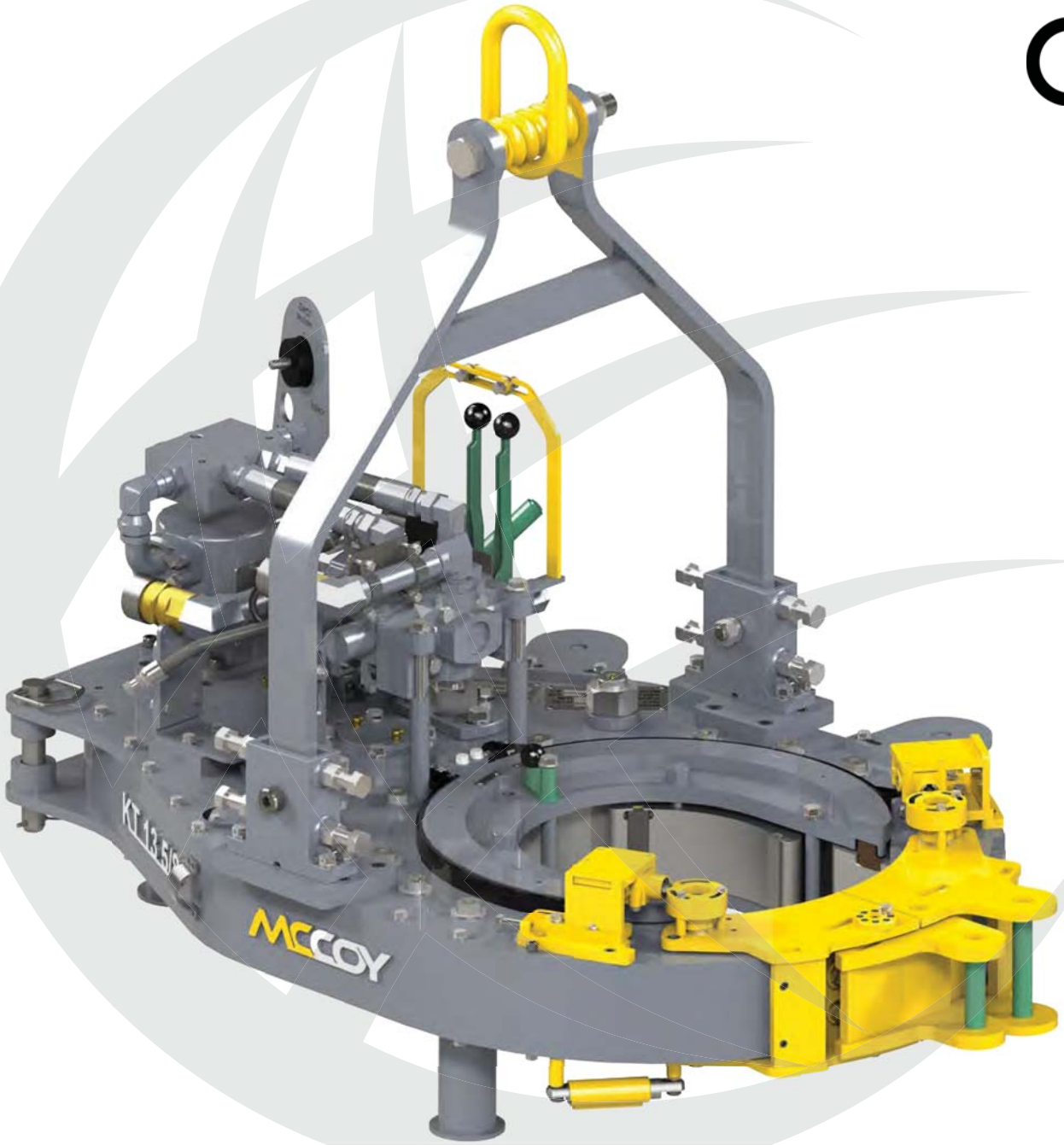
MCCOY GLOBAL

TECHNICAL MANUAL

80-0931-X

13-⅝ in 35,000 lb-ft (47,454 Nm) Hydraulic Power Tong
13-⅝ in 25,000 lb-ft (33,895 Nm) Hydraulic Power Tong (LW version)

CE



SPECIFICATIONS | OPERATION | MAINTENANCE | PARTS

TECHNICAL MANUAL # 12067

MCCOYGLOBAL.COM

ORIGINAL INSTRUCTIONS

THIS TECHNICAL DOCUMENT APPLIES TO THE FOLLOWING MODELS:						
MODEL	REV	Motor Control Valve	Lift Cylinder Control Valve	Dump Valve	Closed Centre Outlet	Remote Door
80-0931-1	4	■				
80-0931-6	2	■		■		
80-0931-7	2	■	■			
80-0931-8	2	■			■ *	
80-0931-11	0	■	■	■		
80-0931-12	2	■	■		■ *	
80-0931-14	A	■	■			■

* **Replaces open-centre outlet**

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

All versions of this tong use a rigid sling for suspension.

This technical manual also applies to the "lightweight" version of this tong. The lightweight tong is similar to the standard tong with a few significant differences, which are clearly identified within this manual.

Model numbers for the "lightweight" (lower torque) versions of the tong are the same as for the standard version with the letters "LW" appended to the model. For example, an 80-0931-1-LW is identical in configuration to the standard 80-0931-1 tong, but will be the "lightweight" version.

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

This page intentionally
left blank

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

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

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

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

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

Summary Of Revisions				
Date	**Section**	**Page**	**Description Of Revision**	**Approved**
MAR 2006	N/A	N/A	Initial Release	
APR 2007	N/A	iii	Added Summary of Revisions page	
	1	1.3	Corrected specifications page to show single speed rather than 2-speed motor.	
AUG 2007	5	5.17	Corrected shifting fork part number.	
JAN 2008	5	5.15	Corrected part number for item “Q”, lower clutch bearing	
		5.25	Modified description and part number for item “H”, ⅜” hose assembly	
OCT 2008	All		Comprehensive content revision - added backup-ready models, added closed-centre models, revised much of the graphics. Revised disassembly and assembly procedures. Added new decommissioning, storage, and recommissioning procedures. Added chain sling procedures and warnings.	
JULY 2009			Moved decommissioning and recommissioning checklists to appendices following Section 7. Section Six has been renumbered to Section Five, Section Seven renumbered to Section Six, Section Eight renumbered to Section Seven.	
	5	5.33	Added part numbers for Items J and L.	
	Appendices		Added daily tong, backup, and power unit daily maintenance checklists, monthly tong maintenance checklist. Moved decommissioning and recommissioning checklists to this section.	
OCT 2010	N/A	N/A	Revised graphical design, added component illustrations for 80-0931-X-LW	
JULY 2011	Intro	iii	Revised list of supported models	SH
	2	2.7	Removed hydraulic schematic, tong without safety door (no longer supported).	
		2.7-2.8	Revised hydraulic schematics	
		2.13	Corrected list of available jaw die kits	
		2.14	Revised section 2.F.1, “Suspension & Restraint”.	
		2.19	Added section 2.G.3, “Shifting Gears”.	
	3	3.1	Revised section 3.A, General Maintenance Safety Practices	
		3.1	Added Section 3.C, “Preventive Maintenance Practices	
		3.10	Added Section 3.E.4, “Shifter Detent Force Adjustment”.	
		3.22	Moved all maintenance checklists from appendix to “Maintenance” section.	
	6	All	Complete revision of torque measurement section	
OCT 2011	5		Checked & corrected part numbers for fasteners where necessary - all B.O.M.s in Section 5	DB
JAN 2012	1	1.3	Corrected specifications page	SH
JUN 2012	5	5.24-5.25	Corrected graphics & B.O.M., motor & motor mount	DB
JUL 2012	Preamble	iii	Removed unsupported & “backup ready” tong models from list	SH
		x	Inserted list of illustrations	
	1	1.3	Inserted illustration of additional hazard areas	
		1.4	Inserted illustration & identification of FARR CE Nameplate	
		1.5	Corrected specifications page	
	1	2.1	Inserted new section “Initial Receipt & Inspection of Equipment”	
		2.4	Renumbered section 2.C, “Sling & Load-Bearing Device Safety”	
		2.7	Inserted new section 2.D, “Lift Cylinder Installation”	
		2.10	Removed obsolete hydraulic schematics from section 2.E, “Hydraulic Schematics and Component Identification. Inserted revised schematics for equipment that is not CE Marked.	
		2.12	Inserted CE-applicable hydraulic schematic (Open Centre)	
		2.13	Inserted CE-applicable hydraulic schematic (Closed Centre)	
		2.16	Renumbered section 2.F, “Hydraulic Connections”	

Continued on next page...

Summary Of Revisions Continued

Date	Section	Page	Description Of Revision	Approved
JUL 2012	2	2.17	Renumbered & revised section 2.G, “Tong Jaw Availability & Installation”	SH
		2.19	Renumbered & revised section 2.H, “Tong Rig-up & Leveling”	
		2.22	Renumbered section 2.I, “Tong Operation”	
		2.22	Inserted new subsection 2.I.2, “Operator Safety”	
		2.23	Revised subsection 2.I.3, “Valve Operation”	
		2.25	Inserted new subsection 2.I.5, “Pre-operational Checks”	
		2.27	Inserted new section 2.J, “Making & Breaking Connections”	
	3	3.2	Inserted new section 3.D, “Hydraulic System De-Pressurizing”	
		3.2	Renumbered section 3.E, “Lubrication Instructions”	
		3.9	Renumbered section 3.F, “Adjustments”	
		3.9	Revised subsection 3.F.1, “Brake Band Adjustment”, replaced illustration	
		3.10	Replaced illustration, subsection 3.F.2, “Door Latch Cam Adjustment”	
		3.12	Replaced illustration, subsection 3.F.4, “Shifter Detent Force Adjustment”	
		3.13	Inserted new subsection 3.F.5, “Safety Door Adjustment”	
		3.13	Renumbered section 3.G, “Recommended Periodic Checks”	
		3.14-3.15	Renumbered & revised section 3.H, Overhaul Procedures - Disassembly. Corrected disassembly procedures and added CE-specific information and warnings.	
		3.16-3.28	Renumbered & revised section 3.I, Assembly Procedures. Corrected / revised assembly procedures and added CE-specific information and warnings.	
		3.29	Renumbered section 3.J, “Power Tong Daily Inspection & Maintenance”, Added CE-Specific information.	
		3.31	Renumbered section 3.K, “Power Tong Monthly Inspection & Maintenance”.	
		3.34	Renumbered section 3.L, “Tubular Connection Equipment De-Commissioning”, Revised section to add packaging and shipping instructions and retitled “Tubular Connection Equipment De-Commissioning & Shipping”.	
		3.38	Renumbered section 3.M, “Tubular Connection Equipment Re-Commissioning”.	
	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	
			Removed illustration & B.O.M., Tong Body Assembly	
		5.22 - 5.23	Inserted new illustration & B.O.M, Tong Leg Assemblies	
		5.24 - 5.25	Inserted new illustration & B.O.M., “Hydraulic Supports”	
			Removed illustration & B.O.M., Hydraulic Assembly	
		5.30 - 5.31	Replaced illustrations & revised B.O.M. to reflect changes to backing pin, Rotary Assembly	
		5.37	Added addition B.O.M. for CE-specific components, Safety Door Components.	
		5.38-5.39	Added addition illustration and B.O.M. for CE-specific components.	
			Removed illustration & B.O.M., Rigid Sling, Backup-Ready Tongs	

Continued on next page

Summary Of Revisions (Continued):				
Date	**Section**	**Page**	**Description Of Revision**	**Approved**
	6	6.2	Revised section 6.A, Basic Torque Measurement	
		6.3	Revised illustration 6.A.4	
		6.4	Removed illustration & B.O.M., Compression Load Cell	
		6.6	Inserted subsection 6.C.3, Reference Checking Torque Measurement System	
JUN 2015	Preamble	iv-v	Added EC Declaration of Conformity	D. Sonnier
		vi	Added warnings regarding spark generation	
	1	1.1	Updated company contact information	
JAN 2016	All	All	Updated to latest technical manual standard	MCG RR BB
	1	All	Added new section, Section 1: Introduction".	
	2	All	Added new section, "Section 2: Equipment & Lubricant Specifications".	
	3	All	Added new section, "Section 3: Installation & Commissioning". Moved all installation and commissioning information to this section.	
	4	All	Added new Section, "Section 4: Operation". Moved all operating instructions to this section.	
	5	All	Renumbered section 5 "Maintenance".	
		5.3	Revised subsection 5.0, General Maintenance Safety Practices	
		5.4	Added new subsection 5.3, Hydraulic System Maintenance	
		5.5	Revised subsection 5.5, Lubrication Instructions	
		5.15	Revised subsection 5.6.3, Adjustments: Door Alignment	
		5.18	Revised subsection 5.6.5, Adjustments: Door Switch Adjustment	
		5.20	Revised subsection 5.7, Recommended Periodic Inspections	
		5.21	Revised subsection 5.8, Removal of Top Plate for Overhaul	
		5.23	Revised subsection 5.9, Assembly Instructions	
		5.38	Revised subsection 5.10, Daily Inspection & Maintenance Checklist	
		5.40	Revised subsection 5.11, Monthly Maintenance Checklist	
		5.43	Revised subsection 5.12, Equipment De-commissioning & Shipping	
	7	7.3 - 7.7	Revised spare parts lists	
		7.22 - 7.23	Revised illustrations and B.O.M., Shifter Assembly	
		7.25	Revised illustration and B.O.M., Brake Bands	
		7.26 - 7.27	Revised illustrations and B.O.M., Hydraulic Supports	
		7.28 - 7.29	Revised illustrations and B.O.M., Motor & Mount Assembly	
		7.34 - 7.36	Revised illustrations and B.O.M., Door Assembly	
		7.37	Revised illustration and B.O.M., Door Switch Assembly	
		7.38 - 7.39	Revised illustrations and B.O.M., Rigid Sling Assembly	
	8	8.3	Revised subsection 8.0, Basic Torque Measurement	
		8.5	Inserted new subsection 8.1, "Turns Counter Encoder"	
		8.8	Revised subsection 8.2, Torque Measurement Troubleshooting	
		8.3	Revised subsection 8.3, Periodic Inspection & Maintenance	
FEB 2016	Preamble	iii	Added 80-0931-14 to list of supported models	
	3	3.11	Updated hydraulic B.O.M. to include hydraulic components for 80-0931-14	
		3.13	Added hydraulic schematic, model 80-0931-14	
	4	4.6	Added control instructions for remote door	
	5	5.12 - 5.13	Added lubrication instructions for remote door assembly	
	7	7.40 - 7.43	Added illustrations and B.O.M.s for remote door	
AUG 2018	7	7.15	Updated BOM	

This page intentionally
left blank

EC DECLARATION OF CONFORMITY

Manufacturer Information

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

Product Description

Product Identification: Model: Serial Number:
Product Description: KT13625
McCoy Global Technical Construction File Reference: T108
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	35000 lb-ft	47460 Nm
Arm Length	36.0 Inch	91.4 Cm
Mass	1600 Lb	726 Kg
	Torque (lb-ft/Nm, Estimated)	
At Pressure	2500 Psi	172 Bar
	7000 Hi	9492 Full
	35000 Lo	47460 Full
	Speed (Rpm, Estimated)	
At flow rate	60 GPM	227 LPM
	45.6 Hi	45.6 Full
	9.1 Lo	9.1 Full
Jaw size range (Inch)	3 1/2 From	13 5/8 to
Overall Length	59.3 In	150.6 Cm
Overall Width	37.8 In	96.0 Cm
Overall Height	52.6 In	133.6 Cm

A noise survey was performed on a McCoy Global Canada KT 13625 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 87 dB

"C" weighted reading of 88 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. CE Ex II 2 G c T6

Authorized representative:

Name _____ Title _____

Signature and date _____

This page intentionally
left blank

SECTION 1: INTRODUCTION

This page intentionally
left blank

1.0 INTRODUCTION & CONTACT INFORMATION

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

McCoy Global Canada

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

Phone: 780.453.3277
Fax: 780.455.2432

McCoy Global USA - Tongs & Bucking Units

4225 HWY 90 East
Broussard, LA, USA
70518

Phone: 337.837.8847
Fax: 337.837.8839

McCoy Global USA - Service

6530 Petropark Drive
Houston, TX, USA
77041

Phone: 281.377.4264
Fax: 281.377.4278

McCoy Global UK Ltd.

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

Phone: +44.1224.245140
Fax: +44.1224.890176

McCoy Global Singapore PTE Ltd.

49 Tuas View Loop
Singapore, 637701
Republic of Singapore

Phone: +44.1224.245140
Fax: +44.1224.890176

McCoy Global S.A.R.L

Warehous No. FZS1BJ03
Jebel Ali Free Zone - South Zone
Dubai, United Arab Emirates

Phone: +971.4803.6900
Fax: +971.4803.6909

Email Sales: dcsales@mccoyglobal.com

www.mccoyglobal.com

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

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

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

This page intentionally
left blank

1.1 SCOPE

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

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

This page intentionally
left blank

1.2 GENERAL HEALTH AND SAFETY

AUTHORIZED USE ONLY!

READ THIS MANUAL BEFORE USING EQUIPMENT

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

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

1.2.1 Hazard Labels

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

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

⚠ DANGER

THIS IDENTIFIES AN EXTREME HAZARD OF PERSONAL INJURY OR DEATH

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

⚠ WARNING

THIS IDENTIFIES A WARNING REGARDING POTENTIAL INJURY OR CATASTROPHIC EQUIPMENT DAMAGE

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

⚠ CAUTION

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

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

NOTICE

THIS HIGHLIGHTS ITEMS OF IMPORTANCE UNRELATED TO PERSONAL INJURY

1.2.2 General Safe Operating Guidelines

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

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

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

1.2.2 General Safe Operation Guidelines (Continued):

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

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

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

Illustration 1.2.1: Equipment Handling Warnings

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

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

⚠ WARNING

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

See Section 4 for the correct, safe procedure for testing the door 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.**

This page intentionally
left blank

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

This page intentionally
left blank

2.0 EQUIPMENT DESCRIPTION

THIS TECHNICAL DOCUMENT APPLIES TO THE FOLLOWING MODELS:						
MODEL	REV	Motor Control Valve	Lift Cylinder Control Valve	Dump Valve	Closed Centre Outlet	Remote Door
80-0931-1	4	■				
80-0931-6	2	■		■		
80-0931-7	2	■	■			
80-0931-8	2	■			■ *	
80-0931-11	0	■	■	■		
80-0931-12	2	■	■		■ *	
80-0931-14	A	■	■			■

*** Replaces open-centre outlet**

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

This equipment uses hydraulic power to energize a rotating section enabling make-up (threading a connection) and break-out (unthreading a connection) of oil field casing tubulars between 3-½ inches (89 mm) and 13-⅝ inches (346 mm) in diameter.

The hydraulic power tong (80-0931-X) 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, lift cylinder raise/lower).

A hydraulic switch mounted in proximity with the tong door automatically inhibits tong rotation if the door on the power tong is not completely closed.

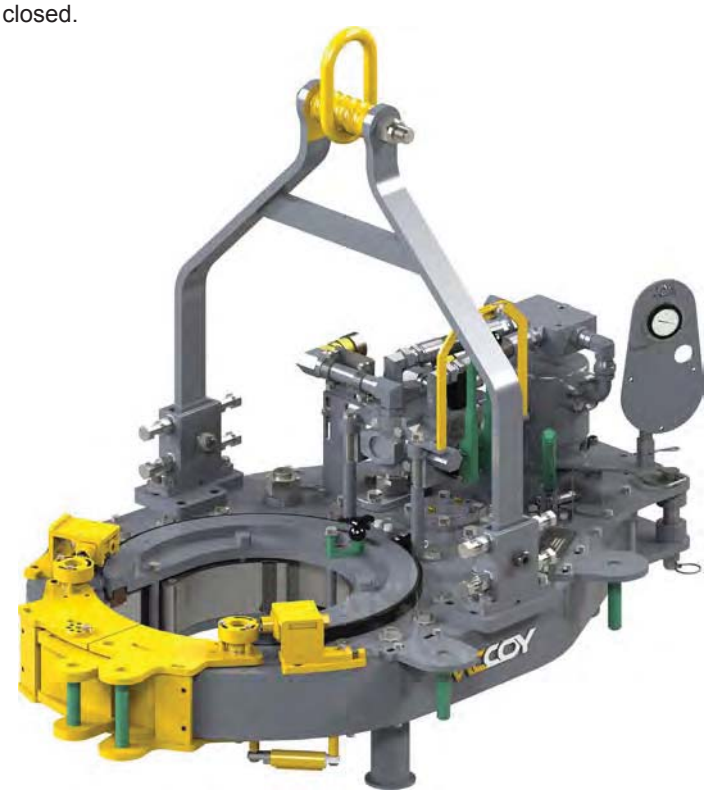
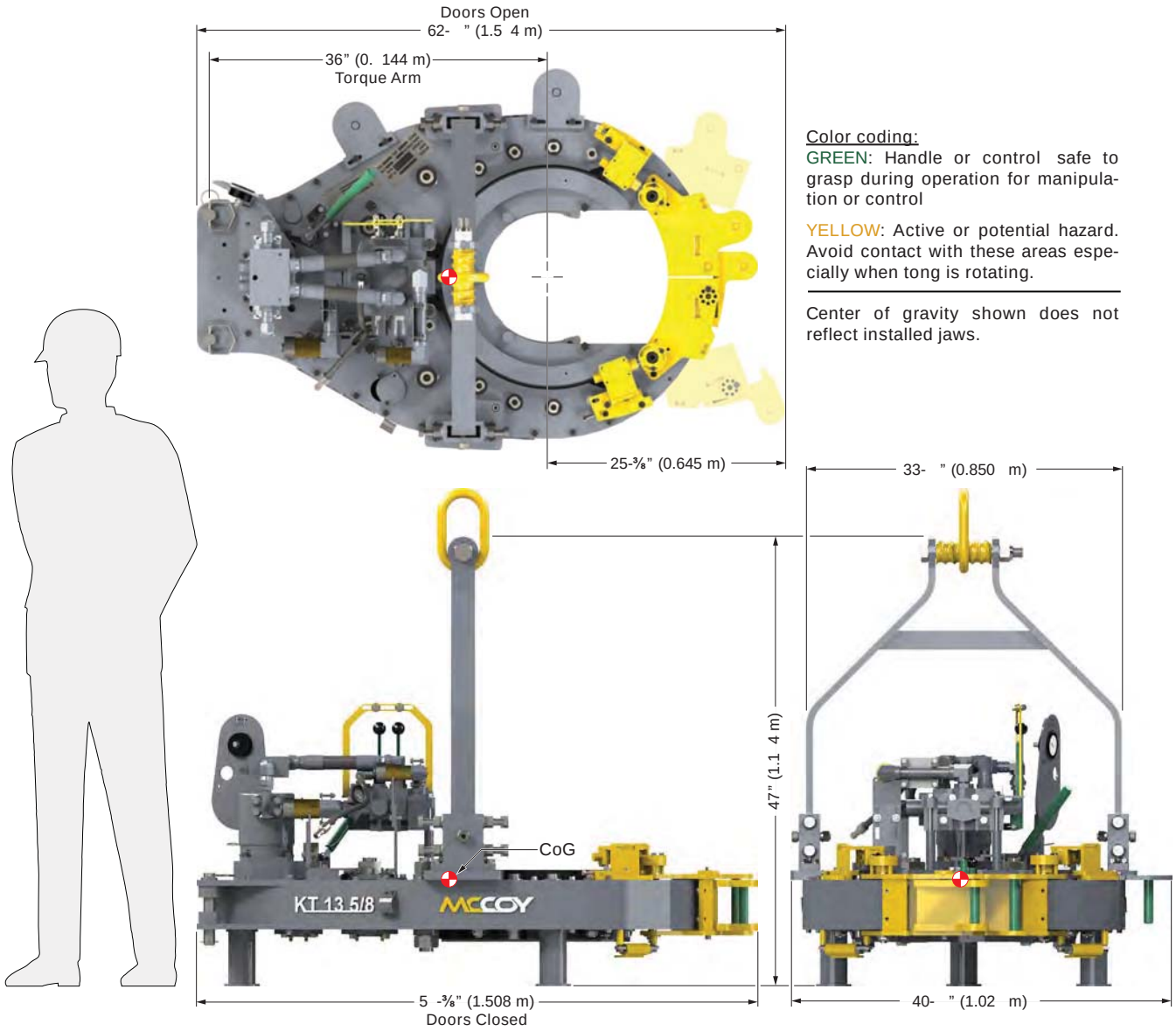


Illustration 2.0.1: 13⅝-35K Tong

2.0 EQUIPMENT DESCRIPTION (CONTINUED):



Color coding:
GREEN: Handle or control safe to grasp during operation for manipulation or control

YELLOW: Active or potential hazard. Avoid contact with these areas especially when tong is rotating.

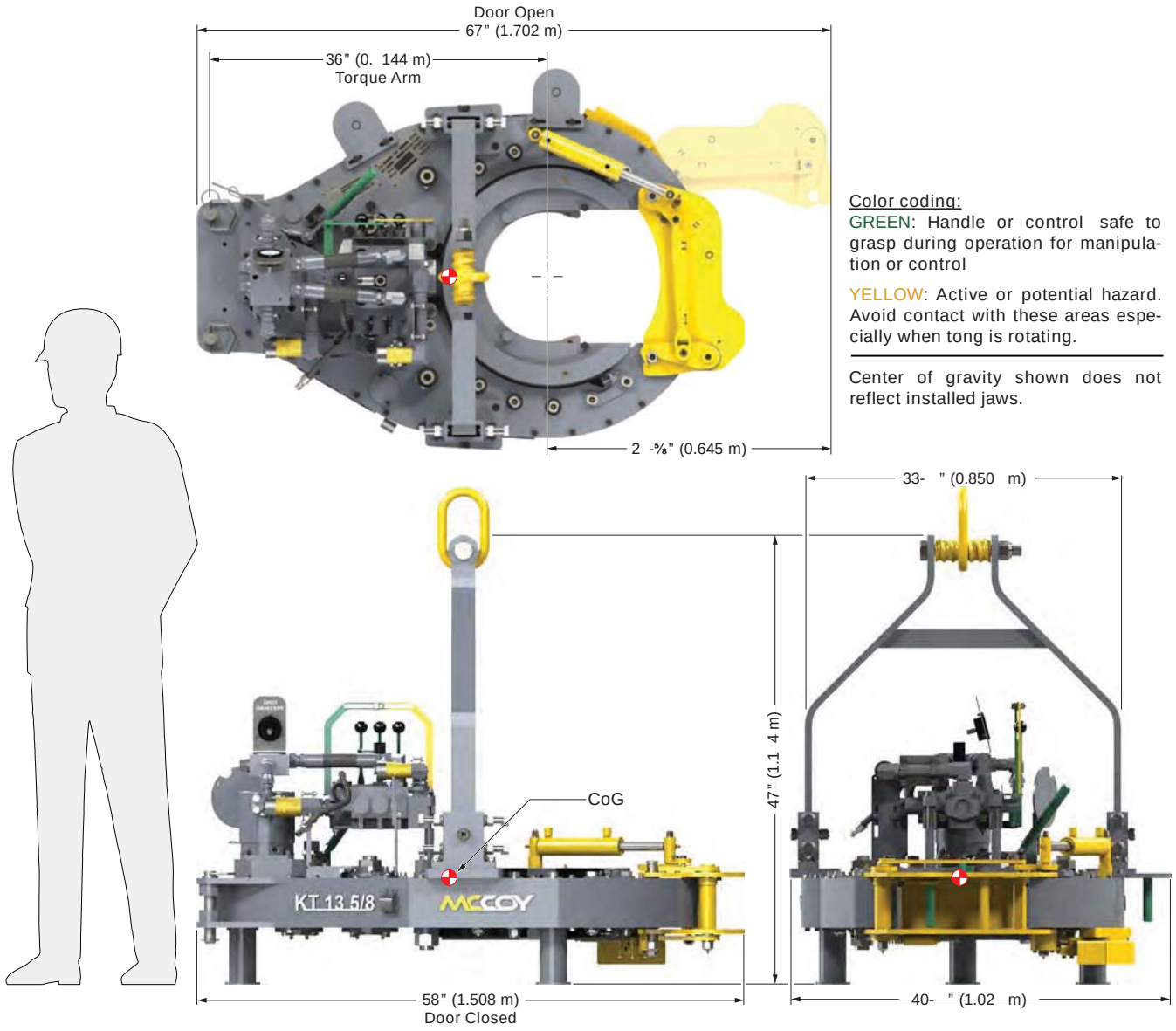
Center of gravity shown does not reflect installed jaws.

Illustration 2.0.2: KT/LW13625 Tong Dimensions

⚠ WARNING

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

2.0 EQUIPMENT DESCRIPTION (CONTINUED):



Color coding:
GREEN: Handle or control safe to grasp during operation for manipulation or control

YELLOW: Active or potential hazard. Avoid contact with these areas especially when tong is rotating.

Center of gravity shown does not reflect installed jaws.

Illustration 2.0.3: Model 80-0931-14 KT13625 Tong Dimensions

⚠ WARNING

In addition to the HAZARD areas of this equipment that are coated YELLOW, the rotating cage plate assembly poses a significant hazard when the equipment is active. Keep hands clear of the cage plate when equipment is energized. SAFE areas to handle while the equipment is energized are indicated by GREEN coating

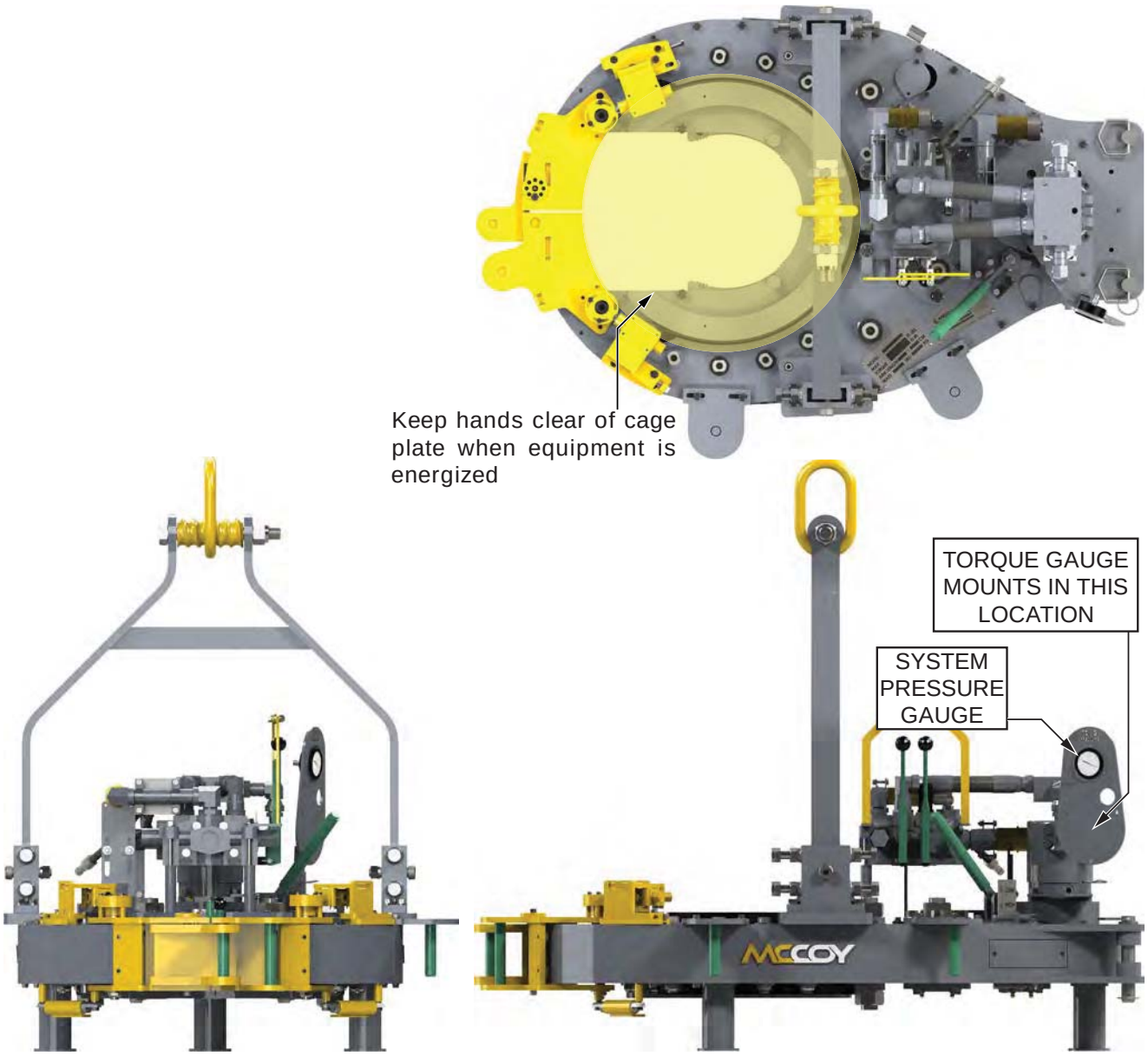


Illustration 2.0.4: KT/LW13625 Additional Hazard Areas

2.1 MAJOR COMPONENT IDENTIFICATION

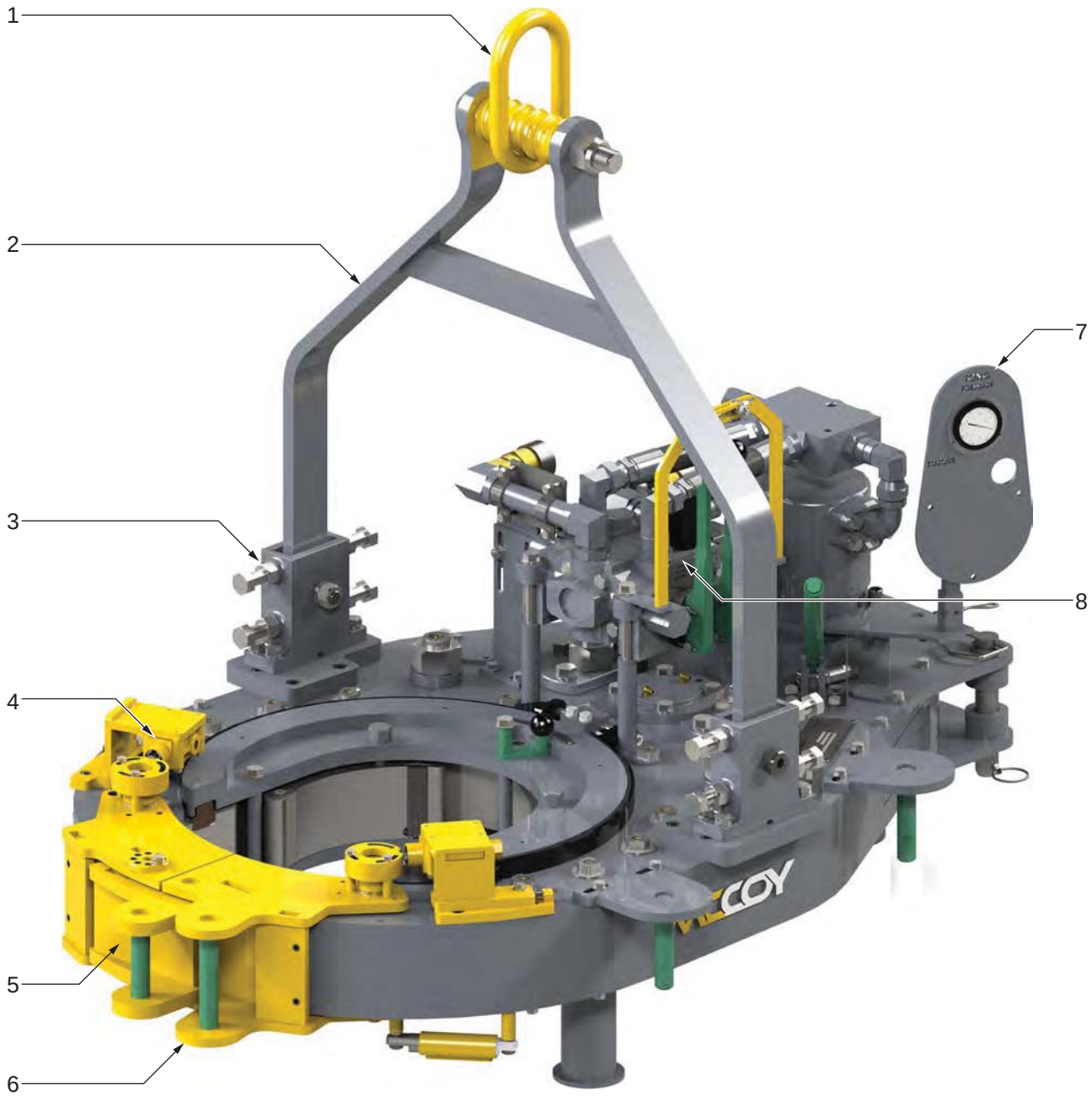


Illustration 2.1.1: Component ID 01

Item	Description
1	Master lifting link
2	Rigid sling
3	Rigid sling leveling adjustment
4	Door switch mechanism
5	Tong door latch
6	Tong door
7	Torque/pressure gauge mounting plate
8	Hydraulic valve bank

2.1 MAJOR COMPONENT IDENTIFICATION (CONTINUED):

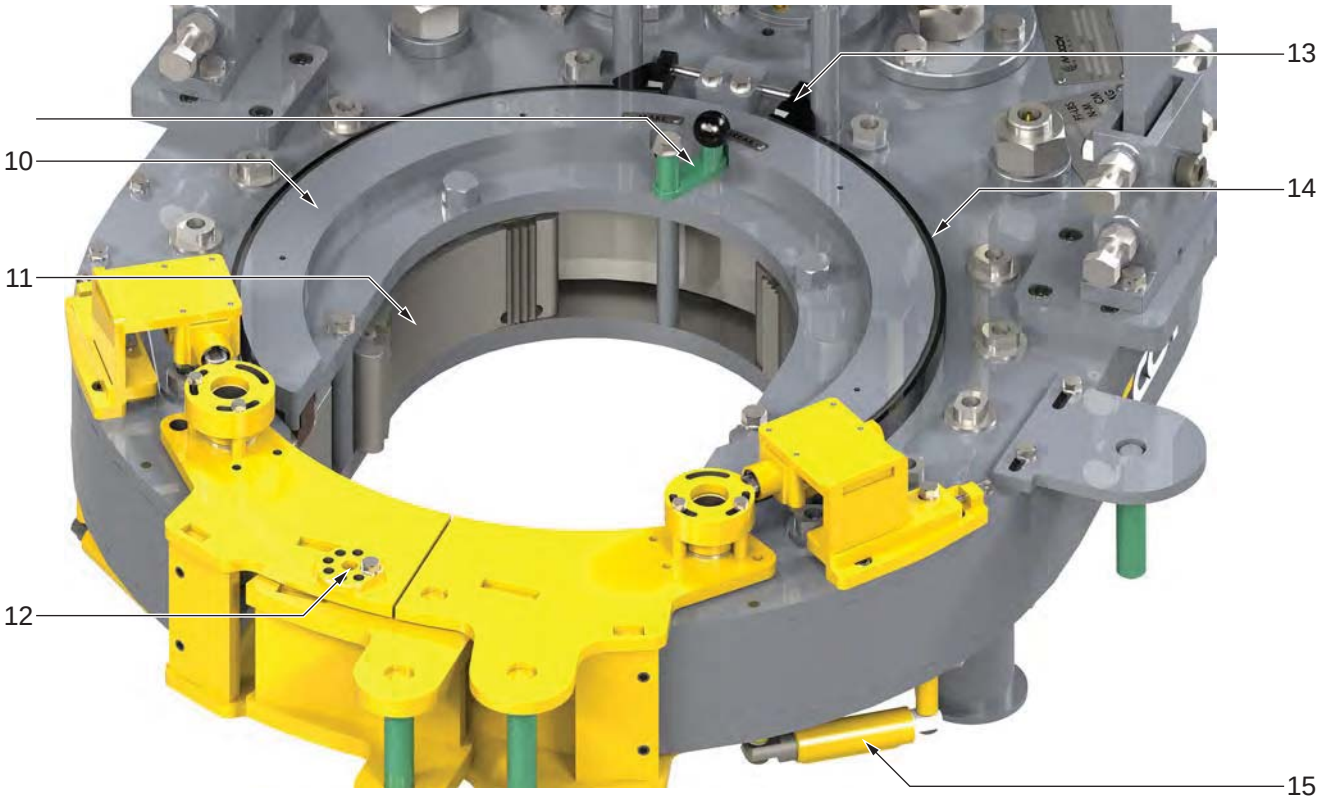


Illustration 2.1.2: Component ID 02

Item	Description
9	Backing pin assembly
10	Cage plate assembly
11	Tong jaws with die inserts
12	Door latch adjustment cam
13	Brake band adjustment
14	Brake band
15	Tong door spring cylinder

2.1 MAJOR COMPONENT IDENTIFICATION (CONTINUED):

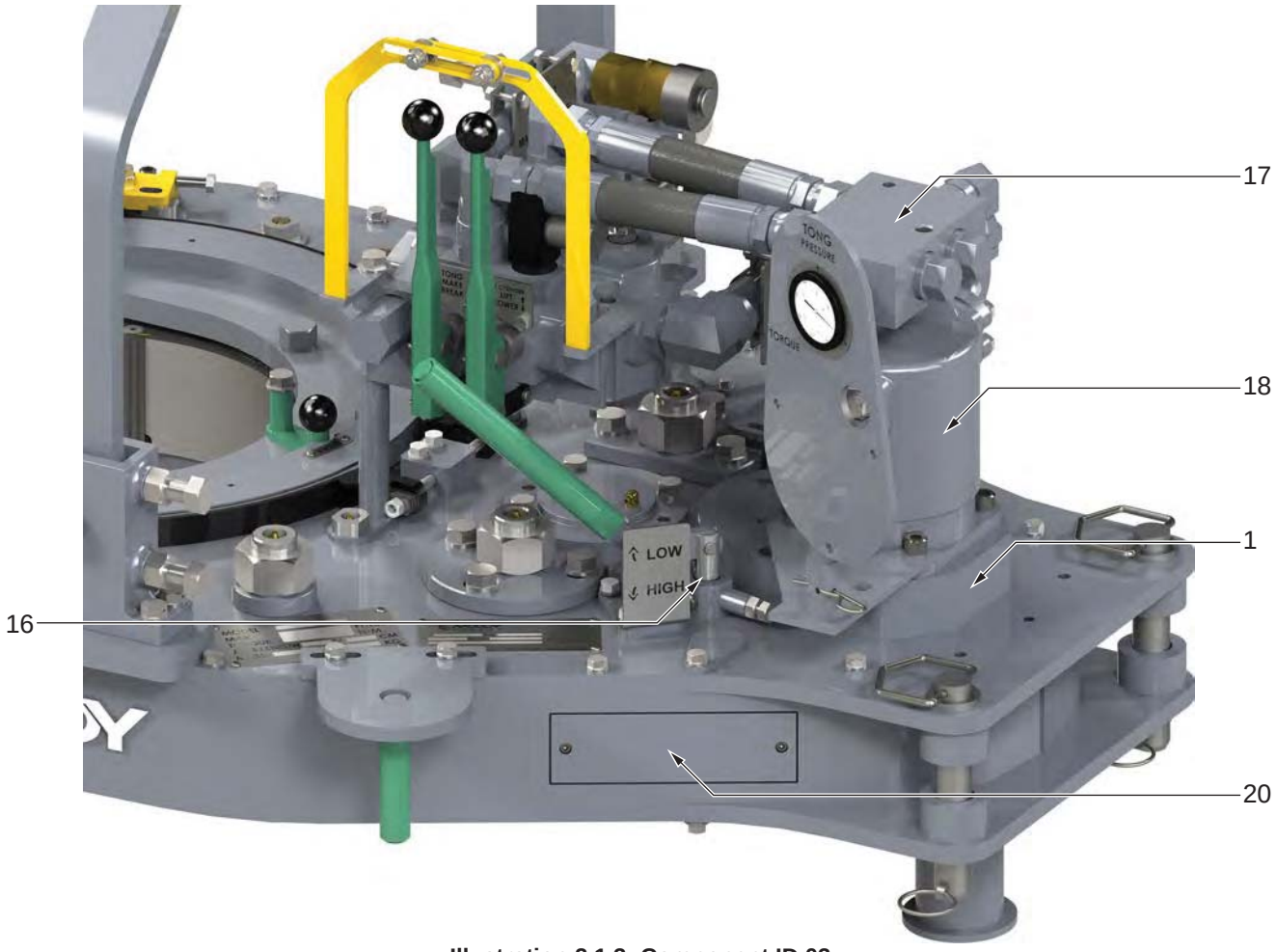


Illustration 2.1.3: Component ID 03

Item	Description
16	Manual shift assembly
17	Door switch valve block
18	Hydraulic motor
19	Motor mount
20	Access panel

2.1 MAJOR COMPONENT IDENTIFICATION (CONTINUED):

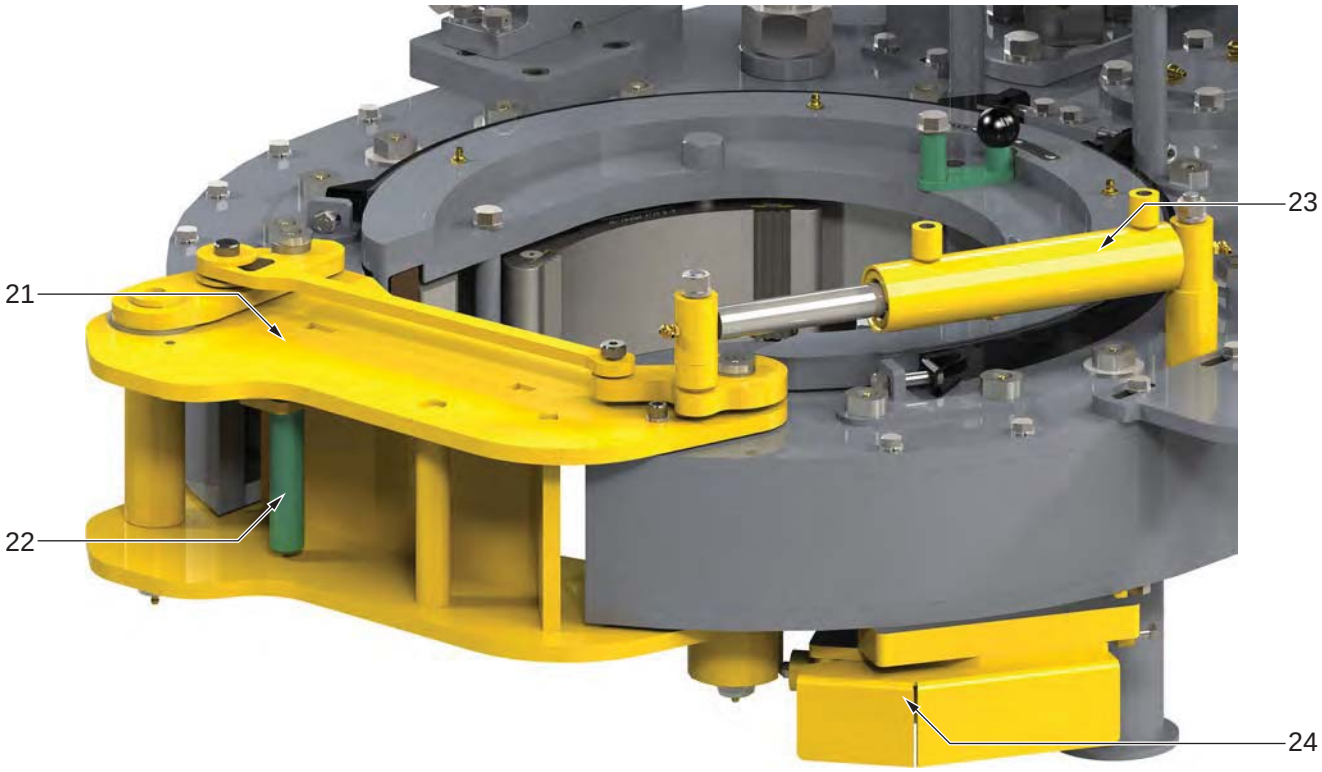


Illustration 2.1.4: Component ID, Model 80-0931-14

Item	Description
21	Remote door assembly, model 80-0931-1
22	Manual latch, remote door, model 80-0931-1
23	Hydraulic cylinder, remote door, model 80-0931-1
24	Door switch assembly, model 80-0931-14

2.2 EQUIPMENT SPECIFICATIONS

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.

TORQUE TABLE

STANDARD TONG					LIGHTWEIGHT TONG				
PRESSURE PSI / MPa	High Gear		Low Gear		PRESSURE PSI / MPa	High Gear		Low Gear	
	LB-FT	NM	LB-FT	NM		LB-FT	NM	LB-FT	NM
1000 / 6.895	2020	2739	10100	13694	1000 / 6.895	1720	2332	8600	11660
1500 / 10.34	3700	5017	18540	25137	1500 / 10.34	3150	4271	15760	21368
2000 / 13.79	5400	7321	26960	36553	2000 / 13.79	4600	6237	23000	31183
2500 / 17.24	7100	9626	35400	47996	2150 / 14.82	5000	6779	25100	34031
MAXIMUM RATED TORQUE: 35000 LB-FT (47450 Nm)					MAXIMUM RATED TORQUE: 25000 LB-FT (33895 Nm)				
SYSTEM RELIEF PRESSURE**: 2475 PSI (17,065 MPa)					SYSTEM RELIEF PRESSURE**: 2145 PSI (14.789 MPa)				

** May vary slightly based on measured relief pressure during testing

SPEED TABLE

STANDARD TONG			LIGHTWEIGHT TONG		
FLOW	SPEED (RPM)		FLOW	SPEED (RPM)	
(US GPM / LPM)	LOW GEAR	HIGH GEAR	(US GPM / LPM)	LOW GEAR	HIGH GEAR
10 / 37.9	1.6	8	10 / 37.9	1.8	9.2
20 / 75.71	3.2	16	20 / 75.71	3.7	18.5
40 / 151.4	6.4	32	40 / 151.4	7.4	36.9
60 / 227.1	9.6	48	60 / 227.1	11.1	55.4

Hydraulic requirements (KT13-⅝)		60 GPM (227.1 LPM)
		3000 PSI (20.684 MPa)
Hydraulic requirements (LW13-⅜)		60 GPM (227.1 LPM)
		2500 PSI (17.237 MPa)
Maximum dimensions	Length (doors closed)	59-⅜ in / 1.508 m
	Length (model 80-0931-14)	58 in / 1.473 m
	height	47 in / 1.194 m
	width	33-¾ in / 0.857 m
Maximum elevator diameter		Unlimited (tong comes off pipe)
Torque arm length (pipe center to anchor center)		36 in / 0.914 m
Gear reduction ratio, turn counter encoder to ring gear		12.833:1
Dead weight (approximate)		1550 lb / 704 kg
Maximum rigid sling load		4200 lb / 1905 kg
Sound level (dBa)		87 dB A @ 1m / 88 dB C @ 1m
Jaws available (inches)		All standard sizes from 3-½" to 13-⅝" (See Section 3)
Recommended spring hanger		85-0106XXH (Capacity = 2400 lb / 1088 kg)

⚠ DANGER

ONLY USE SPRING HANGER SUPPLIED BY MCCOY. IF USING SPRING HANGER REFER TO SECTION 3.2 FOR PROPER RIGGING INSTRUCTIONS.

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

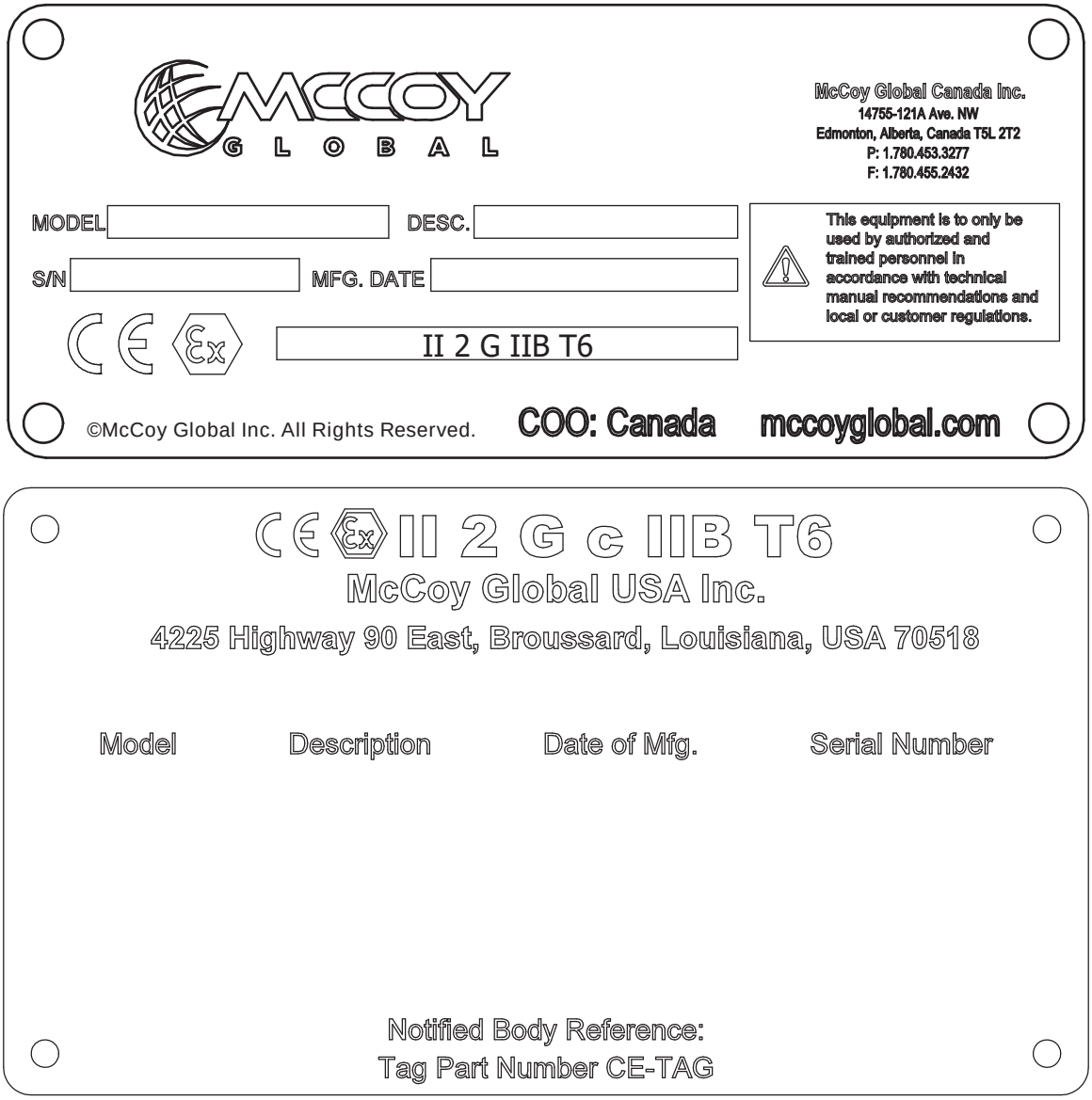


Illustration 2.4.1: CE Nameplates

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

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.

This page intentionally
left blank

SECTION 3: INSTALLATION & COMMISSIONING

This page intentionally
left blank

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

3.0 RECEIPT, INSPECTION, AND HANDLING OF EQUIPMENT

⚠ CAUTION

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

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

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

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

⚠ CAUTION

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

This equipment 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.

Test / Examination			
Time / Interval	**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.

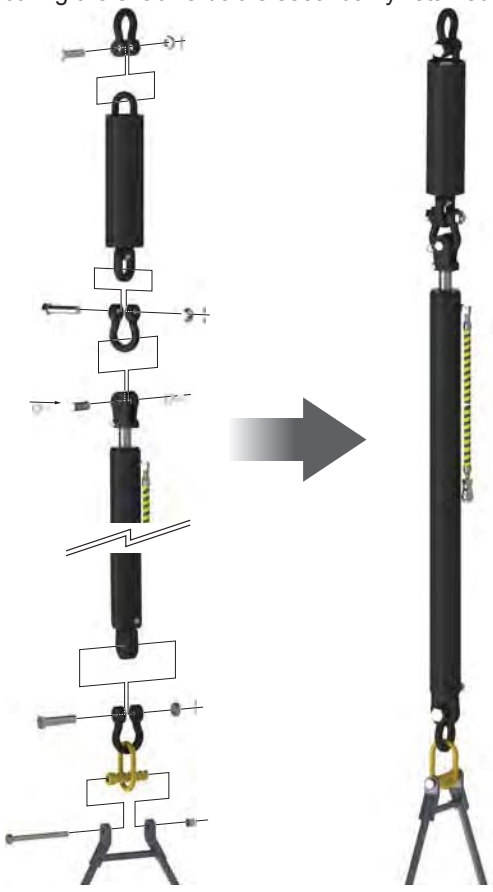


Illustration 3.2.1: Lift Cylinder & Spring Hanger Installation

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.

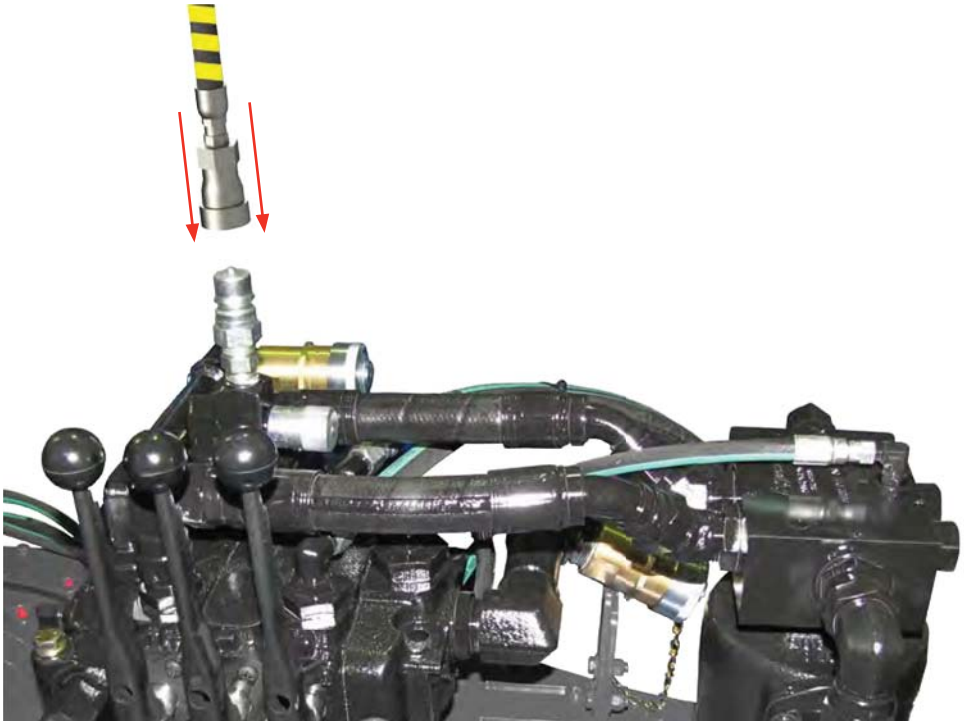


Illustration 3.2.2: Lift Cylinder Hydraulic Connection

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

⚠ WARNING

REPLACE LIFT CYLINDER HYDRAULIC LINE EVERY TWO YEARS

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

⚠ WARNING

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

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

⚠ WARNING

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

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

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

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

3.2.3 Lift Cylinder Safety (continued):

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

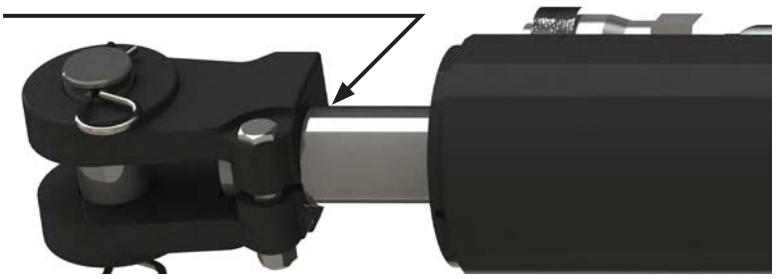


Illustration 3.2.3: Lift Cylinder Clevis Inspection

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

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

⚠ DANGER

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

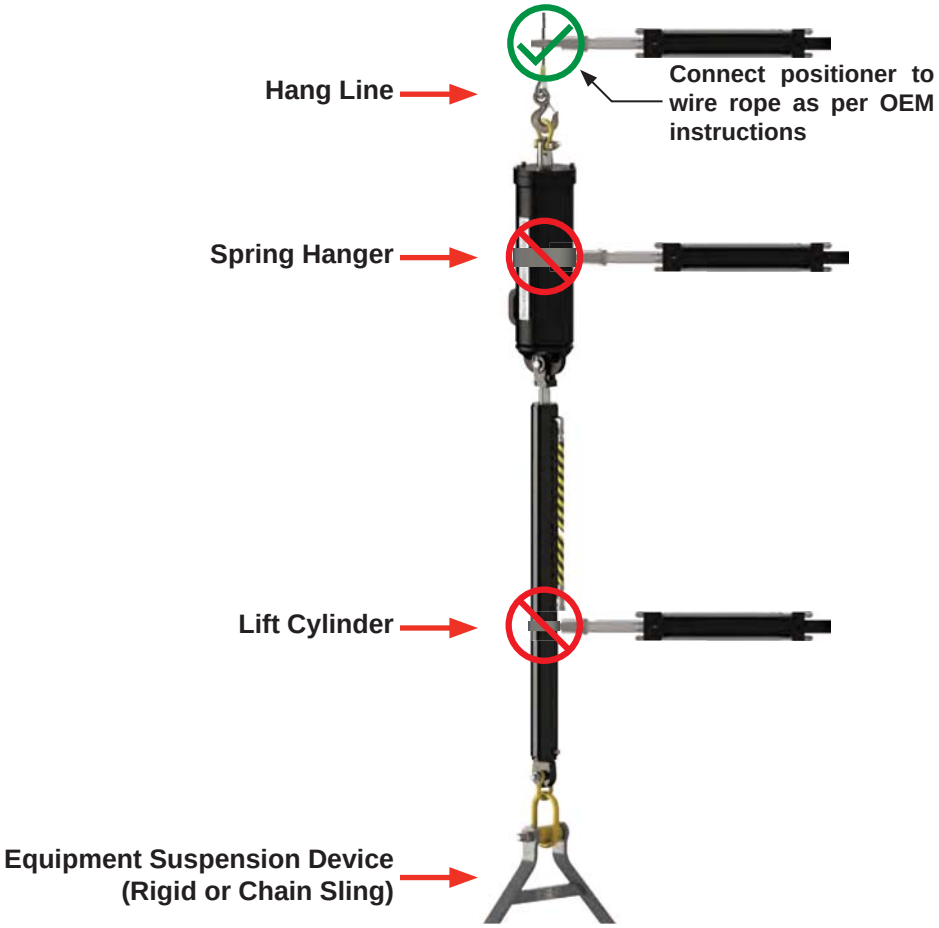


Illustration 3.2.4: Correct Installation of Positioning System

NOTICE

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

3.3 HYDRAULICS

3.3.1 Hydraulic Schematics

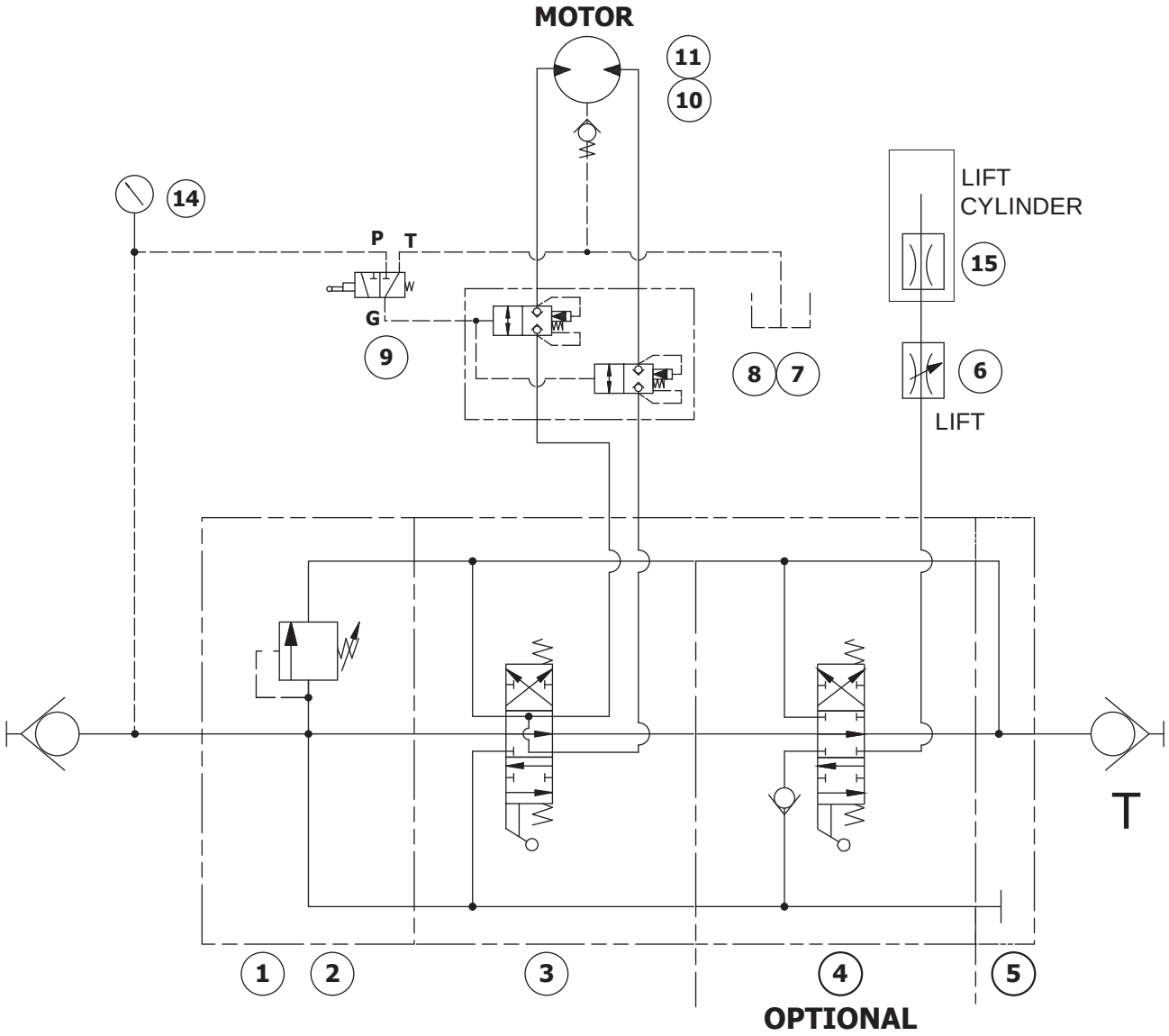


Illustration 3.3.1: Hydraulic Schematic (Open Centre)

Item	Description	Part #
1	Inlet valve section	10-9016
2	Relief valve	10-0062
3	Motor valve section	10-9014
4	Lift cylinder valve section (optional)	10-9019
5	Outlet section, open centre, SAE PORT	10-0086
5A	Outlet section, closed centre, SAE PORT	08-1825
6	Flow control valve, ½”	08-9062
7	Pilot-to-operate cartridge valve	08-1625
8	Door switch valve block	101-0727
9	Door switch	02-E0190
10	Check valve	02-9022

Item	Description	Part #
11	Hydraulic motor (standard tong)	87-0112
	Hydraulic motor (lightweight tong)	87-0110
12	Dump valve (optional)	08-9284
13	Dump valve body (optional)	08-9283
14	3000 PSI pressure gauge	02-0245
15	Lift cylinder orifice	CE-ORIFICE
16	Door cylinder	101-4917
17	Flow control valve, ⅜”	08-0089
18	Valve block	08-0096
19	Relief valve cartridge	08-1053

3.3.1 Hydraulic Schematics (Continued):

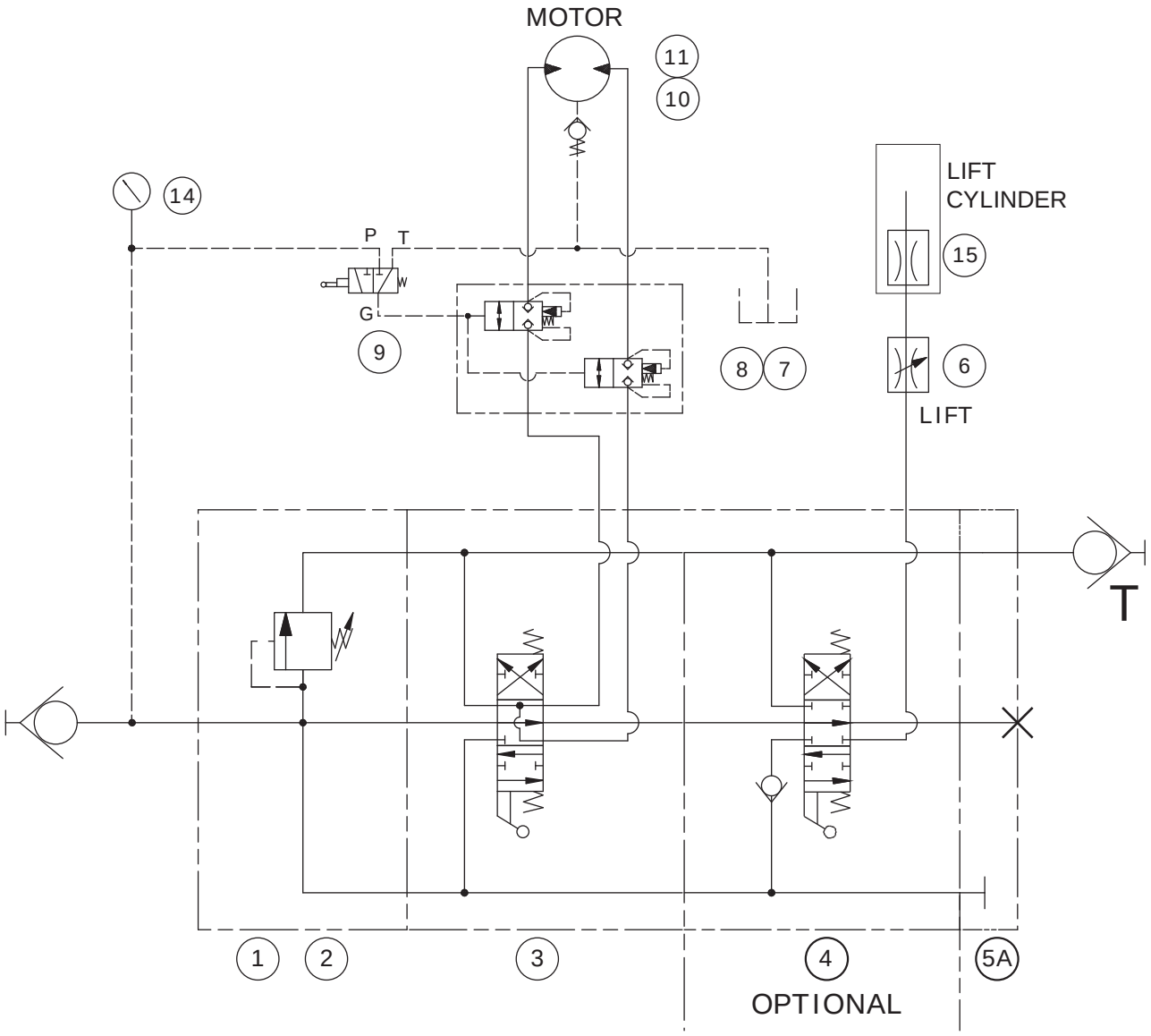


Illustration 3.3.2: Hydraulic Schematic (Closed Centre)

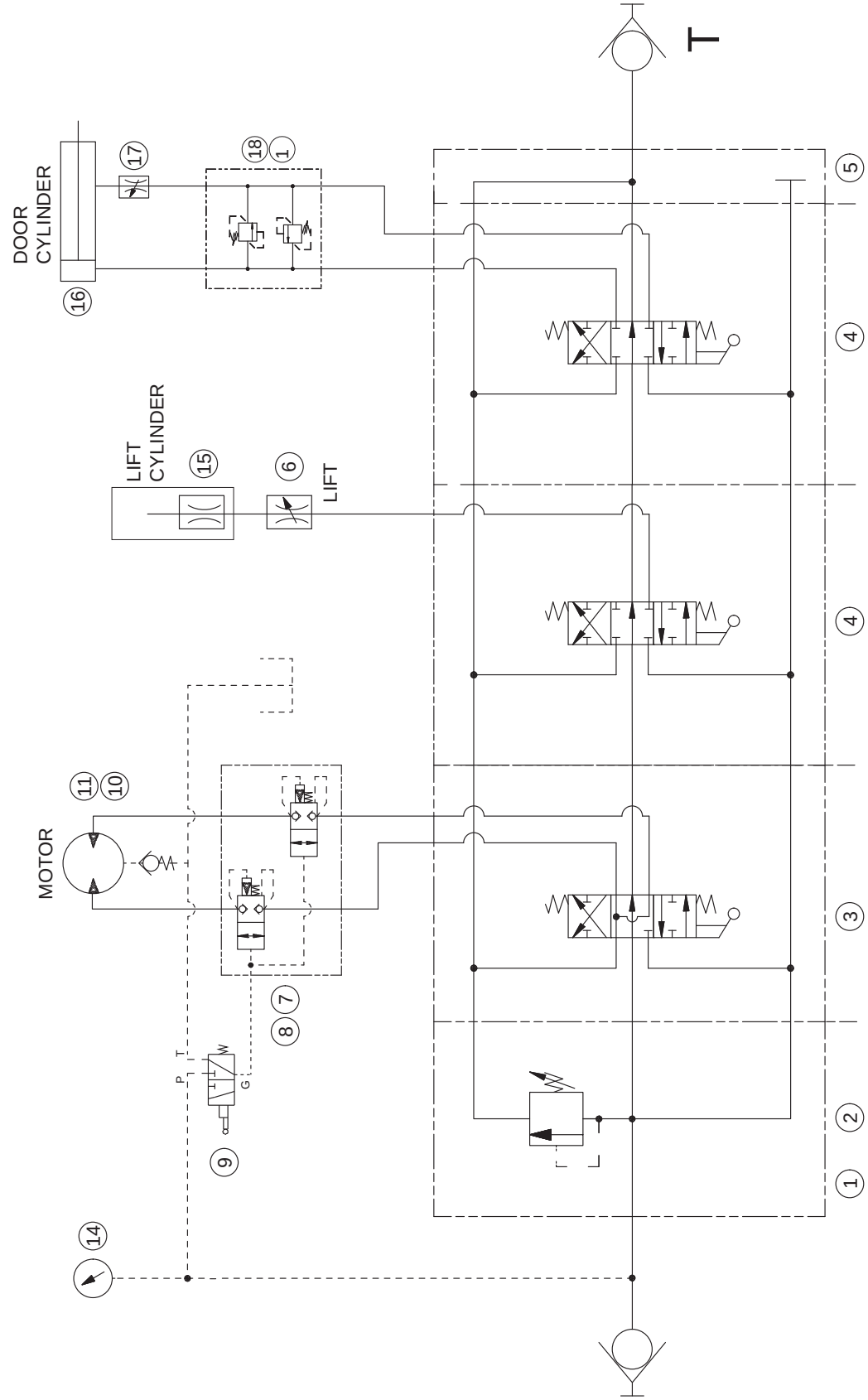


Illustration 3.3.3: Hydraulic Schematic (Model 80-0931-14)

3.3.2 Hydraulic Component Identification

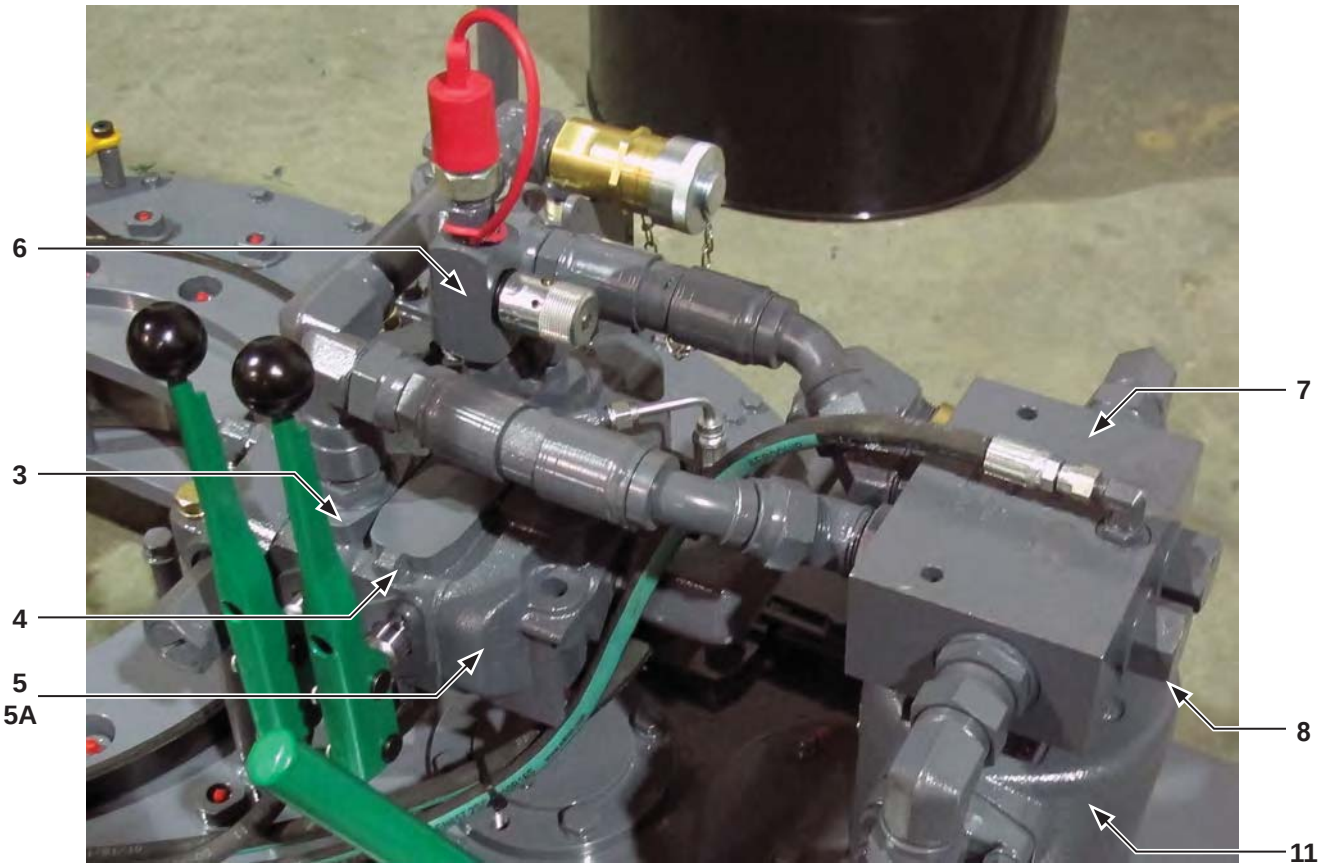


Illustration 3.3.4: Hydraulic Component Identification 01

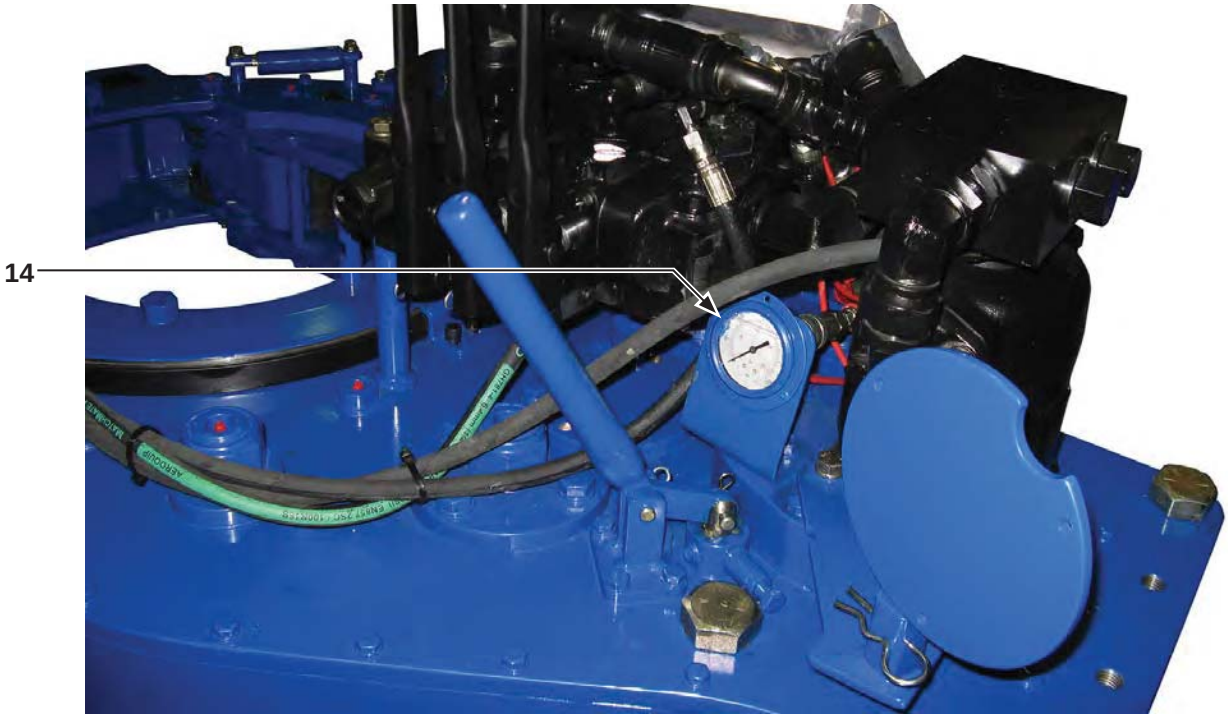


Illustration 3.3.5: Hydraulic Component Identification 02

3.3.2 Hydraulic Component Identification (Continued):

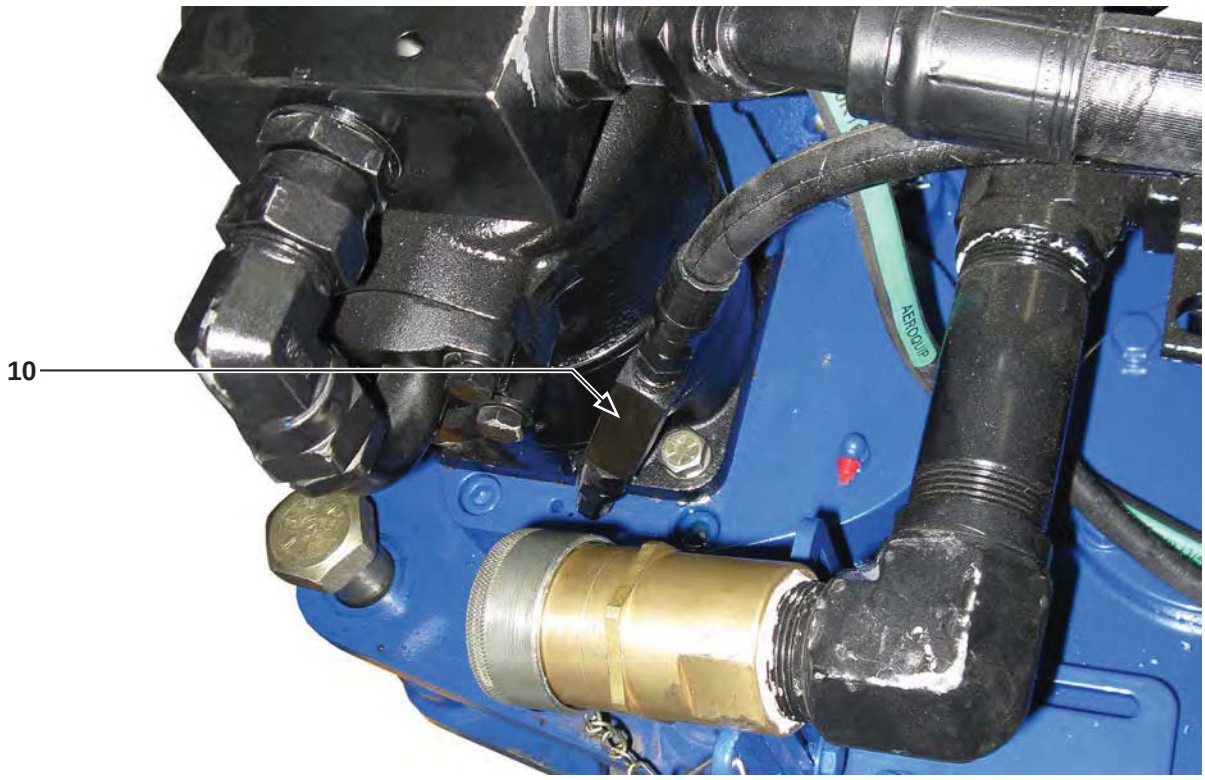


Illustration 3.3.6: Hydraulic Component Identification 03

Illustration 3.3.7: Hydraulic Component Identification 04

3.3.3 Main Hydraulic Connections

Supply hydraulic pressure to your equipment through the 1" hydraulic supply connection. A 1-¼" return connection provides a return path to the power unit. Typically a ⅜" or ½" 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.

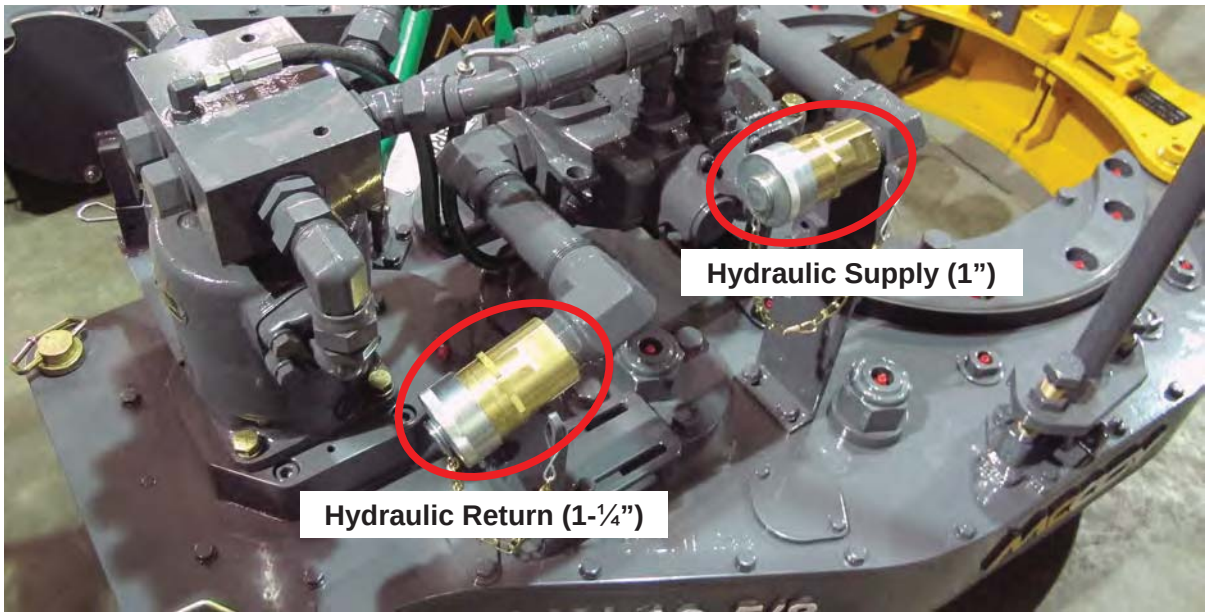
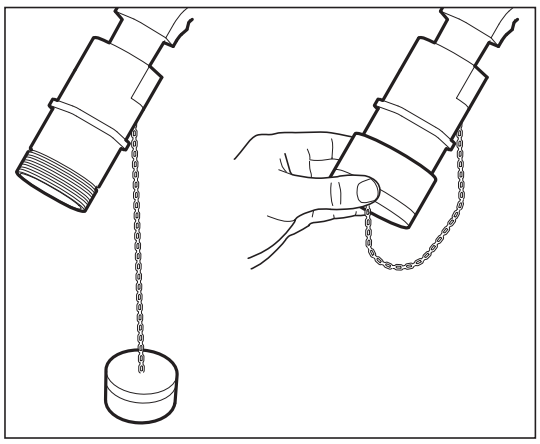


Illustration 3.3.8: Hydraulic Connections 01

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.



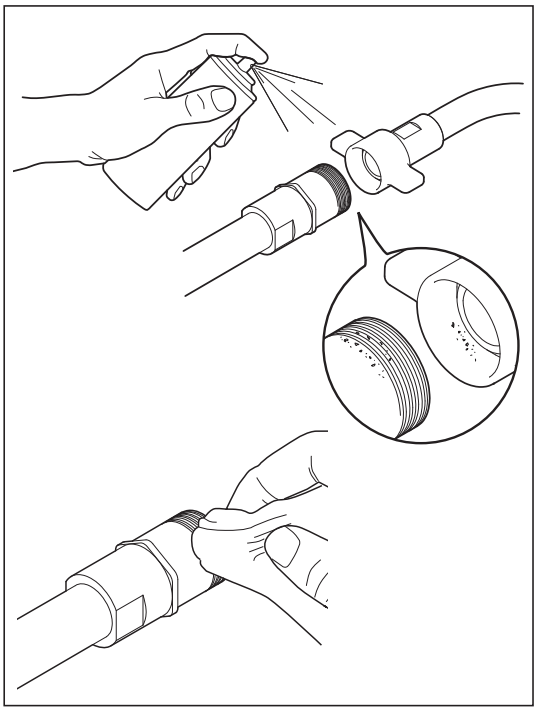


Illustration 3.3.9: Hydraulic Connections 02

3.3.3 Main Hydraulic Connections (Continued):

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

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

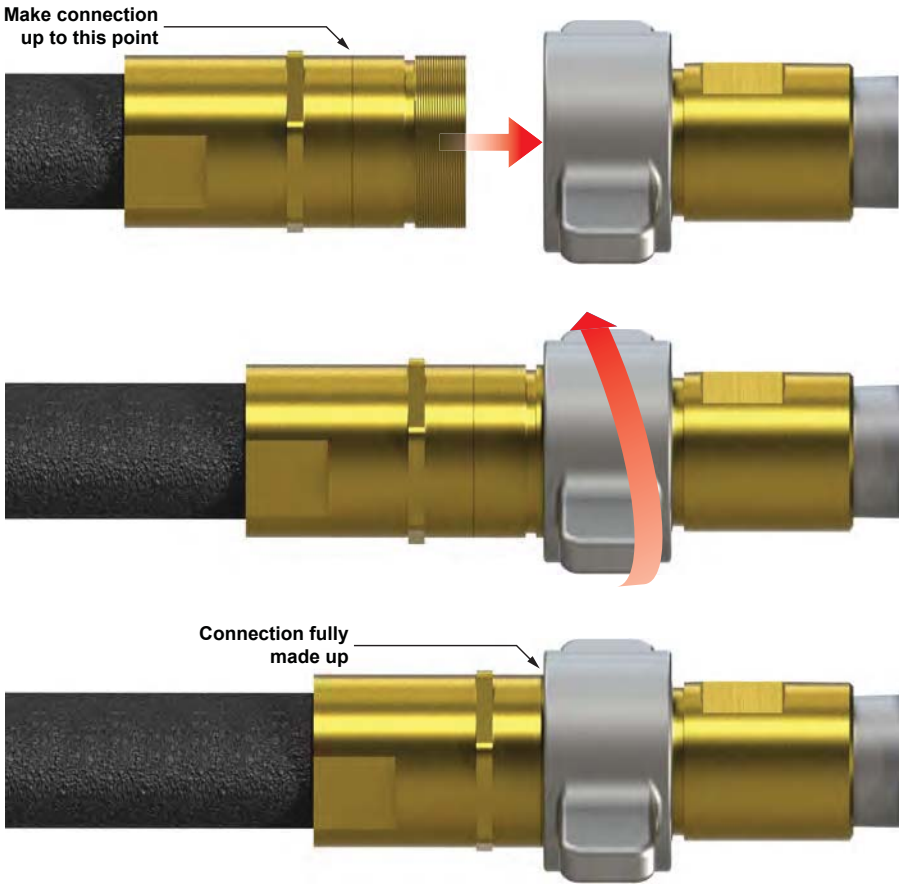


Illustration 3.3.10: Hydraulic Connections 03

⚠ 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.

3.4 TONG JAW AVAILABILITY & INSTALLATION

3.4.1 Jaw Availability

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

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

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

DANGER

USE OF ALUMINIUM DIES IN CE-MARKED EQUIPMENT IS PROHIBITED

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.

Description	Part Number	Jaw Roller Used	Jaw Pin Used	Description	Part Number	Jaw Roller Used	Jaw Pin Used
3-½" jaw die kit (1)	997-WJK-350	N/A	N/A	7-⅝" jaw die kit	997-JDK-315	997-JR-2125	101-1581
4" jaw die kit (2)	997-WJK-550	N/A	N/A	8" jaw die kit	997-JDK-319	997-JR-2125	101-1581
4-½" jaw die kit (3)	997-WJK-550	N/A	N/A	8-⅝" jaw die kit	997-JDK-320	997-JR-2125	101-1581
4-½" jaw die kit (4)	997-JDK-290	997-JR-2125	101-1581	9-⅝" jaw die kit	997-JDK-325	997-JR-2125	101-1581
4-¾" jaw die kit	997-JDK-291	997-JR-2125	101-1581	10-¾" jaw die kit	997-JDK-330	997-JR-2125	101-1581
5" jaw die kit	997-JDK-295	997-JR-2125	101-1581	11-⅜" jaw die kit	997-JDK-334	997-JR-2125	101-1581
5-½" jaw die kit	997-JDK-300	997-JR-2125	101-1581	11-¾" jaw die kit	997-JDK-335	997-JR-2125	101-1581
6" jaw die kit	997-JDK-306	997-JR-2125	101-1581	11-⅞" jaw die kit	997-JDK-336	997-JR-2125	101-1581
6-½" jaw die kit	997-JDK-304	997-JR-2125	101-1581	12-¾" jaw die kit	997-JDK-337	997-JR-1000	N/A
6-⅝" jaw die kit	997-JDK-305	997-JR-225	101-1581	13-⅜" jaw die kit	997-JDK-340	997-JR-1000	N/A
7" jaw die kit	997-JDK-310	997-JR-2125	101-1581	13-⅝" jaw die kit	997-JDK-510	997-JR-1000	N/A

(1) Wraparound jaw die kit uses insert PN: 12-2006 **NOTE: THIS JAW IS TORQUE-LIMITED TO 9000 LB-FT**

(2) Wraparound jaw die kit uses multi-range jaw (997-WJK-550) and wraparound insert PN: 12-2007.

(3) Wraparound jaw die kit uses multi-range jaw (997-WJK-550) and wraparound insert PN: 12-2009.

(4) Optional 4-½" jaw die kit uses contour jaw die PN: 12-0013.

All remaining jaw die kits use strip die PN: 13-0008-314-0.

DANGER

DO NOT EXCEED 9,000 LB-FT OF TORQUE WHEN USING THE 3-½" JAW DIE KIT

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 my 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. Clean the dovetail die slots using a metal brush.
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.

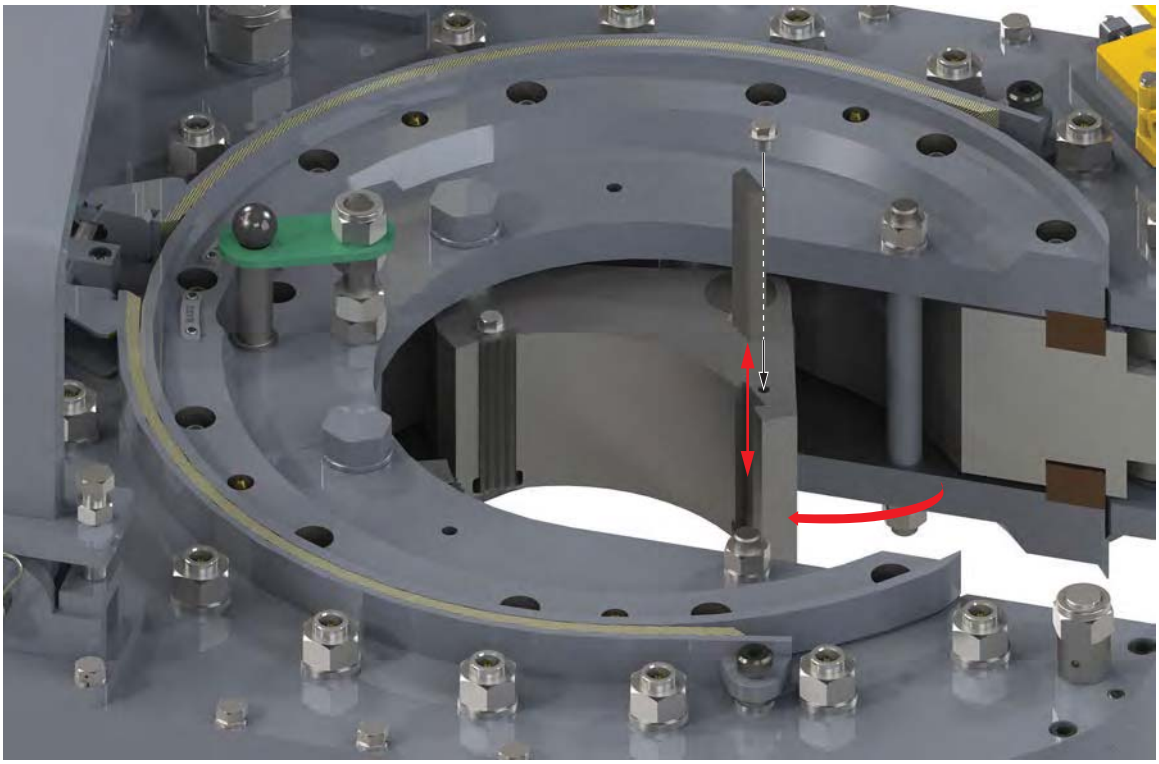


Illustration 3.4.1: Jaw Die Removal

3.4.3 Tong Jaw Installation & Removal

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

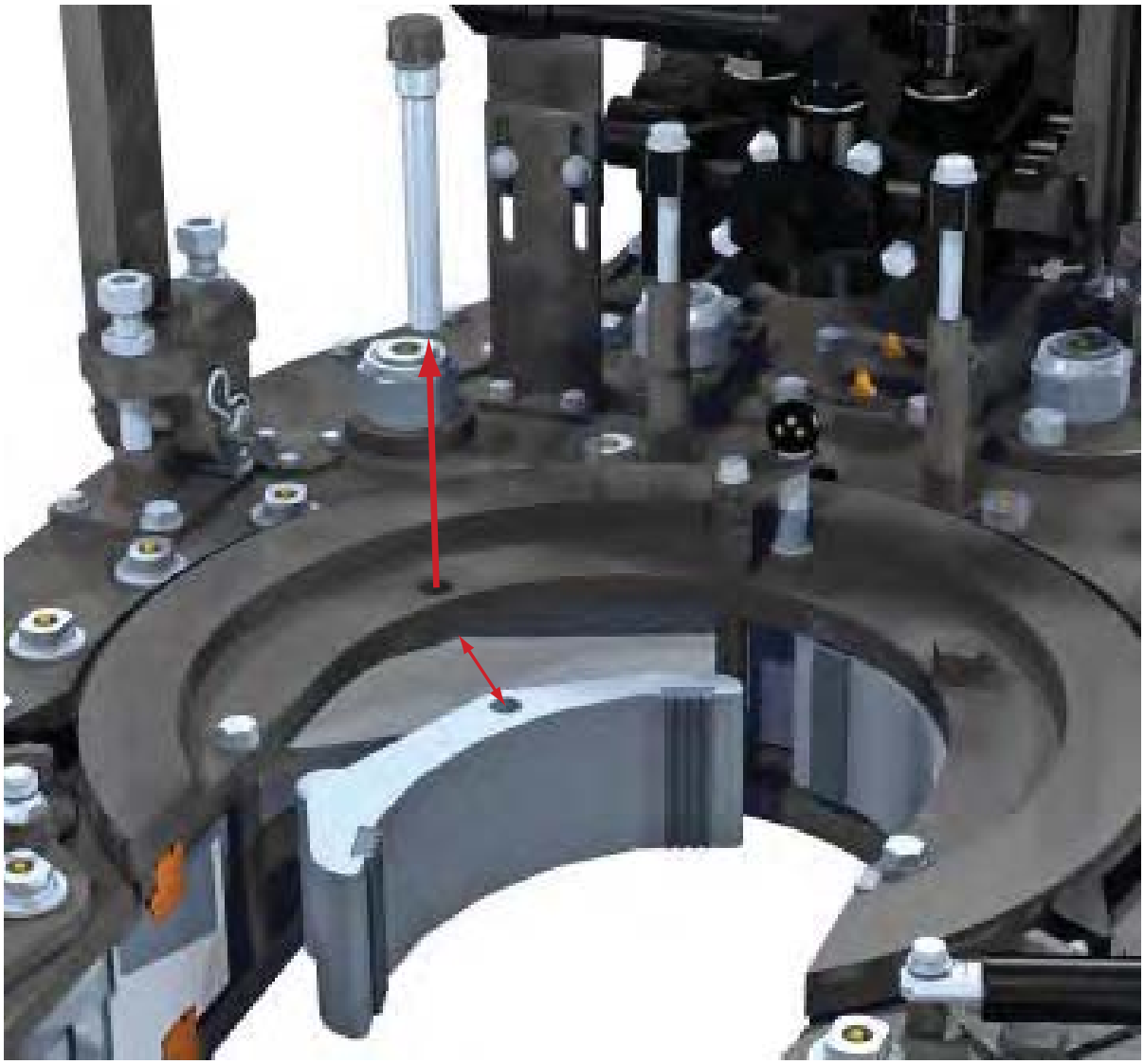


Illustration 3.4.2: Jaw Removal

5. Repeat steps 2 through 4 for the second jaw.

3.4.3 Tong Jaw Installation & Removal (Continued):

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) may be removed and re-used, providing the subcomponents are free of damage.

Illustration 3.4.3: Jaw Disassembly

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 rotary gear during engagement with the tubular. If the roller turns freely, proceed directly to step 12. Rollers that are jammed or otherwise “frozen” 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. 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.
11. Re-check the jaw roller to ensure that it turns freely.

3.4.3 Tong Jaw Installation & Removal (Continued):

12. 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 ONTO TUBULARS WITH INCORRECTLY SIZED JAWS. 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 SIZED JAWS POSES A HAZARD TO PERSONNEL AND EQUIPMENT.

13. Apply a generous coating of grease to the jaw roller & pin. Rotate the roller several times to distribute the grease.
14. 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.

3.5 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 Global 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 Global 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 (lb)	WLL (kg)	Test Load (lb)	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 to identify the recommended spring hanger for this application. McCoy Global will not guarantee or specify spring hangers other than what has been supplied by McCoy Global.

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

McCoy Global recommends using backup (snub) lines on each side of your assembly to restrict motion in either direction of rotation. Snub lines must be of sufficient strength to withstand the force imparted by the maximum rated torque of the tubular connection equipment in use. Calculate the force on the snub lines by dividing the maximum torque of the tong by the tong's torque arm (expressed in feet). For example, a 35,000 lb-ft tong with a 36 inch (3 ft.) torque arm will generate 11,667 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 tied off to a suitable anchor. One snub line must be secured to the load cell, which is then secured to the rear of the tong. The side of the tong the load cell connects to is dependant upon whether make-up or break-out activities are underway. To ensure accurate torque measurement, the torque measurement line must be connected perpendicular to the lengthwise axis of the tong, and perpendicular to the hang line (see illustration 3.5.3). Connect the second snub line on the opposite side of the load cell, perpendicular to the lengthwise axis of the tong and perpendicular to the vertical. Installed snub lines should have as little slack as possible when not under load.

⚠ DANGER

MCCOY GLOBAL ACCEPTS NO RESPONSIBILITY FOR DESIGNING AND SELECTING AN ADEQUATE SUSPENSION AND RESTRAINT SYSTEM FOR YOUR DRILLING EQUIPMENT. FAILURE TO FOLLOW THE INSTRUCTIONS PROVIDED IN THIS SECTION MAY RESULT IN SERIOUS INJURY TO RIG PERSONNEL.

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

3.5.1 Suspension & Restraint (Continued):

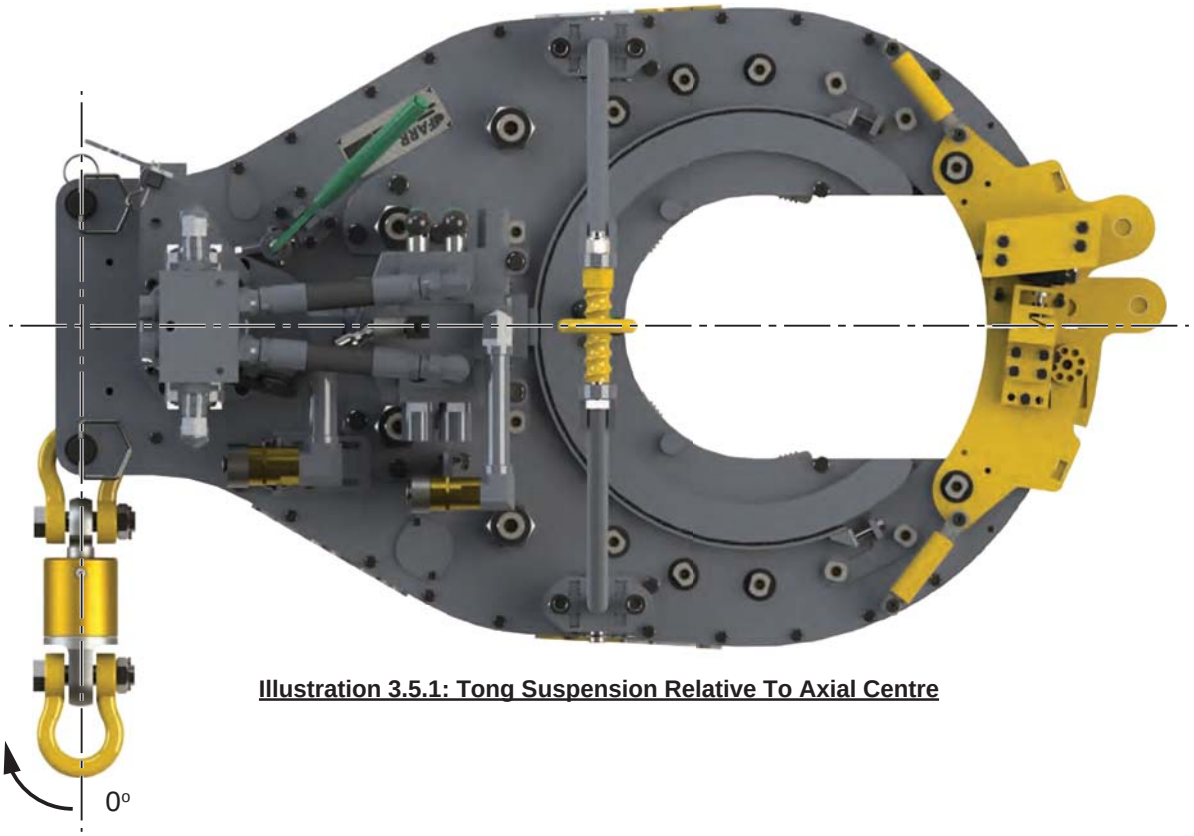


Illustration 3.5.1: Tong Suspension Relative To Axial Centre

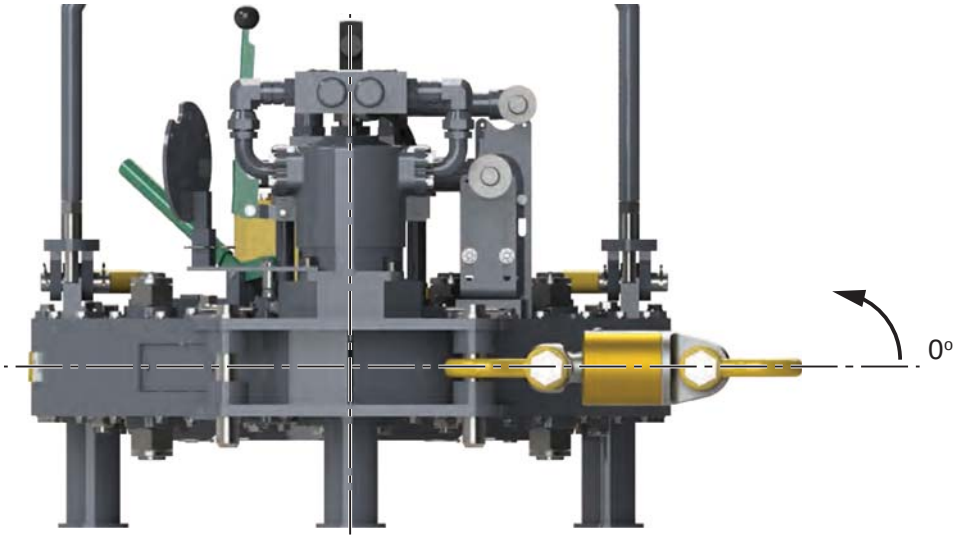


Illustration 3.5.2: Tong Suspension Relative To Vertical Centre

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 ¾" nylock nut on the pin may have to be slightly loosened to allow the helix to rotate.

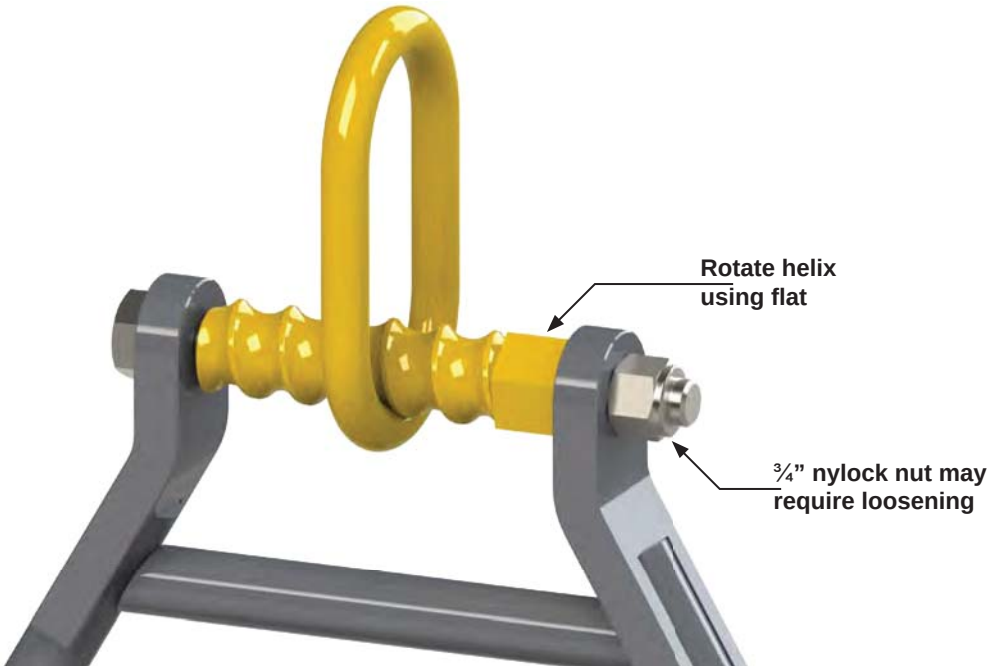


Illustration 3.5.3: Tong Leveling 01

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 ¾" 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).

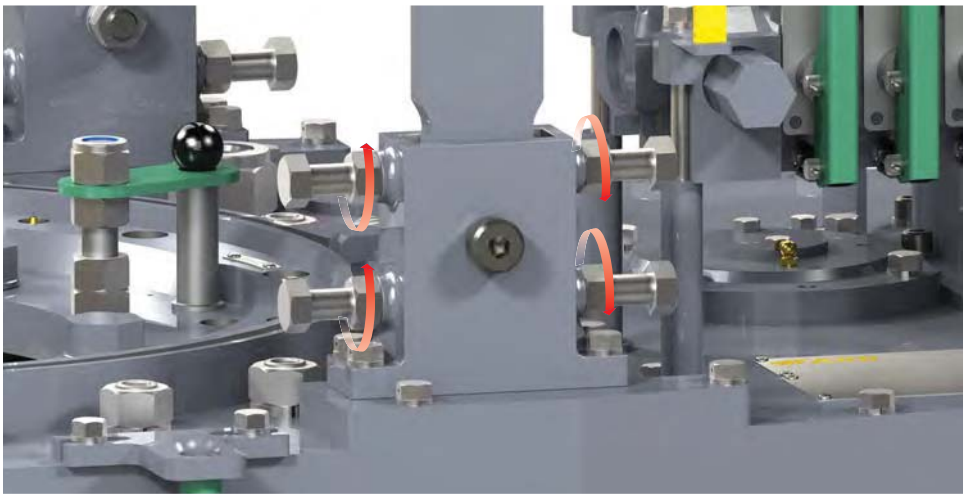


Illustration 3.5.4: Tong Leveling 02

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

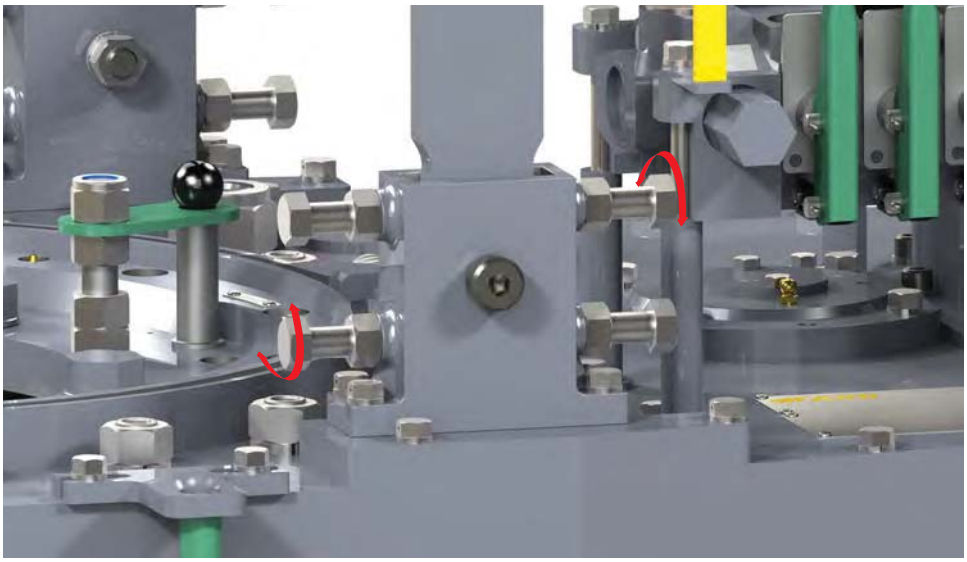


Illustration 3.5.5: Tong Leveling 03

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.

SECTION 4: OPERATION

This page intentionally
left blank

4.0 TONG OPERATION

4.0.1 Operator Training

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

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

4.0.2 Operator Safety

McCoy 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. Inspect anti-tamper devices on door switch components before beginning job. Equipment showing signs of tampering on any safety system must be immediately removed from service and tested. Anti-tamper devices must be restored before allowing equipment to be released to an operating environment.

Confirm the correct operation of the door switch before every job. Never disable or bypass 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. 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 Global 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.

4.0.3 Valve Operation (Continued):

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

TONG MOTOR

Pushing the valve handle forward towards the centre of the tong will cause the rotary gear 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.

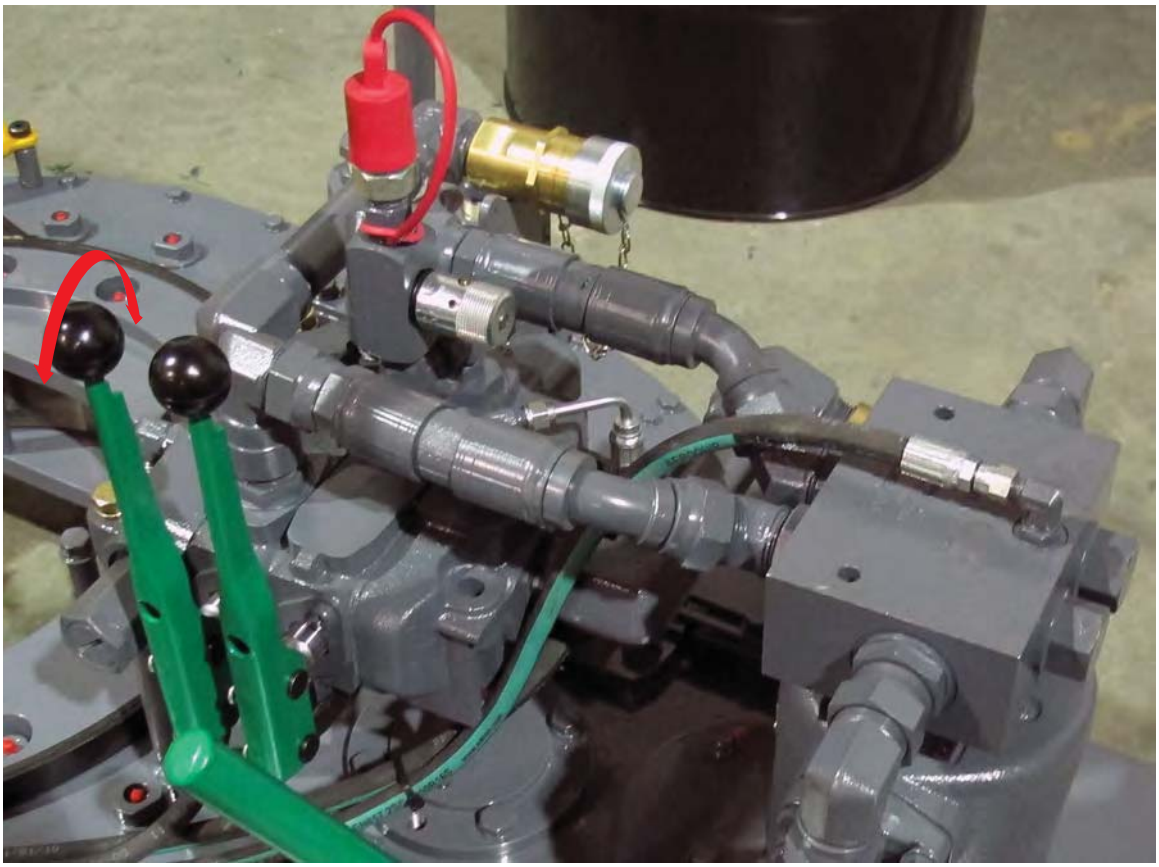


Illustration 4.0.1: Tong Motor Control Valve

LIFT CYLINDER CONTROL VALVE

Pushing the valve handle towards the centre of the tong supplies hydraulic fluid under pressure to the lift cylinder, retracting the cylinder and lifting the equipment vertically. Pulling the valve handle away from the tong does not provide an active hydraulic effect, but opens a hydraulic path to tank. Gravity extends the hydraulic cylinder and lowers the equipment. Releasing the valve handle will immediately stop the lifting or lowering action. The control valve section 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, preventing sudden drop of the lift cylinder in the event of a ruptured hydraulic line or failure of the control valve.

LIFT CYLINDER NEEDLE VALVE (See illustration 4.0.2)

This needle valve regulates hydraulic fluid flow to the lift cylinder. Closing the needle valve (rotating the knob clockwise) will increasingly restrict the flow rate of the fluid, resulting in slower actuation of the cylinder in both directions (lifting & lowering).

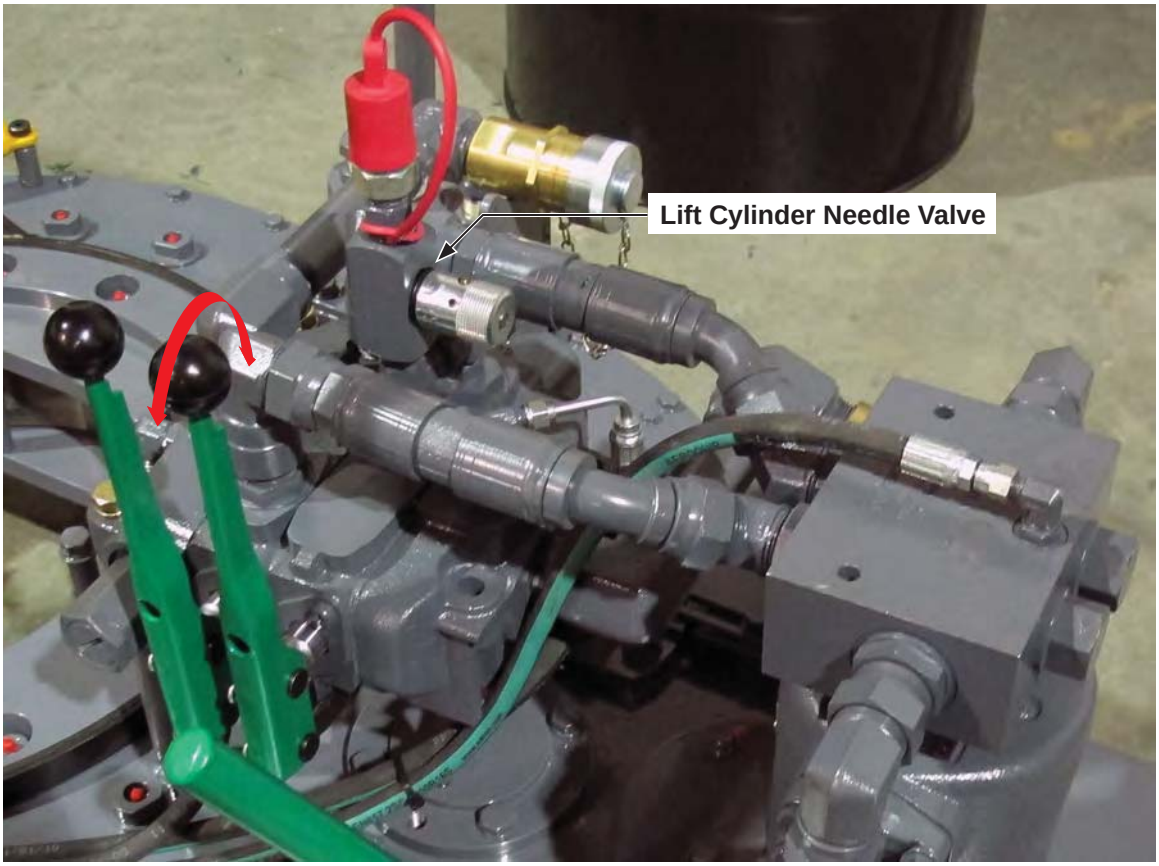


Illustration 4.0.2: Tong Lift Cylinder Control Valves

REMOTE DOOR CONTROL VALVE (MODEL 80-0931-14 ONLY):

Moving the valve handle in the DOOR OPEN direction supplies hydraulic fluid under pressure to the rod end of the door cylinder while providing a path to tank from the port at the cap end, retracting the cylinder to simultaneously release the door latch and open the tong door. Moving the valve handle in the DOOR CLOSE direction supplies hydraulic fluid under pressure to the cap end of the door cylinder while providing a path to tank from the port at the rod end, extending the cylinder and closing the door against the door latch post.

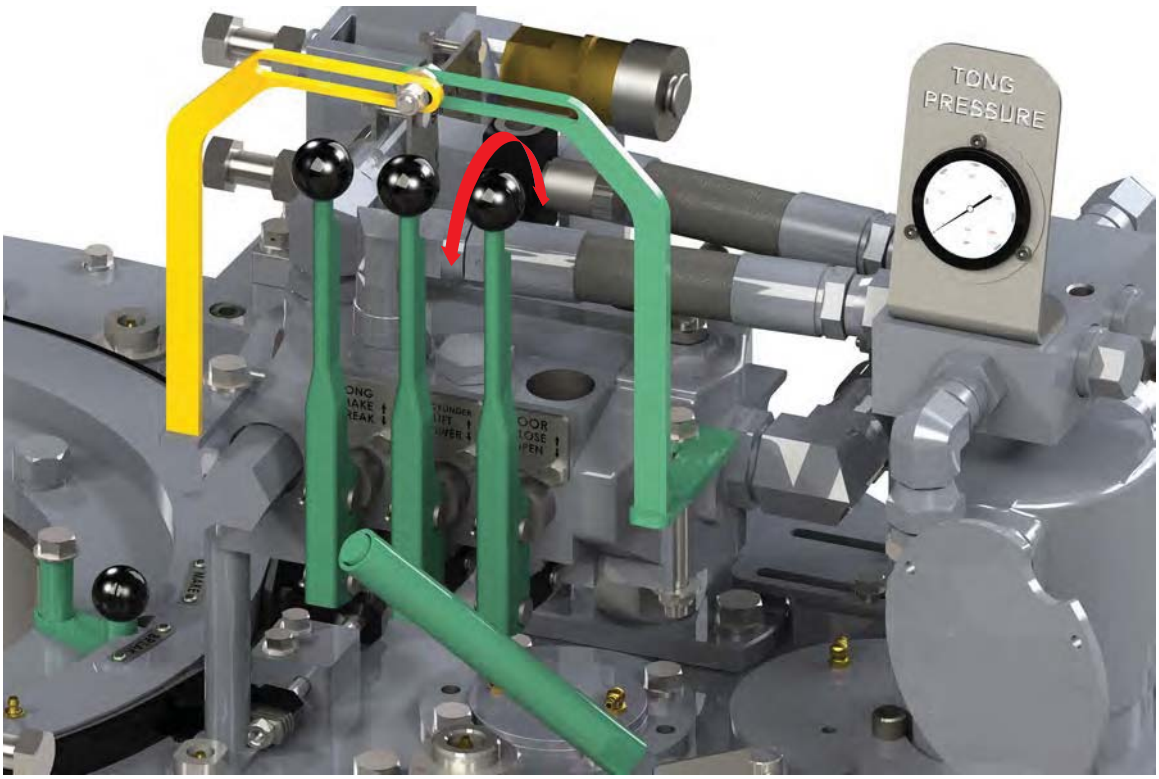


Illustration 4.0.3: Automatic Door Control Valve (Model 80-0931-14 Only)

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

⚠ WARNING

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

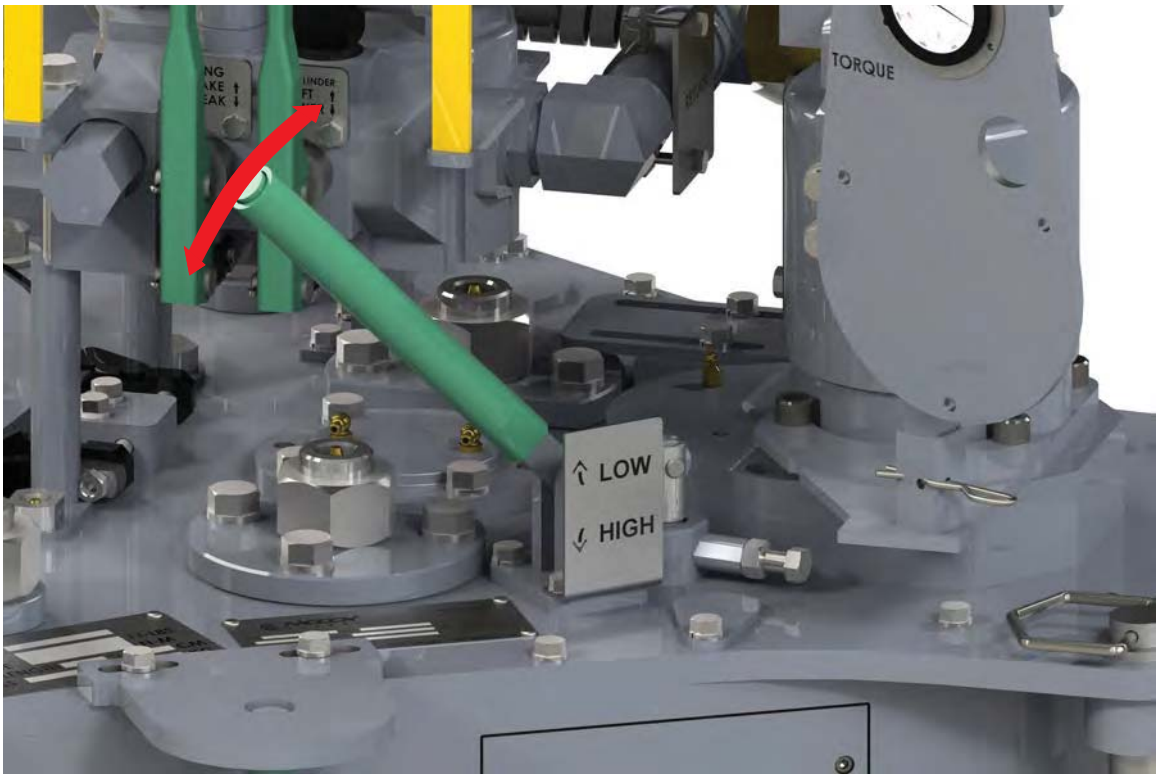


Illustration 4.0.4: Tong Manual Shifter

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 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.

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.

4.0.5 Pre-Operational Checks (Continued):

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 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 frequently causes gear breakage.

⚠ WARNING

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

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

4.1 MAKING AND BREAKING CONNECTIONS

NOTICE

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

Set up and prepare your equipment for operation as per Section 3 of this manual. Refer to the following subsections:

- 3.2 - Lift Cylinder Installation
- 3.3.2 - Hydraulic Connections
- 3.4 - Tong 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. Ensure the backing pin is in the “makeup” position. From the front of the tong, the backing pin correctly configured for makeup will be in the 10 o’clock position. If it is not, simply lift up and place in the correct position. The cage plate opening must be aligned with the door opening when setting the backing pin position.
3. Properly configure the load cell and snub line(s) for making up connections. The “snub line” is a length of wire rope or chain connecting the rear of the tong body opposite to the load cell to a sturdy anchor on the drill floor (see sub-section 3.5.1) which arrests unanticipated and uncontrolled rotation of the assembly. The load cell and snub line(s) must be rated for the applied torque plus whatever safety margins stated by your own operating policies. The load cell and snub line connection point(s) on the drill floor must be sturdy enough to absorb all applied forces generated by tong rotation. When making up joints connect the load cell to the the driller’s side of the tong, which is the left side of the tong as seen from the rear. For accurate torque measurement the load cell connection line must be perpendicular to the vertical, and perpendicular to the centre-line of the tong
4. Use the rig’s pipe-handling equipment to position the fresh tubular in position over the stump. Where possible manually engage the connection, and ensure the connection is not cross-threaded.
5. Grasp the tong latch handle, and pull to release the latch. Swing the latch side door open, followed by the second door. Opening either 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 tool from the drill floor. Refer to the label on the valve section to determine the direction of handle deflection required to perform the necessary action.

⚠ CAUTION

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

Position the tool over the connection. Use the lift cylinder hydraulic control to properly adjust the height of the tool on the connection.

7. Firmly close the LH tong door, followed by the RH tong door. Tug on the LH door handle to ensure the door latch has properly and securely engaged.
8. 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

9. Slowly push the motor hydraulic control valve away from the operator to rotate the tong in the make-up direction to cam the jaws on to the tubular.
10. When the tong jaws cam on to the tubular push the rotation control handle away from the operator 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.
11. 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

4.1.1 Making A Connection (Continued):

12. Push the rotation control handle all the way in 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.

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

4.1.2 Breaking A Connection

NOTICE

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

1. Ensure hydraulic power supply to the tong and backup is energized. The master link on the rigid sling must be used to suspend the tong. Do not suspend the tong from any other point. See Illustration 4.1.1.
2. Set the backing pin for “breakout” operation. Lift up on the backing pin and rotate it to the “breakout” position, which is 2 o’clock as seen from the front of the tong. The opening in the rotary gear must be aligned with the tong door opening in order to properly set the backing pin.
3. Properly configure the load cell for breaking out connections (see Section 3.5.1). The load cell must be transferred to the off-driller’s side (the right hand side as seen from the rear of the tong), and the snub line must be transferred to the driller’s side to perform break-out operations. Load cell and snub lines must be rated for the applied torque plus whatever safety margins stated by your own operating policies. The load cell and snub line connection points on the drill floor must be sturdy enough to absorb all applied forces.
4. Grasp the tong latch handle, and pull to release the latch. Swing the latch side door open, followed by the second door. Opening either 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 tool from the drill floor. Pushing the control handle away from the operator retracts the cylinder to lift the equipment.

⚠ CAUTION

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

6. Move the tool on to the tubing joint. Use the lift cylinder to ensure the tong and backup are at the correct locations above the connection joint.
7. Firmly close the LH tong door, followed by the RH tong door. Tug on the LH door handle to ensure the door latch has properly and securely engaged.
8. Breakout torque is only available when the tong is in low gear. Shift the tong to low gear (see subsection 4.0.4). Do not shift gears while the tong is rotating.

⚠ WARNING

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

9. Pull the motor control valve toward the operator 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.

10. Stop rotation when the connection breaks, and shift to high gear (see Section 4.0.4 for instructions to shift to high gear). This will enable the tong to completely un-thread the connection at high speed.
11. Pull the rotation control handle all the way out to completely un-thread the connection. Reverse the rotation control (push the handle away from operator) to release the tong jaws from the tubing.
12. When the tong jaws disengage align the opening in the rotary gear with the mouth of the tong, and open the tong door.

4.1.2 Breaking A Connection (Continued):

13. Free the tool from the drill string. Note that rig personnel may be required to stabilize the tool as it completely releases from the drill string. Guide the 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 FREED FROM THE TUBULAR.

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

SECTION 5: MAINTENANCE

This page intentionally
left blank

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

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

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

⚠ DANGER

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

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

⚠ WARNING

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

5.0 GENERAL MAINTENANCE SAFETY PRACTICES

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

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

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

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

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

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

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

⚠ WARNING

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

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

5.1 CLEANING

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

5.2 PREVENTIVE MAINTENANCE PRACTICES

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

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

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

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

5.3 HYDRAULIC SYSTEM MAINTENANCE

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

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

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

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

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

5.4 HYDRAULIC SYSTEM DEPRESSURIZATION

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

⚠ CAUTION

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

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

⚠ WARNING

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

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

5.5 LUBRICATION INSTRUCTIONS

Use a quality multipurpose bearing lubricant that will remain within its viscosity range at expected operating temperatures. In addition, 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 Guide Rings / Cam Followers

(Fig. 5.5.1) For tongs equipped with support ring style cage plates, apply grease to the top guide rings through the grease fittings recessed into the top and bottom cage plates (four locations top, four locations bottom).

(Fig. 5.5.2) For tongs equipped with cam follower style cage plates, apply grease to the grease fittings recessed in both the top and bottom cage plates (22 locations total - 11 top / 11 bottom).

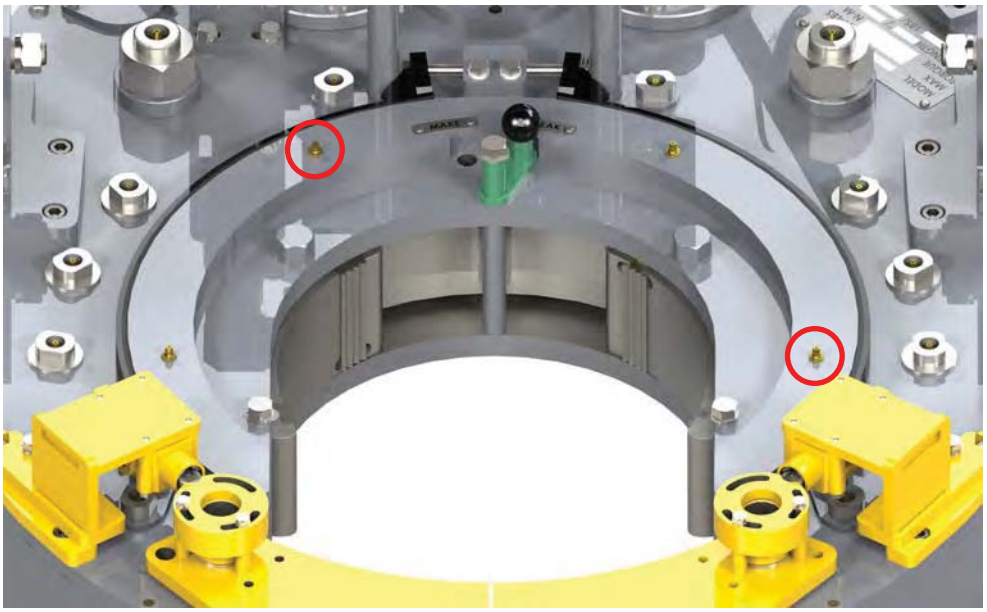


Illustration 5.5.1: Guide Ring Lubrication (KT13-⅝ Tong)

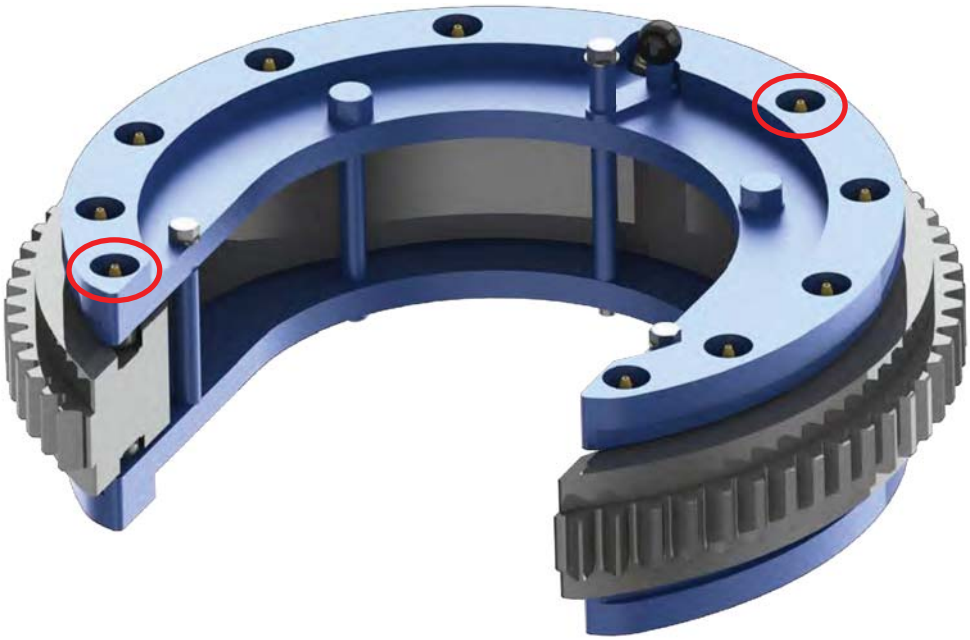


Illustration 5.5.2: Cam Follower Lubrication (LW-13⅝ Tong)

5.5.2 Support Roller Bearings

Supply grease to these bearings through the grease fittings in the ends of the rotary roller shafts, located on the top of the tong (12 locations total).

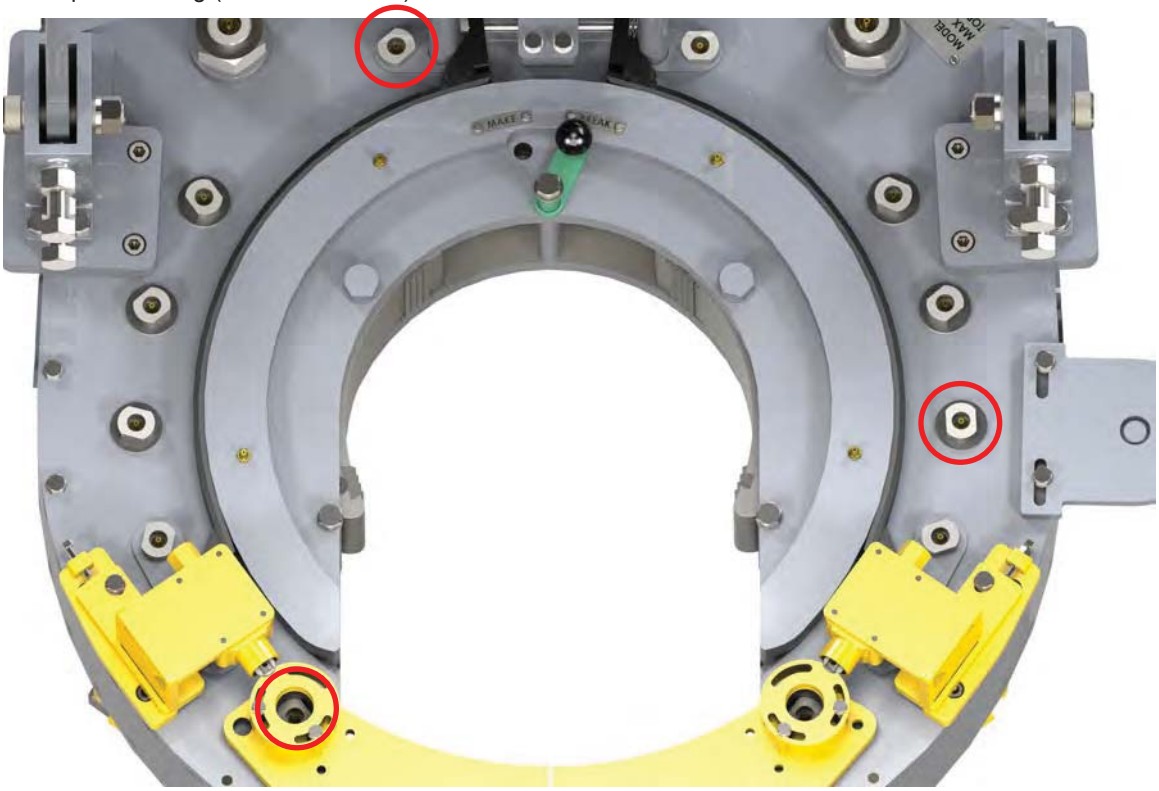


Illustration 5.5.3: KT/LW13-⅝ Support Roller Lubrication

5.5.3 Rotary Idler Bearings

Apply grease to these bearings through the grease fittings in the ends of the rotary idler shafts located on the left and right sides of the tong (2 locations total).

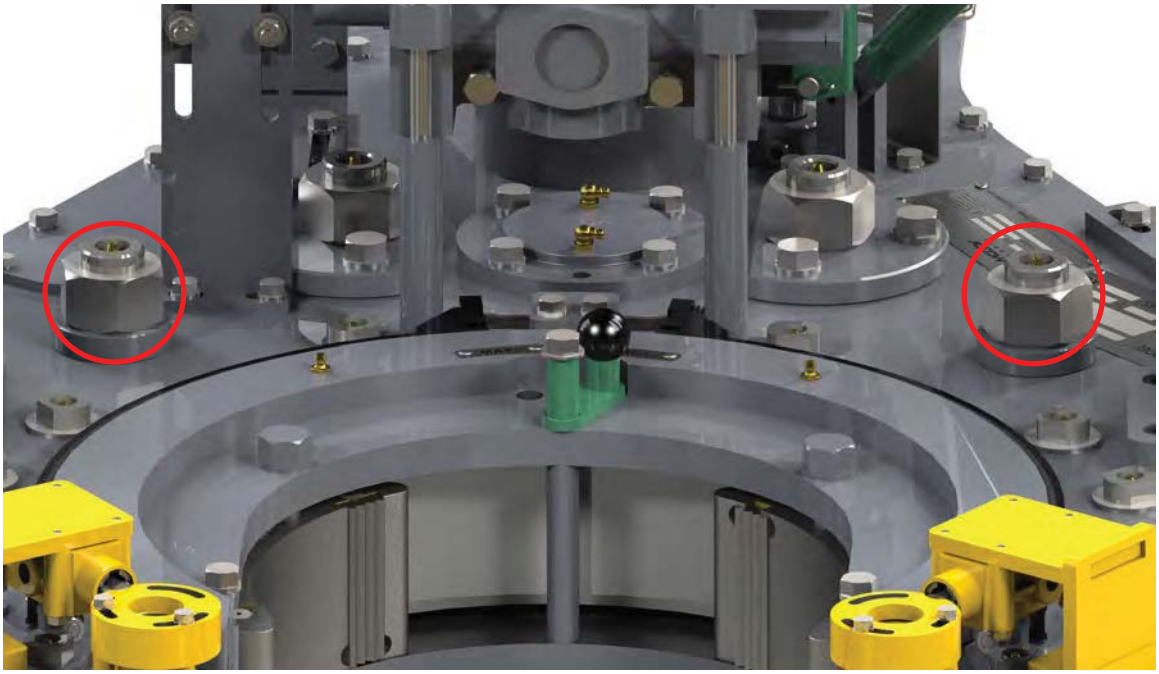


Illustration 5.5.4: KT/LW13-⅝ Rotary Idler Lubrication

5.5.4 Pinion Idler Bearings

Apply grease to these bearings through the grease fittings in the ends of the idler half shafts, located on the top face of the tong (2 locations total).

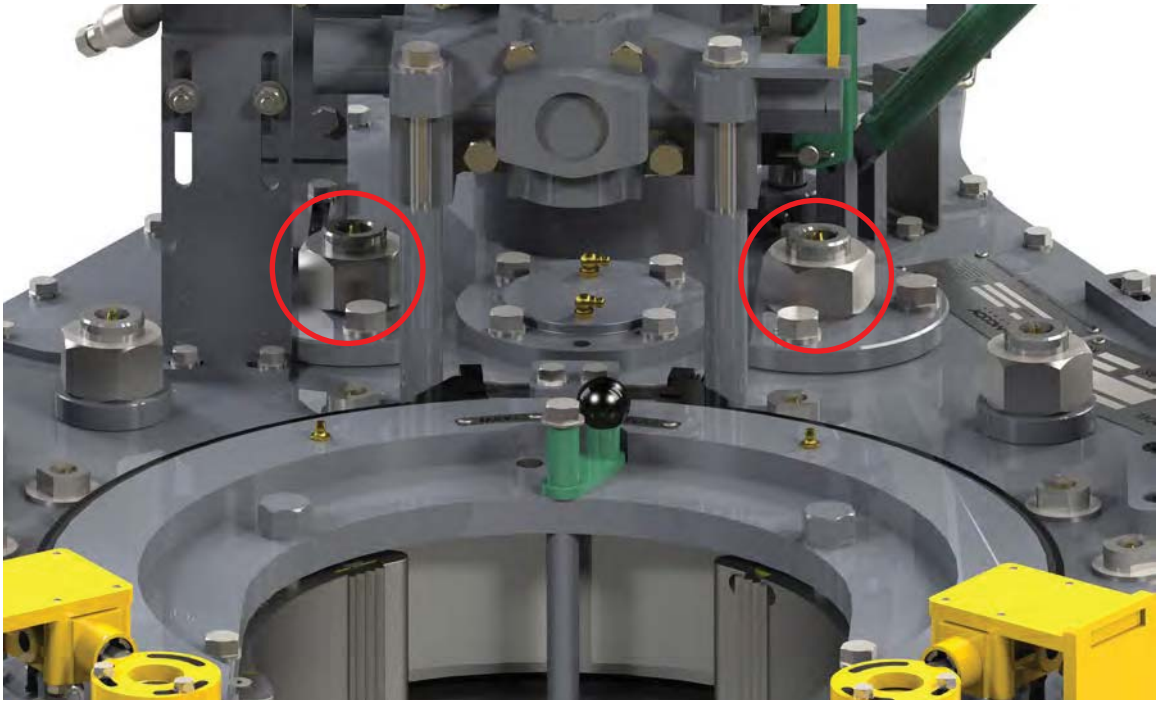


Illustration 5.5.5: KT/LW13-⅝ Pinion Idler Lubrication

5.5.5 Pinion Bearings

Apply grease to these bearings through the grease fittings in the pinion bearing caps, which are located on the top and bottom face of the tong (four locations total).

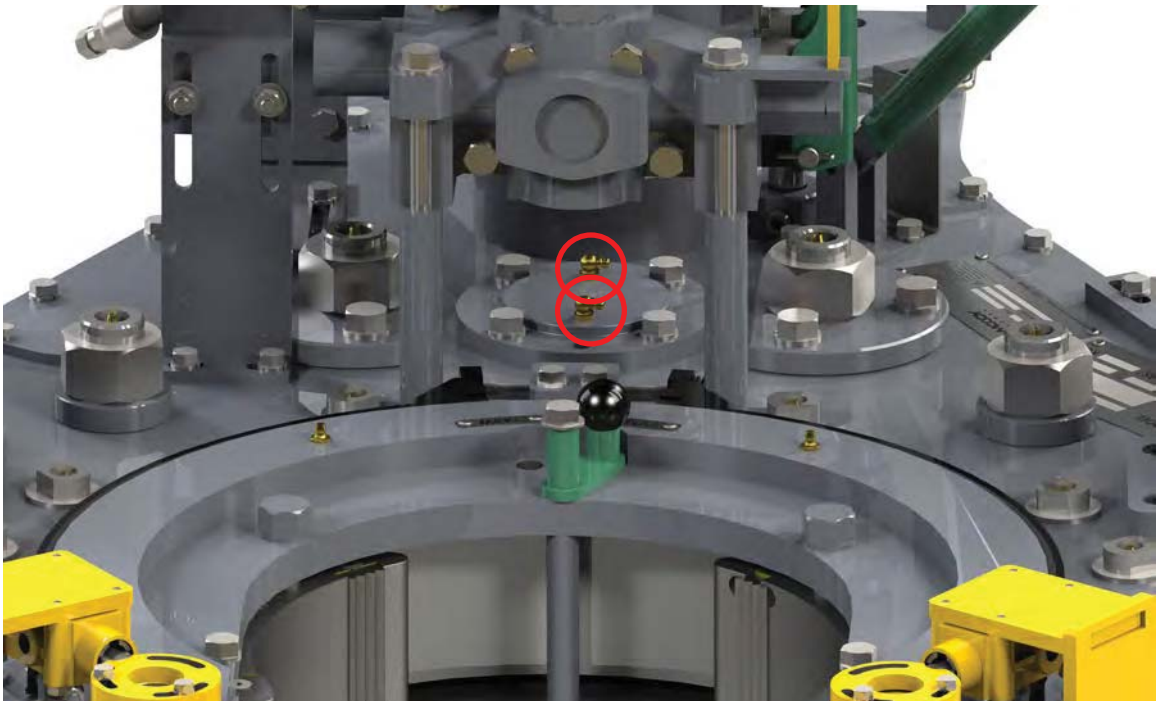


Illustration 5.5.6: KT/LW13-⅝ Pinion Lubrication Top Plate

5.5.5 Pinion Bearings (Continued):

Illustration 5.5.7: KT/LW13-⅝ Pinion Lubrication Bottom Plate

5.5.6 Clutch Shaft

Apply grease to the clutch bearings through the two grease fittings in the clutch bearing cap and the single grease fitting mounted in the end of the clutch gear shaft, located on the bottom face of the tong.

Illustration 5.5.8: KT/LW13-⅝ Clutch Shaft Lubrication

5.5.7 Shifting Shaft

Apply grease to the shifting shaft and shifting shaft bushings, which may be accessed through the cover plate on the side of the tong.

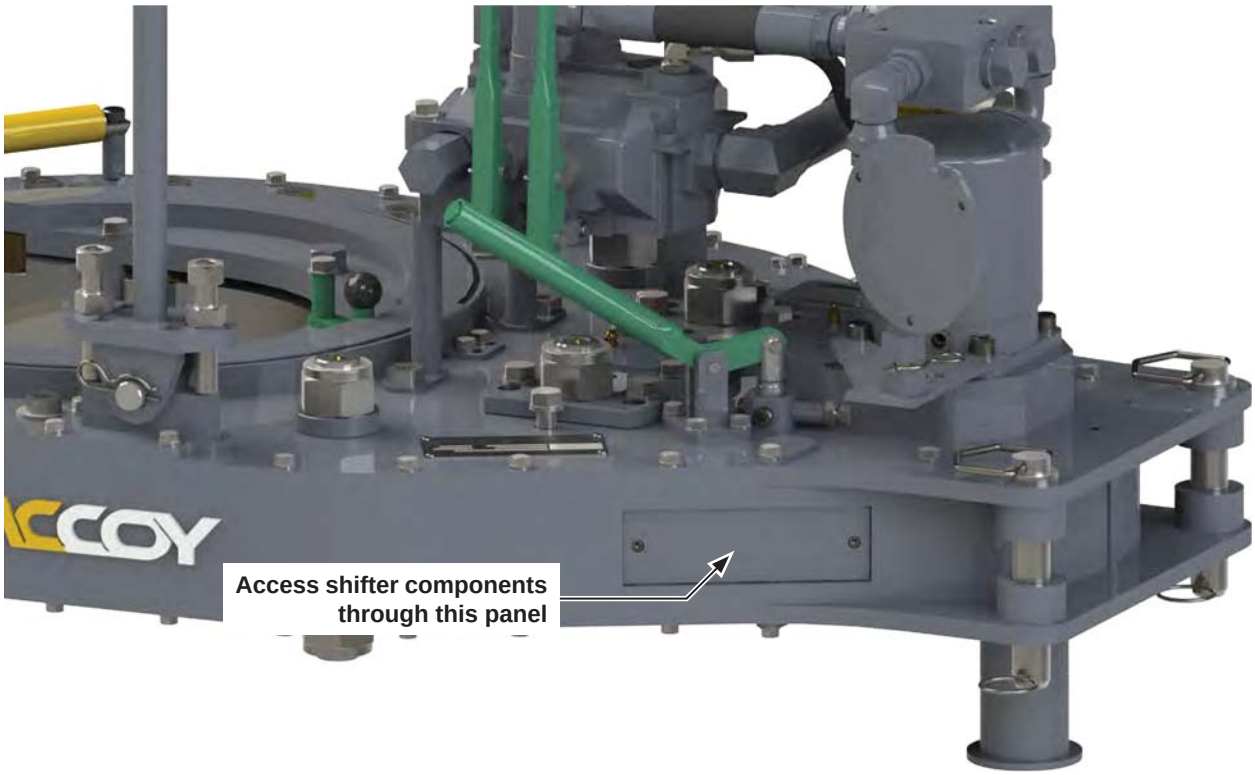


Illustration 5.5.9: Shifting Shaft Lubrication

5.5.8 Motor Mount Housing

Apply grease to the gears in this housing through the grease fitting on the top of the motor mount.

Illustration 5.5.10: Motor Mount Lubrication

5.5.9 Door Latch Cam

Apply grease to the door latch cam through the grease fitting in the top of cam adjustment boss.

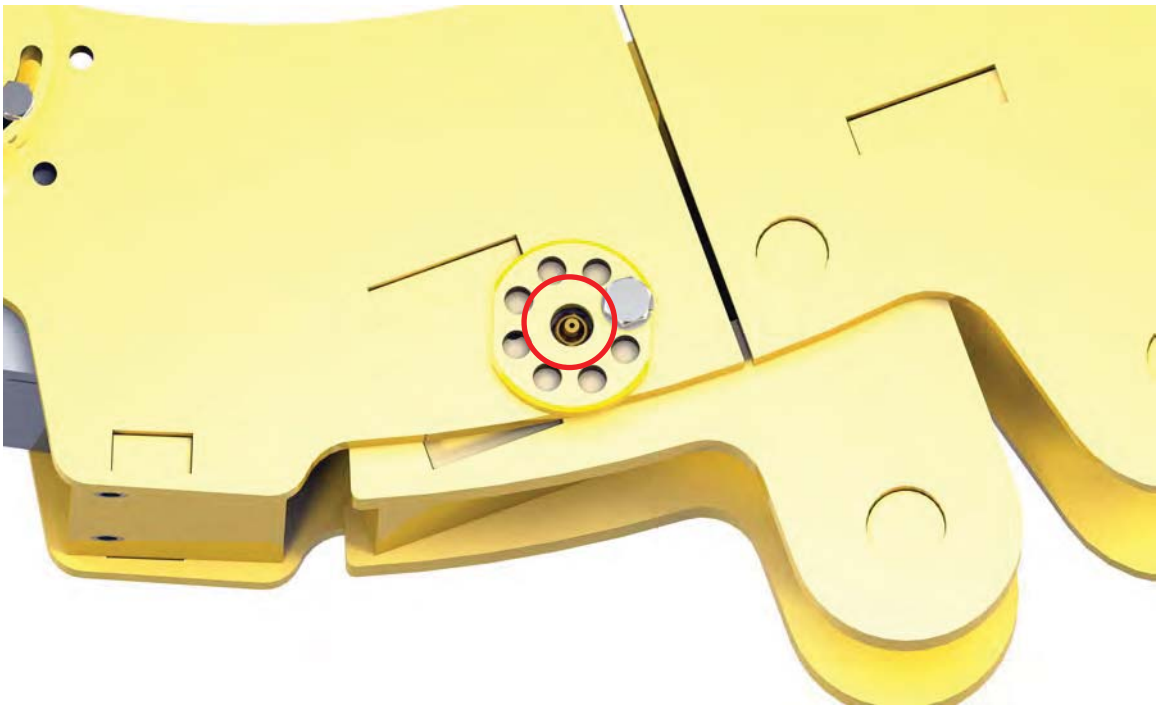


Illustration 5.5.11: Door Latch Cam Lubrication

5.5.10 Door Spring Stop Cylinders

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

Illustration 5.5.12: Door Stop Spring Lubrication

⚠ WARNING

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

5.5.11 Door Latch (Model 80-0931-14 Only)

Apply grease to the door latch pivot bushings through the grease fittings on the top and bottom of the latch pivot shaft (2 locations total), and to the door latch post through the single grease fitting on the top of the latch post.

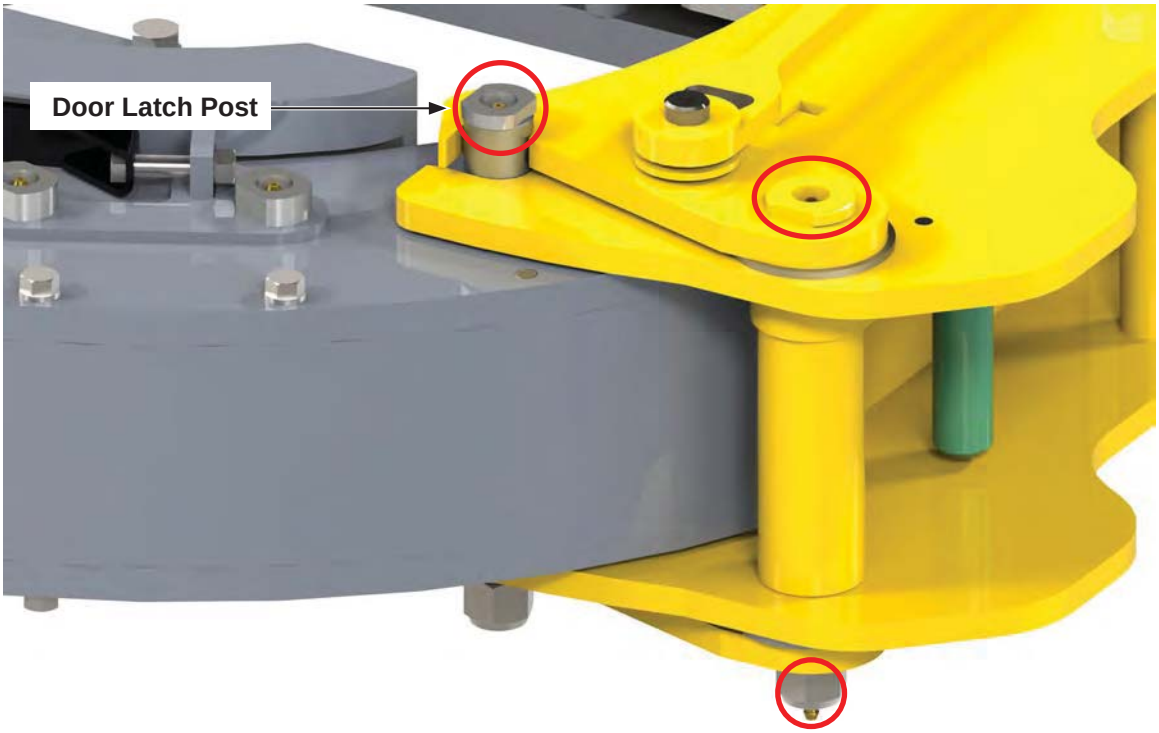


Illustration 5.5.13: Door Latch Lubrication (Model 80-0931-14)

5.5.12 Door Pivot (Model 80-0931-14 Only)

Apply grease to the door pivot bushings through the grease fittings on the top and bottom of the door pivot shaft (2 locations total).

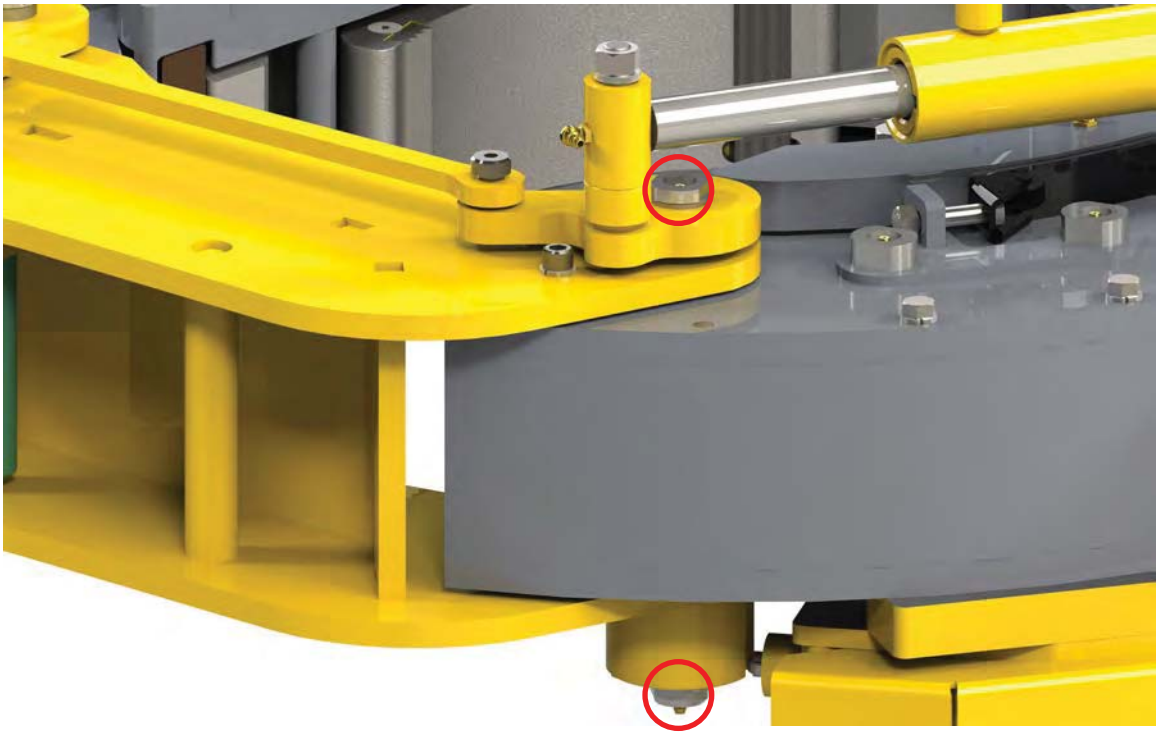


Illustration 5.5.14: Door Pivot Lubrication (Model 80-0931-14)

5.5.13 Hydraulic Door Cylinder (Model 80-0931-14 Only)

Apply grease to the hydraulic door cylinder pivot posts through the grease fittings at each end of the cylinder (2 locations total).

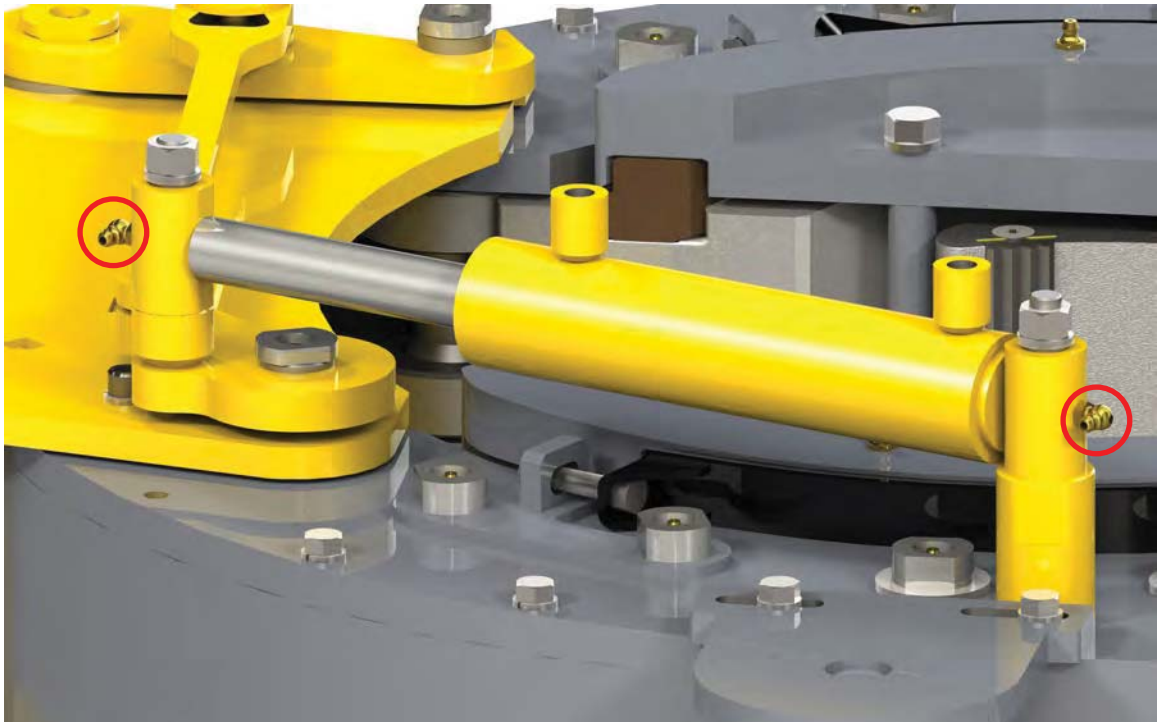


Illustration 5.5.15: Hydraulic Door Cylinder Lubrication (Model 80-0931-14)

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)
Top cage plate guide ring (grease fittings)	2 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
Door latch adjustment cam	4 shots
Shifting shaft	As required
Door latch shaft pivots (model 80-0931-14)	4 shots
Door latch post (model 80-0931-14)	4 shots
Door pivot shaft bushings (model 80-0931-14)	4 shots
Hydraulic door cylinder (model 80-0931-14)	3 shots

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 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.

⚠ CAUTION

TOP AND BOTTOM BRAKE BANDS MUST BE ADJUSTED SIMULTANEOUSLY AND EQUALLY

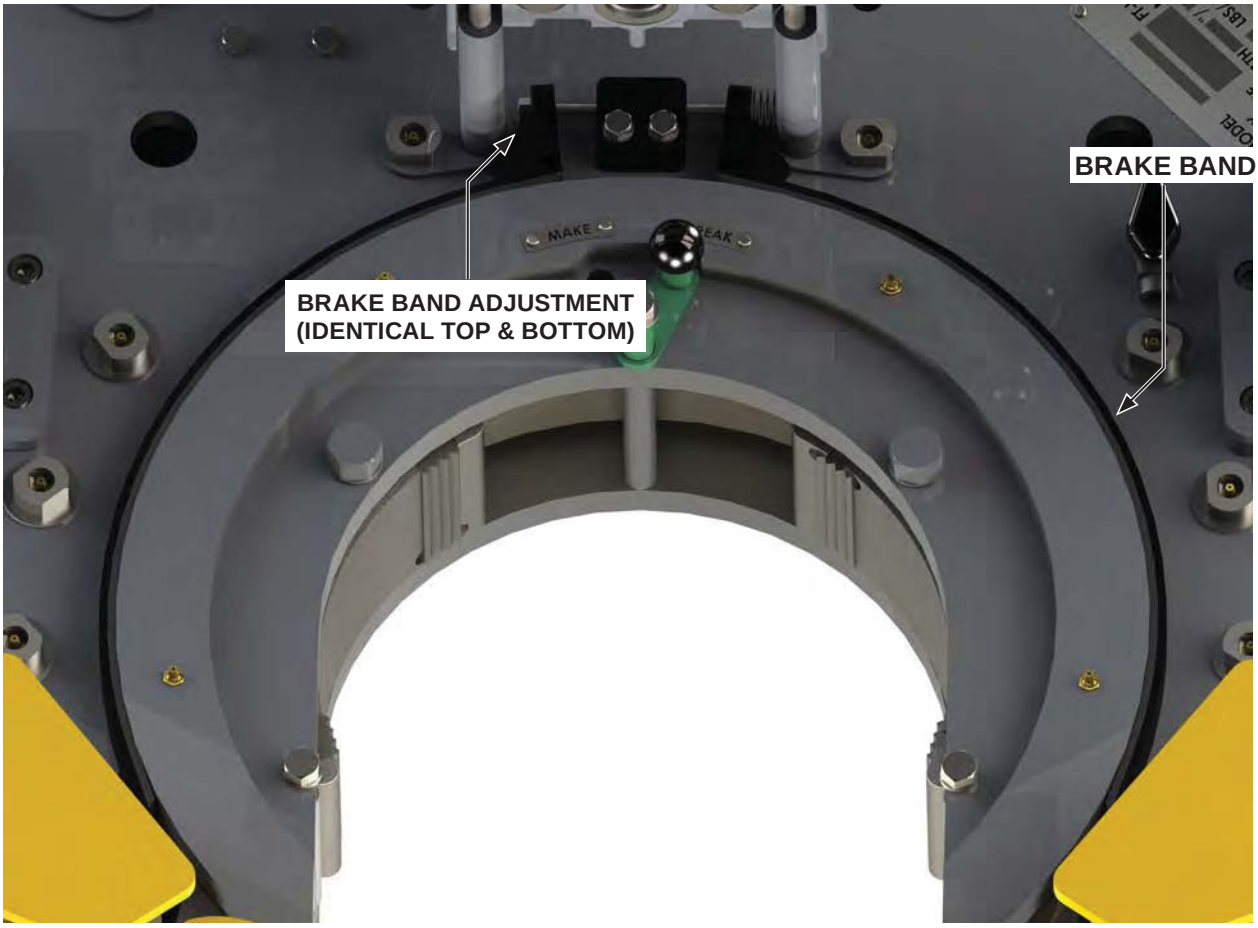


Illustration 5.6.1: Brake Band Adjustment

5.6.2 Door Latch Adjustment

Normal operation of the tong may cause wear of the door latch, which will cause the door to develop a loose fit at the latch. A latch cam plate is located at the top face of the door. The cam plate has eight positioning holes located on a 360 degree bolt circle. The latch cam shaft extends down through the door and is secured at the top by a ⅜" hex head bolt. To make adjustments in door alignment, remove the ⅜" bolt and turn the cam with a wrench. When the door has been adequately aligned, replace the ⅜" bolt.

⚠ WARNING

THE DOOR IS AN IMPORTANT PART OF THE STRUCTURAL INTEGRITY OF THE TONG. ENSURE A SECURE FIT AT THE DOOR IN ORDER TO MAINTAIN PROPER GEAR ALIGNMENT, AND TO MINIMIZE THE POSSIBILITY OF DAMAGE TO THE GEAR TRAIN WHEN OPERATING THE TONG AT SPECIFIED TORQUE. A PROPERLY ADJUSTED DOOR ALSO ENSURES SAFETY OF OPERATING PERSONNEL.

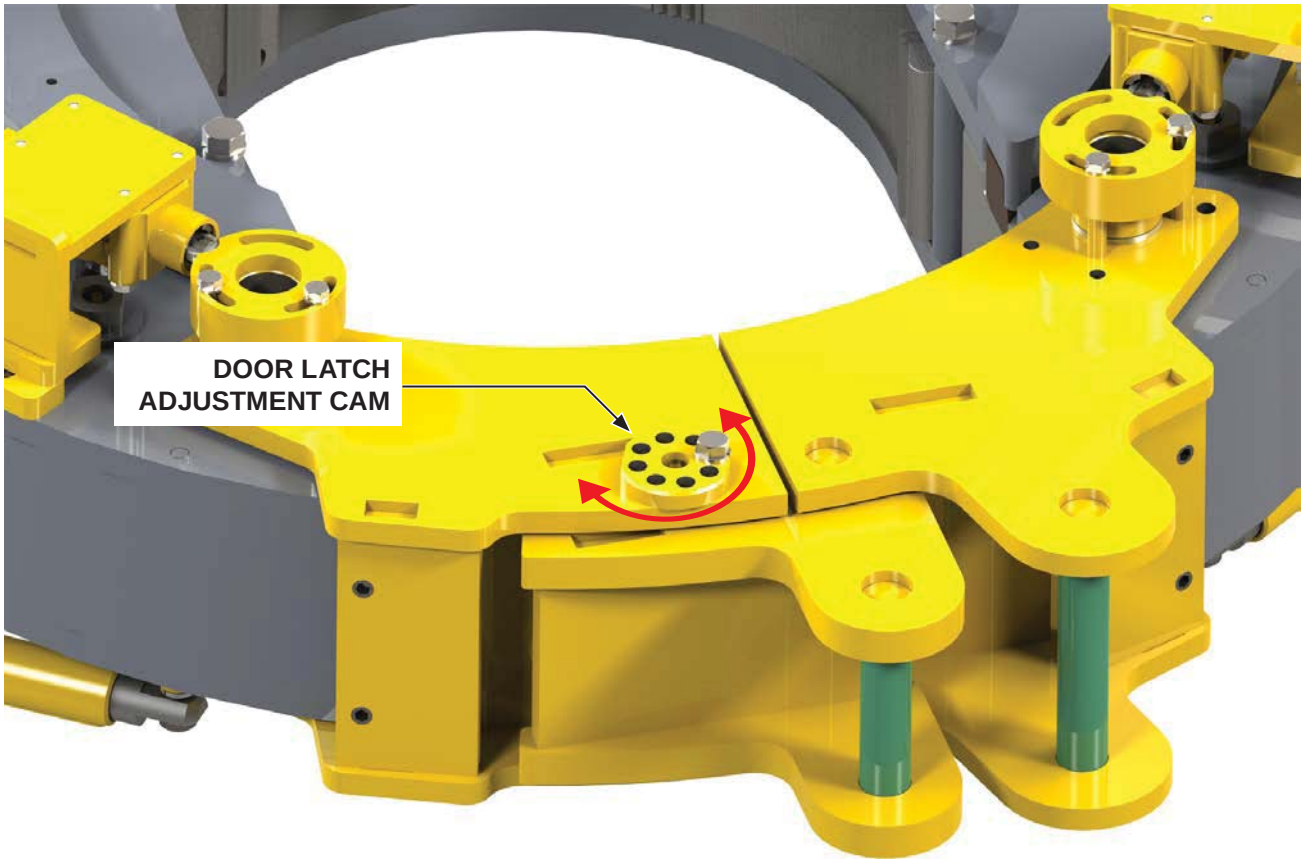


Illustration 5.6.2: Door Latch Cam Adjustment

5.6.3 Door Alignment

Use the provided set screws and jam nuts on each door weldment to align the doors when they are in the closed position. NOTE: the images in this subsection show the safety door cams

1. Ensure tong doors are completely closed and the door latch is firmly engaged.
2. Inspect how one door aligns with the other when closed. Two indicators of misalignment are:

- doors are not parallel to one another when closed
- inside corners of the doors are not aligned

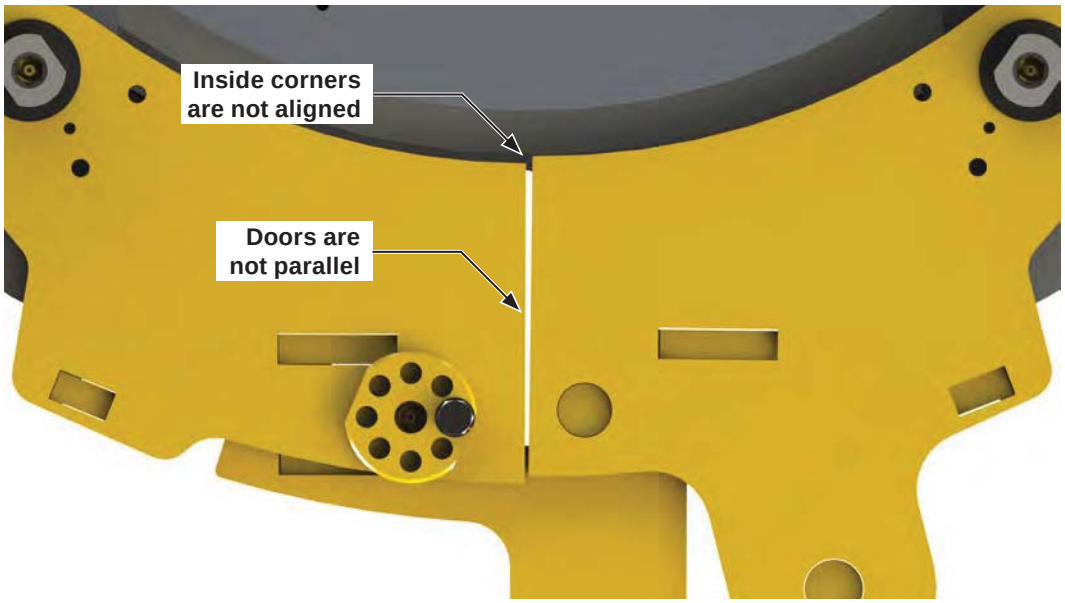


Illustration 5.6.3: Illustration Of Door Misalignment

3. Use a box-end wrench to loosen the lock nuts on the insides of the door weldment - the nuts may be accessed from the side of the door weldment. Use a hex key to turn the hex head set screws either clockwise or counter-clockwise to adjust the door. Note that the top and bottom of the door weldment may not need to be adjusted equally - each set screw should be adjusted independently until the doors are aligned.

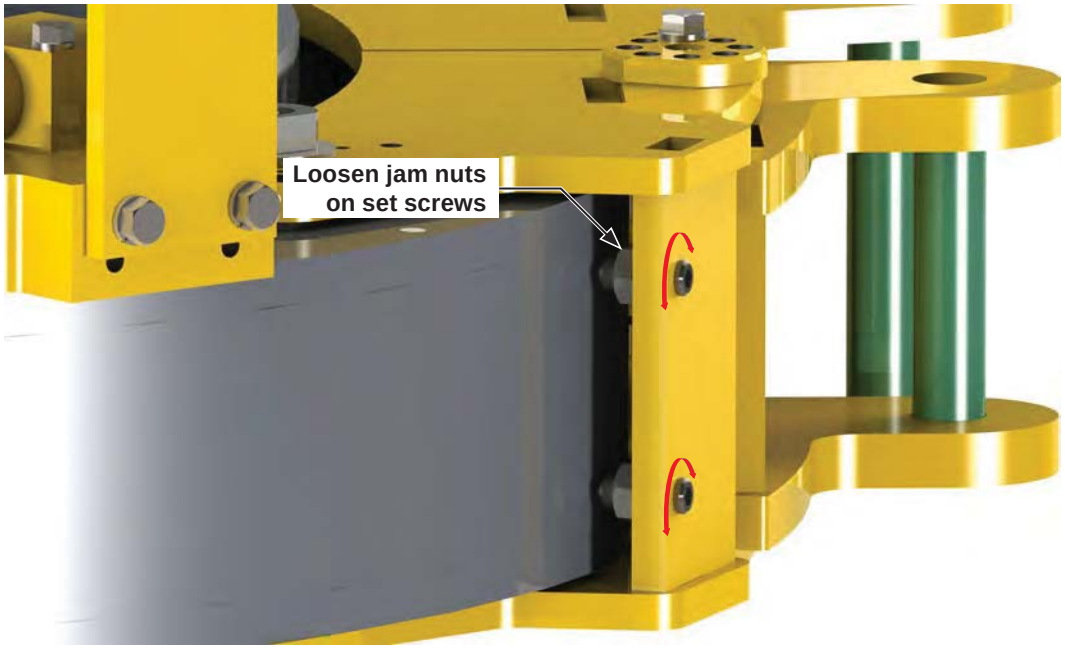


Illustration 5.6.4: Adjustment Set Screw

5.6.3 Door Alignment (Continued):

4. Rotate the cage plate, and stop it when the inside circumference of the door is completely covered. Perform three measurements (see illustration 5.6.5).
5. From the insides of the outer edge of each door weldment to the cage plate (2 measurements total).
6. From the exact centre point (where the two doors meet) to the cage plate.

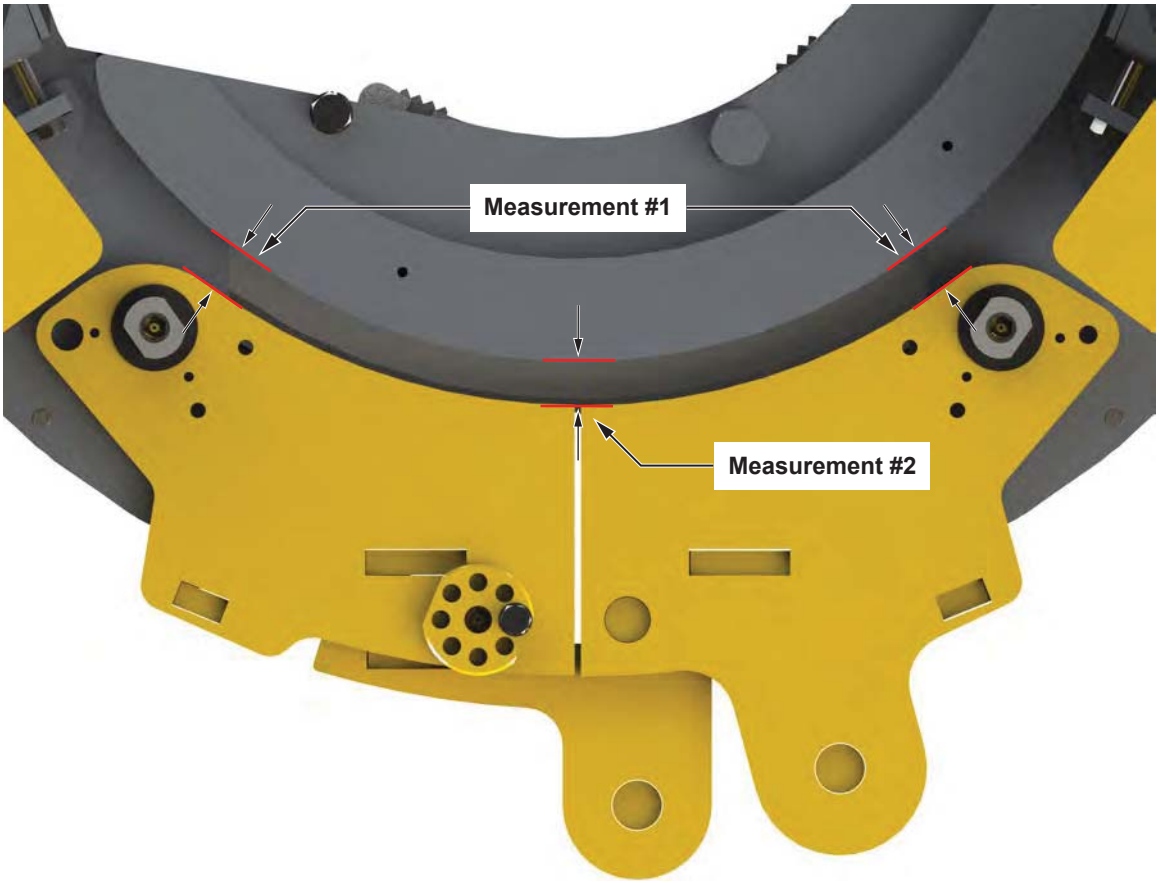


Illustration 5.6.5: Door Alignment

The three measurements should be equal. If the centre measurement is less than the two outside measurements, loosen all four locking nuts on the set screws, and turn all four set screws EQUALLY clockwise, until the centre measurement is equal to the two outer measurements. If the centre measurement is more than the two outside measurements, loosen all four locking nuts on the set screws, and turn all four set screws EQUALLY counter-clockwise, until the centre measurement is equal to the two outer measurements. Ensure that the locking nuts are tightened when this procedure is complete.

5.6.4 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. 7.22 - 7.23).

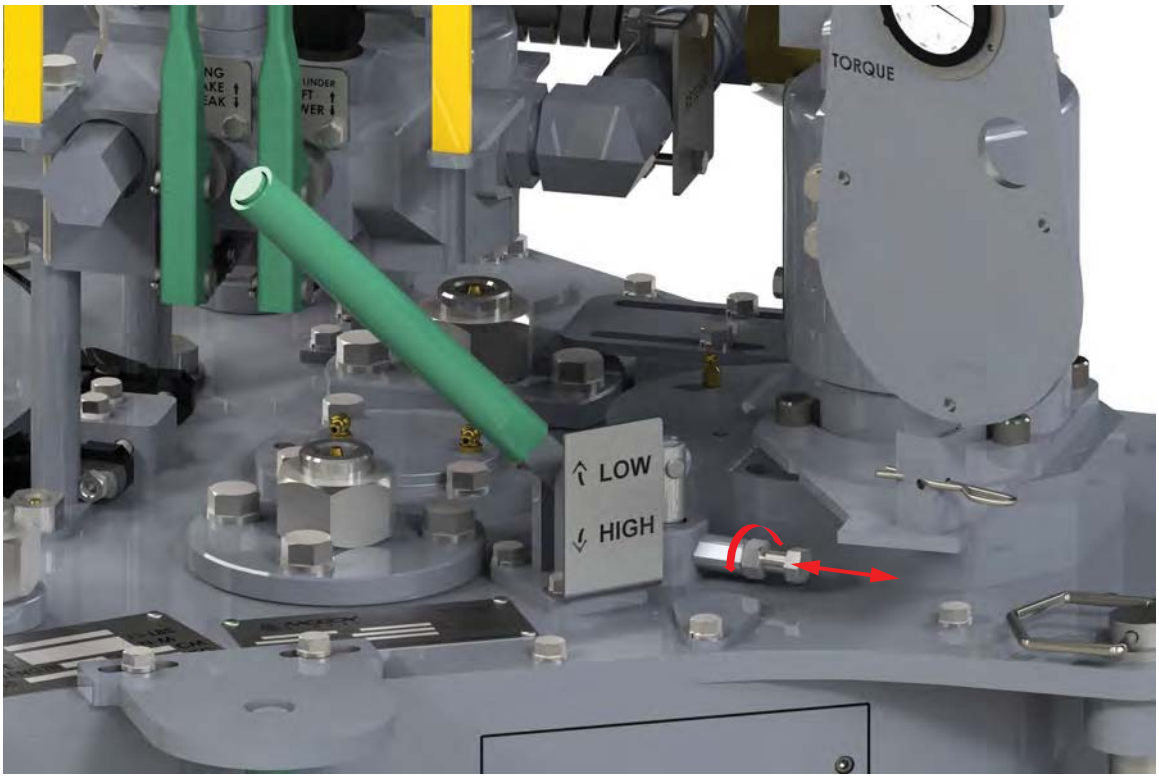


Illustration 5.6.6: Shifter Detent Force Adjustment

5.6.5 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.

⚠ DANGER

APPLYING HYDRAULIC PRESSURE TO DOOR SWITCHES THAT ARE UNCONSTRAINED BY THE DOOR-MOUNTED CAM MAY RESULT IN FAILURE DUE TO OVER-EXCURSION OF THE SWITCH PLUNGER.

2. Check the mechanical operation of the hydraulic door switch:
   - Keep the tong door closed. Loosen the four nuts and bolts securing the door switch to the mounting plate. Loosen the locking nut on the adjustment bolt. Completely back off the adjustment bolt. Slide the switch and mounting plate away from the cam actuator on the door assembly.

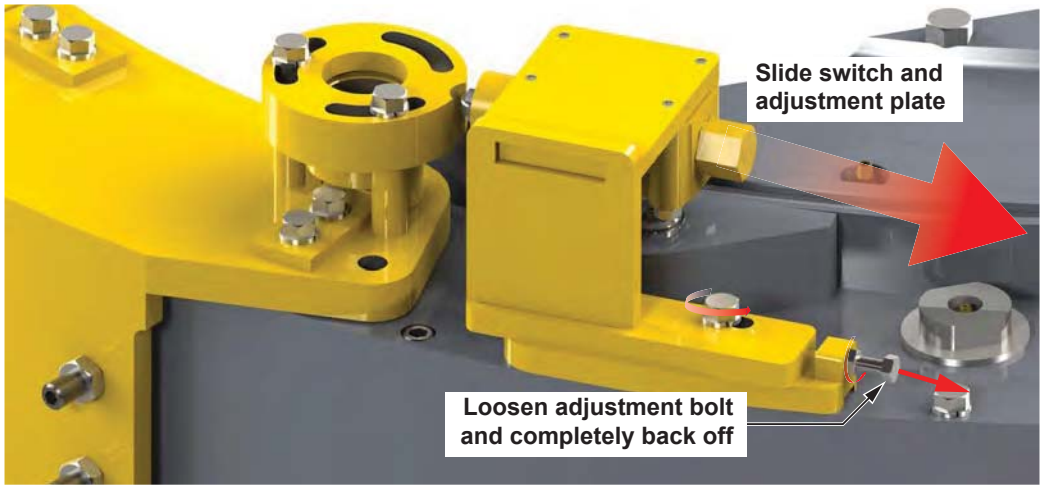


Illustration 5.6.7: Door Switch Adjustment 01

   - Check operation of the hydraulic switch plunger. Depress and allow it spring back several times to ensure smooth operation (see illustration 5.6.7). If the plunger binds or jams, replace the door switch.

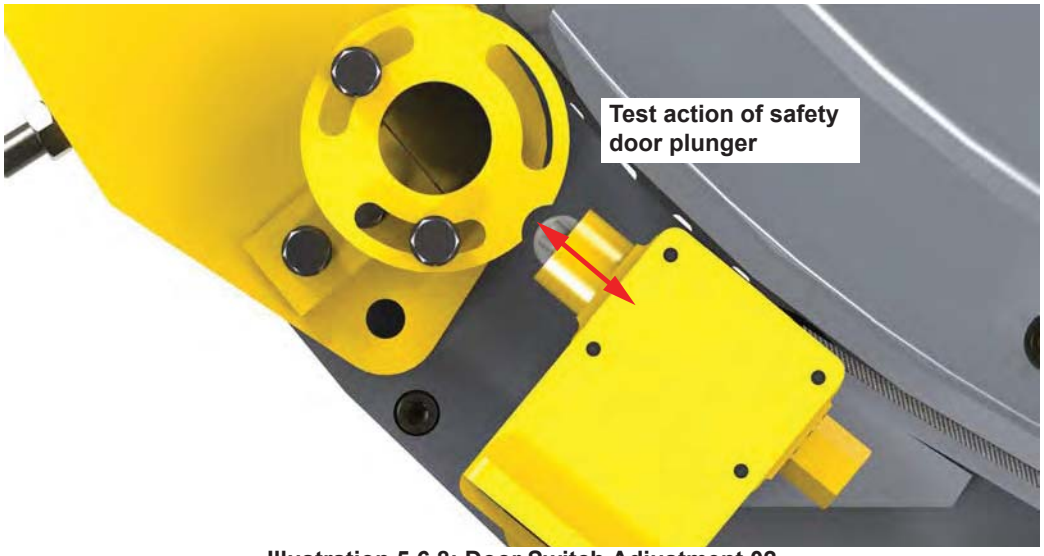


Illustration 5.6.8: Door Switch Adjustment 02

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 three 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 three hex bolts.

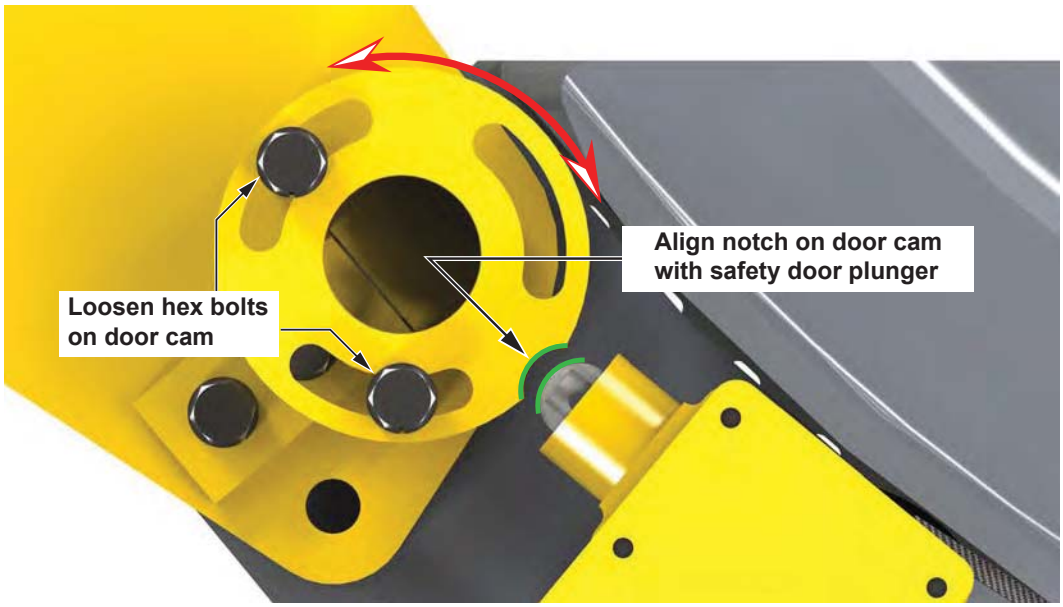


Illustration 5.6.9: Door Switch Adjustment 03

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 four hex bolts to securely fasten the door switch in place.
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.
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.

5.6.5 Door Switch Adjustment (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.

7. 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.

8. Slightly loosen the four bolts securing 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 re-tighten the four mounting bolts, then tighten the locking nut on the adjustment bolt.

9. 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.

5.7 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

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

FASTENERS USED FOR MAINTENANCE OR OVERHAUL OF LOAD-BEARING COMPONENTS (CHAIN SLINGS, RIGID SLINGS, LEGS) MUST BE TIGHTENED TO THE PROPER TORQUE

1. Use a crane to lift the tong on to a sturdy support structure that is capable of safely supporting the entire weight of the tong while still allowing access to the bottom cage plate. Metal horses work well for this application.
2. If not already done, remove the two jaw assemblies and jaw pivot bolts.
3. 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.
4. 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.
5. 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.
6. Support the hydraulic valve assembly with a temporary lifting sling and a crane. Remove the ½” x 5” bolts securing the hydraulic valve assembly to the valve support posts. Lift the hydraulic valve section up and away from the top plate of the tong. If the hydraulic valve assembly does not require service ensure it is stored in a clean, secure location. Cover all exposed connections.
7. Remove the inlet and outlet supports.
8. Remove the top and bottom brake band weldments, leaving the adjustment lug weldments in place for now.
9. Remove the tong door stop cylinders. 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.

⚠ CAUTION

THE DOOR STOP CYLINDER SPRINGS MAY RETAIN COMPRESSION ENERGY. USE A CLAMP TO COMPRESS THE ENDS OF THE CYLINDERS DURING REMOVAL, AND RELIEVE THE SPRING TENSION GRADUALLY.

10. Remove the safety door cams from each door assembly to expose the door pivot roller shafts.
11. Open the tong doors. Remove the nylock nuts and flat washers securing the bottom of the door pivot roller shafts.
12 Support each door assembly during this step (weight = 25 lbs/11.4 kg). Use a soft alloy material (e.g. brass rod) to lightly tap each door pivot shaft up through the support roller assembly until they come free at the top. Use caution that the threads on the ends of the support roller shafts are not damaged.
13. The door assemblies are relatively light weight (weight = 25 lbs/11.4 kg) and may be moved using man power. However, a temporary lifting sling and crane may also be used. ***DISASSEMBLY NOTE:*** the shoulder bushings for the door may become dislodged. If the bushing are to be re-used rather than replaced use caution not to lose them. See the appropriate illustration in Section 7 to identify the exact location of the door bushings.
14. Remove the two fasteners securing the torque gauge mount to the top plate directly behind the motor mount, and lift the gauge mount out of place.

5.8 REMOVAL OF TOP PLATE FOR OVERHAUL (CONTINUED):

15. Remove the clevis pins and R-clips securing the shifting handle to the shift pivot lug and the shifting shaft, and remove the handle.
16. Remove the ½" UNC bolt securing the shift pivot lug weldment to the motor mount and top plate, and remove the shift pivot lug.
17. Remove the four socket head cap screws securing the motor, and lift the motor off 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.
18. Remove the motor mount by removing the four socket head cap screws. The motor mount can be lifted out of place. Take care not to lose the two positioning dowels - one, or both, may come off with the mount.
19. Remove the snap ring securing the top clutch gear to the clutch shaft. Remove the top clutch gear and top clutch bushing. Remove the #10 x ¾" socket head cap screws securing the bearing retainer to the top plate, and remove the bearing retainer.
20. Remove the ½" x 8" bolt securing the backing pin assembly to the top cage plate, and remove the backing pin components.

⚠ 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

21. Remove the two front cage plate bolts, and the rear cage plate bolt, and the cage plate spacers. The cage plates may now be removed - use caution not to damage the bottom cage plate support ring or cage plate cam followers.
22. 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.

23. Remove the 1-½" nuts and pads for the rotary idler gears, and the 1-½" nuts, ⅝" bolts, and half-moon pads from the pinion idler gears.
24. Remove the bottom roller shaft nuts.
25. Carefully remove the remaining twelve support roller shafts. A soft alloy material (e.g. brass rod, etc.) may be required to lightly tap the shafts up through the support roller assembly until they come free at the top. Use caution not to misplace the brake band lug weldments or the two hydraulic valve mounting posts that will come free with this step.
26. Remove the hex head bolts around the perimeter of the tong which secure the top plate to the gear case housing.
27. Remove the countersunk socket head screws around the perimeter of the tong.
28. With all the above steps taken, the top tong plate can be lifted off providing access to the inside of the gear case.

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

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