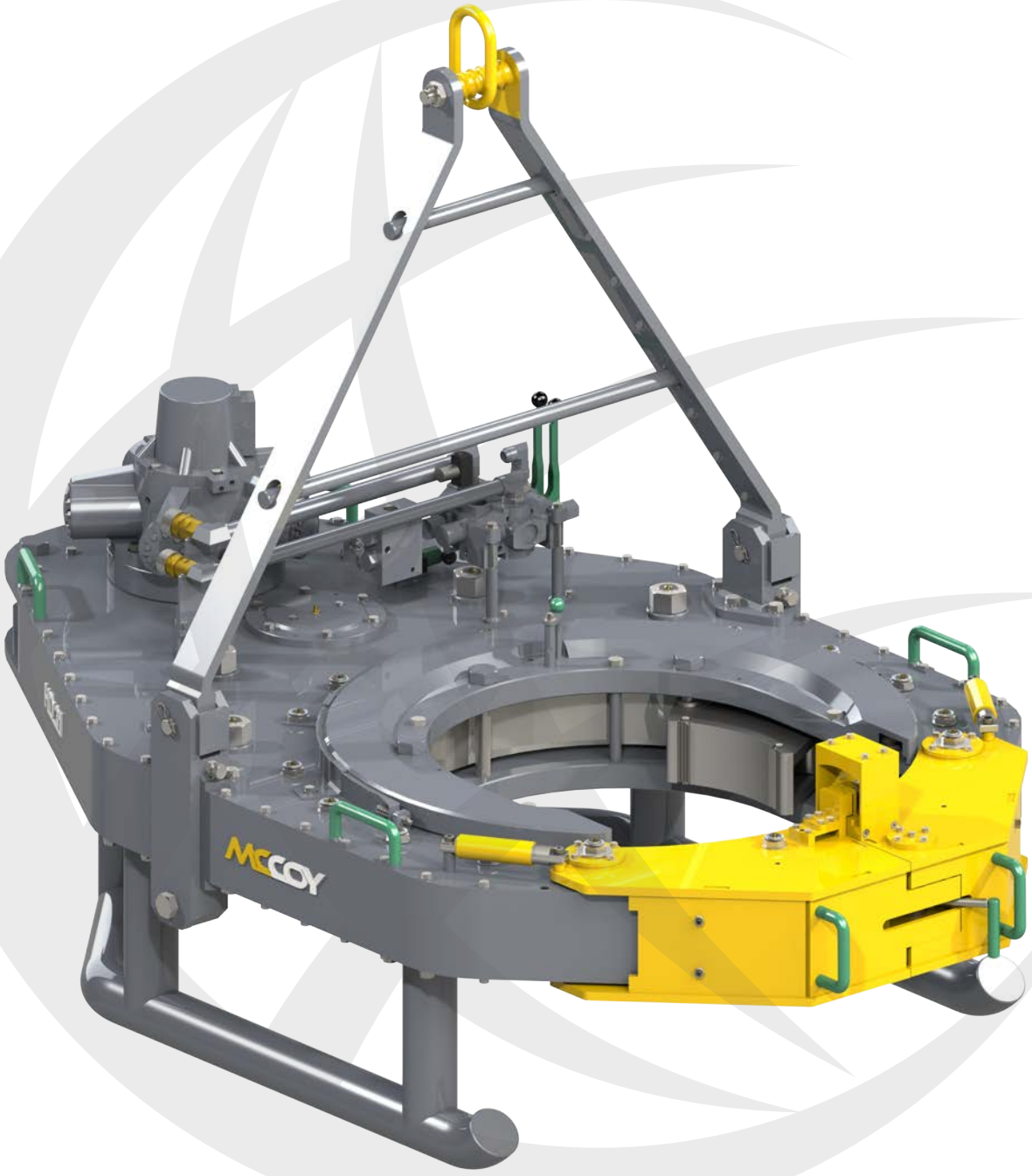
MCCOY GLOBAL

TECHNICAL MANUAL

80-1402-1

31 in 80,000 lb-ft Hydraulic Power Tong



SPECIFICATIONS | OPERATION | MAINTENANCE | PARTS

TECHNICAL MANUAL # 12084

MCCOYGLOBAL.COM

ORIGINAL INSTRUCTIONS

THIS TECHNICAL DOCUMENT APPLIES TO THE FOLLOWING MODELS:		
TONG MODEL	**REV**	**DESCRIPTION**
80-1402-1	2	31” Tong equipped with hydraulic motor, rigid sling, motor valve, lift valve & door switch

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

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

PATENTED & PATENTS PENDING

This page intentionally left blank

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

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

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

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

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

This page intentionally left blank

Summary Of Revisions				
Date	**Section**	**Page**	**Description Of Revision**	**Approved**
Jan 2010	N/A	N/A	Initial Release	
May 2011	6	6.9	Corrected door support roller shaft part number	Bin Ma
APR 2016	ALL	ALL	Complete revision to current technical manual publishing standard. Includes all equipment updates and ECNs to date.	M. Gerwing R. Rahman B. Baldock

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

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

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
WLL	Working Load Limit

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 DESCRIPTION & SPECIFICATIONS

This page intentionally left blank

2.0 EQUIPMENT DESCRIPTION

THIS TECHNICAL DOCUMENT APPLIES TO THE FOLLOWING MODELS:		
TONG MODEL	**REV**	**DESCRIPTION**
80-1402-1	2	31” Tong equipped with hydraulic motor, rigid sling, motor valve, lift valve & door switch

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 10-¾ inches (273 mm) and 30 inches (762 mm) in diameter.

The hydraulic power tong (80-1402-1) 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: 80-1402-1 HD31-80K Tong

2.0 EQUIPMENT DESCRIPTION (CONTINUED):

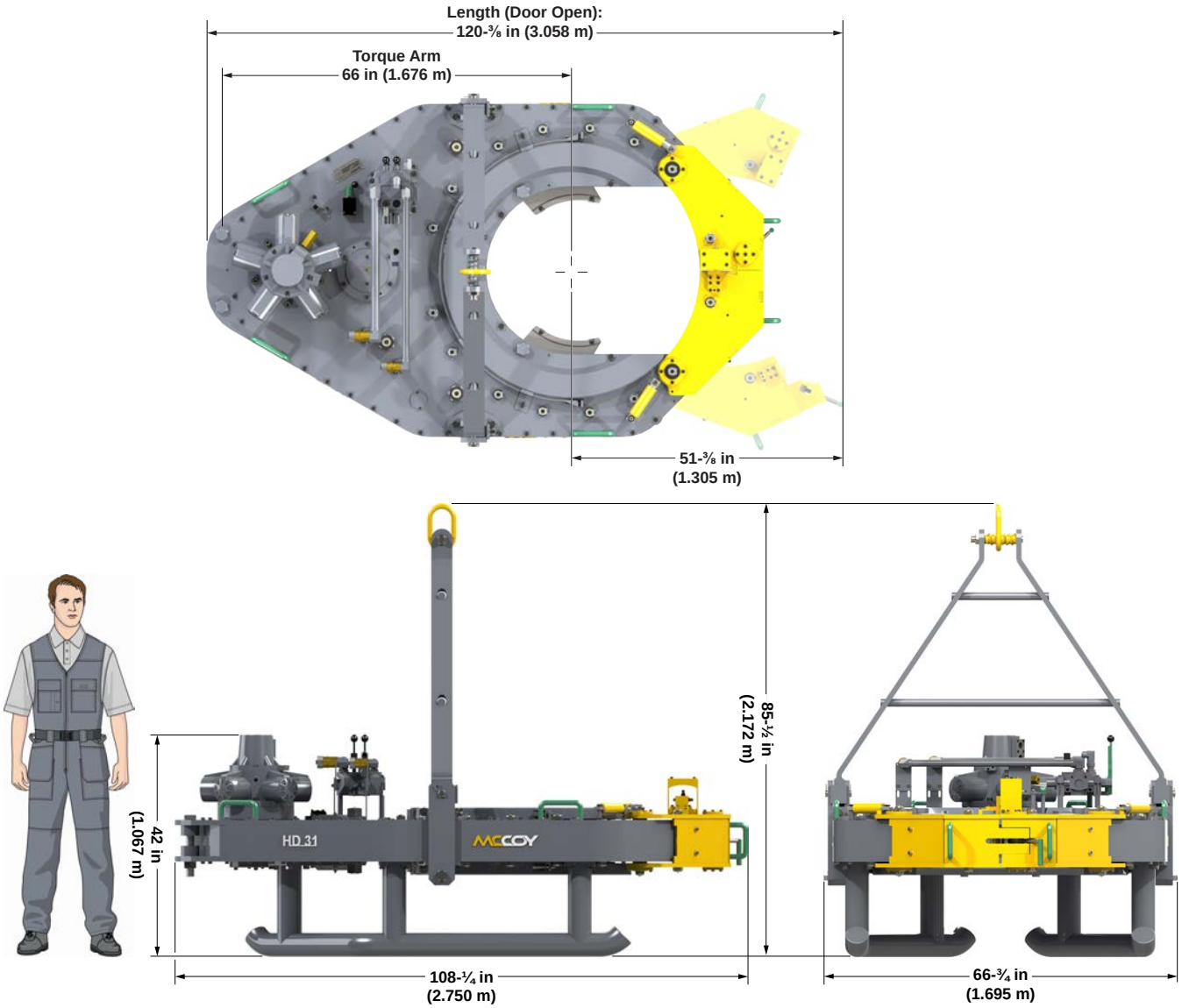
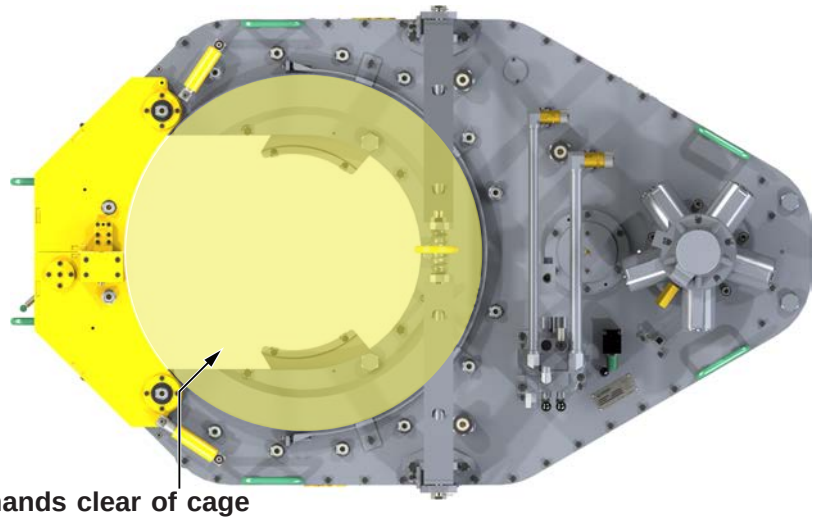


Illustration 2.0.2: 80-1402-1 HD31-80K Tong Dimensions

2.0 EQUIPMENT DESCRIPTION (CONTINUED):

⚠ WARNING

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



Keep hands clear of cage plate when equipment is energized

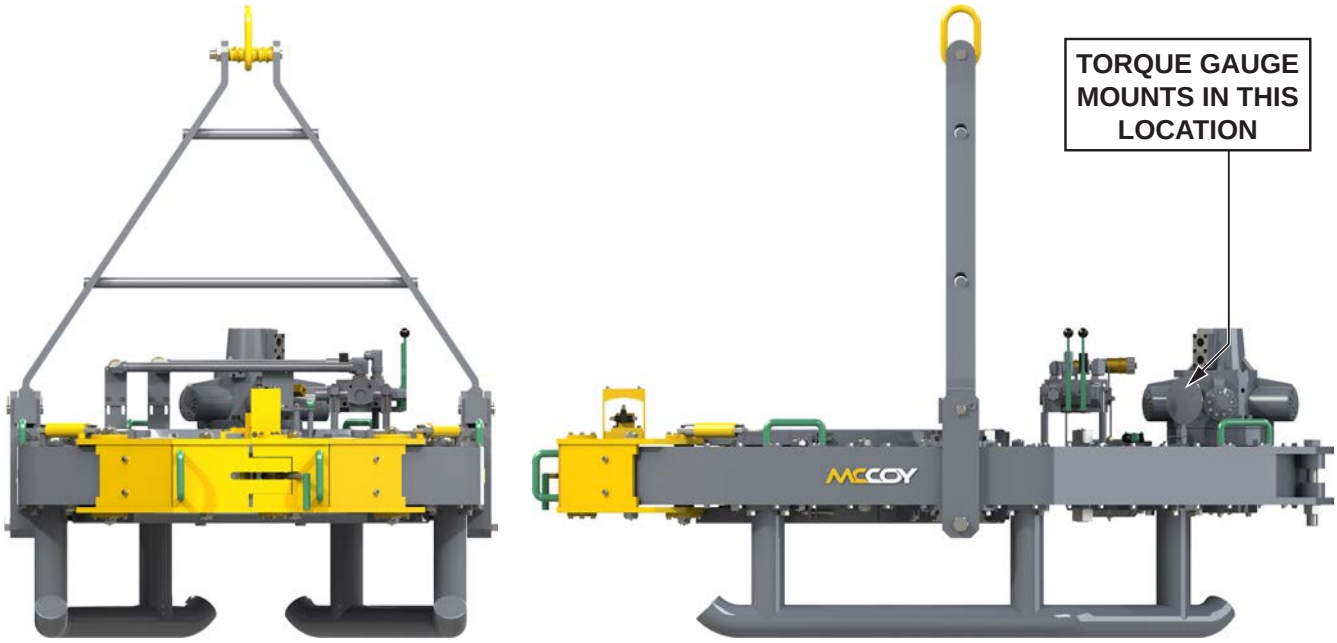


Illustration 2.0.3: 80-1402-1 HD31-80K Additional Hazards

2.1 MAJOR COMPONENT IDENTIFICATION

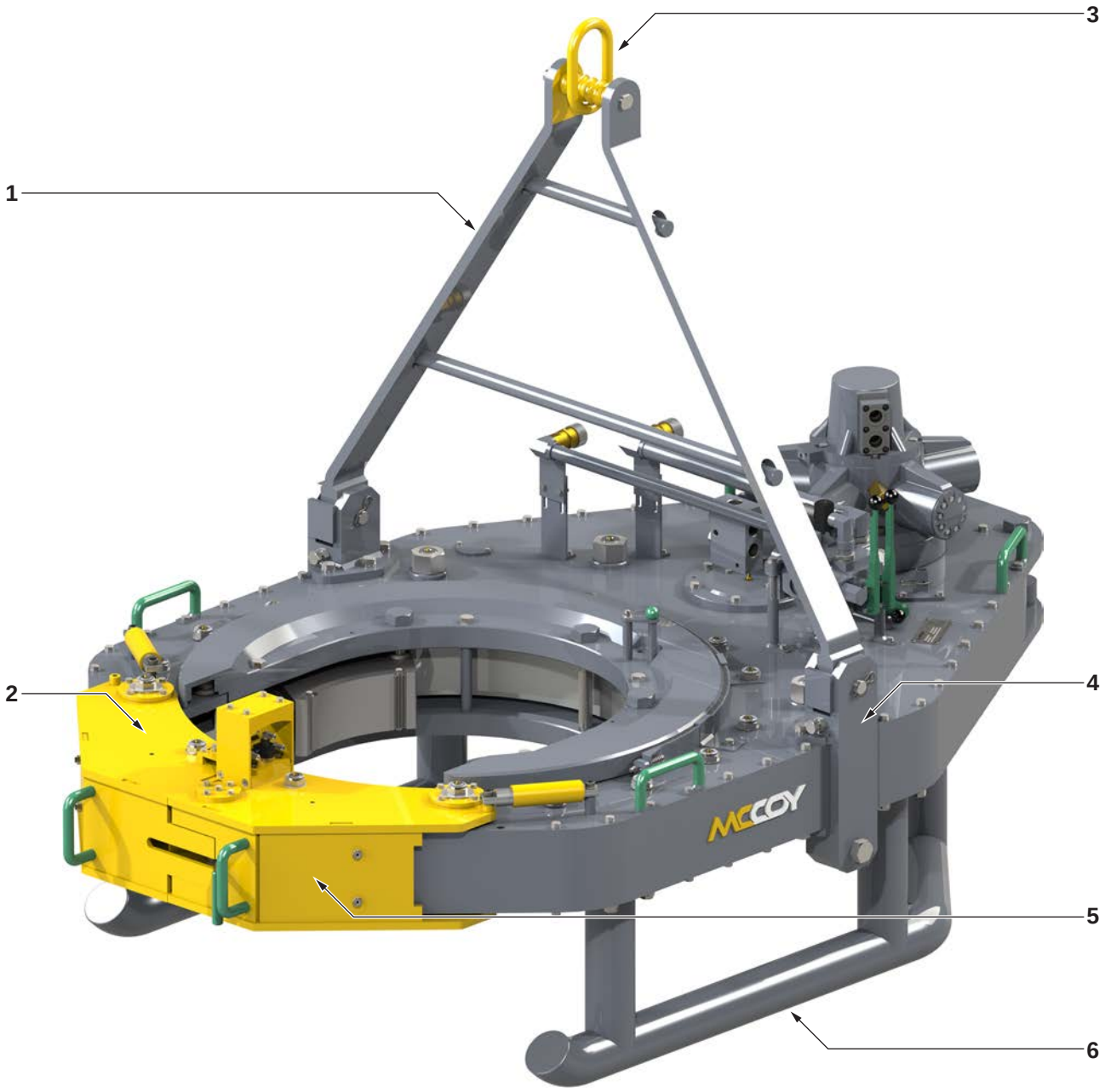


Illustration 2.1.1: Component Identification 01

Item	Description
1	Rigid Sling
2	Door assembly, off-operator's side
3	Master lifting link
4	Longitudinal level adjustment
5	Door assembly, operator's side
6	Tong leg weldment

2.1 MAJOR COMPONENT IDENTIFICATION (CONTINUED):

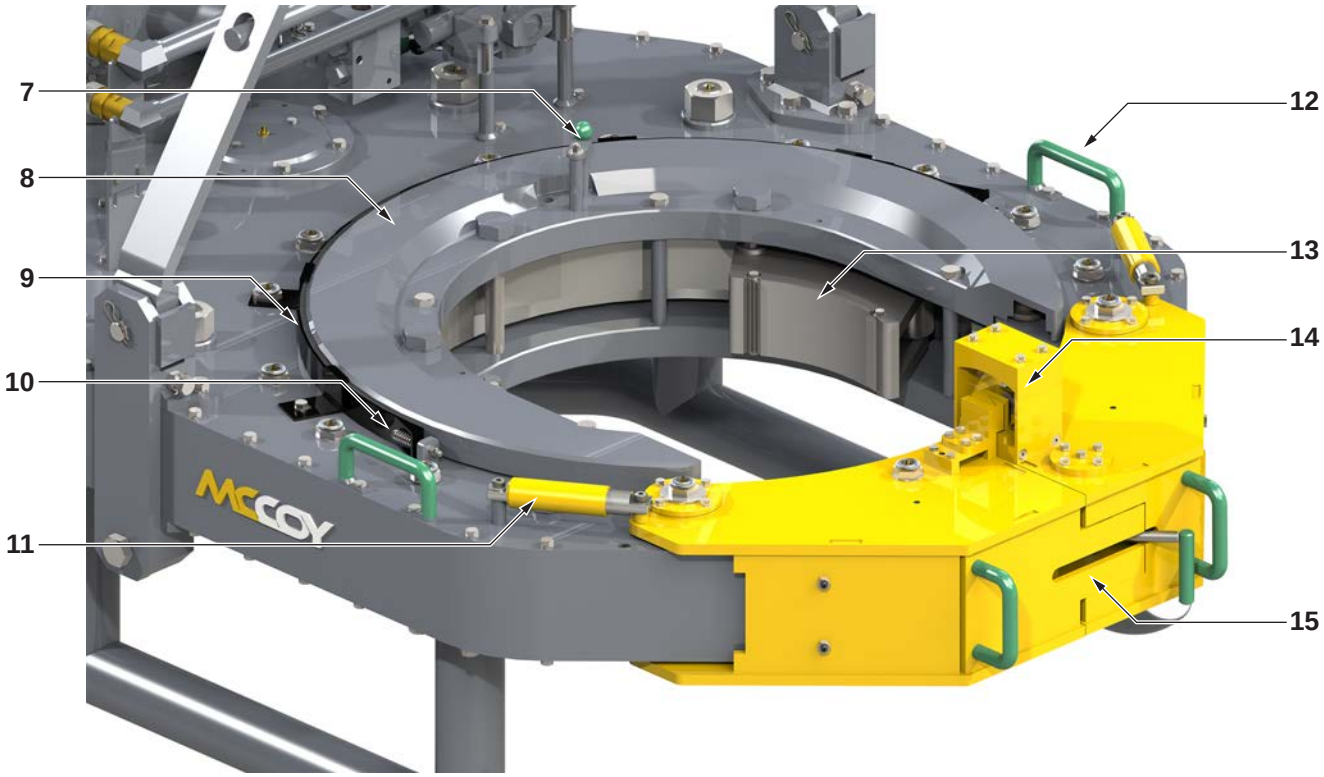


Illustration 2.1.2: Major Component ID 02

Item	Description
7	Backing pin assembly
8	Cage plate assembly
9	Brake band
10	Brake band adjustment
11	Door spring stop cylinder
12	Tong body handle
13	Tong jaw with die insert (18-⅝” shown)
14	Door switch assembly
15	Tong door latch

2.1 MAJOR COMPONENT IDENTIFICATION (CONTINUED):

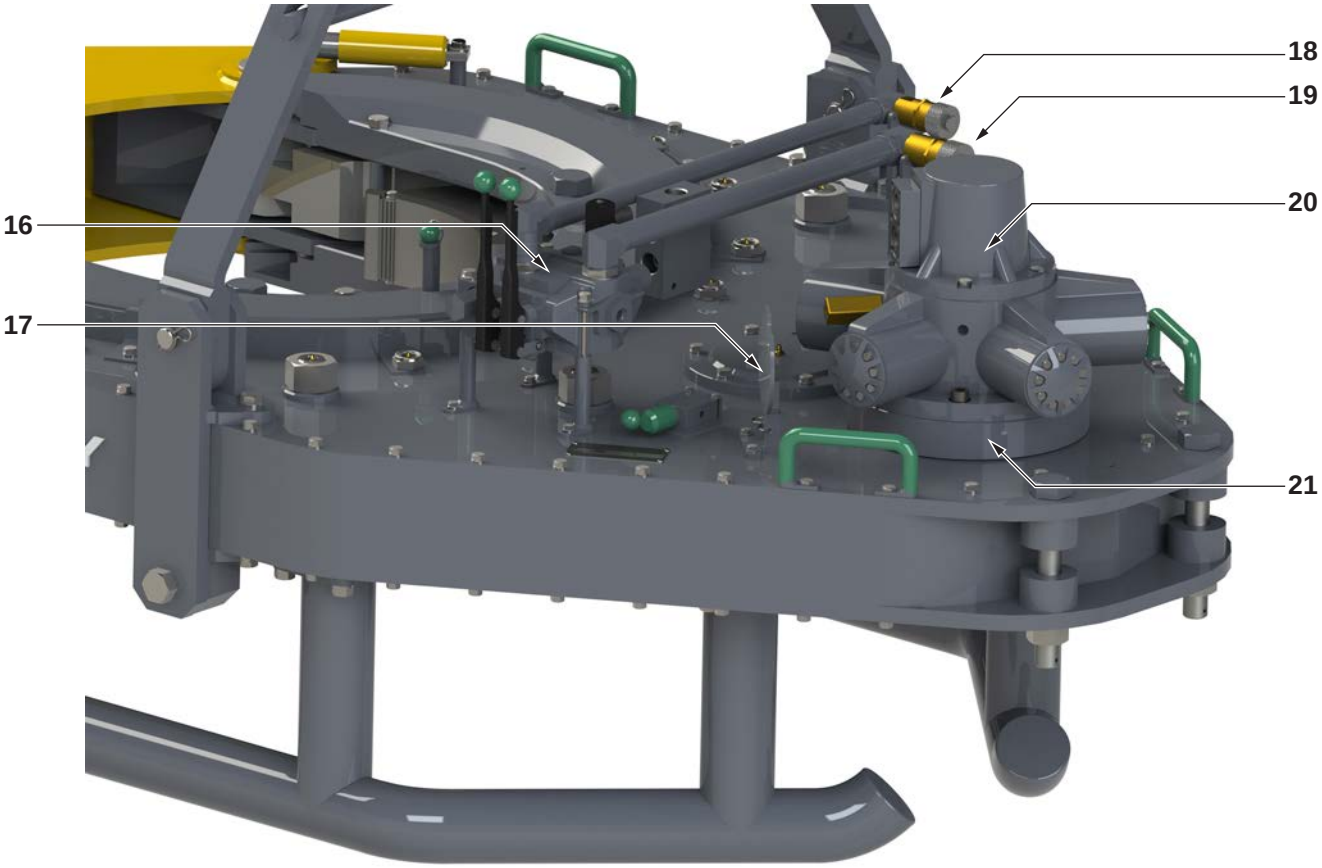


Illustration 2.1.3: Major Component ID 03

Item	Description
16	Hydraulic valve bank
17	Torque gauge mount
18	Hydraulic inlet fitting (1”)
19	Hydraulic outlet fitting (1-¼”)
20	Hydraulic motor
21	Motor mount

Torque Table

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

Pressure	High Gear		Low Gear	
PSI / MPa	Lb-ft	Nm	Lb-ft	Nm
1000 / 6.895	10,101	13,695	20,202	27,390
1500 / 10.34	16,414	22,254	32,828	44,509
2500 / 17.24	29,040	39,373	58,081	78,747
3000 / 20.68	35,354	47,934	70,707	95,866
3368 / 23.22	40,000	54,233	80,000	108,436
MAXIMUM RATED TORQUE: 80,000 LBS.-FT. / 108,436 Nm				
REQUIRED SYSTEM PRESSURE: 3368 PSI / 23.22 MPa				
MAXIMUM SYSTEM PRESSURE: 3500 PSI / 24.132 MPa				
MAXIMUM SYSTEM FLOW: 60 USGPM / 227.1 LPM				

Speed Table

Flow (GPM/LPM)	Low Speed (RPM)	High Speed (RPM)
10 / 37.9	1	2
20 / 75.7	2	4.1
45 / 170.3	4.6	9.3
60 / 227.1	6.2	12.4

⚠ DANGER

DO NOT EXCEED MAXIMUM SPECIFIED FLOW OR PRESSURE

Maximum hydraulic requirements		60 GPM (227.1 LPM)	
		3500 PSI (24.132 MPa)	
Maximum allowable hydraulic return line pressure		200 PSI (1.378 MPa)	
Maximum dimensions	Length (door closed)	108-¼ in (2.750 m)	
	Length (door open)	120-⅜ in (3.058 m)	
	Height	85-½ in (2.172 m)	
	Max width	66-¾ in (1.695)	
Maximum elevator diameter		Unlimited (tong comes off pipe)	
Torque arm length (pipe center to anchor center)		66 in (1.679 m)	
Gear reduction ratio: turns counter encoder gear to ring gear		21.3:1 (60-0001 mount)	Refer to Section 8 for detailed encoder mount information
Dead weight (approximate)		6800 lb / 3090 kg	
Maximum rigid sling load			
Jaws available (inches)		All standard sizes from 10-¾" to 30" (See subsection 3.4)	
Recommended Spring Hanger		85-0106HD (Capacity = 11,500 lb / 5,216 kg)	

⚠ DANGER

ONLY USE SPRING HANGERS SUPPLIED BY MCCOY GLOBAL.

2.3 RECOMMENDED LUBRICANT SPECIFICATIONS

2.3.1 Hydraulic Fluid

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

⚠ CAUTION

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

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

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

NOTICE

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

2.3.2 Gear Fluid

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

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

2.3.3 Grease

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

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

2.4 CE NAMEPLATES

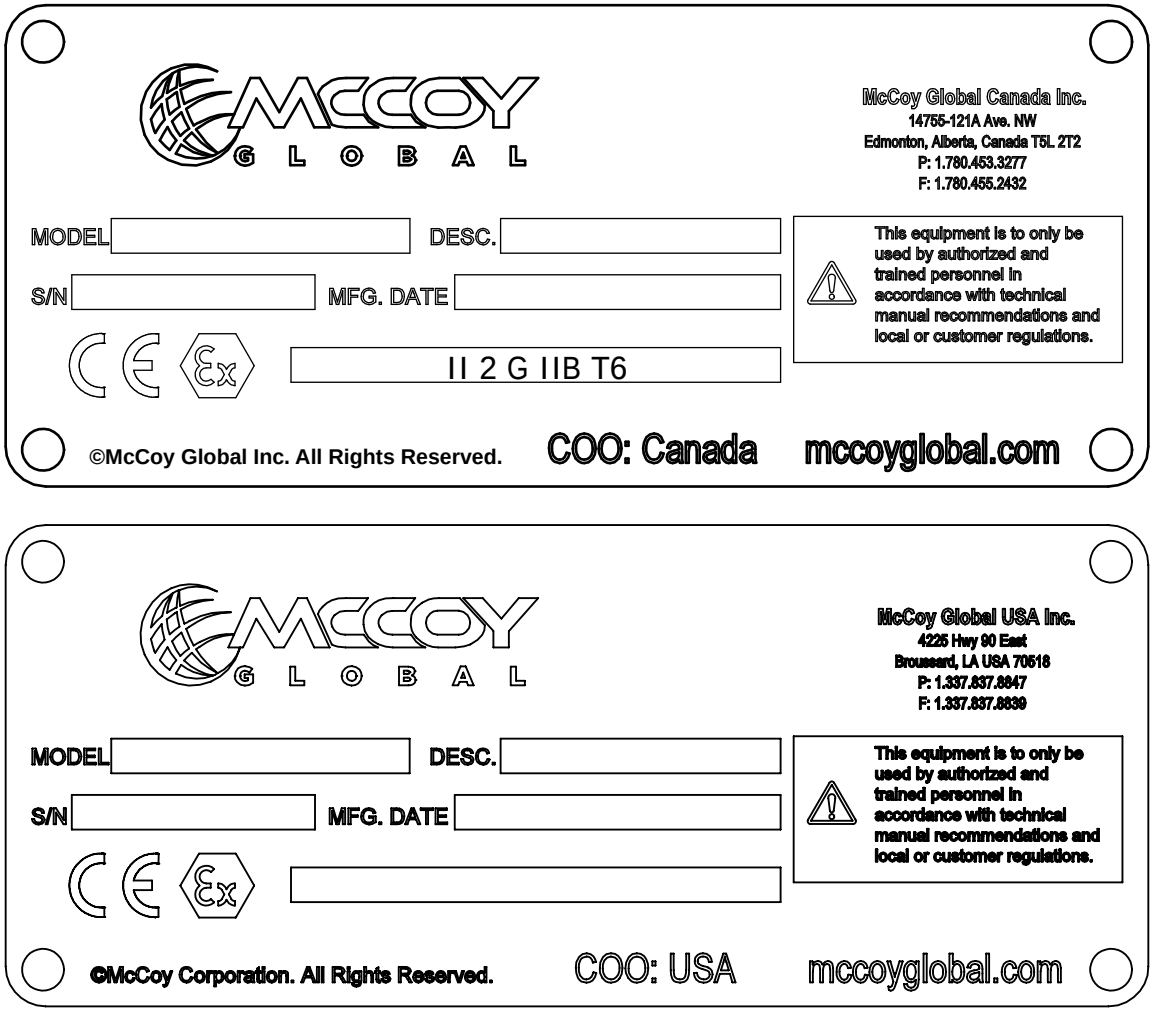


Illustration 2.4.1: CE Nameplates

CE 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.

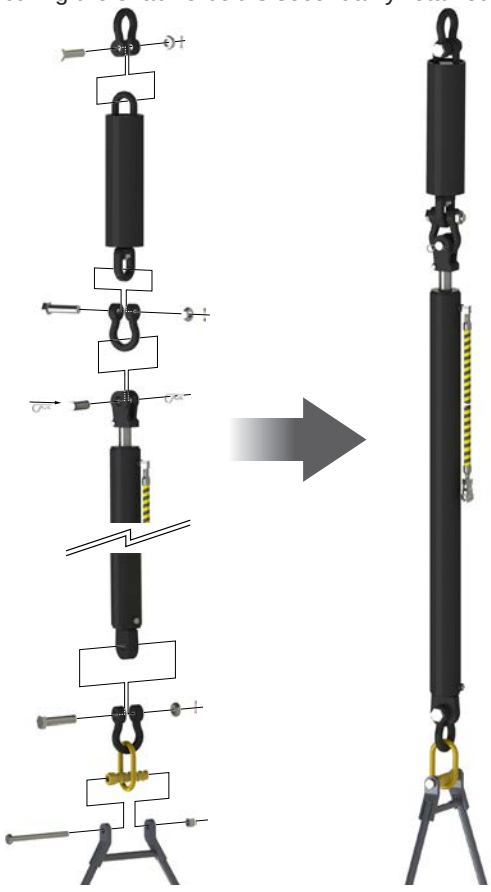


Illustration 3.2.1: Lift Cylinder & Spring Hanger Installation

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.

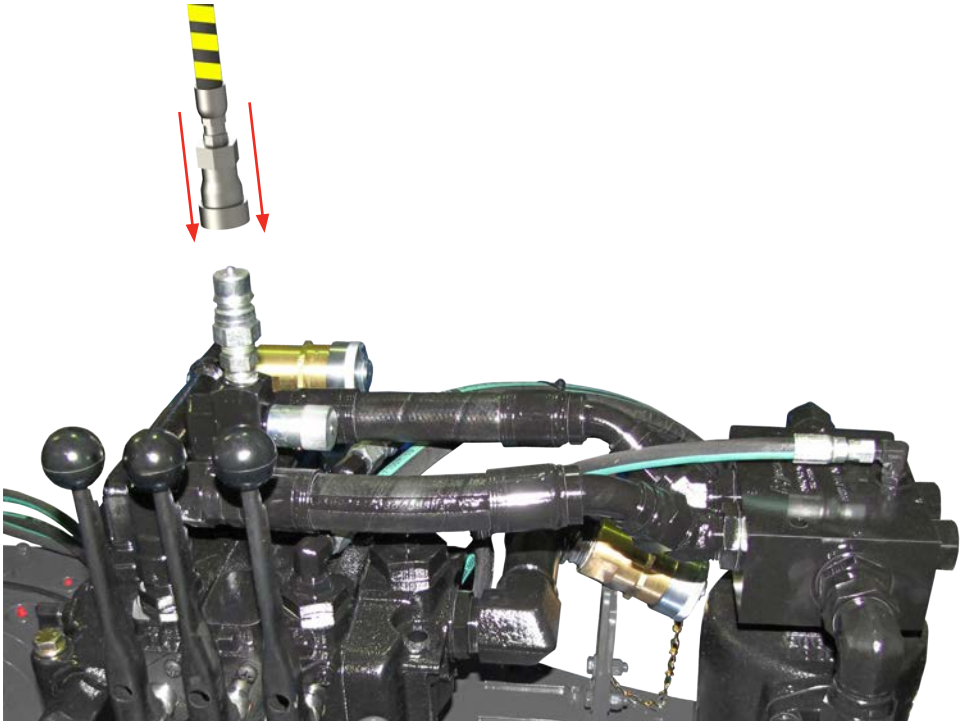


Illustration 3.2.2: Lift Cylinder Hydraulic Connection

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

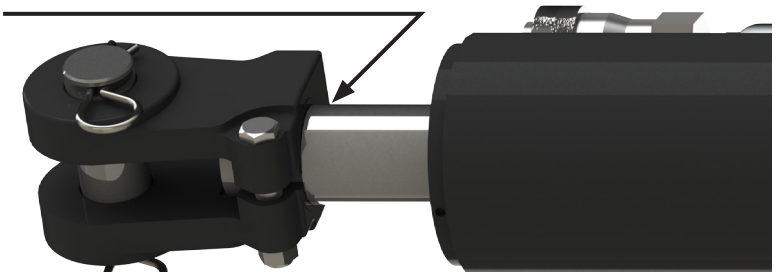


Illustration 3.2.3: Lift Cylinder Clevis Inspection

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 TUBULAR CONNECTION EQUIPMENT ON AND OFF WELL CENTRE.

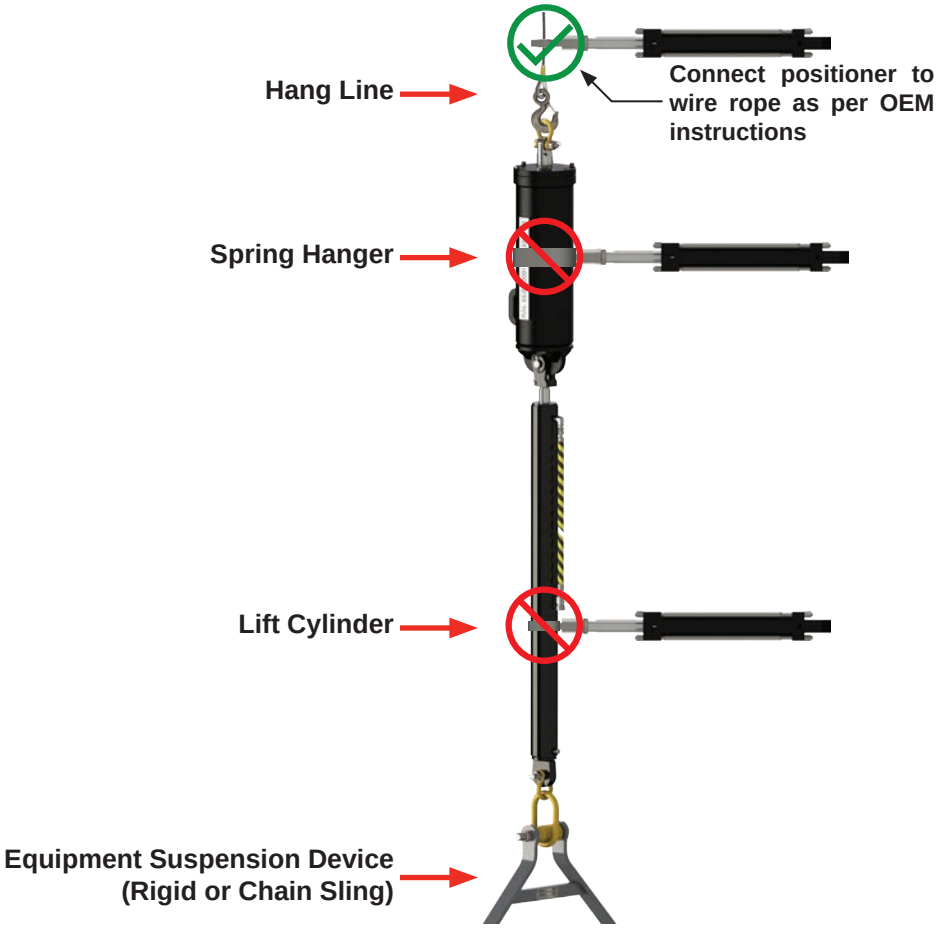


Illustration 3.2.4: Correct Installation of Positioning System

NOTICE

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

3.3 HYDRAULICS

3.3.1 Hydraulic Schematic

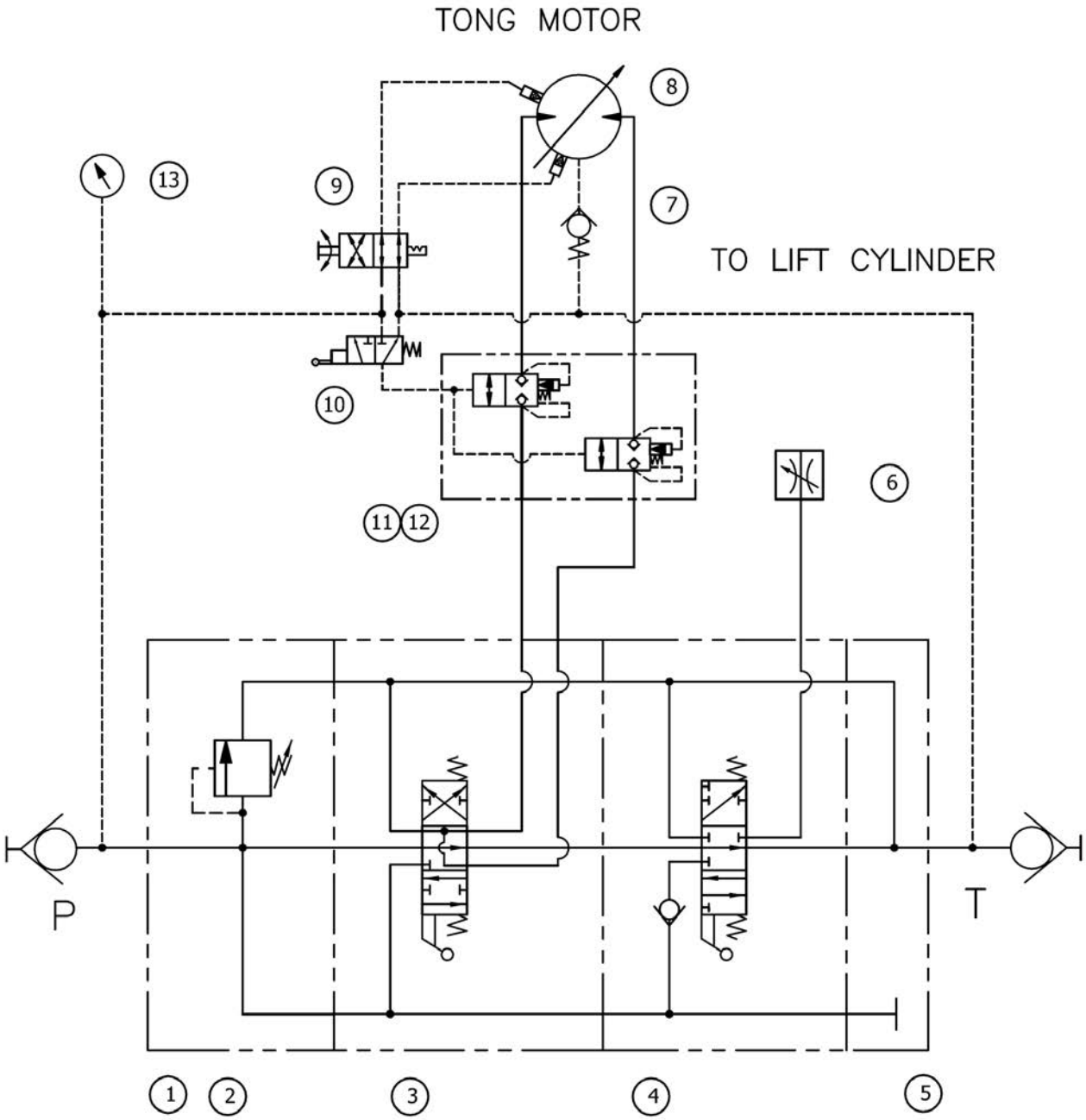


Illustration 3.3.1: Hydraulic Schematic

Item	Description	Part Number	Page
1	Inlet valve section	10-9023	3.12
2	Relief valve	10-9029	3.12
3	Motor valve section	10-9020	3.12
4	Lift valve section	10-9021	3.12
5	Outlet valve section	10-9022	3.12
6	½ in flow control valve	08-9062	3.12
7	Check valve	02-9228	3.13

Item	Description	Part Number	Page
8	Hydraulic motor	87-0210	3.12
9	Motor speed valve	10-9035	3.12
10	Door Switch	08-0337M	3.13
11	Door switch hydraulic block	101-0727	3.13
12	Door switch check valve cartridge	08-1625	3.13
13	0 - 3000 psi pressure gauge	02-0245	

3.3.2 Hydraulic Component Identification

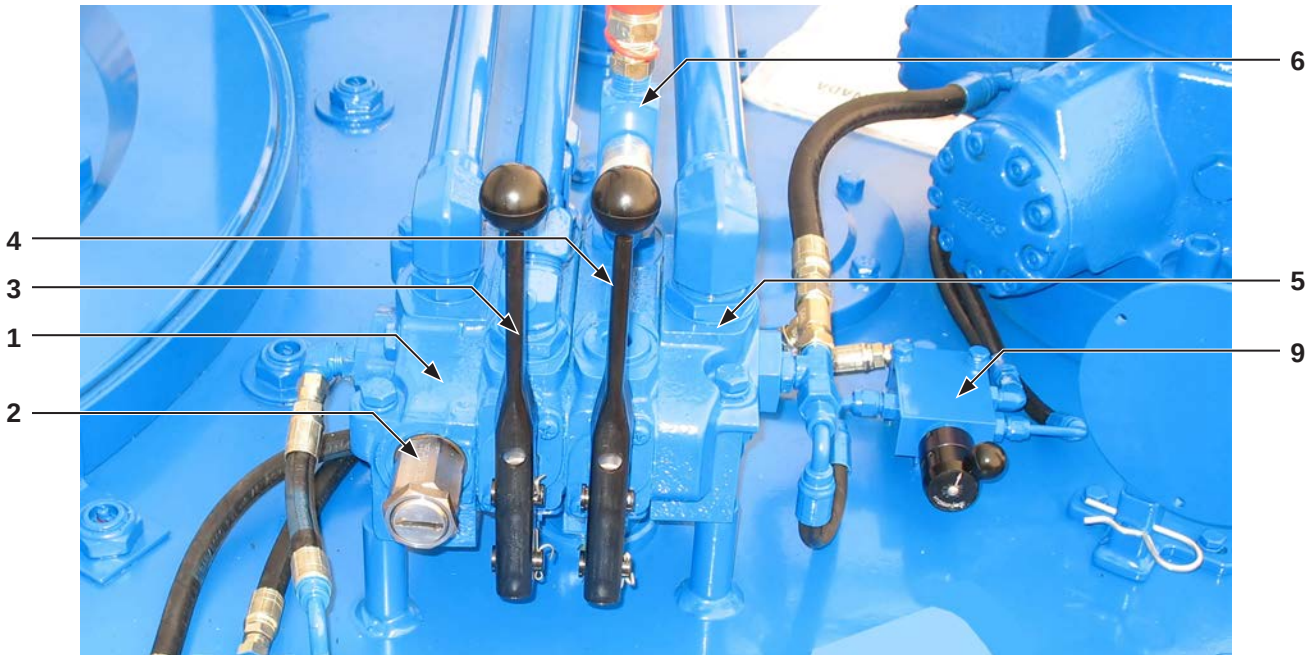


Illustration 3.3.2: Hydraulic Component ID 01

Illustration 3.3.3: Hydraulic Component ID 02

3.3.2 Hydraulic Component Identification (Continued):

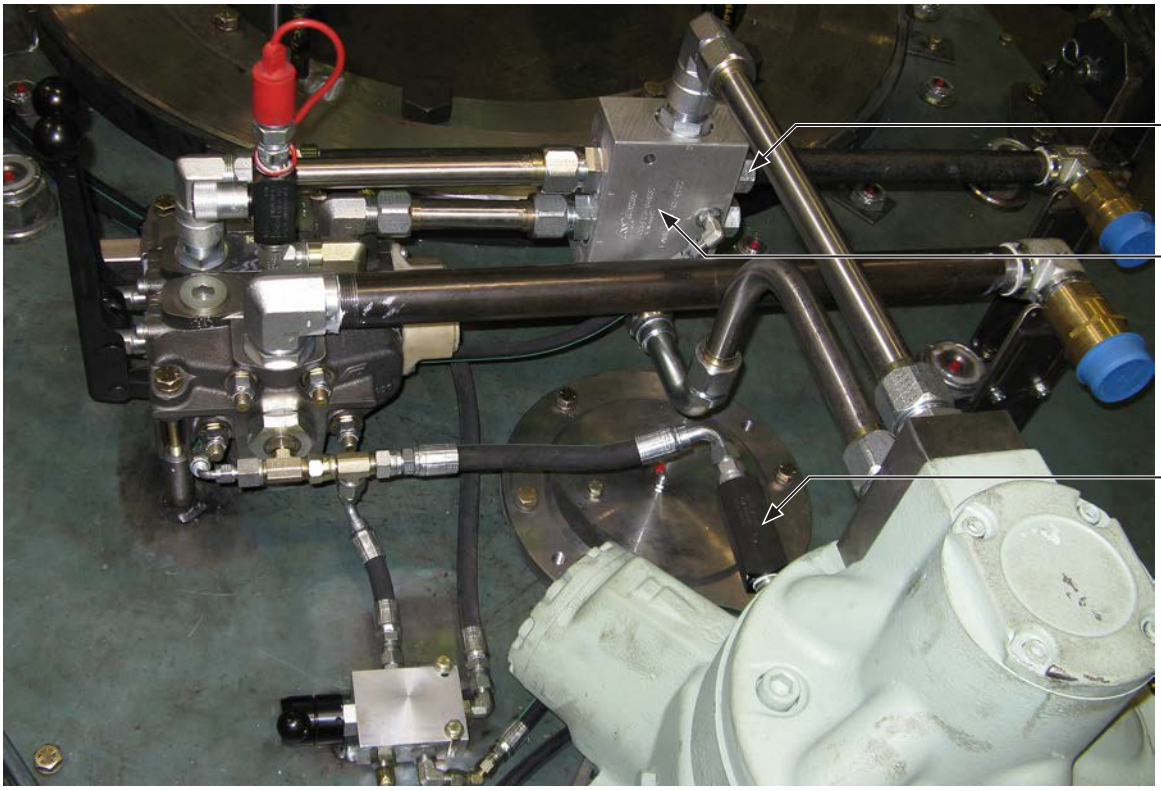


Illustration 3.3.4: Hydraulic Component ID 03

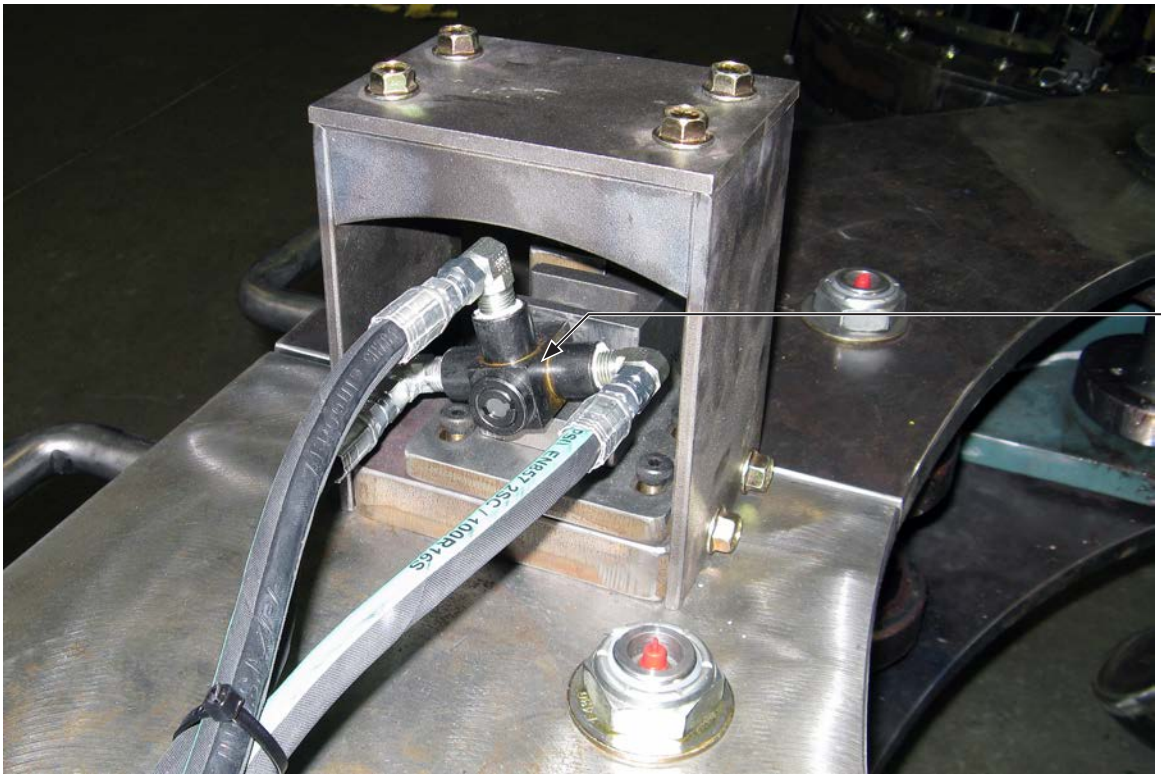


Illustration 3.3.5: Hydraulic Component ID 04

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.

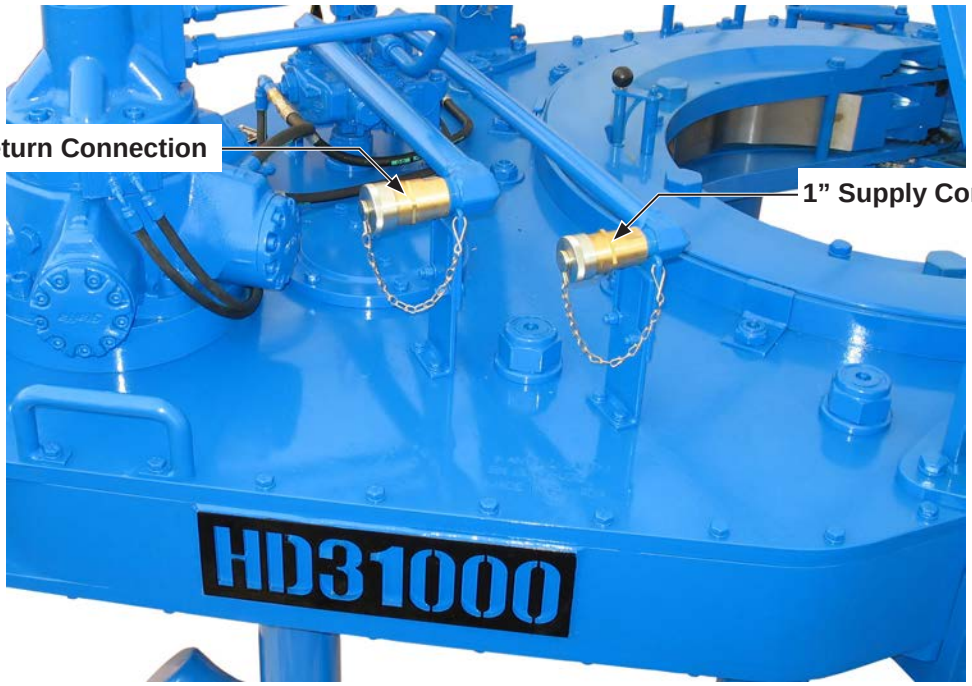


Illustration 3.3.3: Hydraulic Connections 01

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.

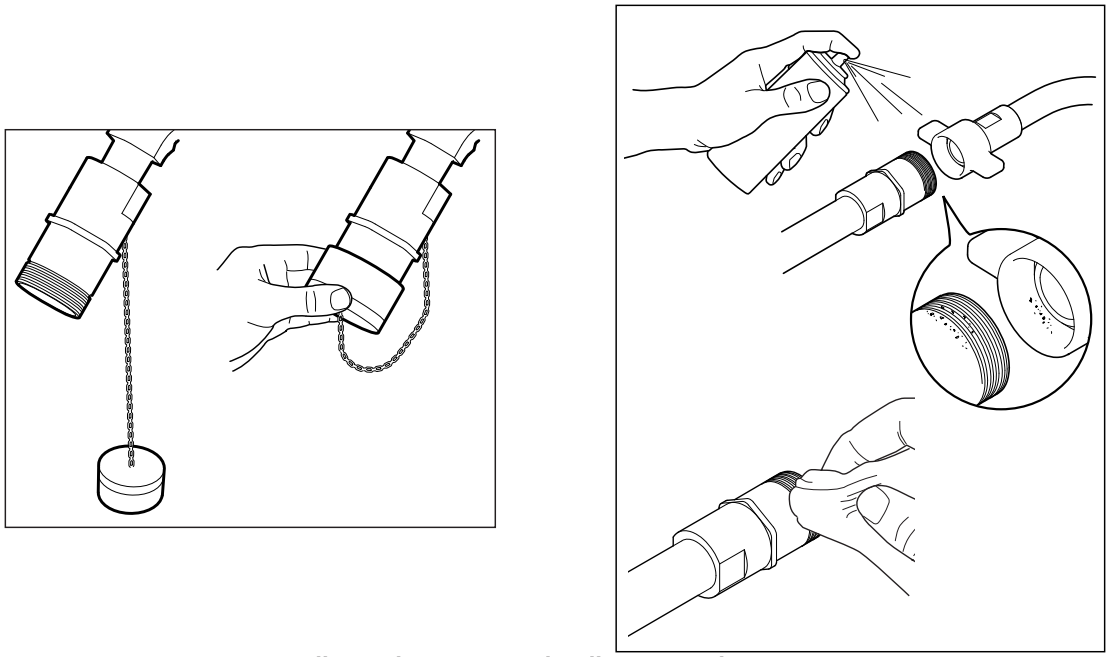


Illustration 3.3.4: Hydraulic Connections 02

3.3.2 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. Do not use a wrench to tighten connections. Do not tap on the “wings” with a hammer to tighten connection.

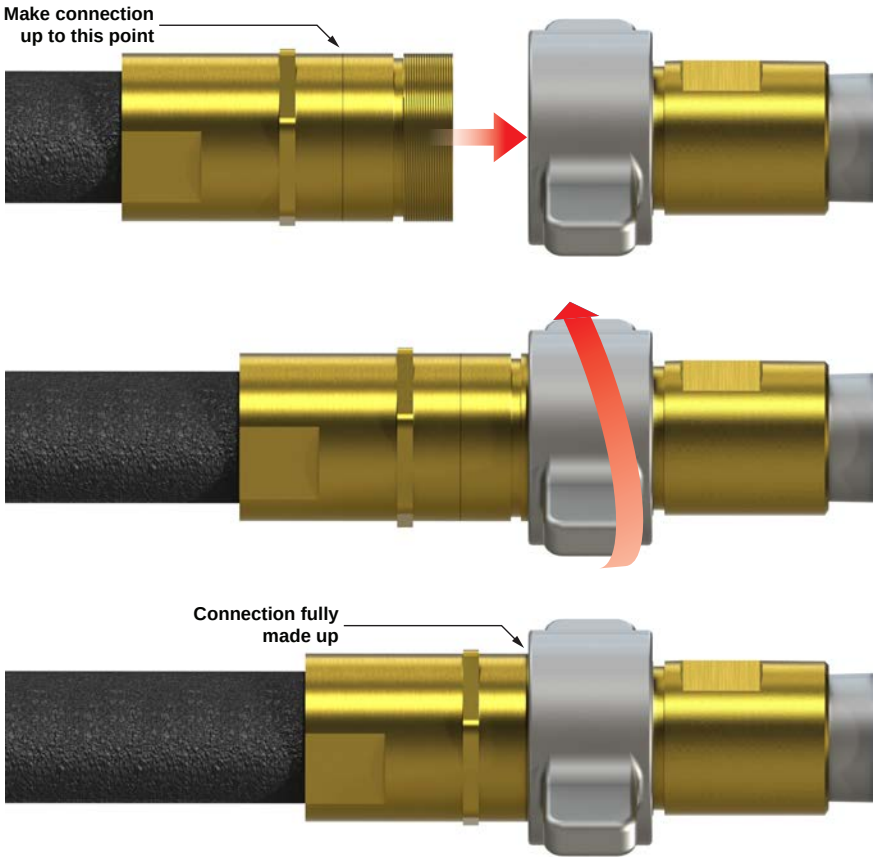


Illustration 3.3.4: Hydraulic Connections 03

⚠ 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
10 - ¾” jaw die kit	1095-JDK-380
13 - ⅝” jaw die kit	1095-JDK-570
16” jaw die kit	1095-JDK-580
18 - ⅝” jaw die kit	1095-JDK-585
20” jaw die kit	1095-JDK-590
22” jaw die kit	1095-JDK-592
24” jaw die kit	1095-JDK-595
26” jaw die kit	1095-JDK-597
28” jaw die kit	1095-JDK-598
30” jaw die kit	1095-JDK-600
Standard 5” replacement die (all jaw sizes)	13-0008-500-0
Jaw roller used (all jaw sizes)	1095-JR-300
Jaw roller pin used (all jaw sizes)	1095-JP

CAUTION

MAXIMUM JAW SIZE IS 30 INCHES

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.

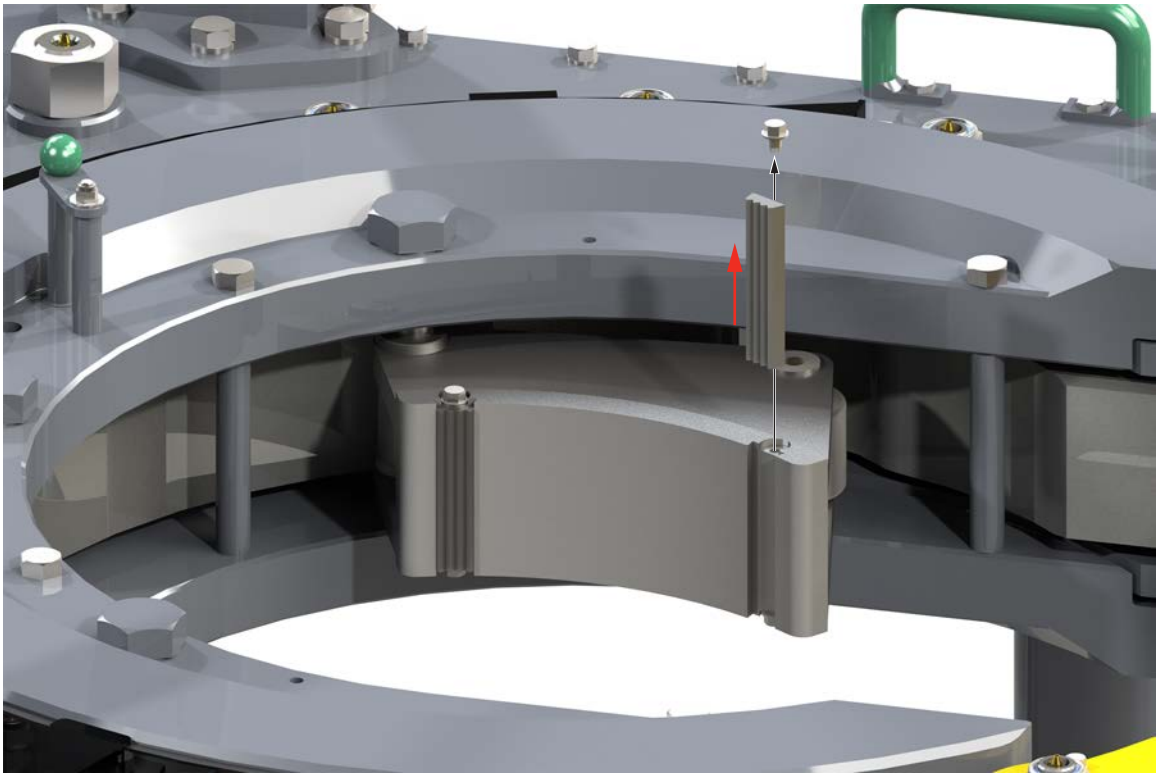


Illustration 3.4.1: Jaw Die Removal

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.
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.

3.4.3 Tong Jaw Installation & Removal (Continued):

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. If equipped, remove the secondary retention from the jaw roller pin. Pin retention could be a screw, a snap ring, or a weld bead, which 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.
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 spring hanger assembly (see specification page for recommended spring hanger). The spring hanger compensates for the downward movement of the casing as the thread is made-up, and imparts additional force to the suspension cable as the internal spring(s) is (are) deflected. The following table lists the working load limit (WLL) and test load for McCoy spring hangers. In all cases hang lines must be rated to support the total weight of the suspended equipment PLUS the additional force imparted as a result of spring hanger deflection. **For design purposes consider the "test loads" listed below as being the maximum total weight of equipment plus spring hanger deflection force.**

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

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

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

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

McCoy Global recommends using backup (snub) lines on each side of your assembly to restrict motion in either direction of rotation. Snub lines must be of sufficient strength to withstand the force imparted by the maximum rated torque of the tong and backup assembly in use. Snub lines will arrest uncontrolled movement of the tong and backup in the event slipping of the backup jaws. Calculate the force on the snub lines by dividing the maximum torque of the tong by the tong's torque arm (expressed in feet). For example, a 75,000 lb-ft tong with a 45-½ inch (3.792 ft) torque arm will generate 19,780 lbs. of force against a snub line connected 90° to the longitudinal axis of the equipment. Select your snub lines based upon the total force and the margins of safety dictated by the policies of your company and by established engineering practices. Ultimately, calculating the force on the snub line and selection of the snub line is the complete responsibility of the customer.

Snub lines must be securely connected to the rear of the tong and backup assembly, and tied off to a suitably rated anchor. When properly installed the snub line should be taut enough to allow very little movement, preventing the tong from generating excessive force on the lines by "snapping" tight when rotation is applied.

⚠ DANGER

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

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

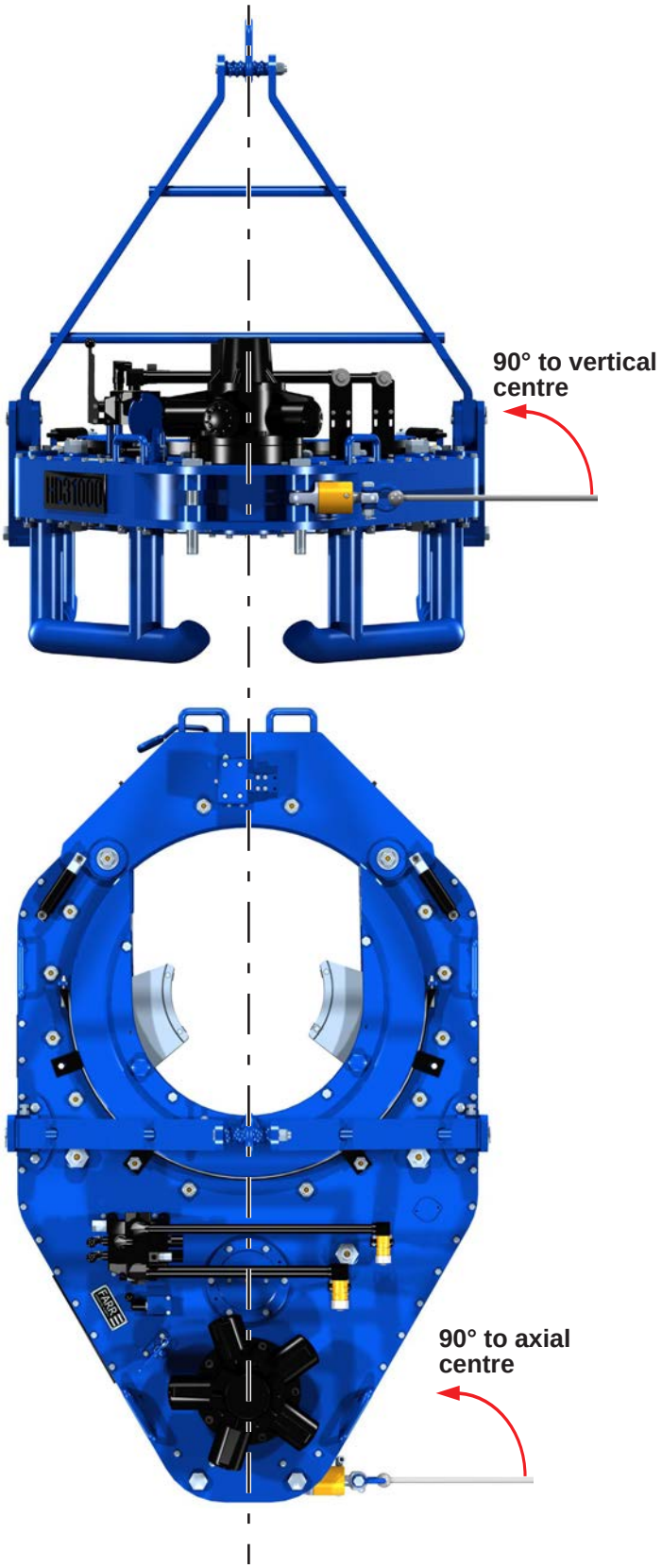


Illustration 3.5.1: Tong Suspension Relative To Vertical & Axial Centre

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.

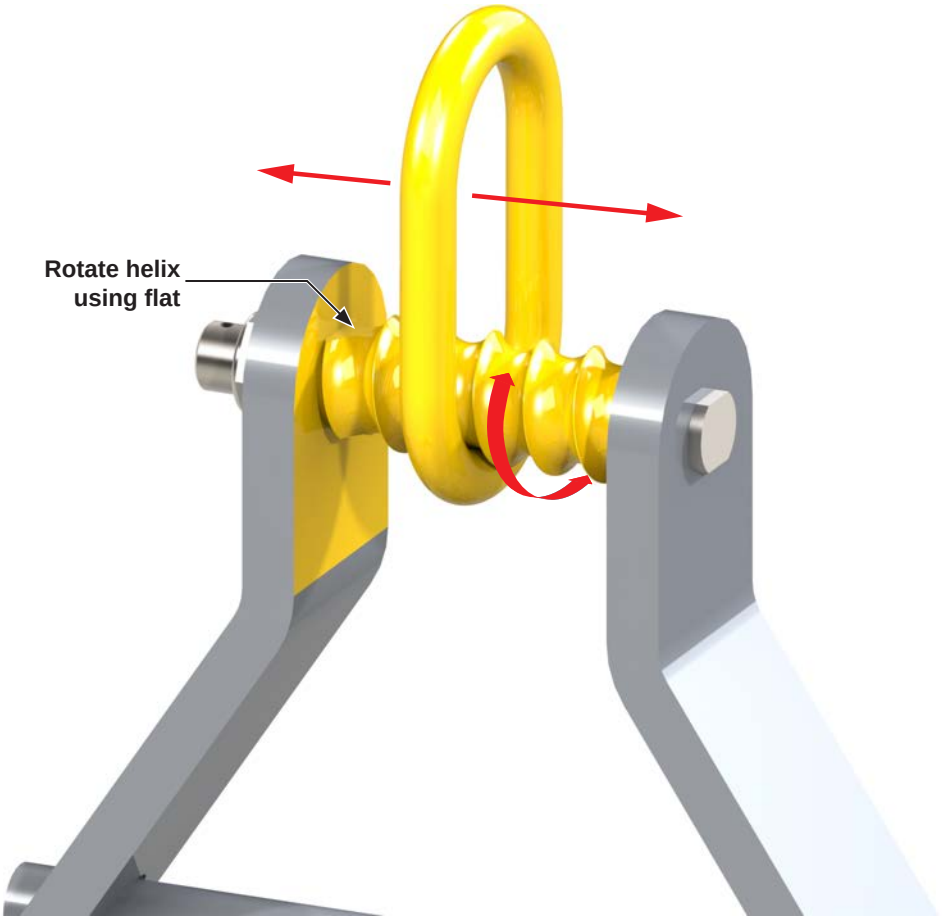


Illustration 3.5.2: Tong Leveling 01

4. Repeat steps 1 through 3 until the level shows that the tong is level side-to-side at well-center.

3.5.2 Tong Leveling (Continued):

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.
7. Loosen the ¾" jam nuts on the adjusting bolts on rigid sling brackets. Completely loosen the adjusting bolts. Turn each adjusting bolt equally until to adjust the rigid sling in the appropriate direction to level the equipment at well centre. Lock adjusting bolts in place with the jam nuts.

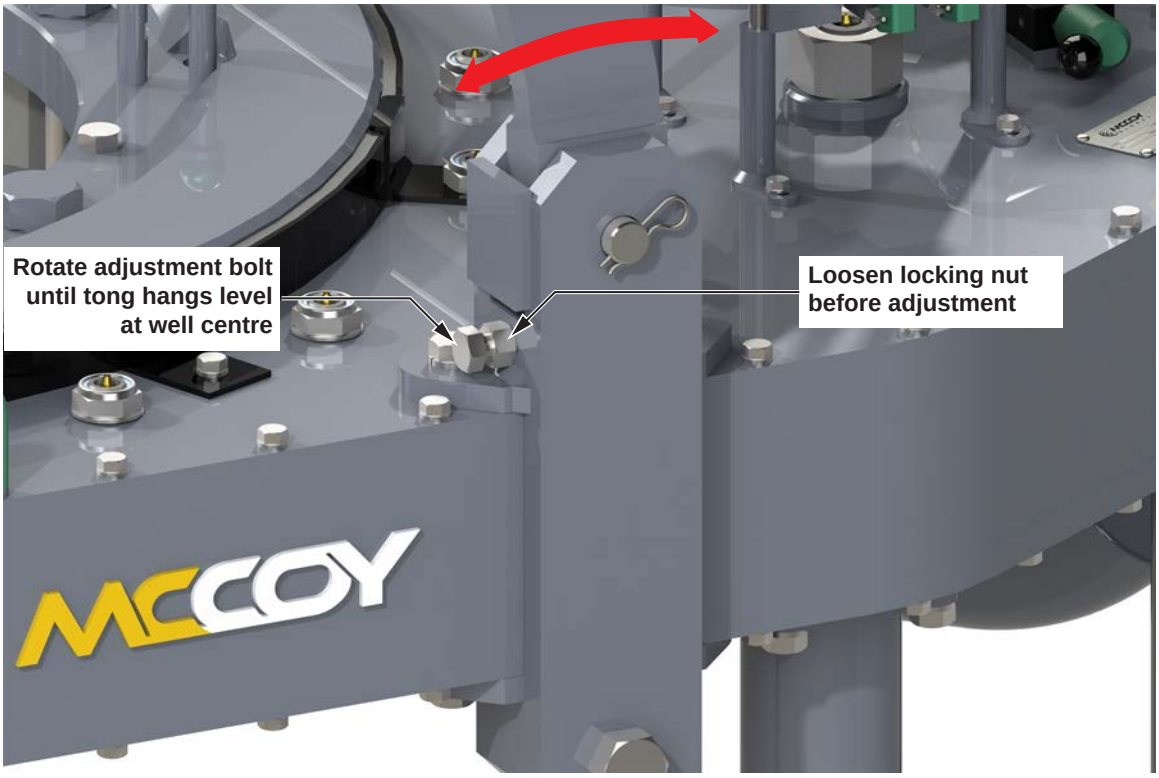


Illustration 3.5.3: Tong Leveling 02

8. Repeat steps 5 through 7 until the equipment is level front-to-rear at well center. Double-check that the equipment has remained level side-to-side.

This page intentionally left blank

SECTION 4: OPERATION

This page intentionally left blank

4.0 TONG OPERATION

4.0.1 Operator Training

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

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

4.0.2 Operator Safety

McCoy 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

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

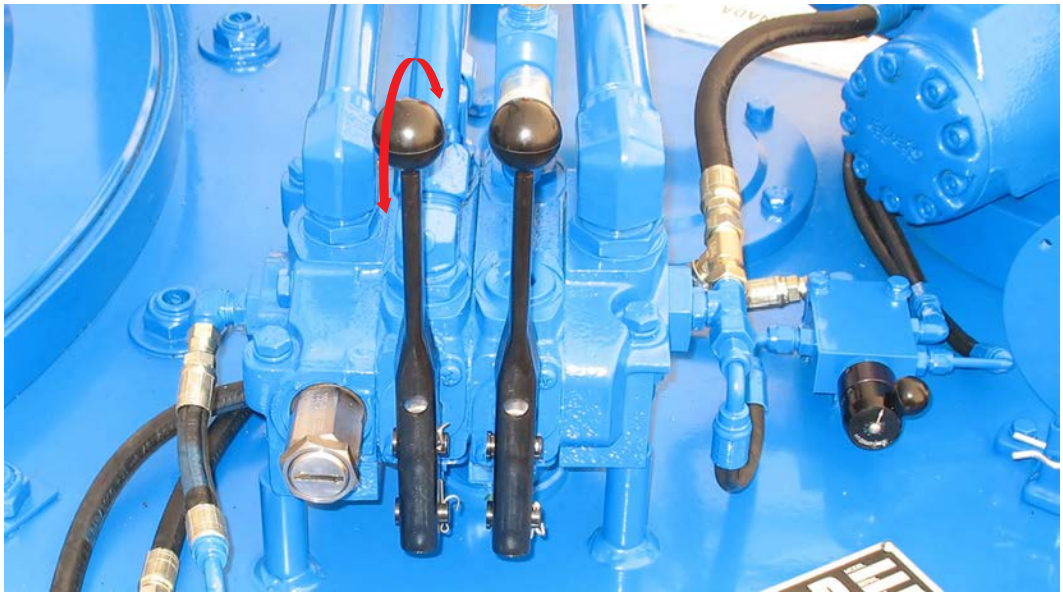


Illustration 4.0.1: Tong Rotation Control Valve

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).

4.0.3 Valve Operation (Continued):

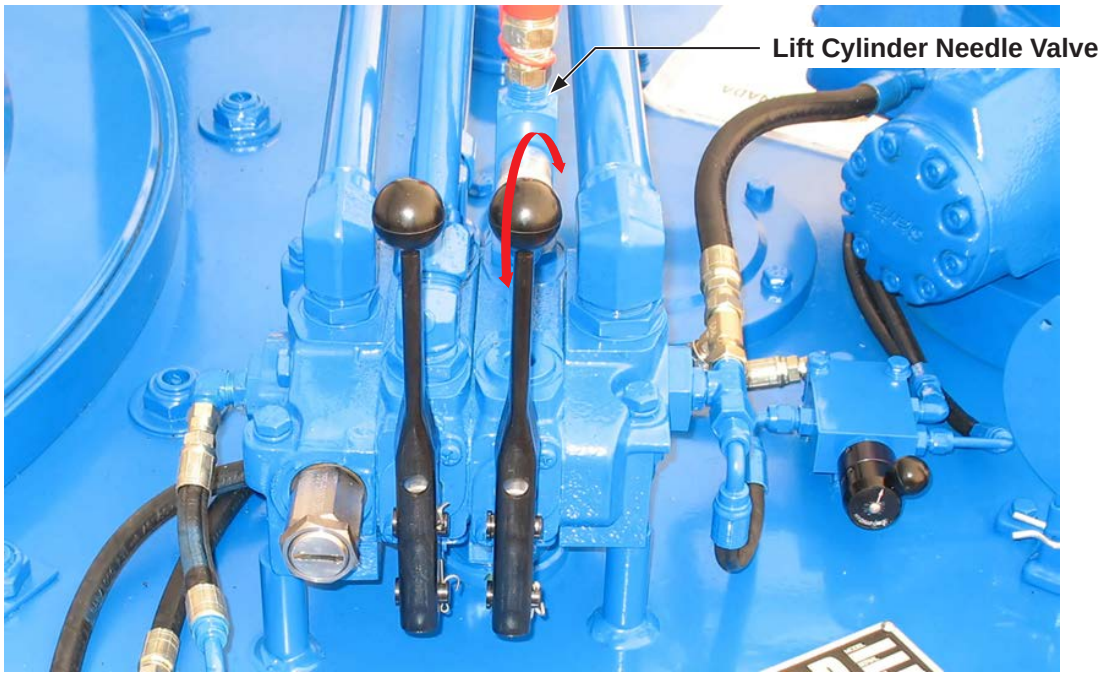


Illustration 4.0.2: Tong Lift Cylinder Control Valve

MOTOR SPEED CONTROL

This is a two-way double-action valve, without proportional control. When the valve handle is in the “LO” position, the two-speed motor rotates at its slowest speed. Rotating the valve handle a quarter-turn clockwise to the “HI” position increases the motor to its HIGH speed. Note that maximum torque can only be applied with the tong motor rotating at its LO speed setting.

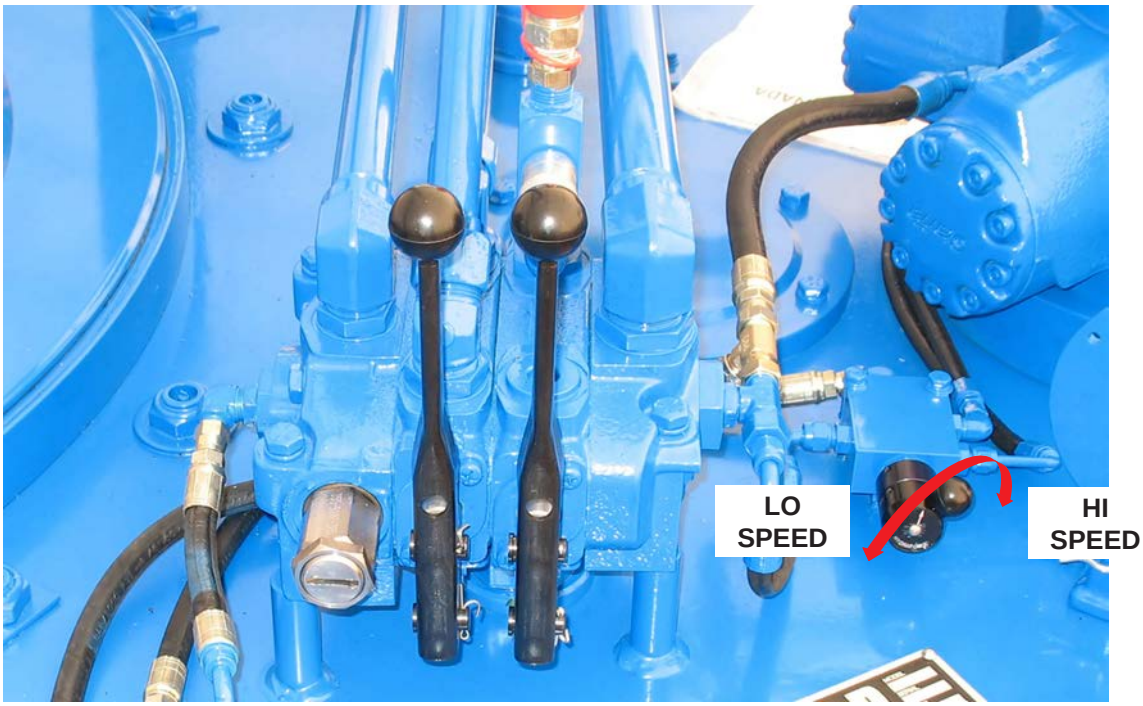


Illustration 4.0.3: Tong Motor Speed Control Valve

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.

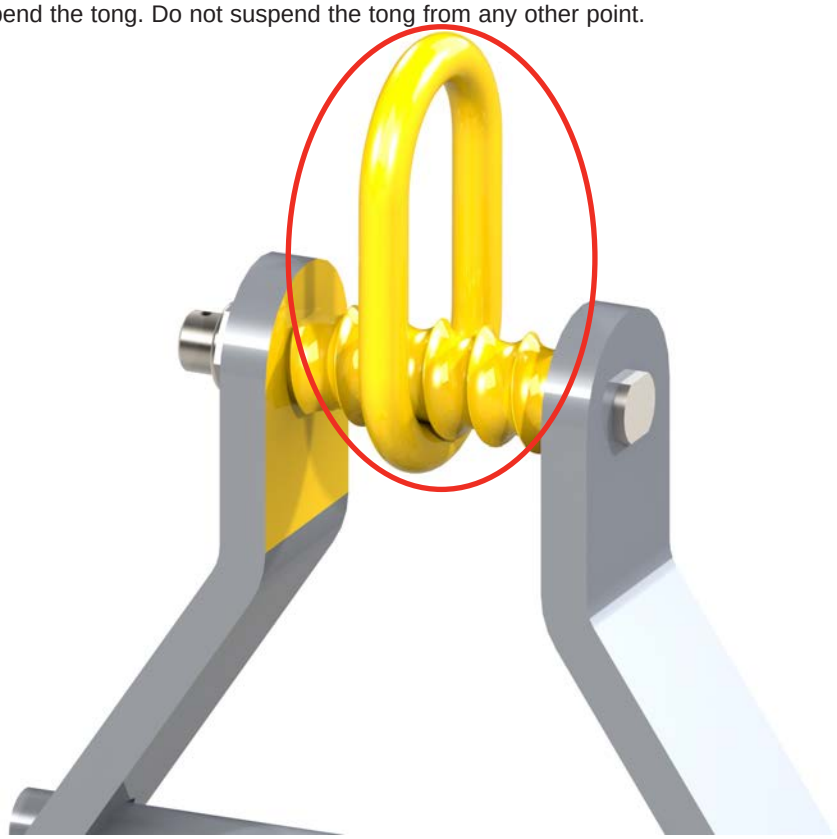


Illustration 4.1.1: Master Lifting Link

⚠ 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 operator’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 tong over the connection. Use the lift cylinder hydraulic control to properly adjust the height of the tong above the connection.

7. Firmly close the LH (operator’s side) door, followed by the RH (off-operator’s side) door, and use the door latch handle to rotate the latch cam to engage the latch pins. Tug on the door handles to ensure the door latch has properly and securely engaged.
8. Use the motor speed valve to set the tong to rotate at high speed (see subsection 4.0.3) to thread the connection at high speed.
9. Slowly move the motor hydraulic control valve in the make-up direction to slowly rotate the cage plate assembly and cam the jaws on to the tubular.
10. When the tong jaws cam on to the tubular fully push the motor hydraulic control valve in the make-up direction 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. As the motor begins to stall use the motor speed valve to set the tong to rotate at low speed (see sub-section 4.0.3). This will enable the tong to produce adequate torque for making up the joint to specification. Monitor the torque gauge during rotation, and stop rotation upon reaching the specified make-up torque
12. Push the motor hydraulic control valve in the break-out direction 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 equipment 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 rotary gear must be aligned with the tong 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-operator’s side (the right hand side as seen from the rear of the tong), and the snub line must be transferred to the operator’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. Unlatch the door, and open the RH (off-operator’s side) door, followed by the LH (operator’s side) door. Opening the tong door activates the door switch system and prevents rotation of the cage plate.
5. If necessary use the lift cylinder hydraulic control to lift the tong 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 EQUIPMENT AS IT IS LIFTED FROM THE DRILL FLOOR

Position the tong over the connection. Use the lift cylinder hydraulic control to properly adjust the height of the tong above the connection.

6. Firmly close the LH (operator’s side) door, followed by the RH (off-operator’s side) door, and use the door latch handle to rotate the latch cam to engage the latch pins. Tug on the door handles to ensure the door latch has properly and securely engaged.
7. Use the motor speed valve to set the tong speed to low. Breakout torque is only available when the tong is set to low speed.
8. Slowly move the motor control valve 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.

9. When the connection breaks use the motor speed valve to set the motor to high speed, enabling the tong to completely un-thread the connection at high speed.
11. Fully push the motor hydraulic control valve in the break-out direction to un-thread the connection at high speed. When the connection is fully separated move the motor hydraulic control valve in the make-up direction 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.
13. Free the tong 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.
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, McCoy recommends the following lubrication procedure at the completion of each job prior to storage.

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

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

5.5.1 Cage Plate Cam Followers

The cage plate cam followers are sealed units, and do not require lubrication.

5.5.2 Support Roller Bearings

Apply grease to the support roller bearings through the grease fittings recessed into the top and bottom of each support roller shaft 16 locations top, 16 locations bottom - see illustration 3.E.1).

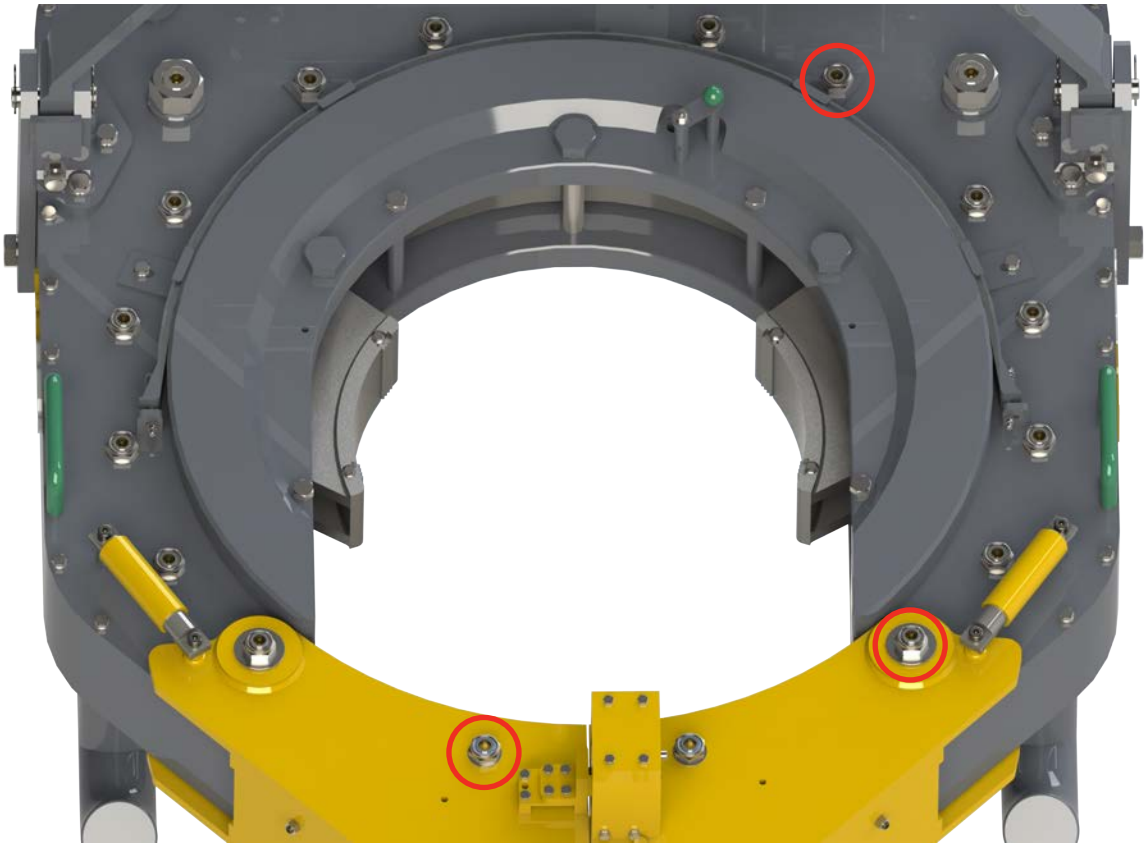


Illustration 5.5.1: Support Roller Lubrication

5.5.3 Rotary Idlers

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

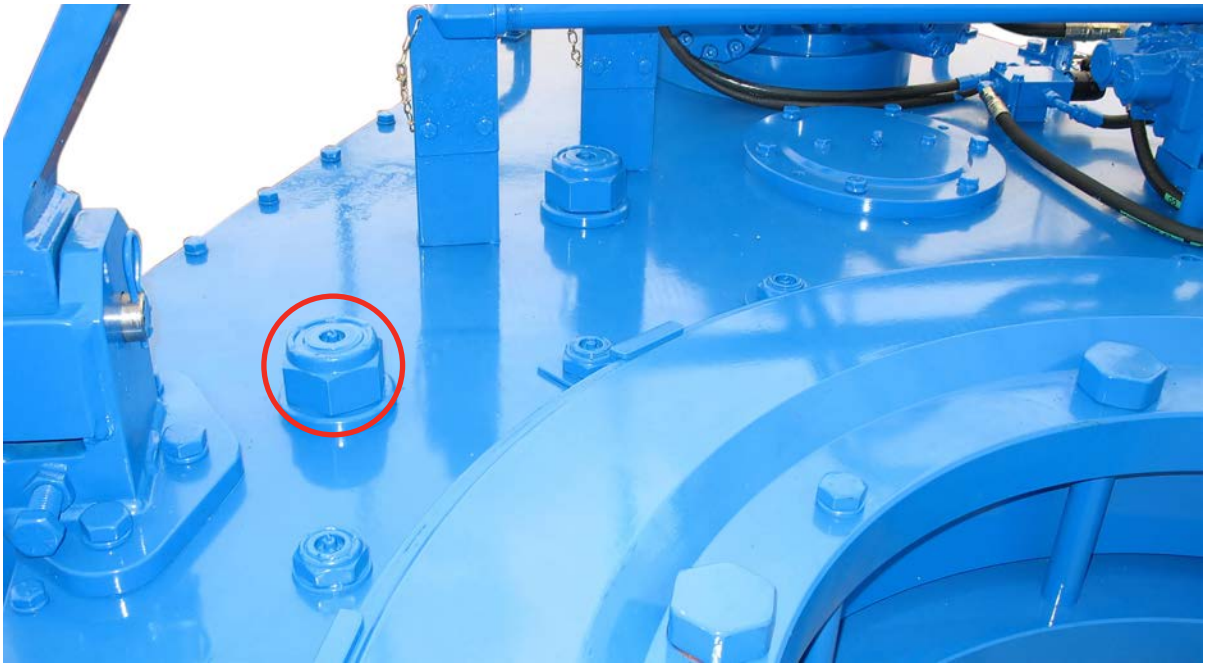


Illustration 5.5.2: Rotary Idler Lubrication

5.5.4 Pinion Idler

Apply grease to the pinion idler bearings through the grease fittings recessed into the tops of the half-shafts, located on the bottom face of the tong.

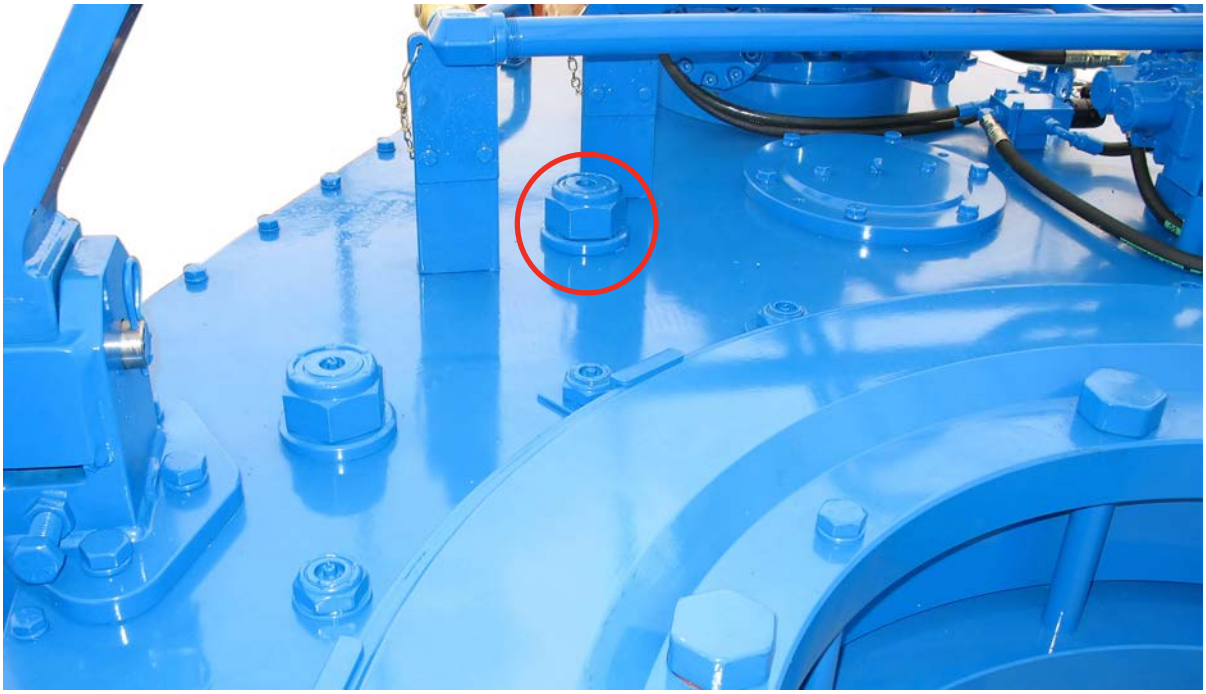


Illustration 5.5.3: Pinion Idler Lubrication

5.5.5 Pinion

Apply grease to the pinion bearings through the grease fittings located in the middle of the bearing caps on the top and bottom faces of the tong (one location top, one location bottom).

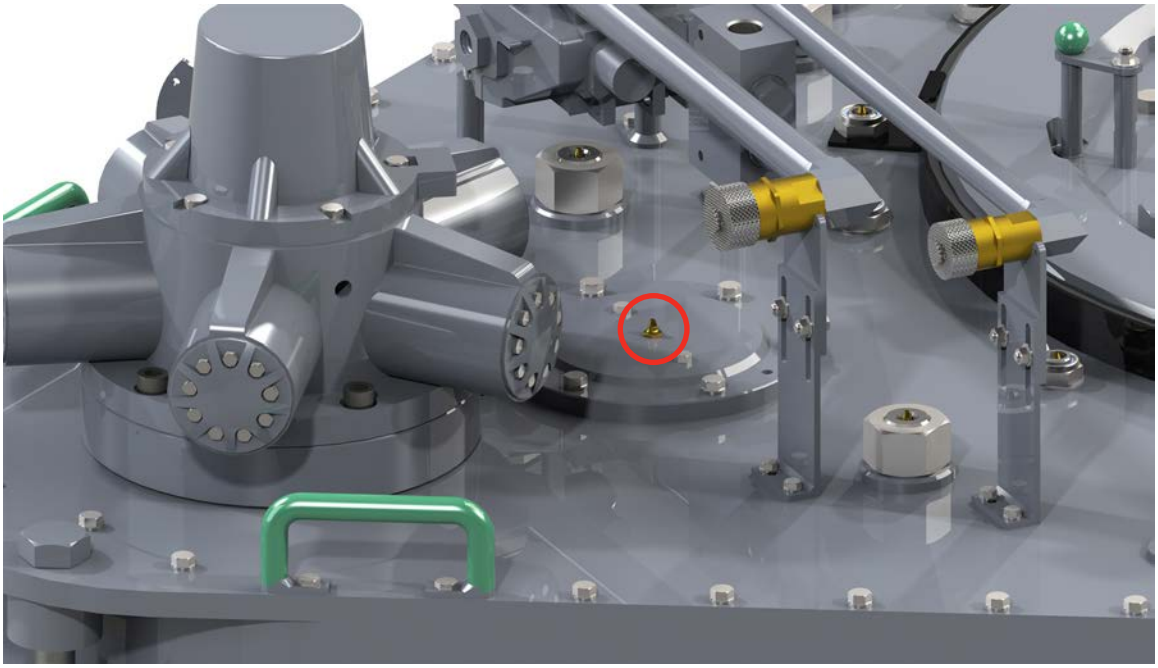


Illustration 5.5.4: Pinion Lubrication, Top Plate

Illustration 5.5.5: Pinion Lubrication, Bottom Plate

5.5.6 Motor / Drive Assembly Lubrication

Apply grease to the drive gear bearing through the grease fitting located in the center of the bearing cap on the bottom rear face of the tong.

Illustration 5.5.6: Motor / Drive Lubrication

5.5.7 Jaw Roller Lubrication

Swing the jaw(s) toward the middle of the tong to expose the jaw roller. Apply grease to the jaw roller through the grease fitting in the top of the jaw pin.

Illustration 5.5.7: Jaw Roller Lubrication

5.5.8 Door Stop Spring Cylinder

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

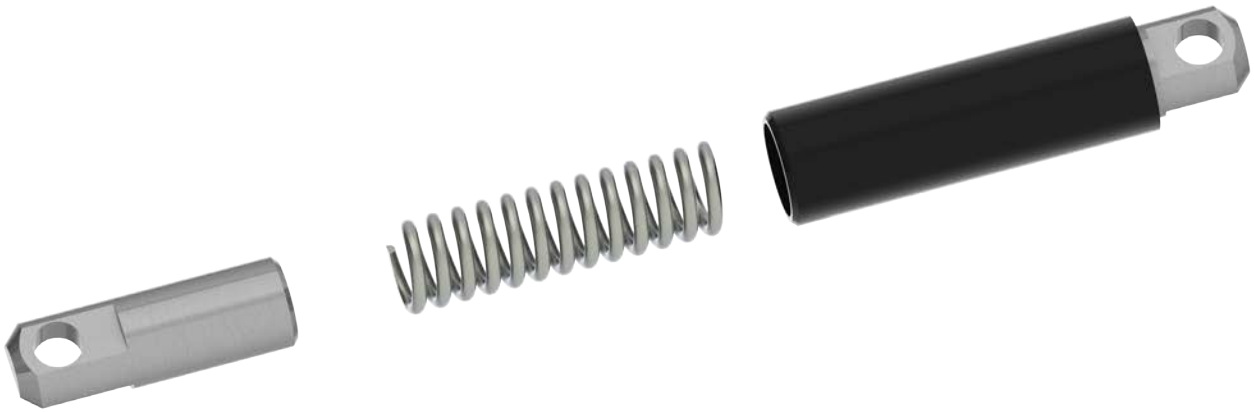


Illustration 5.5.8: Door Stop Spring Lubrication

⚠ 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.

5.5.9 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)
Support roller bearings (upper and lower)	4 shots
Rotary idler bearings	4 shots
Pinion idler bearings	4 shots
Pinion gear bearings	4 shots
Drive gear bearings	6 shots
Jaw rollers	4 shots
Door latch cam and pins	As required

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

5.6 ADJUSTMENTS

5.6.1 Brake Band Adjustment

The 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. Do not over-tighten, as this causes excessive wear to the brake bands. Note that the top and bottom brake bands must be adjusted simultaneously and equally.

⚠ CAUTION

TOP AND BOTTOM BRAKE BANDS MUST BE ADJUSTED SIMULTANEOUSLY AND EQUALLY

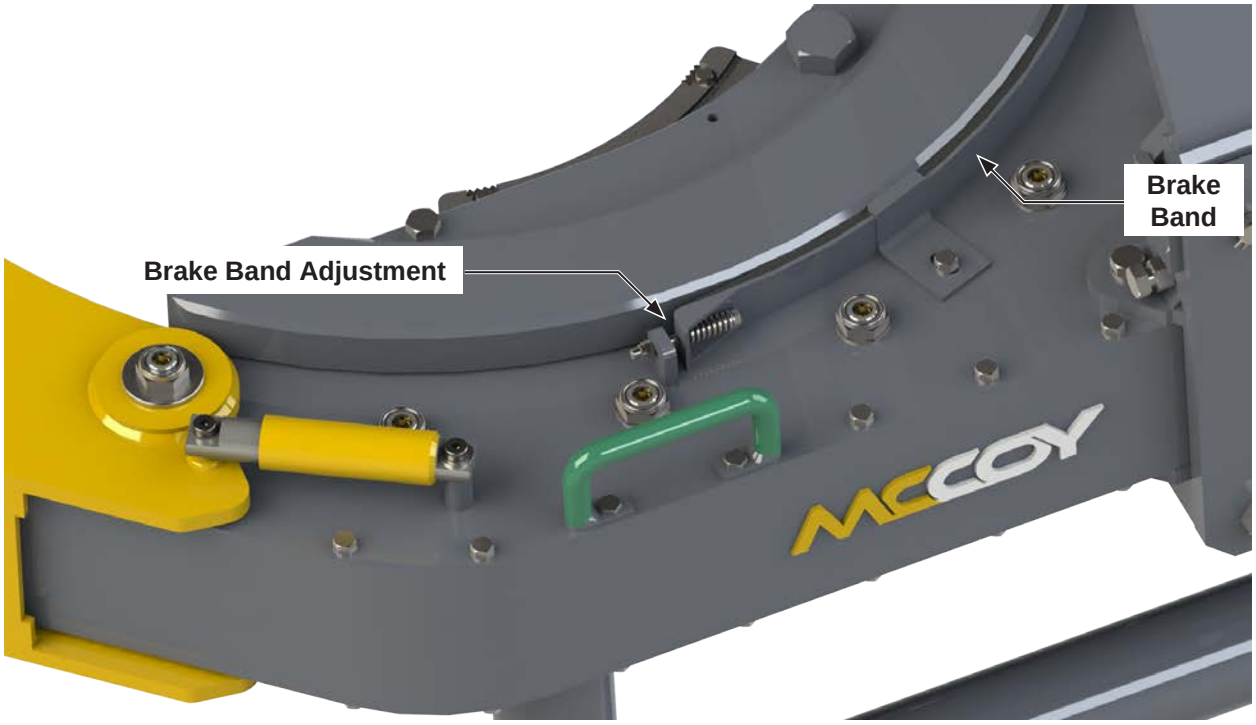


Illustration 5.6.1: Brake Band Adjustment

5.6.2 Tong Door Alignment

Loosen the jam nuts locking the door position set screws on the front plates of the door assemblies (see illustration 5.6.2). In some cases these locking nuts may be located on the inside of the door assemblies.

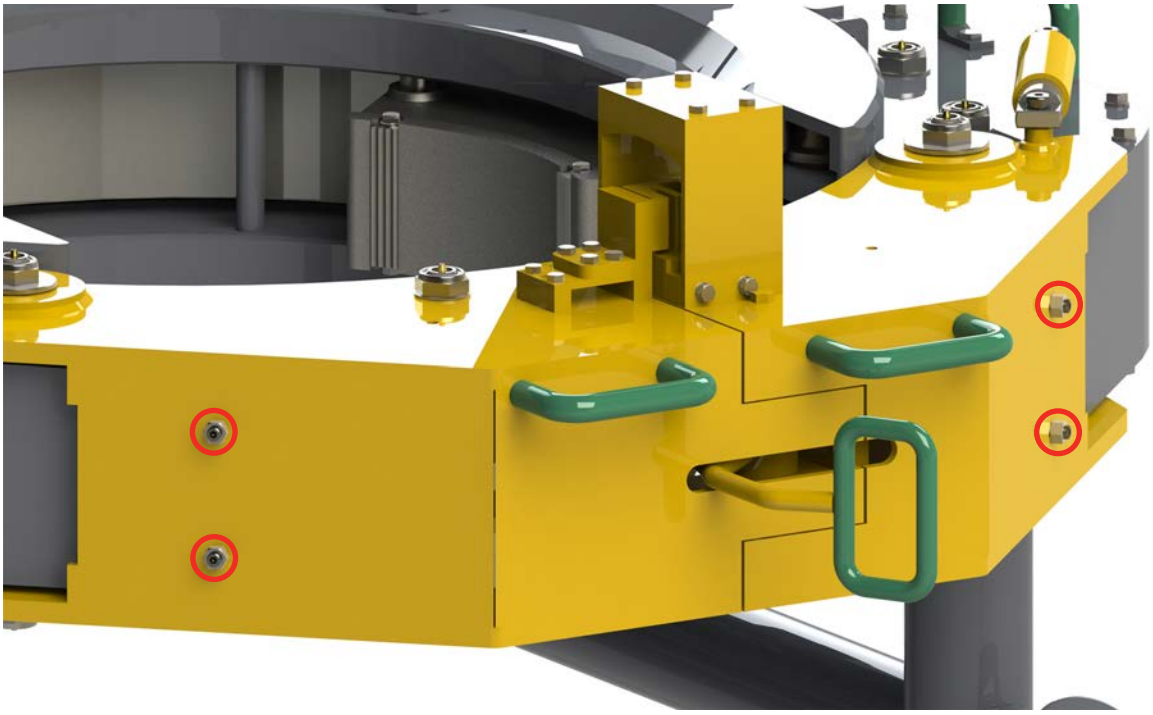


Illustration 5.6.2: Door Alignment 01

Close the LH tong door and, adjusting the two set screws on the LH door weldment equally, adjust the door until it is perpendicular to the side body plate of the tong (see illustration below).

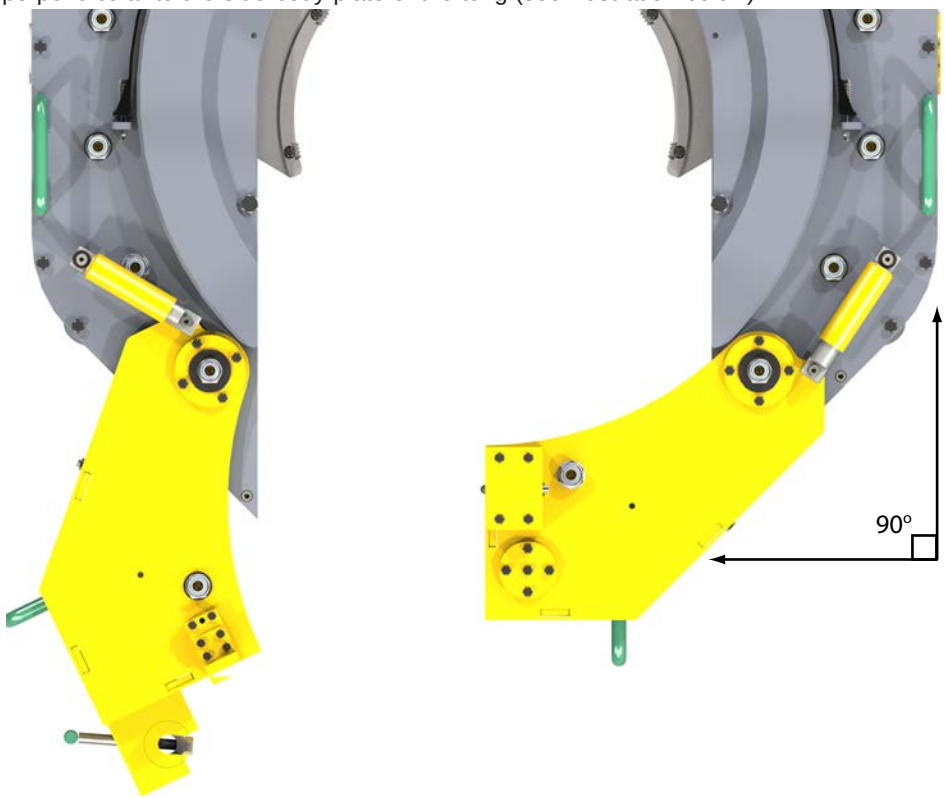


Illustration 5.6.3: Door Alignment 02

5.6.2 Tong Door Alignment (Continued):

Close the RH tong door and, adjusting the two set screws on the LH door weldment equally, adjust the RH door until it is aligned to the LH door adjusted in the previous step. The locking cam on the RH door should lock smoothly with the locking pins in the LH door assembly.

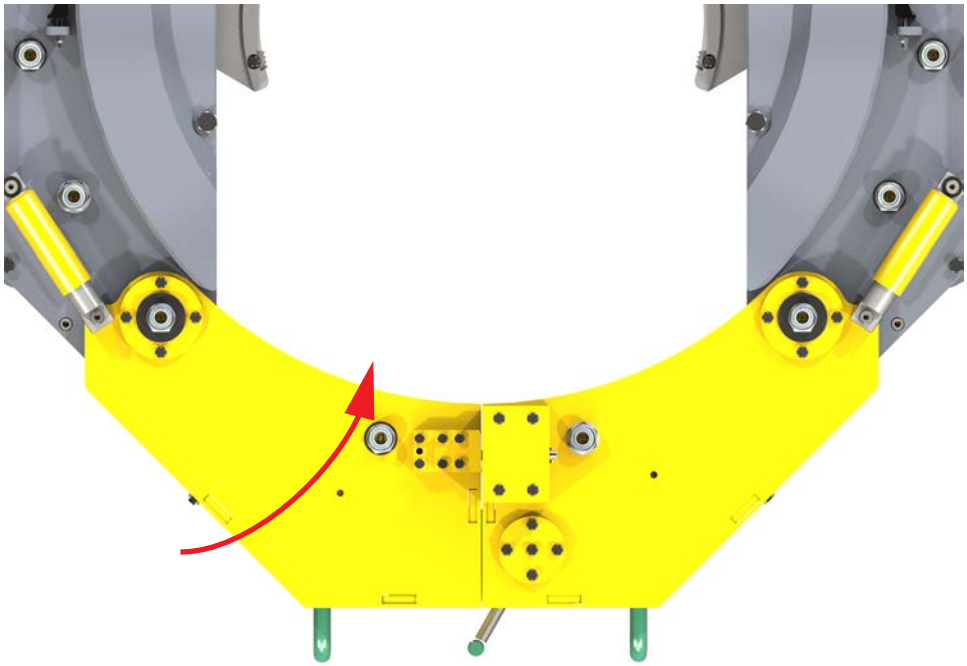


Illustration 5.6.4: Door Alignment 03

Actuate the tong doors to ensure that there is no binding or other impediments to smooth operation. Grease the top and bottom locking pins on the LH door so that the locking cam on the RH door engages smoothly.

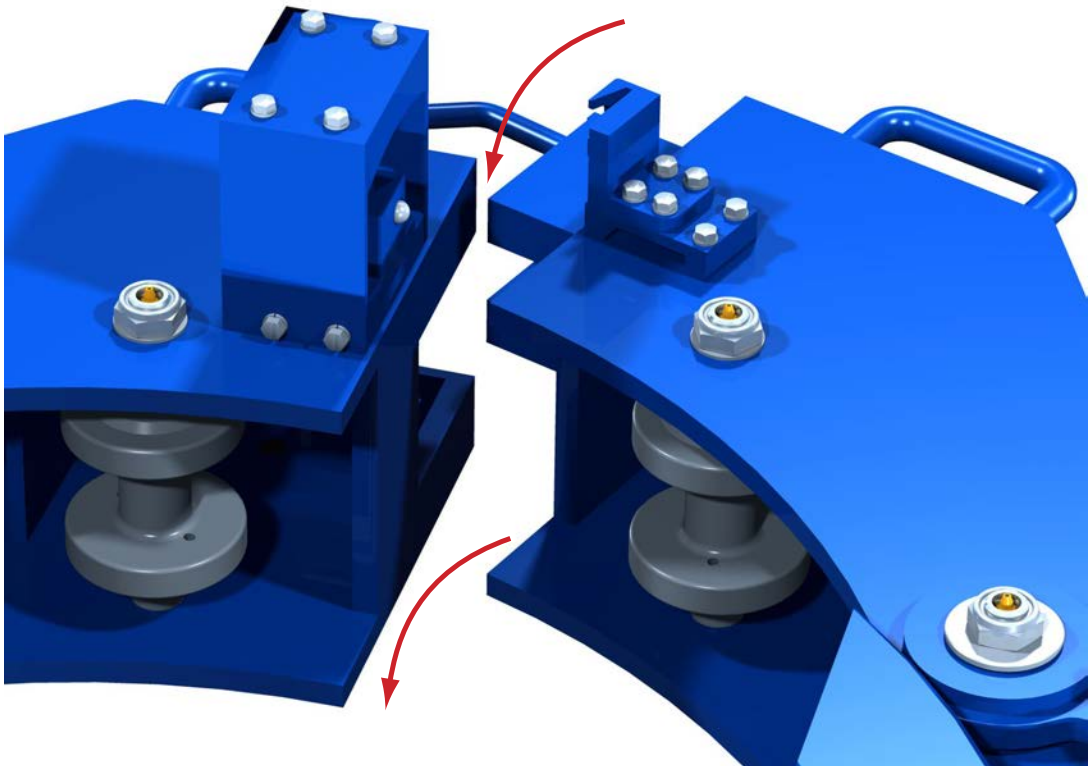


Illustration 5.6.5: Door Alignment 04

5.6.3 Tong Door Latch Handle Stop Adjustment

Adjust the door latch in its unlocked position to ensure the door latch cam and pins remain free from impact damage when closing the tong doors.

1. Unlatch the door latch and open the RH (off operator's-side) door. Ensure the latch handle is firmly against the latch handle stop, which is a bolt and lock-nut arrangement
2. Inspect the openings at the top and bottom of the door latch cam. The openings in the door latch cam must exactly align with the opening in the door weldment when the latch handle is against the latch handle stop. Exact alignment of the openings indicates proper adjustment, and no further action is required. Misalignment of the openings requires readjustment of the latch handle stop beginning in Step 3.
3. Determine if the position of the handle stop bolt needs to be extended or retracted. Move the latch handle away from the stop bolt, and loosen the locking nut.
4. Rotate the stop bolt clockwise to retract the length, and counter-clockwise to extend. Tighten locking nut following the adjustment.

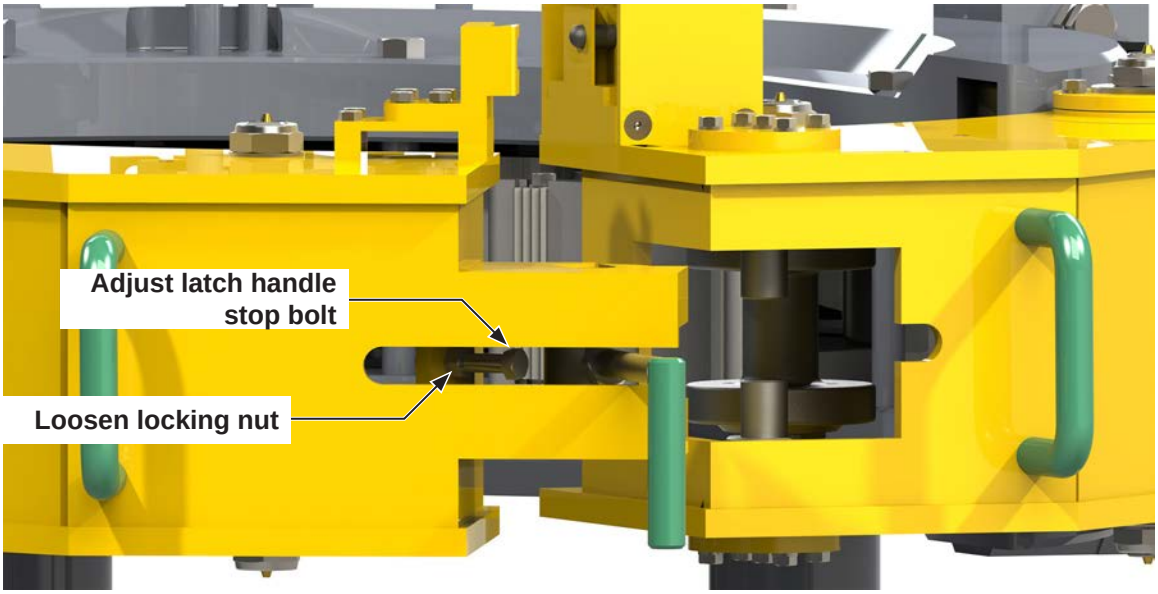


Illustration 5.6.6: Latch Handle Stop Adjustment 01

5. Move the latch handle firmly against the latch handle stop and determine if openings in the door latch cam exactly align with the opening in the door weldment. Repeat steps 3 & 4 if further adjustment is required.

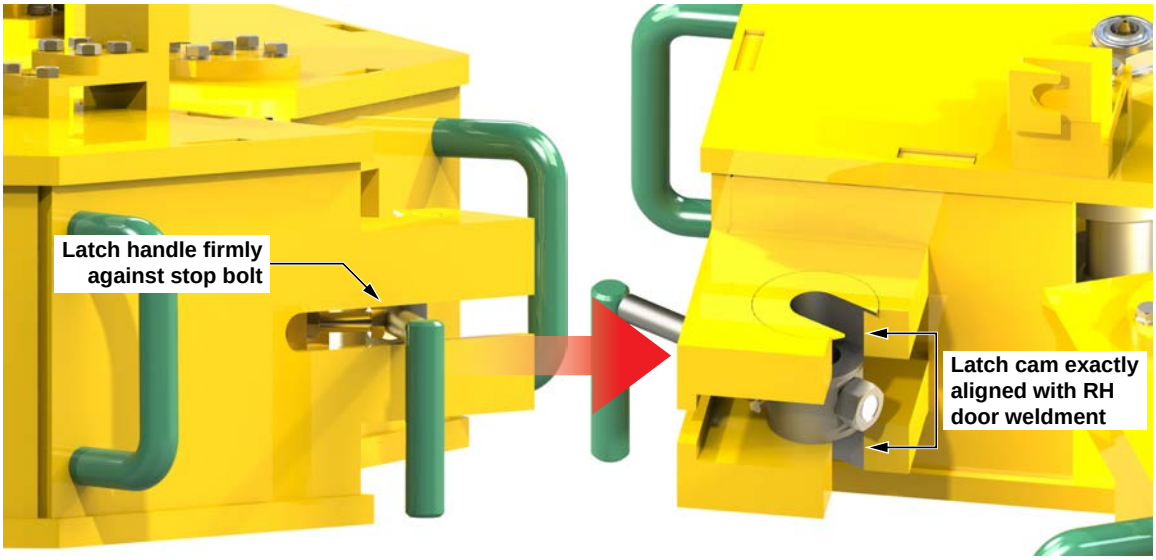


Illustration 5.6.7: Latch Handle Stop Adjustment 02

5.7 RECOMMENDED PERIODIC INSPECTIONS

5.7.1 Door Stop Spring

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

⚠ CAUTION

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

5.7.2 Backing Pin

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

5.7.3 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).

5.7.4 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. If not already done, remove the hitch pin securing the torque gauge and torque gauge mount weldment to the torque gauge holder weldment, and remove the torque gauge and holder.
2. Construct a structure that will support the entire weight of the tong while keeping the top plate of the tong at roughly waist level.
3. Connect the master link of the rigid sling to a crane. The weight of the sling must be supported by the crane without placing shear stress on the rigid sling pins. Remove the four hitch pins securing the rigid sling pins, and remove the pins to free the rigid sling. Use the crane to move the rigid sling to a secure storage location (see Section 2.A for proper rigid sling storage recommendations).
4. Remove the 1-¼” x 6” hex bolts securing each hanger bracket weldment to the bottom brackets.
5. Remove the three ¾” hex bolts and lock washers securing each rigid sling hanger bracket weldment to the top plate.

5.8 REMOVAL OF TOP PLATE FOR OVERHAUL (CONTINUED):

6. Remove the hydraulic valve assembly:
   - Disconnect at the hydraulic valve assembly all flexible hydraulic lines running from the door switch and motor.
   - Disconnect both 1" hydraulic lines at the motor.
   - Remove the bolts securing hydraulic inlet/outlet support base weldment to the top plate of the motor mount.
   - Remove the three ½" x 4-½" bolts securing the hydraulic valve assembly to the valve support posts.
   - Use a temporary sling and crane to 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 three valve support post weldments from the top plate of the tong.
8. Remove the two tong door spring cylinders. Use caution as the door springs may be retain energy from being compressed. Remove both rear door cylinder support posts from the top plate of the tong.
9. Swing the RH door assembly to the open position. Support the entire weight of the door assembly using a temporary lifting sling and crane, using caution not to put any upward force on the door assembly. Remove the nylock nuts securing the top and bottom of the door pivot shaft, followed by the narrow flat washers. Use a soft alloy material (e.g. brass rod, etc.) to lightly tap the shaft up through the support roller assembly until it comes free at the top, using caution not to damage the threads on the ends of the support roller shaft. Use the crane to move the door assembly to a suitable storage location.

   DISASSEMBLY NOTE: The door switch components may be left in place on the door assemblies.
10. Undo any restraints securing the flexible door switch hydraulic lines to the top plate. Repeat Step 7 for the LH door assembly. Use caution that the flexible door switch lines do not snag on any protruding object as the door assembly is moved to a suitable location, and ensure the exposed connectors on the hydraulic lines are protected from contamination.
11. Remove the torque gauge mounting plate from its holder if not already done.
12. Remove the five ¾" hex 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. Move the motor to a suitable clean storage location and ensure that any exposed hydraulic ports are protected from contamination.
13. Remove the motor mount by removing the four ¾" socket head cap screws. The motor mount can be lifted out of place.
14. Loosen both brake bands by backing off the top and bottom brake band adjustment bolts until the brake bands completely release the top and bottom cage plates. Completely remove the adjustment nut and bolt for the top brake band weldments.
15. Remove the jaw pivot bolts and the jaw assemblies.
16. Remove the ⅜" nylock nut connecting the backing pin to the backing pin pivot. Remove the backing pin and retainer - if desired, the pivot can be un-threaded from the top cage plate.

⚠ 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

17. Ensure the bottom cage plate is well supported. Remove the four ¾" x 9" cage plate bolts. Pull the top cage plate straight up from the top plate - be very careful not to damage the cam follower array that is bolted to the top plate. Remove the bottom cage plate - also make sure that the bottom cam follower array is not damaged.
18. Pull the top bearing cap and spacer for the pinion gear by removing the six ½" bolts securing 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.

5.8 REMOVAL OF TOP PLATE FOR OVERHAUL (CONTINUED):

19. Remove the top 1-3/4” nylock nuts and pads for the rotary and pinion idler gears.
20. Remove the top roller shaft thin nylock nuts and washers. Note that two of the top brake band lug weldments will be released - set them aside so they are not misplaced.
21. Remove the top plate fasteners (hex head bolts & socket head cap screws) around the perimeter of the tong which secure the top plate to the gear case housing.
22. Use a soft alloy material (e.g. brass rod, etc.) to lightly tap the remaining support roller shafts down through the support roller assemblies until they are roughly flush with the bottom side of the top plate of the tong. Use caution that the threads on the ends of the support roller shafts are not damaged.
23. With all the above steps taken, the top tong plate can be lifted off providing access to the inside of the gear case. Use this opportunity to inspect the cam follower array mounted on the top and bottom plates - replace damaged cam followers where necessary.

5.9 ASSEMBLY PROCEDURES

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

NOTE ON INSTALLATION PRACTICES: Ensure all bearings are liberally greased before installing over a shaft or into gears or bearing caps. When inserting a shaft through a support roller assembly ensure shaft is greased. Also ensure all metal-to-metal contact in the gear train is adequately greased. When graphics are not used in the assembly process, please refer to the relevant exploded diagrams in Section 7.

⚠ WARNING

ALL FASTENERS USED DURING REASSEMBLY OF LOAD-BEARING COMPONENTS MUST BE TIGHTENED TO THE CORRECT TORQUE. THREADED FASTENERS USED IN LOAD-BEARING DEVICES MUST BE SECURED WITH PERMANENT LOCTITE™.

TIGHTENING TORQUE GUIDE (DRY)			
SAE GRADE 8 - FINE THREAD			
SIZE	CLAMP LOAD	PLAIN	PLATED
¼ - 28 (.250)	3,263	14 ft. lbs.	10 ft. lbs.
5/16- 24 (.3125)	5,113	27 ft. lbs.	20 ft. lbs.
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.

5.9 ASSEMBLY PROCEDURES (CONTINUED):

⚠ WARNING

IMPORTANT ASSEMBLY INFORMATION

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

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

APPLY A THIN LAYER OF GREASE TO THE SURFACE OF EACH MOVING PART DURING ASSEMBLY TO AID IN THE ASSEMBLY PROCESS.

1. Position the tong body gear case on a suitable stationary support such that the bottom body plate is accessible.
2. Press spherical roller bearing (PN 1095-105-50202) into bottom pinion bearing cap (PN 1095-50801), and install bearing cap into bottom plate of tong using six ½" UNC x 2" hex cap screws and six ½" lock washers.
3. Install bearing retainer ring (PN 1095-105-50903) into each rotary idler gear (PN 1095-510). Install a bearing seal (PN 1095-105-515) through the gears and press against the retainer ring. Press a spherical roller bearing (PN 1095-105-50902) into the gears and press against the bearing seal.
4. Slide an idler shaft (PN 1095-516) through each rotary idler gear and bearing assemblies, and visually center.
5. Place the bottom of the rotary idler shafts through the bottom plate into their proper positions (see illustration 5.9.1). **ASSEMBLY NOTE:** The tops of the idler shafts are threaded for a grease fitting and should face up after this step. Secure the bottom side of the shaft to the bottom plate with an idler pad (PN 1095-116) and a 1-¾" heavy hex nut.
6. Place a top idler spacer (PN 1095-522) over each rotary idler. The tapered side of the spacer is placed inside the idler gear against the bearing while the non-tapered side faces up.
7. Slide the pinion gear (PN 1095-504) over the splined end of the pinion gear shaft (PN 1095-105-503), ensuring the larger of the two shoulders on the pinion gear faces towards the center gear on the pinion gear shaft.
8. Slide a pinion gear spacer (PN 1095-505) over the bottom end of the pinion gear shaft, ensuring the flat side of the spacer presses against the pinion gear.
9. Liberally grease the lower pinion bearing in the bearing cap and insert the main pinion gear shaft into the bearing.
10. Press a support roller ball bearing (PN 1095-105-52003) in to each of the four roller cups (PN 1095-523). Slide a roller cup half-shaft (PN 1095-524) through the bottom of each roller cup. Slide a roller cup spacer (PN 1095-519) over the top of each half-shaft, ensuring the machined side of each spacer faces toward the bearing (flat side up).
11. Install two roller cup assemblies through the bottom plate as shown in Illustration 5.9.1. Secure each with a 1-⅛" UNF nylock nut and 1-⅛" narrow flat washer.

5.9 ASSEMBLY PROCEDURES (CONTINUED):

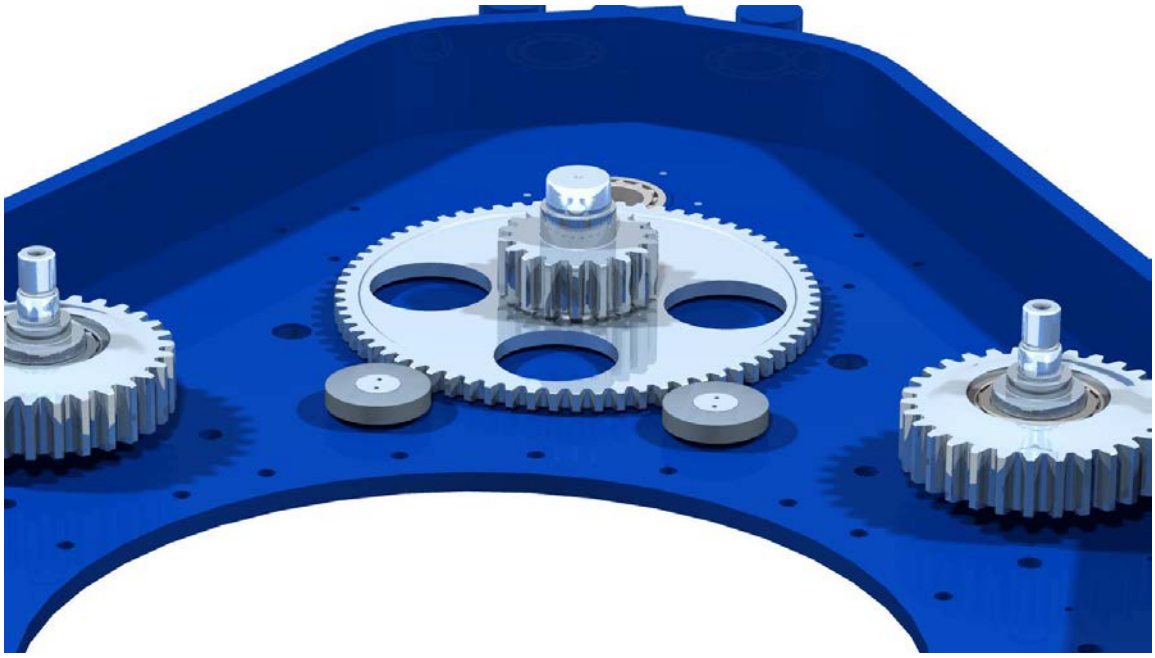


Illustration 5.9.1: Half-Roller Installation

12. Install bearing retainer ring (PN 1095-105-50903) into each pinion idler gear (PN 1095-105-509). Install a bearing seal (PN 1095-105-515) through the gears and press against the retainer ring. Press a spherical roller bearing (PN 1095-105-50902) into the gears and press against the bearing seal.
13. Slide an idler shaft (PN 1095-516) through each pinion idler gear and bearing assemblies, and visually center.
14. Place the bottom of the pinion idler shafts through the bottom plate into their proper positions next to the rotary idler assemblies. ***ASSEMBLY NOTE:*** The tops of the idler shafts are threaded for a grease fitting and should face up after this step. Secure the bottom side of the shaft to the bottom plate with an idler pad (PN 1095-116) and a 1-¾" heavy hex nut.
15. Place a top idler spacer (PN 1095-522) over each pinion idler. The tapered side of the spacer is placed inside the idler gear against the bearing while the non-tapered side faces up.
16. Install fifteen cam followers (PN 101-3200) as shown in Illustration 5.9.2. Secure each cam follower with a ⅞" lock-washer and a ⅞ UNC jam nut. Note that the cam followers are sealed units and do not require lubrication.

Illustration 5.9.2: Cam Follower Installation

5.9 ASSEMBLY PROCEDURES (CONTINUED):

17. Slide an inner spacer (PN 1095-52002) into each support roller dumbbell (PN 1095-52001). Press a support roller ball bearing (PN 1095-105-52003) in to each side of the support roller dumbbells (fourteen assemblies total).
18. Insert a support roller shaft (PN 1095-518) through eight of the dumbbell roller assemblies and center within the assemblies. Slide a roller cup spacer (PN 1095-519) over the top of each half-shaft, ensuring the machined side of each spacer faces toward the bearing (flat side up).
19. Install five of the support roller assemblies in to their locations along one side of the body case, ensuring one is placed between the rotary idler and pinion idler (see Illustration 5.9.3).
20. Use a temporary lifting sling and a crane to maneuver the rotary gear in to place on the tong, making sure the backing pin slots are on the side facing up. Support one side using the support rollers installed in Step 10, and have the opening in the rotary gear oriented as shown in illustration 5.9.3.

Illustration 5.9.3: Initial Support Roller & Rotary Gear Installation

21. Install support roller assemblies in the locations exposed by the opening in the rotary gear. Continue to rotate the rotary gear, installing five support roller assemblies on the other side of the tong in the rotary gear opening as it is rotated.
22. Press a cylindrical roller bearing (PN 1095-105-50202) in to the motor drive assembly bearing cap (PN 1095-50201). Secure the bearing cap to the bottom plate of the tong directly behind the pinion gear stack using six ½" UNC x 2" hex cap screws and six ½" lock washers.
23 Insert the bottom end of the drive gear in to the bearing cap installed in the previous step, ensuring the gear meshes smoothly with the pinion gear.
24. Drop the motor gear spacer (PN 1095-105-517B) in to the centre of the motor drive gear ensuring it rests at the bottom of the splined inner surface of the gear.
25. Install 15 cam followers (PN 101-3200) on the top plate of the tong, ensuring the nuts and washers are on the bottom side of the top plate. Secure each cam follower, PN 101-3200, with a ⅞" lock-washer and a ⅞" UNC jam nut. Note that the cam followers are sealed units and do not require lubrication.
26. Install the two top rear half-roller support assemblies (assembled in Step 10) into the top plate of the tong, directly above the location of the bottom two half-roller assemblies. Secure each with a 1-⅛" UNF nylock nut and 1-⅛" narrow flat washer.
27. Place a dumbbell roller assembly at each door pivot location and insert a door pivot shaft (PN 1095-105-526) through the assemblies.
28. Push the shafts in the 12 installed support roller assemblies down until the shafts are approximately even with the roller cup spacers. A soft alloy metal or rubber mallet may be required to move the shafts.
29. Clean the three non-threaded holes for the dowel pins in the side body (one on either side of the opening, and one in the centre rear of the side body).

5.9 ASSEMBLY PROCEDURES (CONTINUED):

30. Use a temporary sling and crane to carefully position and install the top plate. The plate must be installed parallel to the top of the side body to avoid binding on the pinion shafts as it is lowered. Use caution not to damage the threads on the tops of the rotary idler and support roller shafts.
31. Insert ½" x 2-⅛" dowel pins in the locations identified and cleaned in Step 29. Use a hammer to ensure the pins are fully inserted and flush with the top of the top plate.
32. Secure the top plate to the side body using thirty-six ½" UNC x 2-¾" hex cap screws and thirty-six ½" lock washers. Install at the locations shown in Illustration 5.9.4. Note that six ½" UNC x 1-¾" hex socket head cap screws are used in the locations identified by the red circles.

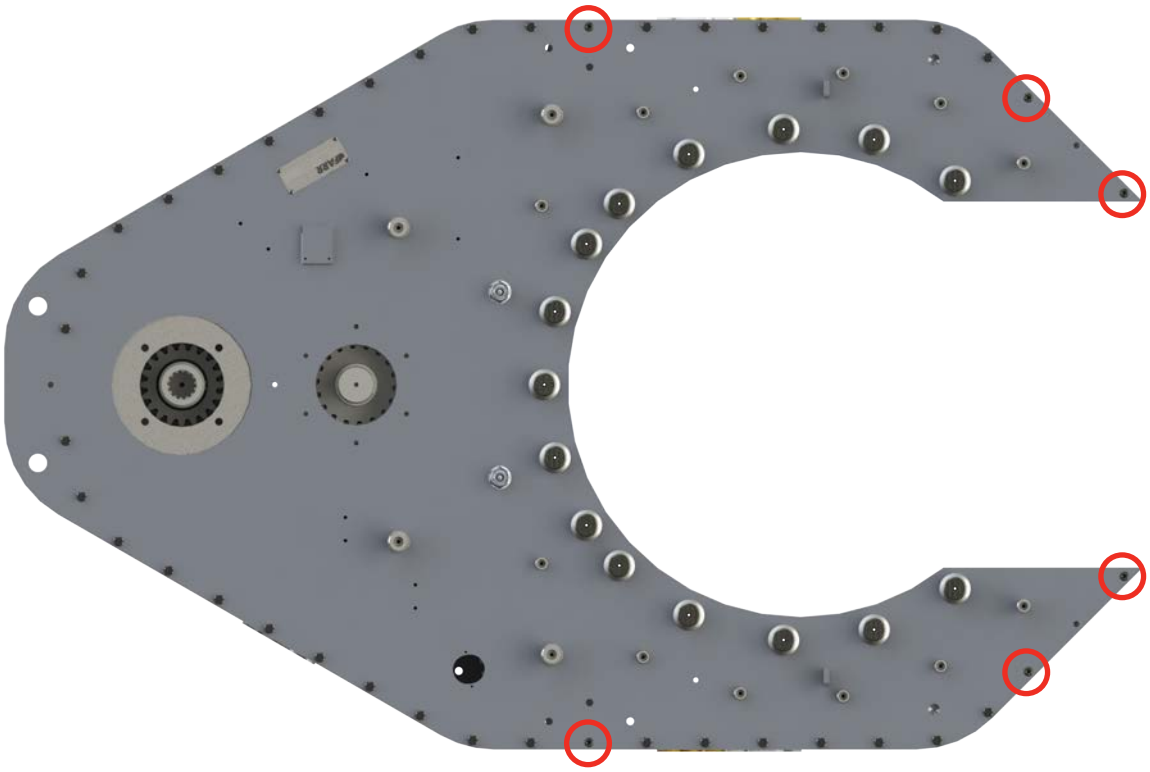


Illustration 5.9.4: Top Plate Fastener Installation

33. Gently tap the support roller shafts from the bottom up through the top plate. Position shafts so that there is roughly the same amount protruding from the top plate as there is from the bottom plate. Secure each shaft top and bottom with 1-⅛" UNF nylock nuts and 1-⅛" narrow flat washers. ASSEMBLY NOTE: Flat washers are not used where the support rollers are coincidental with the brake band lugs (see illustration 5.9.11).
34. Slide idler pads (1095-116) over the ends of all four idler assemblies. Secure all four assemblies with a 1-¾" UNC heavy hex nut.
35. Press a cylindrical roller bearing (PN 1095-105-50202) in to the top pinion bearing cap (PN 1095-50701). Place the bearing and bearing cap over the top of the pinion shaft and secure to the top plate using six ½" UNC x 2" hex cap screws and six ½" lock washers.

5.9 ASSEMBLY PROCEDURES (CONTINUED):

36. Press the bottom cage plate (PN 1095-105-513) over the cam follower array on the bottom plate. Use a crane, temporary lifting sling, and temporary eye bolts to lift the top cage plate (PN 1095-105-512) on to the cam follower array on the top plate. Place four cage plate spacers (PN 1095-38) between the top and bottom cage plates. Insert four ¾" x 9" heavy hex bolts through the top cage plate and cage plate spacers into the bottom cage plate, and secure the two cage plates together.

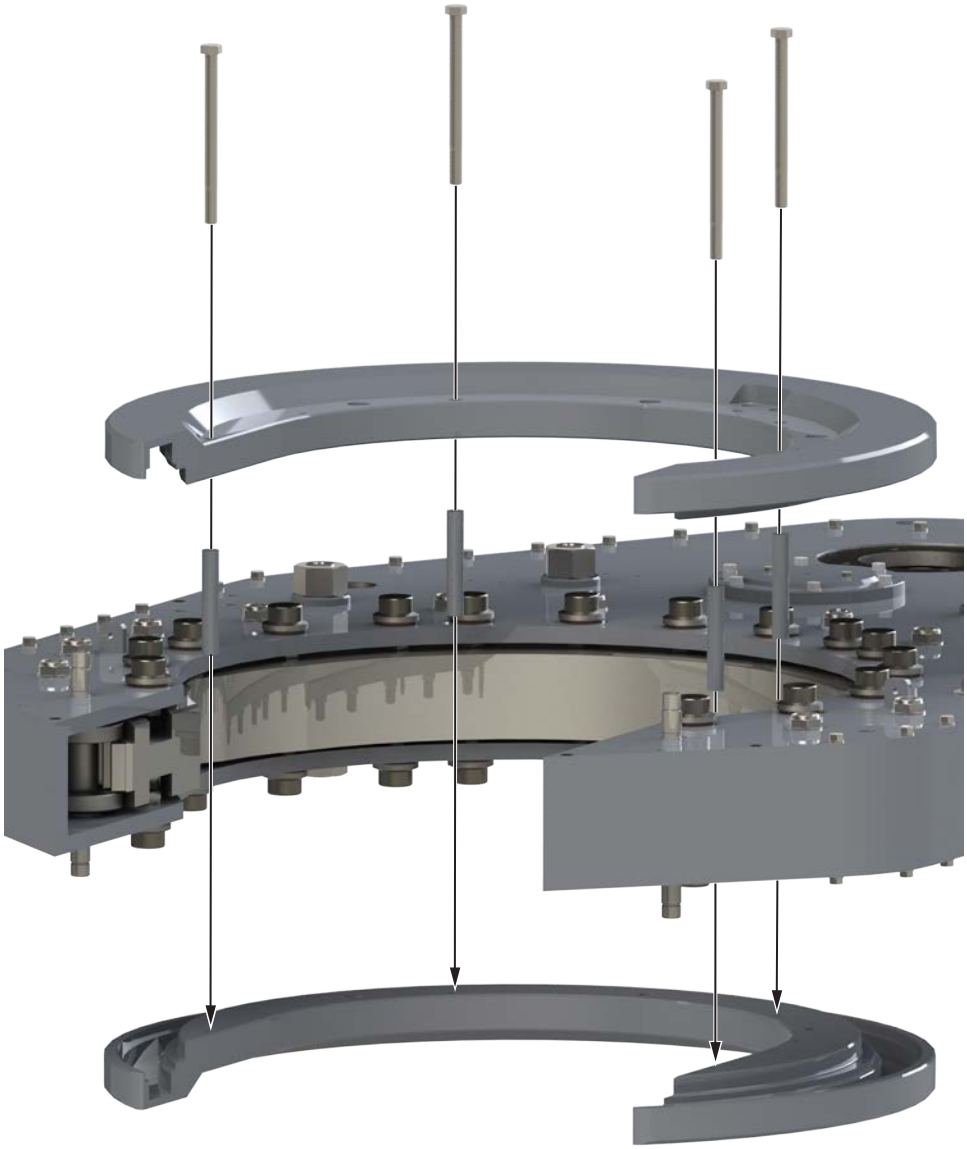


Illustration 5.9.5: Cage Plate Assembly

37. Install motor mount (PN 1095-106B), and secure in place with four ¾" UNC x 1-½" socket head cap screws and ½" lock washers.

38. Lower the hydraulic motor (PN 87-0210) onto motor mount ring, using extreme caution to ensure the splined shaft cleanly engages with the splines on the inside of the drive gear. Secure with five ¾" UNC x 2-¼" hex cap screws and lock washers.

5.9 ASSEMBLY PROCEDURES (CONTINUED):

40. Install door bearings:

    i. Attach bearing holders (PN 101-5827) to the top and bottom plates of both door weldments using four ⅜" UNC x 1" hex bolts and ⅜" lock washers.

    ii. Press a door bearing (PN 1095-103-318) in to each of the four door bearing holders.

Illustration 5.9.6: Door Bearing Installation

5.9 ASSEMBLY PROCEDURES (CONTINUED):

41. Install locking pins:
    i. Attach locking pin (PN 101-5822) to the locking pin plate (PN 101-5823) using one ⅜" UNC x 1" hex bolt and one ⅜" lock washer.
    ii. Secure the locking pin plate to the top plate of the LH door weldment (PN 1095-416) using four ⅜" UNC x 1" hex bolts and four ⅜" lock washer.
    iii. Repeat process for the bottom plate.

Top locking pin assembly shown. Procedure must be repeated for bottom locking pin assembly.

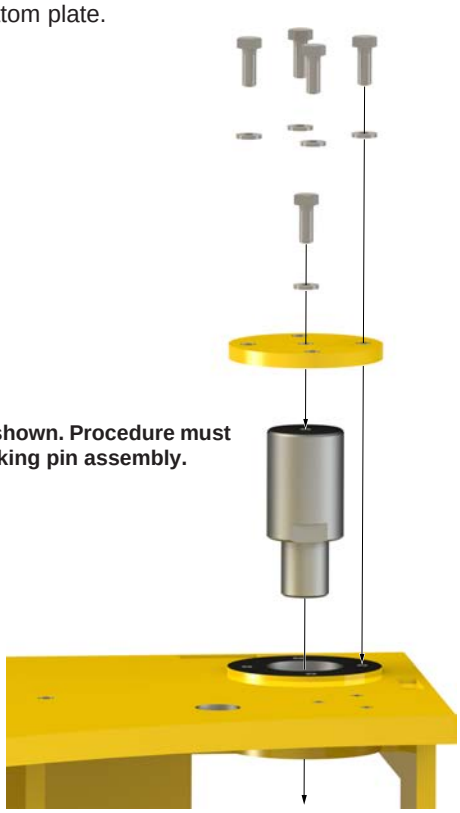


Illustration 5.9.7: Door Locking Pin Installation

42. Thread a ½" UNC hex nut on to a ½" UNC x 2-¾" hex bolt. Thread the bolt in to the RH door weldment (PN 1095-320) as shown in Illustration 5.9.7. Once the nut is threaded in to the door weldment, thread a second ½" UNC hex nut on to the bolt to serve as a locking nut. This bolt will serve as a latch handle adjustment once the doors have been assembled.

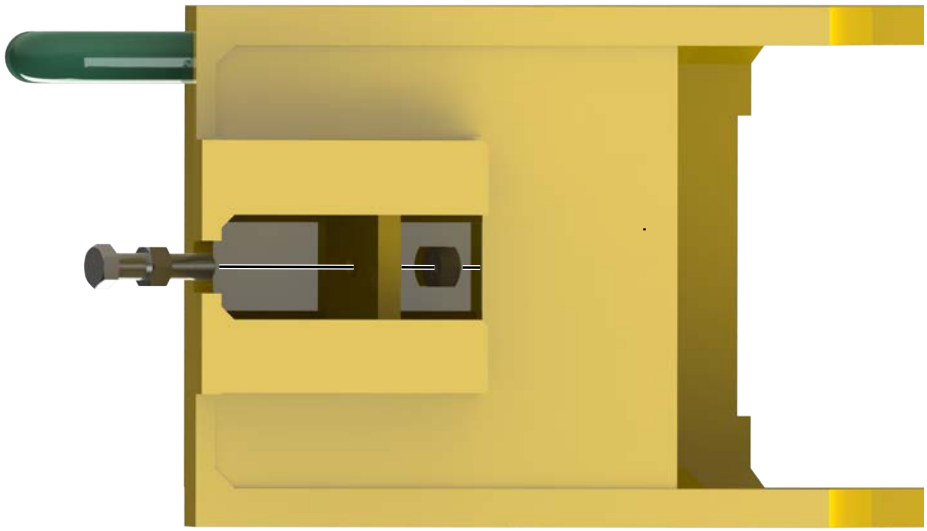


Illustration 5.9.8: Latch Handle Adjustment Bolt Installation

5.9 ASSEMBLY PROCEDURES (CONTINUED):

43. Install the door lock handle assembly in the RH door weldment as shown in Illustration 5.9.9.

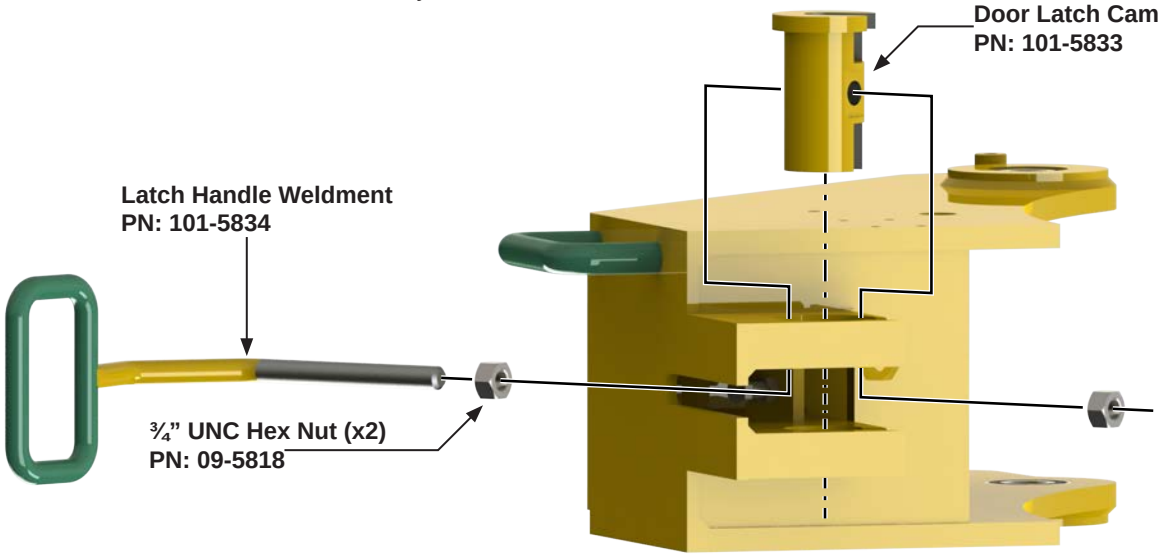


Illustration 5.9.9: Door Lock Handle Assembly

44. Use a rubber mallet or soft metal hammer to remove the two door pivot roller shafts. Install the two door assemblies:
    i. Use a crane and temporary lifting sling to hoist the LH (operator's side) door assembly.
    ii. Position the door assembly so that the bearings are aligned with the support roller assemblies. Insert a roller cup spacer (PN 1095-105-528) between the top and bottom door bearings and the top plate of the tong, oriented so the machined side of the spacers are against the bearings (flat side against the top and bottom plates of the tong).
    iii. When the door and spacer is aligned with the support roller assembly re-insert the door pivot roller shaft. Use a rubber mallet or soft metal hammer to center the shaft between the door plates.
    iv. Slide a bearing spacer-washer (PN 1095-105-529) over each end of the door pivot roller shaft, oriented so that the tapered shoulders are against the door bearings.
    v. Secure the top and bottom of the door pivot roller shaft with 1-⅛" UNF hex nylock nuts.
    vi. Repeat steps 44.ii through 44.v for the second door assembly.

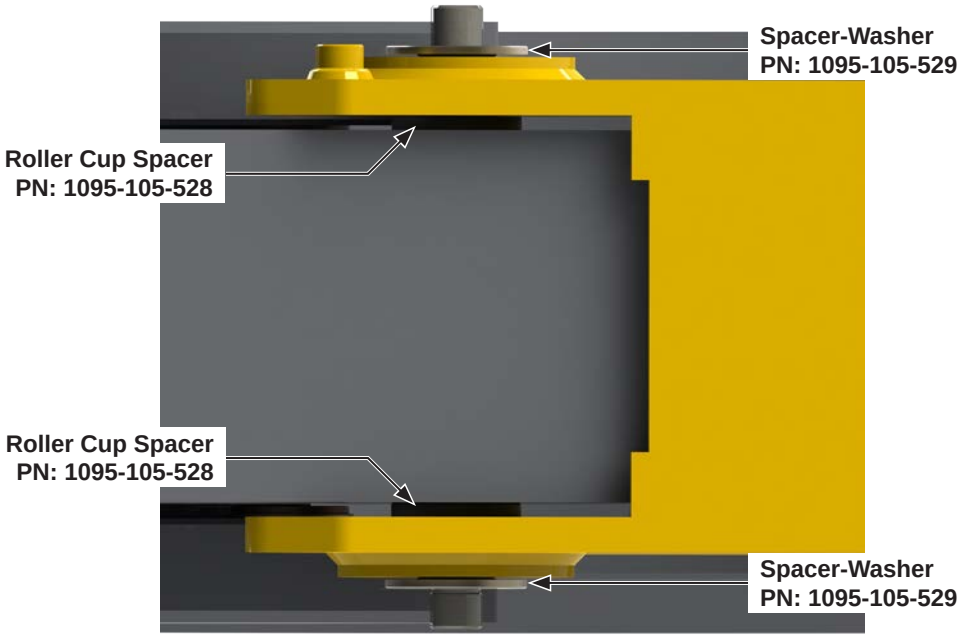


Illustration 5.9.10: Door Spacer-Washer Installation

5.9 ASSEMBLY PROCEDURES (CONTINUED):

45. Thread a ½" UNC hex jam nut on to four ½" UNC x hex socket head flat point or cup point set screws. Thread the set screws in to the threaded holes in the front of the door weldments (2 per side). Thread in just far enough so that they are just protruding through the inside of the door weldments, and lock in place with the jam nuts. These set screws will be used to properly align the tong doors (see sub-section 5.6.2).
46. Swing open one of the door assemblies. Insert a support roller assembly (assembled in steps 16 & 17) into the door assembly, ensuring the two roller cup spacers are in place and correctly oriented over the bearings. Place a door roller spacer (PN 1095-105-527) on each side of the support roller assembly inside the top and bottom plates of the door weldment. Slide a door roller shaft (PN 1095-525) through the top of the door weldment, through the support roller assembly and out the bottom plate of the door weldment. Secure the shaft on the top and bottom with 1-⅛" UNF hex nylock nuts and 1-⅛" narrow flat washers. Repeat this step for the second door assembly.

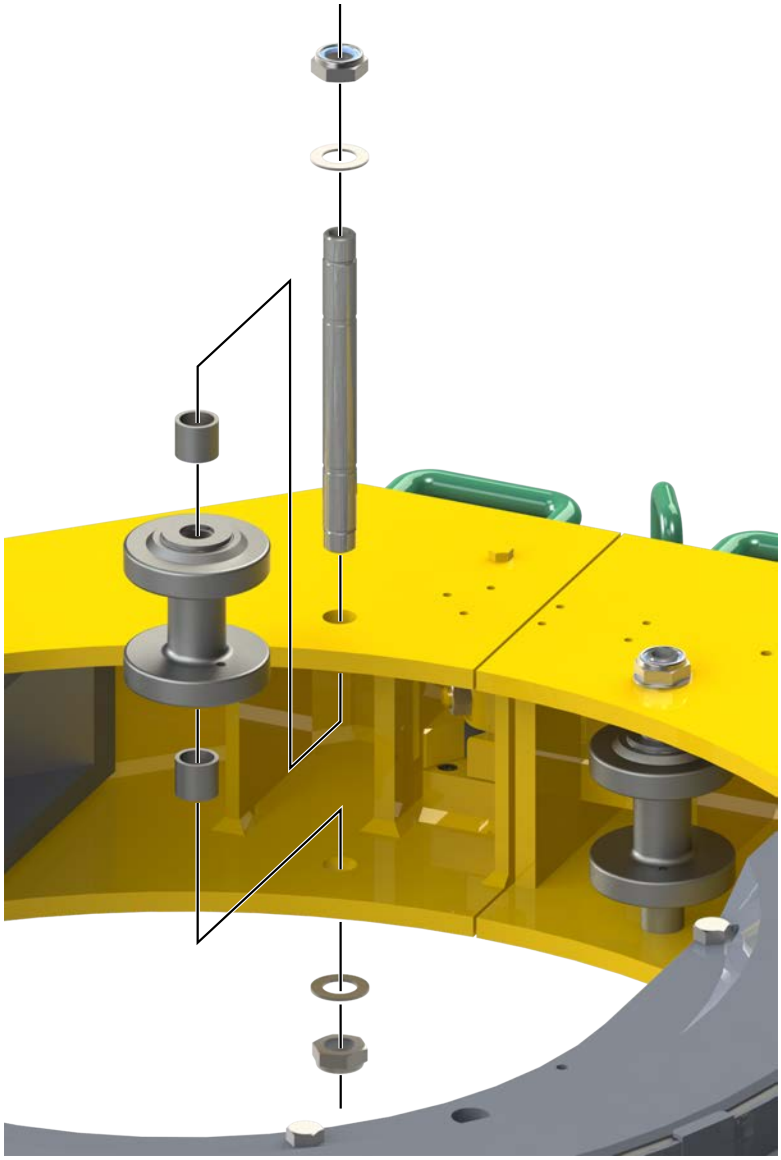


Illustration 5.9.11: Door Support Roller Installation

47. Install the two door spring stop cylinders (PN 1095-141) using two ⅝" x ¾" UNC shoulder bolts per cylinder.
48. Install top and bottom lined brake band weldments (PN 1095-126). Use two brake band retainers (PN 1095-138) on the top and two on the bottom, and secure them to the support roller shafts as noted in step 33. Secure in place with 1-⅛" thin nylock nuts. Note that flat-washers are not used at these four locations. Use two more retainers (PN 1095-137) per brake band assembly, and secure these retainers to the top plate with ½" UNC x 1-¼" hex bolts and lock washers (see illustration 5.9.12).

5.9 ASSEMBLY PROCEDURES (CONTINUED):

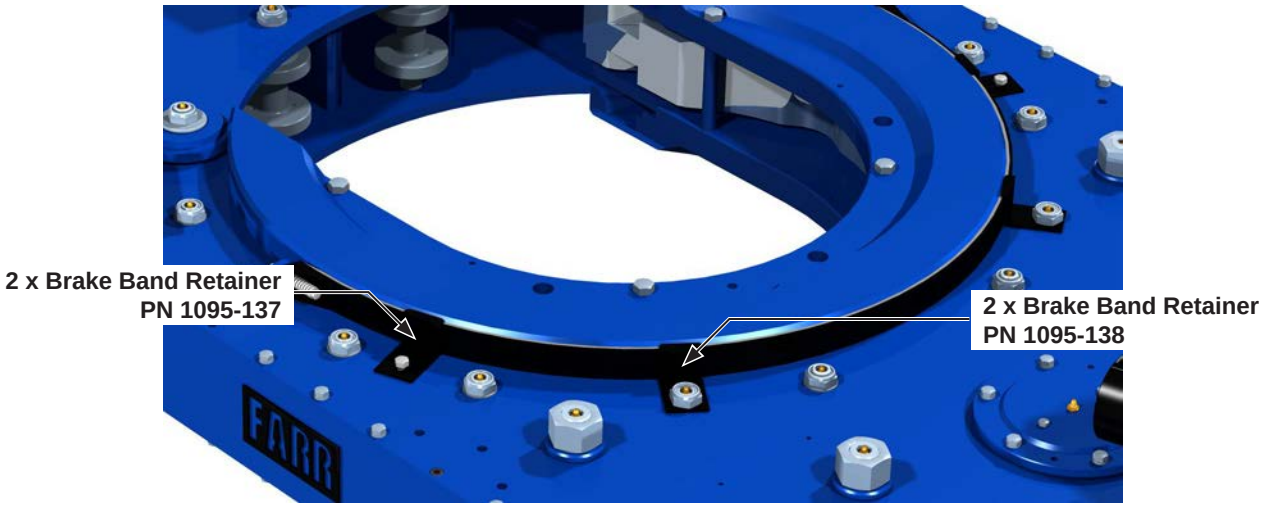


Illustration 5.9.12: Brake Band Installation

49. Secure each adjustment lug on the brake band weldment to the lugs mounted on the top and bottom plates of the tong (four locations total). Attach adjustment bolts, springs, and nuts to brake band assemblies. Slide an adjustment spring (PN 08-9264) over a $^{3}/_{16}$" UNC x 4" hex bolt. Insert the end of the bolt through the adjustment lug on the brake band weldment and the lug mounted on the plate of the tong, and secure with a ⅜" UNC hex nylock nut. Repeat for other three locations.
50. Install backing pin assembly:
    i. Thread backing pin pivot bolt (PN 1095-123) in to top cage plate (see Illustration 5.9.13).
    ii Drop backing pin (PN 1095-12101) into one of the backing pin holes.
    iii. Place the backing pin retainer (PN 1095-122) over the backing pin and pivot bolt. **ASSEMBLY NOTE:** the larger diameter hole in the backing pin retainer fits over the backing pin.
    iv. Secure the backing pin retainer to the pivot bolt using a ⅜" UNC hex nylock nut and ⅜" regular flat washer.
    v. Thread the backing pin knob (PN 02-0017) on to the threaded stud on top of the backing pin.

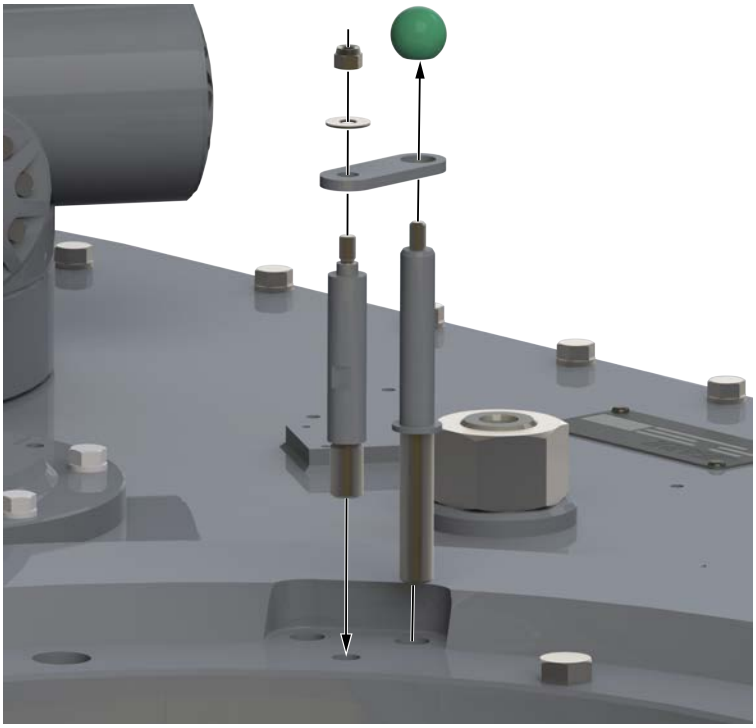


Illustration 5.9.13: Backing Pin Installation

5.9 ASSEMBLY PROCEDURES (CONTINUED):

51. Install lower rigid sling bracket weldments (PN 1095-224) onto the bottom plate of the tong directly adjacent to each rotary idler, and secure each with three ¾" UNC x 2" hex bolts and ¾" lock washers.
52. Bolt the upper rigid sling bracket weldments (left side PN = 1095-225LH, right side = 1095-225) to the top plate of the tong using three ¾" UNC x 2" hex bolts and ¾" lock-washers per side. **ASSEMBLY NOTE:** ensure top rigid sling lugs are not interchanged. When correctly installed the threaded holes for the adjustment bolts will face the front of the tong.
53. Connect the upper and lower sling brackets on each side using a 1-¼" UNC x 6" heavy hex bolt and 1-¼" UNC nylock nut.
54. Thread a ¾" UNC hex nut on to a ¾" UNC x 3-½" hex bolt. Thread the bolt in to the threaded hole on the upper rigid sling hanger bracket weldment - thread in until the end of the bolt barely protrudes into the inside of the weldment. This bolt will be used for leveling the tong. Repeat for the upper sling weldment on the other side of the tong.

Illustration 5.9.14: Leveling Bolt Installation

55. Use a crane to hoist the rigid sling assembly (PN 101-3010). Align rigid sling with the sling brackets, and attach the rigid sling to the brackets using two rigid sling pins (PN 1095-225-03). Secure each pin in place with two 0.148" x 2.938" hitch pins.
56. Suspend the tong using the sling, and attach the tong leg weldments (left side = PN 1095-213, right side = PN 1095-212) to the bottom plate of the tong. Secure each leg using twelve ¾" UNC x 2" hex bolts and ¾" lock washers. Set the tong down on its legs to complete assembly.

5.9 ASSEMBLY PROCEDURES (CONTINUED):

56. Attach four handle weldments (PN 1095-143) to the top plate as shown in the following illustration. If necessary extract the previously-installed top plate fasteners at the installation locations, and use these fasteners to secure the handles in place.

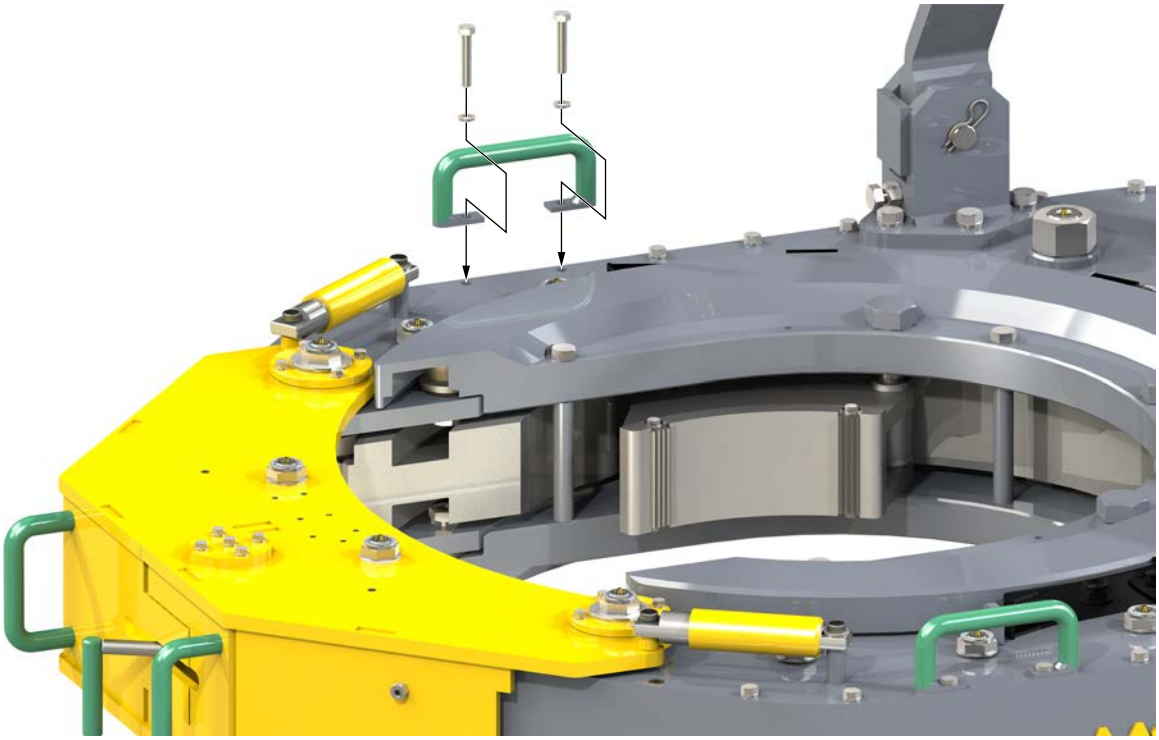


Illustration 5.9.15: Handle Installation

57. Attach adjustable hydraulic support weldments (PN 101-1138) to the top plate of the tong directly adjacent to the RH pinion idler assembly using two ⅜" UNC x 1-¼" hex bolts and ⅜" lock washers per weldment. Attach the adjusting plates (PN 101-0022) to the support weldments using two ⅜" UNC x 1" hex bolts, four ⅜" narrow flat washers and two ⅜" UNC nylock nuts per assembly (see Pp. 5.24 - 5.25).
58. Attach three hydraulic valve supports (PN 101-1324) to the top plate using one ⅜" UNC x 1-¼" hex bolt and ⅜" lock washers per support post (see Pp. 5.24 - 5.25).
59. Use a crane and temporary lifting sling to hoist the hydraulic valve assembly and align with the three supports installed in the previous step, and secure to the posts using three ½" UNC x 4-½" hex bolts and ½" narrow flat washers.
60. Attach torque gauge mount holder (PN 101-0480) to the top plate of the tong using two ⅜" UNC x 1-¼" hex bolts and ⅜" lock washers. Place the torque gauge mount (PN 1500-09-03A) into the torque gauge mount holder and secure with a 0.148" x 2.938" hitch pin.
61. Install the door switch components (see Pp. 5.34 - 5.35)
    i. Attach RH door switch latch plate (PN 101-0319) to the RH door weldment using two ⅜" UNC x 1-½" hex bolts and lock-washers, and two ⅜" UNC x 1-½" flat head countersunk cap screws.
    ii. Attach RH door switch latch block (PN AE13-302M) to the RH door switch latch plate using four ⅜" UNC x ¾" hex cap screws.
    iii. Attach LH door switch latch plate (PN 101-0915) to the LH door weldment using three ⅜" UNC x 1-½" flat head countersunk cap screws.
    iv. Attach LH door switch latch block (PN AE13-301S) to door latch plate # 2 (PN AE13-311) using three ⅜" UNC x ¾" flat head countersunk cap screws.
    v. Attach LH door switch latch plate #2 to the LH door switch latch plate using four $^{5}/_{16}$" x ¾" hex socket UNC shoulder screws.

5.9 ASSEMBLY PROCEDURES (CONTINUED):

62. Install the door switch components (continued):

vi. Insert load plunger, PN AE12-306, into LH door switch latch block.

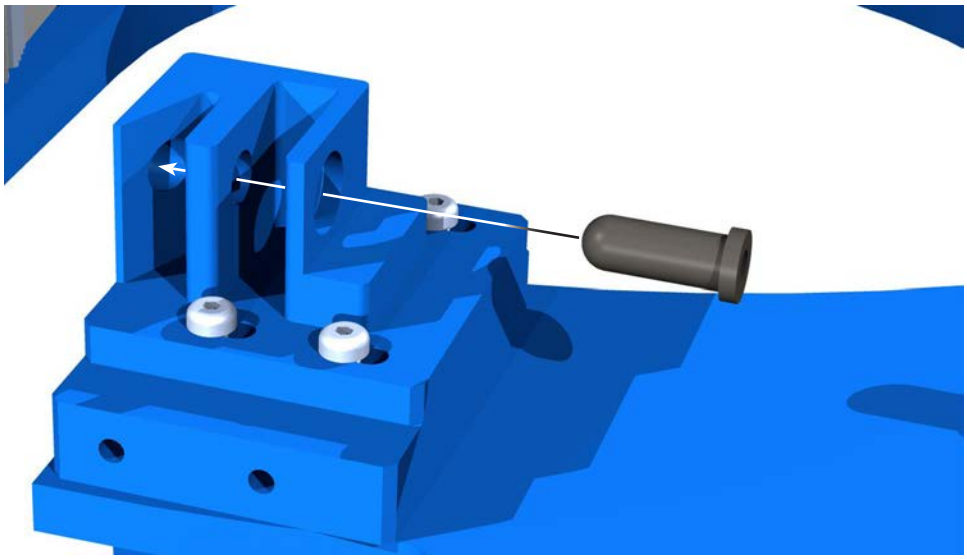


Illustration 5.9.16: Handle Installation

vii. Attach three ¼" NPT JIC elbows to the Deltrol door switch valve, PN 08-0337M. Position a $^{15}/_{16}$" valve lock nut as shown below, and secure the door switch valve to the LH door switch latch block using the valve lock nut.

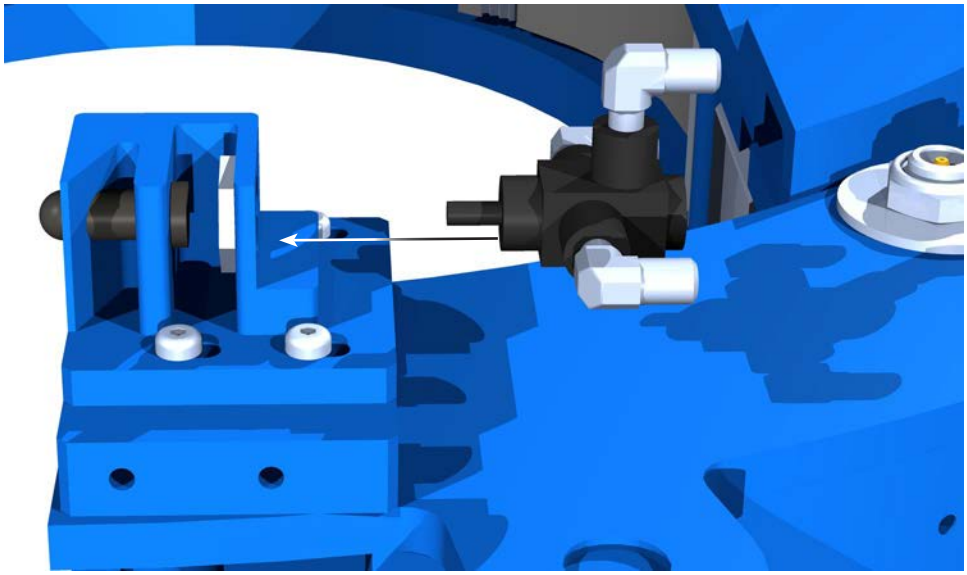


Illustration 5.9.17: Door Switch Installation

viii. Attach the door switch protector weldment, PN 101-0450, to the LH door switch latch plate using four ⅜" UNC x 1" hex bolts and lock-washers. Note that the protector has a removable top plate, PN 101-1238, that is attached to the protector weldment using four ⅜" UNC x ¾" hex bolts and lock-washers.

63. Install the desired size of jaws using the jaw pivot bolts. Note that there is no rear jaw used - the rear jaw pivot bolt is a "dummy".

64. Install the load cell pins, PN 101-2451, and, if prepared, the tension load cell assembly.

5.10 DAILY INSPECTION & MAINTENANCE CHECKLIST

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

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

⚠ WARNING

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

DEPRESSURIZE HYDRAULIC SYSTEM IN PREPARATION FOR MAINTENANCE:

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

⚠ WARNING

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

3. ☐ Remove the majority of dirt and grease build-up from the tong, backup, and frame assembly using a hose with spray nozzle, or a pressure washer set to the “low pressure” mode. Ensure adequate containment is in place to prevent environmental contamination from residual hydraulic fluid and dirty grease.
4. ☐ Remove the access panel on the side of the tong directly adjacent to the shifter mechanism.
5. ☐ Use a flashlight to perform a visual inspection of the gear train through the access panel and the opening of the rotary gear. If gear damage or chips of metal are seen, the tong should be removed from service and overhauled to avoid further damage.
6. ☐ Perform a visual inspection of all fasteners and protruding body pieces (example: hydraulic valve mounts, inlet & outlet line supports, tong legs, shifter handle pivot lugs). Tighten or replace loose or missing fasteners. McCoy recommends that damaged or missing body parts be repaired or replaced as soon as possible.
7. ☐ Inspect the jaws and dies on the tong and backup. Inspect the jaw roller pins for signs of damage - replace pins if necessary. If the pins are welded in place, replace the entire jaw assembly. Ensure dies are secure in the jaw - replace worn dies if necessary. Ensure that the jaw rollers rotate freely. Check to ensure the size of the loaded jaws match the size of casing or pipe you are running.
8. ☐ Perform a visual inspection of all lifting points - if visible damage is seen, including cracks, broken lugs, distorted metal, etc. replace damaged part(s) before placing tong in service. Also inspect all chains, master links, and turnbuckles - again, if any damage is noted replace the damaged part(s) before placing the tong in service.
9. ☐ Inspect tong for signs of premature wear, or moving parts that are rubbing (bare metal where there used to be paint is a good indication of wear).

5.10 DAILY INSPECTION & MAINTENANCE CHECKLIST (CONTINUED):

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

⚠ WARNING

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

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

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

⚠ DANGER

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

21. ☐ While rotating the cage plate, ensure that the jaws properly cam. If the jaws do not cam properly, the brake bands need to be tightened. Incrementally adjust both the top and bottom brake bands EQUALLY until proper cam action is achieved (see section 5.6.1).

5.11 MONTHLY MAINTENANCE CHECKLIST

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

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

⚠ WARNING

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

Depressurize Hydraulic System In Preparation For Maintenance:

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

⚠ WARNING

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

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

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

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

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

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

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

5.11 MONTHLY MAINTENANCE CHECKLIST (CONTINUED):

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

10. ☐ Inspect all paint - locations in which the paint has been damaged must be repaired prior to the tong being returned to service. Prepare areas to be painted to ensure they are free of grease, dirt, or solvent. Touch up using a solvent-based acrylic paint. Allow sufficient time for paint to dry before proceeding.

11. ☐ Inspect all external welds. Any weld that is cracked or separating must be repaired and repainted before returning the tong to service.

12. ☐ Perform a visual inspection of all lifting points - if visible damage is seen, including cracks, broken lugs, distorted metal, etc. replace damaged part(s) before placing tong in service. Also inspect all chains, master links, and turnbuckles - again, if any damage is noted replace the damaged part(s) before placing the tong in service. Refer to Section 3.1 of the technical manual for information on recommended testing and recertification.

13. ☐ Inspect all jaws and dies used since the last monthly inspection. Inspect jaw roller pins for signs of damage - replace pins if necessary. If damaged pins are welded in place, remove and quarantine the jaw until the weld is repaired. Ensure dies are secure in the jaw - replace worn dies if necessary. Ensure that the jaw rollers rotate freely.

14. ☐ Inspect backing pin(s). Replace cracked, broken, or bent pins.

15. ☐ Inspect top and bottom brake band linings - replace if necessary. Unequal wear of the brake bands indicates that the brake band tension is not evenly adjusted. Refer to the maintenance section of the manual for instructions on properly adjusting brake bands.

16. ☐ Test the door stop spring cylinder(s). Ensure the springs retain sufficient strength to be able to assist the opening of the door, and to keep the door open. The springs should also help to “snap” the door shut.

17. ☐ Perform a visual inspection of all hydraulic lines. Replace flexible lines if they appear to be cracked, fatigued, or have visible signs of wear from contact with a rigid object. If your tong is equipped with rigid hydraulic lines, replace any line that is dented or appears to be stressed or cracked.

18. ☐ Generously fill the gear train housing with grease. Perform a full lubrication per section 5.5 of this manual.

19. ☐ Ensure main supply and return connections to the tong are fully made up. Re-connect the remainder of the hydraulic lines, and, if applicable, the electrical line to the turns counter.

⚠ WARNING

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

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

20. ☐ Ensure that supply pressure is at or above the tool’s specified operating pressure, and that the return pressure is less than 350 psi.

21. ☐ Perform a visual inspection of pressurized hydraulic lines. If any hydraulic fittings or hoses are leaking they must be repaired or replaced before proceeding.

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

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

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

25. ☐ Rotate tong at low speed for 5 minutes while monitoring pressurized seals and hydraulic lines. If a seal, line, or fitting begins to leak while tong is rotating, it must be replaced before the equipment is returned to service.

5.11 MONTHLY MAINTENANCE CHECKLIST (CONTINUED):

26. ☐ Rotate tong at high speed for 5 minutes while monitoring temperature of top and bottom bearing caps. If the bearing caps are hot to the touch (higher than approximately 50°C) replace the applicable bearings. Note any unusual sounds (grinding, rubbing) may be indicative of damaged bearings (see section 7 for exploded views for all bearing locations). Monitor hydraulic inlet and outlet lines to ensure operating temperature of the hydraulic fluid does not exceed the specifications stated in Section 2.3.

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

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

29. ☐ While rotating the cage plate, ensure that the jaws properly cam. If the jaws do not cam properly, the brake bands need to be tightened. Incrementally adjust both the top and bottom brake bands EQUALLY until proper cam action is achieved. Refer to the section 5.6.1 for instructions on properly adjusting brake bands.

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

31. ☐ Test door switch feature. Refer to door switch testing procedure in subsection 4.0.5, “Pre-operational Checks”.

⚠ DANGER

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

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

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

5.12 TUBULAR CONNECTION EQUIPMENT DE-COMMISSIONING & SHIPPING

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

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

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

NOTICE

IN ORDER TO MAINTAIN THE INTEGRITY OF INSTALLED SEALS, MCCOY RECOMMENDS THAT THE MAXIMUM STORAGE INTERVAL NOT EXCEED ONE YEAR. AT LEAST ONCE PER YEAR ALL TUBULAR CONNECTION EQUIPMENT IN LONG-TERM STORAGE SHOULD BE RECOMMISSIONED AS PER SECTION 5.13. IF FURTHER STORAGE IS REQUIRED, THE EQUIPMENT SHOULD THEN BE PUT THROUGH ANOTHER DE-COMMISSIONING PROCEDURE.

De-pressurization Procedure In Preparation For Storage:

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

⚠ WARNING

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

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

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

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

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

9. ☐ Perform a liberal lubrication of the equipment - refer to section 5.5 in this manual to determine lubrication points. Generously fill the gear train housing with grease through the opening in the rotary gear.

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

11. ☐ Energize hydraulic power to the tool.

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

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

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

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

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

17. ☐ Depresurize the equipment in preparation for storage

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

⚠ WARNING

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

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

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

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

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

⚠ CAUTION

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

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

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

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

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

Calculation Of Required Desiccant:

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

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

Shipping Instructions:

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

1. If not already done remove accessories (tong jaws, load cell, torque gauge, etc.) McCoy recommends wrapping these items in protective wrap and placing in a separate wooden crate.
2. Place the equipment on a sturdy pallet constructed of 4” x 4” cross-members and 2” x 4” flooring. Ensure the pallet is large enough to accommodate the wooden crate containing the tong accessories (see illustration 5.12.1)

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

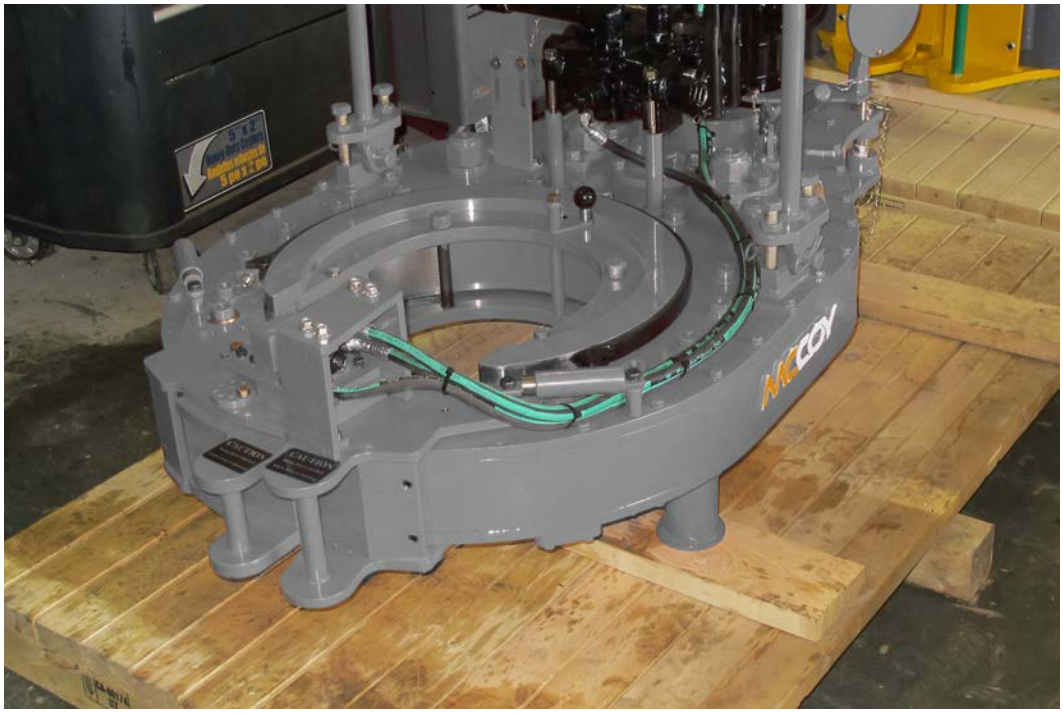


Illustration 5.12.1: Shipping Instructions - Pallet Placement

3. Securely strap the equipment in place using metal strapping (see Illustration 5.12.2). Place strapping as close to the cross-members under the equipment legs as possible, and use caution not to entrap any flexible hydraulic hoses beneath the strapping (guide strapping through beneath the hydraulic hoses). Use the following guidelines to determine the strapping requirements:

Illustration 5.12.2: Shipping Instructions - Strapping to Pallet

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

3. Securely strap the equipment in place (continued):

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

   ¾" x 0.029" metal strapping, 3320 lbs. (1509 kg.) tensile strength
   Minimum two straps

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

   1-¼" x 0.031" metal strapping, 5500 lbs. (2500 kg.) tensile strength
   Minimum two straps for assemblies weighing less than 5000 lbs. (2273 kg.)
   Minimum three straps for assemblies weighing more than 5000 lbs. (2273 kg.)

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

   Place the wooden crate containing the tong accessories on the crate next to the equipment. Strap the crate to the pallet using ¾" x 0.029" metal strapping. If it is not practical to place larger loose items in a wooden crate, ensure they are also securely strapped to the pallet using ¾" x 0.029" metal strapping.

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

5.13 TUBULAR CONNECTION EQUIPMENT RE-COMMISSIONING PROCEDURE

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

1. ☐ Remove all protective plastic wrapping. Exhausted desiccant packs within the wrapping may be disposed of with the regular garbage. Remove all remaining shipping and/or storage material including straps, blocks, plugs, wire-ties, etc. Ensure the backup floats freely on its suspension chains.
2. ☐ Remove the access panel on the side of the tong directly adjacent to the shifter mechanism.
3. ☐ Wipe excess grease or heavy oil from exposed cylinder rods.
4. ☐ Perform a visual inspection of all lifting points - visibly damaged components (cracks, broken lugs, distorted metal, etc.)must be replaced or repaired before placing tong in service. Inspect all chains, master links, and turnbuckles. Damaged components must be replaced before placing the tong in service. If your company requires yearly certification of lifting equipment, ensure that the most recent test date falls within the past year. Perform recertification if necessary.
5. ☐ Perform a liberal lubrication of the equipment - refer to section 5.5 to determine lubrication requirements. Generously fill the gear train housing with grease through the opening in the rotary gear.
6. ☐ Connect the equipment to a hydraulic power unit. Ensure all lines are fully made up to prevent equipment damage from excessive back pressure. Do not neglect to connect the motor drain.

⚠ WARNING

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

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

Continued on next page...

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

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

19. ☐ Test door switch feature. Refer to door switch testing procedure in subsection 4.0.5, “Pre-operational Checks”.

⚠ DANGER

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

20. ☐ While rotating the cage plate, ensure that the jaws properly cam. If the jaws do not cam properly, the brake bands require tightening. See subsection 5.6.1 for instructions for adjusting the brake bands.

21. ☐ When all of the previous steps are completed, you may return your re-commissioned equipment to service.

This page intentionally left blank

SECTION 6: TROUBLESHOOTING

This page intentionally left blank

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

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

6.0 TONG WILL NOT DEVELOP SUFFICIENT TORQUE

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

NOTICE

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

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

6.1 RELIEF VALVE IS INCORRECTLY SET OR NOT FUNCTIONING

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

a. If your tong is equipped with a system pressure indicator proceed to step “f”. If your tong does not have a system pressure indicator, a temporary 0 - 3000 PSI indicator must be installed on the hydraulic inlet.

b. Isolate your tong from hydraulic power, and depressurize following the procedure in section 5.4.

c. Tee in a temporary indicator at the door switch supply pressure port. Ensure all hydraulic connections are performed by a qualified hydraulic technician.

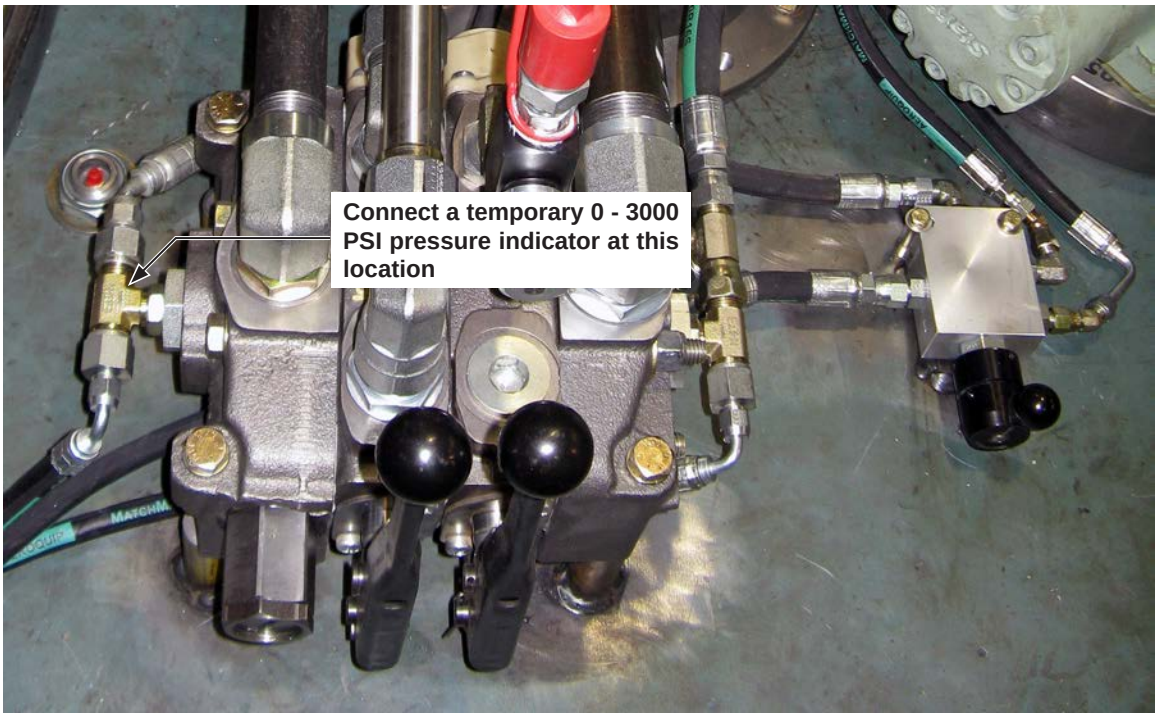


Illustration 6.1.1: Relief Valve Troubleshooting - Temporary Gauge Installation

d. Re-establish hydraulic power to your tong. Ensure that no equipment functions are active.

e. Loosen the locking nut on the pressure relief valve.

f. Open the tong door to activate the door switch system and inhibit tong rotation.

g. Activate motor control valve. Observe the pressure displayed on the pressure indicator. Adjust the relief valve until the pressure indicated is at the maximum system pressure specified on the specifications page (maximum system pressure is the pressure at which your tong achieves its specified torque).

⚠ WARNING

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

h. Release the motor control valve and tighten the locking nut on the pressure relief valve.

i. Isolate your tong from hydraulic power, and depressurize following the procedure in section 5.4

j. Close the tong door, and remove the temporary pressure indicator. Restore the door switch pressure supply line to factory specifications. Verify that door switch is operating correctly (see subsection 4.0.5, step #8).

Continued on next page...

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

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

PROCEDURE:

a. Isolate tong from hydraulic power, and depressurize following the procedure in section 5.4

b. Loosen the locking nut on the pressure relief valve.

c. Use a large flat-head screwdriver to completely un-thread the poppet and spring from the relief assembly.

d. Inspect the relief valve spring, poppet, and valve seat.

e. If no debris is found in relief valve and if seat and poppet are undamaged, replace relief valve spring.

f. Reassemble relief valve.

g. Relief valve must be re-set to allow maximum system pressure. Follow the procedure in Step 1 of this section to properly adjust relief valve.

h. If maximum system pressure still cannot be reached, replace the entire relief valve assembly.

6.2 DOOR SWITCH DOES NOT OPERATE OR IS MALFUNCTIONING

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

6.3 TONG RUNNING TOO SLOWLY

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

6.4 FAILURE OF JAWS TO GRIP PIPE

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

6.5 GENERAL COMMENTS

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

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

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

This page intentionally left blank

SECTION 7: PARTS & ASSEMBLIES

RECOMMENDED (ONE YEAR) SPARE PARTS

McCoy suggests stocking the spare parts listed in the following table. Stocking these components may significantly decrease equipment down-time in the event of long lead times from the factory

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

⚠ DANGER

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

MISC TONG PARTS		
Description	**Part Number**	**Qty. Recommended**
Jaw pivot bolt	1095-131	2
Backing pin knob	02-0017	1
Backing pin retainer	1095-122	1
Backing pin	1095-12101	1
Lined brake band weldment	1095-126	2
Brake band compression spring	08-9264	2
Rigid sling pin	1095-225-03	2
Door spring stop cylinder	1095-141	1
LH door switch latch block	AE13-301S	1
RH door switch latch block	AE13-302M	1
Door switch load plunger	AE12-306	1
BEARINGS & BUSHINGS		
Description	**Part Number**	**Qty. Recommended**
Bearing, pinion & bottom drive assembly	1095-105-50902	3
Cam follower assembly (cage plate)	101-3200	6
Door bearing	1095-103-318	2
HYDRAULIC COMPONENTS		
Description	**Part Number**	**Qty. Recommended**
Relief cartridge (DVG35)	10-9029	1
Relief cartridge (door switch)	08-1625	1
Door switch	08-0337M	1
Motor speed valve	10-9035	1
Hydraulic hose - lift cylinder supply (If lift cylinder is installed)	02-0934H	1
High-visibility protective wrap, lift cylinder hose (If lift cylinder is installed)	02-E0203	1
Seal kit - hydraulic motor	87-7210	1
Seal kit - hydraulic valve	07-0004	1
FITTINGS & FASTENERS		
Description	**Part Number**	**Qty. Recommended**
¾" UNC x 2" hex bolt (rigid sling bracket retainer)	09-1294	12
Hanger pin (main rigid sling hanger)	1095-218	1
1-¼" UNC x 6" hex bolt (rigid sling bottom bracket connection)	09-9134	2
Hitch pin (rigid sling pin retainers)	09-0090	4

RECOMMENDED (ONE YEAR) SPARE PARTS (CONTINUED):

JAW COMPONENTS		
Description	**Part Number**	**Qty. Recommended**
Jaw roller	1095-JR-300	2
Jaw pin	1095-JP	2
Standard 5” die insert	13-0008-500-0	48
⅜” UNC x ½” flange head machine screw (die retainer)	02-9292	4

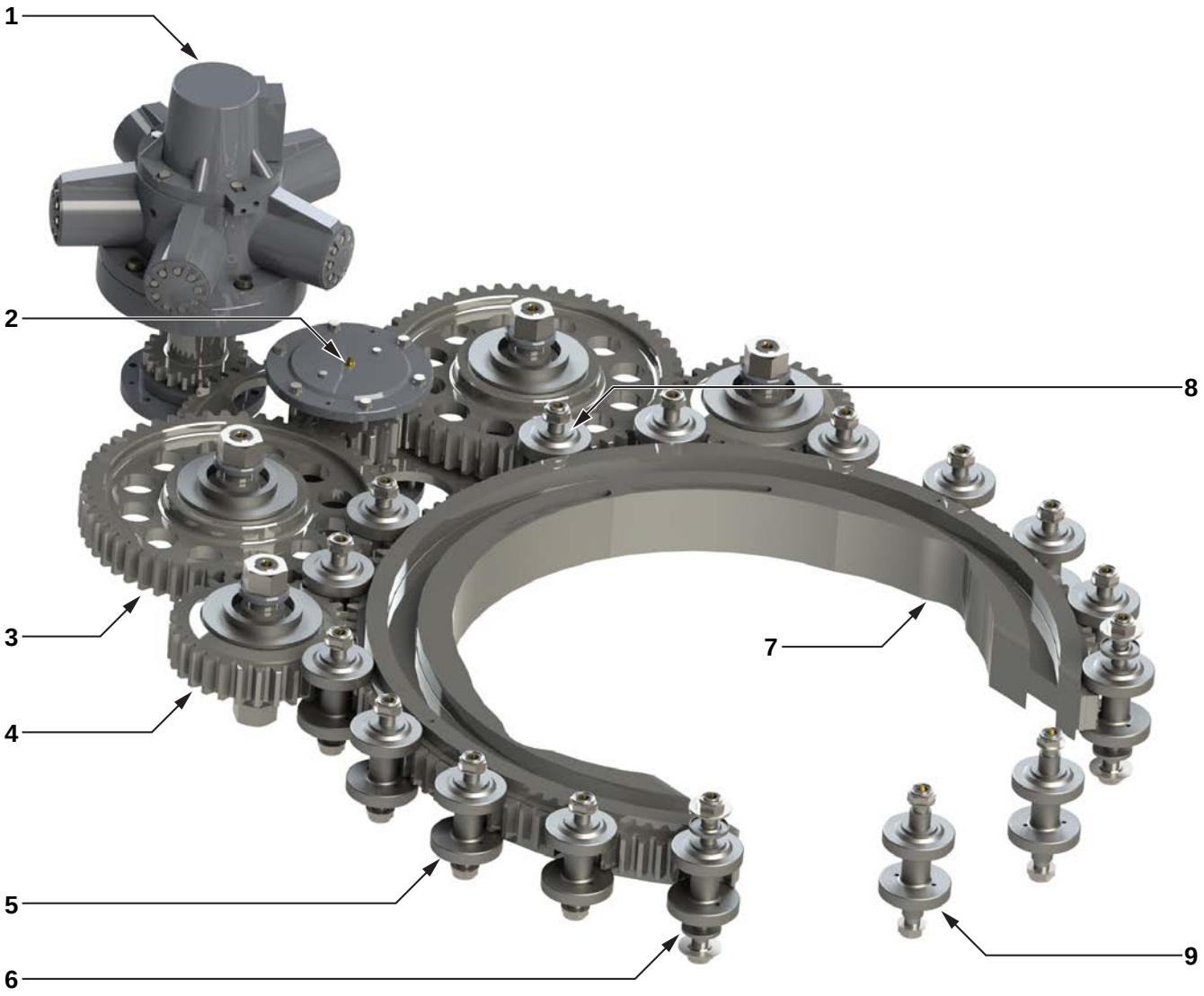


Illustration 7.1: 80-1402 HD31-80K Gear Train ISO View

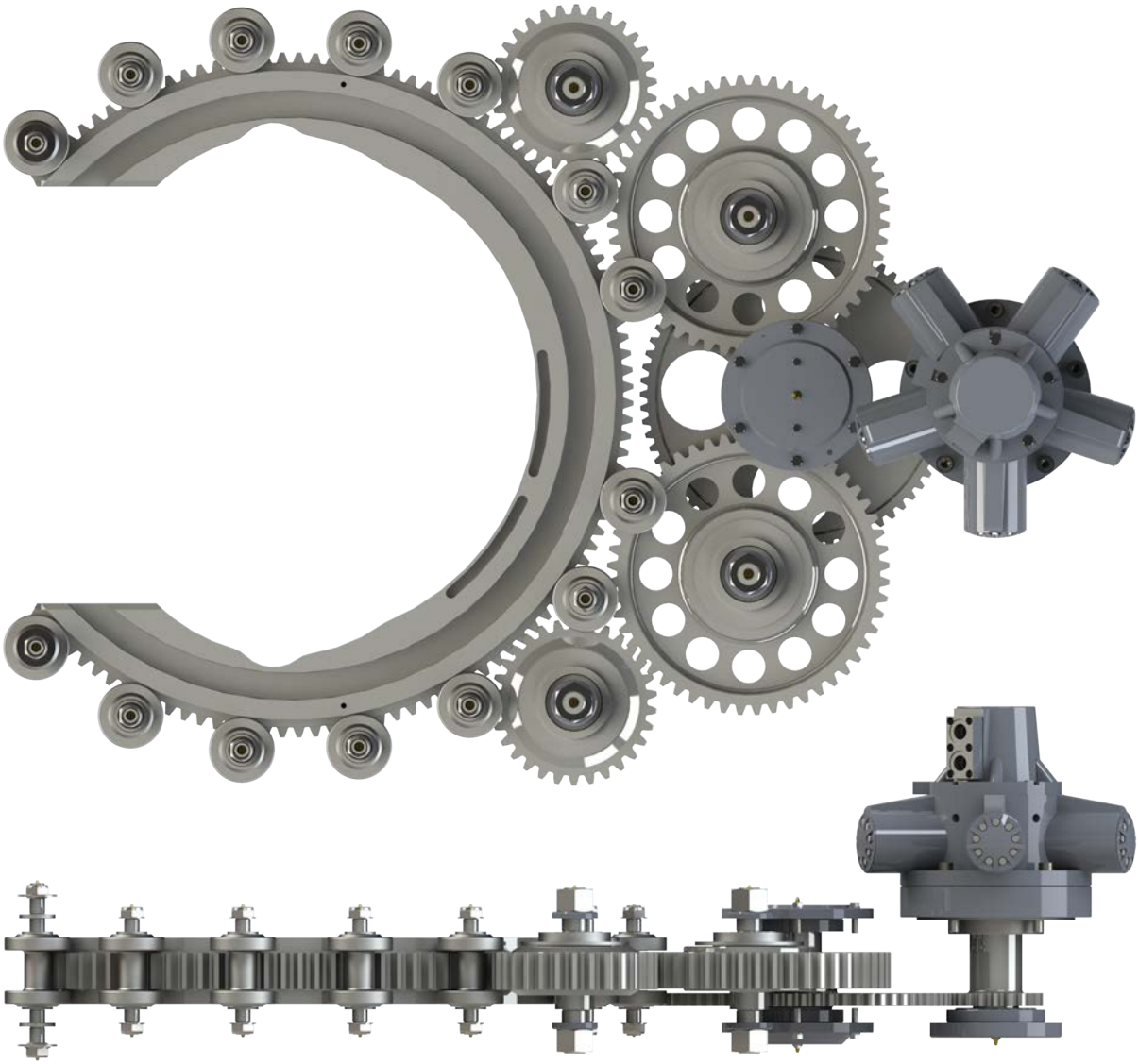


Illustration 7.2: 80-1402 HD31-80K Gear Train Top & Side View

Item	Type	Description	Qty	Part Number
1	Part	Motor & drive gear assembly (Pp. 7.20 - 7.21)	1	101-3011
2	Assembly	Pinion gear assembly (Pp 7.18 - 7.19)	1	101-3498
3	Assembly	Pinion idler assembly (Pp. 7.16-7.17)	2	101-3497
4	Assembly	Rotary idler assembly (Pp 7.14 - 7.15)	2	101-3496
5	Assembly	Support roller assembly (Pp. 7.8 - 7.9)	10	101-3201 (1)
6	Assembly	Door pivot roller assembly (Pp. 7.12 - 7.13)	2	101-3201 (1)
7	Part	Rotary gear	1	1095-105-511
8	Assembly	Half-roller assembly (Pp. 7.6 - 7.7)	4	101-3495
9	Assembly	Door-mounted support roller (Pp. 7.10 - 7.11)	2	101-3201 (1)

(1) Roller assembly only. Does not include shaft or fasteners. See Pp. 7.8-7.13 for details.

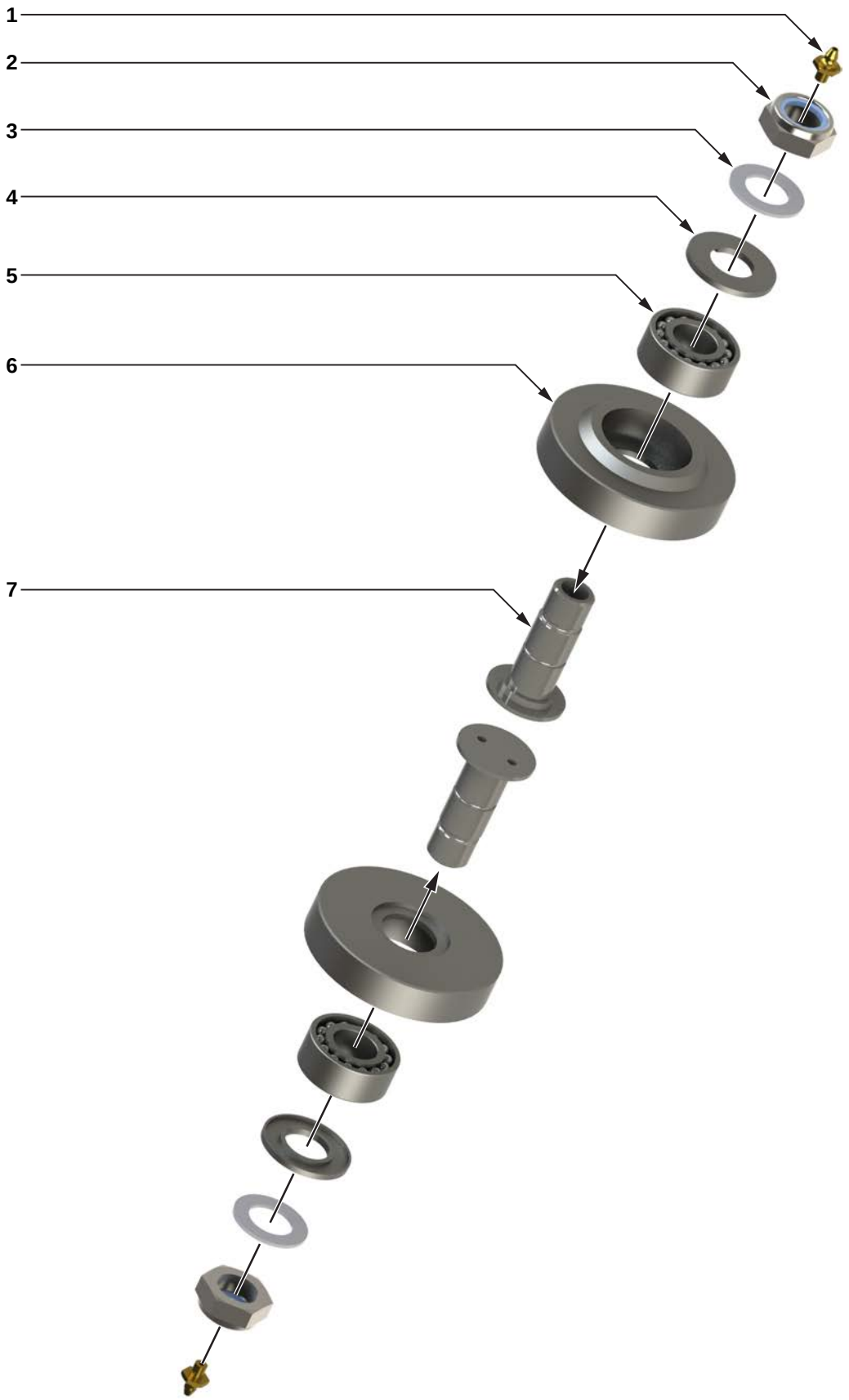


Illustration 7.3: 101-3495 HD31-80K Half-Roller Exploded

Illustration 7.4: 101-3495 HD31-80K Half-Roller

Item	Type	Description	Qty	Part Number
1	Part	⅛” NPT grease fitting	1	02-0005
2	Part	1-⅛” UNF thin nylock nut	1	09-5728
3	Part	1-⅛” narrow flat washer	1	02-0471
4	Part	Roller cup spacer	1	1095-519
5	Part	Ball bearing	1	1095-105-52003
6	Part	Roller cup	1	1095-523
7	Part	Roller half-shaft	1	1095-524

⚠ CAUTION

DO NOT SUBSTITUTE NYLOCK NUTS. SEE IMPORTANT ASSEMBLY INFORMATION ON PAGE 5.19

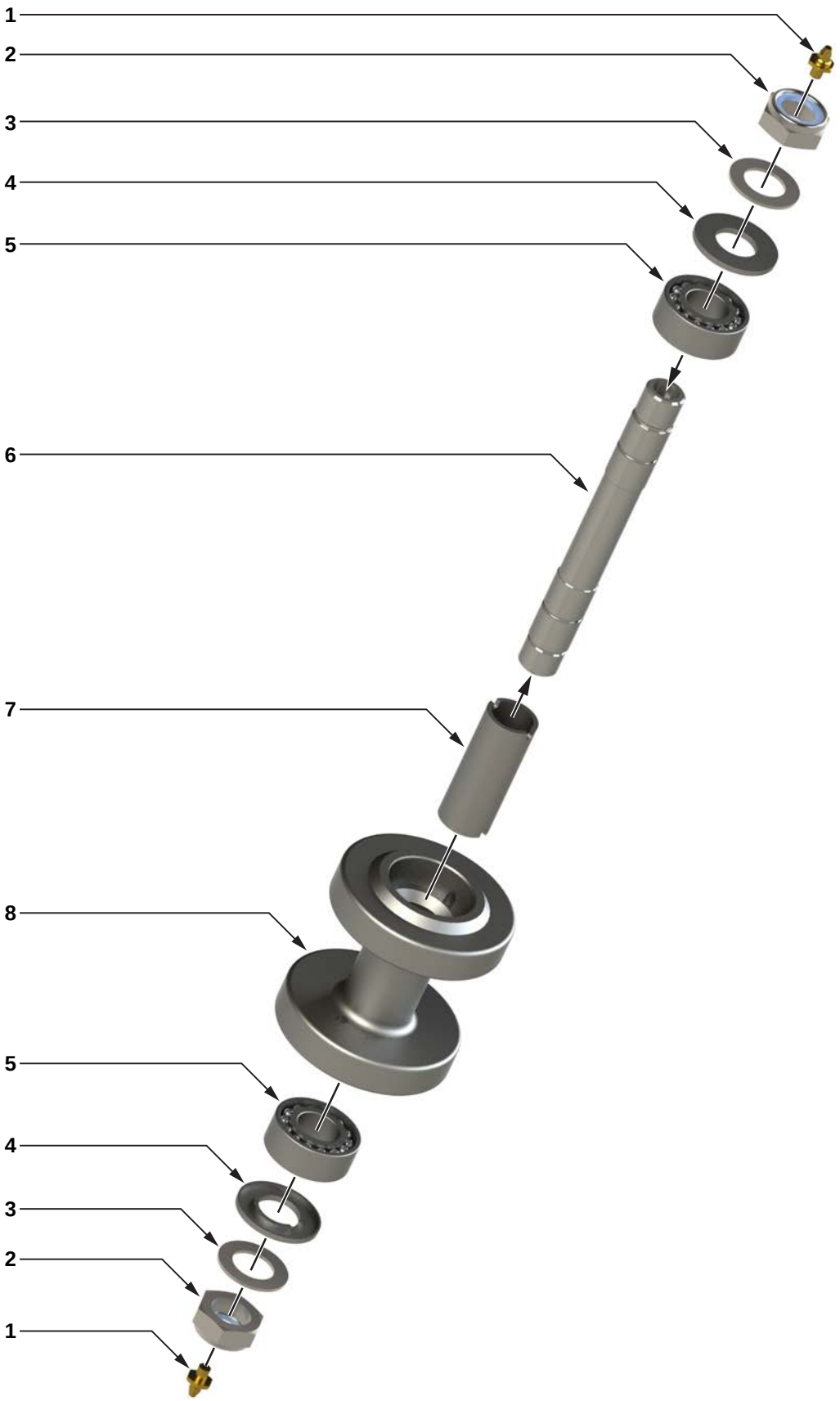


Illustration 7.5: 101-3201 HD31-80K Support Roller Exploded

Illustration 7.6: 101-3201 HD31-80K Support Roller

Item	Type	Description	Qty	Part Number
	Assembly	Support roller assembly (includes items 4, 5, 7, 8 only)		101-3201
1	Part	⅛" NPT grease fitting	2	02-0005
2	Part	1-⅛" UNF thin nylock nut	2	09-5728
3	Part	1-⅛" narrow flat washer	2	02-0471
4	Part	Roller cup spacer	2	1095-519
5	Part	Ball bearing	2	1095-105-52003
6	Part	Support roller shaft	1	1095-518
7	Part	Inner support roller spacer	1	1095-52002
8	Part	Support roller	1	1095-52001

NOTE: Support roller assemblies co-incidental with brake band retainers do not use flat washers.

⚠ CAUTION

DO NOT SUBSTITUTE NYLOCK NUTS. SEE IMPORTANT ASSEMBLY INFORMATION ON PAGE 5.19

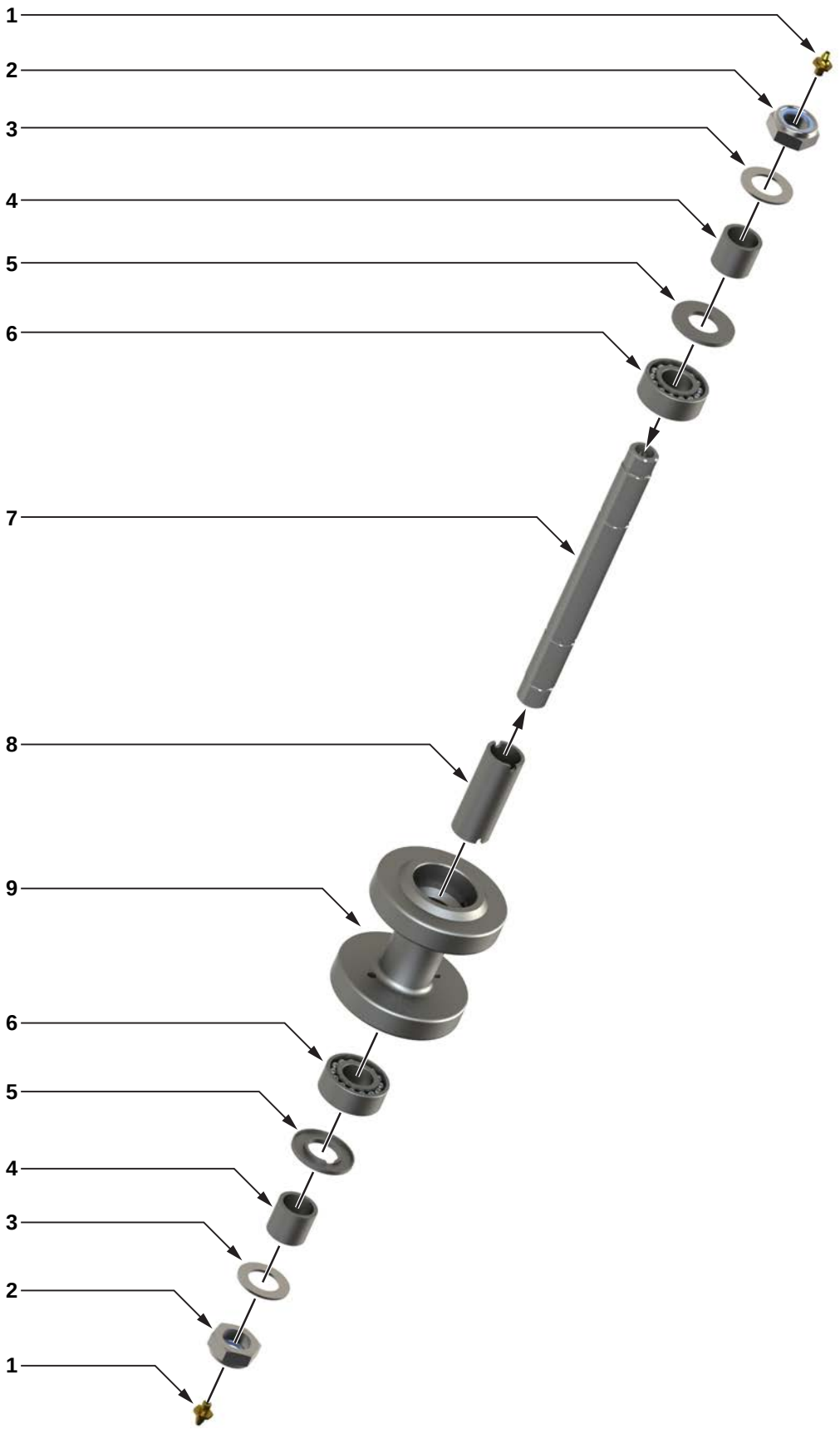


Illustration 7.7: Door-Mounted Support Roller Exploded

Illustration 7.8: Door Mounted Support Roller

Item	Type	Description	Qty	Part Number
	Assembly	Support roller assembly (includes items 5, 6, 7, 8 only)		101-3201
1	Part	⅛" NPT grease fitting	2	02-0005
2	Part	1-⅛" UNF thin nylock nut	2	09-5728
3	Part	1-⅛" narrow flat washer	2	02-0471
4	Part	Door roller spacer	2	1095-105-527
5	Part	Roller cup spacer	2	1095-519
6	Part	Ball bearing	2	1095-105-52003
7	Part	Door support roller shaft	1	1095-105-525
8	Part	Inner support roller spacer	1	1095-52002
9	Part	Support roller	1	1095-52001

⚠ CAUTION

DO NOT SUBSTITUTE NYLOCK NUTS. SEE IMPORTANT ASSEMBLY INFORMATION ON PAGE 5.19

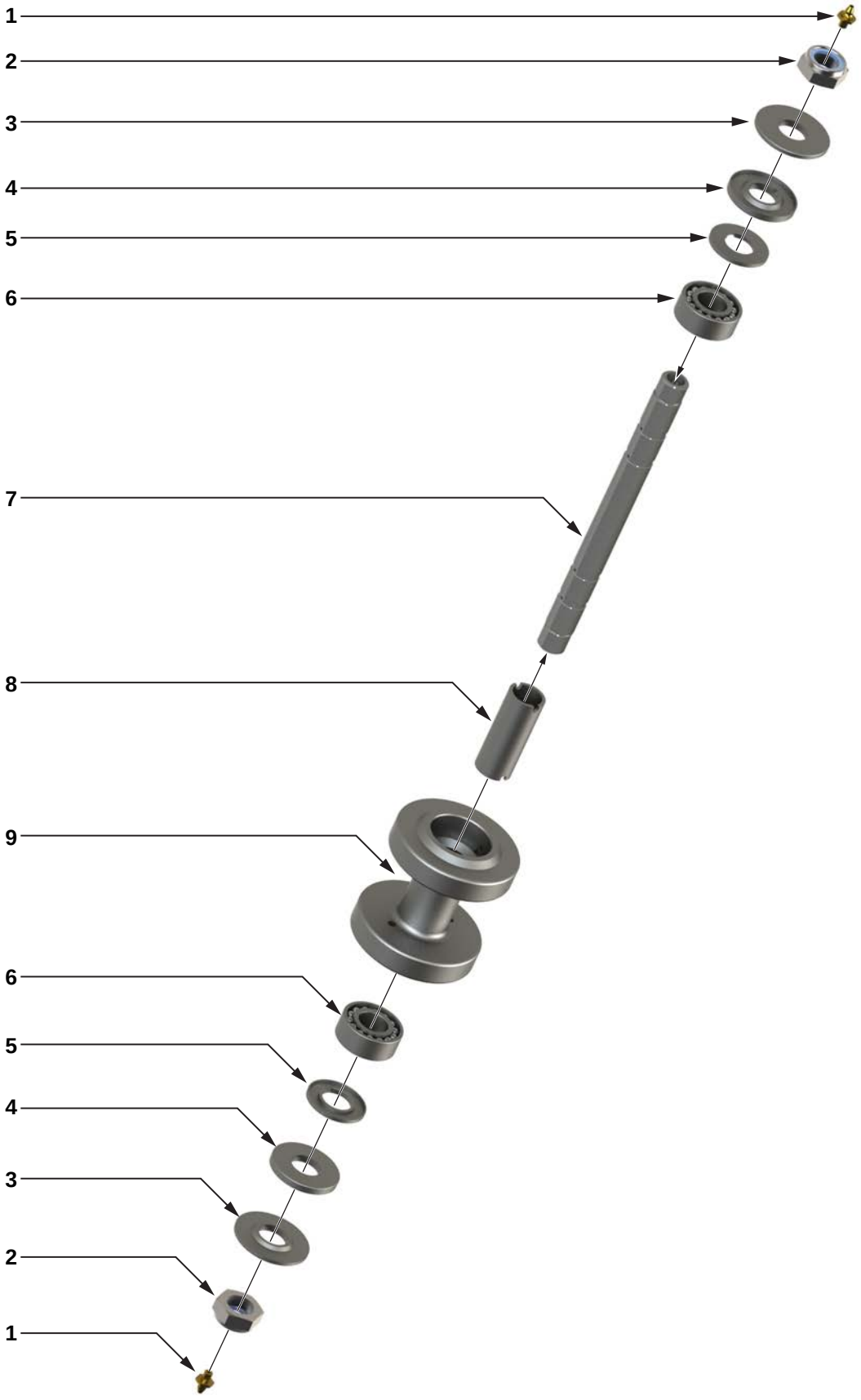


Illustration 7.9: Door Pivot Roller Exploded

Illustration 7.10: Door Pivot Roller

Item	Type	Description	Qty	Part Number
	Assembly	Support roller assembly (includes items 5, 6, 8, 9 only)		101-3201
1	Part	⅛" NPT grease fitting	2	02-0005
2	Part	1-⅛" UNF thin nylock nut	2	09-5728
3	Part	1-⅛" door hinge washer	2	1095-105-529
4	Part	Door hinge spacer	2	1095-105-528
5	Part	Roller cup spacer	2	1095-519
6	Part	Ball bearing	2	1095-105-52003
7	Part	Door pivot roller shaft	1	1095-105-526
8	Part	Inner support roller spacer	1	1095-52002
9	Part	Support roller	1	1095-52001

⚠ CAUTION

DO NOT SUBSTITUTE NYLOCK NUTS. SEE IMPORTANT ASSEMBLY INFORMATION ON PAGE 5.19

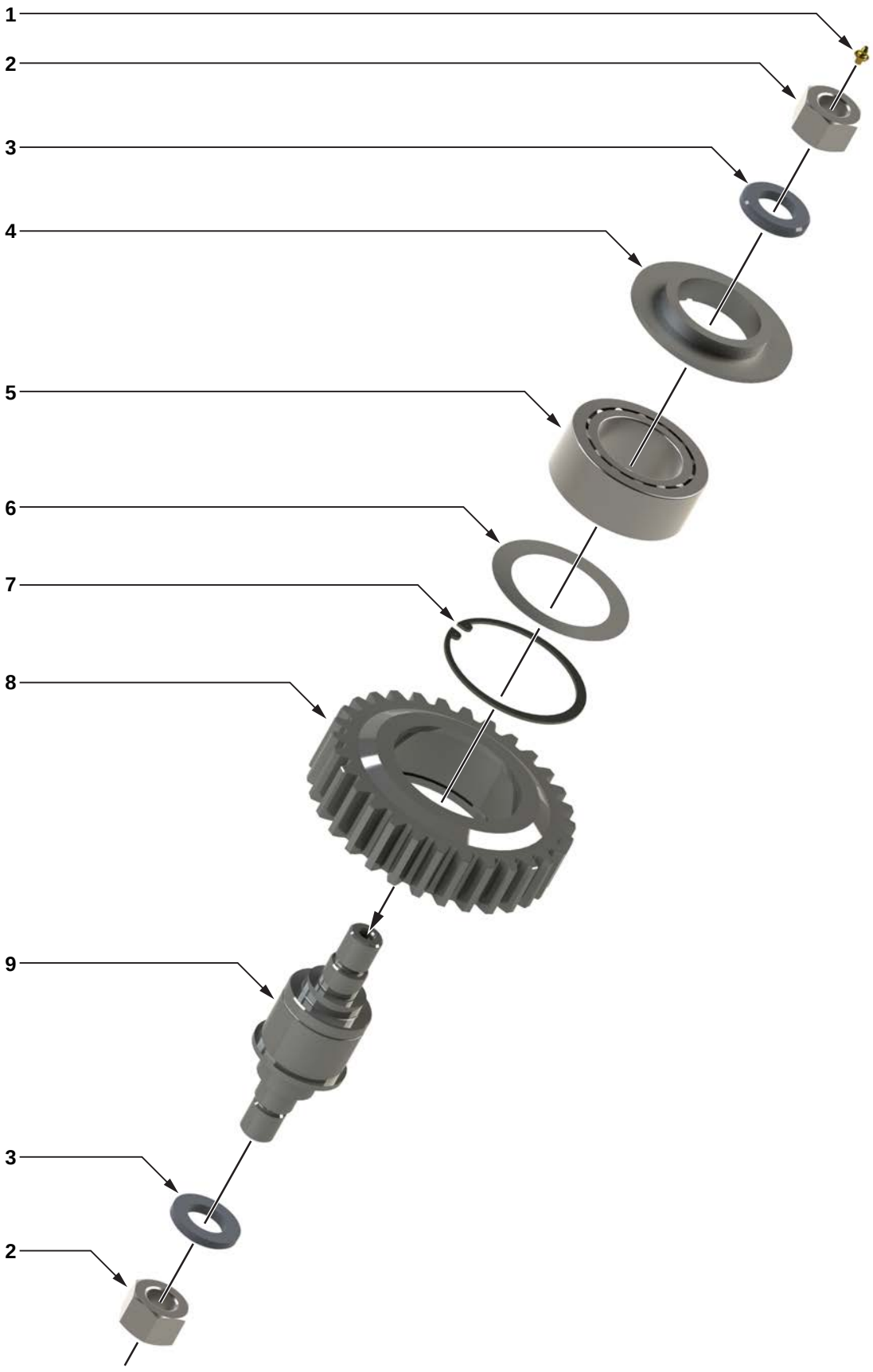


Illustration 7.11: 101-3496 HD31-80K Rotary Idler Exploded

Illustration 7.12: 101-3496 HD31-80K Rotary Idler

Item	Type	Description	Qty	Part Number
A	Part	⅛" NPT grease fitting	1	02-0005
B	Part	1-¾" UNC heavy hex nut	2	09-9172
C	Part	Idler pad	2	1095-116
D	Part	Rotary idler gear top spacer	1	1095-522
E	Part	Cylindrical roller bearing	1	1095-105-50902
F	Part	Bearing seal	1	1095-105-515
G	Part	Bearing retainer	1	1095-105-50903
H	Part	Rotary idler gear	1	1095-510
J	Part	Rotary idler shaft	1	1095-516

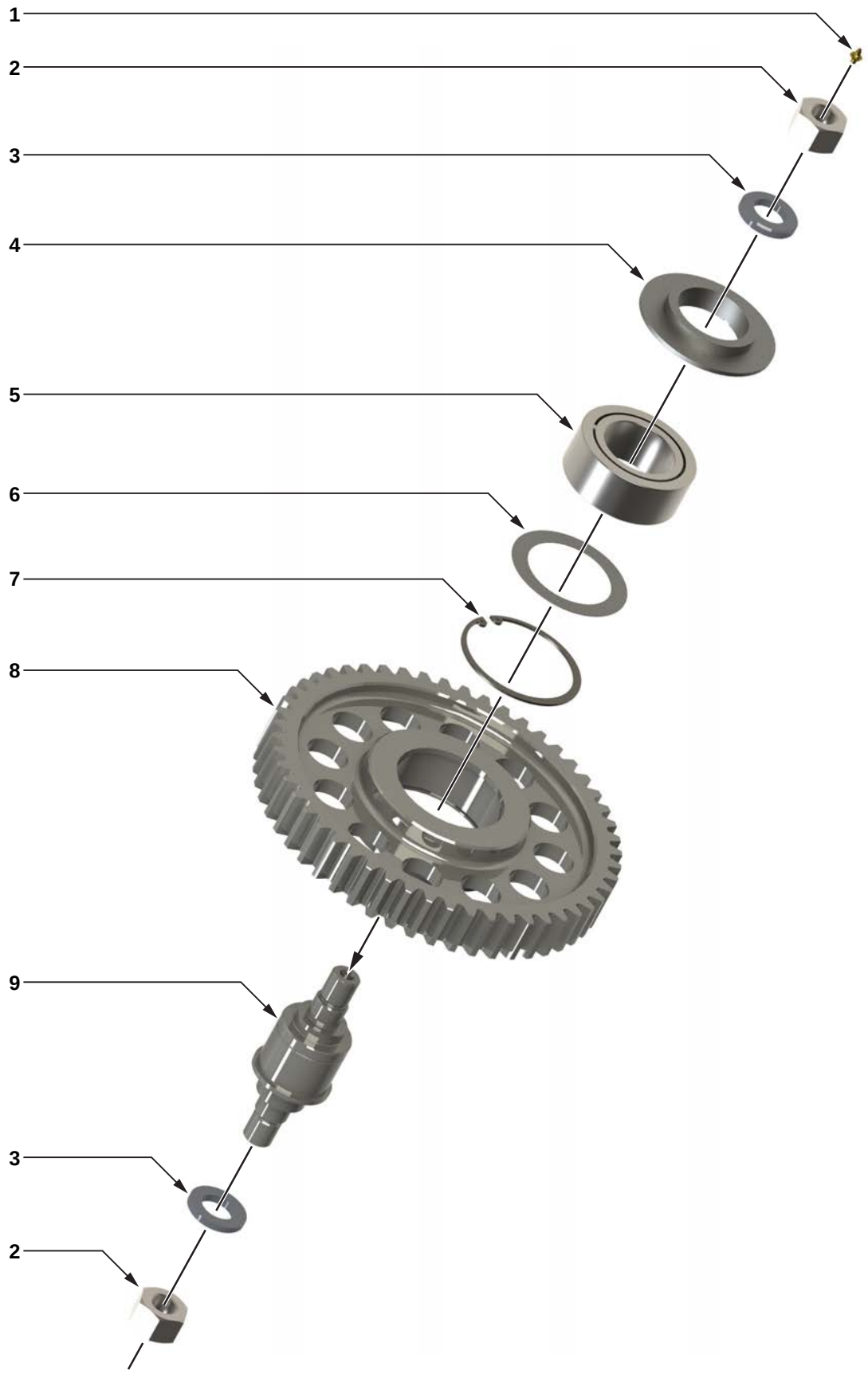


Illustration 7.13: 101-3497 HD31-80K Pinion Idler Exploded

Illustration 7.14: 101-3497 HD31-80K Pinion Idler

Item	Type	Description	Qty	Part Number
1	Part	⅛" NPT grease fitting	2	02-0005
2	Part	1-¾" UNC nylock jam nut	2	09-9172
3	Part	Idler pad	2	1095-116
4	Part	Idler gear top spacer	1	1095-522
5	Part	Cylindrical roller bearing	1	1095-105-50902
6	Part	Bearing seal	1	1095-105-515
7	Part	Bearing retainer	1	1095-105-50903
8	Part	Idler gear	1	1095-105-509
9	Part	Idler shaft	1	1095-516

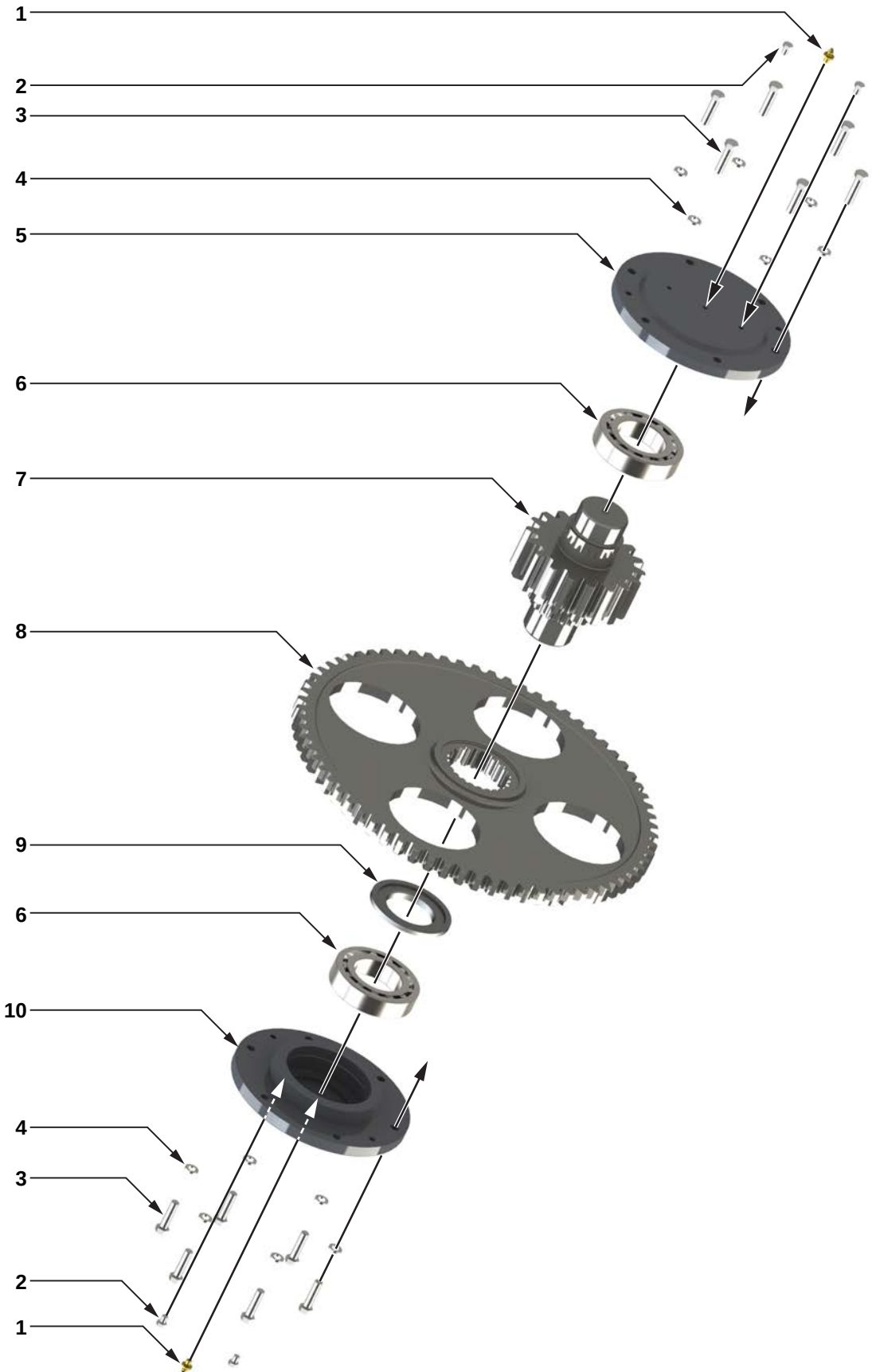


Illustration 7.15: 101-3498 HD31-80K Pinion Exploded

Illustration 7.16: 101-3498 HD31-80K Pinion

Item	Type	Description	Qty	Part Number
1	Part	⅛" NPT grease fitting	2	02-0005
2	Part	⅜" UNC x ½" hex bolt	4	09-1042
3	Part	½" UNC x 2" hex bolt	12	09-1174
4	Part	½" lock washer	12	09-5110
5	Part	Top pinion bearing cap	1	1095-50701
6	Part	Cylindrical roller bearing	2	1095-105-50902
7	Part	Pinion gear shaft	1	1095-105-503
8	Part	Pinion gear	1	1095-504
9	Part	Bearing spacer	1	1095-505
10	Part	Bottom pinion bearing cap	1	1095-50801

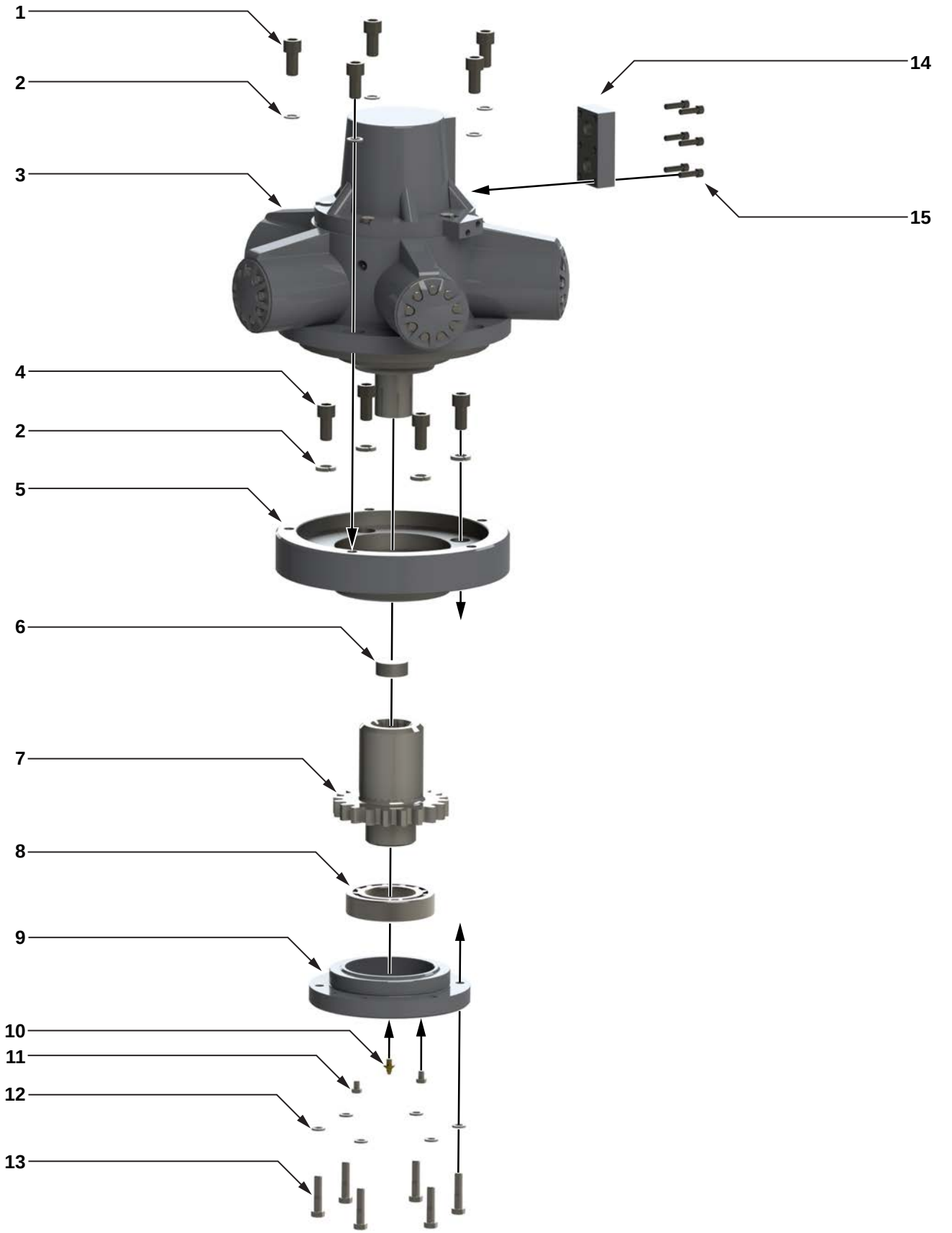
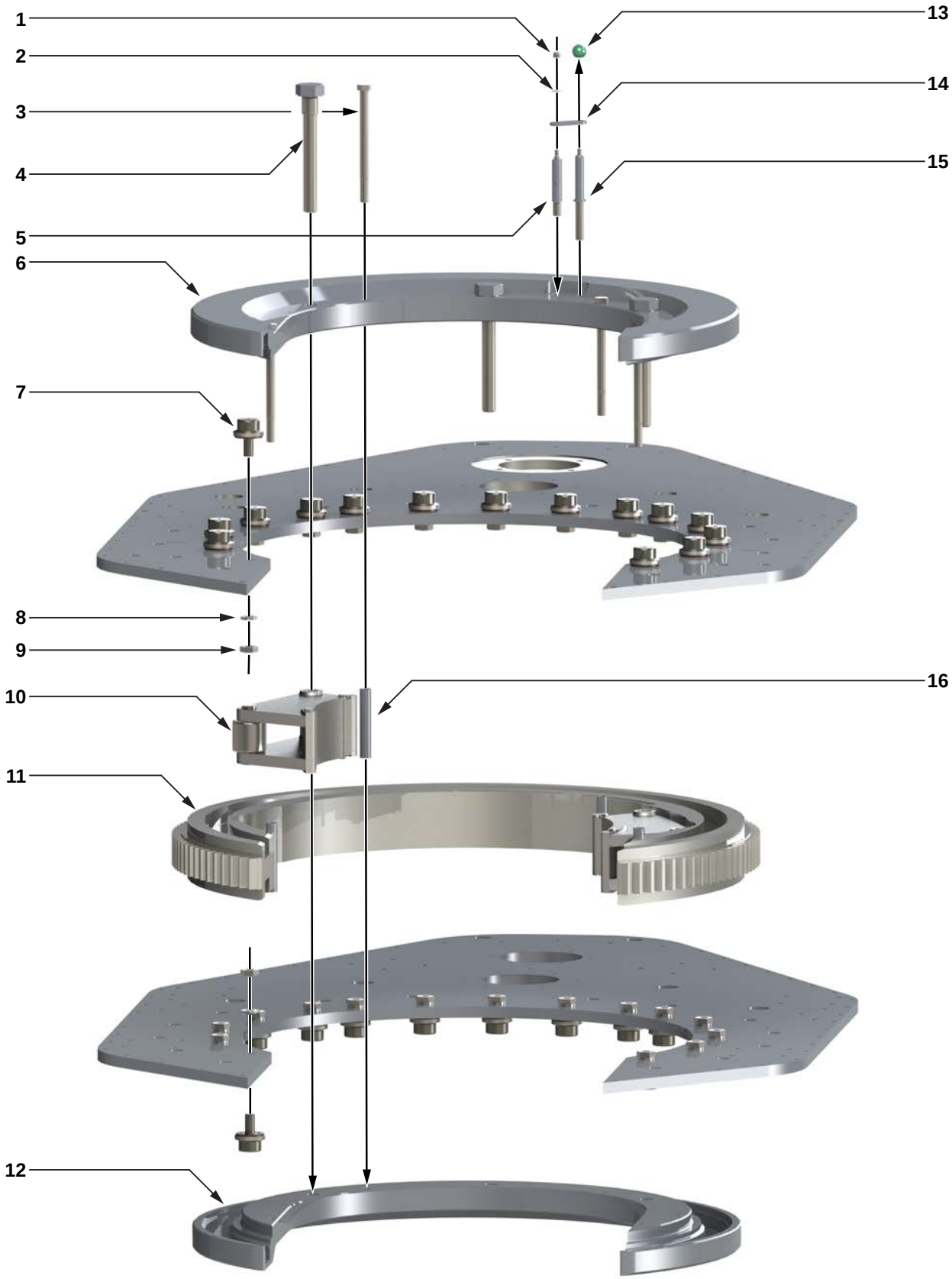


Illustration 7.17: 101-3011 HD31-80K Motor & Drive Assembly Exploded

Illustration 7.18: 101-3011 HD31-80K Motor & Drive Assembly

Item	Type	Description	Qty	Part Number
1	Part	¾" UNC x 2-¼" hex socket head cap screw	5	02-2290
2	Part	¾" lock washer	9	09-5118
3	Part	Hydraulic motor	1	87-0210
4	Part	¾" UNC x 1-½" hex socket head cap screw	4	02-2290
5	Part	Motor mount	1	1095-106B
6	Part	Gear spacer	1	1095-105-517
7	Part	Splined motor gear	1	1095-501B
8	Part	Bearing	1	1095-105-50202
9	Part	Bearing cap	1	1095-50201
10	Part	⅛" NPT grease fitting	1	02-0005
11	Part	⅜" UNC x ½" hex bolt	2	09-1042
12	Part	½" lock washer	6	09-5110
13	Part	½" UNC x 2-¼" hex bolt	6	09-1175
14	Part	Manifold block	1	87-0209
15	Part	⅜" UNC x 1-½" hex socket head cap screw	6	09-2051



NOTE: Top and bottom plates are shown for illustration purposes only

Illustration 7.19: 101-3012 Cage Plate Assembly Exploded

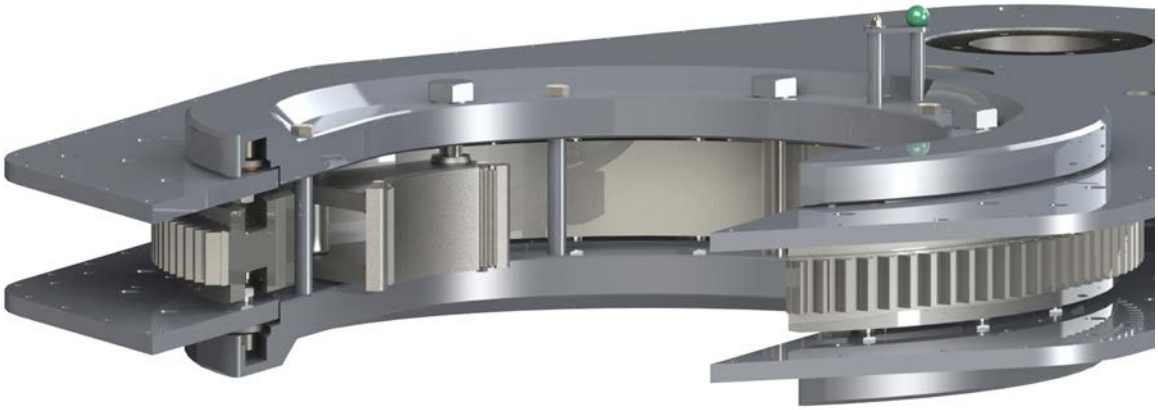


Illustration 7.20: 101-3012 Cage Plate Assembly

Item	Type	Description	Qty	Part Number
1	Part	⅜" UNC nylock nut	1	09-5607
2	Part	⅜" flat washer	1	09-5006
3	Part	¾" UNC x 9" hex bolt	4	09-1322
4	Part	Jaw pivot bolt	4	1095-131
5	Part	Backing pin pivot bolt	1	1095-123
6	Part	Top cage plate	1	1095-105-512
7	Assembly	Cam follower assembly	30	101-3200
8	Part	⅞" lock washer	30	09-5122
9	Part	⅞" UNC heavy jam nut	30	09-5521
10	Assembly	Jaw die kit (18-⅝" shown - see sub-section 3.4)	2	
11	Part	Rotary gear	1	1095-105-511
12	Part	Bottom cage plate	1	1095-105-513
13	Part	Backing pin knob	1	02-0017
14	Part	Backing pin retainer	1	1095-122
15	Part	Backing pin	1	1095-12101
16	Part	Cage plate spacer	4	1095-38

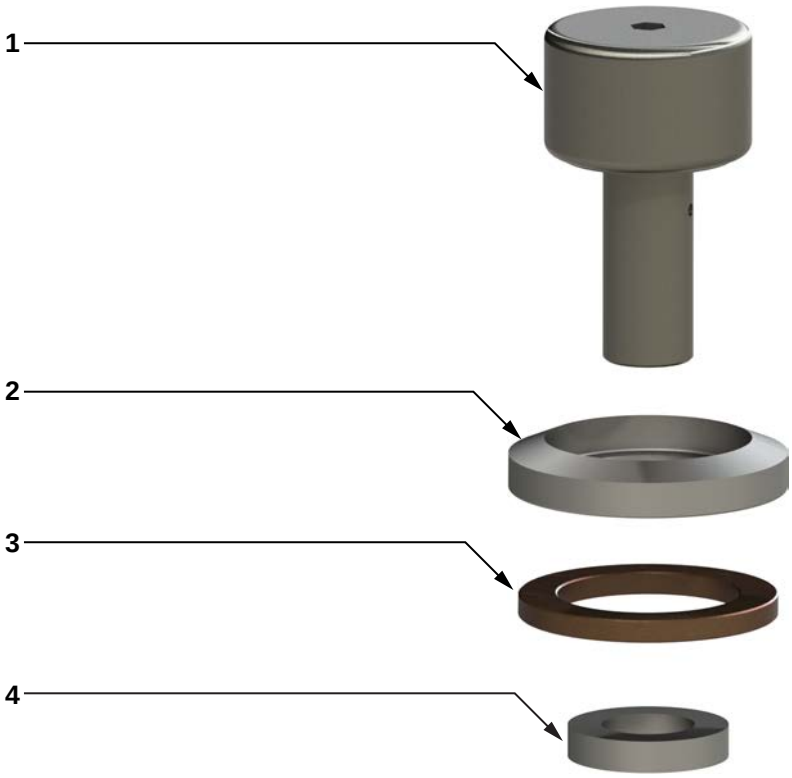


Illustration 7.21: 101-3200 Cam Follower Assembly

Item	Type	Description	Qty	Part Number
1	Part	Sealed cam follower	1	02-0107
2	Part	Cam follower skirt	1	1095-120-01
3	Part	Cam follower bearing	1	1095-120-02
4	Part	Cam follower spacer	1	1095-120-03

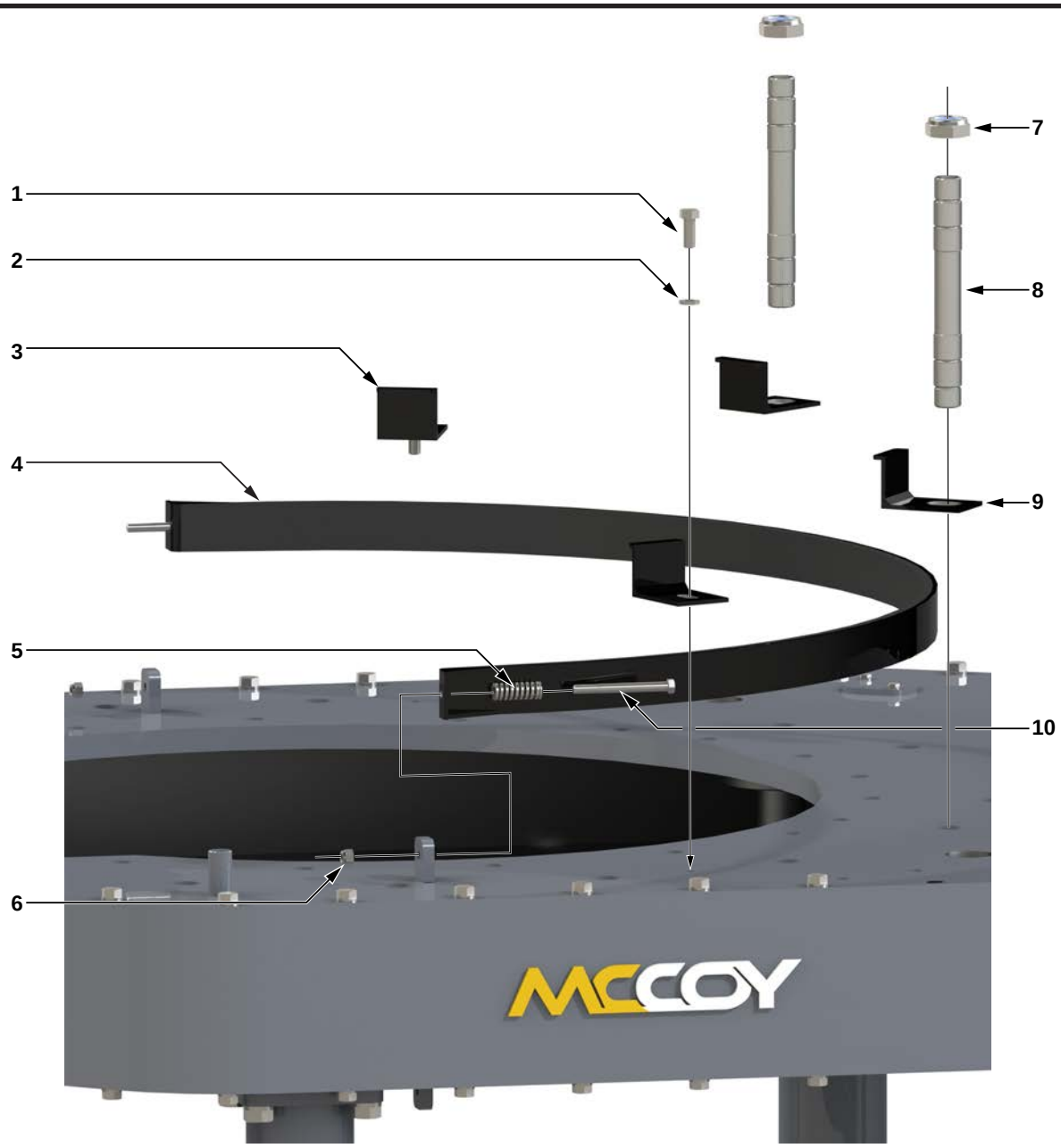


Illustration 7.22: Brake Bands Exploded

Item	Type	Description	Qty	Part Number
1	Part	½" UNC x 1-¼" hex bolt	4	09-1168
2	Part	½" lock washer	4	09-5110
3	Weldment	Brake band retainer	4	1095-137
4	Weldment	Lined brake band weldment	2	1095-126
5	Part	Brake band compression spring	4	08-9264
6	Part	⅜" UNC hex nylock nut	4	09-5607
7	Part	1-⅛" UNF thin nylock nut (part of support roller assembly - shown for illustration purposes only)		
8	Part	Support roller shaft (shown for illustration purposes only)		
9	Weldment	Brake band retainer (support roller coincidental)	4	1095-138
10	Part	⅜" UNC x 4" hex bolt	4	09-1062

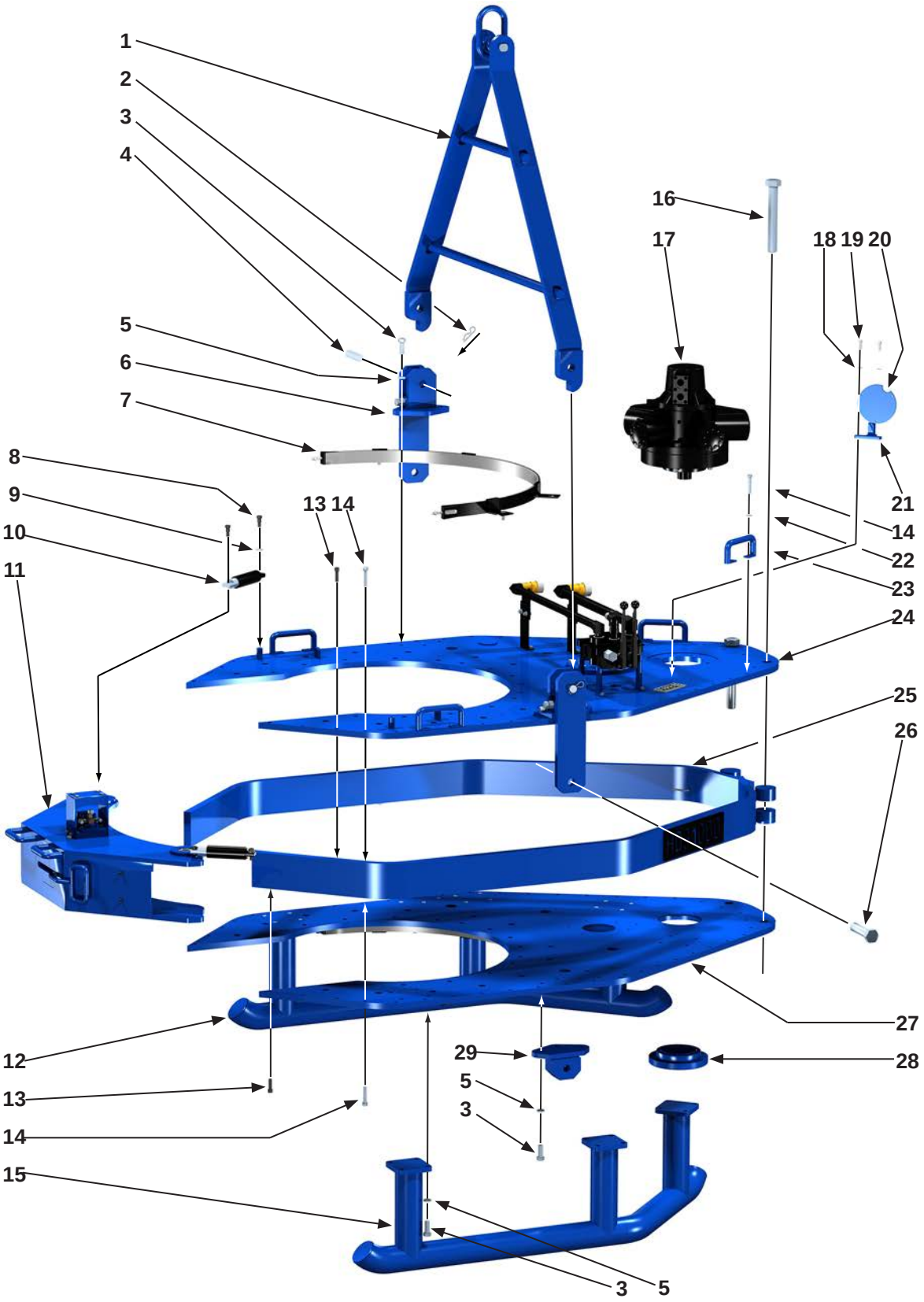


Illustration 7.23: Body Assembly

Item	Type	Description	Qty	Part Number
1	Assembly	Rigid sling (see Pp. 7.30 - 7.31)	1	
2	Part	Hitch pin	1	09-0090
3	Part	¾" UNC x 2" hex bolt	6	09-1294
4	Part	Rigid sling pin	2	1095-225-03
5	Part	¾" lock washer	6	09-5118
6	Assembly	RH rigid sling hanger bracket	1	1095-225
	Assembly	LH rigid sling hanger bracket	1	1095-225LH
7	Assembly	Brake band assembly (see Pp. 7.25)	2	
8	Part	⅝" x ¾" hex socket UNC shoulder bolt	4	09-0049
9	Part	½" plain washer	4	09-5010
10	Part	Door cylinder	2	1095-141
11	Part	Door assemblies (Pp. 7.32 - 7.37)	1	
12	Weldment	RH leg weldment	1	1095-212
13	Part	½" UNC x 1-¾" hex socket head cap screw	12	09-2172
14	Part	½" UNC x 2-¾" hex bolt	72	09-2177
15	Weldment	LH leg weldment	1	1095-213
16	Part	Load cell pin	2	101-2451
17	Part	Hydraulic motor	1	87-0210
18	Part	⅜" lock washer	2	09-5106
19	Part	⅜" UNC x 1-¼" hex bolt	2	09-1048
20	Weldment	Torque gauge mount weldment	1	1500-09-03A
21	Weldment	Torque gauge holder weldment	1	101-0480
22	Part	½" lock washer	72	09-5110
23	Weldment	Body handle weldment	4	1095-143
24	Part	Top body plate (shown for illustration purposes only)		
25	Weldment	Side body weldment (shown for illustration purposes only)		
26	Part	1-¼" UNC x 5-½" hex bolt	2	09-9136
27	Part	Bottom body plate (typically welded to side body - shown for illustration purposes only)		
28	Part	Motor mount bearing cap	1	1095-50201
29	Weldment	Rigid sling hanger bracket weldment	2	1095-224

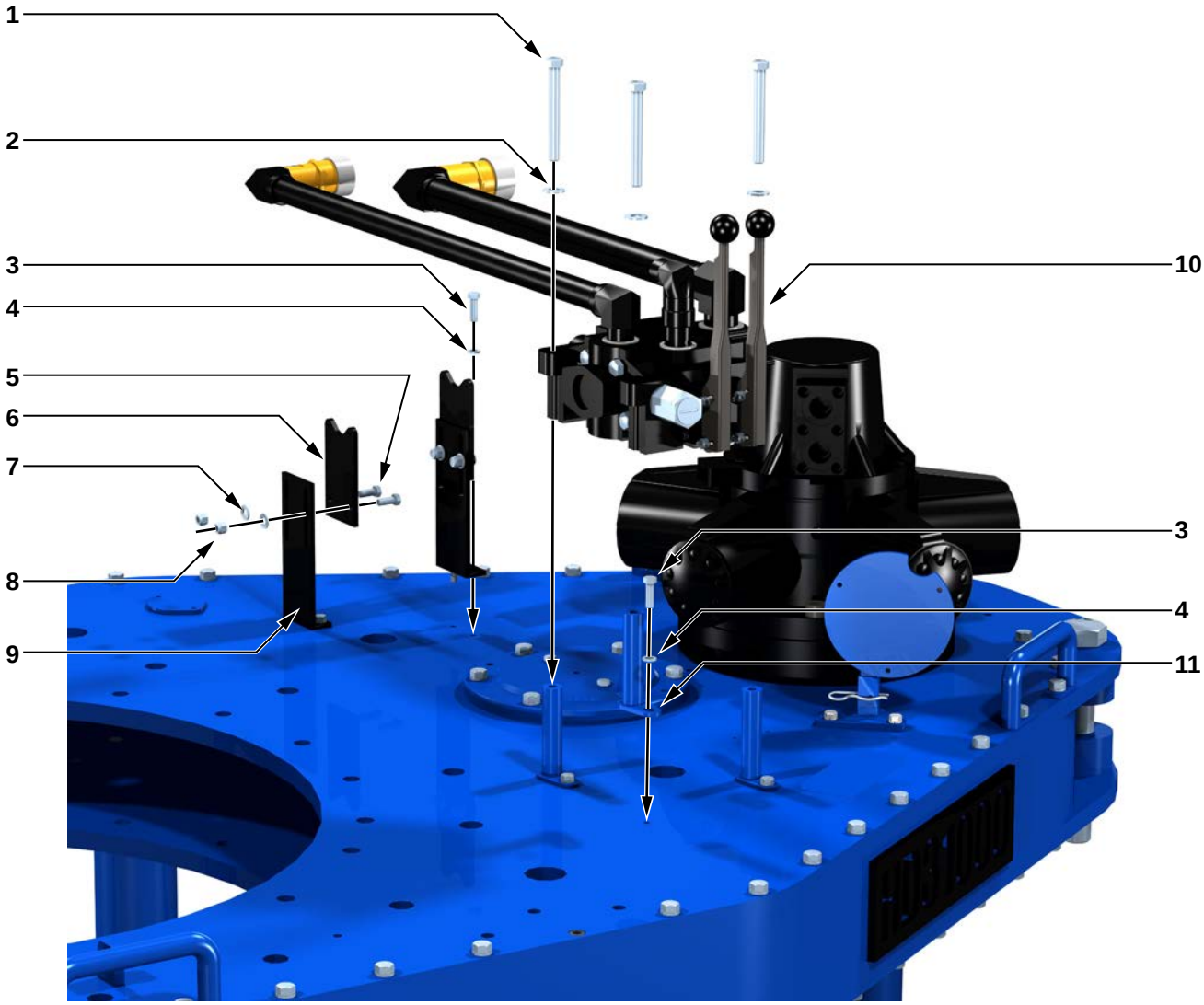


Illustration 7.24: Hydraulic Supports Exploded

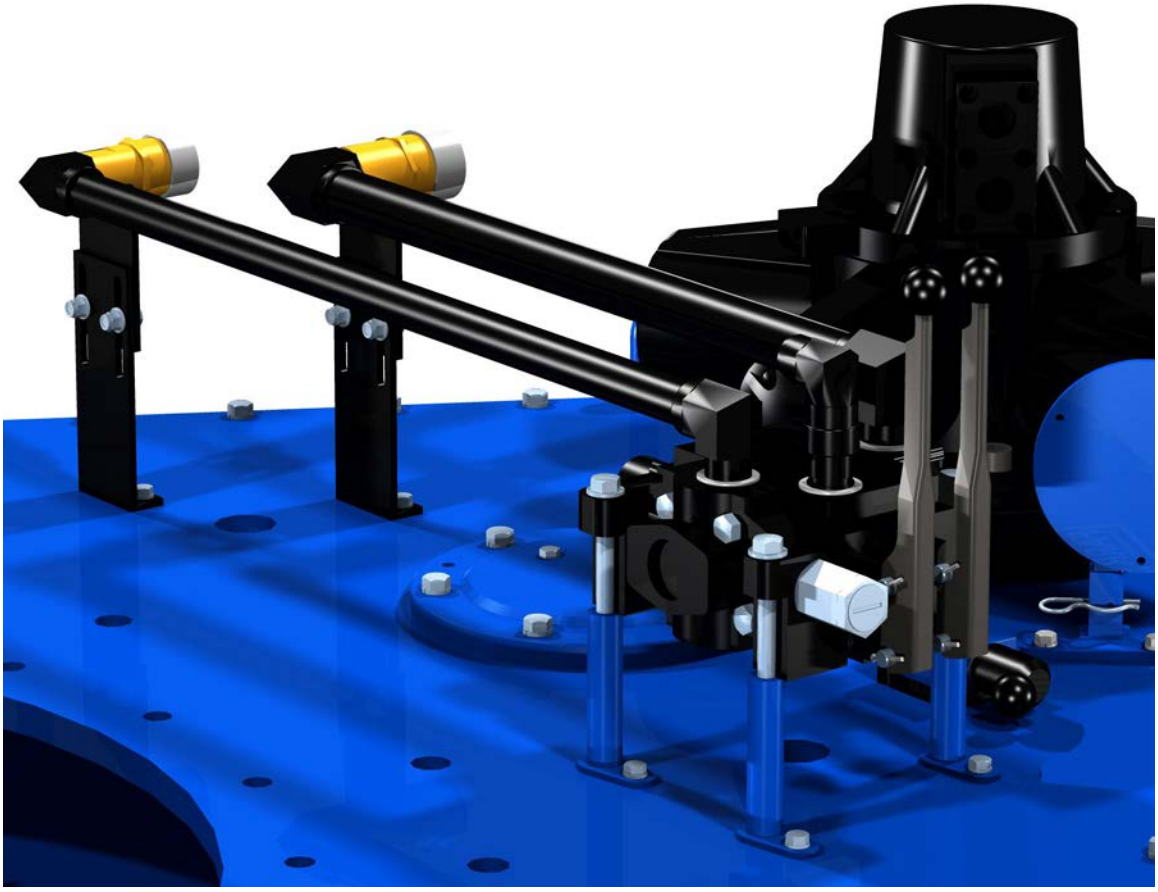


Illustration 7.25: Hydraulic Supports

Item	Type	Description	Qty	Part Number
1	Part	½" UNC x 4-½" hex bolt	3	09-1184
2	Part	½" narrow flat washer	3	09-5119
3	Part	⅜" UNC x 1-¼" hex bolt	7	09-1048
4	Part	⅜" UNC x 1" hex bolt	4	09-1046
5	Part	⅜" lock washer	7	09-5106
6	Part	Adjustable coupling support	2	101-0022
7	Part	⅜" Plain narrow flat washer	4	09-5124
8	Part	⅜" UNC nylock nut	4	09-5607
9	Weldment	Hydraulic coupling support weldment	2	101-1138
10	Assembly	Hydraulic valve assembly	1	101-3501
11	Weldment	Hydraulic valve mount post weldment	3	101-1324

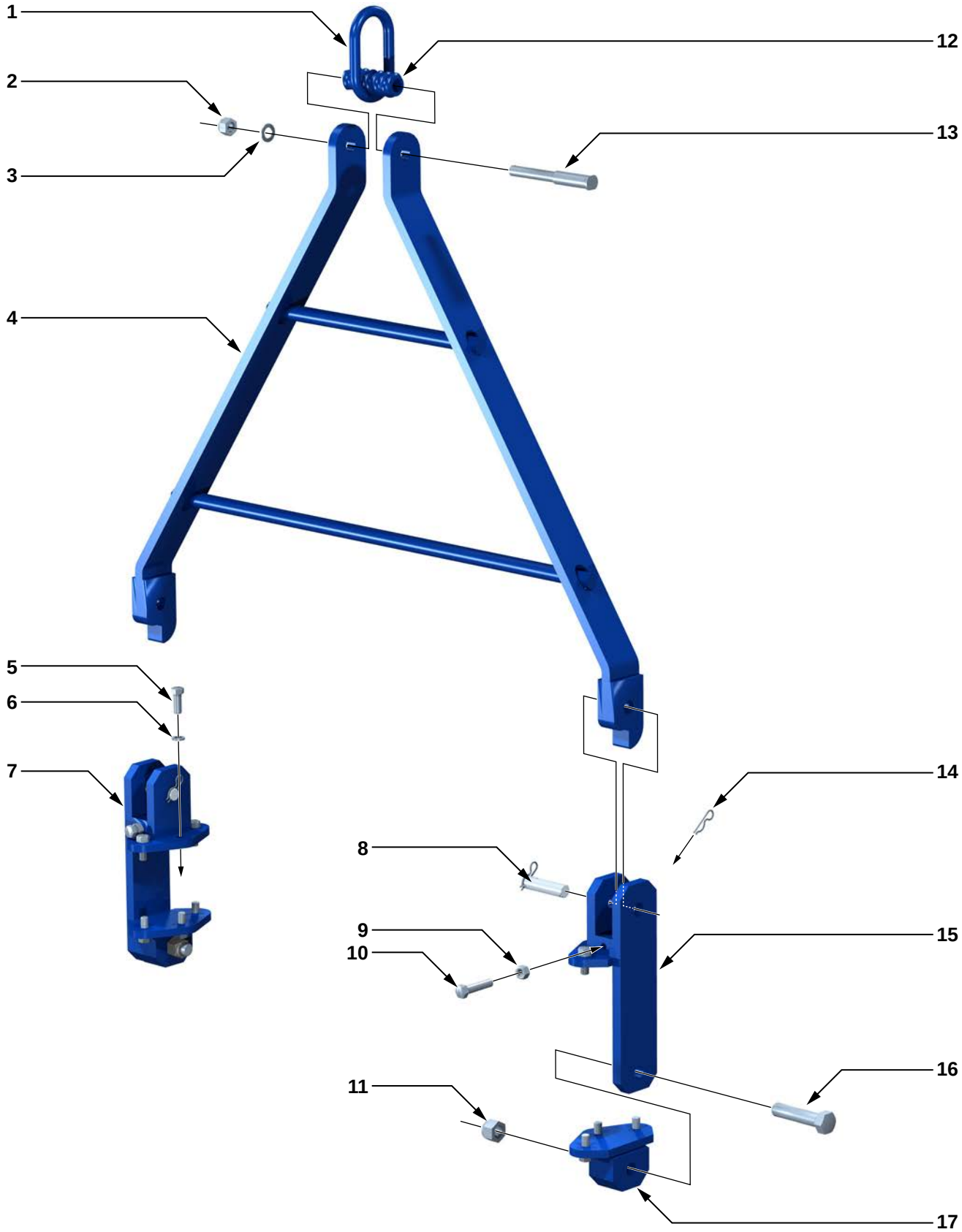


Illustration 7.26: Rigid Sling Exploded

Illustration 7.27: Rigid Sling

Item	Type	Description	Qty	Part Number
1	Part	Master lifting link	1	02-9128
2	Part	1-¼” UNF nylock nut	1	09-5702
3	Part	1-¼” plain narrow flat washer	1	02-0471
4	Part	Rigid sling weldment	1	1095-216
5	Part	¾” UNC x 2” hex bolt	12	09-1294
6	Part	¾” lock washer	12	09-5118
7	Weldment	RH hanger bracket weldment	1	1095-225
8	Part	Rigid sling pin	2	1095-225-03
9	Part	¾” UNC hex nut	2	09-5818
10	Part	¾” UNC x 3-½” hex bolt	2	09-1300
11	Part	1-¼” UNC nylock nut	2	09-1484
12	Part	Adjustment helix	1	1095-220
13	Part	Hanger pin	1	1095-218
14	Part	Hitch pin	4	09-0090
15	Part	LH Hanger bracket weldment	1	1095-225LH
16	Part	1-¼” UNC x 6” hex bolt	2	09-9134
17	Weldment	Hanger bracket weldment	2	1095-224

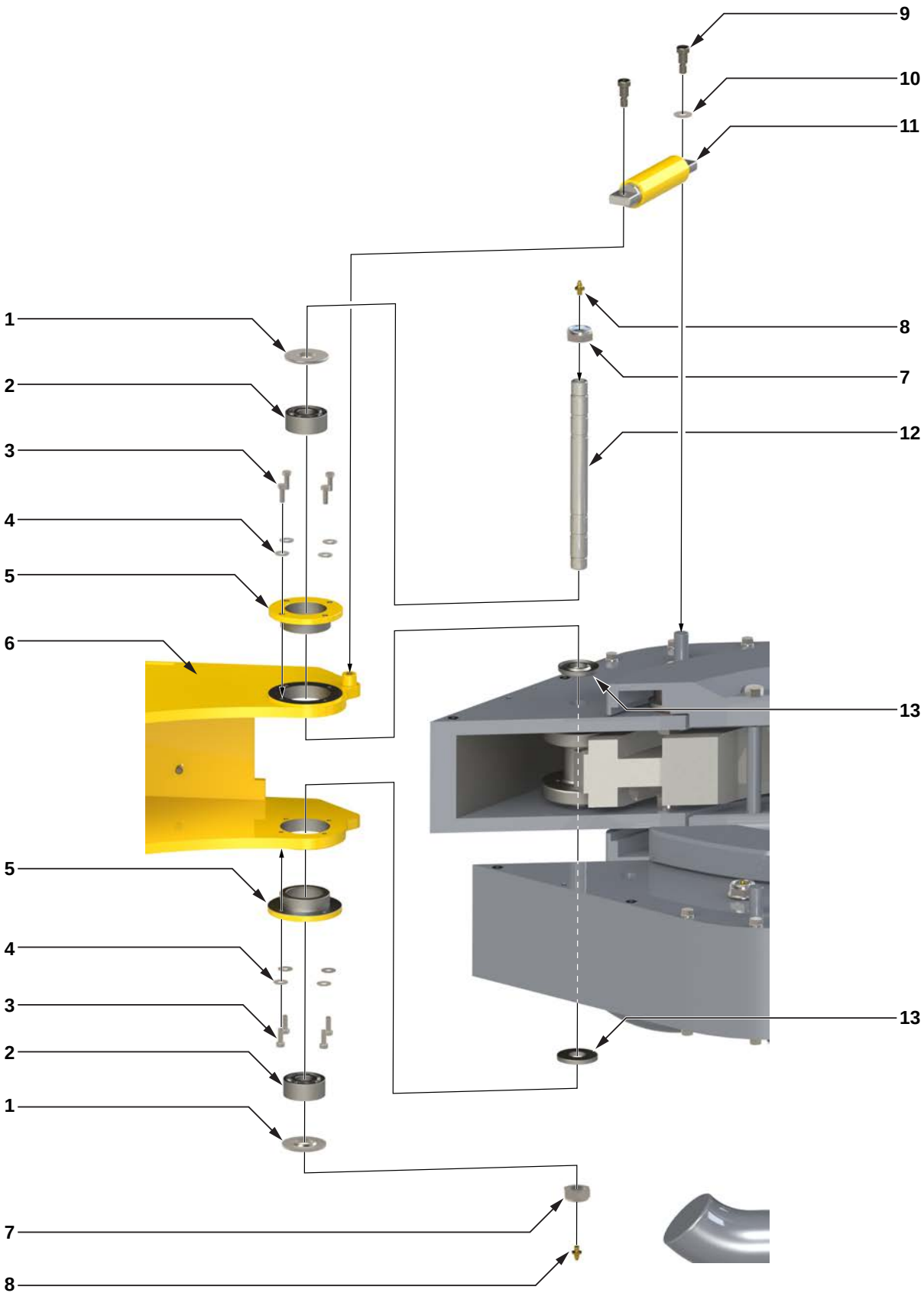


Illustration 7.28: Door Installation

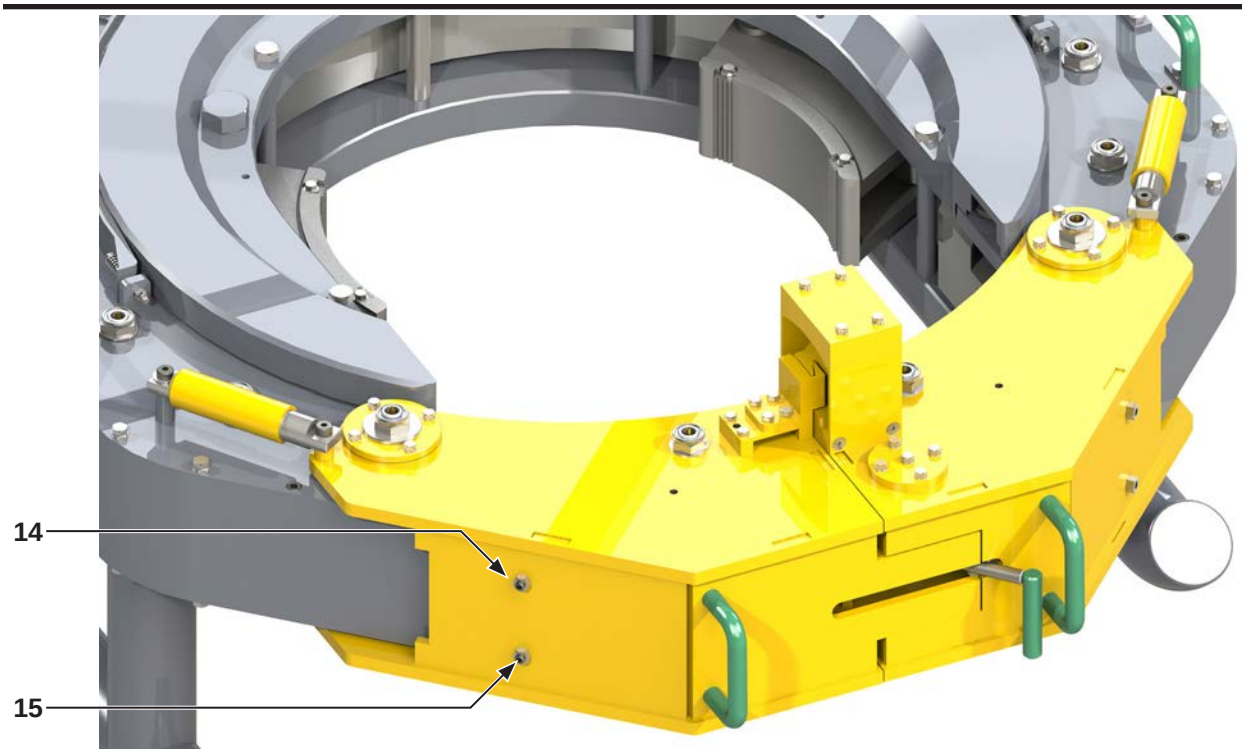


Illustration 7.29: Main Double-Door Assembly

Item	Type	Description	Qty	Part Number
1	Part	Door hinge washer	4	1095-105-529
2	Part	Door bearing	4	1095-103-318
3	Part	⅜" UNC x 1" hex bolt	16	09-1046
4	Part	⅜" lock washer	16	09-5106
5	Part	Door bearing holder	4	101-5827
6	Weldment	RH door weldment	1	101-5829
	Weldment	LH door weldment	1	101-5809
7	Part	1-⅛" UNF thin nylock nut (door pivot roller)	4	09-5728
8	Part	⅛" NPT grease fitting (door pivot roller)	4	02-0005
9	Part	⅝" x ¾" UNC shoulder bolt	4	09-0049
10	Part	⅝" narrow flat washer	2	
11	Assembly	Door cylinder	2	1095-141
12	Part	Door pivot roller shaft	2	1095-105-526
13	Part	Door hinge spacer	4	1095-105-528
14	Part	½" UNC jam nut	4	09-5180
15	Part	½" UNC x 1-½" hex socket set screw	4	

⚠ CAUTION

DO NOT SUBSTITUTE NYLOCK NUTS. SEE IMPORTANT ASSEMBLY INFORMATION ON PAGE 5.19

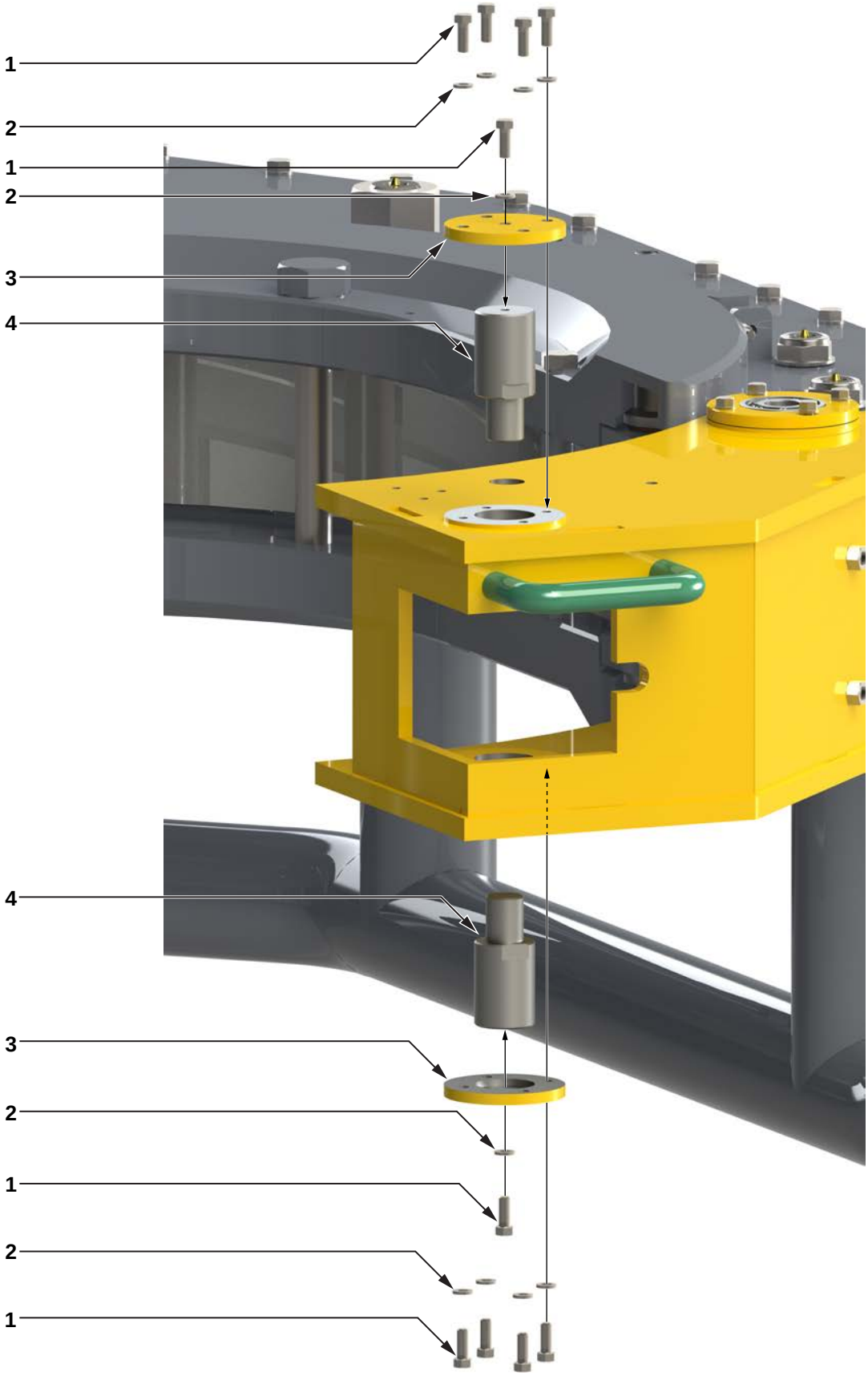


Illustration 7.30: Door Latch Pin Assembly

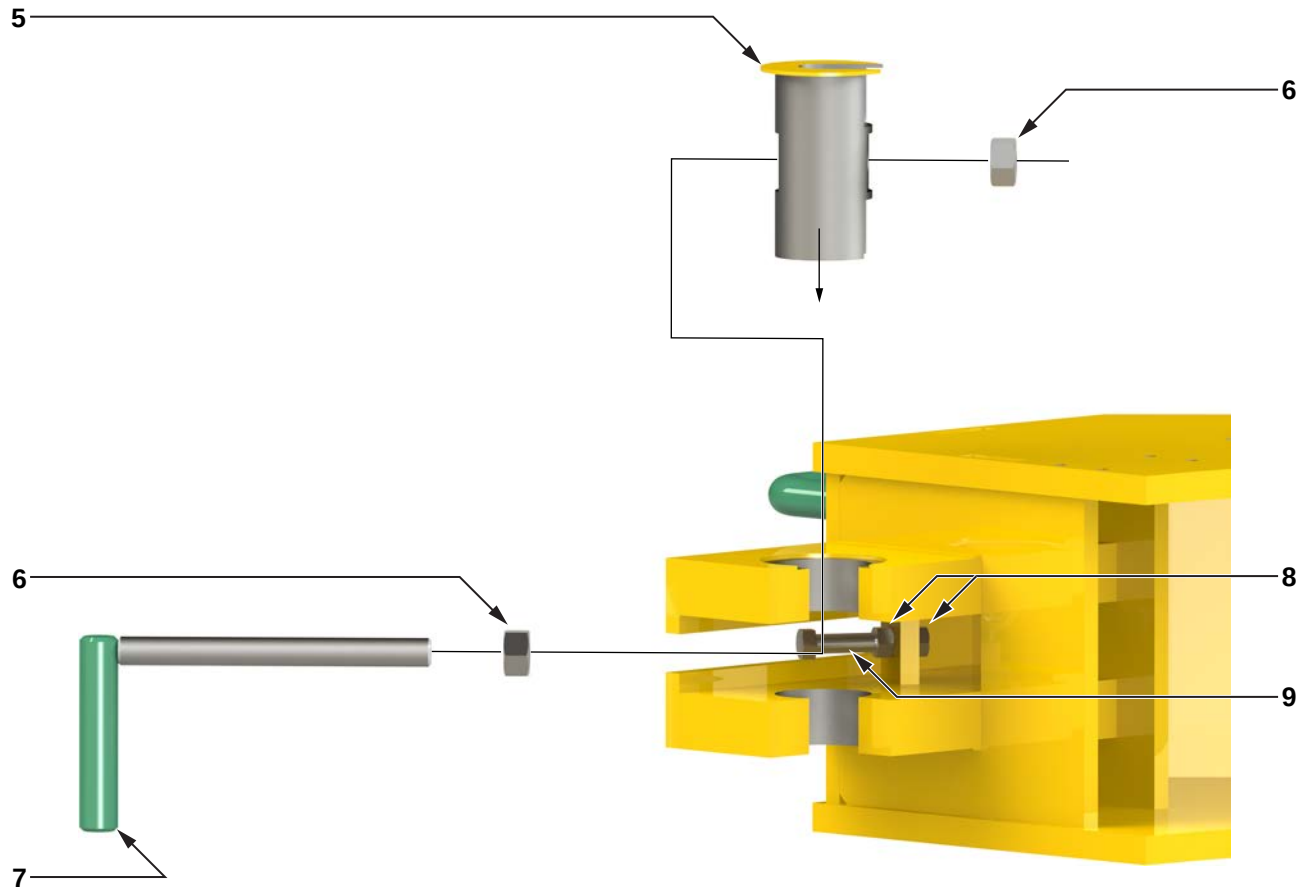


Illustration 7.31: Door Latch Cam Assembly

Item	Type	Description	Qty	Part Number
1	Part	⅜" UNC x 1" hex bolt	10	09-1046
2	Part	⅜" lock washer	10	09-5106
3	Part	Latch pin mounting plate	2	101-5823
4	Part	Latch pin	2	101-5822
5	Part	Door lock shaft (latch cam)	1	101-5833
6	Part	¾" UNC hex nut	2	09-5818
7	Weldment	Door latch shaft weldment	1	101-5834
8	Part	½" UNC hex nut	2	09-9124
9	Part	½" UNC x 3" hex bolt	1	09-1178

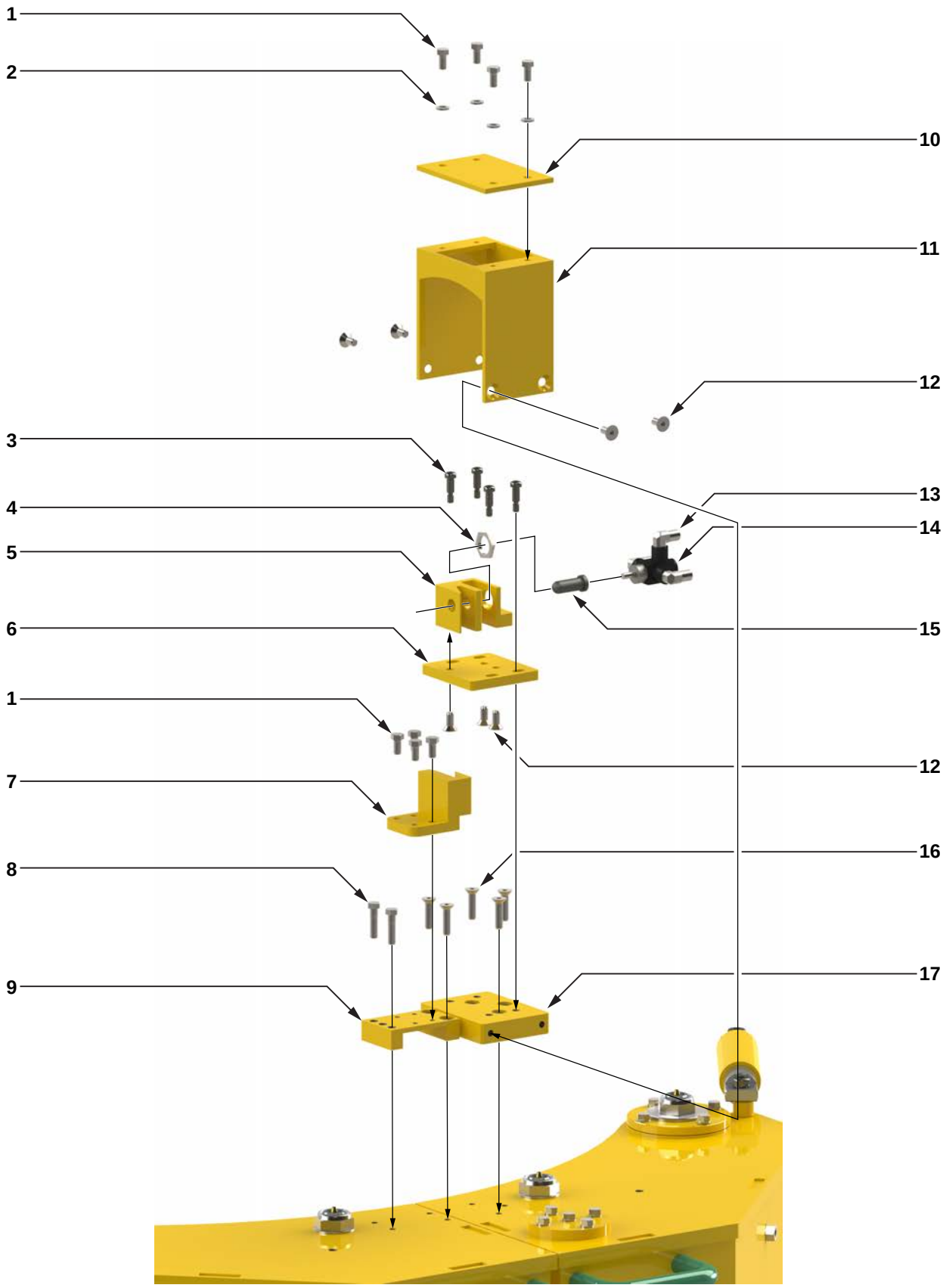


Illustration 7.32: Door Switch Assembly

Item	Type	Description	Qty	Part Number
1	Part	⅜" UNC x ¾" hex bolt	8	09-1044
2	Part	⅜" lock washer	4	09-5106
3	Part	5/16" x ¾" hex socket UNC shoulder screw	4	09-0227
4	Part	15/16" valve lock nut	1	09-0278
5	Part	LH door switch latch block	1	AE13-301S
6	Part	LH door switch latch plate #2	1	AE13-311
7	Part	RH door switch latch block	1	AE13-302M
8	Part	⅜" UNC x 1-½" hex bolt	2	09-1050
9	Part	RH door switch latch plate	1	101-0319
10	Part	Door switch plate	1	101-1238
11	Weldment	Door switch protector weldment	1	101-0450
12	Part	⅜" UNC x ¾" hex socket flat head countersunk machine screw	7	09-4044
13	Part	¼" NPT-JIC 90° elbow	3	08-0284
14	Part	Door switch	1	08-0337M
15	Part	Load plunger	1	AE12-306
16	Part	⅜" UNC x 1-½" hex socket flat head countersunk machine screw	5	09-4050
17	Part	LH door switch latch plate	1	101-0915

This page intentionally left blank

SECTION 8: TORQUE & TURNS MANAGEMENT

8.0 BASIC TORQUE MEASUREMENT

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

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

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

NOTICE

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

Illustration 8.0.1: Torque Gauge (For Illustration Purposes Only)

Illustration 8.0.2: Load Cell Types

NOTICE

THE IMAGES DISPLAYED ARE SUPPLIED FOR ILLUSTRATION PURPOSES ONLY

8.0 BASIC TORQUE MEASUREMENT (CONTINUED:)

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

NOTICE

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

Type	Description	Qty	Part Number
Assembly	66” arm 90K tension load cell and torque gauge assembly	1	10-0037T
Assembly	Tension load cell	1	10-0008T
Part	Torque gauge, 90,000 lb-ft	1	10-0037G
Part	5 ft hydraulic hose assembly	1	02-0069

NOTICE

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

⚠ DANGER

ELECTRONIC LOAD CELLS ARE NOT PERMITTED FOR USE WITH CE MARKED EQUIPMENT

8.1 TURNS COUNTER ENCODER

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

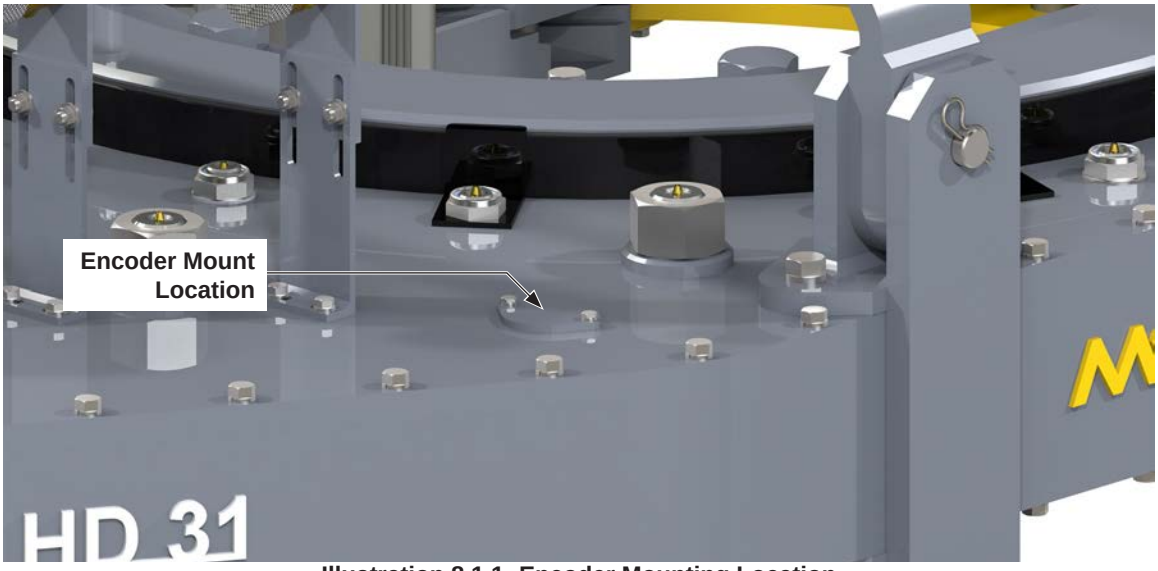


Illustration 8.1.1: Encoder Mounting Location

8.1.1 Encoder Installation

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

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

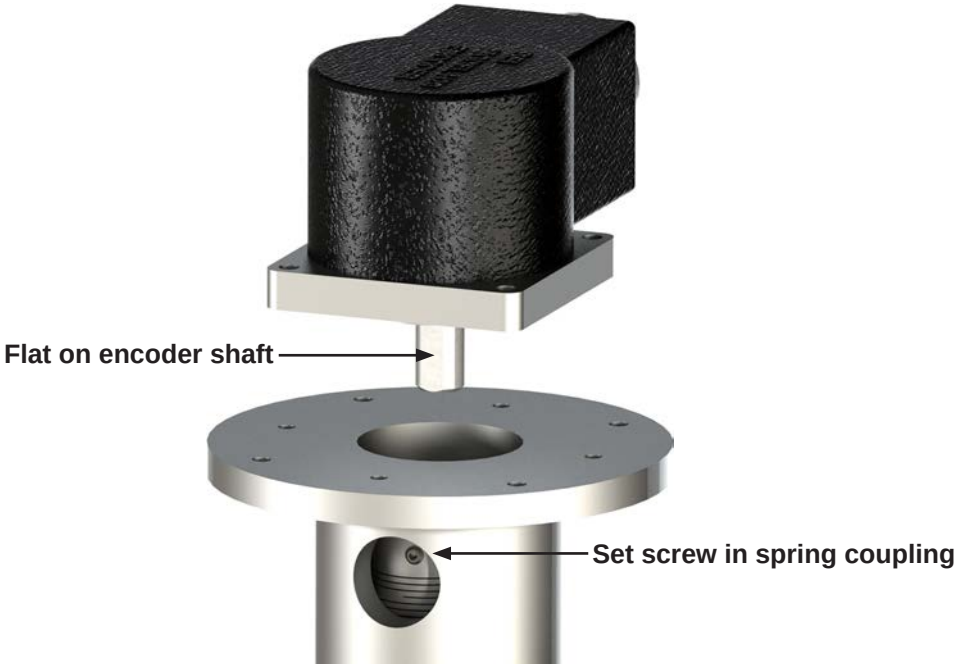


Illustration 8.1.2: Mounting Encoder To Encoder Mount

8.1.1 Encoder Installation (Continued):

2. Secure the encoder to the encoder mount using four #6-32 x ½" hex socket head machine screws.

Illustration 8.1.3: Securing Encoder To Encoder Mount

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

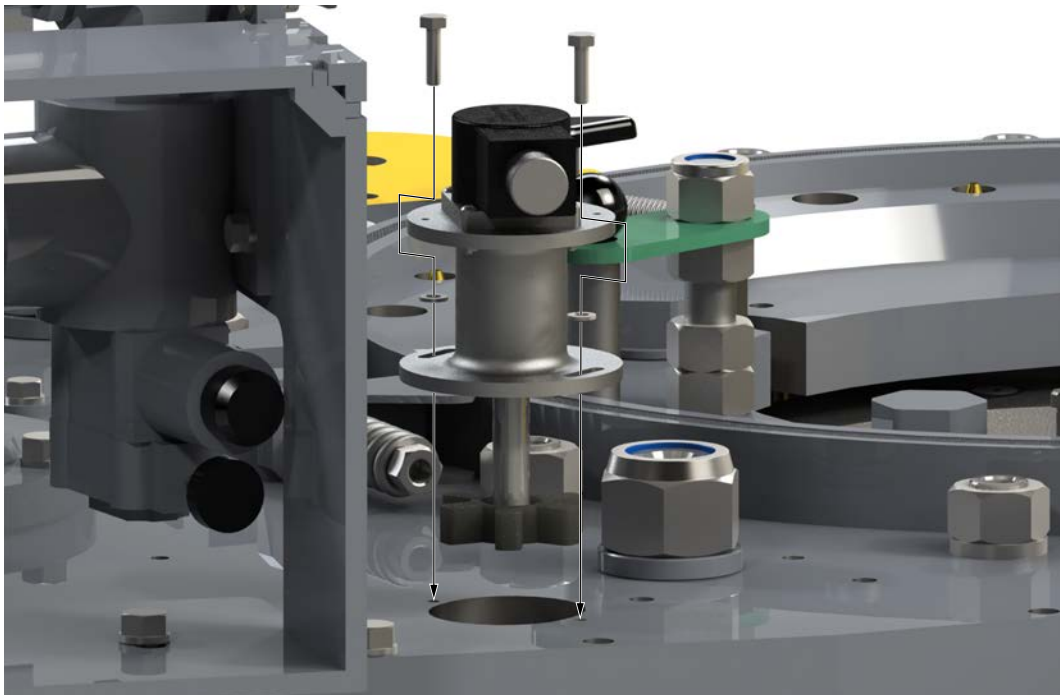
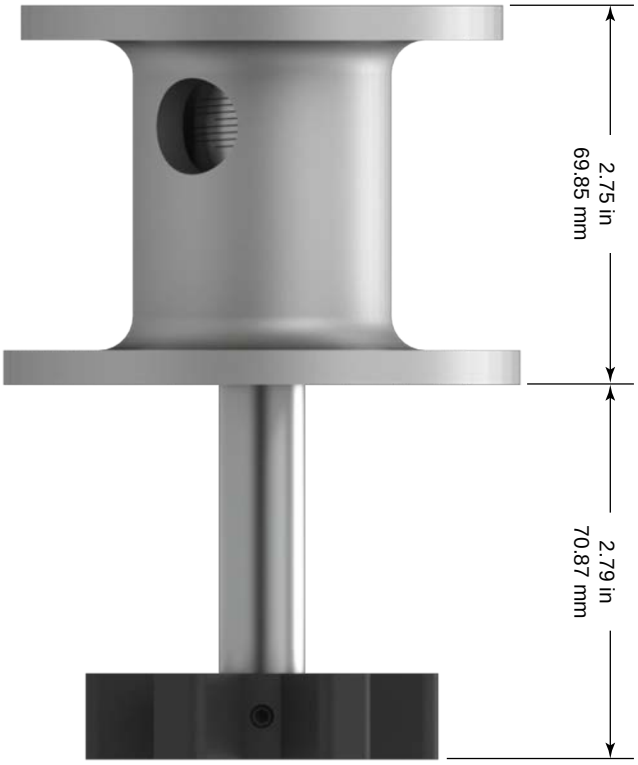
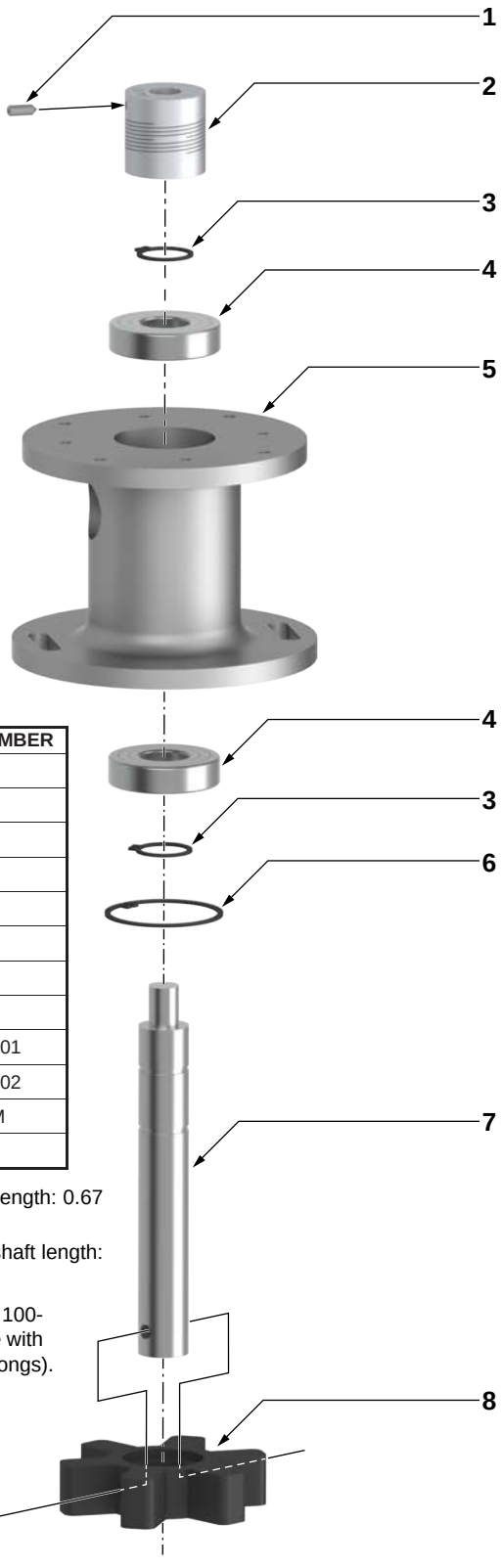


Illustration 8.1.4: Installing Encoder & Encoder Mount





ITEM	TYPE	DESCRIPTION	QTY	PART NUMBER
	Assembly	Encoder mount	1	60-0001
	Assembly	Encoder mount, long encoder shaft	1	60-0001A
1	Part	6-32 x ⅜" hex socket head set screw	4	
2	Part	Helical flexible encoder shaft coupling	1	60-0130N
3	Part	Internal retainer ring	2	1376-13
4	Part	Bearing	2	1376-05
5	Part	Encoder housing	1	1392-104A
6	Part	Internal retainer ring	1	02-0436
7	Part	Encoder shaft, 60-0001 mount	1	1392-103A-01
	Part	Encoder shaft, 60-0001A mount	1	1392-103A-02
8	Part	Encoder gear	1	01-0320A-M
9	Part	10-24 x 1-¼" hex socket head set screw	1	

Encoder # 60-0001 accomodates encoder style H20DB-37 footprint. Min/max shaft length: 0.67 in (17 mm) to 0.92 in (23.4 mm)

Encoder # 60-0001A accomodates encoder style H25D (square) footprint. Min/max shaft length: 1.04 in (26.4 mm) to 1.29 in (32.8 mm)

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

Illustration 8.1.5: 60-0001 / 60-001A Encoder Mount Exploded

8.2 TROUBLESHOOTING

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

NOTICE

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

1	SYMPTOM: NO INDICATION ON TORQUE GAUGE	
	POSSIBLE PROBLEM	**SOLUTION(S)**
	Hydraulic hose is obstructed	Check hydraulic hose for kinks
		Replace hydraulic hose
	Loss of hydraulic fluid	Recharge hydraulic fluid (see Section 8). NOTE: Ensure any breaches in the hydraulic system between the load cell and torque gauge are repaired to prevent further fluid loss.
	Internal mechanism of torque gauge is damaged	Replace gauge

2	SYMPTOM: GAUGE INDICATION UNEXPECTEDLY HIGH	
	POSSIBLE PROBLEM	**SOLUTION(S)**
	Excessive hydraulic fluid	Completely drain hydraulic fluid from torque gauge/load cell system. Recharge following the procedure in Section 8
	Internal mechanism of gauge is damaged	Replace gauge
	Incorrect torque gauge in use (not part of the original torque gauge/load cell pair)	Replace gauge with gauge properly calibrated for the load cell in service

3	SYMPTOM: GAUGE INDICATION UNEXPECTEDLY LOW	
	POSSIBLE PROBLEM	**SOLUTION(S)**
	Insufficient hydraulic fluid	Recharge hydraulic fluid (see Section 8). NOTE: Ensure any breaches in the hydraulic system between the load cell and torque gauge are repaired to prevent further fluid loss
	Obstruction in hydraulic hose	Check hydraulic hose for kinks
		Replace hydraulic hose
	Snub line not at right-angle to tong handle	Check angle of snub line and correct if necessary
	Internal mechanism of gauge is damaged	Replace gauge
	Incorrect torque gauge in use (not part of the original torque gauge/load cell pair)	Replace gauge with gauge properly calibrated for the load cell in service

4	SYMPTOM: GAUGE INDICATION IS ERRATIC OR SLUGGISH	
	POSSIBLE PROBLEM	**SOLUTION(S)**
	Insufficient hydraulic fluid in torque measurement section	Recharge hydraulic fluid (see Section 8). NOTE: Ensure any breaches in the hydraulic system between the load cell and torque gauge are repaired to prevent further fluid loss
	Loss of damping fluid in torque gauge	Top up or refill damping fluid (NOTE: Ensure leakage points in gauge are identified and repaired to prevent further loss of damping fluid)
	Air bubbles in hydraulic fluid in the torque measurement system	Bleed air from load cell and torque gauge and top up fluid (if necessary) as per Section 8
	Internal mechanism of gauge is damaged	Replace gauge

8.3 PERIODIC INSPECTION AND MAINTENANCE

NOTICE

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

8.3.1 Inspection

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

8.3.2 Fluid Recharge

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

a. Place the torque indicating gauge higher than the load cell. Remove the brass ¼" cap from the fitting on the check valve on the top of the gauge.

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

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

⚠ CAUTION

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

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

NOTICE

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

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

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

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

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

i. Disconnect the hand pump from the torque gauge.

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

8.3.3 Repair And Calibration

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

This page intentionally left blank

SECTION 9: OEM DOCUMENTATION

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

This page intentionally left blank

Bosch Rexroth (Rineer) Hydraulic Motors:

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

Parker Series VA/VG Series Valves

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