depending on the encoder selected. The number of pulses emitted per complete revolution of the power tong is dependent upon the gear ratio between the rotating component driving the encoder, and the encoder itself. See the specifications in Section 2 to determine the encoder/ring gear ratio for your specific application.



Illustration 8.1.1: Encoder Mounting Location

8.1.1 Encoder Installation

Install the gear-driven encoder following these steps. If not already done, mount the encoder on the encoder mount before installing the mount on the tong. Typically McCoy Global ships a WINCATT® system with the encoder pre-mounted on the encoder mount. However, in some cases mounting the encoder at a customer site may be required.

1. Loosen all set screws on the spring coupler within the mount. Align the flat on the encoder shaft with one of the upper set screws on the spring coupler within the mount. Tighten the set screw slightly to prevent the encoder shaft from rotating away from the set screw.

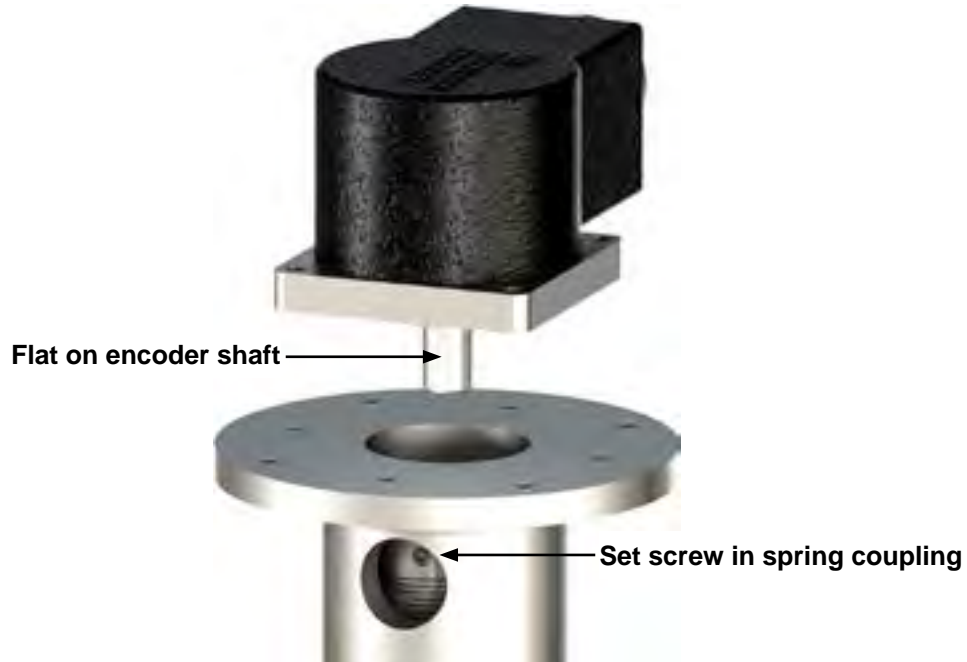


Illustration 8.1.2: Mounting Encoder To Encoder Mount

2. Secure the encoder to the encoder mount using four #6-32 x 1/2" hex socket head machine screws.



Illustration 8.1.3: Securing Encoder To Encoder Mount

8.1.1 Encoder Installation (Continued):

3. Tighten the set screws in the spring coupler against the encoder shaft and the encoder mount shaft.
4. Scribe or cut the paint seam between the cover plate and the top plate. Prying the cover plate from the top plate without scribing or cutting the paint seam risks flaking paint from the top plate, exposing the metal to air and introducing rust and corrosion.
5. Remove the two ¼" bolts fastening the cover plate to the top plate, and remove the cover plate. Use care that the paint coating does not flake from the top plate in the vicinity of the encoder mount mounting hole.
6. Insert the encoder mount through the top plate of the tong. Mesh the drive gear on the encoder mount shaft with the idler gear. Use the two ¼" UNC x 1" bolts and lock washers removed in the previous step to secure the encoder mount to the top plate of the tong.

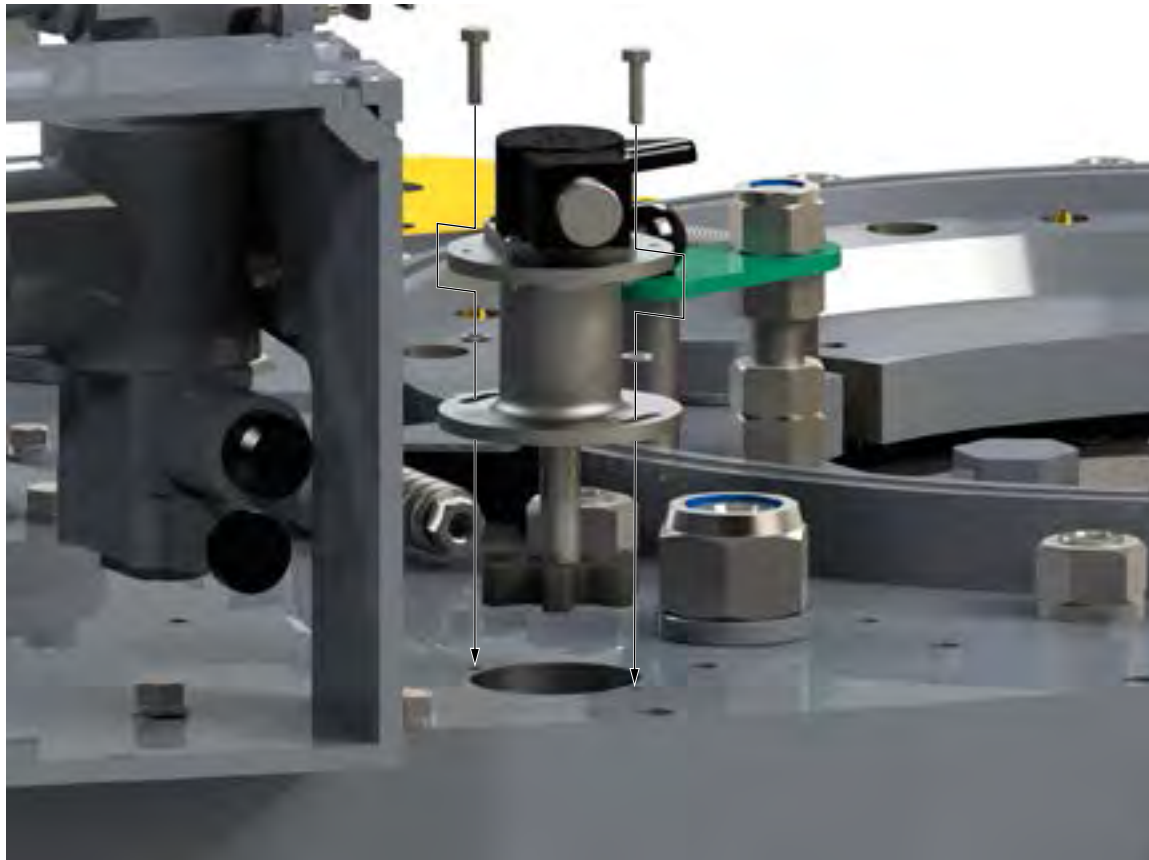
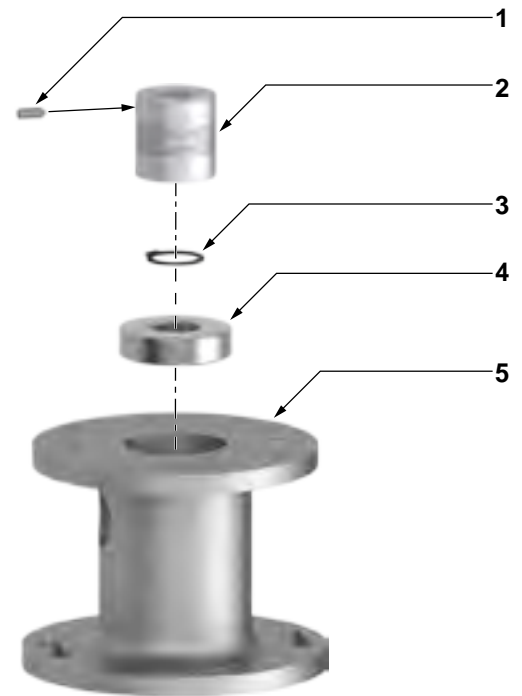
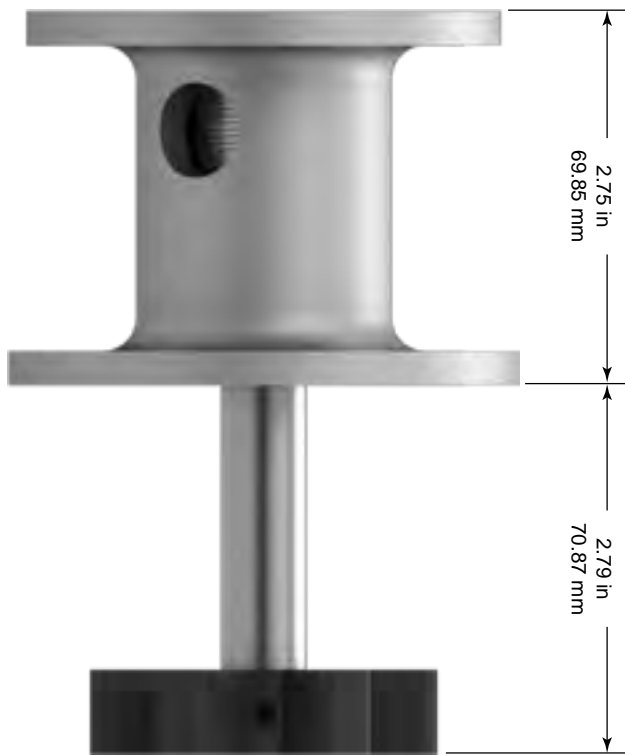
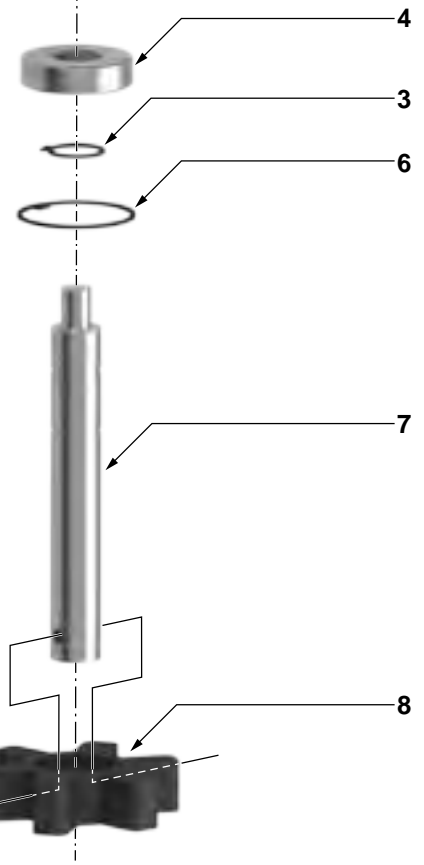


Illustration 8.1.4: Installing Encoder & Encoder Mount



ITEM	TYPE	DESCRIPTION	QTY	PART NUMBER
	Assembly	Encoder mount	1	60-0001
	Assembly	Encoder mount, long encoder shaft	1	60-0001A
1	Part	6-32 x 3/8" hex socket head set screw	4	
2	Part	Helical flexible encoder shaft coupling	1	60-0130N
3	Part	Internal retainer ring	2	1376-13
4	Part	Bearing	2	1376-05
5	Part	Encoder housing	1	1392-104A
6	Part	Internal retainer ring	1	02-0436
7	Part	Encoder shaft, 60-0001 mount	1	1392-103A-01
	Part	Encoder shaft, 60-0001A mount	1	1392-103A-02
8	Part	Encoder gear	1	01-0320A-M
9	Part	10-24 x 1-1/4" hex socket head set screw	1	



Min / max encoder shaft length, encoder # 60-0001: 0.67 in (17 mm) to 0.92 in (23.4 mm)
 Min / max encoder shaft length, encoder # 60-0001A: 1.04 in (26.4 mm) to 1.29 in (32.8 mm)

Encoder mounts accommodate all standard 100-, 200-, & 500-count encoders, and all 100- & 200-count EX encoders supplied by McCoy Global for use with WINCATT®. For use with all configured McCoy tongs with the exception of models 80-0001-X (SL4500 "slim" tongs).

Illustration 8.1.5: Turn Counter Encoder Mount Exploded

8.2 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). 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
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). 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). 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
Internal mechanism of gauge is damaged	Replace gauge

8.3 PERIODIC INSPECTION AND MAINTENANCE

NOTICE

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

8.3.1 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.

8.3.2 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.

- 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.

8.3.3 Repair And Calibration

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



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SECTION 9: OEM DOCUMENTATION

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Bosch Rexroth (Rineer) Hydraulic Motors:

http://dc-america.resource.bosch.com/media/us/products_13/product_groups_1/industrial_hydraulics_5/motors_3/rineer/pdfs_3/repair_manuals/repair_manual_15_series.pdf

Parker Series VA/VG Series Valves

<http://www.parker.com/literature/Hydraulic%20Valve%20Division/hydraulicvalve/Service-Installation/Mobile/Commercial%20Service%20Literature/Bul%20HY14-2004-M1%20VA%20VG%20DCV.pdf>